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Report On

Application for Grant of Equipment Authorization of the
Nextivity Inc.
Cel-Fi QUATRA Cellphone Signal Repeater

FCC CFR 47 Part 2 and Part 24
RSS-Gen and RSS-133

Report No. SD72132066-1017A **November 2017**

REPORT ON	Radio Testing of the Nextivity Inc. Cel-Fi QUATRA Cellphone Signal Repeater
TEST REPORT NUMBER	SD72132066-1017A
PREPARED FOR	Nextivity Inc. 16550 West Bernardo Drive, Bldg 5, Suite 550, San Diego, CA 92127, USA
CONTACT PERSON	CK Li Sr. Principal Engineer, Regulatory (858) 485-9442 CLi@NextivityInc.com
PREPARED BY	Xiaoying Zhang **Name** Authorized Signatory Title: EMC/Wireless Test Engineer
APPROVED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: EMC/Senior Wireless Test Engineer
DATED	November 13, 2017

Revision History

SD72132066-1017A Nextivity Inc. Cel-Fi QUATRA Cellphone Signal Repeater					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
11/13/17	Initial Release				Ferdinand S. Custodio

CONTENTS

SECTION 1

REPORT SUMMARY

Radio Testing of the
Nextivity Inc.
Cel-Fi QUATRA 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 and Part 24
- RSS-Gen 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 QUATRA
Model Number(s)	NU: Q34-4/5/12/13/25NU_EXA CU: Q34-4/5/12/13/25CU_EXA
FCC ID	NU: YETQ34-45121325NU CU: YETQ34-45121325CU
IC Number	NU: 9298A-Q45121325NU CU: 9298A-Q45121325CU
Serial Number(s)	258719000020 (NU) and 259706000160 (CU) 258719000273 (NU) and 259706002416 (CU)
Number of Samples Tested	4
Test Specification/Issue/Date	• FCC CFR 47 Part 2 and Part 24 (October 1, 2016). • RSS-133 – 2 GHz Personal Communications Services (Issue 6, January 2013). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 4, November 2014).
Start of Test	October 23, 2017
Finish of Test	November 01, 2017
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• ANSI/TIA-603-D-2010 – Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards. • KDB971168 (D01 Power Meas License Digital Systems v03) Measurement Guidance For Certification Of Licensed Digital Transmitters • 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. • Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and 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 24	RSS-133		
2.1	2.1046	-	6.4	Transmitter Conducted Output Power	Compliant
2.2	2.1046	24.232 (c)	6.4	Equivalent Isotropic Radiated Power	Compliant
2.3	2.1049	24.238 (b)	RSS-Gen 6.6	Occupied Bandwidth	Compliant
2.4	-	24.232 (d)	6.4	Peak-Average Ratio	Compliant
2.5	2.1051	24.238 (a)	6.5	Band Edge	Compliant
2.6	2.1051	24.238 (a)	6.5	Conducted Spurious Emissions	Compliant
2.7	2.1053	24.238 (a)	6.5	Field Strength of Spurious Radiation	Compliant
2.8	2.1055	24.235	6.3	Frequency Stability	Compliant
-	-	-	6.6	Receiver Spurious Emissions	N/A
-	-	-	RSS-Gen 8.8	Power Line Conducted Emission	Compliant*

Compliant* *The case is Tested with LTE Band 4. Test data is covered under test report SD72132066-1017C Nextivity Quatra FCC IC Part 27 LTE B4 Test Report.pdf.*

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

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Nextivity Inc. Cel-Fi QUATRA Cellphone Signal Repeater. The EUT is a WCDMA/LTE Signal Booster to improve voice and data cellular performance in large enterprise environments. The EUT consists of two separate units: the Network Unit (NU) and the Coverage Unit (CU). The NU comprises a transmitter and receiver which communicate with the cell tower and the CU. Users place the NU in an area with the strongest signal from the carrier network. The CU is then placed in the centre of the home or office, or in the area where the best signal quality is best needed. The NU and CU are placed at varying distances apart and are communicated via Ethernet cables. Both NU and CU also includes Bluetooth LE connectivity. They are using the same Bluetooth module and antenna. The LTE Band 25 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 QUATRA
Model Number(s)	NU: Q34-4/5/12/13/25NU_EXA CU: Q34-4/5/12/13/25CU_EXA
Rated Voltage	NU: 54V DC via external AC/DC adapter CU: 54V DC via POE
Mode Verified	LTE Band 25
Frequency Bands	NU: 1850 - 1915MHz CU: 1930 -1995MHz

Rated Power

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

Capability	WCDMA (Band 5), LTE (Band 25, 12, 13 and 4) and BT LE
Primary Unit (EUT)	☒ Production ☐ Pre-Production ☐ Engineering
Manufacturer Declared Temperature Range	0°C to 40°C
Antenna Type	PCB PIFA
Manufacturer	Nextivity Inc.
Antenna Model	N/A

Maximum Antenna Gain

Band	NU	CU
LTE Band 25	2 dBi	2 dBi

1.3.3 Transmit Frequency Table

Mode	Signal Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	EIRP	
				Max. Power Avg (dBm)	Max. Power Avg (W)
LTE Band 25 Downlink	5	1932.5 – 1992.5	4M42F9W	12.75	0.019
	10	1935 – 1990	8M84F9W	14.60	0.029
	15	1937.5 – 1987.5	13M3F9W	17.39	0.055
	20	1940 – 1985	17M8F9W	17.60	0.058
LTE Band 25 Uplink	5	1852.5 – 1912.5	4M43F9W	23.83	0.242
	10	1855 – 1910	8M86F9W	23.44	0.221
	15	1857.5 – 1907.5	13M4F9W	24.04	0.254
	20	1960 – 1905	17M8F9W	23.90	0.245

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

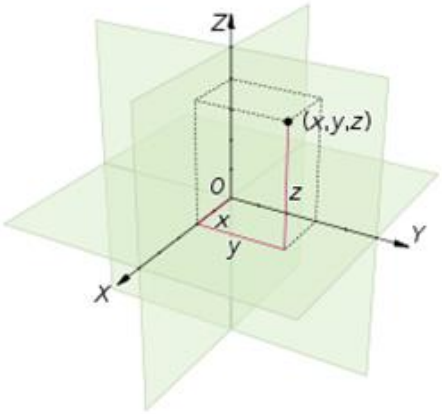
Manufacturer	Equipment/Cable	Description
Nextivity	AC/DC Adapter (EUT)	Model: 290N029-001 S/N: 163400014A1 Input: 100-240V, 50/60Hz, 1.6A; Output: 54VDC 2.22A
-	Support USB cable	1.75 meters, shielded Type A to Micro B connector
-	Support USB cable	Custom 1.0 meter shielded USB Type A to Type B for the Shielded Test Enclosure
Netgear	Network patch Cable (1x NU to CU)	4.0m, unshielded, Cat5e 24AWG UTP
Sony	Support Laptop	M/N PCG-31311L S/N 27545534 3006488
Sony	Support Laptop AC Adapter	M/N PCGA-AC19V9 S/N 147839091 0023259
Rhode & Schwarz	Support Wideband Radio Communication Tester	M/N CMW500 S/N 1201.0002K50/103829
Ramsey	Support Shielded Test Enclosure	With custom USB cable

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:

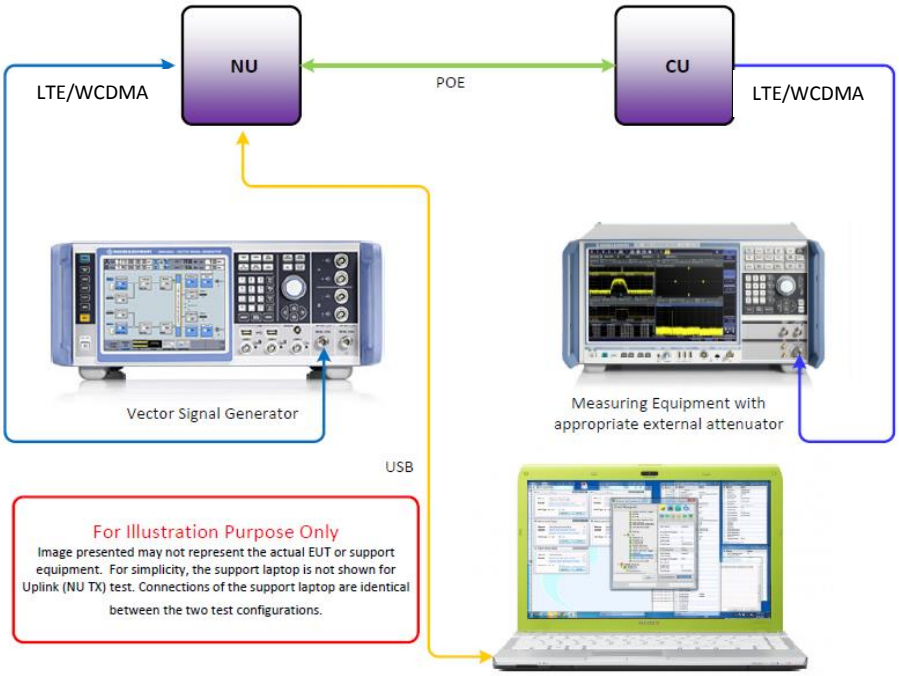
Mode	Signal Bandwidth	Channel No.	Frequency
LTE Band 25 Downlink	20MHz	Low Channel 8140	1940MHz
LTE Band 25 Uplink	15MHz	Middle Channel 26365	1882.5MHz

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.

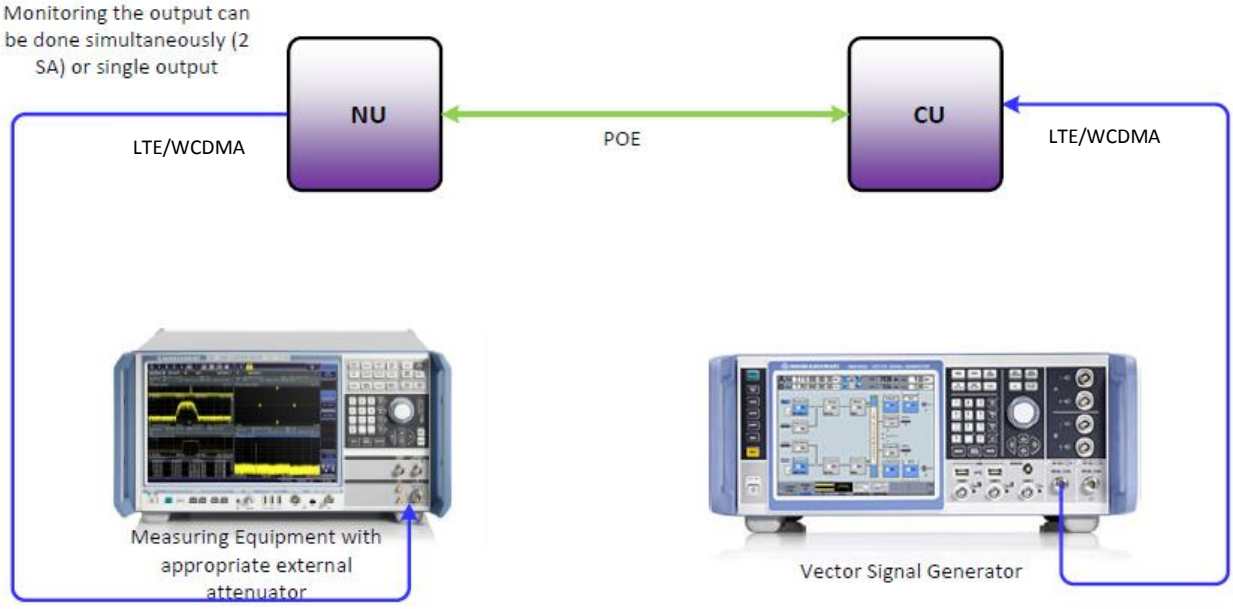


1.4.5 Simplified Test Configuration Diagram

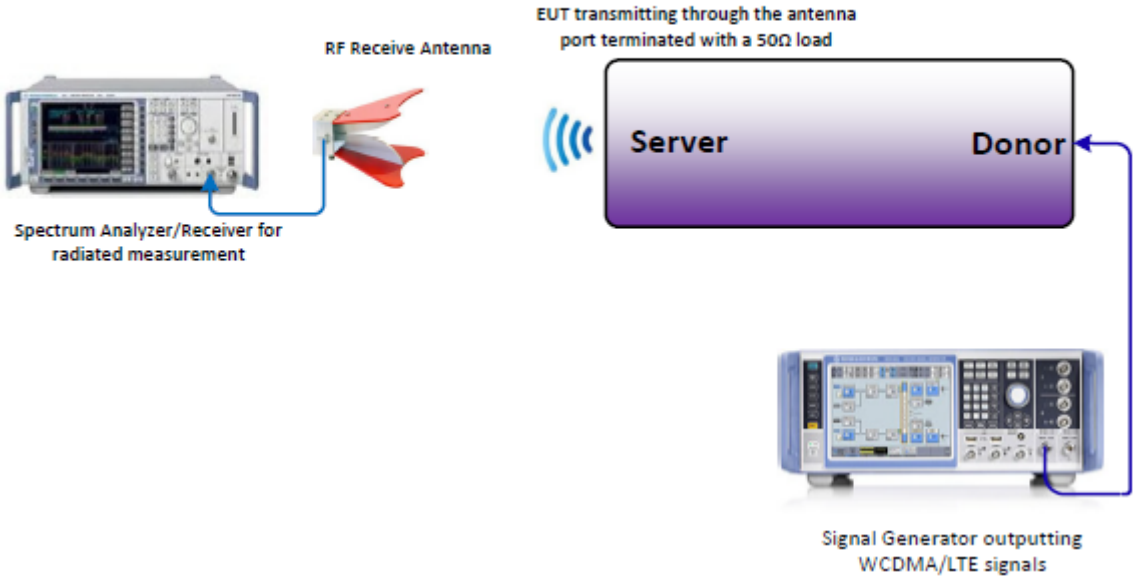
Downlink (CU Tx) Conducted Test



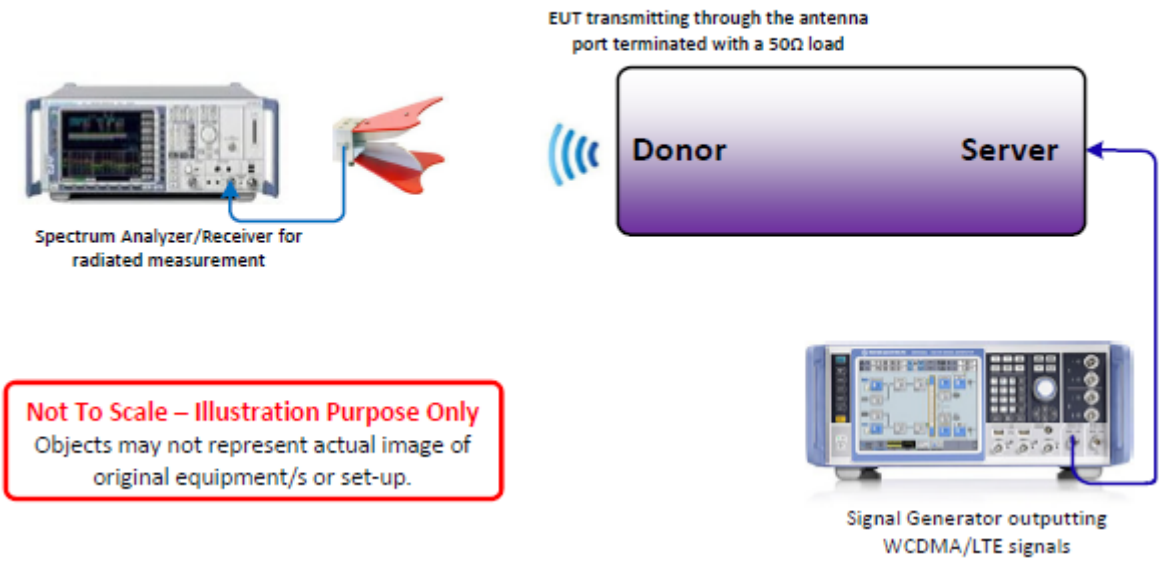
Uplink (NU Tx) Conducted Test



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 258719000020 (NU) and 259706000160 (CU); 258719000273 (NU) and 259706002416 (CU)		
N/A		

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

1.7 TEST METHODOLOGY

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

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

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

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

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 – Designation 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 (ISED) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.
The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

1.10 SAMPLE CALCULATIONS

1.10.1 LTE Emission Designator

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

1.10.2 Spurious Radiated Emission (below 1GHz)

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

1.10.3 Spurious Radiated Emission – Substitution Method

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

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

P_{EIRP} = -18 dBm + 7.8 dBi – 1dB
= 11.2 dBm
P_{ERP} = P_{EIRP} – 2.15 dB
= 11.2 dBm – 2.15 dB
= 9.05 dBm

SECTION 2

TEST DETAILS

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

2.1 TRANSMITTER CONDUCTED OUTPUT POWER

2.1.1 Specification Reference

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

2.1.2 Standard Applicable

The conducted power mesurements were made in accordance to FCC Part 2 Clasue 2.1046 and RSS-133 Clause 6.4.

2.1.3 Equipment Under Test and Modification State

Serial No: 258719000020 (NU) and 259706000160 (CU); 258719000273 (NU) and 259706002416 (CU) / Test Configuration A and B

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

October 23 and 24, and November 01, 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	25.1 - 25.5°C
Relative Humidity	30.0 - 46.9 %
ATM Pressure	98.9 - 99.1 kPa

2.1.7 Additional Observations

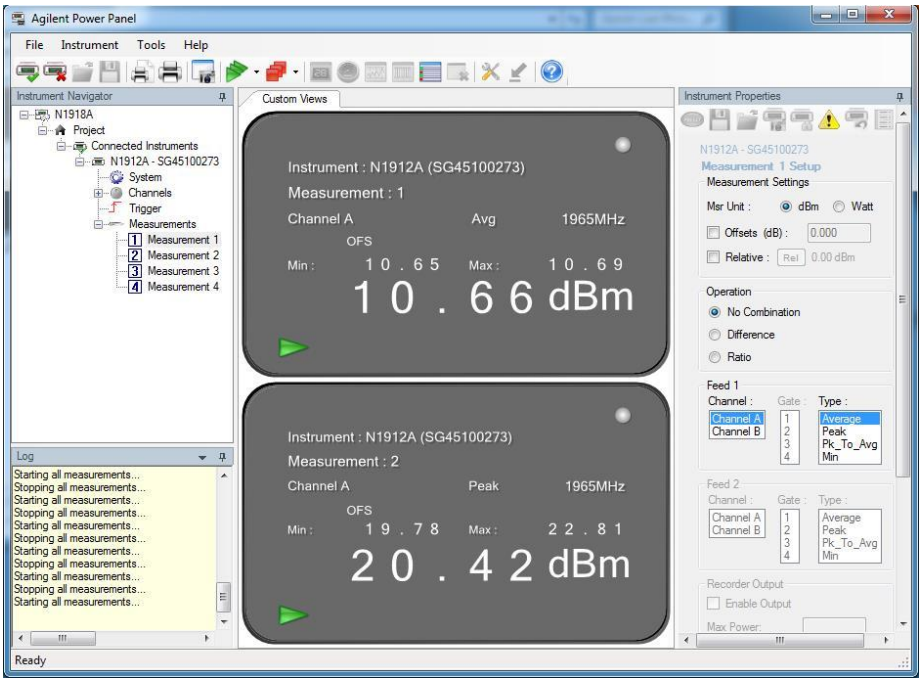
- This is a conducted test using an average power meter.
- The path loss was measured and entered as a level offset.
- Both Peak and Average measurements presented.

2.1.8 Test Results

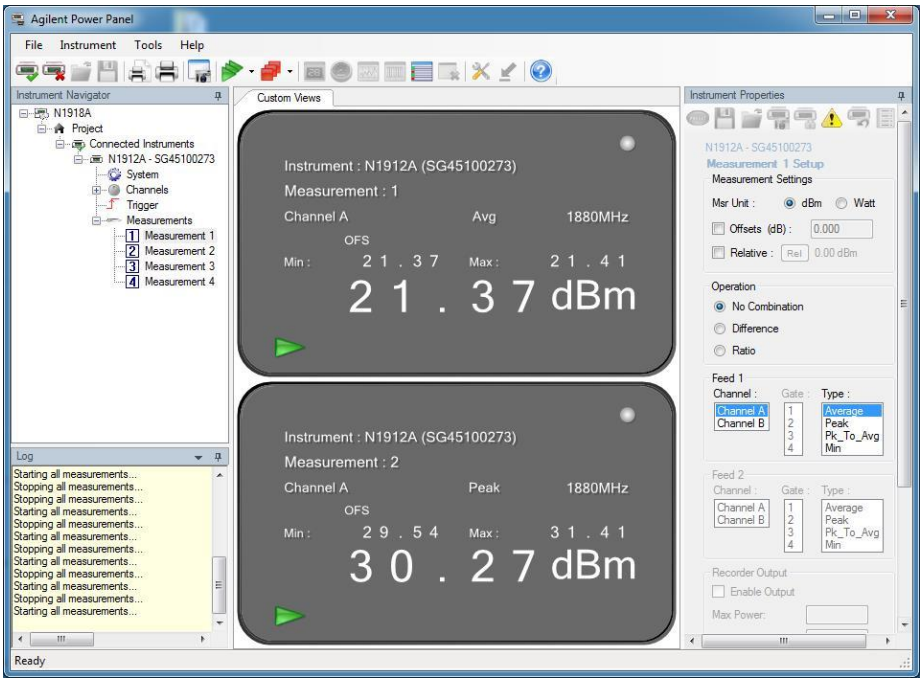
LTE Band 25 Downlink (CU Output)				
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**Average Power (dBm)**	**Peak Power (dBm)**
5 MHz	8065	1932.5	10.08	19.88
	8365	1962.5	10.66	20.42
	8665	1992.5	10.75	20.27
10 MHz	8090	1935.0	12.60	22.61
	8365	1962.5	12.51	22.57
	8640	1990.0	12.46	22.80
15 MHz	8115	1937.5	15.39	25.31
	8365	1962.5	14.35	24.12
	8615	1987.5	14.16	23.77
20 MHz	***8140***	***1940***	***15.60***	***24.94***
	8365	1962.5	15.45	24.70
	8590	1985.0	15.40	24.43

LTE Band 25 Uplink (NU Output)				
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**Average Power (dBm)**	**Peak Power (dBm)**
5 MHz	26065	1852.5	21.83	31.23
	26365	1882.5	21.37	30.27
	26665	1912.5	20.81	28.81
10 MHz	26090	1855.0	21.44	31.96
	26365	1882.5	20.92	31.03
	26640	1910.0	20.83	29.15
15 MHz	26115	1857.5	21.97	31.62
	26365	***1882.5***	***22.04***	***31.22***
	26615	1907.5	21.28	30.27
20 MHz	26140	1860.0	21.80	31.66
	26365	1882.5	21.59	31.90
	26590	1905.0	21.90	31.28

2.1.9 Sample Test Plot



LTE Band 25_Downlink_5MHz Bandwidth_Mid Channel



LTE Band 25_Uplink_5MHz Bandwidth_Mid Channel

2.2 EQUIVALENT ISOTROPIC RADIATED POWER

2.2.1 Specification Reference

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

2.2.2 Standard Applicable

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.

2.2.3 Equipment Under Test and Modification State

Serial No: 258719000020 (NU) and 259706000160 (CU); 258719000273 (NU) and 259706002416 (CU) / Test Configuration (N/A, calculation only)

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

October 23 and 24, and November 01, 2017 /XYZ

2.2.5 Additional Observations

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

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

Where:

$\mathbf{P_T}$ = transmitter conducted output power dBm (Section 2.1 of this test report)
$\mathbf{G_T}$ = gain of the transmitting antenna, in dBi (EIRP);
$\mathbf{L_C}$ = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

2.2.6 Sample Computation

ERP = $P_T + G_T - L_C$
= 23.19 (Average) + 0.13 (max. gain) – 5.28 (cable loss)
= 18.04 dBm

2.2.7 Test Results

LTE Band 25 Downlink (CU Output)					
Bandwidth (MHz)	**Frequency (MHz)**	**Max Power Average (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**Limit (dBm)**
5	1932.5	10.08	2.0	12.08	33
	1962.5	10.66	2.0	12.66	33
	1992.5	10.75	2.0	12.75	33
10	1935.0	12.60	2.0	14.60	33
	1962.5	12.51	2.0	14.51	33
	1990.0	12.46	2.0	14.46	33
15	1937.5	15.39	2.0	17.39	33
	1962.5	14.35	2.0	16.35	33
	1987.5	14.16	2.0	16.16	33
20	***1940***	***15.60***	**2.0**	***17.60***	**33**
	1962.5	15.45	2.0	17.45	33
	1985.0	15.40	2.0	17.40	33

LTE Band 25 Uplink (NU Output)					
Bandwidth (MHz)	**Frequency (MHz)**	**Max Power Average (dBm)**	**Antenna Gain (dBi)**	**EIRP (dBm)**	**Limit (dBm)**
5	1852.5	21.83	2.0	23.83	33
	1882.5	21.37	2.0	23.37	33
	1912.5	20.81	2.0	22.81	33
10	1855.0	21.44	2.0	23.44	33
	1882.5	20.92	2.0	22.92	33
	1910.0	20.83	2.0	22.83	33
15	1857.5	21.97	2.0	23.97	33
	1882.5	***22.04***	**2.0**	***24.04***	**33**
	1907.5	21.28	2.0	23.28	33
20	1860.0	21.80	2.0	23.80	33
	1882.5	21.59	2.0	23.59	33
	1905.0	21.90	2.0	23.90	33

2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

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

2.3.2 Standard Applicable

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

2.3.3 Equipment Under Test and Modification State

Serial No: 258719000020 (NU) and 259706000160 (CU); 258719000273 (NU) and 259706002416 (CU) / Test Configuration A and B

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

October 24 and November 01, 2017/XYZ

2.3.5 Test Equipment Used

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

2.3.6 Environmental Conditions

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

Ambient Temperature	25.1 - 25.5°C
Relative Humidity	30.0 - 46.9%
ATM Pressure	98.9 - 99.1kPa

2.3.7 Additional Observations

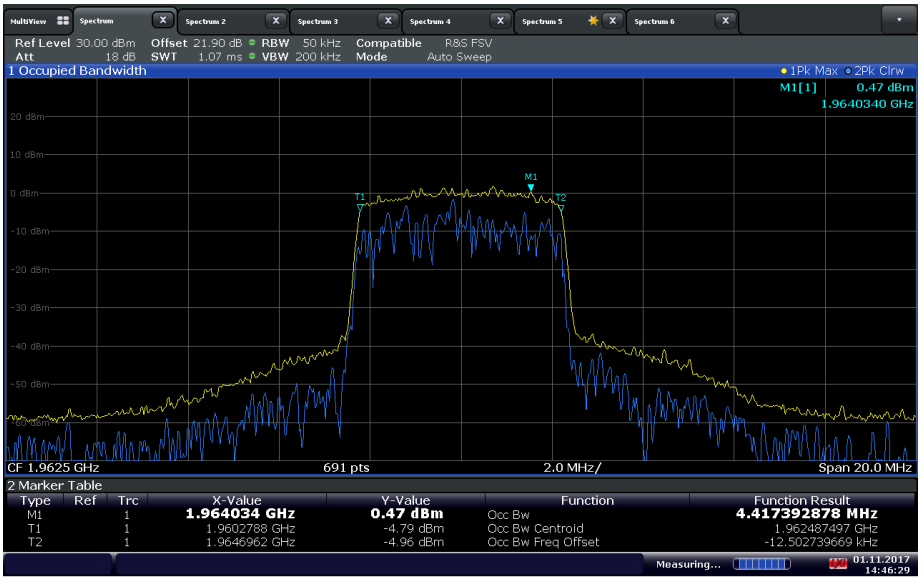
- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- All channels for emission bandwidth verification verified.
- The span is between two and five times the anticipated OBW.
- The RBW is set to 1% of the OBW while the VBW is ≥3X RBW.
- The detector is peak and the trace mode 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.

2.3.8 Test Results

LTE Band 25 Downlink (CU Output)				
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**OBW (MHz)**	**-26dB BW (MHz)**
5 MHz	8065	1932.5	4.42	4.83
	8365	1962.5	4.42	4.80
	8665	1992.5	4.41	4.80
10 MHz	8090	1935.0	8.75	9.38
	8365	1962.5	8.83	9.38
	8640	1990.0	8.84	9.44
15 MHz	8115	1937.5	13.18	14.33
	8365	1962.5	13.33	14.33
	8615	1987.5	13.29	14.24
20 MHz	8140	1940	17.67	19.1
	8365	1962.5	17.84	18.76
	8590	1985.0	17.75	19.0

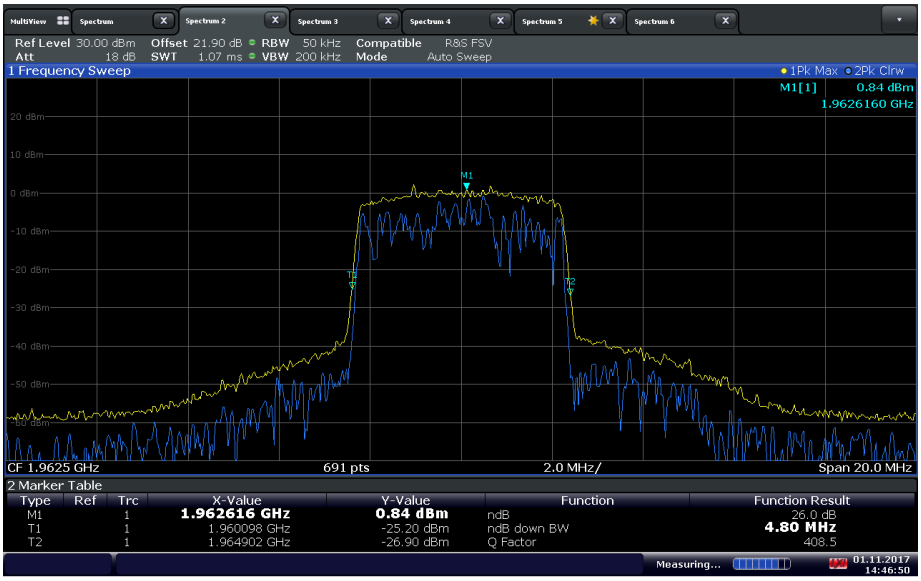
LTE Band 25 Uplink (NU Output)				
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**OBW (MHz)**	**-26dB BW (MHz)**
5 MHz	26065	1852.5	4.43	4.78
	26365	1882.5	4.43	4.80
	26665	1912.5	4.43	4.80
10 MHz	26090	1855.0	8.86	9.38
	26365	1882.5	8.80	9.38
	26640	1910.0	8.74	9.32
15 MHz	26115	1857.5	13.37	14.24
	26365	1882.5	13.30	14.41
	26615	1907.5	13.29	14.24
20 MHz	26140	1860.0	17.83	18.99
	26365	1882.5	17.79	19.22
	26590	1905.0	17.60	18.99

LTE Band 25_5MHz Bandwidth_Downlink Mid Channel 99% OBW



14:46:30 01.11.2017

LTE Band 25_5MHz Bandwidth_Downlink Mid Channel -26dB BW

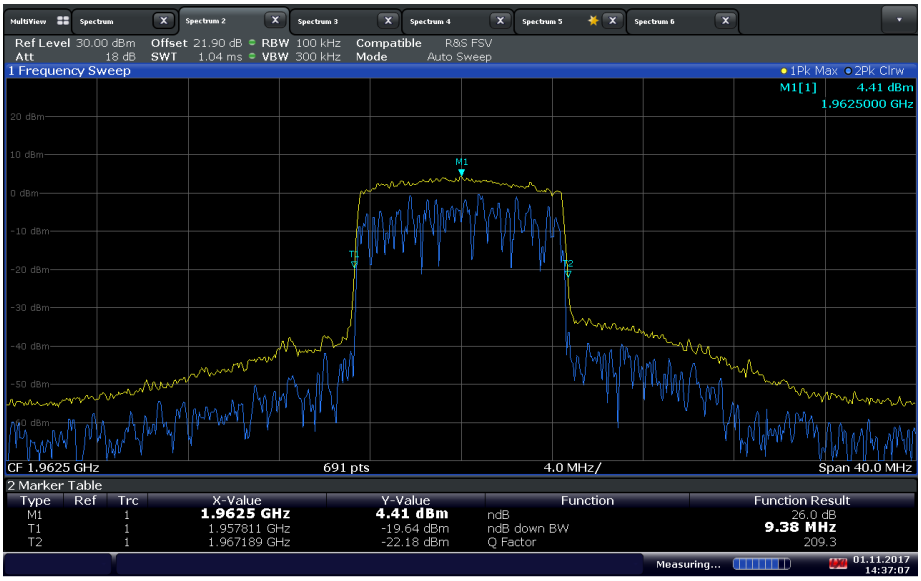


14:46:51 01.11.2017

LTE Band 25_10MHz Bandwidth_Downlink Mid Channel 99% OBW

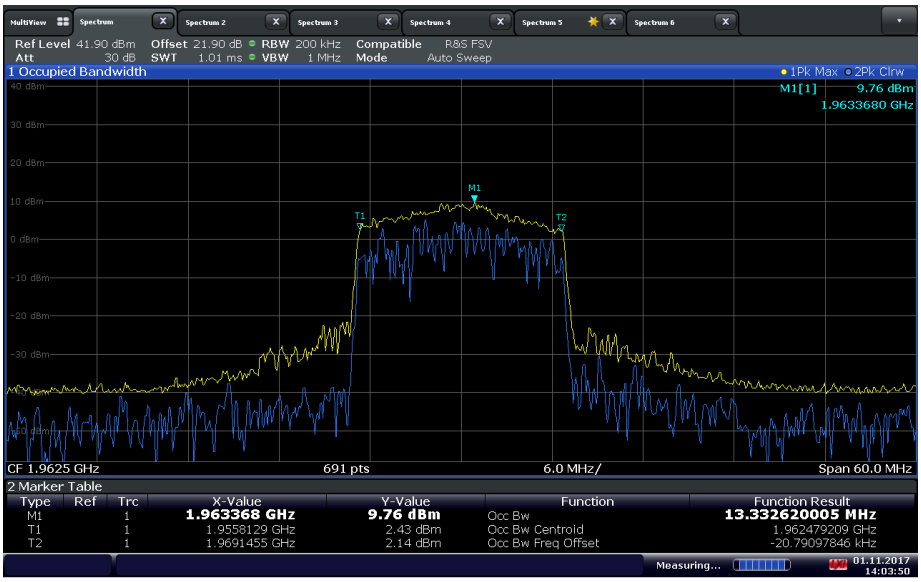
14:36:39 01.11.2017

LTE Band 25_10MHz Bandwidth_Downlink Mid Channel -26dB BW



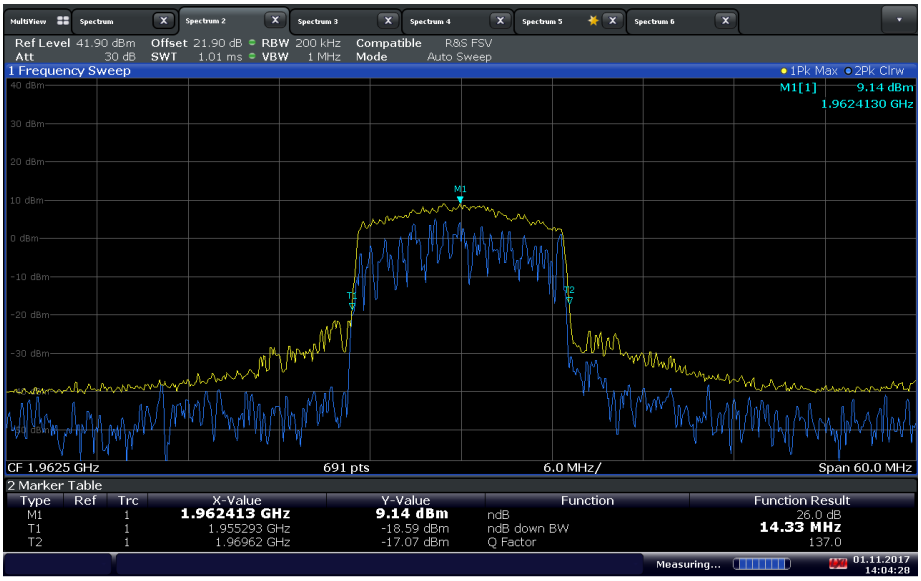
14:37:08 01.11.2017

LTE Band 25_15MHz Bandwidth_Downlink Mid Channel 99% OBW



14:03:50 01.11.2017

LTE Band 25_15MHz Bandwidth_Downlink Mid Channel -26dB BW

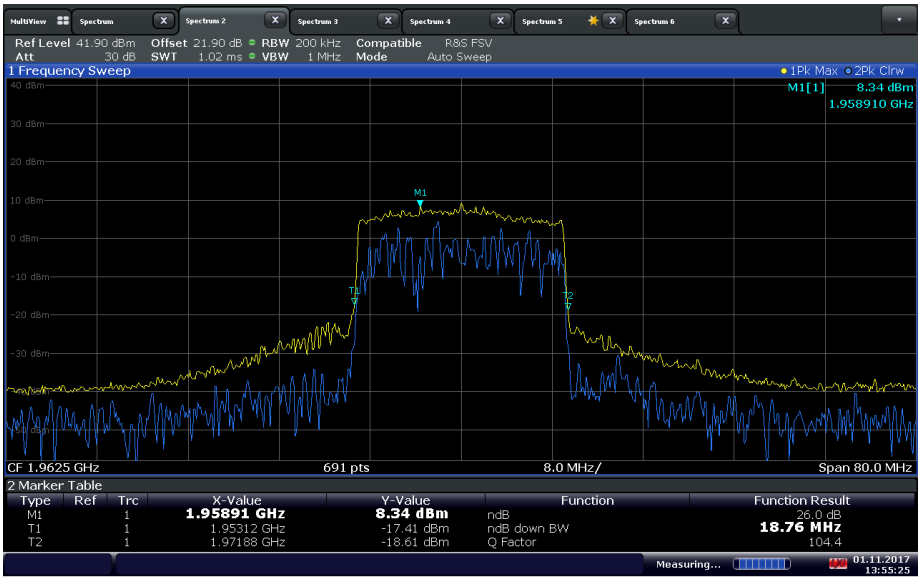


14:04:29 01.11.2017

LTE Band 25_20MHz Bandwidth_Downlink Mid Channel 99% OBW

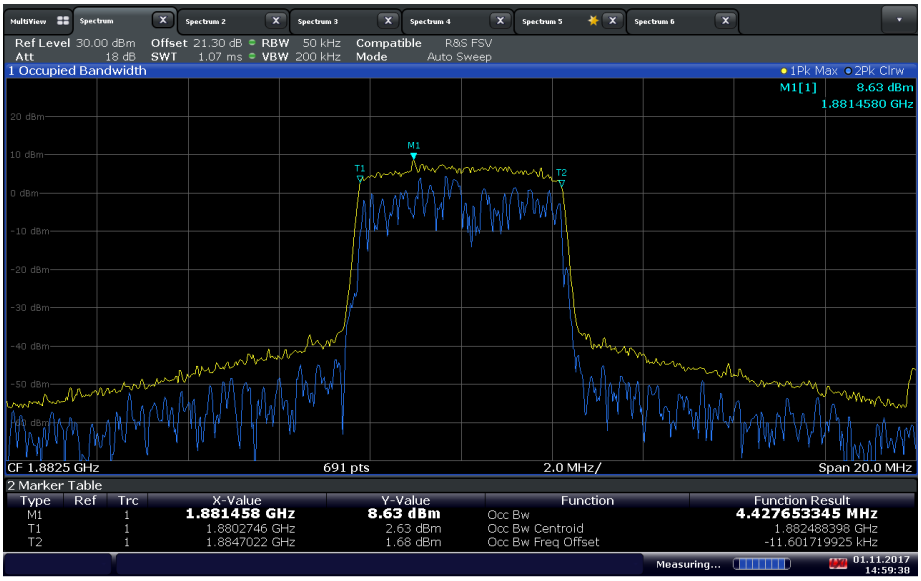
13:54:28 01.11.2017

LTE Band 25_20MHz Bandwidth_Downlink Mid Channel -26dB BW



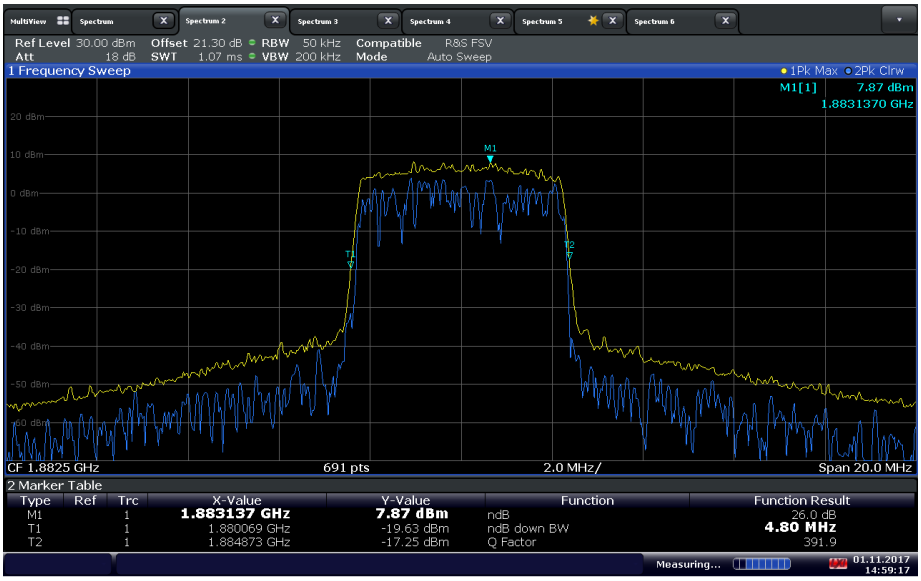
13:55:25 01.11.2017

LTE Band 25_5MHz Bandwidth_Uplink Mid Channel 99% OBW



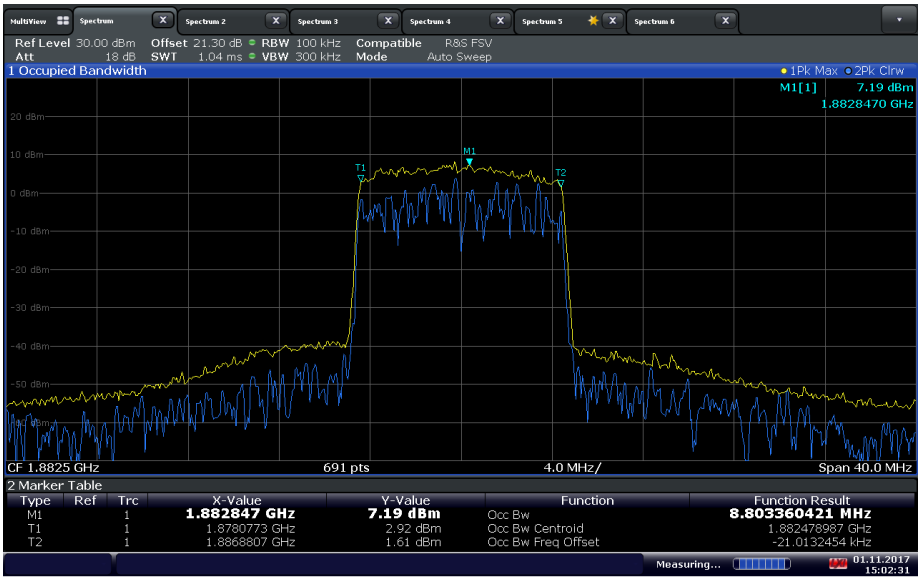
14:59:39 01.11.2017

LTE Band 25_5MHz Bandwidth_Uplink Mid Channel -26dB BW



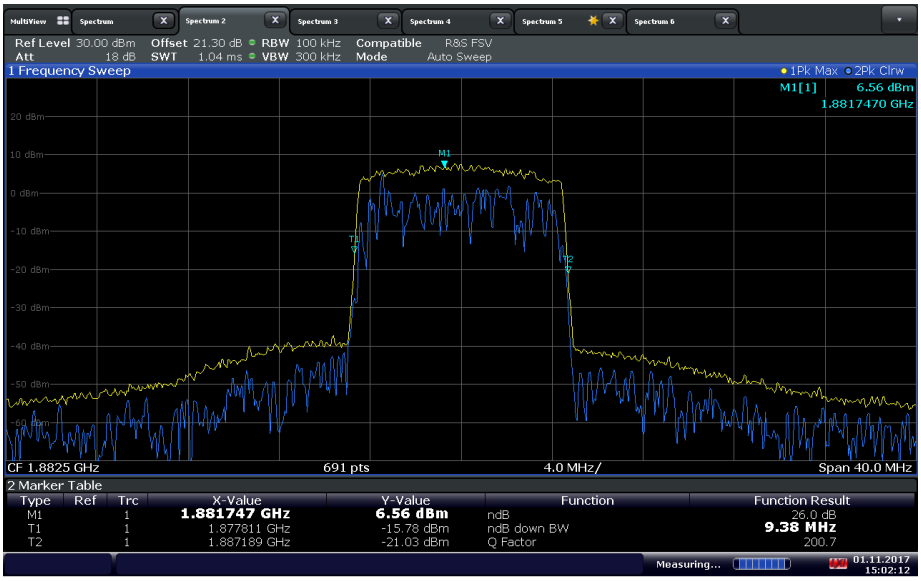
14:59:17 01.11.2017

LTE Band 25_10MHz Bandwidth_Uplink Mid Channel 99% OBW



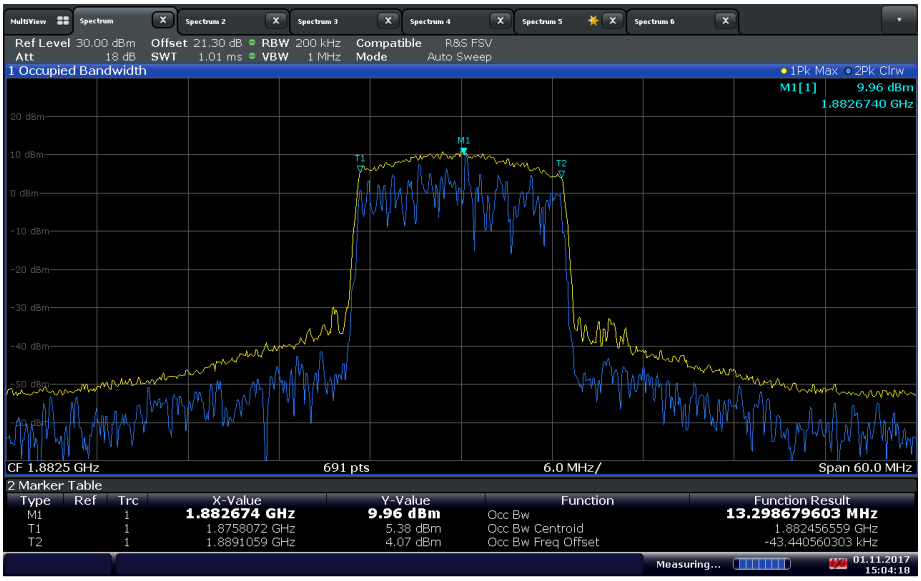
15:02:32 01.11.2017

LTE Band 25_10MHz Bandwidth_Uplink Mid Channel -26dB BW



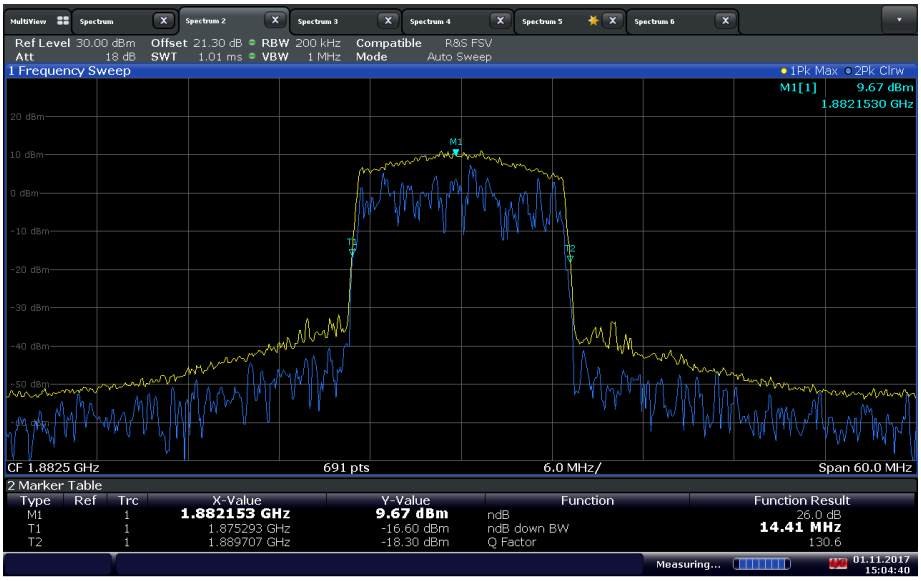
15:02:13 01.11.2017

LTE Band 25_15MHz Bandwidth_Uplink Mid Channel 99% OBW



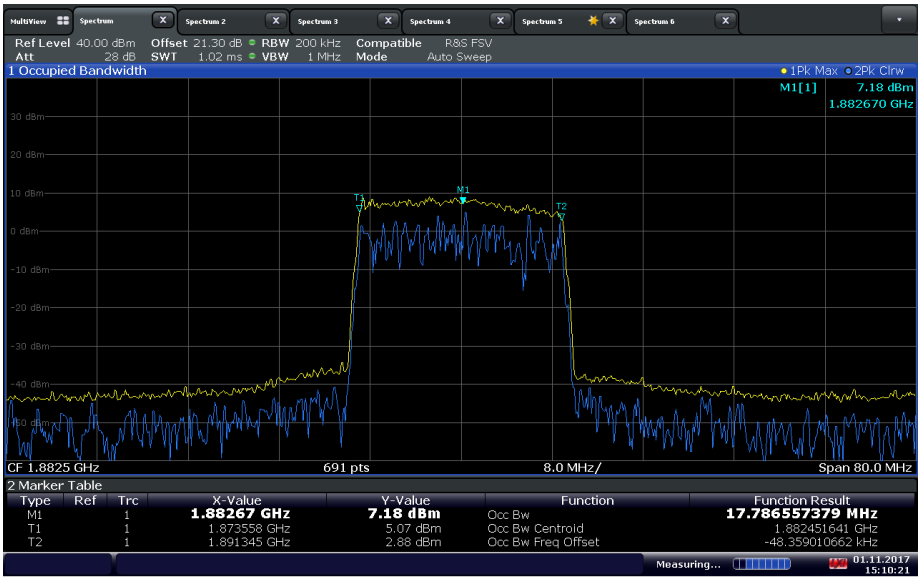
15:04:19 01.11.2017

LTE Band 25_15MHz Bandwidth_Uplink Mid Channel -26dB BW



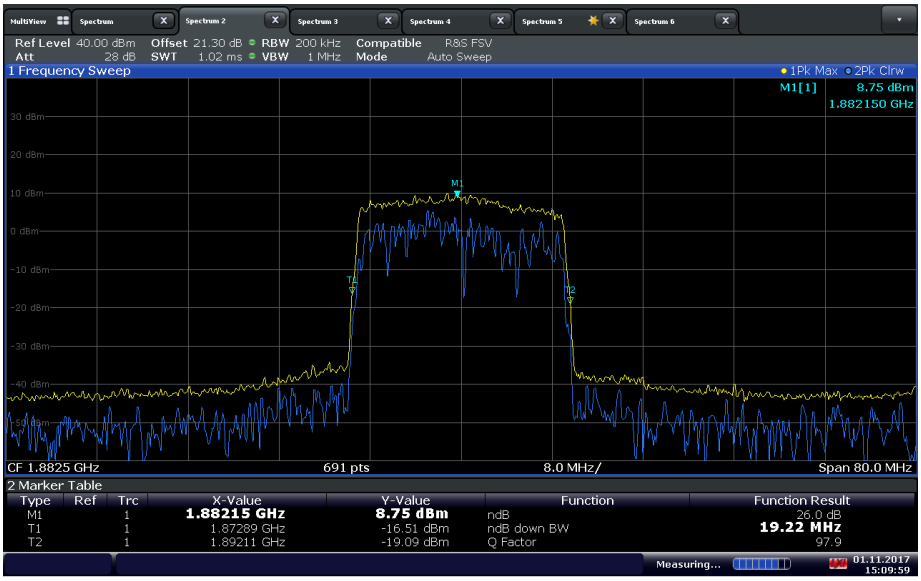
15:04:41 01.11.2017

LTE Band 25_20MHz Bandwidth_Uplink Mid Channel 99% OBW



15:10:21 01.11.2017

LTE Band 25_20MHz Bandwidth_Uplink Mid Channel -26dB BW



15:09:59 01.11.2017

2.4 PEAK-AVERAGE RATIO

2.4.1 Specification Reference

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

2.4.2 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-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.

2.4.3 Equipment Under Test and Modification State

Serial No: 258719000020 (NU) and 259706000160 (CU) / Test Configuration A and B

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

October 24 and 25, 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	25.1 - 25.4°C
Relative Humidity	26.1 - 30.0%
ATM Pressure	98.8 - 99.1kPa

2.4.7 Additional Observations

- This is a conducted test. Test procedure is per Section 5.7 of KDB971168 (D01 Power Meas License Digital Systems v02r02).
- 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.

2.4.8 Test Results

LTE Band 25 Downlink			
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**PAR (dB)**
5 MHz	8065	1932.5	9.49
	8365	1962.5	11.8
	8665	1992.5	10.47
10 MHz	8090	1935.0	10.14
	8365	1962.5	10.19
	8640	1990.0	10.6
15 MHz	8115	1937.5	9.57
	8365	1962.5	9.45
	8615	1987.5	10.06
20 MHz	8140	1940	9.68
	8365	1962.5	9.55
	8590	1985.0	9.61

LTE Band 25 Uplink			
Bandwidth (MHz)	**Channels**	**Frequency (MHz)**	**PAR (dB)**
5 MHz	18625	1852.5	9.67
	18900	1880.0	9.09
	19175	1907.5	8.05
10 MHz	18650	1855.0	9.40
	18900	1880.0	9.71
	19150	1905.0	8.48
15 MHz	18675	1857.5	9.27
	18900	1880.0	9.22
	19125	1902.5	8.15
20 MHz	18700	1860.0	9.25
	18900	1880.0	9.50
	19100	1900.0	9.49

2.4.9 Sample Test Plot

LTE Band 25_5MHz Bandwidth_Downlink Mid Channel -PAR

Date: 24.OCT.2017 14:24:26

LTE Band 25_10MHz Bandwidth_Downlink Mid Channel -PAR

Date: 24.OCT.2017 14:48:11

LTE Band 25_15MHz Bandwidth_Downlink Mid Channel -PAR

Date: 24.OCT.2017 15:12:32

LTE Band 25_20MHz Bandwidth_Downlink Mid Channel -PAR

Date: 24.OCT.2017 14:55:15

LTE Band 25_5MHz Bandwidth_Uplink Mid Channel -PAR

Date: 25.OCT.2017 10:19:12

LTE Band 25_10MHz Bandwidth_Uplink Mid Channel -PAR

Date: 25.OCT.2017 10:24:51

LTE Band 25_15MHz Bandwidth_Upink Mid Channel -PAR

Date: 25.OCT.2017 10:32:20

LTE Band 25_20MHz Bandwidth_Uplink Mid Channel -PAR

Date: 25.OCT.2017 10:39:00

2.5 BAND EDGE

2.5.1 Specification Reference

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

2.5.2 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 log10 p(watts).

2.5.3 Equipment Under Test and Modification State

Serial No: 258719000020 (NU) and 259706000160 (CU) / Test Configuration A and B

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

October 24 and 25, 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.

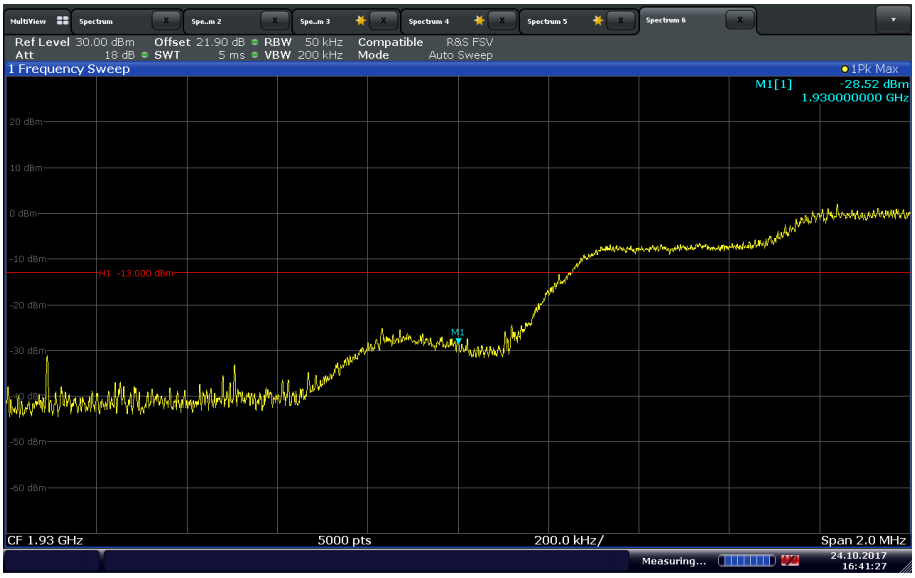
Ambient Temperature	25.1 - 25.4°C
Relative Humidity	26.1 - 30.0%
ATM Pressure	98.8 - 99.1kPa

2.5.7 Additional Observations

- This is a conducted test.
- Test guidance is per Section 6 of KDB971168 (D01 Power Meas License Digital Systems v03).
- 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.

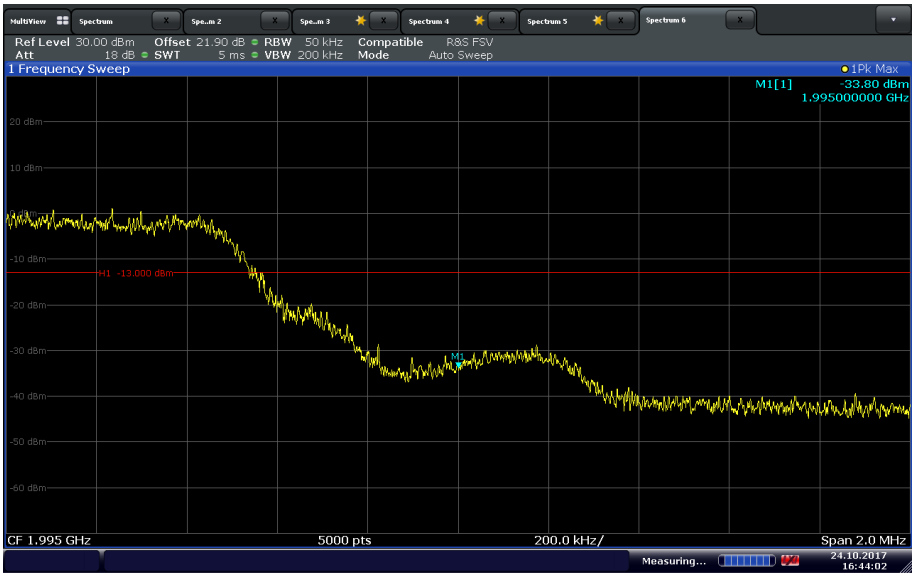
2.5.8 Test Results

LTE Band 25_5MHz Bandwidth_Downlink Low Channel Band Edge



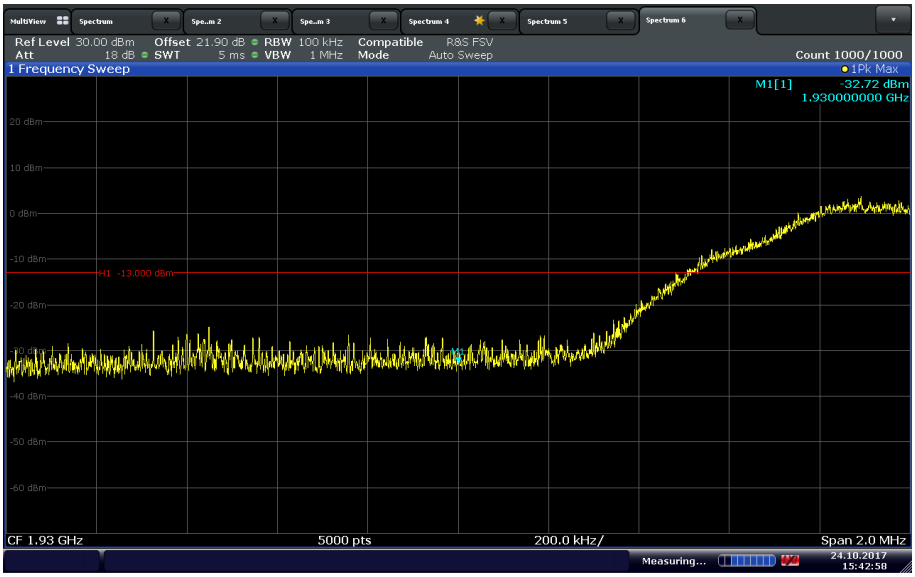
Date: 24.OCT.2017 16:41:27

LTE Band 25_5MHz Bandwidth_Downlink High Channel Band Edge



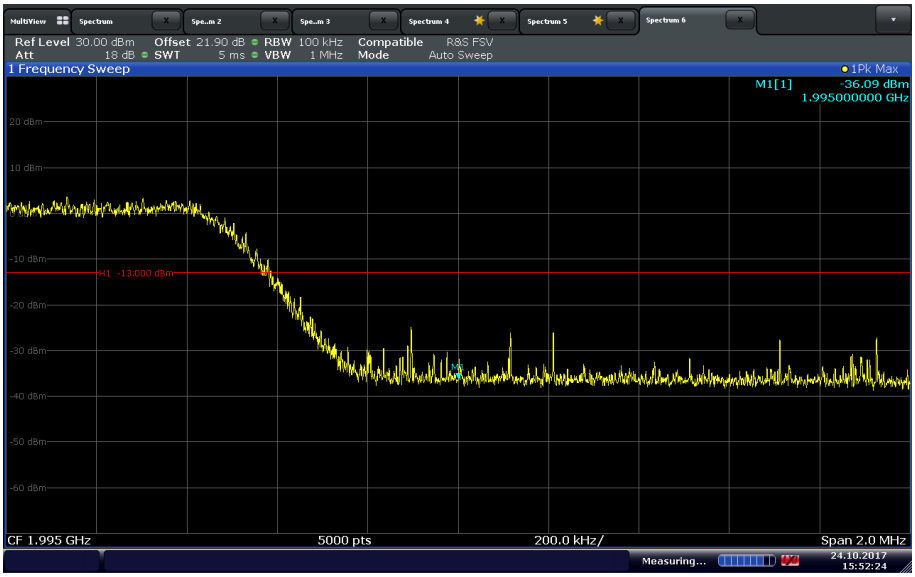
Date: 24.OCT.2017 16:44:02

LTE Band 25_10MHz Bandwidth_Downlink Low Channel Band Edge



Date: 24.OCT.2017 15:42:58

LTE Band 25_10MHz Bandwidth_Downlink High Channel Band Edge



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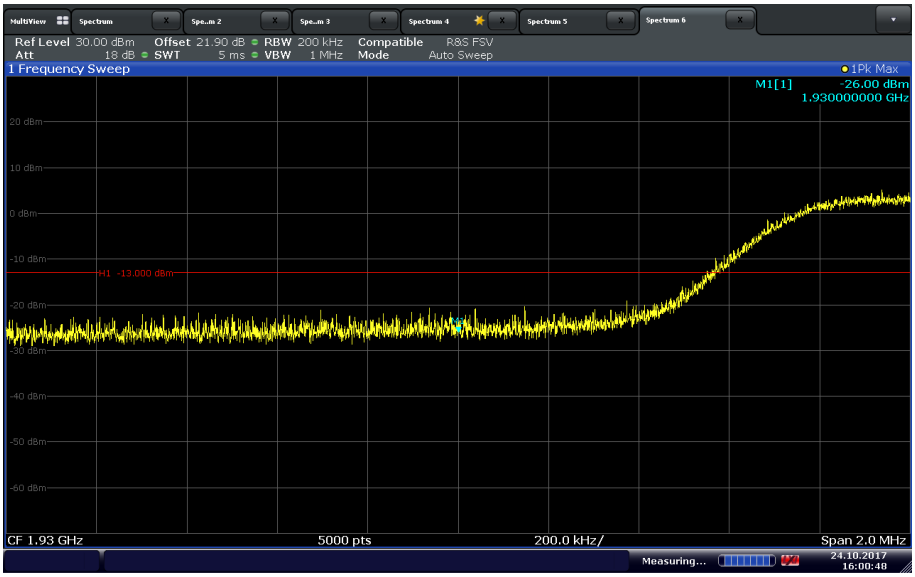
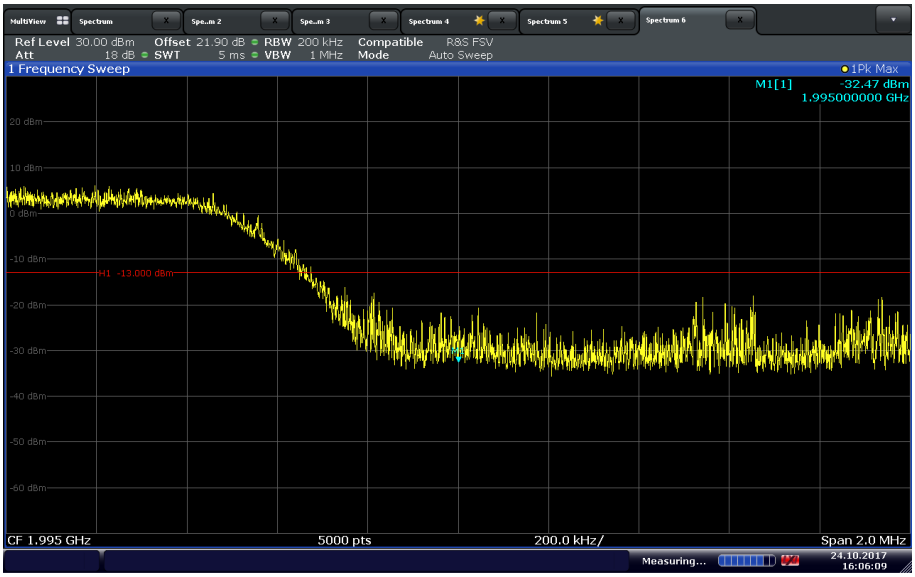
LTE Band 25_15MHz Bandwidth_Downlink Low Channel Band Edge



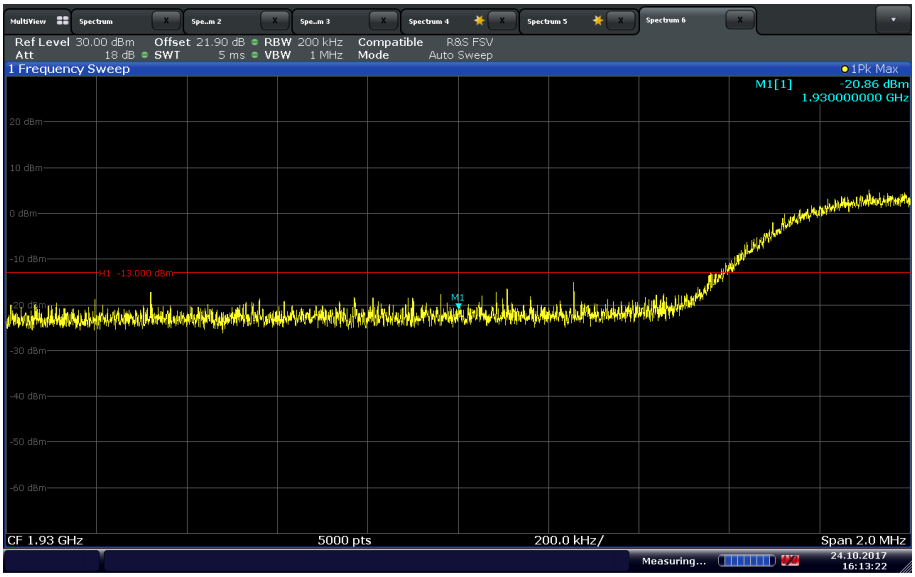
Date: 24.OCT.2017 16:00:48

LTE Band 25_15MHz Bandwidth_Downlink High Channel Band Edge



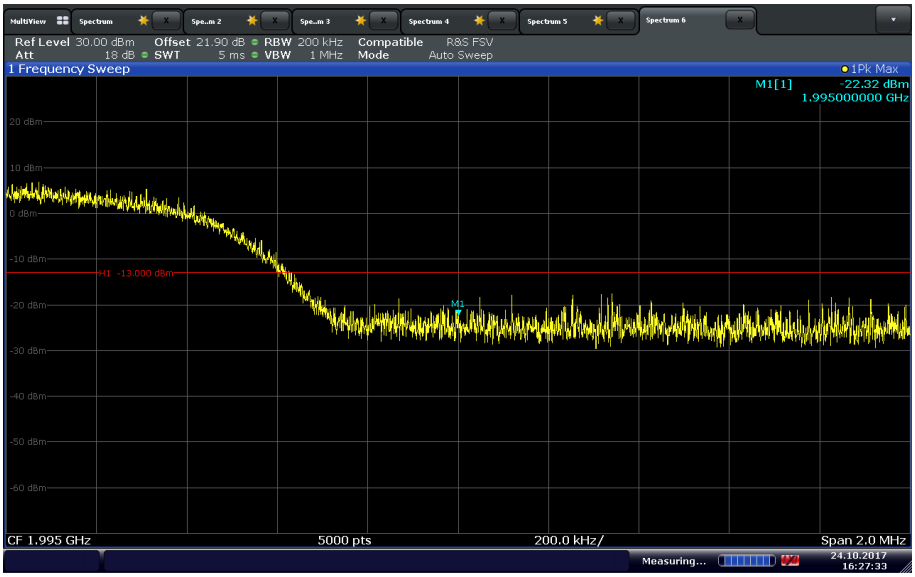
Date: 24.OCT.2017 16:06:09

LTE Band 25_20MHz Bandwidth_Downlink Low Channel Band Edge



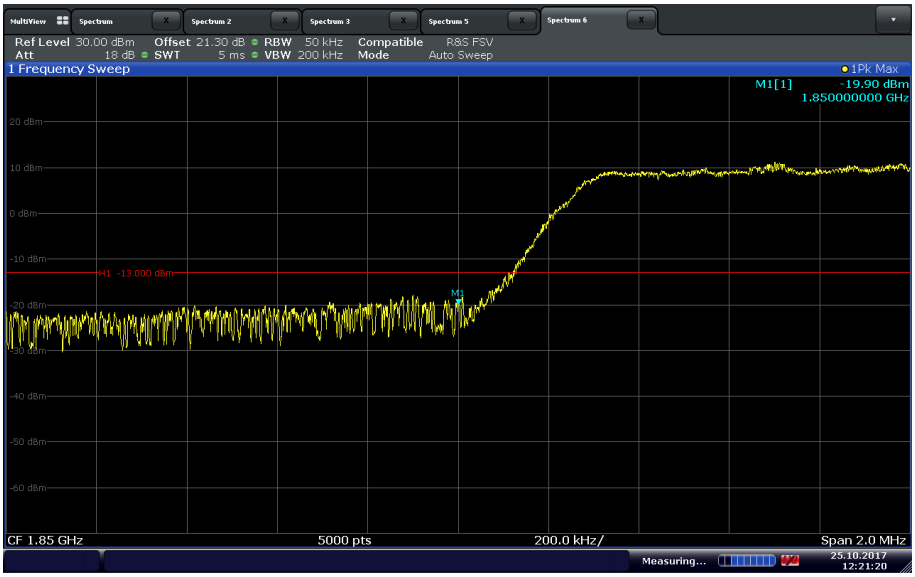
Date: 24.OCT.2017 16:13:22

LTE Band 25_20MHz Bandwidth_Downlink High Channel Band Edge



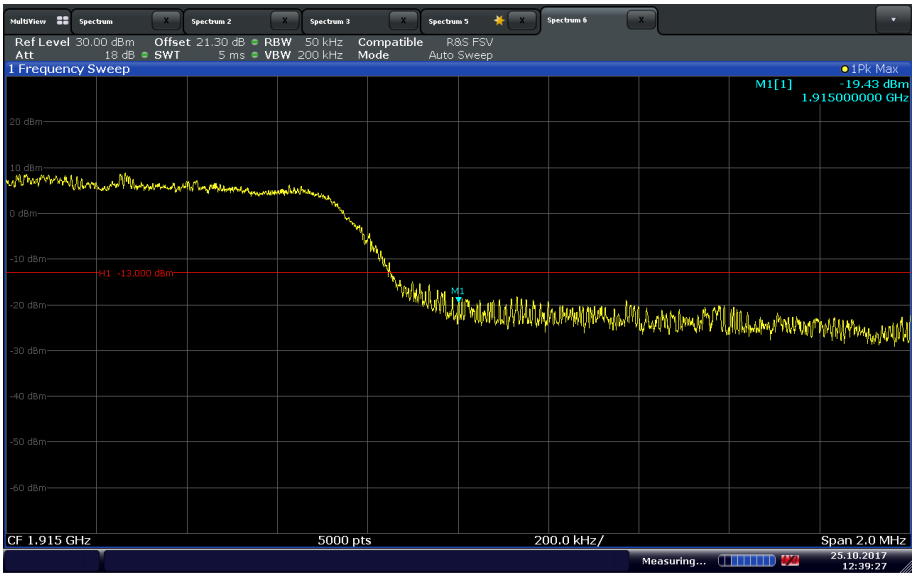
Date: 24.OCT.2017 16:27:33

LTE Band 25_5MHz Bandwidth_Uplink Low Channel Band Edge



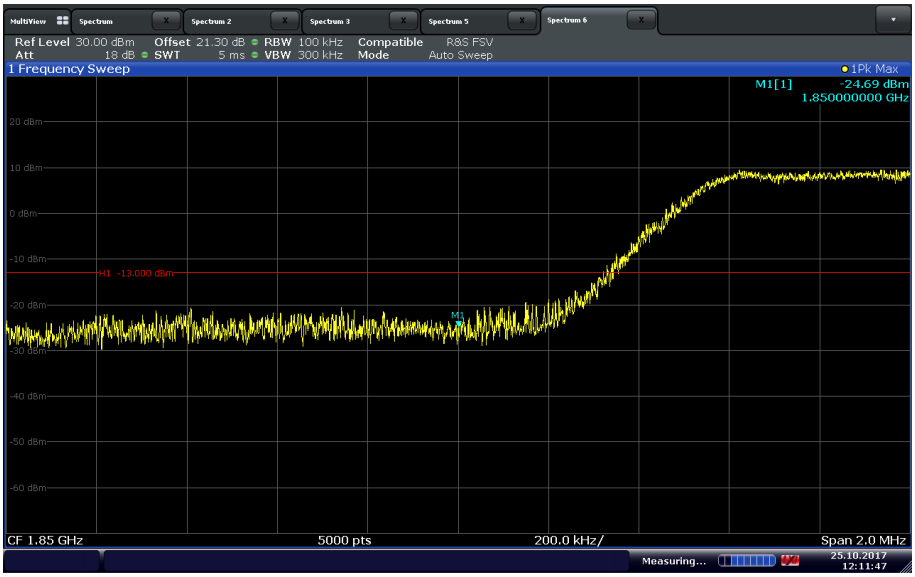
Date: 25.OCT.2017 12:21:21

LTE Band 25_5MHz Bandwidth_Uplink High Channel Band Edge



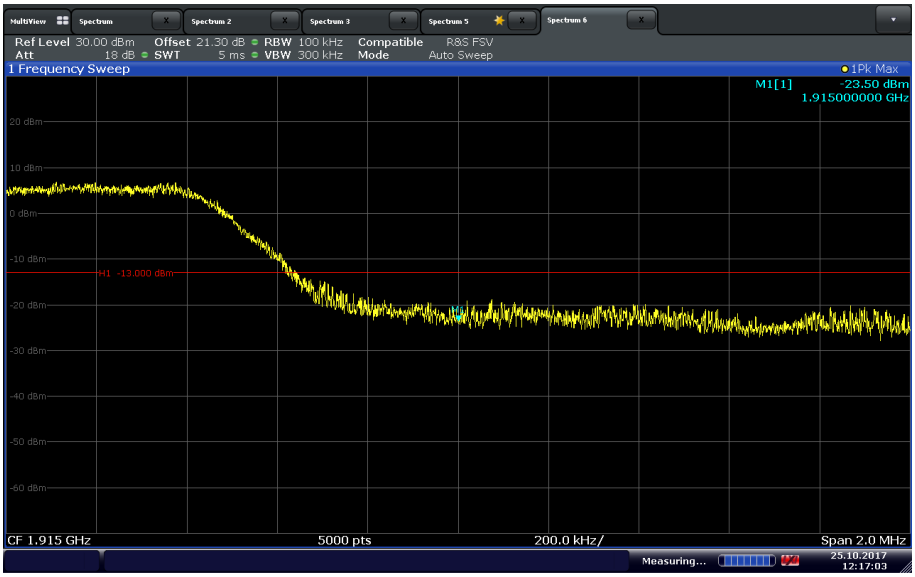
Date: 25.OCT.2017 12:39:27

LTE Band 25_10MHz Bandwidth_Uplink Low Channel Band Edge



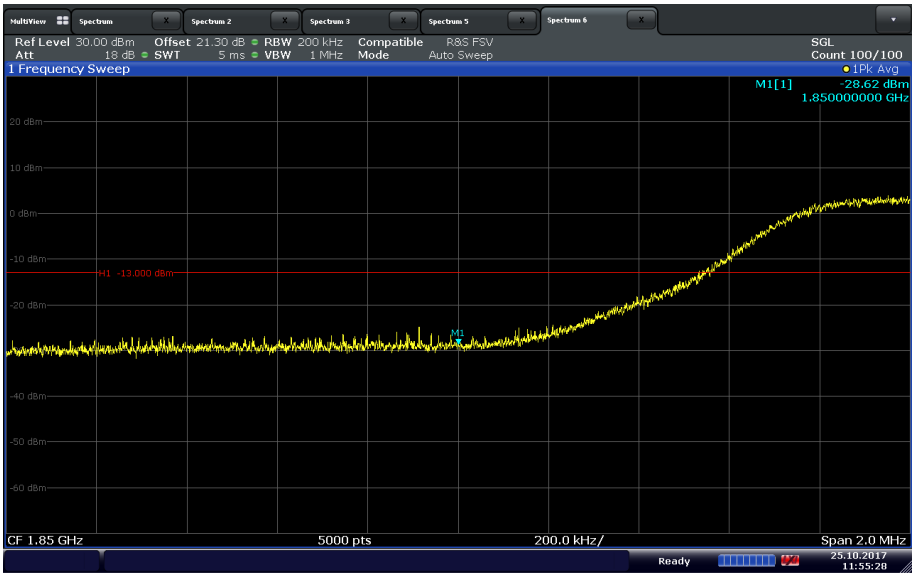
Date: 25.OCT.2017 12:11:48

LTE Band 25_10MHz Bandwidth_Uplink High Channel Band Edge



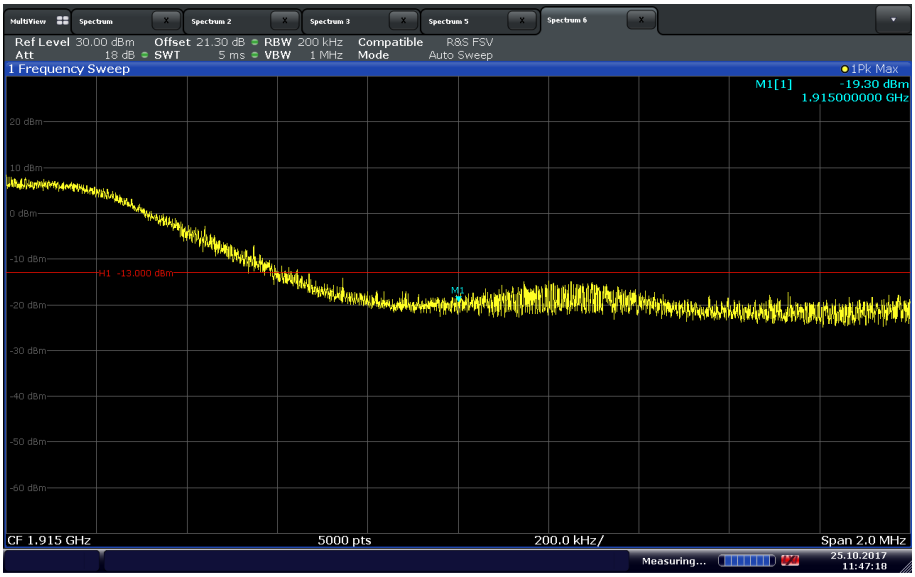
Date: 25.OCT.2017 12:17:03

LTE Band 25_15MHz Bandwidth_Uplink Low Channel Band Edge



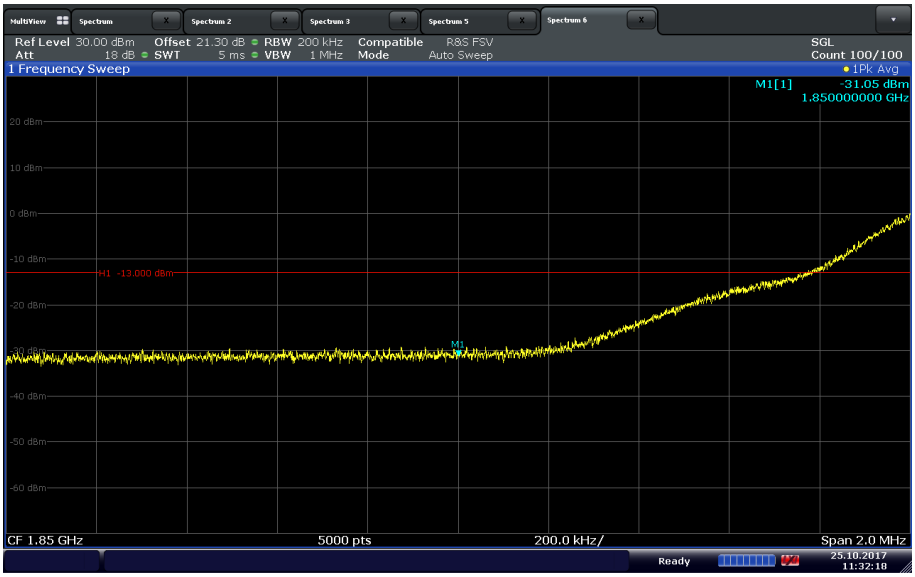
Date: 25.OCT.2017 11:55:28

LTE Band 25_15MHz Bandwidth_Uplink High Channel Band Edge



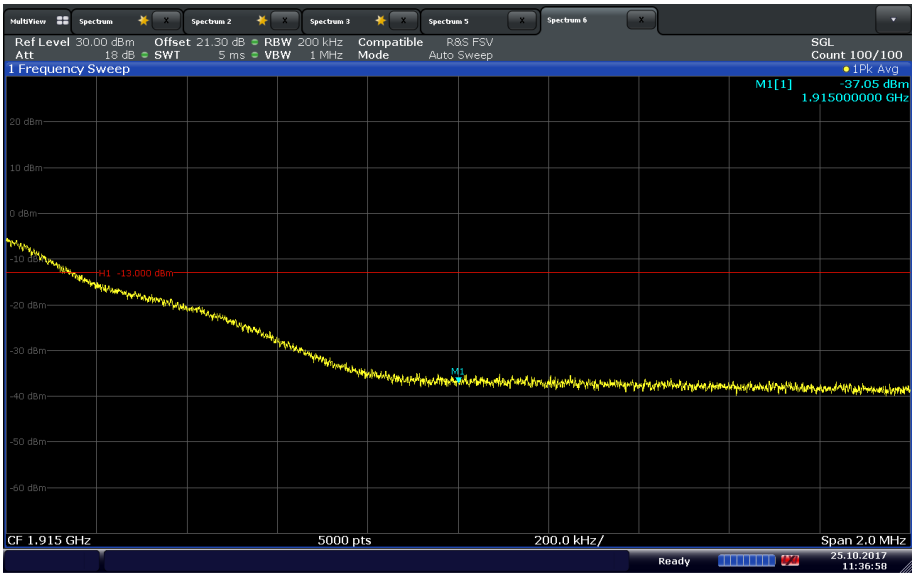
Date: 25.OCT.2017 11:47:18

LTE Band 25 20MHz Bandwidth_Uplink Low Channel Band Edge



Date: 25.OCT.2017 11:32:18

LTE Band 25_20MHz Bandwidth_Uplink High Channel Band Edge



Date: 25.OCT.2017 11:36:58

2.6 CONDUCTED SPURIOUS EMISSIONS

2.6.1 Specification Reference

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

2.6.2 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.

2.6.3 Equipment Under Test and Modification State

Serial No: 258719000020 (NU) and 259706000160 (CU) / Test Configuration A and B

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

October 24 and 25, 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.

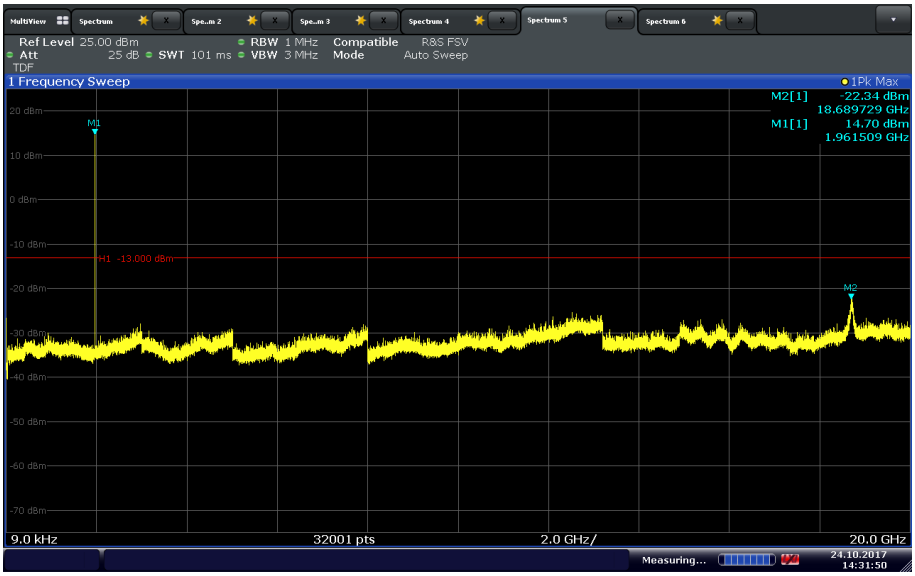
Ambient Temperature	25.1 - 25.4°C
Relative Humidity	26.1 - 30.0%
ATM Pressure	98.8 - 99.1kPa

2.6.7 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.

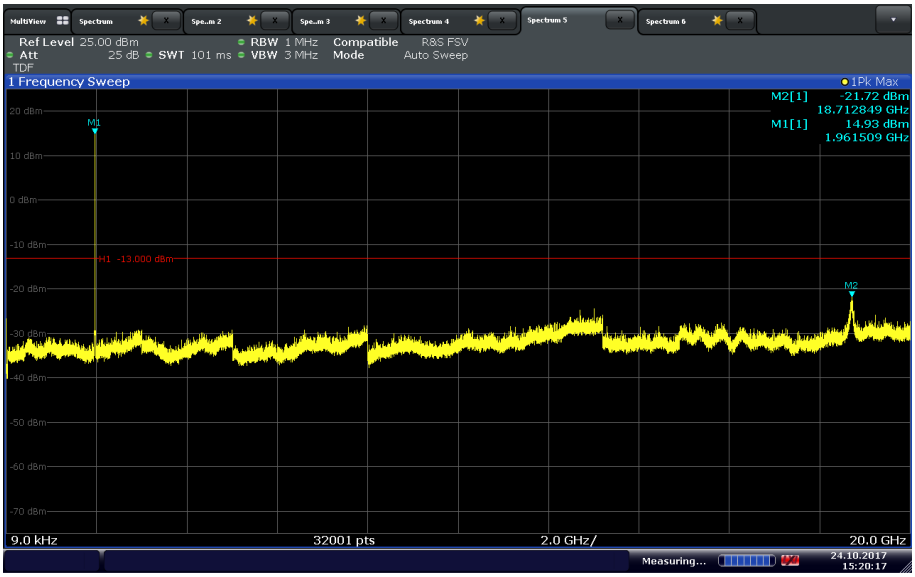
2.6.8 Test Results

LTE Band 25_5MHz Bandwidth_Downlink Mid Channel Conducted Spurious Emissions



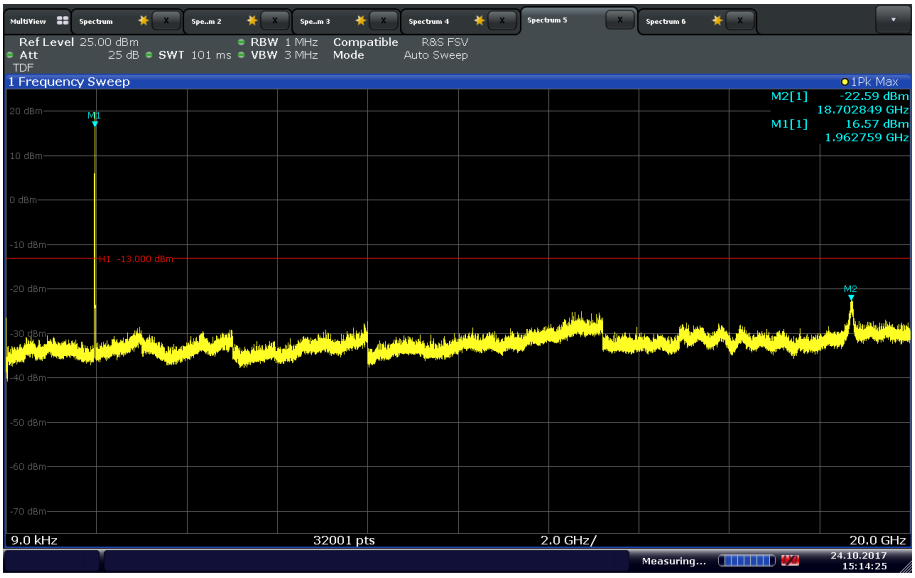
Date: 24.OCT.2017 14:31:50

LTE Band 25_10MHz Bandwidth_Downlink Mid Channel Conducted Spurious Emissions



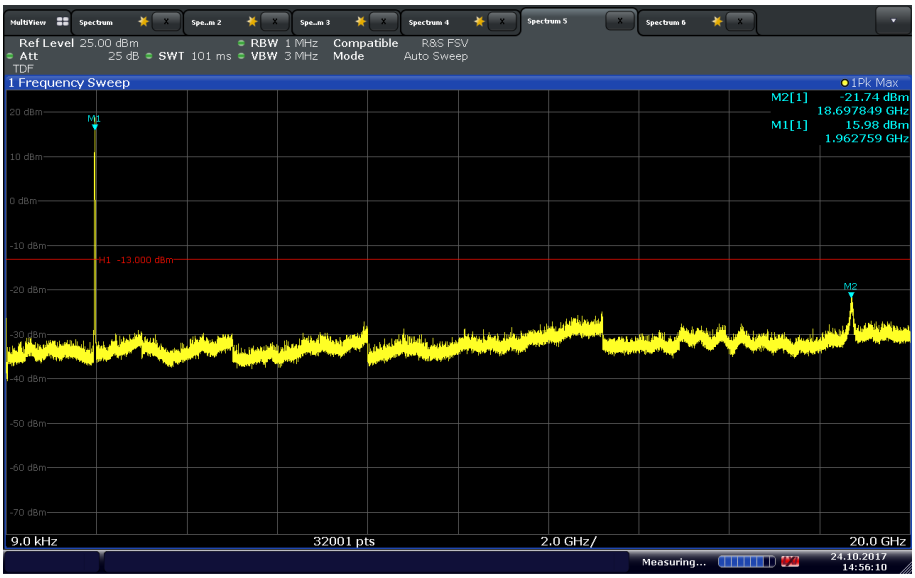
Date: 24.OCT.2017 15:20:18

LTE Band 25_15MHz Bandwidth_Downlink Mid Channel Conducted Spurious Emissions



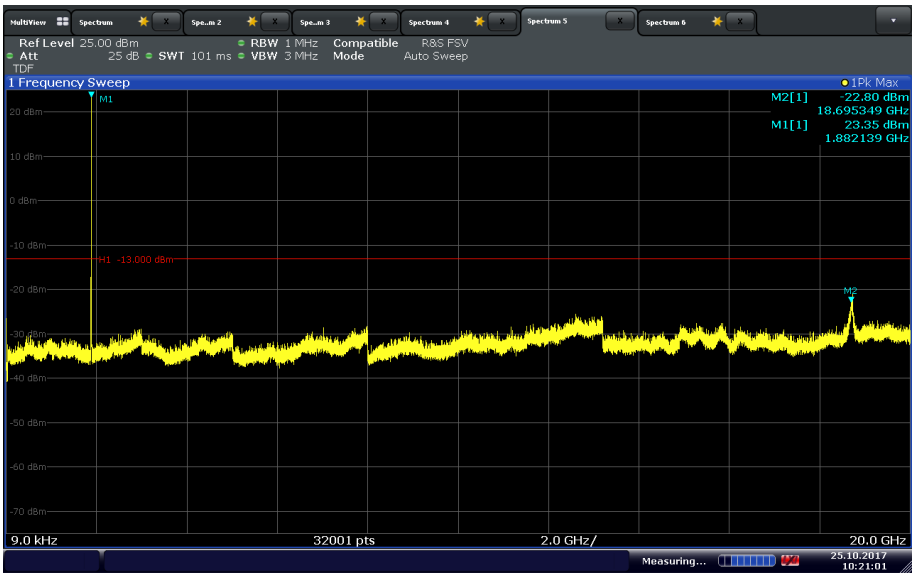
Date: 24.OCT.2017 15:14:26

LTE Band 25_20MHz Bandwidth_Downlink Mid Channel Conducted Spurious Emissions



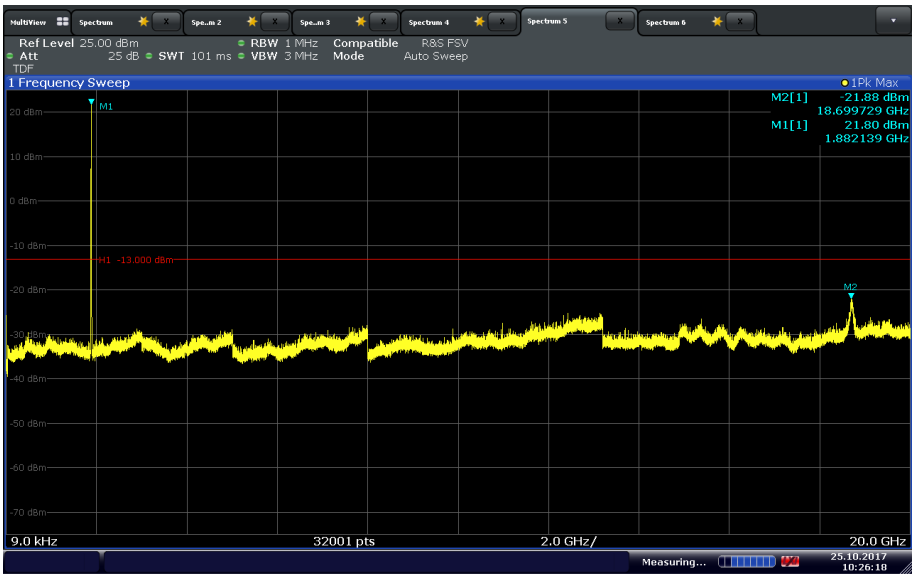
Date: 24.OCT.2017 14:56:10

LTE Band 25_5MHz Bandwidth_Uplink Mid Channel Conducted Spurious Emissions



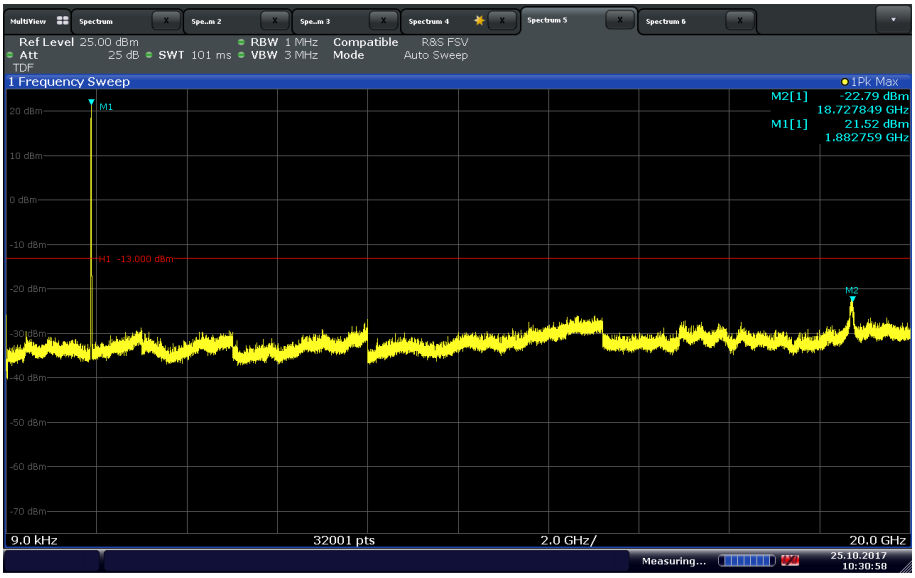
Date: 25.OCT.2017 10:21:01

LTE Band 25_10MHz Bandwidth_Uplink Mid Channel Conducted Spurious Emissions



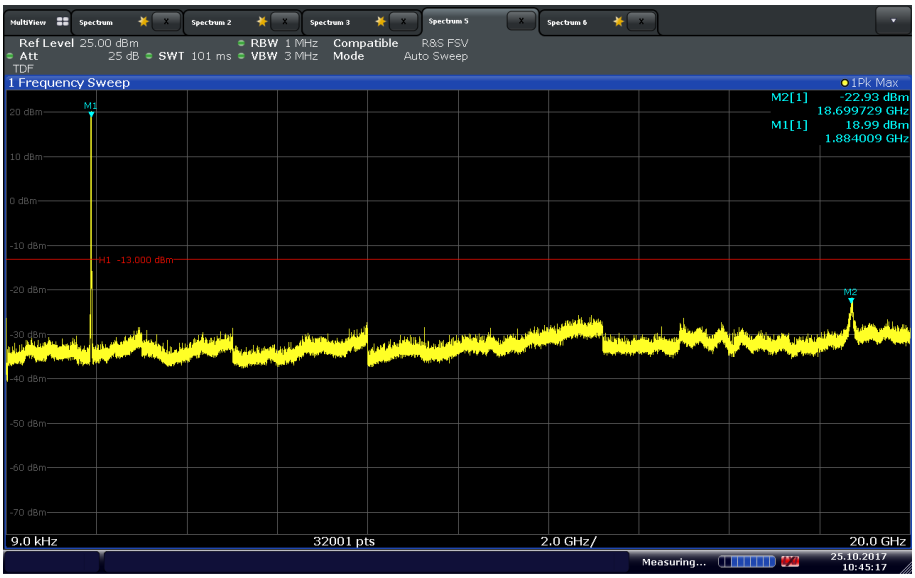
Date: 25.OCT.2017 10:26:18

LTE Band 25_15MHz Bandwidth_Uplink Mid Channel Conducted Spurious Emissions



Date: 25.OCT.2017 10:30:58

LTE Band 25_20MHz Bandwidth_Uplink Mid Channel Conducted Spurious Emissions



Date: 25.OCT.2017 10:45:17

2.7 FIELD STRENGTH OF SPURIOUS RADIATION

2.7.1 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

2.7.2 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: 258719000020 (NU) and 259706000160 (CU) / Test Configuration C and D

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

October 26 and 27, 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

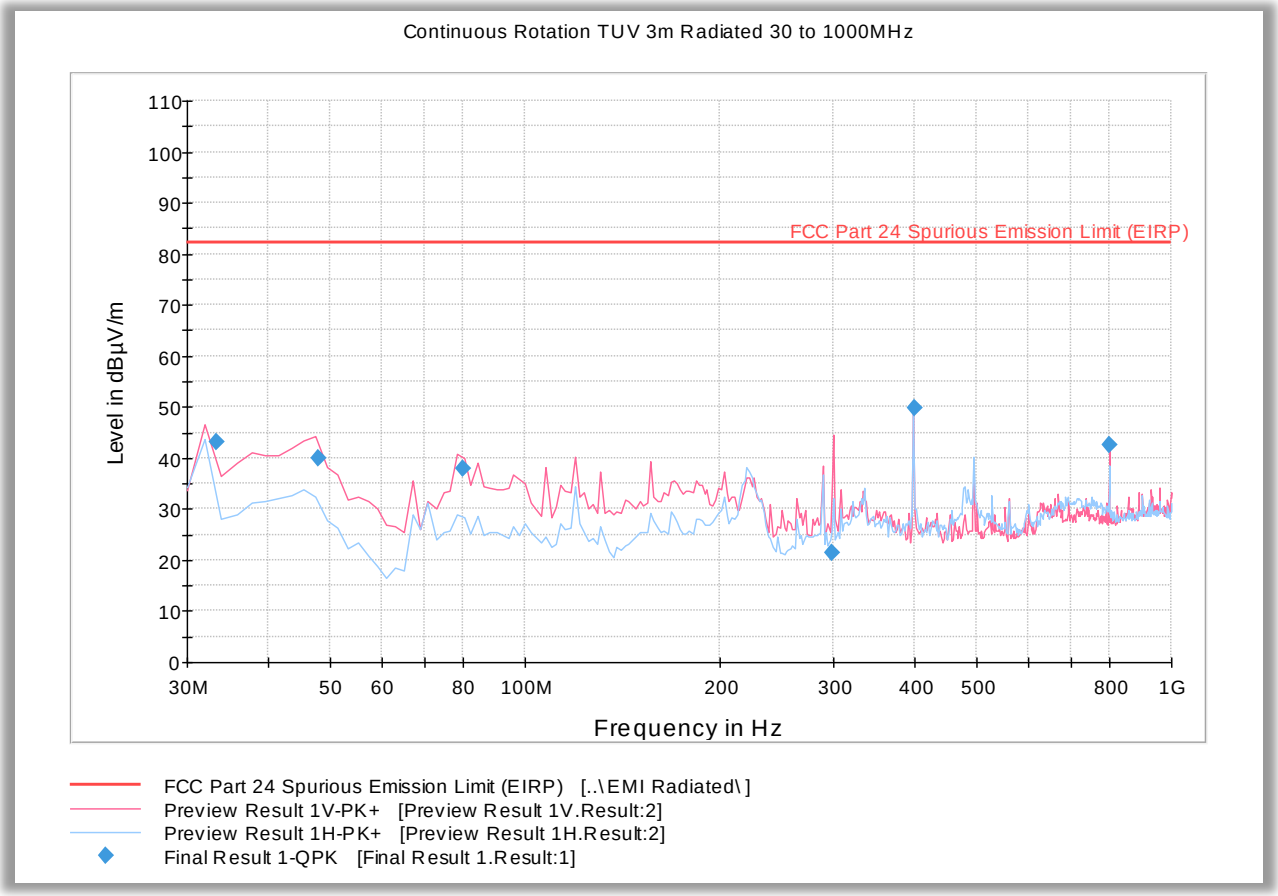
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	25.5 - 26.0°C
Relative Humidity	24.8 - 26.7%
ATM Pressure	98.7 - 98.9kPa

2.7.7 Additional Observations

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

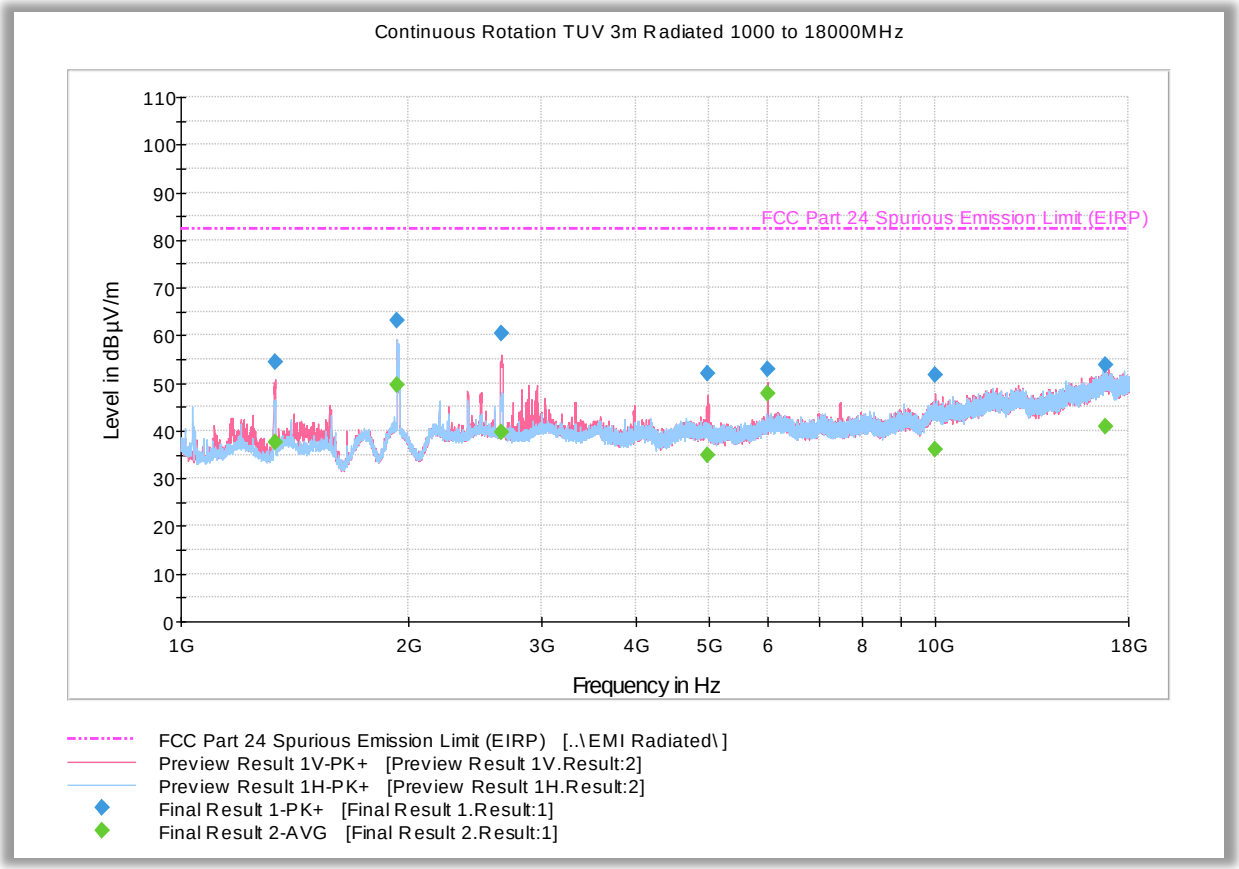
2.7.8 Test Results Below 1GHz (LTE Band 25 Downlink Worst Case Configuration) - 20MHz Bandwidth Low Channel



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)
33.360000	43.1	1000.0	120.000	100.0	V	110.0	-8.5	39.2	82.2
47.974990	40.1	1000.0	120.000	105.0	V	98.0	-14.1	42.1	82.2
79.997194	38.0	1000.0	120.000	106.0	V	9.0	-17.2	44.2	82.2
299.160401	21.3	1000.0	120.000	100.0	V	80.0	-8.1	60.9	82.2
400.018677	49.8	1000.0	120.000	100.0	V	199.0	-4.3	32.4	82.2
800.003447	42.7	1000.0	120.000	100.0	V	14.0	3.7	39.5	82.2

2.7.9 Test Results Above 1GHz (LTE Band 25 Downlink) - 20MHz Bandwidth Low Channel



Peak Data

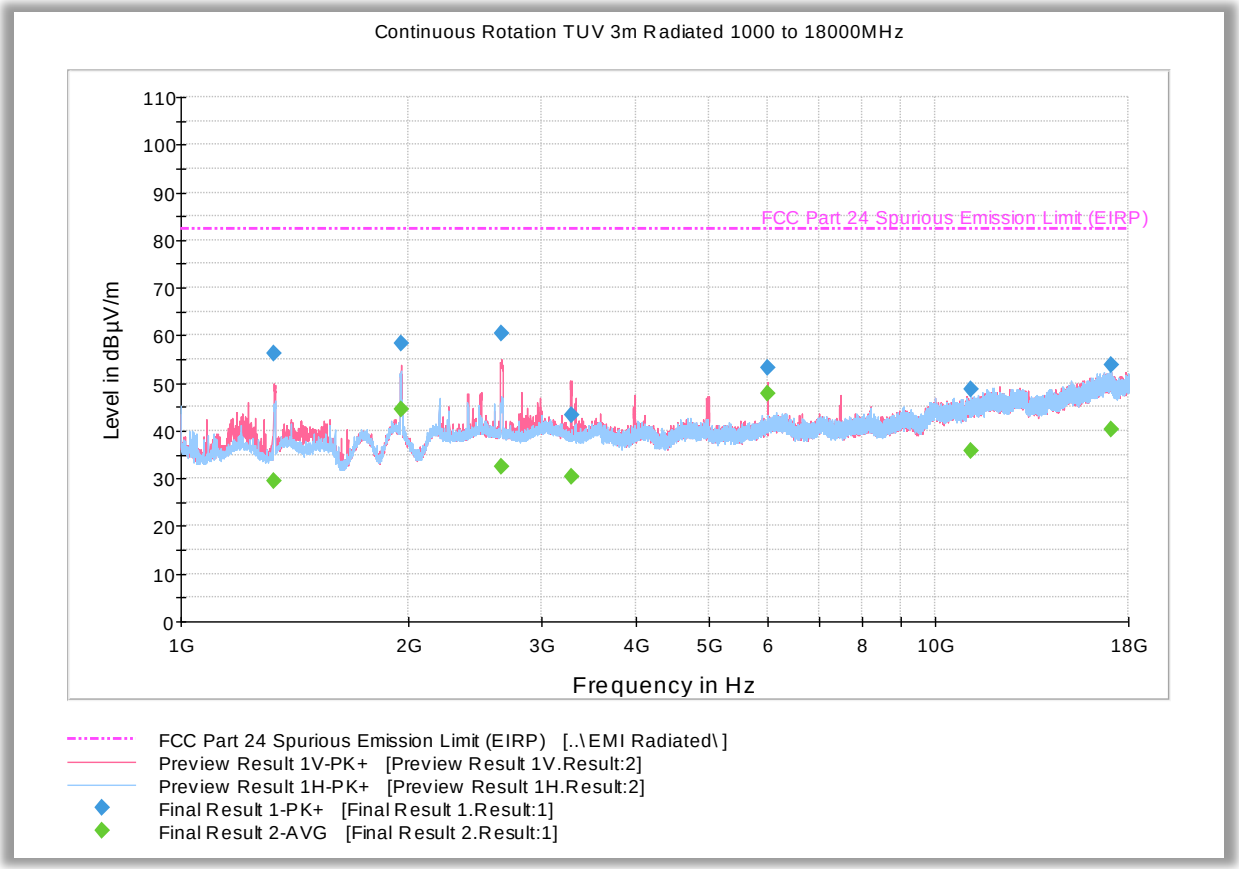
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1331.466667	54.3	1000.0	1000.000	271.2	V	265.0	-5.0	27.9	82.2
1934.400000	63.1	1000.0	1000.000	164.4	H	127.0	-2.3	19.1	82.2
2657.700000	60.5	1000.0	1000.000	352.7	V	281.0	-0.1	21.7	82.2
4990.300000	52.1	1000.0	1000.000	141.4	V	267.0	3.7	30.2	82.2
5999.900000	52.9	1000.0	1000.000	141.4	V	282.0	6.2	29.3	82.2
9971.266667	51.6	1000.0	1000.000	210.3	V	315.0	10.1	30.6	82.2
16776.933333	53.9	1000.0	1000.000	174.3	H	164.0	19.1	28.3	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)
1331.466667	37.5	1000.0	1000.000	271.2	V	265.0	-5.0	44.8	82.2
1934.400000	49.4	1000.0	1000.000	164.4	H	127.0	-2.3	32.8	82.2
2657.700000	39.7	1000.0	1000.000	352.7	V	281.0	-0.1	42.5	82.2
4990.300000	34.9	1000.0	1000.000	141.4	V	267.0	3.7	47.3	82.2
5999.900000	47.8	1000.0	1000.000	141.4	V	282.0	6.2	34.4	82.2
9971.266667	36.2	1000.0	1000.000	210.3	V	315.0	10.1	46.0	82.2
16776.933333	40.8	1000.0	1000.000	174.3	H	164.0	19.1	41.5	82.2

Test Notes: Measurement was performed with a 1.9 GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

2.7.10 Test Results Above 1GHz (LTE Band 25 Downlink) - 20MHz Bandwidth Middle Channel



Peak Data

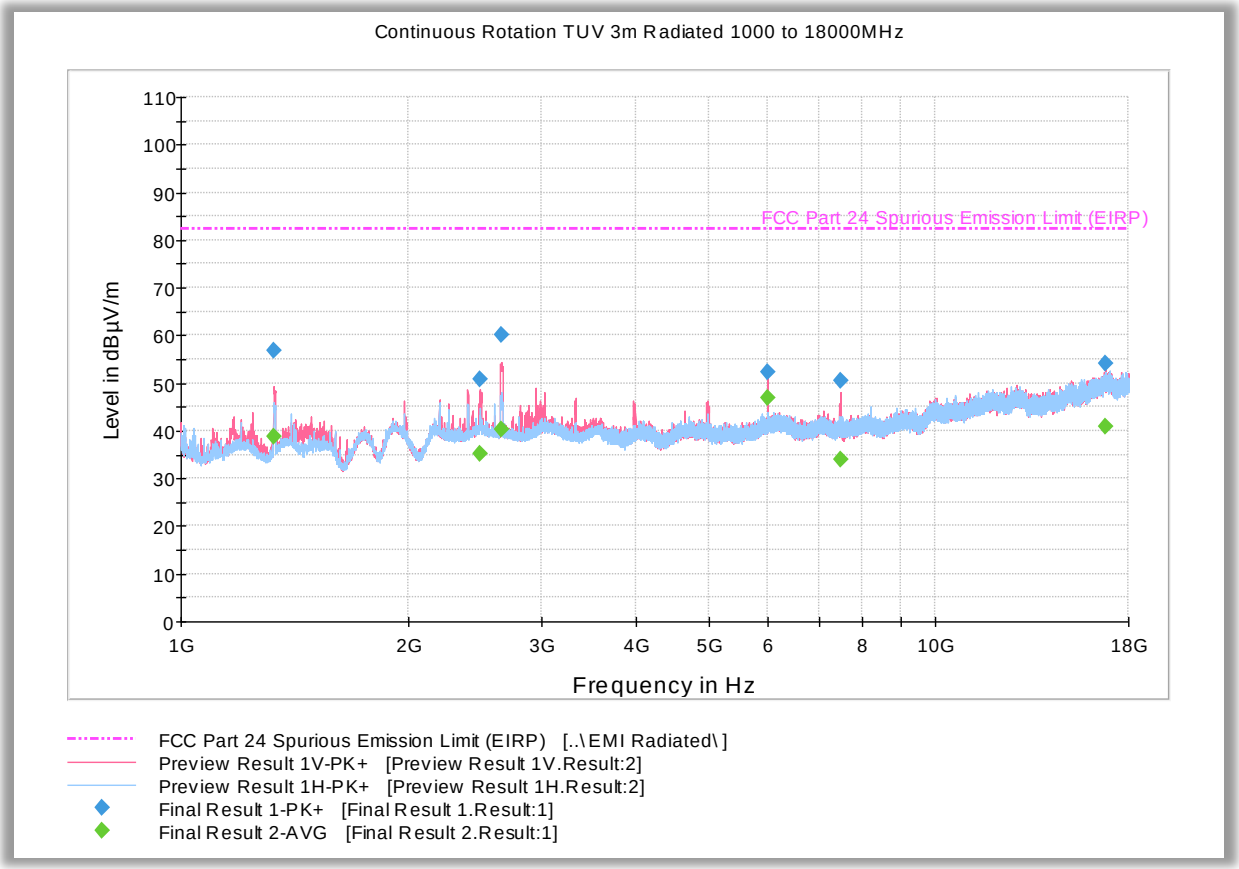
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1329.066667	56.2	1000.0	1000.000	127.4	V	273.0	-5.0	26.0	82.2
1955.200000	58.2	1000.0	1000.000	209.3	V	77.0	-2.2	24.1	82.2
2659.200000	60.6	1000.0	1000.000	344.1	V	281.0	-0.1	21.7	82.2
3295.933333	43.4	1000.0	1000.000	214.3	V	283.0	1.0	38.8	82.2
5999.900000	53.1	1000.0	1000.000	132.4	V	282.0	6.2	29.1	82.2
11114.433333	48.6	1000.0	1000.000	252.2	H	340.0	12.4	33.6	82.2
17099.133333	53.7	1000.0	1000.000	310.1	H	91.0	18.4	28.5	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)
1329.066667	29.4	1000.0	1000.000	127.4	V	273.0	-5.0	52.8	82.2
1955.200000	44.3	1000.0	1000.000	209.3	V	77.0	-2.2	37.9	82.2
2659.200000	32.5	1000.0	1000.000	344.1	V	281.0	-0.1	49.7	82.2
3295.933333	30.4	1000.0	1000.000	214.3	V	283.0	1.0	51.8	82.2
5999.900000	47.9	1000.0	1000.000	132.4	V	282.0	6.2	34.3	82.2
11114.433333	35.6	1000.0	1000.000	252.2	H	340.0	12.4	46.6	82.2
17099.133333	40.1	1000.0	1000.000	310.1	H	91.0	18.4	42.1	82.2

Test Notes: Measurement was performed with a 1.9 GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

2.7.11 Test Results Above 1GHz (LTE Band 25 Downlink) - 20MHz Bandwidth High Channel



Peak Data

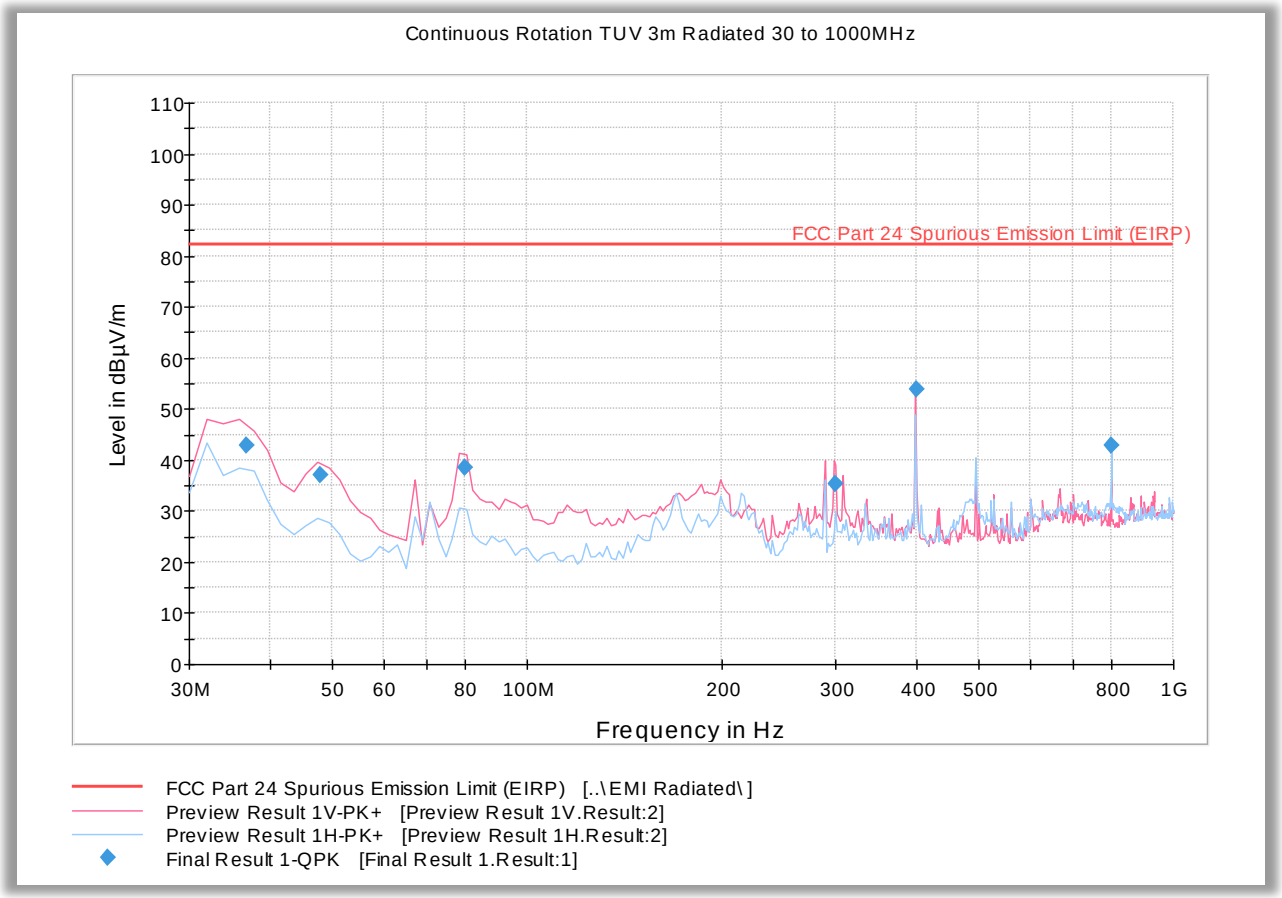
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1329.033333	56.8	1000.0	1000.000	122.4	V	273.0	-5.0	25.4	82.2
2492.233333	50.9	1000.0	1000.000	252.6	V	298.0	-0.3	31.4	82.2
2658.866667	60.2	1000.0	1000.000	332.0	V	281.0	-0.1	22.0	82.2
5999.900000	52.2	1000.0	1000.000	141.4	V	281.0	6.2	30.0	82.2
7469.466667	50.5	1000.0	1000.000	184.3	V	261.0	7.2	31.7	82.2
16782.366667	54.2	1000.0	1000.000	305.1	V	48.0	19.1	28.0	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)
1329.033333	38.9	1000.0	1000.000	122.4	V	273.0	-5.0	43.4	82.2
2492.233333	35.1	1000.0	1000.000	252.6	V	298.0	-0.3	47.1	82.2
2658.866667	40.2	1000.0	1000.000	332.0	V	281.0	-0.1	42.0	82.2
5999.900000	46.9	1000.0	1000.000	141.4	V	281.0	6.2	35.4	82.2
7469.466667	34.1	1000.0	1000.000	184.3	V	261.0	7.2	48.1	82.2
16782.366667	40.8	1000.0	1000.000	305.1	V	48.0	19.1	41.5	82.2

Test Notes: Measurement was performed with a 1.9 GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

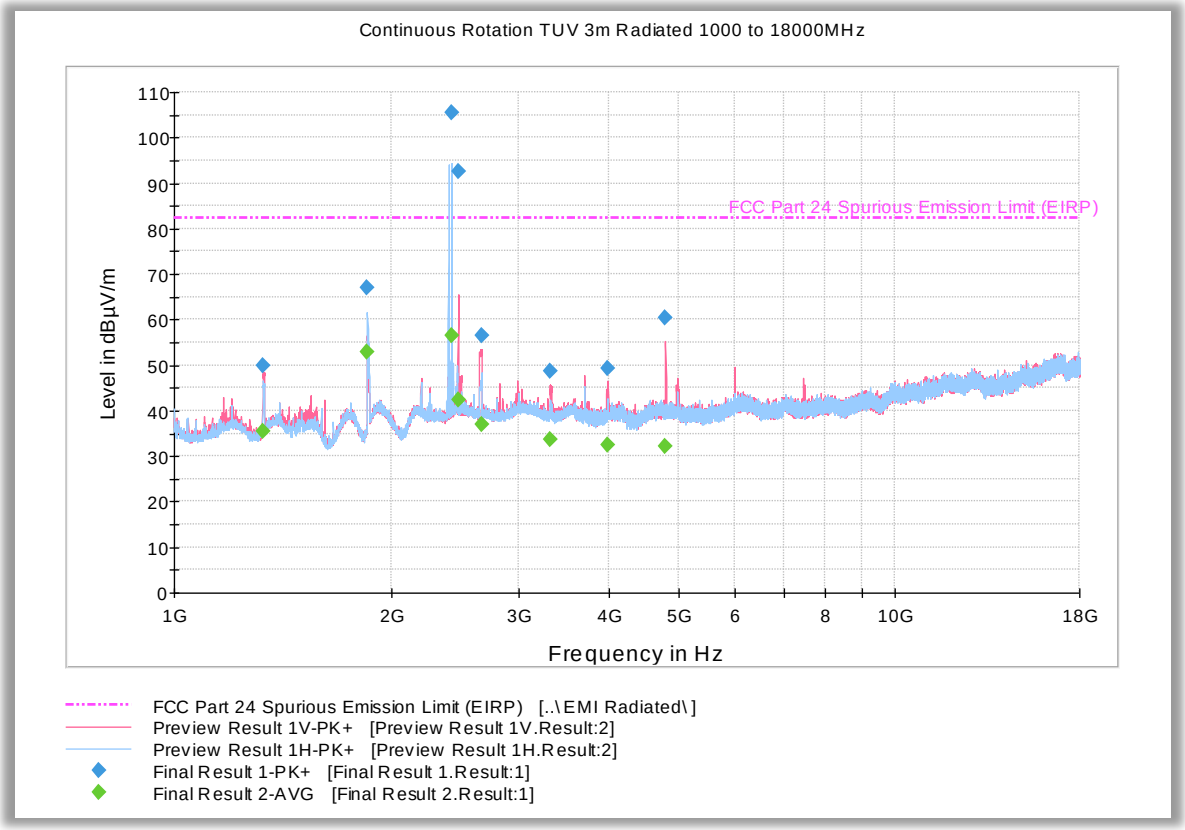
2.7.12 Test Results Below 1GHz (LTE Band 25 Uplink Worst Case Configuration) - 15MHz Bandwidth Middle Channel



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)
36.831663	42.7	1000.0	120.000	100.0	V	15.0	-10.7	39.5	82.2
48.014990	37.1	1000.0	120.000	100.0	V	93.0	-14.1	45.1	82.2
79.997194	38.6	1000.0	120.000	105.0	V	157.0	-17.2	43.6	82.2
299.936513	35.2	1000.0	120.000	100.0	V	260.0	-7.9	47.0	82.2
400.018677	53.9	1000.0	120.000	100.0	V	17.0	-4.3	28.3	82.2
800.003447	42.9	1000.0	120.000	100.0	H	260.0	3.7	39.4	82.2

2.7.13 Test Results Above 1GHz (LTE Band 25 Uplink) - 15MHz Bandwidth Low Channel



Peak Data

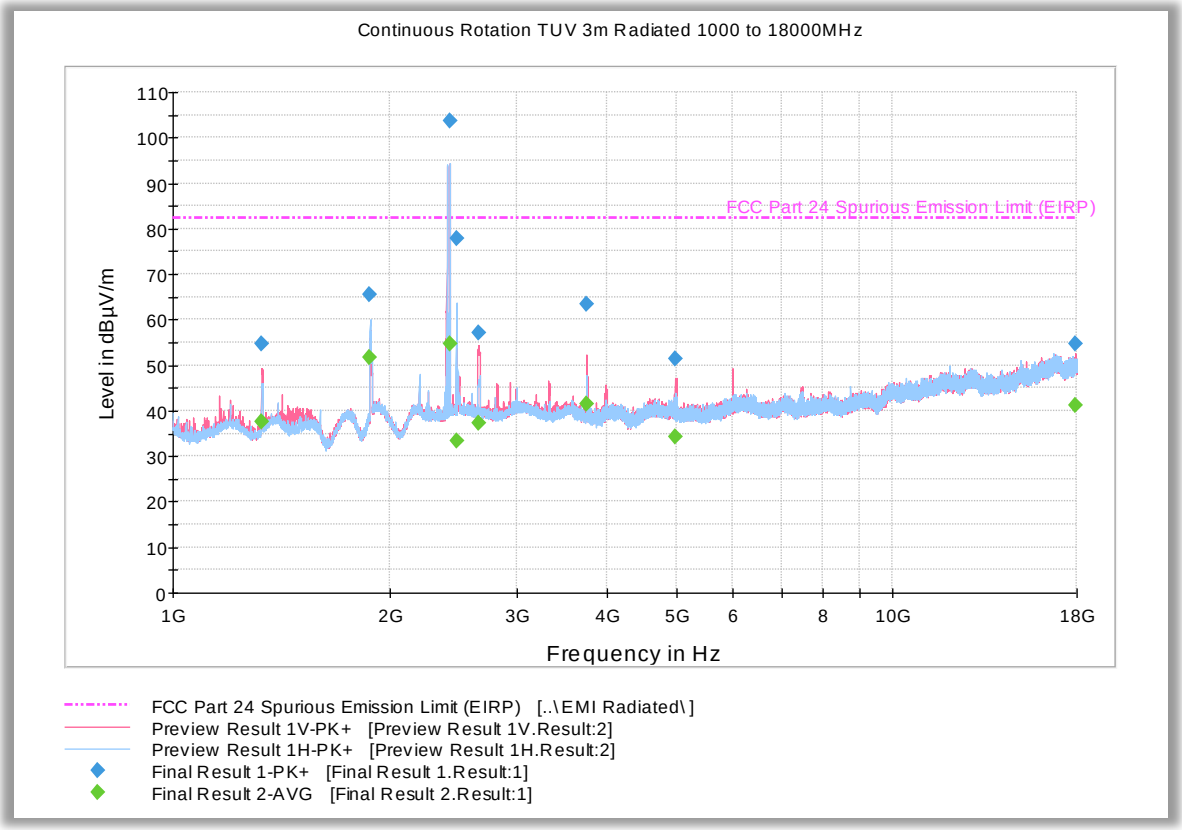
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1330.400000	49.9	1000.0	1000.000	305.1	H	326.0	-5.0	32.3	82.2
1853.766667	66.9	1000.0	1000.000	127.4	H	113.0	-2.7	15.3	82.2
2426.100000	105.5	1000.0	1000.000	151.4	H	161.0	-0.6	BT LE Signal	
2478.866667	92.4	1000.0	1000.000	100.4	V	178.0	-0.3	BT LE Signal	
2665.566667	56.4	1000.0	1000.000	100.4	V	283.0	-0.1	25.9	82.2
3324.700000	48.6	1000.0	1000.000	204.3	V	273.0	1.0	33.7	82.2
3982.566667	49.3	1000.0	1000.000	150.4	V	241.0	2.5	32.9	82.2
4803.666667	60.4	1000.0	1000.000	100.4	V	42.0	3.8	21.9	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)
1330.400000	35.4	1000.0	1000.000	305.1	H	326.0	-5.0	46.8	82.2
1853.766667	52.9	1000.0	1000.000	127.4	H	113.0	-2.7	29.4	82.2
2426.100000	56.5	1000.0	1000.000	151.4	H	161.0	-0.6	BT LE Signal	
2478.866667	42.3	1000.0	1000.000	100.4	V	178.0	-0.3	BT LE Signal	
2665.566667	36.9	1000.0	1000.000	100.4	V	283.0	-0.1	45.3	82.2
3324.700000	33.6	1000.0	1000.000	204.3	V	273.0	1.0	48.7	82.2
3982.566667	32.5	1000.0	1000.000	150.4	V	241.0	2.5	49.7	82.2
4803.666667	32.2	1000.0	1000.000	100.4	V	42.0	3.8	50.0	82.2

Test Notes: Measurement was performed with a 1.9 GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

2.7.14 Test Results Above 1GHz (LTE Band 25 Uplink) - 15MHz Bandwidth Middle Channel



Peak Data

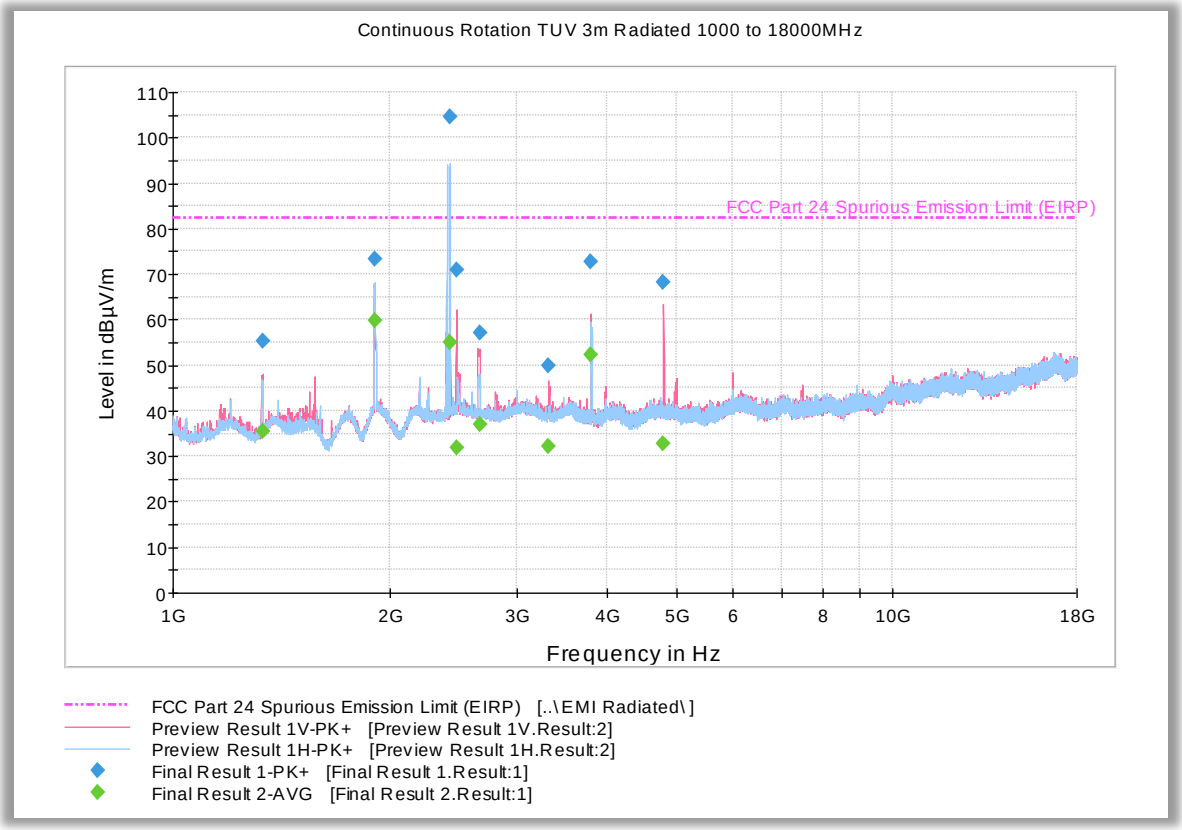
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1327.733333	54.7	1000.0	1000.000	112.4	V	279.0	-5.0	27.6	82.2
1879.266667	65.4	1000.0	1000.000	123.4	H	117.0	-2.5	16.8	82.2
2425.933333	103.7	1000.0	1000.000	172.3	H	102.0	-0.6	BT LE Signal	
2477.733333	77.8	1000.0	1000.000	352.0	H	-19.0	-0.3	BT LE Signal	
2664.500000	57.0	1000.0	1000.000	374.0	V	263.0	-0.1	25.2	82.2
3755.666667	63.5	1000.0	1000.000	192.3	V	70.0	2.0	18.8	82.2
4993.700000	51.3	1000.0	1000.000	223.3	V	237.0	3.7	30.9	82.2
17927.833333	54.8	1000.0	1000.000	396.0	V	229.0	18.9	27.5	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)
1327.733333	37.7	1000.0	1000.000	112.4	V	279.0	-5.0	44.5	82.2
1879.266667	51.7	1000.0	1000.000	123.4	H	117.0	-2.5	30.6	82.2
2425.933333	54.8	1000.0	1000.000	172.3	H	102.0	-0.6	BT LE Signal	
2477.733333	33.3	1000.0	1000.000	352.0	H	-19.0	-0.3	BT LE Signal	
2664.500000	37.1	1000.0	1000.000	374.0	V	263.0	-0.1	45.1	82.2
3755.666667	41.6	1000.0	1000.000	192.3	V	70.0	2.0	40.6	82.2
4993.700000	34.3	1000.0	1000.000	223.3	V	237.0	3.7	48.0	82.2
17927.833333	41.3	1000.0	1000.000	396.0	V	229.0	18.9	40.9	82.2

Test Notes: Measurement was performed with a 1.9 GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

2.7.15 Test Results Above 1GHz (LTE Band 25 Uplink) - 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)
1333.166667	55.4	1000.0	1000.000	175.3	V	273.0	-4.9	26.9	82.2
1904.200000	73.4	1000.0	1000.000	150.4	H	119.0	-2.3	8.8	82.2
2425.933333	104.6	1000.0	1000.000	293.1	H	51.0	-0.6	BT LE Signal	
2477.166667	71.0	1000.0	1000.000	266.2	V	209.0	-0.3	BT LE Signal	
2666.766667	57.2	1000.0	1000.000	100.4	V	280.0	-0.1	25.0	82.2
3324.333333	49.8	1000.0	1000.000	141.4	V	242.0	1.0	32.5	82.2
3808.633333	72.8	1000.0	1000.000	344.1	V	85.0	2.2	9.4	82.2
4804.433333	68.3	1000.0	1000.000	136.4	V	229.0	3.8	13.9	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)
1333.166667	35.5	1000.0	1000.000	175.3	V	273.0	-4.9	46.7	82.2
1904.200000	60.0	1000.0	1000.000	150.4	H	119.0	-2.3	22.3	82.2
2425.933333	54.9	1000.0	1000.000	293.1	H	51.0	-0.6	BT LE Signal	
2477.166667	31.9	1000.0	1000.000	266.2	V	209.0	-0.3	BT LE Signal	
2666.766667	37.0	1000.0	1000.000	100.4	V	280.0	-0.1	45.3	82.2
3324.333333	32.2	1000.0	1000.000	141.4	V	242.0	1.0	50.0	82.2
3808.633333	52.3	1000.0	1000.000	344.1	V	85.0	2.2	29.9	82.2
4804.433333	32.9	1000.0	1000.000	136.4	V	229.0	3.8	49.3	82.2

Test Notes: Measurement was performed with a 1.9 GHz notch filter. No significant emissions observed above 18GHz. Measurements above 18GHz are noise floor figures.

2.8 FREQUENCY STABILITY

2.8.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1055
FCC 47 CFR Part 24, Clause 24.235
RSS-133, Clause 6.3

2.8.2 Standard Applicable

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

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.

2.8.3 Equipment Under Test and Modification State

Serial No: 258719000273 (NU) and 259706002416 (CU) / Test Configuration A and B

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

October 25, 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	25.4°C
Relative Humidity	26.1%
ATM Pressure	98.8kPa

2.8.7 Additional Observations

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

- 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 them 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.
- Middle Channel was tested as the representative configuration.

2.8.8 Test Results Summary

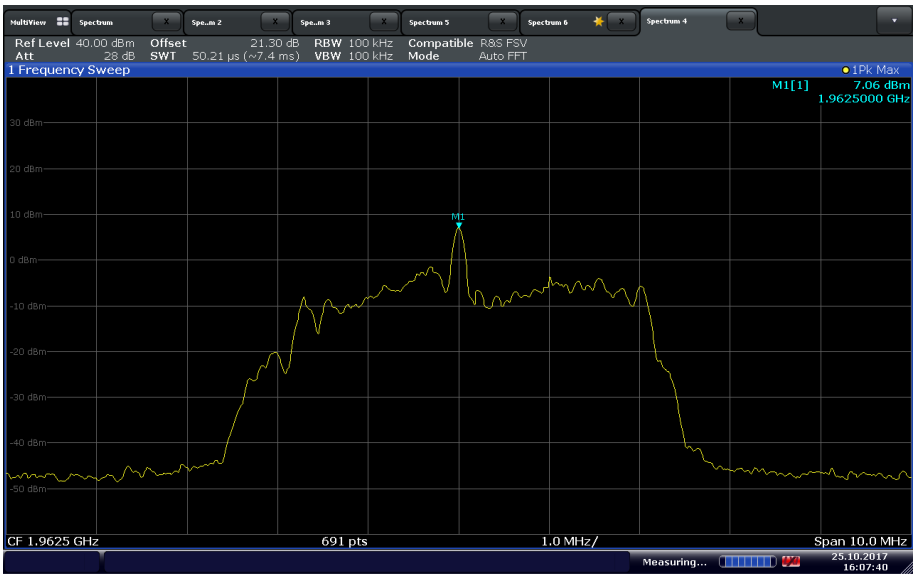
LTE B25 Downlink		
Voltage (VAC)	***Temperature (°C)***	***Frequency Deviation (Hz/ppm)***
120	-30	0 / 0
	-20	0 / 0
	-10	0 / 0
	0	0 / 0
	+10	0 / 0
	+20	0 / 0
	+30	0 / 0
	+40	0 / 0
	+50	0 / 0

LTE B25 Downlink		
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (Hz/ppm)***
20	102	0 / 0
	138	0 / 0

LTE B25 Uplink		
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 B25 Uplink		
Temperature (°C)	***Voltage (VAC)***	***Frequency Deviation (Hz/ppm)***
20	102	0 / 0
	138	0 / 0

2.8.9 Sample Test Plots



Date: 25.OCT.2017 16:07:40

LTE B25 Downlink Mid Channel 120VAC @ 20°C

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	08/14/17	07/27/18
7605	50MHz-18GHz Wideband Power Sensor	N1921A	MY51100054	Agilent	05/19/18	05/19/18
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	04/25/17	04/25/18
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	08/10/17	08/10/18
8871	20dB Attenuator	18N10W-20dB	-	INMET	Verified by 7611 and 7608	
Radiated Emissions						
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	04/25/17	04/25/18
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/06/15	11/06/17
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/01/17	06/01/18
1016	Pre-amplifier	PAM-0202	187	PAM	02/09/17	02/09/18
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	10/17/17	10/17/18
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	Verified by 7611 and 7608	
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7611 and 7608	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7611 and 7608	
7562	Wideband Radio Communication Tester	CMW 500	1201.0002k50 /103829	Rhode & Schwarz	08/10/17	08/10/18

Miscellaneous						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/05/17	07/05/18
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/17/17	01/17/18
	AC Power Supply	EW801-2-115	972430001	ELGAR	Verified by 6708	
	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 Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution xi	Standard Uncertainty u(xi)	[u(xi)]2
1	Receiver/Spectrum Analyzer	Rectangular	0.08	0.05	0.00
2	Cables	Rectangular	0.30	0.17	0.03
4	EUT Setup	Rectangular	0.50	0.29	0.08
				Combined Uncertainty (u_c):	0.34
				Coverage Factor (k):	1.96
				Expanded Uncertainty:	0.67

3.2.2 AC Conducted Emissions

	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

3.2.3 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	Triangular	3.52	1.44	2.07
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.68
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.36

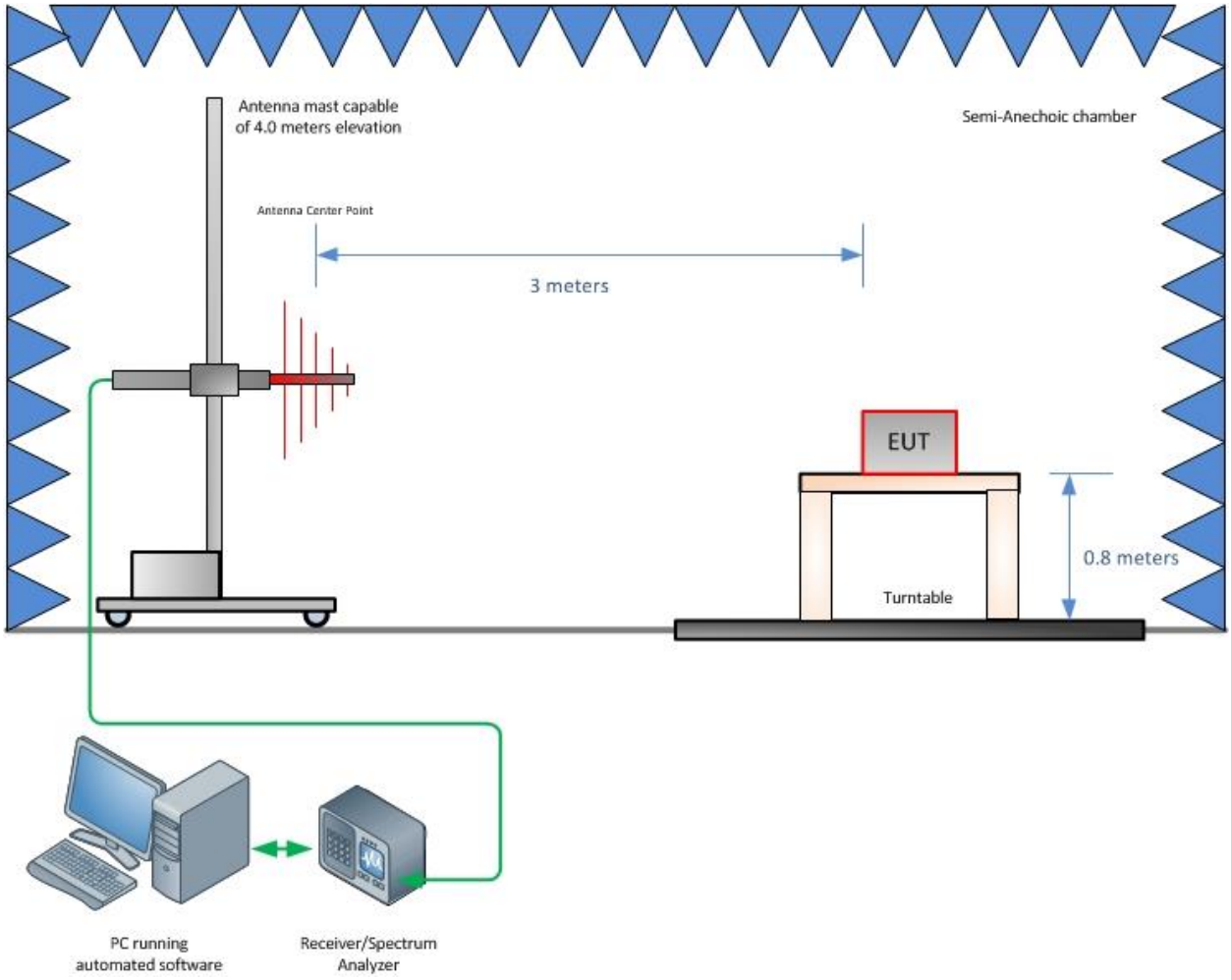
3.2.4 Radiated Measurements (Above 1GHz)

	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	Triangular	3.00	1.22	1.50
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.49
				Coverage Factor (k):	2
				Expanded Uncertainty:	2.99

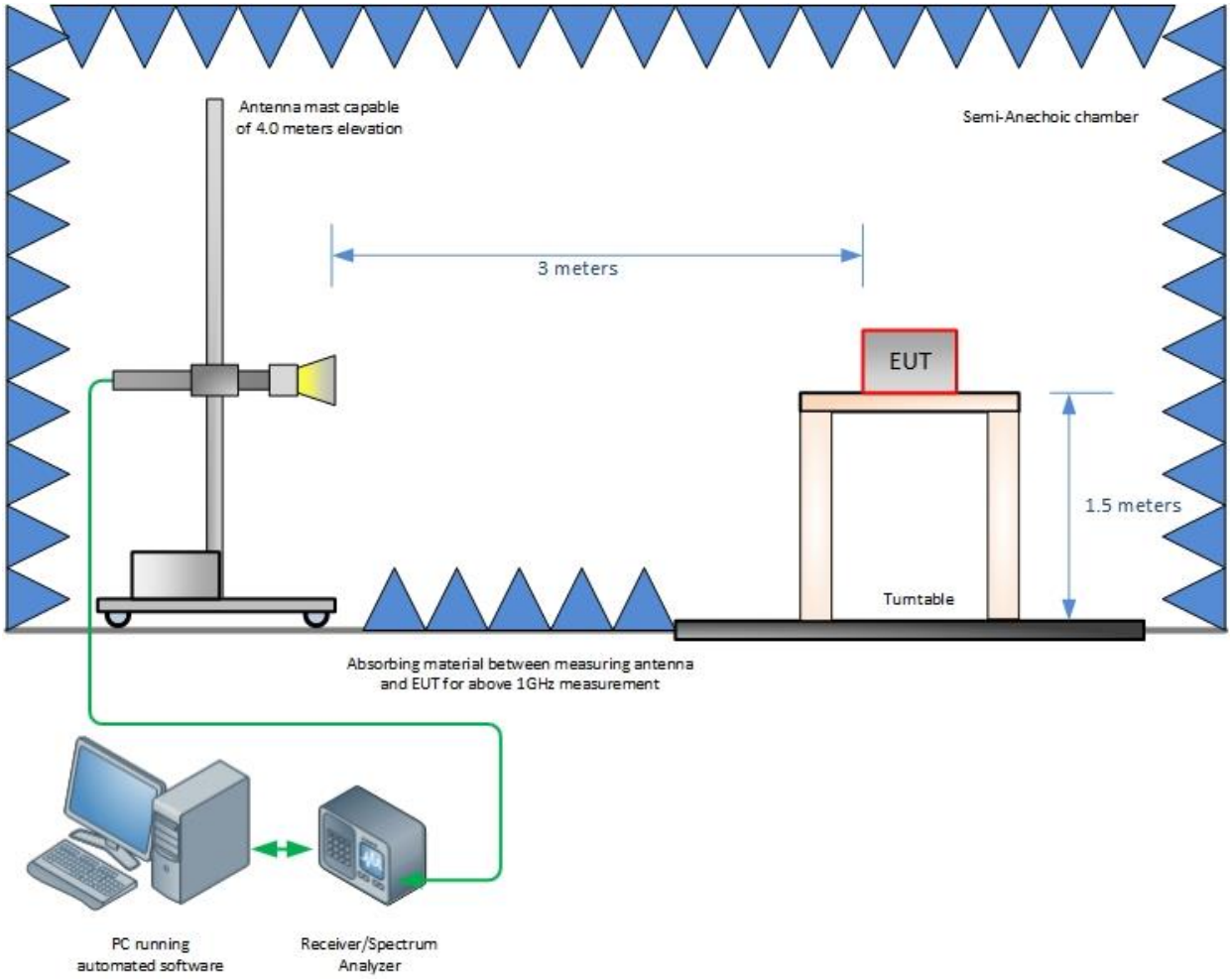
SECTION 4

DIAGRAM OF TEST SETUP

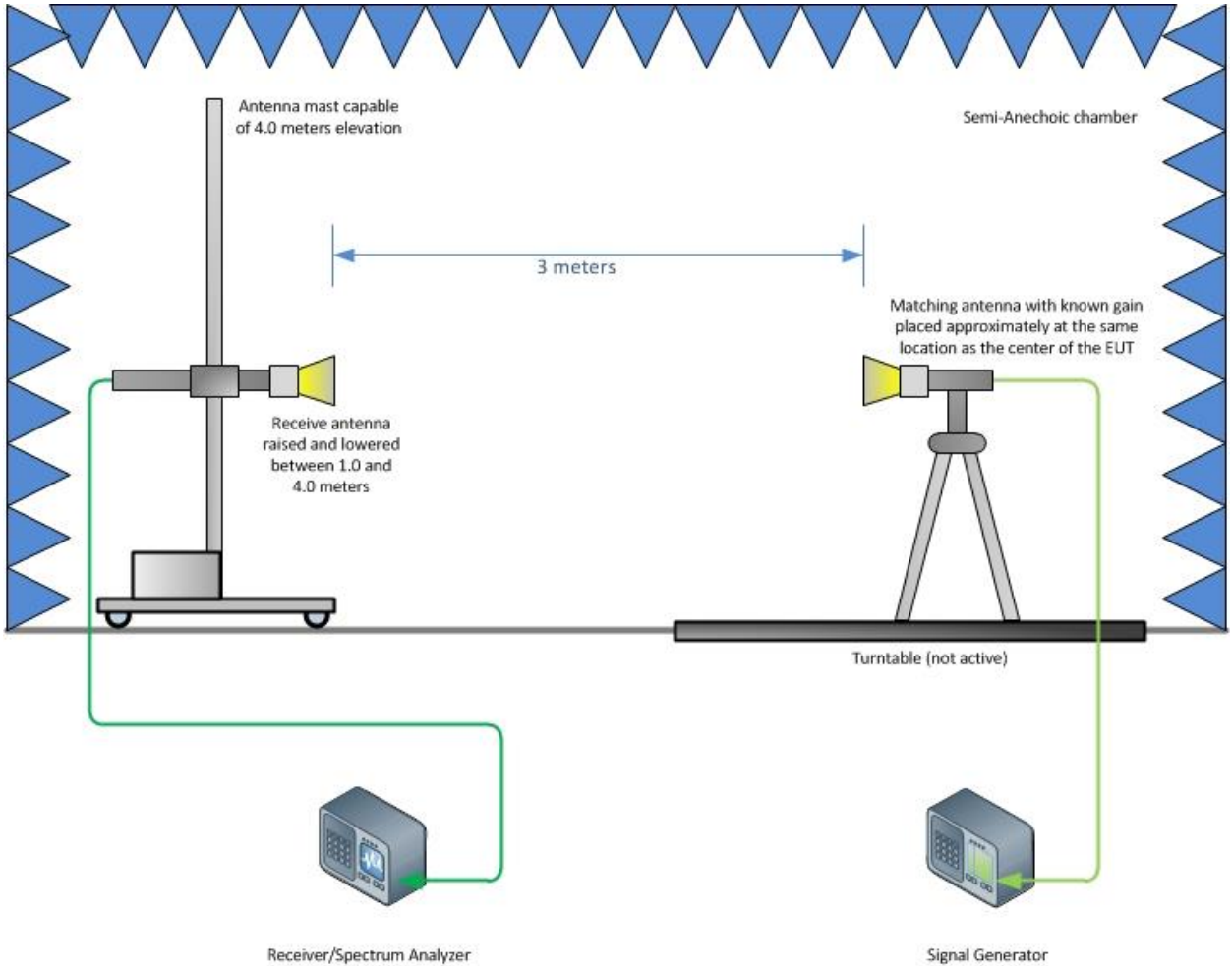
4.1 TEST SETUP DIAGRAM



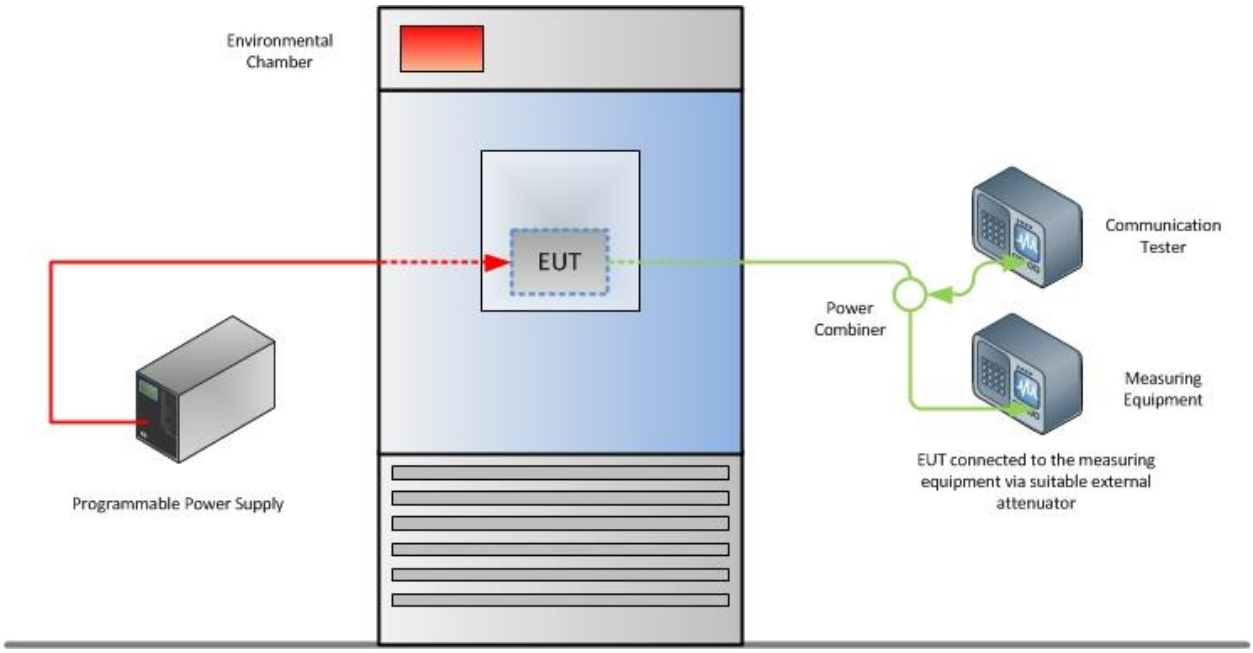
Radiated Emission Test Setup (Below 1GHz)



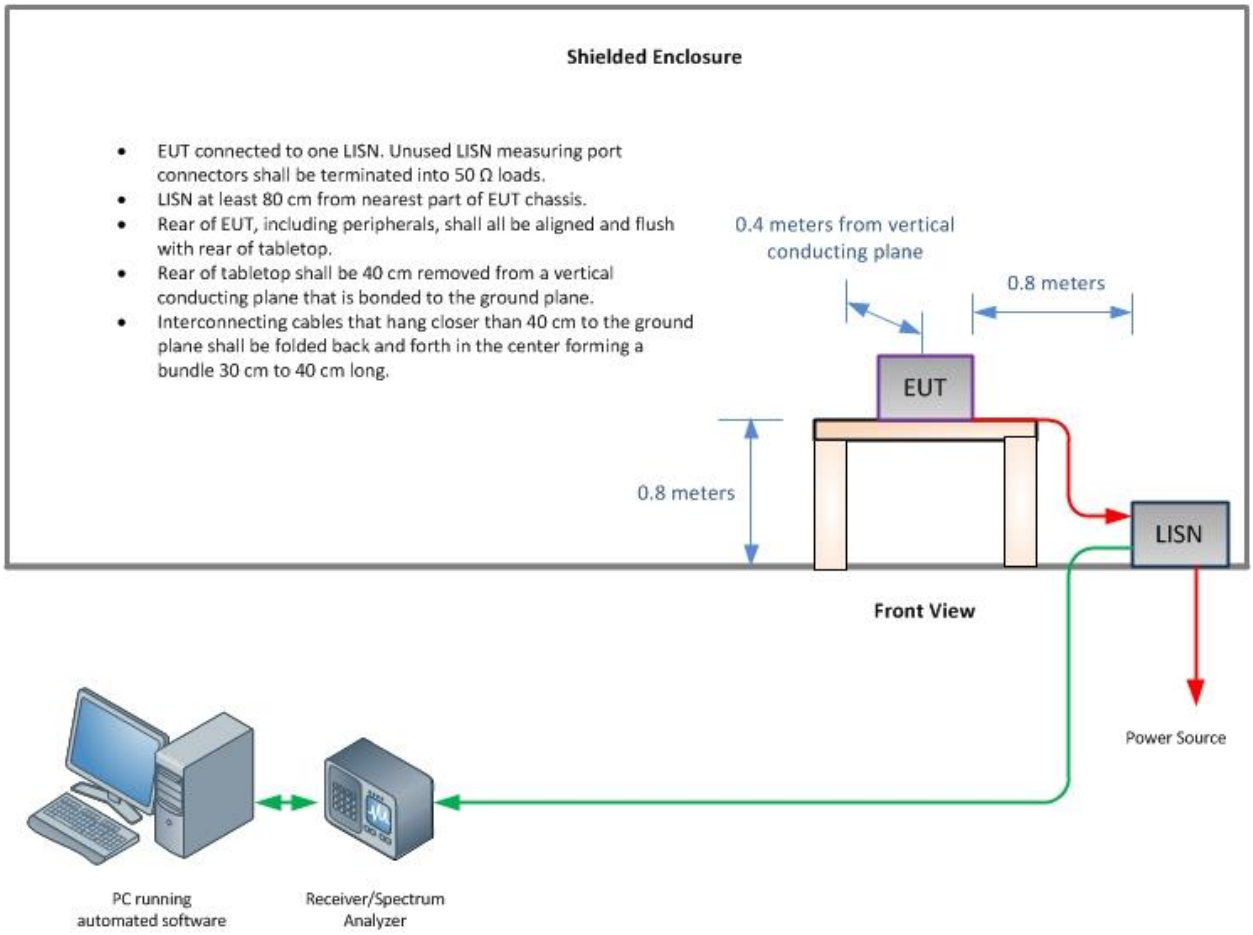
Radiated Emission Test Setup (Above 1GHz)



Substitution Test Method (Above 1GHz, if applicable)



Frequency Stability Test Comfiguration



Conducted Emissions Test Configuration (if applicable)

SECTION 5

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5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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