

RRUC-E 800MHz Spurious Emission Test Report

FCC Part 22 and Industry Canada RSS-129

FCC: X3V800RRUCE
IC: 287AJ-800RRUCE



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Publication History

Issue	Status	Change Summary	Author(s)	Date
0.01	Draft	Initial Version	Terry Chen	2011-03-21
0.02	Updated	Add RRUC-E 800MHz with DPM A-band	Ramon Lao	2011-6-6
0.03	Updated	Updated Sharon's comments	Ramon Lao	2011-6-7
0.04	Standard		Ramon Lao	2011-6-14

1.0 Introduction

1.1 Purpose

The purpose of this document is to describe the verification tests applied by Product Qualification Group on RRUC-E 800MHz to the applicable Electromagnetic Compatibility (EMC) standards as outlined in the References

This document presents the EMC tests result for the qualification on RRUC-E 800MHz configured with CDMA BTS652 and Duplexer Preselector Module(DPM) A and B band.

- A-Band(Rx 824 – 835MHz & Tx 869 – 880MHz)
- B-Band(Rx 835 – 849MHz & Tx 880 – 894MHz)

1.2 Product Overview

The RRUC-E is envisioned to provide flexibility to present RF solution, as a single sector multi-carrier (1-3C) Radio Module, RRUC-E can be mounted on an antenna tower, pole or wall, with fiber connection to the digital equipment of base station. For 1 sector 6 carrier application, two RRUC-Es can share two antennas by Rx overlay mode. For outdoor application RRUC-E support wide range of operation temperature while using a natural cooling method.

The RRUC-E product requires an external Duplexer to meet key RF conditioning requirement. The external Duplexer should be exchangeable on site, to support working frequency migration. As required above, this external Duplexer should work in outdoor condition with wide range of operation temperature.

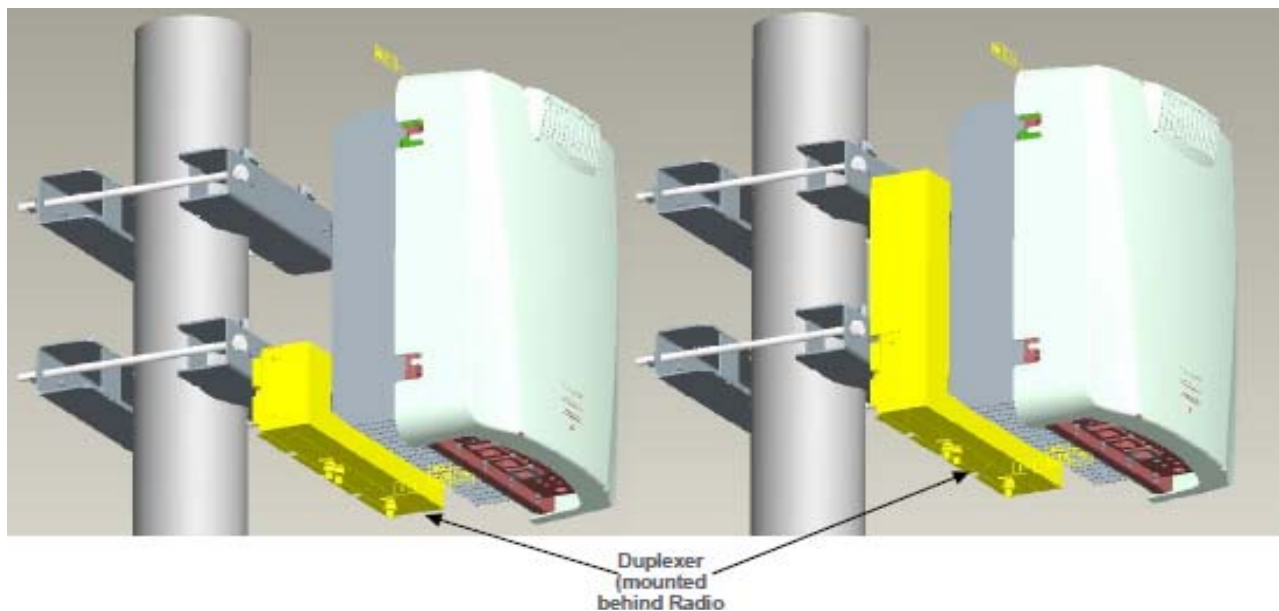


Figure 1. RRUC-E physical concept with external DPM (Yellow module)

2.0 Setup and Configuration

2.1 BTS Environment Setup

The following figure shows environment setup during Spurious Emission testing.

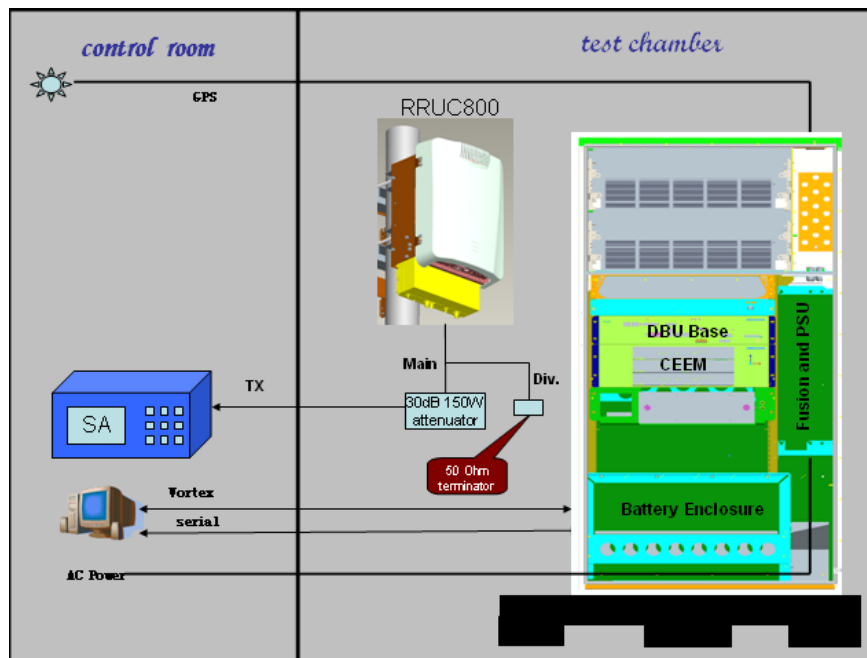


Figure 2. RRUC-E 800MHz With BTS652 and DPM B-band Environment Setup

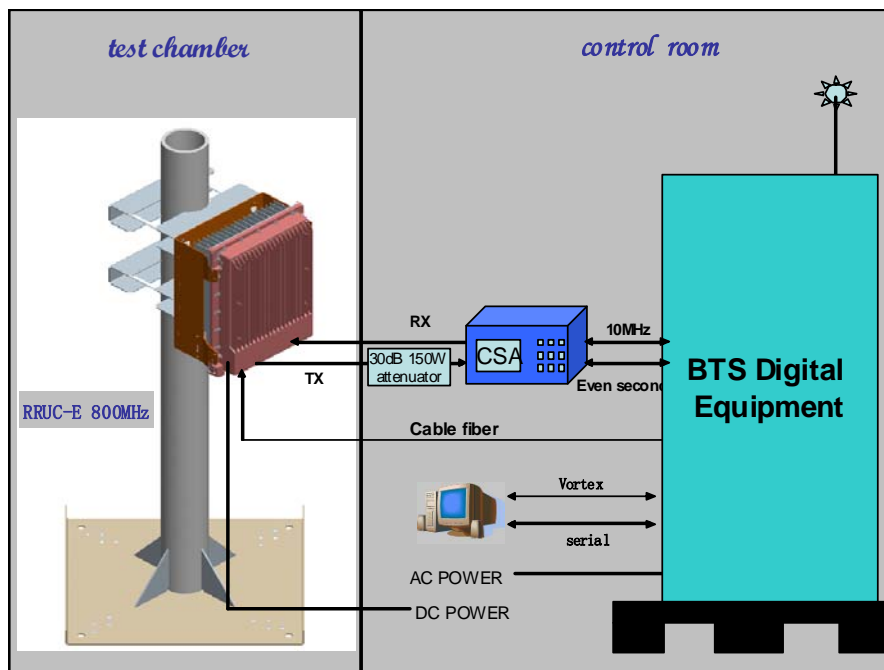


Figure 3. RRUC-E 800MHz With DPM A-band Environment Setup

2.2 BTS Configuration Description

The CDMA BTS will be configured as the most complex condition to normal intended use.

- AC BTS 652
- 1 X DBU
- 1 X CEEM
- 1 X RRUC-E 800MHz.
- 1 X 800MHz DPM B Band
- 1 X 800MHz DPM A Band

2.3 BTS Configuration List

RRUC-E 800MHz Configured With CDMA BTS652			
Item	component	PEC code	SN
1	BTS652 Frame	TBD	TBD
2	DBU	NTLK71AAE5 02	NNTMPX0086CN
3	CEEM Module Assembly	NTLK75AAE5	#10
4	CEEM Back Panel	NTLK76AAE5	NNTMPX004M9H
5	CEEM Adapt Board	NTLK77AAE5	NNTMPX004N9Y
6	800MHz RRUC-E	NTTT70ABE5 A5	NNTMEETY1001
7	800MHz DPM B Band	NTTT75AD A01	WFETMT3NYY03
8	800MHz DPM A Band	NTTT75AA A01	-

3.0 BTS Software

Software	Version
Vortex	18.02_10WK34

4.0 Test Equipment

Item	Quantity	Description
Current Clamp Meter	1	Model:318 Cal. 2010-9-1 to 2011-9-1
Multi-Meter	1	Model:117 Cal. 2010-9-1 to 2011-9-1
VSA	1	Model:E4406A . VSA series transmitter tester (7MHZ-4.0GHZ). Cal. 2010-9-1 to 2011-9-1
HP8935	1	Model: E6380A. CDMA Test Set. Cal. 2010-9-1 to 2011-9-1.
Attenuator	3	30dB @ 150W
Terminal	6	Huber + Suhner Load @ 50 Ohm
BNC Cable	12	2ea for 10, 5ea for 3m.
Ethernet Cable	2	About 10m, shielded
Note: Spurious Emission test equipments in lab are listed in lab report		

5.0 Test Result Summary

Test summary for RRUC-E 800MHz with DPM B-band:

Standard	Test Item	Test
FCC part 2.1053 FCC part 22.917 RSS-GEN SECTION 4.9 RSS-129 SECTION 8.1.2	Transmitter Spurious Emission	PASS
RSS-GEN SECTION 4.10 RSS-129 SECTION 10	Receiver Spurious Emission	PASS

Test summary for RRUC-E 800MHz with DPM A-band:

Standard	Test Item	Test
FCC part 2.1053 FCC part 22.917 RSS-GEN SECTION 4.9 RSS-129 SECTION 8.1.2	Transmitter Spurious Emission	PASS
RSS-GEN SECTION 4.10 RSS-129 SECTION 10	Receiver Spurious Emission	PASS

6.0 Lab Test Report Reference

Refer to Appendix A for lab test report that RRUC-E 800MHz is with DPM B-band.

Refer to Appendix B for lab test report that RRUC-E 800MHz is with DPM A-band.

7.0 Conclusion

The RRUC-E 800MHz configured is compliant with the standard **FCC part 15 § 15.109** (*FCC Rules for Radio Frequency Devices, Title 47 of the Code of Federal Regulations - Radio frequency devices – dated 08/20/02*), **CISPR 22** (*Limits and methods of measurement of radio disturbance characteristics of information technology equipment (2006)*), **EN 55022** (*Information technology equipment – Radio disturbance characteristics – limits and methods of measurement (1998)*), **RSS-Gen Issue3 Section 4.9&4.10** (*Radio Standards Specification-Gen, Issue 3, General Requirements and Information for the Certification of Radio Apparatus*), and **RSS 129 Issue2 Section4.9&4.10** (*Spectrum Management and Telecommunications Policy, Radio Standards Specification, 800 MHz Dual-Mode CDMA Cellular Telephones*).

8.0 Standards Compliance

- [S1] EN 55022 2006+A1 October 2007, "Information technology equipment – Radio disturbance characteristics – limits and methods of measurement (CISPR 22:2005, modified)"
- [S2] CISPR 22, "Limits and methods of measurement of radio disturbance characteristics of information technology equipment (2006)"
- [S3] FCC CFR 47 Part 15, "FCC Rules for Radio Frequency devices, title 47 of the code of federal regulations – radio frequency devices"
- [S4] RSS-Gen issue3, Radio Standards Specification-Gen, Issue 3, General Requirements and Information for the Certification of Radio Apparatus (formerly titled General Requirements and Information for the Certification of Radio communication Equipment)
- [S5] RSS 129 issue2, Spectrum Management and Telecommunications Policy, Radio Standards Specification, 800 MHz Dual-Mode CDMA Cellular Telephones

9.0 References

- [R1] "Recommended Minimum Performance Standards for Spread Spectrum Base Stations" Release C (TIA-97-F), C.S0010-C, Version 1.0, Jan 14, 2005.
- [R2] Lab report provided by Centre Testing International (Shenzhen) Limited (CTI).
- [R3] "Hardware Design Specification for the DBU main board.", Draft, Stream 00, Issue 02, November 27, 2009..
- [R4] CDMA BTS 652 Provisioning Guidelines and Cell Site Requirements.
- [R5] CDMA BTS 652 Interconnect General Specifications.
- [R6] RRUC-E 800MHz GSM Co-location, iDEN band,A-Band, B-Band and Full-Band Duplexer OEM General Specification, Approved, Stream 00, Issue 04, September 10, 2010.
- [R7] 800 MHz Remote Radio Unit CDMA (RRUC) Systems Design Specification, Draft, Stream 00, Issue 01, August 13, 2010.
- [R8] CDMA RRUC-E 800 MHz 3C/1SEricsson Interconnect General Specification, Draft, Stream 00, Issue 01, Setptember 10, 2010.

10.0 Acronyms

Abbreviation	Explanation
BTS	Base Station Transceiver Subsystem
CDMA	Code Division Multiple Access
CM-2	Control Module 2
CORE-2s	Configuration and Resource Management 2s
CEM	Channel Element Module
DPM	Duplexer Preselector Module
EDCG	enhanced Digital Control Group, consists of CM-2 and CORE-2
EMI	Electro-Magnetic Interference
EMU	Equipment Under Test
EMC	Electromagnetic Compatibility
GPSTM	Global Positioning System Timing Module
HW	Hardware
ITE	International Electro technical Commission
IS	Interim Standard
IEC	International Electro technical Commission
MFRM	Multi-carrier Flexible Radio Module
MHz	Megahertz
N/A	Not Applicable
OCNS	Orthogonal Channel Noise Source
PC	Personal Computer
PEC	Product Engineering Code
PI	Product Integrity
RE	Radiated Emissions
PSA	Product Specification Agreement
SW	Software
TBD	To Be Determined
TCCM	T1/E1 Cross Connect Module
TIIM	T1/E1 Indoor Interface Module
RRUC-E	Remote Radio Unit for CDMA-Enhanced
DBU	Digital Baseband Unit
CEEM	Channel Element Expansion Module
XCEM125	1xRTT Channel Element Module -125 Channel Elements

APPENDIX A: Lab Test Report of RRUC-E 800 with DPM B-band

Test Report

Report No. : EESZD02220008-2

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Client : Guangdong Nortel Telecommunications Equipment Co., Ltd.

Address : Rongli Industrial Park, Liuheng Road, Ronggui, Shunde, foshan, Guangdong,
528306, P.R.C

Description of the submitted sample(s):

Sample Name : 800MHz Remote Radio Unit CDMA(RRUC800)

Model/Type : RRUC 800 with CDMA BTS652

Trade : Ericsson

Ratings : AC 230V 50Hz

Test Item : 1. Transmitter Spurious Emission
2. Receiver Spurious Emission

State of Sample(s) : Full power

Sample Quantity : 1pcs

Manufacturer : Ericsson (China) Communications Company Ltd.

Sample Received Date : 2010-12 -3

Sample tested Date : 2010-12 -17

Test Requested : FCC part 2.1053

FCC part 22.917

RSS-GEN SECTION 4.9 Issue 3

RSS-GEN SECTION 4.10 Issue 3

RSS-129 SECTION 8.1.2 Issue 2

RSS-129 SECTION 10 Issue 2

Requirement Of Client

Test Results: PASS

Reviewed by: 
Engineer

Approved by: 
Supervisor

Approved date: 



Check No.: 56513019

CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION
Building C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen, Guangdong, China

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1. TEST SUMMARY:

The EUT has been tested according to the following specifications:

Standard	Test Item	Test
FCC part 2.1053 FCC part 22.917 RSS-GEN SECTION 4.9 RSS-129 SECTION 8.1.2	Transmitter Spurious Emission	PASS
RSS-GEN SECTION 4.10 RSS-129 SECTION 10	Receiver Spurious Emission	PASS

2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Test item	Value
Spurious Emission	4.4dB

3. EQUIPMENT LIST

10M Semi-anechoic Chamber - Radiated Spurious Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
10M Chamber & Accessory Equipment	Rainford	--	--	06/18/2012
Receiver	R&S	ESCI	100435	10/27/2011
Spectrum Analyzer	R&S	FSP40	100416	07/10/2011
ESG Vector signal generators	Agilent	E4438C	MY45095744	04/09/2011
Biconilog Antenna	schwarzbeck	VULB9136	9136-401	08/03/2011
Biconilog Antenna	schwarzbeck	VULB9136	9136--484	03/01/2012
Horn Antenna	ETS-LINGREN	3117	00057407	07/31/2011
Horn Antenna	ETS-LINGREN	3117	00057410	07/31/2011
Microwave Preamplifier	Agilent	8449B	3008A02425	N/A
Microwave Preamplifier	Agilent	11909A	186871	N/A

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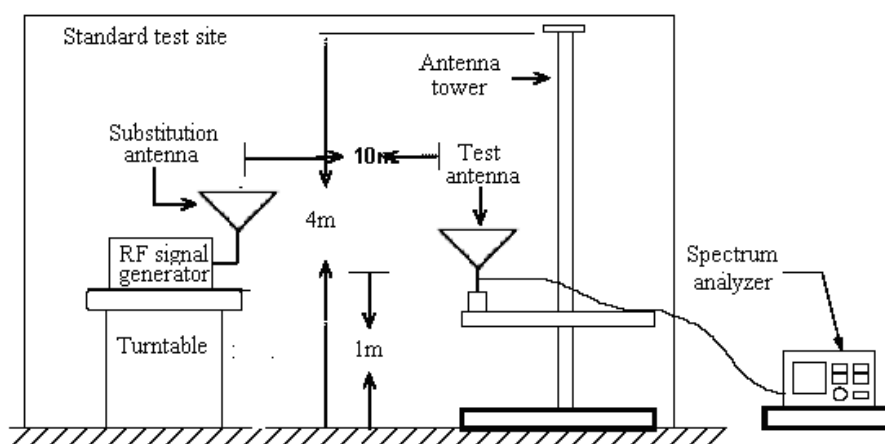
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4. TRANSMITTER SPURIOUS EMISSION

4.1 Test Condition

Operation Mode : Full Power
 Operation Voltage : AC 230V 50Hz
 Temperature / Humidity / Air Pressure : 23°C / 53.4% / 101.2Kpa

4.2 Test setup



4.3 Test Limits

Frequency range(MHz)	Limits(dBm)
0.009 to 10000	The Spurious emission must be attenuated by at least $43+10\log (P) -13$

Note: P is the Transmitter rated power in watts

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4.4 Test Procedure

- 1) On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- 2) The test antenna shall be oriented initially for vertical polarization located 10m from the EUT to correspond to the transmitter.
- 3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report.
The detector selection is based on how close the emission level was approaching the limit.
- 4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- 5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- 6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7) The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- 8) The maximum signal level detected by the measuring receiver shall be noted.
- 9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- 10) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.
- 11) The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- 12) The substitution antenna shall be connected to a calibrated signal generator.
m. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

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4.5 Test Results

Frequency	E-field Emission Level	Signal Generator Level	Antenna Gain	Cable Loss	E.R.P	Limits	Margin	Results	Remarks
(MHz)	(dBuV/m)	(dBm)	dBi	dB	(dBm)	(dBm)	(dB)	P/F	(H/V)
167.740	29.4	-75.01	6.07	0.74	-69.68	-13	56.68	P	H
1756.000	45.9	-51.76	4.8	2.37	-49.33	-13	36.33	P	H
2638.00	39.8	-59.05	6.4	2.78	-55.43	-13	42.43	P	H
107.810	29.2	-67.26	-0.34	0.58	-68.18	-13	55.18	P	V
1756.000	50.2	-47.46	4.8	2.37	-45.03	-13	32.03	P	V

Note: 1. The carrier frequency of the EUT are 880.895MHz—884.605MHz

2. ERP = Signal generator Level – Cable losses + Antenna gain

3. Margin = Limit - ERP

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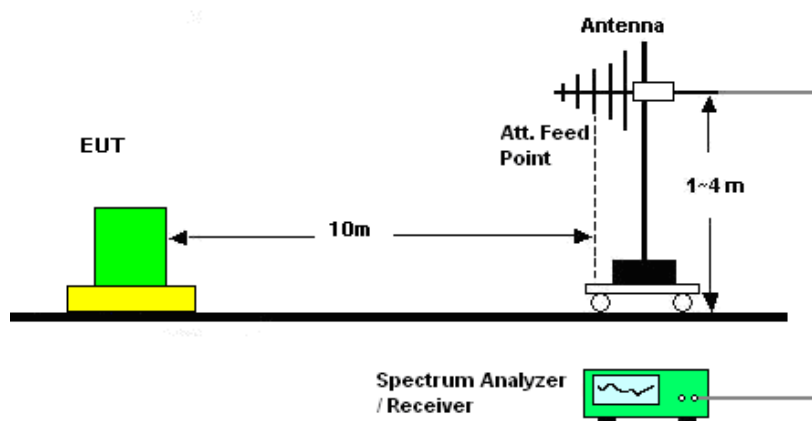
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5. RECEIVER SPURIOUS EMISSION

5.1 Test Condition

Operation Mode : Full Power
 Operation Voltage : AC 230V/50Hz
 Temperature / Humidity / Air Pressure : 23°C / 53.4% / 101.2Kpa

5.2 Test Setup



5.3 Test Limits

Frequency (MHz)	limits at 10m dB(μV/m)
30-88	30.0
88-216	33.5
216-960	36.0
Above 960	44.0

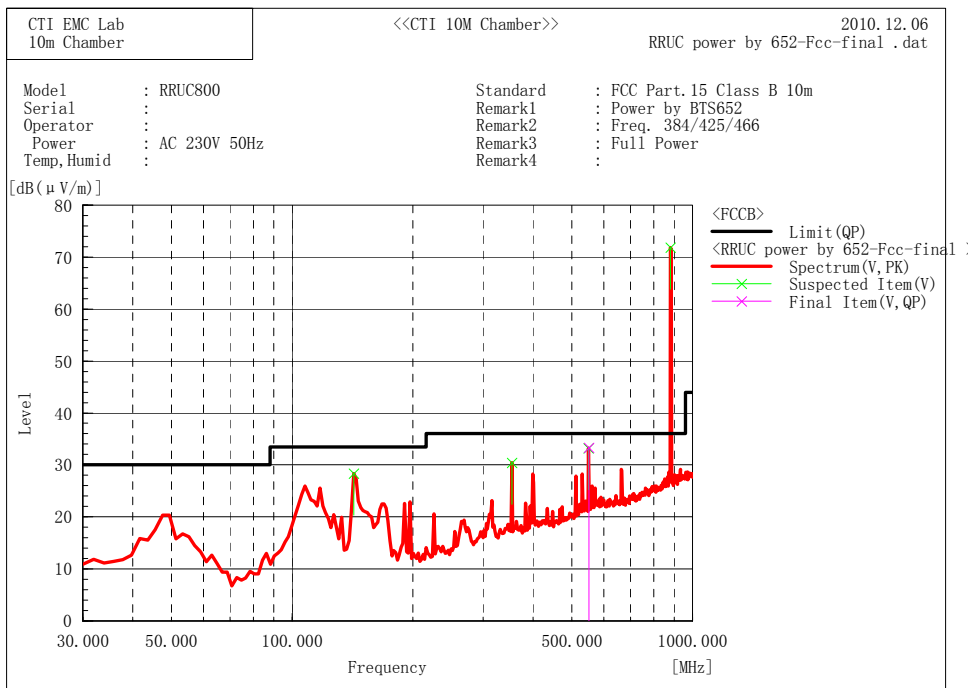
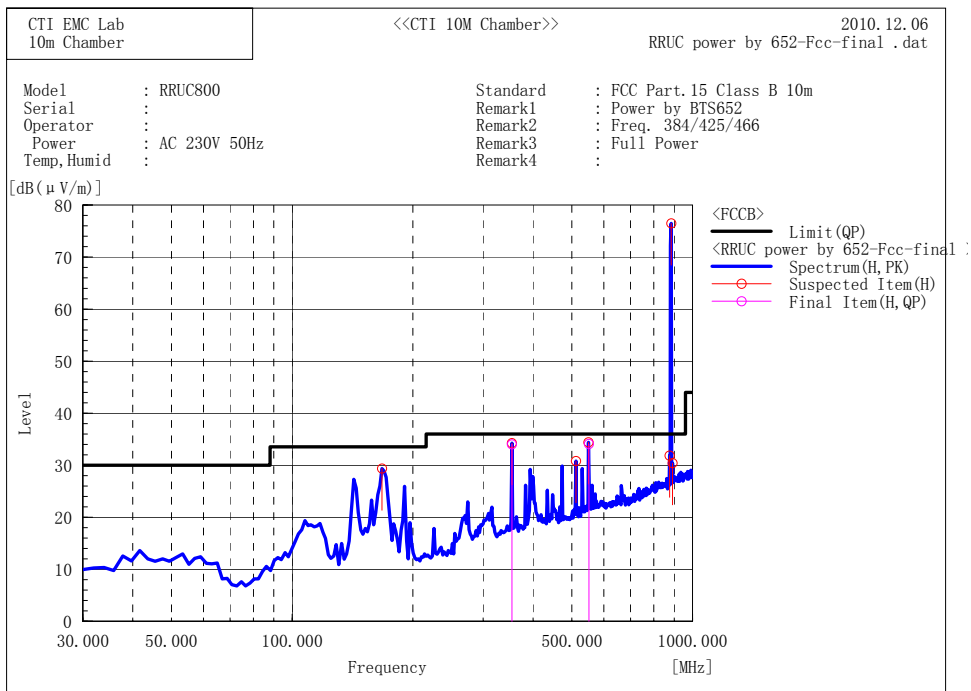
- NOTE:**
1. The lower limit shall apply at the transition frequency.
 2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
 3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

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5.4 Test Results



Test Report

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***** CTI EMC Lab *****
 <<CTI 10M Chamber>> 2010.12.06
 RRUC power by 652-Fcc-final .dat

Standard : FCC Part.15 Class B 10m
 Model : RRUC800
 Serial :
 Operator :
 Power : AC 230V 50Hz
 Temp, Humid :
 Remark1 : Power by BTS652
 Remark2 : Freq. 384/425/466
 Remark3 : Full Power
 Remark4 :

 Spectrum Selection

--- Horizontal Polarization ---						
No.	Frequency	Reading	c. f	Result	Limit	Margin
	[MHz]	[dB(μ V)]	[dB(1/m)]	PK [dB(μ V/m)]	QP [dB(μ V/m)]	QP [dB]
1	885.540	80.3	-3.8	76.5	36.0	-40.5
2	549.920	43.4	-9.0	34.4	36.0	1.6
3	353.980	47.5	-13.2	34.3	36.0	1.7
4	875.840	35.9	-4.0	31.9	36.0	4.1
5	167.740	50.4	-21.0	29.4	33.5	4.1
6	511.120	40.9	-10.1	30.8	36.0	5.2
7	891.360	34.0	-3.6	30.4	36.0	5.6

--- Vertical Polarization ---						
No.	Frequency	Reading	c. f	Result	Limit	Margin
	[MHz]	[dB(μ V)]	[dB(1/m)]	PK [dB(μ V/m)]	QP [dB(μ V/m)]	QP [dB]
1	881.660	75.8	-3.9	71.9	36.0	-35.9
2	549.920	42.2	-9.0	33.2	36.0	2.8
3	142.520	50.6	-22.3	28.3	33.5	5.2
4	353.980	43.7	-13.2	30.5	36.0	5.5

Final Result

--- Horizontal Polarization (QP)---						
No.	Frequency	Reading	c. f	Result	Limit	Margin
	[MHz]	[dB(μ V)]	[dB(1/m)]	[dB(μ V/m)]	[dB(μ V/m)]	[dB]
1	550.502	43.1	-9.0	34.1	36.0	1.9
2	353.883	47.2	-13.2	34.0	36.0	2.0

--- Vertical Polarization (QP)---						
No.	Frequency	Reading	c. f	Result	Limit	Margin
	[MHz]	[dB(μ V)]	[dB(1/m)]	[dB(μ V/m)]	[dB(μ V/m)]	[dB]
1	550.502	42.3	-9.0	33.3	36.0	2.7

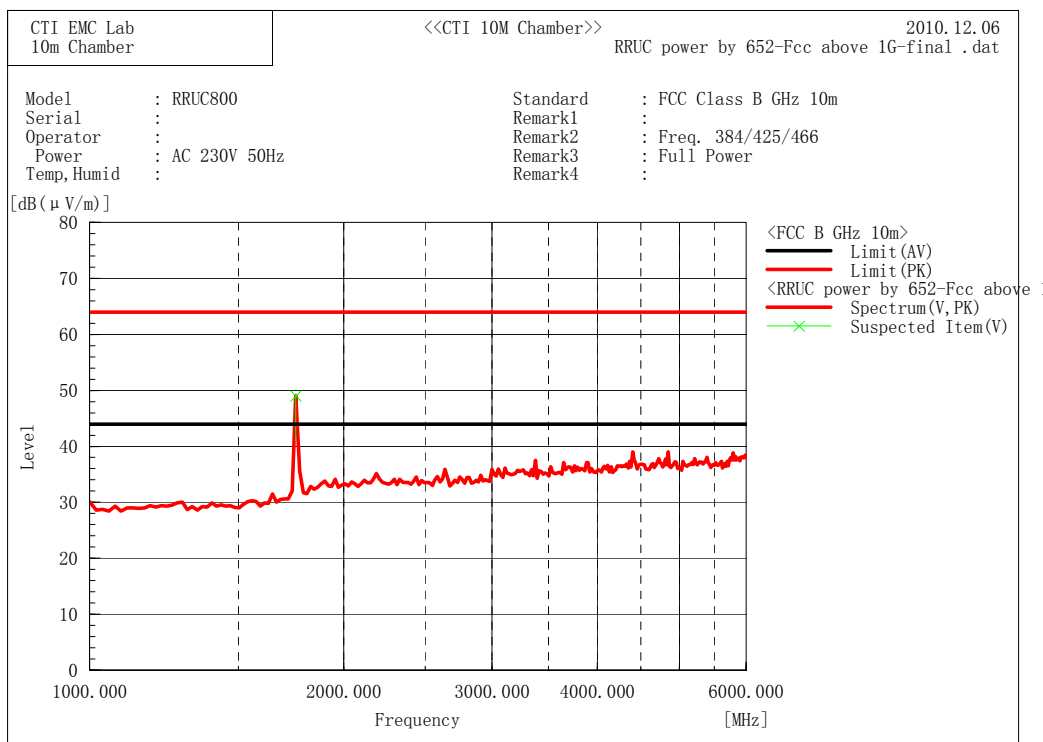
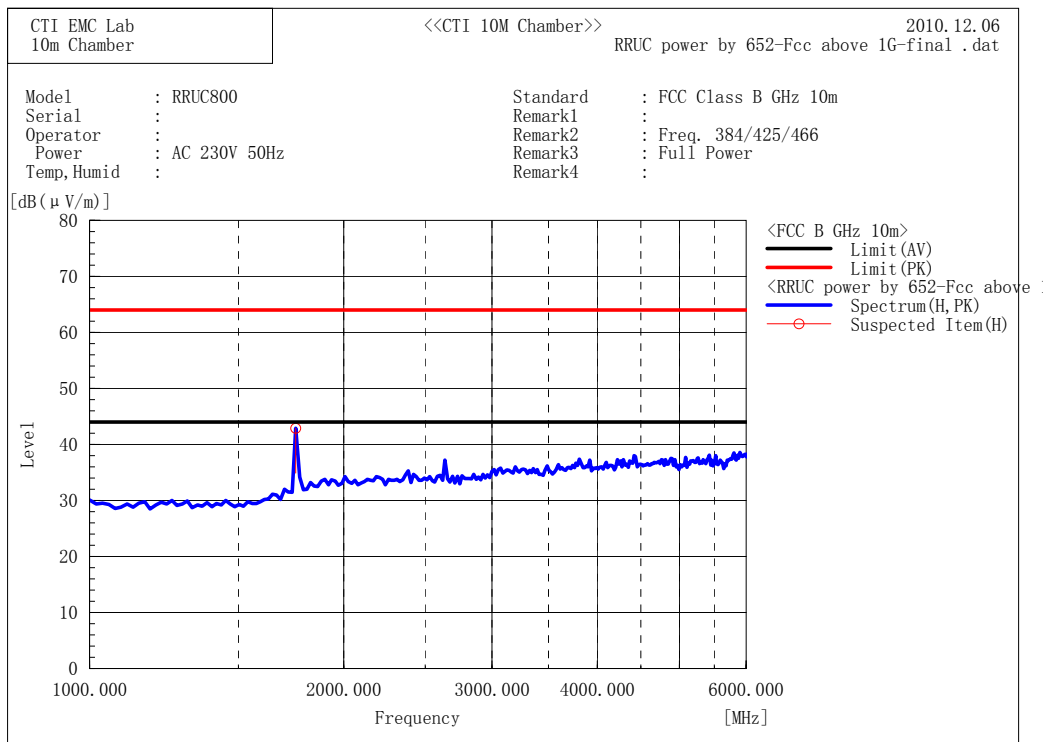
30MHz-1GHz (Powered by CDMA BTS 652)

Note: Marker 1 was the broadcast signal of the RRUC-E 800MHz

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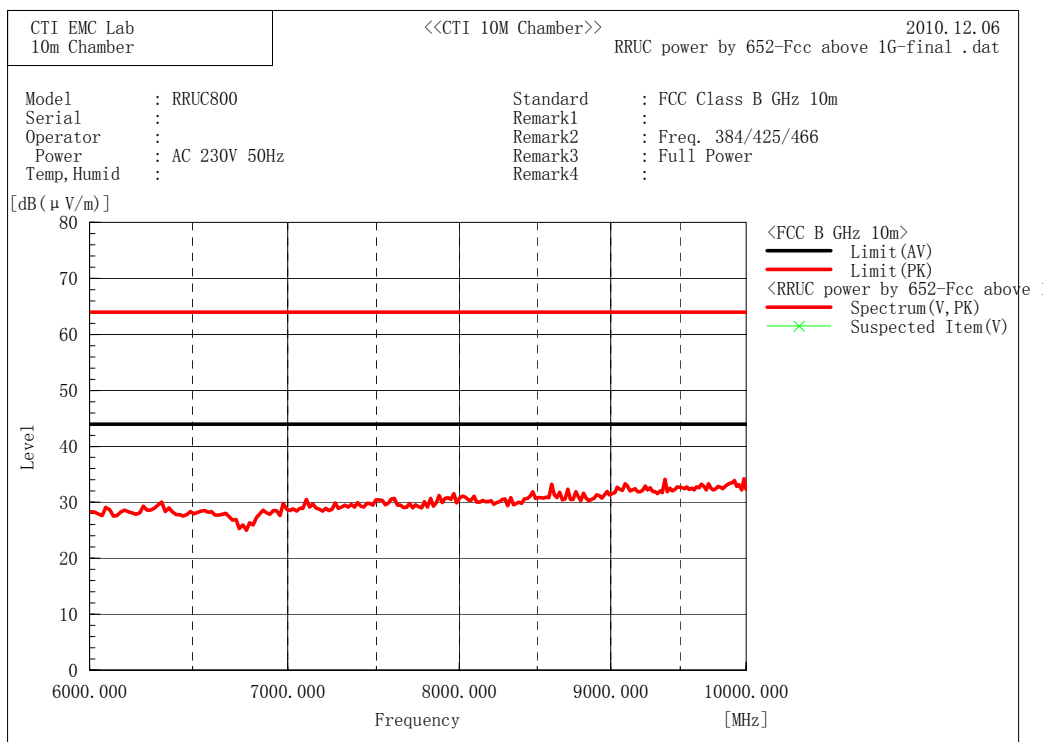
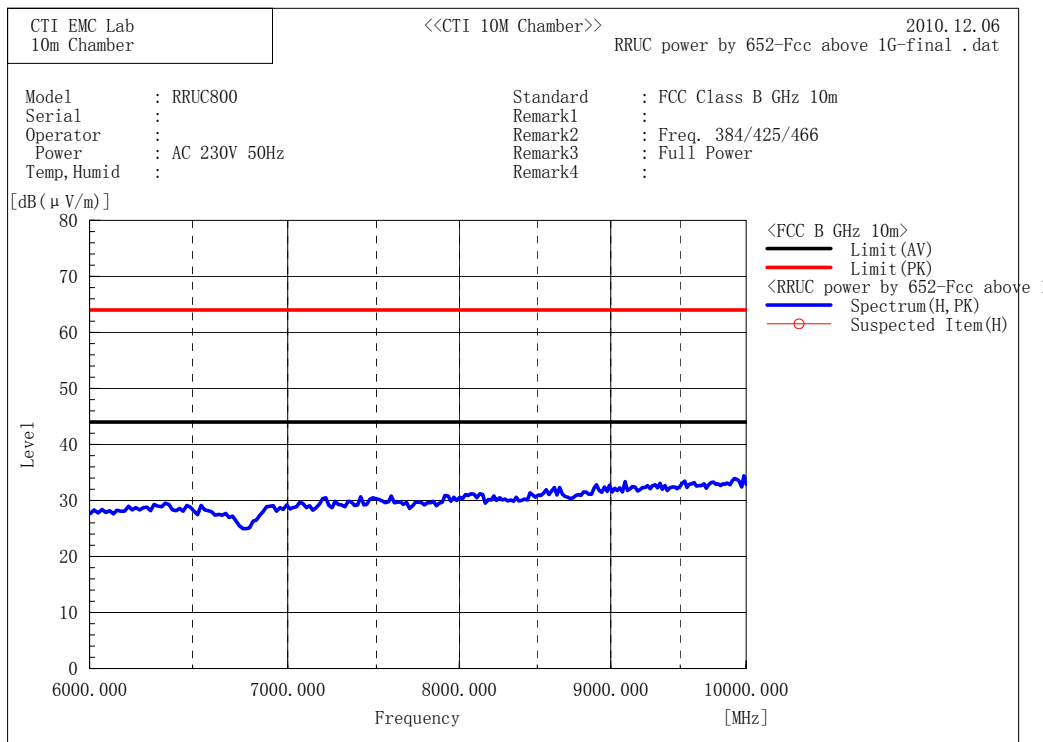


1GHz-6GHz (Powered by CDMA BTS 652)

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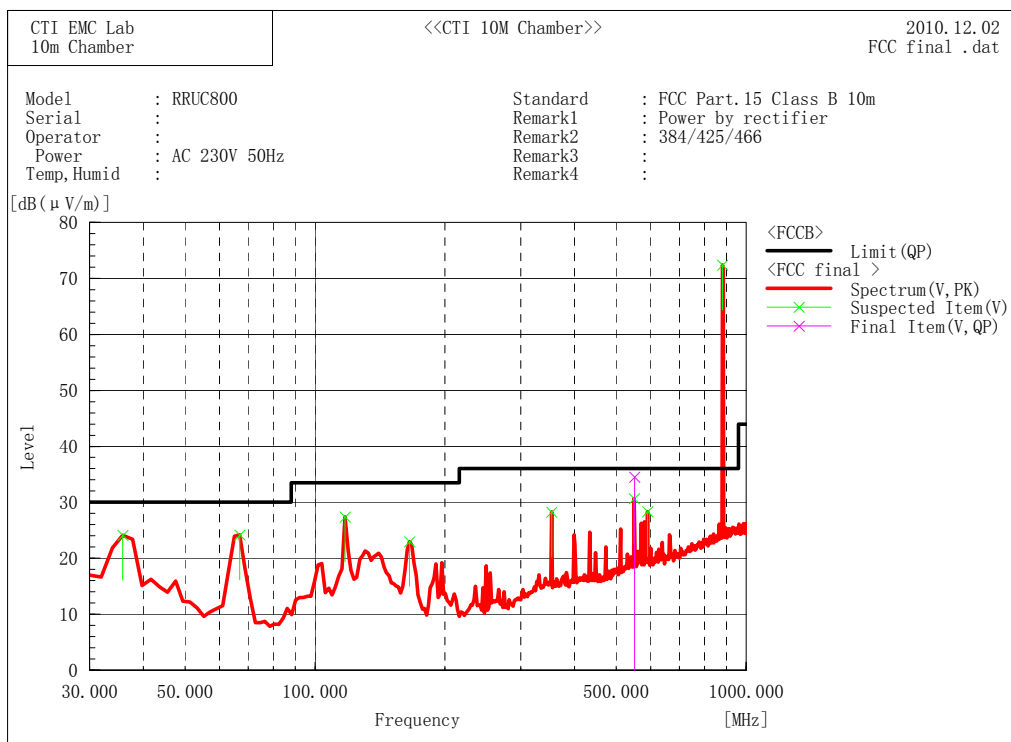
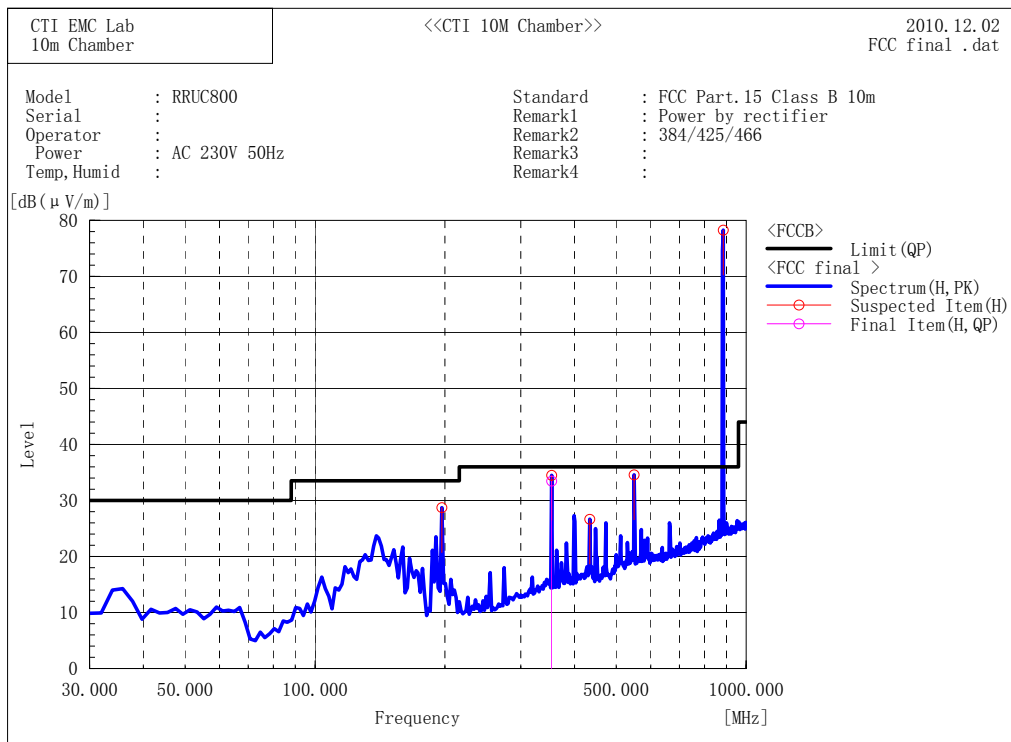


6GHz-10GHz (Powered by CDMA BTS 652)

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***** CTI EMC Lab *****
 <<CTI 10M Chamber>> 2010.12.02
 FCC final .dat

Standard : FCC Part.15 Class B 10m
 Model : RRUC800
 Serial :
 Operator :
 Power : AC 230V 50Hz
 Temp, Humid :
 Remark1 : Power by rectifier
 Remark2 : 384/425/466
 Remark3 :
 Remark4 :

 Spectrum Selection

--- Horizontal Polarization ---						
No.	Frequency	Reading	c.f	Result	Limit	Margin
	[MHz]	[dB(μV)]	[dB(1/m)]	PK [dB(μV/m)]	QP [dB(μV/m)]	QP [dB]
1	885.540	83.1	-4.9	78.2	36.0	-42.2
2	549.920	44.5	-10.0	34.5	36.0	1.5
3	353.980	48.5	-14.0	34.5	36.0	1.5
4	196.840	48.4	-19.6	28.8	33.5	4.7
5	433.520	39.4	-12.8	26.6	36.0	9.4

--- Vertical Polarization ---						
No.	Frequency	Reading	c.f	Result	Limit	Margin
	[MHz]	[dB(μV)]	[dB(1/m)]	PK [dB(μV/m)]	QP [dB(μV/m)]	QP [dB]
1	881.660	77.4	-5.0	72.4	36.0	-36.4
2	549.920	40.7	-10.0	30.7	36.0	5.3
3	66.860	46.2	-22.0	24.2	30.0	5.8
4	35.820	43.9	-19.8	24.1	30.0	5.9
5	117.300	47.9	-20.5	27.4	33.5	6.1
6	590.660	37.8	-9.5	28.3	36.0	7.7
7	353.980	42.2	-14.0	28.2	36.0	7.8
8	165.800	44.7	-21.7	23.0	33.5	10.5

Final Result

--- Horizontal Polarization (QP) ---						
No.	Frequency	Reading	c.f	Result	Limit	Margin
	[MHz]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]
1	353.883	47.4	-14.0	33.4	36.0	2.6

--- Vertical Polarization (QP) ---						
No.	Frequency	Reading	c.f	Result	Limit	Margin
	[MHz]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]
1	550.502	44.5	-10.0	34.5	36.0	1.5

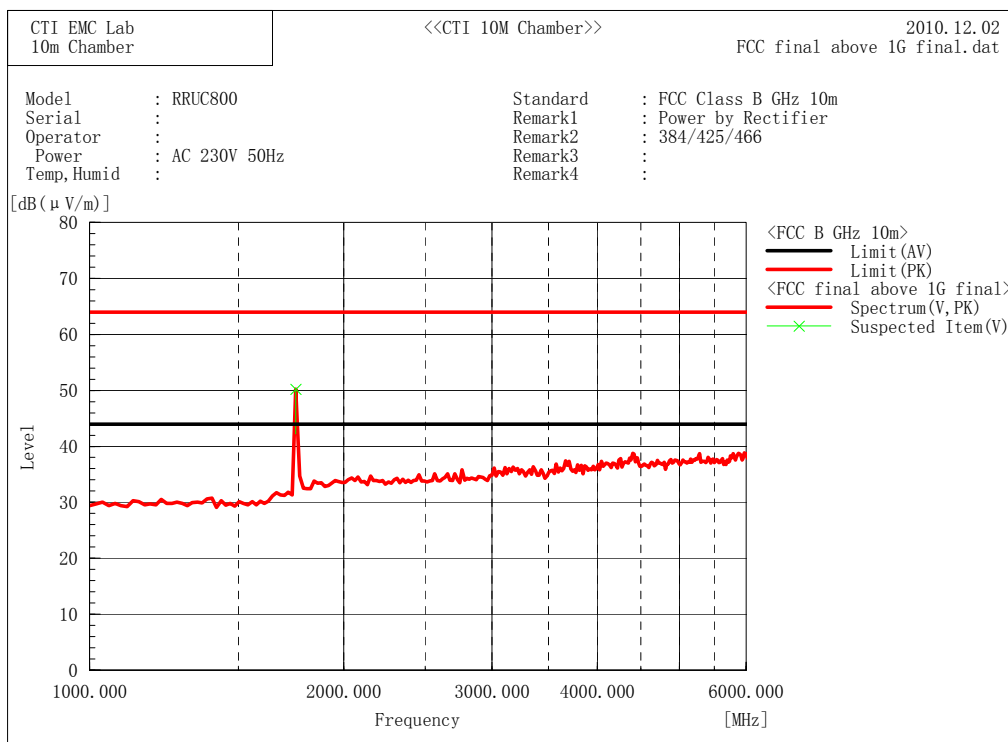
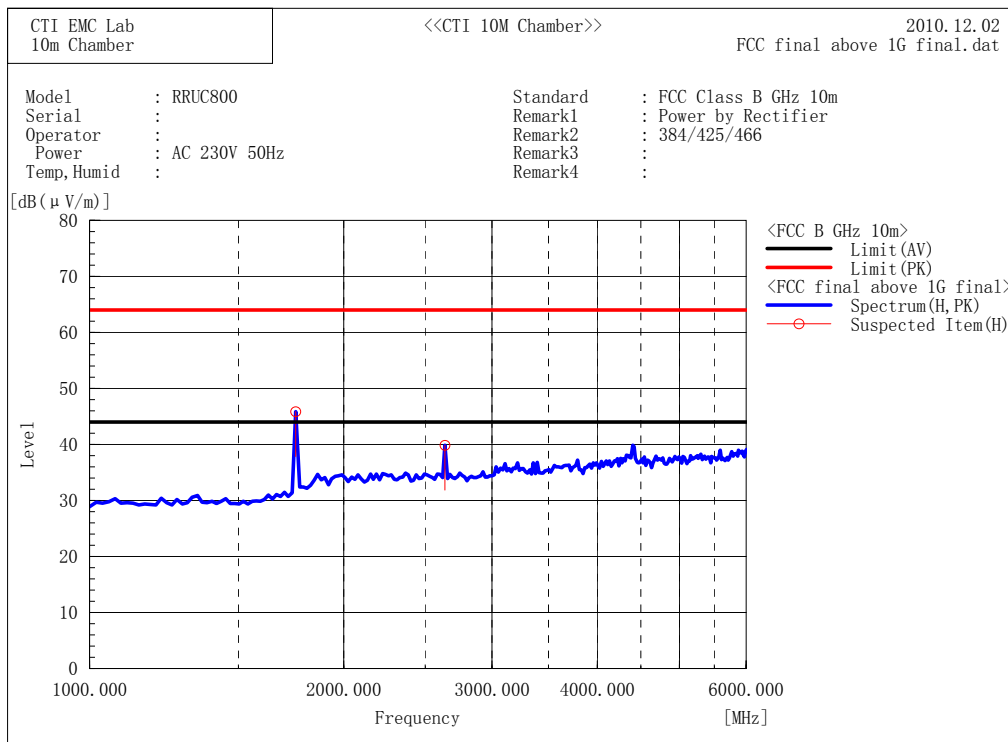
30MHz-1GHz (Powered by Rectifier)

Note: Marker 1 was the broadcast signal of the RRUC-E 800MHz

Test Report

Report No. : EESZD02220008-2

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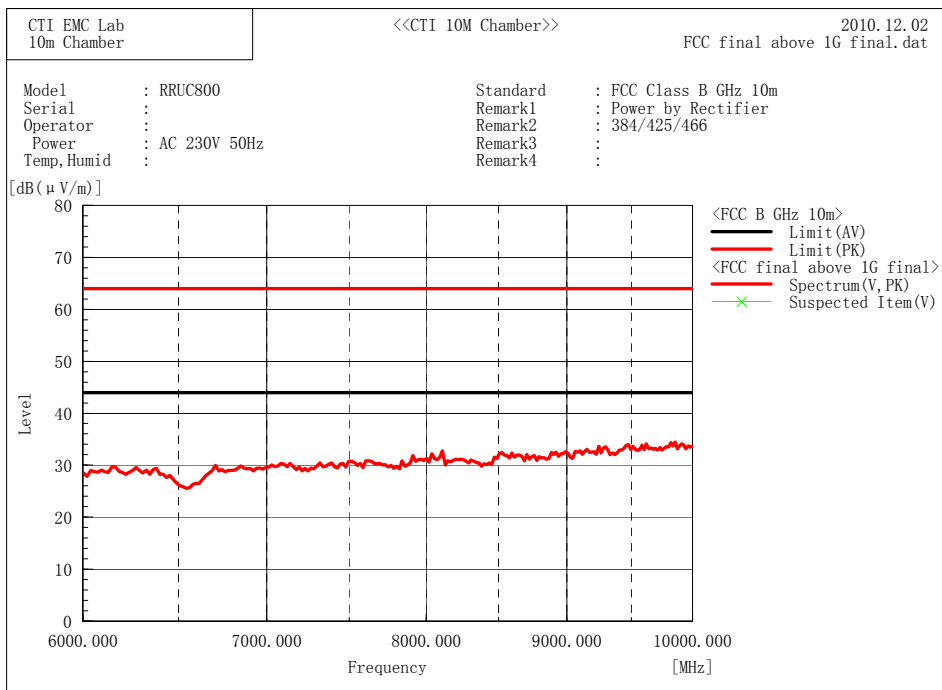
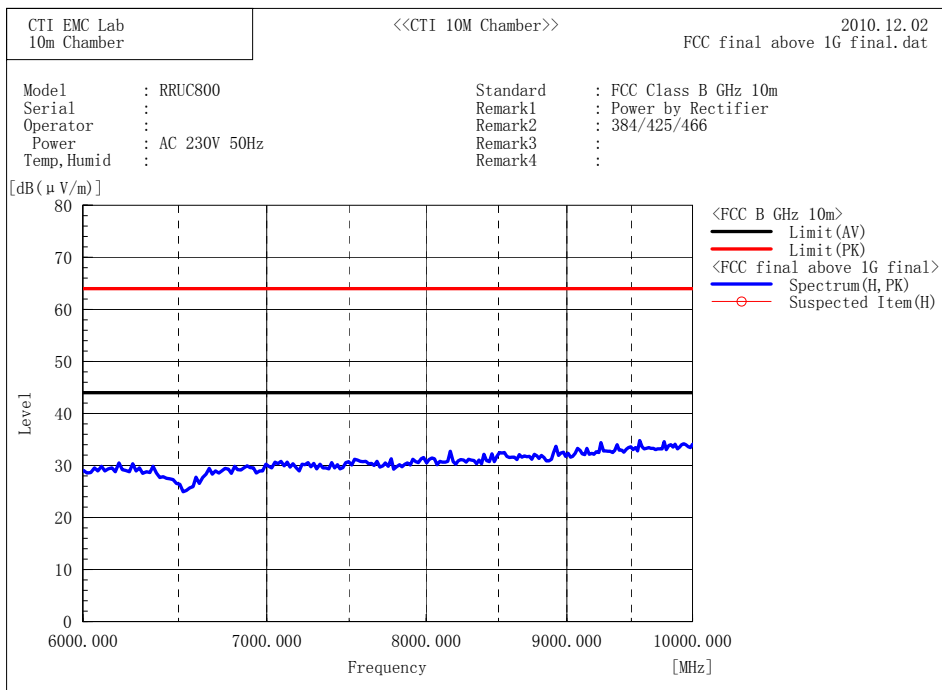


1GHz-6GHz (Powered by Rectifier)

Test Report

Report No. : EESZD02220008-2

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6GHz-10GHz (Powered by Rectifier)

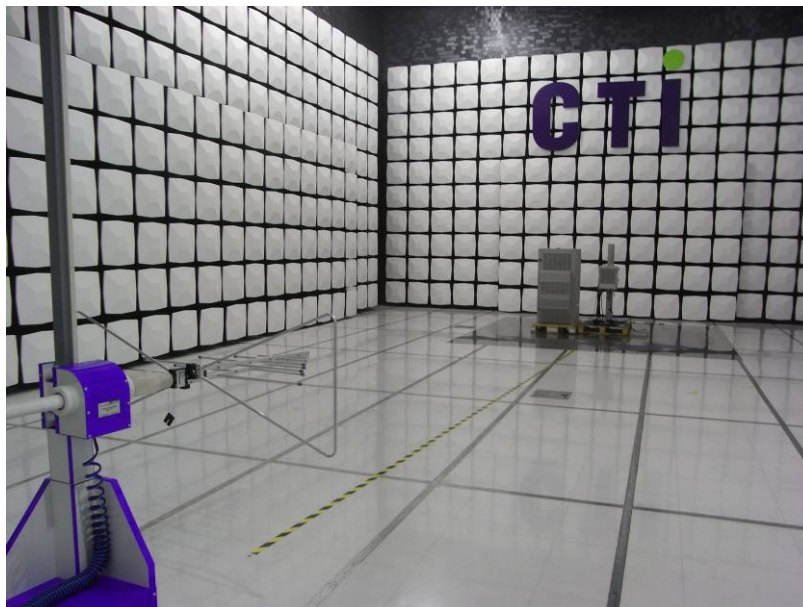
Note: The carrier frequency of the EUT are 880.895MHz—884.605MHz

Test Report

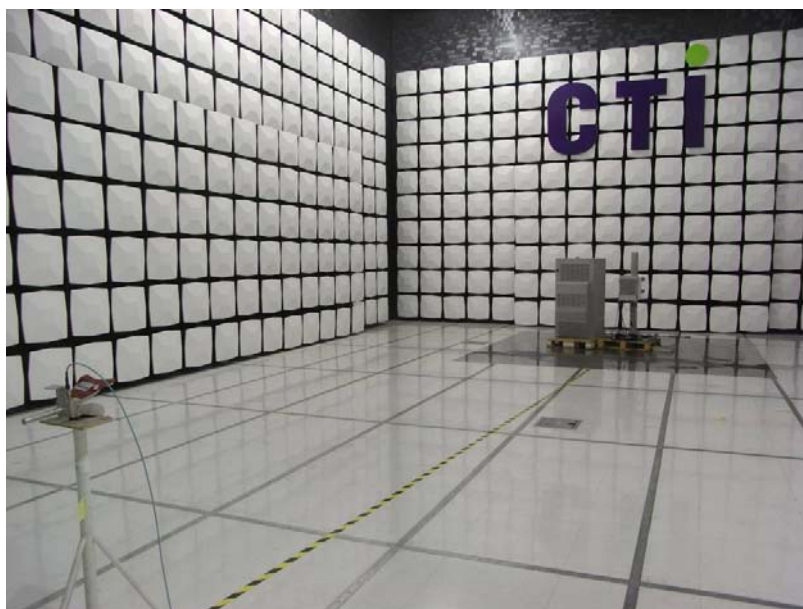
Report No. : EESZD02220008-2

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Setup Photos



30MHz-1GHz



Above 1GHz

*** End of report ***

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APPENDIX B: Lab Test Report of RRUC-E 800 with DPM A-band

Test Report

Report No. : EESZD06030010

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Client : Ericsson (China) Communications Company Ltd.

Address : Rongli Industrial Park, Liuheng Road, Ronggui, Shunde, foshan, Guangdong,
528306, P.R.C

Description of the submitted sample(s):

Sample Name	: 800MHz Remote Radio Unit CDMA-Enhance(RRUC- E 800)
Model/Type	: RRUC-E 800 with duplexer A-band
Trade	: Ericsson
Ratings	: DC -48V
Test Item	: 1. Transmitter Spurious Emission 2. Receiver Spurious Emission
State of Sample(s)	: Full power
Sample Quantity	: 1pcs
Manufacturer	: Ericsson (China) Communications Company Ltd.
Sample Received Date	: 2011-5 -16
Sample tested Date	: 2011-5 -24
Test Requested	: FCC part 2.1053 FCC part 22.917 RSS-GEN SECTION 4.9 Issue 3 RSS-GEN SECTION 4.10 Issue 3 RSS-129 SECTION 8.1.2 Issue 2 RSS-129 SECTION 10 Issue 2 Requirement Of Client

Test Results:. PASS

Reviewed by: Louisa Lu
Engineer

Approved by: [Signature]
Manager

Approved date: June 10, 2011



Check No.: 47229685

CENTRE TESTING INTERNATIONAL (SHENZHEN) CORPORATION
Building C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen, Guangdong, China

Test Report

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1. TEST SUMMARY:

The EUT has been tested according to the following specifications:

Standard	Test Item	Test
FCC part 2.1053 FCC part 22.917 RSS-GEN SECTION 4.9 RSS-129 SECTION 8.1.2	Transmitter Spurious Emission	PASS
RSS-GEN SECTION 4.10 RSS-129 SECTION 10	Receiver Spurious Emission	PASS

2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value
Spurious Emission	4.4dB

3. EQUIPMENT LIST

10M Semi-anechoic Chamber - Radiated Spurious Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
10M Chamber & Accessory Equipment	Rainford	--	--	06/18/2012
Receiver	R&S	ESCI	100435	10/27/2011
Spectrum Analyzer	R&S	FSP40	100416	07/10/2011
ESG Vector signal generators	Agilent	E4438C	MY45095744	03/29/2012
Biconilog Antenna	schwarzbeck	VULB9136	9136-401	08/03/2011
Biconilog Antenna	schwarzbeck	VULB9136	9136--484	03/01/2012
Horn Antenna	ETS-LINGREN	3117	00057407	07/31/2011
Horn Antenna	ETS-LINGREN	3117	00057410	07/31/2011
Microwave Preamplifier	Agilent	8449B	3008A02425	N/A
Microwave Preamplifier	Agilent	11909A	186871	N/A

Test Report

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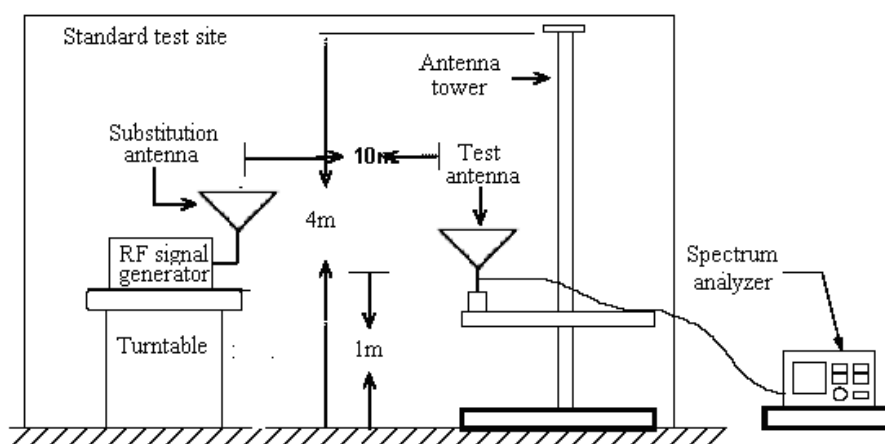
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4. TRANSMITTER SPURIOUS EMISSION

4.1 Test Condition

Operation Mode : Full Power
 Operation Voltage : DC -48V
 Temperature / Humidity / Air Pressure : 23°C / 53.4% / 101.2Kpa

4.2 Test setup



4.3 Test Limits

Frequency range(MHz)	Limits(dBm)
0.009 to 10000	The Spurious emission must be attenuated by at least $43+10\log (P) -13$

Note: P is the Transmitter rated power in watts

Test Report

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4.4 Test Procedure

- 1) On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- 2) The test antenna shall be oriented initially for vertical polarization located 10m from the EUT to correspond to the transmitter.
- 3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report.
The detector selection is based on how close the emission level was approaching the limit.
- 4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- 5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- 6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7) The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- 8) The maximum signal level detected by the measuring receiver shall be noted.
- 9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- 10) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter.
- 11) The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- 12) The substitution antenna shall be connected to a calibrated signal generator.
m. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

Test Report

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4.5 Test Results

Frequency	E-field Emission Level	Signal Generator Level	Antenna Gain	Cable Loss	E.R.P	Limits	Margin	Results	Remarks
(MHz)	(dBuV/m)	(dBm)	dBi	dB	(dBm)	(dBm)	(dB)	P/F	(H/V)
105.660	27.5	-72.16	-1.66	0.62	-69.88	-13	56.88	P	H
1750.000	58.2	-36.17	3.15	2.29	-37.03	-13	24.03	P	H
2630.000	53.6	-40.28	4.13	2.78	-41.63	-13	28.63	P	H
1750.000	51.8	-42.57	3.15	2.29	-43.43	-13	30.43	P	V
2330.000	54.0	-39.88	4.13	2.78	-41.23	-13	28.23	P	V
4390.000	52.4	-39.33	7.35	3.85	-42.83	-13	29.83	P	V

Note: 1. The carrier frequency of the EUT are 875.345MHz—879.115MHz

2. ERP = Signal generator Level – Cable losses + Antenna gain

3. Margin = Limit - ERP

Test Report

Report No. : EESZD06030010

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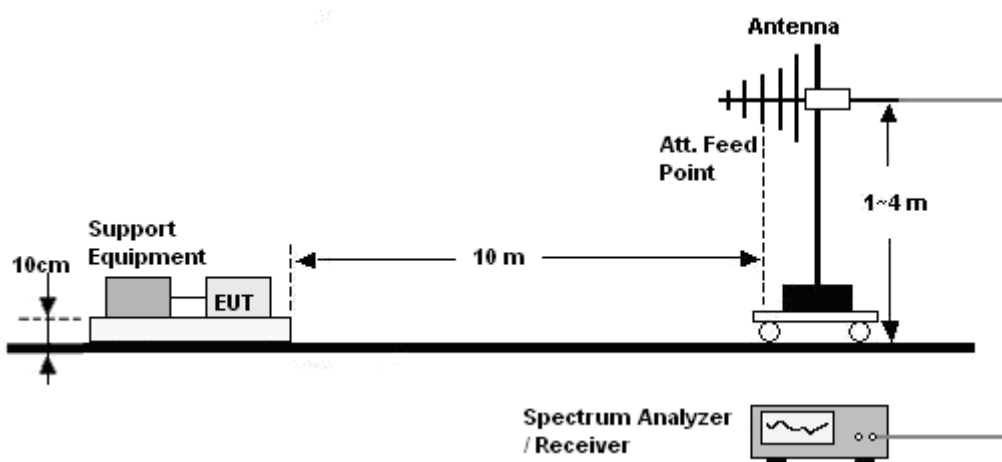
5. RECEIVER SPURIOUS EMISSION

5.1 Test Condition

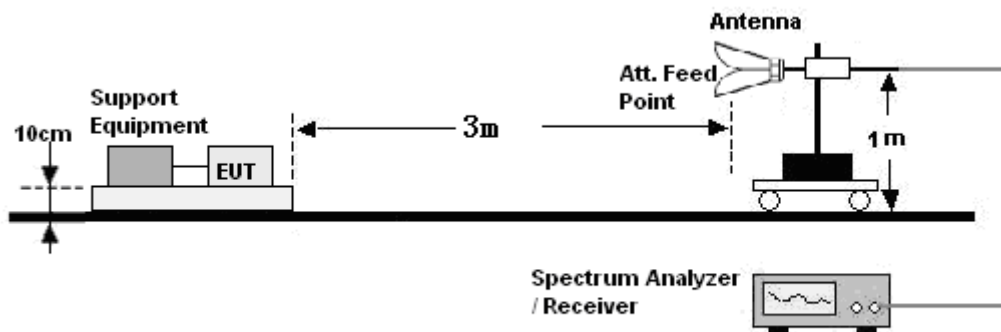
Operation Mode : Full Power
 Operation Voltage : DC -48V
 Temperature / Humidity / Air Pressure : 23°C / 53.4% / 101.2Kpa

5.2 Test Setup

30MHz ~ 1GHz:



Above 1GHz



Test Report

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5.3 Test Limits

30MHz ~ 1GHz:

Frequency (MHz)	limits at 10m dB(μ V/m)
30-88	30.0
88-216	33.5
216-960	36.0
Above 960	44.0

Above 1GHz

Frequency (MHz)	limits at 3m dB(μ V/m)
Above 960	54.0

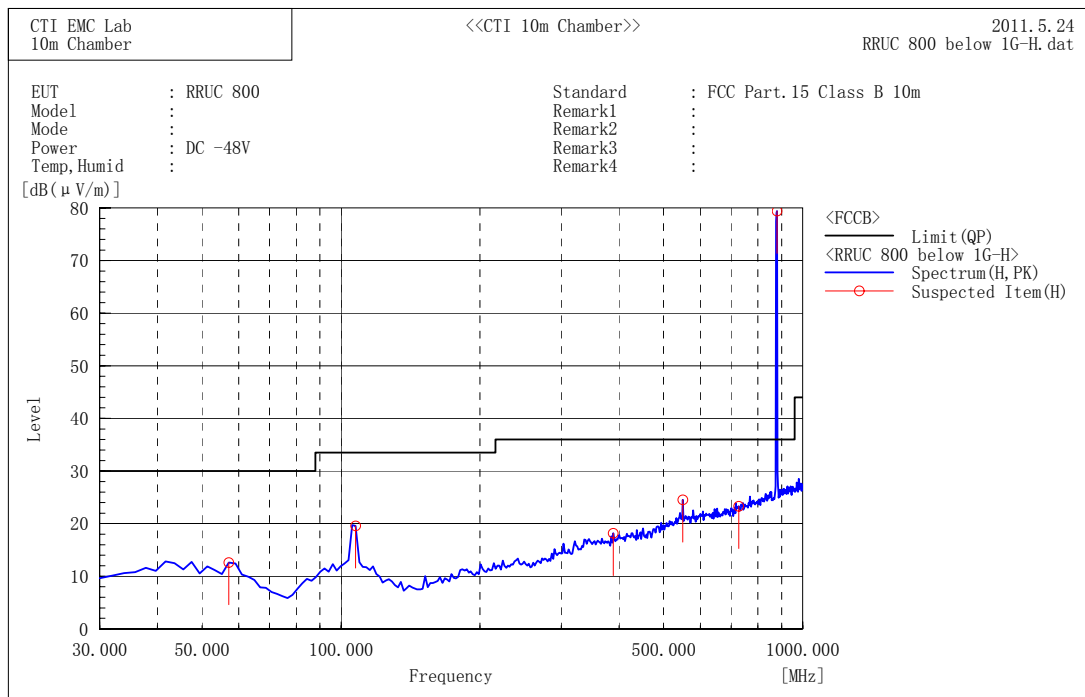
- NOTE:**
1. The lower limit shall apply at the transition frequency.
 2. The limits shown above are based on measuring equipment employing a CISPR quasi-peak detector function for frequencies below or equal to 1000MHz.
 3. The limits shown above are based on measuring equipment employing an average detector function for frequencies above 1000MHz.

Test Report

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5.4 Test Results



Spectrum Selection

--- Horizontal Polarization ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result PK [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Remark
1	57.160	31.5	-18.9	12.6	30.0	17.4	
2	107.600	38.5	-18.9	19.6	33.5	13.9	
3	388.900	31.8	-13.6	18.2	36.0	17.8	
4	549.920	34.5	-10.0	24.5	36.0	11.5	
5	726.460	31.3	-8.0	23.3	36.0	12.7	
6	879.720	84.5	-5.1	79.4	36.0	-43.4	

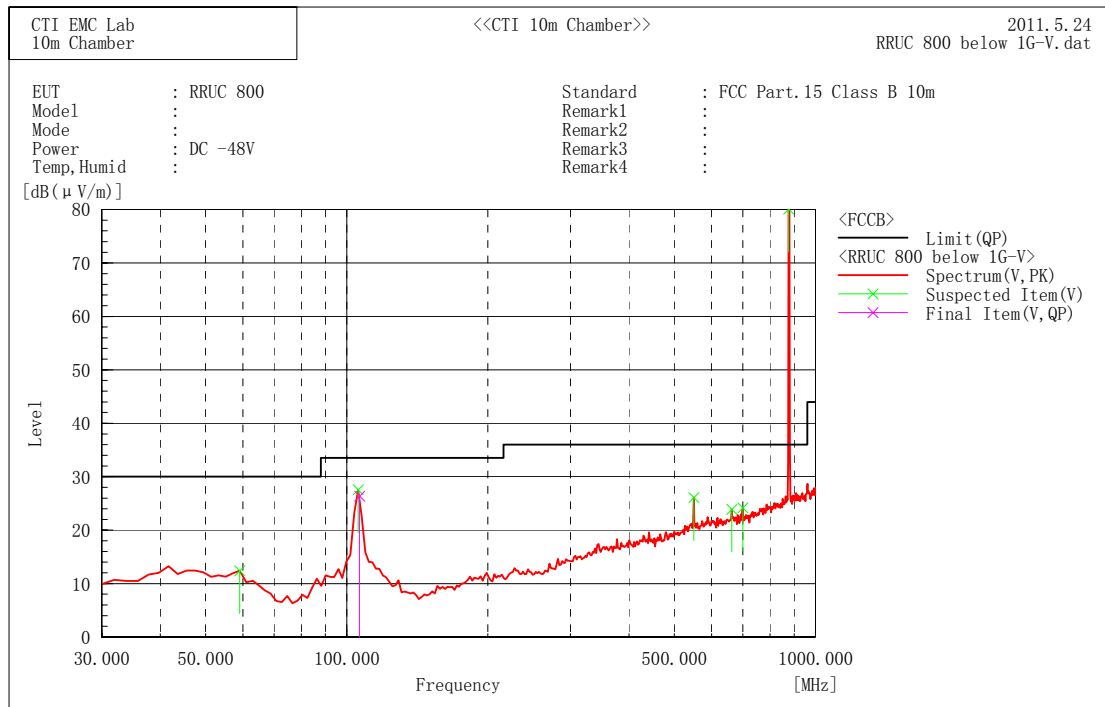
30MHz-1GHz (H)

Note: Marker 6 was the broadcast signal of the RRUC-E 800MHz

Test Report

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Spectrum Selection

--- Vertical Polarization ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result PK [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Remark
1	59.100	31.5	-19.1	12.4	30.0	17.6	
2	105.660	46.2	-18.7	27.5	33.5	6.0	
3	549.920	36.1	-10.0	26.1	36.0	9.9	
4	662.440	32.8	-8.9	23.9	36.0	12.1	
5	699.300	32.7	-8.5	24.2	36.0	11.8	
6	875.840	85.3	-5.2	80.1	36.0	-44.1	

Final Result

--- Vertical Polarization (QP) ---

No.	Frequency [MHz]	Reading [dB(μV)]	c. f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Remark
1	106.455	45.2	-18.8	26.4	33.5	7.1	

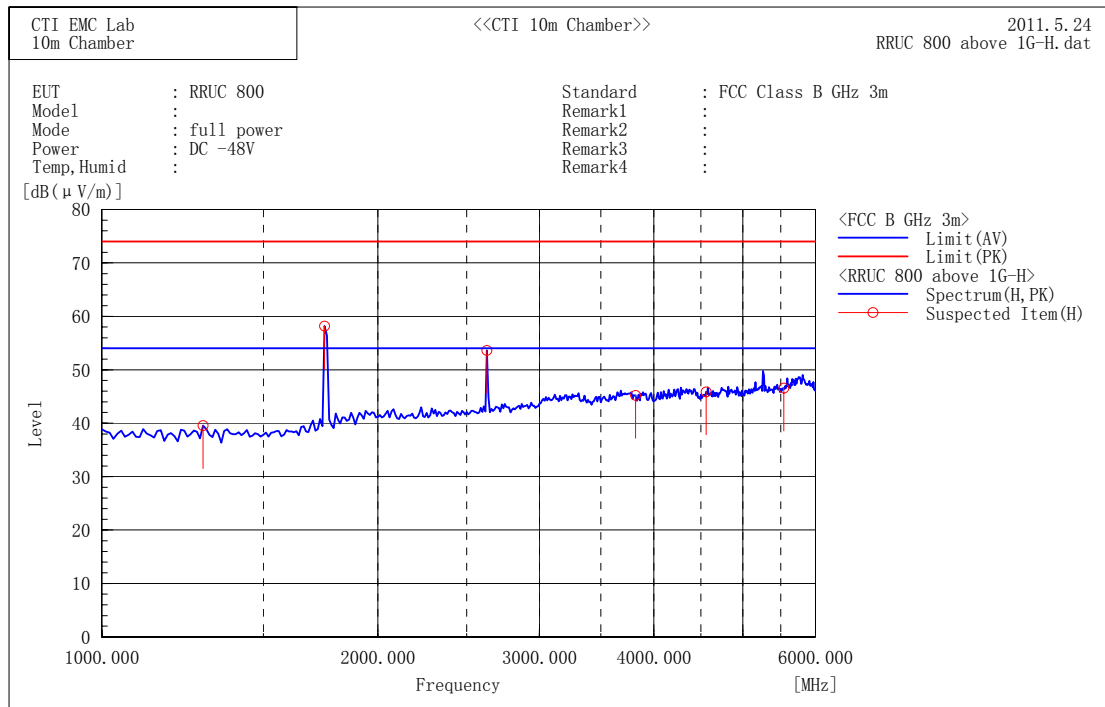
30MHz-1GHz (V)

Note: Marker 6 was the broadcast signal of the RRUC-E 800MHz

Test Report

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Spectrum Selection

--- Horizontal Polarization ---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Limit PK [dB(μV/m)]	Margin PK [dB]	Remark
1	1750.000	55.9	2.3	58.2	74.0	15.8	
2	2630.000	46.5	7.1	53.6	74.0	20.4	
3	1290.000	40.9	-1.3	39.6	74.0	34.4	
4	3820.000	34.7	10.5	45.2	74.0	28.8	
5	4560.000	32.9	13.0	45.9	74.0	28.1	
6	5540.000	31.4	15.2	46.6	74.0	27.4	

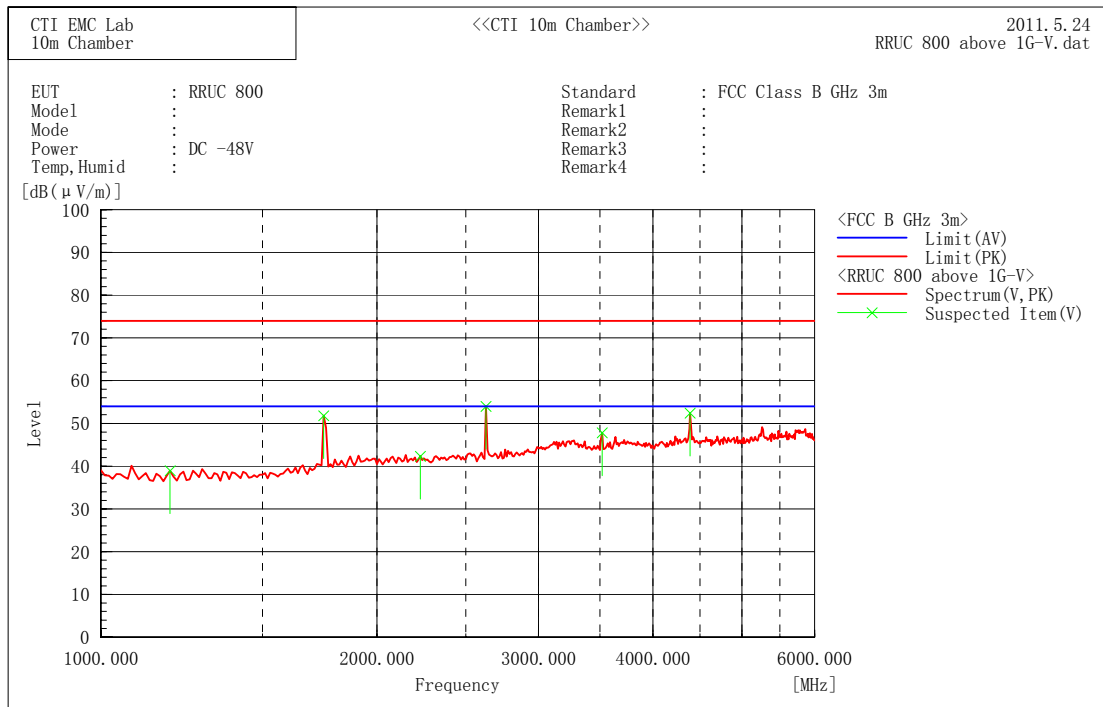
1GHz-6GHz (H)

Note: Marker 1 and 2 were the second and the third harmonic of the intentional signal of the RRUC-E 800MHz

Test Report

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Spectrum Selection

--- Vertical Polarization ---

No.	Frequency [MHz]	Reading [dB(μ V)]	c. f [dB(1/m)]	Result PK [dB(μ V/m)]	Limit PK [dB(μ V/m)]	Margin PK [dB]	Remark
1	4390.000	39.8	12.6	52.4	74.0	21.6	
2	2630.000	46.9	7.1	54.0	74.0	20.0	
3	1190.000	40.8	-1.9	38.9	74.0	35.1	
4	2230.000	36.7	5.6	42.3	74.0	31.7	
5	3520.000	38.1	9.7	47.8	74.0	26.2	
6	1750.000	49.5	2.3	51.8	74.0	22.2	

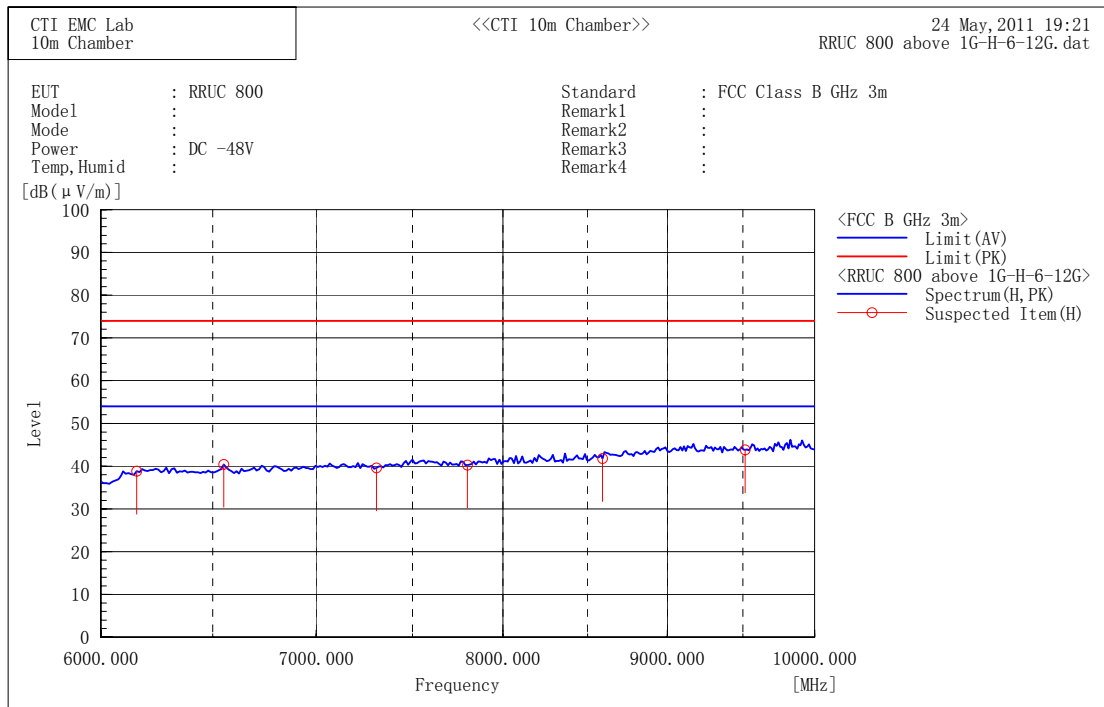
1GHz-6GHz (V)

Note: Marker 6, 2, and 1 were the second, the third and the fifth harmonic of the intentional signal of the RRUC-E 800MHz

Test Report

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Spectrum Selection

--- Horizontal Polarization ---

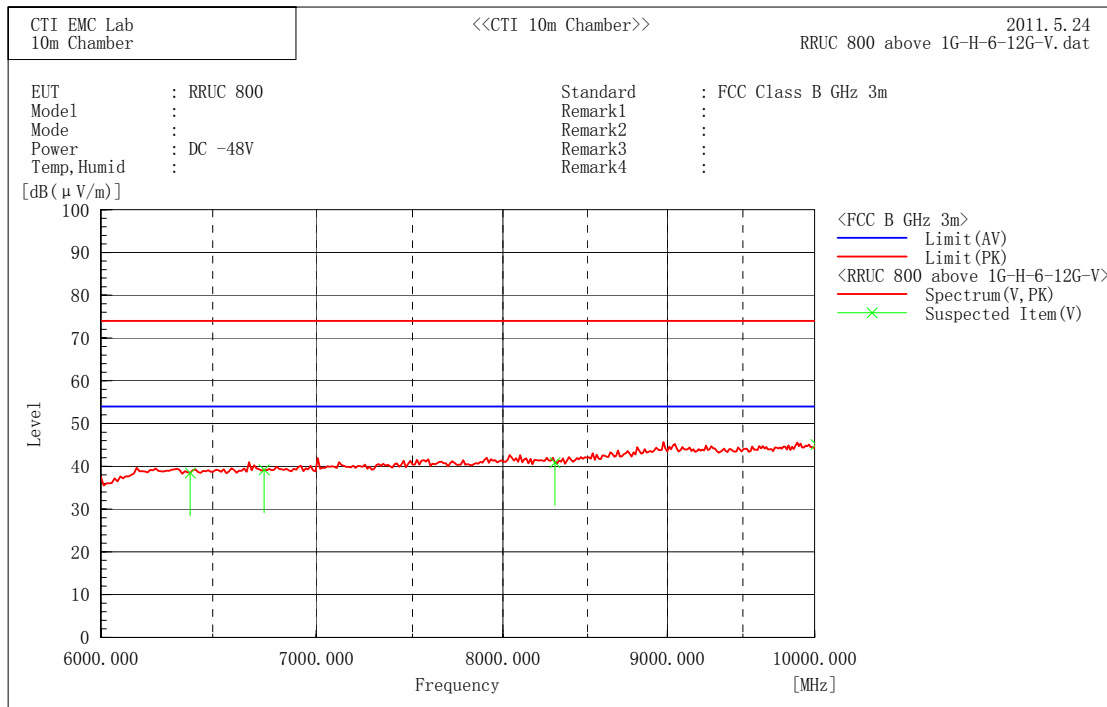
No.	Frequency	Reading	c. f	Result	Limit	Margin	Remark
	[MHz]	[dB(μV)]	[dB(1/m)]	PK [dB(μV/m)]	PK [dB(μV/m)]	PK [dB]	
1	6156.000	32.1	6.8	38.9	74.0	35.1	
2	6552.000	33.1	7.3	40.4	74.0	33.6	
3	7800.000	30.9	9.4	40.3	74.0	33.7	
4	8592.000	31.0	10.8	41.8	74.0	32.2	
5	9516.000	31.2	12.6	43.8	74.0	30.2	
6	7308.000	30.9	8.7	39.6	74.0	34.4	

6GHz- 12GHz (H)

Test Report

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Spectrum Selection

--- Vertical Polarization ---

No.	Frequency	Reading	c. f	Result	Limit	Margin	Remark
	[MHz]	[dB(μV)]	[dB(1/m)]	PK	PK	PK	
				[dB(μV/m)]	[dB(μV/m)]	[dB]	
1	6396.000	31.4	7.1	38.5	74.0	35.5	
2	6744.000	31.7	7.5	39.2	74.0	34.8	
3	8304.000	30.7	10.2	40.9	74.0	33.1	
4	10008.000	31.8	13.4	45.2	74.0	28.8	
5	11232.000	31.9	16.3	48.2	74.0	25.8	

6GHz- 12GHz (V)

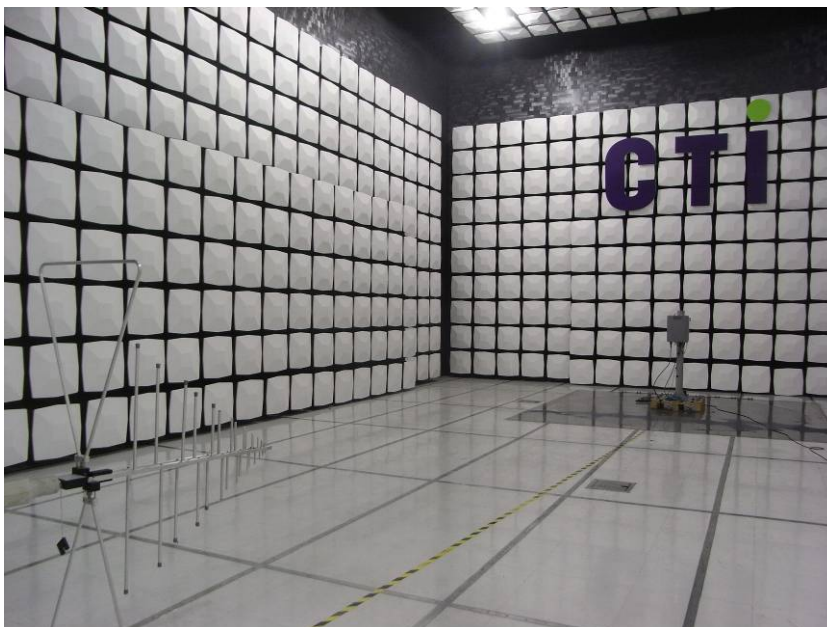
Note: The carrier frequency of the EUT are 875.345MHz—879.115.MHz

Test Report

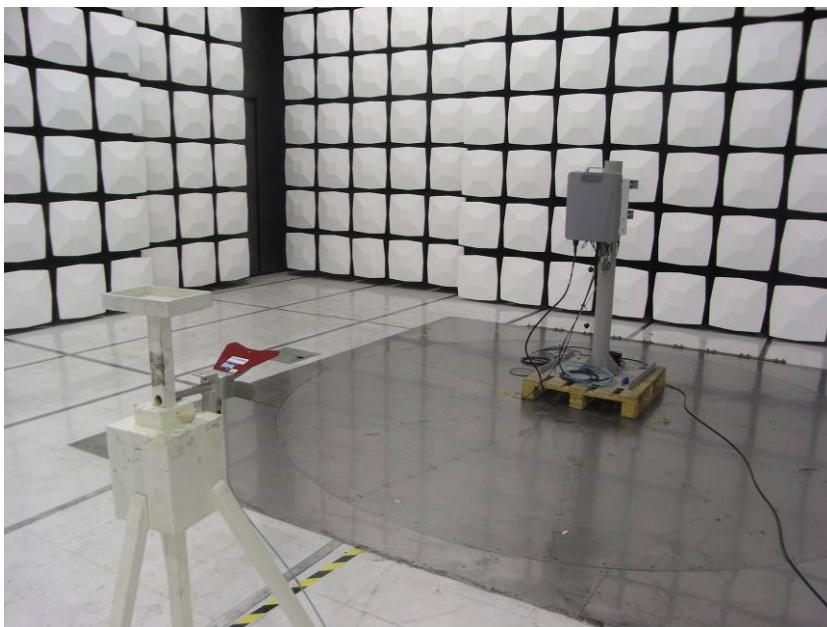
Report No. : EESZD06030010

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Setup Photos



30MHz-1GHz



Above 1GHz

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