



TEST REPORT

No. 2013TAR882

for

TCT Mobile Limited

**HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE 5 bands
mobile phone**

Model Name: Diablo HD LTE EMEA 1.2GHz

Marketing Name: ONE TOUCH 6034R

FCC ID: RAD468

with

Hardware Version: PIO1

Software Version: v1B28

Issued Date: 2014-01-13

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 TMC Beijing.

Test Laboratory:

DAkks accreditation (DIN EN ISO/IEC 17025): No. 12123-01-01

FCC 2.948 Listed: No.733176

IC O.A.T.S listed: No.6629A-1

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1. Test Laboratory

1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT
Address: 3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai
Dian District, Beijing, P. R. China
Postal Code: 100191
Telephone: 00861062304633
Fax: 00861062304633

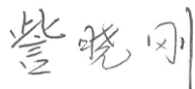
1.2. Testing Environment

Normal Temperature: 15-35°C
Relative Humidity: 20-75%

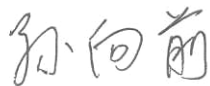
1.3. Project data

Testing Start Date: 2014-01-09
Testing End Date: 2014-01-13

1.4. Signature



Zi Xiaogang
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCT Mobile Limited!
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2.2. Manufacturer Information

Company Name: TCT Mobile Limited!
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Pudong Area Shanghai, P.R. China. 201203
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Postal Code: 201203
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Contact Person: Gong Zhizhou
Contact Email: zhizhou.gong@jrdcom.com
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE 5 bands mobile phone
Model Name	Diablo HD LTE EMEA 1.2GHz
Marketing Name	ONE TOUCH 6034R
FCC ID	RAD468
Frequency	GSM 850MHz; PCS 1900MHz; WCDMA Band V;LTE BAND 7
Antenna	Integrated
Power supply	Battery or Charger (AC Adaptor)
Output power	26.98dBm maximum EIRP measured for LTE Band 7
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.9VDC)
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 Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
N04	862780020000208	PIO1	v1B28
N03	862780020000083	PIO1	v1B28

*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	/
AE3	Travel charger	/
AE4	Travel charger	/
AE1		
Model	CAC2000005C2	
Manufacturer	SCUD	
Nominal voltage	3.8V	
AE2		
Model	CAC2000008C1	
Manufacturer	BYD	
Nominal voltage	3.8V	
AE3		
Model	CBA3000AG0C1	
Manufacturer	Tenpao	

Length of cable	/
AE4	
Model	CBA3000AG0C2
Manufacturer	BYD
Length of cable	/

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

3.4. Normal Accessory setting

Fully charged battery was used during the test.

3.5. General Description

The Equipment Under Test (EUT) is a model of HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE 5 bands with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

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 27	MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES	10-1-12 Edition
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2004
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	2009
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v02r01

5. LABORATORY ENVIRONMENT

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

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

Fully-anechoic chamber 2 (8.6 meters × 6.1 meters × 3.85 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 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

Semi-anechoic chamber 2 / Fully-anechoic chamber 3 (10 meters × 6.7 meters × 6.15 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance
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

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

LTE Band 7

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	27.50(h)(2)	A.1	P
2	Emission Limit	27.53(m), 2.1051	A.2	P
3	Conducted Emission	15.107/15.207	A.3	P
4	Frequency Stability	27.54, 2.1055	A.4	P
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P
6	Emission Bandwidth	27.53(m)	A.6	P
7	Band Edge Compliance	27.53(m)	A.7	P
8	Conducted Spurious Emission	27.53(m), 2.1057	A.8	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 TMC 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
1.	Test Receiver	ESCI	100344	R&S	2014-03-28
2.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
3.	LISN	ESH2-Z5	829991/012	R&S	2014-04-14
4.	EMI Antenna	VULB 9163	9163-482	Schwarzbeck	2014-02-17
5.	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
6.	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
7.	EMI Antenna	VUBA 9117	177	Schwarzbeck	2014-06-29
8.	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19
9.	Climatic chamber	SH-241	92003546	ESPEC	2014-05-11
10.	Universal Radio Communication Tester	CMW500	116588	R&S	2014-11-04

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 27.50(d)(4), 27.50(h)(2).

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 7

Bandwidth	RB size/offset	Frequency (MHz)	Power(dBm)	
			QPSK	16QAM
5MHz	1 RB high	2502.5	20.92	19.51
		2535.0	21.15	20.06
		2567.5	21.29	19.91
	1 RB low	2502.5	20.82	19.45
		2535.0	21.00	19.81
		2567.5	21.12	19.68
	50% RB mid	2502.5	19.82	18.88
		2535.0	20.15	19.28
		2567.5	20.24	19.27
	100% RB	2502.5	19.80	18.95
		2535.0	20.08	19.33
		2567.5	20.23	19.44

(continued)

10MHz	1 RB high	2505.0	20.57	20.45
		2535.0	21.18	21.01
		2565.0	21.36	20.82
	1 RB low	2505.0	20.92	20.74
		2535.0	21.08	20.90
		2565.0	21.07	20.58
	50% RB mid	2505.0	19.90	18.93
		2535.0	20.08	19.10
		2565.0	20.38	19.42
	100% RB	2505.0	19.78	18.83
		2535.0	19.97	19.15
		2565.0	20.29	19.22
15MHz	1 RB high	2507.5	20.60	20.42
		2535.0	21.29	21.07
		2562.5	21.26	21.11
	1 RB low	2507.5	20.98	20.84
		2535.0	20.98	20.77
		2562.5	21.21	20.91
	50% RB mid	2507.5	19.87	19.17
		2535.0	20.06	19.38
		2562.5	20.26	19.52
	100% RB	2507.5	19.71	18.76
		2535.0	19.91	19.07
		2562.5	20.19	19.16
20MHz	1 RB high	2510.0	20.64	19.53
		2535.0	21.36	20.17
		2560.0	21.19	20.55
	1 RB low	2510.0	21.16	19.99
		2535.0	20.99	19.86
		2560.0	21.17	20.53
	50% RB mid	2510.0	19.92	18.88
		2535.0	19.97	19.12
		2560.0	20.23	19.23
	100% RB	2510.0	19.90	19.00
		2535.0	20.02	19.13
		2560.0	20.21	19.25

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.

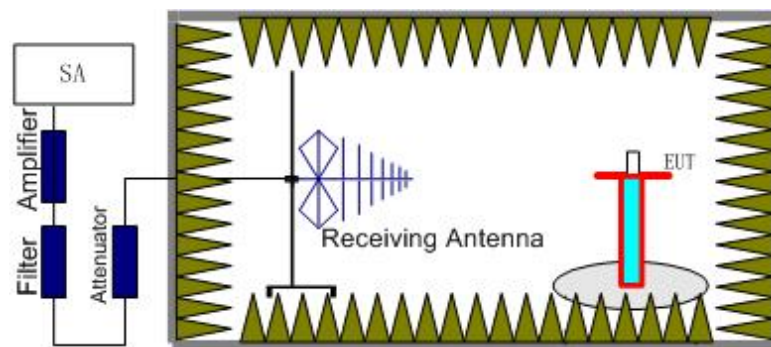
Rule Part 27.50(d) specifies “Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”.

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

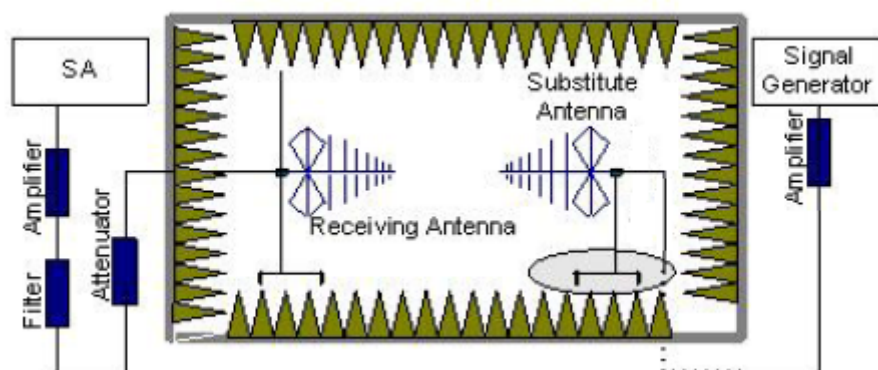
A.1.3.2 Method of Measurement

The measurements procedures in TIA-603C-2004 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 (P_r).
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:

$$\text{Power (EIRP)} = P_{Mea} - P_{Ag} - P_{cl} - G_a$$

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 7_5MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2502.50	-25.91	3.59	-50.00	-5.41	25.91	H
2535.00	-25.47	3.62	-50.00	-5.49	26.40	H
2567.50	-26.71	3.65	-50.00	-5.58	25.22	H

LTE Band 7_10MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2505.00	-27.38	3.59	-50.00	-5.41	24.44	H
2535.00	-25.23	3.62	-50.00	-5.49	26.64	H
2565.00	-26.93	3.65	-50.00	-5.57	24.99	H

LTE Band 7_15MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2507.50	-27.95	3.59	-50.00	-5.42	23.88	H
2535.00	-25.12	3.62	-50.00	-5.49	26.75	H
2562.50	-24.94	3.64	-50.00	-5.56	26.98	H

LTE Band 7_20MHz_QPSK

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2510.00	-29.13	3.59	-50.00	-5.43	22.71	H
2535.00	-25.14	3.62	-50.00	-5.49	26.73	H
2560.00	-27.90	3.64	-50.00	-5.56	24.02	H

LTE Band 7_5MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2502.50	-25.63	3.59	-50.00	-5.41	26.19	H
2535.00	-25.83	3.62	-50.00	-5.49	26.04	H
2567.50	-27.18	3.65	-50.00	-5.58	24.75	H

LTE Band 7_10MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2505.00	-27.80	3.59	-50.00	-5.41	24.02	H
2535.00	-25.67	3.62	-50.00	-5.49	26.20	H
2565.00	-27.27	3.65	-50.00	-5.57	24.65	H

LTE Band 7_15MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2507.50	-28.61	3.59	-50.00	-5.42	23.22	H
2535.00	-25.70	3.62	-50.00	-5.49	26.17	H
2562.50	-27.54	3.64	-50.00	-5.56	24.38	H

LTE Band 7_20MHz_16QAM

Frequency (MHz)	P _{Mea} (dBm)	Cable Loss (dB)	P _{Ag} (dB)	Antenna Gain(dBi)	EIRP(dBm)	Polarization
2510.00	-29.62	3.59	-50.00	-5.43	22.22	H
2535.00	-25.91	3.62	-50.00	-5.49	25.96	H
2560.00	-28.11	3.64	-50.00	-5.56	23.81	H

$$\begin{aligned} \text{Peak EIRP(dBm)} &= P_{\text{Mea}}(-24.94\text{dBm}) - G_a (-5.56\text{dBi}) - P_{\text{Ag}} (-50.00\text{dB}) - P_{\text{cl}} (3.64\text{dB}) \\ &= 26.98\text{dBm} \end{aligned}$$

ANALYZER SETTINGS:

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

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

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

A.2 EMISSION LIMIT

Reference

FCC: CFR 2.1051, Part 27.53(h) , 27.53(m).

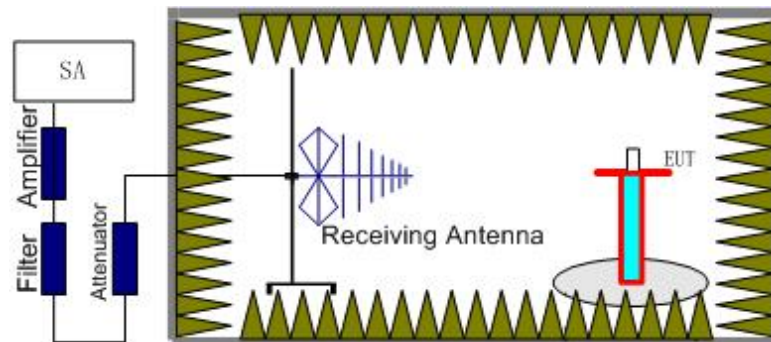
A.2.1 Measurement Method

The measurements procedures in TIA-603C-2004 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

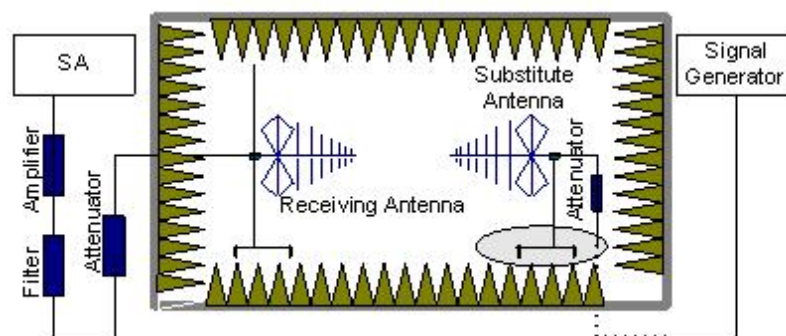
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in, Part 27.53(h) and Part 27.53(m). The spectrum was scanned with the mobile station transmitting at carrier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

The procedure of radiated spurious emissions is as follows:

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



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

$$\text{Power (EIRP)} = P_{Mea} + P_{pl} + G_a$$

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 27.53(h) and 27.53(m) all 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 Band 7. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the LTE Band 7 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

LTE Band 7, 5 MHz, QPSK, Channel 20775

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5000.58	-46.30	5.17	-9.70	-41.77	-13.00	H
7501.02	-50.59	6.61	-11.40	-45.80	-13.00	H
10001.33	-58.28	7.99	-12.40	-53.87	-13.00	H
12501.76	-35.16	8.83	-12.70	-31.29	-13.00	H
15002.31	-42.66	9.64	-13.50	-38.80	-13.00	H
17587.23	-53.76	10.67	-13.35	-51.08	-13.00	V

LTE Band 7, 5 MHz, QPSK, Channel 21100

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5065.72	-49.95	5.22	-9.74	-45.43	-13.00	H
7598.54	-47.12	6.88	-11.50	-42.50	-13.00	H
10528.18	-58.64	8.04	-12.49	-54.19	-13.00	V
12664.07	-37.37	8.87	-12.90	-33.34	-13.00	H
15056.66	-55.20	9.66	-13.49	-51.37	-13.00	V
17730.02	-48.26	11.06	-13.44	-45.88	-13.00	H

LTE Band 7, 5 MHz, QPSK, Channel 21425

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5130.78	-43.40	5.25	-9.78	-38.87	-13.00	H
7695.92	-45.77	6.56	-11.60	-40.73	-13.00	H
10261.21	-55.39	7.55	-12.45	-50.49	-13.00	H
12826.64	-37.52	9.05	-13.09	-33.48	-13.00	H
15391.80	-44.25	9.72	-13.42	-40.55	-13.00	H
17720.00	-55.05	10.86	-13.43	-52.48	-13.00	V

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

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5000.64	-45.85	5.17	-9.70	-41.32	-13.00	H
7500.82	-51.69	6.61	-11.40	-46.90	-13.00	H
10001.61	-58.29	7.99	-12.40	-53.88	-13.00	H
12501.60	-34.65	8.83	-12.70	-30.78	-13.00	H
15002.40	-44.27	9.64	-13.50	-40.41	-13.00	H
17502.76	-45.91	11.02	-13.30	-43.63	-13.00	H

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

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5065.69	-51.99	5.22	-9.74	-47.47	-13.00	H
7598.52	-47.09	6.88	-11.50	-42.47	-13.00	H
9947.87	-57.86	7.67	-12.42	-53.11	-13.00	V
12664.20	-36.91	8.87	-12.90	-32.88	-13.00	H
14851.12	-54.38	9.84	-13.53	-50.69	-13.00	V
17729.85	-48.49	11.05	-13.44	-46.10	-13.00	H

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

Frequency (MHz)	P _{Mea} (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Peak EIRP(dBm)	Limit (dBm)	Polarization
5130.78	-44.43	5.25	-9.78	-39.90	-13.00	H
7696.26	-46.25	6.55	-11.60	-41.20	-13.00	H
10261.48	-56.84	7.55	-12.45	-51.94	-13.00	H
12826.72	-37.81	9.06	-13.09	-33.78	-13.00	H
15736.79	-54.70	10.06	-13.21	-51.55	-13.00	V
17605.73	-52.95	10.69	-13.36	-50.28	-13.00	H

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

A.3 CONDUCTED EMISSION

Reference

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2009 is used. Conducted emission is measured with travel charger. The EUT is working under LTE FDD bands 7 traffic mode which is the worst case of conducted emission measurement.

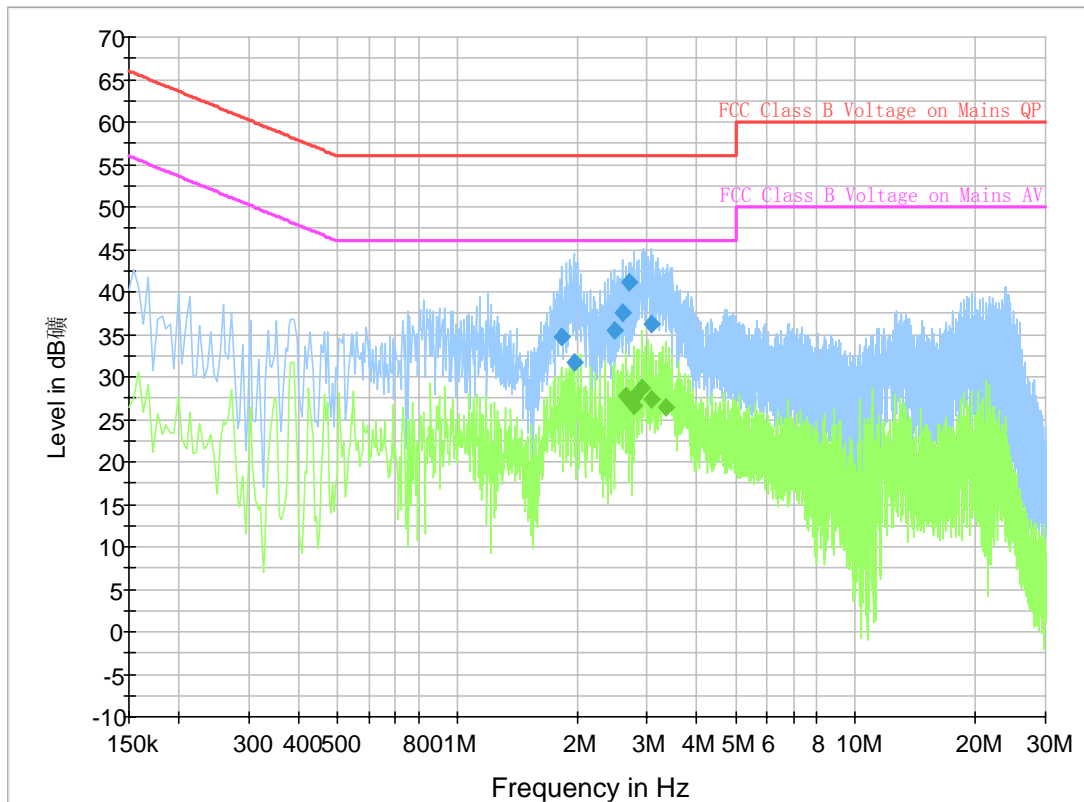
For test layout photo, please refer to Pic.2 in Annex B.

A.3.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi -Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with logarithm of the frequency

A.3.2 Measurement result
LTE Band 7



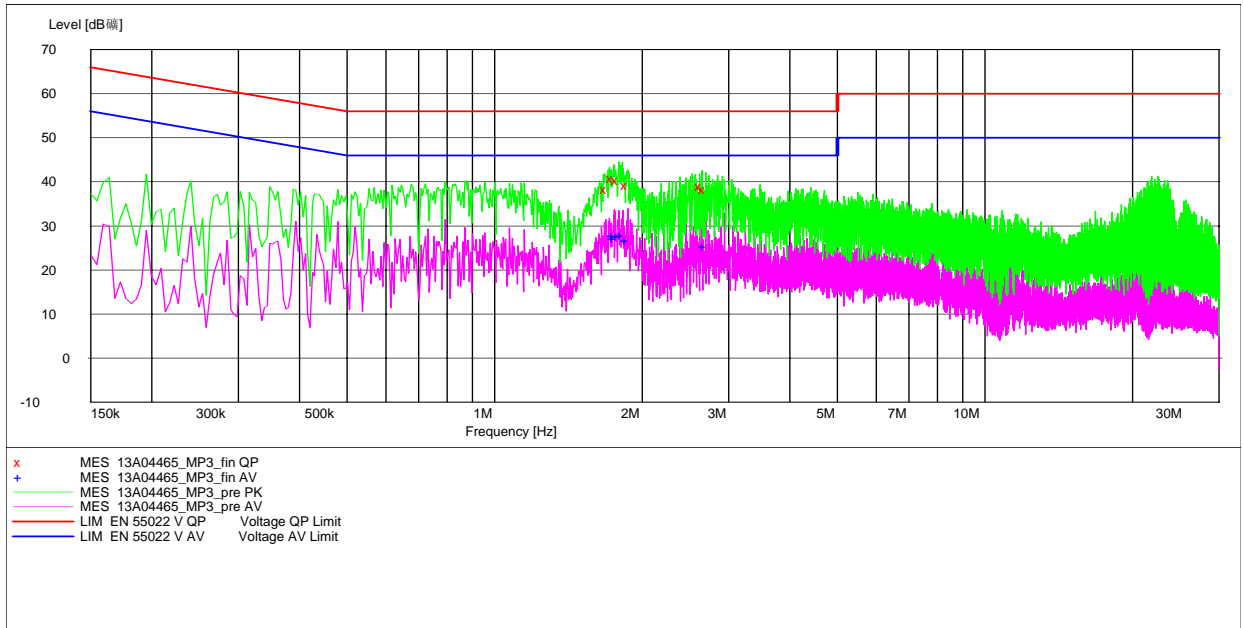
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.837500	34.6	GND	L1	9.7	21.4	56.0
1.963500	31.8	GND	L1	9.7	24.2	56.0
2.476500	35.5	GND	L1	9.7	20.5	56.0
2.607000	37.5	GND	L1	9.7	18.5	56.0
2.697000	41.2	GND	L1	9.7	14.8	56.0
3.061500	36.2	GND	L1	9.7	19.8	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.652000	27.7	GND	L1	9.7	18.3	46.0
2.769000	26.6	GND	L1	9.7	19.4	46.0
2.782500	27.5	GND	L1	9.7	18.5	46.0
2.899500	28.7	GND	L1	9.7	17.3	46.0
3.075000	27.3	GND	L1	9.7	18.7	46.0
3.336000	26.4	GND	L1	9.7	19.6	46.0

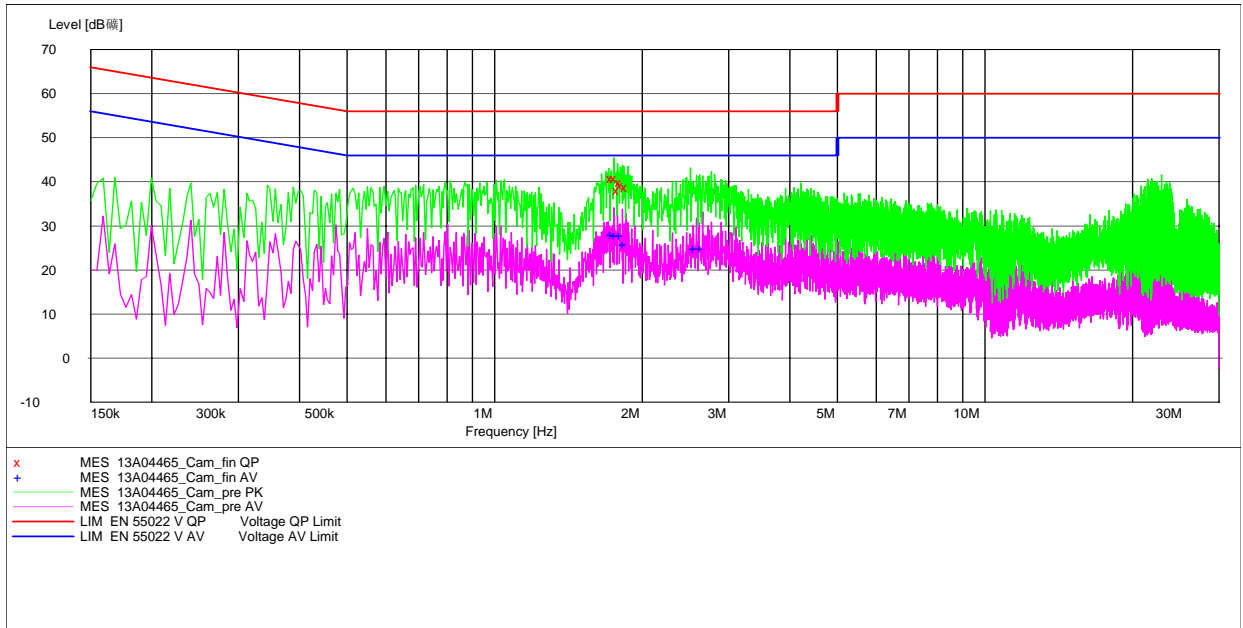
MP3



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.698000	38.30	9.7	56	17.7	L1	GND
1.747500	40.70	9.7	56	15.3	L1	GND
1.792500	40.30	9.7	56	15.7	N	GND
1.869000	39.30	9.7	56	16.7	N	GND
2.648000	39.10	9.7	56	16.9	L1	GND
2.693000	38.30	9.7	56	17.7	L1	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.752000	27.90	9.7	46	18.1	N	GND
1.761000	27.10	9.7	46	18.9	L1	GND
1.792500	27.60	9.7	46	18.4	L1	GND
1.828500	27.80	9.7	46	18.2	L1	GND
1.869000	26.80	9.7	46	19.2	N	GND
2.693000	25.30	9.7	46	20.7	L1	GND

Camera



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.747500	40.70	9.7	56	15.3	L1	GND
1.779000	40.70	9.7	56	15.3	L1	GND
1.801500	38.00	9.7	56	18.0	L1	GND
1.824000	39.90	9.7	56	16.1	N	GND
1.833000	39.30	9.7	56	16.7	N	GND
1.869000	38.70	9.7	56	17.3	N	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.747500	28.00	9.7	46	18.0	N	GND
1.779000	27.80	9.7	46	18.2	L1	GND
1.824000	27.90	9.7	46	18.1	L1	GND
1.855500	25.90	9.7	46	20.1	L1	GND
2.580500	24.80	9.7	46	21.2	L1	GND
2.652500	24.90	9.7	46	21.1	L1	GND

Note: The maximum value of expanded measurement uncertainty for this test item is $U=2.9$ dB, $k = 2$.

A.4 FREQUENCY STABILITY

Reference

FCC: CFR Part 2.1055, 27.54.

A.4.1 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°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 7, 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°C increments from -30°C to +50°C. 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°C.
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 °C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

A.4.2 Measurement Limit

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. 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 4.2VDC, with a nominal voltage of 3.9VDC. 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 -14.3 %. For the purposes of measuring frequency stability these voltage limits are to be used.

A.4.3 Measurement results

LTE Band 7, 5 MHz

Frequency Error vs Voltage

Voltage (V)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
3.5	1	0.000	-27	0.011
3.9	-6	0.002	-23	0.009
4.2	13	0.005	-18	0.007

Frequency Error vs Temperature

Temperature (°C)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
50°	-14	0.006	-17	0.007
40°	-11	0.004	-17	0.007
30°	1	0.000	2	0.001
20°	13	0.005	-21	0.008
10°	-1	0.001	0	0.000
0°	-21	0.008	-20	0.008
- 10°	-11	0.004	-7	0.003
- 20°	4	0.001	1	0.000
- 30°	-17	0.007	-8	0.003

LTE Band 7, 10 MHz

Frequency Error vs Voltage

Voltage (V)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
3.5	-20	0.008	10	0.004
3.9	-20	0.008	-17	0.007
4.2	-20	0.008	-3	0.001

Frequency Error vs Temperature

Temperature (°C)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
50°	-14	0.006	0	0.000
40°	-15	0.006	5	0.002
30°	-11	0.004	-4	0.001
20°	-6	0.002	-12	0.005
10°	8	0.003	-20	0.008
0°	-19	0.007	9	0.004
- 10°	4	0.002	2	0.001

- 20°	8	0.003	-11	0.004
- 30°	13	0.005	-8	0.003

LTE Band 7, 15 MHz

Frequency Error vs Voltage

Voltage (V)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
3.5	-19	0.008	-14	0.006
3.9	5	0.002	-6	0.002
4.2	-11	0.004	8	0.003

Frequency Error vs Temperature

Temperature (°C)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
50°	12	0.005	-19	0.008
40°	1	0.001	-16	0.006
30°	0	0.000	11	0.004
20°	-1	0.000	-9	0.004
10°	1	0.000	12	0.005
0°	-2	0.001	-16	0.006
- 10°	-3	0.001	9	0.003
- 20°	-12	0.005	12	0.005
- 30°	7	0.003	-15	0.006

LTE Band 7, 20 MHz

Frequency Error vs Voltage

Voltage (V)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
3.5	10	0.004	-15	0.006
3.9	14	0.006	0	0.000
4.2	-18	0.007	-19	0.008

Frequency Error vs Temperature

Temperature (°C)	QPSK		16QAM	
	Frequency error (Hz)	Frequency error (ppm)	Frequency error (Hz)	Frequency error (ppm)
50°	-13	0.005	9	0.003
40°	-3	0.001	0	0.000
30°	-22	0.008	-19	0.008
20°	-13	0.005	-26	0.010
10°	-1	0.000	1	0.000

0°	-12	0.005	-9	0.003
- 10°	4	0.002	-23	0.009
- 20°	7	0.003	6	0.003
- 30°	-13	0.005	-13	0.005

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

A.5 OCCUPIED BANDWIDTH

Reference

FCC: CFR Part 2.1049(h)(i)

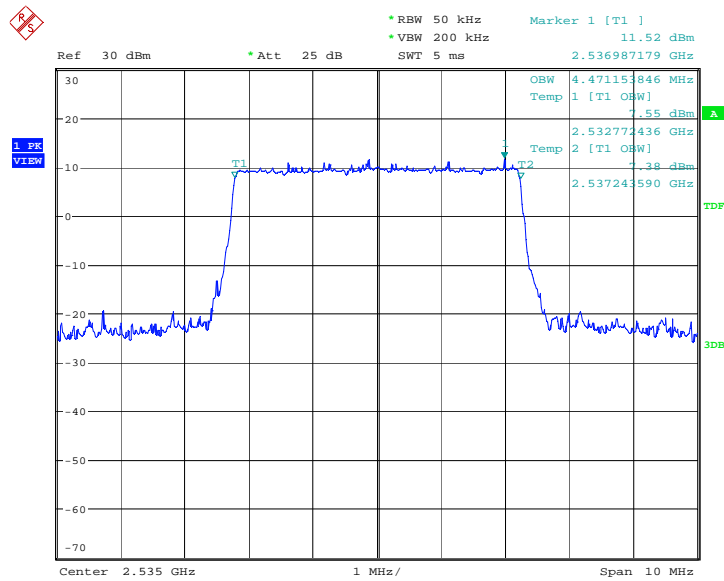
A.5.1 Occupied Bandwidth Results

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.

LTE band 7, 5MHz (99%)

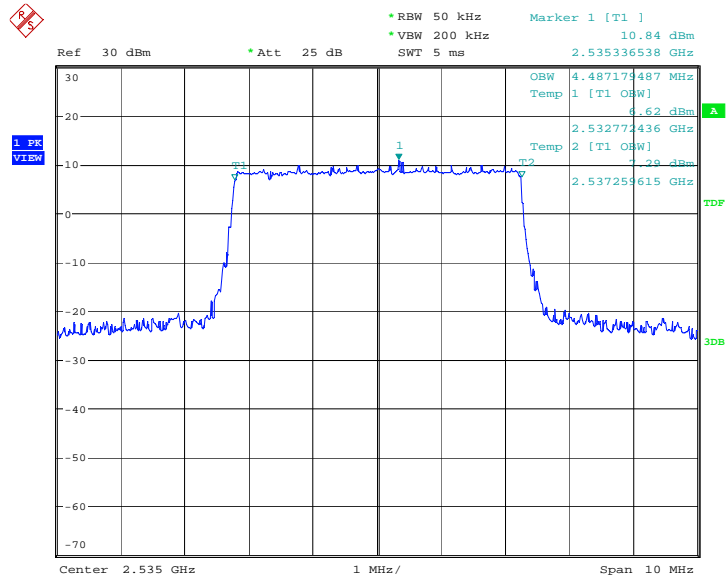
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	4471.15	4487.18

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



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

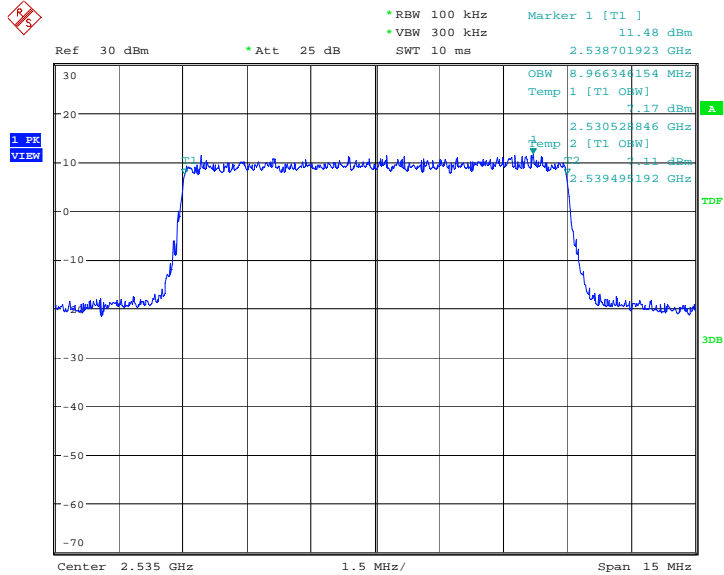


Date: 9.JAN.2014 11:25:18

LTE band 7, 10MHz (99%)

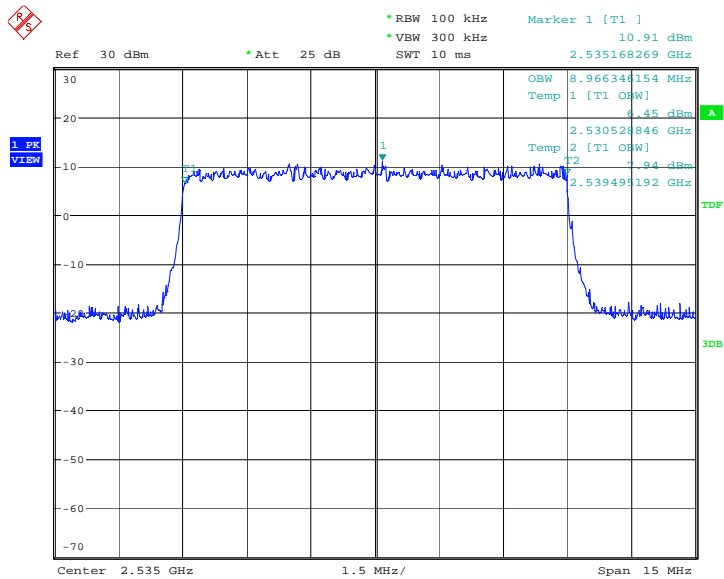
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	8966.35	8966.35

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



Date: 9.JAN.2014 11:30:40

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

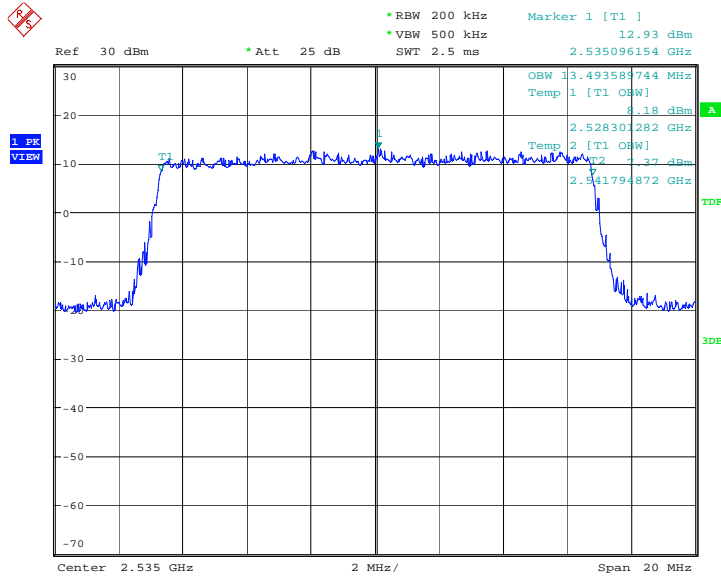


Date: 9.JAN.2014 11:30:54

LTE band 7, 15MHz (99%)

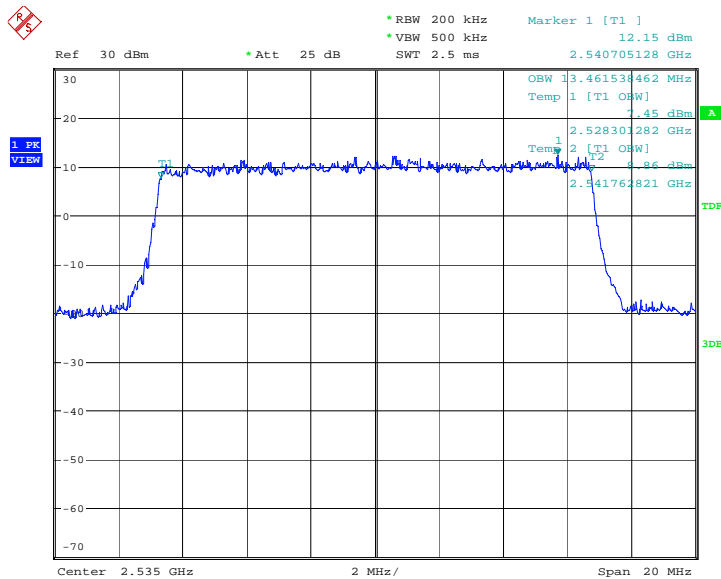
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	13493.59	13461.54

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



Date: 9.JAN.2014 11:36:17

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

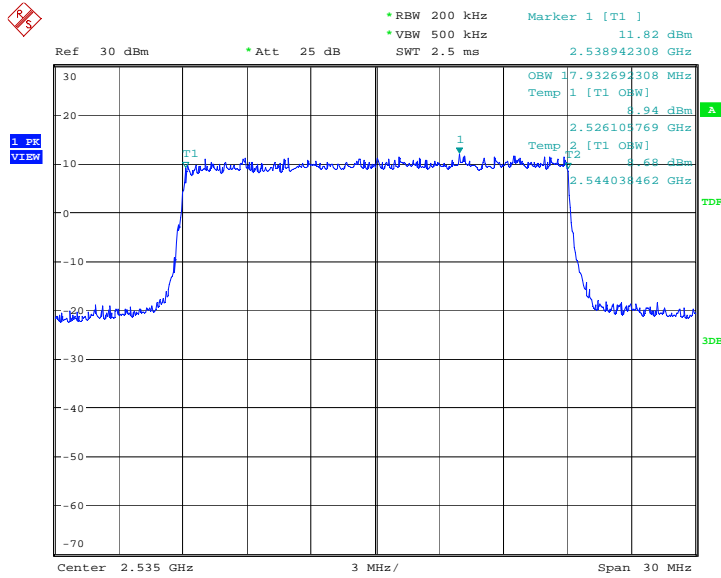


Date: 9.JAN.2014 11:36:31

LTE band 7, 20MHz (99%)

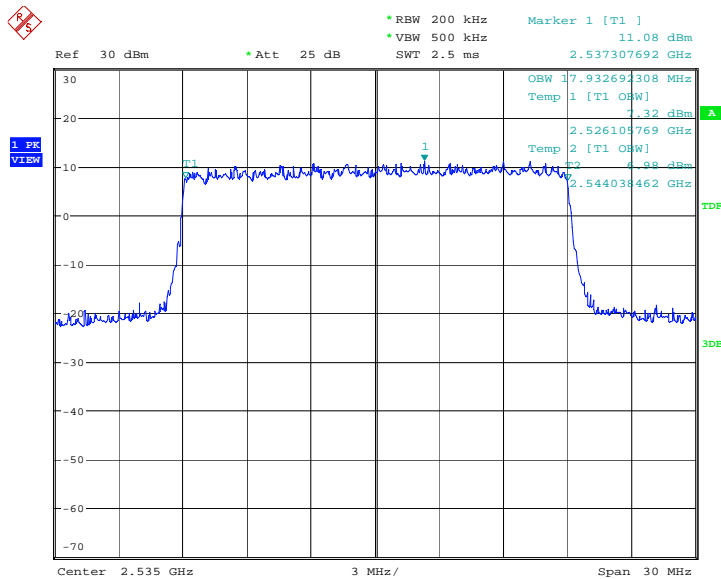
Frequency(MHz)	Occupied Bandwidth (99%)(kHz)	
2535.0	QPSK	16QAM
	17932.69	17932.69

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



Date: 9.JAN.2014 11:42:25

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



Date: 9.JAN.2014 11:42:39

A.6 EMISSION BANDWIDTH

Reference

FCC: CFR Part 27.53(h)

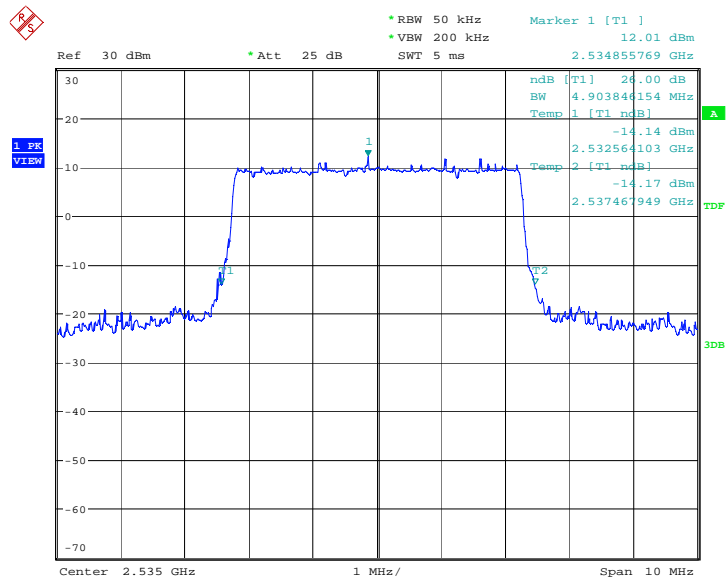
A.6.1 Emission Bandwidth Results

Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

LTE band 7, 5MHz (-26dBc)

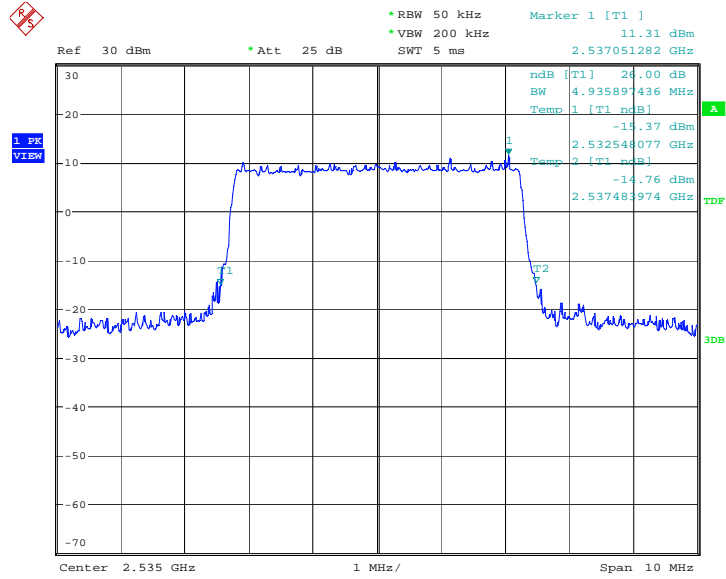
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	4903.85	4935.90

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



Date: 9.JAN.2014 10:43:30

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

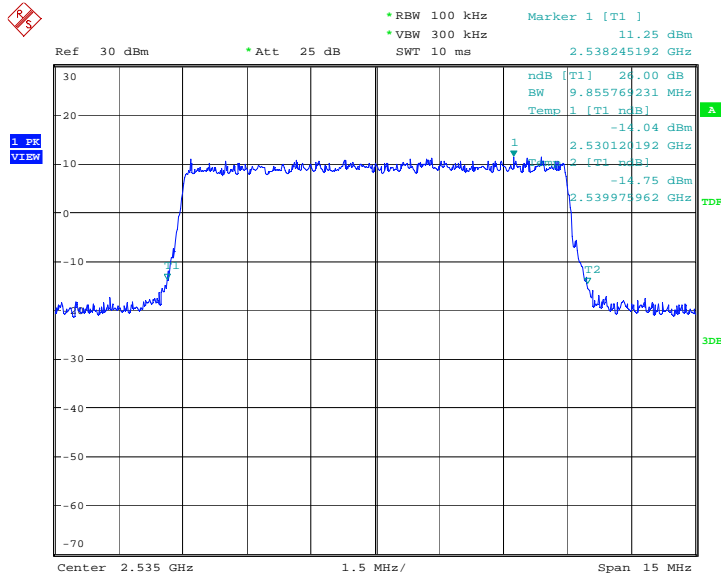


Date: 9.JAN.2014 10:43:46

LTE band 7, 10MHz (-26dBc)

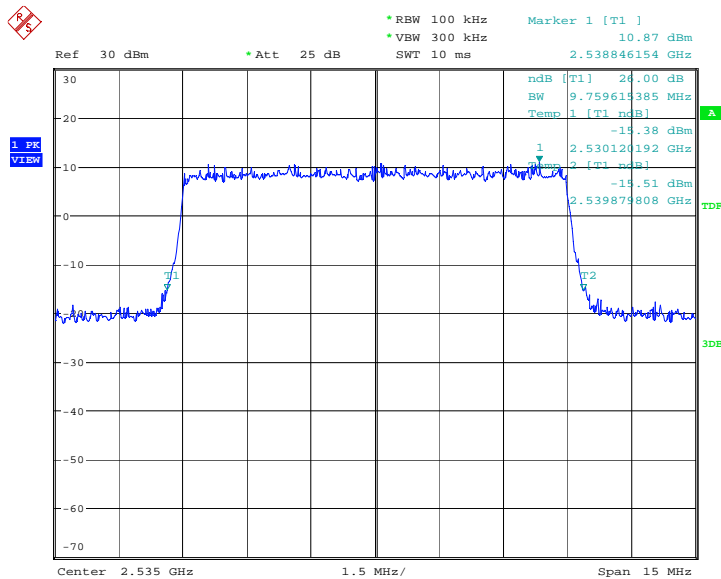
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	9855.77	9759.62

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



Date: 9.JAN.2014 10:52:25

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

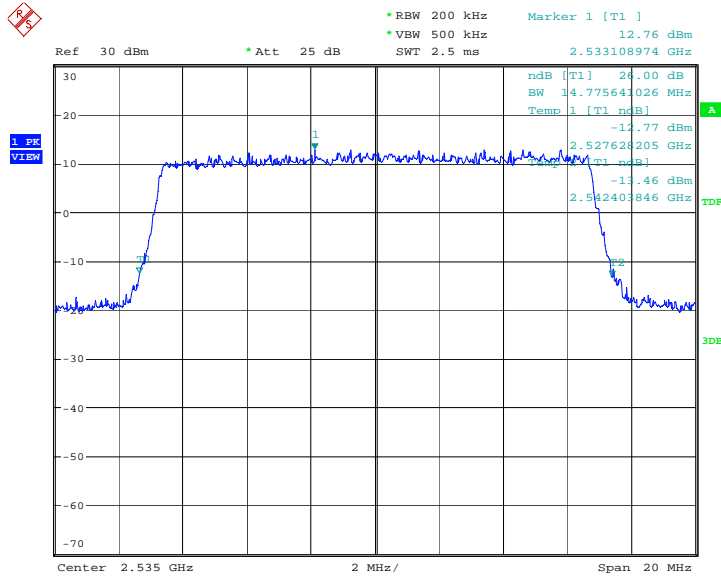


Date: 9.JAN.2014 10:52:41

LTE band 7, 15MHz (-26dBc)

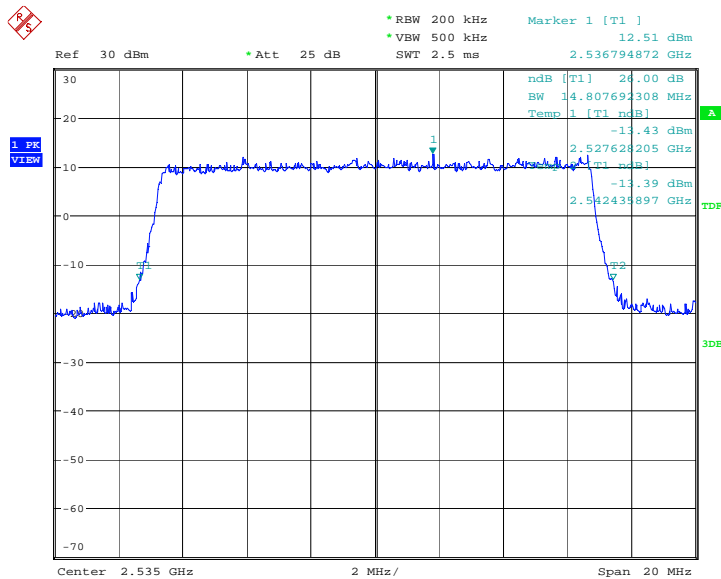
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	14775.64	14807.69

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



Date: 9.JAN.2014 11:01:54

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

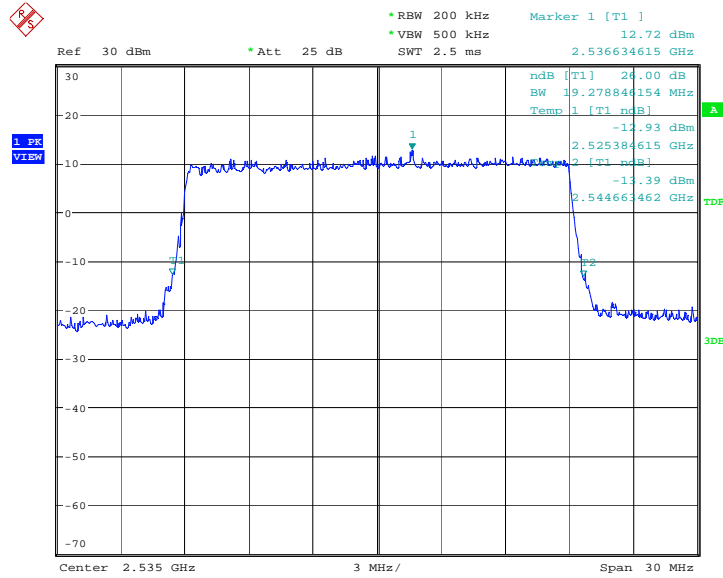


Date: 9.JAN.2014 11:02:10

LTE band 7, 20MHz (-26dBc)

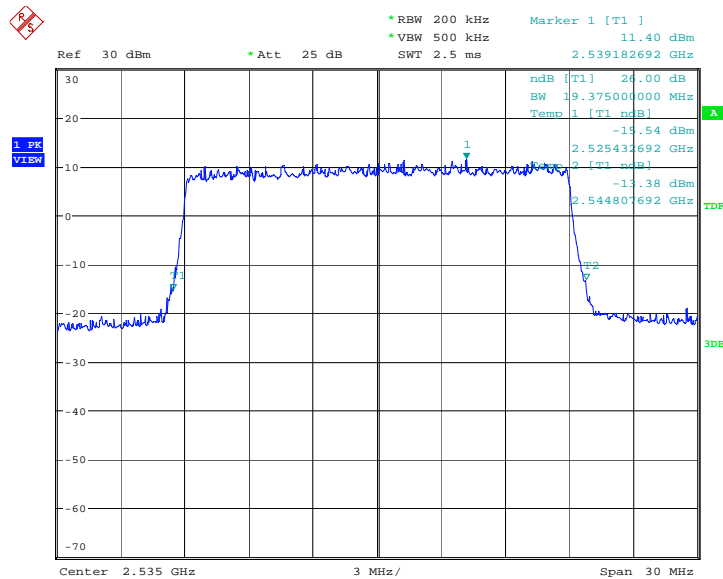
Frequency(MHz)	Occupied Bandwidth (-26dBc)(kHz)	
2535.0	QPSK	16QAM
	19278.85	19375.00

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



Date: 9.JAN.2014 11:16:57

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



Date: 9.JAN.2014 11:17:13

A.7 BAND EDGE COMPLIANCE

Reference

FCC: CFR Part 22.917(b), 24.238(a), 27.53(h).

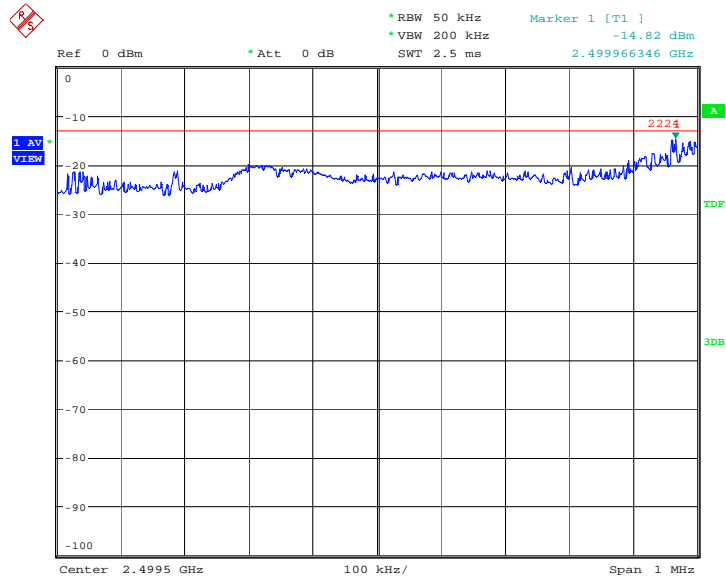
A.7.1 Measurement limit

On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43+10\text{Log}(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

A.7.2 Measurement result

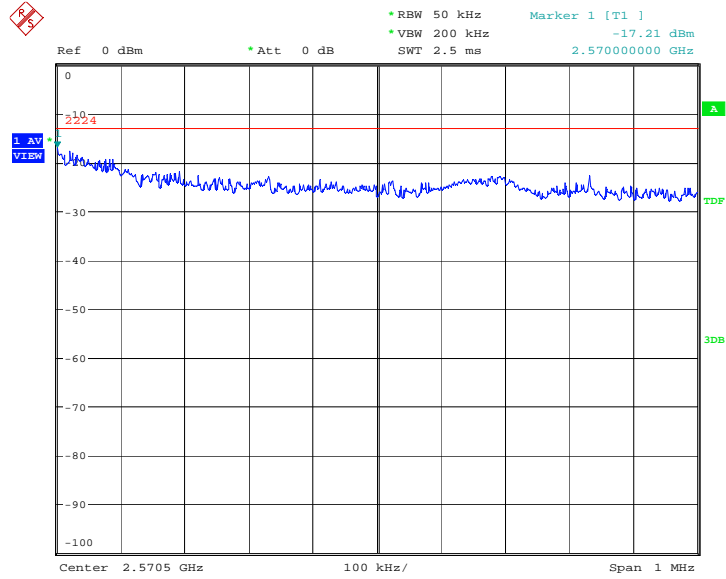
LTE band 7, 5MHz

LOW BAND EDGE BLOCK-QPSK



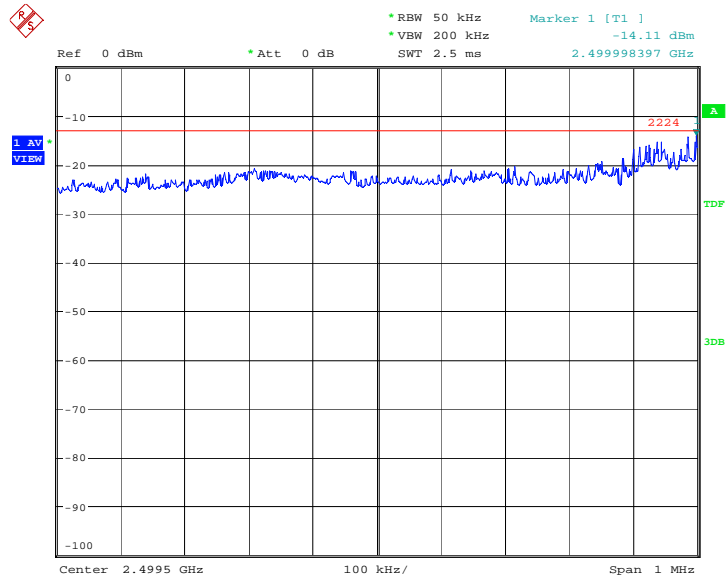
Date: 9.JAN.2014 10:42:24

HIGH BAND EDGE BLOCK-QPSK



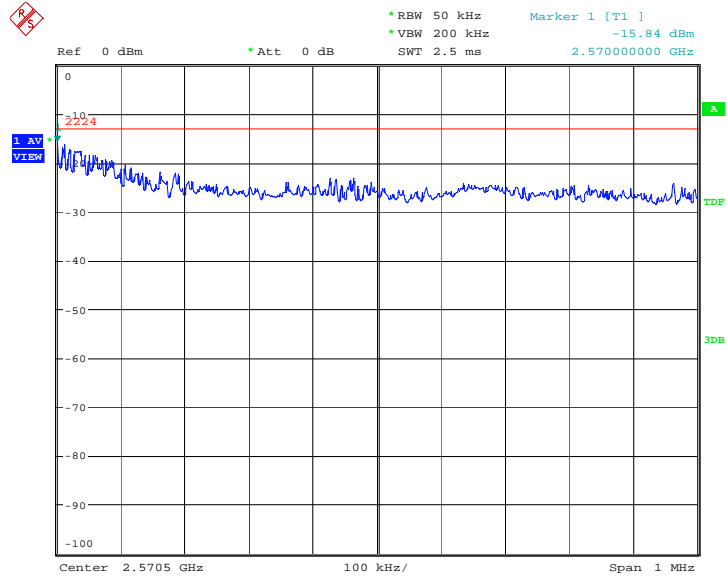
Date: 9.JAN.2014 10:45:45

LOW BAND EDGE BLOCK-16QAM



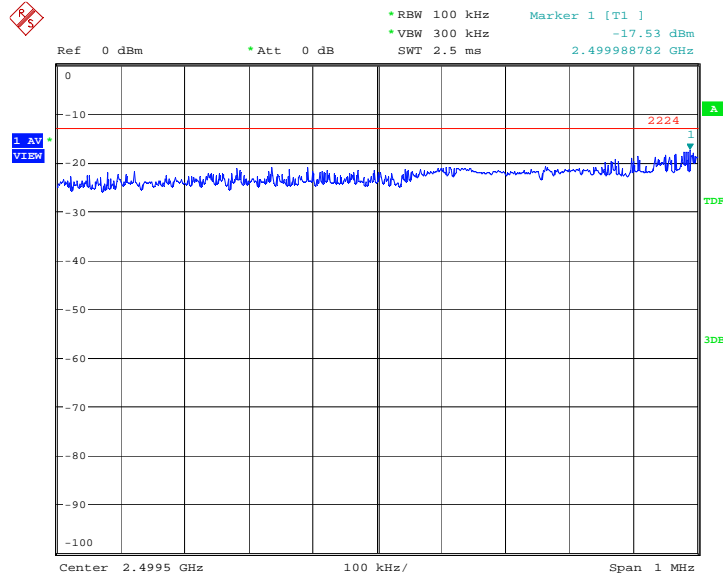
Date: 9.JAN.2014 10:42:35

HIGH BAND EDGE BLOCK-16QAM



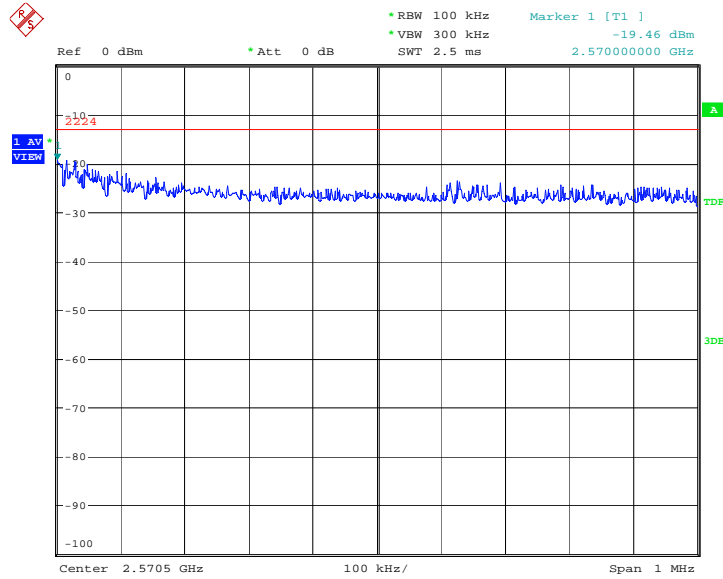
Date: 9.JAN.2014 10:45:56

**LTE band 7, 10MHz
LOW BAND EDGE BLOCK-QPSK**



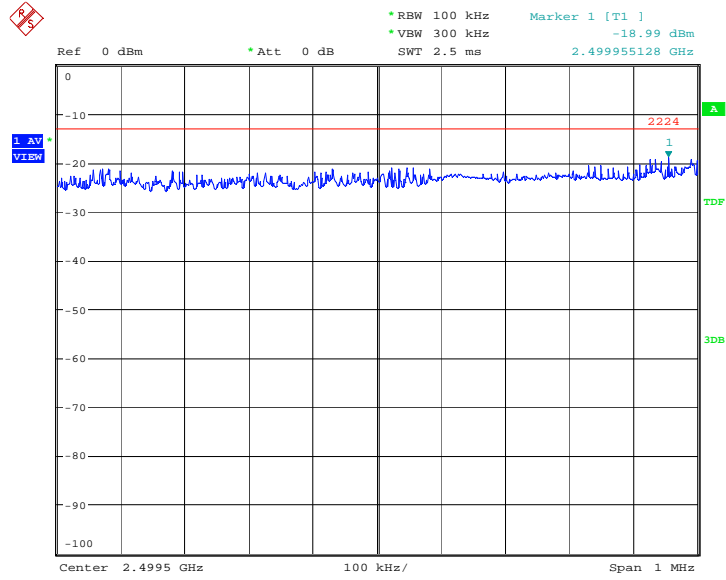
Date: 9.JAN.2014 10:51:20

HIGH BAND EDGE BLOCK-QPSK



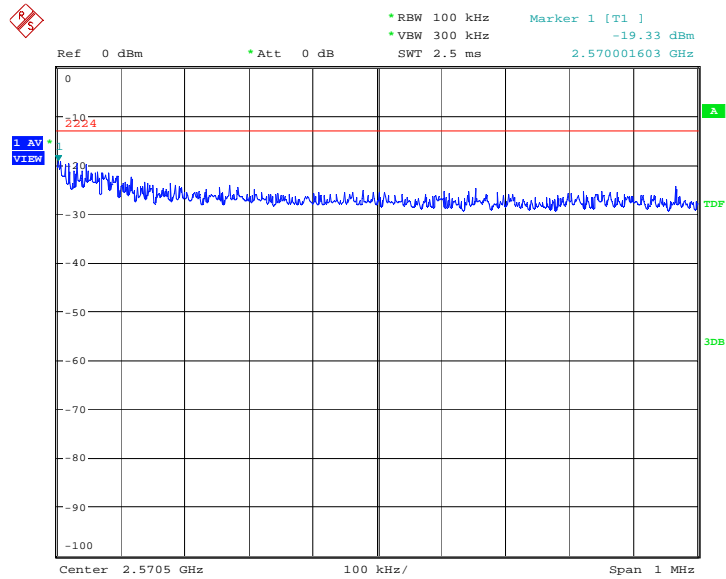
Date: 9.JAN.2014 10:54:40

LOW BAND EDGE BLOCK-16QAM



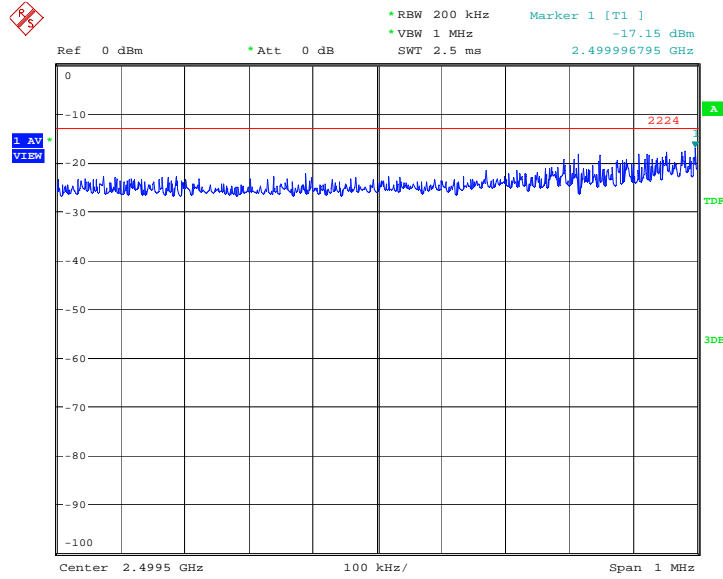
Date: 9.JAN.2014 10:51:30

HIGH BAND EDGE BLOCK-16QAM



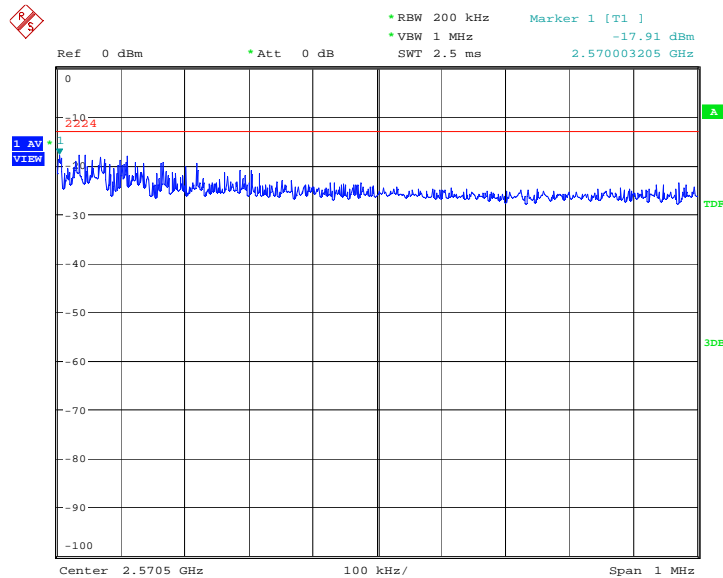
Date: 9.JAN.2014 10:54:50

**LTE band 7, 15MHz
LOW BAND EDGE BLOCK-QPSK**



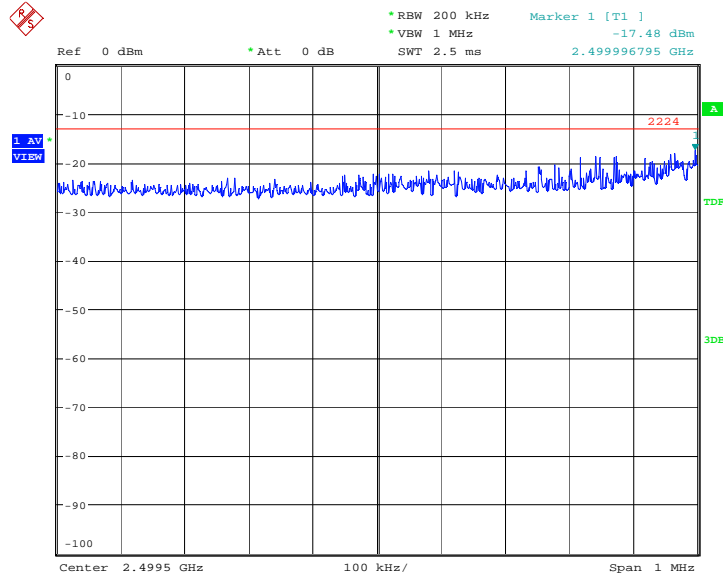
Date: 9.JAN.2014 11:00:19

HIGH BAND EDGE BLOCK-QPSK



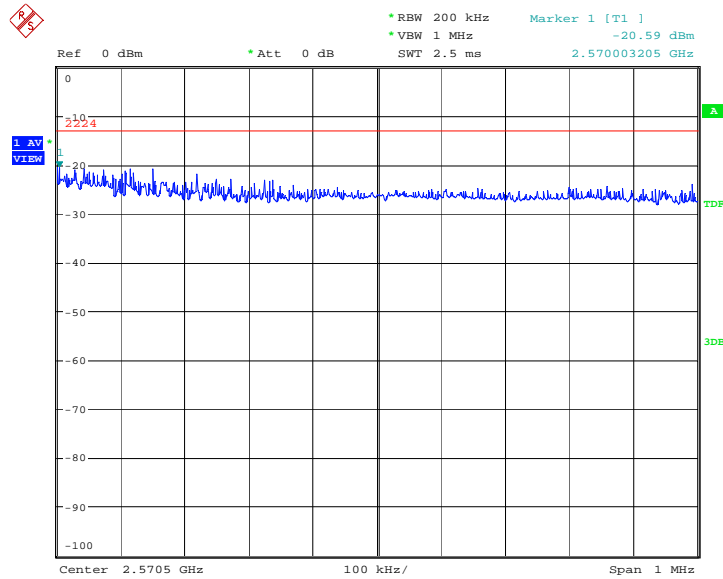
Date: 9.JAN.2014 11:04:39

LOW BAND EDGE BLOCK-16QAM



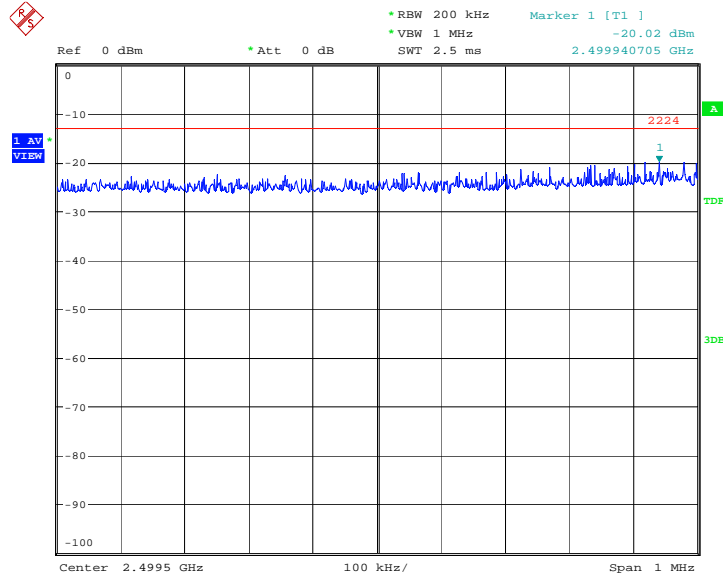
Date: 9.JAN.2014 11:00:29

HIGH BAND EDGE BLOCK-16QAM



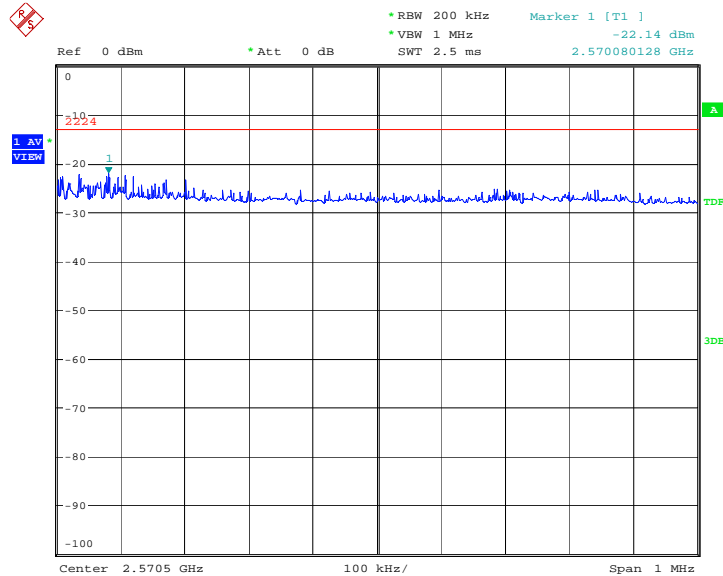
Date: 9.JAN.2014 11:04:50

**LTE band 7, 20MHz
LOW BAND EDGE BLOCK-QPSK**



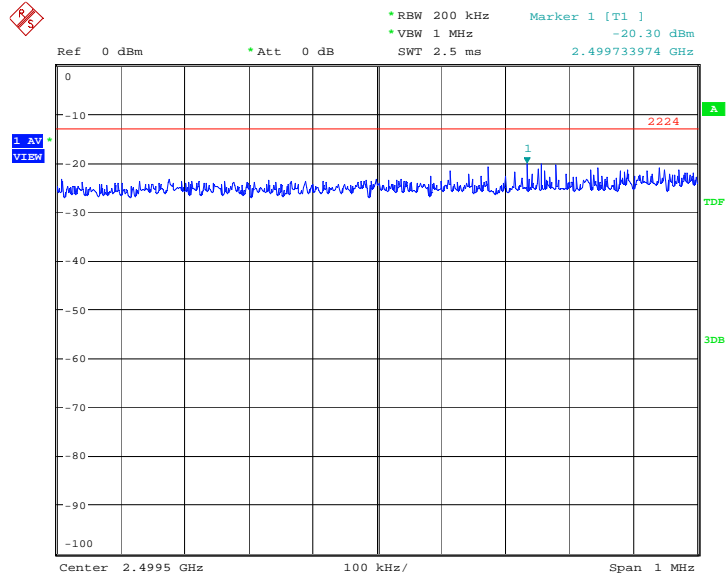
Date: 9.JAN.2014 11:14:52

HIGH BAND EDGE BLOCK-QPSK



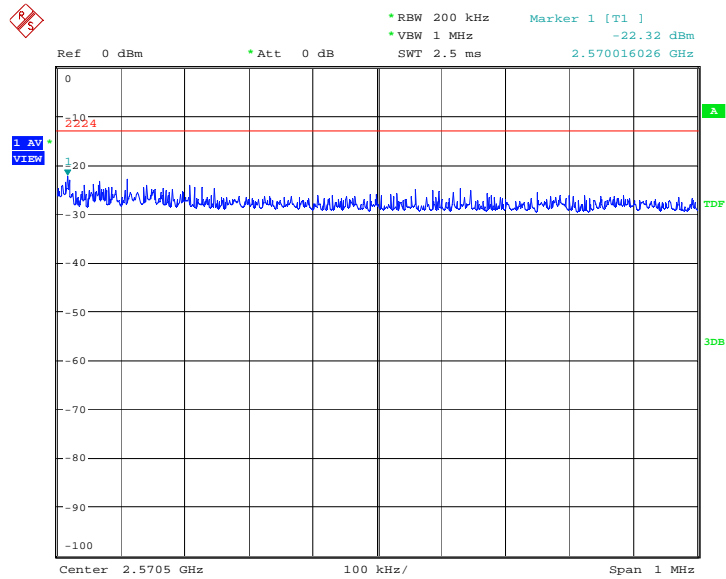
Date: 9.JAN.2014 11:20:13

LOW BAND EDGE BLOCK-16QAM



Date: 9.JAN.2014 11:15:02

HIGH BAND EDGE BLOCK-16QAM



Date: 9.JAN.2014 11:20:23

A.8 CONDUCTED SPURIOUS EMISSION

Reference

FCC: CFR Part 2.1057, 22.917, 24.238, 27.53(h).

A.8.1 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.

A. 8.2 Measurement Limit

Part 22.917, Part 24.238 and Part 27.53 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.

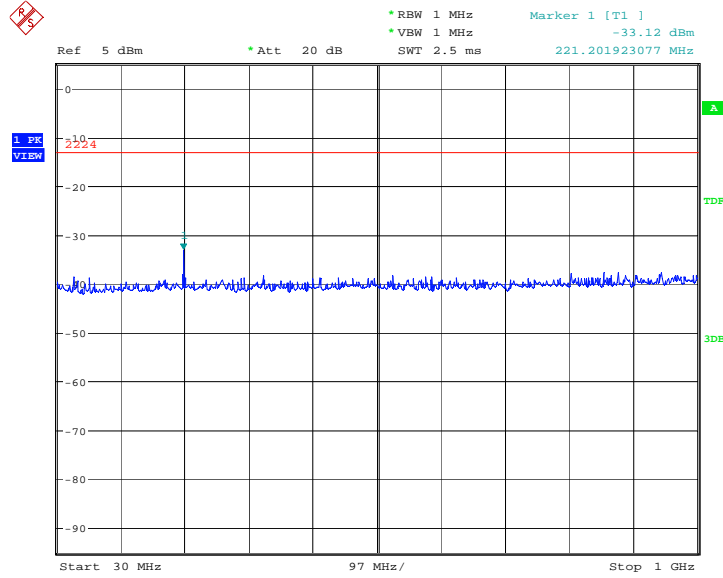
The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 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. 8.3 Measurement result

LTE band 7, 5MHz bandwidth

QPSK: 30MHz – 1GHz

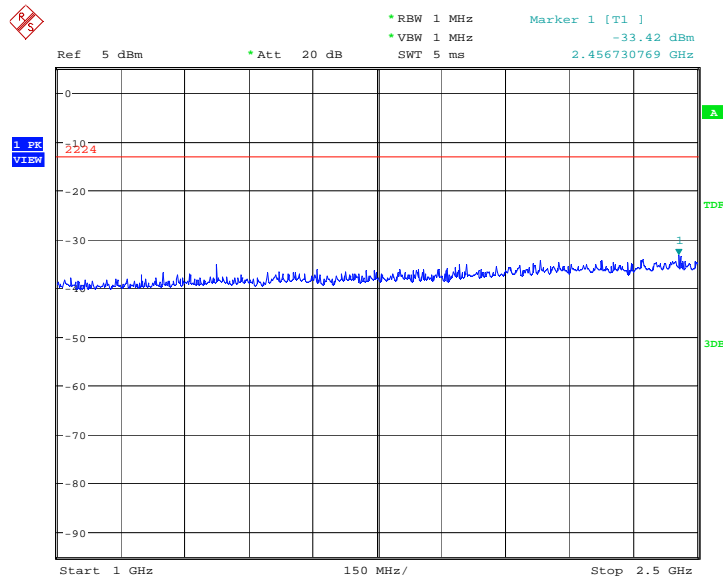
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:26:04

QPSK: 1GHz – 2.5GHz

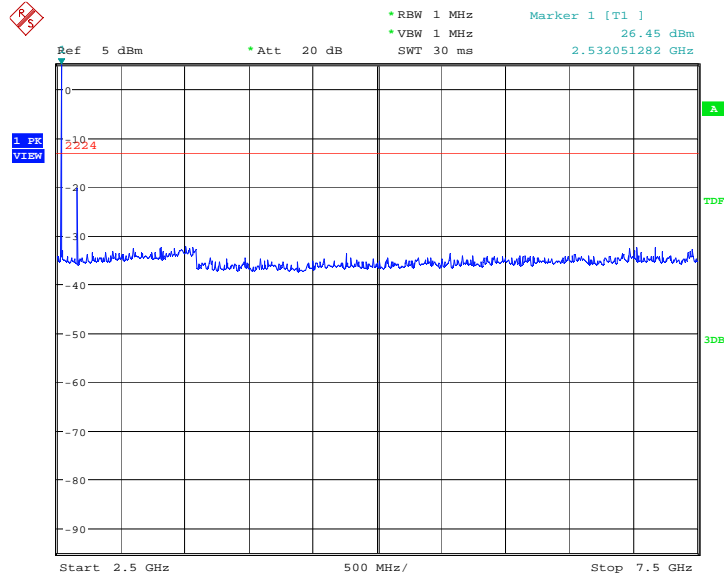
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:26:12

QPSK: 2.5GHz – 7.5GHz

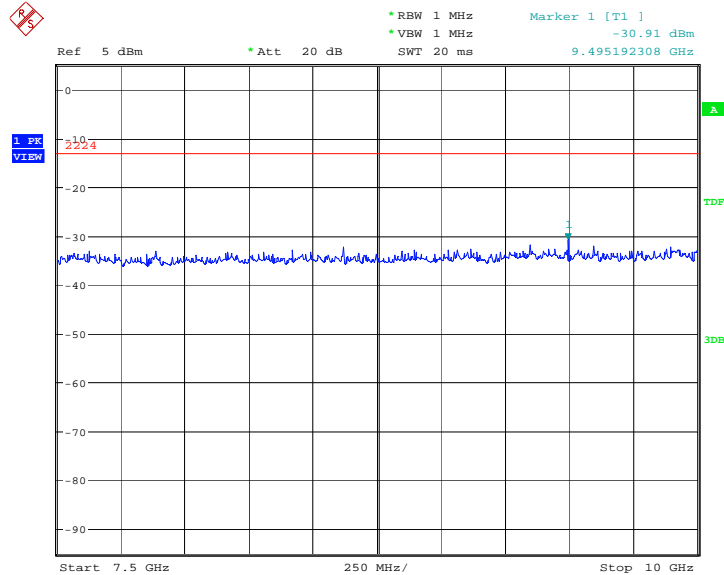
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:26:20

QPSK: 7.5GHz – 10GHz

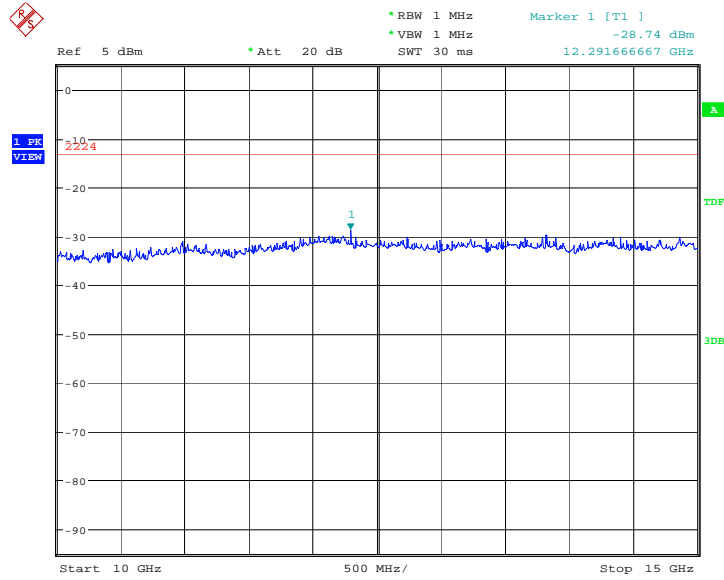
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:26:28

QPSK: 10GHz –15GHz

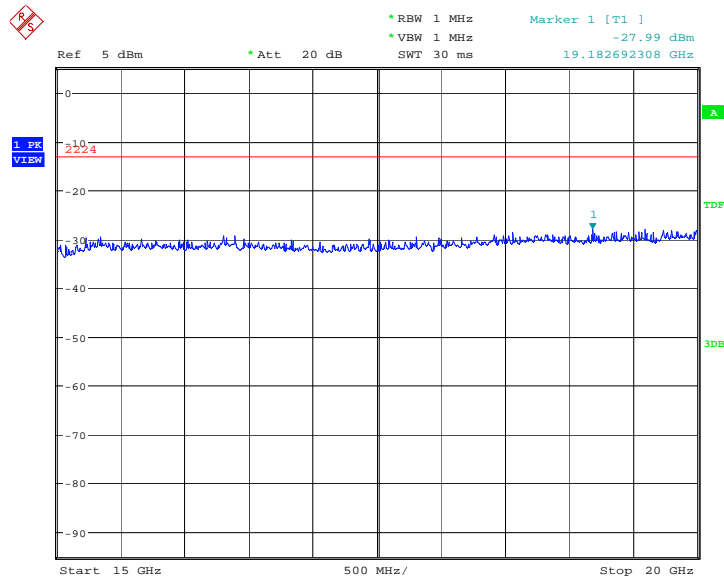
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:26:36

QPSK: 15GHz –20GHz

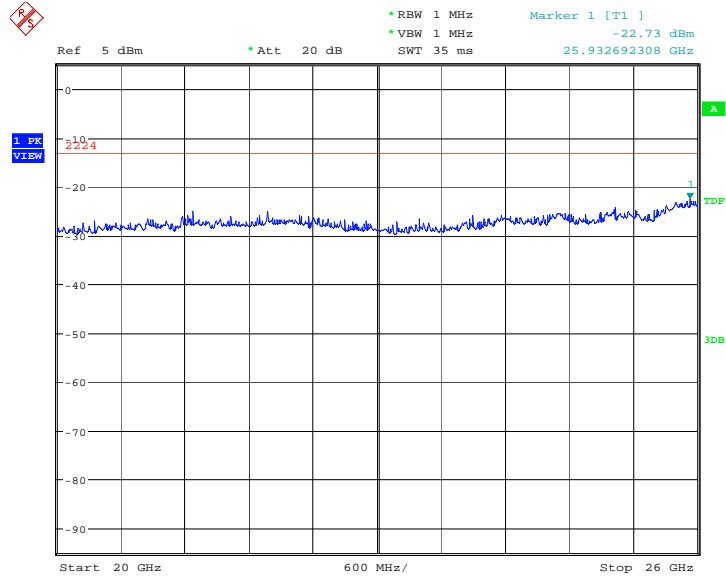
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:26:44

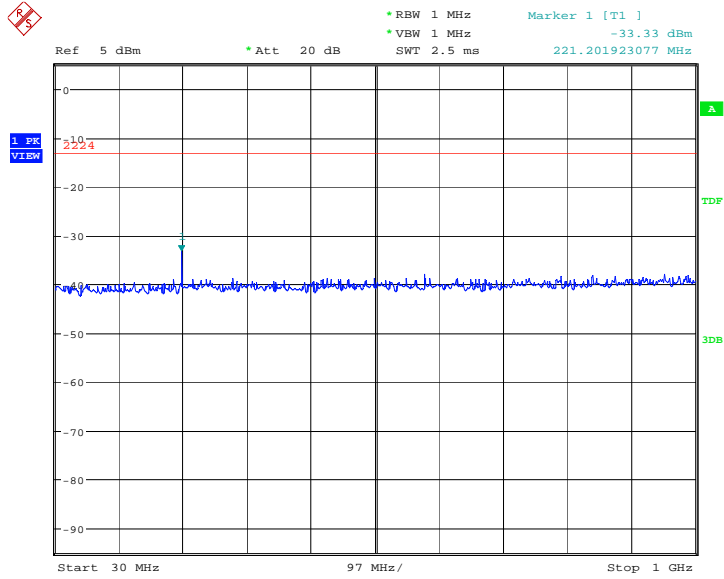
QPSK: 20GHz –26GHz

Spurious emission limit –13dBm.



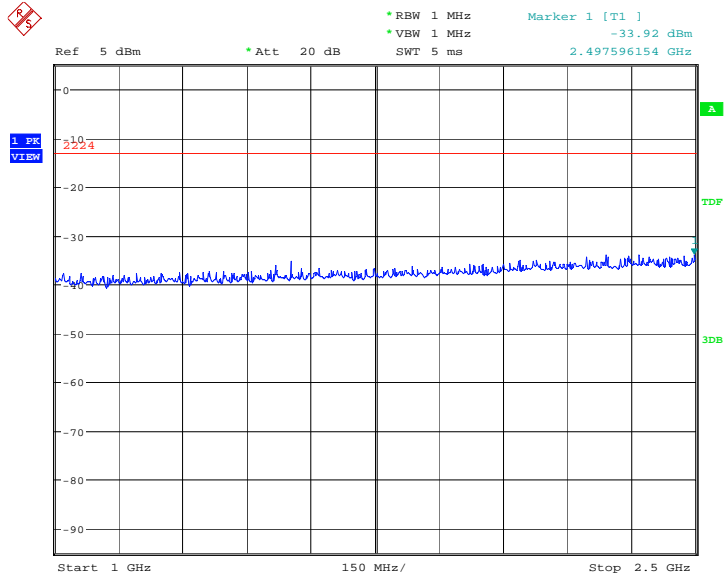
Date: 9.JAN.2014 11:26:52

16QAM: 30MHz – 1GHz
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:01

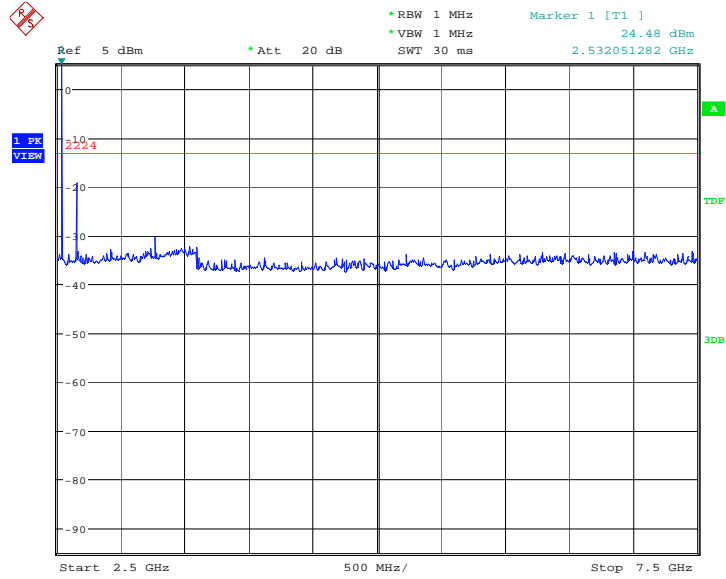
16QAM: 1GHz – 2.5GHz
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:09

16QAM: 2.5GHz – 7.5GHz

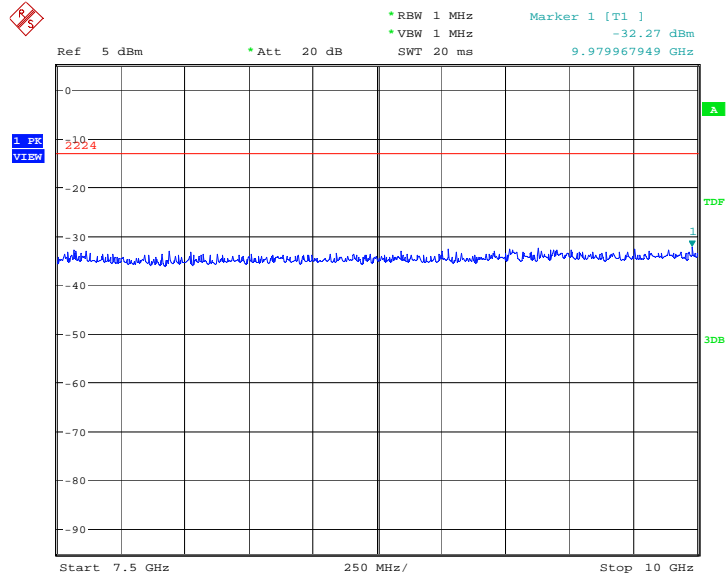
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:17

16QAM: 7.5GHz – 10GHz

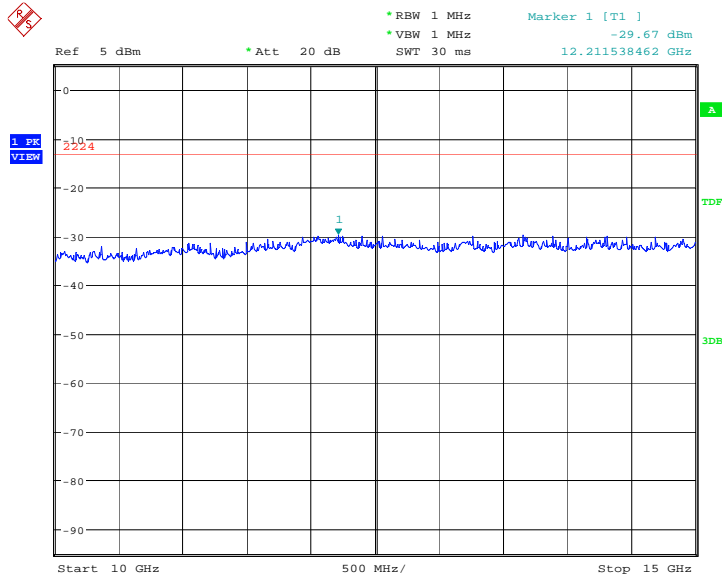
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:25

16QAM: 10GHz –15GHz

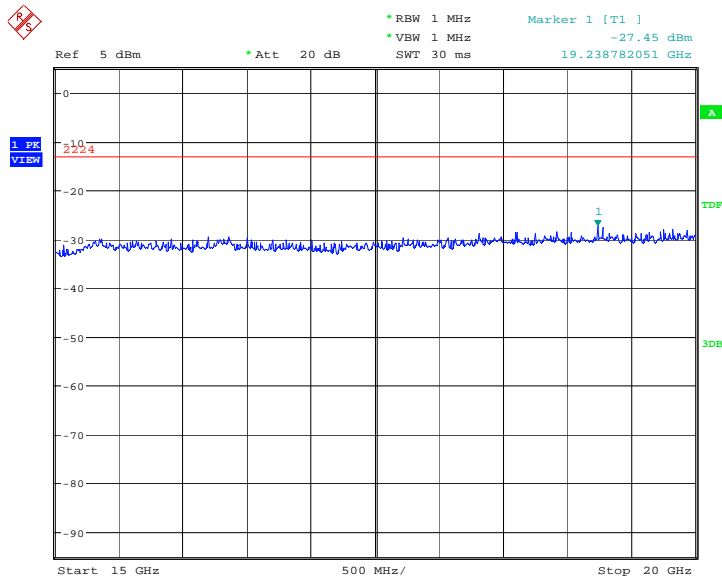
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:33

16QAM: 15GHz –20GHz

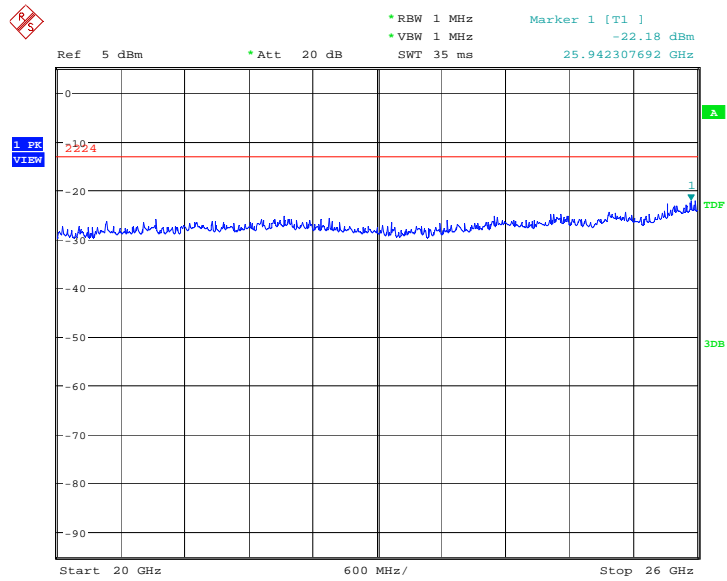
Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:41

16QAM: 20GHz –26GHz

Spurious emission limit –13dBm.



Date: 9.JAN.2014 11:28:49

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