

Report No.: FG041657-01F

: 01



FCC RADIO TEST REPORT

FCC ID : PKRISGM2000A

Equipment : Wireless Hotspot Modem

Brand Name : Inseego Model Name : M2000A Marketing Name : M2000

Applicant : Inseego Corporation

9710 Scranton Road Suite 200, San Diego, CA 92121

Manufacturer : Inseego Corporation

9710 Scranton Road Suite 200, San Diego, CA 92121

Standard : FCC 47 CFR Part 2, and 90(S)

The product was received on Jul. 09, 2020 and testing was started from Aug. 01, 2020 and completed on Sep. 02, 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.

Approved by: Louis Wu

Louis Win

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 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

Table of Contents

Report No. : FG041657-01F

His	story o	of this test report	3
Su	mmar	y of Test Result	4
1	Gene	eral Description	5
	1.1	Feature of Equipment Under Test	
	1.2	Modification of EUT	
	1.3	Testing Site	
	1.4	Applied Standards	
2	Test	Configuration of Equipment Under Test	7
	2.1	Test Mode	7
	2.2	Connection Diagram of Test System	8
	2.3	Support Unit used in test configuration and system	8
	2.4	Measurement Results Explanation Example	8
	2.5	Frequency List of Low/Middle/High Channels	g
3	Cond	ducted Test Items	10
	3.1	Measuring Instruments	10
	3.2	Conducted Output Power Measurement and ERP Measurement	11
	3.3	Peak-to-Average Ratio	12
	3.4	99% Occupied Bandwidth and 26dB Bandwidth Measurement	
	3.5	Emissions Mask Measurement	14
	3.6	Emissions Mask – Out Of Band Emissions Measurement	15
	3.7	Frequency Stability Measurement	16
	3.8	Field Strength of Spurious Radiation Measurement	
4	List	of Measuring Equipment	20
5	Unce	ertainty of Evaluation	21
Ар	pendi	x A. Test Results of Conducted Test	
Αp	pendi	x B. Test Results of ERP and Radiated Test	
QD	- pendi	x C. Test Setup Photographs	

TEL: 886-3-327-3456 Page Number : 2 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

History of this test report

Report No. : FG041657-01F

Report No.	Version	Description	Issued Date
FG041657-01F	01	Initial issue of report	Sep. 16, 2020

TEL: 886-3-327-3456 Page Number : 3 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

Summary of Test Result

Report No.: FG041657-01F

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046 §90.635	Conducted Output Power and Effective Radiated Power	Pass	-
3.3	-	Peak-to-Average Ratio	Reporting only	-
3.4	§2.1049 §90.209	Occupied Bandwidth and 26dB Bandwidth	Reporting only	-
3.5	§2.1051 §90.691	Emission masks – Pass In-band emissions		-
3.6	§2.1051 §90.691	Emission masks – Out of band emissions	Pass	-
3.7	§2.1055 §90.213	Frequency Stability for Temperature & Voltage		-
3.8	§2.1053 §90.691	Field Strength of Spurious Radiation Pass		Under limit 37.02 dB at 4074.000 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: Dara Chiu

TEL: 886-3-327-3456 Page Number : 4 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

1 General Description

1.1 Feature of Equipment Under Test

WCDMA/LTE/5G NR, Wi-Fi 2.4GHz 802.11b/g/n/ax, Wi-Fi 5GHz 802.11a/n/ac/ax and GNSS

Product Specification subjective to this standard				
	WWAN: Fixed Internal Antenna WLAN:			
Antenna Type	<ant. 1="">: Fixed Internal Antenna</ant.>			
	<ant. 2="">: Fixed Internal Antenna</ant.>			
	GPS: Fixed Internal Antenna			

Report No. : FG041657-01F

1.2 Modification of EUT

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

1.3 Testing Site

resting one					
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				
Tool Cita No	Sporton Site No.				
Test Site No.	TH05-HY				
Test Engineer	Benjamin Lin				
Temperature 21.5~23.6°C					
Relative Humidity 45.7~46.9%					

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory			
No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855				
Test Site No.	Sporton Site No.			
rest site No.	03CH12-HY			
Test Engineer	Jack Cheng, Lance Chiang, and Chuan Chu			
Temperature	23.8~25.6℃			
Relative Humidity	56.0~68.0%			

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

FCC Designation No. TW1190 and TW0007

TEL: 886-3-327-3456 Page Number : 5 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

1.4 Applied Standards

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

Report No.: FG041657-01F

- FCC 47 CFR Part 2, 90
- ANSI / TIA-603-E
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01
- Interim Guidance for Equipment Authorization of Devices with Channel Bandwidths Combined Across Two Contiguous Service Rule Allocations OET/Lab/EACB, June 6, 2013

Remark:

- All test items were verified and recorded according to the standards and without any deviation during the test.
- 2. The TAF code is not including all the FCC KDB listed without accreditation.

TEL: 886-3-327-3456 Page Number : 6 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

2 Test Configuration of Equipment Under Test

2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level.

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

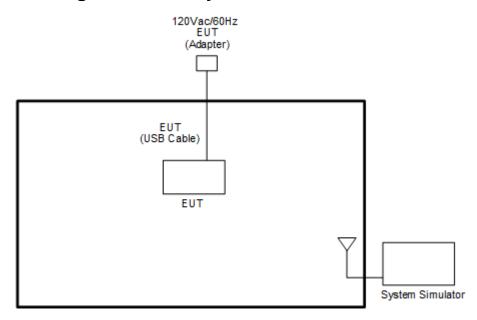
Report No.: FG041657-01F

Frequency range investigated for radiated emission is 30 MHz to 9000 MHz.

Conducted			Ba	andwic	th (Mi	Hz)		N	/lodulatio	n		RB#		Tes	t Cha	nnel
Test Cases	Band	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	М	Н
Max. Output Power	26	٧	٧	v	v	v	ı	٧	v	v	٧	v	V	٧	٧	v
Peak-to-Average Ratio	26					v	ı	٧	v	v	>		v	>	v	v
26dB and 99% Bandwidth	26	v	>	v	v	v	ı	٧	v	v			v	>	v	v
Emission masks In-band emissions	26	>	>	V	v	v	ı	>	v	v	>		V	>		v
Emission masks – Out of band emissions	26	٧	٧	v	v	v	,	٧	v	v	>			>	v	v
Frequency Stability	26	-	-		v	v	-	٧	v	v			~		v	
E.R.P.	26					v	ı	٧	v	v	٧			٧	V	v
Radiated Spurious Emission 26 Worst Case						>	v	v								
Remark	 The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. LTE Band26 transmit frequency for part22 rule is 824MHz-849MHz, for part90 rule is 814MHz-824MHz. ERP over 15MHz bandwidth complies the ERP limit line of part22 rule, therefore ERP of the partial frequency spectrum which falls within part 22 also complies. All the radiated test cases were performed with Battery 2. 															

TEL: 886-3-327-3456 Page Number : 7 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

2.2 Connection Diagram of Test System



Report No.: FG041657-01F

2.3 Support Unit used in test configuration and system

Iter	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	8821C	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 RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

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

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 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 : 8 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

2.5 Frequency List of Low/Middle/High Channels

LTE Band 26 Channel and Frequency List							
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest			
15	Channel	26765	-	-			
15	Frequency	821.5	-	-			
10	Channel	-	26740	-			
10	Frequency	-	819	-			
5	Channel	26715	26740	26765			
5	Frequency	816.5	819	821.5			
3	Channel	26705	26740	26775			
S	Frequency	815.5	819	822.5			
1.4	Channel	26697	26740	26783			
1.4	Frequency	814.7	819	823.3			

Report No. : FG041657-01F

TEL: 886-3-327-3456 Page Number : 9 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

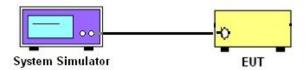
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

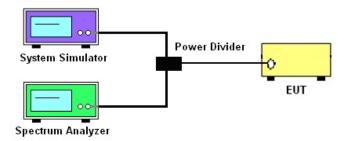
3.1.1 Test Setup

3.1.2 Conducted Output Power

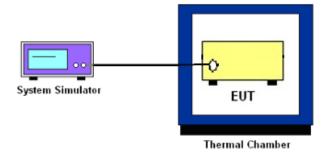


Report No.: FG041657-01F

3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, Emission Mask, Emissions Mask – Out Of Band Emissions, 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 : 10 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.2 Conducted Output Power Measurement and ERP Measurement

3.2.1 Description of the Conducted Output Power Measurement and ERP Measurement

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

Report No.: FG041657-01F

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 26.

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

3.2.2 Test Procedures

- 1. The transmitter output port was connected to the system simulator.
- 2. Set EUT at maximum power through 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 : 11 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.3 Peak-to-Average Ratio

3.3.1 Description of the PAR Measurement

Reporting only

3.3.2 Test Procedures

- 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.

Report No.: FG041657-01F

- 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 : 12 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 Description of (Occupied) Bandwidth Limitations Measurement

The 99% 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.: FG041657-01F

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.4.2 Test Procedures

- 1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
- 2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

TEL: 886-3-327-3456 Page Number : 13 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.5 Emissions Mask Measurement

3.5.1 Description of Emissions Mask Measurement

Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of FCC Part 90.691.(a)

Report No.: FG041657-01F

- (a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
- (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 $\log_{10}(f/6.1)$ decibels or 50 + 10 $\log_{10}(P)$ decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.
- (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \text{Log}_{10}$ (P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

3.5.2 Test Procedures

- 1. The EUT was connected to spectrum analyzer and base station via power divider.
- 2. The emissions mask of low and high channels for the highest RF powers were measured.
- 3. Set RBW and VBW 3 times of RBW to make the measurement with the spectrum analyzer's, and according to KDB 971168 D02 Misc Rev Approve License Devices v02r01 standards, set RBW = 300 Hz to make offsets less than 37.5 kHz from a channel edge, RBW = 100 kHz to make offsets greater than 37.5 kHz, that is allowed.
- 4. The test results were shown below plots with a correction offset factor including cable loss, insertion loss of power divider.

TEL: 886-3-327-3456 Page Number : 14 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.6 Emissions Mask - Out Of Band Emissions Measurement

3.6.1 Description of Conducted Emissions Out of band emissions measurement

The power of any emission FCC Part 90.691 (a)(2) on any frequency removed from the assigned frequency by out of the authorized bandwidth at least 43 + 10 log (P) dB. It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

Report No.: FG041657-01F

3.6.2 Test Procedures

- 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. For testing below 1GHz, make the measurement with the spectrum analyzer's RBW = 100 kHz, VBW = 3MHz, taking the record of maximum spurious emission.
- 6. For testing above 1GHz, make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
- 7. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 8. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

TEL: 886-3-327-3456 Page Number : 15 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.7 Frequency Stability Measurement

3.7.1 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.: FG041657-01F

3.7.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedures for Temperature Variation

- 1. The EUT was set up in the thermal chamber and connected with the base station.
- With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three
 hours. 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.

3.7.4 Test Procedures for Voltage Variation

- 1. The EUT was placed in a temperature chamber at 20±5° C and connected with the base station.
- The power supply voltage to the EUT was varied from BEP 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 : 16 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

3.8 Field Strength of Spurious Radiation Measurement

3.8.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

Report No.: FG041657-01F

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43+10log₁₀(P[Watts]) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

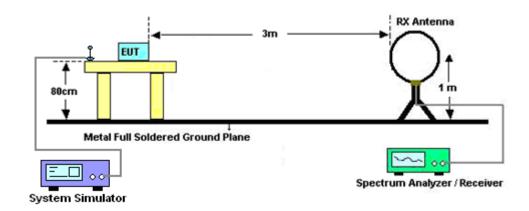
3.8.2 Test Procedures

- 1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
- 2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
- 4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
- 5. For testing below 1GHz, make the measurement with the spectrum analyzer's RBW = 100 kHz, VBW = 3MHz, Sweep = 500ms, Taking the record of maximum spurious emission.
- 6. For testing above 1GHz, make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, Sweep = 500ms, 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.
- 9. Taking the record of output power at antenna port.
- 10. Repeat step 7 to step 8 for another polarization.
- 11. EIRP (dBm) = S.G. Power Tx Cable Loss + Tx Antenna Gain
- 12. ERP (dBm) = EIRP 2.15
- 13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
- 14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

TEL: 886-3-327-3456 Page Number : 17 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

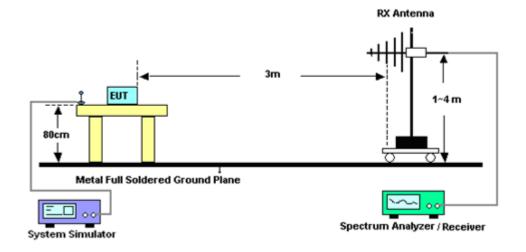
3.8.3 Test Setup

For radiated emissions below 30MHz

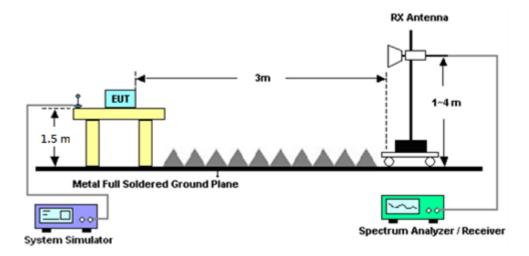


Report No. : FG041657-01F

For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



Report No.: FG041657-01F

3.8.4 Test Result of Field Strength of Spurious Radiated

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 : 19 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Base Station (Measure)	Anritsu	MT8821C	6262025280	GSM / GPRS /WCDMA / LTE FDD/TDD with 44) /LTE-3CC DLCA,2CC ULCA	Oct. 25, 2019	Aug. 01, 2020 ~ Sep. 02, 2020	Oct. 24, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101908	10Hz~40GHz	May 13, 2020	Aug. 01, 2020 ~ Sep. 02, 2020	May 12, 2021	Conducted (TH05-HY)
Thermal Chamber	ESPEC	SU-241	92003713	-40°C~90°C	May 15, 2020	Aug. 01, 2020 ~ Sep. 02, 2020	May 14, 2021	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 09, 2019	Aug. 01, 2020 ~ Sep. 02, 2020	Oct. 08, 2020	Conducted (TH05-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#A	1-18GHz	Jan. 13, 2020	Aug. 01, 2020 ~ Sep. 02, 2020	Jan. 12, 2021	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Aug. 14, 2020 ~ Sep. 02, 2020	Dec. 25, 2020	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	37059 & 01	30MHz~1GHz	Oct. 12, 2019	Aug. 14, 2020 ~ Sep. 02, 2020	Oct. 11, 2020	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Nov. 14, 2019	Aug. 14, 2020 ~ Sep. 02, 2020	Nov. 13, 2020	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-1522	1GHz ~ 18GHz	Sep. 19, 2019	Aug. 14, 2020 ~ Sep. 02, 2020	Sep. 18, 2020	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 25, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Mar. 24, 2021	Radiation (03CH12-HY)
Preamplifier	Keysight	83017A	MY57280120	1GHz~26.5GHz	Jul. 20, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Jul. 19, 2021	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-30 3K	17100018000 54002	1GHz~18GHz	Feb. 07, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Feb. 06, 2021	Radiation (03CH12-HY)
Spectrum Analyzer	Agilent	N9010A	MY54200485	10Hz~44GHz	Feb. 10, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Feb. 09, 2021	Radiation (03CH12-HY)
Signal Generator	Anritsu	MG3694C	163401	0.1Hz~40GHz	Feb. 15, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Feb. 14, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz~30MHz	Mar. 12, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Mar. 11, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 12, 2019	Aug. 14, 2020 ~ Sep. 02, 2020	Dec. 11, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 25, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 25, 2020	Aug. 14, 2020 ~ Sep. 02, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP140349	N/A	Oct. 25, 2019	Aug. 14, 2020 ~ Sep. 02, 2020	Oct. 24, 2020	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 14, 2020 ~ Sep. 02, 2020	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Aug. 14, 2020 ~ Sep. 02, 2020	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Aug. 14, 2020 ~ Sep. 02, 2020	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Aug. 14, 2020 ~ Sep. 02, 2020	N/A	Radiation (03CH12-HY)

Report No. : FG041657-01F

TEL: 886-3-327-3456 Page Number : 20 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of	3.07
Confidence of 95% (U = 2Uc(y))	3.01

Report No. : FG041657-01F

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

Measuring Uncertainty for a Level of	2 24
Confidence of 95% (U = 2Uc(y))	3.21

TEL: 886-3-327-3456 Page Number : 21 of 21 FAX: 886-3-328-4978 Issued Date : Sep. 16, 2020



Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

	LTE Band 26 Maximum Average Power [dBm]										
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest					
15	1	0		23.68	-	-					
15	1	37		23.58	-	-					
15	1	74		23.63	-	-					
15	36	0	QPSK	22.71	-	-					
15	36	20		22.76	-	-					
15	36	39		22.71	-	-					
15	75	0		22.76	-	-					
15	1	0		23.00	-	-					
15	1	37		22.93	-	-					
15	1	74	16-QAM	22.93	-	-					
15	36	0		21.74	-	-					
15	36	20		21.76	-	-					
15	36	39		21.72	-	-					
15	75	0		21.76	-	-					
15	1	0		21.86	-	-					
15	1	37		21.85	-	-					
15	1	74		21.82	-	-					
15	36	0	64-QAM	20.78	-	-					
15	36	20		20.78	-	-					
15	36	39		20.77	-	-					
15	75	0		20.77	-	-					
15	1	0		18.76	-	-					
15	1	37		18.71	-	-					
15	1	74		18.73	-	-					
15	36	0	256-QAM	18.64	-	-					
15	36	20		18.70	-	-					
15	36	39		18.63	-	-					
15	75	0		18.66	-	-					



		LTE	Band 26 Max	cimum Average Po	ower [dBm]	
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
10	1	0		-	23.67	-
10	1	25		-	23.62	-
10	1	49		-	23.78	-
10	25	0	QPSK	_	22.79	-
10	25	12		-	22.87	-
10	25	25		-	22.84	-
10	50	0		-	22.87	-
10	1	0		-	22.83	-
10	1	25		-	22.86	-
10	1	49		-	22.92	-
10	25	0	16-QAM	-	21.80	-
10	25	12		-	21.91	-
10	25	25		-	21.82	-
10	50	0		-	21.87	-
10	1	0		-	21.88	-
10	1	25		-	21.93	-
10	1	49		-	22.00	-
10	25	0	64-QAM	-	20.82	-
10	25	12		-	20.94	-
10	25	25		-	20.87	-
10	50	0		-	20.90	-
10	1	0		-	18.67	-
10	1	25		-	18.71	-
10	1	49		-	18.80	-
10	25	0	256-QAM	-	18.67	-
10	25	12		-	18.70	-
10	25	25		-	18.68	ı
10	50	0		-	18.64	-



FCC RADIO TEST REPORT

		LTE	Band 26 Ma	ximum Average Po	ower [dBm]	
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest
5	1	0		23.67	23.59	23.63
5	1	12		23.56	23.59	23.72
5	1	24		23.61	23.68	23.65
5	12	0	QPSK	22.62	22.73	22.81
5	12	7		22.76	22.82	22.87
5	12	13		22.70	22.86	22.84
5	25	0		22.75	22.72	22.83
5	1	0		23.00	22.87	22.95
5	1	12		22.85	22.96	22.92
5	1	24	16-QAM	22.87	22.83	22.91
5	12	0		21.71	21.69	21.79
5	12	7		21.71	21.75	21.80
5	12	13		21.67	21.80	21.87
5	25	0		21.66	21.81	21.85
5	1	0		21.77	21.73	21.87
5	1	12		21.82	21.92	21.95
5	1	24		21.77	21.86	21.84
5	12	0	64-QAM	20.73	20.78	20.89
5	12	7		20.71	20.79	20.89
5	12	13		20.76	20.91	20.84
5	25	0		20.73	20.82	20.83
5	1	0		18.66	18.64	18.79
5	1	12		18.71	18.79	18.95
5	1	24		18.63	18.89	18.77
5	12	0	256-QAM	18.62	18.65	18.82
5	12	7		18.70	18.73	18.82
5	12	13		18.57	18.75	18.80
5	25	0		18.66	18.64	18.82



	LTE Band 26 Maximum Average Power [dBm]									
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest				
3	1	0		23.68	23.60	23.62				
3	1	8		23.49	23.61	23.80				
3	1	14		23.58	23.75	23.61				
3	8	0	QPSK	22.69	22.66	22.80				
3	8	4		22.76	22.80	22.87				
3	8	7		22.68	22.82	22.91				
3	15	0		22.70	22.77	22.86				
3	1	0		22.93	22.91	22.93				
3	1	8		22.92	22.89	22.89				
3	1	14	16-QAM	22.93	22.84	22.85				
3	8	0		21.64	21.67	21.85				
3	8	4		21.73	21.80	21.83				
3	8	7		21.66	21.78	21.80				
3	15	0		21.72	21.75	21.84				
3	1	0		21.78	21.72	21.87				
3	1	8		21.82	21.89	21.98				
3	1	14		21.75	21.92	21.78				
3	8	0	64-QAM	20.69	20.71	20.82				
3	8	4		20.75	20.77	20.86				
3	8	7		20.74	20.87	20.87				
3	15	0		20.75	20.79	20.87				
3	1	0		18.68	18.62	18.79				
3	1	8		18.67	18.77	18.96				
3	1	14		18.70	18.81	18.84				
3	8	0	256-QAM	18.56	18.74	18.81				
3	8	4		18.70	18.68	18.77				
3	8	7		18.56	18.69	18.83				
3	15	0		18.57	18.72	18.83				



FCC RADIO TEST REPORT

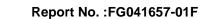
	LTE Band 26 Maximum Average Power [dBm]										
				ximum Average Po							
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest					
1.4	1	0		23.56	23.46	23.61					
1.4	1	3		23.62	23.59	23.64					
1.4	1	5		23.51	23.52	23.53					
1.4	3	0	QPSK	23.63	23.52	23.63					
1.4	3	1		23.61	23.55	23.66					
1.4	3	3		23.59	23.55	23.62					
1.4	6	0		22.62	22.65	22.69					
1.4	1	0		22.90	22.80	22.93					
1.4	1	3		22.95	22.92	22.99					
1.4	1	5		22.88	22.85	22.88					
1.4	3	0	16-QAM	22.71	22.59	22.73					
1.4	3	1		22.74	22.65	22.76					
1.4	3	3		22.68	22.64	22.68					
1.4	6	0		21.73	21.73	21.76					
1.4	1	0		21.85	21.76	21.88					
1.4	1	3		21.88	21.85	21.89					
1.4	1	5		21.80	21.76	21.81					
1.4	3	0	64-QAM	21.80	21.71	21.83					
1.4	3	1		21.87	21.78	21.87					
1.4	3	3		21.76	21.72	21.77					
1.4	6	0		20.68	20.68	20.74					
1.4	1	0		18.74	18.66	18.76					
1.4	1	3		18.68	18.77	18.98					
1.4	1	5		18.67	18.83	18.77					
1.4	3	0	256-QAM	18.62	18.71	18.76					
1.4	3	1		18.62	18.68	18.84					
1.4	3	3		18.61	18.72	18.85					
1.4	6	0		18.60	18.64	18.84					

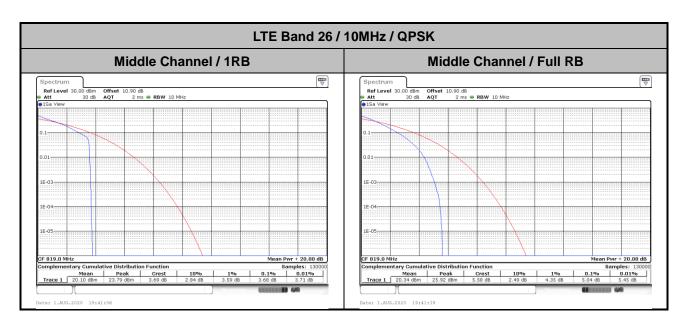
Peak-to-Average Ratio

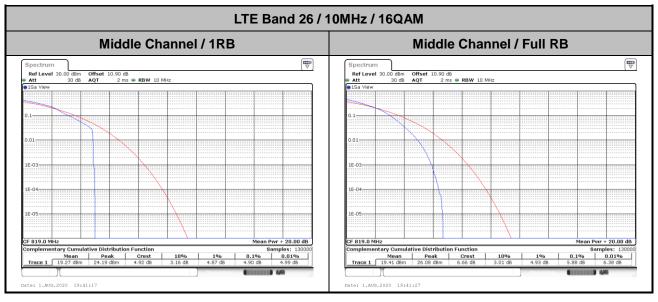
Mode						
Mod.	QP	SK	160	Limit: 13dB		
RB Size	1RB Full RB		1RB	Full RB	Result	
Lowest CH	-	-	-	-		
Middle CH	3.68	5.04	4.90	5.88	PASS	
Highest CH	-	-	-	-		
Mode		LTE Band	26 / 10MHz			
Mod.	64C	MA	2560	QAM	Limit: 13dB	
Mod. RB Size	1RB	Full RB	2560 1RB	QAM Full RB	Limit: 13dB Result	
		<u> </u>		1		
RB Size		<u> </u>		1		

Report No. :FG041657-01F

TEL: 886-3-327-3456 Page Number : A26S-1 of 59

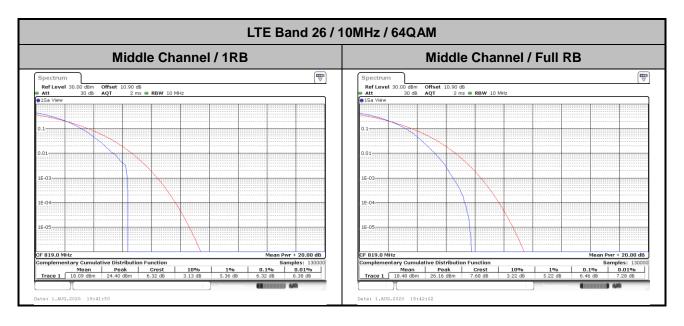


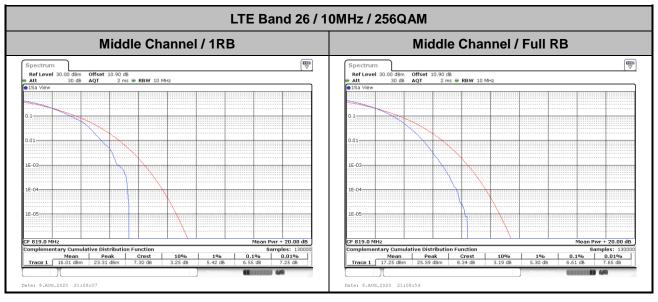




TEL: 886-3-327-3456 Page Number: A26S-2 of 59







TEL: 886-3-327-3456 Page Number: A26S-3 of 59

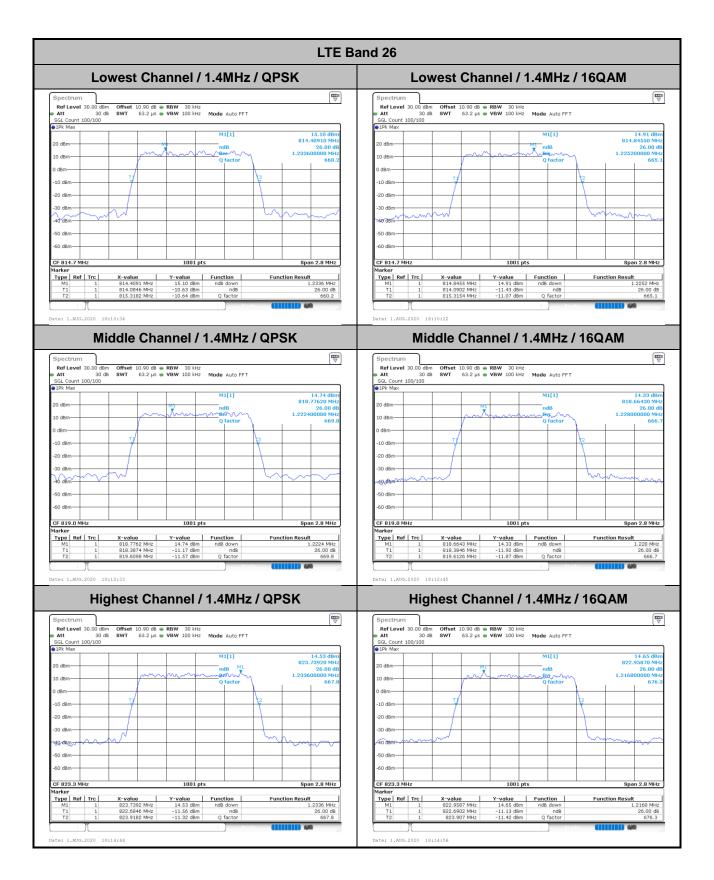
26dB Bandwidth

Mode	LTE Band 26 : 26dB BW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.23	1.23	3.03	3.03	4.95	4.85	-	-	14.45	14.30	-	-
Middle CH	1.22	1.23	3.03	3.04	4.88	4.86	9.85	9.63	-	-	-	-
Highest CH	1.23	1.22	2.96	3.03	4.92	4.87	-	-	-	-	-	-
Mode					LTE B	and 26 : :	26dB BV	V(MHz)				
BW	1.41	MHz	3N	lHz	5MHz 10MHz			15MHz		20MHz		
Mod.	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM
Lowest CH	1.23	1.21	3.02	3.00	4.87	4.81	-	-	14.24	14.63	-	-
Middle CH	1.22	1.23	3.02	3.02	4.87	4.85	9.91	9.73	-	-	-	-
Highest CH	1.21	1.22	3.01	3.03	4.85	4.91	-	-	-	-	-	-

Report No. :FG041657-01F

TEL: 886-3-327-3456 Page Number : A26S-4 of 59

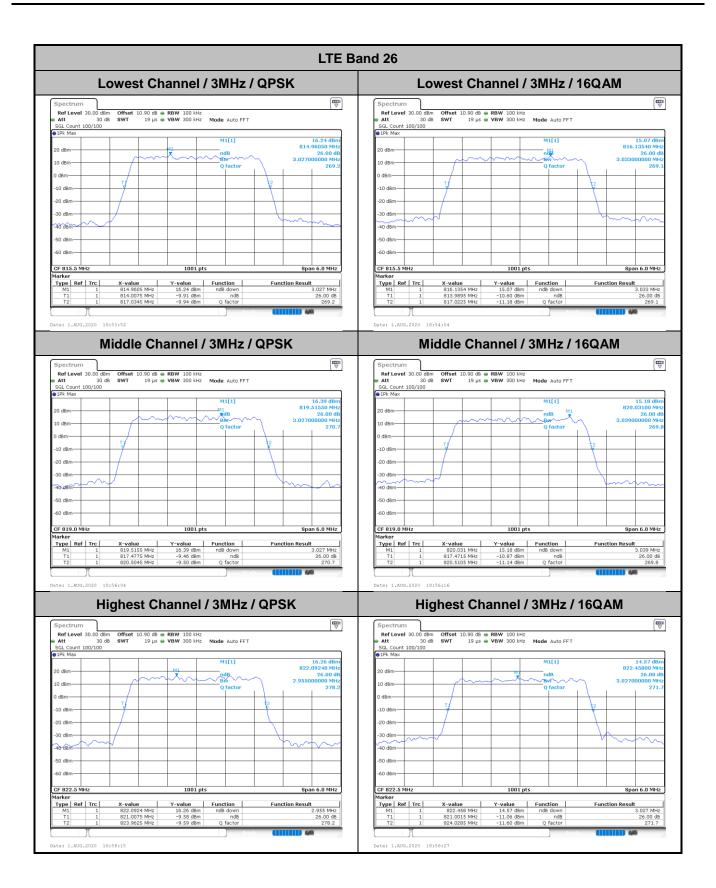
FCC RADIO TEST REPORT

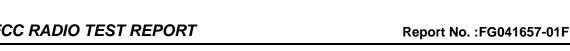


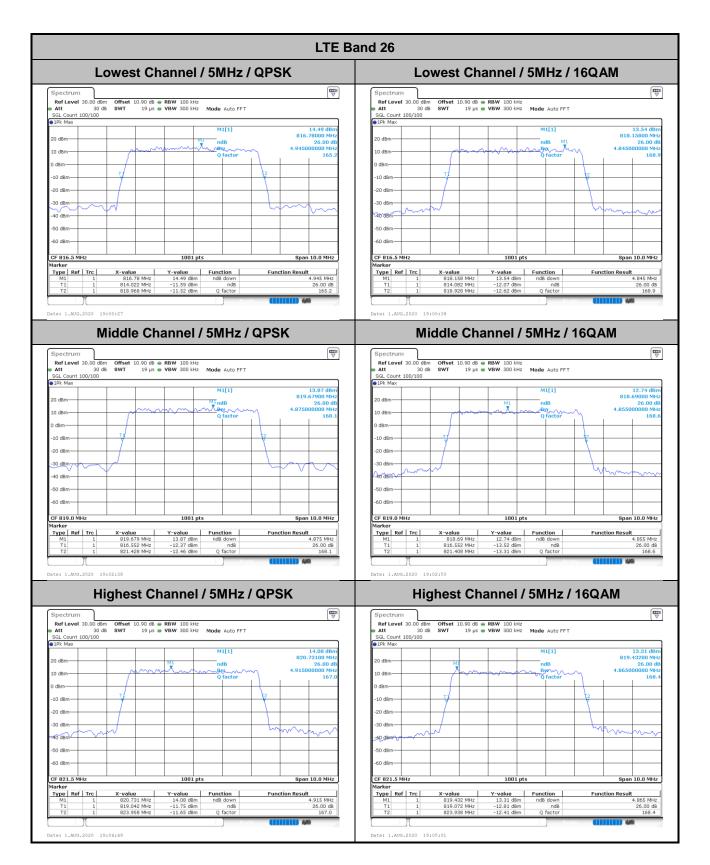
Report No.: FG041657-01F

FCC RADIO TEST REPORT

Report No.: FG041657-01F







TEL: 886-3-327-3456 Page Number : A26S-7 of 59

LTE Band 26 Middle Channel / 10MHz / QPSK Middle Channel / 10MHz / 16QAM 15.28 dB 16.17 dBr 10 dBm 85. -10 dBm--30 dBm -50 dBm-Function Result

9.85 MHz
26.00 dB
83.2
 X-value
 Y-value
 Function

 819.859 MHz
 15.28 dBm
 ndB down

 814.065 MHz
 -11.15 dBm
 ndB

 823.915 MHz
 -11.23 dBm
 Q factor

 X-value
 Y-value
 Function

 820.499 MHz
 16.17 dBm
 nd8 down

 814.185 MHz
 -10.29 dBm
 nd8

 823.815 MHz
 -10.71 dBm
 Q factor
 Type Ref Trc Lowest Channel / 15MHz / QPSK Lowest Channel / 15MHz / 16QAM
 Ref Level
 30.00 dBm
 Offset
 10.90 dB ● RBW
 300 kHz

 Att
 30 dB
 SWT
 12.6 µs ● VBW
 1 MHz
 Mode
 Auto FFT
 -20 dBm-40 dBm -50 dBm

CF 821.5 MHz

Y-value 13.13 dBm -12.50 dBm -12.95 dBm

Span 30.0 MHz

m ndB down m ndB m Q factor Report No.: FG041657-01F

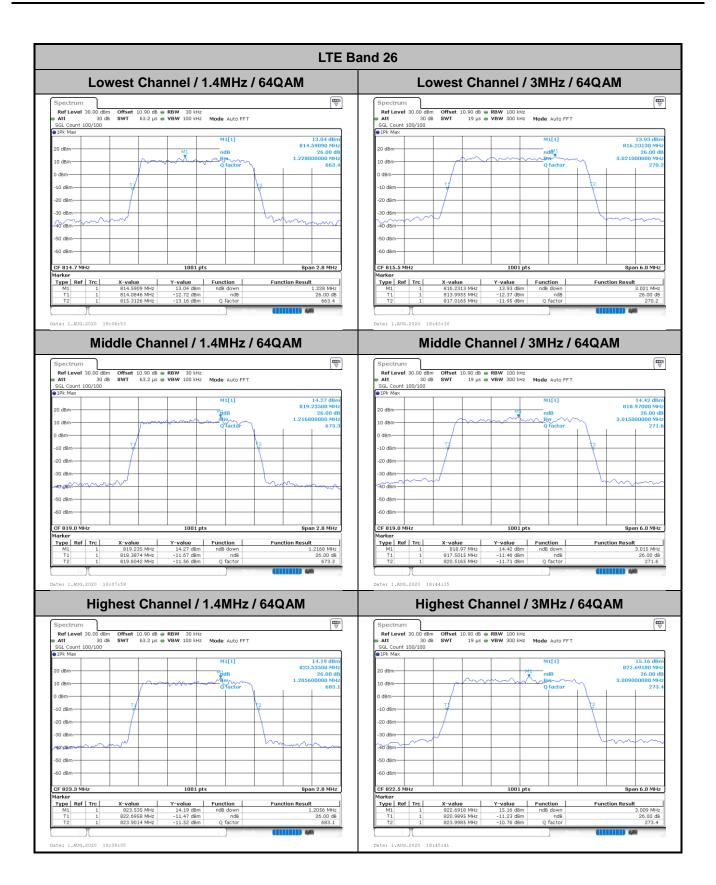
Span 30.0 MHz

TEL: 886-3-327-3456 Page Number: A26S-8 of 59

FAX: 886-3-328-4978

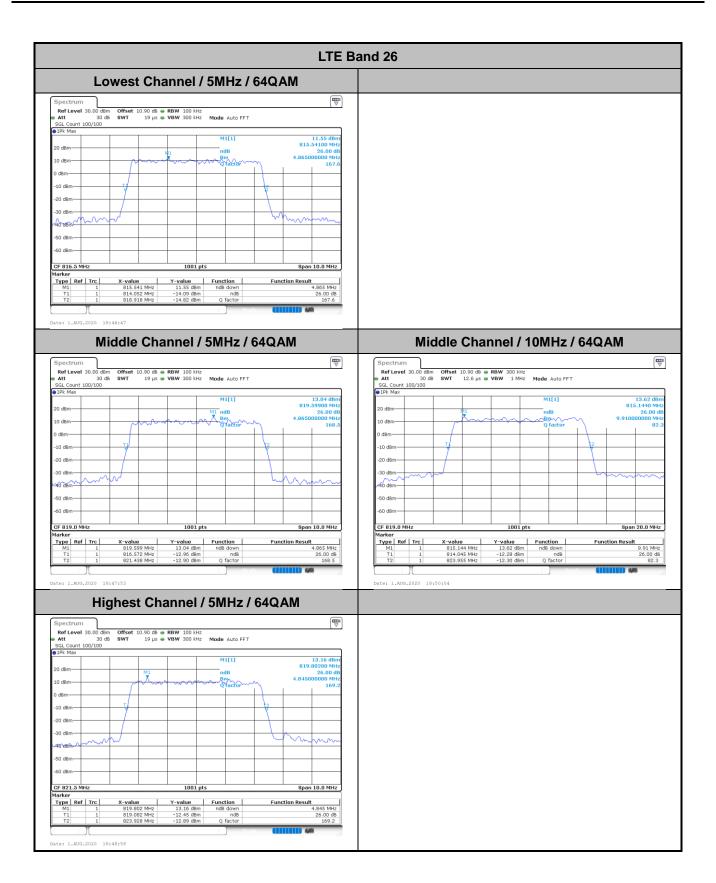
Type Ref Trc

Report No.: FG041657-01F

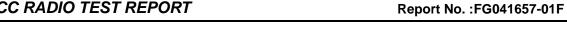


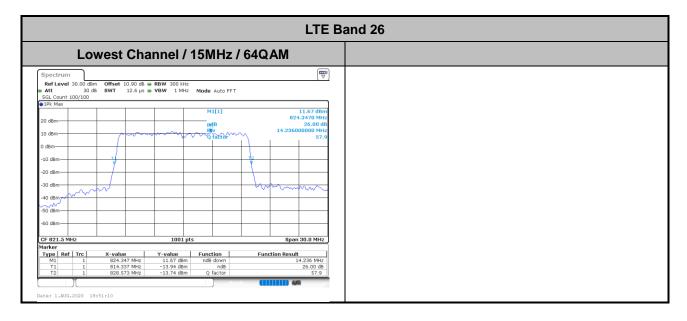
TEL: 886-3-327-3456 Page Number : A26S-9 of 59

Report No.: FG041657-01F

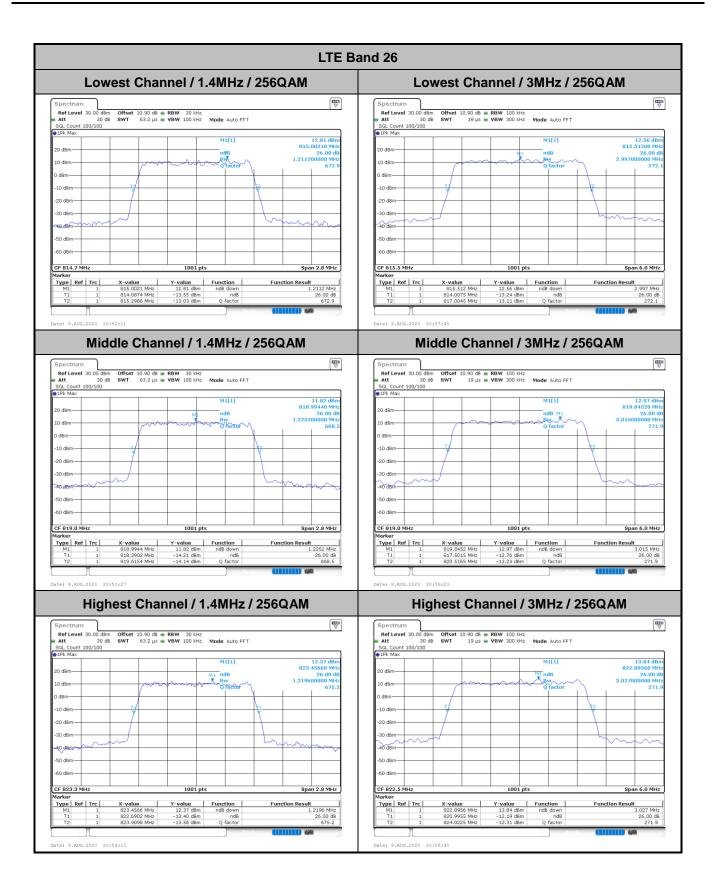


TEL: 886-3-327-3456 Page Number : A26S-10 of 59

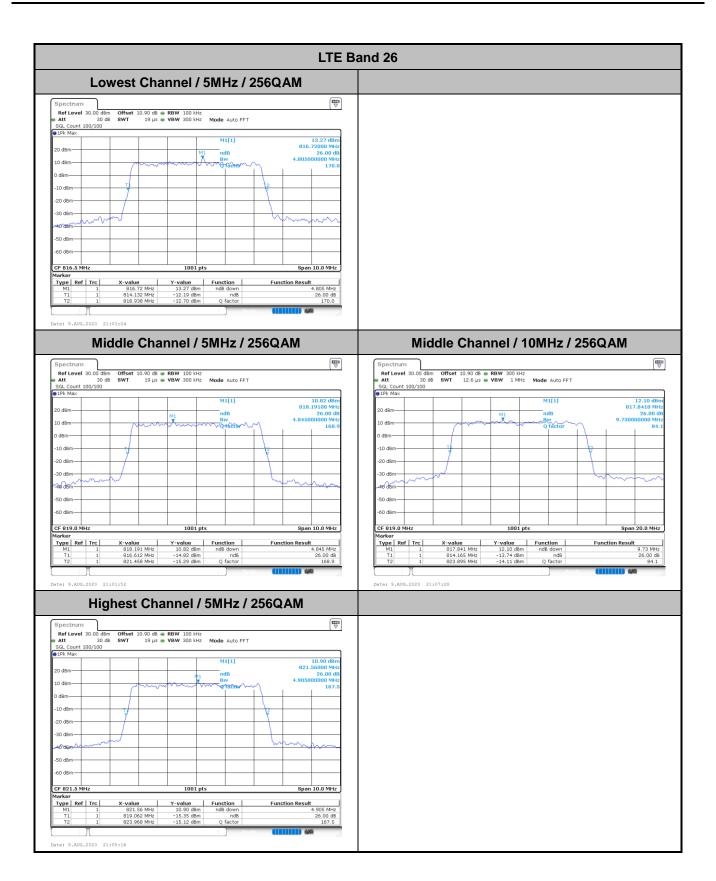




TEL: 886-3-327-3456 Page Number: A26S-11 of 59

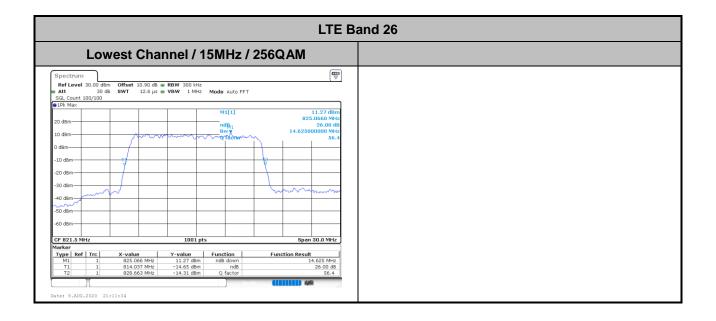


TEL: 886-3-327-3456 Page Number : A26S-12 of 59



TEL: 886-3-327-3456 Page Number : A26S-13 of 59





TEL: 886-3-327-3456 Page Number : A26S-14 of 59

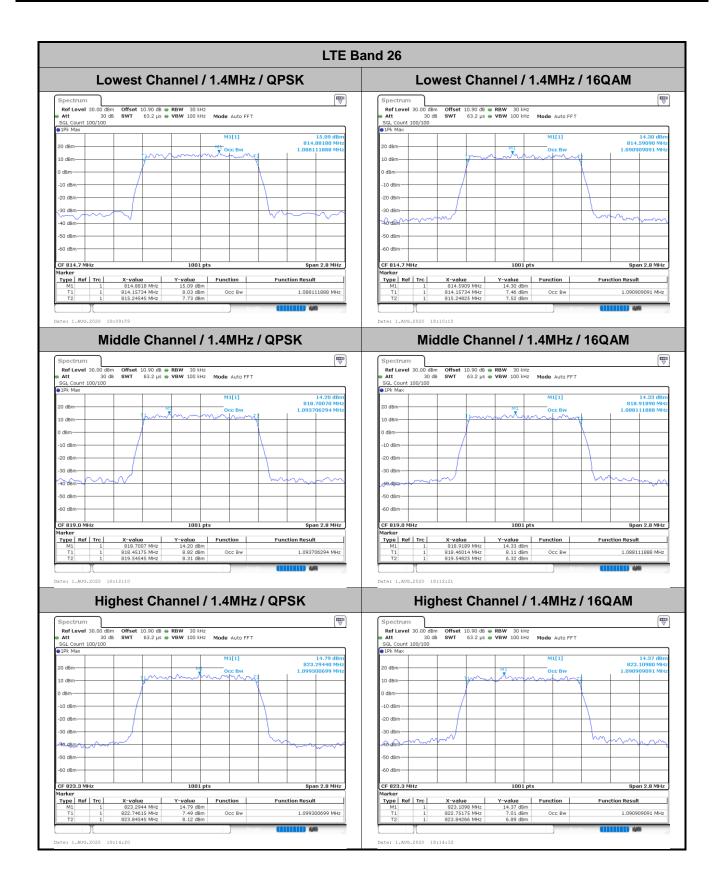
Occupied Bandwidth

Mode	LTE Band 26 : 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	1.09	1.09	2.74	2.70	4.46	4.48	-	-	13.46	13.43	-	-
Middle CH	1.09	1.09	2.71	2.70	4.48	4.48	8.99	8.95	-	-	-	-
Highest CH	1.10	1.09	2.69	2.70	4.50	4.49	-	-	-	-	-	-
Mode	LTE Band 26 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM	64QAM	256 QAM
Lowest CH	1.09	1.09	2.70	2.72	4.49	4.47	-		13.43	13.40	-	-
Middle CH	1.09	1.09	2.72	2.71	4.53	4.48	9.03	8.99	-	-	-	-
Highest CH	1.09	1.08	2.73	2.72	4.49	4.48	-	-	-	-	-	-

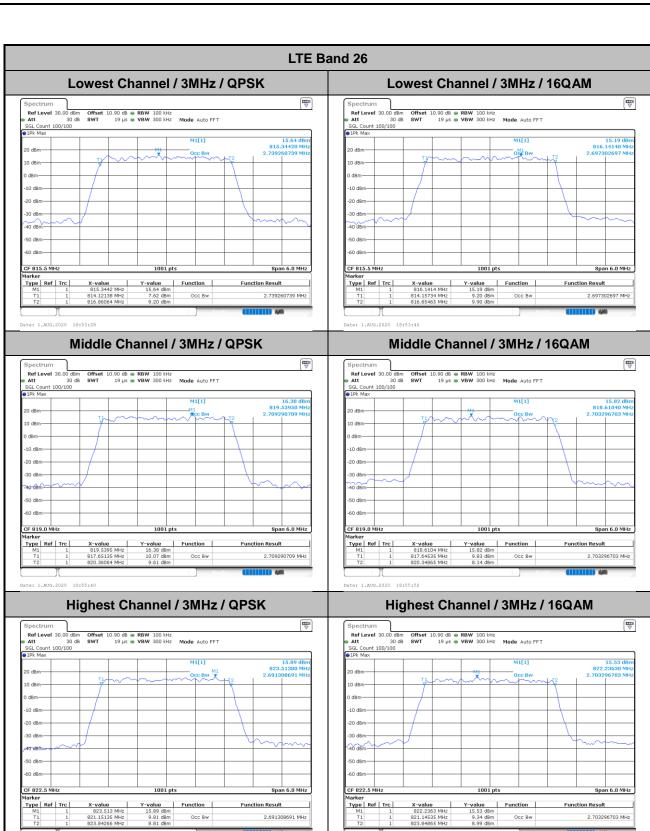
Report No. :FG041657-01F

TEL: 886-3-327-3456 Page Number : A26S-15 of 59

DIO TEST REPORT Report No. :FG041657-01F



TEL: 886-3-327-3456 Page Number : A26S-16 of 59

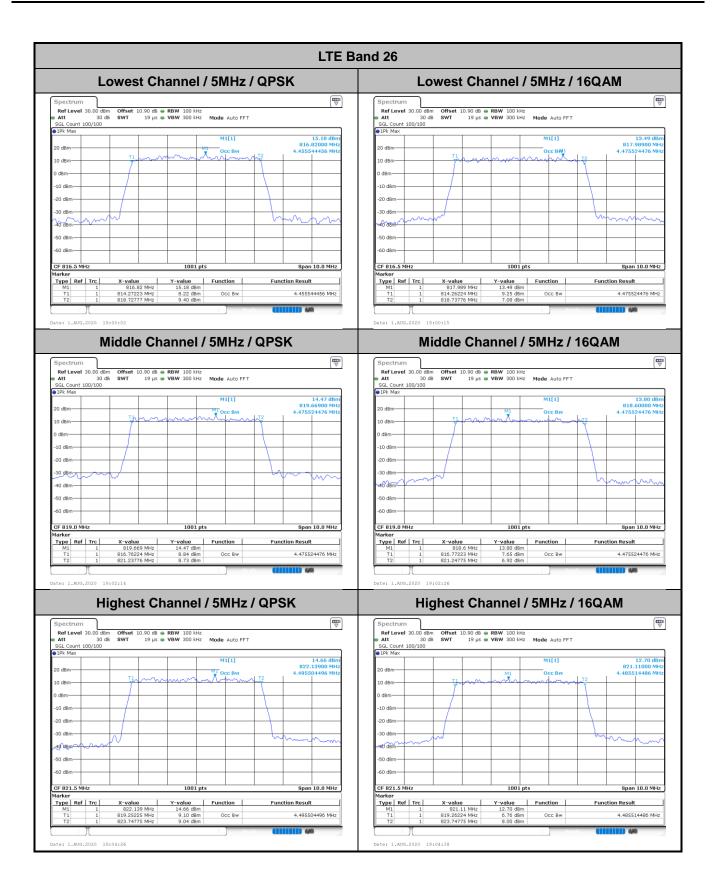


Function Result

2.703296703 MHz

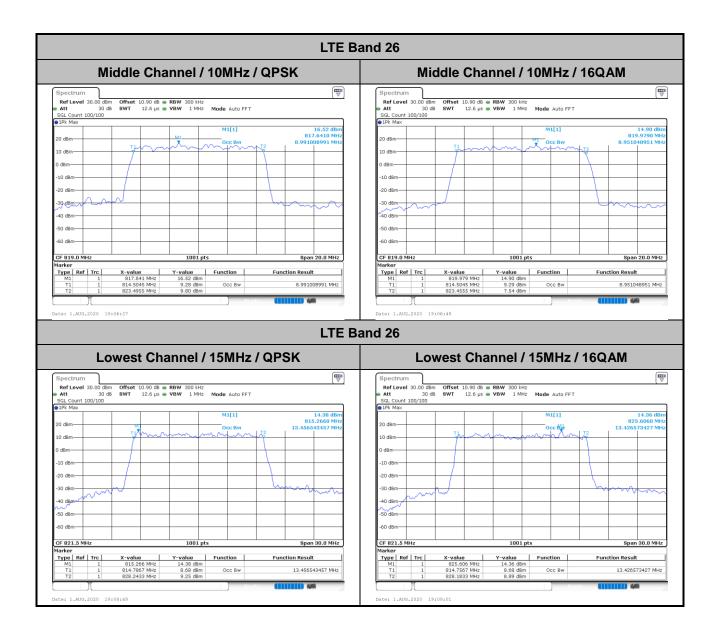
TEL: 886-3-327-3456 Page Number : A26S-17 of 59

2.691308691 MHz



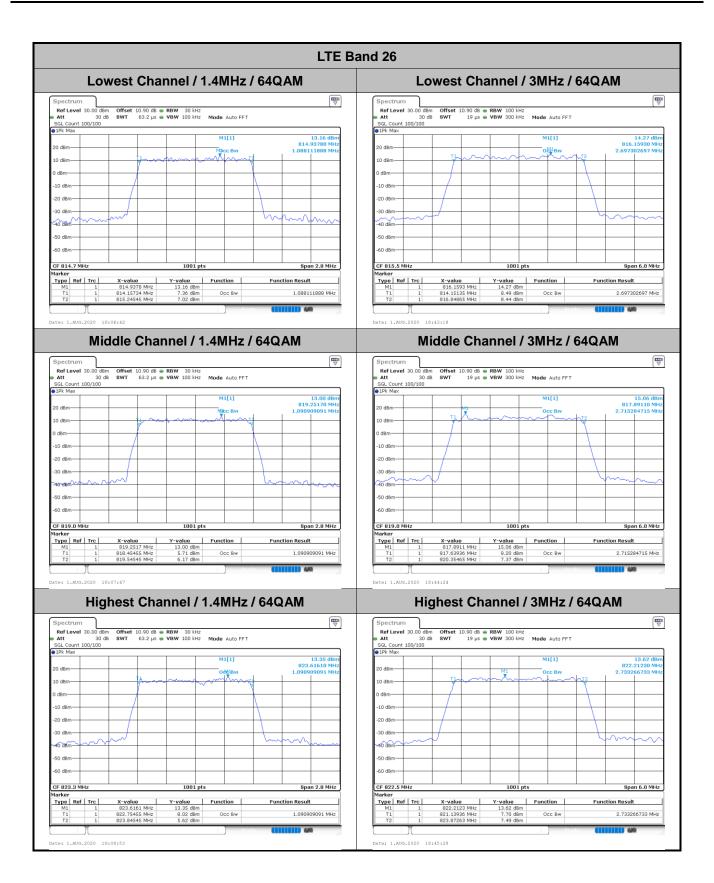
TEL: 886-3-327-3456 Page Number : A26S-18 of 59

CC RADIO TEST REPORT Report No. :FG041657-01F

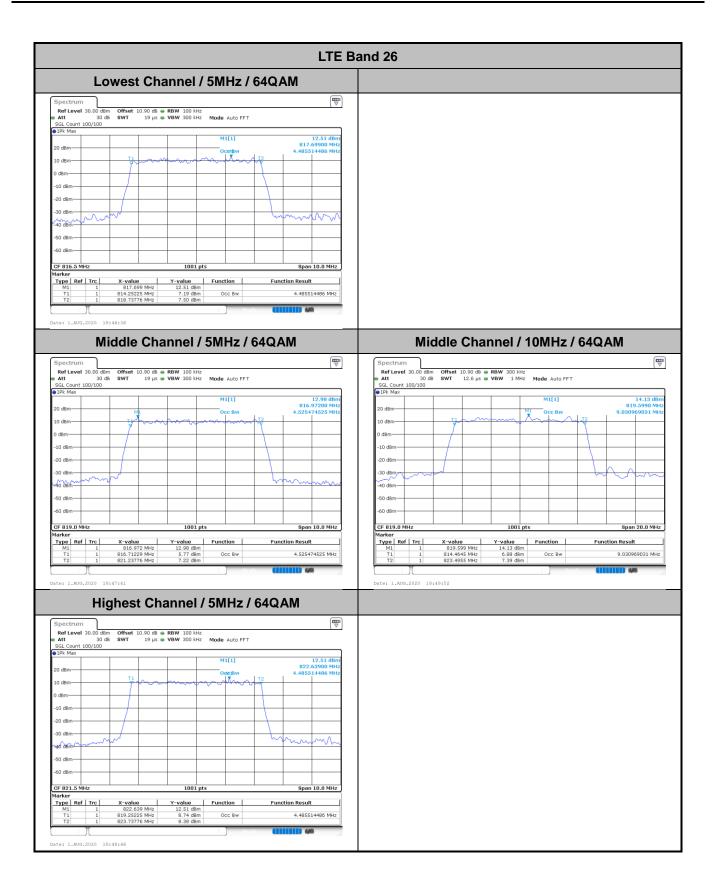


TEL: 886-3-327-3456 Page Number : A26S-19 of 59

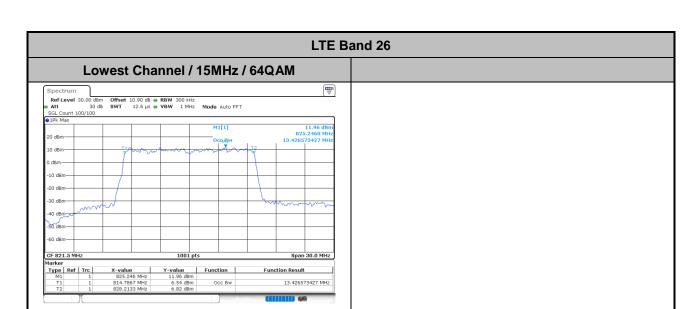
SPORTON LAB. FCC RADIO TEST REPORT



Report No.: FG041657-01F



TEL: 886-3-327-3456 Page Number : A26S-21 of 59



TEL: 886-3-327-3456 Page Number : A26S-22 of 59

LTE Band 26 Lowest Channel / 1.4MHz / 256QAM Lowest Channel / 3MHz / 256QAM -10 dBm--10 dBm-30 dBm-40 dBm--50 dBm--50 dBm--60 dBm-
 X-value
 Y-value
 Function

 815.6499 MHz
 13.33 dBm

 814.13936 MHz
 7.18 dBm
 Occ Bw

 816.86064 MHz
 7.07 dBm
 Occ Bw
 Type Ref Trc Type Ref Trc Middle Channel / 1.4MHz / 256QAM Middle Channel / 3MHz / 256QAM Ref Level 30.00 dBm
Att 30 dB
SGL Count 100/100
Pk Max xer Level 30.00 dBm
Att 30 dB
SGL Count 100/100
1Pk Max 10 dBm -20 dBm-40 dBm--50 dBm-CF 819.0 MHz Span 2.8 MHz Span 6.0 MHz
 X-value
 Y-value
 Function

 819.1566 MHz
 12.40 dBm
 819.4545 MHz

 819.45455 MHz
 5.16 dBm
 Occ Bw

 819.54266 MHz
 5.53 dBm
 Type Ref Trc
 X-value
 Y-value
 Function

 819.1738 MHz
 13.72 dBm
 817.64535 MHz
 7.00 dBm
 Occ Bw

 820.36064 MHz
 7.13 dBm
 7.13 dBm
 Occ Bw
 Function Result Function Result 1.088111888 MHz 2.715284715 MHz Highest Channel / 3MHz / 256QAM Highest Channel / 1.4MHz / 256QAM Ref Level 30.00 dBm Offset 10.90 dB ● RBW 30 kHz
■ Att 30 db SWT 63.2 μs ● VBW 100 kHz Mode Auto FFT

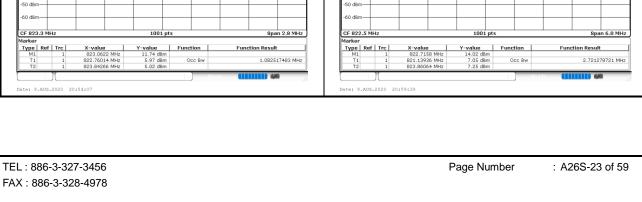
SGL Count 100/100
■1Pk Max Ref Level 30.00 dBm Offset 10.90 dB RBW 100 kHz

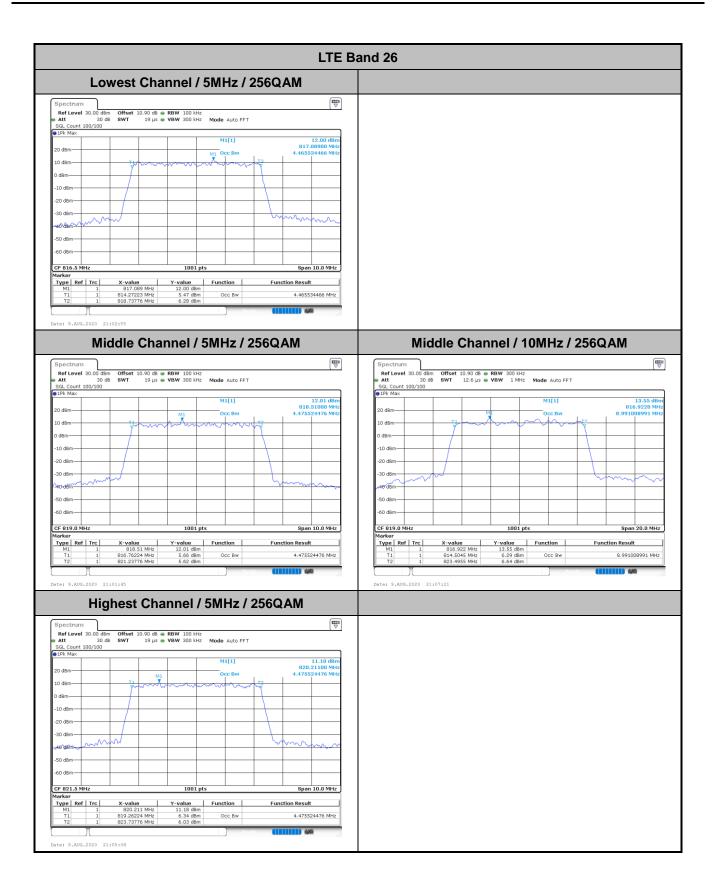
Att 30 db SWT 19 µs VBW 300 kHz Mode Auto FFT

SGL Count 100/100

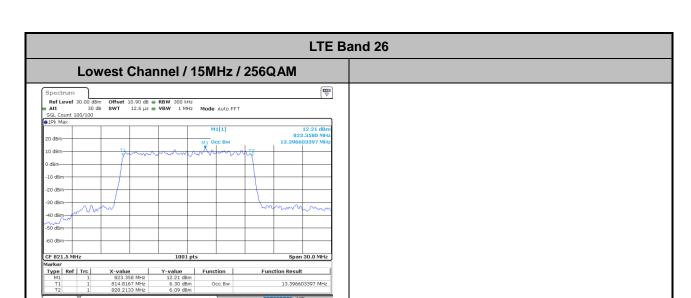
1Pk Max 11.74 dBr 823.06220 MH 1.082517483 MH 14.02 dBr 822.71580 MH 2.721278721 MH 20 dBm dBm-0 dBm--10 dBm--20 dBm-40 dBm-40 dBm -50 dBm--50 dBm-

Report No.: FG041657-01F



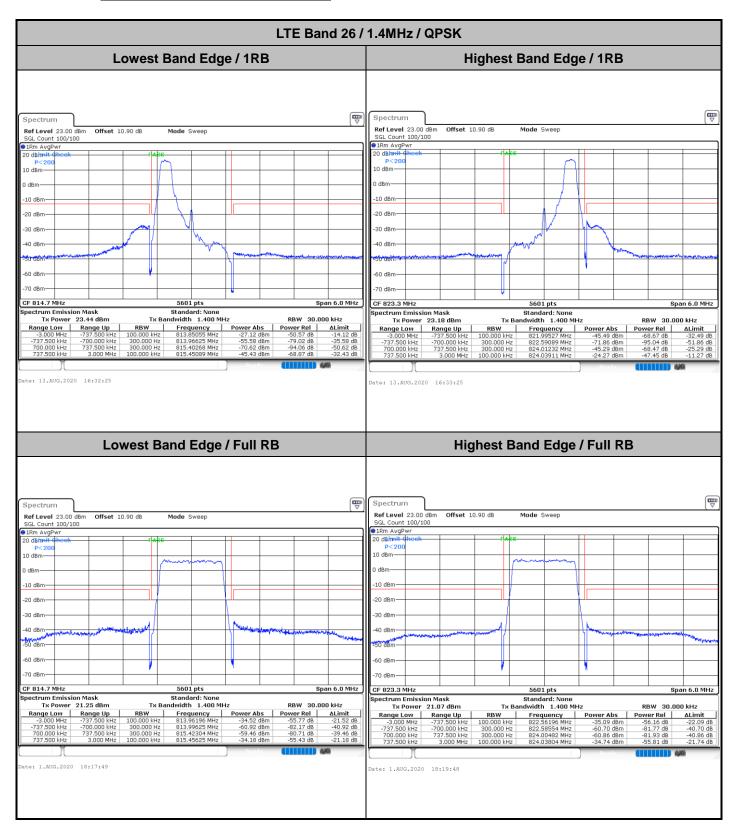


TEL: 886-3-327-3456 Page Number : A26S-24 of 59



TEL: 886-3-327-3456 Page Number : A26S-25 of 59

Conducted Band Edge



Report No.: FG041657-01F

TEL: 886-3-327-3456 Page Number : A26S-26 of 59

LTE Band 26 / 1.4MHz / 16QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Ref Level 23.00 Offset 10.90 dB Mode Sweep Ref Level 23.00 dBm Offset 10.90 dB Mode Sweep SGL Count 100/100 10 dBm 5601 pts CF 823.3 MHz 5601 pts Standard: None Tx Bandwidth 1.400 MHz Spectrum Emission Mask Standard: None Tx Power 22.51 dBm Тх Ba dwidth 1.400 MHz RBW 30.000 kHz
 Range Low
 Range Up

 -3.000 MHz
 -737.500 kHz

 -737.500 kHz
 -700.000 kHz

 700.000 kHz
 737.500 kHz

 737.500 kHz
 3.000 MHz

 Frequency
 Power Abs

 813,96196 MHz
 -23.83 dBm

 813,99839 MHz
 -48.23 dBm

 815,43589 MHz
 -71.80 dBm

 815,44018 MHz
 -45.06 dBm
 ate: 13.AUG.2020 16:32:55 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Ref Level 23.00 dBm Offset 10.90 dB SGL Count 100/100 Mode Sweep Ref Level 23.00 dBm Offset 10.90 dB Mode Sweep SGL Count 100/100 ●1Rm AvgPwr Span 6.0 MHz CF 823.3 MHz 5601 pts ectrum Emission Mask Tx Power 20.17 dBm Standard: None Tx Bandwidth 1.400 MHz Standard: None Tx Bandwidth 1.400 MHz Tx Power 20.10 dBm

Range Low Range Up

-3.000 MHz -737 500 M RBW 30.000 kHz | Power Rel | ALimit |
-55.14 dB	-21.97 dB
-79.41 dB	-39.24 dB
-79.59 dB	-39.41 dB
-52.38 dB	-19.21 dB

Report No.: FG041657-01F

TEL: 886-3-327-3456 Page Number : A26S-27 of 59

LTE Band 26 / 1.4MHz / 64QAM Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Spectrum Ref Level 23.00 Offset 10.90 dB Mode Sweep Ref Level 23.00 dBm Offset 10.90 dB Mode Sweep SGL Count 100/100 10 dBm 5601 pts CF 823.3 MHz 5601 pts Standard: None Tx Bandwidth 1.400 MHz Spectrum Emission Mask Standard: None Tx Power 21.32 dBm

Range Low Range Up

-3.000 MHz -737.500 kHz Тх Ba dwidth 1.400 MHz RBW 30.000 kHz
 Frequency
 Power Abs

 813.95768 MHz
 -24.36 dBm

 813.99411 MHz
 -50.32 dBm

 815.41339 MHz
 -71.70 dBm

 815.51195 MHz
 -46.70 dBm
 ate: 13.AUG.2020 16:34:24 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Ref Level 23.00 dBm Offset 10.90 dB SGL Count 100/100 Mode Sweep Ref Level 23.00 dBm Offset 10.90 dB Mode Sweep SGL Count 100/100 ●1Rm AvgPwr Span 6.0 MHz CF 823.3 MHz 5601 pts ectrum Emission Mask Tx Power 19.20 dBm Standard: None Tx Bandwidth 1.400 MHz Standard: None Tx Bandwidth 1.400 MHz Tx Power 19.06 dBm

Range Low Range Up

-3.000 MHz -737 500 M RBW 30.000 kHz Power Rel ALimit
-54.77 dB -22.57
-79.00 dB -39.80
-78.66 dB -39.46
-54.08 dB -21.88 Range Low Range Up Frequency Power Abs te: 1.AUG.2020 18:21:16 Date: 1.AUG.2020 18:22:16

Report No.: FG041657-01F

TEL: 886-3-327-3456 Page Number : A26S-28 of 59