



FCC RF Test Report

APPLICANT : Motorola Mobility, LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : 4054
FCC ID : IHDT56QD1
STANDARD : FCC 47 CFR Part 2, and 90(S)
CLASSIFICATION : PCS Licensed Transmitter Held to Ear (PCE)

The product was received on Aug. 06, 2014 and testing was completed on Sep. 15, 2014. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI / TIA / EIA-603-C-2004 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FW480670B	Rev. 01	Initial issue of report	Sep. 30, 2014



SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	N/A (Reporting only)	PASS	-
3.2	§2.1049 §90.209	Occupied Bandwidth and 26dB Bandwidth	N/A (Reporting only)	PASS	-
3.3	§2.1051 §90.691	Emission masks – In-band emissions	$< 50 + 10 \log_{10}(P[\text{Watts}])$	PASS	-
3.4	§2.1051 §90.691	Emission masks – Out of band emissions	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	-
3.5	§2.1053 §90.691	Field Strength of Spurious Radiation	$< 43 + 10 \log_{10}(P[\text{Watts}])$	PASS	Under limit 35.46 dB at 2470.000 MHz
3.6	§2.1055 §90.213	Frequency Stability for Temperature & Voltage	$< 2.5 \text{ ppm}$	PASS	-



1 General Description

1.1 Applicant

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

1.2 Manufacturer

Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800, Chicago, IL 60654, United States

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	4054
FCC ID	IHDT56QD1
IMEI Code	990005300005858
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE/NFC
	2.4GHz WLAN 11b/g/n HT20 WLAN 11ac VHT20
	5GHz WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80
	Bluetooth v3.0 EDR
	Bluetooth v4.0 - LE
HW Version	P2
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Accessory List	
AC Adapter	Brand Name : Motorola
	Model Name : SPN5864A
USB Cable	Brand Name : Motorola
	Model Name : SKN6448A
Battery	Brand Name : LG
	Model Name : EZ30
Earphone	Brand Name : Motorola
	Model Name : SJYN1305A

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	814.7 ~ 823.3 MHz
Rx Frequency	859.7 ~ 868.3 MHz
Bandwidth	1.4MHz / 3MHz / 5MHz / 10MHz
Maximum Output Power to Antenna	23.20 dBm
Antenna Type	Fixed Internal Antenna
Type of Modulation	QPSK / 16QAM

Remark: This test report recorded only product characteristics and test results of PCS Licensed Transmitter Held to Ear (PCE).

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Maximum Frequency Tolerance and Emission Designator

FCC Rule	System	Type of Modulation	BW	Emission Designator	Frequency Tolerance (ppm)
Part 90S	LTE Band 26	QPSK	1.4 MHz	1M09G7D	-
Part 90S	LTE Band 26	16QAM	1.4 MHz	1M10W7D	-
Part 90S	LTE Band 26	QPSK	3 MHz	2M67G7D	-
Part 90S	LTE Band 26	16QAM	3 MHz	2M68W7D	-
Part 90S	LTE Band 26	QPSK	5 MHz	4M50G7D	-
Part 90S	LTE Band 26	16QAM	5 MHz	4M49W7D	-
Part 90S	LTE Band 26	QPSK	10 MHz	8M95G7D	0.0112 ppm
Part 90S	LTE Band 26	16QAM	10 MHz	8M93W7D	-

1.7 Testing Site

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH02-HY	03CH07-HY

1.8 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR Part 2, 90
- ANSI / TIA / EIA-603-C-2004
- FCC KDB 971168 D01 Power Meas. License Digital Systems v02r01
- KDB 648474 D03 Handset Wireless Chargers Battery Covers v01r02

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



2 Test Configuration of Equipment Under Test

2.1 Test Mode

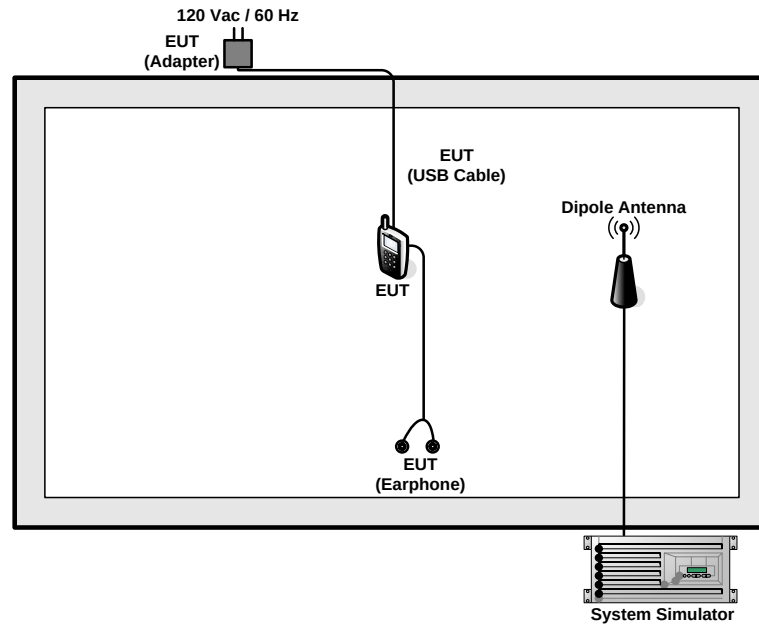
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission is 30 MHz to 9000 MHz.

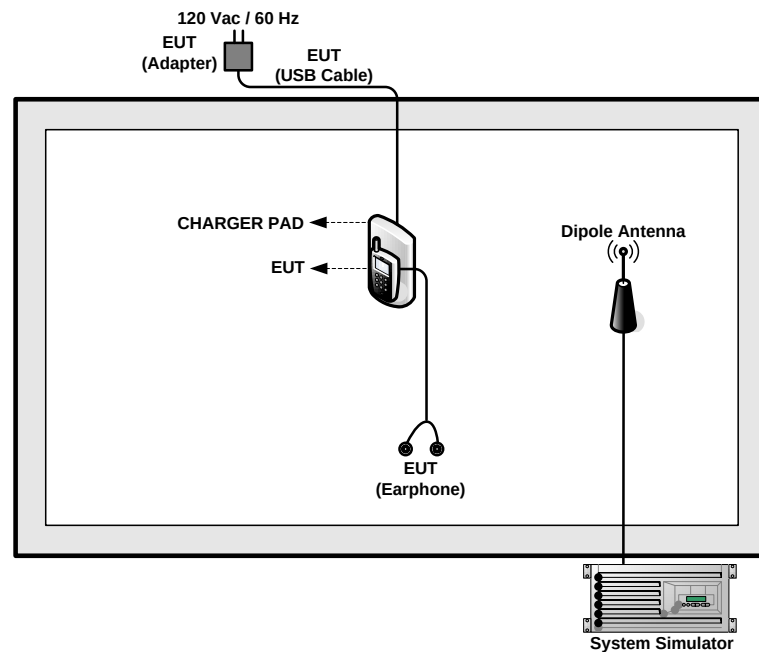
Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	26	v	v	v	v	-	-	v	v	v	v	v	v	v	v
26dB and 99% Bandwidth	26	v	v	v	v	-	-	v	v			v	v	v	v
Emission masks In-band emissions	26	v	v	v	v	-	-	v	v	v		v	v		v
Emission masks – Out of band emissions	26	v	v	v	v	-	-	v	v	v			v	v	v
Frequency Stability	26				v	-	-	v				v		v	
Radiated Spurious Emission	26	v	v	v	v	-	-	v		v			v	v	v
Note	1. The mark “v” means that this configuration is chosen for testing 2. The mark “-” means that this bandwidth is not supported. 3. Wireless charger configuration was evaluated.														

2.2 Connection Diagram of Test System

<EUT with Adapter Mode>



<EUT with CHARGER PAD Mode>



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	Wireless Charger	Samsung	E9-91001EWE	A3LEPP100IJWU		N/A

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example :

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to enforce EUT transmitting at the maximum power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

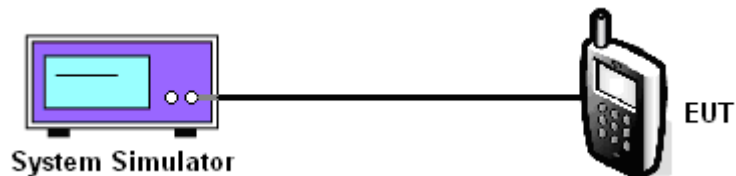
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.

3.1.4 Test Setup





3.1.5 Test Result of Conducted Output Power

<LTE Band 26 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power (dBm) Low Ch. / Freq.	Power (dBm) Middle Ch. / Freq.	Power (dBm) High Ch. / Freq.
Channel					26740	
Frequency (MHz)					819	
10	QPSK	1	0		23.20	
10	QPSK	1	24		23.03	
10	QPSK	1	49		23.13	
10	QPSK	25	0		22.19	
10	QPSK	25	12		22.05	
10	QPSK	25	24		22.11	
10	QPSK	50	0		22.08	
10	16QAM	1	0		21.91	
10	16QAM	1	24		22.05	
10	16QAM	1	49		21.98	
10	16QAM	25	0		20.97	
10	16QAM	25	12		21.04	
10	16QAM	25	24		20.99	
10	16QAM	50	0		20.94	
Channel				26715	26740	26765
Frequency (MHz)				816.5	819	821.5
5	QPSK	1	0	23.06	23.07	23.09
5	QPSK	1	12	23.08	23.06	23.07
5	QPSK	1	24	23.13	23.10	23.10
5	QPSK	12	0	22.10	22.11	22.10
5	QPSK	12	6	22.09	22.06	22.06
5	QPSK	12	11	22.12	22.06	22.13
5	QPSK	25	0	22.00	22.10	22.12
5	16QAM	1	0	22.02	21.98	22.02
5	16QAM	1	12	22.06	22.02	21.98
5	16QAM	1	24	21.99	22.03	22.05
5	16QAM	12	0	21.03	21.03	21.06
5	16QAM	12	6	21.03	21.04	21.06
5	16QAM	12	11	21.06	21.05	21.05
5	16QAM	25	0	21.04	21.02	21.05



BW [MHz]	Modulation	RB Size	RB Offset	Power (dBm) Low Ch. / Freq.	Power (dBm) Middle Ch. / Freq.	Power (dBm) High Ch. / Freq.
Channel				26705	26740	26775
Frequency (MHz)				815.5	819	822.5
3	QPSK	1	0	23.04	23.10	23.09
3	QPSK	1	7	23.05	23.08	23.08
3	QPSK	1	14	23.07	23.07	23.11
3	QPSK	8	0	22.10	22.10	22.11
3	QPSK	8	4	22.07	22.06	22.07
3	QPSK	8	7	22.08	22.09	22.10
3	QPSK	15	0	22.08	22.10	22.15
3	16QAM	1	0	21.94	21.99	22.04
3	16QAM	1	7	21.97	21.99	22.02
3	16QAM	1	14	22.04	22.05	22.02
3	16QAM	8	0	21.03	21.05	21.02
3	16QAM	8	4	21.04	21.03	21.06
3	16QAM	8	7	21.03	21.04	21.08
3	16QAM	15	0	20.98	21.02	21.04
Channel				26697	26740	26783
Frequency (MHz)				814.7	819	823.3
1.4	QPSK	1	0	23.12	23.14	23.17
1.4	QPSK	1	2	23.11	23.11	23.16
1.4	QPSK	1	5	23.12	23.14	23.14
1.4	QPSK	3	0	23.15	23.16	23.14
1.4	QPSK	3	1	23.12	23.11	23.16
1.4	QPSK	3	2	23.11	23.13	23.18
1.4	QPSK	6	0	22.11	22.13	22.17
1.4	16QAM	1	0	22.04	22.04	22.08
1.4	16QAM	1	2	22.03	22.04	22.08
1.4	16QAM	1	5	22.02	22.08	22.08
1.4	16QAM	3	0	22.08	22.11	22.10
1.4	16QAM	3	1	22.04	22.07	22.10
1.4	16QAM	3	2	22.07	22.08	22.08
1.4	16QAM	6	0	20.96	20.97	21.00

Note: Maximum average power for LTE.

3.2 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.2.1 Description of (Occupied) Bandwidth Limitations Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

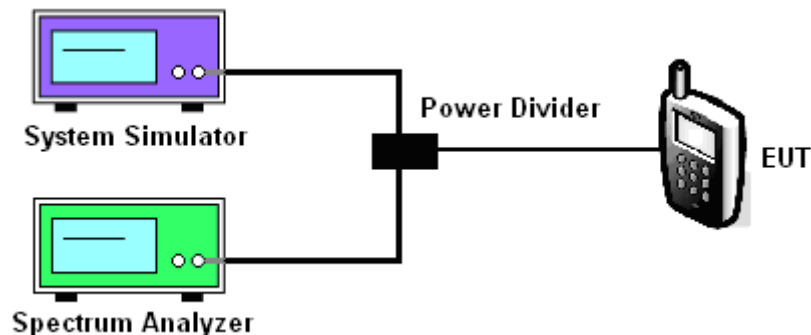
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

3.2.4 Test Setup

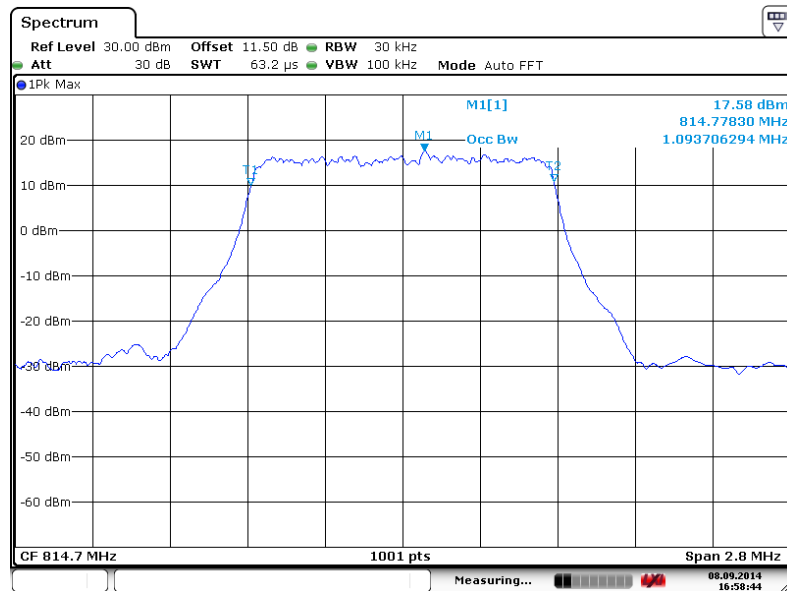




3.2.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth

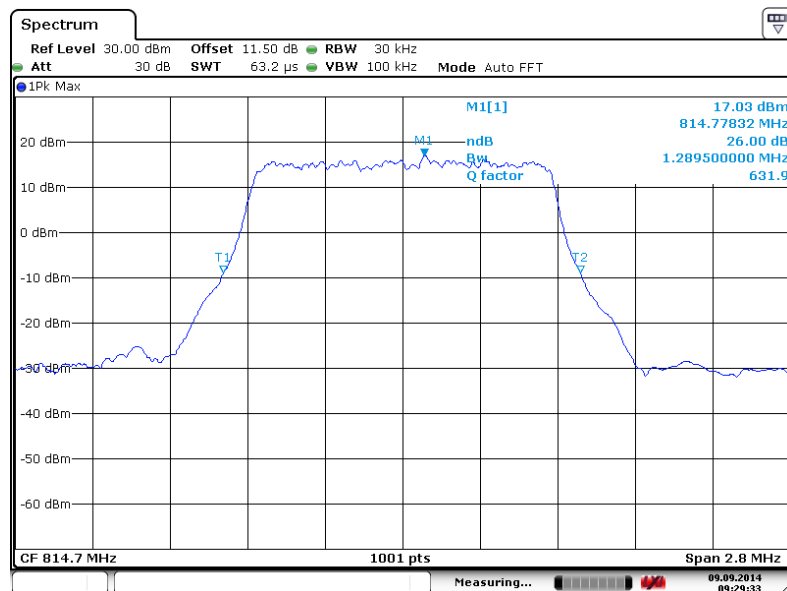
Band :	LTE Band 26	BW / Mod. :	1.4MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26697



Date: 8.SEP.2014 16:58:44

26dB Bandwidth Plot on Channel 26697

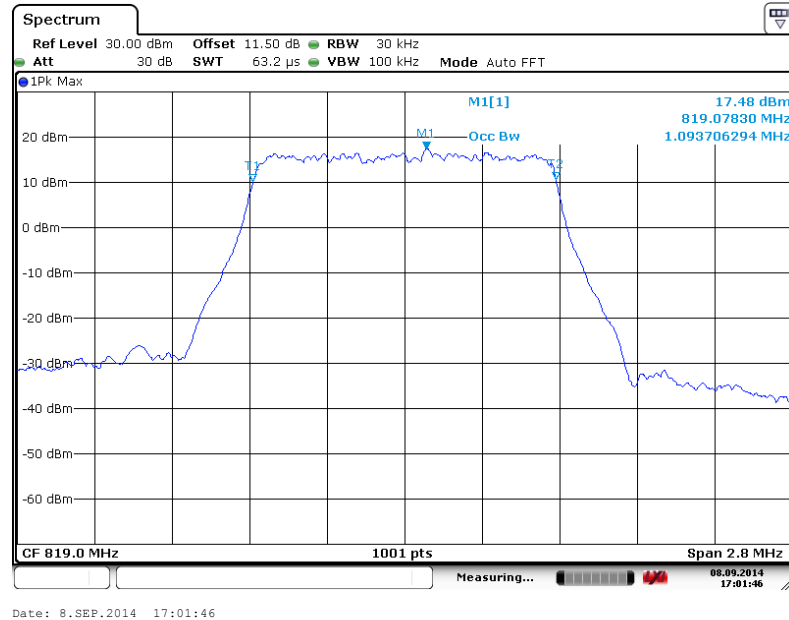


Date: 9.SEP.2014 09:29:33

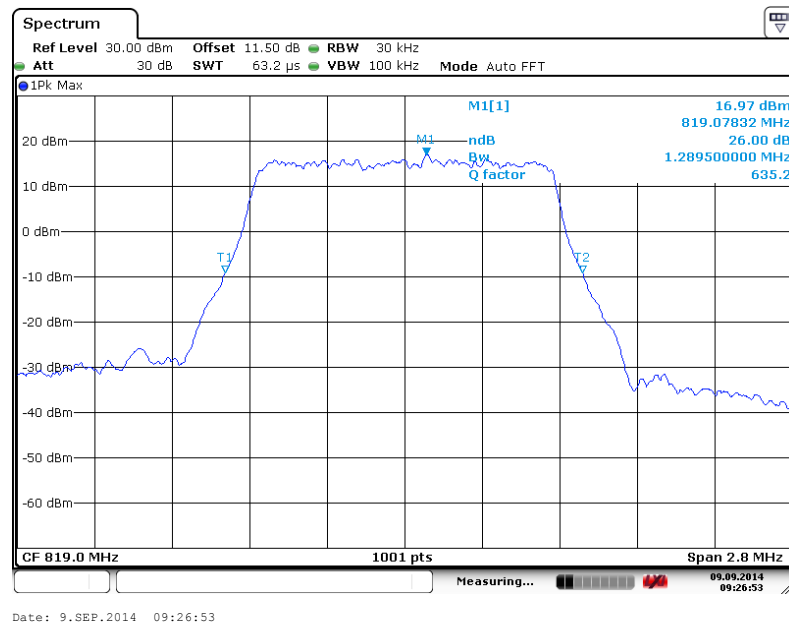


Band :	LTE Band 26	BW / Mod. :	1.4MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26740



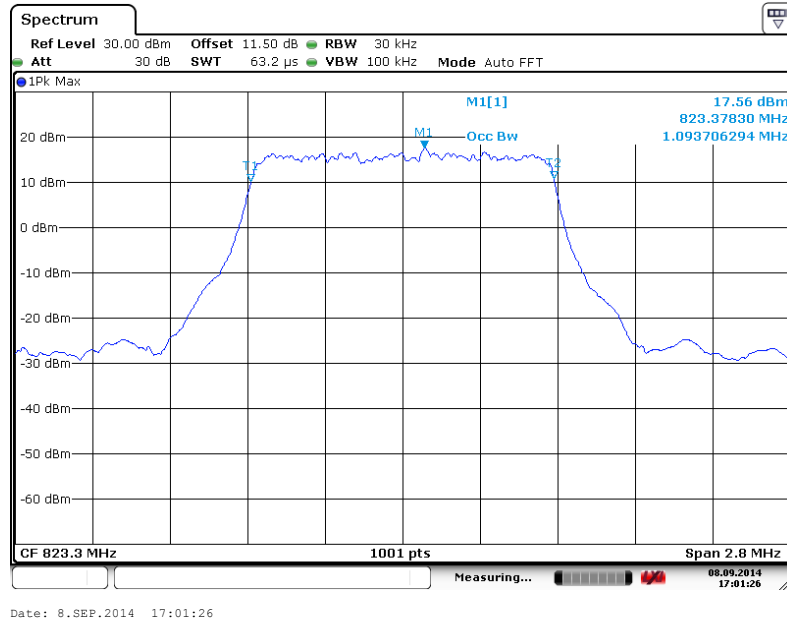
26dB Bandwidth Plot on Channel 26740



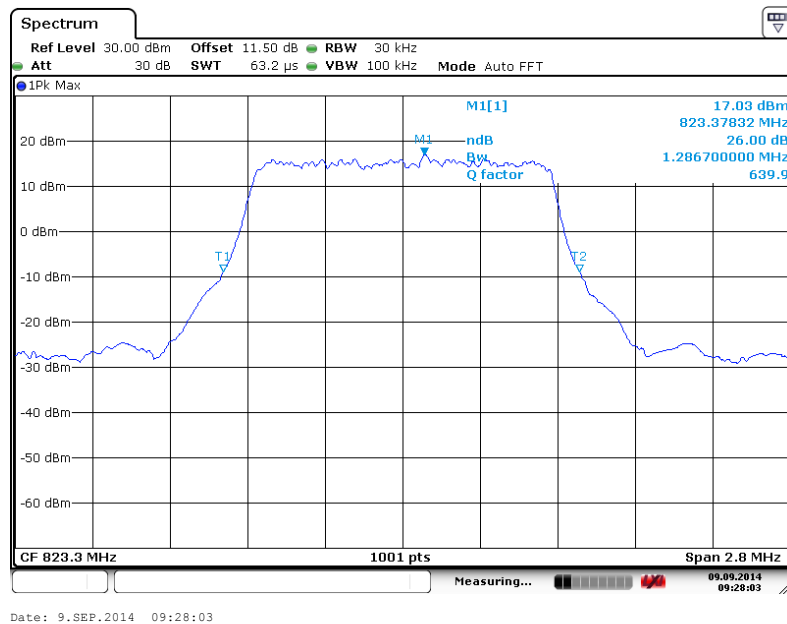


Band :	LTE Band 26	BW / Mod. :	1.4MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26783



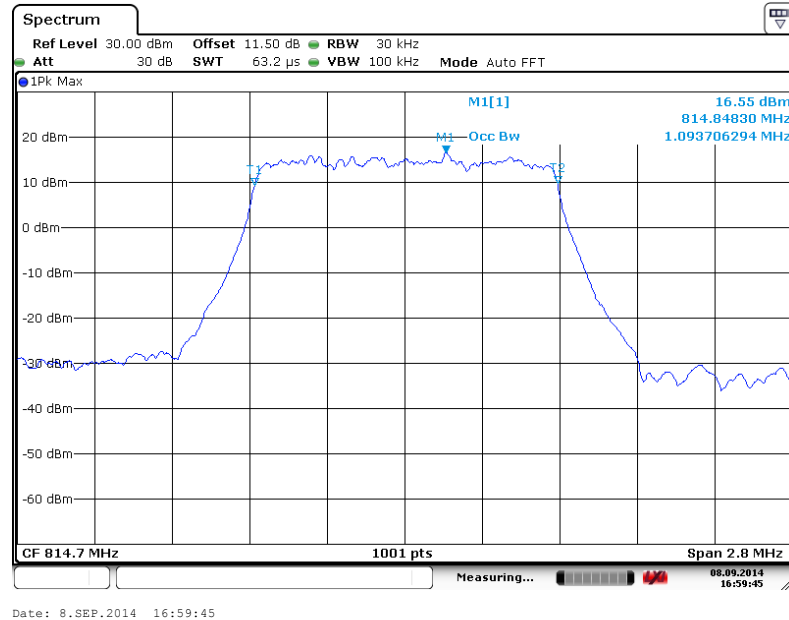
26dB Bandwidth Plot on Channel 26783



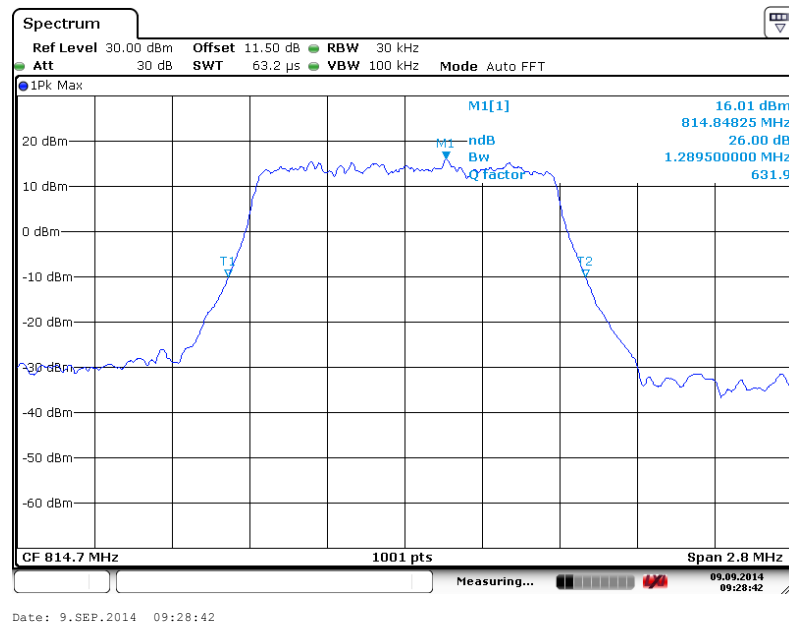


Band :	LTE Band 26	BW / Mod. :	1.4MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26697



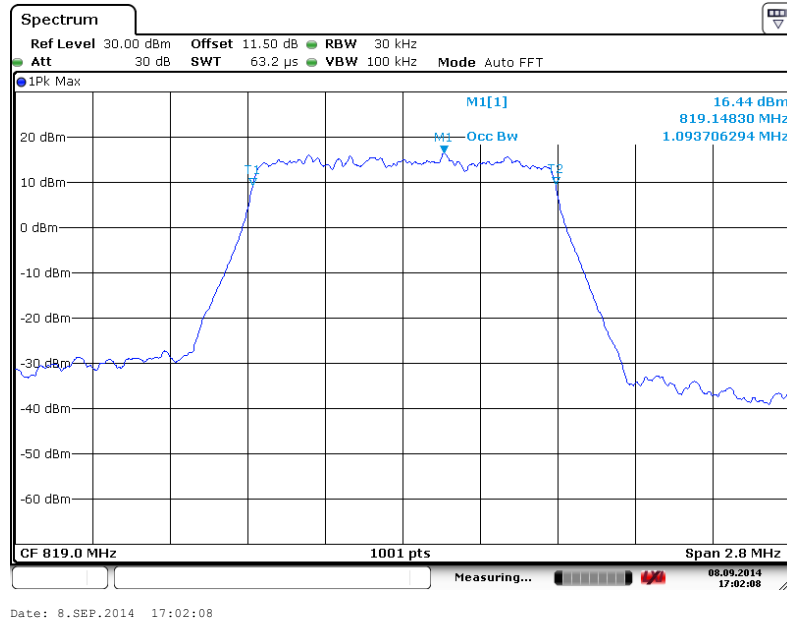
26dB Bandwidth Plot on Channel 26697



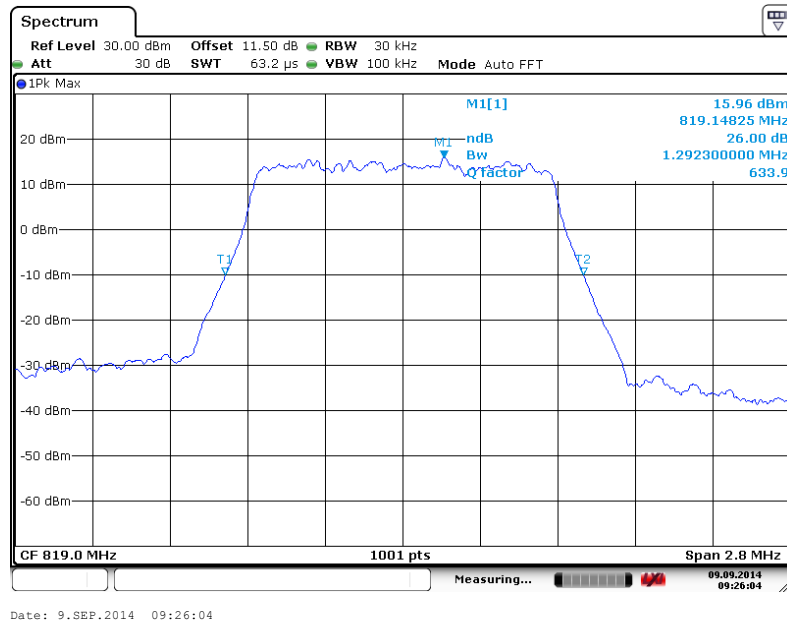


Band :	LTE Band 26	BW / Mod. :	1.4MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26740



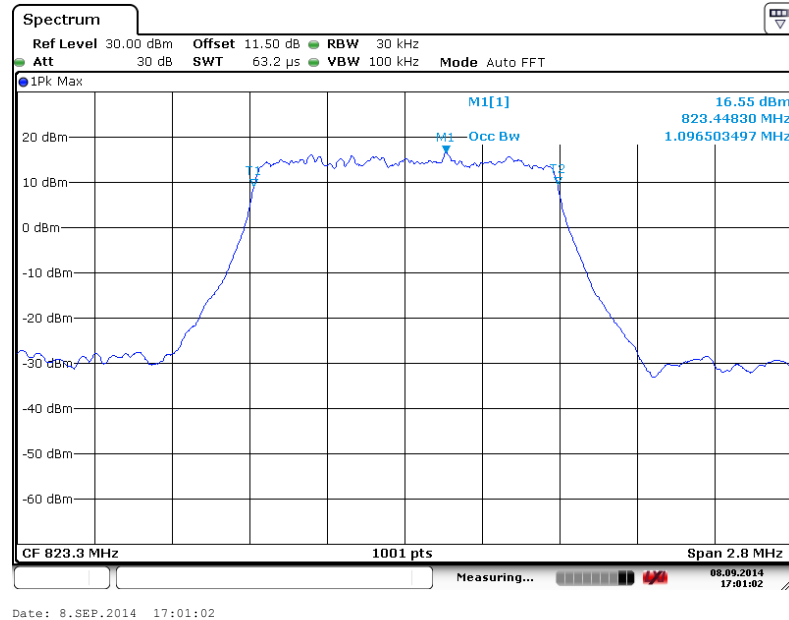
26dB Bandwidth Plot on Channel 26740



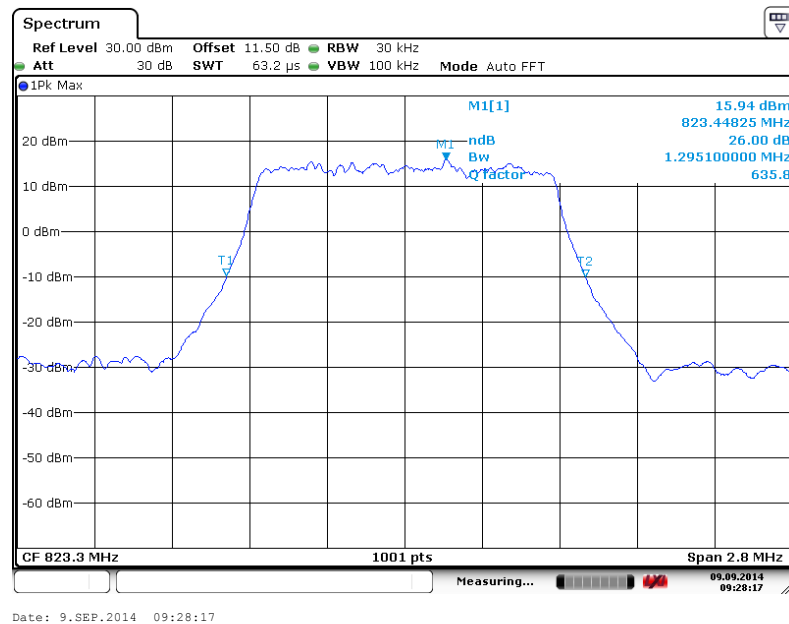


Band :	LTE Band 26	BW / Mod. :	1.4MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26783



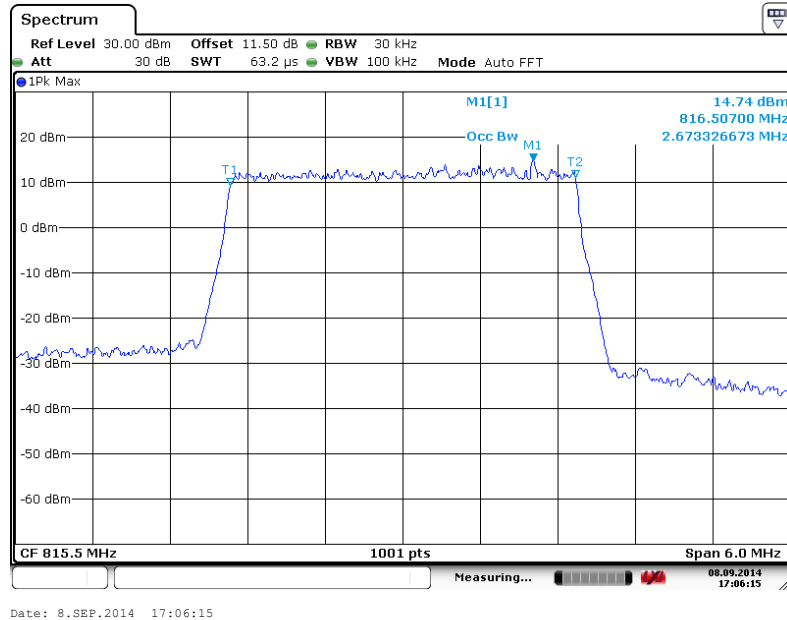
26dB Bandwidth Plot on Channel 26783



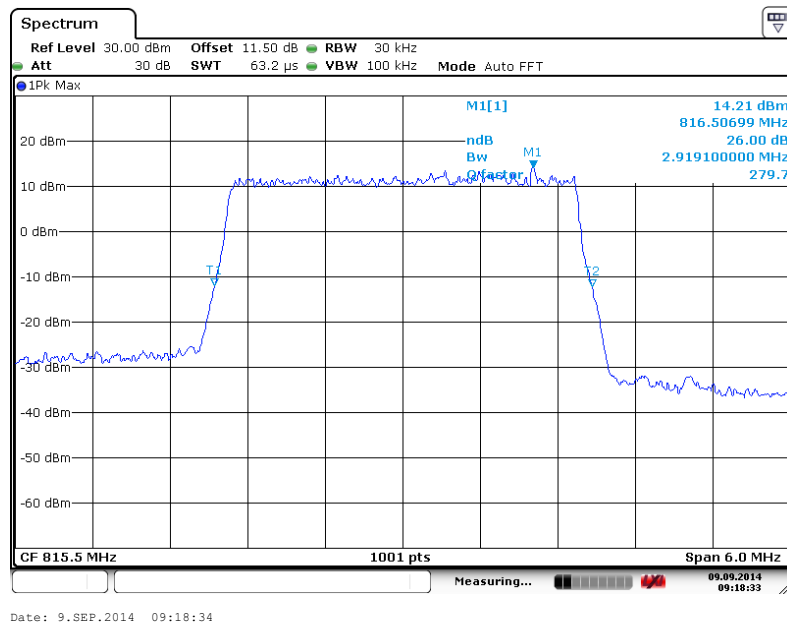


Band :	LTE Band 26	BW / Mod. :	3MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26705



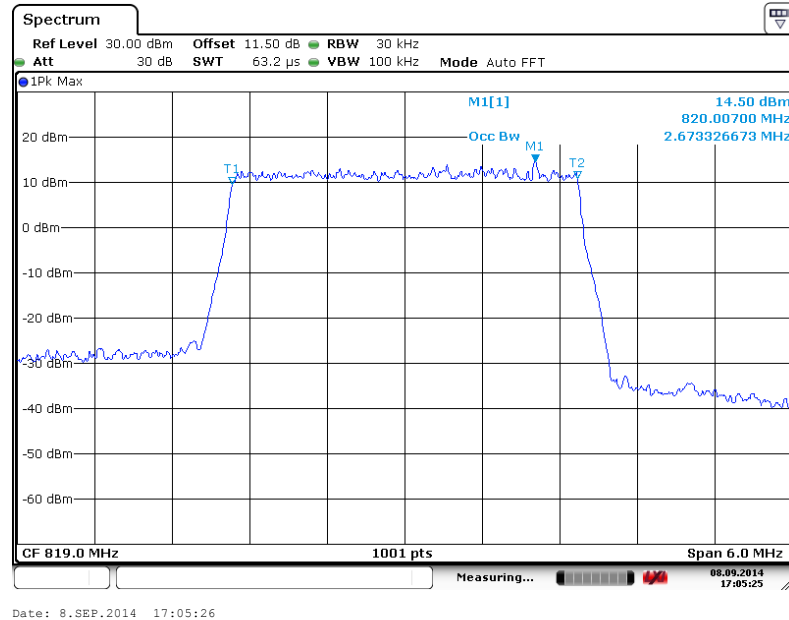
26dB Bandwidth Plot on Channel 26705



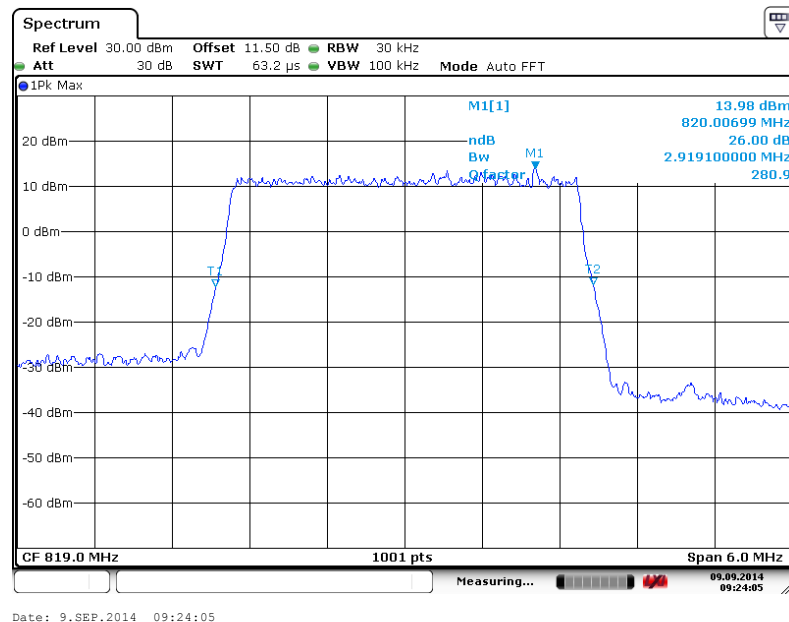


Band :	LTE Band 26	BW / Mod. :	3MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26740



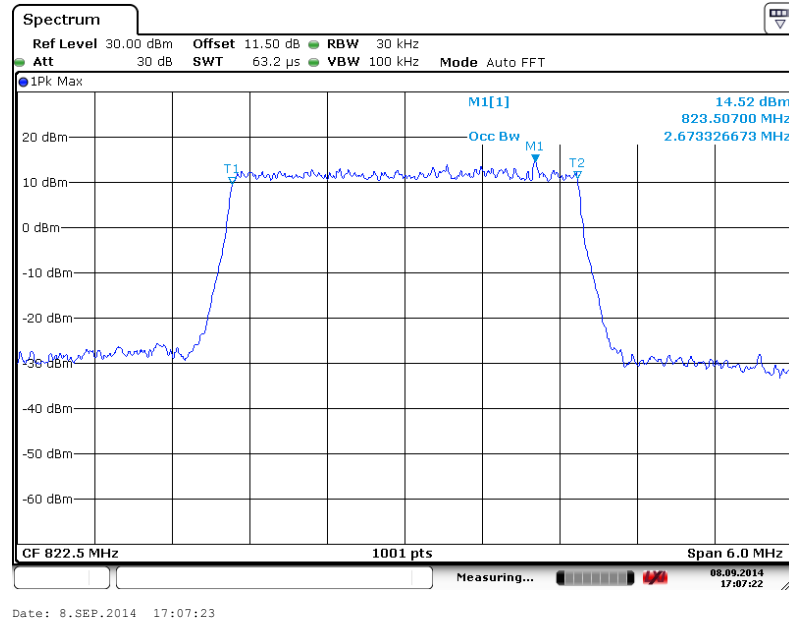
26dB Bandwidth Plot on Channel 26740



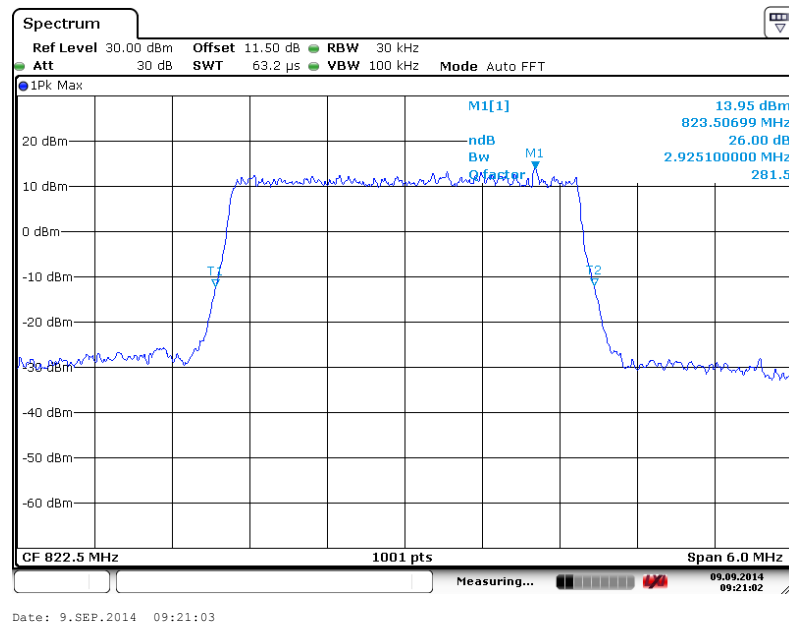


Band :	LTE Band 26	BW / Mod. :	3MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26775



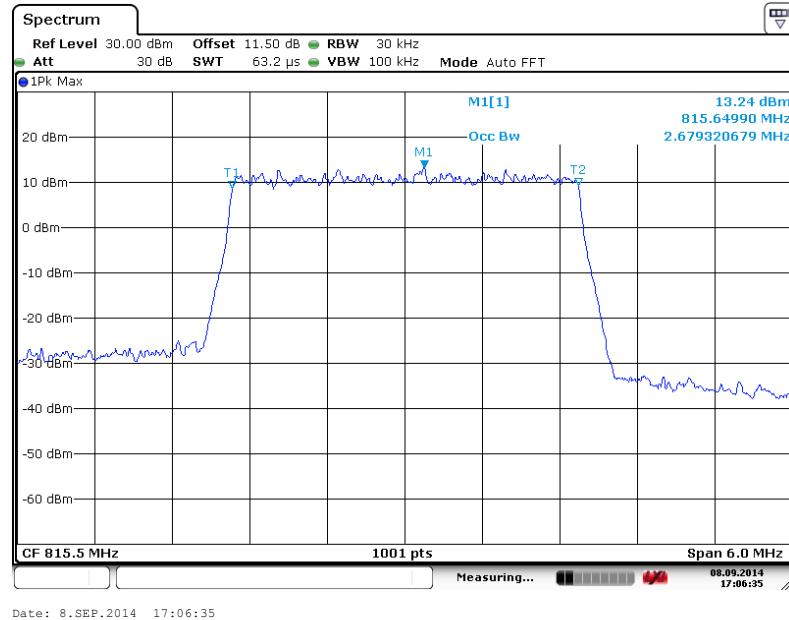
26dB Bandwidth Plot on Channel 26775



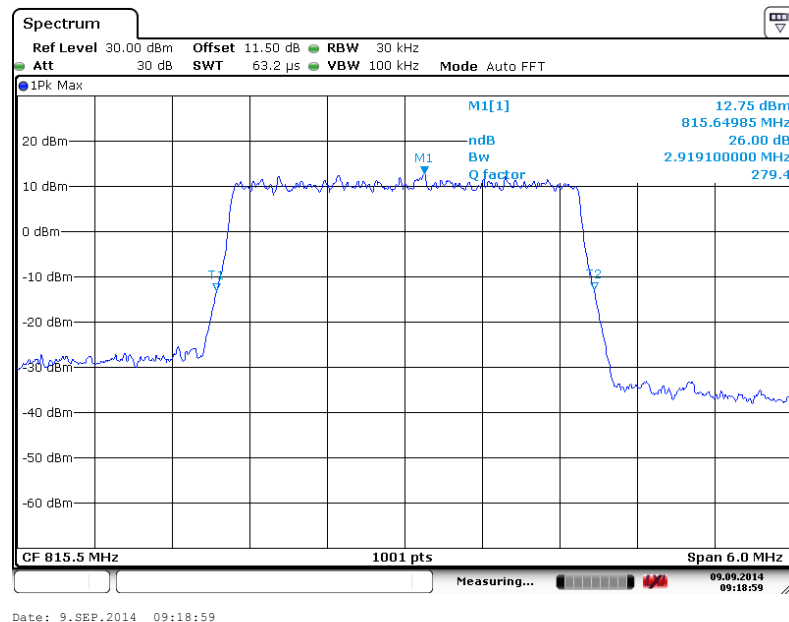


Band :	LTE Band 26	BW / Mod. :	3MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26705



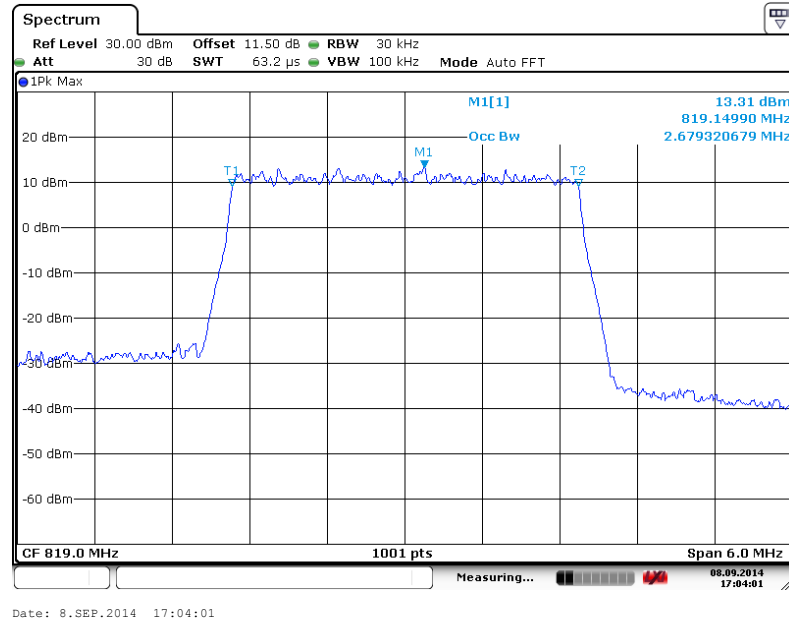
26dB Bandwidth Plot on Channel 26705



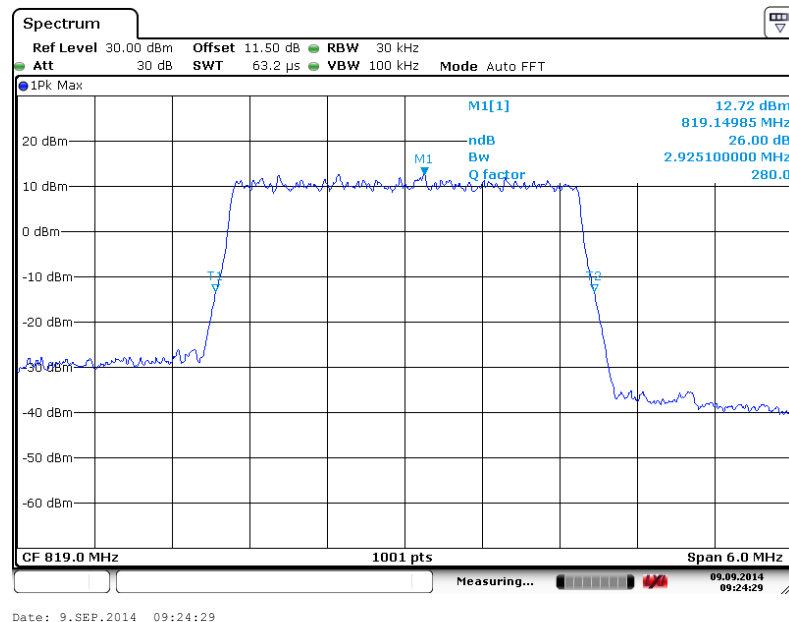


Band :	LTE Band 26	BW / Mod. :	3MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26740



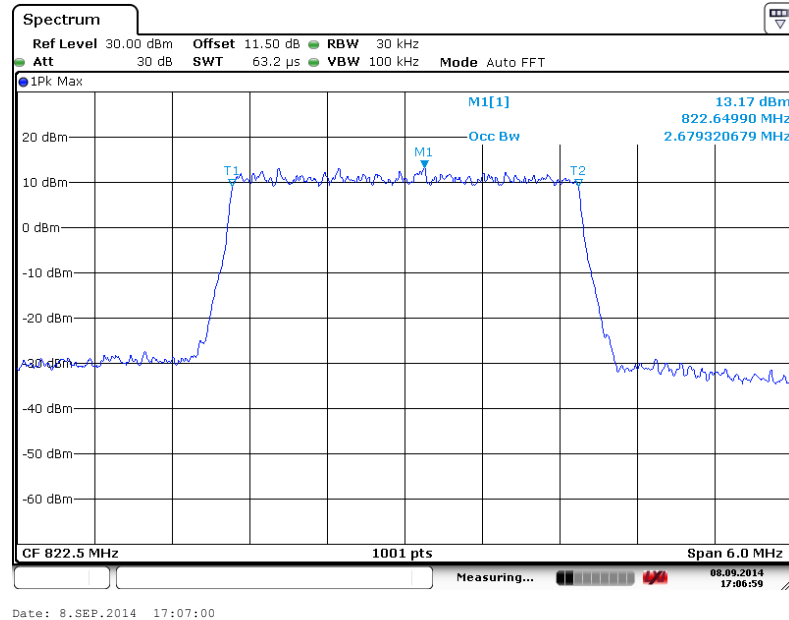
26dB Bandwidth Plot on Channel 26740



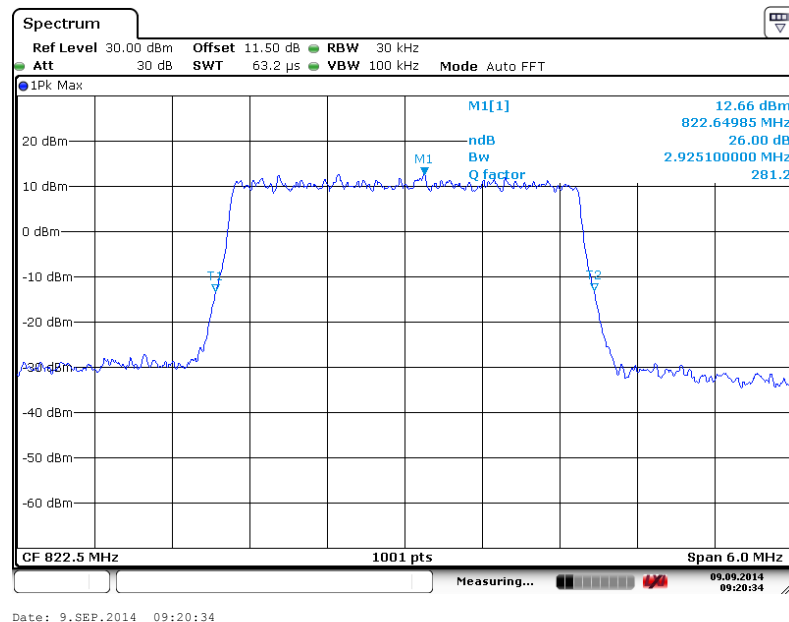


Band :	LTE Band 26	BW / Mod. :	3MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26775



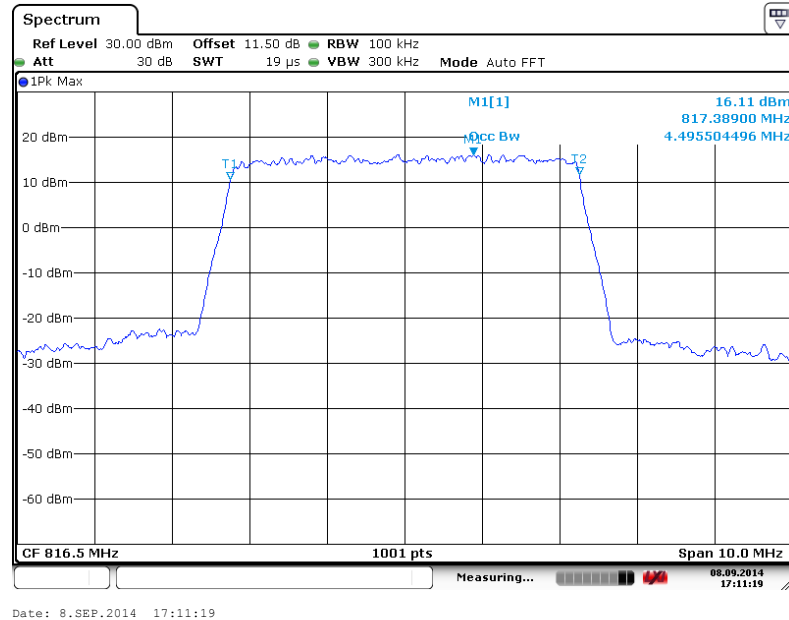
26dB Bandwidth Plot on Channel 26775



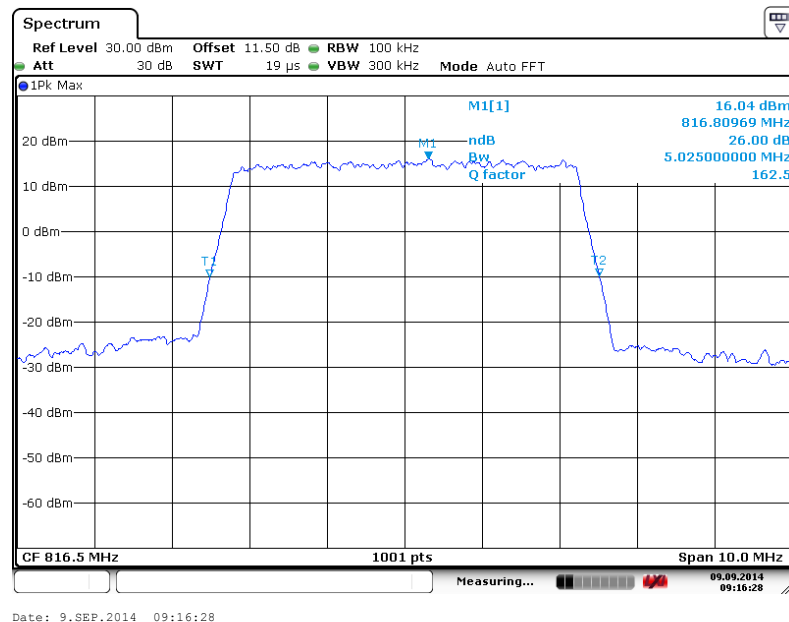


Band :	LTE Band 26	BW / Mod. :	5MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26715



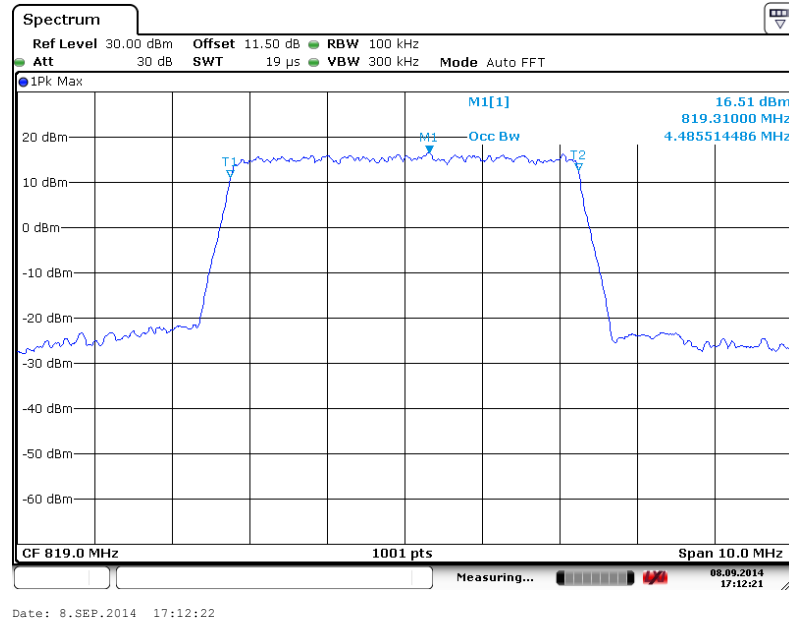
26dB Bandwidth Plot on Channel 26715



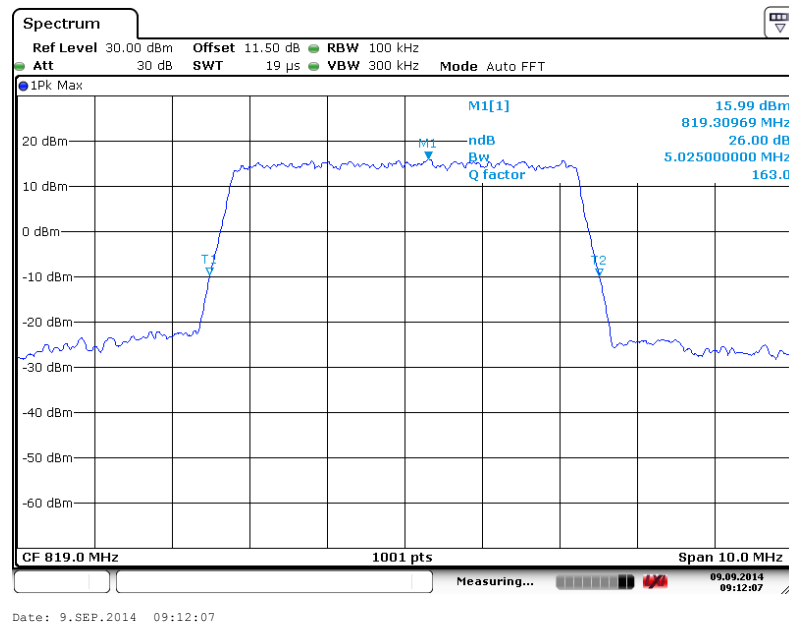


Band :	LTE Band 26	BW / Mod. :	5MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26740



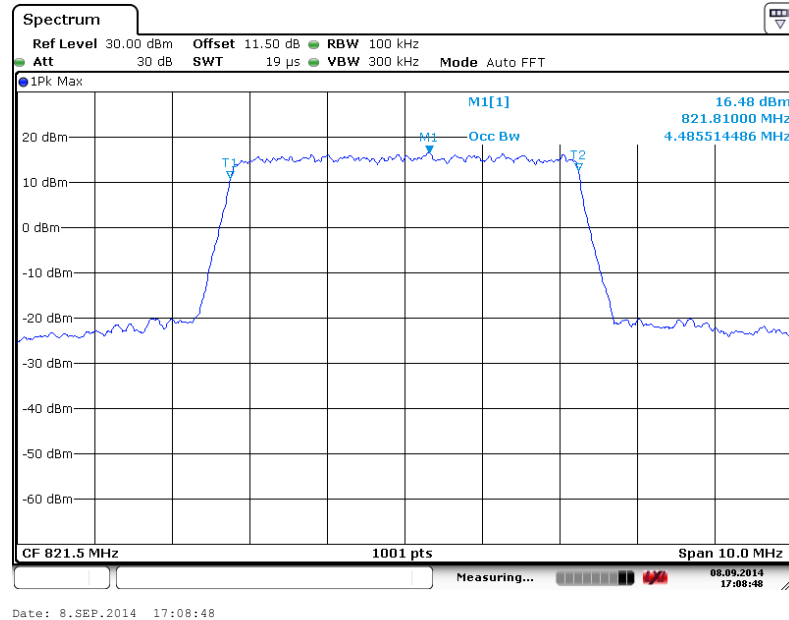
26dB Bandwidth Plot on Channel 26740



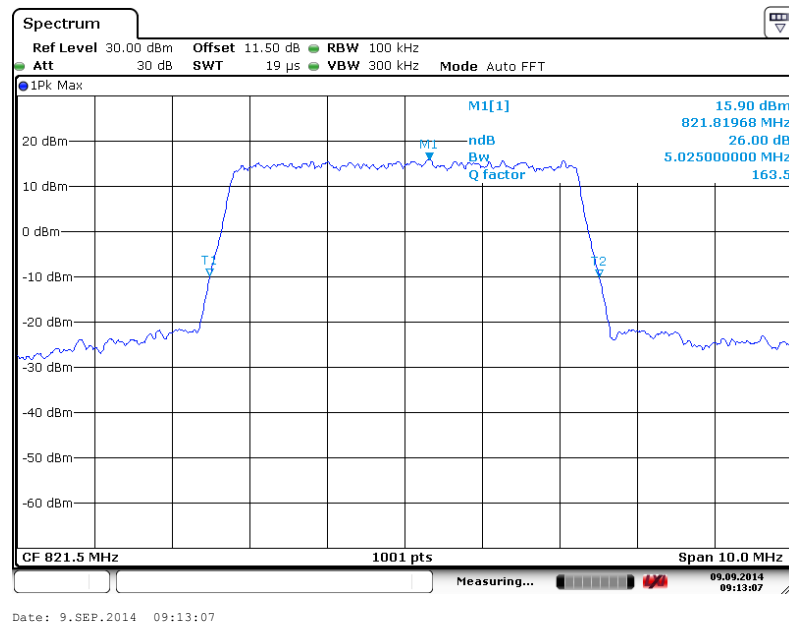


Band :	LTE Band 26	BW / Mod. :	5MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26765



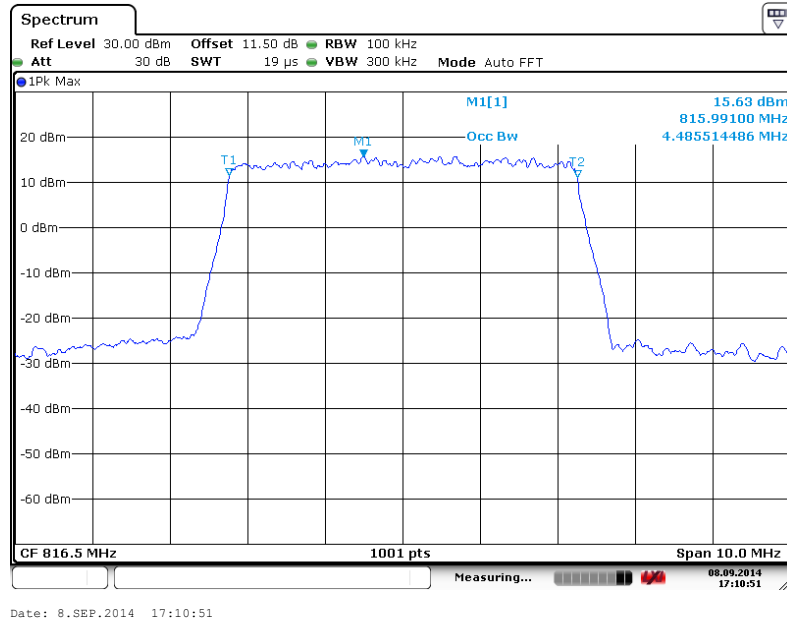
26dB Bandwidth Plot on Channel 26765



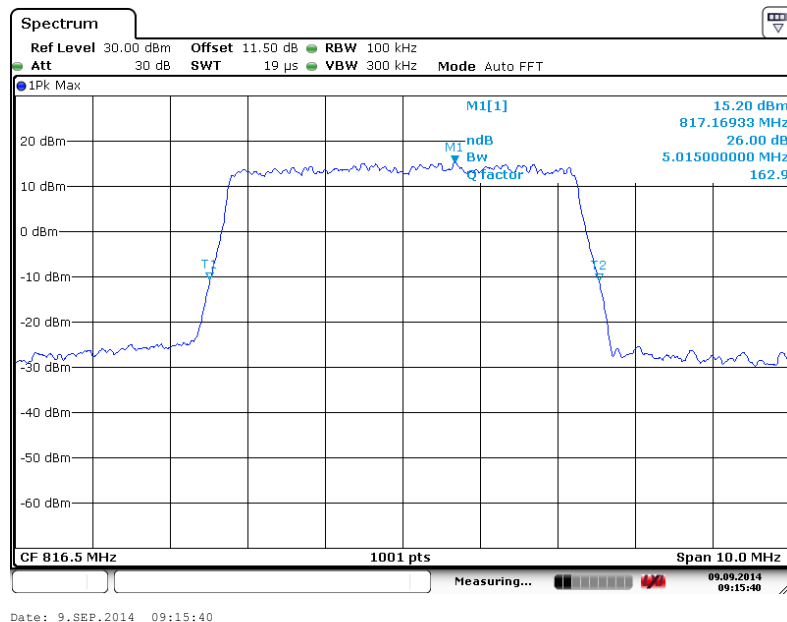


Band :	LTE Band 26	BW / Mod. :	5MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26715



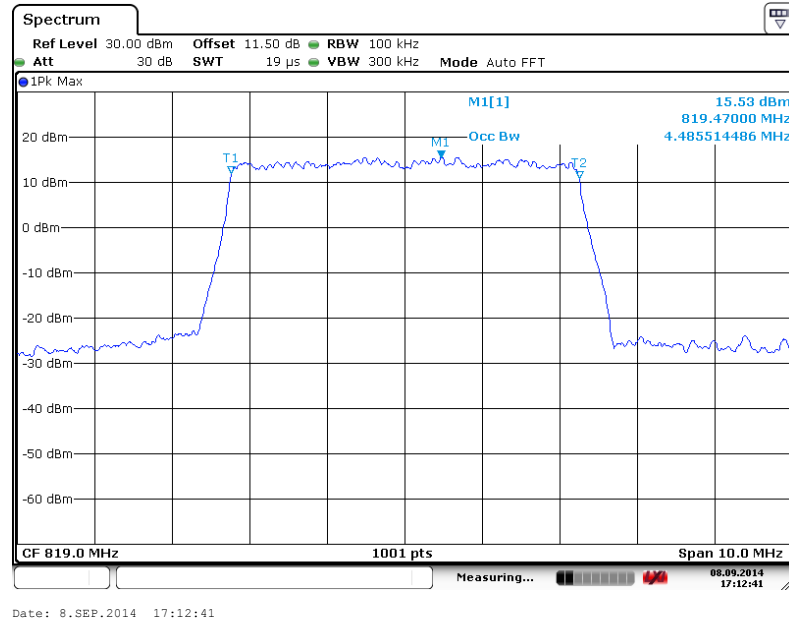
26dB Bandwidth Plot on Channel 26715



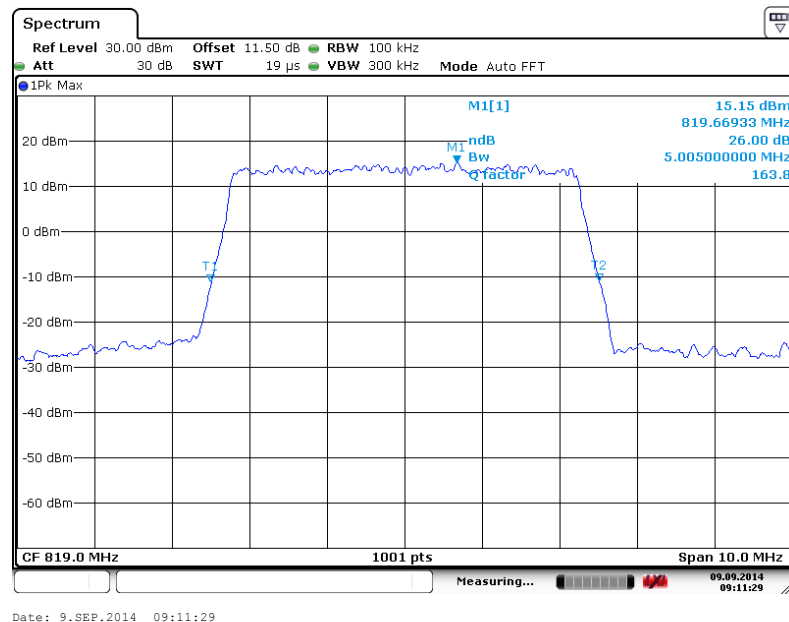


Band :	LTE Band 26	BW / Mod. :	5MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26740



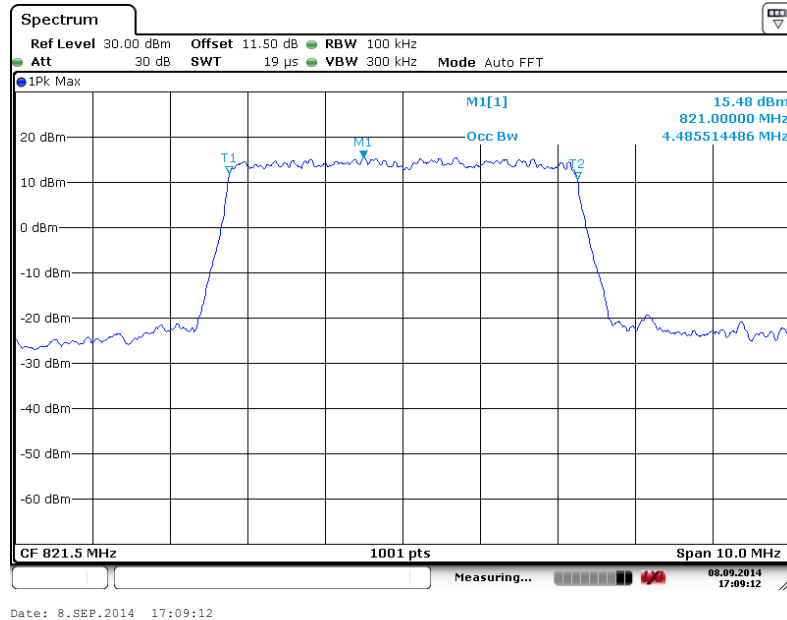
26dB Bandwidth Plot on Channel 26740



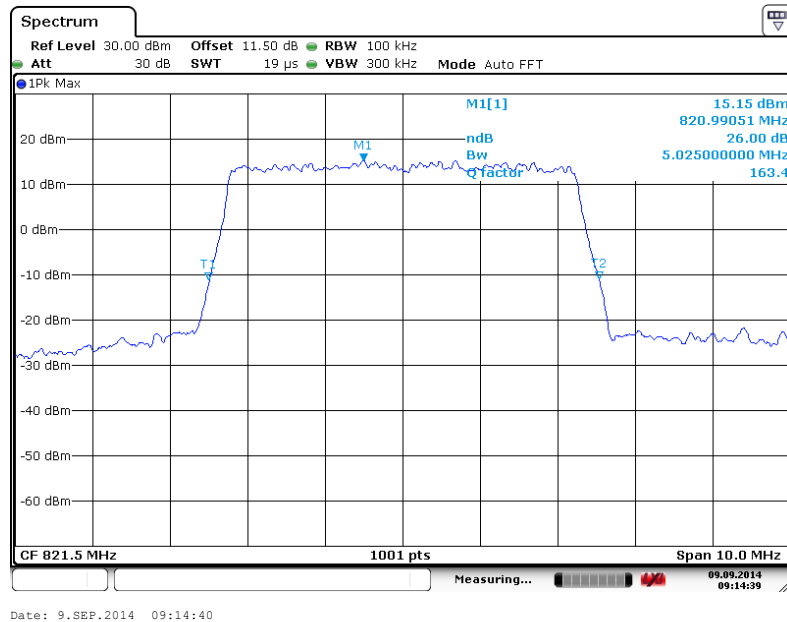


Band :	LTE Band 26	BW / Mod. :	5MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26765



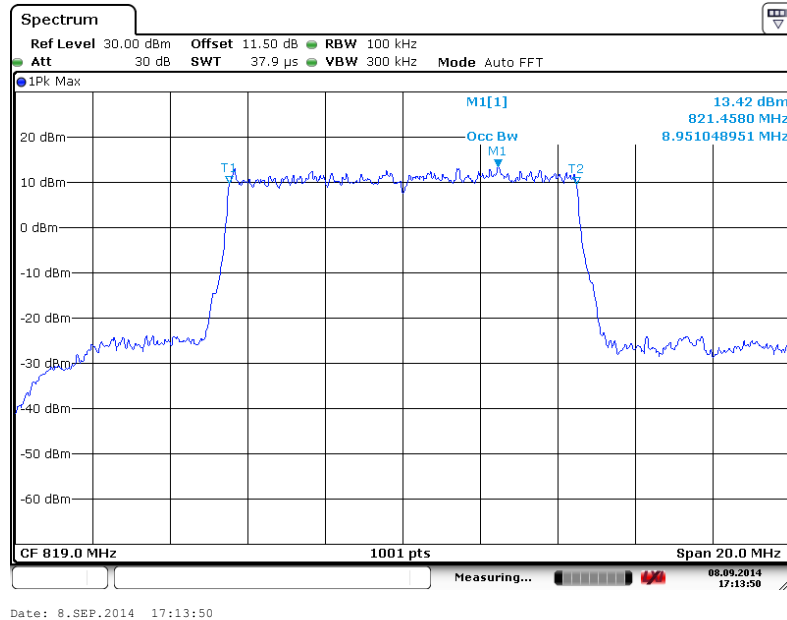
26dB Bandwidth Plot on Channel 26765



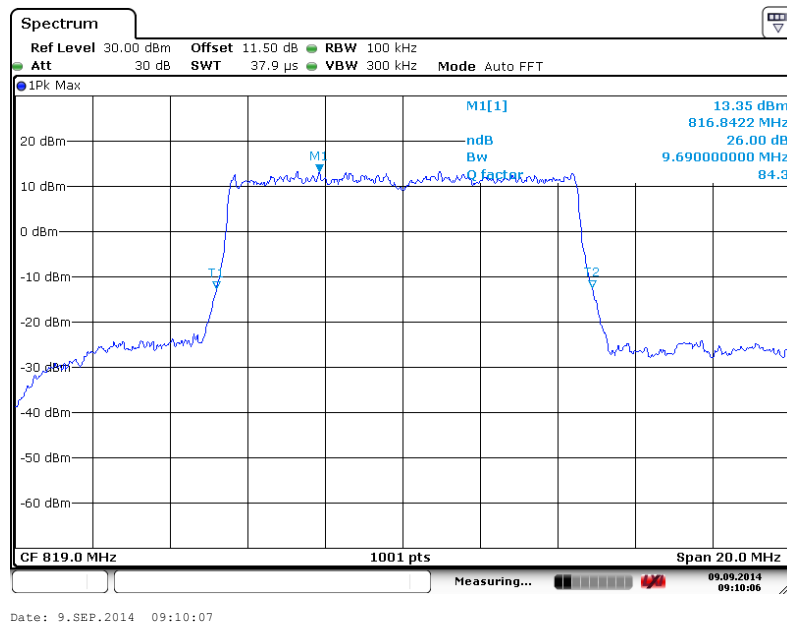


Band :	LTE Band 26	BW / Mod. :	10MHz / QPSK
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99% Occupied Bandwidth Plot on Channel 26740



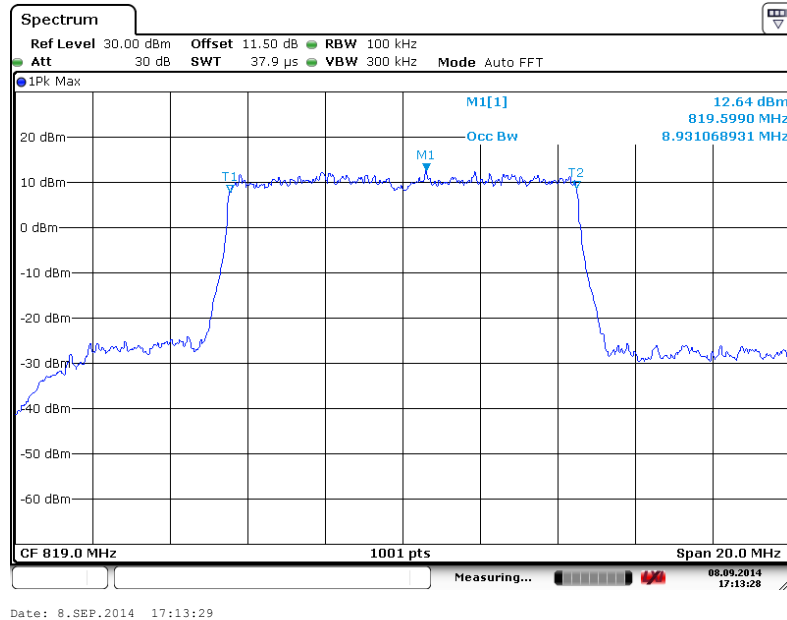
26dB Bandwidth Plot on Channel 26740



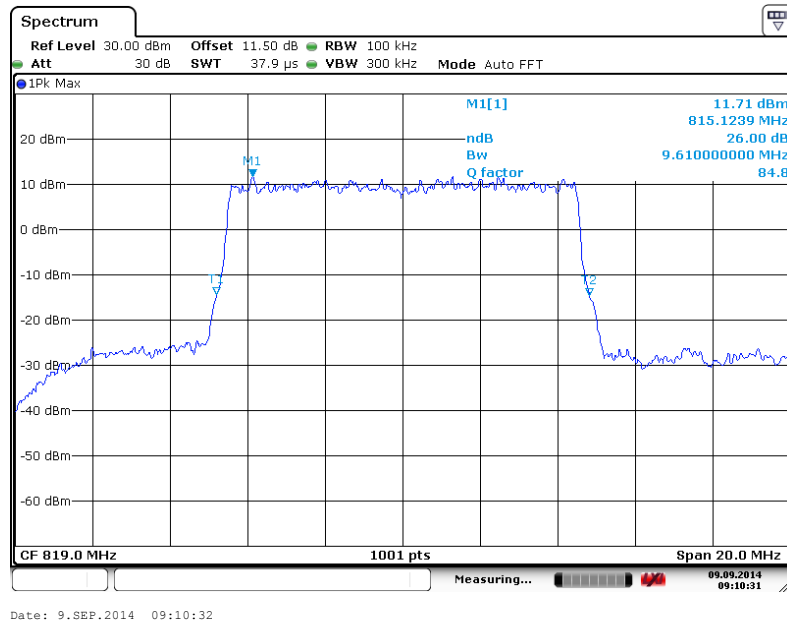


Band :	LTE Band 26	BW / Mod. :	10MHz / 16QAM
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99% Occupied Bandwidth Plot on Channel 26740



26dB Bandwidth Plot on Channel 26740



3.3 Emissions Mask Measurement

3.3.1 Description of Emissions Mask Measurement

Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of FCC Part 90.691.(a)

(a) 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:

(1) 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 $116 \log_{10}(f/6.1)$ decibels or $50 + 10 \log_{10}(P)$ 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.

(2) 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 $43 + 10 \log_{10}(P)$ 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.

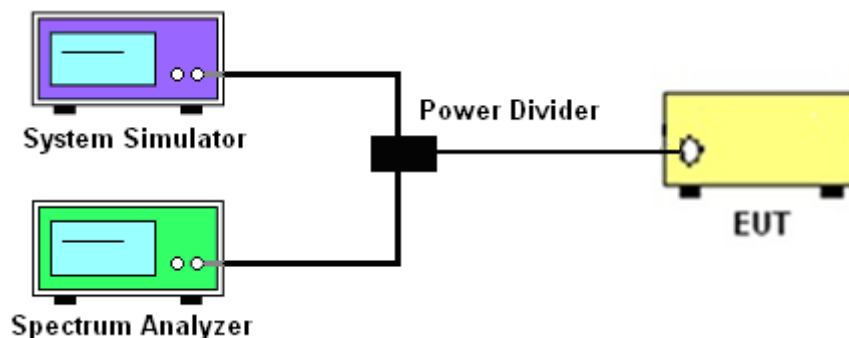
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The emissions mask of low and high channels for the highest RF powers were measured.
3. The measured RBW and the VBW set 3 times of RBW are then set in spectrum analyzer, and the RBW correction factor $10 \log (1\% \text{ of OBW/measured RBW})(\text{dB})$ was compensated, if required.
4. The test results were shown below plots with a correction offset factor including cable loss, insertion loss of power divider.

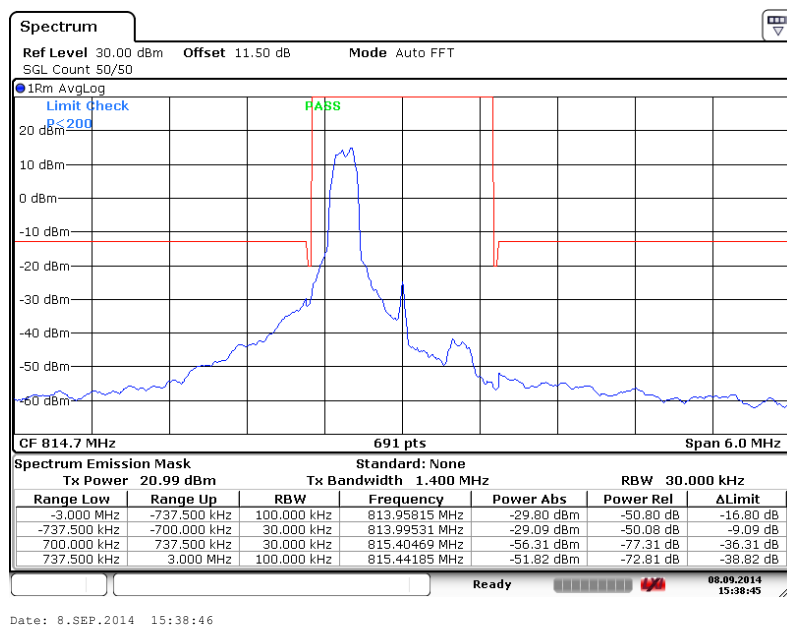
3.3.4 Test Setup



3.3.5 Test Result (Plots) of Conducted Emissions Mask

Band :	LTE Band 26	Band Width :	1.4MHz / QPSK
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Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



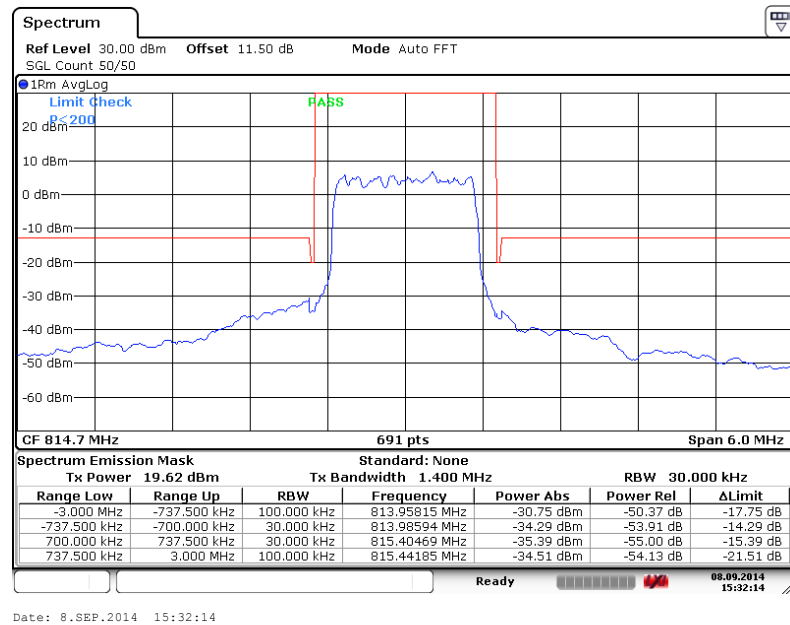
Remark:

$$\begin{aligned}
 \text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\
 &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\
 &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}
 \end{aligned}$$

<1> Test result of 813.99531MHz: - 29.09(dBm) + 0.97(dB)= -28.12 (dBm)

<2> Test result of 815.40469MHz: - 56.31(dBm) + 0.97(dB)= -55.34 (dBm)

Lower Band Edge Plot for QPSK-RB Size 6, RB Offset 0



Remark:

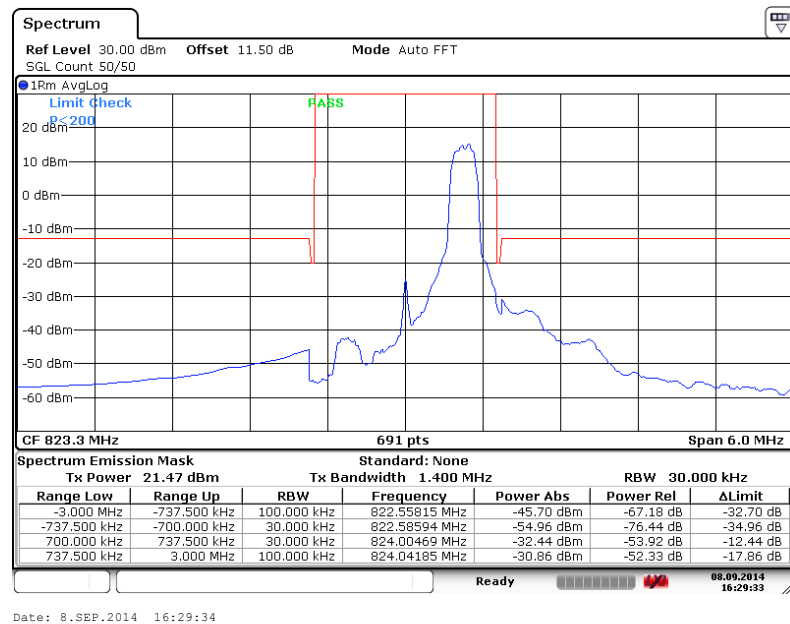
$$\begin{aligned} \text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) (\text{dB}) \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) (\text{dB}) \\ &= \text{Power Abs (dBm)} + 0.97 (\text{dB}) \end{aligned}$$

$$<1> \text{ Test result of 813.98594MHz: } -34.29(\text{dBm}) + 0.97(\text{dB}) = -31.32 (\text{dBm})$$

$$<2> \text{ Test result of 815.40469MHz: } -35.39(\text{dBm}) + 0.97(\text{dB}) = -34.42 (\text{dBm})$$



Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 5



Remark:

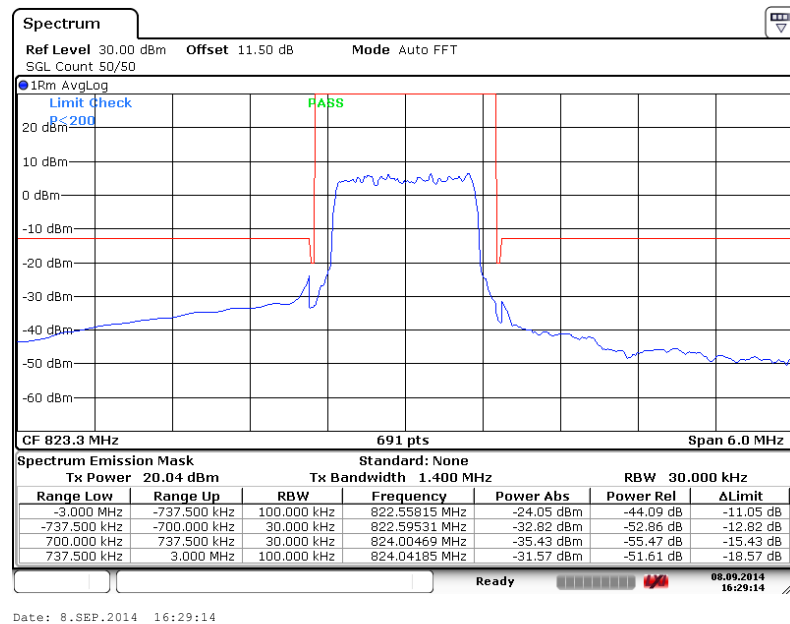
$$\begin{aligned}\text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}\end{aligned}$$

<1> Test result of 822.58594MHz: - 54.96(dBm) + 0.97(dB)= -53.99 (dBm)

<2> Test result of 824.00469MHz: - 32.44(dBm) + 0.97(dB)= -31.47 (dBm)



Higher Band Edge Plot for QPSK-RB Size 6, RB Offset 0



Remark:

$$\begin{aligned}\text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}\end{aligned}$$

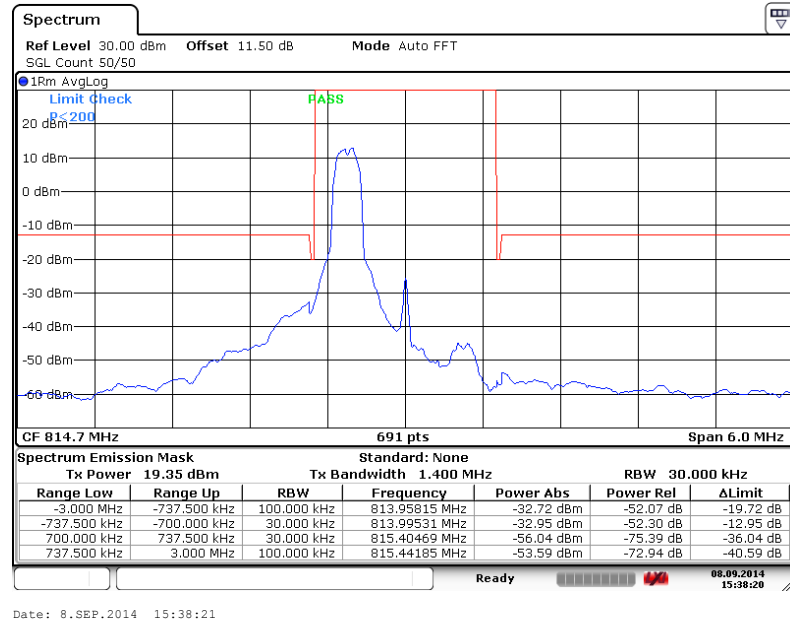
<1> Test result of 822.59531MHz: - 32.82(dBm) + 0.97(dB)= -31.85 (dBm)

<2> Test result of 824.00469MHz: - 35.43(dBm) + 0.97(dB)= -34.46 (dBm)



Band :	LTE Band 26	Band Width :	1.4MHz / 16QAM
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Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Remark:

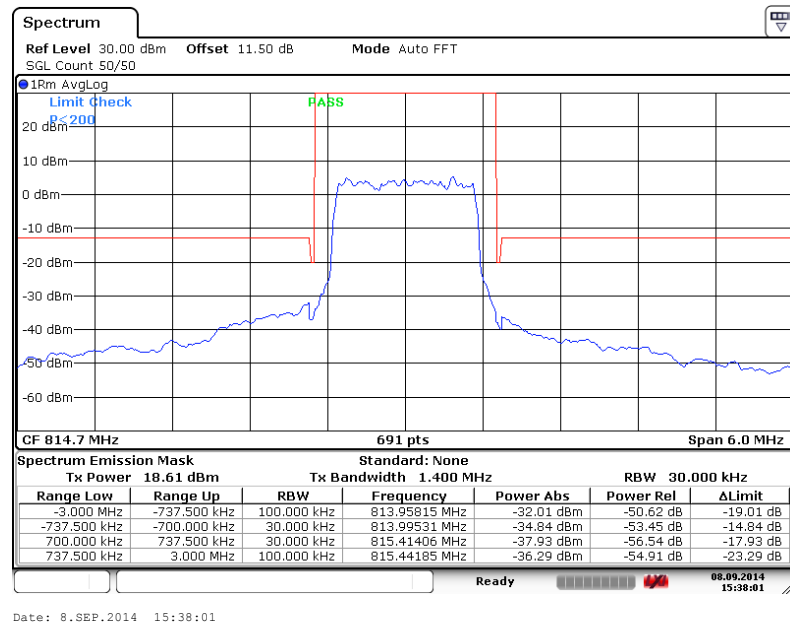
Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)

$$= \text{Power Abs (dBm)} + 10 \cdot \log(37.5\text{kHz}/30\text{kHz})(\text{dB})$$

$$= \text{Power Abs (dBm)} + 0.97 (\text{dB})$$

<1> Test result of 813.99531MHz: - 32.95(dBm) + 0.97(dB)= -31.98 (dBm)

<2> Test result of 815.40469MHz: - 56.04(dBm) + 0.97(dB)= -55.07 (dBm)

Lower Band Edge Plot for 16QAM-RB Size 6, RB Offset 0

Remark:

Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)

= Power Abs (dBm) +10*LOG(37.5kHz/30kHz)(dB)

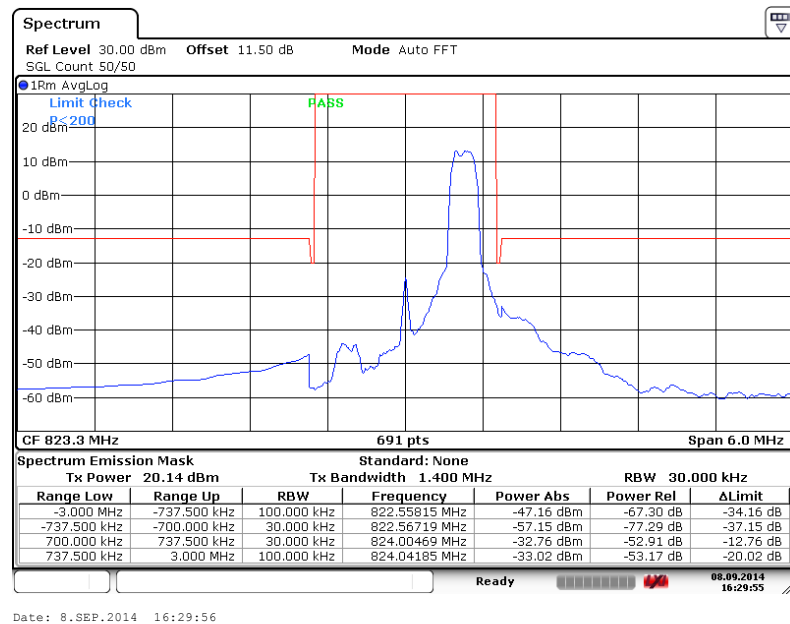
= Power Abs (dBm) +0.97 (dB)

<1> Test result of 813.99531MHz: - 34.84(dBm) + 0.97(dB)= -33.87 (dBm)

<2> Test result of 815.41406MHz: - 37.93(dBm) + 0.97(dB)= -36.96 (dBm)



Higher Band Edge Plot for 16QAM-RB Size 1, RB Offset 5



Remark:

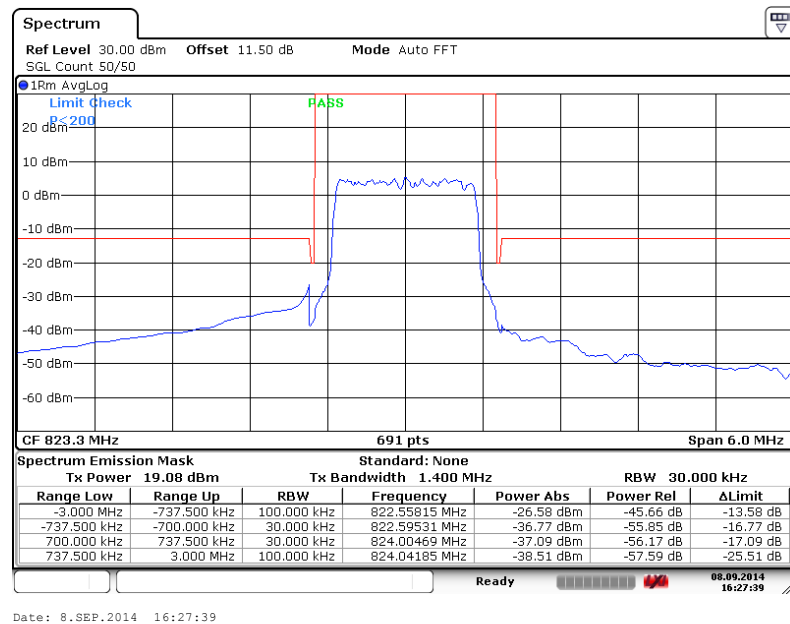
$$\begin{aligned}\text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) (\text{dB}) \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz})(\text{dB}) \\ &= \text{Power Abs (dBm)} + 0.97 (\text{dB})\end{aligned}$$

<1> Test result of 822.56719MHz: - 57.15(dBm) + 0.97(dB)= -56.18 (dBm)

<2> Test result of 824.00469MHz: - 32.76(dBm) + 0.97(dB)= -31.79 (dBm)



Higher Band Edge Plot for 16QAM-RB Size 6, RB Offset 0



Remark:

$$\begin{aligned}\text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}\end{aligned}$$

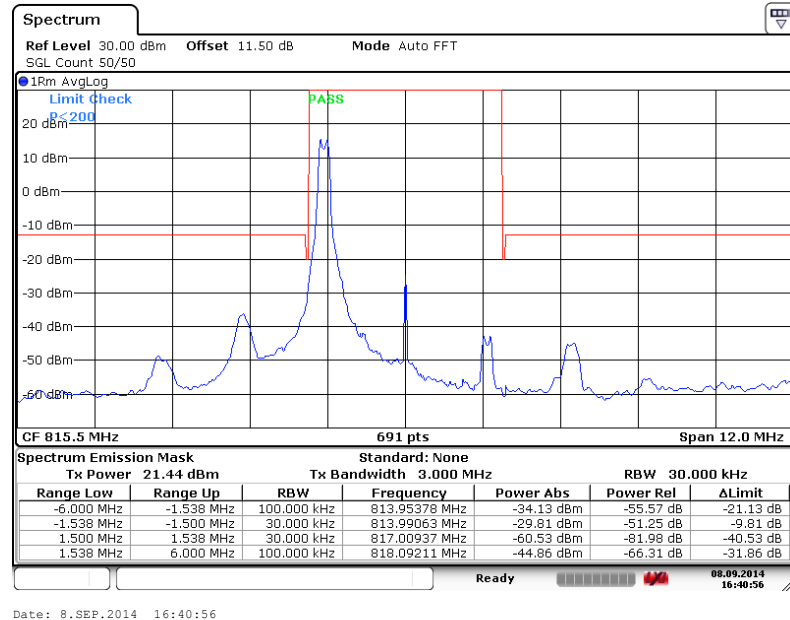
<1> Test result of 822.59531MHz: - 36.77(dBm) + 0.97(dB)= -35.80 (dBm)

<2> Test result of 824.00469MHz: - 37.09(dBm) + 0.97(dB)= -36.12 (dBm)



Band :	LTE Band 26	Band Width :	3MHz / QPSK
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Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Remark:

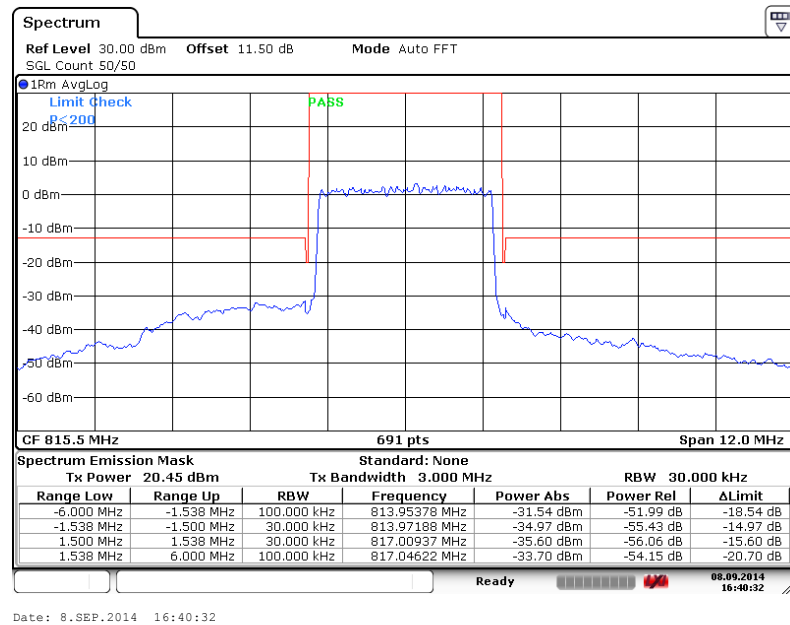
Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)

$$= \text{Power Abs (dBm)} + 10 \cdot \log(37.5\text{kHz}/30\text{kHz}) (\text{dB})$$

$$= \text{Power Abs (dBm)} + 0.97 (\text{dB})$$

<1> Test result of 813.99063MHz: - 29.81(dBm) + 0.97(dB)= -28.84 (dBm)

<2> Test result of 817.00937MHz: - 60.53(dBm) + 0.97(dB)= -59.56 (dBm)

Lower Band Edge Plot for QPSK-RB Size 15, RB Offset 0


Remark:

Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)

= Power Abs (dBm) +10*LOG(37.5kHz/30kHz)(dB)

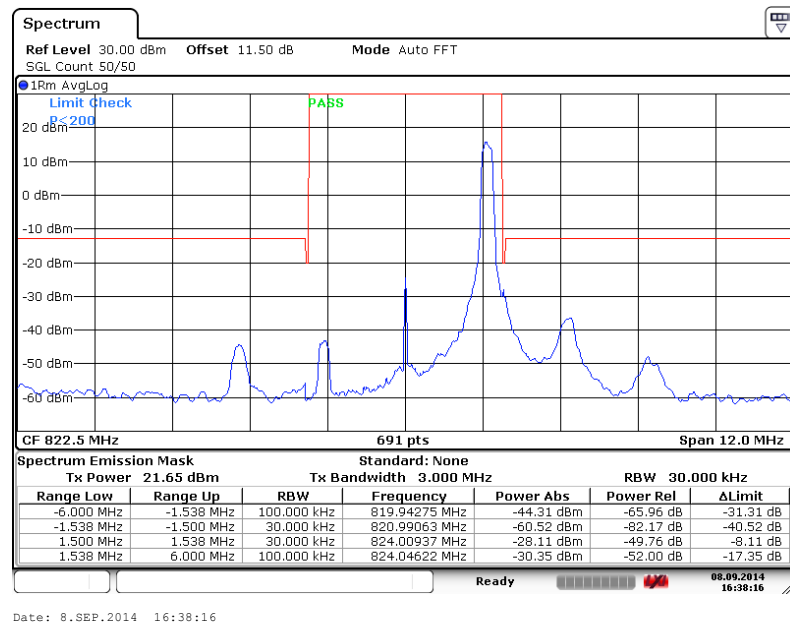
= Power Abs (dBm) +0.97 (dB)

<1> Test result of 813.97188MHz: - 34.97(dBm) + 0.97(dB)= -34.00 (dBm)

<2> Test result of 817.00937MHz: -35.60(dBm) + 0.97(dB)= -34.63 (dBm)



Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 14

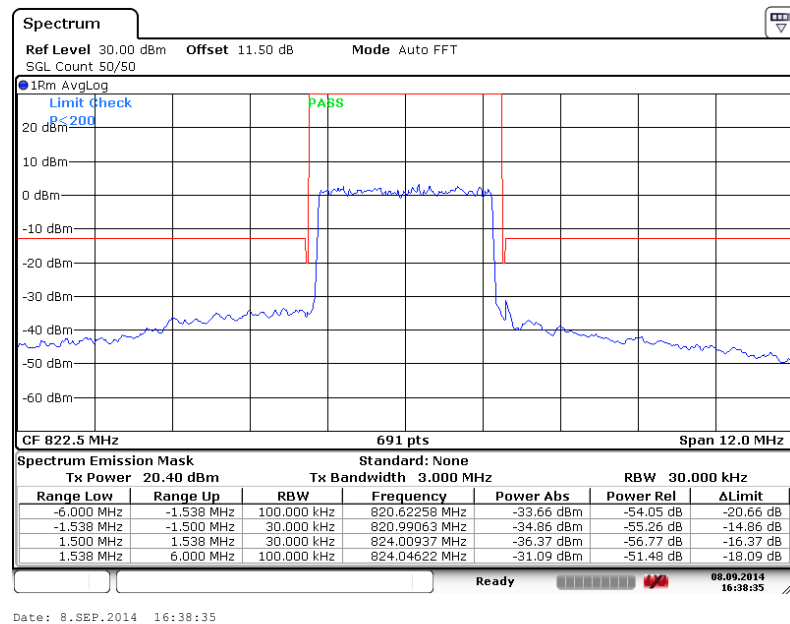


Remark:

$$\begin{aligned}\text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}\end{aligned}$$

<1> Test result of 820.99063MHz: - 60.52(dBm) + 0.97(dB)= -59.55 (dBm)

<2> Test result of 824.00937MHz: - 28.11(dBm) + 0.97(dB)= -27.14 (dBm)

Higher Band Edge Plot for QPSK-RB Size 15, RB Offset 0

Remark:

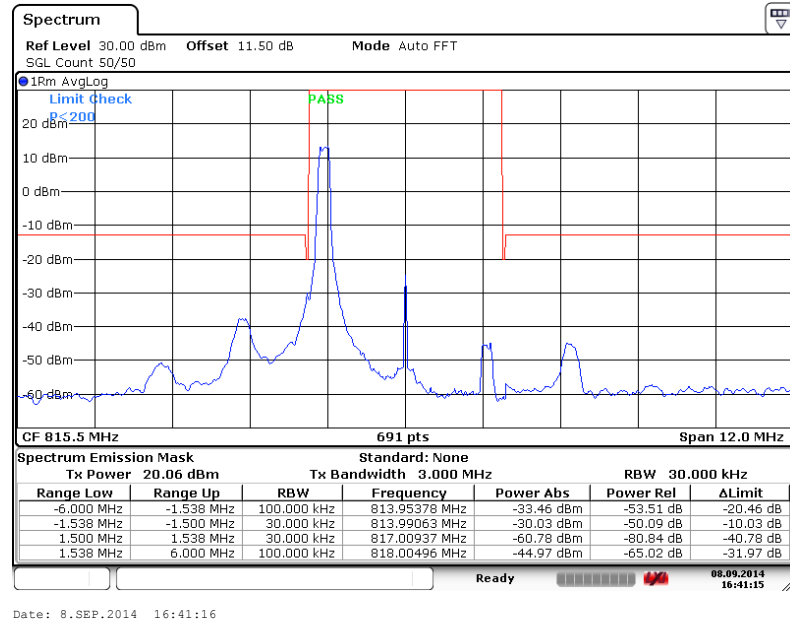
Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)
 = Power Abs (dBm) +10*LOG(37.5kHz/30kHz)(dB)
 = Power Abs (dBm) +0.97 (dB)

<1> Test result of 820.99063MHz: - 34.86(dBm) + 0.97(dB)= -33.89 (dBm)
 <2> Test result of 824.00937MHz: - 36.37(dBm) + 0.97(dB)= -35.40 (dBm)



Band :	LTE Band 26	Band Width :	3MHz / 16QAM
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Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Remark:

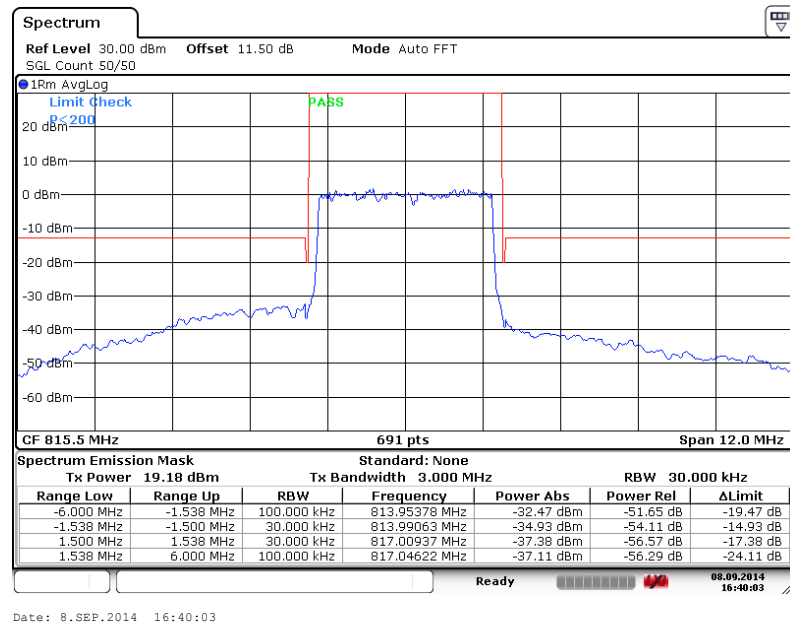
Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)

$$= \text{Power Abs (dBm)} + 10 \cdot \log(37.5\text{kHz}/30\text{kHz})(\text{dB})$$

$$= \text{Power Abs (dBm)} + 0.97 (\text{dB})$$

<1> Test result of 813.99063MHz: - 30.03(dBm) + 0.97(dB)= -29.06 (dBm)

<2> Test result of 817.00937MHz: - 60.78(dBm) + 0.97(dB)= -59.81 (dBm)

Lower Band Edge Plot for 16QAM-RB Size 15, RB Offset 0

Remark:

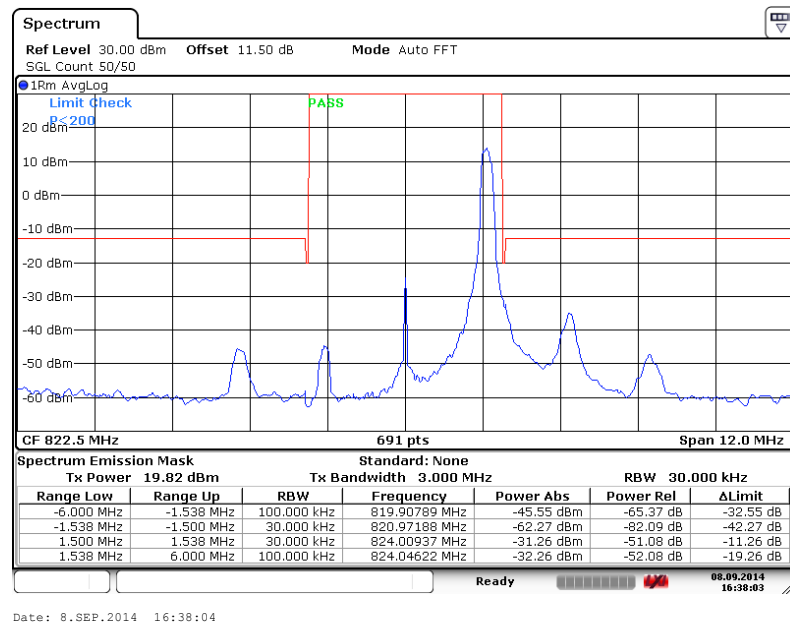
Test Result(dBm) = Power Abs(dBm) + (1% of OBW/measured RBW) (dB)

= Power Abs (dBm) +10*LOG(37.5kHz/30kHz)(dB)

= Power Abs (dBm) +0.97 (dB)

<1> Test result of 813.99063MHz: -34.93(dBm) + 0.97(dB)= -33.96 (dBm)

<2> Test result of 817.00937MHz: - 37.38(dBm) + 0.97(dB)= -36.41 (dBm)

Higher Band Edge Plot for 16QAM-RB Size 1, RB Offset 14


Remark:

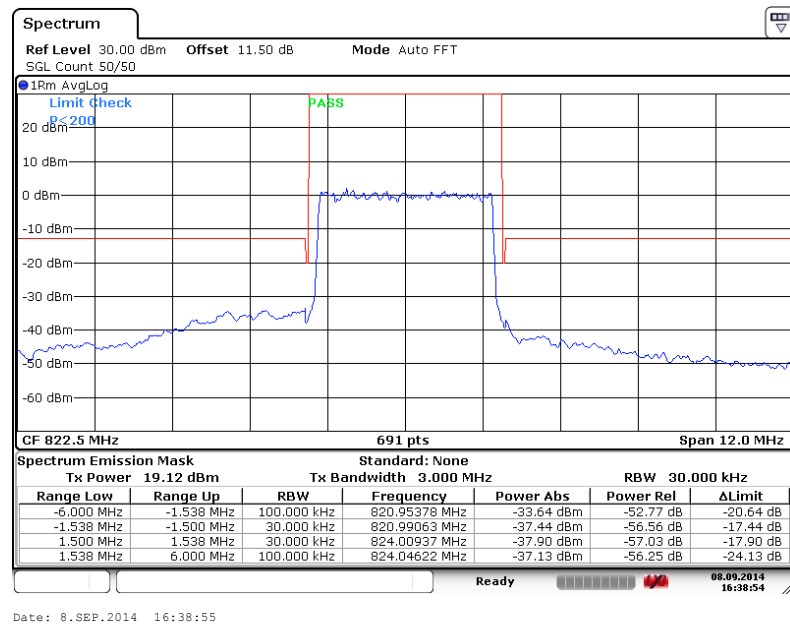
$$\begin{aligned}
 \text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\
 &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\
 &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}
 \end{aligned}$$

<1> Test result of 820.97188MHz: - 62.27(dBm) + 0.97(dB)= -61.30 (dBm)

<2> Test result of 824.00937MHz: - 31.26(dBm) + 0.97(dB)= -30.29 (dBm)



Higher Band Edge Plot for 16QAM-RB Size 15, RB Offset 0



Remark:

$$\begin{aligned}\text{Test Result(dBm)} &= \text{Power Abs(dBm)} + (1\% \text{ of OBW/measured RBW}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 10 \cdot \text{LOG}(37.5\text{kHz}/30\text{kHz}) \text{ (dB)} \\ &= \text{Power Abs (dBm)} + 0.97 \text{ (dB)}\end{aligned}$$

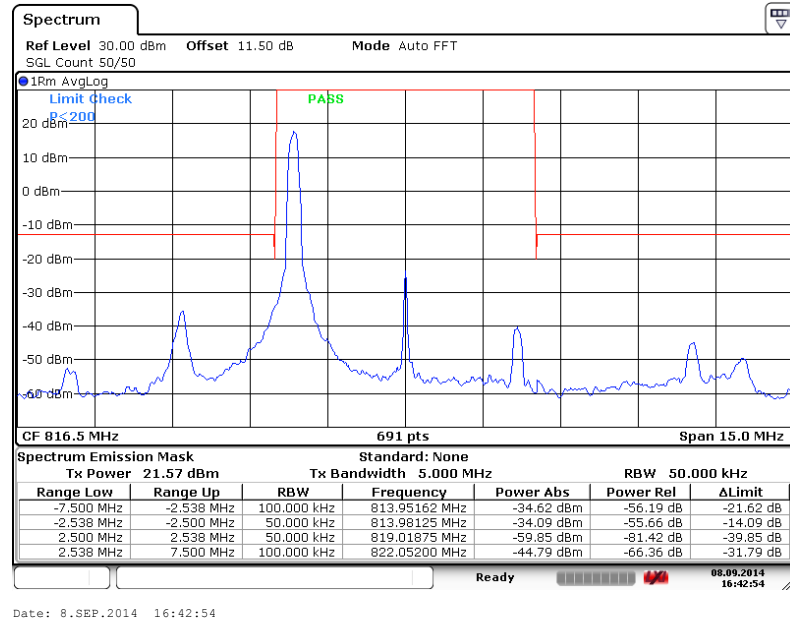
<1> Test result of 820.99063MHz: - 37.44(dBm) + 0.97(dB)= -36.47 (dBm)

<2> Test result of 824.00937MHz: - 37.90(dBm) + 0.97(dB)= -36.93 (dBm)

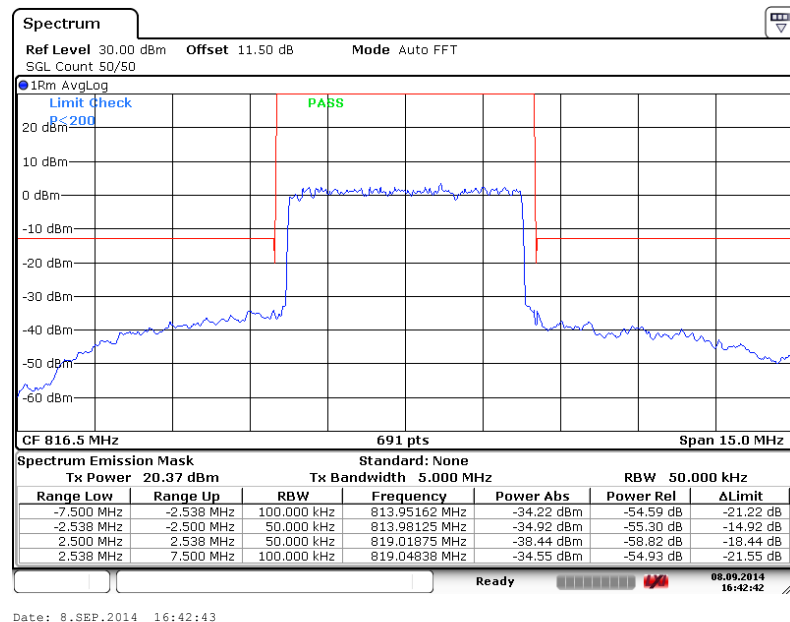


Band :	LTE Band 26	Band Width :	5MHz / QPSK
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Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0

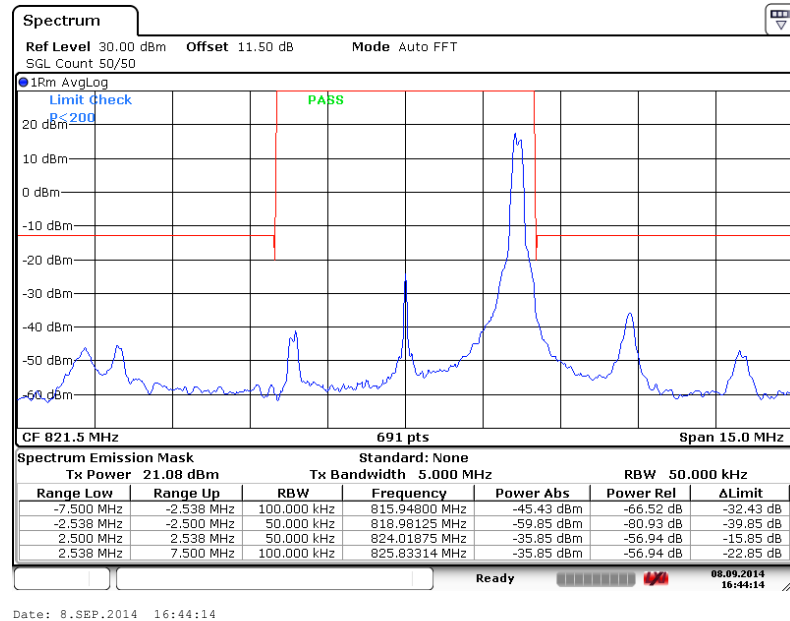


Lower Band Edge Plot for QPSK-RB Size 25, RB Offset 0

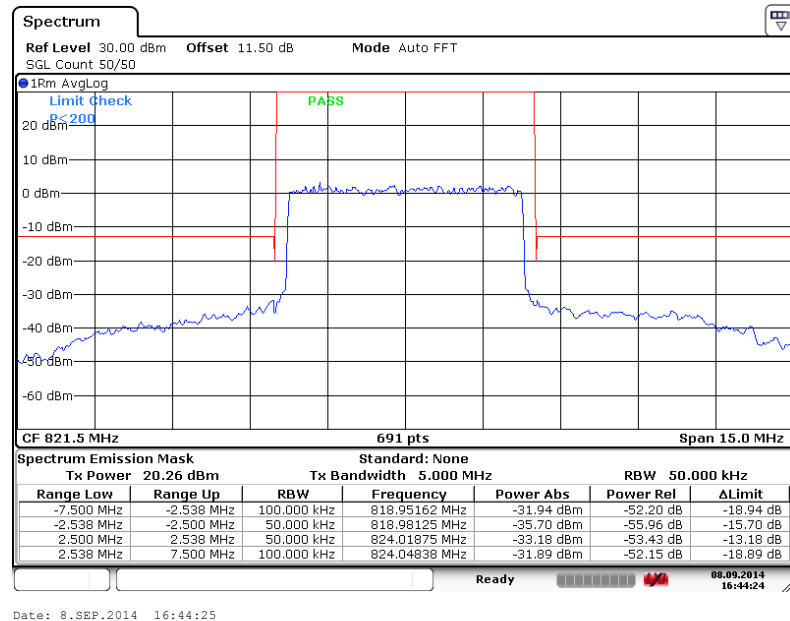




Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24



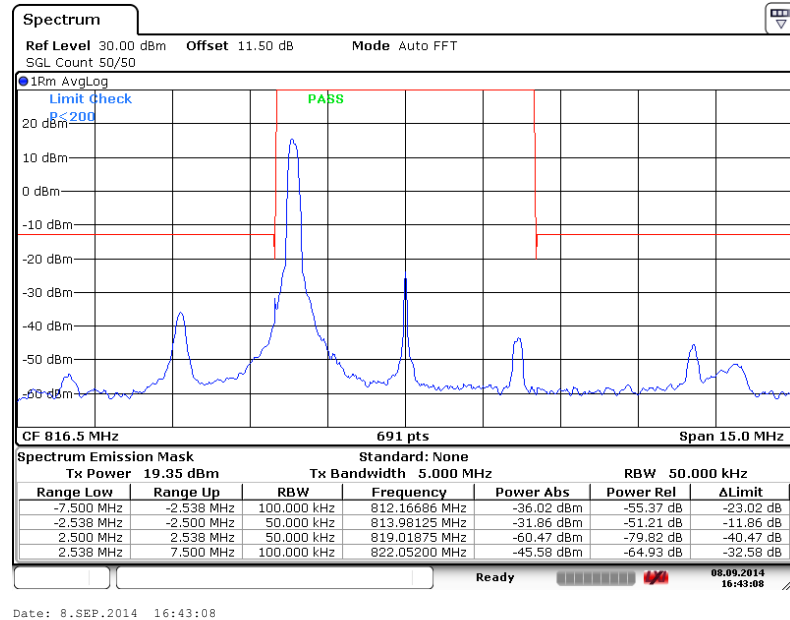
Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0



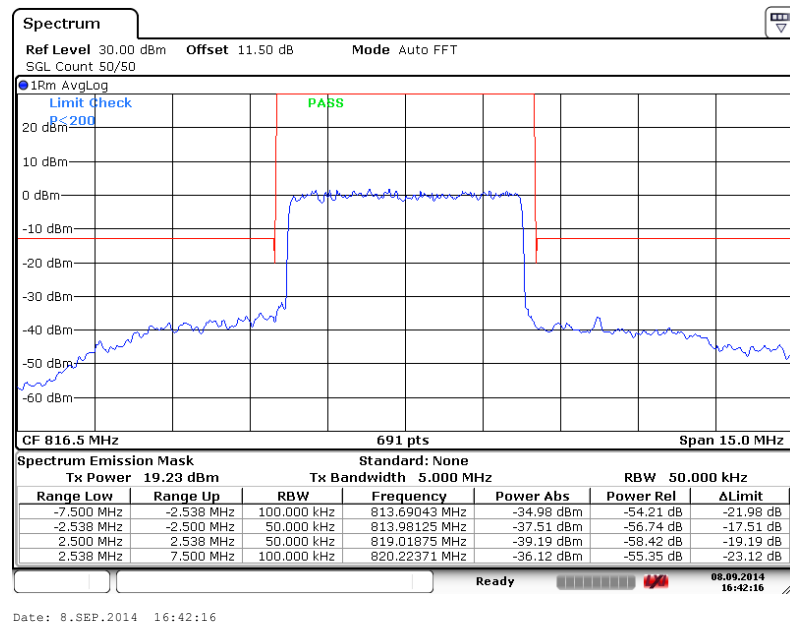


Band :	LTE Band 26	Band Width :	5MHz / 16QAM
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Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0

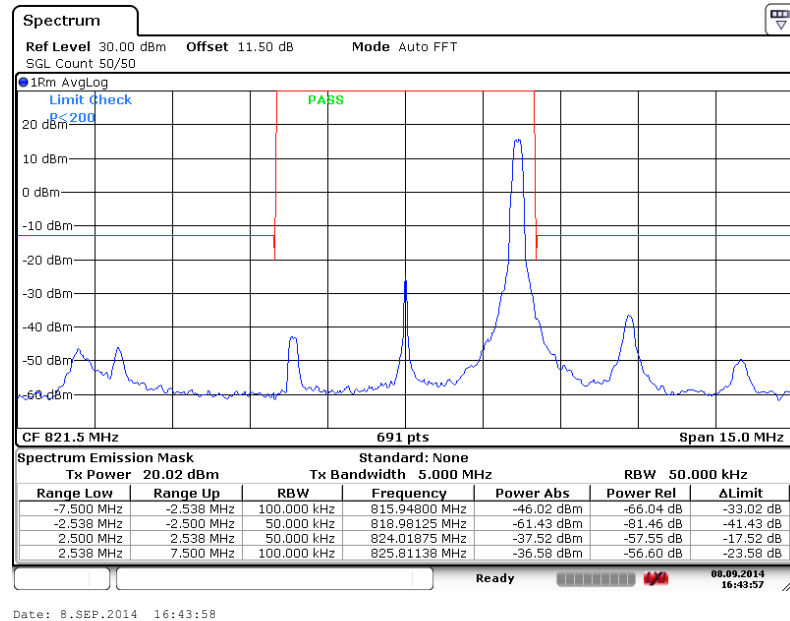


Lower Band Edge Plot for 16QAM-RB Size 25, RB Offset 0

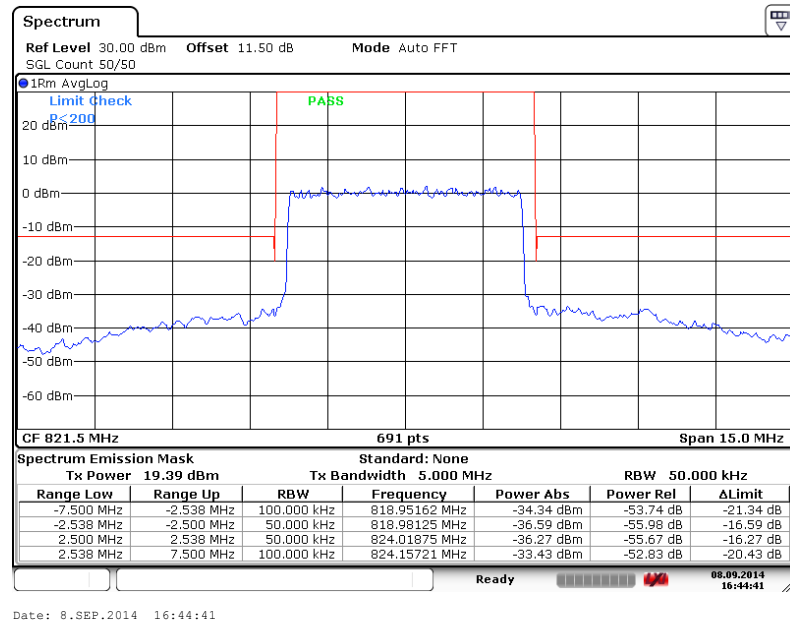




Higher Band Edge Plot for 16QAM-RB Size 1, RB Offset 24



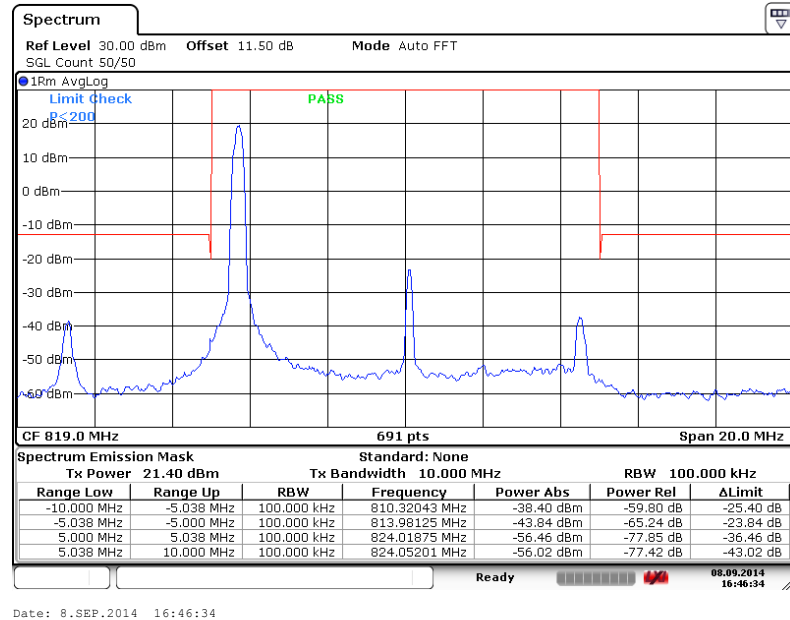
Higher Band Edge Plot for 16QAM-RB Size 25, RB Offset 0



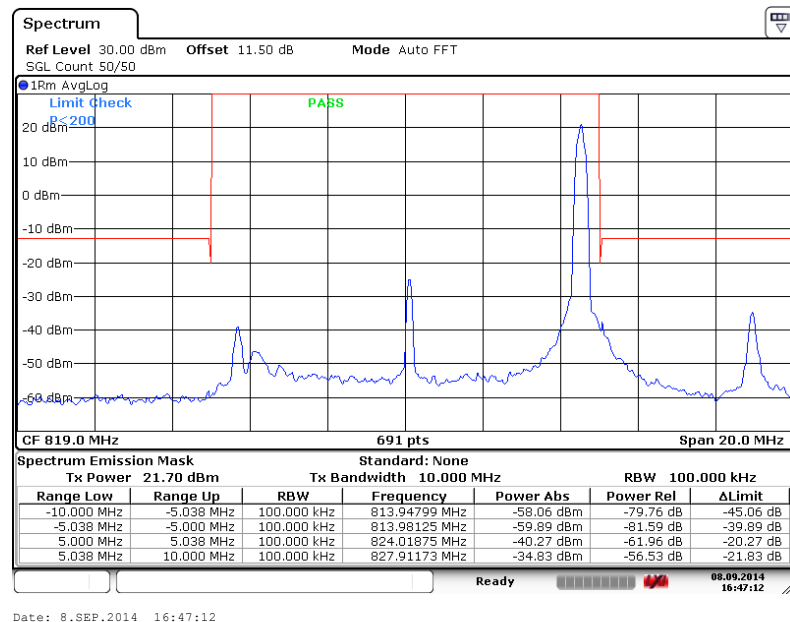


Band :	LTE Band 26	Band Width :	10MHz / QPSK
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Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0

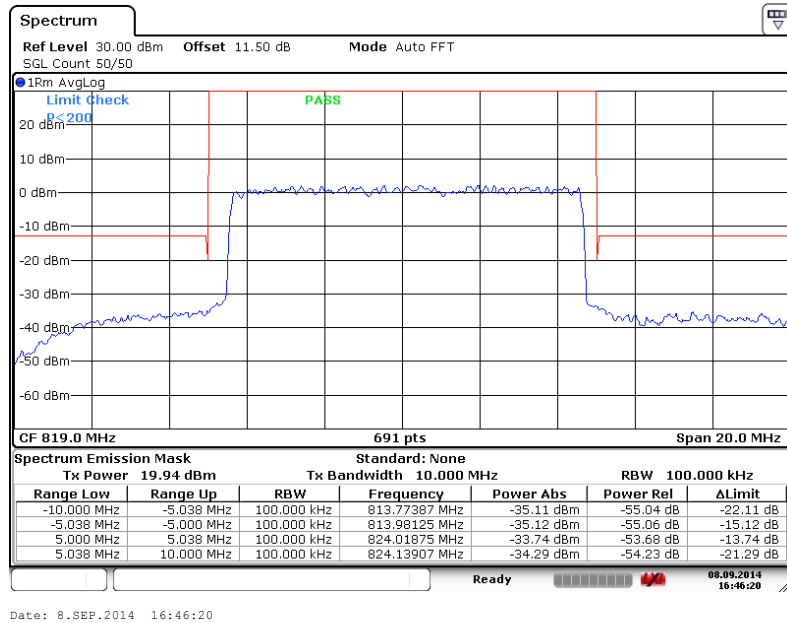


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49





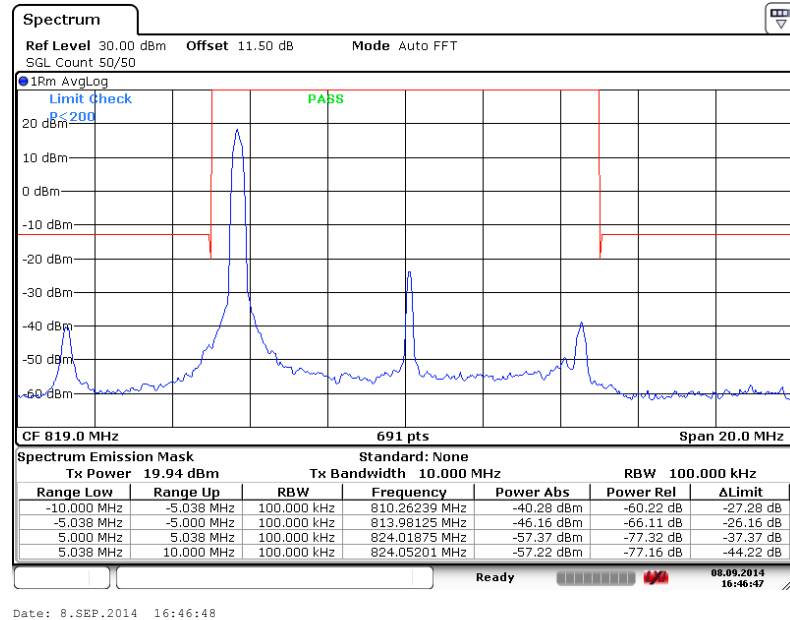
Band Edge Plot for QPSK-RB Size 50, RB Offset 0



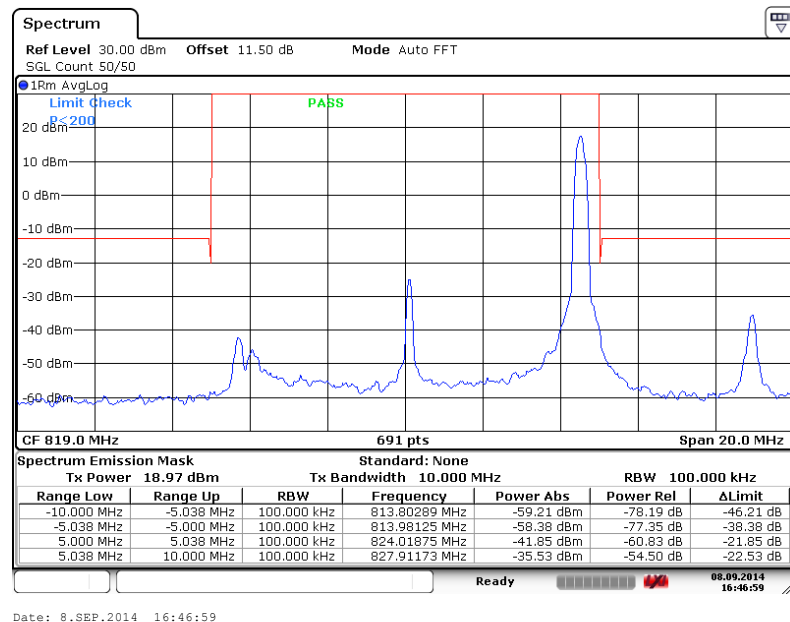


Band :	LTE Band 26	Band Width :	10MHz / 16QAM
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Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0

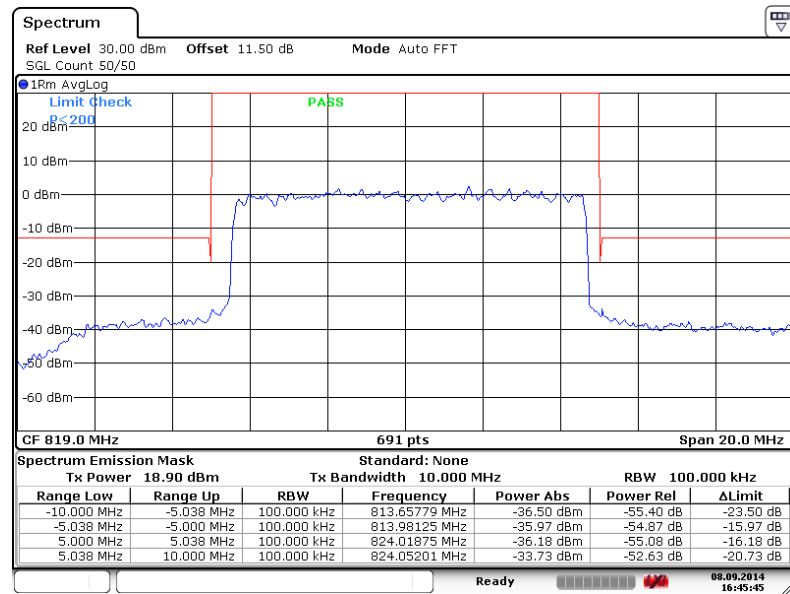


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49





Band Edge Plot for QPSK-RB Size 50, RB Offset 0



Date: 8.SEP.2014 16:45:45

3.4 Emissions Mask – Out Of Band Emissions Measurement

3.4.1 Description of Conducted Emissions Out of band emissions measurement

The power of any emission FCC Part 90.691 (a)(2) on any frequency removed from the assigned frequency by out of the authorized bandwidth at least $43 + 10 \log (P)$ dB. It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

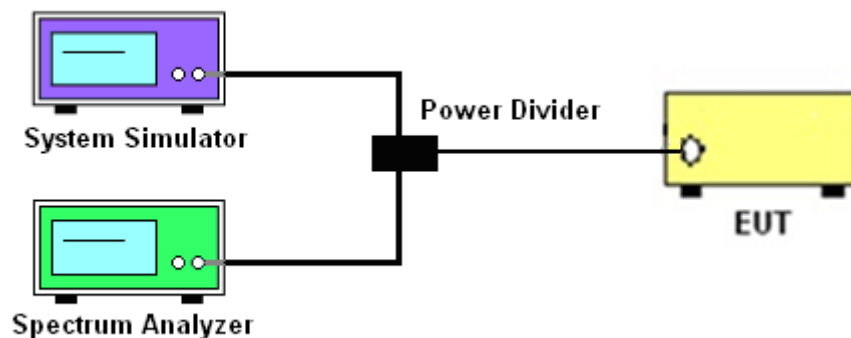
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10\log(P)] \text{ (dB)}$
 $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$
 $= -13\text{dBm}.$

3.4.4 Test Setup

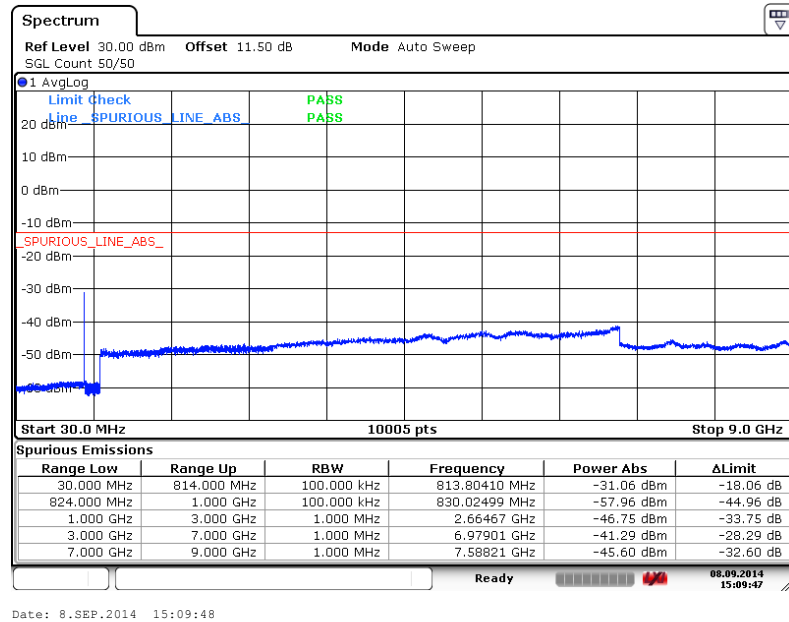




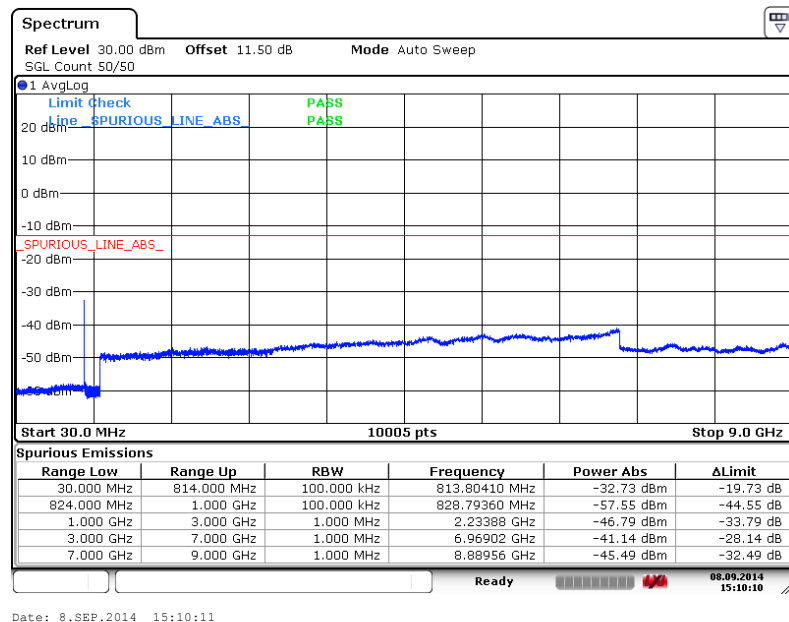
3.4.5 Test Result (Plots) of Conducted Emission

Band :	LTE Band 26	Channel :	CH26697 (Low)
Band Width :	1.4MHz		

QPSK (RB Size 1, RB Offset 0)



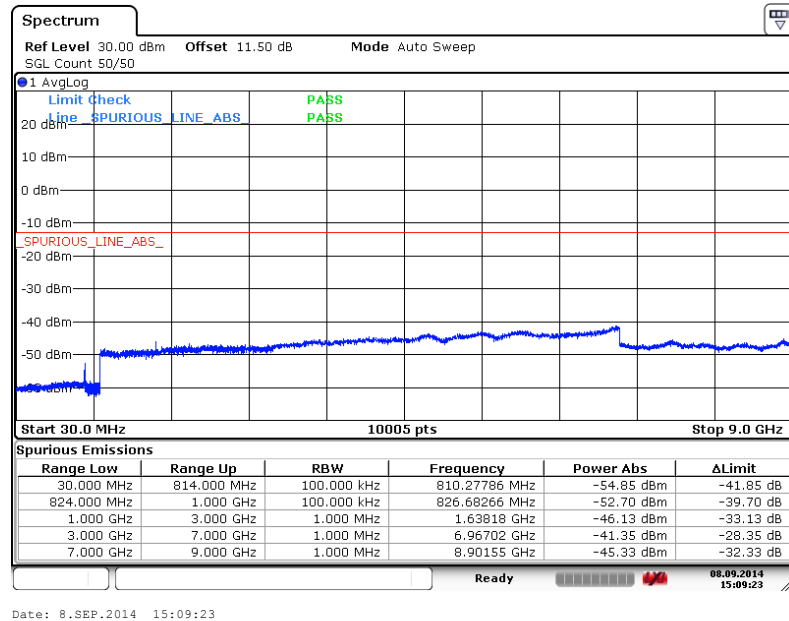
16QAM (RB Size 1, RB Offset 0)



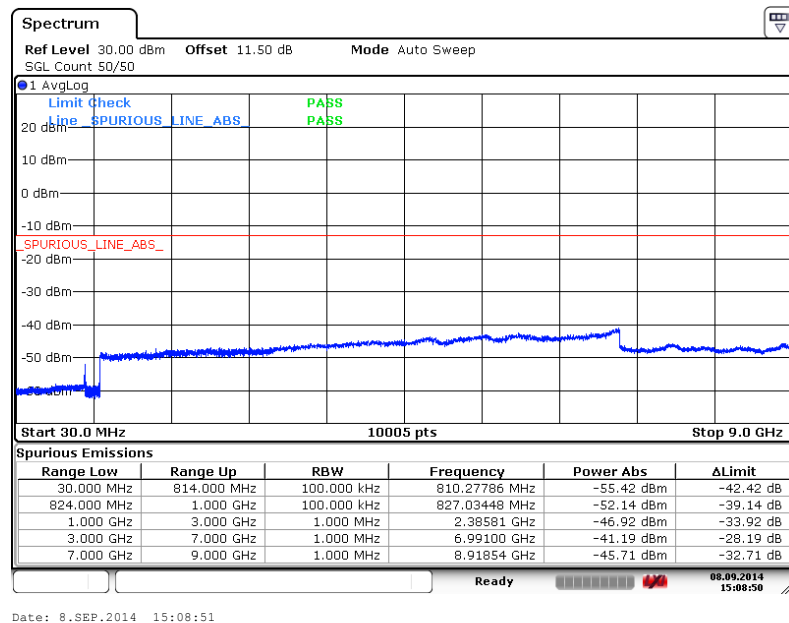


Band :	LTE Band 26	Channel :	CH26740 (Middle)
Band Width :	1.4MHz		

QPSK (RB Size 1, RB Offset 0)



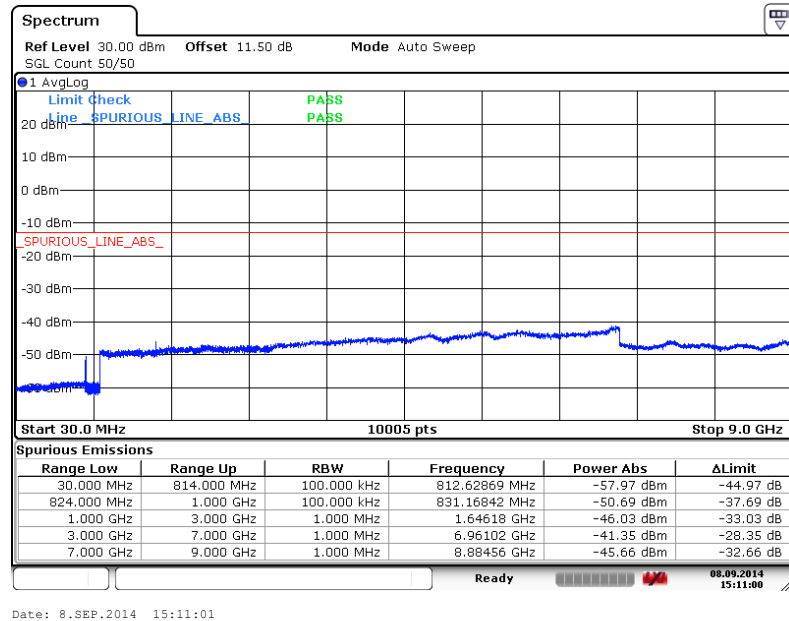
16QAM (RB Size 1, RB Offset 0)



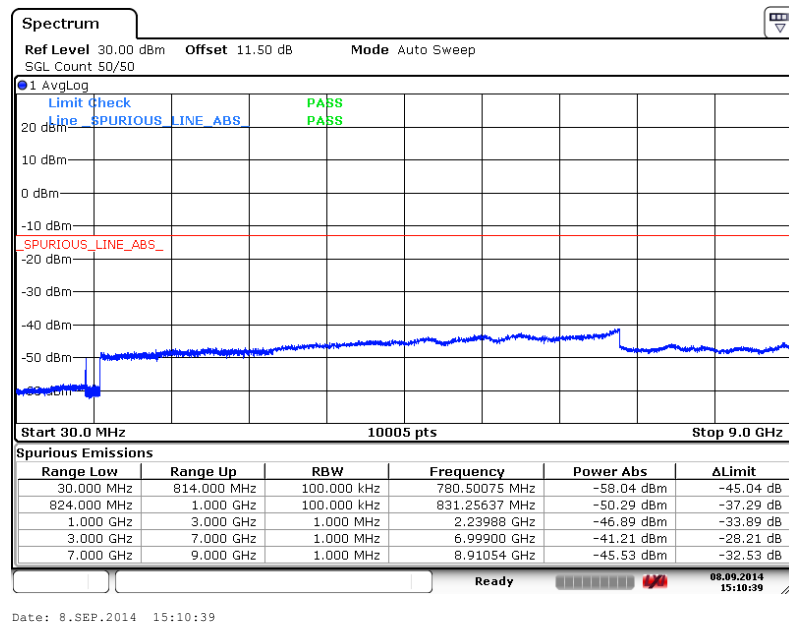


Band :	LTE Band 26	Channel :	CH26783 (High)
Band Width :	1.4MHz		

QPSK (RB Size 1, RB Offset 0)



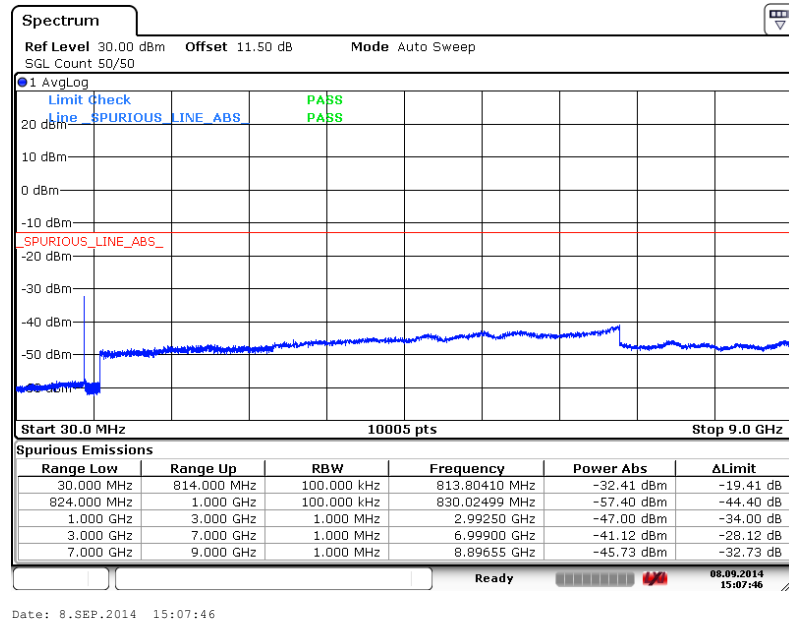
16QAM (RB Size 1, RB Offset 0)



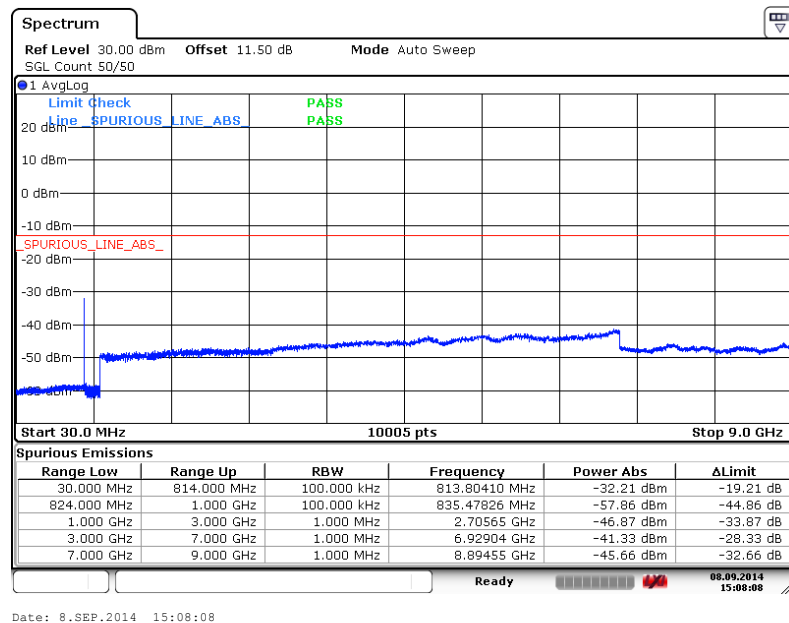


Band :	LTE Band 26	Channel :	CH26705 (Low)
Band Width :	3MHz		

QPSK (RB Size 1, RB Offset 0)



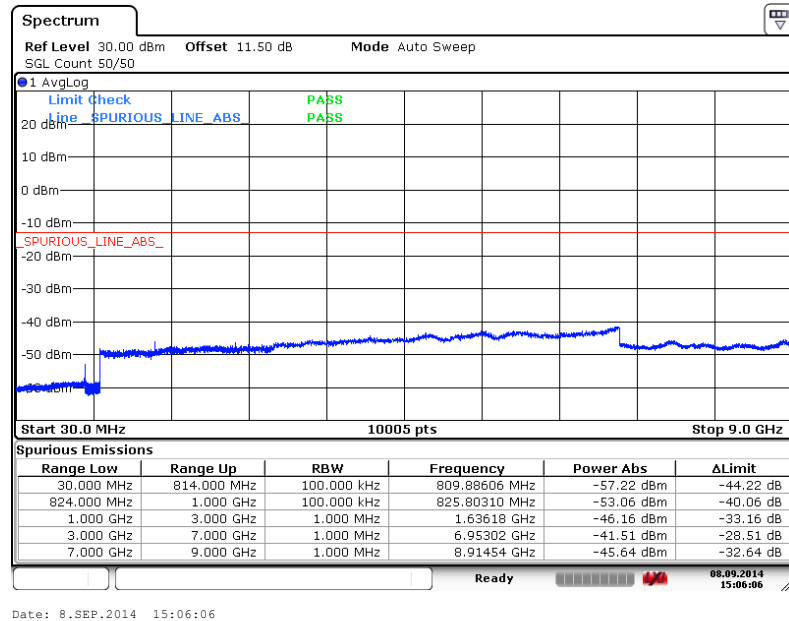
16QAM (RB Size 1, RB Offset 0)



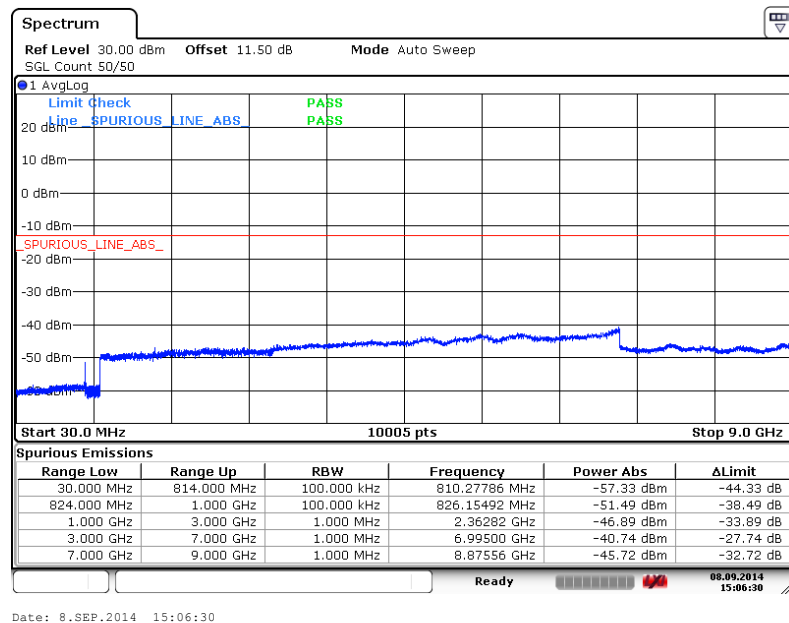


Band :	LTE Band 26	Channel :	CH26740 (Middle)
Band Width :	3MHz		

QPSK (RB Size 1, RB Offset 0)



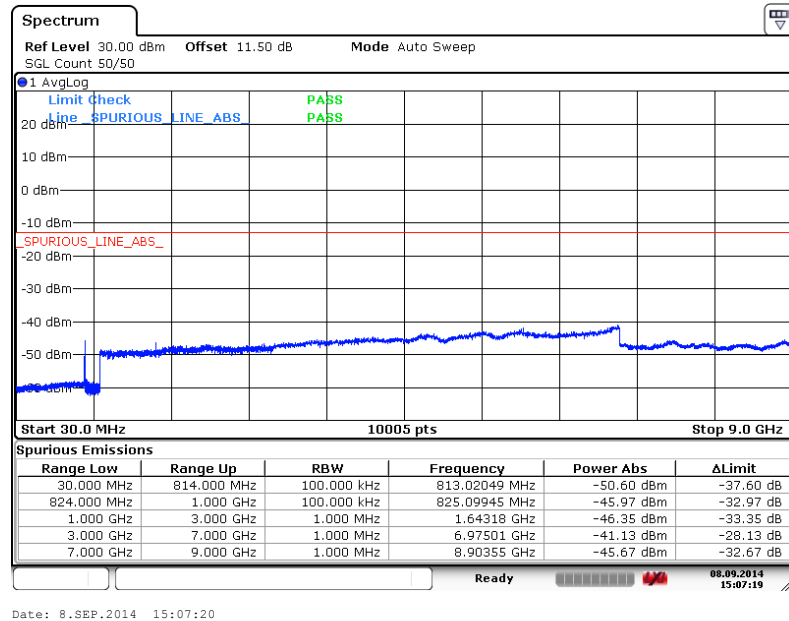
16QAM (RB Size 1, RB Offset 0)



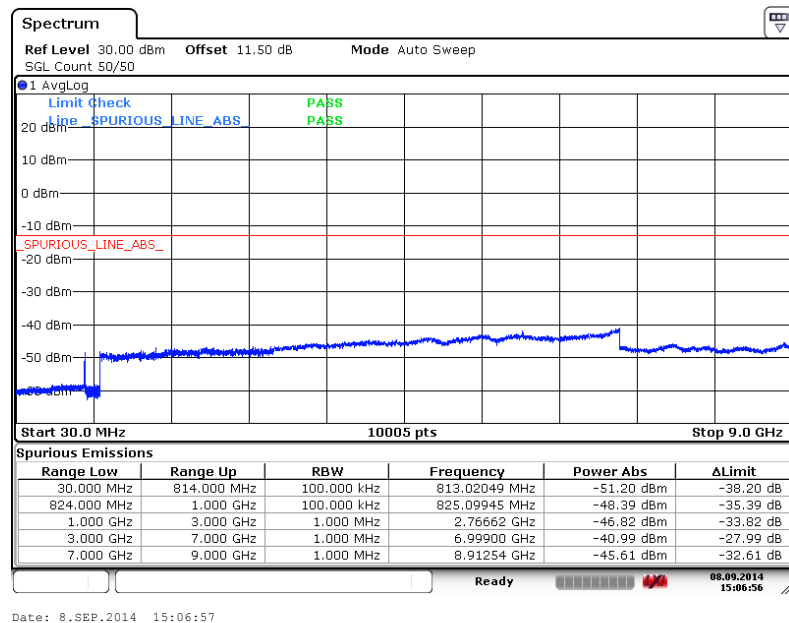


Band :	LTE Band 26	Channel :	CH26775 (High)
Band Width :	3MHz		

QPSK (RB Size 1, RB Offset 0)



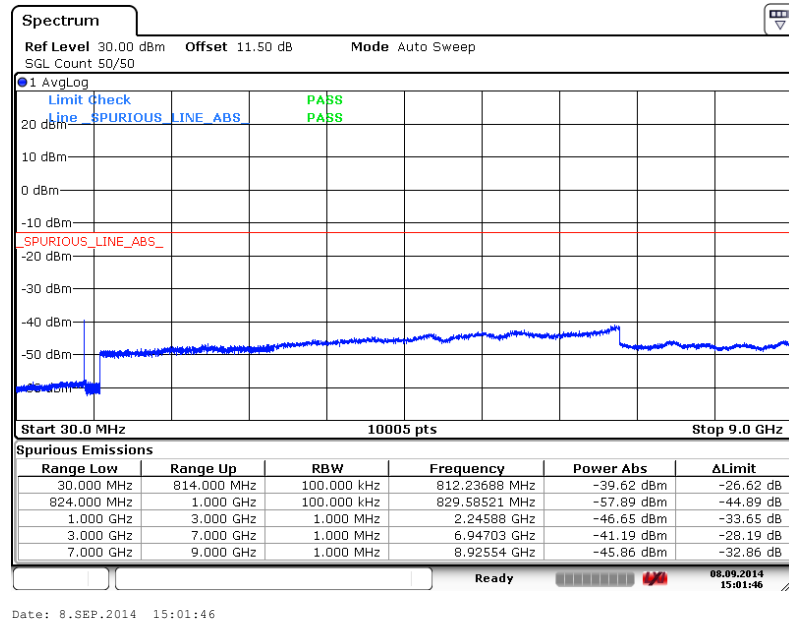
16QAM (RB Size 1, RB Offset 0)



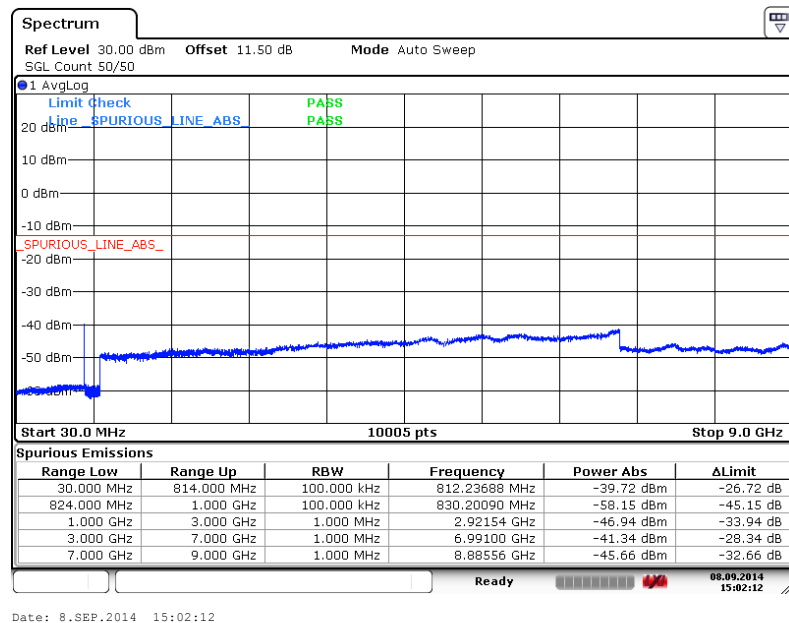


Band :	LTE Band 26	Channel :	CH26715 (Low)
Band Width :	5MHz		

QPSK (RB Size 1, RB Offset 0)



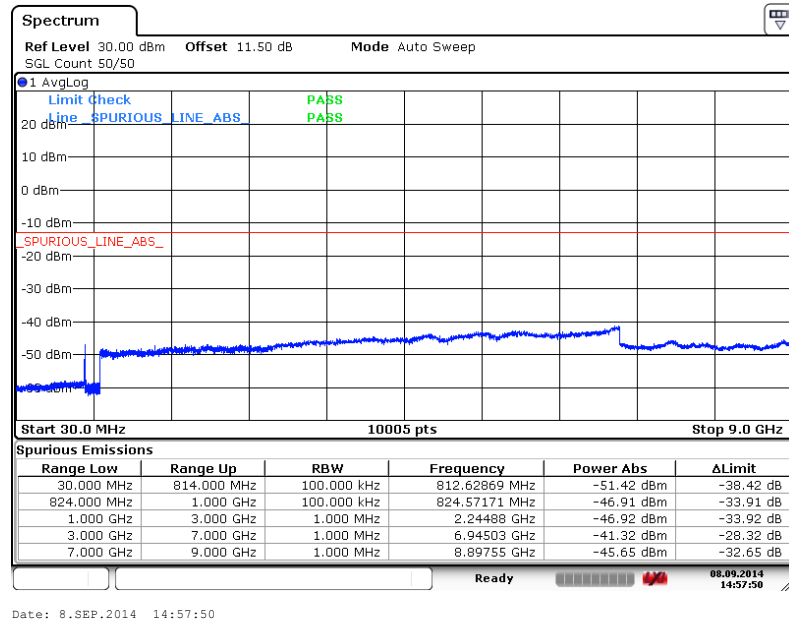
16QAM (RB Size 1, RB Offset 0)



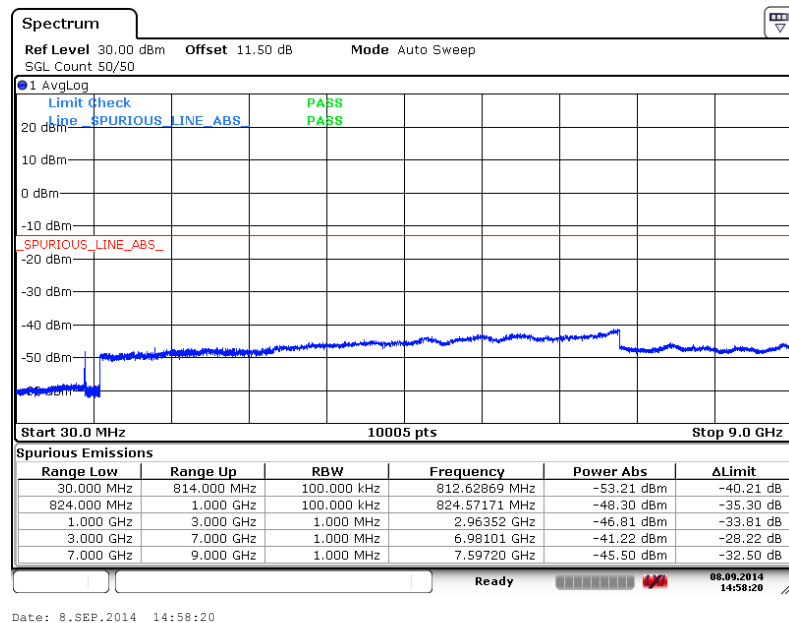


Band :	LTE Band 26	Channel :	CH26740 (Middle)
Band Width :	5MHz		

QPSK (RB Size 1, RB Offset 0)



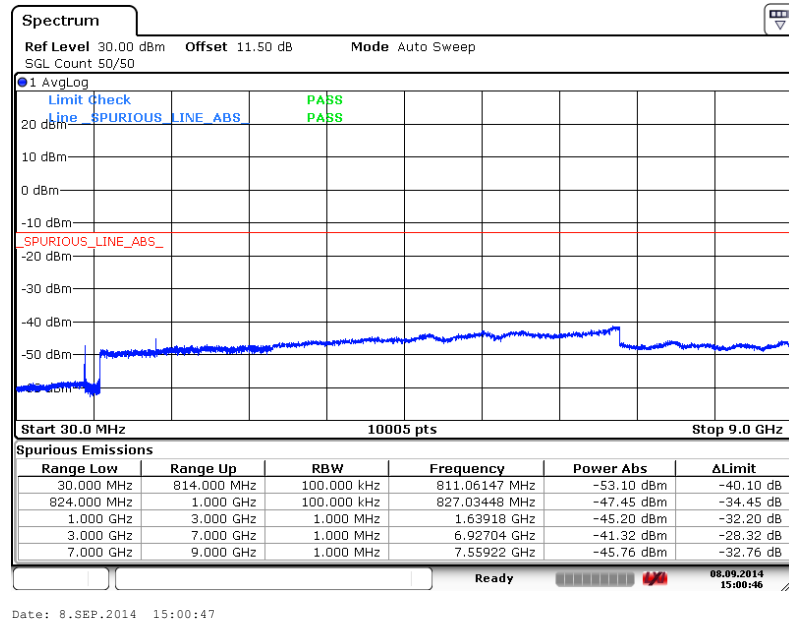
16QAM (RB Size 1, RB Offset 0)



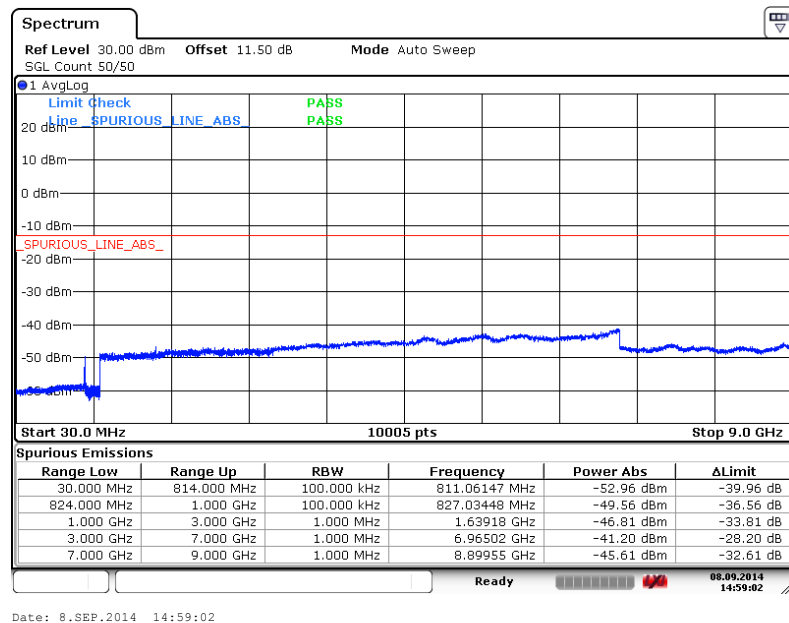


Band :	LTE Band 26	Channel :	CH26765 (High)
Band Width :	5MHz		

QPSK (RB Size 1, RB Offset 0)



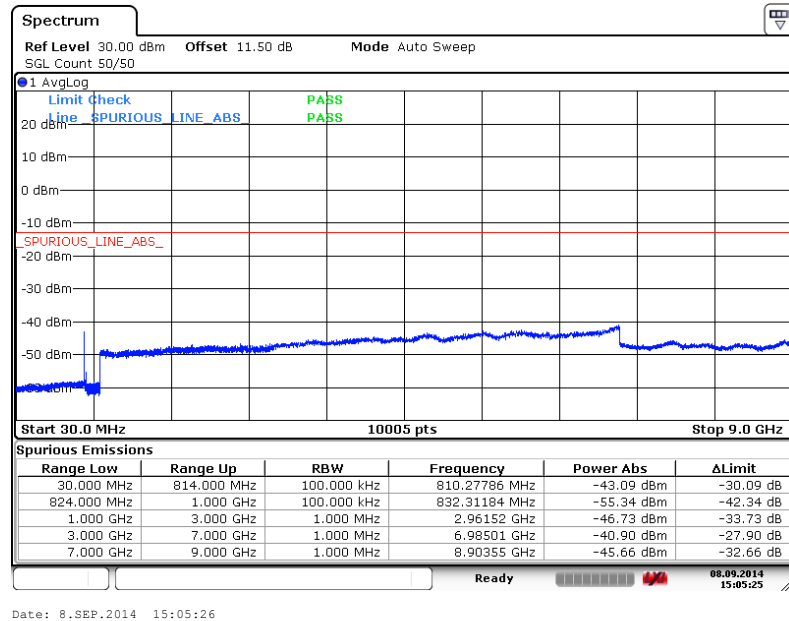
16QAM (RB Size 1, RB Offset 0)



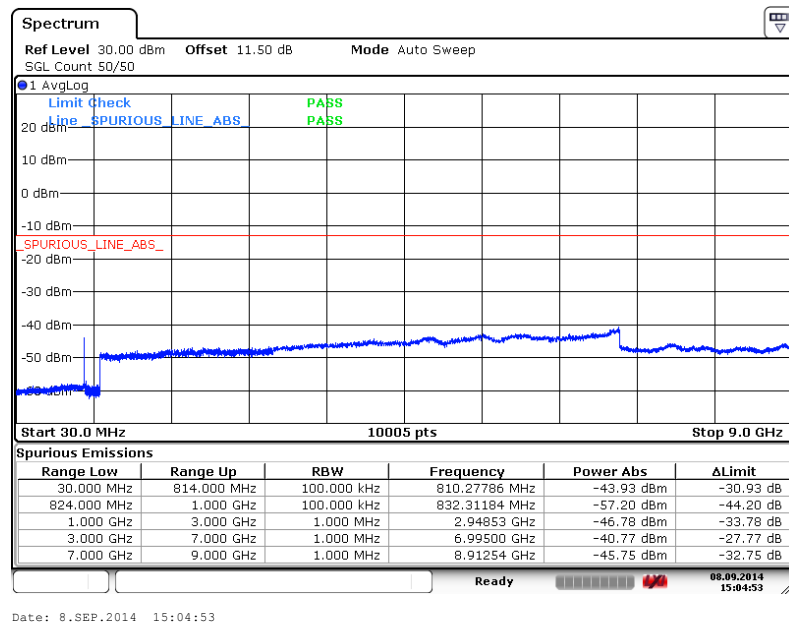


Band :	LTE Band 26	Channel :	CH26740 (Middle)
Band Width :	10MHz		

QPSK (RB Size 1, RB Offset 0)



16QAM (RB Size 1, RB Offset 0)





3.5 Field Strength of Spurious Radiation Measurement

3.5.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA / EIA-603-C-2004. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log_{10}(P[\text{Watts}])$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

Note: Wireless charger configuration was evaluated.

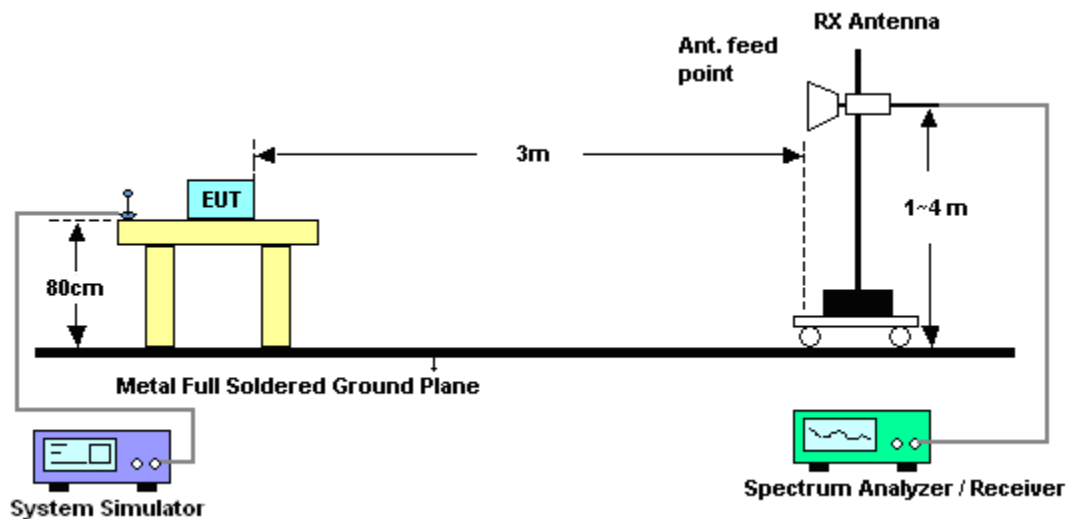
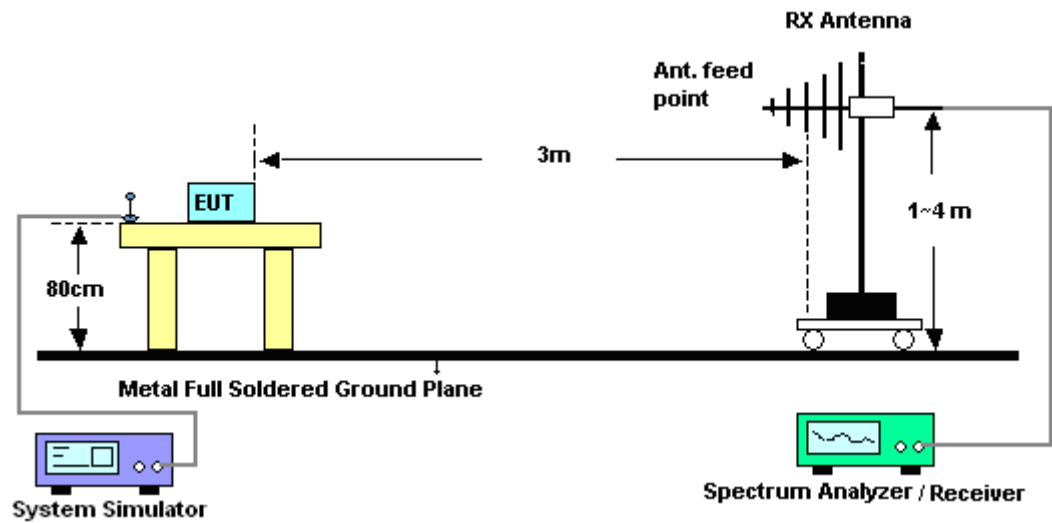
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter about ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. $\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$
11. $\text{ERP (dBm)} = \text{EIRP} - 2.15$
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from $43 + 10 \log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10 \log(P)] \text{ (dB)}$
 $= [30 + 10 \log(P)] \text{ (dBm)} - [43 + 10 \log(P)] \text{ (dB)}$
 $= -13 \text{ dBm}.$

3.5.4 Test Setup





3.5.5 Test Result of Field Strength of Spurious Radiated

<Low Channel>

Band :	LTE Band 26					Temperature :	23~24℃		
Test Mode :	1.4MHz QPSK RB Size 1 Offset 0					Relative Humidity :	46~48%		
Test Engineer :	Eric Shih					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over Limit	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	(dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1632	-55.22	-13	-42.22	-63.23	-57.03	0.97	4.93	H	Pass
2445	-51.57	-13	-38.57	-64.41	-53.38	1.27	5.24	H	Pass
3260	-52.56	-13	-39.56	-65.64	-55.82	1.53	6.94	H	Pass

Band :	LTE Band 26					Temperature :	23~24°C		
Test Mode :	1.4MHz QPSK RB Size 1 Offset 0					Relative Humidity :	46~48%		
Test Engineer :	Eric Shih					Polarization :	Vertical		
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1630.12	-50.55	-13	-37.55	-61.2	-52.37	0.97	4.94	V	Pass
2445.18	-51.50	-13	-38.50	-64.56	-53.31	1.27	5.24	V	Pass
3260.24	-50.77	-13	-37.77	-65.66	-54.03	1.53	6.94	V	Pass



<Middle Channel>

Band :	LTE Band 26				Temperature :	23~24℃			
Test Mode :	1.4MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-55.08	-13	-42.08	-63.15	-56.86	0.97	4.91	H	Pass
2458	-52.18	-13	-39.18	-64.69	-54.03	1.28	5.27	H	Pass
3277	-51.48	-13	-38.48	-64.95	-54.81	1.53	7.02	H	Pass

Band :	LTE Band 26	Temperature :	23~24°C						
Test Mode :	1.4MHz QPSK RB Size 1 Offset 0	Relative Humidity :	46~48%						
Test Engineer :	Eric Shih	Polarization :	Vertical						
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit	Reading	Power	loss	Gain		
(MHz)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	(dBi)	(H/V)	
1640	-50.59	-13	-37.59	-61.41	-52.37	0.97	4.91	V	Pass
2458	-51.52	-13	-38.52	-64.92	-53.37	1.28	5.27	V	Pass
3277	-49.75	-13	-36.75	-65.35	-53.08	1.53	7.02	V	Pass



<High Channel>

Band :	LTE Band 26				Temperature :	23~24℃			
Test Mode :	1.4MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648	-55.05	-13	-42.05	-63.38	-56.81	0.98	4.89	H	Pass
2470	-49.16	-13	-36.16	-61.76	-51.04	1.28	5.31	H	Pass
3294	-51.97	-13	-38.97	-65.32	-55.37	1.54	7.09	H	Pass

Band :	LTE Band 26					Temperature :	23~24°C		
Test Mode :	1.4MHz QPSK RB Size 1 Offset 0					Relative Humidity :	46~48%		
Test Engineer :	Eric Shih					Polarization :	Vertical		
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648	-51.55	-13	-38.55	-62.2	-53.31	0.98	4.89	V	Pass
2470	-51.15	-13	-38.15	-64.25	-53.03	1.28	5.31	V	Pass
3294	-50.35	-13	-37.35	-65.52	-53.75	1.54	7.09	V	Pass



<Low Channel>

Band :	LTE Band 26				Temperature :	23~24℃			
Test Mode :	3MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1633	-54.56	-13	-41.56	-62.81	-56.37	0.97	4.93	H	Pass
2450	-51.84	-13	-38.84	-64.25	-53.66	1.28	5.25	H	Pass
3266	-52.53	-13	-39.53	-65.67	-55.82	1.53	6.97	H	Pass

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	3MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Vertical			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1633	-50.50	-13	-37.50	-60.82	-52.31	0.97	4.93	V	Pass
2450	-51.02	-13	-38.02	-64.57	-52.84	1.28	5.25	V	Pass
3266	-49.52	-13	-36.52	-62.12	-52.81	1.53	6.97	V	Pass



<Middle Channel>

Band :	LTE Band 26					Temperature :	23~24℃		
Test Mode :	3MHz QPSK RB Size 1 Offset 0					Relative Humidity :	46~48%		
Test Engineer :	Eric Shih					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-54.43	-13	-41.43	-62.65	-56.21	0.97	4.91	H	Pass
2460	-51.56	-13	-38.56	-64.33	-53.41	1.28	5.28	H	Pass
3281	-51.84	-13	-38.84	-65.48	-55.19	1.54	7.04	H	Pass

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	3MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Vertical			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-52.23	-13	-39.23	-62.64	-54.01	0.97	4.91	V	Pass
2460	-51.01	-13	-38.01	-64.07	-52.86	1.28	5.28	V	Pass
3281	-50.96	-13	-37.96	-65.85	-54.31	1.54	7.04	V	Pass



<High Channel>

Band :	LTE Band 26				Temperature :	23~24℃			
Test Mode :	3MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648	-54.55	-13	-41.55	-63.11	-56.31	0.98	4.89	H	Pass
2471	-49.33	-13	-36.33	-61.75	-51.21	1.28	5.31	H	Pass
3295	-52.07	-13	-39.07	-65.38	-55.48	1.54	7.10	H	Pass

Band :	LTE Band 26	Temperature :	23~24°C						
Test Mode :	3MHz QPSK RB Size 1 Offset 0	Relative Humidity :	46~48%						
Test Engineer :	Eric Shih	Polarization :	Vertical						
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1647.52	-52.25	-13	-39.25	-62.6	-54.01	0.98	4.89	V	Pass
2471.28	-49.43	-13	-36.43	-62.69	-51.31	1.28	5.31	V	Pass
3295.04	-49.87	-13	-36.87	-65.21	-53.28	1.54	7.10	V	Pass



<Low Channel>

Band :	LTE Band 26	Temperature :	23~24°C						
Test Mode :	5MHz QPSK RB Size 1 Offset 0	Relative Humidity :	46~48%						
Test Engineer :	Eric Shih	Polarization :	Horizontal						
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit	Reading	Power	loss	Gain		
			(dB)	(dBm)	(dBm)	(dB)	(dBi)	(H/V)	
1640	-55.33	-13	-42.33	-63.56	-57.11	0.97	4.91	H	Pass
2455	-51.99	-13	-38.99	-64.45	-53.83	1.28	5.27	H	Pass
3274	-51.99	-13	-38.99	-65.64	-55.31	1.53	7.01	H	Pass

Band :	LTE Band 26				Temperature :	23~24℃			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Vertical			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-50.04	-13	-37.04	-60.53	-51.82	0.97	4.91	V	Pass
2455	-51.53	-13	-38.53	-64.64	-53.37	1.28	5.27	V	Pass
3274	-50.17	-13	-37.17	-65.39	-53.49	1.53	7.01	V	Pass



<Middle Channel>

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
			Limit	Reading	Power	loss	Gain		
(MHz)	(dBm)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	(dBi)	(H/V)	
1642	-54.23	-13	-41.23	-62.28	-56.01	0.98	4.90	H	Pass
2463	-49.85	-13	-36.85	-62.2	-51.71	1.28	5.29	H	Pass
3284	-49.95	-13	-36.95	-65.25	-53.31	1.54	7.05	H	Pass

Band :	LTE Band 26	Temperature :	23~24°C						
Test Mode :	5MHz QPSK RB Size 1 Offset 0	Relative Humidity :	46~48%						
Test Engineer :	Eric Shih	Polarization :	Vertical						
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1642	-50.59	-13	-37.59	-61.35	-52.37	0.98	4.90	V	Pass
2463	-50.35	-13	-37.35	-63.46	-52.21	1.28	5.29	V	Pass
3284	-49.98	-13	-36.98	-65.03	-53.34	1.54	7.05	V	Pass



<High Channel>

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648	-55.06	-13	-42.06	-63.53	-56.82	0.98	4.89	H	Pass
2470	-50.23	-13	-37.23	-62.51	-52.11	1.28	5.31	H	Pass
3294	-51.06	-13	-38.06	-64.86	-54.46	1.54	7.09	H	Pass

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Vertical			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1648	-51.34	-13	-38.34	-61.89	-53.1	0.98	4.89	V	Pass
2470	-48.46	-13	-35.46	-61.45	-50.34	1.28	5.31	V	Pass
3294	-50.01	-13	-37.01	-65.03	-53.41	1.54	7.09	V	Pass

**<Middle Channel>**

Band :	LTE Band 26	Temperature :	23~24°C						
Test Mode :	10MHz QPSK RB Size 1 Offset 0	Relative Humidity :	46~48%						
Test Engineer :	Eric Shih	Polarization :	Horizontal						
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1628	-55.46	-13	-42.46	-63.68	-57.28	0.97	4.94	H	Pass
2442	-49.53	-13	-36.53	-62.01	-51.33	1.27	5.23	H	Pass
3256	-51.75	-13	-38.75	-65.38	-55	1.53	6.93	H	Pass

Band :	LTE Band 26	Temperature :	23~24℃						
Test Mode :	10MHz QPSK RB Size 1 Offset 0	Relative Humidity :	46~48%						
Test Engineer :	Eric Shih	Polarization :	Vertical						
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit	Reading	Power	loss	Gain		
			(dB)	(dBm)	(dBm)	(dB)	(dBi)	(H/V)	
1628	-51.09	-13	-38.09	-61.64	-52.91	0.97	4.94	V	Pass
2442	-50.51	-13	-37.51	-63.45	-52.31	1.27	5.23	V	Pass
3256	-50.02	-13	-37.02	-65.18	-53.27	1.53	6.93	V	Pass

**<WPC Charging Mode>****<Low Channel>**

Band :	LTE Band 26					Temperature :	23~24°C		
Test Mode :	5MHz QPSK RB Size 1 Offset 0					Relative Humidity :	46~48%		
Test Engineer :	Eric Shih					Polarization :	Horizontal		
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-50.34	-13	-37.34	-58.56	-52.12	0.97	4.91	H	Pass
2456	-52.09	-13	-39.09	-64.68	-53.93	1.28	5.27	H	Pass
3272	-52.90	-13	-39.90	-66.05	-56.21	1.53	7.00	H	Pass

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Vertical			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1636	-52.41	-13	-39.41	-62.86	-54.21	0.97	4.92	V	Pass
2454	-51.57	-13	-38.57	-65.36	-53.41	1.28	5.26	V	Pass
3272	-51.01	-13	-38.01	-66.23	-54.32	1.53	7.00	V	Pass

**<Middle Channel>**

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-49.61	-13	-36.61	-57.92	-51.39	0.97	4.91	H	Pass
2456	-51.90	-13	-38.90	-64.99	-53.74	1.28	5.27	H	Pass
3280	-52.42	-13	-39.42	-66.29	-55.77	1.54	7.03	H	Pass

Band :	LTE Band 26					Temperature :	23~24°C		
Test Mode :	5MHz QPSK RB Size 1 Offset 0					Relative Humidity :	46~48%		
Test Engineer :	Eric Shih					Polarization :	Vertical		
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1640	-51.95	-13	-38.95	-62.51	-53.73	0.97	4.91	V	Pass
2456	-52.29	-13	-39.29	-65.83	-54.13	1.28	5.27	V	Pass
3280	-49.47	-13	-36.47	-65.39	-52.82	1.54	7.03	V	Pass



<High Channel>

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Horizontal			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1646	-51.45	-13	-38.45	-59.67	-53.21	0.98	4.89	H	Pass
2469	-53.30	-13	-40.30	-65.73	-55.18	1.28	5.31	H	Pass
3293	-52.37	-13	-39.37	-65.85	-55.77	1.54	7.09	H	Pass

Band :	LTE Band 26				Temperature :	23~24°C			
Test Mode :	5MHz QPSK RB Size 1 Offset 0				Relative Humidity :	46~48%			
Test Engineer :	Eric Shih				Polarization :	Vertical			
Remark :	Spurious emissions within 30-10th harmonic were found more than 20dB below limit line.								
Frequency	ERP	Limit	Over	SPA	S.G.	TX Cable	TX Antenna	Polarization	Result
(MHz)	(dBm)	(dBm)	Limit (dB)	Reading (dBm)	Power (dBm)	loss (dB)	Gain (dBi)	(H/V)	
1646	-53.52	-13	-40.52	-64.01	-55.28	0.98	4.89	V	Pass
2469	-52.30	-13	-39.30	-65.62	-54.18	1.28	5.31	V	Pass
3293	-50.92	-13	-37.92	-66.17	-54.32	1.54	7.09	V	Pass

3.6 Frequency Stability Measurement

3.6.1 Description of Frequency Stability Measurement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency according to FCC Part 90.213.

3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

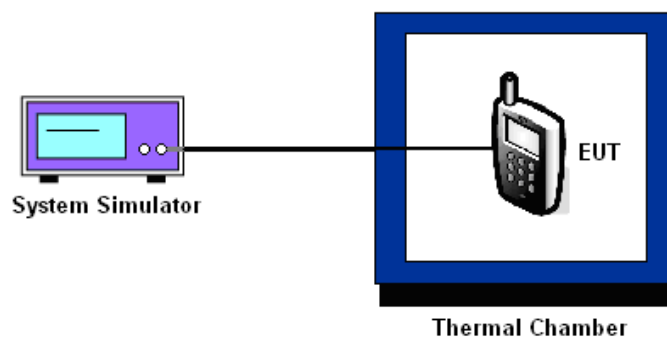
3.6.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.6.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at $25\pm 5^{\circ}\text{C}$ and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

3.6.5 Test Setup



3.6.6 Test Result of Temperature Variation

Band :	LTE Band 26 (QPSK)	Limit (ppm) :	2.5
Temperature (°C)	BW 10MHz	Result	
	Deviation (ppm)		
50	0.0096	PASS	
40	0.0100		
30	0.0094		
20(Ref.)	0.0000		
10	0.0112		
0	0.0098		
-10	0.0002		
-20	0.0006		
-30	0.0001		

3.6.7 Test Result of Voltage Variation

Band	Bandwidth	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 26	10M	4.35	0.0099	2.5	PASS
		Normal	0.0000		
		3.4	0.0005		

Remark:

1. Normal Voltage = 3.8V.
2. The manufacturer declared that the EUT could work properly between voltage 3.4V ~ 4.35V.



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LTE Base Station	Anritsu	MT8820C	6201026480	30MHz~2.7GHz	Jan. 07, 2014	Sep. 08, 2014 ~ Sep. 15, 2014	Jan. 06, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 09, 2014	Sep. 08, 2014 ~ Sep. 15, 2014	Jun. 08, 2015	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 17, 2014	Sep. 08, 2014 ~ Sep. 15, 2014	Jul. 16, 2015	Conducted (TH02-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz ~ 30GHz	Feb. 10, 2014	Sep. 02, 2014	Feb. 09, 2015	Radiation (03CH07-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 10, 2013	Sep. 02, 2014	Oct. 09, 2014	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	75962	1GHz~18GHz	Aug. 19, 2014	Sep. 02, 2014	Aug. 18, 2015	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10 MHz ~ 1000MHz	Mar. 17, 2014	Sep. 02, 2014	Mar. 16, 2015	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1 GHz~26.5 GHz	Nov. 29, 2013	Sep. 02, 2014	Nov. 28, 2014	Radiation (03CH07-HY)
Turn Table	ChainTek	ChainTek 3000	N/A	0 ~ 360 degree	N/A	Sep. 02, 2014	N/A	Radiation (03CH07-HY)
Antenna Mast	ChainTek	ChainTek 3000	N/A	N/A	N/A	Sep. 02, 2014	N/A	Radiation (03CH07-HY)



5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.50
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