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## Report On

Application for Grant of Equipment Authorization of the  
Novatel Wireless Inc.

MiFi 5510L Personal Wireless Router

FCC CFR 47 Part 2 and Part 27

IC RSS-Gen and RSS-139

**Report No. SC1209591C**

**October 2012**

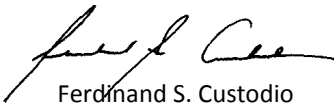


**REPORT ON** Radio Testing of the  
Novatel Wireless Inc.  
Personal Wireless Router

**TEST REPORT NUMBER** SC1209591C

**PREPARED FOR** Novatel Wireless Inc.  
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**APPROVED BY**   
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**Name**  
Authorized Signatory

**DATED** October 26, 2012



**Revision History**

SC1209591C Novatel Wireless Inc. MiFi 5510L Personal Wireless Router					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
10/26/12	Initial Release				Ferdinand Custodio



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## **SECTION 1**

### **REPORT SUMMARY**

Radio Testing of the  
Novatel Wireless Inc.  
Personal Wireless Router



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. Personal Wireless Router to the requirements of the following:

- FCC CFR 47 Part 2 and Part 27
- IC RSS-Gen and RSS-139.

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	Novatel Wireless Inc.
Model Number(s)	MiFi 5510L
FCC ID Number	PKRNVWMIFI5510
IC Number	N/A
Serial Number(s)	UB010912700038
Number of Samples Tested	1
Test Specification/Issue/Date	<ul style="list-style-type: none"><li>• FCC CFR 47 Part 2 and Part 27 (October 1, 2011).</li><li>• RSS-139 - Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz (Issue 2, February 2009).</li><li>• RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010).</li></ul>
Start of Test	October 11, 2012
Finish of Test	October 25, 2012
Name of Engineer(s)	Juan Manuel Gonzalez Ferdinand Custodio
Related Document(s)	<ul style="list-style-type: none"><li>• RF Exposure Lab Certificate Of Compliance SAR Evaluation Test Report Number: SAR.20121001</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 and Part 27 with cross-reference to the corresponding IC RSS standard is shown below.

Section	FCC Part Sections(s)	RSS Section(s)	Test Description	Result
2.1	2.1046		Transmitter Conducted Output Power	Compliant (RF Exposure Test Report)
2.2	2.1046 and 27.50 (d)(4)	RSS-139(6.4)	Equivalent Isotropic Radiated Power	Compliant
2.3	2.1046, 27.50 (b) (10) and (12)		Effective Radiated Power	Compliant
2.4	2.1049 and 27.53(h)(1)	RSS-Gen (4.6.1)	Occupied Bandwidth	Compliant
2.5	27.50(d)(5)	RSS-133(6.4)	Peak-Average Ratio	Compliant
2.6	27.53(c)(2)(5) and (h)	RSS-139(6.5)	Band Edge	Compliant
2.7	27.53(c)(2)(5),(f) and (h)	RSS-139(6.5)	Conducted Spurious Emissions	Compliant
2.8	2.1053, 27.53(c) and (h)	RSS-139(6.5)	Field Strength Of Spurious Radiation	Compliant
2.9	2.1055(a)(1) 2.1055(d)(1) and 27.54	RSS-139(6.3)	Frequency Stability	Compliant
2.10		RSS-139(6.6)	Receiver Spurious Emissions	Compliant
2.11		RSS-Gen 7.2.4	Powerline Conducted Emissions	Compliant

### 1.3 PRODUCT INFORMATION

#### 1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Novatel Wireless Inc. MiFi 5510L Personal Wireless Router. The EUT creates a personal Wi-Fi cloud, capable of sharing high-speed 4G LTE and 3G Mobile Broadband Internet connectivity with up to 10 Wi-Fi-enabled devices simultaneously. The EUT comes with an AC adapter Novatel Wireless model: SSW-2001PI-U.

#### 1.3.2 EUT General Description

EUT Description	MiFi 5510L Personal Wireless Router
Model Number(s)	MiFi 5792
FCC Classification	PCB - PCS Licensed Transmitter
Rated Voltage	3.7VDC Nominal Voltage
Mode	CDMA 1xRTT/1xEV-DO/4G-LTE
Capability	800/1900 CDMA2000 1xRTT and 1xEV-DO Release 0 Revision A, Band 4 and 13 LTE, 802.11 b/g/n WLAN
Frequency Tolerance	0.010 ppm (worst case LTE Band 4)
Primary Unit (EUT)	<input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
Antenna Type	Integral. Planar Inverted F Antenna (Flex)
Antenna Gain	LTE Band 4 (1710-1755 MHz) = 1.77 LTE Band 13 (779-785 MHz) = -0.89



### 1.3.3 Transmit Frequency Table

LTE Band 4				
Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	EIRP	
			Max. Power (W)	Max. Power (dBm)
1.4	1710-1755	1M21G7D	0.464	26.66
1.4	1710-1755	1M17W7D	0.426	26.30
3.0	1710-1755	2M75G7D	0.425	26.28
3.0	1710-1755	2M73W7D	0.571	27.57
5.0	1710-1755	4M50G7D	0.264	24.21
5.0	1710-1755	4M50W7D	0.288	24.59
10.0	1710-1755	8M97G7D	0.293	24.67
10.0	1710-1755	8M98W7D	0.232	23.65
15.0	1710-1755	13M4G7D	0.294	24.68
15.0	1710-1755	13M4W7D	0.284	24.53
20.0	1710-1755	17M9G7D	0.293	24.67
20.0	1710-1755	17M9W7D	0.210	23.22
LTE Band 13				
Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	ERP/EIRP	
			Max. Power (W)	Max. Power (dBm)
5.0	777-787	4M53G7D	0.141	21.489
5.0	777-787	4M51W7D	0.104	20.176
10.0	777-787	8M99G7D	0.132	21.22
10.0	777-787	9M01W7D	0.121	20.838

## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted Emission test setup. EUT powered by USB AC adapter/charger. EUT transmitting max. power.
B	Radiated Emission test setup. Fresh batteries installed before each test. EUT transmitting max. power unless in Receive mode. .
C	Conducted antenna port test setup. EUT powered via battery and USB connected to supplied AC adapter.

**Note:** Antenna port is for service function only and is not accessible to the end user.

### 1.4.2 EUT Exercise Software

None. The firmware installed in the EUT allows direct connection with the call box. All test configuration parameters are configured using the call box (CMW500).

### 1.4.3 Support Equipment and I/O cables

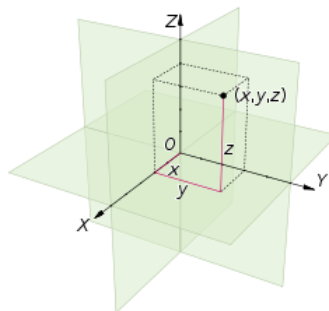
Manufacturer	Equipment/Cable	Description
Dell	Support Laptop	Novatel Wireless Test Configuration Support Laptop
LUXSHARE-ICT	USB cable	Shielded Type A to Micro USB (0.912 meter) USB Revision 2.

### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report provided by the manufacturer and based from SAR Test Report #: SAR.20121001 (RF Exposure Labs)

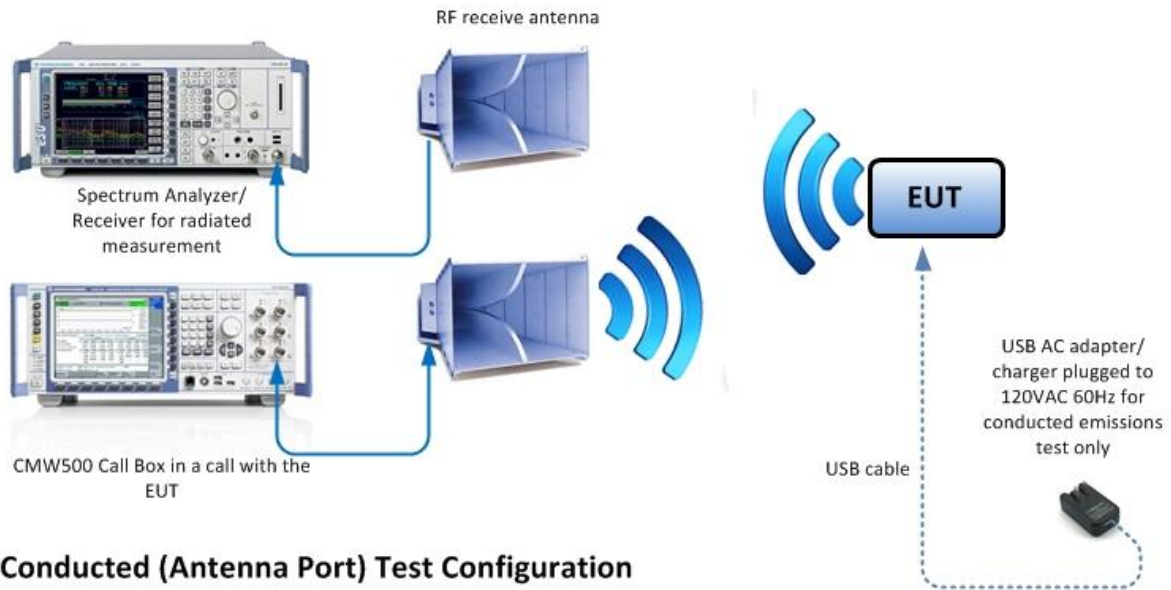
Band	Channel BW	Modulation	RB Size/Offset
LTE Band 4	1.4MHz	QPSK	3/1
LTE Band 13	5.0MHz	QPSK	1/24

EUT is a portable device. For radiated measurements X, Y and Z orientations were verified. Worst case position is "X".

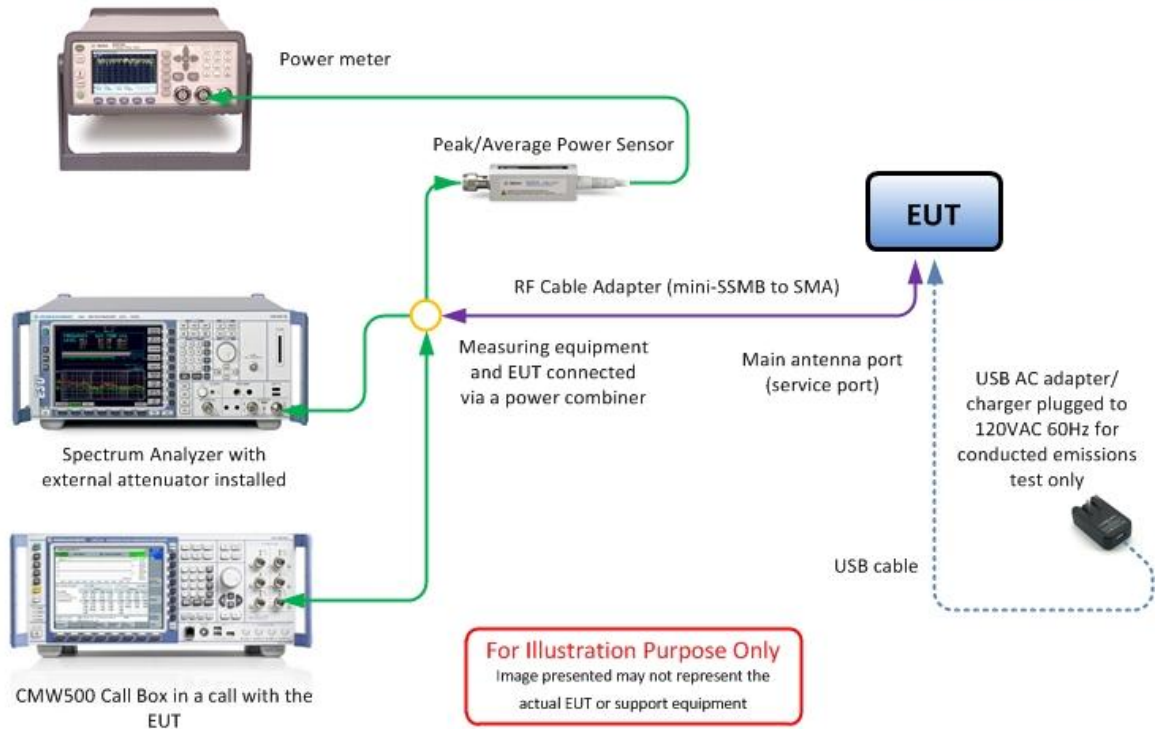


1.4.5 Simplified Test Configuration Diagram

**Radiated Test Configuration/Conducted Emissions Test Configuration**



**Conducted (Antenna Port) Test Configuration**



**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 UB010912700038		
N/A		

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

**1.7 TEST METHODOLOGY**

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements by Substitution method were conducted according to ANSI/TIA/EIA-603-C-2004, August 17,2004. Land Mobile FM or PM -Communications Equipment -Measurement and Performance Standards.

For conducted 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 C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

**1.8 TEST FACILITY**

**1.8.1 FCC – Registration No.: US5296**

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 §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

**1.8.2 Industry Canada (IC) Registration No.: 3067A**

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego), has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.

**1.9 SAMPLE CALCULATIONS**

**1.9.1 LTE Emission Designator (QPSK)**

Emission Designator = 4M51G7D  
 G = Phase Modulation  
 7= Quantized/Digital Info  
 D = Combination (Audio/Data)

**1.9.2 LTE Emission Designator (16QAM)**

Emission Designator = 4M50W7D  
 W = Frequency Modulation  
 7= Quantized/Digital Info  
 D = Combination (Audio/Data)

**1.9.3 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>

**1.9.4 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:

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

## **SECTION 2**

### **TEST DETAILS**

Radio Testing of the  
Novatel Wireless Inc.  
Personal Wireless Router

## **2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS**

### **2.1.1 Specification Reference**

Part 2.1046

### **2.1.2 Standard Applicable**

The conducted power measurements were verified as a requirement for compliance with ANSI/IEEE Std. C95.1-1992.

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

Verification performed by RF Exposure Labs

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

See SAR report #: 20121001 (RF Exposure Labs)

### **2.1.5 Test Equipment Used**

See SAR report #: 20121001 (RF Exposure Labs)

### **2.1.6 Additional Observations**

The following data was taken directly from the SAR report.

### **2.1.7 Test Results**

See attached table. These are the Conducted port measurements at provided by the RF exposure SAR laboratory and inserted into this report for completion. The data was used to help in determining worst case testing conditions for the remainder of the report.

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	1.4 MHz	6	0	19957	1710.7	23.45
					20175	1732.5	23.52
					20393	1754.3	23.58
			3	1	19957	1710.7	24.49
					20175	1732.5	24.44
					20393	1754.3	24.45
			1	0	19957	1710.7	24.44
					20175	1732.5	24.48
					20393	1754.3	24.36
			1	5	19957	1710.7	24.47
					20175	1732.5	24.46
					20393	1754.3	24.33
		3.0 MHz	15	0	19965	1711.5	23.45
					20175	1732.5	23.48
					20385	1753.5	23.54
			8	3	19965	1711.5	23.52
					20175	1732.5	23.50
					20385	1753.5	23.53
			1	0	19965	1711.5	24.48
					20175	1732.5	24.47
					20385	1753.5	24.45
			1	14	19965	1711.5	24.37
					20175	1732.5	24.36
					20385	1753.5	24.39
		5.0 MHz	25	0	19975	1712.5	23.47
					20175	1732.5	23.31
					20375	1752.5	23.54
			12	6	19975	1712.5	23.55
					20175	1732.5	23.41
					20375	1752.5	23.70
			1	0	19975	1712.5	24.48
					20175	1732.5	24.37
					20375	1752.5	24.48
			1	24	19975	1712.5	24.41
					20175	1732.5	24.44
					20375	1752.5	24.40
		10.0 MHz	50	0	20000	1715	23.45
					20175	1732.5	23.46
					20350	1750	23.37
			25	12	20000	1715	23.56
					20175	1732.5	23.34
					20350	1750	23.43
1	0		20000	1715	24.45		
			20175	1732.5	24.45		
			20350	1750	24.37		
1	49		20000	1715	24.46		
			20175	1732.5	24.48		
			20350	1750	24.38		



Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	QPSK	15.0 MHz	75	0	20025	1717.5	23.35
					20175	1732.5	23.36
					20325	1747.5	23.28
			36	19	20025	1717.5	23.37
					20175	1732.5	23.41
					20325	1747.5	23.27
			1	0	20025	1717.5	24.45
					20175	1732.5	24.45
					20325	1747.5	24.40
		1	74	20025	1717.5	24.47	
				20175	1732.5	24.41	
				20325	1747.5	24.47	
		20.0 MHz	100	0	20050	1720	23.49
					20175	1732.5	23.38
					20300	1745	23.36
			50	25	20050	1720	23.44
					20175	1732.5	23.42
					20300	1745	23.28
	1		0	20050	1720	24.48	
				20175	1732.5	24.48	
				20300	1745	24.45	
	1	99	20050	1720	24.48		
			20175	1732.5	24.38		
			20300	1745	24.39		
	16QAM	1.4 MHz	6	0	19957	1710.7	22.49
					20175	1732.5	22.44
					20393	1754.3	22.31
			3	1	19957	1710.7	23.53
					20175	1732.5	23.49
					20393	1754.3	23.53
			1	0	19957	1710.7	23.34
					20175	1732.5	23.38
					20393	1754.3	23.36
		1	5	19957	1710.7	23.51	
				20175	1732.5	23.29	
				20393	1754.3	23.38	
		3.0 MHz	15	0	19965	1711.5	22.35
					20175	1732.5	22.43
					20385	1753.5	22.26
			8	3	19965	1711.5	22.39
					20175	1732.5	22.39
					20385	1753.5	22.22
1	0		19965	1711.5	23.41		
			20175	1732.5	23.41		
			20385	1753.5	23.34		
1	14	19965	1711.5	23.32			
		20175	1732.5	23.21			
		20385	1753.5	23.31			

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power
4	16QAM	5.0 MHz	25	0	19975	1712.5	22.22
					20175	1732.5	22.35
					20375	1752.5	22.23
			12	6	19975	1712.5	22.45
					20175	1732.5	22.43
					20375	1752.5	22.41
			1	0	19975	1712.5	23.39
					20175	1732.5	23.05
					20375	1752.5	23.46
			1	24	19975	1712.5	23.29
					20175	1732.5	23.43
					20375	1752.5	23.45
		10.0 MHz	50	0	20000	1715	22.32
					20175	1732.5	22.27
					20350	1750	22.21
			25	12	20000	1715	22.57
					20175	1732.5	22.33
					20350	1750	22.31
			1	0	20000	1715	23.50
					20175	1732.5	23.65
					20350	1750	23.36
			1	49	20000	1715	23.42
					20175	1732.5	23.44
					20350	1750	23.28
		15.0 MHz	75	0	20025	1717.5	22.28
					20175	1732.5	22.32
					20325	1747.5	22.15
			36	19	20025	1717.5	22.42
					20175	1732.5	22.32
					20325	1747.5	22.19
			1	0	20025	1717.5	23.49
					20175	1732.5	23.61
					20325	1747.5	23.30
			1	74	20025	1717.5	23.41
					20175	1732.5	23.39
					20325	1747.5	23.32
		20.0 MHz	100	0	20050	1720	22.35
					20175	1732.5	22.24
					20300	1745	22.21
			50	25	20050	1720	22.40
					20175	1732.5	22.30
					20300	1745	22.15
1	0		20050	1720	23.49		
			20175	1732.5	23.52		
			20300	1745	23.49		
1	99		20050	1720	23.26		
			20175	1732.5	23.21		
			20300	1745	23.41		

Band	Modulation	Bandwidth	RB Size	RB Offset	Channel	Frequency	Power	
13	QPSK	5.0 MHz	25	0	23205	779.5	23.35	
					23255	784.5	23.35	
			12	6	23205	779.5	23.46	
					23255	784.5	23.47	
			1	0	23205	779.5	24.45	
					23255	784.5	24.40	
		1	24	23205	779.5	24.49		
				23255	784.5	24.44		
		10.0 MHz	50	0	23230	782.0	23.26	
					25	13	23230	782.0
	1						0	23230
	1				49	23230	782.0	24.48
	16QAM	5.0 MHz	25	0	23205	779.5	22.33	
					23255	784.5	22.32	
			12	6	23205	779.5	22.58	
					23255	784.5	22.66	
			1	0	23205	779.5	23.48	
					23255	784.5	23.55	
		1	24	23205	779.5	23.64		
				23255	784.5	23.57		
10.0 MHz		50	0	23230	782.0	22.20		
				25	13	23230	782.0	22.48
	1					0	23230	782.0
	1			49	23230	782.0	23.30	

## **2.2 EQUIVALENT ISOTROPIC RADIATED POWER**

### **2.2.1 Specification Reference**

Part 27 Subpart C §27.50 (d)(4), Part 2.1046, RSS-139 Issue 2 (6.4)

### **2.2.2 Standard Applicable**

(4) Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP. Fixed stations operating in this band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in this band must employ a means for limiting power to the minimum necessary for successful communications

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

Serial No: UB010912700038 / Test Configuration B

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

October 24, 2012/JMG

### **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 Environmental Conditions**

Ambient Temperature	25.0°C
Relative Humidity	48.0%
ATM Pressure	98.9 kPa

### **2.2.7 Additional Observations**

- This is a radiated test as per Radiated Power Output method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- The Substitute level reported is the signal generator level with all correction factors (+ transmit antenna gain – transmit cable loss).
- The EUT was verified under all configurations (RB size and offset) and the worst case radiated power reported for each modulation/channel bandwidth.

### **2.2.8 Test Results**

See attached table.

LTE Band 4								
Freq. (MHz)	Channel BW (MHz)	Mod.	RB Size/Offset	Substitute Level (dBm)	Pol (H/V)	EIRP (dBm)	EIRP (Watt)	Limit (Watt)
1710.7	1.4	QPSK	3/1	24.79	H	24.79	0.301	1
1732.5	1.4	QPSK	3/1	26.66	H	26.66	0.464	1
1754.3	1.4	QPSK	3/1	25.11	H	25.11	0.324	1
1710.7	1.4	16-QAM	3/1	24.55	H	24.55	0.285	1
1732.5	1.4	16-QAM	3/1	26.30	H	26.30	0.426	1
1754.3	1.4	16-QAM	3/1	24.91	H	24.91	0.310	1
1711.5	3	QPSK	1/0	25.36	H	25.36	0.344	1
1732.5	3	QPSK	1/0	26.28	H	26.28	0.425	1
1753.5	3	QPSK	1/0	24.11	H	24.11	0.258	1
1711.5	3	16-QAM	1/0	26.63	H	26.63	0.460	1
1732.5	3	16-QAM	1/0	27.57	H	27.57	0.571	1
1753.5	3	16-QAM	1/0	25.52	H	25.52	0.356	1
1712.5	5	QPSK	1/0	24.21	H	24.21	0.264	1
1732.5	5	QPSK	1/0	22.26	H	22.26	0.168	1
1752.5	5	QPSK	1/0	22.89	H	22.89	0.195	1
1712.5	5	16-QAM	1/0	24.59	H	24.59	0.288	1
1732.5	5	16-QAM	1/0	22.47	H	22.47	0.177	1
1752.5	5	16-QAM	1/0	23.30	H	23.30	0.214	1
1715	10	QPSK	1/0	23.94	H	23.94	0.248	1
1732.5	10	QPSK	1/0	22.53	H	22.53	0.179	1
1750	10	QPSK	1/0	24.67	H	24.67	0.293	1
1715	10	16-QAM	1/0	22.44	H	22.44	0.175	1
1732.5	10	16-QAM	1/0	22.19	H	22.19	0.166	1
1750	10	16-QAM	1/0	23.65	H	23.65	0.232	1
1717.5	15	QPSK	1/0	19.8	H	19.8	0.095	1
1732.5	15	QPSK	1/0	23.68	H	23.68	0.233	1
1747.5	15	QPSK	1/0	24.68	H	24.68	0.294	1
1717.5	15	16-QAM	1/0	19.27	H	19.27	0.085	1
1732.5	15	16-QAM	1/0	23.52	H	23.52	0.225	1
1747.5	15	16-QAM	1/0	24.53	H	24.53	0.284	1
1720	20	QPSK	1/0	23.28	H	23.28	0.213	1
1732.5	20	QPSK	1/0	24.23	H	24.23	0.265	1
1745	20	QPSK	1/0	24.67	H	24.67	0.293	1
1720	20	16-QAM	1/0	21.83	H	21.83	0.152	1
1732.5	20	16-QAM	1/0	22.95	H	22.95	0.197	1
1745	20	16-QAM	1/0	23.22	H	23.22	0.210	1

## **2.3 EFFECTIVE RADIATED POWER OUTPUT DATA**

### **2.3.1 Specification Reference**

Part 27 Subpart C §27.50 (b) (10)(12) and Part 2.1046

### **2.3.2 Standard Applicable**

(b) The following power and antenna height limits apply to transmitters operating in the 746–763 MHz, 775–793 MHz and 805–806 MHz bands:

(10) Portable stations (hand-held devices) transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands are limited to 3 watts ERP.

(12) For transmissions in the 746–757, 758–763, 776–787, and 788–793 MHz bands, licensees may employ equipment operating in compliance with either the measurement techniques described in paragraph (b)(11) of this section or a Commission-approved average power technique. In both instances, equipment employed must be authorized in accordance with the provisions of §27.51.

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

Serial No: UB010912700038 / Test Configuration B

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

October 24, 2012/JMG

### **2.3.5 Test Equipment Used**

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

### **2.3.6 Environmental Conditions**

Ambient Temperature	25.0°C
Relative Humidity	48.0%
ATM Pressure	98.9 kPa

### **2.3.7 Additional Observations**

- This is a radiated test as per Radiated Power Output method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- The Substitute level reported is the signal generator level with all correction factors (+ transmit antenna gain – transmit cable loss). This level is then converted to ERP using a factor of 2.15.
- The EUT was verified under all configurations (RB size and offset) and the worst case radiated power reported for each modulation/channel bandwidth.

### **2.3.8 Test Results**

See attached table.

LTE Band 13								
Freq. (MHz)	Channel BW (MHz)	Mod.	RB Size/Offset	Substitute Level (dBm)	Pol (H/V)	ERP (dBm)	ERP (Watts)	Limit (Watts)
779.5	5	QPSK	1/24	23.64	H	21.489	0.141	3
784.5	5	QPSK	1/24	22.44	H	20.287	0.107	3
779.5	5	16-QAM	1/24	22.33	H	20.176	0.104	3
784.5	5	16-QAM	1/24	21.45	H	19.298	0.085	3
782.0	10	QPSK	1/49	23.37	H	21.22	0.132	3
782.0	10	16-QAM	1/49	22.99	H	20.838	0.121	3

## **2.4 OCCUPIED BANDWIDTH**

### **2.4.1 Specification Reference**

Part 27 Subpart C §27.53(h)(1), 2.1049, RSS-GEN Issue 3 (4.6.1)

### **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: UB010912700038 / Default Test Configuration C

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

October 17, 2012/JMG

### **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**

Ambient Temperature	24.0°C
Relative Humidity	49.7%
ATM Pressure	100.1 kPa

### **2.4.7 Additional Observations**

- This is a conducted test. Test procedure is per Section 3.0 of KDB971168 (D01 Power Meas License Digital Systems v01).
- Although the rule part specify an emission bandwidth, defined as the bandwidth between points on the emission skirts that are 26 dB down from the fundamental power level, the occupied bandwidth is a more accurate and straightforward measurement and is acceptable to the FCC in lieu of the signal's emission bandwidth (from KDB971168).
- All channels per each channel bandwidth/band were verified. Only the worst channel - presented.

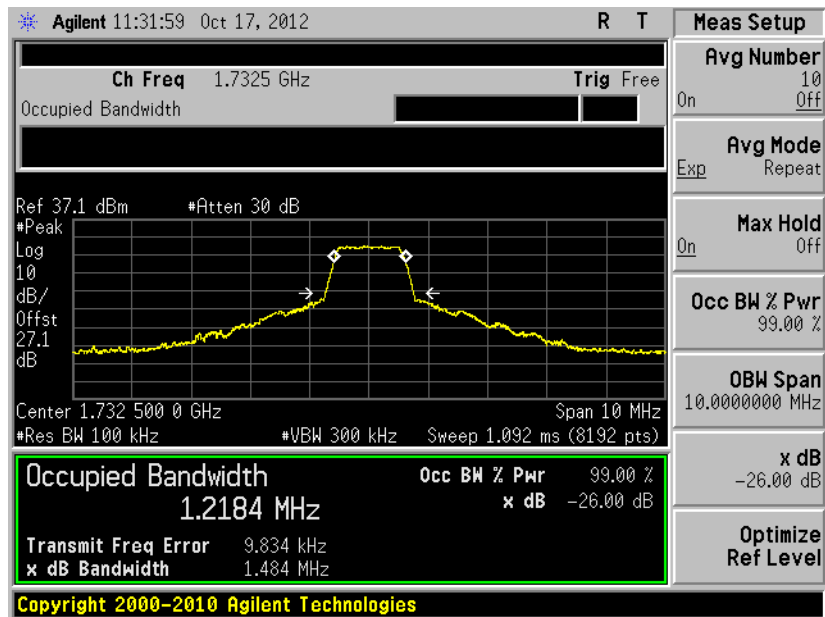
### **2.4.8 Test Results**

See attached table and plots.

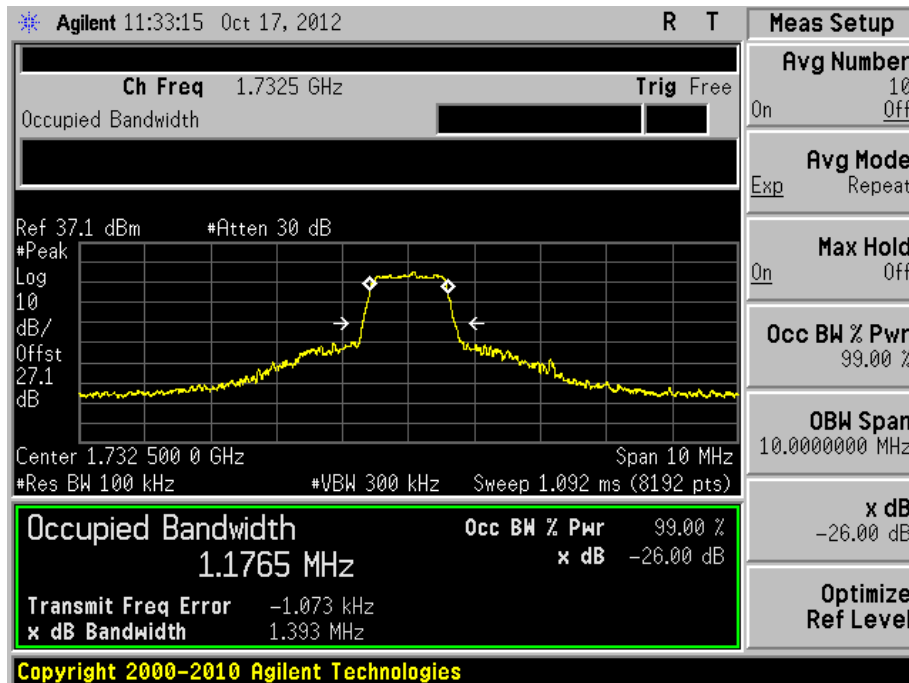


LTE Band	Channel	Frequency (MHz)	BW (MHz)	Modulation	OBW (MHz)
4	20175	1732.5	1.4	QPSK	1.2184
4	20175	1732.5	1.4	16QAM	1.1765
4	20175	1732.5	3.0	QPSK	2.7574
4	20175	1732.5	3.0	16QAM	2.7317
4	20175	1732.5	5.0	QPSK	4.5096
4	20175	1732.5	5.0	16QAM	4.5098
4	20175	1732.5	10.0	QPSK	8.9750
4	20175	1732.5	10.0	16QAM	8.9873
4	20175	1732.5	15.0	QPSK	13.4365
4	20175	1732.5	15.0	16QAM	13.4241
4	20175	1732.5	20.0	QPSK	17.9663
4	20175	1732.5	20.0	16QAM	17.9696
13	23255	784.5	5.0	QPSK	4.5311
13	23255	784.5	5.0	16QAM	4.5168
13	23230	782.0	10.0	QPSK	8.9980
13	23230	782.0	10.0	16QAM	9.0130

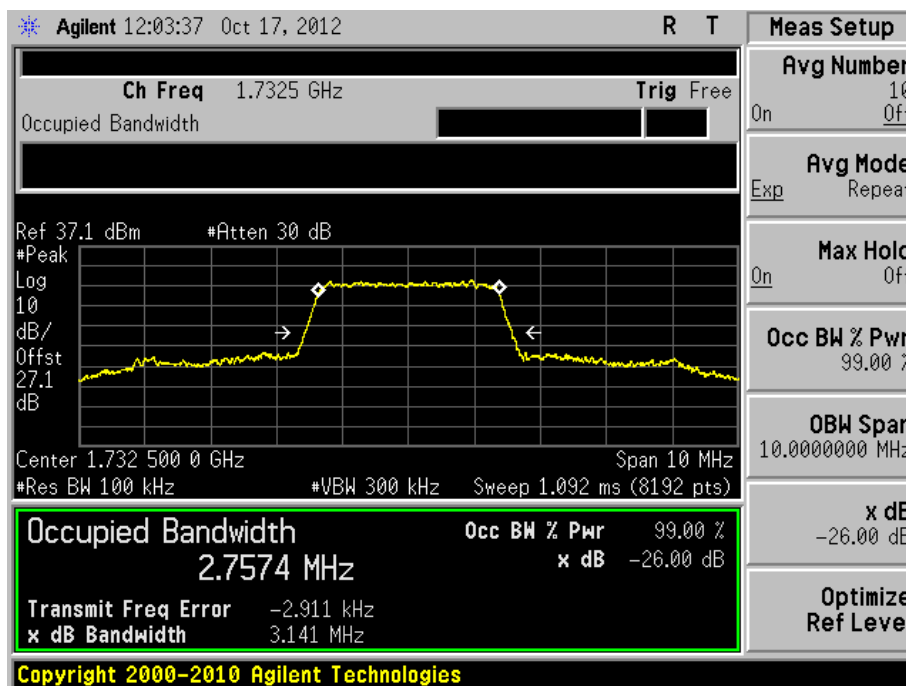
### LTE Band 4 1732.5MHz (1.4 MHz BW) QPSK



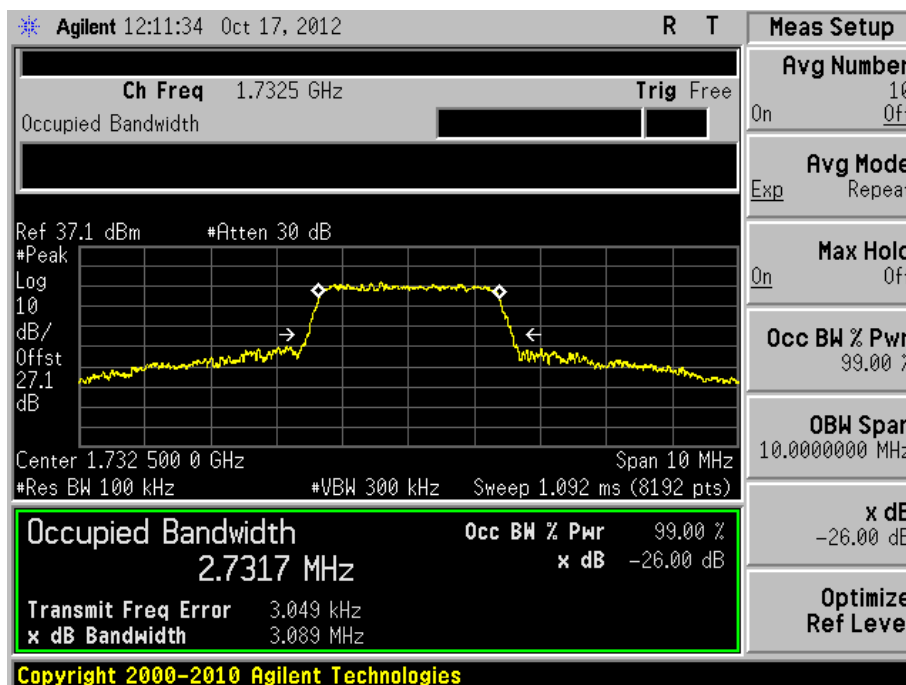
### LTE Band 4 1732.5MHz (1.4 MHz BW) 16QAM



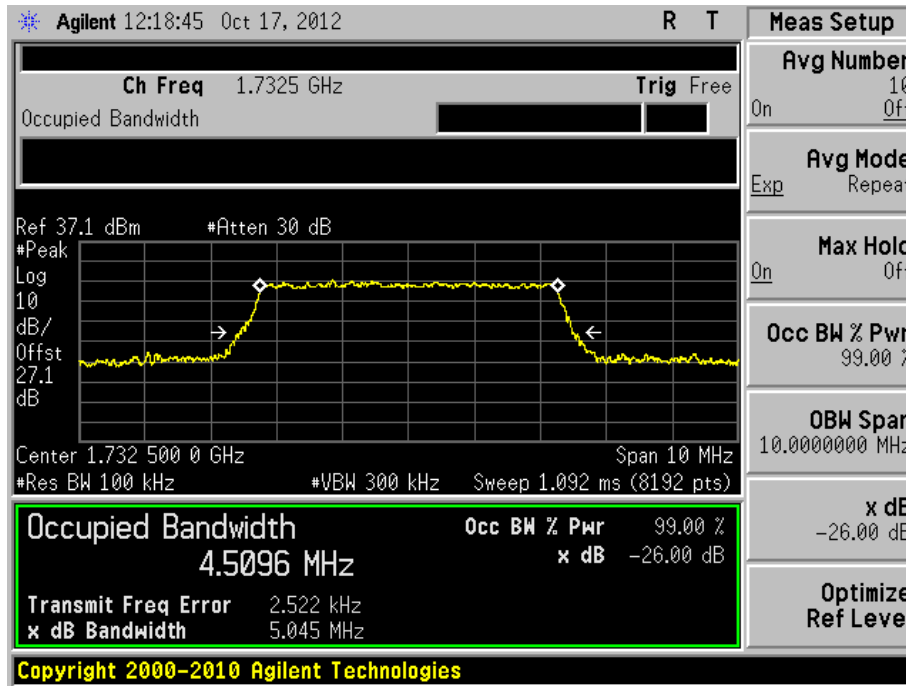
LTE Band 4 1732.5MHz (3.0 MHz BW) QPSK



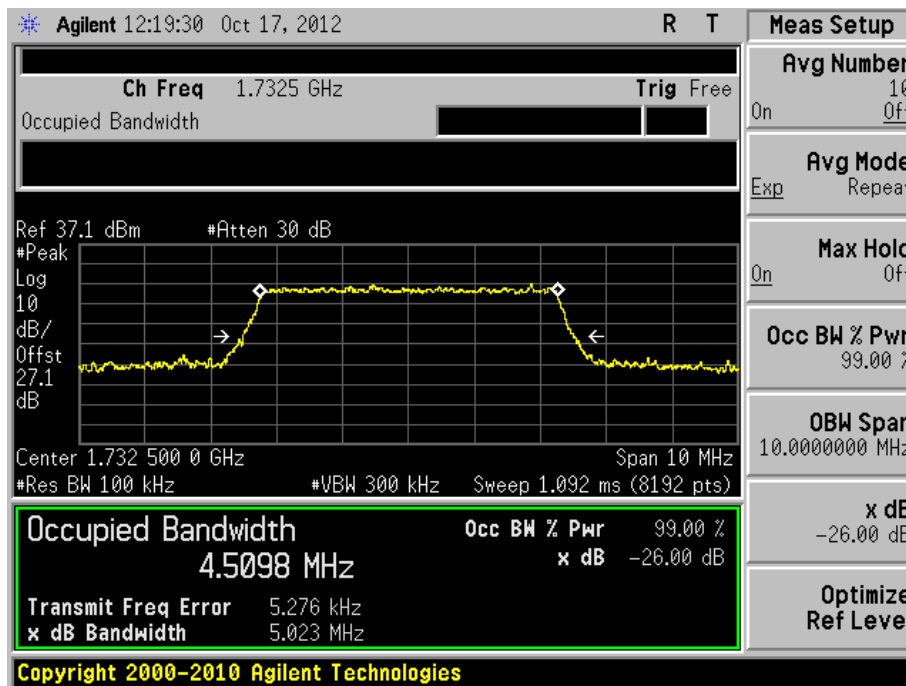
LTE Band 4 1732.5MHz (3.0 MHz BW) 16QAM



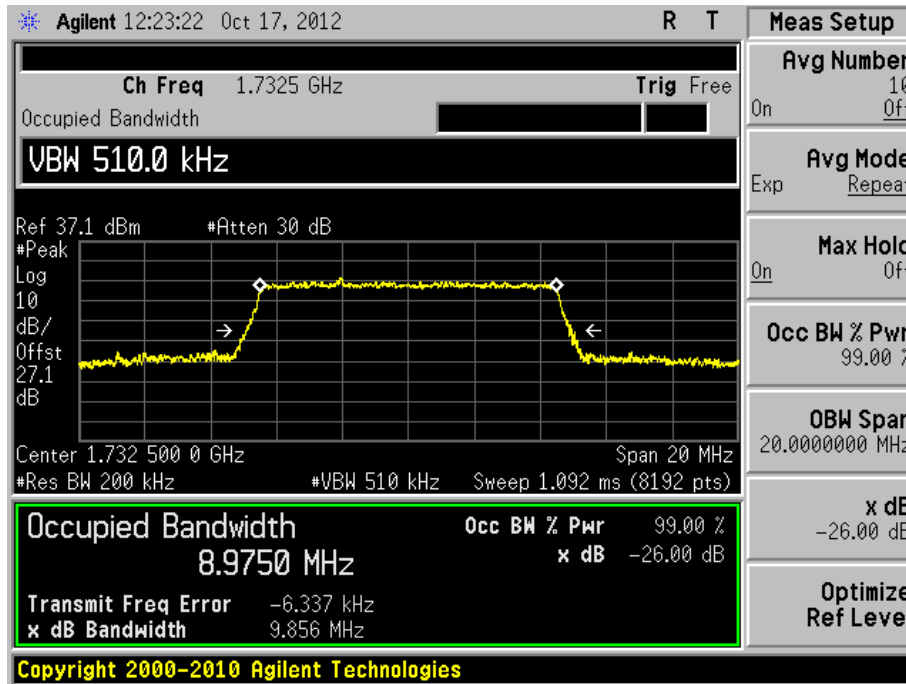
LTE Band 4 1732.5MHz (5.0 MHz BW) QPSK



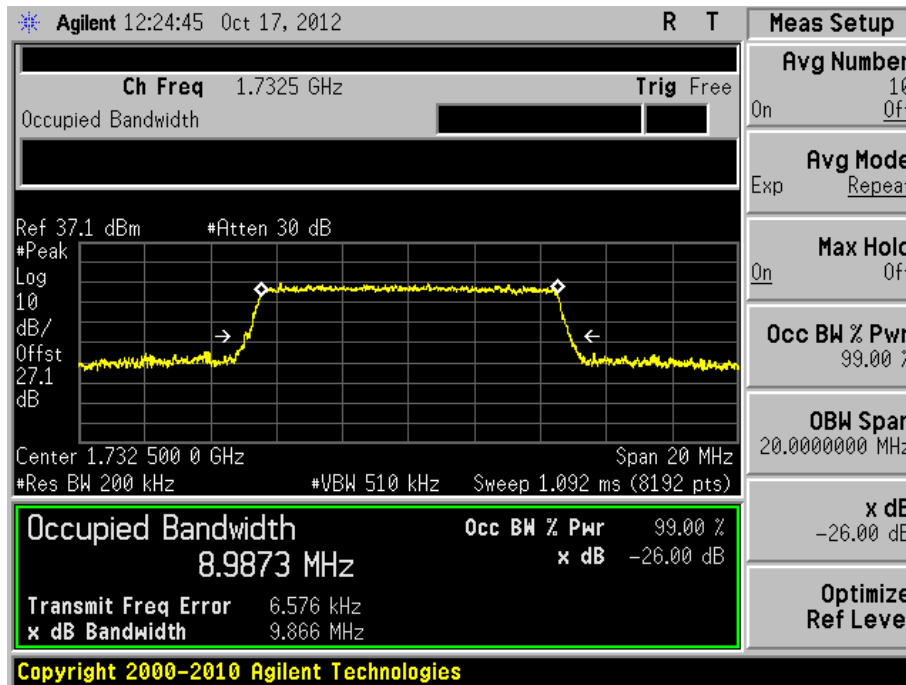
LTE Band 4 1732.5MHz (5.0 MHz BW) 16QAM



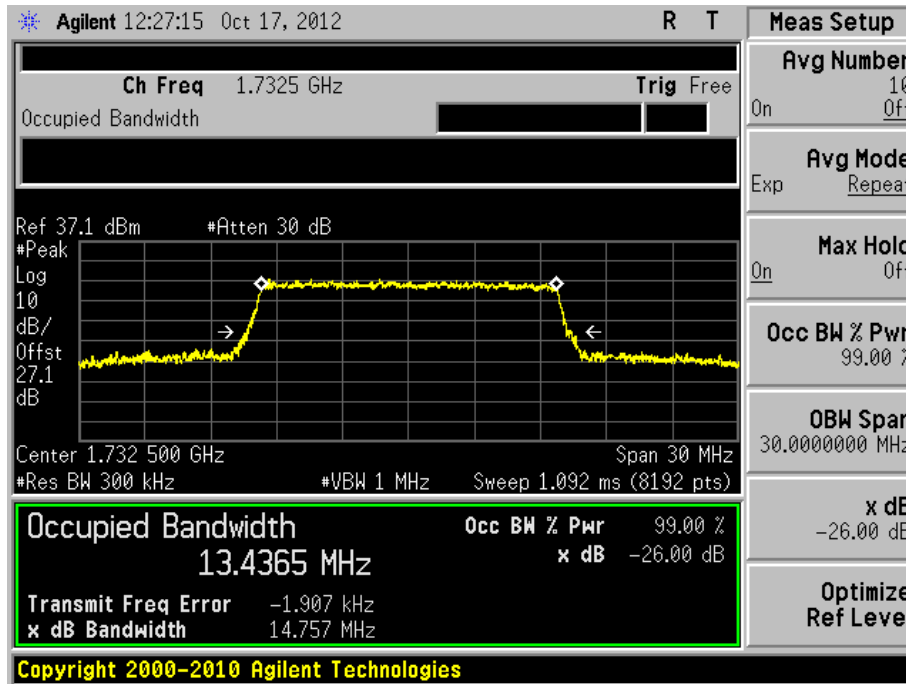
LTE Band 4 1732.5MHz (10.0 MHz BW) QPSK



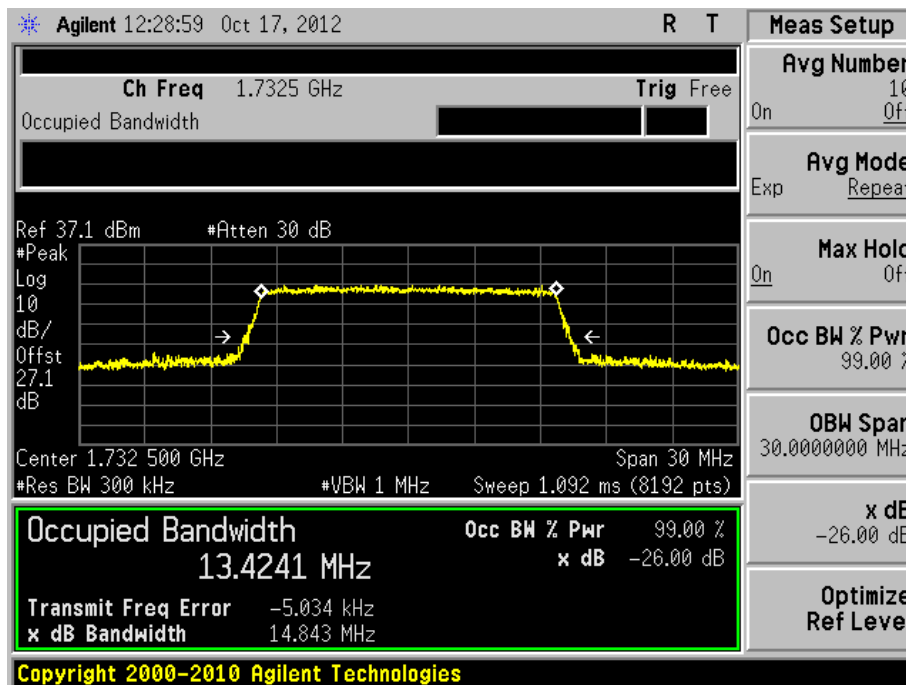
LTE Band 4 1732.5MHz (10.0 MHz BW) 16QAM



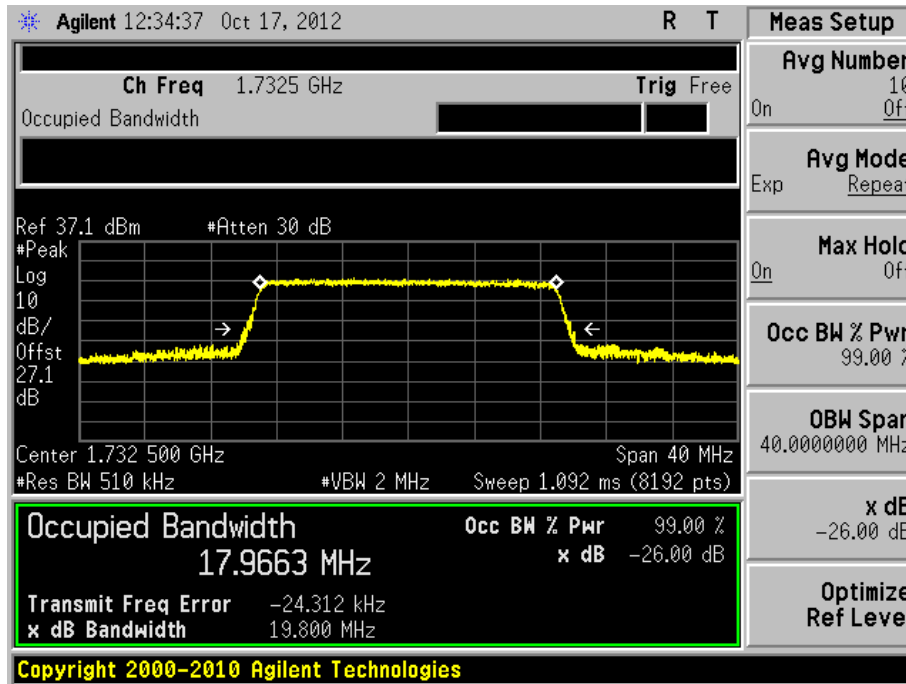
LTE Band 4 1732.5MHz (15.0 MHz BW) QPSK



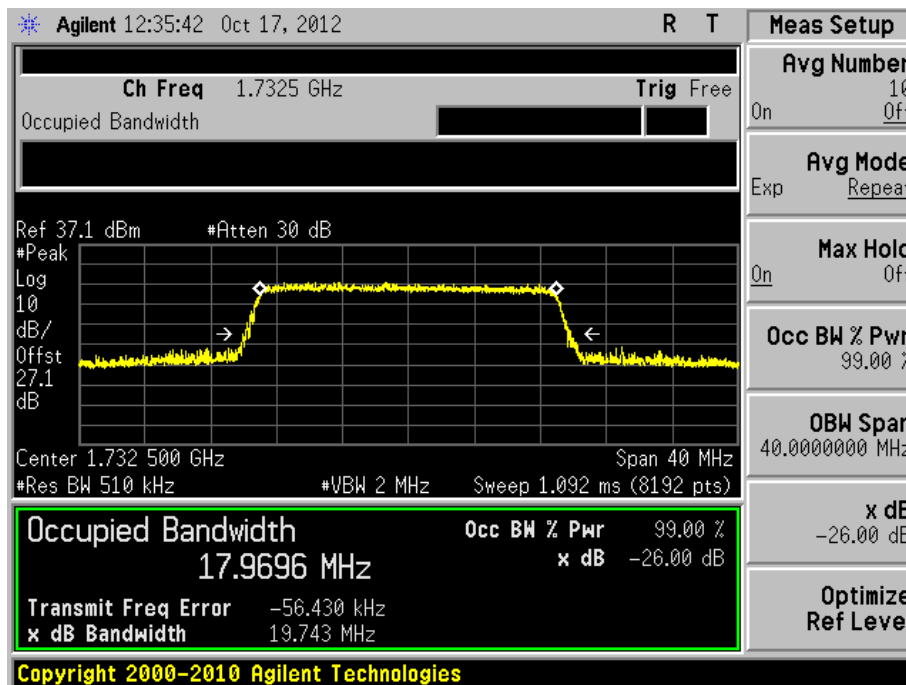
LTE Band 4 1732.5MHz (15.0 MHz BW) 16QAM



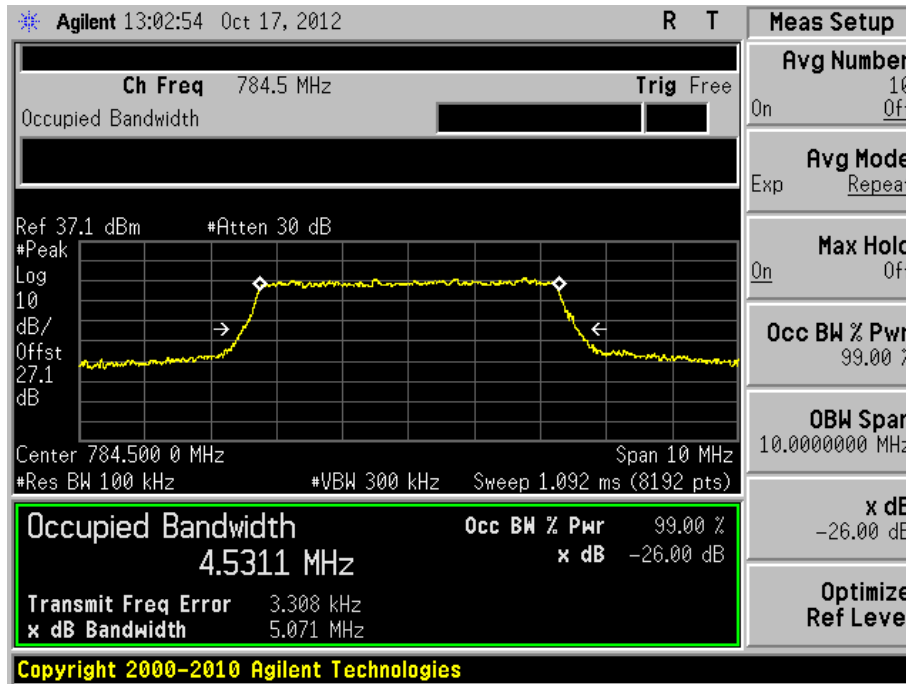
LTE Band 4 1732.5MHz (20.0 MHz BW) QPSK



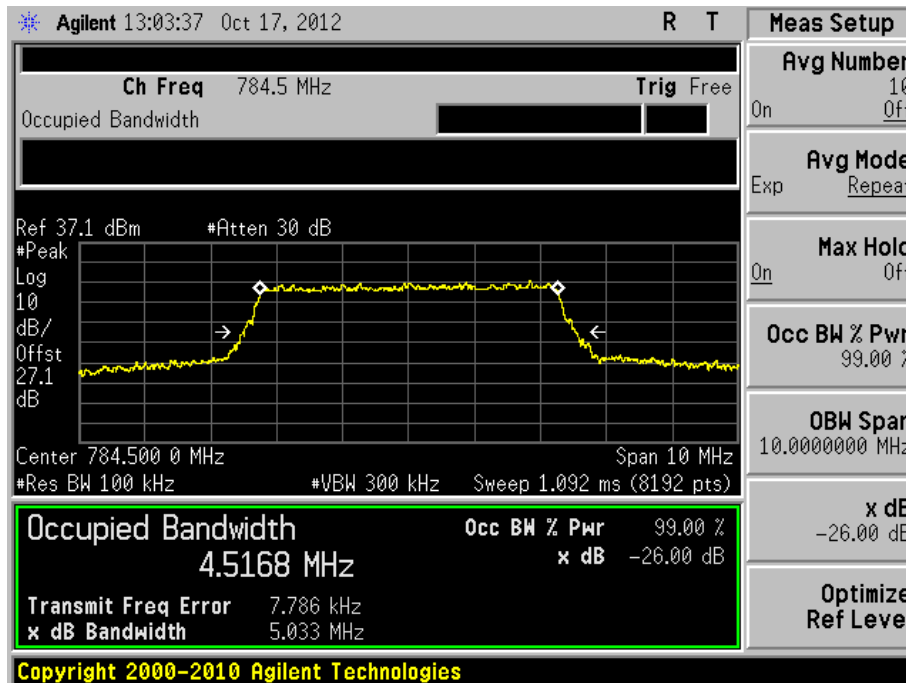
LTE Band 4 1732.5MHz (20.0 MHz BW) 16QAM



LTE Band 13 784.5MHz (5.0 MHz BW) QPSK

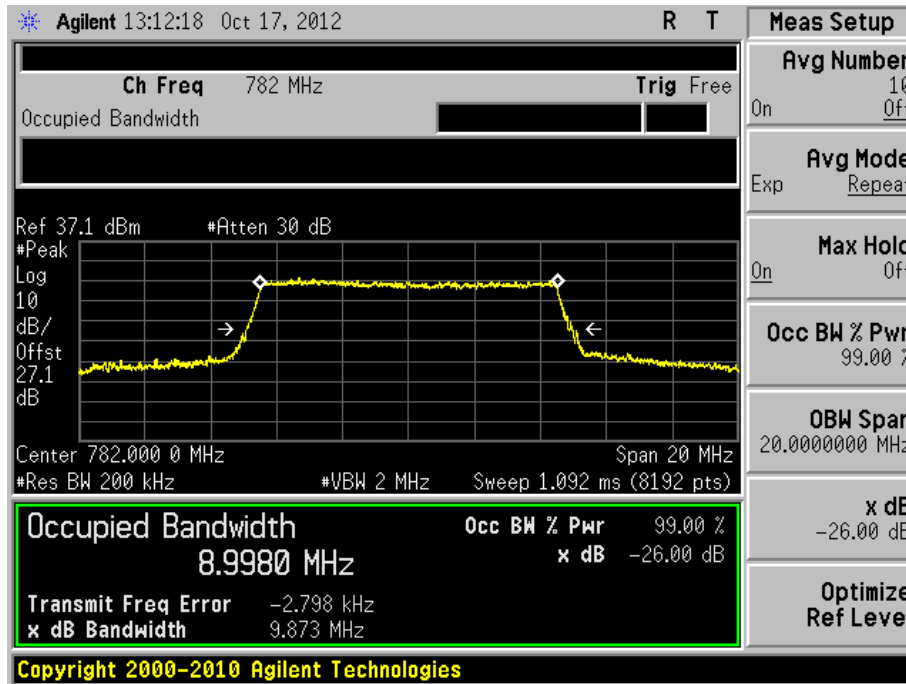


LTE Band 13 784.5MHz (5.0 MHz BW) 16QAM

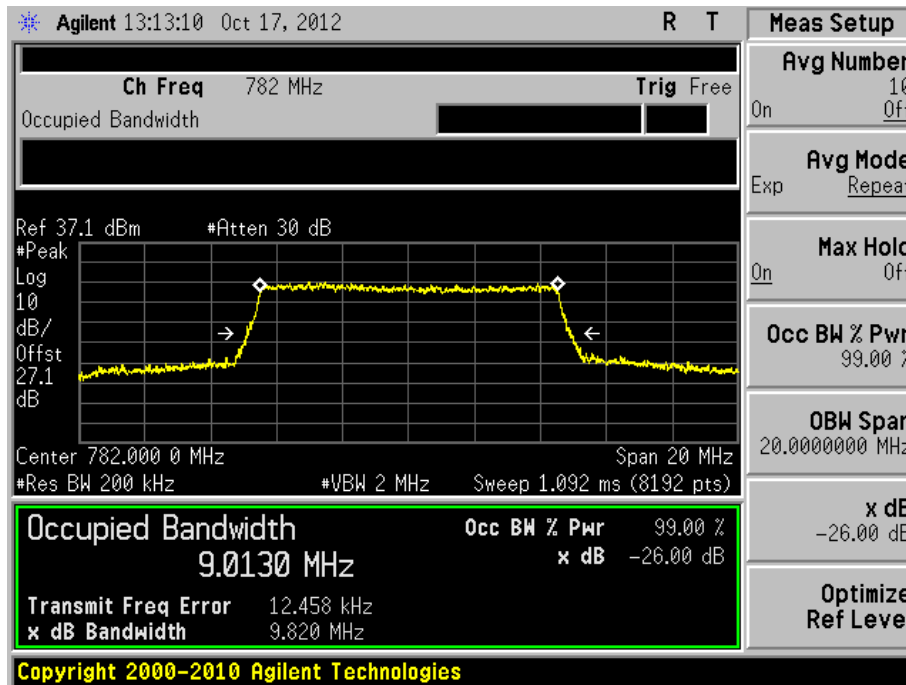




LTE Band 13 782.0MHz (10.0 MHz BW) QPSK



LTE Band 13 782.0MHz (10.0 MHz BW) 16QAM



## **2.5 PEAK-AVERAGE POWER RATIO**

### **2.5.1 Specification Reference**

Part 27 Subpart C §27.50(d)(5), RSS-139 Issue 2 (6.4)

### **2.5.2 Standard Applicable**

(d) The following power and antenna height requirements apply to stations transmitting in the 1710–1755 MHz and 2110–2155 MHz bands:

(5) Equipment employed must be authorized in accordance with the provisions of §24.51. 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 (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

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

Serial No: UB010912700038 / Test Configuration C

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

October 19, 2012/JMG

### **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**

Ambient Temperature	22.5°C
Relative Humidity	54.7%
ATM Pressure	99.8 kPa

### **2.5.7 Additional Observations**

- This is a conducted test. Test procedure is per Section 3.0 of KDB971168 (D01 Power Meas License Digital Systems v01).
- 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) A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth.

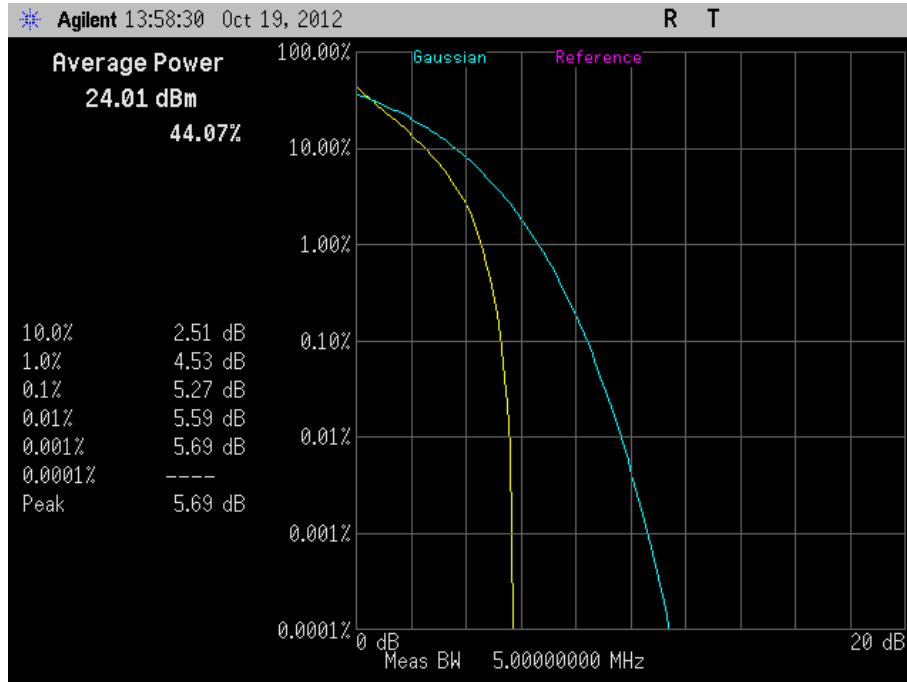
- All channels based from worst case configuration channel bandwidth were verified. Only the worst channel presented.
- There are no measured PAR levels greater than 13dB. EUT complies.

### **2.5.8 Test Results**

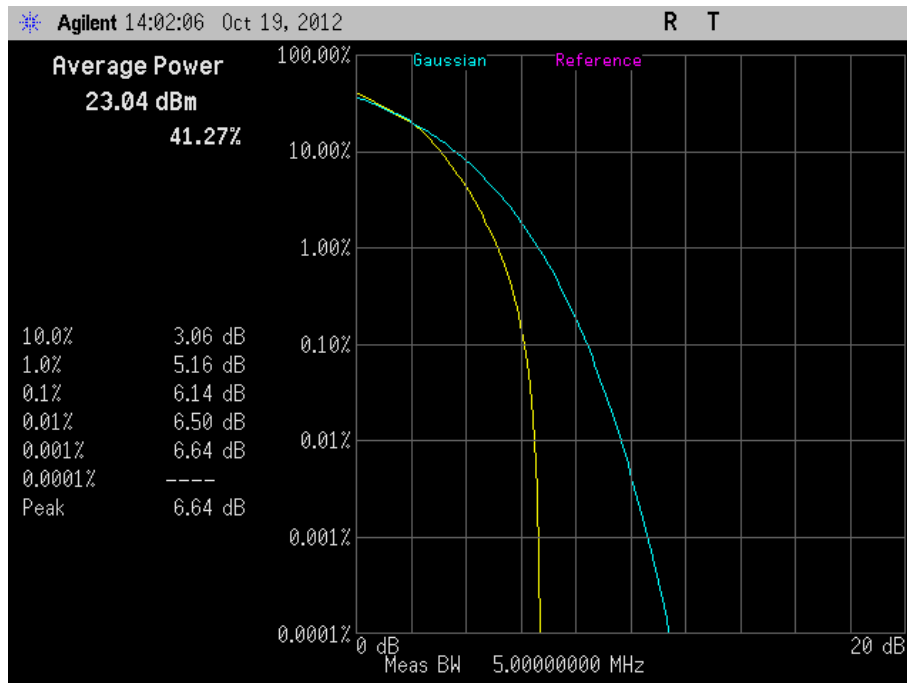
The worst case measured PAR level was 6.26dB at 1732.5 MHz using 16QAM with a 10MHz BW.

See attached plots.

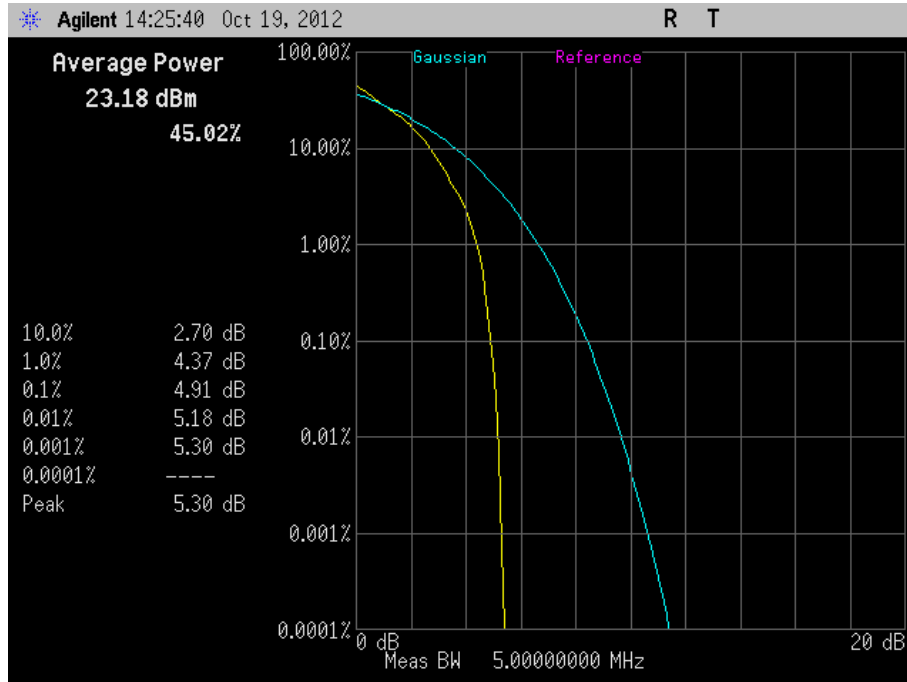
LTE Band 4 1732.5MHz (1.4 MHz BW) QPSK



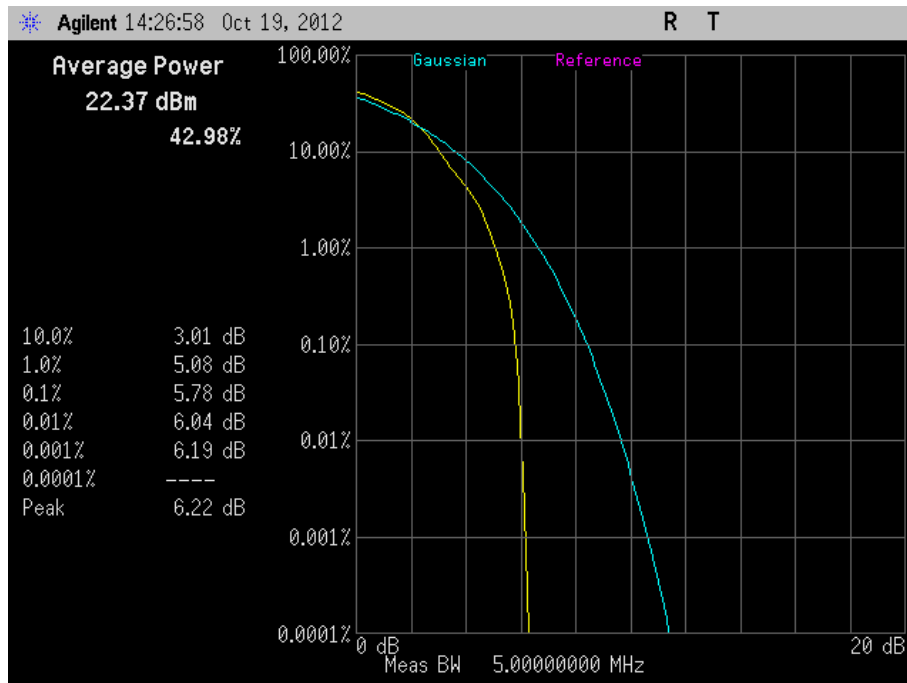
LTE Band 4 1732.5MHz (1.4 MHz BW) 16QAM



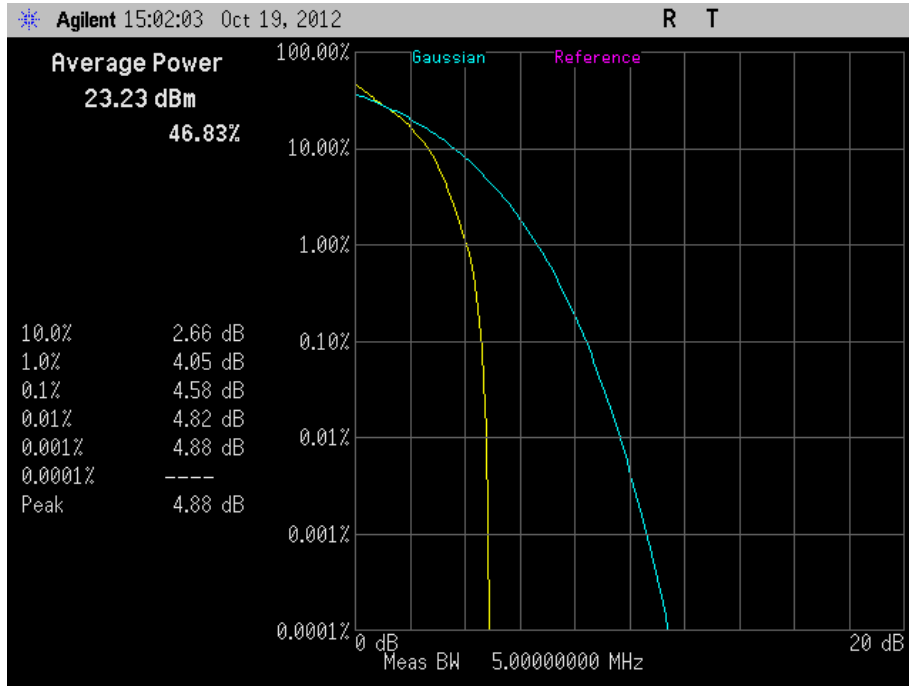
LTE Band 4 1732.5MHz (3.0 MHz BW) QPSK



LTE Band 4 1732.5MHz (3.0 MHz BW) 16QAM



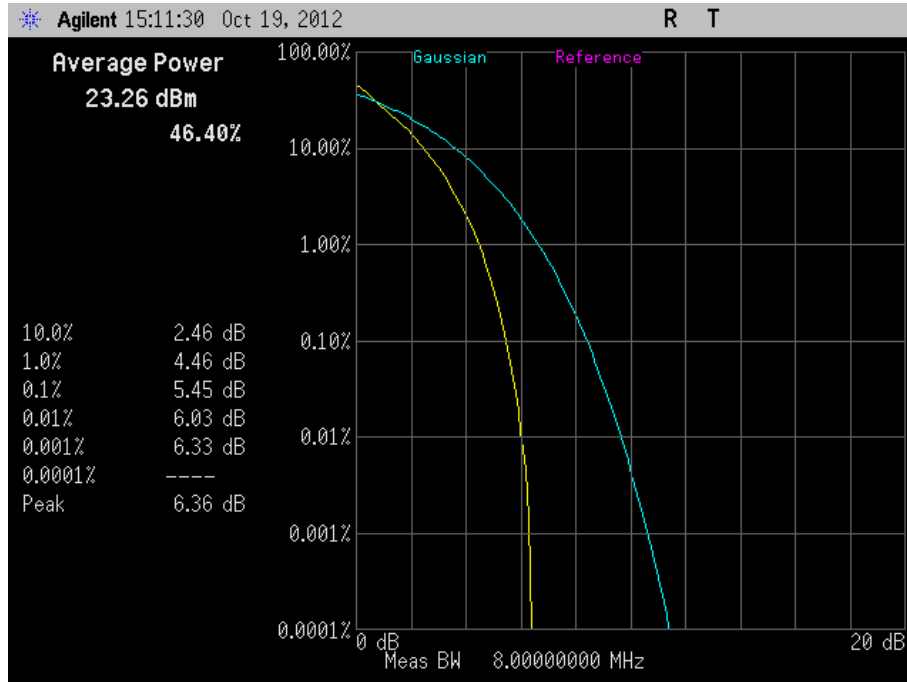
LTE Band 4 1732.5MHz (5.0 MHz BW) QPSK



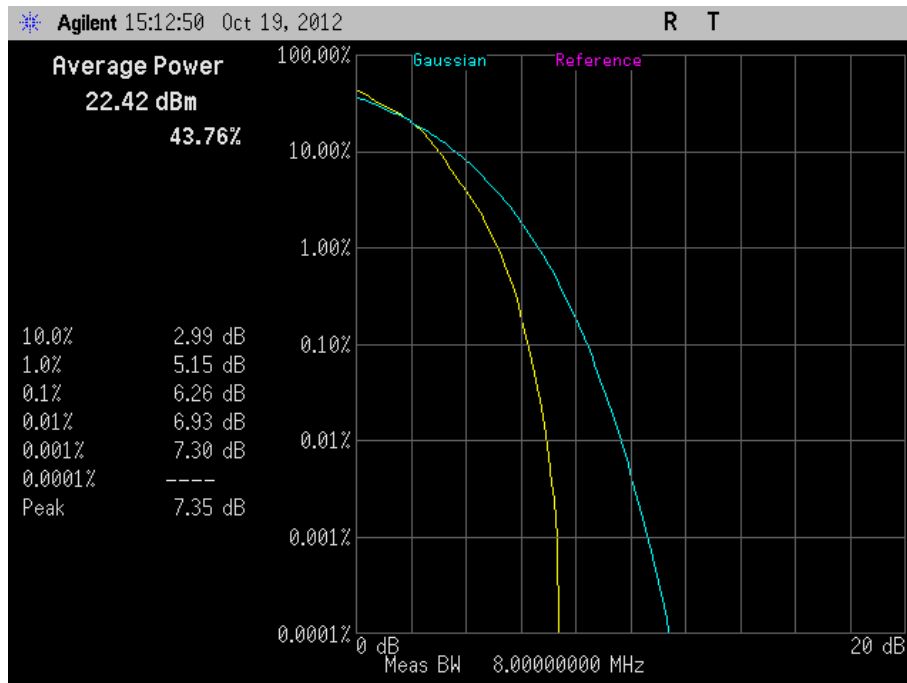
LTE Band 4 1732.5MHz (5.0 MHz BW) 16QAM



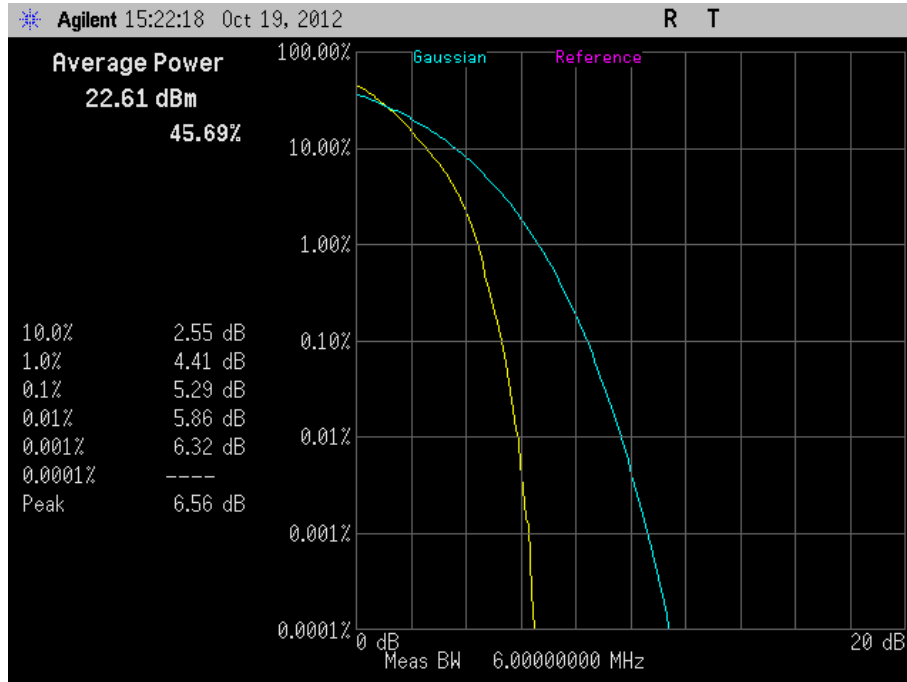
LTE Band 4 1732.5MHz (10.0 MHz BW) QPSK



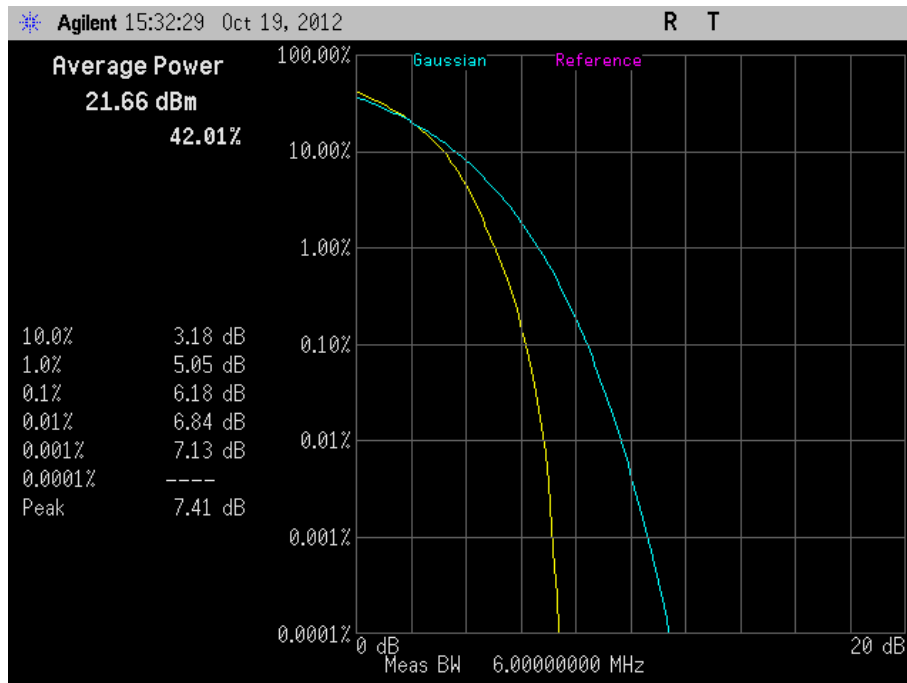
LTE Band 4 1732.5MHz (10.0 MHz BW) 16QAM



LTE Band 4 1732.5MHz (15.0 MHz BW) QPSK

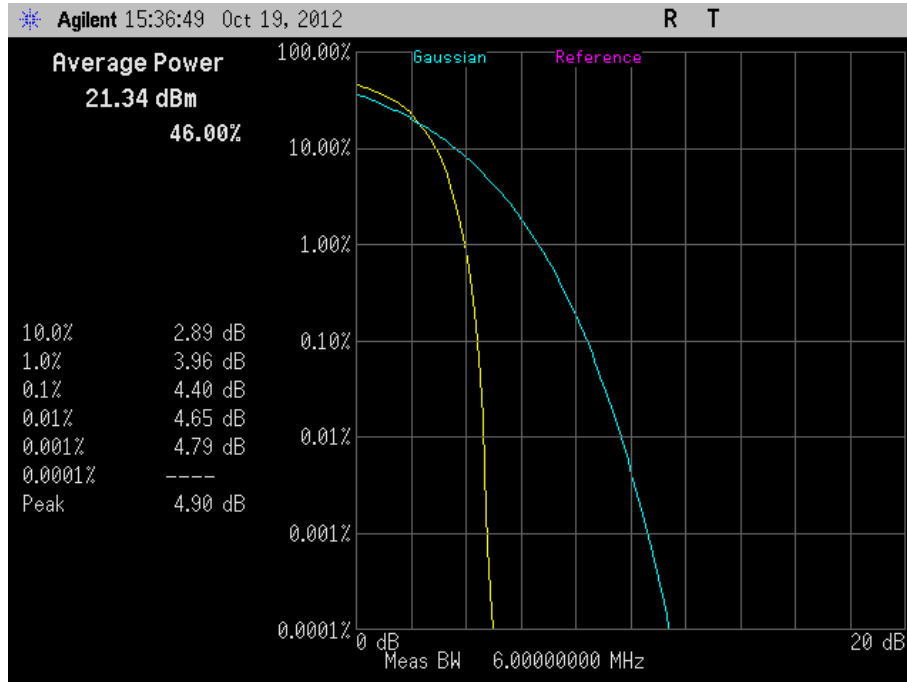


LTE Band 4 1732.5MHz (15.0 MHz BW) 16QAM

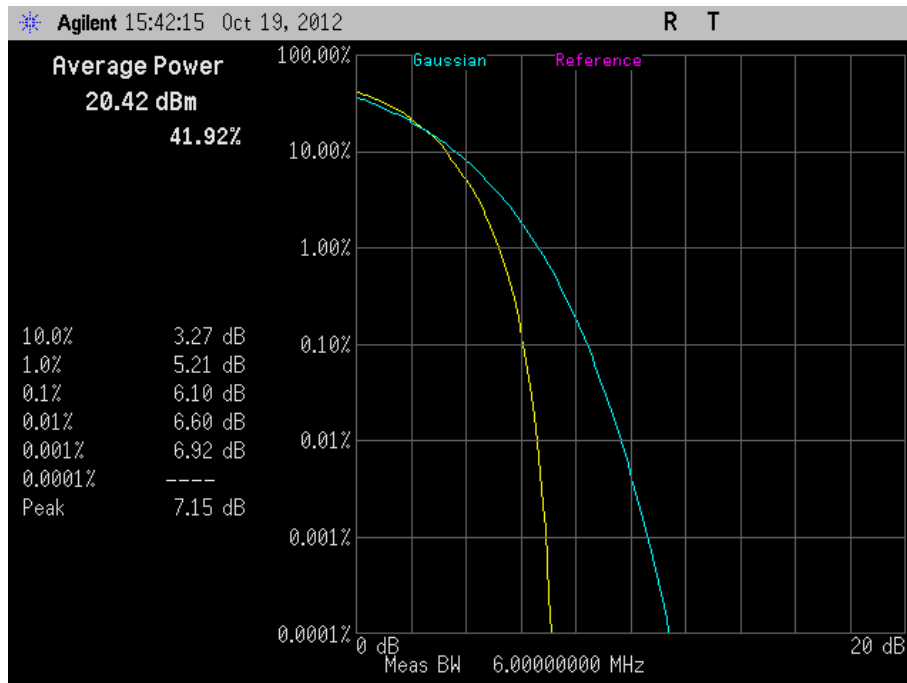




LTE Band 4 1732.5MHz (20.0 MHz BW) QPSK



LTE Band 4 1732.5MHz (20.0 MHz BW) 16QAM



## **2.6 BAND EDGE**

### **2.6.1 Specification Reference**

Part 27 Subpart C §27.53(c)(2)(5) and (h), RSS-139 Issue 2 (6.5)

### **2.6.2 Standard Applicable**

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

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

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

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

Serial No: UB010912700038 / Test Configuration C

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

October 19 and 25, 2012/JMG and FSC

### **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**

Ambient Temperature	22.5°C	25.6°C
Relative Humidity	54.7%	48.8%
ATM Pressure	99.8 kPa	99.8 kPa

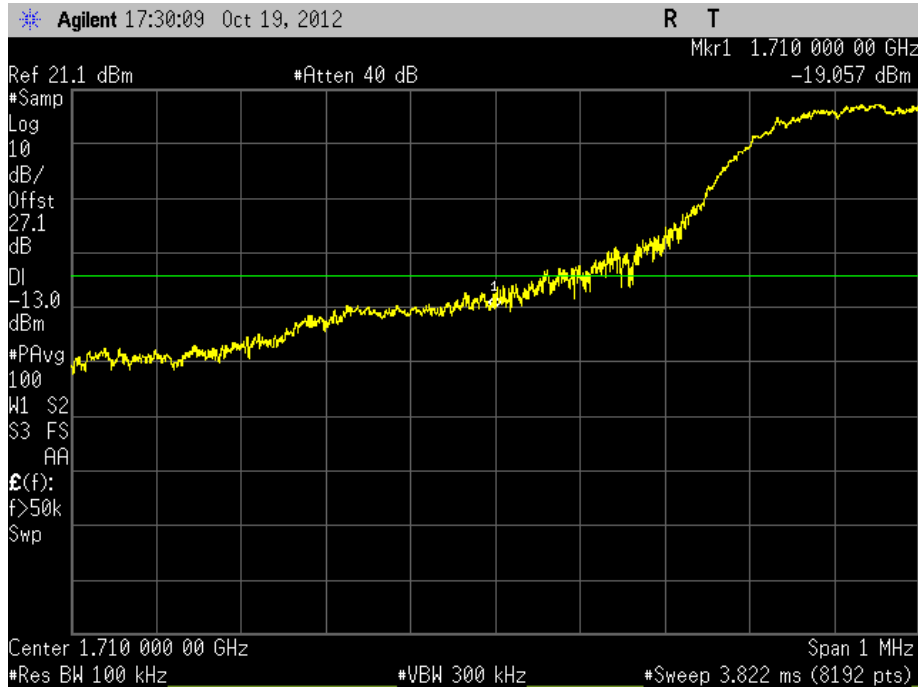
### **2.6.7 Additional Observations**

- This is a conducted test.
- The 27.1dB offset is from the power splitter, external attenuator and cable used.
- The center frequency of the spectrum is the band edge frequency. Using a span of 1MHz, RBW is set to 100 kHz and VBW is set to 3X RBW.
- For lower band edge, 0 offset is utilized while the maximum allowable offset per channel bandwidth for upper band edge is used.
- All RB size available verified and the worst case size for band edge verification presented in this test report.

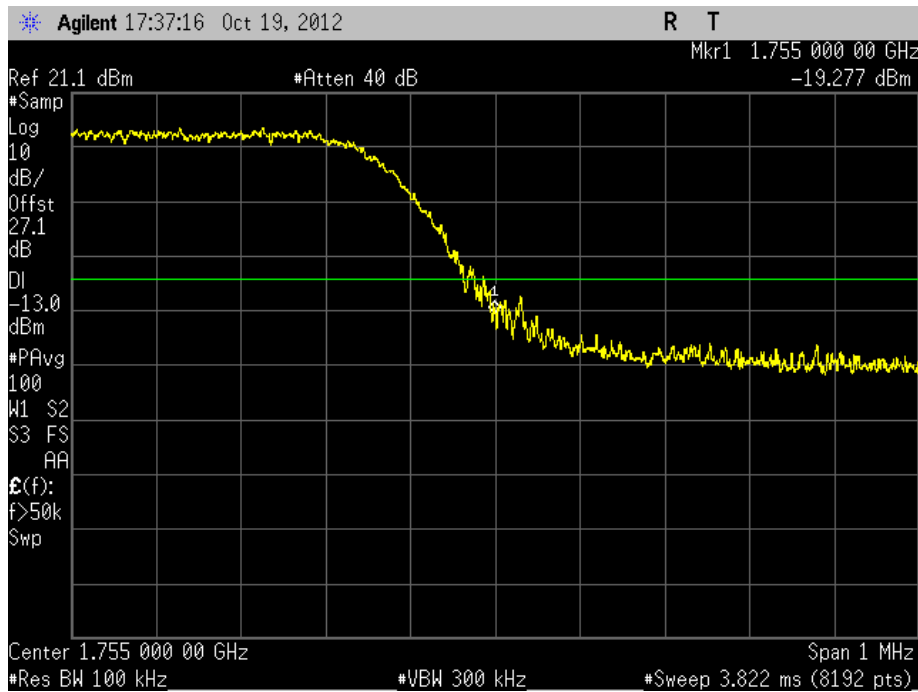
### **2.6.8 Test Results**

See attached plots.

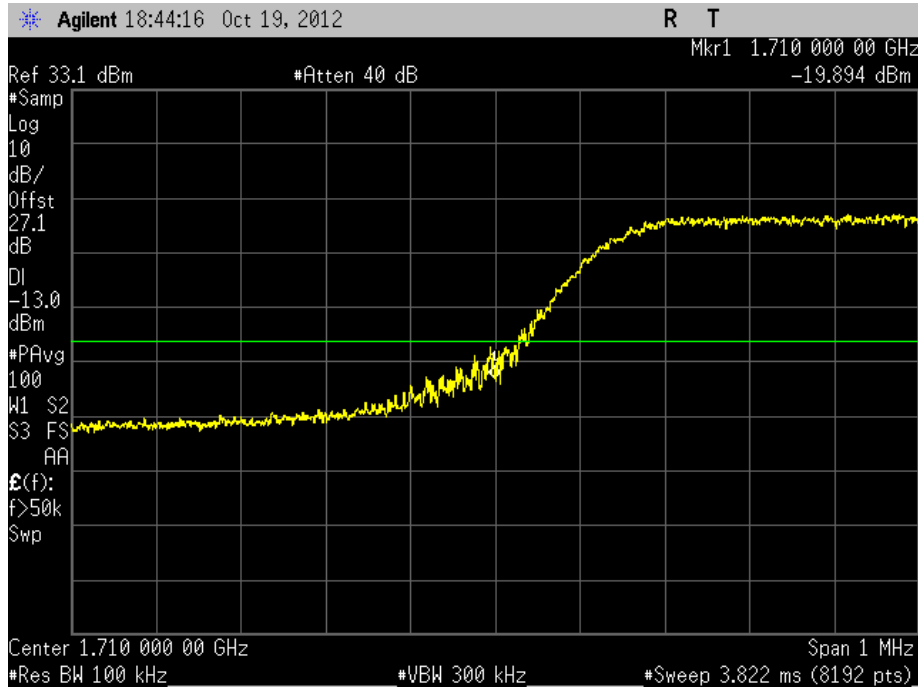
LTE Band 4 1.4MHz BW Low Channel Band Edge @ 1710MHz (1RB)



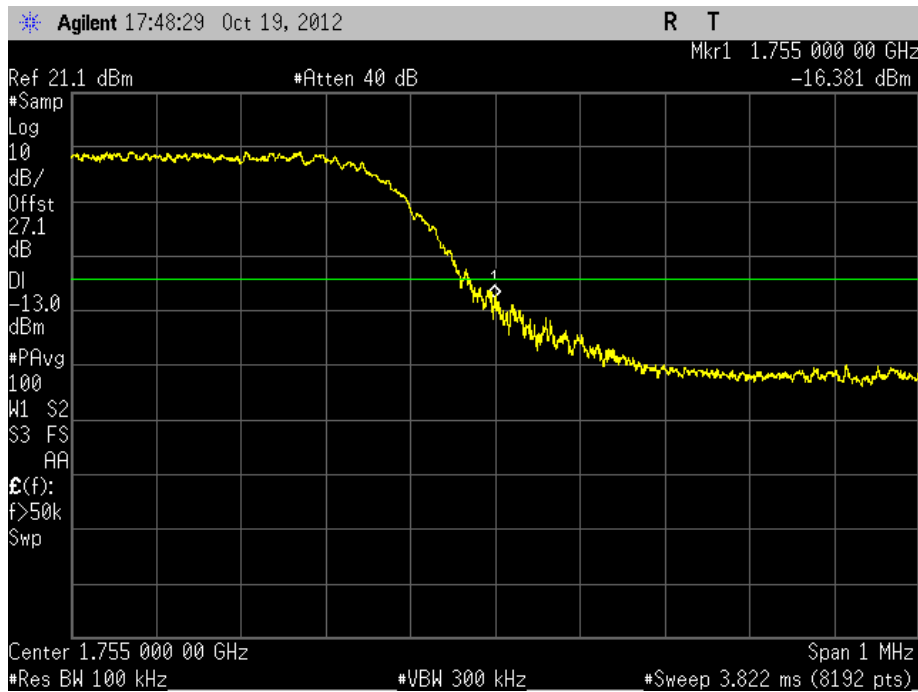
LTE Band 4 1.4MHz BW High Channel Band Edge @ 1755MHz (6RB)



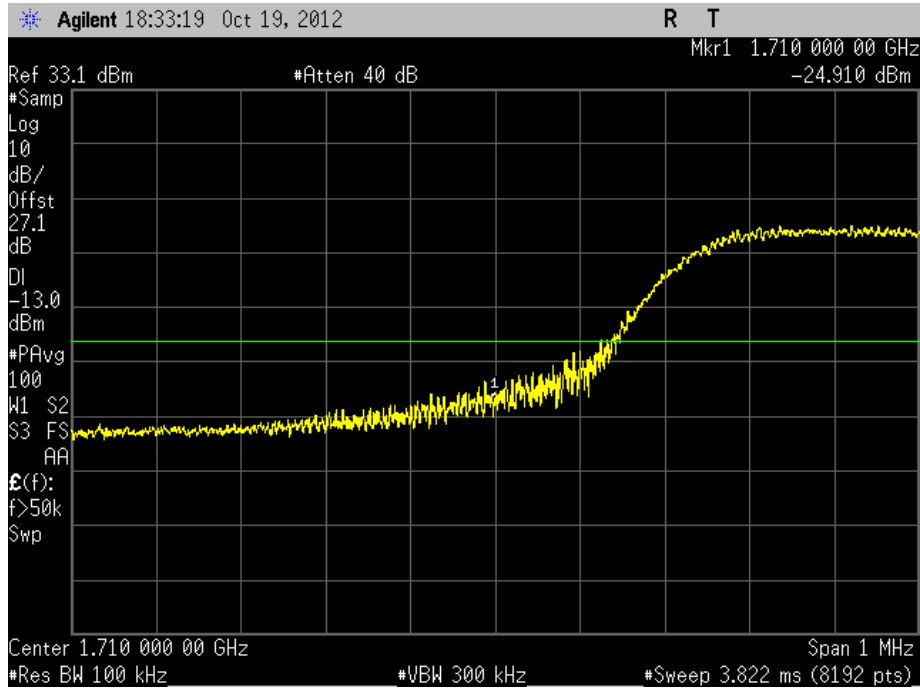
LTE Band 4 3.0MHz BW Low Channel Band Edge @ 1710MHz (15RB)



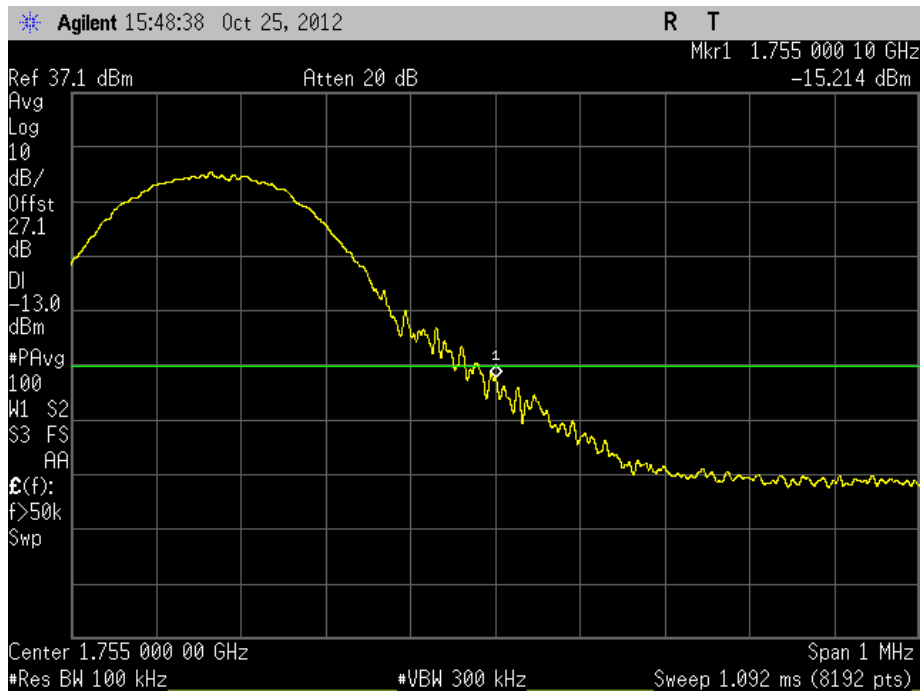
LTE Band 4 3.0MHz BW High Channel Band Edge @ 1755MHz (15RB)



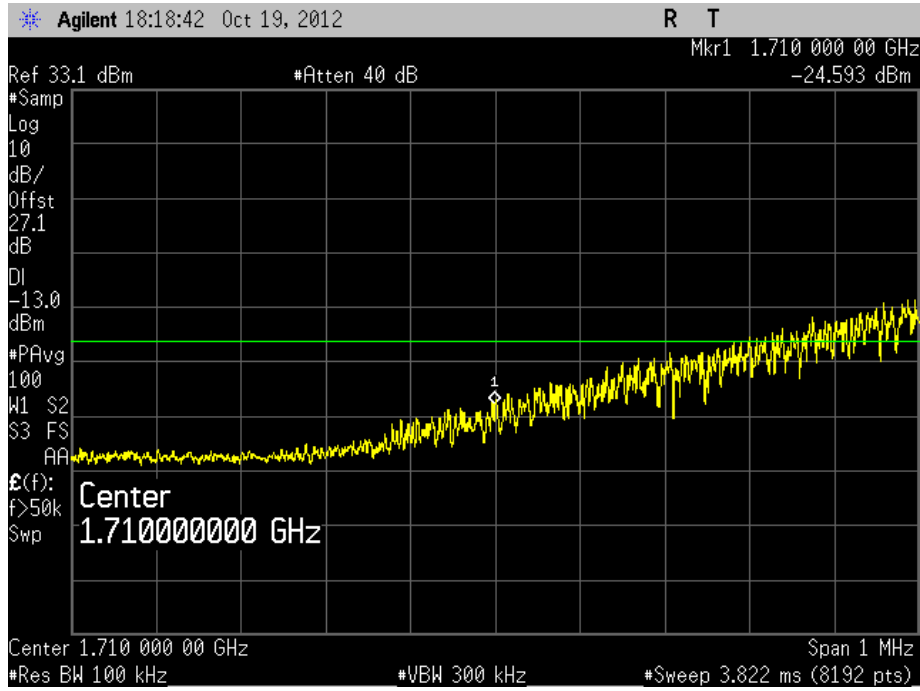
LTE Band 4 5.0MHz BW Low Channel Band Edge @ 1710MHz (1RB)



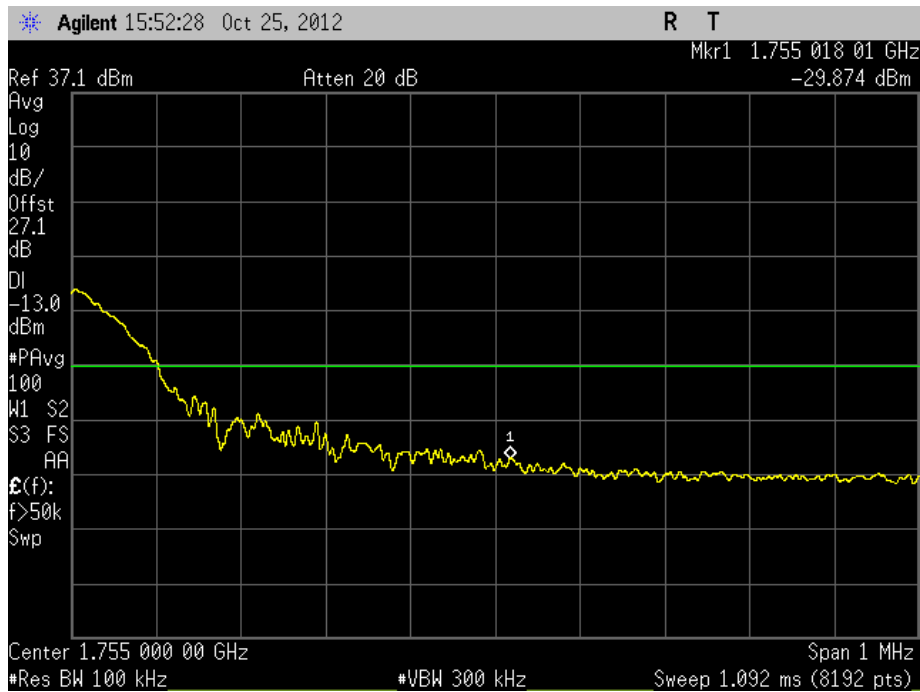
LTE Band 4 5.0MHz BW High Channel Band Edge @ 1755MHz (1RB)



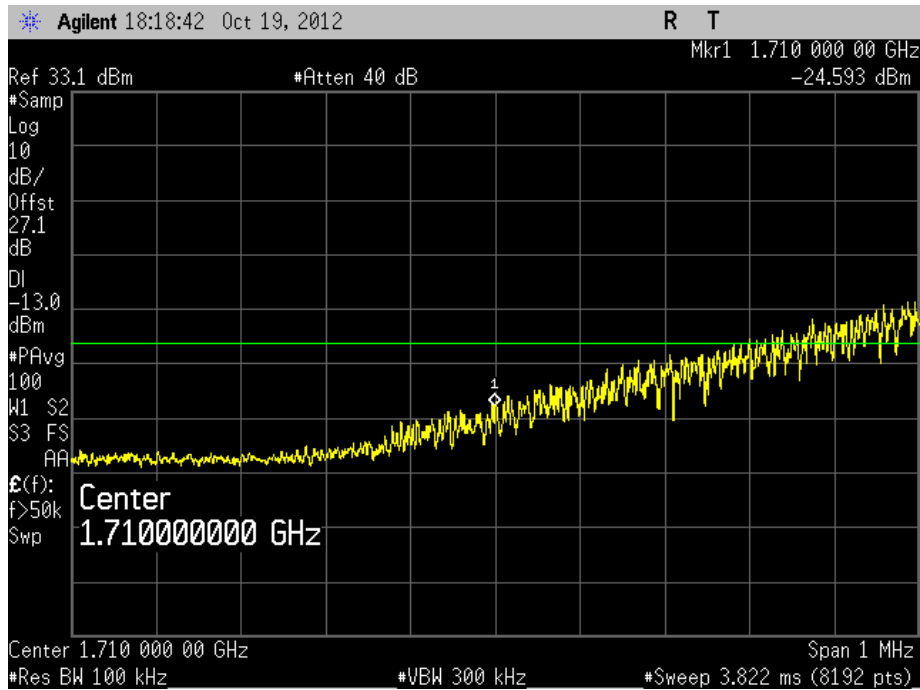
LTE Band 4 10.0MHz BW Low Channel Band Edge @ 1710MHz (50RB)



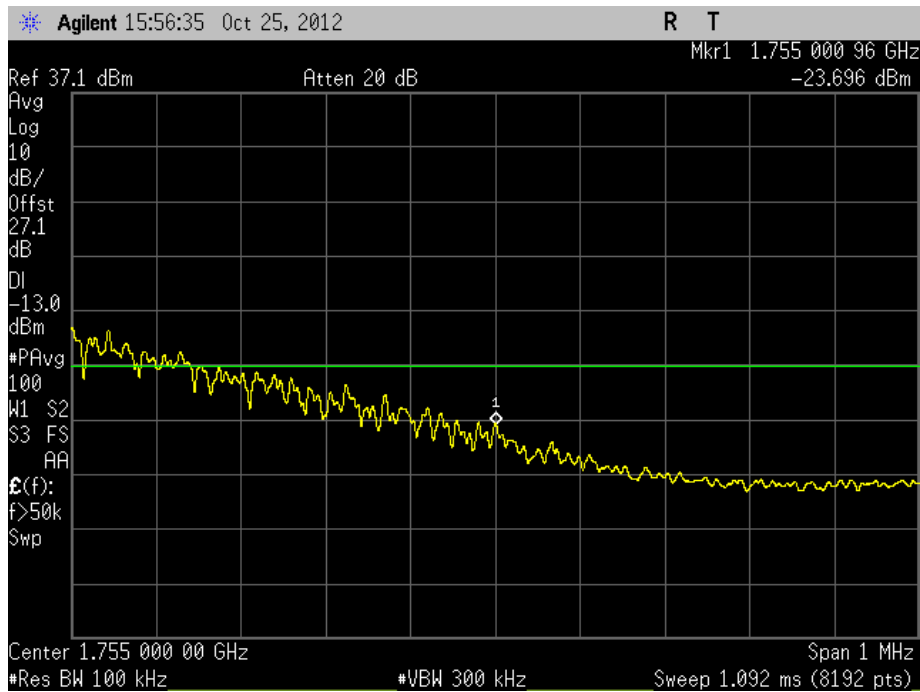
LTE Band 4 10.0MHz BW High Channel Band Edge @ 1755MHz (50RB)



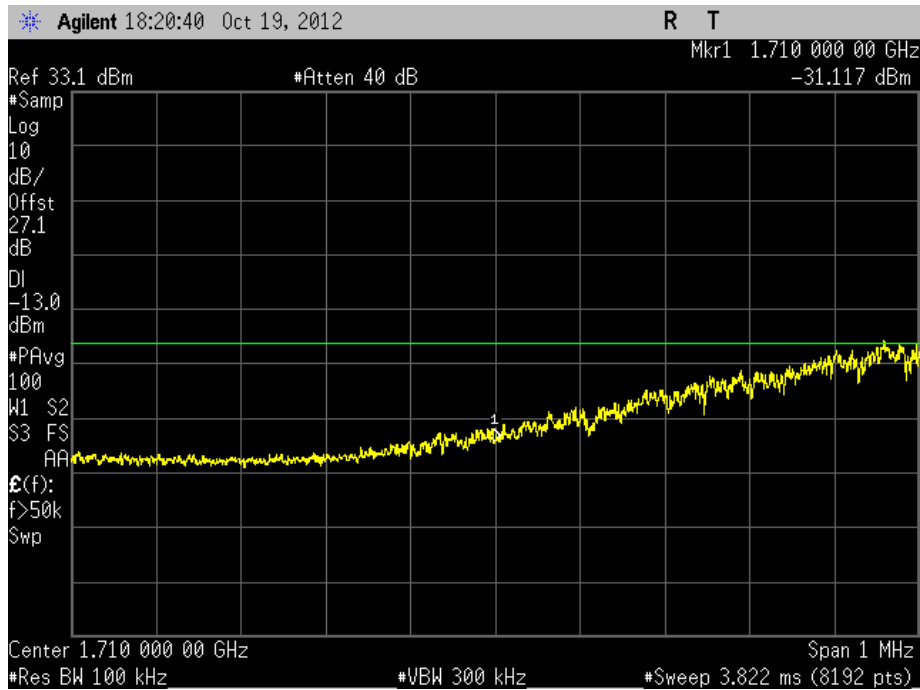
LTE Band 4 15.0MHz BW Low Channel Band Edge @ 1710MHz (1RB)



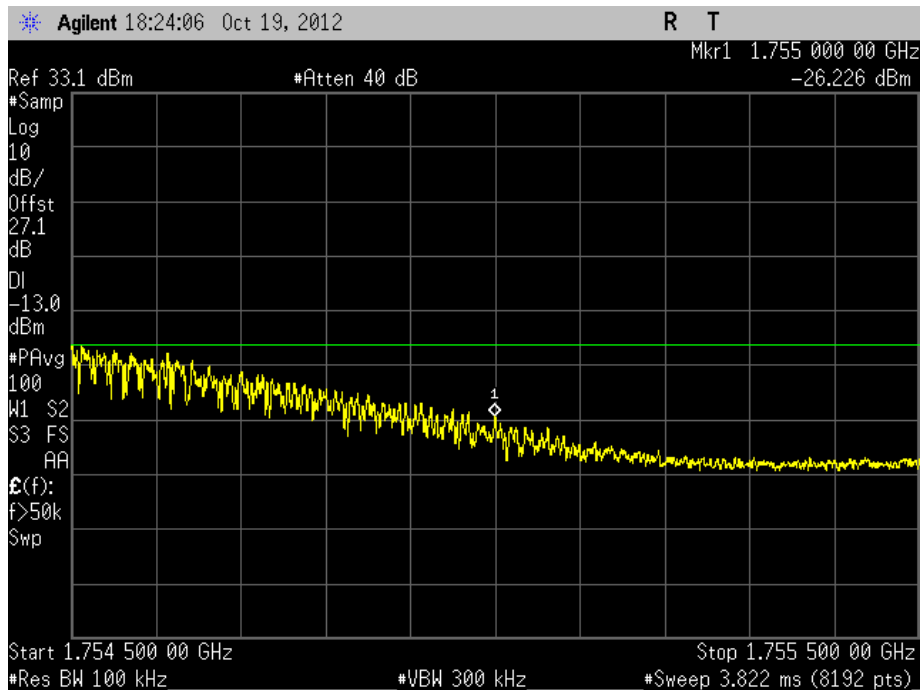
LTE Band 4 15.0MHz BW High Channel Band Edge @ 1755MHz (1RB)



LTE Band 4 20.0MHz BW Low Channel Band Edge @ 1710MHz (1RB)

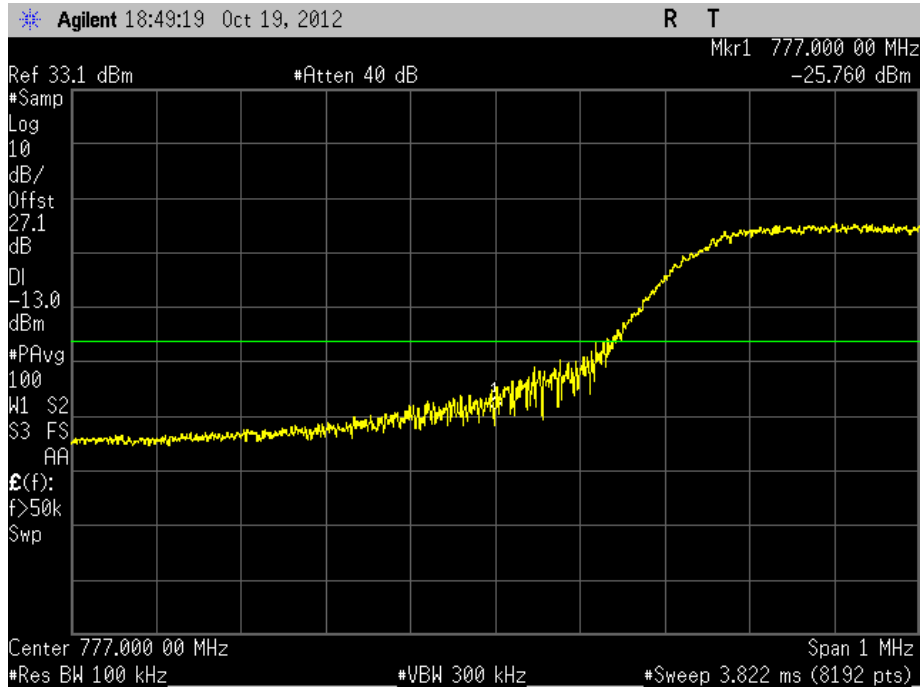


LTE Band 4 20.0MHz BW High Channel Band Edge @ 1755MHz (1RB)

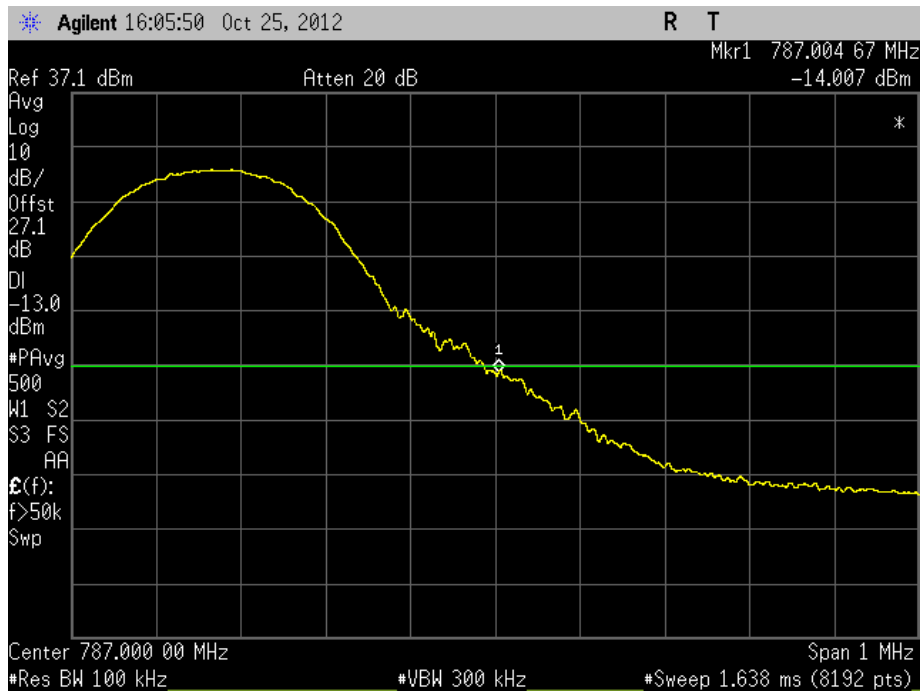




LTE Band 13 5.0MHz BW Low Channel Band Edge @ 777MHz (25RB)



LTE Band 13 5.0MHz BW High Channel Band Edge @ 787MHz (1RB)



## **2.7 CONDUCTED SPURIOUS EMISSIONS**

### **2.7.1 Specification Reference**

Part 27 Subpart C §27.53 (c)(2)(5),(f),(h) and Part 2.1051, RSS-139 Issue 2(6.5)

### **2.7.2 Standard Applicable**

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

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

(f) For operations in the 746–763 MHz, 775–793 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and  $-80$  dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

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

Serial No: UB010912700038 / Default Test Configuration C

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

October 25, 2012/FSC

### **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**

Ambient Temperature	25.6°C
Relative Humidity	48.8%
ATM Pressure	99.8 kPa

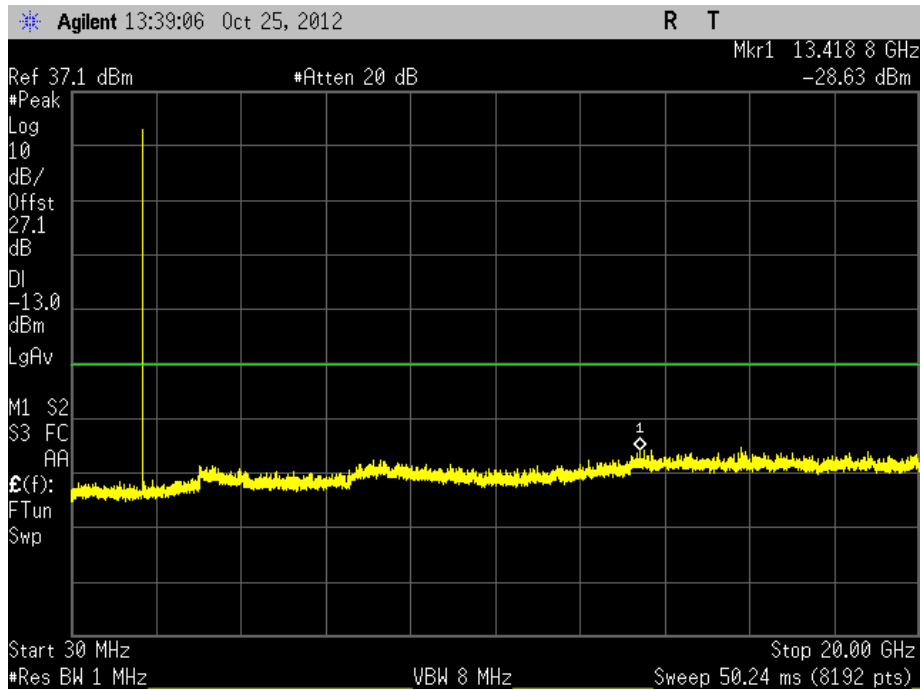
### **2.7.7 Additional Observations**

- This is a conducted test. The 27.1dB offset is from the power splitter, external attenuator and cable used.
- The spectrum was searched from 30MHz to the 10<sup>th</sup> harmonic (20GHz) for Band 4. Band 17 was verified up to 10GHz.
- Low, Mid and High channels on all channel bandwidth verified. Only the worst RB size/offset presented (See Section 1.4.4).

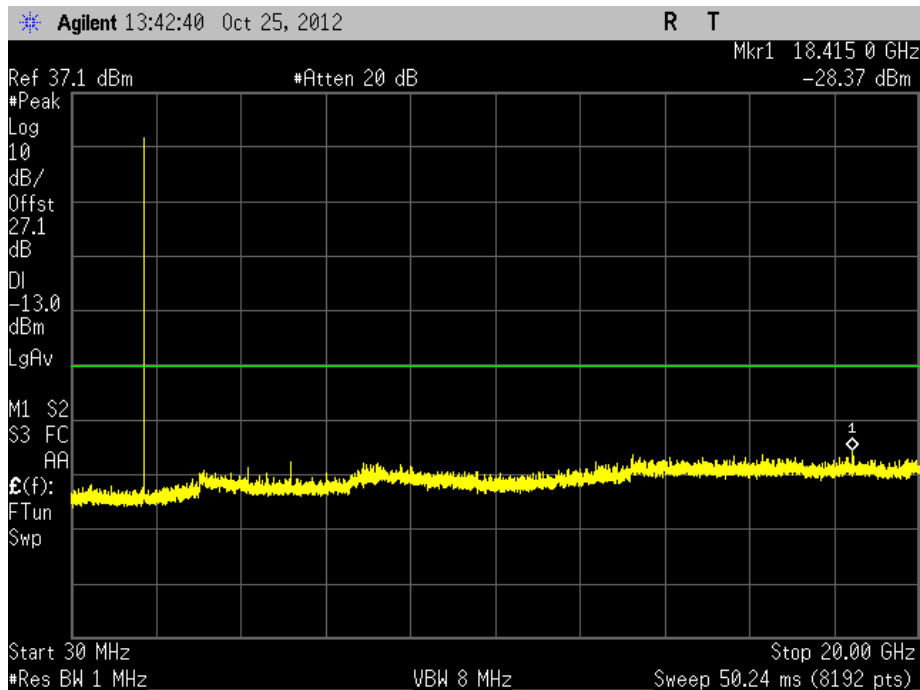
## **2.7.8 Test Results**

Compliant. See attached plots.

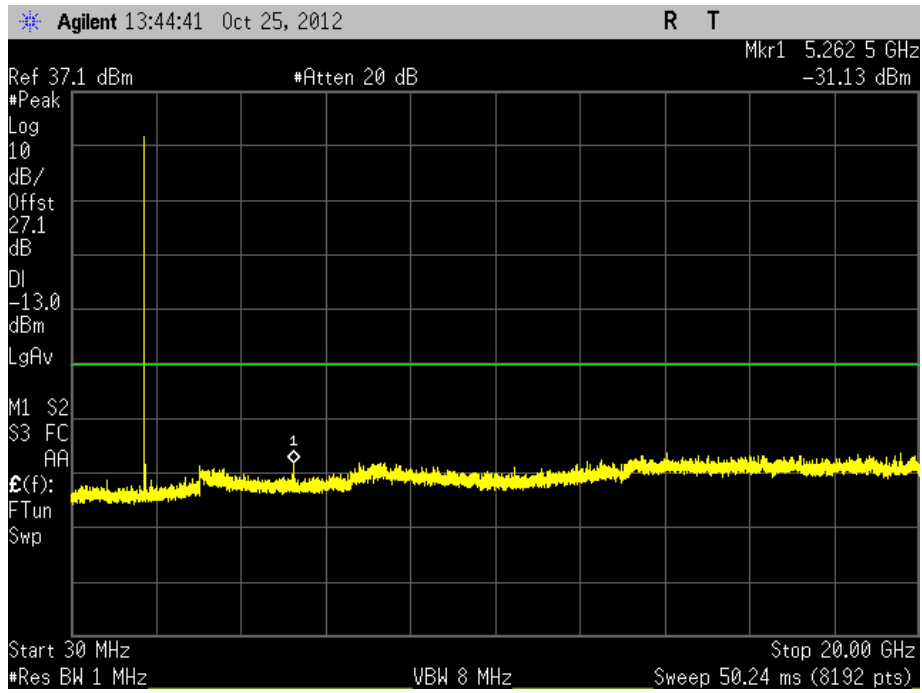
LTE Band 4 1.4MHz BW Low Channel



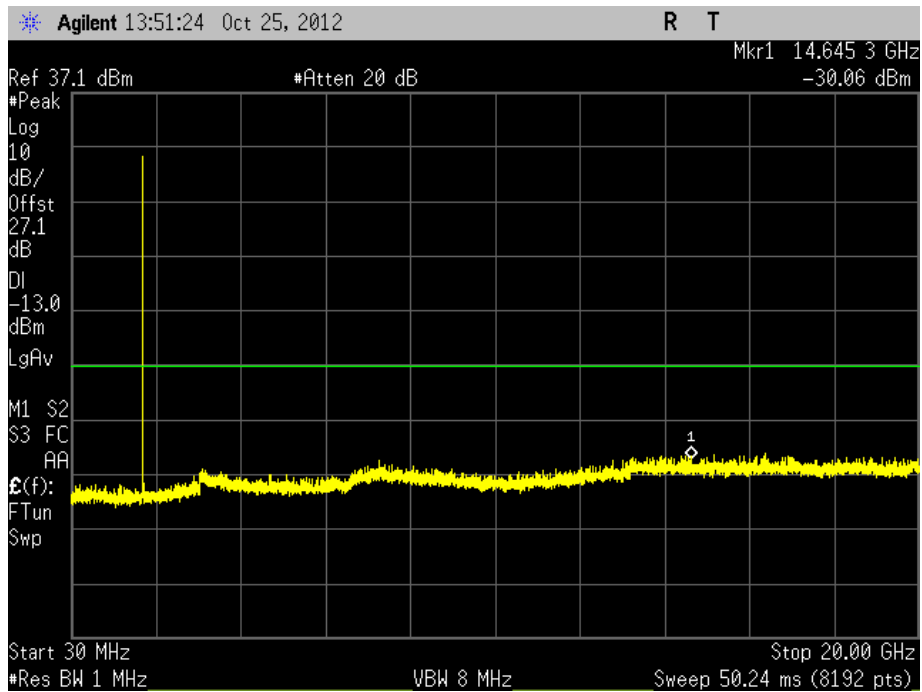
LTE Band 4 1.4MHz BW Mid Channel



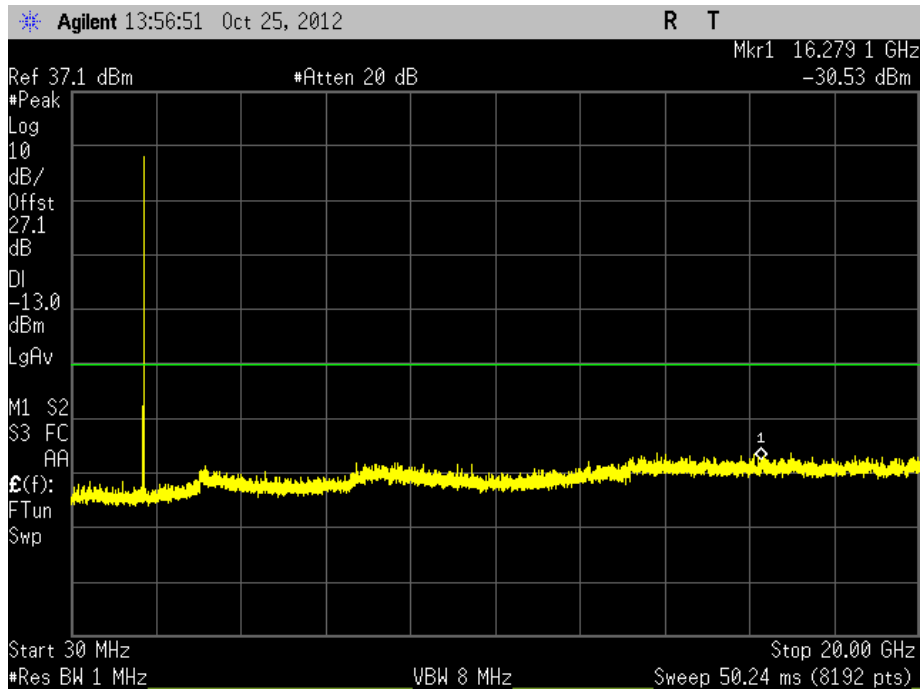
### LTE Band 4 1.4MHz BW High Channel



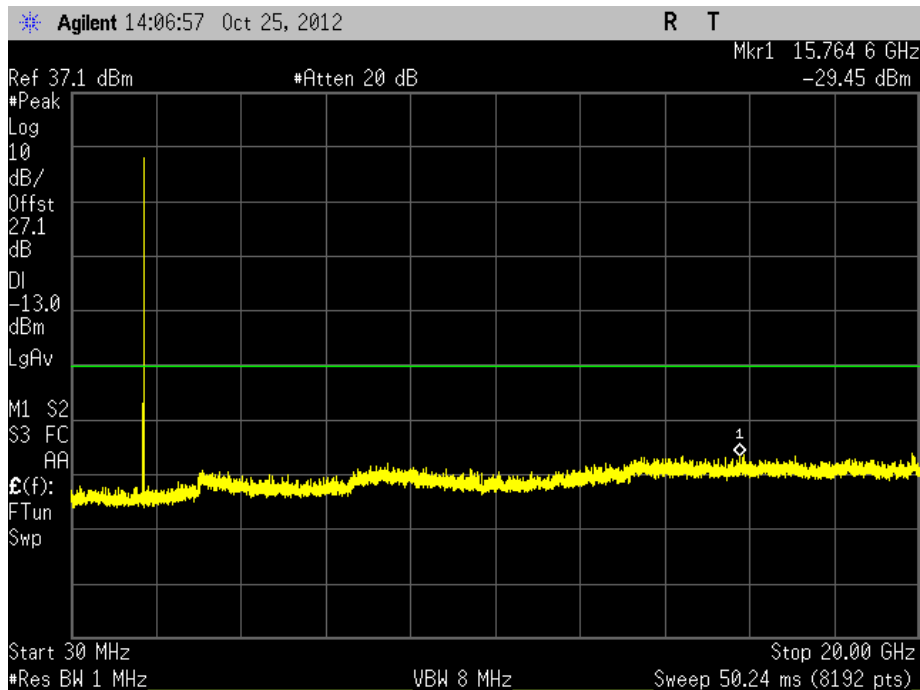
### LTE Band 4 3MHz BW Low Channel



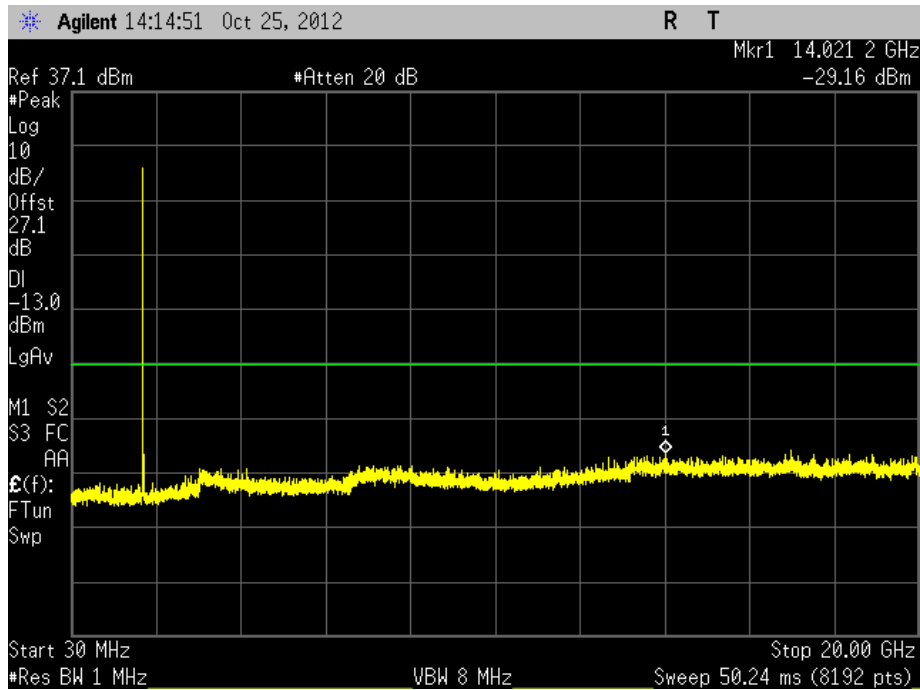
### LTE Band 4 3MHz BW Mid Channel



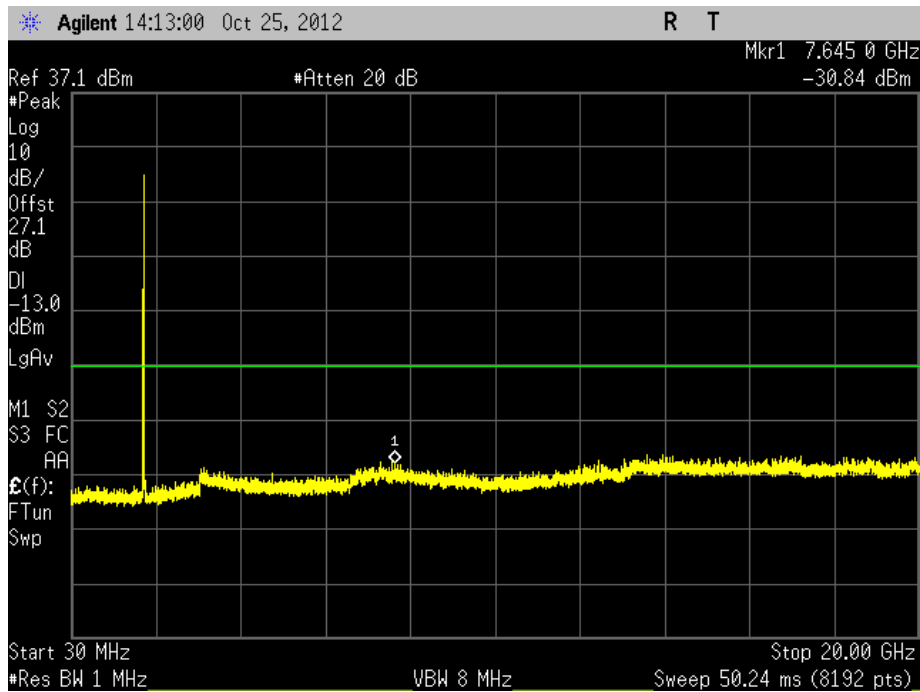
### LTE Band 4 3MHz BW High Channel



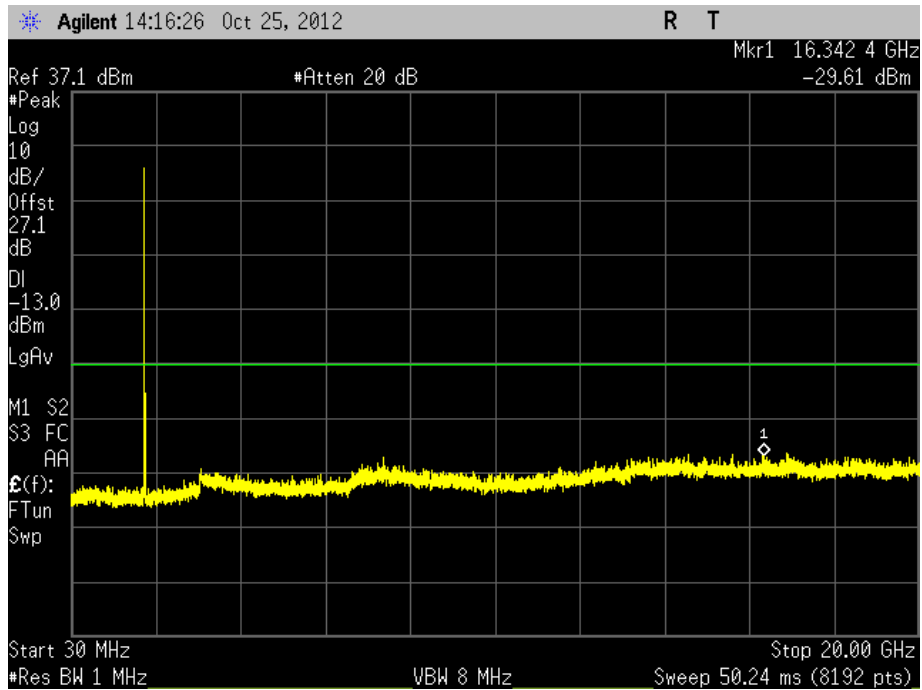
### LTE Band 4 5MHz BW Low Channel



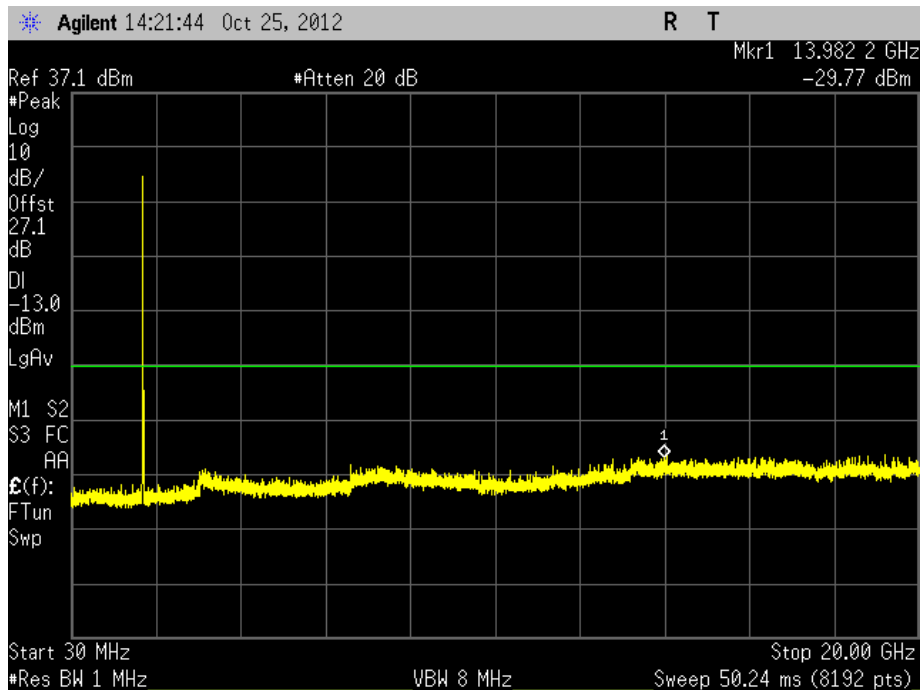
### LTE Band 4 5MHz BW Mid Channel



### LTE Band 4 5MHz BW High Channel

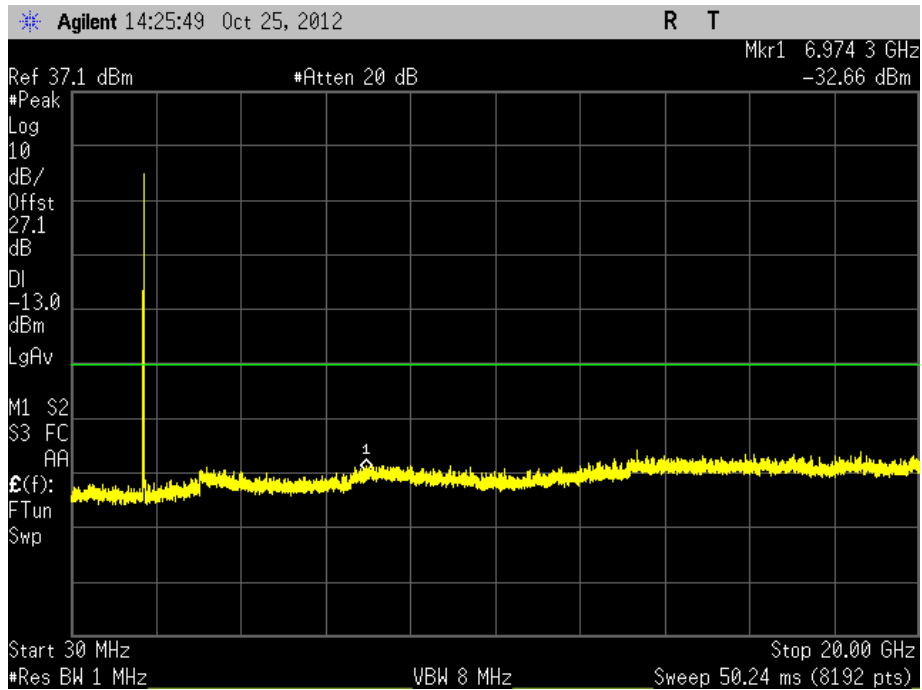


### LTE Band 4 10MHz BW Low Channel

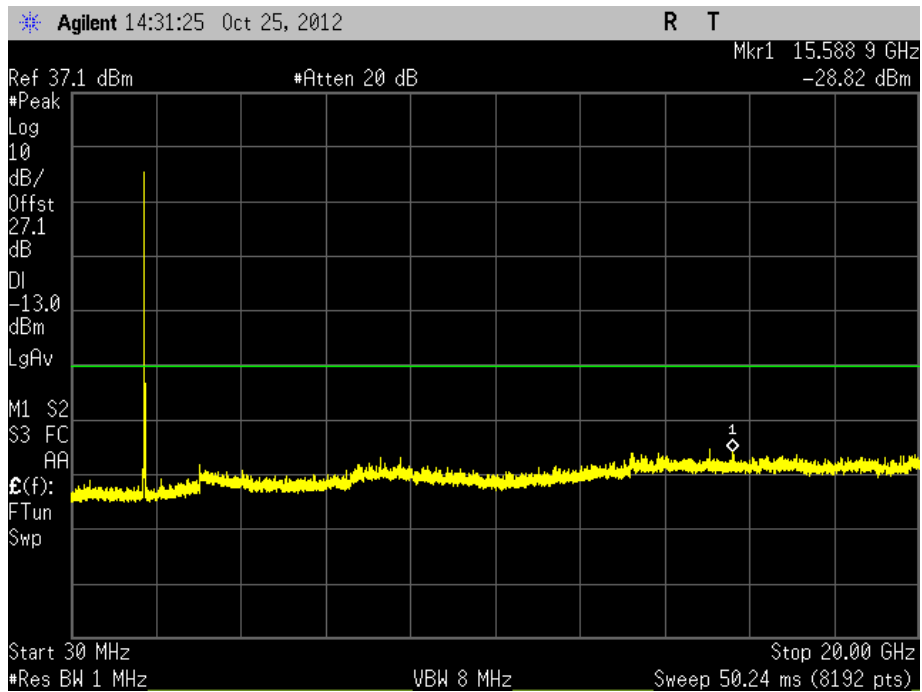




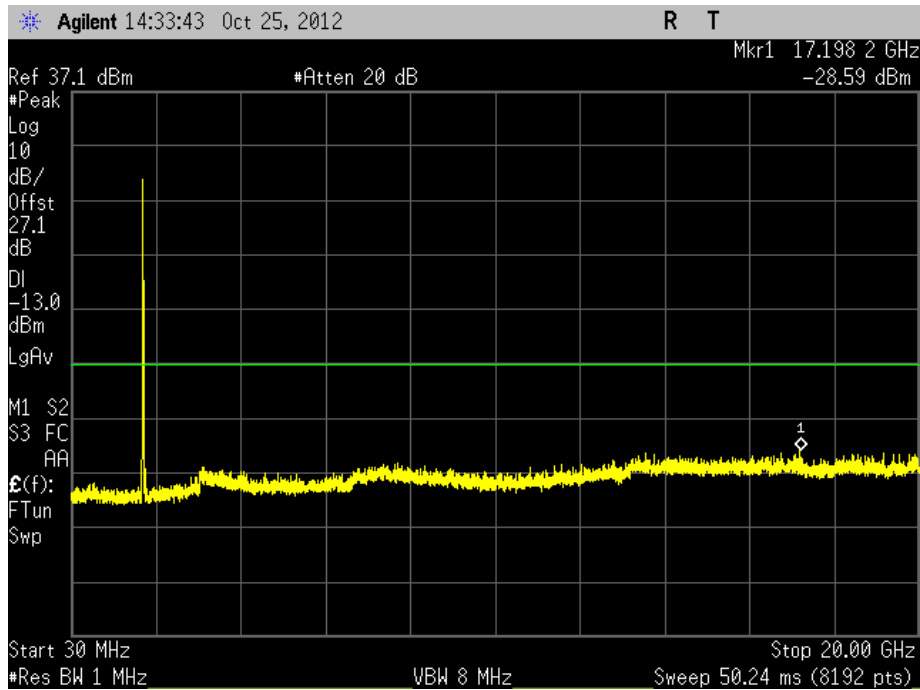
### LTE Band 4 10MHz BW Mid Channel



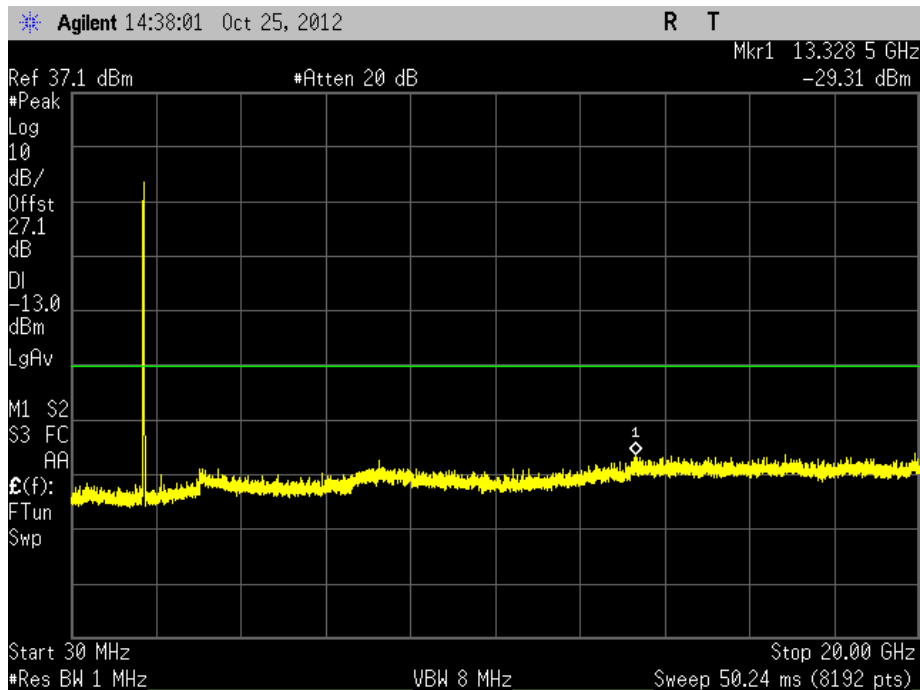
### LTE Band 4 10MHz BW High Channel



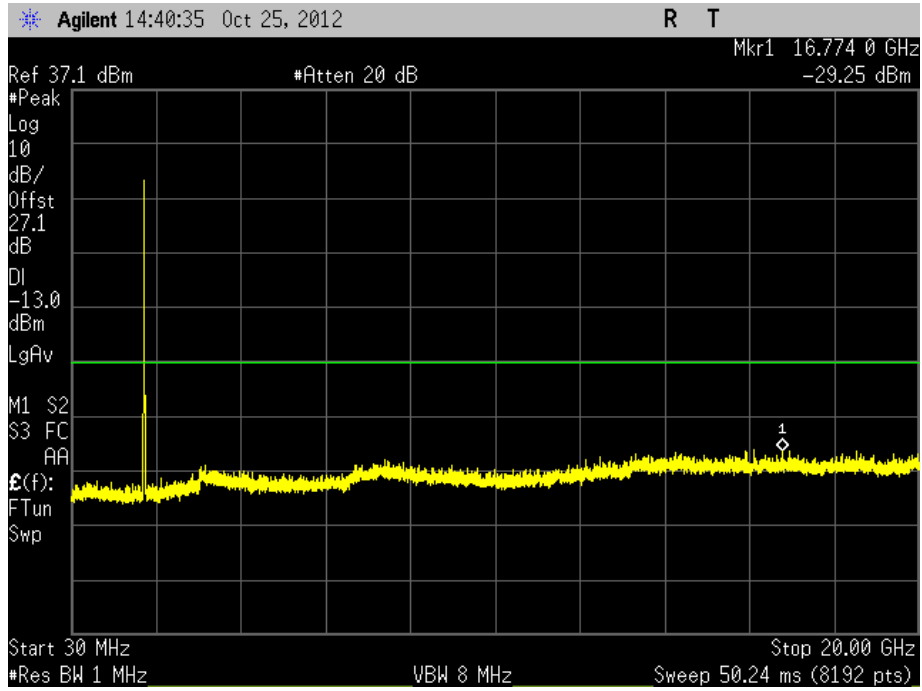
### LTE Band 4 15MHz BW Low Channel



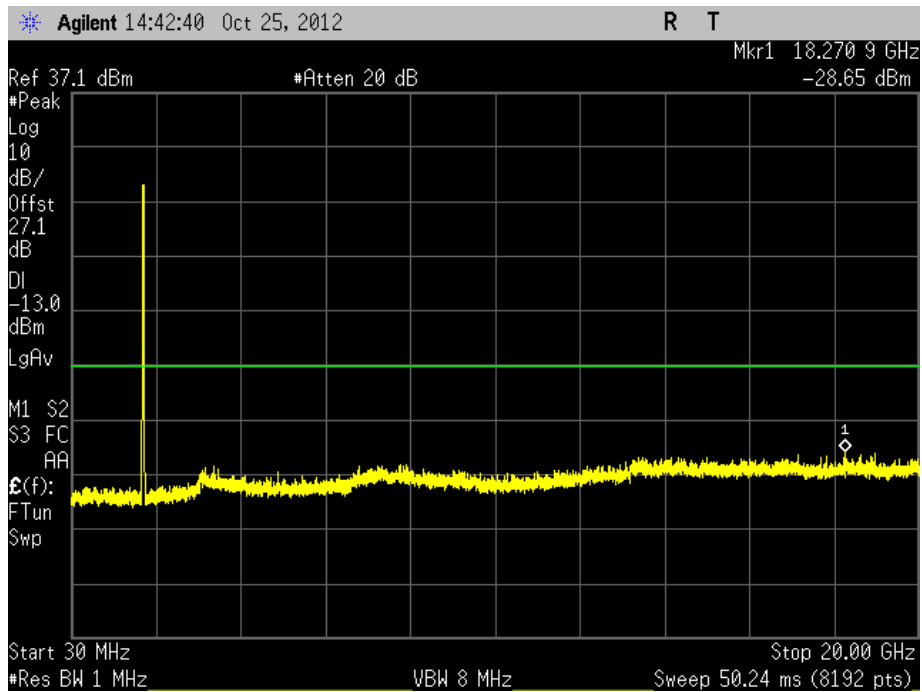
### LTE Band 4 15MHz BW Mid Channel



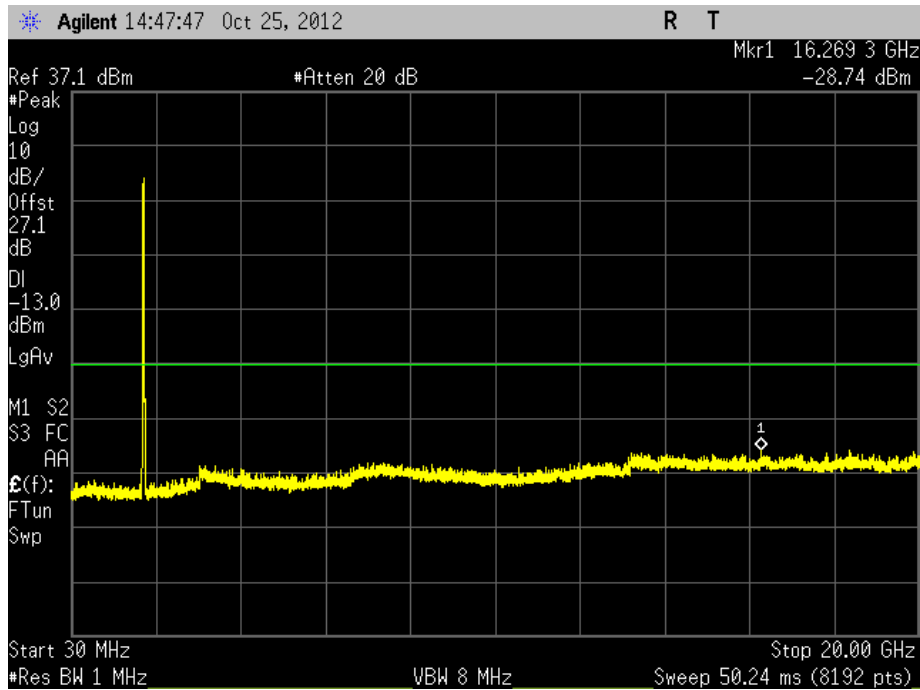
### LTE Band 4 15MHz BW High Channel



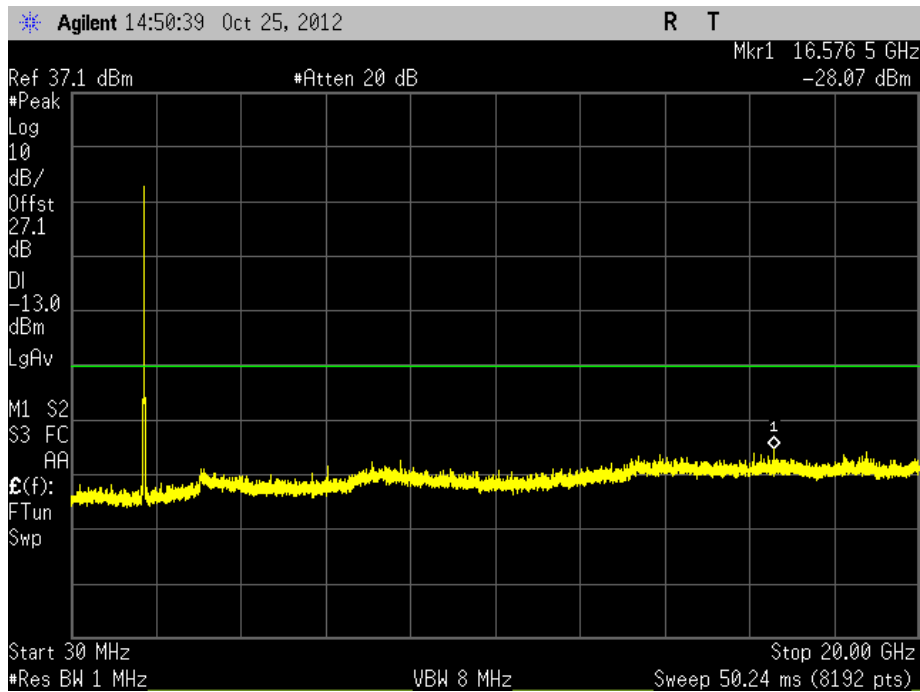
### LTE Band 4 20MHz BW Low Channel



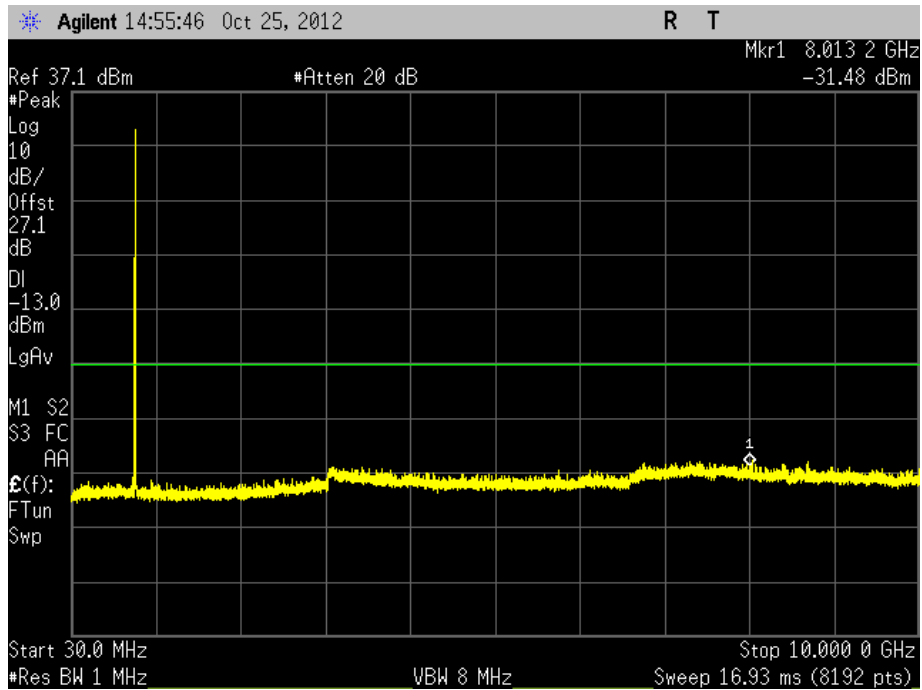
### LTE Band 4 20MHz BW Mid Channel



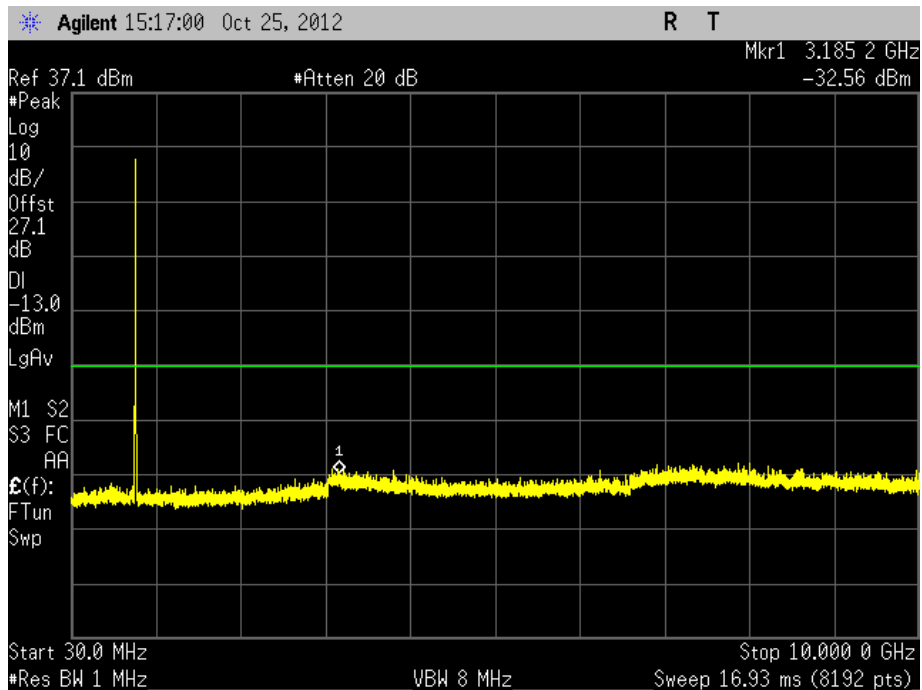
### LTE Band 4 20MHz BW High Channel



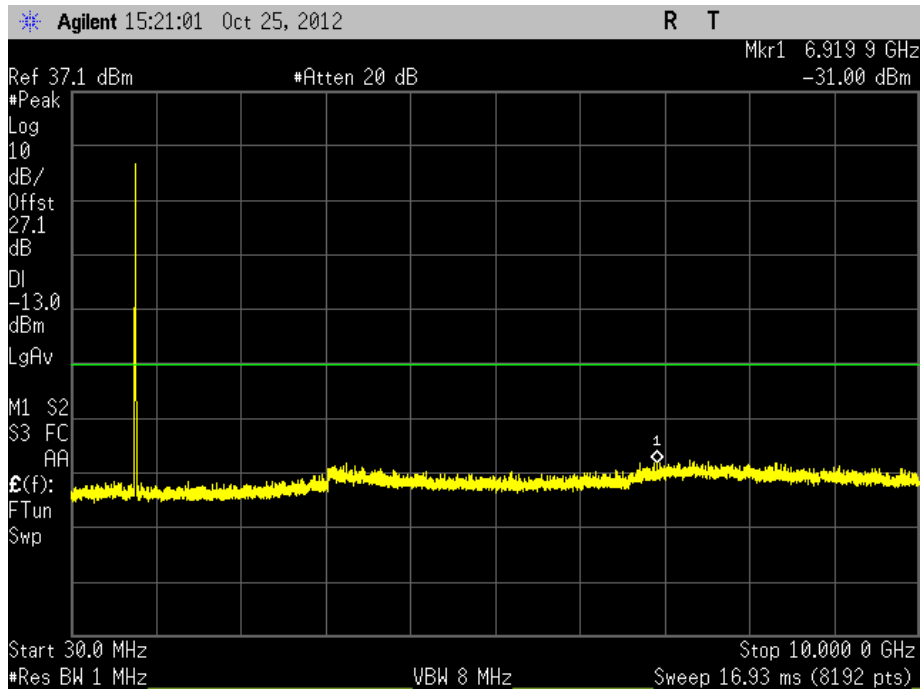
### LTE Band 13 5MHz BW Low Channel



### LTE Band 13 5MHz BW High Channel



LTE Band 13 10MHz BW Mid Channel



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

### **2.8.1 Specification Reference**

Part 27 Subpart C §27.53(c) and (h) and Part 2.1053, RSS-139 Issue 2(6.5)

### **2.8.2 Standard Applicable**

c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB; (5) Compliance with the provisions of paragraphs (c)(1) is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

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

Serial No: UB010912700038 / Test Configuration B

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

October 11, 2012/JMG

### **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**

Ambient Temperature	25.0°C
Relative Humidity	48.0%
ATM Pressure	98.9 kPa

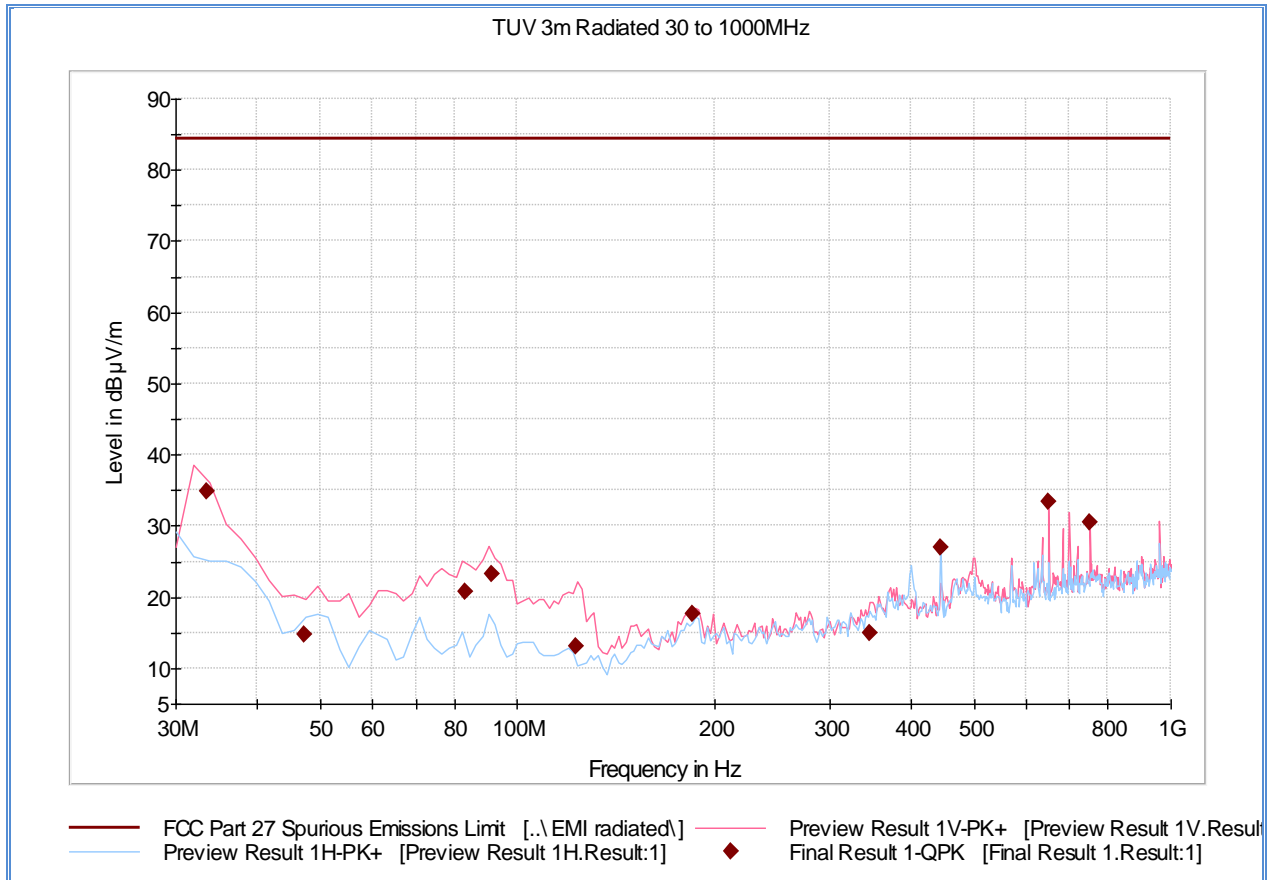
### **2.8.7 Additional Observations**

- 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.

### **2.8.8 Test Results**

See attached plots.

**2.8.9 Test Results Below 1GHz-**



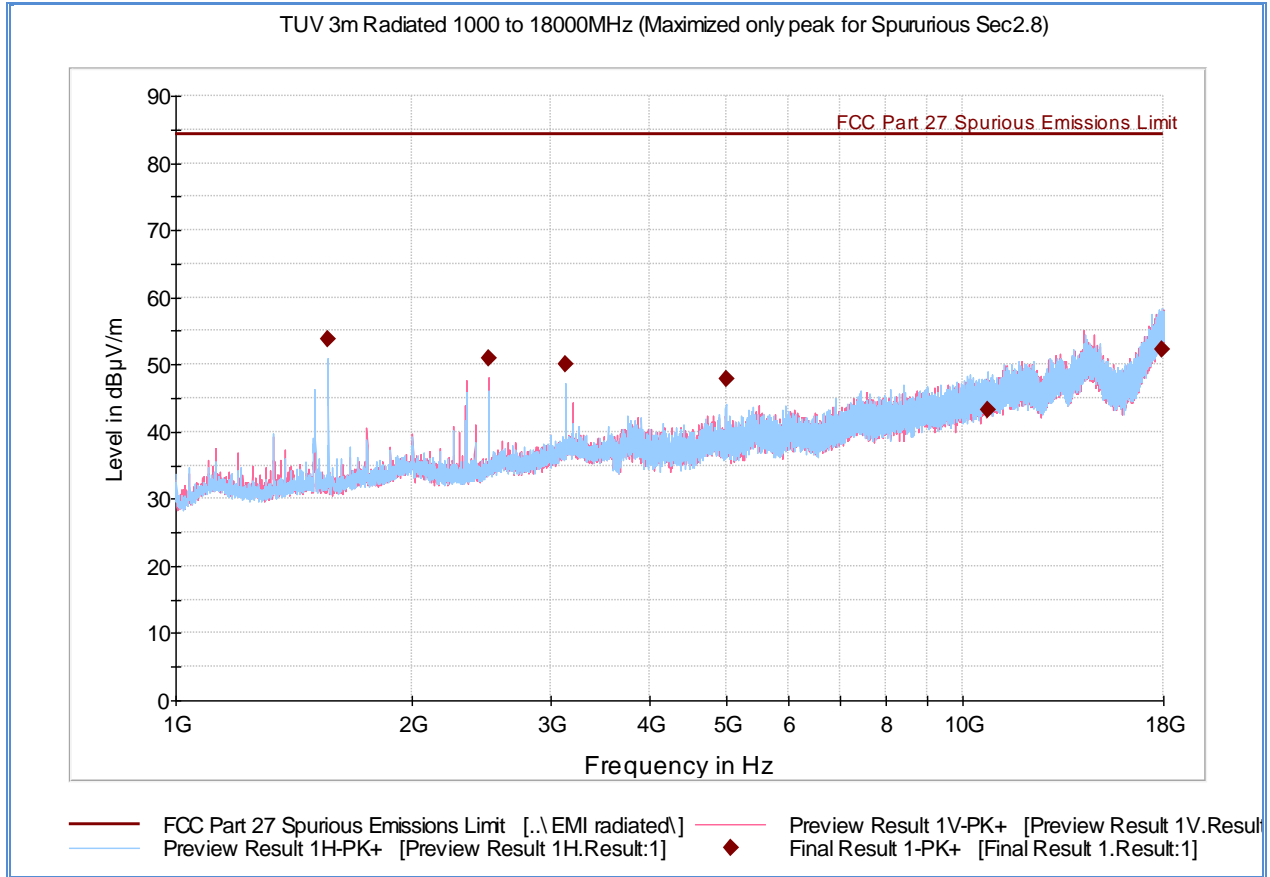
**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.400000	34.9	1000.0	120.000	100.0	V	210.0	-13.8	49.5	84.4
47.118878	14.7	1000.0	120.000	100.0	V	137.0	-19.4	69.7	84.4
83.364970	20.8	1000.0	120.000	142.0	V	110.0	-21.4	63.6	84.4
91.500521	23.3	1000.0	120.000	100.0	V	68.0	-20.6	61.1	84.4
122.586613	13.1	1000.0	120.000	100.0	V	162.0	-20.7	71.3	84.4
185.694910	17.7	1000.0	120.000	100.0	V	111.0	-16.6	66.7	84.4
345.853707	15.0	1000.0	120.000	111.0	V	337.0	-10.5	69.4	84.4
443.168096	26.9	1000.0	120.000	100.0	H	128.0	-8.5	57.5	84.4
650.020200	33.3	1000.0	120.000	100.0	V	105.0	-4.7	51.1	84.4
750.022365	30.4	1000.0	120.000	100.0	V	181.0	-1.9	54.0	84.4

**Test Notes:** Only worst case channel presented for spurious emissions below 1GHz. Emissions profile between Band 4 and 13 are identical below 1GHz. Plot presented is Band 4, low channel, 1.4MHz channel bandwidth with RB size/offset of 3/1. Emissions within 20dB of the limit are proven by substitution method. However no such emission observed.



**2.8.10 Test Results Above 1GHz (Low Channel - Worst Case Configuration Band 13)**



**Peak Data**

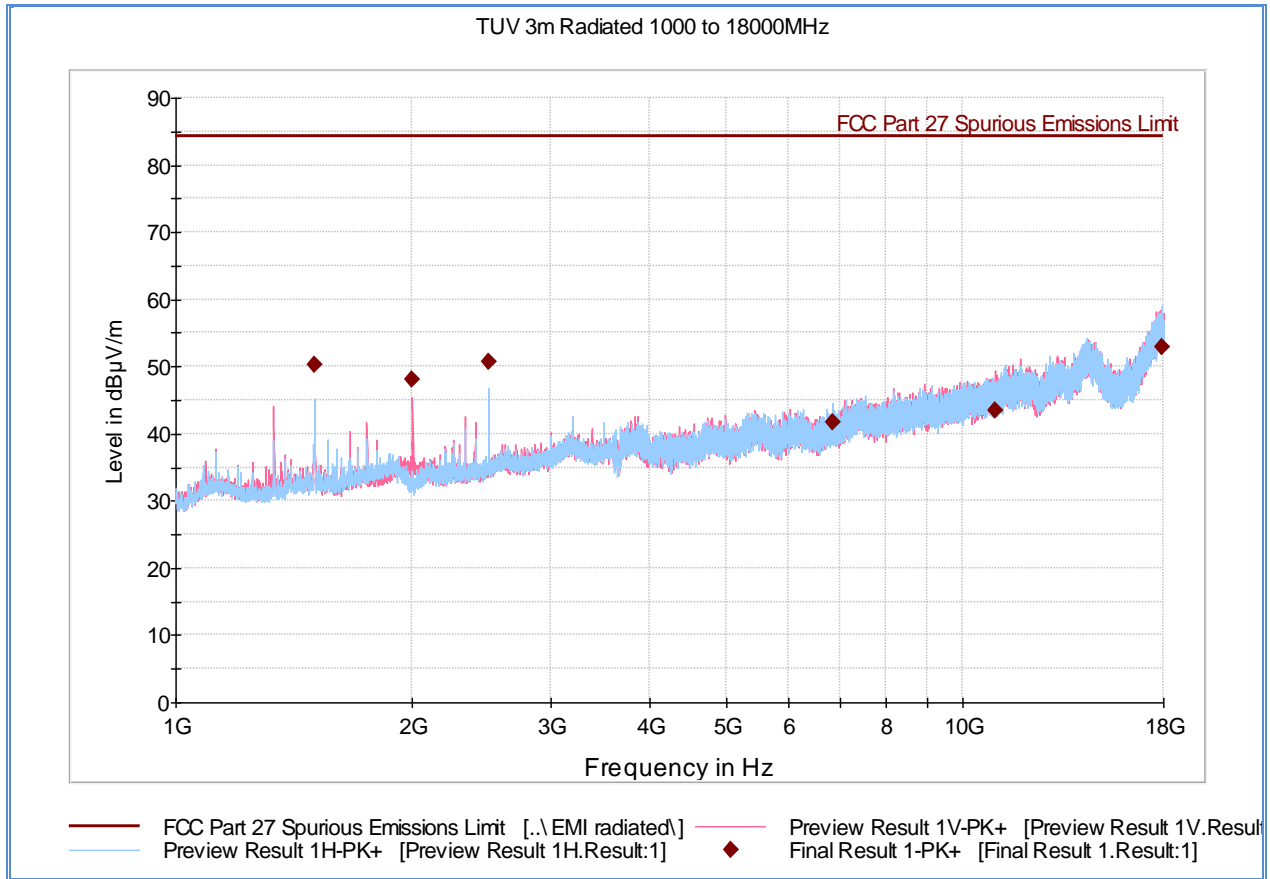
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1563.320000	53.7	105.0	H	159.0	-8.9	30.7	84.4
2500.026667	50.9	101.0	V	327.0	-4.7	33.5	84.4
3126.473333	50.1	106.0	H	100.0	-1.9	34.3	84.4
5000.000000	47.8	101.0	H	226.0	2.3	36.6	84.4
10755.92000	43.3	132.0	H	208.0	11.1	41.1	84.4
17922.62666	52.2	156.0	H	232.0	21.4	32.2	84.4

**Substitution Data**

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

**Test Notes:** Measurement was performed with a 900MHz High Pass filter. Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

**2.8.11 Test Results Above 1GHz (Mid Channel - Worst Case Configuration Band 13)**



**Peak Data**

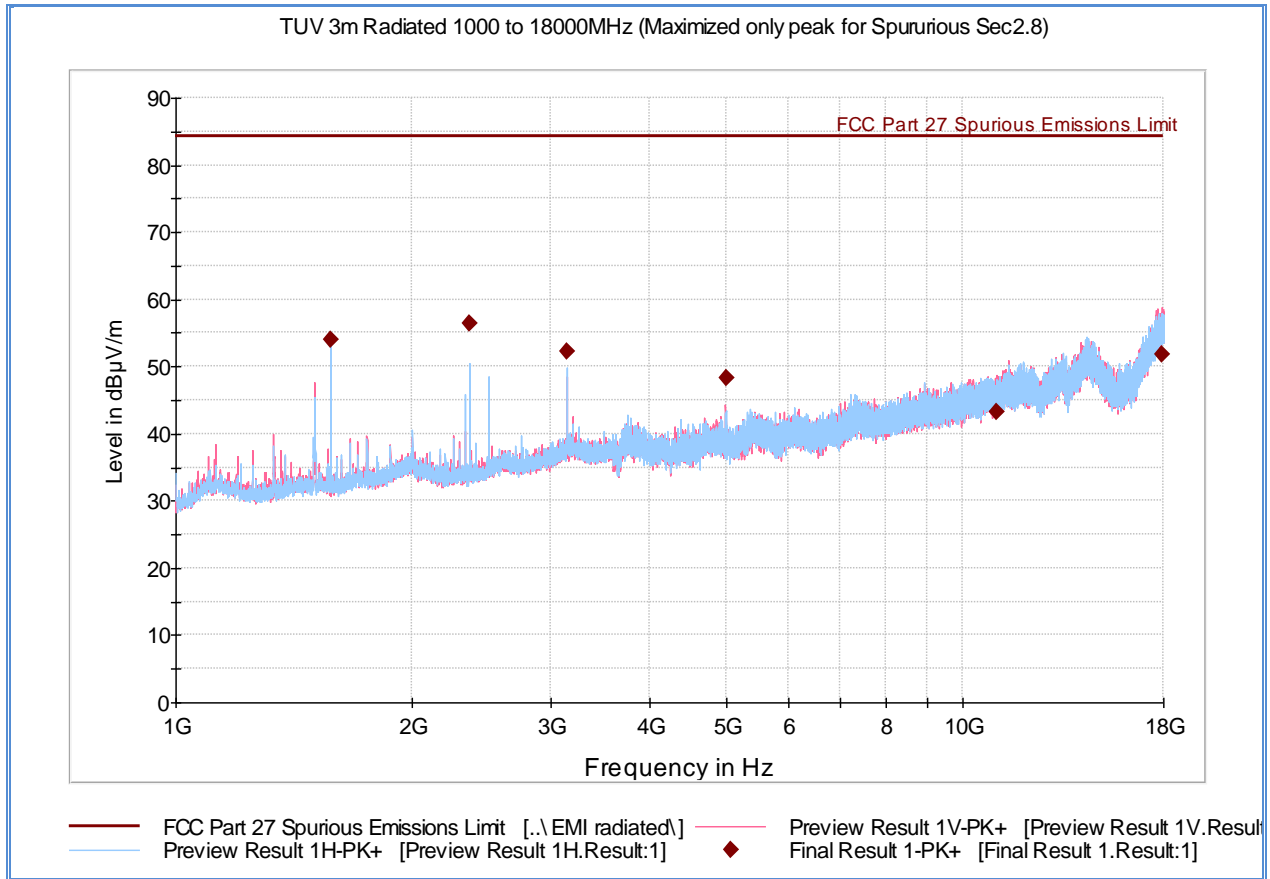
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1500.020000	50.2	100.0	H	277.0	-9.0	34.2	84.4
2000.020000	48.1	100.0	V	305.0	-6.3	36.3	84.4
2499.986667	50.7	100.0	H	291.0	-4.7	33.7	84.4
6827.706667	41.6	100.0	H	175.0	5.3	42.8	84.4
11005.860000	43.5	208.0	V	176.0	11.5	40.9	84.4
17959.666666	52.9	400.0	H	287.0	21.6	31.5	84.4

**Substitution Data**

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

**Test Notes:** Measurement was performed with a 900MHz High Pass filter. Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

**2.8.12 Test Results Above 1GHz (High Channel - Worst Case Configuration Band 17)**



**Peak Data**

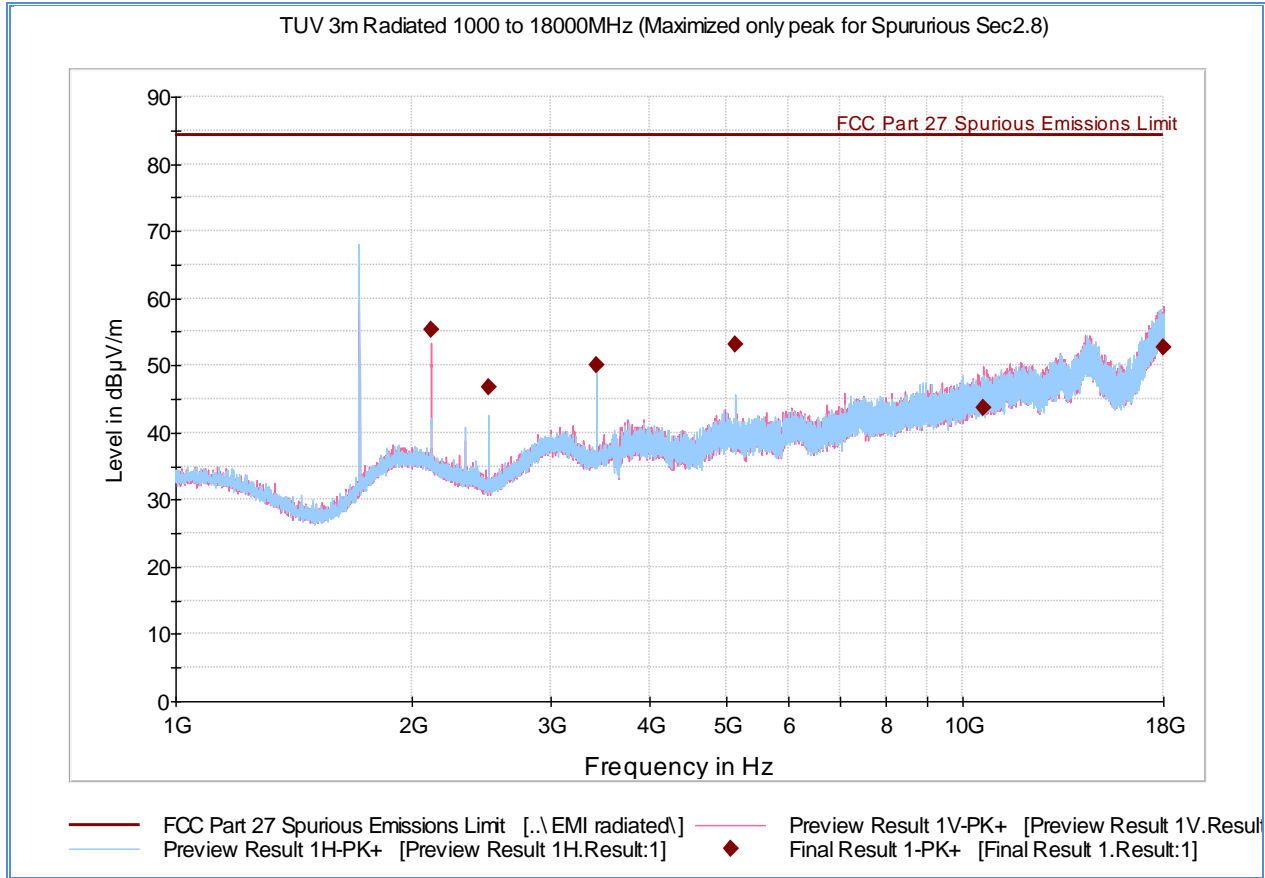
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1573.320000	54.0	101.0	H	104.0	-8.9	30.4	84.4
2359.820000	56.4	101.0	H	132.0	-5.1	28.0	84.4
3146.833333	52.3	106.0	H	306.0	-1.8	32.1	84.4
4999.993333	48.3	108.0	V	308.0	2.3	36.1	84.4
11030.42000	43.1	164.0	V	121.0	11.6	41.3	84.4
17949.18000	51.8	153.0	V	208.0	21.6	32.6	84.4

**Substitution Data**

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

**Test Notes:** Measurement was performed with a 900MHz High Pass filter. Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

**2.8.13 Test Results Above 1GHz (Low Channel - Worst Case Configuration Band 4)**



**Peak Data**

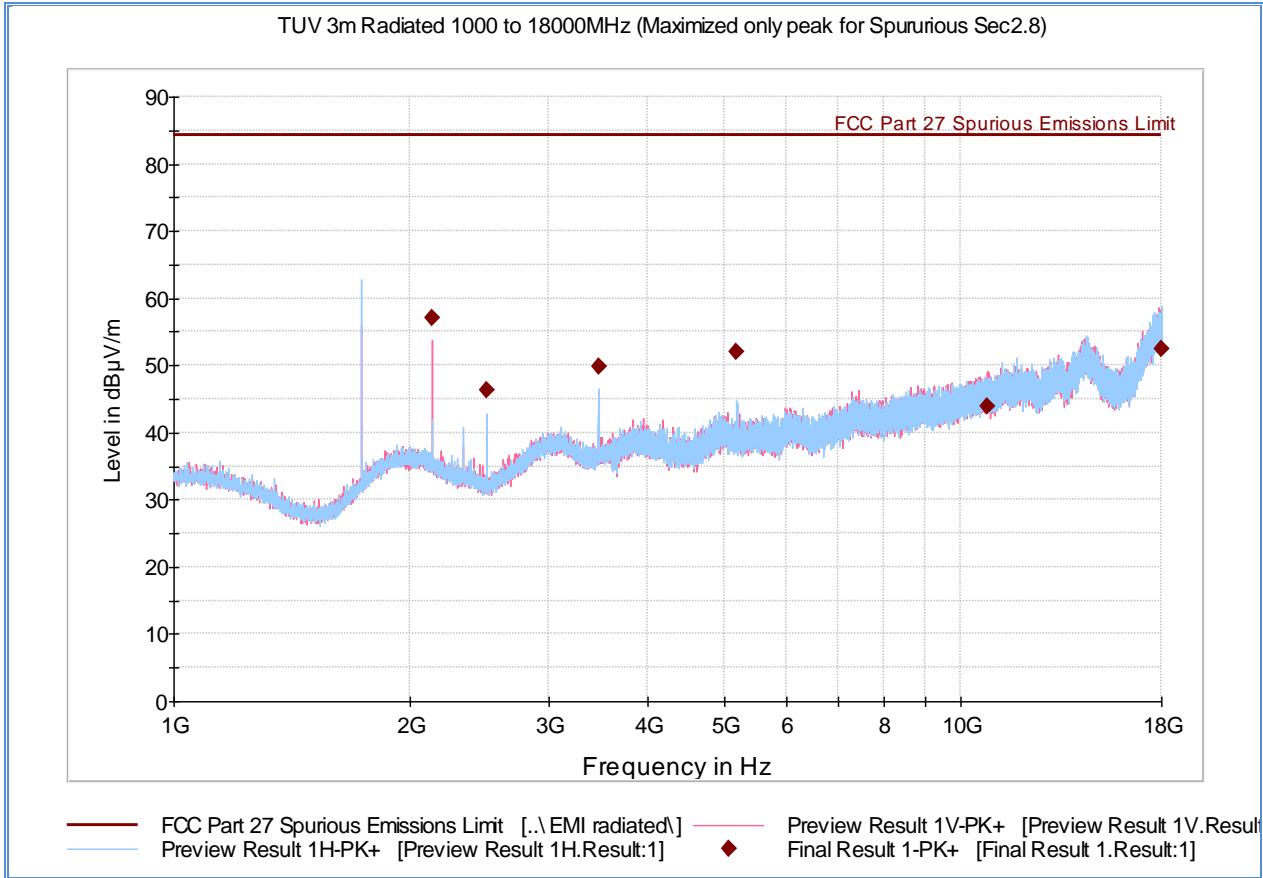
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
2111.260000	55.3	115.0	V	130.0	-6.1	29.1	84.4
2500.020000	46.7	100.0	H	240.0	-4.7	37.7	84.4
3422.840000	50.0	100.0	H	50.0	-0.8	34.4	84.4
5133.566667	53.1	100.0	H	66.0	3.1	31.3	84.4
10619.78666	43.7	139.0	V	201.0	11.0	40.7	84.4
17971.28000	52.6	184.0	V	308.0	21.7	31.8	84.4

**Substitution Data**

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

**Test Notes:** Measurement was performed with a 2.0GHz notch filter. Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

**2.8.14 Test Results Above 1GHz (Mid Channel - Worst Case Configuration Band 4)**



**Peak Data**

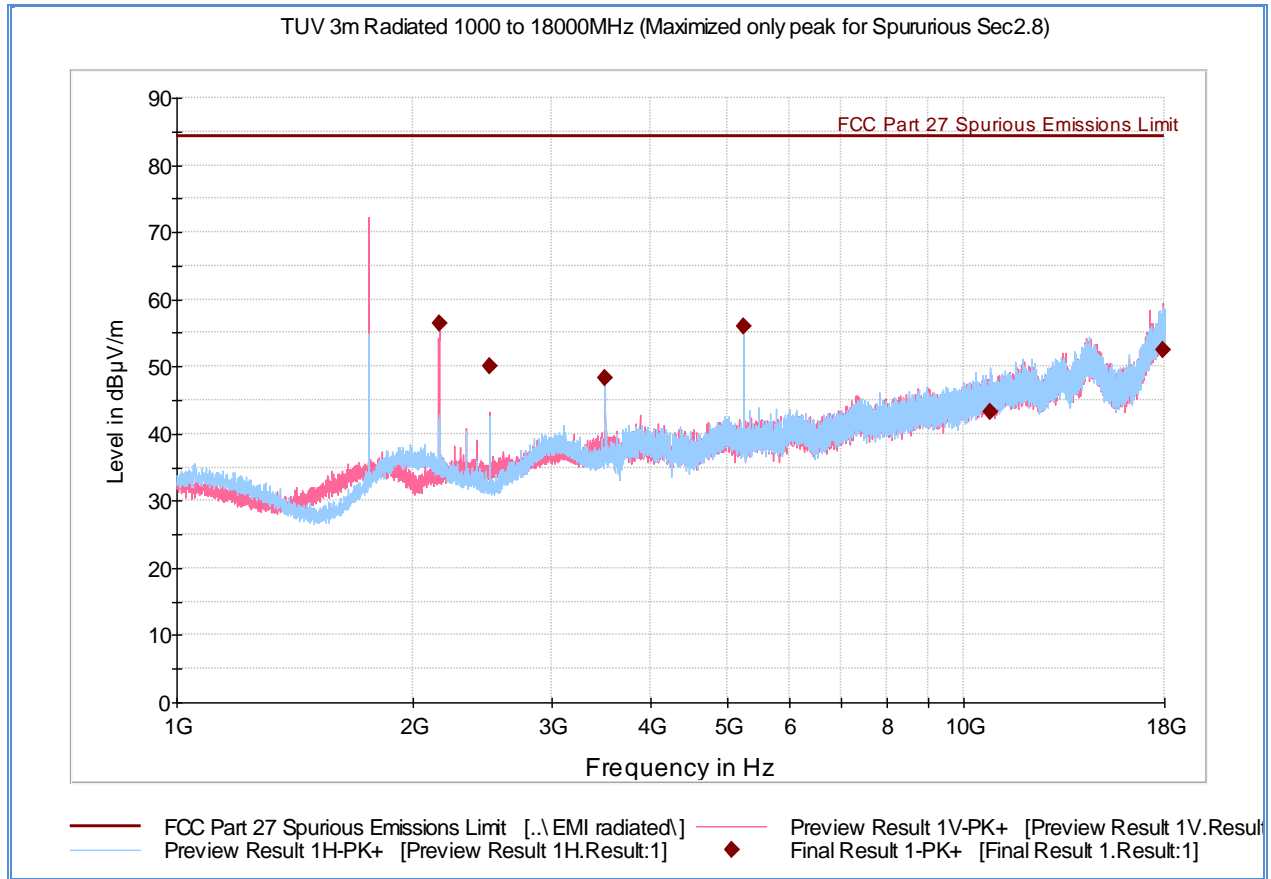
Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
2132.340000	57.0	115.0	V	130.0	-6.1	27.4	84.4
2500.020000	46.4	100.0	H	240.0	-4.7	38.0	84.4
3465.506667	49.8	118.0	H	46.0	-0.7	34.6	84.4
5197.273333	52.0	100.0	H	66.0	3.5	32.4	84.4
10806.466666	43.9	134.0	V	198.0	11.1	40.5	84.4
17964.606666	52.5	115.0	H	213.0	21.7	31.9	84.4

**Substitution Data**

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

**Test Notes:** Measurement was performed with a 2.0GHz notch filter. Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

**2.8.15 Test Results Above 1GHz (High Channel - Worst Case Configuration Band 4)**



**Peak Data**

Frequency (MHz)	MaxPeak-MaxHold (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
2153.600000	56.4	115.0	V	113.0	-6.1	28.0	84.4
2500.020000	50.1	100.0	H	240.0	-4.7	34.3	84.4
3506.100000	48.3	171.0	H	170.0	-0.6	36.1	84.4
5260.900000	55.9	171.0	H	44.0	3.6	28.5	84.4
10797.72666	43.2	168.0	H	198.0	11.1	41.2	84.4
17897.17333	52.4	100.0	V	286.0	21.3	32.0	84.4

**Substitution Data**

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

**Test Notes:** Measurement was performed with a 2.0GHz notch filter. Substitution data not required since margin is >20dB compared to the -13dBm limit (converted to field strength @ 3 meters).

## **2.9 FREQUENCY STABILITY**

### **2.9.1 Specification Reference**

Part 27 Subpart C §27.54 and Part 2.1055(a)(1) and (d)(1), RSS-139(6.3)

### **2.9.2 Standard Applicable**

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

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

Serial No: UB010912700038 / Test Configuration C (USB not connected, battery eliminator utilized)

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

October 23 and 24, 2012/FSC and CF

### **2.9.5 Test Equipment Used**

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

### **2.9.6 Environmental Conditions**

Ambient Temperature	26.1°C
Relative Humidity	47.6%
ATM Pressure	100.1 kPa

### **2.9.7 Additional Observations**

- This is a conducted test. The EUT was operated at 3.7VDC using the battery eliminator unit for testing and was placed in the temperature chamber for this evaluation. The EUT was controlled by a CMW500 outside of the chamber, the CMW500 was also used as the device to measure the frequency error.
- 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 for LTE bands 4 and 13 were then performed. The temperature was then increased by 10°C steps and allowed to settle before taking the next set of measurements.
- To determine worst case configuration for this test, the worst case test results of the conducted band edge were used, see Section 2.6 of this test report for details.

### **2.9.8 Test Results**

See data below

LTE Band 13 – QPSK - Channel 23255– Frequency 784.5MHz – RB 1/24				
<i>Voltage (%)</i>	<i>Power (VDC)</i>	<i>Temp (°C)</i>	<i>Frequency Deviation (Hz)</i>	<i>Complies (Y or N)</i>
100	3.7	-30	7.56	Y (SEE NOTE)
100		-20	5.45	Y (SEE NOTE)
100		-10	3.78	Y (SEE NOTE)
100		0	2.67	Y (SEE NOTE)
100		+10	3.54	Y (SEE NOTE)
100		+20	1.44	Y (SEE NOTE)
100		+30	0.88	Y (SEE NOTE)
100		+40	0.24	Y (SEE NOTE)
100		+50	-1.34	Y (SEE NOTE)
115		4.2	+20	-1.12
85	3.1	+20	-0.89	Y (SEE NOTE)

LTE Band 4 – QPSK - Channel 20375 – Frequency 1752.5MHz RB 1/24				
<i>Voltage (%)</i>	<i>Power (VDC)</i>	<i>Temp (°C)</i>	<i>Frequency Deviation (Hz)</i>	<i>Complies (Y or N)</i>
100	3.7	-30	9.43	Y (SEE NOTE)
100		-20	9.54	Y (SEE NOTE)
100		-10	7.54	Y (SEE NOTE)
100		0	6.73	Y (SEE NOTE)
100		+10	4.23	Y (SEE NOTE)
100		+20	1.44	Y (SEE NOTE)
100		+30	0.88	Y (SEE NOTE)
100		+40	0.24	Y (SEE NOTE)
100		+50	-1.34	Y (SEE NOTE)
115		4.2	+20	-1.12
85	3.1	+20	-0.89	Y (SEE NOTE)

**NOTE:** For both Band 4 and 13 the Frequency deviation was a maximum of 9.54Hz. During bandedge measurements the worst case emission was removed from the bandedge was at least 1 kHz. Therefore this limited amount of deviation confirms the signal remains in the band during the Frequency stability evaluation.



## **2.10 RECEIVER SPURIOUS EMISSIONS**

### **2.10.1 Specification Reference**

RSS-139(6.6) and RSS-GEN Issue 3

### **2.10.2 Standard Applicable**

Receiver spurious emissions shall comply with the limits specified in RSS-Gen.

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

Serial No: UB010912700038 / Test Configuration B

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

October 11, 2012/JMG

### **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	25.0°C
Relative Humidity	48.0%
ATM Pressure	98.9 kPa

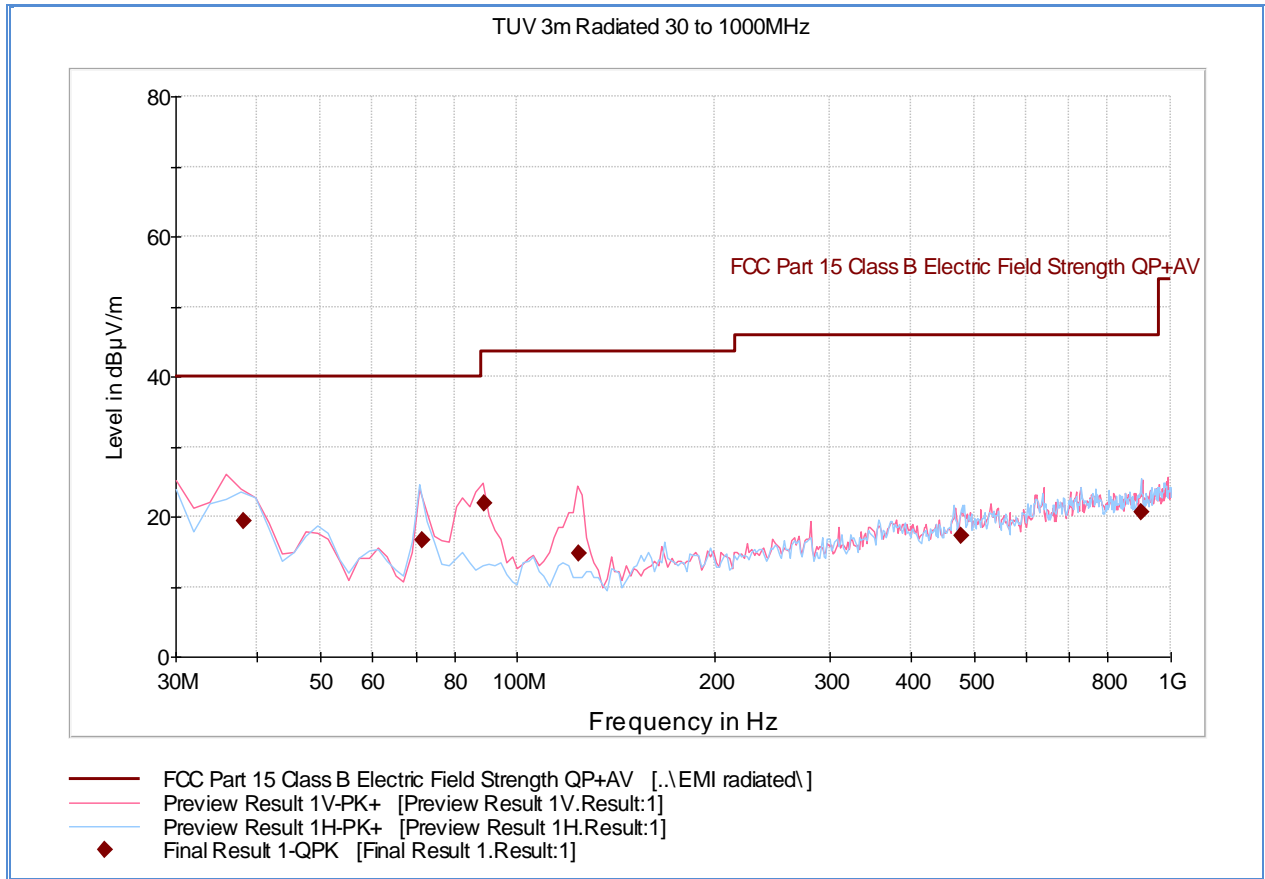
### **2.10.7 Additional Observations**

- This is a radiated test. The spectrum was searched from 30MHz to the 18GHz (6GHz as per requirement).
- Limit used is from FCC §15.209 which is identical to RSS-Gen limits.
- All emissions observed above 1GHz are noise floor measurements.
- 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.

### **2.10.8 Test Results**

See attached plots.

**2.10.9 Test Results Below 1GHz**

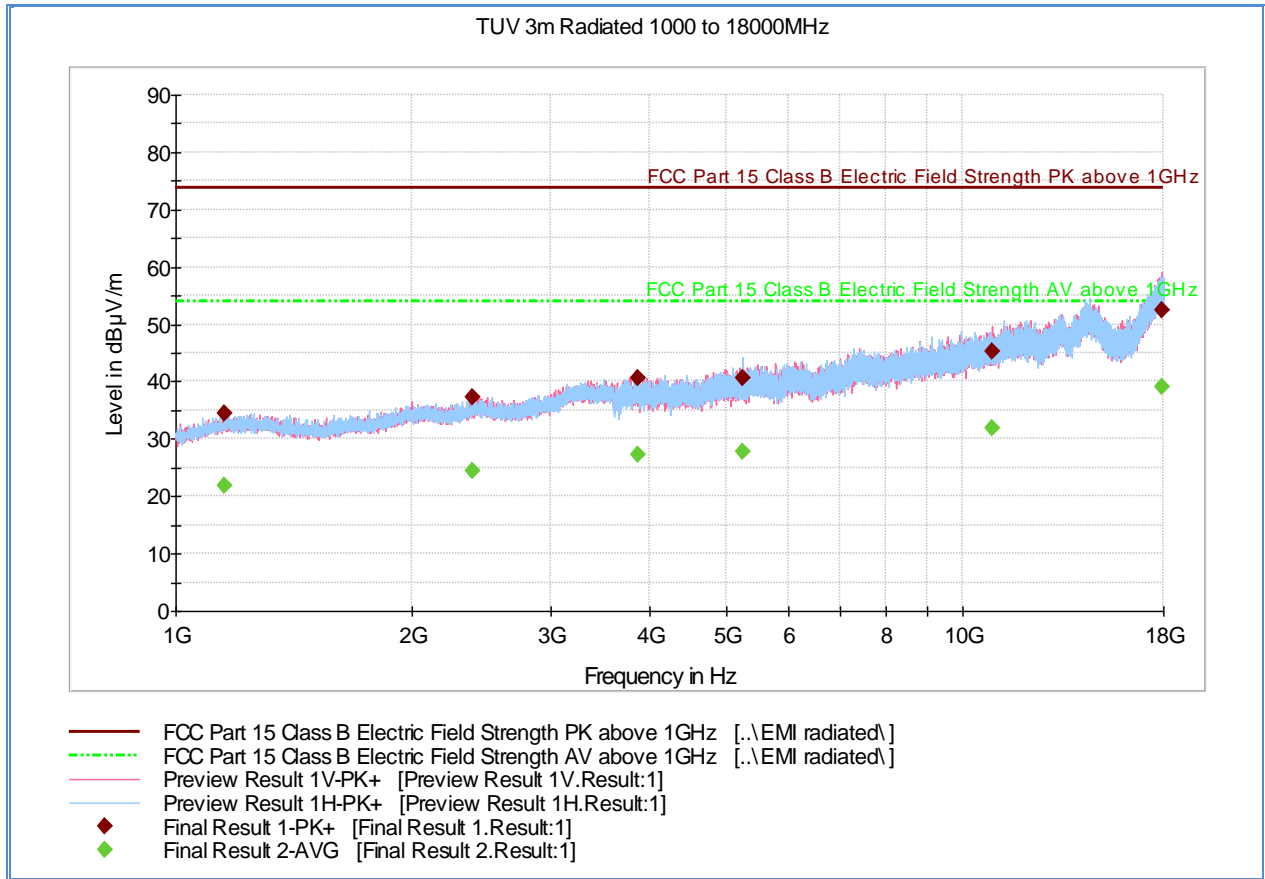


**Quasi Peak Data**

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
38.111663	19.4	1000.0	120.000	117.0	V	18.0	-16.2	20.6	40.0
71.421643	16.7	1000.0	120.000	150.0	H	67.0	-21.9	23.3	40.0
88.772745	21.8	1000.0	120.000	100.0	V	127.0	-21.1	21.7	43.5
124.130501	14.8	1000.0	120.000	150.0	V	296.0	-20.7	28.7	43.5
477.998076	17.3	1000.0	120.000	190.0	H	286.0	-6.4	28.7	46.0
899.197836	20.6	1000.0	120.000	104.0	H	159.0	0.3	25.4	46.0

**Test Notes:** Only worst case channel/configuration presented for spurious emissions below 1GHz. There are no significant emissions variations between modes and configuration when the EUT is on receive mode.

**2.10.10 Test Results Above 1GHz**



**Peak Data**

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1154.520000	34.4	1000.0	1000.000	154.0	V	94.0	-10.0	39.5	73.9
2379.173333	37.2	1000.0	1000.000	298.0	H	4.0	-5.0	36.7	73.9
3871.646667	40.7	1000.0	1000.000	215.0	H	31.0	1.1	33.2	73.9
5252.573333	40.5	1000.0	1000.000	360.0	H	13.0	3.6	33.4	73.9
10916.206667	45.3	1000.0	1000.000	201.0	V	15.0	11.4	28.6	73.9
17929.466667	52.5	1000.0	1000.000	107.0	V	158.0	21.5	21.4	73.9

**Average Data**

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1154.520000	21.8	1000.0	1000.000	154.0	V	94.0	-10.0	32.1	53.9
2379.173333	24.4	1000.0	1000.000	298.0	H	4.0	-5.0	29.5	53.9
3871.646667	27.3	1000.0	1000.000	215.0	H	31.0	1.1	26.6	53.9
5252.573333	27.8	1000.0	1000.000	360.0	H	13.0	3.6	26.1	53.9
10916.206667	31.8	1000.0	1000.000	201.0	V	15.0	11.4	22.1	53.9
17929.466667	39.0	1000.0	1000.000	107.0	V	158.0	21.5	14.9	53.9

**Test Notes:** Only worst case channel/configuration presented for spurious emissions above 1GHz. There are no significant emissions variations between modes and configuration when the EUT is on receive mode.

## 2.11 POWER LINE CONDUCTED EMISSIONS

### 2.11.1 Specification Reference

RSS-Gen 7.2.4

### 2.11.2 Standard Applicable

Except when 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 the table below. The more stringent limit applies at the frequency range boundaries.

The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	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.*

### 2.11.3 Equipment Under Test and Modification State

Serial No: UB010912700038 / Test Configuration A

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

October 17, 2012/FSC

### 2.11.5 Test Equipment Used

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

### 2.11.6 Environmental Conditions

Ambient Temperature	24.8°C
Relative Humidity	49.8%
ATM Pressure	99.9 kPa

### 2.11.7 Additional Observations

- The EUT is a battery powered device however with provision to connect to public AC mains via supplied AC adapter/charger.

- The EUT was verified using worst case configuration (worst case channel/mode). The EUT was set to transmit max. power while plugged into the AC adapter.
- EUT verified using input voltage of 120VAC 60Hz.
- Limit used is from FCC §15.207 which is identical to RSS-Gen limits.
- 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 2.11.8 for sample computation.

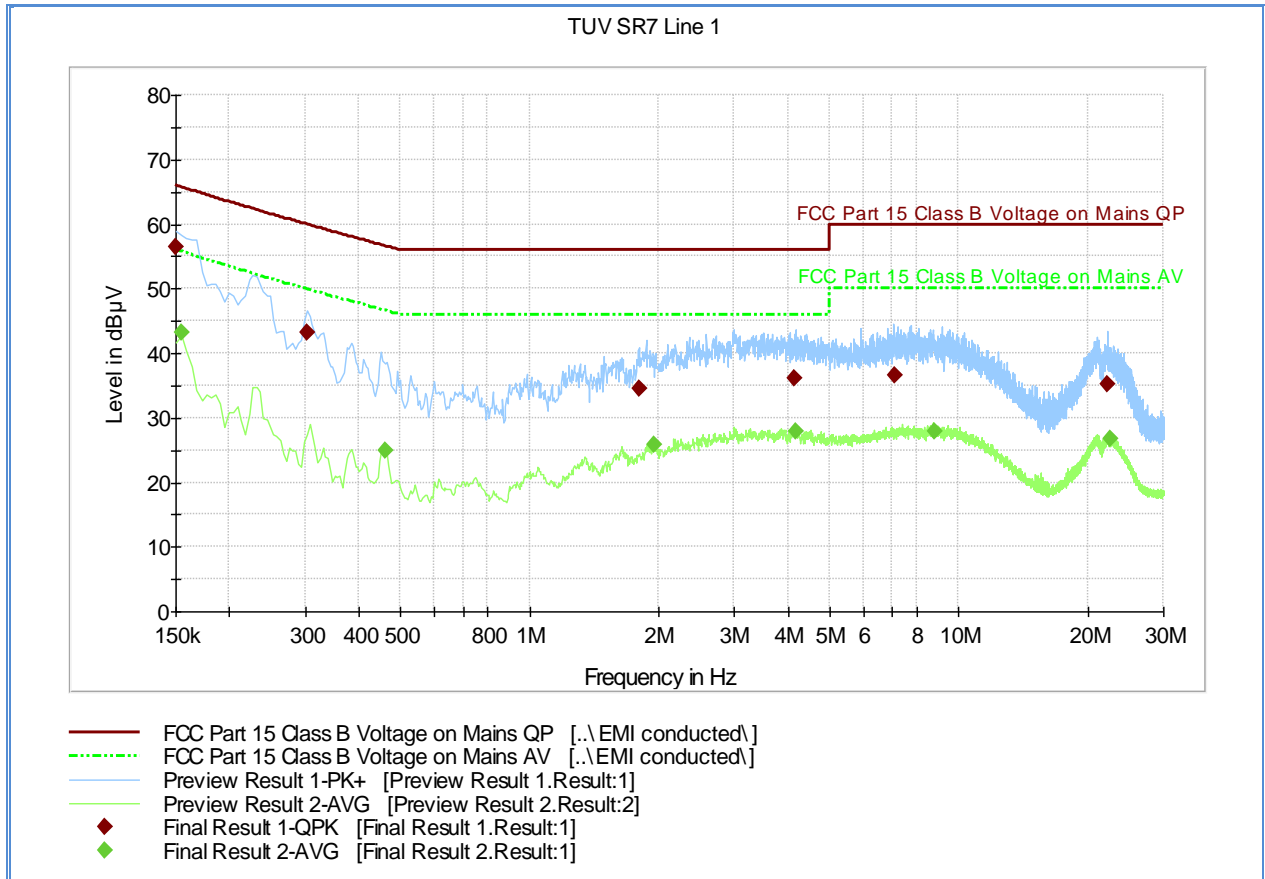
**2.11.8 Sample Computation (Conducted Emission – Quasi Peak)**

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
Reported QuasiPeak Final Measurement (db $\mu$ V) @ 150kHz		26.2

**2.11.9 Test Results**

Compliant. See attached plots and tables.

2.11.10 Line 1 (Hot) LTE Band 4



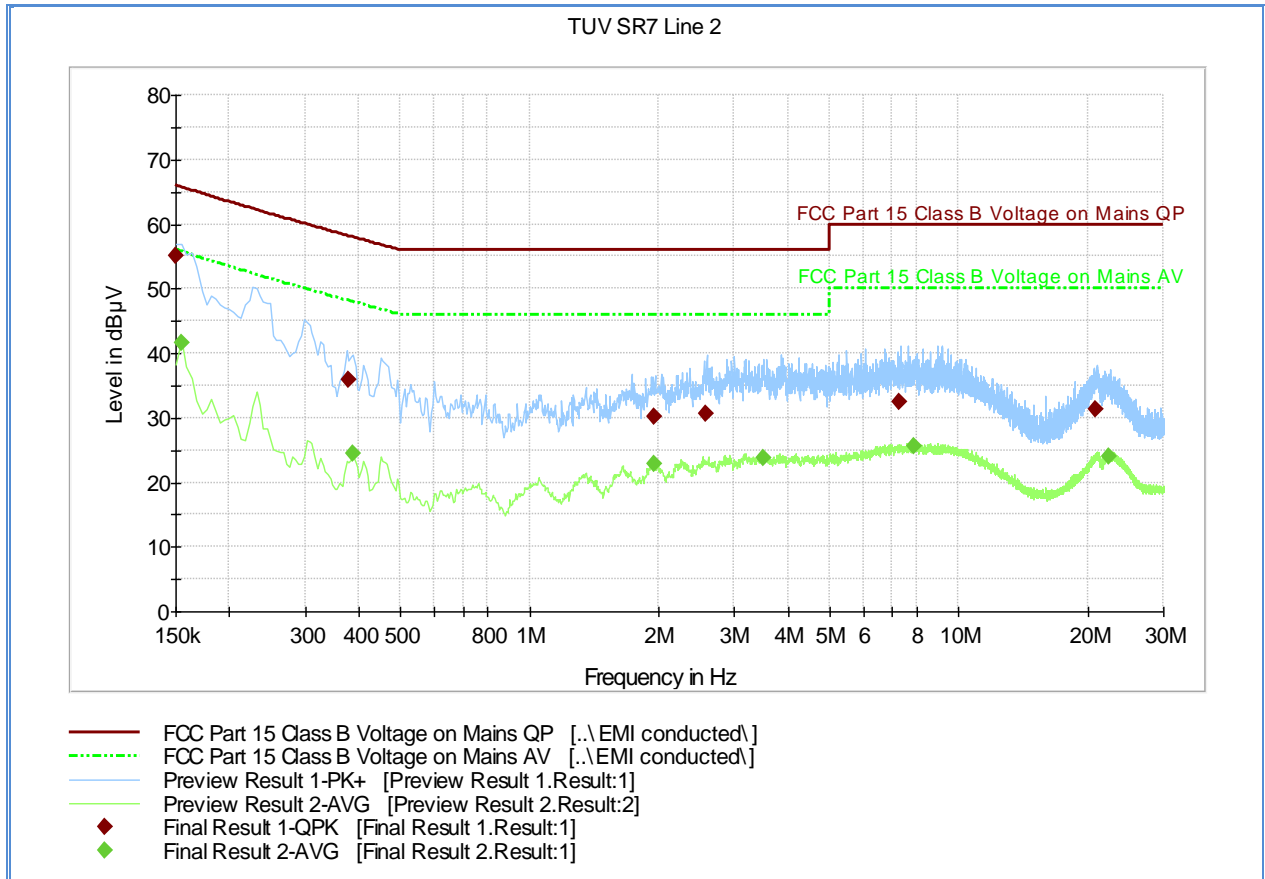
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	56.4	1000.0	9.000	Off	L1	19.6	9.6	66.0
0.303000	43.3	1000.0	9.000	Off	L1	19.4	16.7	60.0
1.810500	34.5	1000.0	9.000	Off	L1	20.0	21.5	56.0
4.141500	36.2	1000.0	9.000	Off	L1	20.4	19.8	56.0
7.075500	36.5	1000.0	9.000	Off	L1	20.5	23.5	60.0
22.213500	35.3	1000.0	9.000	Off	L1	20.9	24.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.154500	43.2	1000.0	9.000	Off	L1	19.6	12.5	55.7
0.460500	24.8	1000.0	9.000	Off	L1	19.4	21.8	46.6
1.954500	25.7	1000.0	9.000	Off	L1	20.0	20.3	46.0
4.164000	27.8	1000.0	9.000	Off	L1	20.4	18.2	46.0
8.794500	27.8	1000.0	9.000	Off	L1	20.5	22.2	50.0
22.609500	26.7	1000.0	9.000	Off	L1	20.9	23.3	50.0

2.11.11 Line 2 (Neutral) LTE Band 4



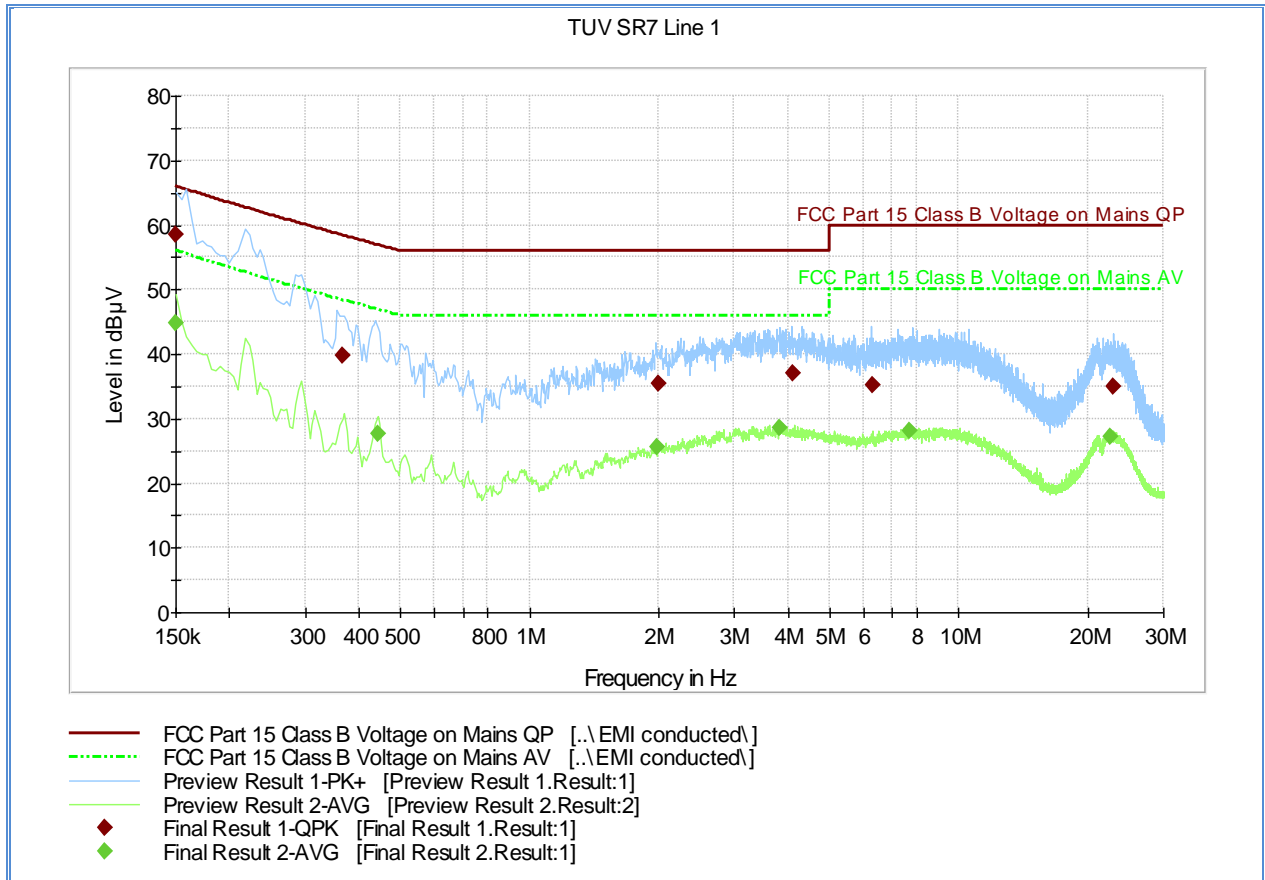
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	55.0	1000.0	9.000	Off	N	19.7	11.0	66.0
0.379500	36.0	1000.0	9.000	Off	N	19.5	22.2	58.1
1.959000	30.1	1000.0	9.000	Off	N	20.6	25.9	56.0
2.584500	30.6	1000.0	9.000	Off	N	20.8	25.4	56.0
7.242000	32.4	1000.0	9.000	Off	N	21.2	27.6	60.0
20.877000	31.3	1000.0	9.000	Off	N	21.5	28.7	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.154500	41.7	1000.0	9.000	Off	N	19.7	14.1	55.7
0.388500	24.5	1000.0	9.000	Off	N	19.5	23.4	47.9
1.954500	23.0	1000.0	9.000	Off	N	20.6	23.0	46.0
3.507000	23.8	1000.0	9.000	Off	N	21.0	22.2	46.0
7.885500	25.6	1000.0	9.000	Off	N	21.2	24.4	50.0
22.317000	24.1	1000.0	9.000	Off	N	21.6	25.9	50.0

2.11.12 Line 1 (Hot) LTE Band 13



Quasi Peak

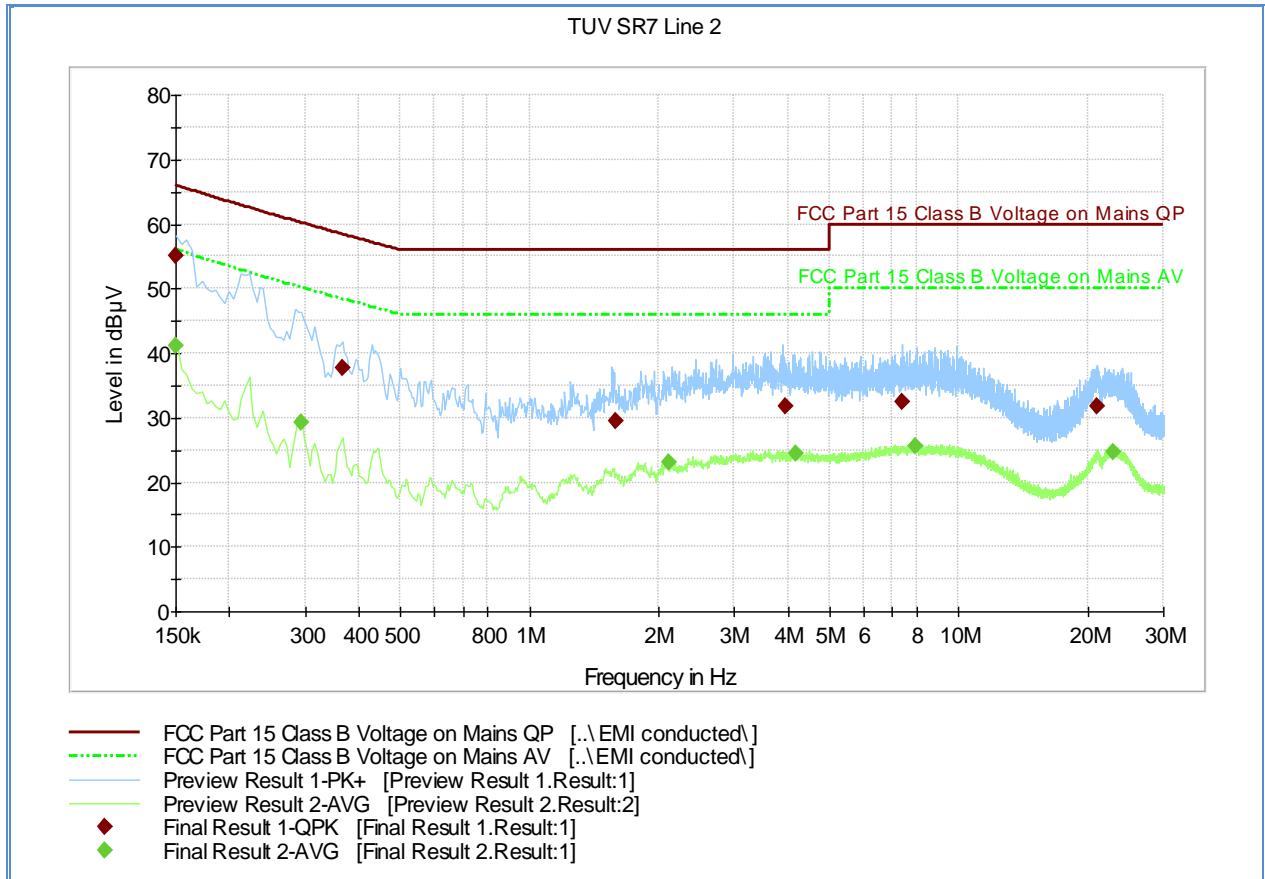
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	58.5	1000.0	9.000	Off	L1	19.6	7.5	66.0
0.366000	39.9	1000.0	9.000	Off	L1	19.4	18.6	58.4
1.999500	35.5	1000.0	9.000	Off	L1	20.0	20.5	56.0
4.096500	37.1	1000.0	9.000	Off	L1	20.4	18.9	56.0
6.315000	35.2	1000.0	9.000	Off	L1	20.5	24.8	60.0
22.960500	34.9	1000.0	9.000	Off	L1	20.9	25.1	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.150000	44.8	1000.0	9.000	Off	L1	19.6	11.2	56.0
0.442500	27.7	1000.0	9.000	Off	L1	19.4	19.2	46.9
1.990500	25.6	1000.0	9.000	Off	L1	20.0	20.4	46.0
3.831000	28.5	1000.0	9.000	Off	L1	20.3	17.5	46.0
7.687500	28.0	1000.0	9.000	Off	L1	20.5	22.0	50.0
22.632000	27.1	1000.0	9.000	Off	L1	20.9	22.9	50.0



2.11.13 Line 2 (Neutral) LTE Band 13



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.150000	55.0	1000.0	9.000	Off	N	19.7	11.0	66.0
0.366000	37.6	1000.0	9.000	Off	N	19.5	20.8	58.4
1.590000	29.5	1000.0	9.000	Off	N	20.4	26.5	56.0
3.934500	31.8	1000.0	9.000	Off	N	21.1	24.2	56.0
7.359000	32.4	1000.0	9.000	Off	N	21.2	27.6	60.0
21.061500	31.7	1000.0	9.000	Off	N	21.5	28.3	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.150000	41.1	1000.0	9.000	Off	N	19.7	14.9	56.0
0.294000	29.2	1000.0	9.000	Off	N	19.5	20.9	50.2
2.107500	23.2	1000.0	9.000	Off	N	20.7	22.8	46.0
4.186500	24.4	1000.0	9.000	Off	N	21.1	21.6	46.0
7.903500	25.6	1000.0	9.000	Off	N	21.2	24.4	50.0
22.902000	24.7	1000.0	9.000	Off	N	21.6	25.3	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
<b>Conducted Port Setup</b>						
6814	PSA Series Spectrum Analyzer	E4440A	MY42510441	Agilent	11/03/11	11/03/12
6610	Temperature Chamber	SH-27C	EV03	Envirotronics	06/29/12	06/29/13
7571	Wideband Radio Communication Tester	CMW 500	1201.0002k50/103829	Rhode & Schwarz	04/04/12	04/04/13
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	02/24/12	02/24/14
7570	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240588	Agilent	02/14/12	02/24/13
<b>Conducted Emissions Test Setup</b>						
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	05/24/12	05/24/13
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	05/24/12	05/24/13
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	02/29/12	02/28/13
8607	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
8609	20dB Attenuator	CAT-20	N/A	MCL HAT-20	08/21/12	08/21/13
<b>Radiated Test Setup</b>						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	12/06/11	12/06/12
6669	Double-ridged waveguide horn antenna	3115	94124364	EMCO	11/07/11	11/07/12
1051	Double-ridged waveguide horn antenna	3115	9408-4329	EMCO	01/04/12	01/04/13
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/21/12	09/21/13
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	09/21/12	09/21/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/10/12	08/10/13
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	06/13/12	06/13/13
1016	Pre-amplifier	PAM-0202	187	PAM	09/24/12	09/24/13
7546	Signal Generator	SMP-02	1035.5005.02	Rhode & Schwarz	06/15/12	06/15/13
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	Verified by 7546 and 1049	
1150	Horn antenna	RA42-K-F-4B-C	012054-004	CMT	Verified by 7546 and 1049	
	2.0GHz Band Notch Filter	BRM50707	005	Micro-Tronics	Verified by 7546 and 1049	
6815	2.4GHz Band Notch Filter	BRM50702	008	Micro-Tronics	Verified by 7546 and 1049	
<b>Miscellaneous</b>						
6452	Multimeter	3478A	2911A52177	Hewlett Packard	07/16/12	07/16/13
	Test Software	EMC32	V8.52	Rhode & Schwarz	N/A	

### 3.2 MEASUREMENT UNCERTAINTY

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

#### 3.2.1 Radiated Emission 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	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty ( $u_c$ ):					2.23
Coverage Factor (k):					2
Expanded Uncertainty:					4.45

#### 3.2.2 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	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty ( $u_c$ ):					2.22
Coverage Factor (k):					2
Expanded Uncertainty:					4.44

#### 3.2.3 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

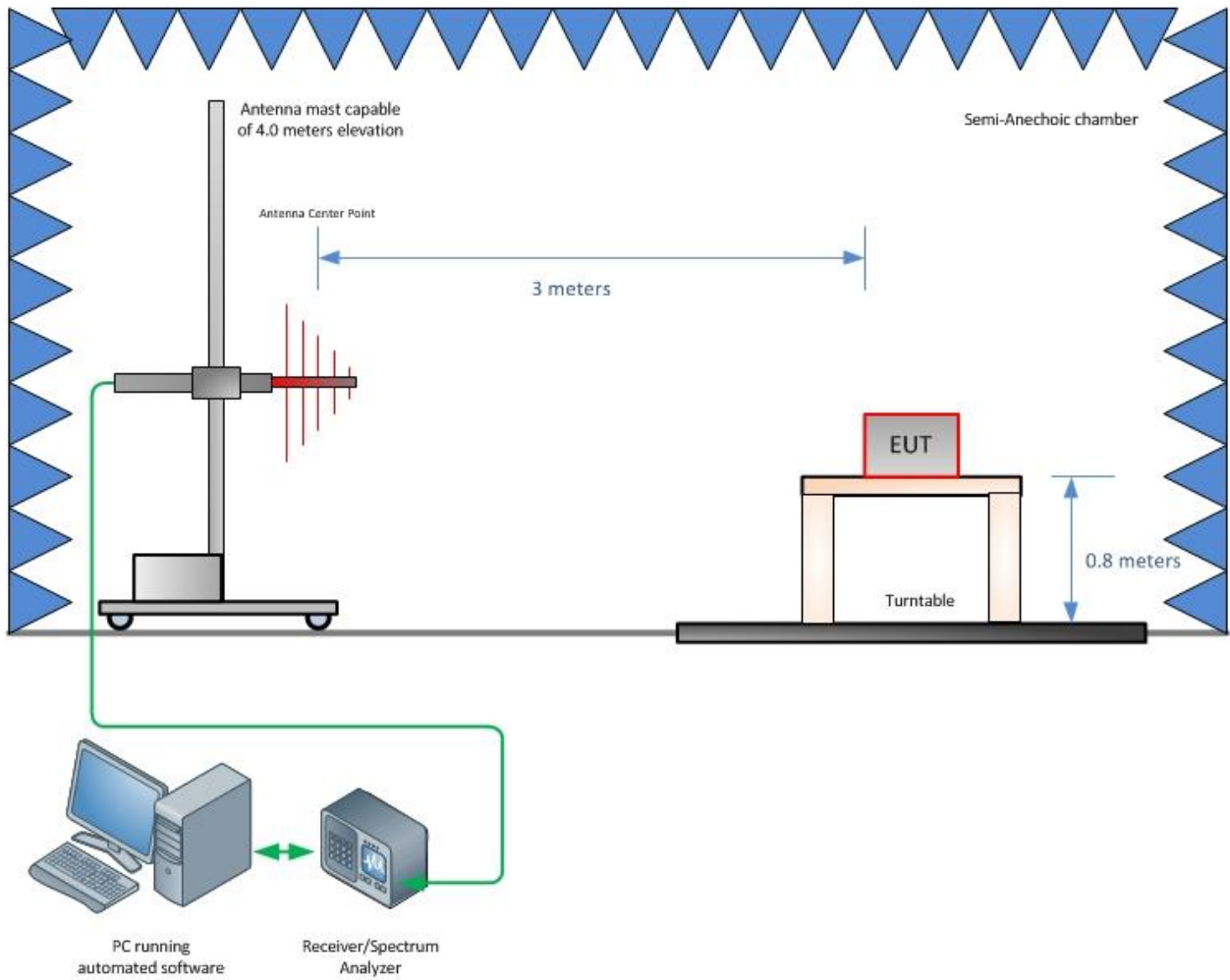
### 3.2.4 AC Mains Conducted Emissions Measurement

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

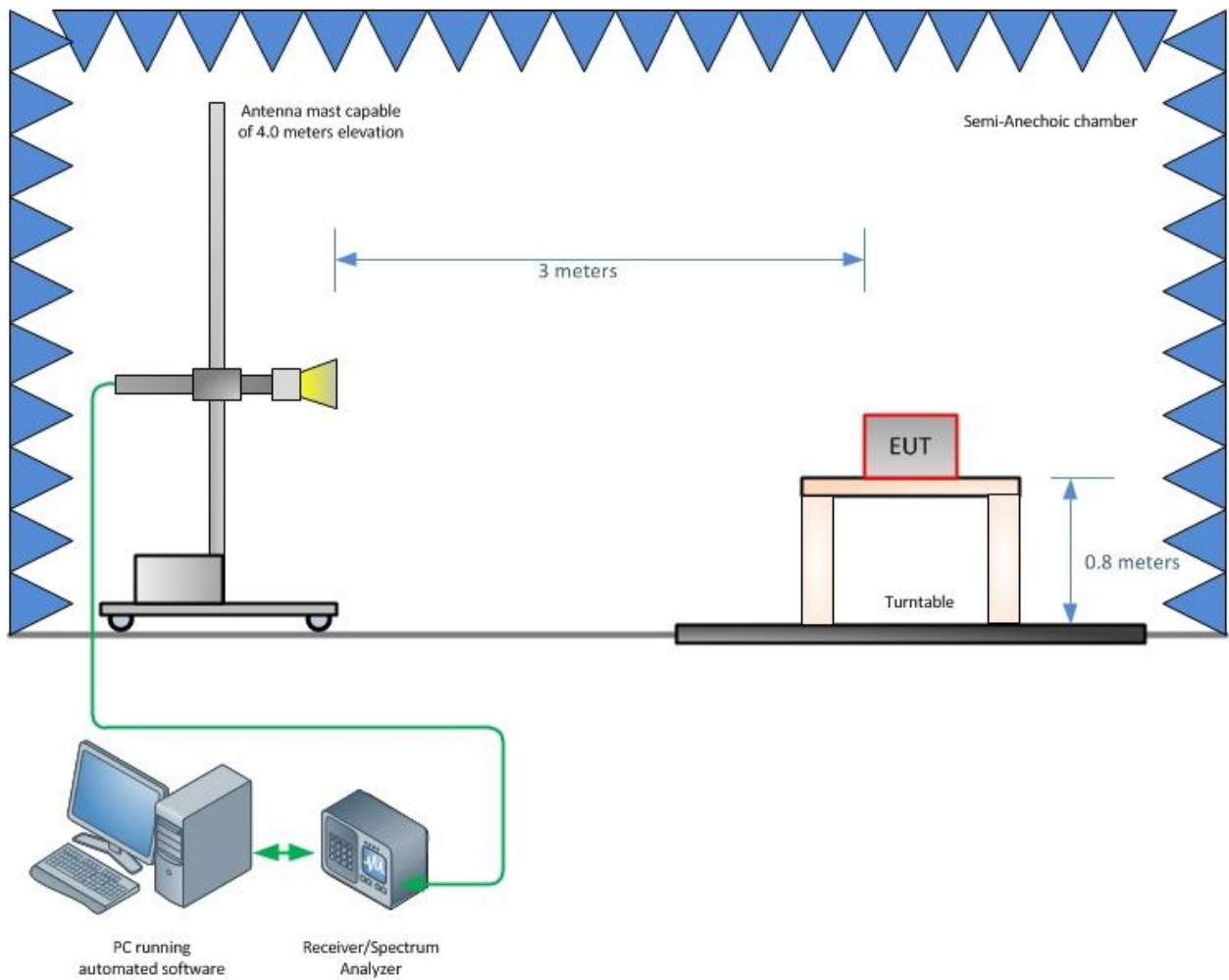
## **SECTION 4**

### **DIAGRAM OF TEST SETUP**

#### 4.1 TEST SETUP DIAGRAM

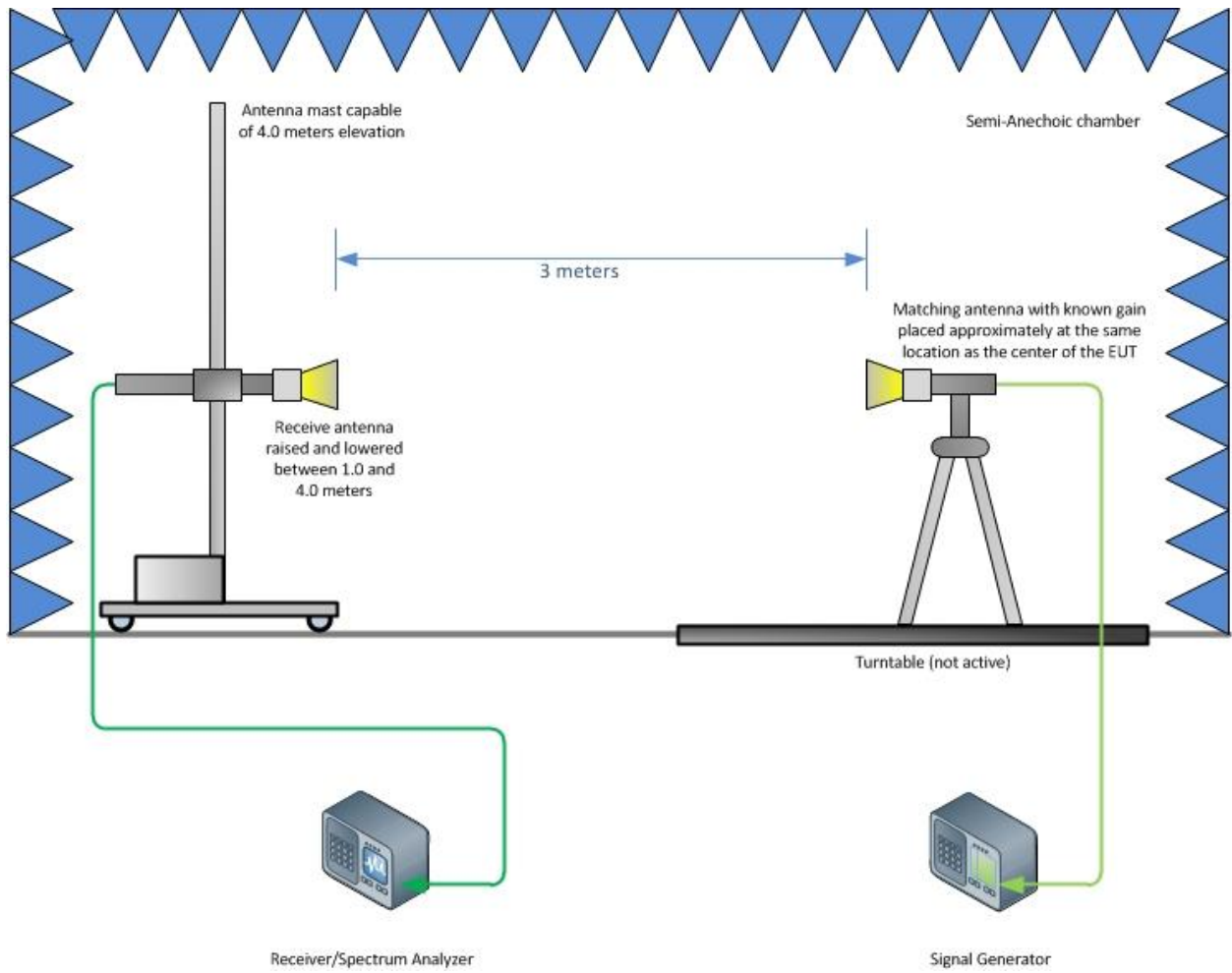


**Radiated Emission Test Setup (Below 1GHz)**

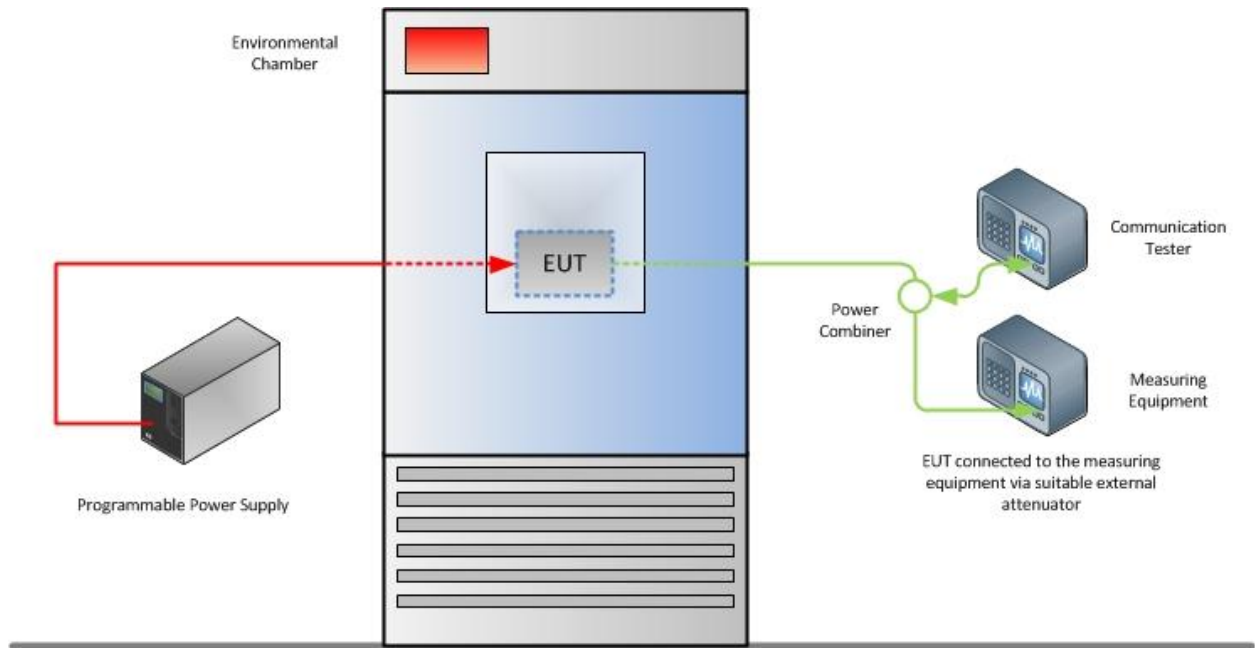


**Radiated Emission Test Setup (Above 1GHz)**





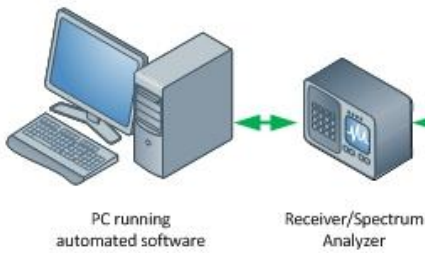
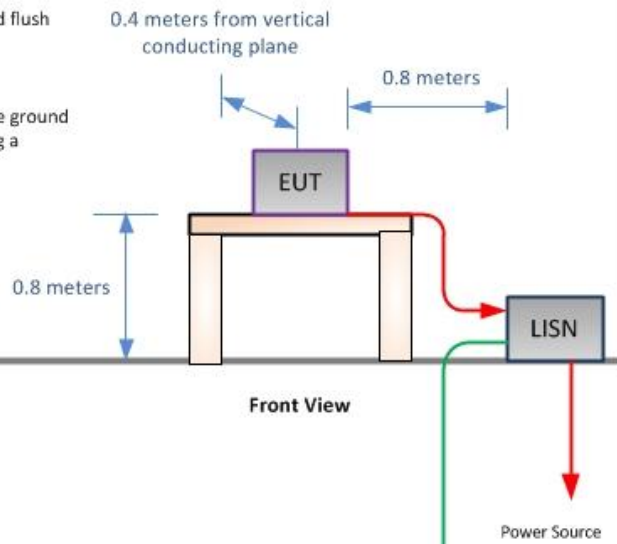
**Substitution Test Method (Above 1GHz)**



**Frequency Stability Test Configuration**

### Shielded Enclosure

- EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated into 50  $\Omega$  loads.
- LISN at least 80 cm from nearest part of EUT chassis.
- Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.



### Conducted Emissions Test Configuration

## **SECTION 5**

### **ACCREDITATION, DISCLAIMERS AND COPYRIGHT**

## 5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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