

TEST REPORT

of

FCC Part 2 Subpart J and Part 27 Subpart C

FCC ID: BEJIWH130FNX4G

1. Equipment Under Test : Car Navigation System
2. Model Name : GEN5 WIDE NX4
3. Variant Model Name(s) : -
4. Applicant : LG Electronics USA
5. Manufacturer : LG Electronics Inc.
6. Date of Receipt : 2020.05.08
7. Date of Test(s) : 2020.05.20 ~ 2020.05.27
8. Date of Issue : 2020.07.06

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

- 1) The results of this test report are effective only to the items tested.
- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

Tested by:



Nancy Park

Technical
Manager:



Jungmin Yang

SGS Korea Co., Ltd. Gunpo Laboratory



INDEX

<u>Table of Contents</u>	Page
1. General Information -----	3
2. RF Radiated Output Power & Spurious Radiated Emission -----	7
3. Conducted Output Power -----	18
4. Occupied Bandwidth -----	20
5. Peak-Average Ratio -----	30
6. Spurious Emissions at Antenna Terminal -----	36
7. Band Edge -----	49
8. Frequency Stability -----	58

1. General Information

1.1. Testing Laboratory

- SGS Korea Co., Ltd. (Gunpo Laboratory)
- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
 - 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
 - Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Phone No. : +82 31 688 0901
 Fax No. : +82 31 688 0921

1.2. Details of Applicant

Applicant : LG Electronics USA.
 Address : 1000 Sylvan Avenue, Englewood Cliffs, New Jersey, United States, 07632
 Contact Person : Han, Kyung-Su
 Phone No. : +1 201 472 2623

1.3. Details of Manufacturer

Company : LG Electronics Inc.
 Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Republic of Korea, 07796

1.4. Description of EUT

Kind of Product	Car Navigation System
Model Name	GEN5 WIDE NX4
Power Supply	DC 12 V
Rated Power	23 dB m
Frequency Range	2 500 MHz ~ 2 570 MHz
Emission Designator	LTE Band 7 (5 MHz): 4M53G7D (QPSK) / 4M53D7D (16QAM) LTE Band 7 (10 MHz): 8M94G7D (QPSK) / 8M94D7D (16QAM) LTE Band 7 (15 MHz): 13M5G7D (QPSK) / 13M5D7D (16QAM) LTE Band 7 (20 MHz): 17M9G7D (QPSK) / 17M9D7D (16QAM)
Modulation Technique	QPSK, 16QAM
Antenna Type	C/PAD antenna
Antenna Gain	1.63 dB i
H/W Version	1.0
S/W Version	1.0

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMBV100A	255834	Jun. 10, 2019	Annual	Jun. 10, 2020
Signal Generator	R&S	SMR40	100272	Jun. 07, 2019	Annual	Jun. 07, 2020
Spectrum Analyzer	R&S	FSV30	103210	Dec. 05, 2019	Annual	Dec. 05, 2020
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 11, 2019	Annual	Sep. 11, 2020
Mobile Test Unit	R&S	CMW500	144034	Feb. 28, 2020	Annual	Feb. 28, 2021
Power Meter	Anritsu	ML2495A	1223004	Jun. 05, 2019	Annual	Jun. 05, 2020
Power Sensor	Anritsu	MA2411B	1207272	Jun. 05, 2019	Annual	Jun. 05, 2020
Temperature Chamber	ESPEC CORP.	PL-1J	15000793	Jun. 10, 2019	Annual	Jun. 10, 2020
Low Pass Filter	Mini-Circuits	NLP-1200+	V9500401023-2	Jun. 05, 2019	Annual	Jun. 05, 2020
High Pass Filter	Wainwright Instrument GmbH	WHK3.0/18G-10SS	344	May 18, 2020	Annual	May 18, 2021
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	Jun. 07, 2019	Annual	Jun. 07, 2020
Directional Coupler	KRYTAR	152613	122660	Jun. 12, 2019	Annual	Jun. 12, 2020
DC Power Supply	Agilent	U8002A	MY50060028	Mar. 03, 2020	Annual	Mar. 03, 2021
Preamplifier	H.P.	8447F	2944A03909	Aug. 07, 2019	Annual	Aug. 07, 2020
Preamplifier	R&S	SCU 18	10117	Jun. 12, 2019	Annual	Jun. 12, 2020
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	May 08, 2020	Annual	May 08, 2021
Test Receiver	R&S	ESU26	100109	Feb. 18, 2020	Annual	Feb. 18, 2021
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 22, 2019	Biennial	Aug. 22, 2021
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	396	Mar. 21, 2019	Biennial	Mar. 21, 2021
Horn Antenna	R&S	HF906	100326	Feb. 14, 2020	Annual	Feb. 14, 2021
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA9170	BBHA9170223	Sep. 10, 2018	Biennial	Sep. 10, 2020
Antenna Master	Innco systems GmbH	MM4000	N/A	N.C.R.	N/A	N.C.R.
Turn Table	Innco systems GmbH	DS 1200S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/3833 0516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L x W x H (9.6 m x 6.4 m x 6.4 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	PL520-NMNM-4M (4 m)	20200324001	May 06, 2020	Semi-annual	Nov. 06, 2020
Coaxial Cable	RFONE	PL520-NMNM-10M (10 m)	20200324001	May 06, 2020	Semi-annual	Nov. 06, 2020
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 01/20	Feb. 13, 2020	Semi-annual	Aug. 13, 2020
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 05/20	Feb. 13, 2020	Semi-annual	Aug. 13, 2020
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 10/20	Feb. 13, 2020	Semi-annual	Aug. 13, 2020

► Support Equipment

Description	Manufacturer	Model	Serial Number
N/A	-	-	-

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 2 and 27		
Section	Test Item(s)	Result
§2.1046 §27.50(h)(2)	RF Radiated Output Power	Complied
§2.1053 §27.53(m)(4)	Spurious Radiated Emission	Complied
§2.1046	Conducted Output Power	Complied
§2.1049	Occupied Bandwidth	Complied
§27.50(d)(5)	Peak-Average Ratio	Complied
§2.1051 §27.53(m)(4)	Spurious Emission at Antenna Terminal	Complied
§27.53(m)(4)	Band Edge	Complied
§2.1055 §27.54	Frequency Stability	Complied

1.7. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL000745	2020.06.08	Initial
1	F690501-RF-RTL000745-1	2020.07.06	Added H/W, S/W Version

1.8. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.8.1. Conducted Test

Offset value (dB) = Directional Coupler (dB) + Cable loss (dB)

1.8.2. Radiation test

- E.I.R.P. (dB m) = Measured level (dB μ V) + Antenna factor (dB) + Cable loss (dB) + 20 Log D - 104.5; where D is the measurement distance in meters.

1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

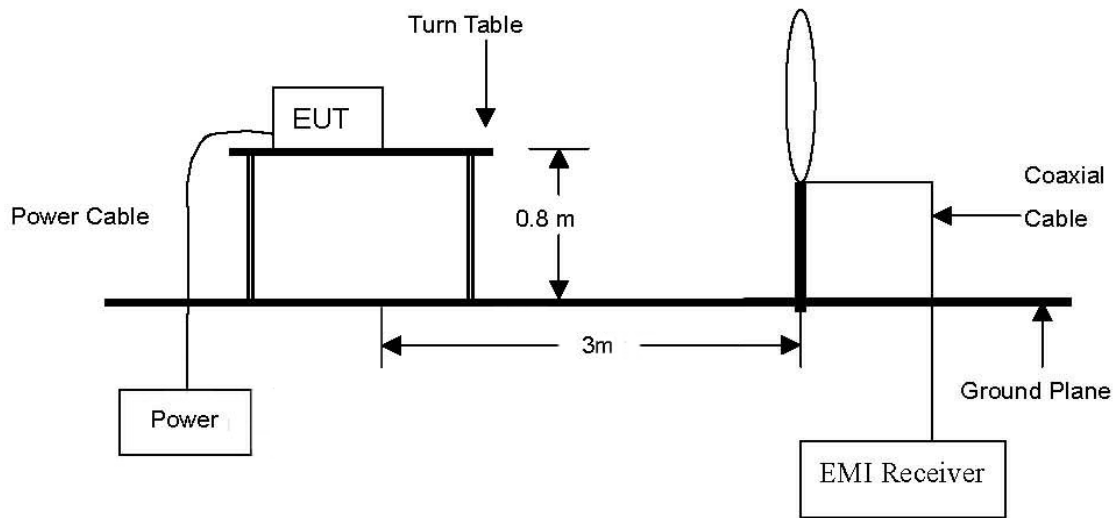
Parameter	Uncertainty
Radiated Emission, 9 kHz to 30 MHz	± 3.59 dB
Radiated Emission, below 1 GHz	± 5.88 dB
Radiated Emission, above 1 GHz	± 5.94 dB

Uncertainty figures are valid to a confidence level of 95 %.

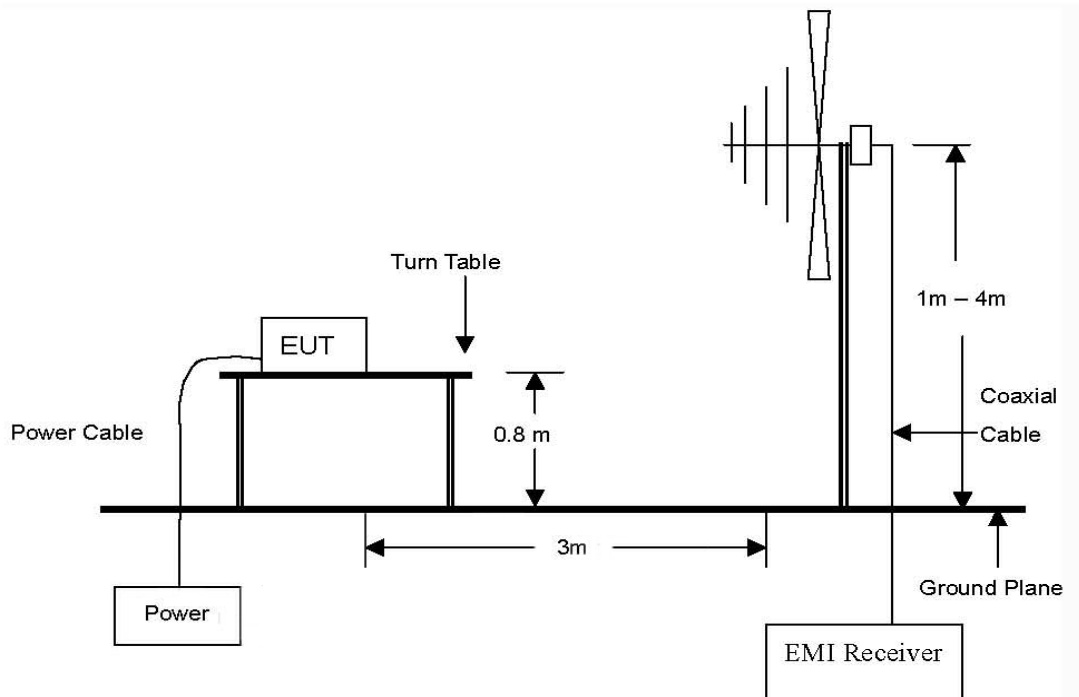
2. RF Radiated Output Power & Spurious Radiated Emission

2.1. Test setup

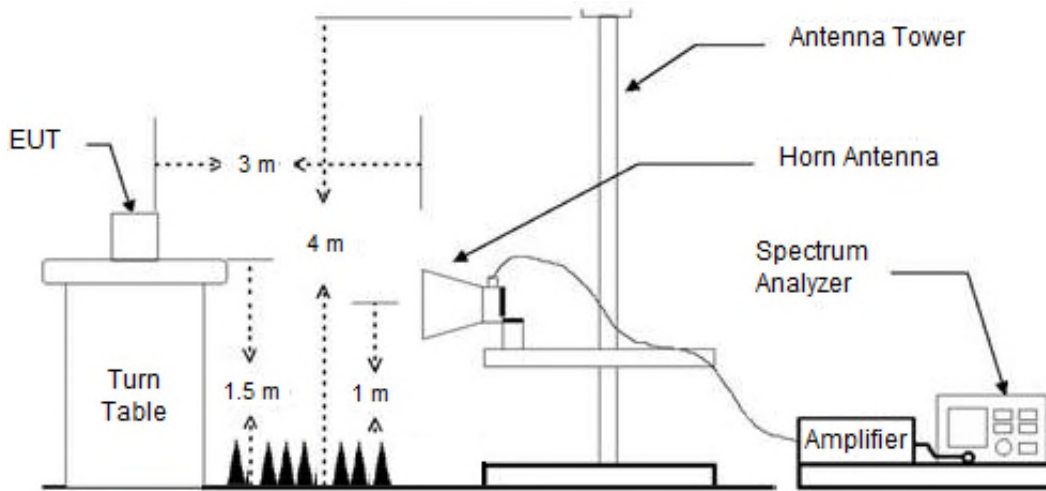
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 26 GHz Emissions.



2.2. Limit

2.2.1. Limit of Radiated Output Power

- §27.50(h)(2), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

2.2.2. Limit of Spurious Radiated Emission

- §27.53(m)(4), For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log_{10}(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log_{10}(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log_{10}(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log_{10}(P)$ dB on all frequencies between 2 490.5 MHz and 2 496 MHz and $55 + 10 \log_{10}(P)$ dB at or below 2 490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2 495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015

1. On a test site, the EUT shall be placed at 0.8 m or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions occupied bandwidth, RBW = 1-5 % of the OBW (not to exceed 1 MHz), VBW $\geq 3 \times$ RBW, Detector = power averaging (rms), sweep time = auto, trace average at least 100 traces in power averaging (rms) mode, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. Radiated spurious emissions measurement method was set as follows:
RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz, VBW $\geq 3 \times$ RBW, Detector = RMS, trace mode = max hold, per the guidelines of ANSI C63.26-2015 and KDB 971168 D01 Power Meas License Digital Systems v03r01.
6. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
7. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
8. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
9. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
10. The maximum signal level detected by the measuring receiver shall be noted.
11. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

2.4. Test result for RF radiated output power

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

LTE band 7 (5 MHz - QPSK)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 502.50	80.15	H	28.30	6.35	114.80	-95.26	19.54	89.95
2 502.50	78.38	V	28.30	6.35	113.03	-95.26	17.77	59.84
2 535.00	83.06	H	28.30	6.36	117.72	-95.26	22.46	176.20
2 535.00	78.51	V	28.30	6.36	113.17	-95.26	17.91	61.80
2 567.50	80.01	H	28.41	6.36	114.78	-95.26	19.52	89.54
2 567.50	77.55	V	28.41	6.36	112.32	-95.26	17.06	50.82

* 5 BW 1 RB size / 0 Offset

LTE band 7 (5 MHz - 16QAM)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 502.50	79.04	H	28.30	6.35	113.69	-95.26	18.43	69.66
2 502.50	77.12	V	28.30	6.35	111.77	-95.26	16.51	44.77
2 535.00	82.30	H	28.30	6.36	116.96	-95.26	21.70	147.91
2 535.00	77.67	V	28.30	6.36	112.33	-95.26	17.07	50.93
2 567.50	78.96	H	28.41	6.36	113.73	-95.26	18.47	70.31
2 567.50	76.63	V	28.41	6.36	111.40	-95.26	16.14	41.11

* 5 BW 1 RB size / 0 Offset

LTE band 7 (10 MHz - QPSK)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 505.00	80.25	H	28.30	6.35	114.90	-95.26	19.64	92.04
2 505.00	78.08	V	28.30	6.35	112.73	-95.26	17.47	55.85
2 535.00	82.99	H	28.30	6.36	117.65	-95.26	22.39	173.38
2 535.00	78.41	V	28.30	6.36	113.07	-95.26	17.81	60.39
2 565.00	80.08	H	28.39	6.36	114.83	-95.26	19.57	90.57
2 565.00	77.93	V	28.39	6.36	112.68	-95.26	17.42	55.21

* 10 BW 1 RB size / 0 Offset

LTE band 7 (10 MHz - 16QAM)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 505.00	79.14	H	28.30	6.35	113.79	-95.26	18.53	71.29
2 505.00	77.26	V	28.30	6.35	111.91	-95.26	16.65	46.24
2 535.00	82.16	H	28.30	6.36	116.82	-95.26	21.56	143.22
2 535.00	77.55	V	28.30	6.36	112.21	-95.26	16.95	49.55
2 565.00	79.20	H	28.39	6.36	113.95	-95.26	18.69	73.96
2 565.00	77.11	V	28.39	6.36	111.86	-95.26	16.60	45.71

* 10 BW 1 RB size / 0 Offset

LTE band 7 (15 MHz - QPSK)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 507.50	80.04	H	28.30	6.35	114.69	-95.26	19.43	87.70
2 507.50	78.14	V	28.30	6.35	112.79	-95.26	17.53	56.62
2 535.00	82.93	H	28.30	6.36	117.59	-95.26	22.33	171.00
2 535.00	78.01	V	28.30	6.36	112.67	-95.26	17.41	55.08
2 562.50	80.34	H	28.38	6.37	115.09	-95.26	19.83	96.16
2 562.50	77.17	V	28.38	6.37	111.92	-95.26	16.66	46.34

* 15 BW 1 RB size / 0 Offset

LTE band 7 (15 MHz - 16QAM)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 507.50	79.19	H	28.30	6.35	113.84	-95.26	18.58	72.11
2 507.50	77.23	V	28.30	6.35	111.88	-95.26	16.62	45.92
2 535.00	82.33	H	28.30	6.36	116.99	-95.26	21.73	148.94
2 535.00	77.62	V	28.30	6.36	112.28	-95.26	17.02	50.35
2 562.50	79.55	H	28.38	6.37	114.30	-95.26	19.04	80.17
2 562.50	76.56	V	28.38	6.37	111.31	-95.26	16.05	40.27

* 15 BW 1 RB size / 0 Offset

LTE band 7 (20 MHz - QPSK)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 510.00	80.06	H	28.30	6.35	114.71	-95.26	19.45	88.10
2 510.00	78.12	V	28.30	6.35	112.77	-95.26	17.51	56.36
2 535.00	82.34	H	28.30	6.36	117.00	-95.26	21.74	149.28
2 535.00	77.43	V	28.30	6.36	112.09	-95.26	16.83	48.19
2 560.00	81.41	H	28.36	6.37	116.14	-95.26	20.88	122.46
2 560.00	77.43	V	28.36	6.37	112.16	-95.26	16.90	48.98

* 20 BW 1 RB size / 0 Offset

LTE band 7 (20 MHz - 16QAM)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P.	
							(dB m)	(mW)
2 510.00	79.17	H	28.30	6.35	113.82	-95.26	18.56	71.78
2 510.00	77.16	V	28.30	6.35	111.81	-95.26	16.55	45.19
2 535.00	81.42	H	28.30	6.36	116.08	-95.26	20.82	120.78
2 535.00	76.01	V	28.30	6.36	110.67	-95.26	15.41	34.75
2 560.00	80.76	H	28.36	6.37	115.49	-95.26	20.23	105.44
2 560.00	76.62	V	28.36	6.37	111.35	-95.26	16.09	40.64

* 20 BW 1 RB size / 0 Offset

Remark;

1. E.I.R.P. (dB m) = E (dB μ V/m) + 20 log D - 104.8; where D is the measurement distance in meters.
2. E (dB μ V/m) = Measured Level (dB μ V) + Antenna Factor (dB/m) + Cable Loss (dB).
3. CF (dB) (E.I.R.P.) = 20 log D - 104.8.
4. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.

2.5. Spurious radiated emission

LTE band 7 (5 MHz - QPSK)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (2 502.5 MHz)									
3 185.96	52.26	V	30.14	-37.90	44.50	-95.26	-50.76	-25	25.76
7 500.96	49.97	H	36.00	-34.77	51.20	-95.26	-44.06	-25	19.06
7 501.10	52.89	V	36.00	-34.77	54.12	-95.26	-41.14	-25	16.14
10 001.36	46.77	H	37.70	-32.30	52.17	-95.26	-43.09	-25	18.09
10 001.38	48.74	V	37.70	-32.30	54.14	-95.26	-41.12	-25	16.12
Middle Channel (2 535.0 MHz)									
3 197.60	53.97	V	30.19	-37.88	46.28	-95.26	-48.98	-25	23.98
7 598.58	54.67	H	36.00	-34.48	56.19	-95.26	-39.07	-25	14.07
7 598.48	54.29	V	36.00	-34.48	55.81	-95.26	-39.45	-25	14.45
10 131.36	47.66	H	37.70	-32.02	53.34	-95.26	-41.92	-25	16.92
10 131.34	48.16	V	37.70	-32.02	53.84	-95.26	-41.42	-25	16.42
High Channel (2 567.5 MHz)									
3 191.61	52.74	V	30.17	-37.90	45.01	-95.26	-50.25	-25	25.25
7 695.93	54.48	H	35.91	-34.61	55.78	-95.26	-39.48	-25	14.48
7 696.04	59.11	V	35.91	-34.61	60.41	-95.26	-34.85	-25	9.85
10 261.27	45.07	H	37.70	-31.94	50.83	-95.26	-44.43	-25	19.43
10 261.38	46.62	V	37.70	-31.94	52.38	-95.26	-42.88	-25	17.88

* 5 BW 1 RB size / 0 Offset

LTE band 7 (10 MHz - QPSK)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (2 505.0 MHz)									
3 190.16	52.84	V	30.16	-37.90	45.10	-95.26	-50.16	-25	25.16
7 501.82	50.22	H	36.00	-34.77	51.45	-95.26	-43.81	-25	18.81
7 501.88	52.47	V	36.00	-34.77	53.70	-95.26	-41.56	-25	16.56
10 002.31	46.99	H	37.70	-32.29	52.40	-95.26	-42.86	-25	17.86
10 002.40	48.58	V	37.70	-32.29	53.99	-95.26	-41.27	-25	16.27
Middle Channel (2 535.0 MHz)									
3 192.75	52.94	V	30.17	-37.90	45.21	-95.26	-50.05	-25	25.05
7 591.82	55.11	H	36.00	-34.48	56.63	-95.26	-38.63	-25	13.63
7 591.75	54.83	V	36.00	-34.48	56.35	-95.26	-38.91	-25	13.91
10 122.47	47.46	H	37.70	-32.01	53.15	-95.26	-42.11	-25	17.11
10 122.41	48.05	V	37.70	-32.01	53.74	-95.26	-41.52	-25	16.52
High Channel (2 565.0 MHz)									
3 194.80	53.00	V	30.18	-37.89	45.29	-95.26	-49.97	-25	24.97
7 681.76	55.36	H	35.94	-34.61	56.69	-95.26	-38.57	-25	13.57
7 681.82	59.29	V	35.94	-34.61	60.62	-95.26	-34.64	-25	9.64
10 242.33	45.45	H	37.70	-31.97	51.18	-95.26	-44.08	-25	19.08
10 242.54	47.02	V	37.70	-31.97	52.75	-95.26	-42.51	-25	17.51

* 10 BW 1 RB size / 0 Offset

LTE band 7 (15 MHz - QPSK)

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (2 507.5 MHz)									
3 189.01	52.30	V	30.16	-37.90	44.56	-95.26	-50.70	-25	25.70
7 502.44	50.25	H	36.00	-34.76	51.49	-95.26	-43.77	-25	18.77
7 502.65	52.61	V	36.00	-34.76	53.85	-95.26	-41.41	-25	16.41
10 003.56	46.98	H	37.70	-32.29	52.39	-95.26	-42.87	-25	17.87
10 003.28	48.52	V	37.70	-32.29	53.93	-95.26	-41.33	-25	16.33
Middle Channel (2 535.0 MHz)									
3 199.10	52.73	V	30.20	-37.88	45.05	-95.26	-50.21	-25	25.21
7 585.13	55.56	H	36.00	-34.48	57.08	-95.26	-38.18	-25	13.18
7 585.04	55.14	V	36.00	-34.48	56.66	-95.26	-38.60	-25	13.60
10 113.28	46.85	H	37.70	-32.02	52.53	-95.26	-42.73	-25	17.73
10 113.50	48.32	V	37.70	-32.02	54.00	-95.26	-41.26	-25	16.26
High Channel (2 562.5 MHz)									
3 195.70	52.44	V	30.18	-37.88	44.74	-95.26	-50.52	-25	25.52
7 667.57	54.45	H	35.96	-34.61	55.80	-95.26	-39.46	-25	14.46
7 667.55	57.96	V	35.96	-34.61	59.31	-95.26	-35.95	-25	10.95
10 223.32	45.02	H	37.70	-31.99	50.73	-95.26	-44.53	-25	19.53
10 223.21	46.73	V	37.70	-31.99	52.44	-95.26	-42.82	-25	17.82

* 15 BW 1 RB size / 0 Offset

LTE band 7 (20 MHz - QPSK)

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (2 510.0 MHz)									
3 194.50	52.73	V	30.18	-37.89	45.02	-95.26	-50.24	-25	25.24
7 503.31	50.24	H	36.00	-34.76	51.48	-95.26	-43.78	-25	18.78
7 503.36	52.47	V	36.00	-34.76	53.71	-95.26	-41.55	-25	16.55
10 004.42	47.01	H	37.70	-32.29	52.42	-95.26	-42.84	-25	17.84
10 004.36	48.66	V	37.70	-32.29	54.07	-95.26	-41.19	-25	16.19
Middle Channel (2 535.0 MHz)									
3 186.36	53.57	V	30.15	-37.90	45.82	-95.26	-49.44	-25	24.44
7 578.22	55.96	H	36.00	-34.48	57.48	-95.26	-37.78	-25	12.78
7 578.40	54.63	V	36.00	-34.48	56.15	-95.26	-39.11	-25	14.11
10 104.39	46.62	H	37.70	-32.01	52.31	-95.26	-42.95	-25	17.95
10 104.45	47.83	V	37.70	-32.01	53.52	-95.26	-41.74	-25	16.74
High Channel (2 560.0 MHz)									
3 194.35	52.47	V	30.18	-37.89	44.76	-95.26	-50.50	-25	25.50
7 653.37	53.85	H	35.99	-34.61	55.23	-95.26	-40.03	-25	15.03
7 653.31	56.98	V	35.99	-34.61	58.36	-95.26	-36.90	-25	11.90
10 204.43	45.50	H	37.70	-32.03	51.17	-95.26	-44.09	-25	19.09
10 204.34	45.91	V	37.70	-32.03	51.58	-95.26	-43.68	-25	18.68

* 20 BW 1 RB size / 0 Offset

Remark;

1. E.I.R.P. (dB m) = E (dBμV/m) + 20 log D - 104.8; where D is the measurement distance in meters.
2. E (dBμV/m) = Measured Level (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB).
3. CF (dB) (E.I.R.P.) = 20 log D - 104.8.
4. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.

3. Conducted Output Power

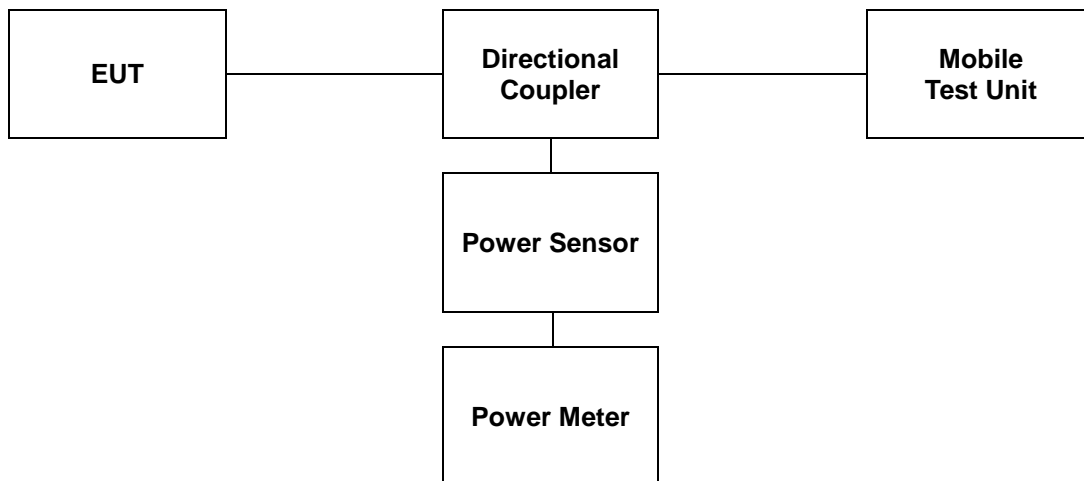
3.1. Limit

CFR 47, Section FCC §2.1046.

3.2. Test Procedure

Output power shall be measured at the RF output terminals for all configurations.

1. The RF output of the transmitter was connected to the input of the mobile test unit in order to establish communication with the EUT.
2. The EUT was set up for the max. output power with pseudo random data modulation by using mobile test unit parameters.
3. The measurement performed using a wideband RF power meter.
4. This EUT was tested under all configurations and the highest power was investigated and reported.



3.3. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

LTE Band	Bandwidth (MHz)	RB Size	RB Offset	QPSK			16QAM		
				20775	21100	21425	20775	21100	21425
				2 502.5	2 535.0	2 567.5	2 502.5	2 535.0	2 567.5
7	5	1	0	22.19	22.15	22.05	21.56	21.57	21.65
		1	12	22.34	22.18	22.26	21.63	21.60	21.73
		1	24	22.15	22.04	22.07	21.50	21.50	21.51
		12	0	21.34	21.15	21.07	20.52	20.42	20.34
		12	7	21.40	21.24	21.11	20.50	20.41	20.32
		12	13	21.30	21.20	21.06	20.47	20.38	20.29
		25	0	21.30	21.21	21.10	20.43	20.46	20.44
	Bandwidth (MHz)	RB Size	RB Offset	20800	21100	21400	20800	21100	21400
				2 505.0	2 535.0	2 565.0	2 505.0	2 535.0	2 565.0
	10	1	0	22.28	22.38	22.33	21.65	21.66	21.61
		1	25	22.36	22.27	22.45	21.65	21.74	21.65
		1	49	22.16	22.22	22.13	21.59	21.46	21.55
		25	0	21.26	21.26	21.24	20.58	20.47	20.39
		25	12	21.33	21.28	21.33	20.60	20.57	20.45
		25	25	21.27	21.20	21.16	20.57	20.53	20.43
		50	0	21.24	21.18	21.23	20.49	20.46	20.40
	Bandwidth (MHz)	RB Size	RB Offset	20825	21100	21375	20825	21100	21375
				2 507.5	2 535.0	2 562.5	2 507.5	2 535.0	2 562.5
	15	1	0	22.17	22.14	22.17	21.63	21.54	21.59
		1	37	22.22	22.10	22.18	21.59	21.66	21.55
		1	74	22.23	21.94	22.10	21.68	21.63	21.62
		36	0	21.27	21.20	21.14	20.49	20.36	20.33
		36	20	21.30	21.23	21.21	20.48	20.40	20.41
		36	39	21.33	21.21	21.19	20.46	20.34	20.41
		75	0	21.25	21.28	21.15	20.42	20.39	20.27
	Bandwidth (MHz)	RB Size	RB Offset	20850	21100	21350	20850	21100	21350
				2 510.0	2 535.0	2 560.0	2 510.0	2 535.0	2 560.0
	20	1	0	22.30	22.04	22.00	21.49	21.45	21.48
1		50	22.38	22.39	22.28	21.46	21.59	21.68	
1		99	22.21	21.87	22.25	21.33	21.47	21.61	
50		0	21.25	21.22	21.12	20.53	20.46	20.29	
50		25	21.26	21.20	21.16	20.51	20.48	20.30	
50		50	21.25	21.17	21.14	20.47	20.43	20.25	
100		0	21.25	21.25	21.08	20.46	20.45	20.25	

4. Occupied Bandwidth

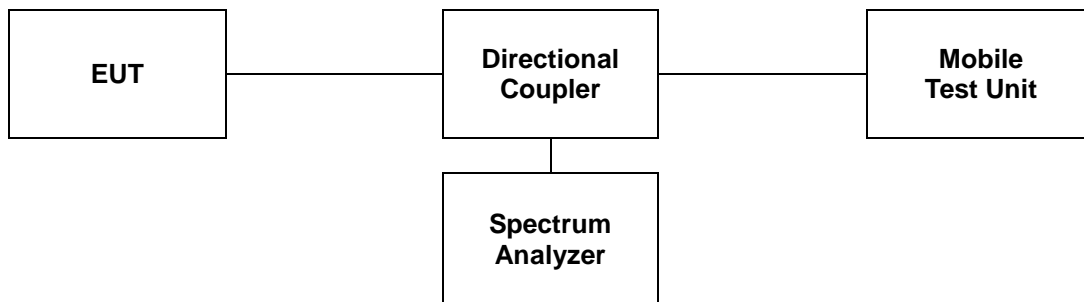
4.1. Limit

CFR 47, Section FCC §2.1049.

4.2. Test Procedure

The test follows section 5.4.4 of ANSI C63.26-2015.

- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient).
- b. The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. Set the detection mode to peak, and the trace mode to max-hold.
- e. If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference these two frequencies.
- f. The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).



4.3 Test Results

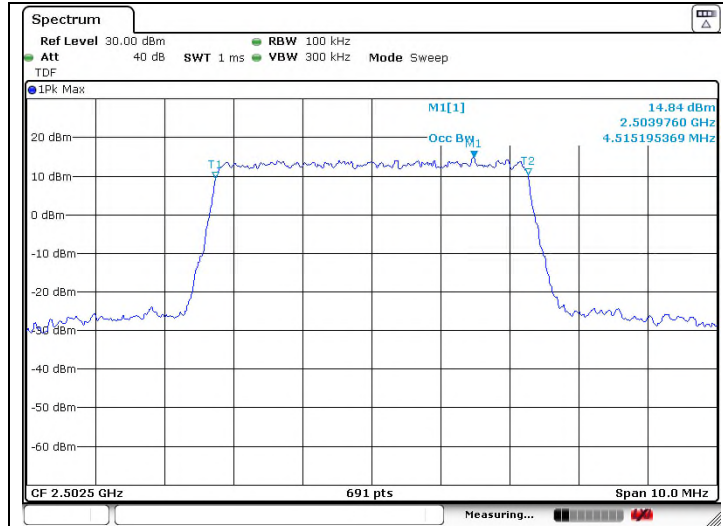
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Band	Bandwidth (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)	
			QPSK	16QAM
7	5	2 502.5	4.515	4.530
		2 535.0	4.530	4.515
		2 567.5	4.515	4.530
	10	2 505.0	8.915	8.915
		2 535.0	8.944	8.944
		2 565.0	8.944	8.944
	15	2 507.5	13.372	13.459
		2 535.0	13.502	13.459
		2 562.5	13.502	13.502
	20	2 510.0	17.887	17.887
		2 535.0	17.887	17.945
		2 560.0	17.945	17.887

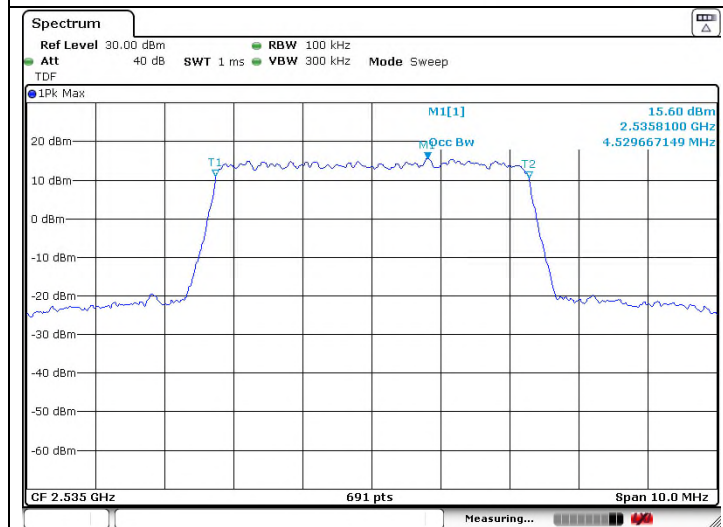
- Test plots

LTE band 7 (5 MHz - QPSK)

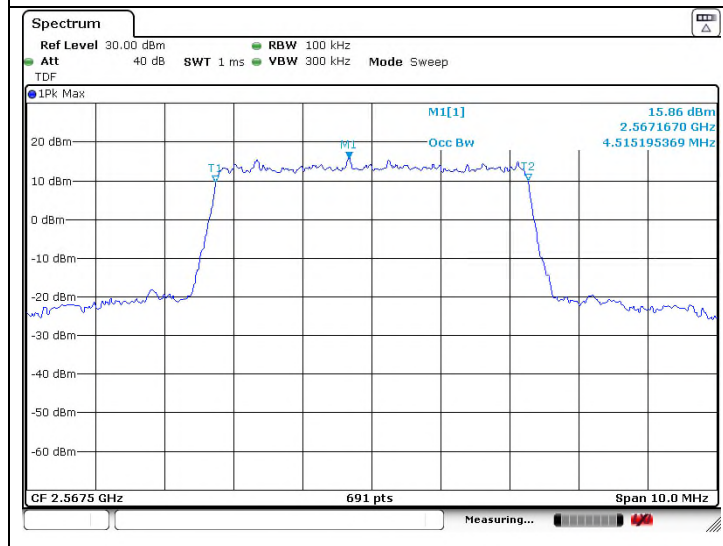
Low Channel



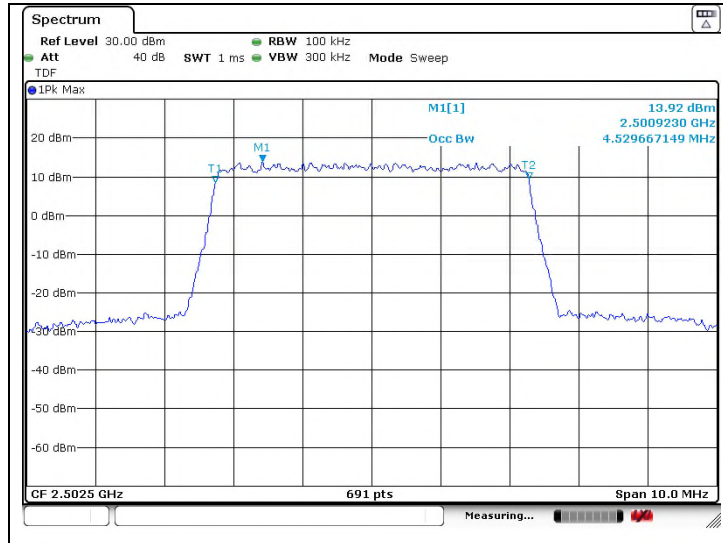
Middle Channel



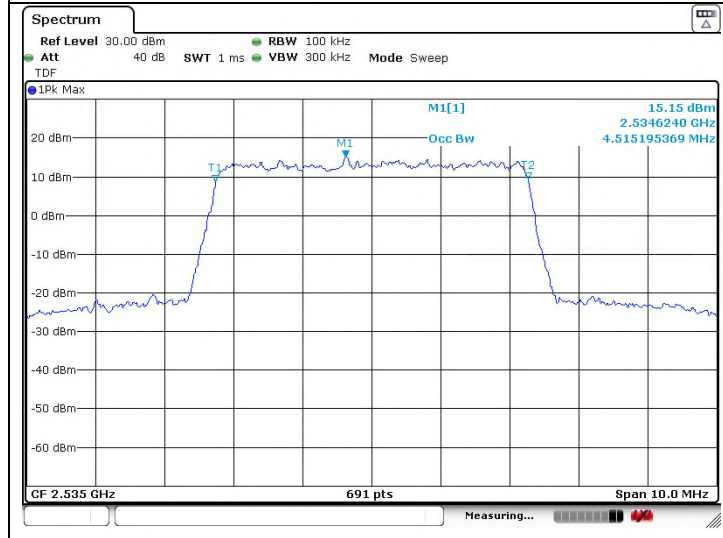
High Channel



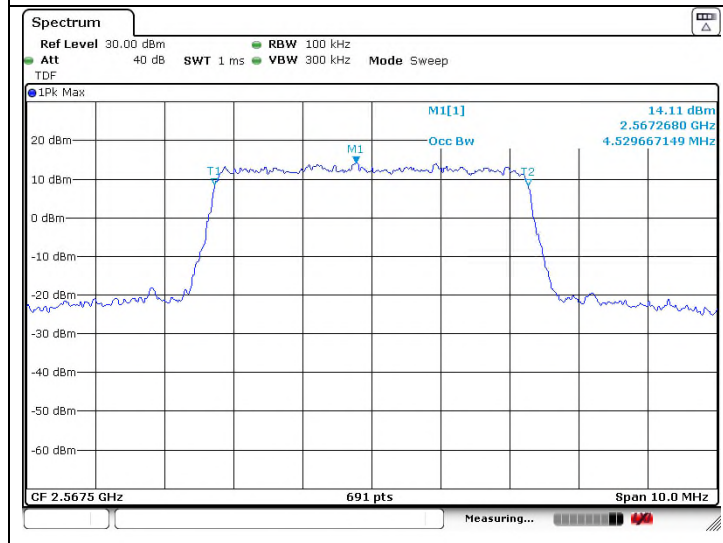
LTE band 7 (5 MHz - 16QAM)
 Low Channel



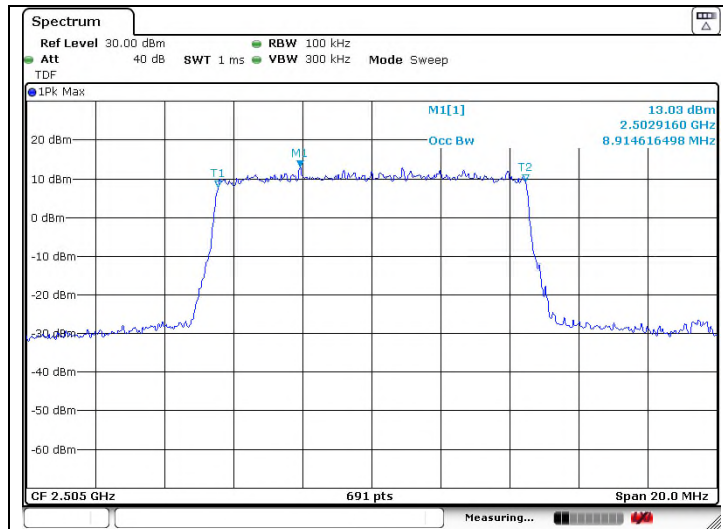
Middle Channel



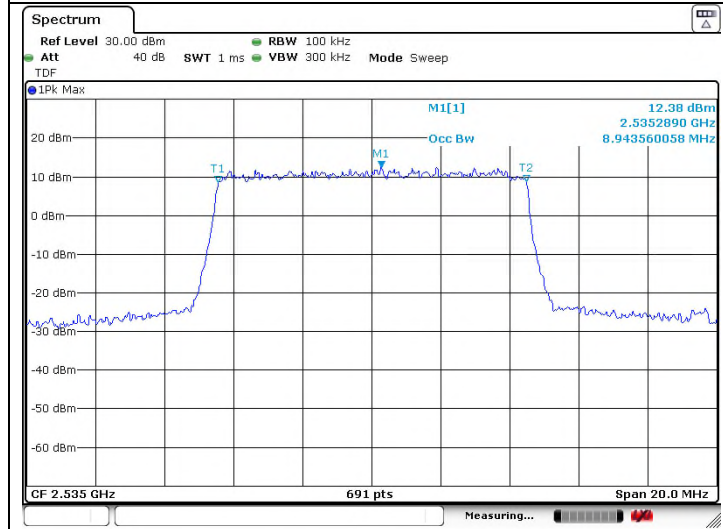
High Channel



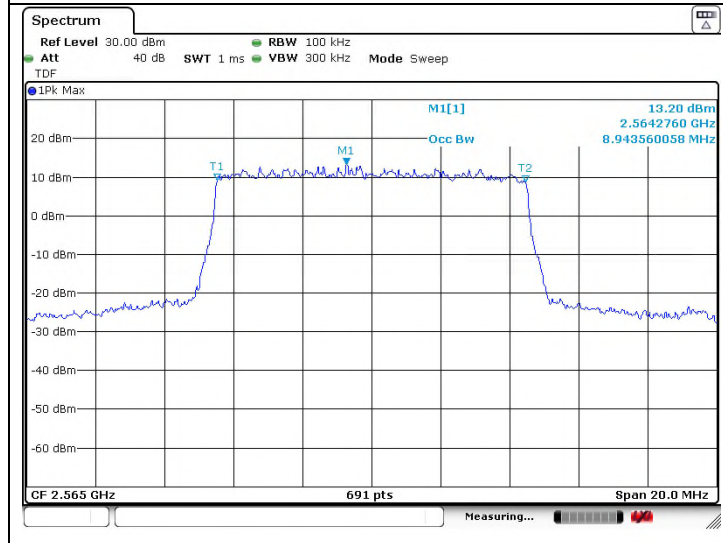
LTE band 7 (10 MHz - QPSK)
 Low Channel



Middle Channel

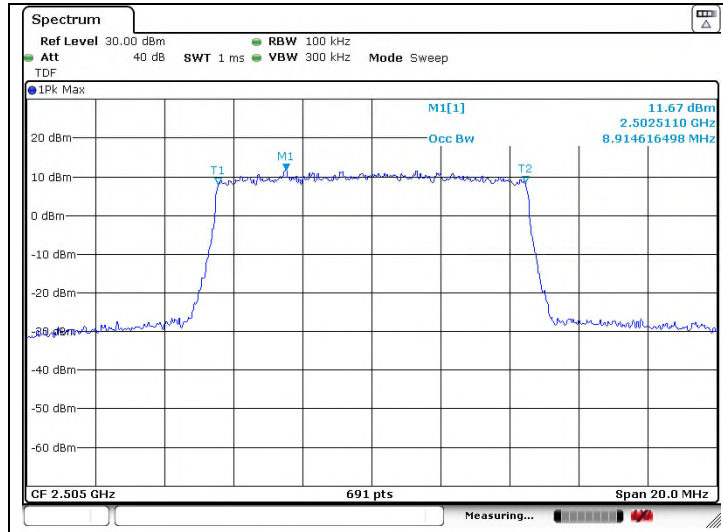


High Channel

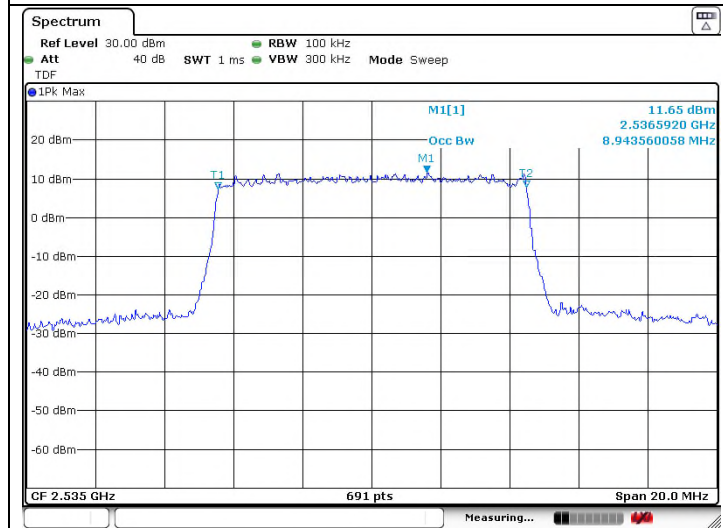


LTE band 7 (10 MHz - 16QAM)

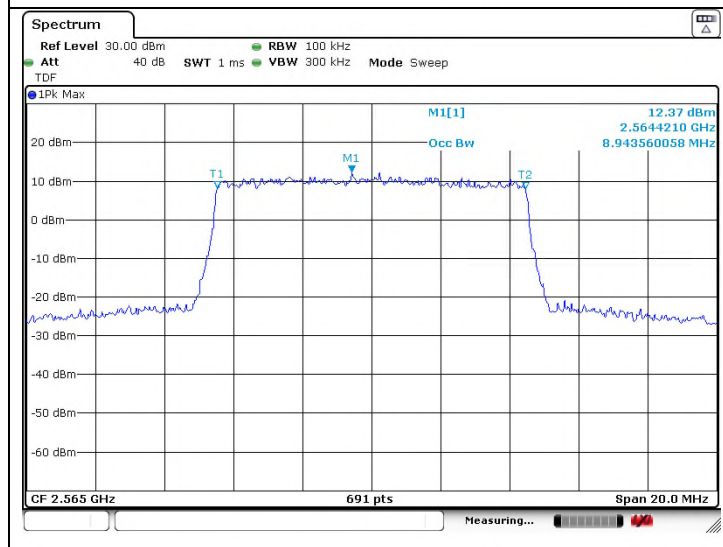
Low Channel



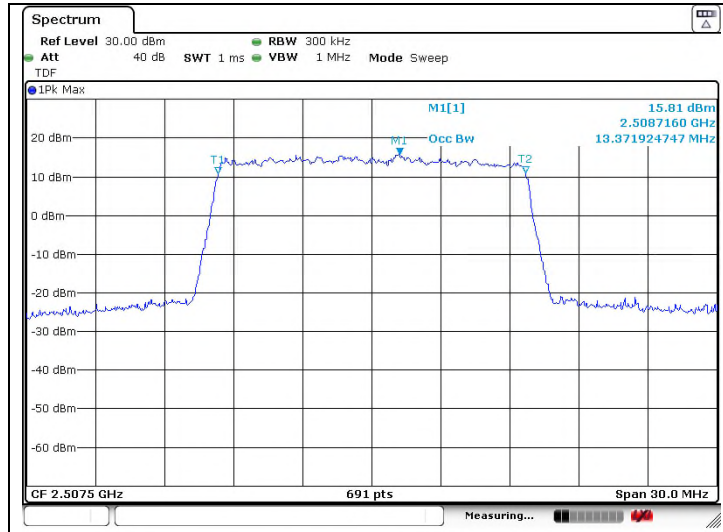
Middle Channel



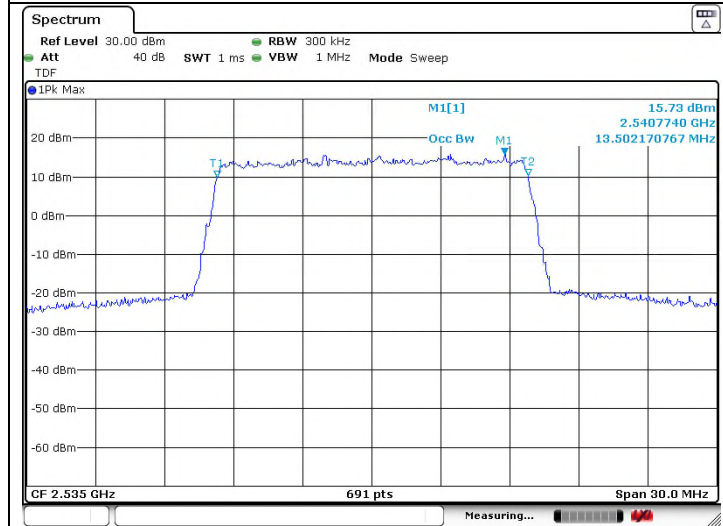
High Channel



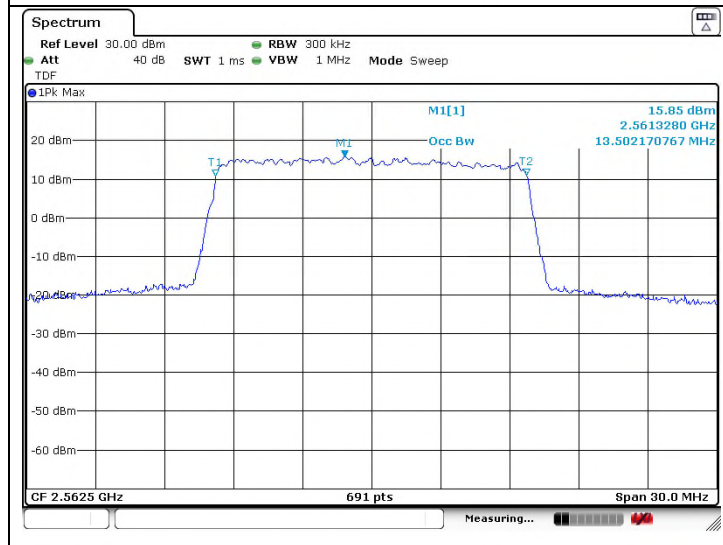
LTE band 7 (15 MHz - QPSK)
Low Channel



Middle Channel

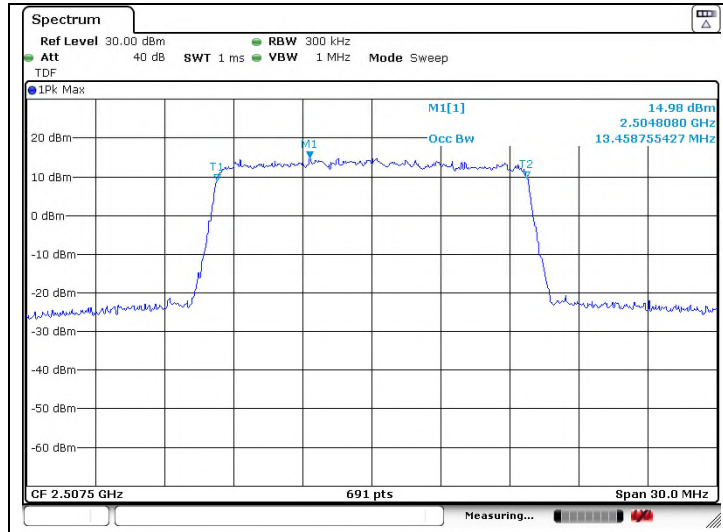


High Channel

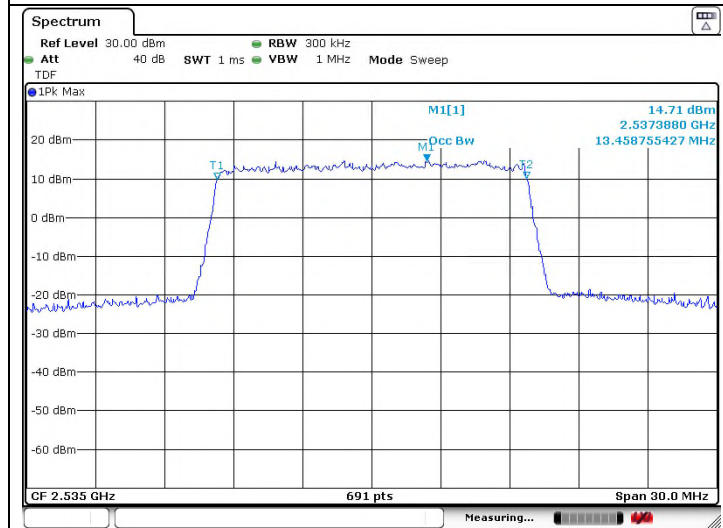


LTE band 7 (15 MHz - 16QAM)

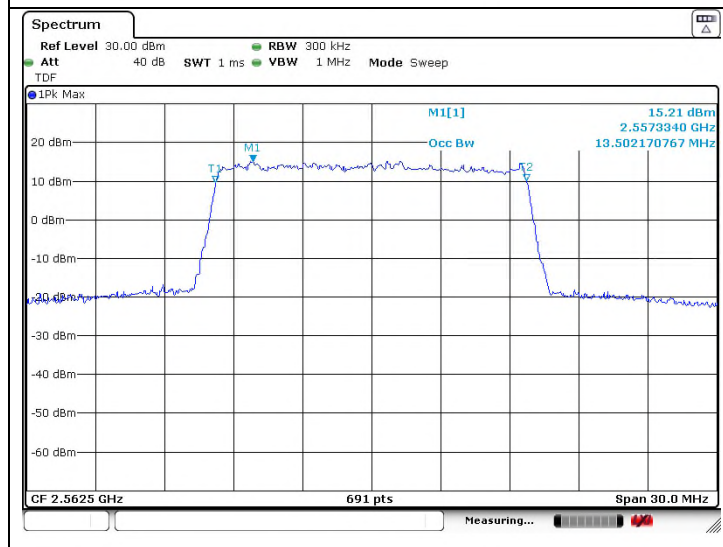
Low Channel



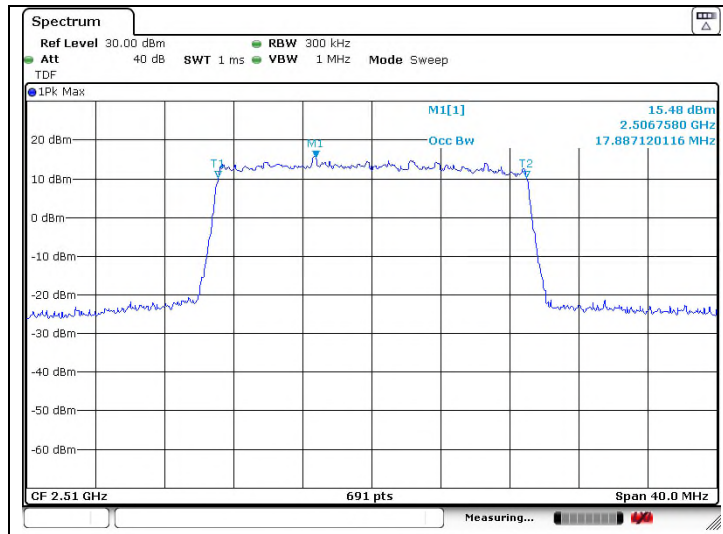
Middle Channel



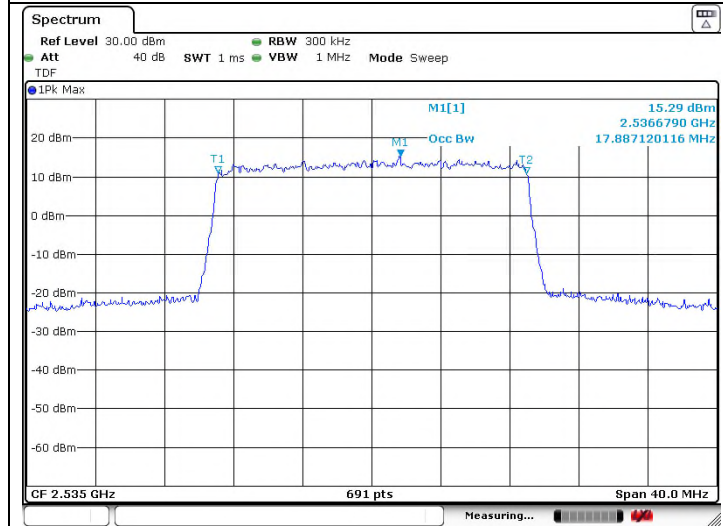
High Channel



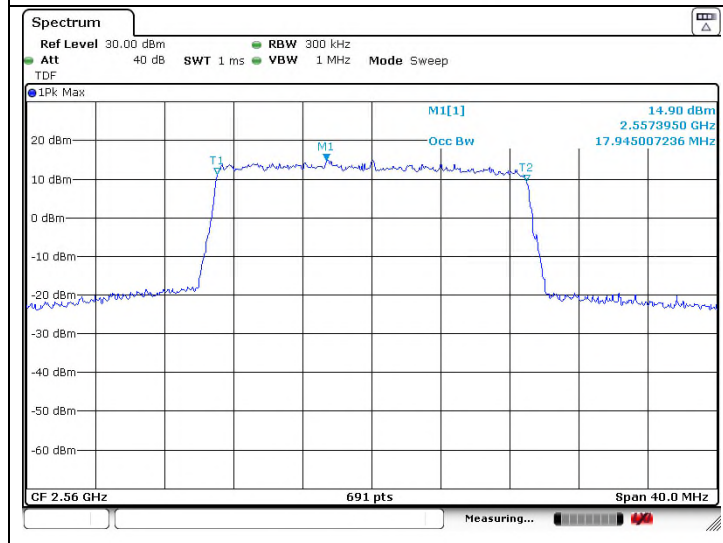
LTE band 7 (20 MHz - QPSK)
 Low Channel



Middle Channel

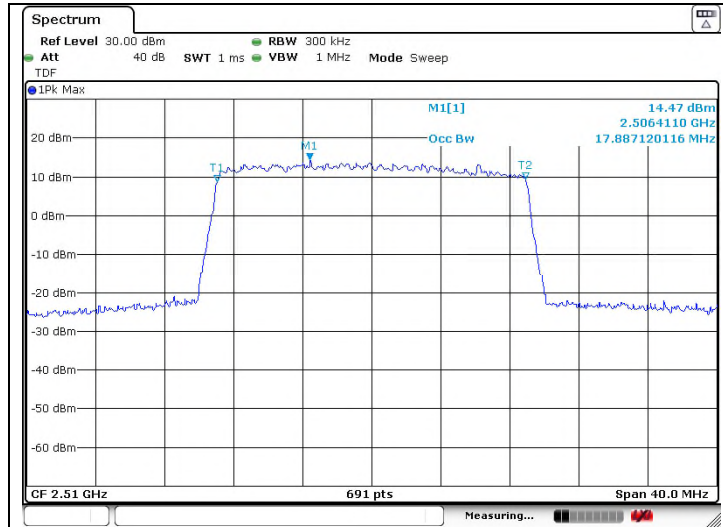


High Channel

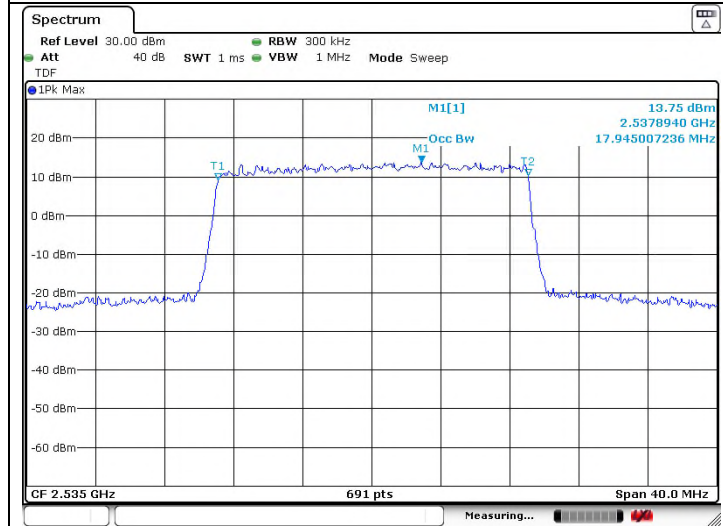


LTE band 7 (20 MHz - 16QAM)

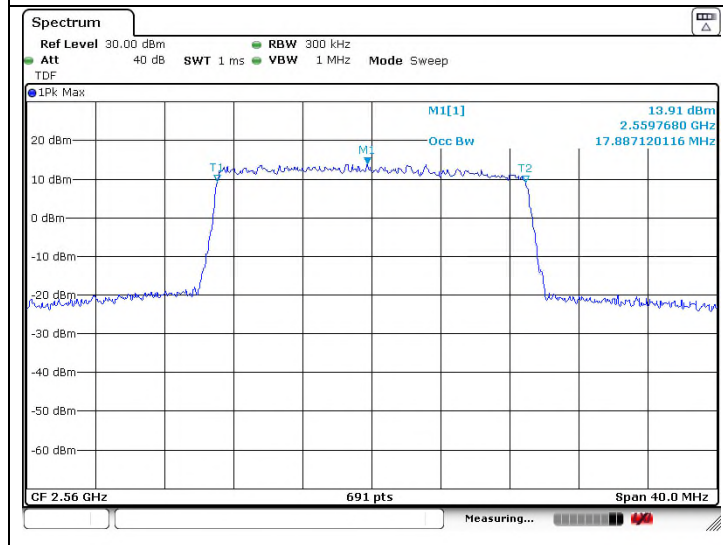
Low Channel



Middle Channel



High Channel



5. Peak-Average Ratio

5.1. Limit

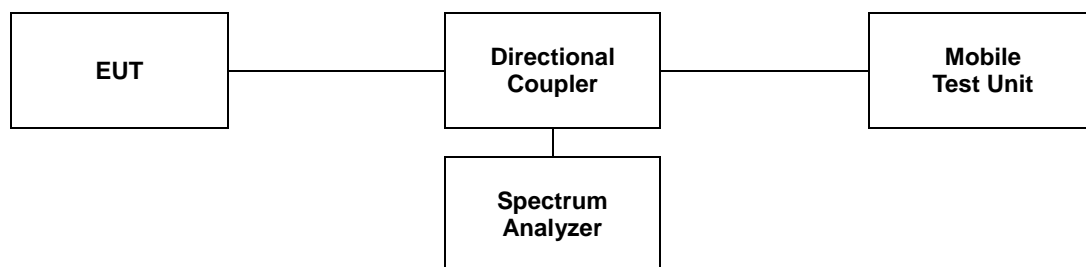
- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.2. Test Procedure

The test follows section 5.2.3.4 of ANSI C63.26-2015.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

- a. Set resolution/measurement bandwidth \geq OBW or specified reference bandwidth.
- b. Set the number of counts to a value that stabilizes the measured CCDF curve.
- c. Set the measurement interval as follows:
 - 1) For continuous transmissions, set to greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d. Record the maximum PAPR level associated with a probability of 0.1 %.
- e. The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.



5.3 Test Results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

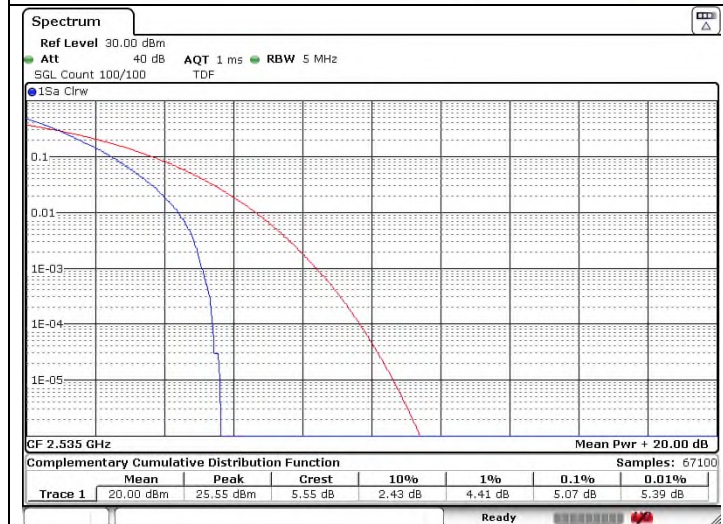
Band	Bandwidth (MHz)	Mode	Frequency (MHz)	PAR (dB)
7	5	QPSK	2 502.5	5.01
			2 535.0	5.07
			2 567.5	5.04
	10	QPSK	2 505.0	5.04
			2 535.0	5.04
			2 565.0	5.16
	15	QPSK	2 507.5	5.30
			2 535.0	5.39
			2 562.5	5.48
	20	QPSK	2 510.0	4.93
			2 535.0	4.96
			2 560.0	5.16

- Test plots

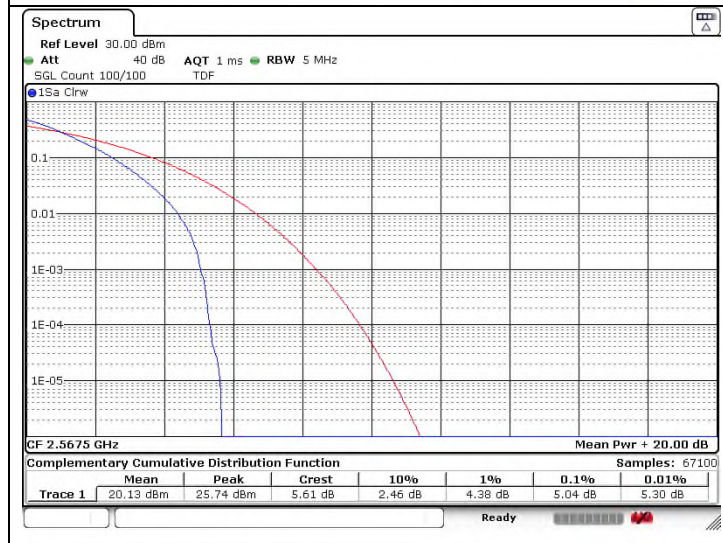
LTE band 7 (5 MHz - QPSK)
 Low Channel



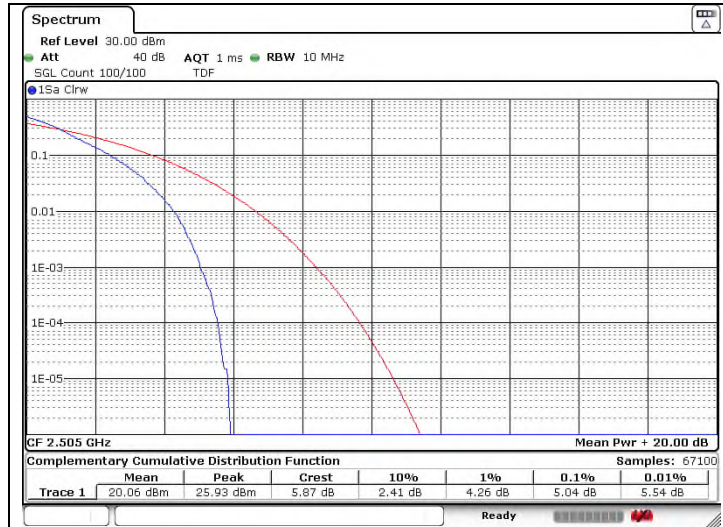
Middle Channel



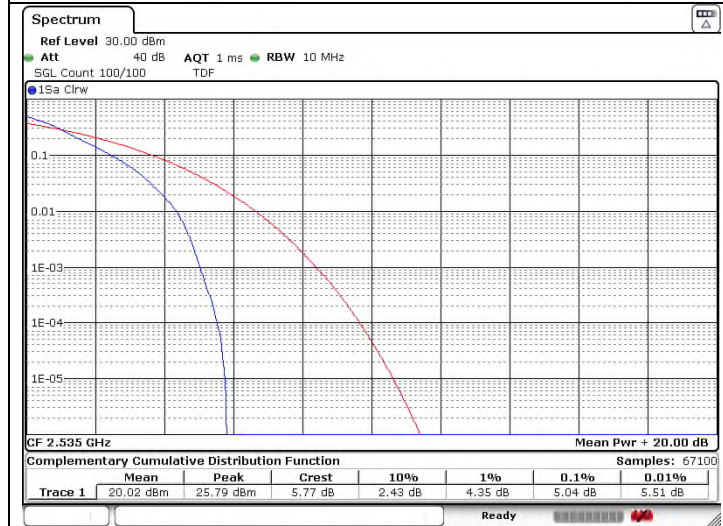
High Channel



LTE band 7 (10 MHz - QPSK)
 Low Channel



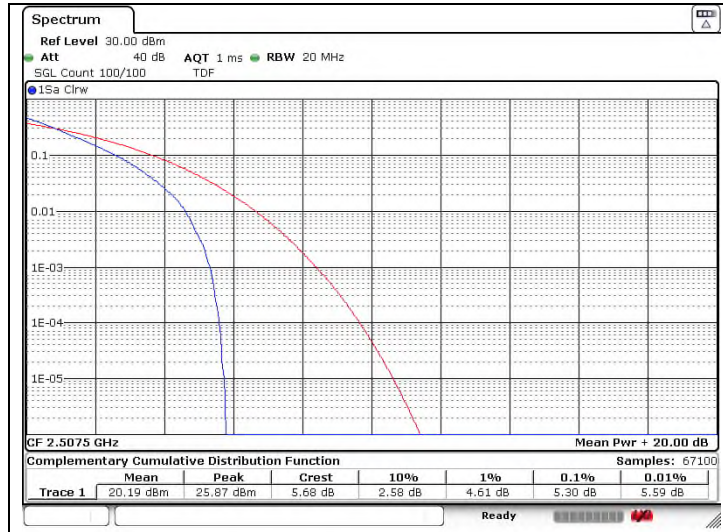
Middle Channel



High Channel



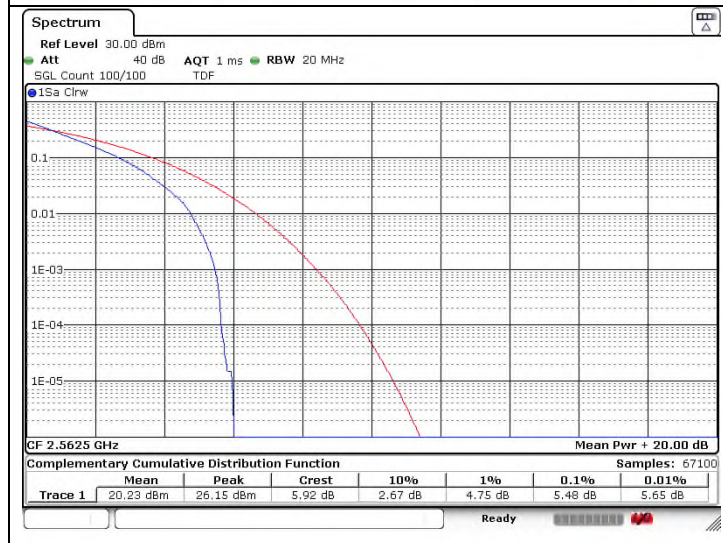
LTE band 7 (15 MHz - QPSK)
Low Channel



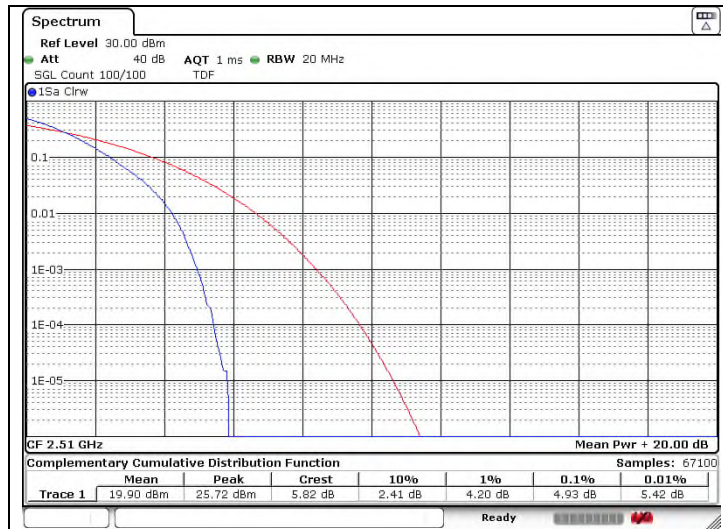
Middle Channel



High Channel



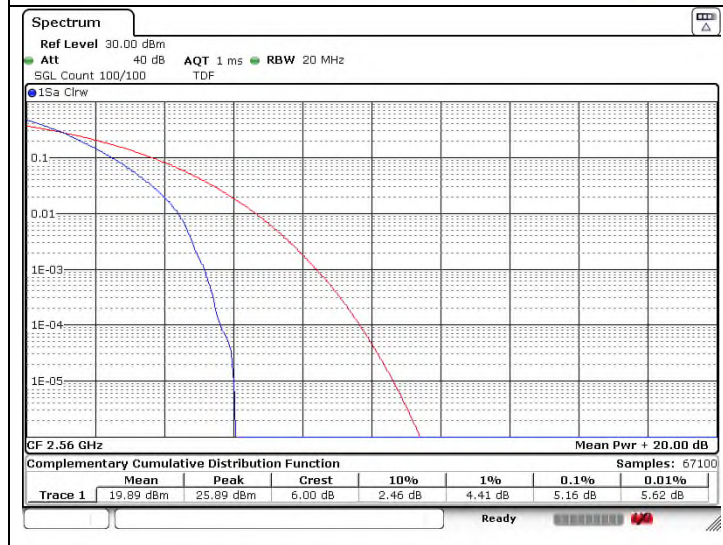
LTE band 7 (20 MHz - QPSK)
Low Channel



Middle Channel



High Channel



6. Spurious Emissions at Antenna Terminal

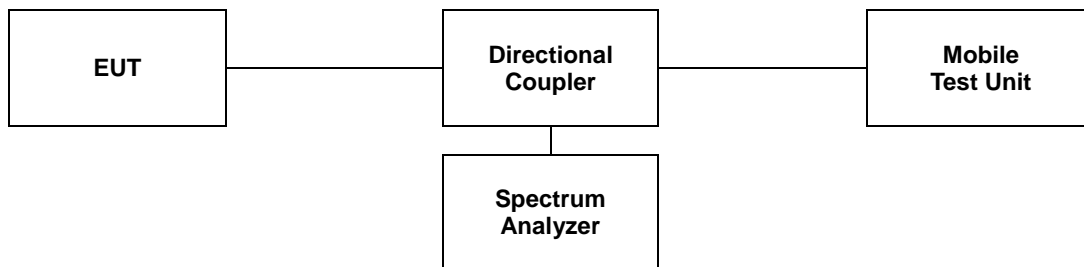
6.1. Limit

- §27.53(m)(4), For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log_{10}(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log_{10}(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log_{10}(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log_{10}(P)$ dB on all frequencies between 2 490.5 MHz and 2 496 MHz and $55 + 10 \log_{10}(P)$ dB at or below 2 490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2 495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees

6.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

1. Start frequency was set to 9 kHz and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = Peak.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 9 kHz to 26 GHz, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as correction factor.



Note;

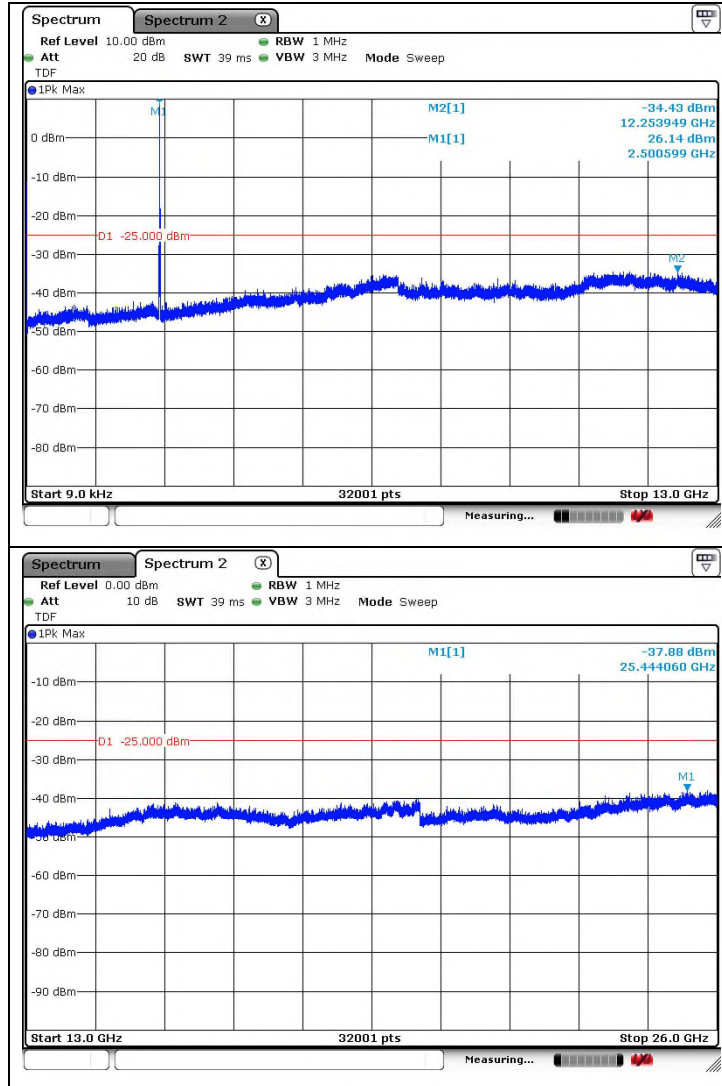
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

6.3. Test Results

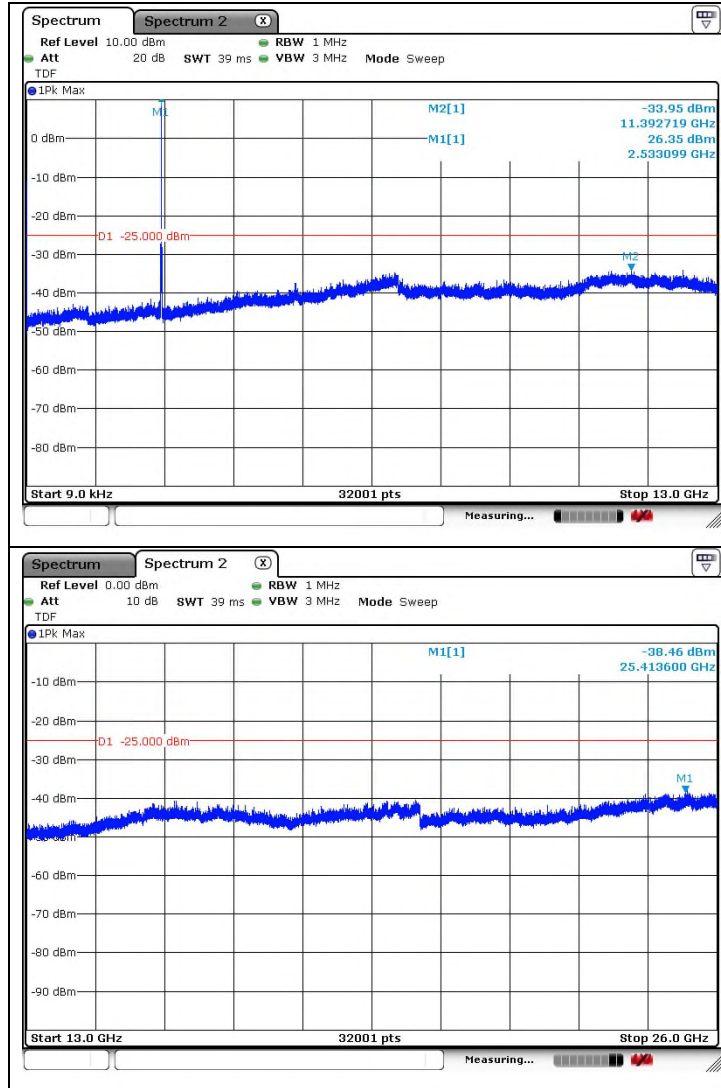
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

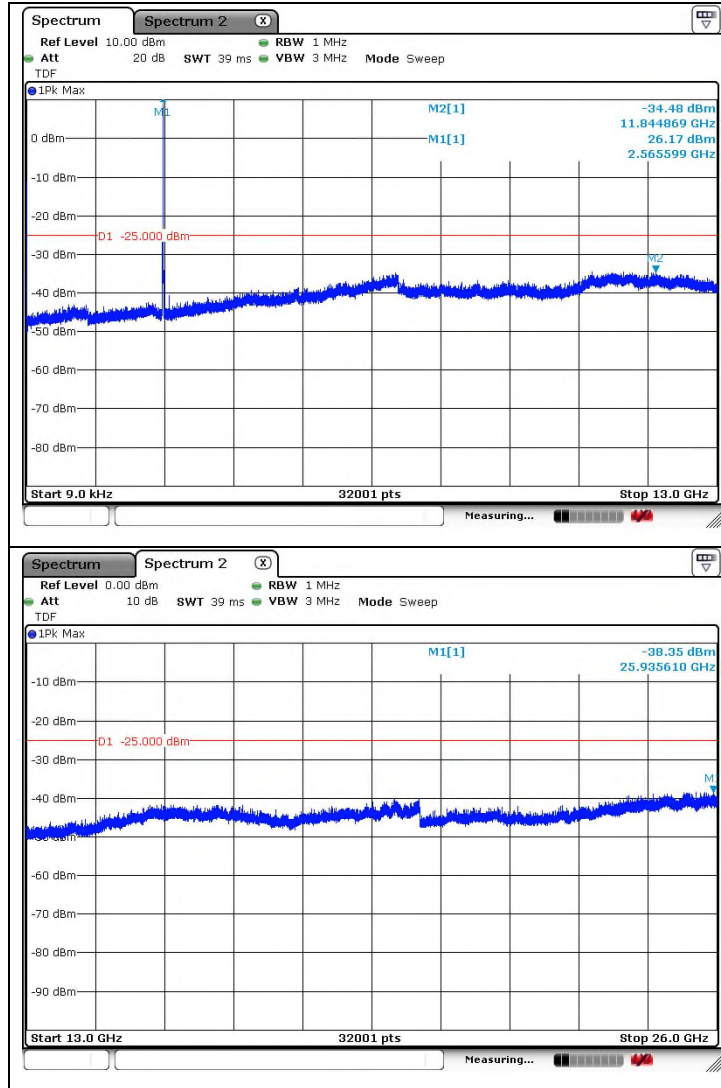
LTE band 7 (5 MHz - QPSK)
 Low Channel



Middle Channel

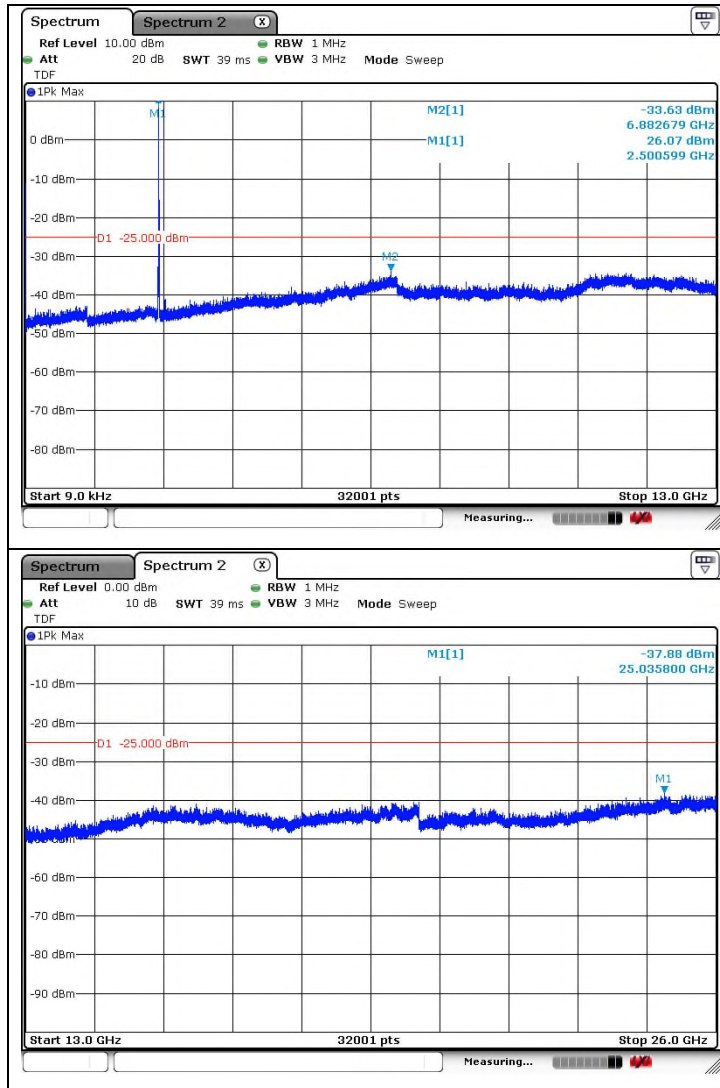


High Channel

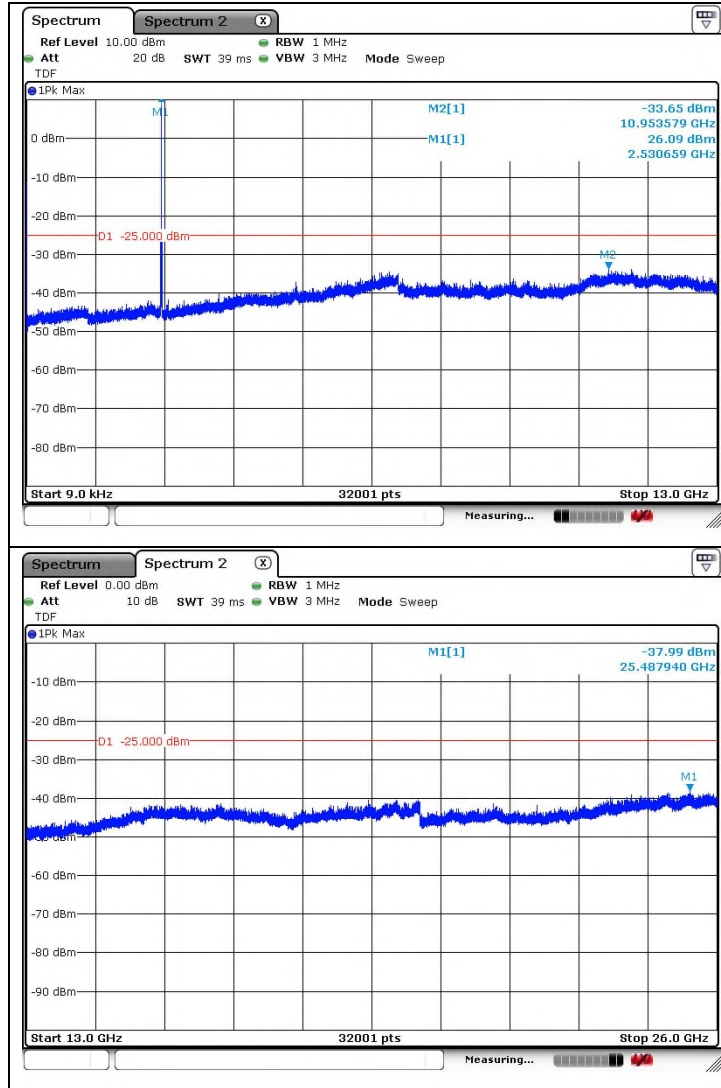


LTE band 7 (10 MHz - QPSK)

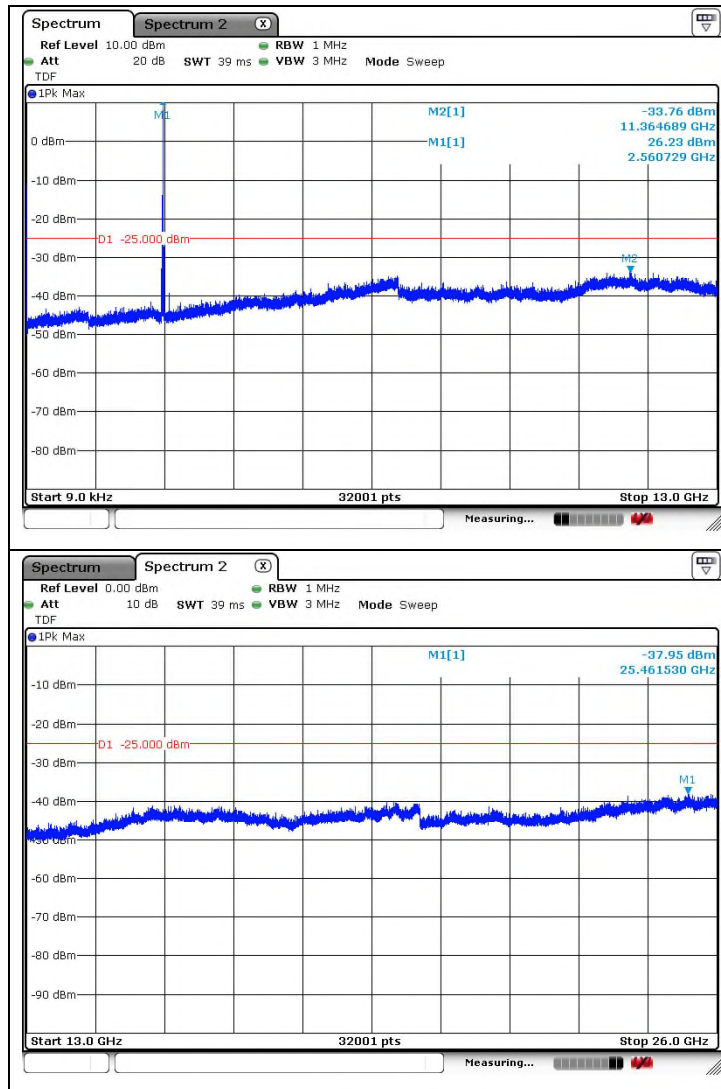
Low Channel



Middle Channel

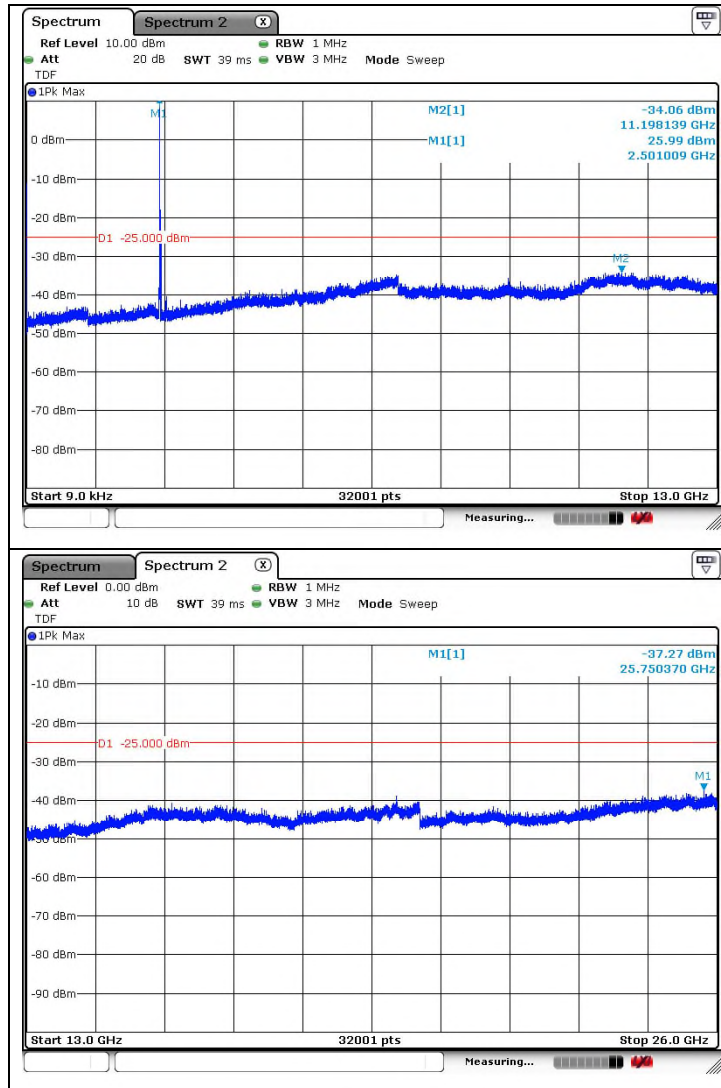


High Channel

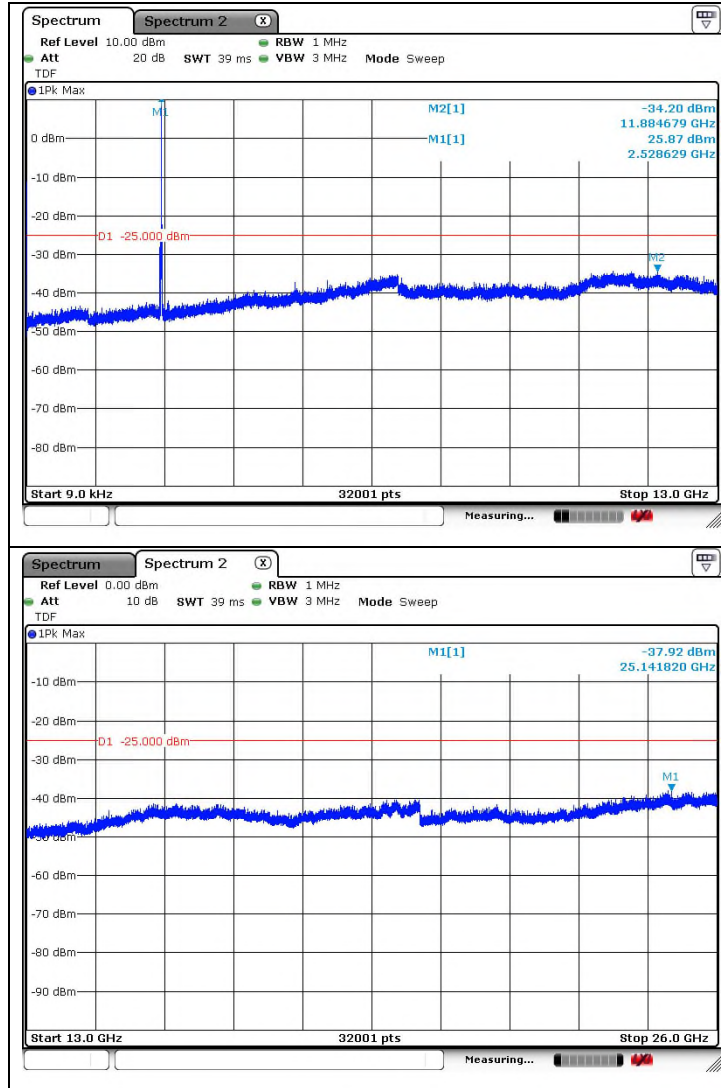


LTE band 7 (15 MHz - QPSK)

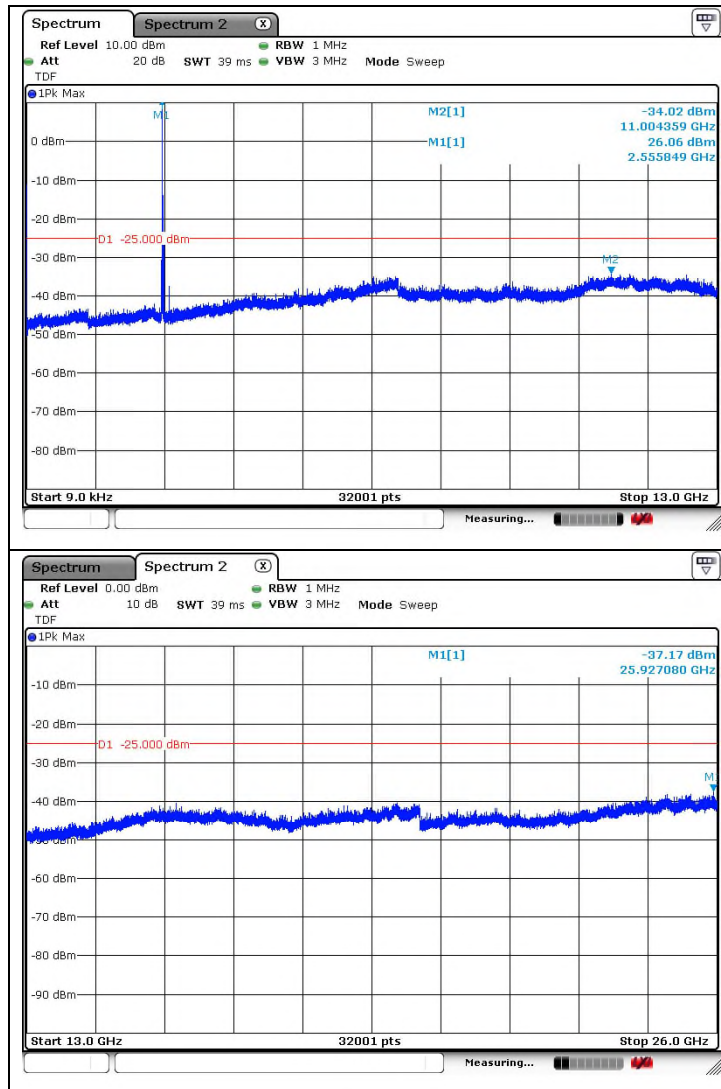
Low Channel



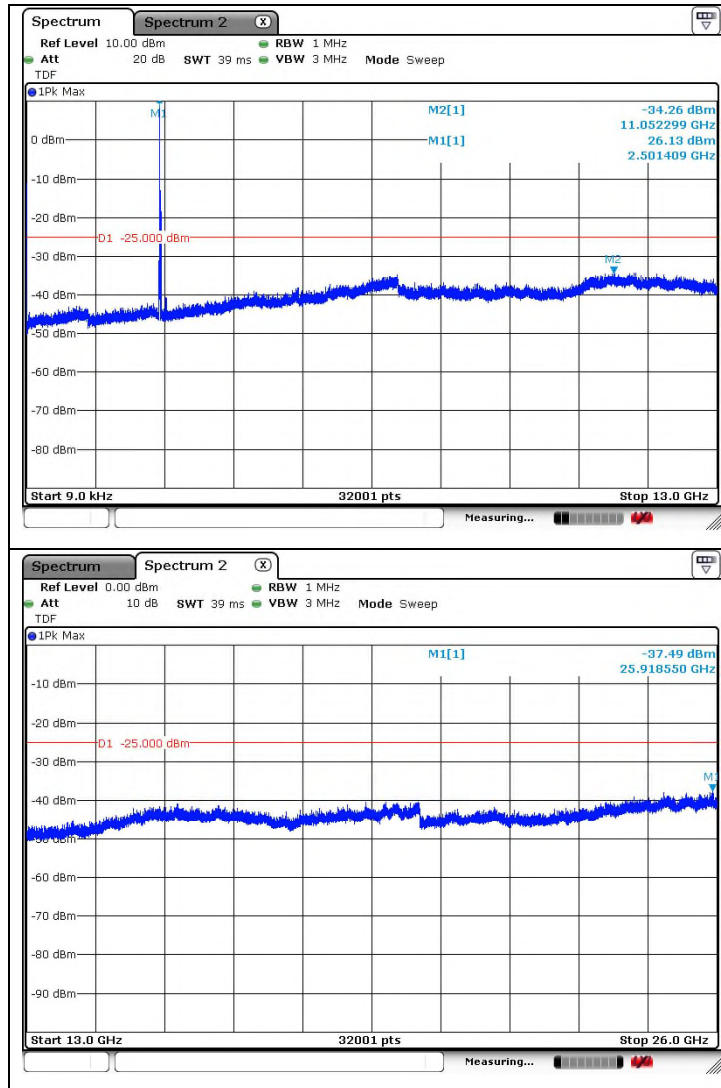
Middle Channel



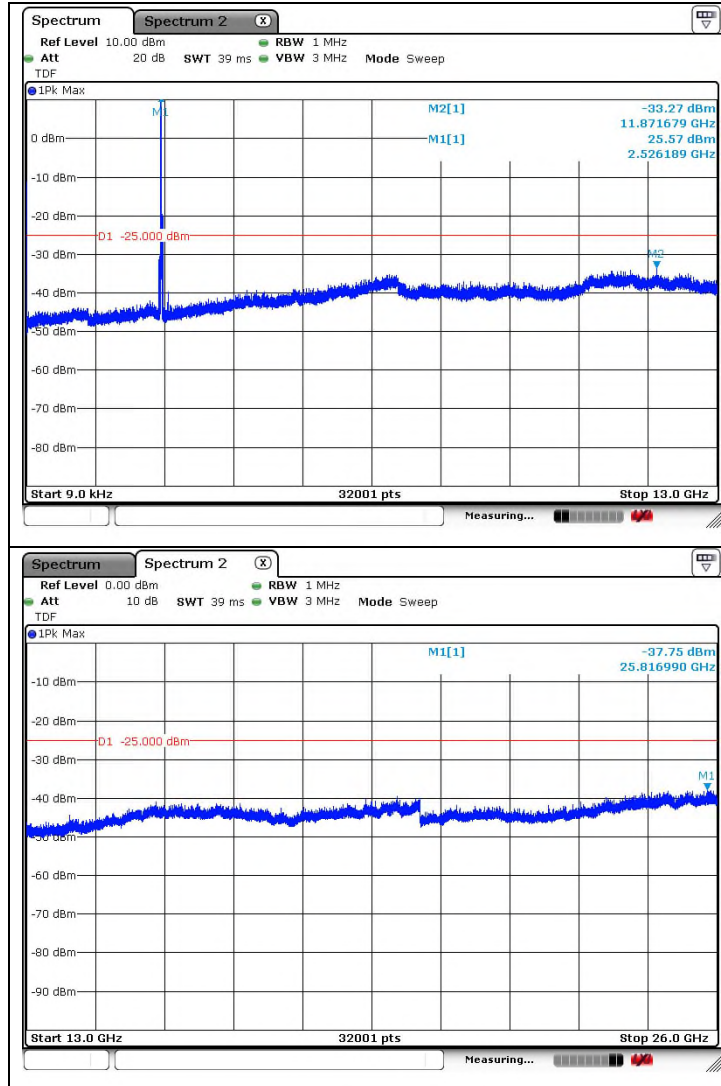
High Channel



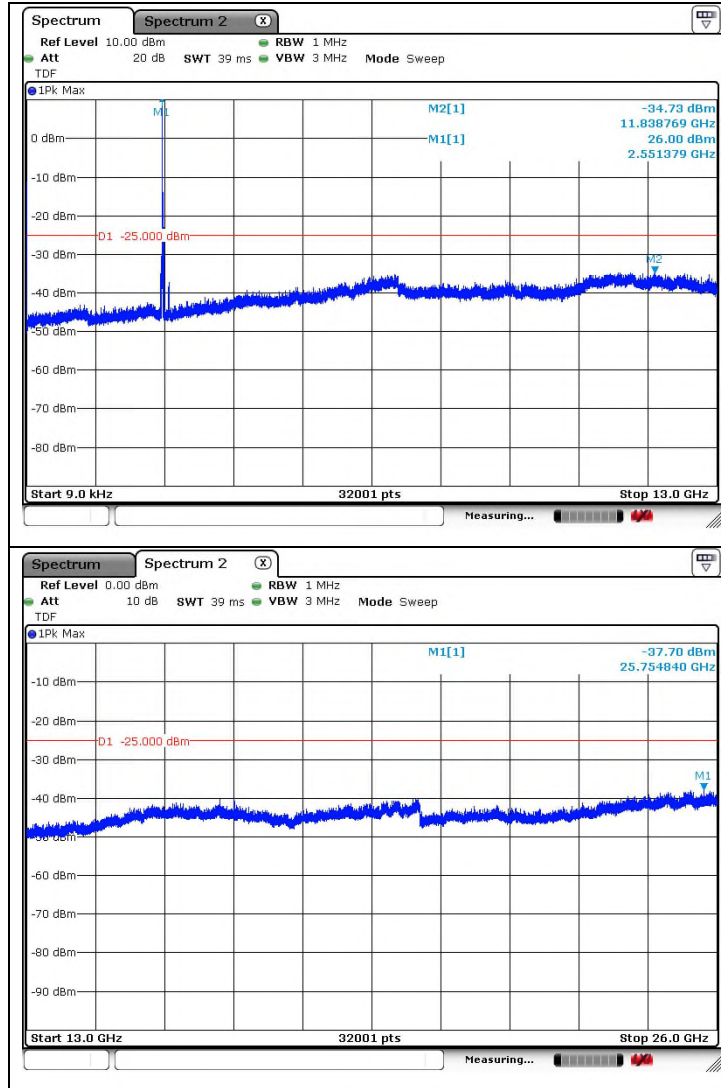
LTE band 7 (20 MHz - QPSK)
 Low Channel



Middle Channel



High Channel



7. Band Edge

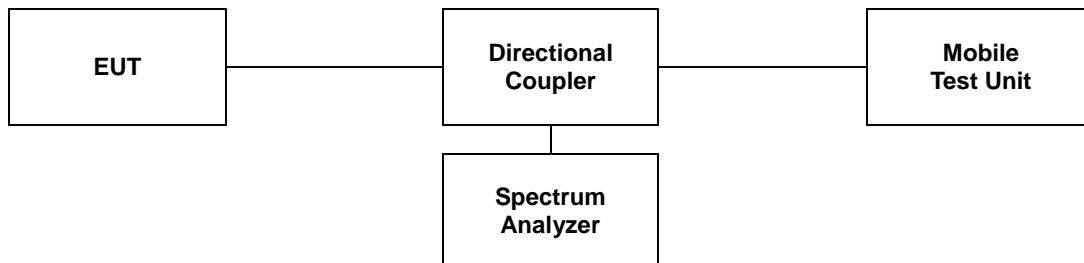
7.1. Limit

- §27.53(m)(4), For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log_{10} (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log_{10} (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log_{10} (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log_{10} (P)$ dB on all frequencies between 2 490.5 MHz and 2 496 MHz and $55 + 10 \log_{10} (P)$ dB at or below 2 490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2 495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

7.2. Test Procedure

The test follows section 5.7.3 of ANSI C63.26-2015.

- a. Span was set large enough so as to capture all out of band emissions near the band edge.
- b. RBW $\geq 1\%$ of OBW
- c. VBW $\geq 3 \times$ RBW.
- d. Detector = RMS.
- e. Trace mode = Average.
- f. Sweep time = Auto.
- g. The trace was allowed to stabilize.
- h. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.

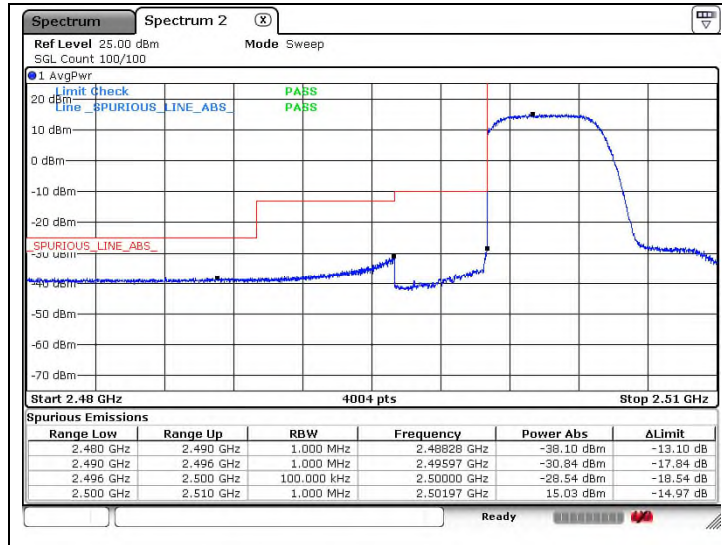


7.3. Test Results

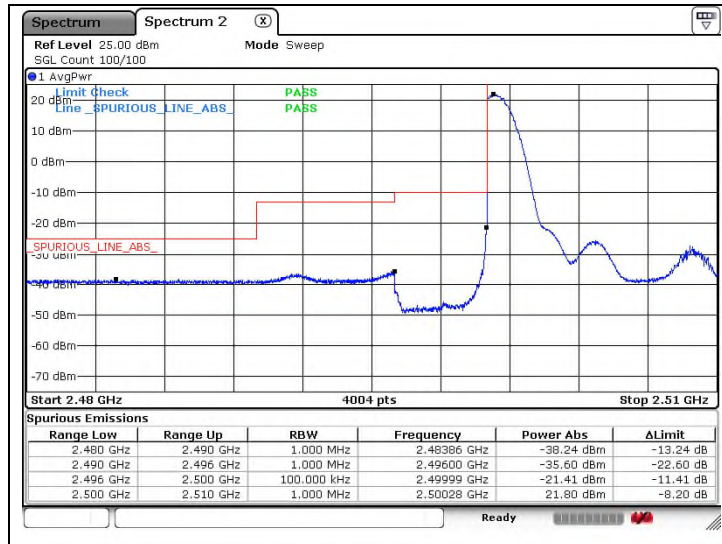
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

LTE band 7 (5 MHz - QPSK_Full RB) Low Channel

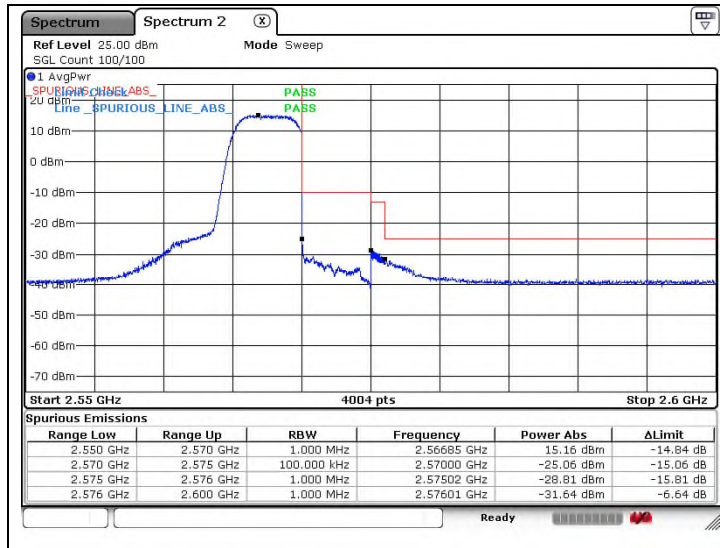


LTE band 7 (5 MHz - QPSK_1 RB) Low Channel



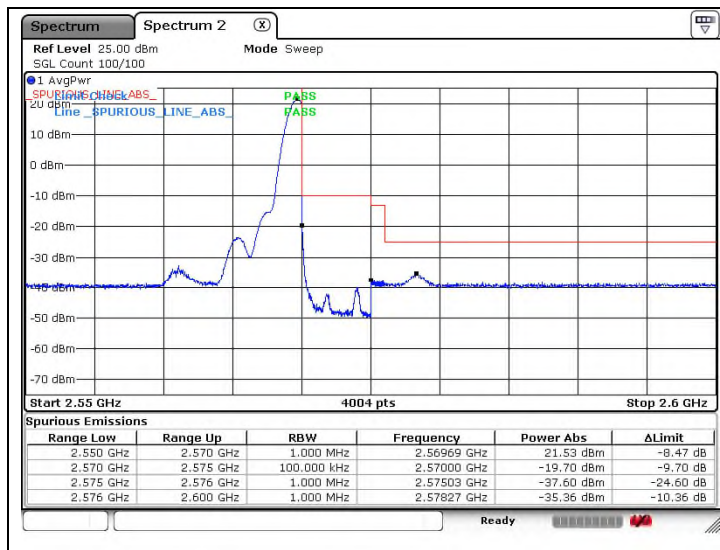
LTE band 7 (5 MHz - QPSK_Full RB)

High Channel



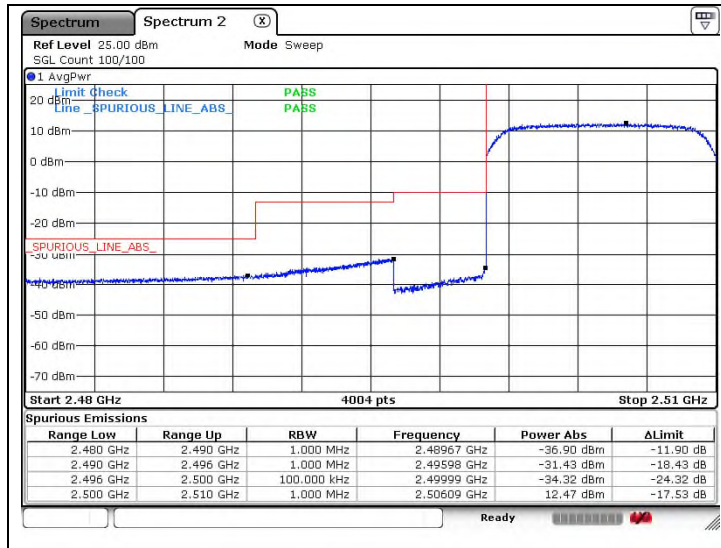
LTE band 7 (5 MHz - QPSK_1 RB)

High Channel



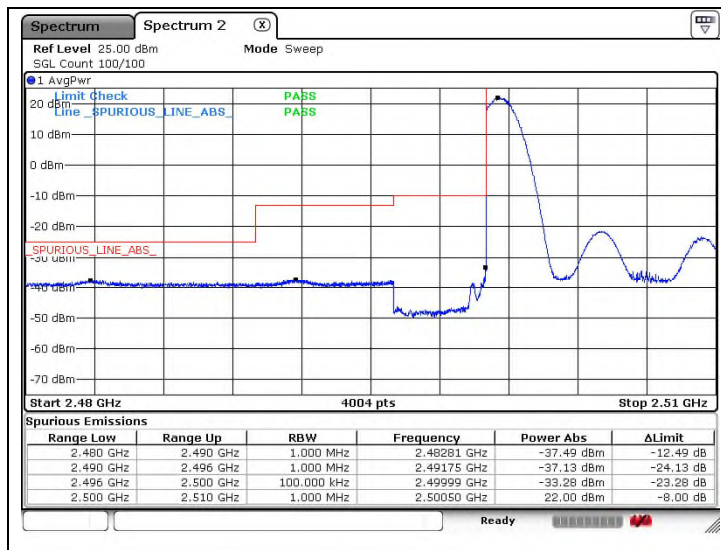
LTE band 7 (10 MHz - QPSK_Full RB)

Low Channel

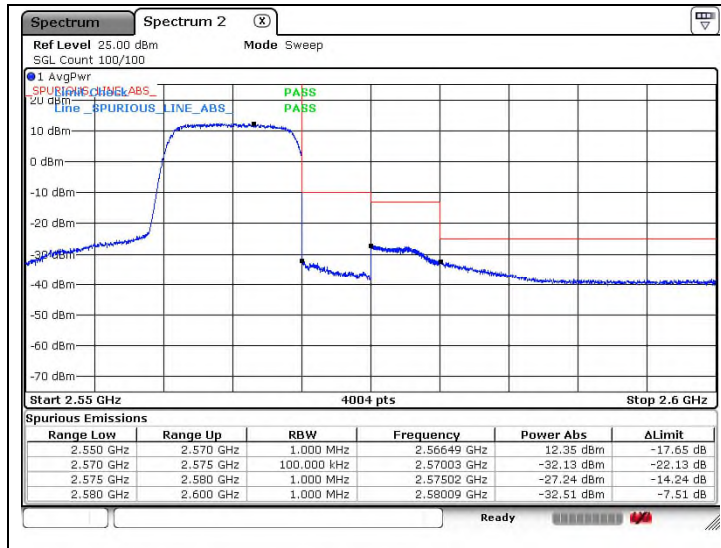


LTE band 7 (10 MHz - QPSK_1 RB)

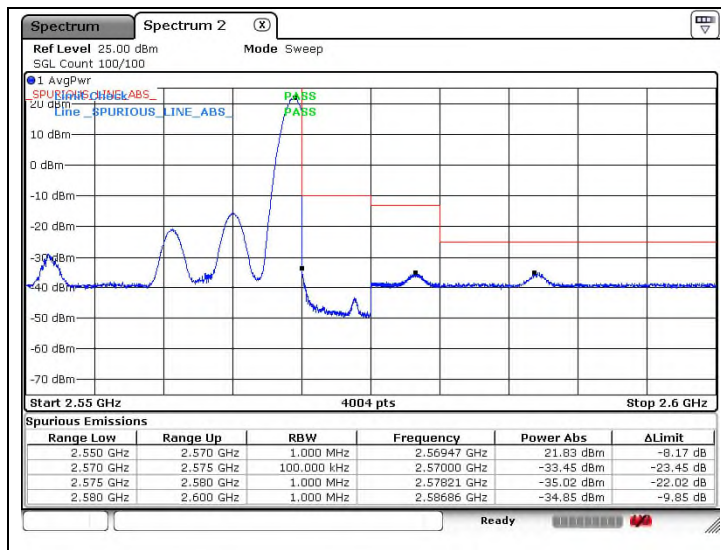
Low Channel



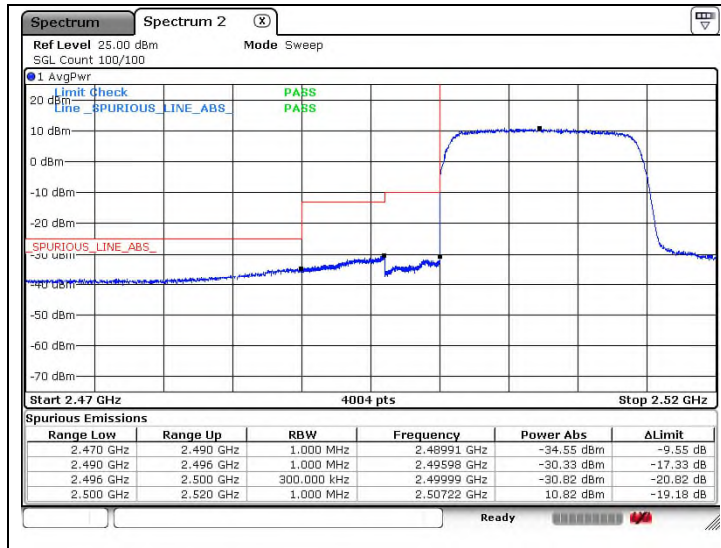
LTE band 7 (10 MHz - QPSK_Full RB)
 High Channel



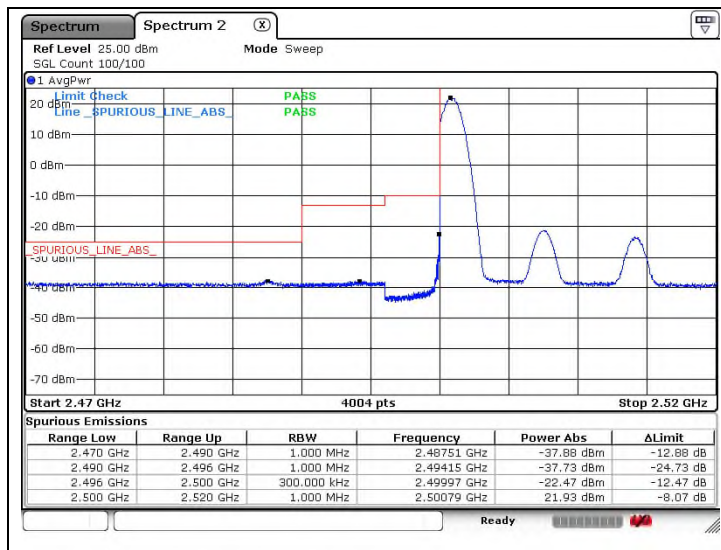
LTE band 7 (10 MHz - QPSK_1 RB)
 High Channel



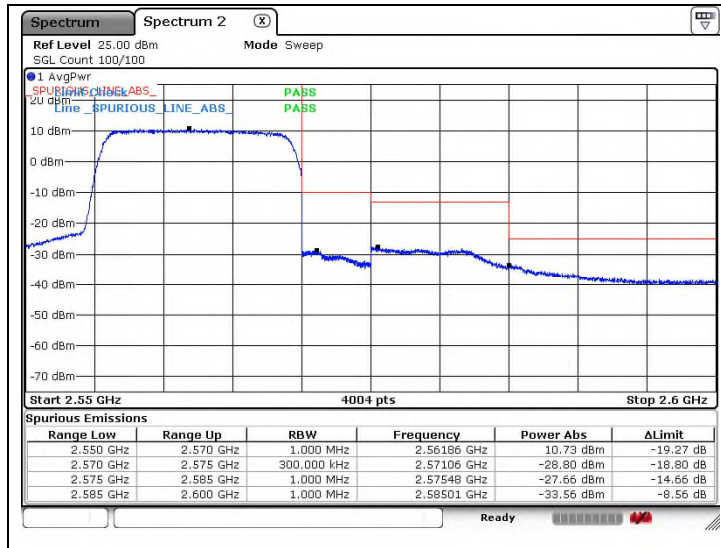
LTE band 7 (15 MHz - QPSK_Full RB)
 Low Channel



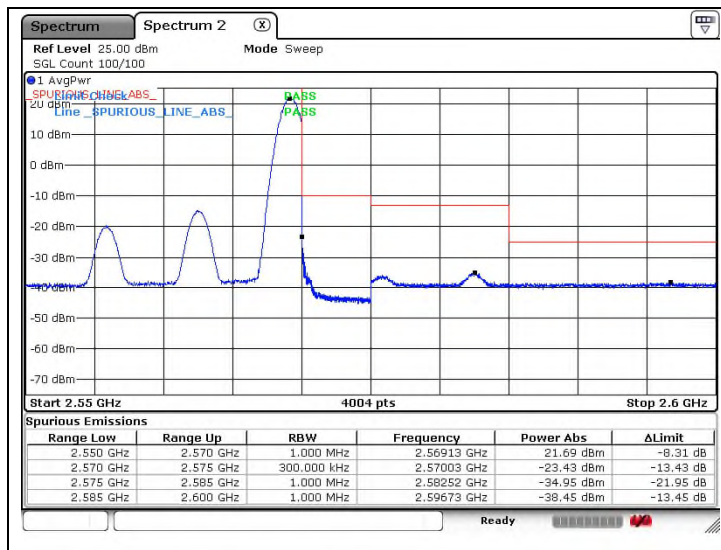
LTE band 7 (15 MHz - QPSK_1 RB)
 Low Channel



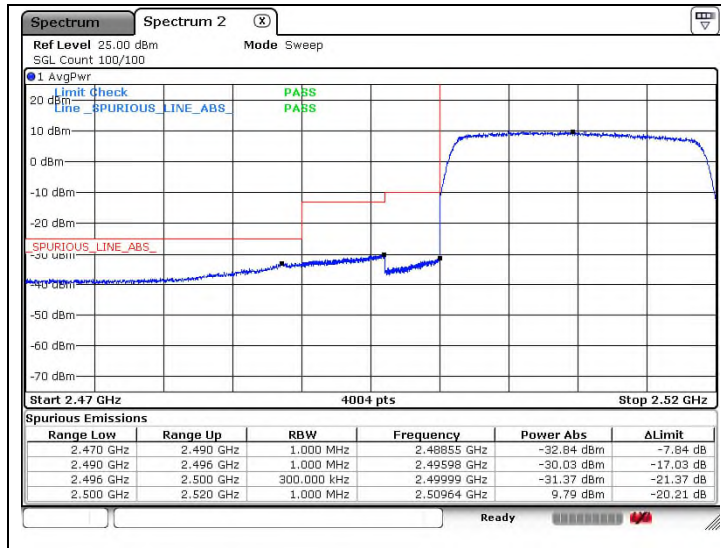
LTE band 7 (15 MHz - QPSK_Full RB)
 High Channel



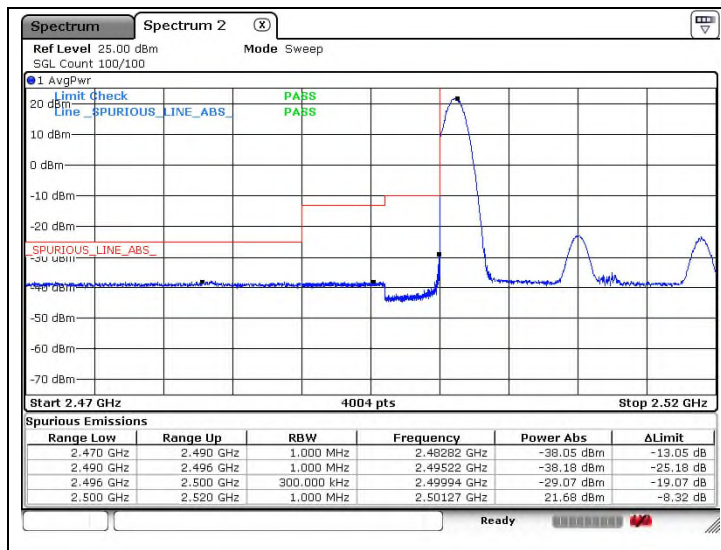
LTE band 7 (15 MHz - QPSK_1 RB)
 High Channel



LTE band 7 (20 MHz - QPSK_Full RB)
 Low Channel

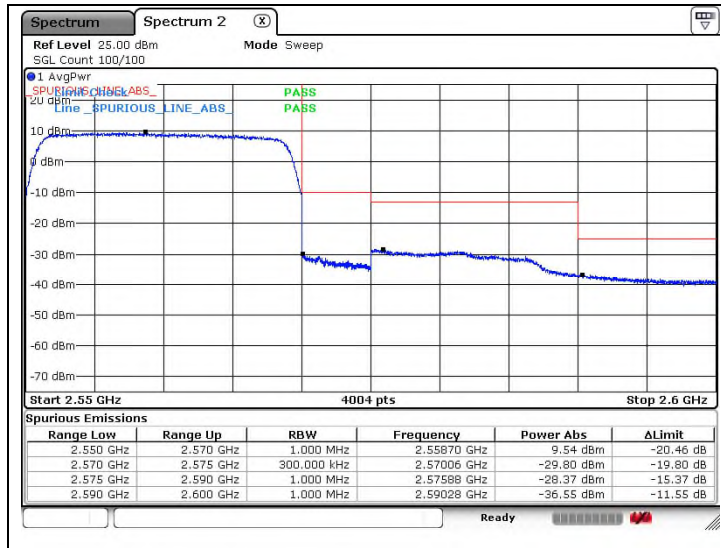


LTE band 7 (20 MHz - QPSK_1 RB)
 Low Channel



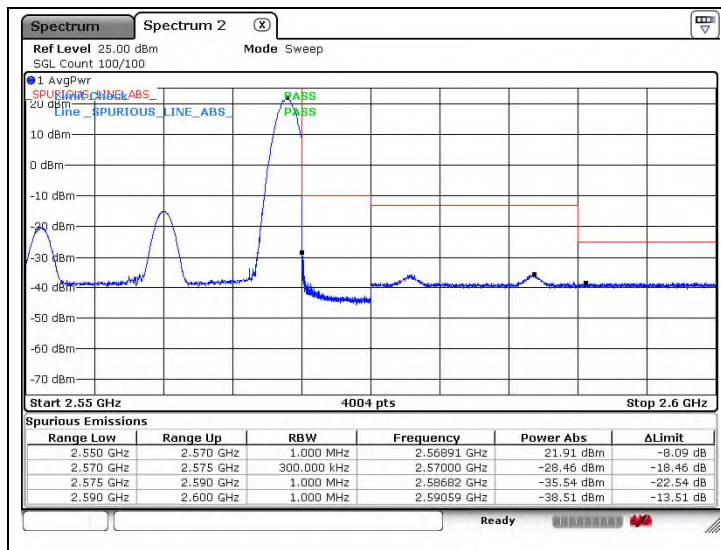
LTE band 7 (20 MHz - QPSK_Full RB)

High Channel



LTE band 7 (20 MHz - QPSK_1 RB)

High Channel



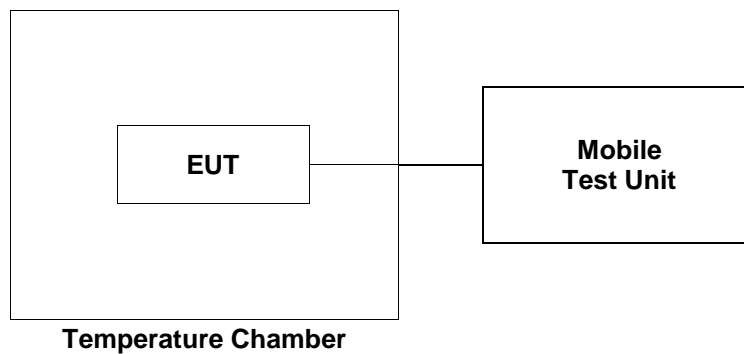
8. Frequency Stability

8.1. Limit

- §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

8.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Mobile Test Unit via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from Mobile Test Unit.



8.3. Test Results

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

LTE band 7 at middle channel

Reference Frequency: 2 535.0 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.0	3.2	0.001 3
40		2.8	0.001 1
30		3.1	0.001 2
23		4.1	0.001 6
10		-1.8	-0.000 7
0		2.1	0.000 8
-10		-3.4	-0.001 3
-20		4.7	0.001 9
-30		2.4	0.000 9
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
23	13.8	2.4	0.000 9
	10.2	3.8	0.001 5

- End of the Test Report -