

Report No.: FG911635C



# FCC RADIO TEST REPORT

FCC ID : UZ7ET56DE

Equipment : Tablet
Brand Name : ZEBRA
Model Name : ET56DE

Applicant : Zebra Technologies Corporation

1 Zebra Plaza, Holtsville, NY 11742

Manufacturer : Zebra Technologies Corporation

1 Zebra Plaza, Holtsville, NY 11742

Standard : FCC 47 CFR Part 2, 90(R)

The product was received on Jan. 16, 2019 and testing was started from Jun. 27, 2019 and completed on Jul. 26, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, 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 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.

Reviewed by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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Report Version

: 01

Report Template No.: BU5-FGLTE90R Version 2.4

## History of this test report

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Report No.	Version	Description	Issued Date
FG911635C	01	Initial issue of report	Aug. 08, 2019

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### **Summary of Test Result**

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Report Clause	Ref Std. Clause	Test Items	Test Items Result (PASS/FAIL)		
3.2	§2.1046	Conducted Output Power	Reporting only	-	
3.2	§90.542 (a)(7)	Effective Radiated Power	Pass	-	
3.3	- Peak-to-Average Ratio Reporting or		Reporting only	-	
3.4	§2.1049	Occupied Bandwidth	Reporting only	-	
3.5	§2.1053 §90.543 (e)(2)	Conducted Band Edge Measurement	Pass	-	
3.6	§2.1051 §90.210 (n)	Emission Mask	Pass	-	
3.7	§2.1053 §90.543 (e)(3) Conducted Spurious Emission		Pass	-	
3.8	§2.1055 §90.539 (e)	Frequency Stability Temperature & Voltage	Pass	-	
4.2	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	Pass	Under limit 9.92 dB at 1577.000 MHz	

#### Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

#### **Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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Report Producer: Yimin Ho

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## 1 General Description

### 1.1 Product Feature of Equipment Under Test

Product Feature						
Equipment	Tablet					
Brand Name	ZEBRA					
Model Name	ET56DE					
FCC ID	UZ7ET56DE					
	WCDMA/HSPA/LTE/NFC/GNSS					
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40					
EOT Supports Radios application	WLAN 11ac VHT20/VHT40/VHT80					
	Bluetooth BR/EDR/LE					
HW Version	DV2					
SW Version	Android version 8.1.0					
FW Version	01-20-03-00-OG-U00-PRD					
MFD	19Jun01					
EUT Stage	Identical Prototype					

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Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories						
Spare Standard Battery 24.13Wh	<b>Brand Name</b>	Zebra	Model Name	BT-000393		

Supported Unit Used in Test Configuration and System									
Cradle (Dock) for EMC	Brand Name	Zebra	Part Number	CRD-ET5X-1SCG1					
Cradle (Dock) for RSE	Brand Name	Zebra	Part Number	CHG-ET5X-CBL1-01					
Adapter	Brand Name	Zebra	Part Number	PWRBGA12V50W0WW					
DC Cable	Brand Name	Zebra	Part Number	CBL-DC-388A1-01					

### 1.2 Product Specification of Equipment Under Test

Product Feature							
Tx Frequency	790.5 MHz ~ 795.5 MHz						
Rx Frequency	760.5 MHz ~ 765.5 MHz						
Bandwidth	5MHz / 10MHz						
Maximum Output Power to Antenna	24.53dBm						
Antenna Type	PCB Antenna						
Antenna Gain	-0.21 dBi						
Type of Modulation	QPSK / 16QAM / 64QAM						

### 1.3 Modification of EUT

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

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### 1.4 Emission Designator

Ľ	TE Band 14		QPSK			16QAM		64QAM			
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	nator Tolerance RRP(W)		Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	Emission Frequency Designator Tolerance (99%OBW) (ppm)		Maximum ERP(W)	
5	790.5 ~ 795.5	4M51G7D	-	0.1648	4M50W7D	-	0.1409	4M52W7D	-	0.1102	
10	793	9M07G7D	0.0232	0.1592	9M05W7D	-	0.1403	9M11W7D	-	0.1112	

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## 1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory				
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.				
rest site No.	TH05-HY				
Test Engineer	Aking Chang				
Temperature	24~26°C				
Relative Humidity	54~56%				

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

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory					
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.					
rest site No.	03CH12-HY					
Test Engineer	Jack Cheng, Lance Chiang, and Chuan Chu					
Temperature	19.3~26°C					
Relative Humidity	57.1~73.1%					

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

FCC Designation No.: TW1190 and TW0007

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### 1.6 Applied 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
- 47 CFR Part 2, Part 90(R)
- ANSI / TIA-603-E
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

#### Remark:

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

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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.

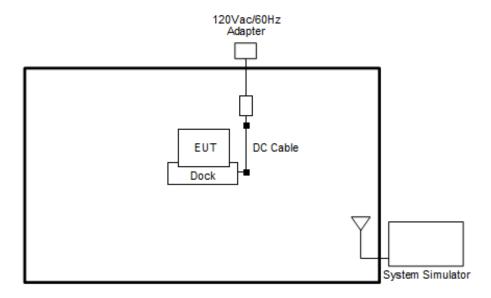
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For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane with Adapter) were recorded in this report.

Conducted	D1		Bandwidth (MHz) Modulation		n		RB#		Test Channel							
Test Cases	Band	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	М	Н
Max. Output Power	14	,	,	٧	v	-	-	v	v	v	٧	v	٧	V	v	٧
Peak-to-Average Ratio	14	ı	ı		v	-	-	v	v	v	>		v	V	v	v
26dB and 99% Bandwidth	14	ı	ı	>	v	-	-	v	v	v			v	V	v	v
Conducted Band Edge	14	ı	ı	>	V	-	ı	v	v	v	٧		v	V		v
Emission Mask	14	1	1	٧	v	-	-	v	v	v	٧		<	V	v	v
Conducted Spurious Emission	14	-	-	V	v	-	-	v	v	v	v			v	v	v
Frequency Stability	14	ı	ı		V	-	ı	v	v	v			v		v	
E.R.P	14	1	1	٧	v	-	-	v	v	v	٧			V	v	v
Radiated Spurious Emission	14 Worst Case							v	v	v						
Remark	2. Th 3. Th te	2. The mark "-" means that this bandwidth is not supported.														

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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

ltem	Equipment	Trade Name	Model No.	lodel No. FCC ID		Power Cord	
1.	System Simulator	Anritsu	MT8820C	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 4.5 dB and 10dB attenuator.

#### Example:

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

= 4.5 + 10 = 14.5 (dB)

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## 2.5 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List										
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest						
10	Channel	-	23330	-						
10	Frequency	-	793	-						
5	Channel	23305	23330	23355						
9	Frequency	790.5	793	795.5						

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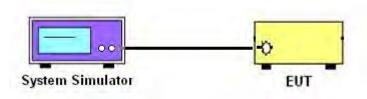
### 3 Conducted Test Items

### 3.1 Measuring Instruments

See list of measuring instruments of this test report.

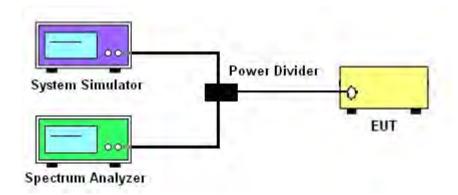
#### 3.1.1 Test Setup

#### 3.1.2 Conducted Output Power

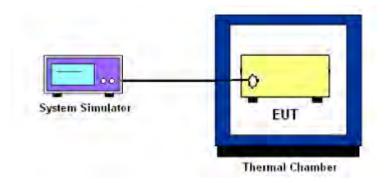


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# 3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, Emission Mask, and Conducted Spurious Emission



### 3.1.4 Frequency Stability



#### 3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

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### 3.2 Conducted Output Power Measurement and ERP

# 3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. 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 3 Watts for LTE Band 14.

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<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 base station.
- 2. Set EUT at maximum power through base station.
- 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 ANSI C63.26-2015 Section 5.2.6

- 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.

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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 ANSI C63.26-2015 Section 5.4.3 (26dB) and Section 5.4.4 (99OB)

- 1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
- 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

90.543(e)

On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log
 (P) dB in a 6.25 kHz band segment, for base and fixed stations.

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- (2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.
- (3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

#### 3.5.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

- 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)

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#### 3.6 Emission Mask

#### 3.6.1 Description of Emissions Mask Measurement

Transmitters designed must meet the emission mask comply with the emission mask provisions of FCC Part 90.210(n).

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#### 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 power of the modulated signal was measured on a spectrum analyzer using an RMS and 10 second sweep time in order to maximize the level.
- 3. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

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### 3.7 Conducted Spurious Emission

#### 3.7.1 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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It is measured by means of a calibrated spectrum analyzer and scanned from 30MHz up to a frequency including its 10<sup>th</sup> harmonic.

#### 3.7.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 6.1.

- 1. The EUT was connected to spectrum analyzer and base station via 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.
- 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)

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### 3.8 Frequency Stability

#### 3.8.1 Description of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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#### 3.8.2 Test Procedures for Temperature Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

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

#### 3.8.3 Test Procedures for Voltage Variation

The testing follows FCC KDB 971168 D01 v03r01 Section 9.0.

- 1. The EUT was placed in a temperature chamber at 20±5° C and connected with the base station.
- 2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
- 3. The variation in frequency was measured for the worst case.

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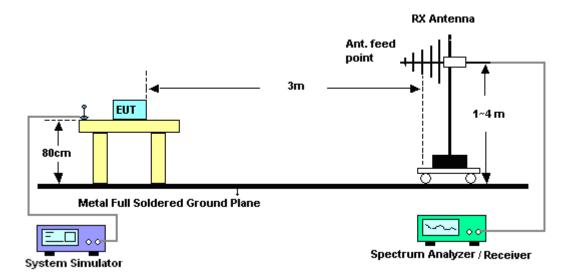
#### 4 Radiated Test Items

## 4.1 Measuring Instruments

See list of measuring instruments of this test report.

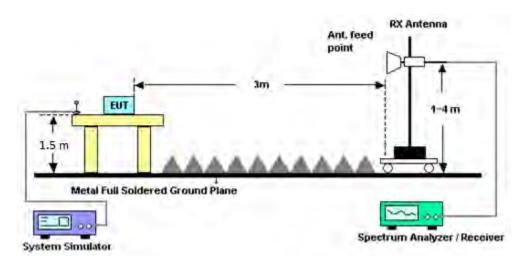
#### 4.1.1 Test Setup

#### 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 operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP)

for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the

purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative

of the type that will be used with the equipment in normal operation.

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 7 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.

The height of the receiving antenna is varied between one meter and four meters to search the

maximum spurious emission for both horizontal and vertical polarizations.

5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep =

500ms, Taking the record of maximum spurious emission.

6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.

7. Tune the output power of signal generator to the same emission level with EUT maximum

spurious emission.

8. Taking the record of output power at antenna port.

9. Repeat step 7 to step 8 for another polarization.

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

frequency band.

11. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

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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. 14, 2018	Jun. 27, 2019~ Jul. 26, 2019	Oct. 13, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 13, 2018	Jun. 27, 2019~ Jul. 26, 2019	Nov. 12, 2019	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40°C~90°C	Aug. 29, 2018	Jun. 27, 2019~ Jul. 26, 2019	Aug. 28, 2019	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 02, 2018	Jun. 27, 2019~ Jul. 26, 2019	Oct. 01, 2019	Conducted (TH05-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#A	1-18GHz	Jan. 14, 2019	Jun. 27, 2019~ Jul. 26, 2019	Jan. 13, 2020	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Jul. 05, 2019~ Jul. 23, 2019	Jan. 06, 2020	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&00802 N1D01N-06	47020&06	30MHz to 1GHz	Oct. 13, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 12, 2019	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-121 2	1GHz ~ 18GHz	Oct. 19, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 18, 2019	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-132 6	1GHz ~ 18GHz	Oct. 30, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 29, 2019	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 584	18GHz ~ 40GHz	Dec. 05, 2018	Jul. 05, 2019~ Jul. 23, 2019	Dec. 04, 2019	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 25, 2019	Jul. 05, 2019~ Jul. 23, 2019	Mar. 24, 2020	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A023 75	1GHz~26.5Ghz	May 28, 2018	Jul. 05, 2019~ Jul. 23, 2019	May 26, 2020	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0055007	1GHz~18GHz	Apr. 01, 2019	Jul. 05, 2019~ Jul. 23, 2019	Mar. 31, 2020	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Jul. 05, 2019~ Jul. 23, 2019	Dec. 05, 2019	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 26, 2018	Jul. 05, 2019~ Jul. 23, 2019	Dec. 25, 2019	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 86	10Hz~44GHz	Dec. 19, 2018	Jul. 05, 2019~ Jul. 23, 2019	Dec. 18, 2019	Radiation (03CH12-HY)
Signal Generator	Rohde & Schwarz	SMB100A	175727	100kHz~40GHz	Dec. 23, 2018	Jul. 05, 2019~ Jul. 23, 2019	Dec. 23, 2019	Radiation (03CH12-HY)
Base Station	Anritsu	MT8821C	620143281 6	GSM / GPRS /WCDMA / LTE FDD/TDD with 44) /LTE-3CC DLCA,2CC ULCA	May 05, 2019	Jul. 05, 2019~ Jul. 23, 2019	May 04, 2020	Radiation (03CH12-HY)

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Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Filter	Wainwright	WLK4-1000-1 530-6000-40S S	SN11	1 GHz Lowpass	Sep. 16, 2018	Jul. 05, 2019~ Jul. 23, 2019	Sep. 15, 2019	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-108 0-1200-1500- 60SS	SN2	1.2G High Pass	Sep. 16, 2018	Jul. 05, 2019~ Jul. 23, 2019	Sep. 15, 2019	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60ST	SN2	3GHz High Pass	Mar. 20, 2019	Jul. 05, 2019~ Jul. 23, 2019	Mar. 19, 2020	Radiation (03CH12-HY)
Notch Filter	EWT	EWT-14-0041	D1	DCS 1800	Nov. 01, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 31, 2019	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCT698/79 8-10/40 8SSK	SN1	AWS Band	Nov. 01, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 31, 2019	Radiation (03CH12-HY)
Notch Filter	Wainwright	WRCG824/84 9-40/8SS	SN35	CDMA 850	Nov. 07, 2018	Jul. 05, 2019~ Jul. 23, 2019	Nov. 06, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30M-18G	Mar. 13, 2019	Jul. 05, 2019~ Jul. 23, 2019	Mar. 12, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 16, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 15, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Oct. 16, 2018	Jul. 05, 2019~ Jul. 23, 2019	Oct. 15, 2019	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1m~4m	N/A	Jul. 05, 2019~ Jul. 23, 2019	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jul. 05, 2019~ Jul. 23, 2019	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-00098 9	N/A	N/A	Jul. 05, 2019~ Jul. 23, 2019	N/A	Radiation (03CH12-HY)

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## 6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of	0.00
Confidence of 95% (U = 2Uc(y))	3.36

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: 01

#### <u>Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)</u>

Measuring Uncertainty for a Level of	3.70
Confidence of 95% (U = 2Uc(y))	3.70

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

Measuring Uncertainty for a Level of	3.98
Confidence of 95% (U = 2Uc(y))	3.90

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

## Conducted Output Power(Average power)

	LTE Band 14 Maximum Average Power [dBm]										
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest					
10	1	0			24.10						
10	1	25			24.38						
10	1	49			24.29						
10	25	0	QPSK		23.53						
10	25	12			23.54						
10	25	25			23.52						
10	50	0			23.54						
10	1	0			23.83						
10	1	25			23.80	7					
10	1	49			23.68						
10	25	0	16-QAM	-	22.67	-					
10	25	12			22.64						
10	25	25			22.57						
10	50	0			22.61						
10	1	0			22.82						
10	1	25			22.74						
10	1	49			22.64						
10	25	0	64-QAM		21.66						
10	25	12			21.68						
10	25	25			21.61	7					
10	50	0			21.65	7					
5	1	0		24.52	24.53	24.36					
5	1	12		24.52	24.49	24.34					
5	1	24		24.48	24.44	24.29					
5	12	0	QPSK	23.58	23.53	23.39					
5	12	7	QPSK	23.60	23.55	23.40					
5	12	13		23.53	23.51	23.35					
5	25	0		23.57	23.46	23.39					
5	1	0		23.76	23.84	23.64					
5	1	12		23.85	23.80	23.62					
5	1	24		23.80	23.74	23.55					
5	12	0	16-QAM	22.66	22.63	22.48					
5	12	7		22.69	22.63	22.49					
5	12	13		22.65	22.59	22.46					
5	25	0		22.66	22.62	22.47					
5	1	0		22.78	22.76	22.63					
5	1	12		22.78	22.78	22.59					
5	1	24		22.75	22.67	22.51					
5	12	0	64-QAM	21.73	21.68	21.55					
5	12	7		21.74	21.72	21.58					
5	12	13		21.69	21.64	21.50					
5	25	0		21.66	21.64	21.49					

## LTE Band 14

## Peak-to-Average Ratio

Mode										
Mod.	QP	SK	16	Limit: 13dB						
RB Size	1RB Full RB		1RB	Full RB	Result					
Lowest CH	-	-	-	-						
Middle CH	3.48	4.61	4.78	5.80	PASS					
Highest CH	-	-	-	-						
Mode		LTE Band 14 / 10MHz								
Mod.	64Q	AM			Limit: 13dB					
RB Size	1RB	Full RB			Result					
Lowest CH	-	-	-	-						
Middle CH	5.97	6.43	-	-	PASS					
Highest CH	-	-	-	-						

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LTE Band 14 / 10MHz / QPSK Middle Channel/ 1RB Middle Channel / Full RB **™** LTE Band 14 / 10MHz / 16QAM Middle Channel/ 1RB Middle Channel / Full RB ₩ V Ref Level 30.00 dBm Att 30 dB Ref Level 30.0 Samples: 130000 Samples: 130000 LTE Band 14 / 10MHz / 64QAM Middle Channel/ 1RB Middle Channel / Full RB 7 Ref Level 30.00 Att 3 Ref Level 30.00 dBm Att 30 dB

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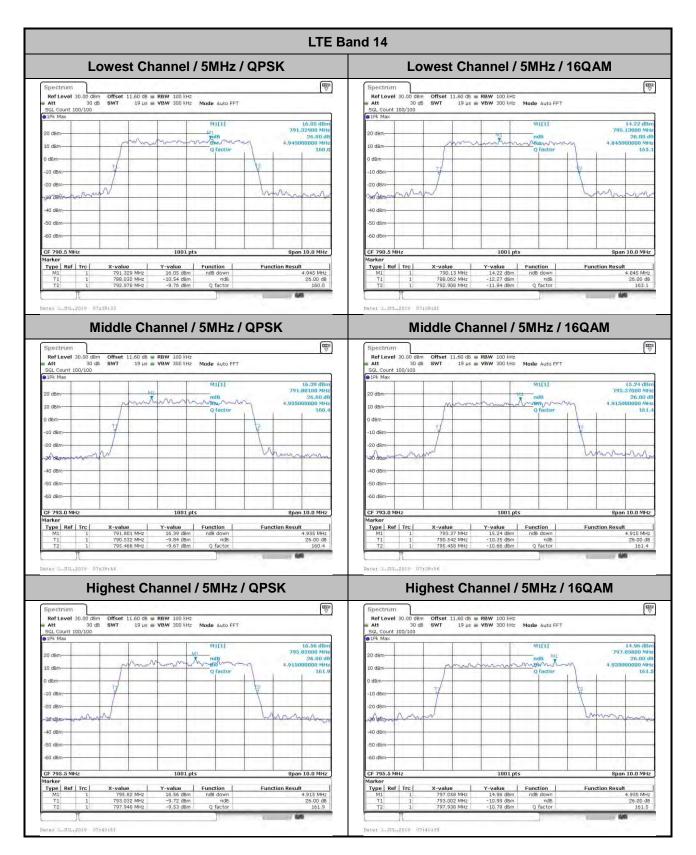
# 26dB Bandwidth

Mode		LTE Band 14 : 26dB BW(MHz)										
BW	1.4MHz 3MHz			lHz	5N	lHz	101	ИHz	15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.95	4.85	-	-	-	-	-	-
Middle CH	-	-	-	-	4.94	4.92	9.89	9.79	-	-	-	_
Highest CH	-	-	-	-	4.92	4.94	-	-	-	-	-	-
Mode					LTE Ba	and 14 : :	26dB BV	V(MHz)				
BW	1.4	ЛHz	3M	lHz	5MHz 10MHz			15MHz		20MHz		
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	4.85	-	-	-	-	-	ı	-
Middle CH	-	-	-	-	4.94	-	9.71	-	-	-	1	-
Highest CH	-	ı	-	-	4.89	-	-	-	-	-	1	-

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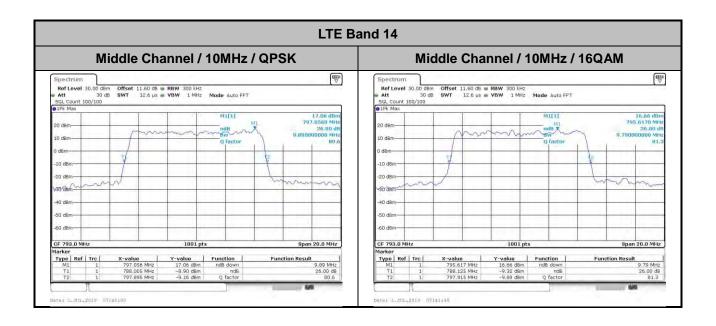
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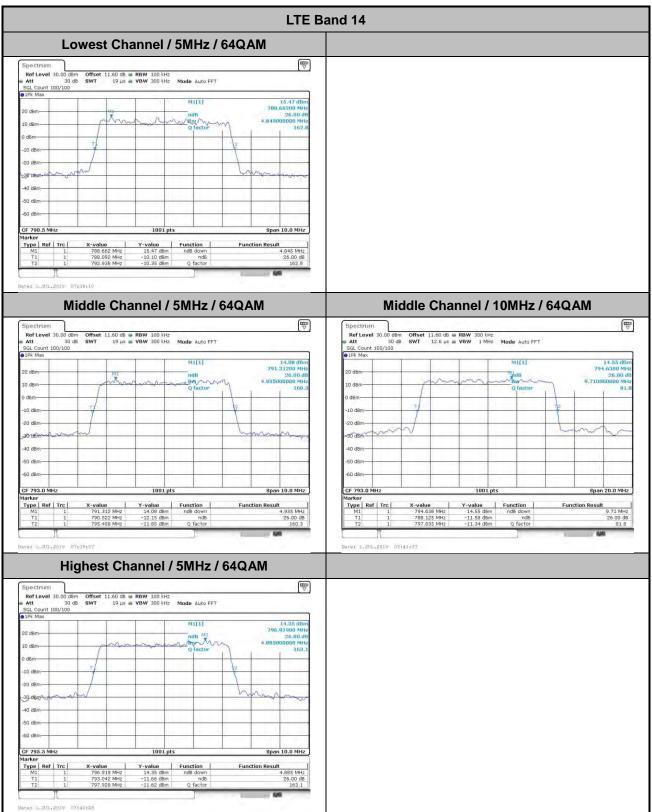
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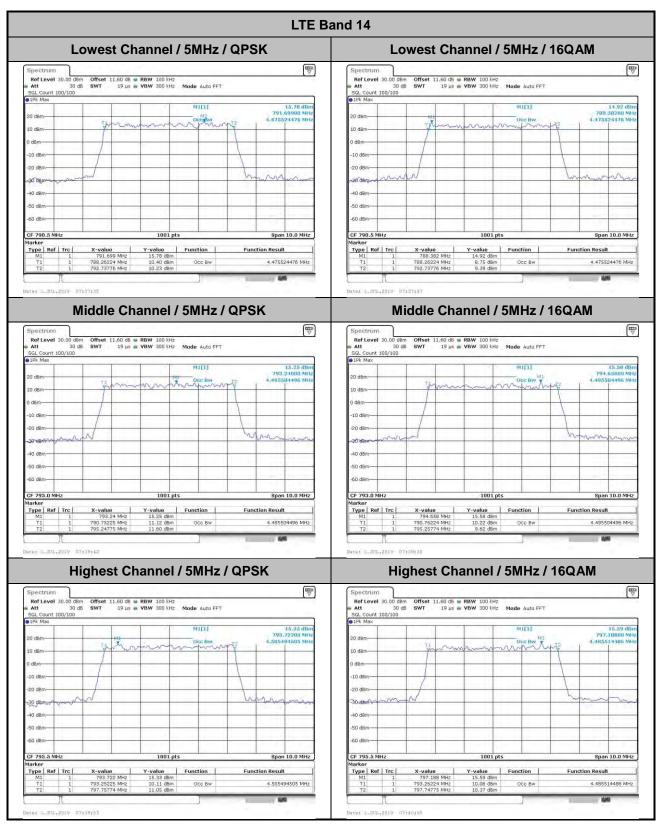
# **Occupied Bandwidth**

Mode		LTE Band 14 : 99%OBW(MHz)										
BW	1.4MHz 3MHz			5N	5MHz 10MHz			15MHz		20MHz		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.48	4.48	-	-	-	-	-	-
Middle CH	-	-	-	-	4.50	4.50	9.07	9.05	-	-	-	-
Highest CH	-	-	-	-	4.51	4.49	-	-	-	-	-	-
Mode					LTE Ba	and 14 : 9	99%OBV	V(MHz)				
BW	1.4	ИHz	3M	lHz	5MHz 10MHz			15MHz		20MHz		
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	4.49	-	-	-	-	-	-	-
Middle CH	-	-	-	-	4.52	-	9.11	-	-	-	-	-
Highest CH	-	-	-	-	4.49	-	-	-	-	-	-	-

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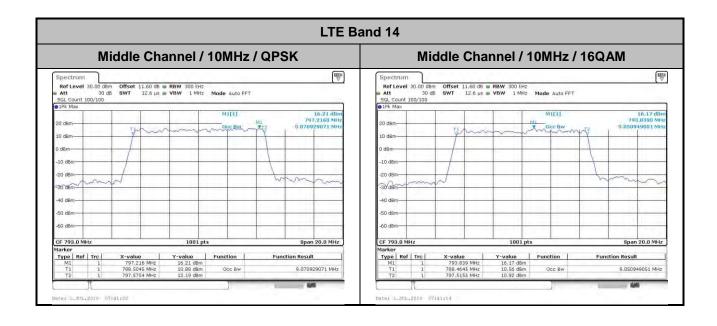
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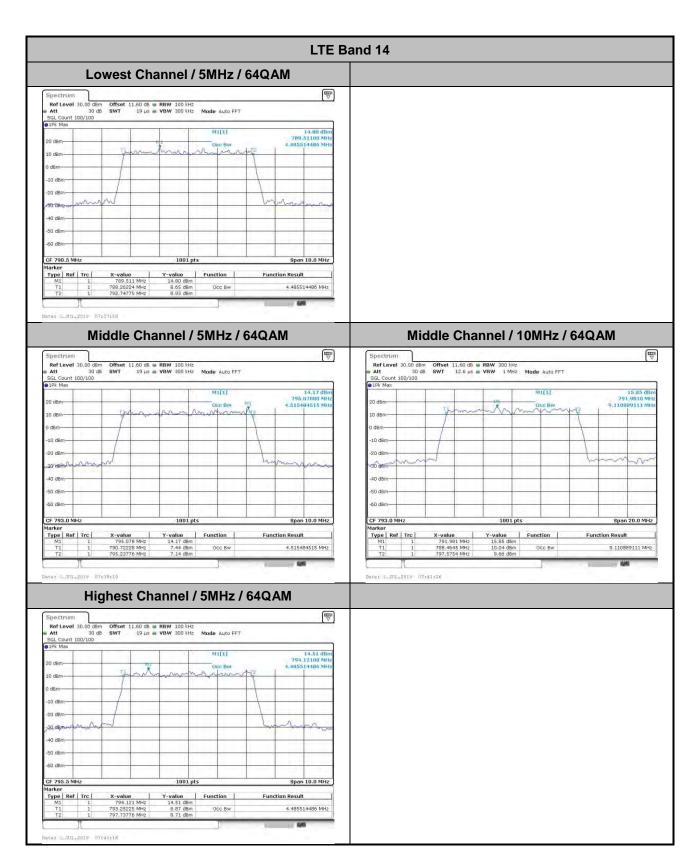
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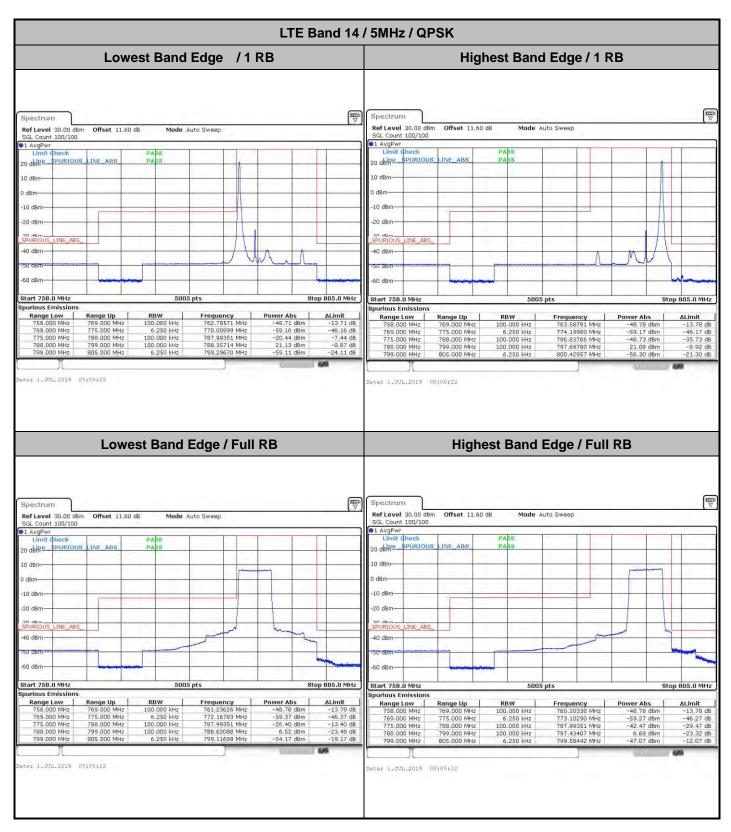
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## **Conducted Band Edge**



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LTE Band 14 / 5MHz / 16QAM Lowest Band Edge /1 RB Highest Band Edge / 1 RB Spectrum Offset 11.60 dB Mode Auto Sweep Offset 11.60 dB Mode Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 ●1 AvgPw 20 dbMe 20 daine SPURIOUS LINE ABS 10 dBm dBm -10 dBm 20 dBm 40 dBm-60 dBm Start 758.0 MHz 5005 pts Stop 805.0 MHz Start 758.0 MH ourious Emissions Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz Power Abs -48,73 dBm -59,35 dBm -20,70 dBm 20,35 dBm -59,06 dBm 760.40110 MHz 773.14486 MHz 787.99351 MHz 788.30220 MHz 803.37862 MHz Range Up RBW 100.000 kHz 6.250 kHz 100.000 kHz 100.000 kHz 6.250 kHz Frequency
762.12637 MHz
771.11888 MHz
775.26623 MHz
797.62088 MHz
800.42358 MHz ΔLimit 758,000 MHz 758.000 MHz Power Abs -48.81 dBn ΔLimit -13.81 dB -46.24 dB -35.80 dB -9.78 dB -21.51 dB -48.81 dBm -59.24 dBm -48.80 dBm 20.22 dBm -56.51 dBm 775.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz ate: 1.JUL.2019 D7:51:46 Date: 1.JUL.2019 08:02:05 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** THE STATE OF Spectrum Spectrum Ref Level 30.00 dBm Offset 11.60 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 11.60 dB SGL Count 100/100 Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit ch ●1 AvgPwr Limit ¢heck 20 deline SPURIOUS LINE ABS SPURIOUS LINE ABS o delle 10 dBn dBm -10 dBm -10 dBm -20 dBm -20 dBm PURIOUS LINE\_ABS LINE ABS 40 dBm-40 dBm Stop 805.0 MHz Start 758.0 MHz urious Emissions 758.000 MHz 769.000 MHz 775.000 MHz 788.000 MHz Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz Frequency 760.00549 MHz 774.13986 MHz 787.99351 MHz 791.46703 MHz 799.13487 MHz Power Abs -48.76 dBm -59.30 dBm -28.67 dBm 5.67 dBm -54.11 dBm Range Low 758,000 MHz 769,000 MHz 775,000 MHz 788,000 MHz 799,000 MHz ΔLimit -13.76 dB -46.30 dB -15.67 dB -24.33 dB -19.11 dB -13.79 dB -46.38 dB -29.45 dB -24.07 dB -11.18 dB te: 1.JUL.2019 07:56:56 Date: 1.JUL.2019 08:07:15

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Report No.: FG911635C LTE Band 14 / 5MHz / 64QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Offset 11.60 dB Mode Auto Sweep Offset 11.60 dB Made Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 ●1 AvgPw 20 dbMe 20 daine SPURIOUS LINE ABS 10 dBm dBm -10 dBm 20 dBm 40 dBm-60 dBm Start 758.0 MHz 5005 pts Stop 805.0 MHz Start 758.0 MH Power Abs 49.79 dBm ourious Emissions Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz Power Abs -48.80 dBm -59.34 dBm -23.13 dBm 19.44 dBm -59.31 dBm 758.18132 MHz 770.31568 MHz 770.31568 MHz 787.99351 MHz 788.31319 MHz 799.20080 MHz Range Up RBW 100.000 kHz 6.250 kHz 100.000 kHz 100.000 kHz 6.250 kHz 764.91758 MHz 772.07193 MHz 782.48701 MHz 797.64286 MHz 800.48951 MHz ΔLimit 758,000 MHz 758.000 MHz ΔLimit -48.79 dBm -59.08 dBm -48.76 dBm 19.21 dBm -56.50 dBm 775.000 MH ate: 1.JUL.2019 D7:53:29 Date: 1.JUL.2019 08:03:48 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** THE STATE OF Spectrum Spectrum Ref Level 30.00 dBm Offset 11.60 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 11.60 dB SGL Count 100/100 Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit ch ●1 AvgPwr Limit ¢heck 20 daine spurious SPURIOUS LINE ABS o delle 10 dBn dBm -10 dBm -10 dBm -20 dBm -20 dBm SPURIOUS LINE\_ABS LINE ABS 40 dBm 40 dBm-Stop 805.0 MHz Start 758.0 MHz urious Emissions 758.000 MHz 769.000 MHz 775.000 MHz 788.000 MHz Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz 758.50000 MHz 758.50000 MHz 769.15285 MHz 787.99351 MHz 788.77473 MHz 799.11688 MHz Power Abs -48.80 dBm -59.39 dBm -29,60 dBm 4.82 dBm -54.93 dBm Range Low 758,000 MHz 769,000 MHz 775,000 MHz 788,000 MHz 799,000 MHz ΔLimit -13.80 dB -46.39 dB -16.60 dB -25.18 dB -19.93 dB

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Date: 1.JUL.2019 08:08:58

FAX: 886-3-328-4978

te: 1.JUL.2019 07:58:39

LTE Band 14 / 10MHz / QPSK Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Offset 11.60 dB Mode Auto Sweep Offset 11.60 dB Made Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 ●1 AvgPw 20 daine SPURIOUS LINE ABS 20 db/// 10 dBm dBm -10 dBm 20 dBm 40 dBm--40 dBm-60 dBm Start 758.0 MHz 5005 pts Stop 805.0 MHz Start 758.0 MH: urious Emissions Power Abs -48.80 dBm -59.38 dBm -34.84 dBm 21.27 dBm -54.92 dBm Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz Frequency
762.98352 MHz
771.12488 MHz
787.99351 MHz
788.60989 MHz
801.80220 MHz Range Low 758.000 MHz 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz Range Up RBW 100.000 kHz 6.250 kHz 100.000 kHz 100.000 kHz 6.250 kHz 764.33516 MHz 769.02098 MHz 779.73377 MHz 797.40110 MHz 800.16583 MHz ΔLimit 758,000 MHz ΔLimit -48.73 dBm -59,25 dBm -43.92 dBm 21.09 dBm -55.67 dBm 775.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz ate: 1.JUL.2019 D8:10:41 Date: 1.JUL.2019 08:15:49 Band Edge / Full RB 7 Spectrum Ref Level 30.00 dBm Offset 11.60 dB Mode Auto Sweep SGL Count 100/100 Limit Check 20 deine SPURIOUS LINE ABS PASS 10 dBm-0 dBm -10 dBm -20 dBm-LINE\_ABS -40 dBm--50 dBm -60 dBm-Start 758.0 MHz 5005 pts Stop 805.0 MHz Spurious Emissions Range Low 758.000 MHz Range Up 769.000 MHz RBW 100.000 kHz Frequency 768.71978 MHz Power Abs -48.39 dBm -13.39 dB 769.000 MHz 775.000 MHz 6.250 kHz 770.06394 MHz -58.83 dBm -45.83 dB -17.68 dB -25.58 dB -11.27 dB 775.000 MHz 788.000 MHz 100.000 kHz 787.99351 MHz -30.68 dBm 788.000 MHz 799.000 MHz 805.000 MHz 100.000 kHz 4.42 dBm -46.27 dBm 799.86014 MHz 799,000 MHz 6.250 kHz

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Date: 2.JUL.2019 05:54:47

769.000 MHz

775.000 MHz

788.000 MHz

799,000 MHz

Date: 2.JUL.2019 05:56:30

775.000 MHz

788.000 MHz

799.000 MHz 805.000 MHz

Report No.: FG911635C LTE Band 14 / 10MHz / 16QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Offset 11.60 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 11.60 dB Made Auto Sweep SGL Count 100/100 SGL Count 100/100 ●1 AvgPw 20 daine SPURIOUS LINE ABS 20 db/RE 10 dBm dBm -10 dBm 20 dBm 40 dBm-60 dBm Start 758.0 MHz 5005 pts Stop 805.0 MHz Start 758.0 MH: urious Emissions Frequency 762.42308 MHz 770.17183 MHz 787.99351 MHz 788.55495 MHz 801.80220 MHz Power Abs -48.77 dBm -59.27 dBm -34.98 dBm 20.53 dBm -57.47 dBm Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz Range Low 758.000 MHz 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz RBW 100.000 kHz 6.250 kHz 100.000 kHz 100.000 kHz 6.250 kHz 760.78571 MHz 769.19481 MHz 779.79870 MHz 797.37912 MHz 800.21379 MHz ΔLimit 758,000 MHz Range Up 769,000 MH ΔLimit -13.77 dB -46.26 dB -31.64 dB -9.71 dB -21.01 dB 775.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz -59.26 dBm -44.64 dBm ate: 1.JUL.2019 D8:12:24 Date: 1.JUL.2019 08:17:32 Band Edge / Full RB 7 Spectrum Ref Level 30.00 dBm Offset 11.60 dB Mode Auto Sweep SGL Count 100/100 Limit Check 20 deine SPURIOUS LINE ABS PASS 10 dBm-0 dBm -10 dBm -20 dBm-LINE\_ABS -40 dBm--SU dBm -60 dBm-Start 758.0 MHz 5005 pts Stop 805.0 MHz Spurious Emissions Power Abs -48.43 dBm -58.77 dBm Range Low 758.000 MHz Range Up 769.000 MHz RBW 100.000 kHz Frequency 761.68681 MHz -13.43 dB -45.77 dB -20.78 dB

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6.250 kHz

100.000 kHz

100.000 kHz

6.250 kHz

769.20080 MHz

787.99351 MHz

796.37912 MHz

799.31469 MHz

-33.78 dBm

-46.35 dBm

3.53 dBm

-26.47 dB -11.35 dB

LTE Band 14 / 10MHz / 64QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Offset 11.60 dB Mode Auto Sweep Offset 11.60 dB Made Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 ●1 AvgPw 20 daine SPURIOUS LINE ABS 20 db/// 10 dBm dBm -10 dBm 20 dBm 40 dBm-SU GBIT 60 dBm Start 758.0 MHz 5005 pts Stop 805.0 MHz Start 758.0 MH: urious Emissions Power Abs -48.78 dBm -59.12 dBm -37.62 dBm 19.39 dBm -57.73 dBm Range Up 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz Frequency
761.79670 MHz
772.24575 MHz
787.99351 MHz
788.56593 MHz
801.79620 MHz Range Low 758.000 MHz 769.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz RBW 100.000 kHz 6.250 kHz 100.000 kHz 100.000 kHz 6.250 kHz Power Abs -48.74 dBm -59.25 dBm -45.83 dBm 19.26 dBm -56.49 dBm 762.19231 MHz 771.16084 MHz 779.75974 MHz 797.40110 MHz 800.17782 MHz ΔLimit 758,000 MHz Range Up 769,000 MH -13.74 dB -46.25 dB -32.83 dB -10.74 dB -21.49 dB 775.000 MHz 775.000 MHz 788.000 MHz 799.000 MHz 805.000 MHz ate: 1.JUL.2019 D8:14:07 Date: 1.JUL.2019 08:19:15 Band Edge / Full RB 7 Spectrum Ref Level 30.00 dBm Offset 11.60 dB Mode Auto Sweep SGL Count 100/100 Limit Check 20 deine SPURIOUS LINE ABS PASS 10 dBm-0 dBm -10 dBm -20 dBm-LINE\_ABS -40 dBm--SU dBm -60 dBm-Start 758.0 MHz 5005 pts Stop 805.0 MHz Spurious Emissions Range Low 758.000 MHz Range Up 769.000 MHz RBW 100.000 kHz Frequency 758.88462 MHz Power Abs -48.41 dBm -13.41 dB 769.000 MHz 775.000 MHz 6.250 kHz 773.33067 MHz -58.83 dBm -45.83 dB -21.64 dB -27.40 dB -12.50 dB 775.000 MHz 788.000 MHz 100.000 kHz 787.99351 MHz -34.64 dBm 788.000 MHz 799.000 MHz 805.000 MHz 100.000 kHz 2.60 dBm -47.50 dBm 799.86014 MHz 799,000 MHz 6.250 kHz

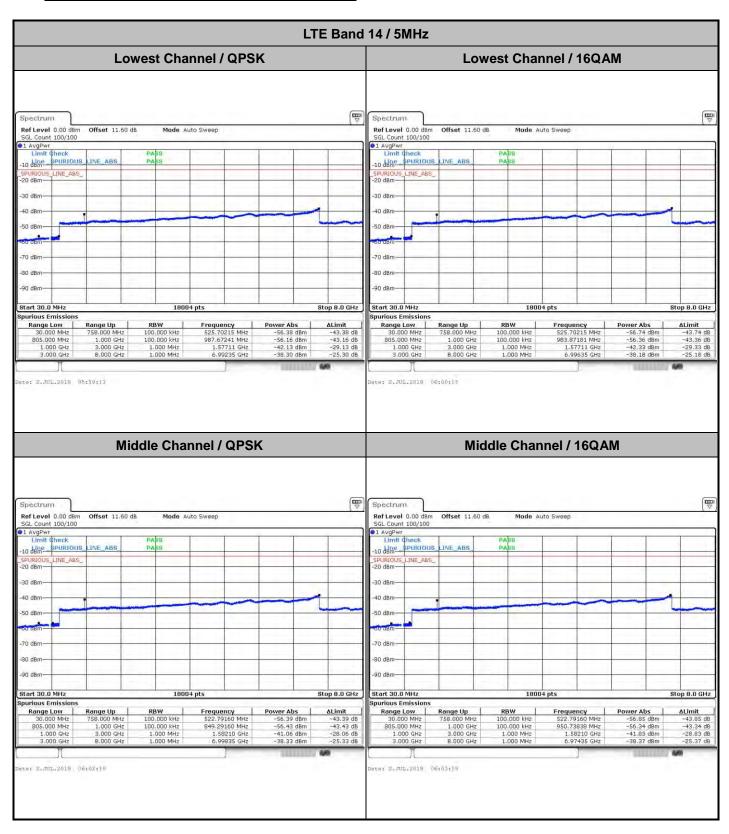
Report No.: FG911635C

TEL: 886-3-327-3456 Page Number: A14-16 of 33

FAX: 886-3-328-4978

Date: 2.JUL.2019 05:58:12

# **Conducted Spurious Emission**



Report No.: FG911635C

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Report No.: FG911635C LTE Band 14 / 5MHz **Highest Channel / QPSK Highest Channel / 16QAM** Spectrum Spectrum Ref Level 0.00 dBm Offset 11.50 dB Mode Auto Sweep Offset 11.60 dB Mode Auto Sweep Ref Level 0.00 dBm GL Count 100/100 SGL Count 100/100 1 AvgPwr Limit Check ●1 AvgPwr Limit Check 10 dem spurious 10 deme SPURIOUS LINE\_ABS INE\_ABS 80 dBm 80 dBm 90 dBm Start 30.0 MHz Stop 8.0 GHz Start 30.0 MHz 18004 pts Stop 8.0 GHz Spurious Emissions RBW 100,000 kHz 100,000 kHz 1,000 MHz 1,000 MHz Power Abs -56.05 dBm -56.35 dBm -40.94 dBm -38.00 dBm -43.05 dB -43.35 dB -27.94 dB -25.00 dB Frequency 519.88106 MHz 823.56447 MHz 1.58710 GHz 6.99685 GHz -56.42 dBm -56.29 dBm -41.67 dBm -38.29 dBm Frequency 519.88106 MHz 980.16867 MHz Range Low 30.000 MHz 805.000 MHz RBW 100,000 kHz 100,000 kHz Range Low 30,000 MHz Range Up Range Up 758.000 MHz ∆Limit -43.42 dB -43.29 dB -28.67 dB -25.29 dB 1.000 GHz 1.58710 GHz 6.99335 GHz ate: 2.JUL.2019 06:05:22 Date: 2.JUL.2019 06:06:23 LTE Band 14 / 10MHz Middle Channel / QPSK Middle Channel / 16QAM 7 Spectrum Spectrum Ref Level 0.00 dBm Offset 11.60 dB Mode Auto Sweep Ref Level 0.00 dBm Offset 11.60 dB Mode Auto Sweep GL Count 100/100 SGL Count 100/100 ●1 AvgPwr Limit Check 10 dem SPURIOUS LINE ABS -10 dem SPURIOUS LINE ABS LINE ABS INE\_ABS\_ 20 dBm 30 dBm 40 dBm 90 dBm Start 30.0 MHz Spurious Emissio Start 30.0 MHz 18004 pts Stop 8.0 GHz 18004 pts Stop 8.0 GHz RBW 100.000 kHz 100.000 kHz 1.000 MHz 1.000 MHz Power Abs -56.39 dBm -42.33 dBm -41.75 dBm -38.14 dBm 30,000 MHz 805,000 MHz Range Up 758.000 MHz 1.000 GHz 3.000 GHz 8.000 GHz -57.04 dBm -57.04 dBm -42.86 dBm -41.93 dBm -38.10 dBm Range Up Frequency 525.33833 MHz 806.21814 MHz ΔLimit Range Low

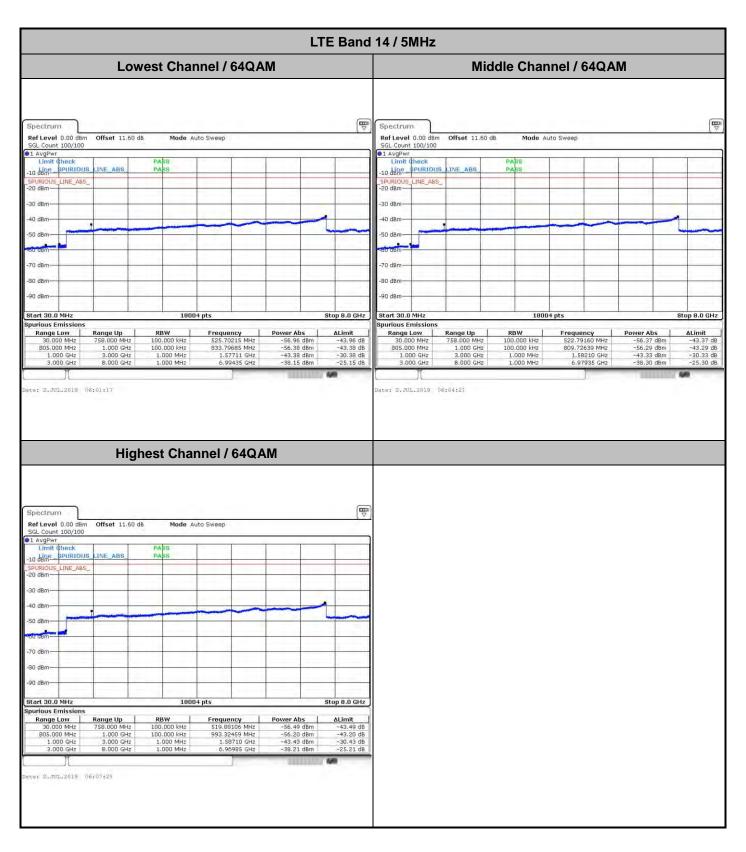
TEL: 886-3-327-3456 Page Number : A14-18 of 33

ate: 2.JUL.2019 06:09:27

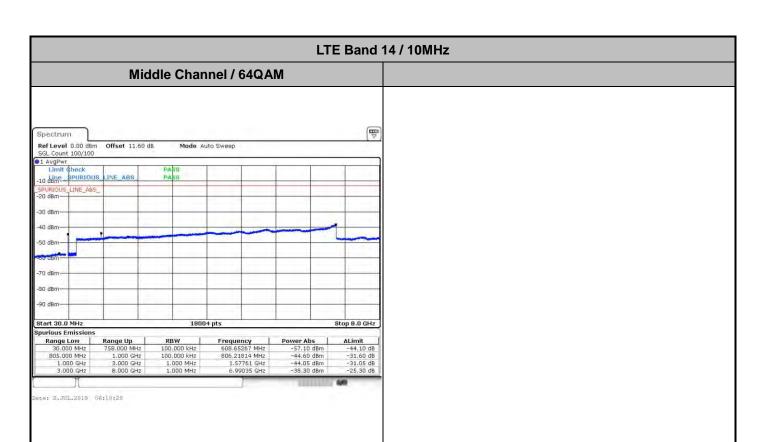
FAX: 886-3-328-4978

ste: 2.JUL.2019 06:08:26

Report No. : FG911635C



TEL: 886-3-327-3456 Page Number : A14-19 of 33

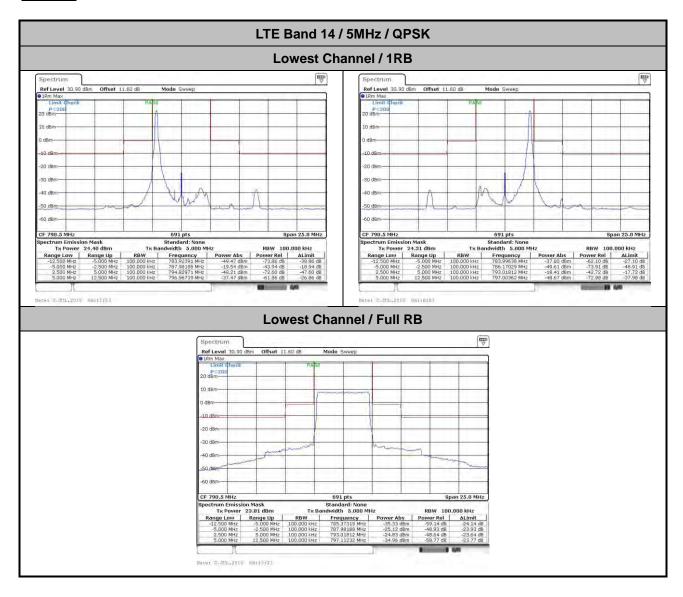


Report No.: FG911635C

TEL: 886-3-327-3456 Page Number: A14-20 of 33

# C RADIO TEST REPORT Report No. : FG911635C

# Mask



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LTE Band 14 / 5MHz / 16QAM **Lowest Channel / 1RB** 7 Ref Level 30.90 dBm Offset 11.60 dB Ref Level 30,90 dBn 10 dBm-CF 790.5 MHz 691 pts **Lowest Channel / Full RB** 7 10 dBm-20 dBm 40 dBm pectrum Emission Mask
Tx Power 22.86 dBm
Range Low Range Up
-12.500 MHz -5.000 MH;

Tx Band

Date: 2.3UL.2019 06:13:53

RBW 100.000 kHz

Report No.: FG911635C

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LTE Band 14 / 5MHz / 64QAM **Lowest Channel / 1RB** 7 Ref Level 30.90 dBm Offset 11.60 dB Ref Level 30,90 dBn 10 dBm-CF 790.5 MHz **Lowest Channel / Full RB** 7 20 dBm 40 dBm | Fertual | Fert Dectrum Emission Mask
Tx Power 21.93 dBm
Range Low Range Up
-12.500 MHz -5.000 MH; RBW 100.000 kHz

Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-23 of 33

Date: 2.3UL.2019 06:14:23

## Comparison | Co

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TEL: 886-3-327-3456 Page Number: A14-24 of 33

Date: 2.301.2019 06:21:55

LTE Band 14 / 5MHz / 16QAM Middle Channel / 1RB 7 10 dBm CF 793.0 MHz 691 pts Middle Channel / Full RB 7 10 dBm-20 dBm | Standard: None | Stan

RBW 100.000 kHz

pectrum Emission Mask
Tx Power 22.81 dBm
Range Low Range Up
-12.500 MHz -5.000 MH;

Date: 2.3UL.2019 06:21:26

Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-25 of 33

LTE Band 14 / 5MHz / 64QAM Middle Channel / 1RB 7 10 dBm-CF 793.0 MHz CF 793.0 MHz Middle Channel / Full RB 7 20 dBm 40 dBm | Standard: None | Stan

RBW 100.000 kHz

37-793.0 MH2
pectrum Emission Mask
Tx Power 21.90 dBm
Range Low Range Up
-12.500 MH2 -2.500 MH:
-2.500 MH2 -2.500 MH:
-2.500 MH2 -2.500 MH:
-2.500 MH2 -2.500 MH:

Date: 2.301.2019 06:20:84

Report No.: FG911635C

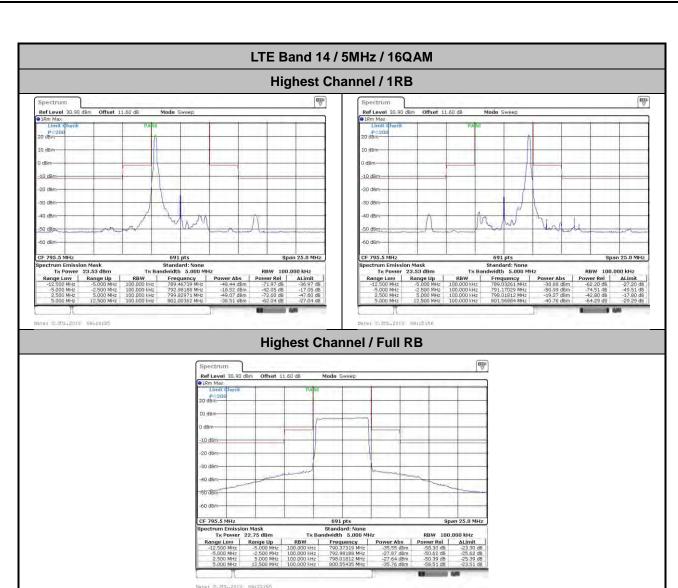
TEL: 886-3-327-3456 Page Number : A14-26 of 33

LTE Band 14 / 5MHz / QPSK **Highest Channel / 1RB** 7 CF 795.5 MHz 691 pts **Highest Channel / Full RB** | Fequency | Power Abs | 170,000 MHz | Fequency | Power Abs | 170,000 MHz | 170,000 MH pectrum Emission Mask
Tx Power 23.59 dBm
Range Low Range Up
-12.500 MHz -5.000 MH; RBW 100.000 kHz

Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-27 of 33

Date: 2.5UL.2019 06:22:25



Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-28 of 33

Date: 2.301.2019 06:22:55

LTE Band 14 / 5MHz / 64QAM **Highest Channel / 1RB** 7 10 dBm-CF 795.5 MHz **Highest Channel / Full RB** 7 20 dBn Like March March Land So dem-691 pts
Stendard: None
Bandwidth 5.000 MHz
Frequency
P0.49169 MHz
- 790.49169 MHz
- 790.59169 MHz
- 790.59169 MHz
- 790.59169 MHz
- 790.5916 pectrum Emission Mask
Tx Power 21.72 dBm
Range Low Range Up
-12.500 MHz -5.000 MHz
2.500 MHz -5.000 MHz
2.500 MHz -5.000 MHz
3.000 MHz -1.2500 MHz
5.000 MHz -1.2500 MHz

RBW 100.000 kHz

Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-29 of 33

Date: 2.5UL.2019 06:23:25

LTE Band 14 / 10MHz / QPSK Middle Channel / 1RB 7 10 dBm-CF 793.0 MHz Middle Channel / Full RB 7 20 dBm 40 dBm | Standard: None | Stan

RBW 100.000 kHz

pectrum Emission Mask
Tx Power 23.38 dBm
Range Low Range Up
-25.000 MHz -10.000 MHz

Date: 2.3UL.2019 06:80:57

Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-30 of 33

LTE Band 14 / 10MHz / 16QAM Middle Channel / 1RB 7 Ref Level 30,90 dBn 10 dBm--10 dBm-CF 793.0 MHz Middle Channel / Full RB 7 10 dBm-20 dBm 40 dBm pectrum Emission Mask
Tx Power 22.55 dBm
Range Low Range Up
-25.000 MHz -10.000 MH; Tx Band RBW 100.000 kHz

Report No.: FG911635C

TEL: 886-3-327-3456 Page Number : A14-31 of 33

Date: 2.5UL.2019 06:80:27

LTE Band 14 / 10MHz / 64QAM Middle Channel / 1RB 7 10 dBm-CF 793.0 MHz 691 pts Middle Channel / Full RB 7 20 dBm 40 dBm | G91 pts | Standard: None | Standard: N Dectrum Emission Mask
Tx Power 21.51 dBm
Range Low Range Up
-25.000 MHz -10.000 MHz Tx Band RBW 100.000 kHz

Report No.: FG911635C

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Date: 2.3UL.2019 06:29:57

# Frequency Stability

Test Conditions		LTE Band 14 (QPSK) / Middle Channel				
Temperature	Voltage	BW 10MHz	Note 2.			
(°C)	(Volt)	Deviation (ppm)	Result			
50	Normal Voltage	0.0232				
40	Normal Voltage	0.0192				
30	Normal Voltage	0.0194				
20(Ref.)	Normal Voltage	0.0000				
10	Normal Voltage	0.0029				
0	Normal Voltage	0.0005	DAGG			
-10	Normal Voltage	0.0219	PASS			
-20	Normal Voltage	0.0223				
-30	Normal Voltage	0.0116				
20	Maximum Voltage	0.0098				
20	Normal Voltage	0.0000				
20	Battery End Point	0.0049				

Report No.: FG911635C

### Note:

- 1. Normal Voltage =3.8 V.; Battery End Point (BEP) =3.5 V.; Maximum Voltage =4.4 V.
- 2. The frequency fundamental emissions stay within the authorized frequency block.

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### **Appendix B. Test Results of ERP and Radiated Test**

## ERP

LTE Band 14 / 5MHz (Average) (GT - LC = -0.21 dB)									
Channel	Mode	RB		Con	ducted	ERP			
		Size	Offset	Power (dBm)	Power (Watts)	ERP (dBm)	ERP (W)		
Lowest	QPSK	1	0	24.52	0.2831	22.16	0.1644		
Middle		1	0	24.53	0.2838	22.17	0.1648		
Highest		1	0	24.36 0.2729		22.00	0.1585		
Lowest	16QAM	1	12	23.85	0.2427	21.49	0.1409		
Middle		1	12	23.80	0.2399	21.44	0.1393		
Highest		1	12	23.62	0.2301	21.26	0.1337		
Lowest		1	0	22.78	0.1897	20.42	0.1102		
Middle	64QAM	1	0	22.76	0.1888	20.40	0.1096		
Highest		1	0	22.63	0.1832	20.27	0.1064		
Limit	ERP < 3W			R	esult	PASS			

LTE Band 14 / 10MHz (Average) (GT - LC = -0.21 dB)									
Channel	Mode	RB		Con	ducted	ERP			
		Size	Offset	Power (dBm)	Power (Watts)	ERP (dBm)	ERP (W)		
Lowest		1	-	-	-	ı	-		
Middle	QPSK	1	25	24.38	0.2742	22.02	0.1592		
Highest		-	-			-	-		
Lowest		ı	-			-	-		
Middle	16QAM	1	0	23.83	0.2415	21.47	0.1403		
Highest		ı	-	-	-	-	-		
Lowest		-	-	-	-	-	-		
Middle	64QAM	1	0	22.82	0.1914	20.46	0.1112		
Highest		1	-	-	-	1	-		
Limit	ERP < 3W			R	esult	PASS			

# **Radiated Spurious Emission**

## LTE Band 14

Report No.: FG911635C

	LTE Band 14 / 5MHz / QPSK									
Channel	Frequency ( MHz )	ERP (dBm)	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)	
	1577	-52.07	-42.15	-9.92	-62.14	-57.42	0.90	8.39	Н	
	2365	-56.23	-13	-43.23	-70.84	-63.47	1.12	10.51	Н	
	3153	-52.87	-13	-39.87	-68.73	-61.09	1.30	11.67	Н	
	3942	-50.33	-13	-37.33	-68.80	-59.47	1.47	12.77	Н	
									Н	
Lowest									Н	
Lowest	1577	-53.86	-42.15	-11.71	-63.46	-59.21	0.90	8.39	V	
	2365	-56.72	-13	-43.72	-71.07	-63.96	1.12	10.51	V	
	3153	-54.60	-13	-41.60	-70.90	-62.82	1.30	11.67	V	
	3942	-53.16	-13	-40.16	-71.64	-62.30	1.47	12.77	V	
									V	
									V	
	1584	-54.34	-42.15	-12.19	-64.42	-59.71	0.90	8.42	Н	
	2373	-56.64	-13	-43.64	-71.13	-63.89	1.12	10.52	Н	
	3163	-52.26	-13	-39.26	-68.12	-60.50	1.30	11.69	Н	
	3954	-51.32	-13	-38.32	-69.85	-60.46	1.48	12.77	Н	
									Н	
									Н	
Middle	1584	-56.05	-42.15	-13.90	-65.66	-61.42	0.90	8.42	V	
	2373	-56.62	-13	-43.62	-70.96	-63.87	1.12	10.52	V	
	3163	-54.64	-13	-41.64	-70.94	-62.88	1.30	11.69	V	
	3954	-53.19	-13	-40.19	-71.68	-62.33	1.48	12.77	V	
									V	
									V	
	1587	-53.07	-42.15	-10.92	-62.99	-58.45	0.90	8.43	Н	
	2380	-55.74	-13	-42.74	-70.22	-63.00	1.12	10.53	Н	
Highest	3173	-50.98	-13	-37.98	-66.86	-59.24	1.30	11.72	Н	
	3967	-50.44	-13	-37.44	-69.01	-59.59	1.48	12.78	Н	
									Н	
									Н	
	1587	-55.44	-42.15	-13.29	-65.01	-60.82	0.90	8.43	V	
	2380	-56.51	-13	-43.51	-70.84	-63.77	1.12	10.53	V	
	3173	-54.32	-13	-41.32	-70.67	-62.58	1.30	11.72	V	
	3967	-53.00	-13	-40.00	-71.50	-62.15	1.48	12.78	V	
									V	
									V	

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

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LTE Band 14 / 10MHz / QPSK									
Channel	Frequency ( MHz )	ERP (dBm)	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
	1586	-55.17	-42.15	-13.02	-65.25	-60.55	0.90	8.43	Н
	2379	-55.02	-13	-42.02	-69.51	-62.28	1.12	10.53	Н
	3172	-50.79	-13	-37.79	-66.67	-59.05	1.30	11.71	Н
	3965	-50.36	-13	-37.36	-68.89	-59.51	1.48	12.78	Н
									Н
									Н
Middle									Н
Middle	1586	-57.41	-42.15	-15.26	-67.02	-62.79	0.90	8.43	V
	2379	-56.56	-13	-43.56	-70.9	-63.82	1.12	10.53	V
	3172	-54.73	-13	-41.73	-71.08	-62.99	1.30	11.71	V
	3965	-52.91	-13	-39.91	-71.4	-62.06	1.48	12.78	V
									V
									V
									V

Report No.: FG911635C

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

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