FCC Test Report
(Part 27)

Report No.:	RF190531C22
FCC ID:	VBNAHIB-01
Test Model:	AHIB
Received Date:	May 31, 2019
Test Date:	Aug. 16 ~ Aug. 26, 2019
Issued Date:	Aug. 26, 2019
Applicant:	Nokia Solutions and Networks OY
Address:	6000 Connection Drive, Irving, TX 75039
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF190531C22	Original release.	Aug. 26, 2019

1 Certificate of Conformity

Product:	AirScale Base Station RRH 2100MHz
Brand:	Nokia
Test Model:	AHIB
Sample Status:	Production Unit
Applicant:	Nokia Solutions and Networks OY
Test Date:	Aug. 16 ~ Aug. 26, 2019
Standards:	FCC Part 27, Subpart C, L FCC Part 2, Subpart J

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 : Celine Chou , **Date:** Aug. 26, 2019

Celine Chou / Senior Specialist

Approved by : Bruce Chen , **Date:** Aug. 26, 2019

Bruce Chen / Senior Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50 (d)(2)	Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
27.50(d)(5)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 27.54	Frequency Stability Stay with the authorized bands of operation	Pass	Meet the requirement of limit.
2.1049 27.53(h)(3)	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -28.30dB at 30.00MHz.

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	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jun. 04, 2019	Jun. 03, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 21, 2018	Nov. 20, 2019
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jul. 11, 2019	Jul. 10, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 19, 2019	Feb. 18, 2020
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM- SM8000	CABLE-CH9-02 (248780+171006)	Jan. 19, 2019	Jan. 18, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jul. 11, 2019	Jul. 10, 2020
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 30, 2019	Jul. 29, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 03, 2019	Jun. 02, 2020
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	May 21, 2019	May 20, 2020

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 9.

3 General Information

3.1 General Description of EUT

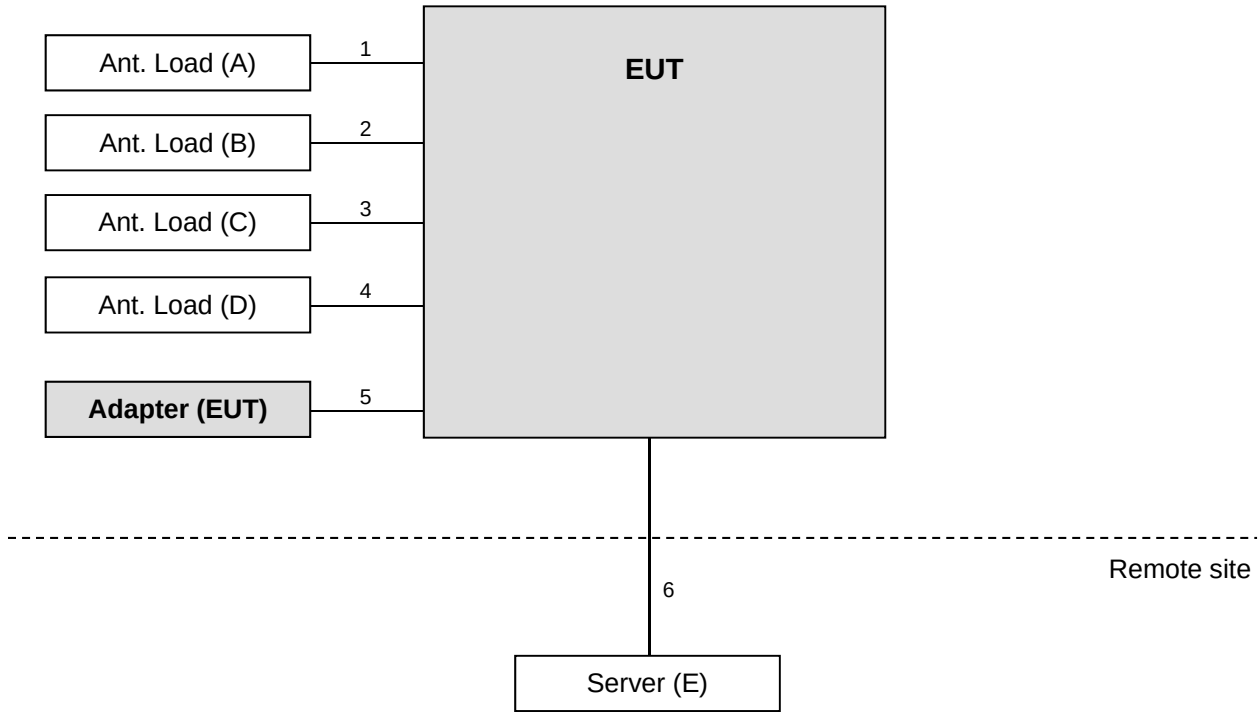
Product	AirScale Base Station RRH 2100MHz	
Brand	Nokia	
Test Model	AHIB	
Sample Status	Production Unit	
Power Supply Rating	DC: -40.5V to -57VDC AC: 100-240VAC	
Modulation Type	WCDMA: QPSK, 16QAM, 64QAM LTE: QPSK, 16QAM, 64QAM, 256QAM	
Operating Frequency	WCDMA Band 10 + LTE Band 66	2110MHz ~ 2200MHz
Max. EIRP Power	WCDMA Band 10 + LTE Band 66	2*WCDMA (5M) + 3*LTE (20M): 59.91dBm WCDMA + LTE (TC3a): 59.93dBm WCDMA + LTE (NTC3a): 59.93dBm
Emission Designator	WCDMA Band 10 + LTE Band 66	69M8F9W
Bandwidth	70MHz	
Antenna Type	Direction Panel antenna with 16.4dBi gain	
Antenna Connector	Nex10	
S/N	474050A.101	
HW Version	A101	
SW Version	SRAN 18A	
Accessory Device	Refer to Note as below	
Cable Supplied	NA	

Note:

1. This report is a supplementary report to the original TUV report no.: Document 75945681 Report 01 Issue 2. This report is prepared for FCC class II permissive change. The difference compared with original report is adding WCDMA Band 10 + LTE Band 66 concurrent support. Therefore, all test items had been tested in this report.
2. The EUT contains following accessory devices.

AC PSU (Optional)	
Brand	Nokia
Model	APAB
Sales Item	474130A.102
S/N	U7174800066
Remark	SUPLET/S818A16
Input Power	100-240Vac, 50-60Hz, 3A MAX
Output Power	-54Vdc, 3A MAX

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	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Ant. Load	NA	NA	NA	NA	Provided by manufacturer
B.	Ant. Load	NA	NA	NA	NA	Provided by manufacturer
C.	Ant. Load	NA	NA	NA	NA	Provided by manufacturer
D.	Ant. Load	NA	NA	NA	NA	Provided by manufacturer
E.	Server	NA	NA	NA	NA	Provided by manufacturer

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item E acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Ant. Cable	1	0.3	Y	0	-
2.	Ant. Cable	1	0.3	Y	0	-
3.	Ant. Cable	1	0.3	Y	0	-
4.	Ant. Cable	1	0.3	Y	0	-
5.	DC Cable	1	0.55	N	0	Provided by manufacturer
6.	Fiber Cable	1	2	N	0	-

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 on X-plane. Following channel(s) was (were) selected for the final test as listed below:

For WCDMA Band 10 + LTE Band 66 Mode:

Test results are presented in the report as below.

Test Mode	Test Condition
A	WCDMA Band 10 QPSK + LTE Band 66 QPSK (2*WCDMA (5M) + 3*LTE (20M))
B	WCDMA Band 10 QPSK (2CA) + LTE Band 66 QPSK (3CA) (TC3a)
C	WCDMA Band 10 QPSK (1CA) + LTE Band 66 QPSK (1CA) (NTC3a)

EUT Configure Mode	Test item	Channel	Test Frequency		Mode
A	EIRP	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 66736 (2140MHz) + CH 66936 (2160MHz) + CH 67136 (2180MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
B		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 67111 (2177.5MHz) + CH 67161 (2182.5MHz) + CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 67211 (2187.5MHz) + CH 67261 (2192.5MHz) + CH 67311 (2197.5MHz)	
C		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
			2155.0MHz	CH 3162 (2122.4MHz) CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) CH 67311 (2197.5MHz)	

EUT Configure Mode	Test item	Channel	Test Frequency		Mode
A	Modulation Characteristics	3112 to 3237 66636 to 67236	2122.4MHz	CH 3162 (2122.4MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2160.0MHz	CH 66936 (2160MHz)	
A	Frequency Stability	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
A	Occupied Bandwidth	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 66736 (2140MHz) + CH 66936 (2160MHz) + CH 67136 (2180MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
B		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 67111 (2177.5MHz) + CH 67161 (2182.5MHz) + CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 67211 (2187.5MHz) + CH 67261 (2192.5MHz) + CH 67311 (2197.5MHz)	
C		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
			2155.0MHz	CH 3162 (2122.4MHz) CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) CH 67311 (2197.5MHz)	

EUT Configure Mode	Test item	Channel	Test Frequency		Mode
A	Band Edge	3112 to 3237 66636 to 67236	2110.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2200.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
B		3112 to 3237 66636 to 67236	2110.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
			2200.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 67211 (2187.5MHz) + CH 67261 (2192.5MHz) + CH 67311 (2197.5MHz)	
C		3112 to 3237 66636 to 67236	2110.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
			2200.0MHz	CH 3212 (2132.4MHz) CH 67311 (2197.5MHz)	

EUT Configure Mode	Test item	Channel	Test Frequency		Mode
A	Peak to Average Ratio	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 66736 (2140MHz) + CH 66936 (2160MHz) + CH 67136 (2180MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
B		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 67111 (2177.5MHz) + CH 67161 (2182.5MHz) + CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 67211 (2187.5MHz) + CH 67261 (2192.5MHz) + CH 67311 (2197.5MHz)	
C		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
			2155.0MHz	CH 3162 (2122.4MHz) CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) CH 67311 (2197.5MHz)	

EUT Configure Mode	Test item	Channel	Test Frequency		Mode
A	Conducted Emission	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 66736 (2140MHz) + CH 66936 (2160MHz) + CH 67136 (2180MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
B		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 67111 (2177.5MHz) + CH 67161 (2182.5MHz) + CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 67211 (2187.5MHz) + CH 67261 (2192.5MHz) + CH 67311 (2197.5MHz)	
C		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
			2155.0MHz	CH 3162 (2122.4MHz) CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) CH 67311 (2197.5MHz)	

EUT Configure Mode	Test item	Channel	Test Frequency		Mode
A	Radiated Emission Below 1GHz	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
B		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
C		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
A	Radiated Emission Above 1GHz	3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137(2117.4MHz) CH 66636 (2130MHz) + CH 66836 (2150MHz) + CH 67036 (2170MHz)	2*WCDMA (5M) + 3*LTE (20M)
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 66736 (2140MHz) + CH 66936 (2160MHz) + CH 67136 (2180MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 66836 (2150MHz) + CH 67036 (2170MHz) + CH 67236 (2190MHz)	
B		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) + CH 3137 (2117.4MHz) CH 67011 (2167.5MHz) + CH 67061 (2172.5MHz) + CH 67111 (2177.5MHz)	TC3a
			2155.0MHz	CH 3162 (2122.4MHz) + CH 3187 (2127.4MHz) CH 67111 (2177.5MHz) + CH 67161 (2182.5MHz) + CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) + CH 3237 (2137.4MHz) CH 67211 (2187.5MHz) + CH 67261 (2192.5MHz) + CH 67311 (2197.5MHz)	
C		3112 to 3237 66636 to 67236	2145.0MHz	CH 3112 (2112.4MHz) CH 67111 (2177.5MHz)	NTC3a
			2155.0MHz	CH 3162 (2122.4MHz) CH 67211 (2187.5MHz)	
			2165.0MHz	CH 3212 (2132.4MHz) CH 67311 (2197.5MHz)	

Test Condition:

Test Item	Environmental Conditions	Input Power (System)	Tested By
EIRP	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Modulation characteristics	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Frequency Stability	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Occupied Bandwidth	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Band Edge	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Peak To Average Ratio	24deg. C, 64%RH	120Vac, 60Hz	James Yang
Conducted Emission	22deg. C, 66%RH	120Vac, 60Hz	Greg Lin
Radiated Emission	22deg. C, 66%RH	120Vac, 60Hz	Greg Lin

3.4 EUT Operating Conditions

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

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

The radiated peak output power shall be according to the specific rule Part 27.50(d)(2) that are limited to EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.

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.R.P power - 2.15dBi.

Where:

$ERP/EIRP = P_{Meas} + G_T - L_C$

P_{Meas} : Measure transmitter output power.
G_T : Gain of the transmitting antenna.
L_C : signal attenuation in the connecting cable between the transmitter and antenna.

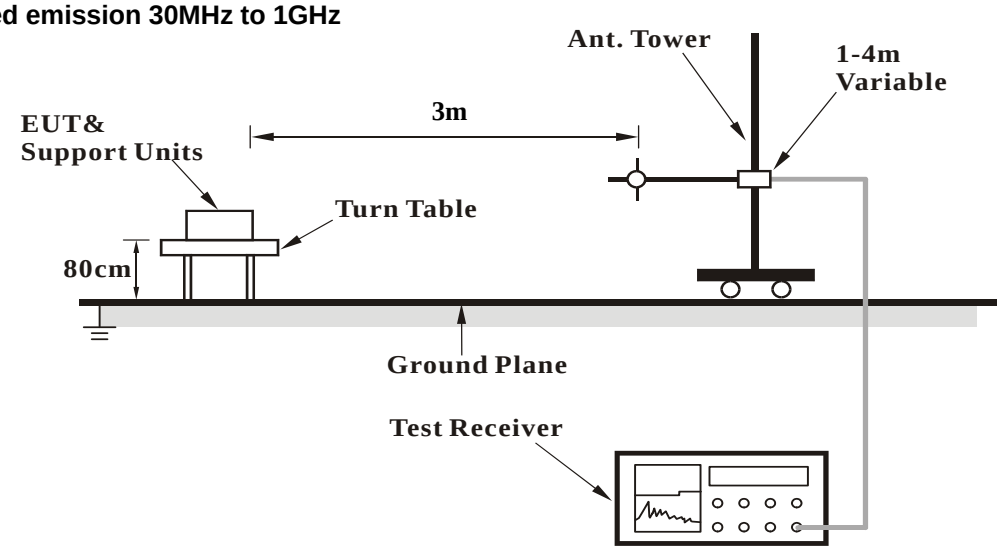
Conducted Power Measurement:

The EUT was set up for the maximum power link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

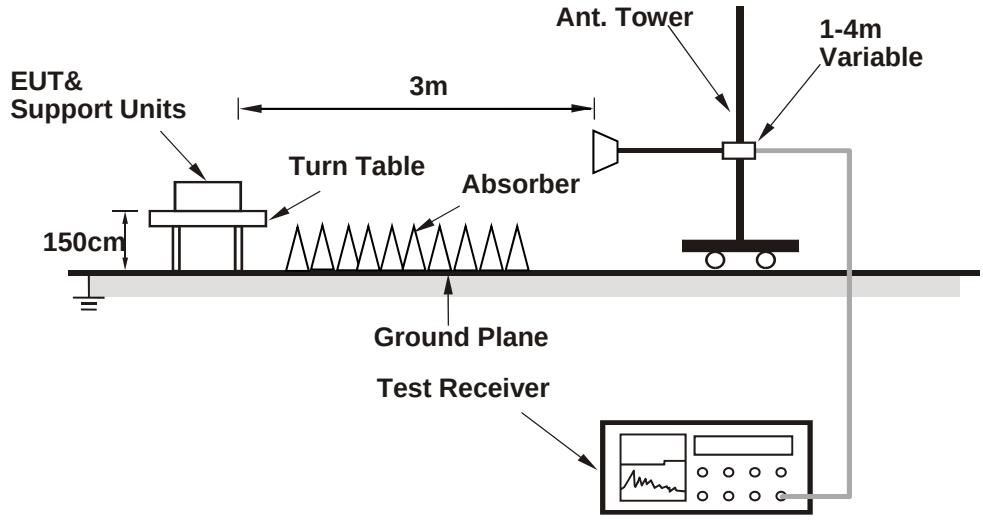
4.1.3 Test Setup

EIRP / ERP Measurement:

For radiated emission 30MHz to 1GHz

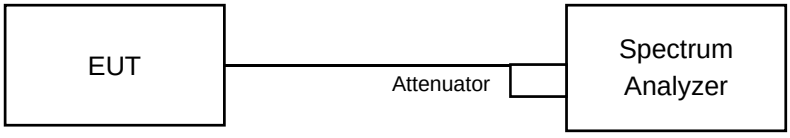


For radiated emission above 1GHz



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)

For WCDMA Band 10 + LTE Band 66

Mode	Chain	QPSK		
		Low CH 2145.0 MHz	Mid CH 2155.0 MHz	High CH 2165.0 MHz
A	0	37.49	37.47	37.53
	1	37.48	37.42	37.46
	2	37.44	37.52	37.48
	3	37.46	37.55	37.49
Mode	Chain	QPSK		
		Low CH 2145.0 MHz	Mid CH 2155.0 MHz	High CH 2165.0 MHz
B	0	37.45	37.49	37.49
	1	37.53	37.48	37.38
	2	37.48	37.56	37.42
	3	37.46	37.51	37.42
Mode	Chain	QPSK		
		Low CH 2145.0 MHz	Mid CH 2155.0 MHz	High CH 2165.0 MHz
C	0	37.46	37.48	37.54
	1	37.32	37.48	37.42
	2	37.54	37.49	37.56
	3	37.50	37.42	37.51

EIRP Power

For WCDMA Band 10 + LTE Band 66

Mode	Chain	QPSK		
		Low CH 2145 MHz	Mid CH 2155 MHz	High CH 2165.0 MHz
A	4TX	59.89	59.91	59.91
Mode	Chain	QPSK		
		Low CH 2145 MHz	Mid CH 2155 MHz	High CH 2165.0 MHz
B	4TX	59.90	59.93	59.85
Mode	Chain	QPSK		
		Low CH 2145 MHz	Mid CH 2155 MHz	High CH 2165.0 MHz
C	4TX	59.88	59.89	59.93

Note: EIRP (dBm) = Conducted Output Power (dBm) + Antenna Gain (dBi)

4.2 Modulation Characteristics Measurement

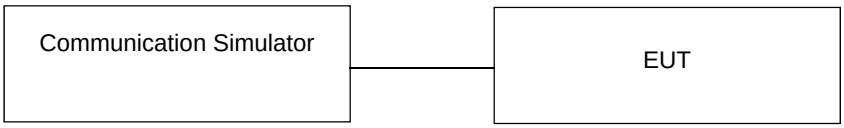
4.2.1 Limits of Modulation Characteristics

N/A

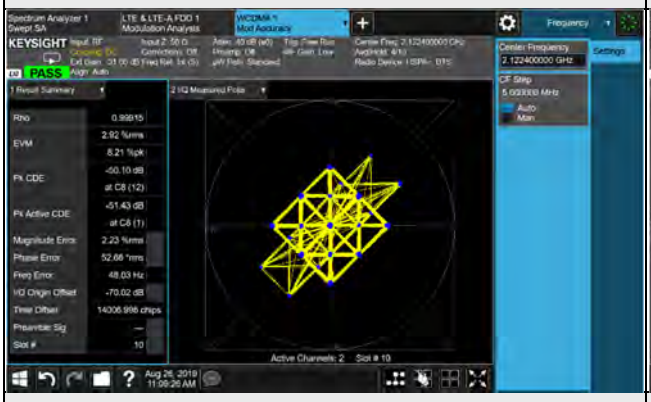
4.2.2 Test Procedure

Connect the EUT to Communication Simulator 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

WCDMA Band 10 + LTE Band 66	
Spectrum Plot of Measurement Value	
WCDMA: 2122.4MHz	LTE, QPSK: 2160.0MHz
	
LTE, 16QAM: 2160.0MHz	LTE, 64QAM: 2160.0MHz
	
LTE, 256QAM: 2160.0MHz	
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

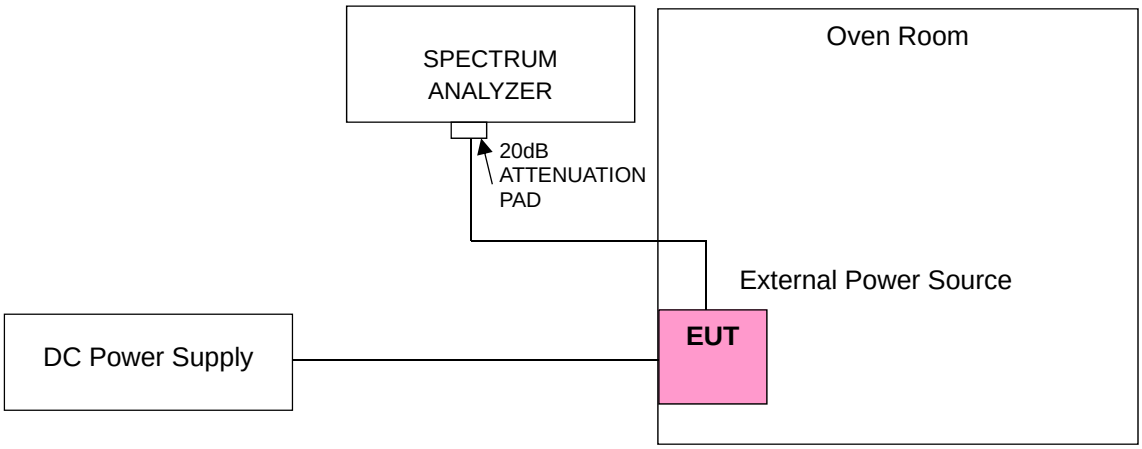
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with -30℃ ~ 50℃.

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 DC 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.

Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA Band 10 + LTE Band 66			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-45.9	2145.000002	0.001	2165.000002	0.001
-54.0	2145.000004	0.002	2165.000003	0.001
-62.1	2145.000002	0.001	2165.000002	0.001

Note: The applicant defined the normal working voltage is from -45.9Vdc to -62.1Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA Band 10 + LTE Band 66			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	2145.000004	0.002	2165.000003	0.001
-20	2145.000004	0.002	2165.000003	0.001
-10	2145.000003	0.002	2165.000002	0.001
0	2145.000002	0.001	2165.000002	0.001
10	2145.000002	0.001	2165.000001	0.001
20	2144.999998	-0.001	2164.999997	-0.001
30	2144.999996	-0.002	2164.999998	-0.001
40	2144.999997	-0.002	2164.999997	-0.001
50	2144.999997	-0.001	2164.999997	-0.002

4.4 Emission Bandwidth Measurement

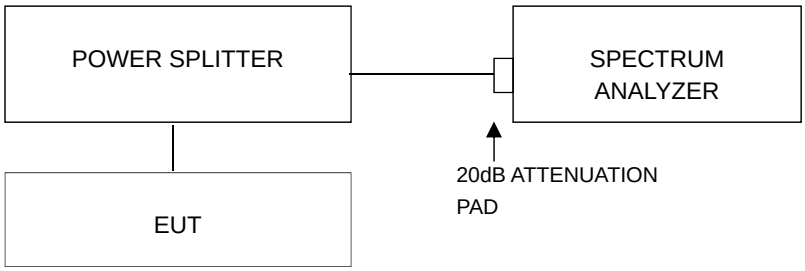
4.4.1 Limits of Emission Bandwidth Measurement

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 = 750kHz and VBW = 2.4MHz. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

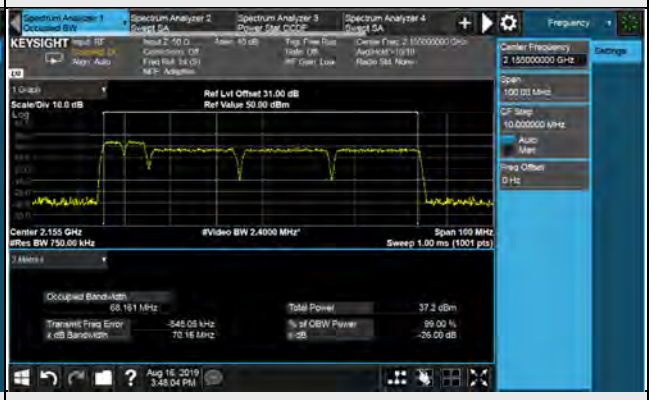
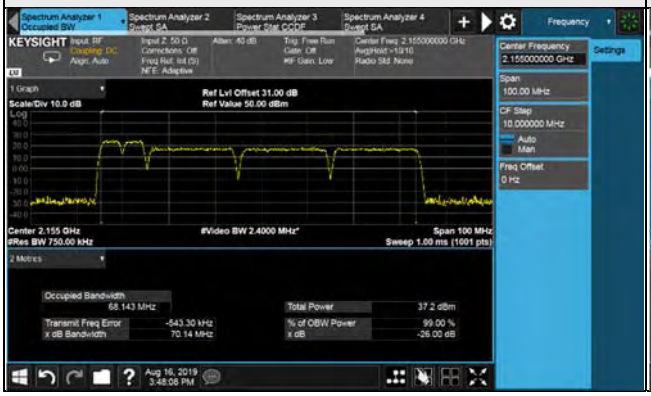
4.4.3 Test Setup



4.4.4 Test Result

Test Mode A

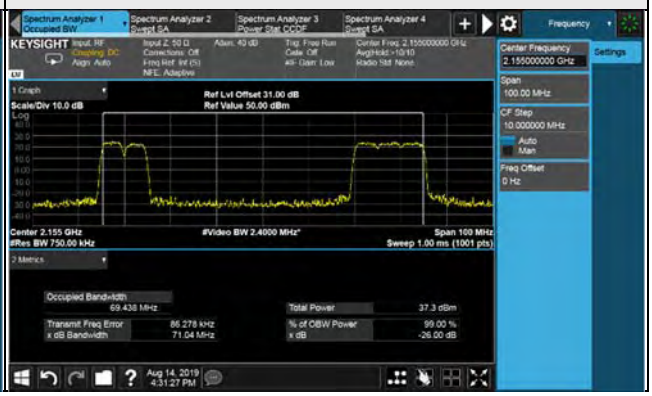
WCDMA Band 10 + LTE Band 66								
Frequency (MHz)	26dBc Bandwidth (MHz)				Occupied Bandwidth (MHz)			
	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
2145.0	70.19	70.09	70.13	70.06	68.15	68.15	68.17	68.12
2155.0	70.05	70.16	70.14	70.04	68.15	68.16	68.14	68.14
2165.0	69.98	70.09	70.03	70.08	68.20	68.24	68.12	68.06

26dBc Bandwidth	
Spectrum Plot of Worst Value	
Chain 0	Chain 1
	
Chain 2	Chain 3
	

Occupied Bandwidth	
Spectrum Plot of Worst Value	
Chain 0	Chain 1
	
Chain 2	Chain 3
	

Test Mode B

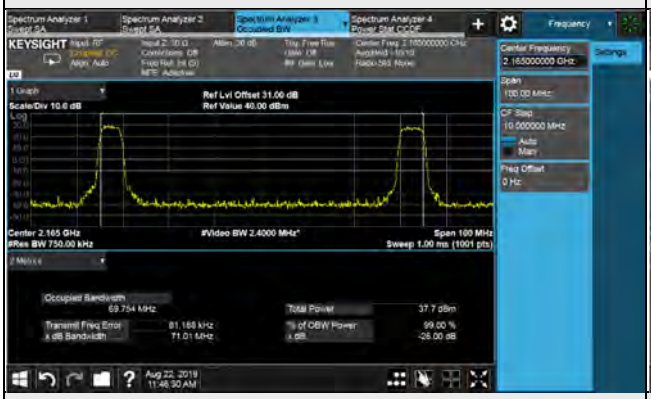
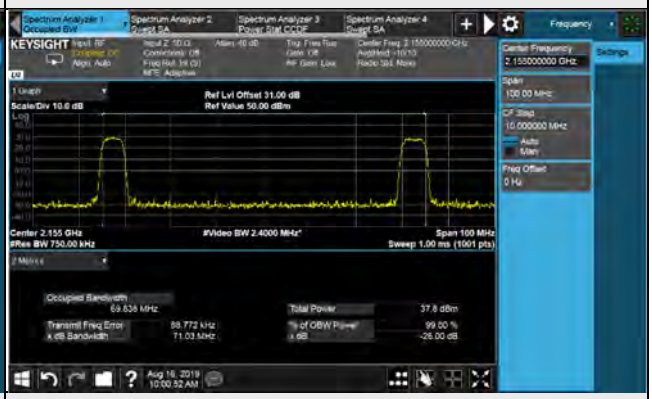
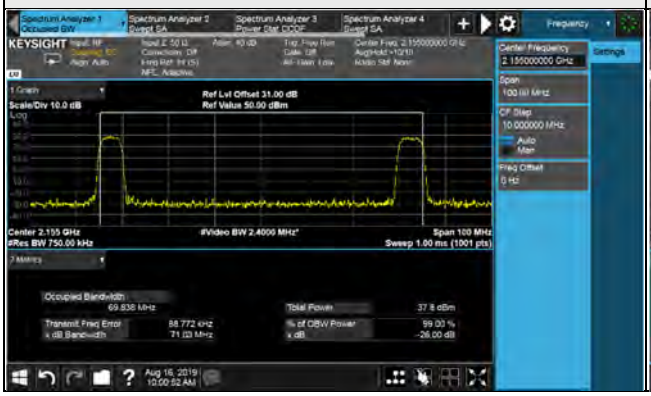
WCDMA Band 10 + LTE Band 66								
Frequency (MHz)	26dBc Bandwidth (MHz)				Occupied Bandwidth (MHz)			
	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
2145.0	70.95	71.00	70.99	70.97	69.33	69.41	69.50	69.43
2155.0	71.01	71.02	71.04	71.04	69.45	69.39	69.41	69.44
2165.0	70.94	71.01	71.00	70.97	69.43	69.42	69.32	69.38

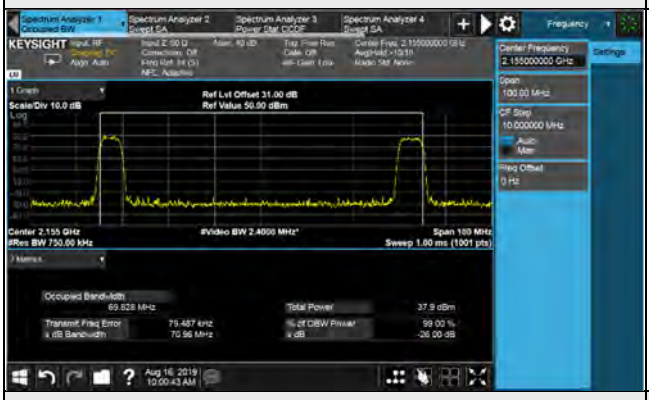
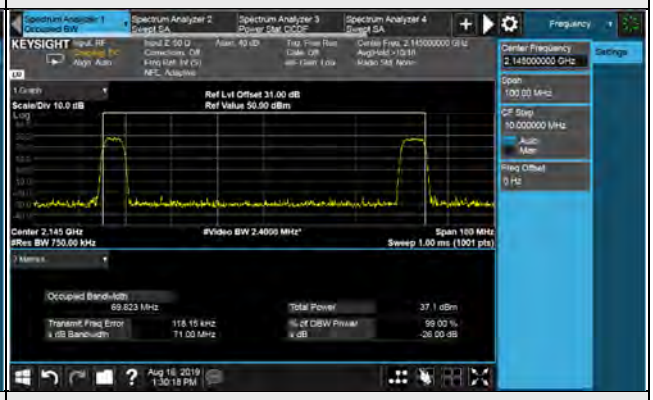
26dBc Bandwidth	
Spectrum Plot of Worst Value	
Chain 0	Chain 1
	
Chain 2	Chain 3
	

Occupied Bandwidth	
Spectrum Plot of Worst Value	
Chain 0	Chain 1
	
Chain 2	Chain 3
	

Test Mode C

WCDMA Band 10 + LTE Band 66								
Frequency (MHz)	26dBc Bandwidth (MHz)				Occupied Bandwidth (MHz)			
	Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
2145.0	70.98	71.00	70.98	70.99	69.72	69.82	69.74	69.82
2155.0	70.96	71.01	71.03	70.99	69.83	69.75	69.84	69.77
2165.0	71.01	70.91	71.00	70.96	69.75	69.73	69.84	69.72

26dBc Bandwidth	
Spectrum Plot of Worst Value	
Chain 0	Chain 1
	
Chain 2	Chain 3
	

Occupied Bandwidth	
Spectrum Plot of Worst Value	
Chain 0	Chain 1
	
Chain 2	Chain 3
	

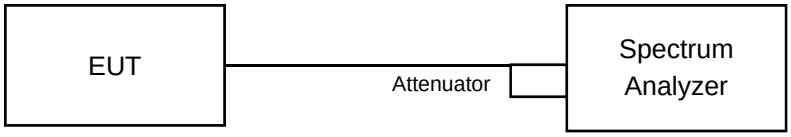
4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB.

Note: This device can be impelement MIMO function, so the limit of spurious emissions needs to be reduced by 10log($Numbers_{Ant}$) according to FCC KDB 662911 D01 guidance.

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 Device has 4x4 MIMO function, so the limit of spurious emissions needs to be reduced by 10log($Numbers_{Ant}$) according to FCC KDB 662911 D01 quidance.

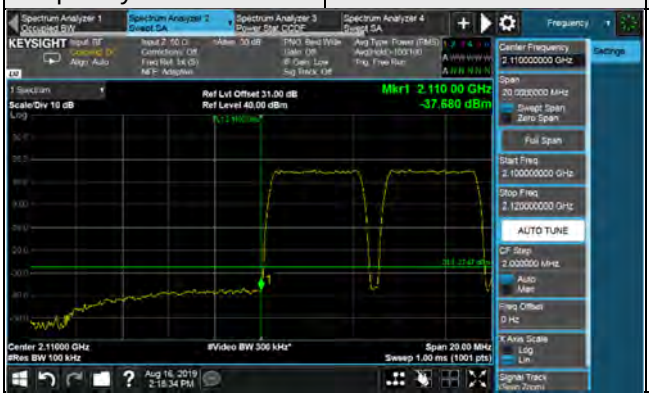
{The limits is adjusted to -13dBm – 10*log(4) = -19.02dBm}

c. For Multi-Carrier BW, extend the 1% range from 700kHz above and below the channel edge and then reduce the limit further by 10 log (100/700)=-8.45dB (i.e. total -19.02+(-8.45)=-27.47dBm) to compensate for the integration from 100kHz.

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

4.5.4 Test Results

Test Mode A

WCDMA Band 10 + LTE Band 66			
Chain 0			
Frequency	2110.0MHz	Frequency	2200.0MHz
			
Chain 1			
Frequency	2110MHz	Frequency	2200MHz
			
Chain 2			
Frequency	2110.0MHz	Frequency	2200.0MHz
			

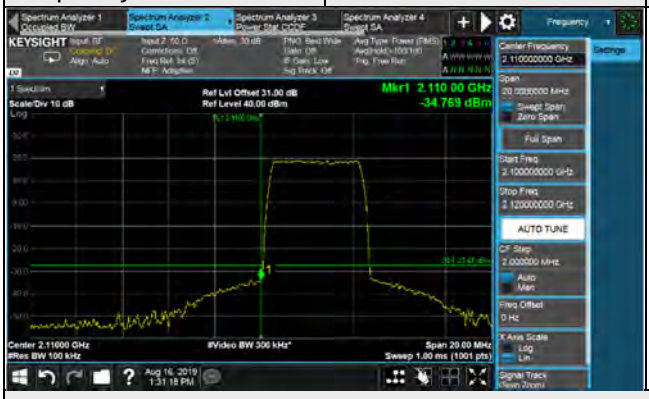
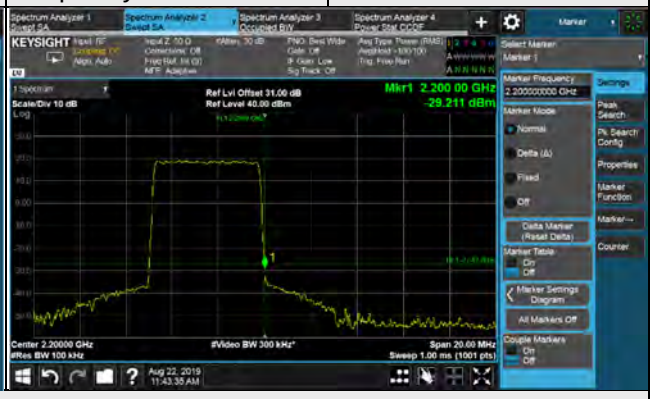
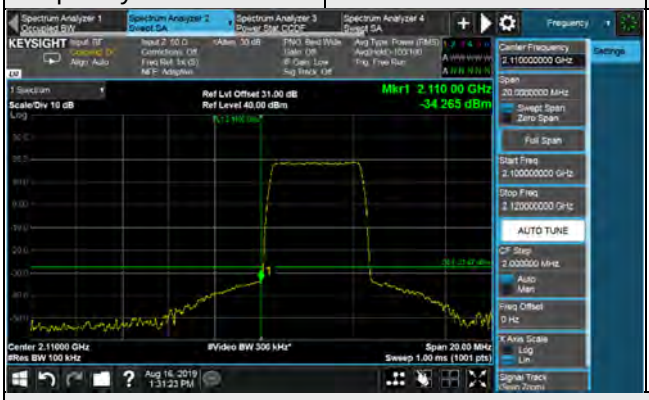
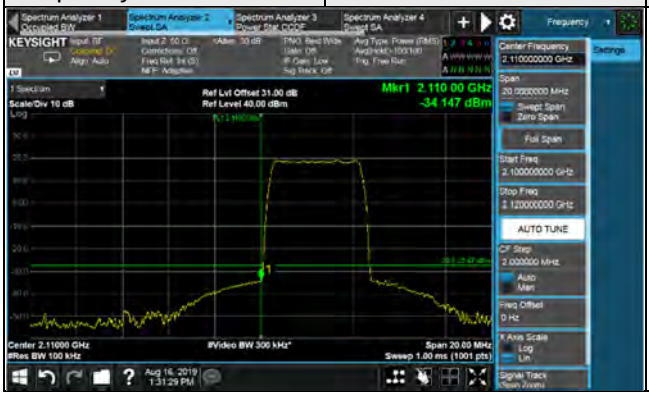
Chain 3			
Frequency	2110.0MHz	Frequency	2200.0MHz
			

Test Mode B

WCDMA Band 10 + LTE Band 66			
Chain 0			
Frequency	2110.0MHz	Frequency	2200.0MHz
			
Chain 1			
Frequency	2110.0MHz	Frequency	2200.0MHz
			
Chain 2			
Frequency	2110.0MHz	Frequency	2200.0MHz
			

Chain 3			
Frequency	2110.0MHz	Frequency	2200.0MHz
			

Test Mode C

WCDMA Band 10 + LTE Band 66			
Chain 0			
Frequency	2110.0MHz	Frequency	2200.0MHz
			
Chain 1			
Frequency	2110.0MHz	Frequency	2200.0MHz
			
Chain 2			
Frequency	2110.0MHz	Frequency	2200.0MHz
			

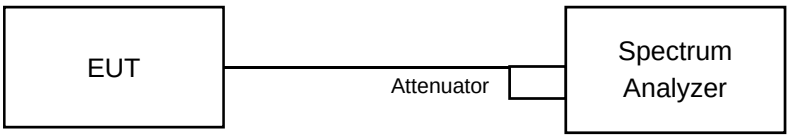
Chain 3			
Frequency	2110.0MHz	Frequency	2200.0MHz
			

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

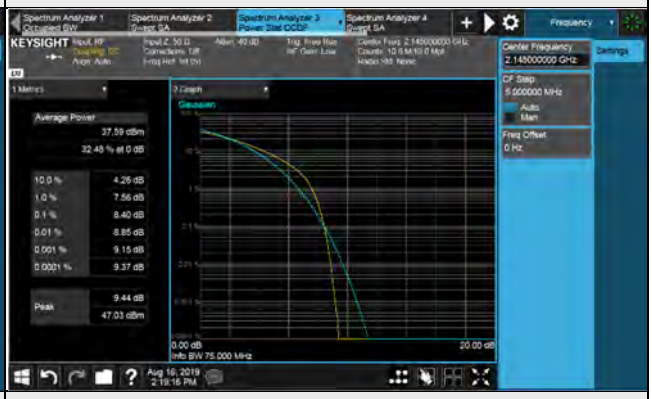
Test Mode A

WCDMA Band 10 + LTE Band 66				
Frequency (MHz)	Peak To Average Ratio (dB)			
	Chain 0	Chain 1	Chain 2	Chain 3
2145.0	8.38	8.40	8.38	8.39
2155.0	8.24	8.25	8.24	8.25
2165.0	8.00	8.00	8.00	7.99

Spectrum Plot of Worst Value

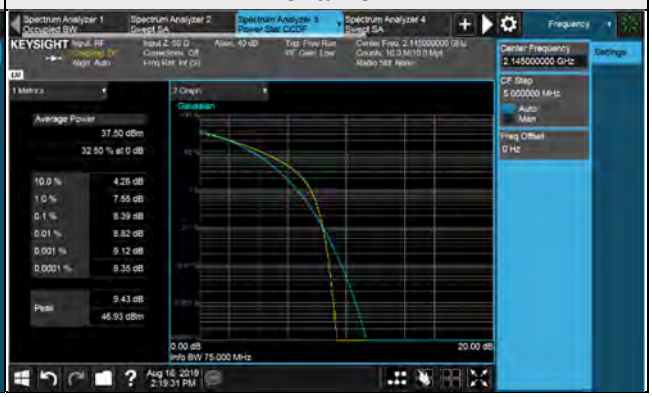
Chain 0

Chain 1



Chain 2

Chain 3

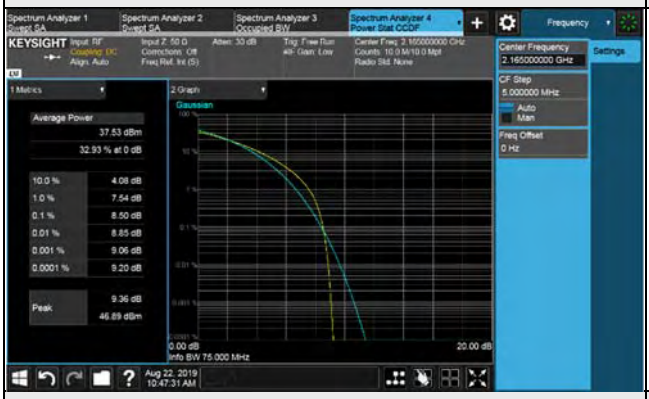


Test Mode B

WCDMA Band 10 + LTE Band 66				
Frequency (MHz)	Peak To Average Ratio (dB)			
	Chain 0	Chain 1	Chain 2	Chain 3
2145.0	8.13	8.12	8.13	8.13
2155.0	8.41	8.41	8.40	8.41
2165.0	8.50	8.51	8.51	8.51

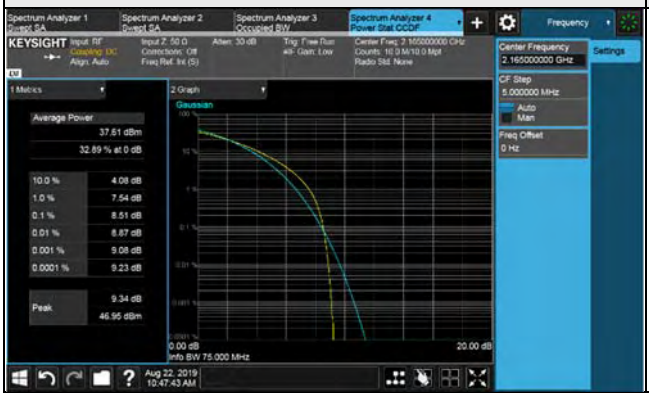
Spectrum Plot of Worst Value

Chain 0

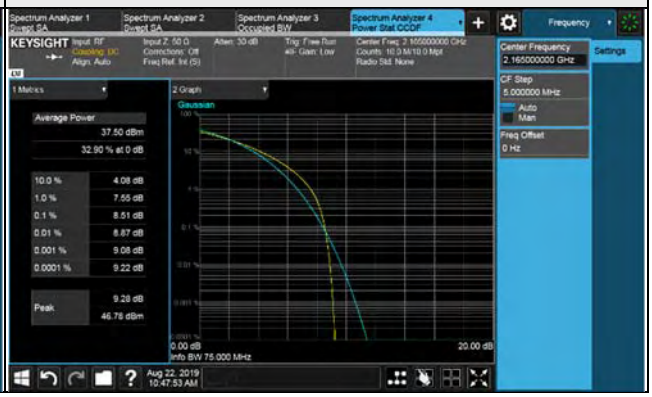


Chain 1

Chain 2



Chain 3



Test Mode C

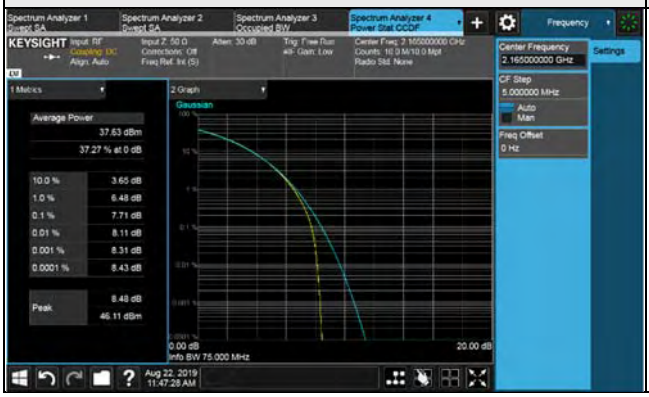
WCDMA Band 10 + LTE Band 66				
Frequency (MHz)	Peak To Average Ratio (dB)			
	Chain 0	Chain 1	Chain 2	Chain 3
2145.0	7.71	7.71	7.71	7.71
2155.0	7.69	7.68	7.69	7.68
2165.0	7.71	7.71	7.71	7.71

Spectrum Plot of Worst Value

Chain 0

Chain 1

Chain 2



Chain 3

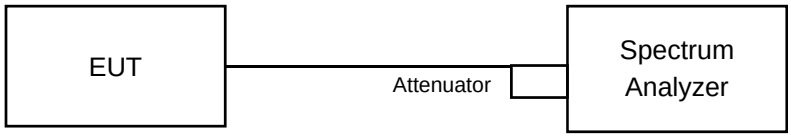
4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

In the FCC 27.53(h)(1),On any frequency outside a licensee's frequency block, The power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB.

Note: This device can be impelement MIMO function, so the limit of spurious emissions needs to be reduced by 10log($Numbers_{Ant}$) according to FCC KDB 662911 D01 guidance.

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 26.5GHz, it shall be connected to the attenuator with the carried frequency.
c. The Device has 4x4 MIMO function, so the limit of spurious emissions needs to be reduced by 10log($Numbers_{Ant}$) according to FCC KDB 662911 D01 quidance.
   {The limits is adjusted to -13dBm – 10*log(4) = -19.02dBm}

4.7.4 Test Results

Test Mode A

WCDMA Band 10 + LTE Band 66 (Chain 0)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

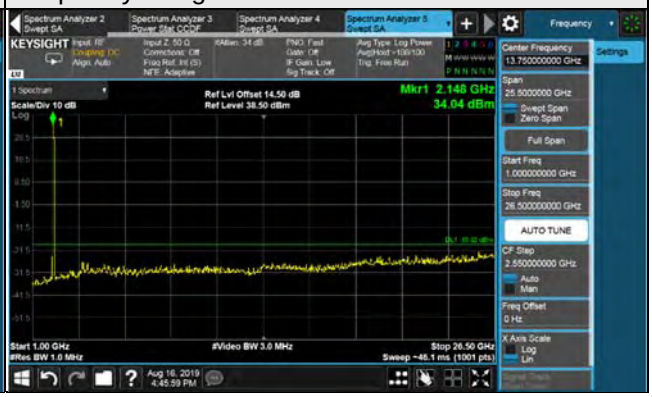
Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 1)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 2)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 3)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

Test Mode B

WCDMA Band 10 + LTE Band 66 (Chain 0)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 1)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 2)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 3)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

Test Mode C

WCDMA Band 10 + LTE Band 66 (Chain 0)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 1)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 2)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

WCDMA Band 10 + LTE Band 66 (Chain 3)	
2145.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2155.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	
2165.0MHz	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~26.5GHz
	

Note: For 9kHz, the signal is from spectrum analyzer.

4.8 Radiated Emission Measurement

4.8.1 Limits of Radiated Emission Measurement

According to FCC 27.53(h) for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

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.

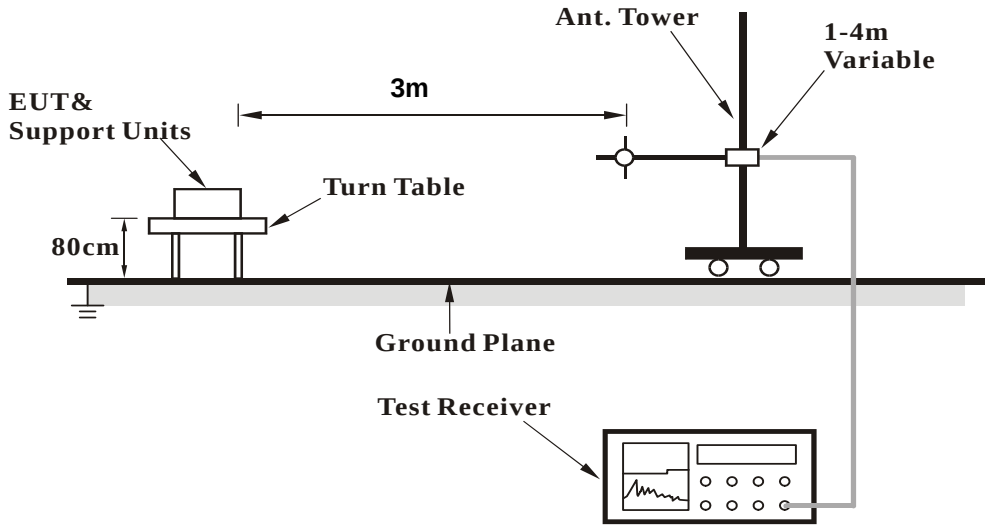
Note: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.8.3 Deviation from Test Standard

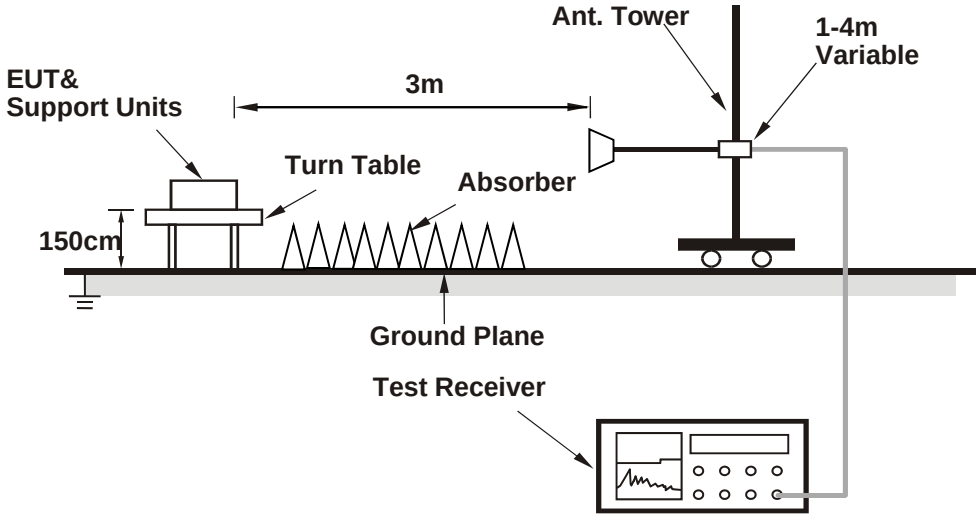
No deviation.

4.8.4 Test Setup

For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.8.5 Test Results

Below 1GHz

WCDMA Band 10 + LTE Band 66

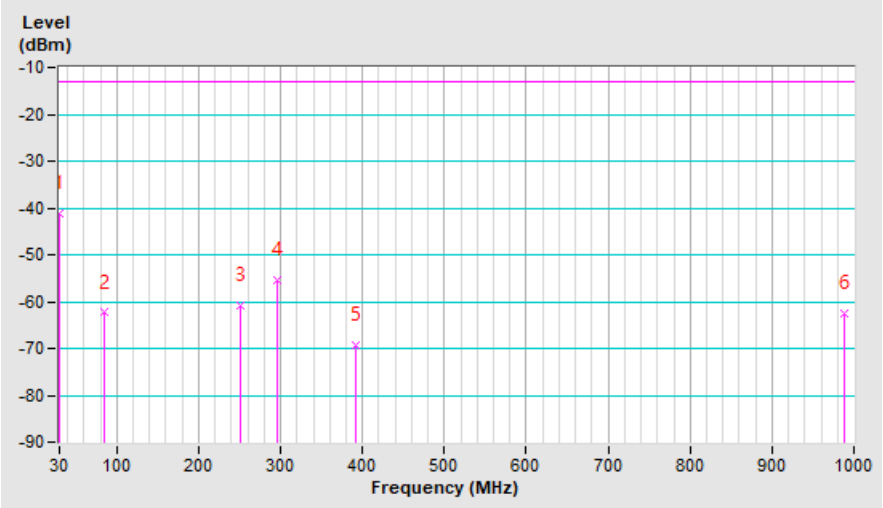
Test Mode A

Mode	TX 2145.0MHz	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	**30.00**	**-45.30**	**-21.90**	**-19.40**	**-41.30**	**-13.00**	**-28.30**
2	84.32	-56.40	-62.80	0.40	-62.40	-13.00	-49.40
3	250.19	-54.50	-59.50	-1.30	-60.80	-13.00	-47.80
4	295.78	-52.50	-53.60	-1.80	-55.40	-13.00	-42.40
5	391.81	-68.80	-72.60	3.40	-69.20	-13.00	-56.20
6	987.39	-71.30	-66.00	3.50	-62.50	-13.00	-49.50

Remarks:

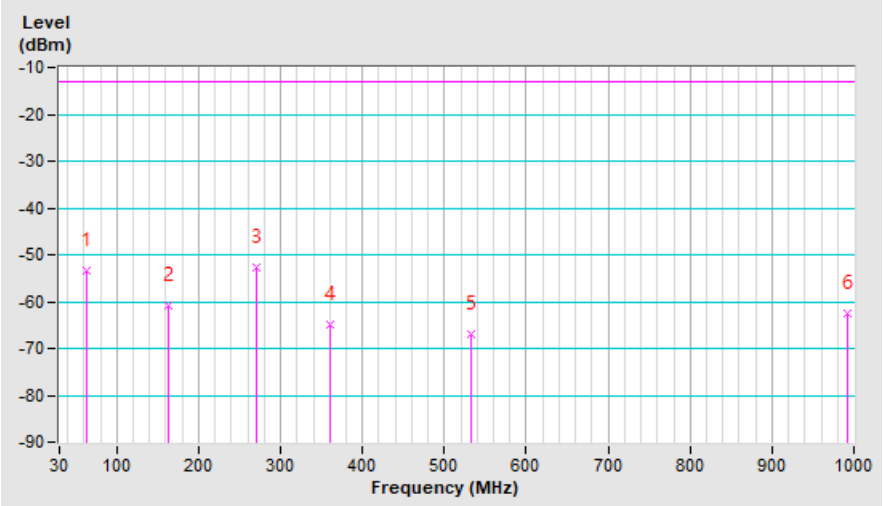
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX 2145.0MHz	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	62.98	-46.70	-51.00	-2.40	-53.40	-13.00	-40.40
2	163.86	-57.70	-57.90	-2.90	-60.80	-13.00	-47.80
3	270.56	-54.80	-51.40	-1.40	-52.80	-13.00	-39.80
4	360.77	-64.40	-68.80	4.00	-64.80	-13.00	-51.80
5	533.43	-68.20	-70.90	3.80	-67.10	-13.00	-54.10
6	992.24	-72.30	-65.80	3.40	-62.40	-13.00	-49.40

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

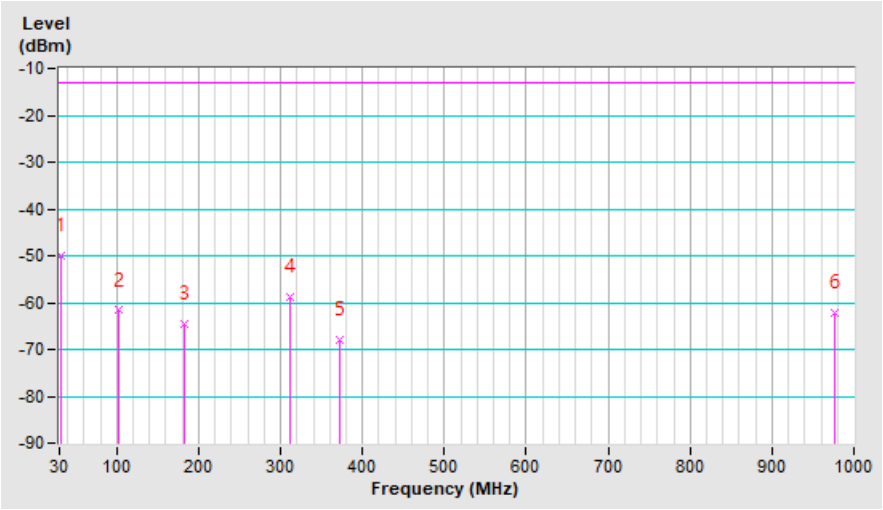


Test Mode B

Mode	TX 2145.0MHz	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	31.94	-53.50	-31.80	-18.30	-50.10	-13.00	-37.10
2	102.75	-53.40	-59.90	-1.80	-61.70	-13.00	-48.70
3	183.26	-56.20	-61.60	-3.00	-64.60	-13.00	-51.60
4	312.27	-54.80	-62.90	4.00	-58.90	-13.00	-45.90
5	371.44	-65.90	-71.90	3.90	-68.00	-13.00	-55.00
6	976.72	-71.10	-65.90	3.60	-62.30	-13.00	-49.30

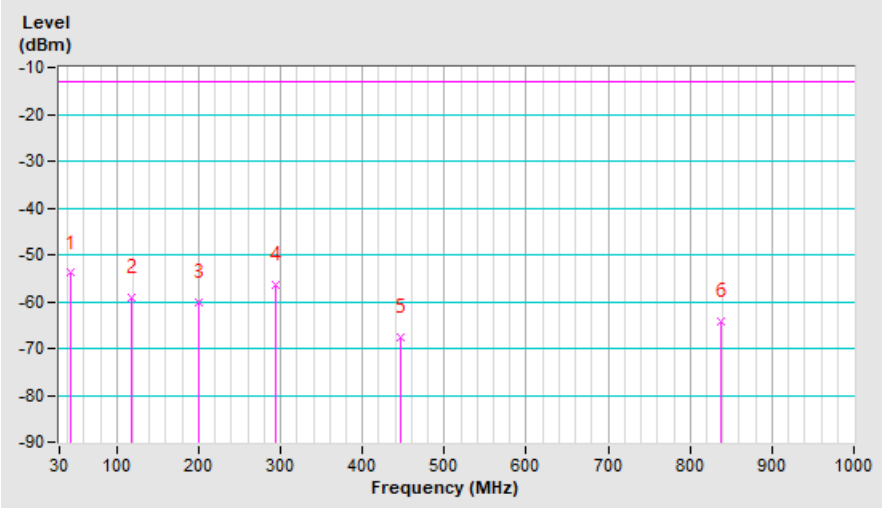
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX 2145.0MHz	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	43.58	-45.40	-42.60	-11.30	-53.90	-13.00	-40.90
2	118.27	-52.50	-56.20	-2.90	-59.10	-13.00	-46.10
3	199.75	-59.10	-57.80	-2.40	-60.20	-13.00	-47.20
4	293.84	-56.60	-54.60	-1.80	-56.40	-13.00	-43.40
5	446.13	-67.30	-71.00	3.40	-67.60	-13.00	-54.60
6	837.04	-71.60	-68.10	3.80	-64.30	-13.00	-51.30

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

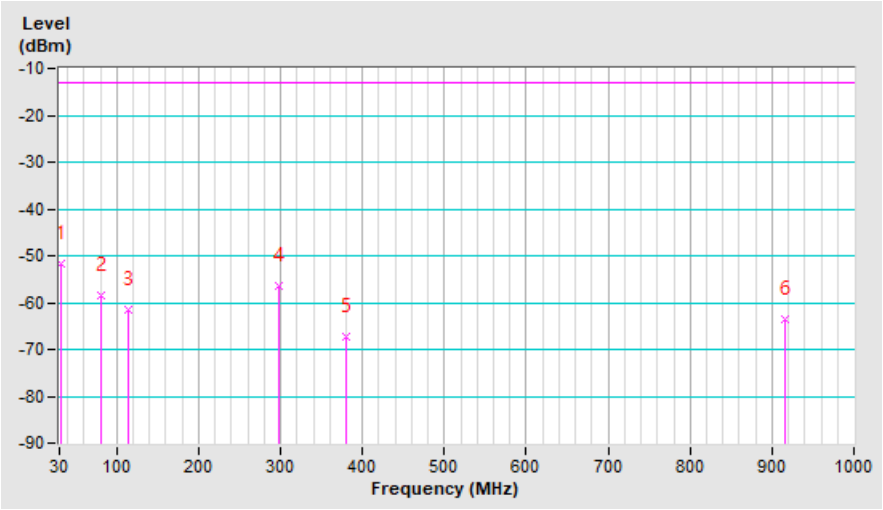


Test Mode C

Mode	TX 2145.0MHz	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	32.91	-54.70	-33.90	-17.70	-51.60	-13.00	-38.60
2	80.44	-53.60	-59.00	0.50	-58.50	-13.00	-45.50
3	113.42	-53.80	-58.80	-2.70	-61.50	-13.00	-48.50
4	297.72	-53.80	-54.80	-1.70	-56.50	-13.00	-43.50
5	379.20	-65.80	-71.00	3.60	-67.40	-13.00	-54.40
6	915.61	-71.60	-67.30	3.60	-63.70	-13.00	-50.70

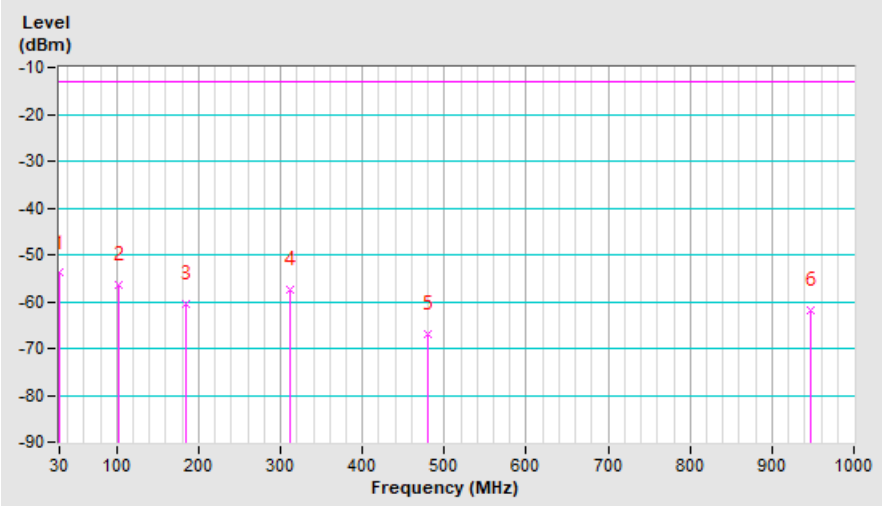
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX 2145.0MHz	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	30.00	-44.00	-34.50	-19.40	-53.90	-13.00	-40.90
2	101.78	-48.20	-55.00	-1.60	-56.60	-13.00	-43.60
3	185.20	-57.50	-57.60	-2.80	-60.40	-13.00	-47.40
4	312.27	-57.50	-61.60	4.00	-57.60	-13.00	-44.60
5	480.08	-66.70	-70.50	3.60	-66.90	-13.00	-53.90
6	947.62	-71.30	-65.80	3.80	-62.00	-13.00	-49.00

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



Above 1GHz

WCDMA Band 10 + LTE Band 66

Test Mode A

Mode	TX 2145.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4290.00	-57.60	-48.60	1.10	-47.50	-13.00	-34.50
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	4290.00	-55.30	-45.90	1.10	-44.80	-13.00	-31.80

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

Mode	TX 2155.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4310.00	-57.80	-48.50	1.00	-47.50	-13.00	-34.50
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	4310.00	-55.60	-46.20	1.00	-45.20	-13.00	-32.20

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

Mode	TX 2165.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4330.00	-57.10	-47.60	1.00	-46.60	-13.00	-33.60
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	4330.00	-54.60	-45.20	1.00	-44.20	-13.00	-31.20

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

Test Mode B

Mode	TX 2145.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4290.00	-57.70	-48.70	1.10	-47.60	-13.00	-34.60
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	4290.00	-55.10	-45.70	1.10	-44.60	-13.00	-31.60

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

Mode	TX 2155.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4310.00	-58.20	-48.90	1.00	-47.90	-13.00	-34.90
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	4310.00	-53.60	-44.20	1.00	-43.20	-13.00	-30.20

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

Mode	TX 2165.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4330.00	-58.20	-48.70	1.00	-47.70	-13.00	-34.70
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	4330.00	-55.50	-46.10	1.00	-45.10	-13.00	-32.10

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

Test Mode C

Mode	TX 2145.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4290.00	-57.90	-48.90	1.10	-47.80	-13.00	-34.80
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	4290.00	-55.20	-45.80	1.10	-44.70	-13.00	-31.70

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

Mode	TX 2155.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4310.00	-58.30	-49.00	1.00	-48.00	-13.00	-35.00
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	4310.00	-55.10	-45.70	1.00	-44.70	-13.00	-31.70

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

Mode	TX 2165.0MHz	Frequency Range	1GHz ~ 26GHz
Environmental Conditions	23deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

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	4330.00	-57.20	-47.70	1.00	-46.70	-13.00	-33.70
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	4330.00	-54.50	-45.10	1.00	-44.10	-13.00	-31.10

Remarks:
1. EIRP (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 and approved according to ISO/IEC 17025.

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

Lin Kou 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

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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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