TEST REPORT

No. I19N00406-RF-LTE

for

DAIMLER AG

CTPDIN

Model Name: CTP2019

FCC ID: 2AMIOCTP4465960

with

Hardware Version: A 000 446 5960

Software Version: 126.200.800

Issued Date: 2019-04-19

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

Test Laboratory:

Designation Number: CN1210

SAICT, Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518026.

Tel: +86(0)755-33322000, Fax: +86(0)755-33322001

Email: yewu@caict.ac.cn, website: www.cszit.com

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19N00406-RF-LTE	Rev.0	1st edition	2019-04-19

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	Shenzhen Academy of Information and Communications Technology
Address:	Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China
Postal Code:	518026
Telephone:	+86(0)755-33322000
Fax:	+86(0)755-33322001

1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.3. Project data

Testing Start Date:	2019-03-04
Testing End Date:	2019-03-14

1.4. Signature

Lai Minghua
(Prepared this test report)

Huang Qiuqin
(Reviewed this test report)

Zhang Hao
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	DAIMLER AG
Address /Post:	Mercedesstraße 137, 70327 Stuttgart, Germany
Contact Person:	Jan Waldmann
Contact Email	jan.waldmann@daimler.com
Telephone:	+49-711-17-40099
Fax:	+49-711-3052-148458

2.2. Manufacturer Information

Company Name:	Bosch Car Multimedia Portugal, S.A.
Address /Post:	Rua Max Grundig, 35 – Lomar, 4705-820 Braga, Portugal
Contact Person:	Eliseu Vieira
Contact Email	Eliseu.Vieira@pt.bosch.com
Telephone:	+351(253)30-6307
Fax:	/

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	CTPDIN
Model Name	CTP2019
FCC ID	2AMIOCTP4465960
Frequency Bands	LTE Band 5,7
Extreme vol. Limits	19.2VDC to 28.8VDC (nominal: 24VDC)
Condition of EUT as received	No abnormality in appearance

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Sample Arrival Date
UT01aa	352255061162925	A 000 446 5960	126.200.800	2019-03-04

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	GNSS antenna	A005 820 3075
AE2	CN Antenna	A002 827 2201
AE3	WiFi Antenna	A177 905 2902
AE4	Power Cable	/
AE5	USB Cable	/

*AE ID: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment Under Test (EUT) is a model LTE-FDD telematic platform with external antenna. It consists of normal options: power line, RF cable and external antenna. Manual and specifications of the EUT were provided to fulfil the test.

4. Reference Documents

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-17 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-17 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-17 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016

5. LABORATORY ENVIRONMENT

Control room / conducted chamber did not exceed following limits along the RF testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. =20 %, Max. = 80 %
Shielding effectiveness	> 110 dB
Electrical insulation	>2 MΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing

Temperature	Min. = 15 ℃, Max. = 35 ℃
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio （VSWR）	≤ 6 dB, from 1 to 18 GHz，3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.1 of this report

LTE Band 5

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/22.913	A.1	P
2	Field Strength of Spurious Radiation	2.1053/22.917	A.2	P
3	Frequency Stability	2.1055/22.355	A.3	P
4	Occupied Bandwidth	2.1049/22.917	A.4	P
5	Emission Bandwidth	2.1049/22.917	A.5	P
6	Band Edge Compliance	2.1051/22.917	A.6	P
7	Conducted Spurious Emission	2.1051/22.917	A.7	P

LTE Band 7

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	2.1046/27.50(h)	A.1	P
2	Field Strength of Spurious Radiation	2.1053/27.53(m)	A.2	P
3	Frequency Stability	2.1055/27.54	A.3	P
4	Occupied Bandwidth	2.1049/27.53(m)	A.4	P
5	Emission Bandwidth	2.1049/27.53(m)	A.5	P
6	Band Edge Compliance	2.1051/27.53(m)	A.6	P
7	Conducted Spurious Emission	2.1051/27.53(m)	A.7	P
8	Peak to Average Power Ratio	27.50(a)	A.8	P

7. Test Equipments Utilized

NO.	Description	TYPE	Manufacture	series number	CAL DUE DATE
1	Test Receiver	ESR7	R&S	101676	2019-11-28
2	BiLog Antenna	3142E	ETS	00224831	2021-05-17
3	Horn Antenna	3117	ETS-lindgren	00066577	2022-04-02
4	Horn Antenna	QSH-SL-18-26-S-20	Q-par	17013	2020-01-15
5	Antenna	3117	ETS-lindgren	00110312	2019-09-01
6	Antenna	VUBA 9117	Schwarzbeck	9117-321	2019-09-01
7	Antenna	QWH-SL-18-40-K-SG	Q-par	15979	2020-01-16
8	preamplifier	83017A	Agilent	MY39501110	/
9	Signal Generator	SMB100A	R&S	179725	2019-11-28
10	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2020-07-20
11	Spectrum Analyzer	FSV40	R&S	101192	2019-05-22
12	Universal Radio Communication Tester	CMW500	R&S	152499	2019-07-19
13	Universal Radio Communication Tester	CMW500	R&S	129146	2019-04-24
14	Spectrum Analyzer	FSU	R&S	200679	2019-12-13
15	Temperature Chamber	SH-241	ESPECs	92007516	2019-11-13
16	DC Power Supply	U3606A	Agilent Technologies	MY50450012	2019-11-13

Test software

Item	Name	Vesion
Radiated	EMC32	Version 10.01.00

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 2.1046, 22.913, 27.50

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

This result contains peak output power and ERP/EIRP measurements for the EUT.

In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Measurement result

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	22.63	21.60
		836.5	22.46	21.41
		824.7	22.23	21.14
	1 RB low	848.3	22.57	21.52
		836.5	22.47	21.42
		824.7	22.16	21.08
	50% RB mid	848.3	22.60	21.63
		836.5	22.46	21.48
		824.7	22.23	21.19
	100% RB	848.3	21.65	20.85
		836.5	21.48	20.60
		824.7	21.19	20.30
3MHz	1 RB high	847.5	22.63	22.16
		836.5	22.29	21.84
		825.5	22.37	21.92
	1 RB low	847.5	22.28	21.84
		836.5	22.50	22.06
		825.5	22.06	21.64
	50% RB mid	847.5	21.63	20.58
		836.5	21.56	20.62
		825.5	21.30	20.36

	100% RB	847.5	21.64	20.51
		836.5	21.54	20.52
		825.5	21.30	20.27
5MHz	1 RB high	846.5	22.69	21.95
		836.5	22.36	21.59
		826.5	22.70	21.55
	1 RB low	846.5	22.21	21.41
		836.5	22.77	22.01
		826.5	22.34	21.16
	50% RB mid	846.5	21.44	20.53
		836.5	21.57	20.59
		826.5	21.37	20.43
	100% RB	846.5	21.49	20.53
		836.5	21.53	20.48
		826.5	21.42	20.39
10MHz	1 RB high	844.0	22.68	22.22
		836.5	22.14	21.72
		829.0	21.64	21.30
	1 RB low	844.0	22.21	21.77
		836.5	22.89	22.44
		829.0	22.63	22.18
	50% RB mid	844.0	21.19	20.22
		836.5	21.63	20.57
		829.0	21.81	20.76
	100% RB	844.0	21.29	20.28
		836.5	21.57	20.51
		829.0	21.74	20.66

Note: Expanded measurement uncertainty is U = 0.488dB, k = 1.96

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	22.33	21.29
		2535.0	20.88	19.82
		2502.5	22.12	21.78
	1 RB low	2567.5	22.35	21.36
		2535.0	21.36	20.36
		2502.5	23.09	22.64
	50% RB mid	2567.5	21.64	20.67
		2535.0	20.11	19.14
		2502.5	19.39	18.46
	100% RB	2567.5	21.51	20.64
		2535.0	20.18	19.12
		2502.5	19.37	18.39
10MHz	1 RB high	2565.0	22.26	21.80
		2535.0	20.64	20.31
		2505.0	20.78	20.25
	1 RB low	2565.0	21.59	21.23
		2535.0	21.53	21.15
		2505.0	20.28	19.94
	50% RB mid	2565.0	21.38	20.51
		2535.0	20.14	19.07
		2505.0	19.44	18.35
	100% RB	2565.0	21.33	20.44
		2535.0	20.21	19.15
		2505.0	19.49	18.39
15MHz	1 RB high	2562.5	22.28	21.81
		2535.0	20.30	19.97
		2507.5	21.35	21.00
	1 RB low	2562.5	20.64	20.29
		2535.0	21.55	21.16
		2507.5	20.23	19.89
	50% RB mid	2562.5	21.06	20.00
		2535.0	20.19	19.10
		2507.5	19.62	18.51
	100% RB	2562.5	21.06	20.03
		2535.0	20.18	19.12
		2507.5	19.79	18.69
20MHz	1 RB high	2560.0	22.41	21.80

		2535.0	20.45	19.67
		2510.0	22.08	21.47
	1 RB low	2560.0	20.36	19.60
		2535.0	22.05	21.36
		2510.0	20.42	19.66
	50% RB mid	2560.0	20.75	19.76
		2535.0	20.17	19.30
		2510.0	20.03	18.98
	100% RB	2560.0	20.74	19.85
		2535.0	20.24	19.35
		2510.0	20.28	19.21

Note: Expanded measurement uncertainty is U = 0.488 dB, k = 1.96

A.1.3 Radiated

A.1.3.1 Description

This is the test for the maximum radiated power from the EUT.

Rule Part 27.50(d) specifies “Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”.

Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

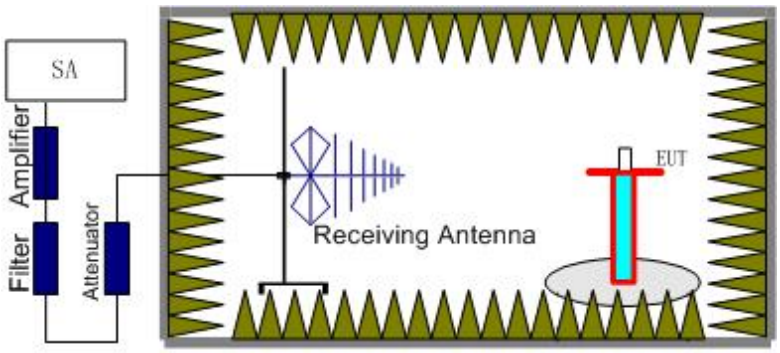
Rule Part 27.50(c) specifies “Portable stations (hand-held de-vices) are limited to 3 watts ERP.”.

Rule Part 27.50(a)(3) specifies “For mobile and portable stations transmitting in the 2305–2315 MHz band or the 2350–2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.”

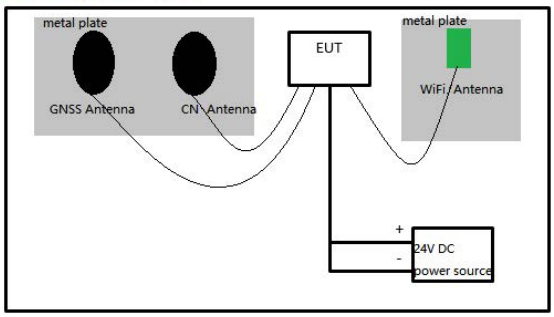
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603-E-2016 are used.

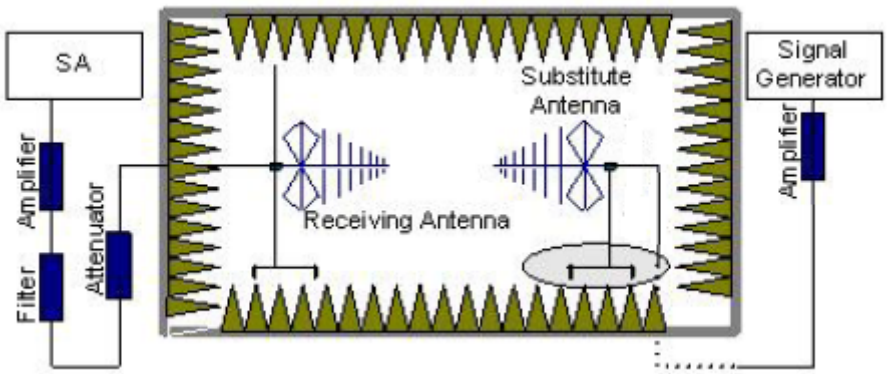
1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr). The placement of EUT and AE is shown in the figure below, what’s more, The EUT was tested in two states, horizontal and vertical.as show in the attachment.



3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss (P_{cl}), the substitution Antenna Gain(dBi) (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) = $P_{Mea} - P_{Ag} - P_{cl} + G_a$
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dB.

A.1.3.3 Measurement result

EUT-Horizontal

LTE Band 5- ERP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-13.09	-33.60	0.28	2.15	18.64	38.45	H
836.50	**-11.88**	**-33.50**	**0.25**	**2.15**	**19.72**	**38.45**	**H**
848.30	-12.72	-33.50	0.21	2.15	18.84	38.45	H

LTE Band 5_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-13.48	-33.60	0.28	2.15	18.25	38.45	H
836.50	-12.34	-33.50	0.25	2.15	19.26	38.45	H
847.50	-12.95	-33.50	0.21	2.15	18.61	38.45	H

LTE Band 5_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-14.29	-33.60	0.28	2.15	17.44	38.45	H
836.50	-13.18	-33.50	0.25	2.15	18.42	38.45	H
846.50	-14.06	-33.50	0.21	2.15	17.50	38.45	H

LTE Band 5_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-14.24	-33.60	0.28	2.15	17.49	38.45	H
836.50	-13.64	-33.50	0.25	2.15	17.96	38.45	H
844.00	-14.71	-33.50	0.21	2.15	16.85	38.45	H

LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-14.32	-33.60	0.28	2.15	17.41	38.45	H
836.50	-13.16	-33.50	0.25	2.15	18.44	38.45	H
848.30	-13.90	-33.50	0.21	2.15	17.66	38.45	H

LTE Band 5_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-14.30	-33.60	0.28	2.15	17.43	38.45	H
836.50	-13.14	-33.50	0.25	2.15	18.46	38.45	H
847.50	-13.69	-33.50	0.21	2.15	17.87	38.45	H

LTE Band 5_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-14.16	-33.60	0.28	2.15	17.57	38.45	H
836.50	-13.11	-33.50	0.25	2.15	18.49	38.45	H
846.50	-13.53	-33.50	0.21	2.15	18.03	38.45	H

LTE Band 5_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-13.80	-33.60	0.28	2.15	17.93	38.45	H
836.50	-13.11	-33.50	0.25	2.15	18.49	38.45	H
844.00	-13.77	-33.50	0.21	2.15	17.79	38.45	H

Peak ERP (dBm)=P_{Mea}(-11.88dBm)-(P_{cl}+P_{Ag})(-33.50dB)+G_a(0.25dB) -2.15dB =19.72dBm

LTE Band 7- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-7.03	-28.70	0.59	22.26	33.00	H
2535.00	-6.29	-28.60	0.45	22.76	33.00	H
2567.50	-6.84	-28.60	0.38	22.14	33.00	V

LTE Band 7_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-6.80	-28.70	0.59	22.49	33.00	H
2535.00	-6.91	-28.60	0.45	22.14	33.00	H
2565.00	-7.10	-28.60	0.38	21.88	33.00	V

LTE Band 7_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-6.80	-28.70	0.59	22.49	33.00	H
2535.00	-6.95	-28.60	0.45	22.10	33.00	H
2562.50	-7.52	-28.60	0.38	21.46	33.00	V

LTE Band 7_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-7.34	-28.70	0.59	21.95	33.00	H
2535.00	-6.72	-28.60	0.45	22.33	33.00	H
2560.00	-7.62	-28.60	0.38	21.36	33.00	V

LTE Band 7_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-9.00	-28.70	0.59	20.29	33.00	V
2535.00	**-5.88**	**-28.60**	**0.45**	**23.17**	**33.00**	**H**
2567.50	-7.45	-28.60	0.38	21.53	33.00	V

LTE Band 7_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-7.94	-28.70	0.59	21.35	33.00	V
2535.00	-6.86	-28.60	0.45	22.19	33.00	H
2565.00	-7.26	-28.60	0.38	21.72	33.00	V

LTE Band 7_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-7.90	-28.70	0.59	21.39	33.00	V
2535.00	-6.78	-28.60	0.45	22.27	33.00	H
2562.50	-7.93	-28.60	0.38	21.05	33.00	V

LTE Band 7_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-8.17	-28.70	0.59	21.12	33.00	V
2535.00	-6.11	-28.60	0.45	22.94	33.00	H
2560.00	-8.60	-28.60	0.38	20.38	33.00	V

Peak EIRP (dBm)=P_{Mea}(-5.88dBm)-（P_{cl}+P_{Ag}）(-28.60dB)+G_a(0.45dB) -2.15dB =23.17dBm

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwidths equal to or less than 5MHz.

RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.

Note: The maximum value of expanded measurement uncertainty for this test item is U = 3.34dB(30MHz-3GHz)/4.06dB(3GHz-18GHz)/4.56dB(18GHz-40GHz), k = 2

EUT- Vertical

LTE Band 5- ERP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-12.83	-33.60	0.28	2.15	18.90	38.45	V
836.50	-12.44	-33.50	0.25	2.15	19.16	38.45	V
848.30	-13.48	-33.50	0.21	2.15	18.08	38.45	V

LTE Band 5_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-12.99	-33.60	0.28	2.15	18.74	38.45	V
836.50	-12.69	-33.50	0.25	2.15	18.91	38.45	V
847.50	-13.20	-33.50	0.21	2.15	18.36	38.45	V

LTE Band 5_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	**-12.60**	**-33.60**	**0.28**	**2.15**	**21.28**	**38.45**	**V**
836.50	-12.57	-33.50	0.25	2.15	21.18	38.45	V
846.50	-12.92	-33.50	0.21	2.15	20.79	38.45	V

LTE Band 5_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-12.81	-33.60	0.28	2.15	18.92	38.45	V
836.50	-12.53	-33.50	0.25	2.15	19.07	38.45	V
844.00	-12.76	-33.50	0.21	2.15	18.80	38.45	V

LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-11.96	-33.60	0.28	2.15	19.77	38.45	V
836.50	-11.97	-33.50	0.25	2.15	19.63	38.45	V
848.30	-13.03	-33.50	0.21	2.15	18.53	38.45	V

LTE Band 5_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-11.94	-33.60	0.28	2.15	19.79	38.45	V
836.50	-11.72	-33.50	0.25	2.15	19.88	38.45	V
847.50	-12.48	-33.50	0.21	2.15	19.08	38.45	V

LTE Band 5_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-11.91	-33.60	0.28	2.15	19.82	38.45	V
836.50	-11.45	-33.50	0.25	2.15	20.15	38.45	V
846.50	-11.97	-33.50	0.21	2.15	19.59	38.45	V

LTE Band 5_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-11.84	-33.60	0.28	2.15	19.89	38.45	V
836.50	-12.19	-33.50	0.25	2.15	19.41	38.45	V
844.00	-11.81	-33.50	0.21	2.15	19.75	38.45	V

Peak ERP (dBm)=P_{Mea}(-12.60dBm)-(P_{cl}+P_{Ag})(-33.60dB)+G_a(0.28dB) -2.15dB =21.28dBm

LTE Band 7- EIRP 27.50(h)(2)

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-7.95	-28.70	0.59	21.34	33.00	H
2535.00	-6.84	-28.60	0.45	22.21	33.00	H
2567.50	-5.70	-28.60	0.38	23.28	33.00	H

LTE Band 7_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-7.99	-28.70	0.59	21.30	33.00	H
2535.00	-6.83	-28.60	0.45	22.22	33.00	H
2565.00	-6.11	-28.60	0.38	22.87	33.00	H

LTE Band 7_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-7.34	-28.70	0.59	21.95	33.00	H
2535.00	-6.86	-28.60	0.45	22.19	33.00	H
2562.50	-6.76	-28.60	0.38	22.22	33.00	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-7.29	-28.70	0.59	22.00	33.00	H
2535.00	-6.27	-28.60	0.45	22.78	33.00	H
2560.00	-6.30	-28.60	0.38	22.68	33.00	H

LTE Band 7_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-9.14	-28.70	0.59	20.15	33.00	H
2535.00	-7.08	-28.60	0.45	21.97	33.00	H
2567.50	-5.92	-28.60	0.38	23.06	33.00	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-7.21	-28.70	0.59	22.08	33.00	H
2535.00	-6.54	-28.60	0.45	22.51	33.00	H
2565.00	**-4.87**	**-28.60**	**0.38**	**24.11**	**33.00**	**H**

LTE Band 7_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-7.60	-28.70	0.59	21.69	33.00	H
2535.00	-7.11	-28.60	0.45	21.94	33.00	H
2562.50	-5.66	-28.60	0.38	23.32	33.00	H

LTE Band 7_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-7.42	-28.70	0.59	21.87	33.00	H
2535.00	-6.77	-28.60	0.45	22.28	33.00	H
2560.00	-6.33	-28.60	0.38	22.65	33.00	H

Peak EIRP (dBm)=P_{Mea}(-4.87dBm)- (P_{cl}+P_{Ag}) (-28.60dB)+G_a(0.38dB) -2.15dB =24.11dBm

ANALYZER SETTINGS:

RBW = VBW = 8MHz for occupied bandwidths equal to or less than 5MHz.

RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.

Note: The maximum value of expanded measurement uncertainty for this test item is U = 3.34dB(30MHz-3GHz)/4.06dB(3GHz-18GHz)/4.56dB(18GHz-40GHz), k = 2

A.2 FIELD STRENGTH OF SPURIOUS RADIATION

Reference

FCC: CFR 2.1053, 22.917, 27.53

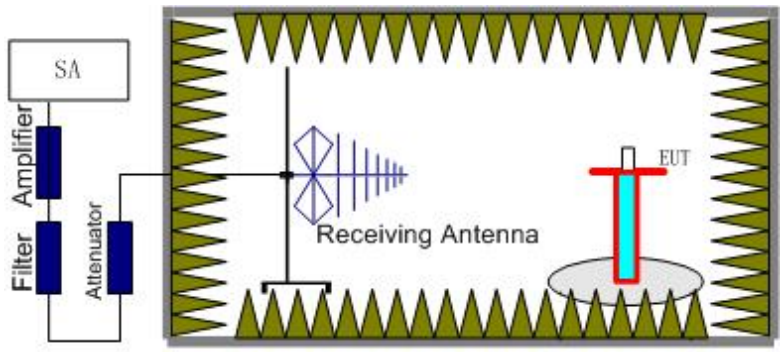
A.2.1 Measurement Method

The measurements procedures in TIA-603-E-2016 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

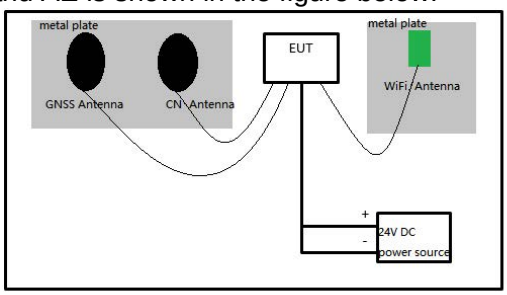
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917, Part 27.53(h). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 5,7.

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



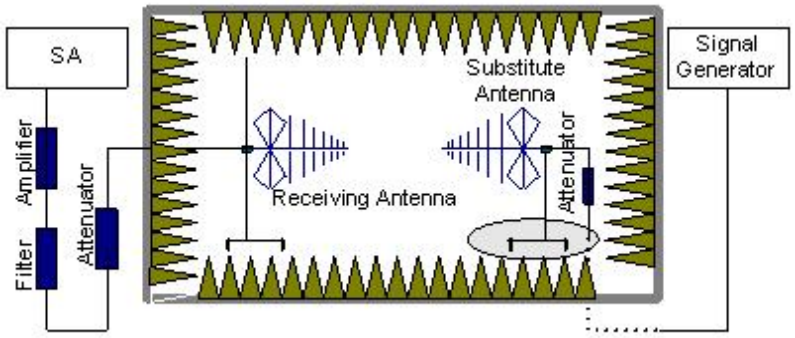
2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr). The placement of EUT and AE is shown in the figure below:



3. The EUT was tested in two states, horizontal and vertical.as show in the attachment.

Additionally, during the testing, the WLAN which worked on 802.11b channel 6 (Power level is 14 and modulation group is 0) was continuously launched, and GNSS function was on.

4. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain(dBi) (G_a) should be recorded after test.
   An amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   Power (EIRP)=P_{Mea} - P_{pl} + G_a
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dB.

A.2.2 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 5,7. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Bands 5,7 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

EUT-Horizontal

LTE Band 5, 1.4MHz, QPSK, Channel 20407 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2930.10	-41.28	1.00	11.40	-33.03	-13.00	H
4121.00	-62.37	1.20	12.60	-53.12	-13.00	V
4874.00	-60.35	1.40	12.60	-51.30	-13.00	V
13409.00	-58.43	2.50	12.90	-50.18	-13.00	V
15236.00	-56.51	2.70	13.00	-48.36	-13.00	H
16781.50	-56.96	2.90	15.20	-46.81	-13.00	V

LTE Band 5, 1.4MHz, QPSK, Channel 20525 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2957.30	-41.25	1.00	11.40	-33.00	-13.00	H
4180.50	-60.72	1.20	12.60	-51.47	-13.00	V
4874.00	-59.64	1.40	12.60	-50.59	-13.00	V
13312.00	-58.65	2.30	12.90	-50.20	-13.00	H
14830.50	-57.15	2.70	13.00	-49.00	-13.00	V
16970.00	-55.36	2.90	13.20	-47.21	-13.00	V

LTE Band 5, 1.4MHz, QPSK, Channel 20643 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2903.70	-41.14	1.00	11.40	-32.89	-13.00	H
4874.00	-60.37	1.40	12.60	-51.32	-13.00	V
13215.00	-58.24	2.30	12.90	-49.79	-13.00	H
14434.50	-57.01	2.60	11.90	-49.86	-13.00	V
15985.50	-59.45	2.60	16.90	-47.30	-13.00	V
17030.00	-55.39	2.90	13.20	-47.24	-13.00	H

LTE Band 5, 1.4MHz, 16QAM, Channel 20407 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2945.60	-42.02	1.00	11.40	-33.77	-13.00	V
4121.00	-57.24	1.20	12.60	-47.99	-13.00	V
4874.00	-59.71	1.40	12.60	-50.66	-13.00	H
13386.50	-57.83	2.50	12.90	-49.58	-13.00	V
15605.50	-59.82	2.70	15.50	-49.17	-13.00	V
16918.50	-54.84	2.90	13.20	-46.69	-13.00	V

LTE Band 5, 1.4MHz, 16QAM, Channel 20525 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2930.70	-41.36	1.00	11.40	-33.11	-13.00	H
4874.00	-59.39	1.40	12.60	-50.34	-13.00	V
11331.00	-58.40	2.50	11.50	-51.55	-13.00	H
13195.50	-58.65	2.40	13.70	-49.50	-13.00	V
15203.00	-56.42	2.70	13.00	-48.27	-13.00	H
17169.00	-54.26	3.20	13.20	-46.41	-13.00	V

LTE Band 5, 1.4MHz, 16QAM, Channel 20643 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2917.60	-41.05	1.00	11.40	-32.80	-13.00	H
4873.50	-59.72	1.40	12.60	-50.67	-13.00	V
12549.00	-59.90	2.40	14.10	-50.35	-13.00	V
14013.50	-57.37	2.50	12.30	-49.72	-13.00	V
15256.00	-57.13	2.70	13.00	-48.98	-13.00	H
16745.00	-57.72	2.90	15.20	-47.57	-13.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 3.34dB(30MHz-3GHz)/4.06dB(3GHz-18GHz)/4.56dB(18GHz-40GHz), k = 2

LTE Band 7, 5 MHz, QPSK, Channel 20775 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2813.90	-42.29	1.00	11.40	-31.89	-25.00	V
4874.00	-60.06	1.40	12.60	-48.86	-25.00	V
8064.50	-60.48	1.80	11.50	-50.78	-25.00	V
12105.50	-58.93	2.60	13.10	-48.43	-25.00	V
14866.50	-57.14	2.70	13.00	-46.84	-25.00	V
17128.00	-55.00	3.20	13.20	-45.00	-25.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21100 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2818.90	-41.45	1.00	11.40	-31.05	-25.00	V
4874.00	-59.90	1.40	12.60	-48.70	-25.00	V
5065.50	-52.98	1.20	12.60	-41.58	-25.00	V
13330.50	-58.44	2.30	12.90	-47.84	-25.00	H
15036.50	-57.24	2.50	13.00	-46.74	-25.00	V
17037.00	-55.37	2.90	13.20	-45.07	-25.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21425 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2993.30	-42.14	1.00	11.40	-31.74	-25.00	V
4874.00	-59.72	1.40	12.60	-48.52	-25.00	V
5130.50	-57.05	1.30	12.60	-45.75	-25.00	V
14503.50	-56.87	2.60	11.90	-47.57	-25.00	H
15579.00	-59.34	2.70	15.50	-46.54	-25.00	H
16804.00	-53.98	2.90	13.20	-43.68	-25.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 20775 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2937.30	-41.14	1.00	11.40	-30.74	-25.00	H
4874.00	-58.72	1.40	12.60	-47.52	-25.00	H
13030.50	-59.61	2.30	13.70	-48.21	-25.00	V
14440.00	-56.86	2.60	11.90	-47.56	-25.00	V
15900.50	-59.89	2.60	16.90	-45.59	-25.00	V
17037.00	-54.78	2.90	13.20	-44.48	-25.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 21100 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2994.90	-41.27	1.00	11.40	-30.87	-25.00	H
4874.00	-59.16	1.40	12.60	-47.96	-25.00	V
5065.50	-48.30	2.30	12.90	-37.70	-25.00	V
13257.50	-59.01	2.30	12.90	-48.41	-25.00	H
15270.00	-57.37	2.70	13.00	-47.07	-25.00	V
17045.50	-55.02	2.90	13.20	-44.72	-25.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 21425 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2893.90	-41.39	1.00	11.40	-30.99	-25.00	H
4874.00	-59.45	1.40	12.60	-48.25	-25.00	V
5130.50	-59.91	1.30	12.60	-48.61	-25.00	V
12762.00	-57.68	2.70	13.70	-46.68	-25.00	H
15936.50	-60.07	2.60	16.90	-45.77	-25.00	V
17087.50	-55.37	2.90	13.20	-45.07	-25.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 3.34dB(30MHz-3GHz)/4.06dB(3GHz-18GHz)/4.56dB(18GHz-40GHz), k = 2

EUT–Vertical

LTE Band 5, 1.4MHz, QPSK, Channel 20407 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2980.30	-41.86	1.00	11.40	-33.60	-13.00	V
4874.00	-60.39	1.40	12.60	-51.30	-13.00	V
9504.00	-59.21	2.10	11.90	-51.60	-13.00	V
13220.50	-59.06	2.30	12.90	-50.60	-13.00	V
15325.50	-59.58	2.40	15.50	-48.60	-13.00	H
17101.00	-54.70	2.90	13.20	-46.60	-13.00	V

LTE Band 5, 1.4MHz, QPSK, Channel 20525 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2964.30	-41.00	1.00	11.40	-32.80	-13.00	H
4873.50	-60.37	1.40	12.60	-51.30	-13.00	V
11604.00	-58.26	2.60	11.50	-51.50	-13.00	V
13228.00	-58.40	2.30	12.90	-50.00	-13.00	V
15072.50	-56.85	2.50	13.00	-48.50	-13.00	V
16813.00	-55.49	2.90	13.20	-47.30	-13.00	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2613.30	-42.73	1.00	10.80	-35.10	-13.00	H
4874.00	-60.29	1.40	12.60	-51.20	-13.00	V
11669.00	-57.57	2.60	11.50	-50.80	-13.00	V
14063.00	-57.79	2.50	12.30	-50.10	-13.00	V
16408.50	-57.59	2.70	15.20	-47.20	-13.00	V
17665.00	-52.77	3.30	11.20	-47.00	-13.00	V

LTE Band 5, 1.4MHz, 16QAM, Channel 20407 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2934.40	-41.77	1.00	11.40	-33.52	-13.00	H
4874.00	-61.12	1.40	12.60	-52.07	-13.00	V
12695.50	-60.00	2.60	14.10	-50.65	-13.00	V
14902.00	-57.40	2.40	13.00	-48.95	-13.00	H
16372.00	-58.64	2.70	15.20	-48.29	-13.00	V
17826.00	-52.18	3.60	11.20	-46.73	-13.00	H

LTE Band 5, 1.4MHz, 16QAM, Channel 20525 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2900.80	-41.66	1.00	11.40	-33.41	-13.00	H
4874.00	-60.59	1.40	12.60	-51.54	-13.00	V
10541.00	-59.18	2.20	11.00	-52.53	-13.00	V
13368.50	-58.51	2.30	12.90	-50.06	-13.00	V
15333.00	-56.59	2.70	13.00	-48.44	-13.00	H
17101.50	-54.66	2.90	13.20	-46.51	-13.00	V

LTE Band 5, 1.4MHz, 16QAM, Channel 20643 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit （dBm）	Polarization
2944.00	-41.94	1.00	11.40	-33.69	-13.00	V
4874.00	-61.04	1.40	12.60	-51.99	-13.00	V
11685.50	-57.87	2.60	11.50	-51.12	-13.00	H
14348.00	-56.85	2.60	11.90	-49.70	-13.00	V
15582.00	-59.52	2.70	15.50	-48.87	-13.00	H
17041.50	-54.52	2.90	13.20	-46.37	-13.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 3.34dB(30MHz-3GHz)/4.06dB(3GHz-18GHz)/4.56dB(18GHz-40GHz), k = 2

LTE Band 7, 5 MHz, QPSK, Channel 20775 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2954.10	-41.54	1.00	11.40	-31.14	-25.00	H
4874.00	-61.45	1.40	12.60	-50.25	-25.00	V
12339.00	-59.59	2.60	14.10	-48.09	-25.00	V
14421.00	-56.59	2.60	11.90	-47.29	-25.00	H
16021.00	-59.93	2.60	16.90	-45.63	-25.00	V
17089.50	-55.36	2.90	13.20	-45.06	-25.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21100 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2926.40	-41.47	1.00	11.40	-31.07	-25.00	V
4874.00	-60.94	1.40	12.60	-49.74	-25.00	V
5066.00	-53.94	1.20	12.60	-42.54	-25.00	V
14029.00	-57.60	2.50	12.30	-47.80	-25.00	V
15942.50	-60.49	2.60	16.90	-46.19	-25.00	H
17385.50	-54.11	2.90	11.20	-45.81	-25.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21425 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2929.90	-41.36	1.00	11.40	-30.96	-25.00	H
4874.00	-60.55	1.40	12.60	-49.35	-25.00	V
5131.00	-58.91	1.30	12.60	-47.61	-25.00	H
13773.50	-58.40	2.20	12.30	-48.30	-25.00	V
15995.50	-59.32	2.60	16.90	-45.02	-25.00	V
17180.50	-54.25	3.20	13.20	-44.25	-25.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 20775 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2928.80	-41.81	1.00	11.40	-31.41	-25.00	H
4874.00	-60.29	1.40	12.60	-49.09	-25.00	V
10977.00	-57.45	2.30	11.00	-48.75	-25.00	V
12961.50	-59.64	2.50	13.70	-48.44	-25.00	H
15302.00	-56.36	2.70	13.00	-46.06	-25.00	V
16992.50	-54.59	2.90	13.20	-44.29	-25.00	V

LTE Band 7, 5 MHz, 16QAM, Channel 21100 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2964.00	-41.22	1.00	11.40	-30.82	-25.00	H
4874.00	-61.27	1.40	12.60	-50.07	-25.00	V
5066.00	-52.12	2.30	12.90	-41.52	-25.00	H
14168.00	-57.50	2.50	12.30	-47.70	-25.00	H
15554.00	-58.75	2.70	15.50	-45.95	-25.00	V
16985.00	-55.40	2.90	13.20	-45.10	-25.00	H

LTE Band 7, 5 MHz, 16QAM, Channel 21425 with GNSS function was on and WLAN was continuously launched (WLAN was worked on 802.11b channel 6,power level is 14 and modulation group is 0)

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Polarization
2915.50	-41.42	1.00	11.40	-31.02	-25.00	H
4874.00	-60.54	1.40	12.60	-49.34	-25.00	V
5130.50	-60.68	1.30	12.60	-49.38	-25.00	H
13514.00	-58.76	2.40	12.90	-48.26	-25.00	V
15866.50	-61.49	2.60	16.90	-47.19	-25.00	H
17357.50	-53.32	2.90	11.20	-45.02	-25.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 3.34dB(30MHz-3GHz)/4.06dB(3GHz-18GHz)/4.56dB(18GHz-40GHz), k = 2

A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 22.355, 27.54.

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

A.3.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 19.2VDC and 28.8VDC, with a nominal voltage of 24VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.3 Measurement results

LTE Band 5, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
19.2	33	46	0.039	0.055
24	45	55	0.054	0.066
28.8	11	61	0.013	0.073

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	25	36	0.030	0.043
-20	51	58	0.061	0.069
-10	49	47	0.059	0.056
0	44	44	0.053	0.053
10	33	46	0.039	0.055
20	52	52	0.062	0.062
30	64	38	0.077	0.045
40	29	62	0.035	0.074
50	36	51	0.043	0.061

Expanded measurement uncertainty is 10Hz, *k* = 2

LTE Band 7, 10MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
19.2	35	36	0.014	0.014
24	28	56	0.011	0.022
28.8	15	22	0.006	0.009

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
-30	17	56	0.007	0.022
-20	48	29	0.019	0.011
-10	51	58	0.020	0.023
0	44	47	0.017	0.019
10	49	16	0.019	0.006
20	38	59	0.015	0.023
30	59	38	0.023	0.015
40	61	43	0.024	0.017
50	24	29	0.009	0.011

Expanded measurement uncertainty is 10Hz, k = 2

A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 27.53.

A.4.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

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 (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

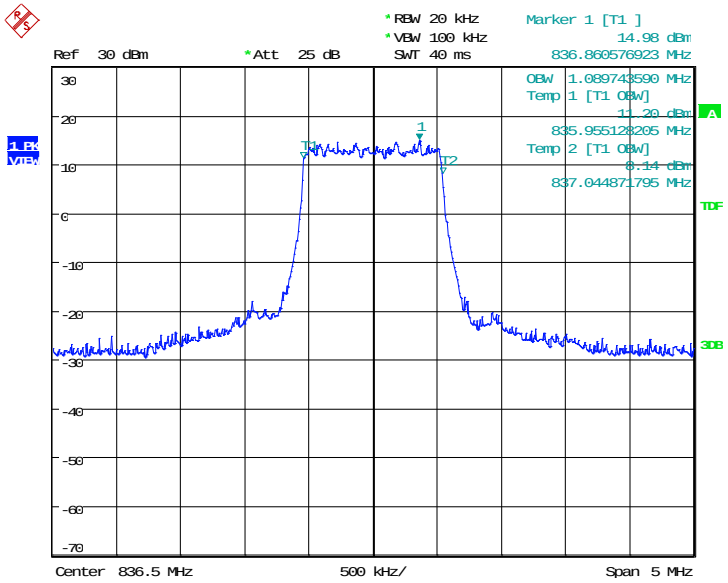
d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

LTE band 5, 1.4MHz (99%)

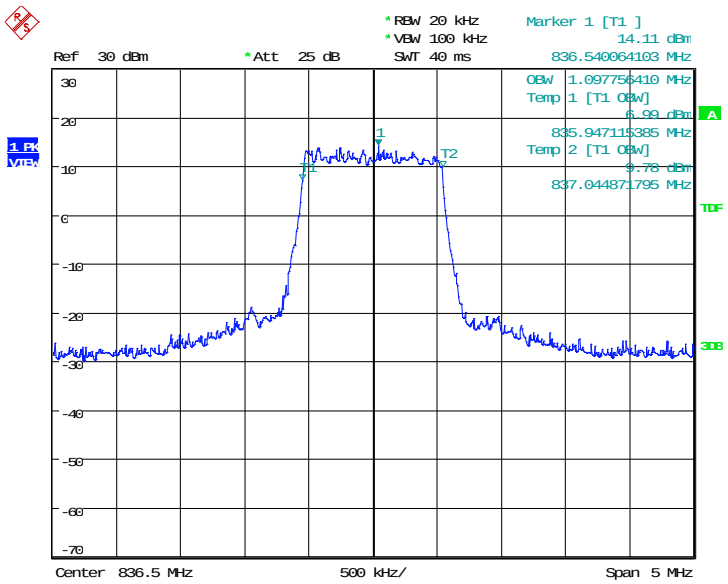
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	1089.74	1097.76

LTE band 5, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:41:24

LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)

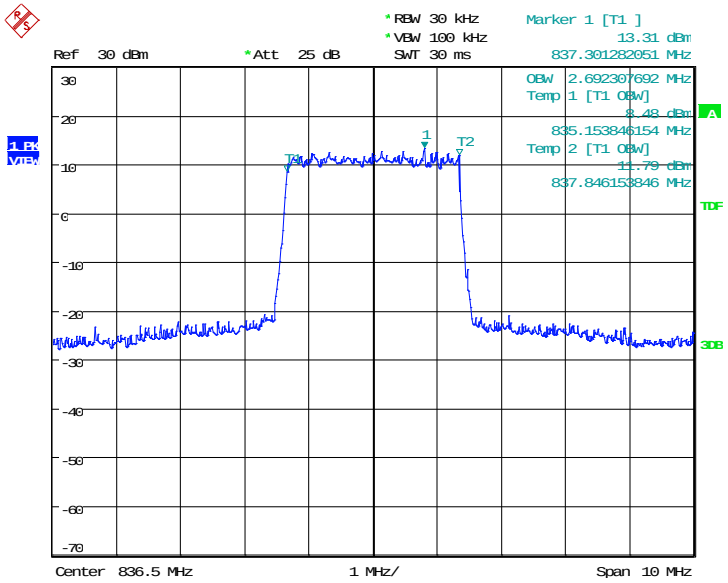


Date: 7.MAR.2019 05:41:38

LTE band 5, 3MHz (99%)

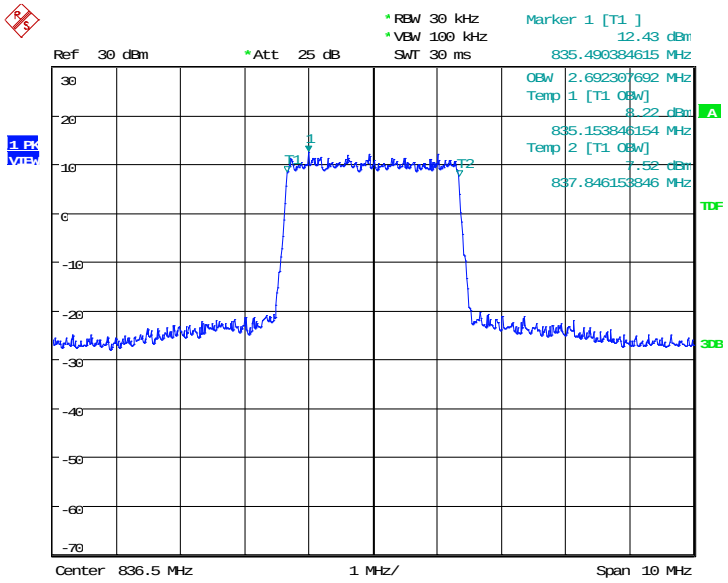
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	2692.31	2692.31

LTE band 5, 3MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:44:33

LTE band 5, 3MHz Bandwidth, 16QAM (99% BW)

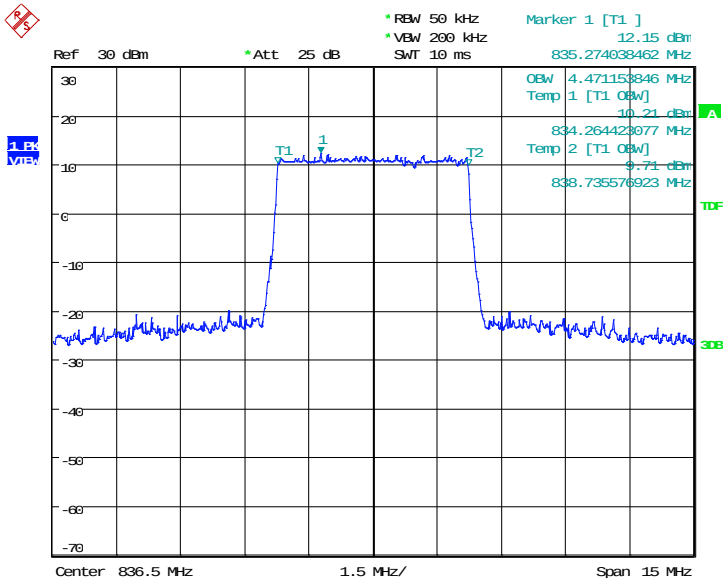


Date: 7.MAR.2019 05:44:47

LTE band 5, 5MHz (99%)

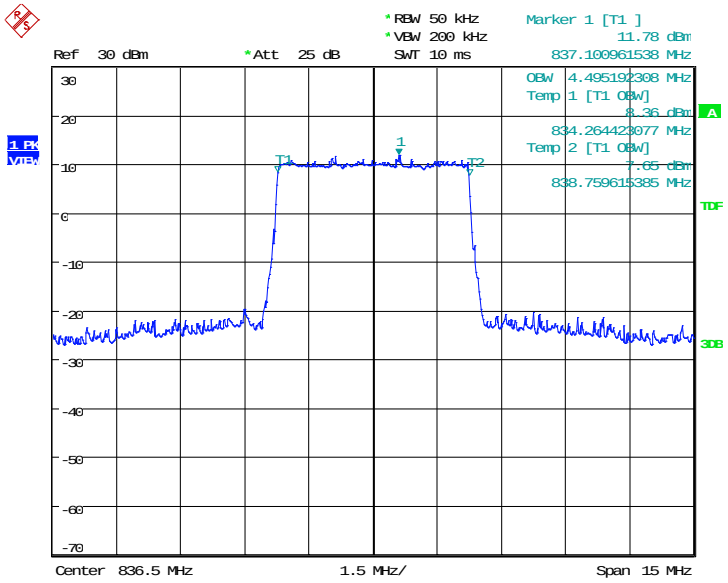
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	4471.15	4495.19

LTE band 5, 5MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:47:41

LTE band 5, 5MHz Bandwidth,16QAM (99% BW)

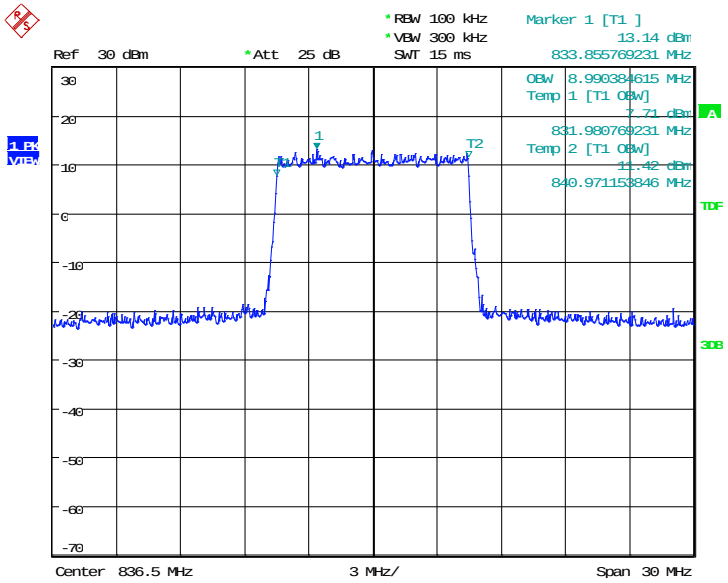


Date: 7.MAR.2019 05:47:55

LTE band 5, 10MHz (99%)

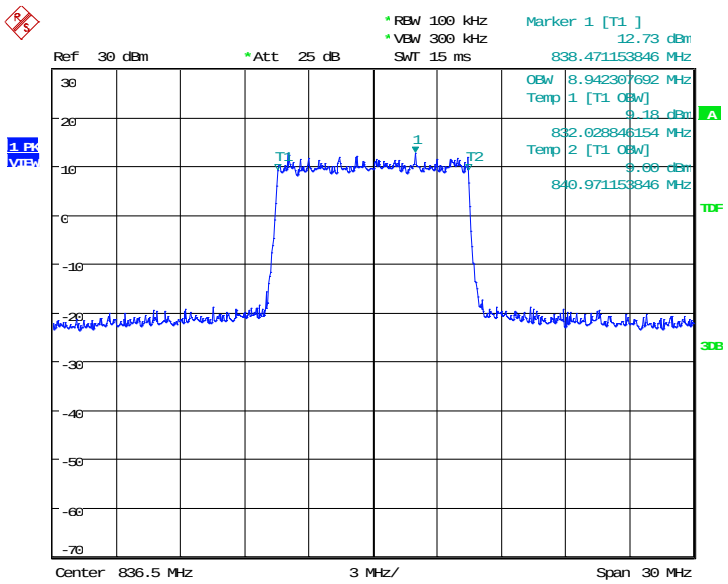
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
836.5	QPSK	16QAM
	8990.38	8942.31

LTE band 5, 10MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:50:50

LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)

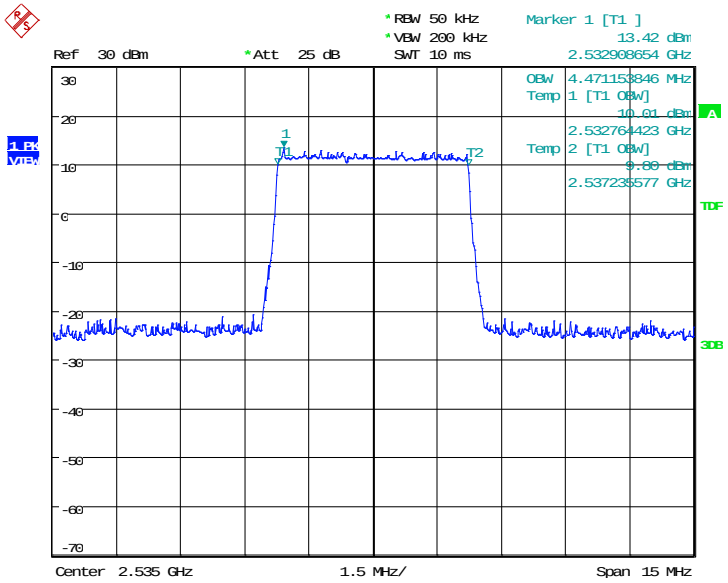


Date: 7.MAR.2019 05:51:04

LTE band 7, 5MHz (99%)

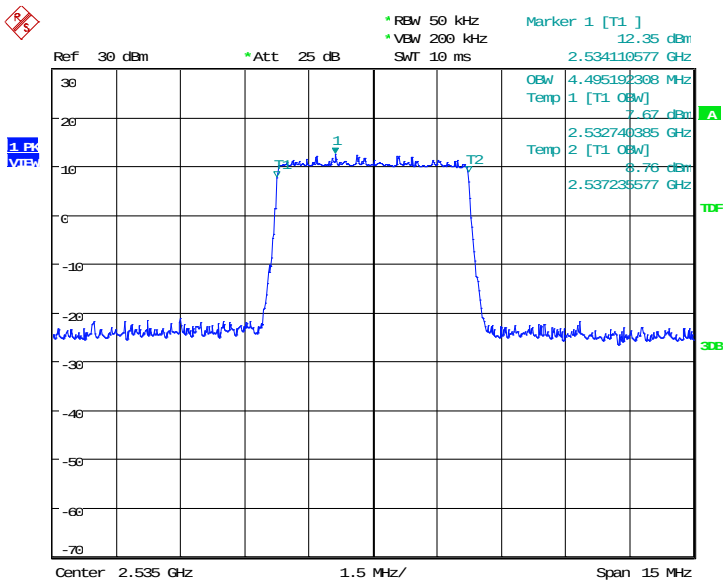
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	4471.15	4495.19

LTE band 7, 5MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:28:42

LTE band 7, 5MHz Bandwidth,16QAM (99% BW)

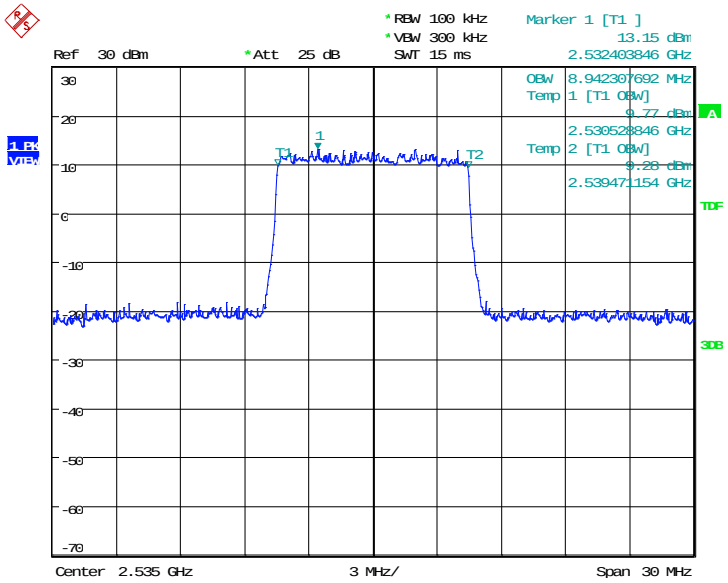


Date: 7.MAR.2019 05:28:56

LTE band 7, 10MHz (99%)

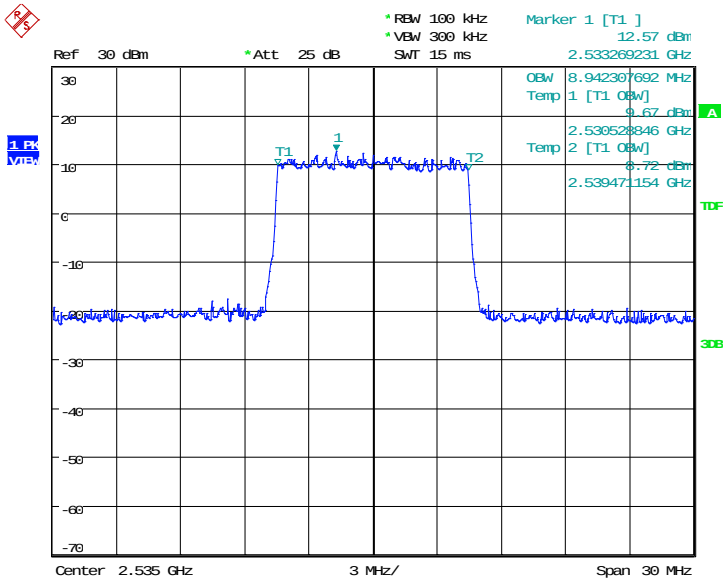
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	8942.31	8942.31

LTE band 7, 10MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:31:51

LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)

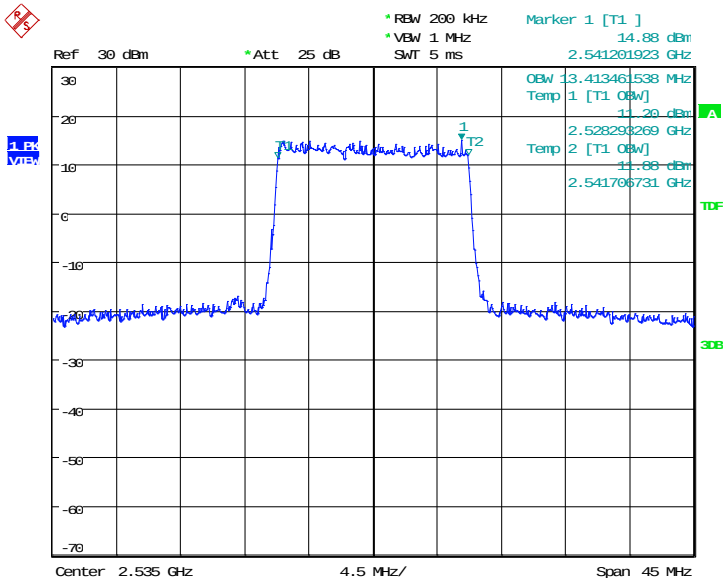


Date: 7.MAR.2019 05:32:05

LTE band 7, 15MHz (99%)

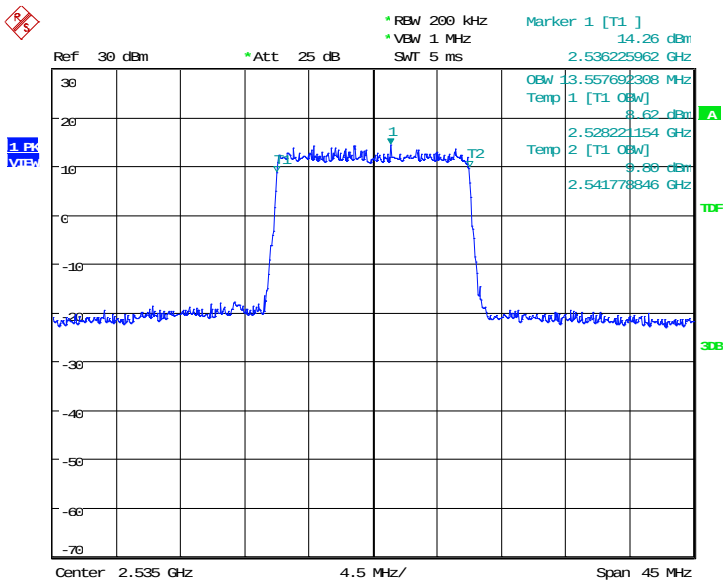
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	13413.46	13557.69

LTE band 7, 15MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:35:00

LTE band 7, 15MHz Bandwidth, 16QAM (99% BW)

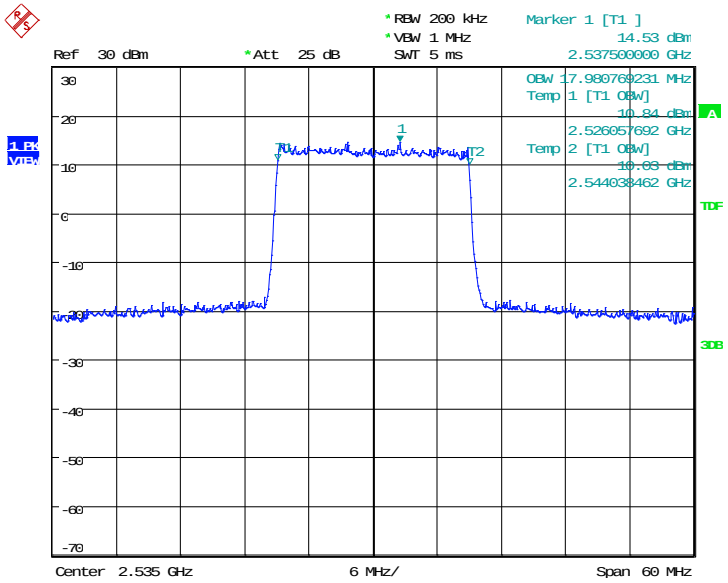


Date: 7.MAR.2019 05:35:14

LTE band 7, 20MHz (99%)

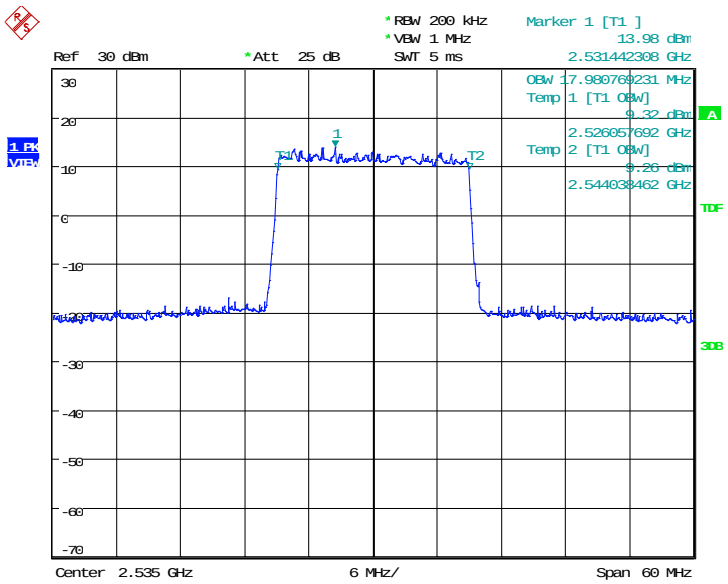
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	17980.77	17980.77

LTE band 7, 20MHz Bandwidth, QPSK (99% BW)



Date: 7.MAR.2019 05:38:10

LTE band 7, 20MHz Bandwidth, 16QAM (99% BW)



Date: 7.MAR.2019 05:38:23

Note: Expanded measurement uncertainty is U = 3428Hz, k = 2

A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 27.53

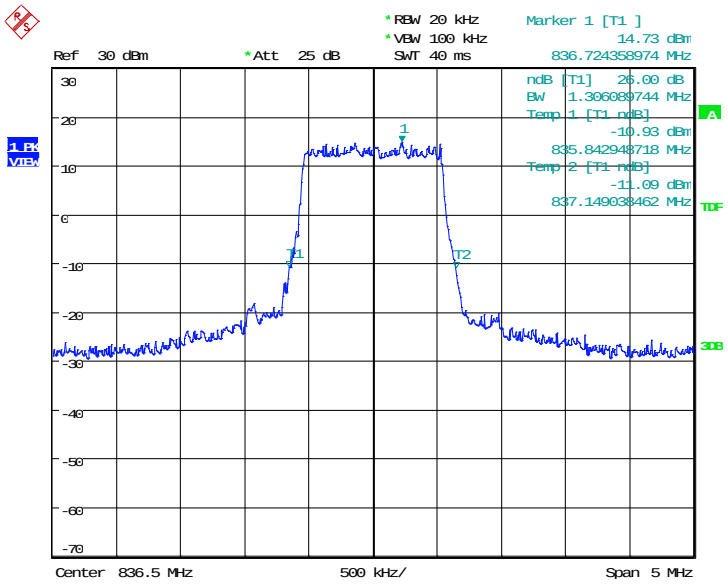
A.5.1Emission Bandwidth Results

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

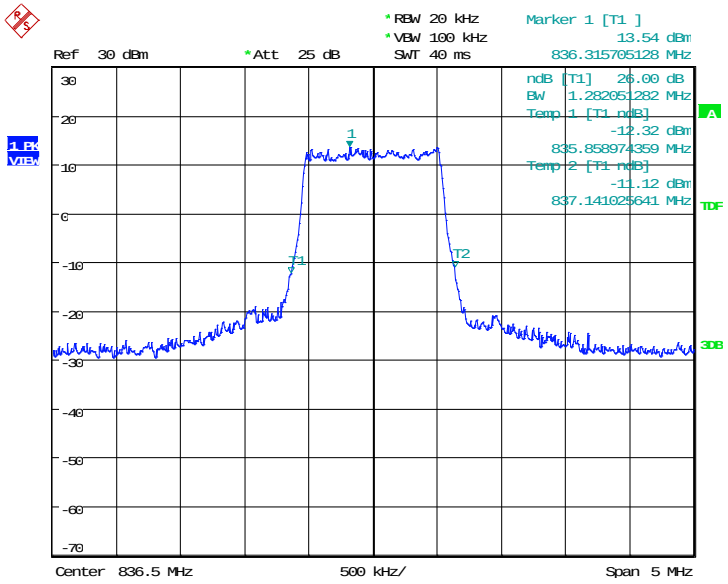
LTE band 5, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	1306.09	1282.05

LTE band 5, 1.4MHz Bandwidth, QPSK (-26dBc BW)



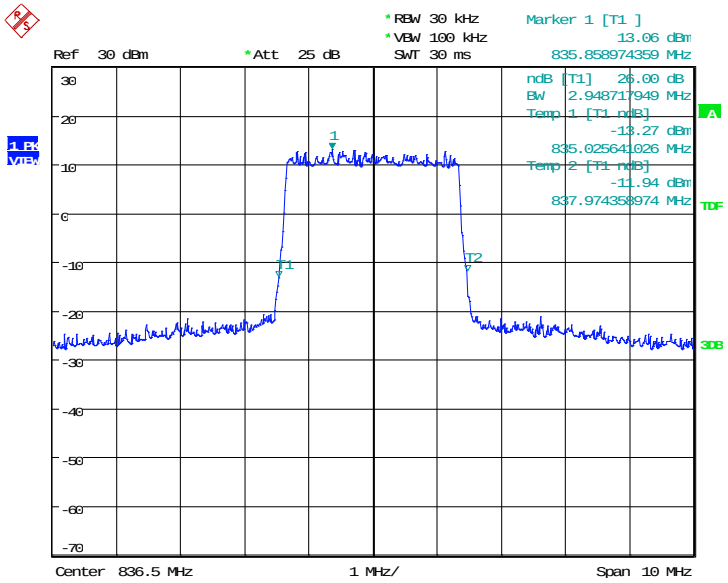
LTE band 5, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



LTE band 5, 3MHz (-26dBc)

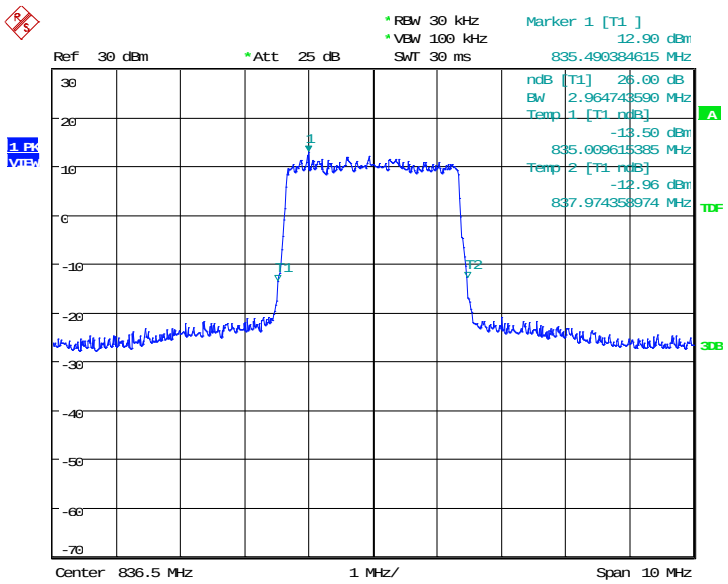
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	2948.72	2964.74

LTE band 5, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.MAR.2019 05:45:41

LTE band 5, 3MHz Bandwidth, 16QAM (-26dBc BW)

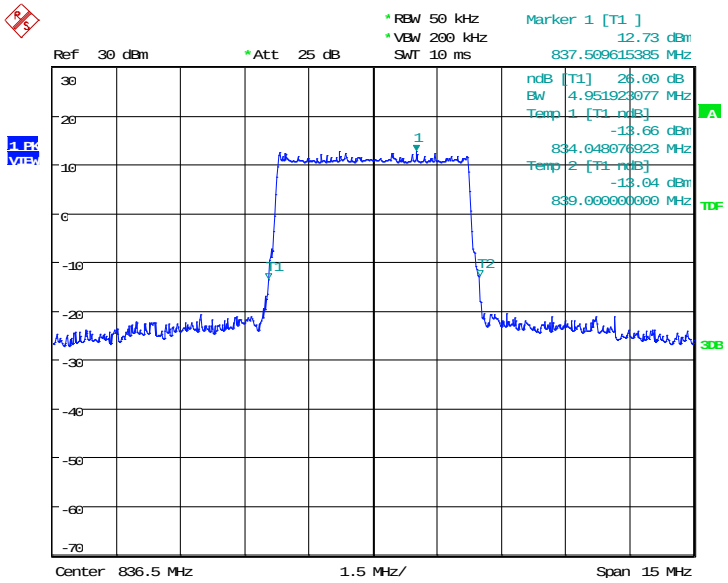


Date: 7.MAR.2019 05:45:57

LTE band 5, 5MHz (-26dBc)

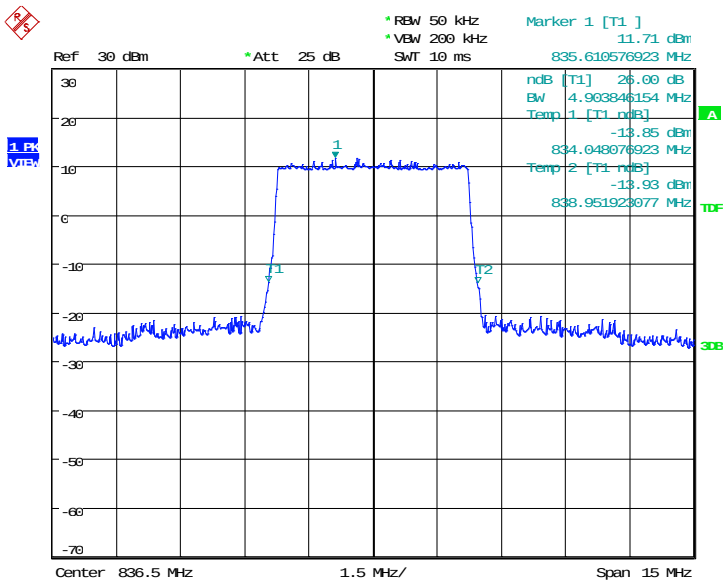
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	4951.92	4903.85

LTE band 5, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.MAR.2019 05:48:49

LTE band 5, 5MHz Bandwidth,16QAM (-26dBc BW)

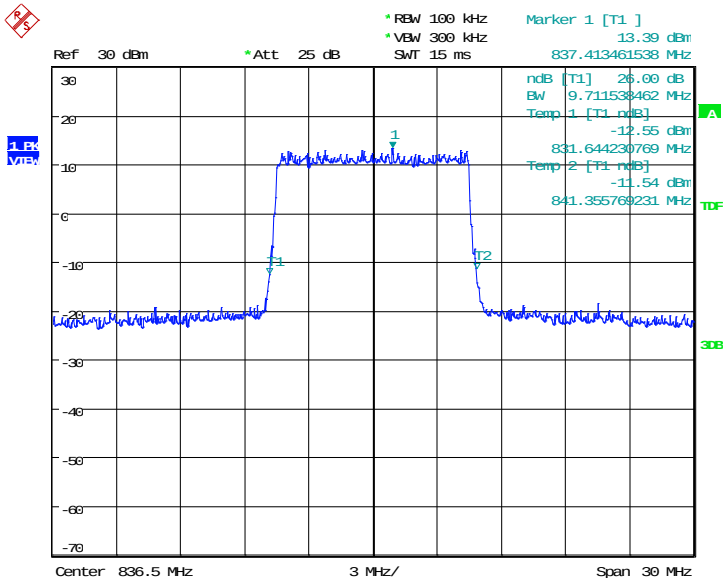


Date: 7.MAR.2019 05:49:05

LTE band 5, 10MHz (-26dBc)

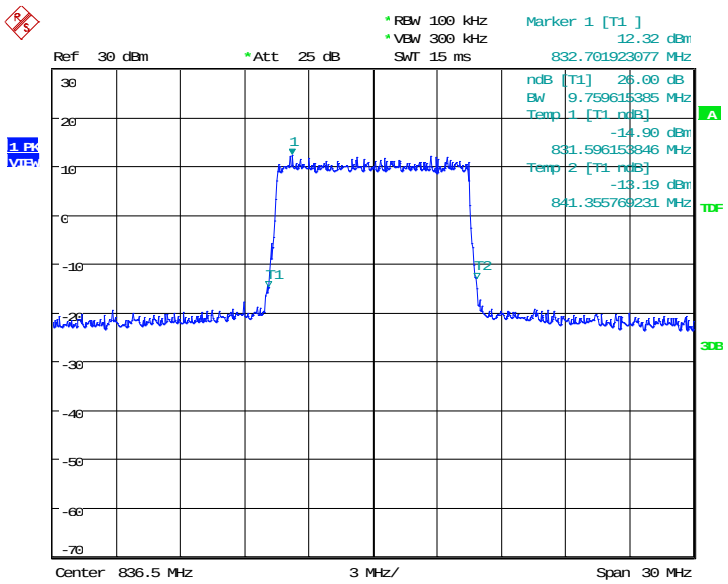
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
836.5	QPSK	16QAM
	9711.54	9759.62

LTE band 5, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.MAR.2019 05:51:58

LTE band 5, 10MHz Bandwidth, 16QAM (-26dBc BW)

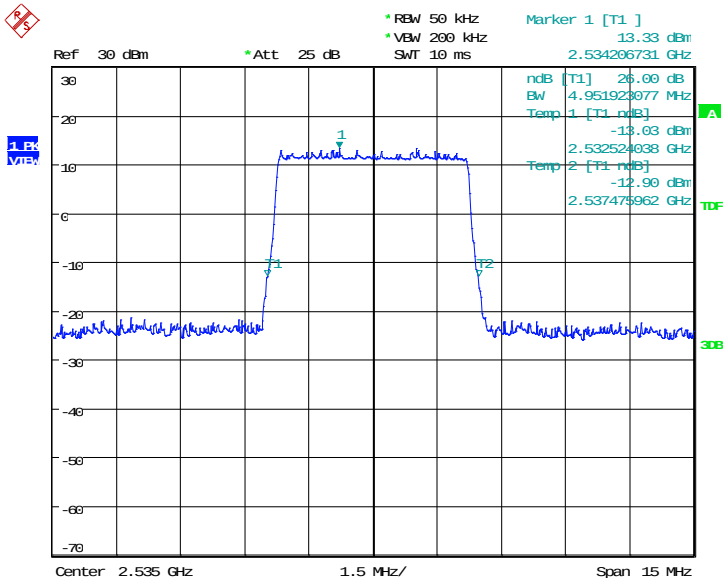


Date: 7.MAR.2019 05:52:14

LTE band 7, 5MHz (-26dBc)

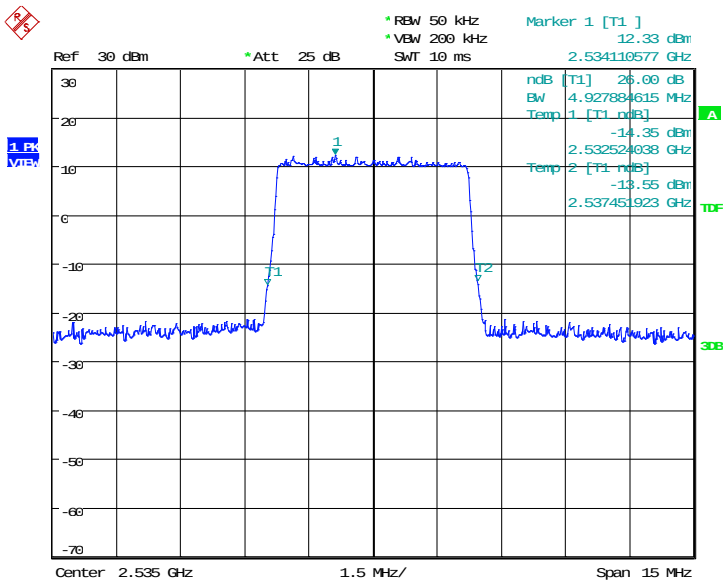
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	4951.92	4927.88

LTE band 7, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.MAR.2019 05:29:50

LTE band 7, 5MHz Bandwidth,16QAM (-26dBc BW)

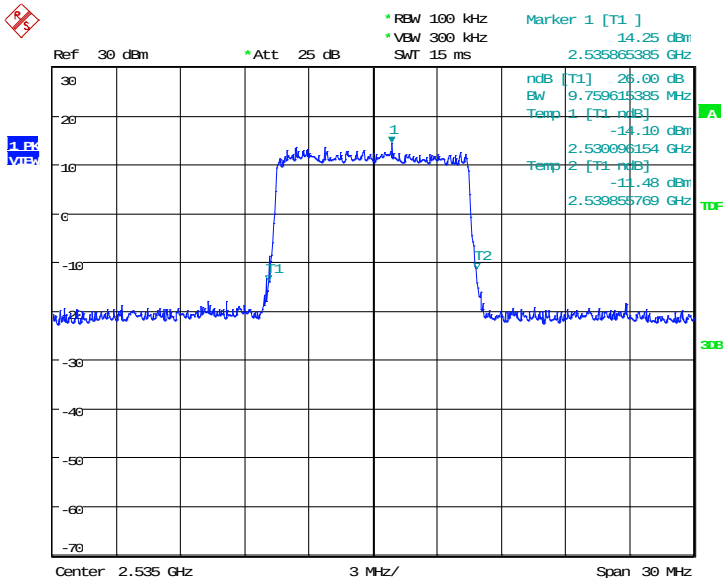


Date: 7.MAR.2019 05:30:06

LTE band 7, 10MHz (-26dBc)

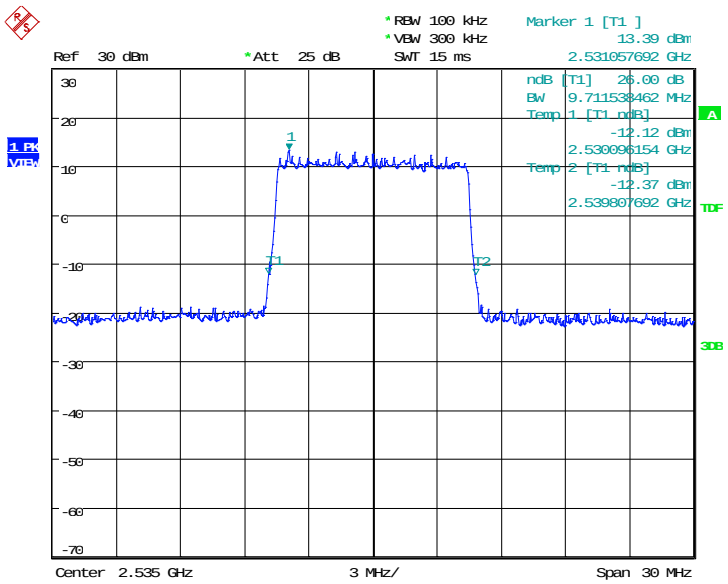
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	9759.62	9711.54

LTE band 7, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.MAR.2019 05:32:59

LTE band 7, 10MHz Bandwidth, 16QAM (-26dBc BW)

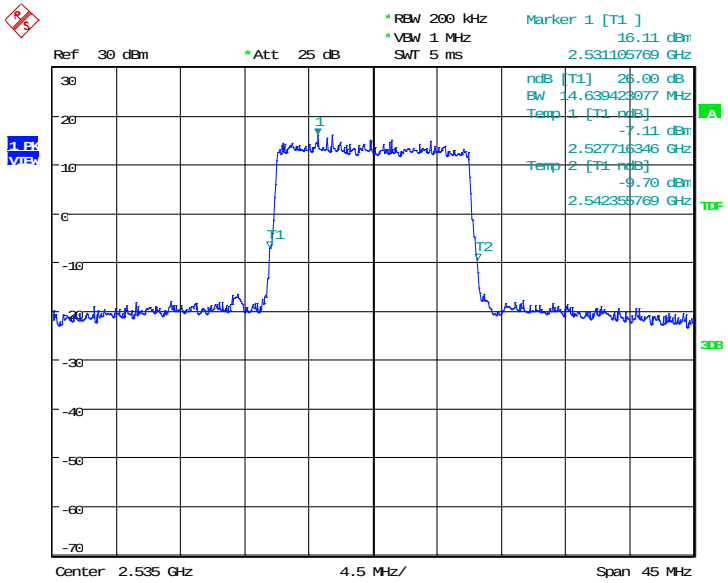


Date: 7.MAR.2019 05:33:15

LTE band 7, 15MHz (-26dBc)

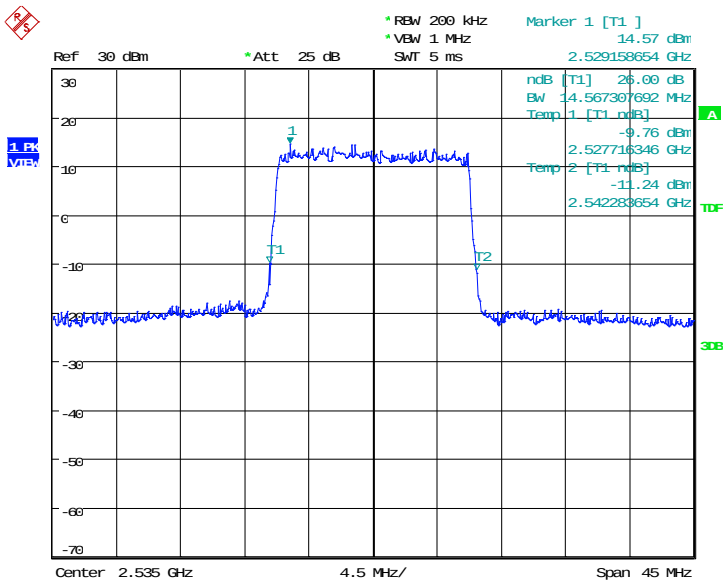
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	14639.42	14567.31

LTE band 7, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 7.MAR.2019 05:36:08

LTE band 7, 15MHz Bandwidth, 16QAM (-26dBc BW)

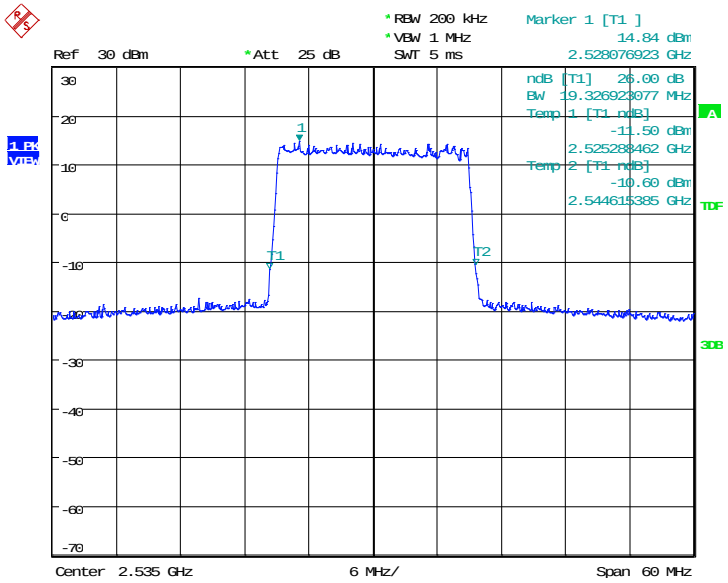


Date: 7.MAR.2019 05:36:24

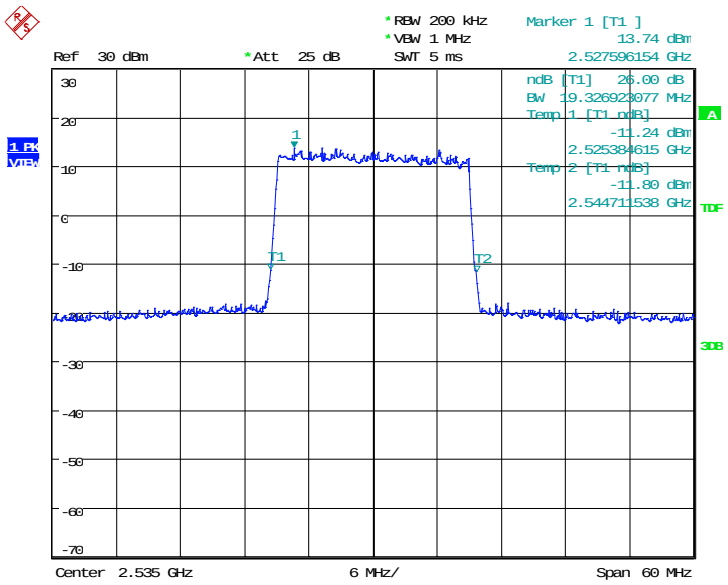
LTE band 7, 20MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	19326.92	19326.92

LTE band 7, 20MHz Bandwidth, QPSK (-26dBc BW)



LTE band 7, 20MHz Bandwidth, 16QAM (-26dBc BW)



Note: Expanded measurement uncertainty is U = 3428Hz, k = 2

A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 2.1051, 22.91, 27.53.

A.6.1 Measurement limit

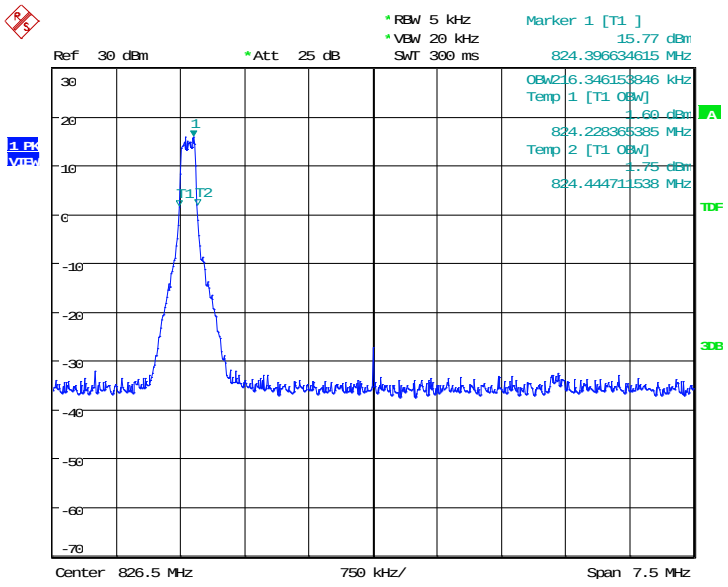
On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. A relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

A.6.2 Measurement result

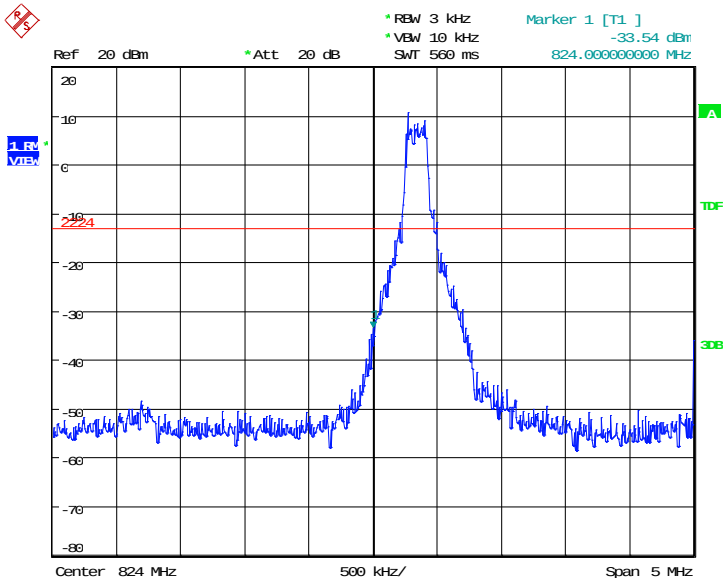
Only worst case result is given below

LTE band 5

OBW: 5MHz-1RB-low_offset- QPSK

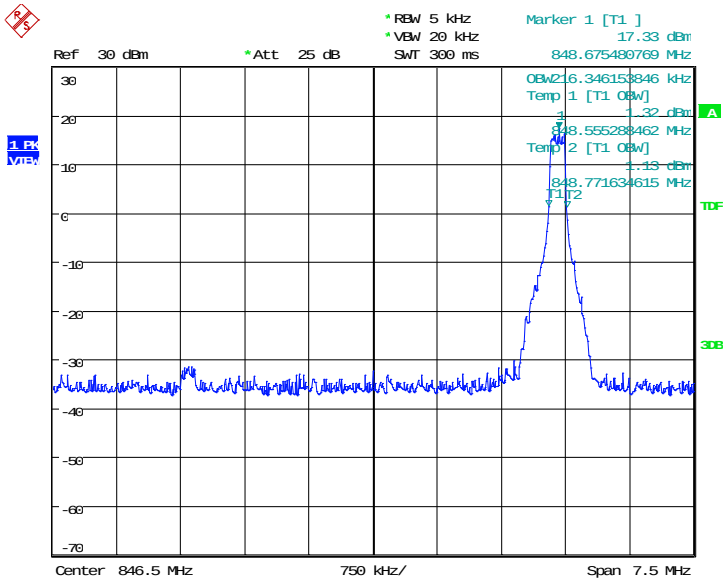


LOW BAND EDGE BLOCK-5MHz-1RB-low_offset-QPSK



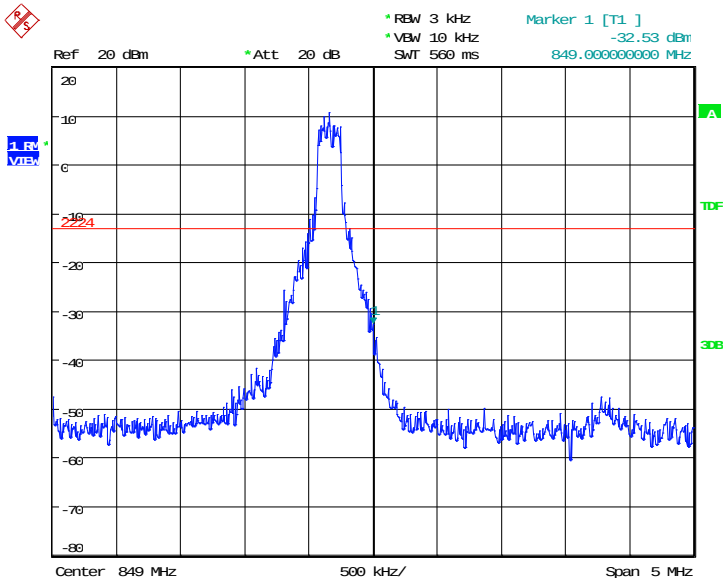
Date: 7.MAR.2019 06:09:52

OBW: 5MHz-1RB-high_offset-QPSK



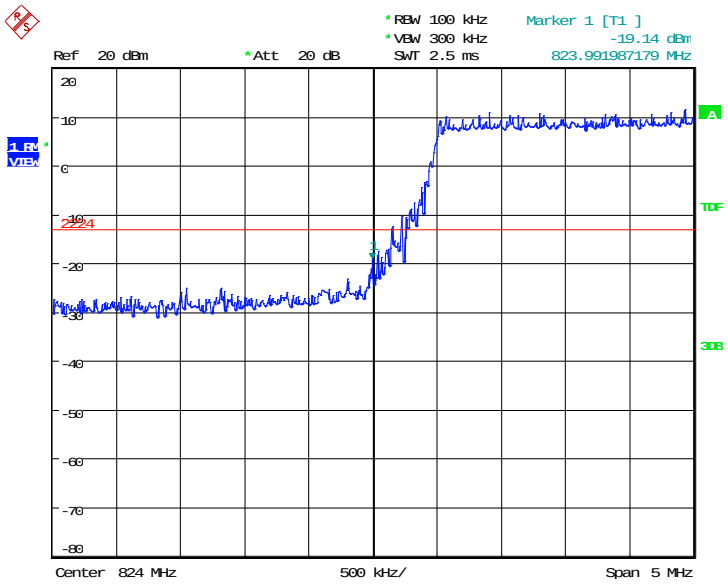
Date: 7.MAR.2019 06:04:18

HIGH BAND EDGE BLOCK-5MHz-1RB-high_offset-QPSK



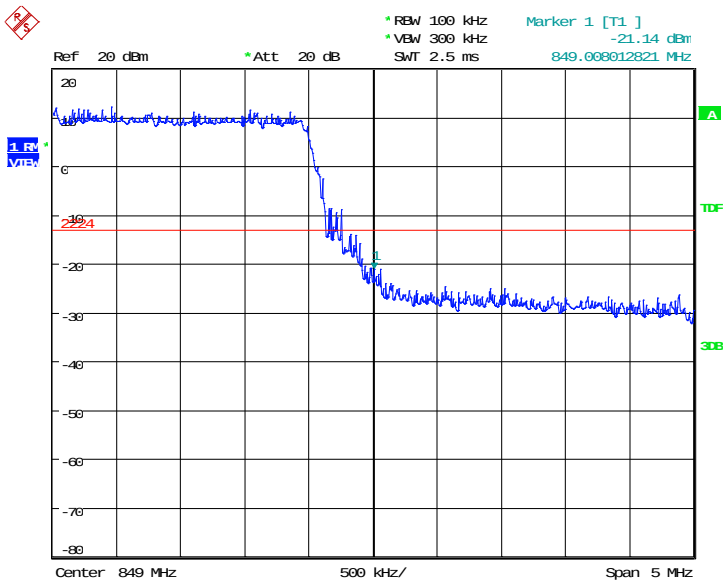
Date: 7.MAR.2019 06:05:02

LOW BAND EDGE BLOCK-10MHz-100%RB-QPSK



Date: 7.MAR.2019 06:17:34

HIGH BAND EDGE BLOCK-10MHz-100%RB-QPSK

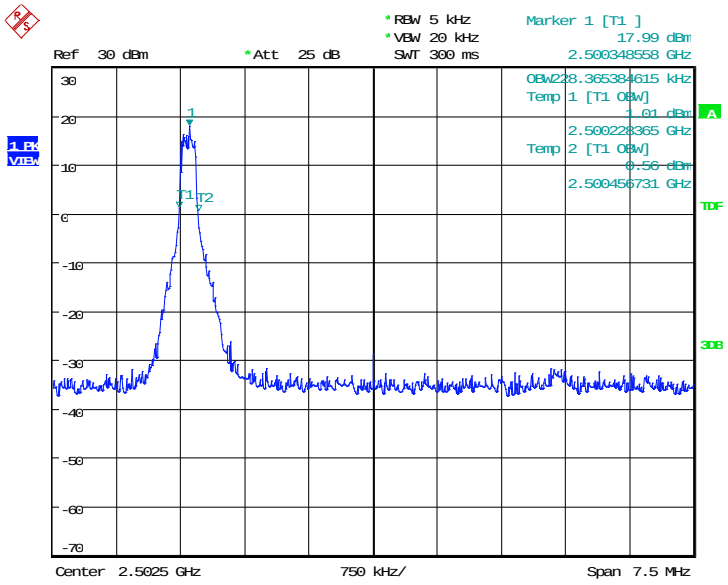


Date: 7.MAR.2019 06:18:20

Only worst case result is given below

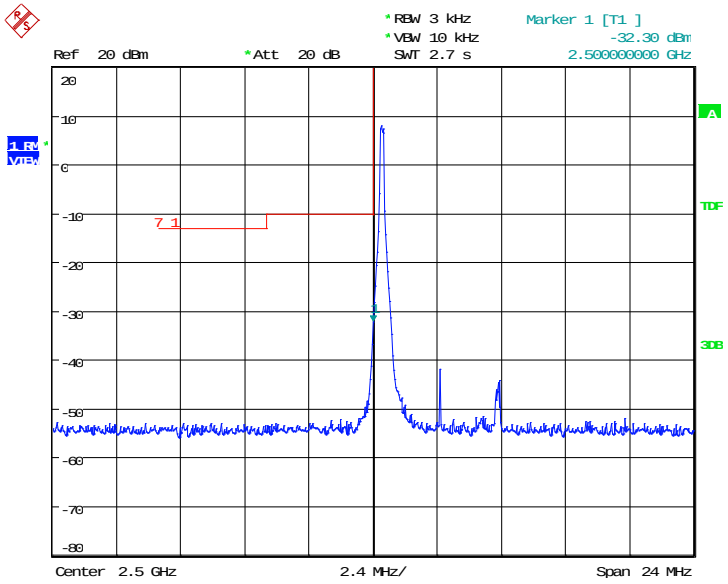
LTE band 7

OBW: 5MHz-1RB-low_offset- QPSK



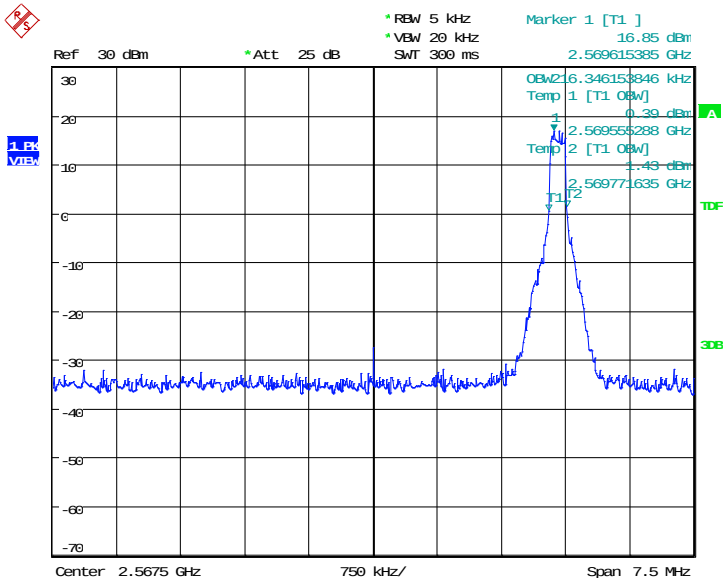
Date: 7.MAR.2019 06:07:28

LOW BAND EDGE BLOCK-5MHz-1RB-low_offset-QPSK



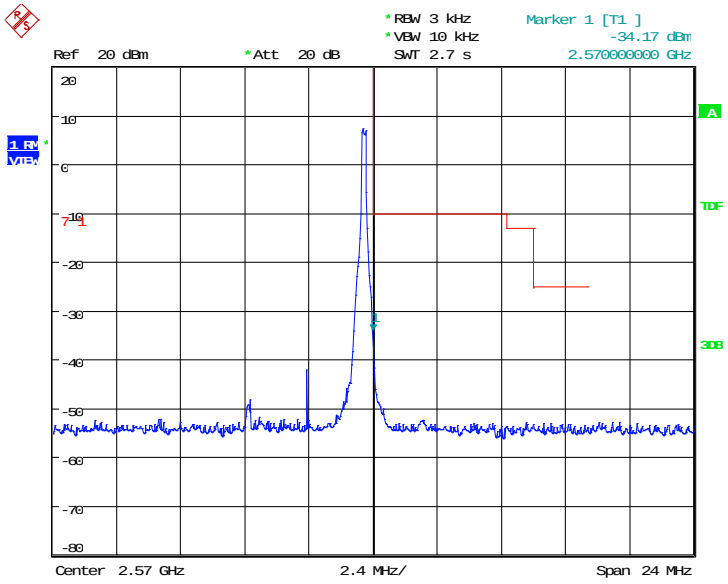
Date: 7.MAR.2019 06:26:36

OBW: 5MHz-1RB-high_offset-QPSK



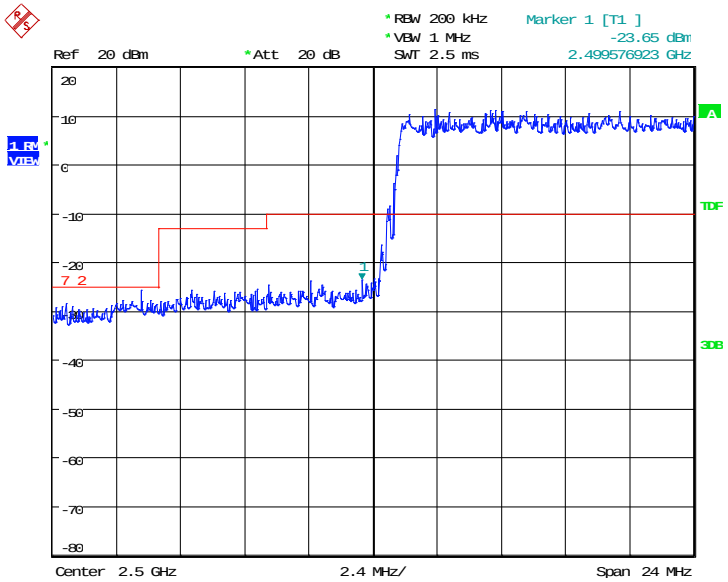
Date: 7.MAR.2019 06:02:37

HIGH BAND EDGE BLOCK-5MHz-1RB-high_offset-QPSK

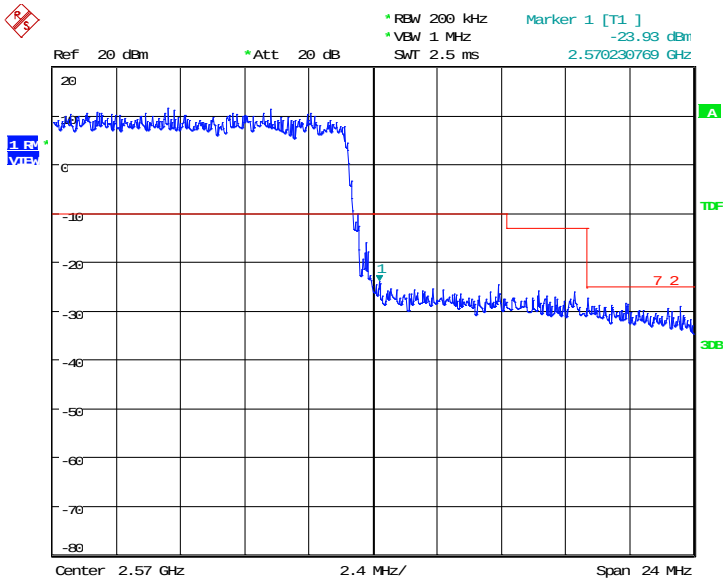


Date: 7.MAR.2019 06:27:36

LOW BAND EDGE BLOCK-20MHz-100%RB-QPSK



HIGH BAND EDGE BLOCK-20MHz-100%RB-QPSK



Note: Expanded measurement uncertainty is U = 0.488dB(100KHz-2GHz)/1.211dB(2GHz-26.5GHz), k = 1.96

A.7 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1051, 22.917, 27.53.

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1051 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

A. 7.2 Measurement Limit

Part 22.917 and Part 27.53(h) specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (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 that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 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.

Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: 43 +10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB onall frequencies between 2328 and 2337MHz;

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz; By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

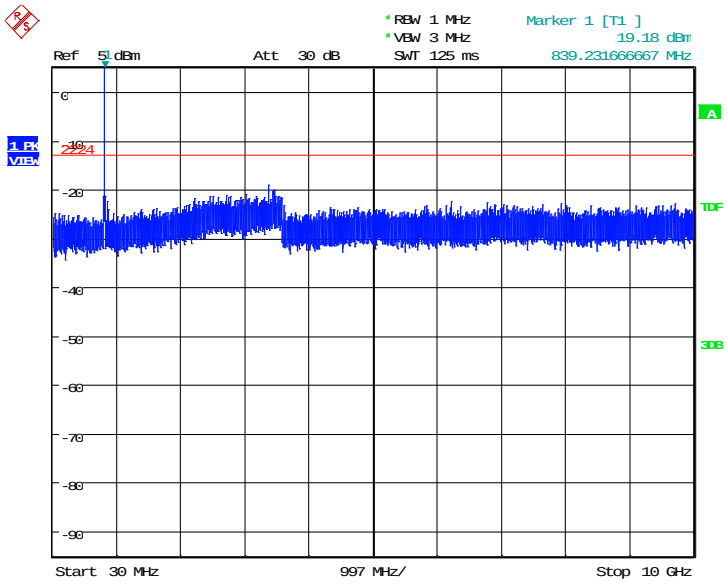
A. 7.3 Measurement result

Only worst case result is given below

LTE band 5 : 30MHz – 10GHz,10MHz, QPSK

Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.

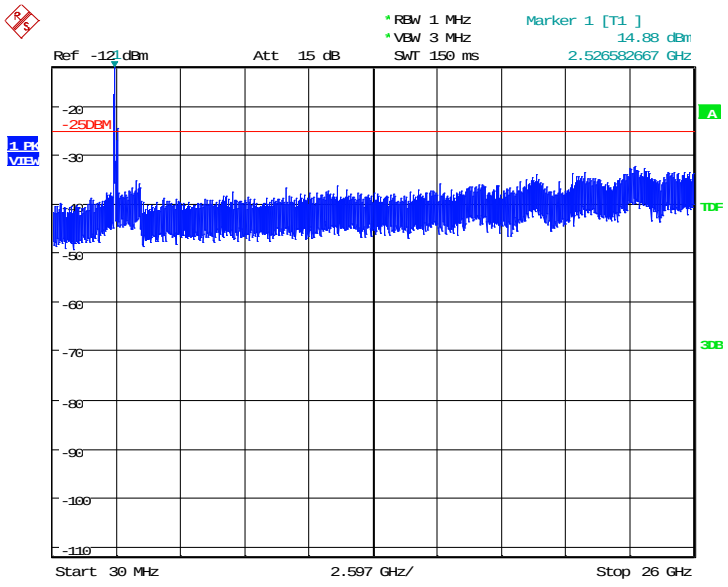


Only worst case result is given below

LTE band 7: 30MHz – 26GHz, 20MHz, QPSK

Spurious emission limit –13dBm.

NOTE: peak above the limit line is the carrier frequency.



Note: Expanded measurement uncertainty is U = 0.488dB(100KHz-2GHz)/1.211dB(2GHz-26.5GHz), k = 1.96

A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 27.50(d)

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

a)Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1 ms

e)Record the maximum PAPR level associated with a probability of 0.1%

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

LTE band 7

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)	
		QPSK	16QAM
2510.0	20	7.28	7.60
	15	6.67	7.34
	10	5.99	6.73
	5	5.90	6.51

Note: Expanded measurement uncertainty is U = 0.483, k = 2

*****END OF REPORT*****