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Report On

Application for Grant of Equipment Authorization of the
Novatel Wireless Inc. an Inseego Company
NX35-L7504 Mobile Tracking Device

FCC CFR 47 Part 2 and 27: 2017
RSS-130 Issue 1: 2013

Report No. 72141149B **August 2018**

REPORT ON	Radio Testing of the Novatel Wireless Inc. an Inseego Company NX35-L7504 Mobile Tracking Device
TEST REPORT NUMBER	72141149B
PREPARED FOR	Novatel Wireless Inc. an Inseego Company 9605 Scranton Road, Suite 300 San Diego, CA 92121 USA
CONTACT PERSON	Roman Olmos Senior Regulatory Engineer (858) 812-3400 rolmos@nvtl.com
PREPARED BY	Xiaoying Zhang **Name** Title: EMC/Wireless Test Engineer
APPROVED BY	Ferdinand S. Custodio **Name** Authorized Signatory Title: Senior EMC Test Engineer/Wireless Team Lead
DATED	August 17, 2018

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Revision History

72141149B **Novatel Wireless Inc. an Inseego Company** **NX35-L7504 Mobile Tracking Device**					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
08/17/2018	Initial Release				Ferdinand Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Novatel Wireless Inc. an Inseego Company
NX35-L7504 Mobile Tracking Device

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Novatel Wireless Inc. an Inseego Company NX35-L7504 Mobile Tracking Device to the requirements of the following:

- FCC CFR 47 Part 2 and 27: 2017
- RSS-130 Issue 1: 2013

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. The EUT uses a certified multi-band wireless modem (Sierra Wireless Inc. WP7504) with FCC ID N7NWP7 and ISED Certification Number 2417C-WP7. LTE B17 was verified in this test report which is subset of LTE B12. LTE B12 is part of the original certification of WP7504. The objective is to provide separate data for LTE B17.
Manufacturer	Novatel Wireless Inc. an Inseego Company
Model Number(s)	NX35-L7504
FCC ID Number	PKRNVWNX35L7504
IC Number	3229A-NX35L7504
Serial Number(s)	N/A (FCC Test Sample)
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC CRF 47 Part 2 and 27 (October 1, 2017) • RSS-130 Issue 1: October 2013 – Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 • RSS-Gen Issue 5: April 2018 - General Requirements for Compliance of Radio Apparatus • ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
Start of Test	July 30, 2018
Finish of Test	August 10, 2018
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• Report Number: B16W00042-FCC-RF (Sierra Wireless Inc. WP7504 Wireless Module) issued by China Telecommunication Technology Labs. No.8, Yuma Road, Chayuan New City, Nan'an District, Chongqing, P.R. China Tel: 0086-23-88069965 • Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and 27: 2017 with cross-reference to the corresponding ISED RSS standard is shown below.

Section	FCC Part Sections(s)	RSS Section(s)	Test Description	Result
2.1	2.1046	RSS-130 (4.4)	Transmitter Conducted Output Power	Compliant
2.2	2.1046 27.50 (h)(2)	RSS-130 (4.4)	Equivalent Isotropic Radiated Power	Compliant
2.3	2.1046 27.50 (c)(9)	-	Effective Radiated Power	Compliant
2.4	2.1049 27.53(a)(5)	RSS-Gen (6.7)	Occupied Bandwidth	Compliant
2.5	27.50 (d)(5)	RSS-130 (4.4)	Peak-Average Ratio	Compliant
2.6	2.1051 27.53(g)	RSS-130 (4.6.1)	Band Edge	Compliant
2.7	2.1051 27.53(g)	RSS-130 (4.6.1)	Conducted Spurious Emissions	Compliant
2.8	2.1051 27.53(g)	RSS-130 (4.6.1)	Field Strength of Spurious Radiation	Compliant
2.9	2.1055 27.54	RSS-130 (4.3)	Frequency Stability	Compliant
-	-	RSS-Gen 7	Receiver Spurious Emissions	N/A
-	-	RSS-GEN 8.8	Power Line Conducted Emissions	N/A*

N/A Not Applicable. The EUT does not fall to any category defined as “Receiver” under Clause 5.0 of RSS-Gen.
N/A* Not Applicable. EUT is not designed to be connected with the public AC mains.

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1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Novatel Wireless Inc. an Inseego Company NX35-L7504 Mobile Tracking Device. The EUT is designed to accurately track position and other data of vehicles or assets and report this data to a data centre. The NX35 is used to gather information relevant to fleet management services, to plot a vehicle position on a map and to follow the route taken by a vehicle during a journey. The position and speed of the vehicle is sampled using GNSS (Global Navigation Satellite System) and reported through a multi-band modem data link with industry standard communication protocols (UMTS/CDMA/LTE networks).

1.3.2 Technical Description

EUT Description	Mobile Tracking Device
Model Number(s)	NX35-L7504
Rated Voltage	6.0 – 32.0VDC (Vehicular Power)
Mode Verified (Frequency Bands)	LTE Band 17: 704-716 MHz
Capability	CDMA BC0, BC1, WCDMA Band 2, 4, 5, LTE Band 2, 4, 5, 12, 17, 25, BT Classic and BLE
Primary Unit (EUT)	☐ Production ☒ Pre-Production ☐ Engineering

(Client declaration, max. antenna gain covered under this test report)

Technologies / Bands	Frequency	Antenna Gain
LTE Band 17	704-716 MHz	1.0 dBi

1.3.3 Transmit Frequency Table

Technology / Band	Modulation	Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	EIRP	
					Max. Power (dBm)	Max. Power (Watt)
LTE Band 17	QPSK	5	704-716	4M48G7D	24.49	0.281
		10	704-716	8M95G7D	24.43	0.277
	16QAM	5	704-716	4M48G7D	24.38	0.274
		10	704-716	8M95G7D	23.47	0.222

Technology / Band	Modulation	Bandwidth (MHz)	Tx Frequency (MHz)	Emission Designator	ERP	
					Max. Power (dBm)	Max. Power (Watt)
LTE Band 17	QPSK	5	704-716	4M50G7D	22.34	0.171
		10	704-716	8M94G7D	22.28	0.169
	16QAM	5	704-716	4M50G7D	22.23	0.167
		10	704-716	8M94G7D	21.32	0.136

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1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted antenna port measurement. EUT Transmits at max power and is powered by a laboratory programmable power supply.
B	Radiated test setup / case spurious emissions. Antenna port terminated by the call box.

1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester. There are no other test software used during verification.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Novatel Wireless	Main Harness	Custom cable/connector which include the main power, RS232, Driver ID, Business/Private/Panic Inputs, Digital Inputs/Outputs, Power and Ignition Inputs

1.4.4 Worst Case Configuration

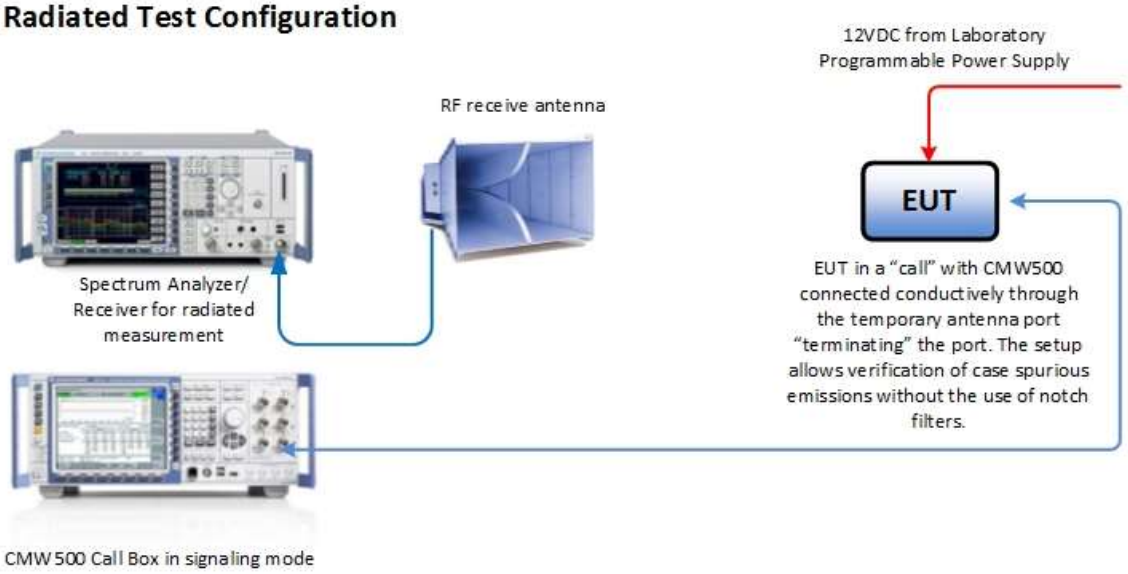
Worst-case configuration used in this test report:

Technology / Band	Modulation	No. of RB	RB Start	Bandwidth
LTE B17	QPSK	1	24	5 MHz
LTE B17	QPSK	1	49	10 MHz

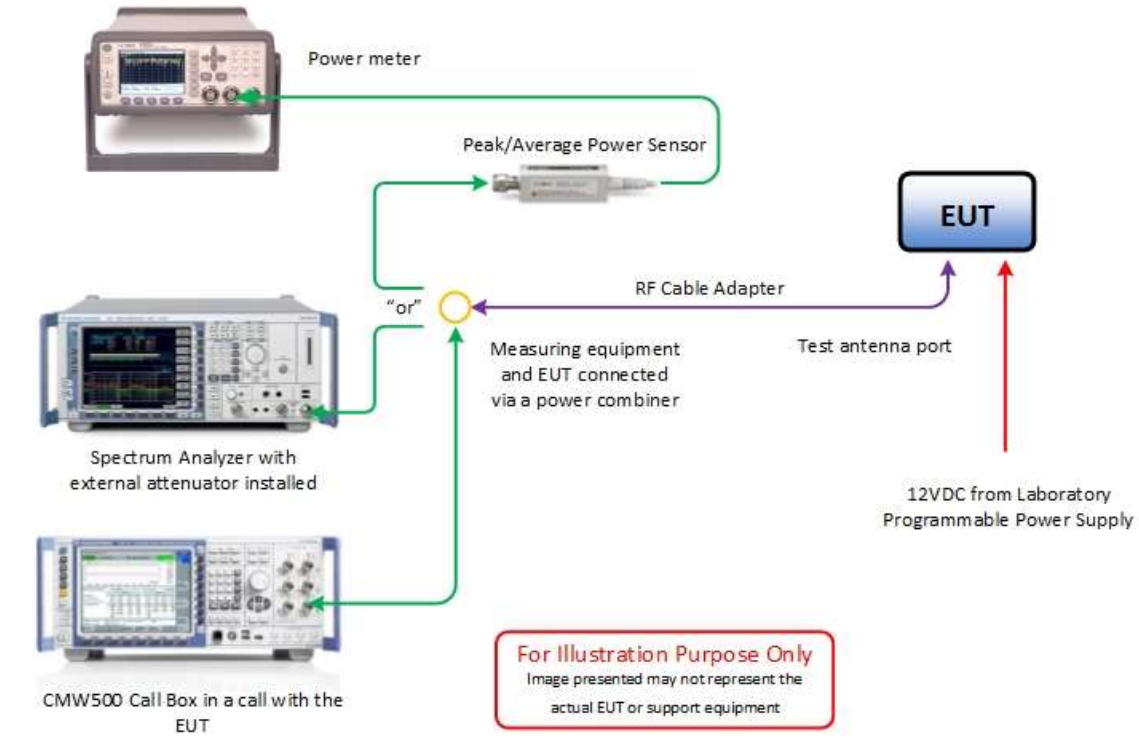
Determination of worst-case configuration were based from the wireless module (Sierra Wireless Inc. WP7504) original certification power measurements of LTE B12. LTE B17 is a subset of B12.

1.4.5 Simplified Test Configuration Diagram

Radiated 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 N/A (FCC Test Sample)		
None	—	—

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 and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. 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 Designation is US1146.

1.9.2 Innovation, Science and Economic Development Canada (IC) 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.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0280 and A-0281

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

1.9.6 RRA – Identification No. US0102

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.9.7 OFCA – U.S. Identification No. US0102

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.

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1.10 SAMPLE CALCULATIONS

1.10.1 GSM Emission Designator

Emission Designator = 250KGXW
GSM BW = 250 kHz
G = Phase Modulation
X = Cases not otherwise covered
W = Combination (Audio/Data)

1.10.2 WCDMA Emission Designator

Emission Designator = 4M15F9W
WCDMA BW = 4.15 MHz
F = Frequency Modulation
9= Composite Digital Info
W = Combination (Audio/Data)

1.10.3 CDMA Emission Designator

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

1.10.4 LTE Emission Designator (QPSK)

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

1.10.5 LTE Emission Designator (16QAM)

Emission Designator = 4M52W7D
W = Frequency Modulation
7= Quantized/Digital Info
D = Combination (Audio/Data

1.10.6 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**

1.10.7 Spurious Radiated Emission (above 1GHz)

Measuring equipment raw measurement (dBµV) @ 2400 MHz			53.9
Correction Factor (dB)	Asset# 1153 (cable)	3.4	-0.4
	Asset# 8628(preamplifier)	-36.5	
	Asset#7575 (antenna)	32.7	
Reported Max Peak Final Measurement (dBµV/m) @ 2400 MHz			**53.5**

1.10.8 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
Novatel Wireless Inc. an Inseego Company
NX35-L7504 Mobile Tracking Device

2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
RSS-130, Clause 4.4

2.1.2 Standard Applicable

The conducted power mesurements were made in accordance to FCC Part 2 Clasue 2.1046 and RSS-139 Clause 6.5, RSS-199 Clause 4.4 and RSS-130 Clause 4.4.

FCC 47 CFR Part 2.1046:
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.
(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

2.1.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration A

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

August 01 and 02, 2018 / 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	26.5 – 27.2 °C
Relative Humidity	52.5 – 53.4 %
ATM Pressure	98.8 - 99.1 kPa

2.1.7 Additional Observations

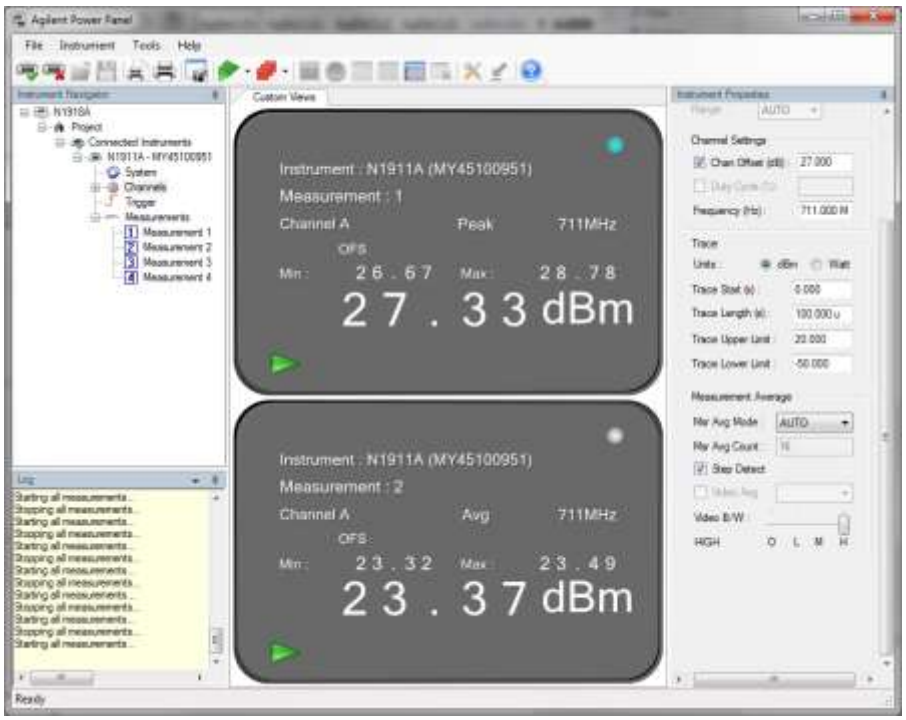
- This is a conducted test using a Power Meter.
- The path loss was measured and entered as a level offset.
- Low, Middle and High channels for all bandwidths and modulations were verified and reported.
- Only the worst-case RB size and RB offset presented.

2.1.8 Test Results

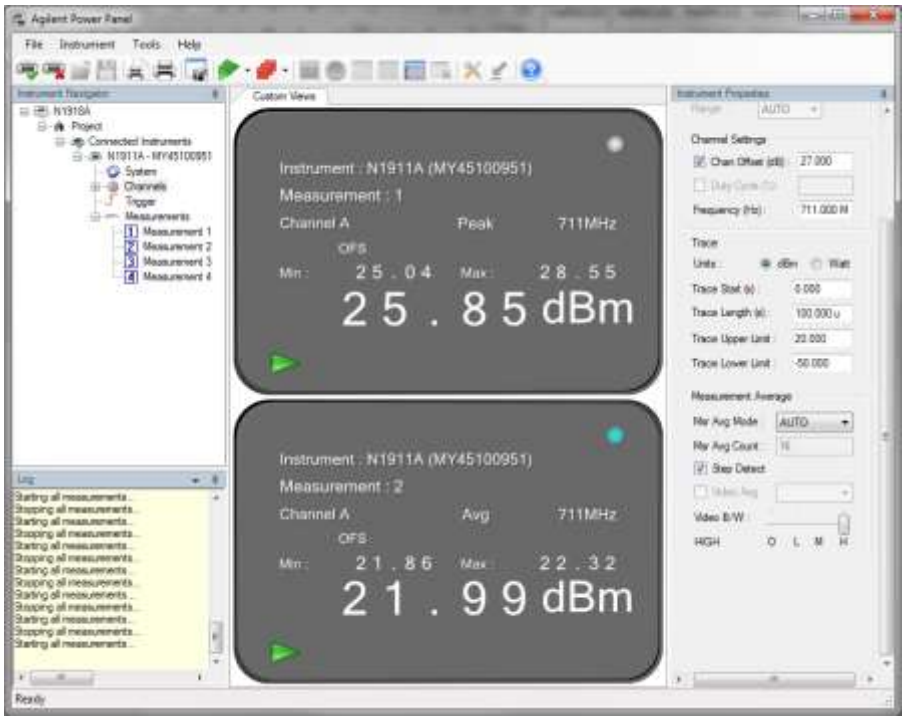
LTE Band 17							
Bandwidth (MHz)	**Channel**	**Frequency (MHz)**	**Modulation**	**No. RB**	**RB Start**	**Average Power (dBm)**	**Peak Power (dBm)**
5	23755	706.5	QPSK	1	0		
				1	13		
				1	24	23.47	29.19
				25	0		
			16QAM	1	0		
				1	13		
				1	24	22.74	28.28
				25	0		
	23790	710.0	QPSK	1	0		
				1	13		
				1	24	23.30	28.47
				25	0		
			16QAM	1	0		
				1	13		
				1	24	22.43	28.35
				25	0		
	23825	713.5	QPSK	1	0		
				1	13		
				1	24	23.49	28.78
				25	0		
			16QAM	1	0		
				1	13		
				1	24	23.28	28.17
				25	0		

LTE Band 17							
Bandwidth (MHz)	**Channel**	**Frequency (MHz)**	**Modulation**	**No. RB**	**RB Start**	**Average Power (dBm)**	**Peak Power (dBm)**
10	23780	709.0	QPSK	1	0		
				1	25		
				1	49	23.22	28.17
				50	0		
			16QAM	1	0		
				1	25		
				1	49	22.47	28.54
				50	0		
	23790	710.0	QPSK	1	0		
				1	25		
				1	49	23.18	28.46
				50	0		
			16QAM	1	0		
				1	25		
				1	49	22.25	27.72
				50	0		
	23800	711.0	QPSK	1	0		
				1	25		
				1	49	23.43	28.50
				50	0		
			16QAM	1	0		
				1	25		
				1	49	22.32	28.55
				50	0		

2.1.9 Sample Test Measurement Screen



LTE Band 17 5MHz Bandwidth High Chanel QPSK



LTE Band 17 10MHz Bandwidth High Chanel 16QAM

2.2 EQUIVALENT ISOTROPIC RADIATED POWER

2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
FCC 47 CFR Part 27, Clause 27.50 (h)(2)
RSS-130, Clause 4.4

2.2.2 Standard Applicable

FCC 47 CFR Part 27.50(h)
(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts ERRP. All user stations are limited to 2.0 watts trasmitter output power.

RSS-130, Clase 4.4:
The e.i.r.p. shall not exceed 50 watts from mobiles equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equiment or for indoor fixed subscriber equipment.

2.2.3 Equipment Under Test and Modification State

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

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

August 01 and 02, 2018 / XYZ

2.2.5 Additional Observations

- EIRP was calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

$$EIRP = P_T + G_T - L_C$$

Where:
P_T = transmitter conducted output power dBm (Section 2.1 of this test report)
G_T = gain of the transmitting antenna, in dBi (EIRP);
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB (EUT posees an internal Antenna. The loss between the EUT and the antenna port is considered negligible).

- Only the worst-case RB size and RB offset presented.

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2.2.6 Test Results

LTE Band 17								
Modulation	***Bandwidth (MHz)***	***Channels***	***Frequency (MHz)***	***Tx Average Power (dBm)***	***Antenna Gain (dBi)***	***EIRP (dBm)***	***Limit (dBm)***	***Margin (dBm)***
QPSK	5	23755	706.5	23.47	1.0	24.47	33	8.53
		23790	710.0	23.30	1.0	24.30	33	8.70
		23825	713.5	23.49	1.0	24.49	33	8.51
	10	23780	709.0	23.22	1.0	24.22	33	8.78
		23790	710.0	23.18	1.0	24.18	33	8.82
		23800	711.0	23.43	1.0	24.43	33	8.57
16QAM	5	23755	706.5	22.74	1.0	23.74	33	9.26
		23790	710.0	22.43	1.0	23.43	33	9.57
		23825	713.5	23.38	1.0	24.38	33	8.62
	10	23780	709.0	22.47	1.0	23.47	33	9.53
		23790	710.0	22.25	1.0	23.25	33	9.75
		23800	711.0	22.32	1.0	23.32	33	9.68

2.3 EFFECTIVE RADIATED POWER

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
FCC 47 CFR Part 27, Clause 27.50 (c)(9)

2.3.2 Standard Applicable

FCC 47 CFR Part 27.50(c)(9)
Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP.

2.3.3 Equipment Under Test and Modification State

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

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

August 01 and 02, 2018 / XYZ

2.3.5 Additional Observations

- ERP was calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

$$\mathbf{ERP = P_T + G_T - L_C - 2.15dB}$$

Where:
P_T = transmitter conducted output power dBm (Section 2.1 of this test report)
G_T = gain of the transmitting antenna, in dBi (EIRP: the -2.15 in the formula is to convert EIRP to ERP);
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB (EUT configuration during verification is mounted on an interface board with short direct connection to the antenna port. The loss between the EUT and the antenna port is considered negligible).

- Only the worst-case RB size and RB offset presented.

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2.3.6 Test Results

LTE Band 17								
Modulation	***Bandwidth (MHz)***	***Channels***	***Frequency (MHz)***	***Tx Average Power (dBm)***	***Antenna Gain (dBi)***	***ERP (dBm)***	***Limit (dBm)***	***Margin (dBm)***
QPSK	5	23755	706.5	23.47	1.0	22.32	44.77	22.45
		23790	710.0	23.30	1.0	22.15	44.77	22.62
		23825	713.5	23.49	1.0	22.34	44.77	22.43
	10	23780	709.0	23.22	1.0	22.07	44.77	22.70
		23790	710.0	23.18	1.0	22.03	44.77	22.74
		23800	711.0	23.43	1.0	22.28	44.77	22.49
16QAM	5	23755	706.5	22.74	1.0	21.59	44.77	23.18
		23790	710.0	22.43	1.0	21.28	44.77	23.49
		23825	713.5	23.38	1.0	22.23	44.77	22.54
	10	23780	709.0	22.47	1.0	21.32	44.77	23.45
		23790	710.0	22.25	1.0	21.10	44.77	23.67
		23800	711.0	22.32	1.0	21.17	44.77	23.60

2.4 OCCUPIED BANDWIDTH

2.4.1 Specification Reference

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

2.4.2 Standard Applicable

The transmitted signal bandwidth shall be reported as the 99% emission bandwidth, that is the frequency bandwidth suuch that, below its lower and above its upper frequency limits, the mean powers radiated are eqch equal to 0.5 percent of the total mean power radiated by a give emission.

26dB 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 by at least 26 dB below the transmitter power.

2.4.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration A

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

August 07, 2018 / 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 Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	26.1 °C
Relative Humidity	48.5 %
ATM Pressure	98.3 kPa

2.4.7 Additional Observations

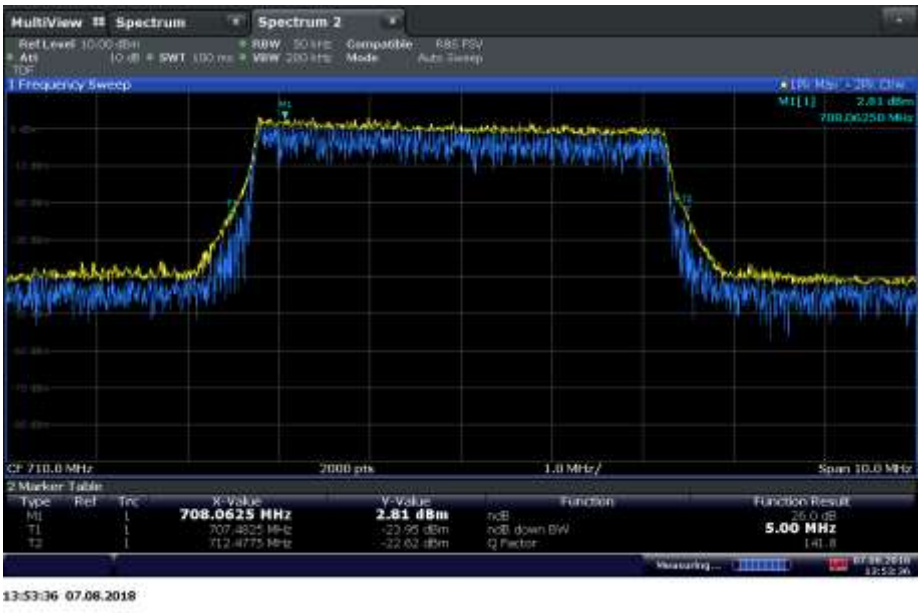
- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- Using the occupied bandwidth measurement function of the spectrum analyzer, the 99% occupied bandwith was measured.
- The 26dB bandwidth was measured in accordance with ANSI C63.26 clause 5.4.3 using the ndB measurement function of the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be at least 3x RBW.
- Low, Mid and High channels for all bandwidths and modulations were verified. Test results of Mid channel were presented as representative channel.

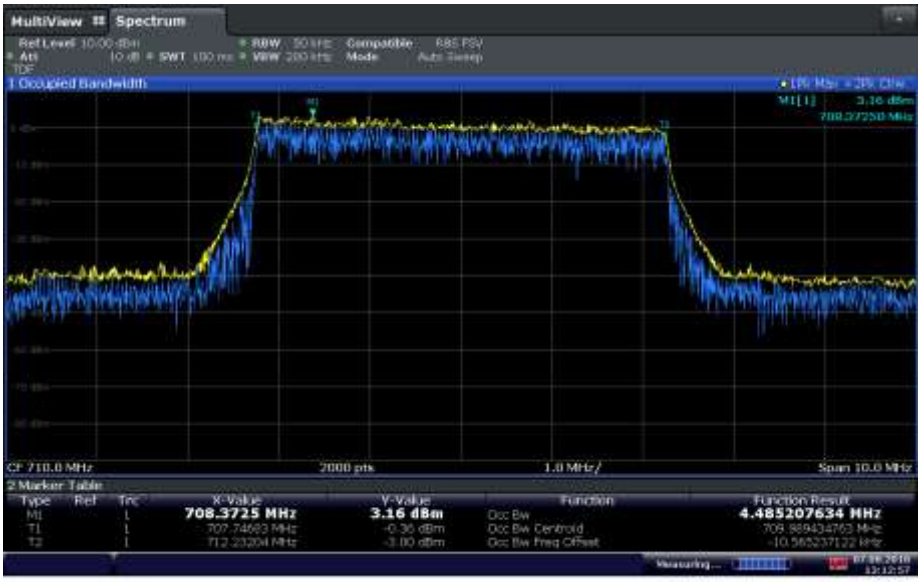
2.4.8 Test Results

LTE Band 17					
Modulation	***Bandwidth (MHz)***	***Channel***	***Frequency (MHz)***	***99% OBW (MHz)***	***26dB BW (MHz)***
QPSK	5	23790	710.0	4.48	5.00
	10			8.95	9.80
16QAM	5	23790	710.0	4.48	4.89
	10			8.95	9.73

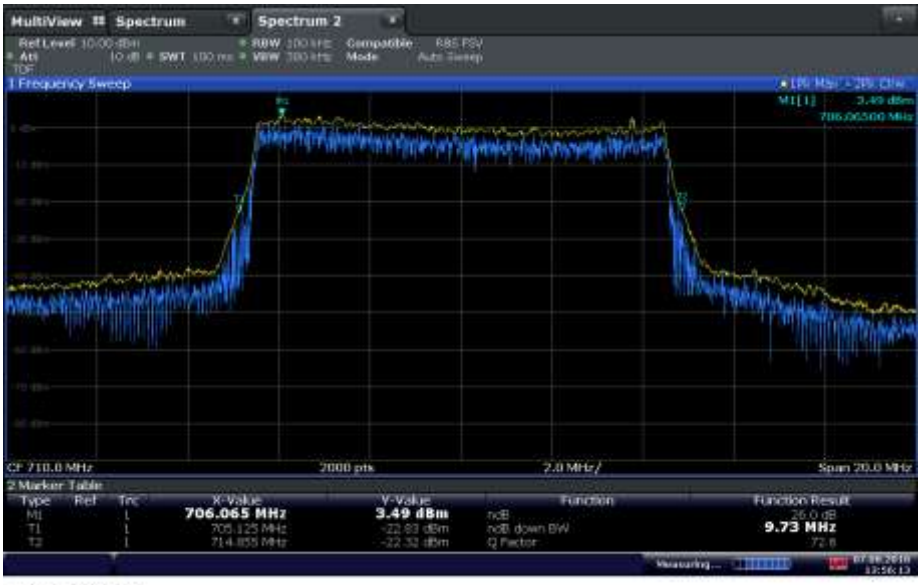
2.4.9 Example Test Plots



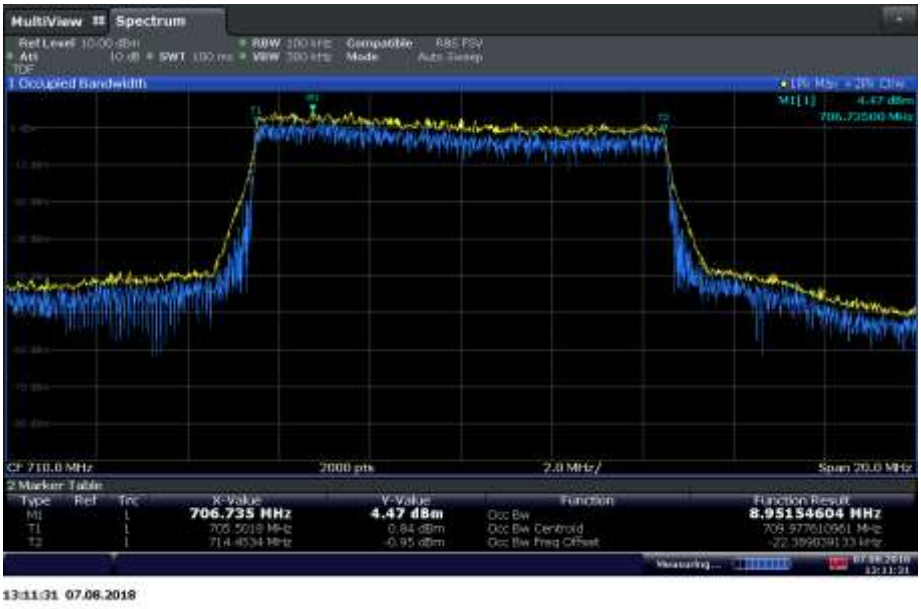
LTE Band 17 (5 MHz BW) / Middle Channel 710 MHz / QPSK / 26dB BW



LTE Band 17 (5 MHz BW) / Middle Channel 710 MHz / QPSK / 99% OBW



LTE Band 17 (10 MHz BW) / Middle Channel 710 MHz / QPSK / 26dB BW



LTE Band 17 (10 MHz BW) / Middle Channel 710 MHz / QPSK / 99% OBW

2.5 PEAK-AVERAGE POWER RATIO

2.5.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.50 (d)(5)
RSS-130, Clause 4.4

2.5.2 Standard Applicable

FCC 47 CFR Part 27.50(d):
(5) 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 13dB.

RSS-130:
The transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

2.5.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration A

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

August 10, 2018 / XYZ

2.5.5 Test Equipment Used

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

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.7 °C
Relative Humidity	51.3 %
ATM Pressure	99.7 kPa

2.5.7 Aditional Observations

- This is a conducted test.
- As per FCC KDB 971168 D01 v03r01 clause 5.7, the PAPR was measured in accorance with ANSI C63.26 clause 5.2.3.4.

- 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.
- Low, Middle and High channels for all bandwidths and modulations were verified.
- The path loss for was measured and entered as a transducer factor (TDF).
- There are no measured PAPR levels greater than 13dB. EUT complies.

2.5.8 Test Results

LTE Band 5					
Modulation	***Bandwidth (MHz)***	**Channels**	**Frequency (MHz)**	**PAR (dB)**	**Limit for PAR (dB)**
QPSK	5	23755	706.5	6.04	13
		23790	710.0	5.51	13
		23825	713.5	5.63	13
	10	23780	709.0	5.29	13
		23790	710.0	5.62	13
		23800	711.0	5.41	13
16QAM	5	23755	706.5	6.46	13
		23790	710.0	6.75	13
		23825	713.5	5.86	13
	10	23780	709.0	7.01	13
		23790	710.0	6.41	13
		23800	711.0	7.15	13

2.5.9 Example Test Plots

LTE Band 17 (10 MHz BW) / Middle Channel 710 MHz / QPSK

Date: 10.AUG.2018 12:27:18

LTE Band 17 (10 MHz BW) / Middle Channel 710 MHz / 16QAM

Date: 10.AUG.2018 12:27:46

2.6 SPURIOUS EMISSION AT BAND EDGE

2.6.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 27, Clause 27.53(g)
RSS-130, Clause 4.6.1

2.6.2 Standard Applicable

FCC 47 CFR Part 27.53(g)
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

RSS-130, Clause 4.6.1:
The power of any unwanted emissios in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 $\log_{10}$ p (watts) dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

2.6.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration A

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

August 10, 2018 / 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 Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

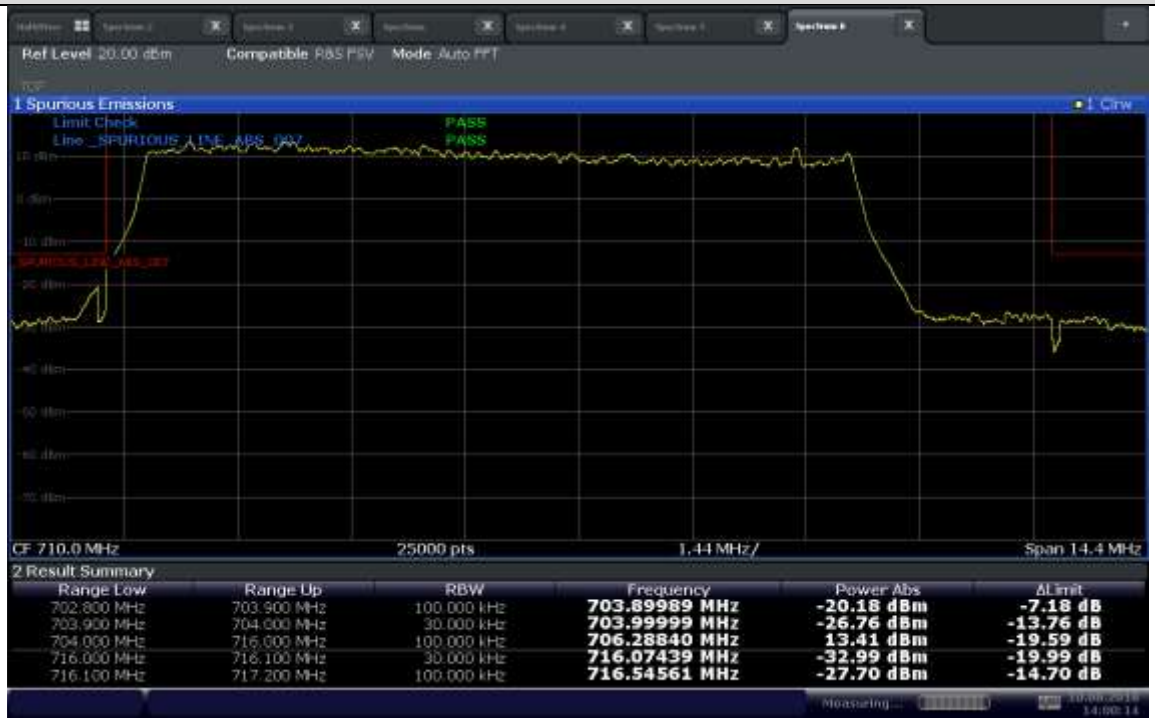
Ambient Temperature	24.7 °C
Relative Humidity	51.3 %
ATM Pressure	99.7 kPa

2.6.7 Additional Observations

- This is a conducted test.
- The path loss was measured and entered as a transducer factor (TDF).
- The Spurious Emissions function of the spectrum analyser was used for this test. The corresponding RBW was pre-programmed according to the requirements. Detector used was Positive Peak.
- Only worst-case configuration and bandwidth presented in this test report.

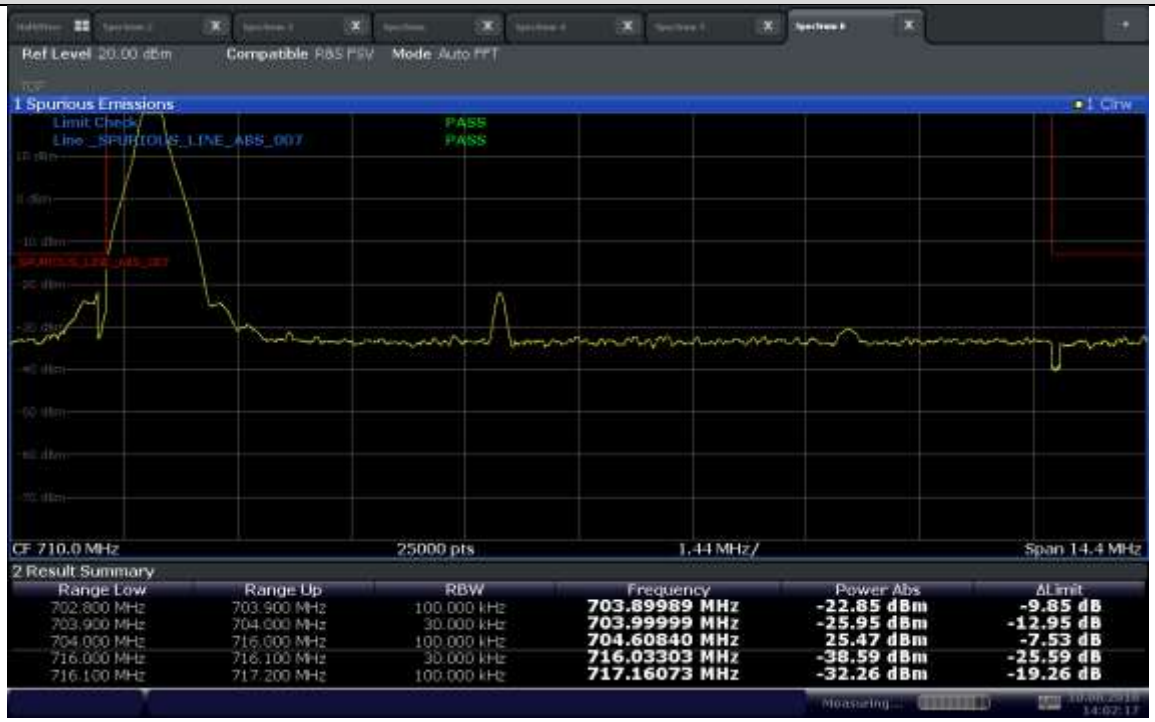
2.6.8 Test Results

LTE Band 17 (10 MHz BW)/QPSK/Low Channel 709 MHz/Full RB Band Edge @ 704 MHz



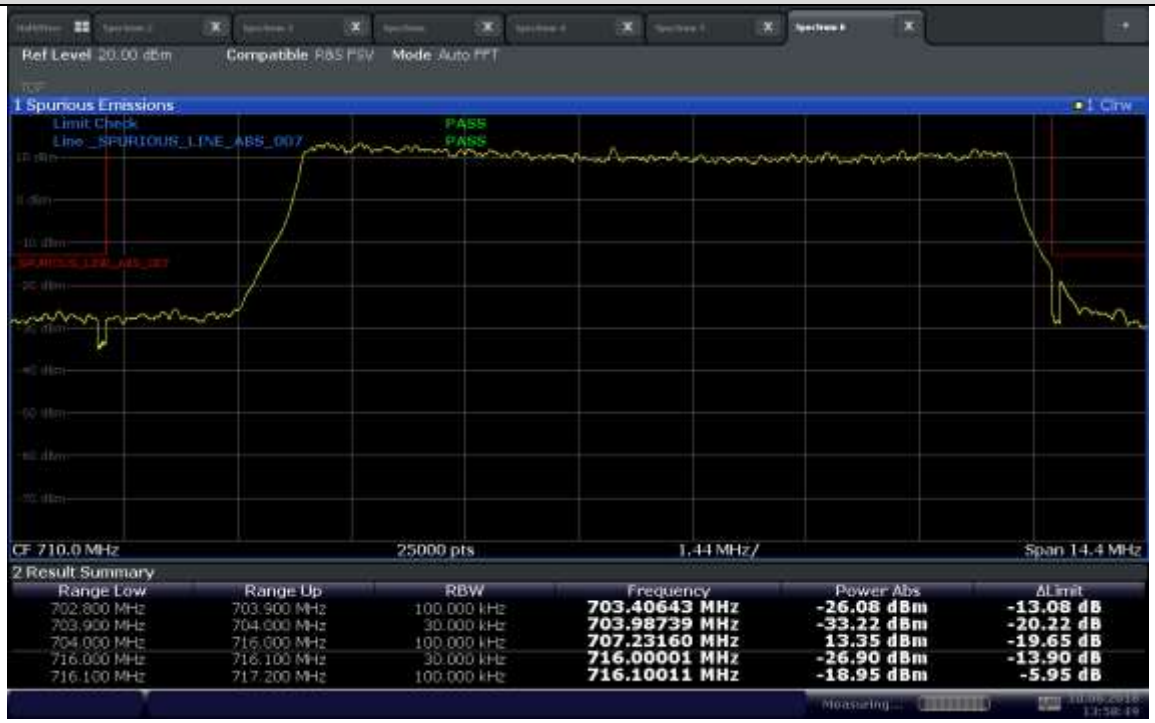
Date: 10.AUG.2018 14:00:14

LTE Band 17 (10 MHz BW)/QPSK/Low Channel 709 MHz/One RB Band Edge @ 704 MHz



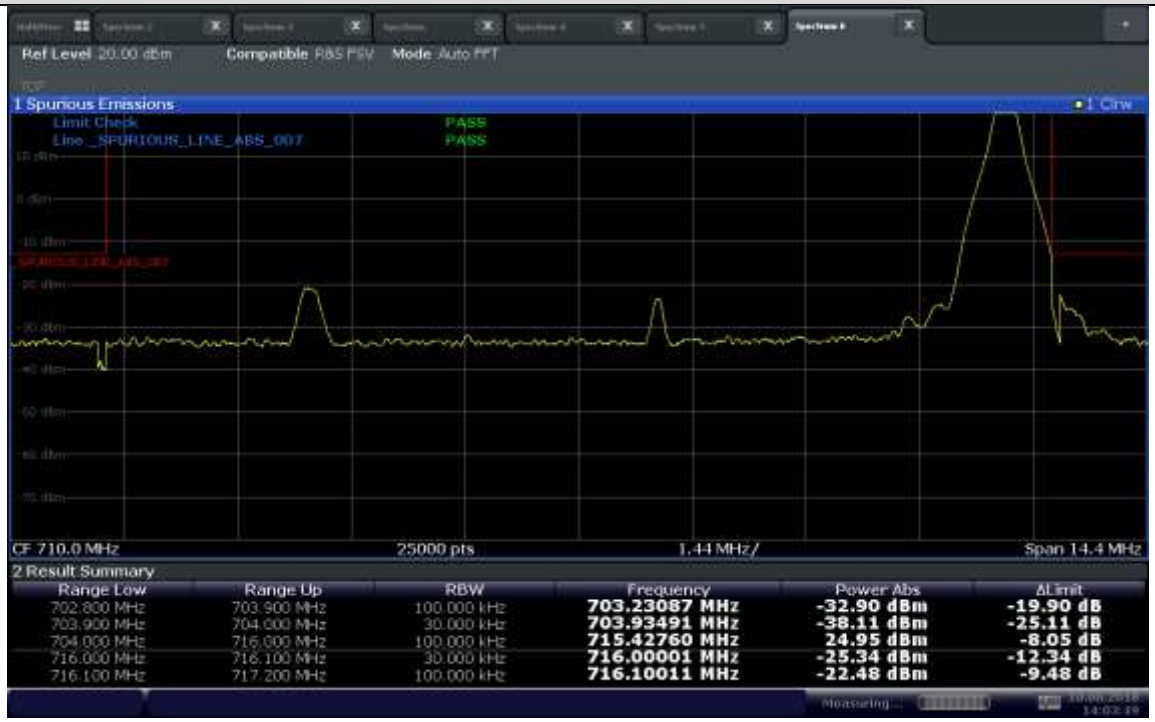
Date: 10.AUG.2018 14:02:17

LTE Band 17 (10 MHz BW)/QPSK/High Channel 711 MHz/Full RB Band Edge @ 716 MHz



Date: 10.AUG.2018 13:58:48

LTE Band 17 (10 MHz BW)/QPSK/High Channel 711 MHz/One RB Band Edge @ 716 MHz



Date: 10.AUG.2018 14:03:49

2.7 CONDUCTED SPURIOUS EMISSIONS

2.7.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 27, Clause 27.53(g)
RSS-130, Clause 4.6.1

2.7.2 Standard Applicable

FCC 47 CFR Part 27.53(g)
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

RSS-130, Clause 4.6.1:
The power of any unwanted emissios in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 $\log_{10}$ p (watts) dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

2.7.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration A

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

August 10, 2018 / 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 Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

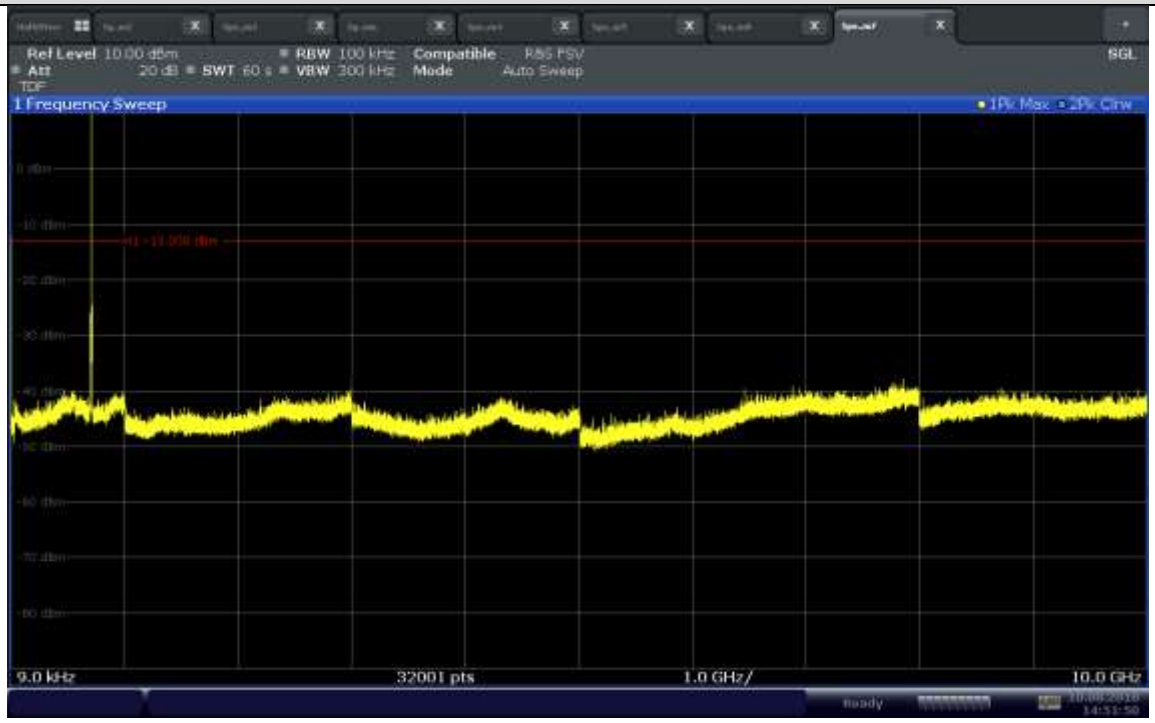
Ambient Temperature	24.7 °C
Relative Humidity	51.3 %
ATM Pressure	99.7 kPa

2.7.7 Additional Observations

- This is a conducted test.
- The spectrum was searched from 9 kHz to the 10th harmonic.
- The path loss was measured and entered as a transducer factor (TDF).
- Low, Middle and High channels on both bandwidths were verified. Only worst- case combination presented in this test report.

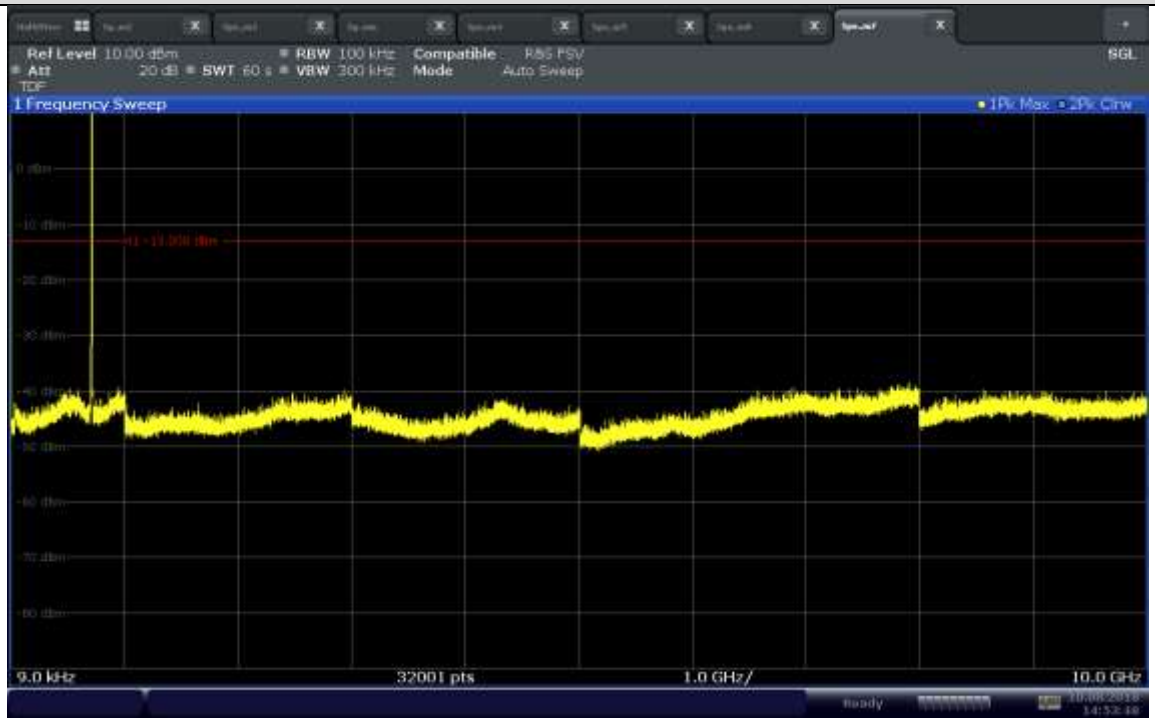
2.7.8 Test Results

LTE Band 17 (5 MHz BW)/QPSK/Low Channel 706.5 MHz



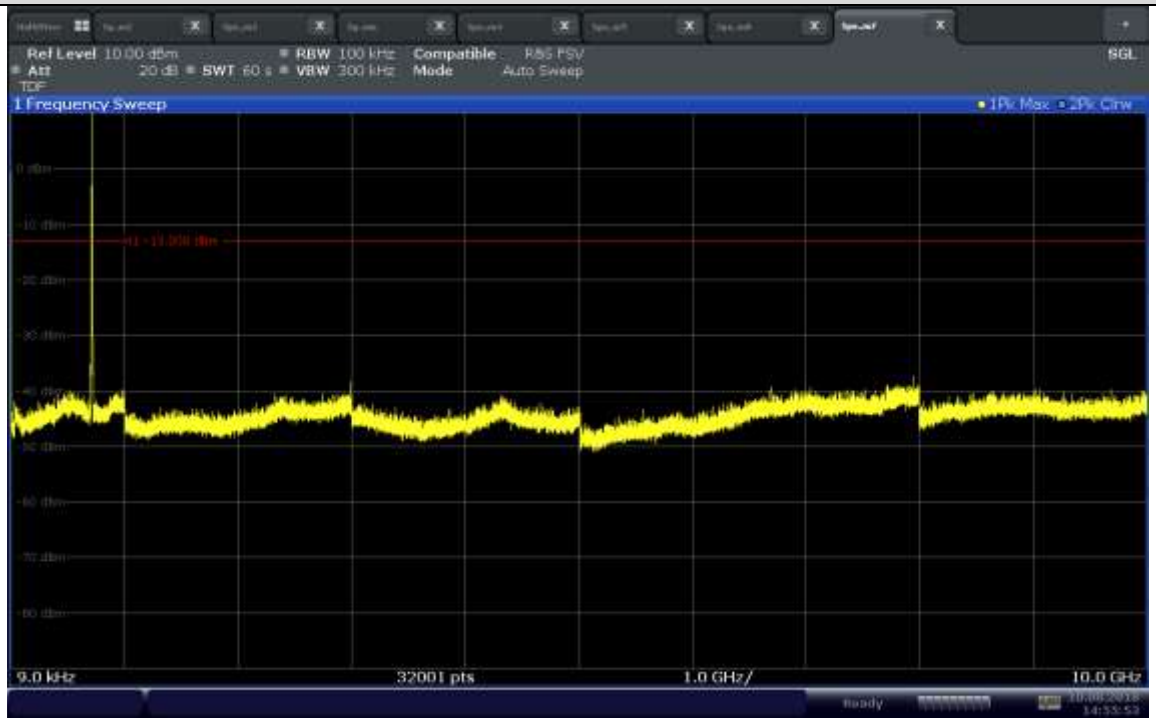
Date: 10.AUG.2018 14:51:50

LTE Band 17 (5 MHz BW)/QPSK/Mid Channel 710 MHz



Date: 10.AUG.2018 14:53:49

LTE Band 17 (5 MHz BW)/QPSK/High Channel 713.5 MHz



Date: 10.AUG.2018 14:55:53

2.8 FIELD STRENGTH OF SPURIOUS RADIATION

2.8.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 27, Clause 27.53(g)
RSS-130, Clause 4.6.1

2.8.2 Standard Applicable

FCC 47 CFR Part 27.53(g)
For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

RSS-130, Clause 4.6.1:
The power of any unwanted emissios in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 $\log_{10}$ p (watts) dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed.

2.8.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration B

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

July 31, 2018 and August 01, 2018 / 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 Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.8 - 25.7 °C
Relative Humidity	45.2 - 48.8 %
ATM Pressure	98.9 - 99.6 kPa

2.8.7 Additional Observations

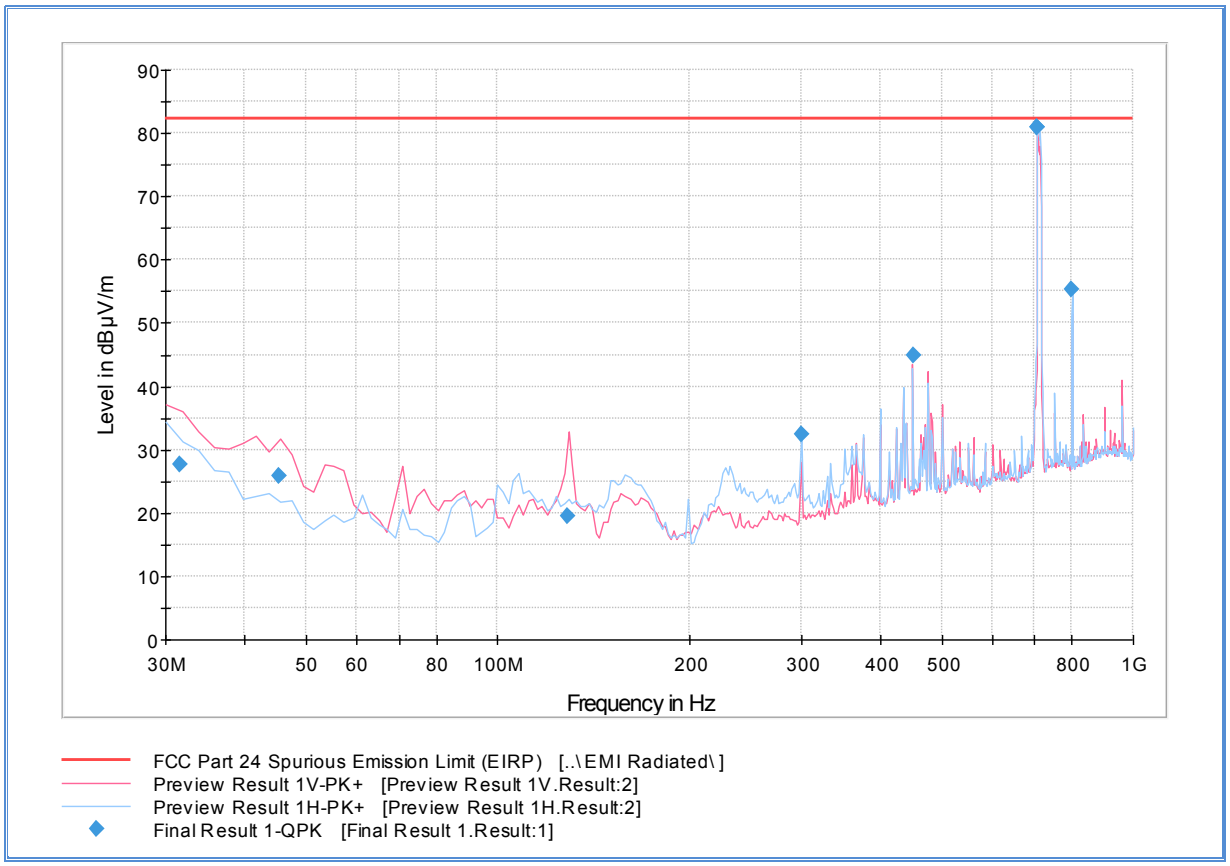
- This is a radiated test using substitution method as per Unwanted Emissions: Radiated Spurious method of measurement of ANSI/TIA/EIA-603-C 2004, August 17, 2004.
- Emissions within 6db of the limit will be proven by substitution method.

- This is cabinet spurious emissions testing. Main antenna port was terminated during the test. Fundamental frequency measurement will be ignored for this test.
- Only the worst case configuration presented in this test report.
- Only noise floor measurements observed above 18GHz.
- Measurement were 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.

2.8.8 Test Results

Compliant. See attached plots.

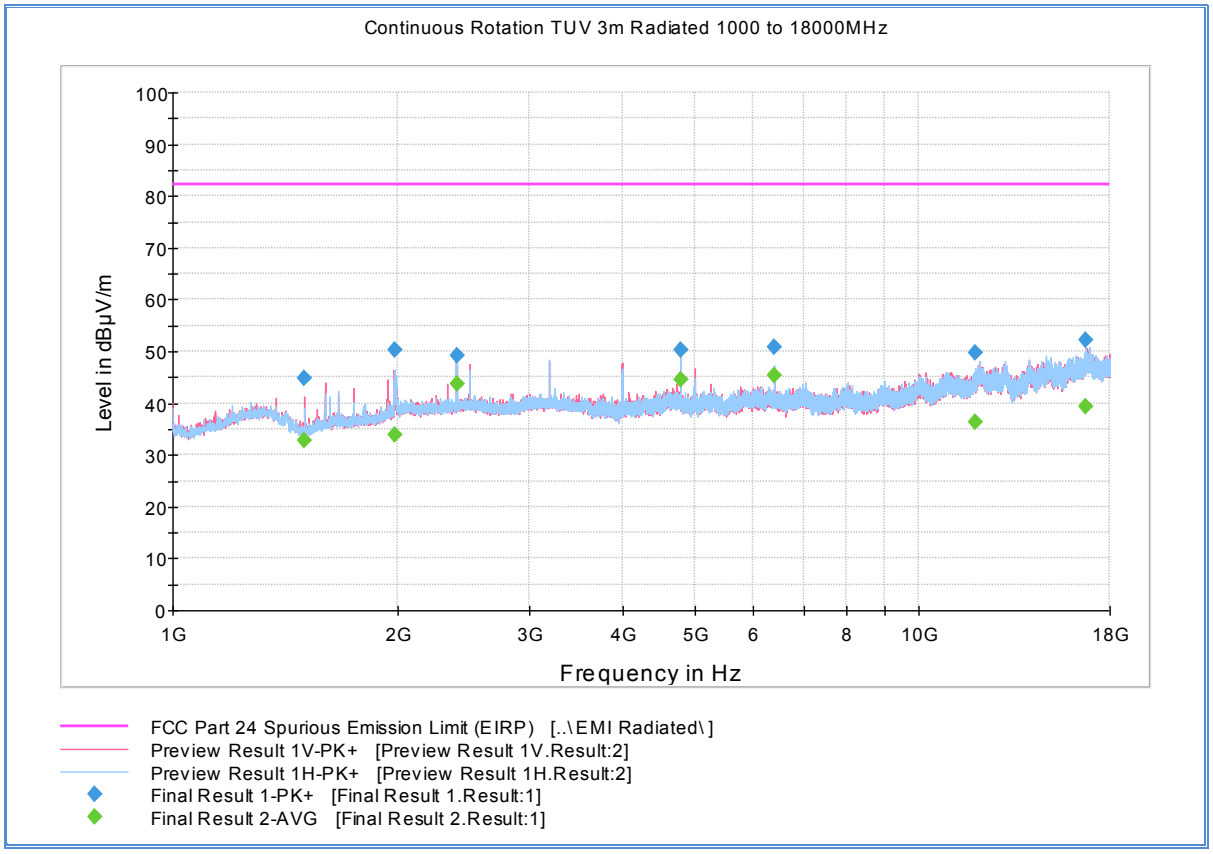
2.8.9 Radiated Emission Test Results Below 1GHz Worst Case Configuration LTE Band 2



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
31.680000	27.6	1000.0	120.000	100.0	V	238.0	-7.7	54.6	82.2
45.151102	25.9	1000.0	120.000	100.0	V	214.0	-14.1	56.3	82.2
128.578277	19.5	1000.0	120.000	100.0	V	18.0	-16.0	62.7	82.2
300.000401	32.5	1000.0	120.000	100.0	H	39.0	-8.1	49.8	82.2
449.999760	45.0	1000.0	120.000	100.0	V	37.0	-3.2	37.3	82.2
705.896834	81.0	1000.0	120.000	109.0	H	110.0	3.2	1.3	82.2
705.905170	80.9	1000.0	120.000	109.0	H	110.0	3.2	1.3	82.2
800.003447	55.4	1000.0	120.000	100.0	H	62.0	4.0	26.8	82.2

2.8.10 Radiated Emission Test Results Above 1GHz Worst Case Configuration LTE Band 2 Low Channel



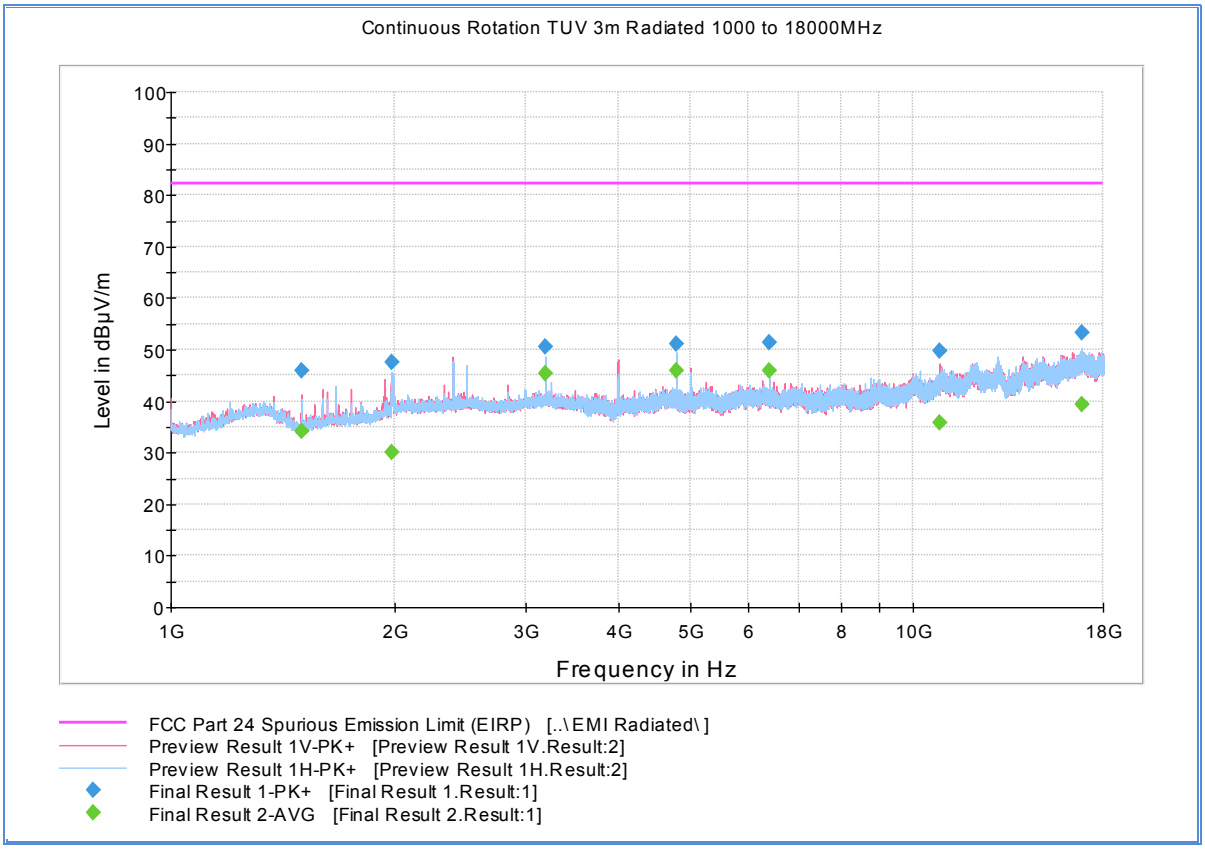
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	44.8	1000.0	1000.000	152.2	V	31.0	-6.1	37.4	82.2
1981.133333	50.3	1000.0	1000.000	372.1	V	264.0	-2.3	31.9	82.2
2400.066667	49.3	1000.0	1000.000	196.5	V	156.0	-1.2	32.9	82.2
4799.866667	50.2	1000.0	1000.000	251.3	H	62.0	3.5	32.0	82.2
6399.766667	50.8	1000.0	1000.000	306.2	H	-13.0	5.9	31.4	82.2
11877.200000	49.6	1000.0	1000.000	264.3	H	298.0	12.8	32.6	82.2
16745.800000	52.2	1000.0	1000.000	169.6	H	20.0	17.8	30.0	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)
1500.000000	32.8	1000.0	1000.000	152.2	V	31.0	-6.1	49.4	82.2
1981.133333	33.9	1000.0	1000.000	372.1	V	264.0	-2.3	48.4	82.2
2400.066667	43.8	1000.0	1000.000	196.5	V	156.0	-1.2	38.5	82.2
4799.866667	44.5	1000.0	1000.000	251.3	H	62.0	3.5	37.7	82.2
6399.766667	45.3	1000.0	1000.000	306.2	H	-13.0	5.9	36.9	82.2
11877.200000	36.2	1000.0	1000.000	264.3	H	298.0	12.8	46.0	82.2
16745.800000	39.5	1000.0	1000.000	169.6	H	20.0	17.8	42.8	82.2

2.8.11 Radiated Emission Test Results Above 1GHz Worst Case Configuration LTE Band 2 Mid Channel



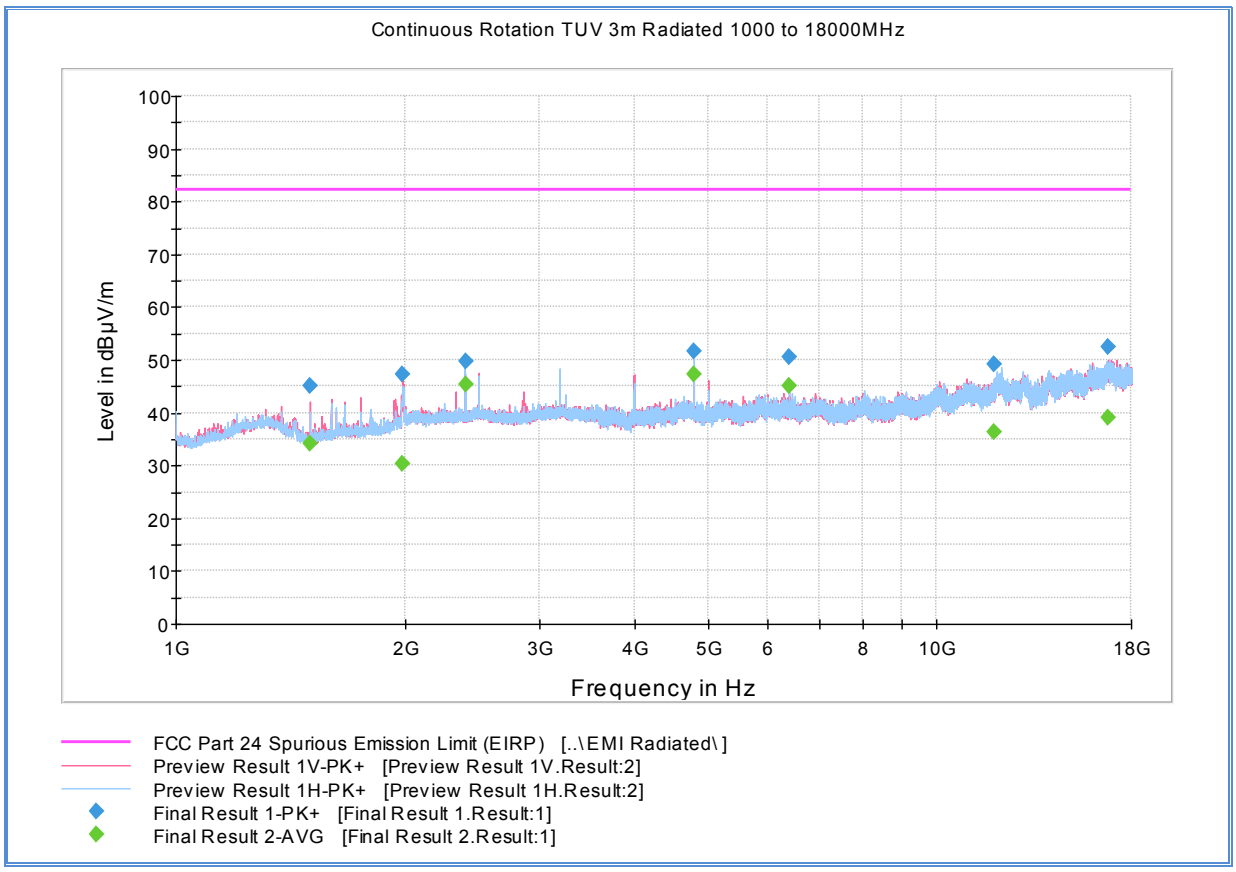
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	45.8	1000.0	1000.000	321.1	V	-2.0	-6.1	36.4	82.2
1987.900000	47.7	1000.0	1000.000	390.1	H	279.0	-2.3	34.6	82.2
3200.000000	50.4	1000.0	1000.000	294.2	H	320.0	1.0	31.8	82.2
4800.266667	51.0	1000.0	1000.000	251.3	H	63.0	3.5	31.2	82.2
6399.966667	51.4	1000.0	1000.000	274.3	H	-13.0	5.9	30.8	82.2
10869.866667	49.7	1000.0	1000.000	152.2	V	331.0	11.5	32.5	82.2
16861.000000	53.2	1000.0	1000.000	250.5	H	11.0	17.9	29.0	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)
1500.000000	34.2	1000.0	1000.000	321.1	V	-2.0	-6.1	48.0	82.2
1987.900000	30.2	1000.0	1000.000	390.1	H	279.0	-2.3	52.1	82.2
3200.000000	45.4	1000.0	1000.000	294.2	H	320.0	1.0	36.9	82.2
4800.266667	46.0	1000.0	1000.000	251.3	H	63.0	3.5	36.3	82.2
6399.966667	46.0	1000.0	1000.000	274.3	H	-13.0	5.9	36.2	82.2
10869.866667	35.7	1000.0	1000.000	152.2	V	331.0	11.5	46.5	82.2
16861.000000	39.4	1000.0	1000.000	250.5	H	11.0	17.9	42.9	82.2

2.8.12 Radiated Emission Test Results Above 1GHz Worst Case Configuration LTE Band 2 High Channel



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1500.000000	45.2	1000.0	1000.000	196.5	V	343.0	-6.1	37.0	82.2
1988.833333	47.4	1000.0	1000.000	389.1	V	101.0	-2.3	34.8	82.2
2399.866667	49.7	1000.0	1000.000	161.6	H	48.0	-1.2	32.5	82.2
4799.866667	51.6	1000.0	1000.000	103.7	H	38.0	3.5	30.6	82.2
6400.166667	50.6	1000.0	1000.000	274.2	H	-12.0	5.9	31.6	82.2
11887.033333	49.1	1000.0	1000.000	390.0	H	303.0	12.8	33.1	82.2
16801.466667	52.4	1000.0	1000.000	389.1	V	304.0	17.8	29.8	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)
1500.000000	34.1	1000.0	1000.000	196.5	V	343.0	-6.1	48.1	82.2
1988.833333	30.4	1000.0	1000.000	389.1	V	101.0	-2.3	51.8	82.2
2399.866667	45.3	1000.0	1000.000	161.6	H	48.0	-1.2	36.9	82.2
4799.866667	47.1	1000.0	1000.000	103.7	H	38.0	3.5	35.1	82.2
6400.166667	45.2	1000.0	1000.000	274.2	H	-12.0	5.9	37.1	82.2
11887.033333	36.2	1000.0	1000.000	390.0	H	303.0	12.8	46.0	82.2
16801.466667	39.1	1000.0	1000.000	389.1	V	304.0	17.8	43.1	82.2

2.9 FREQUENCY STABILITY

2.9.1 Specification Reference

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

2.9.2 Standard Applicable

FCC Part 27, Clause 27.54:
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-130, Clasue 4.3:
The transmitter frequency stability limit shall be determined as follows:
(a) The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded;
(b) Using a resolution bandwidth of 1% of the occupied bandwidth, a reference point at the unwanted emission level which complies with the attenuation of 43 + 10 log10 p (watts) on the emission mask of the lowest and highest channel shall be selected, and the frequency at these points shall be recorded as f_L and f_H respectively.
The applicant shall ensure frequency stability by showing that f_L minus the frequency offset and f_H plus the frequency offset shall be within the frequency range in which the equipment is designed to operate.

2.9.3 Equipment Under Test and Modification State

Serial No: N/A (FCC Test Sample) / Test Configuration A

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

August 06, 2018 / FSC

2.9.5 Test Equipment Used

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

2.9.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

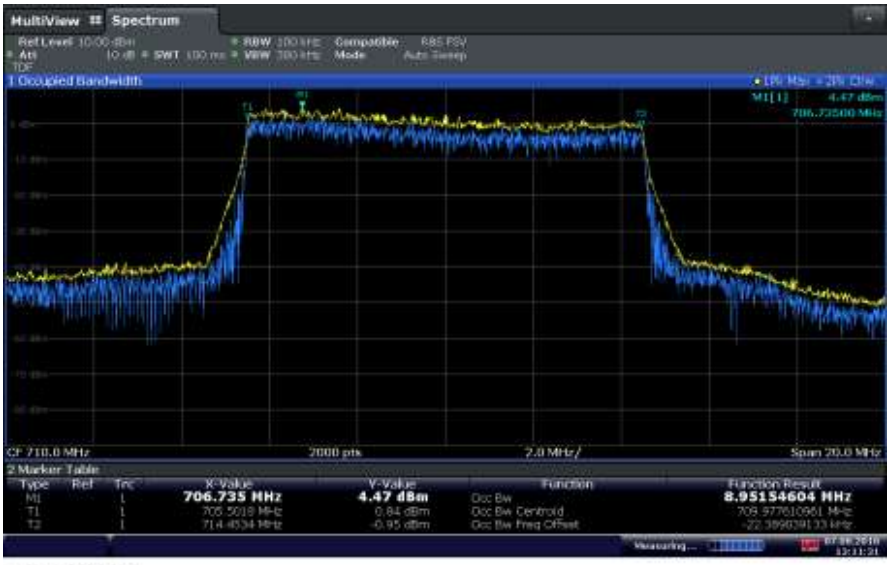
Ambient Temperature	25.3 °C
Relative Humidity	54.4 %
ATM Pressure	98.5 kPa

2.9.7 Additional Observations

- This is a conducted test. The EUT was operated at 12.5VDC nominal voltage and was placed in the temperature chamber for this evaluation. The LTE frequency error measurement function of the CMW500 was used for this test.
- Test performed in 10MHz Bandwidth Middle channel as the representative configuration.
- The EUT was tested over the temperature -30°C to +50°C in 10°C increments and allowed to sit for 1 hour to allow the equipment and chamber temperature to stabilize. The measurements were then performed.
- Voltage variation was also performed at 10.625VDC and 14.375VDC (85% and 115% of the nominal voltage at 20°C).

2.9.8 Limit Calculation

The limit for this test is that the fundamental emissions stay within the authorized band of operation. Having frequency error (Hz) data, the allowed deviation was calculated based from worst case 99% OBW data from Section 2.4 of this test report:



Based from the plot above, the OBW data was used to calculate absolute frequency deviation limit that will keep the fundamental emission within the authorized band of operation:

= 8.951 MHz / 2
= 4.476 MHz (edge of 99% OBW from center frequency)
= 5.0 MHz – 4.476 MHz
= 0.524 MHz (allowance from the band edge for 10MHz BW LTE signal)

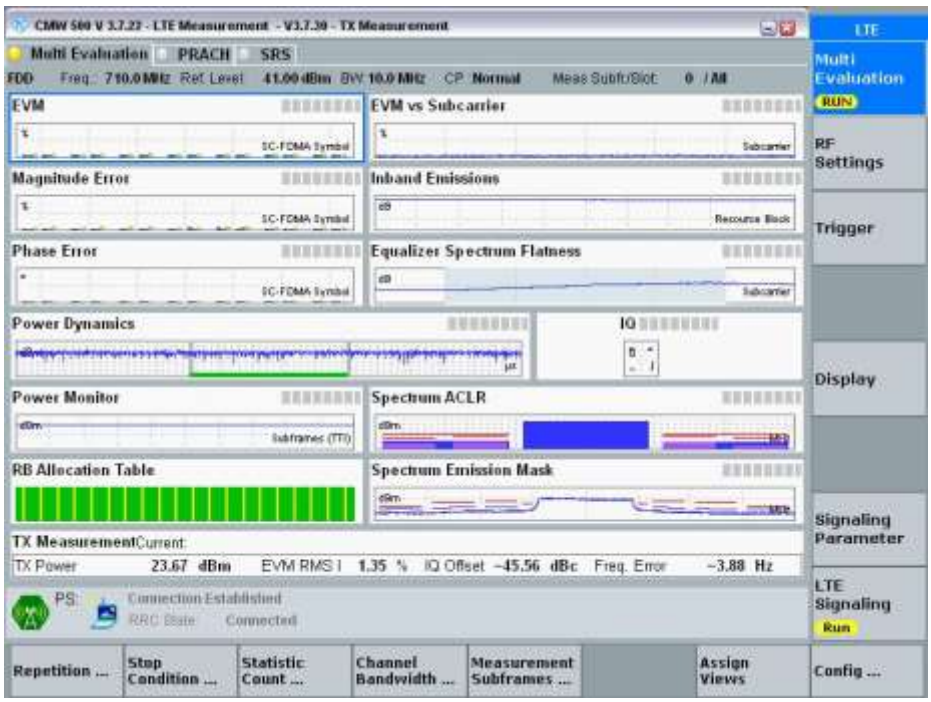
Therefore as long as the fundamental emission doesn't deviate by more than 524kHz,the signal will stay within the authorized band of operation.

2.9.9 Test Results

LTE Band 17 – QPSK 10MHz BW-Middle Channel 710MHz				
Voltage (VDC)	**Temperature (°C)**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Allowed Deviation (kHz)**
12.500	-30	-1.13	-0.0016	<524
	-20	-0.92	-0.0013	
	-10	-3.88	-0.0055	
	0	-3.68	-0.0052	
	+10	-0.11	-0.0002	
	+20	-2.68	-0.0038	
	+30	-0.54	-0.0008	
	+40	-2.17	-0.0031	
	+50	-3.71	-0.0052	
10.625	20	-3.19	-0.0045	
14.375		-4.19	-0.0059	

*

2.9.10 Sample Test Plot



LTE B17 Middle Channel @-10°C nominal voltage

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						
7662	P-Series Power Meter	N1911A	MY45100951	Agilent	06/15/18	06/15/19
7661	50MHz-18GHz Wideband Power Sensor	N1921A	MY45241383	Agilent	06/15/18	06/15/19
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	12/14/17	12/14/18
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	04/04/18	04/04/19
8825	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 7608 and 7582	
-	10dB Attenuator	VAT-10W2+2W	N/A	MCL	Verified by 7608 and 7582	
Radiated Test Setup						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	12/14/17	12/14/18
7608	Vector Signal Generator	SMBV100A	259021	Rhode & Schwarz	09/19/17	09/19/19
1033	Bilog Antenna	3142C	00044556	EMCO	10/11/16	10/11/18
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	06/16/18	06/16/20
1151	Pre-amplifier	TS-PR26	100026	Rhode & Schwarz	Verified by 7608 and 7582	
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	Verified by 7608 and 7582	
8543	High-frequency cable	Micropore 19057793	N/A	United Microwave Products	Verified by 7608 and 7582	
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/25/17	10/25/18
7620	EMI Test Receiver	ESU40	100399	Rhode & Schwarz	10/17/17	10/17/18
1016	Pre-amplifier	PAM-0202	187	PAM	02/06/18	02/06/19
8815	2.5GHz Notch Filter	BRM50702	008	Mircro-Tronics	Verified by 7608 and 7582	
-	Wideband Radio Communication Tester	CMW 500	158164	Rhode & Schwarz	04/04/18	04/04/19
Miscellaneous						
6708	Multimeter	34401A	US36086974	Hewlett Packard	07/18/18	07/18/19
11312	Mini Environmental Quality Meter	850027	CF099-56010-340	Sper Scientific	02/26/28	02/26/19
	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 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	3.52	1.44	2.07
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (uc):	1.68
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.36

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	3.00	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

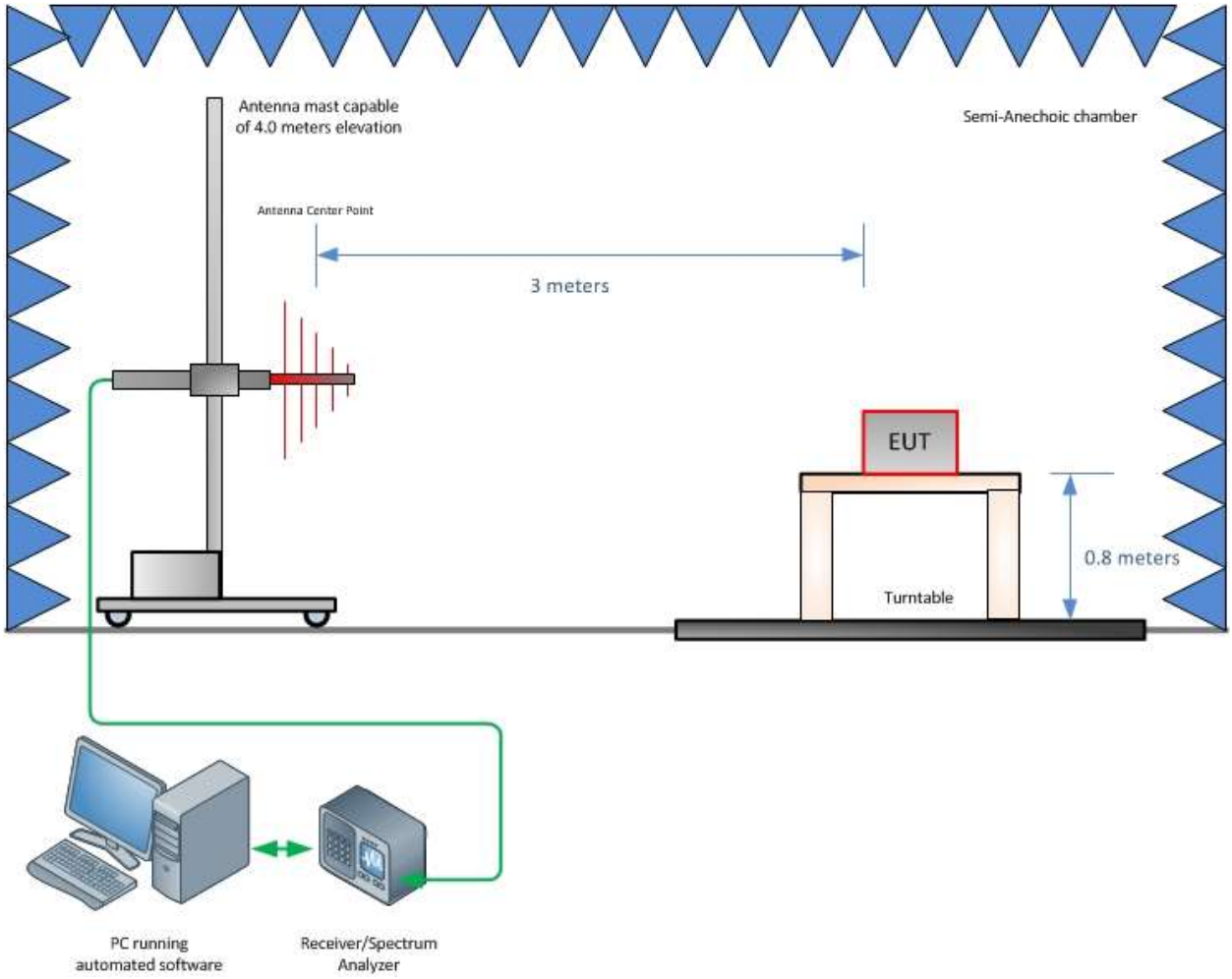
3.2.3 Conducted Antenna Port Measurement

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.34	0.20	0.04
2	Cables	Rectangular	0.30	0.17	0.03
3	EUT Setup	Rectangular	0.50	0.29	0.08
				Combined Uncertainty (u_c):	0.39
				Coverage Factor (k):	1.96
				Expanded Uncertainty:	0.76

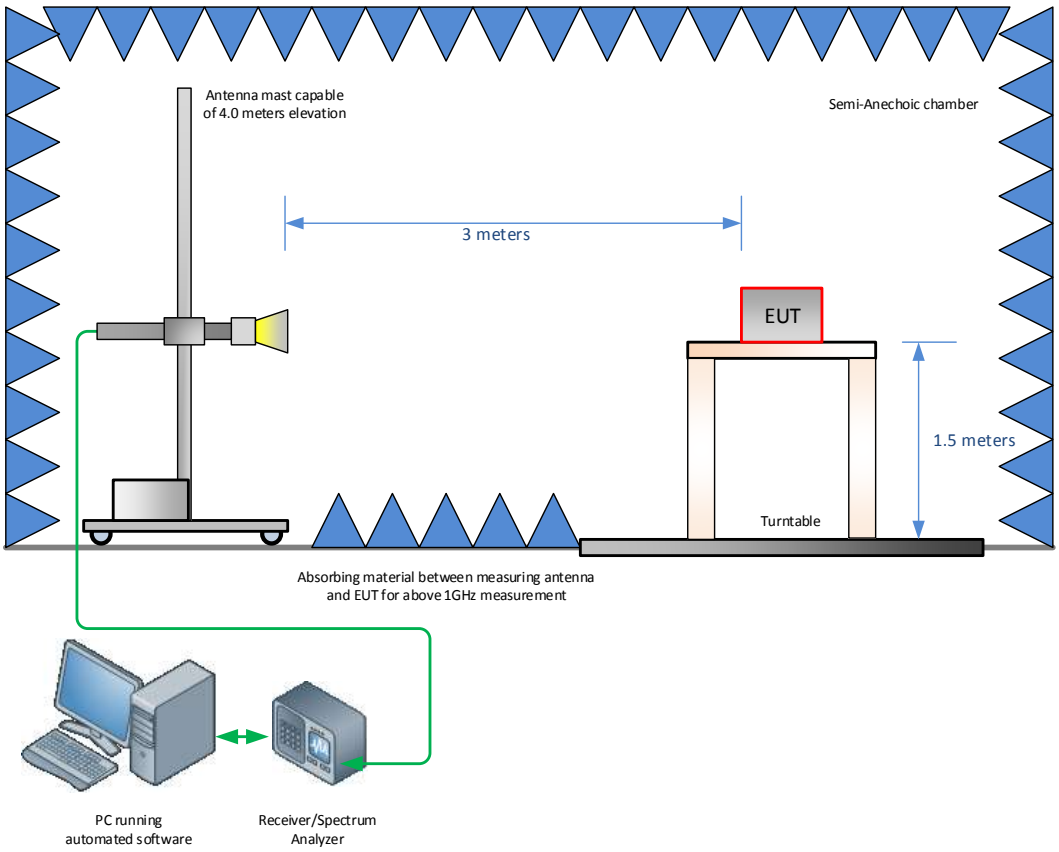
SECTION 4

DIAGRAM OF TEST SETUP

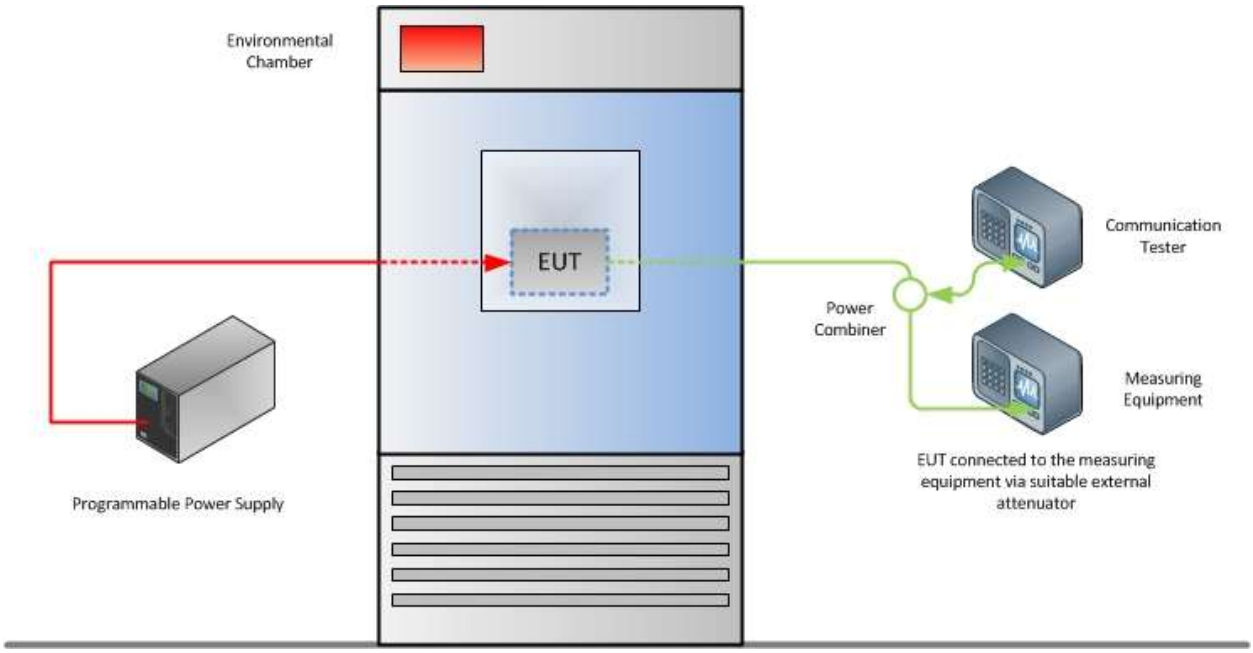
4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



Frequency Stability Test Configuration

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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