

Report No.: FG022521-02D



## FCC RADIO TEST REPORT

FCC ID : A4RG025E

Equipment : Phone Model Name : G025E

Applicant : Google LLC

1600 Amphitheatre Parkway,

Mountain View, California, 94043 USA

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

The product was received on Apr. 30, 2020 and testing was started from May 13, 2020 and completed on Jun. 19, 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 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.

Louis 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.)

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## History of this test report

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Report No.	Version	Description	Issued Date
FG022521-02D	01	Initial issue of report	Jun. 26, 2020

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## **Summary of Test Result**

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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 3.18 dB at 6936.000 MHz for Primary Antenna Under limit 6.12 dB at 6930.000 MHz for ASDIV Antenna		

#### **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: Tina Chuang** 

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## 1 General Description

## 1.1 Product Feature of Equipment Under Test

Product Feature						
Equipment	Phone					
Model Name	G025E					
FCC ID	A4RG025E					
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/LTE/5G NR/ NFC/GNSS WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE					

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

EUT Information List							
S/N	Performed Test Item						
04211FQCB00048	Conducted Measurement EIRP						
04241FQCB00320	Radiated Spurious Emission						

## 1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard						
Tx Frequency	2307.5 MHz ~ 2312.5 MHz					
Rx Frequency	2352.5 MHz ~ 2357.5 MHz					
Bandwidth	5MHz / 10MHz					
Maximum Output Power to Antenna	<primary antenna="">: 22.93 dBm</primary>					
Maximum Output Fower to Antenna	<asdiv antenna="">: 22.65 dBm</asdiv>					
Antenna Type	<primary antenna="">: Monopole Antenna type</primary>					
Antenna Type	<a>ASDIV Antenna&gt;: PIFA Antenna type</a>					
Type of Modulation	QPSK / 16QAM / 64QAM					

#### <Primary Antenna>

Radio Tech	Band Number	Antenna name	Gain
LTE	B30	Ant 2	-1

#### <ASDIV Antenna>

Radio Tech	Band Number	Antenna name	Gain
LTE	B30	Ant 0	-0.5

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## 1.3 Modification of EUT

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

## 1.4 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	Luffy Lin						
Temperature	22~24°C						
Relative Humidity	51~55%						

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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.	03CH13-HY		
Test Engineer	Daniel Lee, Jacky Hung, Wilson Wu		
Temperature	20~25°C		
Relative Humidity	50~60%		

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

FCC Designation No. TW1190 and TW0007

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## 1.5 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
- FCC 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.
- 3. The TAF code is not including all the FCC KDB listed without accreditation.

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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.

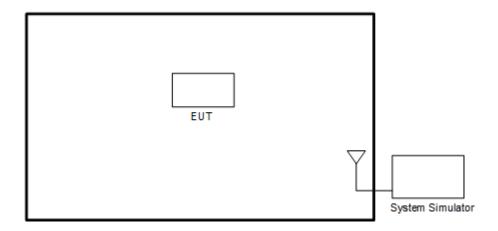
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For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z and Accessory. The worst cases (Z Plane) were recorded in this report.

			Ва	andwid	lth (MF	łz)		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	-	-	٧	v	v	٧	v	v	٧	v	v
Peak-to-Avera ge Ratio	30		-	v	v	-	-	٧	v	v	٧		V	٧	v	v
E.I.R.P PSD	30	-	-	v	v	-	-	<b>&gt;</b>	v	v	>	v	٧	>	v	v
26dB and 99% Bandwidth	30	-	-	v	v	-	-	٧	v	v			v	v	v	v
Conducted Band Edge	30	-	-	v	v	-	-	V	v	v	٧		v	v		v
Conducted Spurious Emission	30	-	-	v	v	-		v	v	v	v			v	v	v
Frequency Stability	30	•		v	v	-	-	٧	v	v			V		v	
Radiated Spurious Emission	30		-				٧	Vorst Cas	e			-		٧	v	v
Remark	<ol> <li>The</li> <li>The difference</li> </ol>	The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.														
Remark	differ repo	rent RB rted.	size/o	ffset an	nd mod	ulations	s in exp	oloratory to	est. Subse	•	nly the					••

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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

Iten	Equipment	uipment Trade Name Mod		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)

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

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

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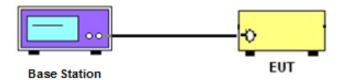
## 3 Conducted Test Items

## 3.1 Measuring Instruments

See list of measuring instruments of this test report.

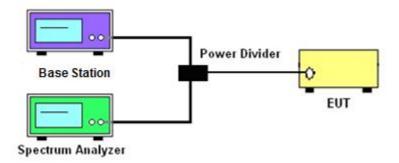
### 3.1.1 Test Setup

### 3.1.2 Conducted Output Power

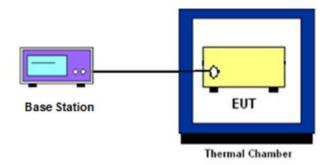


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# 3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, 26dB Bandwidth ,Band-Edge and Conducted Spurious Emission



### 3.1.4 Frequency Stability



### 3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

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## 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.

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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.

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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 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.

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#### 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.
- 9. 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.

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## 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.

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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.

#### 3.5.2 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.

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## 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.

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(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)

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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 70 + 10 log (P) dB.

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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)

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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 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.

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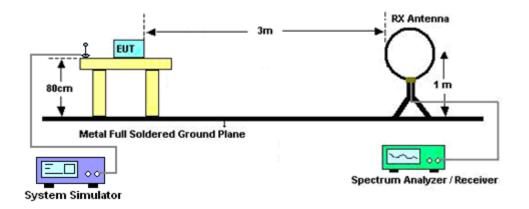
## 4 Radiated Test Items

## 4.1 Measuring Instruments

See list of measuring instruments of this test report.

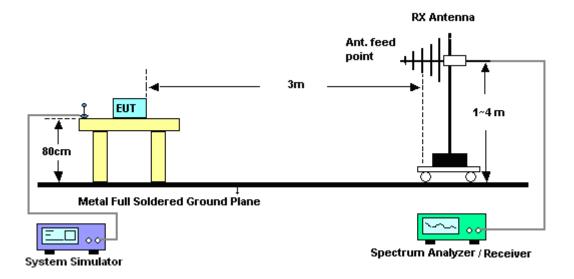
## 4.1.1 Test Setup

#### For radiated emissions below 30MHz



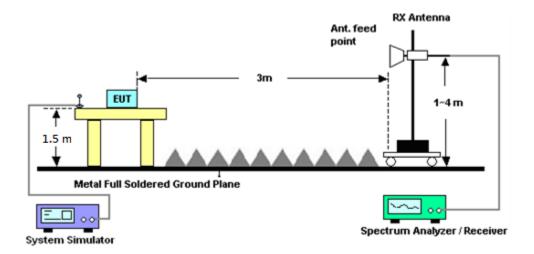
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#### For radiated test from 30MHz to 1GHz



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#### For radiated test above 1GHz



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#### 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.

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## 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.

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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.

- 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)
- = -40dBm.

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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	MT8821C	626200253 41	-	Oct. 24, 2019	May 13 ,2020~ Jun. 19, 2020	Oct. 23, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 15, 2019	May 13 ,2020~ Jun. 19, 2020	Nov. 14, 2020	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40°C ~90°C	Sep. 02, 2019	May 13 ,2020~ Jun. 19, 2020	Sep. 01, 2020	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 09, 2019	May 13 ,2020~ Jun. 19, 2020	Oct. 08, 2020	Conducted (TH05-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#A	1-18GHz	Jan. 13, 2020	May 13 ,2020~ Jun. 19, 2020	Jan. 12,2021	Conducted (TH05-HY)
Amplifier	Sonoma-Instru ment	310 N	187282	9KHz~1GHz	Dec. 17, 2019	May 19, 2020~ Jun. 17, 2020	Dec. 16, 2020	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	40103&07	30MHz to 1GHz	Apr. 29, 2020	May 19, 2020~ Jun. 17, 2020	Apr. 28, 2021	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800 N1D01N-06	41912 & 07	30MHz to 1GHz	Apr. 29, 2020	May 19, 2020~ Jun. 17, 2020	Apr. 28, 2021	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-124 1	1GHz ~ 18GHz	Jul. 02, 2019	May 19, 2020~ Jun. 17, 2020	Jul. 01, 2020	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-152 2	1GHz ~ 18GHz	Sept. 19, 2019	May 19, 2020~ Jun. 17, 2020	Sept. 18, 2020	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590074	1GHz~18GHz	May 19, 2020	May 19, 2020~ Jun. 17, 2020	May 18, 2021	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY532701 47	1GHz~26.5GHz	Oct. 28, 2019	May 19, 2020~ Jun. 17, 2020	Oct. 27, 2020	Radiation (03CH13-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	Aug. 27, 2019	May 19, 2020~ Jun. 17, 2020	Aug. 26, 2020	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY553705 26	10Hz~44GHz	Mar. 20, 2020	May 19, 2020~ Jun. 17, 2020	Mar. 19, 2021	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	May 19, 2020~ Jun. 17, 2020	N/A	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1m~4m	N/A	May 19, 2020~ Jun. 17, 2020	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	May 19, 2020~ Jun. 17, 2020	N/A	Radiation (03CH13-HY)
Software	Audix	E3 6.2009-8-24	RK-00099 2	N/A	N/A	May 19, 2020~ Jun. 17, 2020	N/A	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	May 19, 2020~ Jun. 17, 2020	Dec. 12, 2020	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Feb. 12, 2020	May 19, 2020~ Jun. 17, 2020	Feb. 21, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	804793/4	30M-18G	Feb. 12, 2020	May 19, 2020~ Jun. 17, 2020	Feb. 21, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Feb. 25, 2020	May 19, 2020~ Jun. 17, 2020	Feb. 24, 2021	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Dec. 10, 2019	May 19, 2020~ Jun. 17, 2020	Dec. 09, 2020	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 980	18GHz~40GHz	Jan. 10, 2020	May 19, 2020~ Jun. 17, 2020	Jan. 09, 2021	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60SS	SN2	3GHz High Pass Filter	Jul. 14, 2019	May 19, 2020~ Jun. 17, 2020	Jul. 13, 2020	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-108 0-1200-15000 -60SS	SN3	1.2GHz High Pass Filter	Jul. 03, 2019	May 19, 2020~ Jun. 17, 2020	Jul. 02, 2020	Radiation (03CH13-HY)
Hygrometer	TECPEL	DTM-303B	TP157151	N/A	Jun. 17, 2019	May 19, 2020~ Jun. 15, 2020	Jun. 16, 2020	Radiation (03CH13-HY)
Hygrometer	TECPEL	DTM-303B	TP157151	N/A	Jun. 16, 2020	Jun. 16, 2020~ Jun. 17, 2020	Jun. 16, 2021	Radiation (03CH13-HY)

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## 6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.21
Confidence of 95 % (0 = 200(y))	

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

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

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

Measuring Uncertainty for a Level of	3.99
Confidence of 95% (U = 2Uc(y))	3.99

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

## Conducted Output Power(Average power)

<Primary Antennas

< Primary	<primary antenna="">  LTE Band 30 Maximum Average Power [dBm]</primary>										
					1						
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest					
10	1	0			22.93						
10	1	25			22.81						
10	1	49			22.83						
10	25	0	QPSK		21.86						
10	25	12			21.92						
10	25	25			21.94						
10	50	0			21.92						
10	1	0			22.22						
10	1	25			22.21						
10	1	49			22.22						
10	25	0	16-QAM	-	20.88	-					
10	25	12			20.95						
10	25	25			20.89						
10	50	0			20.93						
10	1	0			21.09						
10	1	25			21.16						
10	1	49			21.08						
10	25	0	64-QAM		19.94						
10	25	12			19.99						
10	25	25			19.99						
10	50	0			19.96						
5	1	0		22.77	22.78	22.83					
5	1	12		22.90	22.85	22.92					
5	1	24		22.90	22.88	22.84					
5	12	0	QPSK	21.90	21.89	21.92					
5	12	7		22.01	21.95	21.97					
5	12	13		22.00	21.94	21.90					
5	25	0		21.95	21.92	21.94					
5	1	0		22.12	22.12	22.16					
5	1	12		22.22	22.21	22.18					
5	1	24		22.24	22.22	22.17					
5	12	0	16-QAM	20.92	20.93	20.95					
5	12	7		20.98	20.97	21.00					
5	12	13		21.00	20.95	20.94					
5	25	0		20.99	20.92	20.95					
5	1	0		21.05	21.07	21.16					
5	1	12		21.09	21.12	21.12					
5	1	24		21.21	21.13	21.09					
5	12	0	64-QAM	19.97	19.97	20.01					
5	12	7		20.06	20.00	20.04					
5	12	13		20.08	20.01	19.95					
5	25	0		20.01	19.96	19.96					

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### <ASDIV Antenna>

<asdiv< th=""><th></th><th></th><th>Band 30 Ma</th><th>ximum Average Po</th><th>ower [dBm]</th><th></th></asdiv<>			Band 30 Ma	ximum Average Po	ower [dBm]	
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0			22.65	
10	1	25			22.64	
10	1	49			22.64	
10	25	0	QPSK		21.50	
10	25	12			21.56	
10	25	25			21.58	
10	50	0			21.54	
10	1	0		•	21.84	
10	1	25			21.85	
10	1	49			21.82	1
10	25	0	16-QAM	-	20.49	-
10	25	12			20.53	
10	25	25			20.53	
10	50	0			20.51	
10	1	0			20.67	
10	1	25			20.79	
10	1	49			20.69	
10	25	0	64-QAM		19.52	
10	25 12			19.59		
10	25	25			19.60	
10	50	0			19.58	
5	1	0		22.40	22.42	22.45
5	1	12		22.52	22.58	22.50
5	1	24		22.57	22.48	22.47
5	12	0	QPSK	21.51	21.53	21.55
5	12	7		21.63	21.56	21.60
5	12	13		21.62	21.56	21.53
5	25	0		21.59	21.52	21.57
5	1	0		21.73	21.73	21.77
5	1	12		21.80	21.81	21.78
5	1	24		21.92	21.80	21.75
5	12	0	16-QAM	20.56	20.54	20.58
5	12	7		20.64	20.60	20.63
5	12	13		20.64	20.58	20.55
5	25	0		20.61	20.53	20.59
5	1	0		20.66	20.65	20.69
5	1	12		20.71	20.76	20.72
5	1	24		20.82	20.75	20.73
5	12	0	64-QAM	19.59	19.60	19.63
5	12	7		19.70	19.66	19.65
5	12	13		19.67	19.64	19.59
5	25	0		19.66	19.60	19.61

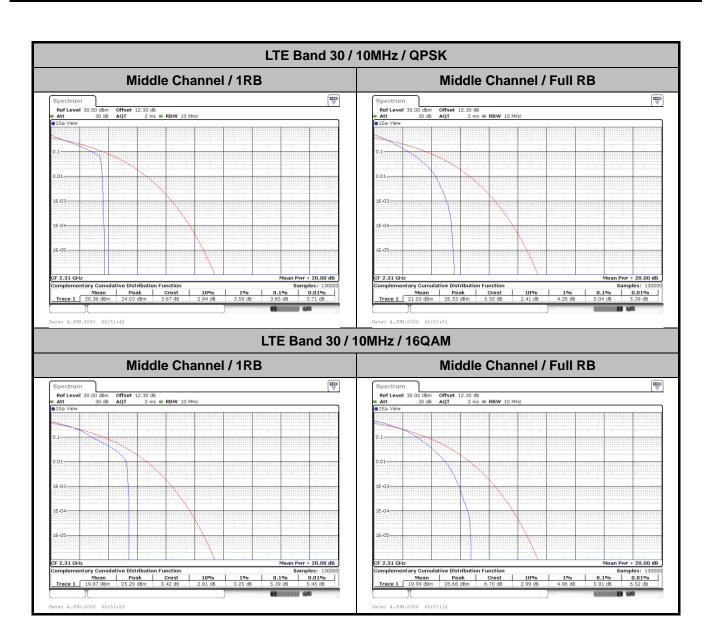
## LTE Band 30

## Peak-to-Average Ratio

Mode		LTE Band 30 / 10MHz									
Mod.	QP	SK	160	Limit: 13dB							
RB Size	1RB Full RB		1RB	Full RB	Result						
Lowest CH	-	-	ı	-							
Middle CH	3.66	5.04	5.39	5.91	PASS						
Highest CH	-	-	-	-	1						
Mode		LTE Band	30 / 10MHz								
Mod.	64Q	AM			Limit: 13dB						
RB Size	1RB	Full RB			Result						
Lowest CH	-	-	ı	-							
Middle CH	6.72	6.32	-	-	PASS						
Highest CH	-	-	-	-							

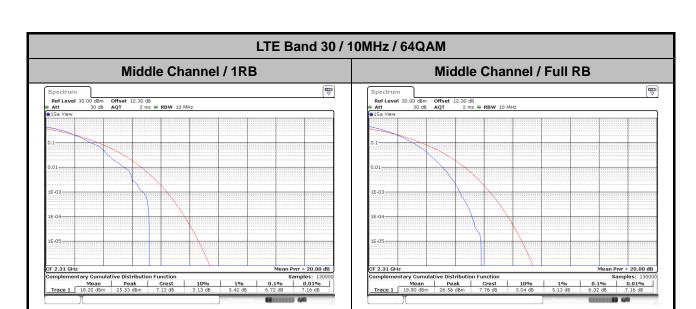
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## **EIRP Power Density**

Mode		LTE Band 30 : Conducted Power Density (dBm/5MHz)										
BW	1.4MHz 3MHz			5M	Hz	101	ЛHz	151	ЛНz	201		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	23.06	22.78	-	-	-	-	-	-
Middle CH	-	-	-	-	23.20	22.67	23.16	22.62	-	-	-	-
Highest CH	-	-	-	-	23.26	22.55	-	-	-	-	-	-
Mode			LT	E Band	30 : Con	ducted I	Power D	ensity (d	Bm/5MF	lz)		
BW	1.4	ИHz	3M	lHz	5M	Hz	101	ЛHz	151	ЛНz	201	ИHz
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	21.98	-	-	-	-	-	-	-
Middle CH	-	-	-	-	21.65	-	21.48	-	-	-	-	-
Highest CH	-	-	-	-	21.52	-	-	-	-	-	-	-

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Mode				LTE Ba	nd 30 : E	IRP Pov	ver Dens	ity (dBn	n/5MHz)			
BW	1.4	ИНz	3M	lHz	5N	lHz	101	ЛНz	15N	ЛHz	201	ИНz
Mod.	od. QPSK 16QAN		QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	22.56	22.28	-	-	-	-	-	-
Middle CH	-	-	-	-	22.70	22.17	22.66	22.12	-	-	-	-
Highest CH	-	-	-	-	22.76	22.05	-	-	-	-	-	-
Mode				LTE Ba	nd 30 : E	IRP Pov	ver Dens	ity (dBn	n/5MHz)			
BW	1.4MHz 3MHz		5MHz 10MHz		ИHz	15MHz		20MHz				
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	21.48	-	-	-	-	-	-	-
Middle CH	-	-	-	-	21.15	-	20.98	-	-	-	-	-
Highest CH	-	-	-	-	21.02	-	-	-	-	-	-	-
Antenna Gain		•		•	•	-0.5	dBi			•		
Limit					250mW	/ 5MHz :	= 24dBm	/ 5MHz				
Result						Pa	SS					

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LTE Band 30 / 5MHz Lowest Channel / 5MHz / 1RB0 / QPSK Lowest Channel / 5MHz / 1RB0 / 16QAM Ref Level 30.00 d8m Offset 12.30 d8 • RBW 5 MHz 
• Att 30 d8 SWT 1 ms • VBW 20 MHz Mode Auto Sweep 
5CL Count 100/100 
• 12m AvgPer Middle Channel / 5MHz / 1RB0 / QPSK Middle Channel / 5MHz / 1RB0 / 16QAM SGL Count 100/100 1Rm AvgPwr M1 Highest Channel / 5MHz / 1RB0 / 16QAM Highest Channel / 5MHz / 1RB0 / QPSK 
 Ref Level
 30.00 d8m
 Offset
 12.30 d8 • RBW
 5 MHz

 Att
 30 d8
 SWT
 1 ms • VBW
 20 MHz
 Mode
 Auto Sweep

 SGL Count 100/100
 61Rm AvgPwr
 4 mode
 Auto Sweep
 4 mode
 Auto Sweep

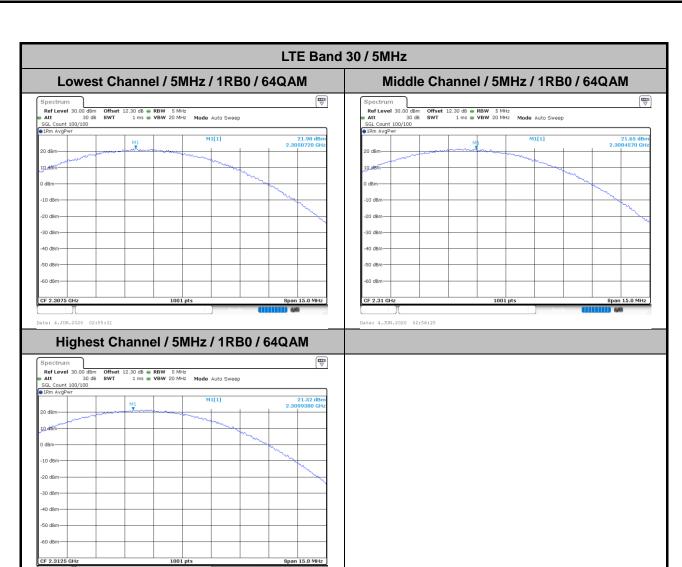
 Ref Level
 30.00 dbm
 Offset
 12.30 db
 RBW
 5 MHz

 a Att
 30 db
 SWT
 1 ms
 VBW
 20 MHz
 Mode
 Auto Sweep

 5GL Count 100/100
 18/m AvgPwr
 4 kg
 4 kg< M1

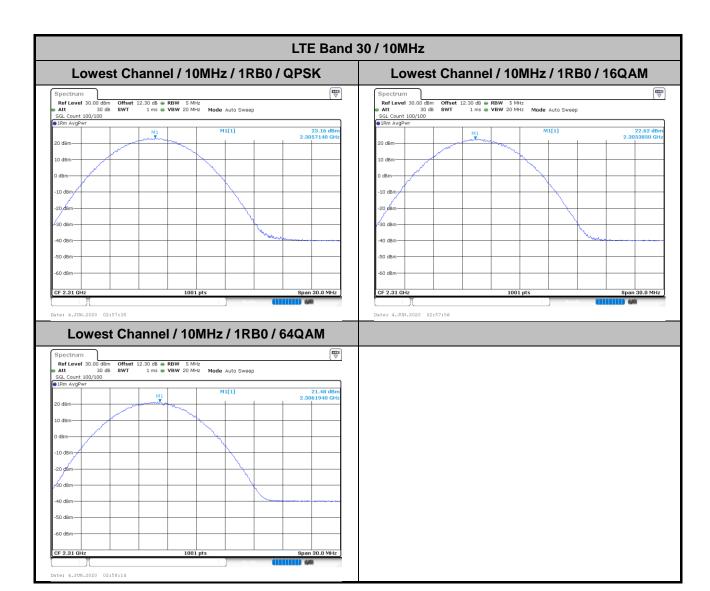
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## 26dB Bandwidth

Mode		LTE Band 30 : 26dB BW(MHz)										
BW	1.4MHz 3MHz			5M	lHz	101	ИHz	151	ЛHz	20MHz		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.90	4.88	-	-	-	-	-	-
Middle CH	-	-	-	-	4.83	4.84	9.67	9.71	-	-	-	-
Highest CH	-	-	-	-	4.94	4.84	-	-	-	-	-	-
Mode					LTE Ba	and 30 : :	26dB BV	V(MHz)				
BW	1.4	ЛHz	3M	lHz	5M	lHz	101	ИHz	151	ЛНz	201	ИHz
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	4.96	-	-	-	-	-	-	-
Middle CH	-	-	-	-	4.87	-	9.63	-	-	-	-	-
Highest CH	-	-	-	-	4.79	-	-	-	-	-	-	-

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LTE Band 30 Lowest Channel / 5MHz / QPSK Lowest Channel / 5MHz / 16QAM Ref Level 30.00 dBm Offset 12.30 db RBW 100 kHz Att 30 db SWT 19 µs VBW 300 kHz Mode Auto FFT SGL Count 100/100 M1[1] 15.39 dBn M1[1] 13.54 dBr 10 dBm 471. 473. -10 dBm -10 dBm 20 dBm <36 asm-30 dBm -40 dBm -50 dBm 60 dBm 
 X-value
 Y-value
 Function

 2.30741 GHz
 15.39 dBm
 nd8 down

 2.30592 GHz
 -10.78 dBm
 nd8

 2.309948 GHz
 -10.51 dBm
 Q factor
 Function Result 4.895 MHz 
 Marker
 Trc
 X-value
 Y-value
 Function

 M1
 1
 2.308859 GHz
 13.54 dBm
 nd8 down

 T1
 1
 2.300882 GHz
 12.26 dBm
 nd8

 T2
 1
 2.309958 GHz
 -12.60 dBm
 Q factor
 Middle Channel / 5MHz / QPSK Middle Channel / 5MHz / 16QAM SGL Count 100/100 1Pk Max 13.46 dBn 2.30876100 GH: 26.00 dE 4.835000000 MH: 477. 2.30900100 GH 26.00 d 4.825000000 MH 478 -20 dBm 190 dBm -40 dBm 40 dBm--50 dBm Span 10.0 MHz Span 10.0 MHz Function Result 4,825 MH 26.00 d 
 X-value
 Y-value
 Function

 2.309001 GHz
 15.31 dBm
 nd8 down

 2.307572 GHz
 -10.56 dBm
 nd8

 2.312398 GHz
 -11.14 dBm
 Q factor
 Type Ref Trc Highest Channel / 5MHz / QPSK Highest Channel / 5MHz / 16QAM .30 dB • RBW 100 kHz 19 µs • VBW 300 kHz Mode Auto FFT Ref Level 30.00 0 dBm Offset 30 dB SWT .30 dB • RBW 100 kHz 19 µs • VBW 300 kHz Mode Auto FFT SGL Count 100/100 SGL Count 100/100 1Pk Max 15.00 dBn 2.31283000 M1[1] 13.91 dBn 2.313 20 dBn 26.00 d 4.935000000 MH 468. dBm--20 dBn -50 dBm -50 dBm CF 2.3125 GHz CF 2.3125 GHz Span 10.0 MHz Span 10.0 MHz Function Result 4.835 MHz 26.00 dB 478.5 | Market | Trc | X-value | Y-value | Function | M1 | 1 | 2.31899 GHz | 13.91 dfbm | ndb down | T1 | 1 | 2.31809 GHz | 12.05 dfbm | ndb down | 1 | 2.314899 GHz | -12.12 dfbm | Q factor | T2 | 1 | 2.314899 GHz | -12.12 dfbm | Q factor | 
 Marker
 Trc
 X-value
 Y-value
 Function

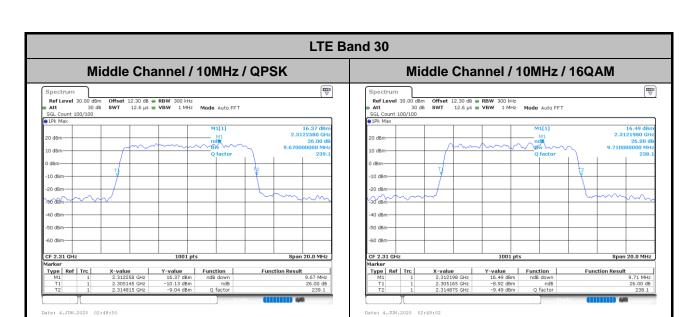
 M1
 1
 2.31283 GHz
 15.00 dBm
 nd8 down

 T1
 1
 2.31029 GHz
 -11.20 dBm
 ndb

 T2
 1
 2.314958 GHz
 -10.81 dBm
 Q factor
 Function Result 4.935 MHz

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LTE Band 30 Lowest Channel / 5MHz / 64QAM M1[1] 12.89 dBr -10 dBm 
 X-value
 Y-value
 Function

 2.305522 GHz
 12.89 dBm
 nd8 down

 2.305002 GHz
 -12.92 dBm
 nd8

 2.309958 GHz
 -13.39 dBm
 Q factor
 Middle Channel / 10MHz / 64QAM Middle Channel / 5MHz / 64QAM Span 10.0 MHz Type Ref Trc Highest Channel / 5MHz / 64QAM M1[1] 13.73 dB 2.31362900 G Function Result 4.785 MHz | Marker | Trope | Ref | Trc | X-value | Y-value | Function | | M1 | 1 | 2.313629 GHz | 13.73 dBm | nd8 down | | 11 | 2.310929 GHz | 12.08 dBm | nd8 | nd8 | | 12 | 1 | 2.314878 GHz | -12.24 dBm | Q factor | |

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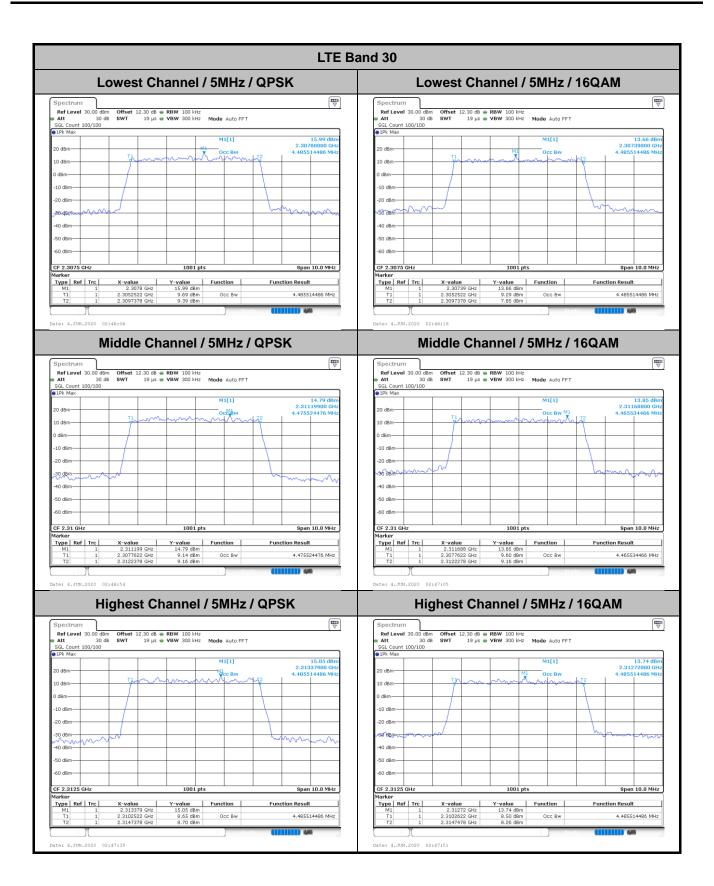
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# **Occupied Bandwidth**

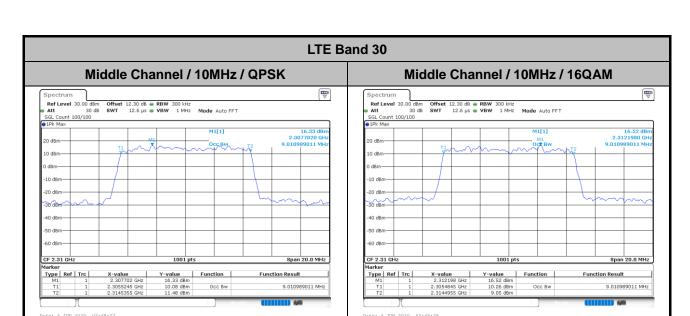
Mode		LTE Band 30 : 99%OBW(MHz)										
BW	1.4MHz 3MHz			5N	5MHz 10MHz			15MHz		20MHz		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	-	-	-	-	4.49	4.49	-	-	-	-	-	-
Middle CH	-	-	-	-	4.48	4.47	9.01	9.01	-	-	-	-
Highest CH	-	-	-	-	4.49	4.49	-	-	-	-	-	-
Mode					LTE Ba	and 26 : 9	99%OBV	V(MHz)				
BW	1.4	ЛHz	3M	lHz	5N	lHz	101	ЛHz	15N	ЛНz	20MHz	
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	-	-	-	-	4.50	-	-	-	-	-	-	-
Middle CH	-	-	-	-	4.54	-	9.01	-	-	-	-	-
Highest CH	-	-	-	-	4.49	-	-	-	-	-	-	-

Report No. : FG022521-02D

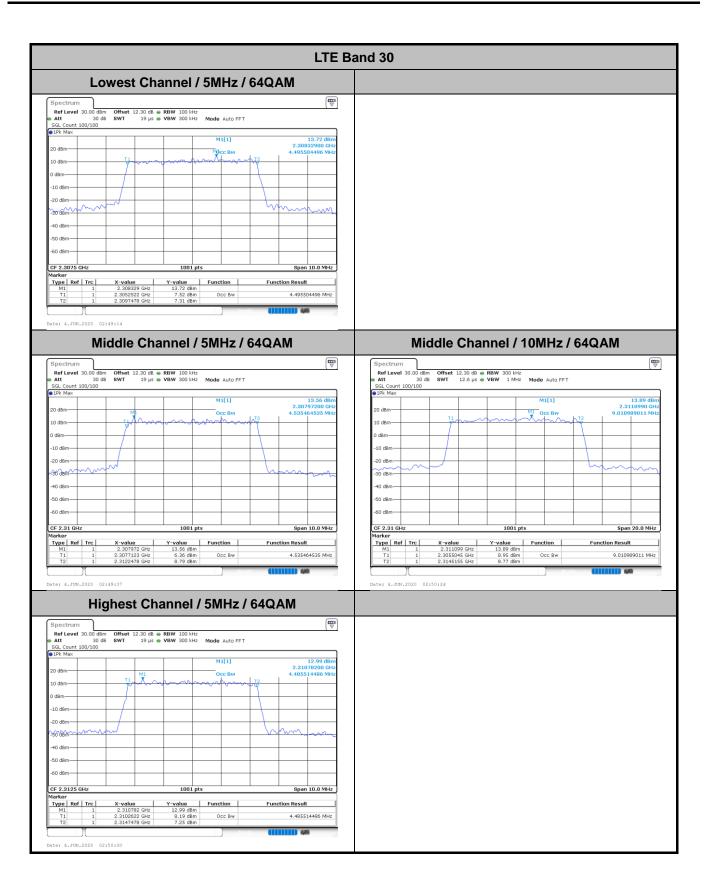
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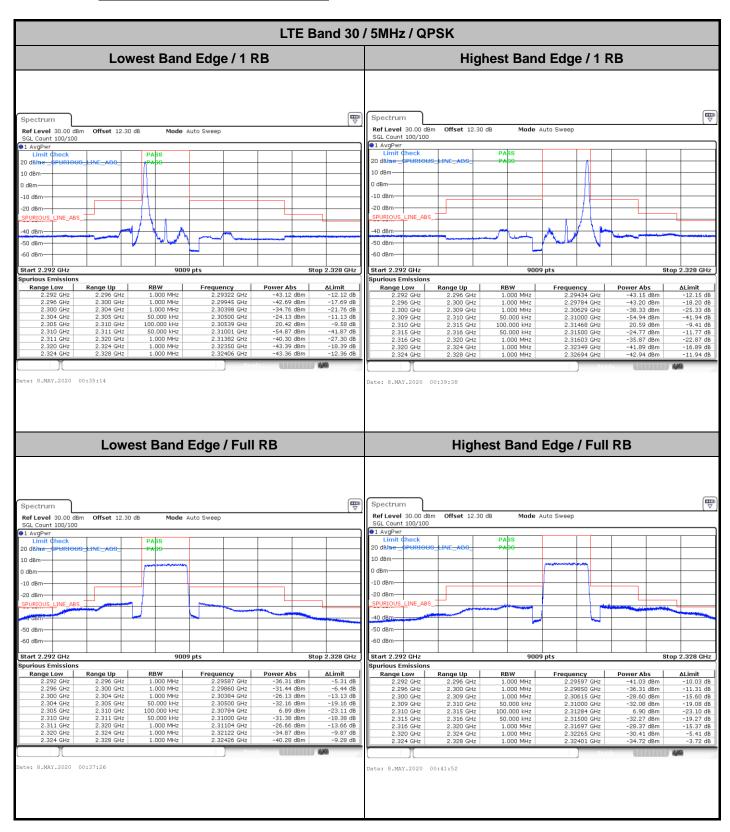


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## **Conducted Band Edge**



Report No.: FG022521-02D

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LTE Band 30 / 5MHz / 16QAM Lowest Band Edge / 1RB Highest Band Edge / 1 RB Spectrum Offset 12.30 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 12.30 dB Mode Auto Sweep SGL Count 100/100 1 AvgPw 10 dBm-10 dBn dBm--10 dBm -20 dBm-20 dBm-40 dBm -40 dBm-50 dBm -50 d8m-60 dBm--60 dBm-Start 2.292 GHz ious Emissions -43.32 dBm -42.89 dBm -35.23 dBm -23.87 dBm 19.67 dBm -55.76 dBm -40.48 dBm -43 43 dBm Frequency
2.29425 GHz
2.29666 GHz
2.30609 GHz
2.30999 GHz
2.31466 GHz
2.31500 GHz
2.31500 GHz
2.32316 GHz
2.32409 GHz Range Up ΔLimit
-12.32 dB
-17.89 dB
-22.23 dB
-10.87 dB
-10.33 dB
-42.76 dB
-27.48 dB ALimit
-12.27 dB
-18.25 dB
-23.56 dB
-42.91 dB
-10.41 dB
-11.84 dB
-21.15 dB
-15.65 dB
-12.04 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 2.29530 GHz 2.29653 GHz 2.30394 GHz 2.300 GHz 2.304 GHz 2.304 GHz 2.305 GHz 2.310 GHz .305 GHz 2.310 GHz 2.311 GHz 2.311 GHz 2.320 GHz 2.31003 GHz 2.31383 GHz ate: 8.MAY.2020 00:35:57 Date: 8.MAY.2020 00:40:22 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Offset 12.30 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 12.30 dB Mode Auto Sweep Count 100/100 SGL Count 100/100 1 AvgPwr Limit ¢l 1 AvgPwr Limit ¢h 20 dBime 10 dBm dBm 10 dBm -10 dBm--20 dBm-PURIOUS 40 dBm -50 dBm Start 2.292 GHz 9009 pts Stop 2.328 GHz Start 2.292 GHz Stop 2.328 GHz rious Emissions Range Low
2.292 GHz
2.292 GHz
2.296 GHz
2.300 GHz
2.300 GHz
2.310 GHz
2.315 GHz
2.315 GHz
2.316 GHz
2.324 GHz 2.296 GHz 2.390 GHz 2.300 GHz 2.305 GHz 2.305 GHz 2.310 GHz 2.311 GHz 2.320 GHz 2.324 GHz 2.328 GHz Frequency
2.29599 GHz
2.29576 GHz
2.30893 GHz
2.31000 GHz
2.31402 GHz
2.31500 GHz
2.31519 GHz
2.32099 GHz
2.32416 GHz Range Up Range Low Frequency te: 8.MAY.2020 00:38:10 Date: 8.MAY.2020 00:42:36

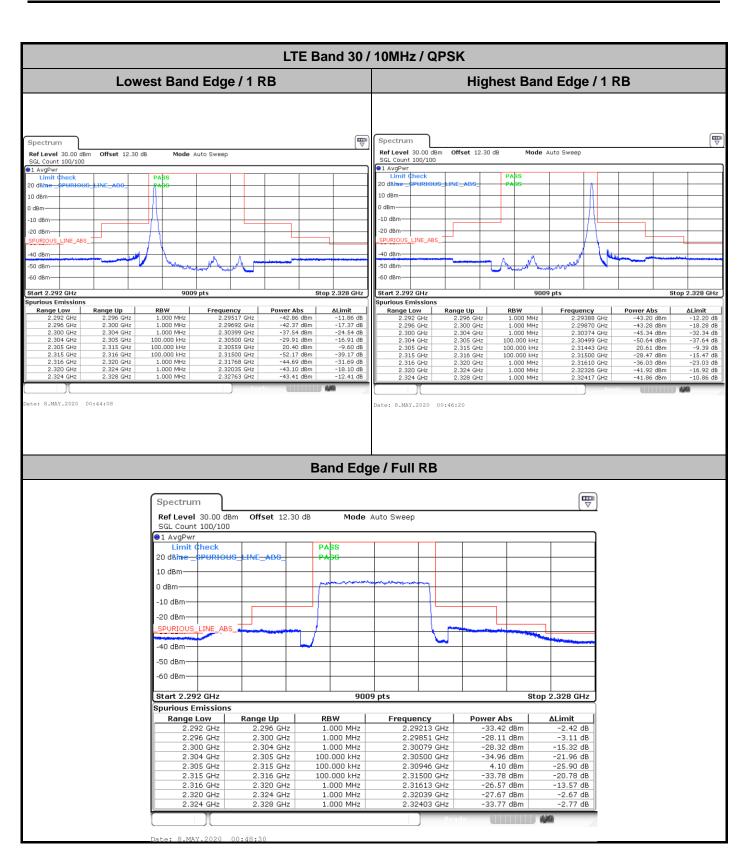
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TEL: 886-3-327-3456 Page Number : A2-17 of 26

LTE Band 30 / 5MHz / 64QAM Lowest Band Edge / 1RB Highest Band Edge / 1 RB Spectrum Offset 12.30 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 12.30 dB Mode Auto Sweep SGL Count 100/100 1 AvgPw 10 dBm-10 dBn dBm--10 dBm -20 dBm-20 dBm-40 dBm -40 dBm-50 dBm -50 dBm-60 dBm -60 dBm-Start 2.292 GHz ious Emissions -43.33 dBm -43.16 dBm -39.04 dBm -26.07 dBm 19.17 dBm -55.92 dBm -42.22 dBm -43.34 dBm Frequency
2.29447 GHz
2.29738 GHz
2.30624 GHz
2.30929 GHz
2.31467 GHz
2.31500 GHz
2.31500 GHz
2.32329 GHz
2.32407 GHz Range Up ALimit
-12.49 dB
-18.42 dB
-25.68 dB
-43.18 dB
-10.87 dB
-12.51 dB
-24.65 dB
-15.65 dB
-12.34 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 2.300 GHz 2.304 GHz 2.304 GHz 2.29374 GHZ 2.29684 GHZ 2.30352 GHZ 2.305 GHz 2.310 GHz .305 GHz .30533 GHz 2.310 GHz 2.311 GHz 2.311 GHz 2.320 GHz 2.31004 GHz 2.31405 GHz ate: 8.MAY.2020 00:36:41 Date: 8.MAY.2020 00:41:07 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Offset 12.30 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 12.30 dB Mode Auto Sweep Count 100/100 SGL Count 100/100 1 AvgPwr Limit ¢l 1 AvgPwr Limit ¢h 20 dBime 10 dBm dBm 10 dBm -10 dBm--20 dBm-PURIOUS 40 dBm -50 dBm Start 2.292 GHz 9009 pts Stop 2.328 GHz Start 2.292 GHz Stop 2.328 GHz rious Emissions Range Low
2.292 GHz
2.292 GHz
2.296 GHz
2.300 GHz
2.300 GHz
2.310 GHz
2.315 GHz
2.315 GHz
2.316 GHz
2.324 GHz 2.296 GHz 2.390 GHz 2.300 GHz 2.305 GHz 2.305 GHz 2.310 GHz 2.311 GHz 2.320 GHz 2.324 GHz 2.328 GHz Frequency
2.29535 GHz
2.29993 GHz
2.30895 GHz
2.31000 GHz
2.31306 GHz
2.31501 GHz
2.31505 GHz
2.32006 GHz
2.32006 GHz Range Up Range Low Frequency te: 8.MAY.2020 00:38:54 Date: 8.MAY.2020 00:43:21

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LTE Band 30 / 10MHz / 16QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Offset 12.30 dB Mode Auto Sweep Ref Level 30.00 dBm Offset 12.30 dB Mode Auto Sweep SGL Count 100/100 ∍1 AvgPw 10 dBm-10 dBn dBm -10 dBm -10 dBm -20 dBm-20 dBm-40 dBm -40 dBm-50 dBm -50 d8m-60 dBm -60 dBm-Start 2.292 GHz Start 2.292 GHz ious Emissions Range Up

2.296 GHz

2.300 GHz

2.304 GHz

2.305 GHz

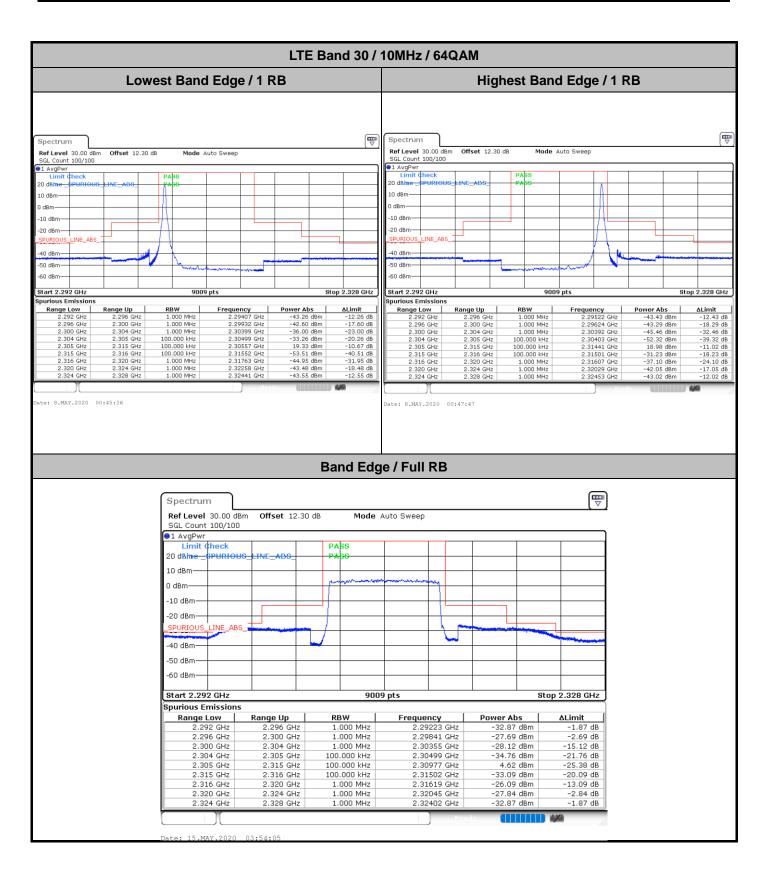
2.315 GHz

2.316 GHz

2.320 GHz -43.13 dBm -43.02 dBm -35.41 dBm -31.37 dBm 19.86 dBm -53.27 dBm -43.34 dBm Frequency
2.29233 GHz
2.29831 GHz
2.30303 GHz
2.30303 GHz
2.30402 GHz
2.31440 GHz
2.31561 GHz
2.31661 GHz
2.32064 GHz
2.32463 GHz 1.000 MHz 1.000 MHz 1.000 MHz ΔLimit
-12.13 dB
-18.02 dB
-22.41 dB
-18.37 dB
-10.14 dB
-40.27 dB
-32.25 dB ALimit
-12.50 dB
-18.47 dB
-30.85 dB
-39.36 dB
-10.45 dB
-16.95 dB
-22.55 dB
-17.76 dB
-12.23 dB 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 2.29428 GHz 2.29946 GHz 2.30398 GHz 2.305 GHz 2.315 GHz 2.315 GHz .30557 GHz 2.31505 GHz 2.31825 GHz ate: 8.MAY.2020 00:44:52 Date: 8.MAY.2020 00:47:03 Band Edge / Full RB Spectrum Ref Level 30.00 dBm Offset 12.30 dB Mode Auto Sweep SGL Count 1000/1000 1 AvgPwr 20 dBime PHRIOHS PARS 10 dBm 0 dBm -10 dBm -20 dBm--40 dBm -50 dBm -60 dBm-Start 2.292 GHz 9009 pts Stop 2.328 GHz Spurious Emissions Range Low Range Up 2.296 GHz RBW Frequency 2.29600 GHz Power Abs -32.56 dBm 1.000 MHz -1.56 dB -28.49 dBm -26.47 dBm -3.49 dB -13.47 dB 2.296 GHz 2.300 GHz 1.000 MHz 2.29999 GHz 1.000 MHz 2.300 GHz 2.304 GHz 30398 GHz -21.83 dB -27.53 dB 2.304 GHz 2.305 GHz 100.000 kHz .30499 GHz -34.83 dBm 2.305 GHz 2.315 GHz 100.000 kHz 2.31033 GHz 2.47 dBm 2.316 GHz 2.320 GHz 2.324 GHz 100.000 kHz -33.78 dBm 2.316 GHz 1.000 MHz 2.31607 GHz -26.26 dBm -13.26 dB 2.320 GHz 1.000 MHz 2.32009 GHz -28.70 dBm -32.57 dBm -3.70 dB 2.324 GHz 2.328 GHz 1.000 MHz 2.32403 GHz -1.57 dB

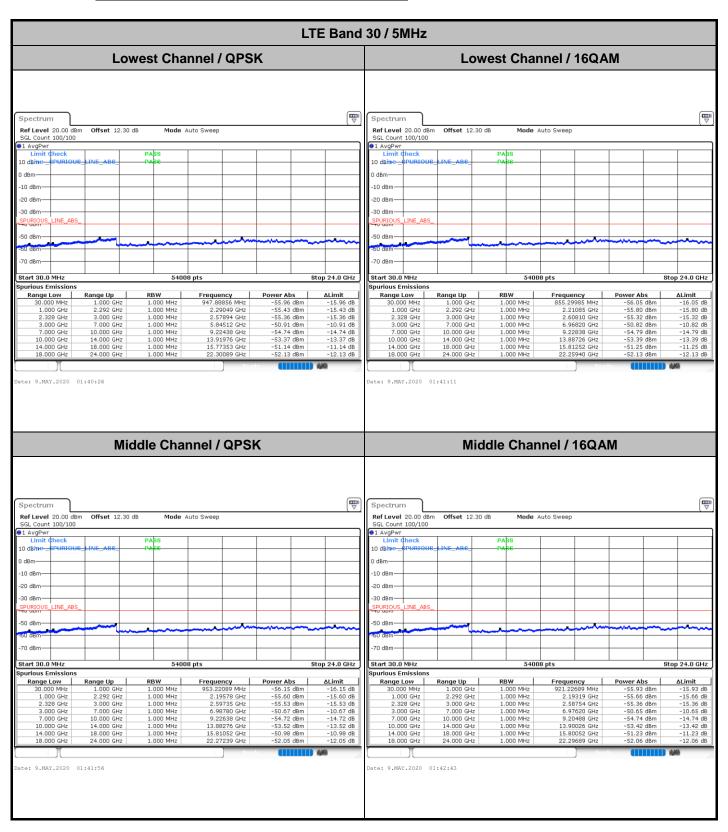
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## **Conducted Spurious Emission**



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TEL: 886-3-327-3456 Page Number: A2-22 of 26 FAX: 886-3-328-4978

LTE Band 30 / 5MHz **Highest Channel / QPSK Highest Channel / 16QAM** ∀ Spectrum Spectrum Ref Level 20.00 dBm Offset 12.30 dB Mode Auto Sweep Ref Level 20.00 dBm Offset 12.30 dB Mode Auto Sweet SGL Count 100/100

1 AvgPwr
Limit theck Count 100/100 1 AvgPwr dBm 0 dBm 10 dBm -10 dBm--20 dBm -20 dBm--30 dBm--30 dBm -50 dBm-70 dBm--70 dBm-Start 30.0 MHz 54008 pt op 24.0 GHz rious Emissions Spurious Emissions 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz Power Abs -56.10 dBm -55.71 dBm -55.39 dBm -50.98 dBm -54.55 dBm -53.62 dBm ΔLimit
-16.10 dB
-15.71 dB
-15.39 dB
-10.98 dB
-14.55 dB
-13.62 dB Range Up 907.16892 MHz 2.18846 GHz 2.98770 GHz 6.95620 GHz 1.000 MHz 1.000 MHz 1.000 MHz 888.74813 MHz 2.20008 GHz 2.63269 GHz Range Low 30,000 MHz Range Low 30,000 MHz ∆Limit -16.02 -16.02 dB -15.69 dB -15.41 dB -10.98 dB -14.73 dB -13.26 dB -56.02 dBm -55.69 dBm -55.41 dBm -50.98 dBm -54.73 dBm -53.26 dBm 1.000 MHz 1.000 GHz 2.328 GHz 3.000 GHz 7.000 GHz 10.000 GHz 1.000 GH .000 MH 6.99700 GHz 9.23688 GHz 13.88626 GHz 14.000 GHz 1.000 MHz 18.000 GHz 24.000 GHz 1.000 MHz 1.000 MHz 14.000 GHz 18.000 GHz 1.000 MHz 1.000 MHz 15.78103 GHz 22.28389 GHz -51.30 dBm -52.17 dBm -11.30 dB -12.17 dB ate: 9.MAY.2020 01:43:28 Date: 9.MAY.2020 01:44:13 LTE Band 30 / 10MHz Middle Channel / QPSK Middle Channel / 16QAM Spectrum Spectrum Ref Level 20.00 dBm Offset 12.30 dB Mode Auto Sweep Ref Level 20.00 dBm Offset 12.30 dB Mode Auto Sweep Count 100/100 Count 100/100 1 AvgPwr ●1 AvgPwi 10 dBine 0 dBm 0 dBm -10 dBm--10 dBm--20 dBm -30 dBm-30 dBm INE\_ABS -50 dBm -50 d8m--70 dBm-70 dBmop 24.0 GHz rious Emission Frequency 70265 MHz Spurious Emissio Frequency 63868 MHz Range Low 30,000 MH Range Up RBW Power Abs ΔLimit Range Low 30.000 MHz Range Up RBW Power Abs -56.10 dBr ΔLimit -16.25 dB -15.68 dB -15.41 dB -11.03 dB -14.77 dB -13.49 dB -11.37 dB -11.95 dB wer Abs
-56.10 dBm
-55.72 dBm
-55.20 dBm
-51.01 dBm
-54.61 dBm
-53.34 dBm
-51.20 dBm -16.10 dB -15.72 dB -15.20 dB -11.01 dB -14.61 dB -13.34 dB -11.20 dB -12.00 dB 1.000 MHz 1.000 MHz -56.25 dBm -55.68 dBm 1.000 GHz 2.292 GHz 1.000 MHz 2.18588 GHz 1.000 GHz 2.292 GHz 2.20181 GHz 1.000 MHz 2.18588 GHz 2.61751 GHz 6.95700 GHz 9.22988 GHz 13.87577 GHz 15.77403 GHz -55.68 dBm -55.41 dBm -51.03 dBm -54.77 dBm -53.49 dBm -51.37 dBm -51.95 dBm 1.000 GHz 2.328 GHz 3.000 GHz 7.000 GHz 10.000 GHz 14.000 GHz 18.000 GHz 2.20181 GHz 2.61133 GHz 6.98100 GHz 9.19138 GHz 13.87827 GHz 15.80202 GHz 22.29889 GHz 3.000 GH .000 MHz 10.000 GHz 14.000 GHz 18.000 GHz 24.000 GHz 7.000 GHz 10.000 GHz 10.000 GHz 14.000 GHz .000 MHz .000 MHz te: 9.MAY.2020 01:47:57 Date: 9.MAY.2020 01:48:42

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LTE Band 30 / 5MHz Lowest Channel / 64QAM Middle Channel / 64QAM Spectrum Spectrum Ref Level 20.00 dBm Offset 12.30 dB Mode Auto Sweep SGL Count 100/100

1 AvgPwr
Limit check
10 dBine\_\_spurtous Ref Level 20.00 dBm Offset 12.30 dB Mode Auto Sween Count 100/100 1 AvgPwr Limit Ch dBm 0 dBm-10 dBm -10 dBm--20 dBm -20 dBm--30 dBm--30 dBm--50 dBm-70 dBm--70 dBm-Start 30.0 MHz 5400 54008 pt Stop 24.0 GHz irious Emissions Spurious Emissions 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz -56.08 dBm -55.69 dBm -55.46 dBm -50.98 dBm -54.54 dBm -53.42 dBm -51.22 dBm ΔLimit
-16.08 dB
-15.69 dB
-15.46 dB
-10.98 dB
-14.54 dB
-13.42 dB 1.000 MHz 1.000 MHz 1.000 MHz 1.000 MHz Power Abs -56.12 dBm -55.80 dBm -55.38 dBm -50.98 dBm -54.78 dBm -53.39 dBm 964.37031 MHz 2.20396 GHz 2.55543 GHz 6.98420 GHz 9.19238 GHz 13.87227 GHz Range Up 1.000 GHz 2.292 GHz 3.000 GHz Range Low 30,000 MHz Range Low 30,000 MHz 1.000 MHz 1.000 GHz 2.328 GHz 3.000 GHz 7.000 GHz 10.000 GHz 2.28102 GHz 2.52613 GHz 1.000 GHz 2.328 GHz 6.98220 GHz 9.19088 GHz 13.90276 GHz 1.000 MHz 14.000 GHz -11.18 dB -12.23 dB 18.000 GHz 24.000 GHz 1.000 MHz 1.000 MHz 14.000 GHz 18.000 GHz 18.000 GHz 24.000 GHz 1.000 MHz 1.000 MHz 15.80102 GHz 18.20273 GHz -51.18 dBm -52.23 dBm ate: 9.MAY.2020 01:44:58 Date: 9.MAY.2020 01:45:42 **Highest Channel / 64QAM** Spectrum Ref Level 20.00 dBm Offset 12.30 dB SGL Count 100/100 Mode Auto Sweep 1 AvgPwr Limit Check 10 dBine dAm -20 dBm--30 dBm-Start 30.0 MHz 54008 pts Stop 24.0 GHz rious Emissions Range Low
30.000 MHz
1.000 GHz
2.328 GHz
3.000 GHz
7.000 GHz
10.000 GHz
14.000 GHz RBW

1.000 MHz

1.000 MHz te: 9.MAY.2020 01:46:27

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LTE Band 30 / 10MHz Middle Channel / 64QAM Spectrum Ref Level 20.00 dBm SGL Count 100/100 1 AvgPwr Limit check 10 dBine - SPURIOUS Offset 12.30 dB Mode Auto Sweep 0 dBm -10 dBm--20 dBm--30 dBm-70 dBm-Start 30.0 MHz urious Emissions Ronge Low
30.000 MHz
1.000 GHz
2.328 GHz
3.000 GHz
7.000 GHz
10.000 GHz
11.000 GHz
11.000 GHz
11.000 GHz
11.000 GHz RBW

1.000 MHz

1.000 MHz 937.70865 MHz 2.29178 GHz 2.57921 GHz 6.98780 GHz 9.19638 GHz 13.87877 GHz 15.78203 GHz 22.26839 GHz Power Abs
-56.19 dBm
-55.34 dBm
-55.41 dBm
-50.95 dBm
-54.57 dBm
-53.44 dBm
-51.10 dBm
-52.14 dBm 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 ΔLimit
-16.19 dB
-15.34 dB
-15.41 dB
-10.95 dB
-14.57 dB
-13.44 dB
-11.10 dB
-12.14 dB ate: 9.MAY.2020 01:47:13

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## Frequency Stability

Test (	Conditions	LTE Band 30 (QPSK) / Middle Channel	Limit
_		BW 10MHz	Note 2.
Temperature (°C)	Voltage (Volt)	Deviation (ppm)	Result
50	Normal Voltage	0.0026	
40	Normal Voltage	0.0029	
30	Normal Voltage	0.0038	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0025	
0	Normal Voltage	0.0021	
-10	Normal Voltage	0.0005	PASS
-20	Normal Voltage	0.0014	
-30	Normal Voltage	0.0004	
20	Maximum Voltage	0.0038	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0024	

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#### Note:

- 1. Normal Voltage =3.87 V.; Battery End Point (BEP) =3.6 V.; Maximum Voltage =4.45 V.
- 2. Note: The frequency fundamental emissions stay within the authorized frequency block.

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

#### EIRP

<Primary Antenna>

CFIIIIary Ai		nd 30 / 4	SMHz (Δ	verage) (GT -	I.C = -1 dB)		
Channal			B		ucted	EII	RP
Channel	Mode	Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest		1	12	22.90	0.1950	21.90	0.1549
Middle	QPSK	1	12	22.85	0.1928	21.85	0.1531
Highest	1	1	12	22.92	0.1959	21.92	0.1556
Lowest		1	24	22.24	0.1675	21.24	0.1330
Middle	16QAM	1	24	22.22	0.1667	21.22	0.1324
Highest		1	24	22.17	0.1648	21.17	0.1309
Lowest		1	24	21.21	0.1321	20.21	0.1050
Middle	64QAM	1	24	21.13	0.1297	20.13	0.1030
Highest		1	24	21.09	0.1285	20.09	0.1021

	LTE Bar	nd 30 / 1	OMHz (A	verage) (GT	- LC = -1 dB)		
Channel	Mode	R	В	Cond	ucted	EII	RP
Chainei	Wode	Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest		1	-	-	-	-	-
Middle	QPSK	1	0	22.93	0.1963	21.93	0.1560
Highest		1	-	-	-	-	-
Lowest		1	-	-	-	-	-
Middle	16QAM	1	0	22.22	0.1667	21.22	0.1324
Highest		1	-	-	-	-	-
Lowest		1	-	-	-	-	-
Middle	64QAM	1	25	21.16	0.1306	20.16	0.1038
Highest		-	-	-	-	-	-

#### <ASDIV Antenna>

7,102177111		100/5		\			
	LTE Bar	nd 30 / 5	MHZ (Av	erage) (GT - I	LC = -0.5 dB)		
Channel	Mode	RB		Cond	ucted	EII	RP
Channel	lviode	Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)
Lowest		1	12	22.52	0.1786	22.02	0.1592
Middle	QPSK	1	12	22.58	0.1811	22.08	0.1614
Highest		1	12	22.50	0.1778	22.00	0.1585
Lowest		1	24	21.92	0.1556	21.42	0.1387
Middle	16QAM	1	24	21.80	0.1514	21.30	0.1349
Highest		1	24	21.75	0.1496	21.25	0.1334
Lowest		1	24	20.82	0.1208	20.32	0.1076
Middle	64QAM	1	24	20.75	0.1189	20.25	0.1059
Highest		1	24	20.73	0.1183	20.23	0.1054

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	LTE Band 30 / 10MHz (Average) (GT - LC = -0.5 dB)											
			B		lucted		RP					
Channel	Mode	Size	Offset	Power (dBm)	Power (Watts)	EIRP(dBm)	EIRP(W)					
Lowest		-	-	-	-	-	-					
Middle	QPSK	1	0	22.65	0.1841	22.15	0.1641					
Highest		-	-	-	-	-	-					
Lowest		-	-	-	-	-	-					
Middle	16QAM	1	25	21.85	0.1531	21.35	0.1365					
Highest		-	-	-	-	-	-					
Lowest		-	-	-	-	-	-					
Middle	64QAM	1	25	20.79	0.1199	20.29	0.1069					
Highest		-	-	-	-	-	-					

## **Radiated Spurious Emission**

<Primary Antenna> <Ant. 2>

## LTE Band 30

Report No. : FG022521-02D

			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)
	4614	-48.96	-40	-8.96	-39.96	-59.00	2.06	12.10	Н
	6924	-49.11	-40	-9.11	-46.66	-57.69	2.39	10.98	Н
	9228	-59.50	-40	-19.50	-61.84	-69.40	2.22	12.13	Н
									Н
									Н
									Н
Lowest									Н
Lowest	4614	-51.03	-40	-11.03	-42.74	-61.07	2.06	12.10	V
	6924	-45.13	-40	-5.13	-43.29	-53.71	2.39	10.98	V
	9228	-60.18	-40	-20.18	-61.94	-70.08	2.22	12.13	V
									V
									V
									V
									V
	4620	-46.85	-40	-6.85	-37.88	-56.89	2.06	12.10	Н
	6930	-48.93	-40	-8.93	-46.49	-57.50	2.40	10.97	Н
	9240	-59.40	-40	-19.40	-61.75	-69.29	2.22	12.11	Н
									Н
Middle									Н
Middle									Н
									Н
	4620	-49.43	-40	-9.43	-41.17	-59.47	2.06	12.10	V
	6930	-44.04	-40	-4.04	-42.22	-52.61	2.40	10.97	V
	9240	-59.63	-40	-19.63	-61.36	-69.52	2.22	12.11	V

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	4626	-49.04	-40	-9.04	-40.1	-59.07	2.07	12.10	Н
	6936	-49.20	-40	-9.20	-46.77	-57.77	2.40	10.96	Н
	9252	-59.47	-40	-19.47	-61.82	-69.35	2.22	12.10	Н
									Н
									Н
									Н
LPshaat									Н
Highest	4626	-49.95	-40	-9.95	-41.71	-59.98	2.07	12.10	V
	6936	-43.18	-40	-3.18	-41.37	-51.75	2.40	10.96	V
	9252	-59.52	-40	-19.52	-61.23	-69.40	2.22	12.10	V
									V
									V
									V
									V

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

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			L	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)
	4614	-46.12	-40	-6.12	-37.12	-56.16	2.06	12.10	Н
	6918	-50.65	-40	-10.65	-48.19	-59.24	2.39	10.98	Н
	9228	-59.22	-40	-19.22	-61.56	-69.12	2.22	12.13	Н
									Н
									Н
									Н
Middle									Н
Middle	4614	-49.16	-40	-9.16	-40.87	-59.20	2.06	12.10	V
	6918	-45.09	-40	-5.09	-43.24	-53.68	2.39	10.98	V
	9228	-59.71	-40	-19.71	-61.47	-69.61	2.22	12.13	V
									V
									V
									V
									V

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

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<ASDIV Antenna> <Ant. 0>

### LTE Band 30

Report No. : FG022521-02D

	LTE Band 30 / 5MHz / QPSK										
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)		
	4614	-61.77	-40	-21.77	-52.77	-71.81	2.06	12.10	Н		
	6924	-46.70	-40	-6.70	-44.25	-55.28	2.39	10.98	Н		
	9228	-58.73	-40	-18.73	-61.07	-68.63	2.22	12.13	Н		
									Н		
									Н		
									Н		
Lowest									Н		
LOWest	4614	-61.06	-40	-21.06	-52.77	-71.10	2.06	12.10	V		
	6924	-50.23	-40	-10.23	-48.39	-58.81	2.39	10.98	V		
	9228	-59.61	-40	-19.61	-61.37	-69.51	2.22	12.13	V		
									V		
									V		
									V		
									V		
	4620	-61.04	-40	-21.04	-52.07	-71.08	2.06	12.10	Н		
	6930	-46.12	-40	-6.12	-43.68	-54.69	2.40	10.97	Н		
	9240	-58.98	-40	-18.98	-61.33	-68.87	2.22	12.11	Н		
									Н		
									Н		
									Н		
Middle									Н		
	4620	-61.48	-40	-21.48	-53.22	-71.52	2.06	12.10	V		
	6930	-48.32	-40	-8.32	-46.5	-56.89	2.40	10.97	V		
	9240	-59.20	-40	-19.20	-60.93	-69.09	2.22	12.11	V		
									V		
									V		
									V		

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	4626	-64.55	-40	-24.55	-55.61	-74.58	2.07	12.10	Н
	6936	-52.69	-40	-12.69	-50.26	-61.26	2.40	10.96	Н
	9252	-58.51	-40	-18.51	-60.86	-68.39	2.22	12.10	Н
									Н
									Н
									Н
Llimboot									Н
Highest	4626	-64.33	-40	-24.33	-56.09	-74.36	2.07	12.10	V
	6936	-50.15	-40	-10.15	-48.34	-58.72	2.40	10.96	V
	9252	-59.62	-40	-19.62	-61.33	-69.50	2.22	12.10	V
									V
									V
									V
									V

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

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			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)
	4614	-56.24	-40	-16.24	-47.24	-66.28	2.06	12.10	Н
	6918	-51.24	-40	-11.24	-48.78	-59.83	2.39	10.98	Н
	9228	-59.03	-40	-19.03	-61.37	-68.93	2.22	12.13	Н
									Н
									Н
									Н
Middle									Н
Middle	4614	-56.87	-40	-16.87	-48.58	-66.91	2.06	12.10	V
	6918	-47.37	-40	-7.37	-45.52	-55.96	2.39	10.98	V
	9228	-59.81	-40	-19.81	-61.57	-69.71	2.22	12.13	V
									V
									V
									V
									V

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



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