TEST REPORT

No. I20N03314-RF-LTE

for

HMD Global Oy

Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN

Model Name: TA-1336

FCC ID: 2AJOTTA-1336

with

Hardware Version: 99652_1_11

Software Version: 000T_0_060

Issued Date: 2021-04-07

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:

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 518000.

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

Email: yewu@caict.ac.cn. www.saict.ac.cn

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20N03314-RF-LTE	Rev.0	1st edition	2021-04-07

Note1: The EUT is a variant model of TA-1347, All the original values of this report are quoted directly from I20N03261-RF-LTE, except the test case of LTE Band 41(2535-2655 MHz), and we just do some spot check of Variant TA-1336..

Note2：As the frequency band range of LTE Band 41(2535-2655 MHz) overlaps the range of LTE Band 38(2570-2620 MHz), the channel bandwidth and other perating parameters for LTE Band 38 are fully supported by LTE Band 41(2535-2655 MHz), and the miximum output power of LTE Band 41(2535-2655 MHz) is larger than the LTE Band 38, we just need to test all the cases of LTE Band 41(2535-2655 MHz).

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1. SUMMARY OF TEST REPORT

1.1. Test Items

Description	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model Name	TA-1336
Applicant's name	HMD Global Oy
Manufacturer's Name	HMD Global Oy

1.2. Test Standards

FCC Part 2/22/27	10-1-19 Edition
ANSI C63.26	2015
KDB971168 D01	v03r01

1.3. Test Result

All test items are pass. Please refer to "6 Summary of Test Results" for detail.

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000

1.5. Project Data

Testing Start Date: 2020-12-14 Testing End Date: 2021-04-07

1.6. Signature

Lai Minghua
(Prepared this test report)

Huang Qiuqin
(Reviewed this test report)

Zhang Hao
(Approved this test report)

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2. CLIENT INFORMATION

2.1. Applicant Information

Company Name:	HMD Global Oy
Address /Post:	Bertel Jungin aukio 902600 Espoo，Finland
Contact Person:	Rosario Casillo
Contact Email	Rosario Casillo@hmdglobal.com
Telephone:	/
Fax:	/

2.2. Manufacturer Information

Company Name:	HMD Global Oy
Address /Post:	Bertel Jungin aukio 902600 Espoo，Finland
Contact Person:	Rosario Casillo
Contact Email	Rosario Casillo@hmdglobal.com
Telephone:	/
Fax:	/

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3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)

3.1. About EUT

Description	Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN
Model Name	TA-1336
FCC ID	2AJOTTA-1336
Frequency Bands	LTE Bands 5,7, 38, 41(2535-2655 MHz)
Antenna	Integrated
Extreme vol. Limits	3.6V to 4.4V (nominal: 3.85V)
Extreme temp. Tolerance	-10°C to +45°C
Condition of EUT as received	No abnormality in appearance

Note: The Declaration of changes from Initial TA-1347 to Variant TA-1336 is as below:

TA-1347 is single SIM, TA-1336 is dual SIM. And Band changes：

TA-1347 GSM : 850,900,1800,1900 WCDMA : 1,2,4,5,8 LTE : 1,2,3,4,5,7,8,12,17,28,66

TA-1336 GSM : 850,900,1800,1900 WCDMA : 1,2,5,8 LTE : 1,3,5,7,8,20,28,38,41

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Sample Arrival Date
UT06aa	359358480000004	99652_1_11	000T_0_060	2020-12-14
UT19aa	359358480001725	99652_1_11	000T_0_060	2020-12-14
UT05aa	358846150003667	99652_1_11	000T_0_060	2020-12-14
UT10aa	358846150013724	99652_1_11	000T_0_060	2020-12-14
UT07aa	358846150013724	99652_1_11	000T_0_060	2020-12-14

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

UT06aa and UT05aa are used for conduction test, UT19aa, UT10aa and UT07aa are used for radiation test.

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery

AE1

Model	WT340
Manufacturer	Guangdong Fenghua New Energy Co.,Ltd
Capacity	4900mAh
Nominal Voltage	3.85V

*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 Multi-band GSM/WCDMA/LTE phone with Bluetooth, WLAN with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

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4. REFERENCE DOCUMENTS

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

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-19 Edition
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-19 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-19 Edition
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB971168 D01	Power Meas License Digital Systems	v03r01

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5. LABORATORY ENVIRONMENT

Shielded room did not exceed following limits along the RF 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	>2 MΩ
Ground system resistance	< 4 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

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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 1.4 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
8	Peak-to-Average Power Ratio	KDB971168 D01	A.8	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)/ KDB971168 D01	A.8	P

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LTE Band 41

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)/ KDB971168 D01	A.8	P

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7. STATEMENT

Since the information of samples in this report is provided by the client, the laboratory is not respo nsible for the authenticity of sample information.
This report takes measured values as criterion of test conclusion. The test conlusion meets the li mit requirements.

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8. TEST EQUIPMENTS UTILIZED

NO.	Description	TYPE	Manufacture	series number	CAL DUE DATE
1	Test Receiver	ESR7	R&S	101676	2021-11-25
2	BiLog Antenna	3142E	ETS-Lindgren	0224831	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	2023-01-06
5	Antenna	BBHA 9120D	Schwarzbeck	1593	2022-12-05
6	Antenna	VUBA 9117	Schwarzbeck	207	2023-07-15
7	Antenna	QWH-SL-18 -40-K-SG	Q-par	15979	2023-01-06
8	preamplifier	83017A	Agilent	MY39501110	/
9	Signal Generator	SMB100A	R&S	179725	2021-11-25
10	Fully Anechoic Chamber	FACT3-2.0	ETS-Lindgren	1285	2021-07-19
11	Spectrum Analyzer	FSV40	R&S	101192	2022-01-13
12	Universal Radio Communication Tester	CMW500	R&S	152499	2021-07-16
13	Universal Radio Communication Tester	CMU200	R&S	123210	2021-12-13
14	Spectrum Analyzer	FSU	R&S	101506	2021-12-13
15	Temperature Chamber	SH-241	ESPEC	92007516	2021-10-15
16	DC Power Supply	U3606A	Agilent Technologies	MY50450012	2021-11-13

Test software

Item	Name	Vesion
Radiated	EMC32	Version 10.01.00

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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	64QAM
1.4MHz	1 RB high	848.3	23.50	22.77	21.51
		836.5	23.42	22.71	21.57
		824.7	23.52	22.72	21.63
	1 RB low	848.3	23.38	22.73	21.46
		836.5	23.41	22.68	21.61
		824.7	23.49	22.67	21.65
	50% RB mid	848.3	23.55	22.64	21.75
		836.5	23.56	22.51	21.66
		824.7	23.57	22.53	21.74
	100% RB	848.3	22.56	21.66	20.54
		836.5	22.65	21.62	20.54
		824.7	22.61	21.63	20.60
3MHz	1 RB high	847.5	23.99	22.73	21.48
		836.5	23.48	22.49	21.63
		825.5	23.59	22.83	21.71
	1 RB low	847.5	23.49	22.72	21.72
		836.5	23.63	22.44	21.59
		825.5	23.50	22.76	21.67
	50% RB mid	847.5	22.59	21.60	20.62
		836.5	22.62	21.65	20.68
		825.5	22.66	21.71	20.68

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	100% RB	847.5	22.55	21.54	20.54
		836.5	22.61	21.59	20.60
		825.5	22.59	21.62	20.65
5MHz	1 RB high	846.5	23.92	22.72	21.73
		836.5	23.45	22.70	21.68
		826.5	23.54	22.47	21.78
	1 RB low	846.5	23.45	22.75	21.75
		836.5	23.43	22.68	21.62
		826.5	23.44	22.46	21.59
	50% RB mid	846.5	22.64	21.60	20.58
		836.5	22.65	21.64	20.65
		826.5	22.67	21.64	20.66
	100% RB	846.5	22.57	21.53	20.77
		836.5	22.63	21.60	20.59
		826.5	22.59	21.60	20.59
10MHz	1 RB high	844.0	23.55	22.89	21.76
		836.5	23.65	22.92	21.70
		829.0	23.61	22.86	21.76
	1 RB low	844.0	23.50	22.83	21.72
		836.5	23.52	22.86	21.81
		829.0	23.58	22.83	21.61
	50% RB mid	844.0	22.65	21.65	20.66
		836.5	22.68	21.64	20.62
		829.0	22.69	21.69	20.70
	100% RB	844.0	22.64	21.68	20.65
		836.5	22.71	21.67	20.63
		829.0	22.67	21.64	20.67

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

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LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	2567.5	22.92	21.79	20.69
		2535.0	22.95	21.75	20.79
		2502.5	22.66	22.20	20.76
	1 RB low	2567.5	22.96	21.78	20.75
		2535.0	22.75	21.76	20.76
		2502.5	22.61	22.18	20.78
	50% RB mid	2567.5	22.17	20.71	19.74
		2535.0	21.90	20.92	19.72
		2502.5	21.66	20.84	19.75
	100% RB	2567.5	22.02	20.67	19.67
		2535.0	21.83	20.95	19.60
		2502.5	21.66	20.92	19.95
10MHz	1 RB high	2565.0	23.15	22.02	21.22
		2535.0	23.11	22.12	20.84
		2505.0	23.16	22.34	20.77
	1 RB low	2565.0	23.05	22.01	20.82
		2535.0	23.02	22.16	20.77
		2505.0	22.59	21.88	20.73
	50% RB mid	2565.0	22.13	20.81	19.77
		2535.0	22.16	21.18	19.71
		2505.0	21.93	21.19	19.74
	100% RB	2565.0	22.14	20.76	19.80
		2535.0	22.19	21.18	19.64
		2505.0	21.68	21.05	19.71
15MHz	1 RB high	2562.5	23.08	21.95	21.43
		2535.0	23.05	22.01	20.87
		2507.5	23.08	22.35	20.87
	1 RB low	2562.5	23.00	21.75	21.05
		2535.0	22.93	22.11	20.73
		2507.5	22.63	22.07	20.78
	50% RB mid	2562.5	22.25	22.07	19.73
		2535.0	22.21	21.23	19.70
		2507.5	22.22	21.22	19.77
	100% RB	2562.5	22.25	21.17	19.76
		2535.0	22.18	21.17	19.69
		2507.5	21.92	21.19	19.69

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20MHz	1 RB high	2560.0	22.69	21.97	20.56
		2535.0	22.71	22.01	20.65
		2510.0	22.73	21.99	20.78
	1 RB low	2560.0	22.58	21.75	20.67
		2535.0	22.59	21.89	20.72
		2510.0	22.66	21.75	20.83
	50% RB mid	2560.0	22.04	21.05	19.55
		2535.0	21.99	21.00	19.97
		2510.0	22.07	21.03	20.05
	100% RB	2560.0	22.02	21.04	19.62
		2535.0	21.90	20.92	19.89
		2510.0	22.05	20.96	19.99

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

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LTE band 41(2535-2655 MHz)

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	2652.5	23.24	22.32	21.03
		2595.0	23.27	22.39	21.05
		2537.5	23.34	22.49	21.22
	1 RB low	2652.5	23.27	22.31	21.02
		2595.0	23.30	22.37	21.08
		2537.5	23.27	22.46	21.09
	50% RB mid	2652.5	22.28	21.25	20.23
		2595.0	22.27	21.37	20.24
		2537.5	22.25	21.34	20.30
	100% RB	2652.5	22.35	21.39	20.12
		2595.0	22.37	21.46	20.15
		2537.5	22.39	21.53	20.23
10MHz	1 RB high	2650.0	23.19	22.30	21.06
		2595.0	23.26	22.40	21.10
		2540.0	23.28	22.45	21.14
	1 RB low	2650.0	23.35	22.40	21.21
		2595.0	23.37	22.43	21.13
		2540.0	23.36	22.50	21.20
	50% RB mid	2650.0	22.36	21.38	20.27
		2595.0	22.34	21.44	20.34
		2540.0	22.31	21.21	20.26
	100% RB	2650.0	22.37	21.45	20.15
		2595.0	22.41	21.52	20.20
		2540.0	22.41	21.47	20.20
15MHz	1 RB high	2647.5	23.36	22.50	21.20
		2595.0	23.56	22.60	21.34
		2542.5	23.63	22.82	21.52
	1 RB low	2647.5	23.33	22.34	21.07
		2595.0	23.31	22.31	21.10
		2542.5	23.35	22.38	21.14
	50% RB mid	2647.5	22.18	21.30	20.22
		2595.0	22.22	21.27	20.20
		2542.5	22.22	21.36	20.14
	100% RB	2647.5	22.37	21.48	20.18
		2595.0	22.46	21.48	20.23
		2542.5	22.49	21.60	20.28

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20MHz	1 RB high	2645.0	23.11	22.33	21.05
		2595.0	23.33	22.44	21.06
		2545.0	23.43	22.56	21.21
	1 RB low	2645.0	23.21	22.40	21.05
		2595.0	23.24	22.39	21.07
		2545.0	23.23	22.38	21.06
	50% RB mid	2645.0	22.21	21.36	20.27
		2595.0	22.32	21.33	20.34
		2545.0	22.30	21.36	20.26
	100% RB	2645.0	22.28	21.46	20.14
		2595.0	22.38	21.48	20.18
		2545.0	22.40	21.52	20.20

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

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Spot check of Variant TA-1336

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1 RB high	848.3	23.45	22.62	21.55
		836.5	23.44	22.69	21.54
		824.7	23.51	22.87	21.62
	100% RB	848.3	22.55	21.69	20.55
		836.5	22.61	21.63	20.57
		824.7	22.60	21.71	20.63
10MHz	1 RB high	844.0	23.57	22.70	21.80
		836.5	23.58	22.57	21.70
		829.0	23.60	22.73	21.77
	100% RB	844.0	22.66	21.64	20.69
		836.5	22.71	21.71	20.63
		829.0	22.67	21.68	20.67

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)		
			QPSK	16QAM	64QAM
5MHz	1 RB high	2567.5	23.18	22.06	21.01
		2535.0	23.27	22.08	21.08
		2502.5	22.94	22.50	21.05
	100% RB	2567.5	22.32	21.02	19.97
		2535.0	22.16	21.29	19.89
		2502.5	22.00	21.21	20.28
20MHz	1 RB high	2560.0	23.05	22.27	20.90
		2535.0	23.04	22.33	20.97
		2510.0	23.09	22.27	21.10
	100% RB	2560.0	22.29	21.35	19.96
		2535.0	22.24	21.27	20.16
		2510.0	22.30	21.30	20.31

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

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A.1.3 Radiated

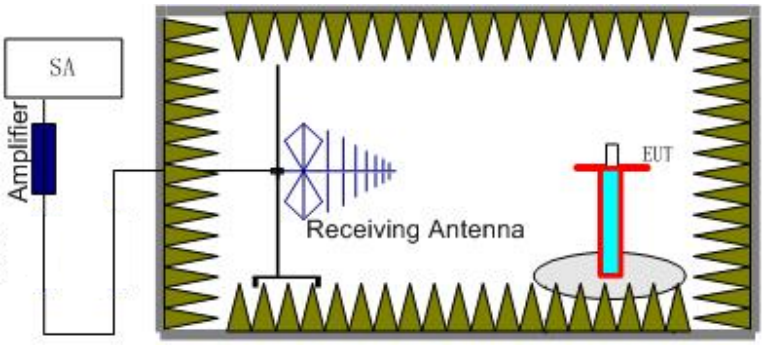
A.1.3.1 Description

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

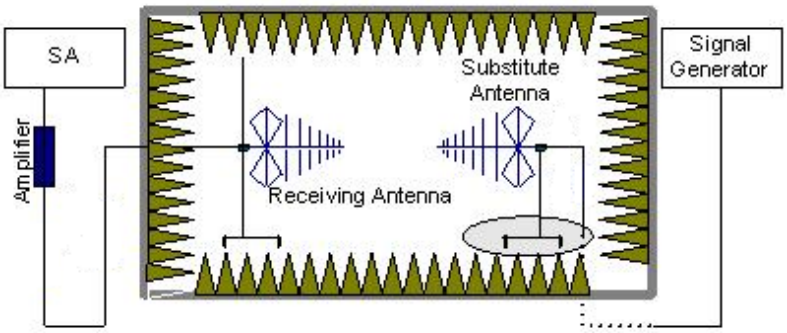
Rule Part 22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts." Rule Part 27.50(h)(2) specifies "Mobile stations are limited to 2.0 watts EIRP."

A.1.3.2 Method of Measurement

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. 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).
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

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substitution antenna and adjusts 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.

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A.1.3.3 Measurement result

LTE Band 5- ERP Part 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	-10.33	-33.60	-0.79	2.15	20.33	38.45	H
836.50	-10.22	-33.50	-0.74	2.15	20.39	38.45	H
848.30	-10.09	-33.50	-0.73	2.15	20.53	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	-10.36	-33.60	-0.84	2.15	20.25	38.45	H
836.50	**-9.97**	**-33.50**	**-0.74**	**2.15**	**20.64**	**38.45**	**H**
847.50	-10.16	-33.50	-0.73	2.15	20.46	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	-10.48	-33.60	-0.84	2.15	20.13	38.45	H
836.50	-10.20	-33.50	-0.74	2.15	20.41	38.45	H
846.50	-10.18	-33.50	-0.73	2.15	20.44	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	-10.31	-33.60	-0.84	2.15	20.30	38.45	H
836.50	-10.13	-33.50	-0.74	2.15	20.48	38.45	H
844.00	-10.02	-33.50	-0.78	2.15	20.55	38.45	H

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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	-10.92	-33.60	-0.79	2.15	19.74	38.45	H
836.50	-10.84	-33.50	-0.74	2.15	19.77	38.45	H
848.30	-10.67	-33.50	-0.73	2.15	19.95	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	-10.63	-33.60	-0.84	2.15	19.98	38.45	H
836.50	-10.75	-33.50	-0.74	2.15	19.86	38.45	H
847.50	-10.62	-33.50	-0.73	2.15	20.00	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	-10.92	-33.60	-0.84	2.15	19.69	38.45	H
836.50	-10.60	-33.50	-0.74	2.15	20.01	38.45	H
846.50	-10.73	-33.50	-0.73	2.15	19.89	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	-10.70	-33.60	-0.84	2.15	19.91	38.45	H
836.50	-10.72	-33.50	-0.74	2.15	19.89	38.45	H
844.00	-10.34	-33.50	-0.78	2.15	20.23	38.45	H

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LTE Band 5_1.4MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
824.70	-11.90	-33.60	-0.79	2.15	18.76	38.45	H
836.50	-11.84	-33.50	-0.74	2.15	18.77	38.45	H
848.30	-12.17	-33.50	-0.73	2.15	18.45	38.45	H

LTE Band 5_3MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
825.50	-11.33	-33.60	-0.84	2.15	19.28	38.45	H
836.50	-11.18	-33.50	-0.74	2.15	19.43	38.45	H
847.50	-11.42	-33.50	-0.73	2.15	19.20	38.45	H

LTE Band 5_5MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
826.50	-11.37	-33.60	-0.84	2.15	19.24	38.45	H
836.50	-11.30	-33.50	-0.74	2.15	19.31	38.45	H
846.50	-11.51	-33.50	-0.73	2.15	19.11	38.45	H

LTE Band 5_10MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	Correction (dB)	ERP(dBm)	Limit(dBm)	Polarization
829.00	-11.61	-33.60	-0.84	2.15	19.00	38.45	H
836.50	-11.86	-33.50	-0.74	2.15	18.75	38.45	H
844.00	-11.65	-33.50	-0.78	2.15	18.92	38.45	H

Peak ERP (dBm)=P_{Mea}(-9.97dBm)-(P_{cl}+P_{Ag})(-33.50dB)+G_a(-0.74dB) -2.15dB =20.64dBm

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LTE Band 7- EIRP Part 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	-17.92	-28.70	10.70	21.48	33.00	H
2535.00	-17.60	-28.60	10.70	21.70	33.00	H
2567.50	**-16.96**	**-28.60**	**10.70**	**22.34**	**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	-18.29	-28.70	10.70	21.11	33.00	H
2535.00	-17.34	-28.60	10.70	21.96	33.00	H
2565.00	-17.52	-28.60	10.70	21.78	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	-18.29	-28.70	10.70	21.11	33.00	H
2535.00	-17.90	-28.60	10.70	21.40	33.00	H
2562.50	-17.33	-28.60	10.70	21.97	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	-18.54	-28.70	10.70	20.86	33.00	H
2535.00	-18.41	-28.60	10.70	20.89	33.00	H
2560.00	-17.81	-28.60	10.70	21.49	33.00	H

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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	-18.01	-28.70	10.70	21.39	33.00	H
2535.00	-17.81	-28.60	10.70	21.49	33.00	H
2567.50	-17.16	-28.60	10.70	22.14	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	-18.66	-28.70	10.70	20.74	33.00	H
2535.00	-18.20	-28.60	10.70	21.10	33.00	H
2565.00	-17.67	-28.60	10.70	21.63	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	-18.70	-28.70	10.70	20.70	33.00	H
2535.00	-18.48	-28.60	10.70	20.82	33.00	H
2562.50	-17.83	-28.60	10.70	21.47	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	-19.06	-28.70	10.70	20.34	33.00	H
2535.00	-18.95	-28.60	10.70	20.35	33.00	H
2560.00	-17.68	-28.60	10.70	21.62	33.00	H

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LTE Band 7_5MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2502.50	-19.81	-28.70	10.70	19.59	33.00	H
2535.00	-19.08	-28.60	10.70	20.22	33.00	H
2567.50	-17.68	-28.60	10.70	21.62	33.00	H

LTE Band 7_10MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2505.00	-19.46	-28.70	10.70	19.94	33.00	H
2535.00	-19.32	-28.60	10.70	19.98	33.00	H
2565.00	-18.11	-28.60	10.70	21.19	33.00	H

LTE Band 7_15MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2507.50	-20.07	-28.70	10.70	19.33	33.00	H
2535.00	-19.39	-28.60	10.70	19.91	33.00	H
2562.50	-17.94	-28.60	10.70	21.36	33.00	H

LTE Band 7_20MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	G_a Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2510.00	-19.71	-28.70	10.70	19.69	33.00	H
2535.00	-20.16	-28.60	10.70	19.14	33.00	H
2560.00	-18.41	-28.60	10.70	20.89	33.00	H

Peak EIRP (dBm)=P_{Mea}(-16.96dBm)-(P_{cl}+P_{Ag})(-28.60dB)+G_a(10.70dB) =22.34dBm

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LTE Band 41 - EIRP Part 27.50(h)(2)

Limits: ≤33dBm (2W)

LTE Band 41_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2537.50	-17.27	-28.70	10.70	22.13	33.00	H
2595.00	**-15.96**	**-28.60**	**10.70**	**23.34**	**33.00**	**H**
2652.50	-19.17	-28.60	10.70	20.13	33.00	H

LTE Band 41_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2540.00	-17.13	-28.70	10.70	22.27	33.00	H
2595.00	**-15.96**	**-28.60**	**10.70**	**23.34**	**33.00**	**H**
2650.00	-19.03	-28.60	10.70	20.27	33.00	H

LTE Band 41_15MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2542.50	-17.48	-28.70	10.70	21.92	33.00	H
2595.00	-16.08	-28.60	10.70	23.22	33.00	H
2647.50	-19.09	-28.60	10.70	20.21	33.00	H

LTE Band 41_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2545.00	-17.34	-28.70	10.70	22.06	33.00	H
2595.00	-16.39	-28.60	10.70	22.91	33.00	H
2645.00	-18.94	-28.60	10.70	20.36	33.00	H

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LTE Band 41_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2537.50	-17.53	-28.70	10.70	21.87	33.00	H
2595.00	-16.67	-28.60	10.70	22.63	33.00	H
2652.50	-19.48	-28.60	10.70	19.82	33.00	H

LTE Band 41_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2540.00	-17.75	-28.70	10.70	21.65	33.00	H
2595.00	-16.30	-28.60	10.70	23.00	33.00	H
2650.00	-19.46	-28.60	10.70	19.84	33.00	H

LTE Band 41_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2542.50	-17.89	-28.70	10.70	21.51	33.00	H
2595.00	-16.64	-28.60	10.70	22.66	33.00	H
2647.50	-19.46	-28.60	10.70	19.84	33.00	H

LTE Band 41_20 MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2545.00	-18.24	-28.70	10.70	21.16	33.00	H
2595.00	-16.82	-28.60	10.70	22.48	33.00	H
2645.00	-19.08	-28.60	10.70	20.22	33.00	H

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LTE Band 41_5MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2537.50	-18.53	-28.70	10.70	20.87	33.00	H
2595.00	-17.83	-28.60	10.70	21.47	33.00	H
2652.50	-20.03	-28.60	10.70	19.27	33.00	H

LTE Band 41_10MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2540.00	-18.67	-28.70	10.70	20.73	33.00	H
2595.00	-17.65	-28.60	10.70	21.65	33.00	H
2650.00	-20.14	-28.60	10.70	19.16	33.00	H

LTE Band 41_15MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2542.50	-18.89	-28.70	10.70	20.51	33.00	H
2595.00	-17.90	-28.60	10.70	21.40	33.00	H
2647.50	-20.06	-28.60	10.70	19.24	33.00	H

LTE Band 41_20 MHz_64QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)+ P_{Ag}(dB)	Ga Antenna Gain(dBi)	EIRP(dBm)	Limit(dBm)	Polarization
2545.00	-19.24	-28.70	10.70	20.16	33.00	H
2595.00	-17.85	-28.60	10.70	21.45	33.00	H
2645.00	-19.58	-28.60	10.70	19.72	33.00	H

Peak EIRP (dBm)=P_{Mea}(-15.96dBm)-(P_{cl}+P_{Ag}) (-28.60dB)+G_a(10.70dB) =23.34dBm

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 = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

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Spot check of Variant TA-1336

LTE Band 5- ERP Part 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	-12.03	-33.60	-0.79	2.15	18.63	38.45	H
836.50	-11.17	-33.50	-0.74	2.15	19.44	38.45	H
848.30	-11.73	-33.50	-0.73	2.15	18.89	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	-12.27	-33.60	-0.84	2.15	18.34	38.45	H
836.50	**-10.82**	**-33.50**	**-0.74**	**2.15**	**19.79**	**38.45**	**H**
847.50	-11.59	-33.50	-0.73	2.15	19.03	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	-12.16	-33.60	-0.84	2.15	18.45	38.45	H
836.50	-11.52	-33.50	-0.74	2.15	19.09	38.45	H
846.50	-11.13	-33.50	-0.73	2.15	19.49	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	-11.72	-33.60	-0.84	2.15	18.89	38.45	H
836.50	-11.04	-33.50	-0.74	2.15	19.57	38.45	H
844.00	-10.84	-33.50	-0.78	2.15	19.73	38.45	H

Peak ERP (dBm)=P_{Mea}(-10.82dBm)-(P_{cl}+P_{Ag})(-33.50dB)+G_a(-0.74dB) -2.15dB =19.79dBm

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

Limits: ≤33 dBm (2W)

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	-17.18	-28.70	10.70	22.22	33.00	H
2535.00	-17.14	-28.60	10.70	22.16	33.00	H
2567.50	-17.30	-28.60	10.70	22.00	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	-17.44	-28.70	10.70	21.96	33.00	H
2535.00	-16.99	-28.60	10.70	22.31	33.00	H
2565.00	-17.31	-28.60	10.70	21.99	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	-17.26	-28.70	10.70	22.14	33.00	H
2535.00	**-16.78**	**-28.60**	**10.70**	**22.52**	**33.00**	**H**
2562.50	-17.40	-28.60	10.70	21.90	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	-17.09	-28.70	10.70	22.31	33.00	H
2535.00	-17.10	-28.60	10.70	22.20	33.00	H
2560.00	-17.82	-28.60	10.70	21.48	33.00	H

Peak EIRP (dBm)=P_{Mea}(-16.78dBm)-(P_{cl}+P_{Ag})(-28.60dB)+G_a(10.70dB) =22.52dBm

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 = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.

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A.2 FIELD STRENGTH OF SPURIOUS RADIATION

Reference

FCC: CFR 2.1053, 22.917, 27.53.

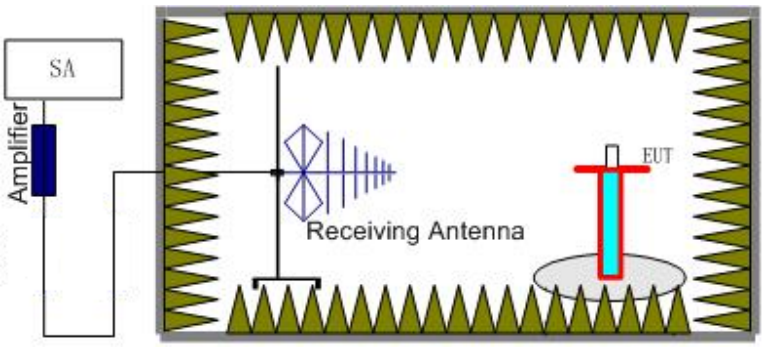
A.2.1 Measurement Method

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, 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, 41(2535-2655 MHz).

The procedure of radiated spurious emissions is as follows:

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. 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).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.

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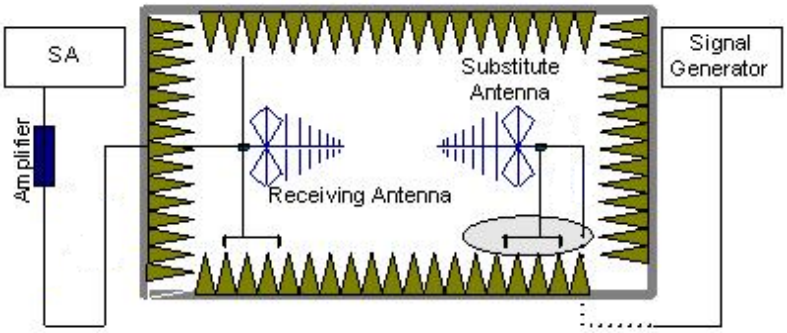

In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna and adjusts 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. 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
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.2.2 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 5,7, 41(2535-2655 MHz). 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, 41(2535-2655 MHz) 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.

Only worst case result is given below.

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LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2925.33	-46.49	1.00	10.70	-38.94	-13.00	V
3297.00	-46.57	1.10	11.50	-38.32	-13.00	H
5136.50	-64.94	1.30	12.50	-55.89	-13.00	V
6121.50	-63.92	1.60	13.10	-54.57	-13.00	V
7512.00	-60.85	1.90	11.30	-53.60	-13.00	V
9193.00	-59.76	2.10	11.60	-52.41	-13.00	H

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2942.40	-46.08	1.00	10.70	-38.53	-13.00	H
3343.50	-39.63	1.10	11.50	-31.38	-13.00	H
6551.00	-63.29	1.70	12.40	-54.74	-13.00	H
7475.00	-62.04	1.90	12.00	-54.09	-13.00	H
8653.50	-60.78	2.00	12.00	-52.93	-13.00	V
9930.50	-57.90	2.20	11.20	-51.05	-13.00	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2926.13	-47.03	1.00	10.70	-39.48	-13.00	V
3391.00	-38.56	1.10	11.50	-30.31	-13.00	H
5764.50	-64.42	1.50	13.10	-54.97	-13.00	V
6750.00	-62.73	1.70	12.40	-54.18	-13.00	V
7813.00	-61.56	1.80	11.30	-54.21	-13.00	V
9272.00	-60.55	2.10	11.60	-53.20	-13.00	H

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LTE Band 5, 1.4MHz, 16QAM, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2902.67	-46.61	1.00	10.70	-39.06	-13.00	H
3297.00	-46.68	1.10	11.50	-38.43	-13.00	H
5434.50	-64.54	1.30	12.50	-55.49	-13.00	H
6646.50	-63.09	1.80	12.40	-54.64	-13.00	H
7755.00	-62.01	1.80	11.30	-54.66	-13.00	H
8999.00	-61.07	2.00	12.00	-53.22	-13.00	V

LTE Band 5, 1.4MHz, 16QAM, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2950.40	-46.21	1.00	10.70	-38.66	-13.00	V
3344.50	-38.58	1.10	11.50	-30.33	-13.00	H
5500.50	-64.51	1.40	13.10	-54.96	-13.00	H
6404.50	-64.62	1.60	13.10	-55.27	-13.00	V
7596.00	-61.48	1.80	11.30	-54.13	-13.00	H
9274.00	-61.72	2.10	11.60	-54.37	-13.00	V

LTE Band 5, 1.4MHz, 16QAM, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2951.73	-46.32	1.00	10.70	-38.77	-13.00	V
3391.00	-38.46	1.10	11.50	-30.21	-13.00	H
5650.00	-64.14	1.30	13.10	-54.49	-13.00	H
6473.50	-64.03	1.60	13.10	-54.68	-13.00	V
7910.50	-61.58	1.70	11.30	-54.13	-13.00	V
9362.00	-60.91	2.00	11.60	-53.46	-13.00	V

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LTE Band 5, 1.4MHz, 64QAM, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2836.27	-45.98	1.00	10.70	-38.43	-13.00	V
5837.00	-63.45	1.40	13.10	-53.90	-13.00	H
6676.50	-62.64	1.80	12.40	-54.19	-13.00	H
7512.50	-60.36	1.90	11.30	-53.11	-13.00	V
8741.50	-61.22	2.00	12.00	-53.37	-13.00	H
9840.00	-58.24	2.30	11.20	-51.49	-13.00	V

LTE Band 5, 1.4MHz, 64QAM, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2984.80	-46.18	1.00	10.70	-38.63	-13.00	V
5804.50	-63.02	1.50	13.10	-53.57	-13.00	H
6984.00	-61.71	1.80	12.40	-53.26	-13.00	V
7851.50	-60.33	1.70	11.30	-52.88	-13.00	H
8533.00	-59.73	2.10	12.00	-51.98	-13.00	H
9610.00	-57.70	2.10	11.20	-50.75	-13.00	H

LTE Band 5, 1.4MHz, 64QAM, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2958.93	-46.44	1.00	10.70	-38.89	-13.00	V
5918.00	-63.79	1.50	13.10	-54.34	-13.00	H
6761.00	-62.57	1.60	12.40	-53.92	-13.00	H
7597.50	-61.34	1.80	11.30	-53.99	-13.00	H
8724.50	-60.76	2.00	12.00	-52.91	-13.00	H
9850.50	-58.48	2.30	11.20	-51.73	-13.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

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LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2942.40	-46.88	1.00	10.70	-37.18	-25.00	H
9976.50	-57.83	2.20	11.20	-48.83	-25.00	V
11991.50	-55.76	2.60	11.00	-47.36	-25.00	V
14710.50	-55.70	2.50	11.20	-47.00	-25.00	V
16276.50	-59.21	2.70	17.40	-44.51	-25.00	V
17874.50	-52.94	3.60	12.80	-43.74	-25.00	H

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2935.20	-46.41	1.00	10.70	-36.71	-25.00	H
10775.50	-57.00	2.40	10.80	-48.60	-25.00	H
12003.50	-57.50	2.60	12.60	-47.50	-25.00	H
15007.00	-56.38	2.40	12.40	-46.38	-25.00	H
16570.00	-58.44	2.60	16.50	-44.54	-25.00	V
17533.50	-53.45	2.90	12.80	-43.55	-25.00	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2921.60	-46.36	1.00	10.70	-36.66	-25.00	H
11886.00	-55.69	2.50	11.00	-47.19	-25.00	H
12765.50	-58.97	2.60	13.80	-47.77	-25.00	V
15303.00	-54.42	2.70	12.40	-44.72	-25.00	H
16789.00	-58.07	2.90	16.50	-44.47	-25.00	H
17907.00	-52.31	3.60	12.80	-43.11	-25.00	H

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LTE Band 7, 5 MHz, 16QAM, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2941.33	-46.72	1.00	10.70	-37.02	-25.00	V
5001.00	-62.12	1.30	12.50	-50.92	-25.00	V
10032.00	-58.53	2.20	11.30	-49.43	-25.00	H
12013.00	-57.90	2.60	12.60	-47.90	-25.00	V
14275.50	-55.99	2.60	11.90	-46.69	-25.00	H
17822.50	-52.98	3.60	12.80	-43.78	-25.00	H

LTE Band 7, 5 MHz, 16QAM, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2961.07	-46.63	1.00	10.70	-36.93	-25.00	H
10443.00	-58.29	2.30	11.30	-49.29	-25.00	H
12556.00	-59.29	2.40	13.80	-47.89	-25.00	H
14805.50	-54.70	2.50	11.20	-46.00	-25.00	H
16282.50	-59.69	2.70	17.40	-44.99	-25.00	V
17807.50	-53.14	3.60	12.80	-43.94	-25.00	H

LTE Band 7, 5 MHz, 16QAM, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2921.60	-46.36	1.00	10.70	-36.66	-25.00	H
10616.00	-57.12	2.20	10.80	-48.52	-25.00	V
11983.50	-55.60	2.60	11.00	-47.20	-25.00	H
15041.50	-56.91	2.40	12.40	-46.91	-25.00	H
16357.50	-59.34	2.70	17.40	-44.64	-25.00	V
17781.50	-52.80	3.60	12.80	-43.60	-25.00	H

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LTE Band 7, 5 MHz, 64QAM, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2956.80	-46.05	1.00	10.70	-36.35	-25.00	H
6139.50	-61.99	1.60	13.10	-50.49	-25.00	H
10022.00	-58.14	2.20	11.30	-49.04	-25.00	H
11914.00	-56.14	2.60	11.00	-47.74	-25.00	H
15035.50	-56.94	2.40	12.40	-46.94	-25.00	H
17820.00	-53.29	3.60	12.80	-44.09	-25.00	H

LTE Band 7, 5 MHz, 64QAM, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2954.67	-46.32	1.00	10.70	-36.62	-25.00	H
5065.50	-58.39	1.20	12.50	-47.09	-25.00	V
9900.00	-58.63	2.20	11.20	-49.63	-25.00	V
11999.50	-56.88	2.60	11.00	-48.48	-25.00	H
14898.50	-55.45	2.70	11.20	-46.95	-25.00	V
17182.00	-55.87	2.90	14.50	-44.27	-25.00	H

LTE Band 7, 5 MHz, 64QAM, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2926.67	-46.57	1.00	10.70	-36.87	-25.00	H
5130.00	-61.25	1.30	12.50	-50.05	-25.00	V
10078.00	-58.53	2.00	11.30	-49.23	-25.00	V
11982.00	-56.54	2.60	11.00	-48.14	-25.00	V
14329.50	-55.39	2.60	11.90	-46.09	-25.00	H
17875.50	-53.19	3.60	12.80	-43.99	-25.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

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LTE Band 41, 5MHz, QPSK, Channel 40065

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2978.67	-46.17	1.00	10.70	-36.47	-25.00	V
5070.50	-60.75	1.20	12.50	-49.45	-25.00	V
10061.00	-58.41	2.00	11.30	-49.11	-25.00	H
11975.00	-56.74	2.60	11.00	-48.34	-25.00	V
14903.50	-55.39	2.70	11.20	-46.89	-25.00	V
17912.50	-55.83	3.60	15.60	-43.83	-25.00	H

LTE Band 41, 5MHz, QPSK, Channel 40690

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2980.27	-46.30	1.00	10.70	-36.60	-25.00	V
8268.00	-60.52	1.90	11.30	-51.12	-25.00	V
10128.50	-58.39	2.00	11.30	-49.09	-25.00	H
12536.00	-59.16	2.40	13.80	-47.76	-25.00	V
14399.00	-56.09	2.60	11.90	-46.79	-25.00	H
17993.50	-56.29	3.20	15.60	-43.89	-25.00	H

LTE Band 41, 5MHz, QPSK, Channel 41215

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2935.47	-46.60	1.00	10.70	-36.90	-25.00	V
8226.50	-59.39	2.20	11.30	-50.29	-25.00	H
10310.50	-58.32	2.10	11.30	-49.12	-25.00	H
12359.00	-58.00	2.60	12.60	-48.00	-25.00	H
14226.00	-56.10	2.50	11.90	-46.70	-25.00	H
17914.00	-55.70	3.60	15.60	-43.70	-25.00	H

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LTE Band 41, 5MHz, 16QAM, Channel 40065

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2995.73	-46.63	1.00	10.70	-36.93	-25.00	H
5070.50	-59.59	1.20	12.50	-48.29	-25.00	V
10382.50	-58.22	2.30	11.30	-49.22	-25.00	V
11950.00	-56.63	2.60	11.00	-48.23	-25.00	V
14775.50	-55.44	2.50	11.20	-46.74	-25.00	H
17907.50	-55.73	3.60	15.60	-43.73	-25.00	H

LTE Band 41, 5MHz, 16QAM, Channel 40690

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2960.53	-46.30	1.00	10.70	-36.60	-25.00	H
8653.50	-60.58	2.00	12.00	-50.58	-25.00	H
10309.50	-58.78	2.10	11.30	-49.58	-25.00	H
12002.50	-57.46	2.60	12.60	-47.46	-25.00	V
14838.00	-55.34	2.70	11.20	-46.84	-25.00	H
17791.50	-55.82	3.60	15.60	-43.82	-25.00	H

LTE Band 41, 5MHz, 16QAM, Channel 41215

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2994.93	-46.54	1.00	10.70	-36.84	-25.00	V
8216.00	-59.95	2.20	11.30	-50.85	-25.00	H
10067.00	-57.95	2.00	11.30	-48.65	-25.00	H
12037.00	-58.03	2.70	12.60	-48.13	-25.00	V
14215.00	-56.11	2.50	11.90	-46.71	-25.00	H
17823.00	-55.67	3.60	15.60	-43.67	-25.00	H

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LTE Band 41, 5MHz, 64QAM, Channel 40065

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2960.73	-48.13	1.00	10.70	-38.43	-25.00	H
5170.50	-60.69	1.60	12.50	-49.79	-25.00	V
10582.50	-59.32	2.20	10.80	-50.72	-25.00	V
11960.00	-58.13	2.60	11.00	-49.73	-25.00	V
14775.50	-56.94	2.50	11.20	-48.24	-25.00	H
17913.50	-57.23	3.60	15.60	-45.23	-25.00	H

LTE Band 41, 5MHz, 64QAM, Channel 40690

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2962.53	-47.65	1.00	10.70	-37.95	-25.00	H
8642.50	-61.93	2.00	12.00	-51.93	-25.00	H
10314.50	-60.13	2.10	11.30	-50.93	-25.00	H
12024.50	-58.81	2.60	12.60	-48.81	-25.00	V
14814.00	-56.89	2.50	11.20	-48.19	-25.00	H
17711.50	-57.47	3.30	15.60	-45.17	-25.00	H

LTE Band 41, 5MHz, 64QAM, Channel 41215

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2994.91	-47.77	1.00	10.70	-38.07	-25.00	V
8146.00	-61.58	1.80	11.30	-52.08	-25.00	H
10367.00	-58.88	2.30	11.30	-49.88	-25.00	H
12041.00	-59.26	2.70	12.60	-49.36	-25.00	V
14125.00	-57.34	2.50	11.90	-47.94	-25.00	H
17863.00	-56.90	3.60	15.60	-44.90	-25.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

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Spot check of Variant TA-1336

LTE Band 5, 1.4MHz, 64QAM, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2936.80	-46.36	1.00	10.70	-38.81	-13.00	H
3296.50	-48.49	1.10	11.50	-40.24	-13.00	H
5883.50	-64.26	1.50	13.10	-54.81	-13.00	H
7031.00	-62.05	1.80	12.00	-54.00	-13.00	H
8409.00	-60.26	1.80	11.30	-52.91	-13.00	H
9596.00	-59.31	2.10	11.20	-52.36	-13.00	H

LTE Band 5, 1.4MHz, 64QAM, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2946.40	-46.67	1.00	10.70	-39.12	-13.00	V
3344.00	-49.91	1.10	11.50	-41.66	-13.00	H
5141.50	-63.12	1.30	12.50	-54.07	-13.00	H
6157.00	-64.15	1.60	13.10	-54.80	-13.00	V
7534.50	-61.28	1.90	11.30	-54.03	-13.00	H
9999.00	-57.71	2.20	11.20	-50.86	-13.00	H

LTE Band 5, 1.4MHz, 64QAM, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak ERP(dBm)	Limit(dBm)	Polarization
2904.53	-46.40	1.00	10.70	-38.85	-13.00	H
3391.50	-51.77	1.10	11.50	-43.52	-13.00	H
5189.50	-63.97	1.60	12.50	-55.22	-13.00	V
6113.50	-64.66	1.60	13.10	-55.31	-13.00	H
7378.00	-62.17	1.70	12.00	-54.02	-13.00	V
8796.50	-60.52	1.90	12.00	-52.57	-13.00	V

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

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LTE Band 7, 5 MHz, 64QAM, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2966.40	-46.93	1.00	10.70	-37.23	-25.00	V
8700.00	-61.13	2.00	12.00	-51.13	-25.00	H
10133.00	-58.36	2.00	11.30	-49.06	-25.00	H
11471.00	-55.68	2.60	10.50	-47.78	-25.00	H
15031.00	-56.94	2.40	12.40	-46.94	-25.00	H
17826.00	-52.77	3.60	12.80	-43.57	-25.00	H

LTE Band 7, 5 MHz, 64QAM, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2939.47	-46.55	1.00	10.70	-36.85	-25.00	H
8648.00	-60.20	2.00	12.00	-50.20	-25.00	H
10032.00	-58.30	2.20	11.30	-49.20	-25.00	H
11946.50	-56.09	2.60	11.00	-47.69	-25.00	V
15050.50	-55.89	2.40	12.40	-45.89	-25.00	H
17776.00	-53.44	3.60	12.80	-44.24	-25.00	H

LTE Band 7, 5 MHz, 64QAM, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit(dBm)	Polarization
2977.33	-45.97	1.00	10.70	-36.27	-25.00	V
8653.50	-60.60	2.00	12.00	-50.60	-25.00	H
10005.00	-58.56	2.20	11.30	-49.46	-25.00	V
11978.00	-56.48	2.60	11.00	-48.08	-25.00	V
14859.50	-54.52	2.70	11.20	-46.02	-25.00	H
17789.50	-52.92	3.60	12.80	-43.72	-25.00	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.72dB(30MHz-3GHz)/3.60dB(3GHz-18GHz)/3.58dB(18GHz-40GHz), k = 2

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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 -10℃.
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 -10℃ 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 -10℃. 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 3.6V and 4.4V, with a nominal voltage of 3.85V. 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.

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A.3.3 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	64QAM	QPSK	16QAM	64QAM
3.6	23	21	16	0.027	0.025	0.019
3.85	25	25	36	0.030	0.030	0.043
4.4	18	33	9	0.022	0.039	0.011

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	22	15	19	0.026	0.018	0.023
0	15	25	17	0.018	0.030	0.020
10	24	11	15	0.029	0.013	0.018
20	32	14	28	0.038	0.017	0.033
30	18	34	7	0.022	0.041	0.008
40	9	36	16	0.011	0.043	0.019
50	25	28	33	0.030	0.033	0.039

Expanded measurement uncertainty is 10Hz, k = 2

LTE Band 7, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.6	23	26	15	0.009	0.010	0.006
3.85	5	8	19	0.002	0.003	0.007
4.4	16	7	28	0.006	0.003	0.011

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	14	33	22	0.006	0.013	0.009
0	18	26	15	0.007	0.010	0.006
10	29	25	26	0.011	0.010	0.010
20	37	8	35	0.015	0.003	0.014
30	14	18	39	0.006	0.007	0.015
40	8	17	17	0.003	0.007	0.007
50	26	24	28	0.010	0.009	0.011

Expanded measurement uncertainty is 10 Hz, k = 2

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LTE Band 41, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3.6	9	13	17	0.003	0.005	0.007
3.85	6	8	14	0.002	0.003	0.005
4.4	12	5	26	0.005	0.002	0.010

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)			Frequency error (ppm)		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
-10	22	24	16	0.008	0.009	0.006
0	15	16	24	0.006	0.006	0.009
10	27	15	26	0.010	0.006	0.010
20	41	8	16	0.016	0.003	0.006
30	33	5	31	0.013	0.002	0.012
40	35	7	29	0.013	0.003	0.011
50	29	14	15	0.011	0.005	0.006

Expanded measurement uncertainty is 10 Hz, k = 2

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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.

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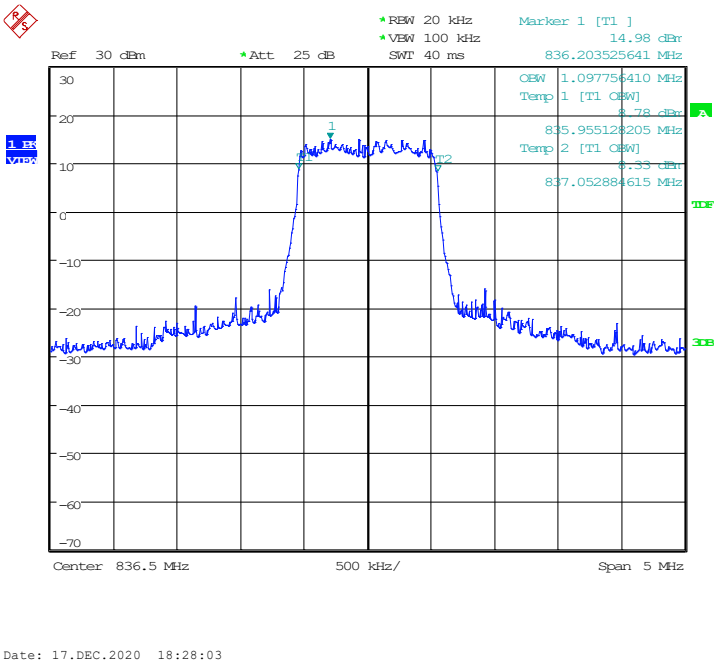
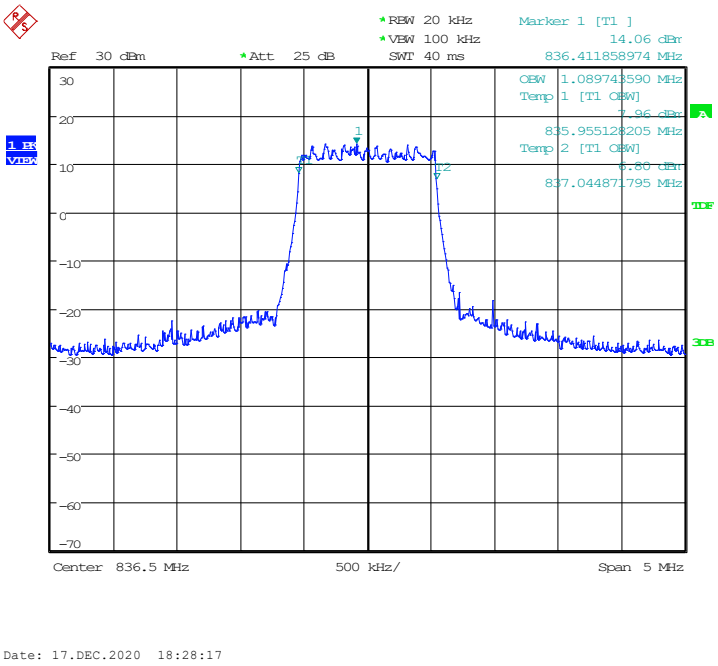
LTE band 5, 1.4MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	1097.76	1089.74	1089.74

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



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



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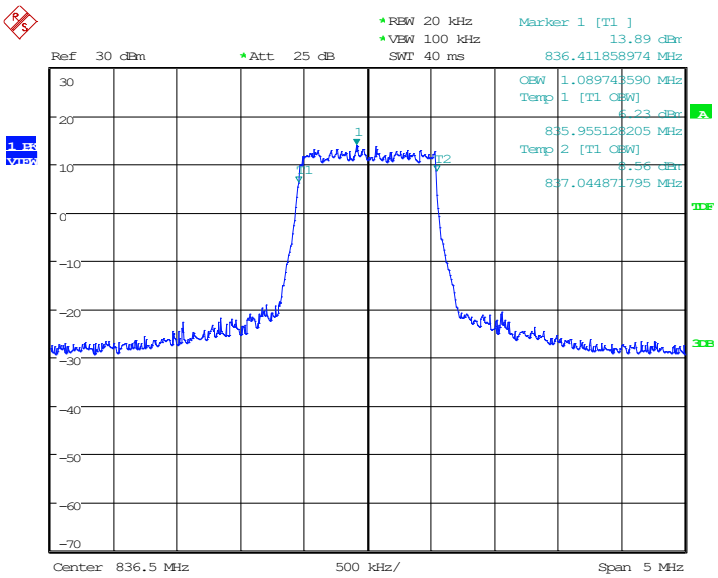
LTE band 5, 1.4MHz Bandwidth, 64QAM (99% BW)



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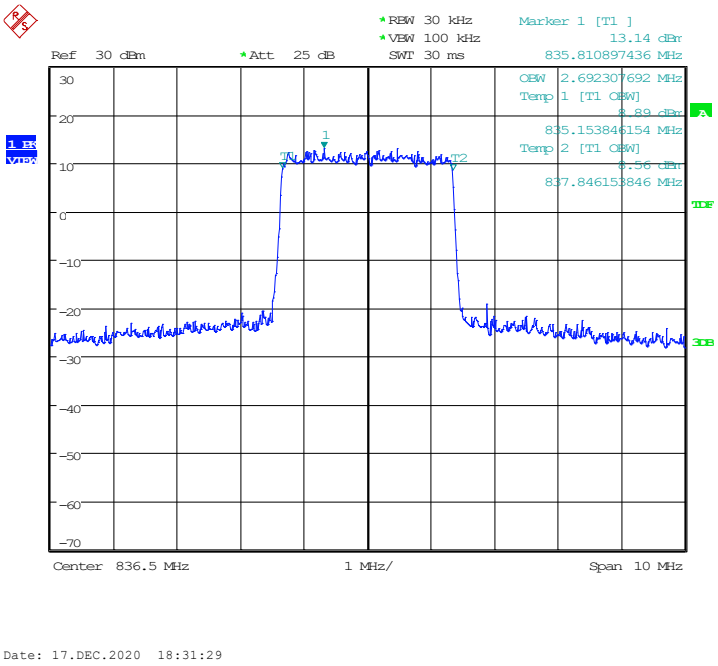
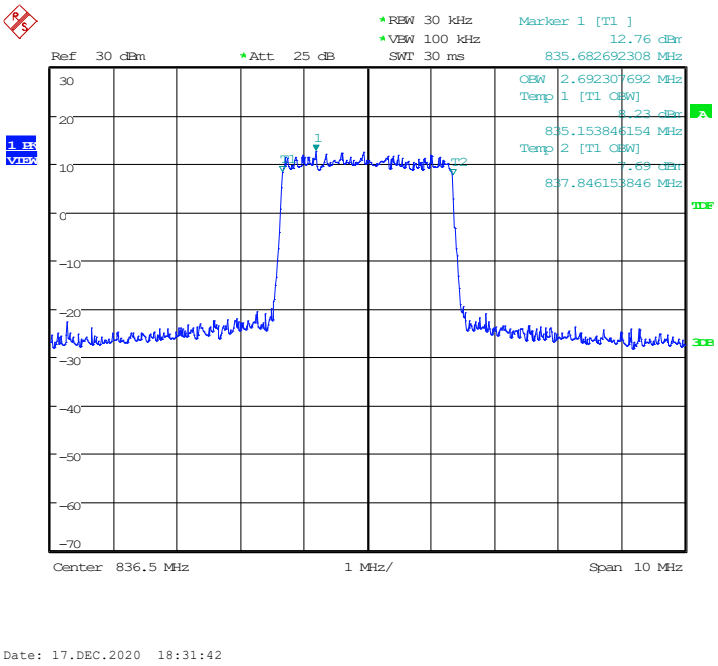
LTE band 5, 3MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	2692.31	2692.31	2692.31

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



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



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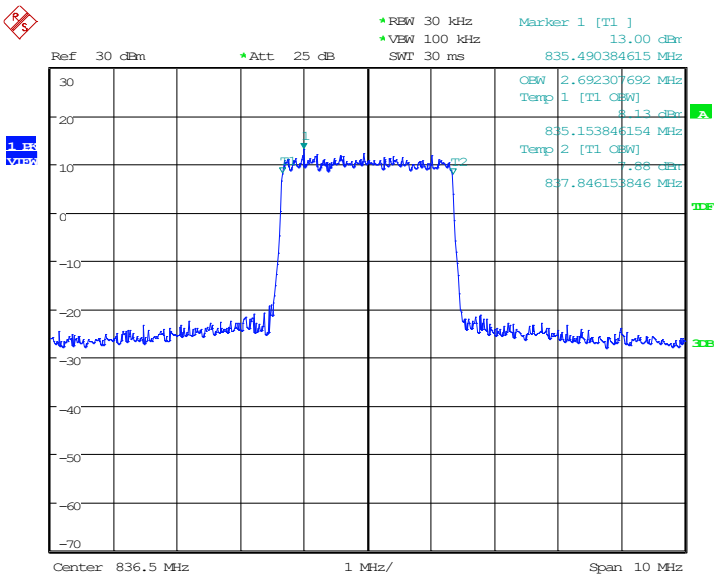
LTE band 5, 3MHz Bandwidth, 64QAM (99% BW)



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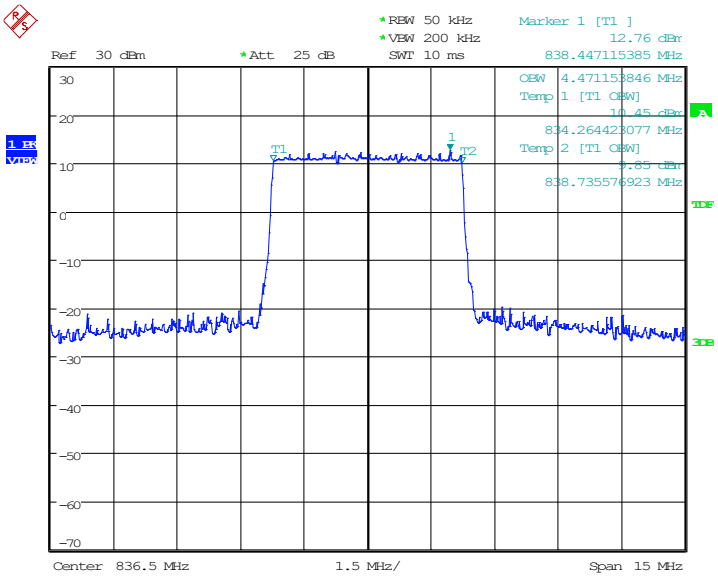
LTE band 5, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	4471.15	4471.15	4471.15

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



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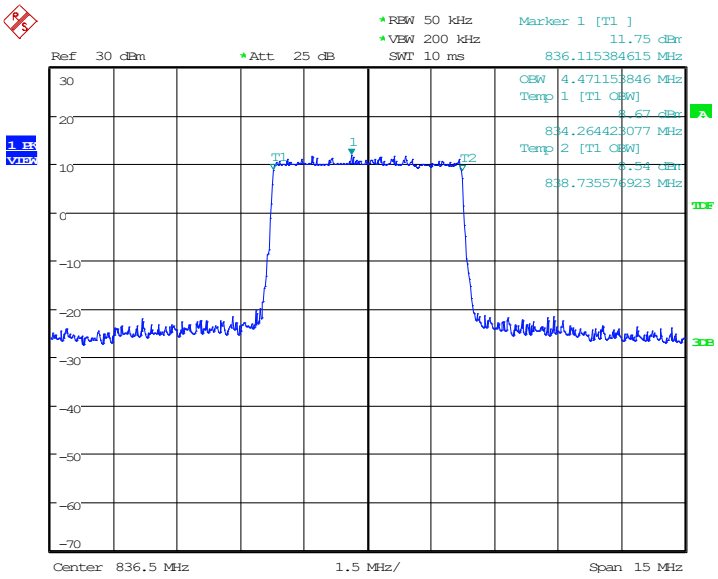
LTE band 5, 5MHz Bandwidth,16QAM (99% BW)



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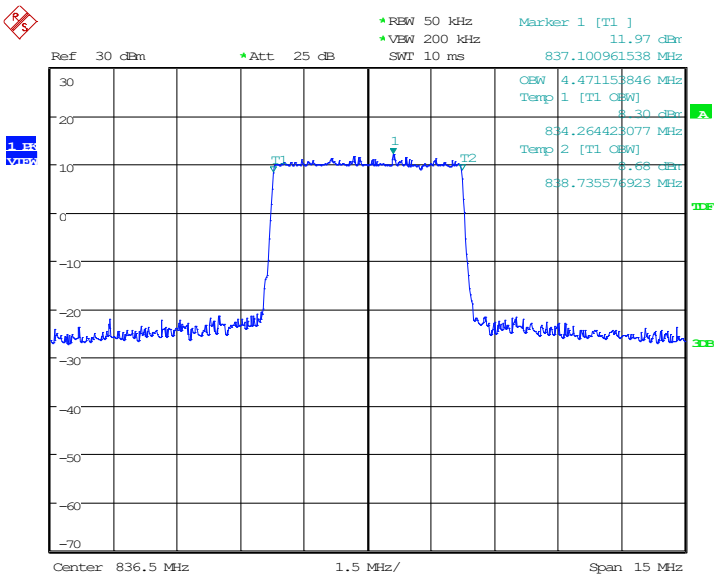
LTE band 5, 5MHz Bandwidth,64QAM (99% BW)



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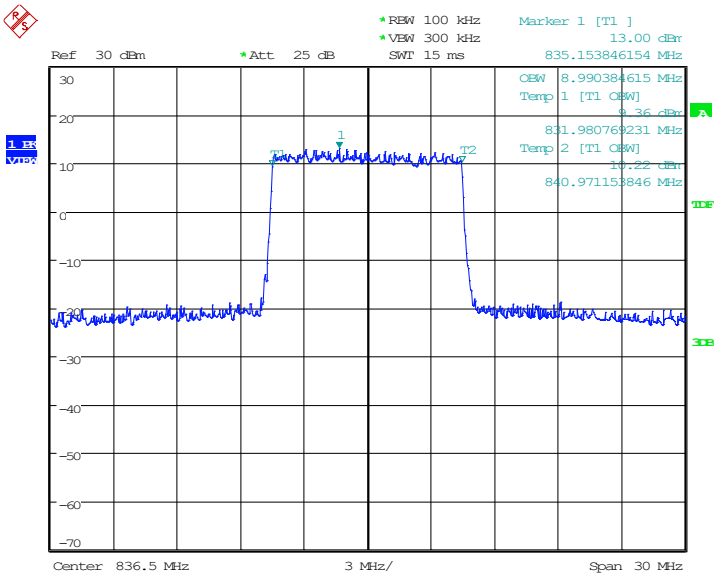
LTE band 5, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	8990.38	8990.38	8942.31

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



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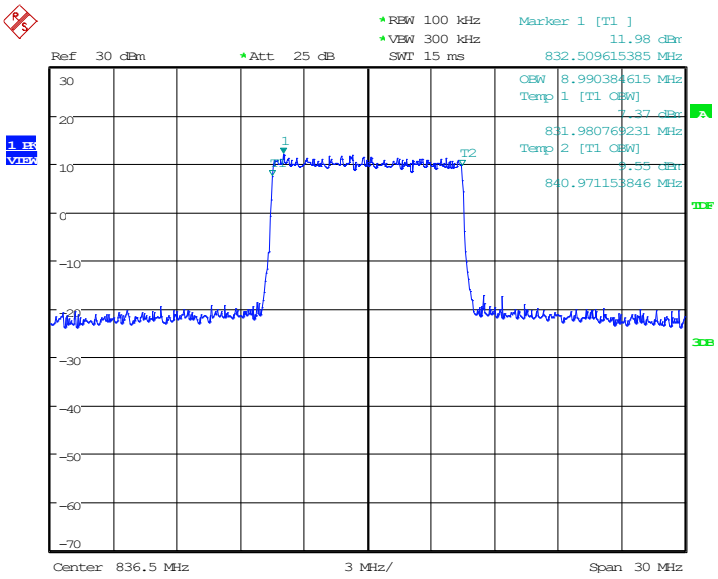
LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)



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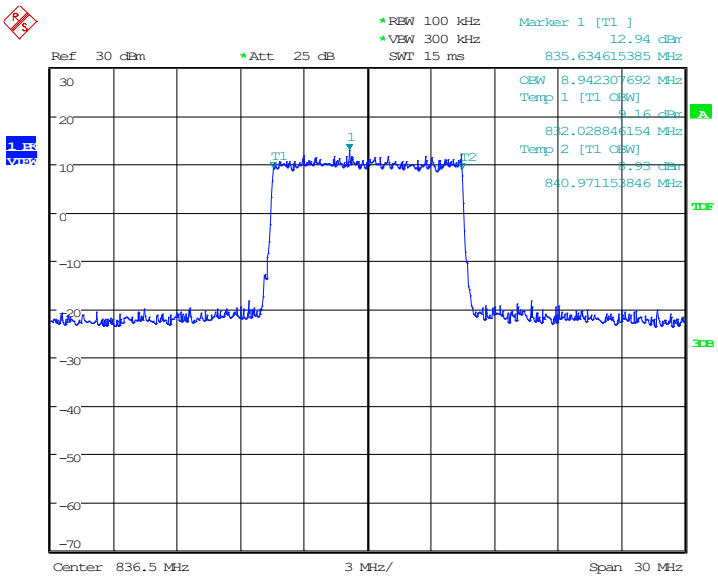
LTE band 5, 10MHz Bandwidth, 64QAM (99% BW)



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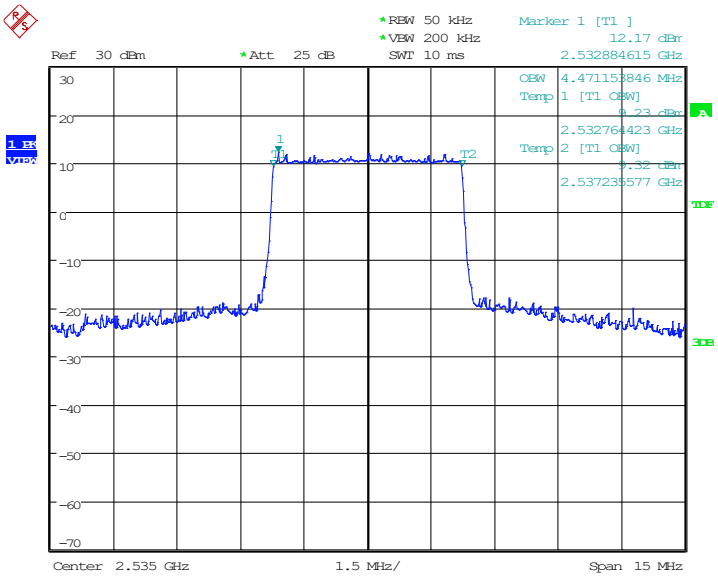
LTE band 7, 5MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	4471.15	4495.19	4471.15

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



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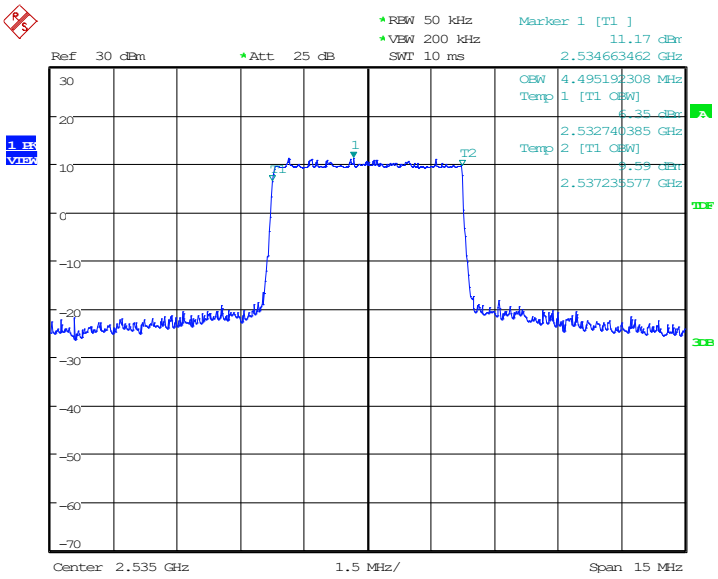
LTE band 7, 5MHz Bandwidth,16QAM (99% BW)



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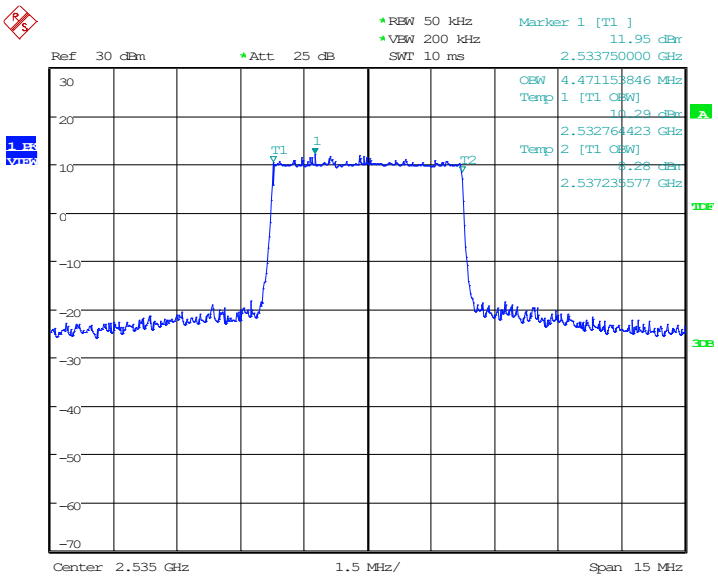
LTE band 7, 5MHz Bandwidth,64QAM (99% BW)



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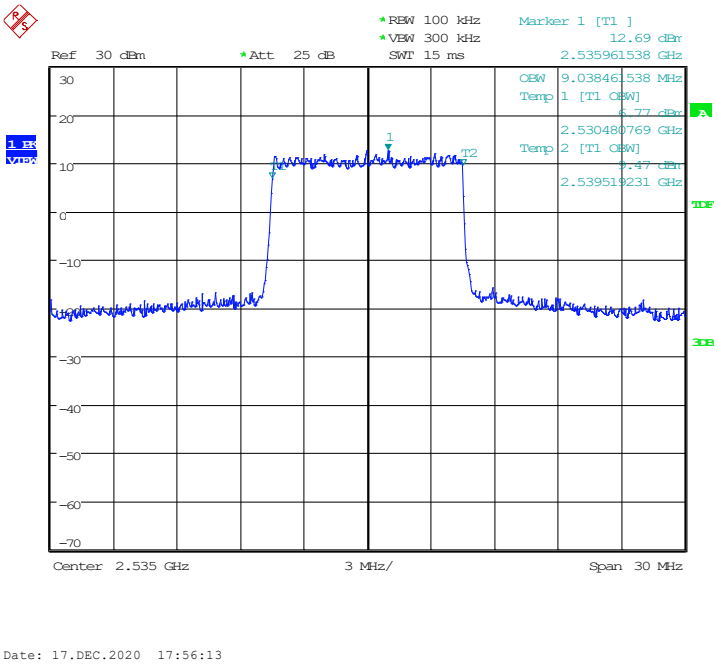
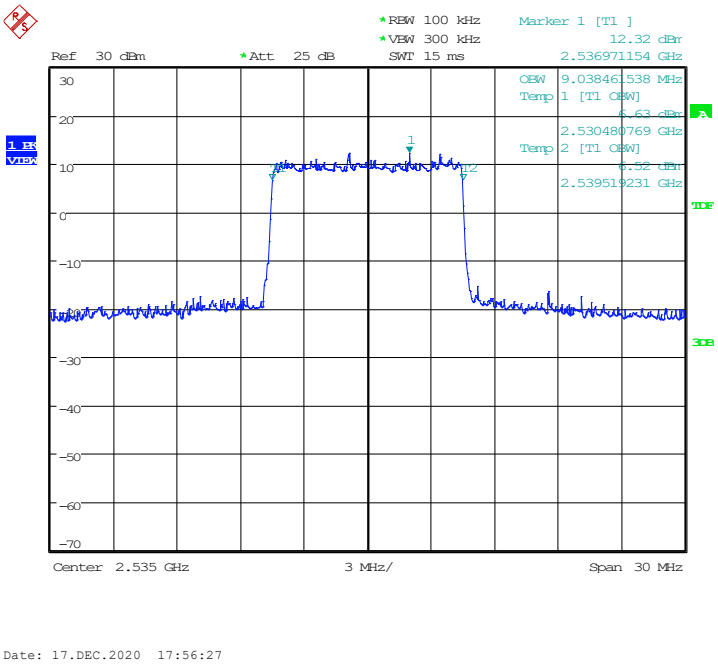
LTE band 7, 10MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	9038.46	9038.46	8990.38

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



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



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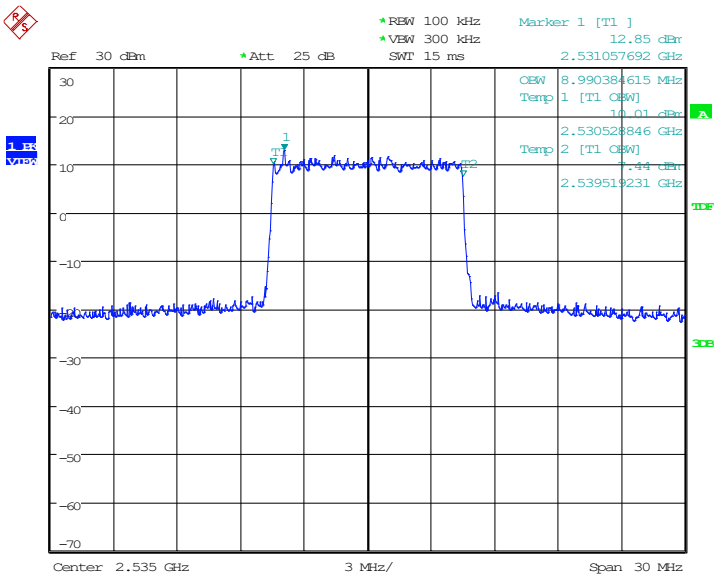
LTE band 7, 10MHz Bandwidth, 64QAM (99% BW)



Date: 18.DEC.2020 13:05:56

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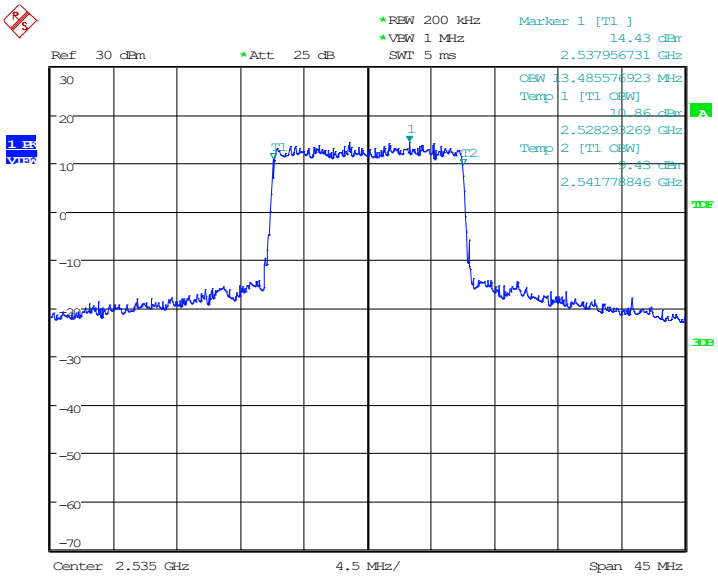
LTE band 7, 15MHz (99% BW)

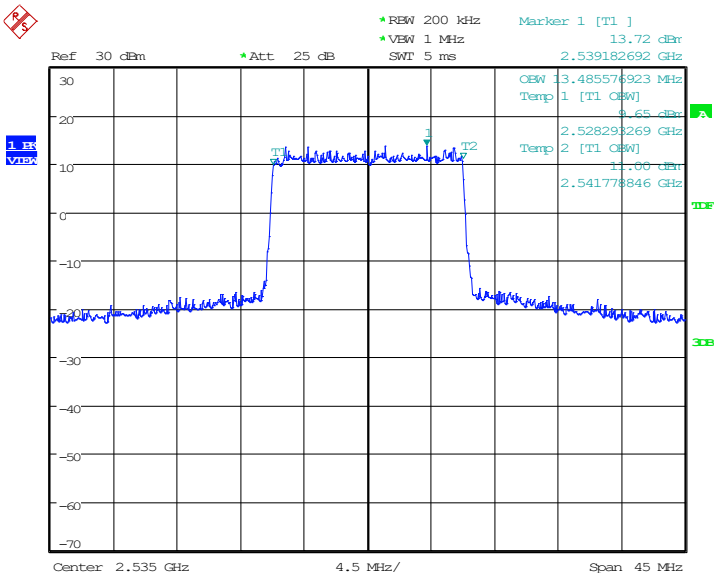
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	13485.58	13485.58	13485.58

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



Date: 17.DEC.2020 17:59:38

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



Date: 17.DEC.2020 17:59:52

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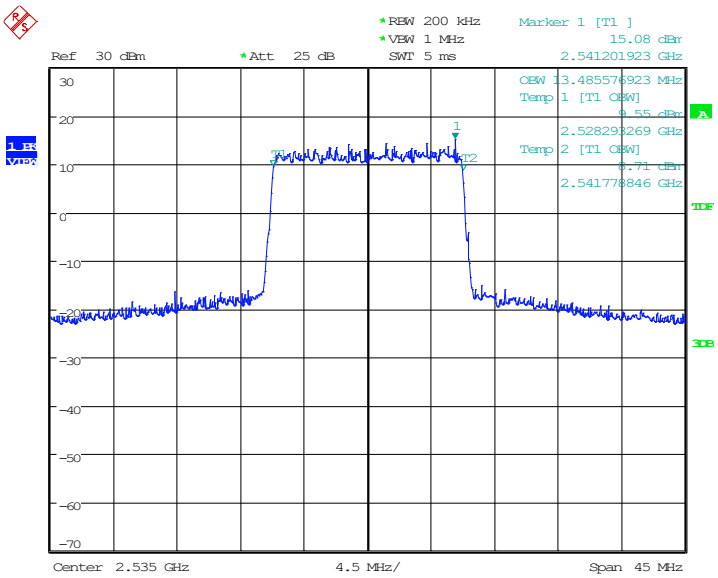
LTE band 7, 15MHz Bandwidth, 64QAM (99% BW)



Date: 18.DEC.2020 13:08:39

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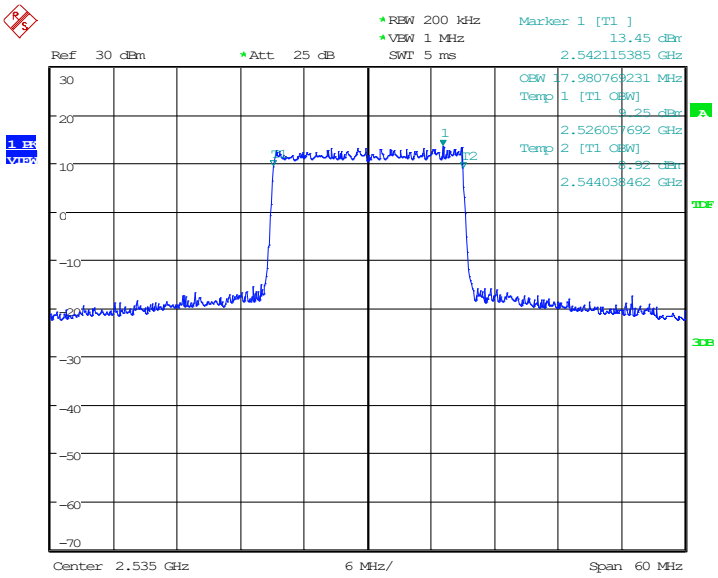
LTE band 7, 20MHz (99% BW)

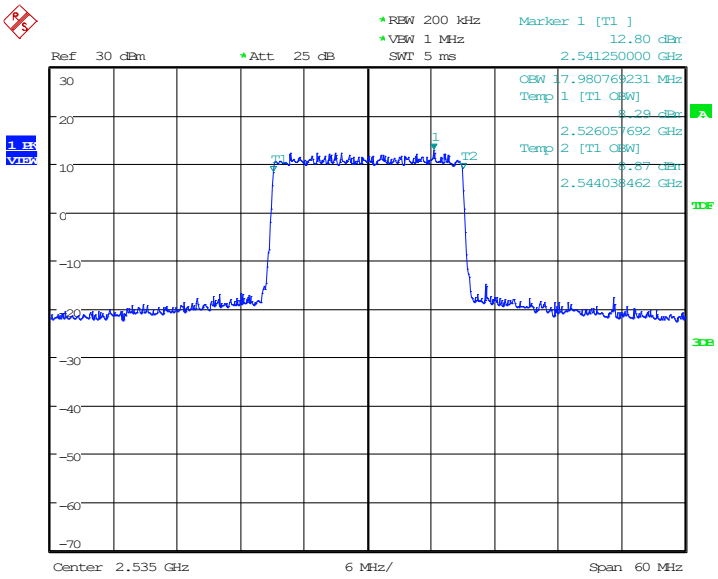
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	17980.77	17980.77	17980.77

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



Date: 17.DEC.2020 18:03:04

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



Date: 17.DEC.2020 18:03:17

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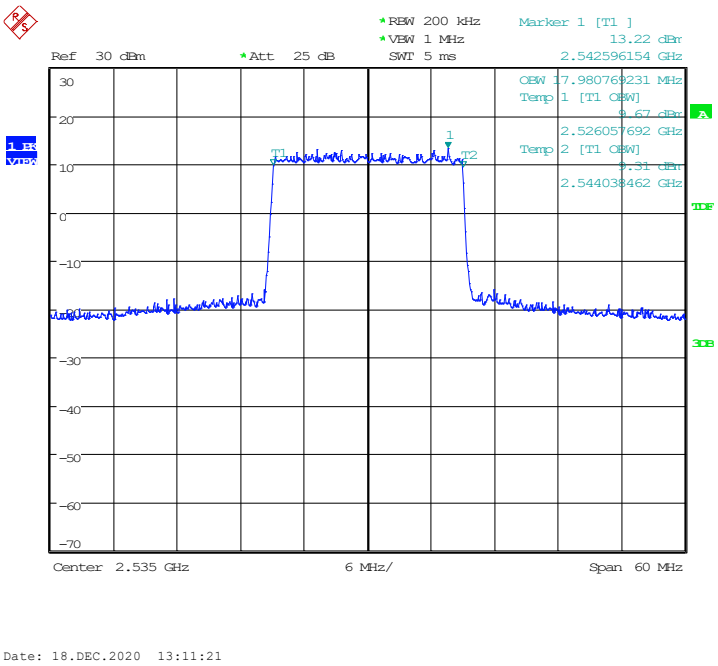
LTE band 7, 20MHz Bandwidth, 64QAM (99% BW)



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

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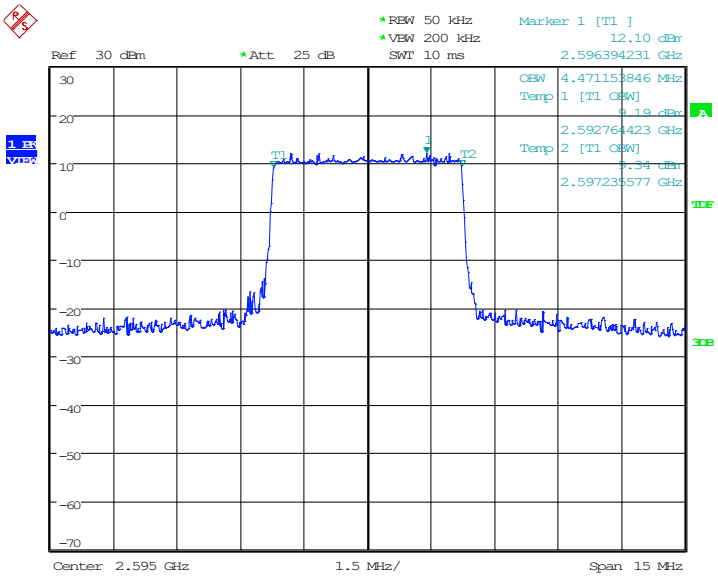
LTE band 41, 5MHz (99% BW)

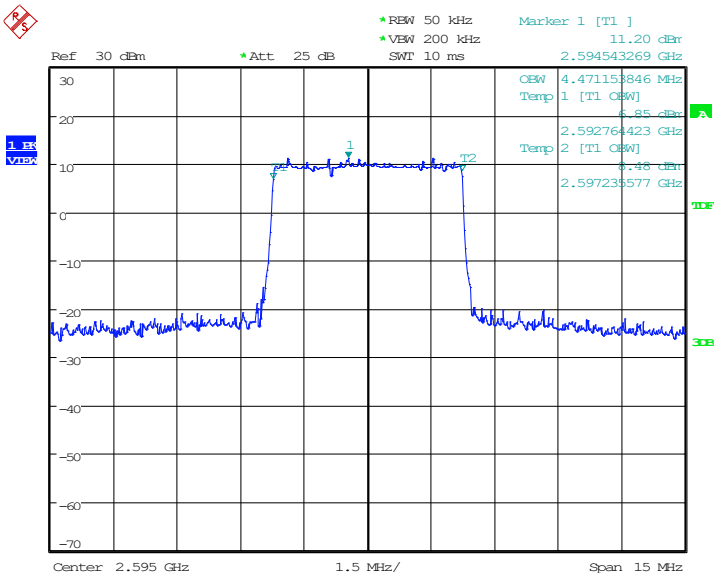
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	4471.15	4471.15	4471.15

LTE band 41, 5MHz Bandwidth, QPSK (99% BW)



Date: 21.DEC.2020 11:59:11

LTE band 41, 5MHz Bandwidth,16QAM (99% BW)



Date: 21.DEC.2020 11:59:25

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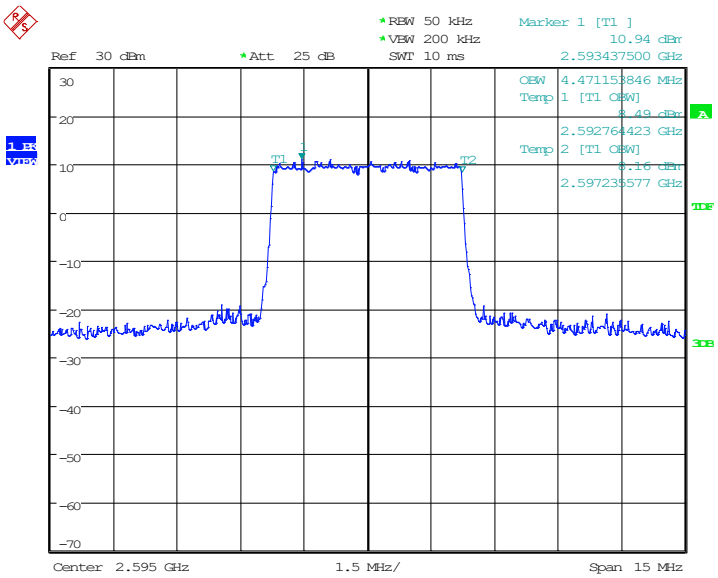
LTE band 41, 5MHz Bandwidth,64QAM (99% BW)



Date: 21.DEC.2020 12:10:49

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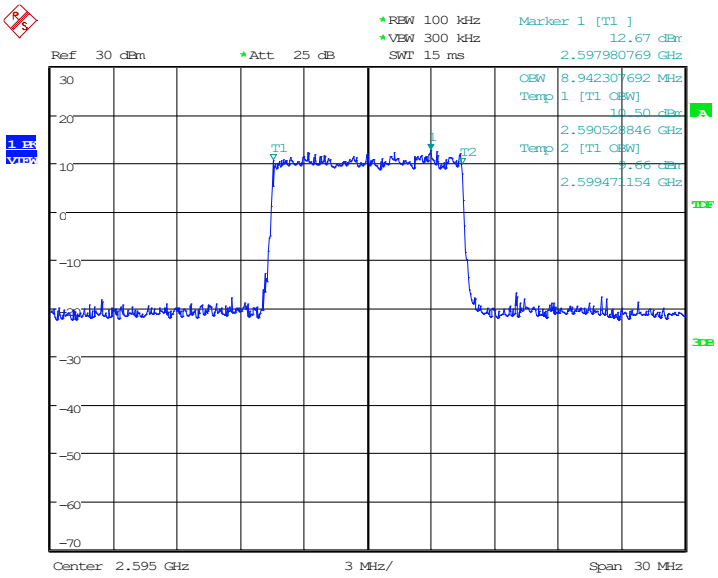
LTE band 41, 10MHz (99% BW)

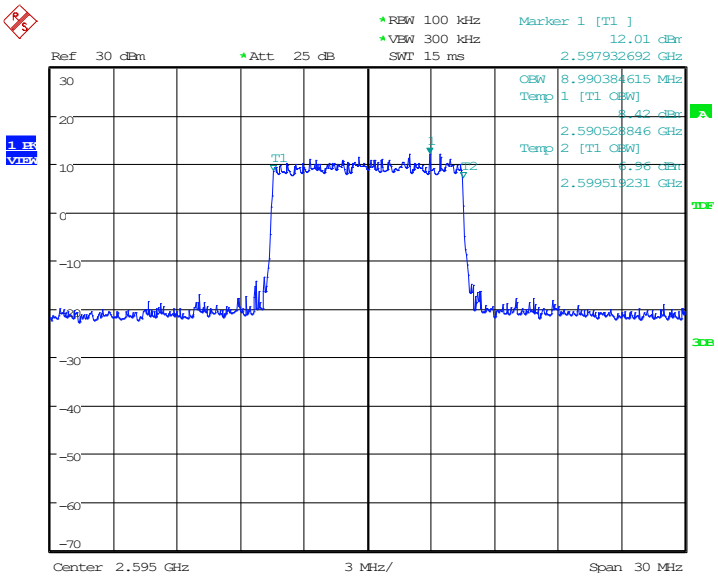
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	8942.31	8990.38	8990.38

LTE band 41, 10MHz Bandwidth, QPSK (99% BW)



Date: 21.DEC.2020 12:01:29

LTE band 41, 10MHz Bandwidth, 16QAM (99% BW)



Date: 21.DEC.2020 12:01:42

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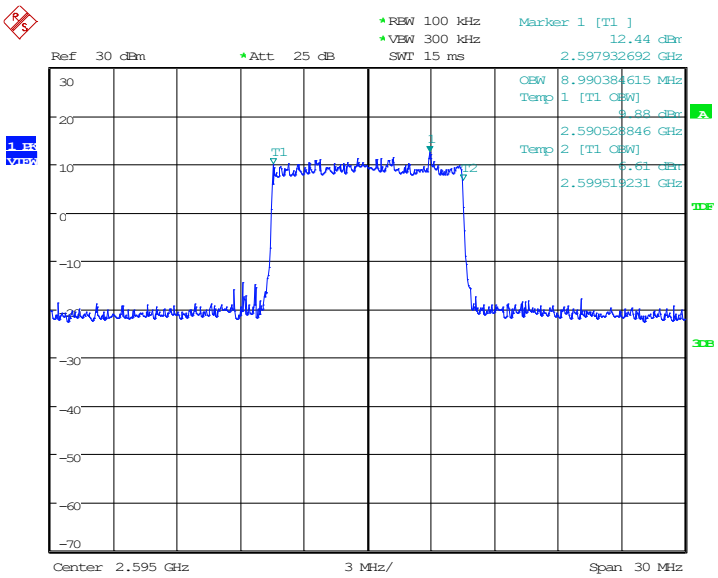
LTE band 41, 10MHz Bandwidth, 64QAM (99% BW)



Date: 21.DEC.2020 12:12:37

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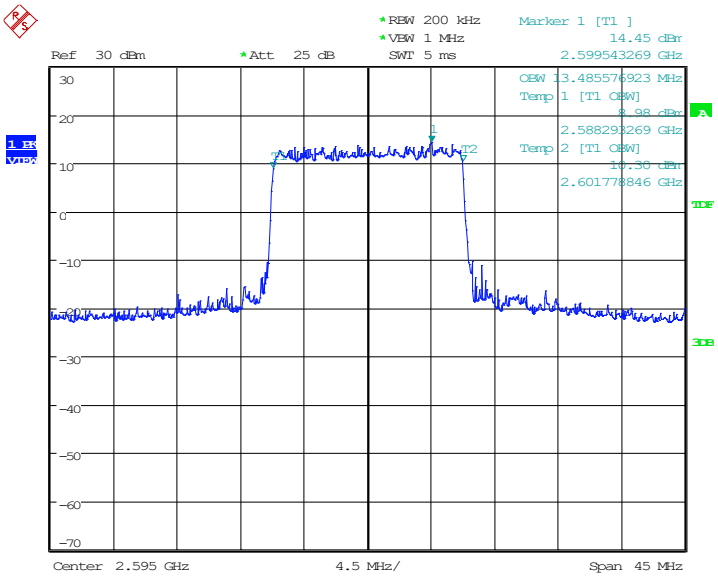
LTE band 41, 15MHz (99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	13485.58	13485.58	13485.58

LTE band 41, 15MHz Bandwidth, QPSK (99% BW)



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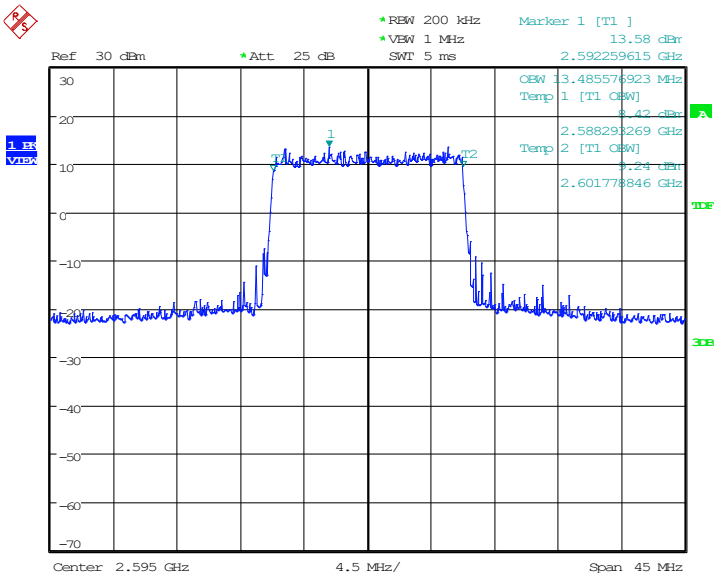
LTE band 41, 15MHz Bandwidth, 16QAM (99% BW)



Date: 21.DEC.2020 12:04:00

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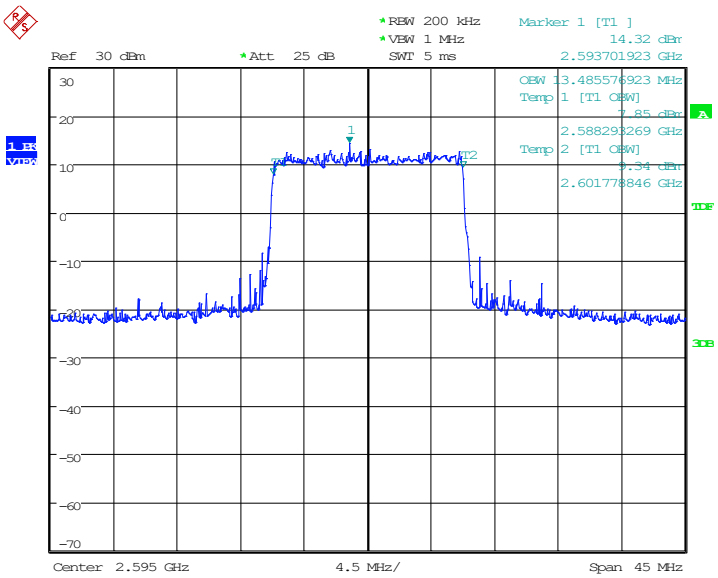
LTE band 41, 15MHz Bandwidth, 64QAM (99% BW)



Date: 21.DEC.2020 12:14:25

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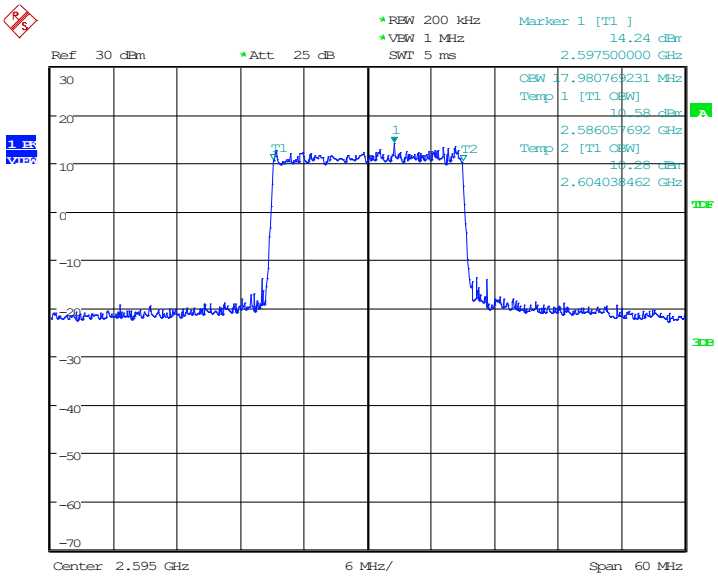
LTE band 41, 20MHz (99% BW)

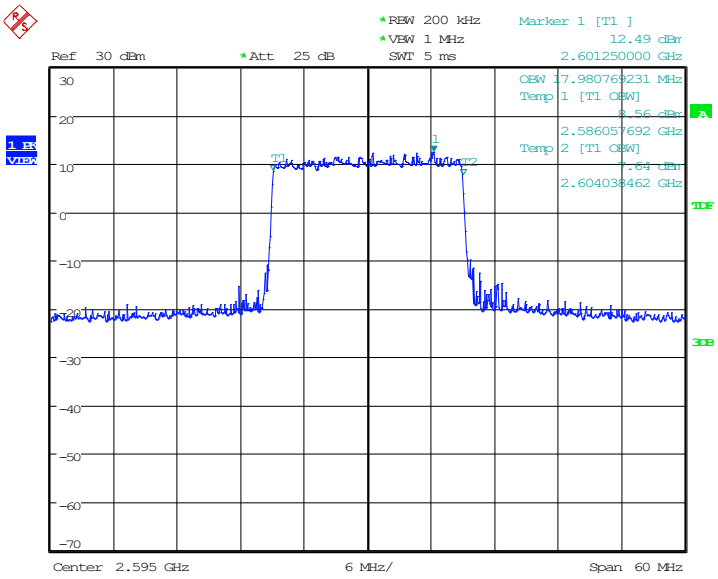
Frequency(MHz)	Occupied Bandwidth (99% BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	17980.77	17980.77	17980.77

LTE band 41, 20MHz Bandwidth, QPSK (99% BW)



Date: 21.DEC.2020 12:06:04

LTE band 41, 20MHz Bandwidth, 16QAM (99% BW)



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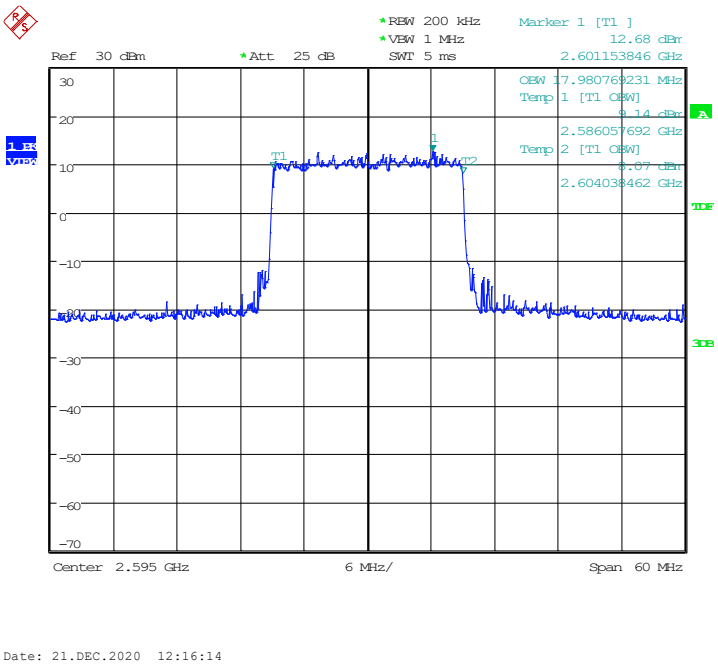
LTE band 41, 20MHz Bandwidth, 64QAM (99% BW)



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

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A.5 EMISSION BANDWIDTH

Reference

FCC: CFR Part 2.1049, 22.917, 27.53.

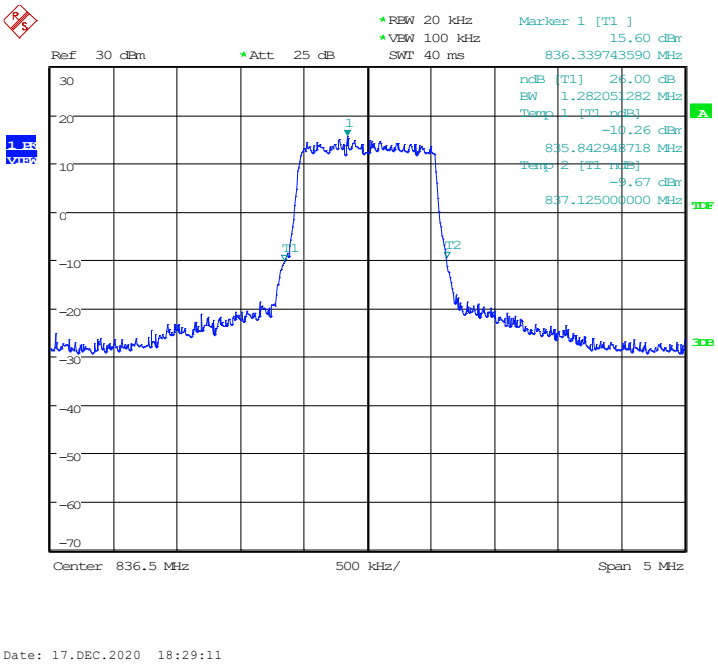
A.5.1Emission Bandwidth Results

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 BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	1282.05	1298.08	1274.04

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



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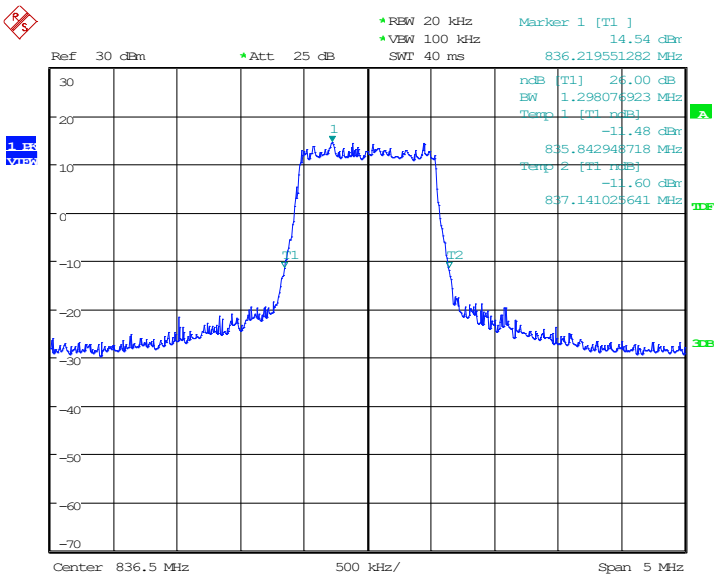
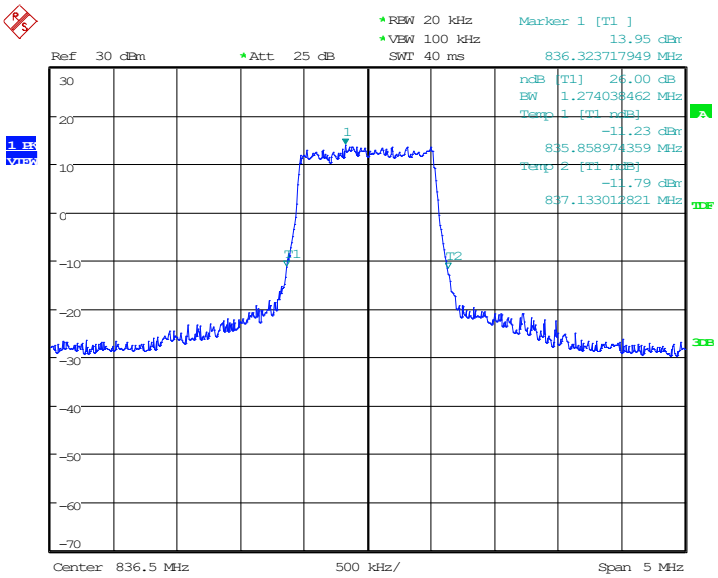
LTE band 5, 1.4MHz Bandwidth, 16QAM (-26dBc BW)



Date: 17.DEC.2020 18:29:27

LTE band 5, 1.4MHz Bandwidth, 64QAM (-26dBc BW)



Date: 18.DEC.2020 13:20:28

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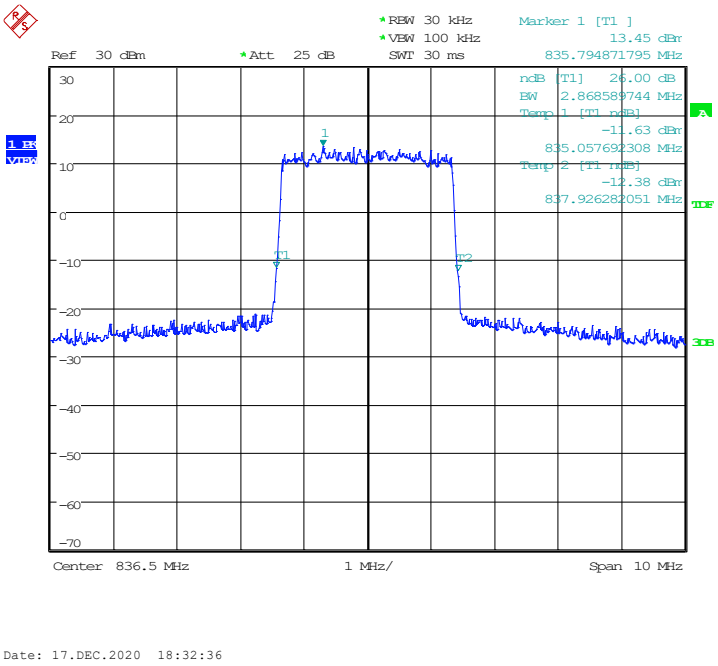
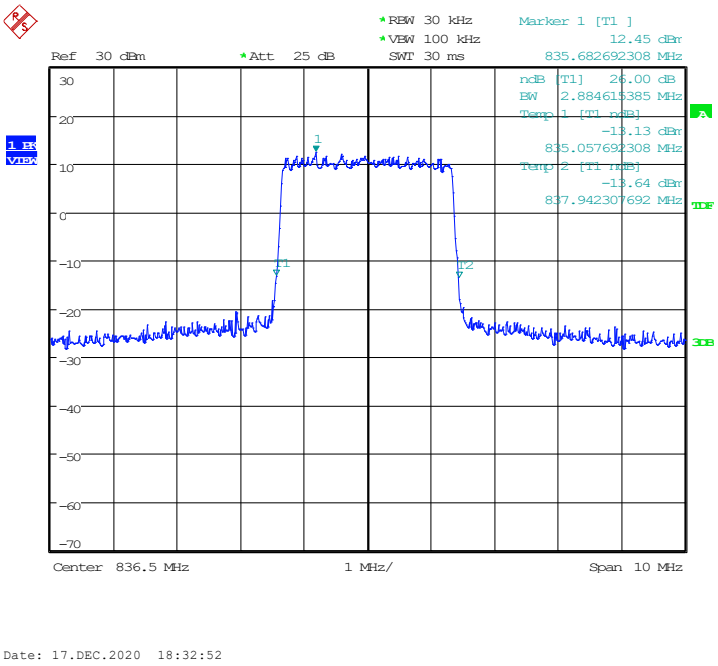
LTE band 5, 3MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	2868.59	2884.62	2868.59

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



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



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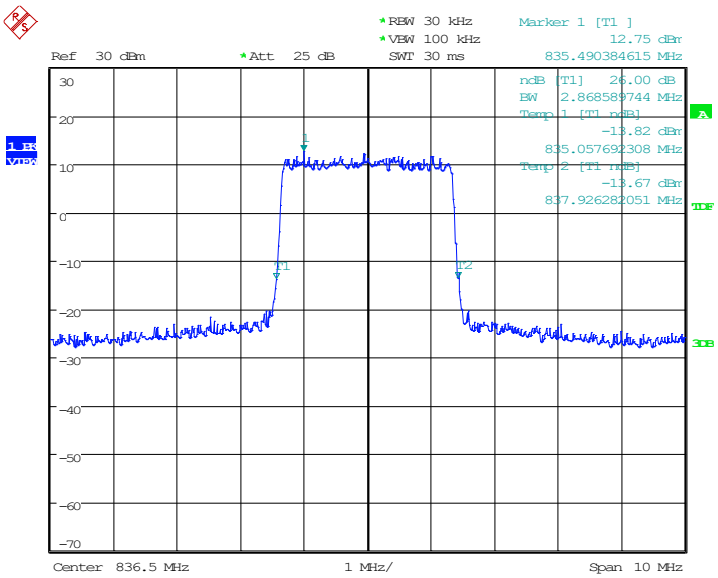
LTE band 5, 3MHz Bandwidth, 64QAM (-26dBc BW)



Date: 18.DEC.2020 13:23:11

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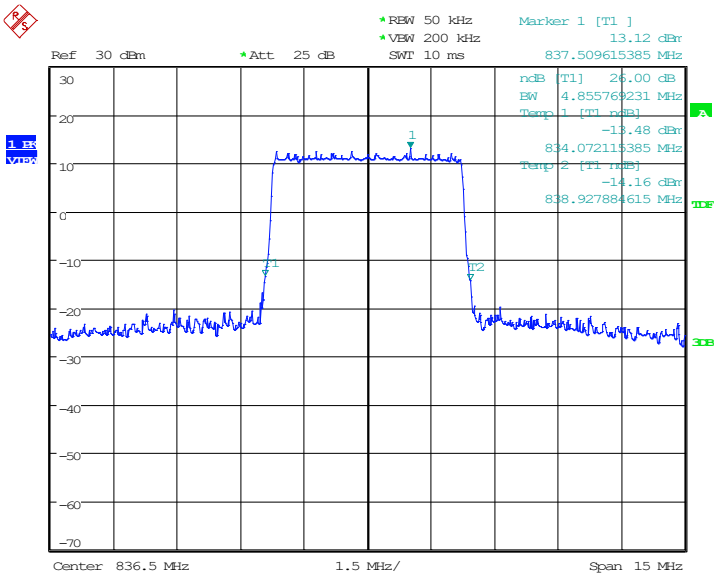
LTE band 5, 5MHz (-26dBc BW)

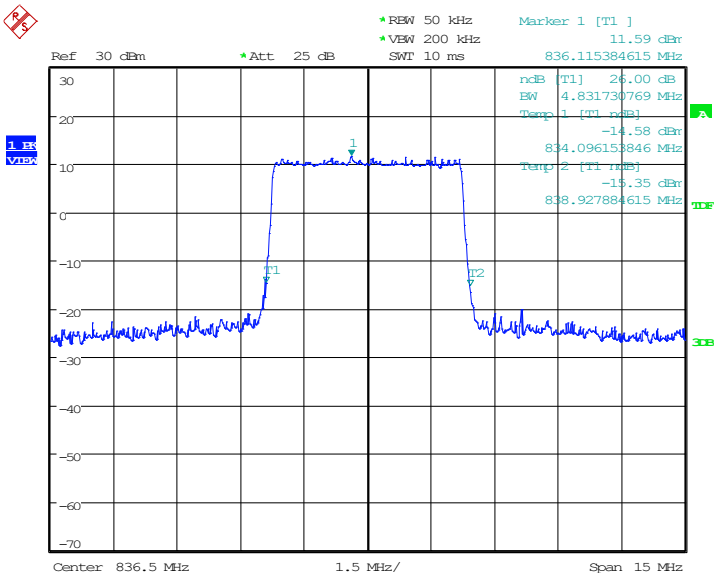
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	4855.77	4831.73	4831.73

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



Date: 17.DEC.2020 18:36:02

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



Date: 17.DEC.2020 18:36:18

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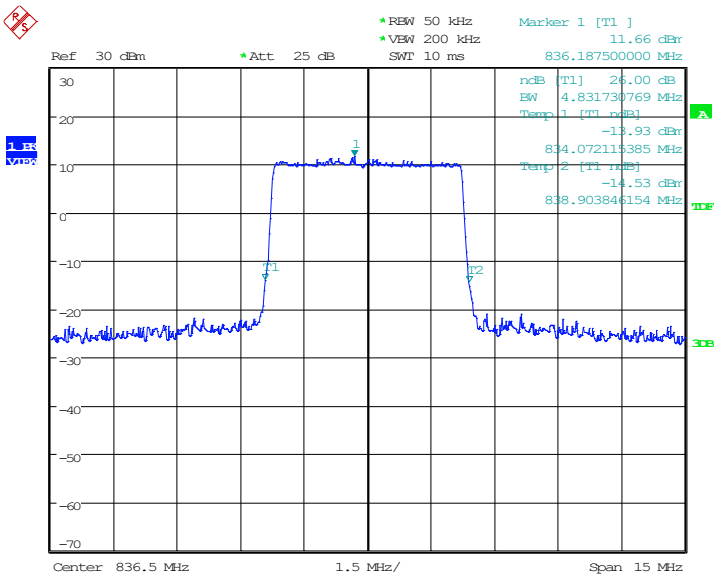
LTE band 5, 5MHz Bandwidth,64QAM (-26dBc BW)



Date: 18.DEC.2020 13:25:53

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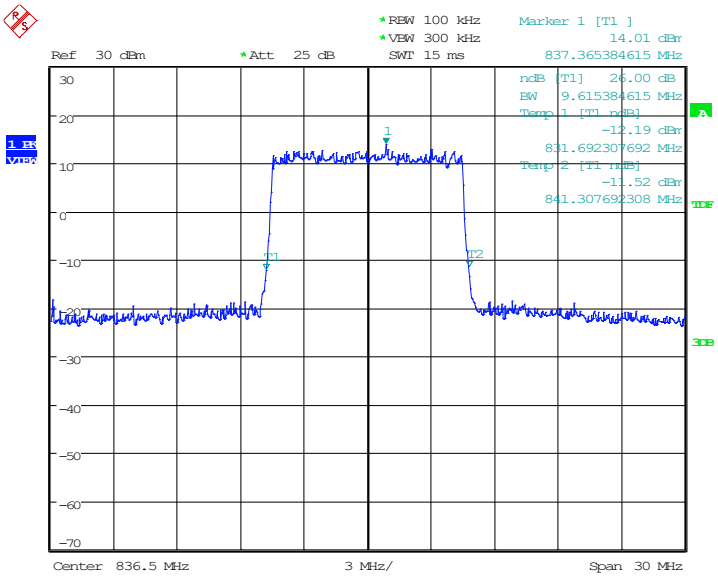
LTE band 5, 10MHz (-26dBc BW)

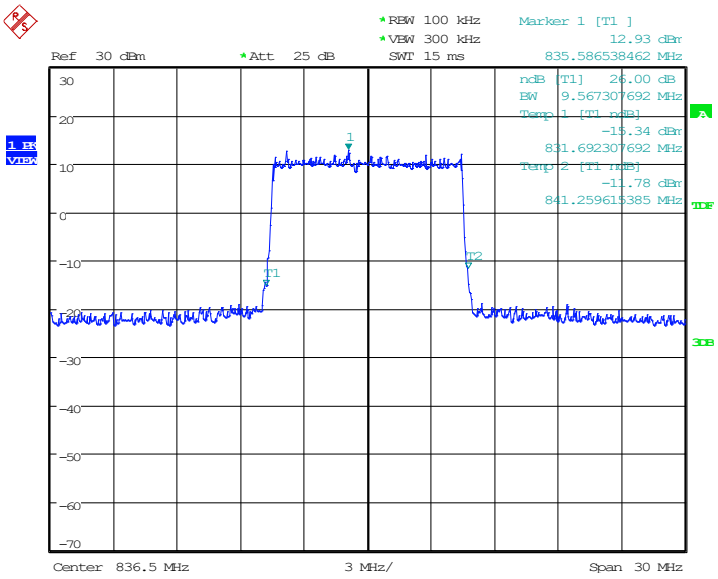
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
836.5	QPSK	16QAM	64QAM
	9615.38	9567.31	9567.31

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



Date: 17.DEC.2020 18:56:02

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



Date: 17.DEC.2020 18:56:18

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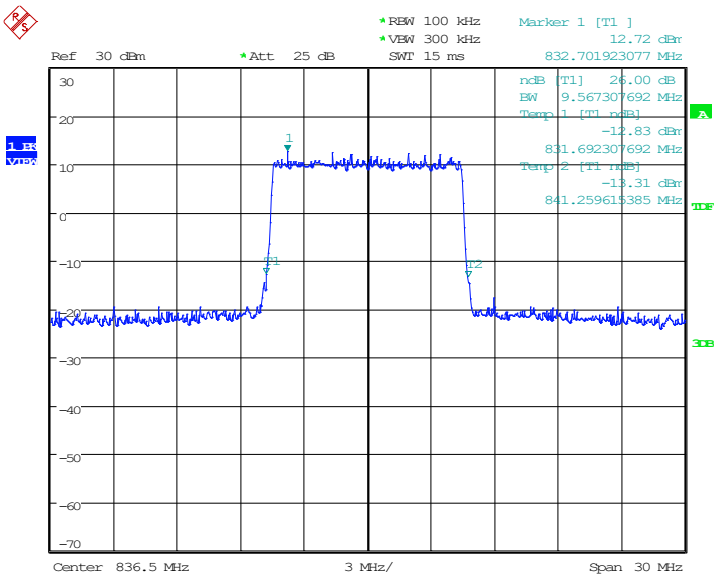
LTE band 5, 10MHz Bandwidth, 64QAM (-26dBc BW)



Date: 18.DEC.2020 13:28:36

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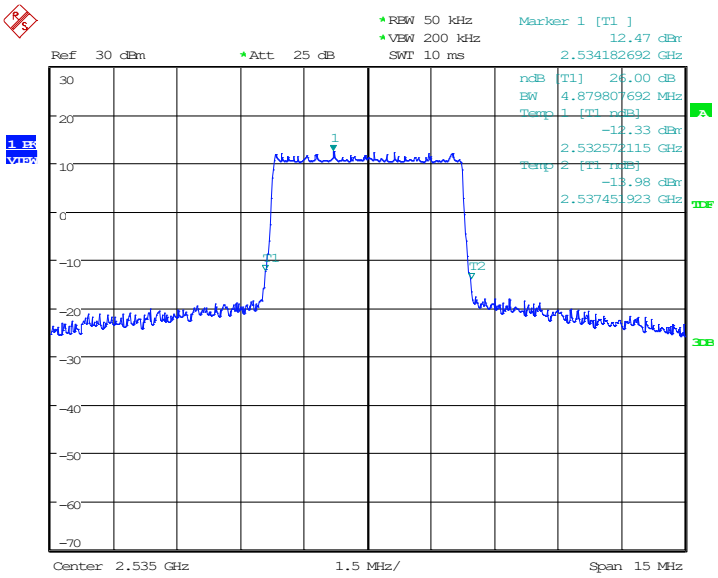
LTE band 7, 5MHz (-26dBc BW)

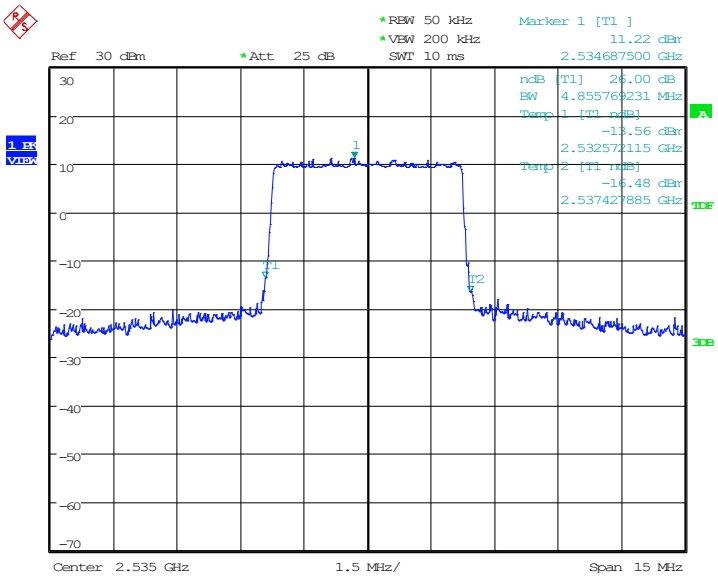
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	4879.81	4855.77	4855.77

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



Date: 17.DEC.2020 17:53:55

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



Date: 17.DEC.2020 17:54:11

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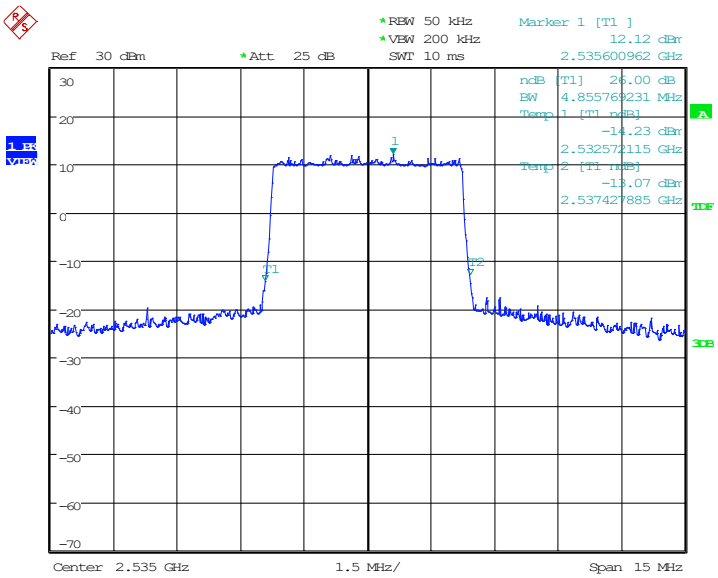
LTE band 7, 5MHz Bandwidth,64QAM (-26dBc BW)



Date: 18.DEC.2020 13:04:08

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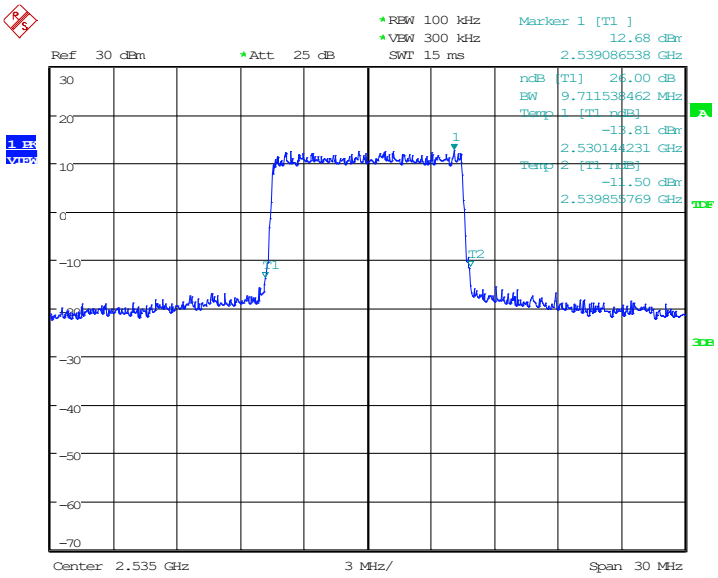
LTE band 7, 10MHz (-26dBc BW)

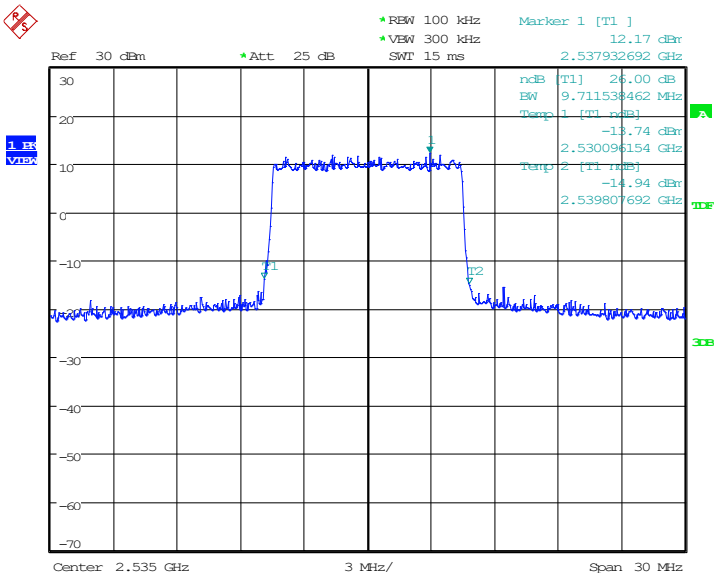
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	9711.54	9711.54	9615.38

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



Date: 17.DEC.2020 17:57:21

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



Date: 17.DEC.2020 17:57:37

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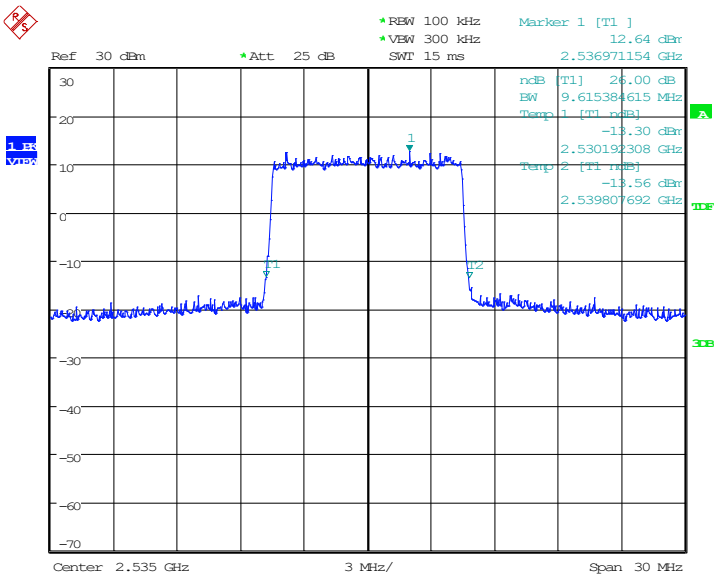
LTE band 7, 10MHz Bandwidth, 64QAM (-26dBc BW)



Date: 18.DEC.2020 13:06:50

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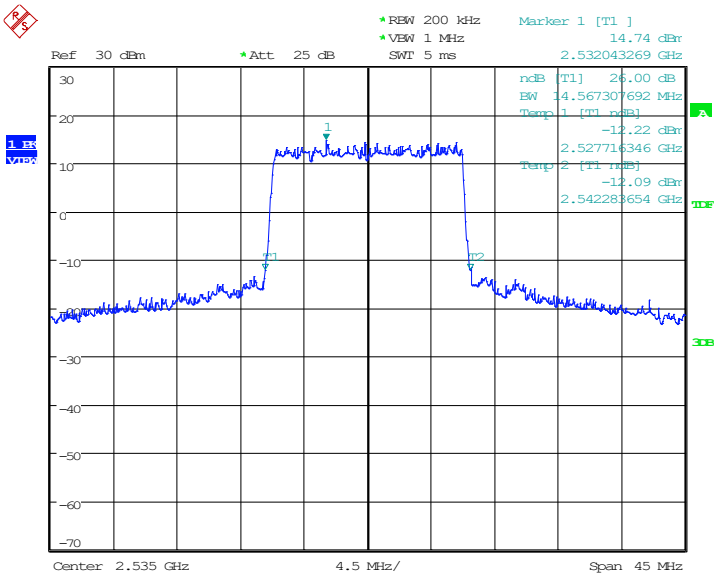
LTE band 7, 15MHz (-26dBc BW)

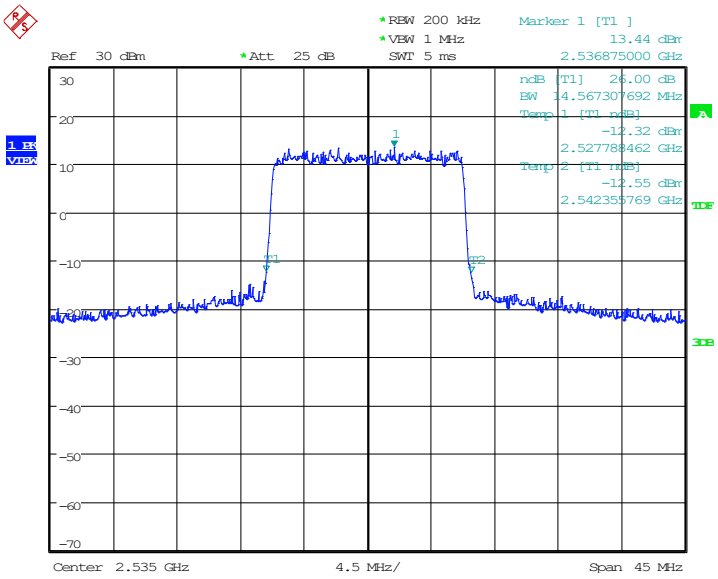
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	14567.31	14567.31	14711.54

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



Date: 17.DEC.2020 18:00:46

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



Date: 17.DEC.2020 18:01:02

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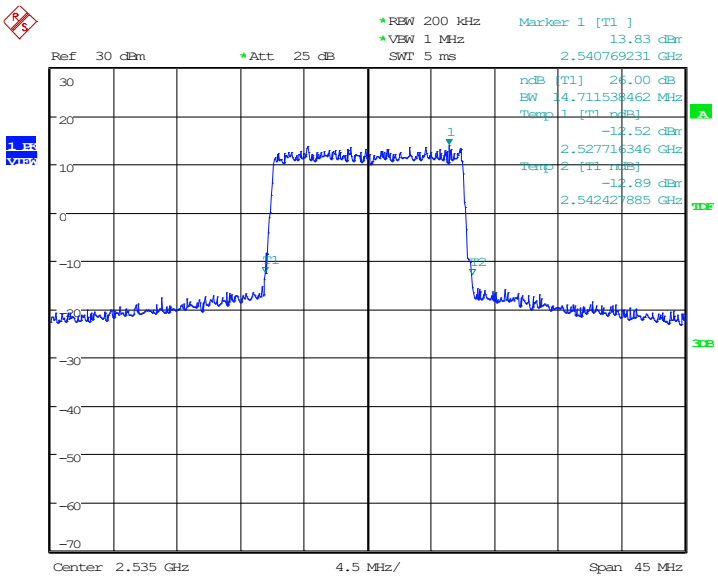
LTE band 7, 15MHz Bandwidth, 64QAM (-26dBc BW)



Date: 18.DEC.2020 13:09:33

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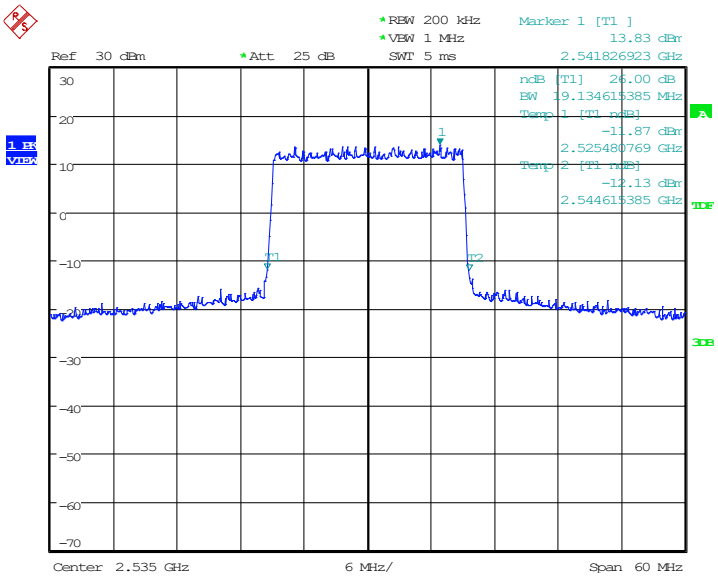
LTE band 7, 20MHz (-26dBc BW)

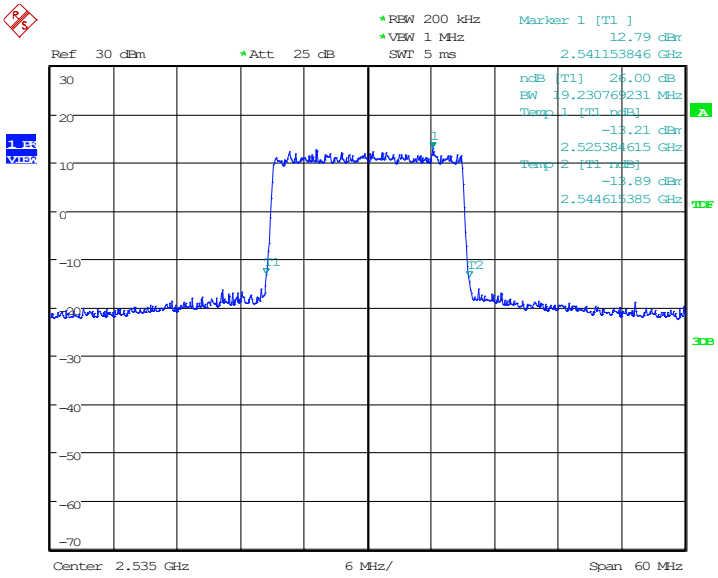
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2535.0	QPSK	16QAM	64QAM
	19134.62	19230.77	19230.77

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



Date: 17.DEC.2020 18:04:11

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



Date: 17.DEC.2020 18:04:27

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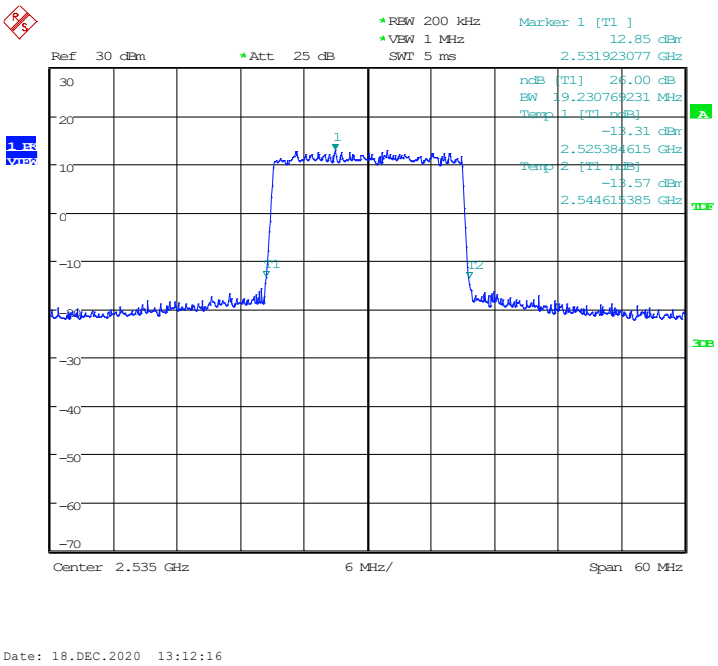
LTE band 7, 20MHz Bandwidth, 64QAM (-26dBc BW)



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

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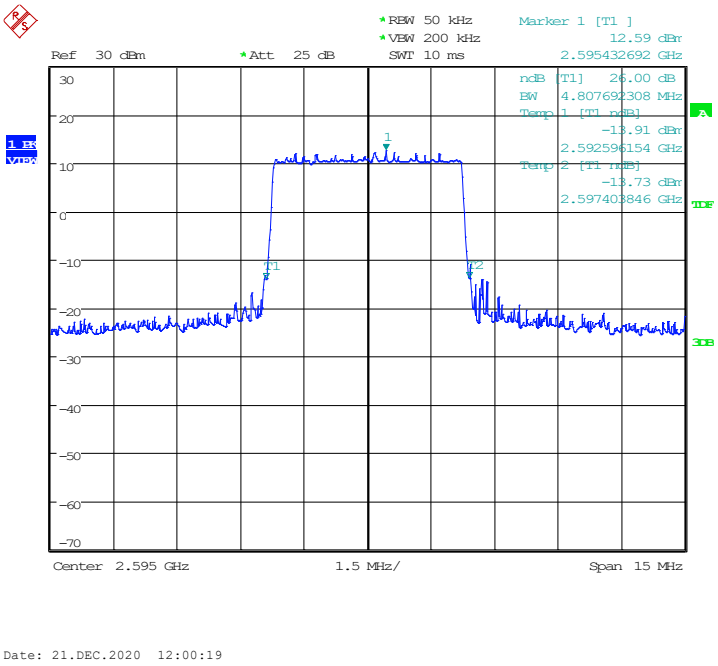
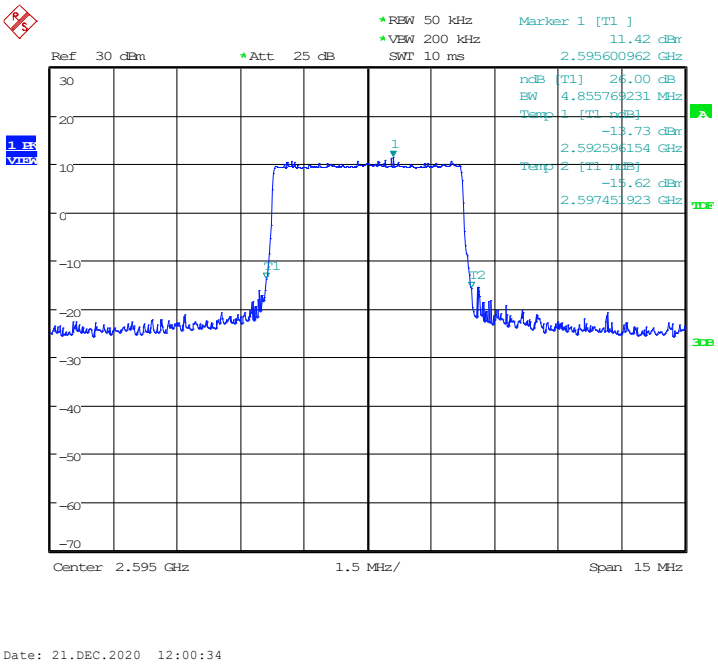
LTE band 41, 5MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	4807.69	4855.77	4831.73

LTE band 41, 5MHz Bandwidth, QPSK (-26dBc BW)



LTE band 41, 5MHz Bandwidth,16QAM (-26dBc BW)



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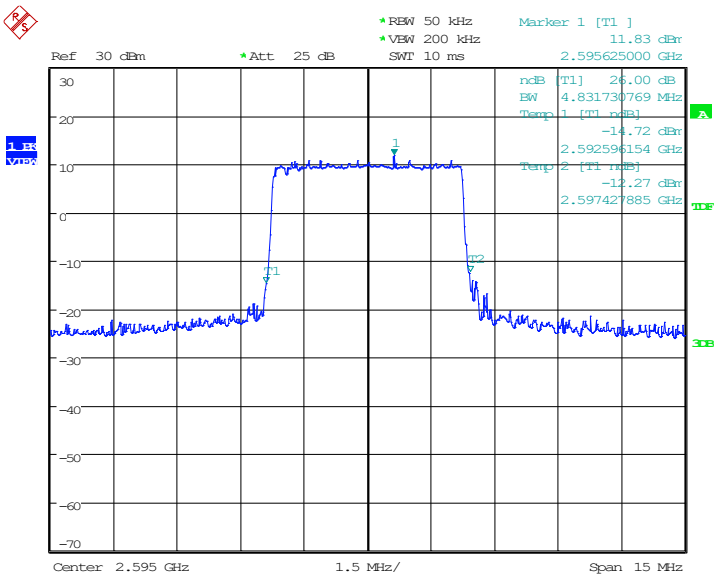
LTE band 41, 5MHz Bandwidth,64QAM (-26dBc BW)



Date: 21.DEC.2020 12:11:43

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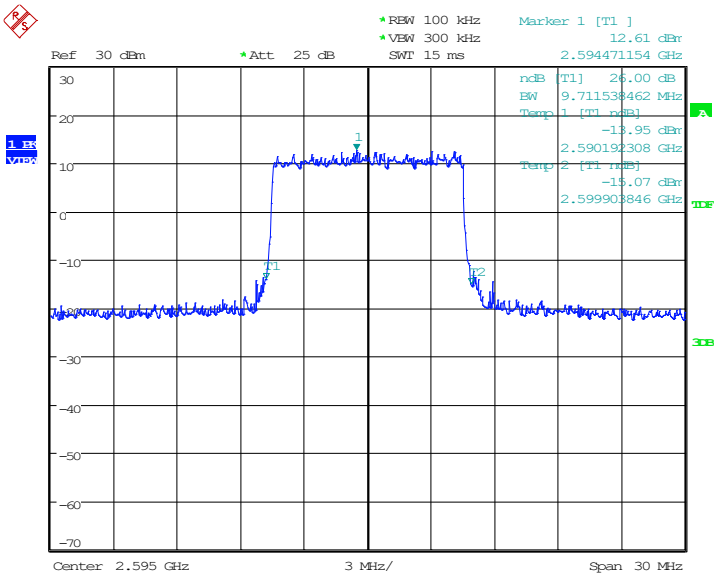
LTE band 41, 10MHz (-26dBc BW)

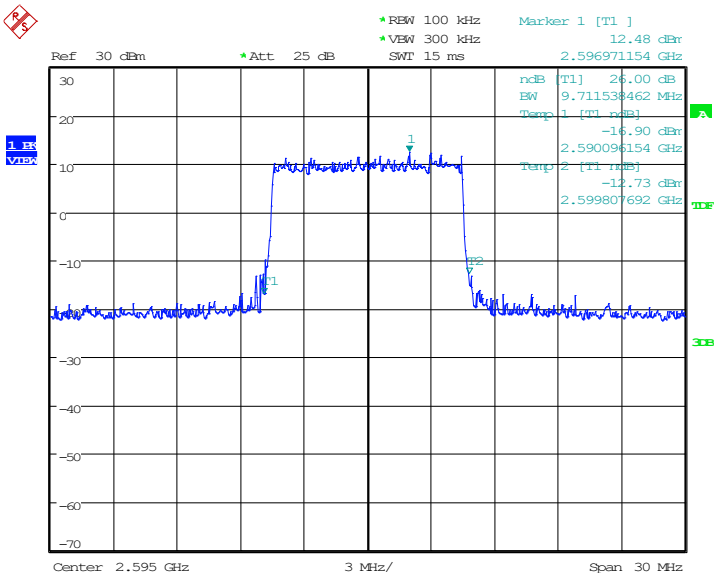
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	9711.54	9711.54	9663.46

LTE band 41, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 21.DEC.2020 12:02:36

LTE band 41, 10MHz Bandwidth, 16QAM (-26dBc BW)



Date: 21.DEC.2020 12:02:52

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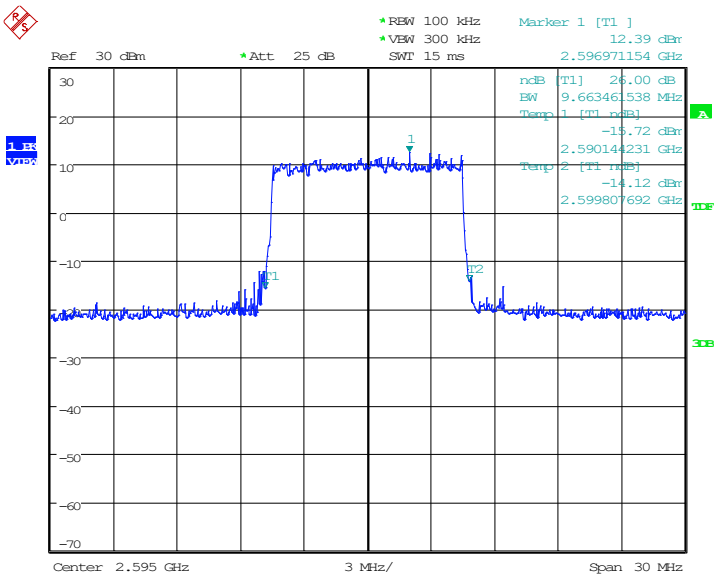
LTE band 41, 10MHz Bandwidth, 64QAM (-26dBc BW)



Date: 21.DEC.2020 12:13:31

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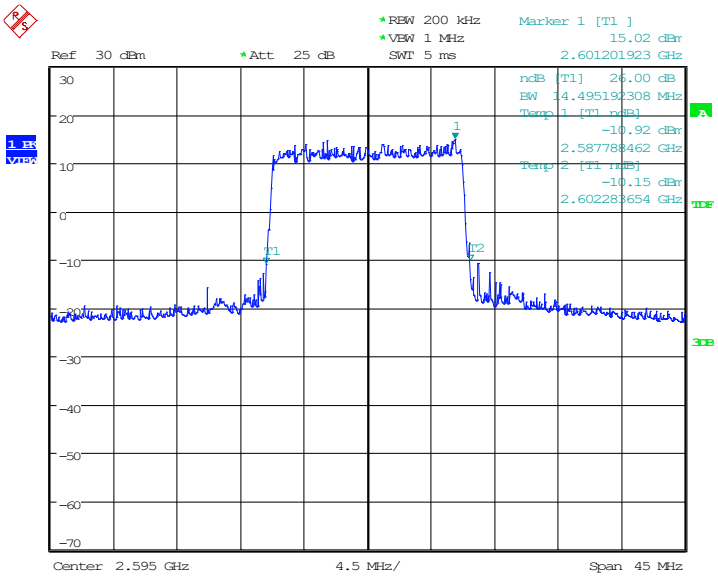
LTE band 41, 15MHz (-26dBc BW)

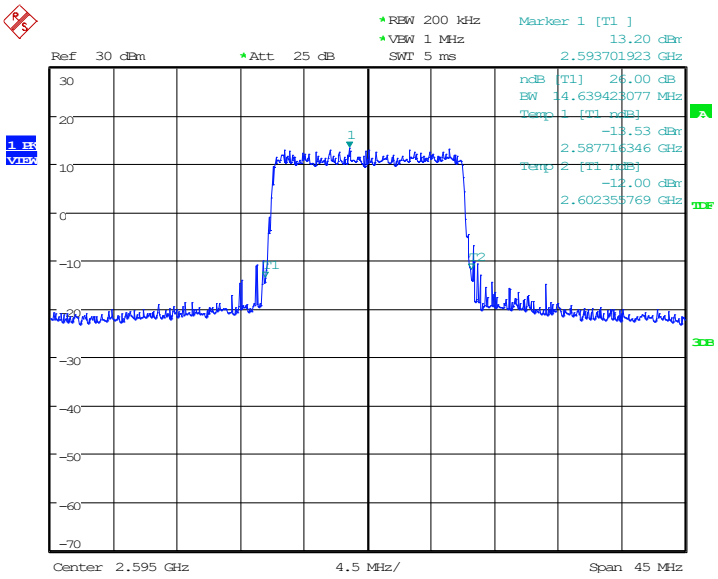
Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	14495.19	14639.42	14567.31

LTE band 41, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 21.DEC.2020 12:04:54

LTE band 41, 15MHz Bandwidth, 16QAM (-26dBc BW)



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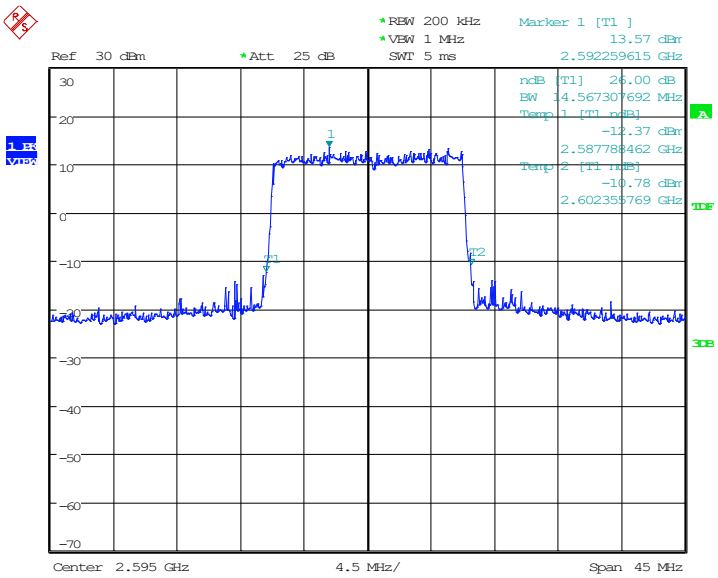
LTE band 41, 15MHz Bandwidth, 64QAM (-26dBc BW)



Date: 21.DEC.2020 12:15:19

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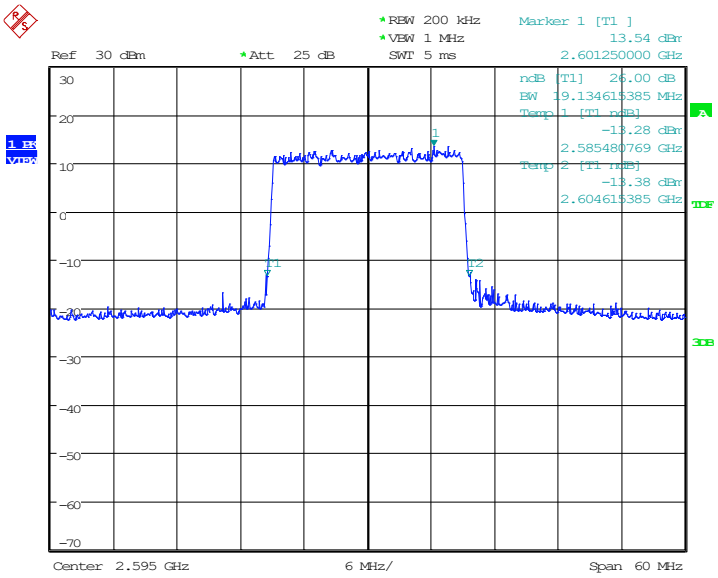
LTE band 41, 20MHz (-26dBc BW)

Frequency(MHz)	Emission Bandwidth (-26dBc BW)(kHz)		
2593.0	QPSK	16QAM	64QAM
	19134.62	19326.92	19230.77

LTE band 41, 20MHz Bandwidth, QPSK (-26dBc BW)



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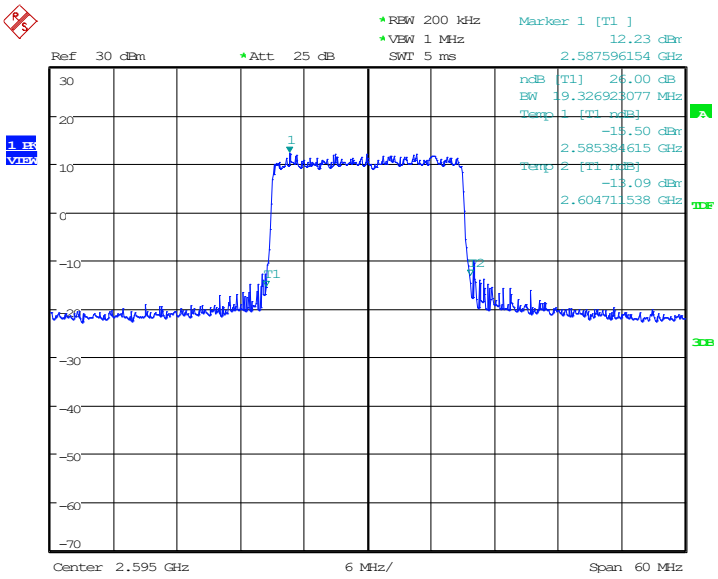
LTE band 41, 20MHz Bandwidth, 16QAM (-26dBc BW)



Date: 21.DEC.2020 12:07:28

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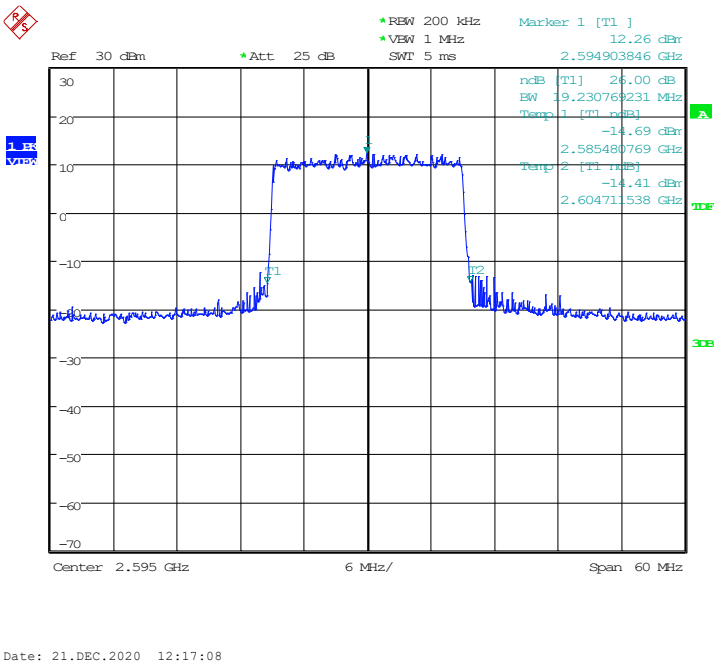
LTE band 41, 20MHz Bandwidth, 64QAM (-26dBc BW)



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

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A.6 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 2.1051, 22.917, 27.53.

A.6.1 Measurement limit

On any frequency outside frequency ban

d 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.

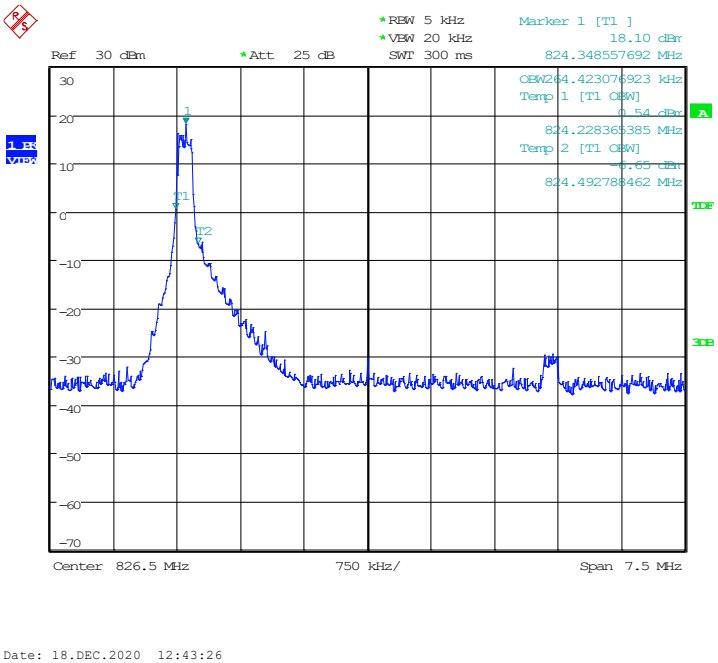
A relaxation of the reference bandwidth is often provided for measurements within a specified frequency range at the edge of the authorized frequency block/band. This is often implemented by permitting the use of a narrower RBW (typically limited to a minimum RBW of 1% of the OBW) for measuring the out-of-band emissions without a requirement to integrate the result over the full reference bandwidth.

A.6.2 Measurement result

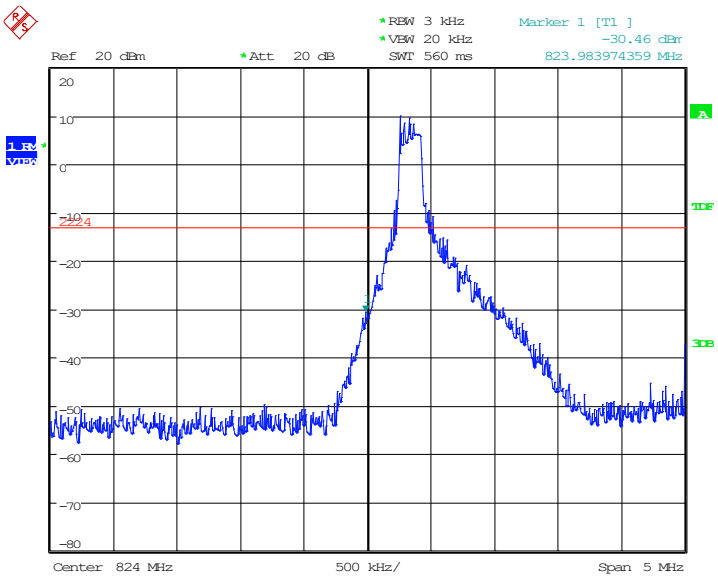
Only worst case result is given below

LTE band 5

OBW: 1RB-low_offset



LOW BAND EDGE BLOCK-1RB-low_offset



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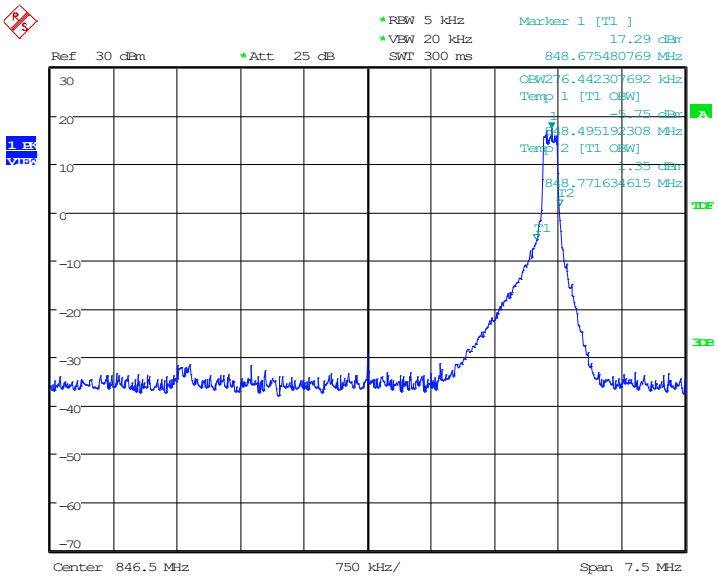
OBW: 1RB-high_offset



Date: 18.DEC.2020 12:36:27

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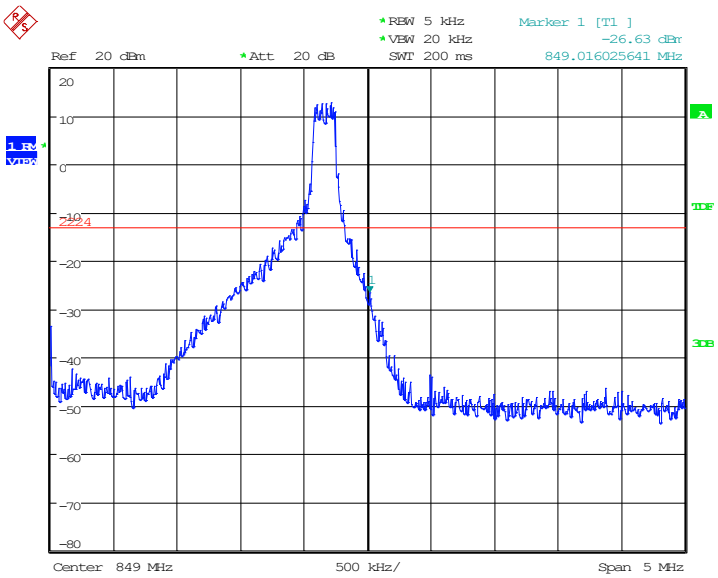
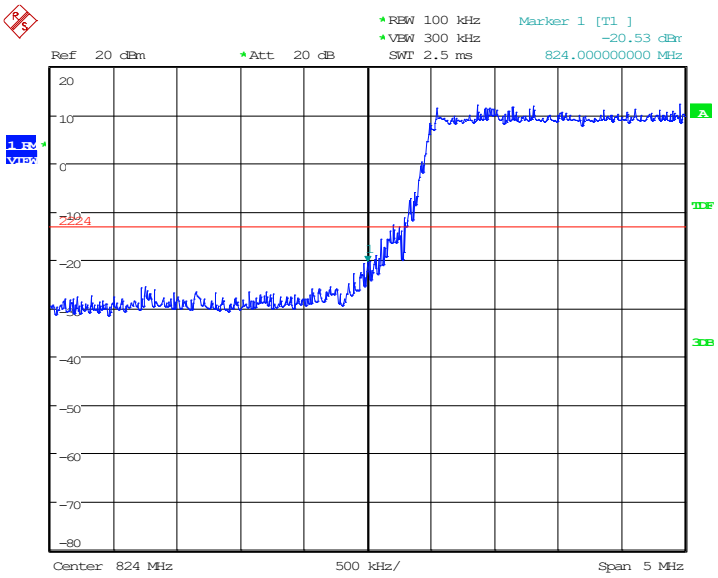
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 18.DEC.2020 12:37:11

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 18.DEC.2020 12:58:08

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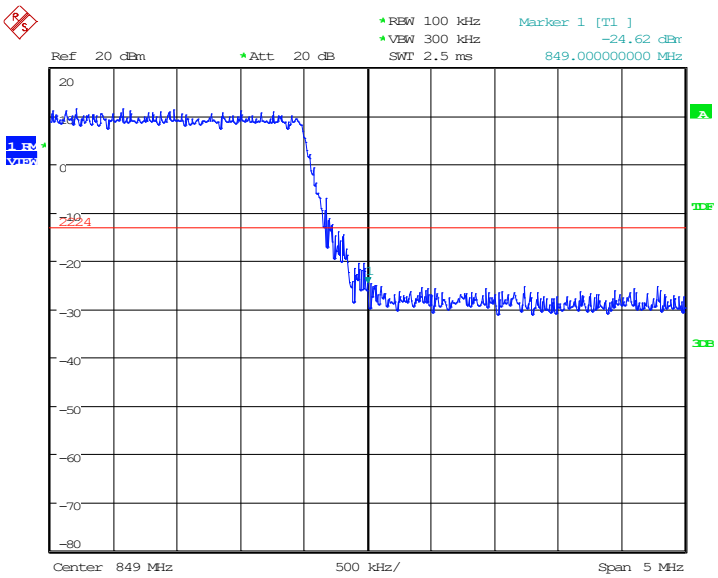
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 18.DEC.2020 12:58:54

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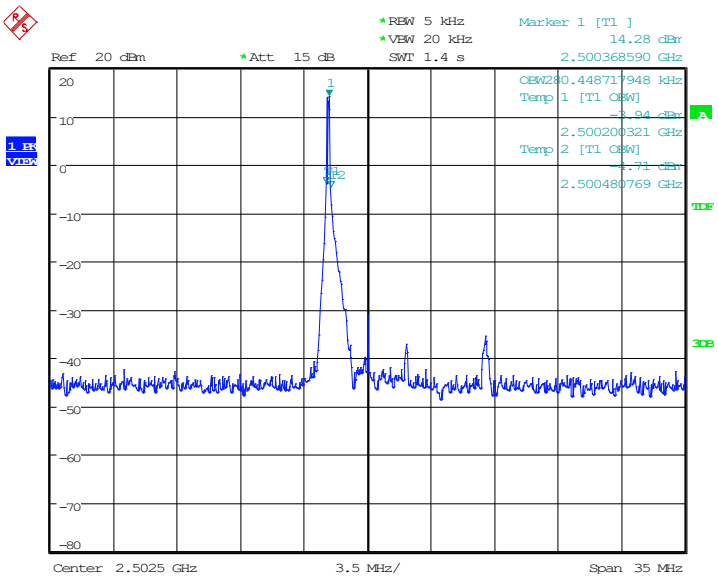
LTE band 7

OBW: 1RB-low_offset



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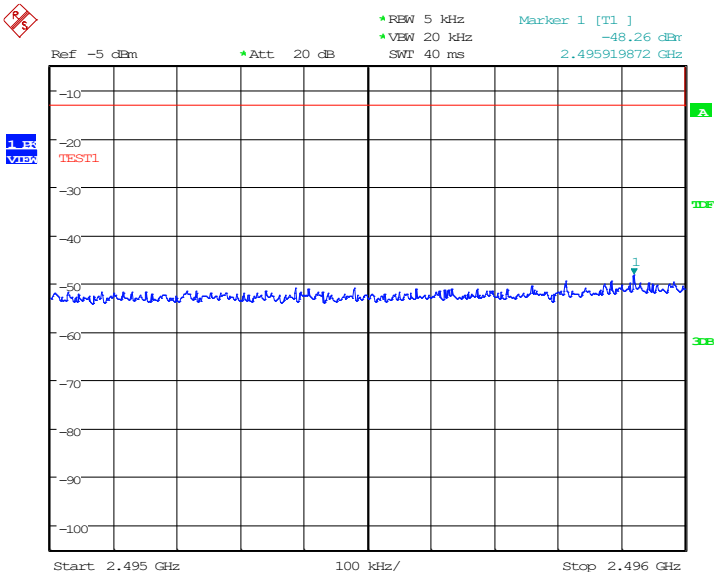
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 18.DEC.2020 16:07:23

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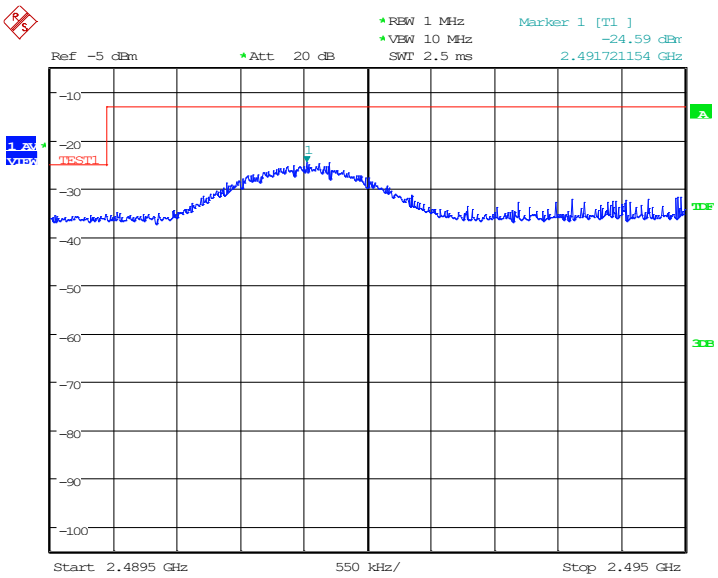
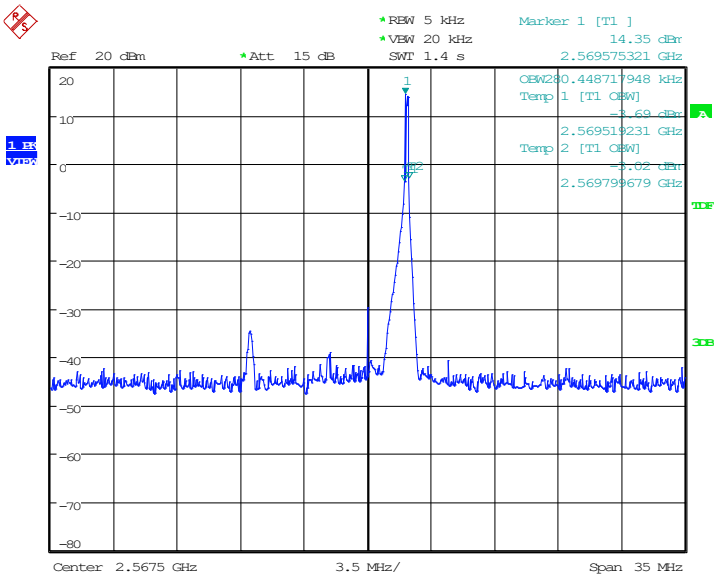


Date: 18.DEC.2020 16:05:43

OBW: 1RB-high_offset



Date: 18.DEC.2020 16:00:48

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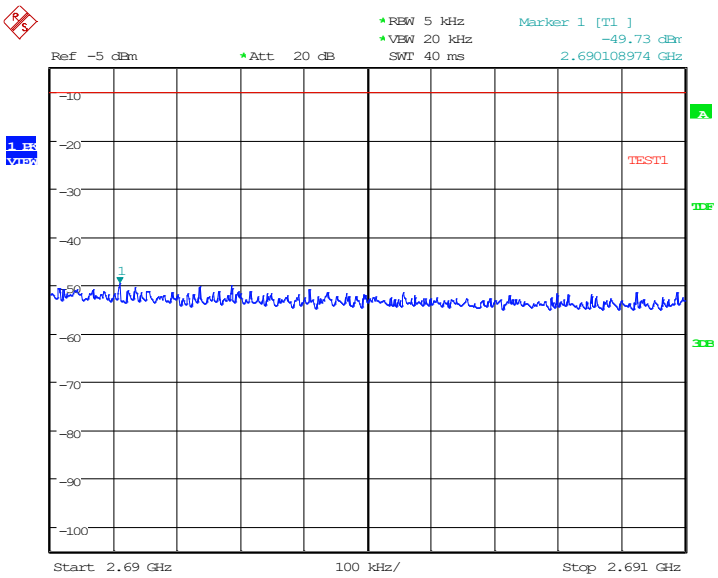
HIGH BAND EDGE BLOCK-1RB-high_offset



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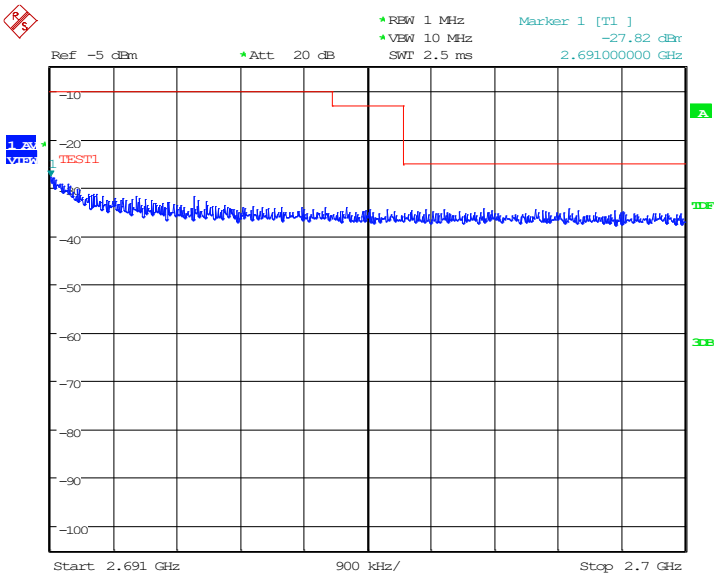

Date: 18.DEC.2020 16:03:37

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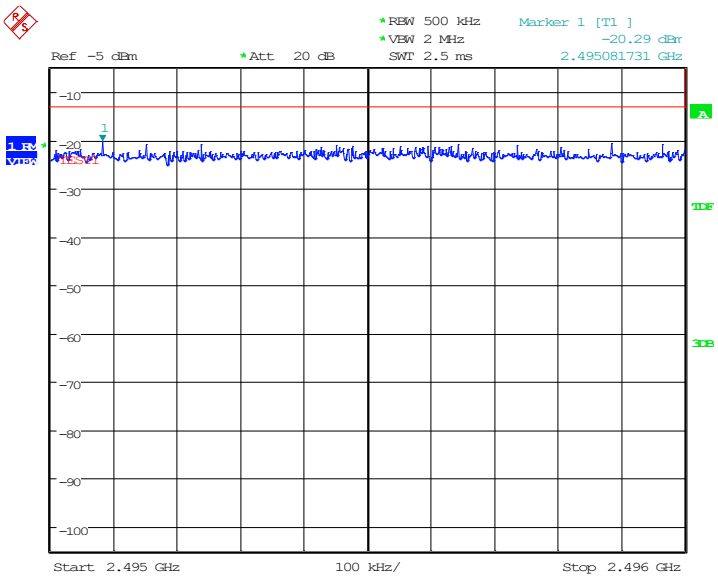
LOW BAND EDGE BLOCK-20MHz-100%RB



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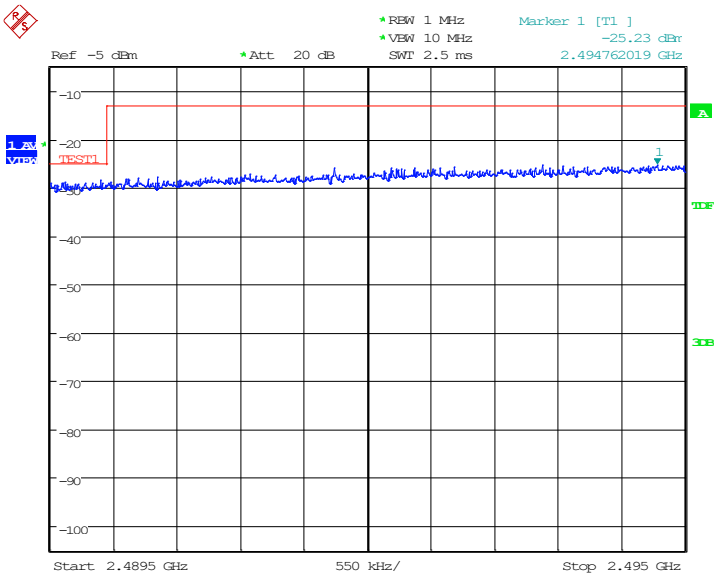

Date: 18.DEC.2020 16:12:30

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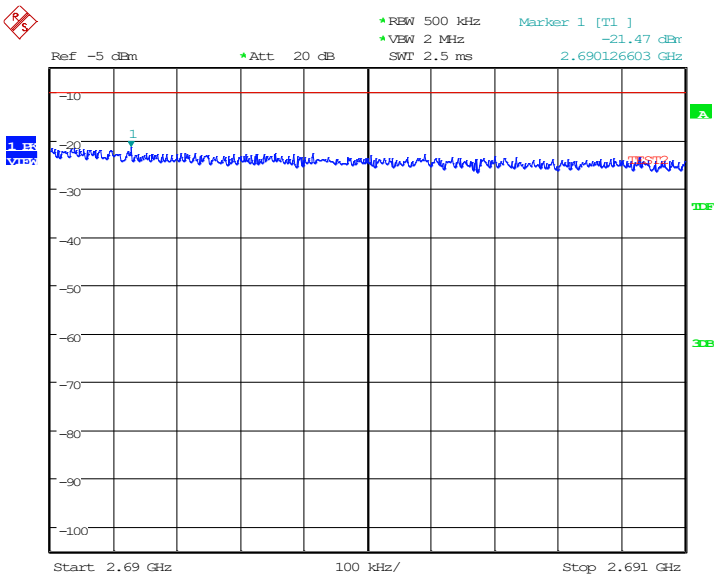
HIGH BAND EDGE BLOCK-20MHz-100%RB



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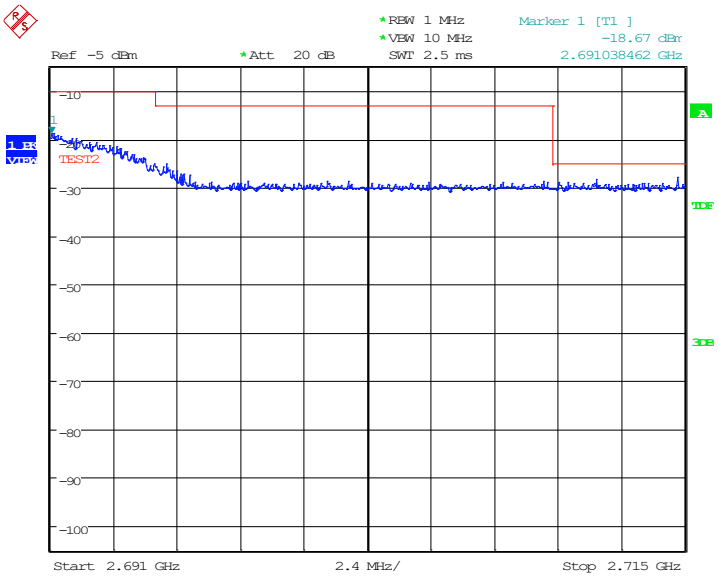

Date: 18.DEC.2020 16:15:18

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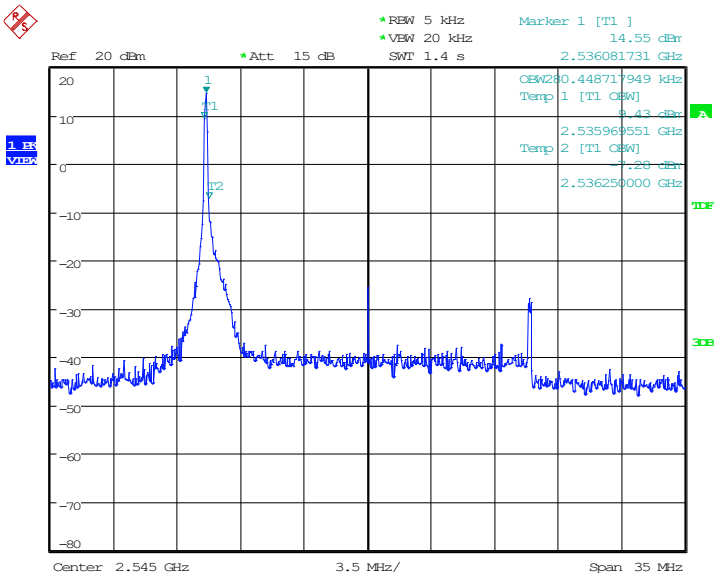
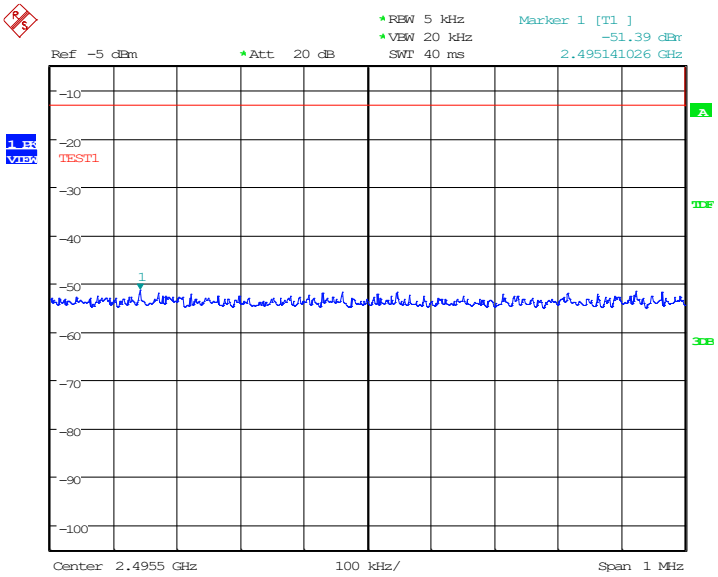
LTE band 41

OBW: 1RB-low_offset



Date: 24.DEC.2020 11:21:35

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 24.DEC.2020 11:23:13

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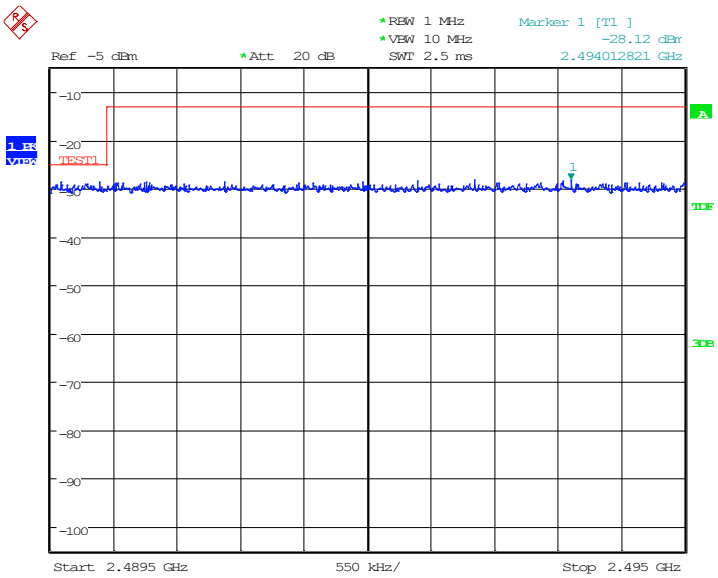

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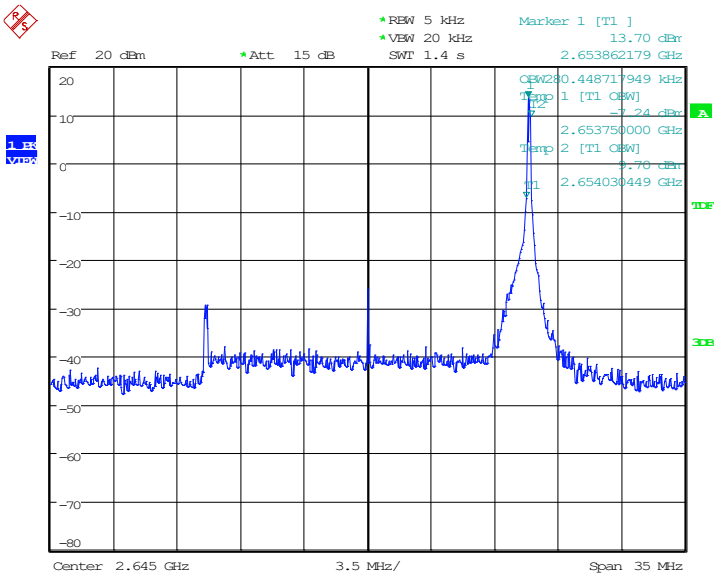
OBW: 1RB-high_offset



Date: 24.DEC.2020 11:19:09

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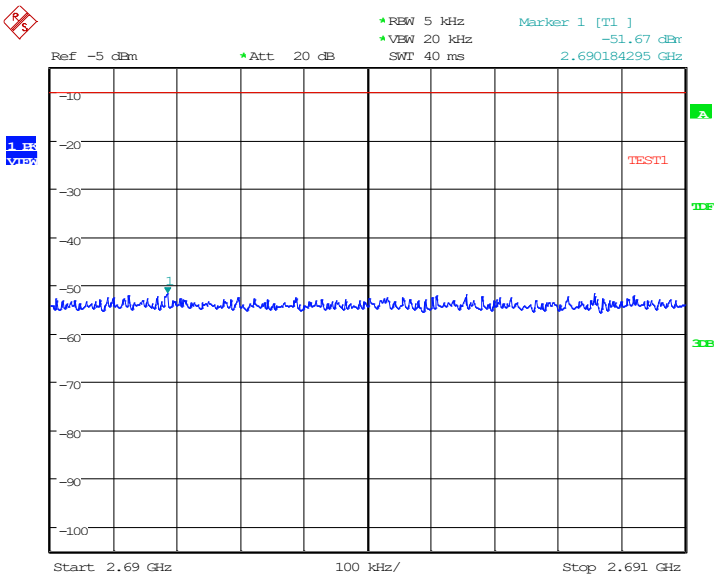
HIGH BAND EDGE BLOCK-1RB-high_offset



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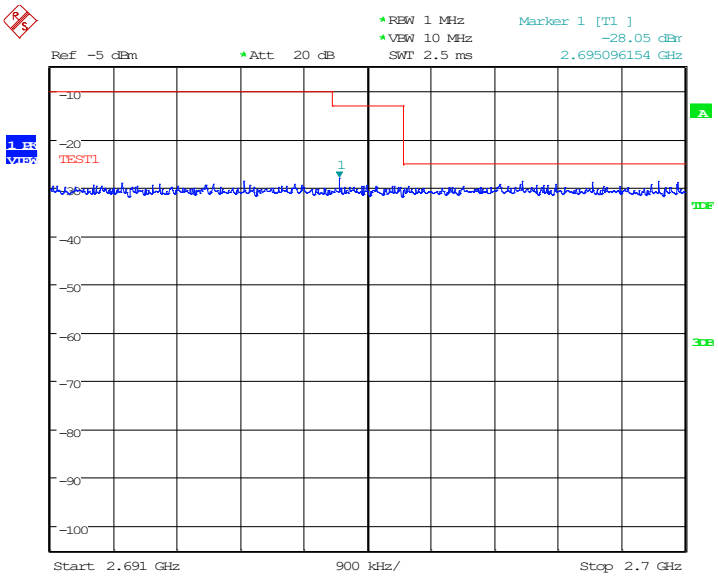

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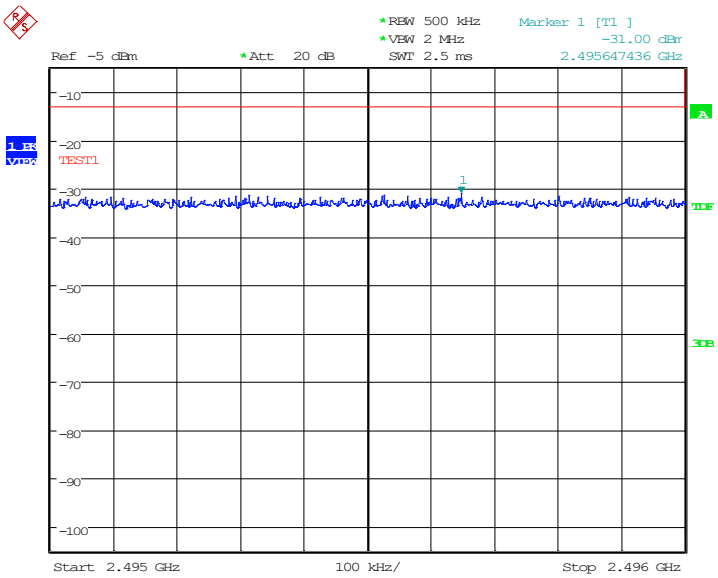
LOW BAND EDGE BLOCK-10MHz-100%RB



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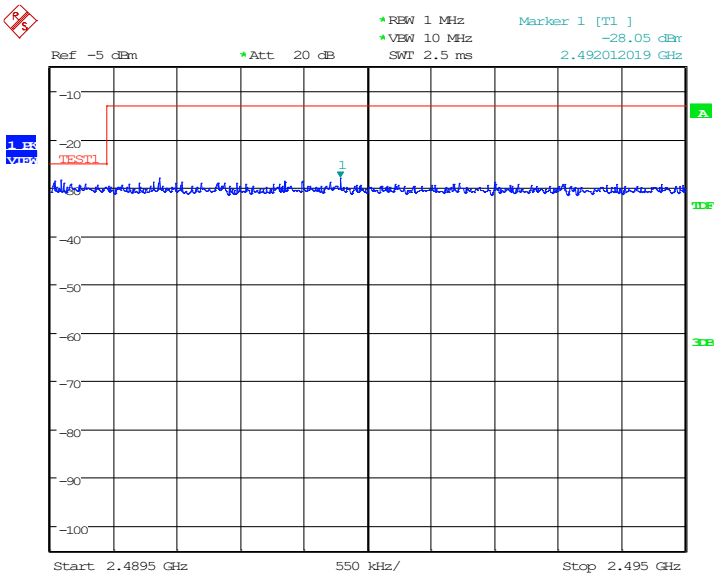

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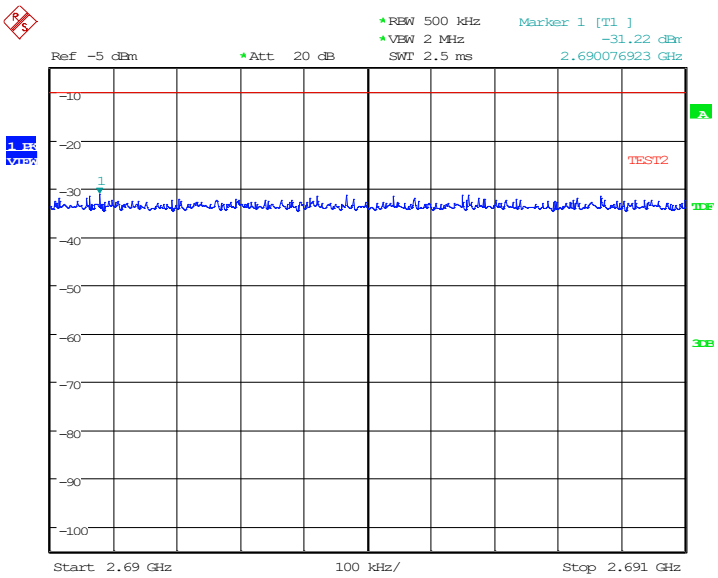
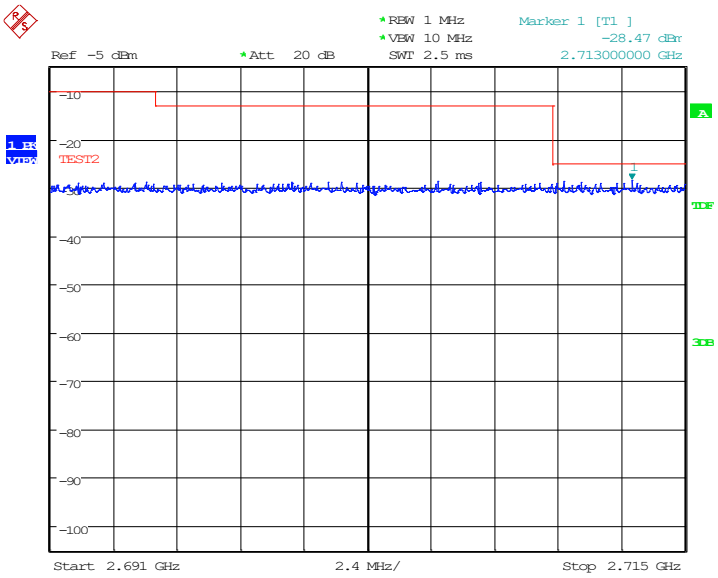
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 24.DEC.2020 11:30:57



Date: 24.DEC.2020 11:33:33

Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96

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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.

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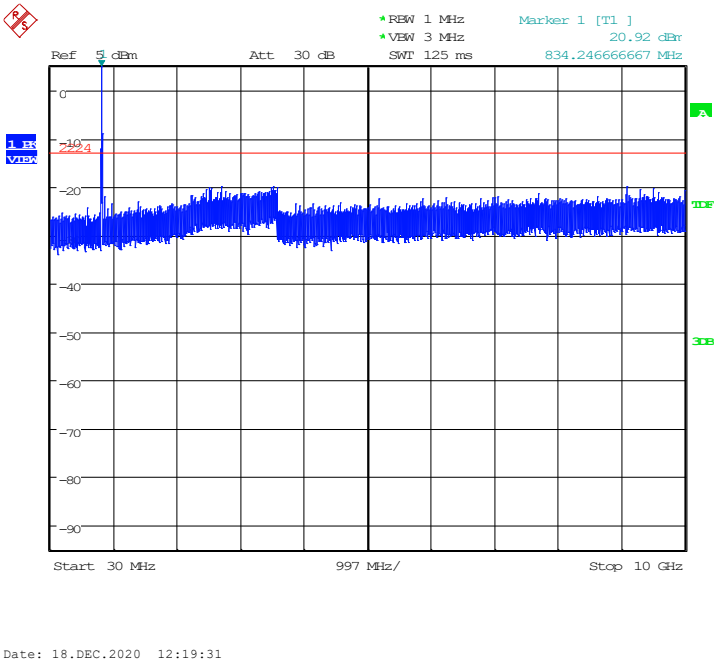
A. 7.3 Measurement result

Only worst case result is given below

LTE band 5 : 30MHz – 10GHz

Spurious emission limit –13dBm.

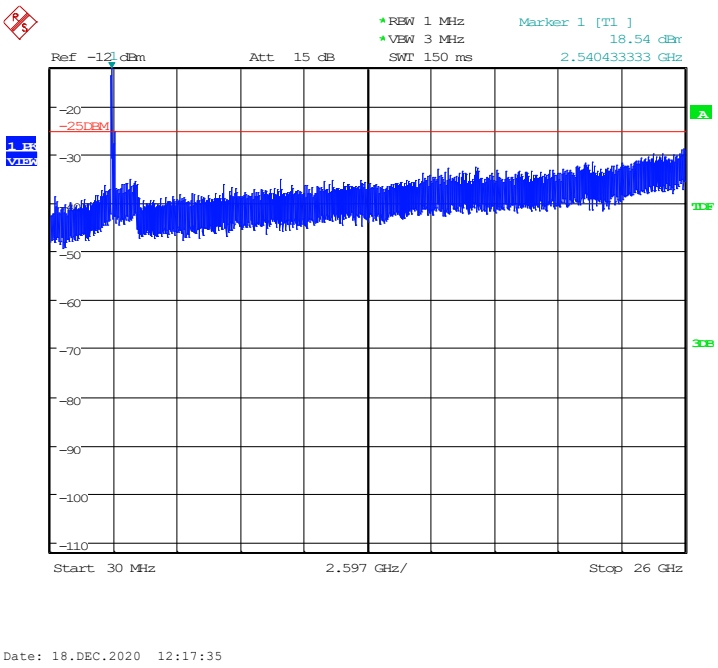
NOTE: peak above the limit line is the carrier frequency.



LTE band 7 20MHz QPSK: 30MHz – 26GHz

Spurious emission limit –25dBm.

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



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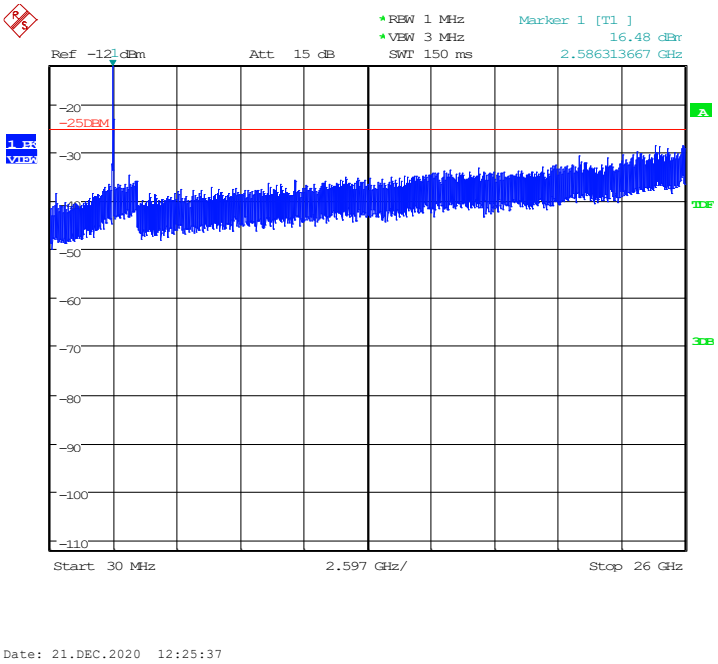
LTE band 41: 30MHz – 26GHz

Spurious emission limit –25dBm.

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



Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96

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A.8 PEAK-TO-AVERAGE POWER RATIO

Reference

FCC: CFR Part 27.50(d), KDB971168 D01(5.7).

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

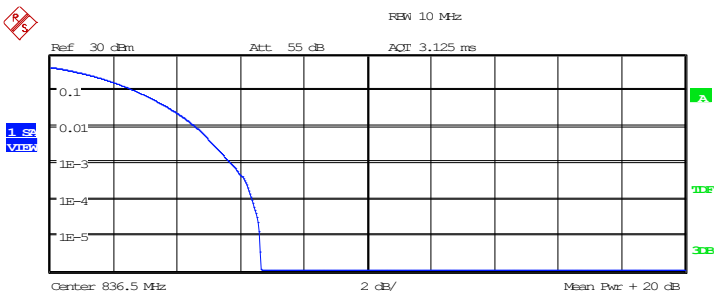
A.8.2 Measurement results

Only worst case result is given below

LTE band 5

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)		
		QPSK	16QAM	64QAM
836.5	10	5.67	6.38	6.51

LTE band 5, 10MHz Bandwidth, QPSK (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	21.57 dBm
Peak	28.21 dBm
Crest	6.64 dB
10 %	2.66 dB
1 %	4.58 dB
.1 %	5.67 dB
.01 %	6.38 dB

Date: 18.DEC.2020 12:04:02

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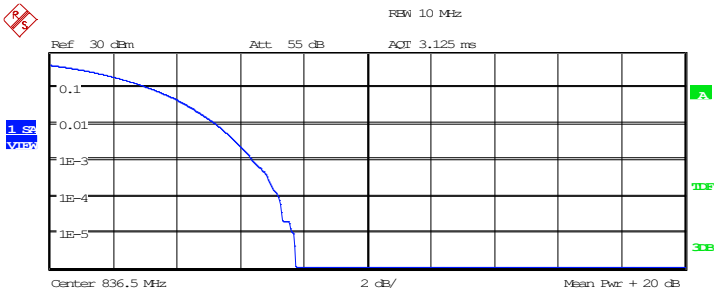
LTE band 5, 10MHz Bandwidth, 16QAM (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	20.61 dBm
Peak	28.35 dBm
Crest	7.74 dB
10 %	3.11 dB
1 %	5.19 dB
.1 %	6.38 dB
.01 %	7.18 dB

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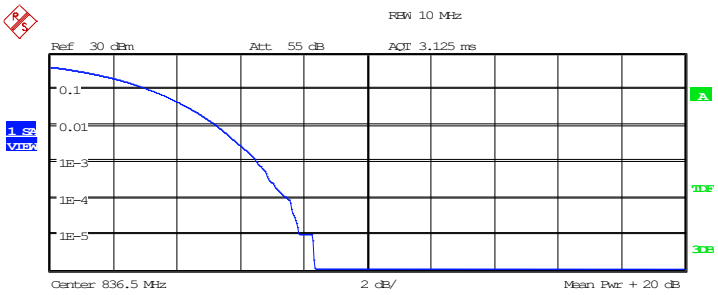
LTE band 5, 10MHz Bandwidth, 64QAM (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	20.23 dBm
Peak	28.56 dBm
Crest	8.33 dB
10 %	3.11 dB
1 %	5.22 dB
.1 %	6.51 dB
.01 %	7.47 dB

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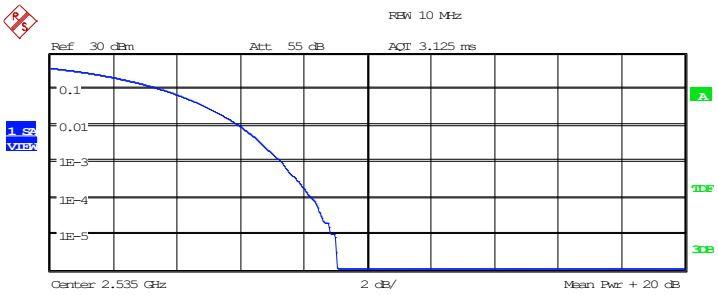
LTE band 7

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)		
		QPSK	16QAM	64QAM
2510.0	20	7.28	7.79	7.69

LTE band 7, 20MHz Bandwidth, QPSK (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

```
        Trace 1
Mean   19.46 dBm
Peak   28.50 dBm
Crest   9.05 dB

 10 %   3.49 dB
  1 %   5.96 dB
 .1 %   7.28 dB
.01 %   8.21 dB
```

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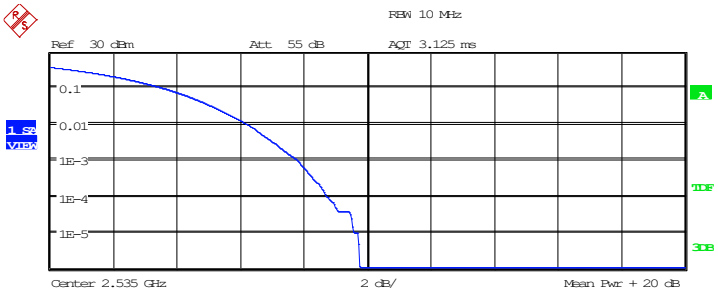
LTE band 7, 20MHz Bandwidth, 16QAM (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

```
        Trace 1
Mean   18.67 dBm
Peak   28.43 dBm
Crest   9.76 dB

 10 %   3.59 dB
  1 %   6.22 dB
 .1 %   7.79 dB
.01 %   8.72 dB
```

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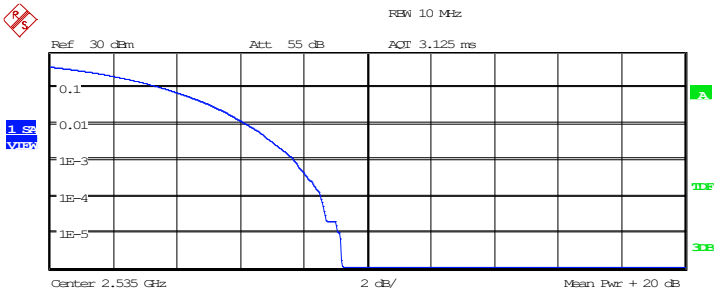
LTE band 7, 20MHz Bandwidth, 64QAM (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	18.46 dBm
Peak	27.66 dBm
Crest	9.20 dB
10 %	3.56 dB
1 %	6.15 dB
.1 %	7.69 dB
.01 %	8.53 dB

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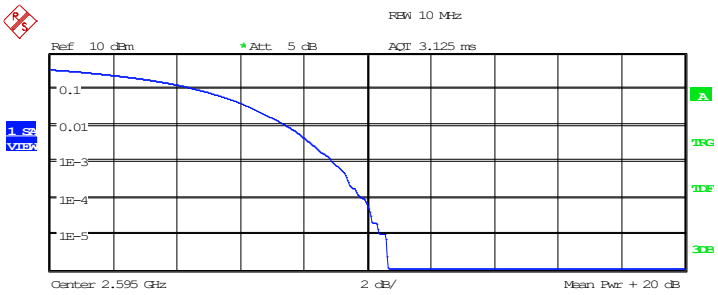
LTE band 41

Frequency(MHz)	Bandwidth(MHz)	PAPR(dB)		
		QPSK	16QAM	64QAM
2593.0	20	8.88	9.42	11.73

LTE band 41, 20MHz Bandwidth, QPSK (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	15.24 dBm
Peak	25.88 dBm
Crest	10.64 dB
10 %	4.65 dB
1 %	7.44 dB
.1 %	8.88 dB
.01 %	9.87 dB

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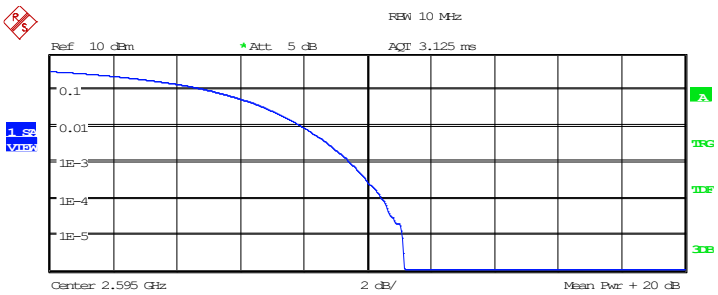
LTE band 41, 20MHz Bandwidth, 16QAM (PAPR)



Complementary Cumulative Distribution Function (100000 samples)

	Trace 1
Mean	14.79 dBm
Peak	25.95 dBm
Crest	11.16 dB
10 %	5.00 dB
1 %	7.92 dB
.1 %	9.42 dB
.01 %	10.45 dB

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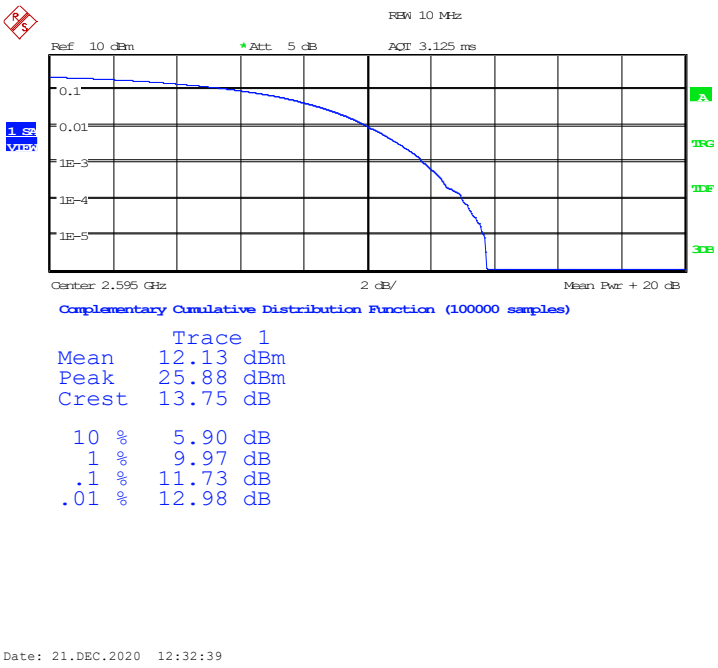
LTE band 41, 20MHz Bandwidth, 64QAM (PAPR)



Note: Expanded measurement uncertainty is U = 0.48, k = 2

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

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