FCC Test Report

(PART 27: LTE Band 41_BTS)

Report No.:	RF181129D01-2
FCC ID:	P27-SRE4105T
Test Model:	SRE4105T-B41
Series Model:	SRE4105Txxxxxxx (1st x should be "blank" or "-", the rest x should be 0 to 9, A to Z, a to z, "blank" or "-", for marketing purpose.)
Received Date:	Nov. 29, 2018
Test Date:	Dec. 25, 2018 ~ Jan. 21, 2019
Issued Date:	Jan. 23, 2019
Applicant:	Sercomm Corp.
Address:	8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)
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.
FCC Registration / Designation Number:	198487 / TW2021

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF181129D01-2	Original release.	Jan. 23, 2019

1 Certificate of Conformity

Product:	SOHO Magic Box
Brand:	Sprint
Test Model:	SRE4105T-B41
Series Model:	SRE4105Txxxxxxx (1st x should be "blank" or "-", the rest x should be 0 to 9, A to Z, a to z, "blank" or "-", for marketing purpose.)
Sample Status:	Engineering sample
Applicant:	Sercomm Corp.
Test Date:	Dec. 25, 2018 ~ Jan. 21, 2019
Standards:	FCC Part 27, Subpart M

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 : Annie Chang , **Date:** Jan. 23, 2019

Annie Chang / Senior Specialist

Approved by : Rex. Lai , **Date:** Jan. 23, 2019

Rex Lai / Associate Technical Manager

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (h)	Equivalent Isotropically Radiated Power	PASS	Meet the requirement of limit.
2.1047	Modulation characteristics	PASS	Meet the requirement
2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	PASS	Meet the requirement of limit.
2.1049 27.53 (m)(6)	Emission Bandwidth	PASS	Meet the requirement of limit.
2.1051 27.53(m)	Band Edge Measurements	PASS	Meet the requirement of limit.
----	Peak To Average Ratio	PASS	Meet the requirement
2.1051 27.53(h)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -30.63dB at 5360.88MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.48 dB

2.2 Test Site And Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 21, 2018	Feb. 20, 2019
HP Preamplifier	8449B	3008A01201	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2018	Feb. 20, 2019
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 6, 2018	Feb. 5, 2019
Schwarzbeck Antenna	VULB 9168	139	Nov. 26, 2018	Nov. 25, 2019
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 25, 2018	Nov. 24, 2019
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 25, 2018	Nov. 24, 2019
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Aug. 13, 2018	Aug. 12, 2019
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Aug. 13, 2018	Aug. 12, 2019
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 4, 2018	Jun. 3, 2019
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 25, 2018	Nov. 24, 2019
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 27, 2018	Sep. 26, 2019
Anritsu Power Sensor	MA2411B	0738404	Apr. 26, 2018	Apr. 25, 2019
Anritsu Power Meter	ML2495A	0842014	Apr. 26, 2018	Apr. 25, 2019
Anritsu Radio Communication Analyzer	MT8820C	6201300638	Jun. 27, 2018	Jun. 8, 2019

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 horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.

3 General Information

3.1 General Description of EUT

Product	SOHO Magic Box
Brand	Sprint
Test Model	SRE4105T-B41
Series Model	SRE4105Txxxxxxx (1st x should be "blank" or "-", the rest x should be 0 to 9, A to Z, a to z, "blank" or "-", for marketing purpose.)
Model Difference	For marketing purpose
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from Adapter
Modulation Type	QPSK, 16QAM, 64QAM
Operating Frequency	LTE Band 41 (Channel Bandwidth 20MHz): 2510~2560MHz, 2630~2680MHz
Max. EIRP Power	LTE Band 41 (Channel Bandwidth 20MHz): 2510~2560MHz: 1798.871mW (32.55dBm), 2630~2680MHz: 1782.379mW (32.51dBm)
Antenna Type	Ant. 9: Dipole antenna with 6.03dBi gain Ant. 10: Dipole antenna with 6.01dBi gain
Antenna Connector	I-PEX
Accessory Device	Refer to user's manual
Data Cable Supplied	N/A

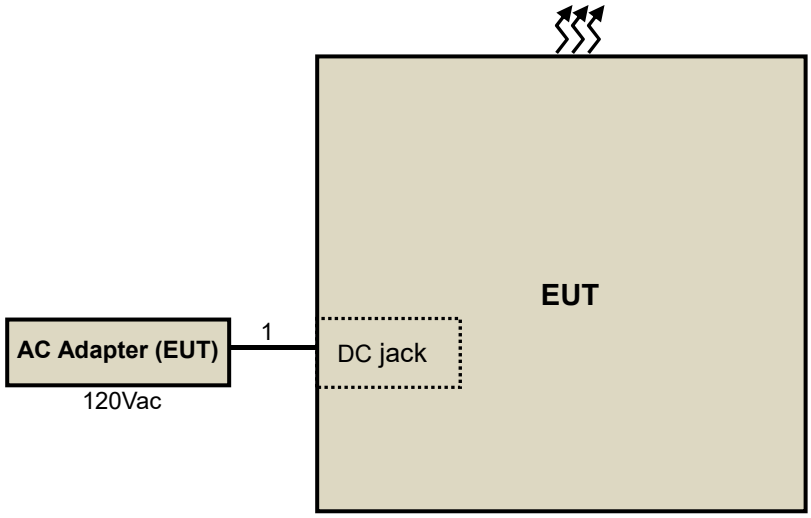
Note:

1. The EUT uses following adapter.

Brand	APD
Model	WA-30P12FU
AC Input Power	100-240V, 50-60Hz, 0.9A
DC Output Power	12V, 2.5A
Power Line	Non-shielded DC cable (2.0m)

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.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	2.0	N	0	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

3.3 Test Mode Applicability and Tested Channel Detail

Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation
Output Power	39790 to 40290, 40990 to 41490	39790, 40040, 40290, 40990, 41240, 41490	20MHz	QPSK / 16QAM / 64QAM
Modulation characteristics	39790 to 40290, 40990 to 41490	40040, 41240	20MHz	QPSK / 16QAM / 64QAM
Frequency Stability	39790 to 40290, 40990 to 41490	40040, 41240	20MHz	QPSK
Emission Bandwidth	39790 to 40290, 40990 to 41490	39790, 40040, 40290, 40990, 41240, 41490	20MHz	QPSK / 16QAM / 64QAM
Band Edge	39790 to 40290, 40990 to 41490	39790, 40290, 40990, 41490	20MHz	QPSK
Peak To Average Ratio	39790 to 40290, 40990 to 41490	39790, 40040, 40290, 40990, 41240, 41490	20MHz	QPSK
Conducted Emission	39790 to 40290, 40990 to 41490	39790, 40040, 40290, 40990, 41240, 41490	20MHz	QPSK
Radiated Emission Below 1GHz	39790 to 40290, 40990 to 41490	39790, 40990	20MHz	QPSK
Radiated Emission Above 1GHz	39790 to 40290, 40990 to 41490	39790, 40040, 40290, 40990, 41240, 41490	20MHz	QPSK

NOTE:

1. For radiated emission below 1 GHz, the low, mid and high channels were pre-tested in chamber. The low channel was the worst case and chosen for final test.
2. The conducted output power for QPSK, 16QAM and 64QAM, measured value of QPSK is higher than other mode. Therefore, the Frequency Stability, Band Edge, Peak To Average Ratio, Conducted Emission and Radiated Emission were performed under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
Output Power	25deg. C, 74%RH	120Vac, 60Hz	Dalen Dai
Modulation characteristics	22deg. C, 70%RH	120Vac, 60Hz	Dalen Dai
Frequency Stability	22deg. C, 70%RH	120Vac, 60Hz	Dalen Dai
Occupied Bandwidth	22deg. C, 70%RH	120Vac, 60Hz	Dalen Dai
Band Edge	22deg. C, 70%RH	120Vac, 60Hz	Dalen Dai
Peak To Average Ratio	22deg. C, 70%RH	120Vac, 60Hz	Dalen Dai
Conducted Emission	22deg. C, 70%RH	120Vac, 60Hz	Dalen Dai
Radiated Emission	21deg. C, 73%RH	120Vac, 60Hz	StarItaly Wu

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

According FCC Part 27 Clause 27.50(h)(1), Main, booster and base stations. The maximum EIRP of a main, booster or base station shall not exceed 33 dBW + 10log(X/Y) dBW.

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 5MHz for LTE mode.

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) 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 1m to 4m 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

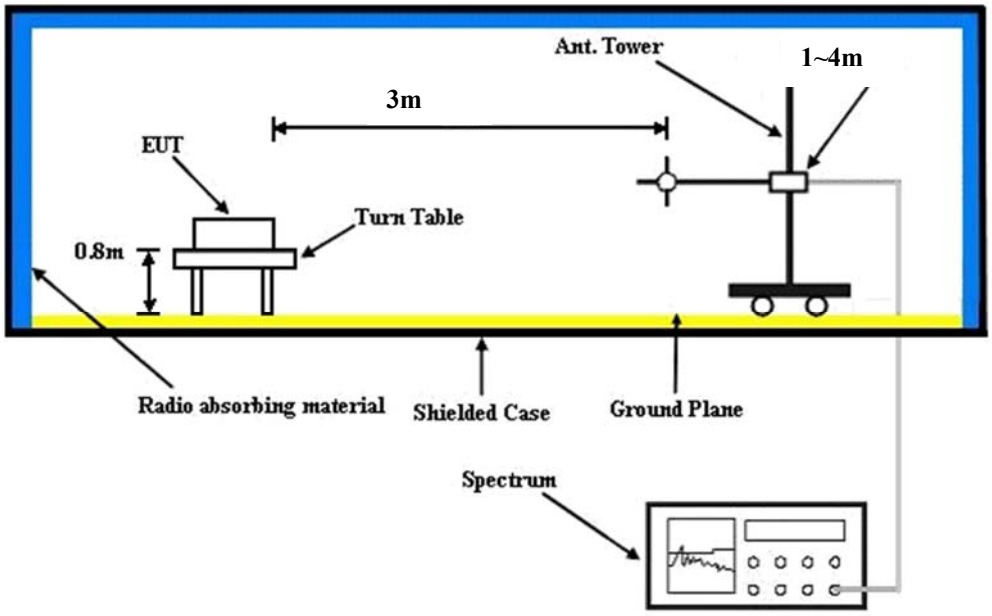
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

Conducted Power Measurement:

A power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

4.1.3 Test Setup

EIRP / ERP MEASUREMENT:



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

CONDUCTED POWER MEASUREMENT:

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

4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

CH	Frequency (MHz)	CONDUCTED OUTPUT POWER (dBm)								
		QPSK			16QAM			64QAM		
		Chain 0	Chain 1	Total	Chain 0	Chain 1	Total	Chain 0	Chain 1	Total
39790	2510	23.94	23.88	26.92	23.86	23.85	26.87	23.81	23.75	26.79
40040	2535	23.87	23.83	26.86	23.84	23.82	26.84	23.77	23.74	26.77
40290	2560	23.91	23.85	26.89	23.83	23.79	26.82	23.72	23.70	26.72
40990	2630	23.96	23.94	26.96	23.89	23.83	26.87	23.83	23.82	26.84
41240	2655	23.89	23.85	26.88	23.85	23.81	26.84	23.77	23.74	26.77
41490	2680	23.87	23.82	26.86	23.81	23.85	26.84	23.75	23.71	26.74

EIRP Power (dBm)

Modulation Type: QPSK

MODE		TX channel 39790					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2510.00	28.73	-7.50	40.05	**32.55**	68.23	-35.68

MODE		TX channel 40040					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2535.00	28.55	-7.88	40.19	32.31	68.23	-35.92

MODE		TX channel 40290					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2560.00	28.53	-8.08	40.32	32.24	68.23	-35.99

MODE		TX channel 40990					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2630.00	28.98	-8.16	40.65	32.49	68.23	-35.74

MODE		TX channel 41240					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2655.00	28.99	-8.34	40.76	32.42	68.23	-35.81

MODE		TX channel 41490					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2680.00	29.17	-8.34	40.85	**32.51**	68.23	-35.72

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Modulation Type: 16QAM

MODE		TX channel 39790					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2510.00	28.41	-7.82	40.05	32.23	68.23	-36.00

MODE		TX channel 40040					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2535.00	28.45	-7.98	40.19	32.21	68.23	-36.02

MODE		TX channel 40290					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2560.00	28.56	-8.05	40.32	32.27	68.23	-35.96

MODE		TX channel 40990					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2630.00	28.84	-8.30	40.65	32.35	68.23	-35.88

MODE		TX channel 41240					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2655.00	28.88	-8.45	40.76	32.31	68.23	-35.92

MODE		TX channel 41490					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2680.00	28.94	-8.57	40.85	32.28	68.23	-35.95

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

Modulation Type: 64QAM

MODE		TX channel 39790					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2510.00	28.37	-7.86	40.05	32.19	68.23	-36.04

MODE		TX channel 40040					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2535.00	28.39	-8.04	40.19	32.15	68.23	-36.08

MODE		TX channel 40290					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2560.00	28.46	-8.15	40.32	32.17	68.23	-36.06

MODE		TX channel 40990					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2630.00	28.67	-8.47	40.65	32.18	68.23	-36.05

MODE		TX channel 41240					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2655.00	28.72	-8.61	40.76	32.15	68.23	-36.08

MODE		TX channel 41490					
Test Distance: 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2680.00	28.77	-8.74	40.85	32.11	68.23	-36.12

Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

4.2 Modulation characteristics Measurement

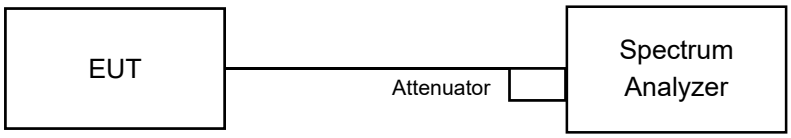
4.2.1 Limits of Modulation characteristics

N/A

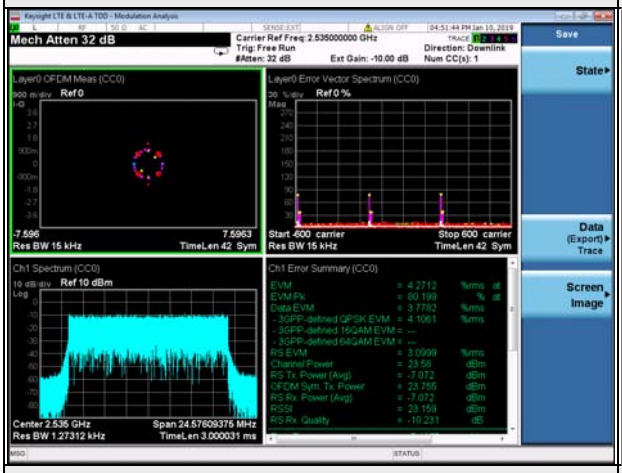
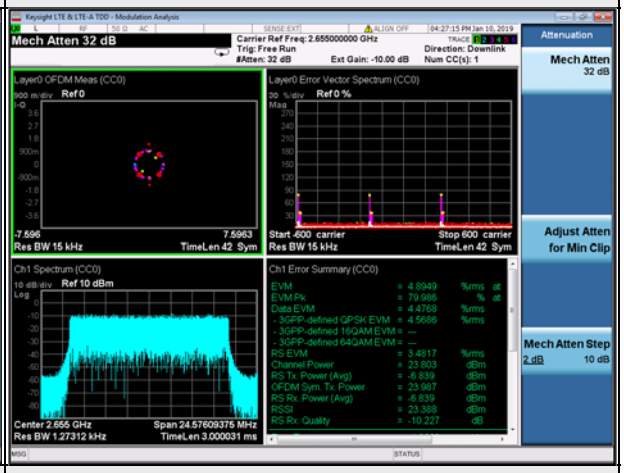
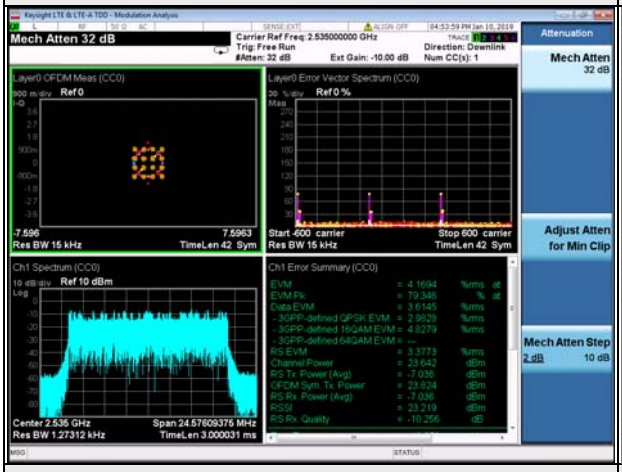
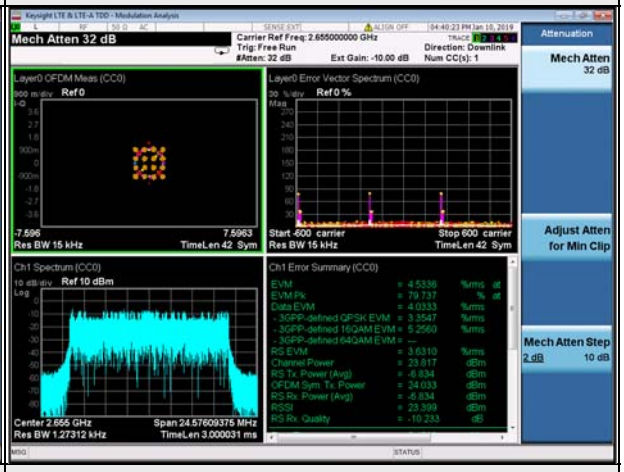
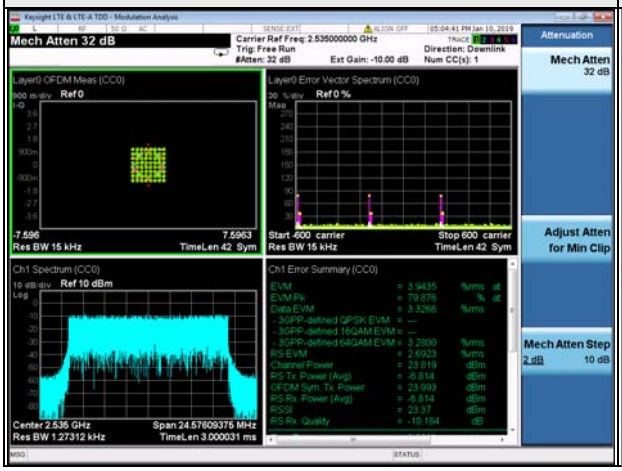
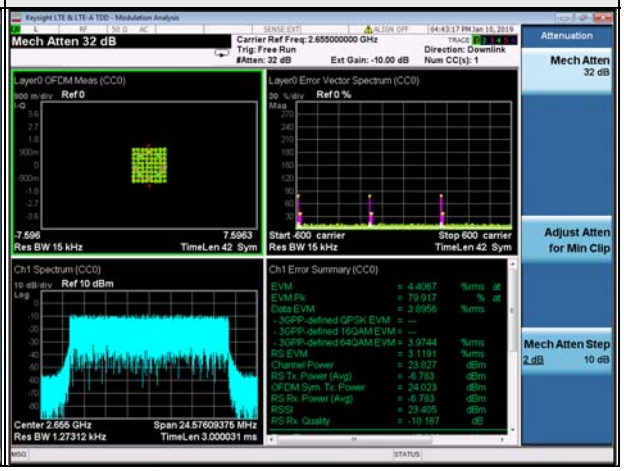
4.2.2 Test Procedure

Connect the EUT to Spectrum via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.3 Test Setup



4.2.4 Test Results

Spectrum Plot of Measurement Value	
Channel: 40040 / Frequency (MHz): 2535 MHz	Channel: 41240 / Frequency (MHz): 2655 MHz
QPSK	QPSK
	
16QAM	16QAM
	
64QAM	64QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

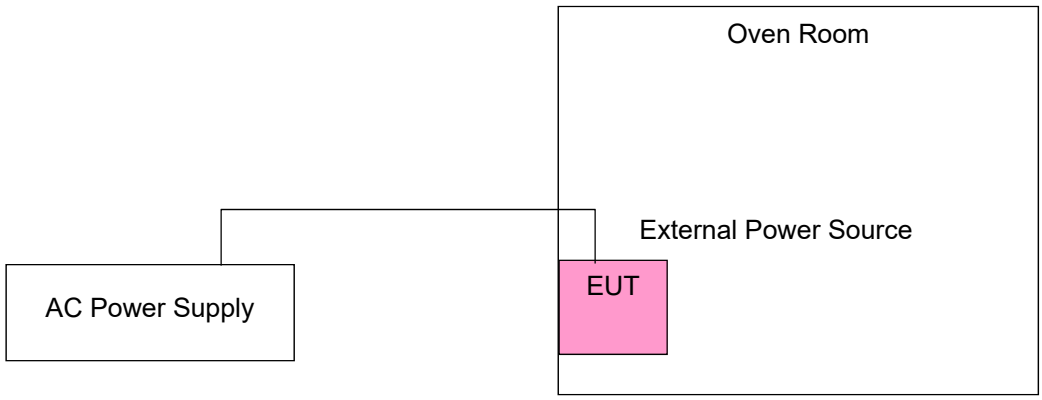
4.3.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (ppm)		Limit (ppm)
	Channel: 40040 (Frequency: 2535 MHz)	Channel: 41240 (Frequency: 2655 MHz)	
	20MHz	20MHz	
102	0.0138067065	0.0146892658	2.5
120	0.0189349114	0.0192090401	2.5
138	0.0114398427	0.0120527311	2.5

NOTE: The applicant defined the normal working voltage is from 102Vac to 138Vac.

Frequency Error vs. Temperature.

TEMP. (℃)	Frequency Error (ppm)		Limit (ppm)
	Channel: 40040 (Frequency: 2535 MHz)	Channel: 41240 (Frequency: 2655 MHz)	
	20MHz	20MHz	
75	0.0134122296	0.0143126183	2.5
70	0.0122287975	0.0128060268	2.5
60	0.0142011836	0.0131826749	2.5
50	0.0173570020	0.0180790965	2.5
40	0.0110453652	0.0173258011	2.5
30	0.0142011840	0.0128060266	2.5
20	0.0161735706	0.0188323922	2.5
10	0.0157790930	0.0109227873	2.5
0	0.0094674561	0.0124293789	2.5
-10	0.0126232745	0.0116760836	2.5
-20	0.0134122295	0.0139359704	2.5
-30	0.0122287972	0.0128060265	2.5

4.4 Emission Bandwidth Measurement

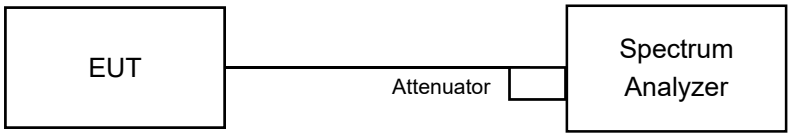
4.4.1 Limits Of Emission Bandwidth Measurement

According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.4.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 430kHz and VBW = 1.3MHz (Channel Bandwidth: 20MHz). The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

4.4.3 Test Setup

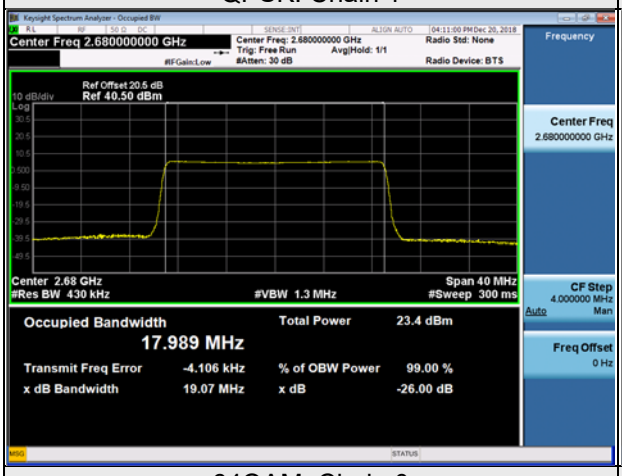


4.4.4 Test Result

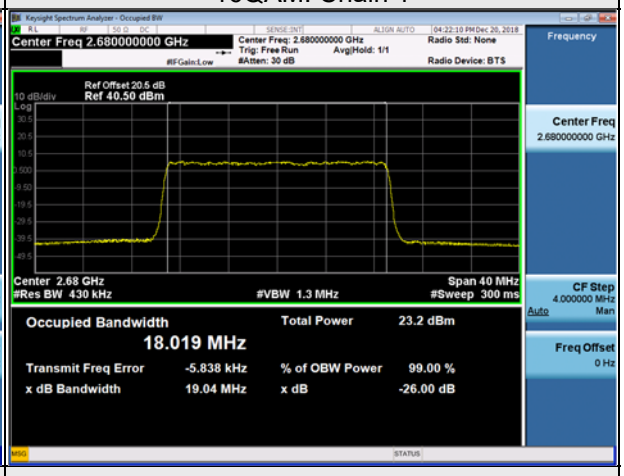
Channel Bandwidth: 20MHz							
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)					
		QPSK		16QAM		64QAM	
		Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1
39790	2510	17.976	17.975	18.014	18.009	17.983	17.980
40040	2535	17.978	17.978	18.007	18.018	17.985	17.986
40290	2560	17.969	17.969	18.000	18.005	17.977	17.977
40990	2630	17.982	17.984	18.010	18.007	17.987	17.988
41240	2655	17.961	17.960	17.985	17.996	17.961	17.962
41490	2680	17.987	17.989	18.018	18.019	17.994	17.993

SPECTRUM PLOT OF WORST VALUE

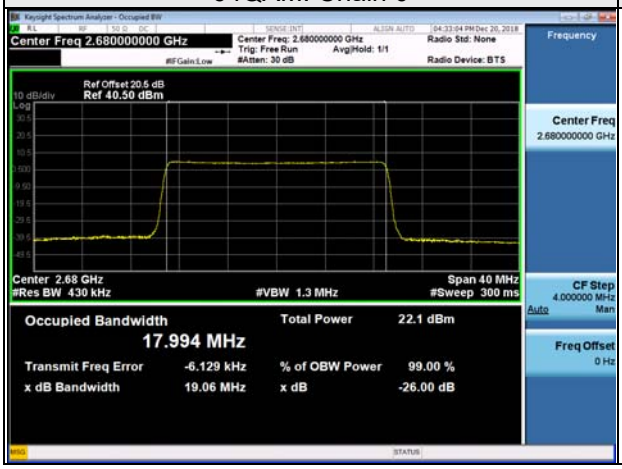
QPSK: Chain 1



16QAM: Chain 1



64QAM: Chain 0



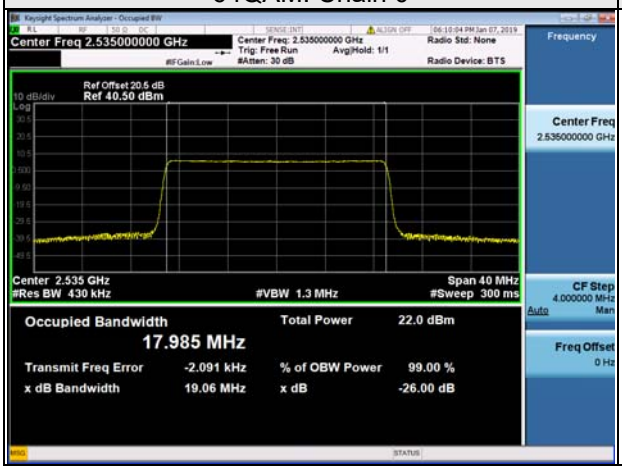
Channel Bandwidth: 20MHz							
Channel	Frequency (MHz)	-26dBc Bandwidth (MHz)					
		QPSK		16QAM		64QAM	
		Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1
39790	2510	19.05	19.05	19.03	19.03	19.04	19.04
40040	2535	19.05	19.06	19.05	19.04	19.06	19.05
40290	2560	19.05	19.05	19.03	19.03	19.05	19.05
40990	2630	19.07	19.07	19.04	19.04	19.04	19.06
41240	2655	19.06	19.05	19.02	19.03	19.05	19.05
41490	2680	19.06	19.07	19.05	19.04	19.06	19.05

SPECTRUM PLOT OF WORST VALUE

QPSK: Chain 0

16QAM: Chain 0

64QAM: Chain 0

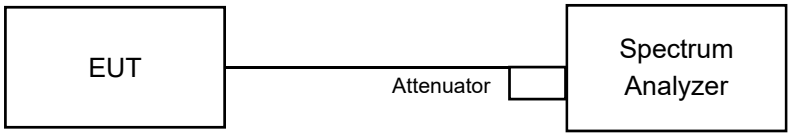


4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

According to FCC 27.53(m)(2)(v) specified for all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

4.5.2 Test Setup



4.5.3 Test Procedures

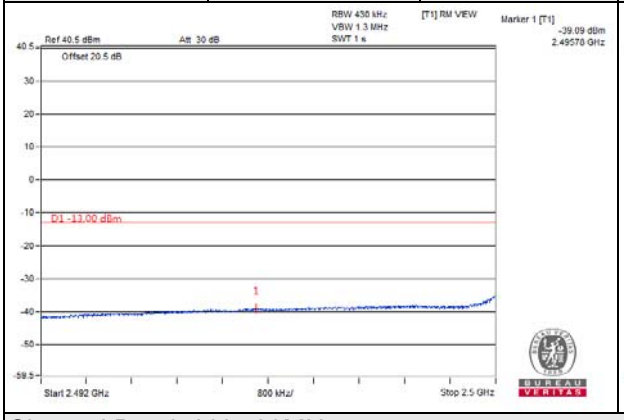
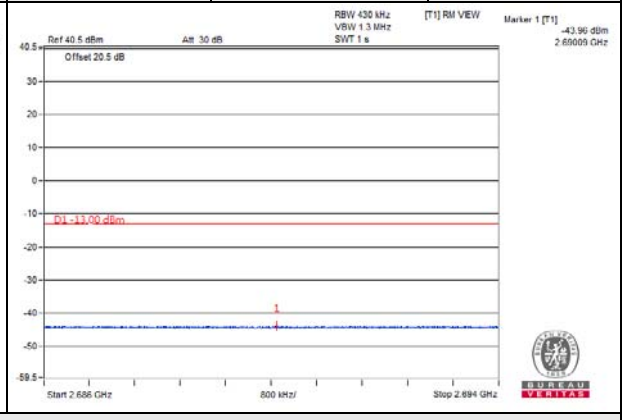
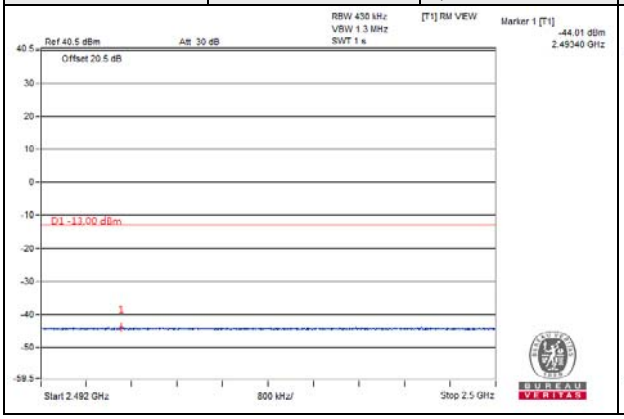
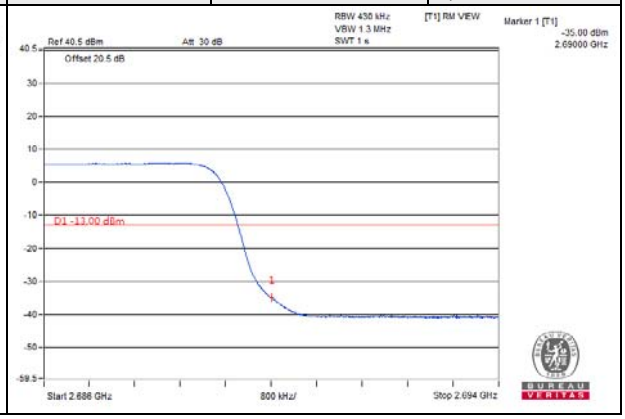
a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. The center frequency of spectrum is the band edge frequency. RBW = 430kHz and VBW = 1.3MHz (Channel Bandwidth: 20MHz).

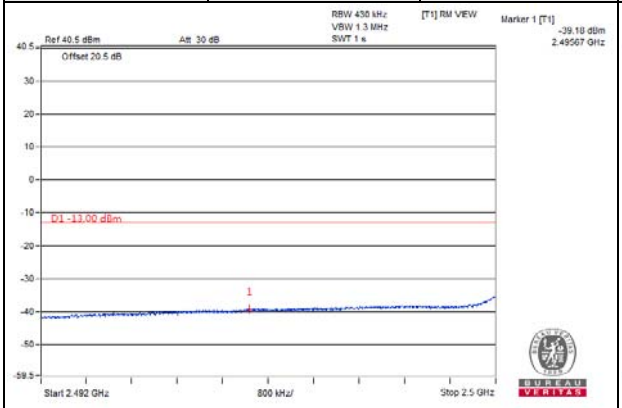
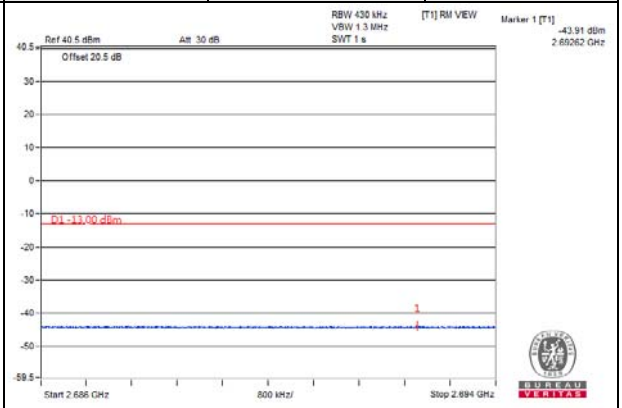
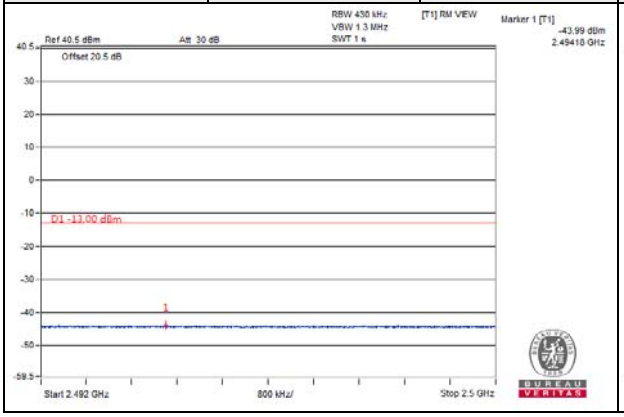
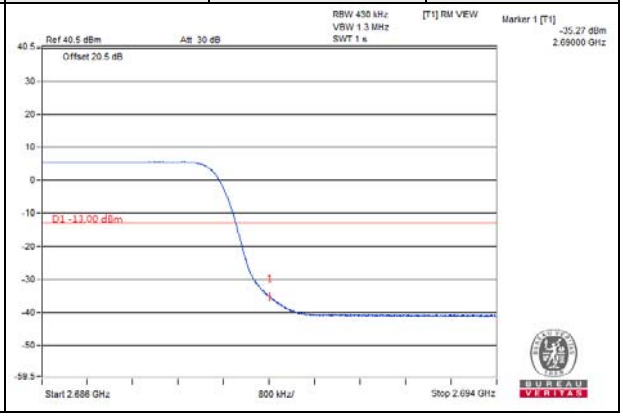
c. Record the max trace plot into the test report.

4.5.4 Test Results

Chain 0

Channel Bandwidth: 20MHz					
Channel	39790	QPSK	Channel	40290	QPSK
					
Channel Bandwidth: 20MHz					
Channel	40990	QPSK	Channel	41490	QPSK
					

Chain 1

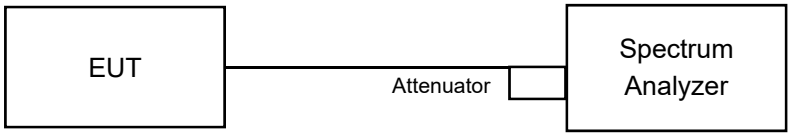
Channel Bandwidth: 20MHz					
Channel	39790	QPSK	Channel	40290	QPSK
					
Channel	40990	QPSK	Channel	41490	QPSK
					

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.6.2 Test Setup



4.6.3 Test Procedures

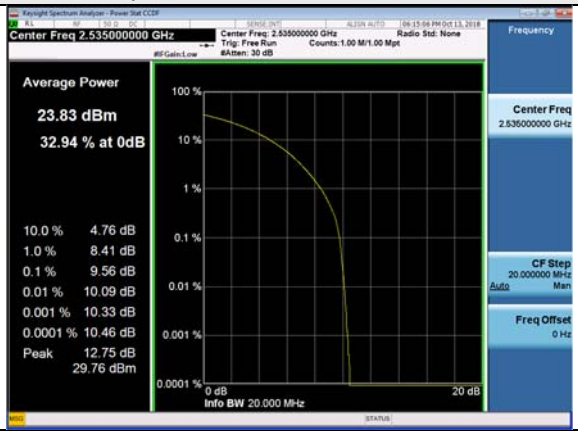
a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

b. Set the number of counts to a value that stabilizes the measured CCDF curve;

c. Record the maximum PAPR level associated with a probability of 0.1%.

4.6.4 Test Results

Channel Bandwidth: 20MHz			
Channel	Frequency (MHz)	Peak To Average Ratio (dB)	
		QPSK	
		Chain 0	Chain 1
39790	2510	9.06	9.04
40040	2535	9.56	9.28
40290	2560	9.32	9.31
40990	2630	9.08	9.12
41240	2655	9.22	9.18
41490	2680	9.19	9.14

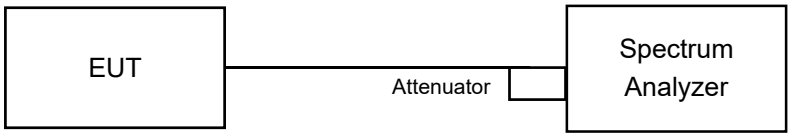
Spectrum Plot Of Worst Value


4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

According to FCC 27.53(m)(2)(v) specified for all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

4.7.2 Test Setup



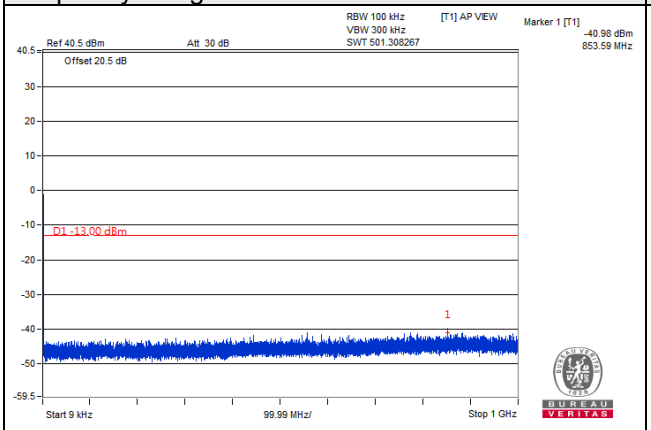
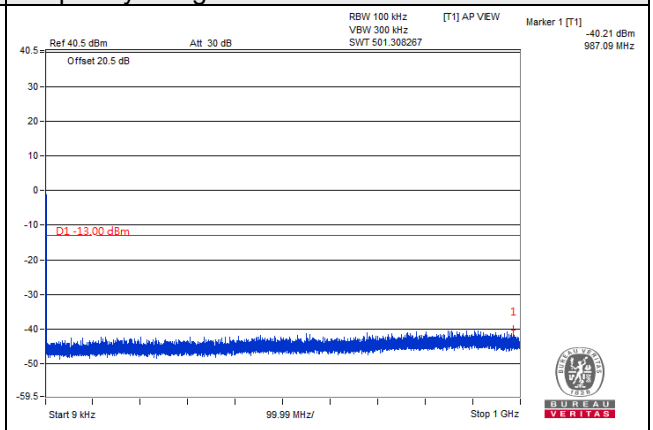
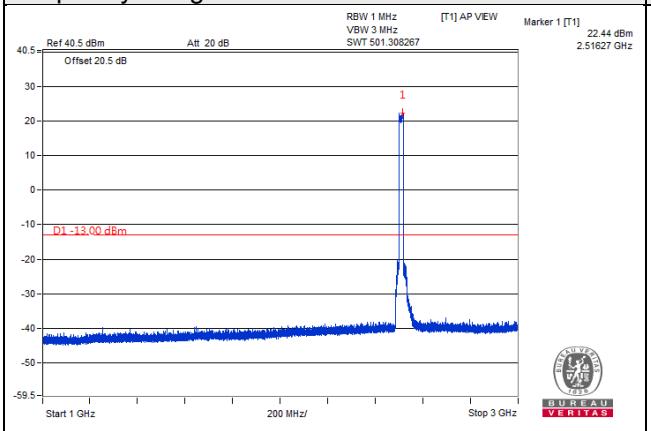
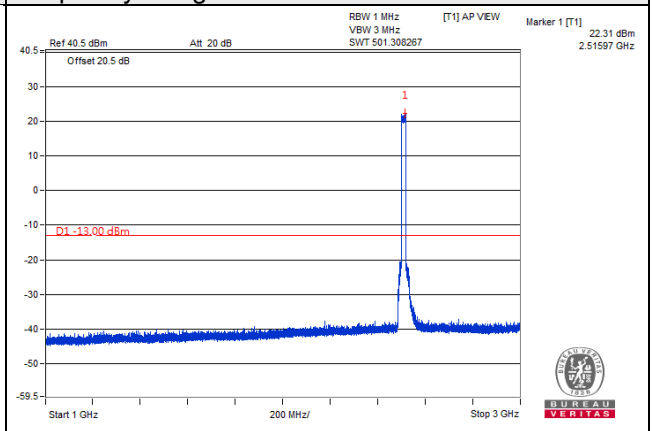
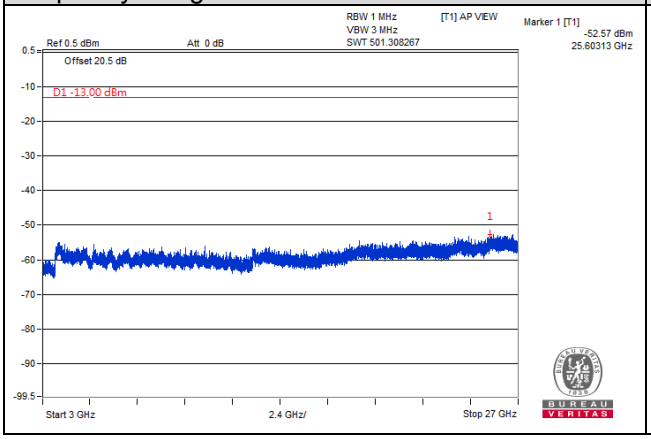
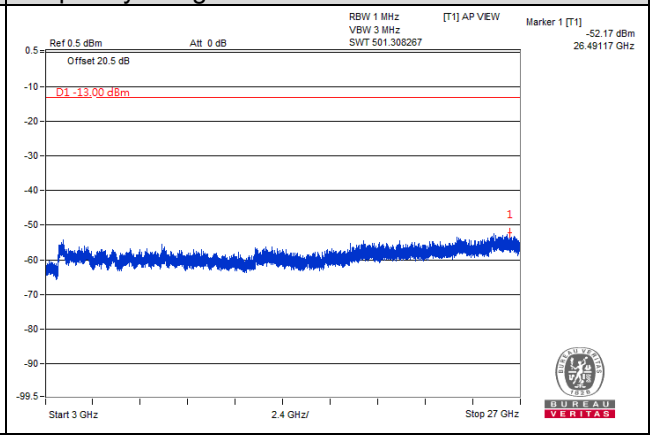
4.7.3 Test Procedure

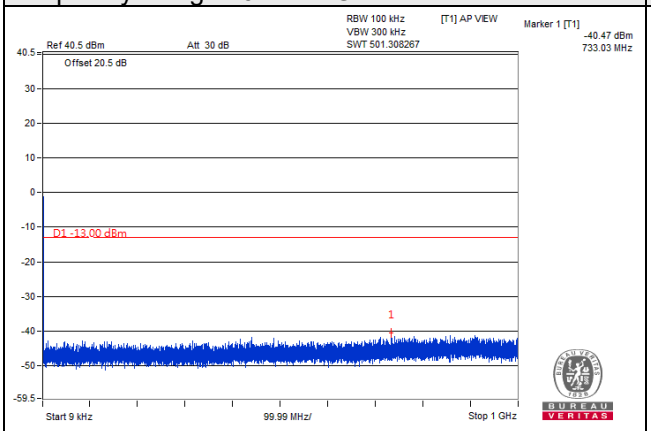
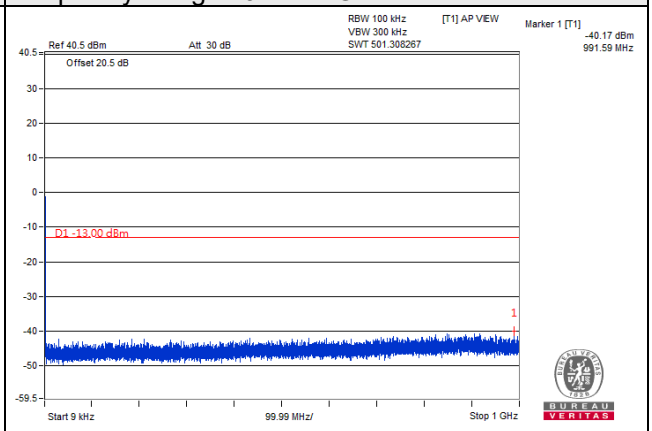
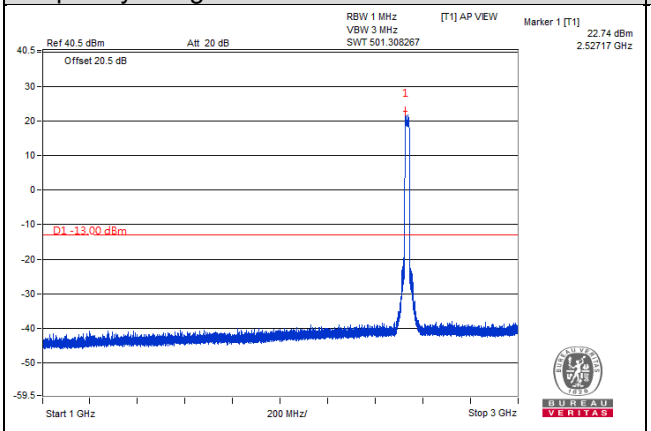
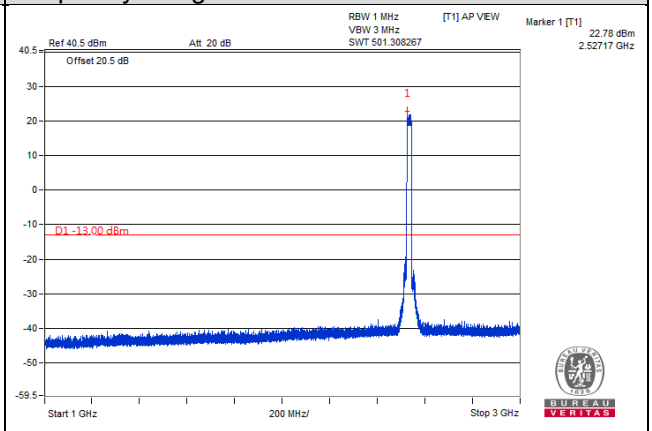
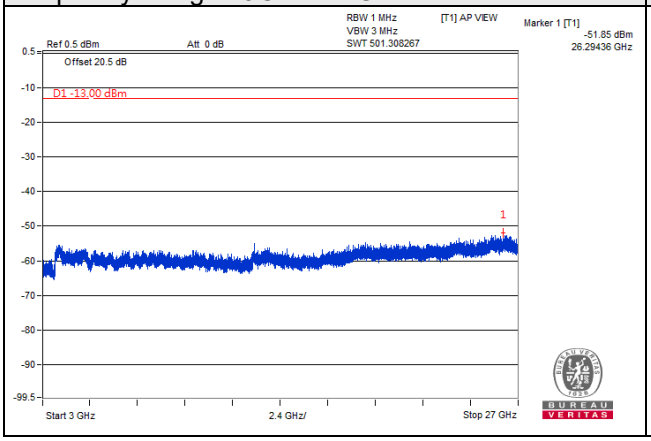
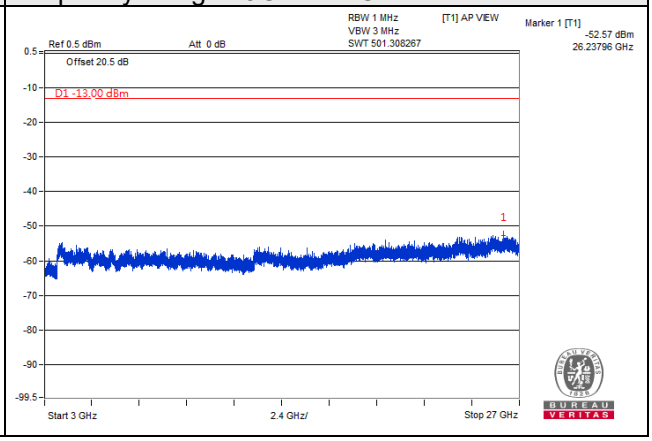
a. All measurements were done at 3 channels: low, middle and high operational frequency range.

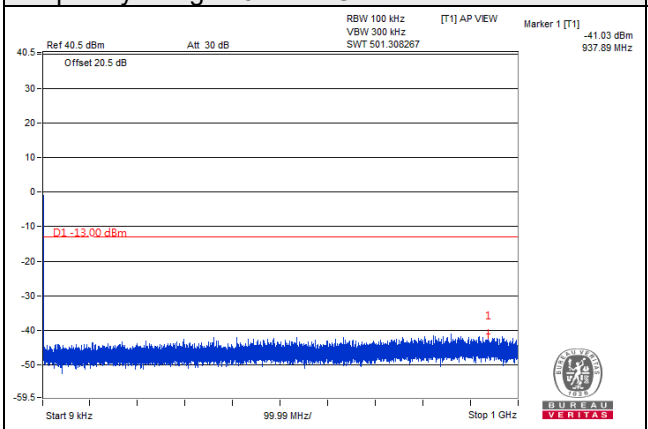
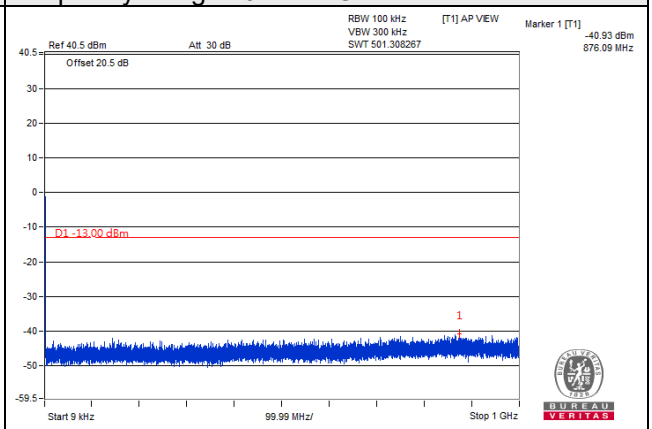
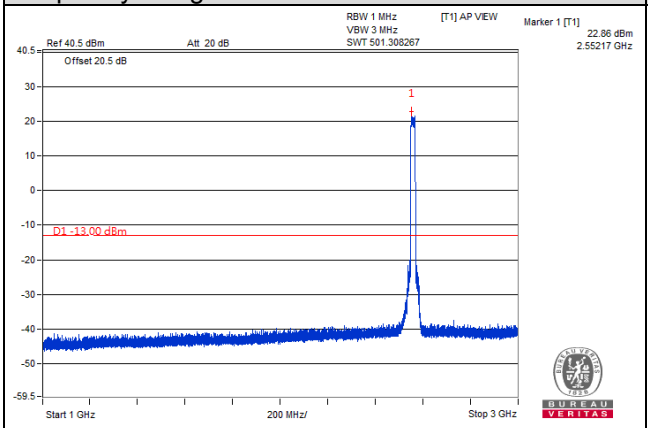
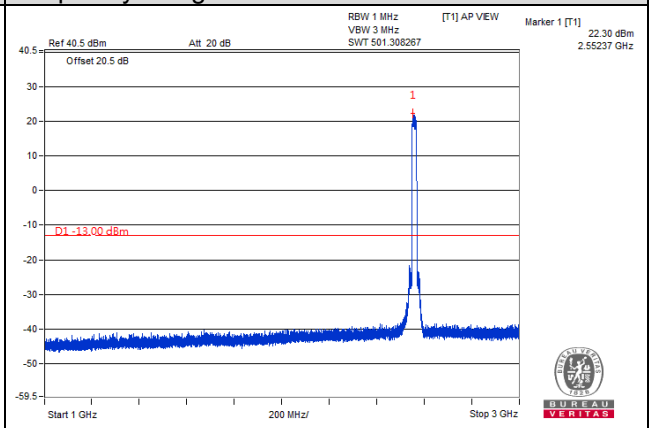
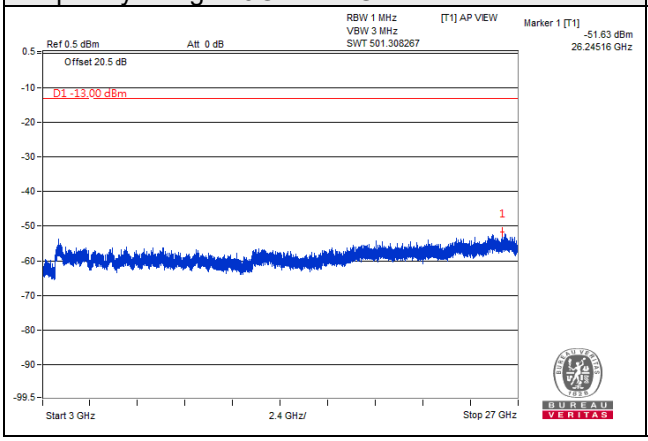
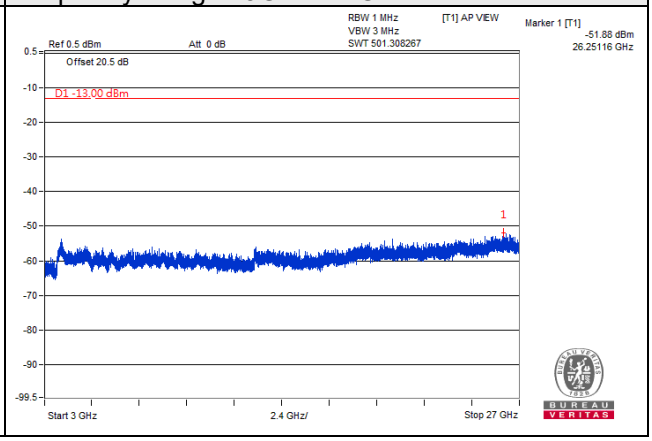
b. When the spectrum scanned from 9kHz to 27GHz, it shall be connected to the 20dB pad attenuated the carried frequency. The spectrum set RB = 100kHz, VB = 300kHz for frequency range: 9kHz~1GHz, RB = 1MHz, VB = 3MHz for frequency range: 1GHz~27GHz.

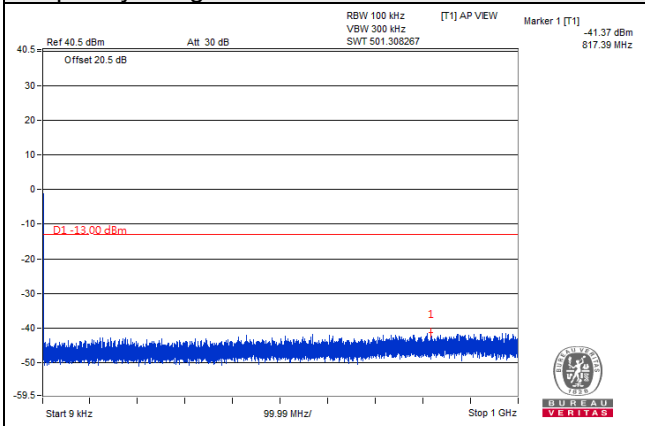
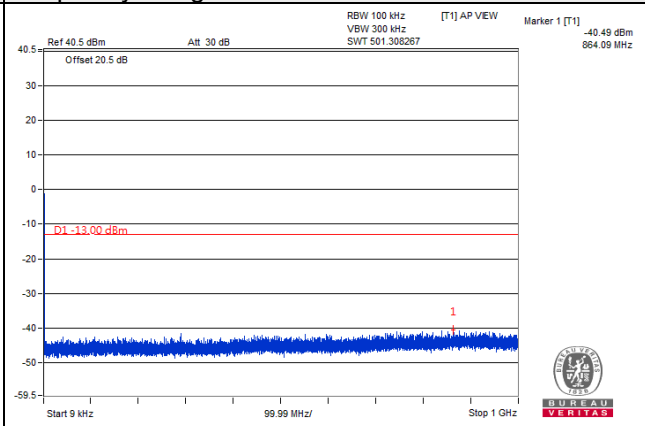
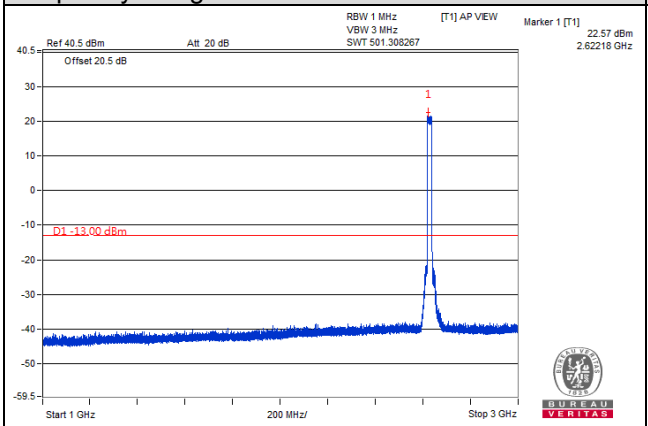
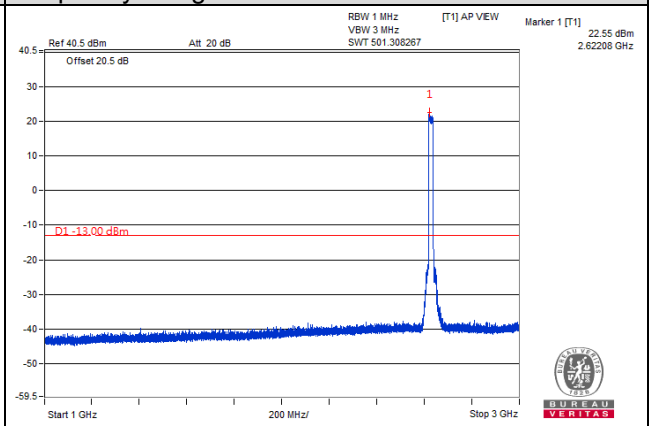
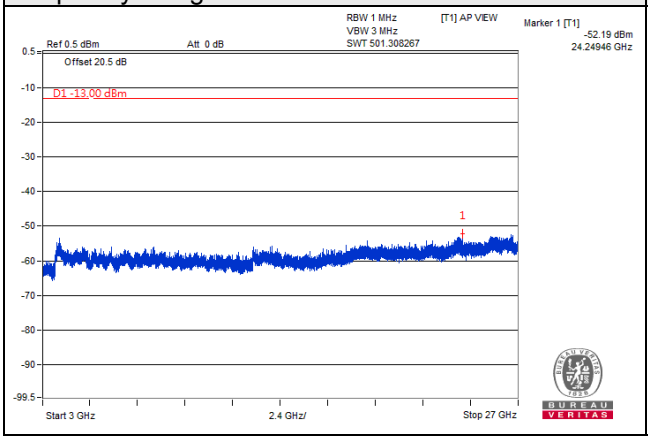
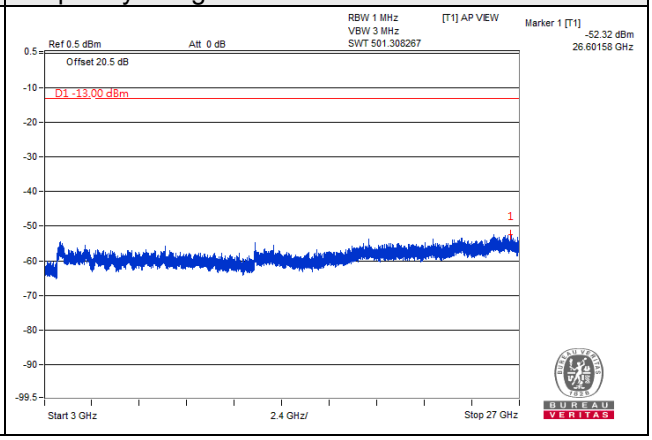
4.7.4 Test Results

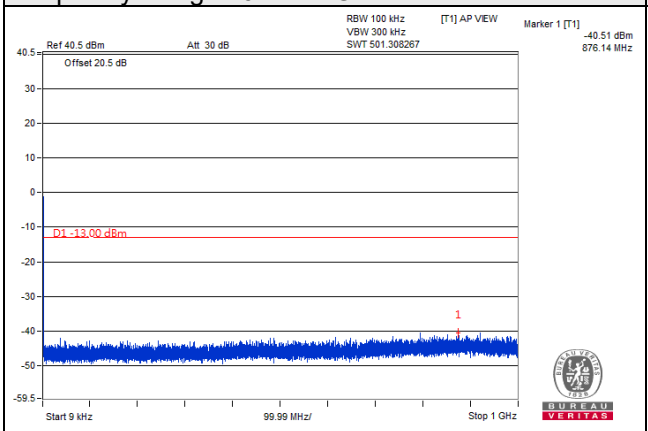
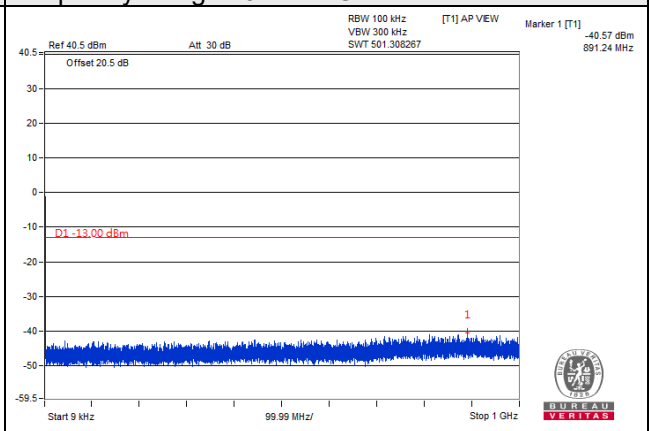
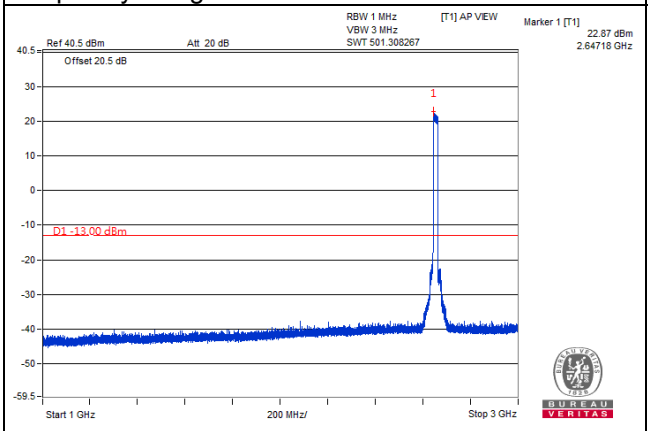
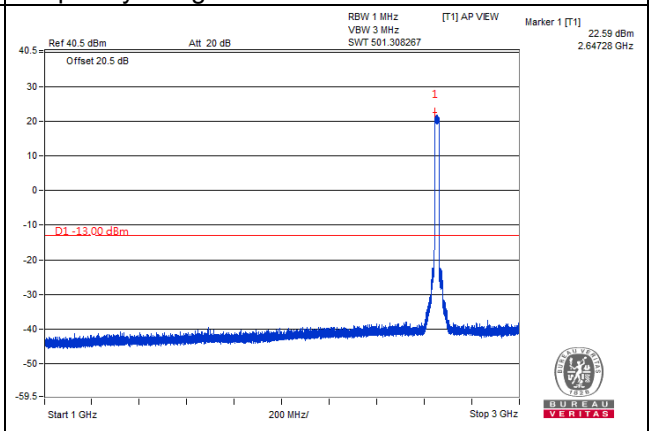
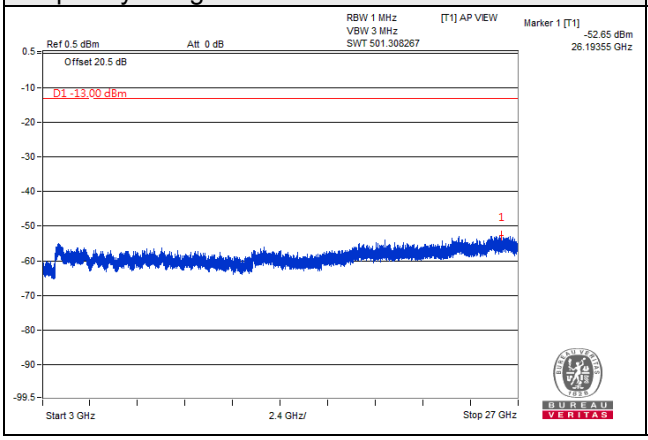
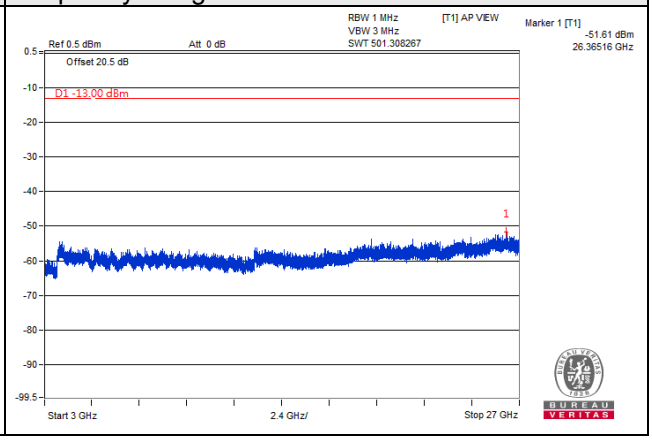
Modulation Type: QPSK

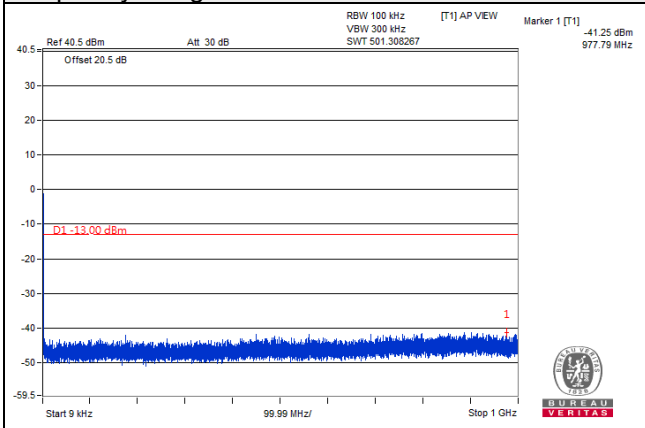
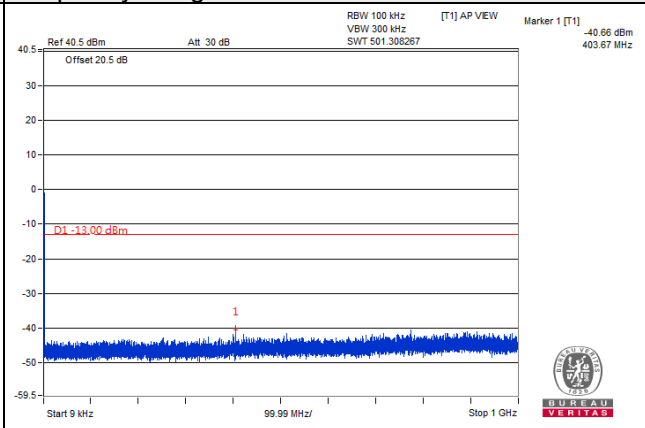
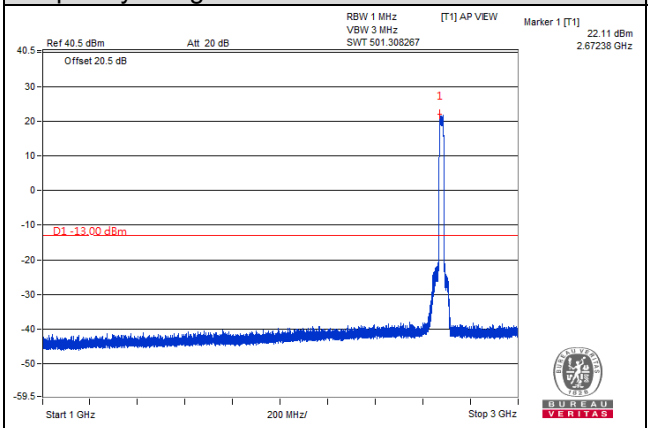
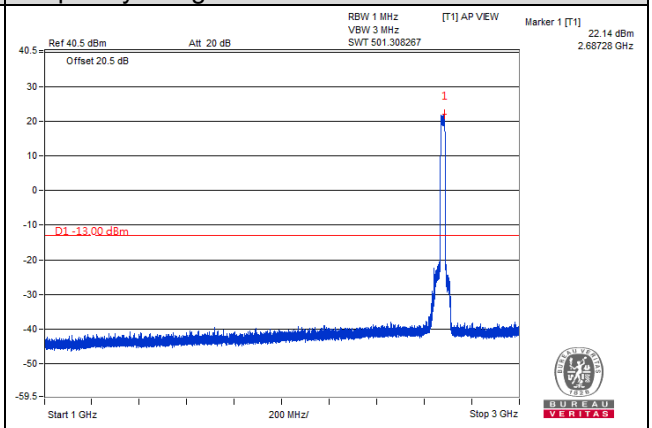
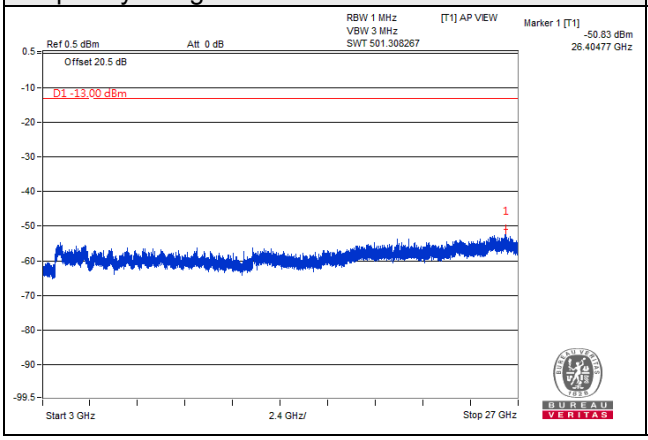
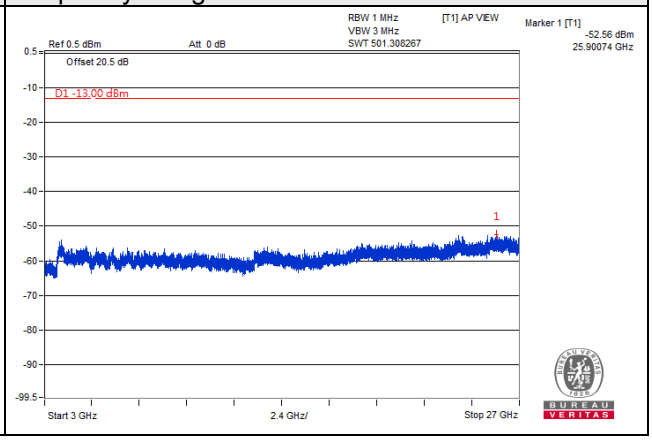
Channel Bandwidth: 20MHz	
Channel 39790	
Chain 0	Chain 1
Frequency Range : 9kHz~1GHz	Frequency Range : 9kHz~1GHz
	
Frequency Range : 1GHz~3GHz	Frequency Range : 1GHz~3GHz
	
Frequency Range : 3GHz~27GHz	Frequency Range : 3GHz~27GHz
	

Channel Bandwidth: 20MHz	
Channel 40040	
Chain 0	Chain 1
Frequency Range : 9kHz~1GHz	Frequency Range : 9kHz~1GHz
	
Frequency Range : 1GHz~3GHz	Frequency Range : 1GHz~3GHz
	
Frequency Range : 3GHz~27GHz	Frequency Range : 3GHz~27GHz
	

Channel Bandwidth: 20MHz	
Channel 40290	
Chain 0	Chain 1
Frequency Range : 9kHz~1GHz	Frequency Range : 9kHz~1GHz
	
Frequency Range : 1GHz~3GHz	Frequency Range : 1GHz~3GHz
	
Frequency Range : 3GHz~27GHz	Frequency Range : 3GHz~27GHz
	

Channel Bandwidth: 20MHz	
Channel 40990	
Chain 0	Chain 1
Frequency Range : 9kHz~1GHz	Frequency Range : 9kHz~1GHz
	
Frequency Range : 1GHz~3GHz	Frequency Range : 1GHz~3GHz
	
Frequency Range : 3GHz~27GHz	Frequency Range : 3GHz~27GHz
	

Channel Bandwidth: 20MHz	
Channel 41240	
Chain 0	Chain 1
Frequency Range : 9kHz~1GHz	Frequency Range : 9kHz~1GHz
	
Frequency Range : 1GHz~3GHz	Frequency Range : 1GHz~3GHz
	
Frequency Range : 3GHz~27GHz	Frequency Range : 3GHz~27GHz
	

Channel Bandwidth: 20MHz	
Channel 41490	
Chain 0	Chain 1
Frequency Range : 9kHz~1GHz	Frequency Range : 9kHz~1GHz
	
Frequency Range : 1GHz~3GHz	Frequency Range : 1GHz~3GHz
	
Frequency Range : 9kHz~1GHz	Frequency Range : 3GHz~27GHz
	

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

According to FCC 27.53(m)(2)(v) specified for all fixed digital user stations, the attenuation factor shall be not less than 43 + 10 log (P) dB at the channel edge.

4.8.2 Test Procedure

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m 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 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution 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

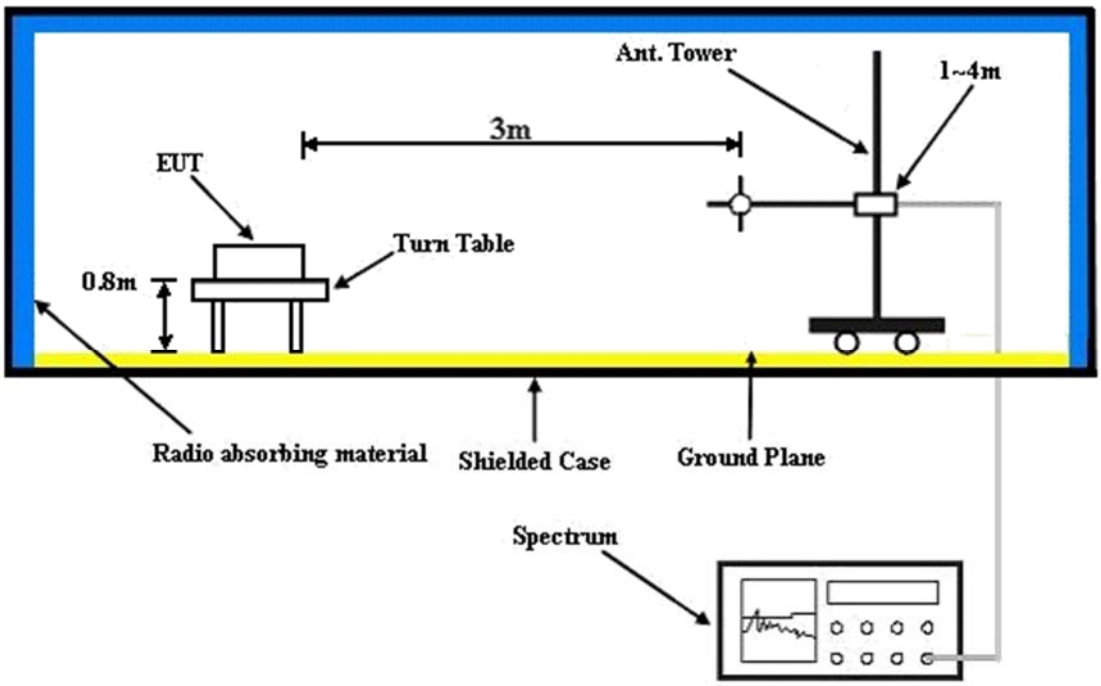
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

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

4.8.3 Deviation from Test Standard

No deviation.

4.8.4 Test Setup



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

4.8.5 Test Results

Below 1GHz

Mode	TX channel 39790 (2510MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	StarItaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	39.94	-52.45	-68.39	13.59	-54.80	-13.00	-41.80
2	119.97	-60.57	-79.26	12.87	-66.39	-13.00	-53.39
3	223.03	-58.30	-79.23	12.81	-66.42	-13.00	-53.42
4	359.92	-67.37	-86.31	17.66	-68.65	-13.00	-55.65
5	403.21	-64.82	-82.73	18.86	-63.87	-13.00	-50.87
6	511.61	-69.76	-87.23	21.58	-65.65	-13.00	-52.65
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	38.61	-46.97	-60.87	13.61	-47.26	-13.00	-34.26
2	48.07	-47.01	-60.85	14.37	-46.48	-13.00	-33.48
3	98.99	-54.00	-70.24	10.46	-59.78	-13.00	-46.78
4	120.09	-50.59	-70.44	12.88	-57.56	-13.00	-44.56
5	401.75	-64.99	-82.60	18.84	-63.76	-13.00	-50.76
6	510.03	-73.78	-91.32	21.54	-69.78	-13.00	-56.78

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 40990 (2630MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	StarItaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	39.82	-52.38	-68.42	13.60	-54.82	-13.00	-41.82
2	119.97	-62.00	-80.69	12.87	-67.82	-13.00	-54.82
3	226.18	-59.32	-80.05	12.89	-67.16	-13.00	-54.16
4	401.39	-65.88	-83.68	18.82	-64.86	-13.00	-51.86
5	509.91	-71.86	-89.25	21.54	-67.71	-13.00	-54.71
6	708.27	-78.08	-97.53	25.19	-72.34	-13.00	-59.34
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	38.61	-47.07	-60.97	13.61	-47.36	-13.00	-34.36
2	48.07	-46.52	-60.36	14.37	-45.99	-13.00	-32.99
3	89.29	-51.61	-69.37	9.50	-59.87	-13.00	-46.87
4	119.97	-51.17	-71.01	12.87	-58.14	-13.00	-45.14
5	261.83	-62.89	-81.79	14.94	-66.85	-13.00	-53.85
6	401.39	-65.13	-82.73	18.82	-63.91	-13.00	-50.91

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

ABOVE 1GHz

Mode	TX channel 39790 (2510MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	Starltaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5020.55	-62.43	-100.73	45.87	-54.86	-13.00	-41.86
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5020.86	-53.00	-91.22	45.88	-45.34	-13.00	-32.34

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 40040 (2535MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	Starltaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5070.82	-56.58	-95.09	46.00	-49.09	-13.00	-36.09
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5070.43	-55.05	-93.72	46.00	-47.72	-13.00	-34.72

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 40290 (2560MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	Starltaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5120.31	-57.66	-96.41	46.18	-50.23	-13.00	-37.23
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5120.67	-54.91	-94.04	46.18	-47.86	-13.00	-34.86

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 40990 (2630MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	Starltaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5260.68	-54.96	-93.87	46.50	-47.37	-13.00	-34.37
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5260.21	-53.36	-92.87	46.49	-46.38	-13.00	-33.38

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 41240 (2655MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	StarItaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5310.77	-56.28	-95.13	46.62	-48.51	-13.00	-35.51
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5310.49	-52.61	-92.04	46.62	-45.42	-13.00	-32.42

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Mode	TX channel 41490 (2680MHz)	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 73%RH	Input Power	120Vac, 60Hz
Tested By	StarItaly Wu		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5360.55	-56.08	-94.75	46.68	-48.07	-13.00	-35.07
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	**5360.88**	**-51.06**	**-90.32**	**46.69**	**-43.63**	**-13.00**	**-30.63**

Remarks:
1. Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

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.

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

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