

## Report On

Application for Grant of Equipment Authorization of the  
Nextivity Inc.

Cel-Fi GO Cellphone Signal Repeater

FCC CFR 47 Part 2, Part 22 and Part 24  
RSS-Gen, RSS-132 and RSS-133

Report No. SD72121023-1016C Rev 1.0

March 2017





**REPORT ON** Radio Testing of the  
Nextivity Inc.  
Cel-Fi GO Cellphone Signal Repeater

**TEST REPORT NUMBER** SD72121023-1016C Rev 1.0

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**DATED** March 30, 2017



**Revision History**

SD72121023-1016C Rev 1.0 Nextivity Inc. Cel-Fi GO Cellphone Signal Repeater					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
03/15/17	Initial Release				Juan M Gonzalez
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## **SECTION 1**

### **REPORT SUMMARY**

Radio Testing of the  
Nextivity Inc.  
Cel-Fi GO Cellphone Signal Repeater



## 1.1 INTRODUCTION

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

- FCC CFR 47 Part 2, Part 22 and Part 24
- RSS-Gen, RSS-132 and RSS-133.

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 Name	Cel-Fi GO
Model Number(s)	G32-2/4/5/12/13
FCC ID	YETG32-2451213
IC Number	9298A-G322451213
Serial Number(s)	332633000356, 931703000264 (Fix Unit) and 332633000417 (Mobile Unit)
Number of Samples Tested	3
Test Specification/Issue/Date	<ul style="list-style-type: none"> <li>• FCC CFR 47 Part 2, Part 22 and Part 24 (October 1, 2016).</li> <li>• RSS-132 – Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894MHz (Issue 3, January 2013).</li> <li>• RSS-133 – 2 GHz Personal Communications Services (Issue 6, January 2013).</li> <li>• RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014).</li> </ul>
Start of Test	December 16, 2016
Finish of Test	February 03, 2017
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	<ul style="list-style-type: none"> <li>• ANSI/TIA-603-D-2010 – Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards.</li> <li>• KDB971168 (D01 Power Meas License Digital Systems v02r02) Measurement Guidance For Certification Of Licensed Digital Transmitters</li> <li>• KDB412172 D01 Determining ERP and EIRP v01r01 (Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System.</li> <li>• Antenna Kitting_v1.pdf</li> <li>• Supporting documents for EUT certification are separate exhibits.</li> </ul>



**1.2 BRIEF SUMMARY OF RESULTS**

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, Part 22 and Part 24 with cross-reference to the corresponding ISED RSS standard is shown below.

Section	Spec Clause					Test Description	Result
	FCC Part 2	FCC Part 22	FCC Part 24	RSS-132	RSS-133		
2.1	2.1046	-	-	5.4	6.4	Transmitter Conducted Output Power	Compliant
2.2	2.1046	22.913 (a)	-	-	-	Effective Radiated Power	Compliant
2.3	2.1046	-	24.232 (c)	5.4	6.4	Equivalent Isotropic Radiated Power	Compliant
2.4	2.1049	22.917 (b)	24.238 (b)	RSS-Gen 6.6		Occupied Bandwidth	Compliant
2.5	-	-	24.232 (d)	5.4	6.4	Peak-Average Ratio	Compliant
2.6	2.1051	22.917 (a)	24.238 (a)	5.5	6.5	Band Edge	Compliant
2.7	2.1051	22.917 (a)	24.238 (a)	5.5	6.5	Conducted Spurious Emissions	Compliant
2.8	2.1053	22.917 (a)	24.238 (a)	5.5	6.5	Field Strength of Spurious Radiation	Compliant
2.9	2.1055	22.355	24.235	5.3	6.3	Frequency Stability	Compliant
-	-	-	-	5.6	6.6	Receiver Spurious Emissions	N/A
2.10	-	-	-	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) is a Nextivity Inc. Cel-Fi GO Cellphone Signal Repeater. The EUT is a WCDMA/LTE Signal Booster to improve voice and data cellular performance in a variety of mobile (e.g. Vehicle and Marine), Fix (e.g. Home/office and Nomadic), Indoor and Outdoor environments. Both Fix and Mobile Versions are identical except the allowed maximum system gains which are set by firmware during production. The model tested in this report was the Fix sample as the representative unit unless otherwise stated. The unit includes Bluetooth LE connectivity. With the use of Nextivity smartphone application, it allows user to register the product, update software, capture / display details metrics of the system. The WCDMA and LTE Band 2 and Band 5 function of the EUT were verified in this test report.



**1.3.2 EUT General Description**

EUT Description: Cellphone Signal Repeater  
 Model Name: Cel-Fi GO  
 Model Number(s): G32-2/4/5/12/13  
 Rated Voltage: 15V DC via external AC/DC adapter (Fix Unit)  
 12V DC via CLA (Cigarette Lighter Adaptor) (Mobile Unit)  
 Mode Verified: WCDMA and LTE Band 2 and Band 5  
 Frequency Bands: B2: Uplink: 1850 - 1910MHz  
 Downlink: 1930 -1990MHz  
 B5: Uplink: 824 - 849MHz  
 Downlink: 869 - 894MHz

Signal Bandwidth (MHz)	Band 2		Band 5	
	DL (dB)	UL (dB)	DL (dB)	UL (dB)
5	10.0	22	10.0	20
10	13.0		13.0	
15	14.8		14.8	
20	16.0		-	

Capability: WCDMA (Band 2 and 5), LTE (Band 2, 5, 12, 13 and 4) and BT LE

Primary Unit (EUT)  
 Production  
 Pre-Production  
 Engineering

Manufacturer Declared Temperature Range: 0°C to 65°C



Antenna Type External Antenna

Manufacturer Refer to the Antenna Kitting information supplied by the manufacture

Antenna Model Refer to the Antenna Kitting information supplied by the manufacture

Maximum Antenna Gain

Radio	Uplink (Donor)	Downlink (Server)
HSPA/LTE Band 2	6.0 dBi	-1.0 dBi
LTE Band 4	6.0 dBi	-1.0 dBi
HSPA/LTE Band 5	8.0 dBi	-1.0 dBi
LTE Band 12	8.0 dBi	-1.0 dBi
LTE Band 13	8.0 dBi	-1.0 dBi



**1.3.3 Transmit Frequency Table**

Mode	Signal Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	EPR (Part 22)		EIRP (Part 24, RSS-132, RSS-133)	
				Max. Power Avg (dBm)	Max. Power Avg (W)	Max. Power Avg (dBm)	Max. Power Avg (W)
WCDMA Band 5 Downlink	5	871.4 – 891.6	4M14F9W	6.46	0.004	8.61	0.007
	5 (3 Carriers)	871.4 – 891.6		11.61	0.014	13.76	0.024
WCDMA Band 5 Uplink	5	826.4 – 846.6	4M34F9W	25.7	0.372	27.85	0.610
	5 (3 Carriers)	871.4 – 891.6		25.34	0.342	27.49	0.561
WCDMA Band 2 Downlink	5	1932.4 – 1987.6	4M14F9W	-	-	8.93	0.008
	5 (3 Carriers)	1932.4 – 1987.6		-	-	15.06	0.032
WCDMA Band 2 Uplink	5	1852.4 – 1909.6	4M14F9W	-	-	28.1	0.646
	5 (3 Carriers)	1932.4 – 1987.6		-	-	28.07	0.641
LTE Band 5 Downlink	5	871.5 – 891.5	4M28F9W	7.4	0.005	9.55	0.009
	10	874 – 889	8M86F9W	10.41	0.011	12.56	0.018
	15	876.5 – 886.5	13M3F9W	11.35	0.014	13.50	0.022
LTE Band 5 Uplink	5	826.5 – 846.5	4M28F9W	28.58	0.721	30.73	1.183
	10	829 – 844	8M86F9W	28.51	0.710	30.66	1.164
	15	831.5 – 881.5	13M3F9W	28.03	0.635	30.18	1.042
LTE Band 2 Downlink	5	1932.5 – 1987.5	4M28F9W	-	-	9.12	0.008
	10	1935 – 1985	8M86F9W	-	-	11.68	0.015
	15	1937.5 – 1982.5	13M3F9W	-	-	14.25	0.027
	20	1940 – 1980	17M8F9W	-	-	15.19	0.033
LTE Band 2 Uplink	5	1852.5 – 1909.5	4M28F9W	-	-	27.55	0.569
	10	1855 – 1907	8M80F9W	-	-	27.13	0.516
	15	1857.5 – 1904.5	13M3F9W	-	-	28.13	0.650
	20	1960 – 1902	17M7F9W	-	-	28.22	0.664



## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

Test Configuration	Description
A	Downlink. Input signal is applied to the antenna port of Donor (NU). Output is monitored from the antenna port of Server (CU).
B	Uplink. Input signal is applied to the antenna port of Server (CU). Output is monitored from the antenna port of Donor (NU).
C	Radiated test setup. Downlink. Input signal is applied to the antenna port of Donor (NU). The antenna port of Server (CU) is terminated with a 50Ω load.
D	Radiated test setup. Uplink. Input signal is applied to the antenna port of Server (CU). The antenna port of Donor (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 EUT is connected via USB.

### 1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
HON-KWANG	I.T.E Power Supply	Model: HK-AY-150A160-US S/N: GB0000007 Input: 100-240V, 50/60Hz, 0.8A; Output: 15 VDC 1.6A
-	Cigarette Lighter Adaptor (CLA)	Model: 290N035-001 Input: 12.6 – 14.7VDC; Output: 12VDC
Nextivity	Support USB cable	Custom 1.0 meter shielded USB Type A to Type A cable
Nextivity	USB / Interface Box	Unshielded with "Tag-Connect" interface
API Technologies Corp.	DC Block	M/N: 8037
Lenovo	Support Laptop	M/N: 2912-3VU, S/N: R9-92MH0 10/11
Lenovo	Support Laptop AC Adapter	M/N: 42T4430 S/N: 11S42T4430Z1ZGWE27AA9X

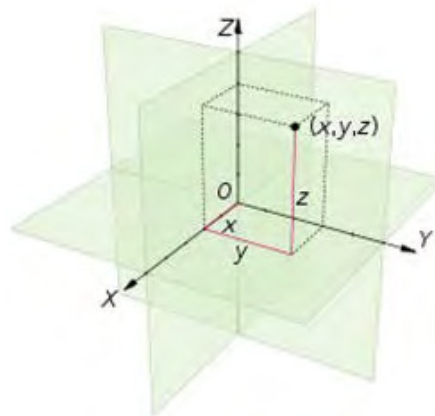


**1.4.4 Worst Case Configuration**

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:

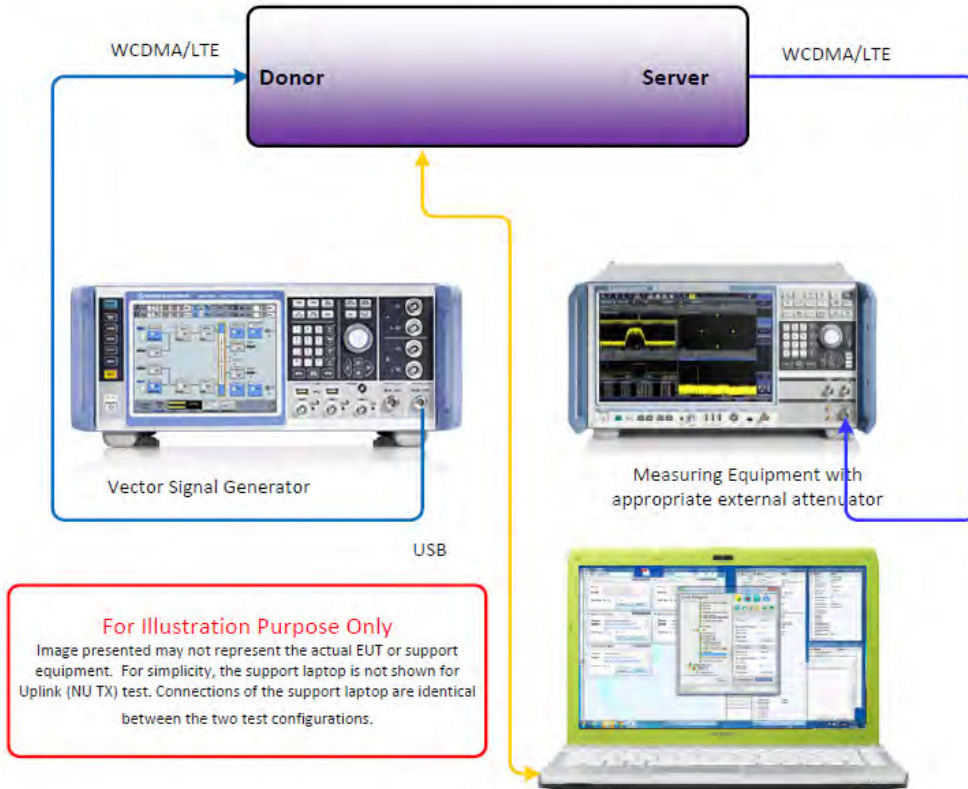
Mode	Signal Bandwidth	Channel No.	Frequency
WCDMA Band 5 Downlink	15MHz	High Channel 4408+4433+4458	881.6MHz+886.6 MHz +891.6 MHz
WCDMA Band 5 Uplink	5MHz	Mid Channel 4183	836.6MHz
WCDMA Band 2 Downlink	20MHz	High Channel 9863+9888+9913+9938	1972.6MHz+1977.6MHz+ 1982.6MHz+1987.6MHz
WCDMA Band 2 Uplink	5MHz	High Channel 9538	1907.6MHz
LTE Band 5 Downlink	15MHz	Mid Channel 2525	881.5MHz
LTE Band 5 Uplink	5MHz	Low Channel 20425	826.5MHz
LTE Band 2 Downlink	20MHz	Low Channel 700	1940MHz
LTE Band 2 Uplink	20MHz	Low Channel 18700	1860MHz

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 “Y” configuration.

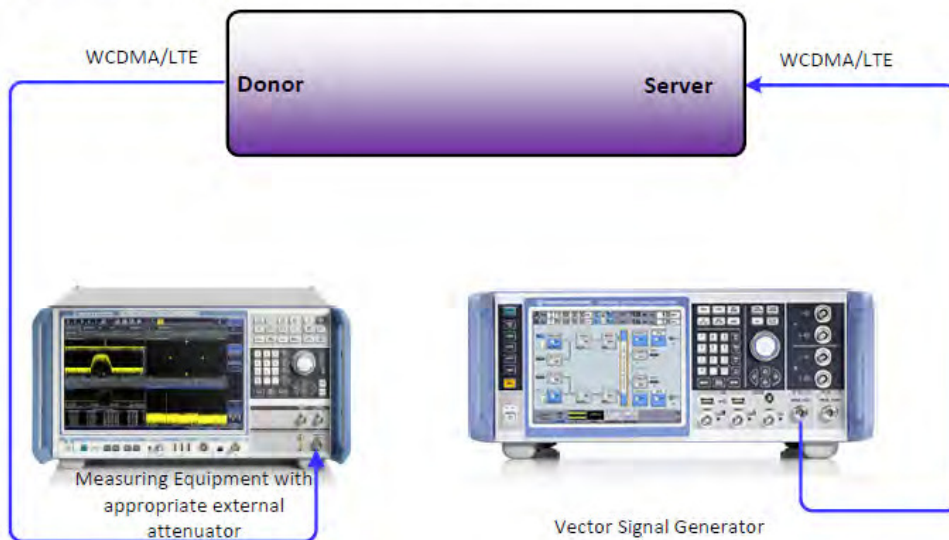


### 1.4.5 Simplified Test Configuration Diagram

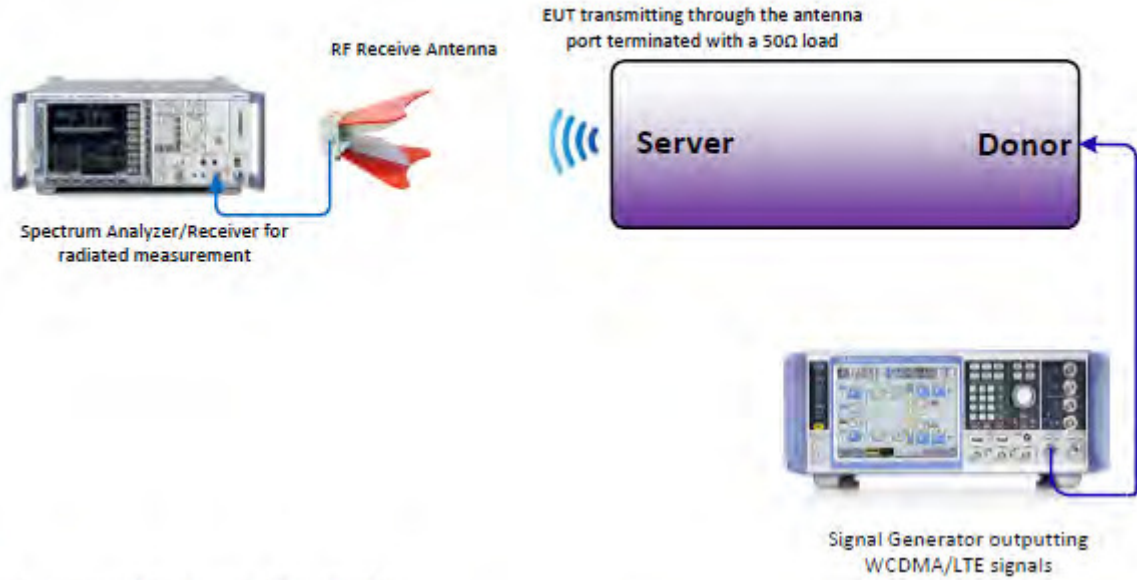
#### Downlink (Server Port) Conducted Test



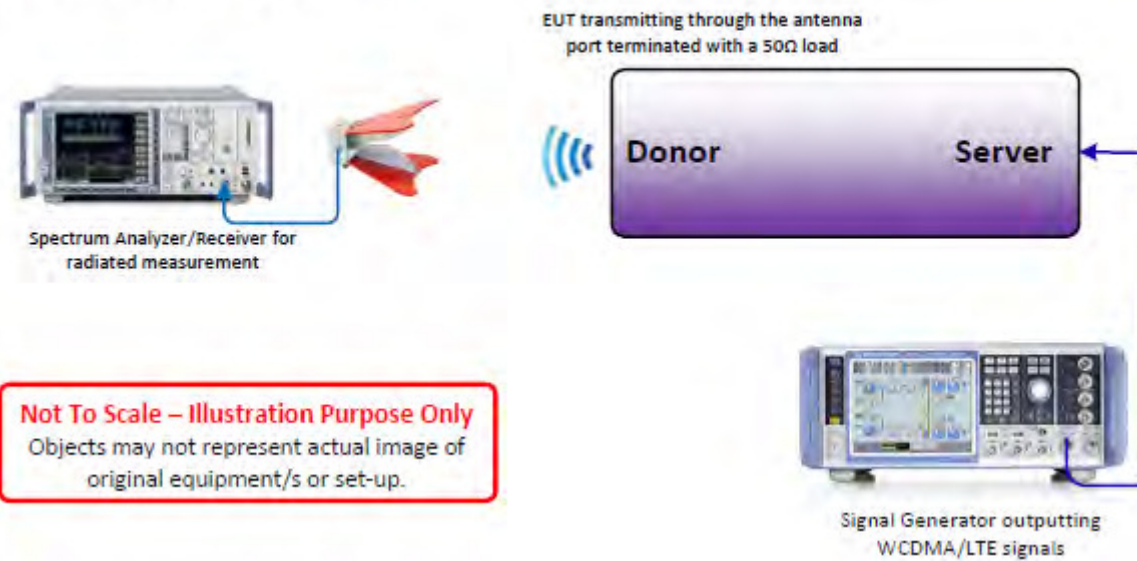
#### Uplink (Donor Port) Conducted Test



### Radiated Testing (Downlink)



### Radiated Testing (Uplink)



**Not To Scale – Illustration Purpose Only**  
Objects may not represent actual image of original equipment/s or set-up.



**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 332633000356, 931703000264 (Fix Unit) and 332633000417 (Mobile Unit)		
Bias voltage for external antenna use was moved from server (CU) port to donor (NU) port and was changed from 12V to 3.3V.	CK Li	February 01, 2017

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)**

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 678-1400 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
	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		<b>11.8</b>

**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 (2<sup>nd</sup> 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:

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



## SECTION 2

### TEST DETAILS

Radio Testing of the  
Nextivity Inc.  
Cel-Fi GO Cellphone Signal Repeater



## **2.1 TRANSMITTER CONDUCTED OUTPUT POWER**

### **2.1.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
RSS-132, Clause 5.4  
RSS-133, Clause 6.4

### **2.1.2 Standard Applicable**

The conducted power measurements were made in accordance to FCC Part 2 Clause 2.1046 and RSS-132 Clause 5.4 and RSS-133 Clause 6.4.

### **2.1.3 Equipment Under Test and Modification State**

Serial No: 332633000356 / Test Configuration A and B

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

December 09, 2016 to January 18, 2017 /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	21.4 - 26.9°C
Relative Humidity	47.6 - 49.4 %
ATM Pressure	99.2 - 99.8 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>WCDMA Band 5 Downlink (CU Output)</i>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	4357	871.4	9.13	20.26
	4408	881.6	9.13	19.83
	4458	891.6	9.61	20.12
15 MHz	4357+4382+4407	871.4+876.4+881.4	14.34	24.30
	4383+4408+4433	876.6+881.6+886.6	14.53	24.78
	<b>4408+4433+4458</b>	<b>881.6+886.6+891.6</b>	<b>14.76</b>	<b>25.69</b>

<i>WCDMA Band 5 Uplink (DU Output)</i>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	4132	826.4	19.59	29.21
	<b>4183</b>	<b>836.6</b>	<b>19.85</b>	<b>30.11</b>
	4233	846.6	19.64	29.65
15 MHz	4132+4157+4182	826.4+831.4+836.4	19.22	29.20
	4158+4183+4208	831.6+836.6+841.6	19.49	29.54
	4183+4208+4233	836.6+841.6+846.6	19.41	29.45



<b>WCDMA Band 2 Downlink (CU Output)</b>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	9662	1932.4	9.23	19.68
	9800	1960.0	9.71	20.97
	9938	1987.6	9.93	20.74
20 MHz	9662+9687+9712+9737	1932.4+1937.4+1942.4+1947.4	15.39	25.21
	9775+9800+9825+9850	1955+1960+1965+1970	15.36	25.40
	<b>9863+9888+9913+9938</b>	<b>1972.6+1977.6+1982.6+1987.6</b>	<b>16.06</b>	<b>26.44</b>

<b>WCDMA Band 2 Uplink (DU Output)</b>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	9262	1852.4	21.41	29.06
	9400	1880.0	21.76	30.92
	<b>9538</b>	<b>1907.6</b>	<b>22.10</b>	<b>31.06</b>
20 MHz	9262+9287+9312+9337	1852.4+1857.4+1862.4+1867.4	22.07	30.61
	9375+9400+9425+9450	1875+1880+1855+1860	21.49	31.32
	9463+9488+9513+9538	1892.6+1897.6+1902.6+1907.6	20.99	30.31



<i>LTE Band 5 Downlink (CU Output)</i>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	2425	871.5	10.33	21.10
	2525	881.5	10.39	22.40
	2625	891.5	10.55	20.61
10 MHz	2450	874.0	13.35	23.33
	2525	881.5	13.56	23.50
	2600	889.0	13.21	23.89
15 MHz	2475	876.5	14.26	24.15
	<b>2525</b>	<b>881.5</b>	<b>14.50</b>	<b>24.39</b>
	2575	886.5	14.25	24.31

<i>LTE Band 5 Uplink (NU Output)</i>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	<b>20425</b>	<b>826.5</b>	<b>22.73</b>	<b>30.53</b>
	20525	836.5	22.58	30.99
	20625	846.5	22.41	30.67
10 MHz	20450	829.0	22.52	30.58
	20525	836.5	22.43	31.19
	20600	844.0	22.66	30.57
15 MHz	20475	831.5	21.68	30.22
	20525	836.5	21.90	31.17
	20575	841.5	22.18	30.37

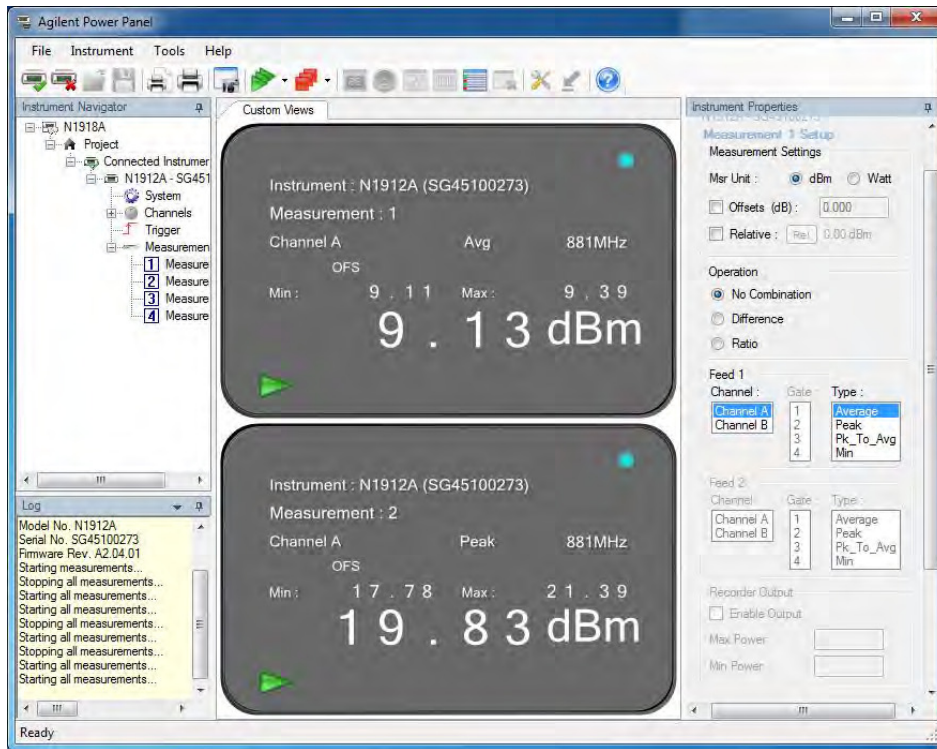


<i>LTE Band 2 Downlink (CU Output)</i>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	625	1932.5	9.58	19.72
	900	1960.0	10.0	21.99
	1175	1987.5	10.12	19.52
10 MHz	650	1935.0	11.98	22.51
	900	1960.0	12.18	22.47
	1150	1985.0	12.68	22.52
15 MHz	675	1937.5	14.03	26.34
	900	1960.0	14.17	25.14
	1125	1982.5	15.25	25.67
20 MHz	<b>700</b>	<b>1940</b>	<b>15.66</b>	<b>25.62</b>
	900	1960.0	15.23	25.54
	1100	1980.0	16.19	25.37

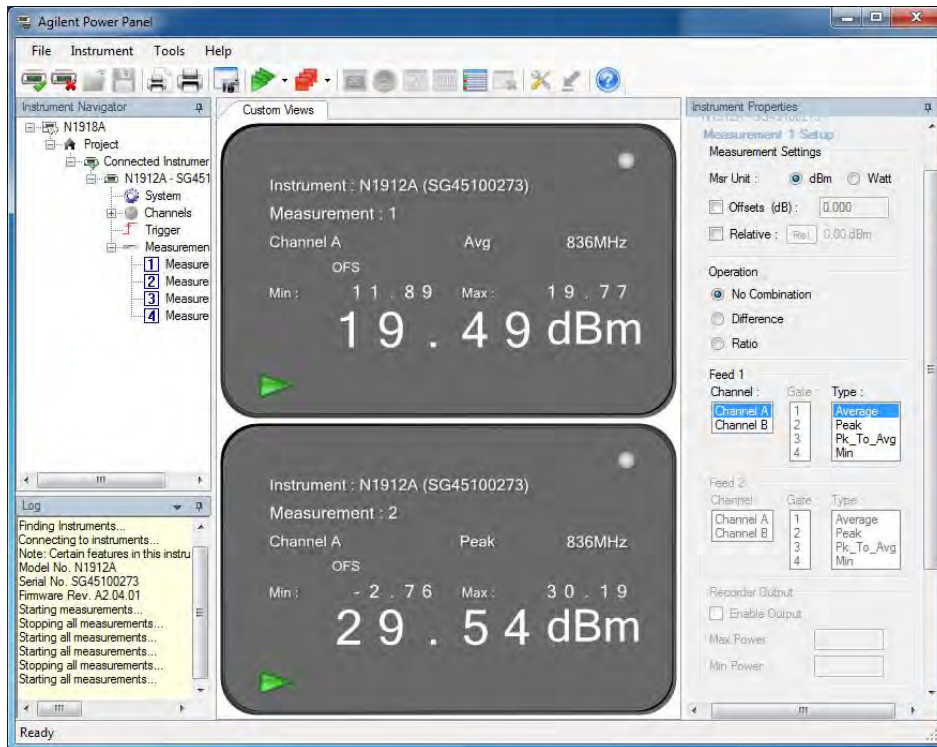


<i>LTE Band 2 Uplink (NU Output)</i>				
<b>Bandwidth (MHz)</b>	<b>Channels</b>	<b>Frequency (MHz)</b>	<b>Average Power (dBm)</b>	<b>Peak Power (dBm)</b>
5 MHz	18625	1852.5	21.55	30.37
	18900	1880.0	21.24	30.13
	19175	1907.5	20.74	29.23
10 MHz	18650	1855.0	21.13	30.23
	18900	1880.0	20.53	30.24
	19150	1905.0	20.47	29.13
15 MHz	18675	1857.5	22.13	30.63
	18900	1880.0	21.61	30.91
	19125	1902.5	20.95	29.74
20 MHz	<b>18700</b>	<b>1860.0</b>	<b>22.22</b>	<b>31.17</b>
	18900	1880.0	21.63	31.30
	19100	1900.0	20.99	30.65

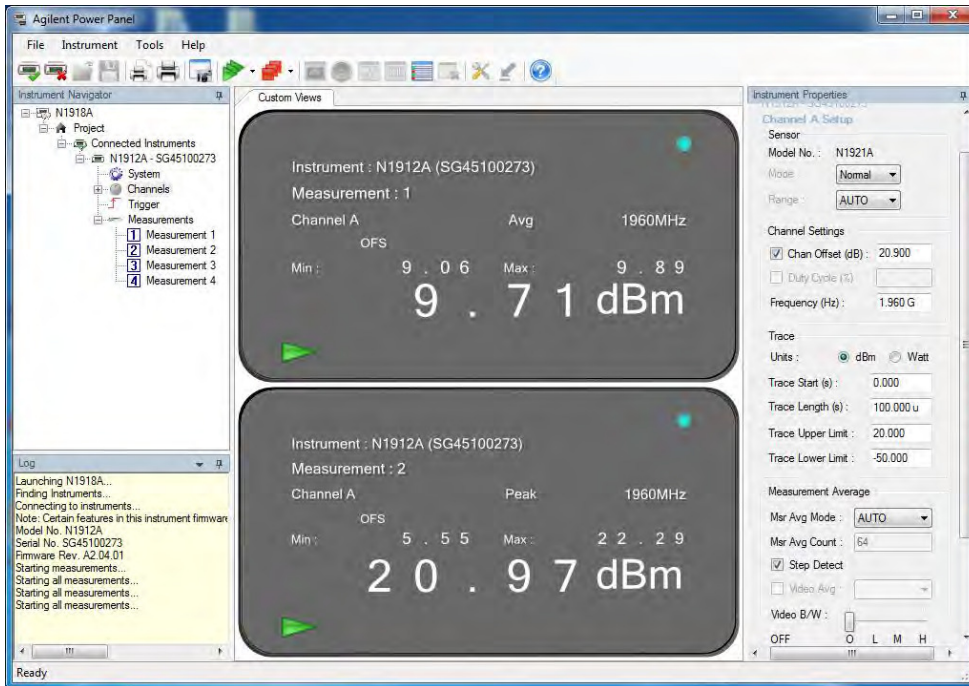
**2.1.9 Sample Test Plot**



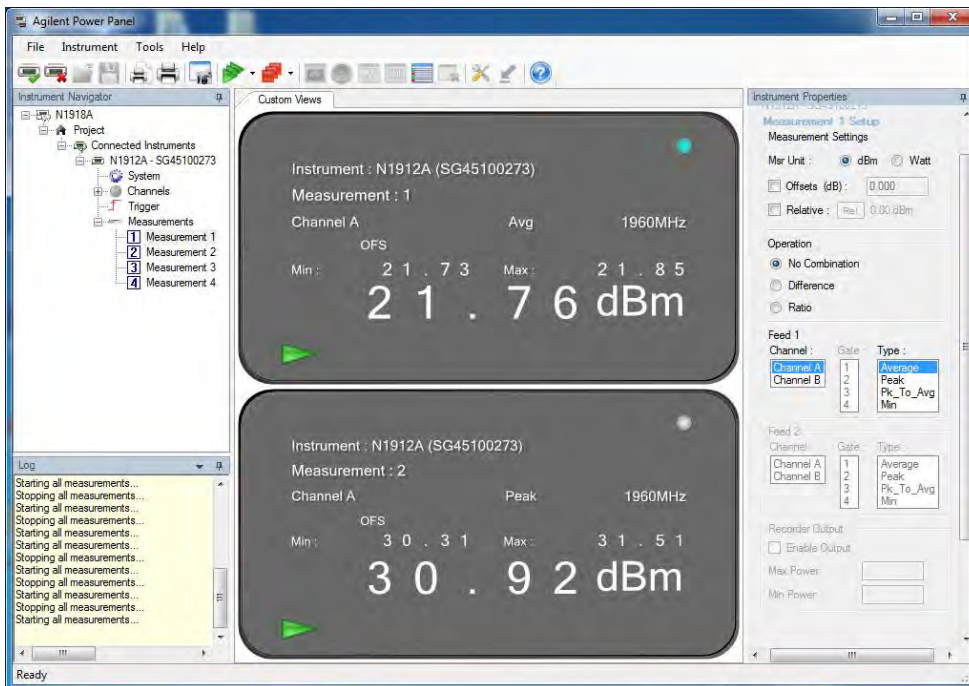
**WCDMA Band 5\_DownLink\_5MHz Bandwidth\_Mid Channel**



**WCDMA Band 5\_UpLink\_5MHz Bandwidth\_Mid Channel**



WCDMA Band 2\_Downlink\_5MHz Bandwidth\_Mid Channel

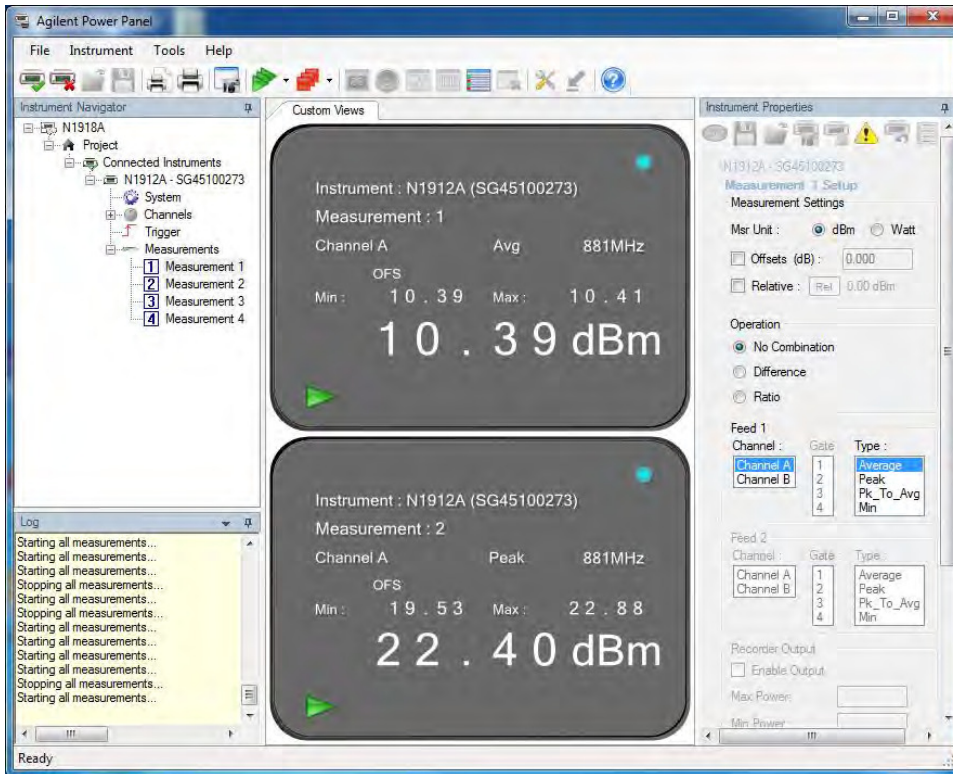


WCDMA Band 2\_Uplink\_5MHz Bandwidth\_Mid Channel

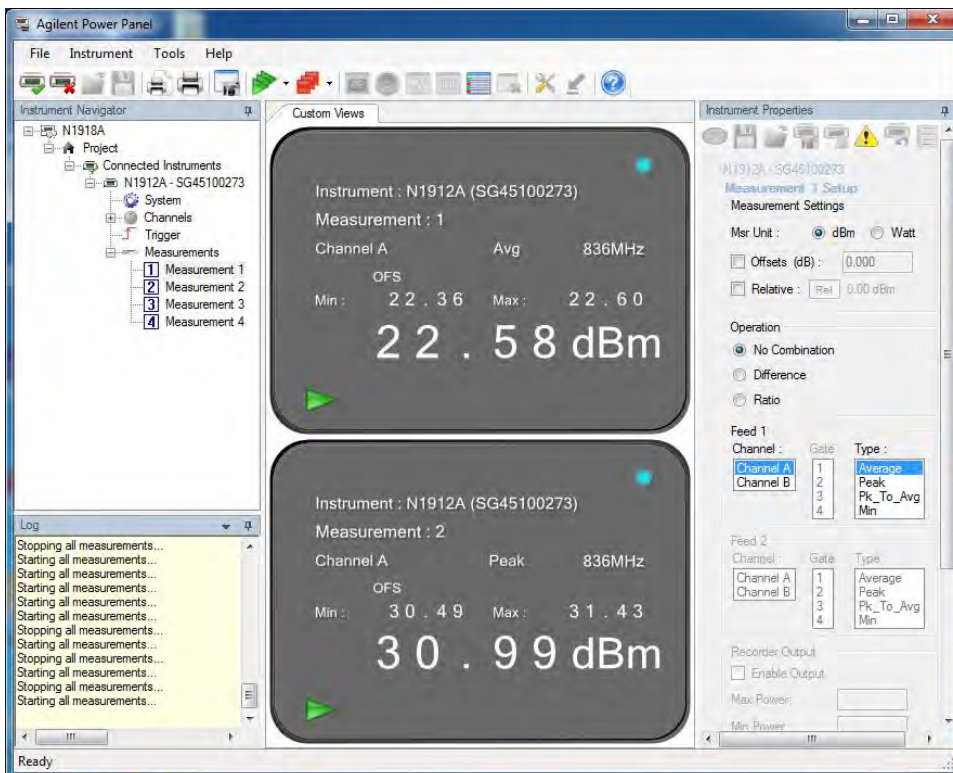




America

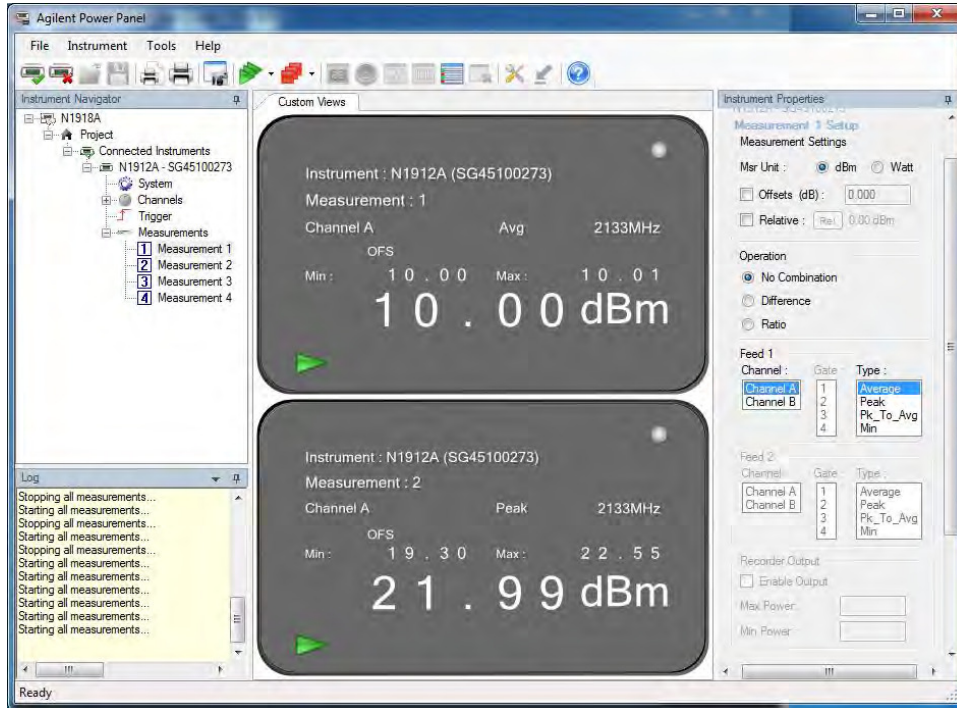


LTE Band 5\_Downlink\_5MHz Bandwidth\_Mid Channel

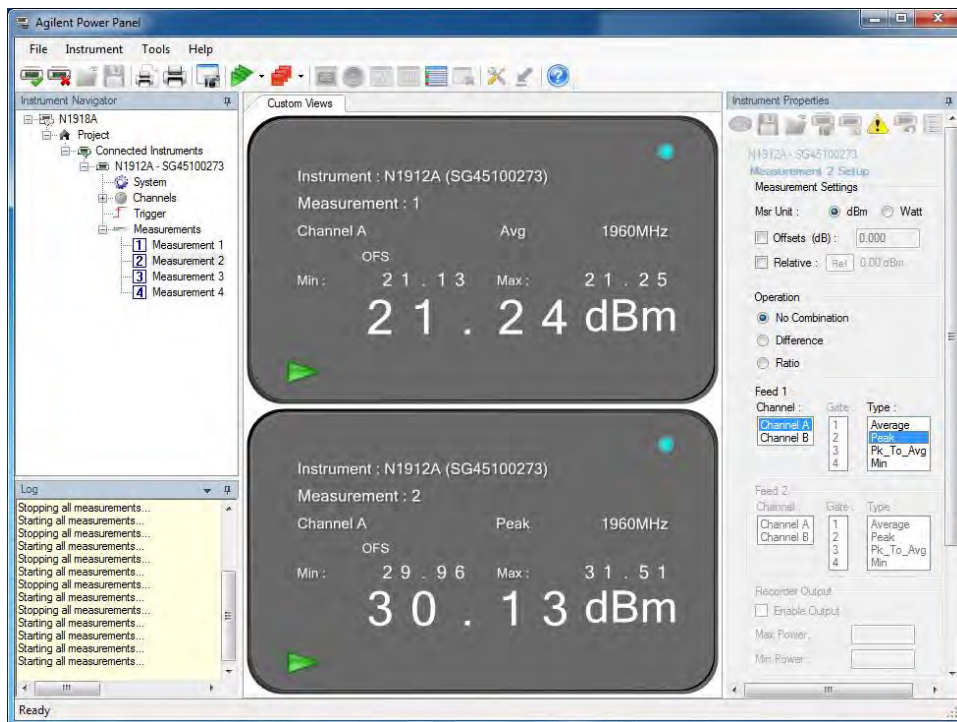


LTE Band 5\_Uplink\_5MHz Bandwidth\_Mid Channel





LTE Band 2\_Downlink\_5MHz Bandwidth\_Mid Channel



LTE Band 2\_Uplink\_5MHz Bandwidth\_Mid Channel



## 2.2 EFFECTIVE RADIATED POWER

### 2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046  
FCC 47 CFR Part 22, Clause 22.913(a)(2)

### 2.2.2 Standard Applicable

FCC Part 22:  
The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

### 2.2.3 Equipment Under Test and Modification State

Serial No: 332633000356 / Test Configuration (N/A, calculation only)

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

December 09, 2016 to January 18, 2017 /XYZ

### 2.2.5 Test Equipment Used

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

### 2.2.6 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 (EUT configuration during verification is mounted on an interface board with short direct connection to the antenna port. The loss between the EUT and the antenna port is considered negligible).



**2.2.7 Test Results**

<i>WCDMA Band 5 Downlink (CU Output)</i>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>ERP (dBm)</b>	<b>Limit (dBm)</b>
5	871.4	9.13	-1.0	5.98	38.45
	881.6	9.13	-1.0	5.98	38.45
	891.6	9.61	-1.0	6.46	38.45
15	871.4+876.4+881.4	14.34	-1.0	11.19	38.45
	876.6+881.6+886.6	14.53	-1.0	11.38	38.45
	881.6+886.6+891.6	14.76	-1.0	11.61	38.45

<i>WCDMA Band 5 Uplink (NU Output)</i>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>ERP (dBm)</b>	<b>Limit (dBm)</b>
5	4132	19.59	8.0	25.44	38.45
	4183	19.85	8.0	25.7	38.45
	4233	19.64	8.0	25.49	38.45
	4132+4157+4182	19.22	8.0	25.07	38.45
	4158+4183+4208	19.49	8.0	25.34	38.45
	4183+4208+4233	19.41	8.0	25.26	38.45



<b>LTE Band 5 Downlink (CU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>ERP (dBm)</b>	<b>Limit (dBm)</b>
5	871.5	10.33	-1.0	7.18	38.45
	881.5	10.39	-1.0	7.24	38.45
	891.5	10.55	-1.0	7.4	38.45
10	874.0	13.35	-1.0	10.2	38.45
	881.5	13.56	-1.0	10.41	38.45
	889.0	13.21	-1.0	10.06	38.45
15	876.5	14.26	-1.0	11.11	38.45
	881.5	14.50	-1.0	11.35	38.45
	886.5	14.25	-1.0	11.1	38.45

<b>LTE Band 5 Uplink (NU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>ERP (dBm)</b>	<b>Limit (dBm)</b>
5	826.5	22.73	8.0	28.58	38.45
	836.5	22.58	8.0	28.43	38.45
	846.5	22.41	8.0	28.26	38.45
10	829.0	22.52	8.0	28.37	38.45
	836.5	22.43	8.0	28.28	38.45
	844.0	22.66	8.0	28.51	38.45
15	831.5	21.68	8.0	27.53	38.45
	836.5	21.90	8.0	27.75	38.45
	841.5	22.18	8.0	28.03	38.45



## 2.3 EQUIVALENT ISOTROPIC RADIATED POWER

### 2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046  
RSS-132, Clause 5.4  
FCC 47 CFR Part 24, Clause 24.232 (c)  
RSS-133, Clause 6.4

### 2.3.2 Standard Applicable

RSS-132:

The EIRP for mobile equipment shall not exceed 11.5 watts

FCC Part 24:

Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

RSS-133:

The equivalent isotropically radiated power (e.i.r.p.) for Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p.

### 2.3.3 Equipment Under Test and Modification State

Serial No: 332633000356 / Test Configuration (N/A, calculation only)

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

December 09, 2016 to January 18, 2017 /XYZ

### 2.3.5 Additional Observations

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

$$\text{EIRP} = P_T + G_T - L_C$$

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);

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

### 2.3.6 Sample Computation

$$\begin{aligned} \text{ERP} &= P_T + G_T - L_C \\ &= 23.19 \text{ (Average)} + 0.13 \text{ (max. gain)} - 5.28 \text{ (cable loss)} \\ &= 18.04 \text{ dBm} \end{aligned}$$



**2.3.7 Test Results**

<i>WCDMA Band 5 Downlink (CU Output)</i>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	871.4	9.13	-1.0	8.13	40.6
	881.6	9.13	-1.0	8.13	40.6
	891.6	9.61	-1.0	8.61	40.6
15	871.4+876.4+881.4	14.34	-1.0	13.34	40.6
	876.6+881.6+886.6	14.53	-1.0	13.53	40.6
	881.6+886.6+891.6	14.76	-1.0	13.76	40.6

<i>WCDMA Band 5 Uplink (NU Uplink)</i>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	826.4	19.59	8.0	27.59	40.6
	836.6	19.85	8.0	27.85	40.6
	846.6	19.64	8.0	27.64	40.6
15	826.4+831.4+836.4	19.22	8.0	27.22	40.6
	831.6+836.6+841.6	19.49	8.0	27.49	40.6
	836.6+841.6+846.6	19.41	8.0	27.41	40.6



<b>WCDMA Band 2 Downlink (CU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	1932.4	9.23	-1.0	8.23	33
	1960.0	9.71	-1.0	8.71	33
	1987.6	9.93	-1.0	8.93	33
20	1932.4+1937.4+1942.4+1947.4	15.39	-1.0	14.39	33
	1955+1960+1965+1970	15.36	-1.0	14.36	33
	1972.6+1977.6+1982.6+1987.6	16.06	-1.0	15.06	33

<b>WCDMA Band 2 Uplink (NU Uplink)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	1852.4	21.41	6.0	27.41	33
	1880.0	21.76	6.0	27.76	33
	1907.6	22.10	6.0	28.1	33
20	1852.4+1857.4+1862.4+1867.4	22.07	6.0	28.07	33
	1875+1880+1855+1860	21.49	6.0	27.49	33
	1892.6+1897.6+1902.6+1907.6	20.99	6.0	26.99	33



<b>LTE Band 5 Downlink (CU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	871.5	10.33	-1.0	9.33	40.6
	881.5	10.39	-1.0	9.39	40.6
	891.5	10.55	-1.0	9.55	40.6
10	874.0	13.35	-1.0	12.35	40.6
	881.5	13.56	-1.0	12.56	40.6
	889.0	13.21	-1.0	12.21	40.6
15	876.5	14.26	-1.0	13.26	40.6
	881.5	14.50	-1.0	13.50	40.6
	886.5	14.25	-1.0	13.25	40.6

<b>LTE Band 5 Uplink (NU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	826.5	22.73	8.0	30.73	40.6
	836.5	22.58	8.0	30.58	40.6
	846.5	22.41	8.0	30.41	40.6
10	829.0	22.52	8.0	30.52	40.6
	836.5	22.43	8.0	30.43	40.6
	844.0	22.66	8.0	30.66	40.6
15	831.5	21.68	8.0	29.68	40.6
	836.5	21.90	8.0	29.9	40.6
	841.5	22.18	8.0	30.18	40.6





<b>LTE Band 2 Downlink (CU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	1932.5	9.58	-1.0	8.58	33
	1960.0	10.0	-1.0	9.0	33
	1987.5	10.12	-1.0	9.12	33
10	1935.0	11.98	-1.0	10.98	33
	1960.0	12.18	-1.0	11.18	33
	1985.0	12.68	-1.0	11.68	33
15	1937.5	14.03	-1.0	13.03	33
	1960.0	14.17	-1.0	13.17	33
	1982.5	15.25	-1.0	14.25	33
20	1940	15.66	-1.0	14.66	33
	1960.0	15.23	-1.0	14.23	33
	1980.0	16.19	-1.0	15.19	33

<b>LTE Band 2 Uplink (NU Output)</b>					
<b>Bandwidth (MHz)</b>	<b>Frequency (MHz)</b>	<b>Max Power Average (dBm)</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>	<b>Limit (dBm)</b>
5	1852.5	21.55	6.0	27.55	33
	1880.0	21.24	6.0	27.24	33
	1907.5	20.74	6.0	26.74	33
10	1855.0	21.13	6.0	27.13	33
	1880.0	20.53	6.0	26.53	33
	1905.0	20.47	6.0	26.47	33
15	1857.5	22.13	6.0	28.13	33
	1880.0	21.61	6.0	27.61	33
	1902.5	20.95	6.0	26.95	33
20	1860.0	22.22	6.0	28.22	33
	1880.0	21.63	6.0	27.63	33
	1900.0	20.99	6.0	26.99	33



## **2.4 OCCUPIED BANDWIDTH**

### **2.4.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1049  
FCC 47 CFR Part 22, Clause 22.917(b)  
FCC 47 CFR Part 24, Clause 24.238(b)  
RSS-Gen, Clause 6.6

### **2.4.2 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.

### **2.4.3 Equipment Under Test and Modification State**

Serial No: 332633000356 / Test Configuration A and B

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

December 09, 13, 14, 21, 2016 and January 18, 2017/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	21.4 - 22.8°C
Relative Humidity	45.1 - 58.1%
ATM Pressure	98.9 - 99.8kPa

### **2.4.7 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.
- Only test plots for middle channel were presented 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.



**2.4.8 Test Results**

<i>WCDMA Band 5 Downlink</i>			
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>OBW (MHz)</b>	<b>-26dB BW (MHz)</b>
4357	871.4	4.14	4.47
4408	881.6	4.14	4.54
4458	891.6	4.11	4.54

<i>WCDMA Band 5 Uplink</i>			
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>OBW (MHz)</b>	<b>-26dB BW (MHz)</b>
4132	826.4	4.31	4.54
4183	836.6	4.34	4.57
4233	846.6	4.31	4.54



<i>WCDMA Band 2 Downlink</i>			
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>OBW (MHz)</b>	<b>-26dB BW (MHz)</b>
9662	1932.4	4.14	4.57
9800	1960	4.11	4.54
9938	1987.6	4.14	4.57

<i>WCDMA Band 2 Uplink</i>			
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>OBW (MHz)</b>	<b>-26dB BW (MHz)</b>
9262	1852.4	4.11	4.57
9400	1880	4.11	4.57
9538	1907.6	4.14	4.54



LTE Band 5 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	OBW (MHz)	-26dB BW (MHz)
5 MHz	2425	871.5	4.28	4.89
	2525	881.5	4.28	4.86
	2625	891.5	4.28	4.86
10 MHz	2450	874.0	8.80	9.38
	2525	881.5	8.86	9.38
	2600	889.0	8.86	9.44
15 MHz	2475	876.5	13.20	14.24
	2525	881.5	13.20	14.33
	2575	886.5	13.29	14.33

LTE Band 5 Uplink				
Bandwidth (MHz)	Channels	Frequency (MHz)	OBW (MHz)	-26dB BW (MHz)
5 MHz	20425	826.5	4.28	4.75
	20525	836.5	4.28	4.75
	20625	846.5	4.28	4.72
10 MHz	20450	829.0	8.80	9.38
	20525	836.5	8.80	9.38
	20600	844.0	8.86	9.38
15 MHz	20475	831.5	13.29	14.24
	20525	836.5	13.29	14.24
	20575	841.5	13.20	14.15



LTE Band 2 Downlink				
Bandwidth (MHz)	Channels	Frequency (MHz)	OBW (MHz)	-26dB BW (MHz)
5 MHz	625	1932.5	4.28	4.75
	900	1960.0	4.25	4.72
	1175	1987.5	4.25	4.72
10 MHz	650	1935.0	8.80	9.38
	900	1960.0	8.86	9.38
	1150	1985.0	8.80	9.38
15 MHz	675	1937.5	13.29	14.24
	900	1960.0	13.29	14.15
	1125	1982.5	13.29	14.24
20 MHz	700	1940	17.71	18.64
	900	1960.0	17.83	18.52
	1100	1980.0	17.71	18.52



LTE Band 2 Uplink				
Bandwidth (MHz)	Channels	Frequency (MHz)	OBW (MHz)	-26dB BW (MHz)
5 MHz	18625	1852.5	4.28	4.72
	18900	1880.0	4.25	4.72
	19175	1907.5	4.28	4.72
10 MHz	18650	1855.0	8.80	9.38
	18900	1880.0	8.80	9.38
	19150	1905.0	8.80	9.44
15 MHz	18675	1857.5	13.29	14.24
	18900	1880.0	13.29	14.24
	19125	1902.5	13.20	14.24
20 MHz	18700	1860.0	17.71	18.64
	18900	1880.0	17.71	18.64
	19100	1900.0	17.71	18.64



**WCDMA Band 5 Downlink Mid Channel 99% OBW**



Date: 14 DEC 2016 13:10:52

**WCDMA Band 5 Downlink Mid Channel -26dB BW**



Date: 14 DEC 2016 13:11:19





**WCDMA Band 2 Downlink Mid Channel 99% OBW**



**WCDMA Band 2 Downlink Mid Channel -26dB BW**





**LTE Band 5\_5MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 9 DEC.2016 10:30:33

**LTE Band 5\_5MHz Bandwidth\_Downlink Mid Channel -26dB BW**



Date: 9 DEC.2016 10:31:04



**LTE Band 5\_10MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 9 DEC.2016 11:01:02

**LTE Band 5\_10MHz Bandwidth\_Downlink Mid Channel -26dB BW**



Date: 9 DEC.2016 11:45:32





**LTE Band 5\_15MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 13 DEC 2016 12:14:24

**LTE Band 5\_15MHz Bandwidth\_Downlink Mid Channel -26dB BW**



Date: 13 DEC 2016 12:16:06



**LTE Band 2\_5MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 21 DEC 2016 13:59:48

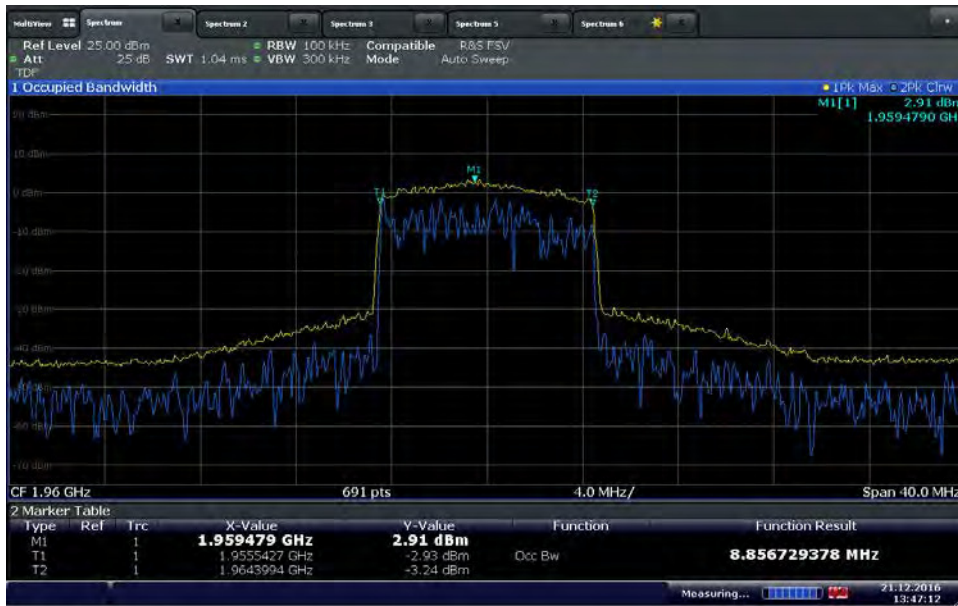
**LTE Band 2\_5MHz Bandwidth\_Downlink Mid Channel -26dB BW**



Date: 21 DEC 2016 14:00:13



**LTE Band 2\_10MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 21 DEC 2016 13:47:11

**LTE Band 2\_10MHz Bandwidth\_Downlink Mid Channel -26dB BW**

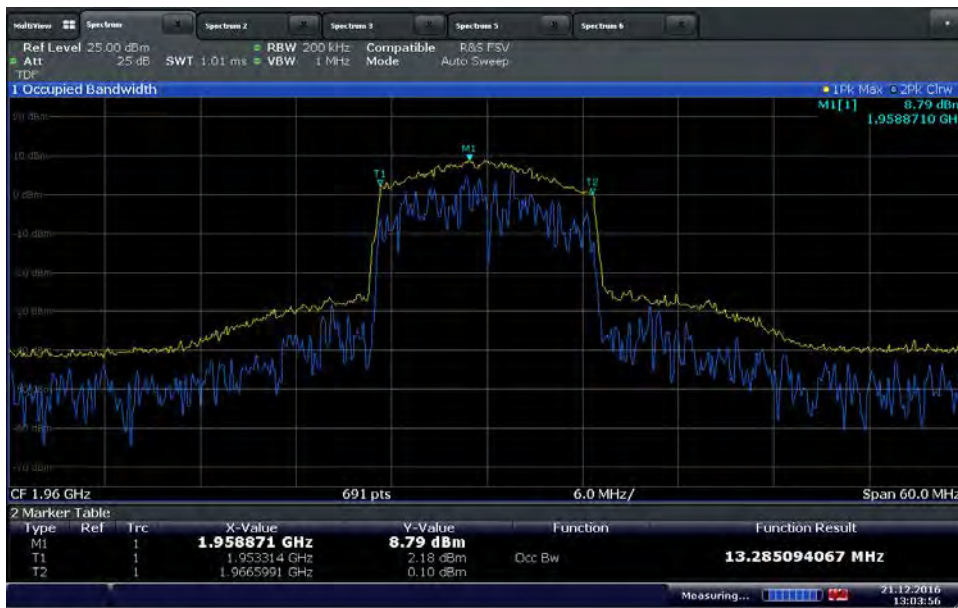


Date: 21 DEC 2016 13:48:12





**LTE Band 2\_15MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 21 DEC 2016 13:03:55

**LTE Band 2\_15MHz Bandwidth\_Downlink Mid Channel -26dB BW**



Date: 21 DEC 2016 13:04:31



**LTE Band 2\_20MHz Bandwidth\_Downlink Mid Channel 99% OBW**



Date: 21 DEC 2016 12:59:22

**LTE Band 2\_20MHz Bandwidth\_Downlink Mid Channel -26dB BW**



Date: 21 DEC 2016 12:59:46





**WCDMA Band 5 Uplink Mid Channel 99% OBW**



Date: 14 DEC.2016 12:53:17

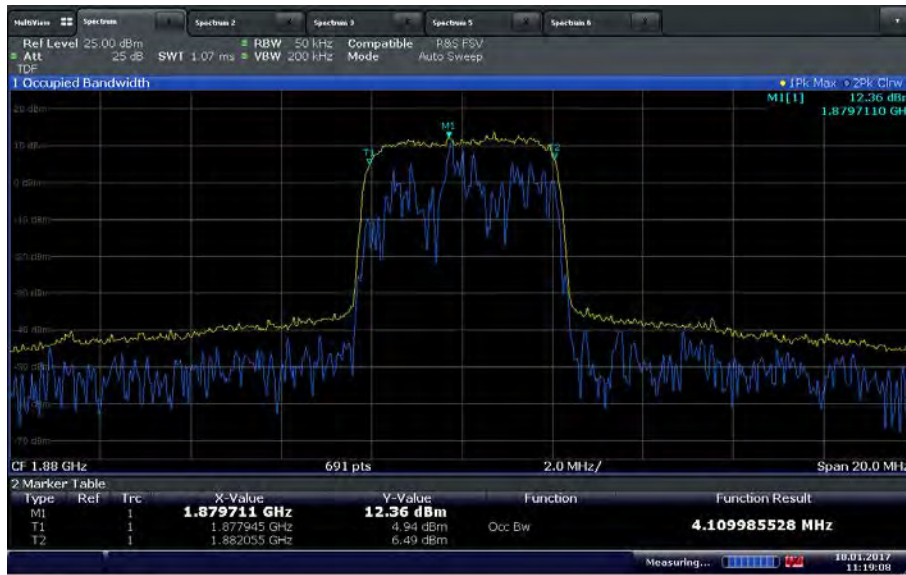
**WCDMA Band 5 Uplink Mid Channel -26dB BW**



Date: 14 DEC.2016 12:53:39



**WCDMA Band 2 Uplink Mid Channel 99% OBW**



**WCDMA Band 2 Uplink Mid Channel -26dB BW**





**LTE Band 5\_5MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 9 DEC.2016 11:34:15

**LTE Band 5\_5MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 9 DEC.2016 11:34:40





**LTE Band 5\_10MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 9 DEC.2016 11:14:12

**LTE Band 5\_10MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 9 DEC.2016 11:14:52



**LTE Band 5\_15MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 9 DEC.2016 11:14:12

**LTE Band 5\_15MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 13 DEC.2016 12:40:34



**LTE Band 2\_5MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 21 DEC 2016 10:55:20

**LTE Band 2\_5MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 21 DEC 2016 10:56:16





**LTE Band 2\_10MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 21 DEC 2016 12:08:40

**LTE Band 2\_10MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 21 DEC 2016 12:09:08



**LTE Band 2\_15MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 21 DEC 2016 12:17:32

**LTE Band 2\_15MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 21 DEC 2016 12:18:14





**LTE Band 2\_20MHz Bandwidth\_Uplink Mid Channel 99% OBW**



Date: 21 DEC 2016 12:33:39

**LTE Band 2\_20MHz Bandwidth\_Uplink Mid Channel -26dB BW**



Date: 21 DEC 2016 12:34:25



**2.5 PEAK-AVERAGE RATIO**

**2.5.1 Specification Reference**

FCC 47 CFR Part 24, Clause 24.232 (d)  
RSS-132, Clause 5.4  
RSS-133, Clause 6.4

**2.5.2 Standard Applicable**

FCC Part 24:

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB

RSS-132 and RSS-133:

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

**2.5.3 Equipment Under Test and Modification State**

Serial No: 332633000356 / Test Configuration A and B

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

December 09, 13, 21, 2016 and January 18, 2017/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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	21.4 - 22.8°C
Relative Humidity	45.1 - 58.1%
ATM Pressure	98.9 - 99.8kPa



**2.5.7 Additional Observations**

- This is a conducted test. Test procedure is per Section 5.7 of KDB971168 (D01 Power Meas License Digital Systems v02r02).
- 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 PAR level associated with a probability of 0.1% was recorded.
- There are no measured PAR levels greater than 13dB. EUT complies.
- Only test plots for middle channel were presented as the representative configuration.

**2.5.8 Test Results**

WCDMA Band 5 Downlink			
Bandwidth (MHz)	Channel	Frequency (MHz)	PAR (dB)
5	4357	871.4	10.80
	4408	881.6	10.82
	4458	891.6	11.27
15	4357+4382+4407	871.4+876.4+881.4	10.94
	4383+4408+4433	876.6+881.6+886.6	10.64
	4408+4433+4458	881.6+886.6+891.6	10.32



WCDMA Band 5 Uplink			
Bandwidth (MHz)	Channel	Frequency (MHz)	PAR (dB)
5	4132	826.4	10.54
	4183	836.6	9.99
	4233	846.6	10.09
15	4132+4157+4182	826.4+831.4+836.4	8.56
	4158+4183+4208	831.6+836.6+841.6	8.64
	4183+4208+4233	836.6+841.6+846.6	8.39

WCDMA Band 2 Downlink			
Bandwidth (MHz)	Channel	Frequency (MHz)	PAR (dB)
5	9662	1932.4	11.08
	9800	1960.0	10.30
	9938	1987.6	10.26
20	9662+9687+9712+9737	1932.4+1937.4+1942.4+1947.4	10.74
	9775+9800+9825+9850	1955+1960+1965+1970	11.85
	9863+9888+9913+9938	1972.6+1977.6+1982.6+1987.6	10.19

WCDMA Band 2 Uplink			
Bandwidth (MHz)	Channel	Frequency (MHz)	PAR (dB)
5	9262	1852.4	10.23
	9400	1880.0	10.39
	9538	1907.6	9.78
20	9262+9287+9312+9337	1852.4+1857.4+1862.4+1867.4	9.59
	9375+9400+9425+9450	1875+1880+1855+1860	9.89
	9463+9488+9513+9538	1892.6+1897.6+1902.6+1907.6	9.66



LTE Band 5 Downlink			
Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)
5 MHz	2425	871.5	11.97
	2525	881.5	10.73
	2625	891.5	10.58
10 MHz	2450	874.0	10.11
	2525	881.5	10.18
	2600	889.0	10.61
15 MHz	2475	876.5	12.57
	2525	881.5	10.34
	2575	886.5	12.19

LTE Band 5 Uplink			
Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)
5 MHz	20425	826.5	8.18
	20525	836.5	9.04
	20625	846.5	8.34
10 MHz	20450	829.0	8.17
	20525	836.5	8.33
	20600	844.0	8.22
15 MHz	20475	831.5	9.53
	20525	836.5	8.86
	20575	841.5	9.05



LTE Band 2 Downlink			
Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)
5 MHz	625	1932.5	12.28
	900	1960.0	11.04
	1175	1987.5	10.57
10 MHz	650	1935.0	12.10
	900	1960.0	10.62
	1150	1985.0	10.56
15 MHz	675	1937.5	12.35
	900	1960.0	11.26
	1125	1982.5	9.74
20 MHz	700	1940	10.84
	900	1960.0	11.30
	1100	1980.0	9.69

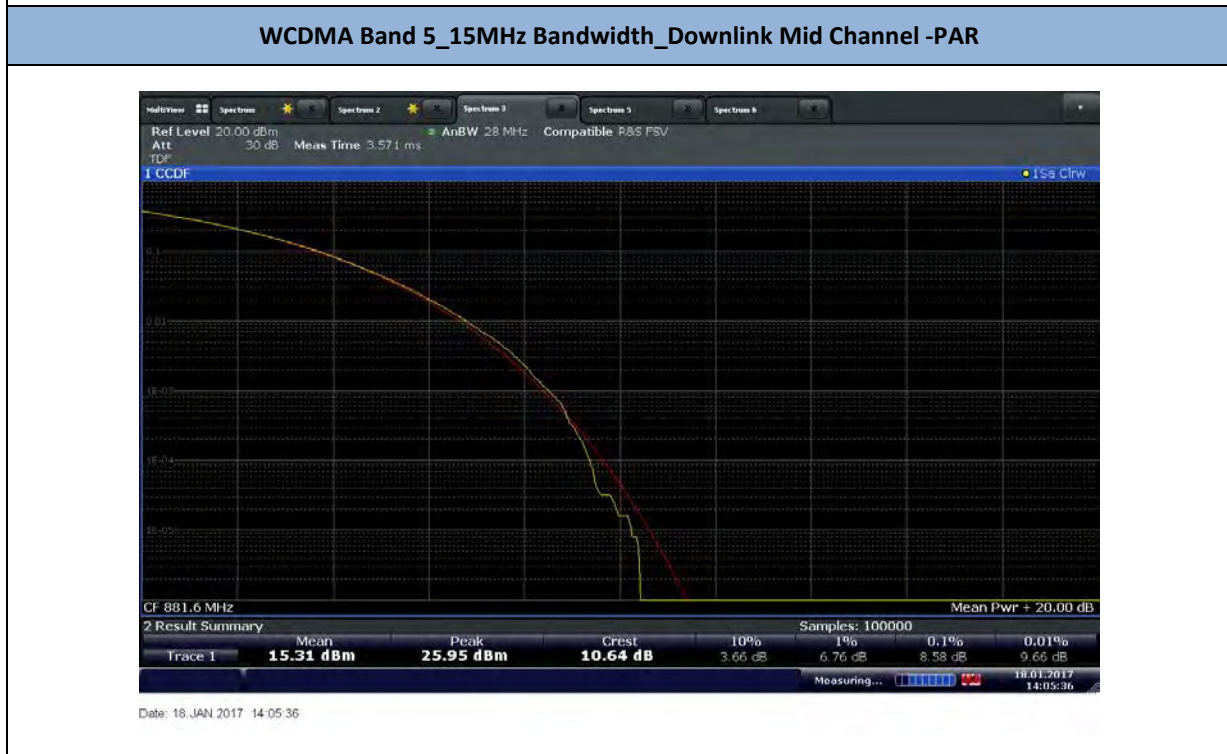
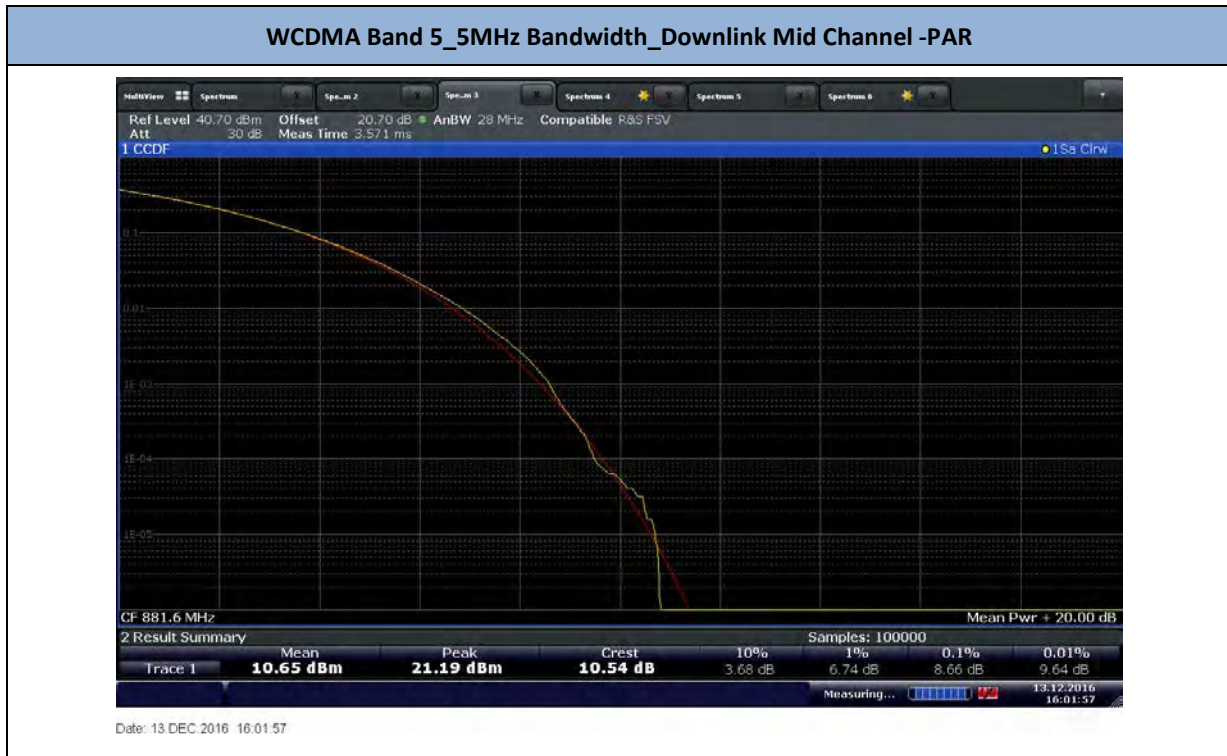


LTE Band 2 Uplink			
Bandwidth (MHz)	Channels	Frequency (MHz)	PAR (dB)
5 MHz	18625	1852.5	9.14
	18900	1880.0	9.54
	19175	1907.5	8.27
10 MHz	18650	1855.0	9.31
	18900	1880.0	10.42
	19150	1905.0	9.23
15 MHz	18675	1857.5	8.86
	18900	1880.0	9.97
	19125	1902.5	9.30
20 MHz	18700	1860.0	9.27
	18900	1880.0	9.91
	19100	1900.0	9.70





2.5.9 Sample Test Plot







**WCDMA Band 2\_5MHz Bandwidth\_Downlink Mid Channel -PAR**



Date: 18.JAN.2017 11:10:50

**WCDMA Band 2\_20MHz Bandwidth\_Downlink Mid Channel -PAR**



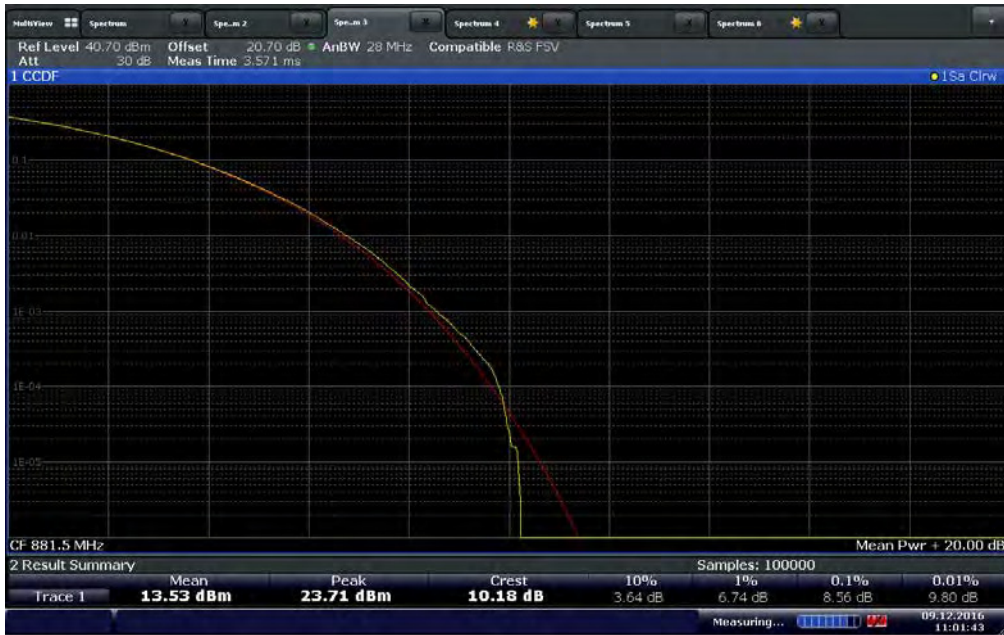
Date: 18.JAN.2017 14:31:51



**LTE Band 5\_5MHz Bandwidth\_Downlink Mid Channel -PAR**



**LTE Band 5\_10MHz Bandwidth\_Downlink Mid Channel -PAR**







**LTE Band 5\_15MHz Bandwidth\_Downlink Mid Channel -PAR**



Date: 13 DEC 2016 12:16:26

**LTE Band 2\_5MHz Bandwidth\_Downlink Mid Channel -PAR**



Date: 21 DEC 2016 14:00:56



**LTE Band 2\_10MHz Bandwidth\_Downlink Mid Channel -PAR**



Date: 21 DEC 2016 13:48:35

**LTE Band 2\_15MHz Bandwidth\_Downlink Mid Channel -PAR**



Date: 21 DEC 2016 13:05:08





**LTE Band 2\_20MHz Bandwidth\_Downlink Mid Channel -PAR**



Date: 21 DEC 2016 13:00:49

**WCDMA Band 5\_5MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 13 DEC 2016 15:49:56



**WCDMA Band 5\_15MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 18.JAN 2017 13:20:03

**WCDMA Band 2\_5MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 18.JAN 2017 11:20:00





**WCDMA Band 2\_20MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 16.JAN.2017 13:07:10

**LTE Band 5\_5MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 9 DEC.2016 11:35:04



LTE Band 5\_10MHz Bandwidth\_Uplink Mid Channel -PAR



Date: 9 DEC 2016 11:16:01

LTE Band 5\_15MHz Bandwidth\_Uplink Mid Channel -PAR



Date: 13 DEC 2016 12:41:01





**LTE Band 2\_5MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 21 DEC 2016 10:56:40

**LTE Band 2\_10MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 21 DEC 2016 12:09:34



**LTE Band 2\_15MHz Bandwidth\_Upink Mid Channel -PAR**



Date: 21 DEC 2016 12:18:32

**LTE Band 2\_20MHz Bandwidth\_Uplink Mid Channel -PAR**



Date: 21 DEC 2016 12:35:14



## **2.6 BAND EDGE**

### **2.6.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1051  
FCC 47 CFR Part 22, Clause 22.917(a)  
FCC 47 CFR Part 24, Clause 24.238(a)  
RSS-132, Clause 5.5  
RSS-133, Clause 6.5

### **2.6.2 Standard Applicable**

In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p(\text{watts})$ .

### **2.6.3 Equipment Under Test and Modification State**

Serial No: 332633000356 / Test Configuration A and B

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

December 09, 13, 14, 21, 2016 and January 18, 2017/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.

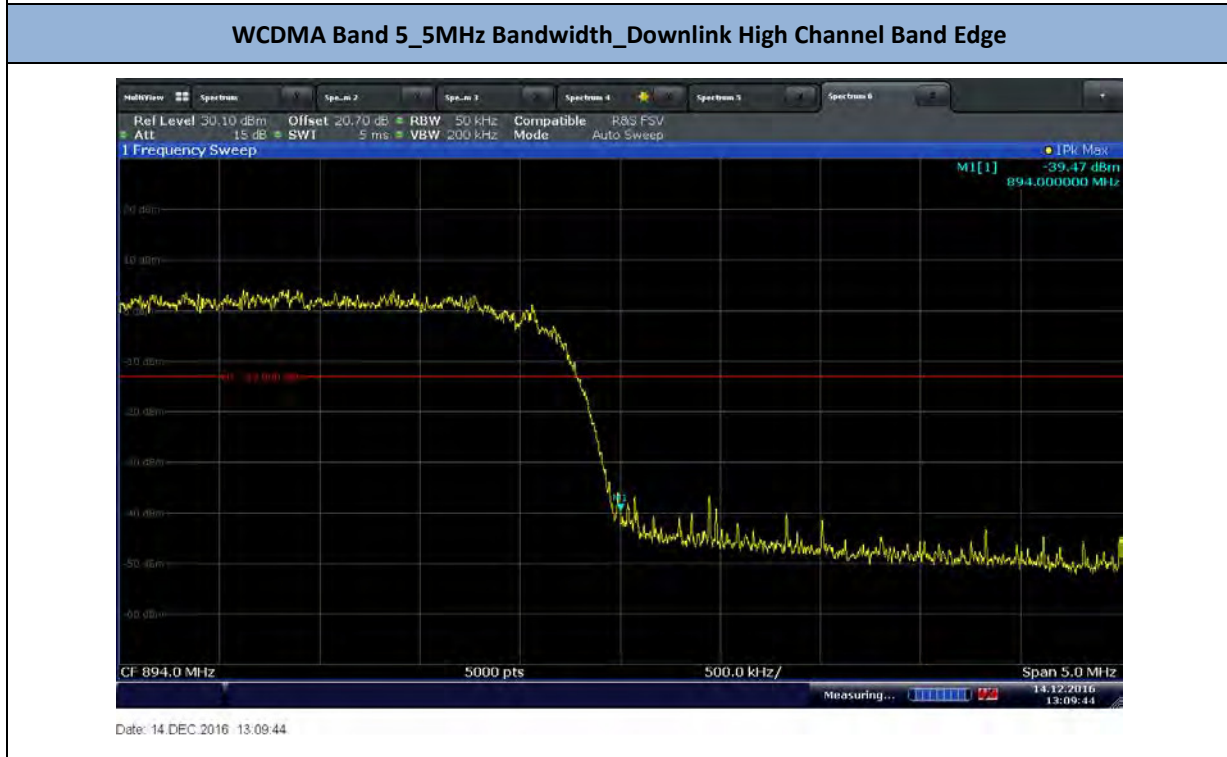
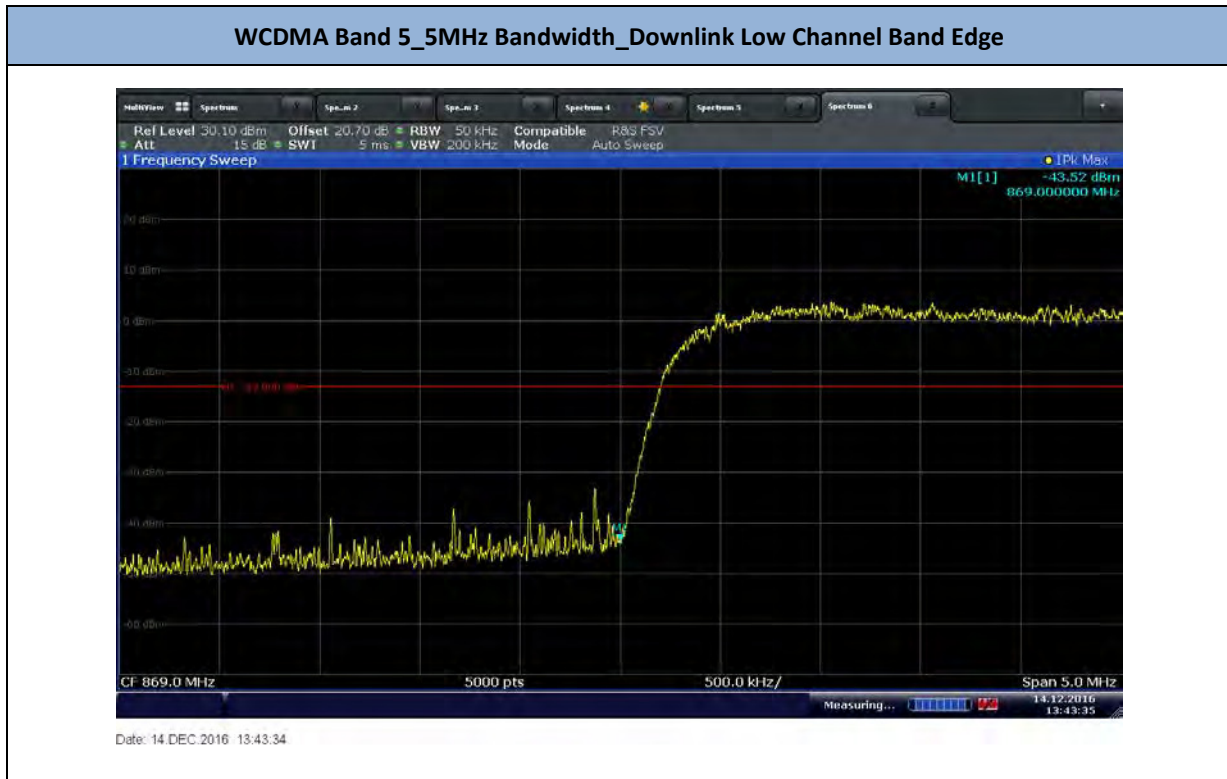
Ambient Temperature	21.4 - 22.8°C
Relative Humidity	45.1 - 58.1%
ATM Pressure	98.9 - 99.8kPa

### **2.6.7 Additional Observations**

- This is a conducted test.
- Test guidance is per Section 6 of KDB971168 (D01 Power Meas License Digital Systems v02r02).
- The path loss was measured and entered as a level offset.
- For band edge measurements, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter was employed.
- The limit is set to -13dBm.



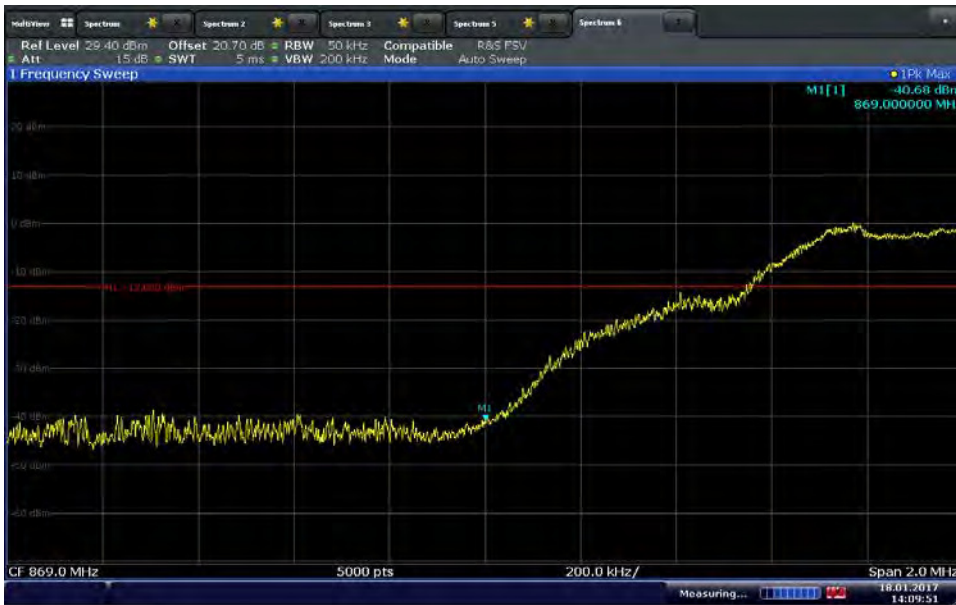
2.6.8 Test Results





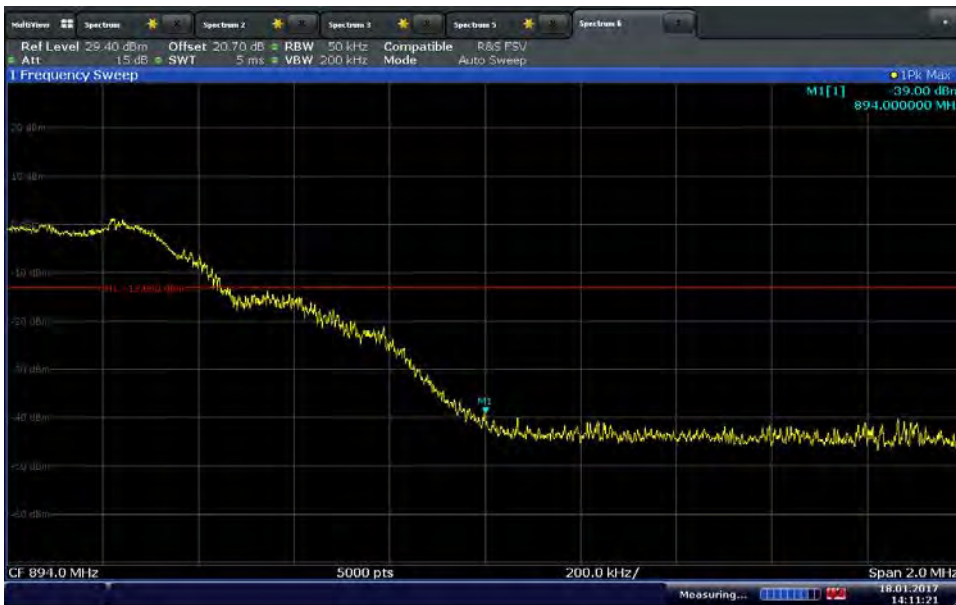


**WCDMA Band 5\_15MHz Bandwidth\_Downlink Low Channel Band Edge**



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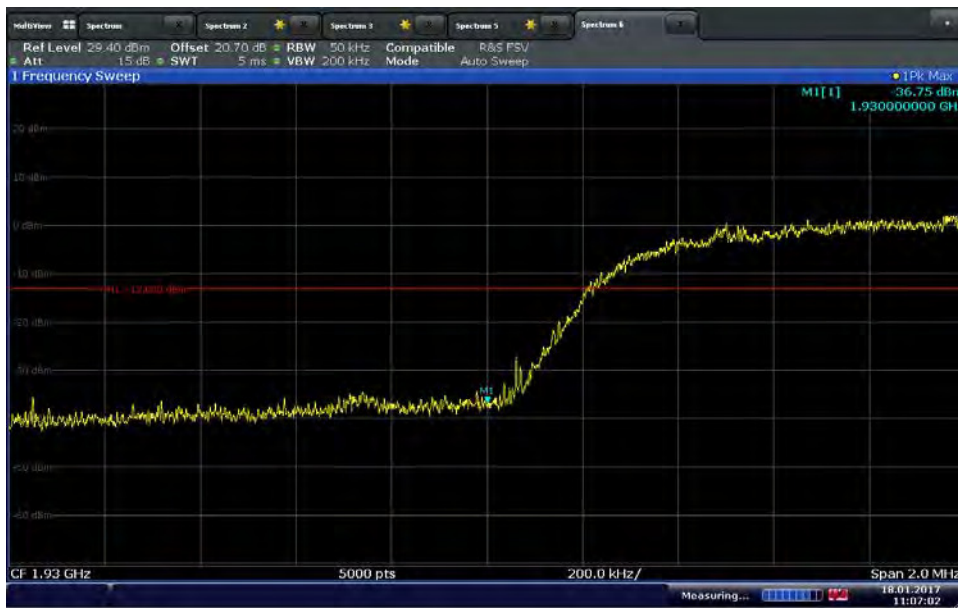
**WCDMA Band 5\_15MHz Bandwidth\_Downlink High Channel Band Edge**



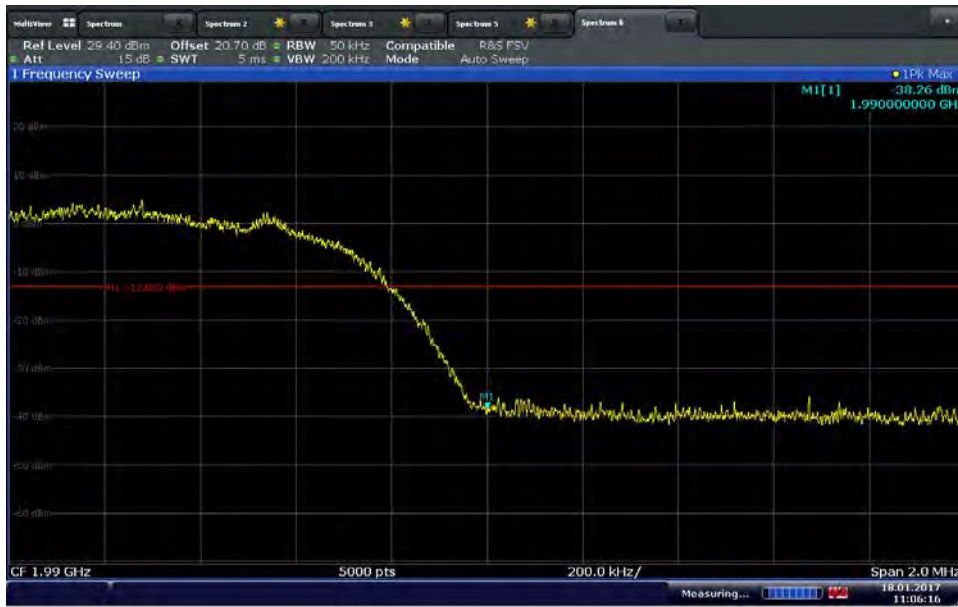
Date: 18. JAN 2017 14:11:21



**WCDMA Band 2\_5MHz Bandwidth\_Downlink Low Channel Band Edge**



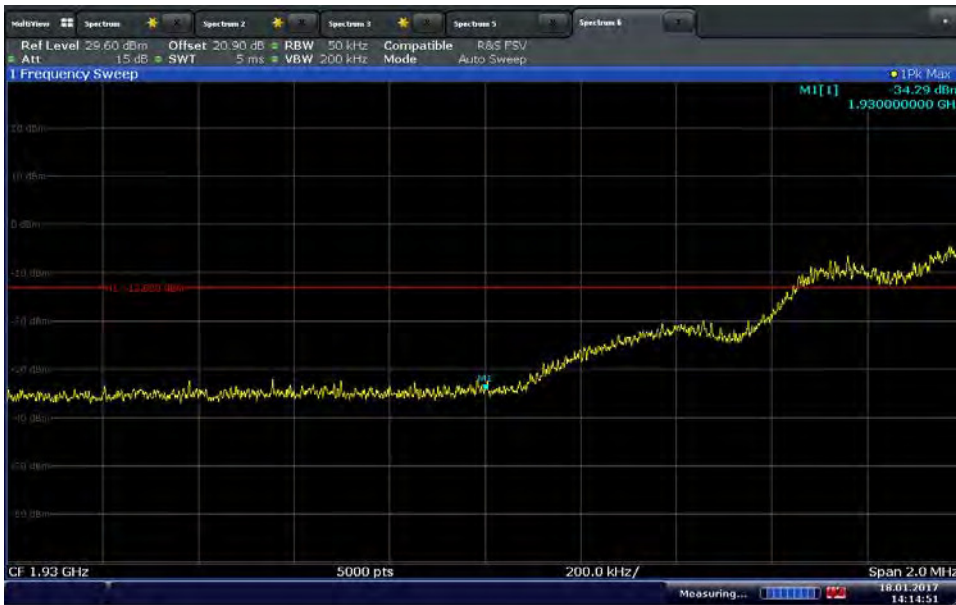
**WCDMA Band 2\_5MHz Bandwidth\_Downlink High Channel Band Edge**







**WCDMA Band 2\_20MHz Bandwidth\_Downlink Low Channel Band Edge**

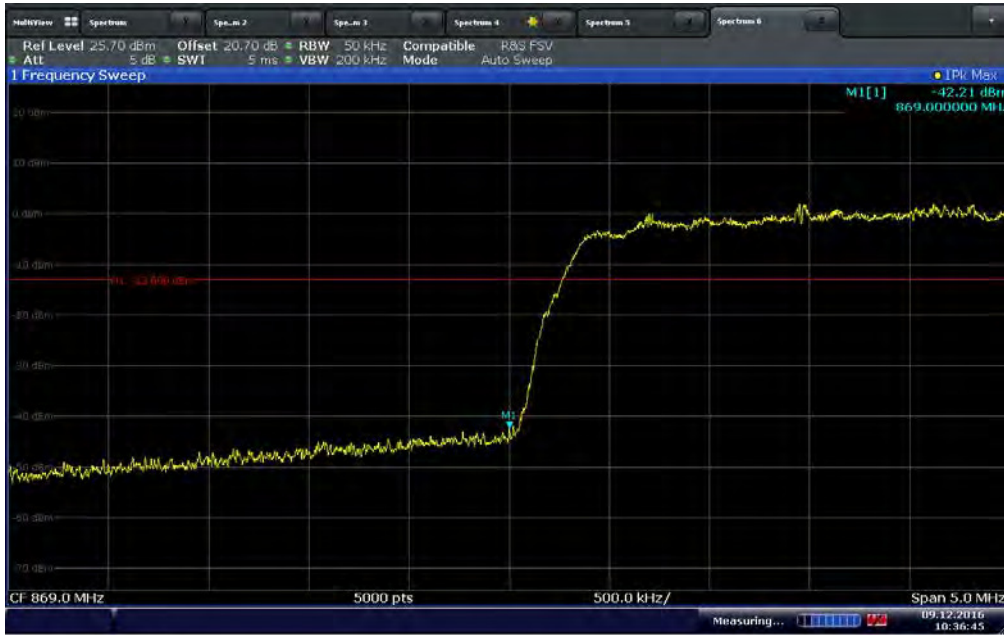


**WCDMA Band 2\_20MHz Bandwidth\_Downlink High Channel Band Edge**



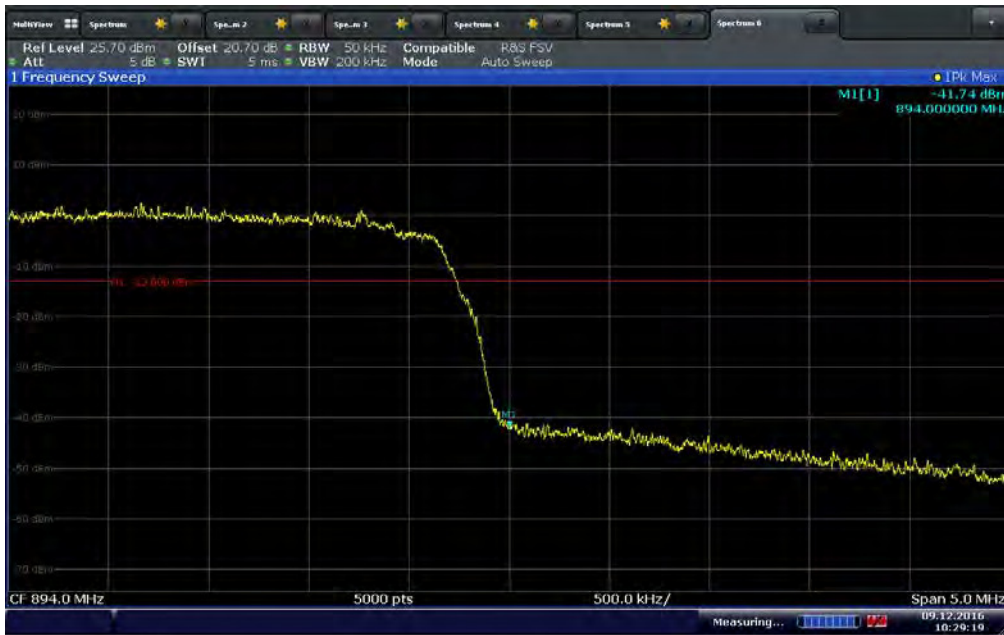


LTE Band 5\_5MHz Bandwidth\_Downlink Low Channel Band Edge



Date: 9 DEC. 2016 10:36:45

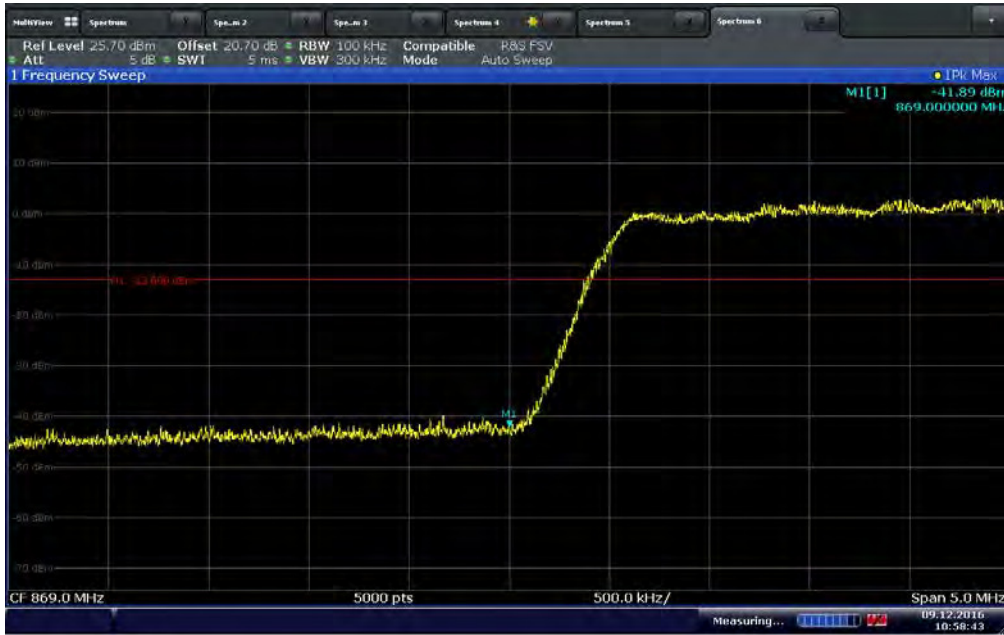
LTE Band 5\_5MHz Bandwidth\_Downlink High Channel Band Edge



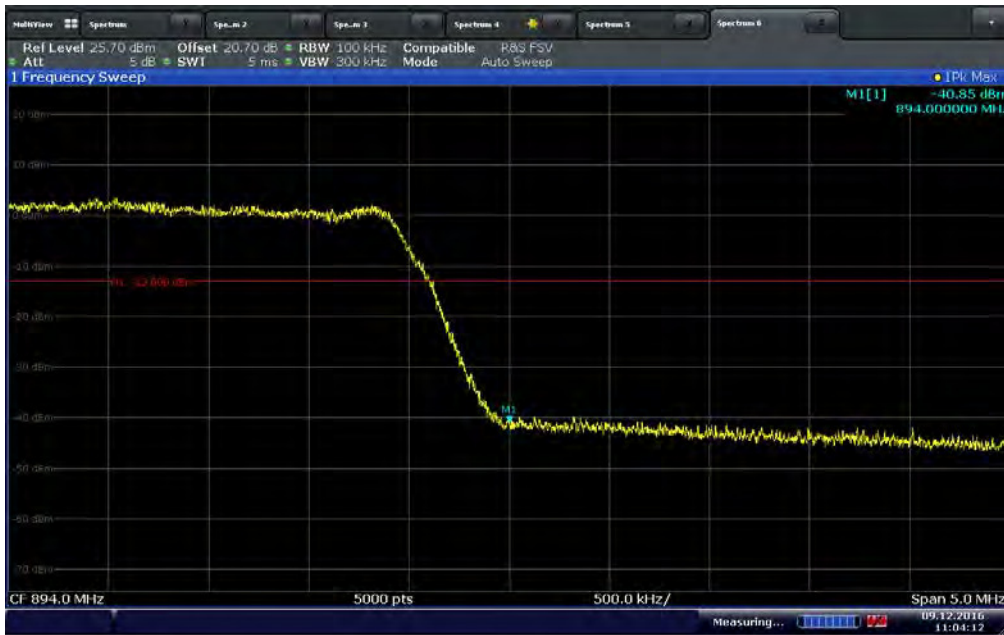
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LTE Band 5\_10MHz Bandwidth\_Downlink Low Channel Band Edge

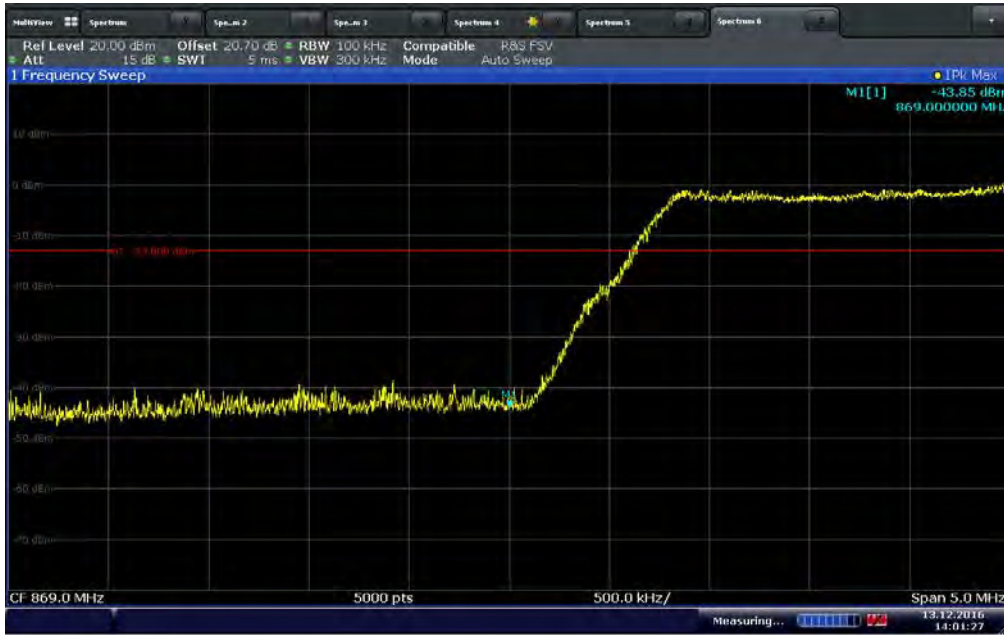


LTE Band 5\_10MHz Bandwidth\_Downlink High Channel Band Edge

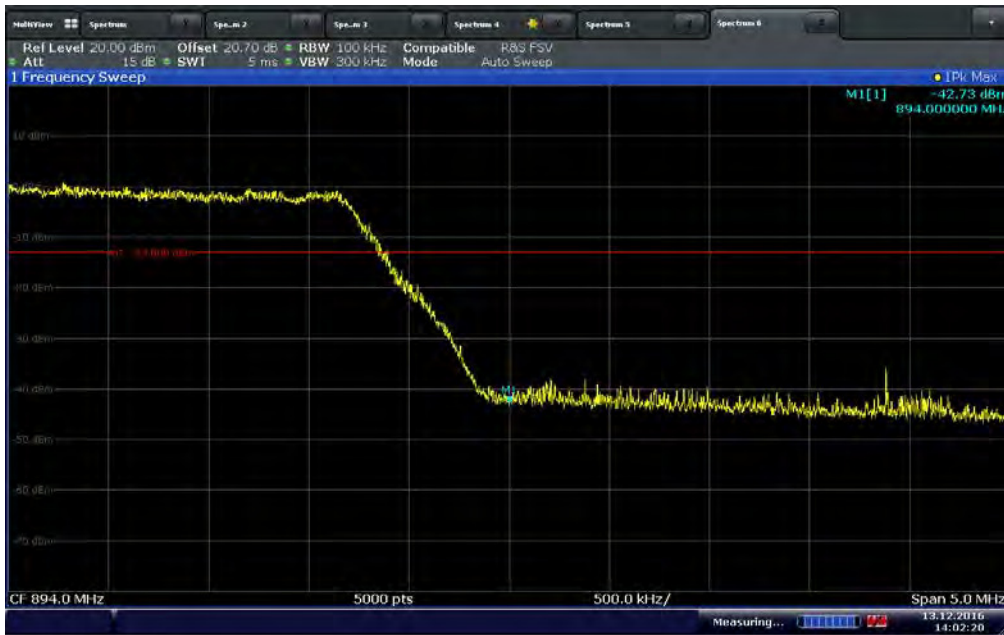




LTE Band 5\_15MHz Bandwidth\_Downlink Low Channel Band Edge



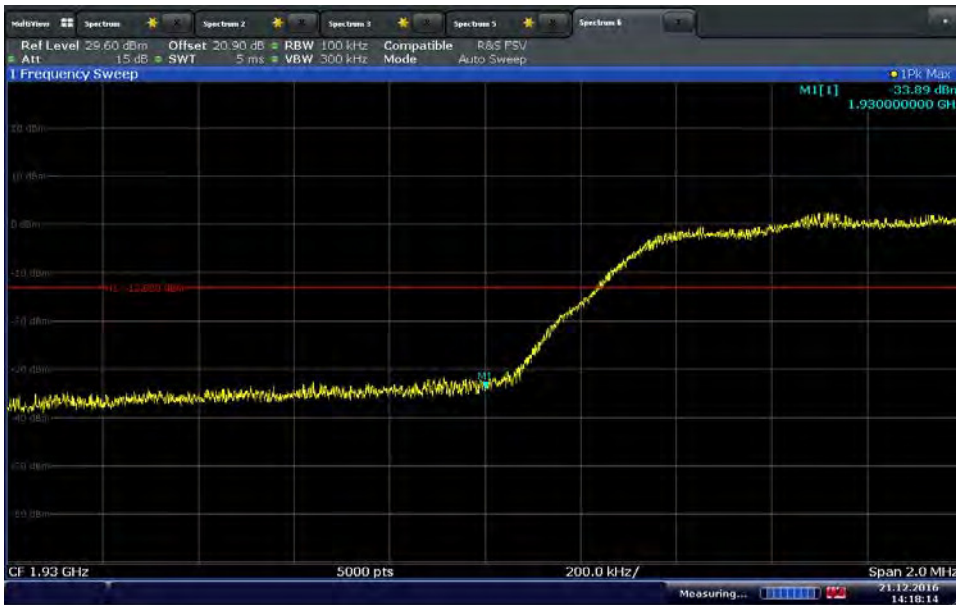
LTE Band 5\_15MHz Bandwidth\_Downlink High Channel Band Edge





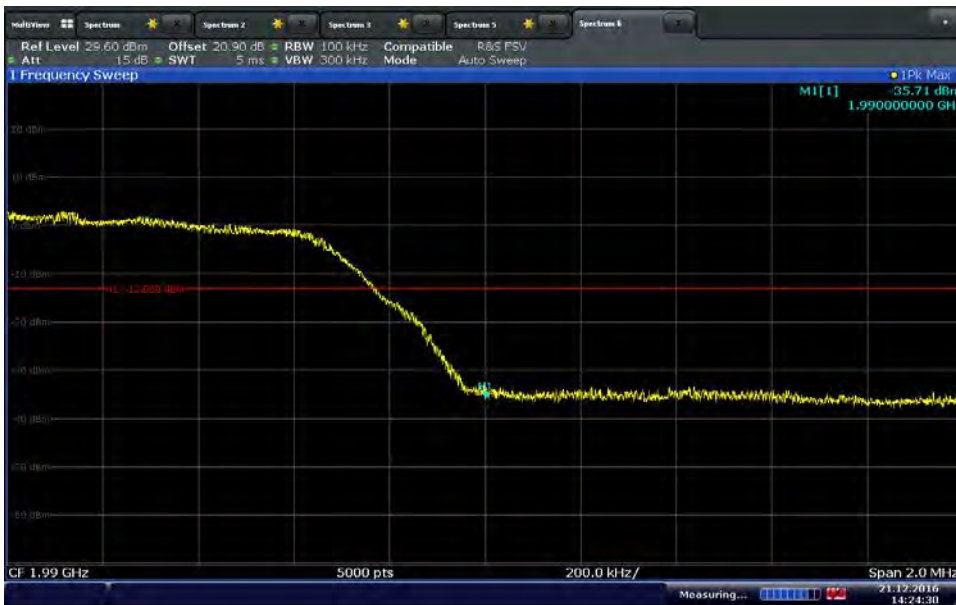


LTE Band 2\_5MHz Bandwidth\_Downlink Low Channel Band Edge



Date: 21 DEC 2016 14:18:15

LTE Band 2\_5MHz Bandwidth\_Downlink High Channel Band Edge

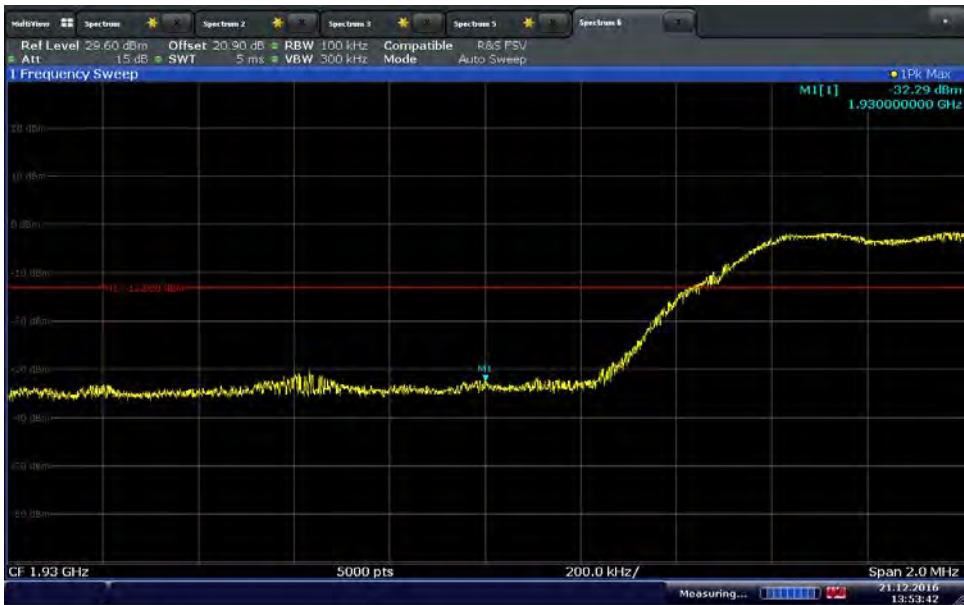


Date: 21 DEC 2016 14:24:31

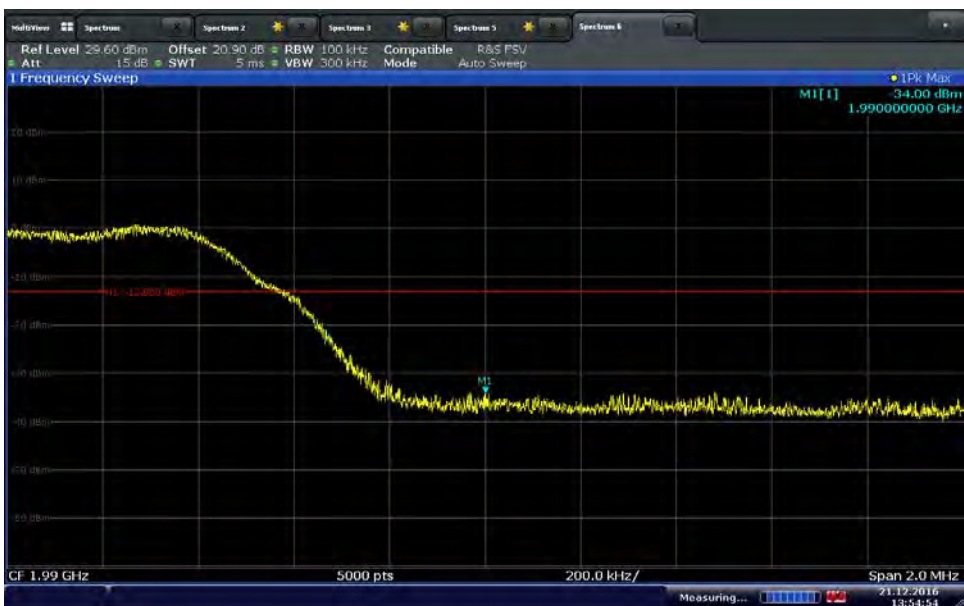




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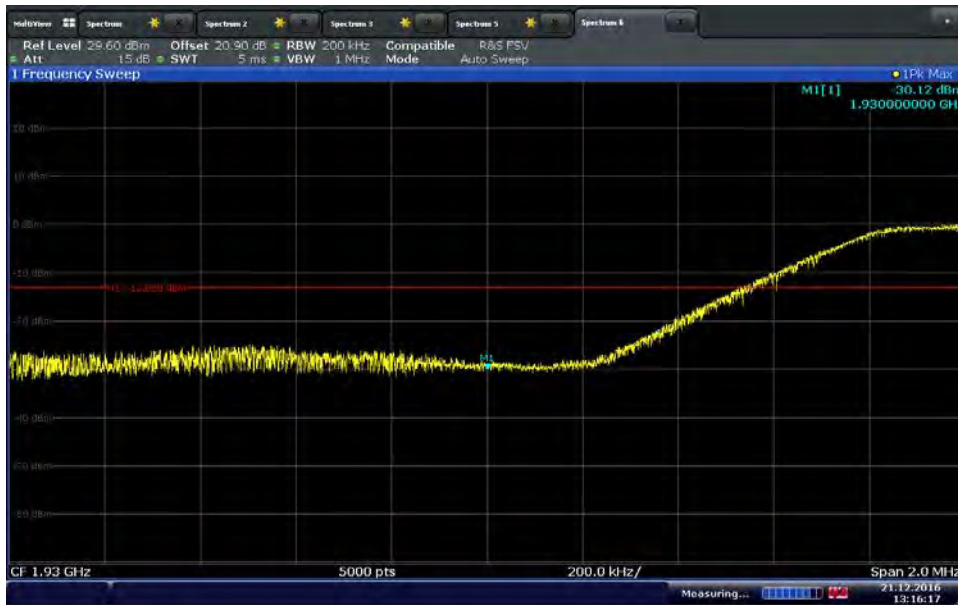


LTE Band 2\_10MHz Bandwidth\_Downlink High Channel Band Edge

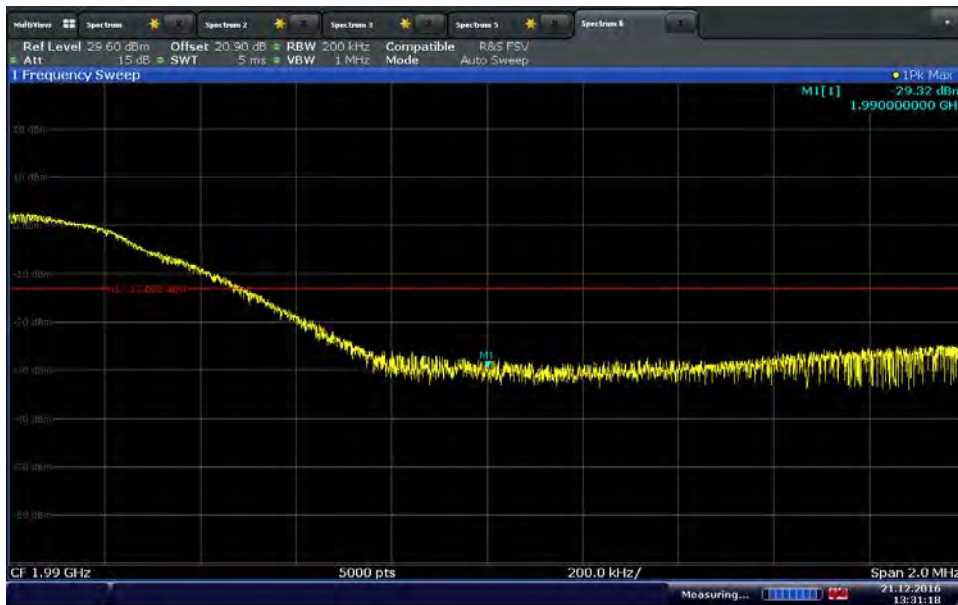




LTE Band 2\_15MHz Bandwidth\_Downlink Low Channel Band Edge

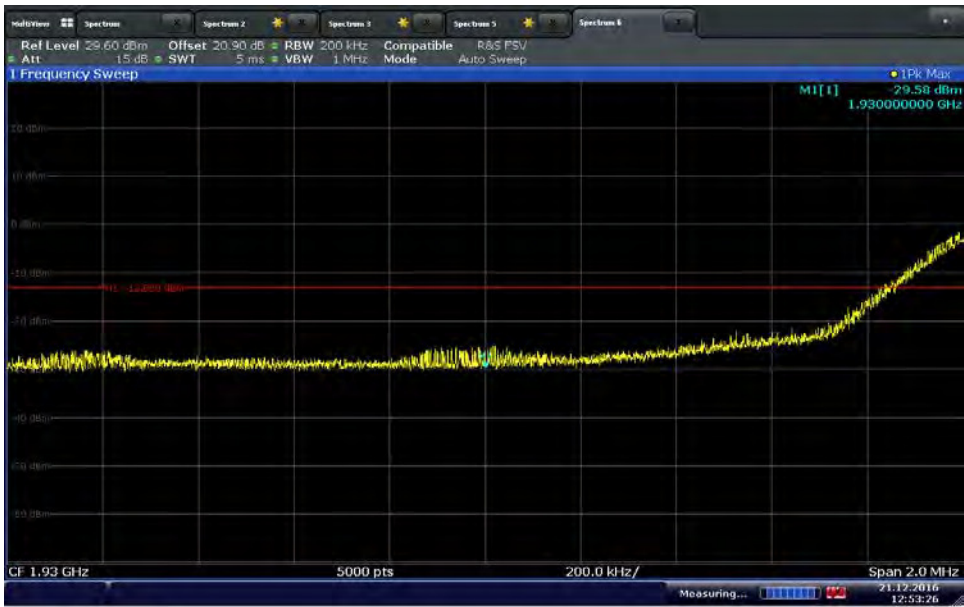


LTE Band 2\_15MHz Bandwidth\_Downlink High Channel Band Edge



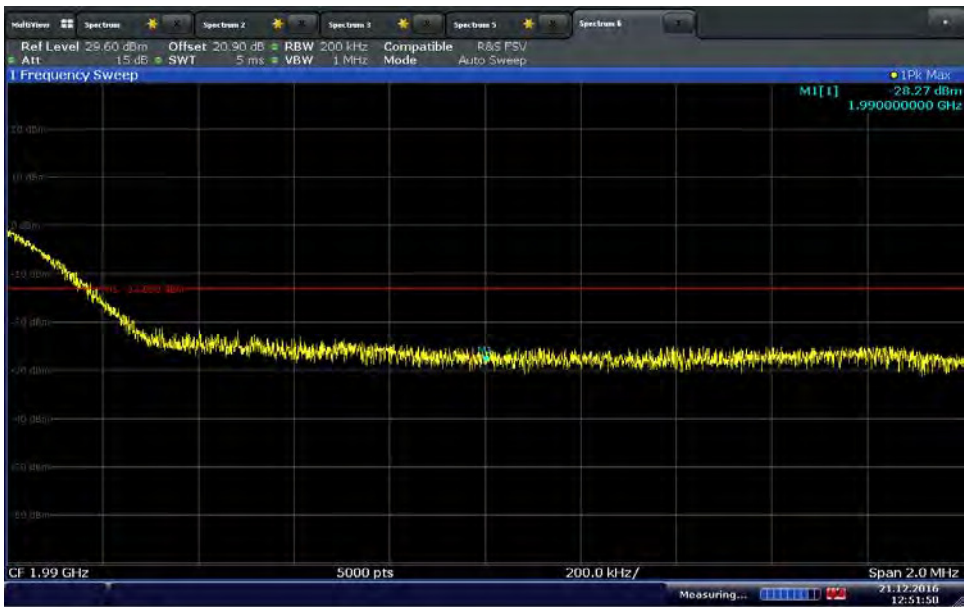


LTE Band 2\_20MHz Bandwidth\_Downlink Low Channel Band Edge



Date: 21 DEC 2016 12:53:26

LTE Band 2\_20MHz Bandwidth\_Downlink High Channel Band Edge



Date: 21 DEC 2016 12:51:50

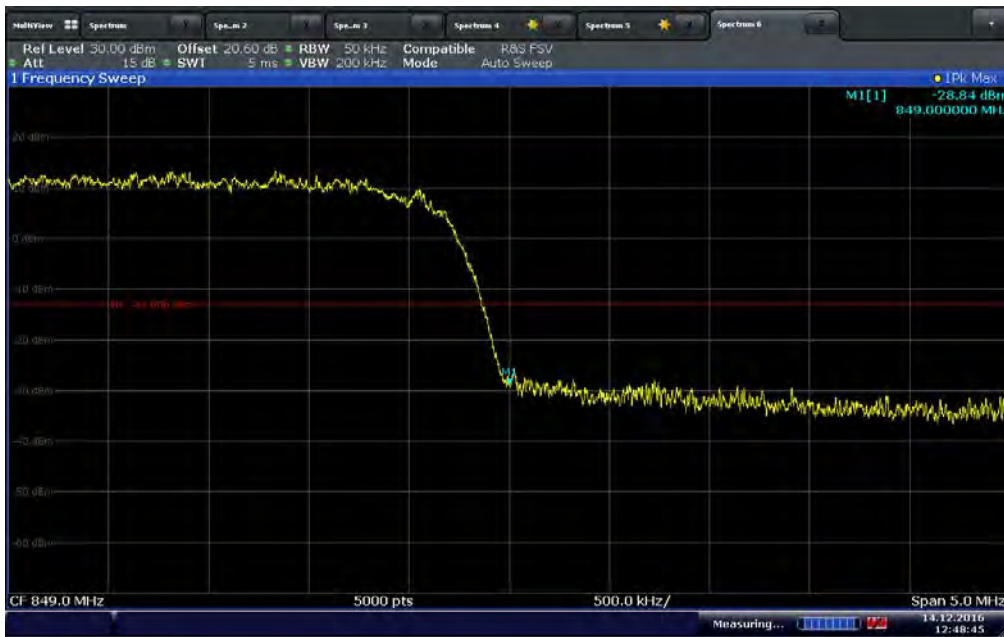


WCDMA Band 5\_5MHz Bandwidth\_Uplink Low Channel Band Edge



Date: 14 DEC.2016 12:50:32

WCDMA Band 5\_5MHz Bandwidth\_Uplink High Channel Band Edge



Date: 14 DEC.2016 12:48:46





**WCDMA Band 5\_15MHz Bandwidth\_Uplink Low Channel Band Edge**



Date: 16.JAN.2017 13:15:17

**WCDMA Band 5\_15MHz Bandwidth\_Uplink High Channel Band Edge**

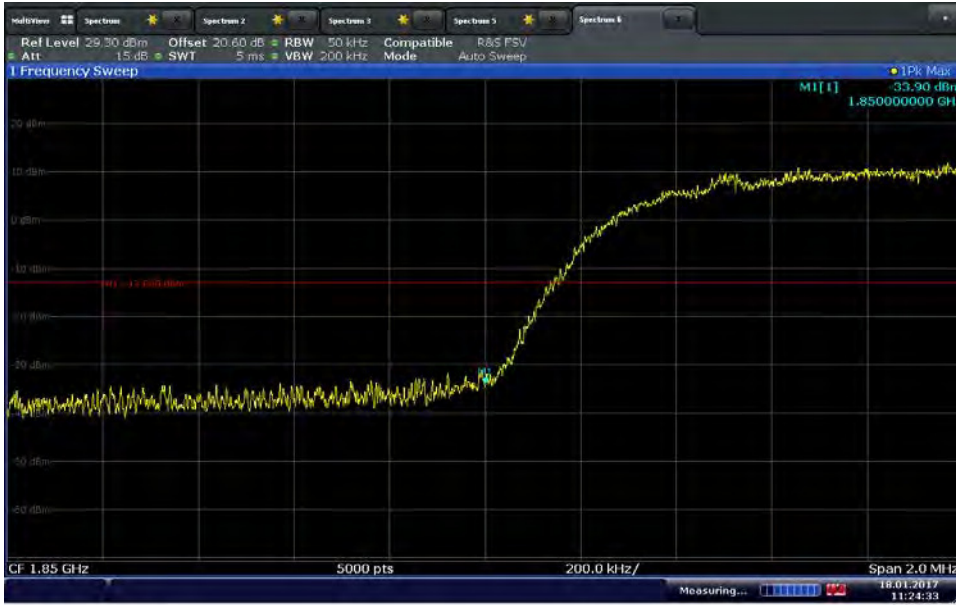


Date: 16.JAN.2017 13:24:17





**WCDMA Band 2\_5MHz Bandwidth\_Uplink Low Channel Band Edge**



Date: 18 JAN 2017 11:24:33

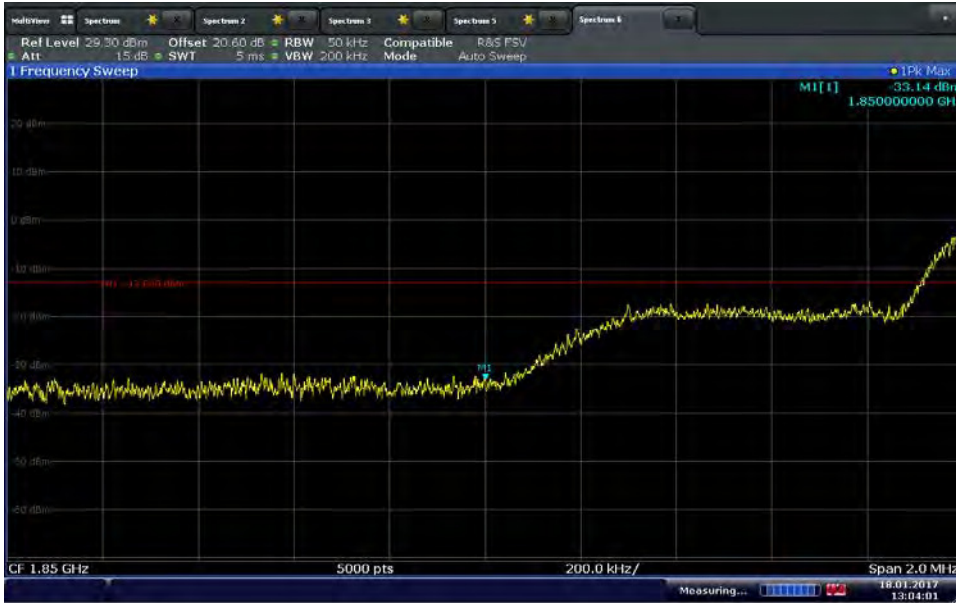
**WCDMA Band 2\_5MHz Bandwidth\_Uplink High Channel Band Edge**



Date: 18 JAN 2017 11:26:38

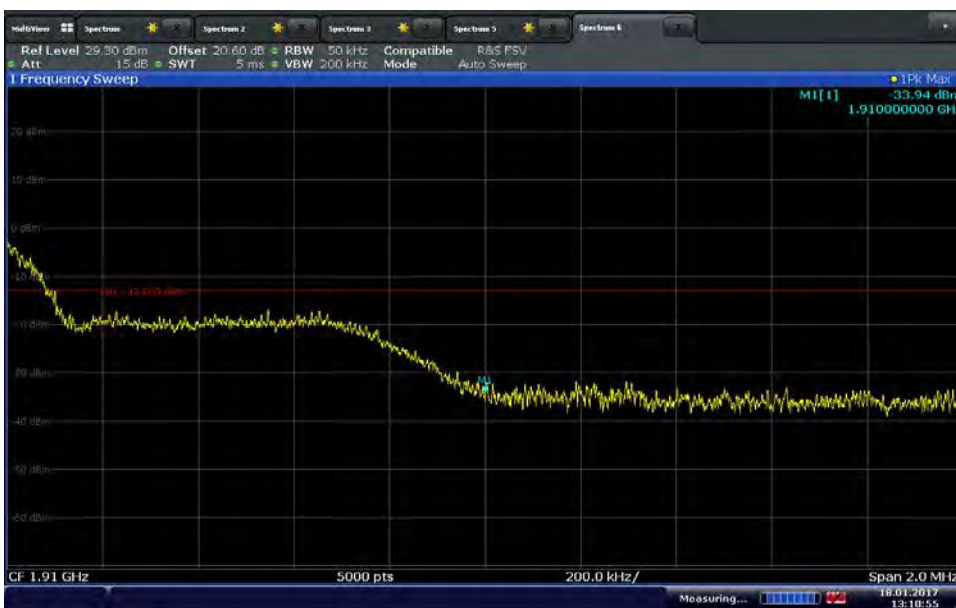


**WCDMA Band 2\_20MHz Bandwidth\_Uplink Low Channel Band Edge**



Date: 18 JAN 2017 13:04:02

**WCDMA Band 2\_20MHz Bandwidth\_Uplink High Channel Band Edge**



Date: 18 JAN 2017 13:10:55



LTE Band 5\_5MHz Bandwidth\_Uplink Low Channel Band Edge



LTE Band 5\_5MHz Bandwidth\_Uplink High Channel Band Edge



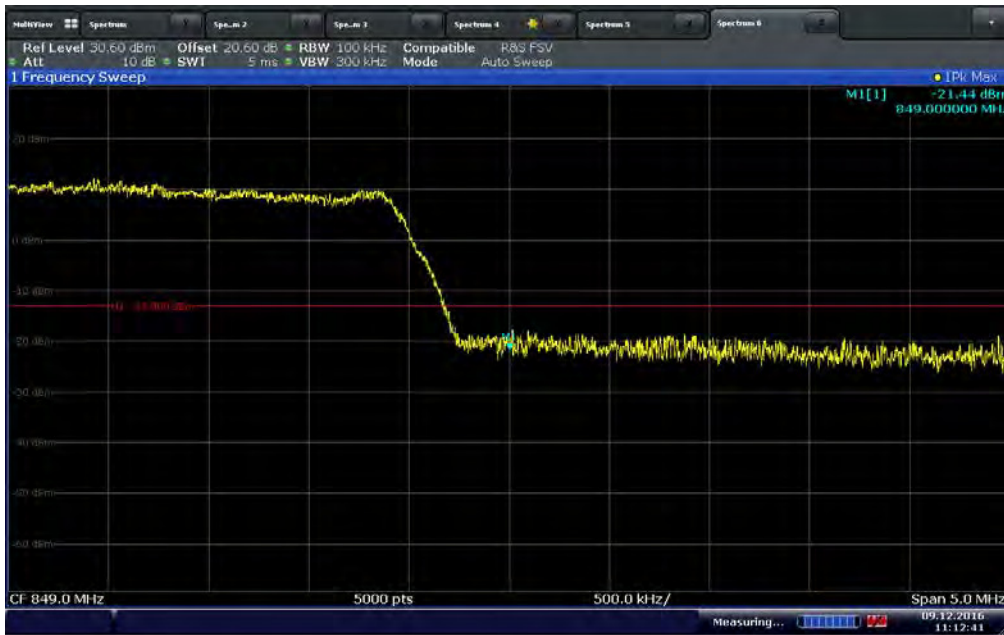


LTE Band 5\_10MHz Bandwidth\_Uplink Low Channel Band Edge



Date: 9 DEC 2016 11:23:24

LTE Band 5\_10MHz Bandwidth\_Uplink High Channel Band Edge

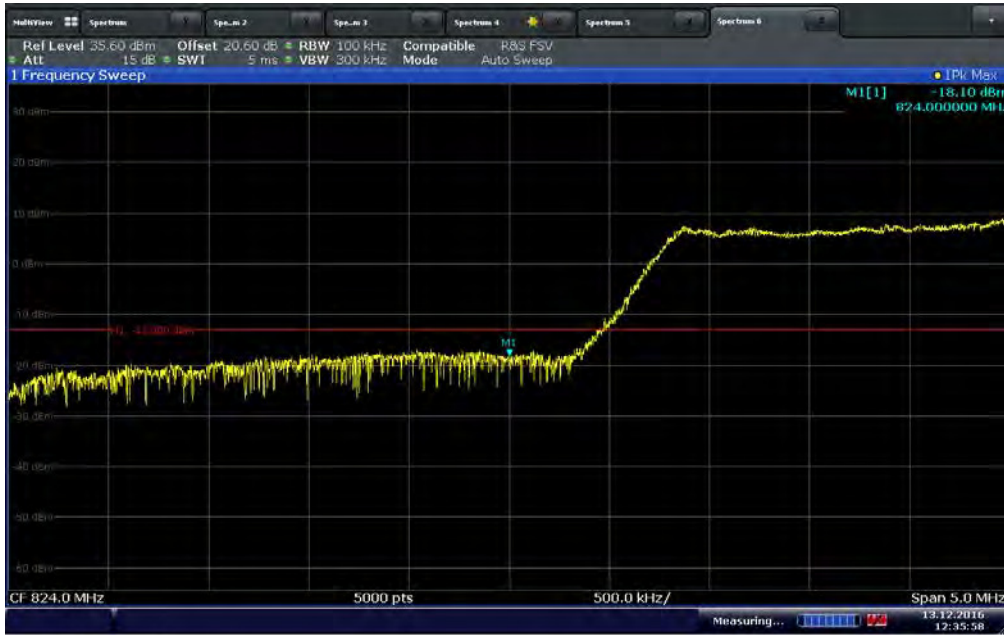


Date: 9 DEC 2016 11:12:41





### LTE Band 5\_15MHz Bandwidth\_Uplink Low Channel Band Edge



Date: 13 DEC 2016 12:35:58

### LTE Band 5\_15MHz Bandwidth\_Uplink High Channel Band Edge



Date: 13 DEC 2016 12:45:18





### LTE Band 2\_5MHz Bandwidth\_Uplink Low Channel Band Edge



Date: 21 DEC 2016 11:02:35

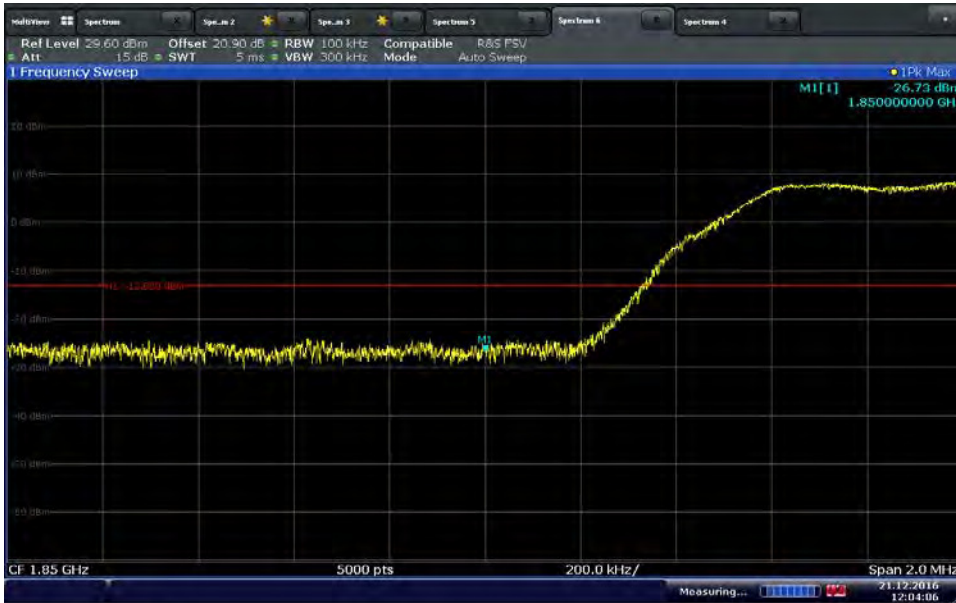
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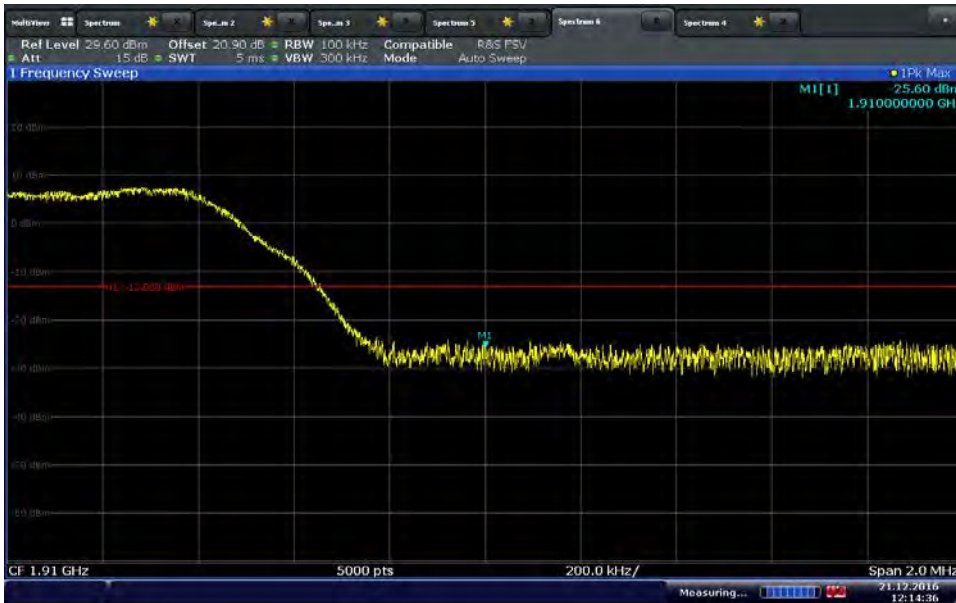


LTE Band 2\_10MHz Bandwidth\_Uplink Low Channel Band Edge



Date: 21 DEC 2016 12:04:06

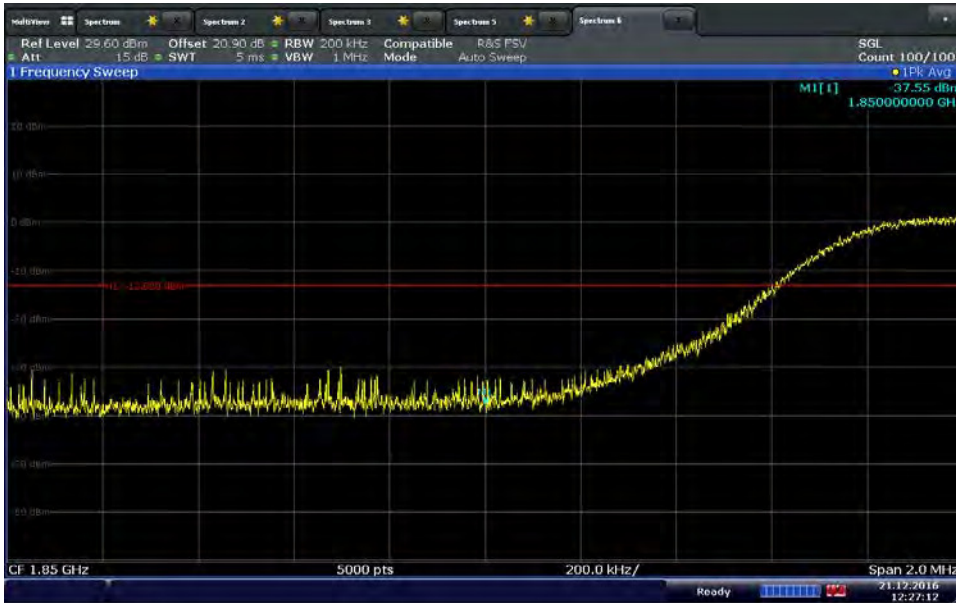
LTE Band 2\_10MHz Bandwidth\_Uplink High Channel Band Edge



Date: 21 DEC 2016 12:14:35

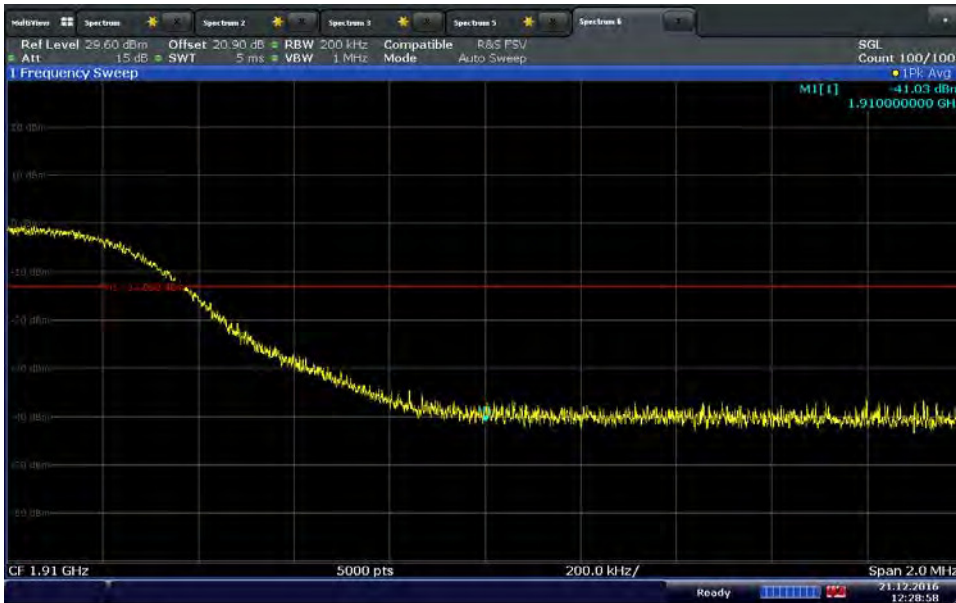


LTE Band 2\_15MHz Bandwidth\_Uplink Low Channel Band Edge



Date: 21 DEC 2016 12:27:12

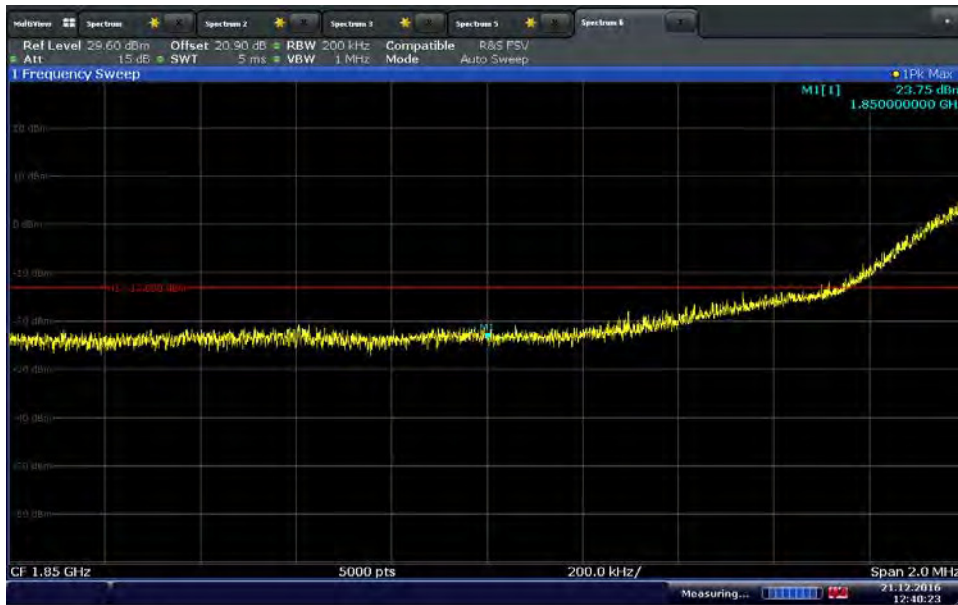
LTE Band 2\_15MHz Bandwidth\_Uplink High Channel Band Edge



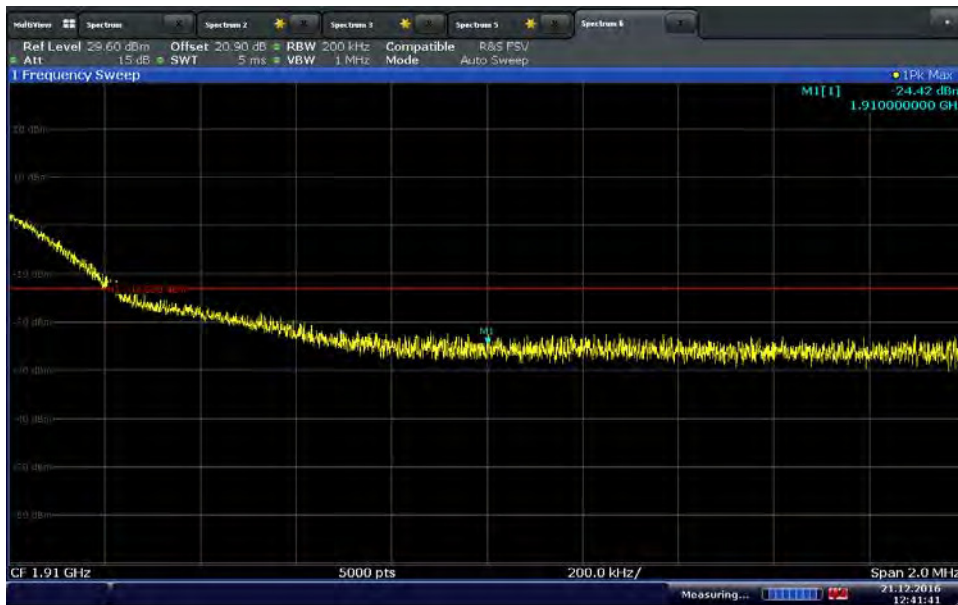
Date: 21 DEC 2016 12:28:58



### LTE Band 20MHz Bandwidth\_Uplink Low Channel Band Edge



### LTE Band 2\_20MHz Bandwidth\_Uplink High Channel Band Edge





## **2.7 CONDUCTED SPURIOUS EMISSIONS**

### **2.7.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1051  
FCC 47 CFR Part 22, Clause 22.917(a)  
FCC 47 CFR Part 24, Clause 24.238(a)  
RSS-132, Clause 5.5  
RSS-133, Clause 6.5

### **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: 332633000356 / Test Configuration A and B

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

December 09, 13, 21, 2016 and January 18, 2017/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	21.4 - 22.8°C
Relative Humidity	45.1 - 58.1%
ATM Pressure	98.9 - 99.8kPa

### **2.7.7 Additional Observations**

- This is a conducted test.
- The transducer factor (TDF) used is from the external attenuators and cables used.
- A resolution bandwidth of 1MHz was used.
- The limit is set to -13dBm.
- Only test plots for middle channel were presented as the representative configuration.





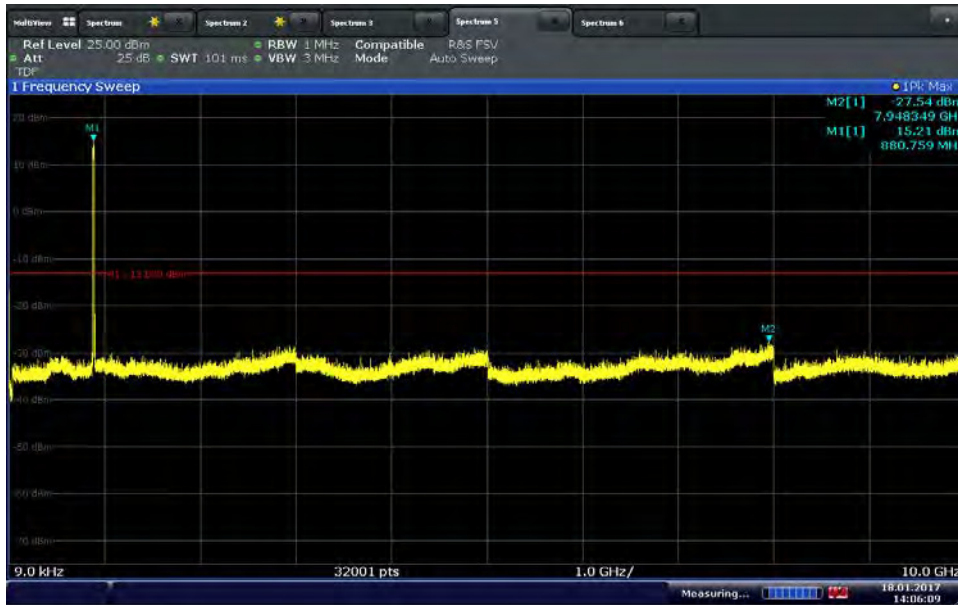
2.7.8 Test Results

WCDMA Band 5\_5MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions



Date: 13 DEC 2016 16:00:52

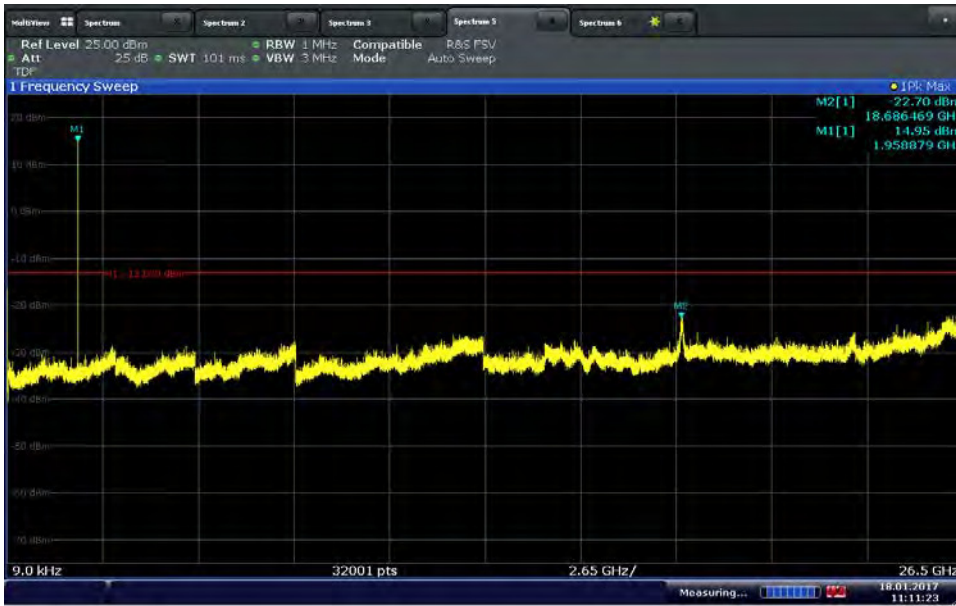
WCDMA Band 5\_15MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions



Date: 16 JAN 2017 14:06:10

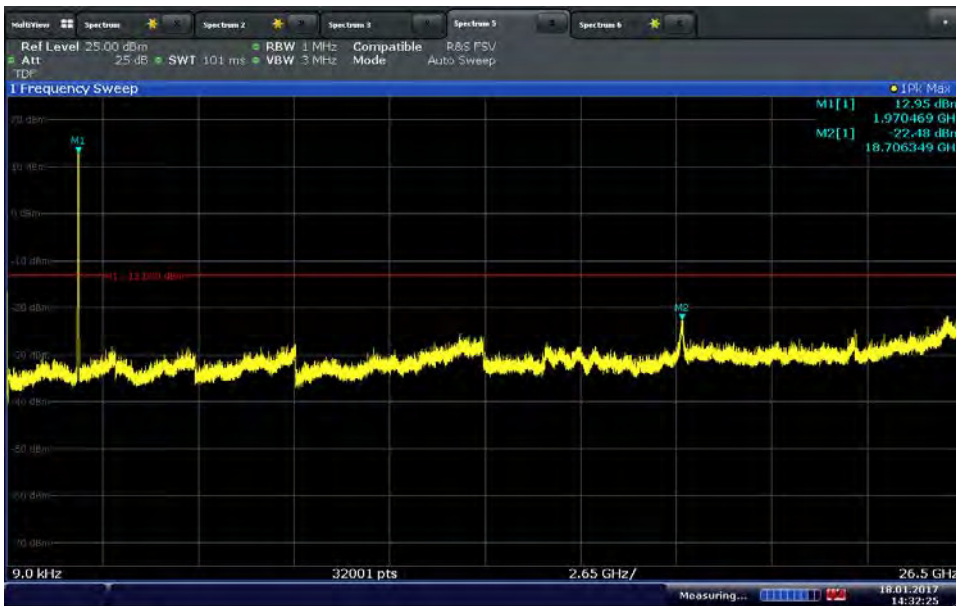


**WCDMA Band 2\_5MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions**



Date: 16 JAN 2017 11:11:24

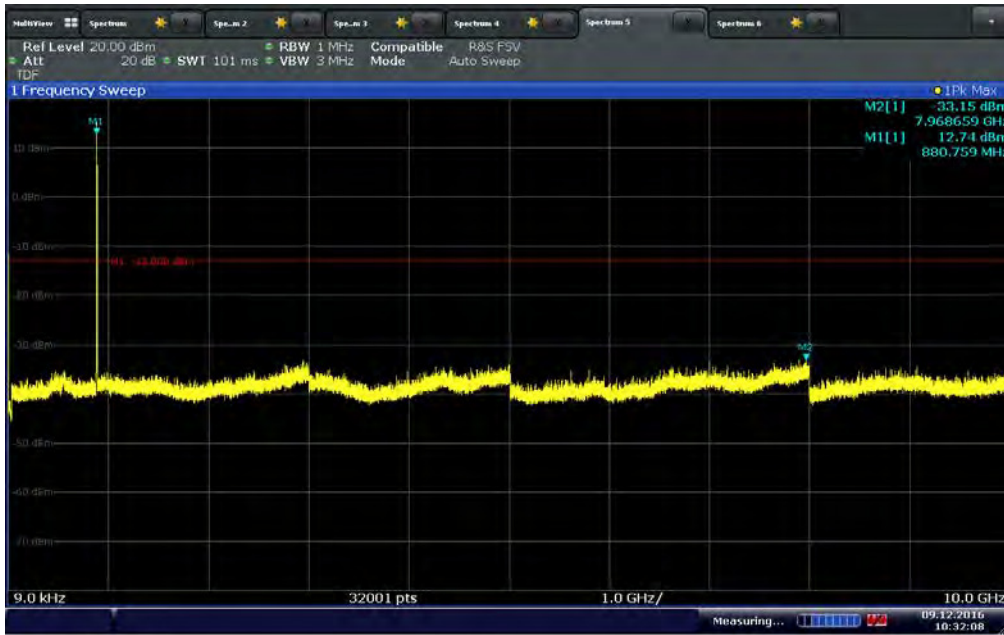
**WCDMA Band 2\_20MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions**



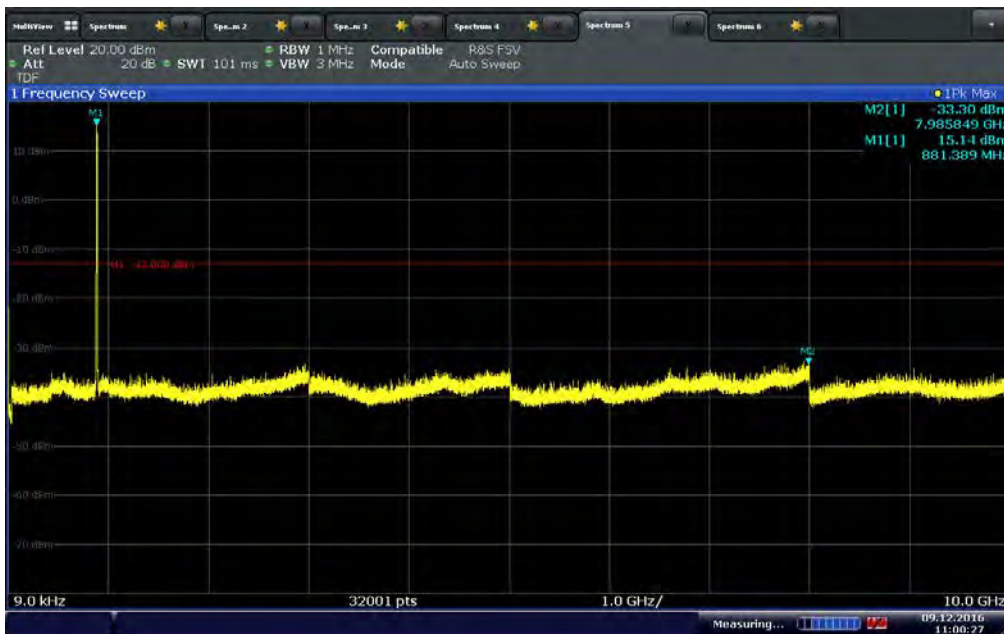
Date: 16 JAN 2017 14:32:25



### LTE Band 5\_5MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions

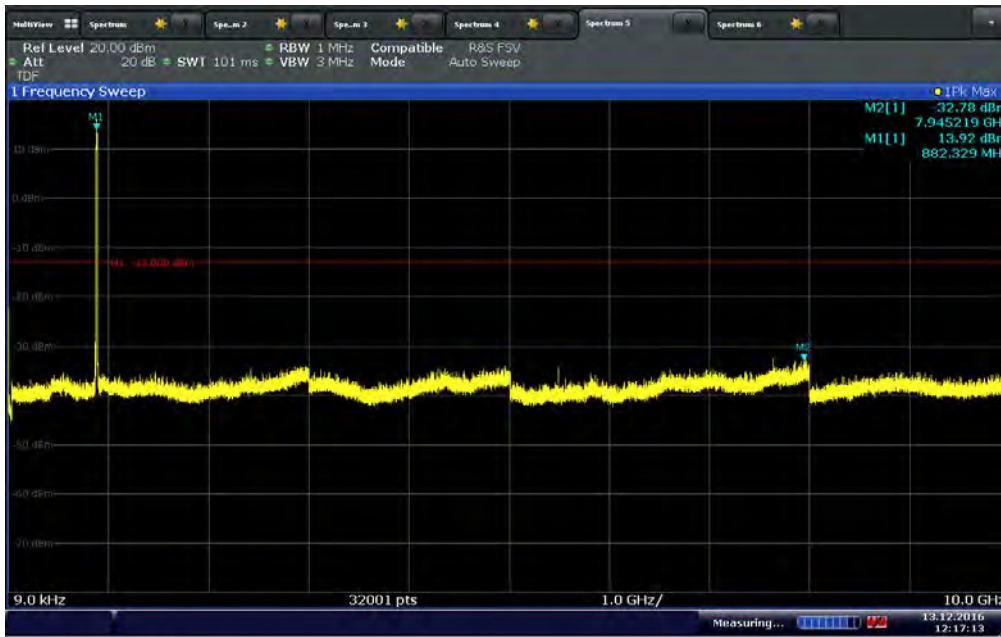


### LTE Band 5\_10MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions

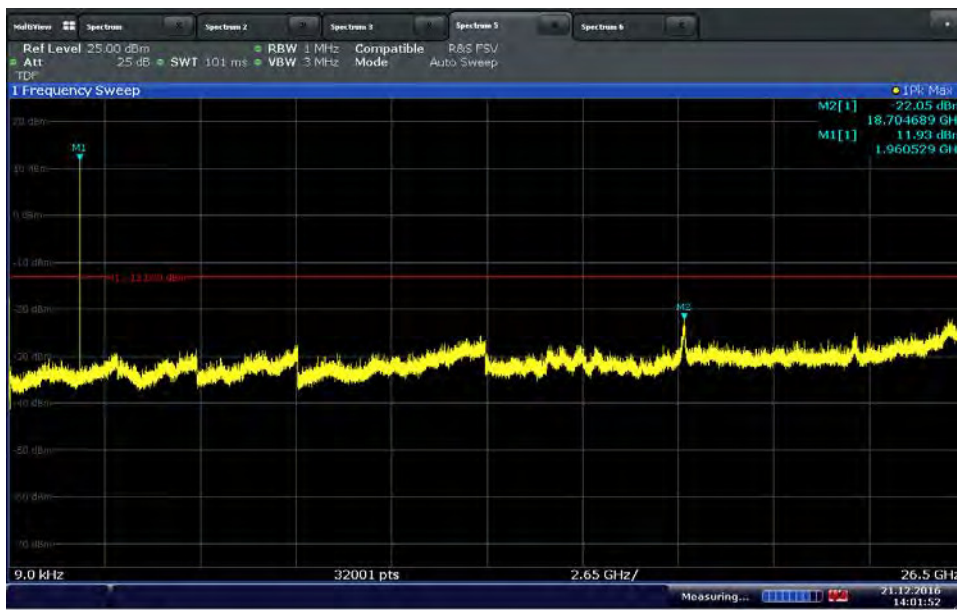




### LTE Band 5\_15MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions



### LTE Band 2\_5MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions





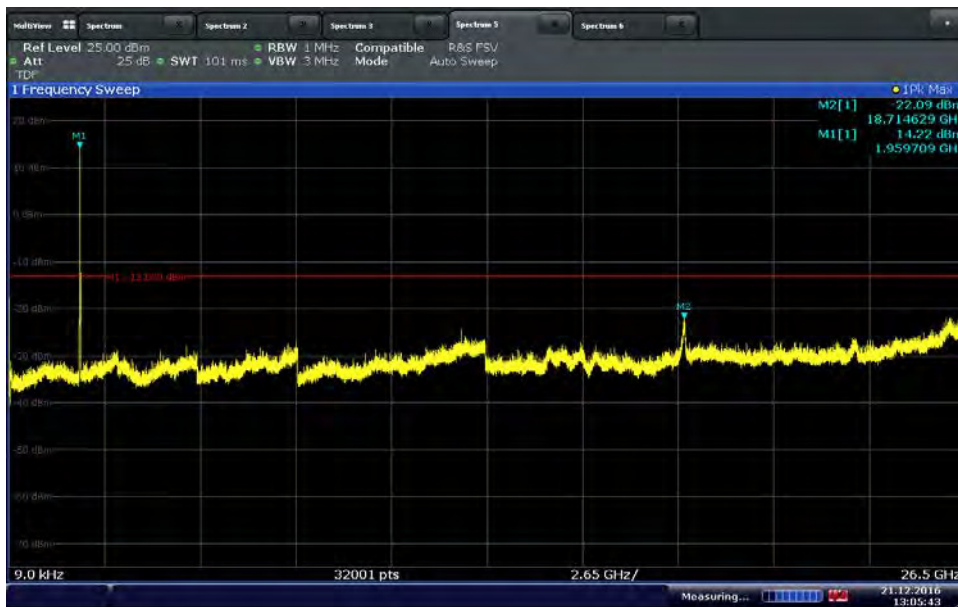


### LTE Band 2\_10MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions



Date: 21 DEC 2016 13:49:07

### LTE Band 2\_15MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions

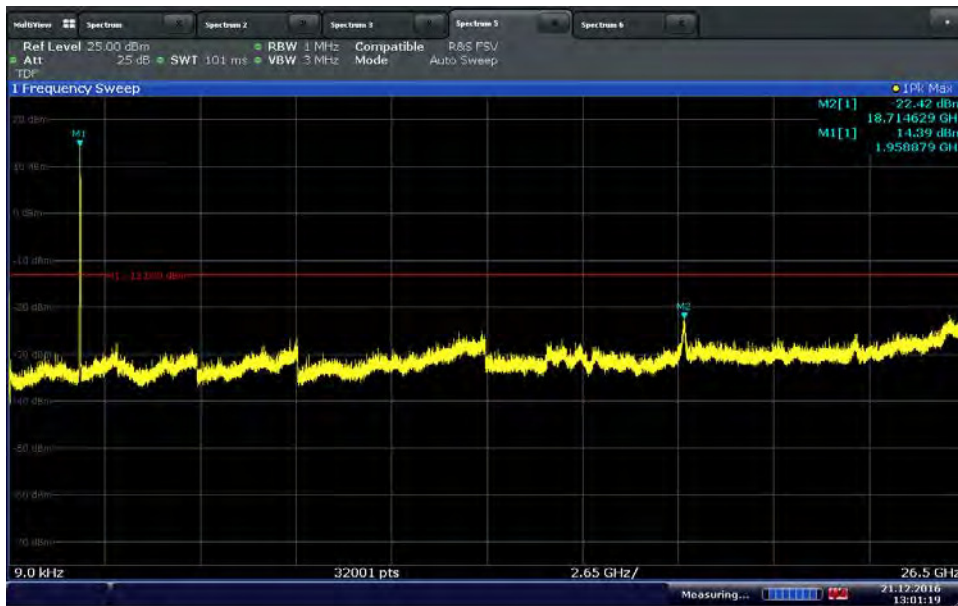


Date: 21 DEC 2016 13:05:44





**LTE Band 2\_20MHz Bandwidth\_Downlink Mid Channel Conducted Spurious Emissions**



Date: 21 DEC 2016 13:01:19

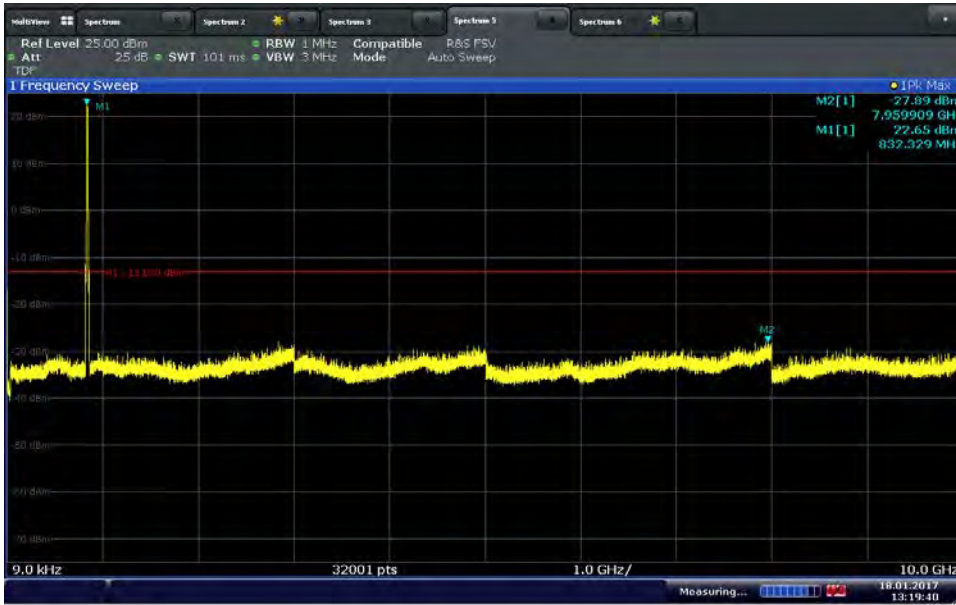
**WCDMA Band 5\_5MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions**



Date: 13 DEC 2016 15:48:44

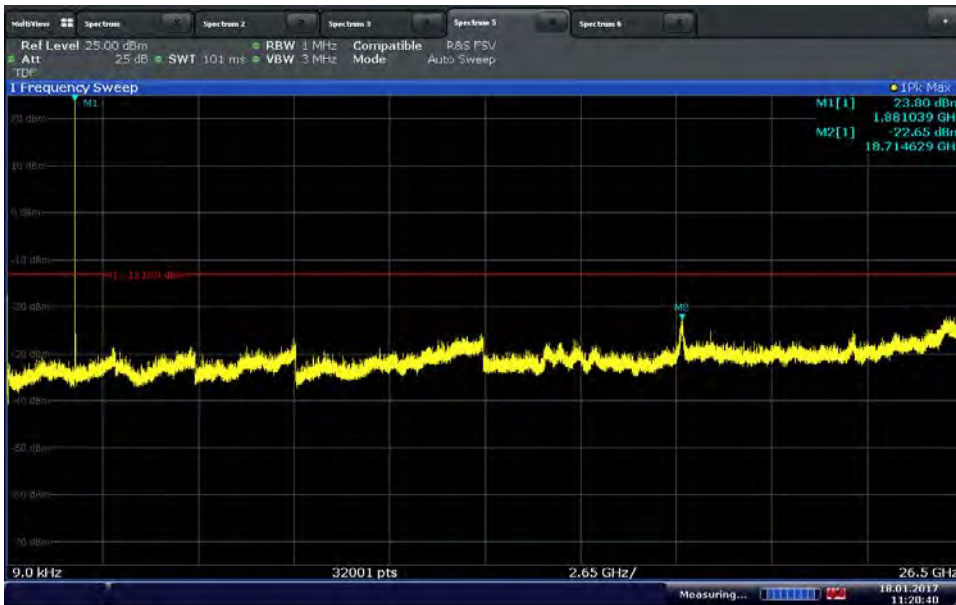


**WCDMA Band 5\_15MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions**



Date: 18 JAN 2017 13:19:40

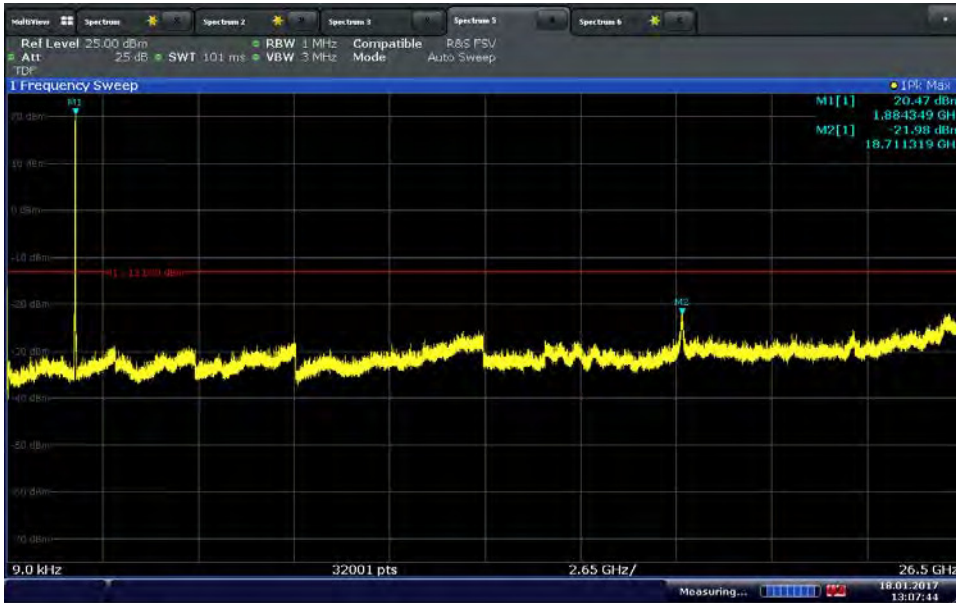
**WCDMA Band 2\_5MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions**



Date: 18 JAN 2017 11:20:40



**WCDMA Band 2\_20MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions**



Date: 18 JAN 2017 13:07:43

**LTE Band 5\_5MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions**



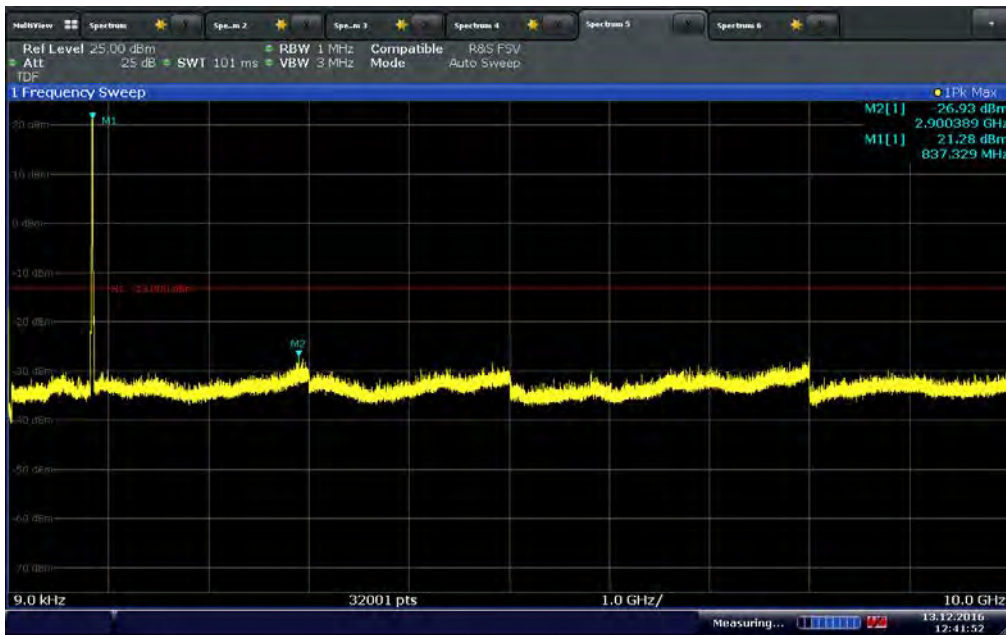
Date: 9 DEC 2016 11:36:27



### LTE Band 5\_10MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions



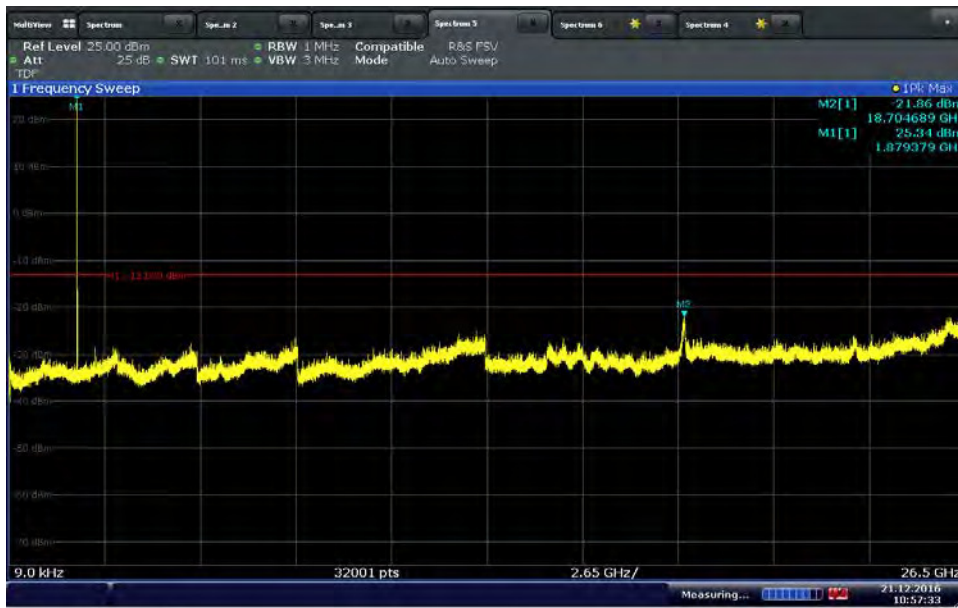
### LTE Band 5\_15MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions





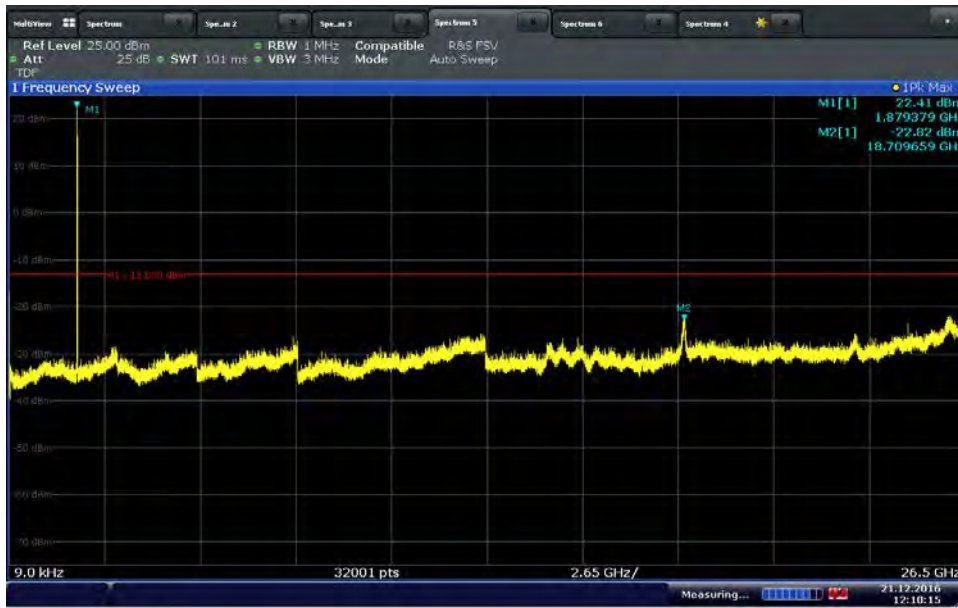


### LTE Band 2\_5MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions



Date: 21 DEC 2016 10:57:33

### LTE Band 2\_10MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions



Date: 21 DEC 2016 12:10:15





### LTE Band 2\_15MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions



Date: 21 DEC 2016 12:19:11

### LTE Band 2\_20MHz Bandwidth\_Uplink Mid Channel Conducted Spurious Emissions



Date: 21 DEC 2016 12:35:59



## **2.8 FIELD STRENGTH OF SPURIOUS RADIATION**

### **2.8.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1053  
FCC 47 CFR Part 22, Clause 22.917(a)  
FCC 47 CFR Part 24, Clause 24.238(a)  
RSS-132, Clause 5.5  
RSS-133, Clause 6.5

### **2.8.2 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.

### **2.8.3 Equipment Under Test and Modification State**

Serial No: 332633000356 and 931703000264 / Test Configuration C and D

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

January 06, 27 and February 02, 03, 2017/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.

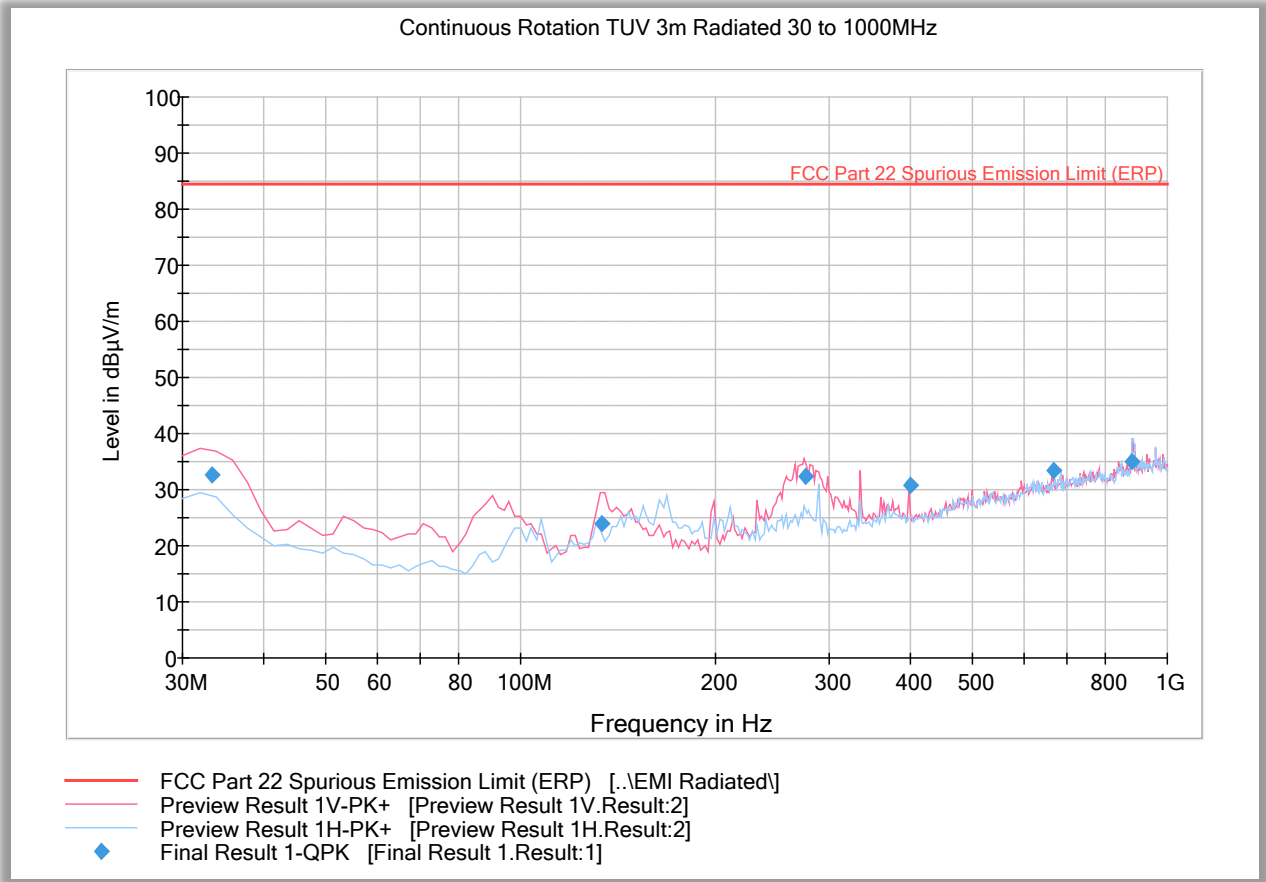
Ambient Temperature	21.2 - 23.5°C
Relative Humidity	27.9 - 53.2%
ATM Pressure	99.0 - 99.5kPa

### **2.8.7 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.



**2.8.8 Test Results Below 1GHz (WCDMA Band 5 Downlink Worst Case Configuration) - 15MHz Bandwidth High Channel**

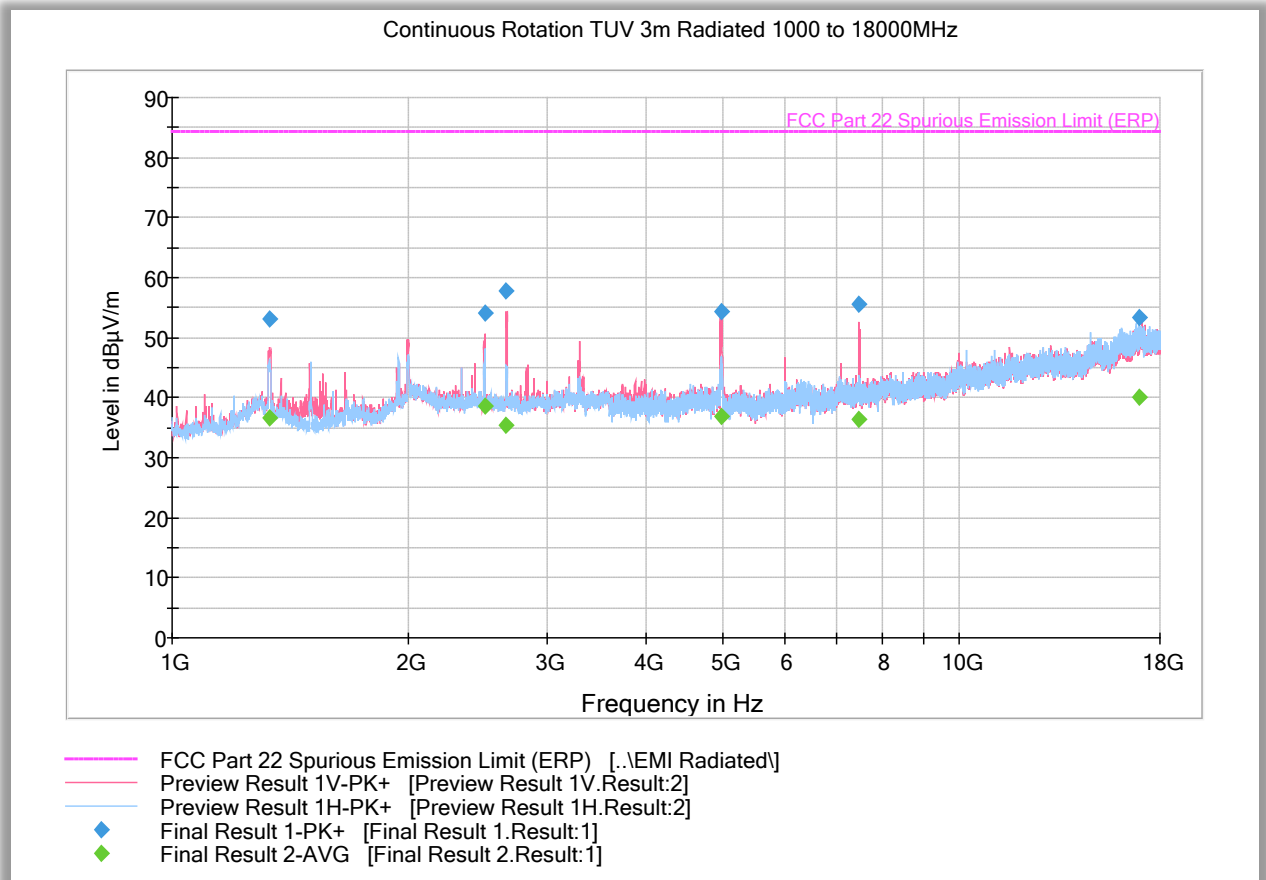


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.320000	32.5	1000.0	120.000	110.0	V	87.0	-7.0	51.9	84.4
133.569940	24.0	1000.0	120.000	109.0	V	55.0	-13.7	60.4	84.4
276.249860	32.4	1000.0	120.000	143.0	V	76.0	-6.7	51.9	84.4
400.018677	30.9	1000.0	120.000	100.0	V	118.0	-2.2	53.5	84.4
666.715190	33.3	1000.0	120.000	100.0	V	89.0	4.6	51.0	84.4
882.302846	35.0	1000.0	120.000	194.0	H	317.0	8.6	49.4	84.4



**2.8.9 Test Results Above 1GHz (WCDMA Band 5 Downlink Worst Case Configuration) - 15MHz Bandwidth High Channel**



**Peak Data**

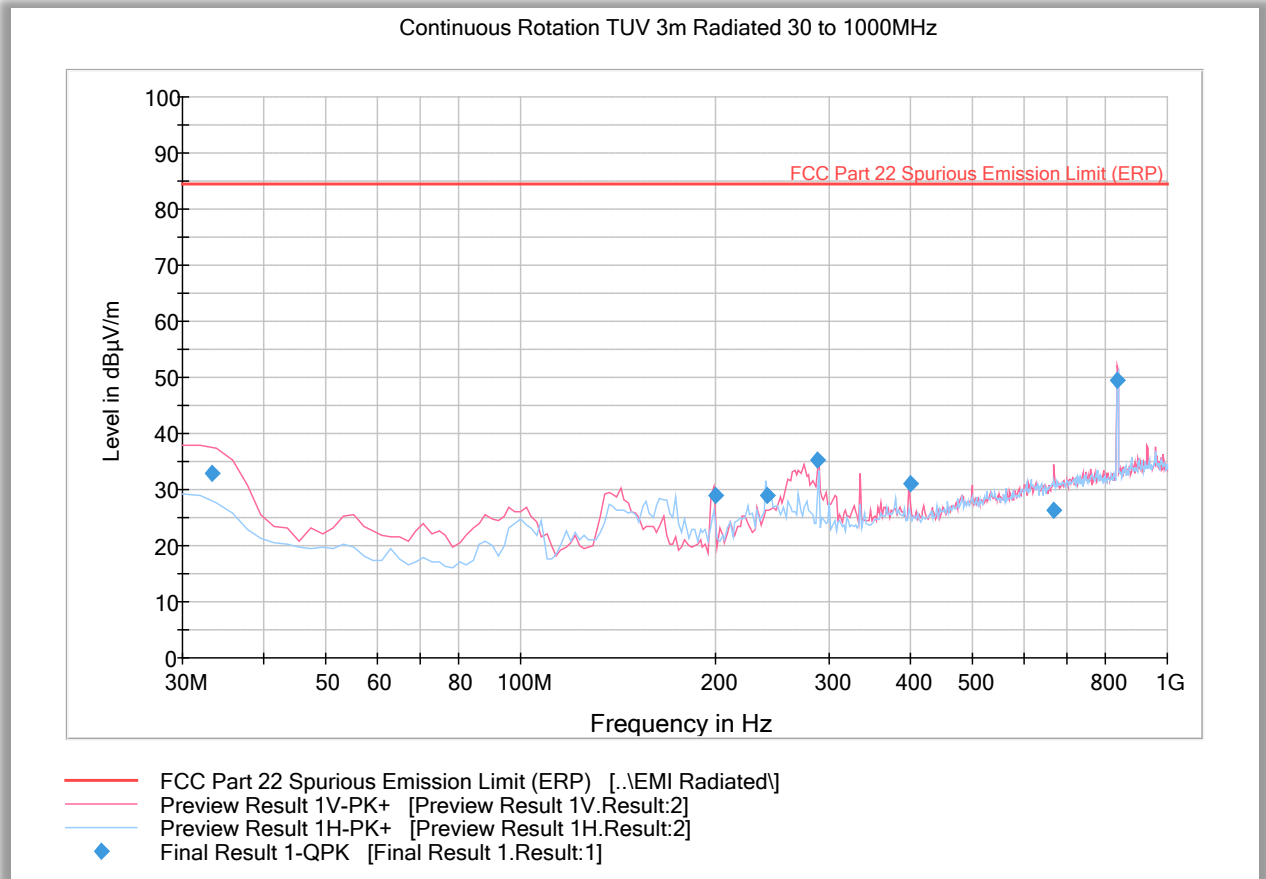
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1331.533333	53.1	1000.0	1000.000	205.5	V	70.0	-5.0	31.3	84.4
2499.800000	54.1	1000.0	1000.000	162.7	V	124.0	-0.7	30.3	84.4
2653.166667	57.8	1000.0	1000.000	191.5	V	89.0	-0.9	26.6	84.4
4985.166667	54.3	1000.0	1000.000	227.4	V	51.0	3.5	30.1	84.4
7469.266667	55.5	1000.0	1000.000	174.6	V	98.0	7.4	28.9	84.4
16916.000000	53.5	1000.0	1000.000	102.8	H	29.0	20.0	30.9	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)
1331.533333	36.7	1000.0	1000.000	205.5	V	70.0	-5.0	47.7	84.4
2499.800000	38.5	1000.0	1000.000	162.7	V	124.0	-0.7	45.9	84.4
2653.166667	35.5	1000.0	1000.000	191.5	V	89.0	-0.9	48.9	84.4
4985.166667	36.8	1000.0	1000.000	227.4	V	51.0	3.5	47.6	84.4
7469.266667	36.3	1000.0	1000.000	174.6	V	98.0	7.4	48.0	84.4
16916.000000	40.2	1000.0	1000.000	102.8	H	29.0	20.0	44.2	84.4



**2.8.10 Test Results Below 1GHz (WCDMA Band 5 Uplink Worst Case Configuration) - 5MHz Bandwidth Middle Channel**



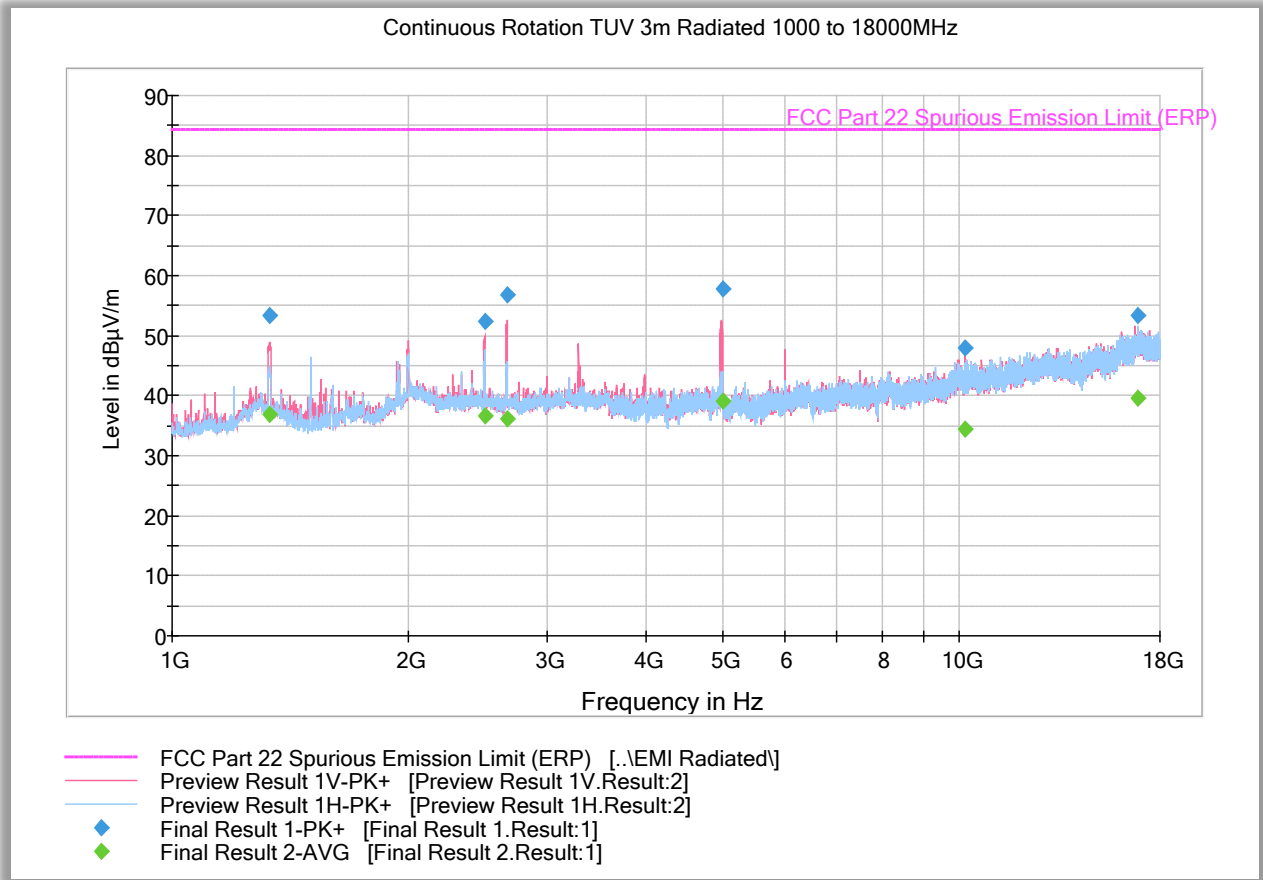
**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.240000	32.8	1000.0	120.000	116.0	V	124.0	-7.0	51.6	84.4
199.998236	29.0	1000.0	120.000	165.0	V	115.0	-10.1	55.3	84.4
239.979880	28.9	1000.0	120.000	115.0	H	271.0	-7.4	55.5	84.4
287.977074	35.3	1000.0	120.000	144.0	V	92.0	-6.8	49.1	84.4
400.018677	31.1	1000.0	120.000	100.0	V	126.0	-2.2	53.3	84.4
665.755190	26.4	1000.0	120.000	250.0	V	11.0	4.5	58.0	84.4
838.233427	49.4	1000.0	120.000	195.0	V	26.0	7.8	Fundamental	





**2.8.11 Test Results Above 1GHz (WCDMA Band 5 Uplink Worst Case Configuration) - 5MHz Bandwidth Middle Channel**



**Peak Data**

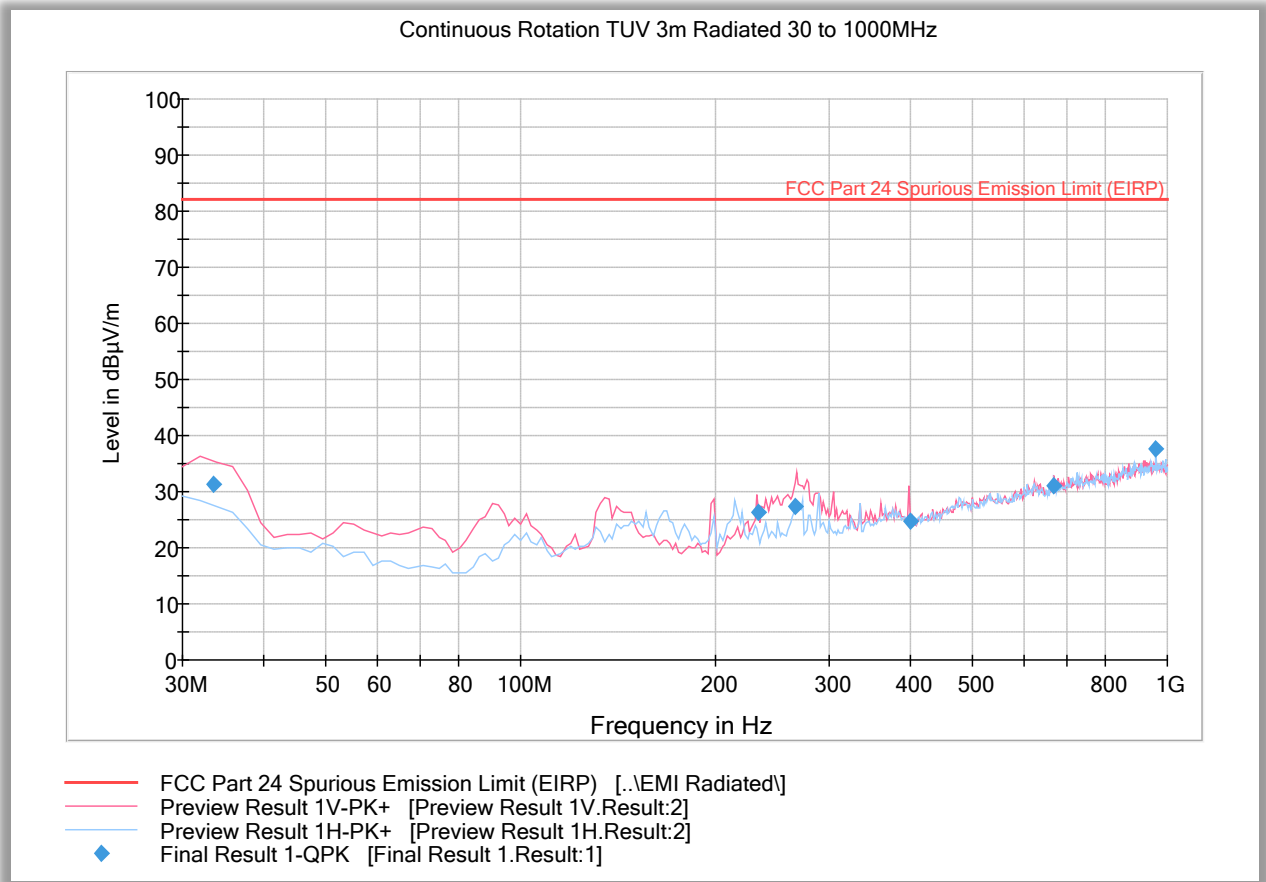
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1332.066667	53.5	1000.0	1000.000	140.7	V	64.0	-5.1	30.9	84.4
2495.300000	52.4	1000.0	1000.000	161.6	V	115.0	-0.7	32.0	84.4
2666.233333	56.7	1000.0	1000.000	112.7	V	89.0	-0.8	27.7	84.4
4999.733333	57.8	1000.0	1000.000	182.6	V	52.0	3.4	26.6	84.4
10190.000000	47.9	1000.0	1000.000	173.6	V	294.0	11.3	36.5	84.4
16877.633333	53.3	1000.0	1000.000	151.6	H	354.0	20.0	31.0	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)
1332.066667	36.8	1000.0	1000.000	140.7	V	64.0	-5.1	47.6	84.4
2495.300000	36.7	1000.0	1000.000	161.6	V	115.0	-0.7	47.7	84.4
2666.233333	36.1	1000.0	1000.000	112.7	V	89.0	-0.8	48.2	84.4
4999.733333	39.2	1000.0	1000.000	182.6	V	52.0	3.4	45.2	84.4
10190.000000	34.3	1000.0	1000.000	173.6	V	294.0	11.3	50.0	84.4
16877.633333	39.7	1000.0	1000.000	151.6	H	354.0	20.0	44.7	84.4



**2.8.12 Test Results Below 1GHz (WCDMA Band 2 Downlink Worst Case Configuration) - 20MHz Bandwidth High Channel**

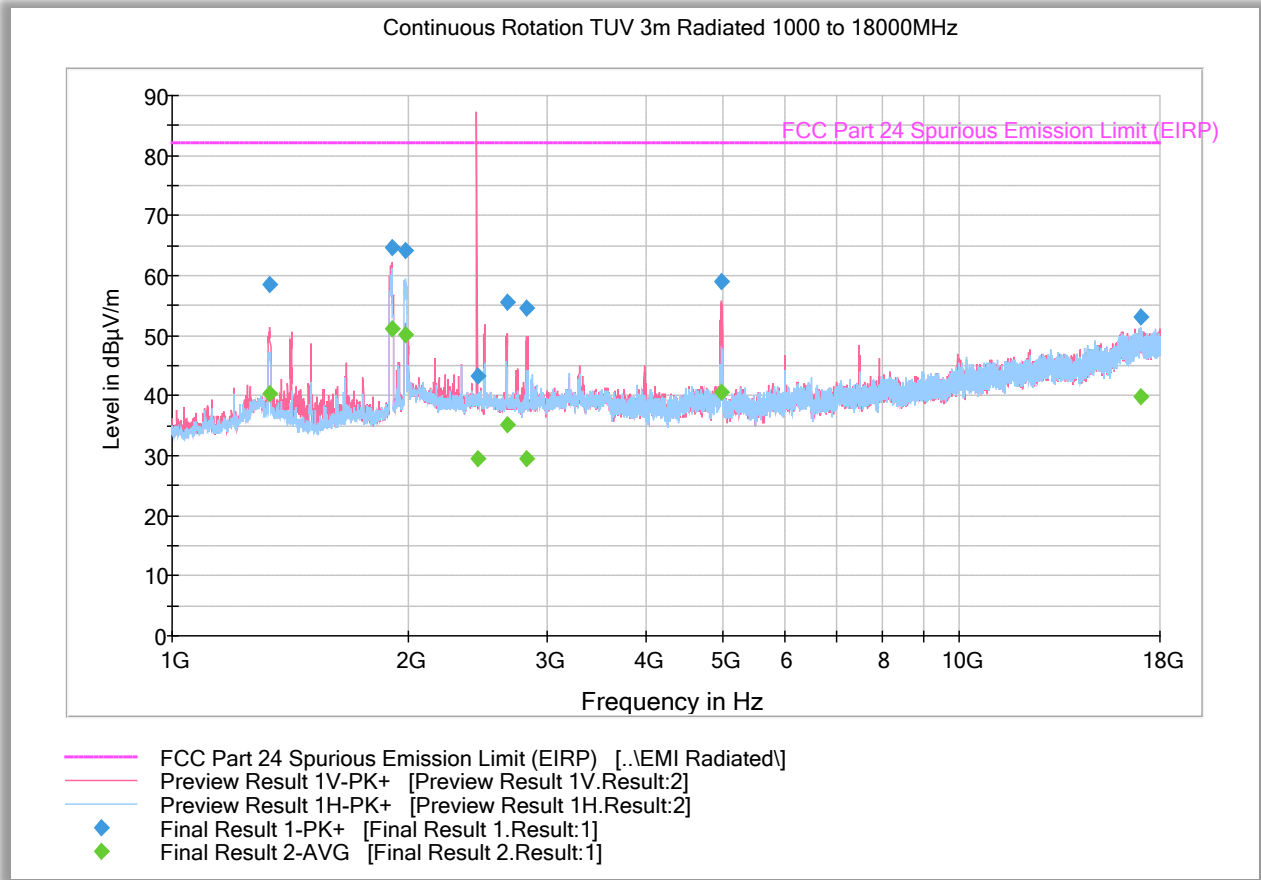


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.520000	31.4	1000.0	120.000	100.0	V	50.0	-7.2	50.8	82.2
233.284329	26.2	1000.0	120.000	203.0	V	-13.0	-7.9	56.0	82.2
265.914309	27.3	1000.0	120.000	150.0	V	79.0	-6.5	54.9	82.2
400.018677	24.6	1000.0	120.000	144.0	V	107.0	-2.2	57.6	82.2
666.715190	31.1	1000.0	120.000	115.0	V	81.0	4.6	51.1	82.2
960.082244	37.6	1000.0	120.000	100.0	H	34.0	9.7	44.6	82.2



**2.8.13 Test Results Above 1GHz (WCDMA Band 2 Downlink Worst Case Configuration) - 20MHz Bandwidth High Channel**



**Peak Data**

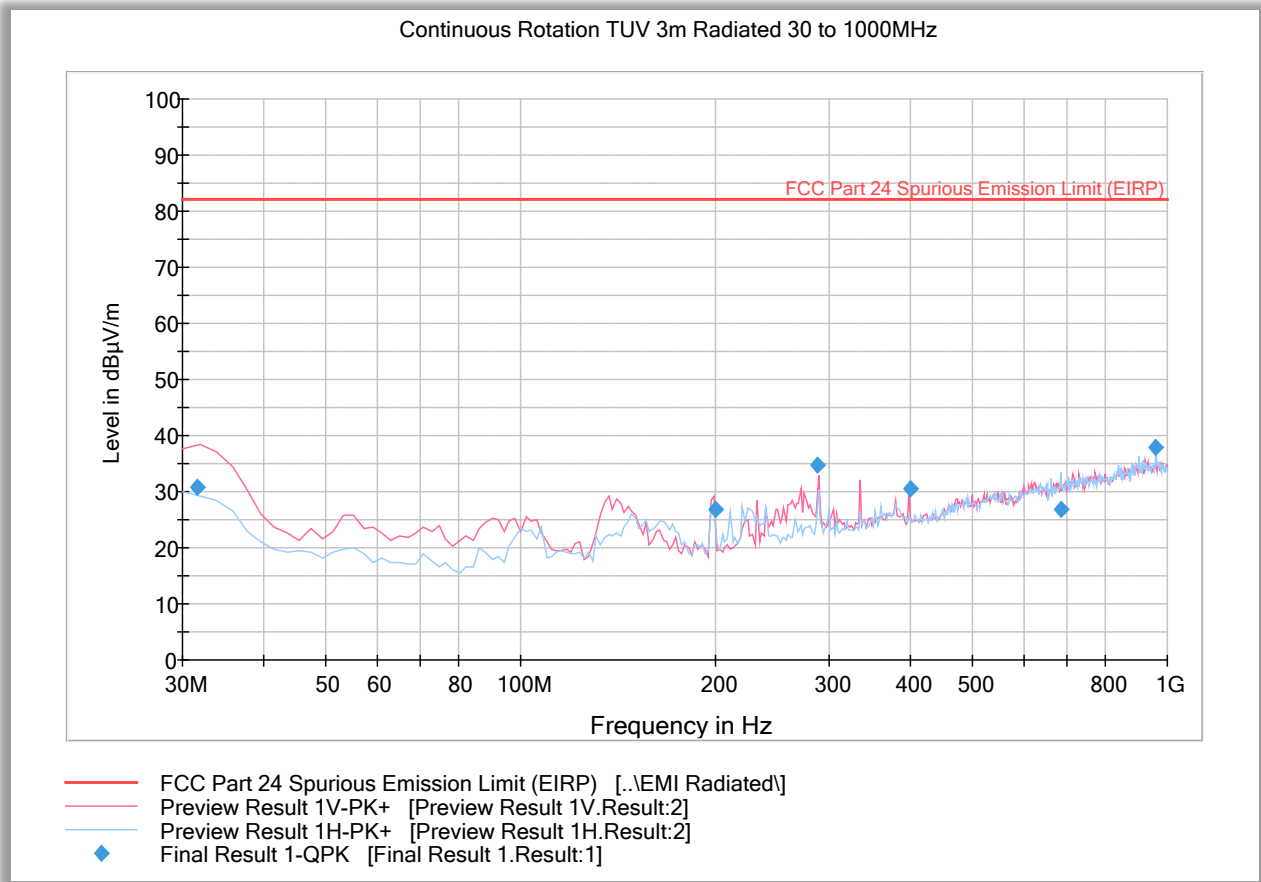
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1330.500000	58.6	1000.0	1000.000	165.6	V	81.0	-5.0	23.6	82.2
1900.633333	64.6	1000.0	1000.000	208.5	V	117.0	-1.3	17.6	82.2
1981.700000	64.2	1000.0	1000.000	195.5	H	228.0	-0.4	Fundamental	
2440.900000	43.3	1000.0	1000.000	195.5	V	131.0	-1.0	BLE Carrier	
2664.300000	55.6	1000.0	1000.000	199.5	V	81.0	-0.8	26.7	82.2
2822.533333	54.7	1000.0	1000.000	208.5	V	4.0	-0.6	27.6	82.2
4985.566667	59.1	1000.0	1000.000	182.6	V	51.0	3.5	23.1	82.2
17025.200000	53.1	1000.0	1000.000	115.7	H	255.0	19.9	29.2	82.2

**Average Data**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1330.500000	40.3	1000.0	1000.000	165.6	V	81.0	-5.0	41.9	82.2
1900.633333	51.1	1000.0	1000.000	208.5	V	117.0	-1.3	31.2	82.2
1981.700000	50.1	1000.0	1000.000	195.5	H	228.0	-0.4	Fundamental	
2440.900000	29.5	1000.0	1000.000	195.5	V	131.0	-1.0	BLE Carrier	
2664.300000	35.2	1000.0	1000.000	199.5	V	81.0	-0.8	47.1	82.2
2822.533333	29.5	1000.0	1000.000	208.5	V	4.0	-0.6	52.7	82.2
4985.566667	40.7	1000.0	1000.000	182.6	V	51.0	3.5	41.6	82.2
17025.200000	39.8	1000.0	1000.000	115.7	H	255.0	19.9	42.4	82.2



**2.8.14 Test Results Below 1GHz (WCDMA Band 2 Uplink Worst Case Configuration) - 5MHz Bandwidth High Channel**

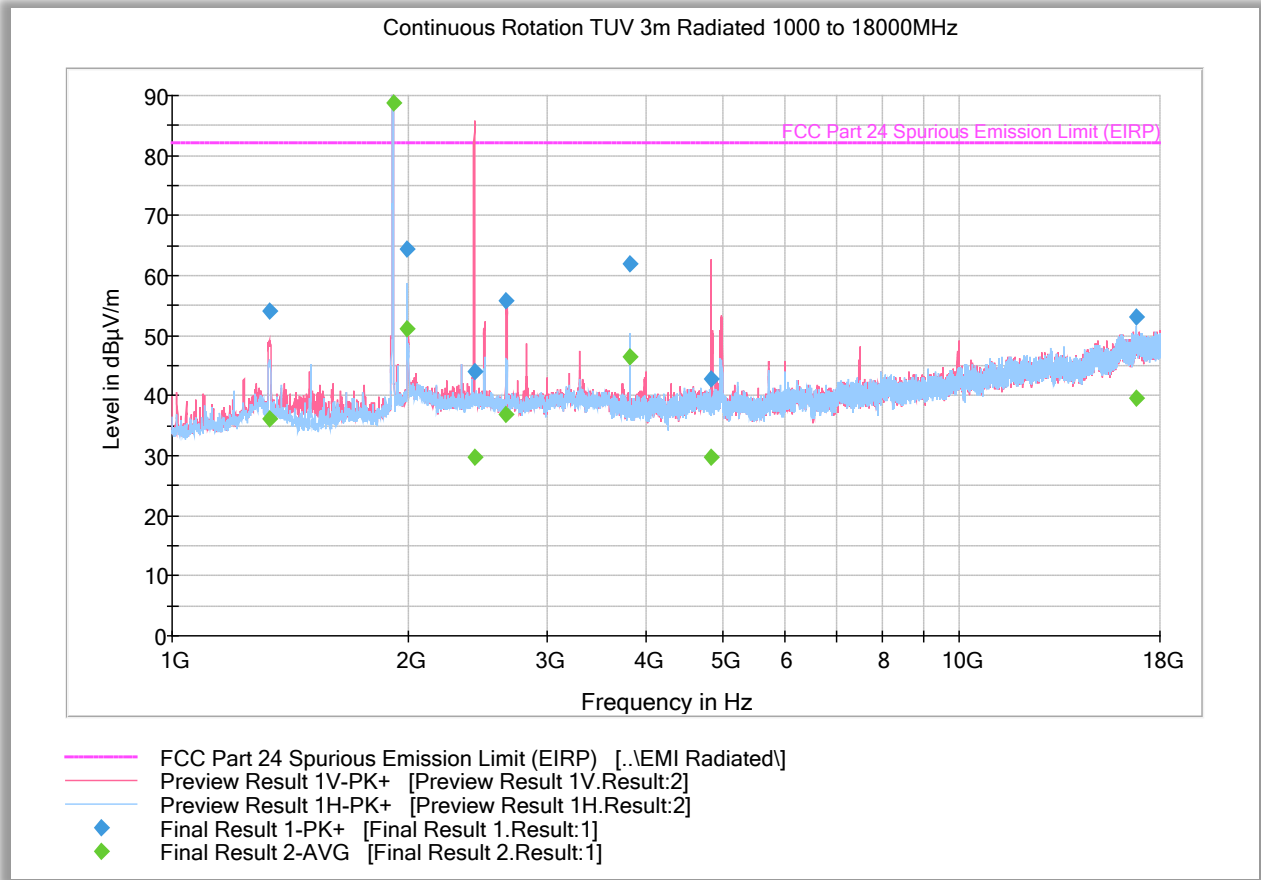


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
31.680000	30.7	1000.0	120.000	100.0	V	115.0	-5.8	51.5	82.2
199.878236	26.8	1000.0	120.000	144.0	V	-8.0	-10.1	55.4	82.2
288.017074	34.9	1000.0	120.000	150.0	V	70.0	-6.8	47.4	82.2
400.018677	30.5	1000.0	120.000	105.0	V	308.0	-2.2	51.7	82.2
683.466293	26.8	1000.0	120.000	150.0	H	120.0	5.2	55.5	82.2
960.082244	38.0	1000.0	120.000	100.0	H	40.0	9.7	44.2	82.2



**2.8.15 Test Results Above 1GHz (WCDMA Band 2 Uplink Worst Case Configuration) - 5MHz Bandwidth 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)
1327.766667	54.2	1000.0	1000.000	151.6	V	75.0	-4.9	28.1	82.2
1908.733333	100.5	1000.0	1000.000	151.6	H	259.0	-1.1	Fundamental	
1987.666667	64.4	1000.0	1000.000	195.5	H	46.0	-0.3	17.8	82.2
2420.433333	44.1	1000.0	1000.000	195.5	V	74.0	-1.1	BLE Carrier	
2653.766667	55.9	1000.0	1000.000	161.6	V	75.0	-0.9	26.3	82.2
3815.400000	61.9	1000.0	1000.000	151.6	H	260.0	1.7	20.3	82.2
4843.500000	42.7	1000.0	1000.000	113.7	V	210.0	3.3	39.5	82.2
16794.100000	53.1	1000.0	1000.000	191.5	H	92.0	20.0	29.2	82.2

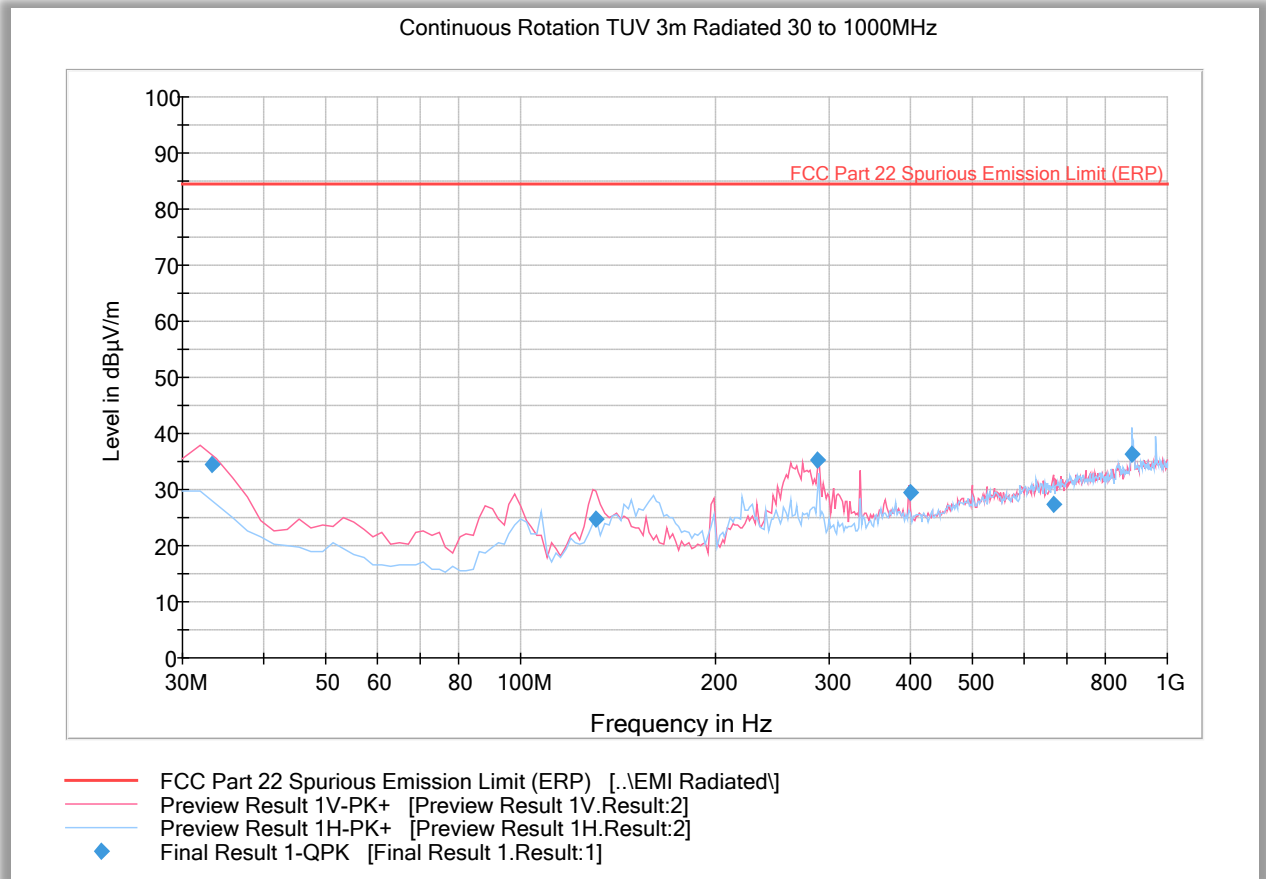
**Average Data**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1327.766667	36.2	1000.0	1000.000	151.6	V	75.0	-4.9	46.1	82.2
1908.733333	88.9	1000.0	1000.000	151.6	H	259.0	-1.1	Fundamental	
1987.666667	51.1	1000.0	1000.000	195.5	H	46.0	-0.3	31.1	82.2
2420.433333	29.8	1000.0	1000.000	195.5	V	74.0	-1.1	BLE Carrier	
2653.766667	36.8	1000.0	1000.000	161.6	V	75.0	-0.9	45.4	82.2
3815.400000	46.4	1000.0	1000.000	151.6	H	260.0	1.7	35.8	82.2
4843.500000	29.8	1000.0	1000.000	113.7	V	210.0	3.3	52.4	82.2
16794.100000	39.5	1000.0	1000.000	191.5	H	92.0	20.0	42.7	82.2





**2.8.16 Test Results Below 1GHz (LTE Band 5 Downlink Worst Case Configuration) - 15MHz Bandwidth Middle Channel**

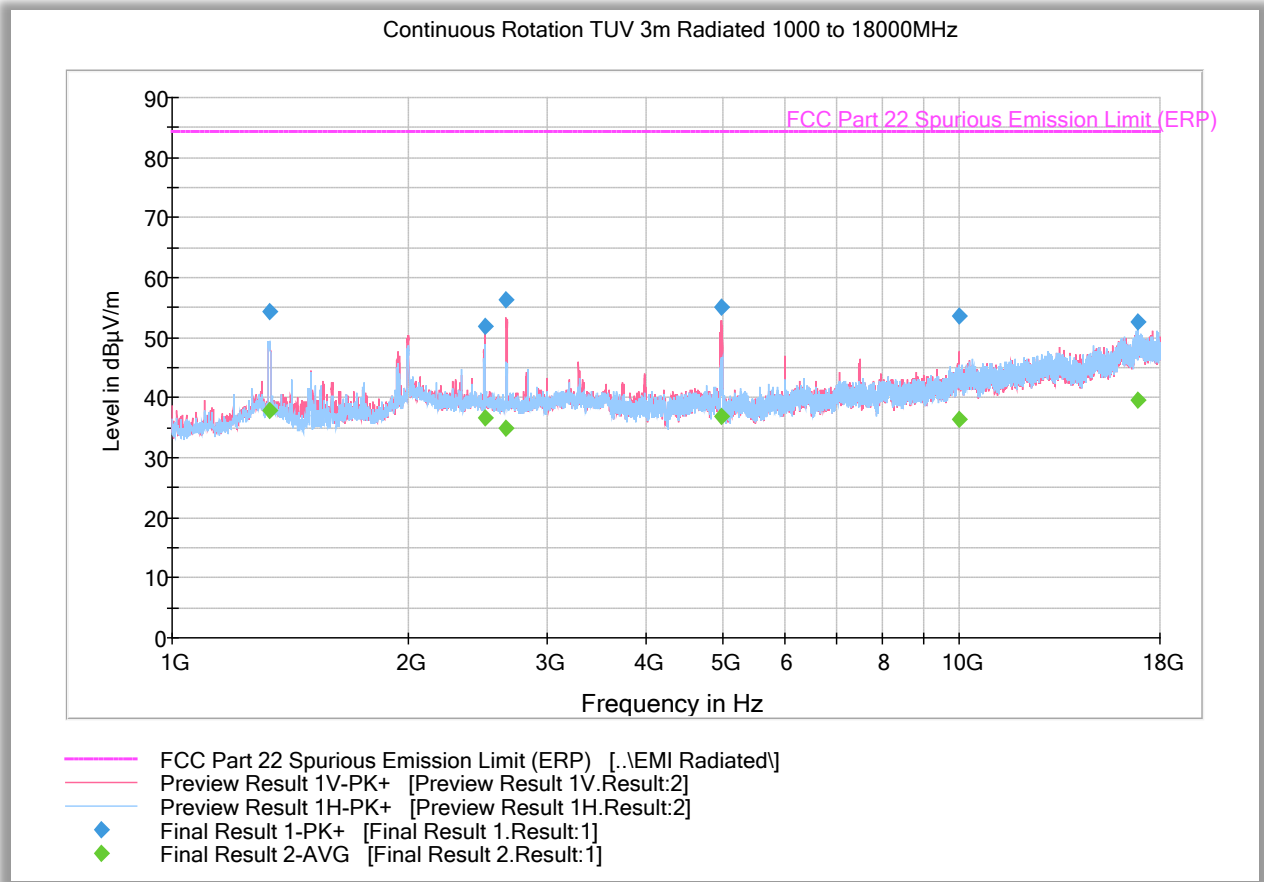


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.280000	34.5	1000.0	120.000	100.0	V	71.0	-7.0	49.8	84.4
130.458277	24.7	1000.0	120.000	100.0	V	213.0	-14.1	59.7	84.4
287.977074	35.3	1000.0	120.000	115.0	V	87.0	-6.8	49.1	84.4
400.018677	29.4	1000.0	120.000	109.0	V	327.0	-2.2	55.0	84.4
666.811303	27.2	1000.0	120.000	219.0	V	84.0	4.6	57.1	84.4
882.862846	36.4	1000.0	120.000	203.0	H	126.0	8.6	48.0	84.4



**2.8.17 Test Results Above 1GHz (LTE Band 5 Downlink Worst Case Configuration) - 15MHz Bandwidth Middle Channel**



**Peak Data**

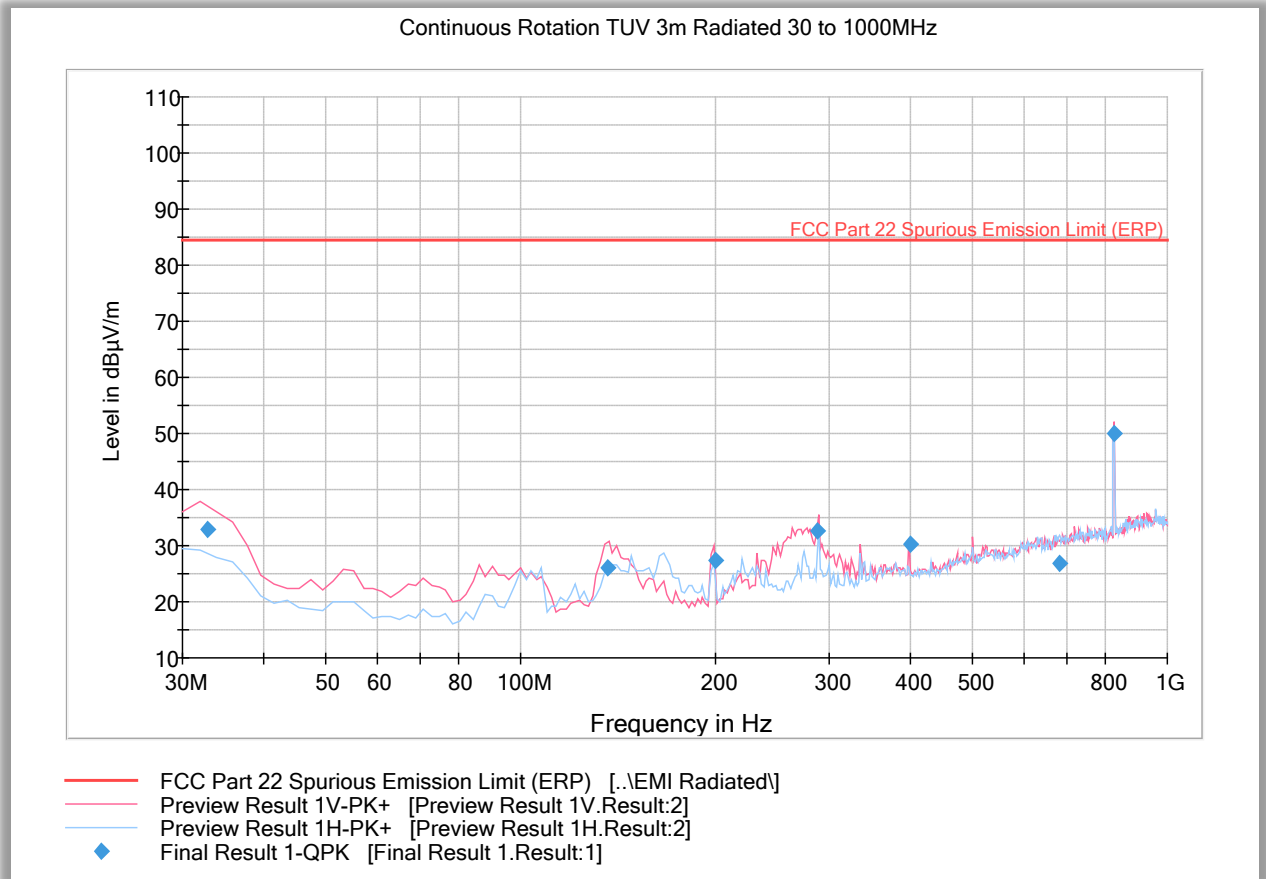
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1329.766667	54.4	1000.0	1000.000	151.6	H	126.0	-5.0	30.0	84.4
2499.800000	51.8	1000.0	1000.000	151.6	V	111.0	-0.7	32.5	84.4
2653.566667	56.3	1000.0	1000.000	136.7	V	84.0	-0.9	28.0	84.4
4983.866667	55.1	1000.0	1000.000	116.7	V	79.0	3.5	29.3	84.4
9999.433333	53.6	1000.0	1000.000	191.5	V	93.0	10.8	30.8	84.4
16882.733333	52.5	1000.0	1000.000	112.7	H	304.0	20.0	31.9	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)
1329.766667	37.9	1000.0	1000.000	151.6	H	126.0	-5.0	46.5	84.4
2499.800000	36.7	1000.0	1000.000	151.6	V	111.0	-0.7	47.7	84.4
2653.566667	35.0	1000.0	1000.000	136.7	V	84.0	-0.9	49.4	84.4
4983.866667	36.9	1000.0	1000.000	116.7	V	79.0	3.5	47.5	84.4
9999.433333	36.5	1000.0	1000.000	191.5	V	93.0	10.8	47.9	84.4
16882.733333	39.5	1000.0	1000.000	112.7	H	304.0	20.0	44.9	84.4



**2.8.18 Test Results Below 1GHz (LTE Band 5 Uplink Worst Case Configuration) - 5MHz Bandwidth Low Channel**

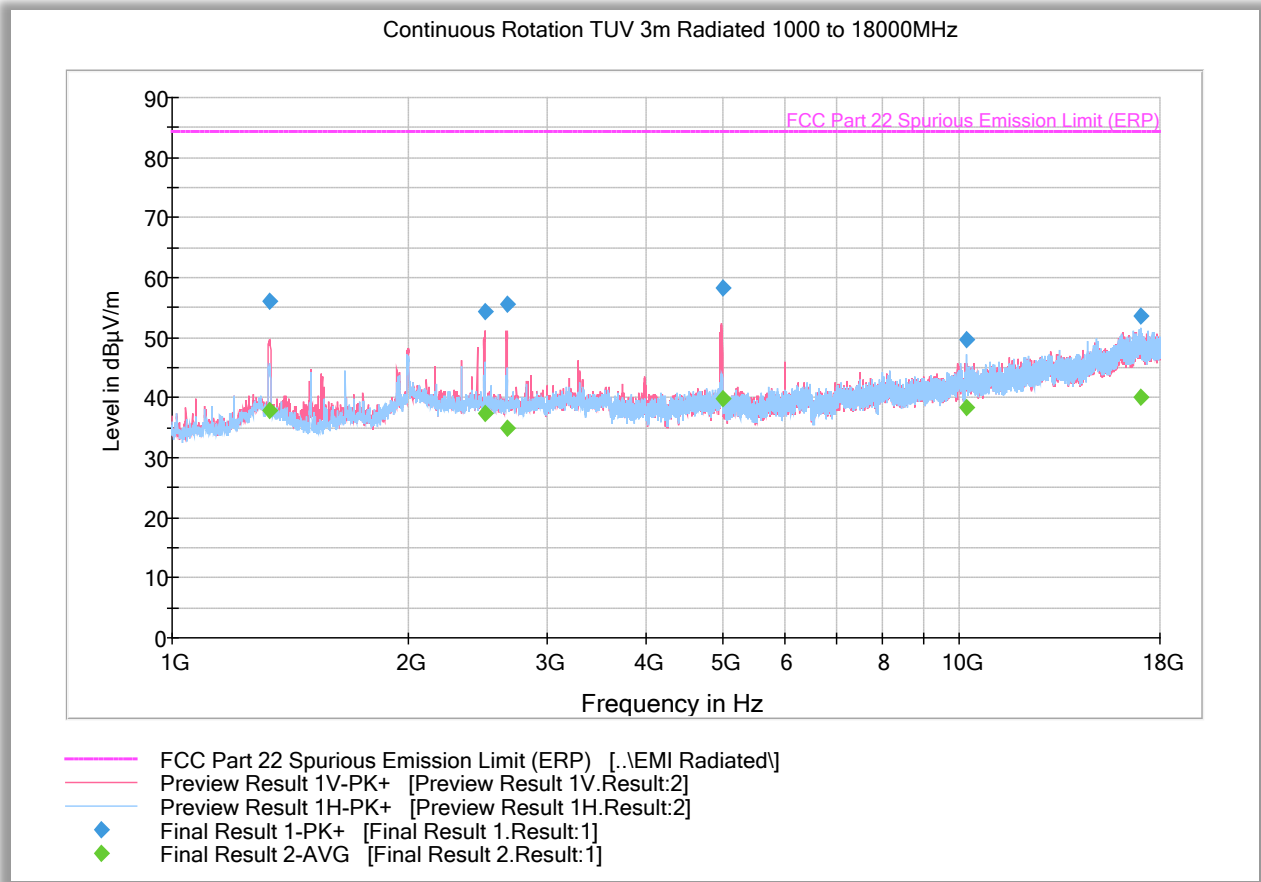


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.800000	32.9	1000.0	120.000	106.0	V	45.0	-6.6	51.5	84.4
136.433828	26.0	1000.0	120.000	106.0	V	194.0	-13.5	58.4	84.4
199.878236	27.4	1000.0	120.000	243.0	V	102.0	-10.1	57.0	84.4
287.977074	32.6	1000.0	120.000	150.0	V	43.0	-6.8	51.8	84.4
400.018677	30.4	1000.0	120.000	100.0	V	134.0	-2.2	54.0	84.4
682.242405	26.8	1000.0	120.000	144.0	H	329.0	5.2	57.6	84.4
827.113988	50.1	1000.0	120.000	196.0	V	5.0	7.3	Fundamental	



**2.8.19 Test Results Above 1GHz (LTE Band 5 Uplink Worst Case Configuration) - 5MHz Bandwidth Low Channel**



**Peak Data**

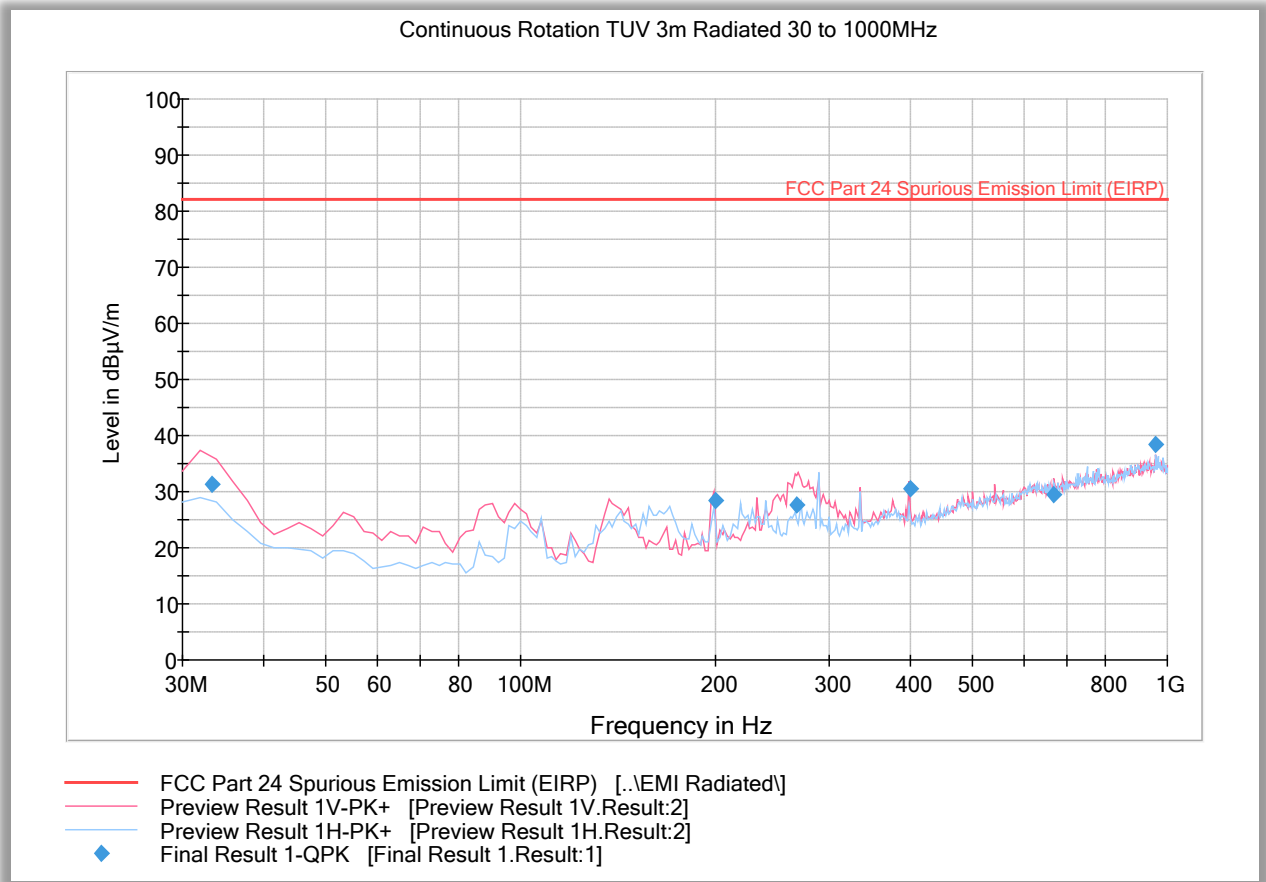
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1327.666667	56.1	1000.0	1000.000	195.5	V	79.0	-4.9	28.3	84.4
2499.266667	54.3	1000.0	1000.000	208.5	V	121.0	-0.7	30.1	84.4
2665.800000	55.5	1000.0	1000.000	116.7	V	101.0	-0.8	28.9	84.4
4999.733333	58.3	1000.0	1000.000	199.5	V	54.0	3.4	26.1	84.4
10200.233333	49.6	1000.0	1000.000	208.5	H	143.0	11.3	34.8	84.4
16989.433333	53.6	1000.0	1000.000	111.7	H	92.0	20.0	30.8	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)
1327.666667	37.9	1000.0	1000.000	195.5	V	79.0	-4.9	46.5	84.4
2499.266667	37.5	1000.0	1000.000	208.5	V	121.0	-0.7	46.9	84.4
2665.800000	35.0	1000.0	1000.000	116.7	V	101.0	-0.8	49.4	84.4
4999.733333	39.9	1000.0	1000.000	199.5	V	54.0	3.4	44.5	84.4
10200.233333	38.4	1000.0	1000.000	208.5	H	143.0	11.3	46.0	84.4
16989.433333	40.2	1000.0	1000.000	111.7	H	92.0	20.0	44.2	84.4



**2.8.20 Test Results Below 1GHz (LTE Band 2 Downlink Worst Case Configuration) - 20MHz Bandwidth Low Channel**



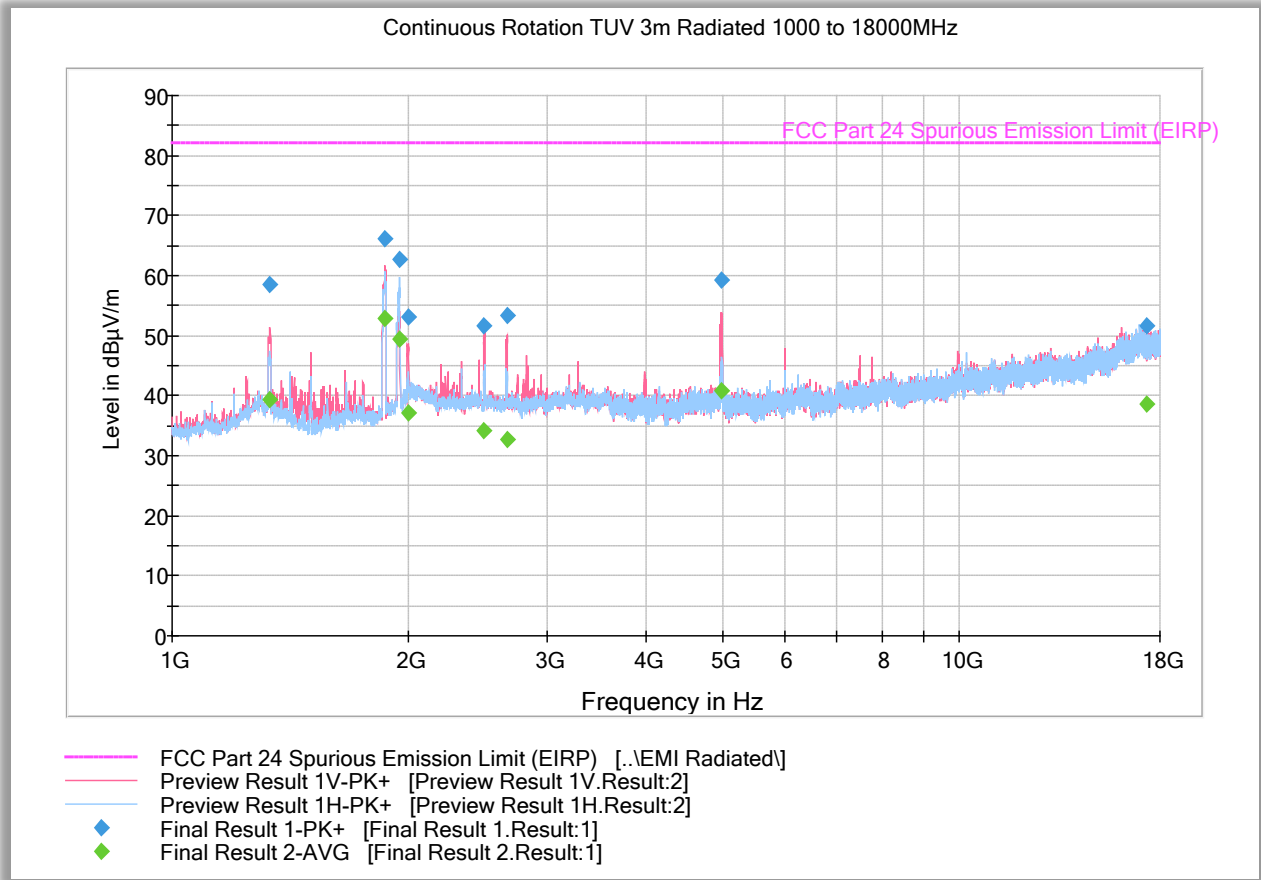
**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.280000	31.3	1000.0	120.000	116.0	V	100.0	-7.0	50.9	82.2
199.878236	28.4	1000.0	120.000	242.0	V	162.0	-10.1	53.8	82.2
267.738196	27.7	1000.0	120.000	150.0	V	102.0	-6.5	54.6	82.2
400.018677	30.6	1000.0	120.000	100.0	V	304.0	-2.2	51.6	82.2
666.755190	29.6	1000.0	120.000	150.0	V	77.0	4.6	52.7	82.2
960.082244	38.5	1000.0	120.000	109.0	H	20.0	9.7	43.7	82.2





**2.8.21 Test Results Above 1GHz (LTE Band 2 Downlink Worst Case Configuration) - 20MHz Bandwidth Low Channel**



**Peak Data**

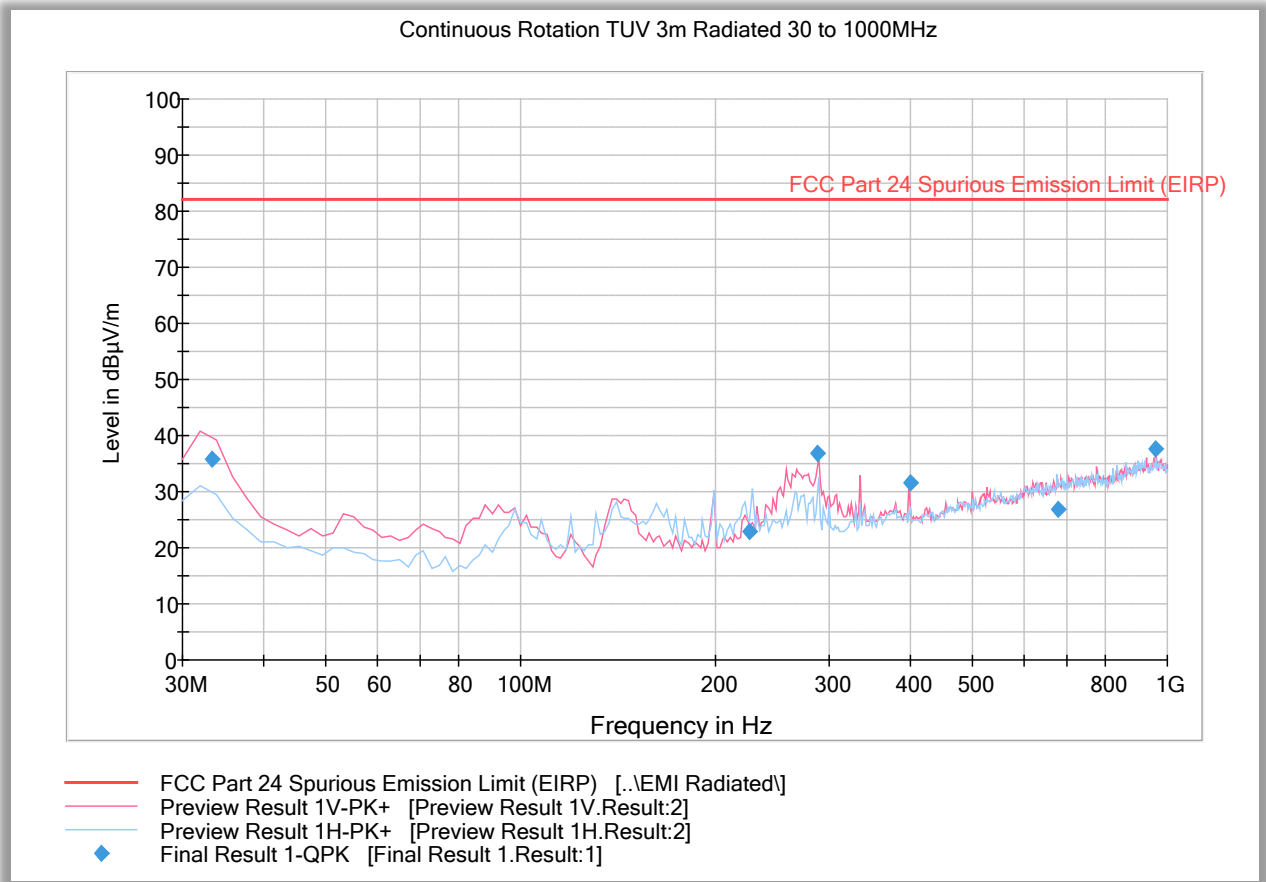
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1331.633333	58.5	1000.0	1000.000	169.6	V	79.0	-5.0	23.8	82.2
1863.400000	66.2	1000.0	1000.000	103.7	V	177.0	-2.2	16.0	82.2
1945.600000	62.8	1000.0	1000.000	204.5	H	237.0	-0.6	19.4	82.2
1993.200000	53.1	1000.0	1000.000	120.7	V	45.0	-0.2	29.2	82.2
2487.933333	51.5	1000.0	1000.000	250.5	V	119.0	-0.7	30.7	82.2
2666.766667	53.3	1000.0	1000.000	241.3	V	74.0	-0.8	28.9	82.2
4989.933333	59.3	1000.0	1000.000	182.6	V	52.0	3.5	22.9	82.2
17324.100000	51.7	1000.0	1000.000	165.6	V	142.0	19.8	30.5	82.2

**Average Data**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1331.633333	39.3	1000.0	1000.000	169.6	V	79.0	-5.0	42.9	82.2
1863.400000	52.8	1000.0	1000.000	103.7	V	177.0	-2.2	29.5	82.2
1945.600000	49.3	1000.0	1000.000	204.5	H	237.0	-0.6	32.9	82.2
1993.200000	37.1	1000.0	1000.000	120.7	V	45.0	-0.2	45.1	82.2
2487.933333	34.1	1000.0	1000.000	250.5	V	119.0	-0.7	48.1	82.2
2666.766667	32.8	1000.0	1000.000	241.3	V	74.0	-0.8	49.4	82.2
4989.933333	40.9	1000.0	1000.000	182.6	V	52.0	3.5	41.3	82.2
17324.100000	38.6	1000.0	1000.000	165.6	V	142.0	19.8	43.6	82.2



**2.8.22 Test Results Below 1GHz (LTE Band 2 Uplink Worst Case Configuration) - 20MHz Bandwidth Low Channel**

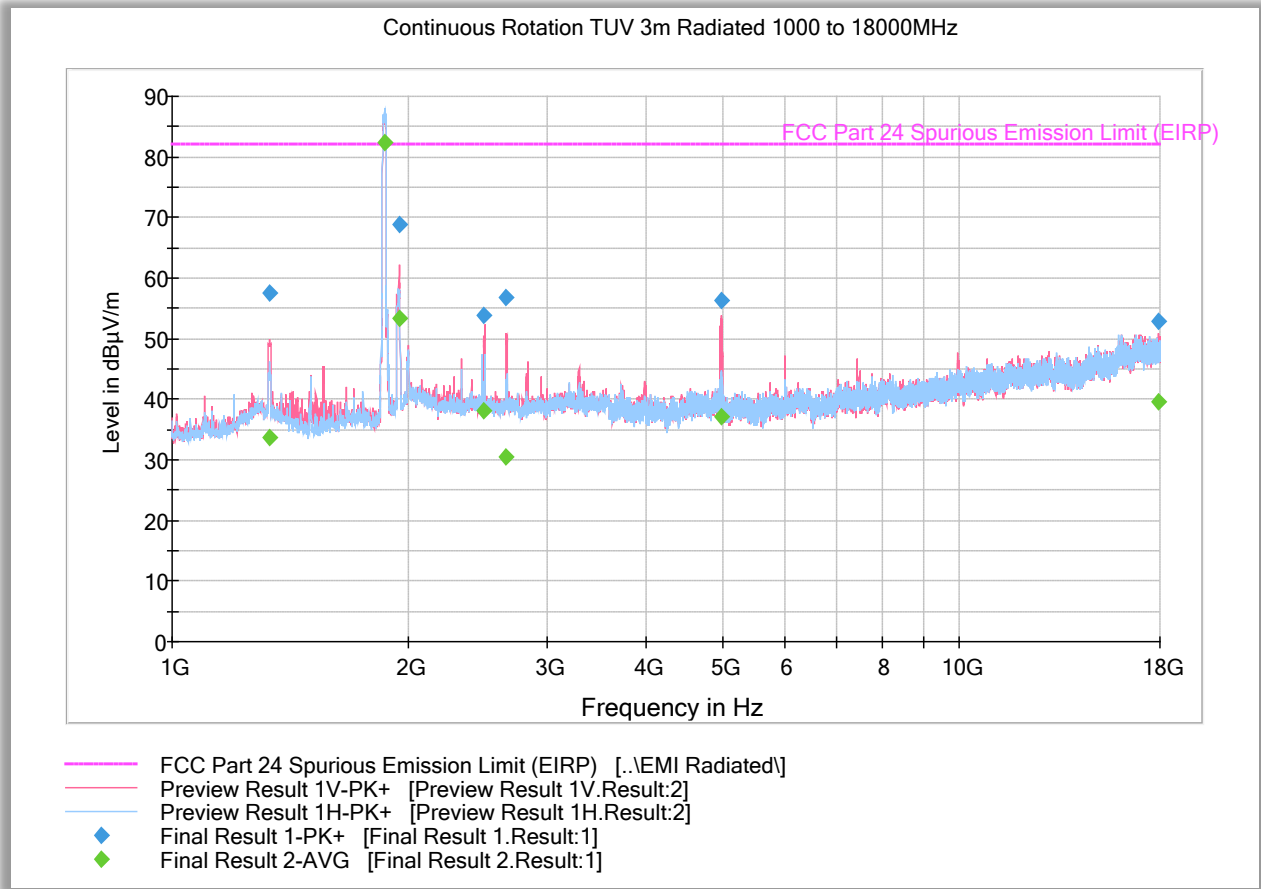


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.320000	35.9	1000.0	120.000	128.0	V	68.0	-7.0	46.4	82.2
225.876553	22.9	1000.0	120.000	115.0	H	82.0	-8.1	59.3	82.2
288.017074	36.7	1000.0	120.000	127.0	V	110.0	-6.8	45.5	82.2
400.018677	31.5	1000.0	120.000	100.0	V	321.0	-2.2	50.7	82.2
676.810741	26.7	1000.0	120.000	150.0	H	169.0	5.1	55.5	82.2
960.082244	37.5	1000.0	120.000	100.0	V	15.0	9.7	44.7	82.2



**2.8.23 Test Results Above 1GHz (LTE Band 2 Uplink Worst Case Configuration) - 20MHz Bandwidth 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)
1329.266667	57.7	1000.0	1000.000	190.5	V	79.0	-5.0	24.6	82.2
1861.566667	95.2	1000.0	1000.000	174.6	H	43.0	-2.3	Fundamental	
1941.600000	68.9	1000.0	1000.000	237.4	V	43.0	-0.6	13.3	82.2
2493.600000	54.0	1000.0	1000.000	165.6	V	119.0	-0.7	28.3	82.2
2658.433333	56.9	1000.0	1000.000	116.7	V	89.0	-0.9	25.3	82.2
4995.700000	56.3	1000.0	1000.000	204.5	V	51.0	3.4	25.9	82.2
17914.233333	53.0	1000.0	1000.000	103.7	V	314.0	20.4	29.2	82.2

**Average Data**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1329.266667	33.8	1000.0	1000.000	190.5	V	79.0	-5.0	48.5	82.2
1861.566667	82.3	1000.0	1000.000	174.6	H	43.0	-2.3	Fundamental	
1941.600000	53.3	1000.0	1000.000	237.4	V	43.0	-0.6	29.0	82.2
2493.600000	38.2	1000.0	1000.000	165.6	V	119.0	-0.7	44.1	82.2
2658.433333	30.6	1000.0	1000.000	116.7	V	89.0	-0.9	51.7	82.2
4995.700000	37.2	1000.0	1000.000	204.5	V	51.0	3.4	45.0	82.2
17914.233333	39.6	1000.0	1000.000	103.7	V	314.0	20.4	42.7	82.2



**2.9 FREQUENCY STABILITY**

**2.9.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1055  
 FCC 47 CFR Part 22, Clause 22.355  
 FCC 47 CFR Part 24, Clause 24.235  
 RSS-132, Clause 5.3  
 RSS-133, Clause 6.3

**2.9.2 Standard Applicable**

FCC Part 22.355:  
 The carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

**TABLE C-1—FREQUENCY TOLERANCE FOR TRANSMITTERS IN THE PUBLIC MOBILE SERVICES**

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50 .....	20.0	20.0	50.0
50 to 450 .....	5.0	5.0	50.0
450 to 512 .....	2.5	5.0	5.0
821 to 896 .....	1.5	2.5	2.5
928 to 929 .....	5.0	n/a	n/a
929 to 960 .....	1.5	n/a	n/a
2110 to 2220 .....	10.0	n/a	n/a

FCC Part 24.235:  
 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-132:  
 The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations.

RSS-133  
 The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

**2.9.3 Equipment Under Test and Modification State**

Serial No: 332633000356 and 332633000417 / Test Configuration A and B

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

December 20 and 21, 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

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

Ambient Temperature	21.7 – 22.1°C
Relative Humidity	23.2 - 58.1%
ATM Pressure	99.0 - 99.5kPa

### 2.9.7 Additional Observations

- This is a conducted test.
- The Fix Unit was operated at 120.0VAC nominal voltage and was placed in the temperature chamber for the series of temperature variation evaluations performed
- 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 on both Fix and Mobile Units.
- 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 analyser.
- Middle Channel was tested as the representative configuration.





**2.9.8 Test Results Summary**

WCDMA Band 5 Downlink (Fix Unit)		
<i>Voltage (VAC)</i>	<i>Temperature (°C)</i>	<i>Frequency Deviation (Hz/ppm)</i>
<b>120</b>	-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

WCDMA Band 5 Downlink (Fix Unit)		
<i>Temperature (°C)</i>	<i>Voltage (VAC)</i>	<i>Frequency Deviation (Hz/ppm)</i>
<b>20</b>	102	0 / 0
	138	0 / 0

WCDMA Band 5 Downlink (Mobile Unit)		
<i>Temperature (°C)</i>	<i>Voltage (VAC)</i>	<i>Frequency Deviation (Hz/ppm)</i>
<b>20</b>	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



WCDMA Band 5 Uplink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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

WCDMA Band 5 Uplink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

WCDMA Band 5 Uplink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



America

WCDMA Band 2 Downlink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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

WCDMA Band 2 Downlink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

WCDMA Band 2 Downlink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



WCDMA Band 2 Uplink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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

WCDMA Band 2 Uplink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

WCDMA Band 2 Uplink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



America

LTE B5 Downlink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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 B5 Downlink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

LTE B5 Downlink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0





LTE B5 Uplink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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 B5 Uplink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

LTE B5 Uplink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



America

LTE B2 Downlink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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 B2 Downlink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

LTE B2 Downlink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



LTE B2 Uplink (Fix Unit)		
Voltage (VAC)	Temperature (°C)	Frequency Deviation (Hz/ppm)
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 B2 Uplink (Fix Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	102	0 / 0
	138	0 / 0

LTE B2 Uplink (Mobile Unit)		
Temperature (°C)	Voltage (VAC)	Frequency Deviation (Hz/ppm)
20	10.2	0 / 0
	12.0	0 / 0
	13.8	0 / 0



### 2.9.9 Sample Test Plots



Date: 21 DEC 2016 15:59:56

WCDMA B2 Downlink Mid Channel 120VAC @ 20°C



**2.10 POWER LINE CONDUCTED EMISSIONS**

**2.10.1 Specification Reference**

RSS-Gen, Clause 8.8

**2.10.2 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.*

**2.10.3 Equipment Under Test and Modification State**

Serial No: 332633000356 / Test Configuration D

**2.10.4 Date of Test/Initial of test personnel who performed the test**

December 16, 2016/XYZ

**2.10.5 Test Equipment Used**

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

**2.10.6 Environmental Conditions**

Ambient Temperature      22.2°C  
 Relative Humidity          56.1%  
 ATM Pressure                98.7kPa





**2.10.7 Additional Observations**

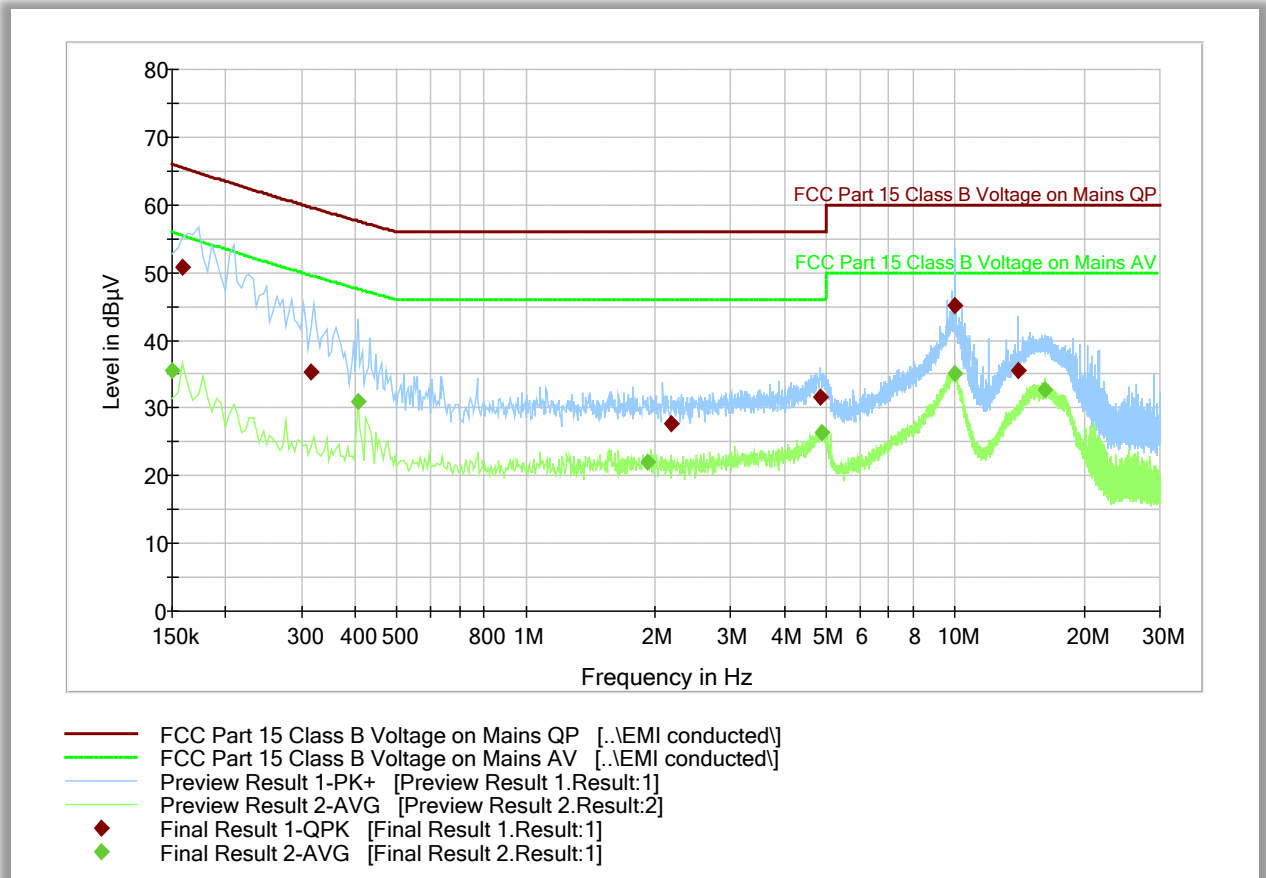
- The EUT was verified using AC adapter supplied by the manufacturer.
- EUT verified using input voltage of 120VAC 60Hz.
- There are no significant variations in test results between each operating modes. Only the one worst operation modes for WCDMA and LTE are presented.
- Measurement was done using 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 2.10.8 for sample computation.

**2.10.8 Sample Computation (Conducted Emission – Quasi Peak)**

Measuring equipment raw measurement (db $\mu$ V) @ 150kHz		5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9
	Asset# 1177 (cable)	0.15
	Asset# 1176 (cable)	0.35
	Asset# 7567 (LISN)	0.30
<b>Reported QuasiPeak Final Measurement (db<math>\mu</math>V) @ 150kHz</b>		<b>26.2</b>



**2.10.9 Test Results - Conducted Emissions Line 1 – Hot (Fix Unit ) – WCDMA B2 as the worst case**



**Quasi Peak**

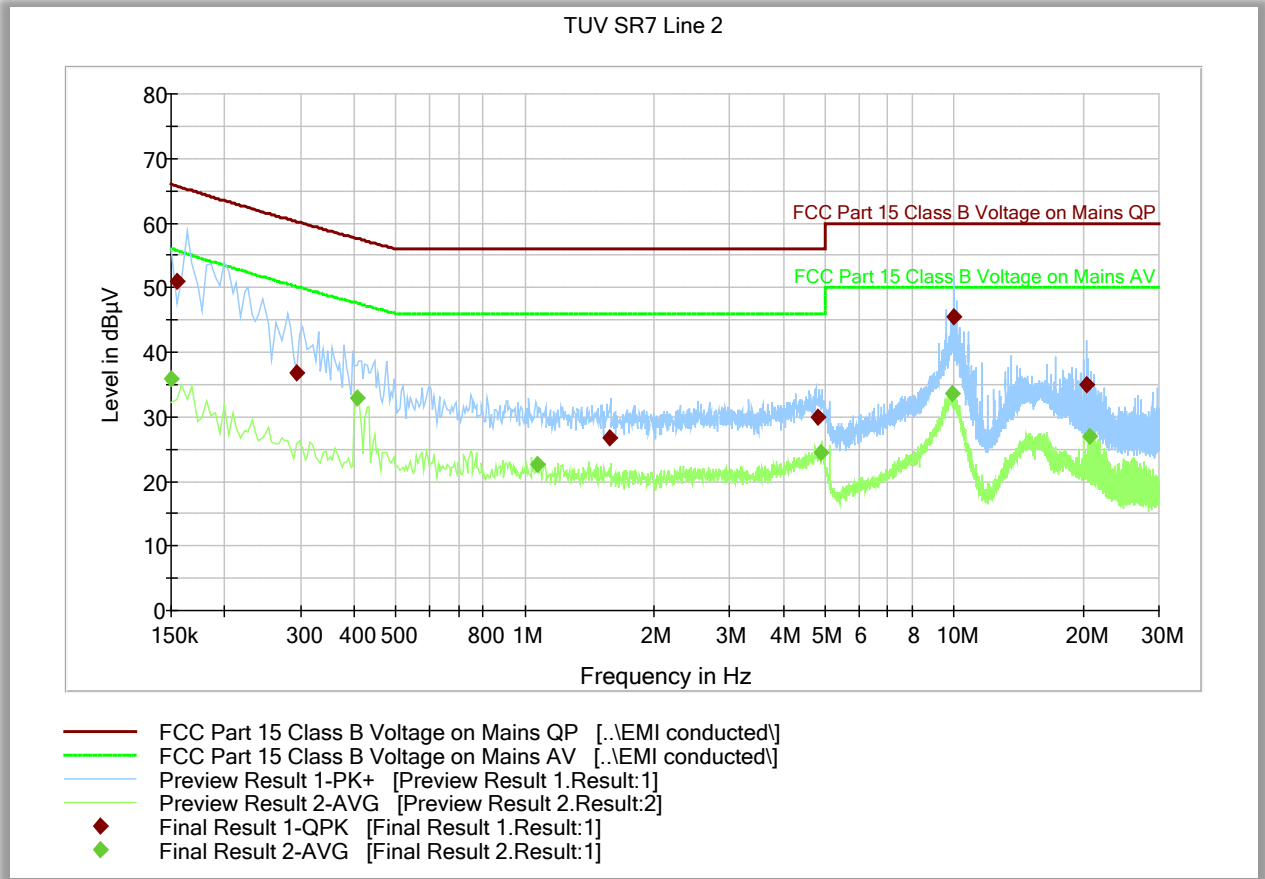
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.159000	50.8	1000.0	9.000	Off	L1	20.2	14.7	65.5
0.316500	35.3	1000.0	9.000	Off	L1	20.0	24.3	59.6
2.175000	27.6	1000.0	9.000	Off	L1	20.1	28.4	56.0
4.834500	31.7	1000.0	9.000	Off	L1	20.1	24.3	56.0
9.996000	45.0	1000.0	9.000	Off	L1	20.2	15.0	60.0
14.001000	35.6	1000.0	9.000	Off	L1	20.2	24.4	60.0

**Average**

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.150000	35.6	1000.0	9.000	Off	L1	20.2	20.4	56.0
0.406500	30.9	1000.0	9.000	Off	L1	20.0	16.7	47.6
1.927500	22.0	1000.0	9.000	Off	L1	20.0	24.0	46.0
4.893000	26.3	1000.0	9.000	Off	L1	20.1	19.7	46.0
9.996000	35.1	1000.0	9.000	Off	L1	20.2	14.9	50.0
16.143000	32.7	1000.0	9.000	Off	L1	20.3	17.3	50.0



**2.10.10 FCC Conducted Emissions Line 2 – Neutral (Fix Unit) - WCDMA B2 as the worst case**



**Quasi Peak**

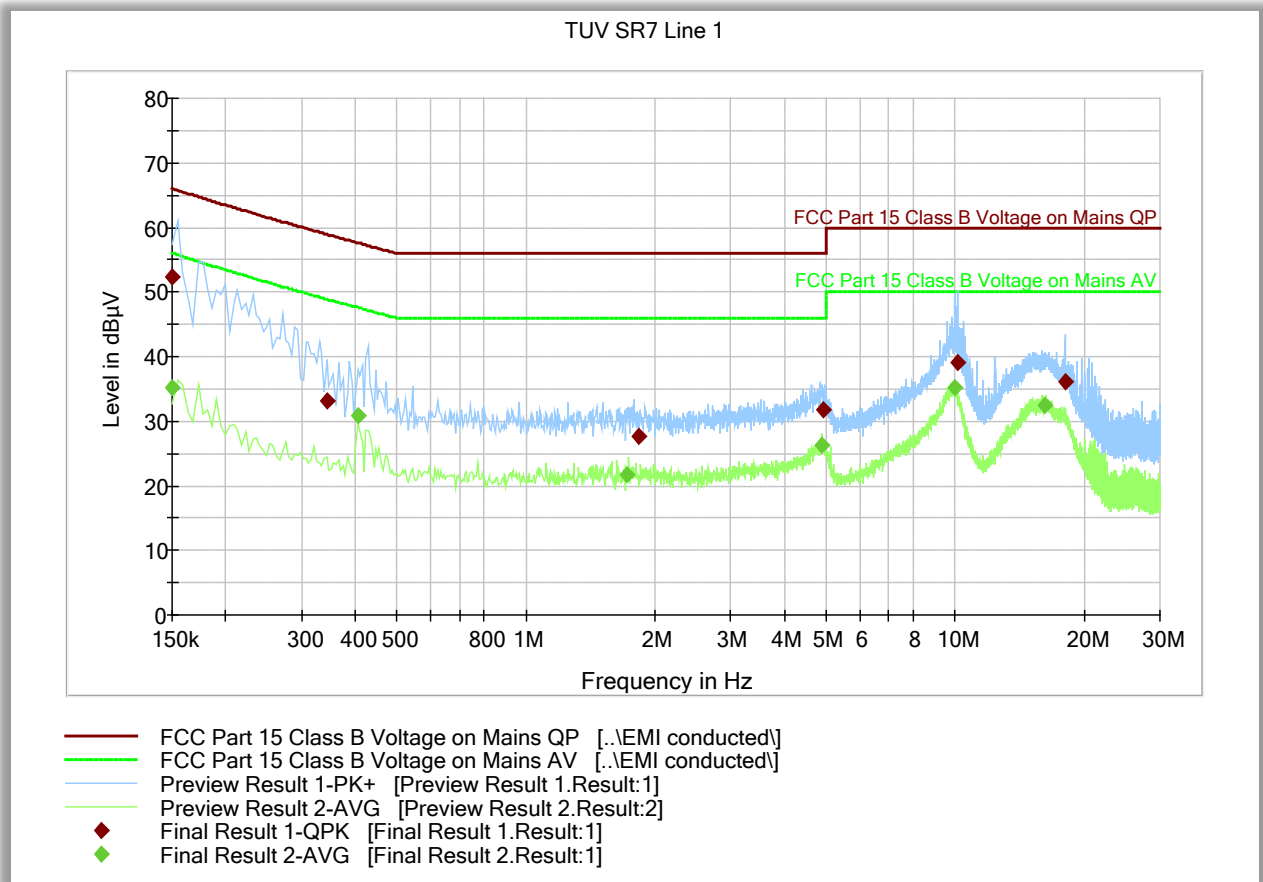
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.154500	50.9	1000.0	9.000	Off	N	20.2	14.9	65.7
0.294000	36.8	1000.0	9.000	Off	N	20.0	23.4	60.2
1.576500	26.6	1000.0	9.000	Off	N	20.0	29.4	56.0
4.807500	30.0	1000.0	9.000	Off	N	20.1	26.0	56.0
10.000500	45.5	1000.0	9.000	Off	N	20.2	14.5	60.0
20.400000	35.1	1000.0	9.000	Off	N	20.4	24.9	60.0

**Average**

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.150000	35.8	1000.0	9.000	Off	N	20.2	20.2	56.0
0.406500	32.9	1000.0	9.000	Off	N	20.0	14.7	47.6
1.068000	22.5	1000.0	9.000	Off	N	20.0	23.5	46.0
4.884000	24.4	1000.0	9.000	Off	N	20.1	21.6	46.0
9.919500	33.5	1000.0	9.000	Off	N	20.2	16.5	50.0
20.737500	27.0	1000.0	9.000	Off	N	20.4	23.0	50.0



**2.10.11 Test Results - Conducted Emissions Line 1 – Hot (Fix Unit - NU) – LTE B5 as the worst case**



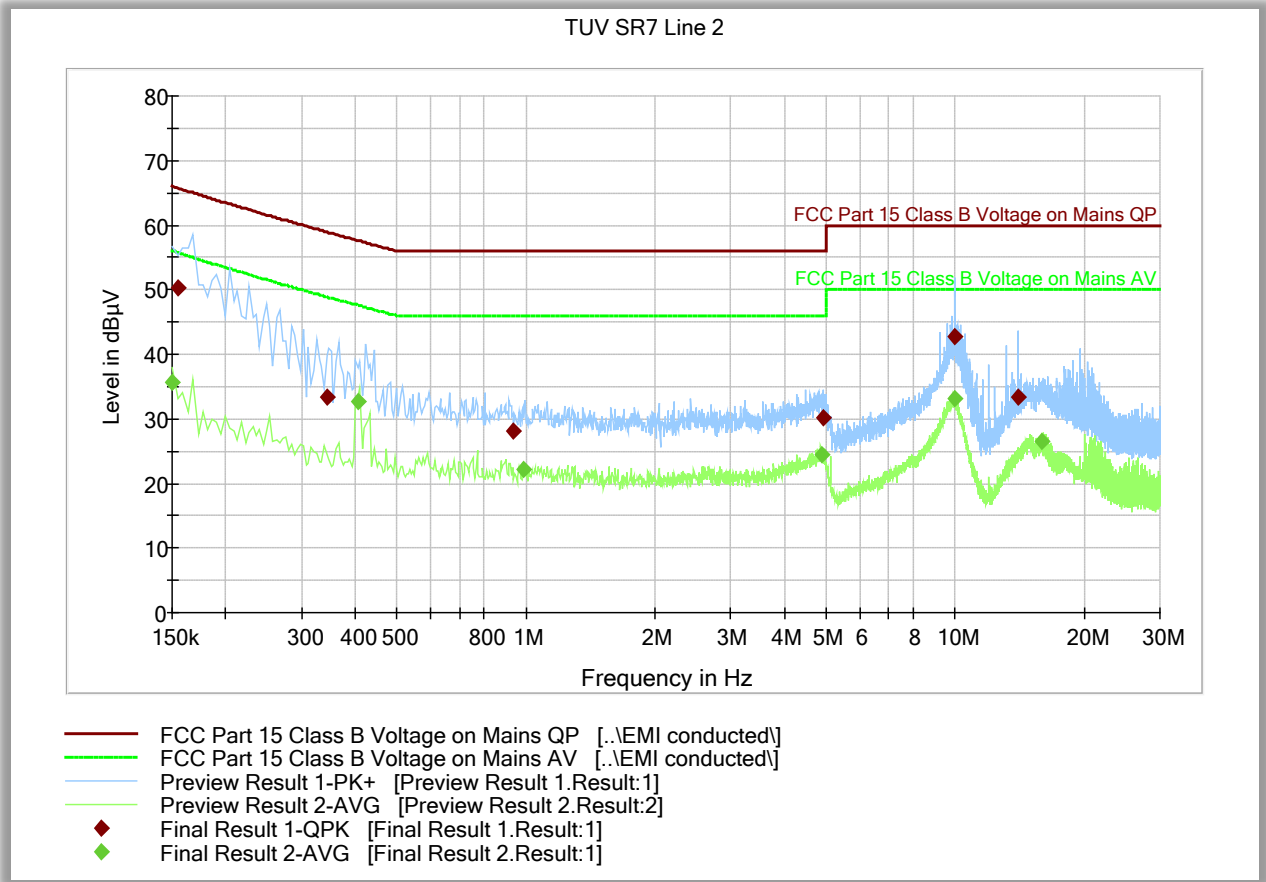
**Quasi Peak**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	52.3	1000.0	9.000	Off	L1	20.2	13.7	66.0
0.343500	33.2	1000.0	9.000	Off	L1	20.0	25.7	58.9
1.833000	27.7	1000.0	9.000	Off	L1	20.0	28.3	56.0
4.938000	31.7	1000.0	9.000	Off	L1	20.1	24.3	56.0
10.117500	39.2	1000.0	9.000	Off	L1	20.2	20.8	60.0
18.001500	36.0	1000.0	9.000	Off	L1	20.4	24.0	60.0

**Average**

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.150000	35.3	1000.0	9.000	Off	L1	20.2	20.7	56.0
0.406500	30.7	1000.0	9.000	Off	L1	20.0	16.8	47.6
1.716000	21.8	1000.0	9.000	Off	L1	20.0	24.2	46.0
4.897500	26.3	1000.0	9.000	Off	L1	20.1	19.7	46.0
10.000500	35.3	1000.0	9.000	Off	L1	20.2	14.7	50.0
16.237500	32.5	1000.0	9.000	Off	L1	20.3	17.5	50.0

**2.10.12 FCC Conducted Emissions Line 2 – Neutral (Fix Unit - NU) - LTE B5 as the worst case**



**Quasi Peak**

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.154500	50.3	1000.0	9.000	Off	N	20.2	15.5	65.7
0.343500	33.4	1000.0	9.000	Off	N	20.0	25.5	58.9
0.937500	28.1	1000.0	9.000	Off	N	20.0	27.9	56.0
4.915500	30.1	1000.0	9.000	Off	N	20.1	25.9	56.0
9.991500	42.8	1000.0	9.000	Off	N	20.2	17.2	60.0
14.001000	33.5	1000.0	9.000	Off	N	20.2	26.5	60.0

**Average**

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.150000	35.6	1000.0	9.000	Off	N	20.2	20.4	56.0
0.406500	32.8	1000.0	9.000	Off	N	20.0	14.8	47.6
0.987000	22.2	1000.0	9.000	Off	N	20.0	23.8	46.0
4.906500	24.4	1000.0	9.000	Off	N	20.1	21.6	46.0
10.009500	33.1	1000.0	9.000	Off	N	20.2	16.9	50.0
15.954000	26.5	1000.0	9.000	Off	N	20.3	23.5	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	07/27/16	07/27/17
7605	50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	04/19/16	04/19/17
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/26/16	10/26/17
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/02/16	09/02/17
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	For signalling	
8871	20dB Attenuator	18N10W-20dB	-	INMET	Verified by 7582 and 7608	
Radiated Emissions						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	10/26/16	10/26/17
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/02/16	09/02/17
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/06/15	11/06/17
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	05/12/16	05/12/17
1016	Pre-amplifier	PAM-0202	187	PAM	10/17/16	10/17/17
1040	EMI Test Receiver	ESU	100133	Rhode & Schwarz	10/07/16	10/07/17
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	Verified by 7582 and 7608	
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7582 and 7608	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7582 and 7608	
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	For signalling	
Conducted Emissions						
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	09/09/16	09/09/17
6837	LISN	FCC-LISN-50-25-2	5025	Fischer Custom Comm.	03/29/16	03/29/17
8822	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/29/16	02/28/17
8824	20dB Attenuator	34-20-34	N/A	MCE / Weinschel	02/29/16	02/28/17
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	For signalling	



Miscellaneous						
6792	Multimeter	3478A	2911A70964	Hewlett Packard	08/29/16	08/29/17
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	08/22/16	08/22/17
	AC Power Supply	EW801-2-115	972430001	ELGAR	Verified by 6792	
	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**

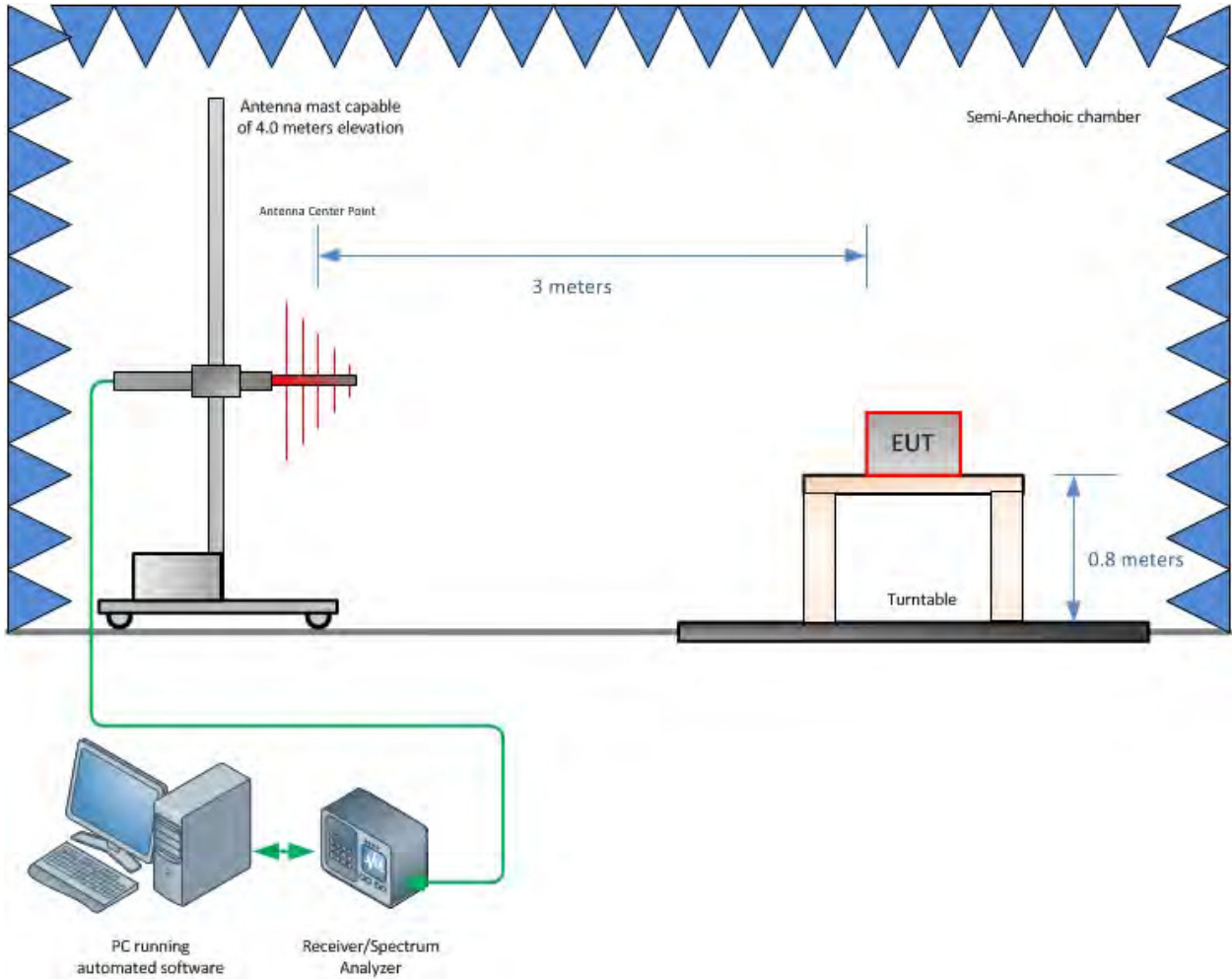
Contribution		Probability Distribution Type	Probability Distribution $x_i$	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty ( $u_c$ ):					0.72
Coverage Factor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



## SECTION 4

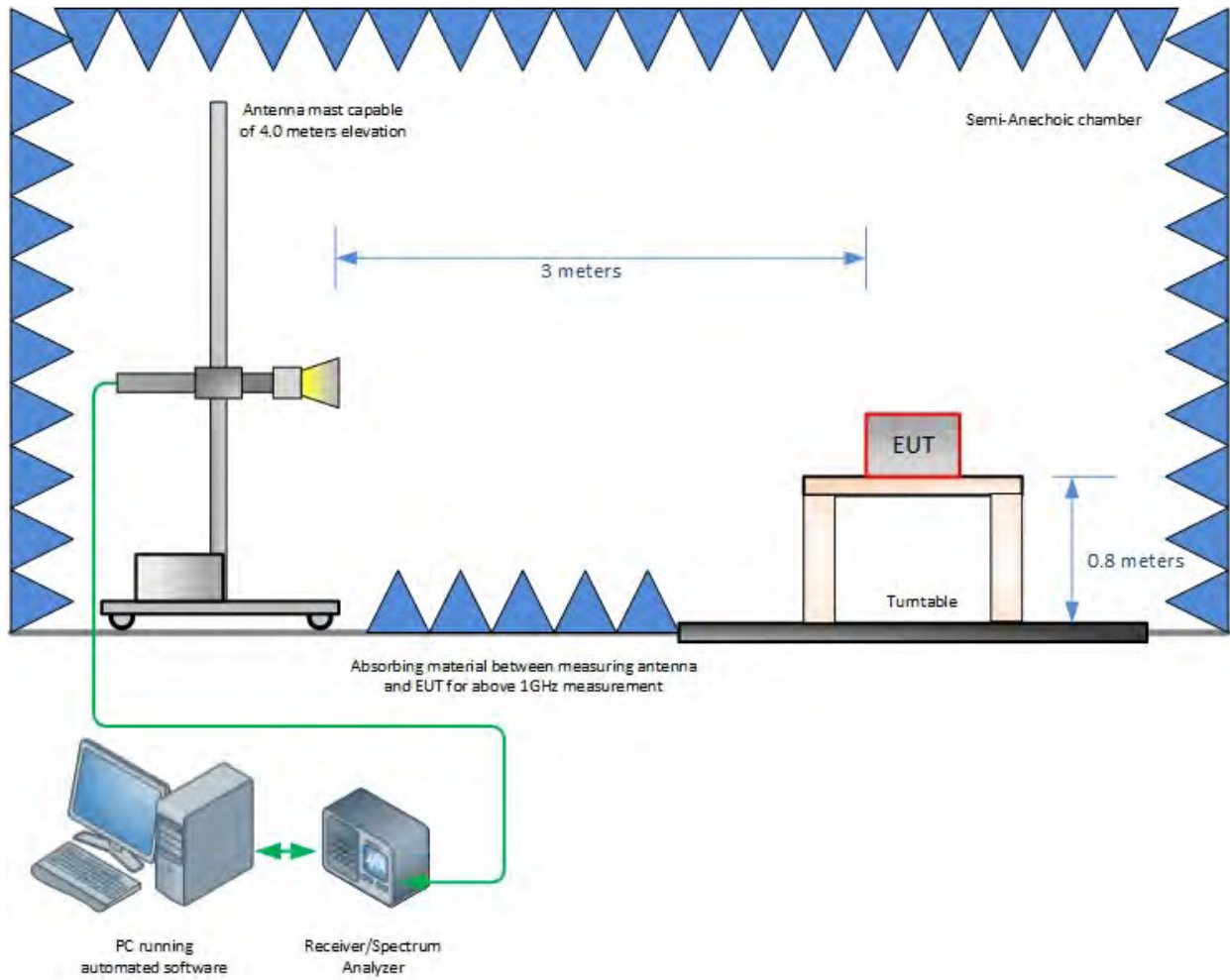
### DIAGRAM OF TEST SETUP

#### 4.1 TEST SETUP DIAGRAM

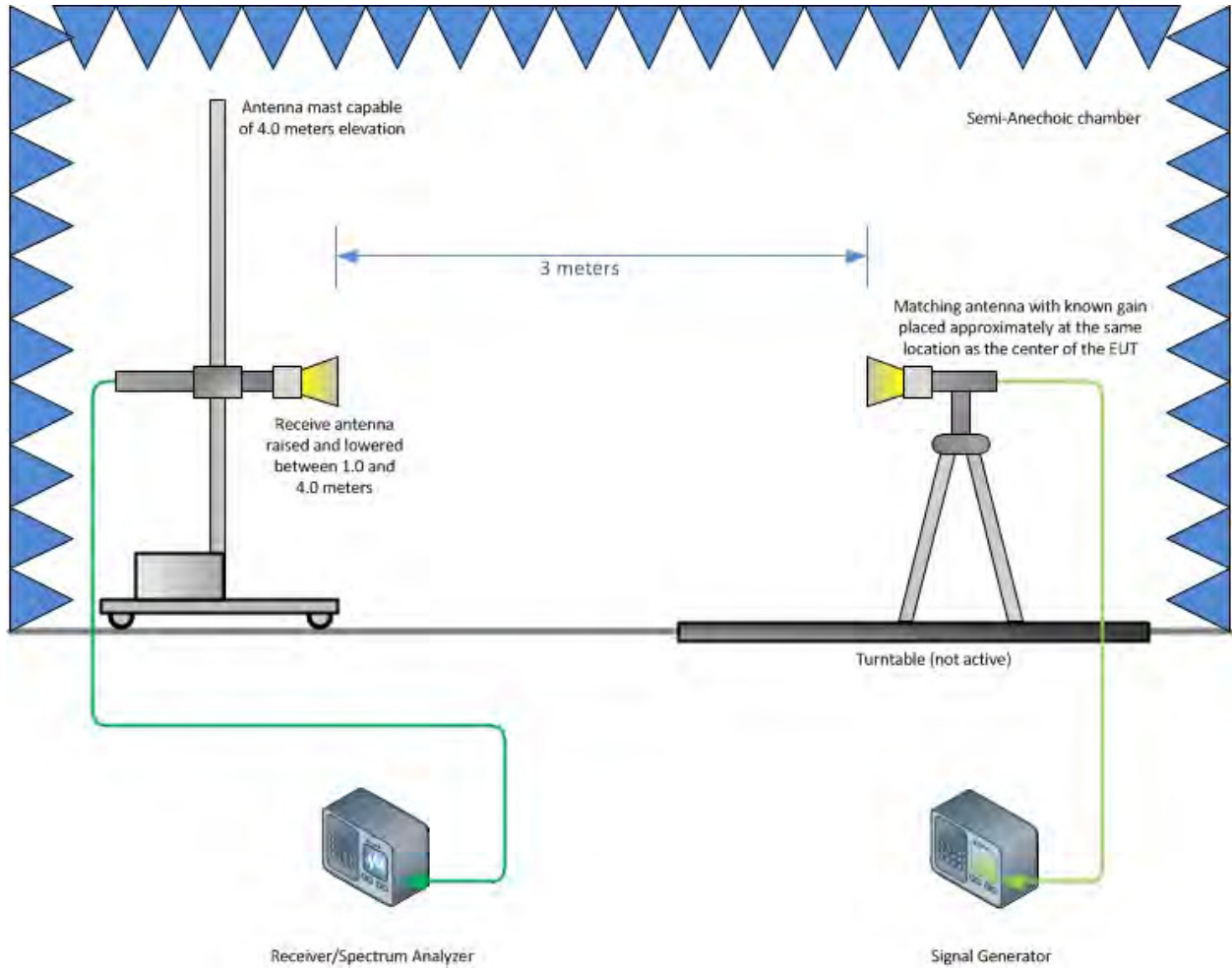


**Radiated Emission Test Setup (Below 1GHz)**

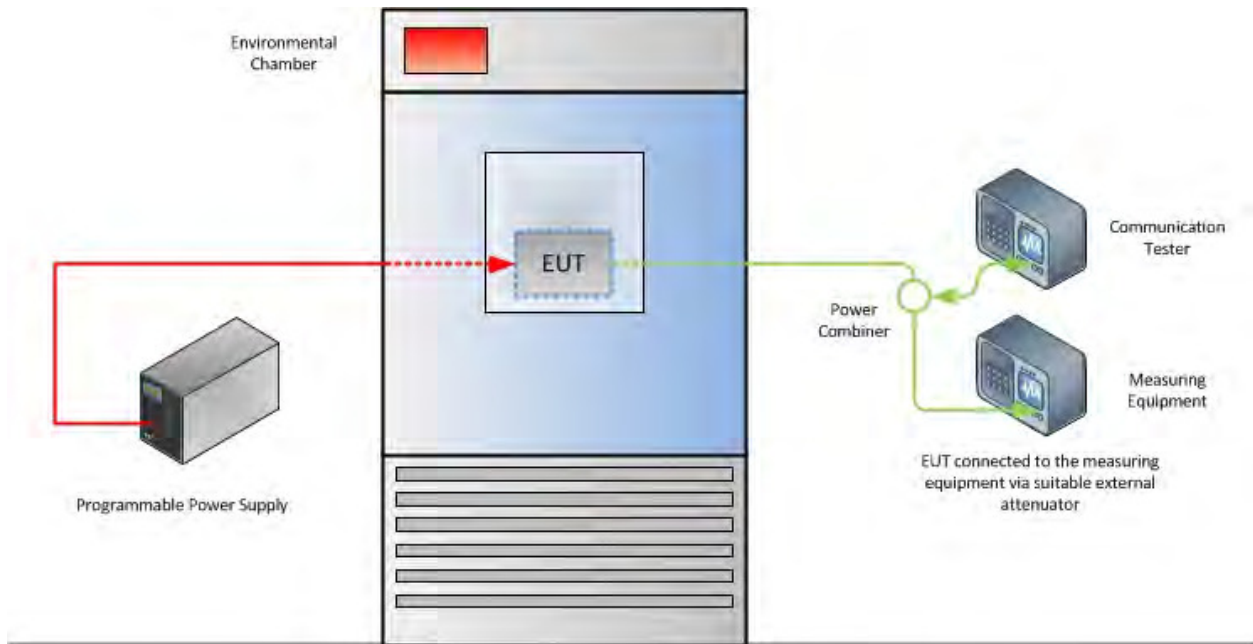




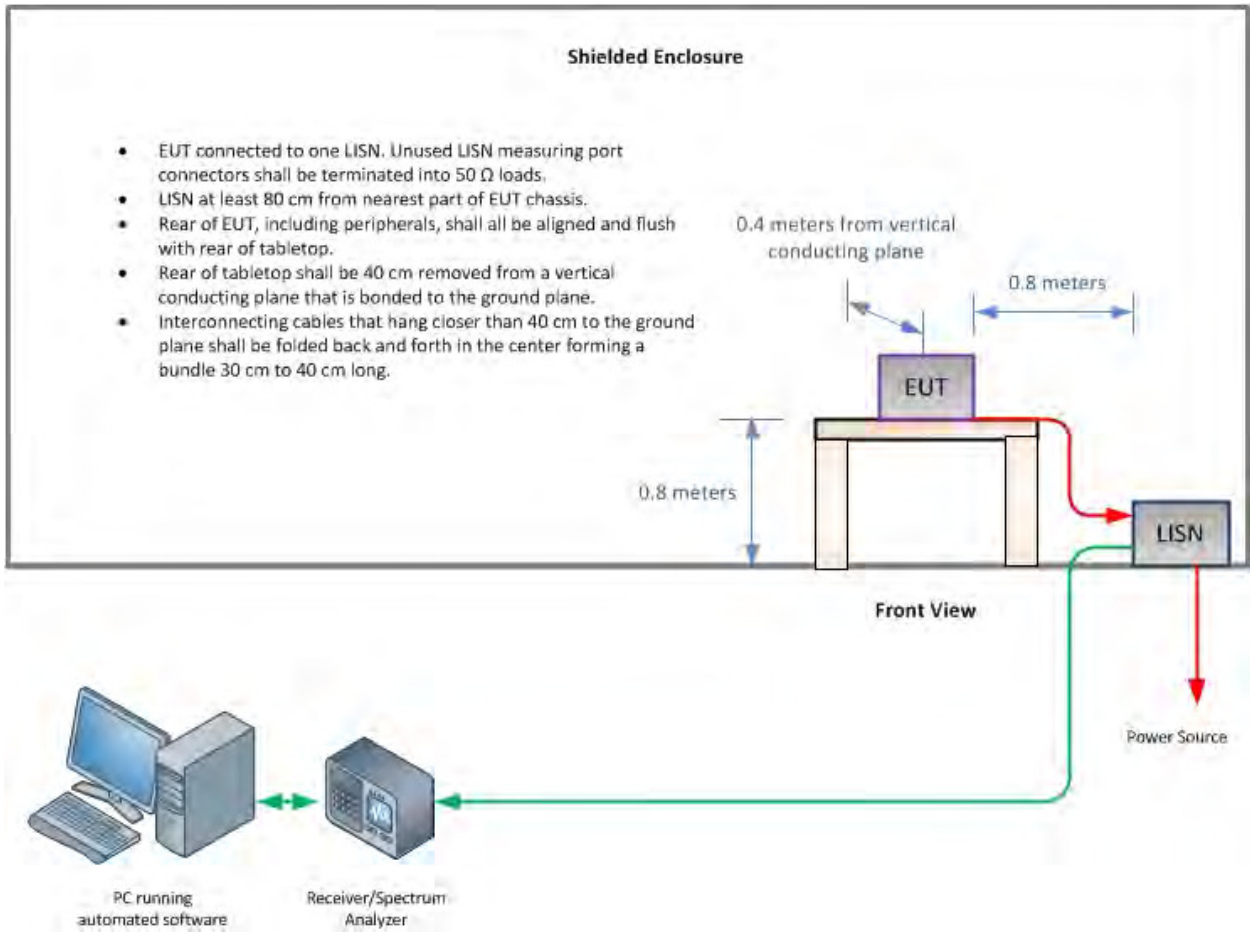
**Radiated Emission Test Setup (Above 1GHz)**



**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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