FCC RADIO TEST REPORT

FCC ID	:	**RWO-RZ350259**
Equipment	:	**Smartphone**
Brand Name	:	**RAZER**
Model Name	:	**RZ35-0259**
Applicant	:	**Razer Inc.** **201 3rd Street, Suite 900, San Francisco, CA 94103, USA**
Manufacturer	:	**Razer Inc.** **201 3rd Street, Suite 900, San Francisco, CA 94103, USA**
Standard	:	**47 CFR Part 2, 22(H), 27**

The product was received on Aug. 08, 2018 and testing was started from Aug. 08, 2018 and completed on Sep. 20, 2018. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Approved by: Joseph Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FG871722-04	01	Initial issue of report	Oct. 18, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
	§22.913 (a)(2)	Effective Radiated Power (Band 5)	Pass	
	§27.50 (h)(2)	Equivalent Isotropic Radiated Power (Band 7) (Band 38)		
3.3	-	Peak-to-Average Ratio	Reporting only	-
3.4	§2.1049	Occupied Bandwidth	Reporting only	-
3.5	§2.1051 §22.917 (a)	Conducted Band Edge Measurement (Band 5)	Pass	-
	§2.1051 §27.53 (m)(4)	Conducted Band Edge Measurement (Band 7) (Band 38)		
3.6	§2.1051 §22.917 (a)	Conducted Spurious Emission (Band 5)	Pass	-
	§2.1051 §27.53 (m)(4)	Conducted Spurious Emission (Band 7) (Band 38)		
-	§2.1055 §22.355 §27.54	Frequency Stability Temperature & Voltage	Not Required	-
4.2	§2.1053 §22.917 (a)	Radiated Spurious Emission (Band 5)	Pass	Under limit 12.96 dB at 17852.000 MHz
	§2.1053 §27.53 (m)(4)	Radiated Spurious Emission (Band 7) (Band 38)		

Note:
1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report by adding LTE CA Band 5, 7, and 38 which are enabled by SW. All the test cases were performed on original report which can be referred to Sporton Report Number FG871722B. Based on the original report, the test cases were verified.

Reviewed by: Wii Chang

Report Producer: Polly Tsai

1 General Description

1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, WPC, and GNSS

Product Specification subjective to this standard	
Antenna Type	WWAN: PIFA Antenna WLAN <Ant. 1>: PIFA Antenna <Ant. 2>: PIFA Antenna Bluetooth: PIFA Antenna GPS/Glonass/BDS: PIFA Antenna NFC: Loop Antenna WPC: Loop Antenna

1.2 Modification of EUT

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

1.3 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH13-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.4 Applicable Standards

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

- ANSI C63.26-2015
- ANSI / TIA-603-E
- 47 CFR Part 2, 22(H), 27
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

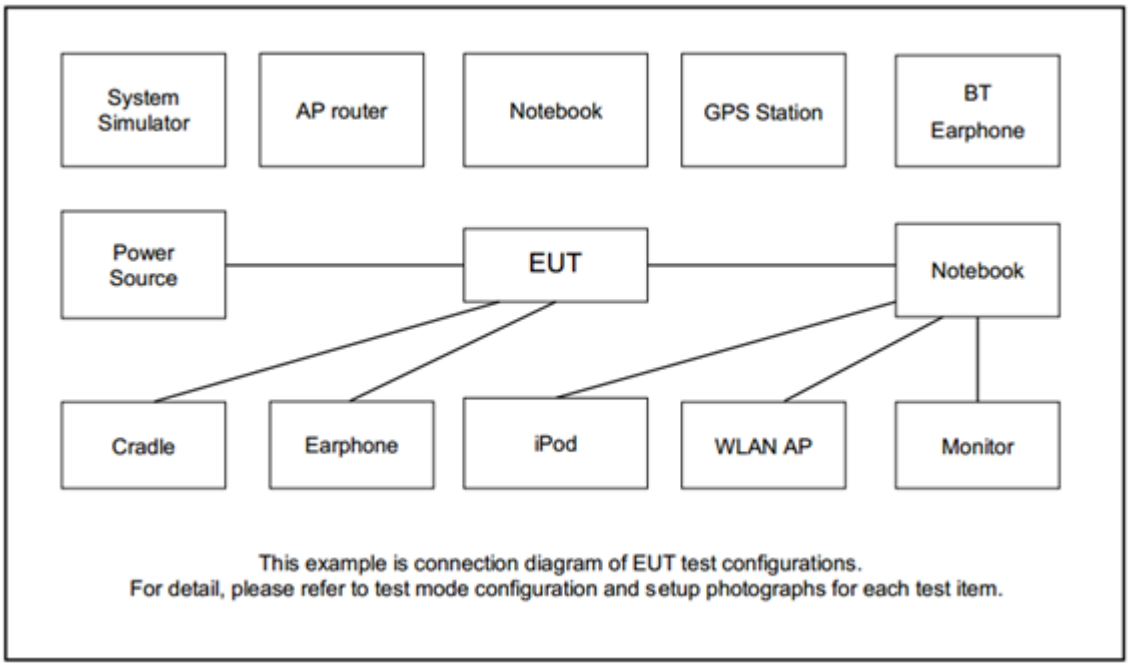
Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane for LTE Band 5, Y plane for LTE Band 7, Z plane for LTE Band 38 for main antenna and Z plane for LTE Band 5 for Aux. antenna) were recorded in this report.

Test Items	Band	Bandwidth (MHz)					Modulation			RB #			Test Channel		
		3+5	5+3	5+10	10+5	10+10	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	5_CA	-	-	v	v	v	v	v	v	v	v	v	v	v	v
26dB and 99% Bandwidth	5_CA	-	-	v	v	v	v	v	v			v	v	v	v
Conducted Band Edge	5_CA	-	-	v	v	v	v	v	v	v		v	v		v
Conducted Spurious Emission	5_CA	-	-	v	v	v	v	v	v	v		v	v	v	v
E.R.P.	5_CA	-	-	v	v	v	v	v	v	v			v	v	v
Radiated Spurious Emission	5_CA	Worst Case											v	v	v
Remark	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 4. All the radiated test cases were performed with Adapter 1.														

Test Items	Band	Bandwidth (MHz)										Modulation			RB #			Test Channel		
		20+20	20+15	15+20	20+10	10+20	20+5	5+20	15+15	15+10	10+15	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Max. Output Power	7_CA	v	v	v	v	v	-	-	v	v	-	v	v	v	v	v	v	v	v	v
	38_CA	v	-	-	-	-	-	-	v	-	-	v	v	v	v	v	v	v	v	v
26dB and 99% Bandwidth	7_CA	v	v	v	v	v	-	-	v	v	-	v	v	v			v	v	v	v
	38_CA	v	-	-	-	-	-	-	v	-	-	v	v	v			v	v	v	v
Conducted Band Edge	7_CA	v	v	v	v	v	-	-	v	v	-	v	v	v	v		v	v		v
	38_CA	v	-	-	-	-	-	-	v	-	-	v	v	v	v		v	v		v
Conducted Spurious Emission	7_CA	v	v	v	v	v	-	-	v	v	-	v	v	v	v		v	v	v	v
	38_CA	v	-	-	-	-	-	-	v	-	-	v	v	v	v		v	v	v	v
E.I.R.P.	7_CA	v	v	v	v	v	-	-	v	v	-	v	v	v	v			v	v	v
	38_CA	v	-	-	-	-	-	-	v	-	-	v	v	v	v			v	v	v
Radiated Spurious Emission	7_CA	Worst Case																v	v	v
	38_CA	Worst Case																v	v	v
Remark	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. 4. All the radiated test cases were performed with Adapter 1.																			

2.2 Connection Diagram of Test System



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.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m

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 EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

2.5 Frequency List of Low/Middle/High Channels

LTE Band 5 Channel and Frequency List_CA					
BW [MHz]	**Channel/Frequency(MHz)**		**Lowest**	**Middle**	**Highest**
10 + 10	PCC	Channel	20450	20476	20501
		Frequency	829.0	831.6	834.1
	SCC	Channel	20549	20575	20600
		Frequency	838.9	841.5	844.0
10 + 5	PCC	Channel	20450	20500	20550
		Frequency	829.0	834.0	839.0
	SCC	Channel	20522	20572	20622
		Frequency	836.2	841.2	846.2
5 + 10	PCC	Channel	20428	20478	20528
		Frequency	826.8	831.8	836.8
	SCC	Channel	20500	20550	20600
		Frequency	834.0	839.0	844.0

LTE Band 7 Channel and Frequency List_CA					
BW [MHz]	Channel/Frequency(MHz)		Lowest	Middle	Highest
20 + 20	PCC	Channel	20850	21001	21152
		Frequency	2510.0	2525.1	2540.2
	SCC	Channel	21048	21199	21350
		Frequency	2529.8	2544.9	2560.0
20 + 15	PCC	Channel	20850	21026	21201
		Frequency	2510.0	2527.6	2545.1
	SCC	Channel	21021	21197	21372
		Frequency	2527.1	2544.7	2562.2
15 + 20	PCC	Channel	20828	21003	21179
		Frequency	2507.8	2525.3	2542.9
	SCC	Channel	20999	21174	21350
		Frequency	2524.9	2542.4	2560.0
20 + 10	PCC	Channel	20850	21051	21251
		Frequency	2510.0	2530.1	2550.1
	SCC	Channel	20994	21195	21395
		Frequency	2524.4	2544.5	2564.5
10 + 20	PCC	Channel	20805	21006	21206
		Frequency	2505.5	2525.6	2545.6
	SCC	Channel	20949	21150	21350
		Frequency	2519.9	2540.0	2560.0
15 + 15	PCC	Channel	20825	21025	21225
		Frequency	2507.5	2527.5	2547.5
	SCC	Channel	20975	21175	21375
		Frequency	2522.5	2542.5	2562.5
15 + 10	PCC	Channel	20825	21051	21277
		Frequency	2507.5	2530.1	2552.7
	SCC	Channel	20945	21171	21397
		Frequency	2519.5	2542.1	2564.7

LTE Band 38 Channel and Frequency List_CA					
BW [MHz]	Channel/Frequency(MHz)		Lowest	Middle	Highest
20 + 20	PCC	Channel	37850	37901	37952
		Frequency	2580.0	2585.1	2590.2
	SCC	Channel	38048	38099	38150
		Frequency	2599.8	2604.9	2610.0
15+ 15	PCC	Channel	37825	37925	38025
		Frequency	2577.5	2587.5	2597.5
	SCC	Channel	37975	38075	38175
		Frequency	2592.5	2602.5	2612.5

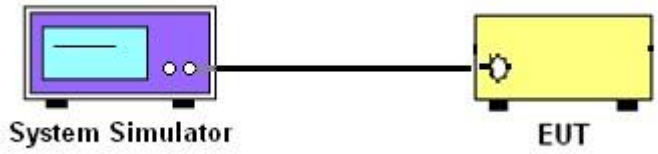
3 Conducted Test Items

3.1 Measuring Instruments

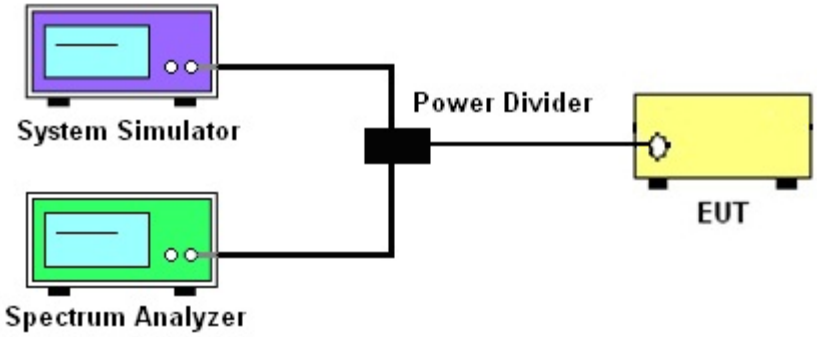
See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Peak-to-Average Ratio, Occupied Bandwidth ,Conducted Band-Edge and Conducted Spurious Emission



3.1.4 Test Result of Conducted Test

Please refer to Appendix A.

3.2 Conducted Output Power and ERP/EIRP

3.2.1 Description of the Conducted Output Power Measurement and ERP/EIRP Measurement

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

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5.

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 7 and Band 38.

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, ERP = EIRP -2.15, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the 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.

3.3 Peak-to-Average Ratio

3.3.1 Description of the PAR Measurement

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

3.3.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 5.7.1

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

3.4 Occupied Bandwidth

3.4.1 Description of Occupied Bandwidth Measurement

The 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 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

3.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 4.2

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be between two and five times the anticipated OBW.
3. The nominal resolution bandwidth (RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.
4. Set the detection mode to peak, and the trace mode to max hold.
5. Determine the reference value: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace. (this is the reference value)
6. Determine the “-26 dB down amplitude” as equal to (Reference Value – X).
7. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “–X dB down amplitude” determined in step 6. If a marker is below this “-X dB down amplitude” value it shall be placed as close as possible to this value. The OBW is the positive frequency difference between the two markers.
8. Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

3.5 Conducted Band Edge

3.5.1 Description of Conducted Band Edge Measurement

22.917(a)

For operations in the 824 – 849 MHz band, the FCC limit is 43 + $10\log_{10}$(P[Watts]) dB below the transmitter power P(Watts) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53(m)(4)

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

3.5.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.0.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
4. Beyond the 1 MHz band from the band edge, RBW=1MHz was used.
5. Set spectrum analyzer with RMS detector.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. Checked that all the results comply with the emission limit line.
   The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
8. For LTE Band 7, 38, the other 40 dB, and 55 dB have additionally applied same calculation above.

3.6 Conducted Spurious Emission

3.6.1 Description of Conducted Spurious Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

For Band 7,38:

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 55 + 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 10^{th} harmonic.

3.6.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.0.

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.
6. Set spectrum analyzer with RMS detector.
7. Taking the record of maximum spurious emission.
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
9. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
10. For Band 7, 38

    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)

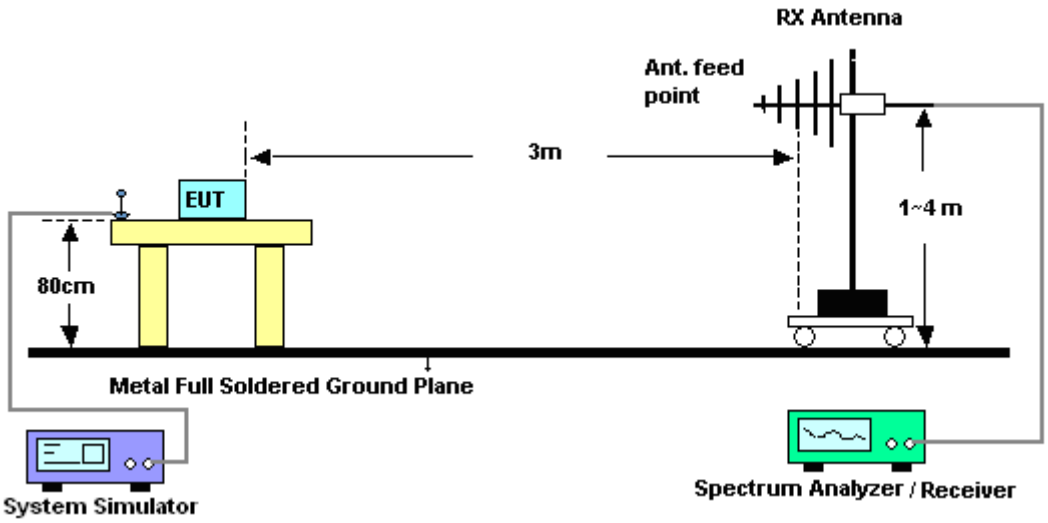
4 Radiated Test Items

4.1 Measuring Instruments

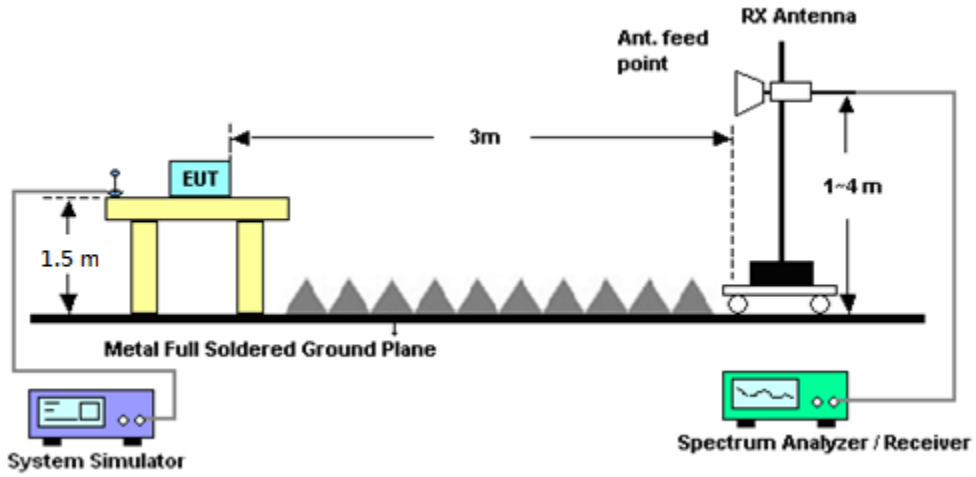
See list of measuring instruments of this test report.

4.1.1 Test Setup

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

4.2 Radiated Spurious Emission

4.2.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. 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 (P) dB.

For Band 7, 38

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 55 + 10 log (P) dB.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.2.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above 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, 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. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
11. For Band 7, 38:
    The limit line is derived from 55 + 10log(P)dB below the transmitter power P(Watts)
    EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
    ERP (dBm) = EIRP - 2.15

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LTE Base Station	Anritsu	MT8820C	6201432821	GSM/GPRS /WCDMA/LTE	Oct. 13, 2017	Aug. 08, 2018~ Oct. 08, 2018	Oct. 12, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 07, 2017	Aug. 08, 2018~ Oct. 08, 2018	Nov. 06, 2018	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890089	1V~20V 0.5A~5A	Jan. 12, 2018	Aug. 08, 2018~ Oct. 08, 2018	Jan. 11, 2019	Conducted (TH05-HY)
Coupler	Warison	1-18GHz 20dB 25WSMA Directional Coupler	#B	1G~18GHz	Dec. 04, 2017	Aug. 08, 2018~ Oct. 08, 2018	Dec. 03, 2018	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Sep. 19, 2018~ Sep. 20, 2018	Nov. 22, 2018	Radiation (03CH13-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 16, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jul. 15, 2019	Radiation (03CH13-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 21, 2017	Sep. 19, 2018~ Sep. 20, 2018	Dec. 20, 2018	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800N1D01N-06	40103&07	30MHz to 1GHz	Jan. 10, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jan. 09, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	Jun. 29, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jun. 28, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Sep. 07, 2018	Sep. 19, 2018~ Sep. 20, 2018	Sep. 06, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN1	1G Low pass Filter	Sep. 17, 2018	Sep. 19, 2018~ Sep. 20, 2018	Sep. 16, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN2	3G High Pass	Sep. 17, 2018	Sep. 19, 2018~ Sep. 20, 2018	Sep. 16, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-1080-1200-15000-60ST	SN3	1.2 GHz High pass	Jul. 05, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jul. 04, 2019	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 05, 2017	Sep. 19, 2018~ Sep. 20, 2018	Dec. 04, 2018	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 27, 2017	Sep. 19, 2018~ Sep. 20, 2018	Nov. 26, 2018	Radiation (03CH13-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800054001	1GHz~18GHz	Apr. 16, 2018	Sep. 19, 2018~ Sep. 20, 2018	Apr. 15, 2019	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Feb. 02, 2018	Sep. 19, 2018~ Sep. 20, 2018	Feb. 01, 2019	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 15, 2018	Sep. 19, 2018~ Sep. 20, 2018	Mar. 14, 2019	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Sep. 19, 2018~ Sep. 20, 2018	N/A	Radiation (03CH13-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Sep. 19, 2018~ Sep. 20, 2018	N/A	Radiation (03CH13-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Jan. 15, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jan. 14, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Jan. 22, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	335041/4	30M-18G	Jan. 22, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24961/ 4	30M~18GHz	Jan. 22, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jan. 21, 2019	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 17, 2017	Sep. 19, 2018~ Sep. 20, 2018	Oct. 16, 2018	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Oct. 17, 2017	Sep. 19, 2018~ Sep. 20, 2018	Oct. 16, 2018	Radiation (03CH13-HY)
Software	AUDIX	E3 6.2009-8-24c	RK-001124	N/A	N/A	Sep. 19, 2018~ Sep. 20, 2018	N/A	Radiation (03CH13-HY)

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.07**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.48**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.92**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE Band 5_CA Maximum Average Power [dBm]								
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest
	RB Size	RB Offset	RB Size	RB Offset				
10+10	0	0	1	49	QPSK	23.90	**24.00**	23.90
10+10	1	0	0	0		23.90	23.90	23.90
10+10	50	0	0	0		23.20	23.40	23.40
10+10	50	0	50	0		22.30	22.40	22.30
10+10	1	0	1	49		13.40	13.50	13.50
10+10	1	0	1	0		13.50	13.50	13.70
10+10	1	49	1	0		23.90	23.80	23.90
10+10	50	0	1	49		19.40	19.50	18.80
10+10	0	0	1	49	16-QAM	23.90	23.50	23.50
10+10	1	0	0	0		23.80	23.50	23.40
10+10	50	0	0	0		22.60	22.50	22.40
10+10	50	0	50	0		21.40	21.50	21.40
10+10	1	0	1	49		14.00	14.10	14.60
10+10	1	0	1	0		14.30	14.10	14.20
10+10	1	49	1	0		23.50	23.30	23.20
10+10	50	0	1	49		19.60	19.60	19.50
10+10	0	0	1	49	64-QAM	22.70	22.50	22.10
10+10	1	0	0	0		22.80	22.50	23.00
10+10	50	0	0	0		21.50	21.50	21.50
10+10	50	0	50	0		21.50	21.50	21.50
10+10	1	0	1	49		13.90	14.00	14.10
10+10	1	0	1	0		14.00	14.00	13.80
10+10	1	49	1	0		21.60	21.60	21.60
10+10	50	0	1	49		19.50	19.60	18.90
10+5	50	0	25	0	QPSK	19.50	19.40	19.40
10+5	1	0	1	24		11.50	11.50	11.50
10+5	1	49	1	0		21.40	21.50	21.40
10+5	50	0	25	0	16-QAM	18.60	18.50	18.50
10+5	1	0	1	24		11.90	11.80	11.90
10+5	1	49	1	0		21.10	21.20	21.10
10+5	50	0	25	0	64-QAM	18.60	18.50	18.50
10+5	1	0	1	24		12.20	12.10	12.20
10+5	1	49	1	0		19.20	19.20	19.20
5+10	25	0	50	0	QPSK	19.30	19.30	19.30
5+10	1	0	1	49		11.20	11.60	11.60
5+10	1	24	1	0		21.50	21.40	21.50
5+10	25	0	50	0	16-QAM	18.50	18.50	18.40
5+10	1	0	1	49		11.90	11.90	11.90
5+10	1	24	1	0		21.20	21.10	21.20
5+10	25	0	50	0	64-QAM	18.50	18.40	18.40
5+10	1	0	1	49		11.80	11.80	11.80
5+10	1	24	1	0		19.30	19.20	19.30

LTE Band 7_CA Maximum Average Power [dBm]								
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest
	RB Size	RB Offset	RB Size	RB Offset				
20+20	0	0	1	99	QPSK	23.17	23.06	22.86
20+20	1	0	0	0		22.58	23.21	23.28
20+20	100	0	0	0		22.43	22.48	22.42
20+20	100	0	100	0		20.47	20.48	20.35
20+20	1	0	1	99		14.28	14.29	14.31
20+20	1	0	1	0		18.68	18.75	18.76
20+20	1	99	1	0		23.36	**23.49**	23.39
20+20	100	0	1	99		19.92	19.88	19.79
20+20	0	0	1	99	16-QAM	22.71	22.62	22.52
20+20	1	0	0	0		22.52	22.78	22.75
20+20	100	0	0	0		21.48	21.54	21.41
20+20	100	0	100	0		20.55	20.54	20.38
20+20	1	0	1	99		14.64	14.88	14.72
20+20	1	0	1	0		19.11	19.33	19.33
20+20	1	99	1	0		22.69	23.07	22.82
20+20	100	0	1	99		19.99	19.98	19.91
20+20	0	0	1	99	64-QAM	21.68	21.46	22.22
20+20	1	0	0	0		21.11	21.41	22.23
20+20	100	0	0	0		20.41	20.54	20.42
20+20	100	0	100	0		20.57	20.51	20.39
20+20	1	0	1	99		14.98	14.95	14.99
20+20	1	0	1	0		19.07	19.11	19.22
20+20	1	99	1	0		20.86	20.89	22.23
20+20	100	0	1	99		19.96	19.96	20.01
20+15	100	0	75	0	QPSK	21.53	21.52	21.49
20+15	1	0	1	74		14.41	14.43	14.39
20+15	1	99	1	0		23.39	23.48	23.43
20+15	100	0	75	0	16-QAM	20.58	20.58	20.51
20+15	1	0	1	74		14.79	14.81	14.81
20+15	1	99	1	0		22.96	22.88	22.88
20+15	100	0	75	0	64-QAM	20.59	20.55	20.49
20+15	1	0	1	74		15.12	15.19	15.17
20+15	1	99	1	0		20.83	20.78	20.93
15+20	75	0	100	0	QPSK	21.62	21.61	21.58
15+20	1	0	1	99		14.42	14.46	14.56
15+20	1	74	1	0		23.46	23.42	**23.49**
15+20	75	0	100	0	16-QAM	20.57	20.59	20.58
15+20	1	0	1	99		14.79	14.79	14.92
15+20	1	74	1	0		22.92	22.89	22.92
15+20	75	0	100	0	64-QAM	20.59	20.63	20.59
15+20	1	0	1	99		15.18	15.23	15.29
15+20	1	74	1	0		20.96	20.87	20.91

LTE Band 7_CA Maximum Average Power [dBm]								
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest
	RB Size	RB Offset	RB Size	RB Offset				
20+10	100	0	50	0	QPSK	17.54	17.52	17.51
20+10	1	0	1	49		14.46	14.46	14.51
20+10	1	99	1	0		**23.37**	**23.41**	**23.39**
20+10	100	0	50	0	16-QAM	17.59	17.57	17.52
20+10	1	0	1	49		14.85	14.88	14.88
20+10	1	99	1	0		22.83	22.91	22.86
20+10	100	0	50	0	64-QAM	17.55	17.56	17.56
20+10	1	0	1	49		15.21	15.19	15.23
20+10	1	99	1	0		20.81	20.93	20.92
10+20	50	0	100	0	QPSK	17.56	17.61	17.62
10+20	1	0	1	99		14.47	14.42	14.41
10+20	1	49	1	0		**23.22**	**23.23**	**23.28**
10+20	50	0	100	0	16-QAM	17.62	17.59	17.63
10+20	1	0	1	99		14.77	14.79	14.83
10+20	1	49	1	0		22.72	22.69	22.81
10+20	50	0	100	0	64-QAM	17.71	17.56	17.72
10+20	1	0	1	99		15.13	15.06	15.31
10+20	1	49	1	0		20.73	20.71	20.88
15+15	75	0	75	0	QPSK	19.94	19.93	19.99
15+15	1	0	1	74		14.57	14.61	14.55
15+15	1	74	1	0		**23.71**	**23.69**	**23.78**
15+15	75	0	75	0	16-QAM	18.03	17.86	17.89
15+15	1	0	1	74		15.03	15.13	15.13
15+15	1	74	1	0		22.78	22.75	22.83
15+15	75	0	75	0	64-QAM	17.94	17.91	17.85
15+15	1	0	1	74		15.21	15.21	15.26
15+15	1	74	1	0		20.93	20.88	20.91
15+10	75	0	50	0	QPSK	21.57	21.61	21.63
15+10	1	0	1	49		14.49	14.51	14.58
15+10	1	74	1	0		**23.56**	**23.53**	**23.55**
15+10	75	0	50	0	16-QAM	20.63	20.55	20.56
15+10	1	0	1	49		14.86	14.86	15.11
15+10	1	74	1	0		22.89	22.91	22.89
15+10	75	0	50	0	64-QAM	20.64	20.58	20.63
15+10	1	0	1	49		15.15	15.13	15.49
15+10	1	74	1	0		20.97	20.89	20.92

LTE Band 38_CA Maximum Average Power [dBm]								
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest
	RB Size	RB Offset	RB Size	RB Offset				
20+20	0	0	1	99	QPSK	22.30	**22.50**	20.60
20+20	1	0	0	0		22.40	22.20	22.20
20+20	100	0	0	0		21.20	21.10	21.50
20+20	100	0	100	0		20.50	20.70	20.70
20+20	1	0	1	99		15.30	15.30	15.30
20+20	1	0	1	0		16.40	16.10	16.20
20+20	1	99	1	0		21.30	20.90	21.10
20+20	100	0	1	99		18.50	18.40	18.00
20+20	0	0	1	99	16-QAM	21.90	22.00	20.00
20+20	1	0	0	0		22.10	21.90	22.20
20+20	100	0	0	0		20.20	20.40	20.60
20+20	100	0	100	0		19.50	19.70	19.80
20+20	1	0	1	99		15.70	16.00	15.60
20+20	1	0	1	0		16.60	16.30	16.30
20+20	1	99	1	0		20.70	20.40	20.50
20+20	100	0	1	99		18.20	18.30	17.80
20+20	0	0	1	99	64-QAM	20.70	20.80	18.70
20+20	1	0	0	0		21.80	21.10	21.20
20+20	100	0	0	0		20.50	19.60	19.70
20+20	100	0	100	0		19.20	18.80	18.90
20+20	1	0	1	99		15.50	15.40	15.30
20+20	1	0	1	0		15.60	14.90	14.90
20+20	1	99	1	0		18.90	18.20	18.30
20+20	100	0	1	99		18.40	18.10	18.30
15+15	75	0	75	0	QPSK	17.20	**20.50**	**20.70**
15+15	1	0	1	74		15.20	15.10	15.50
15+15	1	74	1	0		17.20	13.30	17.30
15+15	75	0	75	0	16-QAM	17.60	19.70	19.70
15+15	1	0	1	74		13.10	13.10	15.50
15+15	1	74	1	0		13.90	17.70	13.70
15+15	75	0	75	0	64-QAM	18.50	18.70	18.90
15+15	1	0	1	74		15.00	15.02	15.10
15+15	1	74	1	0		**19.40**	14.90	20.30

LTE Band 5_CA

26dB Bandwidth

Mode	LTE Band 5 : 26dB BW(MHz)		
QPSK			
BW	3MHz+5MHz	5MHz+3MHz	5MHz+10MHz
Lowest CH	-	-	15.94
Middle CH	-	-	16.06
Highest CH	-	-	16.00
BW	10MHz+5MHz	10MHz+10MHz	
Lowest CH	16.09	20.86	-
Middle CH	16.12	20.86	-
Highest CH	16.06	20.98	-

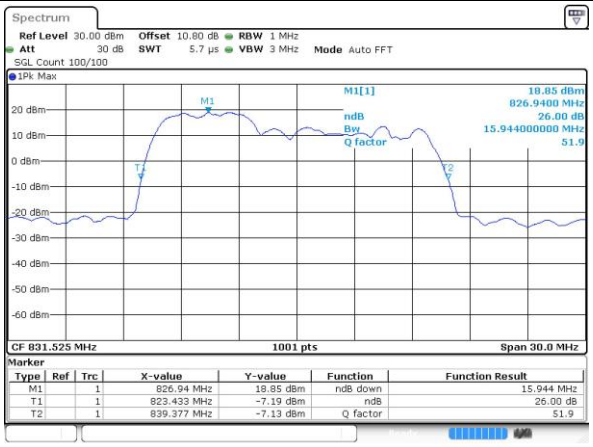
Mode	LTE Band 5 : 26dB BW(MHz)		
16QAM			
BW	3MHz+5MHz	5MHz+3MHz	5MHz+10MHz
Lowest CH	-	-	16.06
Middle CH	-	-	16.06
Highest CH	-	-	16.12
BW	10MHz+5MHz	10MHz+10MHz	
Lowest CH	16.06	20.98	-
Middle CH	16.06	20.94	-
Highest CH	16.12	21.06	-

Mode	LTE Band 5 : 26dB BW(MHz)		
64QAM			
BW	3MHz+5MHz	5MHz+3MHz	5MHz+10MHz
Lowest CH	-	-	15.73
Middle CH	-	-	15.88
Highest CH	-	-	15.91
BW	10MHz+5MHz	10MHz+10MHz	
Lowest CH	16.12	20.98	-
Middle CH	15.97	20.90	-
Highest CH	16.09	20.94	-

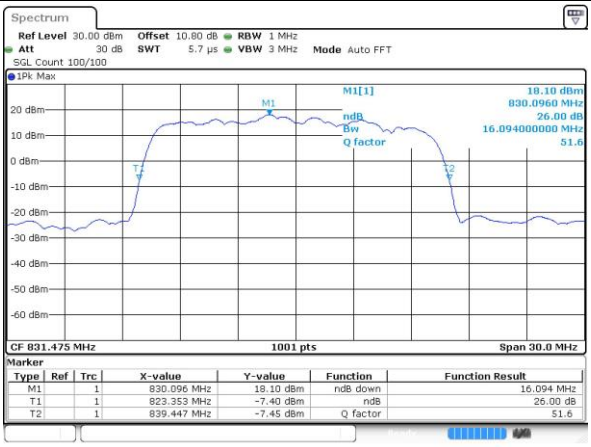
LTE Band 5

QPSK

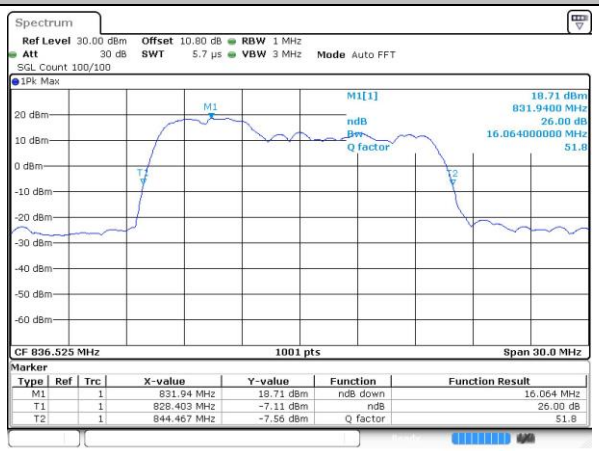
Lowest Channel / 5MHz+10MHz



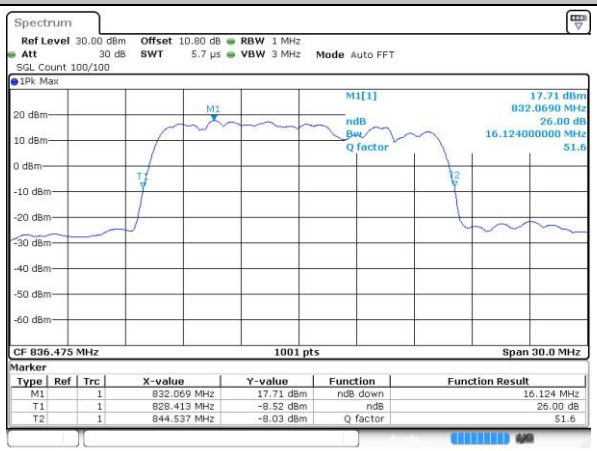
Lowest Channel / 10MHz+5MHz



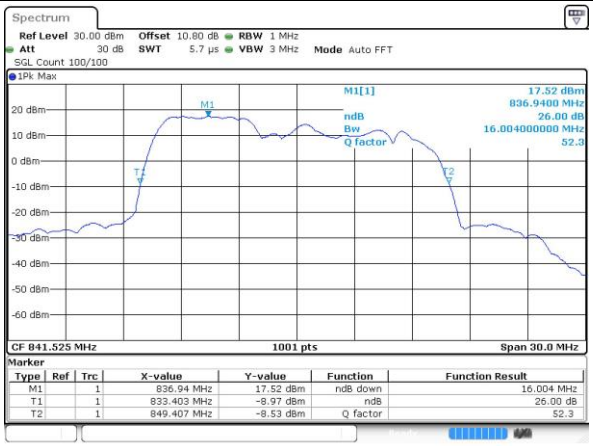
Middle Channel / 5MHz+10MHz



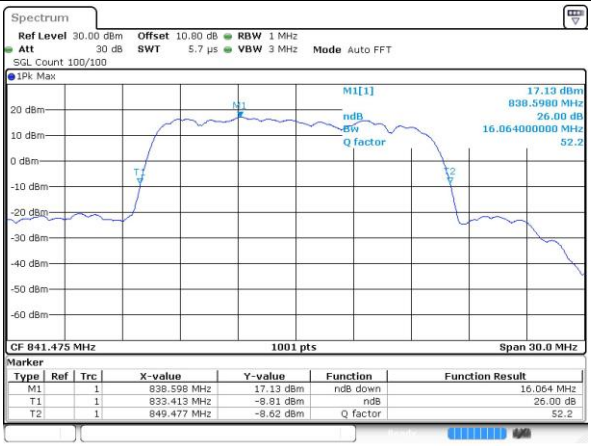
Middle Channel / 10MHz+5MHz

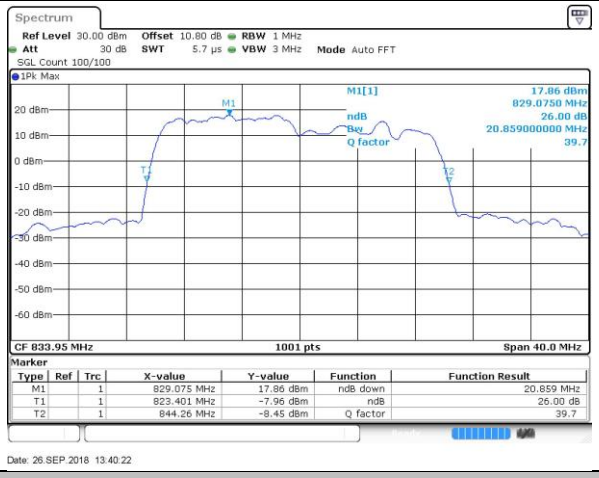
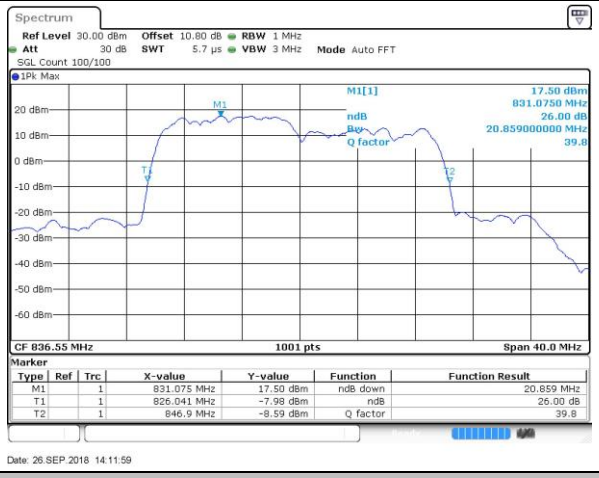
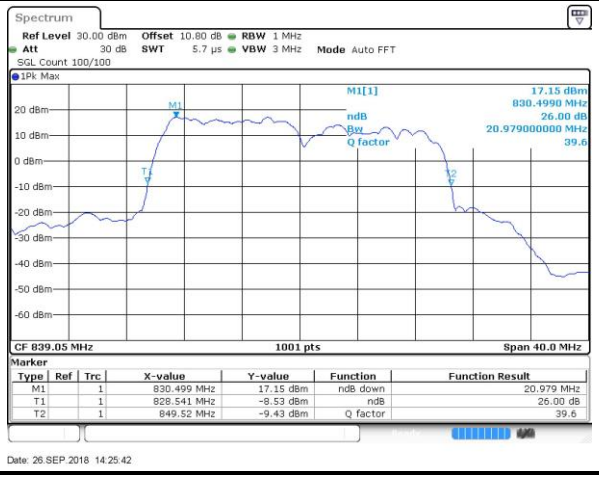


Highest Channel / 5MHz+10MHz



Highest Channel / 10MHz+5MHz

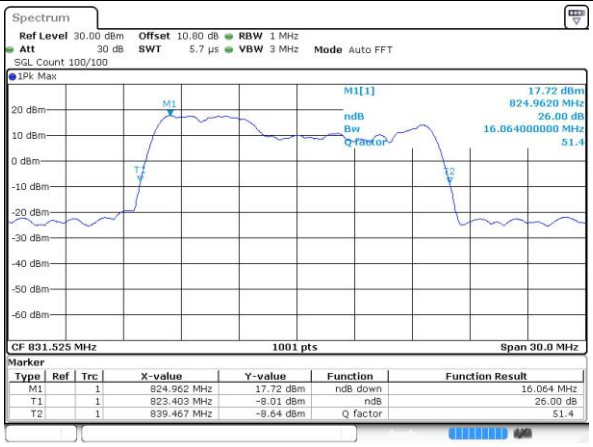


LTE Band 5	
QPSK	
Lowest Channel / 10MHz+10MHz	
	-
Middle Channel / 10MHz+10MHz	
	-
Highest Channel / 10MHz+10MHz	
	-

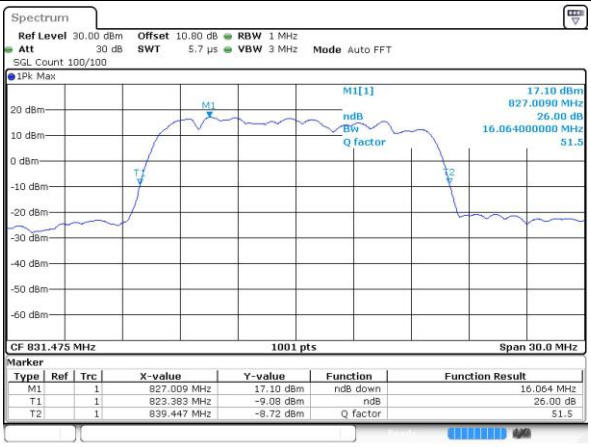
LTE Band 5

16QAM

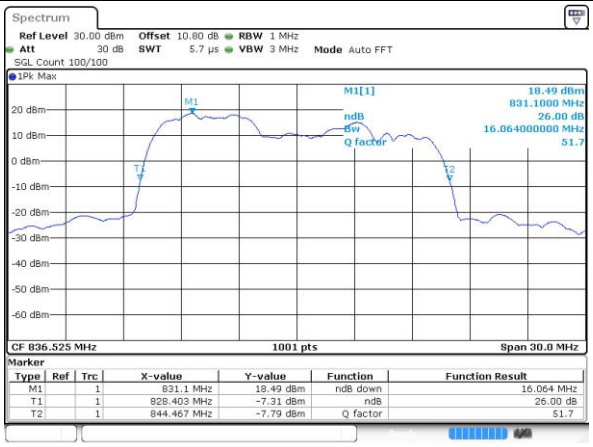
Lowest Channel / 5MHz+10MHz



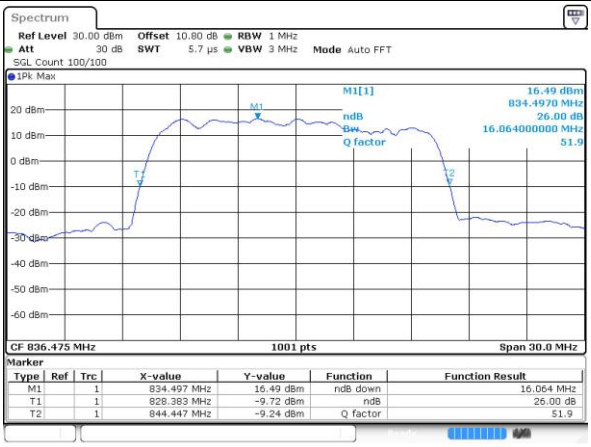
Lowest Channel / 10MHz+5MHz



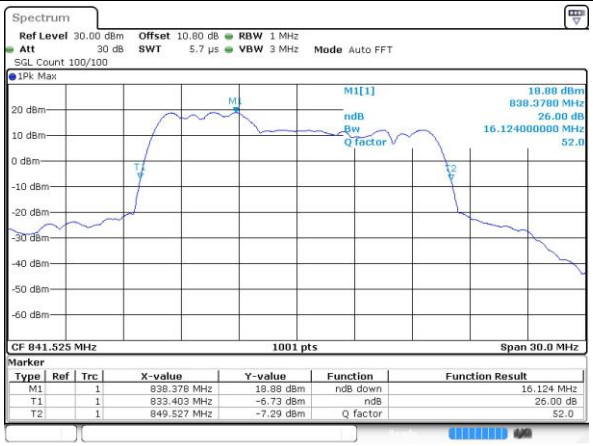
Middle Channel / 5MHz+10MHz



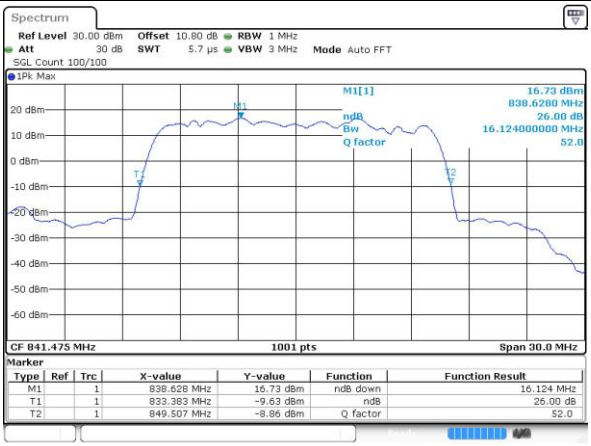
Middle Channel / 10MHz+5MHz

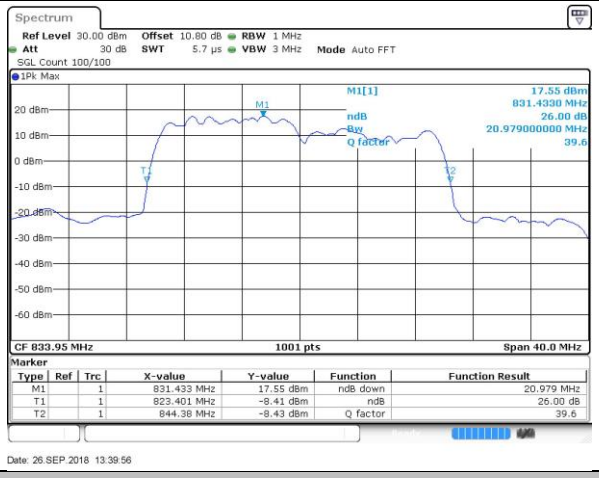
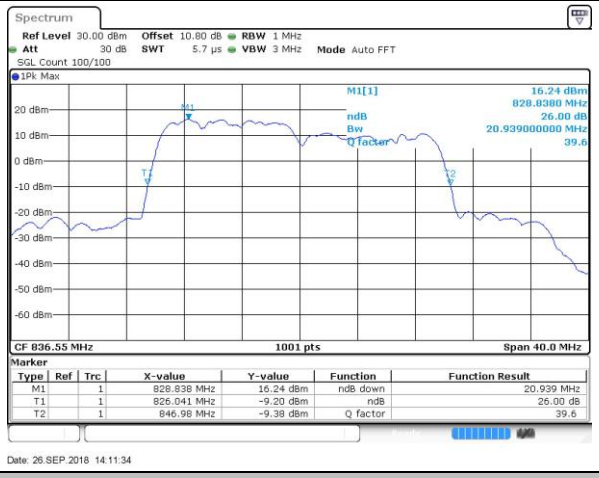
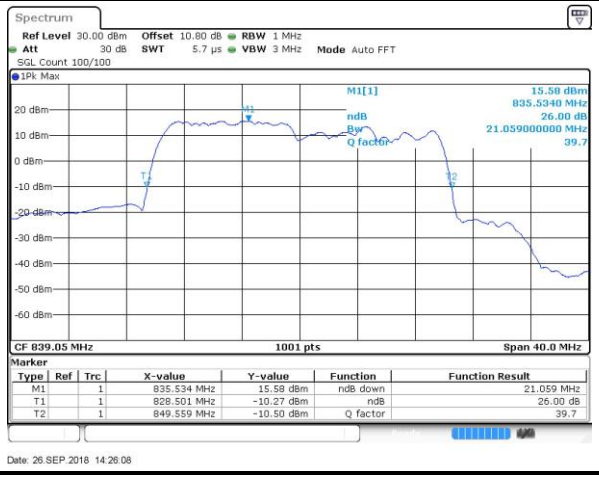


Highest Channel / 5MHz+10MHz



Highest Channel / 10MHz+5MHz

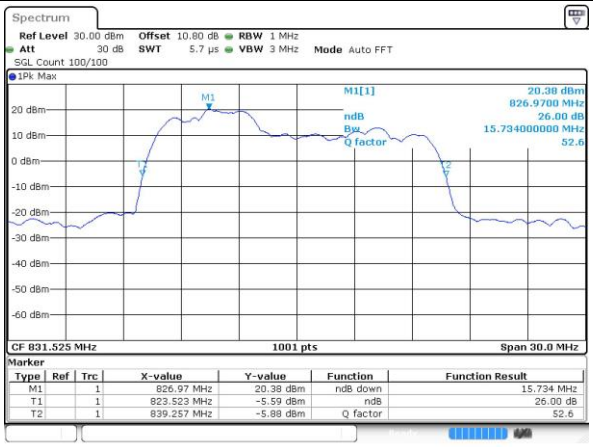


LTE Band 5	
16QAM	
Lowest Channel / 10MHz+10MHz	
	-
Middle Channel / 10MHz+10MHz	
	-
Highest Channel / 10MHz+10MHz	
	-

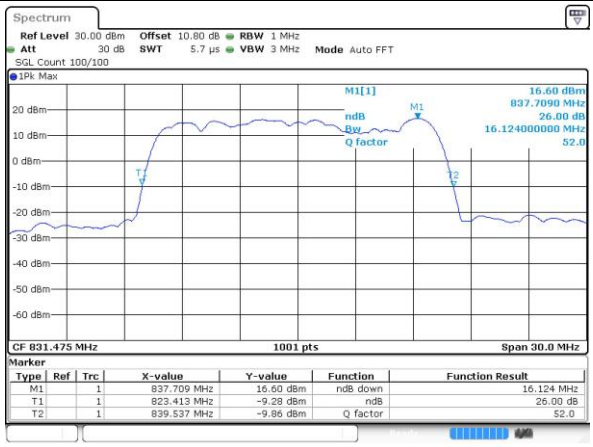
LTE Band 5

64QAM

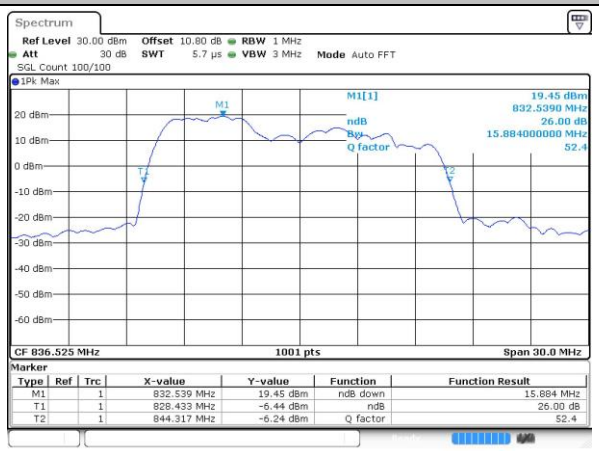
Lowest Channel / 5MHz+10MHz



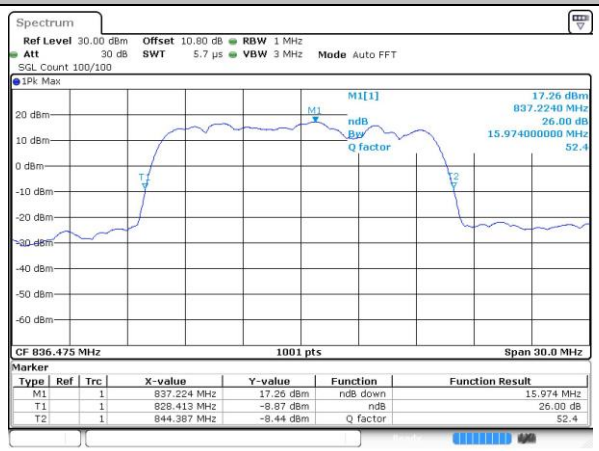
Lowest Channel / 10MHz+5MHz



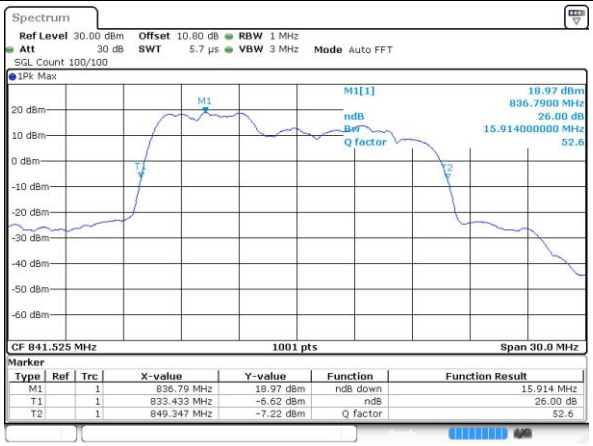
Middle Channel / 5MHz+10MHz



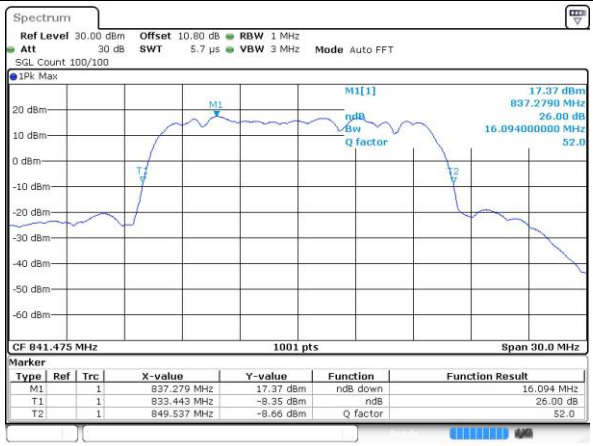
Middle Channel / 10MHz+5MHz

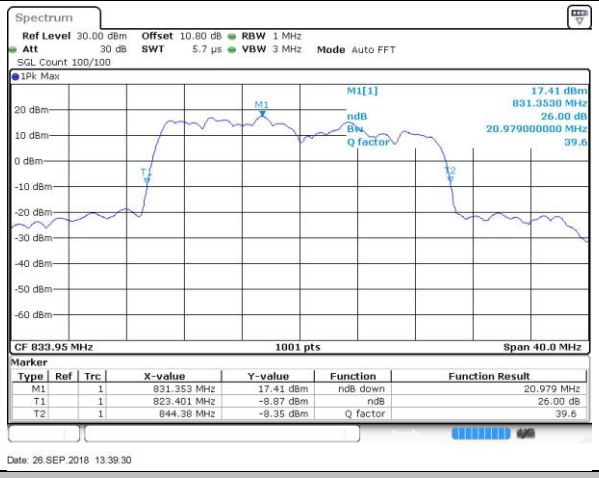
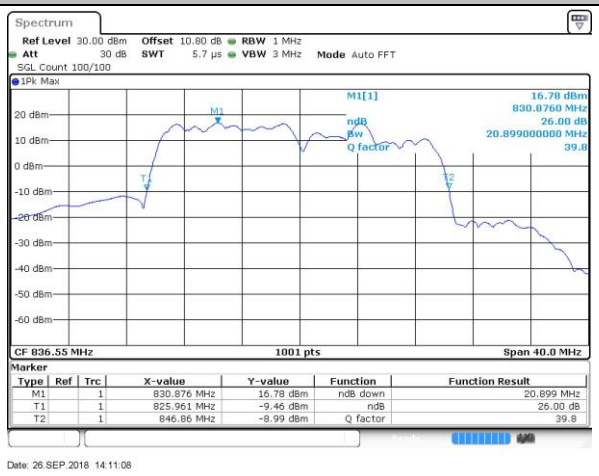
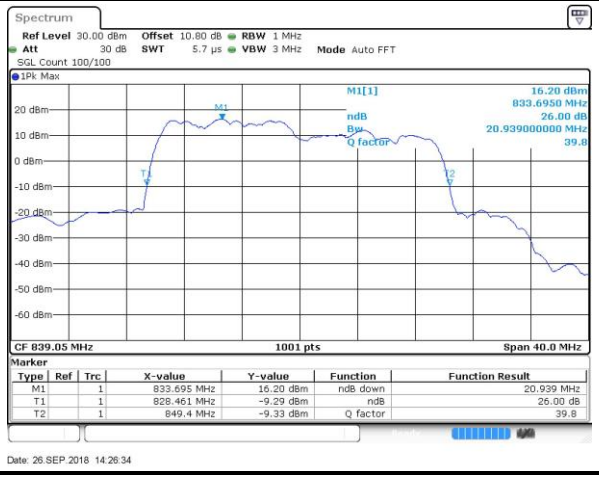


Highest Channel / 5MHz+10MHz



Highest Channel / 10MHz+5MHz



LTE Band 5	
64QAM	
Lowest Channel / 10MHz+10MHz	
	-
Middle Channel / 10MHz+10MHz	
	-
Highest Channel / 10MHz+10MHz	
	-

Occupied Bandwidth

Mode	LTE Band 5 : 99%OBW(MHz)		
QPSK			
BW	3MHz+5MHz	5MHz+3MHz	5MHz+10MHz
Lowest CH	-	-	14.45
Middle CH	-	-	14.33
Highest CH	-	-	14.51
BW	10MHz+5MHz	10MHz+10MHz	
Lowest CH	14.48	19.02	-
Middle CH	14.45	19.22	-
Highest CH	14.42	19.02	-

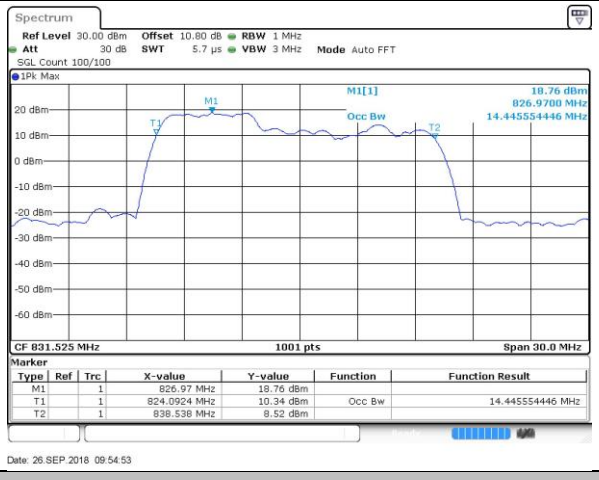
Mode	LTE Band 5 : 99%OBW(MHz)		
16QAM			
BW	3MHz+5MHz	5MHz+3MHz	5MHz+10MHz
Lowest CH	-	-	14.36
Middle CH	-	-	14.39
Highest CH	-	-	14.27
BW	10MHz+5MHz	10MHz+10MHz	
Lowest CH	14.42	19.34	-
Middle CH	14.60	18.98	-
Highest CH	14.42	18.90	-

Mode	LTE Band 5 : 99%OBW(MHz)		
64QAM			
BW	3MHz+5MHz	5MHz+3MHz	5MHz+10MHz
Lowest CH	-	-	14.39
Middle CH	-	-	14.45
Highest CH	-	-	14.42
BW	10MHz+5MHz	10MHz+10MHz	
Lowest CH	14.39	19.14	-
Middle CH	14.39	19.06	-
Highest CH	14.51	18.86	-

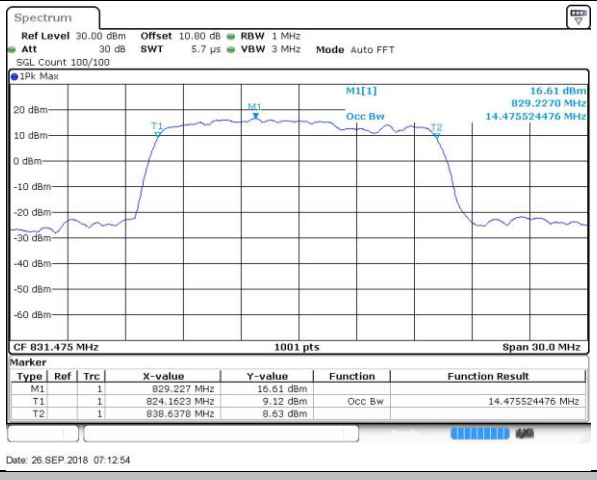
LTE Band 5

QPSK

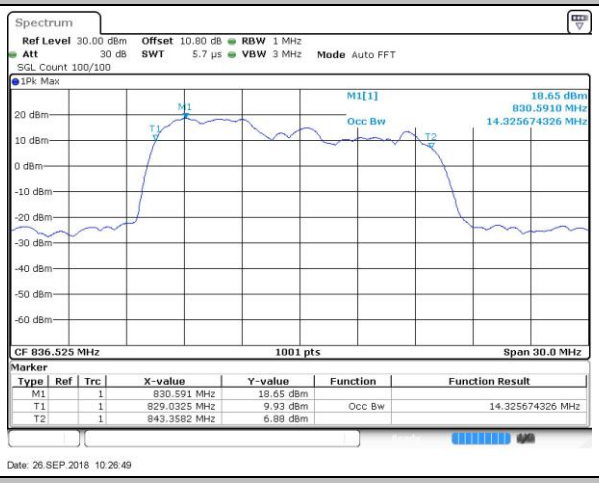
Lowest Channel / 5MHz+10MHz



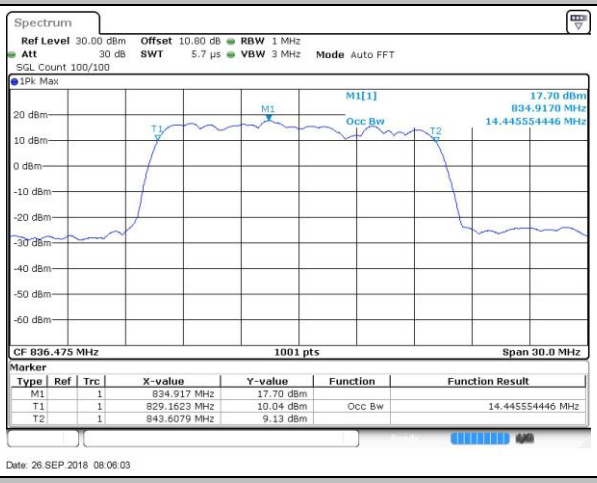
Lowest Channel / 10MHz+5MHz



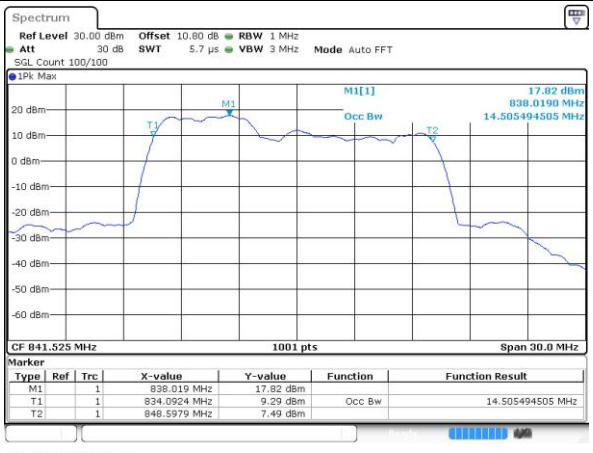
Middle Channel / 5MHz+10MHz



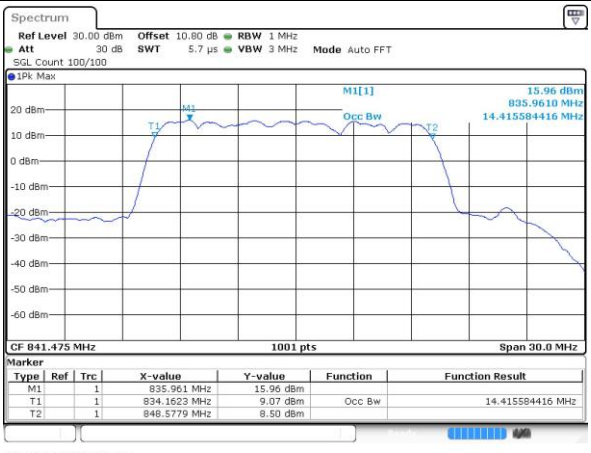
Middle Channel / 10MHz+5MHz

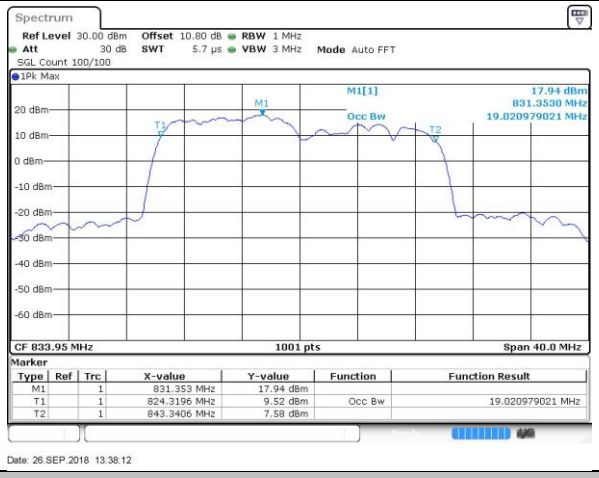
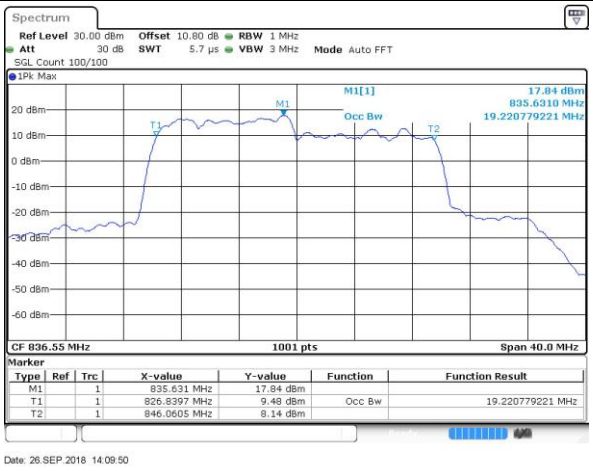
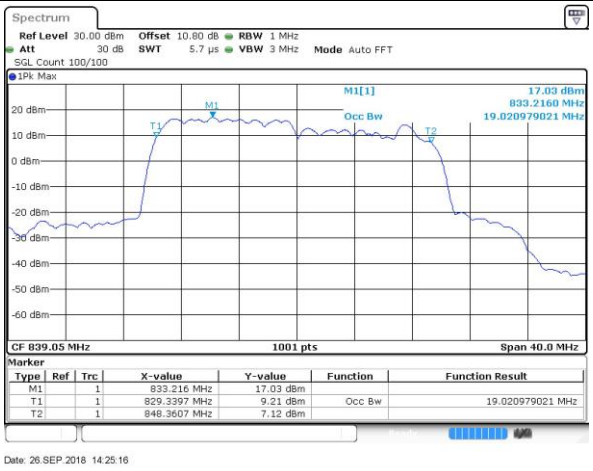


Highest Channel / 5MHz+10MHz



Highest Channel / 10MHz+5MHz

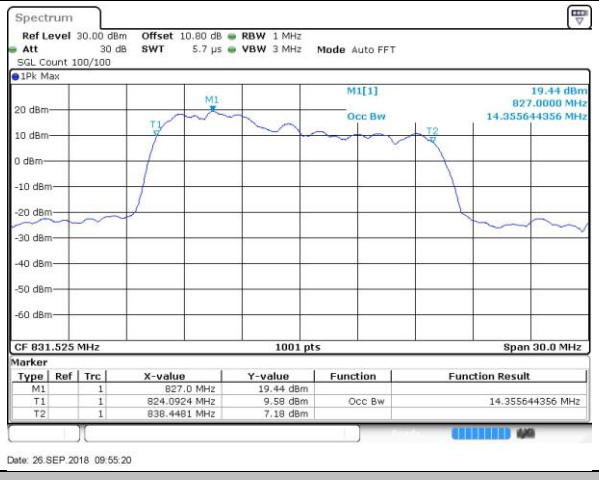


LTE Band 5	
QPSK	
Lowest Channel / 10MHz+10MHz	
	-
Middle Channel / 10MHz+10MHz	
	-
Highest Channel / 10MHz+10MHz	
	-

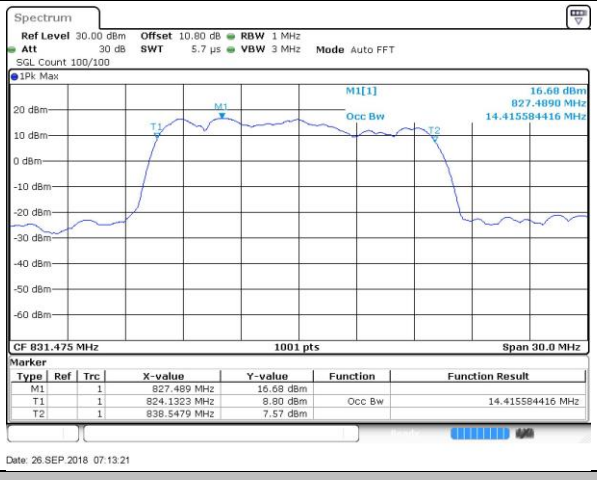
LTE Band 5

16QAM

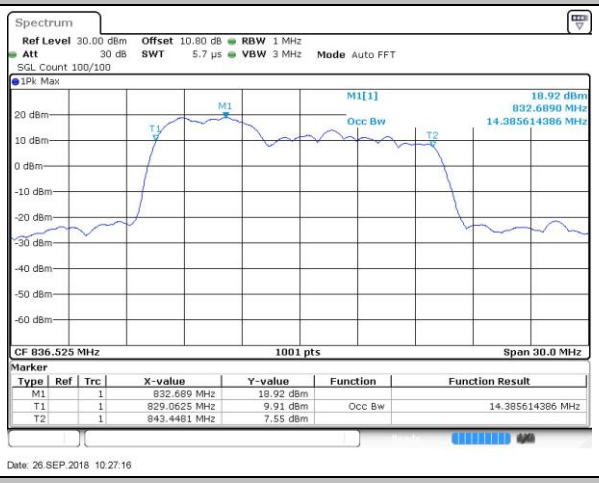
Lowest Channel / 5MHz+10MHz



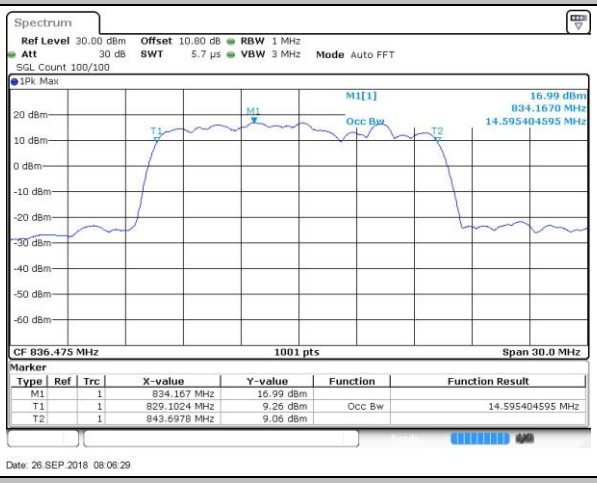
Lowest Channel / 10MHz+5MHz



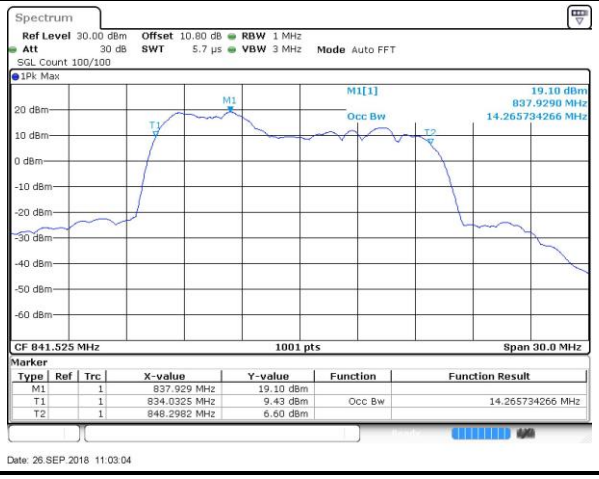
Middle Channel / 5MHz+10MHz



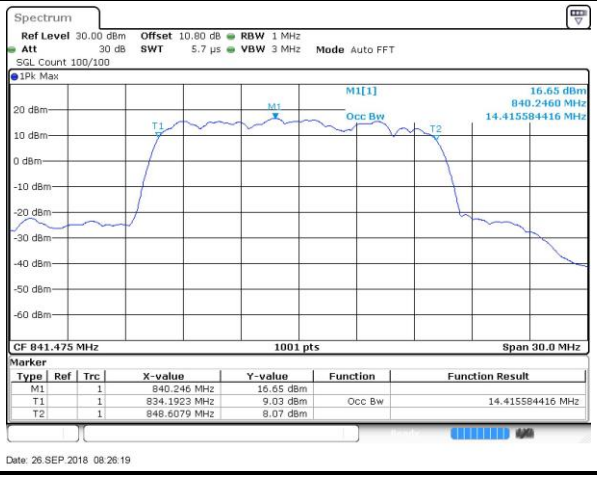
Middle Channel / 10MHz+5MHz

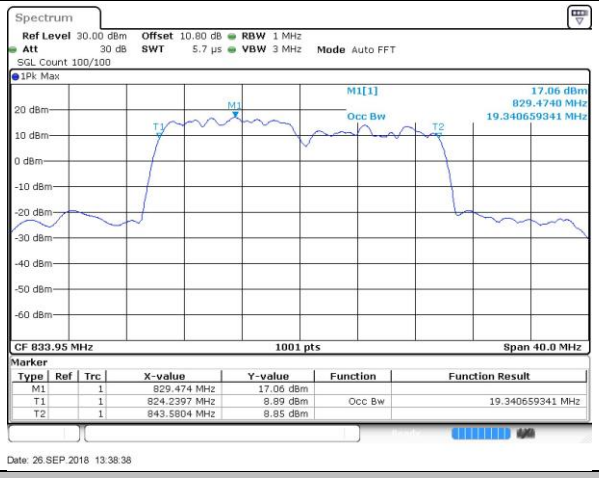
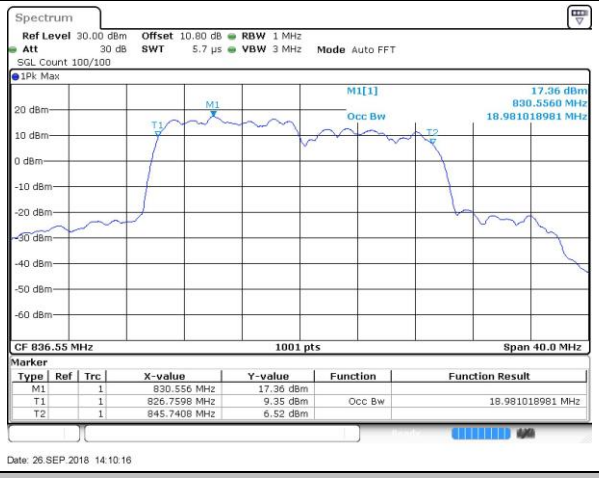
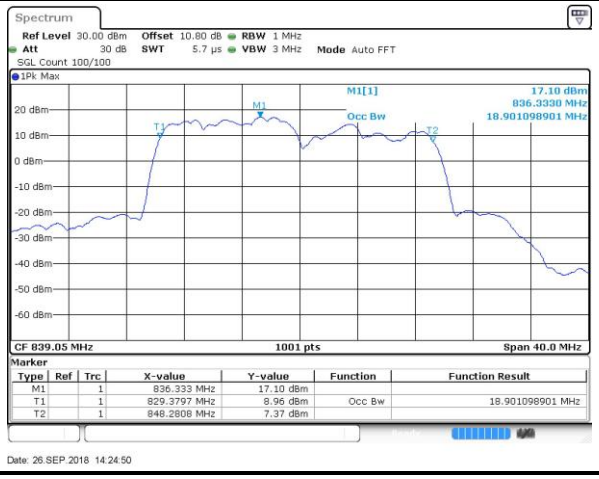


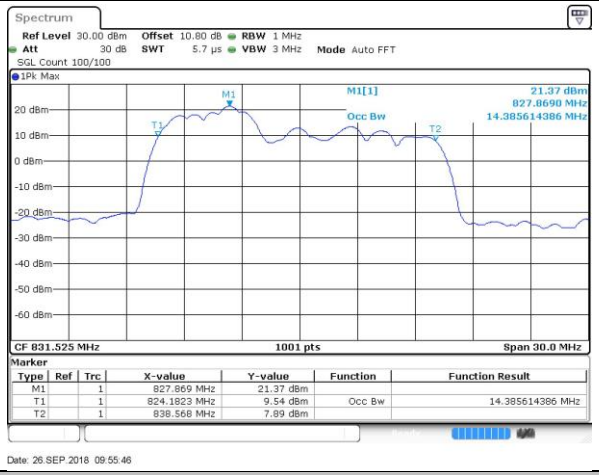
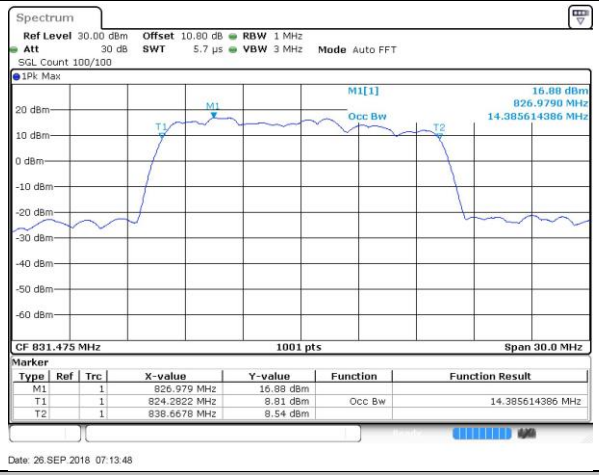
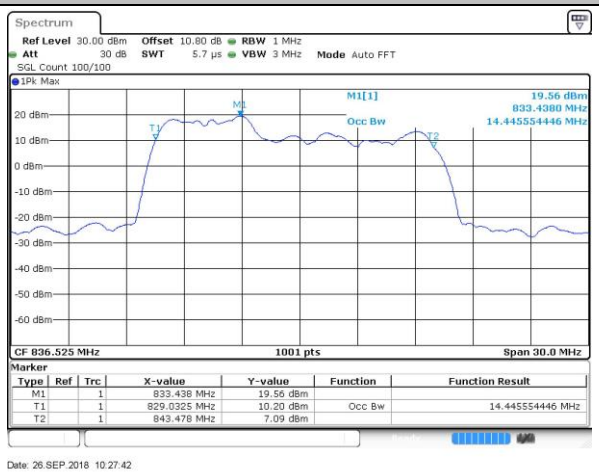
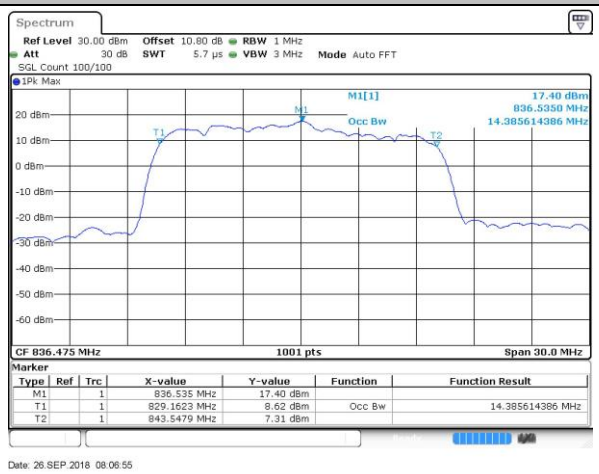
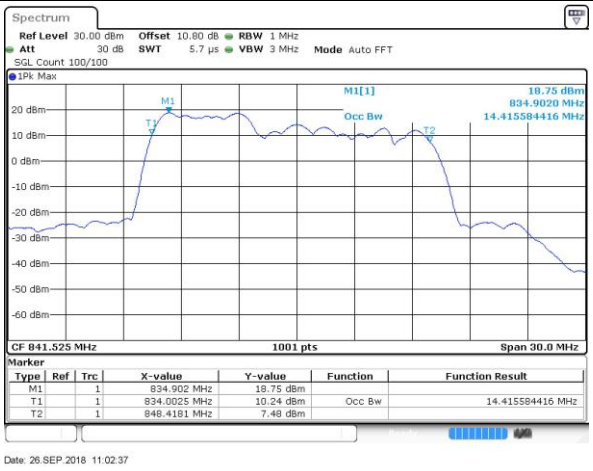
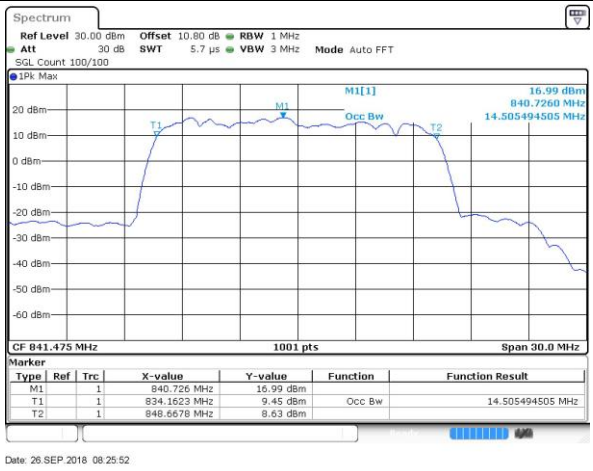
Highest Channel / 5MHz+10MHz

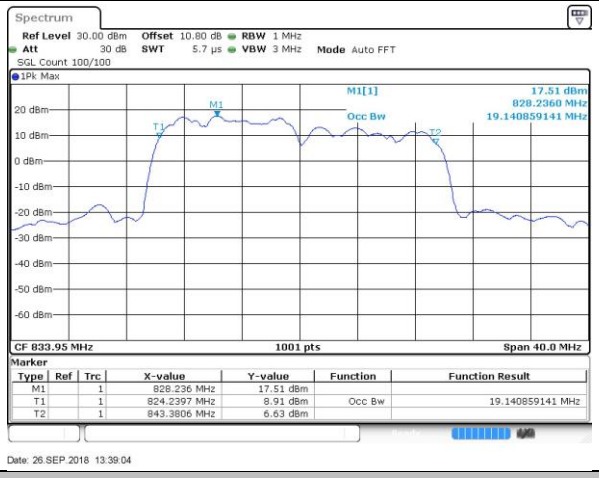
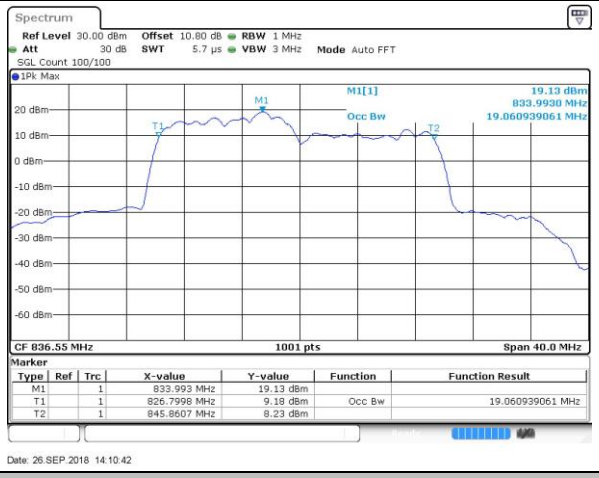
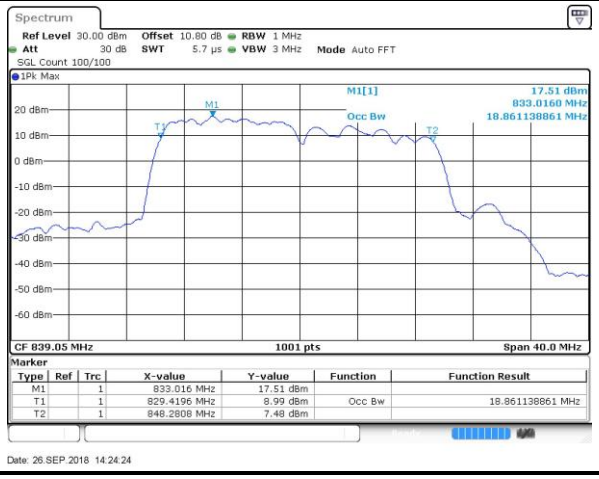


Highest Channel / 10MHz+5MHz



LTE Band 5	
16QAM	
Lowest Channel / 10MHz+10MHz	
	-
Middle Channel / 10MHz+10MHz	
	-
Highest Channel / 10MHz+10MHz	
	-

LTE Band 5	
64QAM	
Lowest Channel / 5MHz+10MHz	Lowest Channel / 10MHz+5MHz
	
Middle Channel / 5MHz+10MHz	Middle Channel / 10MHz+5MHz
	
Highest Channel / 5MHz+10MHz	Highest Channel / 10MHz+5MHz
	

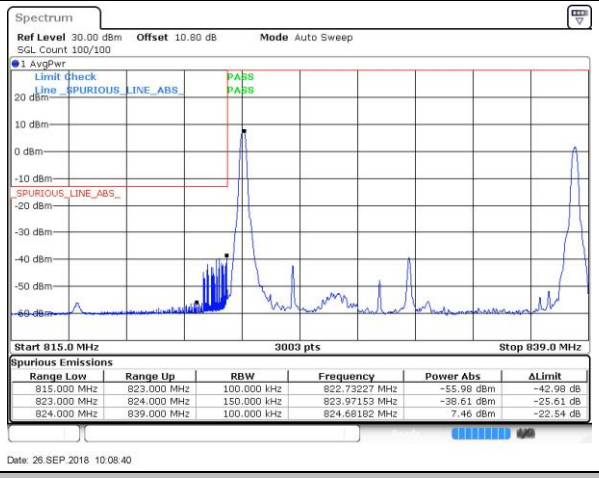
LTE Band 5	
64QAM	
Lowest Channel / 10MHz+10MHz	
	-
Middle Channel / 10MHz+10MHz	
	-
Highest Channel / 10MHz+10MHz	
	-

Conducted Band Edge

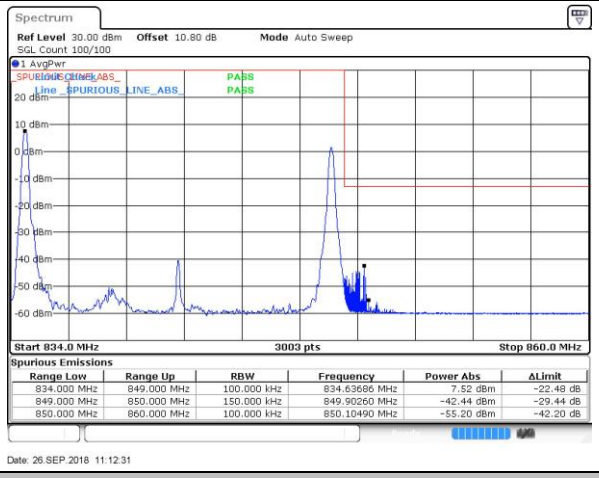
LTE Band 5 / 5MHz+10MHz

QPSK

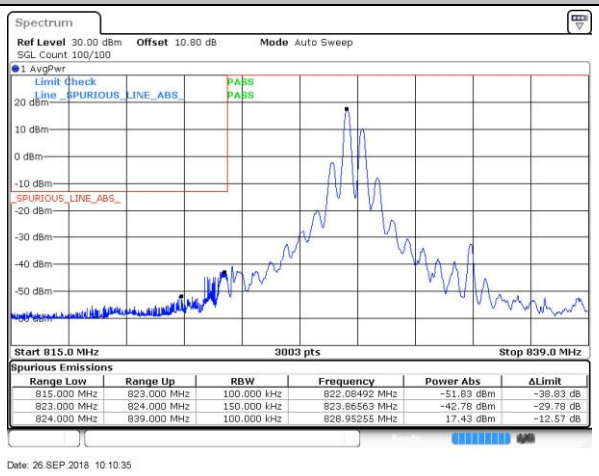
Lowest Band Edge / 1RB0 and 1RB49



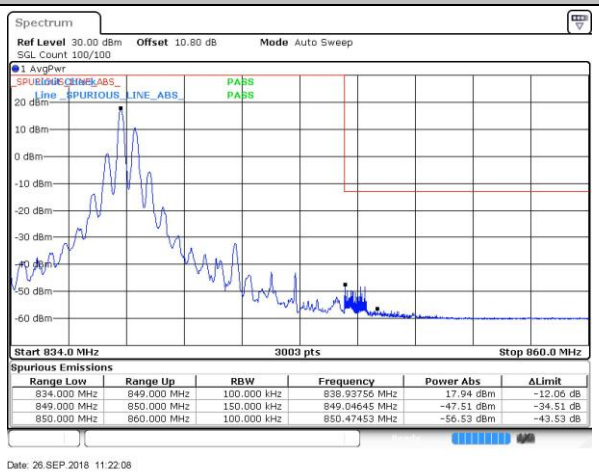
Highest Band Edge / 1RB0 and 1RB49



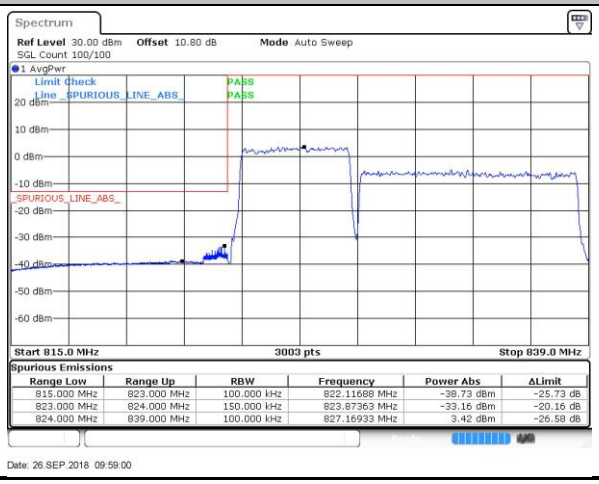
Lowest Band Edge / 1RB24 and 1RB0



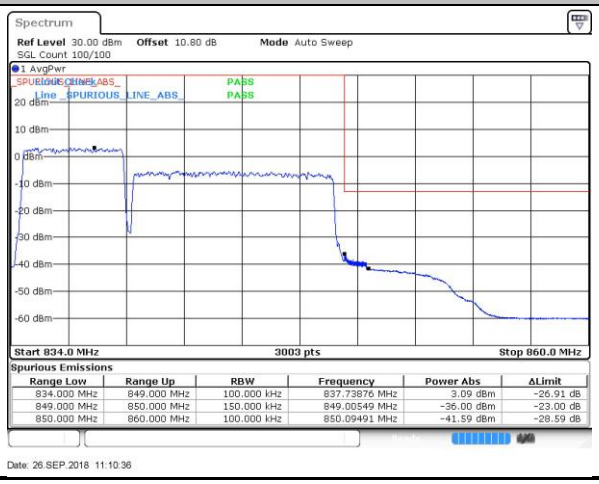
Highest Band Edge / 1RB24 and 1RB0



Lowest Band Edge / Full RB



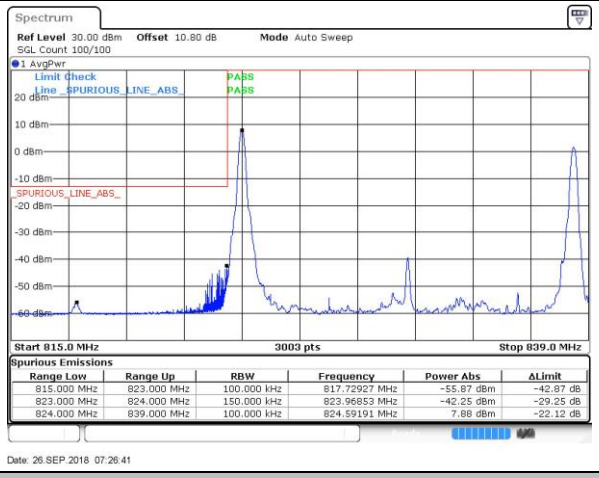
Highest Band Edge / Full RB



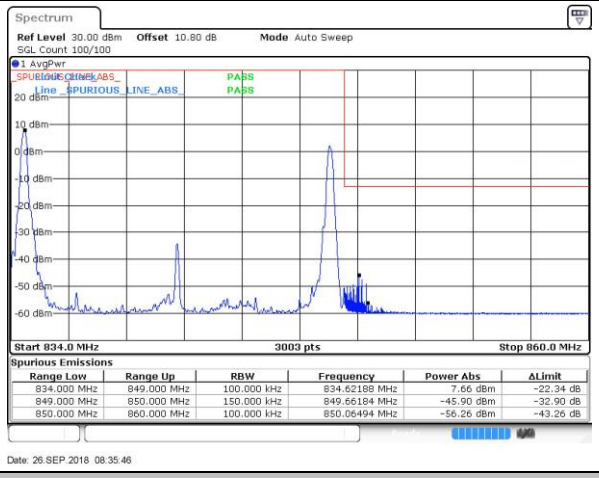
LTE Band 5 / 10MHz+5MHz

QPSK

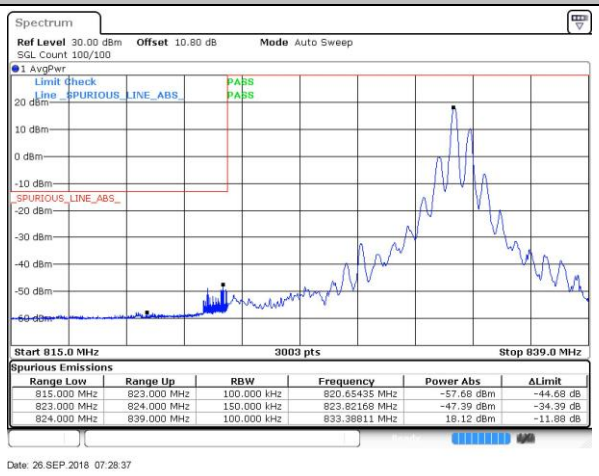
Lowest Band Edge / 1RB0 and 1RB24



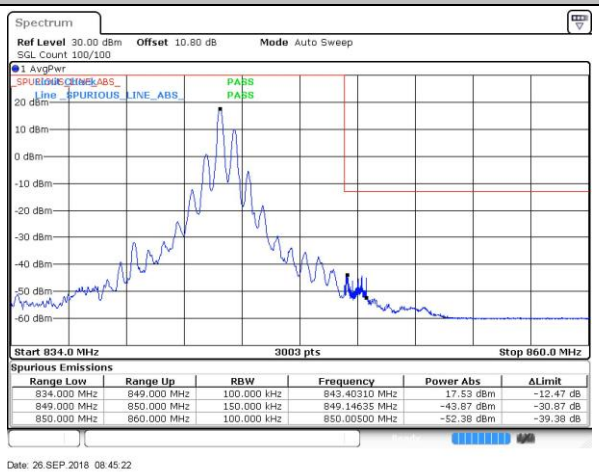
Highest Band Edge / 1RB0 and 1RB24



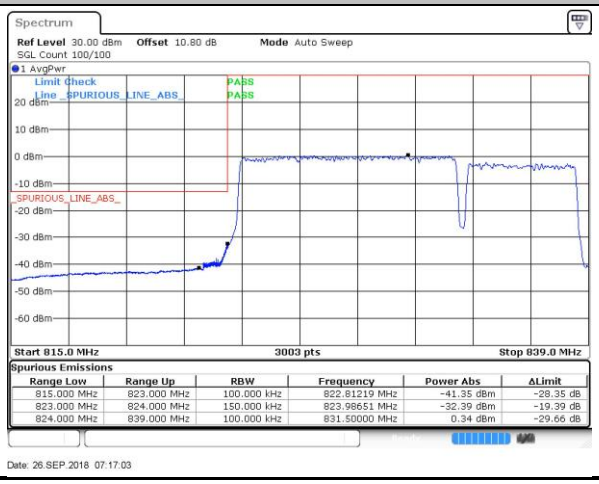
Lowest Band Edge / 1RB49 and 1RB0



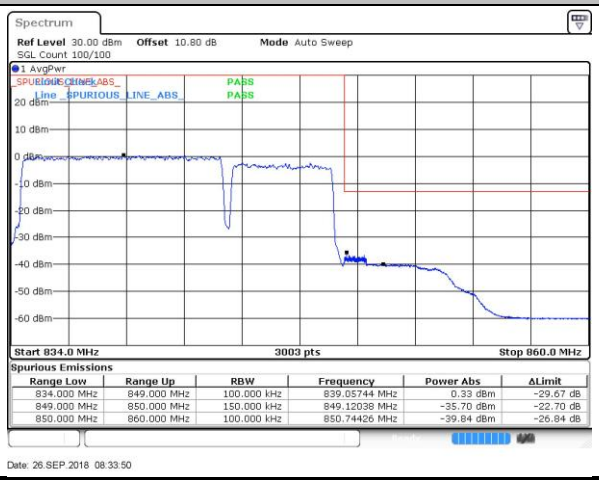
Highest Band Edge / 1RB49 and 1RB0



Lowest Band Edge / Full RB



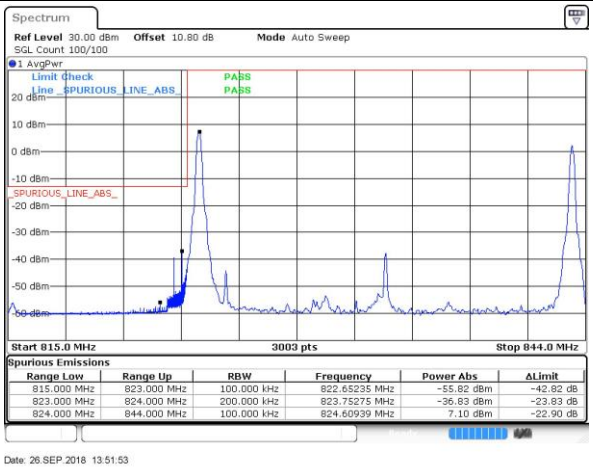
Highest Band Edge / Full RB



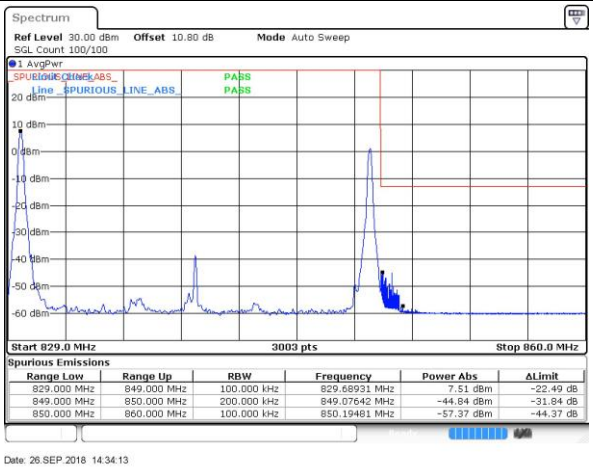
LTE Band 5 / 10MHz+10MHz

QPSK

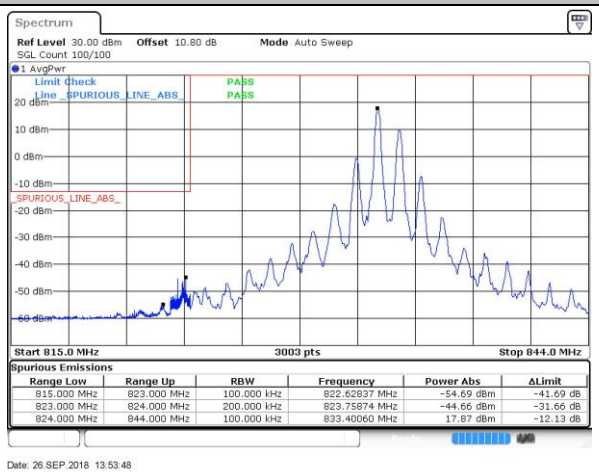
Lowest Band Edge / 1RB0 and 1RB49



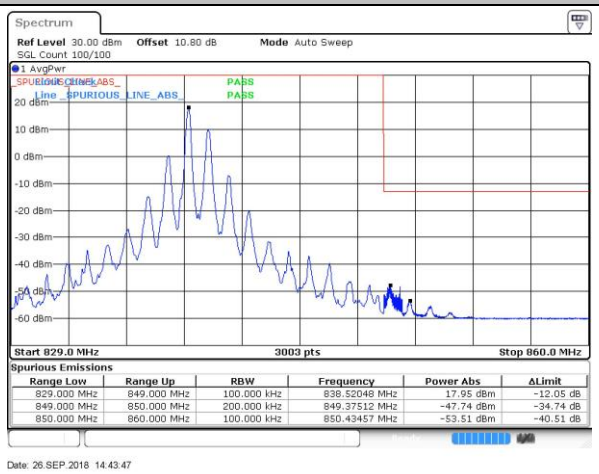
Highest Band Edge / 1RB0 and 1RB49



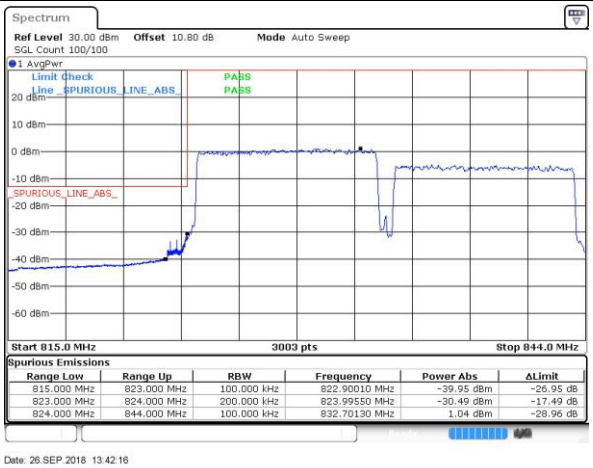
Lowest Band Edge / 1RB49 and 1RB0



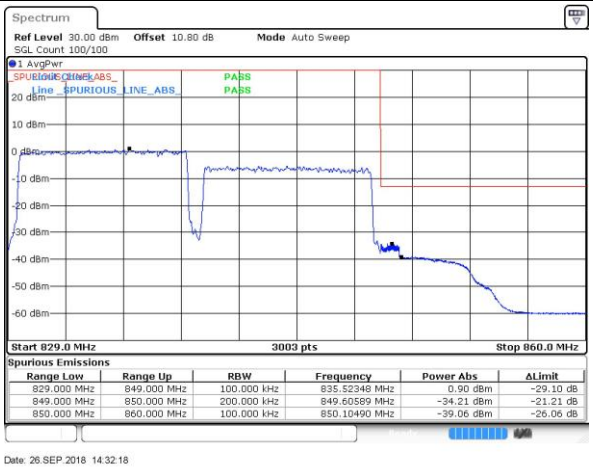
Highest Band Edge / 1RB49 and 1RB0

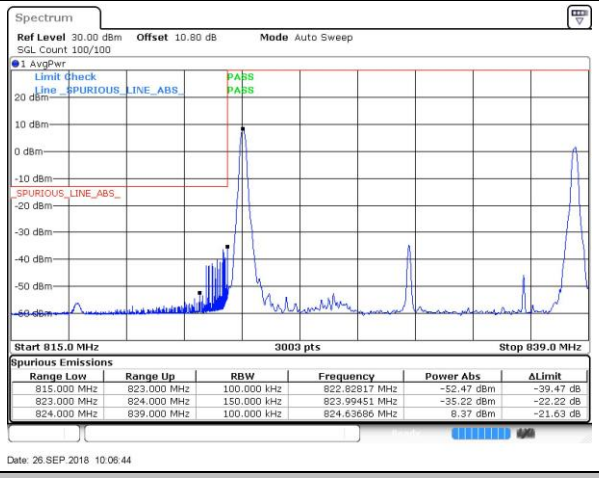
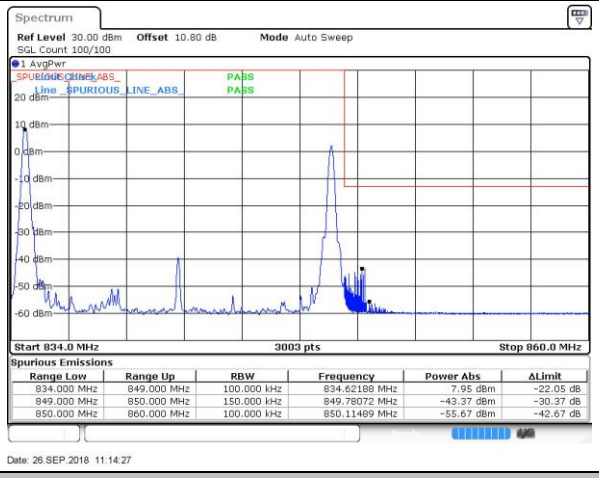
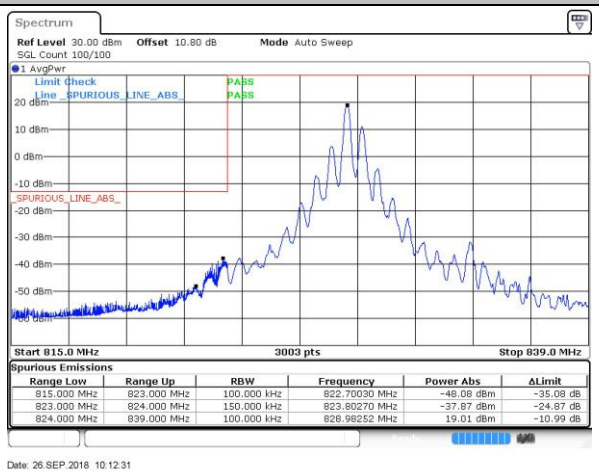
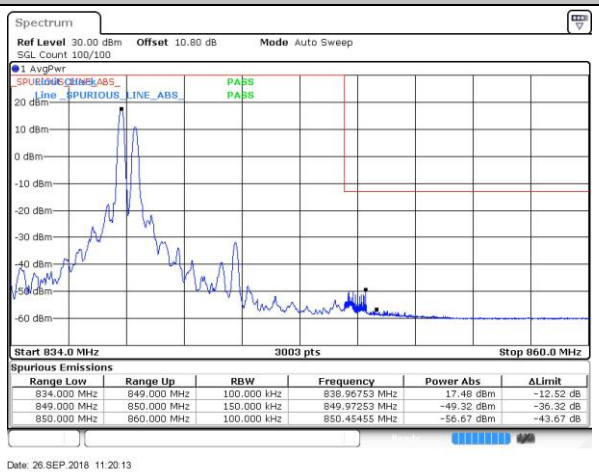
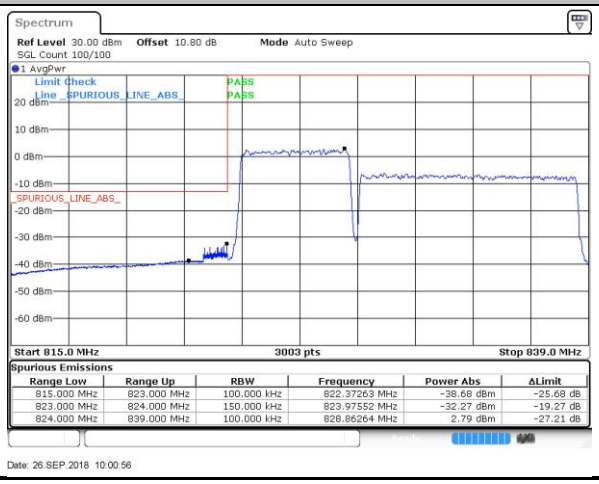
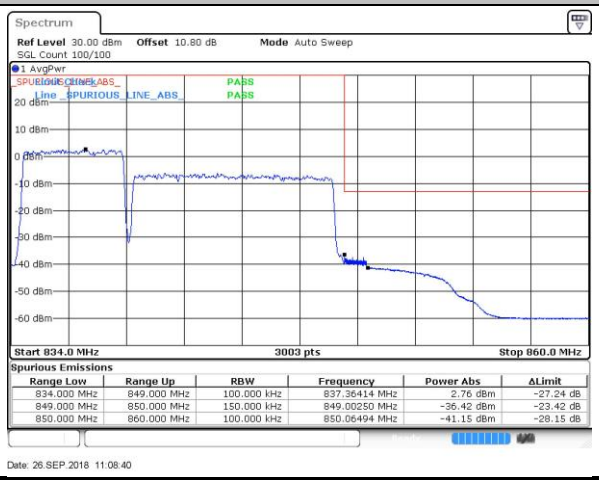


Lowest Band Edge / Full RB



Highest Band Edge / Full RB

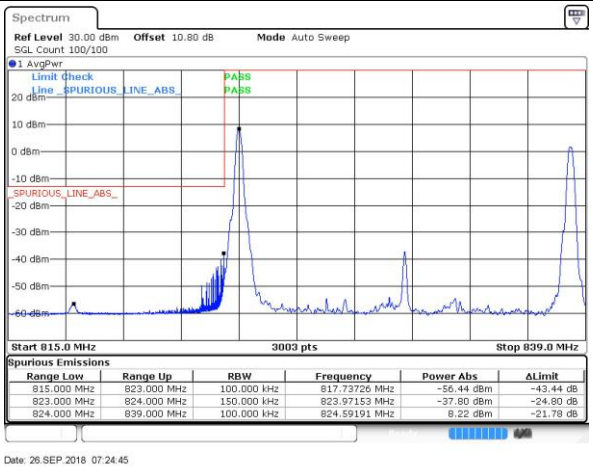


LTE Band 5 / 5MHz+10MHz	
16QAM	
Lowest Band Edge / 1RB0 and 1RB49	Highest Band Edge / 1RB0 and 1RB49
	
Lowest Band Edge / 1RB24 and 1RB0	Highest Band Edge / 1RB24 and 1RB0
	
Lowest Band Edge / Full RB	Highest Band Edge / Full RB
	

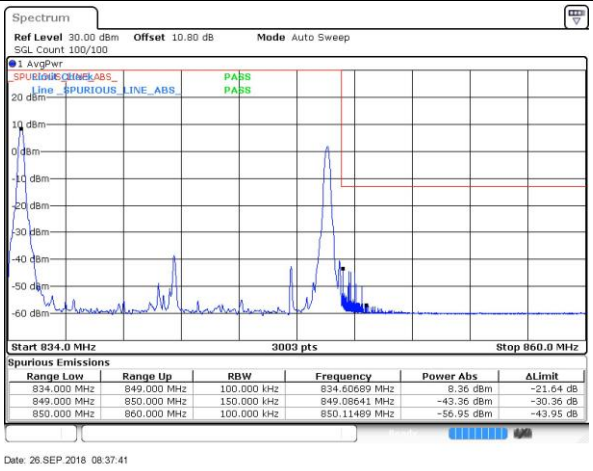
LTE Band 5 / 10MHz+5MHz

16QAM

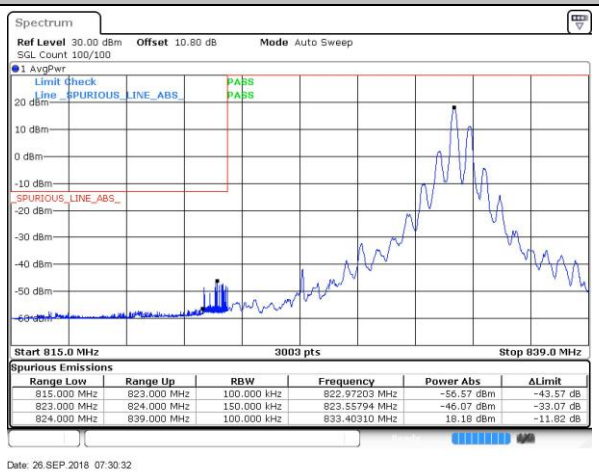
Lowest Band Edge / 1RB0 and 1RB24



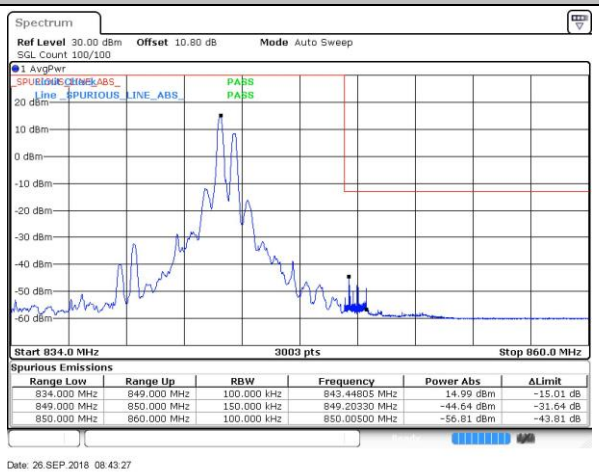
Highest Band Edge / 1RB0 and 1RB24



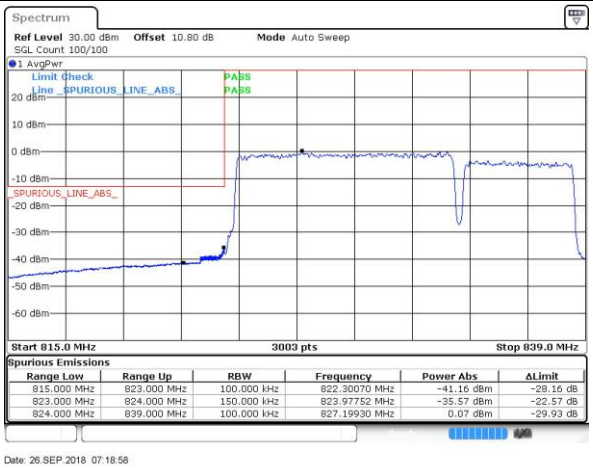
Lowest Band Edge / 1RB49 and 1RB0



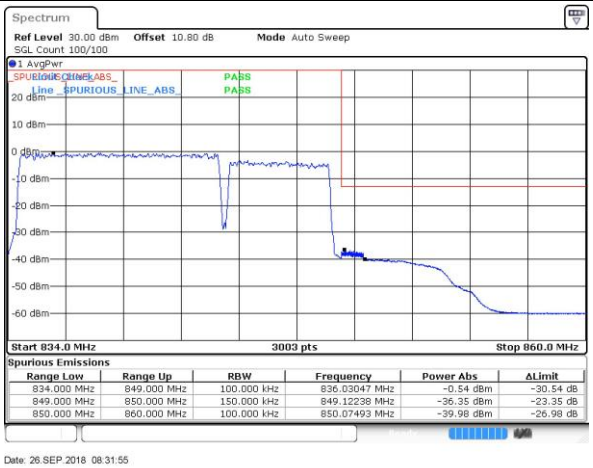
Highest Band Edge / 1RB49 and 1RB0



Lowest Band Edge / Full RB



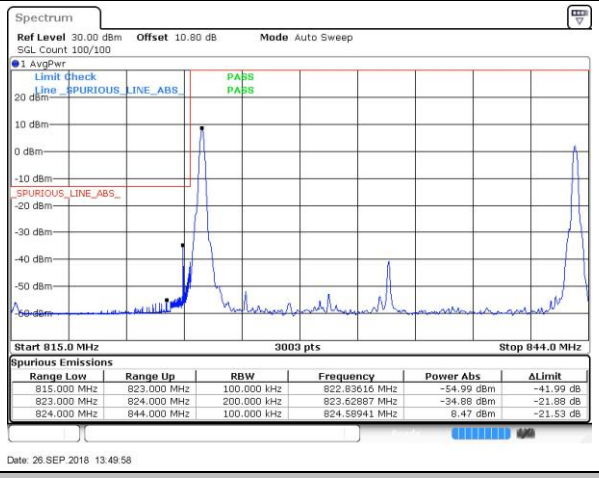
Highest Band Edge / Full RB



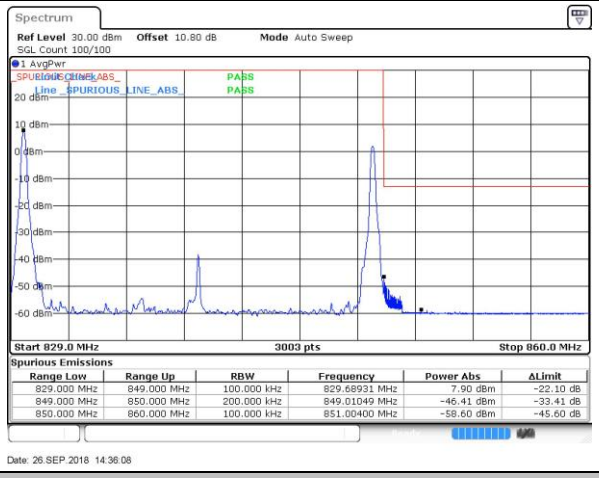
LTE Band 5 / 10MHz+10MHz

16QAM

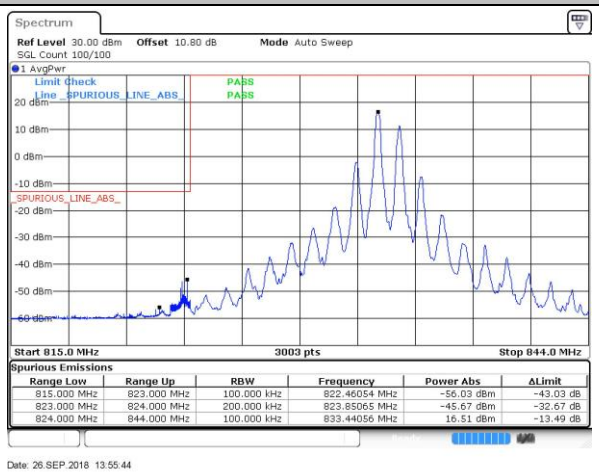
Lowest Band Edge / 1RB0 and 1RB49



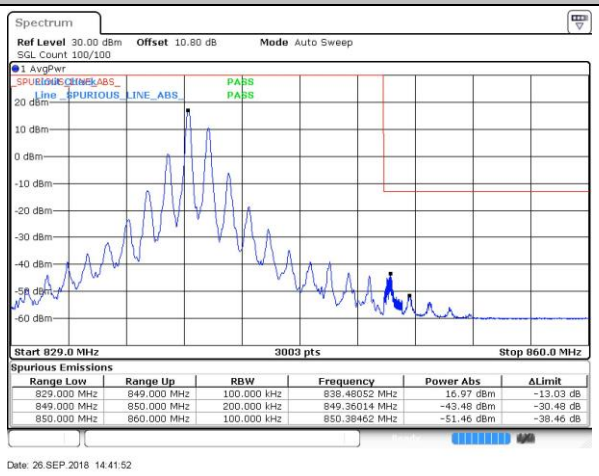
Highest Band Edge / 1RB0 and 1RB49



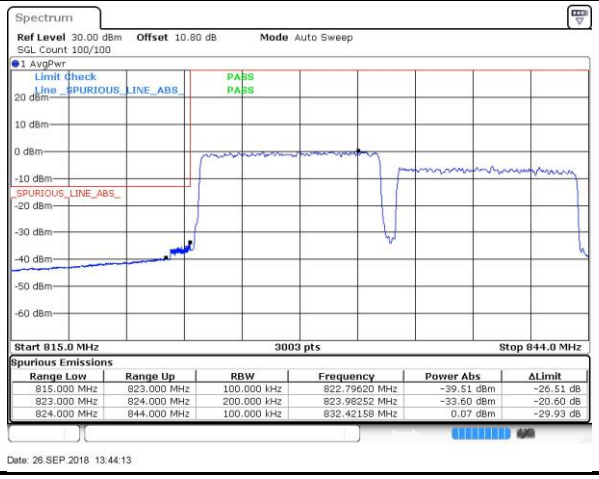
Lowest Band Edge / 1RB49 and 1RB0



Highest Band Edge / 1RB49 and 1RB0



Lowest Band Edge / Full RB



Highest Band Edge / Full RB