TEST REPORT

No. I16Z40549-GTE05

for

TCL Communication Ltd.

CDMA/LTE/GSM/UMTS mobile phone

Model Name: 5027B

FCC ID: 2ACCJB053

with

Hardware Version: VC

Software Version: 5027BAS8

Issued Date: 2016-04-05

Note:

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

Test Laboratory:

FCC 2.948 Listed: No.525429

CTTL,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16Z40549-GTE05	Rev.0	1st edition	2016-04-05

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name: CTTL,Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

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

1.2. Testing Environment

Normal Temperature: 15-35℃

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2016-03-23

Testing End Date: 2016-03-30

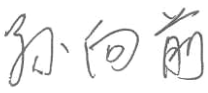
1.4. Signature

Shen Yi

(Prepared this test report)

Zhong Nan

(Reviewed this test report)



Sun Xiang Qian

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

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

3.1. About EUT

Description	CDMA/LTE/GSM/UMTS mobile phone
Model Name	5027B
FCC ID	2ACCJB053
Antenna	Integrated
Output power	22.04dBm maximum EIRP measured for LTE Band 26
Extreme vol. Limits	3.6VDC to 4.35VDC (nominal: 3.8VDC)
Extreme temp. Tolerance	-30°C to +50°C

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
UT31a	35790707000138	VC	5027BAS8
UT32a	35790707000139	VC	5027BAS8

*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	Charger

AE1

Model	CAB1780002C1
Manufacturer	BYD
Capacitance	1780mAh

AE2

Model	CBA0058AG0C2
Manufacturer	TENPAO

*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 CDMA/LTE/GSM/UMTS mobile phone with integrated 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 90	PRIVATE LAND MOBILE RADIO SERVICES	10-1-15 Edition
ANSI/TIA-603-D	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2015
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014
KDB 971168 D01	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS	v02r02

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) 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	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
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 3000 MHz

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

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

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

LTE Band 26

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	90.635	A.1	P
2	Emission Limit	2.1053/90.691	A.2	P
3	Frequency Stability	2.1055/90.213	A.3	P
4	Occupied Bandwidth	2.1049	A.4	P
5	Emission Bandwidth	2.1049	A.5	P
6	Conducted Spurious Emission	2.1051/90.691	A.6	P

6.2. 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	Test Receiver	ESU26	100235	R&S	2017-03-02	1 year
2	Test Receiver	ESU26	100376	R&S	2016-10-29	1 year
3	EMI Antenna	VULB 9163	302	Schwarzbeck	2017-01-03	3 year
4	EMI Antenna	3117	00119024	ETS-Lindgren	2017-01-20	3 year
5	LISN	ENV216	101200	R&S	2016-07-07	1 year
6	Universal Radio Communication Tester	CMW500	101675	R&S	2016-07-13	1 year
7	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2016-07-06	1 year
8	Spectrum Analyzer	E4440A	MY48250642	Agilent	2017-03-02	1 year
9	EMI Antenna	9117	167	Schwarzbeck	2016-04-01	3 year
10	EMI Antenna	VULB9163	9163-234	Schwarzbeck	2016-09-15	3 year
11	Signal Generator	N5183A	MY49060052	Agilent	2017-03-07	1 year
12	Climate chamber	SH-241	92007454	ESPEC	2017-12-14	2 year
13	Loop Antenna	HFH2-Z2	829324/007	R&S	2017-12-10	3 year

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: 90.635.

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.
This result contains peak output power and ERP/EIRP measurements for the EUT.
In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.
The power was measured with spectrum analyzer's RMS detector.
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 26

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
1.4MHz	1 RB high	823.3	23.15	22.18
		819.0	23.12	21.96
		814.7	23.12	22.19
	1 RB low	823.3	23.16	21.89
		819.0	22.98	21.80
		814.7	23.19	21.74
	50% RB mid	823.3	23.23	22.27
		819.0	23.12	22.09
		814.7	23.38	22.69
	100% RB	823.3	22.34	21.39
		819.0	22.25	21.30
		814.7	22.44	21.42
3MHz	1 RB high	822.5	22.97	21.76
		819.0	23.18	22.61
		815.5	23.05	21.96
	1 RB low	822.5	23.06	21.81
		819.0	23.26	22.17
		815.5	23.10	22.01
	50% RB mid	822.5	22.42	21.37

		819.0	22.16	21.29
		815.5	22.17	21.27
	100% RB	822.5	22.36	21.34
		819.0	22.19	21.17
		815.5	22.19	21.29
5MHz	1 RB high	821.5	23.11	22.15
		819.0	23.38	22.44
		816.5	22.89	22.11
	1 RB low	821.5	23.13	22.18
		819.0	23.21	22.45
		816.5	23.14	22.28
	50% RB mid	821.5	22.30	21.60
		819.0	22.17	21.26
		816.5	22.23	21.23
	100% RB	821.5	22.40	21.61
		819.0	22.14	21.14
		816.5	22.19	21.21
10MHz	1 RB high	819.0	23.35	22.83
	1 RB low	819.0	23.27	22.57
	50% RB mid	819.0	22.22	21.41
	100% RB	819.0	22.29	21.37

Note: Expanded measurement uncertainty is U = 0.83 dB, k = 2.

A.1.3 Radiated

A.1.3.1 Description

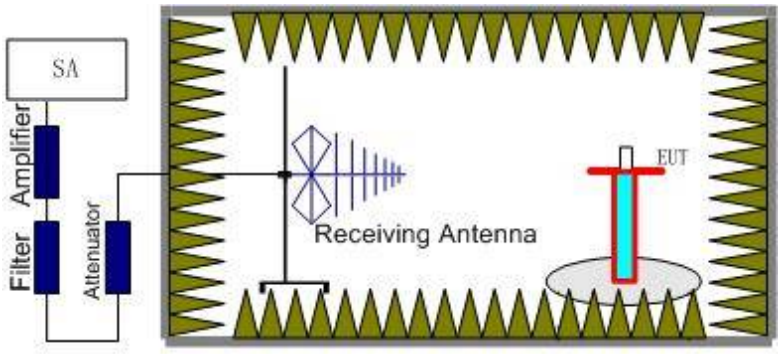
This is the test for the maximum radiated power from the EUT.

Rule Part 90.635(b) specifies “The maximum output power of the transmitter for mobile stations is 100 watts(50dBm)”.

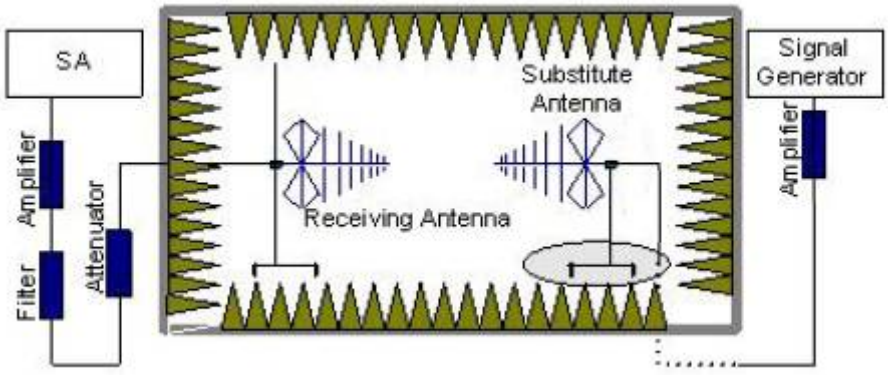
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603D-2015 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 26- ERP 90.635(b)

Limits: ≤50dBm (100W)

LTE Band 26_1.4MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
814.70	-21.49	2.13	-45.86	-0.89	2.15	20.98	50.00	29.02	H
819.00	-20.99	2.19	-45.84	-1.05	2.15	21.56	50.00	28.44	H
823.30	-20.09	2.24	-45.79	-0.55	2.15	21.86	50.00	28.14	H

LTE Band 26_3MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
815.50	-21.75	2.14	-45.87	-0.93	2.15	20.76	50.00	29.24	H
819.00	-21.27	2.19	-45.84	-1.05	2.15	21.28	50.00	28.72	H
822.50	-19.72	2.23	-45.81	-0.33	2.15	**22.04**	50.00	27.96	H

LTE Band 26_5MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
816.50	-21.66	2.16	-45.88	-0.98	2.15	20.89	50.00	29.11	H
819.00	-21.50	2.19	-45.84	-1.05	2.15	21.05	50.00	28.95	H
821.50	-20.46	2.22	-45.82	-0.71	2.15	21.70	50.00	28.30	H

LTE Band 26_10MHz_QPSK

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
819.00	-21.48	2.19	-45.84	-1.05	2.15	21.07	50.00	28.93	H

LTE Band 26_1.4MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
814.70	-22.47	2.13	-45.86	-0.89	2.15	20.00	50.00	30.00	H
819.00	-21.68	2.19	-45.84	-1.05	2.15	20.87	50.00	29.13	H
823.30	-20.78	2.24	-45.79	-0.55	2.15	21.17	50.00	28.83	H

LTE Band 26_3MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
815.50	-22.49	2.14	-45.87	-0.93	2.15	20.02	50.00	29.98	H
819.00	-22.44	2.19	-45.84	-1.05	2.15	20.11	50.00	29.89	H
822.50	-20.31	2.23	-45.81	-0.33	2.15	21.45	50.00	28.55	H

LTE Band 26_5MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
816.50	-22.44	2.16	-45.88	-0.98	2.15	20.11	50.00	29.89	H
819.00	-22.90	2.19	-45.84	-1.05	2.15	19.65	50.00	30.35	H
821.50	-21.42	2.22	-45.82	-0.71	2.15	20.74	50.00	29.26	H

LTE Band 26_10MHz_16QAM

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction	ERP(dBm)	Limit(dBm)	Margin(dB)	Polarization
819.00	-22.39	2.19	-45.84	-1.05	2.15	20.16	50.00	29.84	H

Peak ERP(dBm)=P_{Mea}(-19.72dBm)-G_a(-0.33dBi)-P_{Ag}(-45.81dB)-P_{cl} (2.23dB)-2.15dB = 22.04dBm

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

Reference

FCC: CFR 2.1053, 90.691

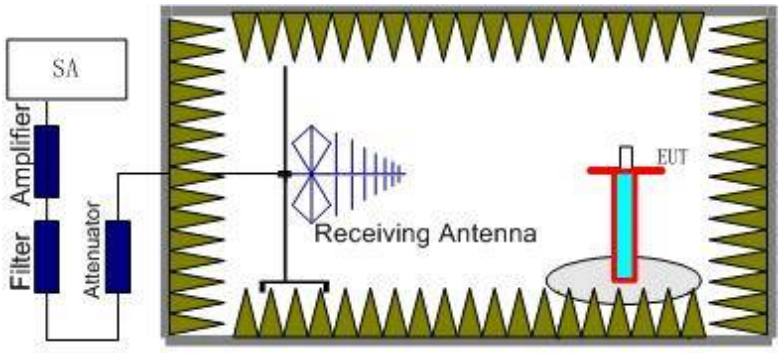
A.2.1 Measurement Method

The measurements procedures in TIA-603D-2015 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

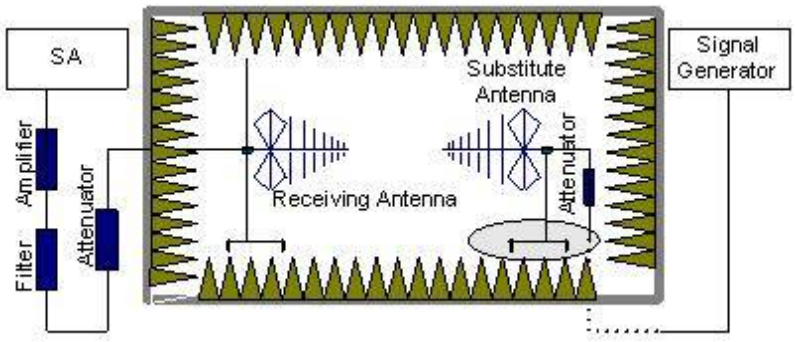
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 90.691. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Band 26.

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

Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

For any frequency removed from the EA licensee’s frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116\text{Log}_{10}(f/6.1)$ decibels or 50 + 10 $\text{Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee’s frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + $10\text{Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper and lower carrier frequencies of LTE Band 26. It was decided that measurements at these 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 LTE Band 26 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.

LTE Band 26, 1.4MHz, QPSK, Channel 26697

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3389.00	-63.04	5.41	-7.93	2.15	-62.67	-13.00	49.67	V
4010.00	-63.79	5.74	-8.91	2.15	-62.77	-13.00	49.77	H
4853.00	-65.90	6.31	-9.75	2.15	-64.61	-13.00	51.61	V
5712.00	-64.23	6.71	-10.56	2.15	-62.53	-13.00	49.53	H
6430.00	-62.59	6.88	-10.93	2.15	-60.69	-13.00	47.69	V
7390.00	-60.22	7.09	-12.07	2.15	-57.39	-13.00	44.39	H

LTE Band 26, 1.4MHz, QPSK, Channel 26740

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3277.82	-66.16	5.16	-7.67	2.15	-65.80	-13.00	52.80	H
4065.78	-65.95	5.60	-8.97	2.15	-64.73	-13.00	51.73	H
4921.87	-61.87	6.33	-9.82	2.15	-60.53	-13.00	47.53	H
5737.11	-63.49	6.77	-10.55	2.15	-61.86	-13.00	48.86	V
6547.12	-62.69	6.99	-11.06	2.15	-60.77	-13.00	47.77	H
7378.66	-65.16	6.99	-12.05	2.15	-62.25	-13.00	49.25	H

LTE Band 26, 1.4MHz, QPSK, Channel 26783

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3285.60	-65.26	5.23	-7.69	2.15	-64.95	-13.00	51.95	H
4122.08	-64.99	5.80	-9.02	2.15	-63.92	-13.00	50.92	H
4935.65	-67.13	6.32	-9.84	2.15	-65.76	-13.00	52.76	H
5754.59	-67.65	6.78	-10.55	2.15	-66.03	-13.00	53.03	V
6588.05	-63.93	7.04	-11.11	2.15	-62.01	-13.00	49.01	V
7408.40	-61.78	7.22	-12.09	2.15	-59.06	-13.00	46.06	V

LTE Band 26, 1.4MHz, 16QAM, Channel 26697

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3214.00	-69.52	5.26	-7.51	2.15	-69.42	-13.00	56.42	H
4235.00	-62.59	6.07	-9.14	2.15	-61.67	-13.00	48.67	V
4790.00	-65.77	6.28	-9.69	2.15	-64.51	-13.00	51.51	V
5653.00	-66.21	6.80	-10.57	2.15	-64.59	-13.00	51.59	V
6420.00	-60.21	6.89	-10.92	2.15	-58.33	-13.00	45.33	H
7361.00	-63.59	6.98	-12.03	2.15	-60.69	-13.00	47.69	H

LTE Band 26, 1.4MHz, 16QAM, Channel 26740

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3280.11	-66.20	5.17	-7.67	2.15	-65.85	-13.00	52.85	V
4075.12	-65.04	5.60	-8.98	2.15	-63.81	-13.00	50.81	H
4913.78	-69.39	6.30	-9.81	2.15	-68.03	-13.00	55.03	V
5745.95	-65.29	6.78	-10.55	2.15	-63.67	-13.00	50.67	H
6546.81	-62.83	6.99	-11.06	2.15	-60.91	-13.00	47.91	V
7369.86	-63.98	6.98	-12.04	2.15	-61.07	-13.00	48.07	V

LTE Band 26, 1.4MHz, 16QAM, Channel 26783

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit （dBm）	Margin(dB)	Polarization
3282.03	-68.41	5.19	-7.68	2.15	-68.07	-13.00	55.07	V
4111.55	-63.33	5.78	-9.01	2.15	-62.25	-13.00	49.25	H
4944.96	-68.26	6.32	-9.84	2.15	-66.89	-13.00	53.89	V
5746.53	-64.55	6.78	-10.55	2.15	-62.93	-13.00	49.93	H
6594.13	-63.30	7.05	-11.11	2.15	-61.39	-13.00	48.39	H
7404.56	-65.07	7.21	-12.09	2.15	-62.34	-13.00	49.34	H

Note: The maximum value of expanded measurement uncertainty for this test item is U = 4.2 dB, k = 2.

A.3 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 90.213.

A.3.1 Method of Measurement

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

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 26, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

A.3.2 Measurement Limit

A.3.2.1 For Hand carried battery powered equipment

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. 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 3.6VDC and 4.35VDC, 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. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.3.2.2 For equipment powered by primary supply voltage

For Part 90.213, the frequency stability of the transmitter shall be maintained within ±2.5ppm of the center frequency. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

A.3.3 Measurement results

LTE Band 26, 1.4MHz bandwidth (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
3.6	-1	16	0.001	0.020
3.8	-2	17	0.002	0.021
4.35	-2	16	0.002	0.019

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	QPSK	16QAM	QPSK	16QAM
50°	-3	15	0.003	0.019
40°	1	16	0.001	0.019
30°	-3	19	0.004	0.023
20°	2	17	0.002	0.021
10°	-2	16	0.002	0.020
0°	-3	17	0.003	0.020
- 10°	-1	15	0.001	0.018
- 20°	0	16	0.001	0.019
- 30°	-1	16	0.001	0.019

Expanded measurement uncertainty for this test item is 10 Hz, $k = 2$.

A.4 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

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:

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.

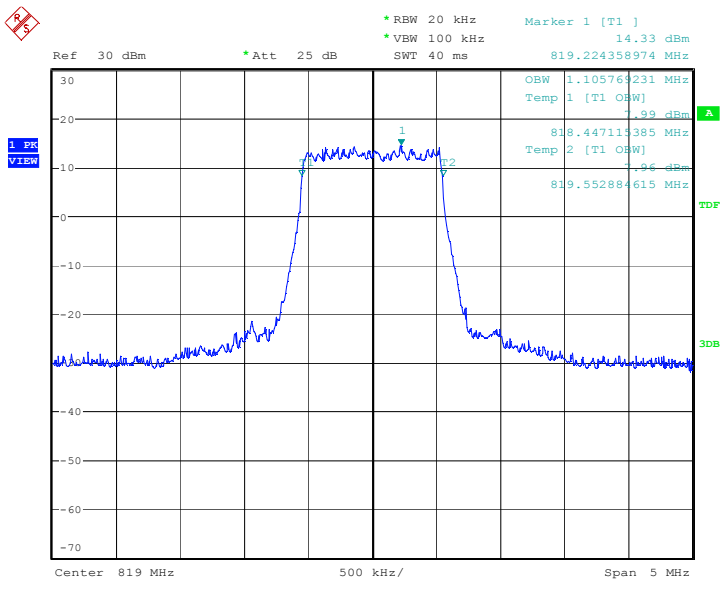
d) Set the detection mode to peak, and the trace mode to max hold.

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

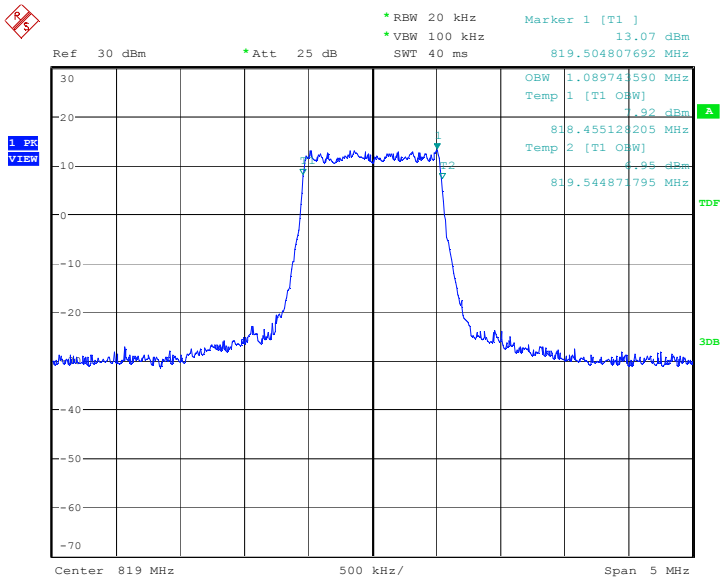
LTE band 26, 1.4MHz (99%)

Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
819.0	QPSK	16QAM
	1105.77	1089.74

LTE band 26, 1.4MHz Bandwidth, QPSK (99% BW)



LTE band 26, 1.4MHz Bandwidth, 16QAM (99% BW)

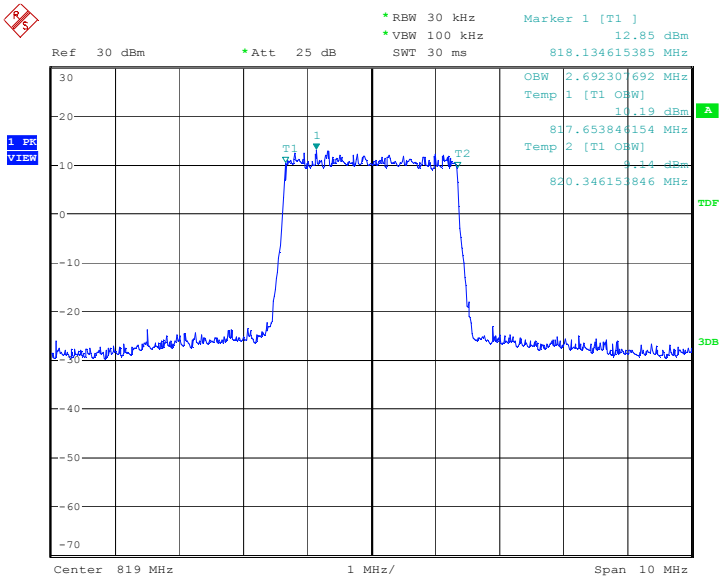


Date: 24.MAR.2016 07:35:31

LTE band 26, 3MHz (99%)

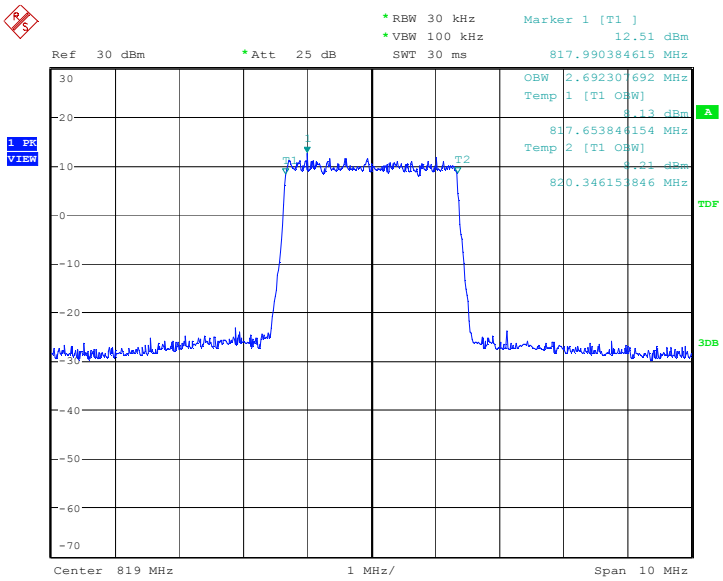
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
819.0	QPSK	16QAM
	2692.31	2692.31

LTE band 26, 3MHz Bandwidth, QPSK (99% BW)



Date: 24.MAR.2016 07:40:59

LTE band 26, 3MHz Bandwidth, 16QAM (99% BW)

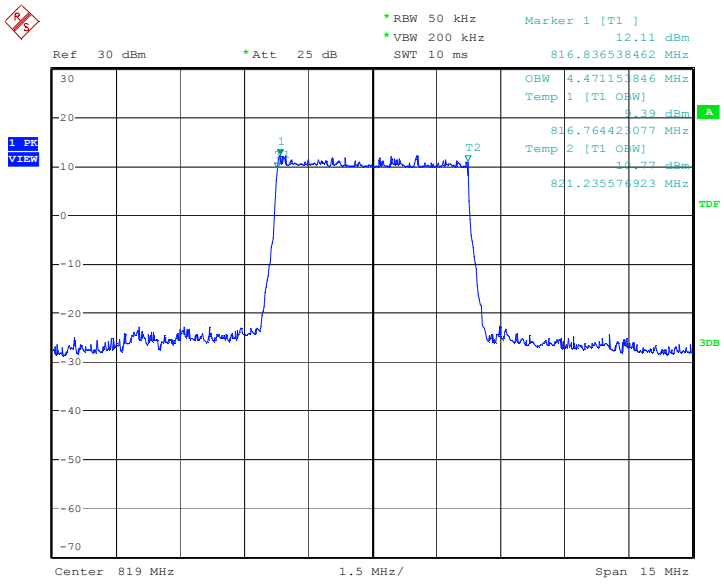


Date: 24.MAR.2016 07:41:14

LTE band 26, 5MHz (99%)

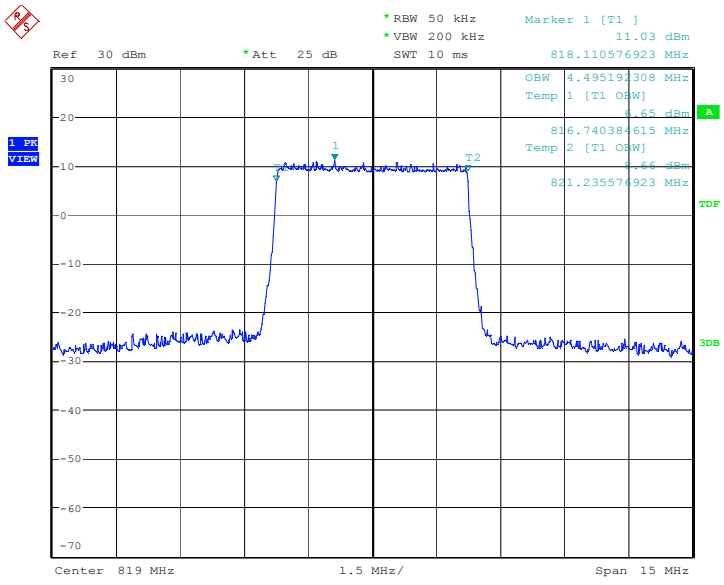
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
819.0	QPSK	16QAM
	4471.15	4495.19

LTE band 26, 5MHz Bandwidth, QPSK (99% BW)



Date: 24.MAR.2016 07:46:44

LTE band 26, 5MHz Bandwidth,16QAM (99% BW)

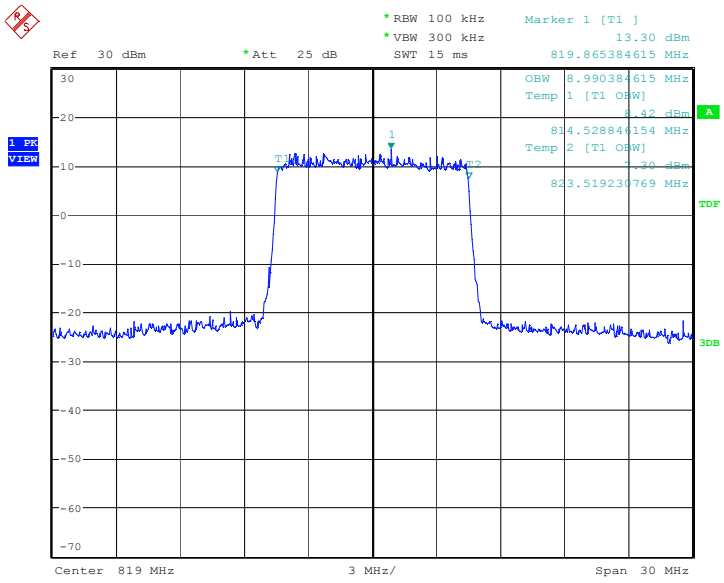


Date: 24.MAR.2016 07:46:59

LTE band 26, 10MHz (99%)

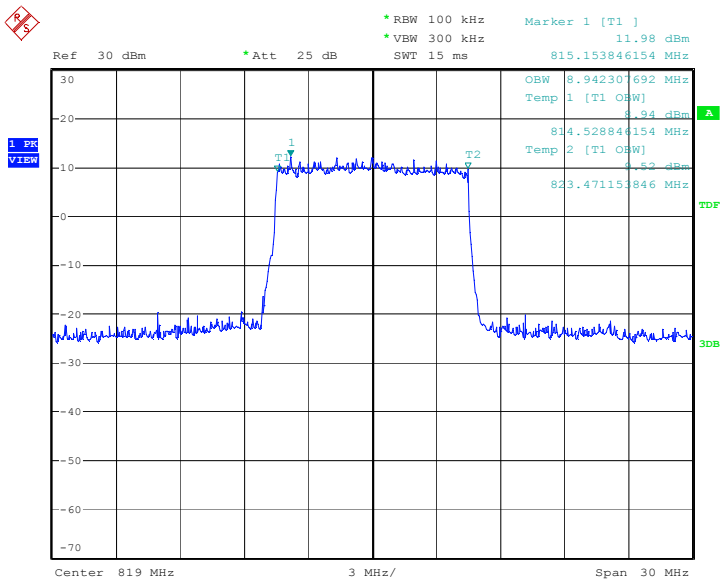
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
819.0	QPSK	16QAM
	8990.38	8942.31

LTE band 26, 10MHz Bandwidth, QPSK (99% BW)



Date: 24.MAR.2016 07:52:28

LTE band 26, 10MHz Bandwidth, 16QAM (99% BW)



Date: 24.MAR.2016 07:52:43

A.5 EMISSION BANDWIDTH

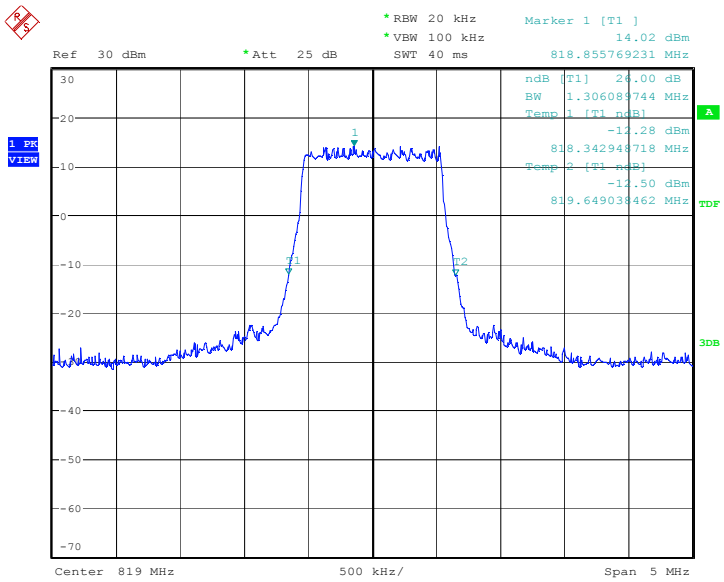
A.5.1Emission Bandwidth Results

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 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 26, 1.4MHz (-26dBc)

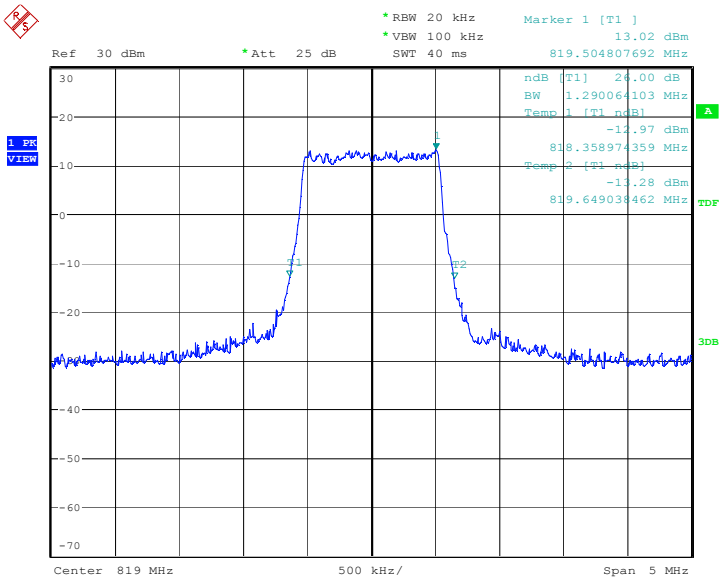
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
819.0	QPSK	16QAM
	1306.09	1290.06

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



Date: 24.MAR.2016 07:36:24

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

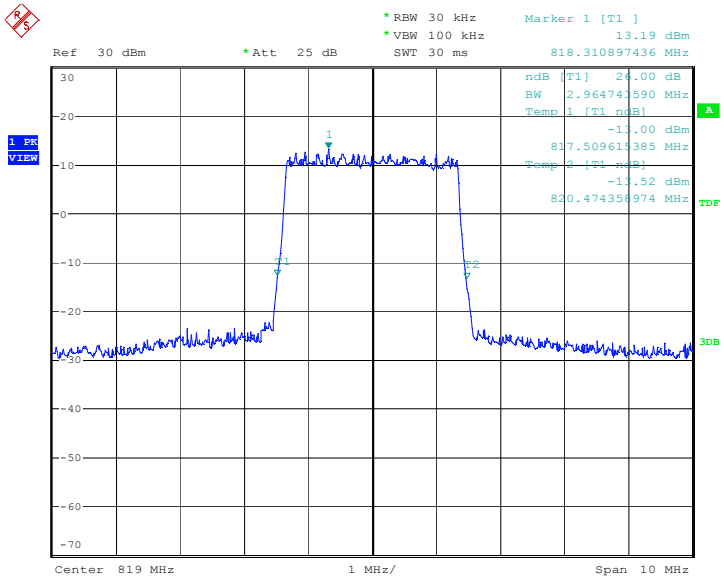


Date: 24.MAR.2016 07:36:41

LTE band 26, 3MHz (-26dBc)

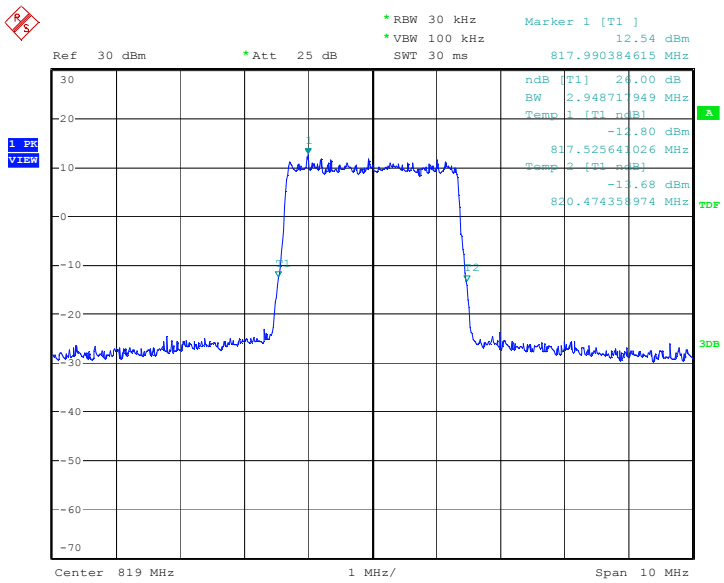
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
819.0	QPSK	16QAM
	2964.74	2948.72

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



Date: 24.MAR.2016 07:42:08

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

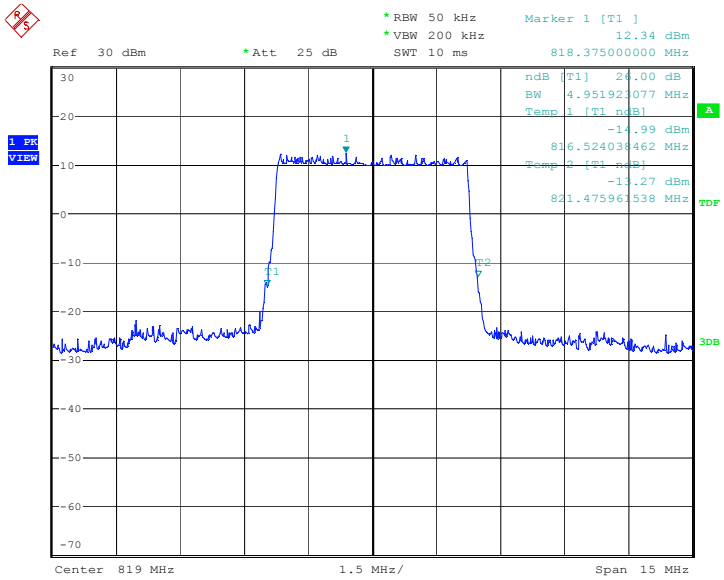


Date: 24.MAR.2016 07:42:25

LTE band 26, 5MHz (-26dBc)

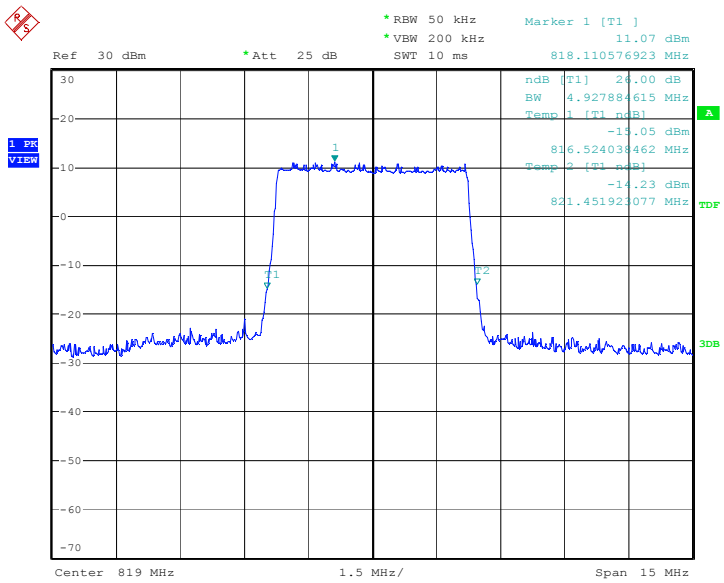
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
819.0	QPSK	16QAM
	4951.92	4927.88

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



Date: 24.MAR.2016 07:47:52

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

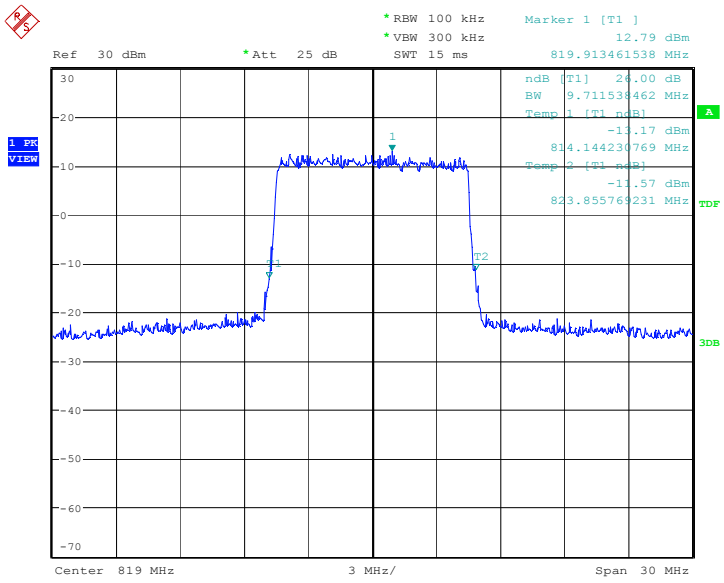


Date: 24.MAR.2016 07:48:09

LTE band 26, 10MHz (-26dBc)

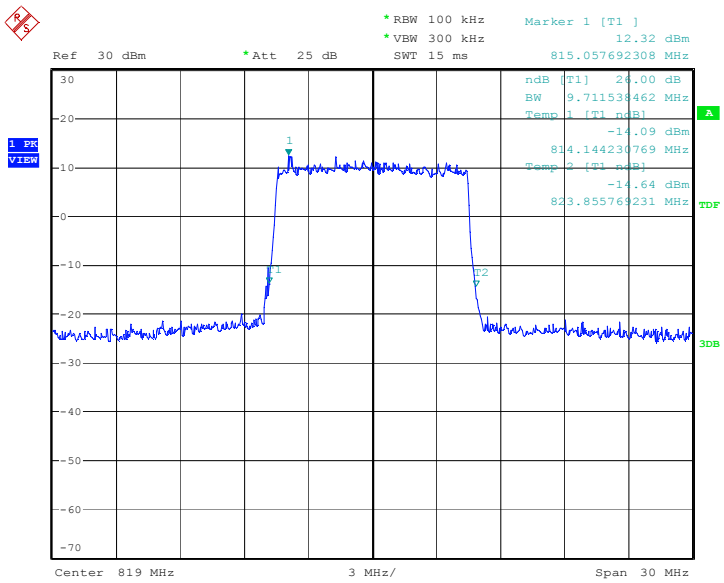
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
819.0	QPSK	16QAM
	9711.54	9711.54

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



Date: 24.MAR.2016 07:53:36

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



Date: 24.MAR.2016 07:53:53

A.6 CONDUCTED SPURIOUS EMISSION

A.6.1 Measurement Method

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. Data taken from 30 MHz to 10GHz.

Out-of-band emission requirement shall apply only to the ‘‘outer’’ channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

For any frequency removed from the EA licensee’s frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $116\text{Log}_{10}(f/6.1)$ decibels or $50 + 10\ \text{Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

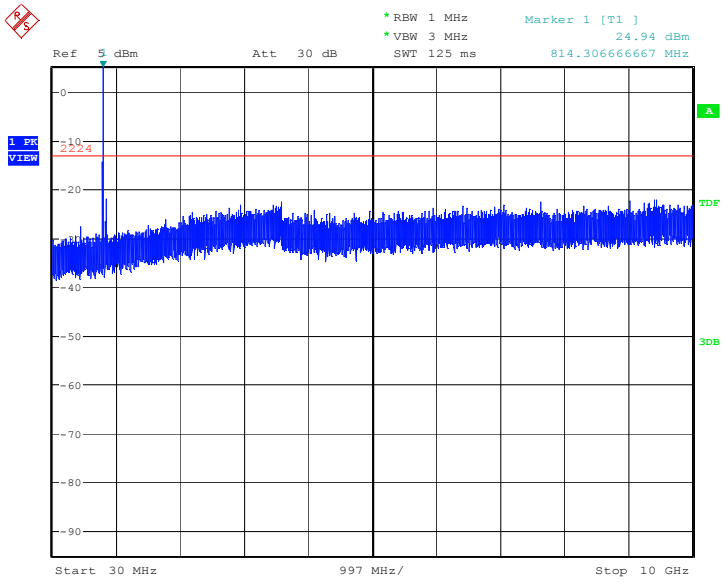
For any frequency removed from the EA licensee’s frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10\text{Log}_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

A.6.2 Measurement result

Only worst case result is given below

LTE band 26: 30MHz – 10GHz

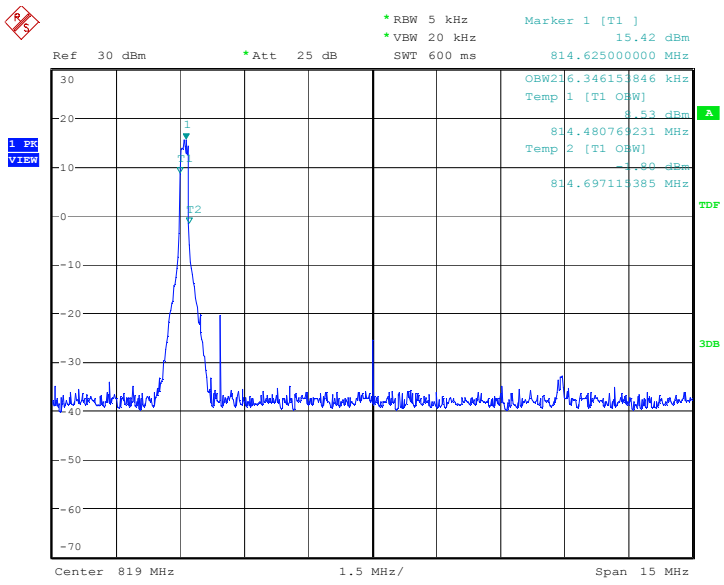
Spurious emission limit –13dBm.



Date: 30.MAR.2016 01:13:48

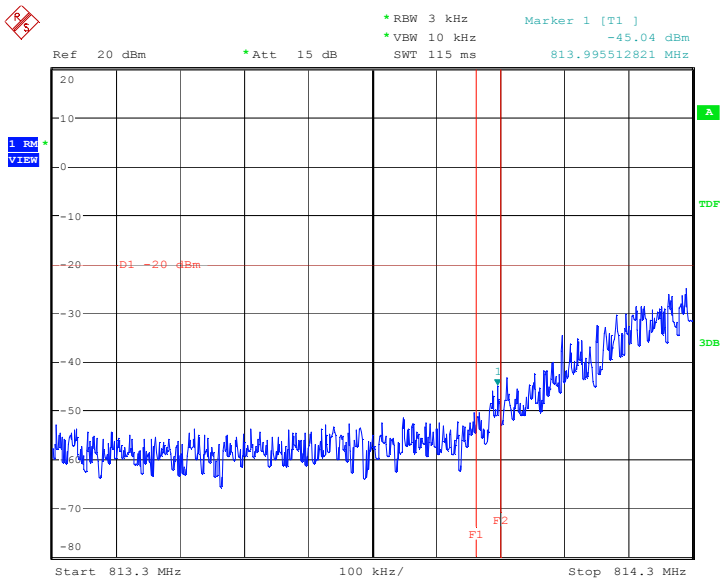
LTE band 26

OBW: 1RB-low_offset



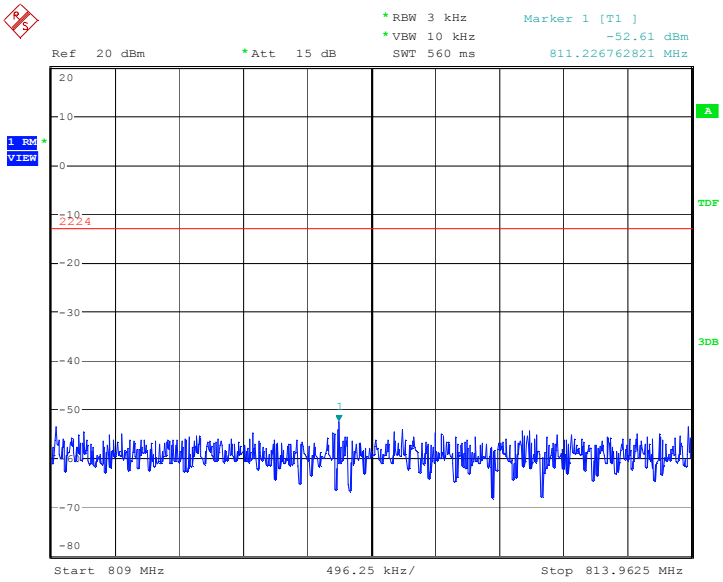
Date: 30.MAR.2016 03:26:07

LOW Emission Mask -1RB-low_offset



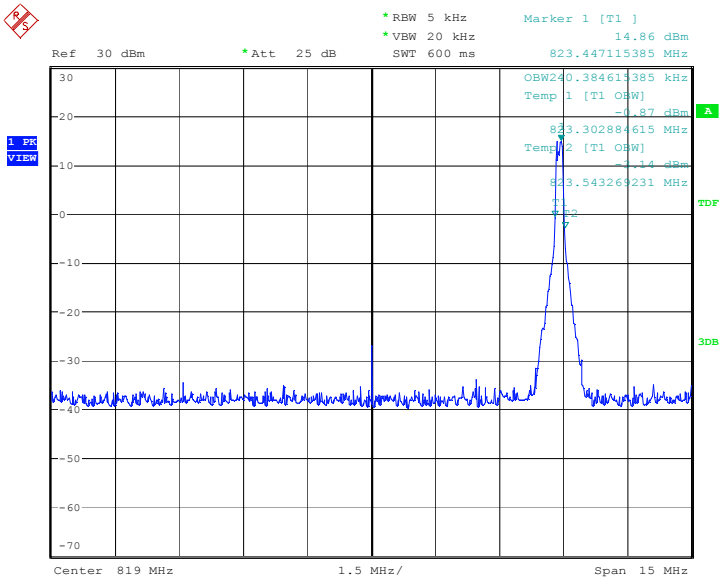
Date: 30.MAR.2016 03:23:33

LOW BAND EDGE BLOCK-1RB-low_offset



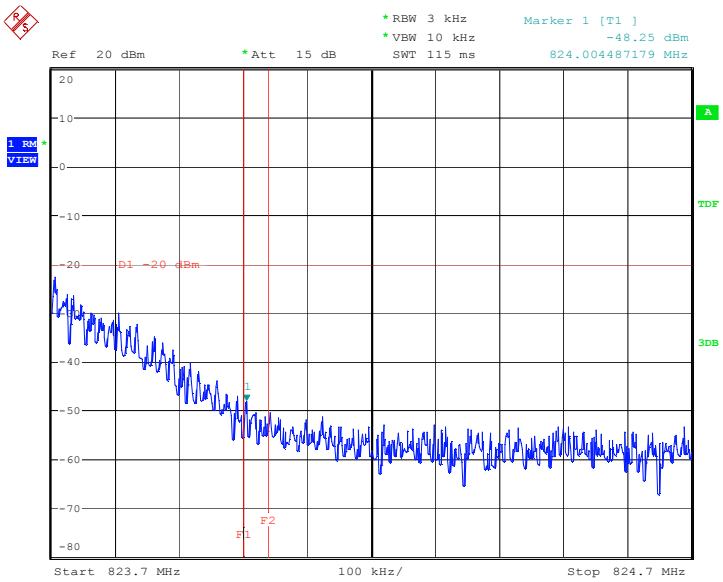
Date: 30.MAR.2016 03:23:37

OBW: 1RB-high_offset



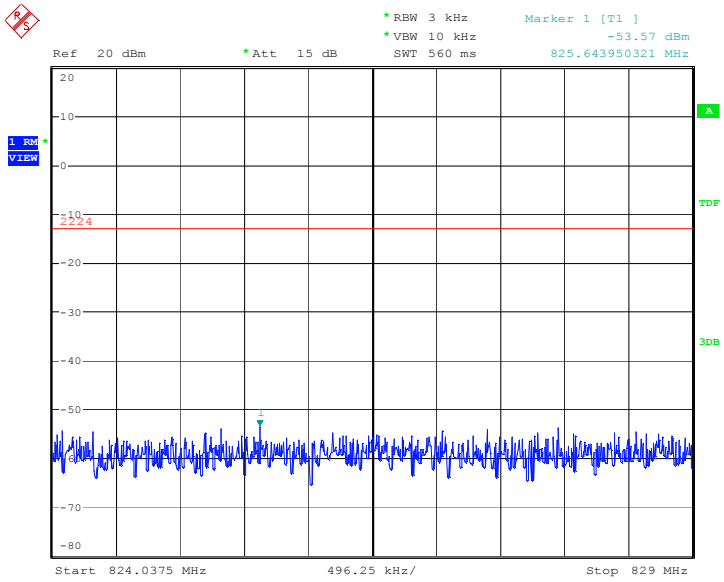
Date: 30.MAR.2016 03:28:08

HIGH Emission Mask -1RB-high_offset



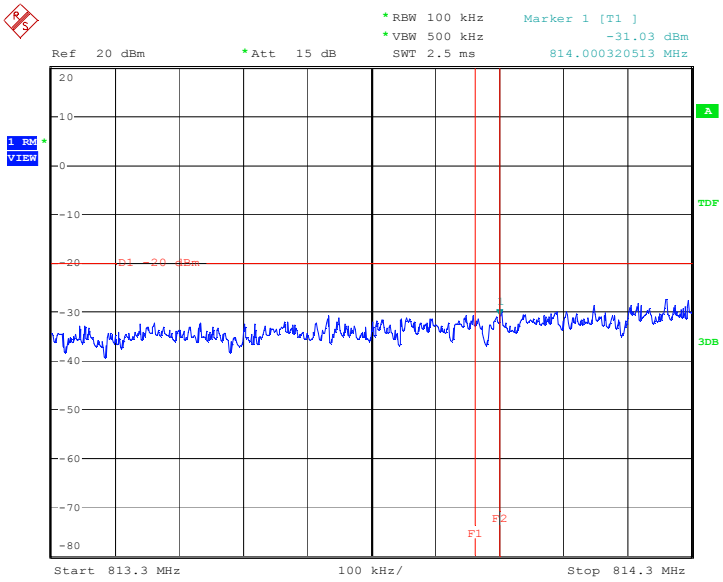
Date: 30.MAR.2016 03:21:28

HIGH BAND EDGE BLOCK-1RB-high_offset



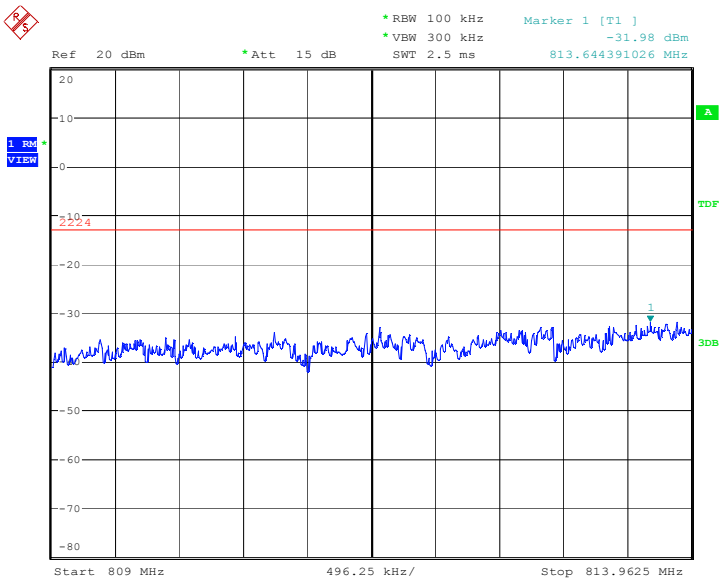
Date: 30.MAR.2016 03:21:32

LOW Emission Mask -10MHz-100%RB



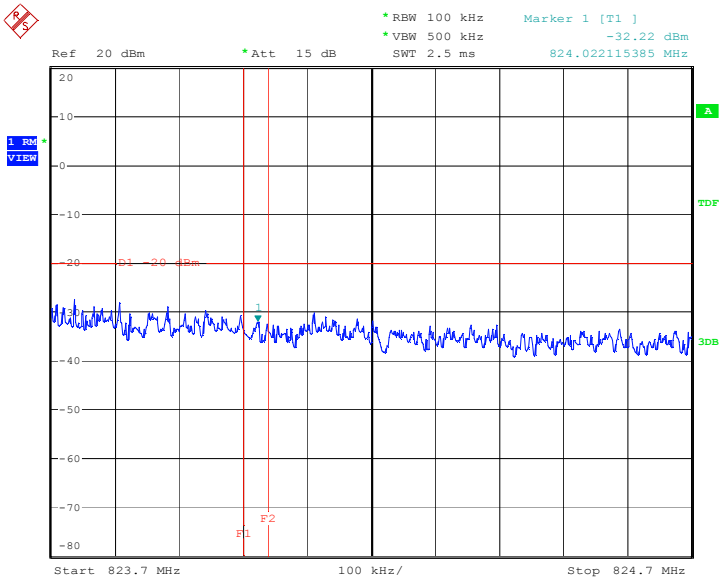
Date: 30.MAR.2016 03:16:13

LOW BAND EDGE BLOCK-10MHz-100%RB



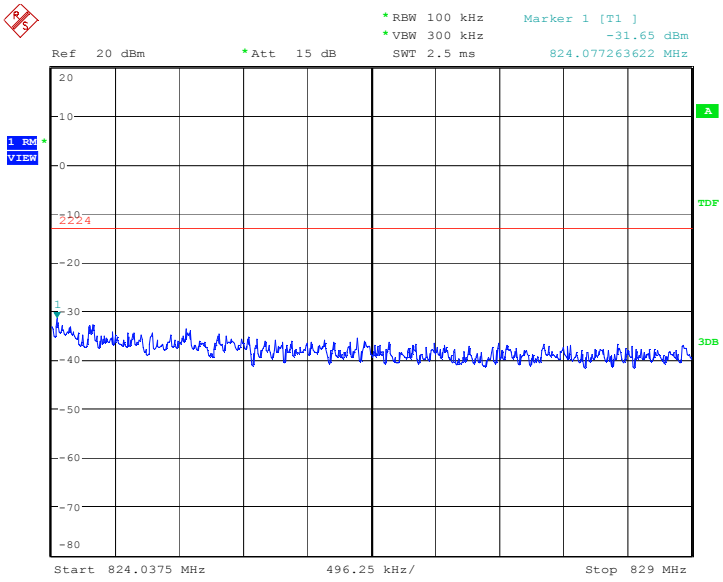
Date: 30.MAR.2016 03:16:17

HIGH Emission Mask -10MHz-100%RB



Date: 30.MAR.2016 03:17:02

HIGH BAND EDGE BLOCK-10MHz-100%RB



Date: 30.MAR.2016 03:17:06

END OF REPORT