

TEST REPORT

of

FCC Part 2 Subpart J, Part 22 Subpart C/H,
Part 24 Subpart E and Part 27 Subpart C

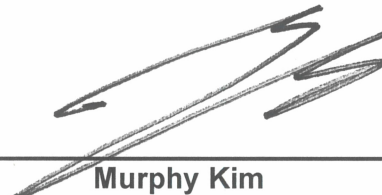
FCC ID: YZP-VL3000

Equipment Under Test : Telematics Modem
Model Name : LTD-VL3000
Variant Model Name(s) : -
Applicant : LG Innotek Co., Ltd.
Manufacturer : LG Innotek Co., Ltd.
Date of Receipt : 2023.05.23
Date of Test(s) : 2023.05.24 ~ 2023.07.28
Date of Issue : 2023.07.28

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

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Tested by:



Murphy Kim

Technical
Manager:



Inho Park

SGS Korea Co., Ltd. Gunpo Laboratory



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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

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1.2. Details of Applicant

Applicant : LG Innotek Co., Ltd.
 Address : 26, Hanamsandan 5beon-ro, Gwangsan-gu, Gwangju, South Korea, 506-731
 Contact Person : Jeong, In-chang
 Phone No. : +82 62 950 0332

1.3. Details of Manufacturer

Company : LG Innotek Co., Ltd.
 Address : 30, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796

1.4. Description of EUT

Kind of Product	Telematics Modem
Model Name	LTD-VL3000
Serial Number	CR1
Power Supply	DC 4 V
Rated Power	LTE Band 2, 4, 5, 13: 23 dB m
Frequency Range	LTE Band 2: 1 850 MHz ~ 1 910 MHz LTE Band 4: 1 710 MHz ~ 1 755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 13: 777 MHz ~ 787 MHz
Modulation Technique	QPSK, 16QAM
Antenna Type	Dipole antenna
Antenna Gain*	Refer to the clause 1.12
H/W Version	B.0
S/W Version	01T_WVZW, 01U_WVZW

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMA100B	106887	Oct. 13, 2022	Annual	Oct. 13, 2023
Spectrum Analyzer	R&S	FSV30	103210	Dec. 07, 2022	Annual	Dec. 07, 2023
Spectrum Analyzer	Agilent	N9020A	MY53421758	Aug. 26, 2022	Annual	Aug. 26, 2023
Mobile Test Unit	R&S	CMW 500	144034	Feb. 17, 2023	Annual	Feb. 17, 2024
Communication Analyzer	Anritsu	MT8821C	6262192291	Oct. 11, 2022	Annual	Oct. 11, 2023
Power Meter	Anritsu	ML2495A	1223004	May 30, 2023	Annual	May 30, 2024
Power Sensor	Anritsu	MA2411B	1207272	May 30, 2023	Annual	May 30, 2024
Temperature Chamber	ESPEC CORP.	SH-662	93000533	Jun. 01, 2023	Annual	Jun. 01, 2024
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-1	May 16, 2023	Annual	May 16, 2024
High Pass Filter	Wainwright Instrument GmbH	WHKX10-900-1000-18000-40SS	7	Mar. 02, 2023	Annual	Mar. 02, 2024
High Pass Filter	Wainwright Instrument GmbH	WHKX2.2/12.75G-10SS	8	Mar. 02, 2023	Annual	Mar. 02, 2024
High Pass Filter	Wainwright Instrument GmbH	WHKX3.0/18G-10SS	21	Jun. 01, 2023	Annual	Jun. 01, 2024
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	Oct. 24, 2022	Annual	Oct. 24, 2023
BRIDGE COUPLER	MARKI MICROWAVE INC	CBR16-0012	1542	May 16, 2023	Annual	May 16, 2024
Directional Coupler	KRYTAR	152613	122660	Jul. 13, 2023	Annual	Jul. 13, 2024
DC Power Supply	Agilent	U8002A	MY49030063	Jan. 20, 2023	Annual	Jan. 20, 2024
Preamplifier	H.P.	8447F	2944A03909	Aug. 04, 2022	Annual	Aug. 04, 2023
Preamplifier	R&S	SCU18F	100959	Jul. 13, 2023	Annual	Jul. 13, 2024
Preamplifier	TESTEK	TK-PA1840H	130016	Jan. 11, 2023	Annual	Jan. 11, 2024
Test Receiver	R&S	ESU26	100109	Jan. 18, 2023	Annual	Jan. 18, 2024
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2021	Biennial	Aug. 23, 2023
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	Feb. 09, 2023	Annual	Feb. 09, 2024
Horn Antenna	R&S	HF906	100326	Feb. 28, 2023	Annual	Feb. 28, 2024
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	Nov. 30, 2022	Annual	Nov. 30, 2023
Antenna Master	Innco systems GmbH	MA4640-XP-ET	MA4640/536/383 30516/L	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	CO3000/963/383 30516/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 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Apr. 04, 2023	Semi-Annual	Oct. 04, 2023
Coaxial Cable	Qualwave Inc.	QA500-18-NN-10 (10 m)	22200114	Apr. 04, 2023	Semi-Annual	Oct. 04, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182287	Apr. 14, 2023	Semi-Annual	Oct. 14, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182288	Apr. 14, 2023	Semi-Annual	Oct. 14, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182291	Apr. 14, 2023	Semi-Annual	Oct. 14, 2023

Note;

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: Part 2, 22, 24 and 27		
Section	Test Item(s)	Result
§2.1046 §22.913(a)(5) §24.232(c) §27.50(b)(10) §27.50(d)(4)	E.R.P. / E.I.R.P.	Complied
§22.917(a) §24.238(a) §27.53(c)(2) §27.53(f) §27.53(h)(1)	Radiated Spurious Emissions	Complied
§2.1046	Conducted Output Power	Complied
§2.1049	Occupied Bandwidth	Complied
§22.913(d) §24.232(d) §27.50(d)(5)	Peak-Average Ratio	Complied
§22.917(a) §24.238(a) §27.53(c)(2) §27.53(h)(1)	Spurious Emission at Antenna Terminal	Complied
§22.917(a) §24.238(a) §27.53(c)(2) §27.53(c)(4) §27.53(h)(1)	Band Edge and Emission Mask	Complied
§2.1055 §22.355 §24.235 §27.54	Frequency Stability	Complied

Note;

Due to following changes, the test was performed for C2PC.
 - PCB layout, PAM, RF switch, Matching components.

1.7. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.7.1. Conducted Test

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

1.7.2. Radiation test

- E.I.R.P. (dB m) = Measured level (dB μ V) + Antenna factor (dB/m) + Cable loss (dB) + 20 Log D - 104.8;
where D is the measurement distance in meters.
- E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB)

1.8. Worst Case Configuration and Mode

The worst-case is based on the conducted output power measurement investigation results. All testing was performed using QPSK and 16QAM modulations. However, the spurious radiated emission and spurious at antenna terminal were only performed on bandwidth and RB offset (with RB size 1) with the highest conducted power in QPSK.

The peak to average ratio were tested only 16QAM modulation as worst case.

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

1.9. Measurement Configuration

Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation		RB #			
		Low	Mid	High	1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	
Conducted Output Power	2	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	4	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	5	V	V	V	V	V	V	V			V	V	V	V	V	V
	13	V	V	V			V	V			V	V	V	V	V	V
Frequency Stability	2	-	V	-	-	-	V	-	-	-	V	-	-	-	-	V
	4	-	V	-	-	-	V	-	-	-	V	-	-	-	-	V
	5	-	V	-	-	-	V	-			V	-	-	-	-	V
	13	-	V	-			V	-			V	-	-	-	-	V
Occupied Bandwidth	2	-	V	-	V	V	V	V	V	V	V	V	V	-	-	V
	4	-	V	-	V	V	V	V	V	V	V	V	V	-	-	V
	5	-	V	-	V	V	V	V			V	V	V	-	-	V
	13	-	V	-			V	V			V	V	V	-	-	V
Peak-to-Average Ratio	2	V	V	V	V	V	V	V	V	V	-	V	-	-	-	V
	4	V	V	V	V	V	V	V	V	V	-	V	-	-	-	V
	5	V	V	V	V	V	V	V			-	V	-	-	-	V
	13	V	V	V			V	V			-	V	-	-	-	V
Band edge	2	V	V	V	V	V	V	V	V	V	V	V	V	-	-	V
	4	V	V	V	V	V	V	V	V	V	V	V	V	-	-	V
	5	V	V	V	V	V	V	V			V	V	V	-	-	V
	13	V	V	V			V	V			V	V	V	-	-	V
Spurious at antenna terminal & Radiated Spurious Emissions	2	V	V	V	Worst case											
	4	V	V	V	Worst case											
	5	V	V	V	Worst case											
	13	V	V	V	Worst case											

1.10. Measurement Uncertainty

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

Parameter	Uncertainty	
Conducted Output Power	0.33 dB	
Occupied Bandwidth	0.04 MHz	
Conducted Spurious Emission	0.85 dB	
Peak to Average Ratio	0.66 dB	
Frequency Stability	0.11 kHz	
Radiated Emission, 9 kHz to 30 MHz	H	3.40 dB
	V	3.40 dB
Radiated Emission, below 1 GHz	H	4.50 dB
	V	5.10 dB
Radiated Emission, above 1 GHz	H	3.70 dB
	V	3.90 dB

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

1.11. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL004279	2023.07.28	Initial

1.12. Antenna Information

Band	Operating Frequency (MHz)	Antenna Peak Gain (dB i)
LTE 2	1 850 ~ 1 910	5.97
LTE 4	1 710 ~ 1 755	4.13
LTE 5	824 ~ 849	2.18
LTE 13	777 ~ 787	-0.24

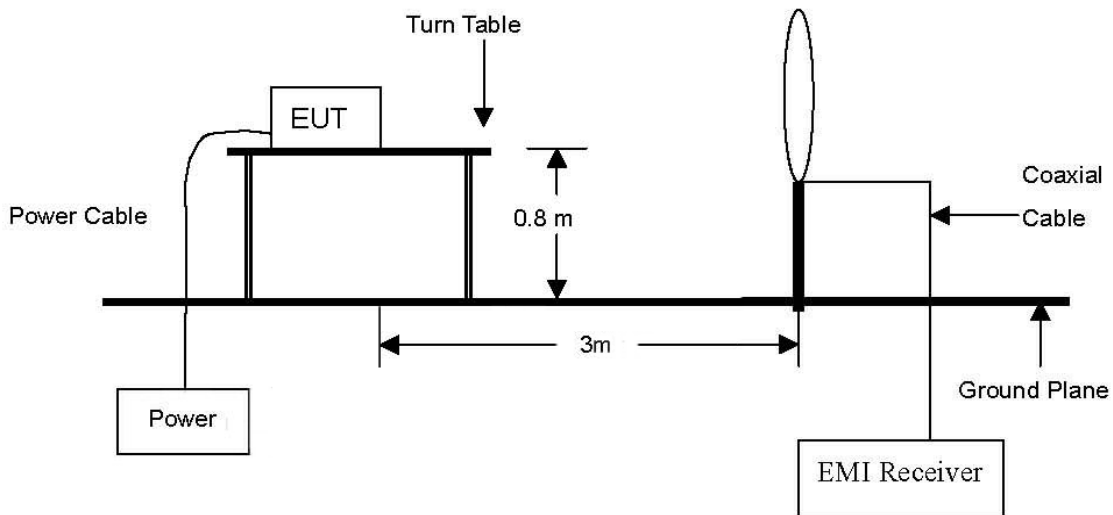
1.13. Emission Designator and Max Power

Band	Band width (MHz)	Modulation	Low Freq. (MHz)	Upper Freq. (MHz)	Conducted Average (dB m)	Ant. Gain (dB i)	E.R.P. / E.I.R.P. Average (dB m)	E.R.P. / E.I.R.P. Average (W)	Emission Designator
2	1.4	QPSK	1 850.7	1 909.3	22.66	5.97	28.63	0.729	1M10G7D
		16QAM			21.76		27.73	0.593	1M09W7D
	3	QPSK	1 851.5	1 908.5	22.71		28.68	0.738	2M69G7D
		16QAM			21.45		27.42	0.552	2M68W7D
	5	QPSK	1 852.5	1 907.5	22.64		28.61	0.726	4M49G7D
		16QAM			21.64		27.61	0.577	4M51W7D
	10	QPSK	1 855	1 905	22.63		28.60	0.724	8M92G7D
		16QAM			21.70		27.67	0.585	8M92W7D
	15	QPSK	1 857.5	1 902.5	22.68		28.65	0.733	13M4G7D
		16QAM			22.00		27.97	0.627	13M5W7D
	20	QPSK	1 860	1 900	22.72		28.69	0.740	17M8G7D
		16QAM			21.62		27.59	0.574	17M9W7D
4	1.4	QPSK	1 710.7	1 754.3	22.41	4.13	26.54	0.451	1M09G7D
		16QAM			21.58		25.71	0.372	1M10W7D
	3	QPSK	1 711.5	1 753.5	22.44		26.57	0.454	2M69G7D
		16QAM			21.50		25.63	0.366	2M69W7D
	5	QPSK	1 712.5	1 752.5	22.41		26.54	0.451	4M51G7D
		16QAM			21.50		25.63	0.366	4M49W7D
	10	QPSK	1 715	1 750	22.56		26.69	0.467	8M95G7D
		16QAM			21.43		25.56	0.360	8M95W7D
	15	QPSK	1 717.5	1 747.5	22.50		26.63	0.460	13M4G7D
		16QAM			21.42		25.55	0.359	13M5W7D
	20	QPSK	1 720	1 745	22.56		26.69	0.467	17M8G7D
		16QAM			21.51		25.64	0.366	17M8W7D
5	1.4	QPSK	824.7	848.3	22.62	2.18	22.65	0.184	1M09G7D
		16QAM			21.42		21.45	0.140	1M10W7D
	3	QPSK	825.5	847.5	22.63		22.66	0.185	2M69G7D
		16QAM			21.37		21.40	0.138	2M68W7D
	5	QPSK	826.5	846.5	22.46		22.49	0.177	4M51G7D
		16QAM			21.46		21.49	0.141	4M51W7D
	10	QPSK	829	844	22.66		22.69	0.186	8M92G7D
		16QAM			21.55		21.58	0.144	8M92W7D
13	5	QPSK	779.5	784.5	22.30	-0.24	19.91	0.098	4M51G7D
		16QAM			21.07		18.68	0.074	4M51W7D
	10	QPSK	782	782	22.54		20.15	0.104	8M87G7D
		16QAM			21.35		18.96	0.079	8M89W7D

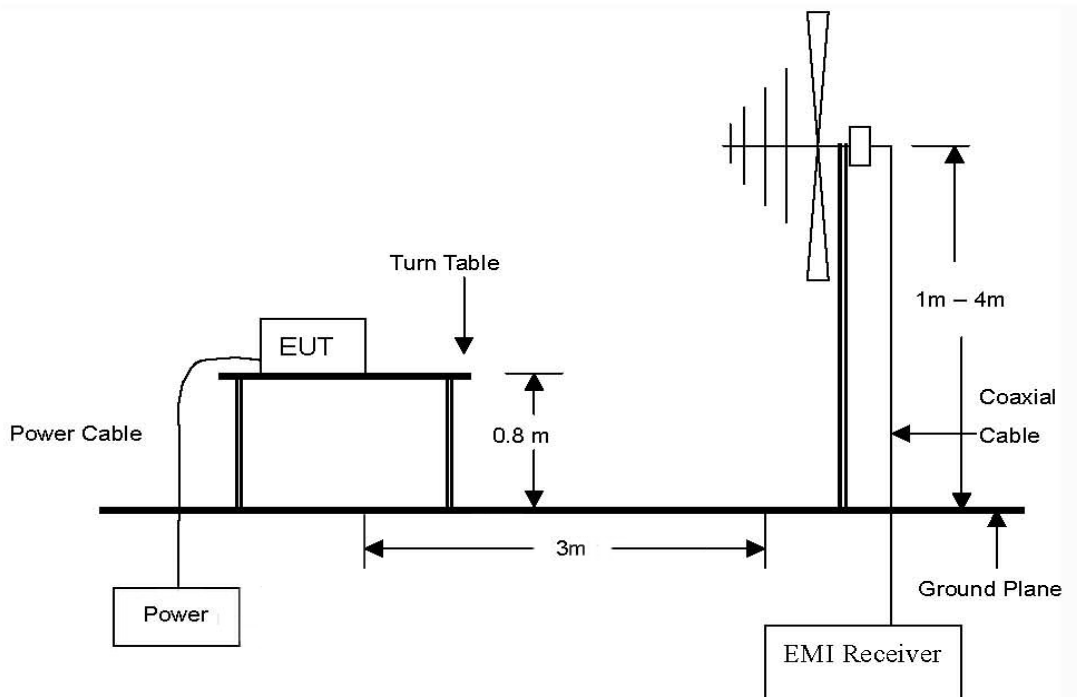
2. E.R.P. / E.I.R.P. & Radiated Spurious Emissions

2.1. Test setup

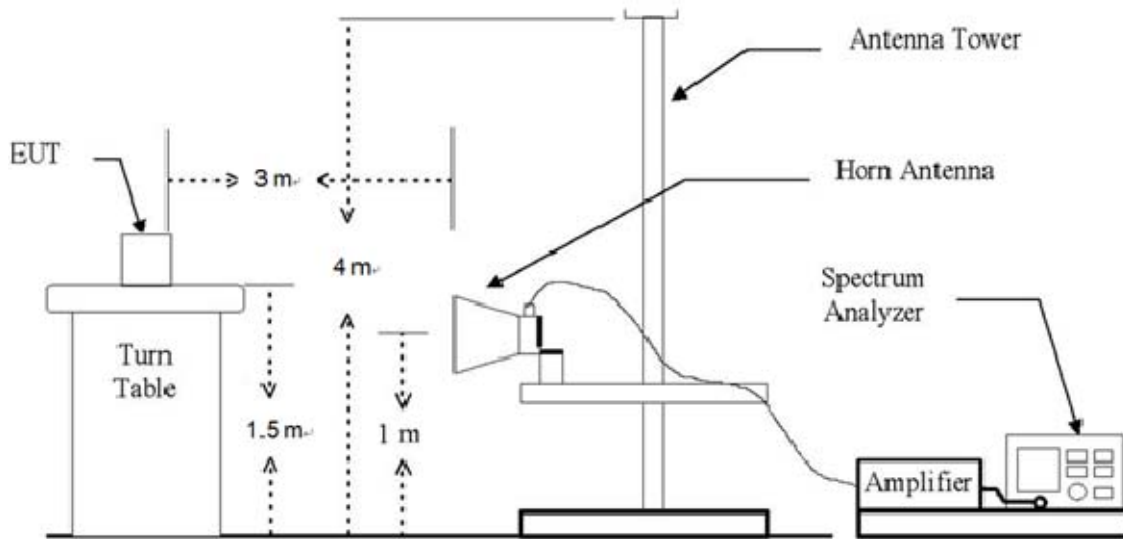
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



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 20 GHz Emissions.



2.2. Limit

2.2.1. Limit of E.R.P. / E.I.R.P.

- §22.913(a)(5), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
- §24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
- §27.50(b)(10), Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.
- §27.50(d)(4), fixed, mobile, and portable (hand-held) stations operating in the 1 710-1 755 MHz band and mobile and portable stations operating in the 1 695-1 710 MHz and 1 755-1 780 MHz bands are limited to 1 watt EIRP.

2.2.2. Limit of Radiated Spurious Emissions

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.
- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.
- §27.53(c)(2), on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB;
- §27.53(f), for operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1 559-1 610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.
- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB.

2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015 and KDB 971168 D01 Power Meas License Digital Systems v03r01.

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. 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 x RBW,
Detector = RMS, trace mode = max hold, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. 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.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. 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.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
11. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
12. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

2.4. Test results

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

2.4.1. E.R.P. / E.I.R.P.

Band	Frequency (MHz)	Maximum Conducted Power (dB m)	Maximum Conducted Power (W)	Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
2	1 850 ~ 1 910	22.72	0.186	5.97	28.67	0.736			2 W E.I.R.P.
4	1 710 ~ 1 755	22.56	0.180	4.13	26.69	0.467			1 W E.I.R.P.
5	824 ~ 849	22.66	0.185	2.18	24.84	0.305	22.69	0.186	7 W E.R.P.
13	777 ~ 787	22.54	0.179	-0.24	22.30	0.170	20.15	0.104	3 W E.R.P.

Remark;

1. E.I.R.P. (dB m) = Maximum Conducted Power (dB m) + Antenna Gain (dB i)
2. E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.

2.4.2. Radiated spurious emissions

LTE band 2 (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 (1 860 MHz)									
3 702.32	45.69	H	32.21	-33.16	44.74	-95.26	-50.52	-13	37.52
3 702.38	42.73	V	32.21	-33.16	41.78	-95.26	-53.48	-13	40.48
5 553.33	49.82	H	34.20	-30.91	53.11	-95.26	-42.15	-13	29.15
5 553.35	51.31	V	34.20	-30.91	54.60	-95.26	-40.66	-13	27.66
Above 5 600.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 880 MHz)									
3 742.17	43.56	H	32.37	-32.76	43.17	-95.26	-52.09	-13	39.09
3 742.20	46.06	V	32.37	-32.76	45.67	-95.26	-49.59	-13	36.59
5 613.38	47.69	H	34.17	-30.30	51.56	-95.26	-43.70	-13	30.70
5 613.18	50.07	V	34.17	-30.31	53.93	-95.26	-41.33	-13	28.33
Above 5 700.00	Not detected	-	-	-	-	-	-	-	-
High Channel (1 900 MHz)									
3 782.05	43.97	H	32.40	-32.96	43.41	-95.26	-51.85	-13	38.85
3 782.19	48.28	V	32.40	-32.96	47.72	-95.26	-47.54	-13	34.54
5 673.32	52.41	H	34.10	-30.08	56.43	-95.26	-38.83	-13	25.83
5 673.29	55.90	V	34.10	-30.08	59.92	-95.26	-35.34	-13	22.34
Above 5 700.00	Not detected	-	-	-	-	-	-	-	-

LTE band 4 (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 (1 715 MHz)									
3 421.32	45.26	H	31.09	-33.45	42.90	-95.26	-52.36	-13	39.36
3 421.24	45.06	V	31.08	-33.45	42.69	-95.26	-52.57	-13	39.57
6 842.35	54.15	V	35.58	-29.95	59.78	-95.26	-35.48	-13	-22.48
Above 6 500.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 732.5 MHz)									
3 456.03	44.50	H	31.21	-33.62	42.09	-95.26	-53.17	-13	40.17
3 456.29	44.50	V	31.21	-33.62	42.09	-95.26	-53.17	-13	40.17
6 912.44	40.45	V	35.50	-29.76	46.19	-95.26	-49.07	-13	36.07
Above 7 000.00	Not detected	-	-	-	-	-	-	-	-
High Channel (1 750 MHz)									
3 491.30	43.14	H	31.28	-33.59	40.83	-95.26	-54.43	-13	41.43
3 491.12	43.99	V	31.28	-33.59	41.68	-95.26	-53.58	-13	40.58
6 982.44	49.71	V	35.56	-29.74	55.53	-95.26	-39.73	-13	26.73
Above 7 000.00	Not detected	-	-	-	-	-	-	-	-

LTE band 5 (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.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (829 MHz)									
1 649.23	60.67	H	25.70	-37.36	49.01	-97.41	-48.40	-13	35.40
1 649.12	58.75	V	25.69	-37.36	47.08	-97.41	-50.33	-13	37.33
Above 1 700.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (836.5 MHz)									
1 664.18	60.93	H	25.93	-37.48	49.38	-97.41	-48.03	-13	35.03
1 664.32	64.04	V	25.93	-37.48	52.49	-97.41	-44.92	-13	31.92
Above 1 700.00	Not detected	-	-	-	-	-	-	-	-
High Channel (844 MHz)									
1 679.08	62.47	H	26.17	-37.52	51.12	-97.41	-46.29	-13	33.29
1 679.05	56.37	V	26.16	-37.52	45.01	-97.41	-52.40	-13	39.40
Above 1 700.00	Not detected	-	-	-	-	-	-	-	-

LTE band 13 (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.R.P. (dB m)	Limit (dB m)	Margin (dB)
Middle Channel (782 MHz)									
1 555.29	58.00	H	25.31	-37.40	45.91	-97.41	-51.50	-13	38.50
1 555.16	53.50	V	25.31	-37.39	41.42	-97.41	-55.99	-13	42.99
2 332.83	51.33	H	28.13	-35.99	43.47	-97.41	-53.94	-13	40.94
2 332.75	49.53	V	28.13	-35.99	41.67	-97.41	-55.74	-13	42.74
3 110.25	48.55	H	30.22	-34.13	44.64	-97.41	-52.77	-13	39.77
3 110.27	53.70	V	30.22	-34.13	49.79	-97.41	-47.62	-13	34.62
Above 3 200.00	Not detected	-	-	-	-	-	-	-	-

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dB μ V/m) = Measured Level (dB μ V) + Antenna Factor (dB/m) + AMP (dB) + Cable Loss (dB).
3. E.I.R.P. (dB m) = E (dB μ V/m) + CF (dB).
4. E.R.P. (dB m) = E (dB μ V/m) + CF (dB) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.
5. CF (dB) = 20 log D - 104.8; where D is the measurement distance in meters, According to KDB 971168 D01 v03r01 5.8.4.
6. The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

3. Conducted Output Power

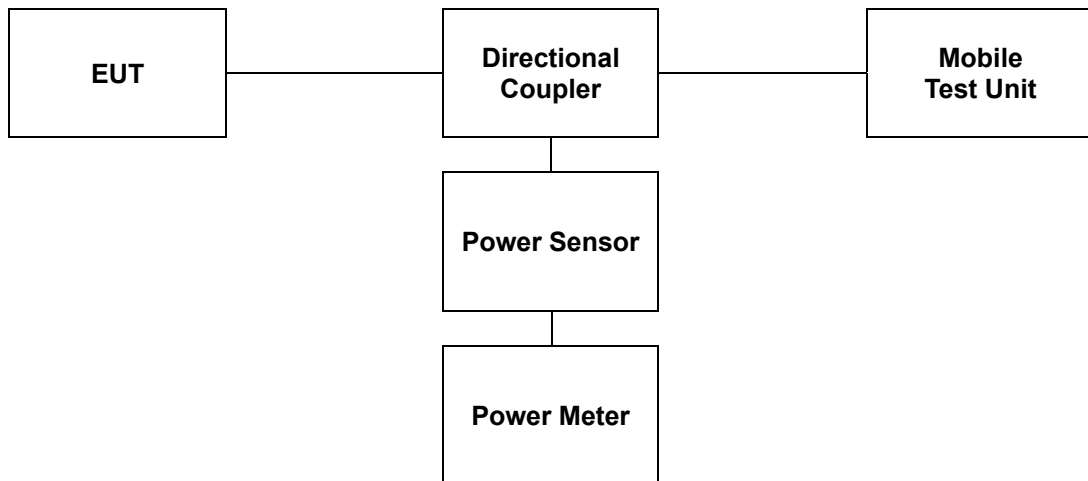
3.1. Limit

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 2									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				18607 (1 850.7 MHz)		18900 (1 880.0 MHz)		19193 (1 909.3 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
1.4	QPSK	1	0	22.38	0.173	22.04	0.160	21.89	0.155
		1	3	22.41	0.174	22.04	0.160	21.90	0.155
		1	5	22.66	0.185	22.04	0.160	21.96	0.157
		3	0	22.62	0.183	22.02	0.159	22.06	0.161
		3	2	22.60	0.182	22.12	0.163	21.96	0.157
		3	3	22.56	0.180	22.02	0.159	21.96	0.157
	16QAM	6	0	21.61	0.145	22.03	0.160	21.93	0.156
		1	0	21.32	0.136	21.31	0.135	20.68	0.117
		1	3	21.39	0.138	20.75	0.119	20.67	0.117
		1	5	21.18	0.131	20.72	0.118	20.67	0.117
		3	0	21.40	0.138	20.81	0.121	20.58	0.114
		3	2	21.76	0.150	20.75	0.119	20.54	0.113
		3	3	21.71	0.148	20.68	0.117	20.57	0.114
		6	0	20.56	0.114	20.87	0.122	20.60	0.115

LTE Band 2									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				18615 (1 851.5 MHz)		18900 (1 880.0 MHz)		19185 (1 908.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
3	QPSK	1	0	22.63	0.183	22.23	0.167	21.98	0.158
		1	7	22.57	0.181	22.06	0.161	22.07	0.161
		1	14	22.71	0.187	21.95	0.157	21.96	0.157
		8	0	22.64	0.184	21.18	0.131	20.88	0.122
		8	4	22.45	0.176	21.21	0.132	20.89	0.123
		8	7	22.55	0.180	21.20	0.132	20.89	0.123
		15	0	21.50	0.141	21.02	0.126	20.88	0.122
	16QAM	1	0	21.31	0.135	20.99	0.126	20.68	0.117
		1	7	21.36	0.137	20.82	0.121	20.68	0.117
		1	14	21.34	0.136	20.72	0.118	20.55	0.114
		8	0	21.30	0.135	20.07	0.102	20.54	0.113
		8	4	21.45	0.140	20.01	0.100	20.50	0.112
		8	7	21.37	0.137	20.42	0.110	20.57	0.114
		15	0	20.38	0.109	20.40	0.110	20.41	0.110

LTE Band 2									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				18625 (1 852.5 MHz)		18900 (1 880.0 MHz)		19175 (1 907.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	22.63	0.183	22.04	0.160	21.95	0.157
		1	12	22.64	0.184	22.12	0.163	22.07	0.161
		1	24	22.60	0.182	22.11	0.163	21.97	0.157
		12	0	22.52	0.179	22.05	0.160	20.89	0.123
		12	6	22.45	0.176	22.08	0.161	20.88	0.122
		12	13	22.48	0.177	22.09	0.162	20.69	0.117
		25	0	22.43	0.175	21.02	0.126	20.88	0.122
	16QAM	1	0	21.24	0.133	20.67	0.117	20.54	0.113
		1	12	21.26	0.134	20.73	0.118	20.55	0.114
		1	24	21.37	0.137	20.64	0.116	20.48	0.112
		12	0	21.32	0.136	20.95	0.124	20.80	0.120
		12	6	21.64	0.146	21.17	0.131	20.98	0.125
		12	13	21.63	0.146	21.09	0.129	21.01	0.126
		25	0	21.52	0.142	20.46	0.111	20.86	0.122

LTE Band 2									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				18650 (1 855.0 MHz)		18900 (1 880.0 MHz)		19150 (1 905.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
10	QPSK	1	0	22.61	0.182	22.27	0.169	22.19	0.166
		1	25	22.63	0.183	22.27	0.169	22.25	0.168
		1	49	22.57	0.181	22.31	0.170	22.07	0.161
		25	0	22.45	0.176	22.19	0.166	22.06	0.161
		25	12	22.59	0.182	22.24	0.167	22.02	0.159
		25	25	22.59	0.182	22.08	0.161	22.25	0.168
		50	0	22.47	0.177	21.36	0.137	21.13	0.130
	16QAM	1	0	21.29	0.135	20.97	0.125	21.04	0.127
		1	25	21.38	0.137	21.02	0.126	20.71	0.118
		1	49	21.33	0.136	20.96	0.125	20.79	0.120
		25	0	21.50	0.141	21.28	0.134	21.00	0.126
		25	12	21.70	0.148	21.46	0.140	21.27	0.134
		25	25	21.48	0.141	21.51	0.142	20.95	0.124
		50	0	21.60	0.145	20.52	0.113	20.36	0.109

LTE Band 2									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				18675 (1 857.5 MHz)		18900 (1 880.0 MHz)		19125 (1 902.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
15	QPSK	1	0	22.55	0.180	22.15	0.164	22.21	0.166
		1	36	22.66	0.185	22.38	0.173	22.37	0.173
		1	74	22.68	0.185	22.38	0.173	22.39	0.173
		36	0	22.46	0.176	22.25	0.168	21.99	0.158
		36	18	22.43	0.175	22.26	0.168	21.99	0.158
		36	37	22.43	0.175	22.26	0.168	22.12	0.163
		75	0	22.39	0.173	22.15	0.164	21.07	0.128
	16QAM	1	0	21.32	0.136	21.03	0.127	20.82	0.121
		1	36	21.40	0.138	20.86	0.122	20.80	0.120
		1	74	22.00	0.158	21.09	0.129	20.85	0.122
		36	0	21.59	0.144	21.33	0.136	20.85	0.122
		36	18	21.53	0.142	21.34	0.136	20.87	0.122
		36	37	21.55	0.143	21.58	0.144	21.17	0.131
		75	0	21.78	0.151	21.30	0.135	20.30	0.107

LTE Band 2									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				18700 (1 860.0 MHz)		18900 (1 880.0 MHz)		19100 (1 900.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
20	QPSK	1	0	22.56	0.180	22.38	0.173	22.02	0.159
		1	50	22.72	0.187	22.37	0.173	22.21	0.166
		1	99	22.59	0.182	22.29	0.169	22.18	0.165
		50	0	22.39	0.173	22.43	0.175	22.04	0.160
		50	25	22.62	0.183	22.19	0.166	22.08	0.161
		50	50	22.62	0.183	22.32	0.171	22.01	0.159
		100	0	22.50	0.178	22.18	0.165	21.01	0.126
	16QAM	1	0	21.34	0.136	21.04	0.127	20.77	0.119
		1	50	21.46	0.140	21.00	0.126	20.85	0.122
		1	99	21.50	0.141	20.84	0.121	20.69	0.117
		50	0	21.62	0.145	21.53	0.142	21.11	0.129
		50	25	21.53	0.142	21.30	0.135	21.34	0.136
		50	50	21.53	0.142	21.41	0.138	21.16	0.131
		100	0	20.73	0.118	21.03	0.127	20.30	0.107

LTE Band 4									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				19957 (1 710.7 MHz)		20175 (1 732.5 MHz)		20393 (1 754.3 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
1.4	QPSK	1	0	22.36	0.172	22.25	0.168	21.89	0.155
		1	3	22.37	0.173	22.23	0.167	21.89	0.155
		1	5	22.23	0.167	22.23	0.167	21.69	0.148
		3	0	22.34	0.171	22.24	0.167	21.91	0.155
		3	2	22.41	0.174	22.29	0.169	21.71	0.148
		3	3	22.39	0.173	22.30	0.170	21.70	0.148
	16QAM	6	0	21.10	0.129	22.23	0.167	21.71	0.148
		1	0	21.29	0.135	20.93	0.124	20.60	0.115
		1	3	20.98	0.125	20.95	0.124	20.56	0.114
		1	5	20.88	0.122	20.90	0.123	20.67	0.117
		3	0	21.11	0.129	20.97	0.125	20.61	0.115
		3	2	21.43	0.139	20.97	0.125	20.58	0.114
		3	3	21.58	0.144	20.90	0.123	20.67	0.117
		6	0	20.39	0.109	20.84	0.121	21.02	0.126

LTE Band 4									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				19965 (1 711.5 MHz)		20175 (1 732.5 MHz)		20385 (1 753.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
3	QPSK	1	0	22.36	0.172	22.27	0.169	21.75	0.150
		1	7	22.44	0.175	22.32	0.171	21.86	0.153
		1	14	22.10	0.162	22.28	0.169	21.88	0.154
		8	0	22.31	0.170	21.14	0.130	20.77	0.119
		8	4	22.39	0.173	21.21	0.132	20.76	0.119
		8	7	22.30	0.170	21.09	0.129	20.76	0.119
	16QAM	15	0	21.31	0.135	21.13	0.130	20.77	0.119
		1	0	21.13	0.130	21.31	0.135	20.73	0.118
		1	7	21.07	0.128	21.38	0.137	20.76	0.119
		1	14	20.93	0.124	20.95	0.124	20.79	0.120
		8	0	21.50	0.141	20.75	0.119	20.52	0.113
		8	4	21.17	0.131	20.84	0.121	20.56	0.114
		8	7	21.22	0.132	20.32	0.108	20.46	0.111
		15	0	20.63	0.116	20.42	0.110	20.47	0.111

LTE Band 4									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				19975 (1 712.5 MHz)		20175 (1 732.5 MHz)		20375 (1 752.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	22.25	0.168	22.17	0.165	21.81	0.152
		1	12	22.41	0.174	22.10	0.162	21.95	0.157
		1	24	22.32	0.171	22.30	0.170	22.00	0.158
		12	0	22.12	0.163	22.25	0.168	20.77	0.119
		12	6	22.18	0.165	22.17	0.165	20.85	0.122
		12	13	22.33	0.171	22.15	0.164	21.00	0.126
		25	0	22.24	0.167	21.11	0.129	20.84	0.121
	16QAM	1	0	20.89	0.123	21.01	0.126	20.98	0.125
		1	12	20.92	0.124	20.82	0.121	20.76	0.119
		1	24	20.95	0.124	20.90	0.123	20.68	0.117
		12	0	21.05	0.127	21.20	0.132	20.56	0.114
		12	6	21.13	0.130	21.19	0.132	20.51	0.112
		12	13	21.50	0.141	20.92	0.124	20.45	0.111
		25	0	20.98	0.125	20.38	0.109	20.43	0.110

LTE Band 4									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20000 (1 715.0 MHz)		20175 (1 732.5 MHz)		20350 (1 750.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
10	QPSK	1	0	22.56	0.180	22.29	0.169	21.98	0.158
		1	25	22.40	0.174	22.35	0.172	21.75	0.150
		1	49	22.47	0.177	22.34	0.171	21.92	0.156
		25	0	22.27	0.169	22.21	0.166	21.68	0.147
		25	12	22.31	0.170	22.29	0.169	21.71	0.148
		25	25	22.40	0.174	22.29	0.169	21.71	0.148
		50	0	22.39	0.173	21.20	0.132	20.60	0.115
	16QAM	1	0	21.03	0.127	21.02	0.126	20.05	0.101
		1	25	21.05	0.127	20.99	0.126	20.44	0.111
		1	49	20.99	0.126	20.98	0.125	20.53	0.113
		25	0	21.06	0.128	21.30	0.135	20.46	0.111
		25	12	21.42	0.139	21.43	0.139	20.91	0.123
		25	25	21.40	0.138	21.42	0.139	20.91	0.123
		50	0	21.26	0.134	20.46	0.111	20.41	0.110

LTE Band 4									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20025 (1 717.5 MHz)		20175 (1 732.5 MHz)		20325 (1 747.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
15	QPSK	1	0	22.50	0.178	22.36	0.172	22.30	0.170
		1	36	22.42	0.175	22.45	0.176	21.89	0.155
		1	74	22.36	0.172	22.50	0.178	21.71	0.148
		36	0	22.26	0.168	22.33	0.171	21.87	0.154
		36	18	22.20	0.166	22.38	0.173	21.64	0.146
		36	37	22.14	0.164	22.40	0.174	21.73	0.149
		75	0	22.16	0.164	22.36	0.172	20.73	0.118
	16QAM	1	0	21.05	0.127	21.08	0.128	20.99	0.126
		1	36	20.94	0.124	21.14	0.130	20.52	0.113
		1	74	20.92	0.124	21.17	0.131	20.37	0.109
		36	0	21.22	0.132	21.33	0.136	20.98	0.125
		36	18	21.15	0.130	21.38	0.137	20.62	0.115
		36	37	21.12	0.129	21.42	0.139	20.60	0.115
		75	0	20.91	0.123	20.42	0.110	20.52	0.113

LTE Band 4									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20050 (1 720.0 MHz)		20175 (1 732.5 MHz)		20300 (1 745.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
20	QPSK	1	0	22.39	0.173	22.37	0.173	22.15	0.164
		1	50	22.56	0.180	22.41	0.174	22.47	0.177
		1	99	22.14	0.164	22.53	0.179	22.27	0.169
		50	0	22.18	0.165	22.29	0.169	22.23	0.167
		50	25	22.08	0.161	22.34	0.171	22.36	0.172
		50	50	22.13	0.163	22.32	0.171	22.38	0.173
		100	0	22.03	0.160	22.21	0.166	21.27	0.134
	16QAM	1	0	21.01	0.126	21.16	0.131	21.11	0.129
		1	50	20.99	0.126	20.88	0.122	21.01	0.126
		1	99	20.83	0.121	21.08	0.128	21.14	0.130
		50	0	21.32	0.136	21.29	0.135	21.24	0.133
		50	25	21.00	0.126	21.24	0.133	21.26	0.134
		50	50	21.05	0.127	21.51	0.142	21.51	0.142
		100	0	20.95	0.124	21.27	0.134	20.31	0.107

LTE Band 5									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20407 (824.7 MHz)		20525 (836.5 MHz)		20643 (848.3 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
1.4	QPSK	1	0	22.13	0.163	22.37	0.173	22.19	0.166
		1	3	22.21	0.166	22.37	0.173	22.21	0.166
		1	5	22.12	0.163	22.62	0.183	22.12	0.163
		3	0	22.01	0.159	22.50	0.178	22.31	0.170
		3	2	22.06	0.161	22.48	0.177	22.20	0.166
		3	3	22.11	0.163	22.57	0.181	22.11	0.163
	16QAM	6	0	21.11	0.129	22.59	0.182	22.11	0.163
		1	0	20.94	0.124	21.29	0.135	20.82	0.121
		1	3	20.85	0.122	21.29	0.135	21.04	0.127
		1	5	21.02	0.126	21.23	0.133	20.90	0.123
		3	0	20.96	0.125	21.23	0.133	21.02	0.126
		3	2	21.42	0.139	21.08	0.128	21.01	0.126
		3	3	21.31	0.135	21.19	0.132	21.06	0.128
		6	0	20.37	0.109	21.18	0.131	21.02	0.126

LTE Band 5									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20415 (825.5 MHz)		20525 (836.5 MHz)		20635 (847.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
3	QPSK	1	0	22.01	0.159	22.50	0.178	22.31	0.170
		1	7	22.16	0.164	22.47	0.177	22.21	0.166
		1	14	22.29	0.169	22.63	0.183	22.33	0.171
		8	0	22.17	0.165	21.50	0.141	21.14	0.130
		8	4	22.15	0.164	21.45	0.140	21.14	0.130
		8	7	22.23	0.167	21.44	0.139	21.24	0.133
	16QAM	15	0	21.11	0.129	21.41	0.138	21.24	0.133
		1	0	21.27	0.134	21.08	0.128	21.04	0.127
		1	7	20.88	0.122	21.12	0.129	20.70	0.117
		1	14	20.79	0.120	20.96	0.125	20.86	0.122
		8	0	20.91	0.123	20.44	0.111	20.91	0.123
		8	4	21.37	0.137	20.44	0.111	20.44	0.111
		8	7	20.91	0.123	20.52	0.113	20.35	0.108
		15	0	20.41	0.110	20.44	0.111	20.34	0.108

LTE Band 5									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20425 (826.5 MHz)		20525 (836.5 MHz)		20625 (846.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	21.99	0.158	22.17	0.165	22.36	0.172
		1	12	22.05	0.160	22.22	0.167	22.41	0.174
		1	24	22.23	0.167	22.46	0.176	22.06	0.161
		12	0	22.06	0.161	22.28	0.169	21.30	0.135
		12	6	22.11	0.163	22.40	0.174	21.30	0.135
		12	13	22.15	0.164	22.45	0.176	21.21	0.132
		25	0	21.99	0.158	21.47	0.140	21.16	0.131
	16QAM	1	0	20.80	0.120	21.46	0.140	20.96	0.125
		1	12	20.63	0.116	21.08	0.128	20.78	0.120
		1	24	20.93	0.124	21.21	0.132	20.79	0.120
		12	0	20.83	0.121	21.04	0.127	20.57	0.114
		12	6	21.33	0.136	21.26	0.134	20.50	0.112
		12	13	21.37	0.137	21.42	0.139	20.52	0.113
		25	0	21.08	0.128	20.62	0.115	20.35	0.108

LTE Band 5									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				20450 (829.0 MHz)		20525 (836.5 MHz)		20600 (844.0 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
10	QPSK	1	0	21.99	0.158	22.35	0.172	22.39	0.173
		1	25	22.27	0.169	22.29	0.169	22.46	0.176
		1	49	22.41	0.174	22.44	0.175	22.66	0.185
		25	0	22.19	0.166	22.33	0.171	22.29	0.169
		25	12	22.22	0.167	22.40	0.174	22.20	0.166
		25	25	22.20	0.166	22.44	0.175	22.33	0.171
		50	0	21.19	0.132	21.39	0.138	21.45	0.140
	16QAM	1	0	20.83	0.121	21.06	0.128	21.02	0.126
		1	25	21.01	0.126	21.17	0.131	20.98	0.125
		1	49	21.01	0.126	21.09	0.129	21.06	0.128
		25	0	20.94	0.124	21.49	0.141	21.18	0.131
		25	12	21.41	0.138	21.55	0.143	21.21	0.132
		25	25	21.25	0.133	21.61	0.145	21.35	0.136
		50	0	21.20	0.132	20.39	0.109	20.36	0.109

LTE Band 13									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
				23205 (779.5 MHz)		23230 (782.0 MHz)		23255 (784.5 MHz)	
				(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
5	QPSK	1	0	22.27	0.169	22.12	0.163	20.88	0.122
		1	12	22.02	0.159	22.29	0.169	21.18	0.131
		1	24	22.13	0.163	22.30	0.170	20.89	0.123
		12	0	21.06	0.128	21.33	0.136	21.15	0.130
		12	6	21.16	0.131	21.23	0.133	21.61	0.145
		12	13	21.09	0.129	21.23	0.133	20.88	0.122
		25	0	21.23	0.133	21.23	0.133	20.88	0.122
	16QAM	1	0	20.82	0.121	20.99	0.126	21.07	0.128
		1	12	20.78	0.120	20.95	0.124	20.86	0.122
		1	24	20.93	0.124	21.03	0.127	20.99	0.126
		12	0	20.50	0.112	20.46	0.111	20.85	0.122
		12	6	20.46	0.111	20.36	0.109	20.87	0.122
		12	13	20.43	0.110	20.33	0.108	20.88	0.122
		25	0	20.36	0.109	20.30	0.107	20.41	0.110

LTE Band 13									
Bandwidth (MHz)	Modulation	RB Size	RB Offset	Conducted Output Power					
						23230 (782.0 MHz)			
						(dB m)	(W)		
10	QPSK	1	0	-	-	22.34	0.171	-	-
		1	25	-	-	22.54	0.179	-	-
		1	49	-	-	22.26	0.168	-	-
		25	0	-	-	21.19	0.132	-	-
		25	12	-	-	21.33	0.136	-	-
		25	25	-	-	21.24	0.133	-	-
		50	0	-	-	21.32	0.136	-	-
	16QAM	1	0	-	-	21.05	0.127	-	-
		1	25	-	-	21.35	0.136	-	-
		1	49	-	-	20.75	0.119	-	-
		25	0	-	-	20.45	0.111	-	-
		25	12	-	-	20.37	0.109	-	-
		25	25	-	-	20.36	0.109	-	-
		50	0	-	-	20.35	0.108	-	-

4. Occupied Bandwidth

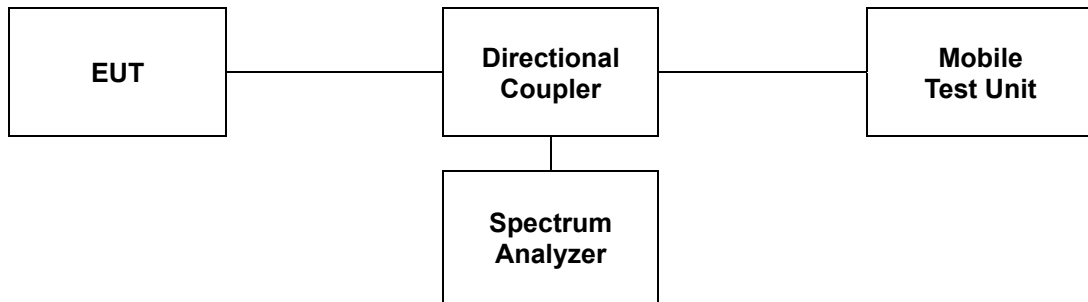
4.1. Limit

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).



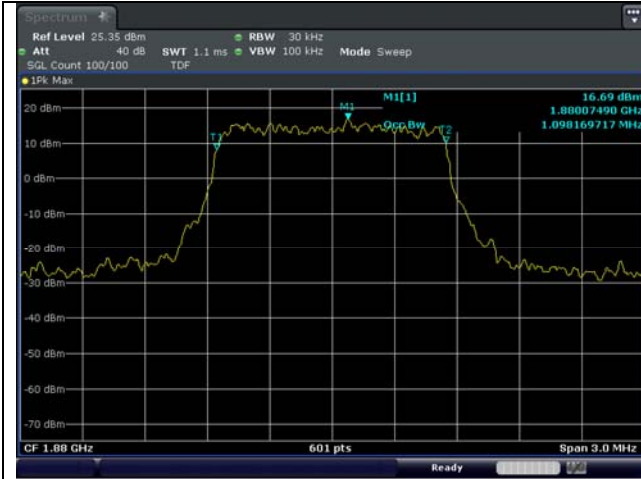
4.3 Test Results

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

Band	Bandwidth (MHz)	Frequency (MHz)	Occupied Bandwidth (MHz)	
			QPSK	16QAM
2	1.4	1 880.0	1.098	1.093
	3		2.686	2.676
	5		4.493	4.509
	10		8.918	8.918
	15		13.378	13.478
	20		17.837	17.903
4	1.4	1 732.5	1.088	1.103
	3		2.686	2.686
	5		4.509	4.493
	10		8.952	8.952
	15		13.428	13.478
	20		17.837	17.837
5	1.4	836.5	1.088	1.098
	3		2.686	2.676
	5		4.509	4.509
	10		8.918	8.918
13	5	782.0	4.509	4.509
	10		8.871	8.891

- Test plots

LTE band 2



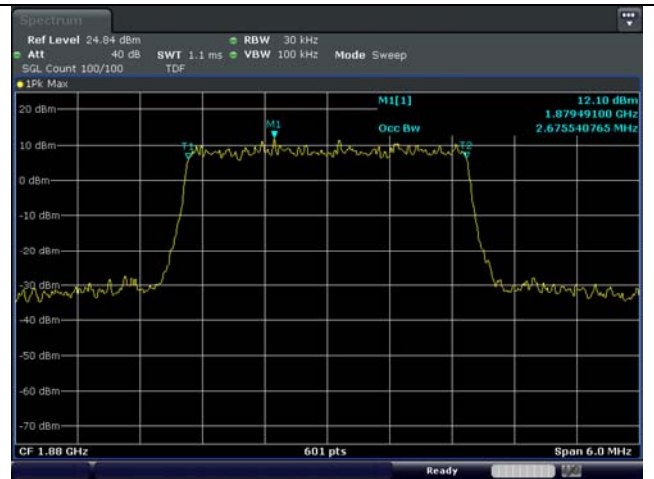
1.4 MHz QPSK Middle Channel - Full RB



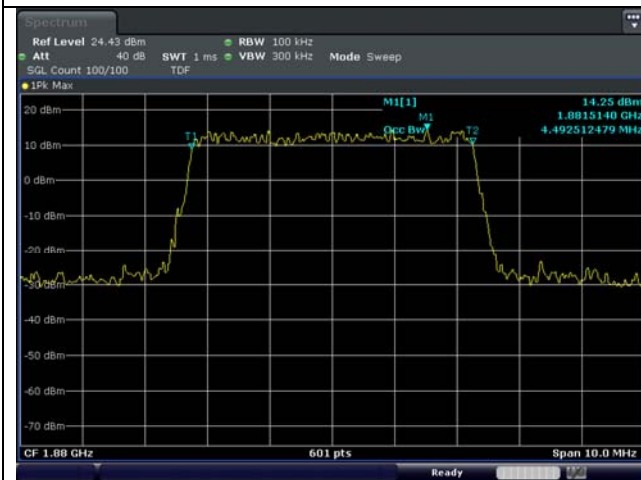
1.4 MHz 16QAM Middle Channel - Full RB



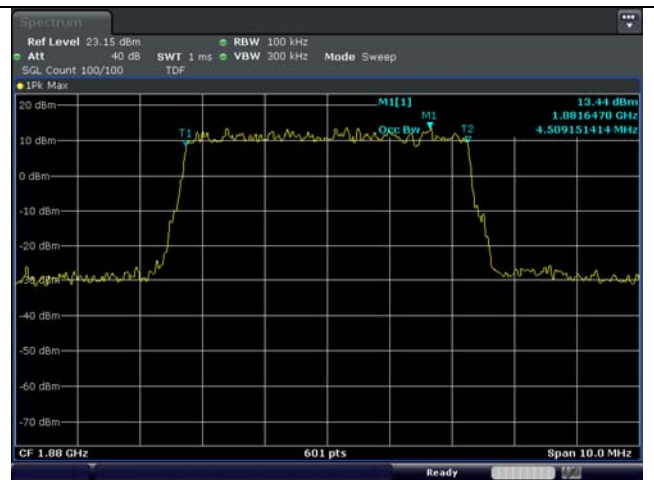
3 MHz QPSK Middle Channel - Full RB



3 MHz 16QAM Middle Channel - Full RB



5 MHz QPSK Middle Channel - Full RB



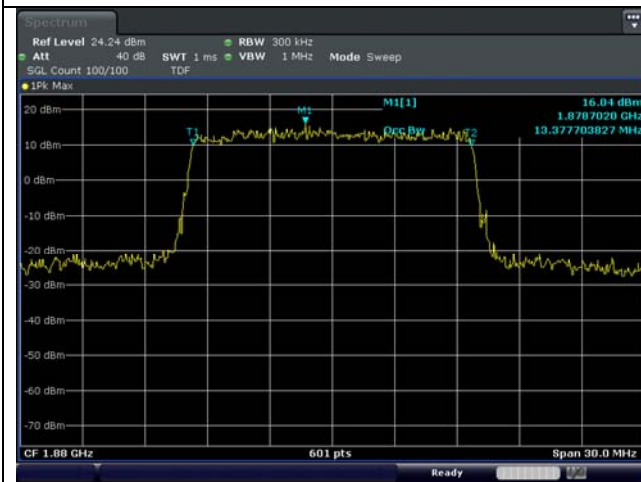
5 MHz 16QAM Middle Channel - Full RB



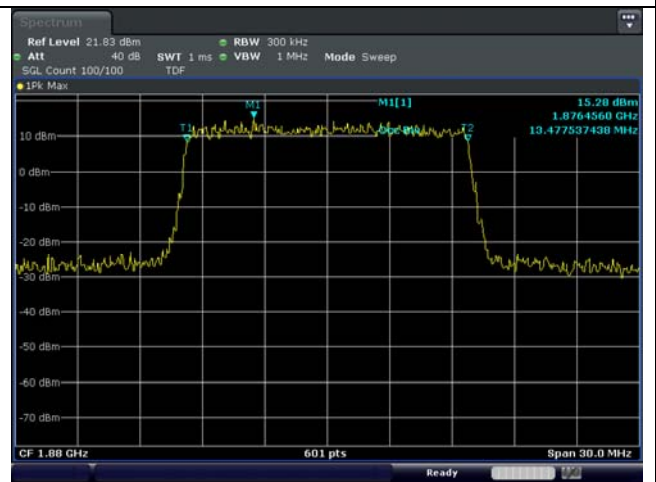
10 MHz QPSK Middle Channel - Full RB



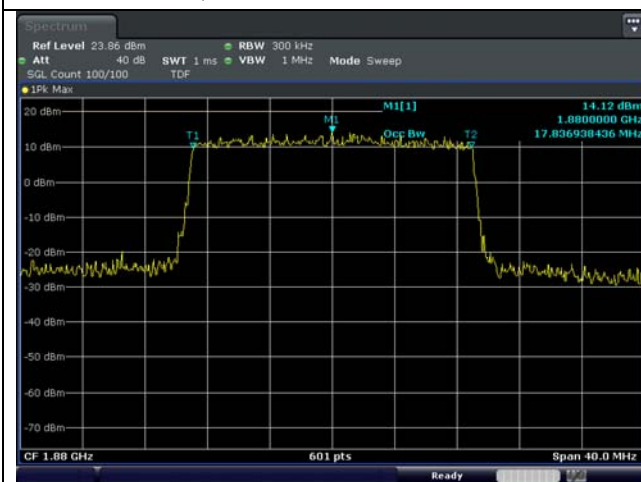
10 MHz 16QAM Middle Channel - Full RB



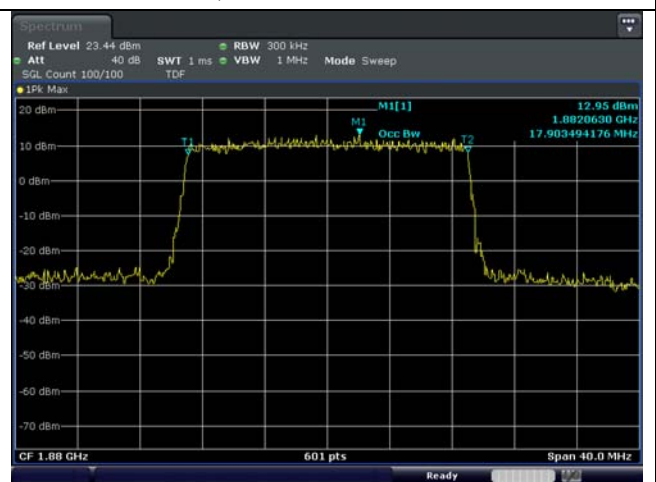
15 MHz QPSK Middle Channel - Full RB



15 MHz 16QAM Middle Channel - Full RB



20 MHz QPSK Middle Channel - Full RB



20 MHz 16QAM Middle Channel - Full RB

LTE band 4



1.4 MHz QPSK Middle Channel - Full RB



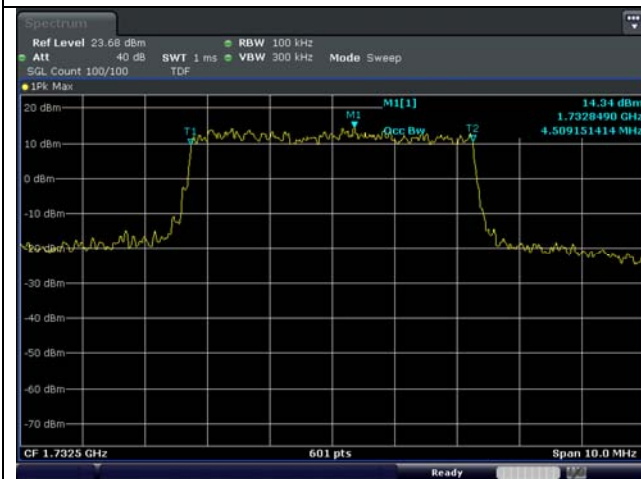
1.4 MHz 16QAM Middle Channel - Full RB



3 MHz QPSK Middle Channel - Full RB



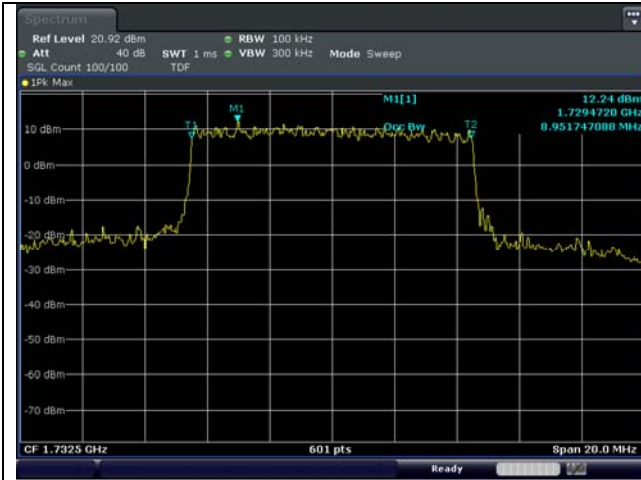
3 MHz 16QAM Middle Channel - Full RB



5 MHz QPSK Middle Channel - Full RB



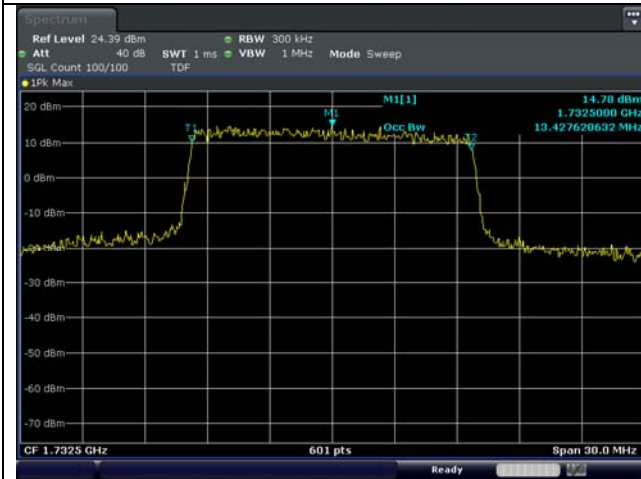
5 MHz 16QAM Middle Channel - Full RB



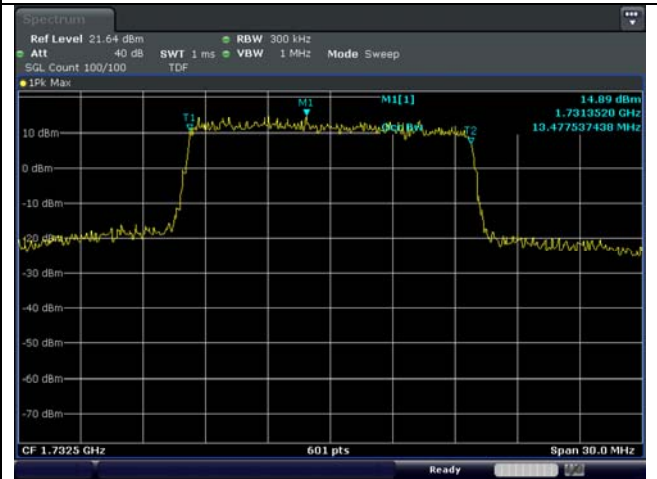
10 MHz QPSK Middle Channel - Full RB



10 MHz 16QAM Middle Channel - Full RB



15 MHz QPSK Middle Channel - Full RB



15 MHz 16QAM Middle Channel - Full RB



20 MHz QPSK Middle Channel - Full RB



20 MHz 16QAM Middle Channel - Full RB

LTE band 5



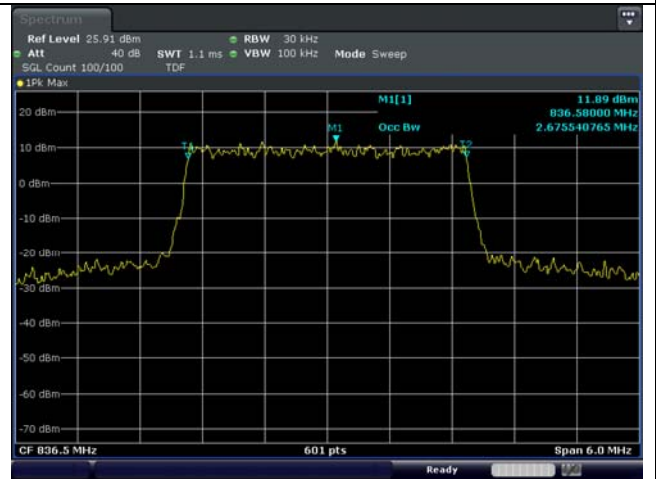
1.4 MHz QPSK Middle Channel - Full RB



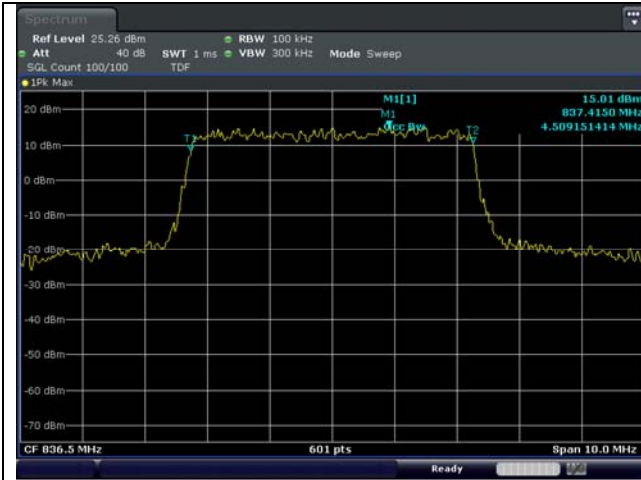
1.4 MHz 16QAM Middle Channel - Full RB



3 MHz QPSK Middle Channel - Full RB



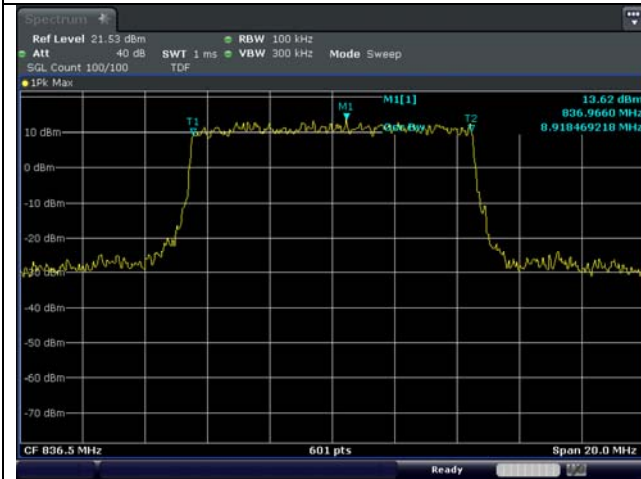
3 MHz 16QAM Middle Channel - Full RB



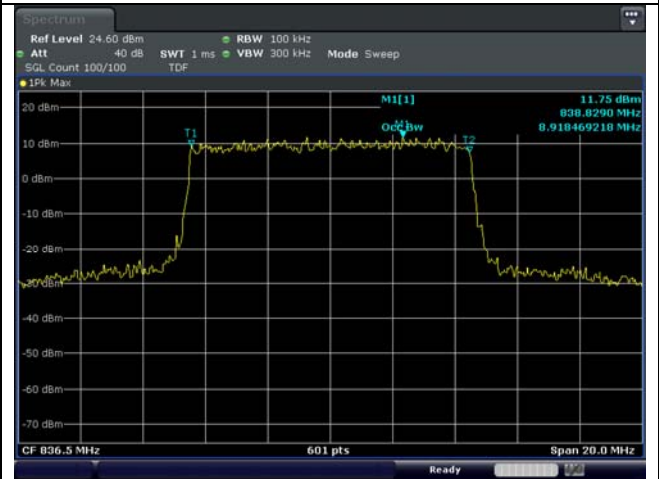
5 MHz QPSK Middle Channel - Full RB



5 MHz 16QAM Middle Channel - Full RB



10 MHz QPSK Middle Channel - Full RB



10 MHz 16QAM Middle Channel - Full RB

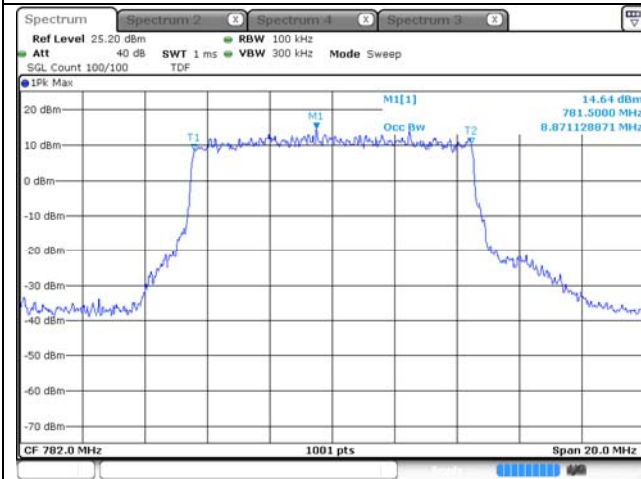
LTE band 13



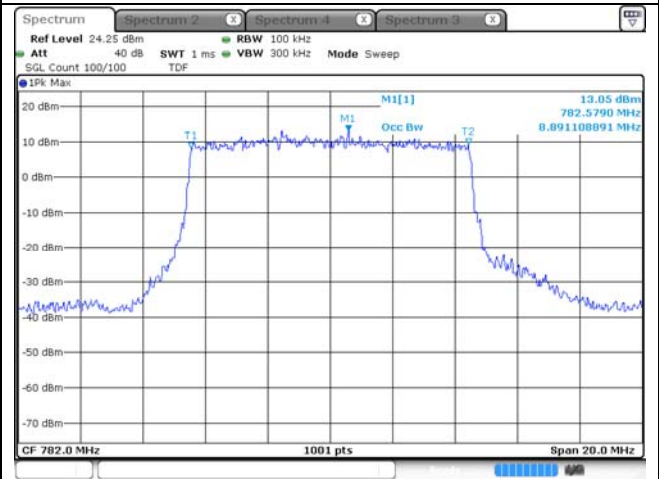
5 MHz QPSK Middle Channel - Full RB



5 MHz 16QAM Middle Channel - Full RB



10 MHz QPSK Middle Channel - Full RB



10 MHz 16QAM Middle Channel - Full RB

5. Peak-Average Ratio

5.1. Limit

- §22.913(d) Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

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

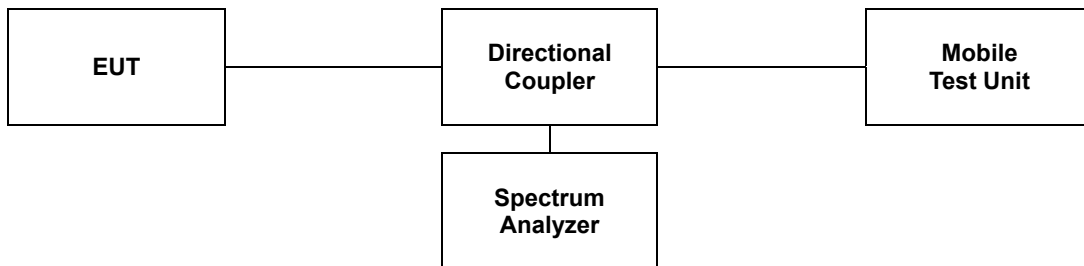
- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, 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)
2	1.4	16QAM	1 850.7	5.04
			1 880.0	6.03
			1 909.3	5.36
	3		1 851.5	5.42
			1 880.0	5.94
			1 908.5	5.57
	5		1 852.5	5.54
			1 880.0	5.74
			1 907.5	5.59
	10		1 855.0	5.54
			1 880.0	5.77
			1 905.0	5.54
	15		1 857.5	5.51
			1 880.0	5.71
1 902.5		5.51		
20	1 860.0	5.57		
	1 880.0	5.62		
	1 900.0	5.51		
4	1.4	16QAM	1 710.7	6.00
			1 732.5	4.84
			1 754.3	5.91
	3		1 711.5	6.03
			1 732.5	5.07
			1 753.5	6.12
	5		1 712.5	5.94
			1 732.5	4.93
			1 752.5	6.09
	10		1 715.0	5.94
			1 732.5	5.04
			1 750.0	5.94
	15		1 717.5	6.00
			1 732.5	5.10
1 747.5		5.88		
20	1 720.0	5.71		
	1 732.5	5.33		
	1 745.0	5.86		
5	1.4	16QAM	824.7	5.42
			836.5	5.39
			848.3	5.97
	3		825.5	5.59
			836.5	5.42
			847.5	6.00
	5		826.5	5.77
			836.5	5.39
			846.5	5.91
	10		829.0	5.86
836.5		5.48		
844.0		5.80		
13	5	16QAM	779.5	5.07
			782.0	4.90
	10		784.5	5.30
			782.0	5.39

- Test plots

LTE band 2



1.4 MHz Low Channel - Full RB



3 MHz Low Channel - Full RB



1.4 MHz Middle Channel - Full RB



3 MHz Middle Channel - Full RB



1.4 MHz High Channel - Full RB



3 MHz High Channel - Full RB

LTE band 2



5 MHz Low Channel - Full RB



10 MHz Low Channel - Full RB



5 MHz Middle Channel - Full RB



10 MHz Middle Channel - Full RB



5 MHz High Channel - Full RB

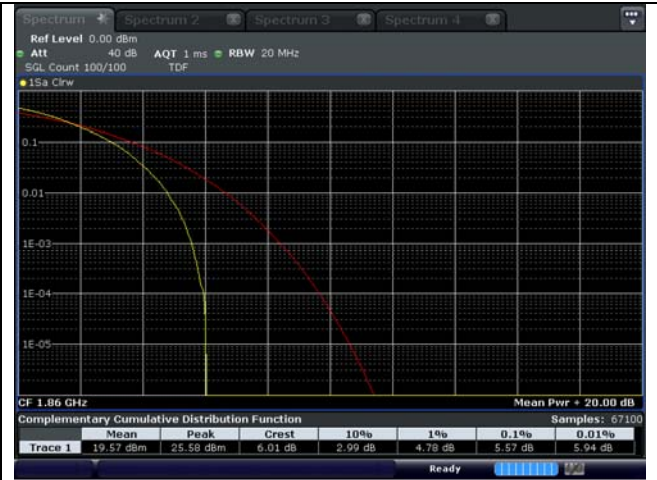


10 MHz High Channel - Full RB

LTE band 2



15 MHz Low Channel - Full RB



20 MHz Low Channel - Full RB



15 MHz Middle Channel - Full RB



20 MHz Middle Channel - Full RB

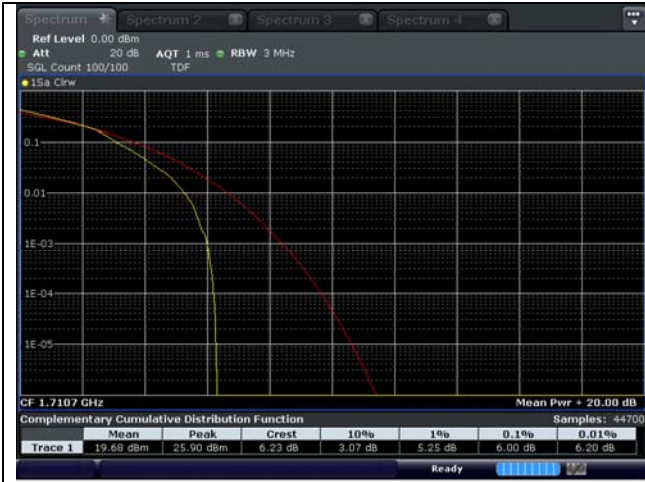


15 MHz High Channel - Full RB

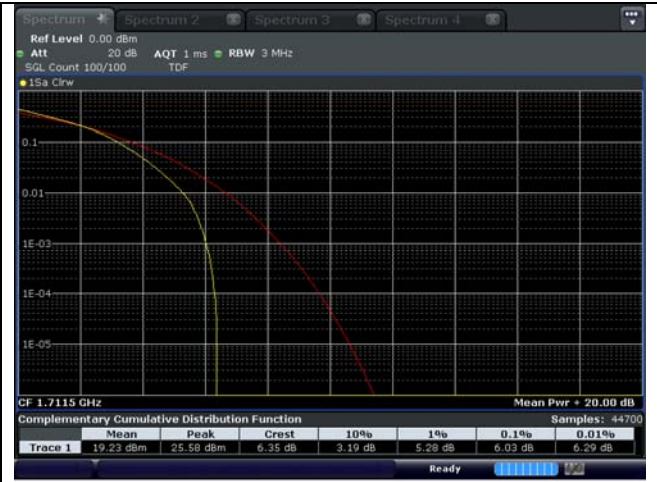


20 MHz High Channel - Full RB

LTE band 4



1.4 MHz Low Channel - Full RB



3 MHz Low Channel - Full RB



1.4 MHz Middle Channel - Full RB



3 MHz Middle Channel - Full RB



1.4 MHz High Channel - Full RB

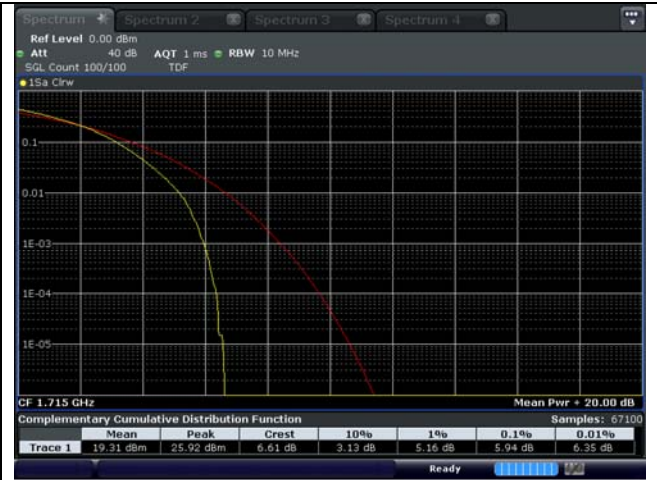


3 MHz High Channel - Full RB

LTE band 4



5 MHz Low Channel - Full RB



10 MHz Low Channel - Full RB



5 MHz Middle Channel - Full RB



10 MHz Middle Channel - Full RB



5 MHz High Channel - Full RB



10 MHz High Channel - Full RB

LTE band 4



15 MHz Low Channel - Full RB



20 MHz Low Channel - Full RB



15 MHz Middle Channel - Full RB



20 MHz Middle Channel - Full RB



15 MHz High Channel - Full RB



20 MHz High Channel - Full RB

LTE band 5



1.4 MHz Low Channel - Full RB



3 MHz Low Channel - Full RB



1.4 MHz Middle Channel - Full RB



3 MHz Middle Channel - Full RB

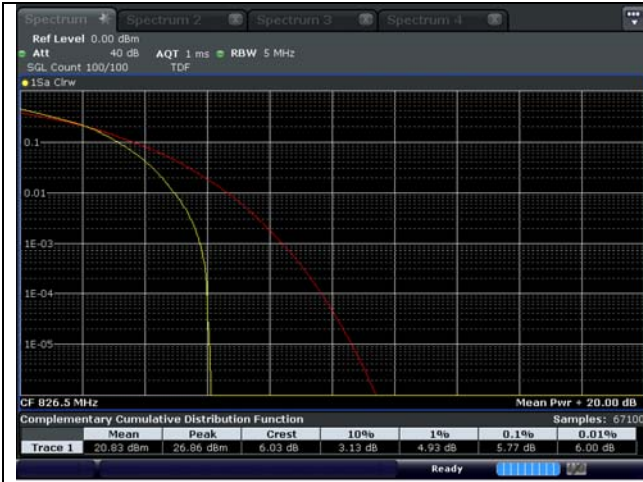


1.4 MHz High Channel - Full RB

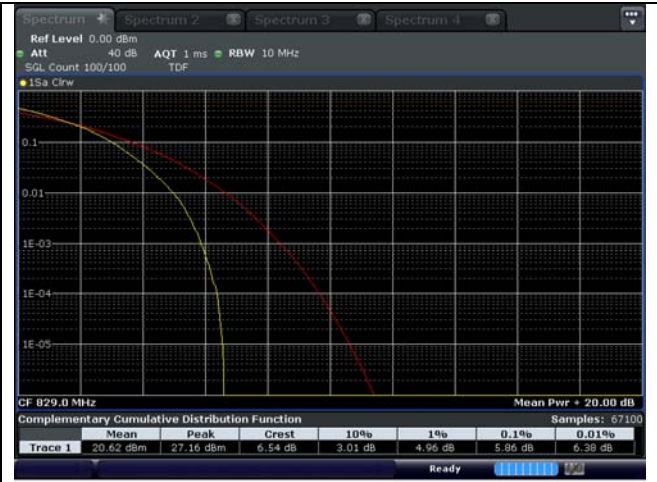


3 MHz High Channel - Full RB

LTE band 5



5 MHz Low Channel - Full RB



10 MHz Low Channel - Full RB



5 MHz Middle Channel - Full RB



10 MHz Middle Channel - Full RB



5 MHz High Channel - Full RB

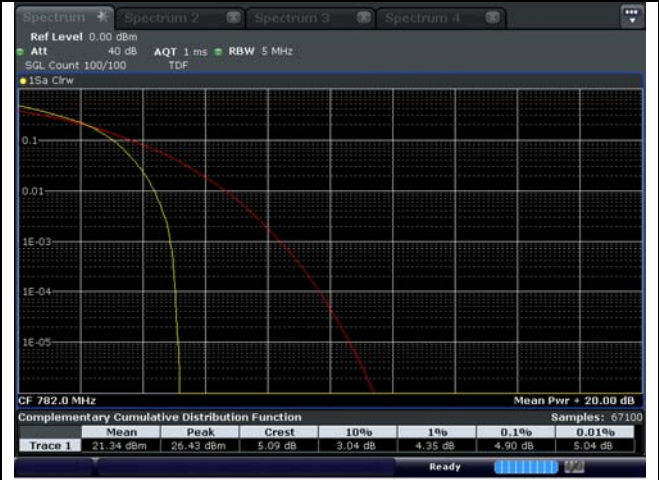


10 MHz High Channel - Full RB

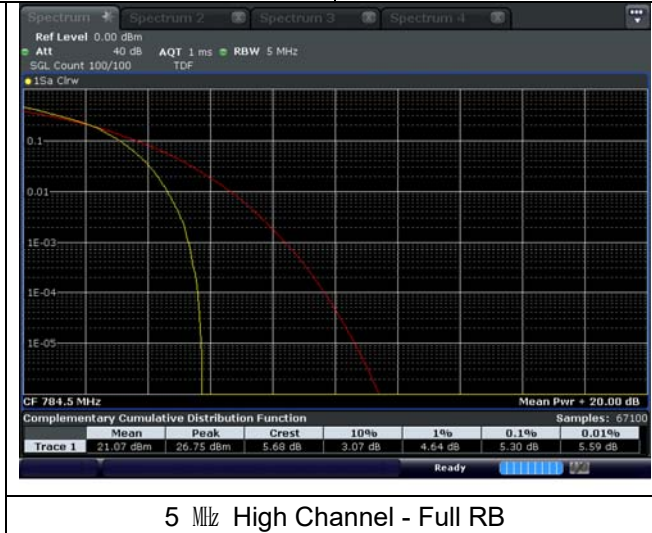
LTE band 13



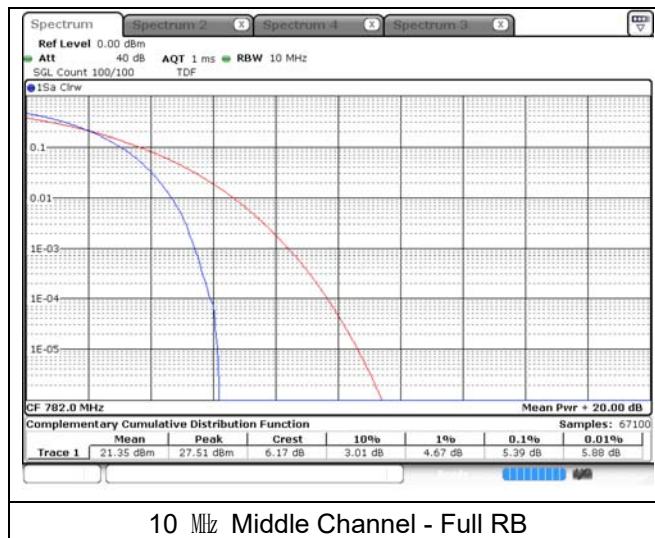
5 MHz Low Channel - Full RB



5 MHz Middle Channel - Full RB



5 MHz High Channel - Full RB



10 MHz Middle Channel - Full RB

6. Spurious Emissions at Antenna Terminal

6.1. Limit

- §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

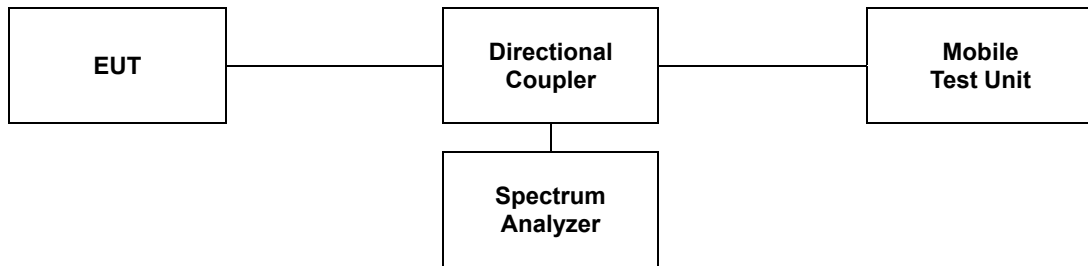
- §27.53(c)(2), on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

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 = RMS.
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 20 GHz, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



Note;

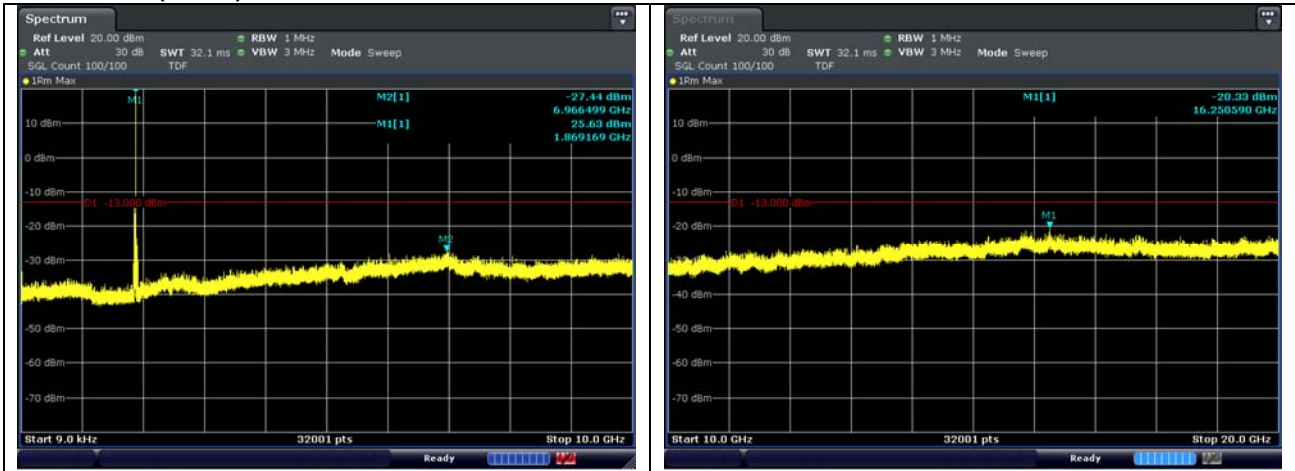
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution 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

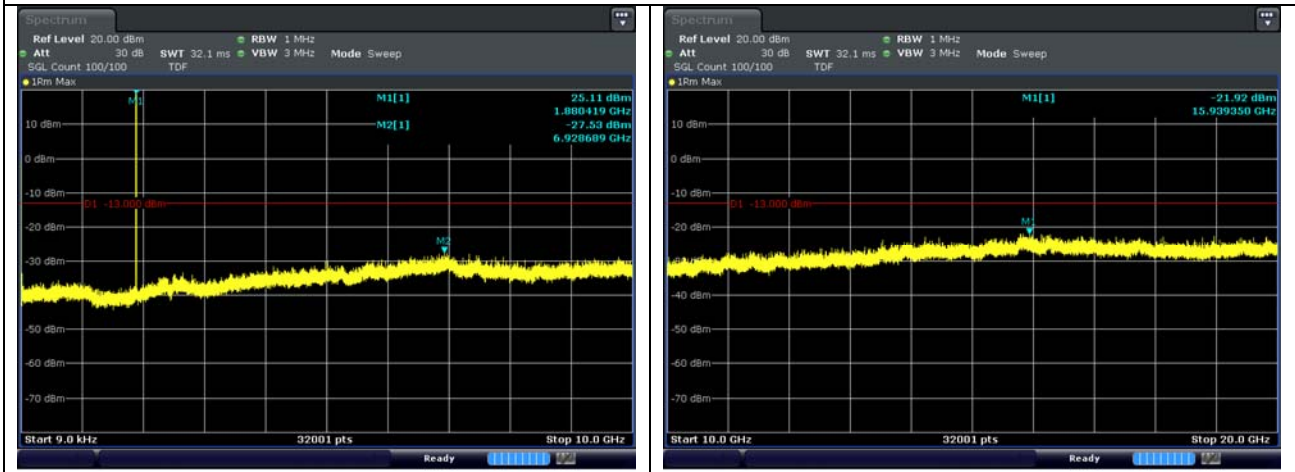
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

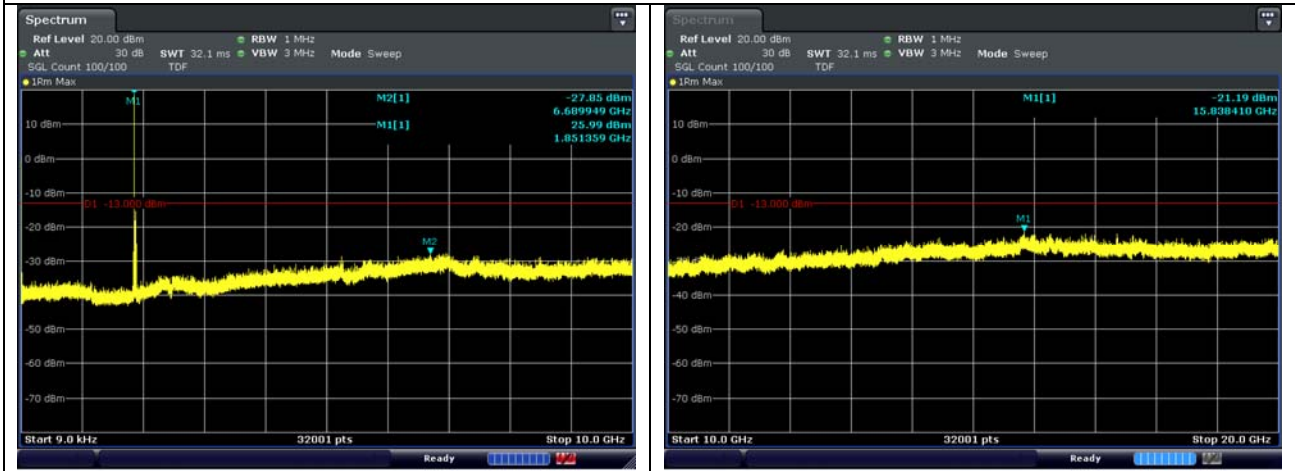
LTE band 2 (20 MHz)



QPSK Low Channel - 1 RB

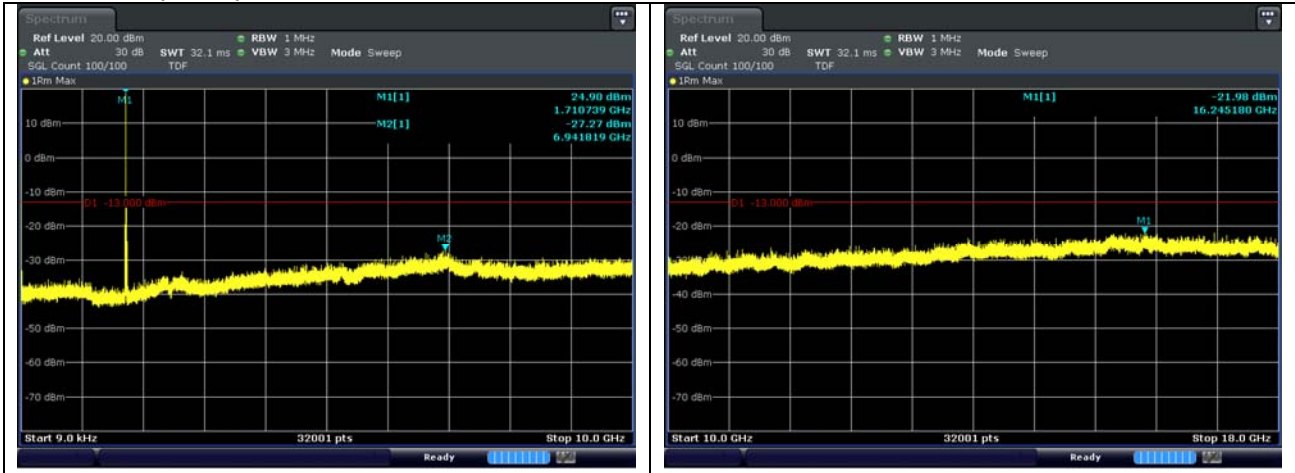


QPSK Middle Channel - 1 RB



QPSK High Channel - 1 RB

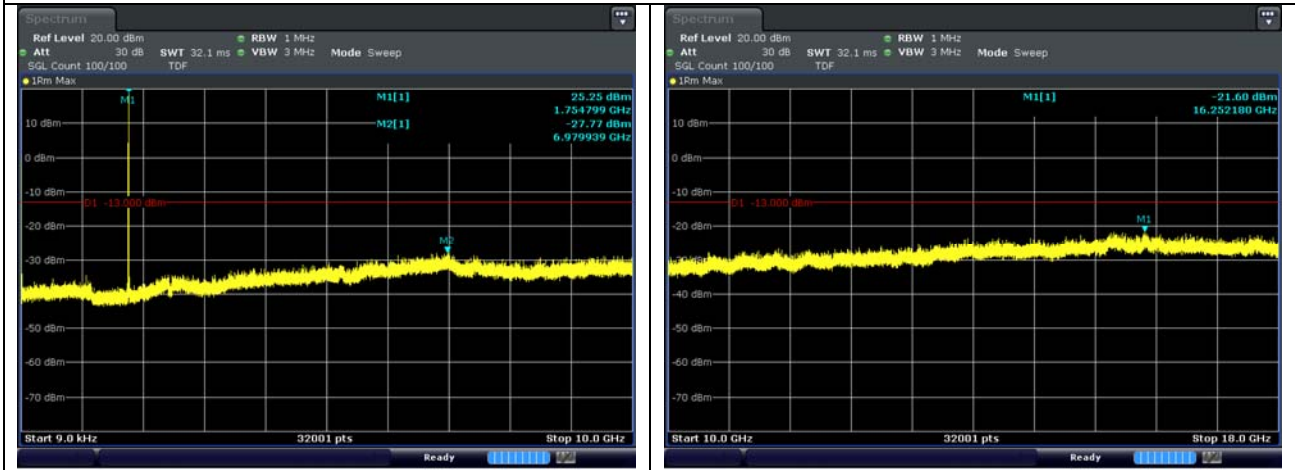
LTE band 4 (10 MHz)



QPSK Low Channel - 1 RB

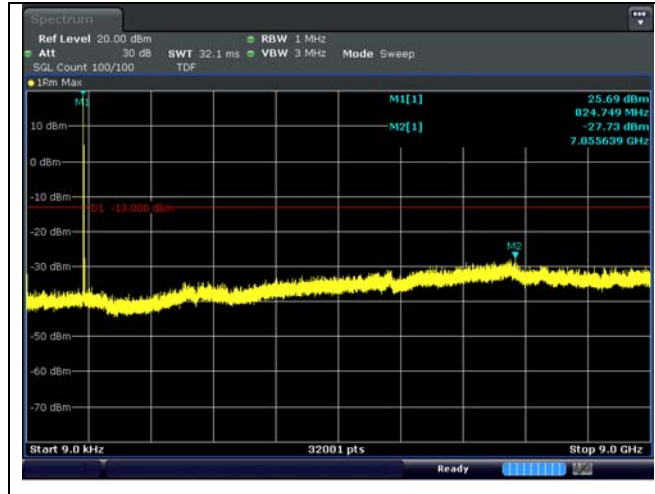


QPSK Middle Channel - 1 RB

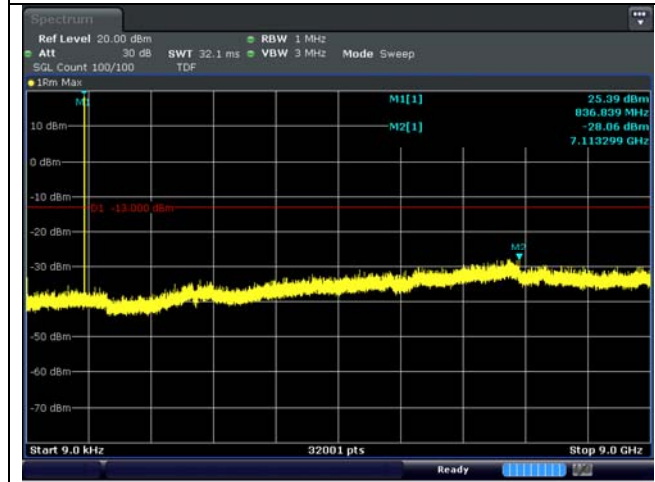


QPSK High Channel - 1 RB

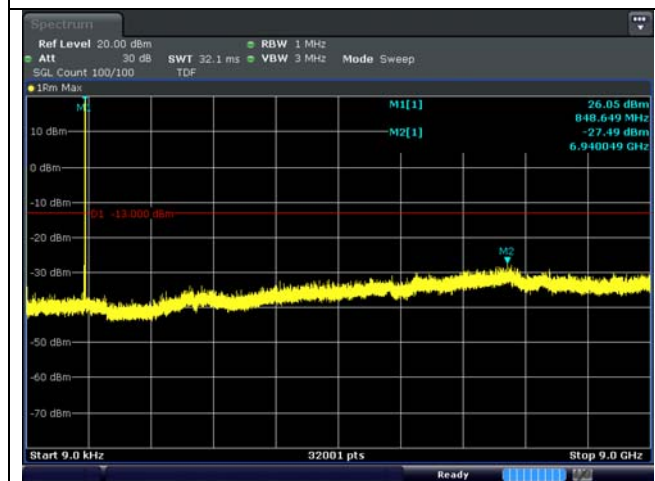
LTE band 5 (10 MHz)



QPSK Low Channel - 1 RB



QPSK Middle Channel - 1 RB



QPSK High Channel - 1 RB

LTE band 13 (10 MHz)

