



# **FCC RADIO TEST REPORT**

FCC ID : IHDT56YJ2

**Equipment**: Mobile Cellular Phone

Brand Name : Motorola Model Name : XT2061-3

Applicant : Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800,

Chicago, IL 60654, United States

Manufacturer : Motorola Mobility, LLC

222 W Merchandise Mart Plaza, Suite 1800,

Chicago, IL 60654, United States

Standard : FCC 47 CFR Part 2, Part 27(D)

The product was received on Dec. 06, 2019 and testing was started from Jan. 28, 2020 and completed on Feb. 28, 2020. 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.

Lunis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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

TEL: 886-3-327-3456 Page Number : 1 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# **Table of Contents**

Report No.: FG9D0635-01E

His	tory o	of this test report	3
Sur	nmar	y of Test Result	4
1	Gene	ral Description	5
	1.1	Product Feature of Equipment Under Test	5
	1.2	Product Specification of Equipment Under Test	5
	1.3	Modification of EUT	6
	1.4	Emission Designator	6
	1.5	Testing Site	6
	1.6	Applied Standards	7
2	Test	Configuration of Equipment Under Test	8
	2.1	Test Mode	8
	2.2	Connection Diagram of Test System	9
	2.3	Support Unit used in test configuration and system	9
	2.4	Measurement Results Explanation Example	g
	2.5	Frequency List of Low/Middle/High Channels	10
3	Cond	lucted Test Items	11
	3.1	Measuring Instruments	11
	3.2	Conducted Output Power Measurement and EIRP Measurement	12
	3.3	Peak-to-Average Ratio	13
	3.4	EIRP Power Density	14
	3.5	Occupied Bandwidth	15
	3.6	Conducted Band Edge	16
	3.7	Conducted Spurious Emission	17
	3.8	Frequency Stability	18
4	Radia	ated Test Items	19
	4.1	Measuring Instruments	19
	4.2	Radiated Spurious Emission Measurement	21
5	List o	of Measuring Equipment	22
6		rtainty of Evaluation	24
		x A. Test Results of Conducted Test	
Apı	pendi	x B. Test Results of Radiated Test	

TEL: 886-3-327-3456 Page Number : 2 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

Report Version

: 01

Report Template No.: BU5-FGLTE27D Version 2.4

# History of this test report

Report No.: FG9D0635-01E

Report No.	Version	Description	Issued Date
FG9D0635-01E	01	Initial issue of report	Mar. 31, 2020

TEL: 886-3-327-3456 Page Number : 3 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# **Summary of Test Result**

Report No.: FG9D0635-01E

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power and Effective Isotropic Radiated Power	Reporting only	-
3.3	-	Peak-to-Average Ratio	Reporting only	-
3.4	§27.50 (a)(3)	EIRP Power Density	Pass	-
3.5	§2.1049	Occupied Bandwidth	Reporting only	-
3.6	§2.1051 §27.53 (a)(4)	Conducted Band Edge Measurement	Pass	-
3.7	§2.1051 §27.53 (a)(4)	Conducted Spurious Emission	Pass	-
3.8	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Pass	-
4.2	§2.1053 §27.53 (a)(4)	Radiated Spurious Emission	Pass	Under limit 15.28 dB at 6916.000 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.

Reviewed by: Wii Chang Report Producer: Ann Lee

TEL: 886-3-327-3456 Page Number : 4 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 1 General Description

# 1.1 Product Feature of Equipment Under Test

Product Feature								
Equipment	Mobile Cellular Phone							
Brand Name	Motorola							
Model Name	XT2061-3							
FCC ID	IHDT56YJ2							
IMEI Code	Conducted: IMEI: 359124100005409							
livier code	<b>Radiation:</b> IMEI: 359124100005367							
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/ GNSS/NFC/WPC WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 WLAN 11ax HE20/HE40/HE80 Bluetooth BR/EDR/LE							
HW Version	DVT2							
EUT Stage	Identical Prototype							

Report No.: FG9D0635-01E

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

Accessory List							
	Brand Name :	Motorola					
AC Adapter 1	Model Name:	SC-51 (SA18C30116)					
	Manufacturer:	Chenyang					
	Brand Name:	Motorola					
AC Adapter 2	Model Name:	SC-51 (SA18C62985)					
	Manufacturer:	Acbel					
Battery	Brand Name:	ATL					
Battery	Model Name:	LW50					
	Brand Name:	Motorola					
USB Cable 1	Model Name:	SC18C24367					
	Manufacturer:	Saibao					
	Brand Name:	Motorola					
USB Cable 2	Model Name:	SC18C24368					
	Manufacturer:	Luxshare					

# 1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard						
Tx Frequency	LTE Band 30 : 2307.5 MHz ~ 2312.5 MHz					
Rx Frequency	LTE Band 30 : 2352.5 MHz ~ 2357.5 MHz					
Bandwidth	5MHz / 10MHz					
Maximum Output Power to Antenna	22.73 dBm					
Antenna Type	Fixed Internal Antenna					
Antenna Gain	-5.0 dBi					
Type of Modulation	QPSK / 16QAM / 64QAM					

TEL: 886-3-327-3456 Page Number : 5 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 1.3 Modification of EUT

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

# 1.4 Emission Designator

Ľ	TE Band 30		QPSK			16QAM		64QAM			
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum EIRP(W)	
5	2307.5~2312.5	4M51G7D	-	0.0585	4M50W7D	-	0.0514	4M49W7D	-	0.0404	
10	2310.0	9M05G7D	0.0063	0.0593	9M01W7D	-	0.0507	9M01W7D	-	0.0394	

Report No.: FG9D0635-01E

# 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.						
Test Site No.	TH05-HY						
Test Engineer	Aking Chang						
Temperature	24~26 ℃						
Relative Humidity	54~58 %						

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	Chuan Chu				
Temperature	22.3~25.3 ℃				
Relative Humidity	55.7~61.9 %				

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

FCC Designation No.: TW1190 and TW0007

TEL: 886-3-327-3456 Page Number : 6 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 1.6 Applied Standards

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

Report No.: FG9D0635-01E

- + ANSI C63.26-2015
- 47 CFR Part 2, Part 27(D)
- ANSI / TIA-603-E
- FCC KDB 971168 Power Meas License Digital Systems D01 v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site 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.

TEL: 886-3-327-3456 Page Number : 7 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 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.

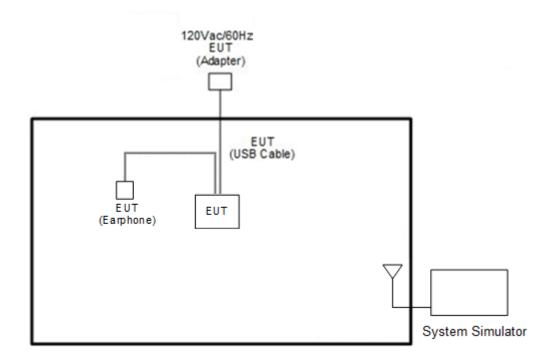
Report No.: FG9D0635-01E

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

		Bandwidth (MHz)					Modulation			RB#			Test Channel			
Test Items	Band	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	М	Н
Max. Output Power	30	-	-	v	v	-	•	v	v	v	v	v	v	v	v	v
Peak-to-Avera ge Ratio	30	-	-	V	٧	-	•	v	v	v	v		٧	v	v	v
E.I.R.P PSD	30	-	•	٧	٧	-	1	v	v	v	v	v	٧	٧	>	v
26dB and 99% Bandwidth	30	-	-	v	v	-	-	v	v	v			v	v	v	v
Conducted Band Edge	30	-	-	v	v	-	•	v	v	v	v		v	v		v
Conducted Spurious Emission	30	-	-	٧	٧	-	•	v	v	v	v			٧	٧	v
Frequency Stability	30	-	1	v	v	-	-	v	v	v			٧		v	
Radiated Spurious Emission	30	Worst Case							v	v	v					
Remark	<ol> <li>The</li> <li>The diffe report</li> </ol>	e mark "v" means that this configuration is chosen for testing e mark "-" means that this bandwidth is not supported. e device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under erent RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are norted.														
			ted tes	t cases	were	perform	ned witl	h Adapter	1 and USI	B Cable 1.						

TEL: 886-3-327-3456 Page Number : 8 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 2.2 Connection Diagram of Test System



Report No.: FG9D0635-01E

### 2.3 Support Unit used in test configuration and system

Iter	Equipment Trade Name		Model No.	FCC ID	Data Cable	Power Cord	
1.	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)

TEL: 886-3-327-3456 Page Number : 9 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 2.5 Frequency List of Low/Middle/High Channels

LTE Band 30 Channel and Frequency List									
BW [MHz] Channel/Frequency(MHz) Lowest Middle									
10	Channel	-	27710	-					
10	Frequency	-	2310	-					
-	Channel	27685	27710	27735					
5	Frequency	2307.5	2310	2312.5					

Report No.: FG9D0635-01E

TEL: 886-3-327-3456 Page Number : 10 of 24 FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

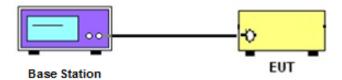
### 3 Conducted Test Items

# 3.1 Measuring Instruments

See list of measuring instruments of this test report.

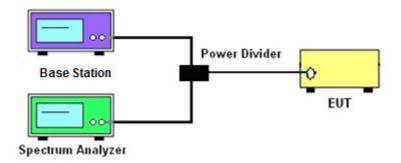
#### 3.1.1 Test Setup

#### 3.1.2 Conducted Output Power

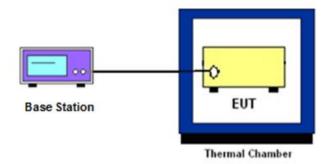


Report No.: FG9D0635-01E

# 3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, 26dB Bandwidth ,Band-Edge and Conducted Spurious Emission



### 3.1.4 Frequency Stability



#### 3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

TEL: 886-3-327-3456 Page Number : 11 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

## 3.2 Conducted Output Power Measurement and EIRP Measurement

# 3.2.1 Description of the Conducted Output Power Measurement and EIRP 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.

Report No.: FG9D0635-01E

According to KDB 412172 D01 Power Approach,

 $EIRP = P_T + G_T - L_C$ , 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 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.

TEL: 886-3-327-3456 Page Number : 12 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

### 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.

Report No.: FG9D0635-01E

#### 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.

TEL: 886-3-327-3456 Page Number : 13 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

## 3.4 EIRP Power Density

#### 3.4.1 Description of EIRP Power Density

For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

Report No.: FG9D0635-01E

#### 3.4.2 Test Procedures

The testing follows ANSI C63.26-2015 Section 5.2.4.5

- 1. Set instrument center frequency to OBW center frequency.
- 2. Set span to at least 1.5 times the OBW.
- 3. Set the RBW to the specified reference bandwidth (5MHz).
- 4. Set VBW ≥ 3 × RBW.
- 5. Detector = RMS (power averaging).
- 6. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span/RBW}$ .
- 7. Sweep time = auto couple.
- 8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level within the reference bandwidth (PSD).
- 10. Determine the EIRP by adding the effective antenna gain to the adjusted power level.

TEL: 886-3-327-3456 Page Number : 14 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

## 3.5 Occupied Bandwidth

#### 3.5.1 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.

Report No.: FG9D0635-01E

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.

#### 3.5.2 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.
- 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.

TEL: 886-3-327-3456 Page Number : 15 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

## 3.6 Conducted Band Edge

#### 3.6.1 Description of Conducted Band Edge Measurement

27.53 (a)(4)

For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than: 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB on all frequencies between 2328 and 2337 MHz.

Report No.: FG9D0635-01E

(ii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300 MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz.

(iii) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

#### 3.6.2 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.
- 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)

TEL: 886-3-327-3456 Page Number : 16 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

## 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 70 + 10 log (P) dB.

Report No.: FG9D0635-01E

It is measured by means of a calibrated spectrum analyzer and scanned from 9 kHz 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 system simulator via a power divider.
- 2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
- 3. The middle channel for the highest RF power within the transmitting frequency was measured.
- 4. The conducted spurious emission for the whole frequency range was taken.
- 5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz.
- 6. Set spectrum analyzer with RMS detector.
- 7. Taking the record of maximum spurious emission.
- 8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 9. The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)

TEL: 886-3-327-3456 Page Number : 17 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

## 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.

Report No.: FG9D0635-01E

#### 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 system simulator.
- 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 system simulator.
- 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.

TEL: 886-3-327-3456 Page Number : 18 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

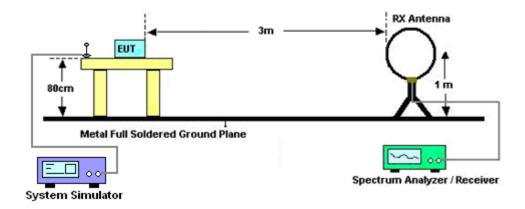
### 4 Radiated Test Items

# 4.1 Measuring Instruments

See list of measuring instruments of this test report.

### 4.1.1 Test Setup

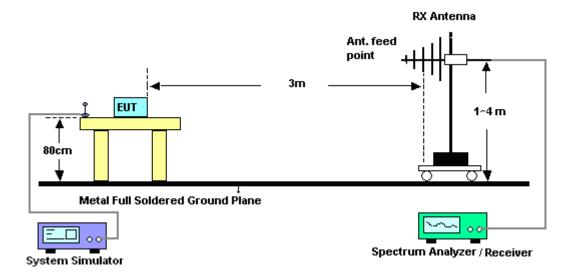
#### For radiated emissions below 30MHz



Report No.: FG9D0635-01E

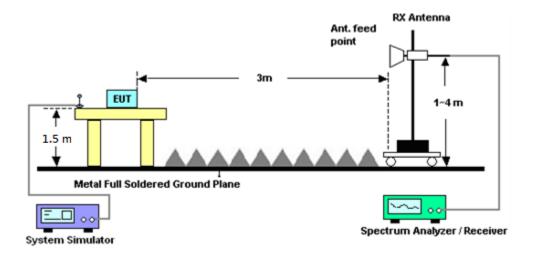
: 01

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



TEL: 886-3-327-3456 Page Number : 19 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

#### For radiated test above 1GHz



Report No.: FG9D0635-01E

#### 4.1.2 Test Result of Radiated Test

Please refer to Appendix B.

#### Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

TEL: 886-3-327-3456 Page Number : 20 of 24 FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

### 4.2 Radiated Spurious Emission Measurement

#### 4.2.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 70 + 10 log (P) dB.

Report No.: FG9D0635-01E

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 height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
- 2. The EUT was set 3 meters from the receiving antenna 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 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
- 5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
- 6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
- 7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
- 8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.

```
EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain ERP (dBm) = EIRP - 2.15
```

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

The limit line is derived from 70 + 10log(P)dB below the transmitter power P(Watts)

- = P(W) [70 + 10log(P)] (dB)
- = [30 + 10log(P)] (dBm) [70 + 10log(P)] (dB)
- = -40 dBm.

TEL: 886-3-327-3456 Page Number : 21 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Jan. 28, 2020~ Feb. 02, 2020	Dec. 25, 2020	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	41912 & 05	30MHz~1GHz	Feb. 12, 2019	Jan. 28, 2020~ Feb. 02, 2020	Feb. 11, 2020	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Nov. 14, 2019	Jan. 28, 2020~ Feb. 02, 2020	Nov. 13, 2020	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA917058 4	18GHz ~ 40GHz	Dec. 10, 2019	Jan. 28, 2020~ Feb. 02, 2020	Dec. 09, 2020	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 25, 2019	Jan. 28, 2020~ Feb. 02, 2020	Mar. 24, 2020	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA00101800- 30-10P	1601180002	1GHz~18GHz	Aug. 01, 2019	Jan. 28, 2020~ Feb. 02, 2020	Jul. 01, 2020	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Jan. 28, 2020~ Feb. 02, 2020	Dec. 12, 2020	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A02375	1GHz~26.5GHz	May 27, 2019	Jan. 28, 2020~ Feb. 02, 2020	May 26, 2020	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 19, 2019	Jan. 28, 2020~ Feb. 02, 2020	Mar. 18, 2020	Radiation (03CH12-HY)
Signal Generator	Rohde & Schwarz	SMB100A	101107	100kHz~40GHz	Aug. 27, 2019	Jan. 28, 2020~ Feb. 02, 2020	Aug. 26, 2020	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP161243	N/A	May 11, 2019	Jan. 28, 2020~ Feb. 02, 2020	May 10, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30M-18G	Mar. 13, 2019	Jan. 28, 2020~ Feb. 02, 2020	Mar. 12, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Feb. 26, 2019	Jan. 28, 2020~ Feb. 02, 2020	Feb. 25, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Feb. 26, 2019	Jan. 28, 2020~ Feb. 02, 2020	Feb. 25, 2020	Radiation (03CH12-HY)
Base Station	Anritsu	MT8821C	6201432816	GSM / GPRS /WCDMA / LTE FDD/TDD with 44) /LTE-3CC DLCA,2CC ULCA	May 05, 2019	Jan. 28, 2020~ Feb. 02, 2020	May 04, 2020	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Jan. 28, 2020~ Feb. 02, 2020	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jan. 28, 2020~ Feb. 02, 2020	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jan. 28, 2020~ Feb. 02, 2020	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Jan. 28, 2020~ Feb. 02, 2020	N/A	Radiation (03CH12-HY)

Report No.: FG9D0635-01E

TEL: 886-3-327-3456 Page Number : 22 of 24 FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Base Station(Measure)	Anritsu	MT8821C	620166475 5	GSM / GPRS /WCDMA / LTE FDD/TDD with 44) /LTE-3CC DLCA,2CC ULCA	Mar. 03, 2019	Feb. 03, 2020~ Feb. 28, 2020	Mar. 02, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	101749	10Hz~30GHz	Jan. 10, 2020	Feb. 03, 2020~ Feb. 28, 2020	Jan. 09, 2021	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40°C~90°C	Sep. 02, 2019	Feb. 03, 2020~ Feb. 28, 2020	Sep. 01, 2020	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 09, 2019	Feb. 03, 2020~ Feb. 28, 2020	Oct. 08, 2020	Conducted (TH05-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#A	1-18GHz	Jan. 13, 2020	Feb. 03, 2020~ Feb. 28, 2020	Jan. 12, 2021	Conducted (TH05-HY)

TEL: 886-3-327-3456 Page Number : 23 of 24 FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020

# 6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of	3.24
Confidence of 95% (U = 2Uc(y))	3.24

Report No.: FG9D0635-01E

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

Measuring Uncertainty for a Level of	2.62
Confidence of 95% (U = 2Uc(y))	3.62

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

Measuring Uncertainty for a Level of	4.06
Confidence of 95% (U = 2Uc(y))	4.00

TEL: 886-3-327-3456 Page Number : 24 of 24
FAX: 886-3-328-4978 Issued Date : Mar. 31, 2020



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

# Conducted Output Power(Average power)

		LTE	Band 30 Ma	ximum Average Po	wer [dBm]	
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0			22.73	
10	1	25			22.57	
10	1	49			22.62	
10	25	0	QPSK		21.77	
10	25	12			21.73	
10	25	25			21.72	
10	50	0			21.73	
10	1	0			21.99	
10	1	25			22.03	
10	1	49			22.05	
10	25	0	16-QAM	-	20.69	-
10	25	12			20.81	
10	25	25			20.81	
10	50	0			20.75	
10	1	0			20.83	
10	1	25			20.93	
10	1	49			20.96	
10	25	0	64-QAM		19.73	
10	25	12			19.87	
10	25	25			19.88	
10	50	0			19.78	
5	1	0		22.54	22.57	22.59
5	1	12		22.63	22.66	22.67
5	1	24		22.60	22.63	22.65
5	12	0	QPSK	21.68	21.69	21.73
5	12	7		21.82	21.81	21.85
5	12	13		21.79	21.82	21.86
5	25	0		21.77	21.78	21.73
5	1	0		21.94	21.91	21.92
5	1	12		21.98	22.02	22.05
5	1	24		22.07	22.07	22.11
5	12	0	16-QAM	20.74	20.75	20.76
5	12	7		20.87	20.85	20.87
5	12	13		20.84	20.83	20.88
5	25	0		20.82	20.80	20.76
5	1	0		20.79	20.84	20.86
5	1	12		20.96	20.87	20.91
5	1	24		21.06	20.98	20.96
5	12	0	64-QAM	19.75	19.76	19.81
5	12	7		19.88	19.88	19.91
5	12	13		19.88	19.89	19.93
5	25	0		19.81	19.81	19.79

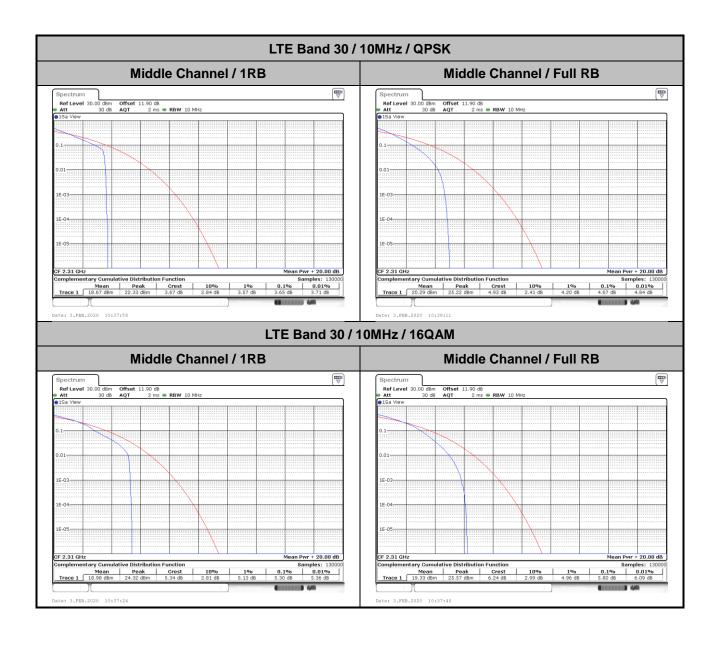


# LTE Band 30

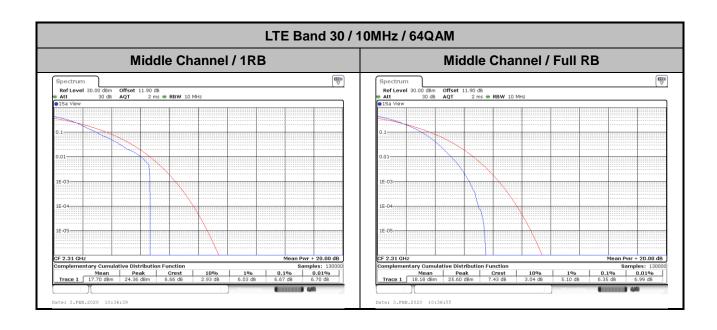
# Peak-to-Average Ratio

Mode						
Mod.	QP	SK	160	Limit: 13dB		
RB Size	1RB Full RB		1RB	Full RB	Result	
Lowest CH			-	-		
Middle CH	3.65	4.67	5.30	5.80	PASS	
Highest CH	-	-	-	-		
Mode		LTE Band	30 / 10MHz			
Mod.	64C	MAM			Limit: 13dB	
Mod.  RB Size	1RB	Full RB			Result	
			<u>-</u>	-		
RB Size	1RB	Full RB	- -	-		

TEL: 886-3-327-3456 Page Number : A30-1 of 26



TEL: 886-3-327-3456 Page Number : A30-2 of 26



TEL: 886-3-327-3456 Page Number : A30-3 of 26

# **EIRP Power Density**

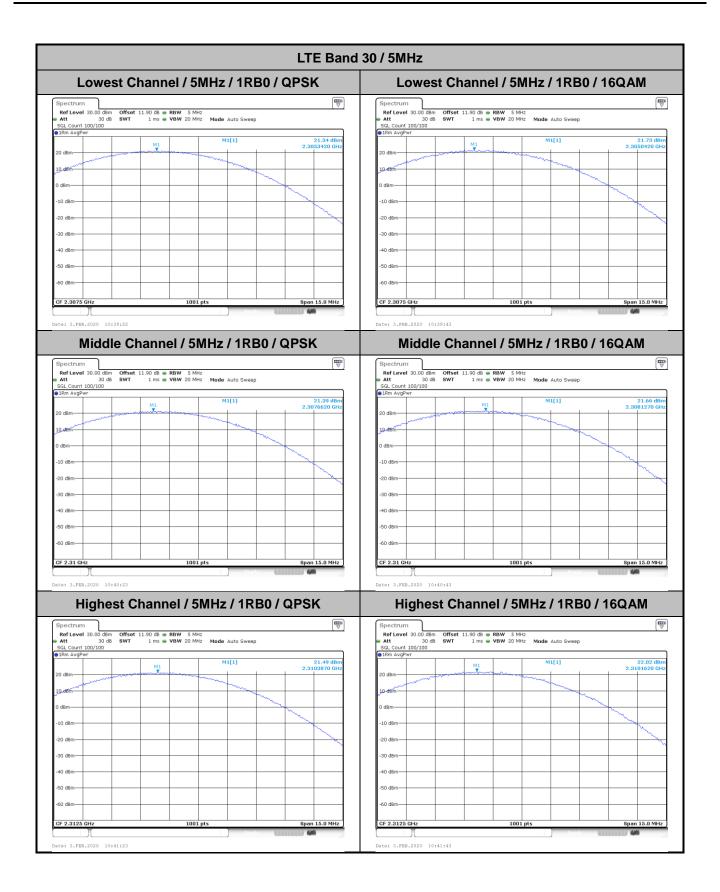
Mode		LTE Band 30 : Conducted Power Density (dBm/5MHz)											
BW	1.4MHz 3MHz			lHz	5M	Hz	10MHz		15MHz		20MHz		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	
Lowest CH	-	-	-	-	21.34	21.73	-	-	-	-	-	-	
Middle CH	-	-	-	-	21.39	21.66	21.11	21.62	-	-	-	-	
Highest CH	-	-	-	-	21.49	22.02	-	-	-	-	-	-	
Mode			LT	E Band	30 : Con	ducted I	Power D	ensity (c	IBm/5MH	Hz)			
BW	1.4	ИHz	3M	lHz	5MHz 10MHz			ИHz	15N	ЛHz	20MHz		
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM		
Lowest CH	-	-	-	-	20.51	-	-	-	-	-	-	-	
Middle CH	-	-	-	-	20.61	-	20.23	-	-	-	-	-	
Highest CH	-	-	-	-	20.14	-	-	-	-	-	-	-	

Report No.: FG9D0635-01B

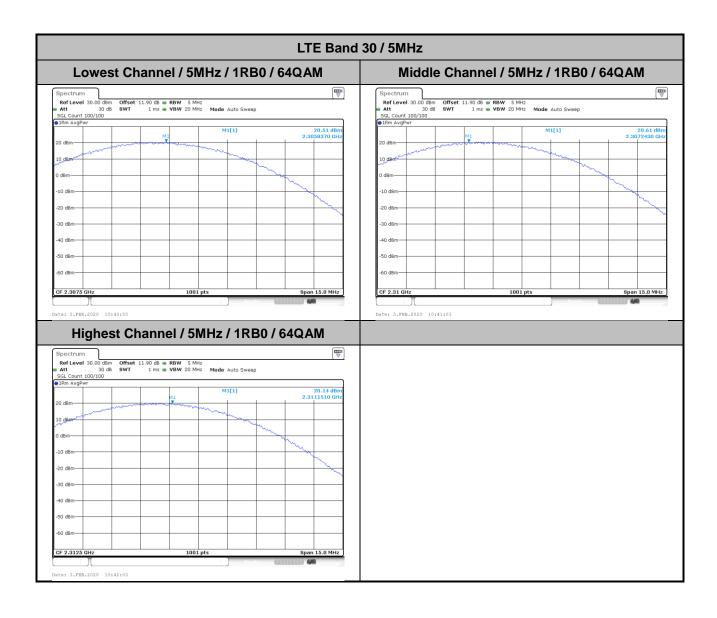
Mode				LTE Ba	nd 30 : E	IRP Pov	ver Dens	ity (dBn	n/5MHz)			
BW	1.4	ИHz	3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	16.34	16.73			1	-		-
Middle CH	-	-	-	-	16.39	16.66	16.11	16.62	-	-	-	-
Highest CH	-	-	-	-	16.49	17.02			-	-	-	-
Mode		LTE Band 30 : EIRP Power Density (dBm/5MHz)										
BW	1.4	ИHz	3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	15.51			-	1	-		-
Middle CH	-	-	-	-	15.61		15.23	-	-	-	-	-
Highest CH	-	-	-	-	15.14			-	-	-	-	-
Antenna Gain						-5.00	dBi					
Limit					250mW	/ 5MHz :	= 24dBm	/5MHz				
Result						Pa	ss					

TEL: 886-3-327-3456 Page Number : A30-4 of 26

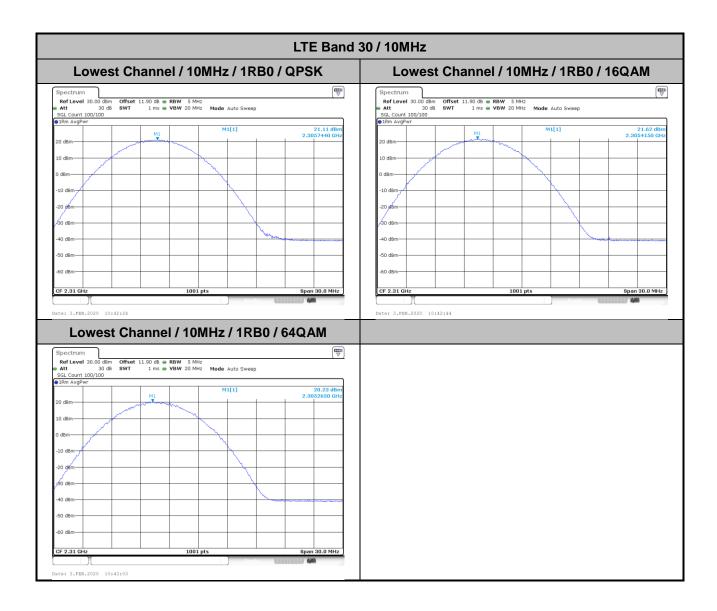
PORT Report No. : FG9D0635-01B



TEL: 886-3-327-3456 Page Number : A30-5 of 26



TEL: 886-3-327-3456 Page Number : A30-6 of 26



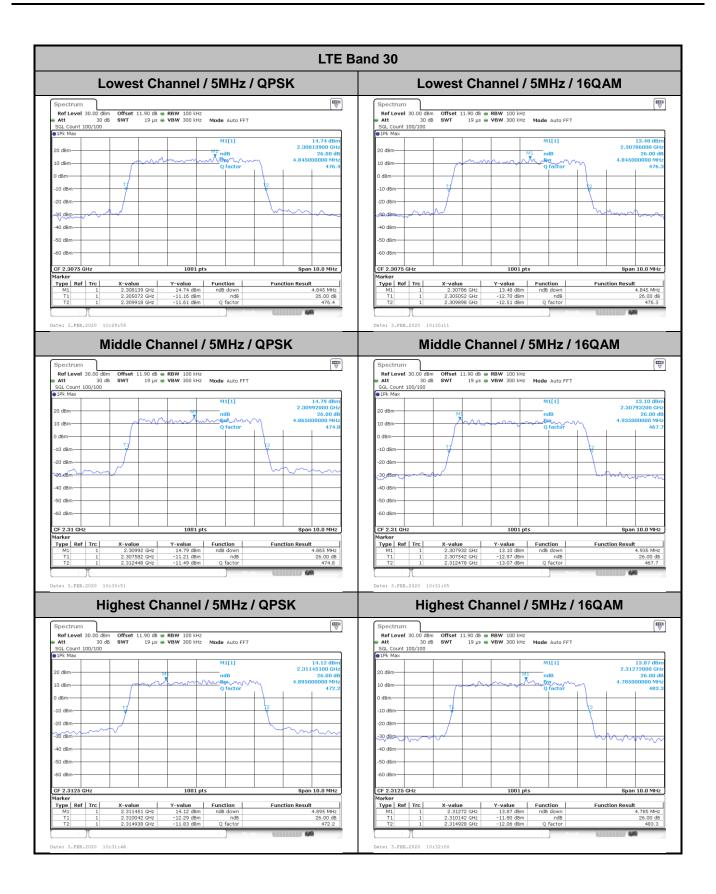
TEL: 886-3-327-3456 Page Number : A30-7 of 26

# 26dB Bandwidth

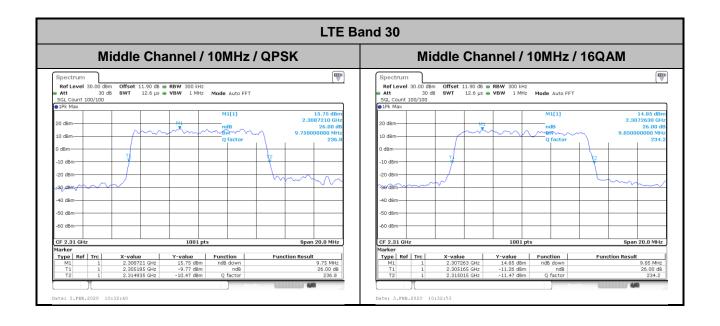
Mode		LTE Band 30 : 26dB BW(MHz)										
BW	1.4MHz 3MHz			5N	5MHz 10MHz			15N	ЛHz	20MHz		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.85	4.85	-	-	-	-	-	-
Middle CH	-	-	-	-	4.87	4.94	9.75	9.85	-	-	-	-
Highest CH	-	-	-	-	4.90	4.79	-	-	-	-	-	-
Mode					LTE Ba	and 30 :	26dB BV	V(MHz)				
BW	1.4	ИHz	3M	lHz	5MHz 10MHz			15N	ЛHz	20MHz		
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	4.86	-	-	-	-	-	-	-
Middle CH	-	-	-	-	4.89	-	9.95	-	-	-		-
Highest CH	-	-	-	-	4.86	-	-	-	-	-	-	-

Report No.: FG9D0635-01B

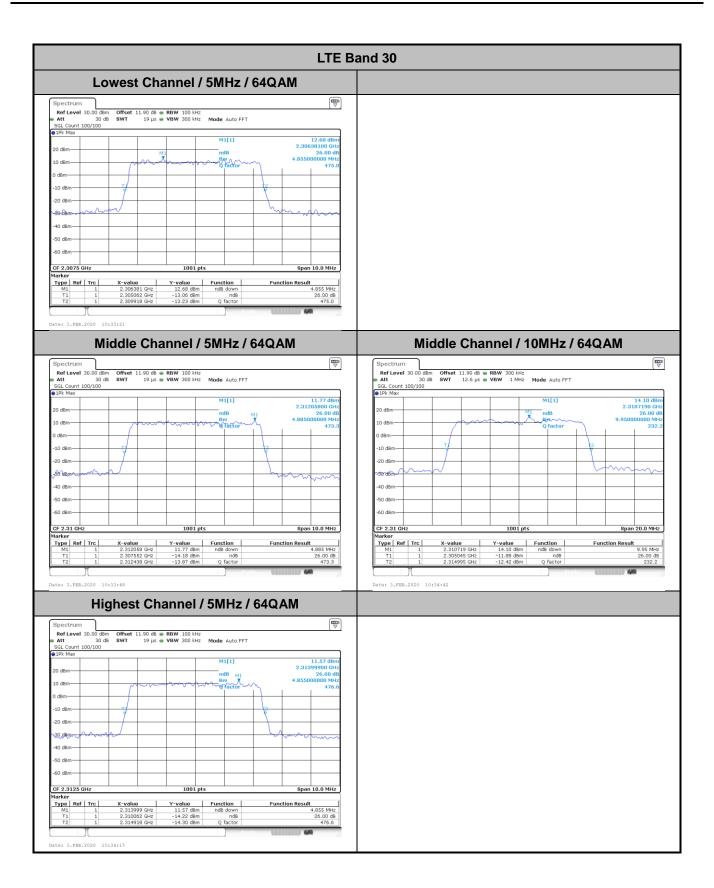
TEL: 886-3-327-3456 Page Number : A30-8 of 26



TEL: 886-3-327-3456 Page Number : A30-9 of 26



TEL: 886-3-327-3456 Page Number : A30-10 of 26



TEL: 886-3-327-3456 Page Number : A30-11 of 26

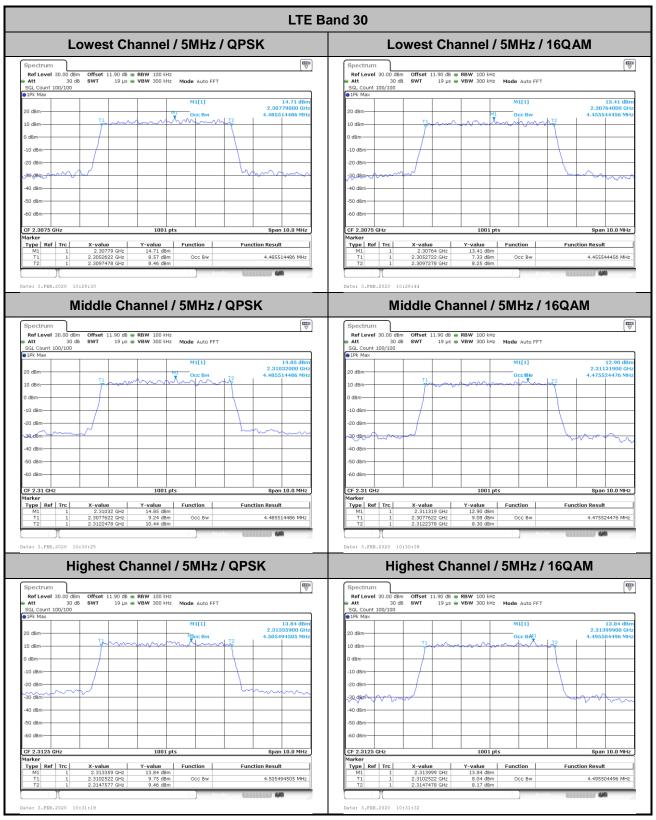
# **Occupied Bandwidth**

Mode		LTE Band 30 : 99%OBW(MHz)										
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.49	4.46	-	-	-	-	-	-
Middle CH	-	-	-	-	4.49	4.48	9.05	9.01	-	-	-	-
Highest CH	-	-	-	-	4.51	4.50	-	-	-	-	-	-
Mode					LTE Ba	and 26 :	99%OBV	V(MHz)				
BW	1.4	ИHz	3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	4.48	-	-	-	-	-	-	-
Middle CH	-	-	-	-	4.49	-	9.01	-	-	-	-	-
Highest CH	-	-	-	-	4.47	-	-	-	-	-	-	-

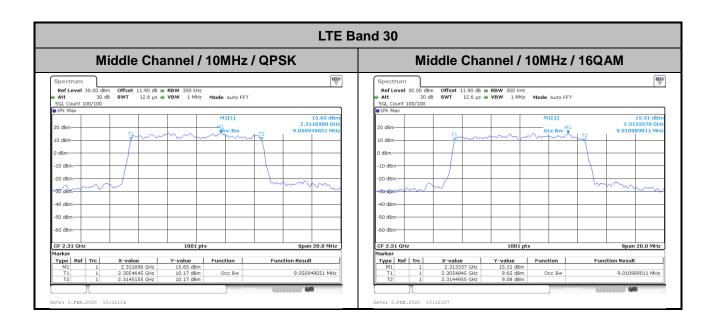
Report No.: FG9D0635-01B

TEL: 886-3-327-3456 Page Number : A30-12 of 26

Report No. : FG9D0635-01B

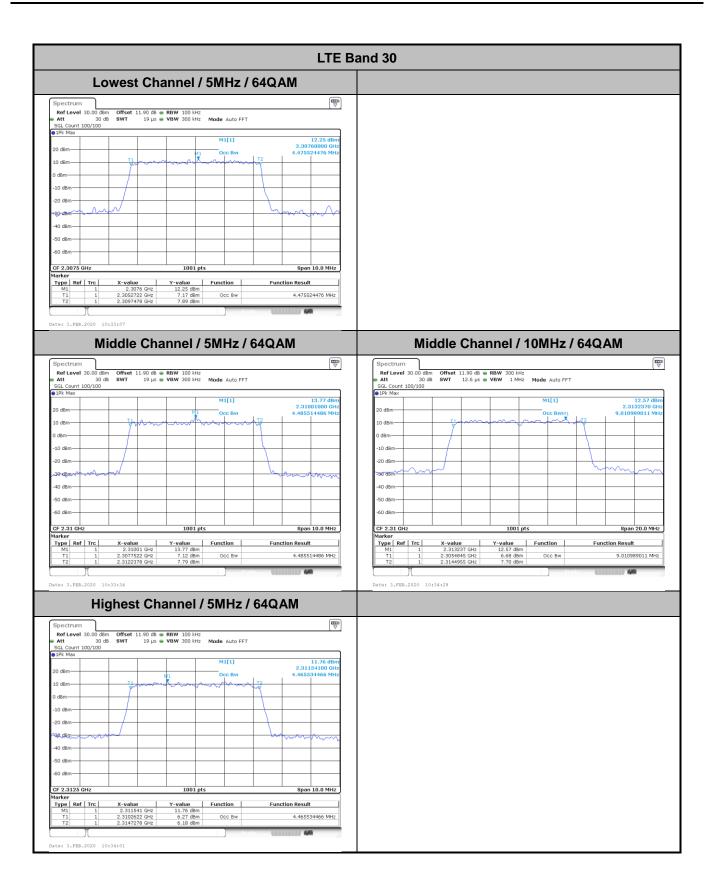


Report No.: FG9D0635-01B



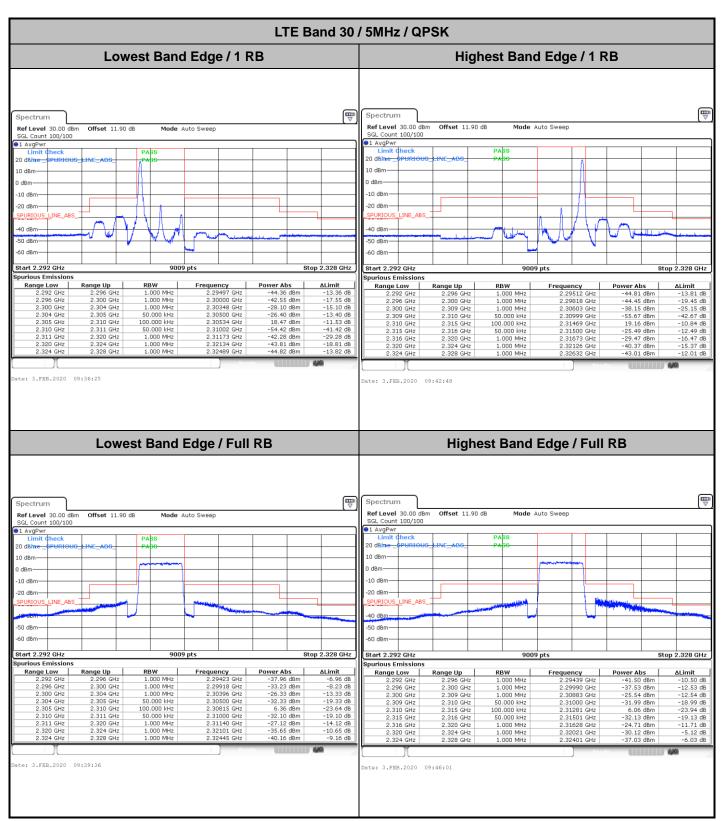
TEL: 886-3-327-3456 Page Number : A30-14 of 26

Report No.: FG9D0635-01B



TEL: 886-3-327-3456 Page Number : A30-15 of 26

## **Conducted Band Edge**



Report No. : FG9D0635-01B

TEL: 886-3-327-3456 Page Number : A30-16 of 26

Report No.: FG9D0635-01B LTE Band 30 / 5MHz / 16QAM Highest Band Edge / 1 RB Lowest Band Edge / 1RB Spectrum Spectrum Offset 11.90 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 11.90 dB Mode Auto Sweep SGL Count 100/100

1 AvgPwr

Limit check SGL Count 100/100 20 dBime 10 dBm 10 dBm dBm 0 dBm -10 dBm -10 dBm-20 dBm -20 dBm-INE\_ABS PURIOUS 40 dBm -60 dBm-Stop 2.328 GHz Start 2.292 GHz 9009 pts Start 2.292 GHz Stop 2.328 GHz urious Emissions
Range Low
2.292 GHz
2.296 GHz
2.300 GHz
2.304 GHz
2.305 GHz
2.311 GHz
2.311 GHz
2.320 GHz
2.320 GHz
2.320 GHz Range Low Range Up Power Abs 2.296 GHz 2.396 GHz 2.300 GHz 2.301 GHz 2.315 GHz 2.316 GHz 2.320 GHz 1.324 GHz 1.328 GHz 2.292 GHz 2.296 GHz 2.300 GHz 2.309 GHz 2.310 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz e: 3.FEB.2020 09:37:29 Date: 3.FEB.2020 09:43:52 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Spectrum Ref Level 30.00 Offset 11.90 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 11.90 dB Mode Auto Sweep SGL Count 100/100 1 AvgPwr PASS 20 dBime 20 dBine 10 dBm 10 dBmdBmn dBm 10 dBm -10 dBm -20 dBm-INE ABS PURIOUS INE\_ABS -40 dBm--50 dBm--50 dBm-60 dBm -60 dBm Start 2.292 GHz 9009 pts Stop 2.328 GHz Stop 2.328 GHz purious Emissions Power Abs
-37.75 dBm
-32.35 dBm
-26.33 dBm
-33.48 dBm
5.30 dBm
-33.35 dBm
-26.82 dBm
-37.05 dBm
-40.91 dBm Range Low
2.292 GHz
2.296 GHz
2.300 GHz
2.304 GHz
2.305 GHz
2.310 GHz
2.311 GHz
2.320 GHz
2.320 GHz Range Low
2.292 GHz
2.296 GHz
2.300 GHz
2.309 GHz
2.310 GHz
2.315 GHz
2.316 GHz
2.320 GHz 2.29583 GHz 2.29583 GHz 2.29995 GHz 2.30898 GHz 2.31000 GHz 2.31109 GHz ∆Limit RBW 1.000 MHz 1.000 MHz 1.000 MHz Range Up Frequency Range Up 2.296 GHz Power Abs -42.21 dBm -42.21 dBm -38.11 dBm -28.40 dBm -33.74 dBm 5.39 dBm -34.15 dBm -26.75 dBm -32.46 dBm -36.50 dBm -11.21 dB -13.11 dB -15.40 dB -20.74 dB -24.61 dB -21.15 dB -13.75 dB -7.46 dB -5.50 dB 2.296 GHz 2.300 GHz 2.309 GHz 2.309 GHz 2.310 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz 2.328 GHz 1.000 MHz 50.000 kHz 100.000 kHz 50.000 kHz 1.000 MHz 1.000 MHz 2.31500 GHz 2.31611 GHz 2.320 GHz ate: 3.FEB.2020 09:47:06

TEL: 886-3-327-3456 Page Number : A30-17 of 26

LTE Band 30 / 5MHz / 64QAM Highest Band Edge / 1 RB Lowest Band Edge / 1RB  $\nabla$ Spectrum Offset 11.90 dB Mode Auto Sweep Offset 11.90 dB Mode Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 1 AvgPw ●1 AvgPw 20 dBime 10 dBm 10 dBm-1 dBm -10 dBm -20 dBm-PURIOU INE ABS 40 dBm-40 dBm-50 dBm--50 dBm-60 dBm--60 dBm-Start 2.292 GHz Start 2.292 GHz 9009 pts Stop 2.328 GHz ious Emission: purious Emissions Power Abs
-44.65 dBm
-44.26 dBm
-41.19 dBm
-56.89 dBm
17.18 dBm
-27.57 dBm
-40.75 dBm
-41.50 dBm Power Abs
-44.55 dBm
-42.95 dBm
-30.46 dBm
-27.37 dBm
17.75 dBm
-55.74 dBm
-44.40 dBm
-44.46 dBm 2.296 GHz 2.300 GHz 2.304 GHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz Range Low 2.292 GH Frequency 2.29370 Range Low 2.292 GHz Range Up ΔLimit 13.55 dB -17.95 dB -17.46 dB -14.37 dB -12.25 dB -42.74 dB -29.77 dB -19.40 dB -13.46 dB ΔLimit
-13.65 dB
-19.26 dB
-28.19 dB
-43.89 dB
-12.82 dB
-14.57 dB
-18.51 dB
-15.75 dB
-10.50 dB 2.296 GHz 2.300 GHz 2.309 GHz 2.310 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz 2.328 GHz 2.296 GHz 2.300 GHz 2.309 GHz 2.310 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz ate: 3.FEB.2020 09:38:33 Date: 3.FEB.2020 09:44:57 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Spectrum Offset 11.90 dB Ref Level 30.00 dBm Mode Auto Sweep Ref Level 30.00 dBm Offset 11.90 dB Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit (1 1 AvgPwr on daine 10 dBmdBm -10 dBm--10 dBm--20 dBm--20 dBm--40 dBm--50 dBm -50 dBm-60 dBm-9009 pt Stop 2.328 GHz Start 2.292 GHz urious Emissions ourious Emissions Power Abs
-37.31 dBm
-32.09 dBm
-25.38 dBm
-33.81 dBm
3.98 dBm
-33.69 dBm
-26.05 dBm
-37.23 dBm
-41.93 dBm 2.292 GHz
2.296 GHz
2.296 GHz
2.300 GHz
2.309 GHz
2.310 GHz
2.315 GHz
2.315 GHz
2.324 GHz 2.296 GHz 2.300 GHz 2.304 GHz 1.000 MHz 1.000 MHz 1.000 MHz -6.31 dB -7.09 dB -12.38 dB -20.81 dB -26.02 dB -20.69 dB -13.05 dB -12.23 dB -10.93 dB 2.300 GHz 2.304 GHz 2.305 GHz 2.310 GHz 2.311 GHz 2.320 GHz 2.304 GHz 2.305 GHz 2.310 GHz 2.311 GHz 2.320 GHz 2.324 GHz 2.328 GHz 1.000 MHz 50.000 kHz 100.000 kHz 50.000 kHz 1.000 MHz 1.000 MHz 1.000 MHz 2.30383 GHz 2.30500 GHz 2.30898 GHz 2.31000 GHz 2.31100 GHz 2.32001 GHz 2.32451 GHz

Report No. : FG9D0635-01B

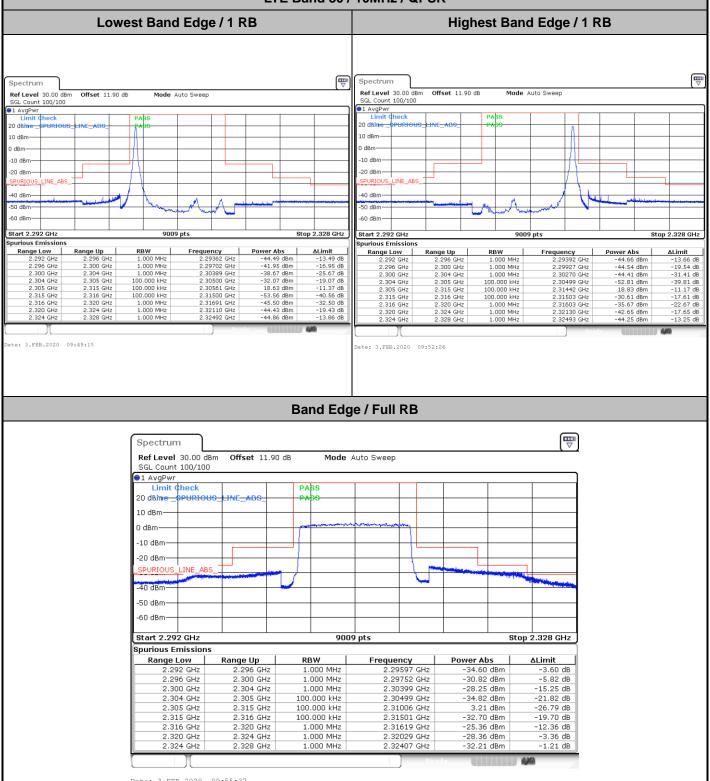
TEL: 886-3-327-3456 Page Number : A30-18 of 26

Date: 3.FEB.2020 09:48:10

FAX: 886-3-328-4978

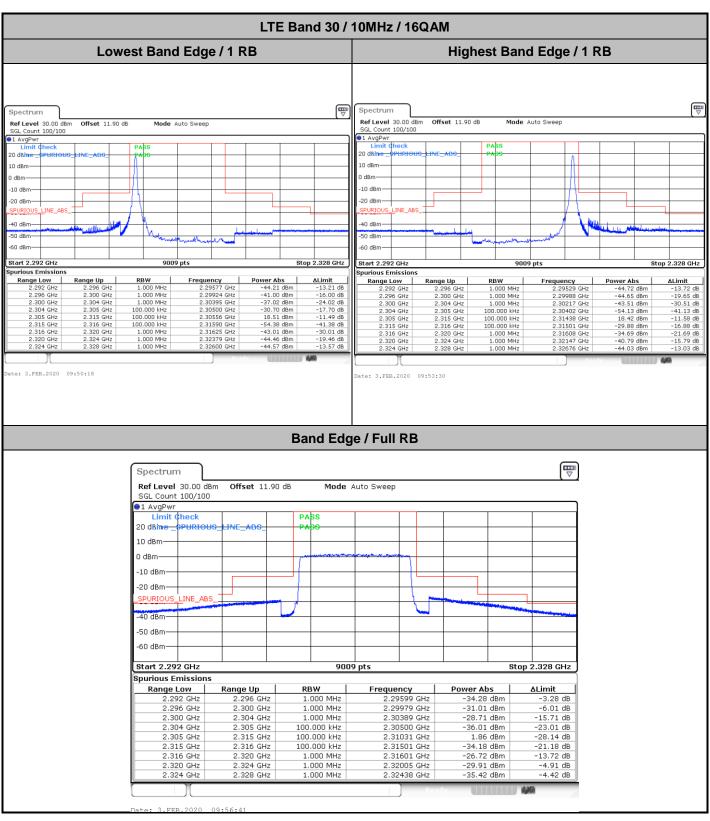
te: 3.FEB.2020 09:41:44

Report No.: FG9D0635-01B LTE Band 30 / 10MHz / QPSK Lowest Band Edge / 1 RB Highest Band Edge / 1 RB  $\nabla$ Spectrum Offset 11.90 dB Mode Auto Sweep Offset 11.90 dB Mode Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 ●1 AvgPw ●1 AvgPw 20 dBime 10 dBm 10 dBm-1 dBm -10 dBm -20 dBm 40 dBm-40 dBm-50 dBm -50 dBm-60 dBm--60 dBm-Start 2.292 GHz 9009 pt Stop 2.328 GHz Start 2.292 GHz ious Emission: purious Emissions Power Abs
-44.66 dBm
-44.54 dBm
-44.41 dBm
-52.81 dBm
18.83 dBm
-30.61 dBm
-35.67 dBm
-42.65 dBm
-44.25 dBm Power Abs
-44.49 dBm
-41.95 dBm
-38.67 dBm
-32.07 dBm
18.63 dBm
-53.56 dBm
-45.50 dBm
-44.43 dBm
-44.86 dBm Range Up
2.296 GHz
2.300 GHz
2.304 GHz
2.305 GHz
2.315 GHz
2.316 GHz
2.320 GHz
2.324 GHz
2.328 GHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 2.29392 GHz 2.29392 GHz 2.29927 GHz 2.30270 GHz 2.30499 GHz Range Low 2.292 GH Frequency ∆Limit Range Low 2.292 GHz Range Up ΔLimit 13.49 dB -16.95 dB -25.67 dB -19.07 dB -11.37 dB -40.56 dB -32.50 dB -19.43 dB -13.86 dB 2.292 GHz 2.296 GHz 2.300 GHz 2.304 GHz 2.305 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz 2.296 GHz 2.300 GHz 2.304 GHz 2.305 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz 2.328 GHz 100.000 kHz 100.000 kHz 100.000 kHz 2.30499 GHz 2.31442 GHz 2.31503 GHz 2.31603 GHz 2.32130 GHz 2.32493 GHz ate: 3.FEB.2020 09:49:15 Date: 3.FEB.2020 09:52:26 Band Edge / Full RB Spectrum Offset 11.90 dB Ref Level 30.00 dBm Mode Auto Sweep SGL Count 100/100 ∍1 AvgPwr Limit Check PASS 20 dBime PURIOUS 10 dBm 0 dBm -10 dBm -20 dBm-



TEL: 886-3-327-3456 : A30-19 of 26 Page Number

Report No. : FG9D0635-01B



TEL: 886-3-327-3456 Page Number : A30-20 of 26

Report No.: FG9D0635-01B LTE Band 30 / 10MHz / 64QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB  $\nabla$ Spectrum Offset 11.90 dB Mode Auto Sweep Offset 11.90 dB Mode Auto Sweep Ref Level 30.00 dBm SGL Count 100/100 SGL Count 100/100 ●1 AvgPw ●1 AvgPw 20 dBime 10 dBm 10 dBm-1 dBm -10 dBm -20 dBm INE\_ABS INE ABS 40 dBm-40 dBm--50 dBm--50 dBm-60 dBm--60 dBm-Start 2.292 GHz 9009 pts Stop 2.328 GHz Start 2.292 GHz Range Up ious Emission: purious Emissions Power Abs
-44.79 dBm
-42.83 dBm
-37.57 dBm
-33.91 dBm
17.57 dBm
-54.83 dBm
-45.20 dBm
-44.80 dBm
-44.89 dBm Power Abs
-44.72 dBm
-44.55 dBm
-44.94 dBm
-54.12 dBm
15.45 dBm
-33.68 dBm
-40.11 dBm
-42.86 dBm
-44.57 dBm Range Up
2.296 GHz
2.300 GHz
2.304 GHz
2.305 GHz
2.315 GHz
2.316 GHz
2.320 GHz
2.324 GHz
2.328 GHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 2.29284 GHz 2.29984 GHz 2.29994 GHz 2.30397 GHz 2.30401 GHz Range Low 2.292 GH Frequency 2.29510 ∆Limit Range Low 2.292 GHz ΔLimit ΔLimit
-13.79 dB
-17.83 dB
-24.57 dB
-20.91 dB
-12.43 dB
-41.83 dB
-32.20 dB
-19.80 dB
-13.89 dB ΔLimit
-13.72 dB
-19.55 dB
-31.94 dB
-41.12 dB
-14.55 dB
-20.68 dB
-27.11 dB
-17.86 dB
-13.57 dB 2.292 GHz 2.296 GHz 2.300 GHz 2.304 GHz 2.305 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz 2.296 GHz 2.300 GHz 2.304 GHz 2.305 GHz 2.315 GHz 2.316 GHz 2.320 GHz 2.324 GHz 2.328 GHz 100.000 kHz 100.000 kHz 100.000 kHz 2.30401 GHz 2.31441 GHz 2.31501 GHz 2.31607 GHz 2.32077 GHz 2.32594 GHz ate: 3.FEB.2020 09:51:22 Date: 3.FEB.2020 09:54:33 Band Edge / Full RB Spectrum Offset 11.90 dB Ref Level 30.00 dBm Mode Auto Sweep SGL Count 100/100 ∍1 AvgPwr Limit Check PASS 20 dBime PURIOUS, 10 dBm 0 dBm -10 dBm -20 dBm-SPURIOUS LINE ABS -40 dBm -50 dBm -60 dBm-9009 pts Stop 2.328 GHz Start 2.292 GHz Spurious Emissions Range Low 2.292 GHz Range Up 2.296 GHz RBW Frequency Power Abs -34.61 dBm ∆Limit -3.61 dB -5.54 dB 1.000 MHz 2.296 GHz 2.300 GHz 1.000 MHz 2.29992 GHz -30.54 dBm -28.42 dBm -15.42 dB 1.000 MHz 30376 GHz

TEL: 886-3-327-3456 : A30-21 of 26 Page Number FAX: 886-3-328-4978

100.000 kHz

100.000 kHz

100.000 kHz

1.000 MHz

1.000 MHz 1.000 MHz

2.30500 GHz 2.30915 GHz

2.31633 GHz

2.32011 GHz

2.32406 GHz

.31500 GHz

-37.15 dBm

-35.21 dBm

-26.73 dBm

-34.54 dBm

0.84 dBm

-24.15 dB

-29.16 dB

-22.21 dB -13.73 dB

-4.40 dB -3.54 dB

304 GHz

316 GHz

2.305 GHz

2.315 GHz

2.320 GHz

2.324 GHz 2.328 GHz

2.300 GHz

2.304 GHz

2.305 GHz

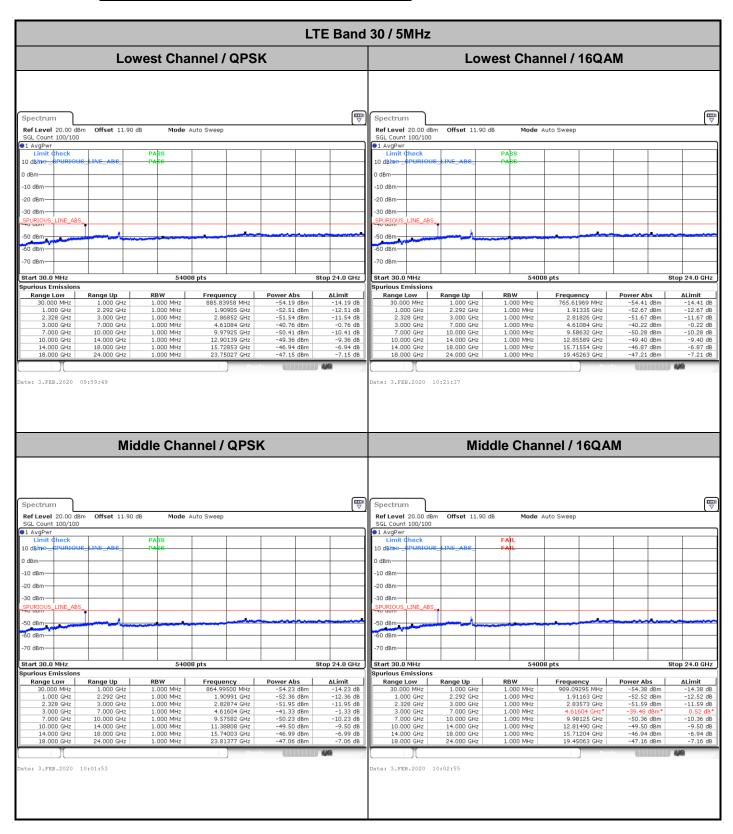
2.315 GHz

2.316 GHz

2.320 GHz

2.324 GHz

# **Conducted Spurious Emission**



Report No. : FG9D0635-01B

TEL: 886-3-327-3456 Page Number : A30-22 of 26

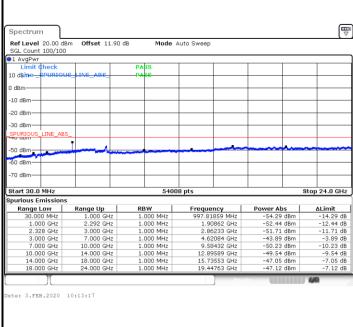
Report No. : FG9D0635-01B LTE Band 30 / 5MHz **Highest Channel / 16QAM Highest Channel / QPSK** Spectrum Ref Level 20.00 dBm SGL Count 100/100 Ref Level 20.00 dBm SGL Count 100/100 Offset 11.90 dB Mode Auto Sweep Offset 11.90 dB Mode Auto Sweep 1 AvgPwr 1 AvgPw 10 dBine 10 dBine 1 dBm 1 dBn -20 dBm--20 dBm 30 dBm -30 dBm-\_LINE\_ABS Stop 24.0 GHz Start 30.0 MHz 54008 pts Stop 24.0 GHz Start 30.0 MHz 54008 pts Start 30.0 MHz
Spurious Emissions
Range Low
30.000 MHz
1.000 GHz
2.328 GHz
3.000 GHz
7.000 GHz
10.000 GHz
14.000 GHz 928.49825 MHz 1.91249 GHz 2.85320 GHz 4.65124 GHz 9.99425 GHz 13.99325 GHz 16.65042 GHz 19.46563 GHz Power Abs
-54.46 dBm
-52.62 dBm
-51.92 dBm
-40.41 dBm
-50.40 dBm
-46.99 dBm
-47.21 dBm Power Abs
-54.36 dBm
-52.49 dBm
-51.93 dBm
-40.19 dBm
-50.25 dBm
-49.37 dBm
-47.14 dBm
-46.96 dBm Frequency 895.04998 MHz 1.91852 GHz 2.85615 GHz 4.62084 GHz 9.96926 GHz 11.34508 GHz 15.72503 GHz 19.45313 GHz Range Low Range Up Range Up ate: 3.FEB.2020 10:10:11 te: 3.FEB.2020 10:09:09 LTE Band 30 / 10MHz Middle Channel / QPSK Middle Channel / 16QAM Spectrum Spectrum Ref Level 20.00 dBm Offset 11.90 dB Mode Auto Sweep Ref Level 20.00 dBm Offset 11.90 dB Mode Auto Sweep SGL Count 100/100 1 AvgPwr Limit Check ∍1 AvgPv 10 dBine 10 dBine 1 dBm 1 dBm 10 dBm -10 dBm -20 dBm -20 dBm 30 dBm--30 dBm-60 dBm -70 dBm 54008 pts Stop 24.0 GHz 54008 pts Stop 24.0 GHz Start 30.0 MHz Start 30.0 MHz Spurious Emissions rious Emissions Range Low 30.000 MHz Range Low 30.000 MHz

TEL: 886-3-327-3456 Page Number : A30-23 of 26

Report No. : FG9D0635-01B LTE Band 30 / 5MHz **Lowest Channel / 64QAM** Middle Channel / 64QAM Spectrum Spectrum Offset 11.90 dB Offset 11.90 dB Mode Auto Sweep Ref Level 20.00 dBm Mode Auto Sweep Ref Level 20.00 dBm SGL Coc.

1 AvgPwr

imit check SGL Count 100/100 SGL Count 100/100 ●1 AvgPwr Limit d 10 dBine dBm dBm -10 dBm -10 dBm 20 dBm -20 dBm LINE\_ABS 70 dBm--70 dBm Start 30.0 MHz Stop 24.0 GHz Start 30.0 MHz 54008 pt rious Emissio Spurious Emission: Power Abs
-54.35 dBm
-52.56 dBm
-51.88 dBm
-42.61 dBm
-50.17 dBm
-49.56 dBm
-47.05 dBm
-47.10 dBm ΔLimit
-14.35 dB
-12.56 dB
-11.88 dB
-2.61 dB
-10.17 dB
-9.56 dB
-7.05 dB
-7.10 dB 897.47376 MHz 1.91465 GHz 2.83156 GHz 4.61604 GHz Range Low 30.000 MHz Range Up RBW Frequency 886.32434 MHz Range Low 30.000 MHz Range Up RBW Power Abs ∆Limit 1.000 MHz -14.11 dB -12.63 dB -11.76 dB -2.07 dB -10.50 dB -9.27 dB -6.90 dB -7.04 dB 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz -54.11 dBm -52.63 dBm -51.76 dBm -42.07 dBm -50.50 dBm -49.27 dBm 6.32434 MHz 1.90517 GHz 2.82310 GHz 4.61084 GHz 1.000 GHz 2.292 GHz 2.292 GHz 3.000 GHz 1.000 GHz 1.000 GHz 2.328 GHz 3.000 GHz 7.000 GHz 10.000 GHz 14.000 GHz 18.000 GHz .328 GHz 3.000 GHz 9.57282 GHz 13.96375 GHz 15.72603 GHz 23.78777 GHz 9.56482 GHz 12.85789 GHz 15.72303 GHz 18.64620 GHz 10.000 GHz 14.000 GHz 7.000 GHz 10.000 GHz 10.000 GHz 14.000 GHz .000 MHz 14.000 GHz 18.000 GHz 18.000 GHz 24.000 GHz 18.000 GHz 24.000 GHz 1.000 MHz 1.000 MHz ate: 3.FEB.2020 10:11:14 ate: 3.FEB.2020 10:12:16 **Highest Channel / 64QAM** 



Page Number : A30-24 of 26

LTE Band 30 / 10MHz Middle Channel / 64QAM Spectrum Ref Level 20.00 dBm Offset 11.90 dB SGL Count 100/100 Mode Auto Sweep ●1 AvgPwr Limit Check 0 dBm -10 dBm -20 dBm LINE\_ABS 70 dBm-Start 30.0 MHz Stop 24.0 GHz rious Emission Range Low 30.000 MHz 1.000 GHz 2.328 GHz 3.000 GHz 7.000 GHz 10.000 GHz 14.000 GHz 18.000 GHz 18.000 GHz RBW 1.000 MHz Frequency 870.81209 MHz 1.91508 GHz 2.83277 GHz 4.61124 GHz 9.59932 GHz 13.97475 GHz 15.72853 GHz 20.81952 GHz Power Abs
-53.84 dBm
-52.63 dBm
-51.65 dBm
-42.59 dBm
-50.24 dBm
-49.48 dBm
-47.25 dBm
-47.19 dBm ΔLimit
-13.84 dB
-12.63 dB
-11.65 dB
-2.59 dB
-10.24 dB
-9.48 dB
-7.25 dB
-7.19 dB Range Up
1.000 GHz
2.292 GHz
3.000 GHz
7.000 GHz
10.000 GHz
14.000 GHz
18.000 GHz
24.000 GHz

Report No.: FG9D0635-01B

TEL: 886-3-327-3456 Page Number : A30-25 of 26

FAX: 886-3-328-4978

ate: 3.FEB.2020 10:14:20

## Frequency Stability

Test (	Conditions	LTE Band 30 (QPSK) / Middle Channel	Limit
T	Valtana	BW 10MHz	Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0024	
40	Normal Voltage	0.0063	
30	Normal Voltage	0.0005	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0000	
0	Normal Voltage	0.0003	
-10	Normal Voltage	0.0021	PASS
-20	Normal Voltage	0.0026	
-30	Normal Voltage	0.0035	
20	Maximum Voltage	0.0048	]
20	Normal Voltage	0.0000	
20	Battery End Point	0.0023	

Report No.: FG9D0635-01B

#### Note:

- 1. Normal Voltage =3.9 V.; Battery End Point (BEP) =3.4 V.; Maximum Voltage =4.35 V.
- **2.** The frequency fundamental emissions stay within the authorized frequency block.

TEL: 886-3-327-3456 Page Number: A30-26 of 26

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

### EIRP

<Reporting Only>

LTE Band 30 / 5MHz (Average) (GT - LC = -5 dB)										
Channel	Mode	RB		Cond	lucted	EIRP				
Chamilei	Wode	Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)			
Lowest		1	12	22.63	0.1832	17.63	0.0579			
Middle	QPSK	1	12	22.66	0.1845	17.66	0.0583			
Highest		1	12	22.67	0.1849	17.67	0.0585			
Lowest		1	24	22.07	0.1611	17.07	0.0509			
Middle	16QAM	1	24	22.07	0.1611	17.07	0.0509			
Highest		1	24	22.11	0.1626	17.11	0.0514			
Lowest		1	24	21.06	0.1276	16.06	0.0404			
Middle	64QAM	1	24	20.98	0.1253	15.98	0.0396			
Highest		1	24	20.96	0.1247	15.96	0.0394			

	LTE Band 30 / 10MHz (Average) (GT - LC = -5 dB)										
Channel	Mode	RB		Cond	ucted	EIRP					
Chainlei	Wode	Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)				
Lowest	QPSK	1	-	-	-	-	-				
Middle		1	0	22.73	0.1875	17.73	0.0593				
Highest		1	-	-	-	-	-				
Lowest		1	-	-	-	-	-				
Middle	16QAM	1	49	22.05	0.1603	17.05	0.0507				
Highest		-	-	-	-	-	-				
Lowest		-	-	-	-	-	-				
Middle	64QAM	1	49	20.96	0.1247	15.96	0.0394				
Highest		-	-	-	-	-	-				

# Radiated Spurious Emission

### LTE Band 30

Report No. : FG9D0635-01E

			L	TE Band 30	/ 5MHz / QP	SK			
Channel	Frequency (MHz)	EIRP (dBm)	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
	4610	-59.67	-40	-19.67	-51.28	-70.89	1.45	12.68	Н
	6916	-55.28	-40	-15.28	-51.45	-65.57	1.73	12.02	Н
	9221	-60.40	-40	-20.40	-58.49	-70.02	2.16	11.78	Н
									Н
									Н
Lowest									Н
Lowest	4610	-60.45	-40	-20.45	-51.28	-71.67	1.45	12.68	V
	6916	-59.93	-40	-19.93	-55.66	-70.22	1.73	12.02	V
	9221	-59.96	-40	-19.96	-59.04	-69.58	2.16	11.78	V
									V
									V
									V
	4615	-64.71	-40	-24.71	-52.6	-75.93	1.46	12.68	Н
	6923	-60.21	-40	-20.21	-56.41	-70.49	1.73	12.01	Н
	9231	-60.49	-40	-20.49	-58.57	-70.10	2.16	11.77	Н
									Н
									Н
Middle									Н
ivildule	4615	-65.20	-40	-25.20	-56.04	-76.42	1.46	12.68	V
	6923	-60.55	-40	-20.55	-56.3	-70.83	1.73	12.01	V
	9231	-59.75	-40	-19.75	-58.84	-69.36	2.16	11.77	V
									V
									V
									V

TEL: 886-3-327-3456 Page Number: B2-1 1 of 3

	4620	-63.09	-40	-23.09	-54.72	-74.31	1.46	12.68	Н
	6931	-59.22	-40	-19.22	-55.46	-69.49	1.73	12.00	Н
	9241	-61.32	-40	-21.32	-59.39	-70.92	2.16	11.76	Н
									Н
									Н
									Н
Llighoot									Н
Highest	4620	-62.85	-40	-22.85	-53.71	-74.07	1.46	12.68	V
	6931	-60.26	-40	-20.26	-56.04	-70.53	1.73	12.00	V
	9241	-60.23	-40	-20.23	-59.33	-69.83	2.16	11.76	V
									V
									V
									V
									V

Report No.: FG9D0635-01E

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

TEL: 886-3-327-3456 Page Number: B2-1 2 of 3

			Ľ	TE Band 30	/ 10MHz / QF	PSK			
Channel	Frequency ( MHz )	EIRP (dBm)	Limit ( dBm )	Over Limit ( dB )	SPA Reading (dBm)	S.G. Power ( dBm )	TX Cable loss ( dB )	TX Antenna Gain (dBi)	Polarization (H/V)
	4611	-64.83	-40	-24.83	-56.44	-76.05	1.45	12.68	Н
	6916	-60.31	-40	-20.31	-56.48	-70.60	1.73	12.02	Н
	9222	-60.84	-40	-20.84	-58.93	-70.46	2.16	11.78	Н
									Н
									Н
									Н
Middle									Н
Middle	4611	-65.08	-40	-25.08	-55.91	-76.30	1.45	12.68	V
	6916	-60.14	-40	-20.14	-55.87	-70.43	1.73	12.02	V
	9222	-59.92	-40	-19.92	-59	-69.54	2.16	11.78	V
									V
									V
									V
									V

Report No.: FG9D0635-01E

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



TEL: 886-3-327-3456 Page Number : B2-1 3 of 3 FAX: 886-3-328-4978