# RF TEST REPORT

**Report No.:** SET2020-00269

**Product:** LTE Base Station

**FCC ID:** 2AG32SBS81040

**IC:** 20982-SBS81040

**Model No. :** sBS81040

**Applicant:** Baicells Technologies Co., Ltd.

**Address:** 3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, China.

**Dates of Testing:** 12/20/2019 —01/07/2020

**Issued by:** CCIC Southern Testing Co., Ltd.

**Lab Location:** Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.

**Tel**：86 755 26627338 **Fax**：86 755 26627238

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# Test Report

| | |
|---|---|
| **Product……:** | LTE Base Station |
| **Brand Name……:** | BaiCells |
| **Trade Name……:** | BaiCells |
| **Applicant……:** | Baicells Technologies Co., Ltd. |
| **Applicant Address……:** | 3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, China. |
| **Manufacturer……:** | Baicells Technologies Co., Ltd. |
| **Manufacturer Address…:** | 3F, Hui Yuan Development Building, No.1 Shangdi Information Industry Base, Haidian Dist., Beijing, China. |
| **Test Standards……:** | 47 CFR FCC Part 2/27<br>RSS-Gen issue 5 March 2019<br>RSS-199 issue 3 December 2016 |
| **Test Result……:** | PASS |
| **Tested by……:** | Vincent 2020.01.13<br>Vincent，Test Engineer |
| **Reviewed by……:** | Chris You 2020.01.13<br>Chris You, Senior Engineer |
| **Approved by……:** | ShuangwenZhang 2020.01.13<br>ShuangwenZhang，Manager |

# Table of Contents

| Change History | | |
|---|---|---|
| Issue | Date | Reason for change |
| 1.0 | 20120.01.13 | First edition |
| | | |
| | | |

# 1. GENERAL INFORMATION

## 1.1 EUT Description

| | |
|---|---|
| EUT Type | LTE Base Station |
| Model No. | sBS81040 |
| Software Version | BaiBS_RTD_3.4.8 |
| Hardware version | Ver.B |
| EUT supports Radios application | LTE Band 41 |
| Frequency Range | FCC:2501MHz~2685MHz<br>IC:2575MHz~2615MHz |
| Number of Carriers | Maximum 2 carriers |
| Support Channel Bandwidth | 10MHz, 15MHz, 20MHz |
| Type of Modulation | QPSK, 16QAM, 64QAM |
| Antenna Type | External Antenna |
| Permission Antenna Gain | 17dBi |
| Power Supply | DC 48V |

## 1.2 Test Channel

Configuration MIMO-SC

FCC

| Test Channel | Frequency | | |
|---|---|---|---|
| | 10M | 15M | 20M |
| lowest | 2501 | 2503.5 | 2506 |
| Middle | 2593 | 2593 | 2593 |
| Highest | 2685 | 2682.5 | 2680 |

IC

| Test Channel | Frequency | | |
|---|---|---|---|
| | 10M | 15M | 20M |
| lowest | 2575 | 2577.5 | 2580 |
| Middle | 2595 | 2595 | 2595 |
| Highest | 2615 | 2612.5 | 2610 |

Configuration MIMO-MC

FCC

| Test Channel | Frequency | | |
|---|---|---|---|
| | 10M | 15M | 20M |
| lowest | 2506 | 2511 | 2516 |
| Middle | 2593 | 2593 | 2593 |
| Highest | 2680 | 2675 | 2670 |

IC

| Test Channel | Frequency | | |
|---|---|---|---|
| | 10M | 15M | 20M |
| lowest | 2580 | 2585 | 2590 |
| Middle | 2595 | 2595 | 2595 |
| Highest | 2610 | 2605 | 2600 |

## 1.3 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

| Test Mode | Description |
|---|---|
| E-TM1.1 | Keep the EUT in data communicating mode (QPSK).<br>(SC: Single Carrier)<br>(MC: Multiple Carrier) |
| E-TM3.1 | Keep the EUT in data communicating mode (64QAM).<br>(SC: Single Carrier)<br>(MC: Multiple Carrier) |

## 1.4 Test Standards and Results

Test detailed items/section required by FCC IC rules and results are as below:

| No. | Section | | Description | Result |
|---|---|---|---|---|
| | FCC | IC | | |
| 1 | 2.1046<br>27.50(h)(1)(ii) | RSS-Gen Section 6.12<br>RSS-199 Section 4.4 | Transmitter Output Power | PASS |
| 2 | Report only | RSS-199 Section 4.4 | Peak to Average Radio | PASS |
| 3 | 2.1047 | RSS-199 Section 4.1 | Modulation Characteristics | PASS |
| 4 | 2.1049<br>27.53(m)(6) | RSS-Gen Section 6.6<br>RSS-199 Section 4.2 | Emission Bandwidth | PASS |
| 5 | 2.1051<br>27.53(m)(2) | RSS-Gen Section 6.13<br>RSS-199 Section 4.5(a) | Spurious Emission at antenna Terminal | PASS |
| 6 | 2.1051<br>27.53(m)(2) | RSS-Gen Section 6.13<br>RSS-199 Section 4.5(a) | Field Strength of Spurious Radiation | PASS |
| 7 | 2.1055(a)(1)(b)<br>2.1055(d)(1)(2)<br>27.54 | RSS-Gen Section 6.11<br>RSS-199 Section 4.3 | Frequency stability | PASS |

## 1.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:
47 CFR FCC Part 27
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI/TIA/EIA-603-E 2016
ANSI C63.26-2015

## 1.6 Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 6B and 10dB attenuator.

Example:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).
= 6+ 10 = 16(dB)

## 1.7 Facilities and Accreditations

### 1.7.1 Test Facilities

**NVLAP Lab Code: 201008-0**

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.

**FCC- Designation Number: CN5031**

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2020.

**ISED Registration: 11185A**

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Dec. 31, 2020

### 1.7.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15℃- 35℃ |
| Relative Humidity (%): | 30% -60% |
| Atmospheric Pressure (kPa): | 86KPa-106KPa |

# 2. TEST REQUIREMENTS

## 2.1 Transmitter Output power

### 2.1.1 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

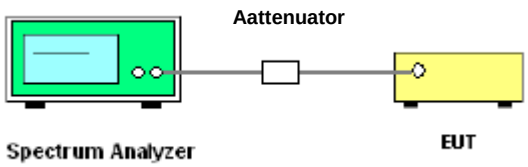
### 2.1.2 Limit

FCC:(1) Main, booster and base stations. (i) The maximum EIRP of a main, booster or base station shall not exceed 33 dBW + 10log(X/Y) dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.
IC: For base station equipment, refer to SRSP-517 for the maximum permissible e.i.r.p. (Fixed and base stations (except fixed subscriber stations) are limited to a maximum permissible equivalent isotropically radiated power (e.i.r.p.) of 1640 W/MHz (i.e. no more than 1640 W e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT)7 up to 300 metres.).

### 2.1.3 Test Procedures

1.The RF output of EUT was connected to Spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set EUT RBW=1MHz, VBW=3MHz, Detector mode=RMS. Trace mode: power averaging Over 100 sweeps
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.
Note: The duty cycle correction=10 log(1/duty cycle)=10 log(1/(6.75/10)) =1.7(dB)
Offset factory=ATT loss + Cable loss + Duty cycle correction=40+1.3+1.7=43(dB)

### 2.1.4 Test Setup



### 2.1.5 Test Results

Configuration MIMO-SC

For FCC measurement data:

| Transmit Output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power (dBm)** | **Chain 1 Output power (dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 10MHz | E-TM1.1 | Low | 41.95 | 41.84 | 44.91 | 17 | 61.91 | 65.22 |
| | | Middle | 42.58 | 42.32 | 45.46 | 17 | 62.46 | |
| | | High | 42.40 | 42.15 | 45.29 | 17 | 62.29 | |
| | E-TM3.1 | Low | 41.87 | 41.78 | 44.84 | 17 | 61.84 | |
| | | Middle | 42.30 | 42.51 | 45.42 | 17 | 62.42 | |
| | | High | 42.29 | 42.24 | 45.28 | 17 | 62.28 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power (dBm)** | **Chain 1 Output power (dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 15MHz | E-TM1.1 | Low | 41.72 | 41.78 | 44.76 | 17 | 61.76 | 66.98 |
| | | Middle | 42.36 | 42.33 | 45.36 | 17 | 62.36 | |
| | | High | 42.07 | 42.11 | 45.10 | 17 | 62.10 | |
| | E-TM3.1 | Low | 41.76 | 41.65 | 44.72 | 17 | 61.83 | |
| | | Middle | 42.67 | 42.38 | 45.54 | 17 | 62.54 | |
| | | High | 42.04 | 42.12 | 45.09 | 17 | 62.33 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power (dBm)** | **Chain 1 Output power (dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 20MHz | E-TM1.1 | Low | 41.92 | 41.93 | 44.94 | 17 | 61.94 | 68.23 |
| | | Middle | 42.63 | 42.53 | 45.59 | 17 | 62.59 | |
| | | High | 42.51 | 42.39 | 45.46 | 17 | 62.46 | |
| | E-TM3.1 | Low | 41.98 | 41.98 | 44.99 | 17 | 61.99 | |
| | | Middle | 42.67 | 42.65 | 45.67 | 17 | 62.67 | |
| | | High | 42.51 | 42.55 | 45.54 | 17 | 62.54 | |

For IC measurement data:

| Transmit Output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Bandwidth** | Test Mode | **Test Channel** | **Chain 0 Output power (dBm)** | **Chain 1 Output power (dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 10MHz | E-TM1.1 | Low | 42.26 | 42.51 | 45.40 | 17 | 62.40 | 72.15 |
| | | Middle | 42.56 | 42.44 | 45.51 | 17 | 62.51 | |
| | | High | 42.63 | 42.59 | 45.62 | 17 | 62.62 | |
| | E-TM3.1 | Low | 42.40 | 42.60 | 45.51 | 17 | 62.35 | |
| | | Middle | 42.56 | 42.42 | 45.50 | 17 | 62.50 | |
| | | High | 42.66 | 42.63 | 45.66 | 17 | 62.62 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | Test Mode | **Test Channel** | **Chain 0 Output power (dBm)** | **Chain 1 Output power (dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 15MHz | E-TM1.1 | Low | 42.28 | 42.18 | 45.24 | 17 | 62.24 | 73.91 |
| | | Middle | 42.47 | 42.27 | 45.38 | 17 | 62.38 | |
| | | High | 42.25 | 42.37 | 45.32 | 17 | 62.32 | |
| | E-TM3.1 | Low | 42.12 | 42.28 | 45.21 | 17 | 62.21 | |
| | | Middle | 42.17 | 42.42 | 45.31 | 17 | 62.31 | |
| | | High | 42.43 | 42.56 | 45.51 | 17 | 62.51 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power (dBm)** | **Chain 1 Output power (dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 20MHz | E-TM1.1 | Low | 42.62 | 42.52 | 45.58 | 17 | 62.58 | 75.16 |
| | | Middle | 42.74 | 42.71 | 45.74 | 17 | 62.74 | |
| | | High | 42.68 | 42.69 | 45.70 | 17 | 62.70 | |
| | E-TM3.1 | Low | 42.64 | 42.56 | 45.61 | 17 | 62.61 | |
| | | Middle | 42.78 | 42.52 | 45.66 | 17 | 62.66 | |
| | | High | 42.58 | 42.71 | 45.66 | 17 | 62.66 | |

Configuration MIMO-MC(C1+C2)

For FCC measurement data:

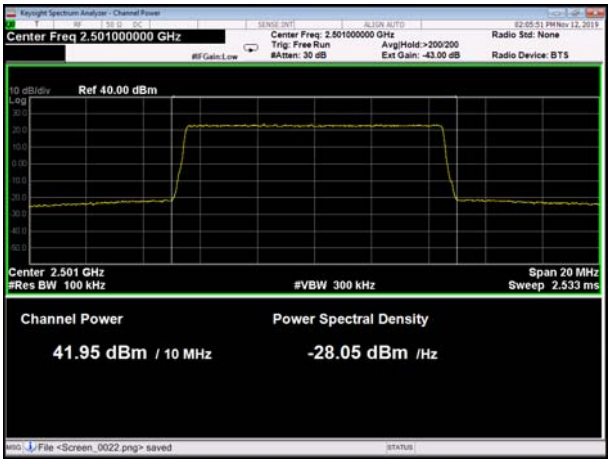
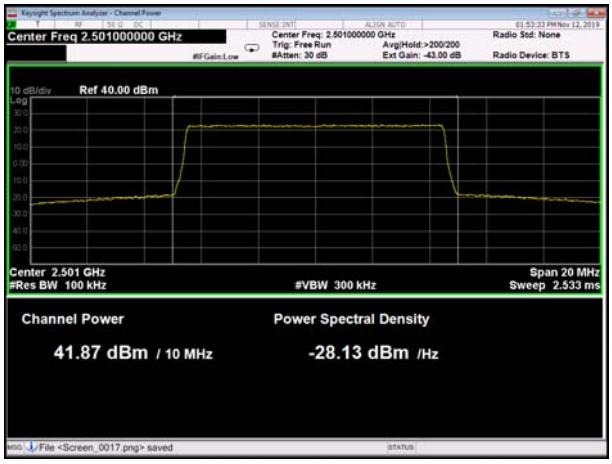
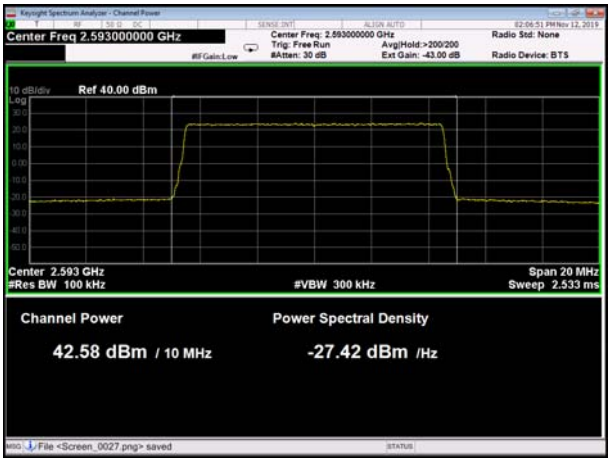
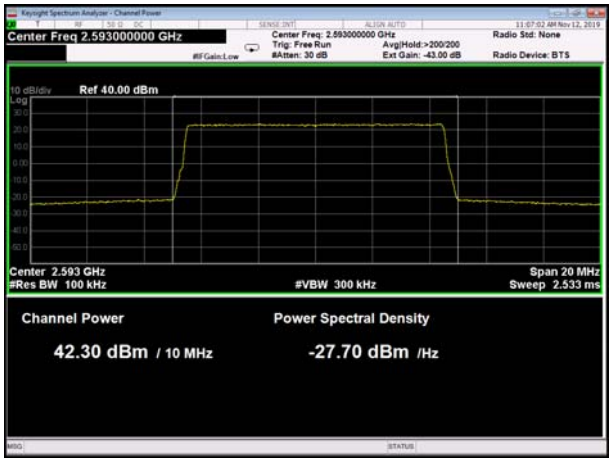
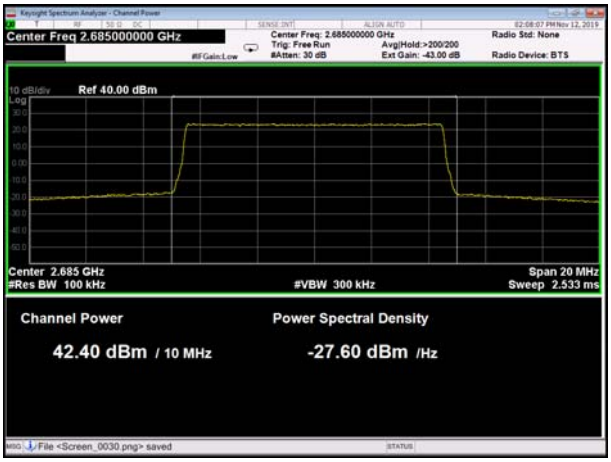
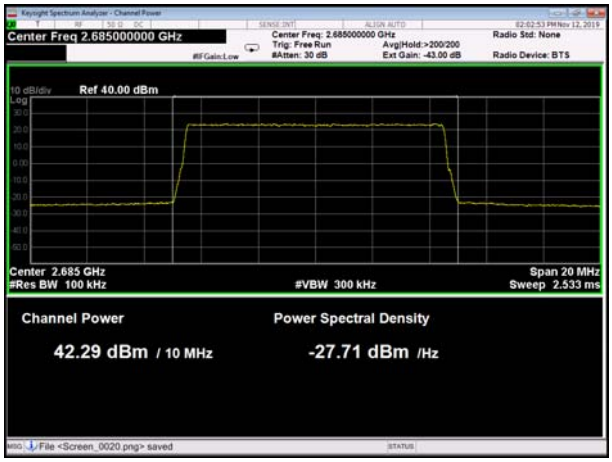
| Transmit Output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power C1+C2(dBm)** | **Chain 1 Output power C1+C2(dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 10MHz | E-TM1.1 | Low | 42.18 | 41.93 | 45.07 | 17 | 62.07 | 65.22 |
| | | Middle | 42.25 | 42.13 | 45.20 | 17 | 62.20 | |
| | | High | 42.06 | 42.10 | 45.09 | 17 | 62.09 | |
| | E-TM3.1 | Low | 41.98 | 42.12 | 45.06 | 17 | 62.06 | |
| | | Middle | 42.18 | 42.16 | 45.18 | 17 | 62.18 | |
| | | High | 41.88 | 41.93 | 44.92 | 17 | 61.92 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power C1+C2(dBm)** | **Chain 1 Output power C1+C2(dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 15MHz | E-TM1.1 | Low | 41.83 | 41.94 | 44.90 | 17 | 61.90 | 66.98 |
| | | Middle | 42.24 | 42.18 | 45.22 | 17 | 62.22 | |
| | | High | 41.96 | 41.84 | 44.91 | 17 | 61.91 | |
| | E-TM3.1 | Low | 41.93 | 41.85 | 44.90 | 17 | 61.90 | |
| | | Middle | 42.34 | 42.31 | 45.34 | 17 | 62.34 | |
| | | High | 42.18 | 42.14 | 45.17 | 17 | 62.17 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power C1+C2(dBm)** | **Chain 1 Output power C1+C2(dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 20MHz | E-TM1.1 | Low | 42.03 | 42.05 | 45.05 | 17 | 62.05 | 68.23 |
| | | Middle | 42.45 | 42.38 | 45.43 | 17 | 62.43 | |
| | | High | 42.39 | 42.33 | 45.37 | 17 | 62.37 | |
| | E-TM3.1 | Low | 41.95 | 41.91 | 44.94 | 17 | 61.94 | |
| | | Middle | 42.52 | 42.41 | 45.48 | 17 | 62.48 | |
| | | High | 42.38 | 42.34 | 45.37 | 17 | 62.37 | |

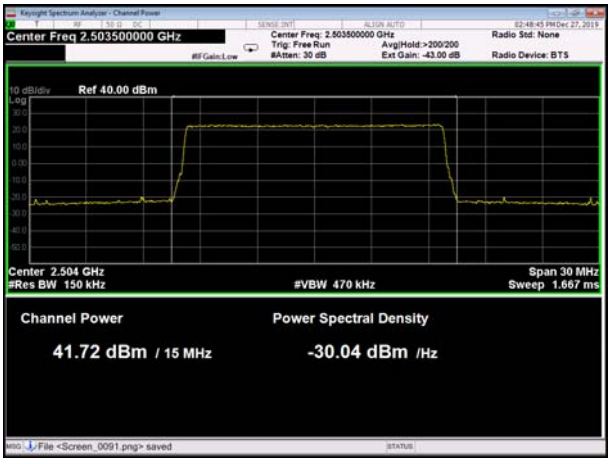
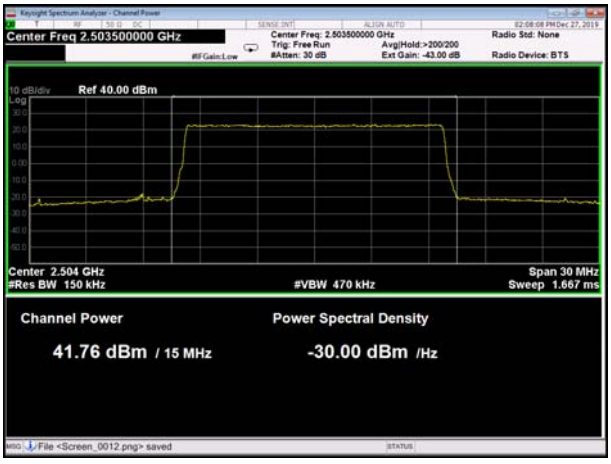
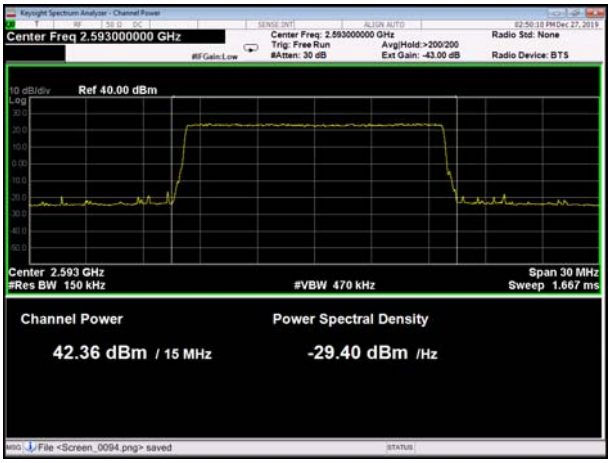
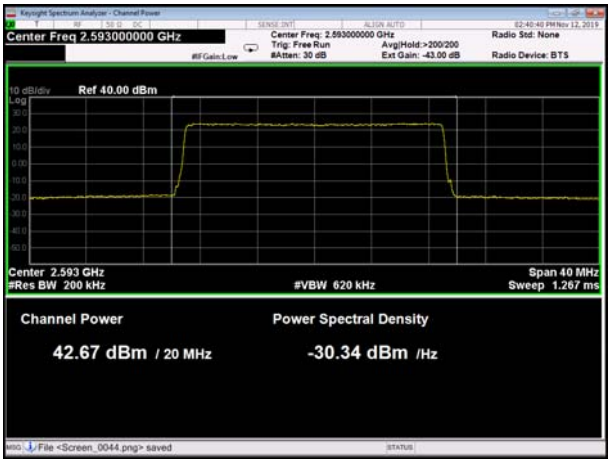
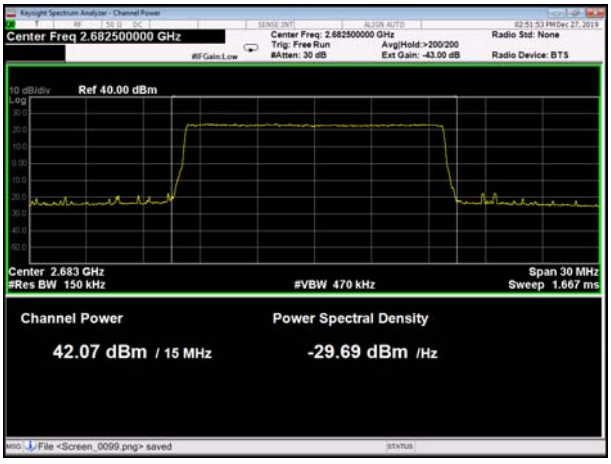
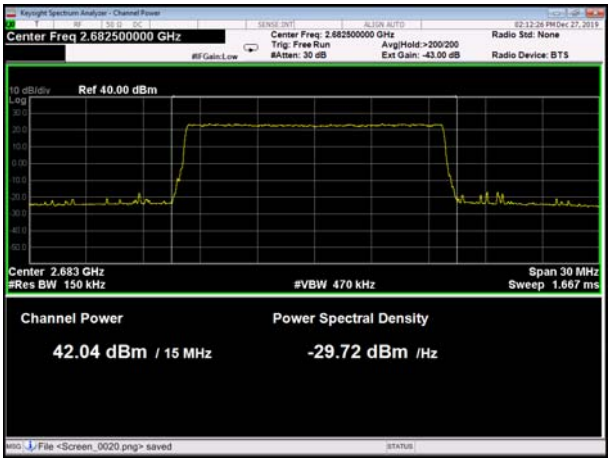
For IC measurement data:

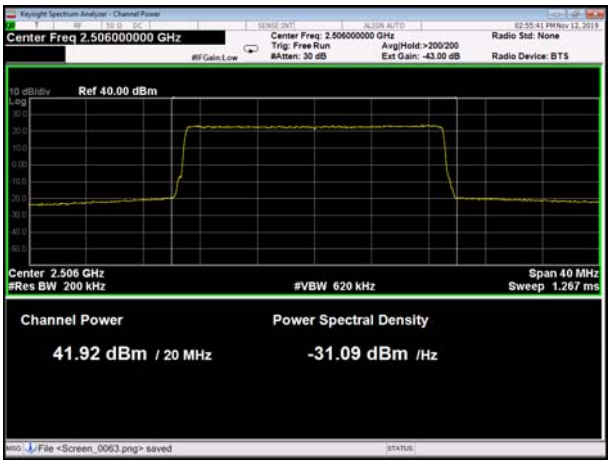
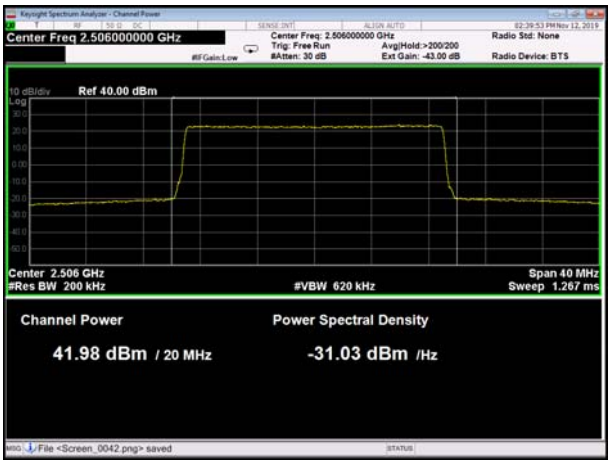
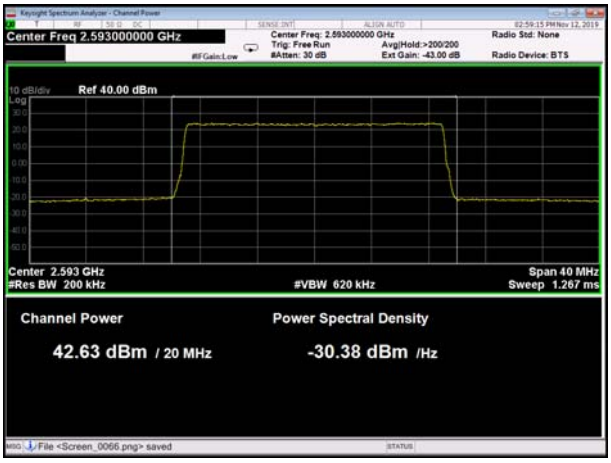
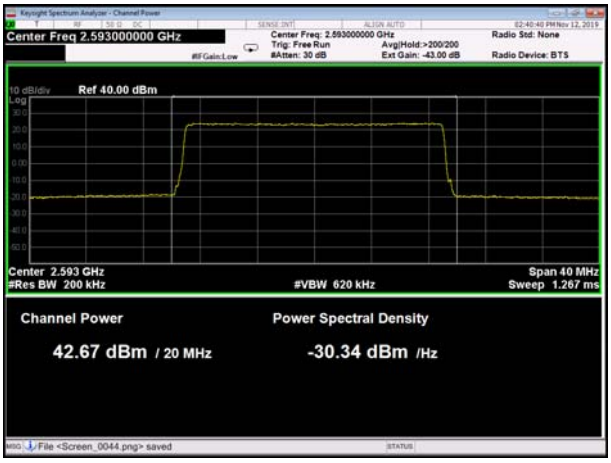
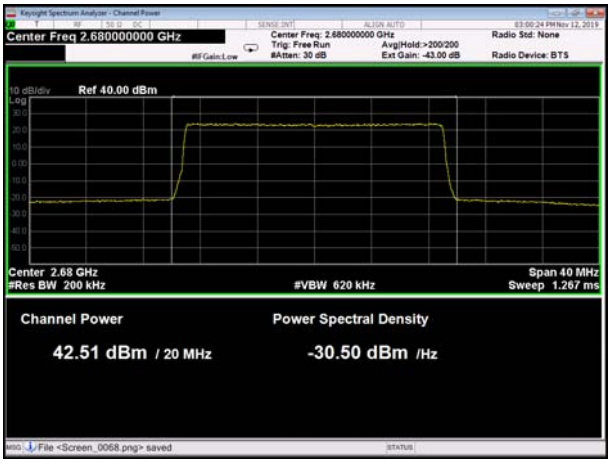
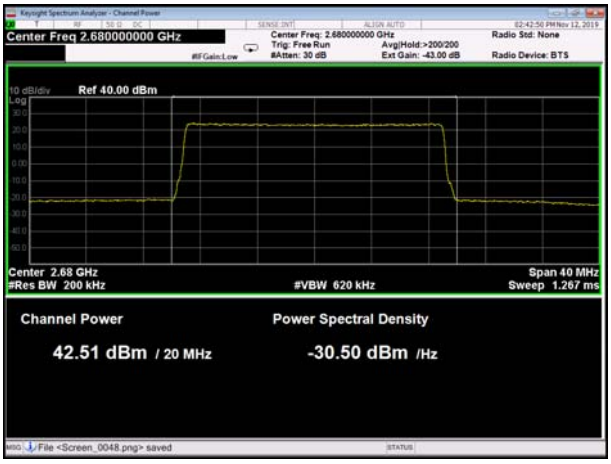
| Transmit Output power | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power C1+C2(dBm)** | **Chain 1 Output power C1+C2(dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 10MHz | E-TM1.1 | Low | 42.15 | 42.36 | 45.27 | 17 | 62.27 | 72.15 |
| | | Middle | 42.41 | 42.48 | 45.46 | 17 | 62.46 | |
| | | High | 42.55 | 42.47 | 45.52 | 17 | 62.52 | |
| | E-TM3.1 | Low | 42.32 | 42.19 | 45.27 | 17 | 62.27 | |
| | | Middle | 42.38 | 42.27 | 45.34 | 17 | 62.34 | |
| | | High | 42.35 | 42.24 | 45.31 | 17 | 62.31 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power C1+C2(dBm)** | **Chain 1 Output power C1+C2(dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 15MHz | E-TM1.1 | Low | 41.96 | 42.08 | 45.03 | 17 | 62.03 | 73.91 |
| | | Middle | 42.04 | 42.11 | 45.09 | 17 | 62.09 | |
| | | High | 42.01 | 41.98 | 45.01 | 17 | 62.01 | |
| | E-TM3.1 | Low | 41.83 | 41.92 | 44.89 | 17 | 61.89 | |
| | | Middle | 42.01 | 41.91 | 44.97 | 17 | 61.97 | |
| | | High | 41.97 | 42.05 | 45.02 | 17 | 62.02 | |
| **Transmit Output power** | | | | | | | | |
| **Bandwidth** | **Test Mode** | **Test Channel** | **Chain 0 Output power C1+C2(dBm)** | **Chain 1 Output power C1+C2(dBm)** | **Total Power (dBm)** | **Antenna Gain (dBi)** | **EIRP (dBm)** | **EIRP LIMIT (dBm)** |
| 20MHz | E-TM1.1 | Low | 41.85 | 41.92 | 44.90 | 17 | 61.90 | 75.16 |
| | | Middle | 42.34 | 42.35 | 45.36 | 17 | 62.36 | |
| | | High | 42.31 | 42.28 | 45.31 | 17 | 62.31 | |
| | E-TM3.1 | Low | 41.91 | 41.83 | 44.88 | 17 | 61.88 | |
| | | Middle | 42.21 | 42.18 | 45.21 | 17 | 62.21 | |
| | | High | 42.08 | 42.12 | 45.11 | 17 | 62.11 | |

## 2.1.6 Test plots for SC

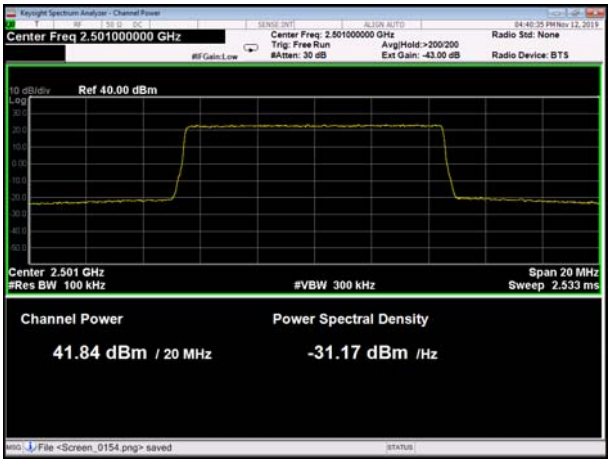
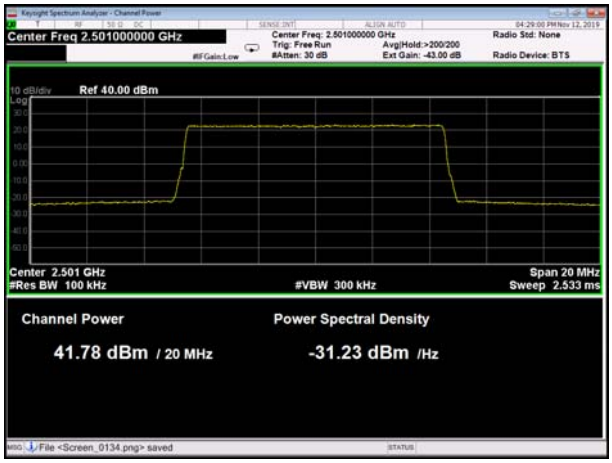
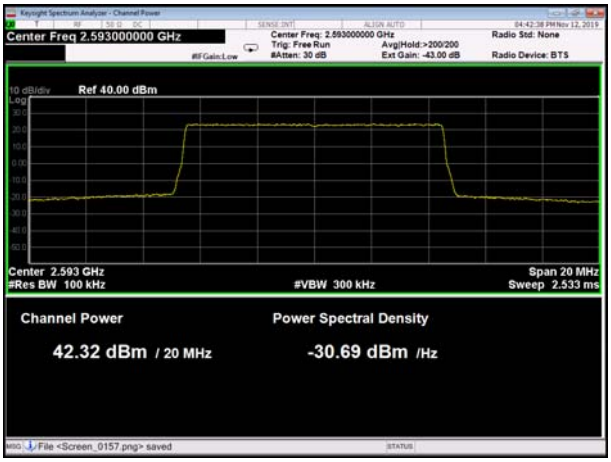
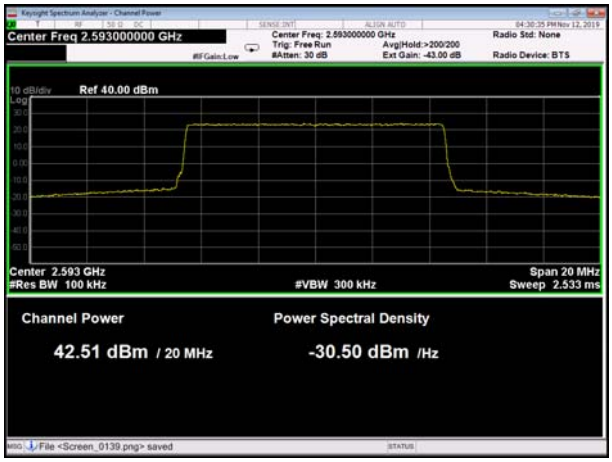
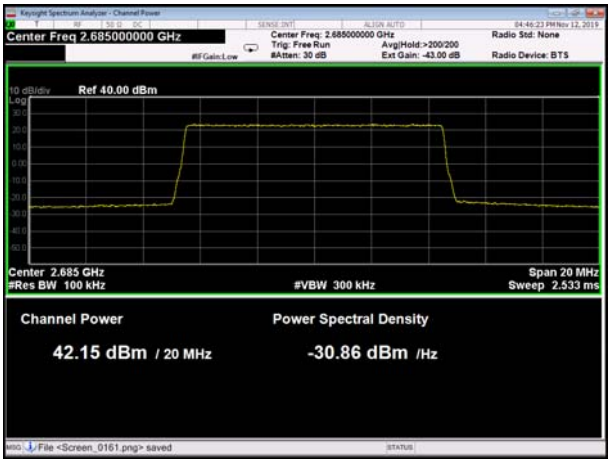
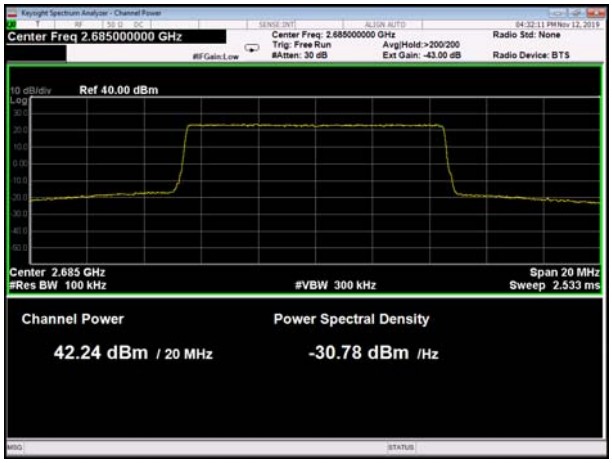
**FCC test data ， Chain 0**

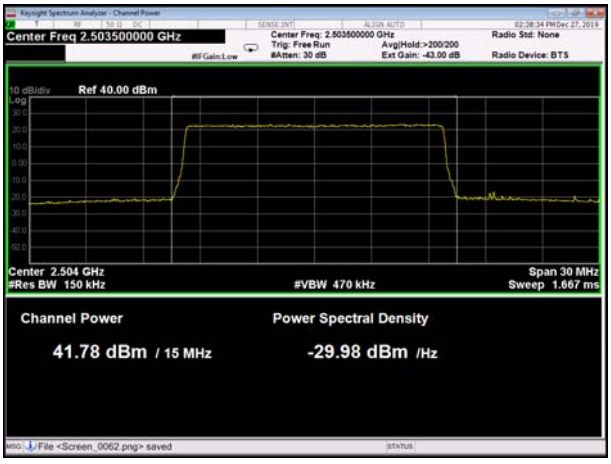
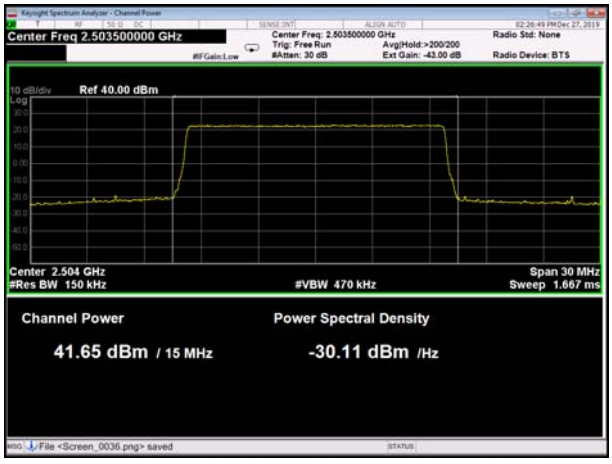
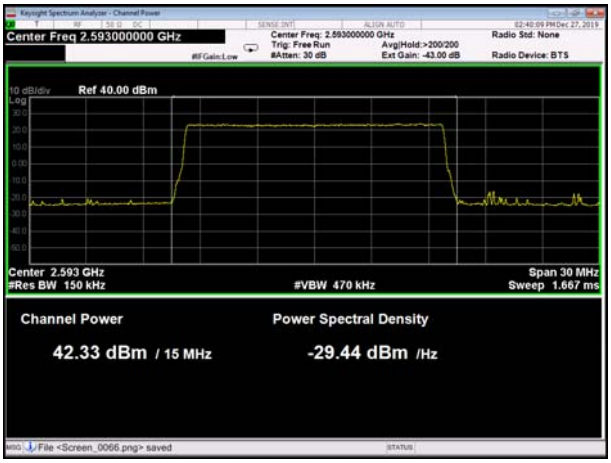
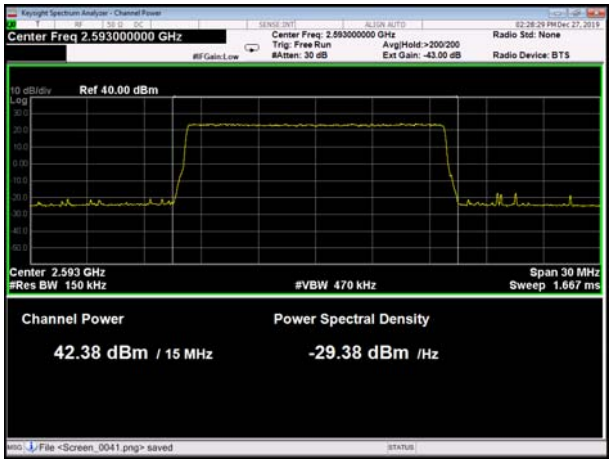
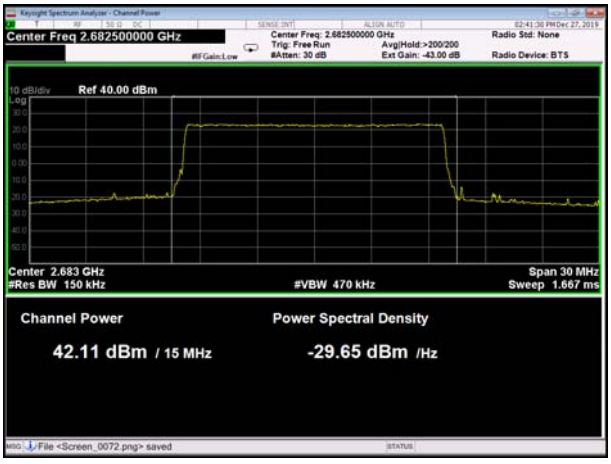
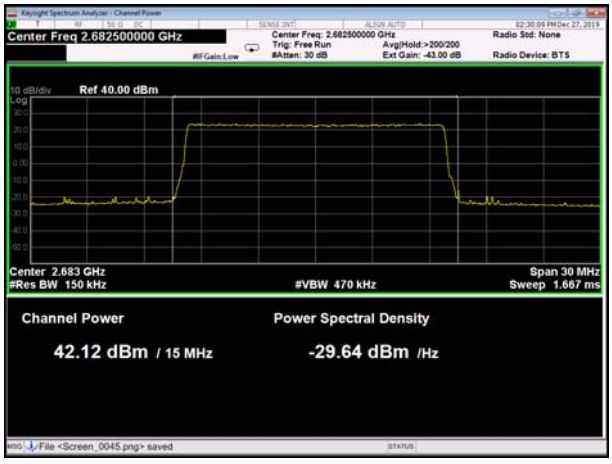
| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

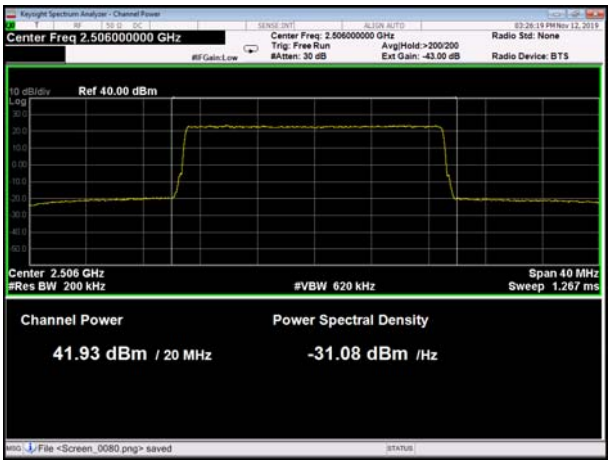
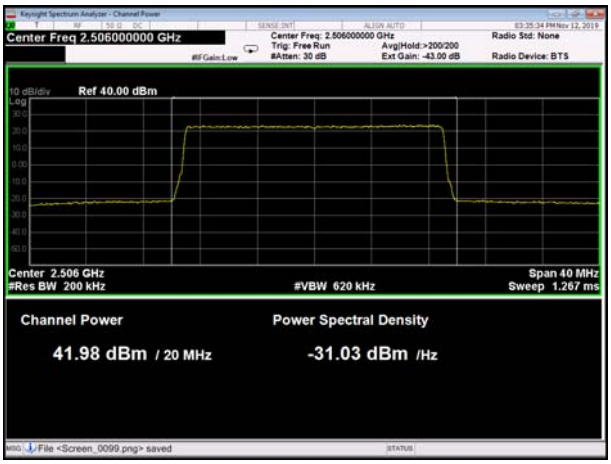
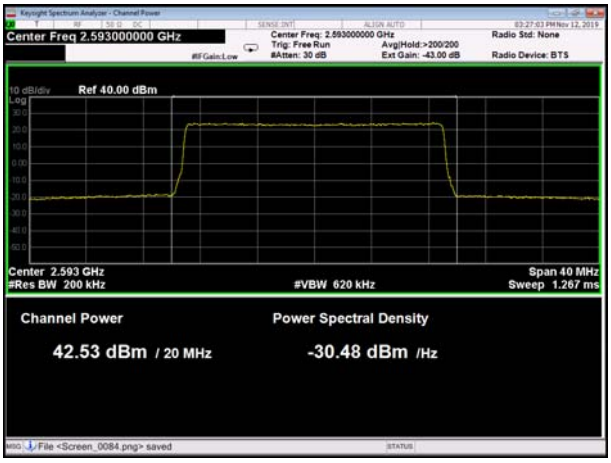
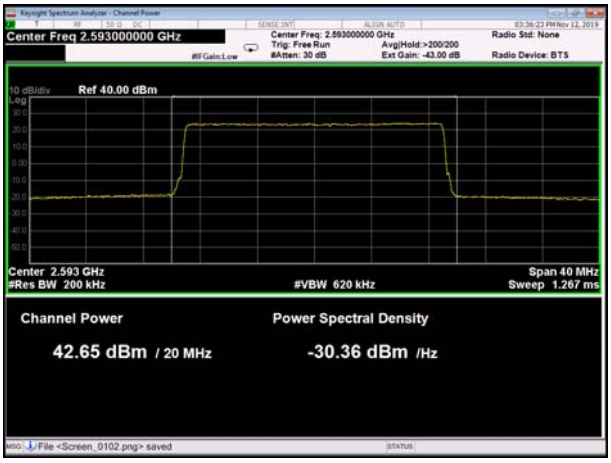
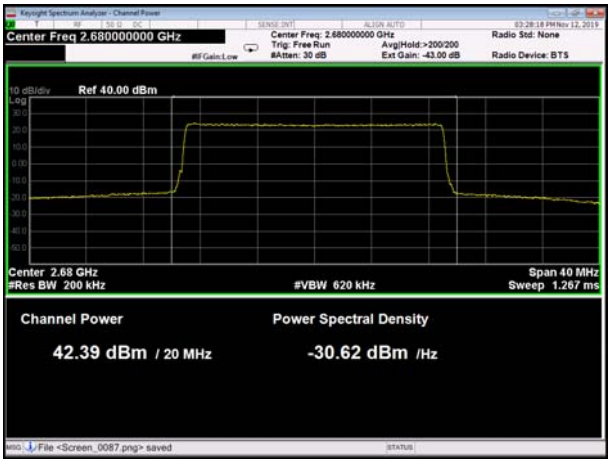
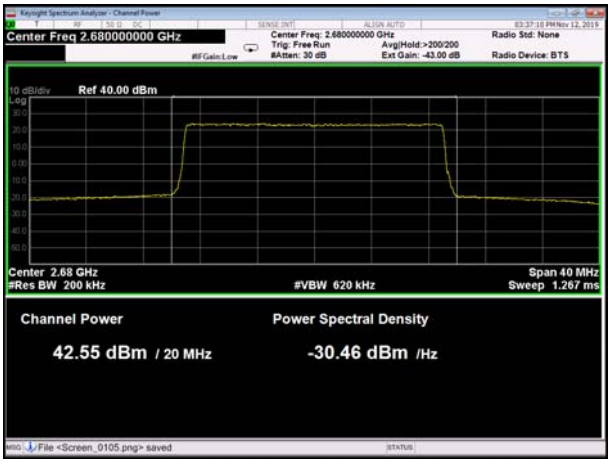
| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM3.1 |
|  |  |

| 20MHz- Low CH E-TM1.1 | 20MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 20MHz- Middle CH E-TM1.1 | 20MHz- Middle CH E-TM3.1 |
|  |  |
| 20MHz- High CH E-TM1.1 | 20MHz- High CH E-TM3.1 |
|  |  |

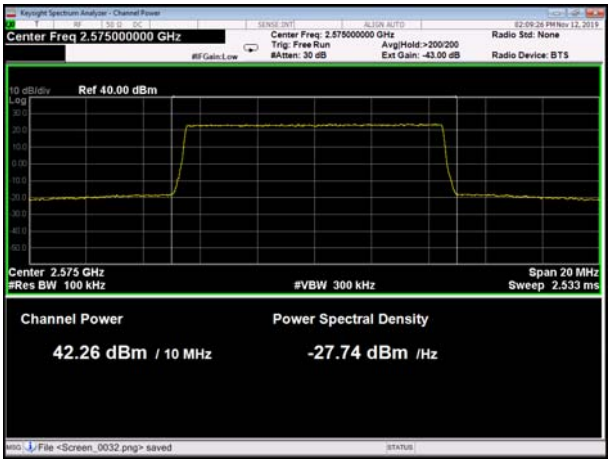
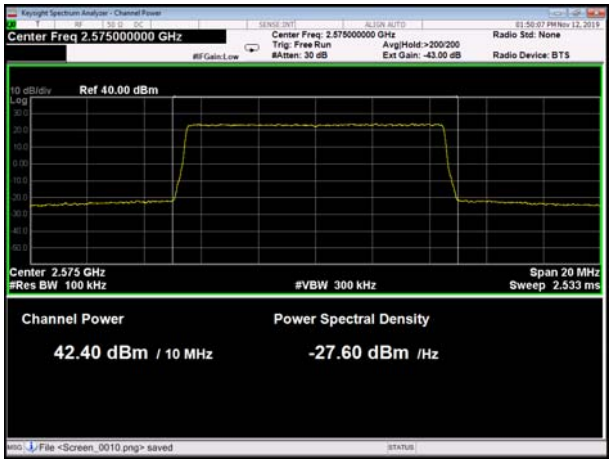
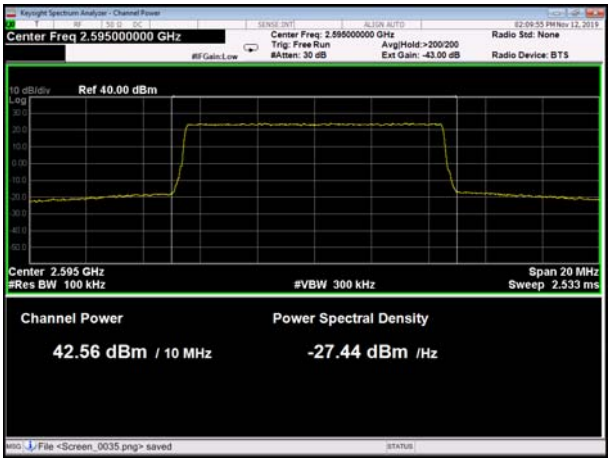
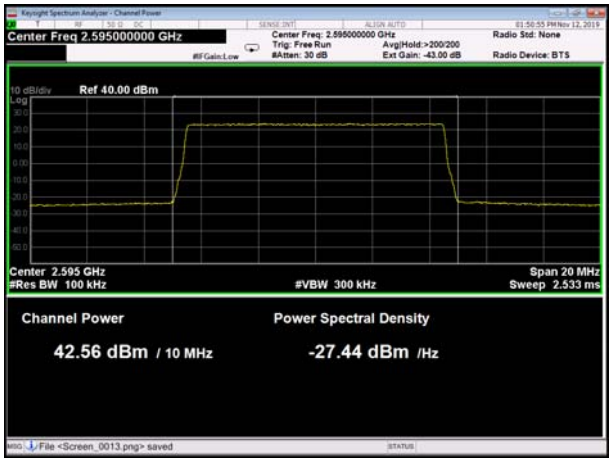
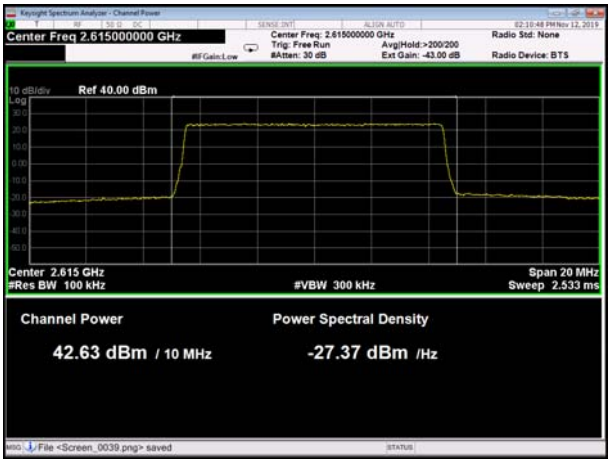
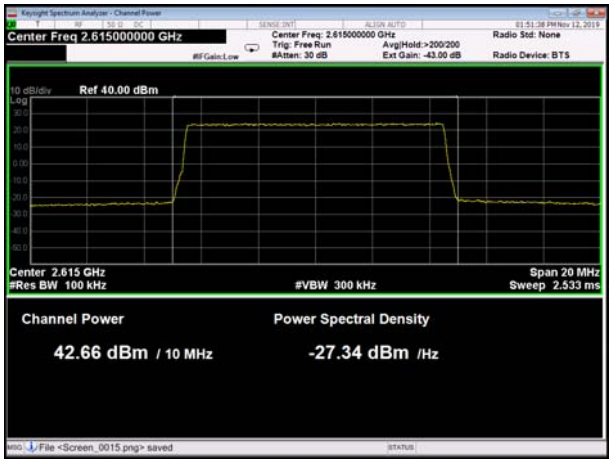
**Chain 1**

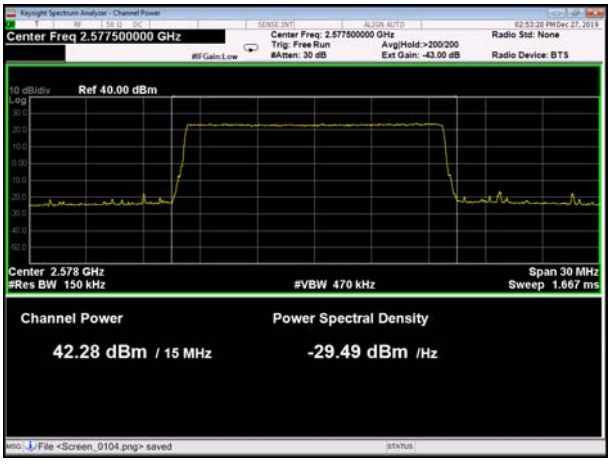
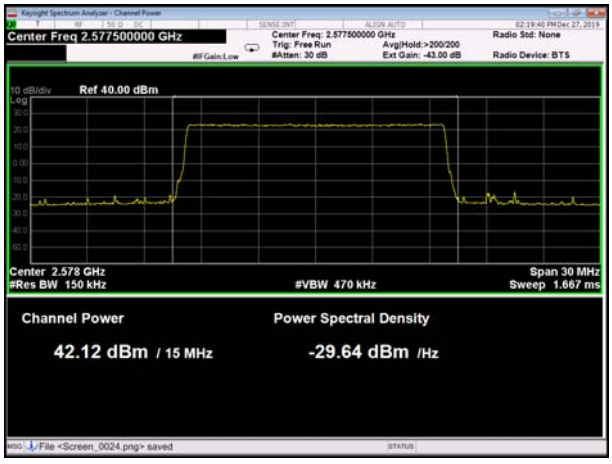
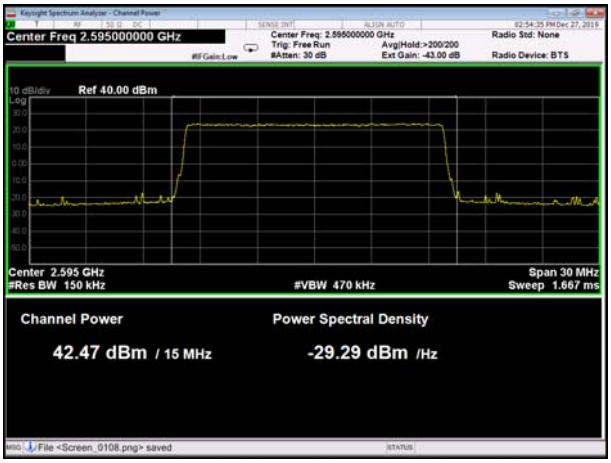
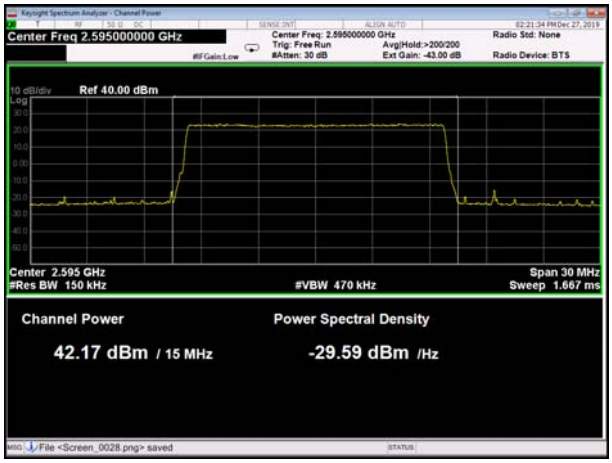
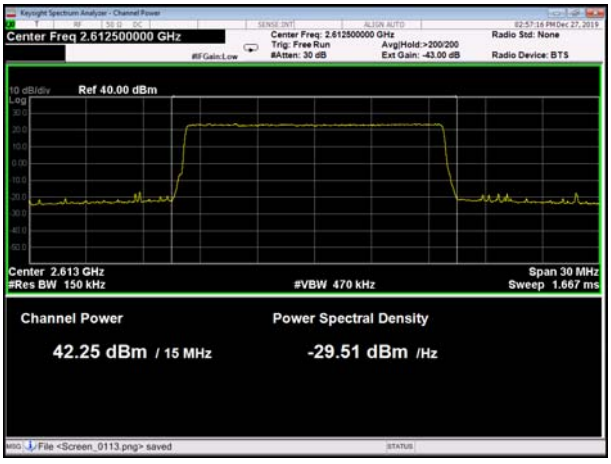
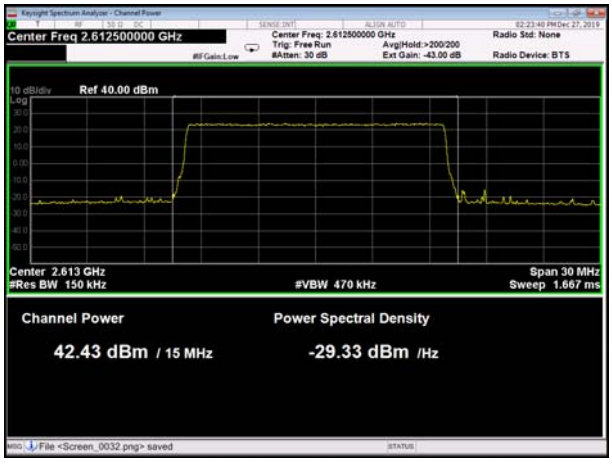
| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

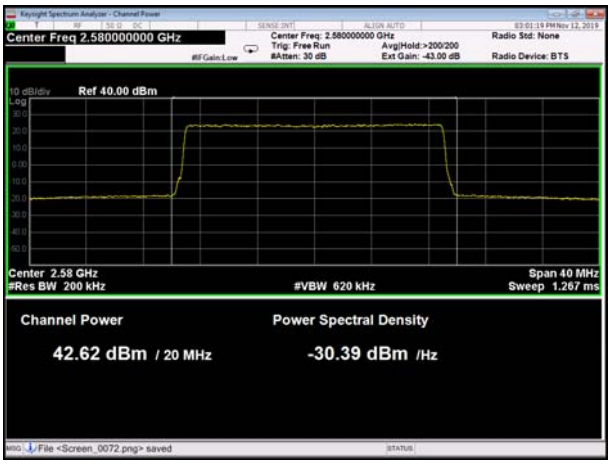
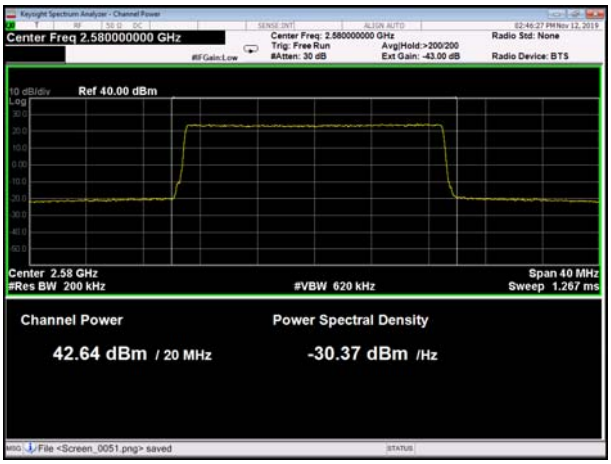
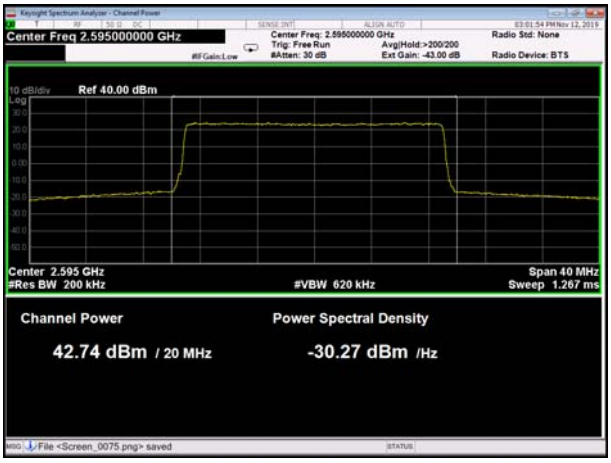
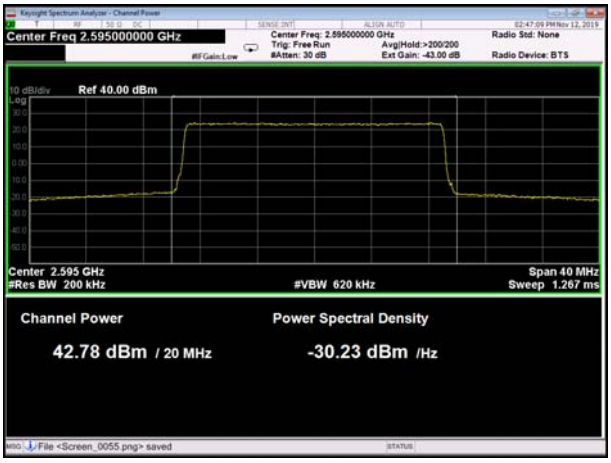
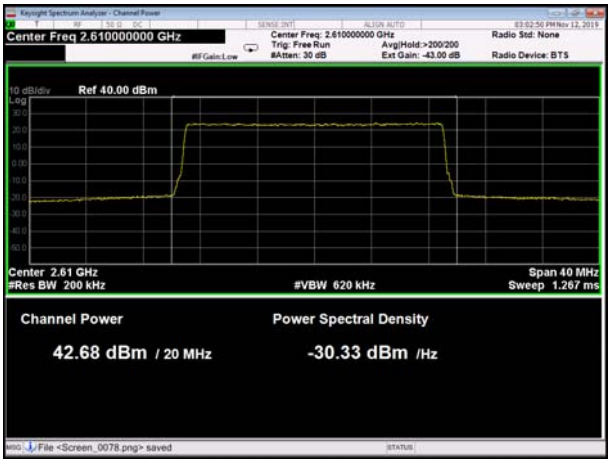
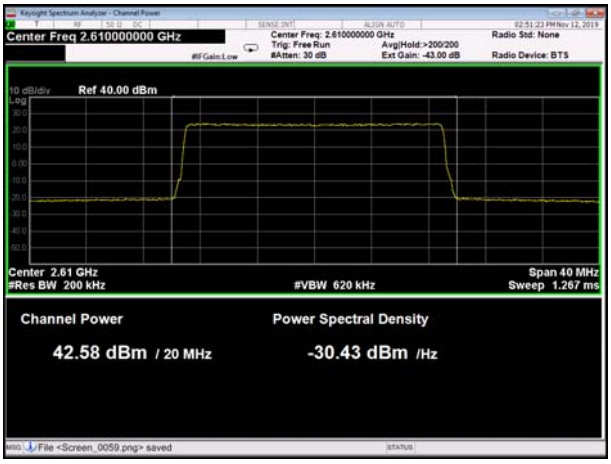
| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM3.1 |
|  |  |

| 20MHz- Low CH E-TM1.1 | 20MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 20MHz- Middle CH E-TM1.1 | 20MHz- Middle CH E-TM3.1 |
|  |  |
| 20MHz- High CH E-TM1.1 | 20MHz- High CH E-TM3.1 |
|  |  |

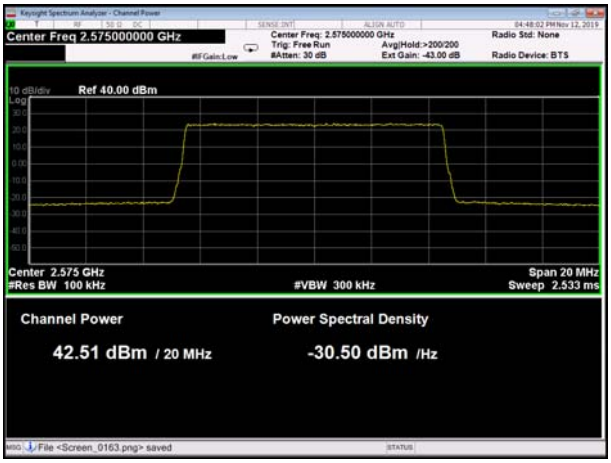
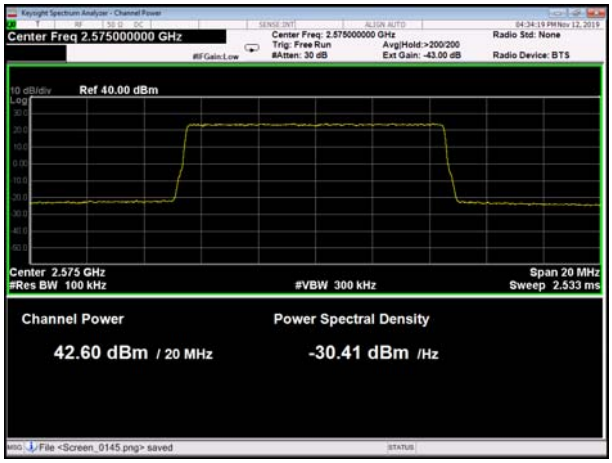
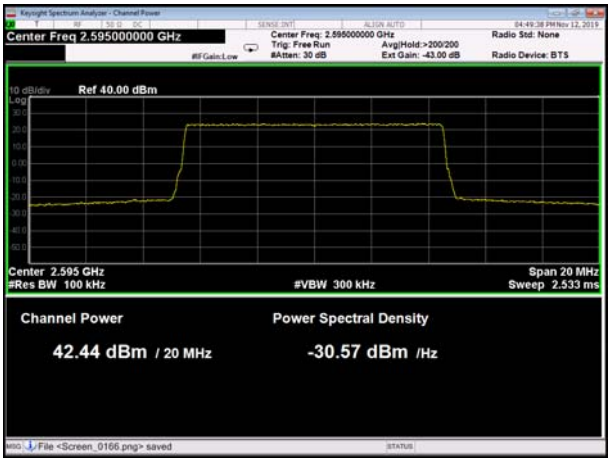
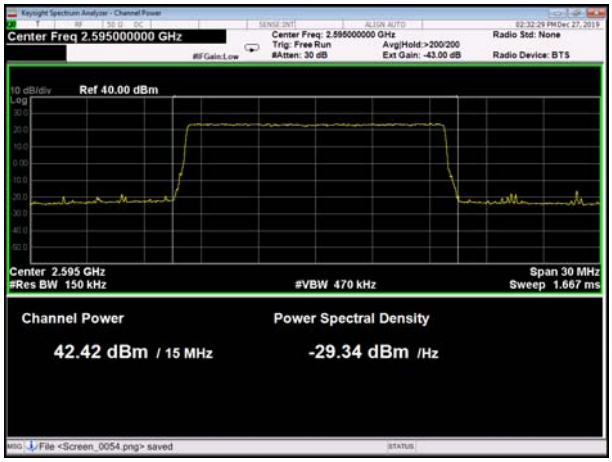
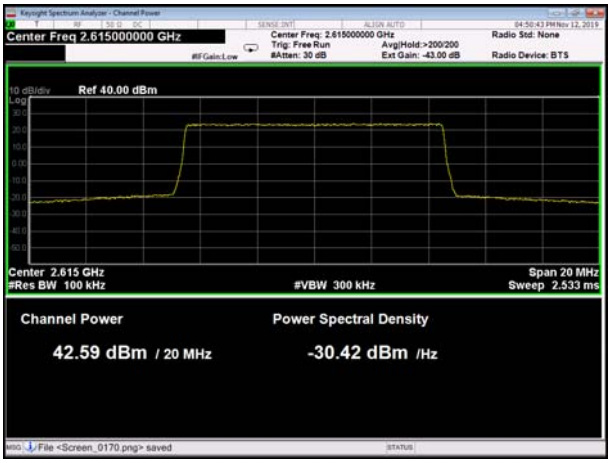
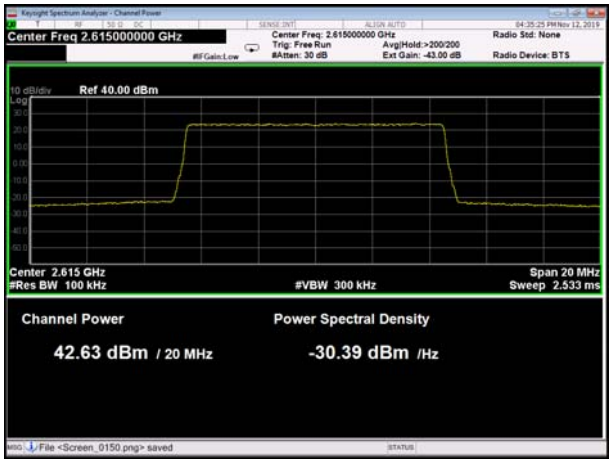
**IC test data ， Chain 0**

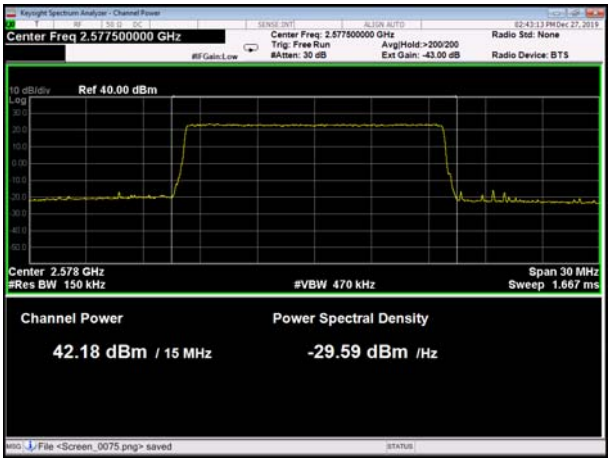
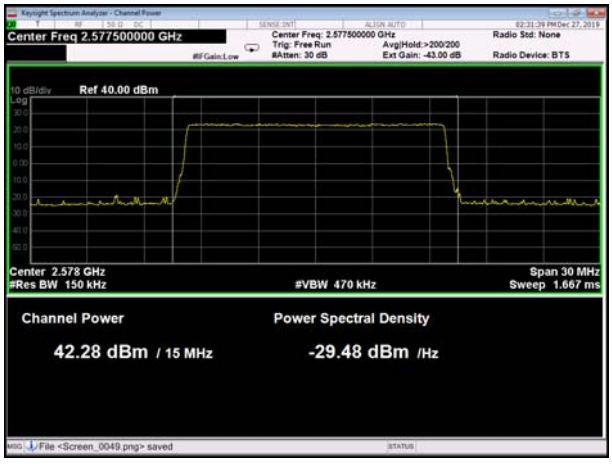
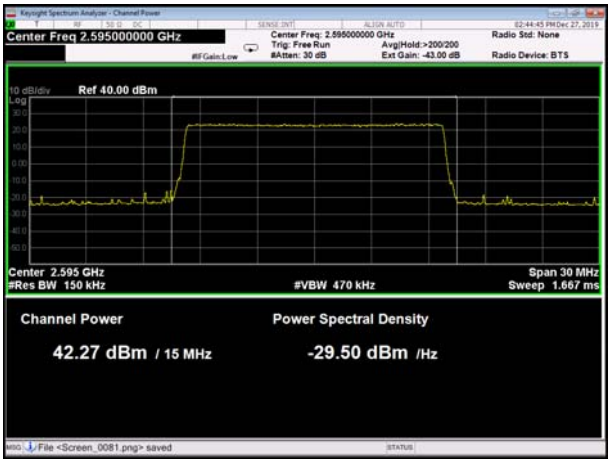
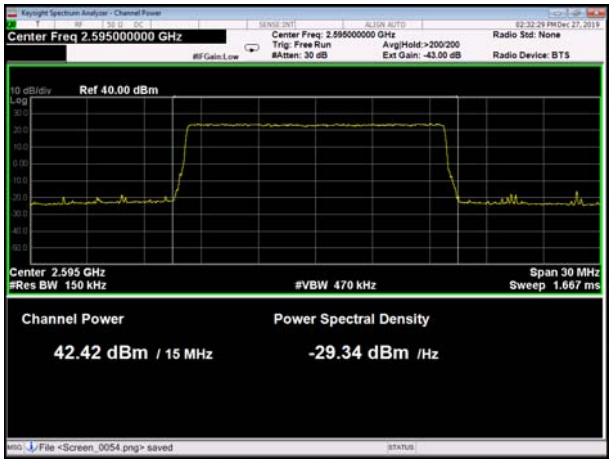
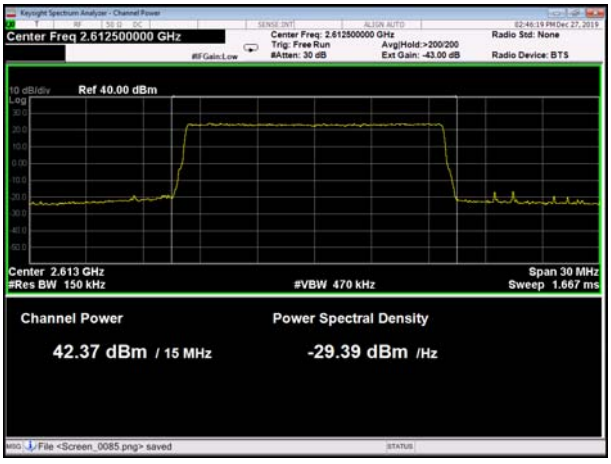
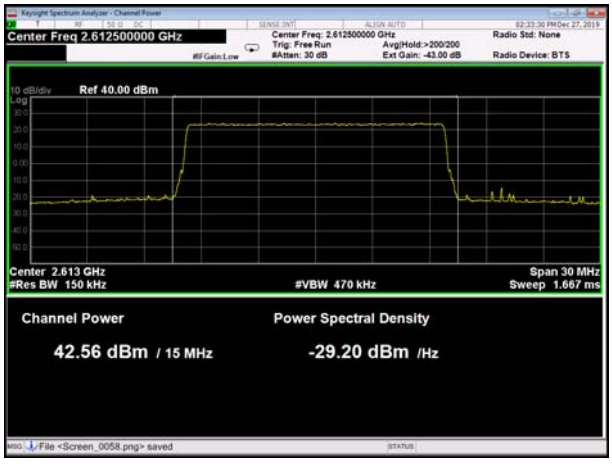
| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

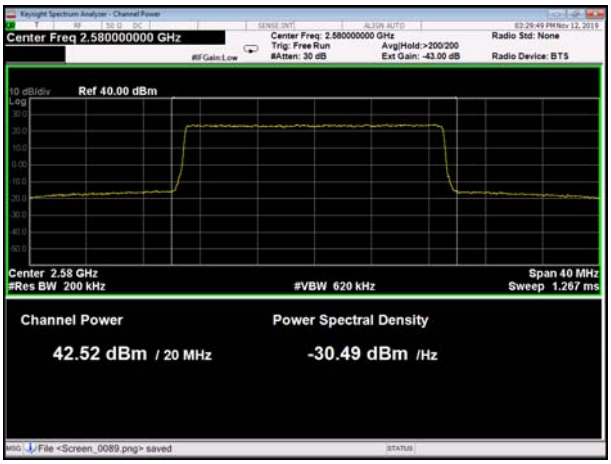
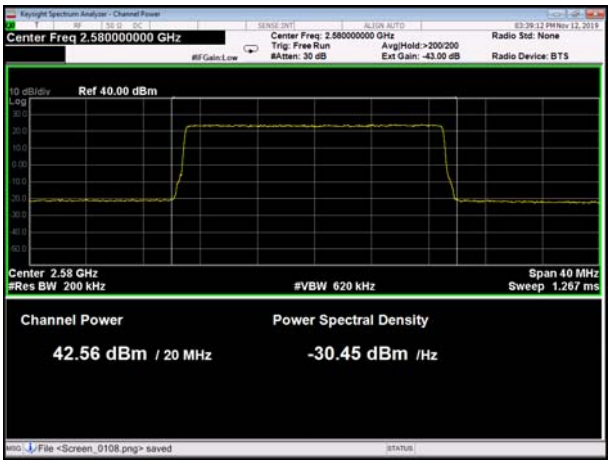
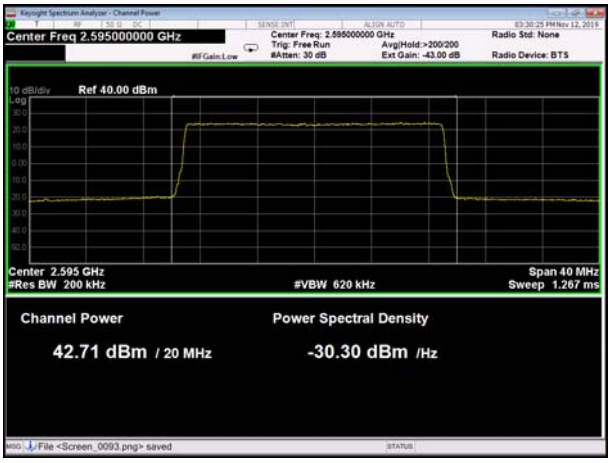
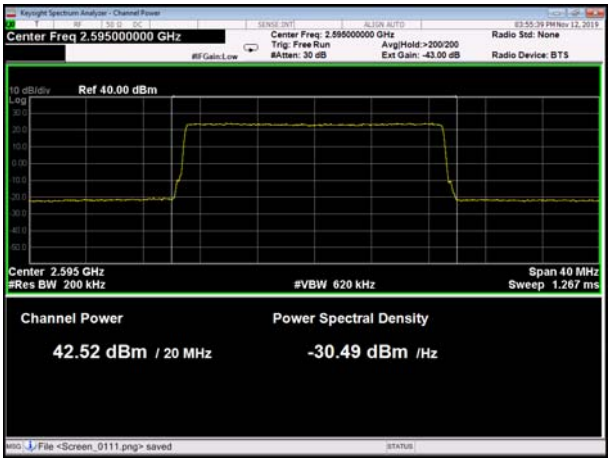
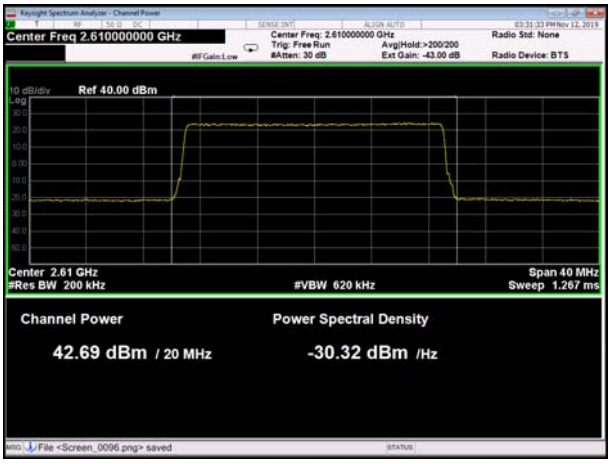
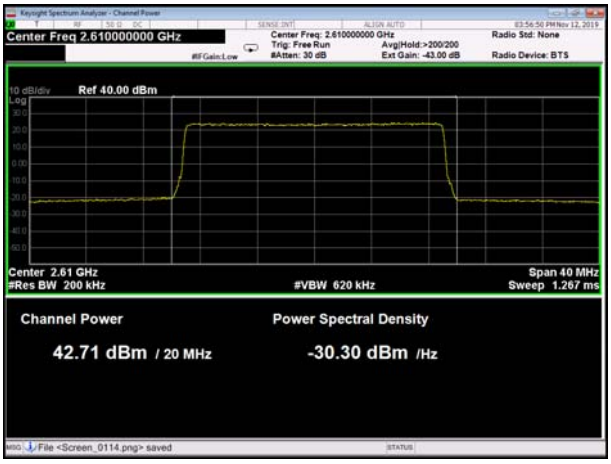
| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM3.1 |
|  |  |

| 20MHz- Low CH E-TM1.1 | 20MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 20MHz- Middle CH E-TM1.1 | 20MHz- Middle CH E-TM3.1 |
|  |  |
| 20MHz- High CH E-TM1.1 | 20MHz- High CH E-TM3.1 |
|  |  |

**Chain 1**

| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM3.1 |
|  |  |

| 20MHz- Low CH E-TM1.1 | 20MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 20MHz- Middle CH E-TM1.1 | 20MHz- Middle CH E-TM3.1 |
|  |  |
| 20MHz- High CH E-TM1.1 | 20MHz- High CH E-TM3.1 |
|  |  |

## 2.2 Peak to Average Radio

### 2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 2.2.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.2.3 Test Procedures

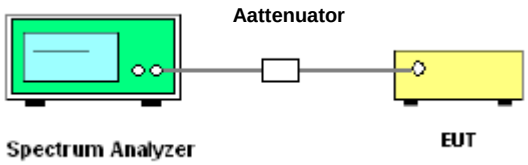
1. The EUT was connected to the spectrum analyzer .

2. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.

3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

4. Record the deviation as Peak to Average Ratio.

### 2.2.4 Test Setup



### 2.2.5 Test Results of Peak-to-Average Ratio

For FCC measurement data:

10MHz Bandwidth E-TM1.1

| Mode | Chain 0 | | | Chain 1 | | | Limit (dB) |
|---|---|---|---|---|---|---|---|
| Channel | Low | Middle | High | Low | Middle | High | 13 |
| Peak-to-Average Ratio (dB) | 9.01 | 8.92 | 8.95 | 8.90 | 8.81 | 9.0 | |

15MHz Bandwidth E-TM1.1

| Mode | Chain 0 | | | Chain 1 | | | Limit (dB) |
|---|---|---|---|---|---|---|---|
| Channel | Low | Middle | High | Low | Middle | High | 13 |
| Peak-to-Average Ratio (dB) | 9.06 | 9.08 | 9.13 | 9.12 | 9.07 | 9.10 | |

20MHz Bandwidth E-TM1.1

| Mode | Chain 0 | | | Chain 1 | | | Limit (dB) |
|---|---|---|---|---|---|---|---|
| Channel | Low | Middle | High | Low | Middle | High | 13 |
| Peak-to-Average Ratio (dB) | 9.40 | 8.98 | 8.94 | 9.23 | 8.86 | 9.09 | |

For IC measurement data:

10MHz Bandwidth E-TM1.1

| Mode | Chain 0 | | | Chain 1 | | | Limit (dB) |
|---|---|---|---|---|---|---|---|
| Channel | Low | Middle | High | Low | Middle | High | 13 |
| Peak-to-Average Ratio (dB) | 8.90 | 9.14 | 8.96 | 8.92 | 8.88 | 8.82 | |

15MHz Bandwidth E-TM1.1

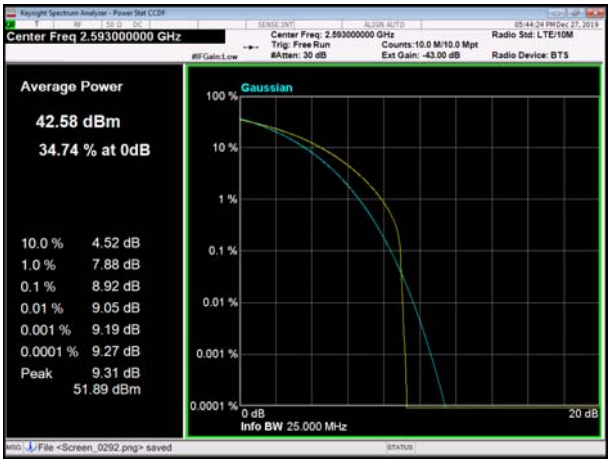
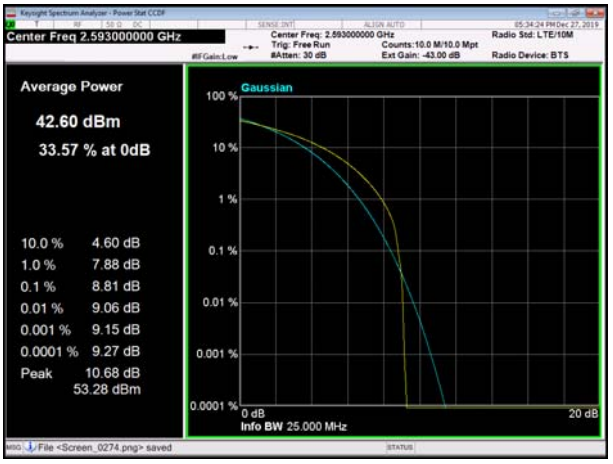
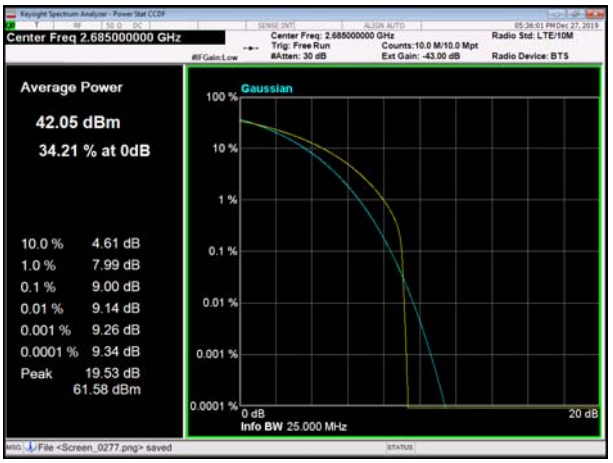
| Mode | Chain 0 | | | Chain 1 | | | Limit (dB) |
|---|---|---|---|---|---|---|---|
| Channel | Low | Middle | High | Low | Middle | High | 13 |
| Peak-to-Average Ratio (dB) | 9.18 | 9.17 | 9.02 | 9.08 | 9.07 | 9.11 | |

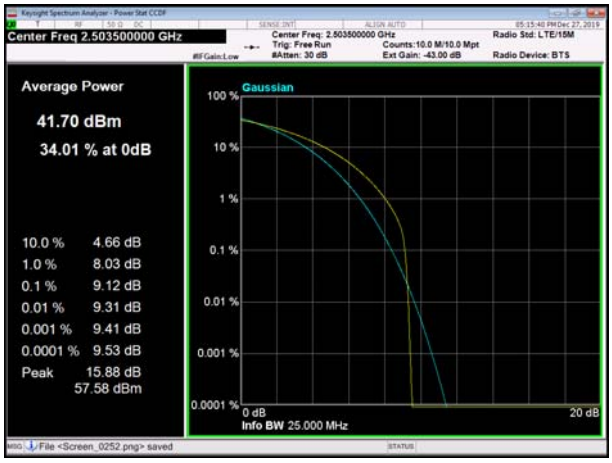
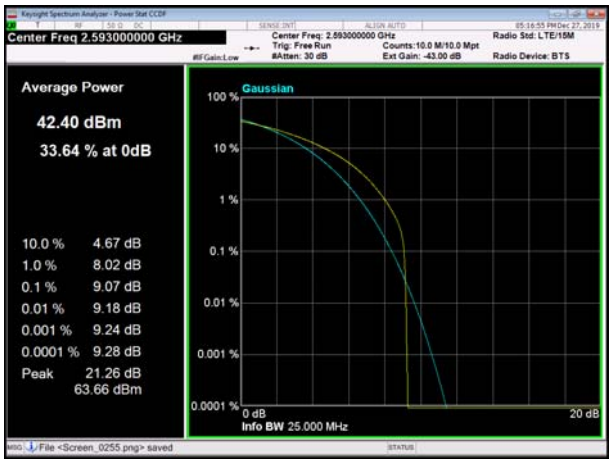
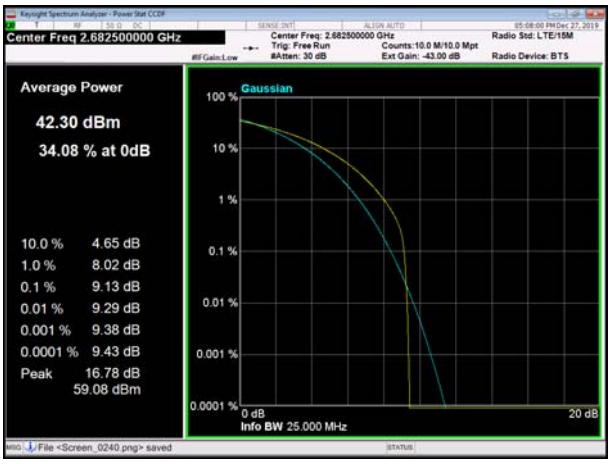
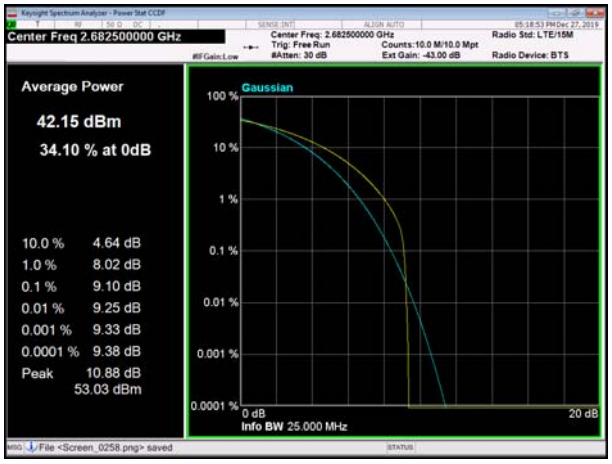
20MHz Bandwidth E-TM1.1

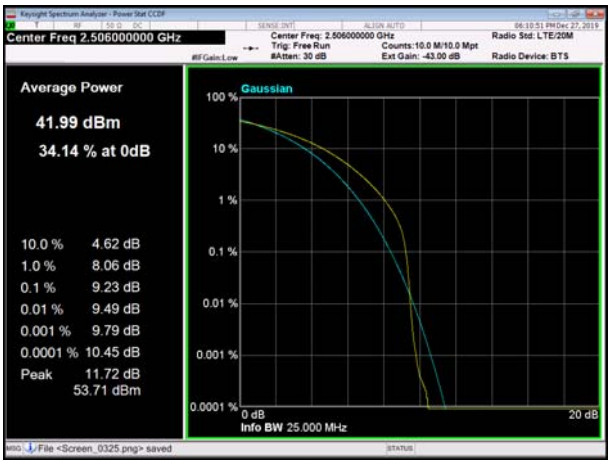
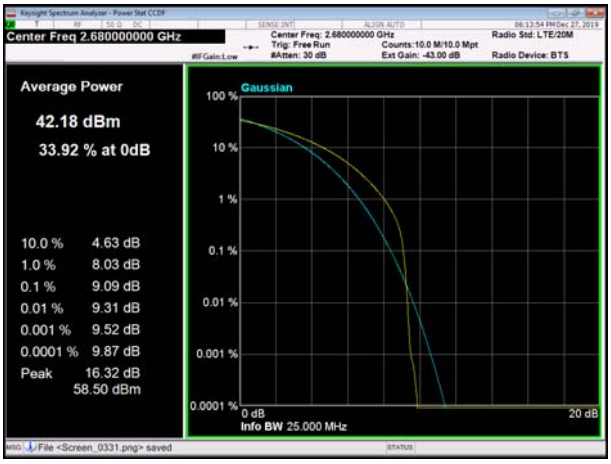
| Mode | Chain 0 | | | Chain 1 | | | Limit (dB) |
|---|---|---|---|---|---|---|---|
| Channel | Low | Middle | High | Low | Middle | High | 13 |
| Peak-to-Average Ratio (dB) | 8.9 | 9.06 | 8.89 | 8.86 | 9.01 | 8.89 | |

### 2.2.6 Test plot

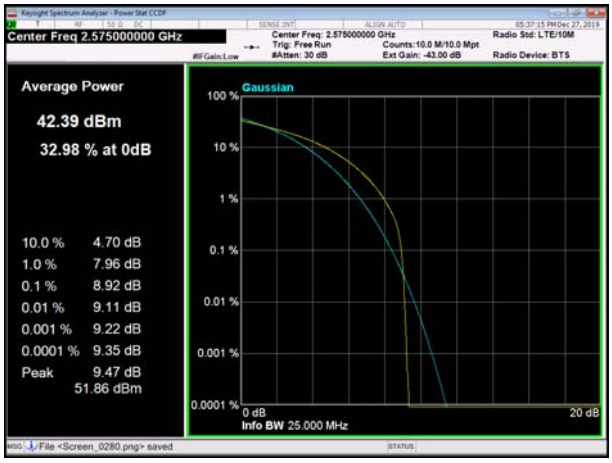
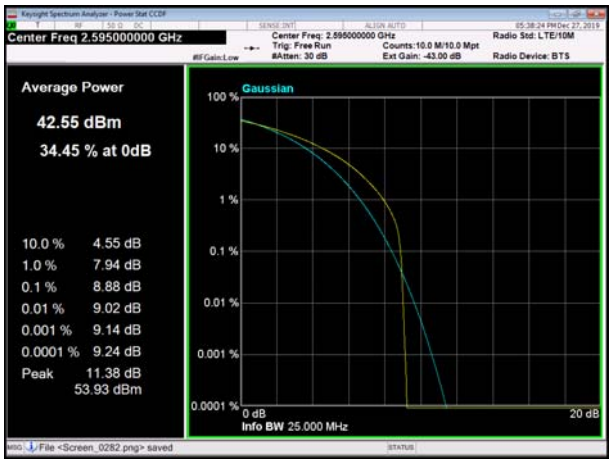
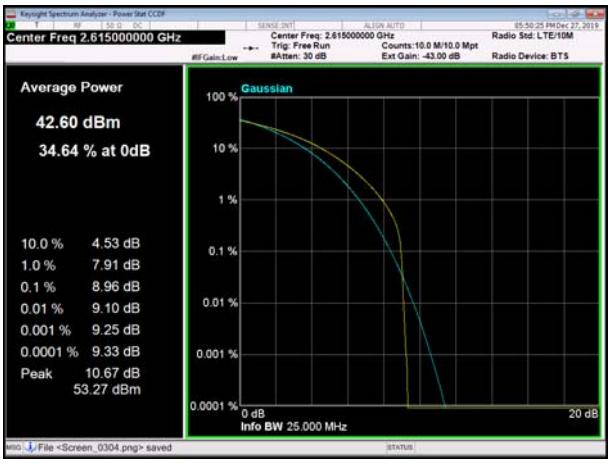
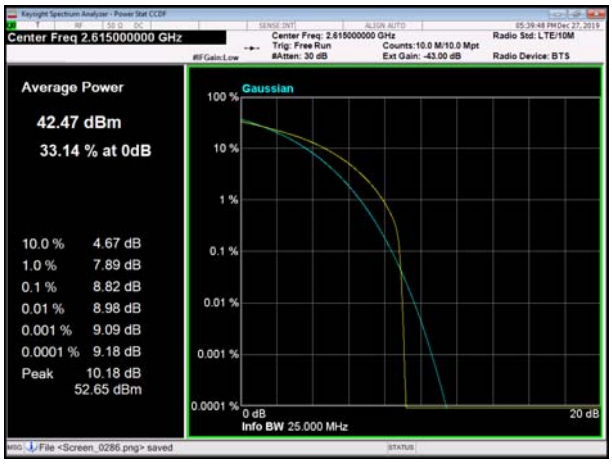
For FCC measurement data:

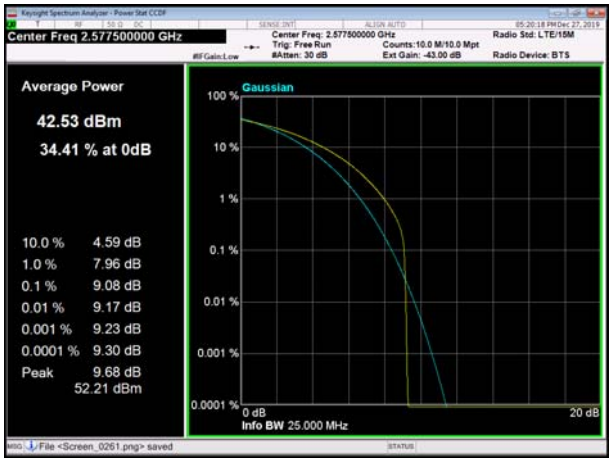
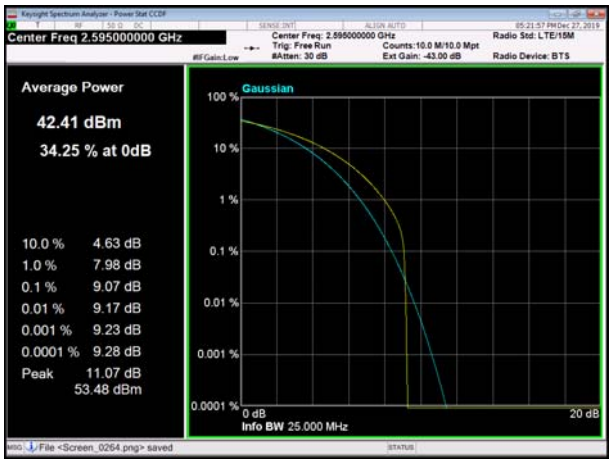
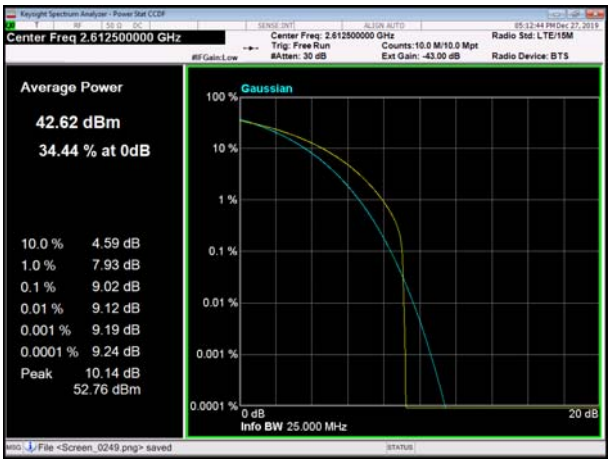
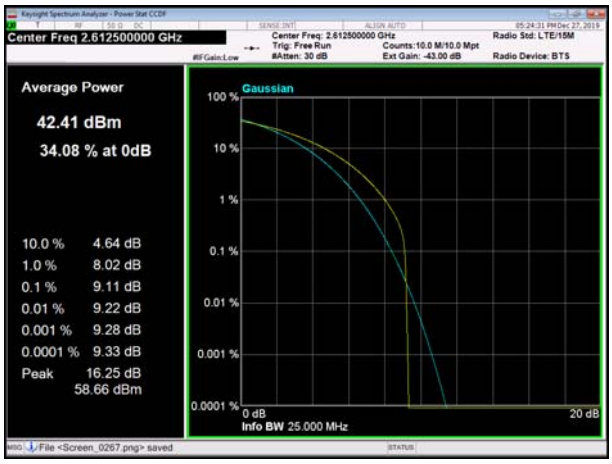
| Chain0, 10MHz- Low CH E-TM1.1 | Chain1, 10MHz- Low CH E-TM1.1 |
|---|---|
|  |  |
| Chain0, 10MHz- Middle CH E-TM1.1 | Chain1, 10MHz- Middle CH E-TM1.1 |
|  |  |
| Chain0, 10MHz- High CH E-TM1.1 | Chain1, 10MHz- High CH E-TM1.1 |
|  |  |

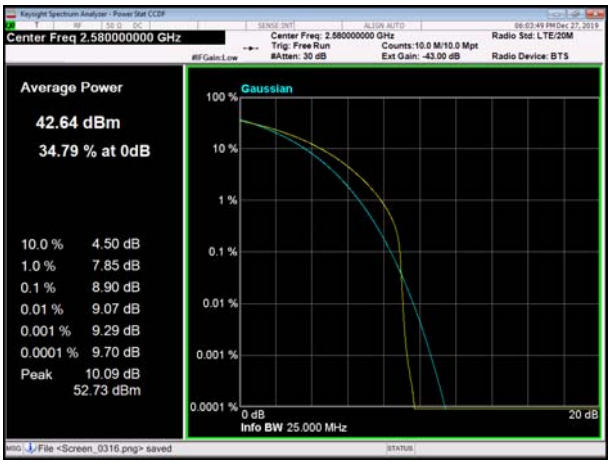
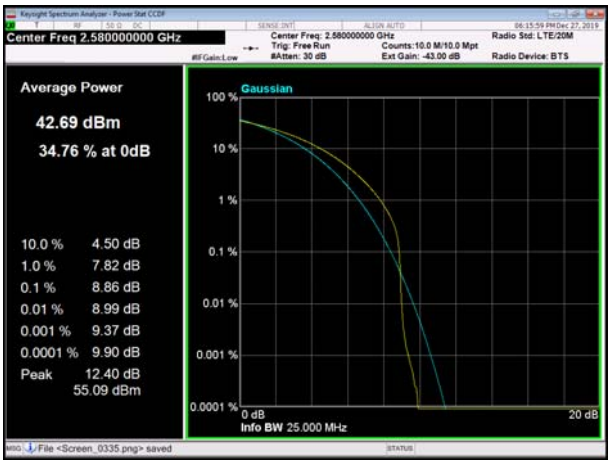
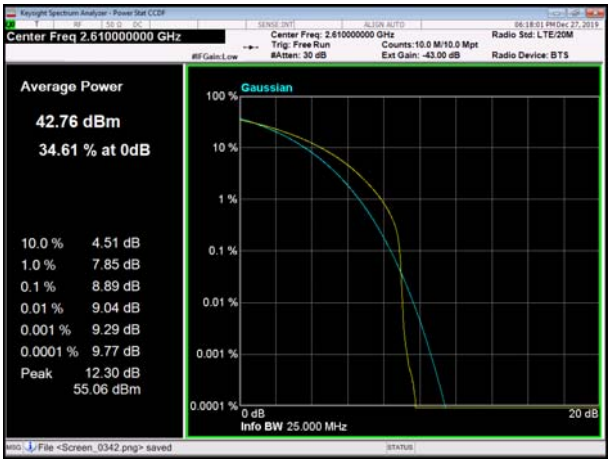
| Chain0, 15MHz- Low CH E-TM1.1 | Chain1, 15MHz- Low CH E-TM1.1 |
|---|---|
|  |  |
| Chain0, 15MHz- Middle CH E-TM1.1 | Chain1, 15MHz- Middle CH E-TM1.1 |
|  |  |
| Chain0, 15MHz- High CH E-TM1.1 | Chain1, 15MHz- High CH E-TM1.1 |
|  |  |

| Chain0, 20MHz- Low CH E-TM1.1 | Chain1, 20MHz- Low CH E-TM1.1 |
|---|---|
|  |  |
| Chain1, 20MHz- Middle CH E-TM1.1 | Chain1, 20MHz- Middle CH E-TM1.1 |
|  |  |
| Chain1, 20MHz- High CH E-TM1.1 | Chain1, 20MHz- High CH E-TM1.1 |
|  |  |

For IC measurement data:

| Chain0, 10MHz- Low CH E-TM1.1 | Chain1, 10MHz- Low CH E-TM1.1 |
|---|---|
|  |  |
| Chain0, 10MHz- Middle CH E-TM1.1 | Chain1, 10MHz- Middle CH E-TM1.1 |
|  |  |
| Chain0, 10MHz- High CH E-TM1.1 | Chain1, 10MHz- High CH E-TM1.1 |
|  |  |

| Chain0, 15MHz- Low CH E-TM1.1 | Chain1, 15MHz- Low CH E-TM1.1 |
|---|---|
|  |  |
| Chain0, 15MHz- Middle CH E-TM1.1 | Chain1, 15MHz- Middle CH E-TM1.1 |
|  |  |
| Chain0, 15MHz- High CH E-TM1.1 | Chain1, 15MHz- High CH E-TM1.1 |
|  |  |

| Chain0, 20MHz- Low CH E-TM1.1 | Chain1, 20MHz- Low CH E-TM1.1 |
|---|---|
|  |  |
| Chain1, 20MHz- Middle CH E-TM1.1 | Chain1, 20MHz- Middle CH E-TM1.1 |
|  |  |
| Chain1, 20MHz- High CH E-TM1.1 | Chain1, 20MHz- High CH E-TM1.1 |
|  |  |

## 2.3 Occupied Bandwidth

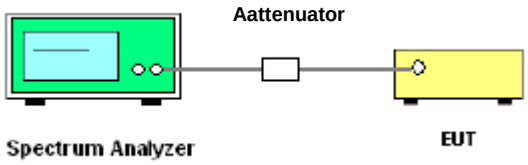
### 2.3.1 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.3.2 Test Procedures

1. The EUT was connected to the spectrum analyzer
2. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set RBW= 1% to 5% of the occupied bandwidth, VBW= 3*RBW, peak detector, trace maximum hold.

### 2.3.3 Test Setup



### 2.3.4 Test Results of 99% Occupied Bandwidth and 26dB Bandwidth

FCC Chain 0

| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| 10MHz | E-TM1.1 | Low | 8.94 | 9.37 |
| | | Middle | 8.94 | 9.32 |
| | | High | 8.94 | 9.30 |
| | E-TM3.1 | Low | 8.94 | 9.40 |
| | | Middle | 8.94 | 9.37 |
| | | High | 8.94 | 9.30 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 15MHz | E-TM1.1 | Low | 13.41 | 13.93 |
| | | Middle | 13.40 | 13.91 |
| | | High | 13.42 | 13.94 |
| | E-TM3.1 | Low | 13.41 | 13.98 |
| | | Middle | 13.39 | 13.90 |
| | | High | 13.41 | 13.92 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 20MHz | E-TM1.1 | Low | 17.86 | 18.54 |
| | | Middle | 17.86 | 18.60 |
| | | High | 17.86 | 18.55 |
| | E-TM3.1 | Low | 17.85 | 18.60 |
| | | Middle | 17.86 | 18.54 |
| | | High | 17.87 | 18.54 |

Chain 1

| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| 10MHz | E-TM1.1 | Low | 8.94 | 9.36 |
| | | Middle | 8.94 | 9.34 |
| | | High | 8.93 | 9.34 |
| | E-TM3.1 | Low | 8.94 | 9.36 |
| | | Middle | 8.95 | 9.33 |
| | | High | 8.94 | 9.34 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 15MHz | E-TM1.1 | Low | 13.41 | 13.97 |
| | | Middle | 13.41 | 13.98 |
| | | High | 13.40 | 13.93 |
| | E-TM3.1 | Low | 13.41 | 13.99 |
| | | Middle | 13.42 | 13.97 |
| | | High | 13.40 | 13.97 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 20MHz | E-TM1.1 | Low | 17.87 | 18.56 |
| | | Middle | 17.87 | 18.57 |
| | | High | 17.86 | 18.56 |
| | E-TM3.1 | Low | 17.85 | 18.65 |
| | | Middle | 17.86 | 18.52 |
| | | High | 17.87 | 18.53 |

IC Chain 0

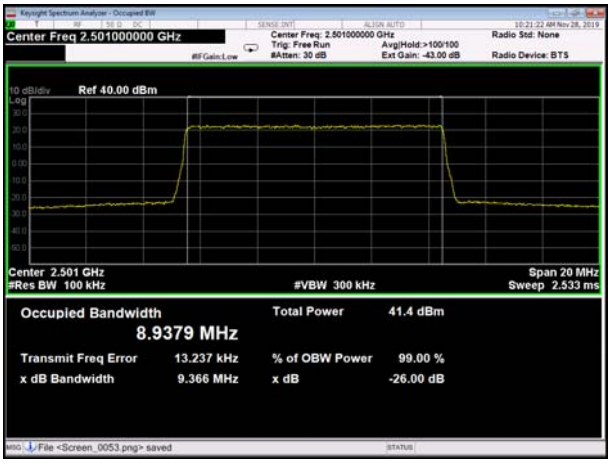
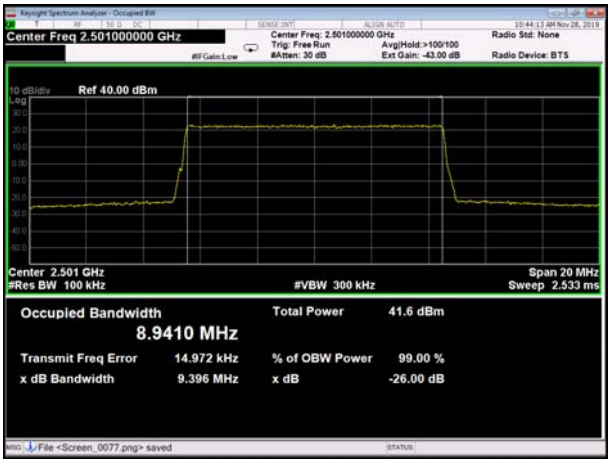
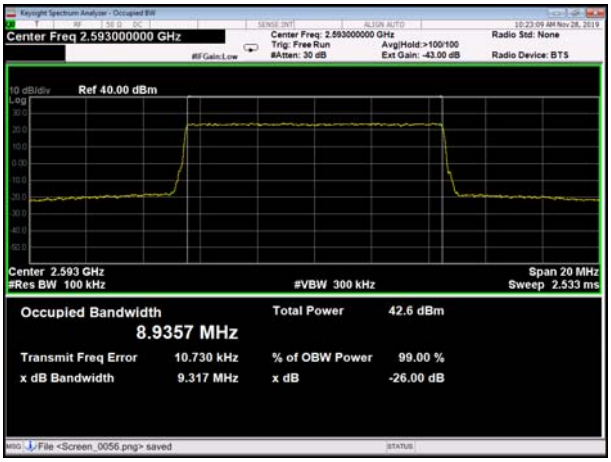
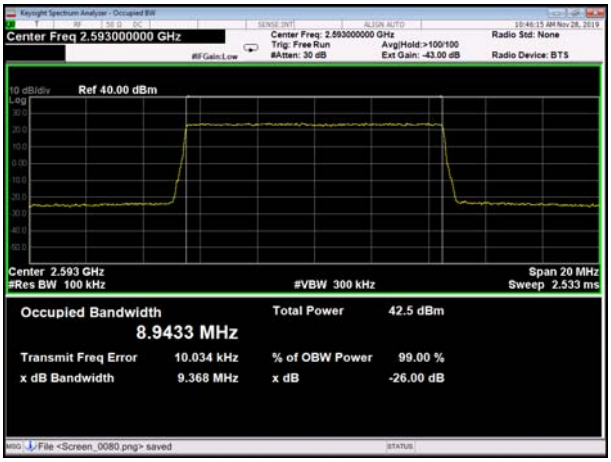
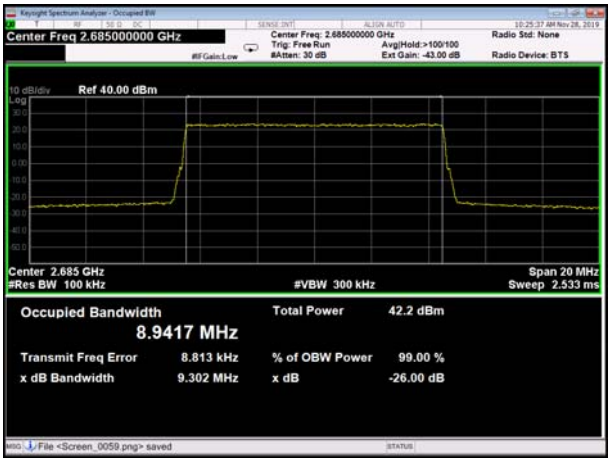
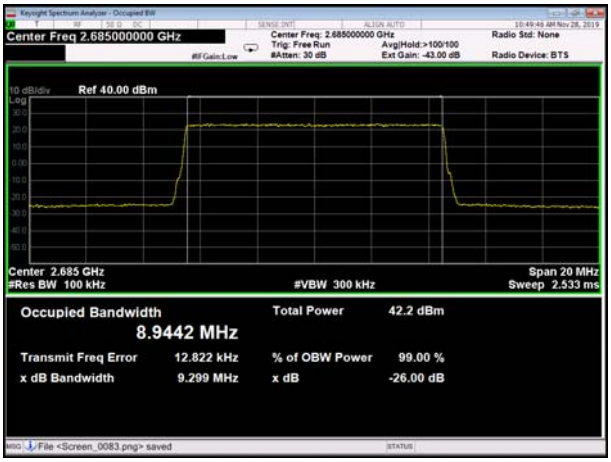
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| 10MHz | E-TM1.1 | Low | 8.95 | 9.31 |
| | | Middle | 8.94 | 9.35 |
| | | High | 8.93 | 9.37 |
| | E-TM3.1 | Low | 8.94 | 9.33 |
| | | Middle | 8.93 | 9.37 |
| | | High | 8.94 | 9.35 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 15MHz | E-TM1.1 | Low | 13.41 | 13.95 |
| | | Middle | 13.41 | 13.90 |
| | | High | 13.40 | 13.99 |
| | E-TM3.1 | Low | 13.41 | 13.91 |
| | | Middle | 13.40 | 13.97 |
| | | High | 13.40 | 13.95 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 20MHz | E-TM1.1 | Low | 17.86 | 18.58 |
| | | Middle | 17.87 | 18.53 |
| | | High | 17.85 | 18.56 |
| | E-TM3.1 | Low | 17.87 | 18.54 |
| | | Middle | 17.85 | 18.54 |
| | | High | 17.87 | 18.52 |

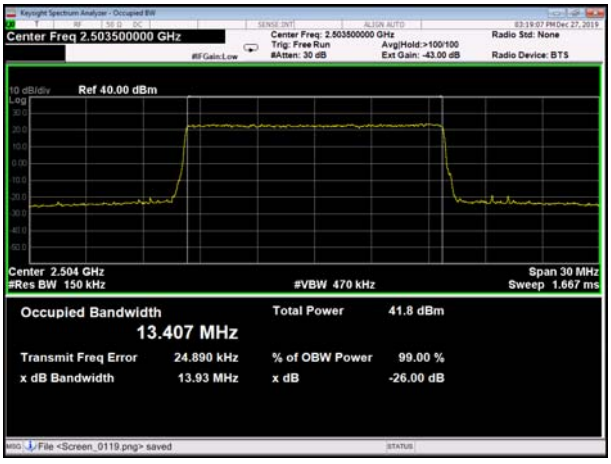
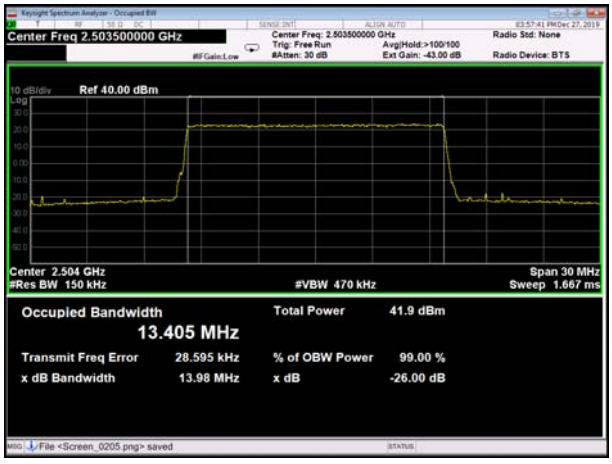
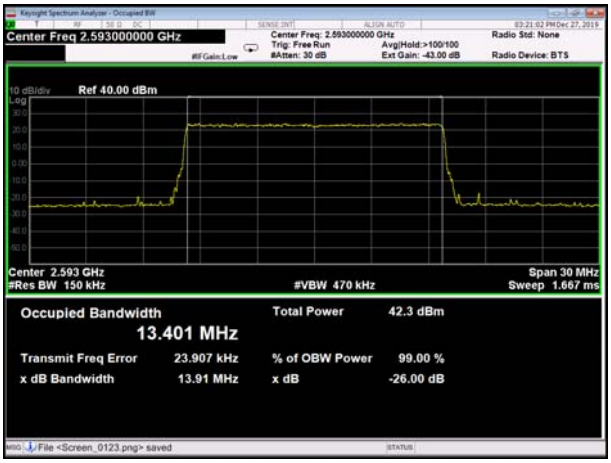
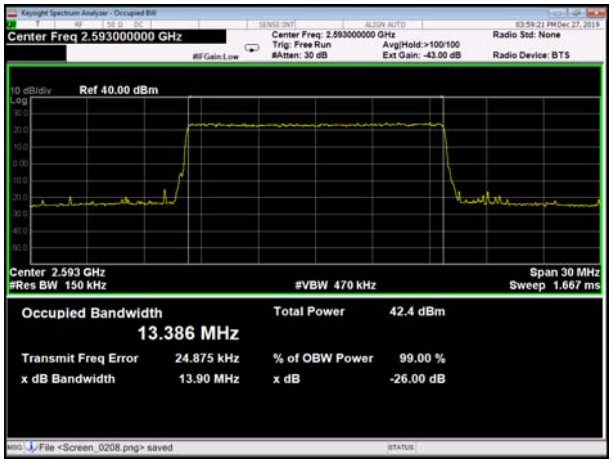
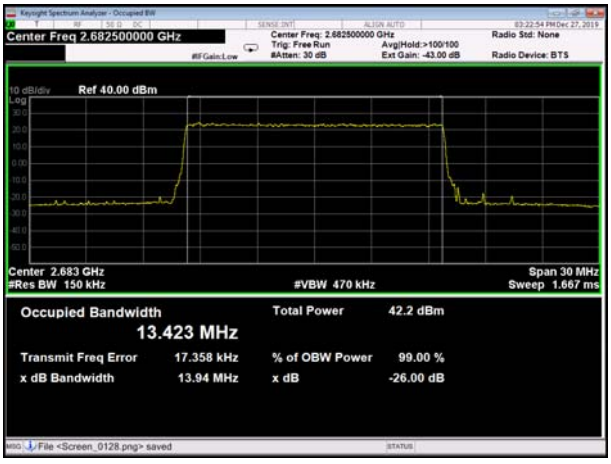
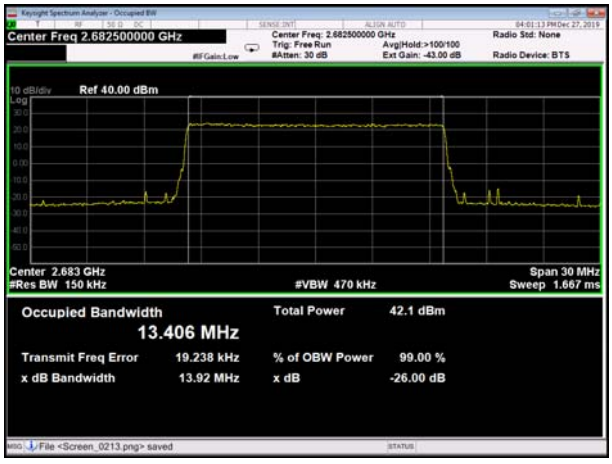
Chain 1

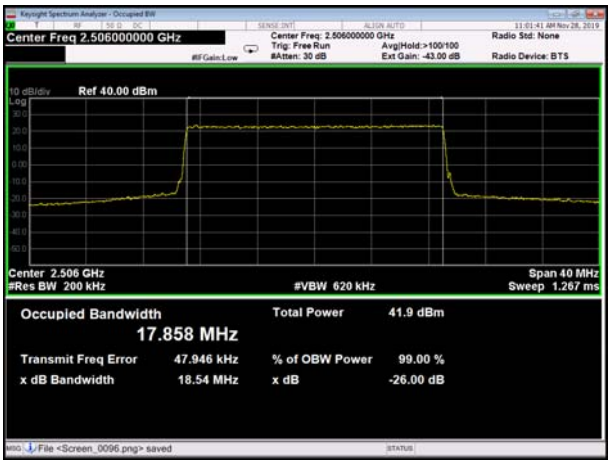
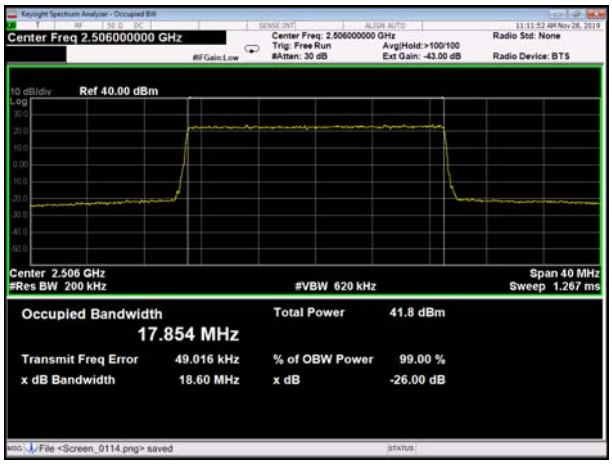
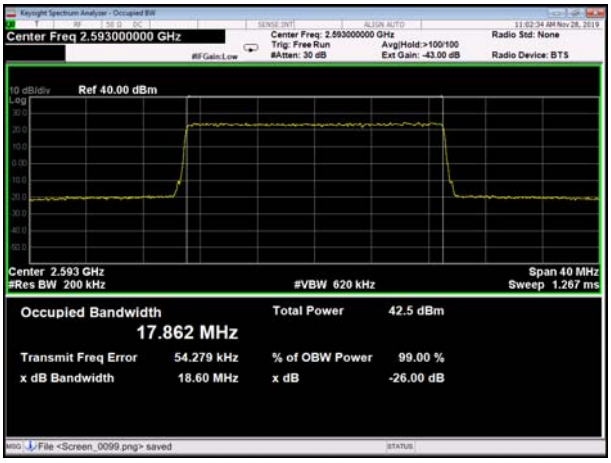
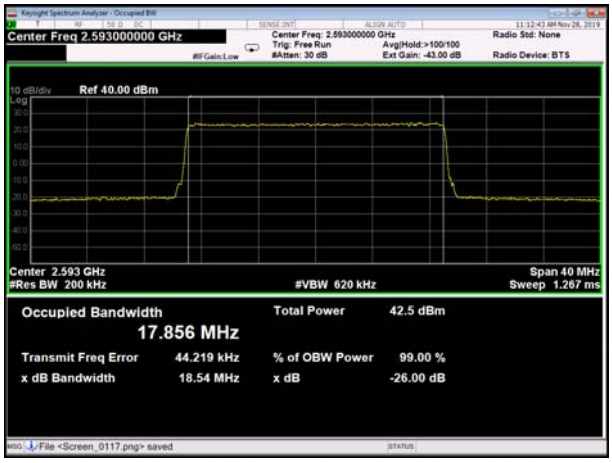
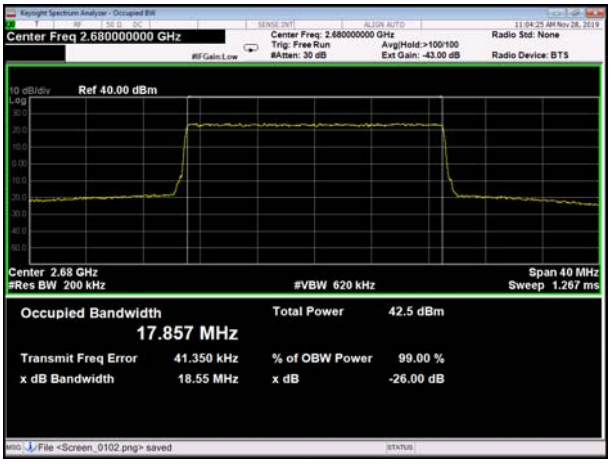
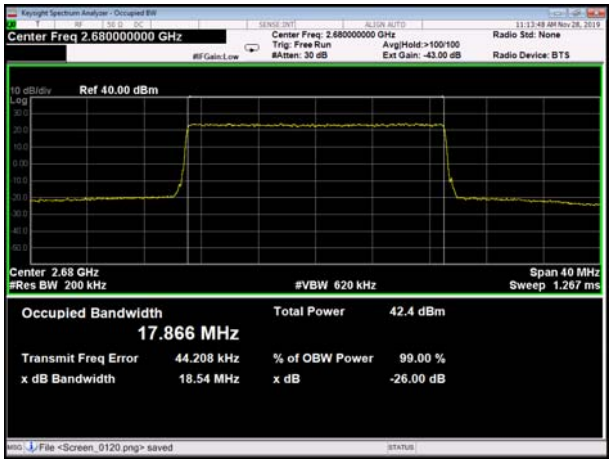
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| 10MHz | E-TM1.1 | Low | 8.94 | 9.38 |
| | | Middle | 8.94 | 9.29 |
| | | High | 8.93 | 9.32 |
| | E-TM3.1 | Low | 8.94 | 9.32 |
| | | Middle | 8.94 | 9.33 |
| | | High | 8.94 | 9.33 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 15MHz | E-TM1.1 | Low | 13.40 | 13.90 |
| | | Middle | 13.41 | 13.93 |
| | | High | 13.40 | 14.02 |
| | E-TM3.1 | Low | 13.41 | 13.91 |
| | | Middle | 13.40 | 13.92 |
| | | High | 13.40 | 14.00 |
| Band width (MHz) | Test Mode | Test channel | 99% Occupied Bandwidth (MHz) | 26dB Occupied Bandwidth (MHz) |
| 20MHz | E-TM1.1 | Low | 17.86 | 18.57 |
| | | Middle | 17.87 | 18.56 |
| | | High | 17.85 | 18.56 |
| | E-TM3.1 | Low | 17.85 | 18.62 |
| | | Middle | 17.88 | 18.65 |
| | | High | 17.86 | 18.58 |

### 2.3.5 Test Results (Plots)

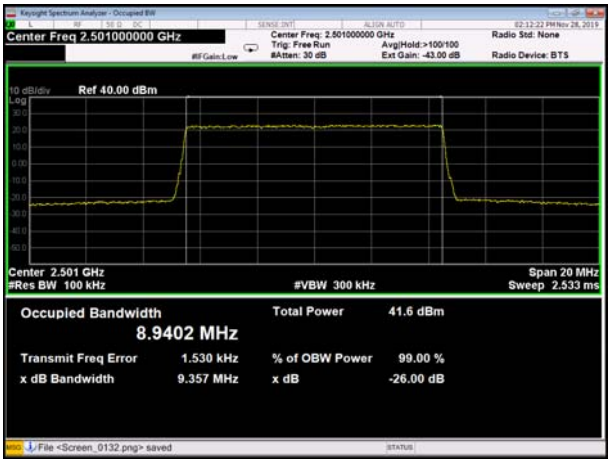
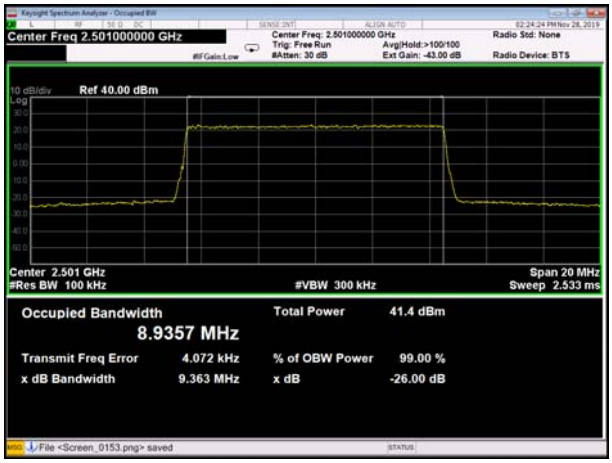
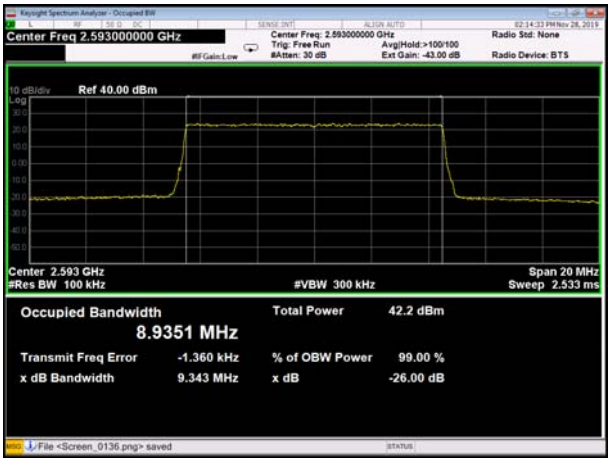
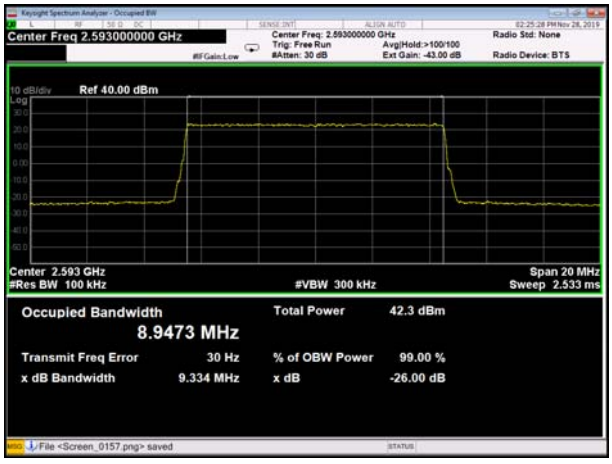
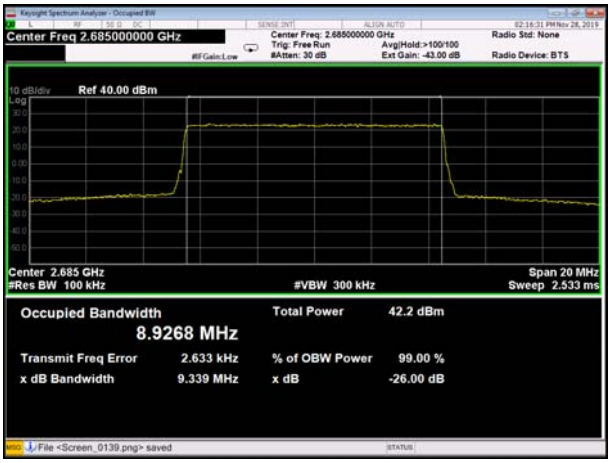
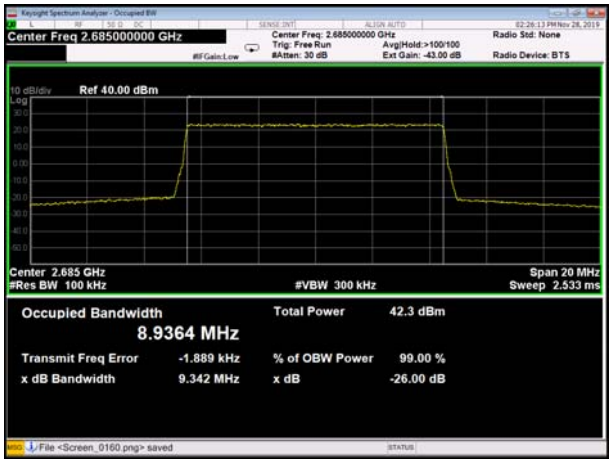
**FCC Chain 0**

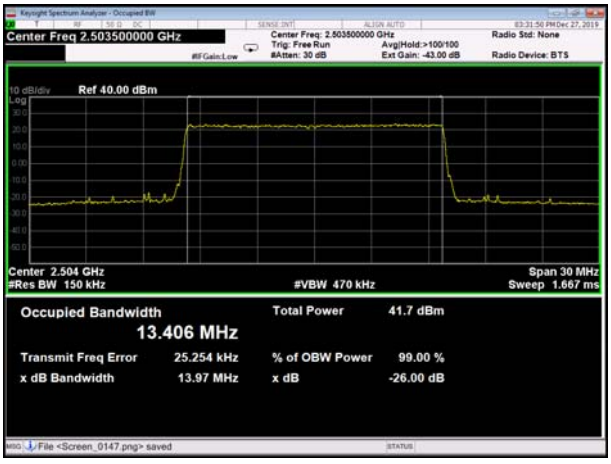
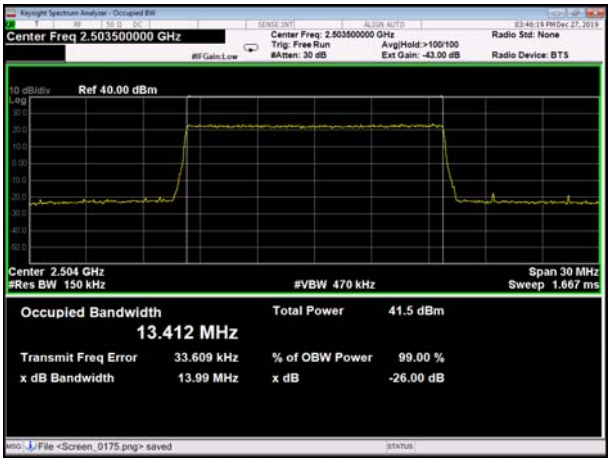
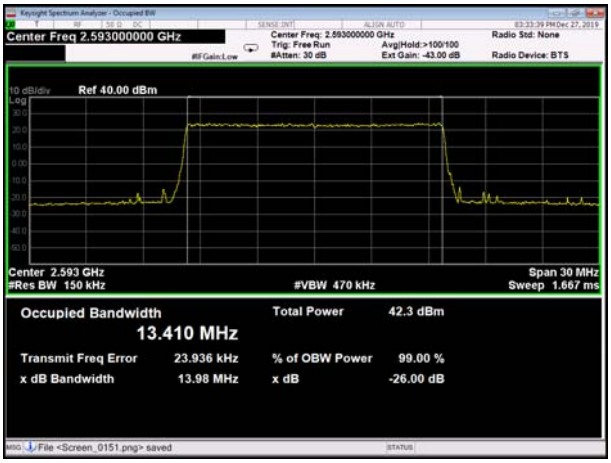
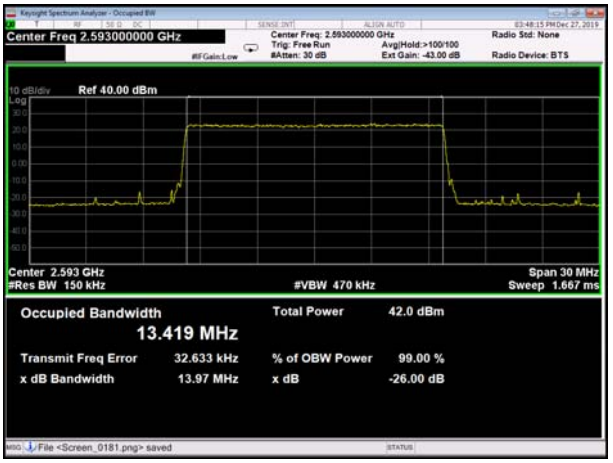
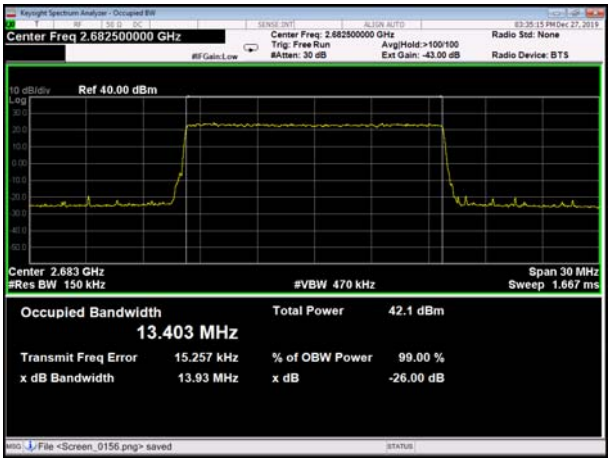
| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

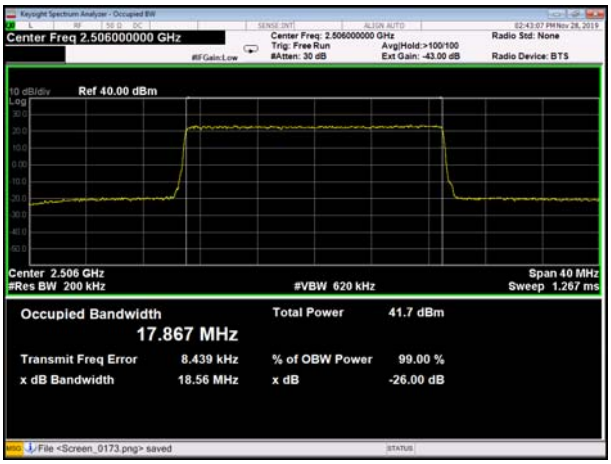
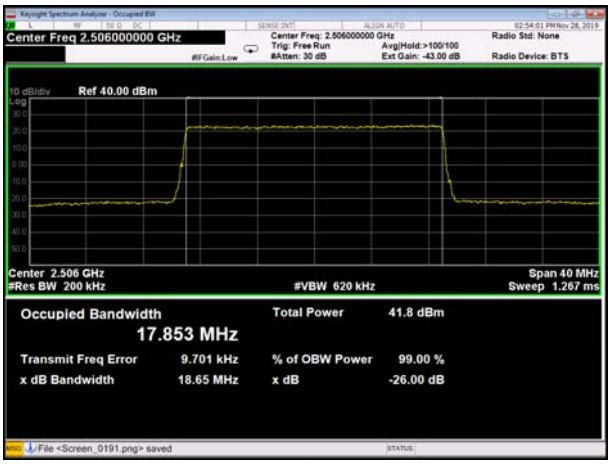
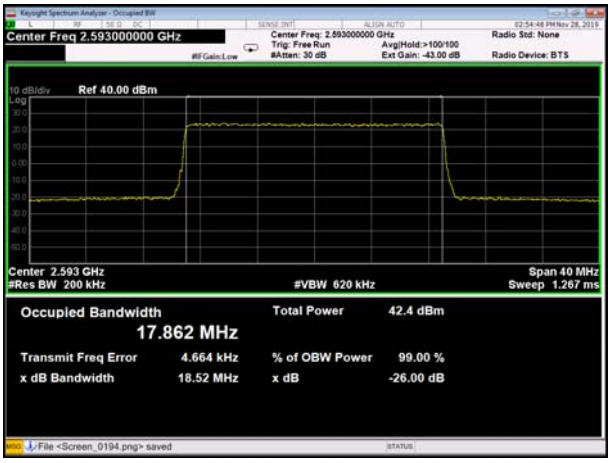
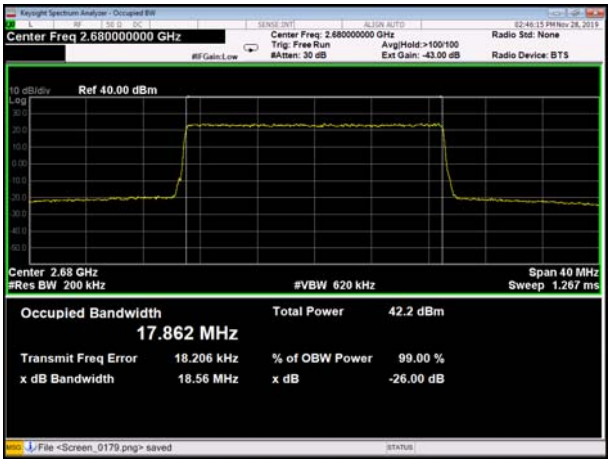
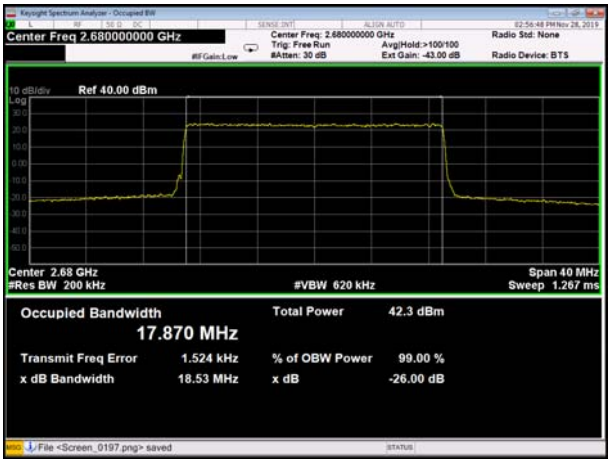
| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM1.1 |
|  |  |

| 20MHz- Low CH E-TM1.1 | 20MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 20MHz- Middle CH E-TM1.1 | 20MHz- Middle CH E-TM3.1 |
|  |  |
| 20MHz- High CH E-TM1.1 | 20MHz- High CH E-TM3.1 |
|  |  |

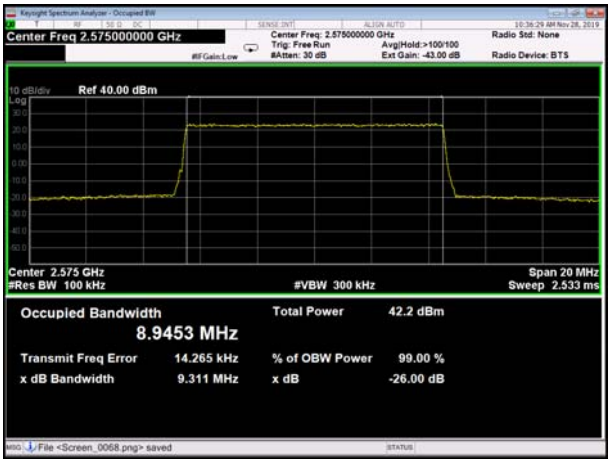
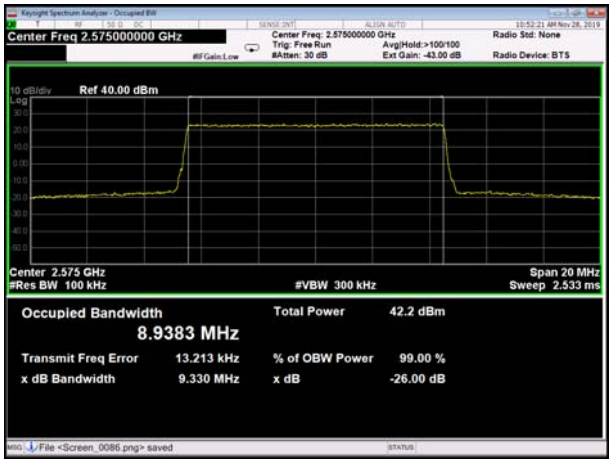
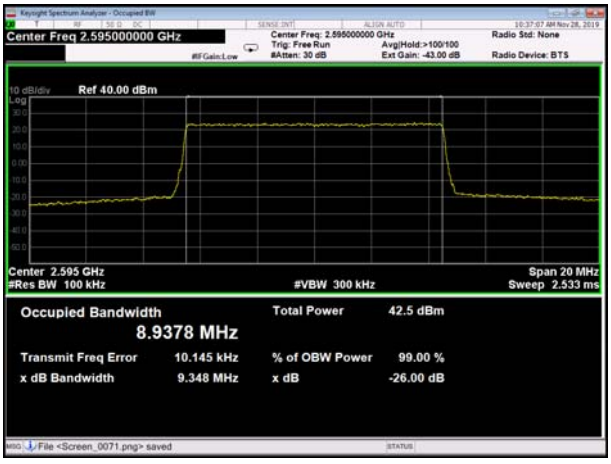
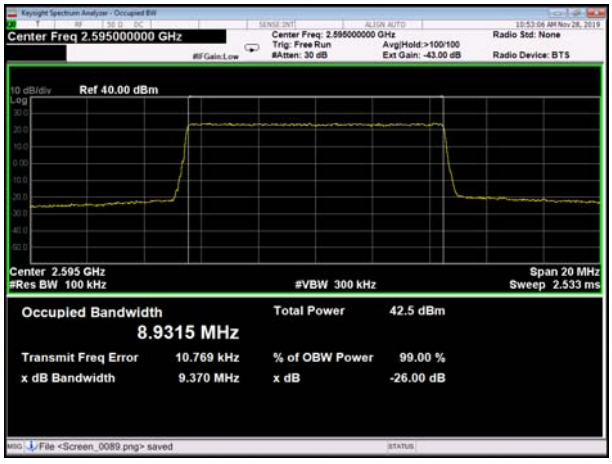
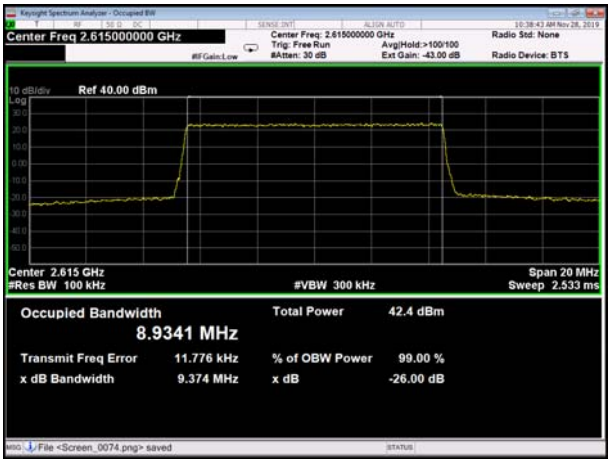
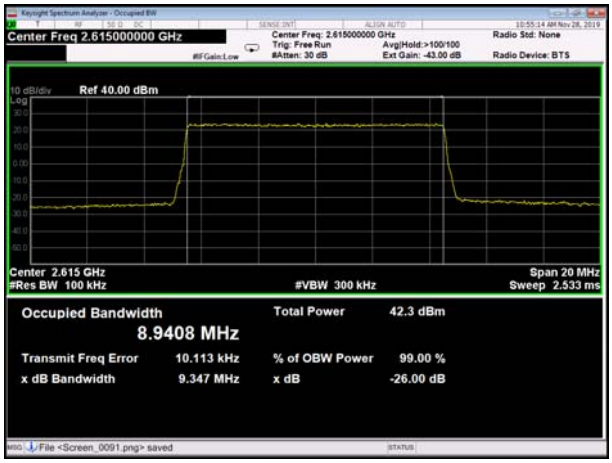
**FCC Chain1**

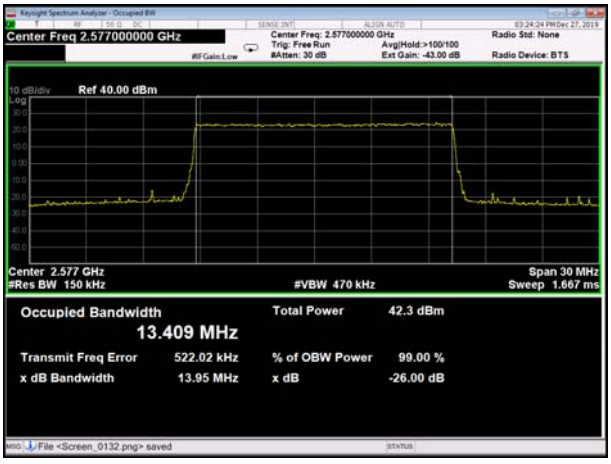
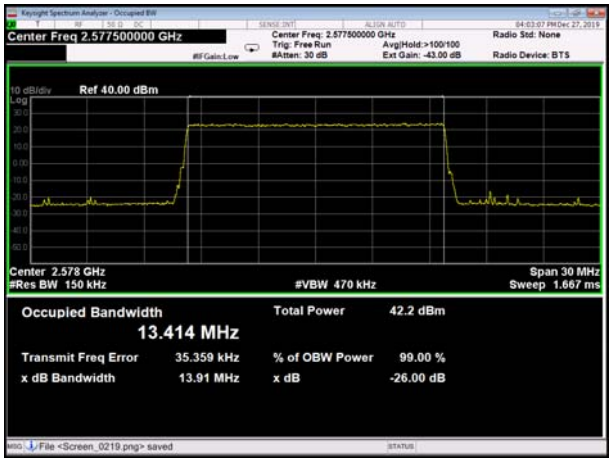
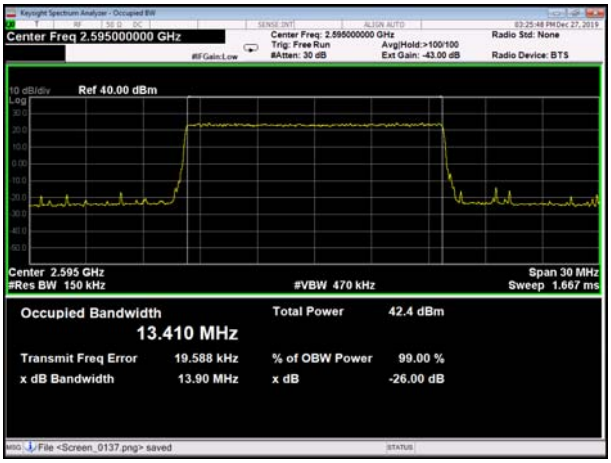
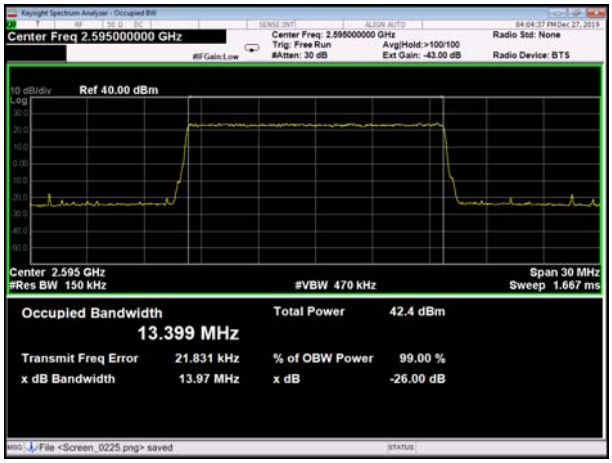
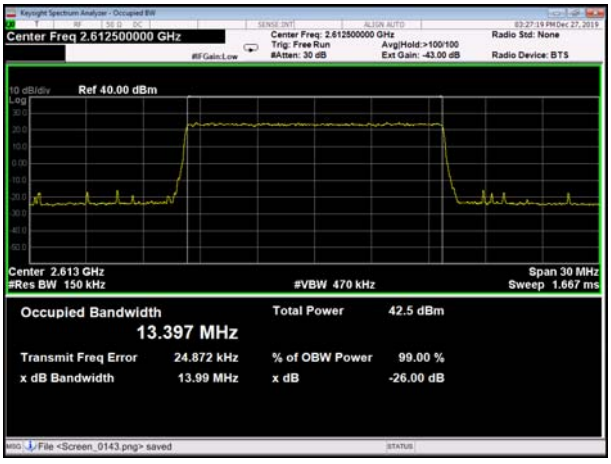
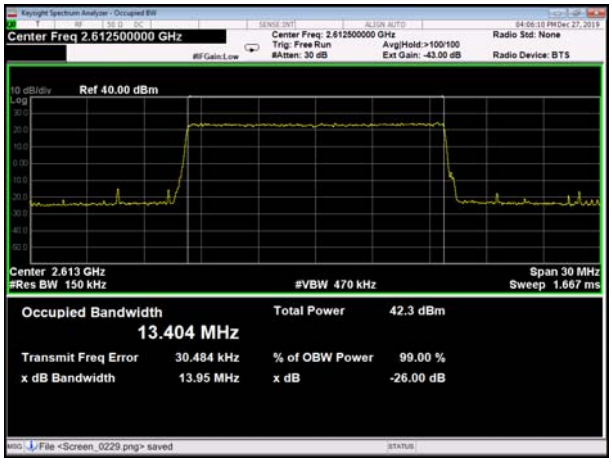
| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM3.1 |
|  |  |

| 20MHz- Low CH E-TM1.1 | 20MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 20MHz- Middle CH E-TM1.1 | 20MHz- Middle CH E-TM3.1 |
|  |  |
| 20MHz- High CH E-TM1.1 | 20MHz- High CH E-TM3.1 |
|  |  |

**IC Chain 0**

| 10MHz- Low CH E-TM1.1 | 10MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 10MHz- Middle CH E-TM1.1 | 10MHz- Middle CH E-TM3.1 |
|  |  |
| 10MHz- High CH E-TM1.1 | 10MHz- High CH E-TM3.1 |
|  |  |

| 15MHz- Low CH E-TM1.1 | 15MHz- Low CH E-TM3.1 |
|---|---|
|  |  |
| 15MHz- Middle CH E-TM1.1 | 15MHz- Middle CH E-TM3.1 |
|  |  |
| 15MHz- High CH E-TM1.1 | 15MHz- High CH E-TM3.1 |
|  |  |