

Variant FCC Test Report

(PART 27)

Report No.: RF171114D13B-1

FCC ID: P27-TPM10

Test Model: TPM10

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Test Date: Oct. 19, 2018

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Applicant: Sercomm Corp.

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**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF171114D13B-1	Original Release	Nov. 01, 2018

1 Certificate of Conformity

Product: Cat-M1 Module

Brand: Sercomm

Test Model: TPM10

Sample Status: Identical Prototype

Applicant: Sercomm Corp.

Test Date: Oct. 19, 2018

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

This report is issued as a supplementary report to BV CPS report no.: RF171114D13-1. This report shall be used by combining with its original report.

Prepared by : Gina Liu, **Date:** Nov. 01, 2018
Gina Liu / Specialist

Approved by : Dylan Chiou, **Date:** Nov. 01, 2018
Dylan Chiou / 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	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	N/A	Refer to original report
2.1049 27.53(h)	Occupied Bandwidth	N/A	Refer to original report
27.50(d)(5)	Peak to Average Ratio	N/A	Refer to original report
27.53(h)	Band Edge Measurements	N/A	Refer to original report
2.1051 27.53(h)	Conducted Spurious Emissions	N/A	Refer to original report
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -30.85 dB at 5197.50 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 original report
2.1055 27.54	Frequency Stability	N/A	Refer to original report
2.1049 27.53(g)	Occupied Bandwidth	N/A	Refer to original report
27.50(d)(5)	Peak to Average Ratio	N/A	Refer to original report
27.53(g)	Band Edge Measurements	N/A	Refer to original report
2.1051 27.53(g)	Conducted Spurious Emissions	N/A	Refer to original report
2.1053 27.53(g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -28.52 dB at 1422 MHz.

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	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Jan. 11, 2018	Jan. 10, 2019
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 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(RF C-SMS-100-SMS- 120+RFC-SMS-1 00-SMS-400)	Jun. 19, 2018	Jun. 19, 2019
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 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. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-800 0&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	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
HORN Antenna Schwarzbeck	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018

- 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

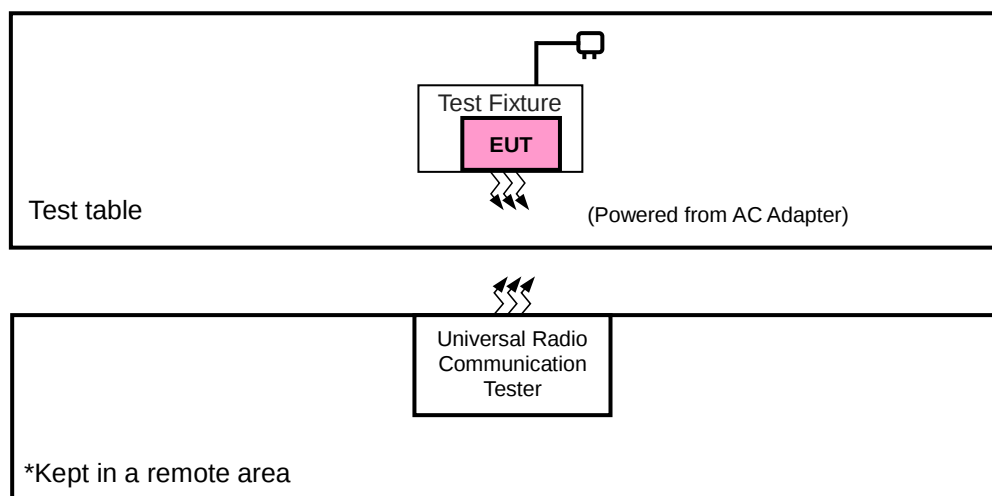
3.1 General Description of EUT

Product	Cat-M1 Module	
Brand	Sercomm	
Test Model	TPM10	
Status of EUT	Identical Prototype	
Power Supply Rating	5.0 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
Max. ERP Power	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	71.12 mW
	LTE Band 12 (Channel Bandwidth: 3 MHz)	75.16 mW
	LTE Band 12 (Channel Bandwidth: 5 MHz)	79.25 mW
	LTE Band 12 (Channel Bandwidth: 10 MHz)	83.18 mW
Max. EIRP Power	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	161.77 mW
	LTE Band 4 (Channel Bandwidth: 3 MHz)	169.79 mW
	LTE Band 4 (Channel Bandwidth: 5 MHz)	179.02 mW
	LTE Band 4 (Channel Bandwidth: 10 MHz)	188.32 mW
	LTE Band 4 (Channel Bandwidth: 15 MHz)	198.56 mW
	LTE Band 4 (Channel Bandwidth: 20 MHz)	208.40 mW
Antenna Type	Monopole Antenna	
Antenna Gain	LTE Band 4	3.03 dBi
	LTE Band 12	0.18 dBi
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. This report is issued as a supplementary report to BV CPS report no. RF171114D13-1. The difference compared with original report is adding new antenna. Therefore, only radiated emissions test and EIRP has been verified and recorded in this report.
2. 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



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	LINKSYS	MT10-1050200-A1	N/A	N/A
2.	Test Fixture	N/A	N/A	N/A	N/A

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

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1-2 were 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	ERP / EIRP	Radiated Emission
LTE Band 4	X-plane	X-axis
LTE Band 12	X-plane	X-axis

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 5 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM	1 RB / 14 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM	1 RB / 74 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	1 RB / 99 RB Offset
-	Radiated Emission	20050 to 20300	20050, 20175, 20300	20 MHz	QPSK	50 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 12

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 2 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
-	Radiated Emission	23060 to 23130	23060, 23095, 23130	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.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP / EIRP	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang
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 27

KDB 971168 D01 Power Meas License Digital Systems v03r01

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 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 698-716 MHz band are limited to 3 watts ERP

4.1.2 Test Procedures

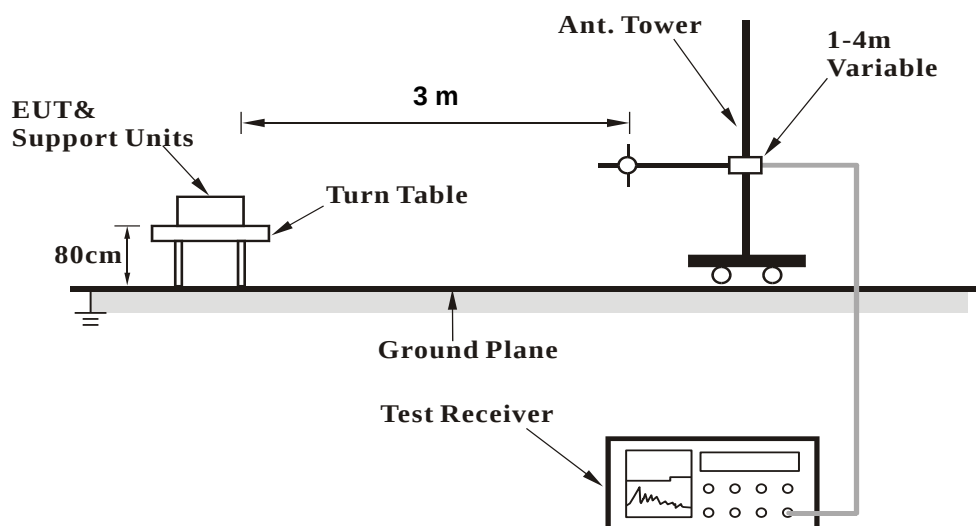
EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
- b. 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.
- c. 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 b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

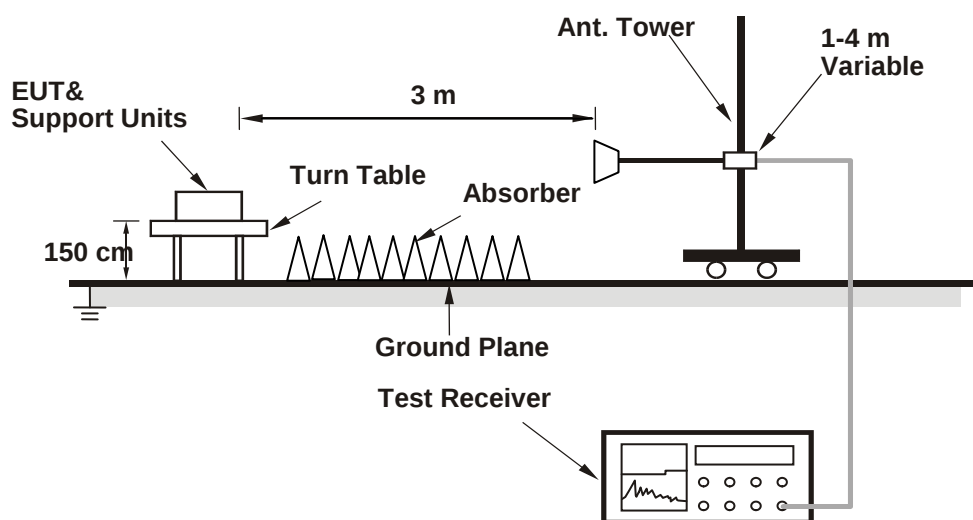
4.1.3 Test Setup

EIRP / ERP Measurement:

<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).

4.1.4 Test Results

ERP Power (dBm)

LTE Band 12							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23017	699.7	-9.82	30.36	18.39	69.02	H
	23095	707.5	-9.55	30.17	18.47	70.31	
	23173	715.3	-9.50	30.17	18.52	71.12	
	23017	699.7	-14.12	32.03	15.76	37.67	V
	23095	707.5	-14.11	31.98	15.72	37.33	
	23173	715.3	-14.23	32.06	15.68	36.98	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	23017	699.7	-10.81	30.36	17.40	54.95	H
	23095	707.5	-10.54	30.17	17.48	55.98	
	23173	715.3	-10.49	30.17	17.53	56.62	
	23017	699.7	-15.11	32.03	14.77	29.99	V
	23095	707.5	-15.10	31.98	14.73	29.72	
	23173	715.3	-15.22	32.06	14.69	29.44	

LTE Band 12							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23025	700.5	-9.39	30.17	18.63	72.95	H
	23095	707.5	-9.31	30.17	18.71	74.30	
	23165	714.5	-9.27	30.18	18.76	75.16	
	23025	700.5	-13.81	31.96	16.00	39.81	V
	23095	707.5	-13.87	31.98	15.96	39.45	
	23165	714.5	-13.96	32.03	15.92	39.08	
Channel Bandwidth: 3 MHz / 16QAM							
X	23025	700.5	-10.40	30.17	17.62	57.81	H
	23095	707.5	-10.32	30.17	17.70	58.88	
	23165	714.5	-10.28	30.18	17.75	59.57	
	23025	700.5	-14.82	31.96	14.99	31.55	V
	23095	707.5	-14.88	31.98	14.95	31.26	
	23165	714.5	-14.97	32.03	14.91	30.97	

LTE Band 12							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23035	701.5	-9.16	30.17	18.86	76.91	H
	23095	707.5	-9.08	30.17	18.94	78.34	
	23155	713.5	-9.04	30.18	18.99	79.25	
	23035	701.5	-13.58	31.96	16.23	41.98	V
	23095	707.5	-13.64	31.98	16.19	41.59	
	23155	713.5	-13.73	32.03	16.15	41.21	
Channel Bandwidth: 5 MHz / 16QAM							
X	23035	701.5	-10.17	30.17	17.85	60.95	H
	23095	707.5	-10.09	30.17	17.93	62.09	
	23155	713.5	-10.05	30.18	17.98	62.81	
	23035	701.5	-14.59	31.96	15.22	33.27	V
	23095	707.5	-14.65	31.98	15.18	32.96	
	23155	713.5	-14.74	32.03	15.14	32.66	

LTE Band 12							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	ERP (dBm)	ERP (mW)	Polarization (H/V)
X	23060	704.0	-8.95	30.17	19.07	80.72	H
	23095	707.5	-8.87	30.17	19.15	82.22	
	23130	711.0	-8.83	30.18	19.20	83.18	
	23060	704.0	-13.37	31.96	16.44	44.06	V
	23095	707.5	-13.43	31.98	16.40	43.65	
	23130	711.0	-13.52	32.03	16.36	43.25	
Channel Bandwidth: 10 MHz / 16QAM							
X	23060	704.0	-9.96	30.17	18.06	63.97	H
	23095	707.5	-9.88	30.17	18.14	65.16	
	23130	711.0	-9.84	30.18	18.19	65.92	
	23060	704.0	-14.38	31.96	15.43	34.91	V
	23095	707.5	-14.44	31.98	15.39	34.59	
	23130	711.0	-14.53	32.03	15.35	34.28	

EIRP Power (dBm)

LTE Band 4							
Channel Bandwidth: 1.4 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	19957	1710.7	-14.41	36.45	22.04	159.96	H
	20175	1732.5	-14.71	36.80	22.09	161.77	
	20393	1754.3	-14.87	36.94	22.07	161.18	
	19957	1710.7	-26.24	37.28	11.04	12.70	V
	20175	1732.5	-26.46	37.63	11.17	13.09	
	20393	1754.3	-26.53	37.64	11.11	12.91	
Channel Bandwidth: 1.4 MHz / 16QAM							
X	19957	1710.7	-15.57	36.45	20.88	122.46	H
	20175	1732.5	-15.87	36.80	20.93	123.85	
	20393	1754.3	-16.03	36.94	20.91	123.40	
	19957	1710.7	-27.40	37.28	9.88	9.72	V
	20175	1732.5	-27.62	37.63	10.01	10.02	
	20393	1754.3	-27.69	37.64	9.95	9.89	

LTE Band 4							
Channel Bandwidth: 3 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	19965	1711.5	-14.20	36.45	22.25	167.88	H
	20175	1732.5	-14.50	36.80	22.30	169.79	
	20385	1753.5	-14.66	36.94	22.28	169.16	
	19965	1711.5	-26.03	37.28	11.25	13.33	V
	20175	1732.5	-26.25	37.63	11.38	13.74	
	20385	1753.5	-26.32	37.64	11.32	13.55	
Channel Bandwidth: 3 MHz / 16QAM							
X	19965	1711.5	-15.34	36.45	21.11	129.12	H
	20175	1732.5	-15.64	36.80	21.16	130.59	
	20385	1753.5	-15.80	36.94	21.14	130.11	
	19965	1711.5	-27.17	37.28	10.11	10.25	V
	20175	1732.5	-27.39	37.63	10.24	10.57	
	20385	1753.5	-27.46	37.64	10.18	10.42	

LTE Band 4							
Channel Bandwidth: 5 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	19975	1712.5	-13.97	36.45	22.48	177.01	H
	20175	1732.5	-14.27	36.80	22.53	179.02	
	20375	1752.5	-14.43	36.94	22.51	178.36	
	19975	1712.5	-25.80	37.28	11.48	14.05	V
	20175	1732.5	-26.02	37.63	11.61	14.49	
	20375	1752.5	-26.09	37.64	11.55	14.29	
Channel Bandwidth: 5 MHz / 16QAM							
X	19975	1712.5	-15.10	36.45	21.35	136.46	H
	20175	1732.5	-15.40	36.80	21.40	138.01	
	20375	1752.5	-15.56	36.94	21.38	137.50	
	19975	1712.5	-26.93	37.28	10.35	10.83	V
	20175	1732.5	-27.15	37.63	10.48	11.17	
	20375	1752.5	-27.22	37.64	10.42	11.02	

LTE Band 4							
Channel Bandwidth: 10 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20000	1715.0	-13.94	36.64	22.70	186.21	H
	20175	1732.5	-14.05	36.80	22.75	188.32	
	20350	1750.0	-14.07	36.80	22.73	187.63	
	20000	1715.0	-25.74	37.44	11.70	14.78	V
	20175	1732.5	-25.80	37.63	11.83	15.24	
	20350	1750.0	-25.87	37.64	11.77	15.03	
Channel Bandwidth: 10 MHz / 16QAM							
X	20000	1715.0	-15.06	36.64	21.58	143.88	H
	20175	1732.5	-15.17	36.80	21.63	145.51	
	20350	1750.0	-15.19	36.80	21.61	144.98	
	20000	1715.0	-26.86	37.44	10.58	11.42	V
	20175	1732.5	-26.92	37.63	10.71	11.78	
	20350	1750.0	-26.99	37.64	10.65	11.61	

LTE Band 4							
Channel Bandwidth: 15 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20025	1717.5	-13.52	36.45	22.93	196.34	H
	20175	1732.5	-13.82	36.80	22.98	198.56	
	20325	1747.5	-13.98	36.94	22.96	197.83	
	20025	1717.5	-25.35	37.28	11.93	15.58	V
	20175	1732.5	-25.57	37.63	12.06	16.07	
	20325	1747.5	-25.64	37.64	12.00	15.85	
Channel Bandwidth: 15 MHz / 16QAM							
X	20025	1717.5	-14.66	36.45	21.79	151.01	H
	20175	1732.5	-14.96	36.80	21.84	152.72	
	20325	1747.5	-15.12	36.94	21.82	152.16	
	20025	1717.5	-26.49	37.28	10.79	11.99	V
	20175	1732.5	-26.71	37.63	10.92	12.36	
	20325	1747.5	-26.78	37.64	10.86	12.19	

LTE Band 4							
Channel Bandwidth: 20 MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
X	20050	1720.0	-13.31	36.45	23.14	206.06	H
	20175	1732.5	-13.61	36.80	23.19	208.40	
	20300	1745.0	-13.77	36.94	23.17	207.63	
	20050	1720.0	-25.14	37.28	12.14	16.36	V
	20175	1732.5	-25.36	37.63	12.27	16.87	
	20300	1745.0	-25.43	37.64	12.21	16.63	
Channel Bandwidth: 20 MHz / 16QAM							
X	20050	1720.0	-14.42	36.45	22.03	159.59	H
	20175	1732.5	-14.72	36.80	22.08	161.40	
	20300	1745.0	-14.88	36.94	22.06	160.81	
	20050	1720.0	-26.25	37.28	11.03	12.67	V
	20175	1732.5	-26.47	37.63	11.16	13.06	
	20300	1745.0	-26.54	37.64	11.10	12.88	

4.2 Radiated Emission Measurement

4.2.1 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.

4.2.2 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$.

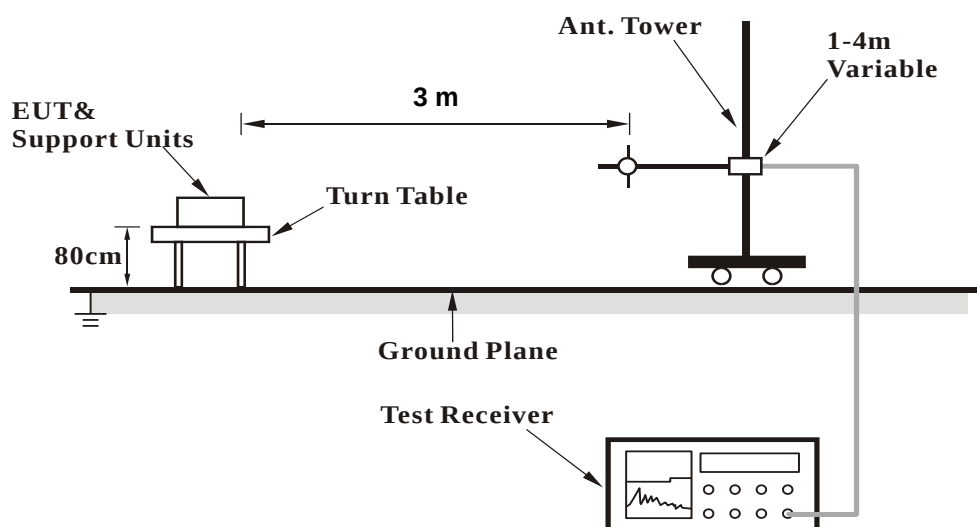
Note: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.2.3 Deviation from Test Standard

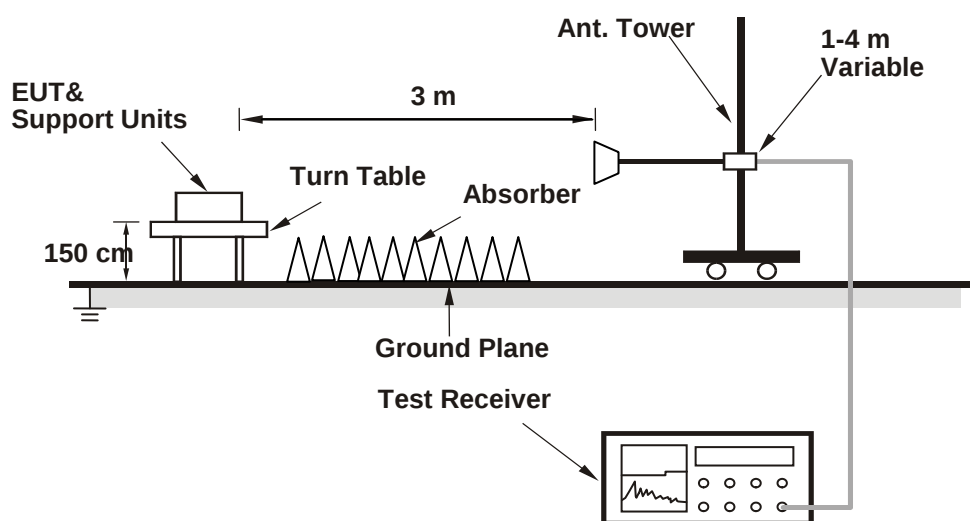
No deviation.

4.2.4 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).

4.2.5 Test Results

LTE Band 4

Channel Bandwidth: 20 MHz / QPSK

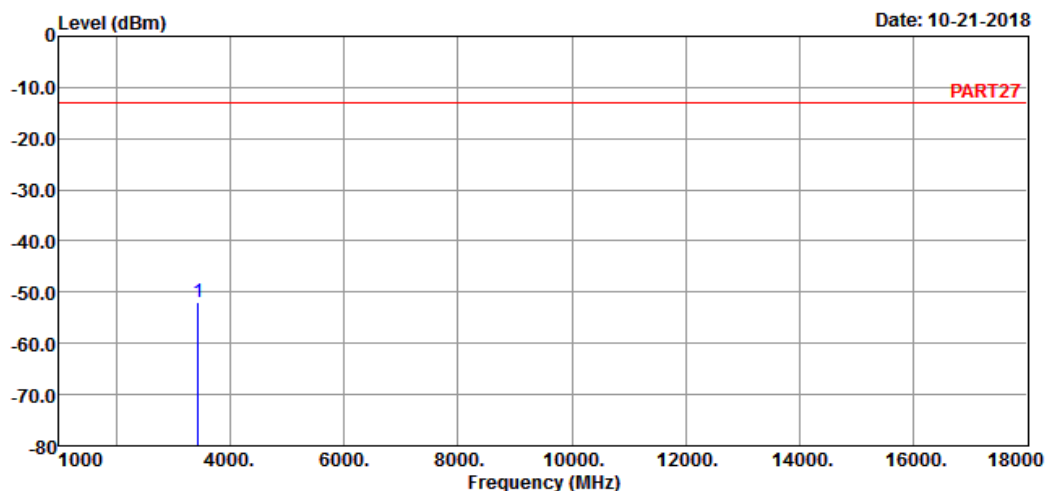
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5
 Condition: PART27 HORIZONTAL
 Remak : Cat-M1 Band 4 QPSK_20M Link_L-CH
 Tested by: Jisyong Wang

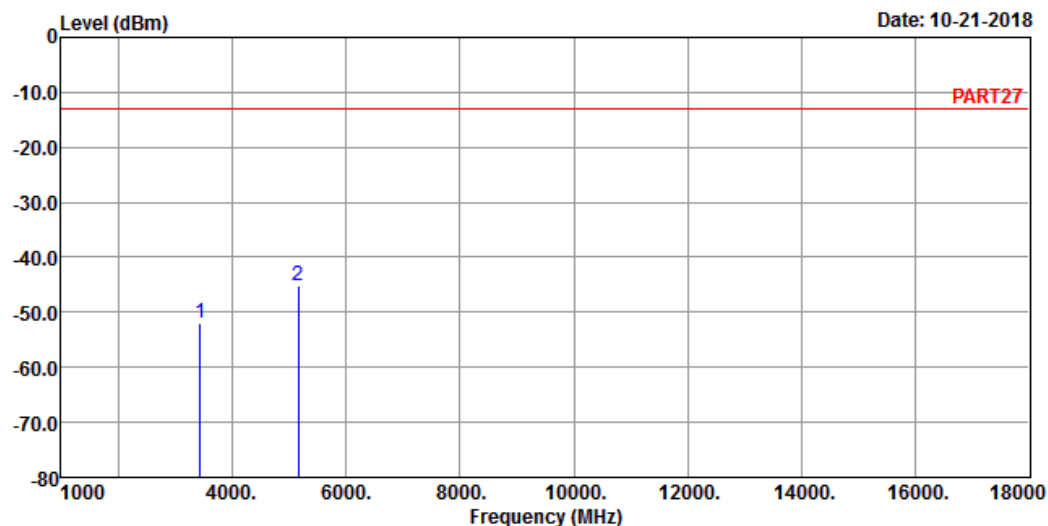
		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	
1 pp 3440.00	-51.86	-43.64	-13.00	-38.86	-8.22	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
 Condition: PART27 VERTICAL
 Remak : Cat-M1 Band 4 QPSK_20M Link_L-CH
 Tested by: Jisyong Wang

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3440.00	-51.99	-43.77	-13.00	-38.99	-8.22	Peak
2 pp	5160.00	-45.26	-43.35	-13.00	-32.26	-1.91	Peak

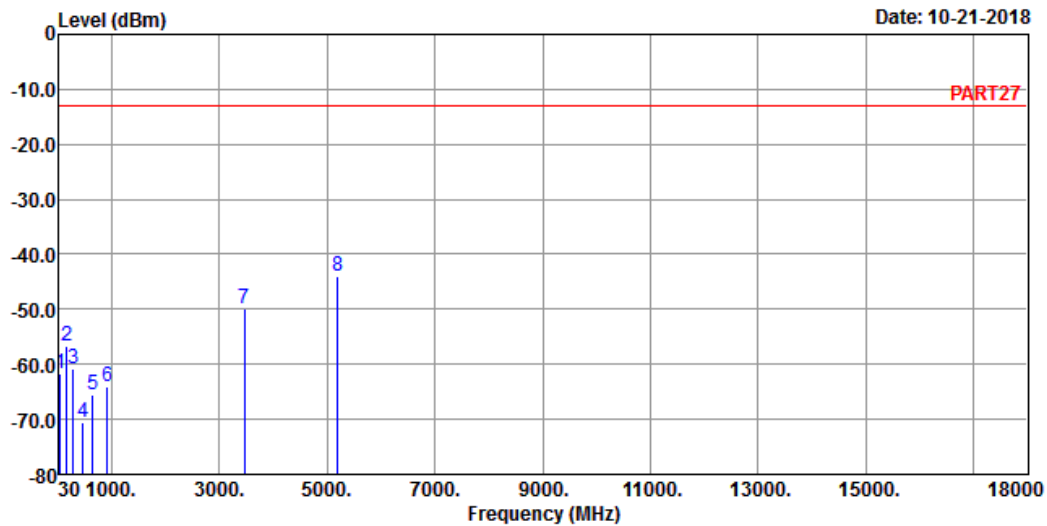
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 Chamber 5
 Condition: PART27 HORIZONTAL
 Remak : Cat-M1 Band 4 QPSK_20M Link_M-CH
 Tested by: Jisyoung Wang

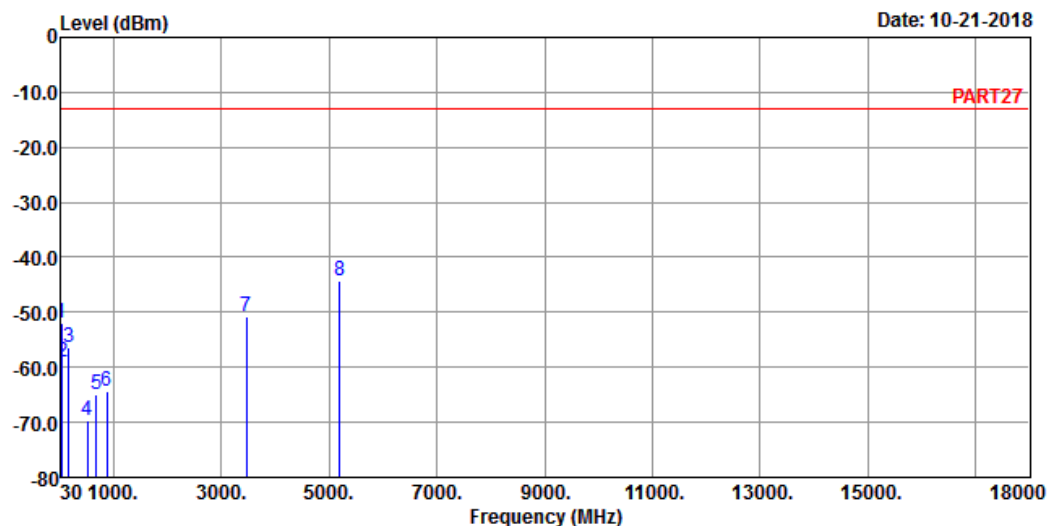
			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.58	-61.70	-60.23	-13.00	-48.70	-1.47	Peak
2	168.71	-56.54	-51.08	-13.00	-43.54	-5.46	Peak
3	284.14	-60.89	-54.20	-13.00	-47.89	-6.69	Peak
4	475.23	-70.57	-65.49	-13.00	-57.57	-5.08	Peak
5	649.83	-65.53	-64.65	-13.00	-52.53	-0.88	Peak
6	919.49	-64.05	-65.10	-13.00	-51.05	1.05	Peak
7	3465.00	-49.99	-42.11	-13.00	-36.99	-7.88	Peak
8 pp	5197.50	-43.85	-41.78	-13.00	-30.85	-2.07	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : Cat-M1 Band 4 QPSK_20M Link_M-CH

Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	30.00	-51.97	-52.35	-13.00	-38.97	0.38	Peak
2	43.58	-59.07	-57.60	-13.00	-46.07	-1.47	Peak
3	167.74	-56.47	-51.08	-13.00	-43.47	-5.39	Peak
4	517.91	-69.61	-65.62	-13.00	-56.61	-3.99	Peak
5	681.84	-64.95	-64.56	-13.00	-51.95	-0.39	Peak
6	881.66	-64.47	-64.94	-13.00	-51.47	0.47	Peak
7	3465.00	-50.89	-43.01	-13.00	-37.89	-7.88	Peak
8 pp	5197.50	-44.25	-42.18	-13.00	-31.25	-2.07	Peak

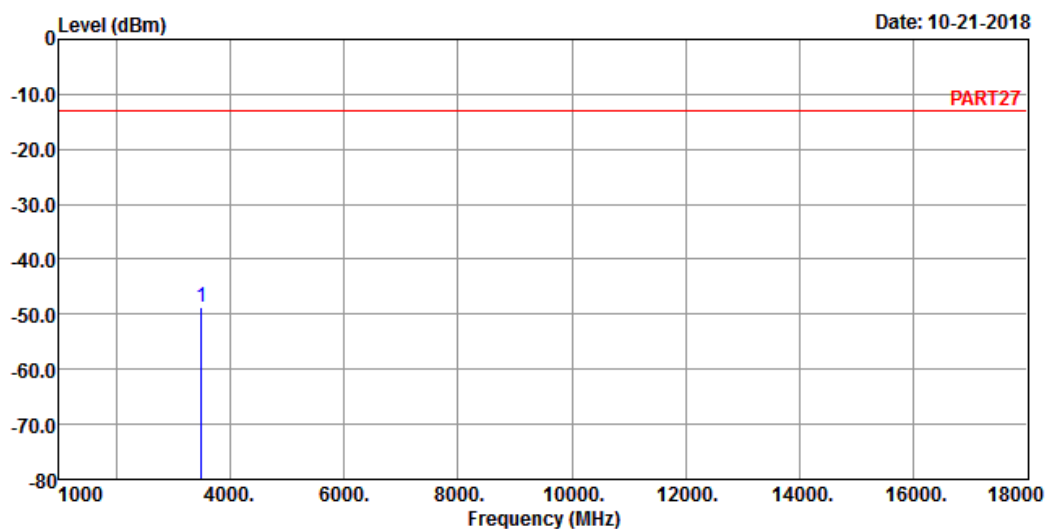
High Channel



Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 5



Site : 966 Chamber 5
Condition: PART27 HORIZONTAL
Remak : Cat-M1 Band 4 QPSK_20M Link_H-CH
Tested by: Jisyong Wang

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3490.00 -48.65 -41.00 -13.00 -35.65 -7.65 Peak

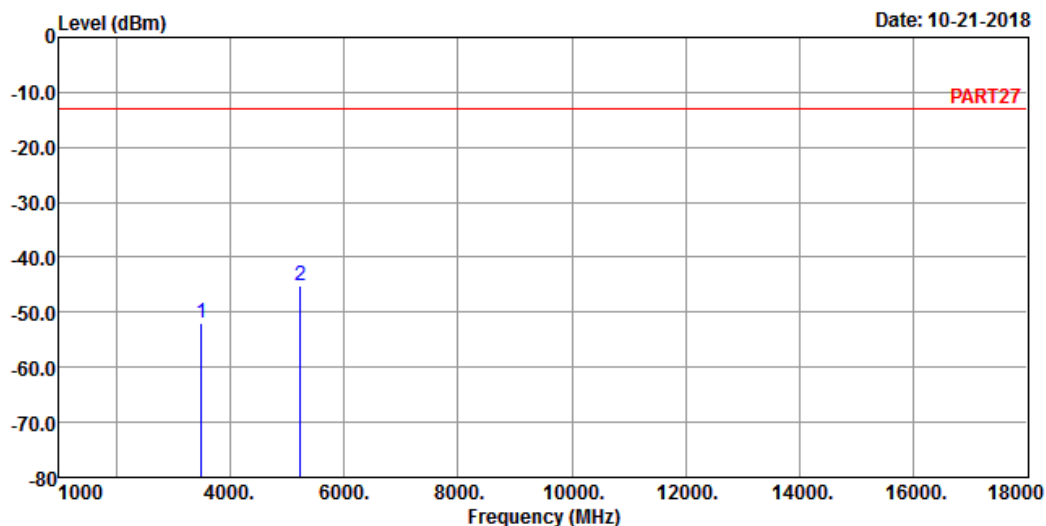


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 10-21-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : Cat-M1 Band 4 QPSK_20M Link_H-CH

Tested by: Jisyong Wang

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	3490.00	-51.99	-44.34	-13.00	-38.99	-7.65	Peak
2 pp	5235.00	-45.23	-42.82	-13.00	-32.23	-2.41	Peak

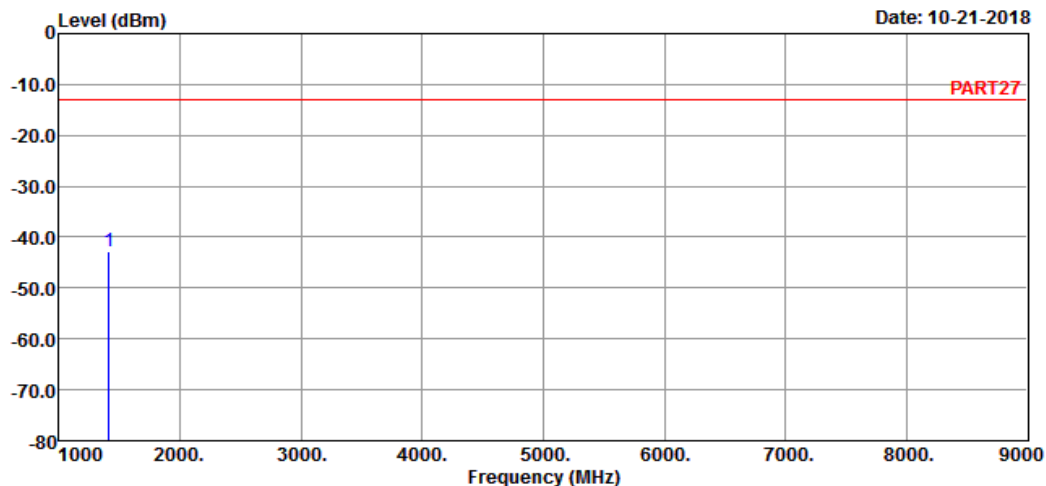
LTE Band 12
Channel Bandwidth: 10 MHz / QPSK
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5
Condition: PART27 HORIZONTAL
Remak : Cat-M1 Band 12 QPSK_10M Link_L-CH
Tested by: Jisyong Wang

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

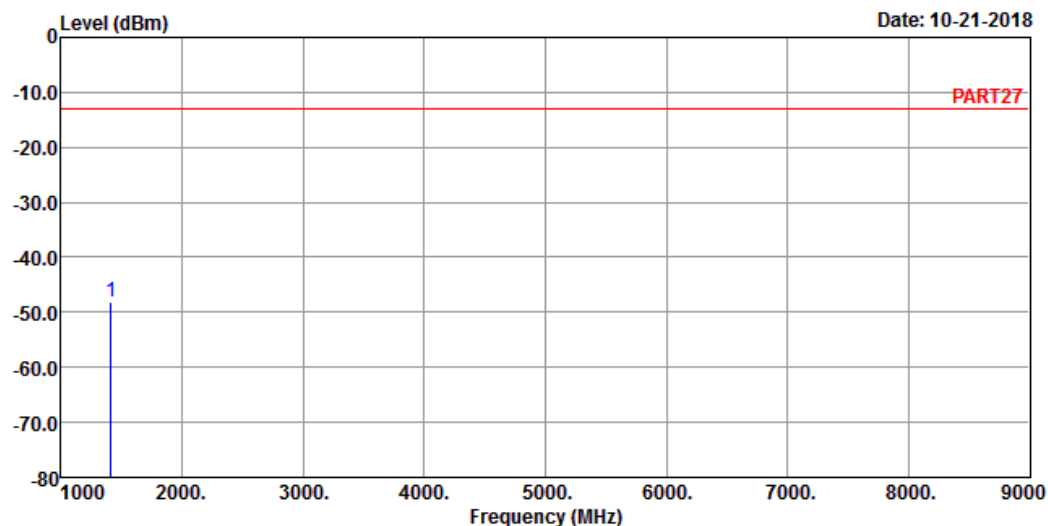
1 pp 1408.00 -42.85 -28.51 -13.00 -29.85 -14.34 Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : Cat-M1 Band 12 QPSK_10M Link_L-CH

Tested by: Jisyong Wang

Freq	Level	Read	Limit	Over	Factor	Remark
		Level	Line	Limit		
MHz	dBm	dBm	dBm	dB	dB	
1 pp 1408.00	-48.12	-33.78	-13.00	-35.12	-14.34	Peak

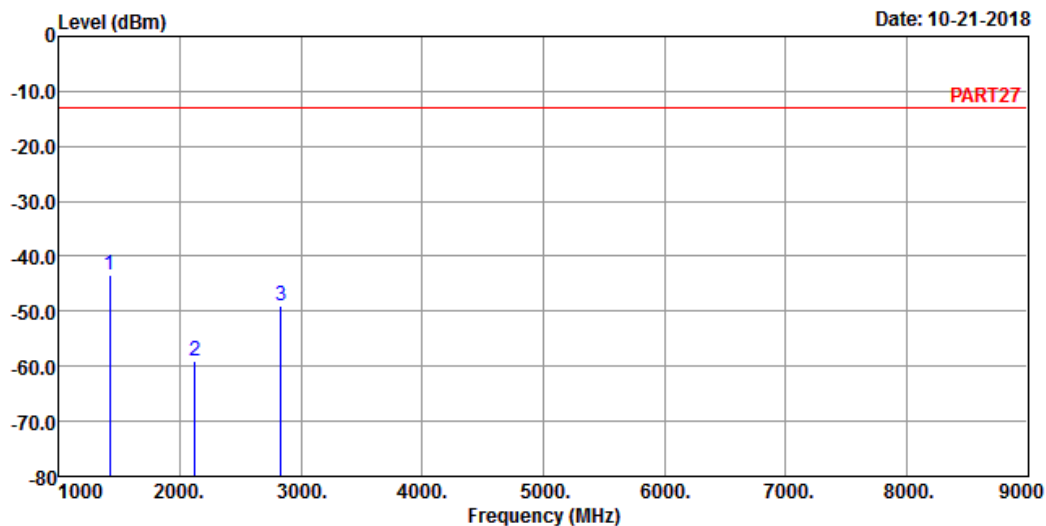
Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART27 HORIZONTAL

Remak : Cat-M1 Band 12 QPSK_10M Link_M-CH

Tested by: Jisyong Wang

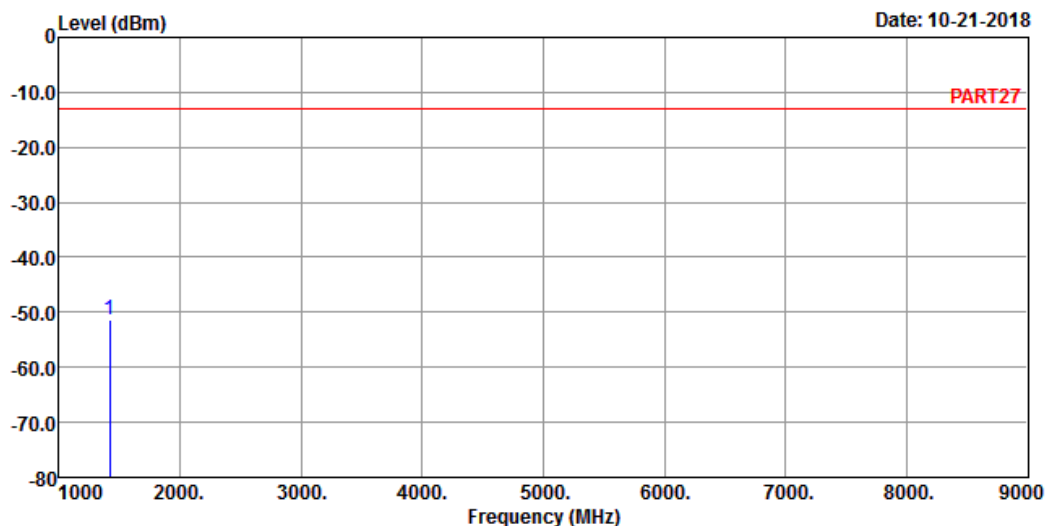
			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1 pp	1415.00	-43.52	-29.18	-13.00	-30.52	-14.34	Peak
2	2122.50	-58.99	-46.75	-13.00	-45.99	-12.24	Peak
3	2830.00	-48.96	-39.25	-13.00	-35.96	-9.71	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4



Site : 966 Chamber 5
Condition: PART27 VERTICAL
Remak : Cat-M1 Band 12 QPSK_10M Link_M-CH
Tested by: Jisyong Wang

Freq	Level	Read	Limit	Over	Factor	Remark
		Level	Line	Limit		
MHz	dBm	dBm	dBm	dB	dB	
1 pp 1415.00	-51.23	-36.89	-13.00	-38.23	-14.34	Peak

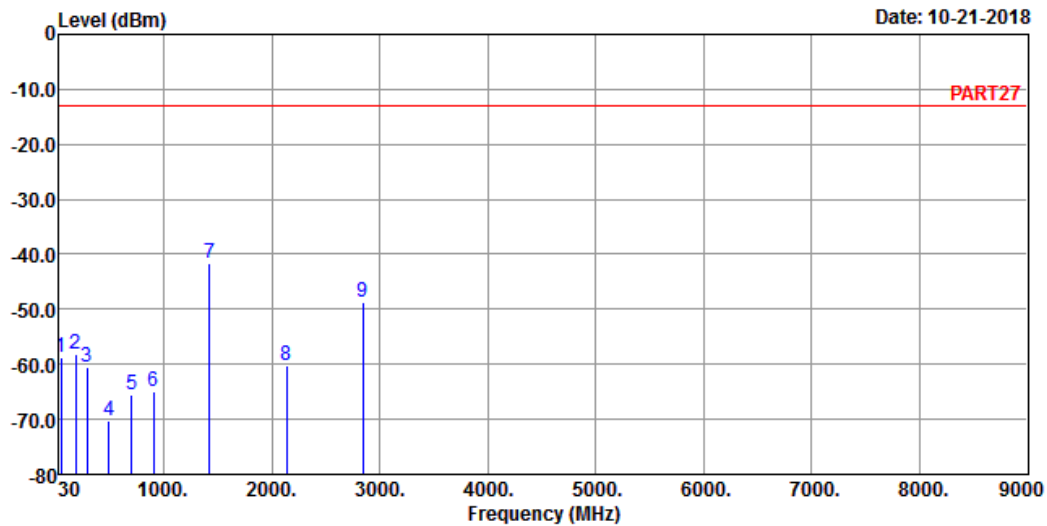
High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 Chamber 5
 Condition: PART27 HORIZONTAL
 Remak : Cat-M1 Band 12 QPSK_10M Link_H-CH
 Tested by: Jisyoung Wang

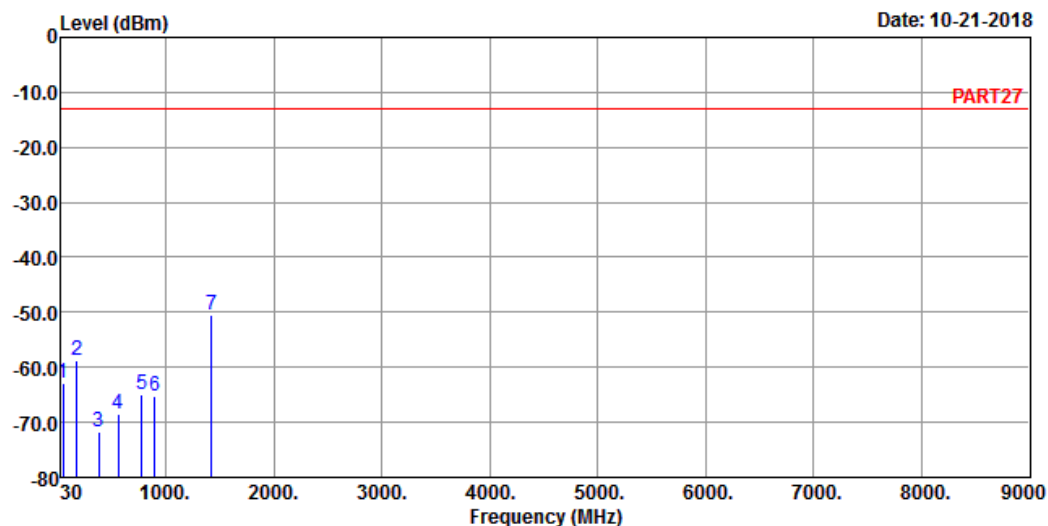
			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	44.55	-58.75	-56.76	-13.00	-45.75	-1.99	Peak
2	179.38	-58.08	-50.85	-13.00	-45.08	-7.23	Peak
3	285.11	-60.54	-53.83	-13.00	-47.54	-6.71	Peak
4	493.66	-70.13	-65.39	-13.00	-57.13	-4.74	Peak
5	702.21	-65.51	-65.45	-13.00	-52.51	-0.06	Peak
6	903.00	-64.83	-65.47	-13.00	-51.83	0.64	Peak
7 pp	1422.00	-41.52	-27.18	-13.00	-28.52	-14.34	Peak
8	2133.00	-60.35	-48.28	-13.00	-47.35	-12.07	Peak
9	2844.00	-48.69	-38.98	-13.00	-35.69	-9.71	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 Chamber 5
Condition: PART27 VERTICAL
Remak : Cat-M1 Band 12 QPSK_10M Link_H-CH
Tested by: Jisyong Wang

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	46.49	-62.82	-59.82	-13.00	-49.82	-3.00	Peak
2	171.62	-58.67	-52.80	-13.00	-45.67	-5.87	Peak
3	374.35	-71.70	-65.60	-13.00	-58.70	-6.10	Peak
4	561.56	-68.34	-65.97	-13.00	-55.34	-2.37	Peak
5	779.81	-64.83	-65.62	-13.00	-51.83	0.79	Peak
6	899.12	-65.24	-65.81	-13.00	-52.24	0.57	Peak
7 pp	1422.00	-50.58	-36.24	-13.00	-37.58	-14.34	Peak

5 Pictures of Test Arrangements

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

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.

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

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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.

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