TEST REPORT

No. I19Z61471-WMD03

for

TCL Communication Ltd.

LTE / UMTS / GSM mobile phone

Model Name: 5033Q

FCC ID: 2ACCJH110

with

Hardware Version: 05

Software Version: v7LTE

Issued Date: 2019-09-04

TESTING
NVLAP LAB CODE 600118-0

Note:

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

Tel: +86(0)10-62304633-2512, Fax: +86(0)10-62304633-2504

Email: cttl_terminals@caict.ac.cn, website: www.caict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19Z61471-WMD03	Rev.0	1st edition	2019-09-04

CONTENTS

1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0 and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

Location 2: CTTL (Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China 100191

1.3. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2018-04-12

Testing End Date: 2019-09-04

1.5. Signature

Dong Yuan

(Prepared this test report)

Zhou Yu

(Reviewed this test report)

Zhao Hui Lin

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	7/F, Block F4, TCL Communication Technology Building, TCL International E City, Zhong Shan Yuan Road, Nanshan District, Shenzhen, Guangdong, P.R. China 518052
Contact:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	7/F, Block F4, TCL Communication Technology Building, TCL International E City, Zhong Shan Yuan Road, Nanshan District, Shenzhen, Guangdong, P.R. China 518052
Contact:	Gong Zhizhou
Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722

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

3.1. About EUT

Description	LTE / UMTS / GSM mobile phone
Model Name	5033Q
FCC ID	2ACCJH110
Antenna	Embedded
Output power	24.81dBm maximum EIRP measured for LTE Band 7
Extreme vol. Limits	3.5VDC to 4.4VDC (nominal: 3.8VDC)
Extreme temp. Tolerance	-10°C to +55°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL.

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Date of receipt
UT06a	359598100000066	05	v7LTE	2019-08-07
UT10a	359598100000017	05	v7LTE	2019-08-07

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

3.3. Internal Identification of AE used during the test

AE ID*	Description
AE1	Battery
AE2	Battery

AE1

Model	CAB1930000C7
Manufacturer	Ningbo Veken Battery Co.,LTD
Capacitance	2000mAh

AE2

Model	CAB1930006C7
Manufacturer	Ningbo Veken Battery Co.,LTD
Capacitance	2000mAh

*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 of LTE / UMTS / GSM mobile phone with embedded antenna. Manual and specifications of the EUT were provided to fulfil the test.

4. Reference Documents

4.1. Reference Documents for testing

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

Reference	Title	Version
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-18 Edition
FCC Part 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-18 Edition
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2016
ANSI/TIA-102.CAAA-E	DIGITAL C4FMCQPSK TRANSCEIVER MEASUREMENT METHODS	2016
ANSI C63.26	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services	2015
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v03r01

5. LABORATORY ENVIRONMENT

Fully-anechoic chamber FAC-3 (9 meters×6.5 meters×4 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 MHz

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

LTE Band 5

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	22.913	P
2	Emission Limit	22.917	P
3	Frequency Stability	2.1055	BR
4	Occupied Bandwidth	2.1049	BR
5	Emission Bandwidth	22.917	BR
6	Band Edge Compliance	22.917	BR
7	Conducted Spurious Emission	22.917	BR

LTE Band 7

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	27.53	P
3	Frequency Stability	2.1055	BR
4	Occupied Bandwidth	2.1049	BR
5	Emission Bandwidth	27.53	BR
6	Band Edge Compliance	27.53	BR
7	Conducted Spurious Emission	27.53	BR
8	Peak-to-Average Power Ratio	27.50	BR

LTE Band 38

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

LTE Band 40

Items	Test Name	Clause in FCC rules	Verdict
1	Output Power	27.50	P
2	Emission Limit	27.53	P
3	Frequency Stability	2.1055	P
4	Occupied Bandwidth	2.1049	P
5	Emission Bandwidth	27.53	P
6	Band Edge Compliance	27.53	P
7	Conducted Spurious Emission	27.53	P
8	Peak-to-Average Power Ratio	27.50	P

Terms used in Verdict column

P	Pass. The EUT complies with the essential requirements in the standard.
NP	Not Performed. The test was not performed by CTTL.
NA	Not Applicable. The test was not applicable.
BR	Re-use test data from basic model report.
F	Fail. The EUT does not comply with the essential requirements in the standard.

6.2. Explanation of re-use of test data

The Equipment Under Test (EUT) model 5033Q (FCC ID: 2ACCJH110) is a variant product of 5033A (FCC ID: 2ACCJH089).According to the declaration of changes provided by the applicant and FCC KDB publication 484596 D01, LTE Band 38 ,40 and spot check measurements were performed on this device. All the other test results are derived from test report No. I18Z60562-WMD03. Please refer Annex A for detail spot check verification data and reference data. The spot check test results are consistent with basic model.

For detail differences between two models please refer the Declaration of Changes document.

6.3. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by CTTL according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the LTE functions among the features described in section 3.

7. Test Equipments Utilized

NO.	Description	TYPE	series number	MANUFACTURE	CAL DUE DATE	Calibration interval
1	Universal Radio Communication Tester	CMW500	159082	R&S	2019-12-25	1 year
2	Spectrum Analyzer	FSU26	200030	R&S	2020-06-03	1 year
3	Climate chamber	SH-242	93008556	ESPEC	2019-12-21	2 year
4	EMI Antenna	VULB9163	9163-235	Schwarzbeck	2019-11-20	1 year
5	EMI Antenna	3117	00058889	ETS-Lindgren	2020-02-02	1 year
6	EMI Antenna	3117	00119024	ETS-Lindgren	2020-02-25	1 year
7	EMI Antenna	9117	177	Schwarzbeck	2020-08-22	1 year
8	Signal Generator	SMF100A	101295	R&S	2019-11-27	1 year
9	Test Receiver	E4440A	MY48250642	Agilent	2020-03-18	1 year
10	Universal Radio Communication Tester	CMW500	143008	R&S	2019-11-26	1 year
11	Power Amplifier	5S1G4	0341863	AR	/	/

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

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

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Measurement result

LTE band 5

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	848.3	22.80	21.81
		836.5	22.84	22.25
		824.7	22.83	21.96
	1 RB low	848.3	22.75	21.77
		836.5	22.84	22.25
		824.7	22.78	21.89
	50% RB mid	848.3	22.83	21.94
		836.5	22.85	22.09
		824.7	22.84	22.01
	100% RB	848.3	21.86	20.96
		836.5	21.87	21.13
		824.7	21.87	21.02
3MHz	1 RB high	847.5	22.84	21.76
		836.5	22.84	21.71
		825.5	22.90	22.19
	1 RB low	847.5	22.84	21.78
		836.5	22.86	21.74
		825.5	22.87	22.18
	50% RB mid	847.5	21.96	20.98
		836.5	21.99	21.11
		825.5	21.94	21.06

	100% RB	847.5	21.91	20.88
		836.5	21.95	21.01
		825.5	21.92	20.99
5MHz	1 RB high	846.5	22.84	21.82
		836.5	22.90	21.93
		826.5	22.83	22.30
	1 RB low	846.5	22.86	21.86
		836.5	22.95	21.98
		826.5	22.83	22.27
	50% RB mid	846.5	21.86	20.89
		836.5	21.90	21.03
		826.5	21.87	21.04
	100% RB	846.5	21.84	20.80
		836.5	21.89	20.92
		826.5	21.88	20.95
10MHz	1 RB high	844.0	22.87	21.78
		836.5	22.89	21.77
		829.0	22.98	22.26
	1 RB low	844.0	22.91	21.88
		836.5	22.95	21.84
		829.0	22.96	22.22
	50% RB mid	844.0	21.86	20.95
		836.5	21.90	20.96
		829.0	21.92	20.99
	100% RB	844.0	21.91	20.95
		836.5	21.94	20.95
		829.0	21.96	21.01

LTE band 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2567.5	21.42	20.49
		2535	21.49	20.56
		2502.5	21.65	21.09
	1 RB low	2567.5	21.39	20.42
		2535	21.53	20.60
		2502.5	20.47	19.45
	50% RB mid	2567.5	20.53	19.59
		2535	20.77	19.87
		2502.5	20.45	19.35
	100% RB	2567.5	20.51	19.49
		2535	20.75	19.79
		2502.5	21.42	20.46
10MHz	1 RB high	2565	21.44	20.37
		2535	21.72	21.01
		2505	21.39	20.44
	1 RB low	2565	21.47	20.42
		2535	21.75	21.04
		2505	20.46	19.54
	50% RB mid	2565	20.55	19.57
		2535	20.72	19.75
		2505	20.53	19.51
	100% RB	2565	20.59	19.54
		2535	20.77	19.77
		2505	21.35	20.75
15MHz	1 RB high	2562.5	21.33	20.27
		2535	21.61	20.85
		2507.5	21.38	20.79
	1 RB low	2562.5	21.46	20.34
		2535	21.71	21.01
		2507.5	20.48	19.43
	50% RB mid	2562.5	20.52	19.44
		2535	20.72	19.73
		2507.5	20.48	19.43
	100% RB	2562.5	20.56	19.55
		2535	20.65	19.62
		2507.5	21.15	20.63
20MHz	1 RB high	2560	21.15	20.56

		2535	21.35	20.84
		2510	21.14	20.65
	1 RB low	2560	21.29	20.69
		2535	21.48	20.96
		2510	20.44	19.44
	50% RB mid	2560	20.53	19.48
		2535	20.62	19.61
		2510	20.42	19.42
	100% RB	2560	20.53	19.53
		2535	20.51	19.54
		2510	21.42	20.49

LTE band 38

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2617.5	22.93	22.27
		2595.0	22.86	22.09
		2572.5	22.87	22.10
	1 RB low	2617.5	22.91	22.27
		2595.0	22.88	22.11
		2572.5	22.91	22.13
	50% RB mid	2617.5	22.09	21.18
		2595.0	22.06	21.10
		2572.5	22.01	20.98
	100% RB	2617.5	22.06	21.05
		2595.0	22.05	21.00
		2572.5	21.96	20.94
10MHz	1 RB high	2615.0	22.98	22.24
		2595.0	23.02	22.40
		2575.0	22.89	22.34
	1 RB low	2615.0	22.96	22.24
		2595.0	22.98	22.40
		2575.0	22.95	22.35
	50% RB mid	2615.0	22.11	21.12
		2595.0	22.09	21.07
		2575.0	22.05	21.03
	100% RB	2615.0	22.17	21.13
		2595.0	22.06	21.03
		2575.0	21.97	21.01
15MHz	1 RB high	2612.5	22.94	22.21
		2595.0	22.85	22.11
		2577.5	22.89	22.31
	1 RB low	2612.5	22.93	22.25
		2595.0	22.91	22.17
		2577.5	22.97	22.34
	50% RB mid	2612.5	22.10	21.14
		2595.0	22.07	21.06
		2577.5	21.99	20.97
	100% RB	2612.5	22.12	21.09
		2595.0	22.07	21.02
		2577.5	21.98	20.93
20MHz	1 RB high	2610.0	22.80	22.17

		2595.0	22.77	22.06
		2580.0	22.84	21.92
	1 RB low	2610.0	22.78	22.15
		2595.0	22.75	22.04
		2580.0	22.83	21.95
	50% RB mid	2610.0	22.07	21.10
		2595.0	22.08	21.04
		2580.0	21.99	20.99
	100% RB	2610.0	22.05	21.05
		2595.0	22.09	20.98
		2580.0	22.00	20.98

LTE band 40(2305MHz~2315MHz)

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	2312.5	23.55	22.76
		2310.0	23.54	22.73
		2307.5	23.48	22.46
	1 RB low	2312.5	23.54	22.74
		2310.0	23.52	22.71
		2307.5	23.44	22.41
	50% RB mid	2312.5	22.56	21.53
		2310.0	22.60	21.55
		2307.5	22.58	21.54
	100% RB	2312.5	22.53	21.50
		2310.0	22.54	21.49
		2307.5	22.55	21.51
10MHz	1 RB high	2310.0	23.60	22.48
	1 RB low	2310.0	23.56	22.44
	50% RB mid	2310.0	22.58	21.52
	100% RB	2310.0	22.55	21.52

LTE band 40(2350MHz~2360MHz)

Bandwidth	RB size/offset	Frequency (MHz)	Power (dBm)	
			QPSK	16QAM
5MHz	1 RB high	2357	23.26	22.44
		2355	23.28	22.46
		2353	23.25	22.20
	1 RB low	2357	23.28	22.47
		2355	23.33	22.50
		2353	23.30	22.28
	50% RB mid	2357	22.30	21.27
		2355	22.32	21.29
		2353	22.33	21.28
	100% RB	2357	22.28	21.23
		2355	22.27	21.25
		2353	22.29	21.25
10MHz	1 RB high	2355	23.32	22.20
	1 RB low	2355	23.44	22.23
	50% RB mid	2355	22.34	21.30
	100% RB	2355	22.32	21.26

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 “Mobile stations are limited to 2.0 watts EIRP.”.

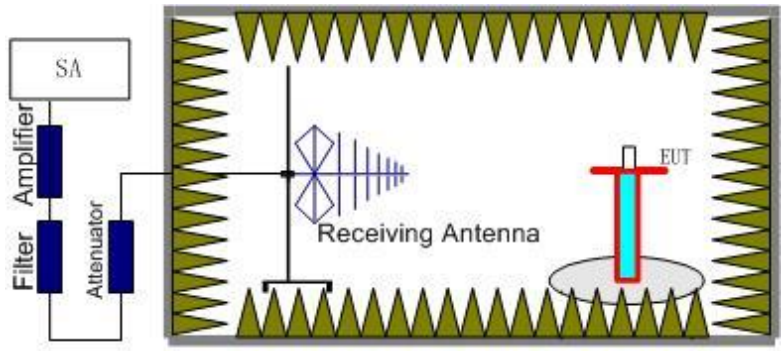
Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

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

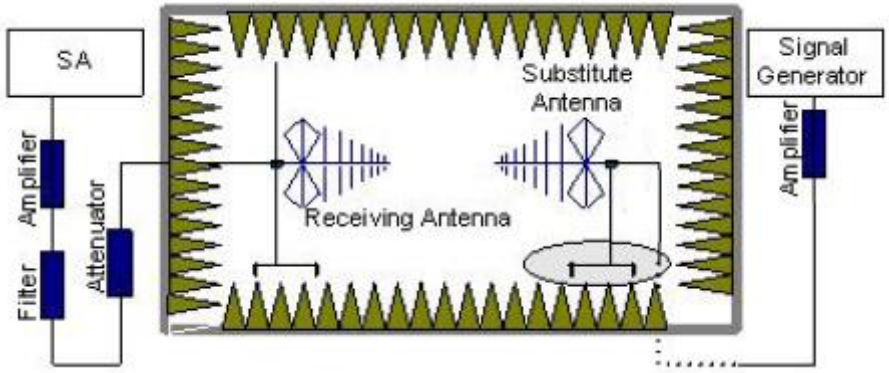
A.1.3.2 Method of Measurement

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

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



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



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

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss (P_{cl}), the substitution antenna Gain (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 -2.15.

A.1.3.3 Measurement result

LTE Band 38- EIRP

Limits: ≤33dBm (2W)

LTE Band 38_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2572.50	-26.94	3.66	44.92	6.23	20.55	33.00	12.45	H
2595.00	-26.61	3.69	44.91	6.27	20.88	33.00	12.12	H
2617.50	-26.53	3.68	44.94	6.31	21.04	33.00	11.96	H

LTE Band 38_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2575.00	-26.98	3.66	44.92	6.23	20.51	33.00	12.49	H
2595.00	-26.59	3.69	44.91	6.27	20.90	33.00	12.10	H
2615.00	-26.21	3.68	44.94	6.31	21.36	33.00	11.64	H

LTE Band 38_15MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2577.50	-26.69	3.66	44.92	6.23	20.80	33.00	12.20	H
2595.00	-26.54	3.69	44.91	6.27	20.95	33.00	12.05	H
2612.50	-26.38	3.68	44.94	6.30	21.18	33.00	11.82	H

LTE Band 38_20MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2580.00	-27.13	3.67	44.92	6.24	20.36	33.00	12.64	H
2595.00	-26.29	3.69	44.91	6.27	21.20	33.00	11.80	H
2610.00	-26.41	3.68	44.94	6.30	21.15	33.00	11.85	H

LTE Band 38_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2572.50	-27.81	3.66	44.92	6.23	19.68	33.00	13.32	H
2595.00	-27.62	3.69	44.91	6.27	19.87	33.00	13.13	H
2617.50	-27.44	3.68	44.94	6.31	20.13	33.00	12.87	H

LTE Band 38_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2575.00	-27.83	3.66	44.92	6.23	19.66	33.00	13.34	H
2595.00	-27.60	3.69	44.91	6.27	19.89	33.00	13.11	H
2615.00	-27.28	3.68	44.94	6.31	20.29	33.00	12.71	H

LTE Band 38_15MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2577.50	-27.71	3.66	44.92	6.23	19.78	33.00	13.22	H
2595.00	-27.56	3.69	44.91	6.27	19.93	33.00	13.07	H
2612.50	-27.38	3.68	44.94	6.30	20.18	33.00	12.82	H

LTE Band 38_20MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2580.00	-28.17	3.67	44.92	6.24	19.32	33.00	13.68	H
2595.00	-27.32	3.69	44.91	6.27	20.17	33.00	12.83	H
2610.00	-27.54	3.68	44.94	6.30	20.02	33.00	12.98	H

LTE Band 40- EIRP

Limits: ≤17dBm (50mW)

LTE Band 40(2305MHz~2315MHz)_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2307.50	-34.73	3.47	44.55	5.52	11.87	17.00	5.13	H
2310.00	-34.62	3.47	44.55	5.53	11.99	17.00	5.01	H
2312.50	-34.77	3.47	44.56	5.54	11.85	17.00	5.15	H

LTE Band 40(2305MHz~2315MHz)_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2310.00	-34.66	3.47	44.55	5.53	11.95	17.00	5.05	H

LTE Band 40(2305MHz~2315MHz)_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2307.50	-35.73	3.47	44.55	5.52	10.87	17.00	6.13	H
2310.00	-35.53	3.47	44.55	5.53	11.08	17.00	5.92	H
2312.50	-35.87	3.47	44.56	5.54	10.75	17.00	6.25	H

LTE Band 40(2305MHz~2315MHz)_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2310.00	-35.74	3.47	44.55	5.53	10.87	17.00	6.13	H

LTE Band 40(2350MHz~2360MHz)_5MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2353.00	-33.79	3.53	44.63	5.66	12.97	17.00	4.03	H
2355.00	-33.86	3.53	44.64	5.67	12.91	17.00	4.09	H
2357.00	-33.86	3.52	44.64	5.67	12.93	17.00	4.07	H

LTE Band 40(2350MHz~2360MHz)_10MHz_QPSK

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2355.00	-33.82	3.53	44.64	5.67	12.95	17.00	4.05	H

LTE Band 40(2350MHz~2360MHz)_5MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2353.00	-34.88	3.53	44.63	5.66	11.88	17.00	5.12	H
2355.00	-34.85	3.53	44.64	5.67	11.92	17.00	5.08	H
2357.00	-34.70	3.52	44.64	5.67	12.09	17.00	4.91	H

LTE Band 40(2350MHz~2360MHz)_10MHz_16QAM

Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	P_{Ag} (dB)	G_a (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
2355.00	-34.88	3.53	44.64	5.67	11.89	17.00	5.11	H

Spot Check Measurement Results:

LTE Band 5- ERP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
824.70	-18.69	2.26	45.79	0.95	2.15	23.64	38.45	14.81	H
836.50	-18.21	2.26	45.66	0.82	2.15	23.86	38.45	14.59	H
848.30	-18.87	2.27	45.55	0.80	2.15	23.06	38.45	15.39	H

LTE Band 5_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
825.50	-18.82	2.26	45.79	0.94	2.15	23.50	38.45	14.95	H
836.50	-18.36	2.26	45.66	0.82	2.15	23.71	38.45	14.74	H
847.50	-19.30	2.27	45.56	0.81	2.15	22.65	38.45	15.80	H

LTE Band 5_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
826.50	-18.81	2.25	45.77	0.93	2.15	23.49	38.45	14.96	H
836.50	-18.37	2.26	45.66	0.82	2.15	23.70	38.45	14.75	H
846.50	-19.21	2.26	45.56	0.82	2.15	22.76	38.45	15.69	H

LTE Band 5_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
829.00	-18.67	2.13	45.74	0.90	2.15	23.69	38.45	14.76	H
836.50	-18.18	2.26	45.66	0.82	2.15	23.89	38.45	14.56	H
844.00	-18.76	2.26	45.59	0.82	2.15	23.24	38.45	15.21	H

LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
824.70	-19.84	2.26	45.79	0.95	2.15	22.49	38.45	15.96	H
836.50	-19.22	2.26	45.66	0.82	2.15	22.85	38.45	15.60	H
848.30	-19.98	2.27	45.55	0.80	2.15	21.95	38.45	16.50	H

LTE Band 5_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
825.50	-19.95	2.26	45.79	0.94	2.15	22.37	38.45	16.08	H
836.50	-19.33	2.26	45.66	0.82	2.15	22.74	38.45	15.71	H
847.50	-20.31	2.27	45.56	0.81	2.15	21.64	38.45	16.81	H

LTE Band 5_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
826.50	-19.93	2.25	45.77	0.93	2.15	22.37	38.45	16.08	H
836.50	-19.38	2.26	45.66	0.82	2.15	22.69	38.45	15.76	H
846.50	-20.24	2.26	45.56	0.82	2.15	21.73	38.45	16.72	H

LTE Band 5_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
829.00	-19.71	2.13	45.74	0.90	2.15	22.65	38.45	15.80	H
836.50	-19.23	2.26	45.66	0.82	2.15	22.84	38.45	15.61	H
844.00	-19.89	2.26	45.59	0.82	2.15	22.11	38.45	16.34	H

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

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2502.50	-24.61	3.58	45.68	6.10	23.59	33.00	9.41	H
2535.00	-23.28	3.63	44.82	6.16	24.07	33.00	8.93	H
2567.50	-23.81	3.65	44.92	6.22	23.68	33.00	9.32	H

LTE Band 7_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2505.00	-24.60	3.59	45.64	6.11	23.56	33.00	9.44	H
2535.00	-23.29	3.63	44.82	6.16	24.06	33.00	8.94	H
2565.00	-23.90	3.65	44.97	6.22	23.64	33.00	9.36	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)	Margin(dB)	Polarization
2507.50	-24.19	3.59	44.92	6.11	23.25	33.00	9.75	H
2535.00	-23.35	3.63	44.82	6.16	24.00	33.00	9.00	H
2562.50	-24.72	3.65	45.67	6.21	23.51	33.00	9.49	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2510.00	-24.52	3.58	45.36	6.12	23.38	33.00	9.62	H
2535.00	-22.95	3.63	44.82	6.16	24.40	33.00	8.60	H
2560.00	-24.96	3.64	45.98	6.21	23.59	33.00	9.41	H

LTE Band 7_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2502.50	-25.55	3.58	45.68	6.10	22.65	33.00	10.35	H
2535.00	-24.23	3.63	44.82	6.16	23.12	33.00	9.88	H
2567.50	-24.67	3.65	44.92	6.22	22.82	33.00	10.18	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2505.00	-25.62	3.59	45.64	6.11	22.54	33.00	10.46	H
2535.00	-24.28	3.63	44.82	6.16	23.07	33.00	9.93	H
2565.00	-24.83	3.65	44.97	6.22	22.71	33.00	10.29	H

LTE Band 7_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2507.50	-25.31	3.59	44.92	6.11	22.13	33.00	10.87	H
2535.00	-24.31	3.63	44.82	6.16	23.04	33.00	9.96	H
2562.50	-25.64	3.65	45.67	6.21	22.59	33.00	10.41	H

LTE Band 7_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2510.00	-25.55	3.58	45.36	6.12	22.35	33.00	10.65	H
2535.00	-23.93	3.63	44.82	6.16	23.42	33.00	9.58	H
2560.00	-25.86	3.64	45.98	6.21	22.69	33.00	10.31	H

Frequency: 2560.00MHz

Peak EIRP(dBm) = P_{Mea}(-25.86dBm) - G_a (-6.21dBi) - P_{Ag} (-45.98dB) - P_{cl} (3.64dB) = 22.69dBm

Note: Expanded measurement uncertainty is U = 2.84 dB, k = 2.

Reference Measurement Results from basic model:

LTE Band 5- ERP 22.913(a)

Limits: ≤38.45dBm (7W)

LTE Band 5_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
824.70	-24.80	2.26	45.79	0.95	2.15	21.83	38.45	16.62	H
836.50	-24.26	2.26	45.66	0.82	2.15	22.11	38.45	16.34	H
848.30	-24.86	2.27	45.55	0.80	2.15	21.37	38.45	17.08	H

LTE Band 5_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
825.50	-20.66	2.26	45.79	0.94	2.15	21.66	38.45	16.79	H
836.50	-20.15	2.26	45.66	0.82	2.15	21.92	38.45	16.53	H
847.50	-20.62	2.27	45.56	0.81	2.15	21.33	38.45	17.12	H

LTE Band 5_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
826.50	-20.60	2.25	45.77	0.93	2.15	21.70	38.45	16.75	H
836.50	-20.14	2.26	45.66	0.82	2.15	21.93	38.45	16.52	H
846.50	-20.59	2.26	45.56	0.82	2.15	21.38	38.45	17.07	H

LTE Band 5_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
829.00	-20.51	2.13	45.74	0.90	2.15	21.85	38.45	16.60	H
836.50	-20.05	2.26	45.66	0.82	2.15	22.02	38.45	16.43	H
844.00	-20.46	2.26	45.59	0.82	2.15	21.54	38.45	16.91	H

LTE Band 5_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
824.70	-25.91	2.26	45.79	0.95	2.15	20.72	38.45	17.73	H
836.50	-25.28	2.26	45.66	0.82	2.15	21.09	38.45	17.36	H
848.30	-25.82	2.27	45.55	0.80	2.15	20.41	38.45	18.04	H

LTE Band 5_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
825.50	-21.76	2.26	45.79	0.94	2.15	20.56	38.45	17.89	H
836.50	-20.96	2.26	45.66	0.82	2.15	21.11	38.45	17.34	H
847.50	-21.60	2.27	45.56	0.81	2.15	20.35	38.45	18.10	H

LTE Band 5_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
826.50	-21.57	2.25	45.77	0.93	2.15	20.73	38.45	17.72	H
836.50	-22.05	2.26	45.66	0.82	2.15	20.02	38.45	18.43	H
846.50	-22.47	2.26	45.56	0.82	2.15	19.50	38.45	18.95	H

LTE Band 5_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
829.00	-21.56	2.13	45.74	0.90	2.15	20.80	38.45	17.65	H
836.50	-20.86	2.26	45.66	0.82	2.15	21.21	38.45	17.24	H
844.00	-21.45	2.26	45.59	0.82	2.15	20.55	38.45	17.90	H

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

Limits: ≤33 dBm (2W)

LTE Band 7_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2502.50	-25.31	3.58	45.68	6.10	22.89	33.00	10.11	H
2535.00	-23.09	3.63	44.82	6.16	24.26	33.00	8.74	H
2567.50	-24.17	3.65	44.92	6.22	23.32	33.00	9.68	H

LTE Band 7_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2505.00	-24.77	3.59	45.64	6.11	23.39	33.00	9.61	H
2535.00	-22.54	3.63	44.82	6.16	24.81	33.00	8.19	H
2565.00	-23.71	3.65	44.97	6.22	23.83	33.00	9.17	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)	Margin(dB)	Polarization
2507.50	-23.93	3.59	44.92	6.11	23.51	33.00	9.49	H
2535.00	-22.72	3.63	44.82	6.16	24.63	33.00	8.37	H
2562.50	-24.37	3.65	45.67	6.21	23.86	33.00	9.14	H

LTE Band 7_20MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2510.00	-24.14	3.58	45.36	6.12	23.76	33.00	9.24	H
2535.00	-22.60	3.63	44.82	6.16	24.75	33.00	8.25	H
2560.00	-24.56	3.64	45.98	6.21	23.99	33.00	9.01	H

LTE Band 7_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2502.50	-26.30	3.58	45.68	6.10	21.90	33.00	11.10	H
2535.00	-23.96	3.63	44.82	6.16	23.39	33.00	9.61	H
2567.50	-24.83	3.65	44.92	6.22	22.66	33.00	10.34	H

LTE Band 7_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2505.00	-25.65	3.59	45.64	6.11	22.51	33.00	10.49	H
2535.00	-23.56	3.63	44.82	6.16	23.79	33.00	9.21	H
2565.00	-24.69	3.65	44.97	6.22	22.85	33.00	10.15	H

LTE Band 7_15MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2507.50	-24.95	3.59	44.92	6.11	22.49	33.00	10.51	H
2535.00	-23.55	3.63	44.82	6.16	23.80	33.00	9.20	H
2562.50	-25.25	3.65	45.67	6.21	22.98	33.00	10.02	H

LTE Band 7_20MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	EIRP(dBm)	Limit(dBm)	Margin(dB)	Polarization
2510.00	-25.02	3.58	45.36	6.12	22.88	33.00	10.12	H
2535.00	-23.59	3.63	44.82	6.16	23.76	33.00	9.24	H
2560.00	-25.55	3.64	45.98	6.21	23.00	33.00	10.00	H

Peak EIRP(dBm) = P_{Mea}(-22.54dBm) - G_a (6.16dBi) - P_{Ag} (44.82dB) - P_{cl} (3.63dB) = 24.81dBm

ANALYZER SETTINGS:

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

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

Note: Expanded measurement uncertainty is U = 0.96 dB, k = 2.

A.2 EMISSION LIMIT

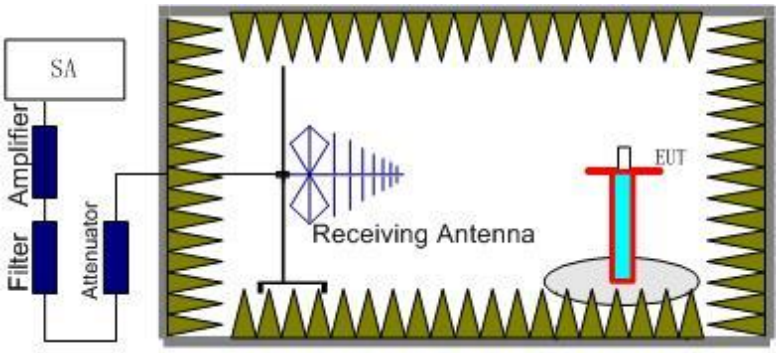
A.2.1 Measurement Method

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

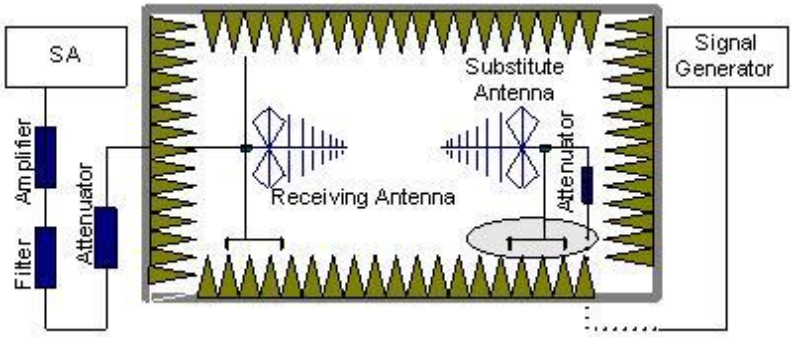
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 5 7 38 40.

The procedure of radiated spurious emissions is as follows:

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



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere

with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (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 Limit

Part 22.917, Part 27.53(g), 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.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 5 7 38 40. 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 38 40 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.The evaluated frequency range is from 30MHz to 26GHz.

LTE Band 38, 5MHz, QPSK, Channel 37775

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5151.02	-40.14	6.88	10.11	-36.91	-25.00	11.91	H
7724.01	-35.01	8.39	12.38	-31.02	-25.00	6.02	H
10309.01	-35.43	9.66	13.02	-32.07	-25.00	7.07	H
12884.01	-35.50	10.55	13.43	-32.62	-25.00	7.62	H
15449.00	-45.22	11.46	13.73	-42.95	-25.00	17.95	H
17989.00	-43.72	12.90	15.58	-41.04	-25.00	16.04	V

LTE Band 38, 5MHz, QPSK, Channel 38000

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5197.02	-48.99	6.96	10.18	-45.77	-25.00	20.77	V
7786.01	-37.45	8.31	12.43	-33.33	-25.00	8.33	H
9056.01	-54.23	9.05	13.13	-50.15	-25.00	25.15	V
10396.01	-36.57	9.79	13.06	-33.30	-25.00	8.30	H
11668.01	-51.08	9.67	13.07	-47.68	-25.00	22.68	H
13001.01	-38.32	10.47	13.50	-35.29	-25.00	10.29	H

LTE Band 38, 5MHz, QPSK, Channel 38225

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
5242.02	-44.28	7.00	10.24	-41.04	-25.00	16.04	H
7859.01	-34.96	8.37	12.49	-30.84	-25.00	5.84	H
9143.01	-54.66	8.93	13.19	-50.40	-25.00	25.40	H
10471.01	-42.22	9.70	13.09	-38.83	-25.00	13.83	H
11773.01	-50.15	9.98	13.05	-47.08	-25.00	22.08	V
13120.01	-38.85	10.85	13.67	-36.03	-25.00	11.03	H

LTE Band 40(2305MHz~2315MHz), 5 MHz, QPSK, Channel 38725

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4621.02	-47.79	6.45	9.52	-44.72	-40.00	4.72	H
6929.01	-51.43	7.75	11.51	-47.67	-40.00	7.67	H
9231.01	-52.93	9.00	13.24	-48.69	-40.00	8.69	H
11547.01	-54.67	9.81	13.09	-51.39	-40.00	11.39	H
13851.01	-57.83	10.71	14.41	-54.13	-40.00	14.13	V
16161.00	-56.00	11.78	13.67	-54.11	-40.00	14.11	H

LTE Band 40(2305MHz~2315MHz), 5 MHz, QPSK, Channel 38750

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4625.02	-45.20	6.44	9.53	-42.11	-40.00	2.11	H
6935.01	-59.74	7.80	11.52	-56.02	-40.00	16.02	H
9241.01	-54.59	9.02	13.24	-50.37	-40.00	10.37	H
11563.01	-55.60	9.80	13.09	-52.31	-40.00	12.31	H
13866.01	-58.66	10.74	14.42	-54.98	-40.00	14.98	V
16172.00	-55.93	11.76	13.67	-54.02	-40.00	14.02	V

LTE Band 40(2305MHz~2315MHz), 5 MHz, QPSK, Channel 38775

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4629.02	-46.39	6.45	9.53	-43.31	-40.00	3.31	H
6944.01	-55.25	7.87	11.53	-51.59	-40.00	11.59	H
9255.01	-57.64	9.05	13.25	-53.44	-40.00	13.44	H
11575.01	-54.83	9.80	13.08	-51.55	-40.00	11.55	H
13896.01	-57.04	10.80	14.44	-53.40	-40.00	13.40	H
16196.00	-55.80	11.73	13.66	-53.87	-40.00	13.87	H

LTE Band 40(2350MHz~2360MHz), 5 MHz, QPSK, Channel 39180

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4711.02	-44.72	6.51	9.61	-41.62	-40.00	1.62	H
7066.01	-53.95	8.20	11.68	-50.47	-40.00	10.47	H
9416.01	-52.38	9.12	13.35	-48.15	-40.00	8.15	H
11780.01	-50.91	10.01	13.04	-47.88	-40.00	7.88	H
14139.01	-56.31	11.00	14.47	-52.84	-40.00	12.84	H
16458.00	-54.86	11.90	13.61	-53.15	-40.00	13.15	H

LTE Band 40(2350MHz~2360MHz), 5 MHz, QPSK, Channel 39200

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4714.02	-49.96	6.52	9.61	-46.87	-40.00	6.87	H
7069.01	-59.62	8.20	11.68	-56.14	-40.00	16.14	H
9426.01	-45.14	9.17	13.36	-40.95	-40.00	0.95	H
11790.01	-50.24	10.06	13.04	-47.26	-40.00	7.26	H
14149.01	-56.04	10.98	14.47	-52.55	-40.00	12.55	H
16466.00	-54.88	11.92	13.61	-53.19	-40.00	13.19	H

LTE Band 40(2350MHz~2360MHz), 5 MHz, QPSK, Channel 39220

Frequency (MHz)	P_{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
4718.02	-58.24	6.52	9.62	-55.14	-40.00	15.14	V
7077.01	-55.54	8.19	11.69	-52.04	-40.00	12.04	H
9434.01	-51.04	9.21	13.36	-46.89	-40.00	6.89	H
11792.01	-53.58	10.07	13.04	-50.61	-40.00	10.61	H
14160.01	-55.35	10.95	14.47	-51.83	-40.00	11.83	H
16474.00	-55.17	11.94	13.61	-53.50	-40.00	13.50	H

Spot Check Measurement Results:

LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1650.01	-51.00	3.57	5.23	2.15	-51.49	-13.00	38.49	H
2474.00	-50.25	4.60	6.02	2.15	-50.98	-13.00	37.98	H
3299.02	-49.15	5.29	7.72	2.15	-48.87	-13.00	35.87	V
4127.02	-47.39	6.04	9.03	2.15	-46.55	-13.00	33.55	H
4952.01	-54.06	6.69	9.85	2.15	-53.05	-13.00	40.05	H
5775.01	-53.16	7.23	10.54	2.15	-52.00	-13.00	39.00	H

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1673.01	-51.78	3.58	5.19	2.15	-52.32	-13.00	39.32	H
2510.00	-47.74	4.63	6.12	2.15	-48.40	-13.00	35.40	H
3346.02	-52.32	5.31	7.83	2.15	-51.95	-13.00	38.95	H
4187.02	-47.40	6.18	9.09	2.15	-46.64	-13.00	33.64	H
5024.01	-54.34	6.56	9.93	2.15	-53.12	-13.00	40.12	H
5857.01	-52.71	7.26	10.53	2.15	-51.59	-13.00	38.59	H

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1697.01	-49.64	3.60	5.15	2.15	-50.24	-13.00	37.24	H
2545.00	-47.59	4.66	6.18	2.15	-48.22	-13.00	35.22	H
3393.02	-48.97	5.36	7.94	2.15	-48.54	-13.00	35.54	V
4244.02	-49.22	6.25	9.14	2.15	-48.48	-13.00	35.48	V
5096.01	-51.52	6.76	10.03	2.15	-50.40	-13.00	37.40	H
5944.01	-50.66	7.47	10.51	2.15	-49.77	-13.00	36.77	H

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Margin(dB)	Polarization
5011.02	-44.16	6.58	9.92	-40.82	-25.00	15.82	H
7513.01	-40.45	8.34	12.21	-36.58	-25.00	11.58	H
10025.01	-35.31	9.25	12.91	-31.65	-25.00	6.65	H
12519.01	-38.19	10.23	13.21	-35.21	-25.00	10.21	V
15017.00	-43.51	11.24	13.99	-40.76	-25.00	15.76	V
17529.00	-40.01	12.84	14.94	-37.91	-25.00	12.91	V

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Margin(dB)	Polarization
5074.02	-44.90	6.70	10.00	-41.60	-25.00	16.60	H
7610.01	-36.82	8.02	12.29	-32.55	-25.00	7.55	H
10155.01	-35.89	9.37	12.96	-32.30	-25.00	7.30	H
12694.01	-40.54	10.31	13.32	-37.53	-25.00	12.53	H
15219.00	-45.95	11.38	13.87	-43.46	-25.00	18.46	H
17747.00	-44.48	12.44	15.25	-41.67	-25.00	16.67	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Margin(dB)	Polarization
5140.02	-46.97	6.87	10.10	-43.74	-25.00	18.74	H
7708.01	-36.25	8.42	12.37	-32.30	-25.00	7.30	H
10284.01	-33.71	9.59	13.01	-30.29	-25.00	5.29	H
12853.01	-36.95	10.63	13.41	-34.17	-25.00	9.17	H
15406.00	-45.42	11.40	13.76	-43.06	-25.00	18.06	H
17990.00	-44.11	12.90	15.59	-41.42	-25.00	16.42	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 5.16 dB, k = 2.

Reference Measurement Results from basic model:

LTE Band 5, 1.4MHz, QPSK, Channel 20407

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1650.01	-51.08	3.57	5.23	2.15	-51.57	-13.00	38.57	V
2474.00	-51.33	4.60	6.02	2.15	-52.06	-13.00	39.06	H
3299.02	-50.17	5.29	7.72	2.15	-49.89	-13.00	36.89	H
4128.02	-42.63	6.04	9.03	2.15	-41.79	-13.00	28.79	H
4954.01	-53.09	6.68	9.85	2.15	-52.07	-13.00	39.07	H
5779.01	-53.61	7.22	10.54	2.15	-52.44	-13.00	39.44	H

LTE Band 5, 1.4MHz, QPSK, Channel 20525

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1673.01	-42.18	3.58	5.19	2.15	-42.72	-13.00	29.72	H
2510.00	-47.66	4.63	6.12	2.15	-48.32	-13.00	35.32	H
3346.02	-52.76	5.31	7.83	2.15	-52.39	-13.00	39.39	V
4183.02	-44.80	6.17	9.08	2.15	-44.04	-13.00	31.04	H
5020.01	-55.17	6.57	9.93	2.15	-53.96	-13.00	40.96	H
5864.01	-54.18	7.28	10.53	2.15	-53.08	-13.00	40.08	V

LTE Band 5, 1.4MHz, QPSK, Channel 20643

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
1697.01	-44.26	3.60	5.15	2.15	-44.86	-13.00	31.86	H
2545.00	-50.88	4.66	6.18	2.15	-51.51	-13.00	38.51	H
3394.02	-48.02	5.36	7.95	2.15	-47.58	-13.00	34.58	V
4246.02	-38.96	6.24	9.15	2.15	-38.20	-13.00	25.20	H
5087.01	-55.12	6.74	10.02	2.15	-53.99	-13.00	40.99	V
5946.01	-53.23	7.47	10.51	2.15	-52.34	-13.00	39.34	H

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Margin(dB)	Polarization
5139.02	-47.66	6.86	10.09	-44.43	-13.00	31.43	V
7707.01	-32.87	8.42	12.37	-28.92	-13.00	15.92	H
10280.01	-37.86	9.57	13.01	-34.42	-13.00	21.42	H
12853.01	-38.19	10.63	13.41	-35.41	-13.00	22.41	H
15413.00	-45.94	11.41	13.75	-43.60	-13.00	30.60	H
17991.00	-42.65	12.90	15.59	-39.96	-13.00	26.96	V

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Margin(dB)	Polarization
5069.02	-43.01	6.68	10.00	-39.69	-13.00	26.69	V
7604.01	-34.49	7.99	12.28	-30.20	-13.00	17.20	H
10141.01	-33.18	9.40	12.96	-29.62	-13.00	16.62	H
12684.01	-38.36	10.33	13.31	-35.38	-13.00	22.38	H
15228.00	-43.23	11.37	13.86	-40.74	-13.00	27.74	H
17755.00	-43.35	12.49	15.26	-40.58	-13.00	27.58	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit（dBm）	Margin(dB)	Polarization
5135.02	-48.10	6.86	10.09	-44.87	-13.00	31.87	V
7707.01	-31.34	8.42	12.37	-27.39	-13.00	14.39	H
10280.01	-34.67	9.57	13.01	-31.23	-13.00	18.23	H
12853.01	-37.95	10.63	13.41	-35.17	-13.00	22.17	H
15386.00	-45.54	11.38	13.77	-43.15	-13.00	30.15	V
17984.00	-43.56	12.90	15.58	-40.88	-13.00	27.88	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 5.16 dB, k = 2.

A.3 FREQUENCY STABILITY

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 for LTE band 5 7 38 40, 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 -10℃ to +50℃. 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

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 3.5VDC and 4.4VDC, with a nominal voltage of 3.8VDC. 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.

A.3.3 Measurement results

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.5	-8	-12	0.009	0.014
3.8	-7	-18	0.008	0.022
4.4	-6	-17	0.007	0.021

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-6	-15	0.007	0.018
40	-3	-11	0.004	0.014
30	-7	-15	0.008	0.017
20	-6	-14	0.008	0.016
10	-7	-11	0.008	0.013
0	-7	-11	0.009	0.013
- 10	-2	-11	0.003	0.013

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

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.5	-2	-4	0.001	0.001
3.8	-7	-2	0.003	0.001
4.4	1	0	0.000	0.000

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-10	-1	0.004	0.000
40	-6	0	0.002	0.000
30	-6	-1	0.002	0.000
20	-7	-13	0.003	0.005
10	-9	-7	0.004	0.003
0	4	-12	0.002	0.005
- 10	-5	-8	0.002	0.003

LTE Band 38, 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.5	-17.42	-15.78	0.0067	0.0061
3.8	-11.83	-13.66	0.0046	0.0053
4.4	-10.27	-15.92	0.0040	0.0061

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-20.60	-17.87	0.0079	0.0069
40	-12.47	-21.99	0.0048	0.0085
30	-12.77	-19.78	0.0049	0.0076
20	-14.65	-18.93	0.0056	0.0073
10	-15.86	-19.31	0.0061	0.0074
0	-12.04	-18.70	0.0046	0.0072
-10	-18.20	-18.78	0.0070	0.0072

LTE Band 40(2305MHz~2315MHz), 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.5	-9.14	-16.52	0.0040	0.0072
3.8	-5.94	-15.91	0.0026	0.0069
4.4	-25.71	-13.13	0.0111	0.0057

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-11.04	-25.98	0.0048	0.0112
40	-18.64	-12.75	0.0081	0.0055
30	-18.11	-13.72	0.0078	0.0059
20	-10.67	-13.07	0.0046	0.0057
10	-8.80	-10.19	0.0038	0.0044
0	-6.54	-9.10	0.0028	0.0039
-10	-8.03	-20.20	0.0035	0.0087

LTE Band 40(2350MHz~2360MHz), 5MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.5	-15.99	-8.87	0.0068	0.0038
3.8	-10.87	-11.63	0.0046	0.0049
4.4	-10.74	-9.70	0.0046	0.0041

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50	-13.53	-8.78	0.0057	0.0037
40	-9.38	-12.39	0.0040	0.0053
30	-20.48	-9.27	0.0087	0.0039
20	-17.54	-7.91	0.0074	0.0034
10	-9.98	19.33	0.0042	0.0082
0	-5.58	-6.62	0.0024	0.0028
-10	-6.77	7.52	0.0029	0.0032

A.4 OCCUPIED BANDWIDTH

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.

The measurement method is from KDB 971168 4.2:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (i.e., two to five times the OBW).

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

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

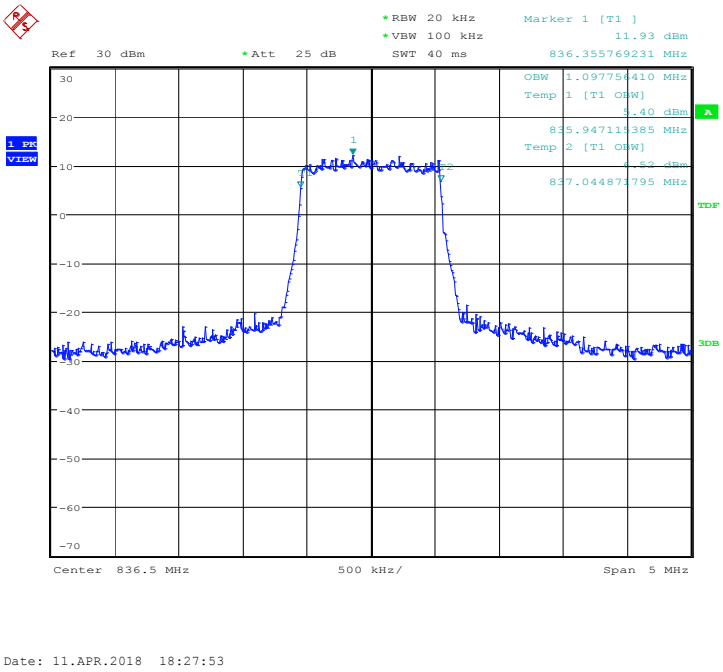
d) Set the detection mode to peak, and the trace mode to max hold.

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

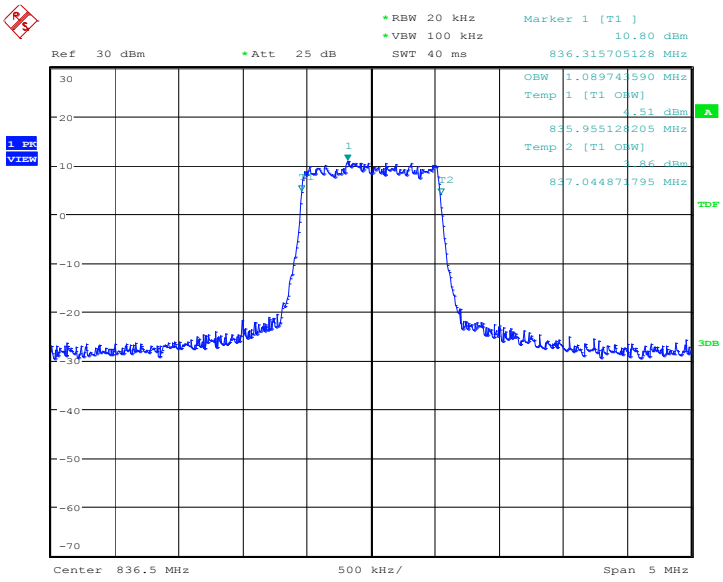
LTE band 5, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5	1097.756	1089.744

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



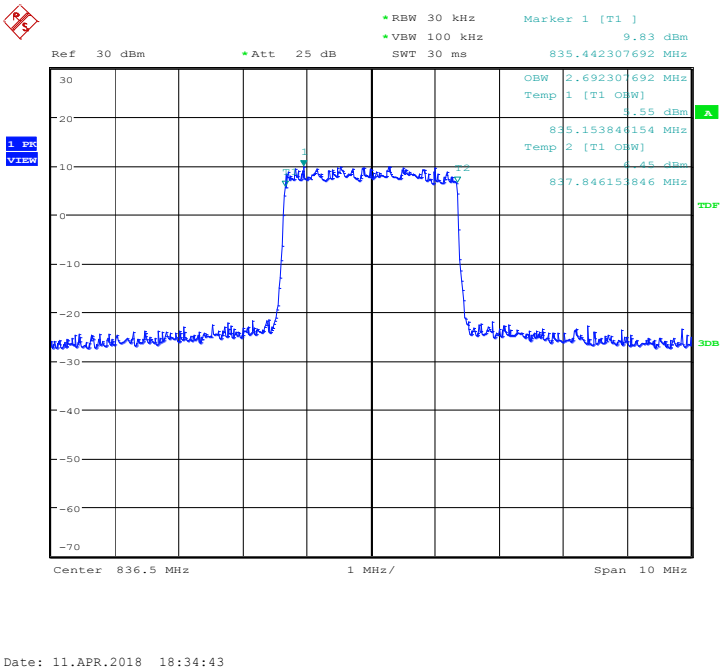
LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)



LTE band 5, 3MHz (99%)

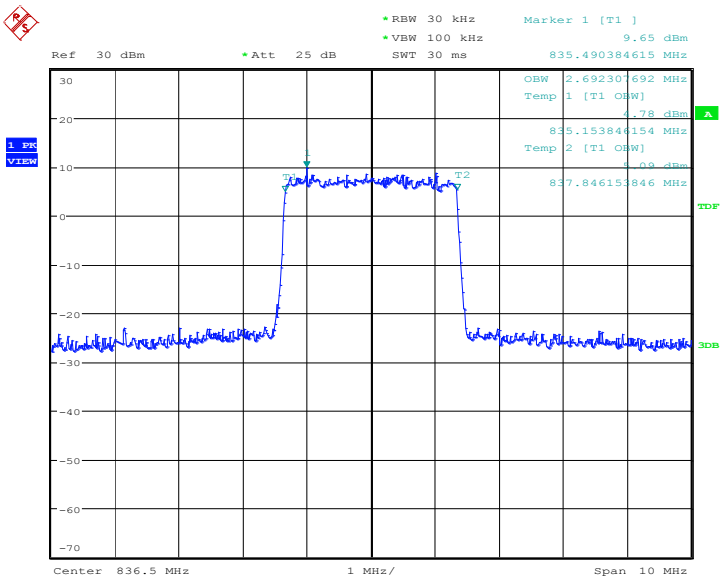
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5	2692.308	2692.308

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



Date: 11.APR.2018 18:34:43

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

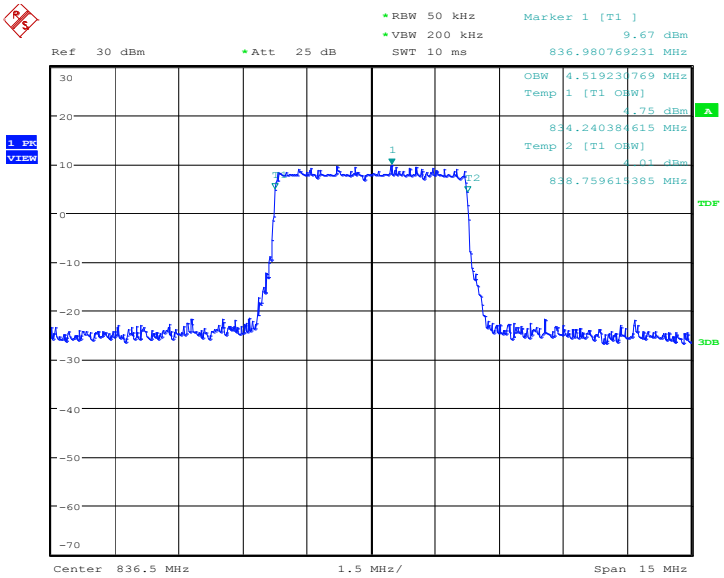


Date: 11.APR.2018 18:34:57

LTE band 5, 5MHz (99%)

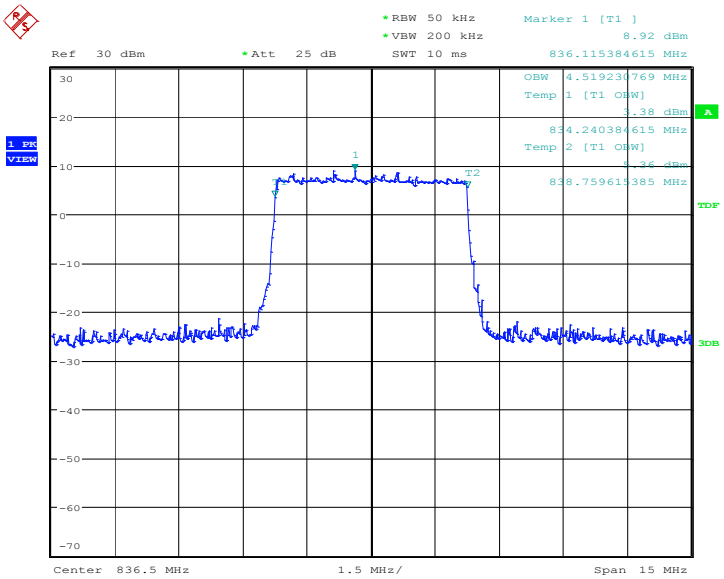
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5	4519.231	4519.231

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



Date: 11.APR.2018 18:41:32

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

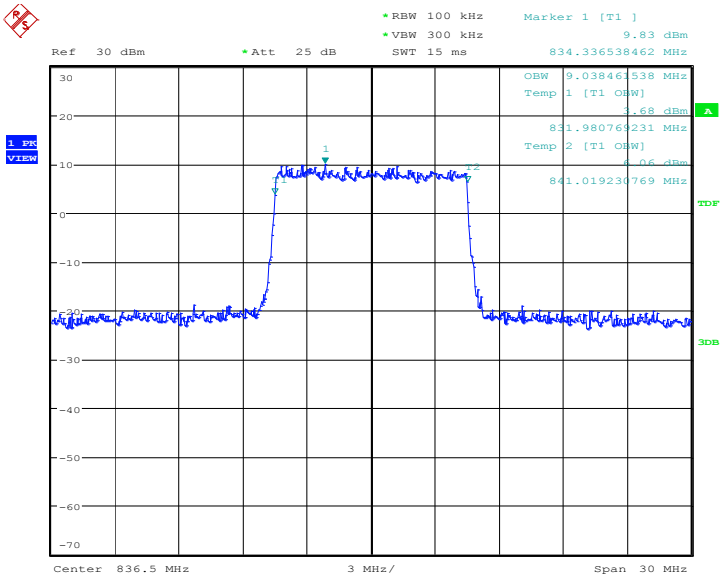


Date: 11.APR.2018 18:41:46

LTE band 5, 10MHz (99%)

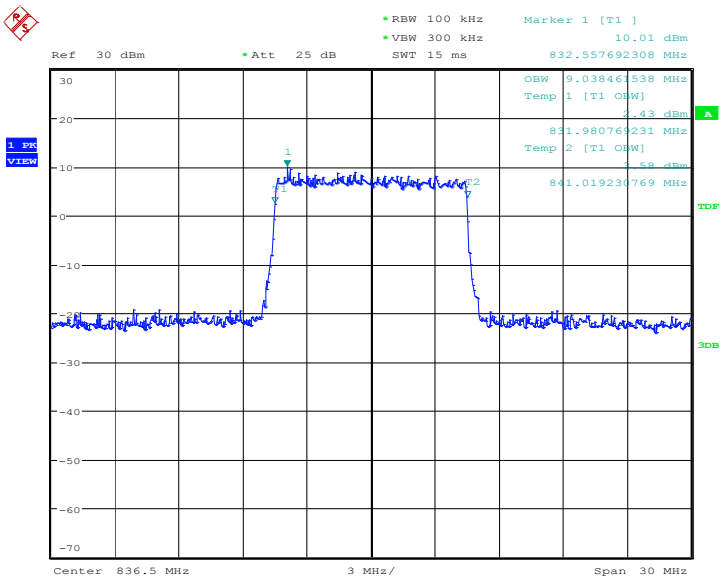
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
836.5	9038.46	9038.46

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



Date: 11.APR.2018 18:48:22

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

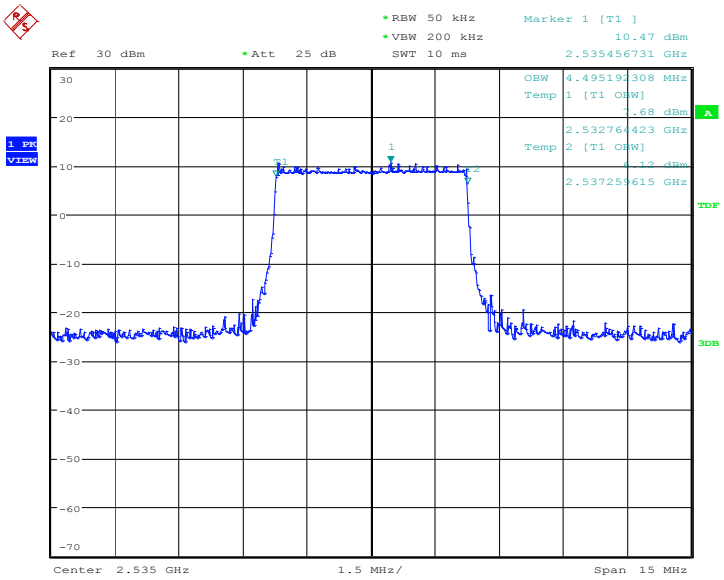


Date: 11.APR.2018 18:48:36

LTE band 7, 5MHz (99%)

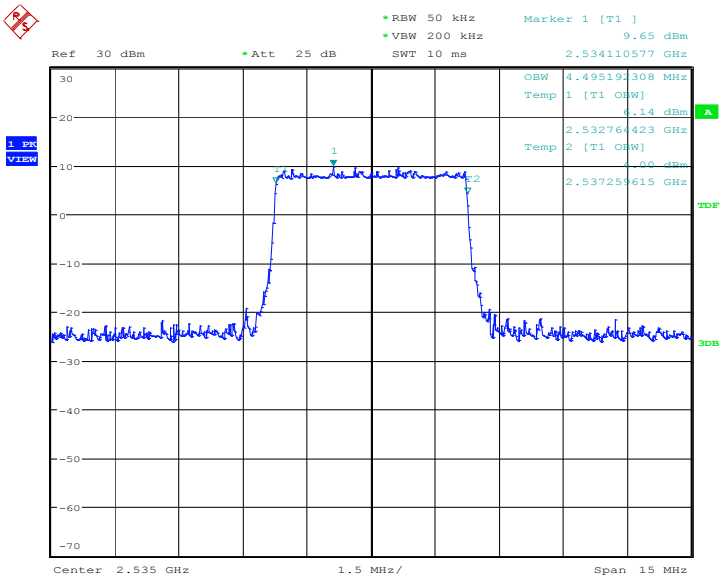
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
2535.0	4495.19	4495.19

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



Date: 11.APR.2018 17:45:19

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

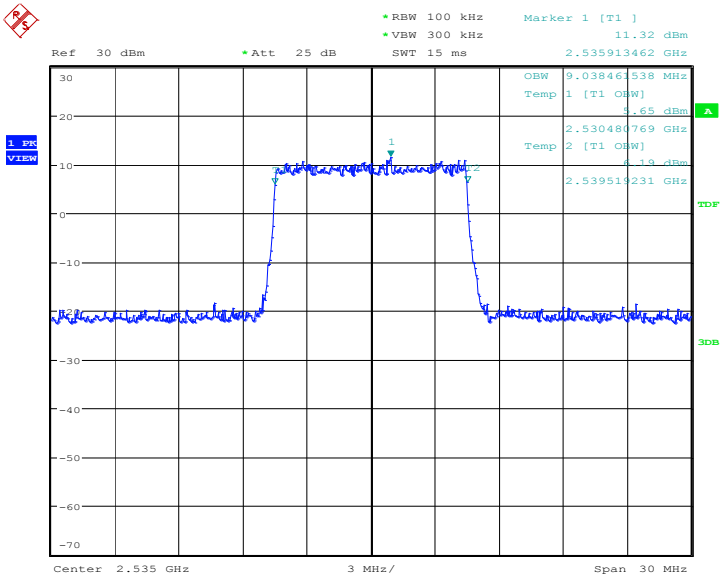


Date: 11.APR.2018 17:45:35

LTE band 7, 10MHz (99%)

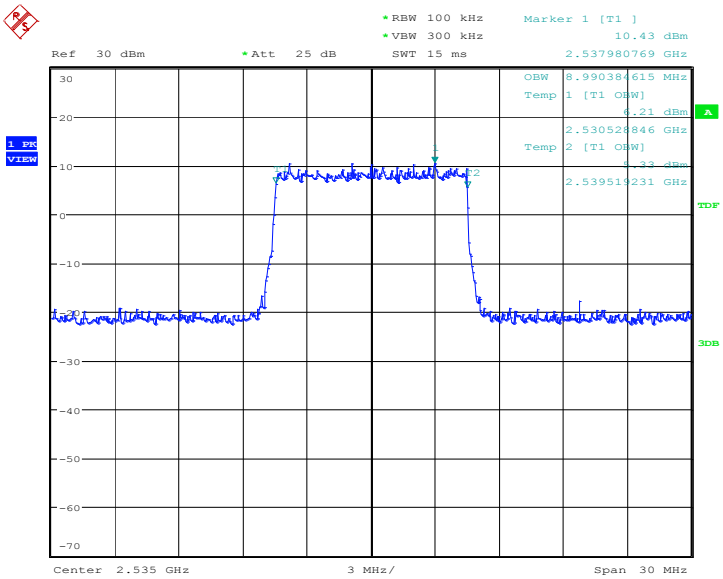
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
2535.0	9038.46	8990.38

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



Date: 11.APR.2018 17:52:12

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

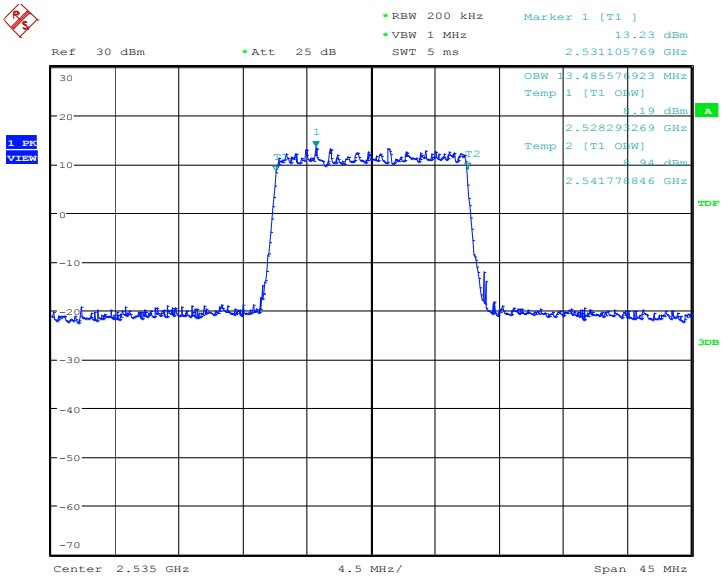


Date: 11.APR.2018 17:52:25

LTE band 7, 15MHz (99%)

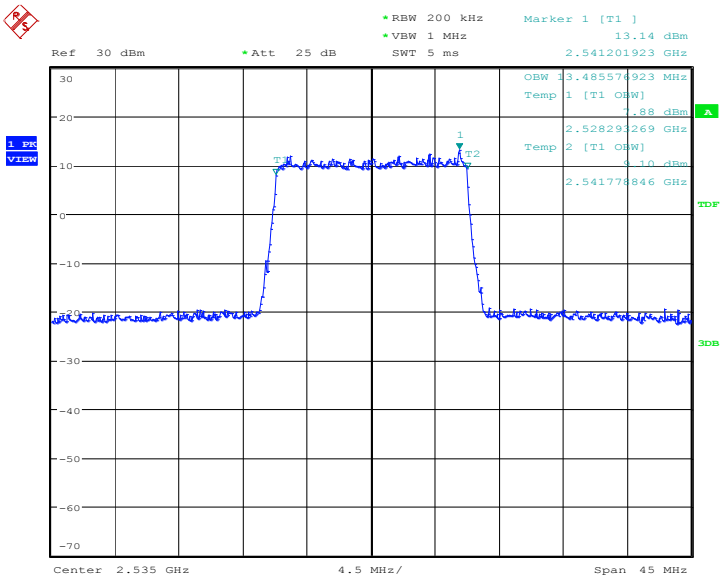
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
2535.0	13485.58	13485.58

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



Date: 11.APR.2018 17:59:39

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

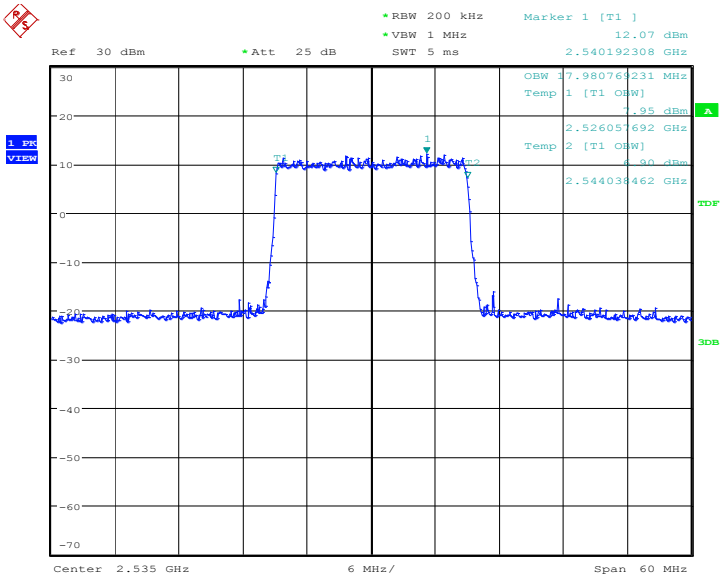


Date: 11.APR.2018 17:59:52

LTE band 7, 20MHz (99%)

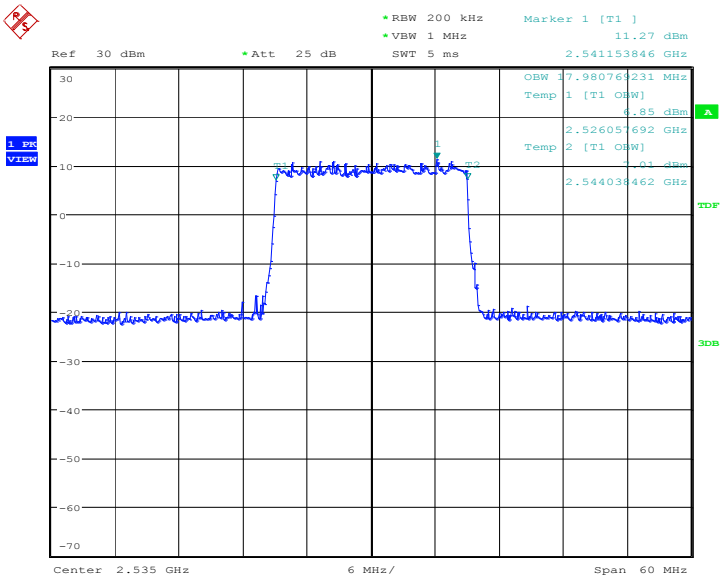
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
	QPSK	16QAM
2535.0	17980.77	17980.77

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



Date: 11.APR.2018 18:07:10

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

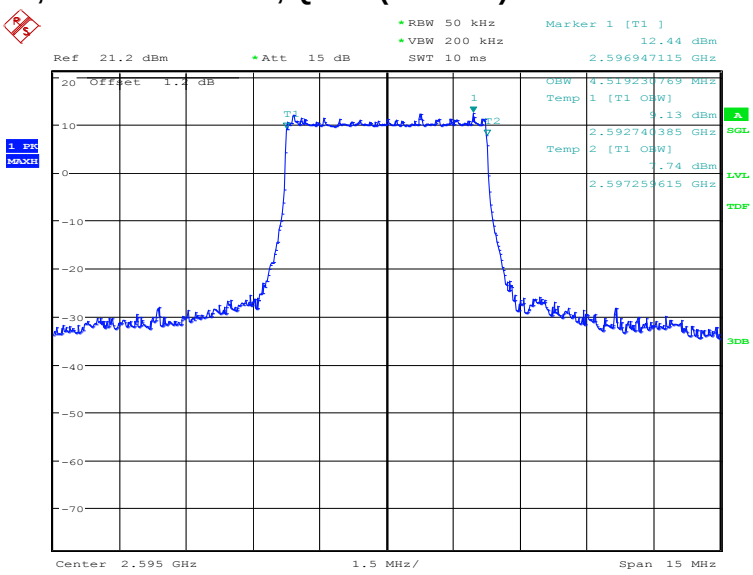


Date: 11.APR.2018 18:07:24

LTE band 38, 5MHz (99%)

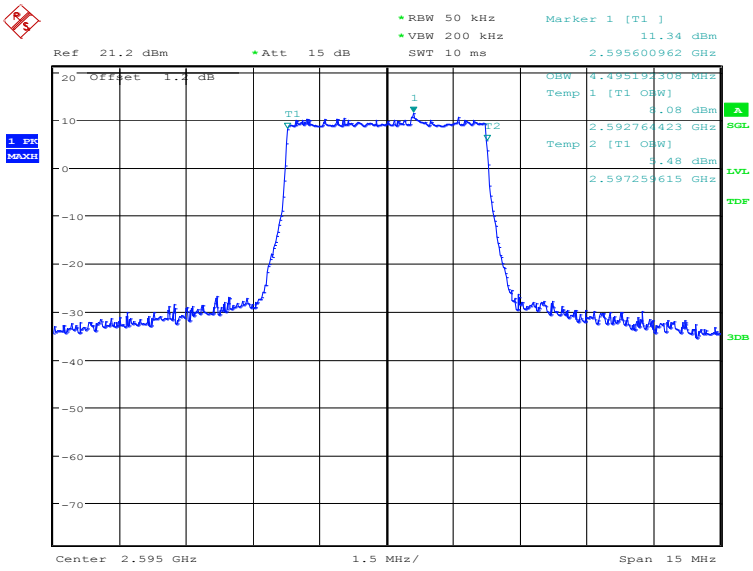
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2595.0	QPSK	16QAM
	4519.23	4495.19

LTE band 38, 5MHz Bandwidth, QPSK (99% BW)



Date: 2.SEP.2019 10:08:11

LTE band 38, 5MHz Bandwidth,16QAM (99% BW)

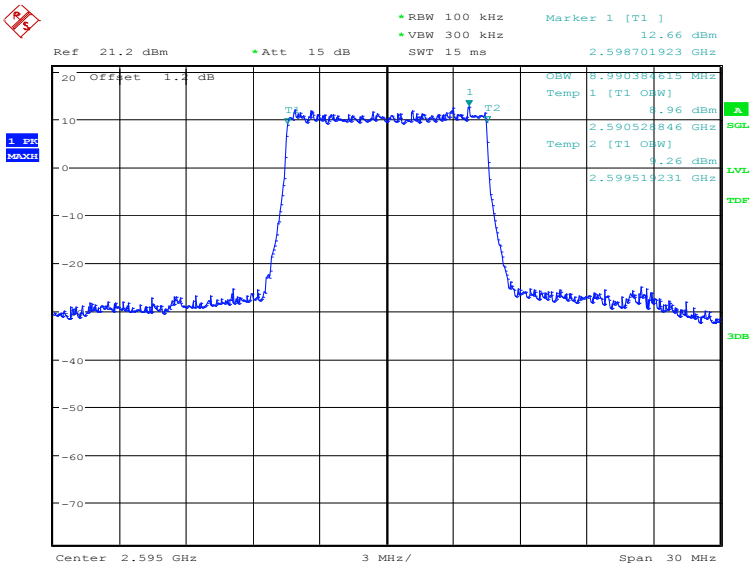


Date: 2.SEP.2019 10:09:36

LTE band 38, 10MHz (99%)

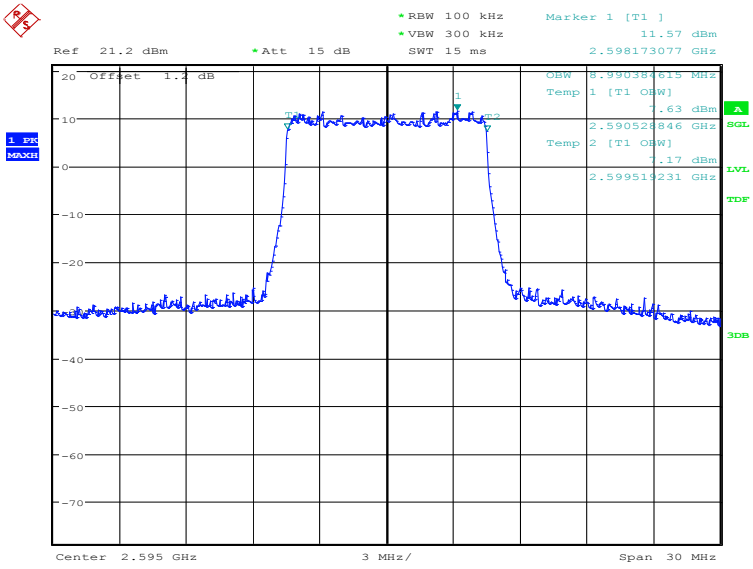
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2595.0	QPSK	16QAM
	8990.38	8990.38

LTE band 38, 10MHz Bandwidth, QPSK (99% BW)



Date: 2.SEP.2019 10:11:49

LTE band 38, 10MHz Bandwidth,16QAM (99% BW)

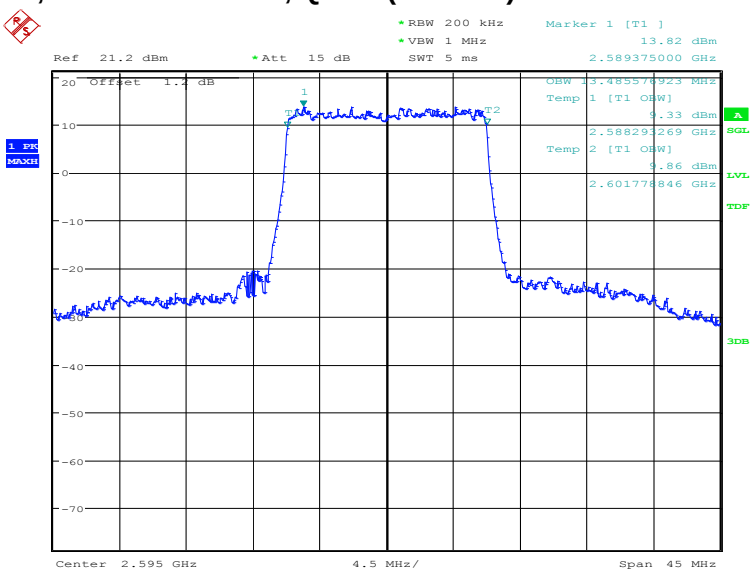


Date: 2.SEP.2019 10:13:14

LTE band 38,15MHz (99%)

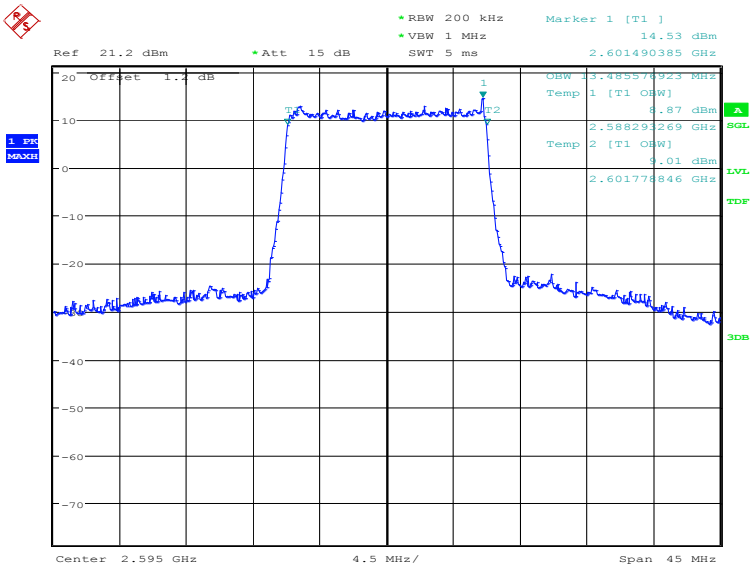
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2595.0	QPSK	16QAM
	13485.58	13485.58

LTE band 38,15MHz Bandwidth, QPSK (99% BW)



Date: 2.SEP.2019 10:15:43

LTE band 38, 15MHz Bandwidth,16QAM (99% BW)

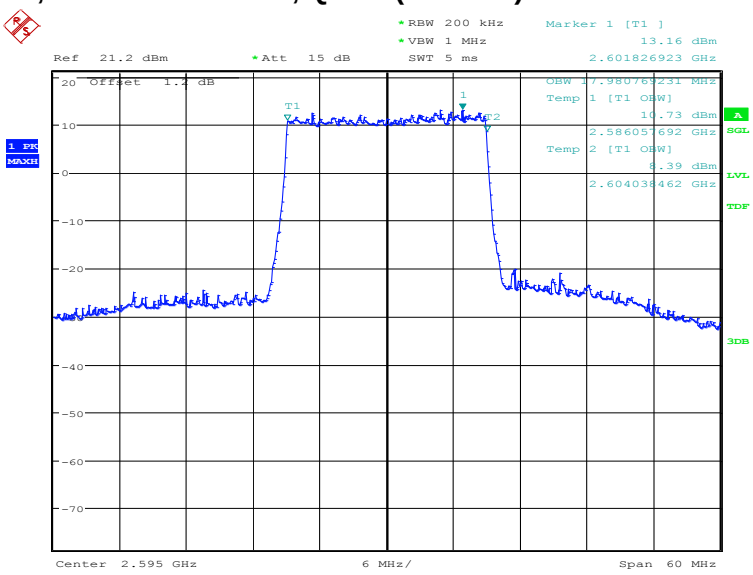


Date: 2.SEP.2019 10:17:08

LTE band 38, 20MHz (99%)

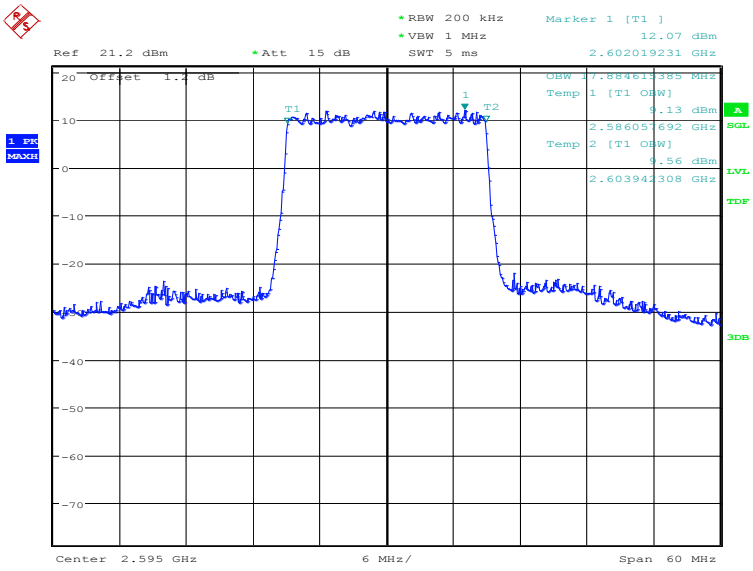
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2595.0	QPSK	16QAM
	17980.77	17884.62

LTE band 38, 20MHz Bandwidth, QPSK (99% BW)



Date: 2.SEP.2019 10:19:43

LTE band 38, 20MHz Bandwidth,16QAM (99% BW)

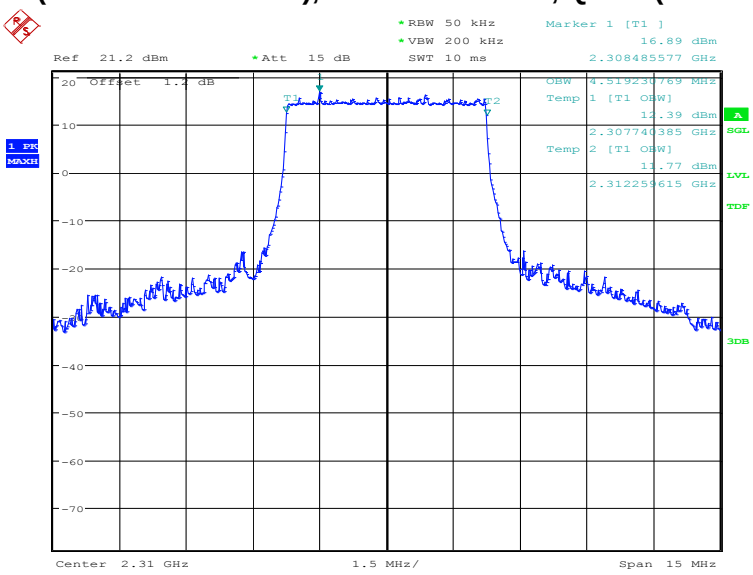


Date: 2.SEP.2019 10:21:08

LTE band 40(2305MHz~2315MHz), 5MHz (99%)

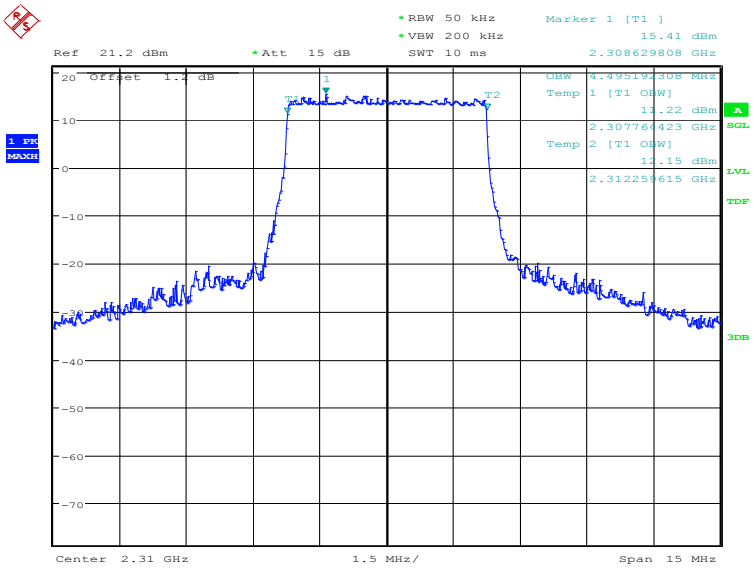
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2310.0	QPSK	16QAM
	4519.23	4495.19

LTE band 40(2305MHz~2315MHz), 5MHz Bandwidth, QPSK (99% BW)



Date: 2.SEP.2019 10:23:25

LTE band 40(2305MHz~2315MHz), 5MHz Bandwidth,16QAM (99% BW)

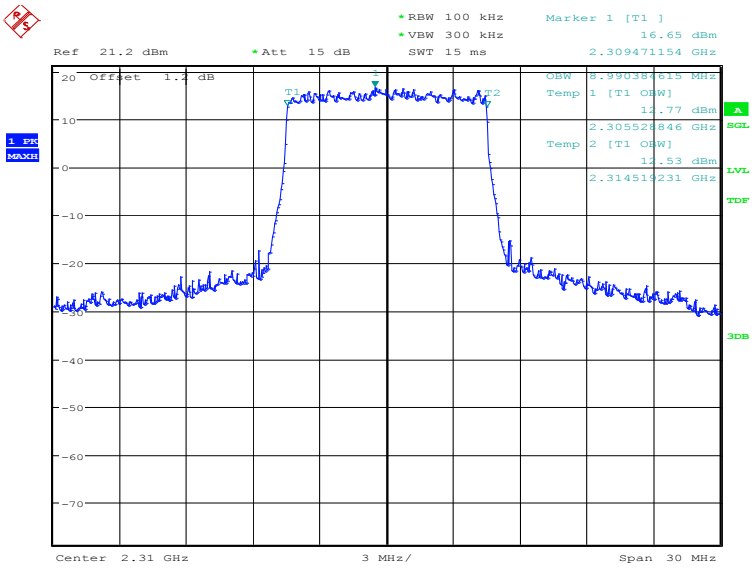


Date: 2.SEP.2019 10:24:50

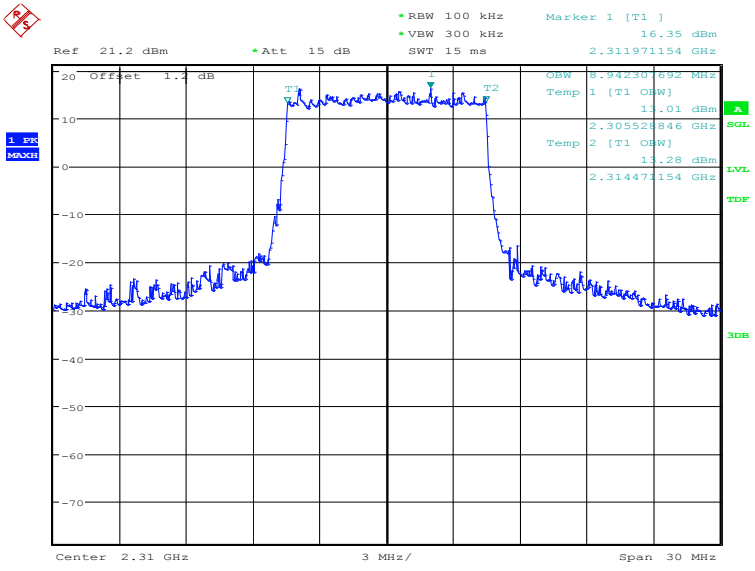
LTE band 40(2305MHz~2315MHz), 10MHz (99%)

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2310.0	QPSK	16QAM
	8990.38	8942.31

LTE band 40(2305MHz~2315MHz), 10MHz Bandwidth, QPSK (99% BW)



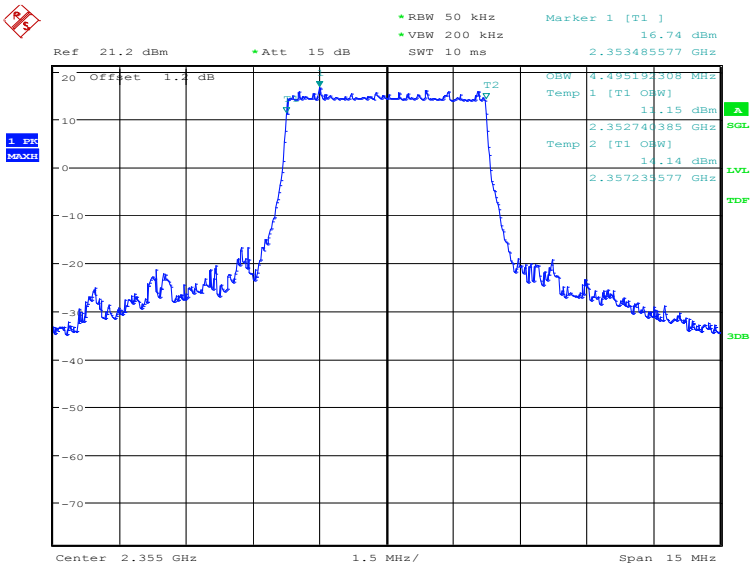
LTE band 40(2305MHz~2315MHz), 10MHz Bandwidth,16QAM (99% BW)



LTE band 40(2350MHz~2360MHz), 5MHz (99%)

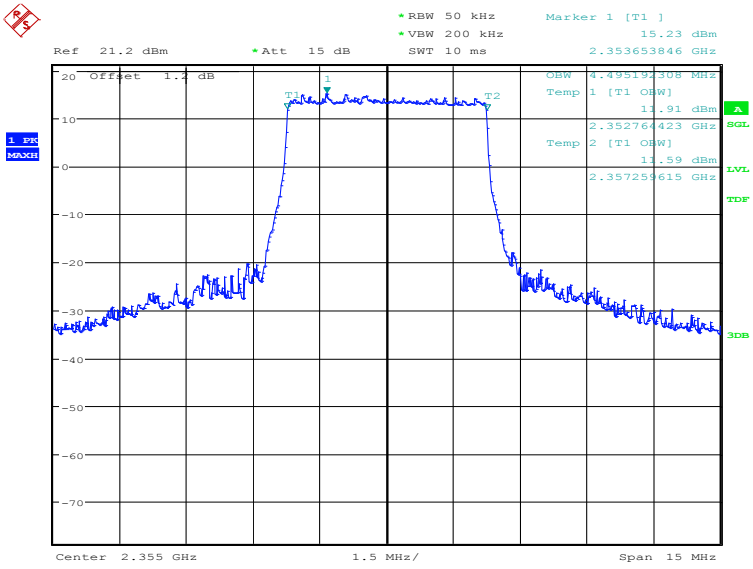
Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2355.0	QPSK	16QAM
	4495.19	4495.19

LTE band 40(2350MHz~2360MHz), 5MHz Bandwidth, QPSK (99% BW)



Date: 2.SEP.2019 10:29:59

LTE band 40(2350MHz~2360MHz), 5MHz Bandwidth,16QAM (99% BW)

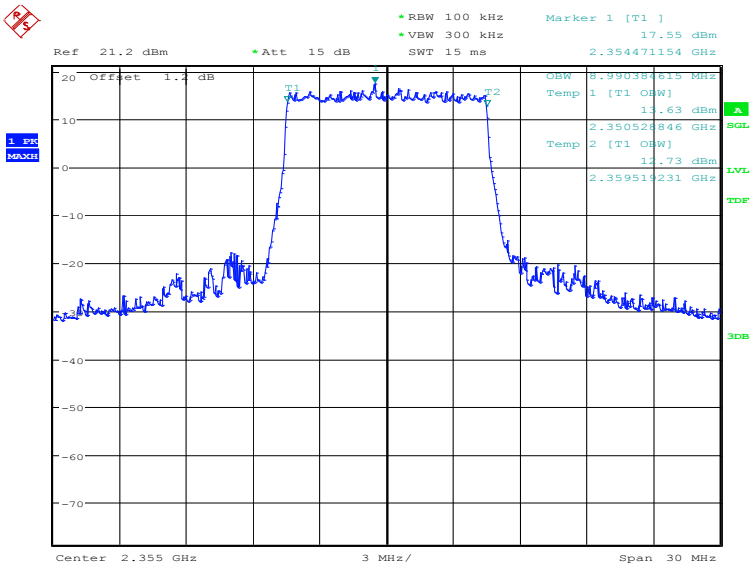


Date: 2.SEP.2019 10:31:23

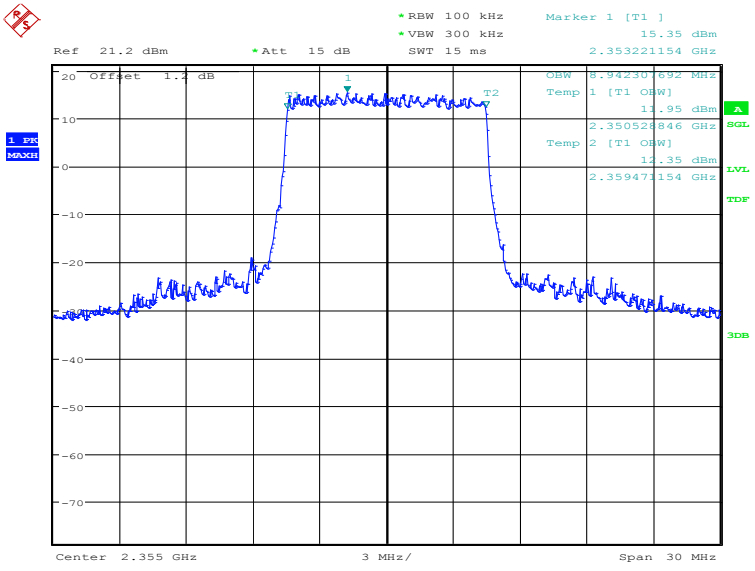
LTE band 40(2350MHz~2360MHz), 10MHz (99%)

Frequency (MHz)	Occupied Bandwidth (99%) (kHz)	
2355.0	QPSK	16QAM
	8990.38	8942.31

LTE band 40(2350MHz~2360MHz), 10MHz Bandwidth, QPSK (99% BW)



LTE band 40(2350MHz~2360MHz), 10MHz Bandwidth,16QAM (99% BW)



A.5 EMISSION BANDWIDTH

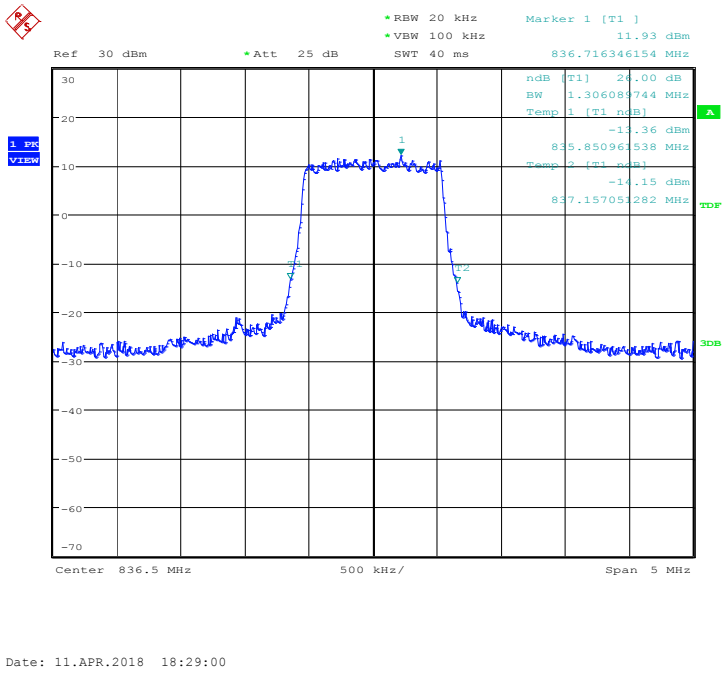
A.5.1Emission Bandwidth Results

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 at least 26 dB below the transmitter power. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

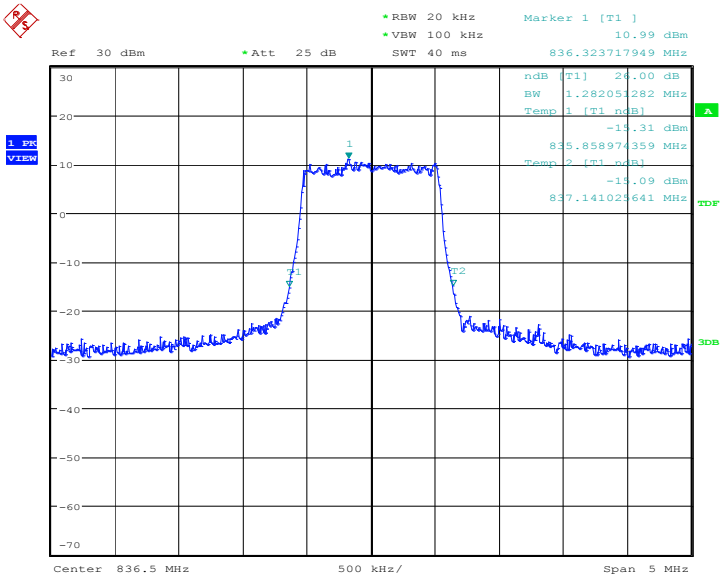
LTE band 5, 1.4MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
836.5	1097.756	1089.744

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



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

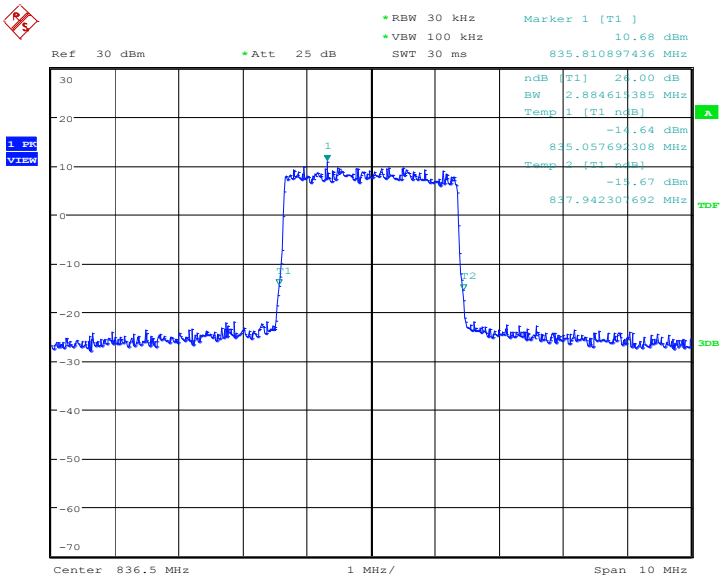


Date: 11.APR.2018 18:29:16

LTE band 5, 3MHz (-26dBc)

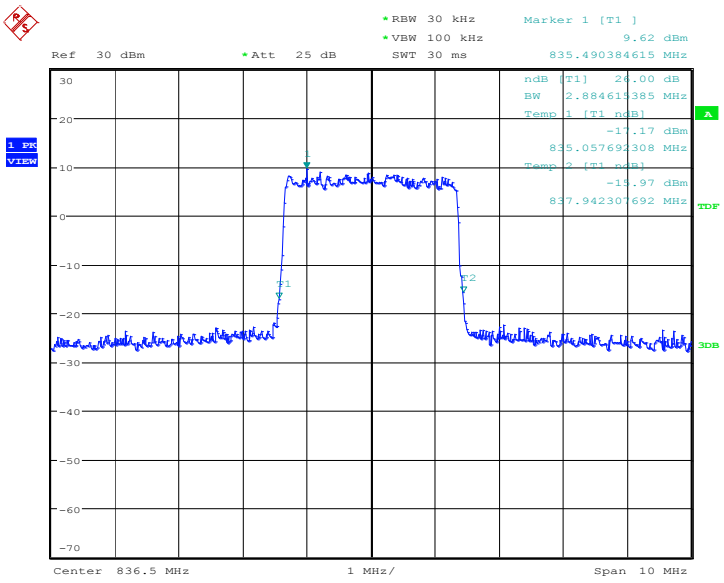
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
836.5	2692.308	2692.308

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



Date: 11.APR.2018 18:35:49

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

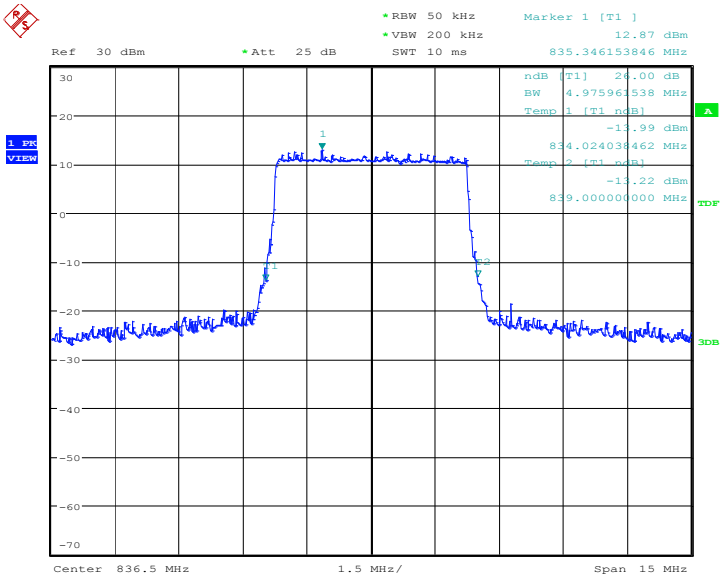


Date: 11.APR.2018 18:36:04

LTE band 5, 5MHz (-26dBc)

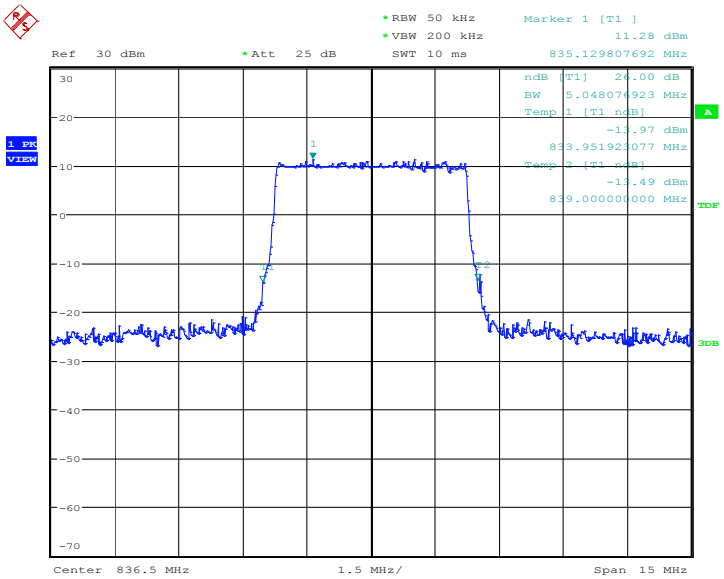
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
836.5	4519.231	4519.231

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



Date: 15.APR.2018 13:41:48

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

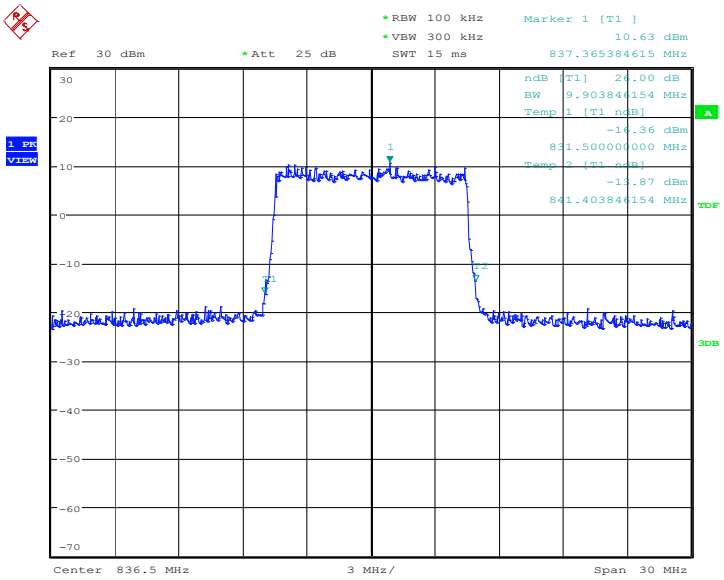


Date: 15.APR.2018 13:43:37

LTE band 5, 10MHz (-26dBc)

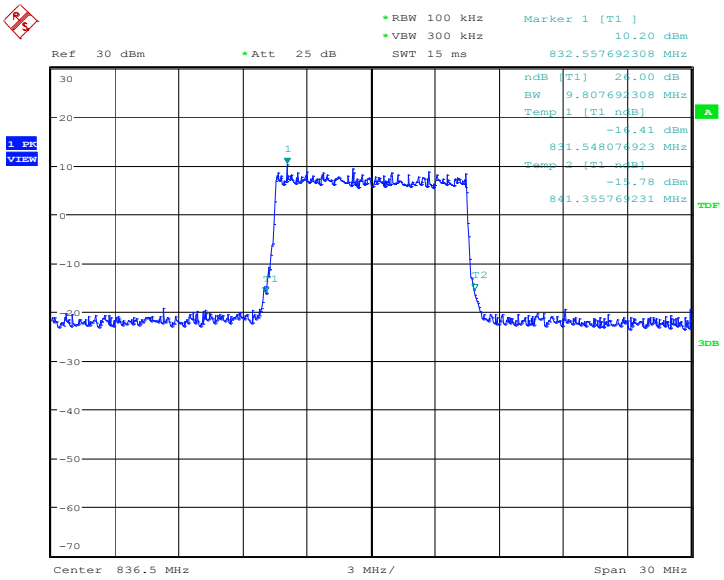
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
836.5	9038.46	9038.46

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



Date: 11.APR.2018 18:49:30

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

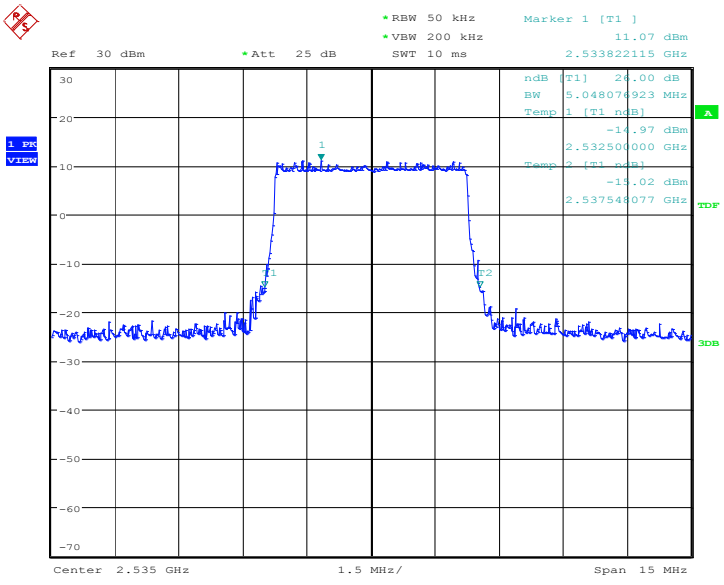


Date: 11.APR.2018 18:49:45

LTE band 7, 5MHz (-26dBc)

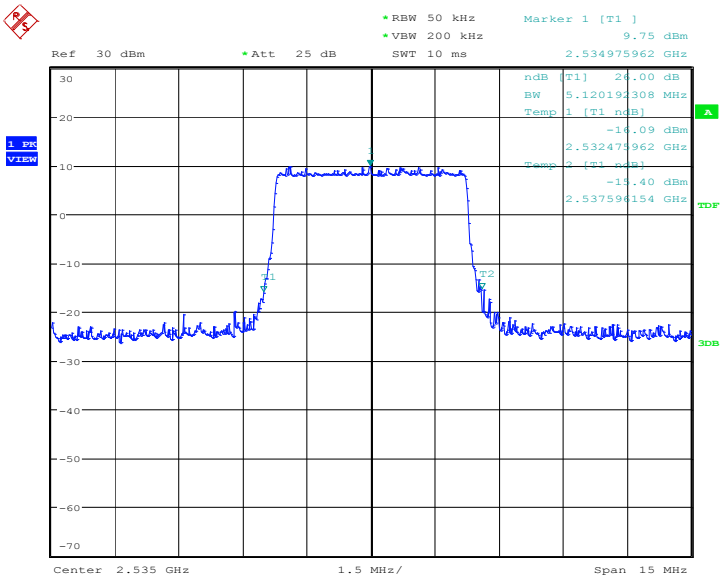
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	5048.08	5120.19

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



Date: 15.APR.2018 13:48:02

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

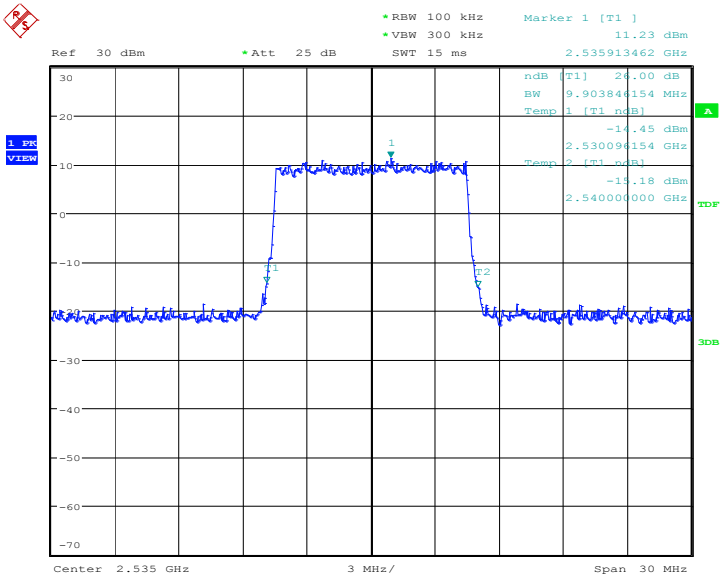


Date: 15.APR.2018 13:48:19

LTE band 7, 10MHz (-26dBc)

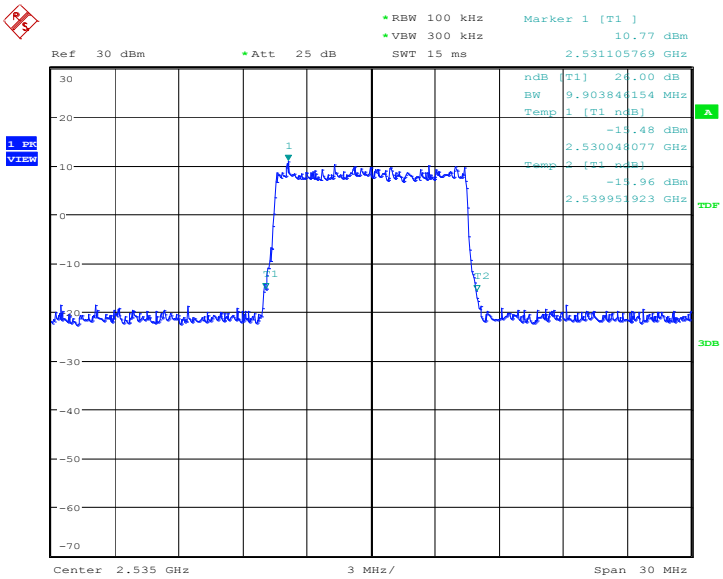
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	9903.85	9903.85

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



Date: 11.APR.2018 17:53:19

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

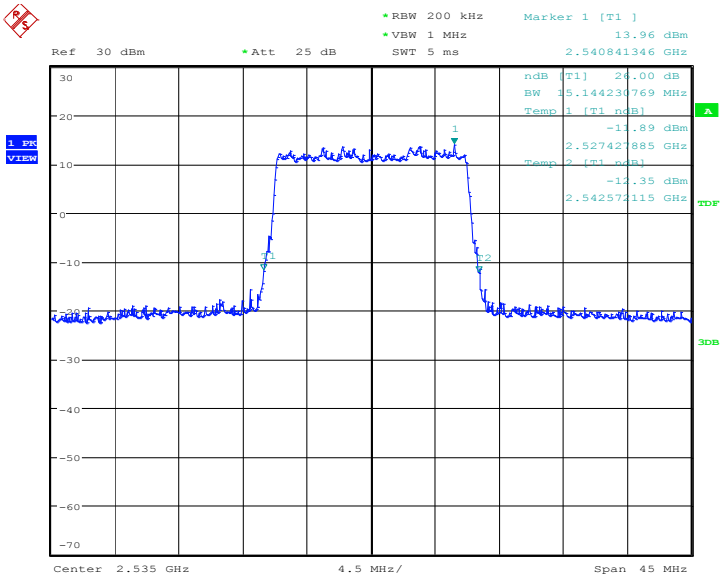


Date: 11.APR.2018 17:53:35

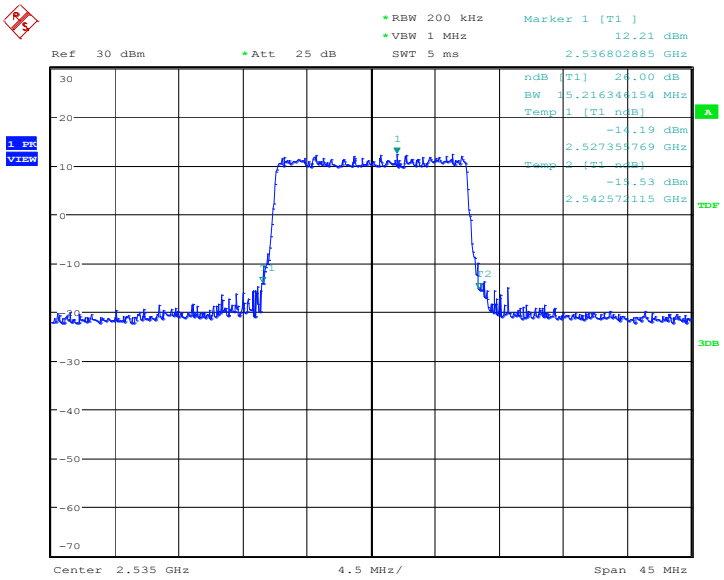
LTE band 7, 15MHz (-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	15144.23	15216.35

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



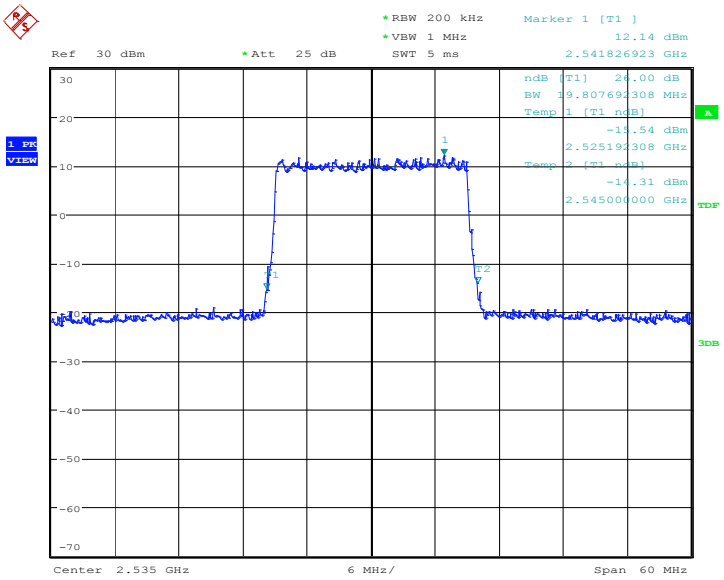
LTE band 7, 15MHz Bandwidth, 16QAM (-26dBc BW)



LTE band 7, 20MHz (-26dBc)

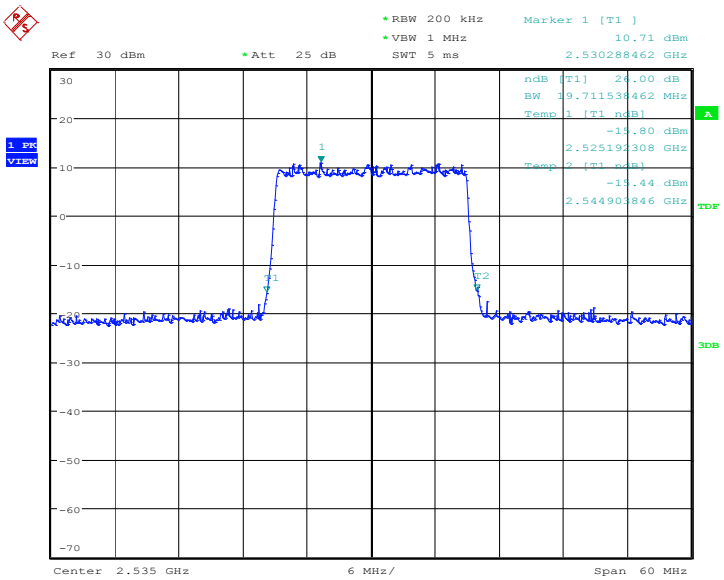
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
	QPSK	16QAM
2535.0	19807.69	19711.54

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



Date: 11.APR.2018 18:08:18

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

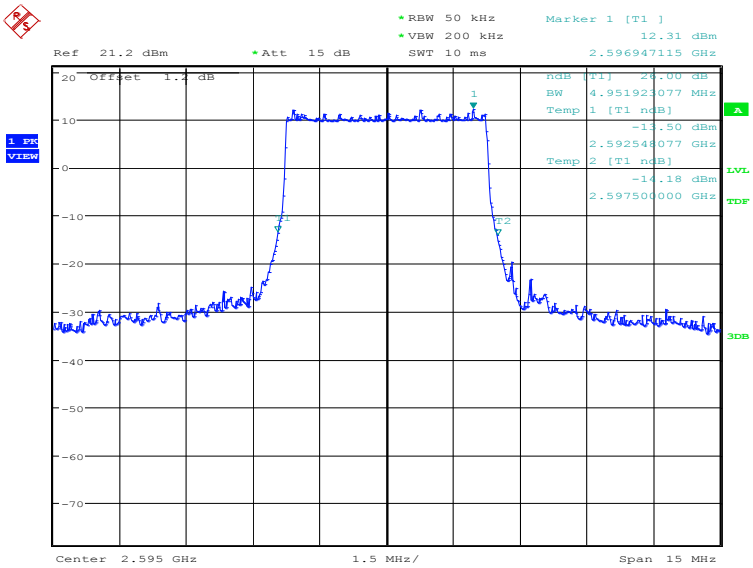


Date: 11.APR.2018 18:08:33

LTE band 38, 5MHz (-26dBc)

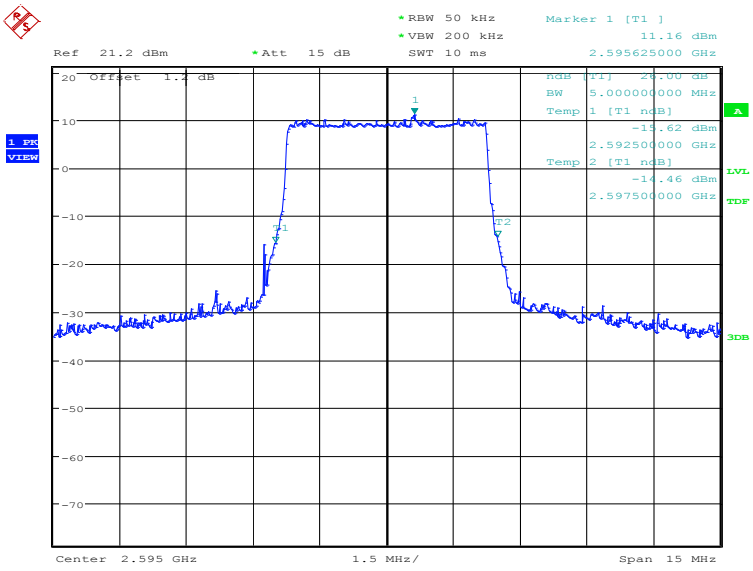
Frequency (MHz)	Occupied Bandwidth (-26dBc) (kHz)	
2595.0	QPSK	16QAM
	4951.92	5000.00

LTE band 38, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:37:23

LTE band 38, 5MHz Bandwidth,16QAM (-26dBc BW)

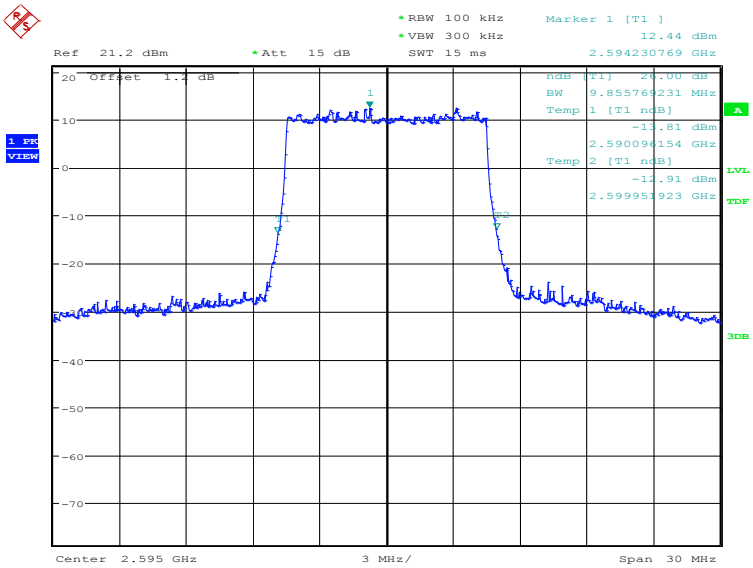


Date: 2.SEP.2019 10:38:47

LTE band 38, 10MHz (-26dBc)

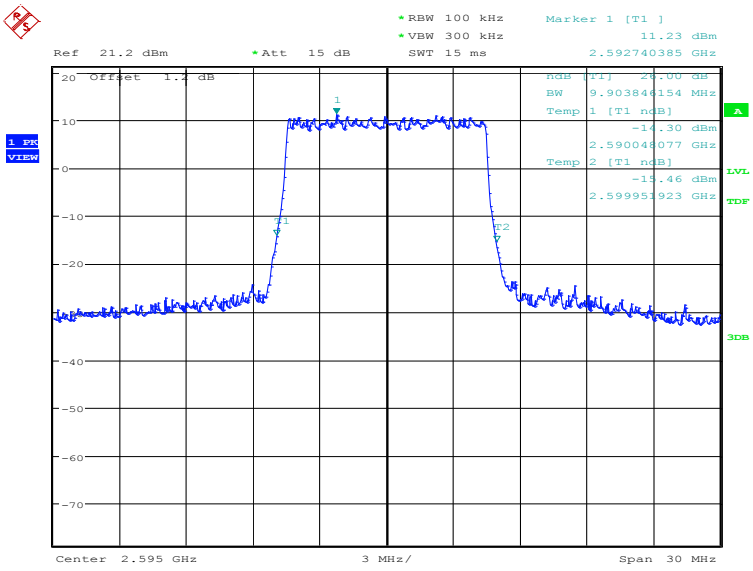
Frequency (MHz)	Occupied Bandwidth (-26dBc) (kHz)	
2595.0	QPSK	16QAM
	9855.77	9903.85

LTE band 38, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:41:12

LTE band 38, 10MHz Bandwidth,16QAM (-26dBc BW)

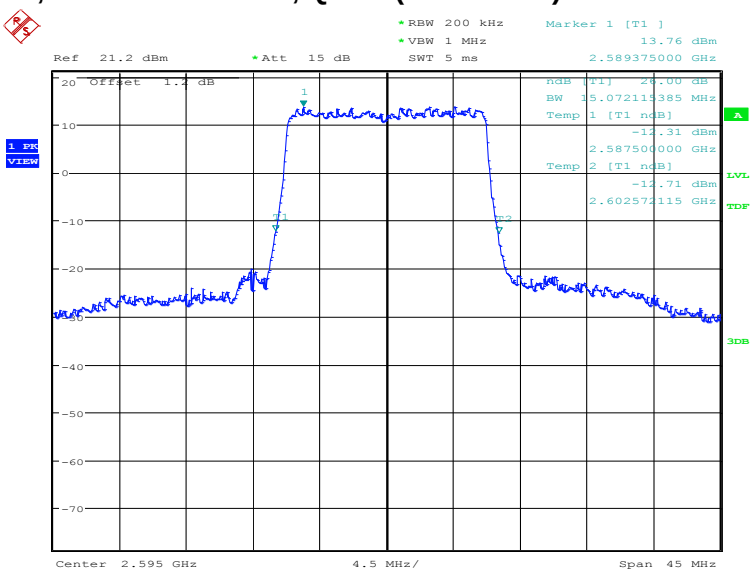


Date: 2.SEP.2019 10:42:36

LTE band 38, 15MHz (-26dBc)

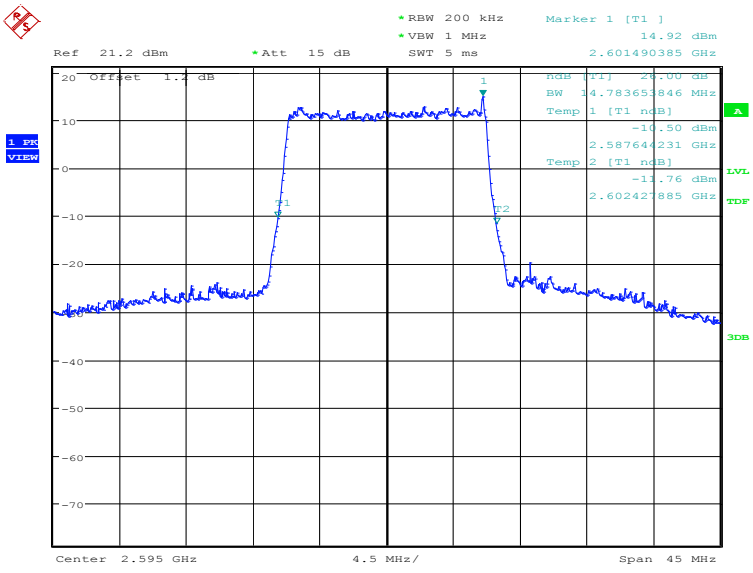
Frequency (MHz)	Occupied Bandwidth (-26dBc) (kHz)	
2595.0	QPSK	16QAM
	15072.12	14783.65

LTE band 38, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:45:05

LTE band 38, 15MHz Bandwidth,16QAM (-26dBc BW)

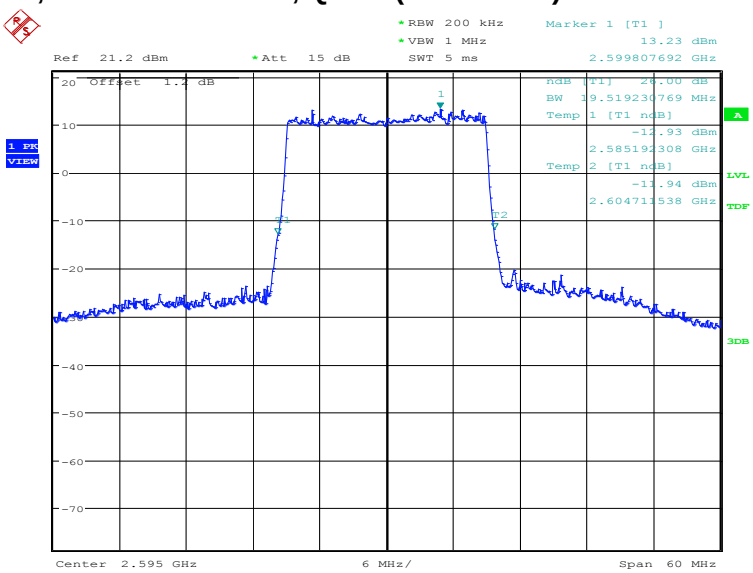


Date: 2.SEP.2019 10:46:30

LTE band 38, 20MHz (-26dBc)

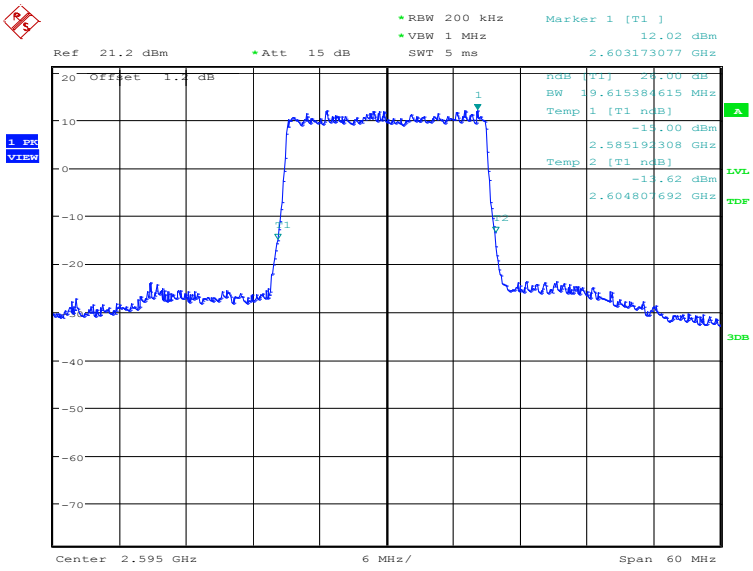
Frequency (MHz)	Occupied Bandwidth (-26dBc) (kHz)	
2595.0	QPSK	16QAM
	19519.23	19615.38

LTE band 38, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:49:06

LTE band 38, 20MHz Bandwidth,16QAM (-26dBc BW)

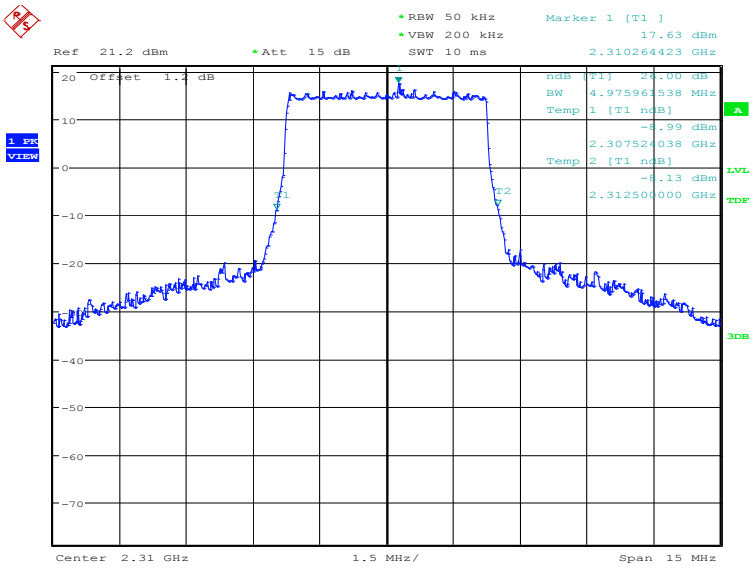


Date: 2.SEP.2019 10:50:30

LTE band 40(2305MHz~2315MHz), 5MHz (-26dBc BW)

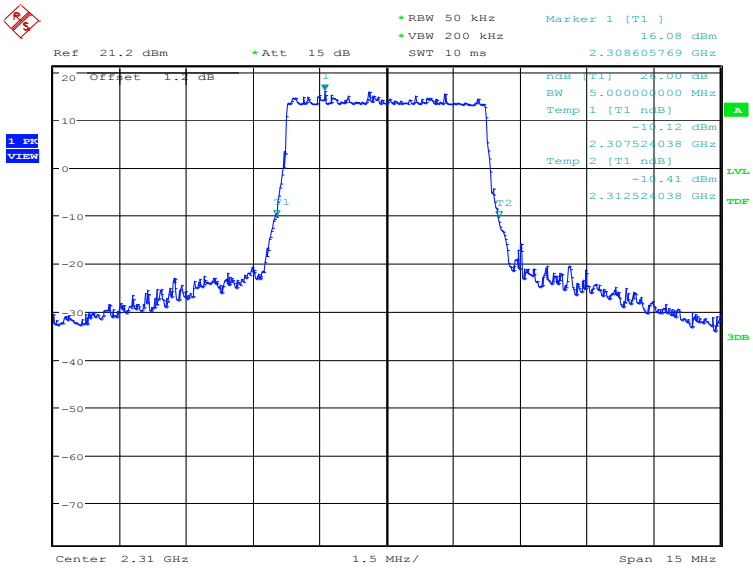
Frequency (MHz)	Occupied Bandwidth (-26dBc BW) (kHz)	
2310.0	QPSK	16QAM
	4975.96	5000.00

LTE band 40(2305MHz~2315MHz), 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:52:57

LTE band 40(2305MHz~2315MHz), 5MHz Bandwidth,16QAM (-26dBc BW)

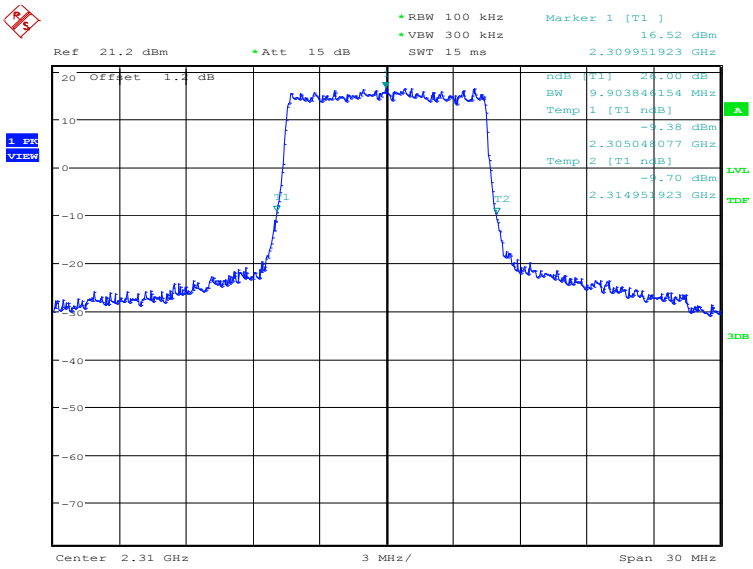


Date: 2.SEP.2019 10:54:21

LTE band 40(2305MHz~2315MHz), 10MHz (-26dBc BW)

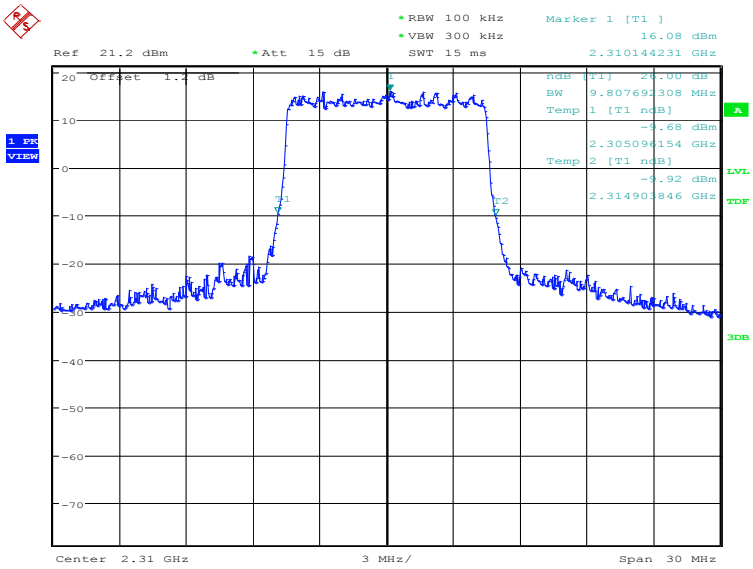
Frequency (MHz)	Occupied Bandwidth (-26dBc BW) (kHz)	
2310.0	QPSK	16QAM
	9903.85	9807.69

LTE band 40(2305MHz~2315MHz), 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:56:34

LTE band 40(2305MHz~2315MHz), 10MHz Bandwidth,16QAM (-26dBc BW)

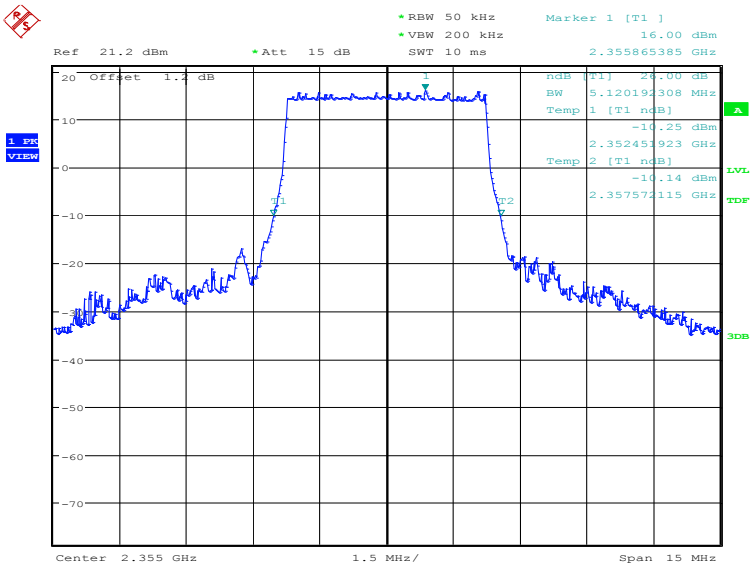


Date: 2.SEP.2019 10:57:59

LTE band 40(2350MHz~2360MHz), 5MHz (-26dBc BW)

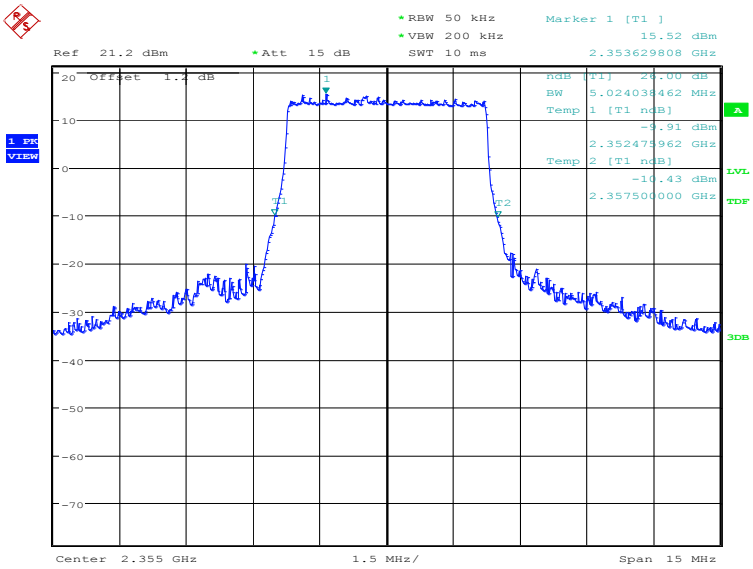
Frequency (MHz)	Occupied Bandwidth (-26dBc BW) (kHz)	
2355.0	QPSK	16QAM
	5120.19	5024.04

LTE band 40(2350MHz~2360MHz), 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 10:59:31

LTE band 40(2350MHz~2360MHz), 5MHz Bandwidth,16QAM (-26dBc BW)

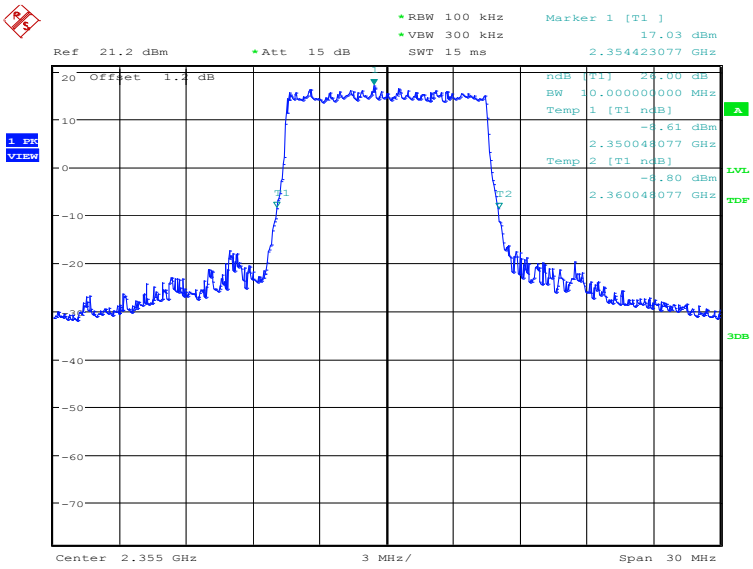


Date: 2.SEP.2019 11:00:55

LTE band 40(2350MHz~2360MHz), 10MHz (-26dBc BW)

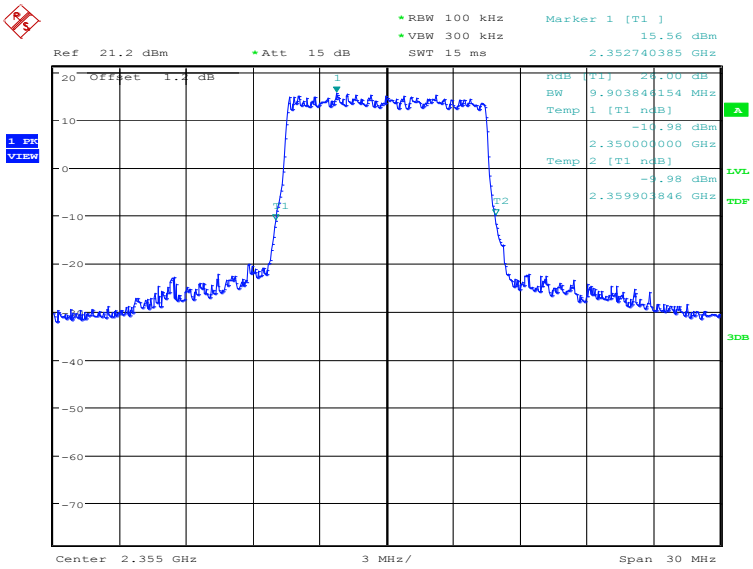
Frequency (MHz)	Occupied Bandwidth (-26dBc BW) (kHz)	
2355.0	QPSK	16QAM
	10000.00	9903.85

LTE band 40(2350MHz~2360MHz), 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 2.SEP.2019 11:03:18

LTE band 40(2350MHz~2360MHz), 10MHz Bandwidth,16QAM (-26dBc BW)



Date: 2.SEP.2019 11:04:42

A.6 BAND EDGE COMPLIANCE

A.6.1 Measurement limit

Part 22.917 specifies 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.

According to KDB 971168 6.0, 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.

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

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

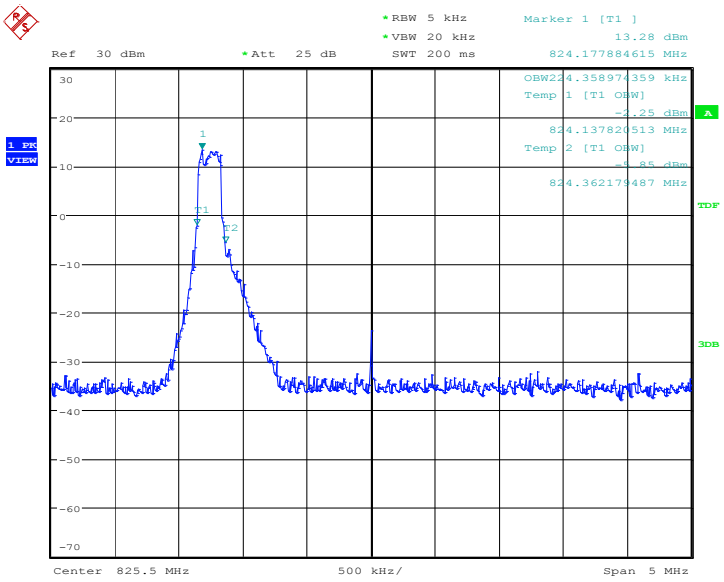
Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: 43 +10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337MHz; By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz; By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

A.6.2 Measurement result

Only worst case result is given below

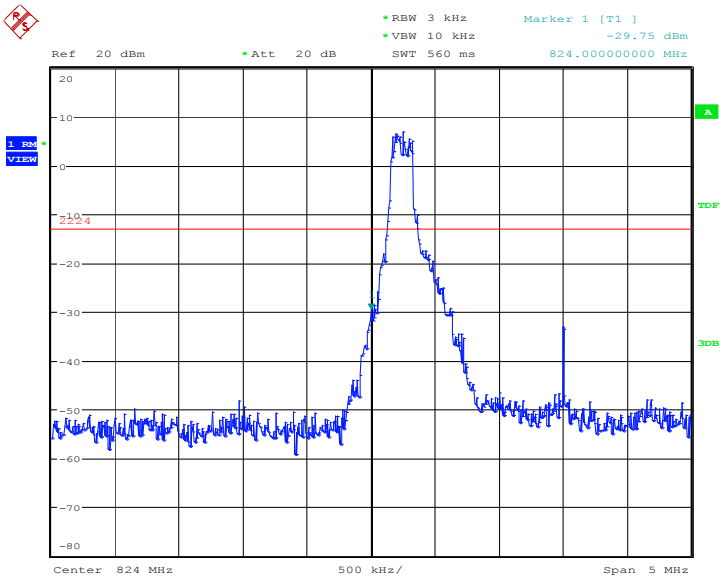
LTE band 5

OBW: 1RB-low_offset



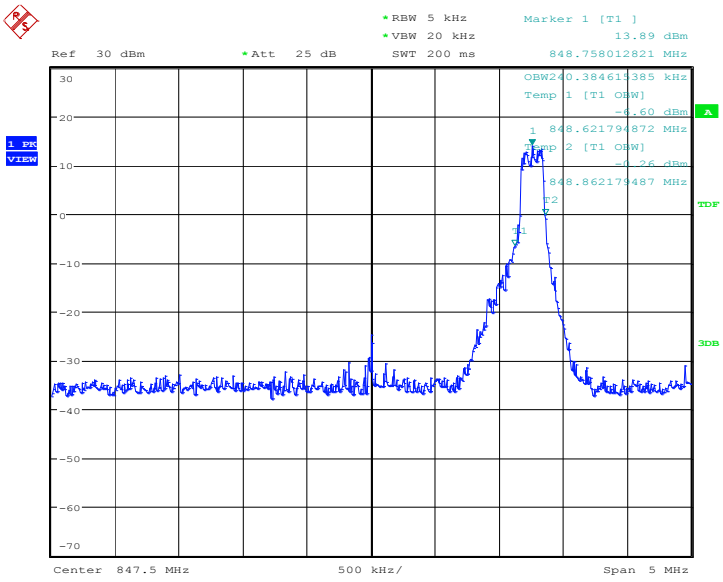
Date: 17.APR.2018 11:52:29

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 17.APR.2018 11:53:13

OBW: 1RB-high_offset



Date: 17.APR.2018 11:05:01

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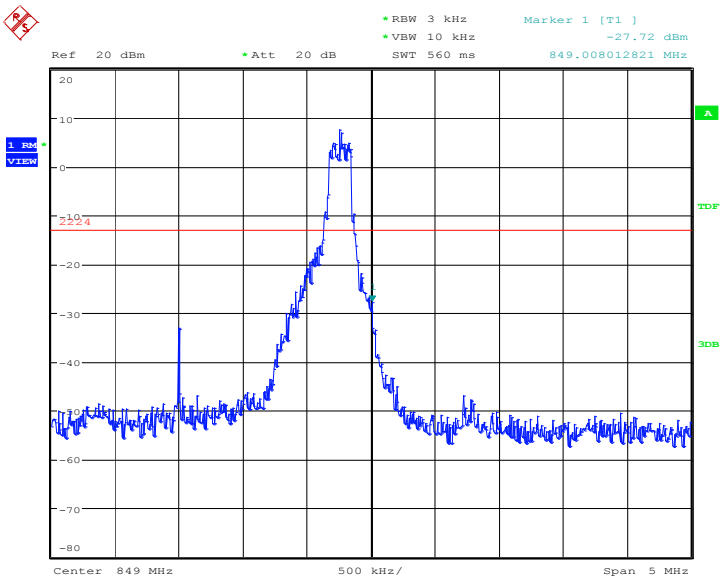
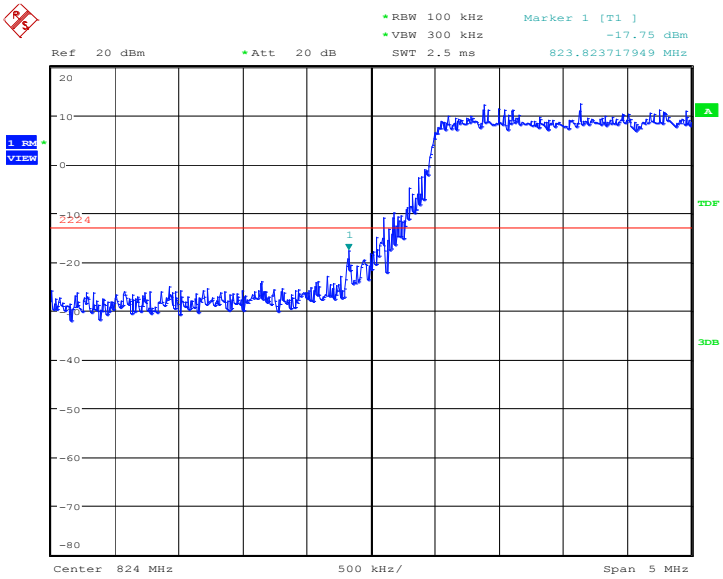


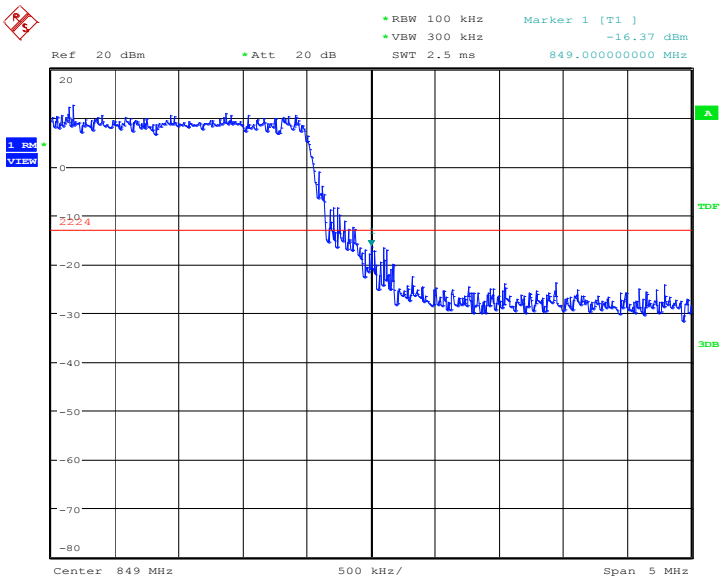
Date: 17.APR.2018 11:05:47

LOW BAND EDGE BLOCK-10MHz-100%RB



Date: 17.APR.2018 08:29:17

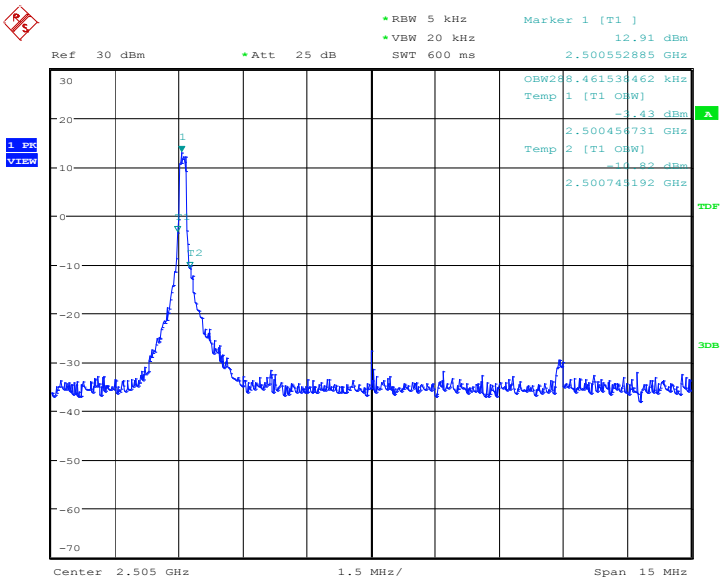
HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 17.APR.2018 08:30:03

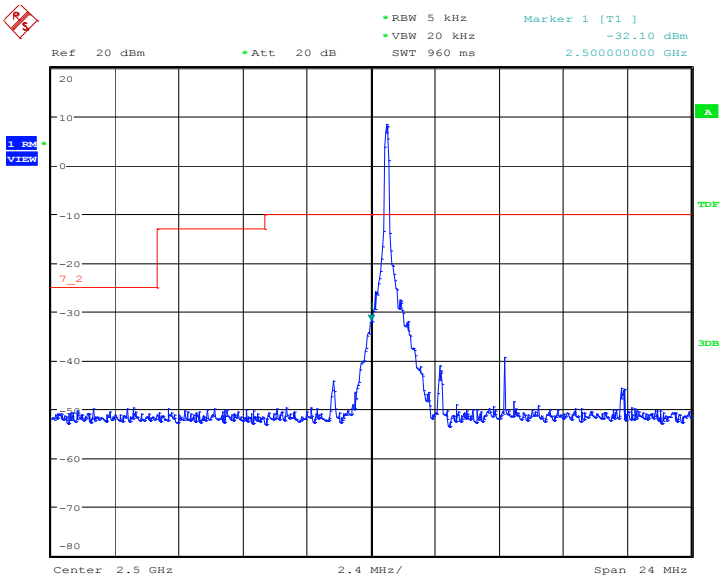
LTE band 7

OBW: 1RB-low_offset



Date: 20.APR.2018 13:30:18

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 20.APR.2018 13:31:12

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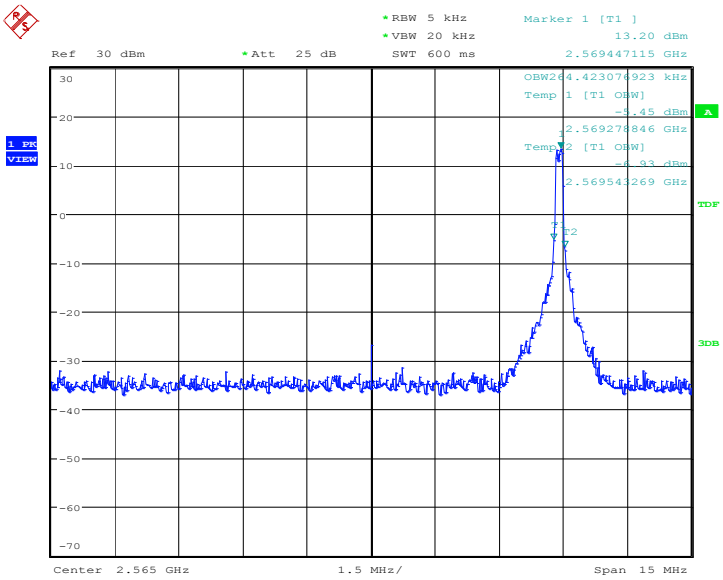
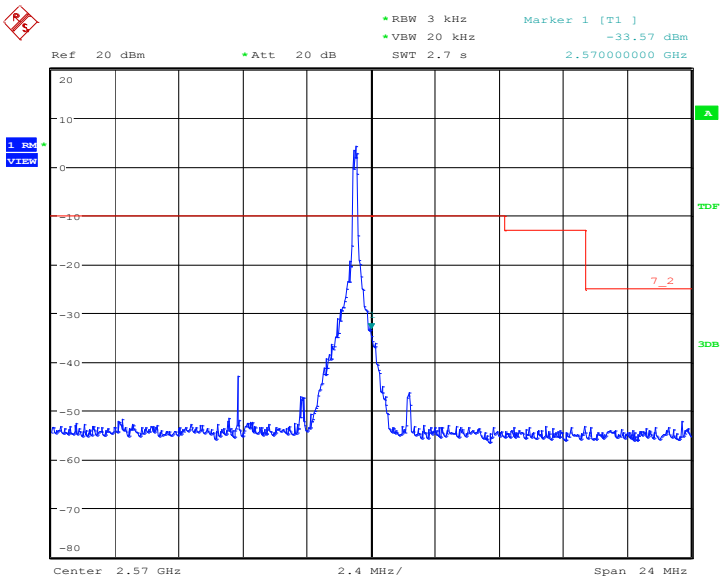


Date: 20.APR.2018 13:35:36

HIGH BAND EDGE BLOCK-1RB-high_offset



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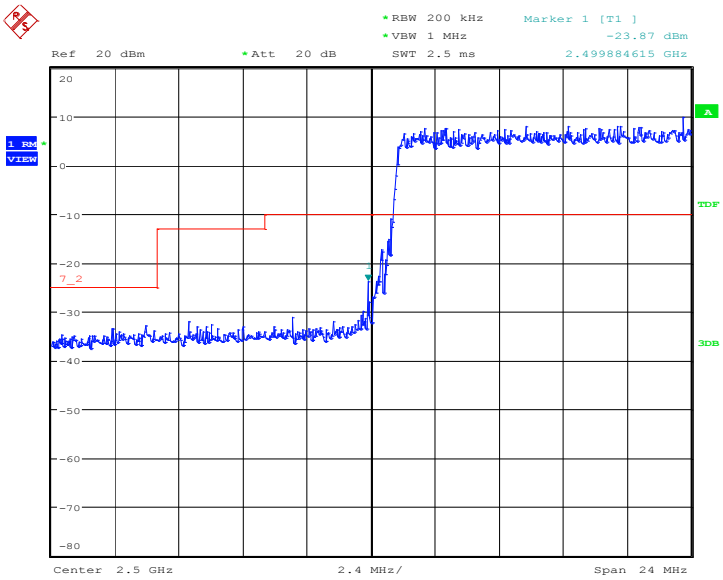
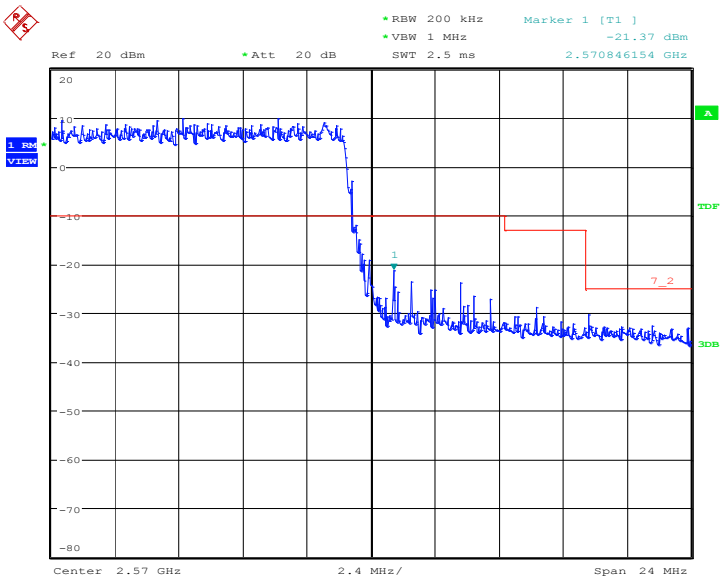
LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 17.APR.2018 08:12:50

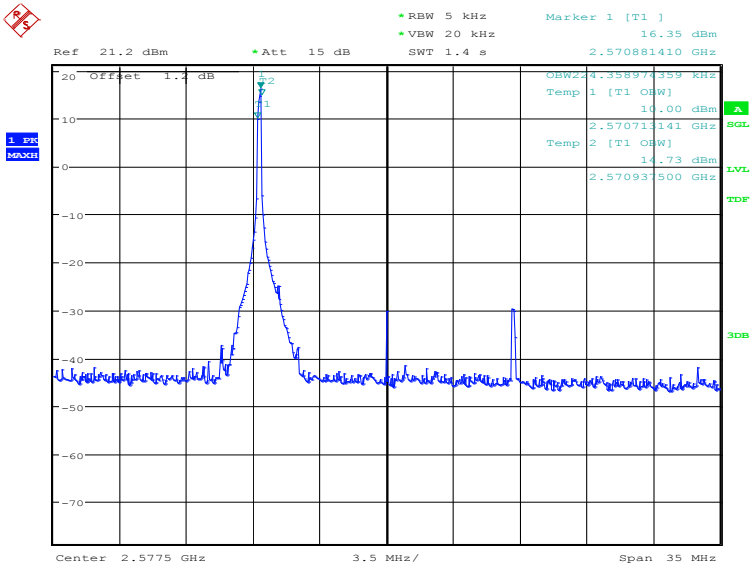
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 17.APR.2018 08:14:05

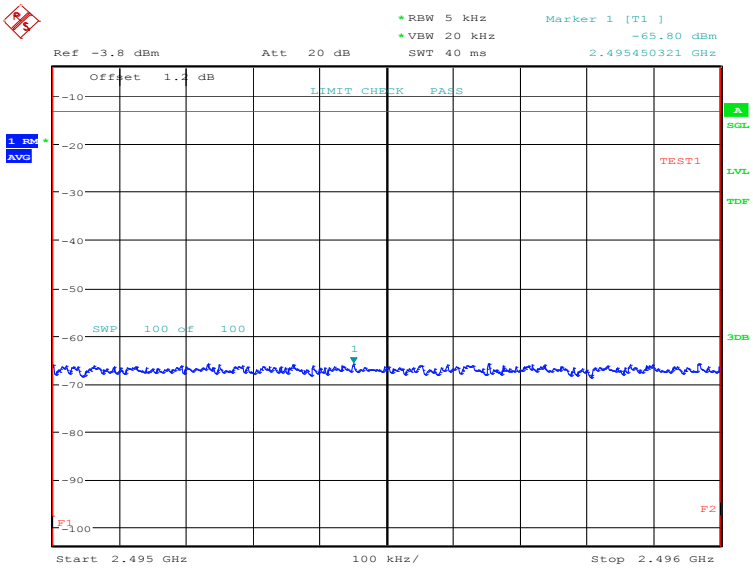
LTE band 38

OBW: 1RB-low_offset



Date: 2.SEP.2019 14:14:27

LOW BAND EDGE BLOCK-1RB-low_offset



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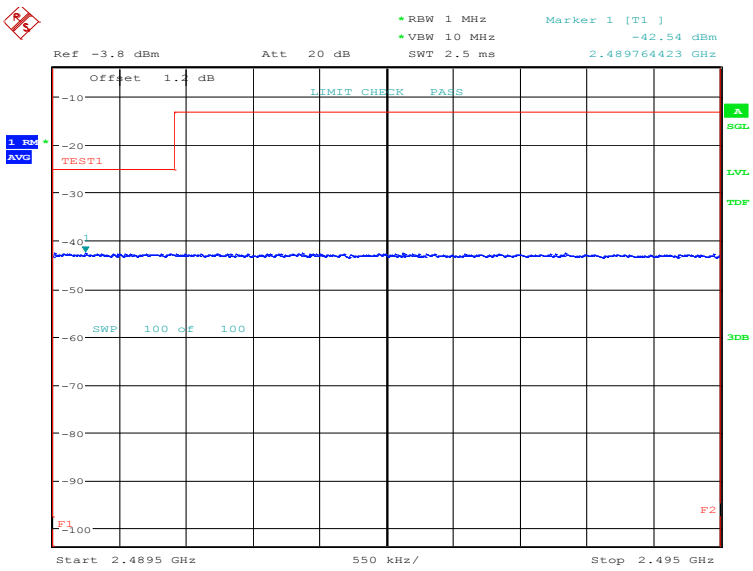
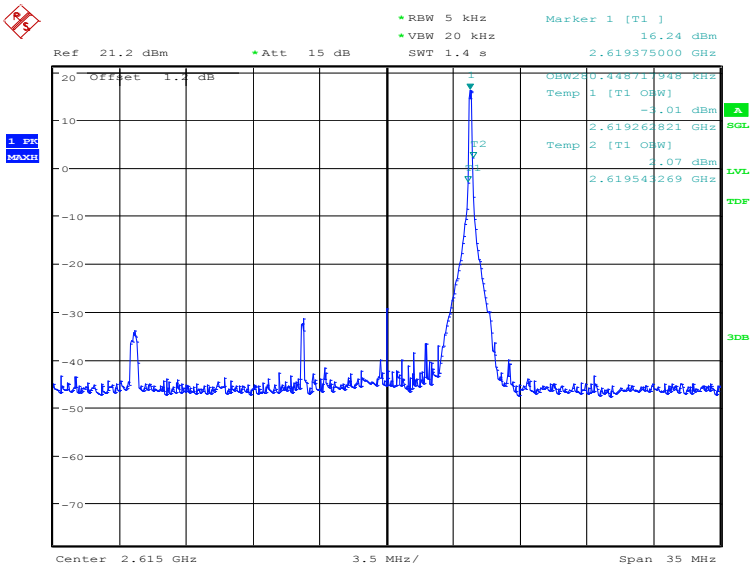


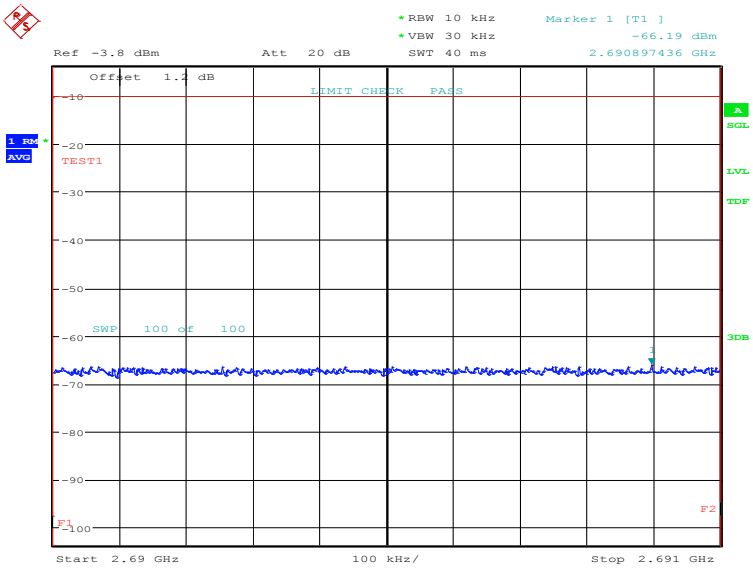
Date: 2.SEP.2019 14:15:03

OBW: 1RB-high_offset

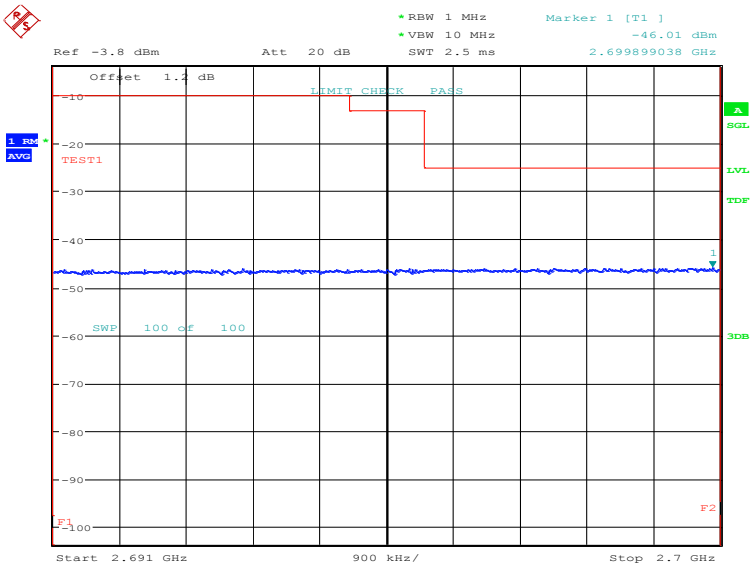


Date: 2.SEP.2019 14:17:59

HIGH BAND EDGE BLOCK-1RB-high_offset

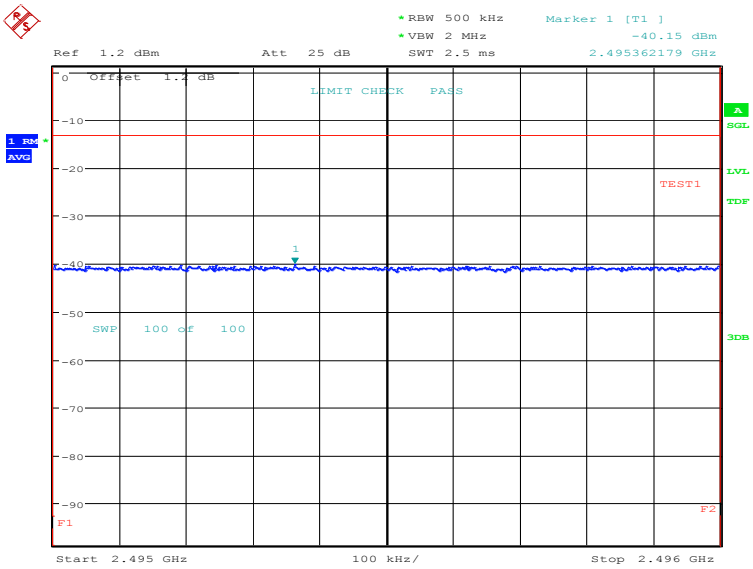


Date: 2.SEP.2019 14:18:20



Date: 2.SEP.2019 14:18:35

LOW BAND EDGE BLOCK-20MHz-100%RB



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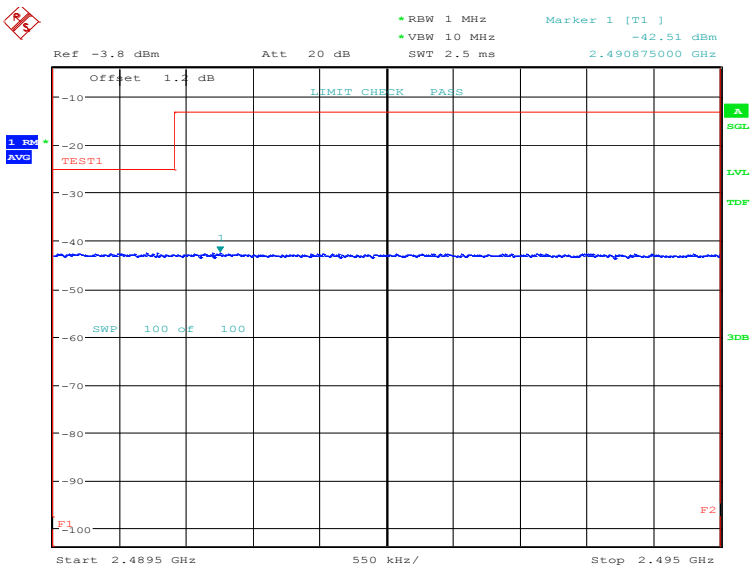

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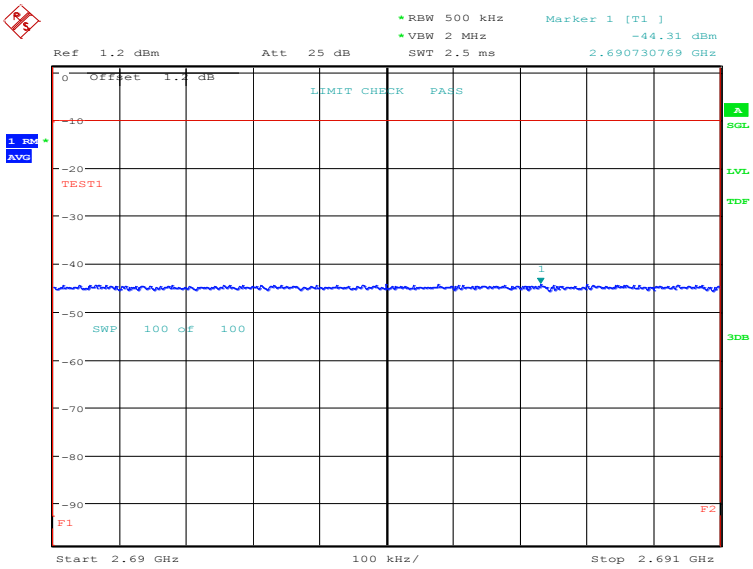
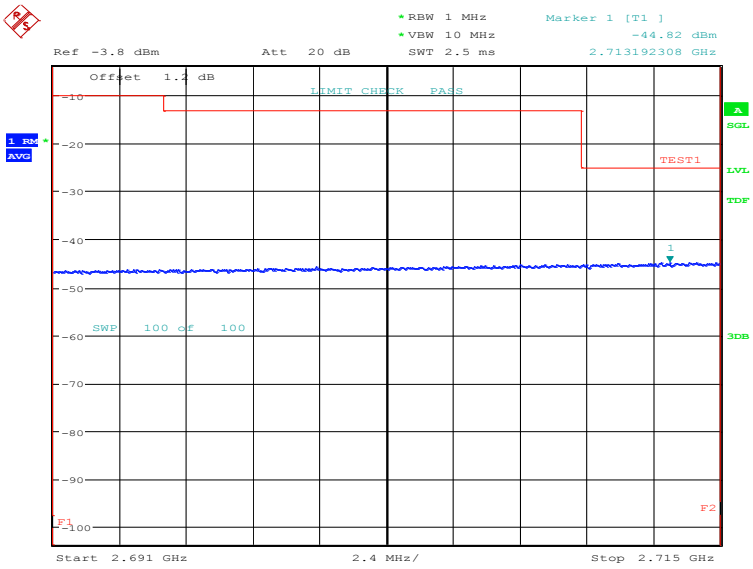
HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 2.SEP.2019 14:19:15



Date: 2.SEP.2019 14:19:30

LTE band 40(2305MHz~2315MHz)

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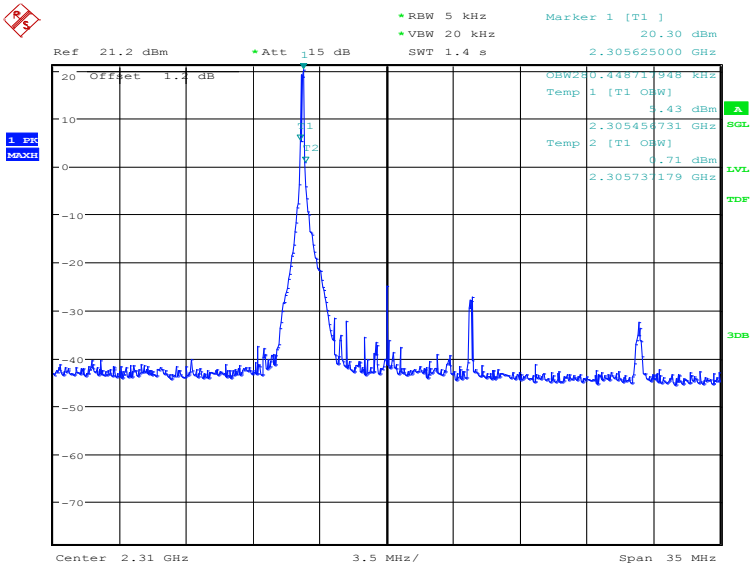
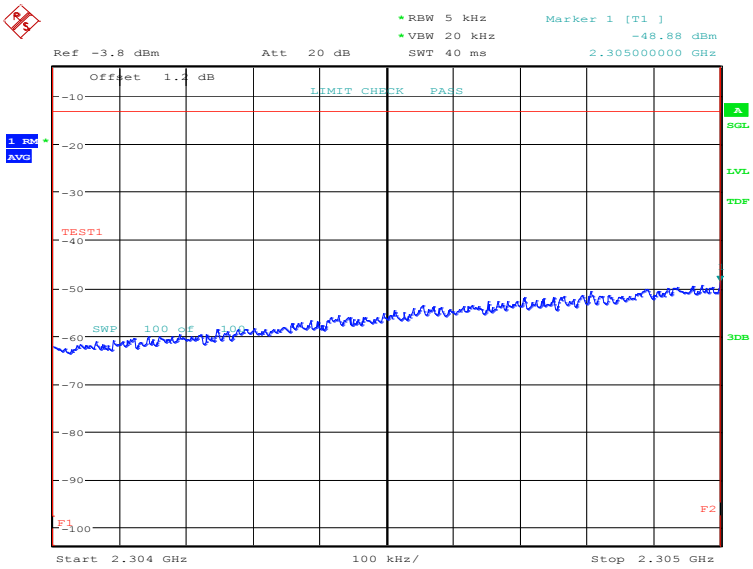
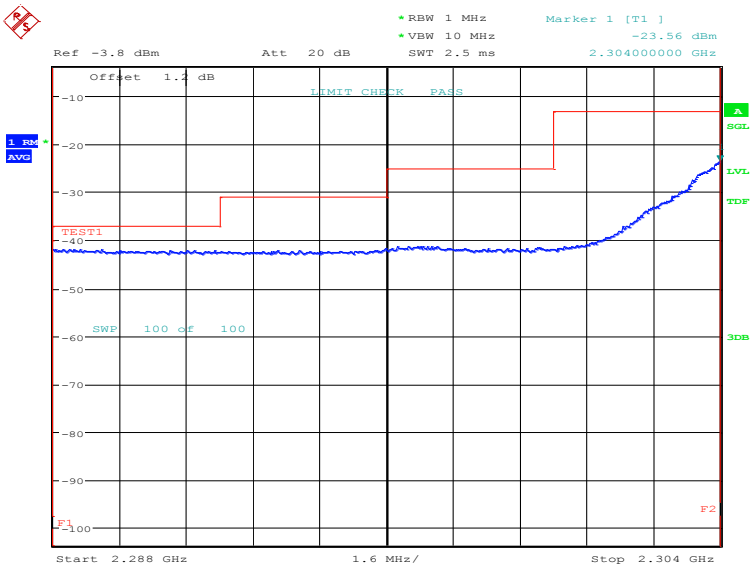


Date: 2.SEP.2019 14:25:15

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 2.SEP.2019 14:25:36



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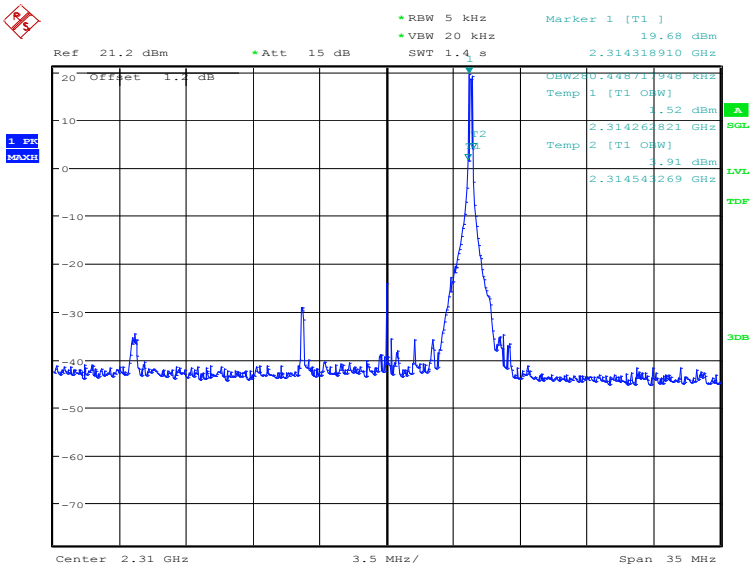
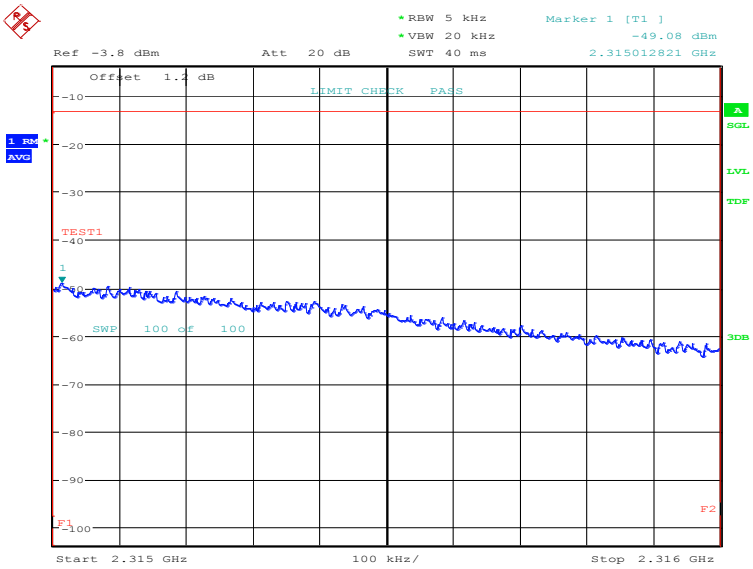
OBW: 1RB-high_offset



Date: 2.SEP.2019 14:28:00

HIGH BAND EDGE BLOCK-1RB-high_offset



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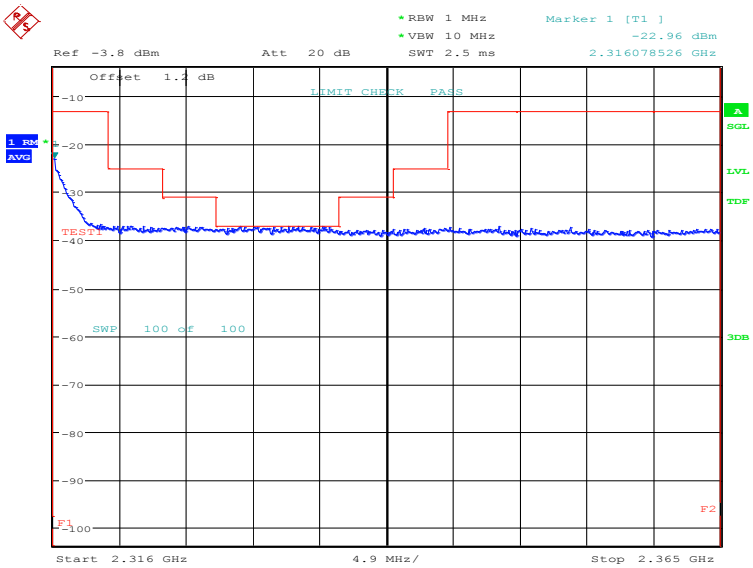
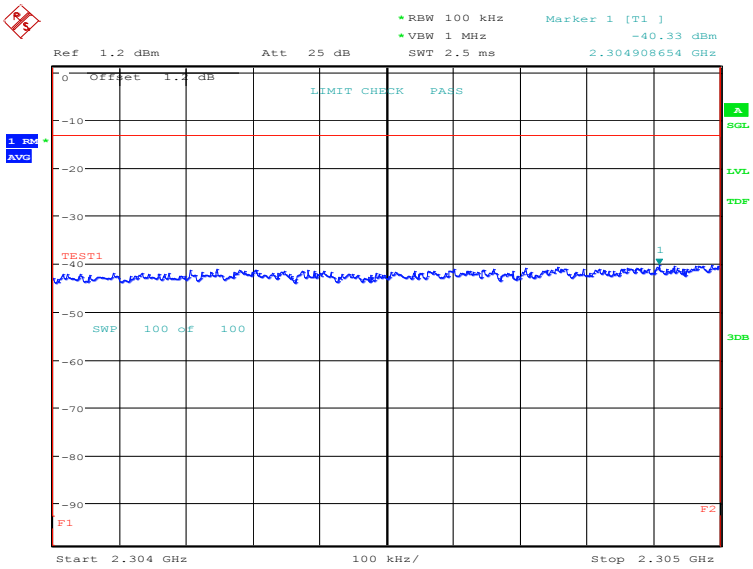


Date: 2.SEP.2019 14:28:36

LOW BAND EDGE BLOCK-10MHz-100%RB



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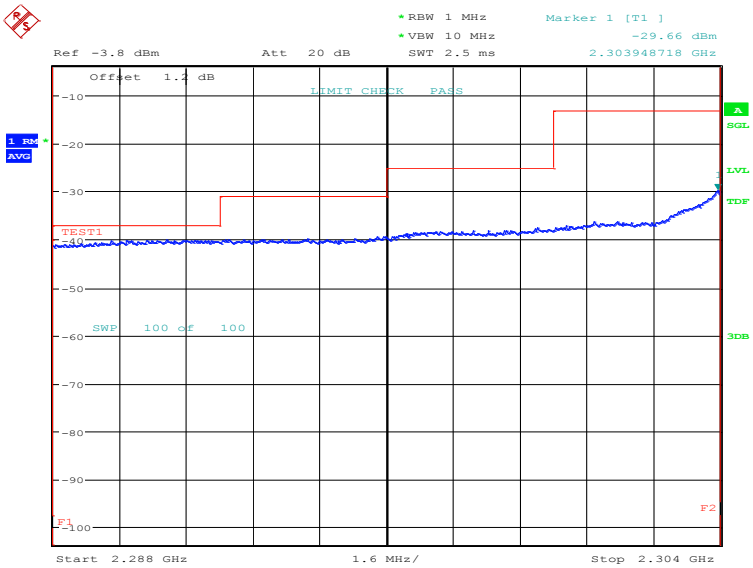
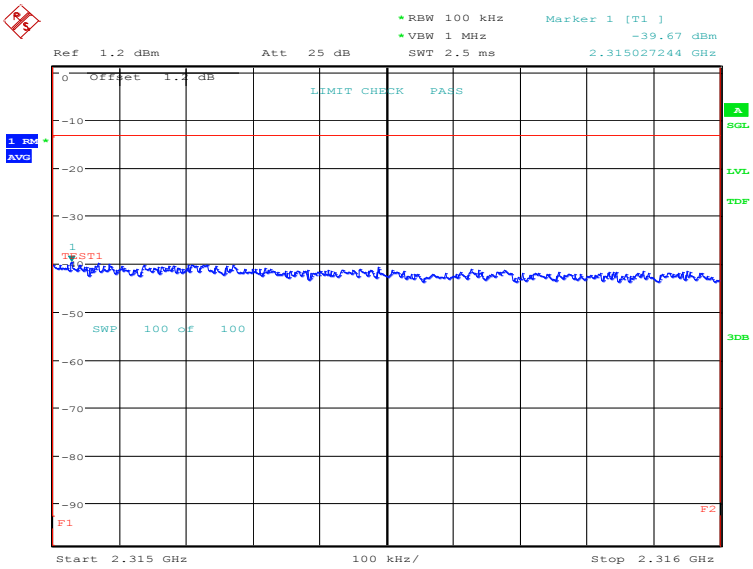
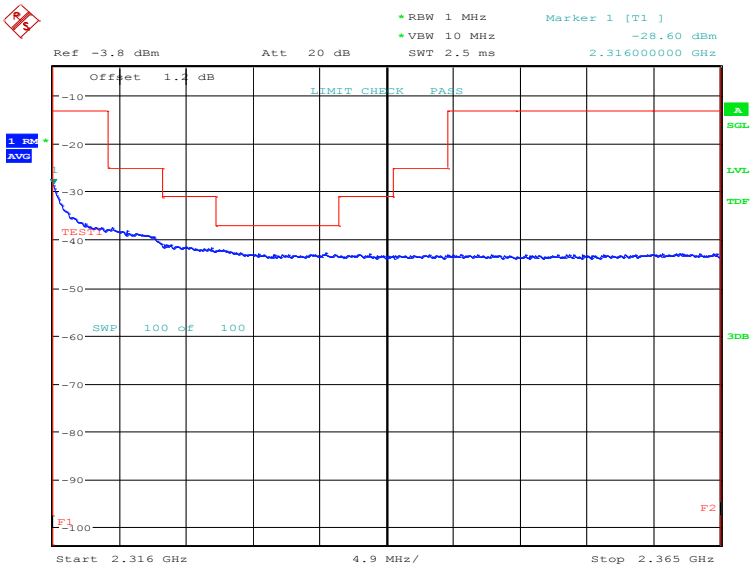


Date: 2.SEP.2019 14:26:39

HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 2.SEP.2019 14:29:08



Date: 2.SEP.2019 14:29:22

LTE band 40(2350MHz~2360MHz)

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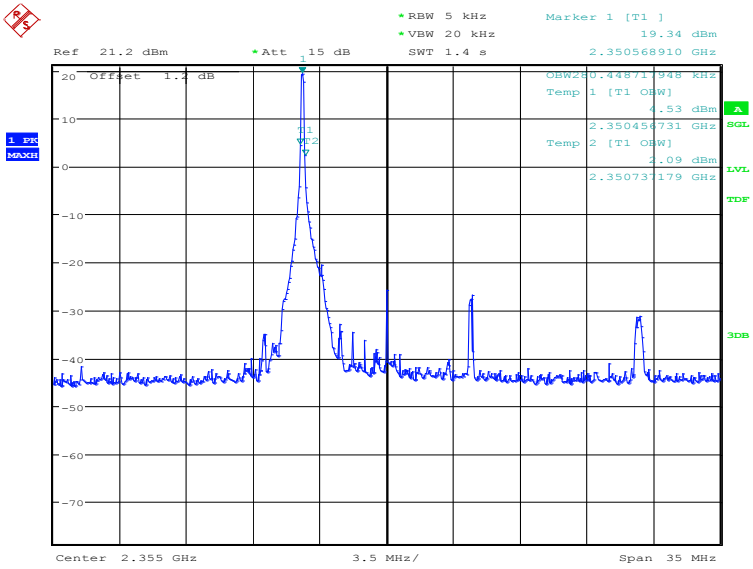
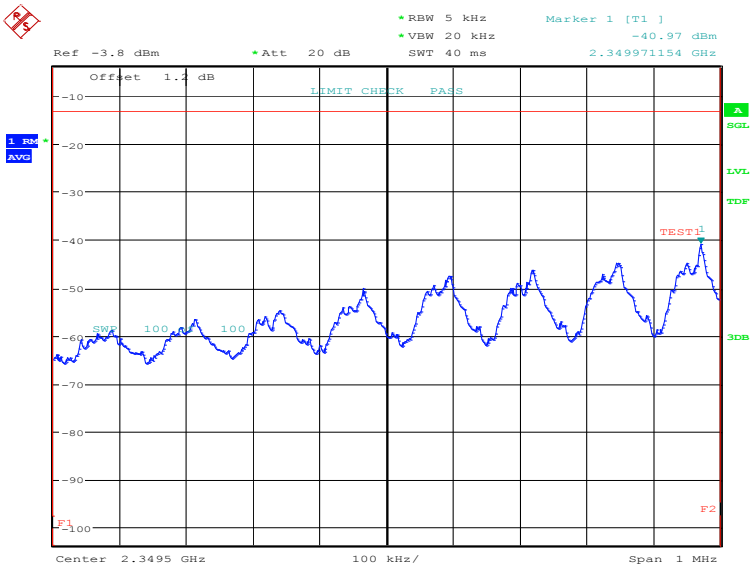
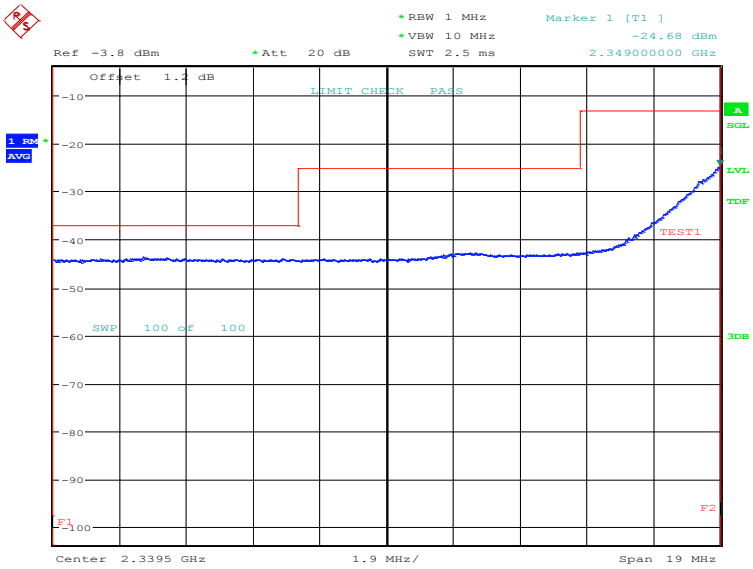


Date: 3.SEP.2019 09:18:15

LOW BAND EDGE BLOCK-1RB-low_offset



Date: 3.SEP.2019 09:19:47



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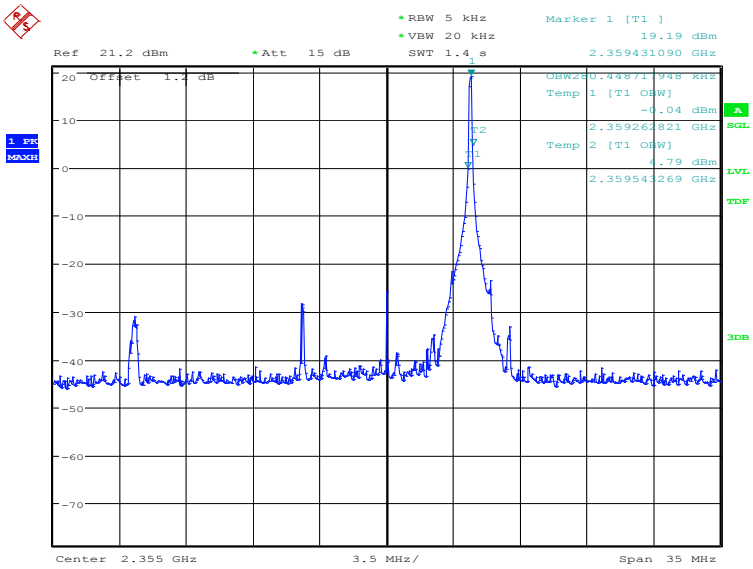
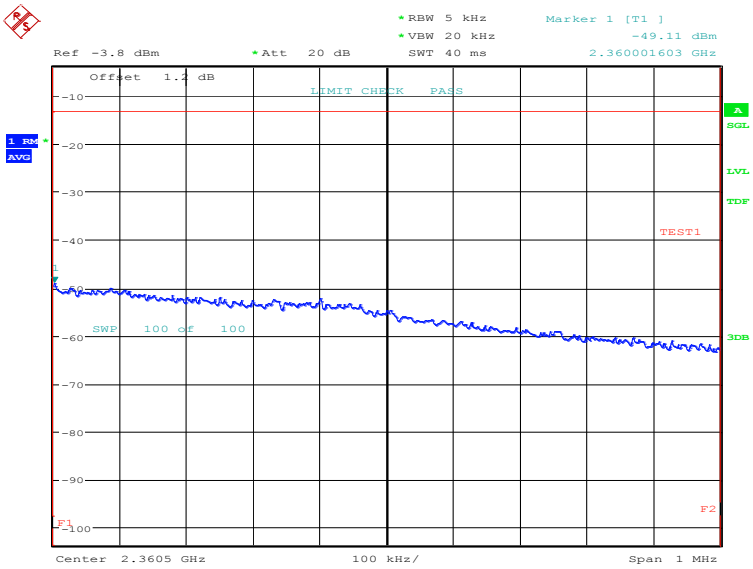
OBW: 1RB-high_offset



Date: 3.SEP.2019 09:22:29

HIGH BAND EDGE BLOCK-1RB-high_offset



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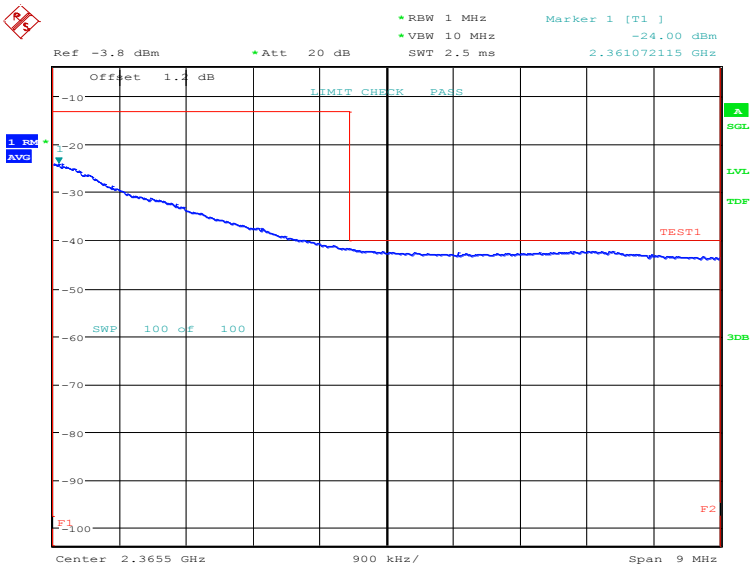
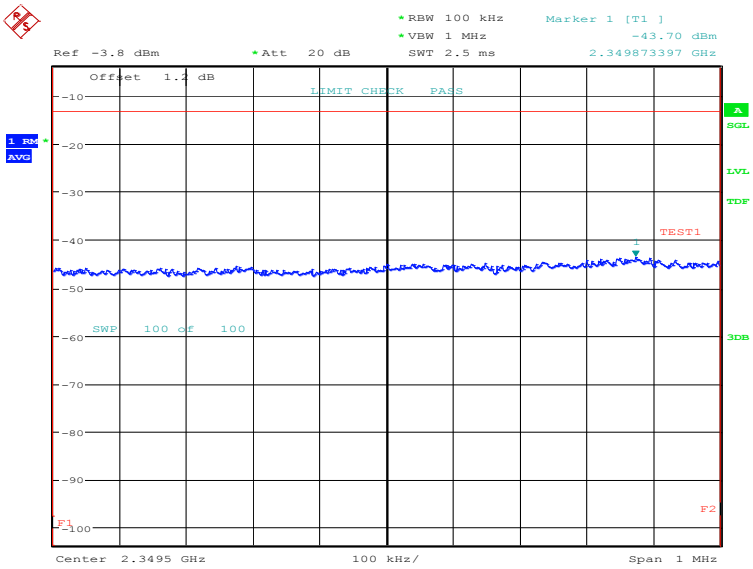
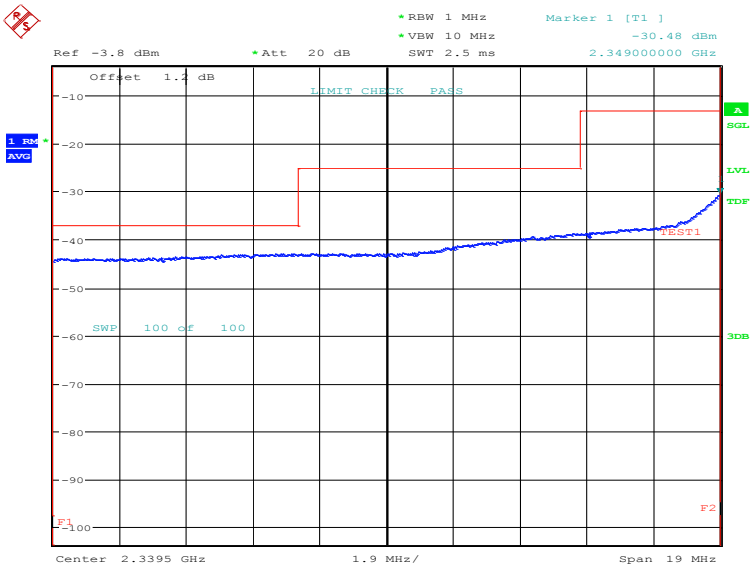


Date: 3.SEP.2019 09:23:35

LOW BAND EDGE BLOCK-10MHz-100%RB

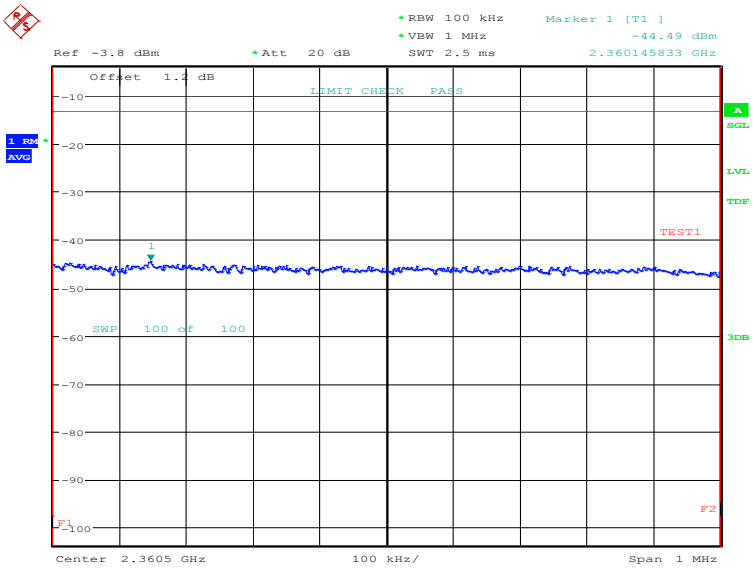


Date: 3.SEP.2019 09:25:03



Date: 3.SEP.2019 09:25:28

HIGH BAND EDGE BLOCK-10MHz-100%RB



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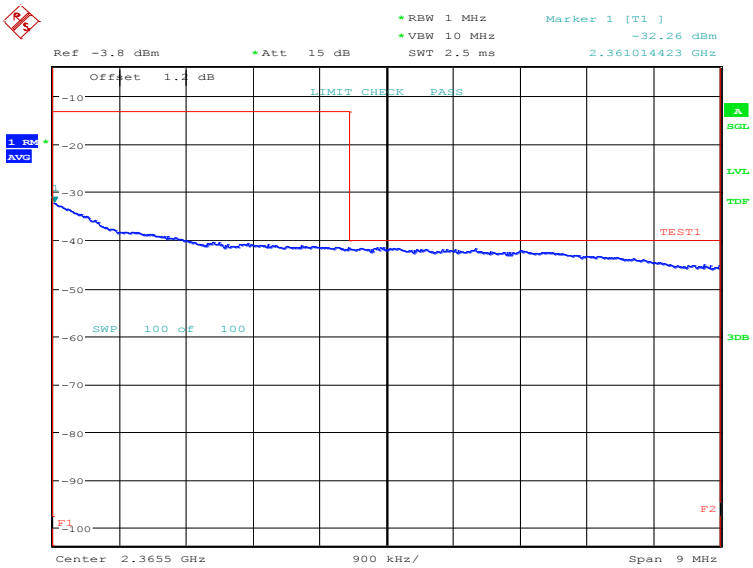


Date: 3.SEP.2019 09:32:29

A.7 CONDUCTED SPURIOUS EMISSION

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 2.1057 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 specifies that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

Part 27.53(m)(4) specifies for mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 27.53(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: 43 +10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337MHz; By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55

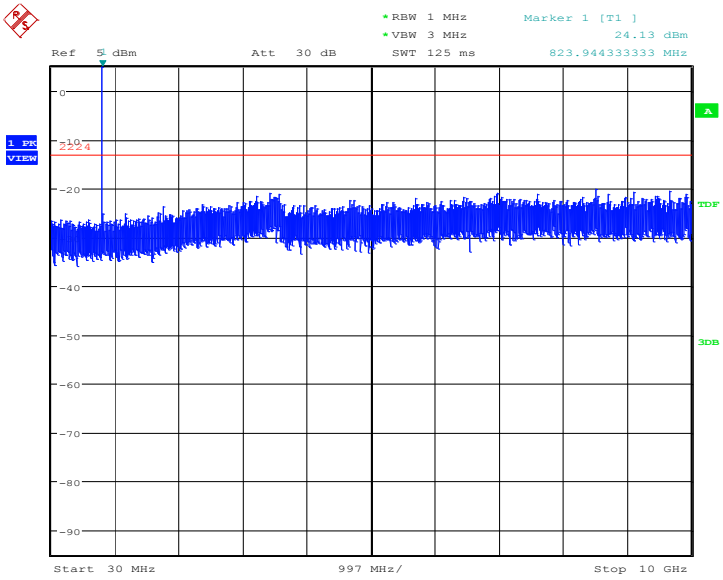
+ 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz; By a factor of not less than 43 + 10 log (P) dB on all frequencies between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

A. 7.3 Measurement result

Only worst case result is given below

LTE band 5: 30MHz – 10GHz

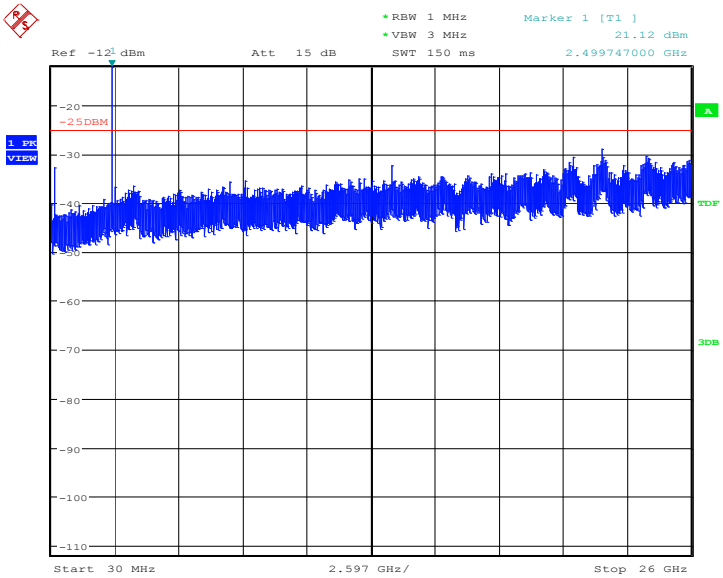
Spurious emission limit –13dBm.



Date: 17.APR.2018 13:18:06

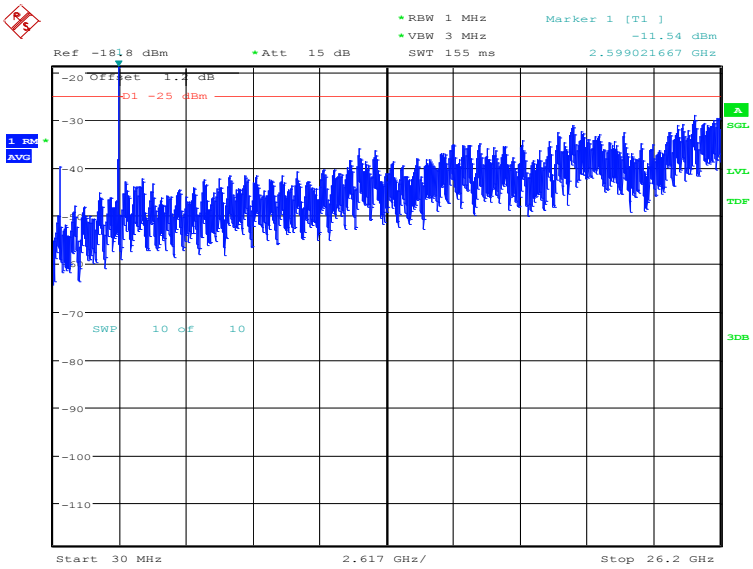
LTE band 7: 30MHz – 26GHz

Spurious emission limit –13dBm.



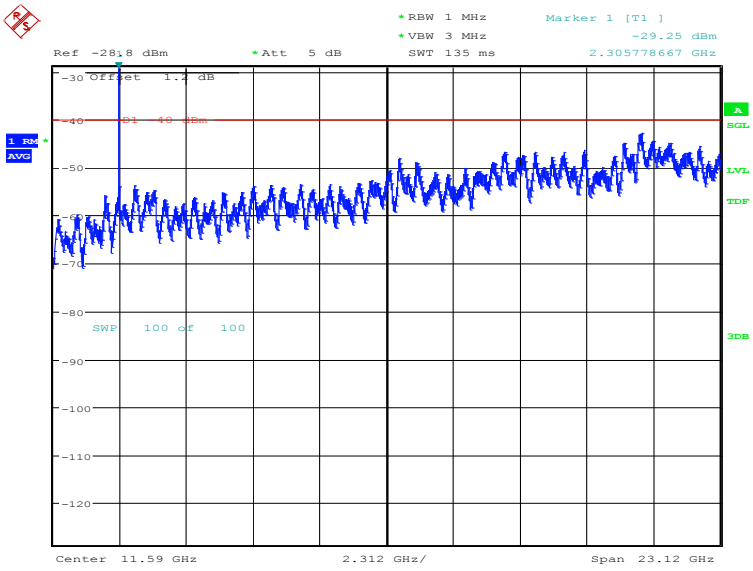
Date: 20.APR.2018 13:32:08

LTE band 38: 30MHz – 26.2GHz



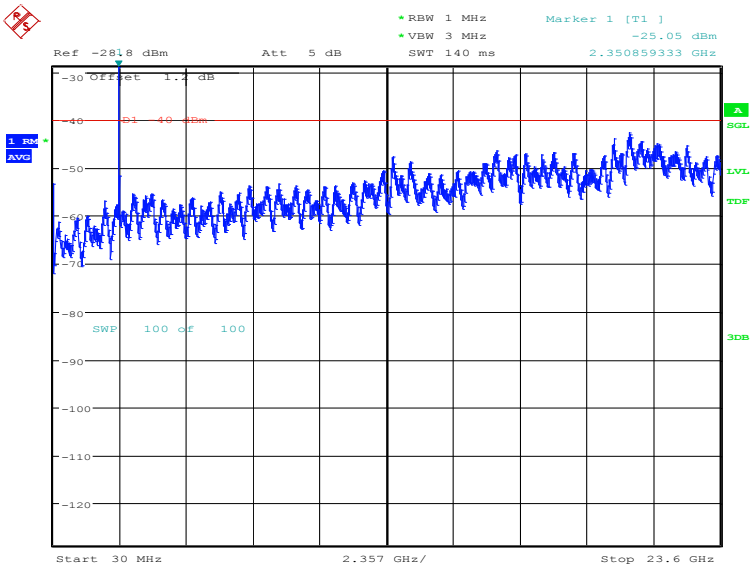
Date: 2.SEP.2019 14:20:43

LTE band 40: 30MHz – 23.15GHz



Date: 3.SEP.2019 09:09:06

LTE band 40: 30MHz – 23.6GHz



Date: 3.SEP.2019 09:14:40

A.8 PEAK-TO-AVERAGE POWER RATIO

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.

According to KDB 971168 5.7.1:

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 1ms;

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

A.8.1 Measurement limit

not exceed 13 dB

A.8.2 Measurement results

LTE band 7, 20MHz

Frequency(MHz)	PAPR(dB)	
2560.0	QPSK	16QAM
	7.08	7.56

LTE band 38, 20MHz

Frequency (MHz)	PAPR (dB)	
2595.0	QPSK	16QAM
	8.24	8.91

LTE band 40(2305MHz~2315MHz)

Frequency (MHz)	PAPR (dB)	
2310.0	QPSK	16QAM
	7.02	7.88

LTE band 40(2350MHz~2360MHz)

Frequency (MHz)	PAPR (dB)	
2355.0	QPSK	16QAM
	7.18	8.01

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2018-09-28 through 2019-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

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