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Report On

Application for Grant of Equipment Authorization of the
Nextivity Inc.

Cel-Fi DUO Smart Cellular Signal Booster

FCC CFR 47 Part 2 and 27
IC RSS-Gen and RSS-130

Report No. SD72112724-0116C Rev1.0

June 2016



REPORT ON	Radio Testing of the Nextivity Inc. Smart Cellular Signal Booster
TEST REPORT NUMBER	SD72112724-0116C Rev1.0
PREPARED FOR	Nextivity Inc. 12230 World Trade Drive, Suite 250 San Diego, CA 92128
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DATED	June 02, 2016

FCC ID: NU: YETD32-21366NU
CU: YETD32-21366CU
IC: N/A
Report No. SD72112724-0116C Rev1.0



Revision History

SD72112724-0116C Rev1.0 Nextivity Inc. M/N D32-2/13/66 Cel-Fi DUO Smart Cellular Signal Booster					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
04/22/16	Initial Release				Juan M Gonzalez
06/02/2016	Initial Release	Rev1.0	Change 1.3.2 Capability to LTE (Band 2, 13 and 4)/UNII and BT LE		Juan M Gonzalez



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SECTION 1

REPORT SUMMARY

Radio Testing of the
Nextivity Inc.
Cel-Fi DUO Smart Cellular Signal Booster



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nextivity Inc. Smart Cellular Signal Booster to the requirements of the following:

- FCC CFR 47 Part 2 and 27
- IC RSS-Gen and RSS-130.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Nextivity Inc.
Model Number(s)	Cel-Fi DUO
FCC ID	NU: YETD32-21366NU CU: YETD32-21366CU
IC Number	N/A
Serial Number(s)	921550000015 (NU and CU)
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC CFR 47 Part 2 and 27 (October 1, 2015). • RSS-130 – Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz (Issue 1, October 2013). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014).
Start of Test	January 11, 2016
Finish of Test	February 02, 2016
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• ANSI/TIA-603-C-2004 – Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards. • KDB971168 (D01 Power Meas License Digital Systems v02r02) Measurement Guidance For Certification Of Licensed Digital Transmitters • KDB412172 D01 Determining ERP and EIRP v0101 (Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System. • Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and 27 with cross-reference to the corresponding IC RSS standard is shown below.

Section	Spec Clause			Test Description	Result
	FCC Part 2	FCC Part 27	RSS-130		
2.1	2.1046	27.50 (b)(9)	4.4	Transmitter Conducted Output Power	Compliant
2.2	2.1046	27.50 (b)(9)	-	Equivalent Isotropic Radiated Power	Compliant
	-	-	4.4	Equivalent Radiated Power	Compliant
2.3	2.1049	27.53 (h)	RSS-Gen 6.6	Occupied Bandwidth	Compliant
2.4	-	27.50 (d)(5)	4.4	Peak-Average Ratio	Compliant
2.5	2.1051	27.53 (c)(1),(2),(5)	4.6.1	Band Edge	Compliant
2.6	2.1051	27.53 (c)(1),(2),(4),(5),(6) and (f)	4.6	Conducted Spurious Emissions	Compliant
2.7	2.1053	27.53 (c)(1),(2),(4),(5),(6) and (f)	4.6	Field Strength Of Spurious Radiation	Compliant
2.8	2.1055	27.54	4.3	Frequency Stability	Compliant
-	-	-	RSS-Gen 6.0	Receiver Spurious Emissions	N/A*
2.9	-	-	RSS-Gen 8.8	Power Line Conducted Emission	Compliant

N/A - Not applicable. EUT has no Stand-Alone receiver port



1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Nextivity Inc. Cel-Fi DUO Smart Cellular Signal Booster. The EUT is a signal booster for indoor residential, small business and small enterprise use. It consists of two units: the Network Unit (NU), and the Coverage Unit (CU). NU and CU are shipped and sold as one unit. The NU transmits and receives Cellular signals from the base station and operates similar to a cellular handset. The CU transmits and receives signals with the cellular handset and operates on frequencies similar to the cellular base station. The NU and CU are connected wirelessly over a full-duplex wireless link in the UNII band using a mixed OFDM and muxed cellular signal over a 30 or 40 MHz channel in each direction. The CU also includes Bluetooth LE connectivity. With the use of smart phone application, it allows user to register the product, update software, capture/display details metrics of the system. NU does not support Bluetooth LE. The LTE Band 13 function of the EUT were verified in this test report.



1.3.2 EUT General Description

EUT Description	Smart Cellular Signal Booster
Model Name	Cel-Fi DUO
Model Number(s)	D32-2/13/66
Rated Voltage	12VDC via external AC/DC adaptor
Mode Verified	LTE Band 13
Frequency Range	NU: 777 MHz – 787 MHz CU: 746 MHz – 756 MHz
Capability	LTE (Band 2, 13 and 4)/UNII and BT LE
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering
Manufacturer Declared Temperature Range	0°C to 40°C
Antenna Type	PCB PIFA
Manufacturer	Nextivity Inc.
Antenna Model	N/A
Maximum Antenna Gain	

NU	CU
0 dBi	0 dBi

1.3.3 Transmit Frequency Table

Mode	Channel Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	ERP(Part 27)	
				Max. Power (dBm)	Max. Power (W)
LTE Band 13 Downlink	5	748.5 - 753.5	4M34F9W	10.67	0.012
	10	751	8M74F9W	12.73	0.019
LTE Band 13 Uplink	5	779.5 - 784.5	4M34F9W	22.82	0.19
	10	782	8M74F9W	22.16	0.16

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Downlink (CU TX). Input signal is applied to B13 antenna port of NU. Output is monitored from B13 Top antenna port of CU.
B	Uplink (NU TX). Input signal is applied to B13 antenna port of CU. Output is monitored from B13 Top antenna port of NU.
C	Radiated test setup. Downlink (CU TX). Input signal is applied to B13 antenna port of NU. B13 Top antenna port of CU is terminated with a 50Ω load.
D	Radiated test setup. Uplink (NU TX). Input signal is applied to B13 antenna port of CU. B13 Top antenna port of NU is terminated with a 50Ω load.

1.4.2 EUT Exercise Software

Manufacturer provided a configuration software (ConformanceTest.exe) running from a support laptop where both EUT are connected via USB.

1.4.3 Support Equipment and I/O cables

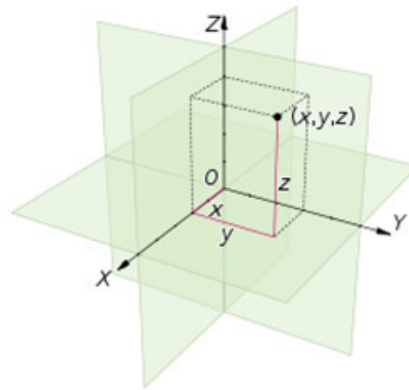
Manufacturer	Equipment/Cable	Description
Hon-Kwang	AC/DC Adapter (EUT)	M/N HK-AB-120A250-US P/N 290N025-001, 12VDC 2.5A
-	Support USB cable	1.75 meters, shielded Type A to Micro B connector
Nextivity	Support USB cable	Custom 1.0 meter shielded USB Type A to DB9 for the Shielded Test Enclosure
Sony	Support Laptop	M/N PCG-31311L S/N 27545534 3006488
Sony	Support Laptop AC Adapter	M/N PCGA-AC19V9 S/N 147839091 0023259
Rhode & Schwarz	Support Wideband Radio Communication Tester	M/N CMW500 S/N 1201.0002k50/103829
Mini-Circuits	Support Coaxial SMA Fixed Attenuator (x4)	M/N VAT-30W2 30dB DC-6GHz
Ramsey	Support Shielded Test Enclosure	M/N STE3300 S/N 3042 with custom USB cable and AC/DC Adapter

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report per Transmitter Conducted Output Power (Section 2.1 of this test report). This is for single channel verification, otherwise all three channels (Low, Mid and High) are verified:

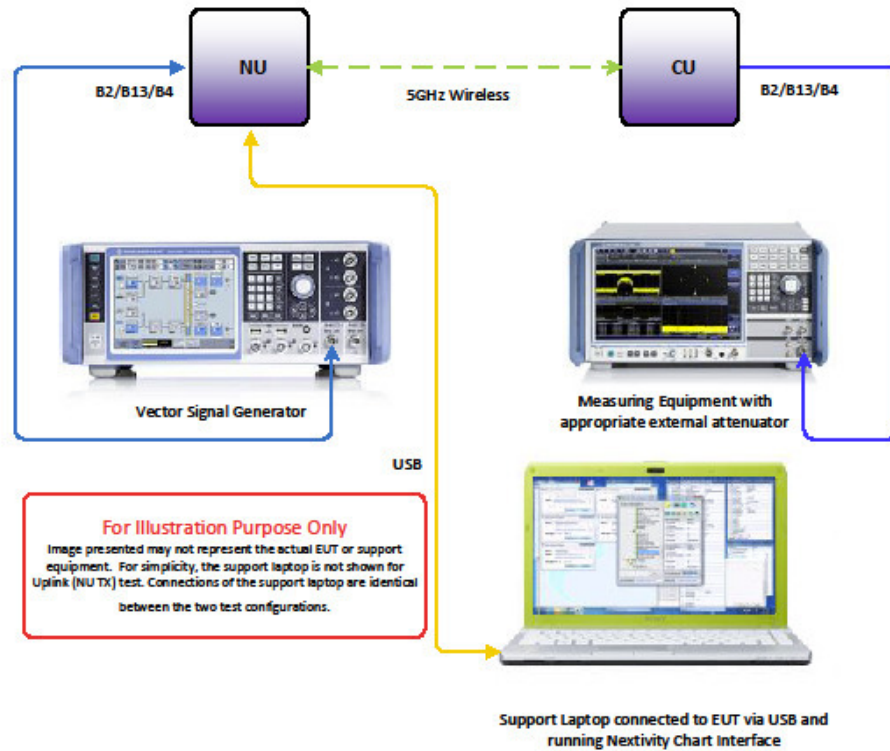
Mode	Bandwidth	Cellular	Frequency
LTE Band 13 Downlink	10MHz	Channel 5230	751 MHz
LTE Band 13 Uplink	5MHz	Channel 23205	779.5 MHz

EUT is a mobile device. Final installation position is unknown at the time of verification. For radiated measurements X, Y and Z orientations were verified. No major variation in emissions observed between the three (3) orientations. Verifications performed using “Z” configuration.



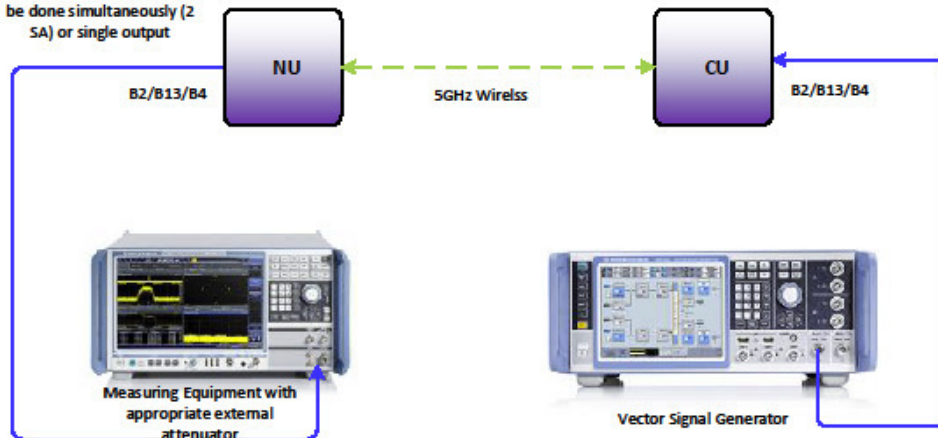
1.4.5 Simplified Test Configuration Diagram

Downlink (CU Tx) Conducted Test

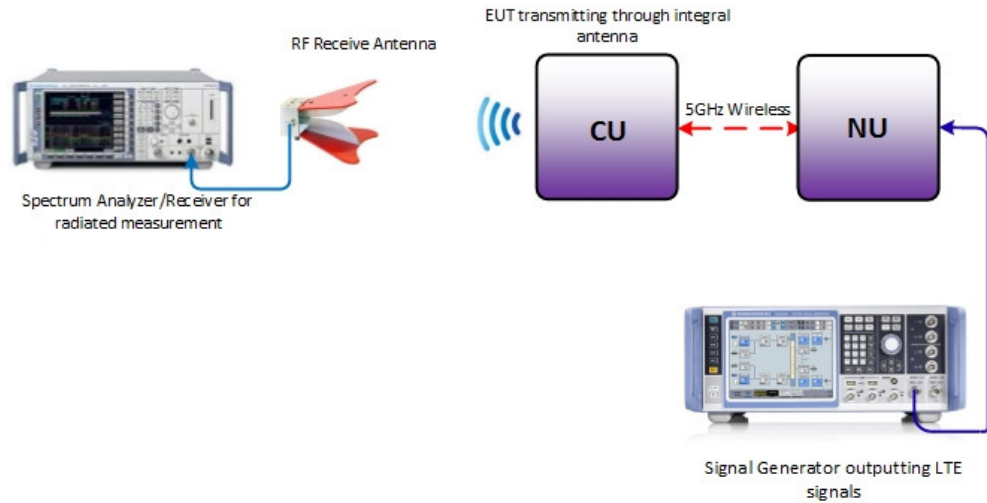


Uplink (NU Tx) Conducted Test

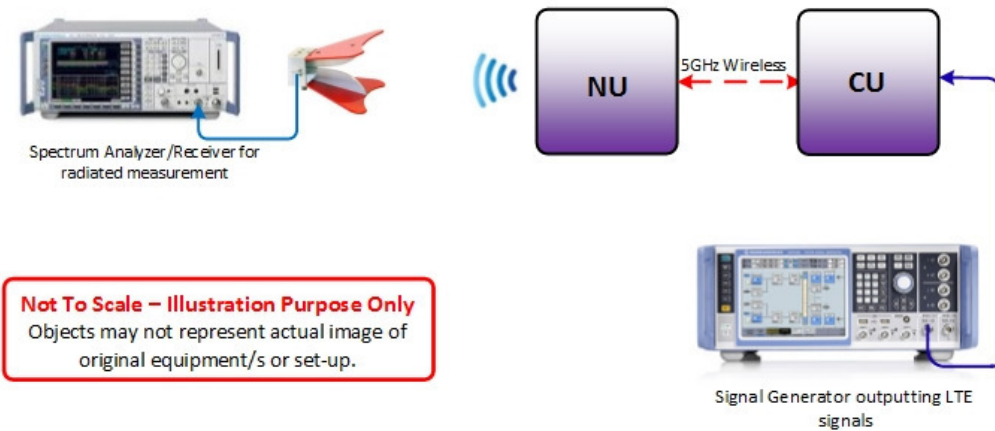
Monitoring the output can be done simultaneously (2 SA) or single output



Radiated Testing (Downlink)



Radiated Testing (Uplink)





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 921550000015 (NU and CU)		
N/A	-	-

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26 2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
For conducted (if applicable) and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.26-2015. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

Building #8, 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 Fax: 858 546 0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.



1.9.2 Innovation, Science and Economic Development Canada Registration No.: 3067A

The 10m Semi-anechoic chamber of TÜV SÜD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A.

1.10 SAMPLE CALCULATIONS

1.10.1 LTE Emission Designator

Emission Designator = 1M30F9W
 F = Frequency Modulation
 9= Composite Digital Info
 W = Combination (Audio/Data)

1.10.2 Spurious Radiated Emission (below 1GHz)

Measuring equipment raw measurement (dBμV/m) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dBμV/m) @ 30MHz			11.8

1.10.3 Spurious Radiated Emission – Substitution Method

Example = 84dBμV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBμV/m @ 1413 MHz (2nd Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBμV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$$\begin{aligned}
 P_{\text{EIRP}} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{\text{ERP}} &= P_{\text{EIRP}} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$



SECTION 2

TEST DETAILS

Radio Testing of the
Nextivity Inc.
Cel-Fi DUO Smart Cellular Signal Booster



2.1 TRANSMITTER CONDUCTED OUTPUT POWER

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046 (a) and (c)
FCC 47 CFR Part 27, Clause 27.50 (b)(9)
RSS-130, Clause 4.4

2.1.2 Standard Applicable

FCC 47 CFR Part 2, Clause 2.1046:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

FCC 47 CFR Part 27, Clause 27.50 (b)(9):

Control stations and mobile stations transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands and fixed stations transmitting in the 787–788 MHz and 805–806 MHz bands are limited to 30 watts ERP.

2.1.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Test Configuration A and B

2.1.4 Date of Test/Initial of test personnel who performed the test

January 11, 2016/XYZ

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	22.5 °C
Relative Humidity	24.4 %
ATM Pressure	100.0 kPa

2.1.7 Additional Observations

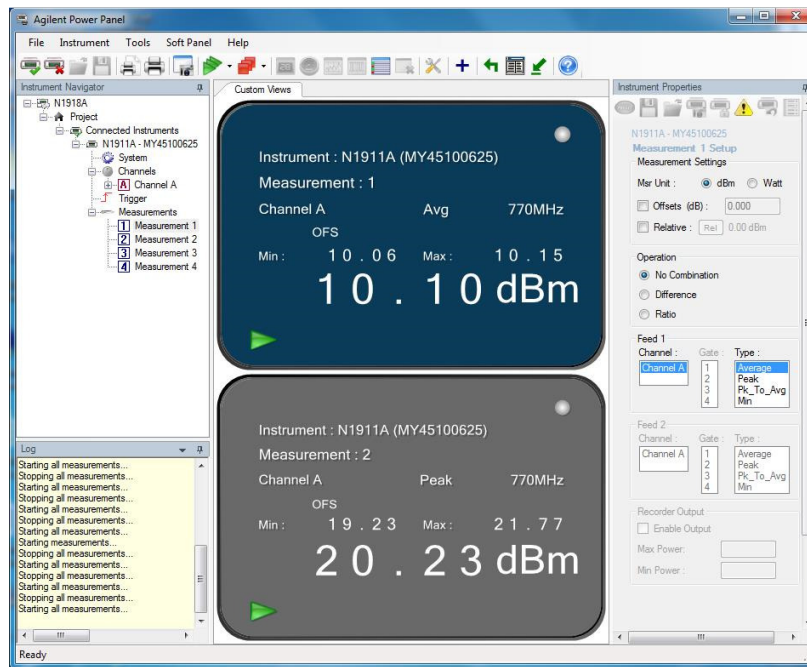
- This is a conducted test using an average power meter.
- The path loss was measured and entered as a level offset.
- Both Peak and Average measurements presented.

2.1.8 Test Results

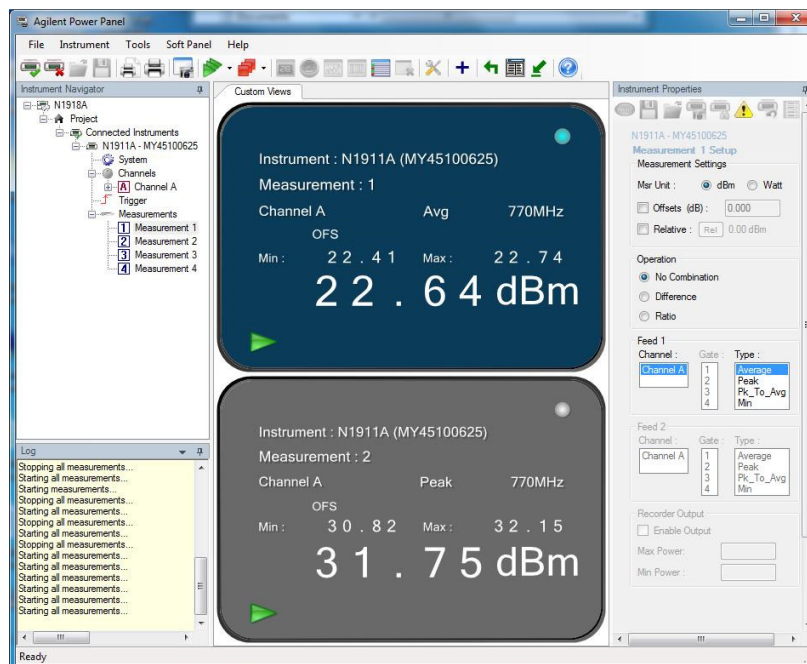
<i>Downlink</i>					
Band	Bandwidth	Channel	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
LTE Band 13	5MHz	5205	748.5	10.67	21.04
		5230	751	10.10	20.23
		5255	753.5	10.16	20.80
	10MHz	-	-	-	-
		5230	751	12.73	22.67
		-	-	-	-

<i>Uplink</i>					
Band	Bandwidth	Channel	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
LTE Band 13	5MHz	23205	779.5	22.82	31.61
		23230	782	22.64	31.75
		23255	784.5	22.34	30.97
	10MHz	-	-	-	-
		23230	782	22.16	31.54
		-	-	-	-

2.1.9 Sample Test Plot



LTE Band 13 DL 5MHz Bandwidth Mid Channel



LTE Band 13 UL 5MHz Bandwidth Mid Channel

2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046 (a) and (c)
FCC 47 CFR Part 27, Clause 27.50 (b)(9)
RSS-130, Clause 4.4

2.2.2 Standard Applicable

FCC 47 CFR Part 27, Clause 27.50 (b)(9):
Control stations and mobile stations transmitting in the 746–757 MHz, 776–788 MHz, and 805–806 MHz bands and fixed stations transmitting in the 787–788 MHz and 805–806 MHz bands are limited to 30 watts ERP.

RSS-130, Clause 4.4:

The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.

2.2.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU)

2.2.4 Date of Test/Initial of test personnel who performed the test

January 11, 2016/XYZ

2.2.5 Additional Observations

- ERP was calculated as per Section 1.3.2 of KDB412172 D01 (Determining ERP and EIRP v01).
- Calculation formula in logarithmic terms:

$$\text{ERP} = P_T + G_T - L_c - 2.15\text{dB}$$

Where:

P_T = transmitter conducted output power dBm (Section 2.1 of this test report)

G_T = gain of the transmitting antenna, in dBi (EIRP: the -2.15 in the formula is to convert EIRP to ERP);

L_c = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

2.2.6 Sample Computation

$$\begin{aligned}\text{ERP} &= P_T + G_T - L_c - 2.15\text{dB} \\ &= 29.87 \text{ (Peak)} + 0.13 \text{ (max. gain)} - 3.84 \text{ (cable loss)} - 2.15 \\ &= 24.01 \text{ dBm}\end{aligned}$$



2.2.7 Test Results

Band 13 Downlink							
Bandwidth	Channel	Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)
5.0MHz	5205	748.5	10.67	0	8.52	10.67	44.78
	5230	751	10.10	0	7.95	10.10	44.78
	5255	753.5	10.16	0	8.01	10.16	44.78
10MHz	-	-	-	0	-	-	44.78
	5230	751	12.73	0	10.58	12.73	44.78
	-	-	-	0	-	-	44.78

Band 13 Uplink							
Bandwidth	Channel	Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)
5.0MHz	23205	779.5	22.82	0	20.67	22.82	44.78
	23230	782	22.64	0	20.49	22.64	44.78
	23255	784.5	22.34	0	20.18	22.34	44.78
10MHz	-	-	-	0	-	-	44.78
	23230	782	22.16	0	20.01	22.16	44.78
	-	-	-	0	-	-	44.78



2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 27, Clause 27.53(h)
RSS-GEN Issue 4, Clause 6.6

2.3.2 Standard Applicable

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

2.3.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU)/ Test Configuration A and B

2.3.4 Date of Test/Initial of test personnel who performed the test

January 11, 2016/XYZ

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	22.5 °C
Relative Humidity	34.4 %
ATM Pressure	100.0 kPa

2.3.7 Additional Observations

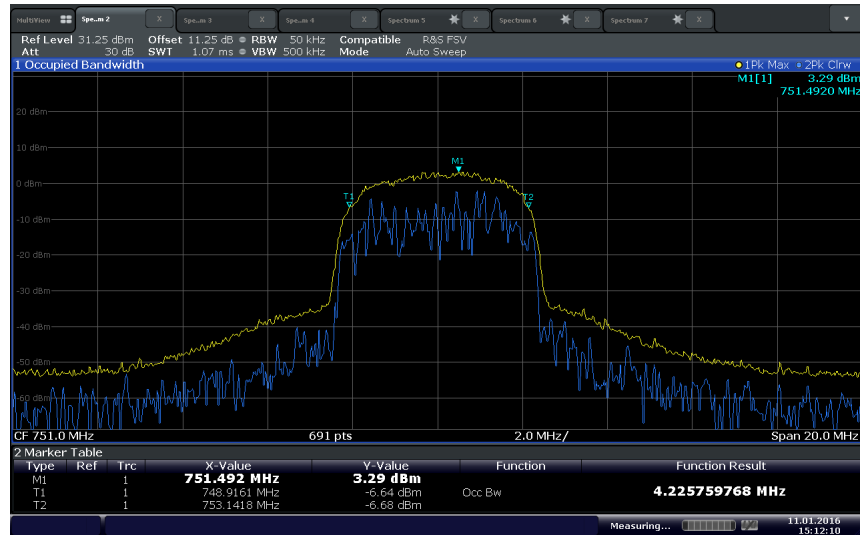
- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- All channels for emission bandwidth verification verified.
- The span is between two and five times the anticipated OBW.
- The RBW is set to 1% of the OBW while the VBW is $\geq 3X$ RBW.
- The detector is peak and the trace mode is max hold.
- All low, middle and high channels were verified. Only test plots for middle channel presented in this test report as the representative configuration.
- The SA built-in emission bandwidth measurement feature is utilized. The power level setting is set to 99% while "x dB" is set to -26.

2.3.8 Test Results

<i>Downlink</i>					
Band	Bandwidth	Channel	Frequency (MHz)	OBW (MHz)	-26dB BW (MHz)
LTE Band 13	5MHz	5205	748.5	4.34	4.89
		5230	751	4.25	4.86
		5255	753.5	4.28	4.86
	10MHz	-	-	-	-
		5230	751	8.74	9.49
		-	-	-	-

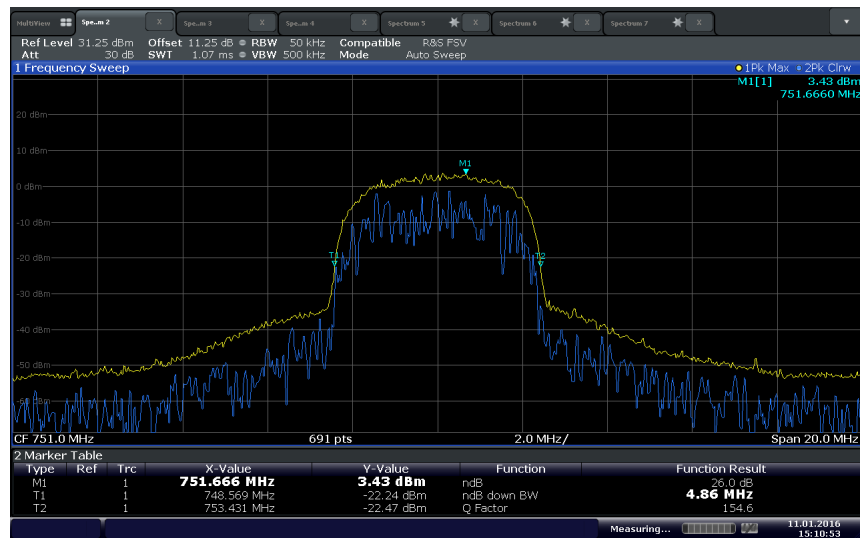
<i>Uplink</i>					
Band	Bandwidth	Channel	Frequency (MHz)	OBW (MHz)	-26dB BW (MHz)
LTE Band 13	5MHz	23205	748.5	4.23	4.86
		23230	751	4.25	4.86
		23255	753.5	4.34	4.89
	10MHz	-	-	-	-
		23230	751	8.74	9.49
		-	-	-	-

LTE Band 13 Downlink 5MHz Bandwidth Mid Channel 99% OBW



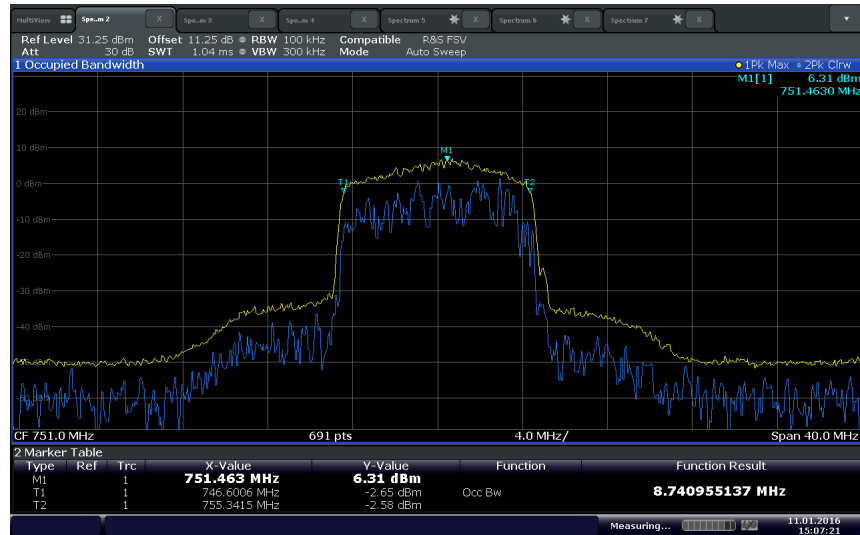
Date: 11 JAN 2016 15:12:10

LTE Band 13 Downlink 5MHz Bandwidth Mid Channel -26dB BW



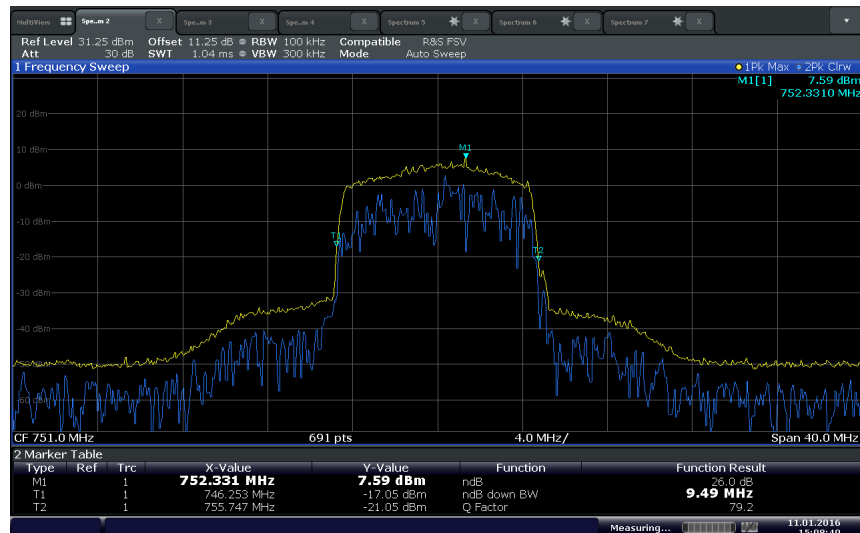
Date: 11 JAN 2016 15:10:53

LTE Band 13 Downlink 10MHz Bandwidth Mid Channel 99% OBW



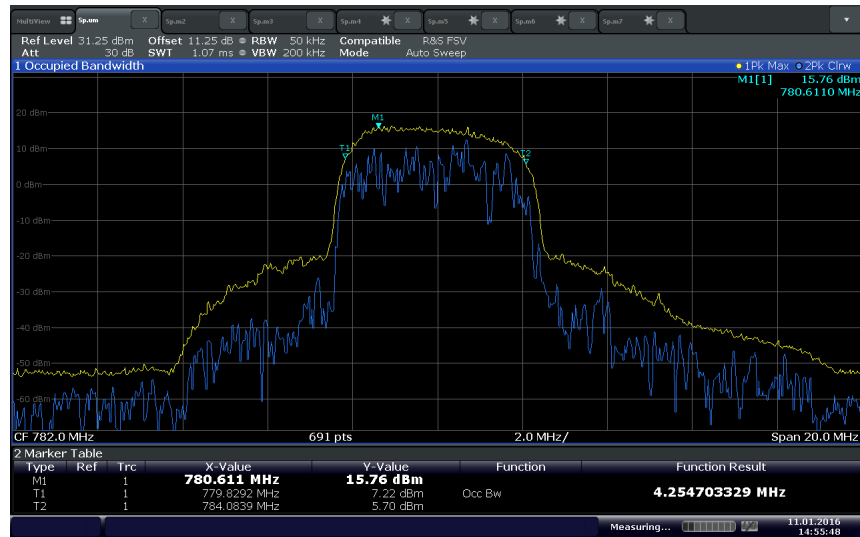
Date: 11 JAN 2016 15:07:21

LTE Band 13 Downlink 10MHz Bandwidth Mid Channel -26dB BW



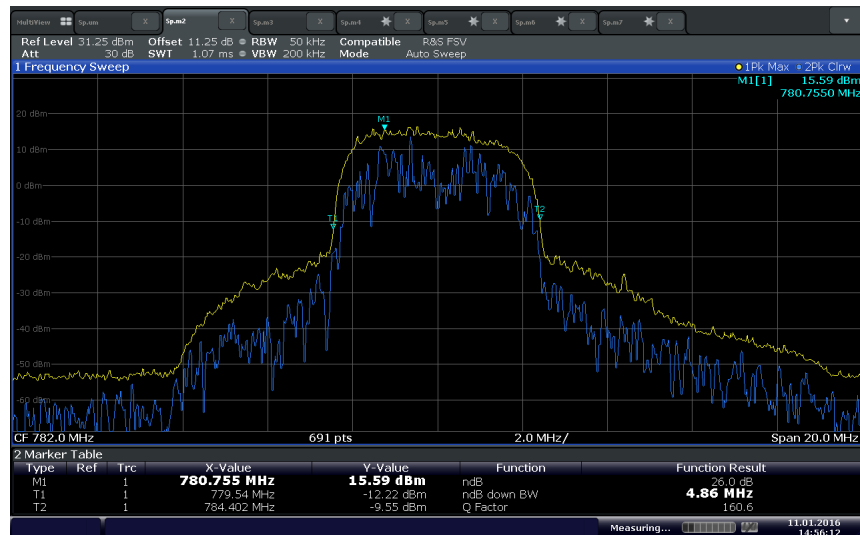
Date: 11 JAN 2016 15:08:40

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel 99% OBW



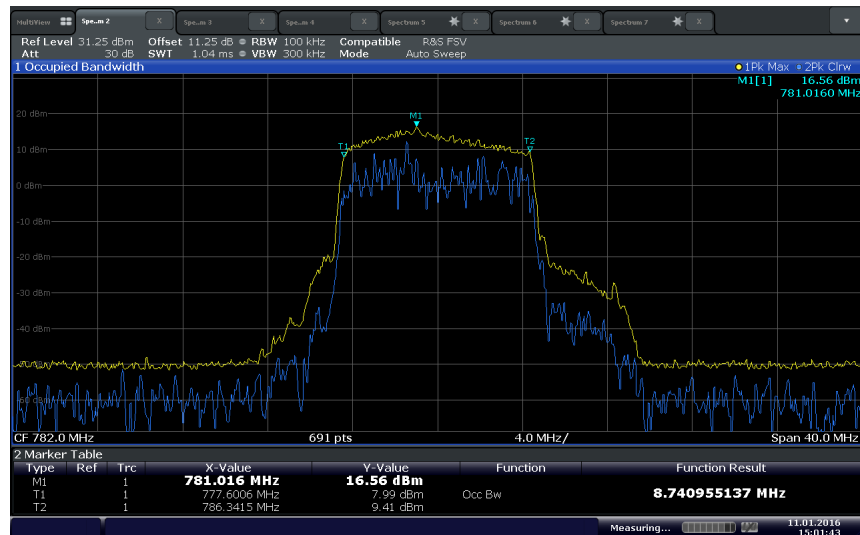
Date: 11 JAN 2016 14:55:48

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel -26dB BW



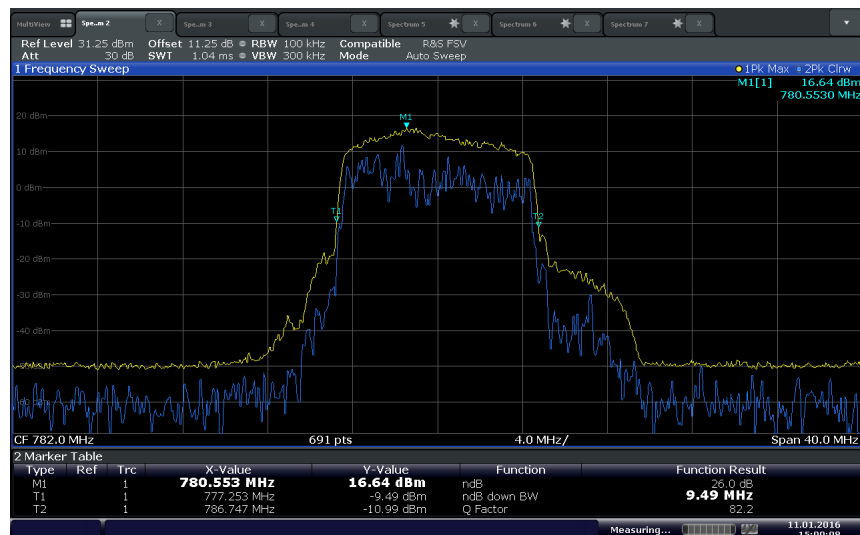
Date: 11 JAN 2016 14:56:11

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel 99% OBW



Date: 11 JAN 2016 15:01:43

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel -26dB BW



Date: 11 JAN 2016 15:00:08



2.4 PEAK-AVERAGE RATIO

2.4.1 Specification Reference

RSS-130, Clause 4.4

2.4.2 Standard Applicable

The peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

2.4.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Test Configuration A and B

2.4.4 Date of Test/Initial of test personnel who performed the test

January 11, 2016/XYZ

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	21.9°C
Relative Humidity	43.3%
ATM Pressure	99.3kPa

2.4.7 Additional Observations

- This is a conducted test. Test procedure is per Section 5.7 of KDB971168 (D01 Power Meas License Digital Systems v02r02). Appropriate offset (line losses) applied.
- Measurement was done using the Spectrum Analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile. The built-in function is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth (crest factor or peak-to-average ratio) The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signals spends at or above the level defines the probability for that particular power level.
- Procedure is per Section 5.7.1 of KDB971168.
- RBW was set to maximum the SA can support.

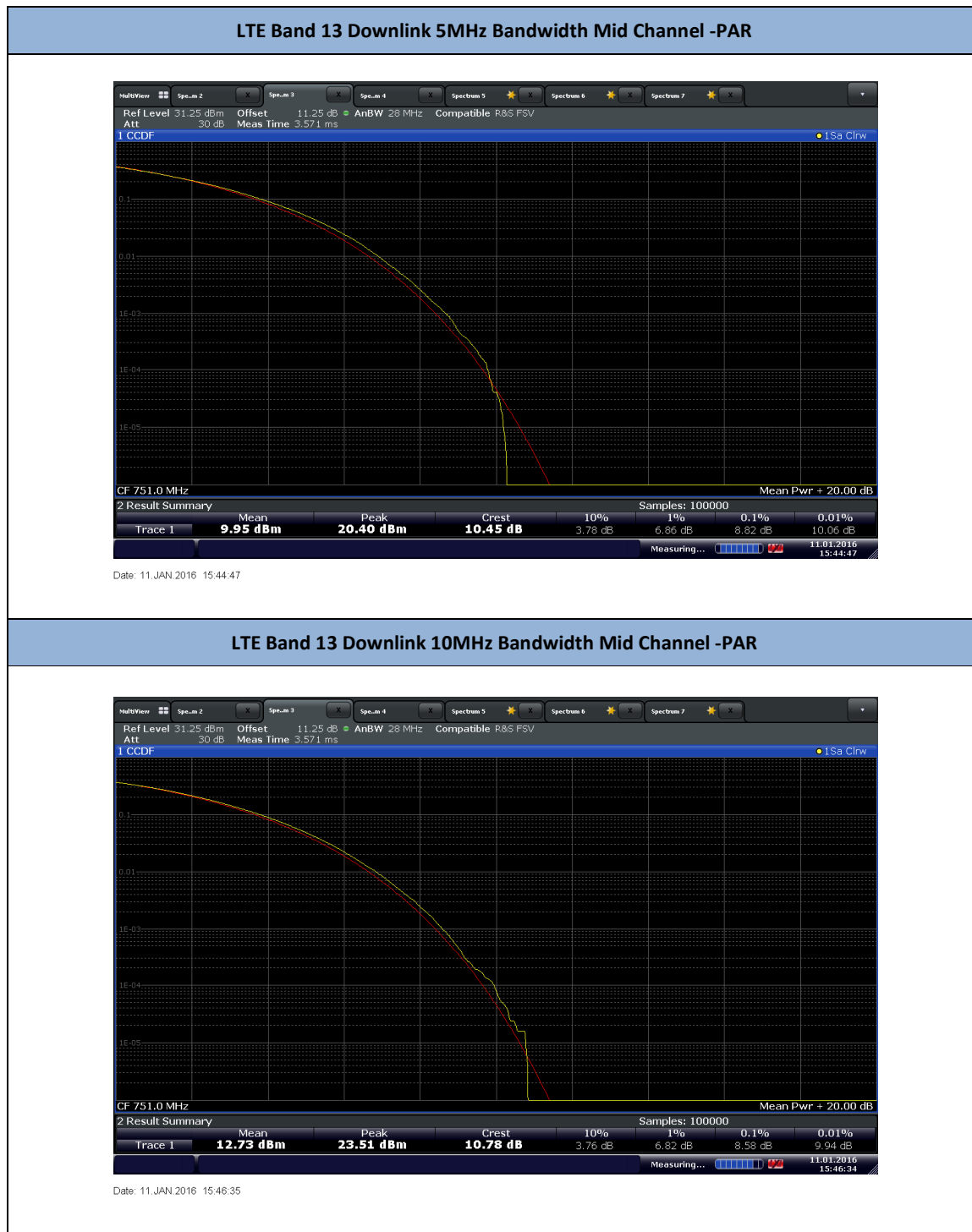
- The maximum PAPR level associated with a probability of 0.1% was recorded.
- All low, middle and high channels were verified. Only test plots for middle channel presented in this test report as the representative configuration.
- There are no measured PAR levels greater than 13dB. EUT complies.

2.4.8 Test Results

<i>Downlink</i>				
Band	Bandwidth	Channel	Frequency (MHz)	PAR (dB)
LTE Band 13	5MHz	5205	748.5	9.82
		5230	751	10.45
		5255	753.5	10.17
	10MHz	-	-	-
		5230	751	10.78
		-	-	-

<i>Uplink</i>				
Band	Bandwidth	Channel	Frequency (MHz)	PAR (dB)
LTE Band 13	5MHz	23205	779.5	8.39
		23230	782	9.45
		23255	784.5	8.80
	10MHz	-	-	-
		23230	782	9.31
		-	-	-

2.4.9 Sample Test Plot



LTE Band 13 Uplink 5MHz Bandwidth Mid Channel -PAR



Date: 11 JAN 2016 15:53:38

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel -PAR



Date: 11 JAN 2016 15:51:17



2.5 BAND EDGE

2.5.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.53(c)(1),(2) and (5)
RSS-130, Clause 4.6.

2.5.2 Standard Applicable

(c)(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
(c)(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed.

The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

2.5.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Test Configuration A

2.5.4 Date of Test/Initial of test personnel who performed the test

January 12, 2016/XYZ

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

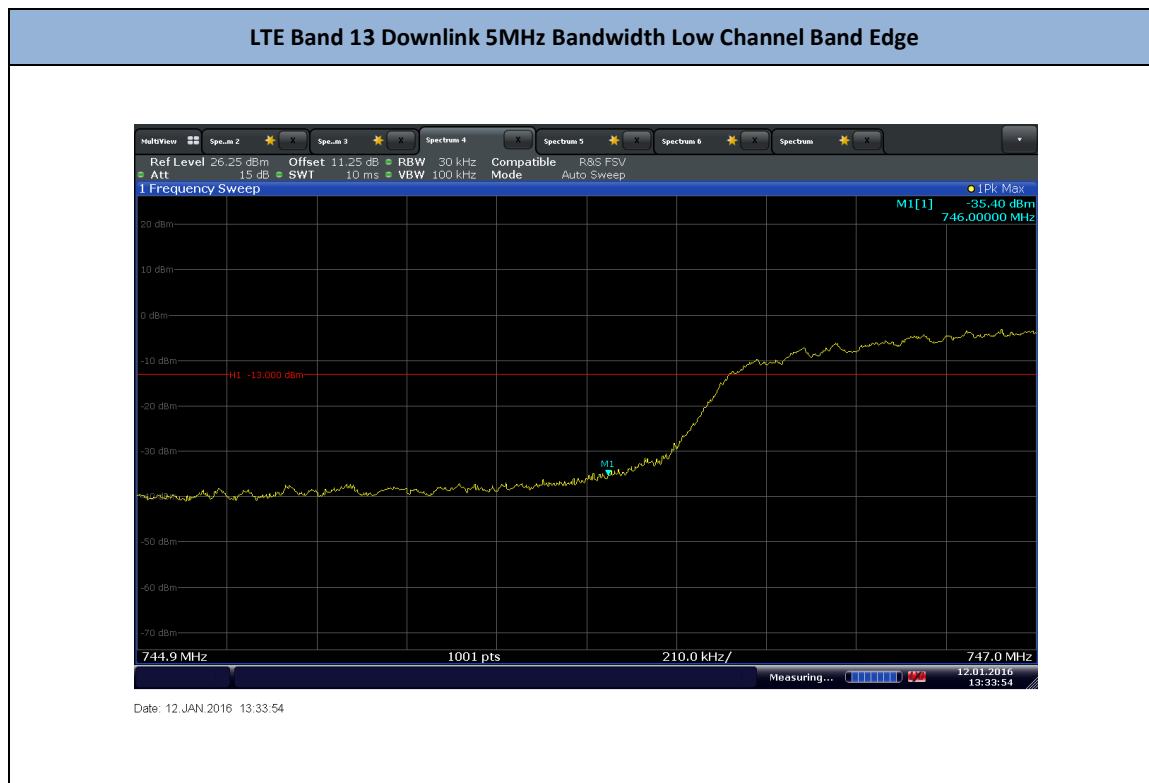
Ambient Temperature	21.5°C
Relative Humidity	23.2%
ATM Pressure	99.9kPa

2.5.7 Additional Observations

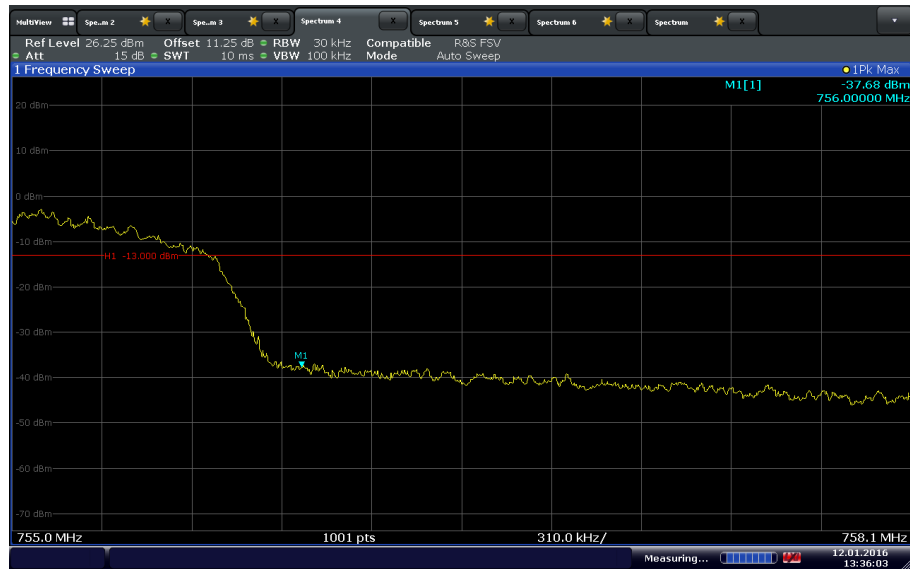
- This is a conducted test. Test guidance is per Section 6.0 of KDB971168 (D01 Power Meas License Digital Systems v02r01).

- The path loss was measured and entered as a level offset.
- The center frequency of the spectrum is the band edge frequency (worst case 777 MHz -787 MHz per IC requirement).
- Using a span of 1MHz for Band 13, RBW is set to 100 kHz (minimum of 30kHz limited to 1% of EBW) and VBW is set to 3X RBW.
- For lower band edge, 0 offset is utilized while the maximum allowable offset per channel bandwidth for upper band edge is used.
- All RB size available verified and the worst case size for band edge verification presented in this test report.

2.5.8 Test Results



LTE Band 13 Downlink 5MHz Bandwidth High Channel Band Edge



Date: 12. JAN.2016 13:36:03

LTE Band 13 Downlink 10MHz Bandwidth Low Channel Band Edge



Date: 12. JAN.2016 13:13:44

LTE Band 13 Downlink 10MHz Bandwidth High Channel Band Edge



Date: 12. JAN 2016 13:12:28

LTE Band 13 Uplink 5MHz Bandwidth Low Channel Band Edge



Date: 12. JAN 2016 11:36:50

LTE Band 13 Uplink 5MHz Bandwidth High Channel Band Edge



Date: 12 JAN 2016 10:36:11

LTE Band 13 Uplink 10MHz Bandwidth Low Channel Band Edge



Date: 12 JAN 2016 12:07:20

LTE Band 13 Uplink 10MHz Bandwidth High Channel Band Edge



Date: 12.JAN.2016 12:08:43



2.6 CONDUCTED SPURIOUS EMISSIONS

2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 27, Clause 27.53(c)
RSS-130, Clause 4.6.2

2.6.2 Standard Applicable

(c)(2) On any frequency outside the 776–788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;

(c)(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed.

4.6.2 In addition to the limit outlined in Section 4.6.1 (IC RSS-Gen and RSS-130), equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

(a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:

(i) $76 + 10 \log_{10} p(\text{watts})$, dB, for base and fixed equipment, and

(ii) $65 + 10 \log_{10} p(\text{watts})$, dB, for mobile and portable equipment.

(b) The e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

2.6.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Test Configuration A and B

2.6.4 Date of Test/Initial of test personnel who performed the test

January 08 and 12, 2016/XYZ

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions

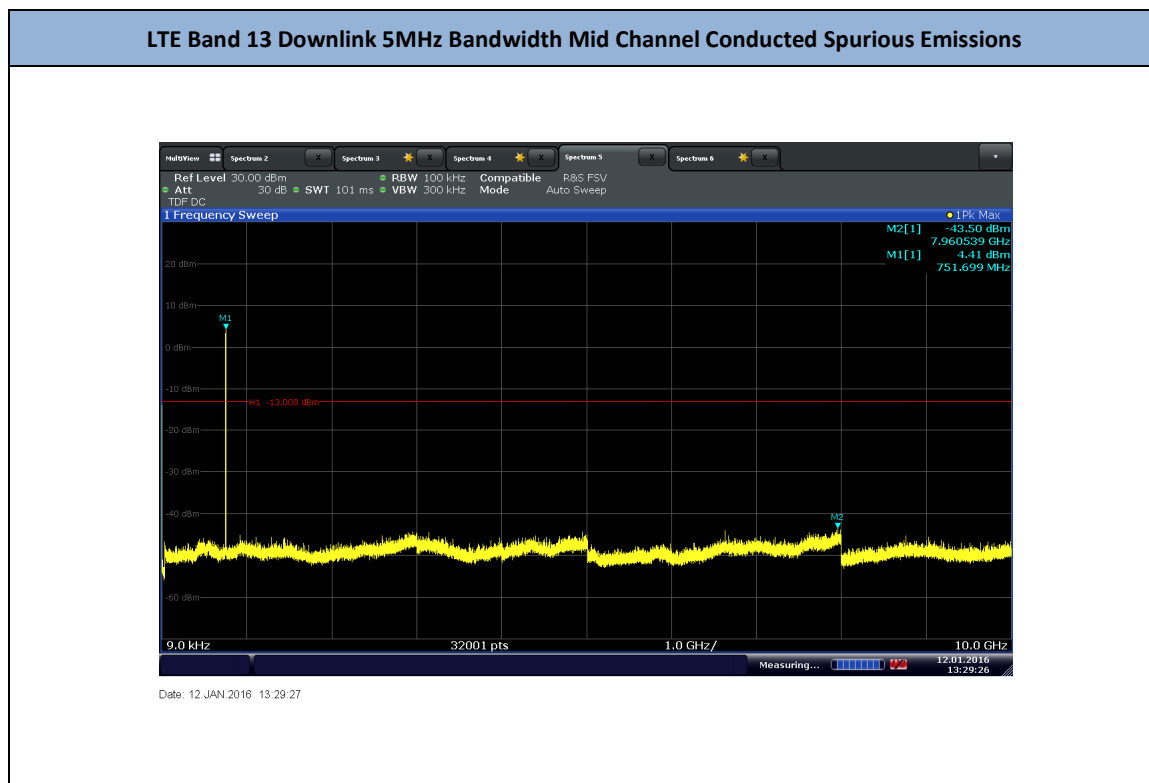
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	21.5 - 21.9°C
Relative Humidity	23.2 - 43.3%
ATM Pressure	99.3 - 99.9kPa

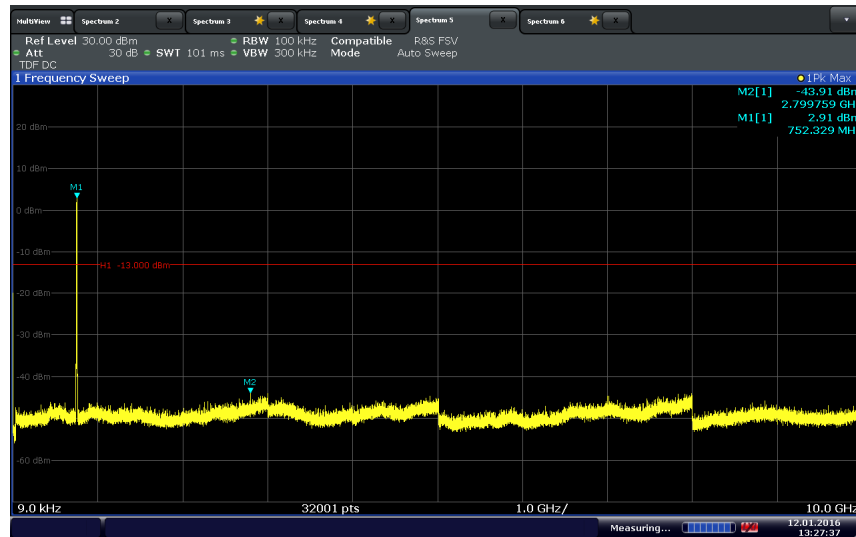
2.6.7 Additional Observations

- This is a conducted test.
- The transducer factor (TDF) used is from the external attenuators and cables used.
- The spectrum was searched from 9 kHz to 26.5GHz (requirement is up to the 10th harmonic ($\leq 8\text{GHz}$)).
- For 763-775 MHz and 793-806 MHz verification, the next available RBW was used (6.25 kHz required, 10kHz RBW utilized).
- All low, middle and high channels were verified. Only test plots for middle channel presented in this test report as the representative configuration.

2.6.8 Test Results

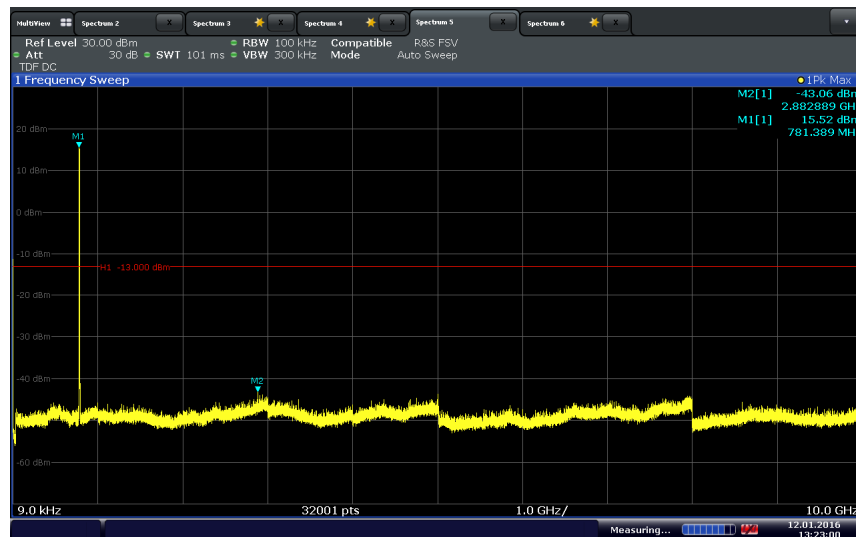


LTE Band 13 Downlink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions



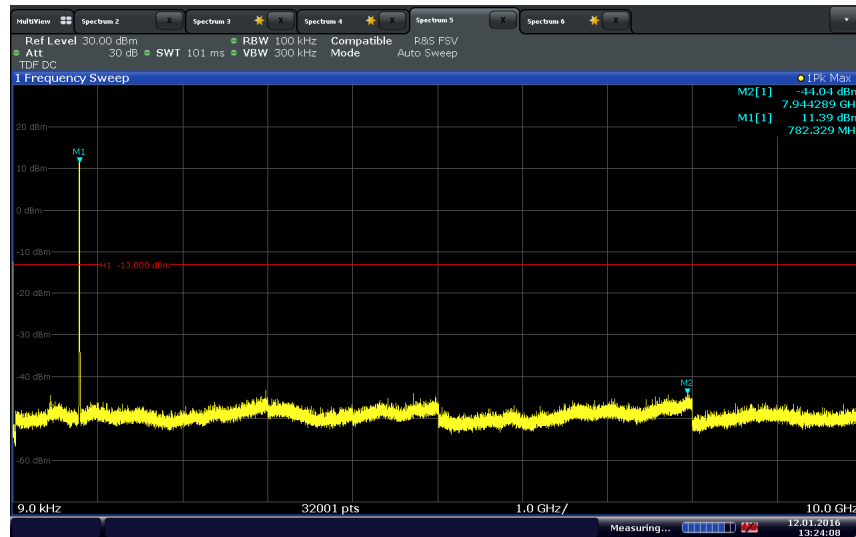
Date: 12 JAN 2016 13:27:37

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions



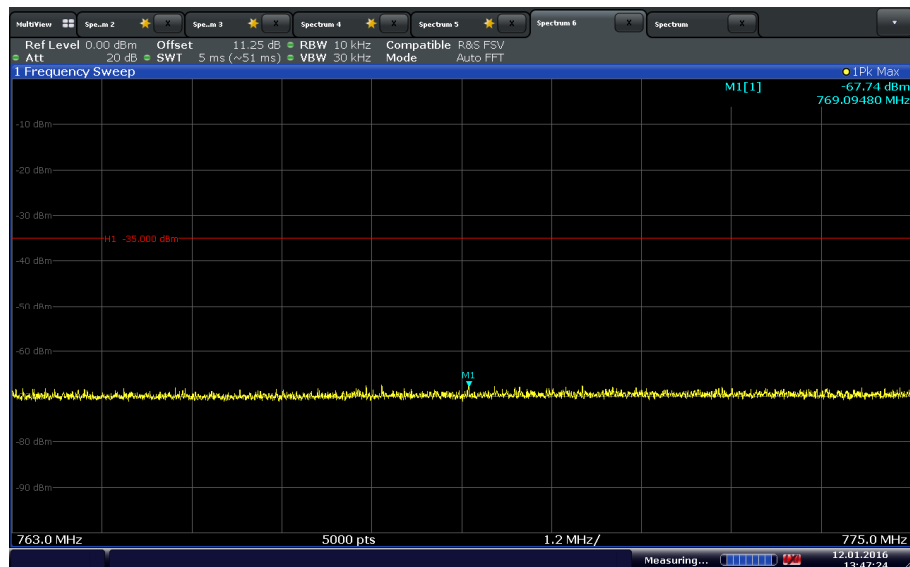
Date: 12 JAN 2016 13:23:00

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions



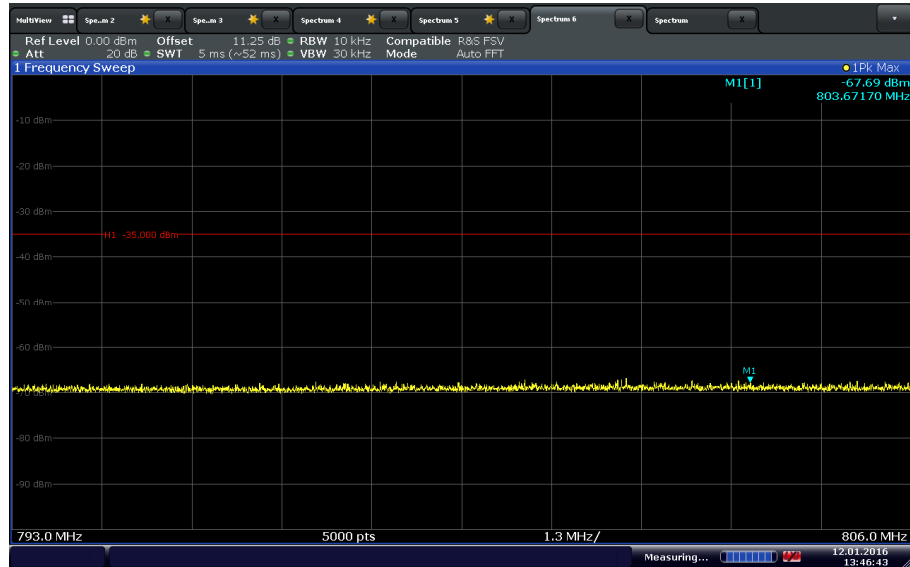
Date: 12 JAN 2016 13:24:08

LTE Band 13 Downlink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions (763-775 MHz)



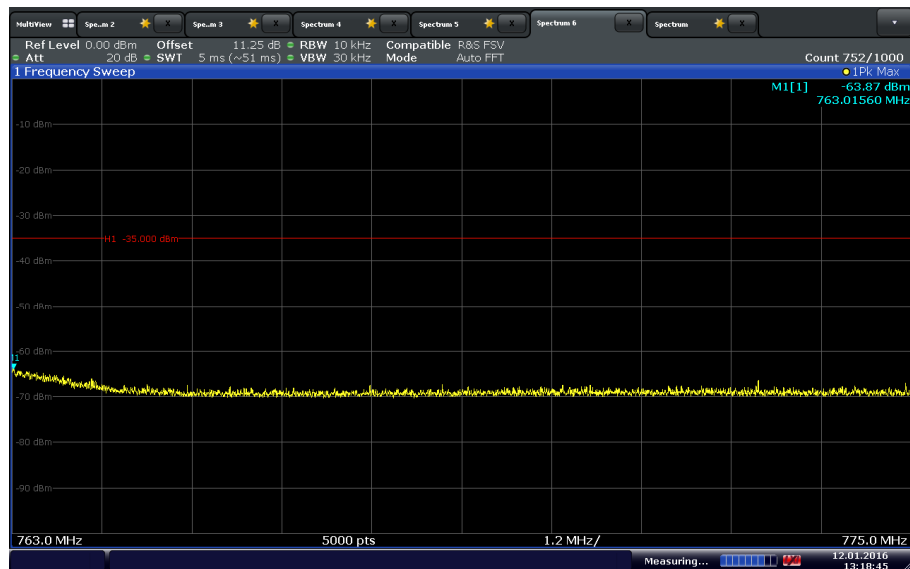
Date: 12 JAN 2016 13:47:24

LTE Band 13 Downlink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions (793-806 MHz)



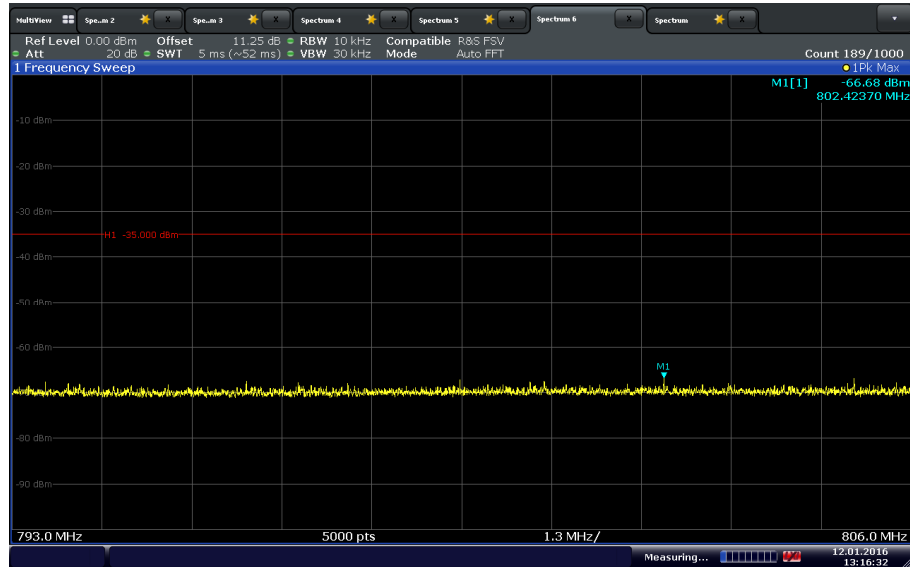
Date: 12. JAN.2016 13:46:44

LTE Band 13 Downlink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions (763-775 MHz)



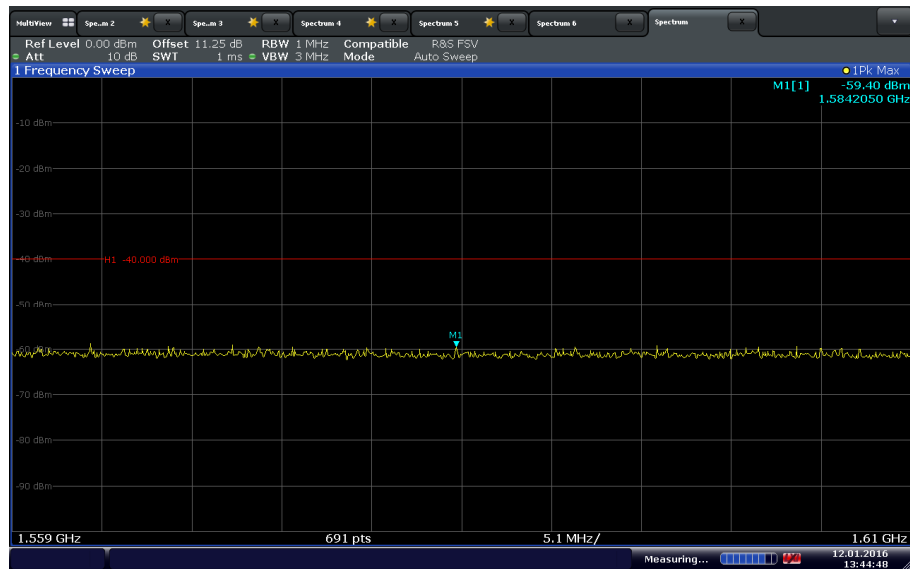
Date: 12. JAN.2016 13:16:46

LTE Band 13 Downlink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions (793-806 MHz)



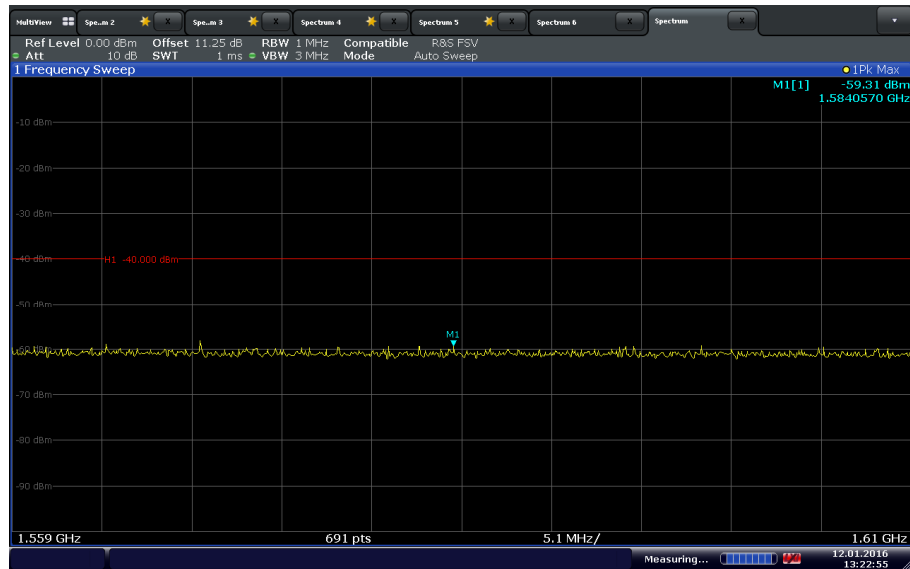
Date: 12. JAN.2016 13:16:33

LTE Band 13 Downlink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions (1559-1610 MHz)



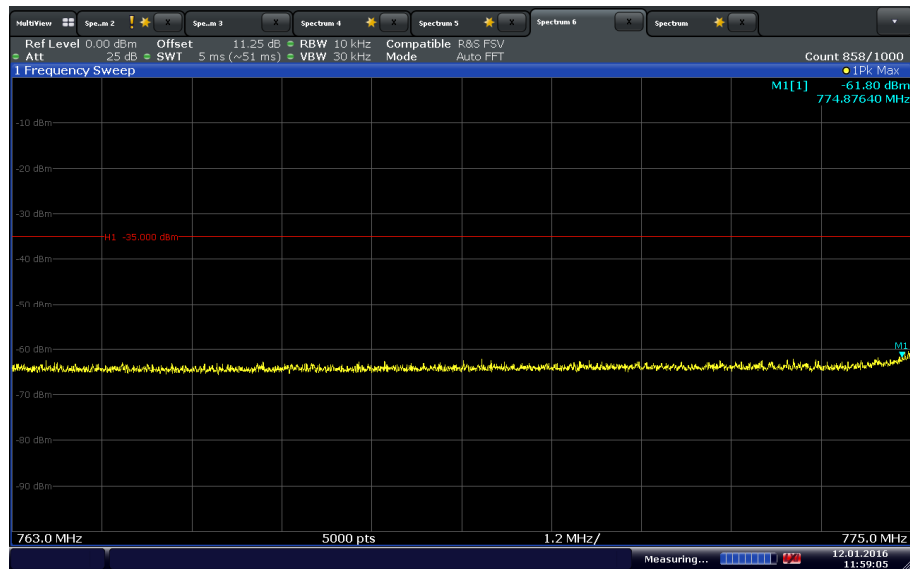
Date: 12. JAN.2016 13:44:48

LTE Band 13 Downlink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions (1559-1610 MHz)



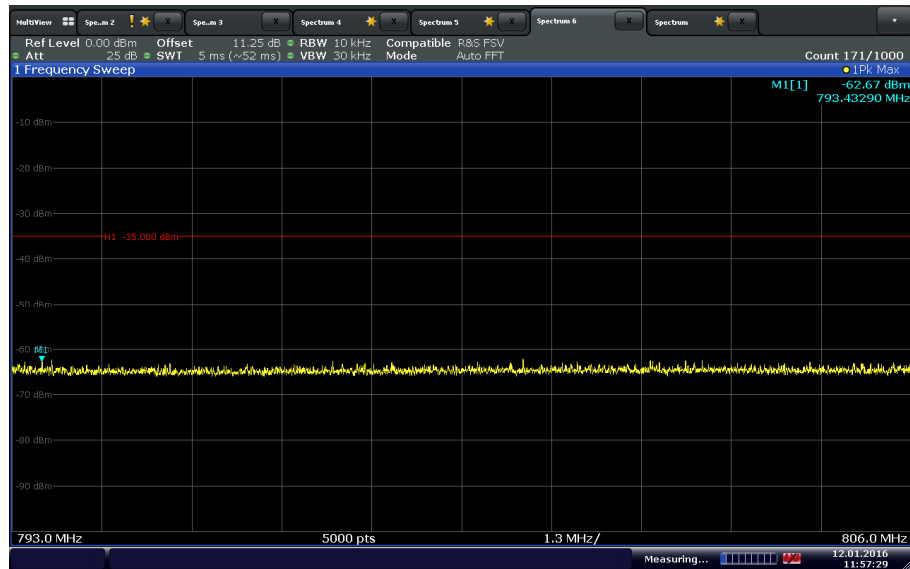
Date: 12. JAN.2016 13:22:55

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions (763 - 775MHz)



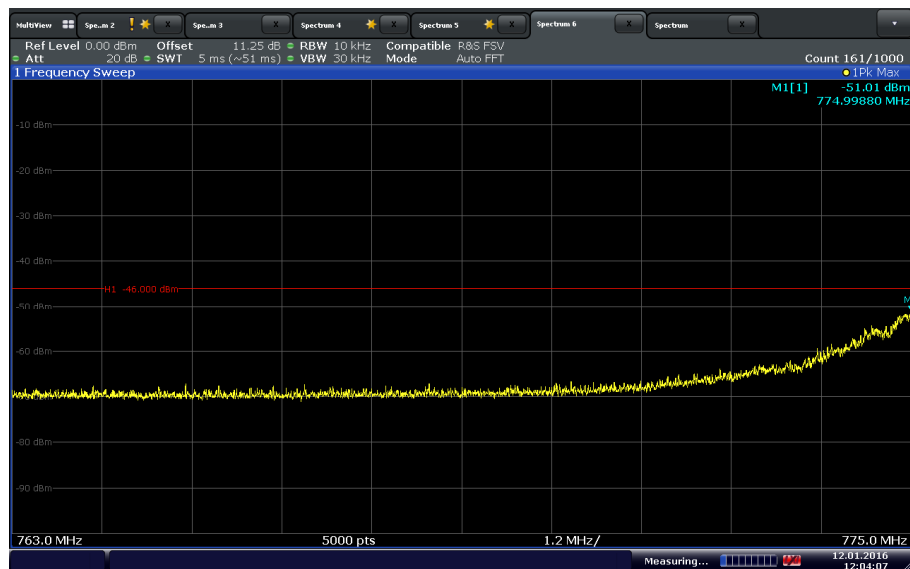
Date: 12. JAN.2016 11:59:05

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions (793-806 MHz)



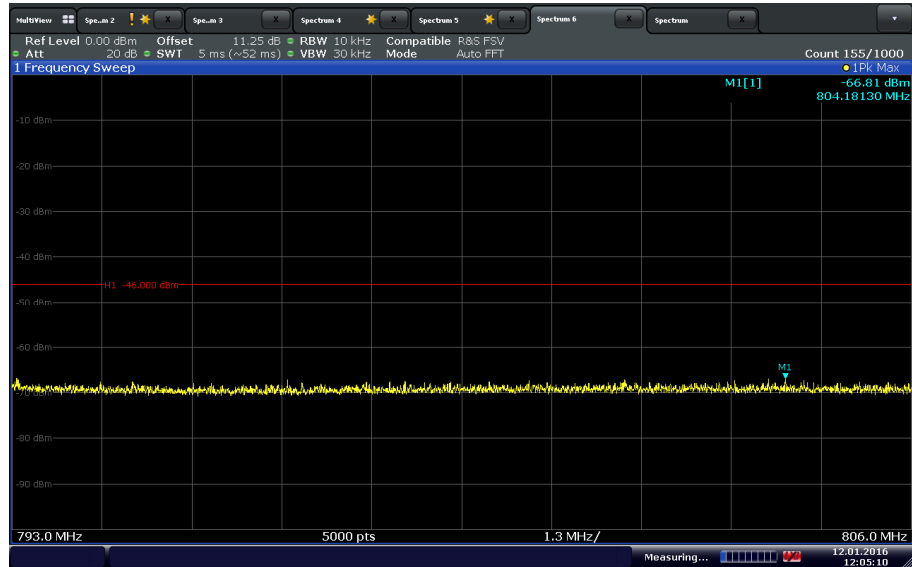
Date: 12. JAN.2016 11:57:29

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions (763 - 775MHz)



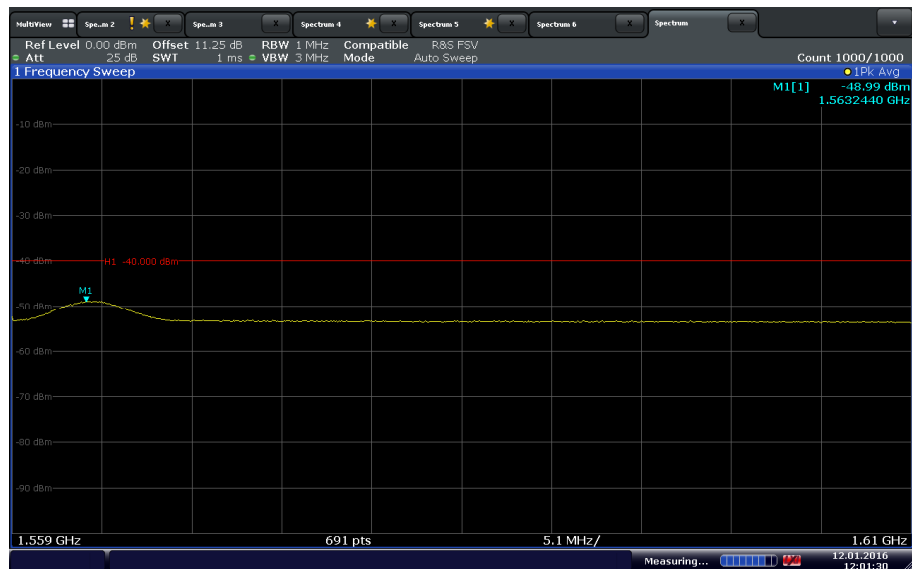
Date: 12. JAN.2016 12:04:08

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions (793-806 MHz)



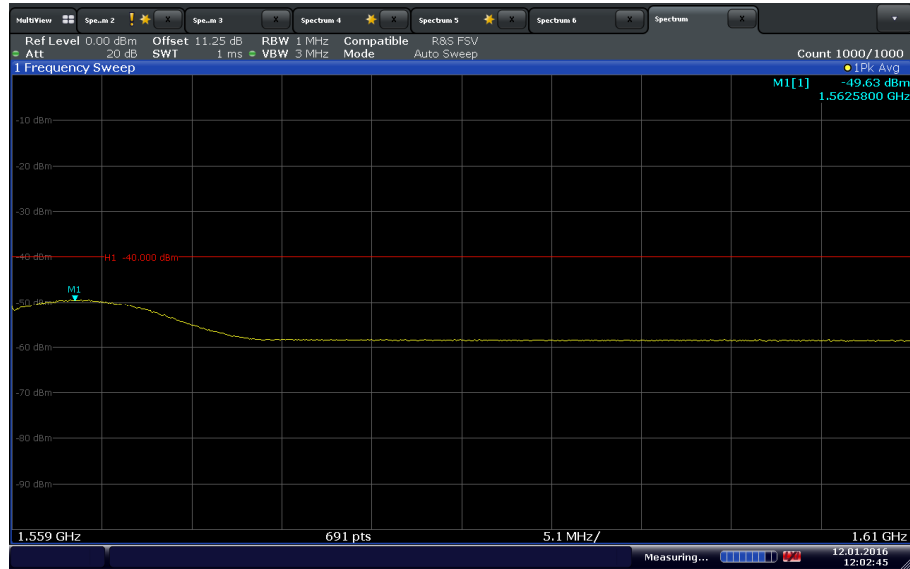
Date: 12. JAN.2016 12:05:11

LTE Band 13 Uplink 5MHz Bandwidth Mid Channel Conducted Spurious Emissions (1559 – 1610MHz)



Date: 12. JAN.2016 12:01:31

LTE Band 13 Uplink 10MHz Bandwidth Mid Channel Conducted Spurious Emissions (1559 – 1610MHz)



Date: 12. JAN. 2016 12:02:46



2.7 FIELD STRENGTH OF SPURIOUS RADIATION

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 27, Clause 27.53(c)
RSS-130, Clause 4.6

2.7.2 Standard Applicable

Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

2.7.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Test Configuration C and D

2.7.4 Date of Test/Initial of test personnel who performed the test

January 19, 20 and 22, 2016/XYZ

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	22.3 - 22.8°C
Relative Humidity	32.5 - 55.8%
ATM Pressure	99.6 - 99.8kPa

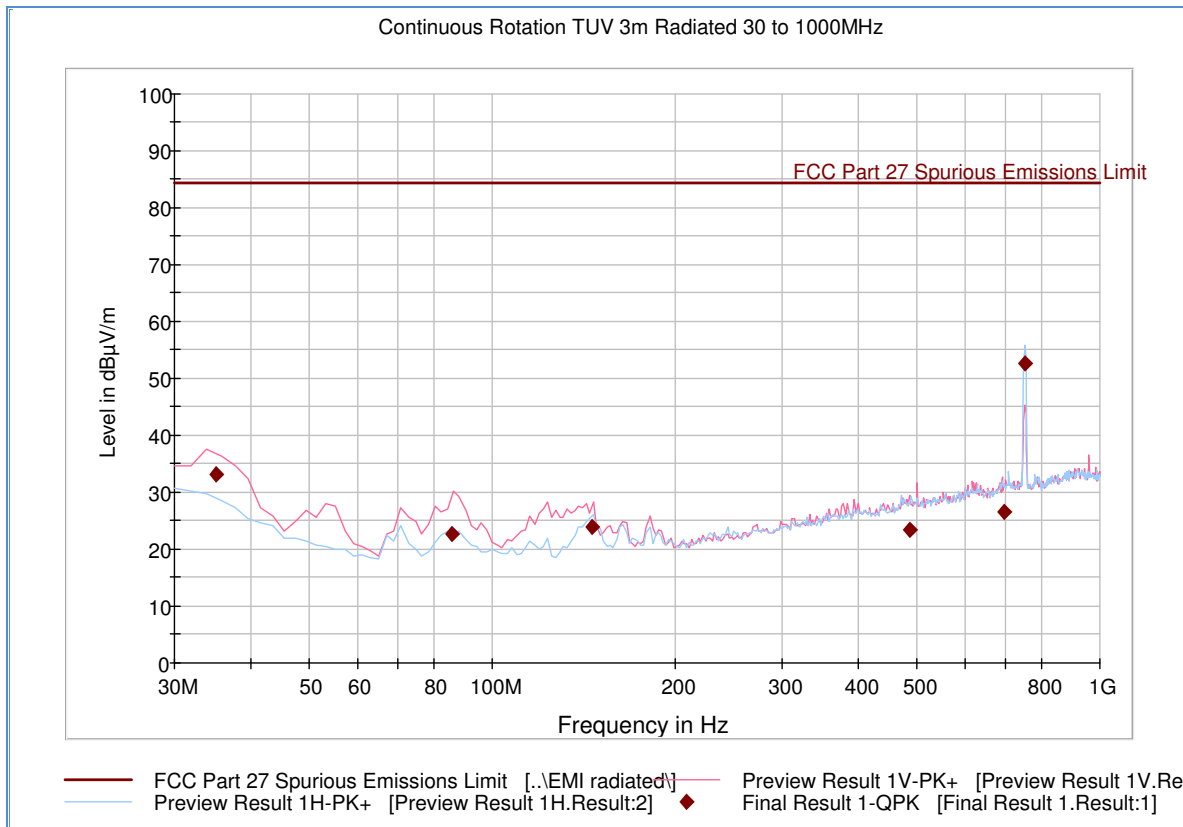
2.7.7 Additional Observations

- This is a radiated test using substitution method as per Unwanted Emissions: Radiated Spurious method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- Only the worst case configuration presented in this test report.
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

2.7.8 Test Results

See attached plots.

2.7.9 Test Results Below 1GHz (Downlink Worst Case Configuration) - 10MHz Bandwidth Middle Channel

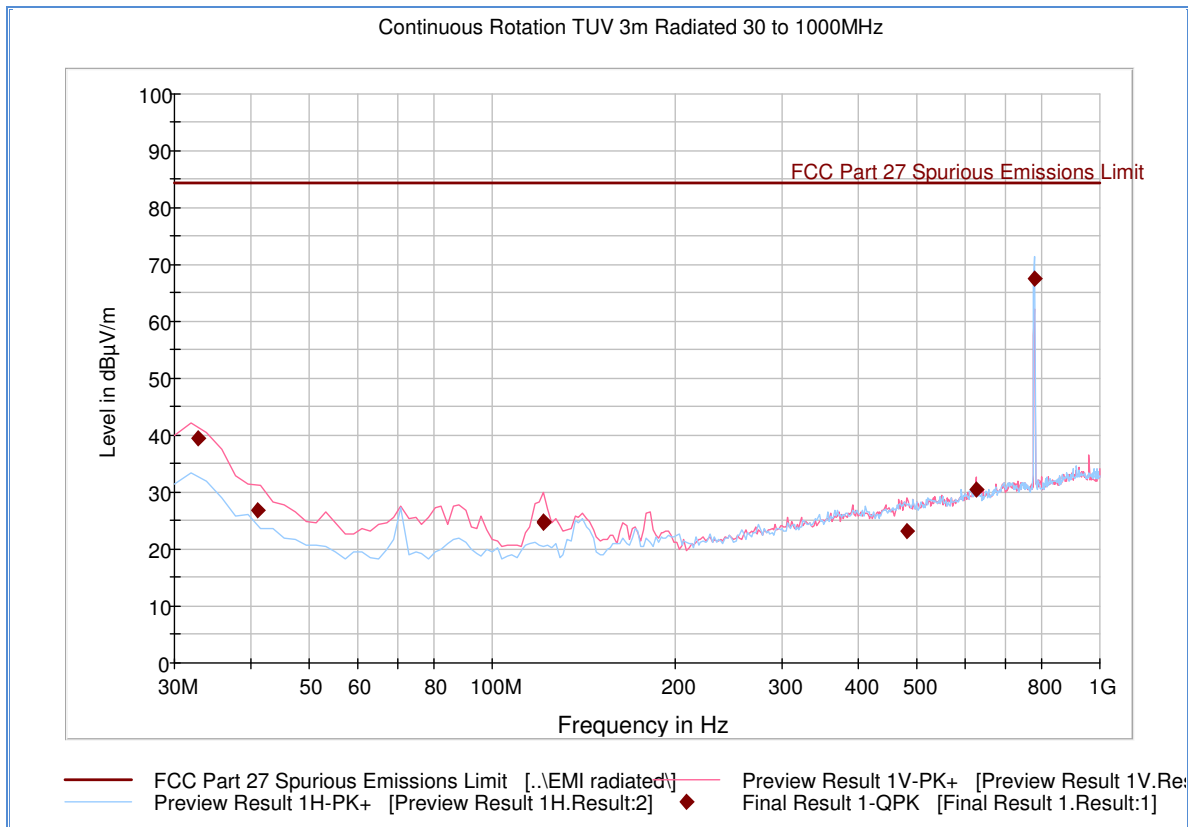


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
35.047776	33.2	1000.0	120.000	100.0	V	-15.0	-8.4	51.2	84.4
85.812745	22.8	1000.0	120.000	100.0	V	221.0	-15.9	61.6	84.4
146.033267	23.9	1000.0	120.000	106.0	V	182.0	-13.6	60.5	84.4
486.613627	23.3	1000.0	120.000	173.0	V	216.0	-1.4	61.1	84.4
693.961844	26.6	1000.0	120.000	100.0	V	-3.0	3.0	57.8	84.4
751.446253	52.7	1000.0	120.000	100.0	H	-3.0	3.5	Fundamental	

Test Notes: Only worst case channel presented for spurious emissions below 1GHz. Only case spurious emissions within 20dB of the calculated limit will be proven by substitution method.

2.7.10 Test Results Below 1GHz (Uplink Worst Case Configuration) - 5MHz Bandwidth Low Channel

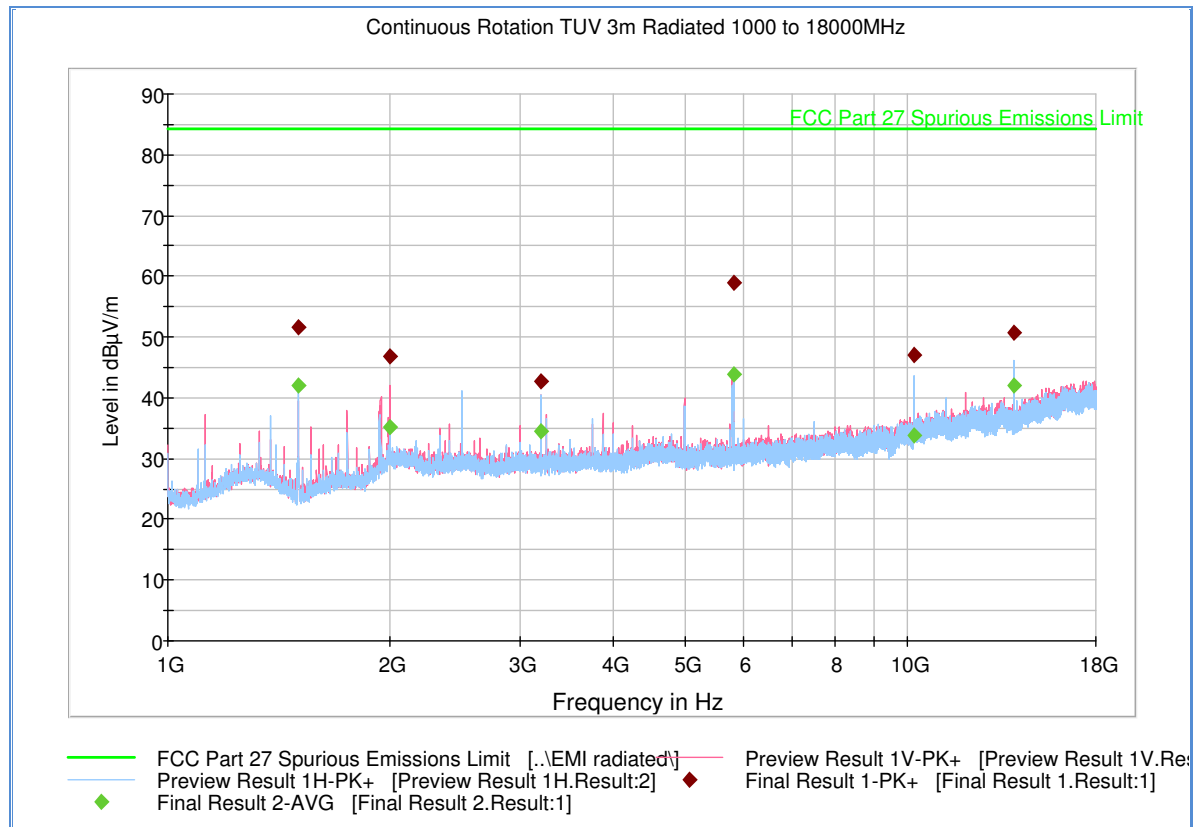


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.720000	39.6	1000.0	120.000	100.0	V	341.0	-7.1	44.8	84.4
41.047214	26.8	1000.0	120.000	111.0	V	244.0	-11.4	57.6	84.4
121.202725	24.8	1000.0	120.000	103.0	V	38.0	-15.1	59.6	84.4
121.202725	24.7	1000.0	120.000	106.0	V	40.0	-15.1	59.7	84.4
482.421964	23.3	1000.0	120.000	273.0	V	98.0	-1.4	61.1	84.4
625.029659	30.5	1000.0	120.000	100.0	V	246.0	1.7	53.9	84.4
779.940681	67.5	1000.0	120.000	100.0	H	316.0	3.7	Fundamental	

Test Notes: Only worst case channel presented for spurious emissions below 1GHz. Only case spurious emissions within 20dB of the calculated limit will be proven by substitution method.

2.7.11 Test Results Above 1GHz - Downlink 10MHz Middle Channel



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	51.5	1000.0	1000.000	103.7	H	140.0	-6.3	32.9	84.4
1999.800000	46.9	1000.0	1000.000	132.7	V	28.0	-0.6	37.5	84.4
3200.000000	42.8	1000.0	1000.000	116.7	V	80.0	0.2	41.6	84.4
5816.500000	59.0	1000.0	1000.000	354.2	V	57.0	4.3	25.4	84.4
10199.633333	47.0	1000.0	1000.000	244.4	H	63.0	9.9	37.4	84.4
13952.833333	50.7	1000.0	1000.000	308.2	H	194.0	13.3	33.8	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	42.1	1000.0	1000.000	103.7	H	140.0	-6.3	42.3	84.4
1999.800000	35.2	1000.0	1000.000	132.7	V	28.0	-0.6	49.2	84.4
3200.000000	34.6	1000.0	1000.000	116.7	V	80.0	0.2	49.8	84.4
5816.500000	43.7	1000.0	1000.000	354.2	V	57.0	4.3	40.7	84.4
10199.633333	33.8	1000.0	1000.000	244.4	H	63.0	9.9	50.6	84.4
13952.833333	42.1	1000.0	1000.000	308.2	H	194.0	13.3	42.3	84.4

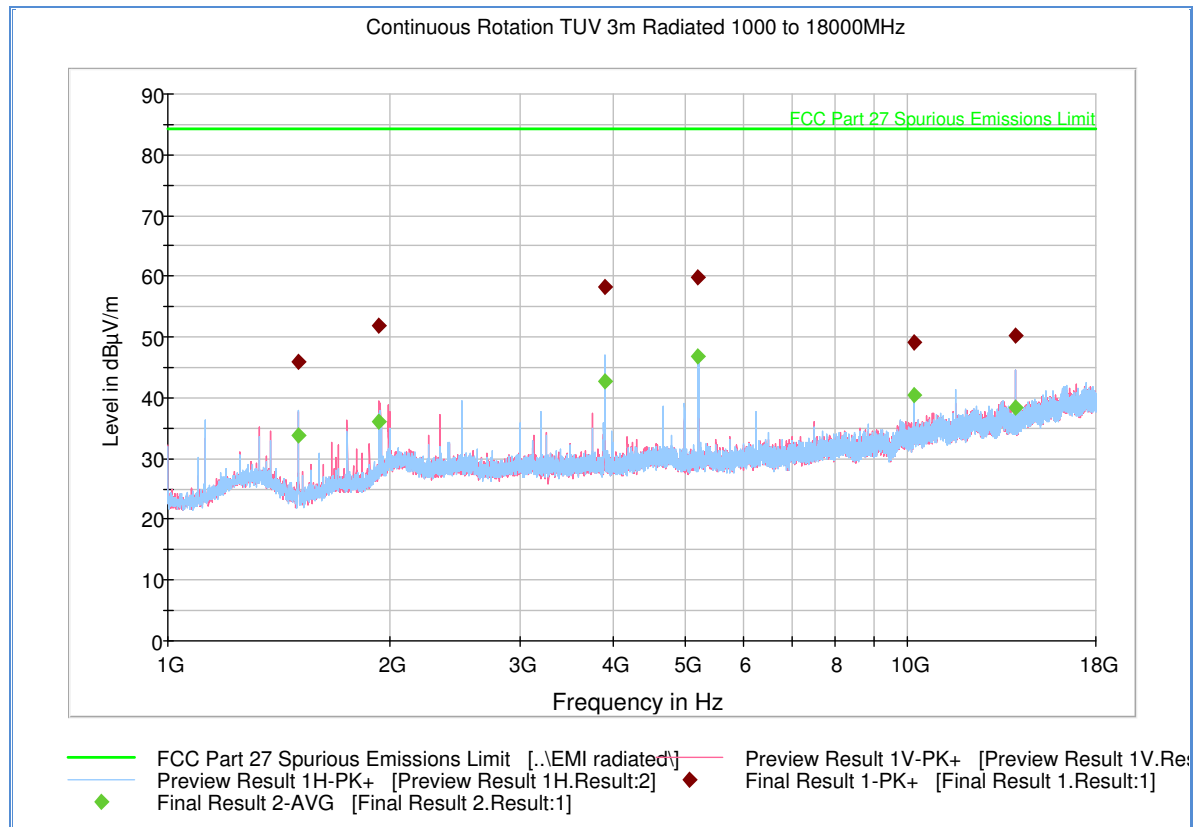


Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBμV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance

Test Notes: Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

2.7.12 Test Results Above 1GHz - Uplink 5MHz Low Channel



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1500.000000	45.9	1000.0	1000.000	102.8	H	201.0	-6.3	38.5	84.4
1932.566667	52.0	1000.0	1000.000	333.1	V	344.0	-1.6	32.4	84.4
3898.466667	58.4	1000.0	1000.000	139.7	H	162.0	1.7	26.0	84.4
5217.733333	59.8	1000.0	1000.000	225.4	V	270.0	3.3	24.6	84.4
10200.033333	49.1	1000.0	1000.000	189.5	H	220.0	9.9	35.3	84.4
14038.833333	50.2	1000.0	1000.000	228.4	V	265.0	13.2	34.2	84.4

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1500.000000	33.9	1000.0	1000.000	102.8	H	201.0	-6.3	50.5	84.4
1932.566667	36.1	1000.0	1000.000	333.1	V	344.0	-1.6	48.3	84.4
3898.466667	42.6	1000.0	1000.000	139.7	H	162.0	1.7	41.8	84.4
5217.733333	46.8	1000.0	1000.000	225.4	V	270.0	3.3	37.6	84.4
10200.033333	40.5	1000.0	1000.000	189.5	H	220.0	9.9	43.9	84.4
14038.833333	38.4	1000.0	1000.000	228.4	V	265.0	13.2	46.0	84.4

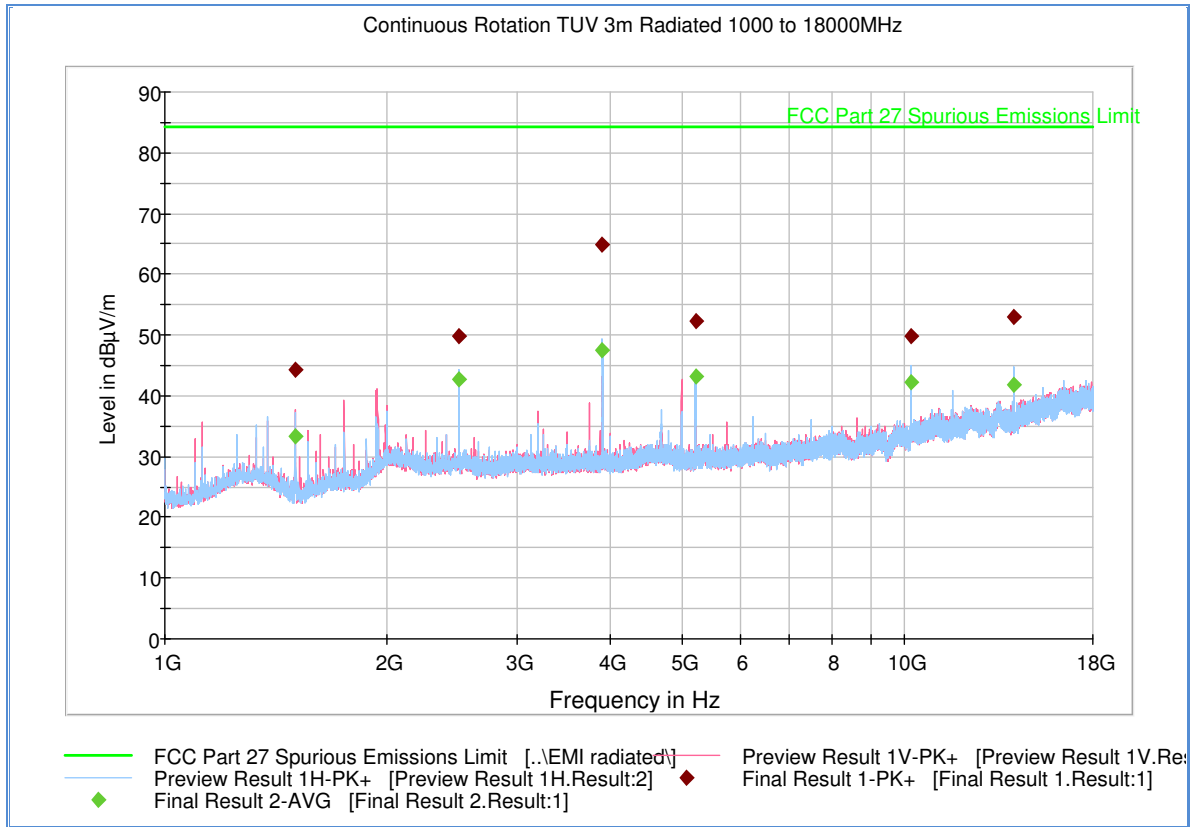


Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBμV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance

Test Notes: Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

2.7.13 Test Results Above 1GHz - Uplink 5MHz Middle Channel



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1500.000000	44.3	1000.0	1000.000	132.7	V	347.0	-6.3	40.1	84.4
2500.166667	49.7	1000.0	1000.000	117.7	H	291.0	-0.8	34.7	84.4
3906.266667	64.9	1000.0	1000.000	117.7	H	161.0	1.7	19.5	84.4
5232.633333	52.3	1000.0	1000.000	200.5	H	0.0	3.4	32.1	84.4
10199.833333	49.8	1000.0	1000.000	207.5	H	197.0	9.9	34.6	84.4
14046.166667	53.0	1000.0	1000.000	403.0	H	223.0	13.3	31.4	84.4

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1500.000000	33.3	1000.0	1000.000	132.7	V	347.0	-6.3	51.1	84.4
2500.166667	42.8	1000.0	1000.000	117.7	H	291.0	-0.8	41.6	84.4
3906.266667	47.5	1000.0	1000.000	117.7	H	161.0	1.7	36.9	84.4
5232.633333	43.2	1000.0	1000.000	200.5	H	0.0	3.4	41.2	84.4
10199.833333	42.2	1000.0	1000.000	207.5	H	197.0	9.9	42.2	84.4
14046.166667	41.7	1000.0	1000.000	403.0	H	223.0	13.3	42.7	84.4

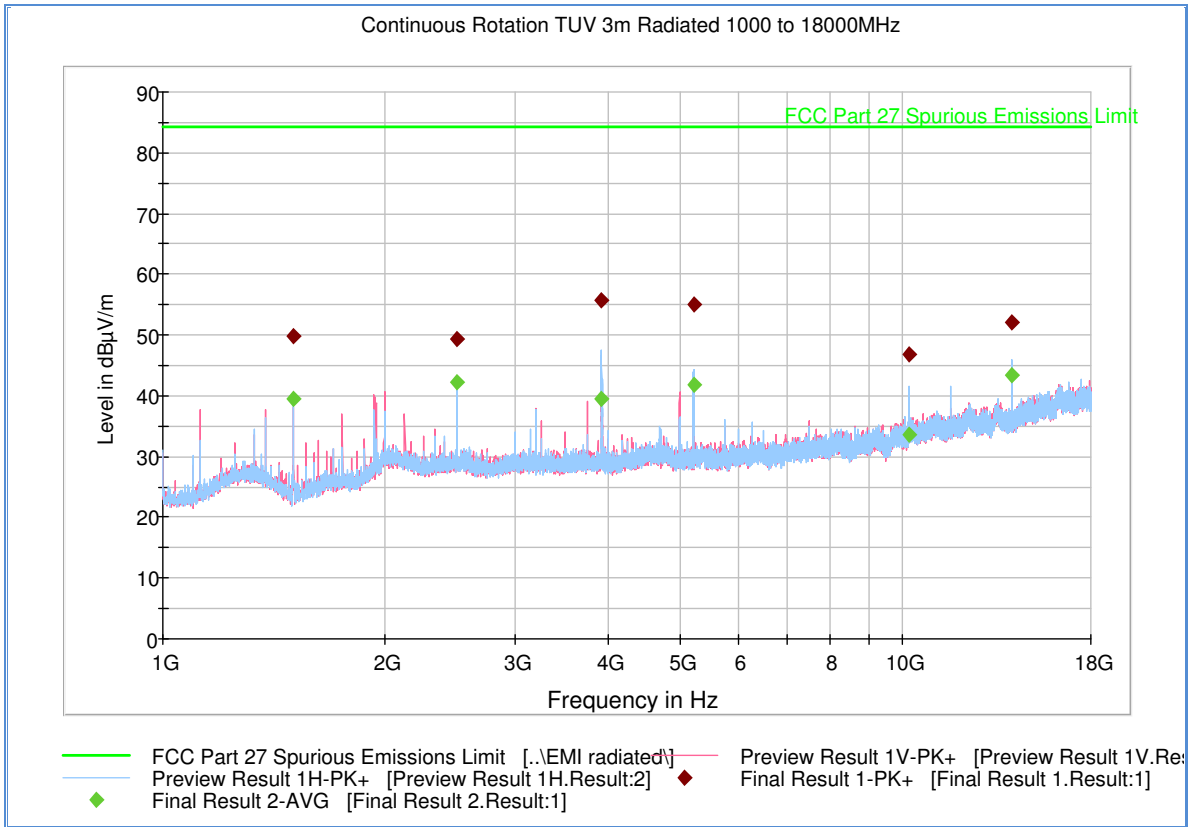


Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBμV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance

Test Notes: Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

2.7.14 Test Results Above 1GHz - Uplink 5MHz High Channel



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1500.000000	49.9	1000.0	1000.000	103.7	H	104.0	-6.3	34.5	84.4
2499.766667	49.2	1000.0	1000.000	124.7	H	291.0	-0.8	35.2	84.4
3922.666667	55.6	1000.0	1000.000	121.7	H	195.0	1.8	28.8	84.4
5228.466667	54.9	1000.0	1000.000	227.4	H	-3.0	3.4	29.5	84.4
10200.233333	46.7	1000.0	1000.000	208.5	H	38.0	9.9	37.7	84.4
14053.533333	52.2	1000.0	1000.000	247.3	H	222.0	13.3	32.2	84.4

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1500.000000	39.6	1000.0	1000.000	103.7	H	104.0	-6.3	44.8	84.4
2499.766667	42.2	1000.0	1000.000	124.7	H	291.0	-0.8	42.3	84.4
3922.666667	39.5	1000.0	1000.000	121.7	H	195.0	1.8	44.9	84.4
5228.466667	41.9	1000.0	1000.000	227.4	H	-3.0	3.4	42.5	84.4
10200.233333	33.5	1000.0	1000.000	208.5	H	38.0	9.9	50.9	84.4
14053.533333	43.5	1000.0	1000.000	247.3	H	222.0	13.3	40.9	84.4



Substitution Data

Frequency (MHz)	Field Strength @ 3 meters (dBμV/m)	Cable Loss (dB)	Substitution Antenna Gain (dBi)	Signal Generator Level (dBm)	Substitution Data SGL+AG-CL (dBm)	Limit (dBm)	Compliance

Test Notes: Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).



2.8 FREQUENCY STABILITY

2.8.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1055
FCC 47 CFR Part 27, Clause 27.54
RSS-130, Clause 4.3

2.8.2 Standard Applicable

(\$27.54) The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

2.8.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Test Configuration A and B

2.8.4 Date of Test/Initial of test personnel who performed the test

February 01 and 02, 2016/XYZ

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	21.3 - 22.8°C
Relative Humidity	26.6 - 29.0%
ATM Pressure	99.2 - 99.7kPa

2.8.7 Additional Observations

- This is a conducted test.
- The EUT was operated at 120.0VAC nominal voltage and was placed in the temperature chamber for the series of evaluations performed.
- Input Type "Tones" was selected and the EUT was injected a CW signal from a Signal Generator and maximum frequency error was monitored using the spectrum analyzer.

- The Temperature was reduced to -30°C and allowed to sit for 1 hour to allow the equipment and chamber temperature to stabilize. The measurements on both downlink and uplink were then performed. The temperature was then increased by 10°C steps and allowed to settle before taking the next set of measurements.
- Voltage variation was also performed at 85% and 115% of the nominal voltage.
- Middle Channel was tested as the representative configuration.

2.8.8 Test Results Summary

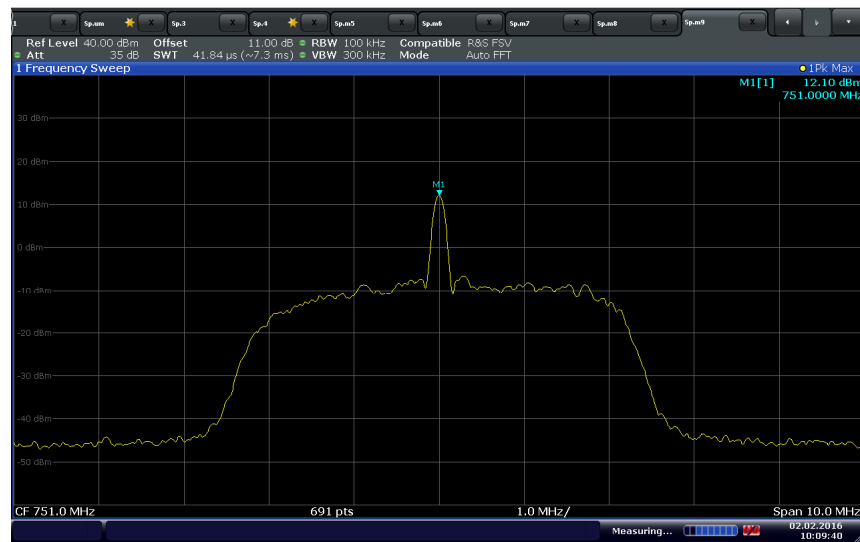
LTE B13 Downlink		
<i>Voltage (VAC)</i>	<i>Temperature (°C)</i>	<i>Frequency Deviation (Hz/ppm)</i>
120	-30	0 / 0
	-20	0 / 0
	-10	0 / 0
	0	0 / 0
	+10	0 / 0
	+20	0 / 0
	+30	0 / 0
	+40	0 / 0
	+50	0 / 0

LTE B13 Downlink		
<i>Temperature (°C)</i>	<i>Voltage (VAC)</i>	<i>Frequency Deviation (Hz/ppm)</i>
20	102	0 / 0
	138	0 / 0

LTE B13 Uplink		
<i>Voltage (VAC)</i>	<i>Temperature (°C)</i>	<i>Frequency Deviation (Hz/ppm)</i>
120	-30	0 / 0
	-20	0 / 0
	-10	0 / 0
	0	0 / 0
	+10	0 / 0
	+20	0 / 0
	+30	0 / 0
	+40	0 / 0
	+50	0 / 0

LTE B13 Uplink		
<i>Temperature (°C)</i>	<i>Voltage (VAC)</i>	<i>Frequency Deviation (Hz/ppm)</i>
20	102	0 / 0
	138	0 / 0

2.8.9 Sample Test Plots



Downlink Mid Channel 120VAC @ 20°C

2.9 POWER LINE CONDUCTED EMISSIONS

2.9.1 Specification Reference

RSS-Gen 8.8

2.9.2 Standard Applicable

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits in table below.

Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in table below. The more stringent limit applies at the frequency range boundaries.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.9.3 Equipment Under Test and Modification State

Serial No: 921550000015 (NU and CU) / Default Test Configuration

2.9.4 Date of Test/Initial of test personnel who performed the test

January 18, 2016/XYZ

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions

Ambient Temperature	22.5 °C
Relative Humidity	52.6. %
ATM Pressure	99.9 kPa



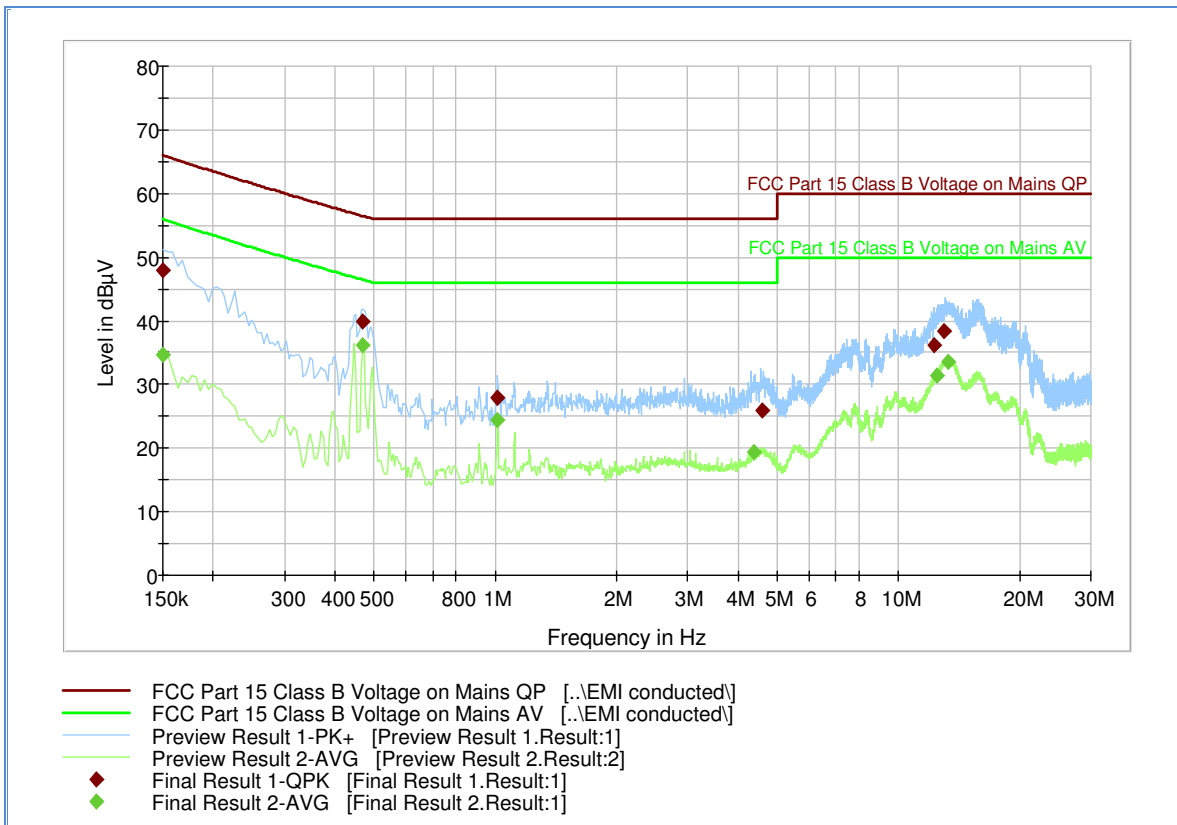
2.9.7 Additional Observations

- The EUT was verified using AC adapter supplied by the manufacturer..
- EUT verified using input voltage of 120VAC 60Hz.
- There are no significant variations in test results between each operating modes. Only the normal operation mode observed is presented.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.2.8 for sample computation.

2.9.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (db μ V) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7567 (LISN)	0.30	
Reported QuasiPeak Final Measurement (db μ V) @ 150kHz			26.2

2.9.9 Test Results - Conducted Emissions Line 1 – Hot (NU)



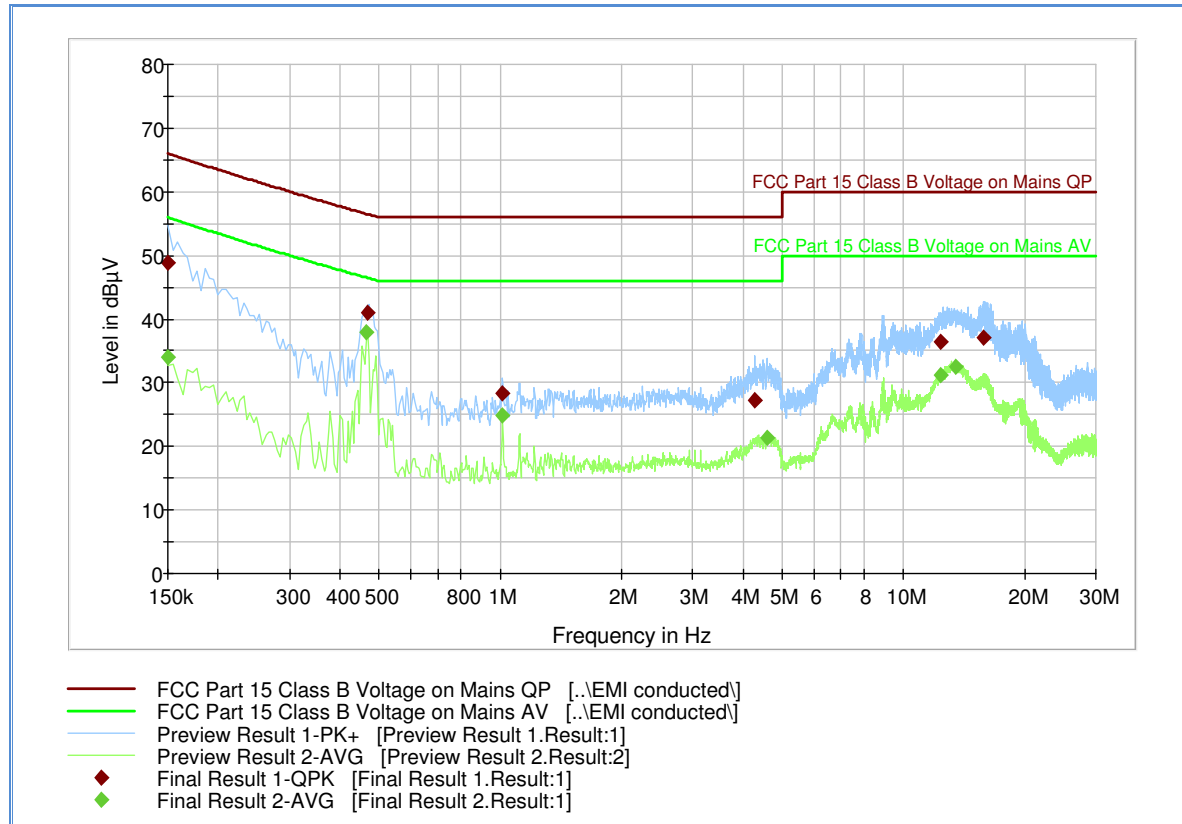
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.150000	47.9	1000.0	9.000	Off	L1	20.1	18.1	66.0
0.469500	40.0	1000.0	9.000	Off	L1	20.1	16.5	56.5
1.014000	28.0	1000.0	9.000	Off	L1	20.2	28.0	56.0
4.609500	25.9	1000.0	9.000	Off	L1	20.5	30.1	56.0
12.246000	36.2	1000.0	9.000	Off	L1	20.6	23.8	60.0
12.997500	38.4	1000.0	9.000	Off	L1	20.6	21.6	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.150000	34.6	1000.0	9.000	Off	L1	20.1	21.4	56.0
0.469500	36.3	1000.0	9.000	Off	L1	20.1	10.2	46.5
1.014000	24.4	1000.0	9.000	Off	L1	20.2	21.6	46.0
4.366500	19.5	1000.0	9.000	Off	L1	20.4	26.5	46.0
12.408000	31.4	1000.0	9.000	Off	L1	20.6	18.6	50.0
13.263000	33.7	1000.0	9.000	Off	L1	20.6	16.3	50.0

2.9.10 Test Results - Conducted Emissions Line 1 – Hot (CU)



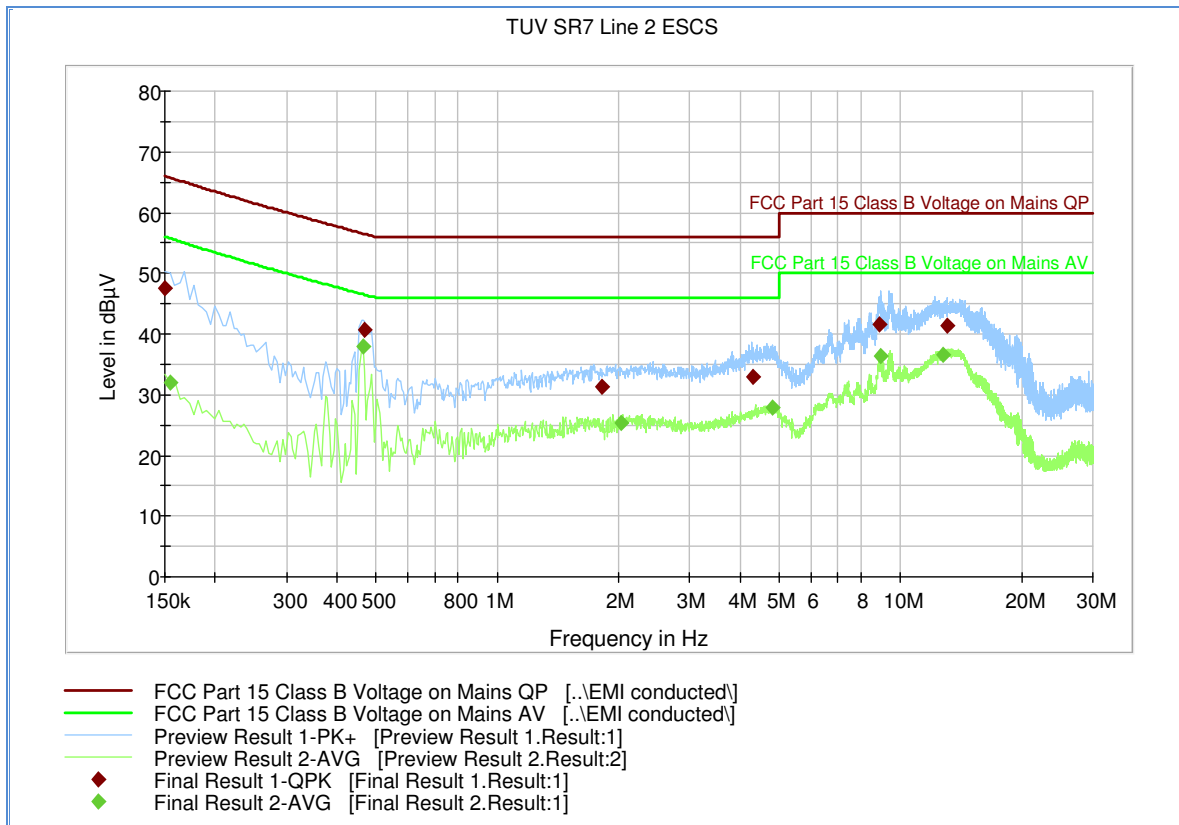
Quasi Peak

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)
0.150000	48.9	1000.0	9.000	Off	L1	20.1	17.1	66.0
0.469500	40.9	1000.0	9.000	Off	L1	20.1	15.6	56.5
1.014000	28.3	1000.0	9.000	Off	L1	20.2	27.7	56.0
4.285500	27.2	1000.0	9.000	Off	L1	20.4	28.8	56.0
12.363000	36.4	1000.0	9.000	Off	L1	20.6	23.6	60.0
15.841500	37.1	1000.0	9.000	Off	L1	20.6	22.9	60.0

Average

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBμV)
0.150000	33.9	1000.0	9.000	Off	L1	20.1	22.1	56.0
0.465000	37.8	1000.0	9.000	Off	L1	20.1	8.7	46.5
1.014000	24.9	1000.0	9.000	Off	L1	20.2	21.1	46.0
4.582500	21.3	1000.0	9.000	Off	L1	20.4	24.7	46.0
12.403500	31.3	1000.0	9.000	Off	L1	20.6	18.7	50.0
13.452000	32.4	1000.0	9.000	Off	L1	20.6	17.6	50.0

2.9.11 FCC Conducted Emissions Line 2 – Neutral (CU)



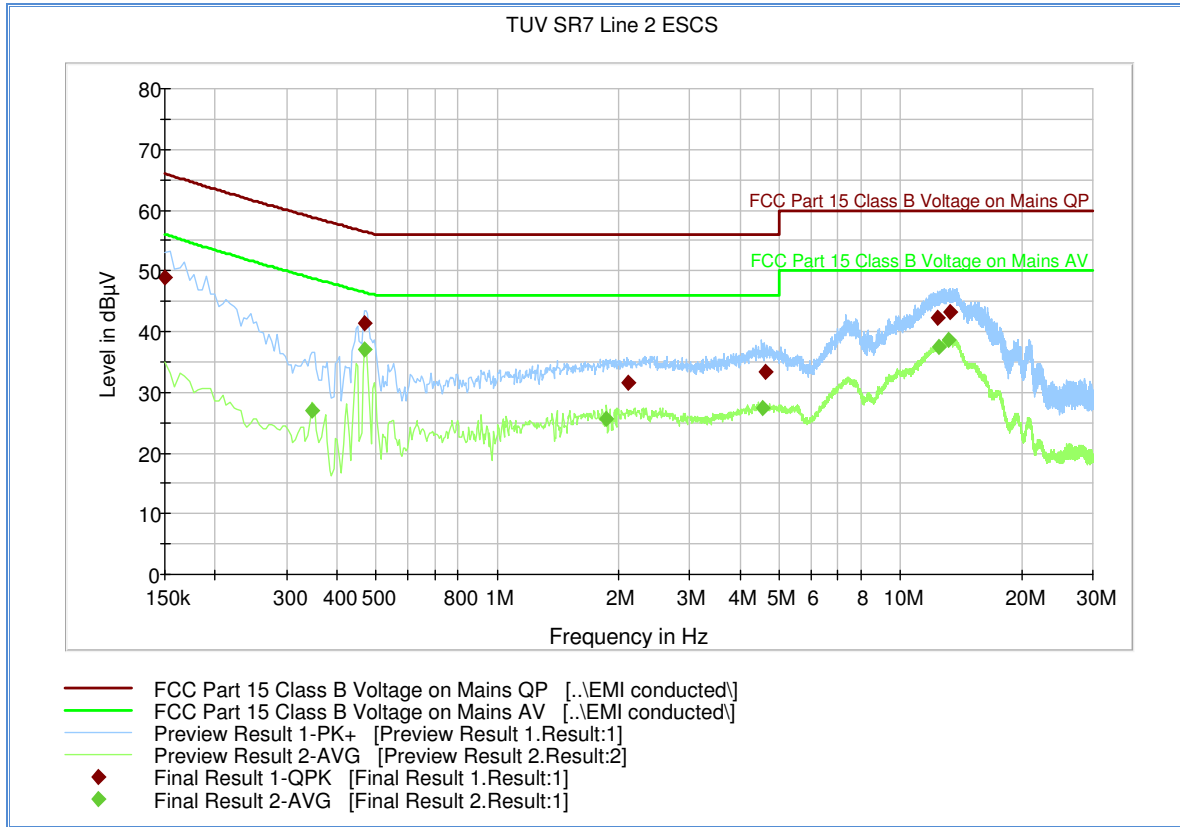
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	47.4	1000.0	9.000	Off	N	20.1	18.6	66.0
0.469500	40.8	1000.0	9.000	Off	N	20.1	15.7	56.5
1.819500	31.2	1000.0	9.000	Off	N	20.2	24.8	56.0
4.312500	32.9	1000.0	9.000	Off	N	20.4	23.1	56.0
8.875500	41.6	1000.0	9.000	Off	N	20.5	18.4	60.0
13.101000	41.4	1000.0	9.000	Off	N	20.6	18.6	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.154500	32.0	1000.0	9.000	Off	N	20.0	23.7	55.7
0.465000	37.8	1000.0	9.000	Off	N	20.1	8.7	46.5
2.031000	25.4	1000.0	9.000	Off	N	20.1	20.6	46.0
4.803000	27.8	1000.0	9.000	Off	N	20.5	18.2	46.0
8.938500	36.2	1000.0	9.000	Off	N	20.5	13.8	50.0
12.741000	36.6	1000.0	9.000	Off	N	20.7	13.4	50.0

2.9.12 FCC Conducted Emissions Line 2 – Neutral (NU)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	49.0	1000.0	9.000	Off	N	20.1	17.0	66.0
0.469500	41.5	1000.0	9.000	Off	N	20.1	15.0	56.5
2.107500	31.5	1000.0	9.000	Off	N	20.3	24.5	56.0
4.623000	33.4	1000.0	9.000	Off	N	20.4	22.6	56.0
12.358500	42.4	1000.0	9.000	Off	N	20.7	17.6	60.0
13.281000	43.2	1000.0	9.000	Off	N	20.6	16.8	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.348000	26.9	1000.0	9.000	Off	N	20.2	21.9	48.8
0.469500	37.1	1000.0	9.000	Off	N	20.1	9.4	46.5
1.860000	25.7	1000.0	9.000	Off	N	20.2	20.3	46.0
4.537500	27.5	1000.0	9.000	Off	N	20.4	18.5	46.0
12.435000	37.5	1000.0	9.000	Off	N	20.7	12.5	50.0
13.177500	38.5	1000.0	9.000	Off	N	20.6	11.5	50.0



SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Antenna Conducted Port Setup						
7604	P-Series Power Meter	N1912A	SG45100273	Agilent	05/27/15	05/27/16
7605	50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	04/10/15	04/10/16
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/05/15	10/05/16
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	07/29/15	07/29/16
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	For sigalling	
8772	10dB Attenuator	606-10-1F4/DR	-	MECA	Verified by 7582 and 7608	
Radiated Emissions						
1033	Bilog Antenna	3142C	00044556	EMCO	09/25/15	09/25/16
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	04/27/15	04/27/16
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	03/20/15	03/20/16
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	09/29/15	09/29/16
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/11/15	03/11/16
1016	Pre-amplifier	PAM-0202	187	PAM	12/15/15	12/15/16
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	04/03/15	04/03/16
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	09/03/15	09/03/16
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	05/03/15	05/03/16
Conducted Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	04/10/15	04/10/16
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	07/14/15	0714/16
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	10/28/15	10/28/16
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/20/15	02/20/16
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/20/15	02/20/16
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	For signalling	

FCC ID: NU: YETD32-21366NU
 CU: YETD32-21366CU
 IC: N/A
 Report No. SD72112724-0116C Rev1.0



Miscellaneous						
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/14/15	08/14/16
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	04/09/15	04/09/16
	DC Power Supply	35010M	D102007S	Protek	Verified by 6792	
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Conducted Measurements

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.80
Coverage Factor (k):					2
Expanded Uncertainty:					1.59

3.2.2 Radiated Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.78
Coverage Factor (k):					2
Expanded Uncertainty:					3.57

3.2.3 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.78
Coverage Factor (k):					2
Expanded Uncertainty:					3.56

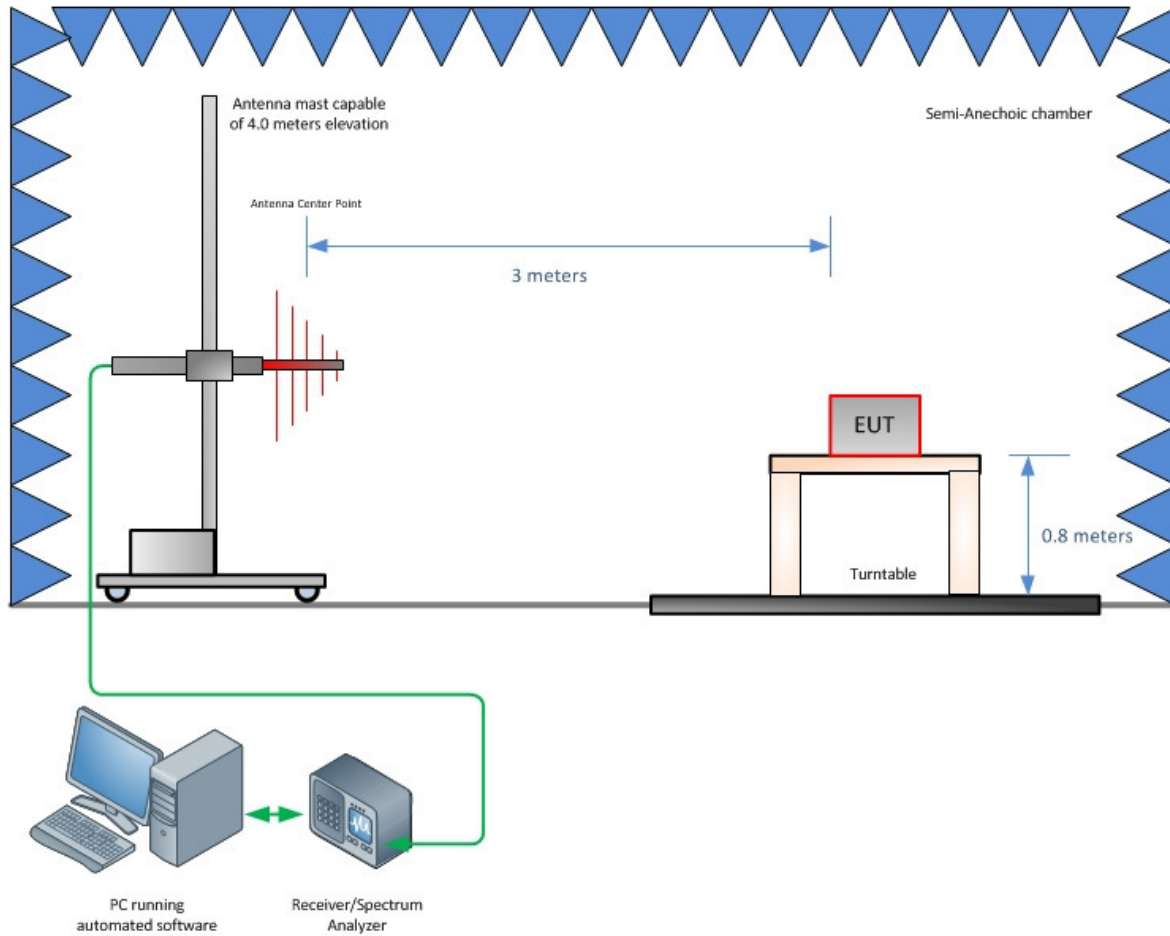
3.2.4 Conducted Antenna Port Measurement

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.72
Coverage Factor (k):					2
Expanded Uncertainty:					1.45

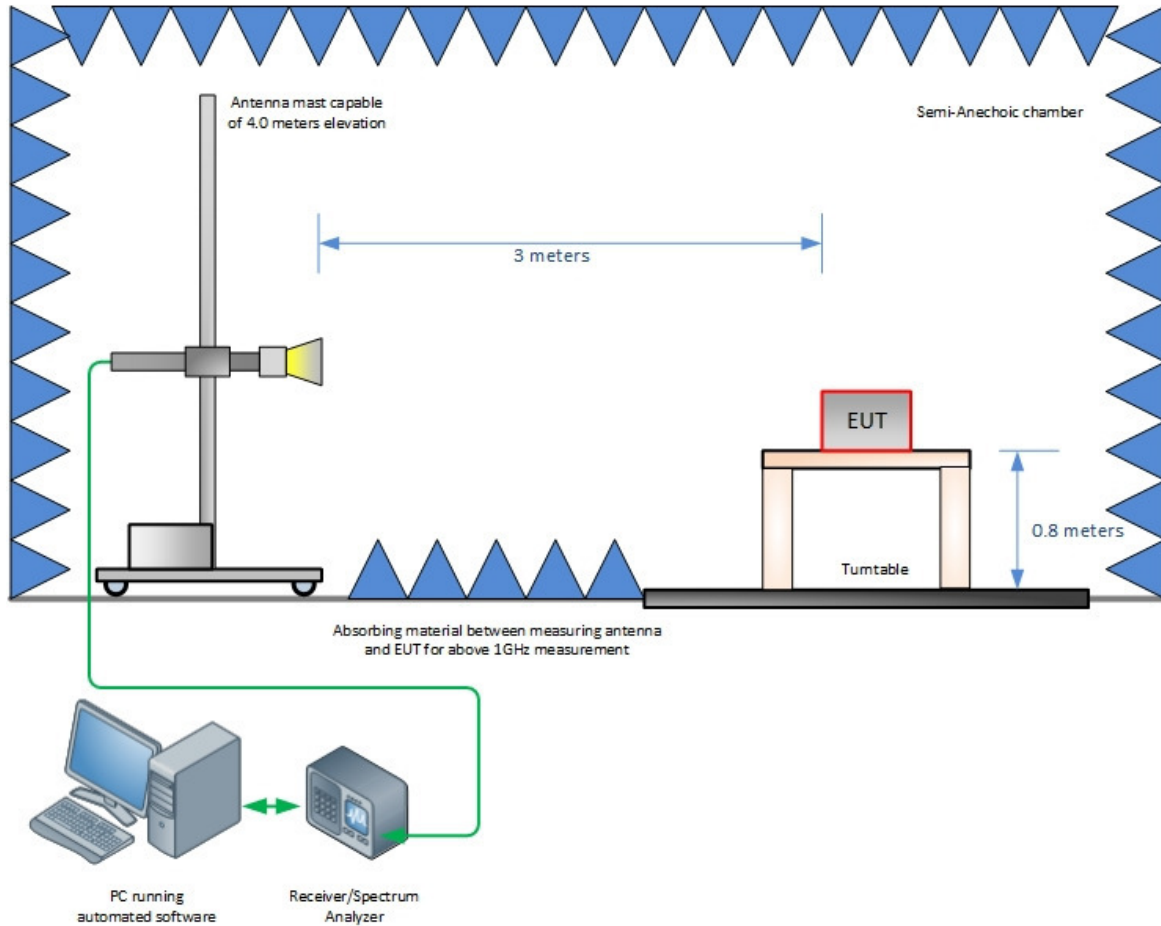
SECTION 4

DIAGRAM OF TEST SETUP

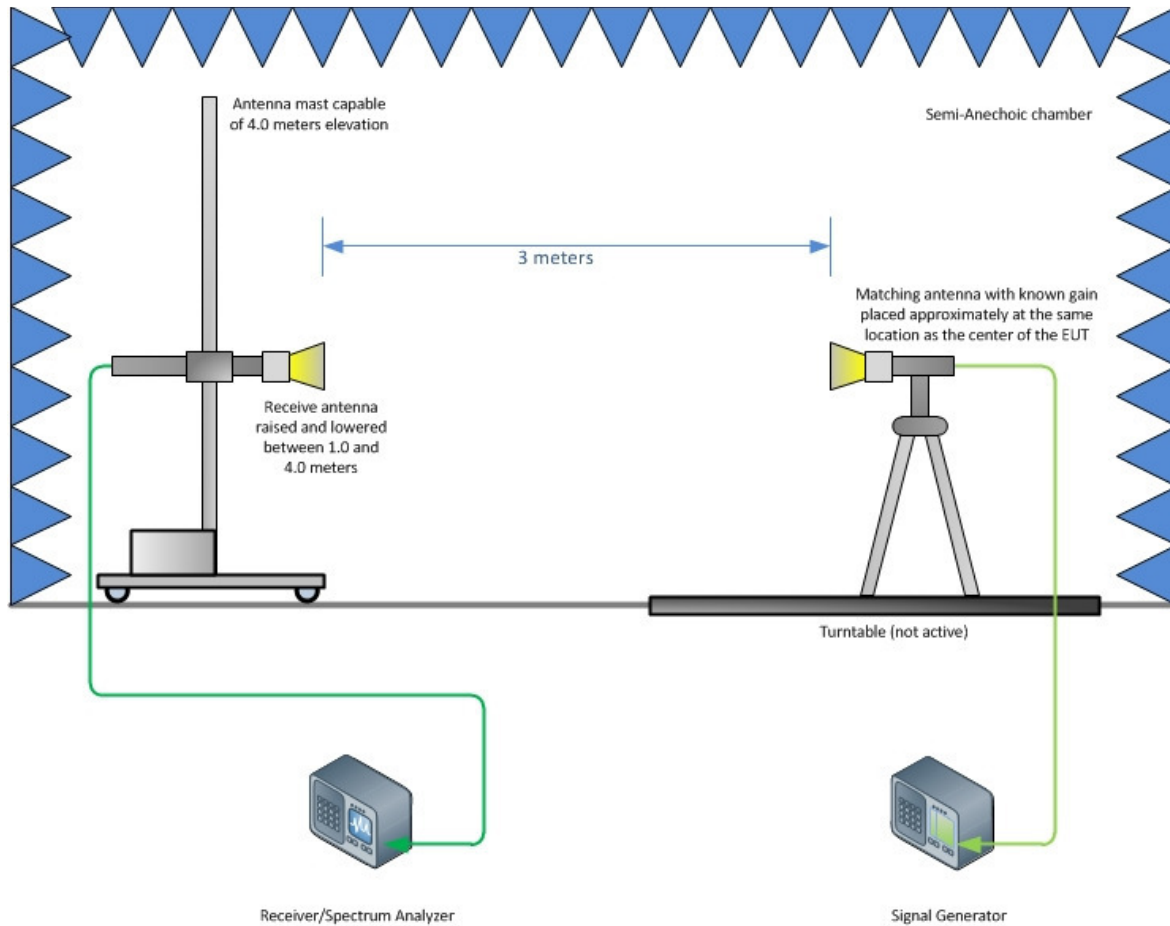
4.1 TEST SETUP DIAGRAM



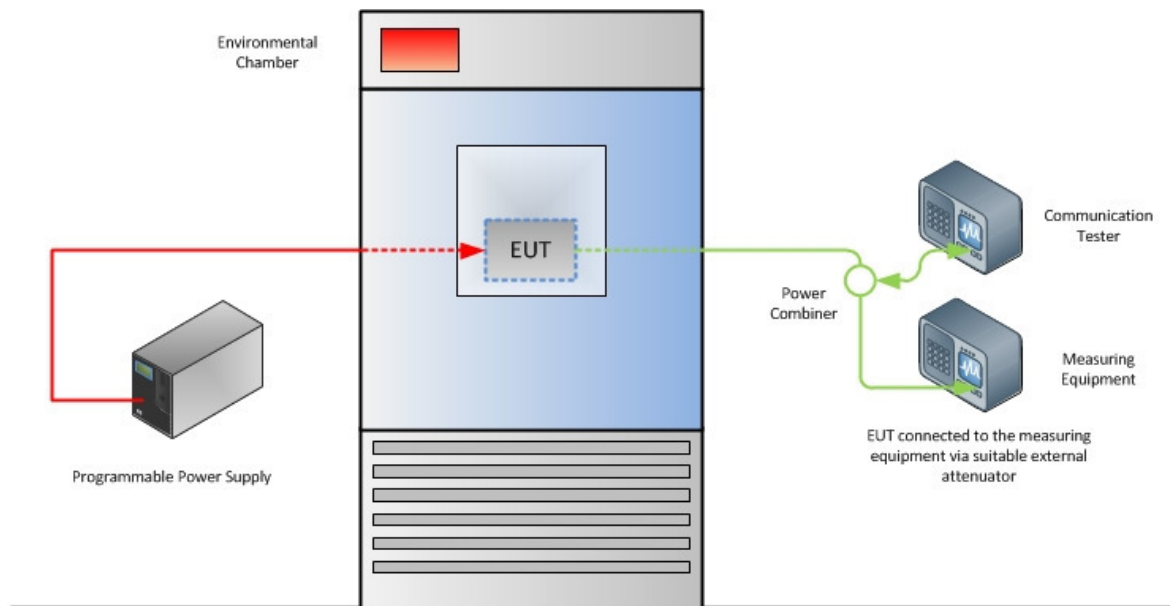
Radiated Emission Test Setup (Below 1GHz)



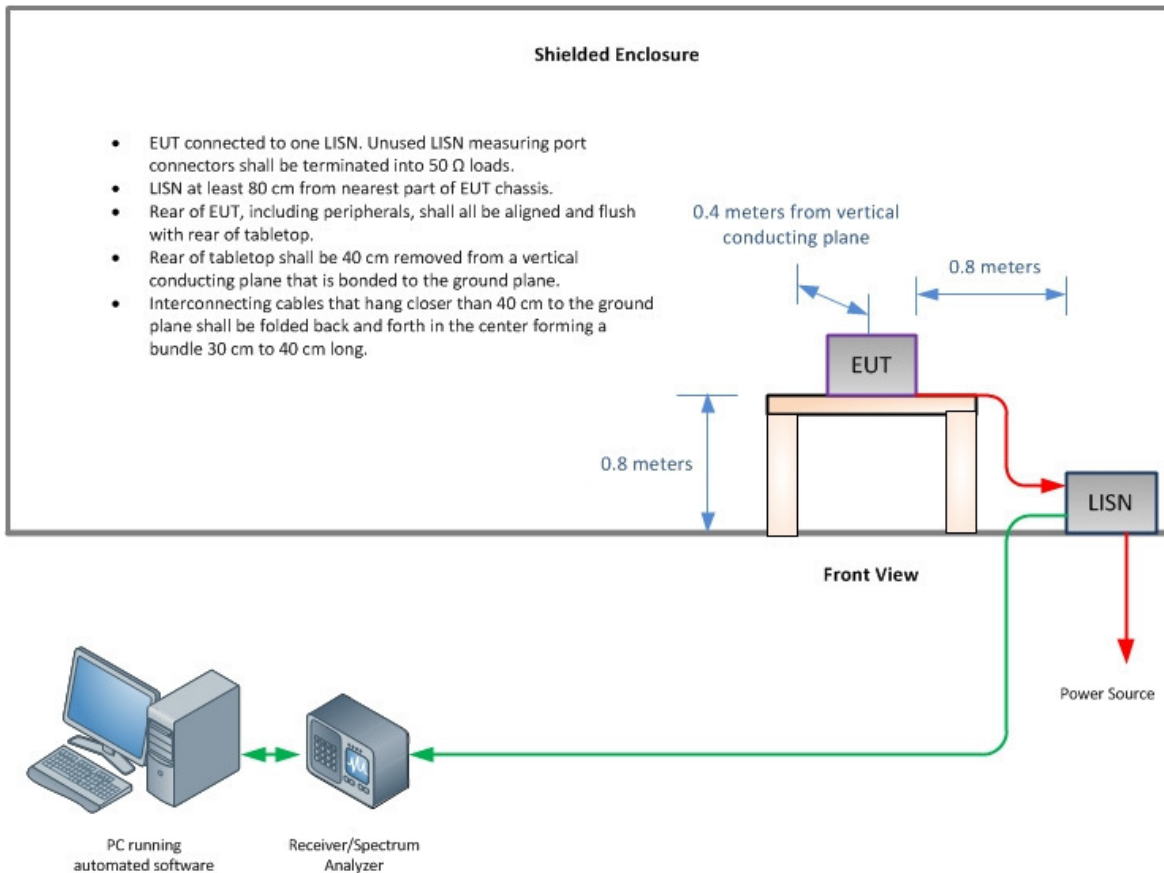
Radiated Emission Test Setup (Above 1GHz)



Substitution Test Method (Above 1GHz, if applicable)



Frequency Stability Test Configuration



Conducted Emissions Test Configuration (if applicable)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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