# ASCENTIO TECHNOLOGIES S.A. OFFICIAL DOCUMENT

**ID:** SB1-B-PRO-T-D01-011 - v1.0

**TITLE:** X-Band Transmitter FM Test Procedure

**SUMMARY:** This document describes the EWC30-FM's aliveness, functional and performace test procedures.

## APPROVAL FLOW

| STATE | ASSIGNEE ROLE | ACTION performed by | COMPLETED DATE |
|---|---|---|---|
| Created | SABIA-Mar COMM-SS I&T Eng. | Juan Vargas | 29/09/2023 |
| Review | SABIA-Mar COMM-SS I&T Eng. | Pablo Brizuela | |
| Review | PMO Team | Juan Carranza | |
| Approved | SABIA-Mar COMM-SS I&T PM | Matías Martini | |

## DOCUMENT CHANGES RECORD

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# 1. Document Information

## 1.1. Purpose

The purpose of this document is to detail the Satellite Communications Equipment aliveness, functional and performance test procedures for the X-Band Modulator, for de FM units. X-band filter is present in the test setup but is fully characterized in AD.01. The objective of test procedure is to ensure repeatability of results.

## 1.2. Scope

This document should be considered as the main reference for aliveness, functional and performance test procedure of X-Band Modulator FM units.

## 1.3. Notations

Not applicable to this document.

## 1.4. Terms and Definitions

Some key terms will be frequently used throughout the document, assuming the following definitions:

- **Verification:** Confirmation through the provision of objective evidence that the realized product is in conformance with applicable requirements.
- **RS422 or RS-422** refer in the same way to TIA/EIA-422-B specification.
- **LVDS** refer to EIA/TIA-644-A specification.

## 1.5. Acronyms and Abbreviations

The following acronyms and abbreviations are used in this document and should be considered as precedent over those defined in other documents in case of discrepancy or inconsistency.

| ACRONYMS | DESCRIPTION |
|---|---|
| ASM | Analog Signal Monitor |
| BB | BaseBand |
| BDM | Bi-Level Discrete Monitor |
| BOB | Break Out Box |
| COMM | Communication |
| CEGSE | Communication Electrical Ground Support Equipment |
| CS | Connector Saver |
| DC | Direct current |
| DET | DETail |
| DUT | Device Under Test |

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Table 1.5.0-1 – Continued

| ACRONYMS | DESCRIPTION |
|---|---|
| DWL TP | Downlink Test Port |
| EM | Engineering Model |
| EGSE | Electrical Ground Support Equipment |
| ESD | Electrostatic Discharge |
| EXE | EXEcute |
| FC | Flight Control |
| GND | Ground |
| GS | Ground Segment |
| GSE | Ground Support Equipment |
| HV-HPC | High Voltage High Power Pulse Command |
| ID | IDentifier |
| IF | Intermediate Frequency |
| IP | Internet Protocol |
| KVM | Keyboard Video and Mouse |
| LED | Light-Emitting Diode |
| LVDS | Low Voltage Differential Signaling |
| MCS | Monitoring & Control Software |
| M&C | Monitor And Control |
| N/A | Not Applicable |
| OVP | Over Voltage Protection |
| PXI | PCI Extensions for Instrumentation |
| RDP | Remote Desktop Protocol |
| RF | Radio Frequency |
| SABIA-Mar | Satélite de Aplicaciones Basadas en la Información Ambiental del Mar |
| SBMA | S-Band Matrix and Attenuator |
| SBA | S-Band Attenuator |
| SBDL | Standard Balanced Digital Link |
| SBM | S-Band Matrix |
| SCL | Spacecraft Control Language |
| SW | Software |
| TBC | To Be Confirmed |

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Table 1.5.0-1 – Continued

| ACRONYMS | DESCRIPTION |
|---|---|
| TC | TeleCommand |
| TM | TeleMetry |
| TMS | TeleMetry Simulator unit |
| TSM | Temperature Sensor Monitor |
| UPL TP | Uplink Test Port |
| USB | Universal Serial Bus |
| UTC | Universal Time Coordinated |
| UVP | Under Voltage Limit |
| VM | Virtual Machine |
| VPN | Virtual Private Network |
| XBMA | X-Band Matrix and Attenuator |

Table 1.5.0-1: Acronyms and Abbreviations

## 1.6. Applicable Documents

The following items are considered as applicable for the present document; this relationship should imply certain precedence so the modification of one of them may affect this one.

| ID | CODE | VER | TITLE |
|---|---|---|---|
| AD.01 | SB1-G-PRO-T-D01-002 | 1.0 | X-Band DSN FM Filter TestProcedure |
| AD.02 | EWC30-100-013 | 2.6 | EWC-30 User Manual |
| AD.03 | EWC30-100-004_EICD | 1.5 | EWC-30 Interface Control Document |
| AD.04 | SB-06040705020000-TS-00001 | A | X-BAND TRANSMITTER TEST SPECIFICATION |
| AD.05 | UAM-0400-PR-00100 | A | LIMPIEZA Y CUIDADOS DE CONECTORES DE RF |
| AD.06 | SBM-GSE-HB-00004 | D | COM EGSE User Manual |
| AD.07 | SB1-D-RPT-T-D01-007 | 2.0 | GS-GSE-FMv2.0 Verification Report |
| AD.08 | SB1-D-RPT-T-D01-009 | 1.0 | GS-GSE-FM v2.0 Delta FAT Report |
| AD.09 | SB1-D-PRO-T-D01-005 | 1.0 | GS-GSE-FM v2.0 Delta FAT Procedure |
| AD.10 | SB1-D-RPT-T-D01-008 | 1.5 | Control de Configuración de GS-GSE-FM(R) v2.0 |

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Table 1.6.0-1 – Continued

| ID | CODE | VER | TITLE |
|---|---|---|---|
| AD.11 | SB1-D-RPT-O-D01-001 | 1.0 | Reporte Modificaciones GS-GSE-FM(R) Para Ensayos COMM-SS-FM |

Table 1.6.0-1: Applicable documents

## 1.7. Reference Documents

The following reference documents are for information purpose only.

| ID | CODE | VER | TITLE |
|---|---|---|---|
| RD.01 | SB1-B-RPT-T-D01-001 | 1.0 | SABIA-Mar COM-SS EM Functional Test Report |
| RD.02 | SB1-B-RPT-T-D01-002 | 1.0 | SABIA-Mar COM-SS EM Performance Test Report |
| RD.03 | - | - | Report_SNFM1CarnelianX_FinalTest _CarnelianX_29_05_2023_16_05_23_25deg |
| RD.04 | - | - | Report_SNFM2Carnelian_FinalTest _CarnelianX_27_06_2023_12_31_17_25deg |
| RD.05 | SB-060407-SP-00100 | A | SABIA-Mar Communication Equipment's Incoming Functional Test Specifications |
| RD.06 | SB1-D-RPT-D-D01-002 | 1.5 | Calculo De Enlaces RF del GS-GSE |
| RD.07 | SB1-D-ADD-D-D01-001 | 1.3 | GS-GSE Architectural Design Document |
| RD.08 | SB1-D-RPT-D-D01-004 | 1.0 | GS-GSE TMTC and Data RF ExternalInterface FMEA |
| RD.09 | SB1-D-SUM-D-D01-002 | 1.2 | Manual de Usuario de GS-GSE-FM v2.0 |
| RD.10 | SB-090200-SP-00100 | A | SABIAMar Grounding, Bonding and Isolation design Specifications |
| RD.11 | SB-020000-SP-00200 | D | SABIA-Mar Downlink and Uplink Telemetry and Telecommand Format Specification Document |
| RD.12 | CCSDS 732.0-B | 3 | Space engineering - AOS SPACE DATA LINK PROTOCOL |
| RD.13 | CCSDS 232.0-B | 3 | Recommendation for Space Data System Standards - TC SPACE DATA LINK PROTOCOL |
| RD.14 | SB1-D-ICD-D-D01-001 | 1.3 | GS-GSE Interface Control Document |
| RD.15 | SB-020100-RQ-00200 | D | SABIA-Mar L2B Mission System Requirements Baseline Documen |

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Table 1.7.0-1 – Continued

| ID | CODE | VER | TITLE |
|---|---|---|---|
| RD.16 | SB-020100-RQ-00100 | D | SABIA-Mar L2B Environmental Requirements Baseline Document |
| RD.17 | SB-080300-RQ-00500 | D | Ground Segment Baseline Requirements |
| RD.18 | 0965-ISGG-3ECIS-007 | B | FILOSOFÍA DE RESISTENCIAS DE TERMINACIÓN EN LÍNEAS DIFERENCIALES RS422 Y LVDS |
| RD.19 | ANSI/TIA/EIA-422-B-1994 | B | TIA/EIA STANDARD, Electrical Characteristics of Balanced Voltage Digital Interface Circuits |
| RD.20 | SBM-GSE-IC-00003 | B | EGSE Interface Control Document |
| RD.21 | SBM-GSE-DS-00002 | C | COM EGSE Software Architecture Document |
| RD.22 | SBM-GSE-DS-00001 | C | AD-HOC Hardware documento de diseño en detalle |
| RD.23 | SB-060407-DS-00210 | A | SABIA-Mar Communication Subsystems EGSE Design |
| RD.24 | SBM-GSE-AN-00002 | A | EGSE FMEA interface |
| RD.25 | SBM-GSE-TR-00011 | B | COM EGSE FUNCTIONAL TEST REPORT |
| RD.26 | SBM-GSE-TR-00012 | A | COMMUNICATION EGSE FAT TEST REPORT |
| RD.27 | EWC29-100-004_EICD | 1.4 | EICD of the X Band transceiver |
| RD.28 | 900830-S-100-022 | 1.0 | USER MANUAL Annex EWC29 - CARNELIAN-S -Band Transceiver |
| RD.29 | 900830-S-120-008 | 1.0 | ATR Acceptance Test Report CARNELIAN-S EM |
| RD.30 | 900830-S-120-008 | 1.1 | ATR Acceptance Test Report CARNELIAN-X EM |
| RD.31 | SB-030000-RP-00200 | A | Reporte de Recepcion EWC-29 |
| RD.32 | SB-030000-RP-00100 | A | Reporte de Recepcion EWC-30 |
| RD.33 | SB1-L-RPT-P-D01-001 | 1.0 | Reporte De Incidencias Ensayos Funcionales SABIA-Mar COMM-SS-EM |

Table 1.7.0-1: Reference documents

# 2. Introduction

The SABIA-Mar Flight Segment telecommunication links are composed for two separated communications channels, one for S-band (uplink & downlink), and another one for X-band (downlink). Syrlinks EWC29 and EWC30 products have been chosen to implement these links. The EWC29 product is a S-band transceiver. The EWC30 product (AD.02) is a X-band transmitter. In order to test these equipments, the CEGSE and GS-GSE-FM (R) are also used.

## 2.1. Test overview

This document details a subsets of procedures according to Test specification (AD.04). Procedures description, setup and step-by-step tables are presented.

The test setup used for the aliveness and functional tests are presented in figure 5.2.0-1 while the setup used in the performance tests are shown in the figures 6.0.0-1 and 6.0.0-2.

# 3. Procedures list

Table 3.0.0-1 shown all procedures in the order that are presented in this documents, same as the baseline execution order. If the performance tests are conducted following the functional tests, procedures SB1FS-COM-F-012-03 and SB1FS-COM-P-013-01 can be skipped.

| Activity Type | Verification Task ID | Verification Task Name | Sub Task | Sub-Task Name | Duration [minutes] TBC |
|---|---|---|---|---|---|
| Deploy | SB1FS-COM-D-011 | Initialization dataset and deploy | 01 | Electrical Verifications and Instruments Initializations | 60 |
| | | | 02 | Test Procedure dataset deploy | 60 |
| Test | SB1FS-COM-F-012 | Aliveness and Functional Test | 01 | Setup and configuration | 150 |
| | | | 02 | Aliveness and Functional Test | 180 |
| | | | 03 | Tests setup break | 45 |
| Test | SB1FS-COM-P-013 | Performace Test | 01 | Setup and configuration | 150 |
| | | | 02 | Spectrum, power and BW with PXA | 60 |
| | | | 03 | CCDF measurement | 60 |
| | | | 04 | Frequency Stability | 90 |
| | | | 05 | Carrier Phase Noise | 90 |
| | | | 06 | Optimum filter confirmation And RF characterization with VSA and Cortex | 90 |
| | | | 07 | BER measurement | 280 |
| | | | 08 | Spurious in DSN Band | 90 |
| | | | 09 | Tests setup break | 45 |

Table 3.0.0-1: Procedures list.

Appendix B shown the complete list of elements necessaries for procedures execution, and also, the elements required for each test are present in each section. By completeness a summary is presented bellow.

- Extension harness for Breakout Board:
  - DB9 to DB9 Harness for Breakout Board.
  - DB15 to DB15 Harness for Breakout Board.
  - DB25 to DB25 harness for Breakout Board.
  - DB37 to DB37 Harness for Breakout Board.
- Breakout Board with bridges and auxiliary wires:
  - DB9 Breakout Board.
  - DB15 Breakout Board.
  - DB25 Breakout Board.
  - DB37 Breakout Board.
- Digital Multimeter with probes.
- Oscilloscope with differential voltage probe and current probe.
- RF Coaxial cables of different lengths and connectors.
- RF accessories, loads, attenuators, power divider, DC-Block, etc.
- Torque wrench and fixed wrench for different RF connectors.
- Torque wrench with 5/64" or 2 mm Hex bit.
- Ground wires.
- Ethernet cables.

- ESD gloves and antistatic wrist strap.
- Pen-drive previously formatted in FAT-32 format.
- Dataset file, `SB1-B-PRO-T-D01-011_v1.0_X-BandTransmitterFM TestProcedure_dataset.zip`, available in pen-drive (with FAT32 format).

## 3.1. Considerations

- All tests with the DUT are carried out in a clean room. Therefore, the operators shall have the appropriate elements: ESD smock, hair cover ,shoe cover and face mask.
- In the following, when referring to **facilities** it will refer to the clean room.
- Operators handling electrical connections or instruments should do using the antistatic wrist strap attached to the facilities grounding system.
- All handling of the DUT must be carried out using ESD gloves.
- GS-GSE-FM (R) is used in this procedure.
- GS-GSE-FM (R) and CEGSE Racks have their own UPS so they do not need to be connected to a safe power supply.
- GS-GSE requirement compliance (RF interfaces and other functionalities) was verified before this test (AD.07 and AD.08).
- GS-GSE-FM (R) was modified before this test for requirement compliance (RF interfaces and other functionalities) (AD.10 and AD.11).
- GS-GSE and CEGSE are connected to facilities network to give access to support team through VPN.
- All hardware components are connected to GND before any electrical connection.
- All unused RF output ports shall be loaded.
- All RF connections are exercised according **RF connector care and cleaning** document (AD.05). Also manufacturer recommendations are taken in to account.
- Both GS-GSE and CEGSE are initialized according to their respective user manuals (RD.09 and AD.06).
- DUTs are mounted on CEGSE's metal tray.
- DUTs are connected to grounding bar.
- Only EWC30 is connected to the ad-hoc box.
- X-Band DSN filter was previously tested according to AD.01.
- CEGSE Power Supply is set to 28 Volts (Vbus of DUT).
- The design of the test setups guarantees that the RF inputs do not exceed the maximum value accepted under any equipment configuration even in conditions of minimal attenuation and maximum gain. See the annex A for details.
- All SMA connections are performed using 5 lb-inch torque wrench.
- The adjustment torque for the harnesses that connect to the savers must be less than 0.10 Nm.

- DUT's connectors and savers connection/disconnection will be logged.
- The purpose of resistance measurements is to detect whether the interface is shorted or open. After functionally checking of CEGSE, the resistances of all the interfaces were measured and a wide range was defined to cover all cases. LVDS interfaces do not follow this criteria.
- Before performing the first DUT power on of the day, validate that DUT temperature is within a range of +/-5 degrees with respect to the ambient temperature. The goal is to validate that the internal sensor is in good health.

# 4. SB1FS-COM-D-011 Initialization and dataset deploy

## 4.1. SB1FS-COM-D-011-01 Electrical Verifications and Instruments Initializations.

| | |
|---|---|
| **Task ID** | SB1FS-COM-D-011-01 |
| **Task name** | Electrical Verifications and Instruments Initializations |
| **Task description** | This task includes:<br>▪ Verification of grounding of all racks and AC power sockets to use.<br>▪ Verification of the facilities AC supply voltages.<br>▪ RF TestBed deployment.<br>▪ Preparation of PXA.<br>▪ Preparation of oscilloscope.<br>▪ Connection of PXI, RF TestBed and PXA to the GS-GSE-FM (R) network.<br>▪ RDP Connections from thin clients. See table 4.1.0-2. |
| **Task purpose** | Prepare CEGSE, GS-GSE-FM (R) and instruments for the execution of aliveness, functional and performace tests of the communication system. |
| **Success criteria** | All electrical verifications are correct. Instruments powered-on and ready to perform measurements. |
| **Test Setup** | - |
| **Duration** | 60 minutes. |
| **Data sets required** | - |
| **Prerequisites** | ▪ GS-GSE-FM (R) initialized according to GS-GSE test procedures (AD.09) or user manual (RD.09).<br>▪ GS-GSE-FM (R) configured according to Control Configuration Document (AD.10) and with their modified RF interfaces (AD.11).<br>▪ CEGSE initialized according to CEGSE user manual (AD.06).<br>▪ RF TestBed powered off and only connected to facilities GND.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1 |

Table 4.1.0-1: Procedure SB1FS-COM-D-011-01 description.

| Name | OW used | IP | User | Password |
|---|---|---|---|---|
| CEGSE | OW Data A | 192.168.75.211 | EGSE COM | Conae1234 |
| TestBed-Cortex HDR-XXL | OW TMTC A | 192.168.75.202 | cortex | cortex |
| GS-GSE.WIN8 | OW TMTC A | 192.168.75.194 | admin | Sb1.C0n43 |
| Data Demodulator | OW TMTC A | 192.168.75.161 | cortex | cortex |
| GS-GSE.MGMT | OW TMTC A | 192.168.75.193 | administrator | Sb1.C0n43 |

Table 4.1.0-2: Initial RDP connections.

| SB1FS-COM-D-011-01 Electrical Verifications and Instruments Initializations | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| | **Session ID Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Record test session ID <session_ID>. | <YYYYMMDD-#N> | | |
| 1 | **Grounding and AC power verification** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Check Instrumentation bench power supply voltage . | Power supply voltage between 210V and 240V. | | |
| | | DET | With the multimeter, measure the **Instrumentation bench** input voltage. | | | |
| 1 | 2 | EXE | Connect the PXA to the AC power socket and verify its ground connection. | Continuity between N connector outer shell and facilities ground. | | |
| | | DET | ▪ Plug in the AC power cord from the AC power source into the rear panel of the PXA.<br>▪ Verify continuity between N connector ground outer shell and facilities ground by means of multimeter | | | |
| 1 | 3 | EXE | Connect the oscilloscope to the AC power socket and verify its ground connection. | Continuity between BNC connector outer shell and facilities ground. | | |
| | | DET | ▪ Plug in the AC power cord from the AC power source into the rear panel of the Oscilloscope.<br>▪ Verify continuity between oscilloscope ground and facilities ground by means of multimeter | | | |
| 1 | 4 | EXE | Verify ground connection of Rack CEGSE. | Continuity between copper bar of Rack CEGSEand facilities ground. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Verify continuity between copper bar of **Rack CEGSE** and facilities ground by means of multimeter. | | | |
| 1 | 5 | EXE | Verify ground connection of Rack RF TestBed. | Continuity between copper bar of Rack Testbed and facilities ground. | | |
| | | DET | Verify continuity between copper bar of **Rack RF TestBed** and facilities ground by means of multimeter. | | | |
| 1 | 6 | EXE | Verify ground connection of Rack TMTC-BB of **GS-GSE-FM (R)**. | Continuity between copper bar of Rack TMTC-BB and facilities ground. | | |
| | | DET | Verify continuity between copper bar of **Rack TMTC-BB** and facilities ground by means of multimeter.<br>**Note:** Copper bar of Rack TMTC-BB is connected to copper bar of Rack TMTC-RF. | | | |
| 1 | 7 | EXE | Verify ground connection of Rack Data-BB of **GS-GSE-FM (R)**. | Continuity between copper bar of Rack Data-BB and facilities ground. | | |
| | | DET | Verify continuity between copper bar of **Rack Data-BB** and facilities ground by means of multimeter.<br>**Note:** Copper bar of Rack Data-BB is connected to copper bar of Rack TMTC-RF. | | | |
| 1 | 8 | EXE | Check Rack CEGSE power supply voltage . | Power supply voltage between 210V and 240V. | | |
| | | DET | With the multimeter, measure the **Rack CEGSE** input voltage. | | | |
| 1 | 9 | EXE | Check Rack RF TestBed power supply voltage . | Power supply voltage between 210V and 240V. | | |
| | | DET | With the multimeter, measure the **Rack RF TestBed** input voltage. | | | |
| 1 | 10 | EXE | Check Rack TMTC-RF power supply voltage of **GS-GSE-FM (R)**. | Power supply voltage between 210V and 240V. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | With the multimeter, measure the **Rack TMTC-RF** input voltage.<br>Note: Rack TMTC-RF share UPS with Rack TMTC-BB | | | |
| 1 | 11 | EXE | Check Rack Data-RF power supply voltage of **GS-GSE-FM (R)**. | Power supply voltage between 210V and 240V. | | |
| | | DET | With the multimeter, measure the **Rack Data-RF** input voltage.<br>Note: Rack Data-RF share UPS with Rack Data-BB | | | |
| **2** | **Installation of the Instruments** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Connect the external reference signal to the PXI. | PXI connected to the reference signal. | | |
| | | DET | Connect the **REF IN** port of the NI PXIe-5653 module to the free port of the Power Splitter DATA GS-GSE-FM (R) through the BNC male to SMA male cable SBB4.18. | | | |
| 2 | 2 | EXE | Connect the DC Block to the RF IN of PXI. | DC Block connected to PXI RF IN. | | |
| | | DET | Connect the DC Block to the RF input of NI PXIe-5605. | | | |
| 2 | 3 | EXE | Installation and power on of PXA. | PXA on. | | |
| | | DET | Press the On/Off button to turn on the PXA on.<br>**Note1:** The PXA takes approximately 12 minutes to initialize in spectrum analyzer mode.<br>**Note2:** It is recommended to connect an external monitor and use it as the only video output. | | | |
| 2 | 4 | EXE | Connect the external frequency reference signal to the PXA. | PXA display SENSE:EXT on lower-left corner of screen. | | |
| | | DET | Connect the **EXT REF IN** port of the PXA to the free 10 MHz port of the Power Splitter Data of GS-GSE-FM (R) through the BNC male to BNC male cable REF1.01. | | | |
| 2 | 5 | EXE | Initialize VSA software on the PXA. | VSA software initialized. | | |
| | | DET | To initialize the VSA software do the following:<br>▪ Press **Mode** button.<br>▪ Press **89601 VSA** key.<br>▪ Press **Start 89601B** key.<br>**Note:** The VSA software takes approximately 5 minutes to initialize. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 6 | EXE | Verify RF hardware input for VSA | ThisAnalyzer9 input is selected. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>▪ Click on the **Utilities, Hardware, Analyzer:Analyzer...** tabs. | | | |
| 2 | 7 | EXE | Configure the PXA as a spectrum analyzer. | PXA configured as a spectrum analyzer. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **Spectrum Analyzer** key. | | | |
| 2 | 8 | EXE | Connect the DC Block to the RF input of PXA. | DC Block connected to PXA. | | |
| | | DET | Connect the DC Block to the RF input of the PXA. | | | |
| 2 | 9 | EXE | Power on the Oscilloscope. | Oscilloscope on. | | |
| | | DET | Power on the Oscilloscope by pressing the power button. | | | |
| **3** | **RF TestBed deploy** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Verify the IF and RF connections of Data RF TestBed. | All IF and RF connections present. | | |
| | | DET | Verify the following connections:<br>▪ 10 dB attenuator ATT10.01 (PE7005-10) is connected to the IF input (J01) of the X-Band Upconverter.<br>▪ Cable PE300-60-03 is connected to the 10 dB attenuator ATT10.01.<br>▪ Cable PE300-60-03 is connected to IF out (J50) of the Testbed Cortex HDR. | | | |
| 3 | 2 | EXE | Connect the TestBed to the facilities safe power supply. | TestBed connected to facilities safe power supply. | | |
| | | DET | Connect the TestBed power socket to facilities safe power supply. | | | |
| 3 | 3 | EXE | Turn on the PDU of TestBed. | PDU of TestBed on | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Turn on the thermal circuit of TestBed PDU.<br><br>**Note:** When the thermal breaker is turned on, the TestBed Ethernet switch is initialized. | | | |
| 3 | 4 | EXE | Turn on the components of Data RF TestBed. | Data RF TestBed components on | | |
| | | DET | ▪ **Cortex HDR** turns on automatically about 15 seconds after PDU thermal circuit breakers are turned on. Verify cortex start up from front panel. If Cortex HDR does not start automatically turn it on from the front panel button.<br>▪ Turn on **X-Band Upconverter** from rear panel switch. | | | |
| **4** | **Network connections** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Connect the CEGSE to GS-GSE-FM (R) network. | CEGSE conected to GS-GSE network. | | |
| | | DET | Connect the Ethernet port 2 of **PXI** computer to **Ethernet Switch TMTC** using a port in the range between 13 and 20 or some free port of **Ethernet Switch Data**.<br>Configure "Local Area Network" interface of CEGSE with the following parameters:<br>▪ IP address: 192.168.75.211<br>▪ Subnet mask: 255.255.255.0<br>▪ Default Gateway: 192.168.75.1 | | | |
| 4 | 2 | EXE | Connect the PXA to GS-GSE network. | PXA conected to GS-GSE-FM (R) network. | | |
| | | DET | Connect the Ethernet port of **PXA** to **Ethernet Switch TMTC GS-GSE-FM (R)** using a port in the range between 13 and 20 or some free port of **Ethernet Switch Data**. | | | |
| 4 | 3 | EXE | Connect the RF TestBed to GS-GSE-FM (R) network. | RF TestBed conected to GS-GSE-FM (R) network. | | |
| | | DET | Connect an ethernet free port of **Switch TestBed** to **Ethernet Switch TMTC GS-GSE-FM (R)** using a port in the range between 13 and 20 or some free port of **Ethernet Switch Data**. | | | |
| **5** | **Remote Connections from Thin Client** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | **RDP connection** to CEGSE from Thin client **Operator Workstation DataA**. | Thin Client **OW DATA A** connected to CEGSE | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | From the Operator Workstation DataA open the Remote Desktop Connection and connect to IP: 192.168.75.211<br>▪ `User: EGSE COM`<br>▪ `Password: Conae1234` | | | |
| 5 | 2 | EXE | **RDP connection** to GS-GSE.MGMT VMfrom Operator Workstation TMTCA. | Operator Workstation DataA connected to GS-GSE.MGMT VM | | |
| | | DET | From the Operator Workstation TMTCA open the Remote Desktop Connection and connect to IP: 192.168.75.193<br>▪ User: administrator<br>▪ Password: Sb1.C0n43 | | | |
| 5 | 3 | EXE | **RDP connection** to Cortex HDR from Operator Workstation TMTCA. | Operator Workstation TMTCA connected to Cortex HDR. | | |
| | | DET | From the Operator Workstation TMTCA open the Remote Desktop Connection and connect to IP: 192.168.75.161<br>▪ `User: cortex`<br>▪ `Password: cortex` | | | |
| 5 | 4 | EXE | **RDP connection** to **Testbed's** Cortex HDR from Operator Workstation TMTCA. | Operator Workstation TMTCA connected to Testbed's Cortex HDR. | | |
| | | DET | From the Operator Workstation TMTCA open the Remote Desktop Connection and connect to IP: 192.168.75.202<br>▪ `User: cortex`<br>▪ `Password: cortex` | | | |
| 5 | 5 | EXE | **RDP connection** to GS-GSE.WIN8 VMfrom Operator Workstation TMTCA. | Operator Workstation TMTCA connected a GS-GSE.WIN8 VM | | |
| | | DET | From the Operator Workstation TMTCA open the Remote Desktop Connection and connect to IP: 192.168.75.194<br>▪ `User: admin`<br>▪ `Password: Sb1.C0n43` | | | |

| 6 | **CEGSE NTP Client** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | Configure the NTP client in CEGSE. | CEGSE time Synchronized to UTC time. | | |

| | | |
|---|---|---|
| | DET | In the **CEGSE**:<br>▪ Click on the current date time in the bottom-right of the screen.<br>▪ Click on **Change date and time settings...**<br>▪ Go to **Internet Time** tab and click on **Change settings...**<br>▪ Set server to **192.168.75.150** and check **"Synchronize with an Internet time server"** option.<br>▪ Perform a manual synchronization by clicking on **Update now** button.<br>▪ Verify that the clock was successfully synchronized.<br>▪ Press OK twice to close open windows. |

Table 4.1.0-3: Procedure SB1FS-COM-D-011-01 table.

## 4.2. SB1FS-COM-D-011-02 Dataset Deployment Procedure

| | |
|---|---|
| **Task ID** | SB1FS-COM-D-011-02 |
| **Task name** | Dataset Deployment Procedure |
| **Task description** | This task includes:<br>▪ Copy dataset from pen-drive to CEGSE hard disk.<br>▪ Unzip dataset on CEGSE.<br>▪ Copy dataset files to the instruments and RF TestBed.<br>▪ Copy dataset files to GS-GSE-FM (R). |
| **Task purpose** | Deploy the necessary files for the execution of aliveness, functional and performance tests of the communication system. |
| **Success criteria** | Files from dataset deployed to its final locations. |
| **Test Setup** | - |
| **Duration** | 60 minutes. |
| **Data sets required** | Dataset associated to this document, `SB1-B-PRO-T-D01-011_v1.0_X-BandTransmitterFMTestProcedure_dataset.zip`, available in pen-drive (FAT-32). |
| **Prerequisites** | Execution of procedure **SB1FS-COM-D-011-01 Electrical Verifications and Instruments Initializations** |

Table 4.2.0-1: Procedure SB1FS-COM-D-011-02 description.

| SB1FS-COM-D-011-02 Dataset Deployment Procedure | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Unzip dataset on PXI** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Check hard disk space on CEGSE | free space > 8 GB | | |
| | | DET | ▪ Launch the File Explorer.<br>▪ In the navigation panel on the left side of the folder, click "Computer."<br>▪ Check available storage space displayed under WINDOWS(C) drive. | | | |
| 1 | 2 | EXE | Connect pendrive to PXI of CEGSE. | Pendrive connected to PXI of CEGSE. | | |
| | | DET | Connect pendrive to PXI of CEGSE. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 3 | EXE | Create test session folder in CEGSE. | Test session folder created. | | |
| | | DET | Open window file explorer and create `<session_ID>` folder in directory `C:/USERS/EGSE COM/Documents/COMM-SS-FM`<br>Where `<session_ID>` has the form <YYYYMMDD-#N><br>**Note:** Create `COMM-SS-FM` folder if not exist. | | | |
| 1 | 4 | EXE | Copy dataset from pendrive to PXI. | Dataset copied. | | |
| | | DET | Copy the file SB1-B-PRO-T-D01-011_v1.0_X-BandTransmitterFMTestProcedure_dataset.zip from pendrive to C:/USERS/EGSE COM/Documents/COMM-SS-FM/<session_ID> | | | |
| 1 | 5 | EXE | Verify MD5 Checksum of dataset in CEGSE. | Current file MD5 value is equal to MD5 value from DMS. | | |
| | | DET | In a terminal window (command prompt) run the following commands:<br>▪ Execute WinMD5Free sofware.<br>▪ On displayed windows press **"Browse .."** button<br>▪ Find and open **SB1-B-PRO-T-D01-011_v1.0_X-BandTransmitterFM TestProcedure_dataset.zip** in **C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>** folder.<br>▪ Compare MD5 with value in **SB1-B-PRO-T-D01-011_v1.0_X-BandTransmitterFM TestProcedure_dataset.md5** file in DMS for data integrity.<br>**Note:** The comparison can be made by copying the expected value in **"Original file MD5 value"** and pressing the **"Verify"** button. | | | |
| 1 | 6 | EXE | Unzip the dataset. | Dataset unzipped. | | |
| | | DET | ▪ Open File Explorer and go to **C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>**<br>▪ Right-click on **SB1-B-PRO-T-D01-011_v1.0_X-BandTransmitterFM TestProcedure_dataset.zip** and select **"7-Zip"** option.<br>▪ In the displayed menu select **Extract here** option.<br>▪ Verify that decompression process ends without error.<br>**Note**: If a file with the same name already exists, replace it. | | | |

## 2 Deploy dataset 1/2

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 2 | 1 | EXE | Deploy CEGSE Configuration files | Files copied. | | |
| | | DET | In the PXI, open the file explorer and do the following:<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-D-011/PXI-config<br>▪ Copy all files in PXI-config folder<br>▪ Paste files into C:/USERS/EGSE COM/Documents/CFG/ folder. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 2 | EXE | Copy oscilloscope configuration folder to pen-drive. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer and do the following:<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-D-011/<br>▪ Copy "osc-config" folder to pendrive<br>**Note:** Check pendrive is in FAT32 format. | | | |
| 2 | 3 | EXE | Check hard disk space on PXA | free space > 3 GB | | |
| | | DET | On the PXA:<br>▪ Launch the File Explorer.<br>▪ In the navigation panel on the left side of the folder, click "Computer."<br>▪ Check available storage space displayed under WINDOWS(D) drive. | | | |
| 2 | 4 | EXE | Copy configurations and screenshots folder to PXA. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `\\192.168.75.231\Users\Instrument\Desktop`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ From C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-D-011/ copy the folder COMM-SS-FM-PXA-config and paste in "Desktop" folder of PXA | | | |
| 2 | 5 | EXE | Copy files for Noise generation to Cortex HDR of RF TestBed | File copied | | |
| | | DET | In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-D-011/cortex-testbed directory.<br>▪ Copy the file SB1GS-Testbed_XB_NoiseGenerator_v1.0.mcs<br>▪ Connect to Cortex testbed with the following address and credentials:<br>• Address: \\192.168.75.202<br>• User: cortex<br>• Password: cortex<br>▪ Go to to \\192.168.75.202\zds\HDR\CrtxMCS\SABIA-Mar\AIT folder<br>▪ Paste the copied file. | | | |

| 3 | Deploy dataset 2/2 (GS-GSE-FM (R)) | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Create test session folder in GS-GSE.MGMT VM. | Test session folder created. | | |
| | | DET | In a terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `mkdir /verification/COMM-SS-FM/<session_ID>/ -p`<br>Where `<session_ID>` has the form <YYYYMMDD-#N> | | | |
| 3 | 2 | EXE | Copy files to GS-GSE.MGMT VMfrom CEGSE. | files copied. | | |
| | | DET | On EGSE open Total Commander from shocut in desktop and do de following:<br>▪ On left side go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-D-011/GS-GSE<br>▪ On rigth side go "Network Neighborhood", select [Secure FTP], press F7 and connect to GS-GSE.MGMT VM with the following paremeters:<br>• 192.168.75.193<br>• User: administrator<br>• Password: Sb1.C0n43<br>▪ On rigth side go to /verification/COMM-SS-FM/<session_ID><br>▪ Copy the content of GS-GSE folder from CEGSE to GS-GSE.MGMT VM | | | |
| 3 | 3 | EXE | Copy files for BER measurement to Cortex HDR of GS-GSE-FM (R) | Files copied to cortex HDR | | |
| | | DET | In the CEGSE do the following:<br>▪ Open file explorer.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-D-011/cortex-hdr.<br>▪ Copy the file **data52050**.<br>▪ Connect to Corte HDR with the following address and credentials:<br>• Address: \\192.168.75.161<br>• User: cortex<br>• Password: cortex<br>▪ Go to \\192.168.75.161\zds\HDR\SPS\BER\ folder.<br>▪ Paste the copied file. If a file with the same name already exists, replace it. | | | |

| 4 | Final Steps | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Remove pendrive from the PXI of CEGSE. | Pen-drive removed. | | |
| | | DET | Remove the pen-drive from the USB port of the PXI of CEGSE. | | | |
| 4 | 2 | EXE | Connect pendrive to Oscilloscope. | Pendrive connected to Oscilloscope. | | |
| | | DET | Connect pendrive to Oscilloscope. | | | |

Table 4.2.0-2: Procedure SB1FS-COM-D-011-02 table.

# 5. SB1FS-COM-F-012 Aliveness and Functional Test

| | |
|---|---|
| **Task ID** | SB1FS-COM-F-012 |
| **Task name** | Aliveness and Functional Test |
| **Task description** | In this procedure the EWC30 X-Band transmitter functional test is performed.<br>First of all, CEGSE interfaces aliveness is performed, Transmitter and Filter ground connections are verified and RF and base-band DUT interfaces are connected to EGSEs. DUT monitoring and control is performed from CEGSE. Oscilloscope and PXI spectrum analyzer are configured to measure power consumption and RF signals characteristics respectively. Data frames will be sent from CEGSE to EWC30 in order to be modulated through X-Band interface. The data received in GS-GSE-FM (R) will be compared with original data. |
| **Task purpose** | Execution of EWC30 functional test. |
| **Success criteria** | ▪ CEGSE and GS-GSE-FM (R), are configured according to procedure and CEGSE interfaces are in good condition. DUT telemetry is between expected values.<br>▪ Measurements of voltages, currents and power consumptions in different states meets the expected values.<br>▪ RF signals are under expected values.<br>▪ Data frames received at GS-GSE are the same as those sent from CEGSE.<br>▪ Evidences are collected. |
| **Test sub-cases** | ▪ SB1FS-COM-F-012-01: Test setup and configuration<br>▪ SB1FS-COM-F-012-02: Aliveness and Functional Test<br>▪ SB1FS-COM-F-012-03: Tests setup break |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 5.2.0-1 for Data Downlink test. |
| **Duration** | ▪ SB1FS-COM-F-012-01: 150 minutes<br>▪ SB1FS-COM-F-012-02: 180 minutes<br>▪ SB1FS-COM-F-012-03: 45 minutes |
| **Data sets required** | ▪ Payload file (`Data-885840_120s_VCh01_payload.bin`)<br>▪ CEGSE PXI configuration file for aliveness (`INIT_FILE_NO_ALARM_EWC30.ini`).<br>▪ CEGSE PXI nominal configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ PXI spectrum analyzer configuration file in `NI-RFSA-data-config` folder |
| **Prerequisites** | ▪ Execution of procedure SB1FS-COM-D-011 Initialization and dataset deploy.<br>▪ EWC30 and DSN filter mated with the connector savers (RF and BB).<br>▪ EWC30 and DSN filter mounted on CEGSE metal tray.<br>▪ EWC30 and DSN filter connected to grounding bar.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1 |

Table 5.0.0-1: Procedure SB1FS-COM-F-012 description.

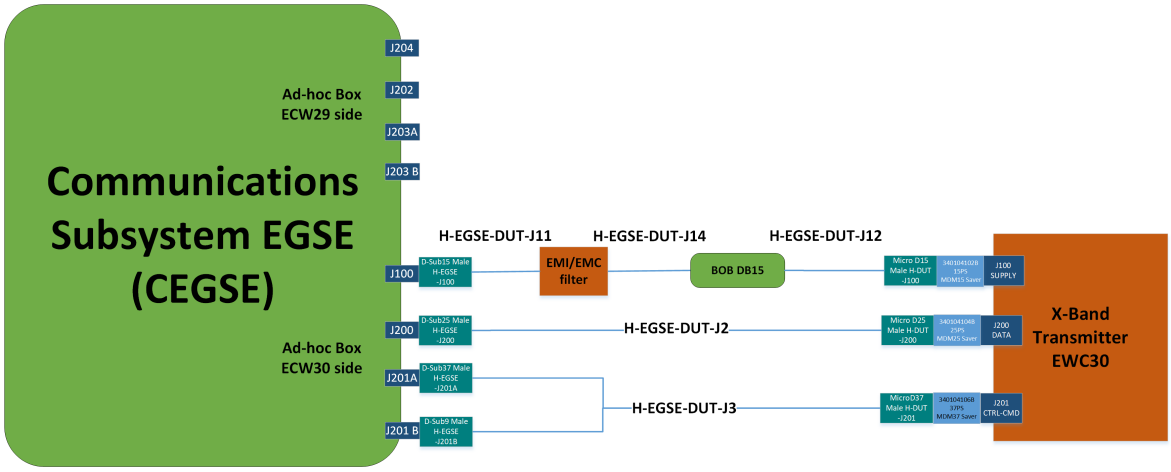


Figure 5.0.0-1: EWC-30 BB connections for ripple measurement.

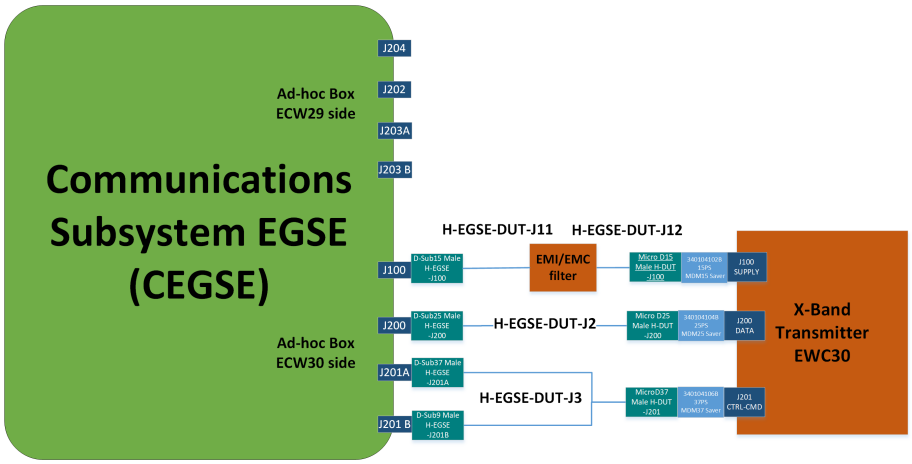


Figure 5.0.0-2: EWC-30 BB general connections.

## 5.1. SB1FS-COM-F-012-01 Setup and Configuration

| SB1FS-COM-F-012-01 Setup and Configuration | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| | **Record DUT's S/N** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Record DUT's S/N | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify that the environmental temperature level in the test site is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity in the test site. | | | |
| 1 | 3 | EXE | Check that temperature an humidity datalogger is working. | Datalogger connected and working properly | | |
| | | DET | In the Datalogger device, check the following:<br>▪ **Temperature** is shown in LCD Screen<br>▪ **Humidity** is shown in LCD Screen<br>▪ Press **INTERVAL** button once and check Recording interval is **5** minutes.<br>▪ Press **INTERVAL** button twice and check Uploading interval is **15** minutes.<br>▪ **REC** Mark is shown in LCD Screen. | | | |

| 2 | **Verification of CEGSE setup.** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Verify BB harness connections. | BB harness conected. | | |
| | | DET | Verify BB harness connections between Ad-hox box and PXI match the EWC30 configuration. | | | |
| 2 | 2 | EXE | Verify Keysight power supply configuration | V LIMIT = 28 V<br>I LIMIT = 3 A<br>OVP = 34 V<br>UVP = 22 V | | |
| | | DET | In front pannel of power supply:<br>▪ press "LIMIT" button to read voltage and current limits.<br>▪ press one time "OVP/UVP" button to read OVP limit<br>▪ press two times "OVP/UVP" button to read UVP limit.<br>**Note:** Adjust the value of I LIMIT if it is not the expected one. Press "LIMIT" and turn the current knob to adjust. | | | |
| 2 | 3 | EXE | Measure COM-EGSE power supply output voltage. | $Voltage \approx 28\ V$ | | |
| | | DET | Set the multimeter to measure voltage and measure the voltage present on the rear terminals of the COM-EGSE power supply. | | | |
| **3** | **Connection of EMI/EMC filter to ad-hoc box** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Connect **H-EGSE-DUT-J11_001** harness to Ad-Hoc box. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J11_001** DB15 male connector to J100 connector of Ad-Hoc box. | | | |
| 3 | 2 | EXE | Connect **H-EGSE-DUT-J11_001** harness to EMI/EMC filter input. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J11_001** DB15 female connector to the EMI/EMC filter DB15 male connector. | | | |
| 3 | 3 | EXE | Connect **H-EGSE-DUT-J12_001** harness to EMI/EMC filter output. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** DB15 male connector to EMI/EMC filter output. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 4 | EXE | Connect **H-EGSE-DUT-J12_001** harness to **H-EGSE-DUT-J13_001** harness. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** MDM15 female connector to **H-EGSE-DUT-J13_001** MDM15 male connector. | | | |
| 3 | 5 | EXE | Connect **H-EGSE-DUT-J13_001** harness to DB-15 BOB. | Harness connected to DB-15 BOB | | |
| | | DET | Connect **H-EGSE-DUT-J13_001** DB15 female connector to DB-15 BOB. | | | |
| **4** | **CEGSE SW Initialization** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Start CEGSE SW using EWC30 "no alarm" configuration file | SW running in EWC30 "no alarm" configuration | | |
| | | DET | ▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-F-012-01" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **"INIT_FILE_NO_ALARM_EWC30.ini"** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |
| **5** | **EWC30 Vbus verification** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 5 | 2 | EXE | Measure VBus voltage on DB-15 BOB. | Voltage=28 V | | |
| | | DET | Measure voltage between the following pairs of pins of Break Out Box:<br>▪ Pin 1(+) and Pin 9(-)<br>▪ Pin 2(+) and Pin 10(-)<br>▪ Pin 3(+) and Pin 11(-)<br>▪ Pin 4(+) and Pin 12(-)<br>▪ Pin 5(+) and Pin 13(-)<br>▪ Pin 6(+) and Pin 14(-)<br>▪ Pin 7(+) and Pin 15(-) | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 3 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 5 | 4 | EXE | Disconnect **H-EGSE-DUT-J13_001** harness to DB-15 BOB. | Harness disconnected from DB-15 BOB | | |
| | | DET | Disconnect **H-EGSE-DUT-J13_001** DB15 female connector from DB-15 BOB. | | | |
| 5 | 5 | EXE | Disconnect **H-EGSE-DUT-J12_001** harness from **H-EGSE-DUT-J13_001** harness. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J12_001** MDM15 female connector to **H-EGSE-DUT-J13_001** MDM15 male connector. | | | |
| 5 | 6 | EXE | Disconnect **H-EGSE-DUT-J12_001** harness from EMI/EMC filter output. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J12_001** DB15 male connector from EMI/EMC filter output. | | | |
| 5 | 7 | EXE | Connect the **DB-9 BOB** box to connector **J201B** of the AD-HOC box. | **DB-9 BOB** connected to Ad-Hoc box | | |
| | | DET | Use the extender cable to connect the **DB-9 BOB** to the **J201B** input. | | | |
| 5 | 8 | EXE | Connect the **DB-25 BOB** box to connector **J200** of the AD-HOC box. | **DB-25 BOB** connected to Ad-Hoc box | | |
| | | DET | Use the extender cable to connect the **DB-25 BOB** to the **J200** input. | | | |
| 5 | 9 | EXE | Connect the **DB-37 BOB** box to connector **J201A** of the AD-HOC box. | **DB-37 BOB** connected to Ad-Hoc box | | |
| | | DET | Use the extender cable to connect the **DB-37 BOB** to the **J201A** input. | | | |
| **6** | **TSM interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | TSM O_TX_TEMP1 interfaces aliveness. | $Voltage \approx 6V$ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Set the multimeter to measure voltage and hold the Max value. Connect the $47K\Omega$ resistor between pin **13(+)** and **31(-)** of the **DB-37 BOB**. Measure voltage across the resistor. **Note:** Multimeter must be set to register the Max value due to CEGSE reading architecture. | | | |
| **7** | **CEGSE power off (PXI and Ad-Hoc Box)** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 7 | 2 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |
| 7 | 3 | EXE | Turn off the PSU switch of the Ad-Hoc box. | PSU LED indicator should turn off | | |
| | | DET | Turn off the PSU by pressing the switch in the center of the Ad-Hoc box.<br>Verify that the LED on the PSU has turned off when the switch is turned off. | | | |
| 7 | 4 | EXE | Disable power supply output of CEGSE. | The LED indicator of the OUT ON output should go out. | | |
| | | DET | Press the OUT ON button to disable the power supply output.<br>Verify that the OUT ON LED indicator turns off when pressing the button to disable the output. | | | |
| 7 | 5 | EXE | Turn off the main switch of the Ad-Hoc box. | The main switch light must be turned off | | |
| | | DET | Turn off the main switch of the Ad-Hoc box. | | | |
| 7 | 6 | EXE | Power off PXI. | PXI off. | | |
| | | DET | From the CEGSE KVM shutdown the PXI. | | | |
| **8** | **HV-HPC interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | HV-HPC I_STBY_2_OPE_M interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **1(+)** and **6(-)** of the **DB-9 BOB**. | | | |
| 8 | 2 | EXE | HV-HPC I_OPE_2_STBY_R interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **2(+)** and **7(-)** of the **DB-9 BOB**. | | | |
| 8 | 3 | EXE | HV-HPC I_STBY_2_OPE_R interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **3(+)** and **8(-)** of the **DB-9 BOB**. | | | |
| 8 | 4 | EXE | HV-HPC I_OPE_2_STBY_M interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **4(+)** and **9(-)** of the **DB-9 BOB**. | | | |
| **9** | **ASM interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | ASM SEC_V_RF interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **3(+)** and **22(-)** of the **DB-37 BOB**. | | | |
| 9 | 2 | EXE | ASM SEC_V_NUM interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **11(+)** and **29(-)** of the **DB-37 BOB**. | | | |
| 9 | 3 | EXE | ASM OUTPUT_PWR interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **12(+)** and **30(-)** of the **DB-37 BOB**. | | | |

| 10 | **BDM interfaces aliveness** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | BDM O_CLK_LOCKED interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **1(+)** and **20(-)** of the **DB-37 BOB**. | | | |
| 10 | 2 | EXE | BDM O_MMU_CLK_STATUS interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **2(+)** and **21(-)** of the **DB-37 BOB**. | | | |
| 10 | 3 | EXE | BDM O_TX_STATUS interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **4(+)** and **23(-)** of the **DB-37 BOB**. | | | |
| **11** | **LVDS interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | LVDS I_MMU_DATA_7 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 3(+) and 15(-) of the DB-25 BOB. | | | |
| 11 | 2 | EXE | LVDS I_MMU_DATA_6 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 4(+) and 16(-) of the DB-25 BOB. | | | |
| 11 | 3 | EXE | LVDS I_MMU_DATA_5 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 5(+) and 17(-) of the DB-25 BOB. | | | |

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| 11 | 4 | EXE | LVDS I_MMU_DATA_4 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 6(+) and 18(-) of the DB-25 BOB. | | | |
| 11 | 5 | EXE | LVDS I_MMU_DATA_3 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 7(+) and 19(-) of the DB-25 BOB. | | | |
| 11 | 6 | EXE | LVDS I_MMU_DATA_2 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 8(+) and 20(-) of the DB-25 BOB. | | | |
| 11 | 7 | EXE | LVDS I_MMU_DATA_1 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 9(+) and 21(-) of the DB-25 BOB. | | | |
| 11 | 8 | EXE | LVDS I_MMU_DATA_0 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 10(+) and 22(-) of the DB-25 BOB. | | | |
| 11 | 9 | EXE | LVDS I_MMU_CLK interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 11(+) and 23(-) of the DB-25 BOB. | | | |
| 11 | 10 | EXE | Disconnect the DB-9 BOB from the AD-Hoc box. | The DB-9 BOB disconnected from the AD-Hoc box. | | |
| | | DET | With the DB-9 also disconnect the extender cable from the AD-Hoc box. | | | |

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| 11 | 11 | EXE | Disconnect the DB-25 BOB from the AD-Hoc box. | The DB-25 BOB disconnected from the AD-Hoc box. | | |
| | | DET | With the DB-25 also disconnect the extender cable from the AD-Hoc box. | | | |
| 11 | 12 | EXE | Disconnect the DB-37 BOB from the AD-Hoc box. | The DB-37 BOB disconnected from the AD-Hoc box. | | |
| | | DET | With the DB-37 also disconnect the extender cable from the AD-Hoc box. | | | |
| **12** | **GS-GSE configuration and verification** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 12 | 1 | EXE | Enable Monitor and Control in **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | Interface status in **Monitor and Control**. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Interface Status** field and select **Monitor and Control**. | | | |
| 12 | 2 | EXE | Set **N1** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N1 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 1 Transfer Switch Control** field and press the **Nadir 1 to Redundant 1** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the upper indicator of the **N1 TRANSFER SWITCH** block is **ON** and green. | | | |
| 12 | 3 | EXE | Set **N2** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N2 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 2 Transfer Switch Control** field and press the **Nadir 2 to Redundant 2** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the bottom indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |

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| 12 | 3 | EXE | Set attenuation of GS-GSE-FM (R) **X-Band Matrix and Attenuator** . | Attenuation of 0 dB. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Go to the **Variable Attenuador Control** field and press the 0 dB button.<br>▪ Go to the **ATENUATOR VARIABLE** block and verify that the 0 dB indicator is green. | | | |
| 12 | 4 | EXE | Verify **X-Band DownconverterN1** configuration. | ▪ RF = 8106.0 MHz<br>▪ Aten = 6 dB<br>▪ RF = ON | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter01-FM_v1.0.py`<br>In the displayed menu, verify that the parameters are configured according to the expected values. Then enter the number 5 and press enter to exit the menu. | | | |
| 12 | 5 | EXE | Verify **X-Band DownconverterN2** configuration. | ▪ RF = 8269.0 MHz<br>▪ Aten = 4 dB<br>▪ RF = ON | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter02-FM_v1.0.py`<br>In the displayed menu, verify that the parameters are configured according to the expected values. Then enter the number 5 and press enter to exit the menu. | | | |
| 12 | 6 | EXE | Configure the **Cortex HDR**. | Cortex HDRconfigured. | | |
| | | DET | In Cortex MCS (192.168.75.161) open the configuration file from directory `D:\ZDS\Data\HDR\MCS\SABIA-Mar\:`<br>▪ `SB1GS-GSE-FM-R_RF-N1_v1.4.mcsif` **EWC30-FM1** is under test.<br>▪ `SB1GS-GSE-FM-R_RF-N2_v1.4.mcsif` **EWC30-FM2** is under test.<br>Then enable configuration by clicking on the **Control Access** icon (key icon) and click the **OK** button. Then click on **Copy Cnf->Mon** icon and then click yes if needed. | | | |

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| 12 | 7 | EXE | Clear storage in **Cortex HDR** | Cleaning done | | |
| | | DET | In Cortex MCS (192.168.75.161) do the following:<br>▪ Open the DMM by clicking on the **Open the global disk memory management window** icon.<br>▪ In the **Status** window of DMM, click on **Build or Erase** button.<br>▪ Select **Errase all files in all directories in all partitions** and then click on **OK** button.<br>▪ In the displayed window confirm erase by clicking on the **OK** button.<br>▪ Enable the acquisition mode by clicking on the **Configuration vs Acquisition Mode** icon and on the **Control Access**. | | | |
| **13** | **Instruments setup** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 13 | 1 | EXE | Connect measurement probes to the oscilloscope | Probes connected according to detail. | | |
| | | DET | In CH1 connect current probe, in CH2 connect differential probe. | | | |
| 13 | 2 | EXE | Connect measurement probes to the AD-HOC box | Probes connected according to detail. | | |
| | | DET | ▪ Connect CH1 current probe to measure EWC30 TX.<br>▪ Connect CH2 differential probe to measure EWC30 TX.<br>**Note:** When the current tip is placed in the ad-hoc box the arrow on the current tip should point to the left. | | | |
| **14** | **DUT Connection** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 14 | 1 | EXE | Verify ground connection of EWC-30. | EWC-30 is grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the EWC-30 connector J104 and to the copper bar are properly adjusted.<br>▪ Verify continuity between ground connector of EWC-30 and copper bar of facilities. | | | |
| 14 | 2 | EXE | Verify ground connection of X-Band Filter. | X-Band Filter is grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the X-Band Filter and to the copper bar are properly adjusted.<br>▪ Verify Continuity between X-Band Filter and copper bar of facilities. | | | |

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| 14 | 3 | EXE | Connect W10 cable between IN Port of DSN Filter and J103 Port of EWC30. | Cable W10 connected between ports. | | |
| | | DET | ▪ Connect W10 cable between IN Port of DSN Filter and J103 Port of EWC30. | | | |
| 14 | 4 | EXE | Connect W2 cable to OUT Port of DSN Filter. | W2 Cable connected to OUT Port. | | |
| | | DET | ▪ Connect W2 cable to the OUT port of DSN Filter.<br>▪ Mount W2 cable in the sliding tray. | | | |
| **15** | **BB harness connection to DUT** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 15 | 1 | EXE | Connect **H-EGSE-DUT-J12_001** harness to EWC30 | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** harness to connector saver J100 of the EWC30 | | | |
| 15 | 2 | EXE | Connect **H-EGSE-DUT-J2_001** harness to EWC30 | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J2_001** harness to connector saver J200 of the EWC30 | | | |
| 15 | 3 | EXE | Connect **H-EGSE-DUT-J3_001** harness to EWC30 | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J3_001** harness to connector saver J201 of the EWC30 | | | |
| **16** | **Mount CEGSE mechanical support in CEGSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 16 | 1 | EXE | Disconnect ground of EWC30. | Ground of EWC30 disconnected | | |
| | | DET | ▪ Disconnect ground wire of EWC30 from copper bar of facilities | | | |
| 16 | 2 | EXE | Ground X-Band Filter. | Ground of X-Band Filter disconnected | | |

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| | | DET | ▪ Disconnect ground wire of X-Band Filter from copper bar of facilities | | | |
| 16 | 3 | EXE | Mount CEGSE mechanical support to the CEGSE rack. | CEGSE mechanical support mounted. | | |
| | | DET | Mount CEGSE mechanical support to the CEGSE rack. Take all possible precautions since the DUT is mounted on this. | | | |
| 16 | 4 | EXE | Ground EWC30. | EWC30 grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the EWC30 connector J104 is properly adjusted.<br>▪ Connect ground wire from EWC30 to copper bar of CEGSE rack<br>▪ Verify continuity between ground connector of EWC30 and copper bar of CEGSE rack. | | | |
| 16 | 5 | EXE | Ground X-Band Filter. | X-Band Filter grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the X-Band Filter is properly adjusted.<br>▪ Connect ground wire from X-Band Filter to copper bar of CEGSE rack<br>▪ Verify Continuity between X-Band Filter and copper bar of CEGSE rack. | | | |
| 16 | 6 | EXE | VBus grounding resistance measurement. | $R \approx 2K\Omega$ | | |
| | | DET | ▪ Set the multimeter to measure resistance.<br>▪ Connect the multimeter probes to measure resistance between negative terminal of Keysight power supply and copper bar of CEGSE. | | | |

## 17 BB harness connection to Ad-hoc box

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 17 | 1 | EXE | Connect **H-EGSE-DUT-J12_001** harness from EMI/EMC filter to Ad-hoc box | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** harness to connector J100 of the Ad-hoc box | | | |
| 17 | 2 | EXE | Connect **H-EGSE-DUT-J2_001** harness form EWC30 to Ad-hoc box. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J2_001** harness to connector J200 of the Ad-hoc box | | | |
| 17 | 3 | EXE | Connect **H-EGSE-DUT-J3_001** harness form EWC30 to Ad-hoc box. | Harness connected | | |

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| | | DET | Connect **H-EGSE-DUT-J3_001** harness to connector J201A and J201B of the Ad-hoc box | | | |
| 17 | 4 | EXE | Take photos of the setup and DUT connections. | Photos taken. | | |
| | | DET | Take photos of setup and DUT connections. | | | |
| **18** | **RF connection to CEGSE and GS-GSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 18 | 1 | EXE | Connect W3 cable between Coupler Port and EWC30 port of CEGSE. | Cable W3 connected between ports. | | |
| | | DET | ▪ Disconnect the 50 ohm load from the EWC30 Port of CEGSE.<br>▪ Connect W3 cable between Coupler Port and EWC30 Port. | | | |
| 18 | 2 | EXE | Connect XRF4.02 cable to GS-GSE Data [X-Band] interface. | Cable XRF4.02 connected to GS-GSE Data [X-Band] interface. | | |
| | | DET | ▪ Connect XRF4.02 cable to interface GS-GSE Data [X-Band] (N1)interface if **EWC30-FM1** is under test.<br>▪ Connect XRF4.02 cable to interface GS-GSE Data [X-Band] (N2)interface if **EWC30-FM2** is under test. | | | |
| 18 | 3 | EXE | Connect XRF4.02 cable to IN/OUT Port of CEGSE. | Cable XRF4.02 connected to IN/OUT Port. | | |
| | | DET | ▪ Disconnect the 50 ohm load from the IN/OUT Port of CEGSE.<br>▪ Connect XRF4.02 cable to the IN/OUT Port of CEGSE. | | | |
| **19** | **Power-on CEGSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 19 | 1 | EXE | Turn on the main switch of the Ad-Hoc box. | The main switch light must be turned on | | |
| | | DET | Turn on the main switch of the Ad-Hoc box. | | | |
| 19 | 2 | EXE | Verify Keysight power supply configuration | V LIMIT = 28 V<br>I LIMIT = 3 A<br>OVP = 34 V<br>UVP = 22 V | | |

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| | | DET | In front pannel of power supply:<br>▪ press "LIMIT" button to read voltage and current limits.<br>▪ press one time "OVP/UVP" button to read OVP limit<br>▪ press two times "OVP/UVP" button to read UVP limit.<br>**Note:** Adjust the value of I LIMIT if it is not the expected one. Press "LIMIT" and turn the current knob to adjust. | | | |
| 19 | 3 | EXE | Enable power supply output of CEGSE. | The LED indicator of the OUT ON output is ON. | | |
| | | DET | Press the OUT ON button to enable the power supply output.<br>Verify that the OUT ON LED indicator turns on when pressing the button. | | | |
| 19 | 4 | EXE | Turn on the PSU switch of the Ad-Hoc box. | PSU LED indicator should turn on | | |
| | | DET | Turn on the PSU by pressing the switch in the center of the Ad-Hoc box.<br>Verify that the LED on the PSU has turned on when the switch is turned on. | | | |
| 19 | 5 | EXE | Power on PXI computer. | PXI on. | | |
| | | DET | Connect the PXI to power supply and turn it on | | | |
| 19 | 6 | EXE | **RDP connection** to CEGSE from Thin client **Operator Workstation DataA**. | Thin Client **OW DATA A** connected to CEGSE | | |
| | | DET | From the Operator Workstation DataA open the Remote Desktop Connection and connect to IP: 192.168.75.211<br>▪ `User: EGSE COM`<br>▪ `Password: Conae1234` | | | |

## 20 Collect Evidences

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 20 | 1 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-F-012-01 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-F-012/SB1FS-COM-F-012-01 directory.<br>▪ Paste the copied folder. | | | |

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| 20 | 2 | EXE | Save evidence photos | Evidence photos saved | | |
| | | DET | Create **pictures** folder on C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-01 save all photos taken during the DUT connections. | | | |
| **21** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 21 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify that the environmental temperature level in the test site is according to the required levels. | | | |
| 21 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity in the test site. | | | |

Table 5.1.0-1: SB1FS-COM-F-012-01 procedure.

## 5.2. SB1FS-COM-F-012-02 Aliveness and Functional Test

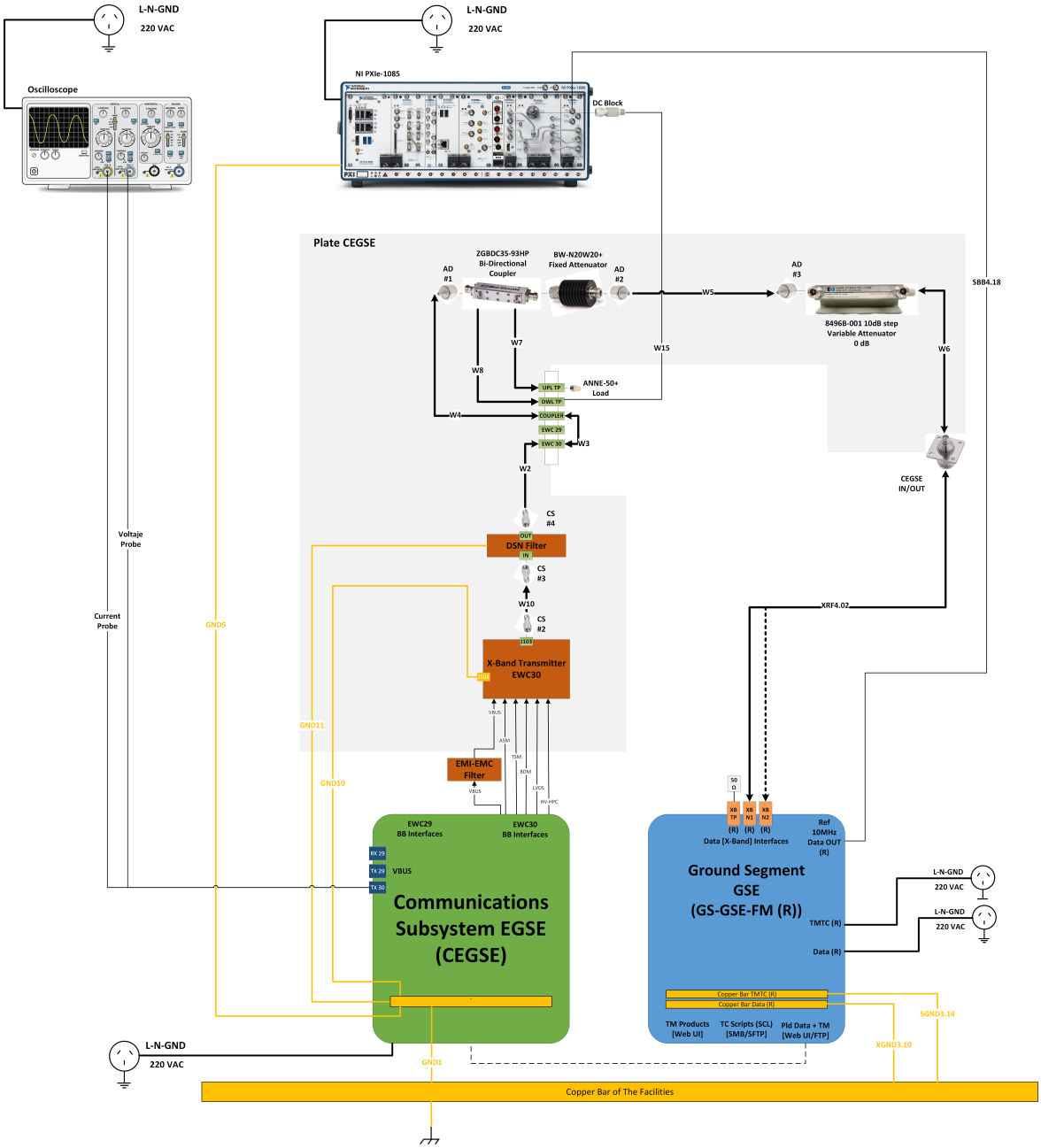


Figure 5.2.0-1: Aliveness and functional test setup.

| SB1FS-COM-F-012-02 Aliveness and Functional Test | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify that the environmental temperature level in the test site is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity in the test site. | | | |
| 2 | **Preparation of GS-GSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Enable **N1** interface in the **X-Band Matrix and Attenuator**. | N1 interface enabled. | | |
| | | DET | Note: Skip this step if **EWC30-FM2** is under test.<br><br>In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Press the **Nadir 1 to Down Converters** button.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **bottom** indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **bottom** indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 2 | 2 | EXE | Enable **N2** interface in the **X-Band Matrix and Attenuator**. | N2 interface enabled. | | |
| | | DET | Note: Skip this step if **EWC30-FM1** is under test.<br><br>In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Press the **Nadir 2 to Down Converters** button.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **top** indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **top** indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |

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| 2 | 3 | EXE | Open **Vector**, **Spectrum** and **Recording Global** tabs in Cortex HDR. | Tabs open. | | |
| | | DET | Go to MCS Cortex (192.168.75.161), in the **Global** window, do the following:<br>■ Open Vector tab.<br>• Click in **DMU-1** (Demodulator Unit 1).<br>• In the displayed window go to vector tab, select cumulative option and press enable button<br>■ Open Spectrum<br>• Click in **DMU-1** (Demodulator Unit 1).<br>• In the displayed window go to Spectrum tab and press enable button.<br>■ Open Recording Global<br>• Click in **DRU-1** (Data Recording Unit 1).<br>• In the displayed window go to Recording Global tab. | | | |
| **3** | **PXI Spectrum Analyzer connection** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Connect W15 cable to DWL TP of CEGSE. | W15 connected to DWL TP. | | |
| | | DET | ■ Disconnect the 50 ohm load from the DWL TP of CEGSE.<br>■ Connect W15 cable to the DWL TP of CEGSE. | | | |
| 3 | 2 | EXE | Connect W15 cable to DC Block. | Cable connected. | | |
| | | DET | ■ Connect the end W15 cable to DC Block (this is connected to the RF IN of PXI). | | | |
| **4** | **Instrument configuration** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Start PXI spectrum analyzer. | PXI spectrum analyzer started. | | |
| | | DET | Start PXI spectrum analyzer by clicking on the **NI RFSA Soft Front Panel(64-bit)** icon on the desktop. | | | |
| 4 | 2 | EXE | Configure PXI spectrum analyzer. | PXI spectrum analyzer configured. | | |
| | | DET | ■ Load the configuration file from the `C:/USERS/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-F-012/NI-RFSA-data-config` directory.<br>• **NI-RFSA-Data-N1.tdms if EWC30-FM1 is under test**<br>• **NI-RFSA-Data-N2.tdms if EWC30-FM2 is under test**<br>■ Select the external reference: **Device/System** -> **Freq Ref Scr** -> **Ref In** | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 3 | EXE | Configure band power measurement in PXI spectrum analyzer. | PXI spectrum analyzer configured. | | |
| | | DET | Go to **NI RFSA Soft Fron Panel** and do the following:<br>▪ Click on **Meas**, **Channel Power** and enter 195 MHz in **Bandwidth** field.<br>▪ Click **Meas, Channel Power** and enter 100 in **Number of Averages** field. | | | |
| **5** | **EGSE Settings** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB. | Attenuation in 0 dB. | | |
| | | DET | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB attenuation position. | | | |
| **6** | **CEGSE SW Initialization** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | ▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-F-012-02" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |
| **7** | **DUT Power On** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | Verify EWC-30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 7 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 7 | 3 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-ON.set** from **osc-config** folder in the pendrive. | | | |
| 7 | 4 | EXE | Press "SINGLE" button | "SINGLE" button light is on | | |
| | | DET | On oscilloscope press "SINGLE" button. | | | |
| 7 | 5 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 7 | 6 | EXE | Take screenshot of captured signals. | `<filename.png>` saved. | | |
| | | DET | Take the screenshot of the oscilloscope by pressing save button. Take note the saved file name. | | | |
| 7 | 7 | EXE | Measure inrush current on CH1 using cursors of oscilloscope. | screenshots saved | | |
| | | DET | ▪ Take screenshot of peak-current measurement. Take note of the file name.<br>▪ Take screenshot of peak-current duration. Take note of the file name. | | | |
| 7 | 8 | EXE | Save Waveforms. | Waveforms saved | | |
| | | DET | On oscilloscope:<br>▪ Press **menu** in save/recall.<br>▪ Push **Save waveform** from the lower-bezel menu.<br>▪ In Source select **all waveforms** using knob A<br>▪ In destination select **File** option.<br>▪ Press **Files details** and press **ISF format**.<br>▪ Select **Removable media E:** using knob A.<br>▪ In side-bezel menu press **OK (save)**.<br>▪ Take note of the saved file name. | | | |
| 7 | 9 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 7 | 10 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28V$<br>I < 282 mA | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 7 | 11 | EXE | Verify TX power consumption. | P ≈ 8 W@standby | | |
| | | DET | Verify that product between high measurements for **CH1** and **CH2** is approximately expected value. | | | |
| **8** | **Verify DUT Telemetry** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | Verify O_SEC_V_RF value | 4.31 V < GUI value < 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 8 | 2 | EXE | Verify O_SEC_V_NUM value | 3.3 V < GUI value < 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 8 | 3 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR < 0.5 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 8 | 4 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 8 | 5 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = OFF | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 8 | 6 | EXE | Check Locked status of the base band PLL | 0_MMU_CLK_STATUS = OFF | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to SBDL& BDM tab on CEGSE GUI and verify 0_MMU_CLK_STATUS status. | | | |
| 8 | 7 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| **9** | **File generation for data transmission** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Generate down link file | file generated | | |
| | | DET | ▪ On CEGSE GUI select COMM tab, then select DOWNLINK tab.<br>▪ Set VCID to 1 (RT HK TM)<br>▪ Set "Idle before" to 1330000 (≈180 seconds).<br>▪ Set "Idle after" to 1330000.<br>▪ Press to Folder icon of the “Downlink Payload File” section.<br>▪ Select payload file C:\Users\EGSE COM\Documents\ COMM-SS-FM\SB1FS-COM-F-012**Data-885840_120s_VCh01_payload.bin** and press OK.<br>▪ Press "Generate Downlink File" button.<br>▪ Wait until stage shows "Generated File" and "Generating File" indicator is off (15 minutes). | | | |
| **10** | **Ripple voltage and current measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 10 | 2 | EXE | Start data transmission through the **main HV-HPC** interface | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that **stage** box does not show **Sending X Band File** message.<br>▪ Switch file selector to **Send Generated Downlink File**<br>▪ Place the switch in **I_STBY_2_OPE_M**<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that **stage** box shows **Sending X Band File**. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 10 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 10 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 10 | 6 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I $\approx$ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |
| 10 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RIPPLE.set** from **osc-config** folder in the pendrive. | | | |
| 10 | 8 | EXE | Stop acquisition | Acquisition stopped | | |
| | | DET | Press the **Run**/**Stop** button on the oscilloscope. | | | |
| 10 | 9 | EXE | Take screenshot of captured signals. | `<filename.png>` saved. | | |
| | | DET | Take the screenshot of the oscilloscope by pressing save button. Take note the saved file name. | | | |
| 10 | 10 | EXE | Save Waveforms. | Waveforms saved | | |
| | | DET | On oscilloscope:<br>▪ Press **menu** in save/recall.<br>▪ Push **Save waveform** from the lower-bezel menu.<br>▪ In Source select **all waveforms** using knob A<br>▪ In destination select **File** option.<br>▪ Press **Files details** and press **ISF format**.<br>▪ Select **Removable media E:** using knob A.<br>▪ In side-bezel menu press **OK (save)**.<br>▪ Take note of the saved file name. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 11 | EXE | Start acquisition | Acquisition started | | |
| | | DET | Press the **Run**/**Stop** button on the oscilloscope. | | | |
| 10 | 12 | EXE | Change oscilloscope time settings. | Oscilloscope configured. | | |
| | | DET | Change time setting to 200 $\mu s/div$ on the oscilloscope. | | | |
| 10 | 13 | EXE | Stop acquisition | Acquisition stopped | | |
| | | DET | Press the **Run**/**Stop** button on the oscilloscope. | | | |
| 10 | 14 | EXE | Take screenshot of captured signals. | `<filename.png>` saved. | | |
| | | DET | Take the screenshot of the oscilloscope by pressing save button. Take note the saved file name. | | | |
| 10 | 15 | EXE | Save Waveforms. | Waveforms saved | | |
| | | DET | On oscilloscope:<br>▪ Press **menu** in save/recall.<br>▪ Push **Save waveform** from the lower-bezel menu.<br>▪ In Source select **all waveforms** using knob A<br>▪ In destination select **File** option.<br>▪ Press **Files details** and press **ISF format**.<br>▪ Select **Removable media E:** using knob A.<br>▪ In side-bezel menu press **OK (save)**.<br>▪ Take note of the saved file name. | | | |
| 10 | 16 | EXE | Verify of peak to peak current and voltage measurement of TX on oscilloscope. | $\Delta V < 542\ mVpp$<br>$\Delta I < 750\ mApp$ | | |
| | | DET | ▪ Verify that measurements for CH1 and CH2 are as expected. | | | |

| 11 | **Ripple current measurement** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | Connect measurement probe to **H-EGSE-DUT-J12_001** harness | Probe connected according to detail. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Connect CH1 current probe to the 7 positive wires (+V) of the **H-EGSE-DUT-J12_001** harness.<br>**Note:** When the current tip is placed in the cables of harness the arrow on the current tip should point from EMI/EMC filter to DUT. | | | |
| 11 | 2 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RIPPLE.set** from **osc-config** folder in the pendrive. | | | |
| 11 | 3 | EXE | Stop acquisition | Acquisition stopped | | |
| | | DET | Press the **Run**/**Stop** button on the oscilloscope. | | | |
| 11 | 4 | EXE | Take screenshot of captured signals. | `<filename.png>` saved. | | |
| | | DET | Take the screenshot of the oscilloscope by pressing save button. Take note the saved file name. | | | |
| 11 | 5 | EXE | Save Waveforms. | Waveforms saved | | |
| | | DET | On oscilloscope:<br>▪ Press **menu** in save/recall.<br>▪ Push **Save waveform** from the lower-bezel menu.<br>▪ In Source select **all waveforms** using knob A<br>▪ In destination select **File** option.<br>▪ Press **Files details** and press **ISF format**.<br>▪ Select **Removable media E:** using knob A.<br>▪ In side-bezel menu press **OK (save)**.<br>▪ Take note of the saved file name. | | | |
| 11 | 6 | EXE | Start acquisition | Acquisition started | | |
| | | DET | Press the **Run**/**Stop** button on the oscilloscope. | | | |
| 11 | 7 | EXE | Change oscilloscope time settings. | Oscilloscope configured. | | |
| | | DET | Change time setting to 200 $\mu s/div$ on the oscilloscope. | | | |
| 11 | 8 | EXE | Stop acquisition | Acquisition stopped | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Press the **Run**/**Stop** button on the oscilloscope. | | | |
| 11 | 9 | EXE | Take screenshot of captured signals. | `<filename.png>` saved. | | |
| | | DET | Take the screenshot of the oscilloscope by pressing save button. Take note the saved file name. | | | |
| 11 | 10 | EXE | Save Waveforms. | Waveforms saved | | |
| | | DET | On oscilloscope:<br>▪ Press **menu** in save/recall.<br>▪ Push **Save waveform** from the lower-bezel menu.<br>▪ In Source select **all waveforms** using knob A<br>▪ In destination select **File** option.<br>▪ Press **Files details** and press **ISF format**.<br>▪ Select **Removable media E:** using knob A.<br>▪ In side-bezel menu press **OK (save)**.<br>▪ Take note of the saved file name. | | | |
| 11 | 11 | EXE | Verify of peak to peak current measurement of TX on oscilloscope. | $\Delta I < 750\ mApp$ | | |
| | | DET | ▪ Verify that measurement for CH1 is as expected. | | | |
| 11 | 12 | EXE | Connect measurement probes to the AD-HOC box | Probes connected according to detail. | | |
| | | DET | ▪ Connect CH1 current probe to measure EWC30 TX.<br>▪ Connect CH2 differential probe to measure EWC30 TX.<br>**Note:** When the current tip is placed in the ad-hoc box the arrow on the current tip should point to the left. | | | |
| 11 | 13 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 11 | 14 | EXE | Send command standby to change Tx status to I_OPE_2_STBY_M | command sent | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **standby** button. Button turns green during 0.6 seconds. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 15 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 11 | 16 | EXE | Stop DUT transmission. | Transmission stopped. | | |
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** sub-tab.<br>▪ Press **Stop** button.<br>▪ Verify that **TxFinished** indicator in **ON**. | | | |
| **12** | **RF measurements with the PXI Spectrum Analyzer and Data Downlink test** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 12 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 12 | 2 | EXE | Start data transmission through the **redundant HV-HPC** interface | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that **stage** box does not show **Sending X Band File** message.<br>▪ Switch file selector to **Send Generated Downlink File**<br>▪ Place the switch in **I_STBY_2_OPE_R**<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that **stage** box shows **Sending X Band File**. | | | |
| 12 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 12 | 4 | EXE | Verify locked status in Cortex HDR | PLL, B/S, Viterbi and F/S are locked and stable. | | |

| | | | | | | |
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| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) do the following:<br>▪ From Recording Global tab of **DRU-1** (Data Recording Unit 1)<br>• Verify that **PLL** is locked.<br>• Verify that **B**/**S** is locked.<br>• Verify that **F**/**S** is locked.<br>▪ From Vector or Spectrum tab of **DMU-1** (Demodulator Unit 1)<br>• Verify that **Viterbi** is Locked.<br><br>Verify for 15 seconds that none of them unlock. | | | |
| 12 | 5 | EXE | Start ingestion in **Cortex HDR** of **GS-GSE** | Ingestion started | | |
| | | DET | In Cortex MCS (192.168.75.161) do the following:<br>▪ In the **Global** window, click on the DRU-1.<br>▪ In the **Recording Global** window of DRU-1, click on **Start Recording** (Red button).<br>▪ Verify that the sign **Recording in Progress. Awaiting for Stop Command** appears in green. | | | |
| 12 | 6 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 12 | 7 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 12 | 8 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 12 | 9 | EXE | Check Locked status of the base band PLL | 0_MMU_CLK_STATUS = ON | | |
| | | DET | Go to SBDL& BDM tab on CEGSE GUI and verify 0_MMU_CLK_STATUS status. | | | |
| 12 | 10 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 12 | 11 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I ≈ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |
| 12 | 12 | EXE | Measure modulated power. | $P_{out} = 40\ dBm \pm 1dB.$ | | |
| | | DET | Go to **NI RFSA Soft Front Panel** and do following:<br>▪ Wait until Avgs = 100/100<br>▪ See **Measurement: Channel Power** and verify that the measured meet the expected value. | | | |
| 12 | 13 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | Take screenshot (use paint) and save it in `C:/USERS/EGSE COM/Documents/COMM-SS-FM-FT/<session_ID>/SB1FS-COM-F-012/SB1FS-COM-F-012-02/screenshot-pxi` directory | | | |
| 12 | 14 | EXE | Configure Occupied Bandwidth measurement in PXI spectrum analyzer. | PXI spectrum analyzer configured. | | |
| | | DET | Go to **NI RFSA Soft Front Panel** and do the following:<br>▪ Click on **Meas**, **Occupied Bandwidth** and enter 99 % in **OBW Power** field.<br>▪ Click **Meas, Occupied Bandwidth** and enter 100 in **Number of Averages** field. | | | |
| 12 | 15 | EXE | Measure Occupied Bandwidth at 99 %. | $OBW_{99\,\%} \approx 205\ MHz$ | | |
| | | DET | Go to **NI RFSA Soft Front Panel** and do following:<br>▪ Wait until Avgs = 100/100<br>▪ See **Measurement: Occupied Bandwidth** and verify that the measured meet the expected value. | | | |
| 12 | 16 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | Take screenshot (use paint) and save it in `C:/USERS/EGSE COM/Documents/COMM-SS-FM-FT/<session_ID>/SB1FS-COM-F-012/SB1FS-COM-F-012-02/screenshot-pxi` directory | | | |

| | | | | | | |
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| 12 | 17 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |
| 12 | 18 | EXE | Stop ingestion in **Cortex HDR** of **GS-GSE** | Ingestion stopped | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Recording Global** window of DRU-1 and in the **Recorder Programming** field click on **Stop Recording** button. | | | |
| 12 | 19 | EXE | Verify LO leakage frequency. | ≈ 8106 MHz for **EWC30-FM1**<br>≈ 8269 MHz for **EWC30-FM2** | | |
| | | DET | Go to **NI RFSA Soft Front Panel** and do following:<br>▪ Click on **Meas**, then on **All Meas Off**<br>▪ Click on **BW**, then on **FFT Windows**<br>▪ Select **FFT flat top**<br>▪ Press the **Peak Search** button<br>▪ Wait until Avgs = 100/100<br>▪ See in window the **frequency** and verify that the measured meet the expected value. | | | |
| 12 | 20 | EXE | Send command standby to change Tx status to I_OPE_2_STBY_R | command sent | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **standby** button. Button turns green during 0.6 seconds. | | | |
| 12 | 21 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

| 13 | **Verify received data** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 13 | 1 | EXE | Verify number of frames received in VCh63 by **Cortex HDR** | ≈ 2457000 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of DRU-A and verify that the **Total TM Block** column for **VC Sort value = 63** has the expected value.<br>**Note:** The HV-HPC command to switch to operation mode occurs 5 seconds after pressing the "send" button. Switching from standby to operational takes 2.5 seconds. 15 seconds of stable engagement is expected in the Cortex HDR. The start of ingestion takes approximately 5 seconds. This causes at least 203000 idle frames to be lost. | | | |

| | | | | | | |
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| 13 | 2 | EXE | Verify number of frames received in VCh01 by **Cortex HDR** | VCh01 ≈ 885840 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of Data Recording Unit 1 (DRU-1) and verify that the **Total TM Block** column for **VC Sort value = 1** has the expected value. | | | |
| 13 | 3 | EXE | Start DATA RF flow on GS-GSE-FM (R) | DATA RF flow started. | | |
| | | DET | From SABIA-Mar Ground Segment web, click the **Status Monitor** icon, in the open tab do the following:<br>▪ Click on the button on the left and select **New Activity**.<br>▪ In the displayed window<br>• Click on the icon corresponding to **data-rf-n1** if **EWC30-FM1** is under test.<br>• Click on the icon corresponding to **data-rf-n2** if **EWC30-FM2** is under test.<br>▪ Enter 1800 and then click on the **Confirm** button.<br>▪ Click on the **Instant** button and then click on the **Confirm** button.<br>▪ Click on the **Ok** button.<br>▪ Finally verify in **Timeline View** that **DATA RF flow** has started. | | | |
| 13 | 4 | EXE | Wait until **Start Data RF flow** execution is finished. | Data RF flow finished. | | |
| | | DET | On the web browser go to **Status Monitor** tab, identify the current flow **data-gse-flow-rf-n1** (or **data-gse-flow-rf-n2**) and wait until the flow ends. This takes approximately 6 minutes. | | | |
| 13 | 5 | EXE | Login to Configuration Control Manager from CEGSE | | | |
| | | DET | From PXI computer (192.168.75.211), open the FireFox browser and access to Configuration Control Manager web with the following parameters:<br>▪ URL: http://192.168.75.104:6080<br>▪ User: operator-conae<br>▪ Password: operator-conae | | | |
| 13 | 6 | EXE | Go to Products section in CCM. | Products window is shown | | |
| | | DET | On CCM web click the number in the PRODUCTS section. | | | |
| 13 | 7 | EXE | Find last XBand Product for VC01 in CCM | product available | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | On CCM web sort products by date to see newer product at the top. Identify the following XBand Product corresponding to this execution.<br>▪ SB1_XBandN**<X>**VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>Where <X> is 1 if **EWC30-FM1** is under test and 2 if **EWC30-FM2** is under test. | | | |
| 13 | 8 | EXE | Download identified products | products downloaded | | |
| | | DET | ▪ Download identified products by pressing download icon.<br>▪ Move downloaded products to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-02\ folder | | | |
| 13 | 9 | EXE | Remove Transport Layer | VC ID = 1<br>#Frames = 885840<br>Generated File = On | | |
| | | DET | ▪ Execute TM_Downlink_File_to_Payload_File_Converter from Desktop icon.<br>▪ Press the folder icon next to “File path to read” and select the downloaded file on C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-02 folder.<br>▪ In “Telemetry Selector”, select X Band<br>▪ Press the folder icon next to “Destination directory path” and select the C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-02 folder.<br>▪ Press the “Remove Transport Layer” button to create the final file to be compared | | | |
| 13 | 10 | EXE | Compare payload files | Files are equals | | |
| | | DET | On PXI computer:<br>▪ Open Winmerge Software.<br>▪ Press Ctrl + O<br>▪ Select as first file the file C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012**Data-885840_120s_VCh01_payload.bin**<br>▪ Select as second payload file the file C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-02\ **EWC30_payload_received_<yyyymmddTHHMMSS>.bin**<br>▪ Press "compare" button on winmerge GUI.<br>▪ Press "yes" to confirme that winmerge only show the comparison results. | | | |

| 14 | DUT Turn Off | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 14 | 1 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-OFF.set** from **osc-config** folder in the pendrive. | | | |
| 14 | 2 | EXE | Press "SINGLE" button | "SINGLE" button light is on | | |
| | | DET | On oscilloscope press "SINGLE" button. | | | |
| 14 | 3 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 14 | 4 | EXE | Take screenshot of captured signals. | `<filename.png>` saved. | | |
| | | DET | Take the screenshot of the oscilloscope by pressing save button. Take note the saved file name. | | | |
| 14 | 5 | EXE | Measure power-down current on CH1 using cursors of oscilloscope. | screenshots saved | | |
| | | DET | ▪ Take screenshot of power-down curve duration. Take note of the file name. | | | |
| 14 | 6 | EXE | Save Waveforms. | Waveforms saved | | |
| | | DET | On oscilloscope:<br>▪ Press **menu** in save/recall.<br>▪ Push **Save waveform** from the lower-bezel menu.<br>▪ In Source select **all waveforms** using knob A<br>▪ In destination select **File** option.<br>▪ Press **Files details** and press **ISF format**.<br>▪ Select **Removable media E:** using knob A.<br>▪ In side-bezel menu press **OK (save)**.<br>▪ Take note of the saved file name. | | | |

| 15 | CEGSE SW Shutdown | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 15 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |

| 16 | Collect Evidences | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 16 | 1 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-F-012-02 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-F-012/SB1FS-COM-F-012-02 directory.<br>▪ Paste the copied folder. | | | |
| 16 | 2 | EXE | Copy oscilloscope screen-shots and .ISF files to CEGSE. | files copied. | | |
| | | DET | Unplug the pendrive from USB port of oscilloscope<br>Plug the pendrive to USB port of CEGSEIn the CEGSE, open the file explorer and do the following:<br>▪ Go to pen-drive folder.<br>▪ Copy all folder content.<br>▪ Go to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID><br>▪ Paste the copied files.<br>Unplug the pendrive to USB port of CEGSE | | | |
| 16 | 3 | EXE | Get temperature and humidity data from datalogger. | Datalogger data obtained | | |
| | | DET | Download datalogger from the web: https://webstorage-service.com/member/login.php<br>With credentials:<br>▪ User: tdgb6655<br>▪ Password: Sabi4M4r<br>To do this, execute the following steps:<br>▪ Click on SABIAMAR1 in Watch list<br>▪ In the displayed window, click on Menu and then on csv.<br>▪ Download the file .csv.<br>▪ Save the file downloaded in the test evidence directory of PXI: C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-02. | | | |

| 17 | **Final Steps** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 17 | 1 | EXE | Set the redundant side of the GS-GSE in the **XBMA**. | Selected redundant GS-GSE. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Go to the **Nadir 1 Transfer Switch Control** field and press the **Nadir 1 to Redundant 1** button.<br>▪ Go to the **X-Band Matrix and AttenuatorControl Diagram** field and verify that the upper indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **Nadir 2 Transfer Switch Control** field and press the **Nadir 2 to Redundant 2** button.<br>▪ Go to the **X-Band Matrix and AttenuatorControl Diagram** field and verify that the bottom indicator of the **N2 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **Interface Status** field and select **Monitor**. | | | |
| 17 | 2 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify that the environmental temperature level in the test site is according to the required levels. | | | |
| 17 | 3 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity in the test site. | | | |
| 17 | 4 | EXE | Disconnect W15 cable from DWL Test Port of CEGSE. | W15 disconnected from DWL Test Port. DWL Test Port with RF load. | | |
| | | DET | ▪ Disconnect W15 cable from the DWL Test Port of CEGSE.<br>▪ Connect the 50 ohm load fto the DWL Test Port of CEGSE. | | | |
| 17 | 5 | EXE | Disconnect W15 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | ▪ Disconnect the end W15 cable from DC Block (This is connected to RF IN of PXI). | | | |
| 17 | 6 | EXE | Close PXI spectrum analyzer. | PXI spectrum analyzer closed. | | |
| | | DET | Close **NI RFSA Soft Front Panel(64-bit)**. | | | |

Table 5.2.0-1: Procedure SB1FS-COM-F-012-02 table.

## 5.3. SB1FS-COM-F-012-03 Tests setup break

| SB1FS-COM-F-012-03 Tests setup break | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **CEGSEpower off (PXI and Ad-Hoc Box)** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify that the CEGSE SW is not running. | CEGSE SW is not running. | | |
| | | DET | In CEGSE verify that the CEGSE SW is not running. | | | |
| 1 | 2 | EXE | Turn off the PSU switch of the Ad-Hoc box. | PSU LED indicator should turn off | | |
| | | DET | Turn off the PSU by pressing the switch in the center of the Ad-Hoc box.<br>Verify that the LED on the PSU has turned off when the switch is turned off. | | | |
| 1 | 3 | EXE | Disable power supply output of CEGSE. | The LED indicator of the OUT ON output should go out. | | |
| | | DET | Press the OUT ON button to disable the power supply output.<br>Verify that the OUT ON LED indicator turns off when pressing the button to disable the output. | | | |
| 1 | 4 | EXE | Turn off the main switch of the Ad-Hoc box. | The main switch light must be turned off | | |
| | | DET | Turn off the main switch of the Ad-Hoc box. | | | |
| 1 | 5 | EXE | Power off PXI. | PXI off. | | |
| | | DET | From the CEGSE KVM shutdown the PXI. | | | |
| 1 | 6 | EXE | Disconnect the external reference signal from PXI and GS-GSE. | Reference signal disconnected. | | |

| | | |
|---|---|---|
| | DET | ▪ Disconnect cable SBB4.18 from the **REF IN** port of the NI PXIe-5653 module.<br>▪ Disconnect other end of cable SBB4.18 from Power Splitter Data port. |

## 2 Disconnection of BB interfaces

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 2 | 1 | EXE | Disconnect harness **H-EGSE-DUT-J12_001** from EWC30 | Harness disconnected | | |
| | | DET | Disconnect harness **H-EGSE-DUT-J12_001** from connector J100 of EWC30 | | | |
| 2 | 2 | EXE | Disconnect **H-EGSE-DUT-J12_001** harness from **output** EMI/EMC filter. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J12_001** harness from **output** EMI/EMC filter. | | | |
| 2 | 3 | EXE | Disconnect **H-EGSE-DUT-J11_001** harness from **input** EMI/EMC filter. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J11_001** harness from **input** EMI/EMC filter. | | | |
| 2 | 4 | EXE | Disconnect harness **H-EGSE-DUT-J11_001** from Ad-hoc box | Harness disconnected | | |
| | | DET | Disconnect harness **H-EGSE-DUT-J11_001** from connector J100 of Ad-hoc box | | | |
| 2 | 5 | EXE | Disconnect harness H-EGSE-DUT-J2_001 from EWC30 and the Ad-Hoc box | harness disconnected | | |
| | | DET | ▪ Disconnect **H-EGSE-DUT-J2_001** harness from connector saver J200 of the EWC30<br>▪ Disconnect **H-EGSE-DUT-J2_001** harness from connector(s) J200 of the ad-hoc box. | | | |
| 2 | 6 | EXE | Disconnect harness H-EGSE-DUT-J3_001 from EWC30 and the Ad-Hoc box | harness disconnected | | |
| | | DET | ▪ Disconnect **H-EGSE-DUT-J3_001** harness from connector saver J201 of the EWC30<br>▪ Disconnect **H-EGSE-DUT-J3_001** harness from connector(s) J201A and J201B of the ad-hoc box. | | | |

| 3 | Disconnection of RF Interfaces | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Disconnect W10 cable from IN Port of DSN Filter and J103 Port of EWC30. | Cable W10 disconnected from ports. | | |
| | | DET | ▪ Disconnect W10 cable from IN Port of DSN Filter and J103 Port of EWC30. | | | |
| 3 | 2 | EXE | Disconnect W2 cable from OUT Port of DSN Filter. | W2 Cable disconnected from OUT Port. | | |
| | | DET | ▪ Disconnect W2 cable to the OUT port of DSN Filter. | | | |
| 3 | 3 | EXE | Disconnect W3 cable between Coupler Port and EWC30 port of CEGSE. | Cable W3 disconnected between ports. | | |
| | | DET | ▪ Disconnect W3 cable between Coupler Port and EWC30 Port.<br>▪ Connect the 50 ohm load to the Coupler Port of CEGSE.<br>▪ Connect the 50 ohm load to the EWC30 Port of CEGSE. | | | |
| 3 | 4 | EXE | Disconnect XRF4.02 cable from IN/OUT Port of CEGSE. | Cable XRF4.02 disconnected from IN/OUT Port. | | |
| | | DET | ▪ Disconnect XRF4.02 cable to the IN/OUT Port of CEGSE.<br>▪ Connect the 50 ohm load from the IN/OUT Port of CEGSE. | | | |
| 3 | 5 | EXE | Disconnect XRF4.02 cable from GS-GSE Data [X-Band] interface. | Cable XRF4.02 disconnected from Data [X-band] interface. | | |
| | | DET | ▪ Disconnect XRF4.02 cable from GS-GSE Data [X-Band] (N1) or Data [X-Band] (N2) interface. | | | |
| 4 | Final Steps | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Get temperature and humidity data from datalogger. | Datalogger data obtained | | |

| | | |
|---|---|---|
| | DET | Download datalogger from the web: https://webstorage-service.com/member/login.php<br>With credentials:<br>▪ User: tdgb6655<br>▪ Password: Sabi4M4r<br>To do this, execute the following steps:<br>▪ Click on SABIAMAR1 in Watch list<br>▪ In the displayed window, click on Menu and then on csv.<br>▪ Download the file .csv.<br>▪ Save the file downloaded in the test evidence directory of PXI: C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-F-012\SB1FS-COM-F-012-03. |

Table 5.3.0-1: Procedure SB1FS-COM-F-012-03 table.

# 6. SB1FS-COM-P-013 Performance Test

This section details the test procedures for EWC30 transmitter. The figures 6.0.0-1 and 6.0.0-2 show the test setups. Solid lines are connections that apply to all downlink tests and dashed lines are connections that change from one test to another.

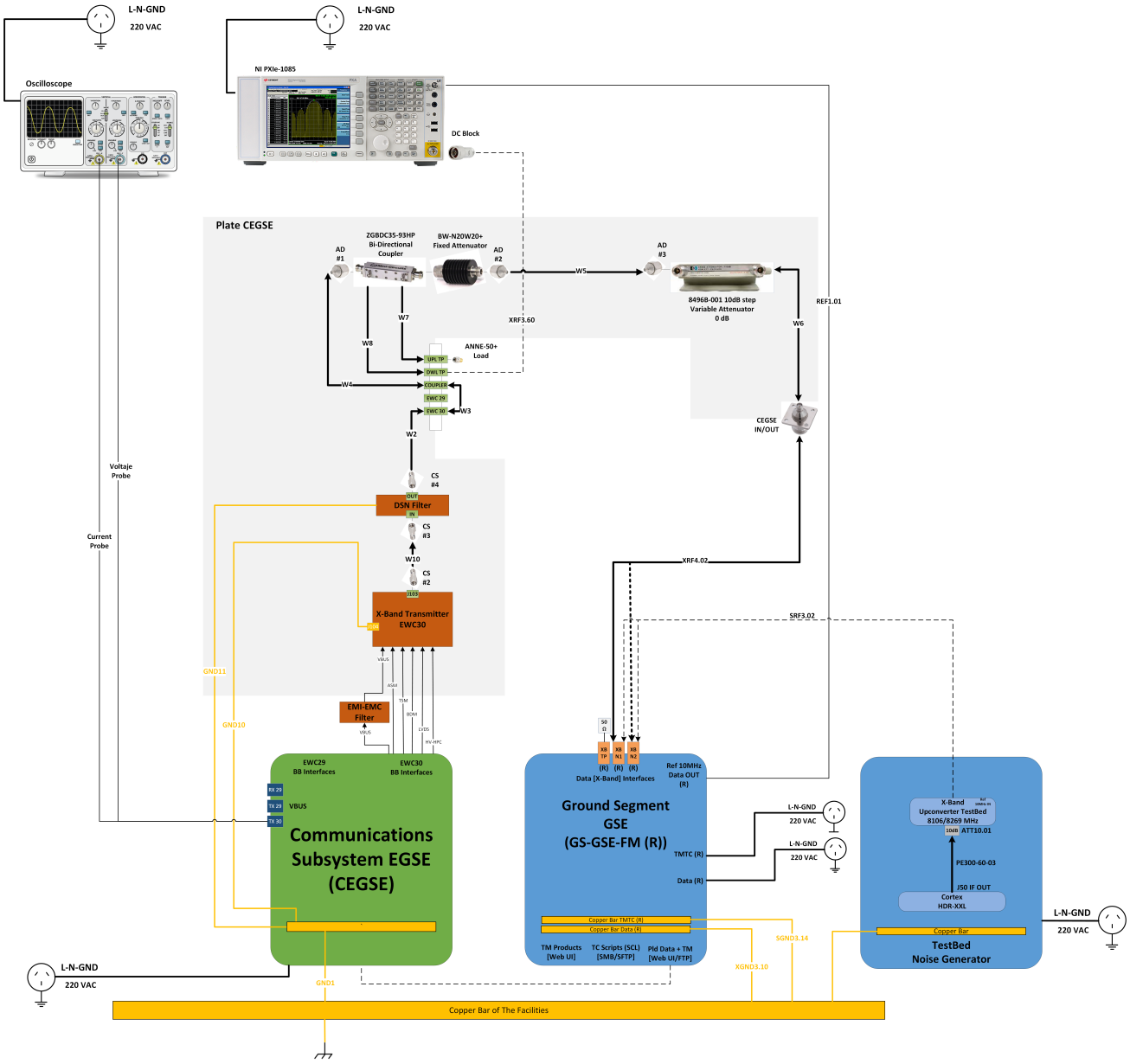



Figure 6.0.0-1: EWC30 Transmissions Test Setup

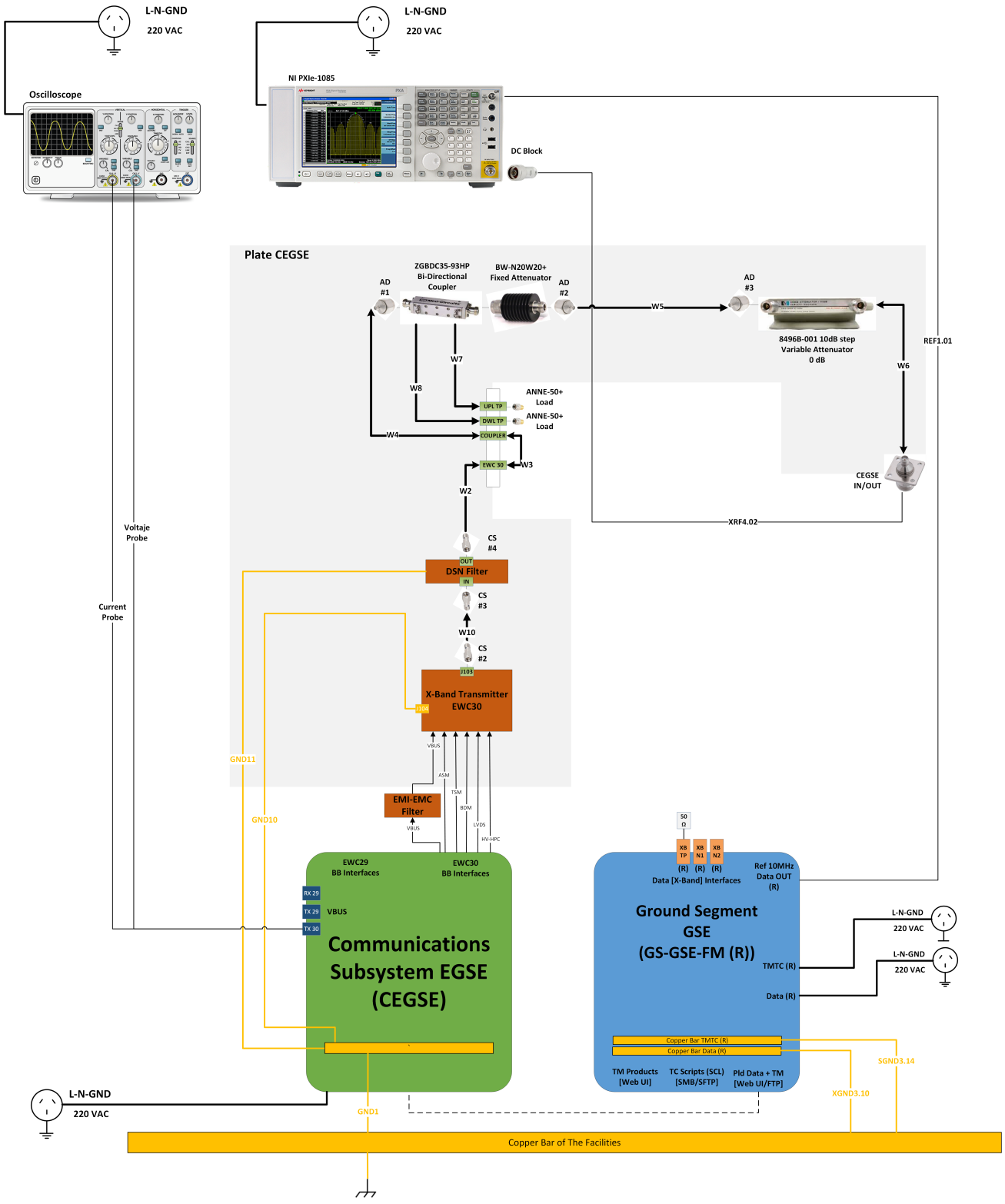



Figure 6.0.0-2: EWC30 Spurious in DSN Band Test Setup

## 6.1. SB1FS-COM-P-013-01 Setup and configuration

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-01 |
| **Task name** | Setup and configuration |
| **Task description** | This task includes:<br>▪ Aliveness of the CEGSE interfaces (CEGSE power off).<br>▪ Verification of the GS-GSE configuration.<br>▪ Measurement setup with oscilloscope.<br>▪ Connection of RF interfaces of EWC30<br>▪ Connection of BB cables between EWC30 and had-hoc box.<br>▪ CEGSE power on. |
| **Task purpose** | Verify CEGSE electrical interfaces. Connect EWC30 to test setup. Verify GS-GSE initial configuration. |
| **Success criteria** | ▪ Both instruments, CEGSE and GS-GSE, are configured according to procedure and CEGSE interfaces are in good condition.<br>▪ Evidences are collected. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1. |
| **Duration** | 150 minutes. |
| **Data sets required** | ▪ CEGSE PXI configuration file for aliveness (`INIT_FILE_NO_ALARM_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder |
| **Prerequisites** | ▪ CEGSEinitialized according to CEGSE user manual (AD.06).<br>▪ Execution of procedure SB1FS-COM-D-011 Initialization and dataset deploy.<br>▪ EWC30 and DSN filter mated with the connector savers (RF and BB).<br>▪ EWC30 and DSN filter mounted on CEGSE metal tray.<br>▪ EWC30 and DSN filter connected to grounding bar.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1 |

Table 6.1.0-1: Procedure SB1FS-COM-P-013 description.

| SB1FS-COM-P-013-01 Setup and configuration | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify that the environmental temperature level in the test site is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Take note the environmental humidity in the test site. | | | |
| 1 | 3 | EXE | Check that temperature an humidity datalogger is working. | Datalogger connected and working properly | | |
| | | DET | In the Datalogger device, check the following:<br>▪ **Temperature** is shown in LCD Screen<br>▪ **Humidity** is shown in LCD Screen<br>▪ Press **INTERVAL** button once and check Recording interval is **5** minutes.<br>▪ Press **INTERVAL** button twice and check Uploading interval is **15** minutes.<br>▪ **REC** Mark is shown in LCD Screen. | | | |
| **2** | **Verification of CEGSE setup.** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Verify BB harness connections. | BB harness conected. | | |
| | | DET | Verify BB harness connections between Ad-hox box and PXI match the EWC30 configuration. | | | |
| 2 | 2 | EXE | Verify Keysight power supply configuration | V LIMIT = 28 V<br>I LIMIT = 3 A<br>OVP = 34 V<br>UVP = 22 V | | |
| | | DET | In front pannel of power supply:<br>▪ press "LIMIT" button to read voltage and current limits.<br>▪ press one time "OVP/UVP" button to read OVP limit<br>▪ press two times "OVP/UVP" button to read UVP limit.<br>**Note:** Adjust the value of I LIMIT if it is not the expected one. Press "LIMIT" and turn the current knob to adjust. | | | |
| 2 | 3 | EXE | Measure COM-EGSE power supply output voltage. | $Voltage \approx 28\ V$ | | |
| | | DET | Set the multimeter to measure voltage and measure the voltage present on the rear terminals of the COM-EGSE power supply. | | | |
| **3** | **Connection of EMI/EMC filter to ad-hoc box** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Connect **H-EGSE-DUT-J11_001** harness to Ad-Hoc box. | Harness connected | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Connect **H-EGSE-DUT-J11_001** DB15 male connector to J100 connector of Ad-Hoc box. | | | |
| 3 | 2 | EXE | Connect **H-EGSE-DUT-J11_001** harness to EMI/EMC filter input. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J11_001** DB15 female connector to the EMI/EMC filter DB15 male connector. | | | |
| 3 | 3 | EXE | Connect **H-EGSE-DUT-J12_001** harness to EMI/EMC filter output. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** DB15 male connector to EMI/EMC filter output. | | | |
| 3 | 4 | EXE | Connect **H-EGSE-DUT-J12_001** harness to **H-EGSE-DUT-J13_001** harness. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** MDM15 female connector to **H-EGSE-DUT-J13_001** MDM15 male connector. | | | |
| 3 | 5 | EXE | Connect **H-EGSE-DUT-J13_001** harness to DB-15 BOB. | Harness connected to DB-15 BOB | | |
| | | DET | Connect **H-EGSE-DUT-J13_001** DB15 female connector to DB-15 BOB. | | | |

## 4 CEGSE SW Initialization

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 4 | 1 | EXE | Start CEGSE SW using EWC30 "no alarm" configuration file | SW running in EWC30 "no alarm" configuration | | |
| | | DET | ▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-01" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **"INIT_FILE_NO_ALARM_EWC30.ini"** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |

| 5 | EWC30 Vbus verification | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 5 | 2 | EXE | Measure VBus voltage on DB-15 BOB. | Voltage=28 V | | |
| | | DET | Measure voltage between the following pairs of pins of Break Out Box:<br>▪ Pin 1(+) and Pin 9(-)<br>▪ Pin 2(+) and Pin 10(-)<br>▪ Pin 3(+) and Pin 11(-)<br>▪ Pin 4(+) and Pin 12(-)<br>▪ Pin 5(+) and Pin 13(-)<br>▪ Pin 6(+) and Pin 14(-)<br>▪ Pin 7(+) and Pin 15(-) | | | |
| 5 | 3 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 5 | 4 | EXE | Disconnect **H-EGSE-DUT-J13_001** harness to DB-15 BOB. | Harness disconnected from DB-15 BOB | | |
| | | DET | Disconnect **H-EGSE-DUT-J13_001** DB15 female connector from DB-15 BOB. | | | |
| 5 | 5 | EXE | Disconnect **H-EGSE-DUT-J12_001** harness from **H-EGSE-DUT-J13_001** harness. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J12_001** MDM15 female connector to **H-EGSE-DUT-J13_001** MDM15 male connector. | | | |
| 5 | 6 | EXE | Disconnect **H-EGSE-DUT-J12_001** harness from EMI/EMC filter output. | Harness disconnected | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Disconnect **H-EGSE-DUT-J12_001** DB15 male connector from EMI/EMC filter output. | | | |
| 5 | 7 | EXE | Connect the **DB-9 BOB** box to connector **J201B** of the AD-HOC box. | **DB-9 BOB** connected to Ad-Hoc box | | |
| | | DET | Use the extender cable to connect the **DB-9 BOB** to the **J201B** input. | | | |
| 5 | 8 | EXE | Connect the **DB-25 BOB** box to connector **J200** of the AD-HOC box. | **DB-25 BOB** connected to Ad-Hoc box | | |
| | | DET | Use the extender cable to connect the **DB-25 BOB** to the **J200** input. | | | |
| 5 | 9 | EXE | Connect the **DB-37 BOB** box to connector **J201A** of the AD-HOC box. | **DB-37 BOB** connected to Ad-Hoc box | | |
| | | DET | Use the extender cable to connect the **DB-37 BOB** to the **J201A** input. | | | |
| **6** | **TSM interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | TSM O_TX_TEMP1 interfaces aliveness. | $Voltage \approx 6V$ | | |
| | | DET | Set the multimeter to measure voltage and hold the Max value. Connect the $47K\Omega$ resistor between pin **13(+)** and **31(-)** of the **DB-37 BOB**. Measure voltage across the resistor. **Note:** Multimeter must be set to register the Max value due to CEGSE reading architecture. | | | |
| **7** | **CEGSE power off (PXI and Ad-Hoc Box)** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 7 | 2 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |
| 7 | 3 | EXE | Turn off the PSU switch of the Ad-Hoc box. | PSU LED indicator should turn off | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Turn off the PSU by pressing the switch in the center of the Ad-Hoc box.<br>Verify that the LED on the PSU has turned off when the switch is turned off. | | | |
| 7 | 4 | EXE | Disable power supply output of CEGSE. | The LED indicator of the OUT ON output should go out. | | |
| | | DET | Press the OUT ON button to disable the power supply output.<br>Verify that the OUT ON LED indicator turns off when pressing the button to disable the output. | | | |
| 7 | 5 | EXE | Turn off the main switch of the Ad-Hoc box. | The main switch light must be turned off | | |
| | | DET | Turn off the main switch of the Ad-Hoc box. | | | |
| 7 | 6 | EXE | Power off PXI. | PXI off. | | |
| | | DET | From the CEGSE KVM shutdown the PXI. | | | |
| **8** | **HV-HPC interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | HV-HPC I_STBY_2_OPE_M interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **1(+)** and **6(-)** of the **DB-9 BOB**. | | | |
| 8 | 2 | EXE | HV-HPC I_OPE_2_STBY_R interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **2(+)** and **7(-)** of the **DB-9 BOB**. | | | |
| 8 | 3 | EXE | HV-HPC I_STBY_2_OPE_R interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **3(+)** and **8(-)** of the **DB-9 BOB**. | | | |
| 8 | 4 | EXE | HV-HPC I_OPE_2_STBY_M interface output resistance measurement | $3M\Omega < R < 30M\Omega$ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **4(+)** and **9(-)** of the **DB-9 BOB**. | | | |
| **9** | **ASM interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | ASM SEC_V_RF interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **3(+)** and **22(-)** of the **DB-37 BOB**. | | | |
| 9 | 2 | EXE | ASM SEC_V_NUM interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **11(+)** and **29(-)** of the **DB-37 BOB**. | | | |
| 9 | 3 | EXE | ASM OUTPUT_PWR interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **12(+)** and **30(-)** of the **DB-37 BOB**. | | | |
| **10** | **BDM interfaces aliveness** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | BDM O_CLK_LOCKED interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **1(+)** and **20(-)** of the **DB-37 BOB**. | | | |
| 10 | 2 | EXE | BDM O_MMU_CLK_STATUS interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **2(+)** and **21(-)** of the **DB-37 BOB**. | | | |
| 10 | 3 | EXE | BDM O_TX_STATUS interface input resistance measurement. | $3M\Omega < R < 30M\Omega$ | | |

| | | | |
|---|---|---|---|
| | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins **4(+)** and **23(-)** of the **DB-37 BOB**. | |

| 11 | **LVDS interfaces aliveness** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | LVDS I_MMU_DATA_7 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 3(+) and 15(-) of the DB-25 BOB. | | | |
| 11 | 2 | EXE | LVDS I_MMU_DATA_6 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 4(+) and 16(-) of the DB-25 BOB. | | | |
| 11 | 3 | EXE | LVDS I_MMU_DATA_5 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 5(+) and 17(-) of the DB-25 BOB. | | | |
| 11 | 4 | EXE | LVDS I_MMU_DATA_4 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 6(+) and 18(-) of the DB-25 BOB. | | | |
| 11 | 5 | EXE | LVDS I_MMU_DATA_3 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 7(+) and 19(-) of the DB-25 BOB. | | | |
| 11 | 6 | EXE | LVDS I_MMU_DATA_2 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 8(+) and 20(-) of the DB-25 BOB. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 7 | EXE | LVDS I_MMU_DATA_1 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 9(+) and 21(-) of the DB-25 BOB. | | | |
| 11 | 8 | EXE | LVDS I_MMU_DATA_0 interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 10(+) and 22(-) of the DB-25 BOB. | | | |
| 11 | 9 | EXE | LVDS I_MMU_CLK interface input resistance measurement. | $R \approx 100\Omega$ | | |
| | | DET | Set the multimeter to measure resistance.<br>Connect the multimeter probes to pins 11(+) and 23(-) of the DB-25 BOB. | | | |
| 11 | 10 | EXE | Disconnect the DB-9 BOB from the AD-Hoc box. | The DB-9 BOB disconnected from the AD-Hoc box. | | |
| | | DET | With the DB-9 also disconnect the extender cable from the AD-Hoc box. | | | |
| 11 | 11 | EXE | Disconnect the DB-25 BOB from the AD-Hoc box. | The DB-25 BOB disconnected from the AD-Hoc box. | | |
| | | DET | With the DB-25 also disconnect the extender cable from the AD-Hoc box. | | | |
| 11 | 12 | EXE | Disconnect the DB-37 BOB from the AD-Hoc box. | The DB-37 BOB disconnected from the AD-Hoc box. | | |
| | | DET | With the DB-37 also disconnect the extender cable from the AD-Hoc box. | | | |

## 12 GS-GSE configuration and verification

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 12 | 1 | EXE | Enable Monitor and Control in **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | Interface status in **Monitor and Control**. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Interface Status** field and select **Monitor and Control**. | | | |
| 12 | 2 | EXE | Set **N1** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N1 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 1 Transfer Switch Control** field and press the **Nadir 1 to Redundant 1** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the upper indicator of the **N1 TRANSFER SWITCH** block is **ON** and green. | | | |
| 12 | 3 | EXE | Set **N2** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N2 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 2 Transfer Switch Control** field and press the **Nadir 2 to Redundant 2** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the bottom indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 12 | 3 | EXE | Set attenuation of GS-GSE-FM (R) **X-Band Matrix and Attenuator** . | Attenuation of 0 dB. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Go to the **Variable Attenuador Control** field and press the 0 dB button.<br>▪ Go to the **ATENUATOR VARIABLE** block and verify that the 0 dB indicator is green. | | | |
| 12 | 4 | EXE | Verify **X-Band DownconverterN1** configuration. | ▪ RF = 8106.0 MHz<br>▪ Aten = 6 dB<br>▪ RF = ON | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter01-FM_v1.0.py`<br>In the displayed menu, verify that the parameters are configured according to the expected values. Then enter the number 5 and press enter to exit the menu. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | 5 | EXE | Verify **X-Band DownconverterN2** configuration. | ▪ RF = 8269.0 MHz<br>▪ Aten = 4 dB<br>▪ RF = ON | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter02-FM_v1.0.py`<br>In the displayed menu, verify that the parameters are configured according to the expected values. Then enter the number 5 and press enter to exit the menu. | | | |
| 12 | 6 | EXE | Configure the **Cortex HDR**. | Cortex HDRconfigured. | | |
| | | DET | In Cortex MCS (192.168.75.161) open the configuration file from directory `D:\ZDS\Data\HDR\MCS\SABIA-Mar\:`<br>▪ `SB1GS-GSE-FM-R_RF-N1_v1.4.mcs`if **EWC30-FM1** is under test.<br>▪ `SB1GS-GSE-FM-R_RF-N2_v1.4.mcs`if **EWC30-FM2** is under test.<br>Then enable configuration by clicking on the **Control Access** icon (key icon) and click the **OK** button. Then click on **Copy Cnf->Mon** icon and then click yes if needed. | | | |
| 12 | 7 | EXE | Clear storage in **Cortex HDR** | Cleaning done | | |
| | | DET | In Cortex MCS (192.168.75.161) do the following:<br>▪ Open the DMM by clicking on the **Open the global disk memory management window** icon.<br>▪ In the **Status** window of DMM, click on **Build or Erase** button.<br>▪ Select **Errase all files in all directories in all partitions** and then click on **OK** button.<br>▪ In the displayed window confirm erase by clicking on the **OK** button.<br>▪ Enable the acquisition mode by clicking on the **Configuration vs Acquisition Mode** icon and on the **Control Access**. | | | |

## 13 Instruments setup

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 13 | 1 | EXE | Connect measurement probes to the oscilloscope | Probes connected according to detail. | | |
| | | DET | In CH1 connect current probe, in CH2 connect differential probe. | | | |
| 13 | 2 | EXE | Connect measurement probes to the AD-HOC box | Probes connected according to detail. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Connect CH1 current probe to measure EWC30 TX.<br>▪ Connect CH2 differential probe to measure EWC30 TX.<br>**Note:** When the current tip is placed in the ad-hoc box the arrow on the current tip should point to the left. | | | |
| **14** | **DUT Connection** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 14 | 1 | EXE | Verify ground connection of EWC-30. | EWC-30 is grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the EWC-30 connector J104 and to the copper bar are properly adjusted.<br>▪ Verify continuity between ground connector of EWC-30 and copper bar of facilities. | | | |
| 14 | 2 | EXE | Verify ground connection of X-Band Filter. | X-Band Filter is grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the X-Band Filter and to the copper bar are properly adjusted.<br>▪ Verify Continuity between X-Band Filter and copper bar of facilities. | | | |
| 14 | 3 | EXE | Connect W10 cable between IN Port of DSN Filter and J103 Port of EWC30. | Cable W10 connected between ports. | | |
| | | DET | ▪ Connect W10 cable between IN Port of DSN Filter and J103 Port of EWC30. | | | |
| 14 | 4 | EXE | Connect W2 cable to OUT Port of DSN Filter. | W2 Cable connected to OUT Port. | | |
| | | DET | ▪ Connect W2 cable to the OUT port of DSN Filter.<br>▪ Mount W2 cable in the sliding tray. | | | |
| **15** | **BB harness connection to DUT** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 15 | 1 | EXE | Connect **H-EGSE-DUT-J12_001** harness to EWC30 | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** harness to connector saver J100 of the EWC30 | | | |
| 15 | 2 | EXE | Connect **H-EGSE-DUT-J2_001** harness to EWC30 | Harness connected | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Connect **H-EGSE-DUT-J2_001** harness to connector saver J200 of the EWC30 | | | |
| 15 | 3 | EXE | Connect **H-EGSE-DUT-J3_001** harness to EWC30 | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J3_001** harness to connector saver J201 of the EWC30 | | | |
| **16** | **Mount CEGSE mechanical support in CEGSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 16 | 1 | EXE | Disconnect ground of EWC30. | Ground of EWC30 disconnected | | |
| | | DET | ▪ Disconnect ground wire of EWC30 from copper bar of facilities | | | |
| 16 | 2 | EXE | Ground X-Band Filter. | Ground of X-Band Filter disconnected | | |
| | | DET | ▪ Disconnect ground wire of X-Band Filter from copper bar of facilities | | | |
| 16 | 3 | EXE | Mount CEGSE mechanical support to the CEGSE rack. | CEGSE mechanical support mounted. | | |
| | | DET | Mount CEGSE mechanical support to the CEGSE rack. Take all possible precautions since the DUT is mounted on this. | | | |
| 16 | 4 | EXE | Ground EWC30. | EWC30 grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the EWC30 connector J104 is properly adjusted.<br>▪ Connect ground wire from EWC30 to copper bar of CEGSE rack<br>▪ Verify continuity between ground connector of EWC30 and copper bar of CEGSE rack. | | | |
| 16 | 5 | EXE | Ground X-Band Filter. | X-Band Filter grounded | | |
| | | DET | ▪ Visually inspect that the ground connection to the X-Band Filter is properly adjusted.<br>▪ Connect ground wire from X-Band Filter to copper bar of CEGSE rack<br>▪ Verify Continuity between X-Band Filter and copper bar of CEGSE rack. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 6 | EXE | VBus grounding resistance measurement. | $R \approx 2K\Omega$ | | |
| | | DET | ▪ Set the multimeter to measure resistance.<br>▪ Connect the multimeter probes to measure resistance between negative terminal of Keysight power supply and copper bar of CEGSE. | | | |
| **17** | **BB harness connection to Ad-hoc box** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 17 | 1 | EXE | Connect **H-EGSE-DUT-J12_001** harness from EMI/EMC filter to Ad-hoc box | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J12_001** harness to connector J100 of the Ad-hoc box | | | |
| 17 | 2 | EXE | Connect **H-EGSE-DUT-J2_001** harness form EWC30 to Ad-hoc box. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J2_001** harness to connector J200 of the Ad-hoc box | | | |
| 17 | 3 | EXE | Connect **H-EGSE-DUT-J3_001** harness form EWC30 to Ad-hoc box. | Harness connected | | |
| | | DET | Connect **H-EGSE-DUT-J3_001** harness to connector J201A and J201B of the Ad-hoc box | | | |
| 17 | 4 | EXE | Take photos of the setup and DUT connections. | Photos taken. | | |
| | | DET | Take photos of setup and DUT connections. | | | |
| **18** | **RF connection to CEGSE and GS-GSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 18 | 1 | EXE | Connect W3 cable between Coupler Port and EWC30 port of CEGSE. | Cable W3 connected between ports. | | |
| | | DET | ▪ Disconnect the 50 ohm load from the EWC30 Port of CEGSE.<br>▪ Connect W3 cable between Coupler Port and EWC30 Port. | | | |
| 18 | 2 | EXE | Connect XRF4.02 cable to GS-GSE Data [X-Band] interface. | Cable XRF4.02 connected to GS-GSE Data [X-Band] interface. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Connect XRF4.02 cable to interface GS-GSE Data [X-Band] (N1)interface if **EWC30-FM1** is under test.<br>▪ Connect XRF4.02 cable to interface GS-GSE Data [X-Band] (N2)interface if **EWC30-FM2** is under test. | | | |
| 18 | 3 | EXE | Connect XRF4.02 cable to IN/OUT Port of CEGSE. | Cable XRF4.02 connected to IN/OUT Port. | | |
| | | DET | ▪ Disconnect the 50 ohm load from the IN/OUT Port of CEGSE.<br>▪ Connect XRF4.02 cable to the IN/OUT Port of CEGSE. | | | |
| **19** | **Power-on CEGSE** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 19 | 1 | EXE | Turn on the main switch of the Ad-Hoc box. | The main switch light must be turned on | | |
| | | DET | Turn on the main switch of the Ad-Hoc box. | | | |
| 19 | 2 | EXE | Verify Keysight power supply configuration | V LIMIT = 28 V<br>I LIMIT = 3 A<br>OVP = 34 V<br>UVP = 22 V | | |
| | | DET | In front pannel of power supply:<br>▪ press "LIMIT" button to read voltage and current limits.<br>▪ press one time "OVP/UVP" button to read OVP limit<br>▪ press two times "OVP/UVP" button to read UVP limit.<br>**Note:** Adjust the value of I LIMIT if it is not the expected one. Press "LIMIT" and turn the current knob to adjust. | | | |
| 19 | 3 | EXE | Enable power supply output of CEGSE. | The LED indicator of the OUT ON output is ON. | | |
| | | DET | Press the OUT ON button to enable the power supply output.<br>Verify that the OUT ON LED indicator turns on when pressing the button. | | | |
| 19 | 4 | EXE | Turn on the PSU switch of the Ad-Hoc box. | PSU LED indicator should turn on | | |
| | | DET | Turn on the PSU by pressing the switch in the center of the Ad-Hoc box.<br>Verify that the LED on the PSU has turned on when the switch is turned on. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 | 5 | EXE | Power on PXI computer. | PXI on. | | |
| | | DET | Connect the PXI to power supply and turn it on | | | |
| 19 | 6 | EXE | **RDP connection** to CEGSE from Thin client **Operator Workstation DataA**. | Thin Client **OW DATA A** connected to CEGSE | | |
| | | DET | From the Operator Workstation DataA open the Remote Desktop Connection and connect to IP: 192.168.75.211<br>▪ `User: EGSE COM`<br>▪ `Password: Conae1234` | | | |

## 20 Collect Evidences

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 20 | 1 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-01 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-01 directory.<br>▪ Paste the copied folder. | | | |
| 20 | 2 | EXE | Save evidence photos | Evidence photos saved | | |
| | | DET | Create **pictures** folder on C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-01 save all photos taken during the DUT connections. | | | |

## 21 Final Steps

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 21 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify that the environmental temperature level in the test site is according to the required levels. | | | |
| 21 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity in the test site. | | | |

Table 6.1.0-2: SB1FS-COM-P-013-01 procedure.

## 6.2. SB1FS-COM-P-013-02 Spectrum, power and BW with PXA

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-02 |
| **Task name** | Spectrum, power and BW with PXA |
| **Task description** | In this test the EWC30 TX is set to modulation mode. RF Power, OBW and Frequency are measured with the PXA. |
| **Task purpose** | RF Power, OBW and Frequency measurements over X-Band signal. |
| **Success criteria** | RF Power, OBW and Frequency measurements performed. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1 and the following optional connection:<br>• RF input of PXA connected to **DWL TP** of CEGSE. |
| **Duration** | 60 minutes. |
| **Data sets required** | ▪ CEGSE PXI configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder<br>▪ Data file for modulation Data-4429200_600s_VCh01_wPN.bin.<br>▪ PXA configuration files in `COMM-SS-FM-PXA-config` folder:<br>• EWC30TX-FM1-Downlink-MOD-v1.0.state: Data downlink spectrum.<br>• EWC30TX-FM1-CHPOWER-v1.0.state: Data downlink channel power.<br>• EWC30TX-FM1-OBW-v1.0.state: Data downlink occupied bandwidth.<br>• EWC30TX-FM2-Downlink-MOD-v1.0.state: Data downlink spectrum.<br>• EWC30TX-FM2-CHPOWER-v1.0.state: Data downlink channel power.<br>• EWC30TX-FM2-OBW-v1.0.state: Data downlink occupied bandwidth. |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.2.0-1: Procedure SB1FS-COM-P-013-02 description.

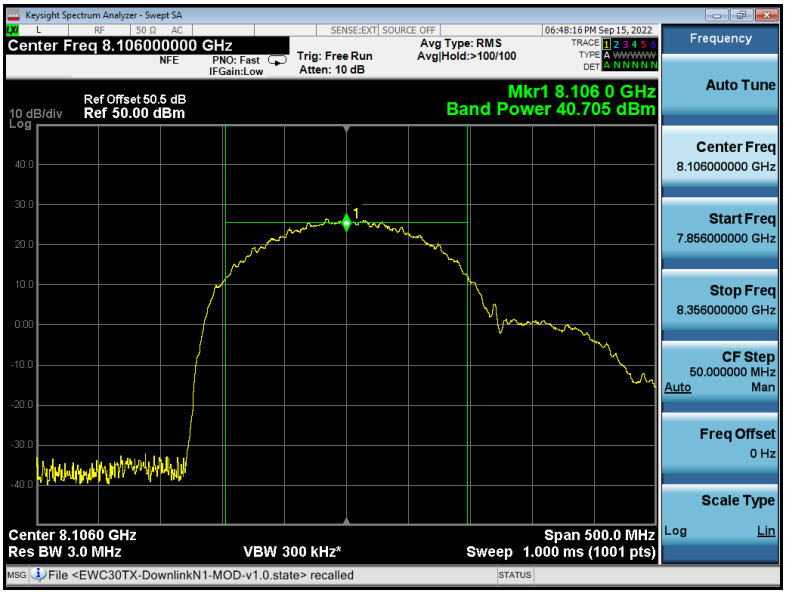
| SB1FS-COM-P-013-02 Spectrum, power and BW with PXA | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 2 | **PXA Connection and configuration** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Connect XRF3.60 cable to DWL TP of CEGSE. | XRF3.60 connected to DWL TP. | | |
| | | DET | ▪ Disconnect the 50 ohm load from the DWL TP of CEGSE.<br>▪ Connect XRF3.60 cable to the DWL TP of CEGSE. | | | |
| 2 | 2 | EXE | Connect XRF3.60 cable to DC Block on PXA. | Cable connected. | | |
| | | DET | ▪ Connect the end XRF3.60 cable to DC Block (this is connected to the RF IN of PXA). | | | |
| 2 | 3 | EXE | Configure the PXA as a spectrum analyzer. | PXA configured as a spectrum analyzer. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **Spectrum Analyzer** key. | | | |

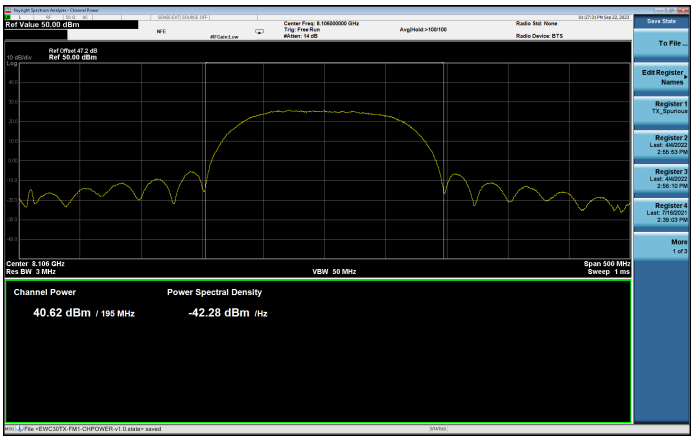
| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 4 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Downlink-MOD-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Downlink-MOD-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | |
| **3** | **CEGSE SW Initialization** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | ▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-02" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |
| **4** | **DUT power on** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 4 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 4 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 4 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 4 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 4 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 4 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 4 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

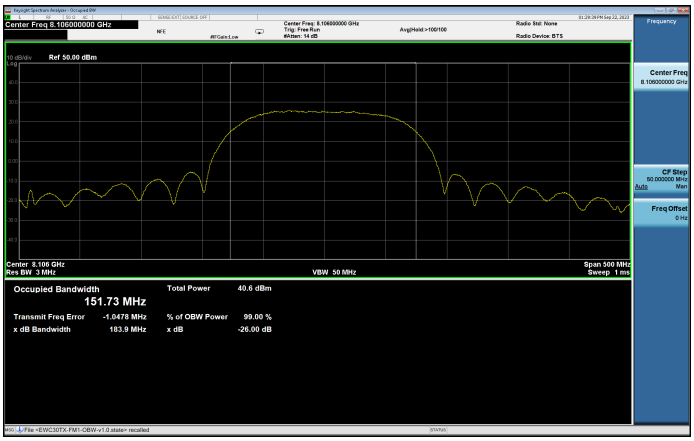
| 5 | **Switch DUT to Modulation Mode** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Start data transmission | Data transmission started | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in **I_STBY_2_OPE_M**<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**. | | | |
| 5 | 2 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 5 | 3 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 5 | 4 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 5 | 5 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I $\approx$ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |

| SB1FS-COM-P-013-02 Spectrum, power and BW with PXA | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 6 | EXE | Verify spectrum Data presence with the PXA. | Spectrum present | | |
| | | DET | Observe the spectrum of the signal on the PXA. It must correspond to a carrier with modulation as shown in the following image:<br>  <br><br>**Note:** The image shown should be taken for illustrative purposes. | | | |
| 5 | 7 | EXE | Take screenshot of signals measurements. | `DATA-MOD.png` saved. | | |
| | | DET | ▪ Press **Single** button.<br>▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-02 directory.<br>▪ Enter file name: DATA-MOD.png<br>▪ Press **Save** button.<br>▪ Press **Cont** button. | | | |
| 5 | 8 | EXE | Take trace of signals measurements. | `<filename.trace>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Trace (+state)** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-02 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 9 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-CHPOWER-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-CHPOWER-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |
| 5 | 10 | EXE | Measure channel power using PXA. | P = 40 dBm +/- 1dB | | |
| | | DET | On PXA instrument:<br>▪ Wait until the Counts: **100.0 Avg**/**100.0 Hold** indicator (See image below) is complete.<br>▪ Verify that the measurement meets the expected value.<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 11 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-02 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 5 | 12 | EXE | Save CSV of signals measurements. | `chpower.csv` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Data (Export)** key.<br>▪ Select **Meas Result** option.<br>▪ Press **Save As...** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-02 directory.<br>▪ Enter the file name: chpower.csv.<br>▪ Press **Save** button. | | | |
| 5 | 13 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-OBW-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-OBW-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |

| SB1FS-COM-P-013-02 Spectrum, power and BW with PXA | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 14 | EXE | Measure OBW and frequency error using PXA. | OBW ≈ 205 MHz<br>Freq error < 500 KHz | | |
| | | DET | On PXA instrument:<br>▪ Wait until the Counts: **100.0 Avg**/**100.0 Hold** indicator (See image below) is complete.<br>▪ Verify that the OBW and Transmit Freq Error meets the expected value. The displayed Freq Error is the difference between the value configured in the PXA and the measured value.<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |
| 5 | 15 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-02 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 5 | 16 | EXE | Save CSV of signals measurements. | `obw.csv` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Data (Export)** key.<br>▪ Select **Meas Result** option.<br>▪ Press **Save As...** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-02 directory.<br>▪ Enter the file name: obw.csv.<br>▪ Press **Save** button. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 17 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 5 | 18 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

## 6 DUT Turn off

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 6 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

## 7 CEGSE SW shutdown

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 7 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |

## 8 Collect Evidences

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 8 | 1 | EXE | Copy test folder of PXA to CEGSE. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `//192.168.75.231/d$/Users/`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ Copy the SB1FS-COM-P-013-02 folder from D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013 directory to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013` directory on CEGSE. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 2 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-02 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-02 directory.<br>▪ Paste the copied folder. | | | |
| **9** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 9 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 9 | 3 | EXE | Disconnect XRF3.60 cable from DWL Test Port of CEGSE. | XRF3.60 disconnected from DWL Test Port. DWL Test Port with RF load. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect XRF3.60 cable from the DWL Test Port of CEGSE.<br>▪ Connect the 50 ohm load fto the DWL Test Port of CEGSE. | | | |
| 9 | 4 | EXE | Disconnect XRF3.60 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect the end XRF3.60 cable from DC Block (This is connected to RF IN of PXA). | | | |

Table 6.2.0-2: SB1FS-COM-P-013-02 procedure.

## 6.3. SB1FS-COM-P-013-03 CCDF Measurement

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-03 |
| **Task name** | CCDF Measurement |
| **Task description** | In this test the EWC30 TX is set to modulation mode. CCDF is measured with the PXA. |
| **Task purpose** | CCDF Measurement over RF Data. |
| **Success criteria** | CCDF measurement performed. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1 and the following optional connections:<br>• RF input of PXA connected to **DWL TP** of CEGSE. |
| **Duration** | 60 minutes. |
| **Data sets required** | ▪ CEGSE PXI configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder<br>▪ Data file for modulation Data-4429200_600s_VCh01_wPN.bin.<br>▪ PXA configuration files in `COMM-SS-FM-PXA-config` folder:<br>• EWC30TX-FM1-Downlink-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM1-CCDF-v1.0.state: CCDF of Data Downlink signal.<br>• EWC30TX-FM2-Downlink-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM2-CCDF-v1.0.state: CCDF of Data Downlink signal. |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.3.0-1: Procedure SB1FS-COM-P-013-03 description.

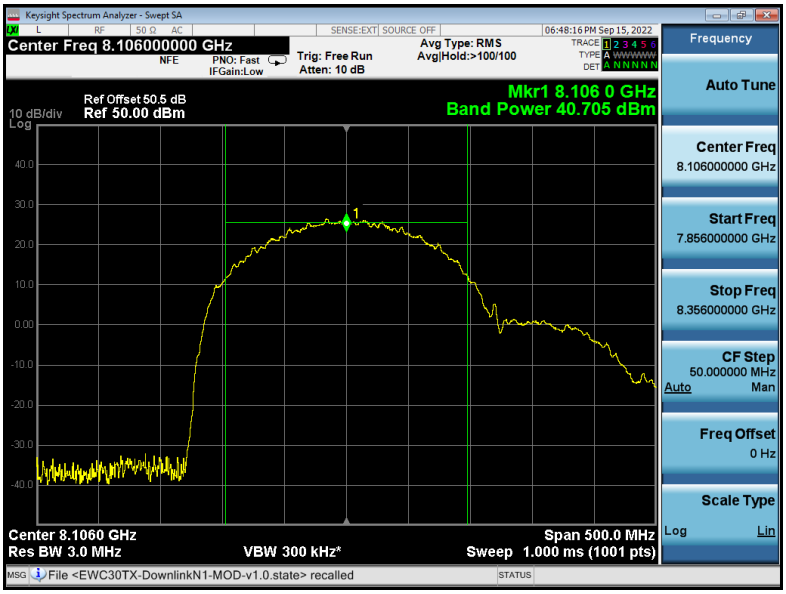
| SB1FS-COM-P-013-03 CCDF Measurement | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 2 | **PXA Connection and configuration** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Connect XRF3.60 cable to DWL TP of CEGSE. | XRF3.60 connected to DWL TP. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Disconnect the 50 ohm load from the DWL TP of CEGSE.<br>▪ Connect XRF3.60 cable to the DWL TP of CEGSE. | | | |
| 2 | 2 | EXE | Connect XRF3.60 cable to DC Block on PXA. | Cable connected. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Connect the end XRF3.60 cable to DC Block (this is connected to the RF IN of PXA). | | | |
| 2 | 3 | EXE | Configure the PXA as a spectrum analyzer. | PXA configured as a spectrum analyzer. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **Spectrum Analyzer** key. | | | |

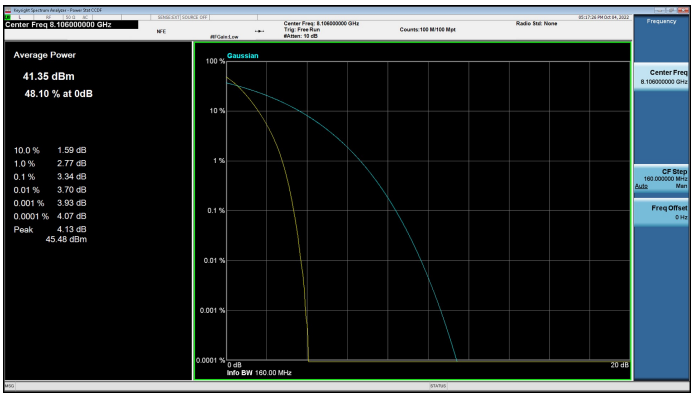
| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 4 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Downlink-MOD-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Downlink-MOD-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |
| **3** | **CEGSE SW Initialization** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-03" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |
| **4** | **DUT power on** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 4 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 4 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 4 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 4 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 4 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 4 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 4 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

| 5 | **Switch DUT to Modulation Mode** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Start data transmission | Data transmission started | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in **I_STBY_2_OPE_M**<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**. | | | |
| 5 | 2 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 5 | 3 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 5 | 4 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 5 | 5 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I $\approx$ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |

| SB1FS-COM-P-013-03 CCDF Measurement | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 6 | EXE | Verify spectrum Data presence with the PXA. | Spectrum present | | |
| | | DET | Observe the spectrum of the signal on the PXA. It must correspond to a carrier with modulation as shown in the following image:<br>  <br><br>**Note:** The image shown should be taken for illustrative purposes. | | | |
| 5 | 7 | EXE | Take screenshot of signals measurements. | `DATA-MOD.png` saved. | | |
| | | DET | ▪ Press **Single** button.<br>▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-03 directory.<br>▪ Enter file name: DATA-MOD.png<br>▪ Press **Save** button.<br>▪ Press **Cont** button. | | | |
| 5 | 8 | EXE | Take trace of signals measurements. | `<filename.trace>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Trace (+state)** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-03 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 9 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-CCDF-v1.0.state**, to do this, do the following:<br>■ Press **Recall** button<br>■ Press **State** key<br>■ Press **From File...** key<br>■ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>■ Go to `SB1FS-COM-P-013` directory.<br>■ In the displayed window, select file `EWC30TX-FM<X>-CCDF-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>■ Press **Open** button. | | | |
| 5 | 10 | EXE | Measure CCDF using PXA. | CCDF measured | | |
| | | DET | On PXA instrument:<br>■ Press Restart button to make a fresh measurement.<br>■ Wait until the Counts: **100.0 M/100.0 Mpt** indicator (See image below) is complete.<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 11 | EXE | Verify the measured parameter | Power Average = 40 dB $\pm$ 1 | | |
| | | DET | Verify that the parameter measured in the test is as expected. | | | |
| 5 | 12 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-03 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 5 | 13 | EXE | Save CSV of signals measurements. | `ccdf.csv` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Data (Export)** key.<br>▪ Select **Meas Result** option.<br>▪ Press **Save As...** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-03 directory.<br>▪ Enter the file name: ccdf.csv.<br>▪ Press **Save** button. | | | |
| 5 | 14 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 5 | 15 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

## 6 DUT Turn off

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 6 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | **Note: If the following test is executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| **7** | **CEGSE SW shutdown** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |
| **8** | **Collect Evidences** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | Copy test folder of PXA to CEGSE. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `//192.168.75.231/d$/Users/`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ Copy the SB1FS-COM-P-013-03 folder from D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013 directory to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013` directory on CEGSE. | | | |
| 8 | 2 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>**Note: In case the CEGSE SW has not been started in this test, the CEGSE logs must be saved in the test folder in which the CEGSE SW was started.**<br>In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-03 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-03 directory.<br>▪ Paste the copied folder. | | | |

| 9 | Final Steps | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 9 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 9 | 3 | EXE | Disconnect XRF3.60 cable from DWL Test Port of CEGSE. | XRF3.60 disconnected from DWL Test Port. DWL Test Port with RF load. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect XRF3.60 cable from the DWL Test Port of CEGSE.<br>▪ Connect the 50 ohm load fto the DWL Test Port of CEGSE. | | | |
| 9 | 4 | EXE | Disconnect XRF3.60 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect the end XRF3.60 cable from DC Block (This is connected to RF IN of PXA). | | | |

Table 6.3.0-2: SB1FS-COM-P-013-03 procedure.

## 6.4. SB1FS-COM-P-013-04 Frequency Stability

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-04 |
| **Task name** | Frequency Stability |
| **Task description** | In this test the EWC30 is put into operating mode and transmitting the LO leakage. Frequency and power of the carrier are measured with the PXA while temperature stabilizes. Ten measurements every 60 seconds are taken with the temperature stabilized. Finally, the maximum errors are calculated. |
| **Task purpose** | The objective of the test is to verify the Frequency Stability of the EWC30 transmitter. |
| **Success criteria** | Frequency stability according to test specification (AD.04):<br>■ $FrequencyStability < 10\ ppm$ |
| **Test Setup** | ■ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>■ General setup according to figure 6.0.0-1 and the following optional connection:<br>• RF input of PXA connected to **DWL TP** of CEGSE. |
| **Duration** | 90 minutes. |
| **Data sets required** | ■ CEGSE PXI configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>■ Oscilloscope configuration files in `osc-config` folder<br>■ Data file for modulation Data-1_VCh01_payload.bin.<br>■ PXA configuration files in `COMM-SS-FM-PXA-config` folder:<br>• EWC30TX-FM1-Downlink-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM1-Downlink-CW-v1.0.state: Data Downlink CW signal.<br>• EWC30TX-FM1-FreqStability-v1.0.state: Data Downlink Frequency Stability.<br>• EWC30TX-FM2-Downlink-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM2-Downlink-CW-v1.0.state: Data Downlink CW signal.<br>• EWC30TX-FM2-FreqStability-v1.0.state: Data Downlink Frequency Stability. |
| **Prerequisites** | ■ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>■ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.4.0-1: Procedure SB1FS-COM-P-013-04 description.

| SB1FS-COM-P-013-04 Frequency Stability | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 2 | **PXA Connection and configuration** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Connect XRF3.60 cable to DWL TP of CEGSE. | XRF3.60 connected to DWL TP. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Disconnect the 50 ohm load from the DWL TP of CEGSE.<br>▪ Connect XRF3.60 cable to the DWL TP of CEGSE. | | | |
| 2 | 2 | EXE | Connect XRF3.60 cable to DC Block on PXA. | Cable connected. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Connect the end XRF3.60 cable to DC Block (this is connected to the RF IN of PXA). | | | |
| 2 | 3 | EXE | Configure the PXA as a spectrum analyzer. | PXA configured as a spectrum analyzer. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **Spectrum Analyzer** key. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 4 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Downlink-MOD-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Downlink-MOD-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | |

## 3 CEGSE SW Initialization

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 3 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-04" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |

## 4 DUT power on

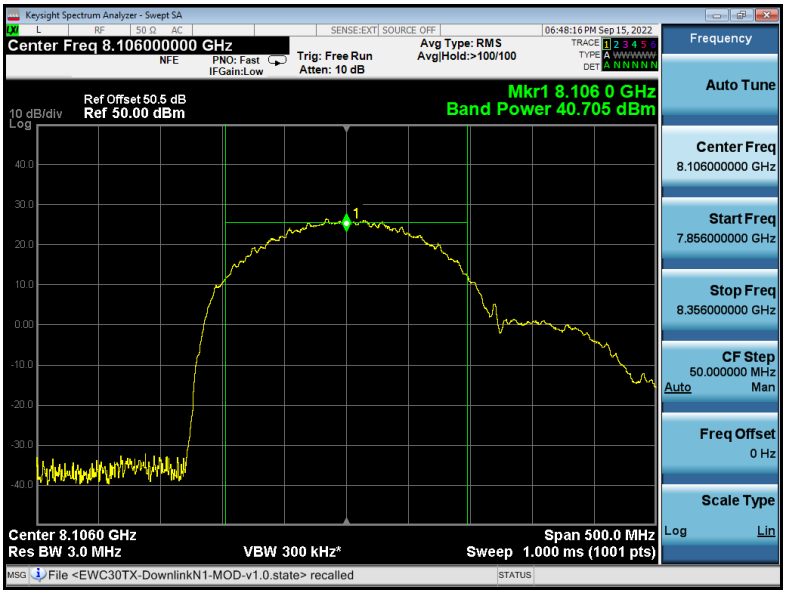
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 4 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 4 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 4 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 4 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 4 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 4 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 4 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 4 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

## 5 Switch DUT to Modulation Mode

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 5 | 1 | EXE | Generate down link file | file generated | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ On CEGSE GUI select COMM tab, then select DOWNLINK tab.<br>▪ Set VCID to 1 (RT HK TM)<br>▪ Set "Idle before" to 110730 (≈15 seconds).<br>▪ Set "Idle after" to 110730.<br>▪ Press to Folder icon of the “Downlink Payload File” section.<br>▪ Select payload file C:\Users\EGSE COM\Documents\ COMM-SS-FM\SB1FS-COM-P-013**Data-1_VCh01_payload.bin** and press OK.<br>▪ Press "Generate Downlink File" button.<br>▪ Wait until stage shows "Generated File" and "Generating File" indicator is off (15 minutes). | | | |
| 5 | 2 | EXE | Start data transmission through the **main HV-HPC** interface | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that **stage** box does not show **Sending X Band File** message.<br>▪ Switch file selector to **Send Generated Downlink File**<br>▪ Place the switch in **I_STBY_2_OPE_M**<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that **stage** box shows **Sending X Band File**. | | | |
| 5 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 5 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 5 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR ≈ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 5 | 6 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I ≈ 2.46 A | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |
| 5 | 7 | EXE | Verify spectrum Data presence with the PXA. | Spectrum present | | |
| | | DET | Observe the spectrum of the signal on the PXA. It must correspond to a carrier with modulation as shown in the following image:<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 8 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |
| 5 | 9 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Downlink-CW-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Downlink-CW-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |

## 6 Verify frequency LO leakage

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 6 | 1 | EXE | Verify LO leakage. | $F_{out} = 8106\ MHz$. for **EWC30-FM1**<br>$F_{out} = 8269\ MHz$. for **EWC30-FM2**<br>$P_{out}$ | | |
| | | DET | Press the **Peak Search** button in PXA, verify that the measured frequency meet the expected value and take note of the power value. | | | |
| 6 | 2 | EXE | Take screenshot of signals measurements. | `CW.png` saved. | | |
| | | DET | ▪ Press **Single** button.<br>▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-04 directory.<br>▪ Enter file name: CW.png<br>▪ Press **Save** button.<br>▪ Press **Cont** button. | | | |

| 7 | DUT TX Thermal stabilization | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-FreqStability-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-FreqStability-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |
| 7 | 2 | EXE | Take an initial screenshot in PXA before use Quick save button. | `CW-A` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, browse to the **D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config \SB1FS-COM-P-013\SB1FS-COM-P-013-04\pxa-screenshot** directory.<br>▪ Enter File Name: CW-A.<br>▪ Press **Save** button.<br>**Note:** When pressing QuickSave button a new <file name>_nnnn.png screenshot is saved. nnnn start from 0 and increase every quick save. | | | |
| 7 | 3 | EXE | Measure carrier power and frequency every 60 seconds during temperature stabilization. | measurements performed | | |
| | | DET | On PXA instrument:<br>▪ Press **Restart** button when PXA clock time ends in 00 seconds.<br>▪ Press **Quick Save** button when PXA clock time ends in 40 seconds.<br>▪ Register PXA screenshot file name in table 6.5.0-2.<br>▪ Register **O_TX_TEMPERATURE** in table 6.5.0-2.<br>▪ Repeat until Tx temperature remains stable for 5 minutes. | | | |

| # | Temp. Tx$[°C]$ | Screen shot # | Frequency $[Hz]$ | Power $[dBm]$ | # | Temp. Tx$[°C]$ | Screen shot # | Frequency $[Hz]$ | Power $[dBm]$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | 11 | | | | |
| 2 | | | | | 12 | | | | |
| 3 | | | | | 13 | | | | |
| 4 | | | | | 14 | | | | |
| 5 | | | | | 15 | | | | |
| 6 | | | | | 16 | | | | |
| 7 | | | | | 17 | | | | |
| 8 | | | | | 18 | | | | |
| 9 | | | | | 19 | | | | |
| 10 | | | | | 20 | | | | |

Table 6.4.0-2: Temperature stabilization

| SB1FS-COM-P-013-04 Frequency Stability | | | | | | |
|---|---|---|---|---|---|---|
| 8 | **Frequency stability Measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | Take an initial screenshot in PXA before use Quick save button. | `CW-B` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, browse to the **D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config \SB1FS-COM-P-013\SB1FS-COM-P-013-04\pxa-screenshot** directory.<br>▪ Enter File Name: CW-B.<br>▪ Press **Save** button.<br>**Note:** When pressing QuickSave button a new <file name>_nnnn.png screenshot is saved. nnnn start from 0 and increase every quick save. | | | |
| 8 | 2 | EXE | Measure carrier power and frequency every 60 seconds during temperature stabilization. | measurements performed | | |
| | | DET | On PXA instrument:<br>▪ Press **Restart** button when PXA clock time ends in 00 seconds.<br>▪ Press **Quick Save** button when PXA clock time ends in 40 seconds.<br>▪ Register PXA screenshot file name in table 6.5.0-2.<br>▪ Register **O_TX_TEMPERATURE** in table 6.5.0-2.<br>▪ Repeat until Tx temperature remains stable for 5 minutes. | | | |

| # | Temp. Tx$[^{\circ}C]$ | Screen shot# | Frequency $[Hz]$ | Power $[dBm]$ | # | Temp. Tx$[^{\circ}C]$ | Screen shot# | Frequency$[Hz]$ | Power $[dBm]$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | 6 | | | | |
| 2 | | | | | 7 | | | | |
| 3 | | | | | 8 | | | | |
| 4 | | | | | 9 | | | | |
| 5 | | | | | 10 | | | | |

Table 6.4.0-3: Frequency stability

| SB1FS-COM-P-013-04 Frequency Stability | | | | | | |
|---|---|---|---|---|---|---|
| **9** | **DUT Turn off** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 9 | 2 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| **10** | **CEGSE SW shutdown** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |
| **11** | **Collect Evidences** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | Copy test folder of PXA to CEGSE. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `//192.168.75.231/d$/Users/`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ Copy the SB1FS-COM-P-013-04 folder from D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013 directory to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013` directory on CEGSE. | | | |

| SB1FS-COM-P-013-04 Frequency Stability | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 2 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>**Note: In case the CEGSE SW has not been started in this test, the CEGSE logs must be saved in the test folder in which the CEGSE SW was started.**<br>In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-04 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-04 directory.<br>▪ Paste the copied folder. | | | |
| **12** | **Error Calculation** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 12 | 1 | EXE | Compute average and maximum error in Hz and ppm | $f_{stability\_ppm} < 10ppm$ | | |
| | | DET | With the last 10 measurements calculate the frequency error and the frequency stability.<br>$f_{avg\_Hz} = \frac{\sum_{i=1}^{10} Fmeas_i}{10}$<br>$f_{stability\_Hz} = MAX(ABS(Fmeas_i - f_{avg\_Hz}))$<br>$f_{stability\_ppm} = \frac{f_{stability\_Hz}}{<X>[MHz]}$<br>Where **<X>** is 8106 for **EWC30-FM1** and 8269 for **EWC30-FM2**. | | | |
| **13** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 13 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 13 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 13 | 3 | EXE | Disconnect XRF3.60 cable from DWL Test Port of CEGSE. | XRF3.60 disconnected from DWL Test Port. DWL Test Port with RF load. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect XRF3.60 cable from the DWL Test Port of CEGSE.<br>▪ Connect the 50 ohm load fto the DWL Test Port of CEGSE. | | | |
| 13 | 4 | EXE | Disconnect XRF3.60 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect the end XRF3.60 cable from DC Block (This is connected to RF IN of PXA). | | | |

Table 6.4.0-4: SB1FS-COM-P-013-04 procedure.

## 6.5. SB1FS-COM-P-013-05 Carrier Phase Noise

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-05 |
| **Task name** | Carrier Phase Noise |
| **Task description** | In this test the EWC30 is put into operating mode and transmitting the LO leakage. Frequency and power of the carrier are measured with the PXA while temperature stabilizes. When temperature is stabilized, Phase Noise of LO leakage is measured with the PXA. |
| **Task purpose** | The objective of the test is measure EWC30 TX LO leakage phase noise. |
| **Success criteria** | Carrier phase noise according to test specification (AD.04):<br>▪ $PhaseNoise < 6° rms$ |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1 and the following optional connection:<br>• RF input of PXA connected to **DWL TP** of CEGSE. |
| **Duration** | 90 minutes. |
| **Data sets required** | ▪ CEGSE PXI configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder<br>▪ Data file for modulation Data-1_VCh01_payload.bin.<br>▪ PXA configuration files in `COMM-SS-FM-PXA-config` folder:<br>• EWC30TX-FM1-Downlink-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM1-Downlink-CW-v1.0.state: Data Downlink CW signal.<br>• EWC30TX-FM1-PhaseNoise-v1.0.state: Data Downlink Phase Noise.<br>• EWC30TX-FM2-Downlink-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM2-Downlink-CW-v1.0.state: Data Downlink CW signal.<br>• EWC30TX-FM2-PhaseNoise-v1.0.state: Data Downlink Phase Noise. |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.5.0-1: Procedure SB1FS-COM-P-013-05 description.

| SB1FS-COM-P-013-05 Carrier Phase Noise | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 2 | **PXA Connection and configuration** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Connect XRF3.60 cable to DWL TP of CEGSE. | XRF3.60 connected to DWL TP. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Disconnect the 50 ohm load from the DWL TP of CEGSE.<br>▪ Connect XRF3.60 cable to the DWL TP of CEGSE. | | | |
| 2 | 2 | EXE | Connect XRF3.60 cable to DC Block on PXA. | Cable connected. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Connect the end XRF3.60 cable to DC Block (this is connected to the RF IN of PXA). | | | |
| 2 | 3 | EXE | Configure the PXA as a spectrum analyzer. | PXA configured as a spectrum analyzer. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **Spectrum Analyzer** key. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 4 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Downlink-MOD-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Downlink-MOD-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | |

## 3 CEGSE SW Initialization

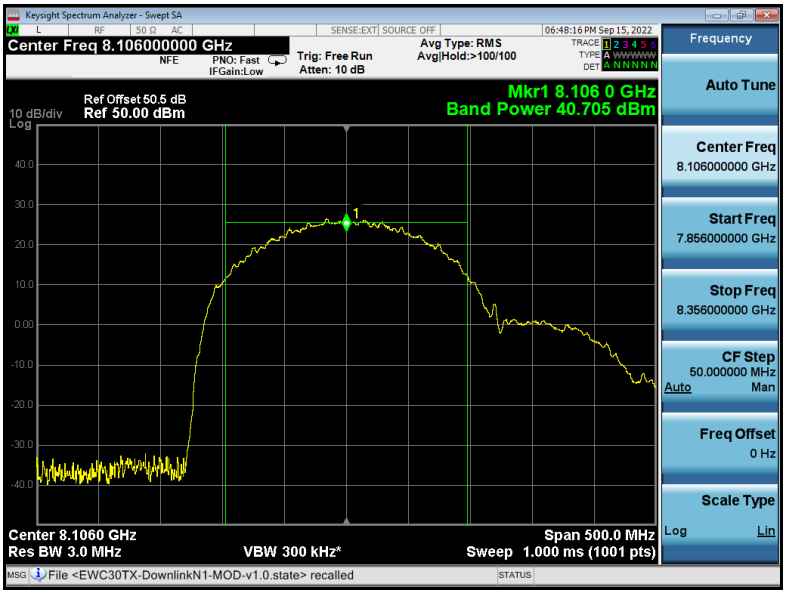
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 3 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-05" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |

## 4 DUT power on

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 4 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 4 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 4 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 4 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 4 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 4 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 4 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 4 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 4 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

| SB1FS-COM-P-013-05 Carrier Phase Noise | | | | | | |
|---|---|---|---|---|---|---|
| **5** | **Switch DUT to Modulation Mode** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Generate down link file | file generated | | |
| | | DET | ▪ On CEGSE GUI select COMM tab, then select DOWNLINK tab.<br>▪ Set VCID to 1 (RT HK TM)<br>▪ Set "Idle before" to 110730 (≈15 seconds).<br>▪ Set "Idle after" to 110730.<br>▪ Press to Folder icon of the “Downlink Payload File” section.<br>▪ Select payload file C:\Users\EGSE COM\Documents\ COMM-SS-FM\SB1FS-COM-P-013**Data-1_VCh01_payload.bin** and press OK.<br>▪ Press "Generate Downlink File" button.<br>▪ Wait until stage shows "Generated File" and "Generating File" indicator is off (15 minutes). | | | |
| 5 | 2 | EXE | Start data transmission through the **main HV-HPC** interface | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Go to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that **stage** box does not show **Sending X Band File** message.<br>▪ Switch file selector to **Send Generated Downlink File**<br>▪ Place the switch in **I_STBY_2_OPE_M**<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that **stage** box shows **Sending X Band File**. | | | |
| 5 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 5 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 5 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR ≈ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 6 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I ≈ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |
| 5 | 7 | EXE | Verify spectrum Data presence with the PXA. | Spectrum present | | |
| | | DET | Observe the spectrum of the signal on the PXA. It must correspond to a carrier with modulation as shown in the following image:<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 8 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |
| 5 | 9 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Downlink-CW-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Downlink-CW-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |

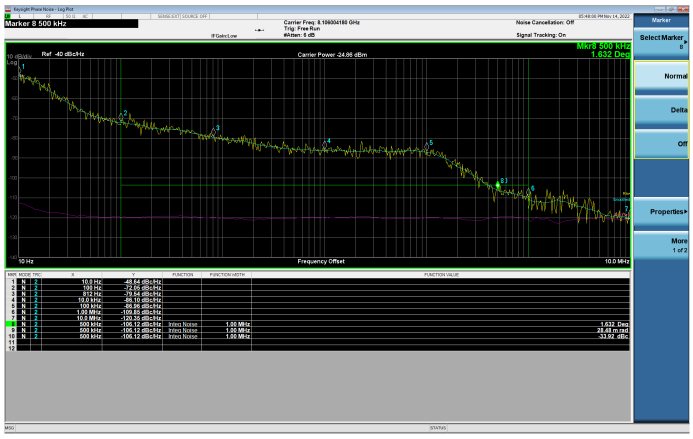
## 6 Verify frequency LO leakage

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 6 | 1 | EXE | Verify LO leakage. | $F_{out} = 8106\ MHz$. for **EWC30-FM1**<br>$F_{out} = 8269\ MHz$. for **EWC30-FM2**<br>$P_{out}$ | | |
| | | DET | Press the **Peak Search** button in PXA, verify that the measured frequency meet the expected value and take note of the power value. | | | |
| 6 | 2 | EXE | Take screenshot of signals measurements. | `CW.png` saved. | | |
| | | DET | ▪ Press **Single** button.<br>▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-05 directory.<br>▪ Enter file name: CW.png<br>▪ Press **Save** button.<br>▪ Press **Cont** button. | | | |

| 7 | DUT TX Thermal stabilization | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-FreqStability-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-FreqStability-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |
| 7 | 2 | EXE | Take an initial screenshot in PXA before use Quick save button. | `CW-A` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, browse to the **D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config \SB1FS-COM-P-013\SB1FS-COM-P-013-05\pxa-screenshot** directory.<br>▪ Enter File Name: CW-A.<br>▪ Press **Save** button.<br>**Note:** When pressing QuickSave button a new <file name>_nnnn.png screenshot is saved. nnnn start from 0 and increase every quick save. | | | |
| 7 | 3 | EXE | Measure carrier power and frequency every 60 seconds during temperature stabilization. | measurements performed | | |
| | | DET | On PXA instrument:<br>▪ Press **Restart** button when PXA clock time ends in 00 seconds.<br>▪ Press **Quick Save** button when PXA clock time ends in 40 seconds.<br>▪ Register PXA screenshot file name in table 6.5.0-2.<br>▪ Register **O_TX_TEMPERATURE** in table 6.5.0-2.<br>▪ Repeat until Tx temperature remains stable for 5 minutes. | | | |

| # | Temp. Tx$[^{\circ}C]$ | Screen shot # | Frequency $[Hz]$ | Power $[dBm]$ | # | Temp. Tx$[^{\circ}C]$ | Screen shot # | Frequency $[Hz]$ | Power $[dBm]$ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | 11 | | | | |
| 2 | | | | | 12 | | | | |
| 3 | | | | | 13 | | | | |
| 4 | | | | | 14 | | | | |
| 5 | | | | | 15 | | | | |
| 6 | | | | | 16 | | | | |
| 7 | | | | | 17 | | | | |
| 8 | | | | | 18 | | | | |
| 9 | | | | | 19 | | | | |
| 10 | | | | | 20 | | | | |

Table 6.5.0-2: Temperature stabilization

| SB1FS-COM-P-013-05 Carrier Phase Noise | | | | | | |
|---|---|---|---|---|---|---|
| **8** | **Phase Noise Measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-PhaseNoise-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-PhaseNoise-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | | |
| 8 | 2 | EXE | Measure DANL with the PXA. | DANL saved in trace3 | | |
| | | DET | On PXA instrument:<br>▪ Press **Restart** button to make a first carrier acquisition.<br>▪ Press **MeasSetup** button.<br>▪ Press **Meas type** key and select **DANL floor**.<br>▪ Press **Restart** button.<br>▪ Press **trace/detector** button and select **More/Copy Echange** keys.<br>▪ Select From **Trace 2** to **Trace 3**.<br>▪ Press **From Trace** key and select **Trace 2**<br>▪ Press **To Trace** key and select **Trace 3**<br>▪ Press **Copy Now** key.<br>▪ Press **MeasSetup** button.<br>▪ Press **Meas type** key and select **Phase Noise**. | | | |
| 8 | 3 | EXE | Measure Phase Noise using PXA. | $phase\ noise\ <\ 6^o rms$ | | |
| | | DET | On PXA instrument:<br>▪ Press **Restart** button to make a fresh measurement.<br>▪ Wait until measurement ends. The observed measurement should be similar to the figure below.<br>▪ Verify that the measured value is as expected.<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 4 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-05 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 8 | 5 | EXE | Save trace 1 of phase noise measurement. | `1.csv` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Data (Export)** key.<br>▪ Press **Trace** key.<br>▪ Press **Trace 1** key.<br>▪ Press **Save as ...** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-05 directory.<br>▪ Enter as file name: 1.csv<br>▪ Press **Save** button. | | | |
| 8 | 6 | EXE | Save trace 2 of phase noise measurement. | `2.csv` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Data (Export)** key.<br>▪ Press **Trace** key.<br>▪ Press **Trace 2** key.<br>▪ Press **Save as ...** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-05 directory.<br>▪ Enter as file name: 2.csv<br>▪ Press **Save** button. | | | |
| 8 | 7 | EXE | Save trace 3 of phase noise measurement. | `3.csv` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Data (Export)** key.<br>▪ Press **Trace** key.<br>▪ Press **Trace 3** key.<br>▪ Press **Save as ...** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-05 directory.<br>▪ Enter as file name: 3.csv<br>▪ Press **Save** button. | | | |

| 9 | DUT Turn off | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 9 | 2 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

| 10 | CEGSE SW shutdown | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |

| 11 | Collect Evidences | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | Copy test folder of PXA to CEGSE. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `//192.168.75.231/d$/Users/`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ Copy the SB1FS-COM-P-013-05 folder from D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013 directory to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013` directory on CEGSE. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 2 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>**Note: In case the CEGSE SW has not been started in this test, the CEGSE logs must be saved in the test folder in which the CEGSE SW was started.**<br>In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-05 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-05 directory.<br>▪ Paste the copied folder. | | | |
| **12** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 12 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 12 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 12 | 3 | EXE | Disconnect XRF3.60 cable from DWL Test Port of CEGSE. | XRF3.60 disconnected from DWL Test Port. DWL Test Port with RF load. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect XRF3.60 cable from the DWL Test Port of CEGSE.<br>▪ Connect the 50 ohm load fto the DWL Test Port of CEGSE. | | | |
| 12 | 4 | EXE | Disconnect XRF3.60 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | **Note: If the following test is executed skip this step.**<br>▪ Disconnect the end XRF3.60 cable from DC Block (This is connected to RF IN of PXA). | | | |

Table 6.5.0-3: SB1FS-COM-P-013-05 procedure.

## 6.6. SB1FS-COM-P-013-06 Optimum filter confirmation And RF characterization with VSA and Cortex

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-06 |
| **Task name** | Optimum filter confirmation And RF characterization with VSA and Cortex |
| **Task description** | In this test the EWC30 TX is set in Modulation mode. The modulated signal is received through the N1 [X-Band] interface of the GS-GSE-FM (R) in the case of the **EWC30-FM1** and through N2 in the case of the **EWC30-FM2**. Two filter configurations in Data Demodulator (Cortex HDR) are evaluated (see table 6.6.0-2). A vector analysis of the received signals is carried out using the VSA and the Vector Script. |
| **Task purpose** | The purpose of this test is to evaluate the two filters configurations (see table 6.6.0-2) in the Cortex HDR.On the other hand, it is to perform a vector analysis of the modulated signals. |
| **Success criteria** | ▪ The **A10** and **B2** filter configurations are evaluated.<br>▪ Vector analysis is performed.<br>▪ For **A10** filter configuration<br>• EVM < 6 %<br>• \|Amplitude Error\| < 0.5 dB rms<br>• \|Phase Error\| < 5° rms for **EWC30-FM1**.<br>• \|Phase Error\| $\leq$ 5.3° rms for **EWC30-FM2**. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1 and the following optional connections:<br>• RF input of PXA connected to **XB TP** of GS-GSE-FM (R). |
| **Duration** | 90 minutes |
| **Data sets required** | ▪ CEGSE PXI nominal configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder<br>▪ Data file for modulation:<br>• Data-4429200_600s_VCh01_wPN.bin.<br>▪ PXA configuration files in `COMM-SS-FM-PXA-config` folder:<br>• EWC30TX-FM1-VSA-v1.0.setx.<br>• EWC30TX-FM2-VSA-v1.0.setx.<br>• SB1FS-COM.csd.<br>▪ Vector-0.9.4 script installed in GS-GSE.MGMT VM. |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.6.0-1: Procedure SB1FS-COM-P-013-06 description.

| Configuration# | Filter Type and Advanced Cfg |
|---|---|
| A10 (RD.02) | SRRC filter, Roll-off = 0.5, Asym, Comp, LPF, HBF, LMS, DEAF |
| B2 (RD.02) | SRRC filter, Roll-off = 0.5, Asym, Comp, LPF, HBF, CMA |

Table 6.6.0-2: Filter configurations for Data demodulation.

## SB1FS-COM-P-013-06 Optimum filter confirmation And RF characterization with VSA and Cortex

### Executor Record

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |

### 1 Environmental temperature and humidity

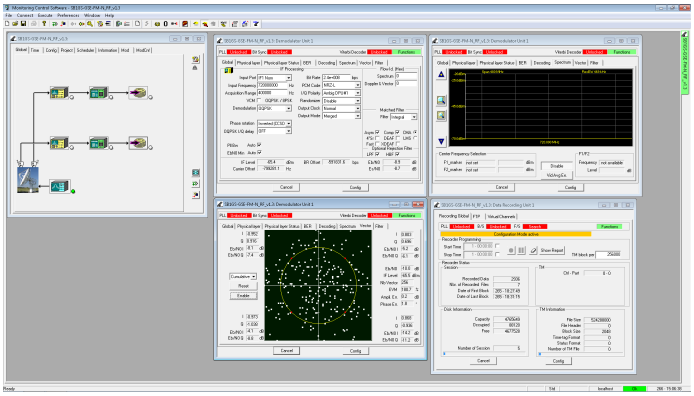
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |

### 2 PXA Connection and configuration

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 2 | 1 | EXE | Connect XRF3.60 cable to DWL TP of CEGSE. | XRF3.60 connected to DWL TP. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Disconnect the 50 ohm load from the DWL TP of CEGSE.<br>▪ Connect XRF3.60 cable to the DWL TP of CEGSE. | | | |
| 2 | 2 | EXE | Connect XRF3.60 cable to DC Block on PXA. | Cable connected. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Connect the end XRF3.60 cable to DC Block (this is connected to the RF IN of PXA). | | | |
| 2 | 3 | EXE | Configure the PXA in VSA mode. | PXA configured in VSA mode. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **89601 VSA** key. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 4 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>■ Click on **File, Recall, Recall Setup...**<br>■ Go to `D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config` directory.<br>■ Go to `SB1FS-COM-P-013\` directory.<br>■ In the displayed window, select file `EWC30TX-FM<X>-VSA-v1.0.setx`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>■ Click on the Open button. | | | |
| 2 | 5 | EXE | Load state definition file into VSA software. | State definition loaded. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>■ Click on **MeasSetup, Digital Demod Properties...**<br>■ In the displayed window, click on **Recall State Definitions...**<br>■ Go to `D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config` directory.<br>■ Select the `SB1FS-COM-P-013\` folder.<br>■ In the displayed window, select file `SB1FS-COM.csd`.<br>■ Click on the Open button.<br>■ Click on **View State Definitions**.<br>■ Verify that the following states definition is visible (Inverse mapping).<br>• **10 00**<br>• **11 01**<br>■ Close displayed window. | | | |
| **3** | **GS-GSE Preparation** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Enable Monitor and Control in **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | Interface status in **Monitor and Control**. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>■ Go to the **Interface Status** field and select **Monitor and Control**. | | | |
| 3 | 2 | EXE | Enable **N1** interface in the **X-Band Matrix and Attenuator**. | N1 interface enabled. | | |
| | | DET | Note: Skip this step if **EWC30-FM2** is under test.<br><br>In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>■ Press the **Nadir 1 to Down Converters** button.<br>■ Go to the **XBMA Control Diagram** field and verify that the **bottom** indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>■ Go to the **XBMA Control Diagram** field and verify that the **bottom** indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |

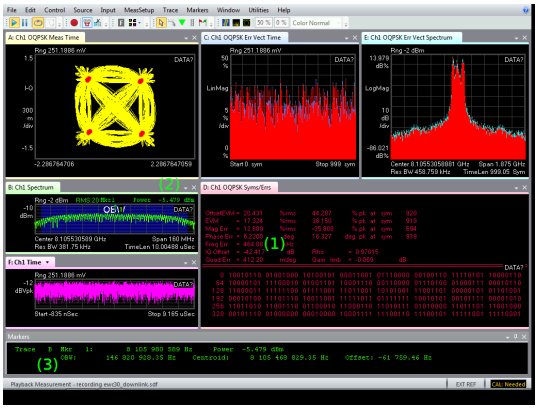
| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 3 | EXE | Enable **N2** interface in the **X-Band Matrix and Attenuator**. | N2 interface enabled. | | |
| | | DET | Note: Skip this step if **EWC30-FM1** is under test.<br><br>In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Press the **Nadir 2 to Down Converters** button.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **top** indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **top** indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 3 | 3 | EXE | Set attenuation of GS-GSE-FM (R) **X-Band Matrix and Attenuator** . | Attenuation of 0 dB. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Go to the **Variable Attenuador Control** field and press the 0 dB button.<br>▪ Go to the **ATENUATOR VARIABLE** block and verify that the 0 dB indicator is green. | | | |
| 3 | 4 | EXE | Verify **X-Band DownconverterN1** configuration. | ▪ RF = 8106.0 MHz<br>▪ Aten = 6 dB<br>▪ RF = ON | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br><br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter01-FM_v1.0.py`<br><br>In the displayed menu, verify that the parameters are configured according to the expected values. Then enter the number 5 and press enter to exit the menu. | | | |
| 3 | 5 | EXE | Verify **X-Band DownconverterN2** configuration. | ▪ RF = 8269.0 MHz<br>▪ Aten = 4 dB<br>▪ RF = ON | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br><br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter02-FM_v1.0.py`<br><br>In the displayed menu, verify that the parameters are configured according to the expected values. Then enter the number 5 and press enter to exit the menu. | | | |

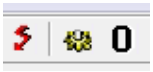
| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 6 | EXE | Create folder for screenshots in Cortex HDR. | Folder created. | | |
| | | DET | In Cortex HDR(192.168.75.161) open window file explorer and create **cortex-screenshot-013-06** folder in directory `D:\ZDS\Data\HDR\MCS\` | | | |
| 3 | 7 | EXE | Configure the **Cortex HDR**. | Cortex HDRconfigured. | | |
| | | DET | In Cortex MCS (192.168.75.161) open the configuration file from directory `D:\ZDS\Data\HDR\MCS\SABIA-Mar\:`<br>▪ `SB1GS-GSE-FM-R_RF-N1_v1.4.mcsif` **EWC30-FM1** is under test.<br>▪ `SB1GS-GSE-FM-R_RF-N2_v1.4.mcsif` **EWC30-FM2** is under test.<br>Then enable configuration by clicking on the **Control Access** icon (key icon) and click the **OK** button. Then click on **Copy Cnf->Mon** icon and then click yes if needed. | | | |
| 3 | 8 | EXE | Open Global, Spectrum and Vector plots in Cortex HDR of GS-GSE-FM (R). | Windows open. | | |
| | | DET | Go to MCS Cortex (192.168.75.161). According to the figures below, do the following:<br>▪ Global tab of DMU-1 (Demodulator Unit 1):<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to Global tab.<br>▪ Spectrum tab of DMU-1:<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to Spectrum tab and press enable button.<br>▪ Vector tab of DMU-1:<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to vector tab, select cumulative option and press enable button.<br>▪ Global tab of DRU-1:<br>• In the Global window, click on the DRU-1 (Data Recording Unit 1).<br>• In the displayed window go to Global tab.<br>  <br>**Note:** The image shown should be taken for illustrative purposes. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | 9 | EXE | Verify Matched Filter parameter of Cortex HDR of GS-GSE-FM (R). | Matched Filter -> Filter = RootRaised filter<br>Roll-Off = 0.5<br>Matched Filter -> Asym, Comp, DEAF, LMS, LPF and HBF checked | | |
| | | DET | Go to MCS Cortex (192.168.75.161), in Global tab of DMU-1 (Demodulator Unit 1), verify the following:<br>▪ Matched Filter -> Filter = RootRaised filter<br>▪ Roll-Off = 0.5<br>▪ Matched Filter -> Asym, Comp, DEAF, LMS checked<br>▪ Optional Rejection Filter -> LPF and HBF checked | | | |
| **4** | **EGSE Settings** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB. | Attenuation in 0 dB. | | |
| | | DET | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB attenuation position. | | | |
| **5** | **CEGSE SW Initialization** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-06" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |
| **6** | **DUT power on** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 6 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 6 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 6 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 6 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 6 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 6 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 6 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 6 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| **7** | **Data transmission** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | Start data transmission for 10 minutes | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 7 | 2 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 7 | 3 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 7 | 4 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 7 | 5 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I $\approx$ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |

| 8 | VSA measurement | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | Start recording RF signal with PXA. | Recording started. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>▪ Click on the **Control, Record** tabs. | | | |
| 8 | 2 | EXE | Save Recorded RF signal with PXA. | `<filename.sdf>` saved. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>▪ Wait for the signal to be fully recorded.<br>▪ Click on the **File, Save, Save Recording...** tabs.<br>▪ In the displayed window, find and select the **pxa-recording** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-06 directory.<br>▪ Enter a name and click the **Save** button. | | | |
| 8 | 3 | EXE | Play VSA recording. | Started Playback. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>▪ Click on the **Control, Restart** tabs. | | | |
| 8 | 4 | EXE | Measure Data characteristics in VSA | - Freq Err $< 500KHz$<br>- EVM [%]<br>- Mag Err [%]<br>- Phase Err [°]<br>- Output power = -7.2 dBm $\pm 1\ dB$ for **EWC30-FM1**<br>-7.3 dBm $\pm 1\ dB$ for **EWC30-FM2**<br>- Modulation scheme = $O-QPSK(4\ states)$. | | |
| | | DET | According to the image below, do the following:<br>▪ In window D (QPSK Syms/Errs), verify that **Freq Err** meets the expected values (1), the displayed Freq Err is the difference between the value configured in the VSA software and the measured value. Take note of the measured values of **EVM**, **Mag Err** and **Phase Err**.<br>▪ In window B (Ch1: Spectrum), verify that the **output power** meets the expected values (2).<br>▪ In window A (QPSK Meas Time), verify that the **modulation scheme** is as expected.<br>  | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 8 | 5 | EXE | Take screenshot de VSA software. | `<filename.png>` saved. | | |
| | | DET | In the menu VSA software of PXA do the following:<br>▪ Click on the **File, Save, Save Bitmap...** tabs.<br>▪ In the displayed window, click on the **Save** button.<br>▪ In the displayed window, find and select the folder pxa-screenshot in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-06 directory.<br>▪ Enter a name and click on the **Save** button<br>▪ Close the displayed window. | | | |
| **9** | **A10: SRRC roll-off=0.5, Asym, Comp, LPF, HBF, LMS, DEAF filter meassurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Restart carrier acquisition on DMU-1 | carrier acquisition restarted | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>▪ Select open DMU-1 Window.<br>▪ Press "Restart Demodulator or Modulator" unit  . | | | |
| 9 | 2 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |
| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 9 | 3 | EXE | Measure Data characteristics in **Cortex HDR** of GS-GSE | **Eb/N0:**_____<br>**IF Level:**_____<br>**EVM:**_____<br>**Ampli Err:**_____<br>**Phase Err:**_____ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R), in Vector tab, do the following:<br>▪ Press reset button and wait 20 seconds.<br>▪ Read the following parameters: **Eb/N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.** | | | |
| 9 | 4 | EXE | Take screenshot of signal measurement. | `a10.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-06 folder with name a10.png. This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 9 | 5 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd /verification/Vector`<br>▪ `date`<br>▪ `sh vector.sh`<br>Then take note of date. | | | |
| 9 | 6 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>▪ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |
| 9 | 7 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| **10** | **B2: SRRC roll-off=0.5, Asym, Comp, LPF, HBF, CMA filter meassurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | Configure the matched filter on Cortex HDR of GS-GSE. | Cortex HDR configured. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE:<br>▪ In the Global tab of DMU-1 (Demodulator Unit 1) do the following:<br>• click the **Config** button.<br>• Set Asym = OFF<br>• Set Comp = OFF<br>• Set LMS = OFF<br>• Set 4*Sr = OFF<br>• Set DEAF = OFF<br>• Set CMA = **ON**<br>• Set Fast = OFF<br>• Set XDEAF = OFF<br>• Set LPF = OFF<br>• Set HBF = OFF<br>• click the **Apply** button. | | | |
| 10 | 2 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |
| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 10 | 3 | EXE | Measure Data characteristics in **Cortex HDR** of GS-GSE | **Eb/N0:**_____<br>**IF Level:**_____<br>**EVM:**_____<br>**Ampli Err:**_____<br>**Phase Err:**_____ | | |
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R), in Vector tab, do the following:<br>▪ Press reset button and wait 20 seconds.<br>▪ Read the following parameters: **Eb/N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.** | | | |
| 10 | 4 | EXE | Take screenshot of signal measurement. | `b2.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-06 folder with name b2.png.<br>This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 10 | 5 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd /verification/Vector`<br>▪ `date`<br>▪ `sh vector.sh`<br>Then take note of date. | | | |
| 10 | 6 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>▪ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |
| 10 | 7 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| 10 | 8 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 10 | 9 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

| 11 | **Filter settings comparison.** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | Get EVM value | EVM [%] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **option A10**.<br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | 2 | EXE | Get EVM value | EVM [%] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **option B2**.<br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |
| 11 | 3 | EXE | Complete the reporting table. | Table filled. | | |
| | | DET | Complete the reporting table **Results for configurations filter of data demodulation** bellow. | | | |
| 11 | 4 | EXE | Verify the measured parameters | For **A10** filter configuration:<br>- EVM < 6 %<br>- \|Amplitude Error\| < 0.5 dB rms<br>- \|Phase Error\| < 5° rms for **EWC30-FM1**.<br>- \|Phase Error\| $\leq$ 5.3° rms for **EWC30-FM2**. | | |
| | | DET | Verify that the parameters measured in the test are as expected. | | | |

## 12 DUT Power off

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 12 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

## 13 CEGSE SW shutdown

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 13 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |

## 14 Collect Evidences

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 1 | EXE | Copy test folder of PXA to CEGSE. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `//192.168.75.231/d$/Users/`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ Copy the SB1FS-COM-P-013-06 folder from D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013 directory to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013` directory on CEGSE. | | | |
| 14 | 2 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | **Note: In case the CEGSE SW has not been started in this test, the CEGSE logs must be saved in the test folder in which the CEGSE SW was started.**<br>In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-06 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-06 directory.<br>▪ Paste the copied folder. | | | |
| 14 | 3 | EXE | Copy screenshots folder of Cortex HDR to CEGSE. | Folder copied | | |
| | | DET | In the CEGSE:<br>▪ Open the file explorer and connect to Cortex HDR (192.168.75.161) with the following credentials:<br>• Address: \\192.168.75.161<br>• User: cortex<br>• Password: cortex<br>▪ Go to \\192.168.75.161\zds\HDR\MCS\<br>▪ Copy the screenshots folder cortex-screenshot-013-06.<br>▪ Go to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-06` directory of CEGSE.<br>▪ Paste the copied folder.<br>▪ Go to \\192.168.75.161\zds\HDR\MCS\<br>▪ Delete the folder cortex-screenshot-013-06 from Cortex HDR. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 4 | EXE | Copy files to CEGSEfrom GS-GSE.MGMT VM. | files copied. | | |
| | | DET | On EGSE open Total Commander from shocut in desktop and do de following:<br>■ On left side go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-P-013/SB1FS-COM-P-013-06/<br>■ On rigth side go "Network Neighborhood", select [Secure FTP], press F7 and connect to GS-GSE.MGMT VM with the following paremeters:<br>• 192.168.75.193<br>• User: administrator<br>• Password: Sb1.C0n43<br>■ On rigth side go to /opt/sao/appsharedfiles/Vector/output/ directory.<br>■ Find and copy `Vector-HDR-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>.tar.gz` files created after the date taken in the step where the Vector script for **option A10** was started.<br>■ Page files .tar.gz in C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-P-013/SB1FS-COM-P-013-06/ | | |

## 15 Final Steps

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 15 | 1 | EXE | Close **Cortex HDR of GS-GSE** configuration file. | File closed. | | |
| | | DET | In Cortex MCS close configuration file **without save changes**. Go to **File>Close** and then click **No**. | | | |
| 15 | 2 | EXE | Set **N1** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N1 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>■ Go to the **Nadir 1 Transfer Switch Control** field and press the **Nadir 1 to Redundant 1** button.<br>■ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the upper indicator of the **N1 TRANSFER SWITCH** block is **ON** and green. | | | |
| 15 | 3 | EXE | Set **N2** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N2 to redundant side. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 2 Transfer Switch Control** field and press the **Nadir 2 to Redundant 2** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the bottom indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 15 | 4 | EXE | Disconnect XRF3.60 cable from DWL Test Port of CEGSE. | XRF3.60 disconnected from DWL Test Port. DWL Test Port with RF load. | | |
| | | DET | ▪ Disconnect XRF3.60 cable from the DWL Test Port of CEGSE.<br>▪ Connect the 50 ohm load fto the DWL Test Port of CEGSE. | | | |
| 15 | 5 | EXE | Disconnect XRF3.60 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | ▪ Disconnect the end XRF3.60 cable from DC Block (This is connected to RF IN of PXA). | | | |
| 15 | 6 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 15 | 7 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |

Table 6.6.0-3: SB1FS-COM-P-013-06 procedure.

| Option Cfg # | IF level | Eb/N0 | EVM (Vector Script) | Unb. Ratio(max) | Phase Error (max) |
|---|---|---|---|---|---|
| A10 | | | | | |
| B2 | | | | | |

Table 6.6.0-4: Results for configurations filter of data demodulation.

## 6.7. SB1FS-COM-P-013-07 BER measurement

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-07 |
| **Task name** | BER measurement |
| **Task description** | In this test the EWC30 TX is set in Modulation mode. RF TestBed is configured as X-Band Noise generator. The modulated signal entering the GS-GSE-FM (R) through a [X-Band] interface is added to the noise entering through other [X-Band] interface in the GS-GSE-FM (R) itself. Noise level is adjusted to different test levels of Eb/N0 (seen at the cortex). For each test level, demodulation parameters in the Cortex and Vector script are recorded. |
| **Task purpose** | The purpose of this test is to evaluate BER for different levels of Eb/N0. |
| **Success criteria** | Measurements performed for all Eb/N0 levels. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1 |
| **Duration** | 280 minutes |
| **Data sets required** | ▪ CEGSE PXI nominal configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder<br>▪ Data files for modulation:<br>• Data-4429200_600s_VCh01_wPN.bin.<br>▪ Data RF TestBed:<br>• SB1GS-Testbed_XB_NoiseGenerator_v1.0.mcs<br>▪ Data RF Cortex HDR of GS-GSE-FM (R):<br>• data52050<br>▪ GS-GSE File:<br>• UpConverter01_TB-FM_v1.0.py<br>▪ Vector-0.9.4 script installed in GS-GSE.MGMT VM. |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

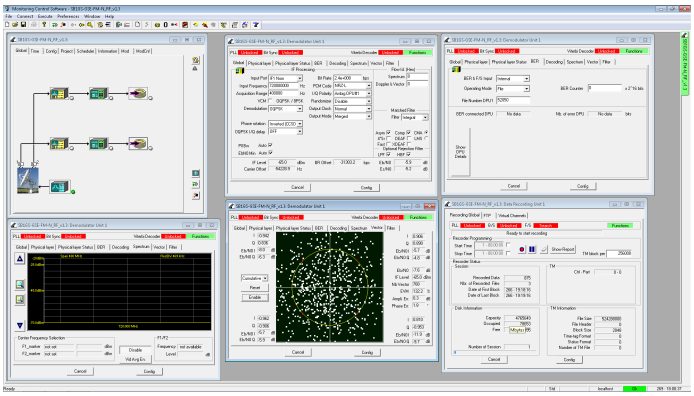
Table 6.7.0-1: Procedure SB1FS-COM-P-013-07 description.

| SB1FS-COM-P-013-07 BER measurement | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 2 | **GS-GSE Preparation** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Remove attenuators from **[X-Band] (N1)** interface of GS-GSE-FM (R) | Attenuators removed | | |
| | | DET | Note: Skip this step if **EWC30-FM1** is under test.<br>▪ Disconnect cable **XRF3.12** from 30 dB attenuator.<br>▪ Remove 30 dB attenuator from **N1** input of XBMA03.<br>▪ Connect cable **XRF3.12** to **N1** input of XBMA03. | | | |
| 2 | 2 | EXE | Remove attenuators from **[X-Band] (N2)** interface of GS-GSE-FM (R) | Attenuators removed | | |
| | | DET | Note: Skip this step if **EWC30-FM2** is under test.<br>▪ Disconnect cable **XRF3.13** from 30 dB attenuator.<br>▪ Remove 30 dB attenuator from **N2** input of XBMA03.<br>▪ Connect cable **XRF3.13** to **N2** input of XBMA03. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 3 | EXE | Enable Monitor and Control in **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | Interface status in **Monitor and Control**. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Interface Status** field and select **Monitor and Control**. | | | |
| 2 | 4 | EXE | Enable **N1** interface in the **X-Band Matrix and Attenuator**. | N1 interface enabled. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Press the **Nadir 1 to Down Converters** button.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **bottom** indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **bottom** indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 2 | 5 | EXE | Enable **N2** interface in the **X-Band Matrix and Attenuator**. | N2 interface enabled. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Press the **Nadir 2 to Down Converters** button.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **top** indicator of the **N1 TRANSFER SWITCH** block is **ON** and green.<br>▪ Go to the **XBMA Control Diagram** field and verify that the **top** indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 2 | 5 | EXE | Set attenuation of GS-GSE-FM (R) **X-Band Matrix and Attenuator** . | Attenuation of 0 dB. | | |
| | | DET | In the XBMA App v1.0.0software run on GS-GSE.WIN8 VM(192.168.75.194):<br>▪ Go to the **Variable Attenuador Control** field and press the 0 dB button.<br>▪ Go to the **ATENUATOR VARIABLE** block and verify that the 0 dB indicator is green. | | | |
| 2 | 6 | EXE | Configure **X-Band Downconverter N1**. | ▪ RF = 8106.0 MHz<br>▪ Aten = 0<br>▪ RF = ON | | |
| | | DET | Note: Skip this step if **EWC30-FM2** is under test.<br><br>In the terminal window of GS-GSE.MGMT VM (192.168.75.193) of GS-GSE-FM (N) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter01-FM_v1.0.py`<br>In the displayed menu, do the following:<br>▪ Configure Aten = 0.<br>▪ Verify that Freq = 8106 MHz.<br>▪ Verify that RF = ON<br>Then enter the number 5 and press enter to exit the menu. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 7 | EXE | Configure **X-Band Downconverter N2**. | ▪ RF = 8269.0 MHz<br>▪ Aten = 0<br>▪ RF = ON | | |
| | | DET | Note: Skip this step if **EWC30-FM1** is under test.<br><br>In the terminal window of GS-GSE.MGMT VM (192.168.75.193) of GS-GSE-FM (N) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter02-FM_v1.0.py`<br>In the displayed menu, do the following:<br>▪ Configure Aten = 0.<br>▪ Verify that Freq = 8269 MHz.<br>▪ Verify that RF = ON<br>Then enter the number 5 and press enter to exit the menu. | | | |
| 2 | 8 | EXE | Create folder for screenshots in Cortex HDR. | Folder created. | | |
| | | DET | In Cortex HDR(192.168.75.161) open window file explorer and create **cortex-screenshot-013-07** folder in directory `D:\ZDS\Data\HDR\MCS\` | | | |
| 2 | 9 | EXE | Configure the **Cortex HDR**. | Cortex HDRconfigured. | | |
| | | DET | In Cortex MCS (192.168.75.161) open the configuration file from directory `D:\ZDS\Data\HDR\MCS\SABIA-Mar\:`<br><br>▪ `SB1GS-GSE-FM-R_RF-N1_v1.4.mcs`if **EWC30-FM1** is under test.<br><br>▪ `SB1GS-GSE-FM-R_RF-N2_v1.4.mcs`if **EWC30-FM2** is under test.<br><br>Then enable configuration by clicking on the **Control Access** icon (key icon) and click the **OK** button. Then click on **Copy Cnf->Mon** icon and then click yes if needed. | | | |
| 2 | 10 | EXE | Clear storage in **Cortex HDR** | Cleaning done | | |
| | | DET | In Cortex MCS (192.168.75.161) do the following:<br>▪ Open the DMM by clicking on the **Open the global disk memory management window** icon.<br>▪ In the **Status** window of DMM, click on **Build or Erase** button.<br>▪ Select **Errase all files in all directories in all partitions** and then click on **OK** button.<br>▪ In the displayed window confirm erase by clicking on the **OK** button.<br>▪ Enable the acquisition mode by clicking on the **Configuration vs Acquisition Mode** icon and on the **Control Access**. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 11 | EXE | Configure Cortex HDR for BER measurement | Cortex HDR configured for BER measurement. | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>■ In the Global window, click on the DMU-1(Demodulator Unit 1).<br>• In the displayed window go to BER tab.<br>• Click on Config button.<br>• In Operating Mode select : File.<br>• In File Number DPU1: 52050<br>• Click on Apply button.<br>■ In the Global window, click on the DPU-1(Data Procesor Unit 1)<br>• In the displayed window go to BER-FER tab.<br>• Click on Config button.<br>• In Operating Mode select : File.<br>• In File Number: 52050<br>• Click on Apply button. | | | |

| SB1FS-COM-P-013-07 BER measurement | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 12 | EXE | Open Global,BER, Spectrum, Vector and Recording Global tabs in Cortex HDR of GS-GSE-FM (R). | tabs open. | | |
| | | DET | Go to MCS Cortex (192.168.75.161). According to the figures below, do the following:<br>■ Global tab of DMU-1 (Demodulator Unit 1):<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to Global tab.<br>■ BER tab of DMU-1:<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to BER tab.<br>■ Spectrum tab of DMU-1:<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to Spectrum tab and press enable button.<br>■ Vector tab of DMU-1:<br>• In the Global window, click on the DMU-1.<br>• In the displayed window go to vector tab, select cumulative option and press enable button.<br>■ BER-FER tab of DPU-1:<br>• In the Global window, click on the DPU-1 (Data Procesor Unit 1).<br>• In the displayed window go to BER-FER tab.<br>■ Global tab of DRU-1:<br>• In the Global window, click on the DRU-1 (Data Recording Unit 1).<br>• In the displayed window go to Recording Global tab.<br>  | | | |

| 3 | Data TestBed setting and connection | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Configure X-Band Upconverter of RF TestBed. | ■ RF = 8106.0 MHz for **EWC30-FM2**<br>■ RF = 8269.0 MHz for **EWC30-FM1**<br>■ Aten = 0 dB<br>■ RF = OFF | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the terminal window of GS-GSE.MGMT VM (192.168.75.193) of GS-GSE-FM (R) run the following commands:<br>▪ `cd /verification/COMM-SS-FM/session_ID/`<br>▪ `python UpConverter01_TB-FM_v1.0.py`<br>In the displayed menu, do the following:<br>▪ Configure Aten = 0 dB.<br>▪ Configure Freq = 8269 MHz for **EWC30-FM1** and 8106 for **EWC30-FM2**.<br>▪ Verify that RF = OFF | | | |
| 3 | 2 | EXE | Configure the **Cortex HDR** of TestBed. | Cortex HDR configured. | | |
| | | DET | In Cortex MCS (192.168.75.202) open the configuration file SB1GS-Testbed_XB_NoiseGenerator_v1.0.mcs from directory `D:\ZDS\Data\HDR\CrtxMsc\SABIA-Mar\AIT\`, enable configuration by clicking on the **Control Access** icon (key icon) and click the **OK** button. Then click on **Copy Cnf->Mon** icon and then click yes if needed. | | | |
| 3 | 3 | EXE | Open TMU window in Cortex HDR of GS-GSE-FM (R). | Windows open. | | |
| | | DET | Go to MCS Cortex (192.168.75.202)and do the following:<br>▪ In the Global window, click on the TMU-1(Test Modulator Unit). | | | |
| 3 | 4 | EXE | Verify the IF and RF connections of Data RF TestBed. | All IF and RF connections present. | | |
| | | DET | Verify the following connections:<br>▪ 10 dB attenuator ATT10.01 (PE7005-10) is connected to the IF input (J01) of the X-Band Upconverter.<br>▪ Cable PE300-60-03 is connected to the 10 dB attenuator ATT10.01.<br>▪ Cable PE300-60-03 is connected to IF out (J50) of the Testbed Cortex HDR. | | | |
| 3 | 5 | EXE | Connect SRF3.02 cable to GS-GSE [X-Band] interface. | Cable SRF3.02 connected to [X-Band] interface. | | |
| | | DET | ▪ Connect SRF3.02 cable to the Data [X-Band] (N2) interface if **EWC30-FM1** is under test.<br>▪ Connect SRF3.02 cable to the Data [X-Band] (N1) interface if **EWC30-FM2** is under test. | | | |
| 3 | 6 | EXE | Connect **SRF3.02** cable to RF output (J2) of Upconverter of TestBed | Cable SRF3.02 connected RF output of Upconverter | | |

| | | | | | | |
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| | | DET | ▪ Connect SRF3.02 cable to RF output of Upconverter. | | | |
| 3 | 7 | EXE | Enable RF output of X-Band Upconverter of TestBed | RF output ON. | | |
| | | DET | Go to the X-Band Upconverter configuration menu in the terminal window and do the following:<br>▪ Press the 3 key and then enter.<br>▪ Press the 1 key and then enter<br>▪ Click on **Apply** button.<br>Verify that the desired parameter was configured correctly by viewing the menu display. | | | |
| **4** | **EGSE Settings** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Set **10 dB step Variable Attenuator** in CEGSE to 20 dB. | Attenuation in 20 dB. | | |
| | | DET | Set **10 dB step Variable Attenuator** in CEGSE to 20 dB attenuation position. | | | |
| **5** | **CEGSE SW Initialization** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 5 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | ▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-07" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |
| **6** | **DUT power on** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 6 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |

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| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 6 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 6 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 6 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 6 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 6 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 6 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 6 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |

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| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| **7** | **Data transmission 1** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 7 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 7 | 2 | EXE | Start data transmission for 10 minutes | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 7 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 7 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 7 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR ≈ 3.2 V | | |

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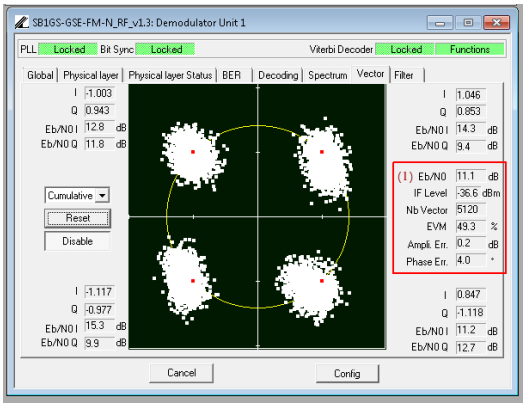
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 7 | 6 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I ≈ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |
| **8** | **Eb/N0 ≈ 6 dB measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | Adjust the Noise Power generation in Cortex HDR of TestBed in order to get an Eb/N0 close to 6 dB in Cortex HDR of GS-GSE | Eb/N0 ≈ 6 dB | | |
| | | DET | Go to Cortex HDR of RF TestBed and set an initial value of -103 dBm/Hz in Noise Level output, then adjust this, until obtain an Eb/N0 close to 6 dB in Cortex HDR of GS-GSE-FM.<br>In MCS Cortex (192.168.75.161) of GS-GSE-FM (R), press Reset buttom and wait 20 seconds. Then, see Eb/N0 in the Vector tab of the DMU-1, in the Eb/N0 field (1)<br>  | | | |

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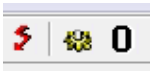
| 8 | 2 | EXE | Restart carrier acquisition on DMU-1 | carrier acquisition restarted | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>▪ Select open DMU-1 Window.<br>▪ Press "Restart Demodulator or Modulator" unit  . | | | |
| 8 | 3 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |
| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 8 | 4 | EXE | Reset Vector in DMU-1 of Cortex HDR | Vector in DMU-1 reset. | | |
| | | DET | On Cortex HDR MCS of GS-GSE-FM (R), in the Vector tab of DMU-1 press the reset button. | | | |
| 8 | 5 | EXE | Reset BER counter of Cortex HDR | Number of errors reseted. | | |
| | | DET | On Cortex HDR MCS, select DMU-1 window and Click the button BER Reset in the toolbar (Button with the 0 symbol) | | | |
| 8 | 6 | EXE | Ingest data in **Cortex HDR** of **GS-GSE-FM (R)** for two minutes. | Ingestion performed | | |
| | | DET | In Cortex MCS (192.168.75.161) ingest data for 2 minutes. It is suggested to use a stopwatch.<br>In DRU-1 (Data Recording Unit 1), go to Recording Global window and do following:<br>▪ Click on **Start Recording** (Red button).<br>▪ Verify that the sign Recording in Progress. Awaiting for Stop Command appears in green.<br>▪ Wait 2 minutes of ingestion and then click on Stop Recording button. | | | |

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| 8 | 7 | EXE | Take screenshot of signal measurement. | `ebno6.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-07 folder with name ebno6.png. This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 8 | 8 | EXE | Measure Data characteristics in DMU-1 and DPU-1 of **Cortex HDR** of GS-GSE | **Eb/N0:_____**<br>**IF Level:_____**<br>**EVM:_____**<br>**Ampli Err:_____**<br>**Phase Err:_____**<br>**BER:_____**<br>**Nb. error:_____** | | |
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R) do the following:<br>■ In Vector tab of DMU-1, read the following parameters: **Eb/N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.**<br>■ In the BER-FER tab of DPU-1, read the following parameters: **BER** and **Number of error**. | | | |
| 8 | 9 | EXE | Verify number of frames received in VCh01 by **Cortex HDR** | VCh01 ≈ 885840 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of Data Recording Unit 1 (DRU-1) and verify that the **Total TM Block** column for **VC Sort value = 1** has the expected value. | | | |
| 8 | 10 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>■ `cd /verification/Vector`<br>■ `date`<br>■ `sh vector.sh`<br>Then take note of date. | | | |
| 8 | 11 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>■ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |

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| 8 | 12 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| 8 | 13 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 8 | 14 | EXE | Start DATA RF flow on GS-GSE-FM (R) | DATA RF flow started. | | |
| | | DET | From SABIA-Mar Ground Segment web, click the **Status Monitor** icon, in the open tab do the following:<br>▪ Click on the button on the left and select **New Activity**.<br>▪ In the displayed window<br>• Click on the icon corresponding to **data-rf-n1** if **EWC30-FM1** is under test.<br>• Click on the icon corresponding to **data-rf-n2** if **EWC30-FM2** is under test.<br>▪ Enter 600 and then click on the **Confirm** button.<br>▪ Click on the **Instant** button and then click on the **Confirm** button.<br>▪ Click on the **Ok** button.<br>▪ Finally verify in **Timeline View** that **DATA RF flow** has started. | | | |
| 8 | 15 | EXE | Wait until **Start Data RF flow** execution is finished. | Data RF flow finished. | | |
| | | DET | On the web browser go to **Status Monitor** tab, identify the current flow **data-gse-flow-rf-n1** (or **data-gse-flow-rf-n2**) and wait until the flow ends. This takes approximately 6 minutes. | | | |
| 8 | 16 | EXE | Login to Configuration Control Manager from CEGSE | | | |
| | | DET | From PXI computer (192.168.75.211), open the FireFox browser and access to Configuration Control Manager web with the following parameters:<br>▪ URL: http://192.168.75.104:6080<br>▪ User: operator-conae<br>▪ Password: operator-conae | | | |

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| 8 | 17 | EXE | Go to Products section in CCM. | Products window is shown | | |
| | | DET | On CCM web click the number in the PRODUCTS section. | | | |
| 8 | 18 | EXE | Find last XBand Product for VC01 in CCM | product available | | |
| | | DET | On CCM web sort products by date to see newer product at the top. Identify the following XBand Product corresponding to this execution.<br>▪ SB1_XBandN**<X>**VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>Where <X> is 1 if **EWC30-FM1** is under test and 2 if **EWC30-FM2** is under test. | | | |
| 8 | 19 | EXE | Download identified products | products downloaded | | |
| | | DET | ▪ Download identified products by pressing download icon.<br>▪ Move downloaded products to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07\ebno6 folder | | | |
| 8 | 20 | EXE | Estimate BER from **data** | BER= x<br>Error Count = # | | |
| | | DET | On CEGSE, open terminal window and execute following commands:<br>▪ cd C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07.<br>▪ Ber.exe -m data -i ebno6\SB1_XBandN<X>VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>**Note 1:** View estimated BER values with **syncronize and compare**.<br>**Note 2:** <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**. | | | |
| 8 | 21 | EXE | Get EVM value | EVM [%] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **Eb/N0** $\approx$ **6 dB**.<br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |

| | | | | | | |
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| 8 | 22 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |
| **9** | **Data transmission 2** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 9 | 2 | EXE | Start data transmission for 10 minutes | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 9 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 9 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 9 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR ≈ 3.2 V | | |

| | | | | | | |
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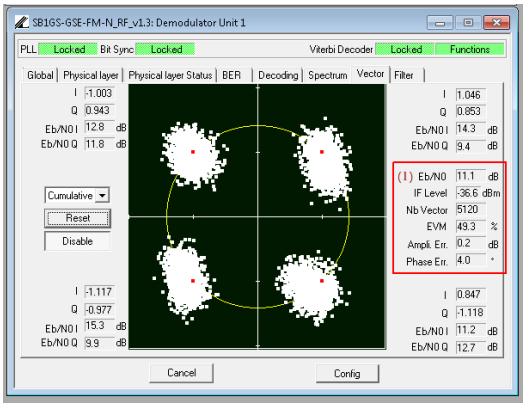
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| **10** | **Eb/N0 ≈ 5 dB measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | Adjust the Noise Power generation in Cortex HDR of TestBed in order to get an Eb/N0 close to 5 dB in Cortex HDR of GS-GSE | Eb/N0 ≈ 5 dB | | |
| | | DET | Go to Cortex HDR of RF TestBed and adjust Noise Level output until obtain Eb/N0 close to 5 dB in Cortex HDR of GS-GSE-FM.<br>In MCS Cortex (192.168.75.161) of GS-GSE-FM (R), press Reset buttom and wait 20 seconds. Then, see Eb/N0 in the Vector tab of the DMU-1, in the Eb/N0 field (1)<br>  | | | |
| 10 | 2 | EXE | Restart carrier acquisition on DMU-1 | carrier acquisition restarted | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>▪ Select open DMU-1 Window.<br>▪ Press "Restart Demodulator or Modulator" unit  . | | | |
| 10 | 3 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |

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| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 10 | 4 | EXE | Reset Vector in DMU-1 of Cortex HDR | Vector in DMU-1 reset. | | |
| | | DET | On Cortex HDR MCS of GS-GSE-FM (R), in the Vector tab of DMU-1 press the reset button. | | | |
| 10 | 5 | EXE | Reset BER counter of Cortex HDR | Number of errors reseted. | | |
| | | DET | On Cortex HDR MCS, select DMU-1 window and Click the button BER Reset in the toolbar (Button with the 0 symbol) | | | |
| 10 | 6 | EXE | Ingest data in **Cortex HDR** of **GS-GSE-FM (R)** for two minutes. | Ingestion performed | | |
| | | DET | In Cortex MCS (192.168.75.161) ingest data for 2 minutes. It is suggested to use a stopwatch.<br>In DRU-1 (Data Recording Unit 1), go to Recording Global window and do following:<br>▪ Click on **Start Recording** (Red button).<br>▪ Verify that the sign Recording in Progress. Awaiting for Stop Command appears in green.<br>▪ Wait 2 minutes of ingestion and then click on Stop Recording button. | | | |
| 10 | 7 | EXE | Take screenshot of signal measurement. | `ebno5.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-07 folder with name ebno5.png. This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 10 | 8 | EXE | Measure Data characteristics in DMU-1 and DPU-1 of **Cortex HDR** of GS-GSE | **Eb/N0:**_____<br>**IF Level:**_____<br>**EVM:**_____<br>**Ampli Err:**_____<br>**Phase Err:**_____<br>**BER:**_____<br>**Nb. error:**_____ | | |

| | | | | | | |
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| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R) do the following:<br>▪ In Vector tab of DMU-1, read the following parameters: **Eb/N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.**<br>▪ In the BER-FER tab of DPU-1, read the following parameters: **BER** and **Number of error**. | | | |
| 10 | 9 | EXE | Verify number of frames received in VCh01 by **Cortex HDR** | VCh01 ≈ 885840 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of Data Recording Unit 1 (DRU-1) and verify that the **Total TM Block** column for **VC Sort value = 1** has the expected value. | | | |
| 10 | 10 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd /verification/Vector`<br>▪ `date`<br>▪ `sh vector.sh`<br>Then take note of date. | | | |
| 10 | 11 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>▪ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |
| 10 | 12 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| 10 | 13 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

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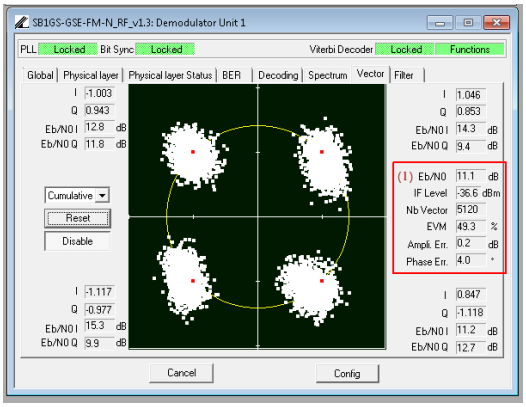
|---|---|---|---|---|---|---|
| 10 | 14 | EXE | Start DATA RF flow on GS-GSE-FM (R) | DATA RF flow started. | | |
| | | DET | From SABIA-Mar Ground Segment web, click the **Status Monitor** icon, in the open tab do the following:<br>▪ Click on the button on the left and select **New Activity**.<br>▪ In the displayed window<br>• Click on the icon corresponding to **data-rf-n1** if **EWC30-FM1** is under test.<br>• Click on the icon corresponding to **data-rf-n2** if **EWC30-FM2** is under test.<br>▪ Enter 600 and then click on the **Confirm** button.<br>▪ Click on the **Instant** button and then click on the **Confirm** button.<br>▪ Click on the **Ok** button.<br>▪ Finally verify in **Timeline View** that **DATA RF flow** has started. | | | |
| 10 | 15 | EXE | Wait until **Start Data RF flow** execution is finished. | Data RF flow finished. | | |
| | | DET | On the web browser go to **Status Monitor** tab, identify the current flow **data-gse-flow-rf-n1** (or **data-gse-flow-rf-n2**) and wait until the flow ends. This takes approximately 6 minutes. | | | |
| 10 | 16 | EXE | Login to Configuration Control Manager from CEGSE | | | |
| | | DET | From PXI computer (192.168.75.211), open the FireFox browser and access to Configuration Control Manager web with the following parameters:<br>▪ URL: http://192.168.75.104:6080<br>▪ User: operator-conae<br>▪ Password: operator-conae | | | |
| 10 | 17 | EXE | Go to Products section in CCM. | Products window is shown | | |
| | | DET | On CCM web click the number in the PRODUCTS section. | | | |
| 10 | 18 | EXE | Find last XBand Product for VC01 in CCM | product available | | |
| | | DET | On CCM web sort products by date to see newer product at the top. Identify the following XBand Product corresponding to this execution.<br>▪ SB1_XBandN**<X>**VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>Where <X> is 1 if **EWC30-FM1** is under test and 2 if **EWC30-FM2** is under test. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 19 | EXE | Download identified products | products downloaded | | |
| | | DET | ▪ Download identified products by pressing download icon.<br>▪ Move downloaded products to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07\ebno5 folder | | | |
| 10 | 20 | EXE | Estimate BER from **data** | BER= x<br>Error Count = # | | |
| | | DET | On CEGSE, open terminal window and execute following commands:<br>▪ cd C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07.<br>▪ Ber.exe -m data -i ebno5\SB1_XBandN<X>VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br><br>**Note 1:** View estimated BER values with **syncronize and compare**.<br>**Note 2:** <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**. | | | |
| 10 | 21 | EXE | Get EVM value | EVM [ %] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br><br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br><br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **Eb/N0** $\approx$ **5 dB**.<br><br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |
| 10 | 22 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

## 11 Data transmission 3

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 11 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 11 | 2 | EXE | Start data transmission for 10 minutes | Data transmission started | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 11 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 11 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 11 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |

| SB1FS-COM-P-013-07 BER measurement | | | | | | |
|---|---|---|---|---|---|---|
| 12 | **Eb/N0 ≈ 4 dB measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 12 | 1 | EXE | Adjust the Noise Power generation in Cortex HDR of TestBed in order to get an Eb/N0 close to 4 dB in Cortex HDR of GS-GSE | Eb/N0 ≈ 4 dB | | |
| | | DET | Go to Cortex HDR of RF TestBed and adjust Noise Level output until obtain Eb/N0 close to 4 dB in Cortex HDR of GS-GSE-FM.<br>In MCS Cortex (192.168.75.161) of GS-GSE-FM (R), press Reset buttom and wait 20 seconds. Then, see Eb/N0 in the Vector tab of the DMU-1, in the Eb/N0 field (1)<br>  | | |
| 12 | 2 | EXE | Restart carrier acquisition on DMU-1 | carrier acquisition restarted | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>▪ Select open DMU-1 Window.<br>▪ Press "Restart Demodulator or Modulator" unit  . | | | |
| 12 | 3 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 12 | 4 | EXE | Reset Vector in DMU-1 of Cortex HDR | Vector in DMU-1 reset. | | |
| | | DET | On Cortex HDR MCS of GS-GSE-FM (R), in the Vector tab of DMU-1 press the reset button. | | | |
| 12 | 5 | EXE | Reset BER counter of Cortex HDR | Number of errors reseted. | | |
| | | DET | On Cortex HDR MCS, select DMU-1 window and Click the button BER Reset in the toolbar (Button with the 0 symbol) | | | |
| 12 | 6 | EXE | Ingest data in **Cortex HDR** of **GS-GSE-FM (R)** for two minutes. | Ingestion performed | | |
| | | DET | In Cortex MCS (192.168.75.161) ingest data for 2 minutes. It is suggested to use a stopwatch.<br>In DRU-1 (Data Recording Unit 1), go to Recording Global window and do following:<br>▪ Click on **Start Recording** (Red button).<br>▪ Verify that the sign Recording in Progress. Awaiting for Stop Command appears in green.<br>▪ Wait 2 minutes of ingestion and then click on Stop Recording button. | | | |
| 12 | 7 | EXE | Take screenshot of signal measurement. | `ebno4.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-07 folder with name ebno4.png. This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 12 | 8 | EXE | Measure Data characteristics in DMU-1 and DPU-1 of **Cortex HDR** of GS-GSE | **Eb/N0:**_____<br>**IF Level:**_____<br>**EVM:**_____<br>**Ampli Err:**_____<br>**Phase Err:**_____<br>**BER:**_____<br>**Nb. error:**_____ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R) do the following:<br>▪ In Vector tab of DMU-1, read the following parameters: **Eb**/**N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.**<br>▪ In the BER-FER tab of DPU-1, read the following parameters: **BER** and **Number of error**. | | | |
| 12 | 9 | EXE | Verify number of frames received in VCh01 by **Cortex HDR** | VCh01 ≈ 885840 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of Data Recording Unit 1 (DRU-1) and verify that the **Total TM Block** column for **VC Sort value = 1** has the expected value. | | | |
| 12 | 10 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd /verification/Vector`<br>▪ `date`<br>▪ `sh vector.sh`<br>Then take note of date. | | | |
| 12 | 11 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>▪ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |
| 12 | 12 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| 12 | 13 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

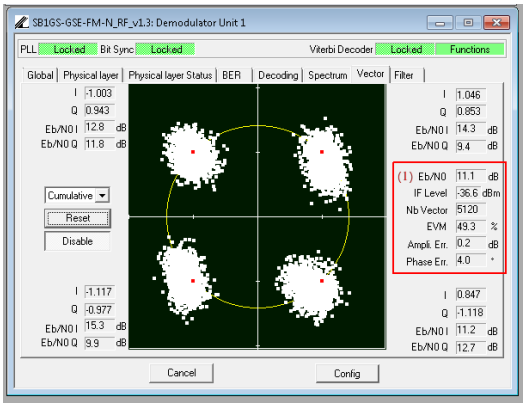
| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | 14 | EXE | Start DATA RF flow on GS-GSE-FM (R) | DATA RF flow started. | | |
| | | DET | From SABIA-Mar Ground Segment web, click the **Status Monitor** icon, in the open tab do the following:<br>▪ Click on the button on the left and select **New Activity**.<br>▪ In the displayed window<br>  • Click on the icon corresponding to **data-rf-n1** if **EWC30-FM1** is under test.<br>  • Click on the icon corresponding to **data-rf-n2** if **EWC30-FM2** is under test.<br>▪ Enter 600 and then click on the **Confirm** button.<br>▪ Click on the **Instant** button and then click on the **Confirm** button.<br>▪ Click on the **Ok** button.<br>▪ Finally verify in **Timeline View** that **DATA RF flow** has started. | | | |
| 12 | 15 | EXE | Wait until **Start Data RF flow** execution is finished. | Data RF flow finished. | | |
| | | DET | On the web browser go to **Status Monitor** tab, identify the current flow **data-gse-flow-rf-n1** (or **data-gse-flow-rf-n2**) and wait until the flow ends. This takes approximately 6 minutes. | | | |
| 12 | 16 | EXE | Login to Configuration Control Manager from CEGSE | | | |
| | | DET | From PXI computer (192.168.75.211), open the FireFox browser and access to Configuration Control Manager web with the following parameters:<br>▪ URL: http://192.168.75.104:6080<br>▪ User: operator-conae<br>▪ Password: operator-conae | | | |
| 12 | 17 | EXE | Go to Products section in CCM. | Products window is shown | | |
| | | DET | On CCM web click the number in the PRODUCTS section. | | | |
| 12 | 18 | EXE | Find last XBand Product for VC01 in CCM | product available | | |
| | | DET | On CCM web sort products by date to see newer product at the top. Identify the following XBand Product corresponding to this execution.<br>▪ SB1_XBandN**<X>**VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>Where <X> is 1 if **EWC30-FM1** is under test and 2 if **EWC30-FM2** is under test. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | 19 | EXE | Download identified products | products downloaded | | |
| | | DET | ▪ Download identified products by pressing download icon.<br>▪ Move downloaded products to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07\ebno4 folder | | | |
| 12 | 20 | EXE | Estimate BER from **data** | BER= x<br>Error Count = # | | |
| | | DET | On CEGSE, open terminal window and execute following commands:<br>▪ cd C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07.<br>▪ Ber.exe -m data -i ebno4\SB1_XBandN<X>VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br><br>**Note 1:** View estimated BER values with **syncronize and compare**.<br>**Note 2:** <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**. | | | |
| 12 | 21 | EXE | Get EVM value | EVM [ %] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br><br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br><br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **Eb/N0** $\approx$ **4 dB**.<br><br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |
| 12 | 22 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

## 13 Data transmission 4

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 13 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 13 | 2 | EXE | Start data transmission for 10 minutes | Data transmission started | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 13 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 13 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 13 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |

| SB1FS-COM-P-013-07 BER measurement | | | | | | |
|---|---|---|---|---|---|---|
| 14 | **Eb/N0 ≈ 3 dB measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 14 | 1 | EXE | Adjust the Noise Power generation in Cortex HDR of TestBed in order to get an Eb/N0 close to 3 dB in Cortex HDR of GS-GSE | Eb/N0 ≈ 3 dB | | |
| | | DET | Go to Cortex HDR of RF TestBed and adjust Noise Level output until obtain Eb/N0 close to 3 dB in Cortex HDR of GS-GSE-FM.<br>In MCS Cortex (192.168.75.161) of GS-GSE-FM (R), press Reset buttom and wait 20 seconds. Then, see Eb/N0 in the Vector tab of the DMU-1, in the Eb/N0 field (1)<br>  | | | |
| 14 | 2 | EXE | Restart carrier acquisition on DMU-1 | carrier acquisition restarted | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>▪ Select open DMU-1 Window.<br>▪ Press "Restart Demodulator or Modulator" unit  . | | | |
| 14 | 3 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 14 | 4 | EXE | Reset Vector in DMU-1 of Cortex HDR | Vector in DMU-1 reset. | | |
| | | DET | On Cortex HDR MCS of GS-GSE-FM (R), in the Vector tab of DMU-1 press the reset button. | | | |
| 14 | 5 | EXE | Reset BER counter of Cortex HDR | Number of errors reseted. | | |
| | | DET | On Cortex HDR MCS, select DMU-1 window and Click the button BER Reset in the toolbar (Button with the 0 symbol) | | | |
| 14 | 6 | EXE | Ingest data in **Cortex HDR** of **GS-GSE-FM (R)** for two minutes. | Ingestion performed | | |
| | | DET | In Cortex MCS (192.168.75.161) ingest data for 2 minutes. It is suggested to use a stopwatch.<br>In DRU-1 (Data Recording Unit 1), go to Recording Global window and do following:<br>▪ Click on **Start Recording** (Red button).<br>▪ Verify that the sign Recording in Progress. Awaiting for Stop Command appears in green.<br>▪ Wait 2 minutes of ingestion and then click on Stop Recording button. | | | |
| 14 | 7 | EXE | Take screenshot of signal measurement. | `ebno3.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-07 folder with name ebno3.png. This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 14 | 8 | EXE | Measure Data characteristics in DMU-1 and DPU-1 of **Cortex HDR** of GS-GSE | **Eb/N0:**_____<br>**IF Level:**_____<br>**EVM:**_____<br>**Ampli Err:**_____<br>**Phase Err:**_____<br>**BER:**_____<br>**Nb. error:**_____ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R) do the following:<br>▪ In Vector tab of DMU-1, read the following parameters: **Eb/N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.**<br>▪ In the BER-FER tab of DPU-1, read the following parameters: **BER** and **Number of error**. | | | |
| 14 | 9 | EXE | Verify number of frames received in VCh01 by **Cortex HDR** | VCh01 ≈ 885840 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of Data Recording Unit 1 (DRU-1) and verify that the **Total TM Block** column for **VC Sort value = 1** has the expected value. | | | |
| 14 | 10 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd /verification/Vector`<br>▪ `date`<br>▪ `sh vector.sh`<br>Then take note of date. | | | |
| 14 | 11 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>▪ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |
| 14 | 12 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| 14 | 13 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

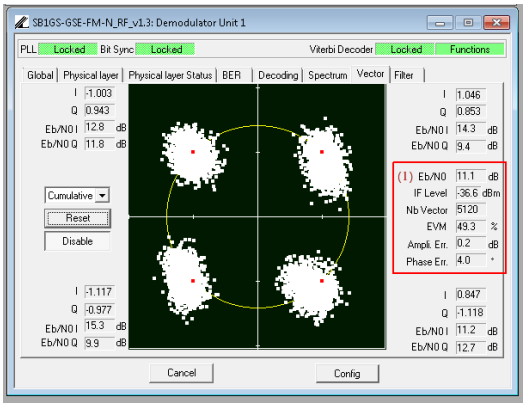
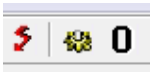
| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 14 | EXE | Start DATA RF flow on GS-GSE-FM (R) | DATA RF flow started. | | |
| | | DET | From SABIA-Mar Ground Segment web, click the **Status Monitor** icon, in the open tab do the following:<br>▪ Click on the button on the left and select **New Activity**.<br>▪ In the displayed window<br>  • Click on the icon corresponding to **data-rf-n1** if **EWC30-FM1** is under test.<br>  • Click on the icon corresponding to **data-rf-n2** if **EWC30-FM2** is under test.<br>▪ Enter 600 and then click on the **Confirm** button.<br>▪ Click on the **Instant** button and then click on the **Confirm** button.<br>▪ Click on the **Ok** button.<br>▪ Finally verify in **Timeline View** that **DATA RF flow** has started. | | | |
| 14 | 15 | EXE | Wait until **Start Data RF flow** execution is finished. | Data RF flow finished. | | |
| | | DET | On the web browser go to **Status Monitor** tab, identify the current flow **data-gse-flow-rf-n1** (or **data-gse-flow-rf-n2**) and wait until the flow ends. This takes approximately 6 minutes. | | | |
| 14 | 16 | EXE | Login to Configuration Control Manager from CEGSE | | | |
| | | DET | From PXI computer (192.168.75.211), open the FireFox browser and access to Configuration Control Manager web with the following parameters:<br>▪ URL: http://192.168.75.104:6080<br>▪ User: operator-conae<br>▪ Password: operator-conae | | | |
| 14 | 17 | EXE | Go to Products section in CCM. | Products window is shown | | |
| | | DET | On CCM web click the number in the PRODUCTS section. | | | |
| 14 | 18 | EXE | Find last XBand Product for VC01 in CCM | product available | | |
| | | DET | On CCM web sort products by date to see newer product at the top. Identify the following XBand Product corresponding to this execution.<br>▪ SB1_XBandN**<X>**VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>Where <X> is 1 if **EWC30-FM1** is under test and 2 if **EWC30-FM2** is under test. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | 19 | EXE | Download identified products | products downloaded | | |
| | | DET | ▪ Download identified products by pressing download icon.<br>▪ Move downloaded products to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07\ebno3 folder | | | |
| 14 | 20 | EXE | Estimate BER from **data** | BER= x<br>Error Count = # | | |
| | | DET | On CEGSE, open terminal window and execute following commands:<br>▪ cd C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07.<br>▪ Ber.exe -m data -i ebno3\SB1_XBandN<X>VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br><br>**Note 1:** View estimated BER values with **syncronize and compare**.<br>**Note 2:** <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**. | | | |
| 14 | 21 | EXE | Get EVM value | EVM [ %] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br><br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br><br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **Eb/N0** $\approx$ **3 dB**.<br><br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |
| 14 | 22 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

## 15 Data transmission 5

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 15 | 1 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 15 | 2 | EXE | Start data transmission for 10 minutes | Data transmission started | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 15 | 3 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 15 | 4 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 15 | 5 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR $\approx$ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |

| SB1FS-COM-P-013-07 BER measurement | | | | | | |
|---|---|---|---|---|---|---|
| **16** | **Eb/N0 ≈ 2 dB measurement** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 16 | 1 | EXE | Adjust the Noise Power generation in Cortex HDR of TestBed in order to get an Eb/N0 close to 2 dB in Cortex HDR of GS-GSE | Eb/N0 ≈ 2 dB | | |
| | | DET | Go to Cortex HDR of RF TestBed and adjust Noise Level output until obtain Eb/N0 close to 2 dB in Cortex HDR of GS-GSE-FM.<br>In MCS Cortex (192.168.75.161) of GS-GSE-FM (R), press Reset buttom and wait 20 seconds. Then, see Eb/N0 in the Vector tab of the DMU-1, in the Eb/N0 field (1)<br>  | | |
| 16 | 2 | EXE | Restart carrier acquisition on DMU-1 | carrier acquisition restarted | | |
| | | DET | Go to MCS Cortex (192.168.75.161) and do the following:<br>▪ Select open DMU-1 Window.<br>▪ Press "Restart Demodulator or Modulator" unit  . | | | |
| 16 | 3 | EXE | Verify locked status in DPU-1 of **Cortex HDR** of **GS-GSE** | PLL is locked and stable.<br>B/S is locked and stable.<br>Viterbi is locked and stable.<br>F/S is locked and stable. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to Cortex MCS (192.168.75.161) of GS-GSE-FM (R) and in the open DPU-1 window do the following:<br>▪ Verify that PLL is locked.<br>▪ Verify that B/S is locked.<br>▪ Verify that Viterbi is Locked.<br>▪ Verify that F/S is locked.<br>Verify for 30 seconds that none of them unlock. | | | |
| 16 | 4 | EXE | Reset Vector in DMU-1 of Cortex HDR | Vector in DMU-1 reset. | | |
| | | DET | On Cortex HDR MCS of GS-GSE-FM (R), in the Vector tab of DMU-1 press the reset button. | | | |
| 16 | 5 | EXE | Reset BER counter of Cortex HDR | Number of errors reseted. | | |
| | | DET | On Cortex HDR MCS, select DMU-1 window and Click the button BER Reset in the toolbar (Button with the 0 symbol) | | | |
| 16 | 6 | EXE | Ingest data in **Cortex HDR** of **GS-GSE-FM (R)** for two minutes. | Ingestion performed | | |
| | | DET | In Cortex MCS (192.168.75.161) ingest data for 2 minutes. It is suggested to use a stopwatch.<br>In DRU-1 (Data Recording Unit 1), go to Recording Global window and do following:<br>▪ Click on **Start Recording** (Red button).<br>▪ Verify that the sign Recording in Progress. Awaiting for Stop Command appears in green.<br>▪ Wait 2 minutes of ingestion and then click on Stop Recording button. | | | |
| 16 | 7 | EXE | Take screenshot of signal measurement. | `ebno2.png` saved. | | |
| | | DET | Save screenshot of MCS (192.168.75.161) in cortex-screenshot-013-07 folder with name ebno2.png. This could be done by pressing the **print screen key** and using the Paint software. | | | |
| 16 | 8 | EXE | Measure Data characteristics in DMU-1 and DPU-1 of **Cortex HDR** of GS-GSE | **Eb/N0:**_____<br>**IF Level:**_____<br>**EVM:**_____<br>**Ampli Err:**_____<br>**Phase Err:**_____<br>**BER:**_____<br>**Nb. error:**_____ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Go to MCS Cortex (192.168.75.161) of GS-GSE-FM (R) do the following:<br>▪ In Vector tab of DMU-1, read the following parameters: **Eb/N0**,**IF Level**,**EVM**, **Ampli Err** and **Phase Err.**<br>▪ In the BER-FER tab of DPU-1, read the following parameters: **BER** and **Number of error**. | | | |
| 16 | 9 | EXE | Verify number of frames received in VCh01 by **Cortex HDR** | VCh01 ≈ 885840 frames | | |
| | | DET | In Cortex MCS (192.168.75.161) go to **Virtual Channels** window of Data Recording Unit 1 (DRU-1) and verify that the **Total TM Block** column for **VC Sort value = 1** has the expected value. | | | |
| 16 | 10 | EXE | Start Vector script | Vector script started YYYYMMDDHHMMSS: | | |
| | | DET | In the terminal window of GS-GSE.MGMT VM(192.168.75.193) run the following commands:<br>▪ `cd /verification/Vector`<br>▪ `date`<br>▪ `sh vector.sh`<br>Then take note of date. | | | |
| 16 | 11 | EXE | Verify connection of clients in Cortex HDR | Clients conected a Cortex HDR | | |
| | | DET | According to the figure below, do the following:<br>▪ Go to MCS Cortex (192.168.75.161), in the Global window<br>• Verify client connection  | | | |
| 16 | 12 | EXE | Stop Vector script | Vector script stoped | | |
| | | DET | ▪ Wait 30 seconds<br>▪ Go to terminal were Vector script was executed and press Ctrl + C | | | |
| 16 | 13 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 14 | EXE | Start DATA RF flow on GS-GSE-FM (R) | DATA RF flow started. | | |
| | | DET | From SABIA-Mar Ground Segment web, click the **Status Monitor** icon, in the open tab do the following:<br>▪ Click on the button on the left and select **New Activity**.<br>▪ In the displayed window<br>  • Click on the icon corresponding to **data-rf-n1** if **EWC30-FM1** is under test.<br>  • Click on the icon corresponding to **data-rf-n2** if **EWC30-FM2** is under test.<br>▪ Enter 600 and then click on the **Confirm** button.<br>▪ Click on the **Instant** button and then click on the **Confirm** button.<br>▪ Click on the **Ok** button.<br>▪ Finally verify in **Timeline View** that **DATA RF flow** has started. | | | |
| 16 | 15 | EXE | Wait until **Start Data RF flow** execution is finished. | Data RF flow finished. | | |
| | | DET | On the web browser go to **Status Monitor** tab, identify the current flow **data-gse-flow-rf-n1** (or **data-gse-flow-rf-n2**) and wait until the flow ends. This takes approximately 6 minutes. | | | |
| 16 | 16 | EXE | Login to Configuration Control Manager from CEGSE | | | |
| | | DET | From PXI computer (192.168.75.211), open the FireFox browser and access to Configuration Control Manager web with the following parameters:<br>▪ URL: http://192.168.75.104:6080<br>▪ User: operator-conae<br>▪ Password: operator-conae | | | |
| 16 | 17 | EXE | Go to Products section in CCM. | Products window is shown | | |
| | | DET | On CCM web click the number in the PRODUCTS section. | | | |
| 16 | 18 | EXE | Find last XBand Product for VC01 in CCM | product available | | |
| | | DET | On CCM web sort products by date to see newer product at the top. Identify the following XBand Product corresponding to this execution.<br>▪ SB1_XBandN**<X>**VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br>Where <X> is 1 if **EWC30-FM1** is under test and 2 if **EWC30-FM2** is under test. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 16 | 19 | EXE | Download identified products | products downloaded | | |
| | | DET | ▪ Download identified products by pressing download icon.<br>▪ Move downloaded products to C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07\ebno2 folder | | | |
| 16 | 20 | EXE | Estimate BER from **data** | BER= x<br>Error Count = # | | |
| | | DET | On CEGSE, open terminal window and execute following commands:<br>▪ cd C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07.<br>▪ Ber.exe -m data -i ebno2\SB1_XBandN<X>VC01_<passID>_<YYYYMMDDTHHMMSS>.bin<br><br>**Note 1:** View estimated BER values with **syncronize and compare**.<br>**Note 2:** <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**. | | | |
| 16 | 21 | EXE | Get EVM value | EVM [ %] value | | |
| | | DET | From the file explorer in the GS-GSE.MGMT VM(192.168.75.193)<br><br>▪ Go to the `/opt/sao/appsharedfiles/Vector/workspace` directory<br><br>▪ Open `Vector-HDR_DMU1_Vector-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>-001.scv` file created later than the date taken in vector script start step for **Eb/N0 ≈ 2 dB**.<br><br>▪ Get average value of **DMU.EVM.Calc.Normalized.percent**. | | | |
| 16 | 22 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

## 17 Report tables

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 17 | 1 | EXE | Complete the reporting table. | Table filled. | | |
| | | DET | Complete the reporting table **Data demodulation table** bellow. | | | |

## 18 DUT Power off

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 18 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| **19** | **CEGSE SW shutdown** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 19 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |
| **20** | **Collect Evidences** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 20 | 1 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-07 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-07 directory.<br>▪ Paste the copied folder. | | | |
| 20 | 2 | EXE | Copy screenshots folder of Cortex HDR to CEGSE. | Folder copied | | |
| | | DET | In the CEGSE:<br>▪ Open the file explorer and connect to Cortex HDR (192.168.75.161) with the following credentials:<br>• Address: \\192.168.75.161<br>• User: cortex<br>• Password: cortex<br>▪ Go to \\192.168.75.161\zds\HDR\MCS\<br>▪ Copy the screenshots folder cortex-screenshot-013-07.<br>▪ Go to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\ <session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-07` directory of CEGSE.<br>▪ Paste the copied folder.<br>▪ Go to \\192.168.75.161\zds\HDR\MCS\<br>▪ Delete the folder cortex-screenshot-013-07 from Cortex HDR. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 20 | 3 | EXE | Copy files to CEGSEfrom GS-GSE.MGMT VM. | files copied. | | |
| | | DET | On EGSE open Total Commander from shocut in desktop and do de following:<br>▪ On left side go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-P-013/SB1FS-COM-P-013-07/<br>▪ On rigth side go "Network Neighborhood", select [Secure FTP], press F7 and connect to GS-GSE.MGMT VM with the following paremeters:<br>• 192.168.75.193<br>• User: administrator<br>• Password: Sb1.C0n43<br>▪ On rigth side go to /opt/sao/appsharedfiles/Vector/output/ directory.<br>▪ Find and copy `Vector-HDR-100<YYYYMMDDHHMMSS>-<YYYYMMDDTHHMMSS>.tar.gz` files created after the date taken in the step where the Vector script for **Eb/E0** ≈ **6** was started.<br>▪ Page files .tar.gz in C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/SB1FS-COM-P-013/SB1FS-COM-P-013-07/ | | | |
| **21** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 21 | 1 | EXE | Set **N1** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N1 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 1 Transfer Switch Control** field and press the **Nadir 1 to Redundant 1** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the upper indicator of the **N1 TRANSFER SWITCH** block is **ON** and green. | | | |
| 21 | 2 | EXE | Set **N2** to the **redundant** side in the **X-Band Matrix and Attenuator** of GS-GSE-FM (R). | N2 to redundant side. | | |
| | | DET | In the XBMA App v1.0.0 software run on GS-GSE.WIN8 VM (192.168.75.194):<br>▪ Go to the **Nadir 2 Transfer Switch Control** field and press the **Nadir 2 to Redundant 2** button.<br>▪ Go to the **X-Band Matrix and Attenuator Control Diagram** field and verify that the bottom indicator of the **N2 TRANSFER SWITCH** block is **ON** and green. | | | |
| 21 | 3 | EXE | Configure **X-Band Downconverter N1**. | ▪ RF = 8106.0 MHz<br>▪ Aten = 6<br>▪ RF = ON | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Note: Skip this step if **EWC30-FM2** is under test.<br><br>In the terminal window of GS-GSE.MGMT VM (192.168.75.193) of GS-GSE-FM (N) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter01-FM_v1.0.py`<br>In the displayed menu, do the following:<br>▪ Configure Aten = 6.<br>▪ Verify that Freq = 8106 MHz.<br>▪ Verify that RF = ON<br>Then enter the number 5 and press enter to exit the menu. | | | |
| 21 | 4 | EXE | Configure **X-Band Downconverter N2**. | ▪ RF = 8269.0 MHz<br>▪ Aten = 4<br>▪ RF = ON | | |
| | | DET | Note: Skip this step if **EWC30-FM1** is under test.<br><br>In the terminal window of GS-GSE.MGMT VM (192.168.75.193) of GS-GSE-FM (N) run the following commands:<br>▪ `cd ~/Documents/gse_scripts/xband_converters_scripts/`<br>▪ `python DownConverter02-FM_v1.0.py`<br>In the displayed menu, do the following:<br>▪ Configure Aten = 4.<br>▪ Verify that Freq = 8269 MHz.<br>▪ Verify that RF = ON<br>Then enter the number 5 and press enter to exit the menu. | | | |
| 21 | 5 | EXE | Close **Cortex HDR of GS-GSE** configuration file. | File closed. | | |
| | | DET | In Cortex MCS close configuration file **without save changes**. Go to **File>Close** and then click **No**. | | | |
| 21 | 6 | EXE | Close configuration menu of X-Band Upconverter of Data RF TestBed. | Menu closed. | | |
| | | DET | Go to the X-Band Upconverter configuration menu in the terminal window and do the following: Press the 5 key and then enter. | | | |
| 21 | 7 | EXE | Disable noise generation in **Cortex HDR of TestBed**. | Noise disabled. | | |
| | | DET | Go to MCS Cortex (192.168.75.202) and in Global window of TMU (Test Modulator Unit) do the following:<br>▪ Click on **Config** button.<br>▪ UnMark **Noise Enable** field.<br>▪ Click on **Apply** button. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21 | 8 | EXE | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB. | Attenuation in 0 dB. | | |
| | | DET | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB attenuation position. | | | |
| 21 | 9 | EXE | Disconnect XRF4.02 cable from IN/OUT Port of CEGSE. | Cable XRF4.02 disconnected from IN/OUT Port. | | |
| | | DET | ▪ Disconnect XRF4.02 cable to the IN/OUT Port of CEGSE.<br>▪ Connect the 50 ohm load from the IN/OUT Port of CEGSE. | | | |
| 21 | 10 | EXE | Disconnect XRF4.02 cable from [X-Band] interface of GS-GSE-FM(R) | Cable XRF4.02 disconnected | | |
| | | DET | ▪ Disconnect XRF4.02 cable from [X-Band] interface of GS-GSE-FM(R) | | | |
| 21 | 11 | EXE | Disconnect **SRF3.02** cable from RF output of Upconverter of TestBed | Cable SRF3.02 disconnected from RF output of Upconverter | | |
| | | DET | ▪ Disconnect SRF3.02 cable from RF output of Upconverter. | | | |
| 21 | 12 | EXE | Disconnect SRF3.02 cable from [X-Band] interface of GS-GSE-FM(R) | Cable SRF3.02 disconnected | | |
| | | DET | ▪ Disconnect SRF3.02 cable from [X-Band] interface of GS-GSE-FM(R) | | | |
| 21 | 13 | EXE | Connect attenuators to **[X-Band] (N1)** interface of GS-GSE-FM (R) | Attenuators conected | | |
| | | DET | Note: Skip this step if **EWC30-FM1** is under test.<br>▪ Disconnect cable **XRF3.12** from **N1** input of XBMA03.<br>▪ Connect 30 dB attenuators to **N1** input of XBMA03.<br>▪ Connect cable **XRF3.12** to 30 dB attenuator. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 21 | 14 | EXE | Connect attenuators to **[X-Band] (N2)** interface of GS-GSE-FM (R) | Attenuators conected | | |
| | | DET | Note: Skip this step if **EWC30-FM2** is under test.<br>▪ Disconnect cable **XRF3.13** from **N2** input of XBMA03.<br>▪ Connect 30 dB attenuators to **N2** input of XBMA03.<br>▪ Connect cable **XRF3.13** to 30 dB attenuator. | | | |
| 21 | 15 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 21 | 16 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |

Table 6.7.0-2: SB1FS-COM-P-013-07 procedure.

| Eb/No | Figure | BER from file | Cortex HDR | | | | |
|---|---|---|---|---|---|---|---|
| | | | BER | IF Level | EVM | Amplitude Error | Phase Error |
| 6 | | | | | | | |
| 5 | | | | | | | |
| 4 | | | | | | | |
| 3 | | | | | | | |
| 2 | | | | | | | |

Table 6.7.0-3: Data demodulation table.

## 6.8. SB1FS-COM-P-013-08 Spurious in DSN Band

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-08 |
| **Task name** | Spurious in DSN Band |
| **Task description** | In this test the EWC30 TX is set to modulation mode. Spurious in DSN Band is measured with the PXA. |
| **Task purpose** | Spurious in DSN Band over RF signal. |
| **Success criteria** | Spurious in DSN Band performed. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-2 and the following optional connections:<br>• RF input of PXA connected to **RF IN**/**OUT** of CEGSE. |
| **Duration** | 90 minutes. |
| **Data sets required** | ▪ CEGSE PXI configuration file for EWC30 (`INIT_FILE_EWC30.ini`).<br>▪ Oscilloscope configuration files in `osc-config` folder<br>▪ Data file for modulation Data-4429200_600s_VCh01_wPN.bin.<br>▪ PXA configuration files in `COMM-SS-FM-PXA-config` folder:<br>• EWC30TX-FM1-Spurious-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM2-Spurious-MOD-v1.0.state: Data Downlink spectrum.<br>• EWC30TX-FM-Spurious-DSN-v1.0.state: Data DownlinK Spurious in DSN Band.<br>• EWC30TX-FM-Spurious-DSN-10KHz-v1.0.state: Data DownlinK Spurious in DSN Band. |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.8.0-1: Procedure SB1FS-COM-P-013-08 description.

| SB1FS-COM-P-013-08 Spurious in DSN Band | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **Environmental temperature and humidity** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 1 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 2 | **PXA Connection and configuration** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Connect XRF4.02 cable to IN/OUT Port of CEGSE. | Cable XRF4.02 connected to IN/OUT Port. | | |
| | | DET | ▪ Disconnect the 50 ohm load from the IN/OUT Port of CEGSE.<br>▪ Connect XRF4.02 cable to the IN/OUT Port of CEGSE. | | | |
| 2 | 2 | EXE | Connect XRF4.02 cable to DC Block on PXA. | Cable connected. | | |
| | | DET | ▪ Connect the end XRF4.02 cable to DC Block (this is connected to the RF IN of PXA). | | | |
| 2 | 3 | EXE | Configure the PXA as a spectrum analyzer. | PXA configured as a spectrum analyzer. | | |
| | | DET | For this do the following:<br>▪ Press **Mode** button.<br>▪ Press **Spectrum Analyzer** key. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | 4 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM<X>-Spurious-MOD-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM<X>-Spurious-MOD-v1.0.state`. Where <X> is 1 for **EWC30-FM1** and 2 for **EWC30-FM2**.<br>▪ Press **Open** button. | | |

## 3 EGSE Settings

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 3 | 1 | EXE | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB. | Attenuation in 0 dB. | | |
| | | DET | Set **10 dB step Variable Attenuator** in CEGSE to 0 dB attenuation position. | | | |

## 4 CEGSE SW Initialization

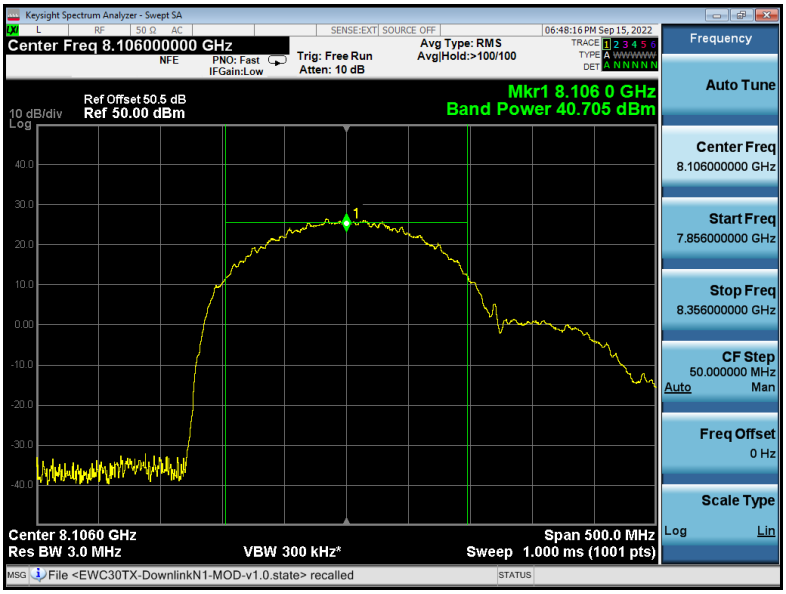
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 4 | 1 | EXE | Start CEGSE SW using EWC30 Nominal configuration file | SW running in EWC30 Nominal configuration | | |
| | | DET | ▪ Locate “EGSE_COM_V1.0.4.exe” program icon on the desktop. Double-click to open the icon and run the program.<br>▪ Write <YYYYMMDD-#N> in “User” and “SB1FS-COM-P-013-08" in “Test Code”. Click “Next”.<br>▪ In “Configuration File” search and load configuration file called **INIT_FILE_EWC30.ini** located in C:/USERS/EGSE COM/Documents/CFG/ folder.<br>▪ Click “Next” and press “OK” to confirm EWC30 configuration. | | | |

## 5 DUT power on

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 5 | 1 | EXE | Verify EWC30 alarms status | No alarms | | |
| | | DET | All ALARMS indicators are green. | | | |
| 5 | 2 | EXE | Take note of DUT temperatures | 25℃ < Temperature < 40℃ | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In EGSE_COM_v1.0.4GUI move to TSM tab and read **O_TX_TEMP1**.<br>**Note:** In the first power on of the day use range $T_{amb} \pm 5°C$ | | | |
| 5 | 3 | EXE | Turn on VBUS of TX | TX30X led is on. | | |
| | | DET | **Note: If the previous test was executed skip this step.**<br>In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |
| 5 | 4 | EXE | Verify O_SEC_V_RF value | 4.31 V $<$ GUI value $<$ 5.3 V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_RF**. Verify that secondary voltage meets expected value. | | | |
| 5 | 5 | EXE | Verify O_SEC_V_NUM value | 3.3 V $<$ GUI value $<$ 3.8V | | |
| | | DET | On CEGSE GUI got to ASM tab to read **O_SEC_V_NUM**. Verify that secondary voltage meets expected value. | | | |
| 5 | 6 | EXE | On CEGSE GUI verify O_TX_TEMP1 value | 25℃ < Temperature < 40℃ | | |
| | | DET | On CEGSE GUI got to TSM tab to read **O_TX_TEMP1**. Verify that temperature meets expected value. | | | |
| 5 | 7 | EXE | Load oscilloscope configuration. | Configuration loaded. | | |
| | | DET | In the oscilloscope menu load the configuration file **EWC30-TX-RUN.set** from **osc-config** folder in the pendrive. | | | |
| 5 | 8 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I < 282 mA | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2. | | | |
| 5 | 9 | EXE | Check Tx status | **Standby Mode** indicator is ON | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| **6** | **Switch DUT to Modulation Mode** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 6 | 1 | EXE | Start data transmission for 10 minutes | Data transmission started | | |
| | | DET | In the CEGSE SW:<br>▪ Got to the **COMM** tab and then go to the **Downlink** subtab.<br>▪ Verify that “stage” box does not show "Sending X-Band File" message.<br>▪ On the **Stored Downlink File** box choose the file `Data-4429200_600s_VCh01_wPN.bin` in `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\` directory.<br>▪ Switch file selector to **Send Stored Downlink File**<br>▪ Place the switch in "I_STBY_2_OPE_M"<br>▪ Switch **Bit Endianness** selector to **Big**.<br>▪ Press **Send** button.<br>▪ Verify that “stage” box shows **Sending X Band File**.<br>**Note:** The transmission time of the EWC30 is 10 minutes, if it ends before all mesurements are performed transmit againg when EWC30 temperature is low.<br>**Note:** Constantly check the temperature, if it is higher than 53℃ switch the EWC30 to standby mode (by pressing I_OPE_2_STBY_M in HV-HPC tab) and wait until it cools down. Then repeat this step and resume test execution. | | | |
| 6 | 2 | EXE | Check Tx status | **Operation Mode** indicator is ON | | |
| | | DET | Verify Tx Status in **STATE** section of CEGSE GUI. | | | |
| 6 | 3 | EXE | Verify RF status of EWC30 | 0_CLK_LOCKED = ON | | |
| | | DET | On CEGSE GUI got to SBDL&BDM tab and read **0_CLK_LOCKED**. Verify that indicator is on. | | | |
| 6 | 4 | EXE | Verify RF output power Telemetry (TM4) | OUTPUT_PWR ≈ 3.2 V | | |
| | | DET | On CEGSE GUI got to ASM tab and read **O_TX_OUTPUT_PWR** . Verify that values is as expected. | | | |
| 6 | 5 | EXE | Take note of current and voltage measurement of TX on oscilloscope. | $V \approx 28\ V$<br>I ≈ 2.46 A | | |
| | | DET | ▪ Take note of HIGH (Alta) Amplitude Measurements for CH1 and CH2.<br>**Note:** The indicated current value corresponds to an estimate obtained from the EWC30 FM1 and FM2 reports (RD.03 and RD.04). | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 6 | 6 | EXE | Verify spectrum Data presence with the PXA. | Spectrum present | | |
| | | DET | Observe the spectrum of the signal on the PXA. It must correspond to a carrier with modulation as shown in the following image:<br>  <br><br>**Note:** The image shown should be taken for illustrative purposes. | | | |
| 6 | 7 | EXE | Take screenshot of signals measurements. | `DATA-MOD.png` saved. | | |
| | | DET | ▪ Press **Single** button.<br>▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-08 directory.<br>▪ Enter file name: DATA-MOD.png<br>▪ Press **Save** button.<br>▪ Press **Cont** button. | | | |

## 7 Spurious in DSN Band

| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
|---|---|---|---|---|---|---|
| 7 | 1 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM-Spurious-DSN-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM-Spurious-DSN-v1.0.state`.<br>▪ Press **Open** button. | | | |
| 7 | 2 | EXE | Wait for the entire frequency range to be measured for PXA | -Entire frequency range measured<br>-Noise PSD max $\leq$ -105 dBm/Hz | | |
| | | DET | On PXA front pannel:<br>▪ Press "Sweep/control" button.<br>▪ Press "Restart" button<br>▪ Wait for the entire frequency range to be measured.<br>▪ Verify that noise power spectral density is according to the expected value. | | | |
| 7 | 3 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-08 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 7 | 4 | EXE | Take trace of signals measurements. | `<filename.trace>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Trace (+state)** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\SB1FS-COM-P-013-08 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | 5 | EXE | Measure the peak value of the Noise PSD. | Peak Noise Power [dBm] | | |
| | | DET | On PXA front pannel:<br>▪ Press **Marker** button.<br>▪ Press **Select Marker** key and then **Marker2**.<br>▪ Press **Peak Search** button.<br>▪ Take note of the measured peak value | | | |
| 7 | 6 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-08 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 7 | 7 | EXE | In the PXA instrument load software configuration file. | Configuration loaded. | | |
| | | DET | In the PXA menu load the configuration file **EWC30TX-FM-Spurious-DSN-10KHz-v1.0.state**, to do this, do the following:<br>▪ Press **Recall** button<br>▪ Press **State** key<br>▪ Press **From File...** key<br>▪ Go to `D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config` directory.<br>▪ Go to `SB1FS-COM-P-013` directory.<br>▪ In the displayed window, select file `EWC30TX-FM-Spurious-DSN-10KHz-v1.0.state`.<br>▪ Press **Open** button. | | | |
| 7 | 8 | EXE | Wait for the entire frequency range to be measured for PXA | -Entire frequency range measured<br>-Noise PSD max $\leq$ -105 dBm/Hz | | |
| | | DET | On PXA front pannel:<br>▪ Press "Sweep/control" button.<br>▪ Press "Restart" button<br>▪ Wait for the entire frequency range to be measured.<br>▪ Verify that noise power spectral density is according to the expected value. | | | |
| 7 | 9 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-08 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 7 | 10 | EXE | Take trace of signals measurements. | `<filename.trace>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Trace (+state)** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-trace** folder in D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-08 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 7 | 11 | EXE | Measure the peak value of the Noise PSD. | Peak Noise Power [dBm] | | |
| | | DET | On PXA front pannel:<br>▪ Press **Marker** button.<br>▪ Press **Select Marker** key and then **Marker2**.<br>▪ Press **Peak Search** button.<br>▪ Take note of the measured peak value | | | |
| 7 | 12 | EXE | Take screenshot of signals measurements. | `<filename.png>` saved. | | |
| | | DET | ▪ Press **Save** button.<br>▪ Press **Screen Image** key.<br>▪ Press **Save As** key.<br>▪ In the displayed window, select the **pxa-screenshot** folder in D:\Users\Instrument\Desktop\COMM-SS-FM-PXA-config\SB1FS-COM-P-013\ SB1FS-COM-P-013-08 directory.<br>▪ Press **Save** button.<br>▪ Take note of the saved file name. | | | |
| 7 | 13 | EXE | Send command **I_OPE_2_STBY_M** to change Tx status to Standby Mode. | **Standby Mode** indicator is ON | | |
| | | DET | Go to HV-HPC tab on CEGSE GUI and press **I_OPE_2_STBY_M** button. Button turns green during 0.6 seconds.<br>Verify Tx Status in **STATE** section of CEGSE GUI. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 7 | 14 | EXE | Wait until TM transmission is done on CEGSE | **Txfinished** is on | | |
| | | DET | On CEGSE go to COM tab. Go to DOWNLINK subtab. Wait until **Txfinished** indicator goes green. | | | |

| 8 | **DUT Turn off** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 8 | 1 | EXE | Turn off VBUS of TX | TX30X led is off. | | |
| | | DET | In the CEGSE SW press **EWC30** button. In the AD-HOC box verify **TX30X** led status. | | | |

| 9 | **CEGSE SW shutdown** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 9 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |

| 10 | **Collect Evidences** | | | | | |
|---|---|---|---|---|---|---|
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 10 | 1 | EXE | Copy test folder of PXA to CEGSE. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, connect to PXA with the following address and credentials:<br>▪ Address: `//192.168.75.231/d$/Users/`<br>▪ User: administrator<br>▪ Password: agilent4u<br>and do the following:<br>▪ Copy the SB1FS-COM-P-013-08 folder from D:\Users\Instrument\DesktopCOMM-SS-FM-PXA-config\SB1FS-COM-P-013 directory to `C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013` directory on CEGSE. | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | 2 | EXE | Copy CEGSE log to Evidences Folder. | Folder copied. | | |
| | | DET | In the CEGSE, open the file explorer, and do the following:<br>▪ Go to C:/Users/EGSE COM/Desktop/LOGs/<session_ID>/SB1FS-COM-P-013-08 directory.<br>▪ Copy the **EGSE COM(Root)** folder.<br>▪ Go to C:/Users/EGSE COM/Documents/COMM-SS-FM/<session_ID>/ SB1FS-COM-P-013/SB1FS-COM-P-013-08 directory.<br>▪ Paste the copied folder. | | | |
| **11** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 11 | 1 | EXE | Verify environmental **temperature** levels. | +23 ℃ ± 3 ℃ | | |
| | | DET | Verify in the sensor located on working table that the environmental temperature level is according to the required levels. | | | |
| 11 | 2 | EXE | Take note of the environmental humidity. | Humidity | | |
| | | DET | Take note the environmental humidity from the sensor located on working table. | | | |
| 11 | 3 | EXE | Disconnect XRF4.02 cable from IN/OUT Port of CEGSE. | Cable XRF4.02 disconnected from IN/OUT Port. | | |
| | | DET | ▪ Disconnect XRF4.02 cable to the IN/OUT Port of CEGSE.<br>▪ Connect the 50 ohm load from the IN/OUT Port of CEGSE. | | | |
| 11 | 4 | EXE | Disconnect XRF4.02 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | ▪ Disconnect the end XRF4.02 cable from DC Block (This is connected to RF IN of PXA). | | | |

Table 6.8.0-2: SB1FS-COM-P-013-08 procedure.

## 6.9. SB1FS-COM-P-013-09 Tests Setup break

| | |
|---|---|
| **Task ID** | SB1FS-COM-P-013-09 |
| **Task name** | Tests Setup break |
| **Task description** | This task includes:<br>▪ CEGSE power off.<br>▪ Disconnection of BB cables between EWC30 and ad-hoc box.<br>▪ Disconnection of RF cables. |
| **Task purpose** | Disconnect the EWC30 from the CEGSE and remove the connections made for the test. |
| **Success criteria** | ▪ EWC30 BB interfaces are not connected.<br>▪ EWC30 RF output is charge with 50 ohms load. |
| **Test Setup** | ▪ CEGSE to DUT base-band electrical connections according to figure 5.0.0-2<br>▪ General setup according to figure 6.0.0-1 without any optional connections. |
| **Duration** | 45 minutes. |
| **Data sets required** | - |
| **Prerequisites** | ▪ Execution of procedure **SB1FS-COM-P-013-01 Setup and Configuration** or **SB1FS-COM-F-012-01 Setup and Configuration**.<br>▪ Hardware: The necessary items are shown in the table B.0.0-1. |

Table 6.9.0-1: Procedure SB1FS-COM-P-013-09 description.

| SB1FS-COM-P-013-09 Tests Setup break | | | | | | |
|---|---|---|---|---|---|---|
| | **Executor Record** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| | | WRI | Date UTC _____/_____/_____ [DDMMAA]<br>Time UTC _____:_____:_____[HHMMSS]<br>Executor _____<br>Signature _____ | | | |
| 1 | **CEGSE power off (PXI and Ad-Hoc Box)** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 1 | 1 | EXE | Stop the CEGSE SW by pressing the "Stop" button. | The program ends and stops | | |
| | | DET | When you finish using the program in the CEGSE, you must press the **Stop** button to stop it. | | | |
| 1 | 2 | EXE | Turn off the PSU switch of the Ad-Hoc box. | PSU LED indicator should turn off | | |
| | | DET | Turn off the PSU by pressing the switch in the center of the Ad-Hoc box.<br>Verify that the LED on the PSU has turned off when the switch is turned off. | | | |
| 1 | 3 | EXE | Disable power supply output of CEGSE. | The LED indicator of the OUT ON output should go out. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Press the OUT ON button to disable the power supply output.<br>Verify that the OUT ON LED indicator turns off when pressing the button to disable the output. | | | |
| 1 | 4 | EXE | Turn off the main switch of the Ad-Hoc box. | The main switch light must be turned off | | |
| | | DET | Turn off the main switch of the Ad-Hoc box. | | | |
| 1 | 5 | EXE | Power off PXI. | PXI off. | | |
| | | DET | From the CEGSE KVM shutdown the PXI. | | | |
| 1 | 6 | EXE | Disconnect the external frequency reference signal from the PXA. | PXA display SENSE:INT on lower-left corner of screen. | | |
| | | DET | Disconnect the **EXT REF IN** port of the PXA. | | | |
| **2** | **Disconnection of BB Interfaces** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 2 | 1 | EXE | Disconnect harness **H-EGSE-DUT-J12_001** from EWC30 | Harness disconnected | | |
| | | DET | Disconnect harness **H-EGSE-DUT-J12_001** from connector J100 of EWC30 | | | |
| 2 | 2 | EXE | Disconnect **H-EGSE-DUT-J12_001** harness from **output** EMI/EMC filter. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J12_001** harness from **output** EMI/EMC filter. | | | |
| 2 | 3 | EXE | Disconnect **H-EGSE-DUT-J11_001** harness from **input** EMI/EMC filter. | Harness disconnected | | |
| | | DET | Disconnect **H-EGSE-DUT-J11_001** harness from **input** EMI/EMC filter. | | | |
| 2 | 4 | EXE | Disconnect harness **H-EGSE-DUT-J11_001** from Ad-hoc box | Harness disconnected | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | Disconnect harness **H-EGSE-DUT-J11_001** from connector J100 of Ad-hoc box | | | |
| 2 | 5 | EXE | Disconnect harness H-EGSE-DUT-J2_001 from EWC30 and the Ad-Hoc box | harness disconnected | | |
| | | DET | ▪ Disconnect **H-EGSE-DUT-J2_001** harness from connector saver J200 of the EWC30<br>▪ Disconnect **H-EGSE-DUT-J2_001** harness from connector(s) J200 of the ad-hoc box. | | | |
| 2 | 6 | EXE | Disconnect harness H-EGSE-DUT-J3_001 from EWC30 and the Ad-Hoc box | harness disconnected | | |
| | | DET | ▪ Disconnect **H-EGSE-DUT-J3_001** harness from connector saver J201 of the EWC30<br>▪ Disconnect **H-EGSE-DUT-J3_001** harness from connector(s) J201A and J201B of the ad-hoc box. | | | |
| **3** | **Disconnection of RF Interfaces** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 3 | 1 | EXE | Disconnect W10 cable from IN Port of DSN Filter and J103 Port of EWC30. | Cable W10 disconnected from ports. | | |
| | | DET | ▪ Disconnect W10 cable from IN Port of DSN Filter and J103 Port of EWC30. | | | |
| 3 | 2 | EXE | Disconnect W2 cable from OUT Port of DSN Filter. | W2 Cable disconnected from OUT Port. | | |
| | | DET | ▪ Disconnect W2 cable to the OUT port of DSN Filter. | | | |
| 3 | 3 | EXE | Disconnect W3 cable between Coupler Port and EWC30 port of CEGSE. | Cable W3 disconnected between ports. | | |
| | | DET | ▪ Disconnect W3 cable between Coupler Port and EWC30 Port.<br>▪ Connect the 50 ohm load to the Coupler Port of CEGSE.<br>▪ Connect the 50 ohm load to the EWC30 Port of CEGSE. | | | |
| 3 | 4 | EXE | Disconnect XRF4.02 cable from IN/OUT Port of CEGSE. | Cable XRF4.02 disconnected from IN/OUT Port. | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | DET | ▪ Disconnect XRF4.02 cable to the IN/OUT Port of CEGSE.<br>▪ Connect the 50 ohm load from the IN/OUT Port of CEGSE. | | | |
| 3 | 5 | EXE | Disconnect XRF4.02 cable from DC Block. | Cable disconnected from DC Block. | | |
| | | DET | ▪ Disconnect the end XRF4.02 cable from DC Block (This is connected to RF IN of PXA). | | | |
| **4** | **Final Steps** | | | | | |
| Sect. | Nbr. | Type | Activity | Expected result | Result | Status |
| 4 | 1 | EXE | Get temperature and humidity data from datalogger. | Datalogger data obtained | | |
| | | DET | Download datalogger from the web: https://webstorage-service.com/member/login.php<br>With credentials:<br>▪ User: tdgb6655<br>▪ Password: Sabi4M4r<br>To do this, execute the following steps:<br>▪ Click on SABIAMAR1 in Watch list<br>▪ In the displayed window, click on Menu and then on csv.<br>▪ Download the file .csv.<br>▪ Save the file downloaded in the test evidence directory of PXI: C:\Users\EGSE COM\Documents\ COMM-SS-FM\<session_ID>\SB1FS-COM-P-013\SB1FS-COM-P-013-09. | | | |

Table 6.9.0-2: SB1FS-COM-P-013-09 procedure.

# A. RF Link budget

This appendix presents link budgets for **EWC30-FM1** and **EWC30-FM2** tests and has three cases. The first case uses the setups showed in figures 5.2.0-1 and 6.0.0-1. The second case use the setup showed in figure 6.0.0-1 and the third case use the setup showed in figure 6.0.0-2. This budgets are performed with the GS-GSE-FM (R). The link budget for the first case is presented in tables A.0.0-1 and A.0.0-2 this applies to **SB1FS-COM-F-012-02 Aliveness and Functional Test**, **SB1FS-COM-P-013-02 Spectrum, power and BW with PXA**, **SB1FS-COM-P-013-03 CCDF measurement**, **SB1FS-COM-P-013-04 Frequency Stability**, **SB1FS-COM-P-013-05 Carrier Phase Noise** and **SB1FS-COM-P-013-06 Optimum filter confirmation And RF characterization with VSA and Cortex** tests. In all these tests, except the first and the last, the GS-GSE-FM (R) operate as a load and the instrumentation line is connected to the CEGSE. The link budget for the second case is presented in tables A.0.0-3 and A.0.0-4 this applies to **SB1FS-COM-P-013-07 BER measurement** test. In this test, the DUT power signal is connected to the X-Band port of GS-GSE-FM (R), the Noise generator (TestBed) is connected to the other X-Band port. The link budget for the third case is presented in tables A.0.0-5 and A.0.0-6, and applies to **SB1FS-COM-P-013-08 Spurious in DSN Band** test. In this test, the DUT power signal is connected to Instrument Port.

Related to second case, X-Band Downlink budget is dimensioned in order to obtain Eb/N0 specified values (6dB to 2dB) as shown in AD.04, thus, the setup showed in figure 6.0.0-1 is obtained in order to achieve minimum specified Eb/N0 values. Eb/N0 budget shows that it can obtain Eb/N0 values from $\approx$ 6dB to $\approx$2dB setting Noise Density level from -103dBm/Hz to -99dBm/Hz, respectively. For this case Eb/N0 required are adjusted only from Cortex HDR-XXL of TestBed.

Summary tables are presented at the end of budgets showing attenuation values of components that can be configured, and power values received by the receivers under different conditions. The nominal condition corresponds to the budget shown in the "main line" table. The Maximum Level condition corresponds to the configuration that allows to achieve the highest RF power in the receivers and the PXI or PXA as applicable. For all cases are observed that in conditions of minimum attenuation and maximum gain, the maximum power values achieved not exceed the value accepted by the Data Demodulator or instrument.

For all cases, PXA is set to measure DUT power TX levels, therefore, it is configured with a references level offset.

The tables show components highlighted in red, they are not characterized, thus the indicated attenuation is an estimate. When the characterization of the components is carried out, the link calculations will be updated. The changes in the expected levels are in the order of tenths of dB.

## Table A.0.0-1: EWC30-FM1 Link Budget - X-Band Data Downlink - case 1.

| X-Band Data N1 Downlink RF Power Budgets - Main Line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **DUT** | | | | | |
| **Transmitted Power @ Transmitter port** | **-** | **-** | **40,0** | N/A | EWC30 Pout at output DSN filter (900830_X-040-752_User_Manual_Annex FM1_v1.0) |
| Connector Saver #2 | -0,1 | 40,0 | 39,9 | - | R340200302B Attenuation corresponds to SV Microwave 95077 measured previously |
| RF Cable W10 | -1,2 | 39,9 | 38,8 | 47,8 | MCJ088D, G from cable characterization. |
| Connector Saver #3 | -0,1 | 38,8 | 38,7 | - | R340200302B . Attenuation corresponds to SV Microwave 95077 measured previously |
| DSN Filter | -0,6 | 38,7 | 38,1 | - | Attenuation corresponds to EM filter measured previously |
| Connector Saver #4 | -0,1 | 38,1 | 38,0 | - | SV Microwave 95077. Attenuation corresponds to other SV Microwave 95077 measured previously |
| **CEGSE - Main line** | | | | | |
| **Input Power @ CEGSE port** | - | **38,0** | - | - | |
| RF Cable W2 | -1,2 | 38,0 | 36,8 | 47,8 | MCJ088D + (Adapter#3) PE9212. Attenuation corresponds to other MCJ088D measured previously |
| RF Cable W3 | -0,5 | 36,8 | 36,3 | 47,8 | MCJ088D, G from cable characterization. |
| RF Cable W4 | -1,0 | 36,3 | 35,3 | 47,8 | PE91337 (AD#1) + MCJ088D + (Adapter#1) PE9312 , G from characterization. |
| Bidirectional Coupler (IN-OUT) | 0,0 | 35,3 | 35,2 | 50,0 | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| Fixed Attenuator | -19,6 | 35,2 | 15,6 | 43,0 | Mini-circuits BW-N20W20+, G from characterization. |
| RF Cable W5 | -1,2 | 15,6 | 14,4 | 47,8 | PE91337 (AD#2) + MCJ088D-0-0197-3Q03Q0 + PE91337 (AD#3). G from cable charaterization. |
| CEGSE Variable Attenuator 10dB step | -0,7 | 14,4 | 13,7 | 30,0 | Agilent 8496B-001, G from characterization. |
| RF Cable W6 | -1,3 | 13,7 | 12,4 | - | UT-141-FORM-0315-380580/A, G from characterization. |
| SMA to N adapter | -0,1 | 12,4 | 12,3 | - | PE9104. Attenuation is estimated. |
| **Output Power @ CEGSE port** | - | - | **12,3** | - | |
| **Interconnetion Elements - Main line** | | | | | |
| RF Cable XRF4.02 | -4,1 | 12,3 | 8,2 | 54,7 | UFB197C-0-1969-7GU7GU, G from characterization. |
| **GS-GSE - Main line** | | | | | |
| **Received Power @ GSE port** | - | **8,2** | - | - | |
| X Band External Attenuators | -30,2 | 8,2 | -22,0 | 33 | G from characterization. |
| RF Cable XRF3.12 | -2,1 | -22,0 | -24,1 | 51,7 | PE301-60, G characterization from XFR3.12. |
| X-Band Matrix and Attenuator (N1-DC1) | -30,6 | -24,1 | -54,7 | 30 | Measured Value from XBMA03. |
| | 0,0 | | | | Variable attenuation. |
| RF Cable XRF3.05 | -1,2 | -54,7 | -55,9 | 48 | MCJ088D. G characterization from XRF3.05. |
| X-Band Downconverter N1 | 30,5 | -55,9 | -31,4 | 10,0 | Measured Gain: 25,5dB@5dB attenuation. NF 10dB from ATR. |
| | -6,0 | | | | Internal variable attenuator from XBDC. |
| RF Cable XRF3.07 | -0,6 | -31,4 | -32,0 | 51,7 | PE301-60. G characterization from XRF3.07. |
| **Demodulator (D)** | | **-32,0** | N/A | -10 | Nominal values: -30dBm to -40dBm, -10dBm to -50dBm aceptable values. |

| X-Band Data Downlink RF Power Budgets - Instrumentation line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **CEGSE - Instrumentation line** | | | | | |
| Bidirectional Coupler (IN-CPL IN) | -34,4 | 35,3 | 0,9 | - | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| RF Cable W8 | -0,8 | 0,9 | 0,1 | 47,8 | MCJ088D-0-0137-38V320 PM, G from characterization. |
| **Output Power @ TP Downlink port** | | | **0,1** | - | |
| **Interconnetion Elements - Instrumentation line** | | | | | |
| RF Cable W15 | -1,4 | 0,1 | -1,3 | 54,7 | MRF 64639 227197-004, G from characterization. |
| DC Block DCB1.01 | -0,4 | -1,3 | -1,7 | - | PE8210, G from characterization. |
| **PXI @ Input port** | | **-1,7** | | 30,0 | |
| RF Cable XRF3.60 | -6,9 | 0,1 | -6,8 | 54,7 | UFA 210A-0-3937-70U300, 10m, G from characterization. |
| DC Block | -0,4 | -6,8 | -7,2 | - | PE8213, G from characterization. |
| **PXA @ Input port** | | **-7,2** | | 30,0 | |

| X-Band Data Downlink Resume (N1) | | |
|---|---|---|
| **Parameter** | **Condition** | |
| | **Nominal** | **Maximun Levels** |
| CEGSE Variable Attenuator 10dB step | -0,7 | - |
| X-Band Downconverter Attenuation | -6,0 | 0,0 |
| Pin Demodulator | -32,0 | -26,0 |
| Ofset PXI | -41,7 | |
| Ofset PXA | -47,2 | |

Table A.0.0-2: EWC30-FM2 Link Budget - X-Band Data Downlink - case 1.

| X-Band Data N2 Downlink RF Power Budgets - Main Line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **DUT** | | | | | |
| **Transmitted Power @ Transmitter port** | - | - | **40,0** | N/A | EWC30 Pout at output DSN filter (900830_X-040-753_User_Manual_Annex FM2_v1.0) |
| Connector Saver #2 | -0,1 | 40,0 | 39,9 | - | R340200302B Attenuation corresponds to SV Microwave 95077 measured previously |
| RF Cable W10 | -1,2 | 39,9 | 38,8 | 47,8 | MCJ088D, G from cable characterization. |
| Connector Saver #3 | -0,1 | 38,8 | 38,7 | - | R340200302B . Attenuation corresponds to SV Microwave 95077 measured previously |
| DSN Filter | -0,6 | 38,7 | 38,1 | - | Attenuation corresponds to EM filter measured previously |
| Connector Saver #4 | -0,1 | 38,1 | 38,0 | - | SV Microwave 95077. Attenuation corresponds to other SV Microwave 95077 measured previously |
| **CEGSE - Main line** | | | | | |
| **Input Power @ CEGSE port** | - | **38,0** | - | - | |
| RF Cable W2 | -1,2 | 38,0 | 36,8 | 47,8 | MCJ088D + (Adapter#3) PE9212. Attenuation corresponds to other MCJ088D measured previously |
| RF Cable W3 | -0,5 | 36,8 | 36,3 | 47,8 | MCJ088D, G from cable characterization. |
| RF Cable W4 | -1,0 | 36,3 | 35,3 | 47,8 | PE91337 (AD#1) + MCJ088D + (Adapter#1) PE9312 , G from characterization. |
| Bidirectional Coupler (IN-OUT) | 0,0 | 35,3 | 35,2 | 50,0 | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| Fixed Attenuator | -19,6 | 35,2 | 15,6 | 43,0 | Mini-circuits BW-N20W20+, G from characterization. |
| RF Cable W5 | -1,3 | 15,6 | 14,4 | 47,8 | PE91337 (AD#2) + MCJ088D-0-0197-3Q03Q0 + PE91337 (AD#3). G from cable charaterization. |
| CEGSE Variable Attenuator 10dB step | -0,7 | 14,4 | 13,7 | 30,0 | Agilent 8496B-001, G from characterization. |
| RF Cable W6 | -1,5 | 13,7 | 12,2 | - | UT-141-FORM-0315-380580/A, G from characterization. |
| SMA to N adapter | -0,1 | 12,2 | 12,1 | - | PE9104. Attenuation is estimated. |
| **Output Power @ CEGSE port** | - | - | **12,1** | - | |
| **Interconnetion Elements - Main line** | | | | | |
| RF Cable XRF4.02 | -4,2 | 12,1 | 7,9 | 54,7 | UFB197C-0-1969-7GU7GU, G from characterization. |
| **GS-GSE - Main line** | | | | | |
| **Received Power @ GSE port** | - | **7,9** | - | - | |
| X Band External Attenuators | -30,1 | 7,9 | -22,2 | 33 | G from characterization. |
| RF Cable XRF3.13 | -2,2 | -22,2 | -24,3 | 51,7 | PE301-60, G characterization from XFR3.13. |
| X-Band Matrix and Attenuator (N2-DC2) | -30,6 | -24,3 | -54,9 | 30 | Measured Value from XBMA03. |
| | 0,0 | | | | Variable attenuation. |
| RF Cable XRF3.06 | -1,2 | -54,9 | -56,1 | 48 | MCJ088D. G characterization from XRF3.06. |
| X-Band Downconverter N2 | 29,1 | -56,1 | -31,0 | 10,0 | Measured Gain: 25,1dB@4dB attenuation. NF 11dB from ATR. |
| | -4,0 | | | | Internal variable attenuator from XBDC. |
| RF Cable XRF3.08 | -0,5 | -31,0 | -31,6 | 51,7 | PE301-60. G characterization from XRF3.08. |
| **Demodulator (D)** | | **-31,6** | N/A | -10 | Nominal values: -30dBm to -40dBm, -10dBm to -50dBm aceptable values. |

| X-Band Data Downlink RF Power Budgets - Instrumentation line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **CEGSE - Instrumentation line** | | | | | |
| Bidirectional Coupler (IN-CPL IN) | -34,4 | 35,3 | 0,8 | - | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| RF Cable W8 | -0,8 | 0,8 | 0,0 | 47,8 | MCJ088D-0-0137-38V320 PM, G from characterization. |
| **Output Power @ TP Downlink port** | | | **0,0** | - | |
| **Interconnetion Elements - Instrumentation line** | | | | | |
| RF Cable W15 | -1,4 | 0,0 | -1,4 | 54,7 | MRF 64639 227197-004, G from characterization. |
| DC Block DCB1.01 | -0,3 | -1,4 | -1,7 | - | PE8210, G from characterization. |
| **PXI @ Input port** | | **-1,7** | | 30,0 | |
| RF Cable XRF3.60 | -7,0 | 0,0 | -7,0 | 54,7 | UFA 210A-0-3937-70U300, 10m, G from characterization. |
| DC Block | -0,4 | -7,0 | -7,4 | - | PE8213, G from characterization. |
| **PXA @ Input port** | | **-7,4** | | 30,0 | |

| X-Band Data Downlink Resume (N2) | | |
|---|---|---|
| **Parameter** | **Condition** | |
| | **Nominal** | **Maximun Levels** |
| CEGSE Variable Attenuator 10dB step | -0,7 | - |
| X-Band Downconverter Attenuation | -4,0 | 0,0 |
| Pin Demodulator | -31,6 | -27,6 |
| Ofset PXI | -41,7 | |
| Ofset PXA | -47,4 | |

## Table A.0.0-3: EWC30-FM1 Link Budget - X-Band Data Downlink - case 2.

| X-Band Data N1 Downlink RF Power Budgets - Main Line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **DUT** | | | | | |
| **Transmitted Power @ Transmitter port** | - | - | **40,0** | N/A | EWC30 Pout at output DSN filter (900830_X-040-752_User_Manual_Annex FM1_v1.0) |
| Connector Saver #2 | -0,1 | 40,0 | 39,9 | - | R340200302B Attenuation corresponds to SV Microwave 95077 measured previously |
| RF Cable W10 | -1,2 | 39,9 | 38,8 | 47,8 | MCJ088D, G from cable characterization. |
| Connector Saver #3 | -0,1 | 38,8 | 38,7 | - | R340200302B . Attenuation corresponds to SV Microwave 95077 measured previously |
| DSN Filter | -0,6 | 38,7 | 38,1 | - | Attenuation corresponds to EM filter measured previously |
| Connector Saver #4 | -0,1 | 38,1 | 38,0 | - | SV Microwave 95077. Attenuation corresponds to other SV Microwave 95077 measured previously |
| **CEGSE - Main line** | | | | | |
| **Input Power @ CEGSE port** | - | **38,0** | - | - | |
| RF Cable W2 | -1,2 | 38,0 | 36,8 | 47,8 | MCJ088D + (Adapter#3) PE9212. Attenuation corresponds to other MCJ088D measured previously |
| RF Cable W3 | -0,5 | 36,8 | 36,3 | 47,8 | MCJ088D, G from cable characterization. |
| RF Cable W4 | -1,0 | 36,3 | 35,3 | 47,8 | PE91337 (AD#1) + MCJ088D + (Adapter#1) PE9312 , G from characterization. |
| Bidirectional Coupler (IN-OUT) | 0,0 | 35,3 | 35,3 | 50,0 | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| Fixed Attenuator | -19,6 | 35,3 | 15,7 | 43,0 | Mini-circuits BW-N20W20+, G from characterization. |
| RF Cable W5 | -1,2 | 15,7 | 14,4 | 47,8 | PE91337 (AD#2) + MCJ088D-0-0197-3Q03Q0 + PE91337 (AD#3). G from cable charaterization. |
| CEGSE Variable Attenuator 10dB step | -20,7 | 14,4 | -6,3 | 30,0 | Agilent 8496B-001, G from characterization. |
| RF Cable W6 | -1,3 | -6,3 | -7,6 | - | UT-141-FORM-0315-380580/A, G from characterization. |
| SMA to N adapter | -0,1 | -7,6 | -7,7 | - | PE9104. Attenuation is estimated. |
| **Output Power @ CEGSE port** | - | - | **-7,7** | - | |
| **Interconnetion Elements - Main line** | | | | | |
| RF Cable XRF4.02 | -4,1 | -7,7 | -11,8 | 54,7 | UFB197C-0-1969-7GU7GU, G from characterization. |

| Noise Generator (TestBed) | | | | | |
|---|---|---|---|---|---|
| **Noise Source (dBm/Hz)** | - | - | **-99,0** | - | Noise density -130dBm/Hz to -93dBm/Hz (1dB step) in 2GHz bandwidth |
| Power Output (dBm) | - | - | -55,0 | - | Carrier Level -55 to -5 dBm |
| Noise Source (dBm) | - | - | -6,0 | - | In 2GHz bandwidth |
| RF Cable PE300-60-03 | -0,5 | -6,0 | -6,5 | - | G from characterization. |
| External Attenuator ATT10.01 (01) | -10,0 | -6,5 | -16,5 | - | PE7005-10. Attenuation is estimated. |
| X-Band Upconverter TestBet | 22,0 | | | | Measured Gain: 22dB@0dB attenuation. |
| | 0,0 | -16,5 | 5,5 | 10,0 | Internal variable attenuator 0 to 30dB from XBUC. |
| RF Cable SRF3.02 | -37,5 | 5,5 | -32,0 | - | 10m N(M)-SMA(M) To connect N2 port. G from characterization. |
| **Output Noise Power @TestBed port** | | | **-32,0** | - | |

| GS-GSE - Main line | | | | | |
|---|---|---|---|---|---|
| **Received Power @ N1 GSE port** | - | **-11,8** | - | - | |
| X Band External Attenuators | -30,2 | -11,8 | -42,0 | 33 | G from characterization. |
| RF Cable XRF3.12 (N1) | -2,1 | -42,0 | -44,1 | 51,7 | PE301-60, G characterization from XFR3.12. |
| **Received Power @ N2 GSE port** | - | **-32,0** | - | - | |
| RF Cable XRF3.13 (N2) | -2,2 | -32,0 | -34,2 | 51,7 | PE301-60, G characterization from XFR3.13. |
| X-Band Matrix and Attenuator (N1-DC1) | -30,6 | -33,8 | -64,4 | 30 | Measured Value from XBMA03. |
| | 0,0 | | | | Variable attenuation. |
| X-Band Matrix and Attenuator (N2-DC2) | -30,6 | -33,8 | -64,4 | 30 | Measured Value from XBMA03. |
| | 0,0 | | | | Variable attenuation. |
| RF Cable XRF3.05 | -1,2 | -64,4 | -65,5 | 48 | MCJ088D. G characterization from XRF3.05. |
| X-Band Downconverter N1 | 30,5 | -65,5 | -35,1 | 10,0 | Measured Gain: 25,5dB@5dB attenuation. NF 10dB from ATR. |
| | 0,0 | | | | Internal variable attenuator from XBDC. |
| RF Cable XRF3.07 | -0,6 | -35,1 | -35,6 | 51,7 | PE301-60. G characterization from XRF3.07. |
| **Demodulator (D)** | | **-35,6** | N/A | -10 | Nominal values: -30dBm to -40dBm, -10dBm to -50dBm aceptable values. |

| Eb/N0 | | | | | |
|---|---|---|---|---|---|
| Received Power (dBm) | - | **-42,0** | - | - | N1 GS-GSE-FM (R) input port |
| Received Power Noise (dBm) | - | **-32,0** | - | - | N2 GS-GSE-FM (R) input port |
| Received Power Noise in (dBm/Hz) | - | -125,0 | - | - | Power Spectral Density. |
| Bit Rate (dB.Hz) | - | 80,8 | - | - | |
| Estimated C/N0 @N1, N2 GS-GSE (dB. Hz) | - | 83,0 | - | - | |
| Required C/N0 (dB.Hz) | - | 86,6 | - | - | for QPSK @ BER <=1E-6, Coding Gain for CC 7 1/2, 1dB implementation loss |
| Eb/No estimated (dB) | - | 2,3 | - | - | |

| X-Band Data Downlink Resume (N1) | | |
|---|---|---|
| **Parameter** | **Condition** | |
| | **Nominal** | **Maximun Levels** |
| CEGSE Variable Attenuator 10dB step | -20,7 | -0,7 |
| Noise Source (dBm/Hz) | -99,0 | -93,0 |
| Pin Demodulator | -35,6 | -24,5 |

## Table A.0.0-4: EWC30-FM2 Link Budget - X-Band Data Downlink - case 2.

| X-Band Data N2 Downlink RF Power Budgets - Main Line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **DUT** | | | | | |
| **Transmitted Power @ Transmitter port** | - | - | **40,0** | N/A | EWC30 Pout at output DSN filter (900830_X-040-753_User_Manual_Annex FM2_v1.0) |
| Connector Saver #2 | -0,1 | 40,0 | 39,9 | - | R340200302B Attenuation corresponds to SV Microwave 95077 measured previously |
| RF Cable W10 | -1,2 | 39,9 | 38,8 | 47,8 | MCJ088D, G from cable characterization. |
| Connector Saver #3 | -0,1 | 38,8 | 38,7 | - | R340200302B . Attenuation corresponds to SV Microwave 95077 measured previously |
| DSN Filter | -0,6 | 38,7 | 38,1 | - | Attenuation corresponds to EM filter measured previously |
| Connector Saver #4 | -0,1 | 38,1 | 38,0 | - | SV Microwave 95077. Attenuation corresponds to other SV Microwave 95077 measured previously |
| **CEGSE - Main line** | | | | | |
| **Input Power @ CEGSE port** | - | **38,0** | - | - | |
| RF Cable W2 | -1,2 | 38,0 | 36,8 | 47,8 | MCJ088D + (Adapter#3) PE9212. Attenuation corresponds to other MCJ088D measured previously |
| RF Cable W3 | -0,5 | 36,8 | 36,3 | 47,8 | MCJ088D, G from cable characterization. |
| RF Cable W4 | -1,0 | 36,3 | 35,3 | 47,8 | PE91337 (AD#1) + MCJ088D + (Adapter#1) PE9312 , G from characterization. |
| Bidirectional Coupler (IN-OUT) | 0,0 | 35,3 | 35,3 | 50,0 | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| Fixed Attenuator | -19,6 | 35,3 | 15,7 | 43,0 | Mini-circuits BW-N20W20+, G from characterization. |
| RF Cable W5 | -1,3 | 15,7 | 14,4 | 47,8 | PE91337 (AD#2) + MCJ088D-0-0197-3Q03Q0 + PE91337 (AD#3). G from cable charaterization. |
| CEGSE Variable Attenuator 10dB step | -20,7 | 14,4 | -6,3 | 30,0 | Agilent 8496B-001, G from characterization. |
| RF Cable W6 | -1,5 | -6,3 | -7,8 | - | UT-141-FORM-0315-380580/A, G from characterization. |
| SMA to N adapter | -0,1 | -7,8 | -7,9 | - | PE9104. Attenuation is estimated. |
| **Output Power @ CEGSE port** | - | - | **-7,9** | - | |
| **Interconnetion Elements - Main line** | | | | | |
| RF Cable XRF4.02 | -4,2 | -7,9 | -12,0 | 54,7 | UFB197C-0-1969-7GU7GU, G from characterization. |

| Noise Generator (TestBed) | | | | | |
|---|---|---|---|---|---|
| **Noise Source (dBm/Hz)** | - | - | **-99,0** | - | Noise density -130dBm/Hz to -93dBm/Hz (1dB step) in 2GHz bandwidth |
| Power Output (dBm) | - | - | -55,0 | - | Carrier Level -55 to -5 dBm |
| Noise Source (dBm) | - | - | -6,0 | - | In 2GHz bandwidth |
| RF Cable PE300-60-03 | -0,5 | -6,0 | -6,5 | - | G from characterization. |
| External Attenuator ATT10.01 (01) | -10,0 | -6,5 | -16,5 | - | PE7005-10. Attenuation is estimated. |
| X-Band Upconverter TestBet | 22,0 | | | | Measured Gain: 22dB@0dB attenuation. |
| | 0,0 | -16,5 | 5,5 | 10,0 | Internal variable attenuator 0 to 30dB from XBUC. |
| RF Cable SRF3.02 | -37,5 | 5,5 | -32,0 | - | 10m N(M)-SMA(M) To connect N2 port. G from characterization. |
| **Output Noise Power @TestBed port** | | | **-32,0** | - | |

| GS-GSE - Main line | | | | | |
|---|---|---|---|---|---|
| **Received Power @ N1 GSE port** | - | **-32,0** | - | - | |
| RF Cable XRF3.12 (N1) | -2,1 | -32,0 | -34,2 | 51,7 | PE301-60, G characterization from XFR3.12. |
| **Received Power @ N2 GSE port** | - | **-12,0** | - | - | |
| X Band External Attenuators | -30,1 | -12,0 | -42,2 | 33 | G from characterization. |
| RF Cable XRF3.13 (N2) | -2,2 | -42,2 | -44,3 | 51,7 | PE301-60, G characterization from XFR3.13. |
| X-Band Matrix and Attenuator (N1-DC1) | -30,6 | -33,8 | -64,4 | 30 | Measured Value from XBMA03. |
| | 0,0 | | | | Variable attenuation. |
| X-Band Matrix and Attenuator (N2-DC2) | -30,6 | -33,8 | -64,4 | 30 | Measured Value from XBMA03. |
| | 0,0 | | | | Variable attenuation. |
| RF Cable XRF3.06 | -1,2 | -64,4 | -65,5 | 48 | MCJ088D. G characterization from XRF3.06. |
| X-Band Downconverter N2 | 29,1 | -65,5 | -36,5 | 10,0 | Measured Gain: 25,1dB@4dB attenuation. NF 11dB from ATR. |
| | 0,0 | | | | Internal variable attenuator from XBDC. |
| RF Cable XRF3.08 | -0,5 | -36,5 | -37,0 | 51,7 | PE301-60. G characterization from XRF3.08. |
| **Demodulator (D)** | | **-37,0** | N/A | -10 | Nominal values: -30dBm to -40dBm, -10dBm to -50dBm aceptable values. |

| Eb/N0 | | | | | |
|---|---|---|---|---|---|
| Received Power (dBm) | - | **-42,2** | - | - | N1 GS-GSE-FM (R) input port |
| Received Power Noise (dBm) | - | **-32,0** | - | - | N2 GS-GSE-FM (R) input port |
| Received Power Noise in (dBm/Hz) | - | -125,0 | - | - | Power Spectral Density. |
| Bit Rate (dB.Hz) | - | 80,8 | - | - | |
| Estimated C/N0 @N2, N1 GS-GSE (dB. Hz) | - | 82,9 | - | - | |
| Required C/N0 (dB.Hz) | - | 86,6 | - | - | for QPSK @ BER <=1E-6, Coding Gain for CC 7 1/2, 1dB implementation loss |
| Eb/No estimated (dB) | - | 2,1 | - | - | |

| X-Band Data Downlink Resume (N2) | | |
|---|---|---|
| **Parameter** | **Condition** | |
| | **Nominal** | **Maximun Levels** |
| CEGSE Variable Attenuator 10dB step | -20,7 | -0,7 |
| Noise Source (dBm/Hz) | -99,0 | -93,0 |
| Pin Demodulator | -37,0 | -26,0 |

Table A.0.0-5: EWC30-FM1 Link Budget - X-Band Data Downlink - case 3.

| X-Band Data N1 Downlink RF Power Budgets - Main Line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **DUT** | | | | | |
| **Transmitted Power @ Transmitter port** | **-** | **-** | **40,0** | N/A | EWC30 Pout at output DSN filter (900830_X-040-752_User_Manual_Annex FM1_v1.0) |
| Connector Saver #2 | -0,1 | 40,0 | 39,9 | - | R340200302B Attenuation corresponds to SV Microwave 95077 measured previously |
| RF Cable W10 | -1,2 | 39,9 | 38,8 | 47,8 | MCJ088D, G from cable characterization. |
| Connector Saver #3 | -0,1 | 38,8 | 38,7 | - | R340200302B . Attenuation corresponds to SV Microwave 95077 measured previously |
| DSN Filter | -0,6 | 38,7 | 38,1 | - | Attenuation corresponds to EM filter measured previously |
| Connector Saver #4 | -0,1 | 38,1 | 38,0 | - | SV Microwave 95077. Attenuation corresponds to other SV Microwave 95077 measured previously |
| **CEGSE - Main line** | | | | | |
| **Input Power @ CEGSE port** | - | **38,0** | - | - | |
| RF Cable W2 | -1,2 | 38,0 | 36,8 | 47,8 | MCJ088D + (Adapter#3) PE9212. Attenuation corresponds to other MCJ088D measured previously |
| RF Cable W3 | -0,5 | 36,8 | 36,3 | 47,8 | MCJ088D, G from cable characterization. |
| RF Cable W4 | -1,0 | 36,3 | 35,3 | 47,8 | PE91337 (AD#1) + MCJ088D + (Adapter#1) PE9312 , G from characterization. |
| Bidirectional Coupler (IN-OUT) | 0,0 | 35,3 | 35,3 | 50,0 | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| Fixed Attenuator | -19,6 | 35,3 | 15,7 | 43,0 | Mini-circuits BW-N20W20+, G from characterization. |
| RF Cable W5 | -1,2 | 15,7 | 14,4 | 47,8 | PE91337 (AD#2) + MCJ088D-0-0197-3Q03Q0 + PE91337 (AD#3). G from cable charaterization. |
| CEGSE Variable Attenuator 10dB step | -0,7 | 14,4 | 13,7 | 30,0 | Agilent 8496B-001, G from characterization. |
| RF Cable W6 | -1,4 | 13,7 | 12,3 | - | UT-141-FORM-0315-380580/A, G from characterization. |
| SMA to N adapter | -0,1 | 12,3 | 12,3 | - | PE9104. Attenuation is estimated. |
| **Output Power @ CEGSE port** | - | - | **12,3** | - | |

| X-Band Data Downlink RF Power Budgets - Instrumentation line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **Interconnetion Elements - Instrumentation line** | | | | | |
| RF Cable XRF4.02 | -4,2 | 12,3 | 8,1 | 54,7 | UFA 210A-0-3937-70U300, 10m, G from characterization. |
| DC Block | -0,4 | 8,1 | 7,7 | - | PE8213, G from characterization. |
| **PXA @ Input port** | | **7,7** | | 30,0 | |

| X-Band Data Downlink Resume (N1) | | |
|---|---|---|
| **Parameter** | **Condition** | |
| | **Nominal** | **Maximun Levels** |
| CEGSE Variable Attenuator 10dB step | -0,7 | - |
| Pin PXA | 7,7 | 7,7 |
| Ofset PXA | -32,3 | |

Table A.0.0-6: EWC30-FM2 Link Budget - X-Band Data Downlink - case 3.

| X-Band Data N2 Downlink RF Power Budgets - Main Line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **DUT** | | | | | |
| **Transmitted Power @ Transmitter port** | - | - | **40,0** | N/A | EWC30 Pout at output DSN filter (900830_X-040-753_User_Manual_Annex FM2_v1.0) |
| Connector Saver #2 | -0,1 | 40,0 | 39,9 | - | R340200302B Attenuation corresponds to SV Microwave 95077 measured previously |
| RF Cable W10 | -1,2 | 39,9 | 38,8 | 47,8 | MCJ088D, G from cable characterization. |
| Connector Saver #3 | -0,1 | 38,8 | 38,7 | - | R340200302B . Attenuation corresponds to SV Microwave 95077 measured previously |
| DSN Filter | -0,6 | 38,7 | 38,1 | - | Attenuation corresponds to EM filter measured previously |
| Connector Saver #4 | -0,1 | 38,1 | 38,0 | - | SV Microwave 95077. Attenuation corresponds to other SV Microwave 95077 measured previously |
| **CEGSE - Main line** | | | | | |
| **Input Power @ CEGSE port** | - | **38,0** | - | - | |
| RF Cable W2 | -1,2 | 38,0 | 36,8 | 47,8 | MCJ088D + (Adapter#3) PE9212. Attenuation corresponds to other MCJ088D measured previously |
| RF Cable W3 | -0,5 | 36,8 | 36,3 | 47,8 | MCJ088D, G from cable characterization. |
| RF Cable W4 | -1,0 | 36,3 | 35,3 | 47,8 | PE91337 (AD#1) + MCJ088D + (Adapter#1) PE9312 , G from characterization. |
| Bidirectional Coupler (IN-OUT) | 0,0 | 35,3 | 35,3 | 50,0 | Mini-circuits ZGBDC35-93HP+, G from characterization. |
| Fixed Attenuator | -19,6 | 35,3 | 15,7 | 43,0 | Mini-circuits BW-N20W20+, G from characterization. |
| RF Cable W5 | -1,3 | 15,7 | 14,4 | 47,8 | PE91337 (AD#2) + MCJ088D-0-0197-3Q03Q0 + PE91337 (AD#3). G from cable charaterization. |
| CEGSE Variable Attenuator 10dB step | -0,7 | 14,4 | 13,7 | 30,0 | Agilent 8496B-001, G from characterization. |
| RF Cable W6 | -1,5 | 13,7 | 12,2 | - | UT-141-FORM-0315-380580/A, G from characterization. |
| SMA to N adapter | -0,1 | 12,2 | 12,1 | - | PE9104. Attenuation is estimated. |
| **Output Power @ CEGSE port** | - | - | **12,1** | - | |

| X-Band Data Downlink RF Power Budgets - Instrumentation line | | | | | |
|---|---|---|---|---|---|
| **Component** | **G [dB]** | **Input Power [dBm]** | **Output Power [dBm]** | **Max Input Power [dBm]** | **Comments** |
| **Interconnetion Elements - Instrumentation line** | | | | | |
| RF Cable XRF4.02 | -4,2 | 12,1 | 8,0 | 54,7 | UFA 210A-0-3937-70U300, 10m, G from characterization. |
| DC Block | -0,4 | 8,0 | 7,6 | - | PE8213, G from characterization. |
| **PXA @ Input port** | | **7,6** | | 30,0 | |

| X-Band Data Downlink Resume (N2) | | |
|---|---|---|
| **Parameter** | **Condition** | |
| | **Nominal** | **Maximun Levels** |
| CEGSE Variable Attenuator 10dB step | 0,0 | - |
| Pin PXA | 7,6 | 7,6 |
| Ofset PXA | -32,4 | |

# B. Test elements list

Table B.0.0-1 shown all hardware items required for the execution of test procedures of this documents.

Table B.0.0-1: Required hardware items for procedures execution.

| ID | Name | Type | Brand | P/N | S/N | ID CONAE | Comments |
|---|---|---|---|---|---|---|---|
| - | 5/64" or 2 mm Hex bit. | Hex bit | - | - | - | - | 5/64" or 2 mm Hex bit for 1/4" hex socket |
| - | N Torque Wrench | Torque Wrench | Pasternack | PE5011-6 | - | - | Fixed Click Type Torque Wrench With 13/16" Bit For N, SC Connectors Pre-set to 14 in-lbs. |
| - | SMA Torque Wrench | Torque Wrench | Maury | 8799D1 | - | - | Torque Wrench With 5/16" Bit For SMA, SC Connectors Pre-set to 5 in-lbs. |
| - | Fixed wrench | Fixed wrench | - | - | - | - | To perform RF connections. |
| - | Screwdriver for slotted screws | Screwdriver | - | - | - | - | To perform connectors adjustments. |
| - | Antistatic wrist strap | Safety accessory | - | - | - | - | For operator, instrument and equipment safety. |
| - | Multimeter | Instrument | Agilent | U1232A | MY53110041 | - | True RMS Multimeter. |
| PXA | Spectrum Analyzer | Instrument | Agilent | N9030A | MY53310573 | 021016 | - Keysight N9030A PXA Signal Analyzer<br>- N9030A 3Hz-13.6GHz<br>-RT1 Real-time analysis up to 160 MHz BW, basic detection 89600 VSA PathWave Vector Signal Analysis v. 22.21<br>- 89601B-200 Basic vector signal analysis, transportable license<br>- 89601B-AYA Vector modulation analysis, transportable license. |
| DC Block | DC Block on Inner Conductor N male to N Female | DC Block | Pasternack | PE8213 | - | - | Instrument safety recommendation (PXA). |
| DC Block | DC Block on Inner Conductor SMA male to SMA Female | DC Block | Pasternack | PE8210 | - | - | For instrument safety recommendation (PXI). |
| - | Oscilloscope | Instrument | Tektronix | DPO3054 | CO21329 | 019203 | Instrument to measure electrical signals. |
| - | Oscilloscope differential probe | Instrument | Tektronix | TDP0500 | B012833 | - | Used to measure voltage values. |
| - | Oscilloscope current probe | Instrument | Tektronix | TCP0030A | C000884 | - | Used to measure current values. |
| - | 47 KOhm Resistor | Connection Board | - | - | - | - | With wire and connector compatible with BOB. For electrical test of TSM Interface. |
| - | DB9 Breakout Board | Connection Board | Silver Engineering Inc (SEI) | SE-01021-11 | 6351 | 022265 | With nine compatible bridges. For electrical and functional test of HV-HPC Interface. |
| - | DB25 Breakout Board | Connection Board | Silver Engineering Inc (SEI) | SE-01023-11 | 6357 | 022271 | With twenty five compatible bridges. For electrical and functional test of the LVDS interface. |
| - | DB37 Breakout Board | Connection Board | Silver Engineering Inc (SEI) | SE-01024-11 | 6359 | 022273 | With thirty-seven compatible bridges. For electrical and functional test of the TSM, ASM and BDM interface. |
| TestCableDB9 | Auxiliary wires for Breakout Board | Adapter cable | - | - | - | - | Wires used to connect ad-hoc box to Breakout Board terminals. |
| TestCableDB25 | Auxiliary wires for Breakout Board | Adapter cable | - | - | - | - | Wires used to connect ad-hoc box to Breakout Board terminals. |
| TestCableDB37 | Auxiliary wires for Breakout Board | Adapter cable | - | - | - | - | Wires used to connect ad-hoc box to Breakout Board terminals. |
|  | EMI/EMC filter | - | Veng | - | - | - | - To filter ripple of the current and voltage of the DUT. |

Table B.0.0-1: Required hardware items for procedures execution.

| ID | Name | Type | Brand | P/N | S/N | ID CONAE | Comments |
|---|---|---|---|---|---|---|---|
| RACK20 | Rack | - | SKB cases | 3SKB-R914U24 | - | 016598 | -Belongs to TestBed<br>-TestBed rack to hold tests components. |
| GLS10-TB | Ethernet Switch | Switch | D-Link | DES-1024D | - | 012821 | -Belongs to TestBed<br>-To connect network components. |
| PDU30 | Power Distribution Unit | - | - | - | - | - | -Belongs to TestBed<br>-Contains circuit breaker 15A. |
| XUP01-TB | X-Band Up-converter | Frequency Converter | Zodiac | SM01022979B | 4005892003 | 023920 | -Belongs to TestBed<br>-It is used to frequency conversion in Data tests. |
| HDR10 | Cortex HDR-XXL | Modulator, demodulator and processor | Zodiac Aerospace | SM01022661B | 13032 | 021374 | -Belongs to TestBed<br>-To perform Data tests. |
| ATT10.01 | Fixed Attenuator SMA male to SMA female | Attenuator | Pasternack | PE7005-10 | - | - | -Belongs to TestBed<br>-It is used to prevent RF power levels and/or achieve test condition values. |
| PE300-60-03 | SMA m to SMA m 1.5m Harness | RF Auxiliary Harness | Pasternack | PE300-60 | - | - | -Belongs to TestBed<br>-To connect Cortex HDR-XXL (through J50 IF OUT) with TestBed XBUC (through ATT10.01)<br>-To connect TestBed XBDC with TestBed XBUC (through ATT10.01). |
| XRF4.02 | N m to N m 5m Harness | RF Auxiliary Harness | UTiFLEX | UFB197C-0-1969-7GU7GU | - | - | -Belongs to TestBed<br>-To connect CEGSE IN/OUT port with SB N1 (N)<br>-To connect CEGSE IN/OUT port with XB N1 (N). |
| SRF3.02 | N m to SMA m 10m Harness | RF Auxiliary Harness | UTiFLEX | UFA 210A-0-3937-70U300 | - | - | -Belongs to TestBed<br>-To connect XBUC TB outport with XB N1/N2 (N). |
| XRF3.60 | N m to N m 5m Harness | RF Auxiliary Harness | UTiFLEX | UFB197C-0-1969-7GU7GU | - | - | -Belongs to TestBed<br>-To connect CEGSE IN/OUT port with SB N1 (N)<br>-To connect CEGSE IN/OUT port with XB N1 (N). |
| REF1.01 | BNC m to BNC m 6m Harness | Ref Harness | - | E119932 RG174/U | - | - | To connect the 10 MHz reference signal to the PXA. |
| SBB4.18 | BNC m to SMA m 6m Harness | Ref Harness | HUBER+SUHNER | RG174/11BNC/11SMA | - | - | To connect the 10 MHz reference signal to the PXA. |
| W2 | SMA m to SMA m 55.1cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0217-300300TV | MRF64639 225314-044 | - | -Belongs to CEGSE<br>-To connect OUT (through CS#4) port of the DSN Filter with the EWC30 port in DUT plate. |
| W3 | SMA m to SMA m 20cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0079-300300TV | MFR64639 225309-002 | - | -Belongs to CEGSE<br>-To connect EWC29 port in DUT plate with the COUPLER port in DUT plate.<br>-To connect EWC30 port in DUT plate with the COUPLER port in DUT plate. |
| W4 | SMA m to SMA m 37.6cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0148-300300TV | MFR64639 225312-026 | -Belongs to CEGSE<br>- | To connect COUPLER port in DUT plate with the IN port (through AD#1) in Bi-Directional Coupler. |
| W5 | SMA m to SMA m 50cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0197-3Q03Q0 | MFR64639 351640-080 | - | -Belongs to CEGSE<br>-To connect Fixed Attenuator (through AD#2) with 1dB step Variable Attenuator port. |
| W6 | N m to SMA m 80cm Harness | RF Auxiliary Harness | UTiFLEX | UT-141-FORM-0315-380580/A | MFR 64639 380910-007 | - | -Belongs to CEGSE<br>-To connect 10dB step Variable Attenuator port with CEGSE IN/OUT port in DUT plate. |
| W7 | SMA f to SMA m 34.8cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0137-38V320 PM | MFR64639 345487-048 MB48 | - | -Belongs to CEGSE<br>-To connect OUT CPL port in Bi-Directional Coupler with UPL TP port in DUT plate. |
| W8 | SMA f to SMA m 34.8cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0137-38V320 PM | MFR64639 345487-042 MB42 | - | -Belongs to CEGSE<br>-To connect IN CPL port in Bi-Directional Coupler with DWL TP port in DUT plate. |

Table B.0.0-1: Required hardware items for procedures execution.

| ID | Name | Type | Brand | P/N | S/N | ID CONAE | Comments |
|---|---|---|---|---|---|---|---|
| W10 | SMA m to SMA m 50cm Harness | RF Auxiliary Harness | UTiFLEX | MCJ088D-0-0197-3Q03Q0 | MFR64639 351640-017 | - | -Belongs to CEGSE<br>-To connect J103 port (through CS#2) of EWC30 with IN port (through CS#3) of the DSN Filter. |
| ZGBDC35-93HP | Bi-Directional Coupler | Coupler | MiniCircuits | ZGBDC35-93HP | 285 | - | -Belongs to CEGSE<br>-35dB Bi-Directional Coupler 900MHz to 9000MHz up to 250W. |
| BW-N20W20+ | 20dB Fixed attenuator | Attenuator | MiniCircuits | BW-N20W20+ | - | - | -Belongs to CEGSE<br>-20dB fixed attenuator DC to 18GHz up to 20W. |
| 8496B-001 | 10dB step Variable attenuator | Attenuator | Keysight | 8496B-001 | - | - | -Belongs to CEGSE<br>-10 dB step Variable attenuator 0-110dB DC-18GHz 1W max. input power. |
| AD#1 | N m to SMA f adapter | Adapter | Pasternack | PE91337 | - | - | -Belongs to CEGSE<br>-To connect W4 cable with IN port in Bi-Directional Coupler. |
| AD#2 | N m to SMA f adapter | Adapter | Pasternack | PE91337 | - | - | -Belongs to CEGSE<br>-To connect Fixed attenuator with W5 cable. |
| AD#3 | N m to SMA f adapter | Adapter | Pasternack | PE91337 | - | - | -Belongs to CEGSE<br>-To connect W9 cable with 1dB step Variable Attenuator port. |
| Adapter#1 | Adapter SMA f to SMA f | Adapter | Pasternack | PE9312 | - | - | -Belongs to CEGSE<br>-To connect in the DUT plate in the Coupler position. |
| Adapter#3 | Adapter SMA f to SMA f | Adapter | Pasternack | PE9312 | - | - | -Belongs to CEGSE<br>-To connect in the DUT plate in the position EWC30. |
| H-EGSE-DUT-J11_001 | DB15 m to DB15 f 1m Harness | Data BB Harness | - | - | - | - | -Belongs to CEGSE<br>-To connect J100 of CEGSE with Input of EMI/EMC filter. |
| H-EGSE-DUT-J12_001 | DB15 m to MDM15 m 0.5m (or 0.8m) Harness | Data BB Harness | - | - | - | - | -Belongs to CEGSE<br>-To connect Output of EMI/EMC filter with J100 of EWC30. |
| H-EGSE-DUT-J13_001 | MDM15 f to DB15 f 0.25m (or 0.5m) Harness | Data BB Harness | - | - | - | - | -Belongs to CEGSE<br>-To verify EMI/EMC filter. |
| H-EGSE-DUT-J2_001 | DB25 m to MDM25 m 0.9m Harness | Data BB Harness | - | - | - | - | -Belongs to CEGSE<br>-To connect J200 of EWC30 with J200 of ad-hoc box. |
| H-EGSE-DUT-J3_001 | DB37 m and DB9 m to MDM37 m 0.9m Harness | Data BB Harness | - | - | - | - | -Belongs to CEGSE<br>-To connect J201 of EWC30 with J201A and J201B of ad-hoc box. |
| - | Saver MDM 15 pts | Saver | C&K | 340104102B 15PS | - | - | -Belongs to XTX FM1<br>-To connect to J100 port of EWC30. |
| - | Saver MDM 25 pts | Saver | C&K | 340104104B 25PS | - | - | -Belongs to XTX FM1<br>-To connect to J200 port of EWC30. |
| - | Saver MDM 37 pts | Saver | C&K | 340104106B 37PS | - | - | -Belongs to XTX FM1<br>-To connect to J201 port of EWC30. |
| CS#2 - | Saver SMA | Saver | Radiall | 3402 0030 2B101 | - | - | -Belongs to XTX FM1<br>-To connect to J103 port of EWC30. |
| - | Saver MDM 15 pts | Saver | C&K | 340104102B 15PS | - | - | -Belongs to XTX FM2<br>-To connect to J100 port of EWC30. |
| - | Saver MDM 25 pts | Saver | C&K | 340104104B 25PS | - | - | -Belongs to XTX FM2<br>-To connect to J200 port of EWC30. |
| - | Saver MDM 37 pts | Saver | C&K | 340104106B 37PS | - | - | -Belongs to XTX FM2<br>-To connect to J201 port of EWC30. |
| CS#2 - | Saver SMA | Saver | Radiall | 3402 0030 2B101 | - | - | -Belongs to XTX FM2<br>-To connect to J103 port of EWC30. |

Table B.0.0-1: Required hardware items for procedures execution.

| ID | Name | Type | Brand | P/N | S/N | ID CONAE | Comments |
|---|---|---|---|---|---|---|---|
| - | Pen-drive | Informatic | - | - | - | - | Previously formatted in FAT32 format. |
| - | Auxiliary Notebook | Informatic | - | - | - | - | With Windows SO, TR7 for Windows and T&D Graph installed (Datalogger programs). |

# C. Test items characteristics

In this appendix specifications of harness used for test are presented. Other components specifications can be consulted in its respective user manuals o test reports. For RF components S parameters for work frequency obtained in measurements are presented. For base band harness pin-out is presented.

## C.1. XRF4.02 N m to N m 5m Harness

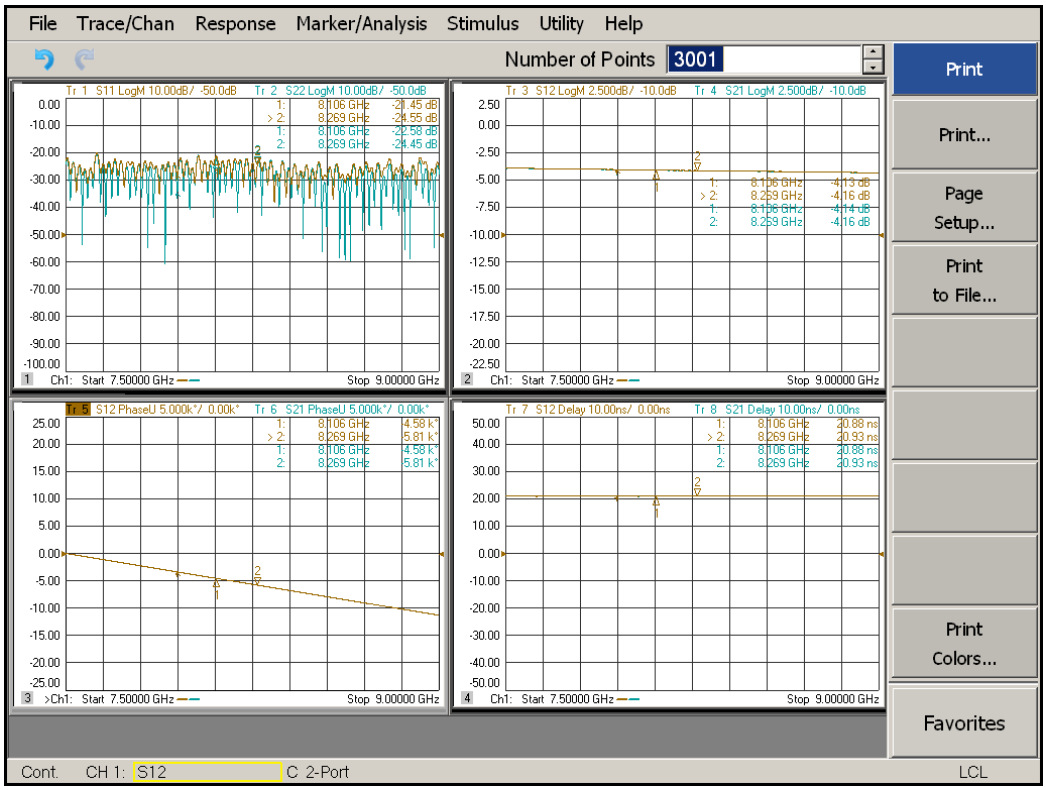



Table C.1.0-1: X-Band electrical measurements of XRF4.02 N m to N m 5m Harness.

## C.2. XRF3.60 N m to SMA m 10m Harness

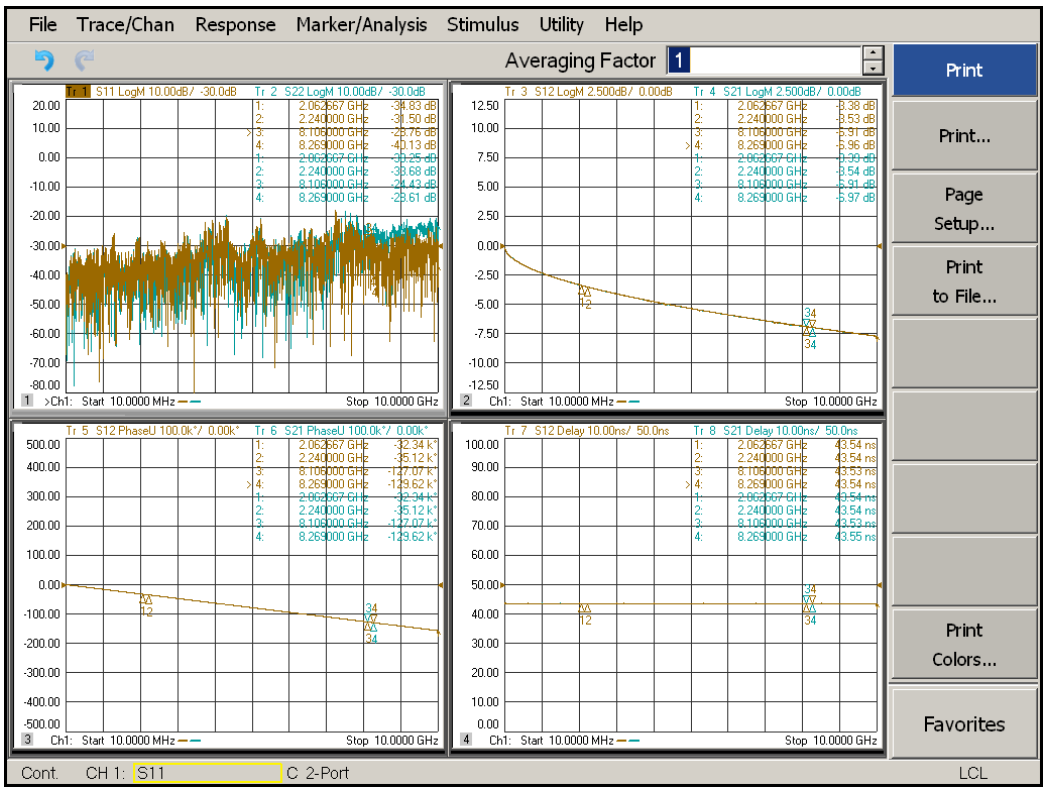



Table C.2.0-1: Electrical measurements of XRF3.60 N m to SMA m 10m Harness.

## C.3. SRF3.02 N m to SMA m 10m Harness


Table C.3.0-1: X-Band Electrical measurements of SRF3.02 N m to SMA m 10m Harness.

## C.4. W2 SMA m to SMA m 55.1cm Harness

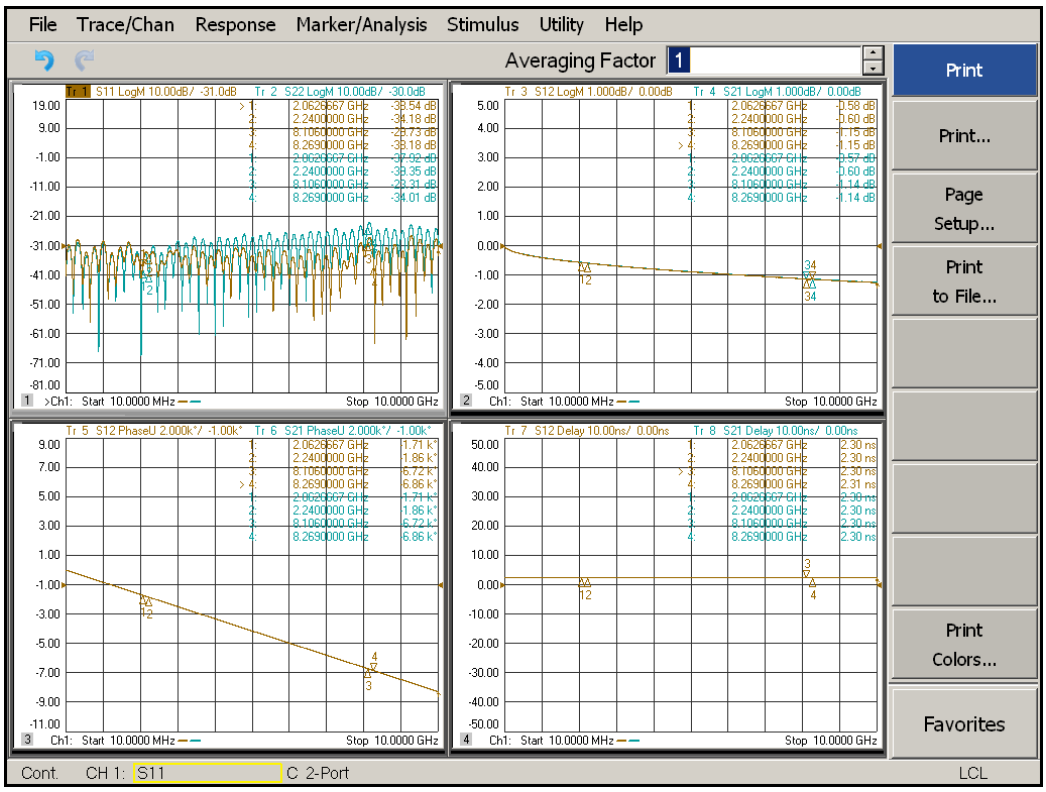



Table C.4.0-1: S-Band and X-Band electrical measurements of W2 SMA m to SMA m 55.1cm Harness.

## C.5. W3 SMA m to SMA m 20cm Harness

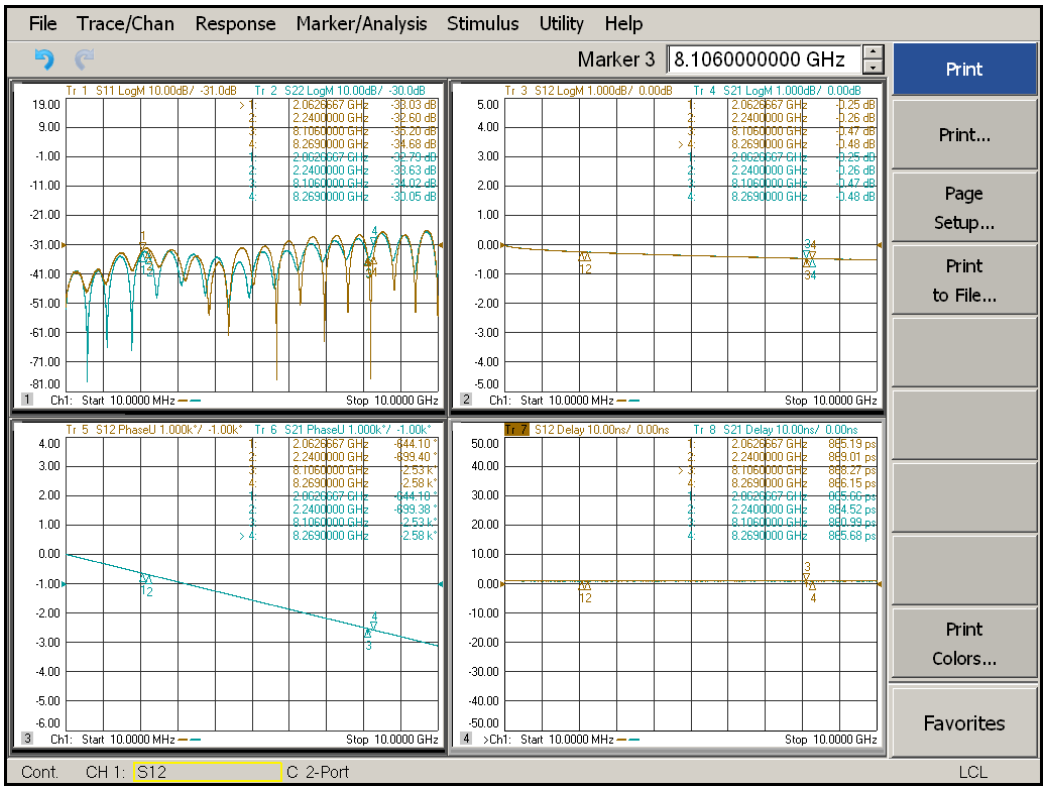



Table C.5.0-1: S-Band and X-Band electrical measurements of W3 SMA m to SMA m 20cm Harness.

## C.6. W4 SMA m to SMA m 37.6cm Harness

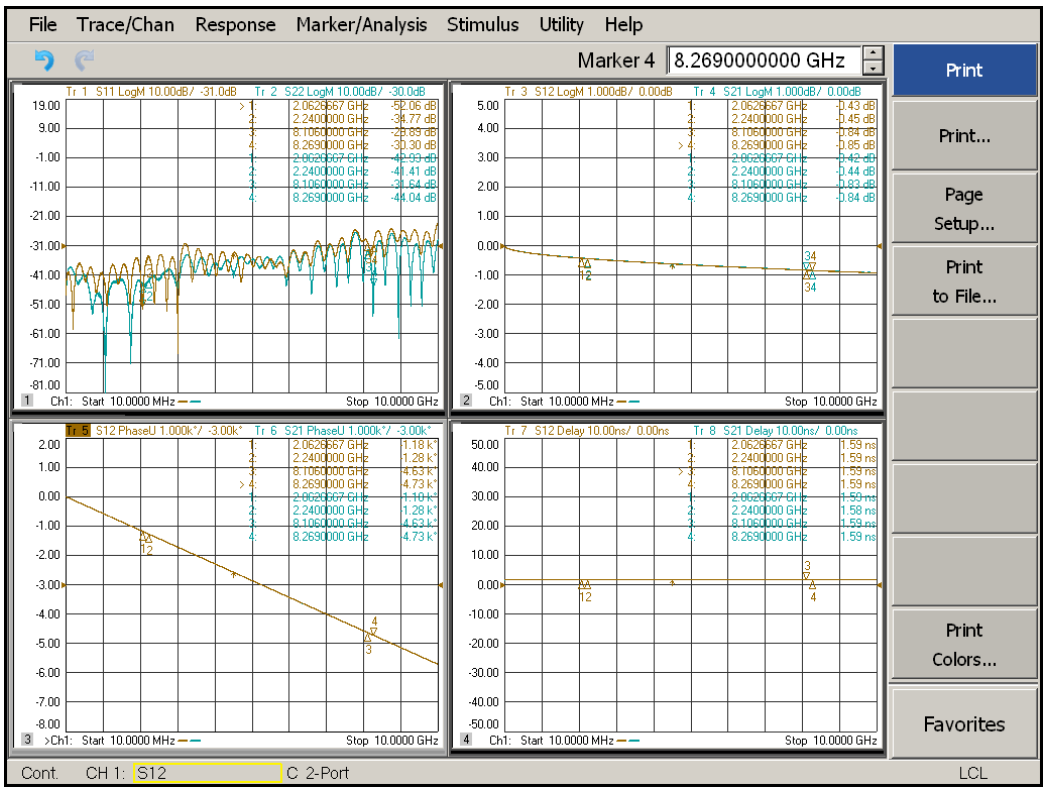



Table C.6.0-1: S-Band and X-Band electrical measurements of W4 SMA m to SMA m 37.6cm Harness.

## C.7. W5 SMA m to SMA m 50cm Harness

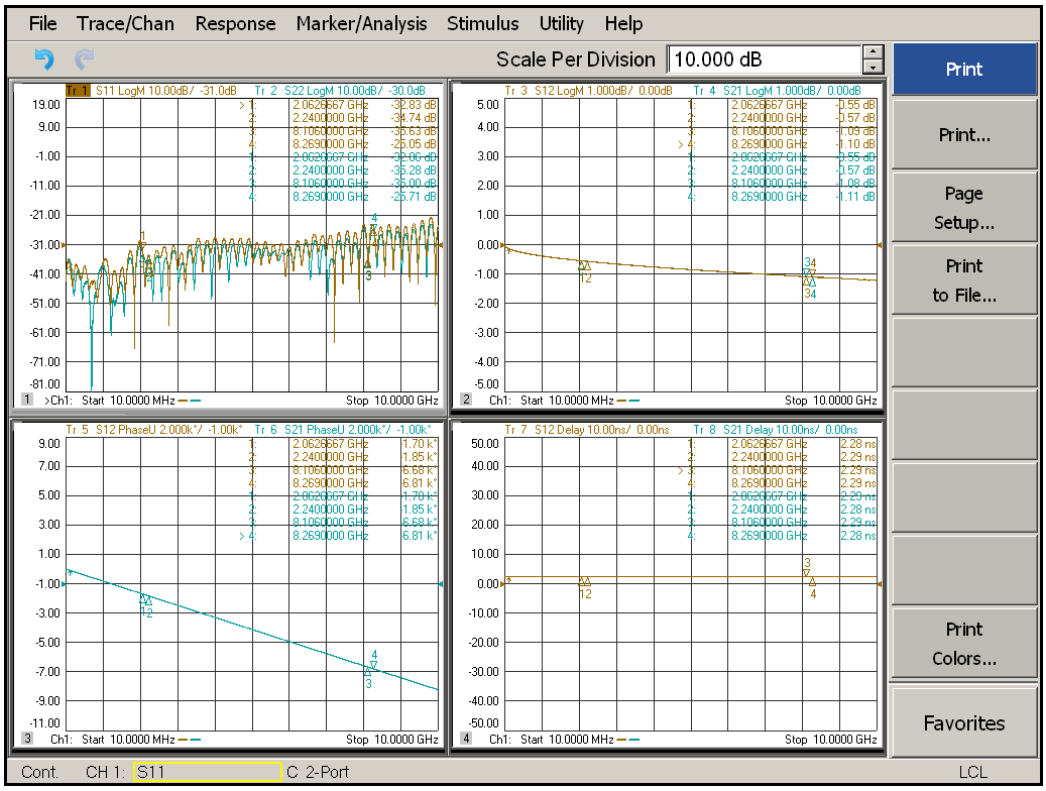



Table C.7.0-1: S-Band and X-Band electrical measurements of W5 SMA m to SMA m 50cm Harness.

## C.8. W6 N m to SMA m 80cm Harness

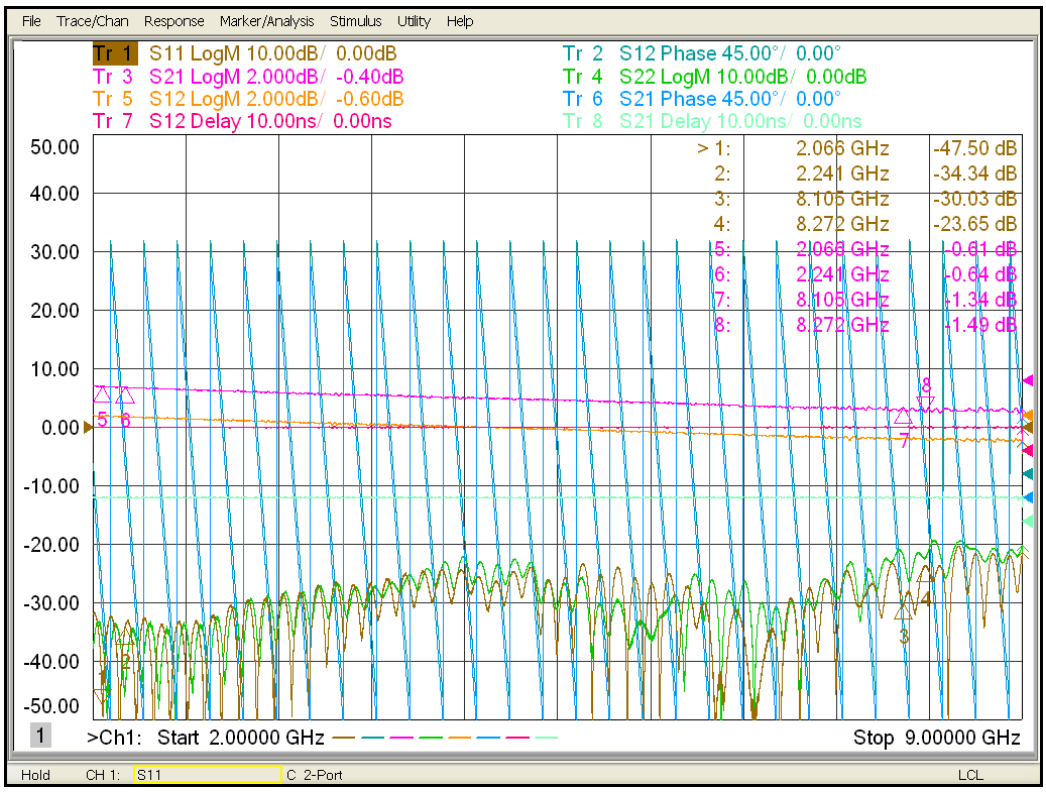



Table C.8.0-1: S-Band and X-Band electrical measurements of W6 N m to SMA m 80cm Harness.

## C.9. W7 SMA f to SMA m 34.8cm Harness

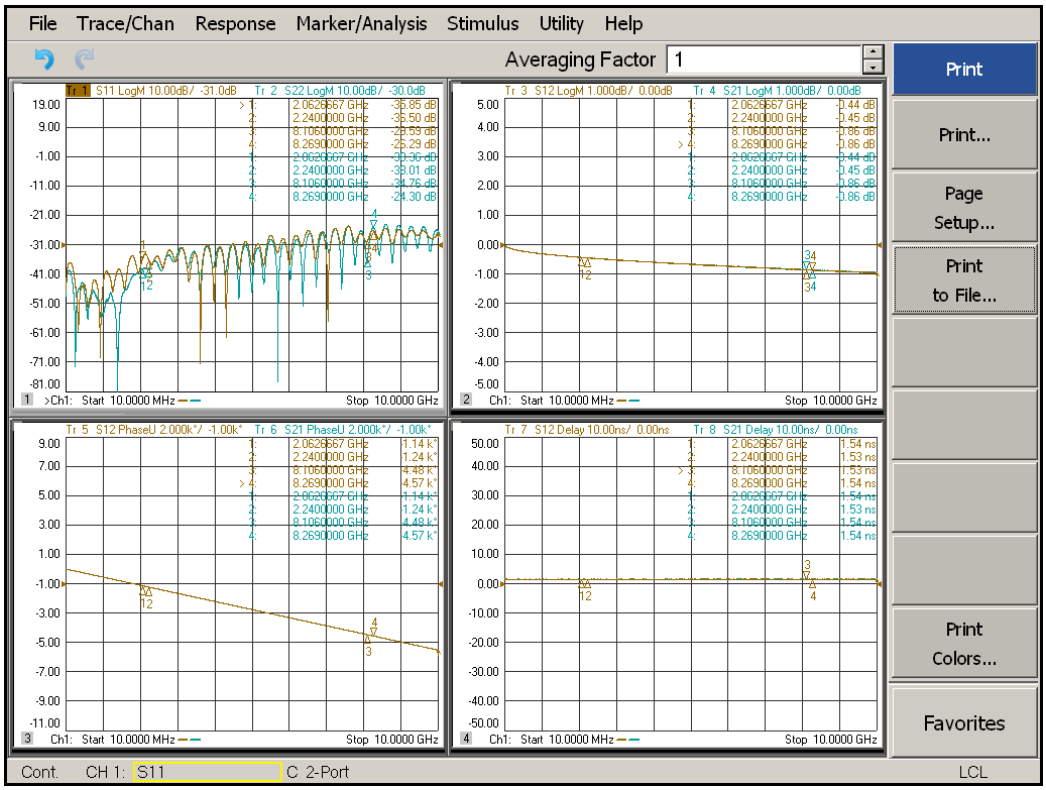



Table C.9.0-1: S-Band and X-Band electrical measurements of W7 SMA f to SMA m 34.8cm Harness.

## C.10. W8 SMA f to SMA m 34.8cm Harness

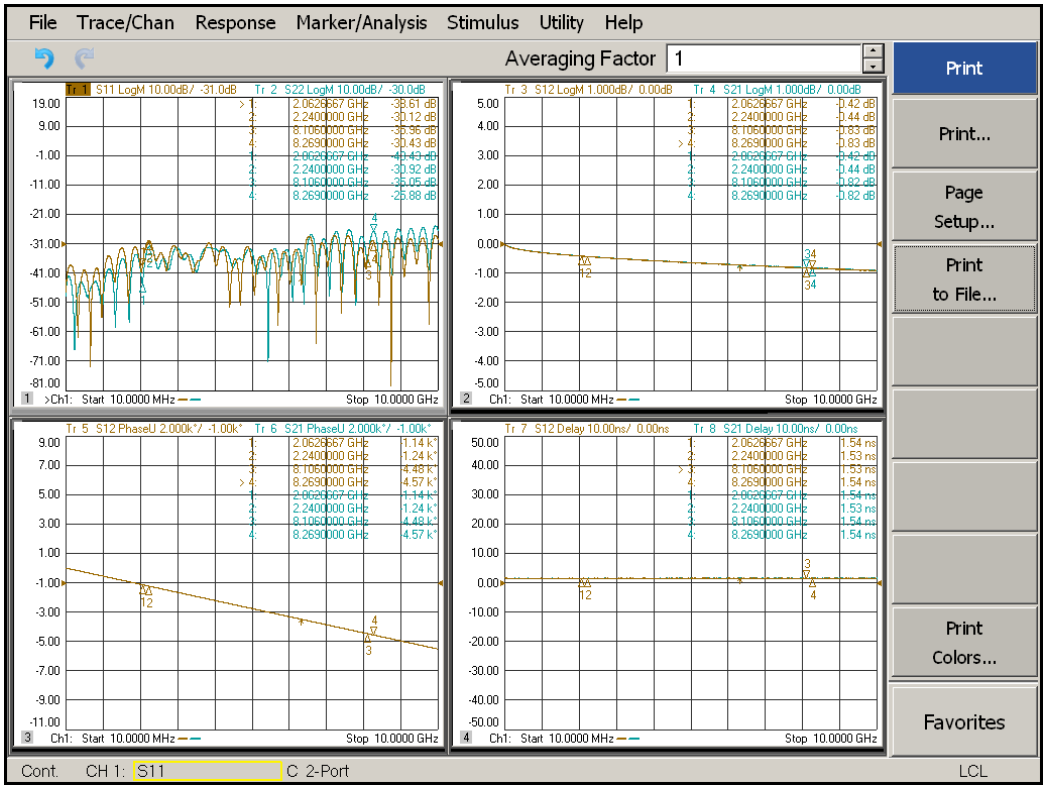



Table C.10.0-1: S-Band and X-Band electrical measurements of W8 SMA f to SMA m 34.8cm Harness.

## C.11. W10 SMA m to SMA m 50cm Harness

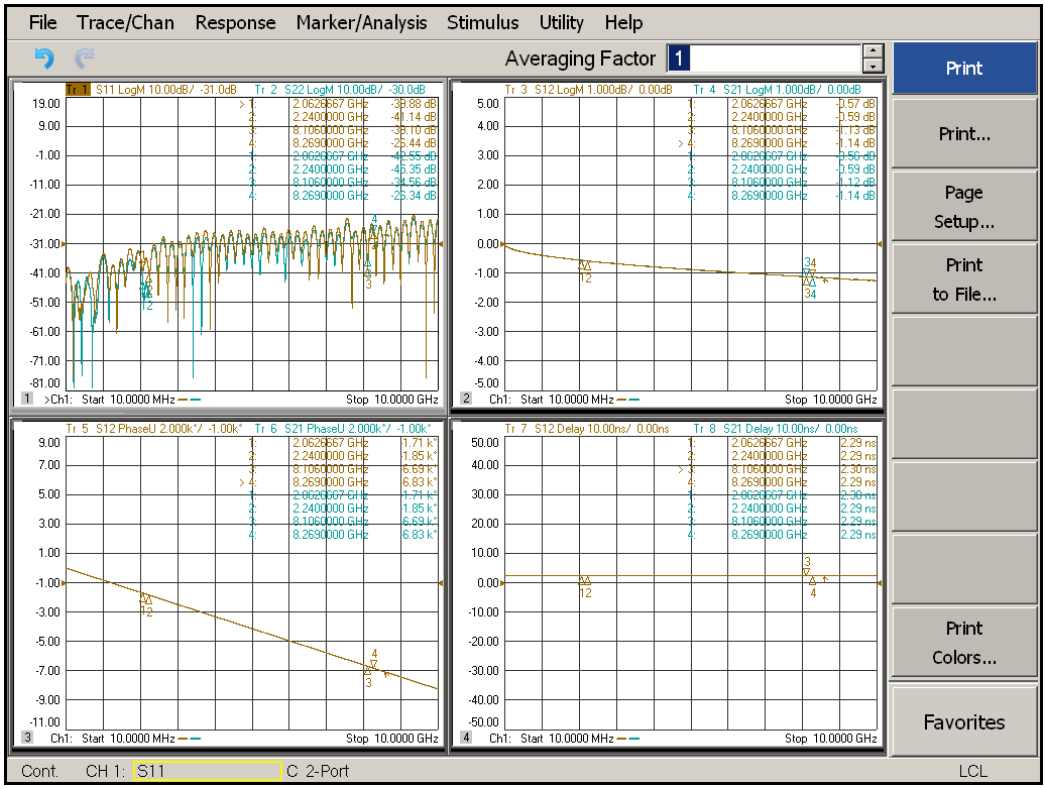



Table C.11.0-1: S-Band and X-Band electrical measurements of W10 SMA m to SMA m 50cm Harness.

## C.12. W15 SMA m to SMA m 240cm Harness

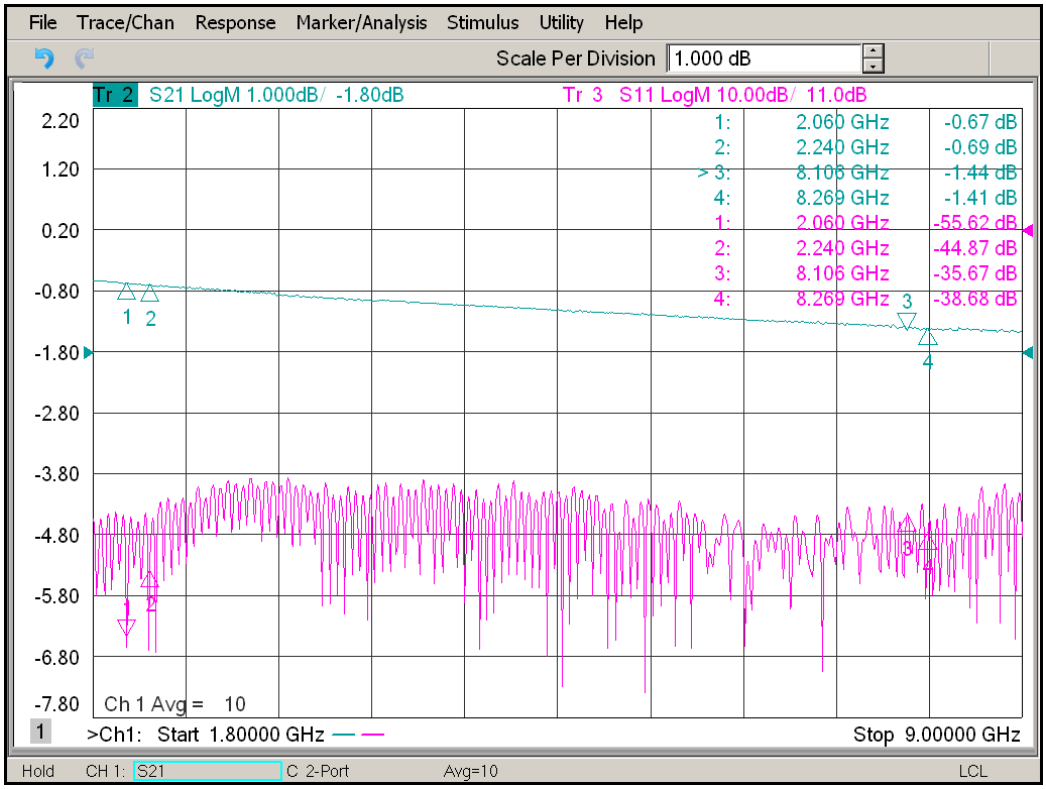



Table C.12.0-1: S-Band and X-Band electrical measurements of W15 SMA m to SMA m 240cm Harness.

## C.13. Fixed Attenuator BW-N20W20+

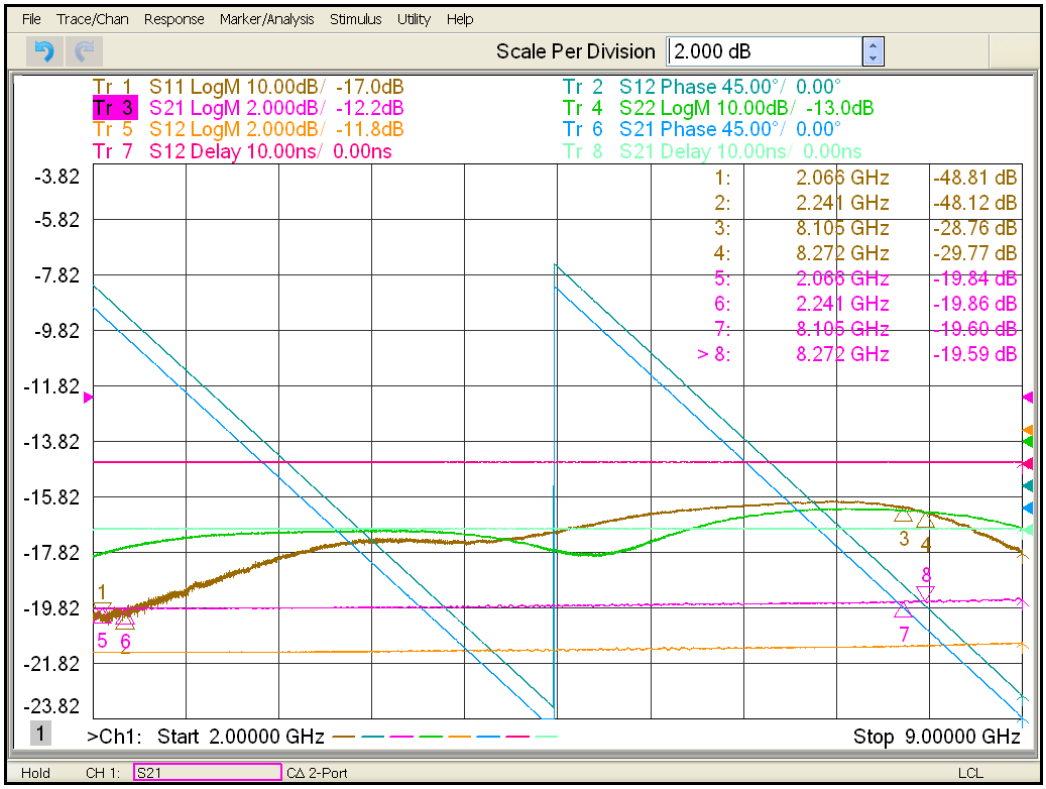



Table C.13.0-1: S-Band and X-Band electrical measurements of Fixed attenuator ATT BW-N20W20+.

## C.14. Coupler bi-directional ZGBDC35-93HP+

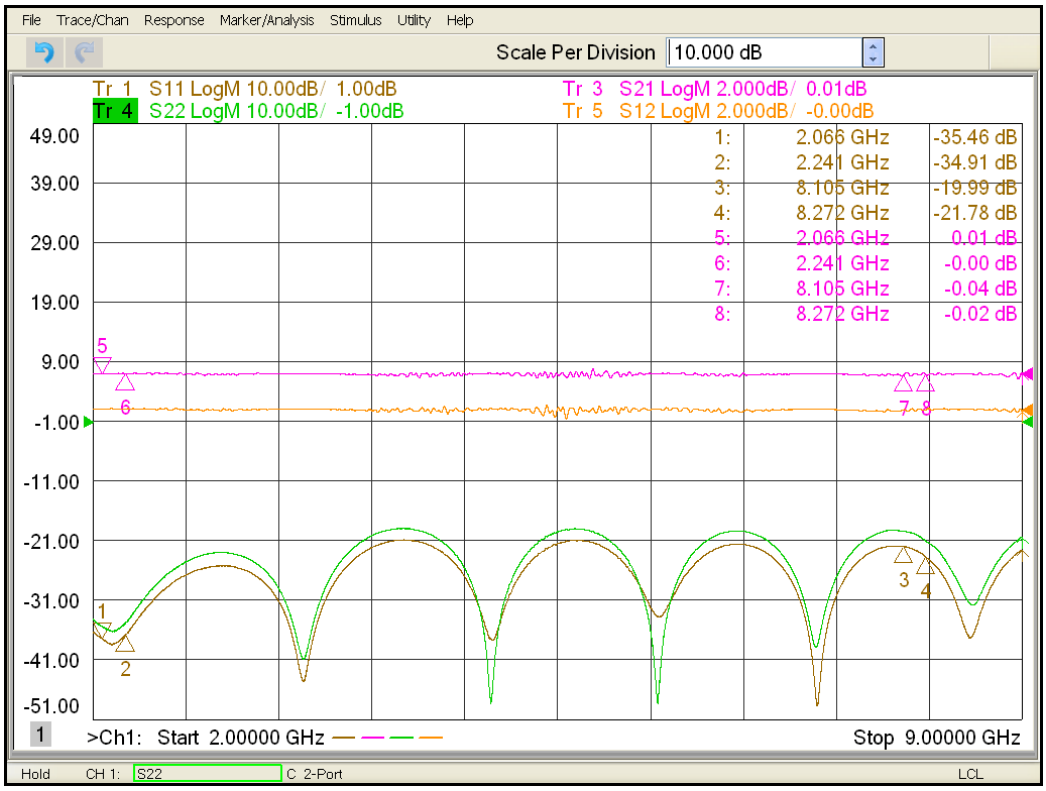



Table C.14.0-1: S-Band and X-Band electrical measurements of coupler bi-directional ZGBDC35-93HP+ (IN-OUT).

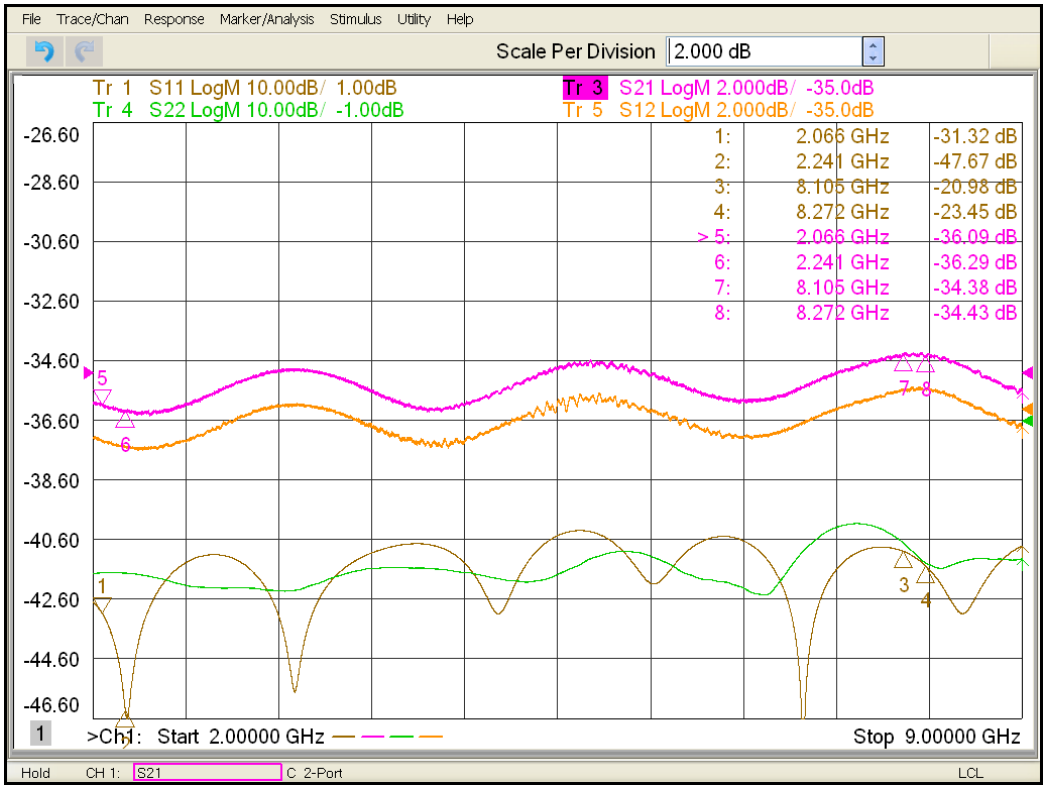



Table C.14.0-2: S-Band and X-Band electrical measurements of coupler bi-directional ZGBDC35-93HP+ (IN-CPL IN).

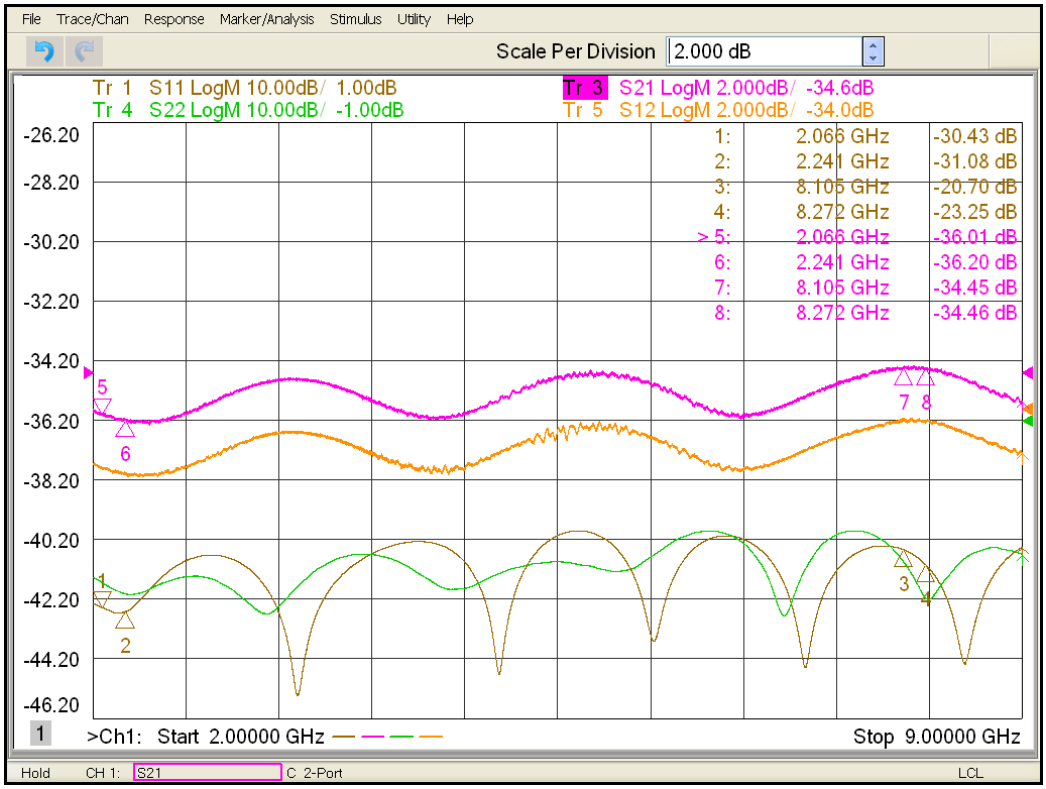



Table C.14.0-3: S-Band and X-Band electrical measurements of coupler bi-directional ZGBDC35-93HP+ (OUT-CPL OUT).

## C.15. Variable Attenuator 8496B-001 (0 ATT)

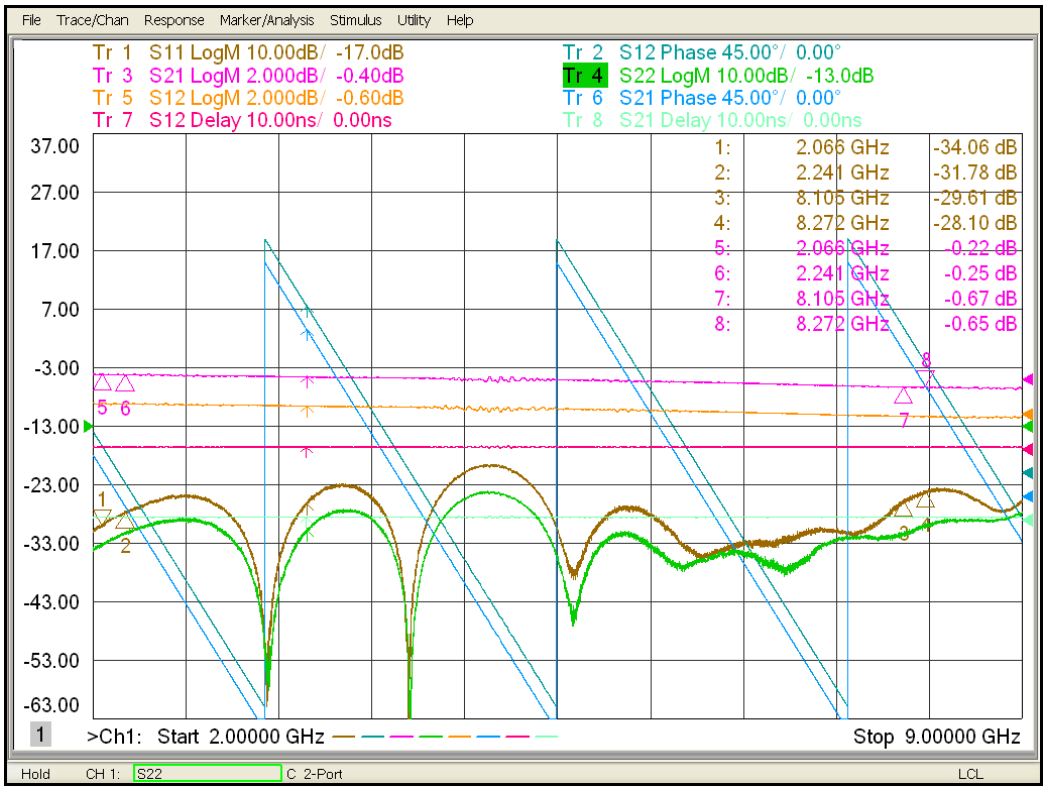



Table C.15.0-1: S-Band and X-Band electrical measurements of variable attenuator 8496B-001 (0 ATT).

## C.16. DC-BLOCK PE8213

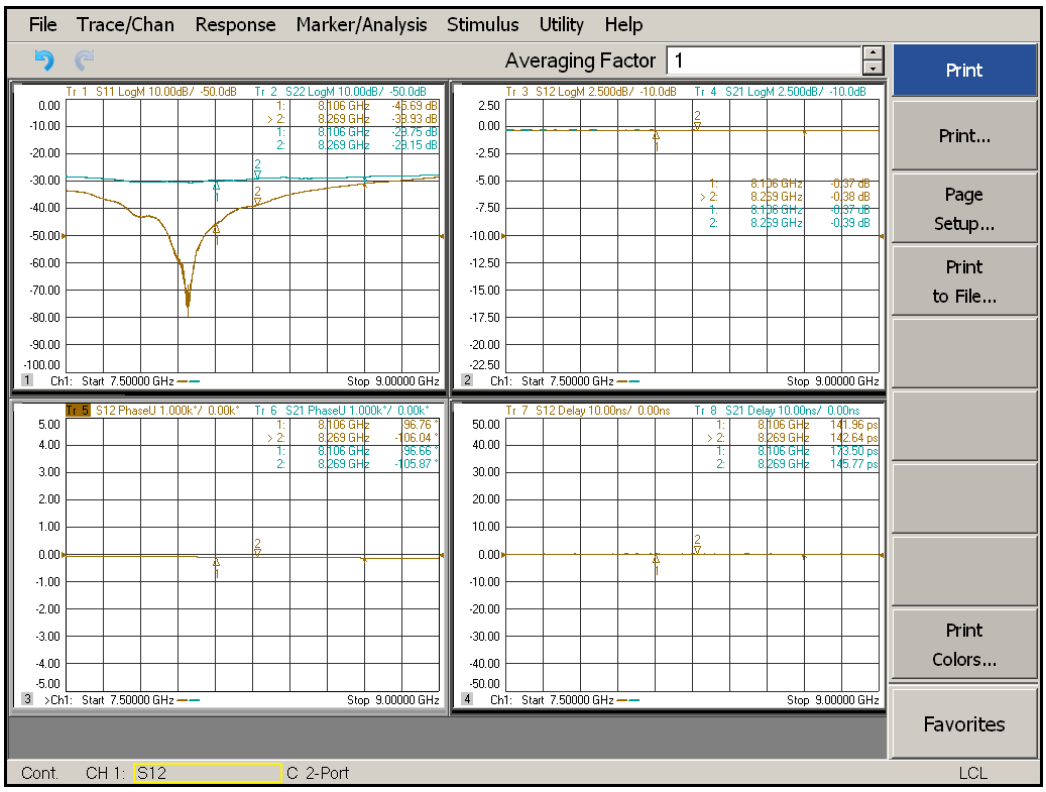



Table C.16.0-1: X-Band electrical measurements of DC-BLOCK PE8213.

## C.17. DC-BLOCK PE8210

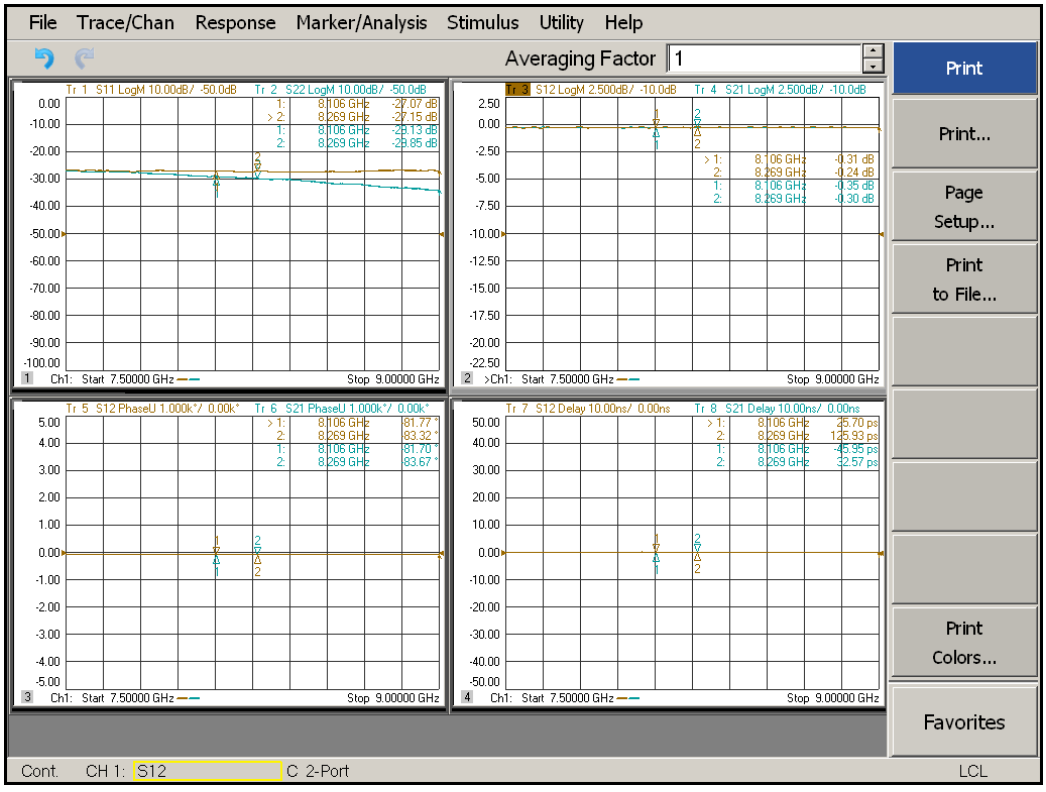



Table C.17.0-1: X-Band electrical measurements of DC-BLOCK PE8210.

## C.18. Savers

TBC.

## C.19. Adapters N m to SMA f

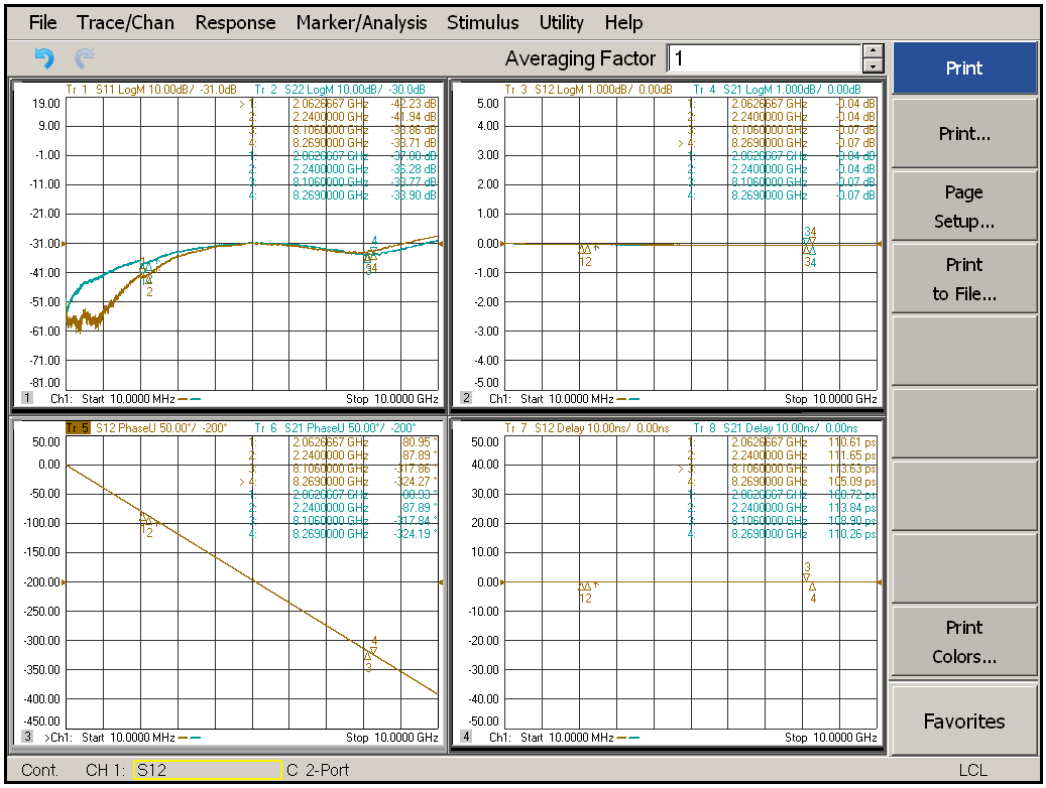



Table C.19.0-1: S-Band and X-Band electrical measurements of Adapter N m to SMA f AD#1.

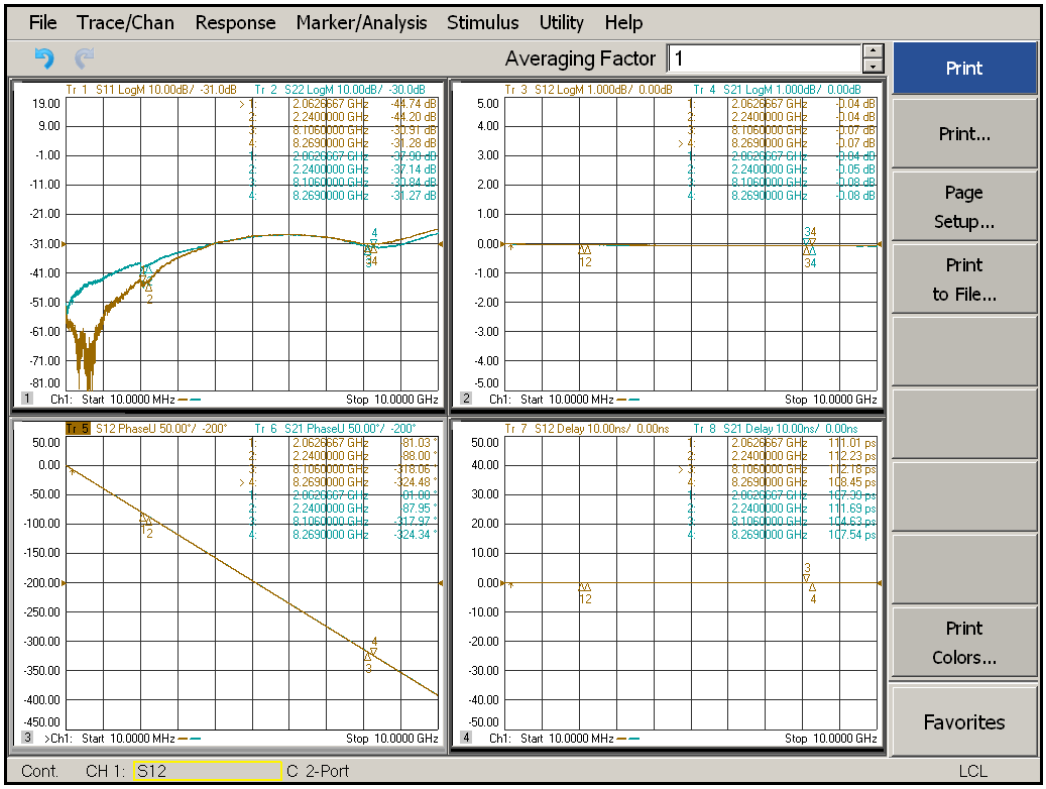



Table C.19.0-2: S-Band and X-Band electrical measurements of Adapter N m to SMA f AD#2.

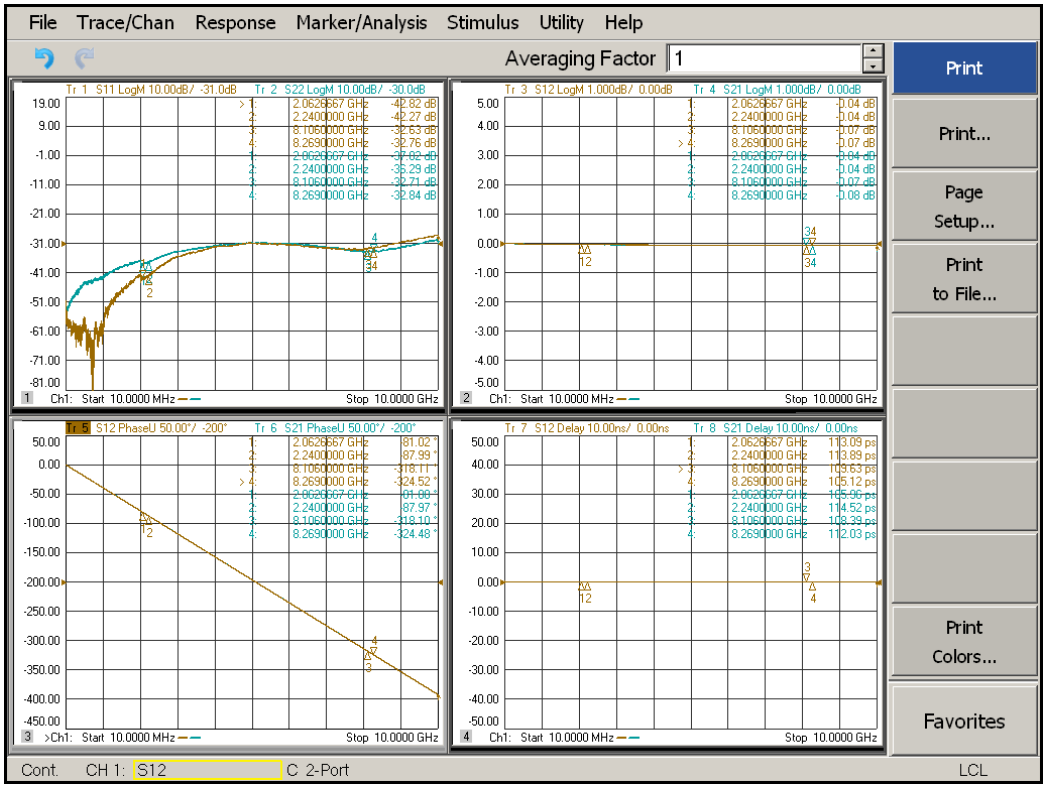



Table C.19.0-3: S-Band and X-Band electrical measurements of Adapter N m to SMA f AD#3.

## C.20. Adapters SMA f to SMA f

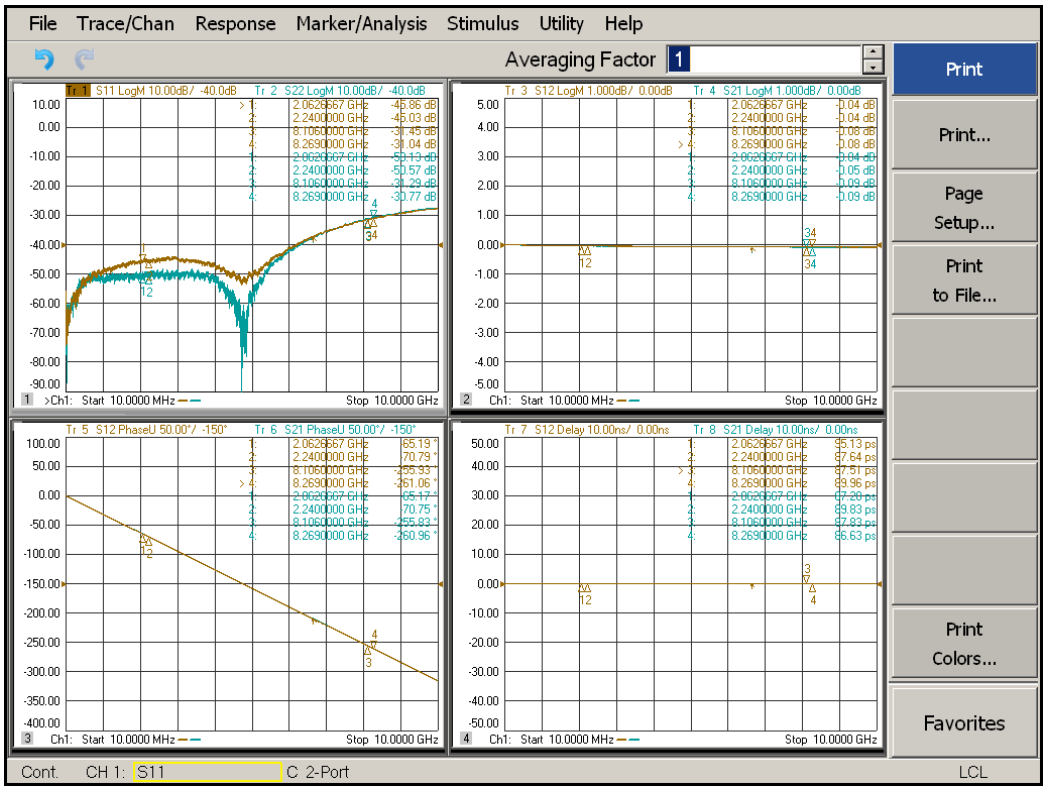



Table C.20.0-1: S-Band and X-Band electrical measurements of Adapter SMA f to SMA f #1 (Coupler port).

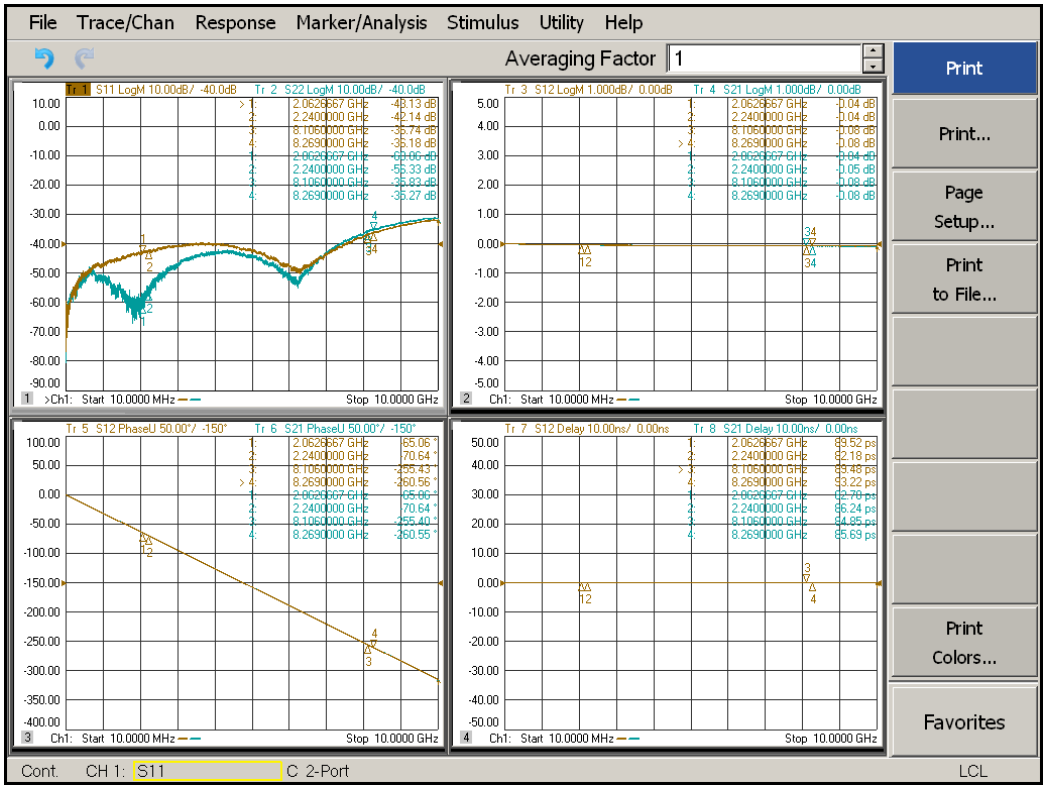



Table C.20.0-2: S-Band and X-Band electrical measurements of Adapter SMA f to SMA f #3 (EWC30 port) of COMM-SS-EM.