

Partial FCC Test Report

(PART 22)

Report No.: RF171212C20

FCC ID: XMR201706SC20A

Test Model: SC20-A

Received Date: Dec. 12, 2017

Test Date: Jan. 17, 2018

Issued Date: Mar. 05, 2018

Applicant: Quectel Wireless Solutions Co., Ltd.

Address: 7th Floor, Hongye Building, No. 1801 Hongmei Road, Xuhui District,

Shanghai 200233, China

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

(R.O.C)

Test Location (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan

Hsien 333, Taiwan, R.O.C.

FCC Registration /

788550 / TW0003

Designation Number:





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Release Control Record

Issue No.	Description	Date Issued
RF171212C20	Original Release	Mar. 05, 2018



Certificate of Conformity 1

Product: LTE Module

Brand: Quectel

Test Model: SC20-A

Sample Status: Identical Prototype

Applicant: Quectel Wireless Solutions Co., Ltd.

Test Date: Jan. 17, 2018

Standards: FCC Part 22, Subpart H

The above equipment has been tested by Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Vera Huang , Date: Mar. 05, 2018

Vera Huang / Specialist



2 Summary of Test Results

	Applied Standard: FCC Part 22 & Part 2					
FCC Test Item		Result	Remarks			
2.1046 22.913 (a)	Effective Radiated Power		Refer to Note			
	Peak to Average Ratio		Refer to Note			
2.1055 22.355 Frequency Stability		N/A	Refer to Note			
2.1049	2.1049 Occupied Bandwidth		Refer to Note			
22.917	Band Edge Measurements	N/A	Refer to Note			
2.1051 22.917 Conducted Spurious Emissions		N/A	Refer to Note			
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -45.38 dB at 43.23 MHz.			

Note:

Only test item for radiated emissions test was performed for this report. For other test data, please refer to Sporton Report No.: FG741007A and FG741007B for module (Name: Quectel, Model: SC20-A).

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Dedicted Emissions up to 4 CHr	30 MHz ~ 200 MHz	2.93 dB
Radiated Emissions up to 1 GHz	200 MHz ~ 1000 MHz	2.95 dB



2.2 Test Site and Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier EMCI	EMC001340	980201	Nov. 01, 2017	Oct. 30, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8 000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.

- 2. The test was performed in HwaYa Chamber 10.
- 3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
- 4. The IC Site Registration No. is IC7450F-10.



3 General Information

3.1 General Description of EUT

Product	LTE Module		
Brand	Quectel		
Test Model	SC20-A		
Status of EUT	Identical Prototype		
Danier Commbine Datin in	5.0 Vdc (adapter)		
Power Supply Rating	7.26 Vdc (Li-ion battery)		
	GSM/GPRS	GMSK	
Madaladau Torra	EDGE	GMSK, 8PSK	
Modulation Type	WCDMA	QPSK	
	LTE	QPSK, 16QAM	
	GSM/GPRS/EDGE	824.2 ~ 848.8 MHz	
	WCDMA	826.4 ~ 846.6 MHz	
	LTE 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz	
	LTE 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz	
	LTE 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz	
Frequency Range	LTE 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz	
	LTE 26 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz	
	LTE 26 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz	
	LTE 26 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz	
	LTE 26 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz	
	LTE 26 (Channel Bandwidth: 15 MHz)	831.5 ~ 841.5 MHz	
Antenna Type	Dipole Antenna		
Accessory Device	Refer to Note as below		
Data Cable Supplied	Refer to Note as below		

Note:

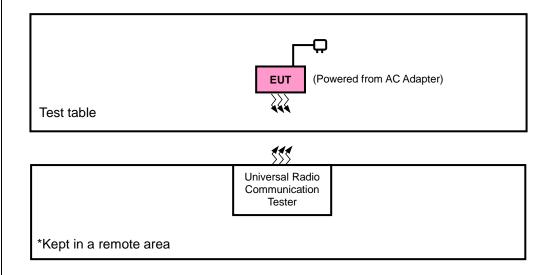
- 1. The EUT was installed in POS Terminal (Brand: CASTLES TECHNOLOGY, Model: SATURN1000).
- 2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Battery	CHENG UEI PRECISION INDUSTRY CO., LTD.	S1-26H	7.26 Vdc, 2600 mAh
USB Cable	TAYU	2000007X	1m shielded cable w/o core

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Adapter	FSP	FSP010-FPDN	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

- 1. All power cords of the above support units are non-shielded (1.8m).
- 2. Item 1 was provided by client.



3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports.

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
GSM	Y-axis
EDGE	Y-axis
WCDMA	Y-axis
LTE Band 5	Y-axis
LTE Band 26	Y-axis

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	Radiated Emission	128 to 251	251	GSM, EDGE

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	Radiated Emission	4132 to 4233	4182	WCDMA

LTE Band 5

EUT Configu Mode		Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	20450 to 20600	20525	10 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE Band 26

Cor	EUT nfigure ⁄lode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
	-	Radiated Emission	26865 to 26965	26915	15 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.



Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2
FCC 47 CFR Part 22
KDB 971168 D01 Power Meas License Digital Systems v02r02
ANSI/TIA/EIA-603-E 2016
ANSI 63.26-2015

Note: All test items have been performed and recorded as per the above standards.



4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit is equal to -13 dBm.

4.1.2 Test Procedure

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power 2.15 dBi.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

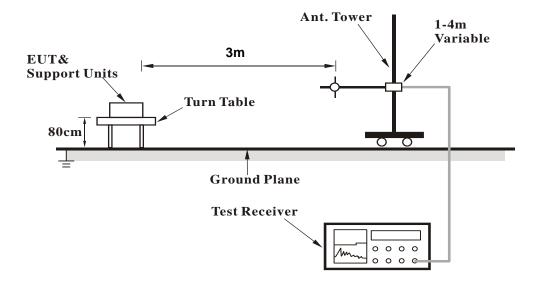
4.1.3 Deviation from Test Standard

No deviation.

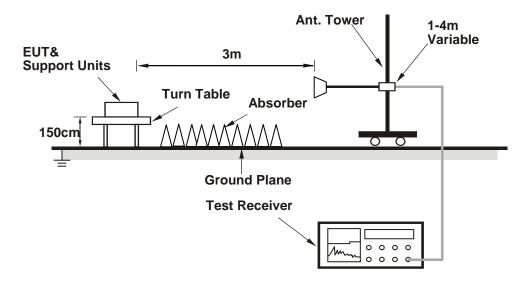


4.1.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).



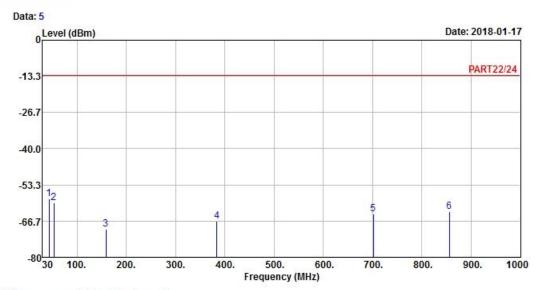
4.1.5 Test Results

GSM:

High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 Chamber 5

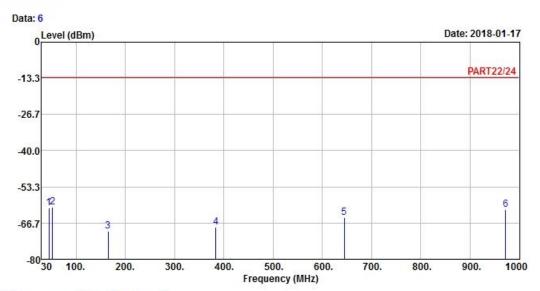
Condition: PART22/24 HORIZONTAL Remak : GPRS 850 Link_H-CH

Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line		Factor	Remark
8	MHz	dBm	dBm	dBm	dB	dB	KI .
1 pp	43.23	-58.38	-56.91	-13.00	-45.38	-1.47	Peak
2	52.95	-60.02	-54.21	-13.00	-47.02	-5.81	Peak
3	158.25	-69.81	-64.42	-13.00	-56.81	-5.39	Peak
4	384.00	-66.74	-60.70	-13.00	-53.74	-6.04	Peak
5	701.80	-64.13	-64.07	-13.00	-51.13	-0.06	Peak
6	855.80	-63.30	-63.62	-13.00	-50.30	0.32	Peak







Site : 966 Chamber 5 Condition: PART22/24 VERTICAL Remak : GPRS 850 Link_H-CH

Tested by: Jisyong Wang

6

	Remark	Factor		Limit Line	207777	Level	Freq
-		dB	dB	dBm	dBm	dBm	MHz
	Peak	-1.99	-48.09	-13.00	-59.10	-61.09	44.85
	Peak	-5.54	-47.76	-13.00	-55.22	-60.76	52.41
	Peak	-5.19	-56.58	-13.00	-64.39	-69.58	165.27
	Peak	-6.04	-55.20	-13.00	-62.16	-68.20	384.00
	Peak	-0.87	-51.71	-13.00	-63.84	-64.71	644.40
	Peak Peak Peak	-5.54 -5.19 -6.04	-47.76 -56.58 -55.20	-13.00 -13.00 -13.00	-55.22 -64.39 -62.16	- <mark>60.76</mark> -69.58 -68.20	52.41 165.27 384.00

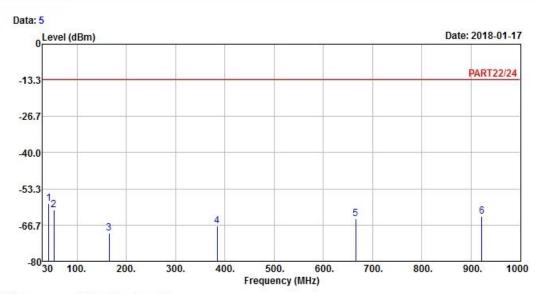
972.00 -61.64 -64.23 -13.00 -48.64 2.59 Peak



EDGE: High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 Chamber 5

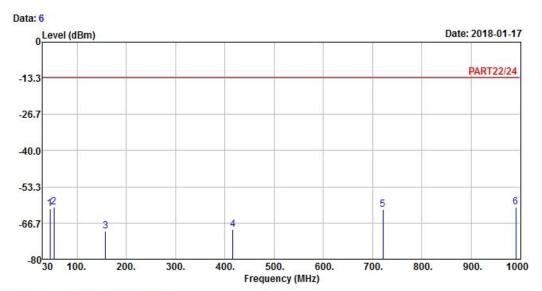
Condition: PART22/24 HORIZONTAL Remak : EDGE 850 Link_H-CH

Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line		Factor	Remark
ć.	MHz	dBm	dBm	dBm	dB	dB	i i
1 pp	42.69	-58.88	-57.94	-13.00	-45.88	-0.94	Peak
2	52.68	-61.19	-55.65	-13.00	-48.19	-5.54	Peak
3	165.27	-69.81	-64.62	-13.00	-56.81	-5.19	Peak
4 5	384.70	-66.95	-60.92	-13.00	-53.95	-6.03	Peak
5	665.40	-64.44	-63.80	-13.00	-51.44	-0.64	Peak
6	921.60	-63.40	-64.50	-13.00	-50.40	1.10	Peak







Site : 966 Chamber 5 Condition: PART22/24 VERTICAL Remak : EDGE 850 Link_H-CH

Tested by: Jisyong Wang

6

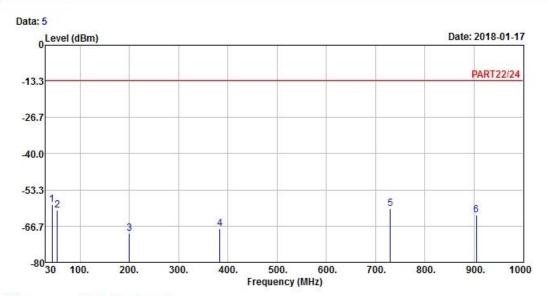
		Read	Limit	0ver		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	4
44.58	-61.35	-59.36	-13.00	-48.35	-1.99	Peak
52.68	-60.67	-55.13	-13.00	-47.67	-5.54	Peak
157.98	-69.77	-64.38	-13.00	-56.77	-5.39	Peak
416.20	-69.10	-63.28	-13.00	-56.10	-5.82	Peak



WCDMA: Middle Channel



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Site : 966 Chamber 5

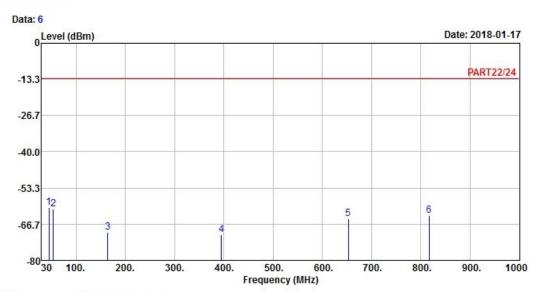
Condition: PART22/24 HORIZONTAL
Remak : WCDMA Band V Link_M-CH

Tested by: Jisyong Wang

T PP	47.27	- 50.05	-21.22	13.00	-45.05	T. TI CON	
2	53.49	-60.95	-55.14	-13.00	-47.95	-5.81 Peak	
3	200.37	-69.23	-61.25	-13.00	-56.23	-7.98 Peak	
4	384.00	-67.55	-61.51	-13.00	-54.55	-6.04 Peak	
5	729.80	-60.20	-60.68	-13.00	-47.20	0.48 Peak	
6	904.80	-62.72	-63.41	-13.00	-49.72	0.69 Peak	







Site : 966 Chamber 5 Condition: PART22/24 VERTICAL Remak : WCDMA Band V Link M-CH

Tested by: Jisyong Wang

1 pp

3

5

Read Limit 0ver Freq Level Level Line Limit Factor Remark MHz dBm dBm dBm dB dB 44.58 -60.38 -58.39 -13.00 -47.38 -1.99 Peak 54.03 -61.15 -55.08 -13.00 -48.15 -6.07 Peak 164.19 -69.73 -64.61 -13.00 -56.73 -5.12 Peak 395.20 -70.58 -64.60 -13.00 -57.58 -5.98 Peak

652.80 -64.58 -63.74 -13.00 -51.58 -0.84 Peak

816.60 -63.57 -64.16 -13.00 -50.57

0.59 Peak



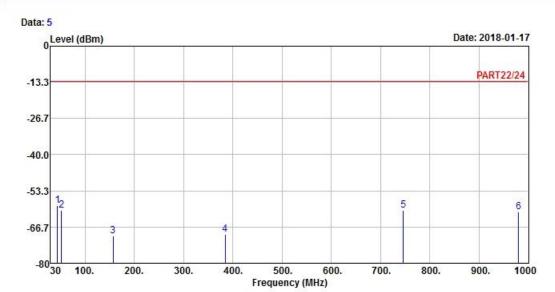
LTE Band 5

Channel Bandwidth: 10 MHz / QPSK

Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

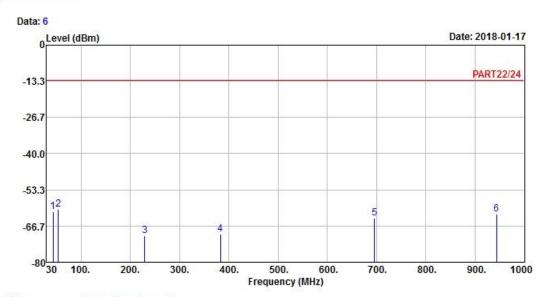
Remak : LTE Band 5 QPSK_10M Link_M-CH

Tested by: Jisyong Wang

1 pp 43.77 -58.69 -57.22 -13.00 -45.69 -1.47 Peak 2 52.41 -60.60 -55.06 -13.00 -47.60 -5.54 Peak 3 156.63 -70.11 -64.45 -13.00 -57.11 -5.66 Peak 4 384.70 -69.29 -63.26 -13.00 -56.29 -6.03 Peak 5 745.90 -60.45 -61.25 -13.00 -47.45 0.80 Peak 6 980.40 -61.14 -64.03 -13.00 -48.14 2.89 Peak







Site : 966 Chamber 5 Condition: PART22/24 VERTICAL

Remak : LTE Band 5 QPSK_10M Link_M-CH

Tested by: Jisyong Wang

Read Limit Over
Freq Level Level Line Limit Factor Remark

MHz dBm dBm dBm dB dB

1 43.23 -61.33 -59.86 -13.00 -48.33 -1.47 Peak
2 pp 53.76 -60.49 -54.68 -13.00 -47.49 -5.81 Peak
3 228.99 -70.13 -63.28 -13.00 -57.13 -6.85 Peak
4 382.60 -69.79 -63.75 -13.00 -56.79 -6.04 Peak
5 695.50 -63.91 -63.74 -13.00 -50.91 -0.17 Peak
6 943.30 -62.16 -63.81 -13.00 -49.16 1.65 Peak



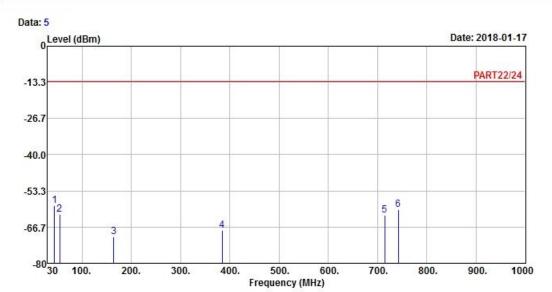
LTE Band 26

Channel Bandwidth: 15 MHz / QPSK

Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 26 QPSK_15M Link_M-CH

742.40 -60.31 -61.04 -13.00 -47.31

Tested by: Jisyong Wang

1 pp

3

4

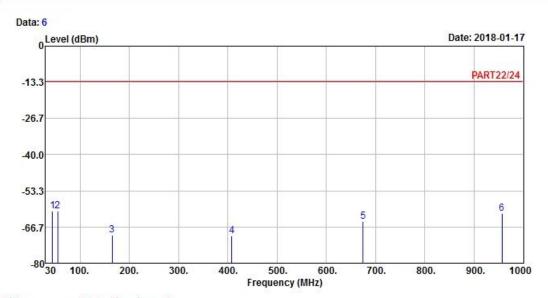
5

Read Limit 0ver Freq Level Level Line Limit Factor Remark dBm dB MHz dBm dBm dB 43.77 -58.88 -57.41 -13.00 -45.88 -1.47 Peak 54.84 -61.96 -55.62 -13.00 -48.96 -6.34 Peak 164.19 -70.17 -65.05 -13.00 -57.17 -5.12 Peak 384.70 -67.79 -61.76 -13.00 -54.79 -6.03 Peak 714.40 -62.35 -62.54 -13.00 -49.35 0.19 Peak

0.73 Peak







Site : 966 Chamber 5 Condition: PART22/24 VERTICAL

Remak : LTE Band 26 QPSK_15M Link_M-CH

Tested by: Jisyong Wang

Read Limit Over
Freq Level Level Line Limit Factor Remark

MHz dBm dBm dBm dB dB

44.31 -60.83 -58.84 -13.00 -47.83 -1.99 Peak



5 Pictures of Test Arrangements	
Please refer to the attached file (Test Setup Photo).	
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Appendix - Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab

Tel: 886-2-26052180 Fax: 886-2-26051924

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232 Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

--- END ---