

Report No.: FG010720D



FCC RADIO TEST REPORT

FCC ID : UZ7TC26AK

Equipment : Touch computer

Brand Name : Zebra Model Name : TC26AK

Applicant : Zebra Technologies Corporation

1 Zebra Plaza, Holtsville, NY 11742

Manufacturer : Zebra Technologies Corporation

1 Zebra Plaza, Holtsville, NY 11742

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

The product was received on Mar. 12, 2020 and testing was started from Mar. 20, 2020 and completed on Apr. 26, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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

TEL: 886-3-327-3456 Page Number : 1 of 24
FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

Table of Contents

Report No. : FG010720D

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	5
	1.2	Product Specification of Equipment Under Test	
	1.3	Modification of EUT	
	1.4	Emission Designator	6
	1.5	Testing Site	7
	1.6	Applied Standards	8
2	Test	Configuration of Equipment Under Test	9
	2.1	Test Mode	9
	2.2	Connection Diagram of Test System	10
	2.3	Support Unit used in test configuration and system	10
	2.4	Measurement Results Explanation Example	10
	2.5	Frequency List of Low/Middle/High Channels	11
3	Cond	lucted Test Items	12
	3.1	Measuring Instruments	12
	3.2	Conducted Output Power Measurement and ERP Measurement	13
	3.3	Peak-to-Average Ratio	
	3.4	99% Occupied Bandwidth and 26dB Bandwidth Measurement	15
	3.5	Emissions Mask Measurement	16
	3.6	Emissions Mask – Out Of Band Emissions Measurement	
	3.7	Frequency Stability Measurement	18
	3.8	Field Strength of Spurious Radiation Measurement	19
4	List	of Measuring Equipment	22
5	Unce	ertainty of Evaluation	24
Аp	pendi	x A. Test Results of Conducted Test	
Ар	pendi	x B. Test Results of ERP and Radiated Test	
An	pendi	x C. Test Setup Photographs	

TEL: 886-3-327-3456 Page Number : 2 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

History of this test report

Report No. : FG010720D

Report No.	Version	Description	Issued Date
FG010720D	01	Initial issue of report	Apr. 30, 2020

TEL: 886-3-327-3456 Page Number : 3 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

Summary of Test Result

Report No.: FG010720D

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 – In-band emissions	Pass	-	
3.6	§2.1051 §90.691	Emission masks – Out of band emissions	Pass	-	
3.7	§2.1055 §90.213	Frequency Stability for Temperature & Voltage	Pass	-	
3.8	§2.1053 §90.691	Field Strength of Spurious Radiation	Pass	Under limit 34.04 dB at 3256.000 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: Tina Chuang

TEL: 886-3-327-3456 Page Number : 4 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

1 General Description

1.1 Feature of Equipment Under Test

	Product Feature				
Equipment	Touch computer				
Brand Name	Zebra				
Model Name	TC26AK				
FCC ID	UZ7TC26AK				
Sample	Single-WAN, WLAN, GMS, SE4710, NFC, 4GB/64GB, Rear camera and Front camera, 2-pin connector				
EUT supports Radios application	WCDMA/HSPA/LTE/NFC/GNSS WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE				
HW Version	DV0				
SW Version	Android version 10				
OS Version	FUSION_QA_2_1.0.0.008_Q				
FW Version	Zebra/TC26PA/TC26:10/03-09-09.00-QN-U00-PRD/Nabe030 91333:userdebug/test-keys				
MFD	26MAR20				
EUT Stage	Engineering sample				

Report No.: FG010720D

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

Specification of Accessories									
AC Adapter	Brand Name	Zebra	Part Number	PWR-WUA5V12W0US					
Battery 1	Brand Name	Zebra	Part Number	BT-000409-00					
Battery 2	Brand Name	Zebra	Part Number	BT-000409-50					
Battery 3	Brand Name	Zebra	Part Number	BT-000411-08					
USB Cable 1 (Type A plug to Type C plug)	Brand Name	Zebra	Part Number	CBL-TC5X-USBC2A-01					
USB Cable 2 (Type A plug to Type C plug)	Brand Name	Zebra	Part Number	CBL-TC2Y-USBC90A-01					
Headset 3.5mm type with PTT/micassy	Brand Name	Zebra	Part Number	HDST-35MM-PTVP-01					
Adapter Cable PTT headset (3.5mm to 3.5mm)	Brand Name	Zebra	Part Number	CBL-TC51-HDST35-01					
Snap on Trigger handle	Brand Name	Zebra	Part Number	TRG-TC2Y-SNP1-01					
Belt Holster	Brand Name	Zebra	Part Number	SG-TC2Y-HLSTR1-01					
Wearable Arm Mount	Brand Name	Zebra	Part Number	SG-TC2Y-ARMNT-01					

Support Unit used in test configuration and system								
Type C to 3.5mm headset adaptor	Brand Name	Google	Part Number	Pixel-2-2XL				

TEL: 886-3-327-3456 Page Number : 5 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

1.2 Product Specification of Equipment Under Test

Product Specification subjective to this standard						
Tx Frequency	LTE Band 26 : 814.7 ~ 823.3 MHz					
Rx Frequency	LTE Band 26 : 859.7 ~ 868.3 MHz					
Bandwidth	1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz					
Maximum Output Power to Antenna	24.19 dBm					
Antenna Type	PIFA Antenna					
Antenna Gain	1.4 dBi					
Type of Modulation	QPSK / 16QAM / 64QAM					

Report No.: FG010720D

1.3 Modification of EUT

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

1.4 Emission Designator

LT	E Band 26		QPSK			16QAM		64QAM			
BW (MHz)	Frequency Range (MHz)	Emission Designator (99%OBW)		Maximum ERP(W)	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum	Emission Designator (99%OBW)	Frequency Tolerance (ppm)	Maximum ERP(W)	
1.4	814.7~823.3	1M10G7D	-	-	1M09W7D	-	-	1M10W7D	-	-	
3	815.5~822.5	2M73G7D	-	-	2M73W7D	-	-	2M73W7D	-	-	
5	816.5~821.5	4M53G7D	-	-	4M52W7D	-	-	4M50W7D	-	-	
10	819.0	9M03G7D	0.0203	-	9M03W7D	-	-	9M03W7D	-	-	
15	821.5	13M4G7D	0.0207	0.2208	13M5W7D	-	0.1897	13M4W7D	-	0.1476	

TEL: 886-3-327-3456 Page Number : 6 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory						
Test Site Location No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978							
Test Site No.	Sporton Site No.						
rest site No.	TH03-HY						
Test Engineer	Louis Chung						
Temperature	21~24°C						
Relative Humidity	51~55%						

Report No.: FG010720D

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.	03CH11-HY				
Test Engineer	Cookie Ku, Fu Chen, Troye Hsieh, and Quentin Liu				
Temperature	19.6~26.5°C				
Relative Humidity	59.6~70.1%				

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

FCC Designation No.: TW1190 and TW0007

TEL: 886-3-327-3456 Page Number : 7 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

1.6 Applied Standards

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

Report No.: FG010720D

- 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. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

TEL: 886-3-327-3456 Page Number : 8 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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 and Accessory. The worst cases (Y plane with Earphone) were recorded in this report.

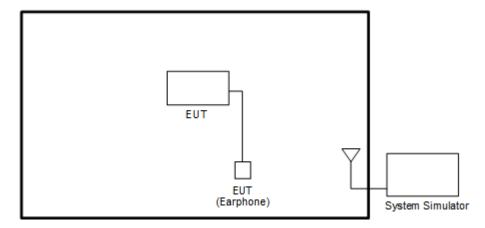
Report No.: FG010720D

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

Conducted		Bandwidth (MHz)					Modulation				RB#		Test Channel			
Test Cases	Band	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	Н
Max. Output Power	26	٧	v	٧	v	v	1	v	v	v	v	v	v	v	٧	v
Peak-to-Average Ratio	26					v	ı	V	v	v	V		v	V	>	٧
26dB and 99% Bandwidth	26	٧	v	٧	v	v	-	v	v	v			v	v	٧	v
Emission masks In-band emissions	26	٧	v	٧	v	v	ı	v	v	v	v		v	v		٧
Emission masks – Out of band emissions	26	٧	v	>	v	v	1	v	v	v	v			v	>	v
Frequency Stability	26	-	-		v	v	-	v					v		v	
E.R.P.	26					V	ı	v	v	v	V			V		
Radiated Spurious Emission	26		Worst Case V V									٧				
1. The mark "v" means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. LTE Band26 transmit frequency for part22 rule is 824MHz-849MHz, for part90 rule is 814MHz-8 ERP over 15MHz bandwidth complies the ERP limit line of part22 rule, therefore ERP of the part frequency spectrum which falls within part 22 also complies. 4. All the radiated test cases were performed with USB Cable 1.							ЛНz.									

TEL: 886-3-327-3456 Page Number : 9 of 24
FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

2.2 Connection Diagram of Test System



Report No.: FG010720D

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord	
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m	

2.4 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 : 10 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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	-	-					
40	Channel	-	26740	-					
10	Frequency	-	819	-					
5	Channel	26715	26740	26765					
5	Frequency	816.5	819	821.5					
2	Channel	26705	26740	26775					
3	Frequency	815.5	819	822.5					
1.4	Channel	26697	26740	26783					
1.4	Frequency	814.7	819	823.3					

Report No. : FG010720D

TEL: 886-3-327-3456 Page Number : 11 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

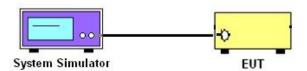
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

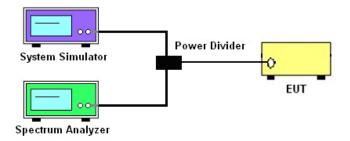
3.1.1 Test Setup

3.1.2 Conducted Output Power

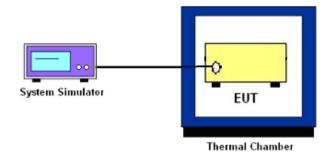


Report No.: FG010720D

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 : 12 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

The ERP of mobile transmitters must not exceed 100 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 : 13 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

- 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 : 14 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

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 : 15 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

- (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 : 16 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

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.
- 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 : 17 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

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.
- 2. 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 : 18 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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.: FG010720D

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.

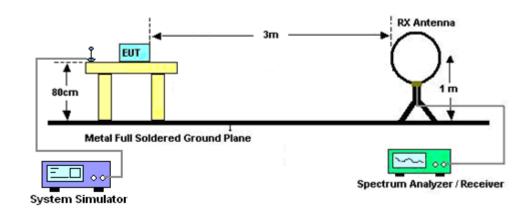
3.8.2 Test Procedures

- 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 : 19 of 24
FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

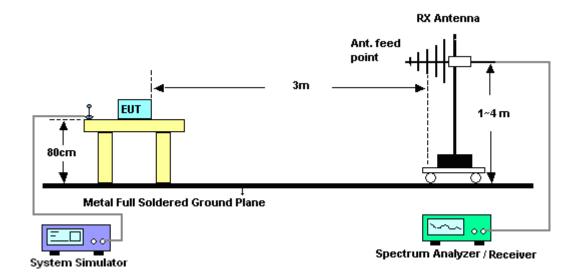
3.8.3 Test Setup

For radiated emissions below 30MHz



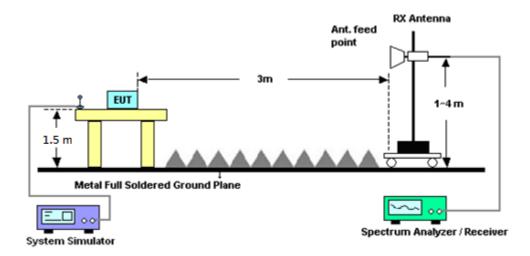
Report No.: FG010720D

For radiated test from 30MHz to 1GHz



TEL: 886-3-327-3456 Page Number : 20 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

For radiated test above 1GHz



Report No.: FG010720D

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 : 21 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

4 List of Measuring Equipment

Inctrument	Manufacturer	Model No	Carial Na	Characteristics Calibration		Took Date	Due Dete	Domonic
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Date	Test Date	Due Date	Remark
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Mar. 25, 2020~ Apr. 26, 2020	Dec. 12, 2020	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 03, 2019	Mar. 25, 2020~ Apr. 26, 2020	Dec. 02, 2020	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA917058 4	18GHz- 40GHz	Dec. 10, 2019	Mar. 25, 2020~ Apr. 26, 2020	Dec. 09, 2020	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 12, 2019	Mar. 25, 2020~ Apr. 26, 2020	Oct. 11, 2020	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Nov. 04, 2019	Mar. 25, 2020~ Apr. 26, 2020	Nov. 03, 2020	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 09, 2020	Mar. 25, 2020~ Apr. 26, 2020	Jan. 08, 2021	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 13, 2019	Mar. 25, 2020~ Apr. 26, 2020	Nov. 12, 2020	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 28, 2019	Mar. 25, 2020~ Apr. 26, 2020	Oct. 27, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-1080 -1200-15000-6 0SS	SN2	1.2GHz High Pass Filter	Sep. 15, 2019	Mar. 25, 2020~ Apr. 26, 2020	Sep. 14, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 0SS	SN3	3GHz High Pass Filter	Sep. 15, 2019	Mar. 25, 2020~ Apr. 26, 2020	Sep. 14, 2020	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Mar. 25, 2020~ Apr. 26, 2020	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Mar. 25, 2020~ Apr. 26, 2020	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Mar. 25, 2020~ Apr. 26, 2020	N/A	Radiation (03CH11-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Nov. 01, 2019	Mar. 25, 2020~ Apr. 26, 2020	Oct. 31, 2020	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	Mar. 25, 2020~ Apr. 26, 2020	N/A	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTN-303B	TP140325	N/A	Nov. 07, 2019	Mar. 25, 2020~ Apr. 26, 2020	Nov. 06, 2020	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTN-303B	TP161237	N/A	Oct. 25, 2019	Mar. 25, 2020~ Apr. 26, 2020	Oct. 24, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 12, 2020	Mar. 25, 2020~ Apr. 26, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 12, 2020	Mar. 25, 2020~ Apr. 26, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30M-18G	Mar. 12, 2020	Mar. 25, 2020~ Apr. 26, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 12, 2020	Mar. 25, 2020~ Apr. 26, 2020	Mar. 11, 2021	Radiation (03CH11-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	Aug. 27, 2019	Mar. 25, 2020~ Apr. 26, 2020	Aug. 26, 2020	Radiation (03CH11-HY)

Report No. : FG010720D

TEL: 886-3-327-3456 Page Number : 22 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Base Station (Measure)	Anritsu	MT8821C	6262025341	GSM / GPRS /WCDMA / LTE FDD/TDD with 44) /LTE-3CC DLCA,2CC ULCA	Oct. 24, 2019	Mar. 20, 2020~ Apr. 01, 2020	Oct. 23, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV30	100895	10Hz~30GHz	Apr. 24, 2019	Mar. 20, 2020~ Apr. 01, 2020	Apr. 23, 2020	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40°C~90°C	Sep. 02, 2019	Mar. 20, 2020~ Apr. 01, 2020	Sep. 01, 2020	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 09, 2019	Mar. 20, 2020~ Apr. 01, 2020	Oct. 08, 2020	Conducted (TH05-HY)
Coupler	Warison	20dB 20W SMA Directional Coupler	WRTA4WAM 2B2	0.4-26.5GHz	Jan. 23, 2020	Mar. 20, 2020~ Apr. 01, 2020	Jan. 22, 2021	Conducted (TH05-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#A	1-18GHz	Jan. 13, 2020	Mar. 20, 2020~ Apr. 01, 2020	Jan. 12, 2021	Conducted (TH05-HY)

Report No.: FG010720D

TEL: 886-3-327-3456 Page Number : 23 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 2020

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of	3.09
Confidence of 95% (U = 2Uc(y))	3.09

Report No.: FG010720D

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

Measuring Uncertainty for a Level of	3.44
Confidence of 95% (U = 2Uc(y))	3.44

<u>Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)</u>

Measuring Uncertainty for a Level of	2.05
Confidence of 95% (U = 2Uc(y))	3.95

TEL: 886-3-327-3456 Page Number : 24 of 24 FAX: 886-3-328-4978 Issued Date : Apr. 30, 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		24.19	-	-				
15	1	37		24.15	-	-				
15	1	74		24.18	-	-				
15	36	0	QPSK	23.28	-	-				
15	36	20		23.34	-	-				
15	36	39		23.27	-	-				
15	75	0		23.27	-	-				
15	1	0		23.44	-	-				
15	1	37		23.50	-	-				
15	1	74		23.53	-	-				
15	36	0	16-QAM	22.31	-	-				
15	36	20		22.39	-	-				
15	36	39		22.32	-	-				
15	75	0		22.38	-	-				
15	1	0		22.40	-	-				
15	1	37		22.43	-	-				
15	1	74		22.44	-	-				
15	36	0	64-QAM	21.36	-	-				
15	36	20		21.44	-	-				
15	36	39		21.39	-	-				
15	75	0		21.37	-	-				
10	1	0		-	24.15	-				
10	1	25		-	24.05	-				
10	1	49		-	24.11	-				
10	25	0	QPSK	-	23.27	-				
10	25	12		-	23.29	-				
10	25	25		-	23.24	-				
10	50	0		-	23.17	-				
10	1	0		-	23.46	-				
10	1	25		-	23.59	-				
10	1	49		-	23.41	-				
10	25	0	16-QAM	-	22.21	-				
10	25	12		-	22.21	-				
10	25	25		-	22.32	-				
10	50	0		-	22.28	-				
10	1	0		-	22.49	-				
10	1	25		-	22.44	-				
10	1	49		-	22.24	-				
10	25	0	64-QAM	-	21.37	-				
10	25	12		-	21.29	-				
10	25	25		-	21.32	-				
10	50	0		-	21.29	-				



FCC RADIO TEST REPORT

LTE Band 26 Maximum Average Power [dBm] BW [MHz] **RB Size RB Offset** Mod Lowest Middle Highest 24.11 24.08 24.10 5 1 0 5 1 12 24.11 24.04 24.02 24 5 1 24.13 24.09 23.88 **QPSK** 5 12 0 23.10 23.09 23.07 5 12 23.23 23.26 23.21 5 12 13 23.08 23.17 23.02 5 25 0 23.12 23.14 22.96 5 1 0 23.26 23.38 23.47 12 5 1 23.41 23.53 23.29 5 24 23.50 23.21 1 23.43 5 12 0 16-QAM 22.11 22.21 22.17 22.23 5 12 7 22.19 22.11 12 22.32 22.08 5 13 22.31 5 25 0 22.34 22.20 22.18 5 1 0 22.25 22.41 22.30 5 1 12 22.41 22.46 22.30 5 1 24 22.28 22.26 22.24 5 12 64-QAM 21.23 0 21.19 21.16 12 21.36 21.37 21.24 5 5 12 13 21.22 21.23 21.10 5 25 0 21.35 21.39 21.24 3 1 0 23.93 24.19 24.11 3 1 8 24.02 24.01 24.02 3 1 14 24.05 24.05 23.97 3 8 0 QPSK 23.14 23.25 23.05 3 8 4 23.34 23.25 23.09 3 8 23.22 22.96 23.13 3 15 0 23.08 23.23 23.01 3 1 0 23.28 23.51 23.50 23.47 3 1 8 23.46 23.22 3 1 14 23.48 23.45 23.20 3 8 0 16-QAM 22.21 22.41 22.07 3 8 4 22.36 22.24 22.18 3 7 22.27 22.14 8 22.28 15 3 22.17 0 22.33 22.31 3 1 0 22.29 22.50 22.42 22.47 3 1 8 22.42 22.27 3 1 14 22.38 22.25 22.27 3 8 0 64-QAM 21.34 21.32 21.12 3 8 4 21.33 21.34 21.26 7 3 8 21.36 21.19 21.06 3 15 0 21.22 21.20 21.18

Report No.: FG010720D



	LTE Band 26 Maximum Average Power [dBm]									
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest				
1.4	1	0		23.99	24.10	23.93				
1.4	1	3		24.05	24.17	24.01				
1.4	1	5		23.97	24.10	23.90				
1.4	3	0	QPSK	24.05	24.14	23.97				
1.4	3	1		24.07	24.17	24.04				
1.4	3	3		24.04	24.13	23.98				
1.4	6	0		23.01	23.17	23.00				
1.4	1	0		23.31	23.42	23.23				
1.4	1	3	16-QAM	23.39	23.54	23.27				
1.4	1	5		23.27	23.45	23.17				
1.4	3	0		23.12	23.23	23.01				
1.4	3	1		23.16	23.28	23.08				
1.4	3	3		23.11	23.24	23.01				
1.4	6	0		22.18	22.31	22.16				
1.4	1	0		22.24	22.41	22.18				
1.4	1	3		22.31	22.46	22.25				
1.4	1	5		22.24	22.36	22.14				
1.4	3	0	64-QAM	22.26	22.37	22.21				
1.4	3	1		22.31	22.43	22.21				
1.4	3	3		22.25	22.37	22.20				
1.4	6	0		21.15	21.28	21.10				

Report No.: FG010720D



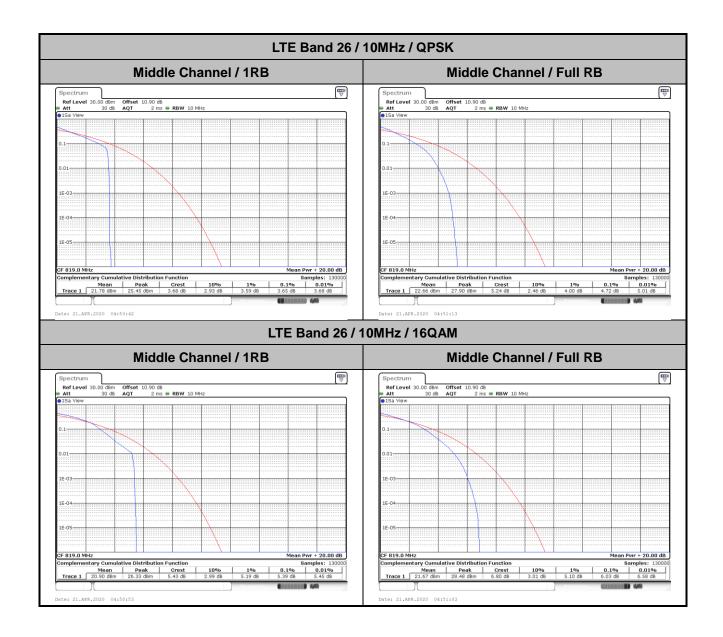
LTE Band 26_Part 90S

Peak-to-Average Ratio

Mode		LTE Band 26 / 10MHz								
Mod.	QP	SK	160	Limit: 13dB						
RB Size	1RB Full RB		1RB	Full RB	Result					
Lowest CH			-	-						
Middle CH	3.65	4.72	5.39	6.03	PASS					
Highest CH	-	-	-	-						
Mode		LTE Band	26 / 10MHz							
Mod.	64C	AM			Limit: 13dB					
RB Size	1RB	1RB Full RB			Result					
Lowest CH	-	-	-	-						
Lowest CH Middle CH	6.43	- 6.58	-	-	PASS					

Report No.:FG010720D

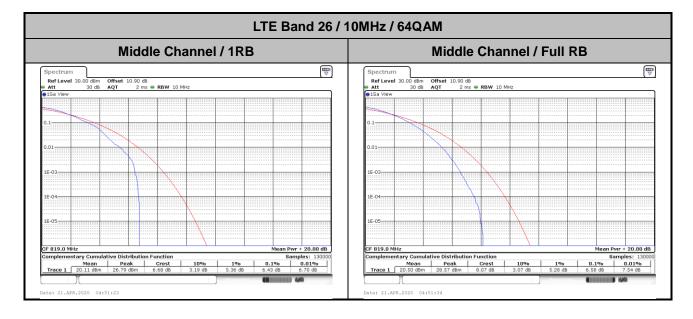
TEL: 886-3-327-3456 Page Number : A26S-1 of 45



TEL: 886-3-327-3456 Page Number : A26S-2 of 45

Report No.:FG010720D





TEL: 886-3-327-3456 Page Number : A26S-3 of 45

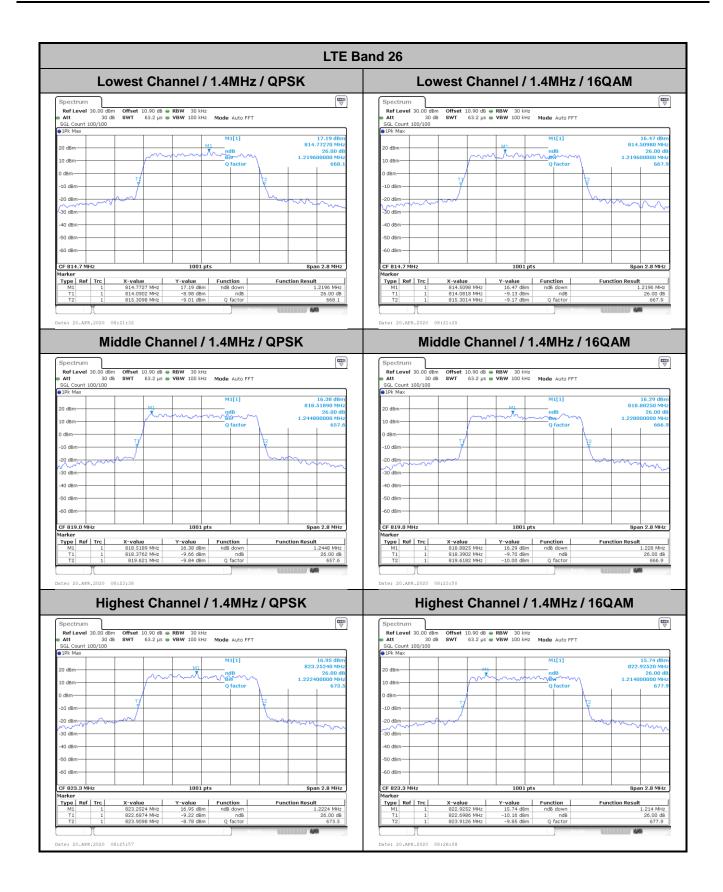
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26dB Bandwidth

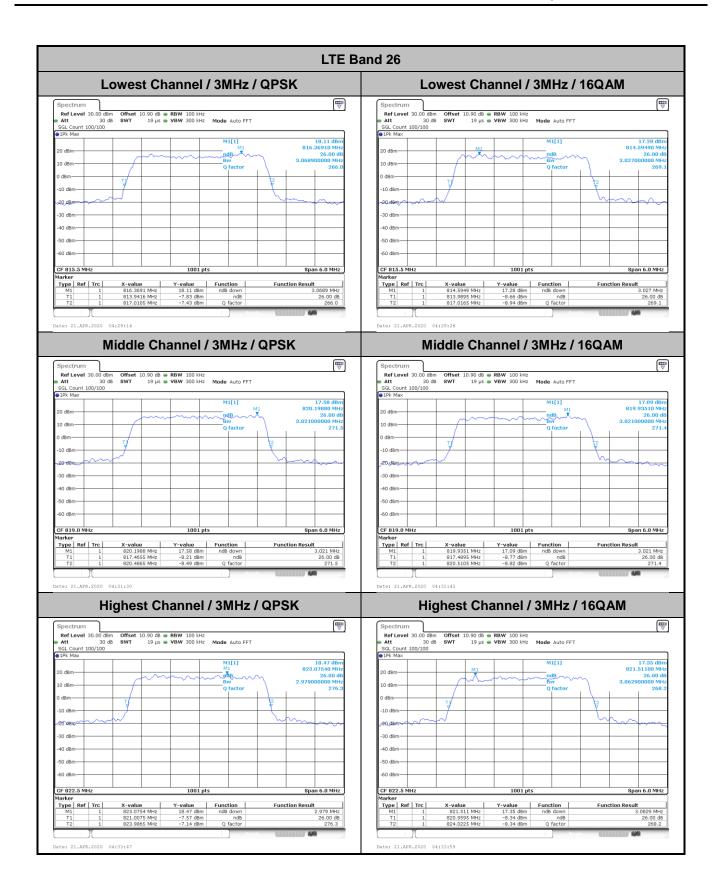
Mode		LTE Band 26 : 26dB BW(MHz)										
BW	1.4MHz 3MHz				5MHz 10MHz			15MHz		20MHz		
Mod.	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Lowest CH	1.22	1.22	3.07	3.03	4.94	4.91	-	-	14.27	14.15	-	-
Middle CH	1.24	1.23	3.02	3.02	4.95	4.98	9.77	9.85	-	-	-	-
Highest CH	1.22	1.21	2.98	3.06	5.01	4.92	-	-	-	-	-	-
Mode					LTE Ba	and 26 :	26dB BV	V(MHz)				
BW	1.4	ИHz	3M	lHz	5MHz 10MHz			15MHz		20MHz		
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	1.24	-	3.03	-	4.91	-	-	-	14.45	-	-	-
Middle CH	1.23	-	3.03	-	4.95	-	9.73	-	-	-	-	-
Highest CH	1.23	-	3.03	-	4.86	-	-	-	-	-	-	-

TEL: 886-3-327-3456 Page Number : A26S-4 of 45

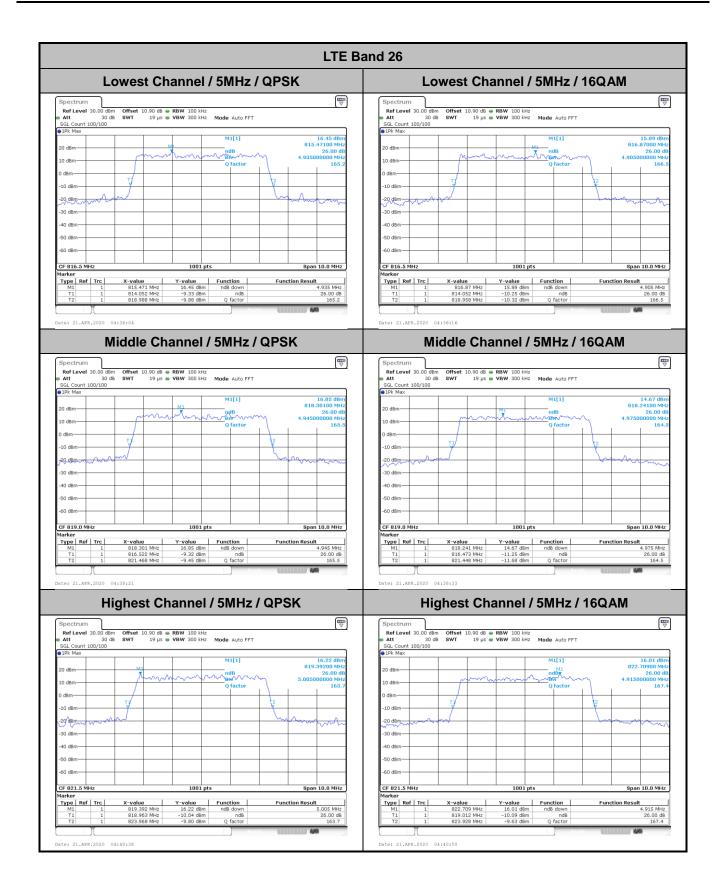




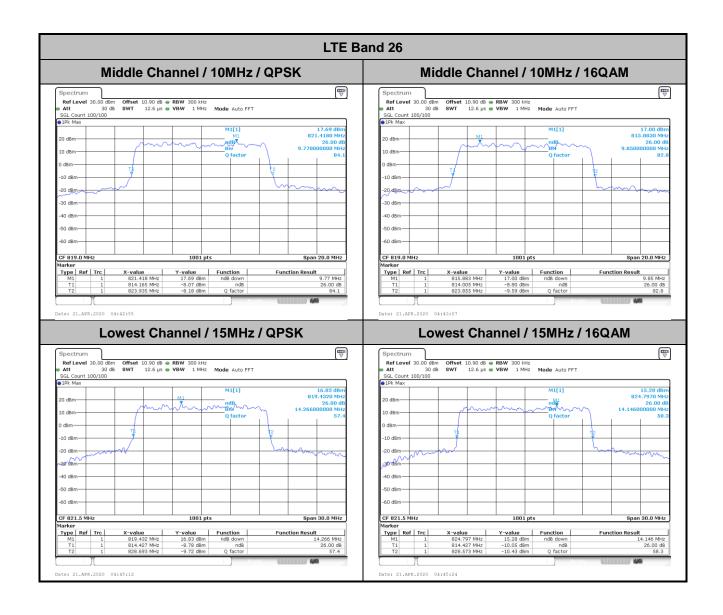
TEL: 886-3-327-3456 Page Number : A26S-5 of 45



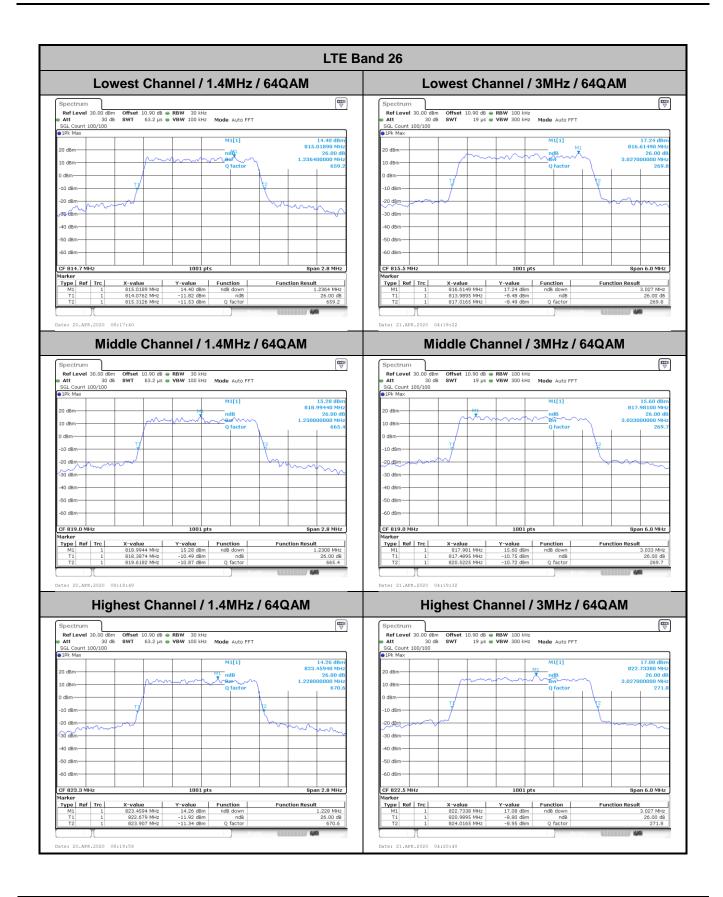
TEL: 886-3-327-3456 Page Number : A26S-6 of 45



TEL: 886-3-327-3456 Page Number : A26S-7 of 45

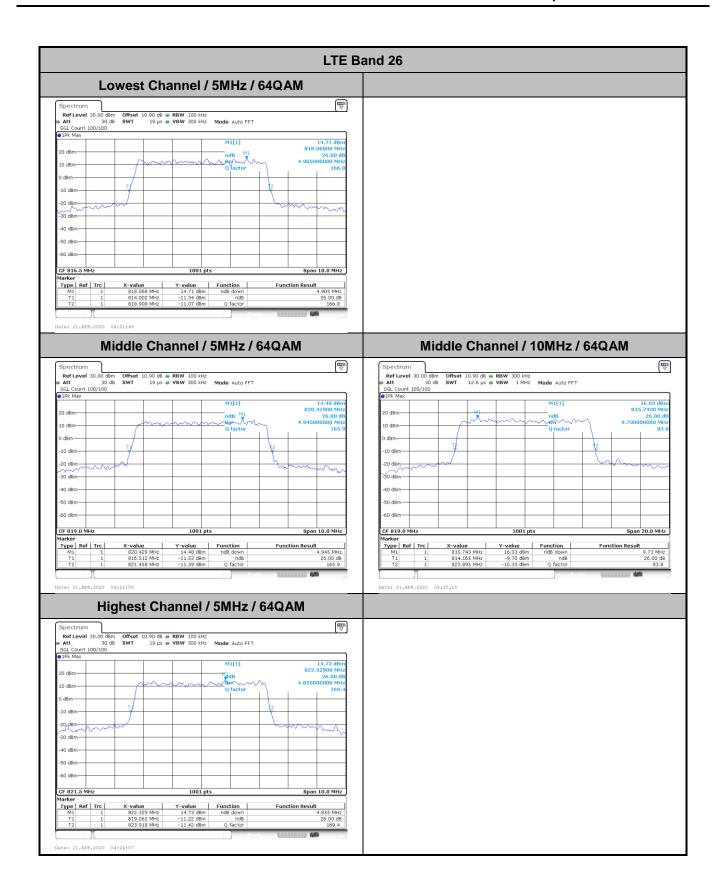


TEL: 886-3-327-3456 Page Number: A26S-8 of 45

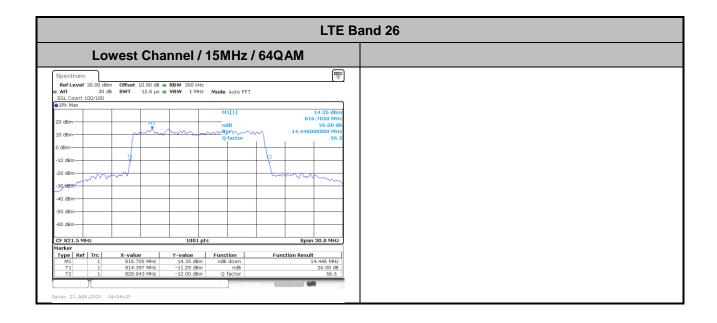


TEL: 886-3-327-3456 Page Number : A26S-9 of 45





TEL: 886-3-327-3456 Page Number : A26S-10 of 45



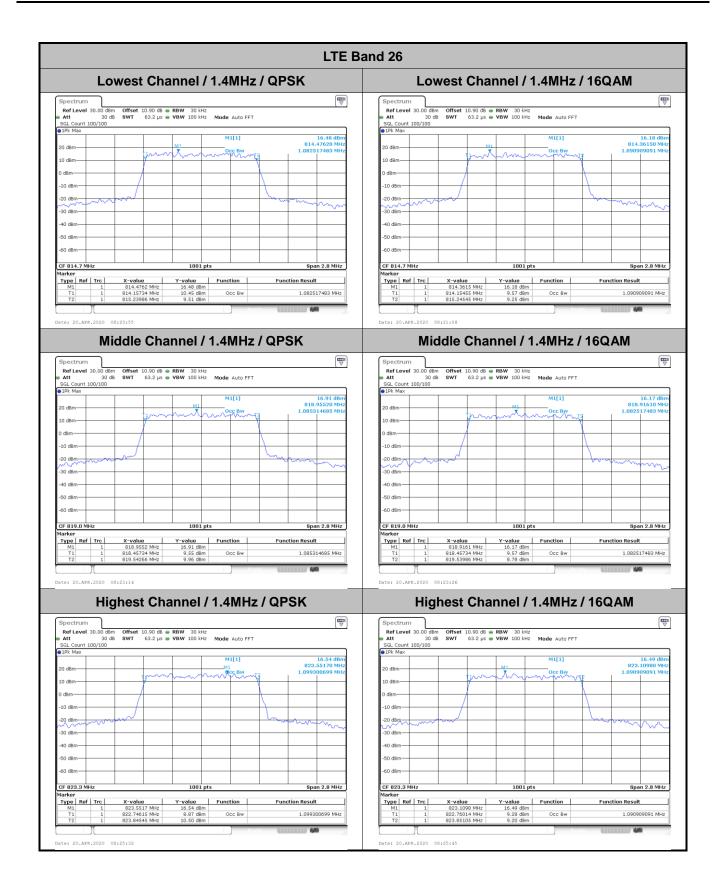
TEL: 886-3-327-3456 Page Number : A26S-11 of 45

Report No.:FG010720D

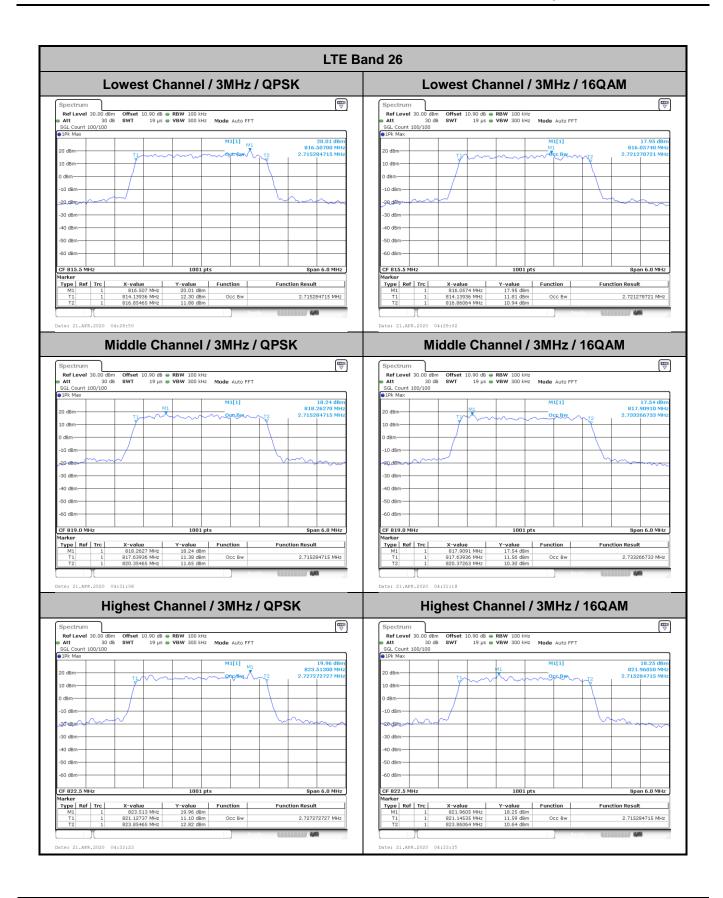
Occupied Bandwidth

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	1.08	1.09	2.72	2.72	4.49	4.50	-	-	13.37	13.52	-	-
Middle CH	1.09	1.08	2.72	2.73	4.53	4.52	9.03	9.03	-	-	-	-
Highest CH	1.10	1.09	2.73	2.72	4.51	4.49	-	-	-	-	-	-
Mode	LTE Band 26 : 99%OBW(MHz)											
BW	1.4MHz		3MHz		5MHz		10MHz		15MHz		20MHz	
Mod.	64QAM		64QAM		64QAM		64QAM		64QAM		64QAM	
Lowest CH	1.09	-	2.73	-	4.50	-	-	-	13.40	-	-	-
Middle CH	1.10	-	2.73	-	4.49	-	9.03	-	-	-	-	-
Highest CH	1.09	-	2.73	-	4.50	-	-	-	-	-	-	-

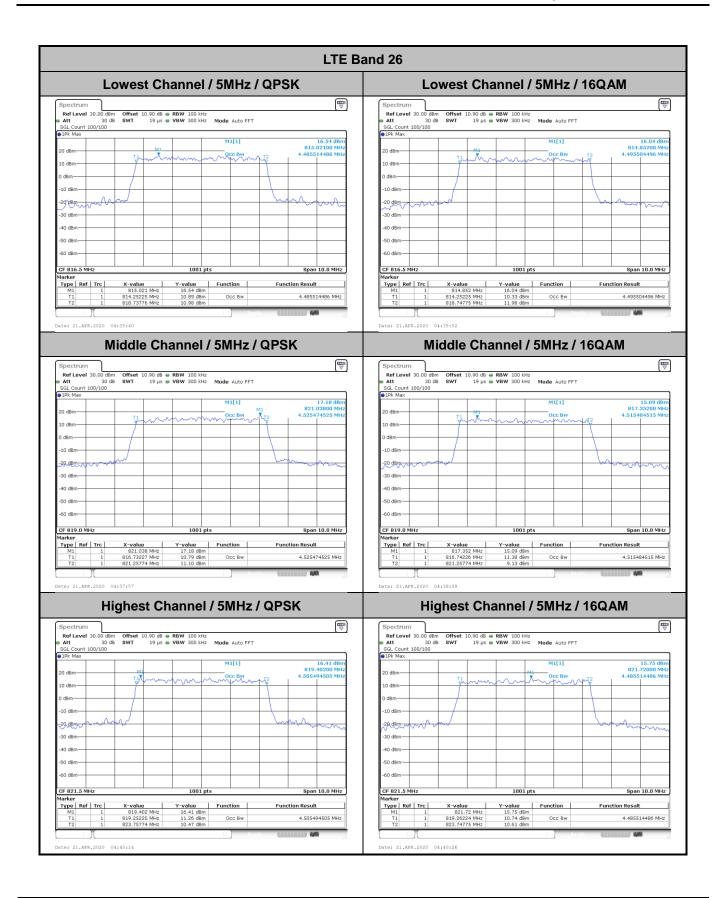
TEL: 886-3-327-3456 Page Number : A26S-12 of 45



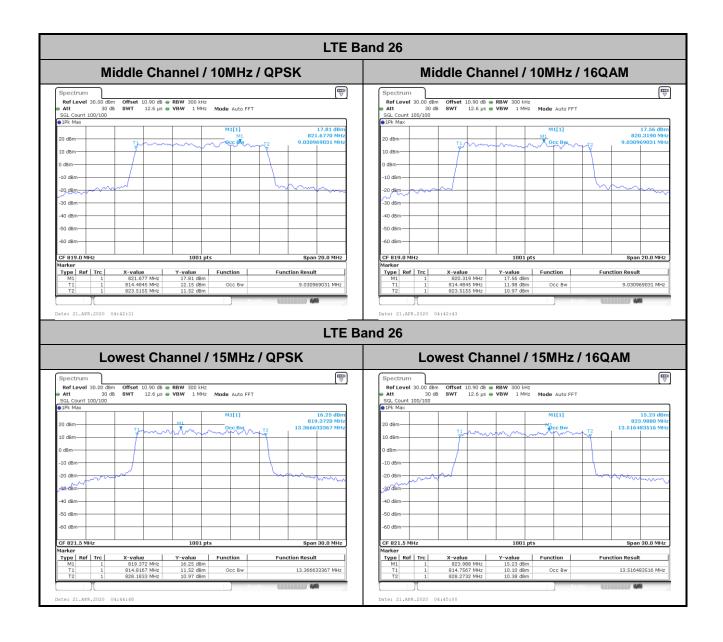
TEL: 886-3-327-3456 Page Number : A26S-13 of 45



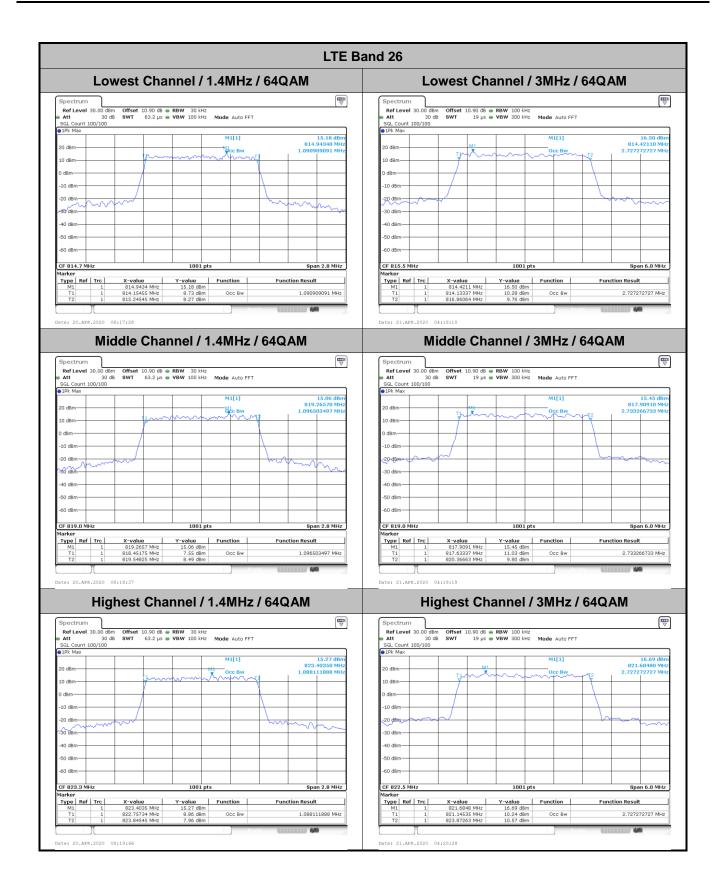
TEL: 886-3-327-3456 Page Number : A26S-14 of 45



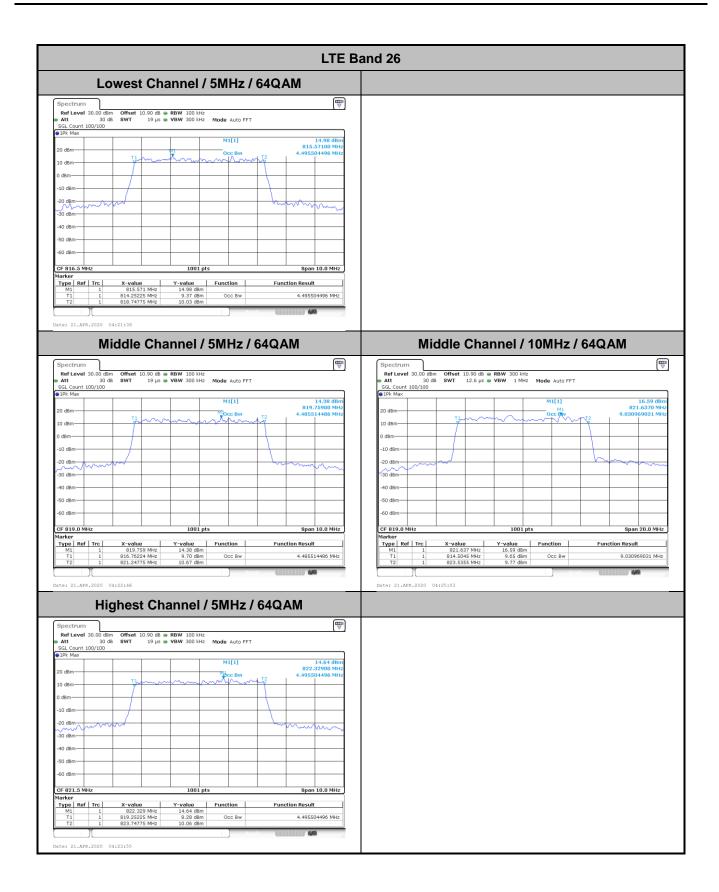
TEL: 886-3-327-3456 Page Number : A26S-15 of 45



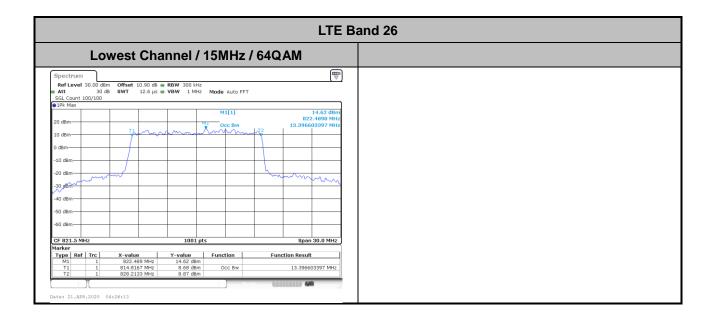
TEL: 886-3-327-3456 Page Number : A26S-16 of 45



TEL: 886-3-327-3456 Page Number : A26S-17 of 45



TEL: 886-3-327-3456 Page Number : A26S-18 of 45

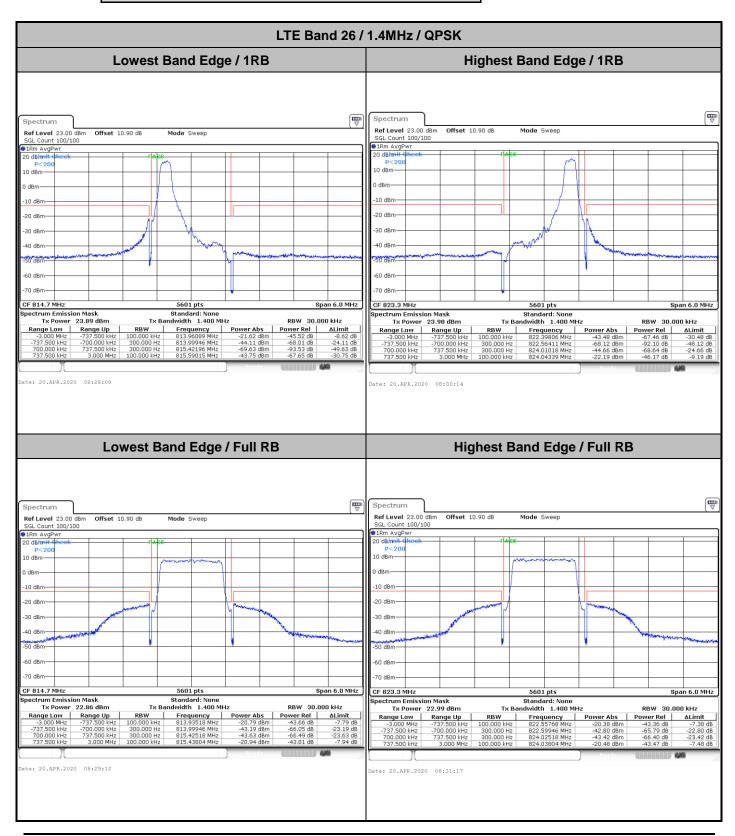


TEL: 886-3-327-3456 Page Number : A26S-19 of 45

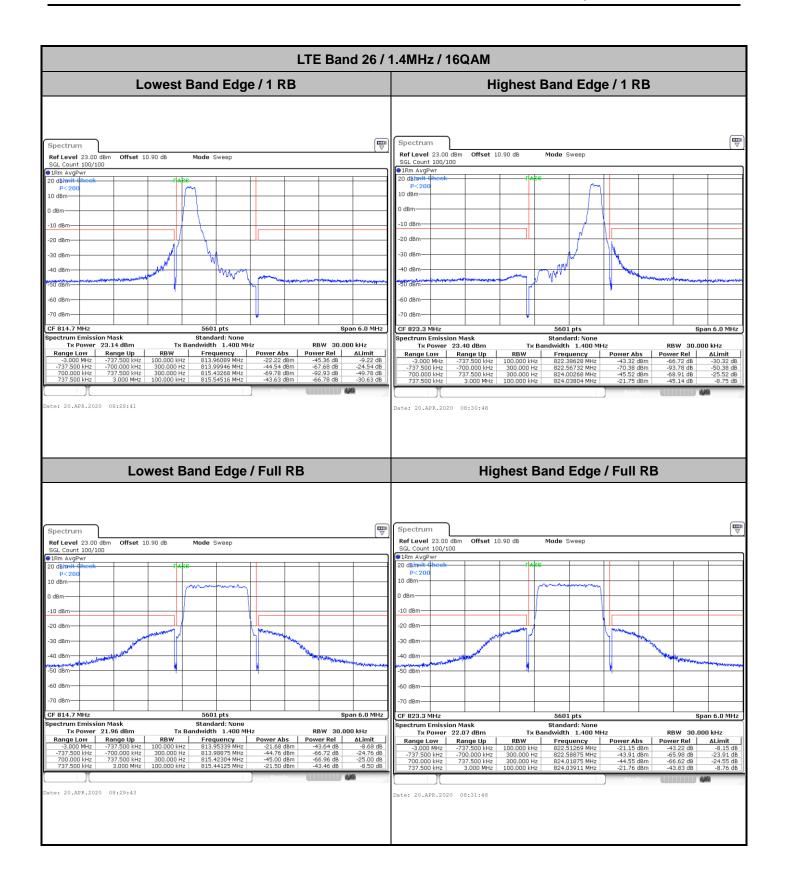
Report No.: FG010720D



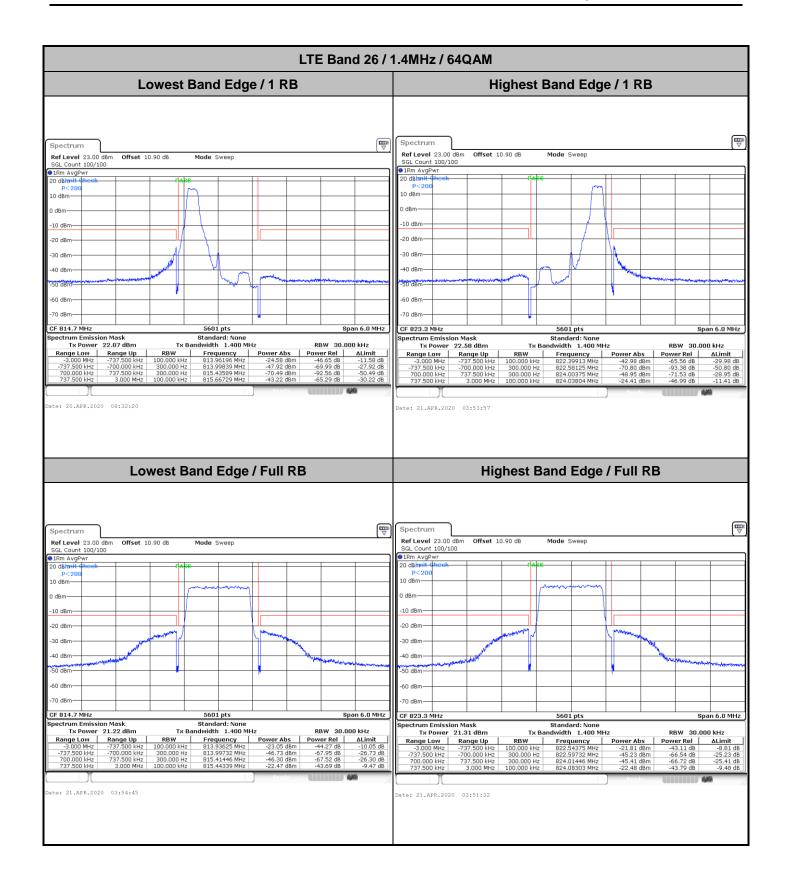
Emission masks – In-band emissions



TEL: 886-3-327-3456 Page Number : A26S-20 of 45

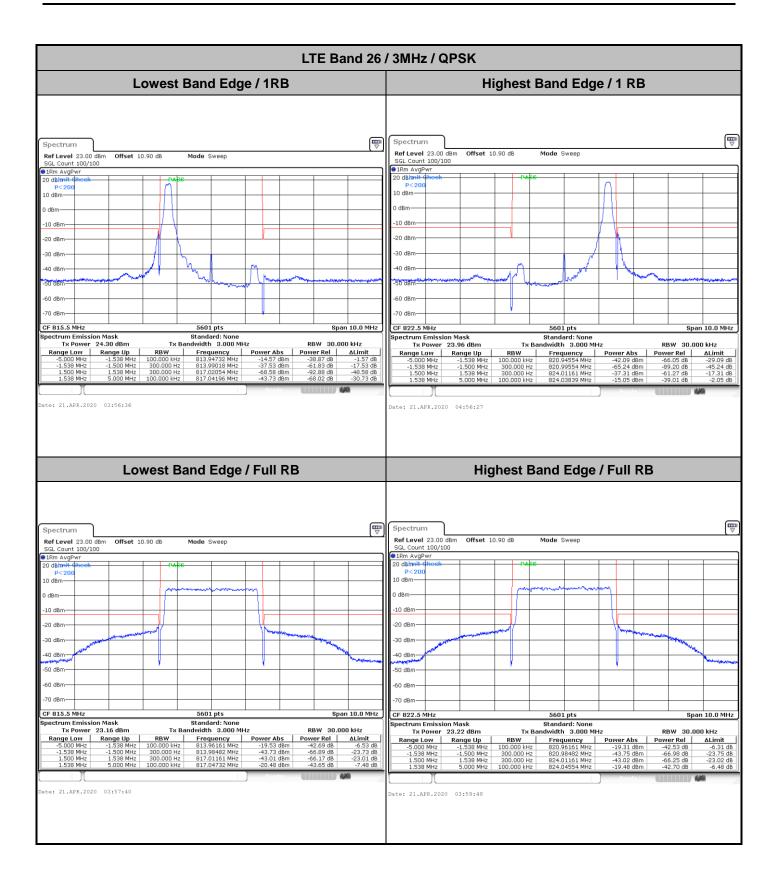


TEL: 886-3-327-3456 Page Number : A26S-21 of 45



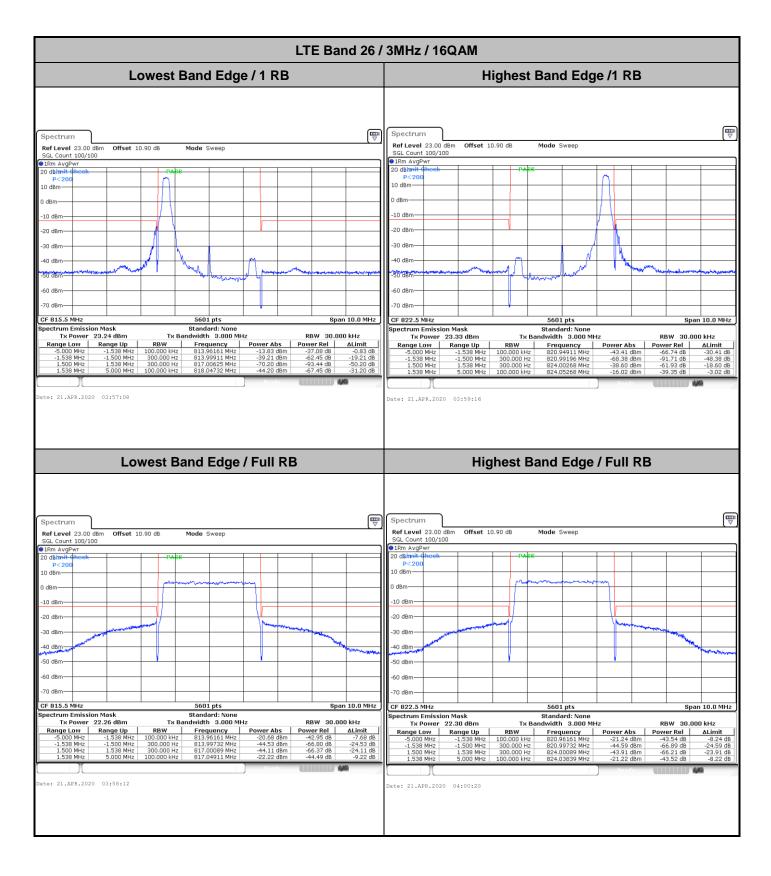
TEL: 886-3-327-3456 Page Number: A26S-22 of 45



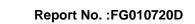


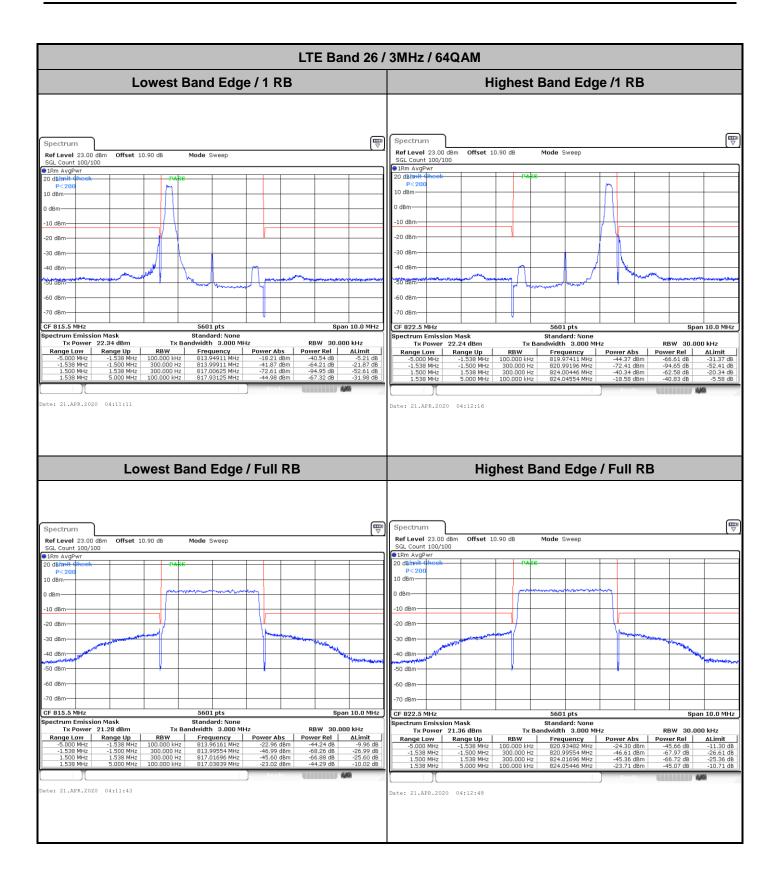
TEL: 886-3-327-3456 Page Number : A26S-23 of 45





TEL: 886-3-327-3456 Page Number: A26S-24 of 45





TEL: 886-3-327-3456 Page Number : A26S-25 of 45

LTE Band 26 / 5MHz / QPSK Lowest Band Edge / 1 RB Highest Band Edge / 1 RB Ref Level 23.00 dBm Offset 10.90 dB Mode Sweep Ref Level 23.00 dBm SGL Count 100/100 Offset 10.90 dB Mode Sweep GL Count 100/100 1Rm AvgP n dBim 10 dBm -10 dBm -10 dBm -20 dBm -30 dBr 5601 pts Span 15.0 MHz CF 821.5 MHz 5601 pts Standard: None Tx Bandwidth 5.000 MHz Standard: None ndwidth 5.000 MHz RBW 50.000 kHz Frequency 813.96116 MHz 813.99866 MHz 819.01741 MHz 820.78054 MHz RBW 100.000 kHz 300.000 Hz 300.000 Hz 100.000 kHz
 Frequency
 Power Abs

 817.23822 MHz
 -45.12 dBm

 818.98795 MHz
 -72.37 dBm

 824.00134 MHz
 -43.67 dBm

 824.03884 MHz
 -19.68 dBm

 Power Rel
 ΔLimit

 -68.93 dB
 -32.12 dB

 -96.18 dB
 -52.37 dB

 -67.48 dB
 -23.67 dB

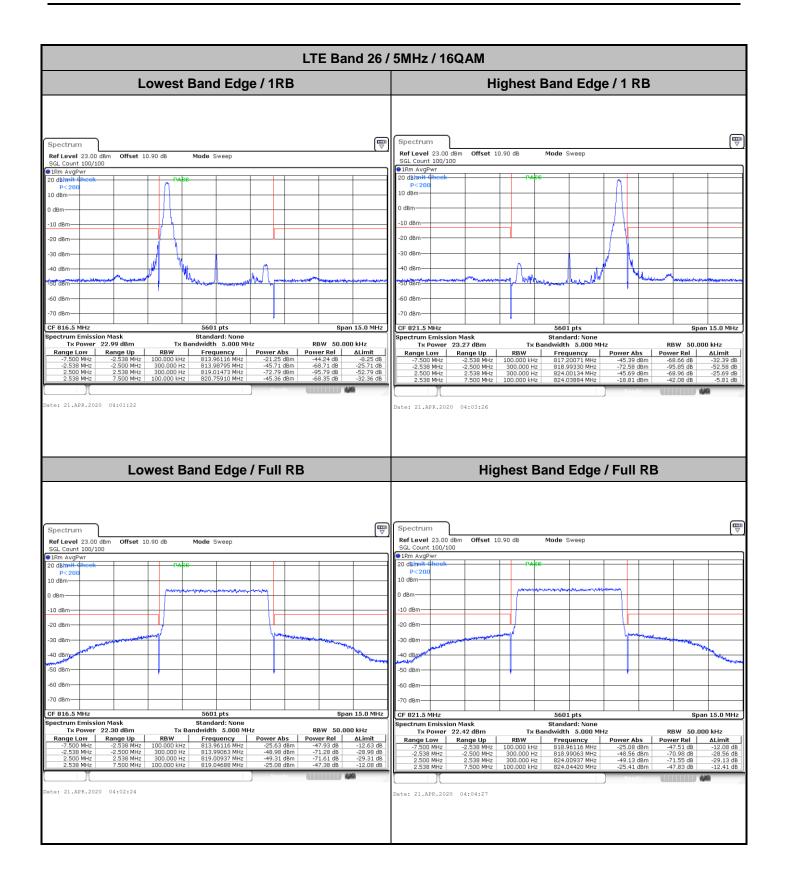
 -43.49 dB
 -6.68 dB
 Power Abs Range Low Range Up ate: 21.APR.2020 04:00:51 Date: 21.APR.2020 04:02:55 Lowest Band Edge / Full RB **Highest Band Edge / Full RB** Spectrum Ref Level 23.00 dBm Offset 10.90 dB SGL Count 100/100 Mode Sweep Ref Level 23.00 dBm Offset 10.90 dB Mode Sweep SGL Count 100/100 ●1Rm AvgPwr CF 821.5 MHz Span 15.0 MHz 5601 pts ectrum Emission Mask Tx Power 23.21 dBm Standard: None Tx Bandwidth 5.000 MHz Standard: None Tx Bandwidth 5.000 MHz Tx Power 23.29 dBm

Range Low Range Up

-7 500 MHz -2 538 Mi RBW 50.000 kHz Range Up Frequency Power Abs te: 21.APR.2020 04:01:53 Date: 21.APR.2020 04:03:57

Report No.: FG010720D

TEL: 886-3-327-3456 Page Number: A26S-26 of 45



TEL: 886-3-327-3456 Page Number: A26S-27 of 45