

Report No.: FG871722-04



# 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.)

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# History of this test report

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

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# **Summary of Test Result**

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark	
	§2.1046	Conducted Output Power	Reporting only		
3.2	§22.913 (a)(2)	Effective Radiated Power (Band 5)	Pass	-	
	§27.50 (h)(2)	Equivalent Isotropic Radiated Power (Band 7) (Band 38)	Pass		
3.3	-	Peak-to-Average Ratio	Reporting only	-	
3.4	§2.1049	Occupied Bandwidth	Reporting only	-	
0.5	§2.1051 §22.917 (a)	Conducted Band Edge Measurement (Band 5)			
3.5	§2.1051 §27.53 (m)(4)	Conducted Band Edge Measurement (Band 7) (Band 38)	Pass	-	
0.0	§2.1051 §22.917 (a)	Conducted Spurious Emission (Band 5)	Design		
3.6	§2.1051 §27.53 (m)(4)	Conducted Spurious Emission (Band 7) (Band 38)	Pass	-	
-	§2.1055 §22.355 §27.54	Frequency Stability Temperature & Voltage	Not Required	-	
	§2.1053 §22.917 (a)	Radiated Spurious Emission (Band 5)		Under limit	
4.2	§2.1053 §27.53 (m)(4)	Radiated Spurious Emission (Band 7) (Band 38)	Pass	12.96 dB at 17852.000 MHz	

#### 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

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# 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

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Product Specification subjective to this standard								
	WWAN: PIFA Antenna WLAN <ant. 1="">: PIFA Antenna</ant.>							
Antenna Type	<ant. 1="">: FIT A Antenna  <ant. 2="">: PIFA Antenna  Bluetooth: PIFA Antenna</ant.></ant.>							
	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.					
1031 0110 140.	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.

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# 1.4 Applicable Standards

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

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- + 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.

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# 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.

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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.

		Bandwidth (MHz)					N	lodulatio	on		RB#		Tes	Cha	nnel
Test Items	Band	3+5	5+3	5+10	10+5	10+10	QPSK	16QAM	64QAM	1	Half	Full	L	М	Н
Max. Output Power	5_CA	•	•	v	v	v	v	v	v	٧	٧	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		<b>&gt;</b>
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	<ol> <li>The difference</li> </ol>	<ol> <li>The mark "-" means that this bandwidth is not supported.</li> <li>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.</li> </ol>													

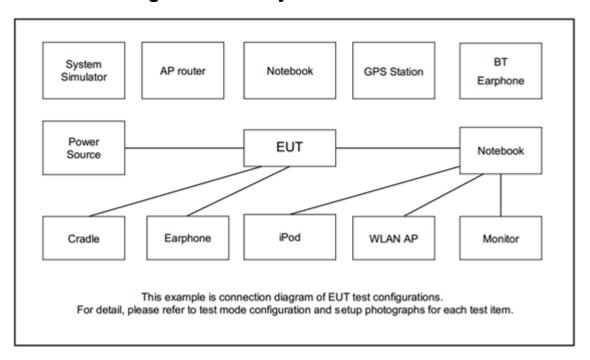
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Test Items	Band		Bandwidth (MHz)						Modulation		RB#			Test Channel						
10011101110		20+20	20+15	15+20	20+10	10+20	20+5	5+20	15+15	15+10	10+15	QPSK	16QAM	64QAM	1	Half	Full	L	М	н
Max. Output	7_CA	٧	٧	v	٧	v	-	-	v	v	•	v	v	v	v	v	٧	v	٧	٧
Power	38_CA	٧	-	-	-	-	-	-	v	-	•	v	v	v	v	٧	٧	v	٧	٧
26dB and	7_CA	v	v	v	v	v	-	-	v	v	-	٧	v	v			v	v	v	v
99% Bandwidth	38_CA	v	-	-	-	-	-	-	v	•	-	٧	v	v			v	v	v	v
Conducted	7_CA	v	v	v	v	v	-	-	v	٧	-	٧	v	v	v		v	v		v
Band Edge	38_CA	v	•	1	1	-	-	1	v	•	•	٧	v	v	>		٧	٧		v
Conducted	7_CA	v	v	v	v	v	-	-	v	٧	-	٧	v	v	v		v	v	v	v
Spurious Emission	38_CA	v	-	•	•	•	•	•	٧	•	•	٧	v	v	٧		v	٧	٧	v
E.I.R.P.	7_CA	v	v	v	v	v	-	•	v	٧	-	٧	v	v	v			v	v	v
E.I.K.P.	38_CA	v	-	-	-	-	-	•	v	•	-	>	v	v	٧			٧	>	v
Radiated	7_CA								Wors	t Cas	е						,	v	v	v
Spurious Emission	38_CA								Wors	t Cas	е							٧	٧	٧
Remark	<ol> <li>The difference</li> </ol>	<ol> <li>The mark "-" means that this bandwidth is not supported.</li> <li>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.</li> </ol>																		

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## 2.2 Connection Diagram of Test System



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## 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)

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# 2.5 Frequency List of Low/Middle/High Channels

LTE Band 5 Channel and Frequency List_CA									
BW [MHz]	Channe	/Frequency(MHz)	Lowest	Middle	Highest				
	PCC	Channel	20450	20476	20501				
40 - 40	PCC	Frequency	829.0	831.6	834.1				
10 + 10	500	Channel	20549	20575	20600				
	SCC	Frequency	838.9	841.5	844.0				
	PCC	Channel	20450	20500	20550				
40 . 5		Frequency	829.0	834.0	839.0				
10 + 5	000	Channel	20522	20572	20622				
	SCC	Frequency	836.2	841.2	846.2				
	PCC	Channel	20428	20478	20528				
F . 10	PCC	Frequency	826.8	831.8	836.8				
5 + 10	000	Channel	20500	20550	20600				
	SCC	Frequency	834.0	839.0	844.0				

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LTE Band 7 Channel and Frequency List\_CA BW [MHz] Channel/Frequency(MHz) Lowest Middle **Highest** Channel 20850 21001 21152 **PCC** 2510.0 2540.2 Frequency 2525.1 20 + 2021048 21199 21350 Channel SCC 2544.9 Frequency 2529.8 2560.0 21201 Channel 20850 21026 **PCC** Frequency 2510.0 2527.6 2545.1 20 + 1521372 Channel 21021 21197 SCC 2527.1 2544.7 2562.2 Frequency Channel 20828 21003 21179 **PCC** Frequency 2507.8 2525.3 2542.9 15 + 2021350 Channel 20999 21174 SCC 2560.0 Frequency 2524.9 2542.4 21251 Channel 20850 21051 **PCC** Frequency 2510.0 2530.1 2550.1 20 + 10Channel 20994 21195 21395 SCC 2524.4 2544.5 2564.5 Frequency Channel 20805 21006 21206 PCC Frequency 2545.6 2505.5 2525.6 10 + 20Channel 20949 21150 21350 SCC 2519.9 2540.0 2560.0 Frequency Channel 20825 21025 21225 **PCC** Frequency 2507.5 2527.5 2547.5 15 + 1521175 21375 Channel 20975 SCC Frequency 2522.5 2542.5 2562.5 Channel 20825 21051 21277 **PCC** Frequency 2507.5 2530.1 2552.7 15 + 10Channel 20945 21171 21397 SCC Frequency 2519.5 2542.1 2564.7

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

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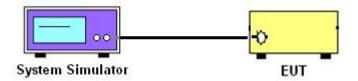
## 3 Conducted Test Items

# 3.1 Measuring Instruments

See list of measuring instruments of this test report.

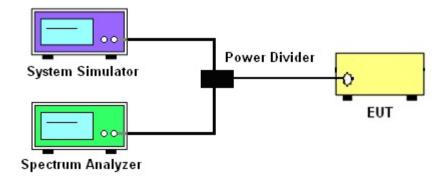
#### 3.1.1 Test Setup

### 3.1.2 Conducted Output Power



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# 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.

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## 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.

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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<sub>T</sub> = transmitter output power in dBm

 $G_T$  = gain of the transmitting antenna in dBi

L<sub>C</sub> = 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.

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## 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.

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#### 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.

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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.

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## 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.

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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.
- The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 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.

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## 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.

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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<sup>th</sup> 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.
- 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)

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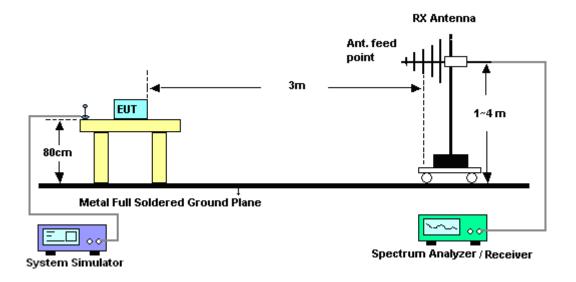
## 4 Radiated Test Items

# 4.1 Measuring Instruments

See list of measuring instruments of this test report.

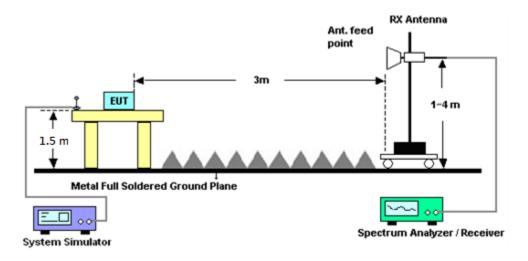
## 4.1.1 Test Setup

#### For radiated test from 30MHz to 1GHz



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#### For radiated test above 1GHz



#### 4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

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## 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.

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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.

- 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

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# 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
LTE Base Station	Anritsu	MT8820C	620143282 1	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 20d B 25WSMA Directional C oupler	#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-Instru ment	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&00800 N1D01N-06	40103&07	30MHz to 1GHz	Jan. 10, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jan. 09, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-124 1	1GHz ~ 18GHz	Jun. 29, 2018	Sep. 19, 2018~ Sep. 20, 2018	Jun. 28, 2019	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-152 2	1G~18GHz	Sep. 07, 2018	Sep. 19, 2018~ Sep. 20, 2018	Sep. 06, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WLK4-1000-1 530-8000-40S S	SN1	1G Low pass Filter	Sep. 17, 2018	Sep. 19, 2018~ Sep. 20, 2018	Sep. 16, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60SS	SN2	3G High Pass	Sep. 17, 2018	Sep. 19, 2018~ Sep. 20, 2018	Sep. 16, 2019	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-108 0-1200-15000 -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	SCHWARZBE CK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Nov. 27, 2017	Sep. 19, 2018~ Sep. 20, 2018	Nov. 26, 2018	Radiation (03CH13-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0054001	1GHz~18GHz	Apr. 16, 2018	Sep. 19, 2018~ Sep. 20, 2018	Apr. 15, 2019	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY532701 47	1GHz~26.5GHz	Feb. 02, 2018	Sep. 19, 2018~ Sep. 20, 2018	Feb. 01, 2019	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY553705 26	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)

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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)

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# 6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of	2.07
Confidence of 95% (U = 2Uc(y))	3.07

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

Measuring Uncertainty for a Level of	2.49
Confidence of 95% (U = 2Uc(y))	3.48

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

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

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# **Appendix A. Test Results of Conducted Test**

# Conducted Output Power(Average power)

		LTE	Band 5_C/	A Maximur	n Average P	ower [dBm]		
BW [MHz]	P	CC	S	SCC				
DVV [IVITIZ]	RB Size	RB Offset	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10+10	0	0	1	49		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	QPSK	22.30	22.40	22.30
10+10	1	0	1	49	QF 5R	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		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	16-QAM	21.40	21.50	21.40
10+10	1	0	1	49	10-QAW	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		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	04.0414	21.50	21.50	21.50
10+10	1	0	1	49	64-QAM	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		19.50	19.40	19.40
10+5	1	0	1	24	QPSK	11.50	11.50	11.50
10+5	1	49	1	0		21.40	21.50	21.40
10+5	50	0	25	0		18.60	18.50	18.50
10+5	1	0	1	24	16-QAM	11.90	11.80	11.90
10+5	1	49	1	0		21.10	21.20	21.10
10+5	50	0	25	0		18.60	18.50	18.50
10+5	1	0	1	24	64-QAM	12.20	12.10	12.20
10+5	1	49	1	0		19.20	19.20	19.20
5+10	25	0	50	0		19.30	19.30	19.30
5+10	1	0	1	49	QPSK	11.20	11.60	11.60
5+10	1	24	1	0		21.50	21.40	21.50
5+10	25	0	50	0		18.50	18.50	18.40
5+10	1	0	1	49	16-QAM	11.90	11.90	11.90
5+10	1	24	1	0		21.20	21.10	21.20
5+10	25	0	50	0		18.50	18.40	18.40
5+10	1	0	1	49	64-QAM	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]							
DW FACE 1	P	CC	S	CC				
BW [MHz]	RB Size	RB Offset	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20+20	0	0	1	99		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	QPSK	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 20+20	<u>0</u> 1	0	0	99		22.71 22.52	22.62 22.78	22.52 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	16-QAM	14.64	14.88	14.72
20+20	<u>·</u> 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		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	64-QAM	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		21.53	21.52	21.49
20+15	1	0	1	74	QPSK	14.41	14.43	14.39
20+15	1	99	1	0		23.39	23.48	23.43
20+15	100	0	75	0		20.58	20.58	20.51
20+15	1	0	1	74	16-QAM	14.79	14.81	14.81
20+15	<u> </u>	99	1	0		22.96	22.88	22.88
20+15	100	0	75	0		20.59	20.55	20.49
20+15	1	0	1	74	64-QAM	15.12	15.19	15.17
20+15	1	99	1	0	04-QAW	20.83	20.78	20.93
15+20	75	0	100	0	OPOK	21.62	21.61	21.58
15+20	1	0	1	99	QPSK	14.42	14.46	14.56
15+20	1	74	1	0		23.46	23.42	23.49
15+20	75	0	100	0		20.57	20.59	20.58
15+20	1	0	1	99	16-QAM	14.79	14.79	14.92
15+20	1	74	1	0		22.92	22.89	22.92
15+20	75	0	100	0		20.59	20.63	20.59
15+20	1	0	1	99	64-QAM	15.18	15.23	15.29
15+20	1	74	1	0		20.96	20.87	20.91



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	LTE Band 7_CA Maximum Average Power [dBm]							
	P	CC		CC				
BW [MHz]	RB Size	RB Offset	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20+10	100	0	50	0		17.54	17.52	17.51
20+10	1	0	1	49	QPSK	14.46	14.46	14.51
20+10	1	99	1	0		23.37	23.41	23.39
20+10	100	0	50	0		17.59	17.57	17.52
20+10	1	0	1	49	16-QAM	14.85	14.88	14.88
20+10	1	99	1	0		22.83	22.91	22.86
20+10	100	0	50	0		17.55	17.56	17.56
20+10	1	0	1	49	64-QAM	15.21	15.19	15.23
20+10	1	99	1	0		20.81	20.93	20.92
10+20	50	0	100	0		17.56	17.61	17.62
10+20	1	0	1	99	QPSK	14.47	14.42	14.41
10+20	1	49	1	0		23.22	23.23	23.28
10+20	50	0	100	0		17.62	17.59	17.63
10+20	1	0	1	99	16-QAM	14.77	14.79	14.83
10+20	1	49	1	0		22.72	22.69	22.81
10+20	50	0	100	0		17.71	17.56	17.72
10+20	1	0	1	99	64-QAM	15.13	15.06	15.31
10+20	1	49	1	0		20.73	20.71	20.88
15+15	75	0	75	0		19.94	19.93	19.99
15+15	1	0	1	74	QPSK	14.57	14.61	14.55
15+15	1	74	1	0		23.71	23.69	23.78
15+15	75	0	75	0		18.03	17.86	17.89
15+15	1	0	1	74	16-QAM	15.03	15.13	15.13
15+15	1	74	1	0		22.78	22.75	22.83
15+15	75	0	75	0		17.94	17.91	17.85
15+15	1	0	1	74	64-QAM	15.21	15.21	15.26
15+15	1	74	1	0		20.93	20.88	20.91
15+10	75	0	50	0		21.57	21.61	21.63
15+10	1	0	1	49	QPSK	14.49	14.51	14.58
15+10	1	74	1	0		23.56	23.53	23.55
15+10	75	0	50	0		20.63	20.55	20.56
15+10	1	0	1	49	16-QAM	14.86	14.86	15.11
15+10	1	74	1	0		22.89	22.91	22.89
15+10	75	0	50	0		20.64	20.58	20.63
15+10	1	0	1	49	64-QAM	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]							
DW/ FMILL-1	PCC SCC		CC	Mod				
BW [MHz]	RB Size	RB Offset	RB Size	RB Offset	Mod	Lowest	Middle	Highest
20+20	0	0	1	99		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	QPSK	20.50	20.70	20.70
20+20	1	0	1	99	QI OIL	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		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	16-QAM	19.50	19.70	19.80
20+20	1	0	1	99	10-QAW	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		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	64-QAM	19.20	18.80	18.90
20+20	1	0	1	99	04-QAIVI	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		17.20	20.50	20.70
15+15	1	0	1	74	QPSK	15.20	15.10	15.50
15+15	1	74	1	0		17.20	13.30	17.30
15+15	75	0	75	0		17.60	19.70	19.70
15+15	1	0	1	74	16-QAM	13.10	13.10	15.50
15+15	1	74	1	0		13.90	17.70	13.70
15+15	75	0	75	0		18.50	18.70	18.90
15+15	1	0	1	74	64-QAM	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	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	-					

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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	-							

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LTE Band 5 **QPSK** Lowest Channel / 5MHz+10MHz Lowest Channel / 10MHz+5MHz Offset 10.80 dB ● RBW 1 MHz SWT 5.7 µs ● VBW 3 MHz Mode Auto FFT 10.80 dB • RBW 1 MHz 5.7 μs • VBW 3 MHz Mode Auto FFT M1[1] 10 dBm MH 51. -20 dBm -40 dBm 40 dBm CF 831.525 MH CF 831.475 MHz Function Result 15,944 MHz 26,00 dB 51,9 Function Result 16.094 MHz 26.00 dB 51.6 
 X-value
 Y-value
 Function

 826.94 MHz
 18.85 dBm
 nd8 down

 923.433 MHz
 -7.19 dBm
 nd8

 839.377 MHz
 -7.13 dBm
 Q factor
 Type | Ref | Trc | 
 X-value
 Y-value
 Function

 830,096 MHz
 18.10 dBm
 nd8 down

 923,353 MHz
 -7.40 dBm
 nd8

 839,447 MHz
 -7.45 dBm
 Q factor
 Type | Ref | Trc | Date: 26.SEP.2018 09:57:05 Date: 26.SEP.2018 07:15:07 Middle Channel / 5MHz+10MHz Middle Channel / 10MHz+5MHz 18.71 dB: 831.9400 MH 17.71 dB 832.0690 MH 10 dBm-30 dBm -50 dBm--50 dBm-Span 30.0 MHz CF 836.475 MHz CF 836.525 MHz 1001 pts Type | Ref | Trc | X-value 832.069 MHz 828.413 MHz 844.537 MHz Y-value Function **Function Result** Function Result Highest Channel / 10MHz+5MHz **Highest Channel / 5MHz+10MHz** 17.52 dBi 836.9400 MH 26.00 d 16.004000000 MH 17.13 dB 10 dBm-52. -10 dBm--20 dBm--60 dBm -60 dBm Type | Ref | Trc |

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Date: 26.SEP.2018 08:27:11

Date: 26.SEP.2018 11:03:56

LTE Band 5 **QPSK** Lowest Channel / 10MHz+10MHz M1[1] CF 833.95 MHz Function Result 20.859 MHz 26.00 dB 39.7 Type Ref Trc Date: 26.SEP.2018 13:40:22 Middle Channel / 10MHz+10MHz 17.50 dB: 831.0750 MH Type | Ref | Trc | Function Result **Highest Channel / 10MHz+10MHz** 

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FAX: 886-3-328-4978

Date: 26.SEP.2018 14:25:42

LTE Band 5 **16QAM** Lowest Channel / 5MHz+10MHz Lowest Channel / 10MHz+5MHz Offset 10.80 dB ● RBW 1 MHz SWT 5.7 µs ● VBW 3 MHz Mode Auto FFT 10.80 dB • RBW 1 MHz 5.7 μs • VBW 3 MHz Mode Auto FFT M1[1] MH 51. 10 dBm 20 dBm -30 dBm -40 dBm 40 dBm CF 831.525 MH CF 831.475 MHz Function Result 16.064 MHz 26.00 dB 51.4 Function Result 16.064 MHz 26.00 dB 51.5 Type | Ref | Trc | 
 X-value
 Y-value
 Function

 827.009 MHz
 17.10 dBm
 ndB down

 923.383 MHz
 -9.08 dBm
 ndB

 839.447 MHz
 -8.72 dBm
 Q factor
 Type | Ref | Trc | Date: 26.SEP.2018 09:56:39 Date: 26.SEP.2018 07:14:41 Middle Channel / 5MHz+10MHz Middle Channel / 10MHz+5MHz 18.49 dB: 831.1000 MH 16.49 dBr 834.4970 MH -50 dBm -50 dBm-CF 836.475 MHz CF 836.525 MHz 1001 pts Y-value Type | Ref | Trc | Function **Function Result** Function Function Result 16.064 MH X-value **Highest Channel / 5MHz+10MHz** Highest Channel / 10MHz+5MHz 18.88 dBi 838.3780 MH 26.00 d 16.124000000 MH 10 dBm-52. -10 dBm -60 dBm -60 dBm Type | Ref | Trc | Type | Ref | Trc |

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Date: 26.SEP.2018 08:27:38

Date: 26.SEP.2018 11:04:23

LTE Band 5 16QAM Lowest Channel / 10MHz+10MHz M1[1] CF 833.95 MHz Function Result 20.979 MHz 26.00 dB 39.6 Type Ref Trc Date: 26.SEP.2018 13:39:56 Middle Channel / 10MHz+10MHz Type | Ref | Trc | Function Result **Highest Channel / 10MHz+10MHz** Date: 26.SEP.2018 14:26:08

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LTE Band 5 64QAM Lowest Channel / 5MHz+10MHz Lowest Channel / 10MHz+5MHz Offset 10.80 dB ● RBW 1 MHz SWT 5.7 µs ● VBW 3 MHz Mode Auto FFT M1[1] 10 dBm 40 dBm 40 dBm CF 831.525 MH CF 831.475 MHz Function Result 15.734 MHz 26.00 dB 52.6 Function Result 16.124 MHz 26.00 dB 52.0 
 X-value
 Y-value
 Function

 826.97 MHz
 20.38 dBm
 nd8 down

 823.523 MHz
 -5.59 dBm
 nd8

 839.257 MHz
 -5.88 dBm
 Q factor
 Type | Ref | Trc | 
 X-value
 Y-value
 Function

 837,709 MHz
 16.60 dBm
 ndB down

 823.413 MHz
 -9.28 dBm
 ndB

 839.537 MHz
 -9.86 dBm
 Q factor
 Type | Ref | Trc | Date: 26.SEP.2018 09:56:12 Date: 26.SEP.2018 07:14:14 Middle Channel / 5MHz+10MHz Middle Channel / 10MHz+5MHz 19.45 dB: 832.5390 MH 17.26 dBr 837.2240 MH -30 dBm -50 dBm--50 dBm-CF 836.525 MHz CF 836.475 MHz 1001 pts X-value Y-value
832.539 MHz 19.45 dB
828.433 MHz -6.44 dB
844.317 MHz -6.24 dB X-value Function Result 15.884 MH Type | Ref | Trc | Function Y-value **Function Result** Highest Channel / 10MHz+5MHz **Highest Channel / 5MHz+10MHz** 18.97 dB 10 dBm-52. -10 dBm--60 dBn -60 dBm Type | Ref | Trc |

Report No.: FG871722-04

Date: 26.SEP.2018 08:28:04

Date: 26.SEP.2018 11:04:49

LTE Band 5 **64QAM** Lowest Channel / 10MHz+10MHz M1[1] CF 833.95 MHz Function Result 20.979 MHz 26.00 dB 39.6 Type Ref Trc Date: 26.SEP.2018 13:39:30 Middle Channel / 10MHz+10MHz Marker Type | Ref | Trc | Function Result **Highest Channel / 10MHz+10MHz** Date: 26.SEP.2018 14:26:34

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# **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	-						

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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	-	

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LTE Band 5 **QPSK** Lowest Channel / 5MHz+10MHz Lowest Channel / 10MHz+5MHz | Count 100/100 | Count 100/10 Ref Level 30.00 dBm
Att 30 dB
SGL Count 100/100 Offset 10.80 dB @ RBW 1 MHz SWT 5.7 µs @ VBW 3 MHz Mode Auto FFT 10 dBm d8m--20 dBm 20 dBm--30 dBm--40 dBm 40 dBm CF 831.525 MHz 1001 pts CF 831.475 MHz 1001 pts 
 X-value
 Y-value
 Function

 826.97 MHz
 18.76 dBm

 824.0924 MHz
 10.34 dBm
 Occ Bw

 838.538 MHz
 8.52 dBm
 Type | Ref | Trc | Type | Ref | Trc | Function Result 
 X-value
 Y-value
 Function

 829.227 MHz
 16.61 dBm
 **Function Result** 14.445554446 MHz Occ Bw 14.475524476 MHz Date: 26.SEP.2018 09:54:53 Date: 26.SEP.2018 07:12:54 Middle Channel / 5MHz+10MHz Middle Channel / 10MHz+5MHz 10 dBm--20 dBn -30 dBm-30 dBm--50 dBm--50 dBm-CF 836.525 MHz CF 836.475 MHz 1001 pts 
 X-value
 Y-value
 Function

 830.591 MHz
 18.65 dBm

 829.0325 MHz
 9.93 dBm
 Occ Bw

 843.3582 MHz
 6.88 dBm
 | Marker | Trc | X-value | Y-value | Function | M1 | 1 | 834,917 MHz | 17,770 dBm | T1 | 1 | 829,1623 MHz | 10,04 dBm | Occ 8w | T2 | 1 | 843,6079 MHz | 9,13 dBm | Type | Ref | Trc | Function Result Function Result 14.325674326 MHz 14.445554446 MHz **Highest Channel / 5MHz+10MHz** Highest Channel / 10MHz+5MHz 15.96 dBn 835.9610 MH 14.415584416 MH M1[1] 10 dBm--10 dBm-20 dBm--60 dBm -60 dBm Type | Ref | Trc | Type | Ref | Trc | Function Date: 26.SEP.2018 11:03:30 Date: 26.SEP.2018 08:26:45

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LTE Band 5 **QPSK** Lowest Channel / 10MHz+10MHz CF 833.95 MHz Type Ref Trc 
 X-value
 Y-value
 Function

 831.353 MHz
 17.94 dBm
 Lead of the control of the Function Result 19.020979021 MHz Date: 26.SEP.2018 13:38:12 Middle Channel / 10MHz+10MHz 
 Marker
 Y-value
 Function

 M1
 1
 835.531 MHz
 17.94 dbm

 T1
 1
 826.8397 MHz
 9.48 dbm
 Occ Bw

 T2
 1
 846.0605 MHz
 8.14 dbm
 Occ Bw
 Function Result 19.220779221 MHz Highest Channel / 10MHz+10MHz 

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FAX: 886-3-328-4978

Date: 26.SEP.2018 14:25:16

LTE Band 5 **16QAM** Lowest Channel / 5MHz+10MHz Lowest Channel / 10MHz+5MHz | Count 100/100 | Count 100/10 10 dBm d8m--20 dBm--40 dBm 40 dBm CF 831.525 MHz CF 831,475 MHz 1001 pts 
 X-value
 Y-value
 Function

 827.0 MHz
 19.44 dBm
 824.0924 MHz
 9.58 dBm
 Occ Bw

 838.4481 MHz
 7.18 dBm
 Occ Bw
 Type | Ref | Trc | Type | Ref | Trc | Function Result 
 X-value
 Y-value
 Function

 827.489 MHz
 16.68 dBm
 **Function Result** 14.355644356 MHz Occ Bw 14.415584416 MHz Date: 26.SEP.2018 09:55:20 Date: 26.SEP.2018 07:13:21 Middle Channel / 5MHz+10MHz Middle Channel / 10MHz+5MHz 18.92 dBr 832.6890 MH 10 dBm--20 dBn -20 dBm -30 dBm 30 dBm -50 dBm--50 dBm-CF 836.525 MHz CF 836.475 MHz 1001 pts 
 X-value
 Y-value
 Function

 832.689 MHz
 18.92 d8m

 829.0525 MHz
 9.91 d8m
 Occ Bw

 843.4481 MHz
 7.55 d8m
 Type | Ref | Trc | Function Result 
 Type
 Ref
 Trc
 X-value
 Y-value
 Function

 M1
 1
 834.167 MHz
 16.99 dBm
 Function Result 14.385614386 MHz Occ Bw 14.595404595 MHz **Highest Channel / 5MHz+10MHz** Highest Channel / 10MHz+5MHz 10 dBm--10 dBm--60 dBm -60 dBm-Type | Ref | Trc | Function Type | Ref | Trc |

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Date: 26.SEP.2018 08:26:19

Date: 26.SEP.2018 11:03:04

LTE Band 5 **16QAM** Lowest Channel / 10MHz+10MHz -40 dBm CF 833.95 MHz Type | Ref | Trc | 
 X-value
 Y-value
 Function

 829,474 MHz
 17,06 dBm
 824,2397 MHz
 8.89 dBm
 Occ Bw

 843,5804 MHz
 8.85 dBm
 Occ Bw
 Function Result 19.340659341 MHz Date: 26.SEP.2018 13:38:38 Middle Channel / 10MHz+10MHz -30 dBm -50 dBm- 
 Marker
 Y-value
 Function

 M1
 1
 830.556 MHz
 17.3 d dlm

 T1
 1
 826.7598 MHz
 9.55 dlm
 Occ Bw

 T2
 1
 845.7408 MHz
 6.52 dlm
 Occ Bw
 Function Result 18.981018981 MHz Highest Channel / 10MHz+10MHz Date: 26.SEP.2018 14:24:50

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LTE Band 5 **64QAM** Lowest Channel / 5MHz+10MHz Lowest Channel / 10MHz+5MHz | Count 100/100 | Count 100/10 Ref Level 30.00 dBm
Att 30 dB
SGL Count 100/100 Offset 10.80 dB @ RBW 1 MHz SWT 5.7 µs @ VBW 3 MHz Mode Auto FFT 10 dBm d8m--20 dBm--20 dBm -40 dBm 40 dBm CF 831.525 MHz CF 831.475 MHz 
 X-value
 Y-value
 Function

 827.869 MHz
 21.37 dBm

 824.1823 MHz
 9.54 dBm
 Occ Bw

 839.568 MHz
 7.89 dBm
 Type | Ref | Trc | Type | Ref | Trc | **Function Result**  
 X-value
 Y-value
 Function

 826.979 MHz
 16.88 dBm
 Function Result 14.385614386 MHz Occ Bw 14.385614386 MHz Date: 26.SEP.2018 09:55:46 Date: 26.SEP.2018 07:13:48 Middle Channel / 5MHz+10MHz Middle Channel / 10MHz+5MHz 19.56 dBs 833.4380 MH 10 dBm-30 dBm -50 dBm--50 dBm-CF 836.475 MHz CF 836.525 MHz 1001 pts 
 X-value
 Y-value
 Function

 833.438 MHz
 19.56 dBm

 829.0325 MHz
 10.20 dBm
 Occ Bw

 843.478 MHz
 7.09 dBm
 Type | Ref | Trc | Function Result 
 Type
 Ref
 Trc
 X-value
 Y-value
 Function

 M1
 1
 836.535 MHz
 17.40 dBm
 **Function Result** 14.445554446 MHz Occ Bw 14.385614386 MHz **Highest Channel / 5MHz+10MHz** Highest Channel / 10MHz+5MHz 10 dBm--10 dBm--60 dBm -60 dBm-Type | Ref | Trc | Function Date: 26.SEP.2018 11:02:37 Date: 26.SEP.2018 08:25:52

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LTE Band 5 **64QAM** Lowest Channel / 10MHz+10MHz 17.51 dBr 828.2360 MH 19.140859141 MH CF 833.95 MHz Type Ref Trc 
 X-value
 Y-value
 Function

 828.236 MHz
 17.51 dBm
 0.00 dBm

 824.2397 MHz
 8.91 dBm
 Occ Bw

 843.3806 MHz
 6.63 dBm
 Occ Bw
 Function Result 19.140859141 MHz Date: 26.SEP.2018 13:39:04 Middle Channel / 10MHz+10MHz -20 dBm--50 dBm- 
 Marker
 Y-value
 Function

 M1
 1
 833.993 MHz
 19.13 dbm

 T1
 1
 826.7998 MHz
 19.13 dbm

 T2
 1
 845.8607 MHz
 8.23 dbm
 Function Result 19.060939061 MHz Highest Channel / 10MHz+10MHz Date: 26.SEP.2018 14:24:24

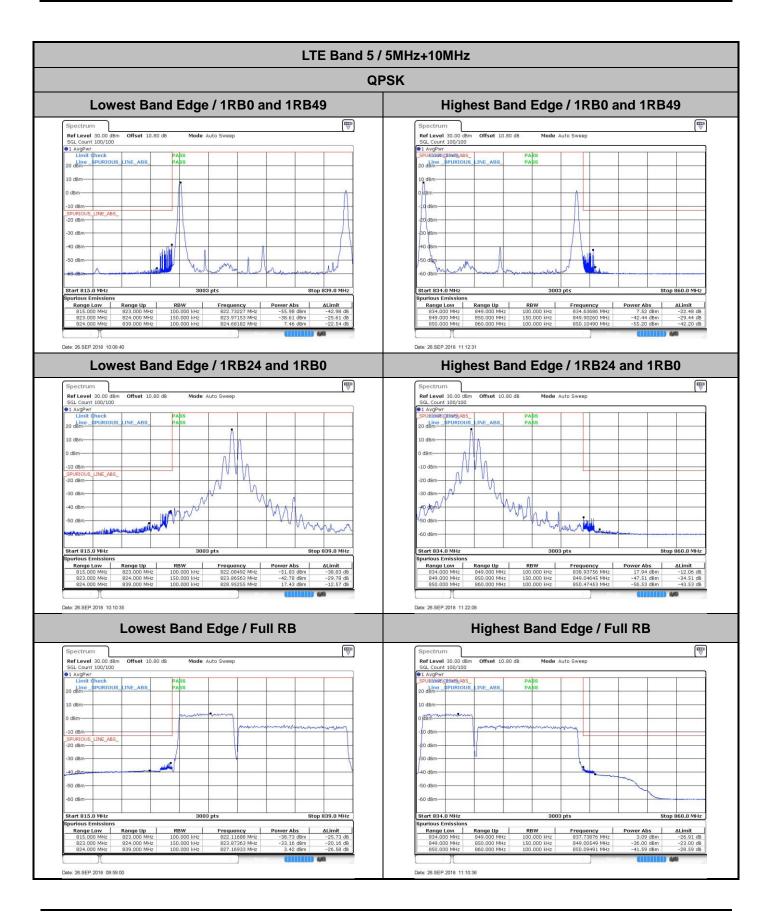
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## **Conducted Band Edge**

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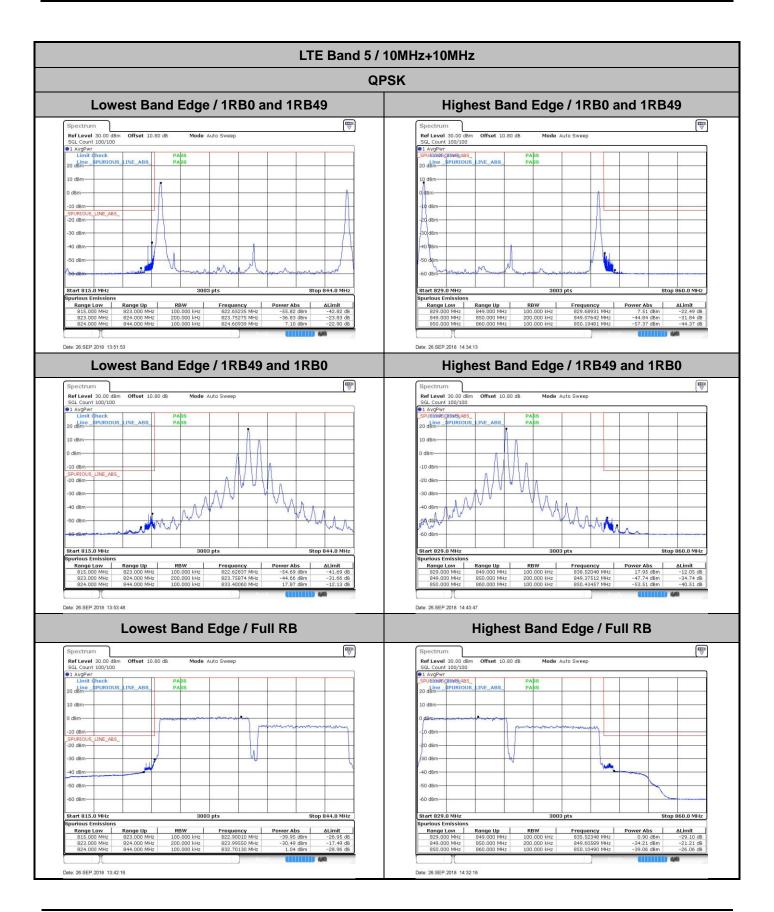
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LTE Band 5 / 10MHz+5MHz **QPSK** Lowest Band Edge / 1RB0 and 1RB24 Highest Band Edge / 1RB0 and 1RB24 Ref Level 30.00 dBm SGL Count 100/100 SGL Count ...

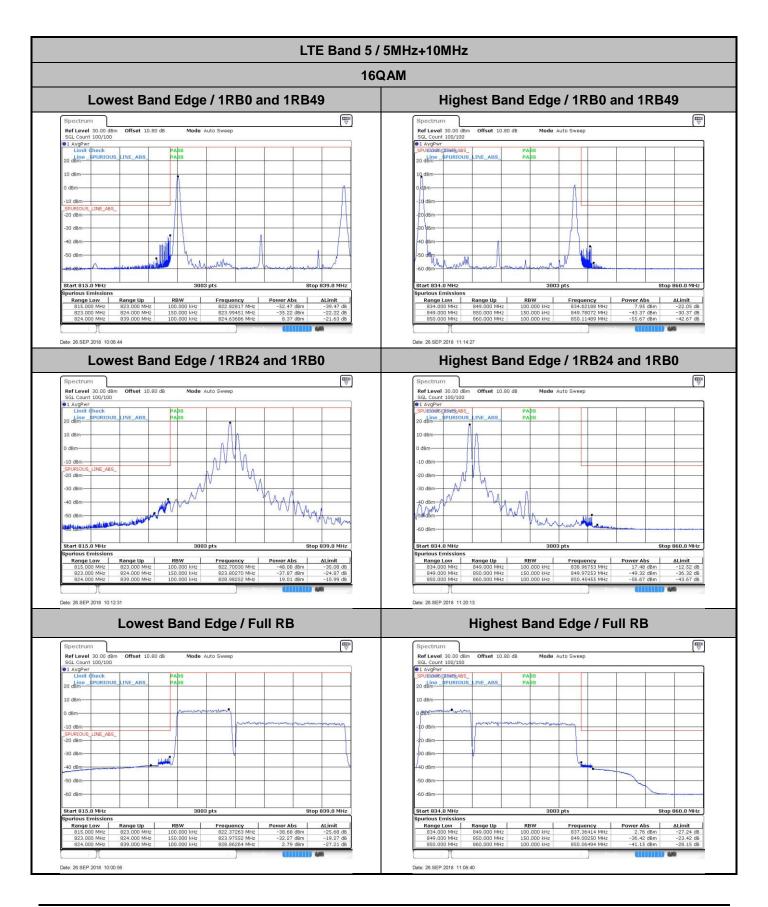
1 AvgPwr
Limit check 20 dBm SPURIOUS\_LINE\_ABS dam SPURIOUS LINE\_ABS 50 dBm-Start 834.0 MHz Range Low Range Up 815 000 MHz 823 000 MHz Date: 26.SEP.2018 08:35:46 Date: 26.SEP.2018 07:26:41 Lowest Band Edge / 1RB49 and 1RB0 Highest Band Edge / 1RB49 and 1RB0 Spectrum

Ref Level 30.00 dBm Offset 10.80 dB
SGL Count 100/100 Ref Level 30.00 dB SGL Count 100/100 Offset 10.80 dB 1 AvgPwr SPURIOUSOHWELABS 20 dbm SPURIOUS 10 dBm -10 dBm LINE ABS 40 dBm-Start 815.0 MHz Stop 839.0 MHz Frequency 843.40310 MHz 849.14635 MHz 850.00500 MHz Range Low Range Up RBW Range Up 823.82168 MHz 833.38811 MHz Date: 26.SEP.2018 07:28:37 Date: 26.SEP.2018 08:45:22 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Ref Level 30.00 dBm Offset 10.80 dB SGL Count 100/100 SGL Count 100/100 1 AvgPwr 1 AvgPwr imit ¢heck SPURIOUS\_LINE\_ABS\_ 20 dBm PURIOUS 30 dBm-60 dBm--60 dBm-Frequency 822.81219 MHz 823.98651 MHz 831.50000 MHz

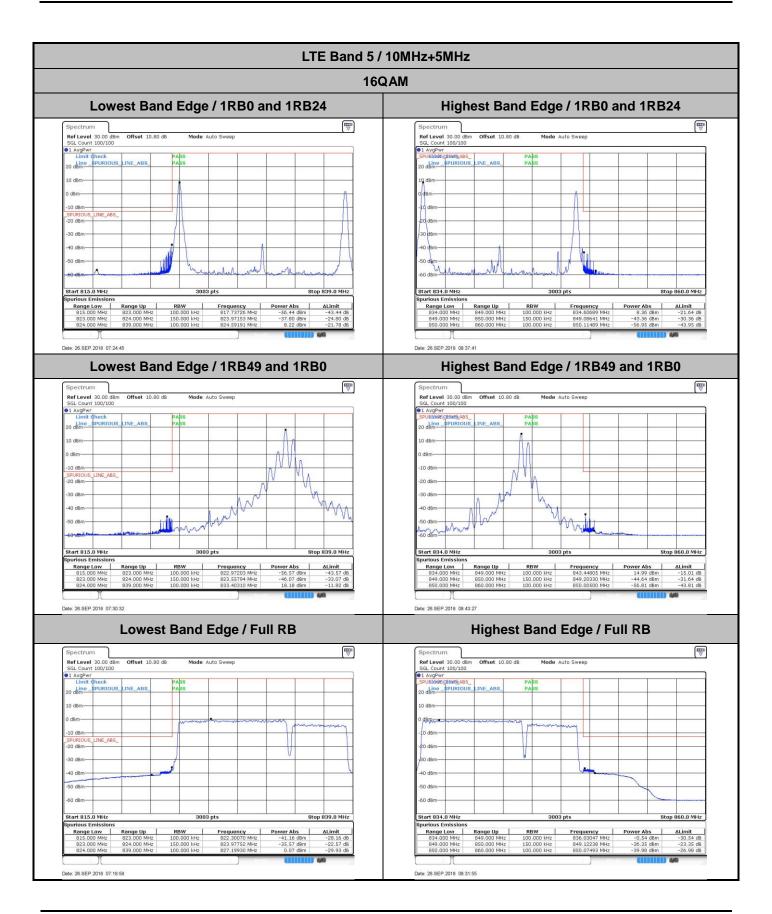
Report No.: FG871722-04



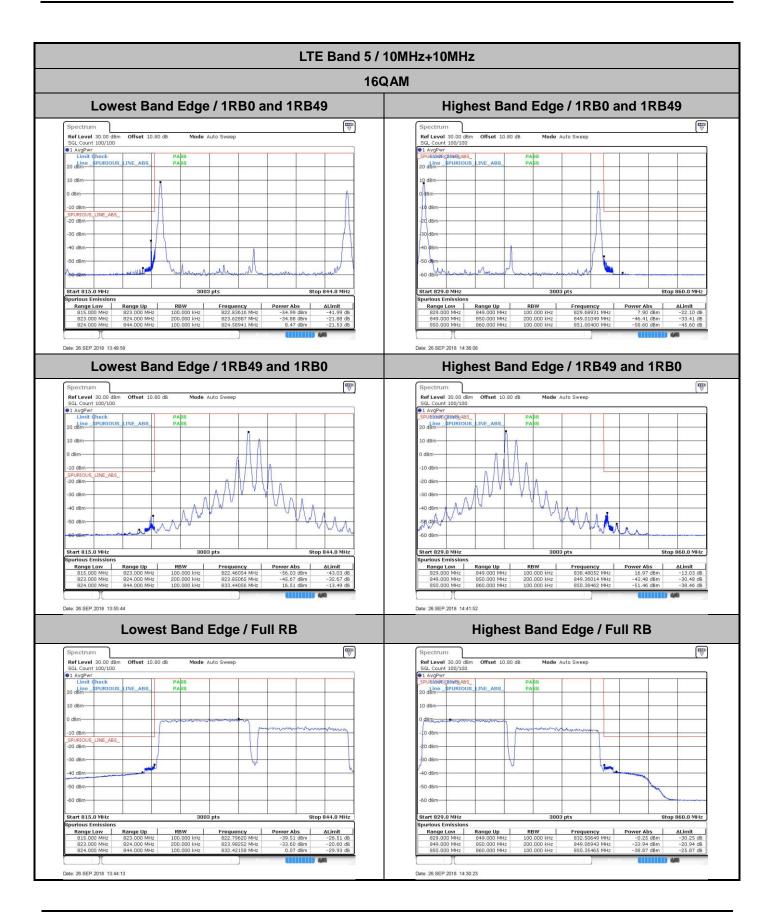
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