

Variant FCC Test Report

(PART 27)

Report No.: RFBEIH-WTW-P21070244-2

FCC ID: P27-IG515

Test Model: IG515-4G

Received Date: Jul. 08, 2021

Test Date: Sep. 30, 2021

Issued Date: Dec. 03, 2021

Applicant: Sercomm Corp.

Address: 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C.

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

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

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33383, Taiwan

FCC Registration /
Designation Number: 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P21070244-2	Original Release	Dec. 03, 2021

1 Certificate of Conformity

Product: Gateway

Brand: Sercomm

Test Model: IG515-4G

Sample Status: Engineering Sample

Applicant: Sercomm Corp.

Test Date: Sep. 30, 2021

Standards: FCC Part 27, Subpart C, H, F, L

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.

Prepared by : Lena Wang, **Date:** Dec. 03, 2021
Lena Wang / Specialist

Approved by : Jeremy Lin, **Date:** Dec. 03, 2021
Jeremy Lin / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2 (LTE 4)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	Maximum Peak Output Power	N/A	Refer to note
2.1047	Modulation Characteristics	N/A	Refer to note
2.1055 27.54	Frequency Stability	N/A	Refer to note
2.1049	Occupied Bandwidth	N/A	Refer to note
27.50(d)(5)	Peak to Average Ratio	N/A	Refer to note
27.53(h)	Band Edge Measurements	N/A	Refer to note
2.1051 27.53(h)	Conducted Spurious Emissions	N/A	Refer to note
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -31.01 dB at 59.10 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 12)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(c)(10)	Maximum Peak Output Power	N/A	Refer to note
2.1047	Modulation Characteristics	N/A	Refer to note
2.1055 27.54	Frequency Stability	N/A	Refer to note
2.1049	Occupied Bandwidth	N/A	Refer to note
---	Peak to Average Ratio	N/A	Refer to note
27.53(g)	Band Edge Measurements	N/A	Refer to note
2.1051 27.53(g)	Conducted Spurious Emissions	N/A	Refer to note
2.1053 27.53(g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -32.67 dB at 68.80 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 13)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(b)(10)	Maximum Peak Output Power	N/A	Refer to note
2.1047	Modulation Characteristics	N/A	Refer to note
2.1055 27.54	Frequency Stability	N/A	Refer to note
2.1049	Occupied Bandwidth	N/A	Refer to note
---	Peak to Average Ratio	N/A	Refer to note
27.53(c)(2)(4)	Band Edge Measurements	N/A	Refer to note
2.1051 27.53(c)(2)&(f)	Conducted Spurious Emissions	N/A	Refer to note
2.1053 27.53(c)(2)&(f)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -30.84 dB at 62.01 MHz.

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Only Radiated Spurious Emissions (below 1GHz) tests was performed for this addendum. Refer to original report for other test data.

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	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 07, 2020	Dec. 06, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Preamplifier EMCI	EMC 012645	980115	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC 184045	980116	Oct. 07, 2020	Oct. 06, 2021
Preamplifier EMCI	EMC001340	980201	Oct. 21, 2020	Oct. 20, 2021
Preamplifier EMCI	EMC 330H	980112	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
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
Radio Communication Analyzer Anritsu	MT8821C	6201240431	NA	NA
Spectrum Analyzer ROHDE & SCHWARZ	FSW43	101582	Apr. 01, 2021	Mar. 31, 2022

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

2. The test was performed in HwaYa Chamber 10.

3 General Information

3.1 General Description of EUT

Product	Gateway	
Brand	Sercomm	
Test Model	IG515-4G	
Status of EUT	Engineering Sample	
Power Supply Rating	12.0 Vdc (adapter)	
Modulation Type	LTE	QPSK, 16QAM
Frequency Range	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1754.3 MHz
	LTE Band 4 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1753.5 MHz
	LTE Band 4 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1752.5 MHz
	LTE Band 4 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1750.0 MHz
	LTE Band 4 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1747.5 MHz
	LTE Band 4 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1745.0 MHz
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	699.7 ~ 715.3 MHz
	LTE Band 12 (Channel Bandwidth: 3 MHz)	700.5 ~ 714.5 MHz
	LTE Band 12 (Channel Bandwidth: 5 MHz)	701.5 ~ 713.5 MHz
	LTE Band 12 (Channel Bandwidth: 10 MHz)	704.0 ~ 711.0 MHz
	LTE Band 13 (Channel Bandwidth: 5 MHz)	779.5 ~ 784.5 MHz
	LTE Band 13 (Channel Bandwidth: 10 MHz)	782.0 MHz
Antenna Type	Refer to Note as below	
Antenna Gain	Refer to Note as below	
Accessory Device	Refer to Note as below	
Data Cable Supplied	N/A	

Note:

- This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to BV CPS report no. FD200709D02-2. The difference compared with original report is listed as below, therefore only Radiated Spurious Emissions (below 1GHz) tests was performed for this addendum.

- ◆ Adding new HW, Buzzer, Tamper & Pairing button
- ◆ Adding new battery source (Main source : Simpo : Model : Sercomm NA50X_NA502S, 2nd source : FUJI : Model : IG55)
- ◆ Cancel the large shell of the original report.

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	APD	WB-24J12FU	I/P: 100-240 Vac, 50/60 Hz, 0.7 A O/P: 12 Vdc, 2 A
Battery	FUJI	IG55	7.2V, 3100mAh, 22.32Wh

3. The antenna information is listed as below.

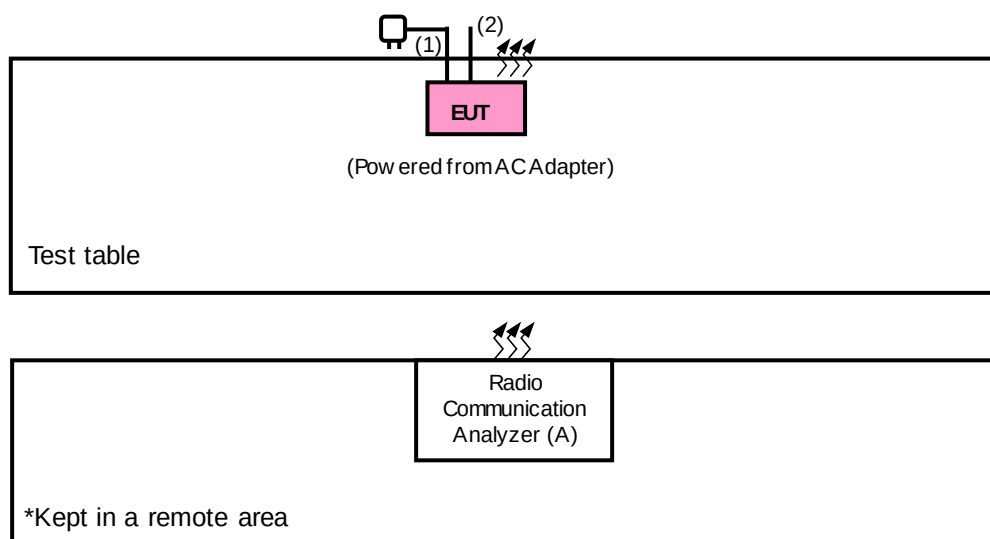
Antenna Type		PIFA				
Band		LTE				
		2	4	5	12	13
Gain	Ant. 1 (Main)	2.3	2.8	1.3	1.1	1.1
	Ant. 2 (Div)	2.6	2.8	2.5	2.8	2.8

4. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

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

3.2 Configuration of System under Test

<Radiated Emission 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
A	Radio Communication Analyzer	ANRITSU	MT8820C	6201240431	N/A

No.	Signal Cable Description Of The Above Support Units
1.	Power Cable: 1.5m
2.	LAN Cable: 2m

Note:

1. All power cords of the above support units are non-shielded (1.8m).

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
LTE Band 4	X-plane
LTE Band 12	X-plane
LTE Band 13	X-plane

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	20050 to 20300	20050	20 MHz	QPSK	1 RB / 0 RB Offset

Note: For radiated emissions below 1 GHz, select the worst radiated emission channel for final testing.

LTE Band 12

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	23060 to 23130	23095	10 MHz	QPSK	1 RB / 0 RB Offset

Note: For radiated emissions below 1 GHz, select the worst radiated emission channel for final testing.

LTE Band 13

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission	23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset

Note: For radiated emissions below 1 GHz, select the worst radiated emission channel for final testing.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang, 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 and references

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

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI 63.26-2015

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

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-E 2016

Note: All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission Measurement

4.1.1 Limits of Radiated Emission Measurement

- a. The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. The limit of emission is equal to -13 dBm.
- b. For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

4.1.2 Test Procedure

- a. 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. $EIRP = \text{Output power level} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. Correction Factor (includes EIRP and ERP unit conversion factor) = Antenna gain of substitution horn. - Tx cable loss. Measurement method refers to ANSI C63.26 section 5.2.7 & 5.5.
- c. E.R.P power can be calculated from E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.R.P power - 2.15 dB.

Note: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

NOTE: The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:

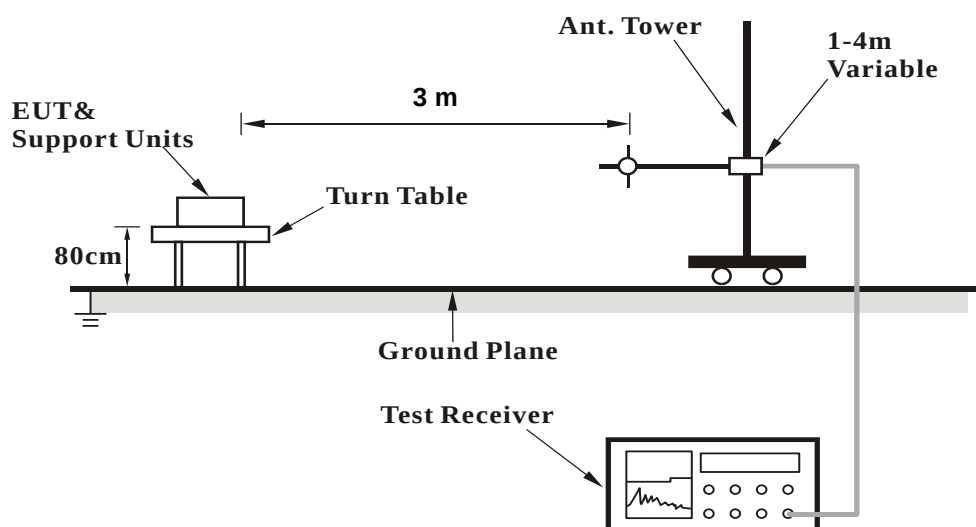
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

4.1.3 Deviation from Test Standard

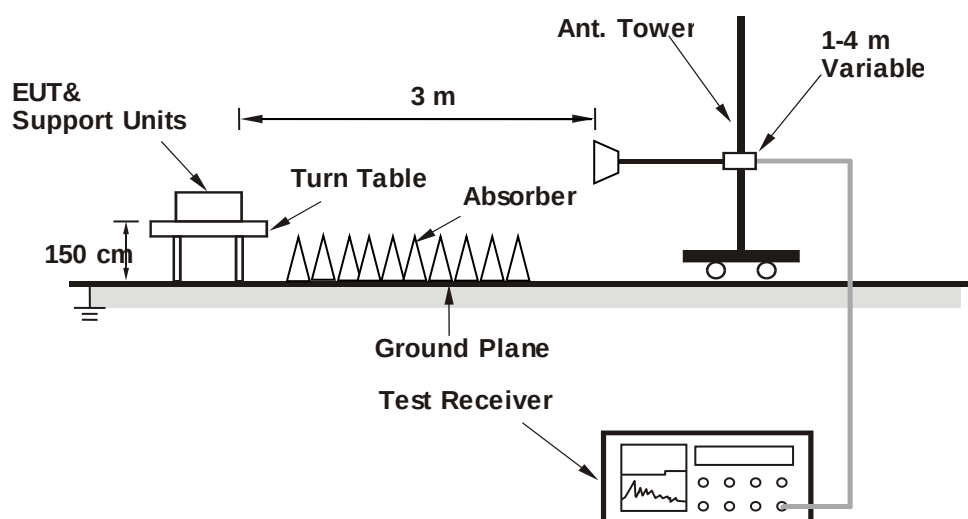
No deviation.

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

LTE Band 4

Channel Bandwidth: 20 MHz / QPSK

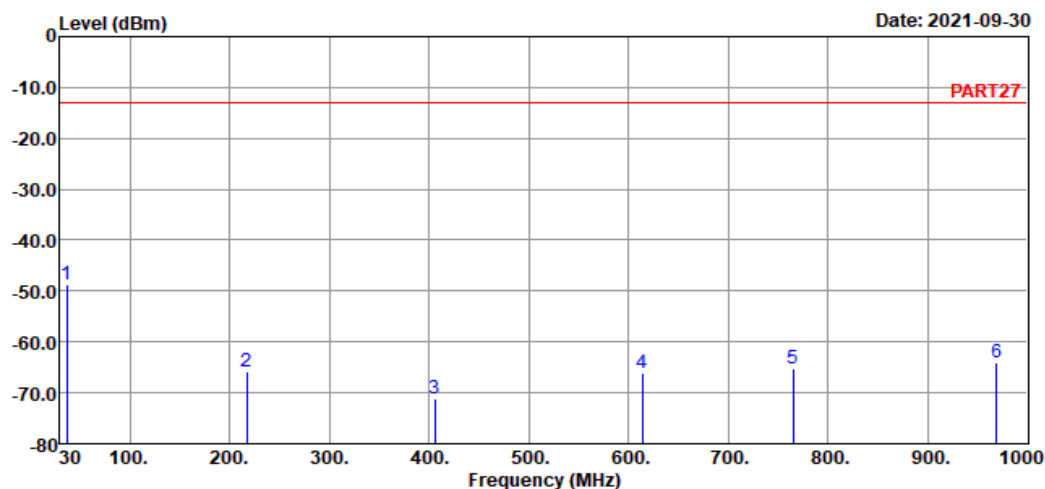
Low Channel



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Data: 3



Site : 966 Chamber 5

Condition: PART27 HORIZONTAL

Remak : LTE Band 4 QPSK_20M Link_L-CH

Tested by: Cookie Ku

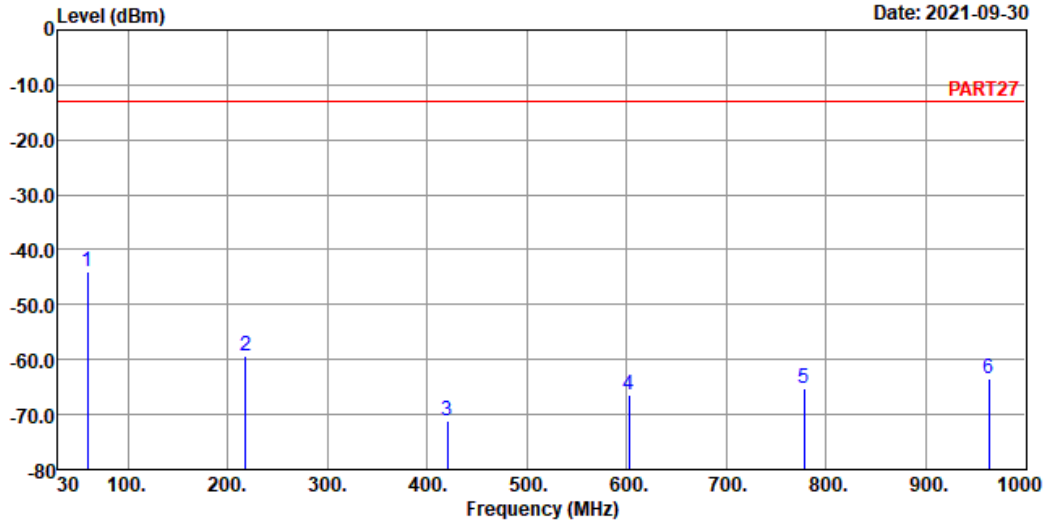
	Freq	Level	Read Level	Limit	Over	
	MHz	dBm	dBm	dBm	Factor	Limit Remark
1 pp	36.79	-48.83	-47.84	-13.00	-0.99	-35.83 Peak
2	217.21	-65.84	-58.52	-13.00	-7.32	-52.84 Peak
3	405.39	-71.12	-65.22	-13.00	-5.90	-58.12 Peak
4	613.94	-66.10	-65.31	-13.00	-0.79	-53.10 Peak
5	765.26	-65.28	-66.12	-13.00	0.84	-52.28 Peak
6	968.96	-64.05	-66.53	-13.00	2.48	-51.05 Peak



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Data: 4



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK_20M Link_L-CH

Tested by: Cookie Ku

	Freq	Level	Read Level	Limit	Line Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	59.10	-44.01	-36.61	-13.00	-7.40	-31.01	Peak
2	218.18	-59.34	-52.06	-13.00	-7.28	-46.34	Peak
3	419.94	-71.07	-65.28	-13.00	-5.79	-58.07	Peak
4	602.30	-66.49	-65.73	-13.00	-0.76	-53.49	Peak
5	777.87	-65.13	-65.93	-13.00	0.80	-52.13	Peak
6	963.14	-63.43	-65.71	-13.00	2.28	-50.43	Peak

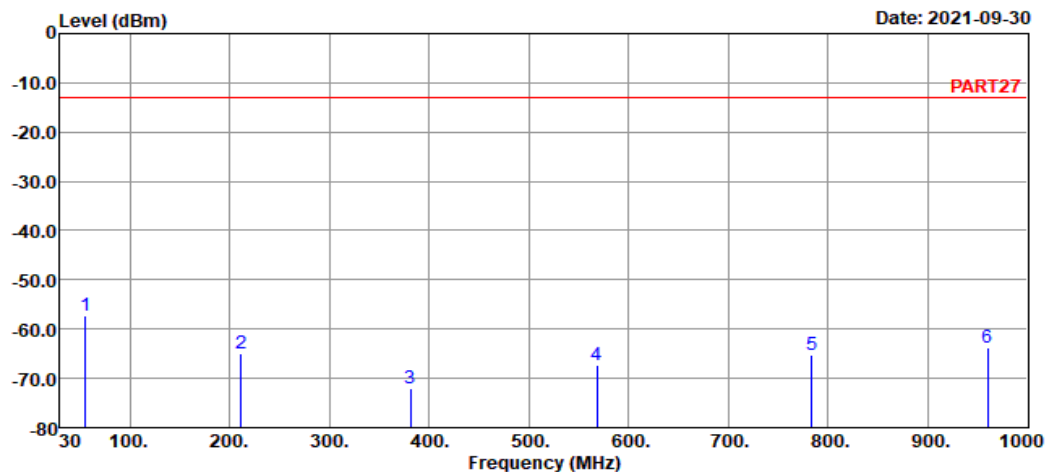
LTE Band 12
Channel Bandwidth: 10 MHz / QPSK
Middle Channel



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Data: 3



Site : 966 Chamber 5
Condition: PART27 HORIZONTAL
Remak : LTE Band 12 QPSK_10M Link_M-CH
Tested by: Cookie Ku

	Freq	Level	Read Level	Limit	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	55.22	-57.28	-50.94	-13.00	-6.34	-44.28	Peak
2	211.39	-64.82	-57.27	-13.00	-7.55	-51.82	Peak
3	381.14	-71.94	-65.88	-13.00	-6.06	-58.94	Peak
4	568.35	-67.38	-65.30	-13.00	-2.08	-54.38	Peak
5	783.69	-65.20	-65.98	-13.00	0.78	-52.20	Peak
6	960.23	-63.87	-66.05	-13.00	2.18	-50.87	Peak

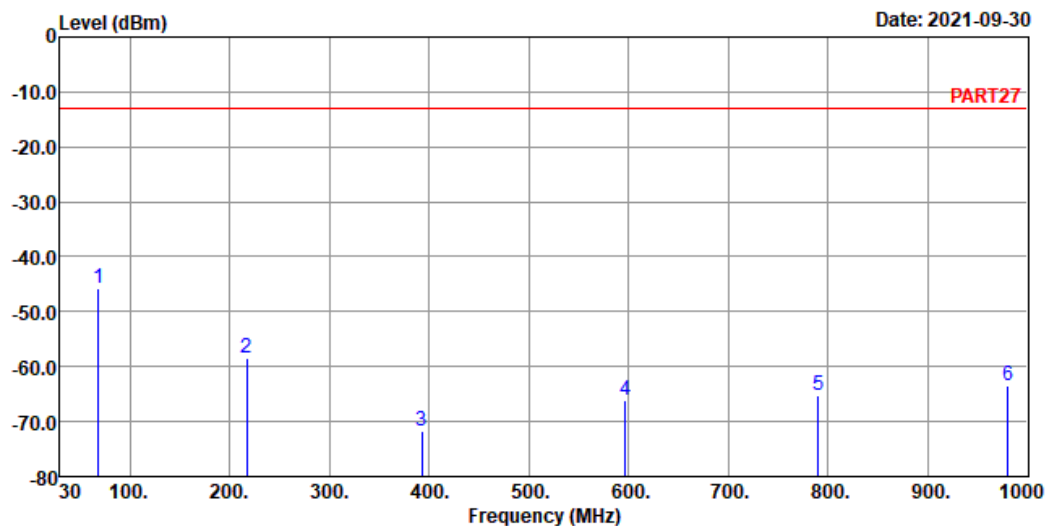


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Data: 4

Date: 2021-09-30



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK_10M Link_M-CH

Tested by: Cookie Ku

	Freq	Level	Read Level	Limit	Over	
	MHz	dBm	dBm	dBm	dB	Limit Remark
1 pp	68.80	-45.67	-37.35	-13.00	-8.32	-32.67 Peak
2	217.21	-58.53	-51.21	-13.00	-7.32	-45.53 Peak
3	392.78	-71.59	-65.60	-13.00	-5.99	-58.59 Peak
4	596.48	-66.26	-65.35	-13.00	-0.91	-53.26 Peak
5	790.48	-65.15	-65.91	-13.00	0.76	-52.15 Peak
6	980.60	-63.39	-66.28	-13.00	2.89	-50.39 Peak

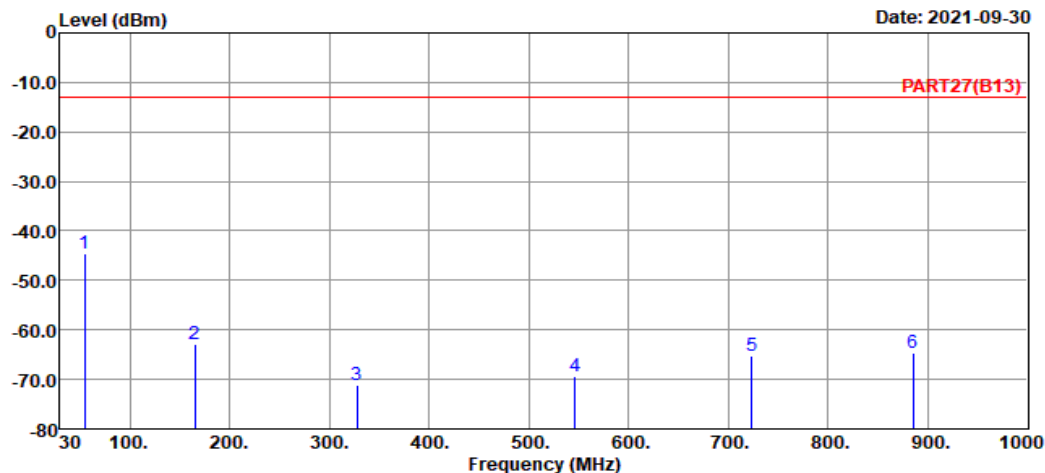
LTE Band 13
Channel Bandwidth: 10 MHz / QPSK
Middle Channel



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Data: 3



Site : 966 Chamber 5
Condition: PART27(B13) HORIZONTAL
Remak : LTE Band 13 QPSK_10M Link_M-CH
Tested by: Cookie Ku

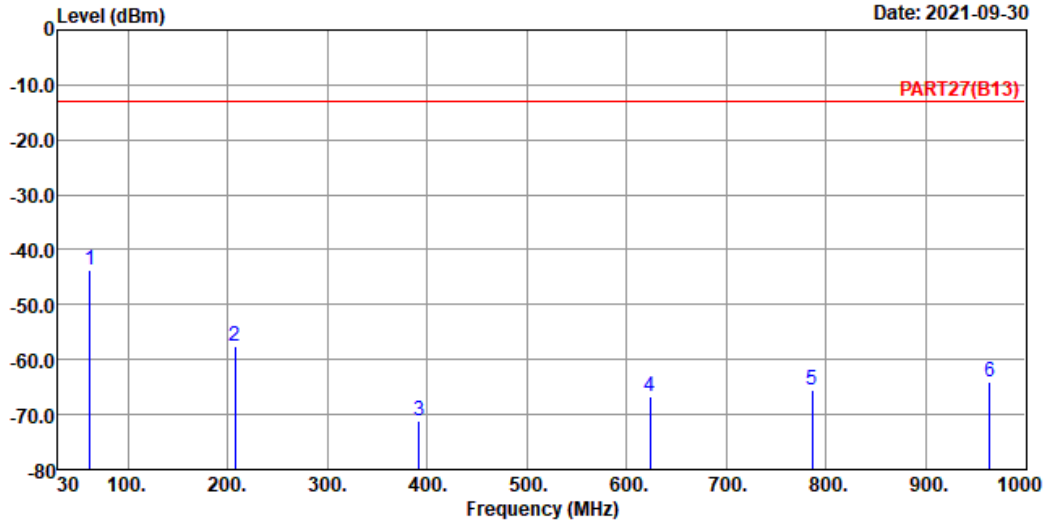
	Freq	Level	Read Level	Limit Line	Factor	Over Limit	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	54.25	-44.68	-38.61	-13.00	-6.07	-31.68	Peak
2	164.83	-62.86	-57.67	-13.00	-5.19	-49.86	Peak
3	327.79	-71.16	-64.58	-13.00	-6.58	-58.16	Peak
4	546.04	-69.33	-66.34	-13.00	-2.99	-56.33	Peak
5	723.55	-65.23	-65.59	-13.00	0.36	-52.23	Peak
6	885.54	-64.66	-65.15	-13.00	0.49	-51.66	Peak



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Data: 4



Site : 966 Chamber 5
Condition: PART27(B13) VERTICAL
Remak : LTE Band 13 QPSK_10M Link_M-CH
Tested by: Cookie Ku

	Freq	Level	Read Level	Limit	Over	
	MHz	dBm	dBm	dBm	Factor	Limit Remark
1 pp	62.01	-43.84	-36.03	-13.00	-7.81	-30.84 Peak
2	207.51	-57.51	-49.80	-13.00	-7.71	-44.51 Peak
3	391.81	-71.09	-65.10	-13.00	-5.99	-58.09 Peak
4	623.64	-66.68	-65.86	-13.00	-0.82	-53.68 Peak
5	785.63	-65.62	-66.40	-13.00	0.78	-52.62 Peak
6	964.11	-64.16	-66.47	-13.00	2.31	-51.16 Peak

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of 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.

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

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.

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