

FCC Test Report (CA mode)

Report No.: RF200513C20-2

FCC ID: H8NSFE3056

Test Model: SS2FII Femtocell Multi-band SOHO

Received Date: May 13, 2020

Test Date: Jun. 03 ~ Jun. 04, 2020 & Aug. 12, 2020

Issued Date: Aug. 13, 2020

Applicant: ASKEY COMPUTER CORP.

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FCC Registration / 788550 / TW0003

Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
RF200513C20-2	Original release	Aug. 13, 2020

1 Certificate of Conformity

Product: Femtocell

Brand: Nokia

Test Model: SS2FII Femtocell Multi-band SOHO

Sample Status: Engineering sample

Applicant: ASKEY COMPUTER CORP.

Test Date: Jun. 03 ~ Jun. 04, 2020 & Aug. 12, 2020

Standards: FCC Part 24, Subpart E
FCC Part 27, Subpart C, L

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

Prepared by : Pettie Chen, **Date:** Aug. 13, 2020
Pettie Chen / Senior Specialist

Approved by : Bruce Chen, **Date:** Aug. 13, 2020
Bruce Chen / Senior Project Engineer

2 Summary of Test Results

FCC Clause		Test Item	Result	Remarks
FCC Part 24 & Part 2	FCC Part 27 & Part 2			
2.1046 24.232	-	Effective radiated power	Pass	Meet the requirement of limit.
-	2.1046 27.50(d)(2)	Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
2.1049 24.238(b)	-	Occupied Bandwidth	Pass	Meet the requirement of limit.
-	2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1053 24.238	2.1051 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -23.7dB at 4265.00MHz.

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. LTE CA mode is similar to digital modulation in LTE single frequency band, so please refer to BV CPS report no.: RF200513C20, RF200513C20-1 for the modulation characteristics data of CA mode

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) ($\pm$)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 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. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 23, 2019	Sep. 22, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
			Jul. 06, 2020	Jul. 05, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jul. 11, 2019	Jul. 10, 2020
			Jun. 08, 2020	Jun. 07, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 18, 2020	Feb. 17, 2021
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 18, 2020	Jan. 17, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jul. 11, 2019	Jul. 10, 2020
			Jan. 18, 2020	Jan. 17, 2021
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 30, 2019	Jul. 29, 2020
			Jun. 08, 2020	Jun. 07, 2021
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. 01, 2020	May 31, 2021
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Digital Multimeter Fluke	87-III	70360742	Jun. 27, 2019	Jun. 26, 2020
			Jun. 23, 2020	Jun. 22, 2021
Radio Communication Analyzer	MT8821C	6261786083	Jan. 18, 2020	Jan. 17, 2021

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	Femtocell
Brand	Nokia
Test Model	SS2FII Femtocell Multi-band SOHO
Sample Status	Engineering sample
Power Supply Rating	12Vdc (Adapter)
Modulation Type	LTE: QPSK, 16QAM, 64QAM
Operating Frequency	LTE Band 2 (Channel Bandwidth 5MHz): 1932.5MHz ~ 1987.5MHz LTE Band 2 (Channel Bandwidth 10MHz): 1935.0MHz ~ 1985.0MHz LTE Band 2 (Channel Bandwidth 15MHz): 1937.5MHz ~ 1982.5MHz LTE Band 2 (Channel Bandwidth 20MHz): 1940.0MHz ~ 1980.0MHz LTE Band 4 (Channel Bandwidth 5MHz): 2112.5MHz ~ 2152.5MHz LTE Band 4 (Channel Bandwidth 10MHz): 2115.0MHz ~ 2150.0MHz LTE Band 4 (Channel Bandwidth 15MHz): 2117.5MHz ~ 2147.5MHz LTE Band 4 (Channel Bandwidth 20MHz): 2120.0MHz ~ 2145.0MHz
Emission Designator	Refer to Note
Max. EIRP Power	Refer to Note
Antenna Type	LTE Band 2: Antenna 2: PIFA antenna with 2.9dBi gain Antenna 4: PIFA antenna with 3.7dBi gain LTE Band 4: Antenna 1: PIFA antenna with 3.1dBi gain Antenna 3: PIFA antenna with 2.6dBi gain
Antenna Connector	NA
Accessory Device	Adapter, GPS antenna (Brand: INPAQ, model: GPSSGLONASS15D-S6-0341-A, cable: 4.55m non-shielded cable w/o core)
Data Cable Supplied	2.95m non-shielded RJ45 cable w/o core

Note:

1. The EUT uses following adapters.

Adapter 1	
Brand	Asian Power Devices Inc.
Model	WB-24J12FU
Input Power	100-240Vac~50-60Hz 0.7A Max.
Output Power	12Vdc / 2A
Power Line	1.5m DC cable without core attached on adapter

Adapter 2	
Brand	AOEM
Model	ADS0248T-W120200(H)
Input Power	100-240Vac~50-60Hz 0.6A
Output Power	12Vdc / 2.0A
Power Line	1.5m DC cable without core attached on adapter

Adapter 3	
Brand	ChenZhou Frecom electronics Co., Ltd.
Model	F24L9-120200SPA
Input Power	100-240Vac~50/60Hz 0.6A
Output Power	12Vdc / 2A
Power Line	1.5m DC cable without core attached on adapter

*After pre-testing, adapter 1 was the worst case for the final tests.

- The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
- The EUT provides 2 completed transmitters and 2 receivers.

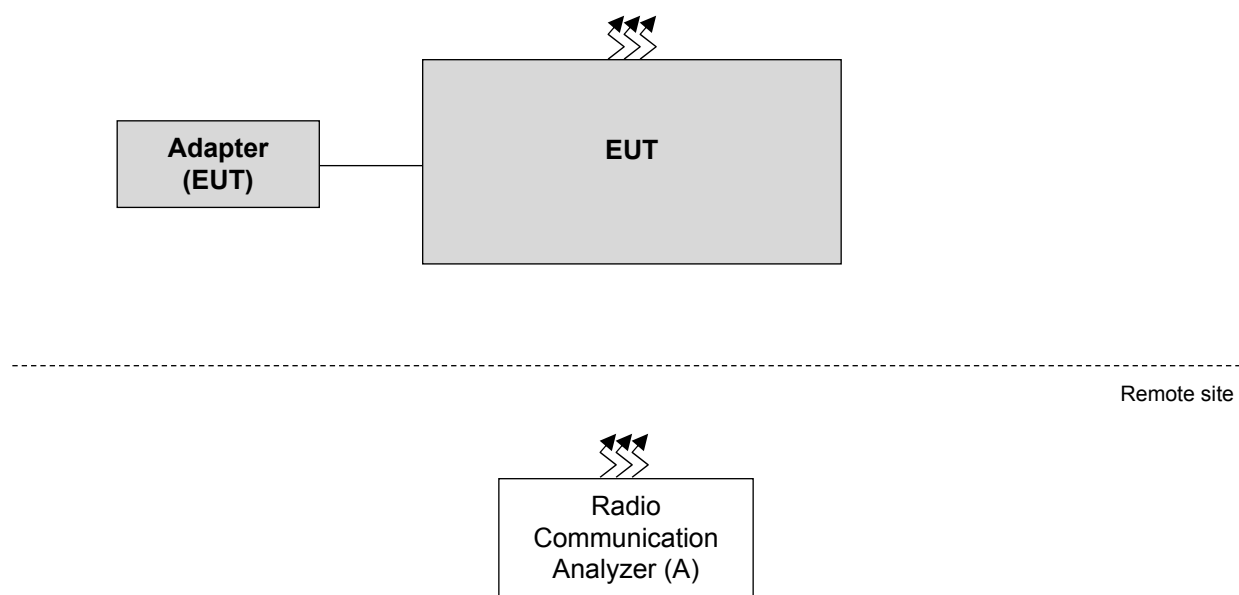
Modulation Mode	TX FUNCTION	RX FUNCTION
LTE	2TX	2RX

- The EUT support 5M+5M & 10M+10M & 20M+20M only.

- Max. EIRP Power & Emission Designator as below.

Mode	EIRP			Emission Designator		
	QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
CA mode: LTE Band 2 5M +LTE Band 4 5M	0.331W (25.2dBm)	0.263W (24.2dBm)	0.234W (23.7dBm)	8M86G7D	8M86W7D	8M86W7D
CA mode: LTE Band 2 10M +LTE Band 4 10M	0.355W (25.5dBm)	0.282W (24.5dBm)	0.251W (24.0dBm)	17M8G7D	17M8W7D	17M8W7D
CA mode: LTE Band 2 20M +LTE Band 4 20M	0.363W (25.6dBm)	0.288W (24.6dBm)	0.257W (24.1dBm)	35M7G7D	35M7W7D	35M7W7D

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.	Radio Communication Analyzer	Anritsu	MT8821C	6261786083	NA	-

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

3.3 Test Mode Applicability and Tested Channel Detail

Following channel(s) was (were) selected for the final test as listed below:

Band	Tested Channel	Band	Tested Channel
LTE Band 2 (Channel Bandwidth 5MHz)	625(1932.5MHz) 900(1960.0MHz) 1175(1987.5MHz)	LTE Band 4 (Channel Bandwidth 5MHz)	1975(2112.5MHz) 2175(2132.5MHz) 2375(2152.5MHz)
LTE Band 2 (Channel Bandwidth 10MHz)	650(1935.0MHz) 900(1960.0MHz) 1150(1985.0MHz)	LTE Band 4 (Channel Bandwidth 10MHz)	2000(2115.0MHz) 2175(2132.5MHz) 2350(2150.0MHz)
LTE Band 2 (Channel Bandwidth 20MHz)	700(1940.0MHz) 900(1960.0MHz) 1100(1980.0MHz)	LTE Band 4 (Channel Bandwidth 20MHz)	2050(2120.0MHz) 2175(2132.5MHz) 2300(2145.0MHz)

Note: Depends on 3GPP TS 36.141 Ver. 13.4.0 clause 4.7 and consult with manufacturer to declare test mode.

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards and References

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

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 24

FCC 47 CFR Part 27

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

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-D 2010

3GPP TS 36.141 version 13.4.0

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

For WCDMA 2/LTE Band 2:

Base stations with an emission bandwidth greater than 1MHz are limited to 1640 watts/MHz EIRP with an antenna height up to 300 meters HAAT.

For LTE Band 4:

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:

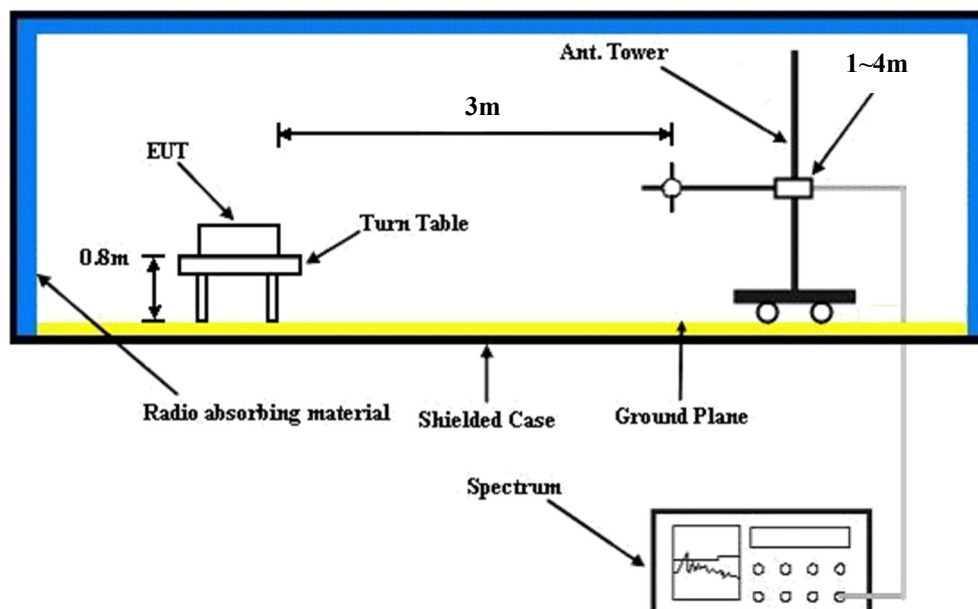
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz and 3MHz for WCDMA, 3MHz and 10MHz for LTE.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 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 horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15\text{dB}$.

Conducted Power Measurement:

The EUT was set up for the maximum power with WCDMA, LTE 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 the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

Modulation Type: QPSK

EIRP Power (dBm)

MODE		LTE Band 2 5MHz: TX channel 900 + LTE Band 4 5MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1960.00	-17.9	22.6	-0.3	22.3	62.1	-39.8
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1960.00	-15.8	25.4	-0.3	25.1	62.1	-37.0
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-19.1	22.8	-0.4	22.4	62.1	-39.7
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-17.0	25.6	-0.4	25.2	62.1	-36.9

MODE		LTE Band 2 10MHz: TX channel 1150 + LTE Band 4 10MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1985.00	14.4	22.5	-0.4	22.1	62.1	-40.0
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1985.00	19.2	25.9	-0.4	25.5	62.1	-36.6
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	15.8	23.0	-0.4	22.6	62.1	-39.5
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	19.5	25.5	-0.4	25.1	62.1	-37.0

MODE		LTE Band 2 20MHz: TX channel 1100 + LTE Band 4 20MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1980.00	14.2	22.3	-0.4	21.9	62.1	-40.2
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1980.00	18.9	25.7	-0.4	25.3	62.1	-36.8
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	15.6	22.8	-0.4	22.4	62.1	-39.7
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	20.0	26.0	-0.4	25.6	62.1	-36.5

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

Modulation Type: 16QAM

EIRP Power (dBm)

MODE		LTE Band 2 5MHz: TX channel 900 + LTE Band 4 5MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1960.00	-18.9	21.6	-0.3	21.3	62.1	-40.8
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1960.00	-16.8	24.4	-0.3	24.1	62.1	-38.0
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-20.1	21.8	-0.4	21.4	62.1	-40.7
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-18.0	24.6	-0.4	24.2	62.1	-37.9

MODE		LTE Band 2 10MHz: TX channel 1150 + LTE Band 4 10MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1985.00	13.4	21.5	-0.4	21.1	62.1	-41.0
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1985.00	18.2	24.9	-0.4	24.5	62.1	-37.6
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	14.8	22.0	-0.4	21.6	62.1	-40.5
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	18.5	24.5	-0.4	24.1	62.1	-38.0

MODE		LTE Band 2 20MHz: TX channel 1100 + LTE Band 4 20MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1980.00	13.2	21.3	-0.4	20.9	62.1	-41.2
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1980.00	17.9	24.7	-0.4	24.3	62.1	-37.8
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	14.6	21.8	-0.4	21.4	62.1	-40.7
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	19.0	25.0	-0.4	24.6	62.1	-37.5

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

Modulation Type: 64QAM

EIRP Power (dBm)

MODE		LTE Band 2 5MHz: TX channel 900 + LTE Band 4 5MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1960.00	-19.5	21.0	-0.3	20.7	62.1	-41.4
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1960.00	-17.4	23.8	-0.3	23.5	62.1	-38.6
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-20.6	21.3	-0.4	20.9	62.1	-41.2
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	-18.5	24.1	-0.4	23.7	62.1	-38.4

MODE		LTE Band 2 10MHz: TX channel 1150 + LTE Band 4 10MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1985.00	12.9	21.0	-0.4	20.6	62.1	-41.5
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1985.00	17.7	24.4	-0.4	24.0	62.1	-38.1
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	14.2	21.4	-0.4	21.0	62.1	-41.1
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	18.0	24.0	-0.4	23.6	62.1	-38.5

MODE		LTE Band 2 20MHz: TX channel 1100 + LTE Band 4 20MHz TX channel 2175					
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1980.00	12.6	20.7	-0.4	20.3	62.1	-41.8
Antenna Polarity & Test Distance: Vertical at 3 M (Part 24)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1980.00	17.3	24.1	-0.4	23.7	62.1	-38.4
Antenna Polarity & Test Distance: Horizontal at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	14.1	21.3	-0.4	20.9	62.1	-41.2
Antenna Polarity & Test Distance: Vertical at 3 M (Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2132.50	18.5	24.5	-0.4	24.1	62.1	-38.0

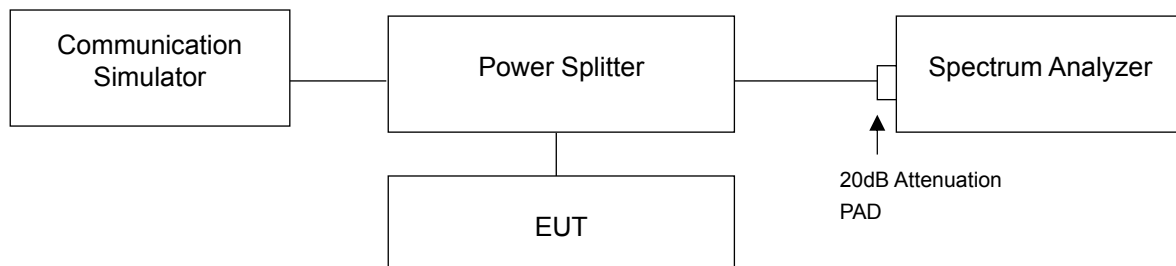
Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

4.2 Occupied Bandwidth Measurement

4.2.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.2.2 Test Setup



4.2.3 Test Result

Band	BW	Chain	QPSK			16QAM			64QAM		
			B2 Low CH 625 1932.5 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1175 1987.5 MHz	B2 Low CH 625 1932.5 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1175 1987.5 MHz	B2 Low CH 625 1932.5 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1175 1987.5 MHz
			B4 Low CH 1975 2112.5 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2375 2152.5 MHz	B4 Low CH 1975 2112.5 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2375 2152.5 MHz	B4 Low CH 1975 2112.5 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2375 2152.5 MHz
CA B2+B4	5M+5M	B2 max	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43	4.43
		B4 max	4.42	4.43	4.42	4.42	4.43	4.42	4.42	4.43	4.42
		Total max BW	8.85	8.86	8.85	8.85	8.86	8.85	8.85	8.86	8.85

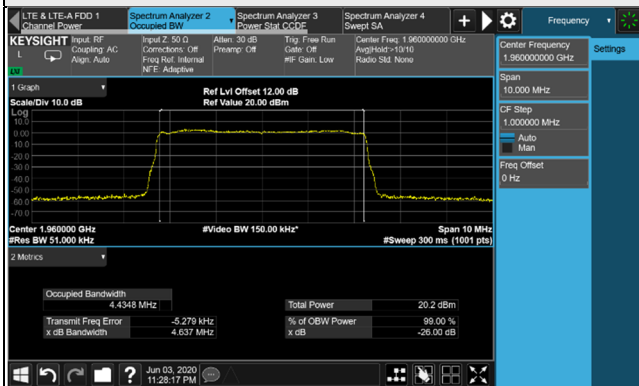
Band	BW	Chain	QPSK			16QAM			64QAM		
			B2 Low CH 650 1935 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1150 1985 MHz	B2 Low CH 650 1935 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1150 1985 MHz	B2 Low CH 650 1935 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1150 1985 MHz
			B4 Low CH 2000 2115 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2350 2150 MHz	B4 Low CH 2000 2115 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2350 2150 MHz	B4 Low CH 2000 2115 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2350 2150 MHz
CA B2+B4	10M+10M	B2 max	8.93	8.91	8.91	8.91	8.91	8.93	8.93	8.91	8.91
		B4 max	8.90	8.90	8.90	8.91	8.90	8.90	8.90	8.90	8.90
		Total max BW	17.83	17.81	17.81	17.82	17.81	17.83	17.83	17.81	17.81

Band	BW	Chain	QPSK			16QAM			64QAM		
			B2 Low CH 700 1940 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1100 1980 MHz	B2 Low CH 700 1940 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1100 1980 MHz	B2 Low CH 700 1940 MHz	B2 Mid CH 900 1960 MHz	B2 High CH 1100 1980 MHz
			B4 Low CH 2050 2120 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2300 2145 MHz	B4 Low CH 2050 2120 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2300 2145 MHz	B4 Low CH 2050 2120 MHz	B4 Mid CH 2175 2132.5 MHz	B4 High CH 2300 2145 MHz
CA B2+B4	20M+20M	B2 max	17.85	17.84	17.83	17.85	17.84	17.83	17.84	17.84	17.83
		B4 max	17.85	17.82	17.82	17.85	17.82	17.82	17.85	17.82	17.82
		Total max BW	35.70	35.66	35.65	35.70	35.66	35.65	35.69	35.66	35.65

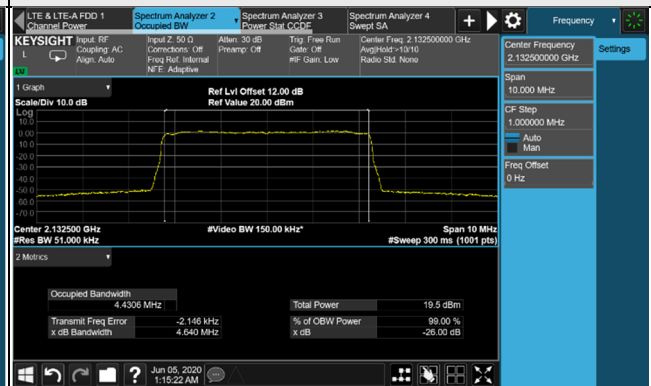
Spectrum Plot of Worst Value

5MHz+5MHz / 64QAM

LTE Band 2: CH 900

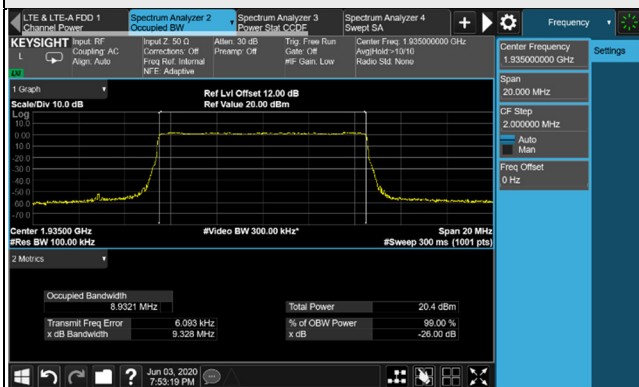


LTE Band 4: CH 2175

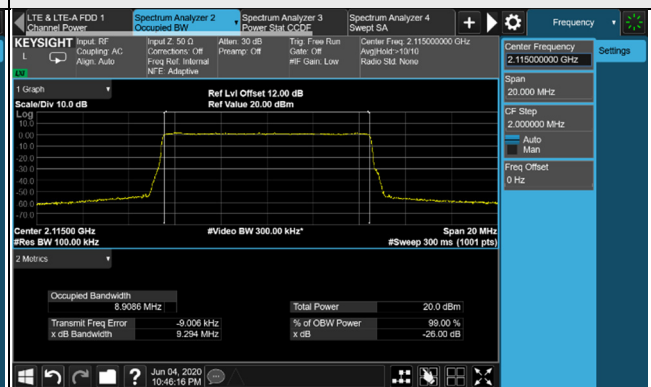


10MHz+10MHz / 64QAM

LTE Band 2: CH 650

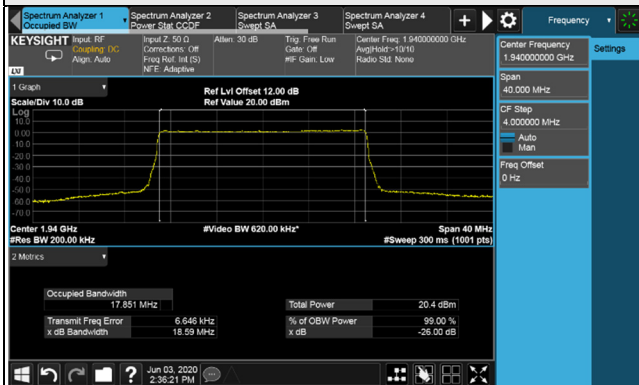


LTE Band 4: CH 2000

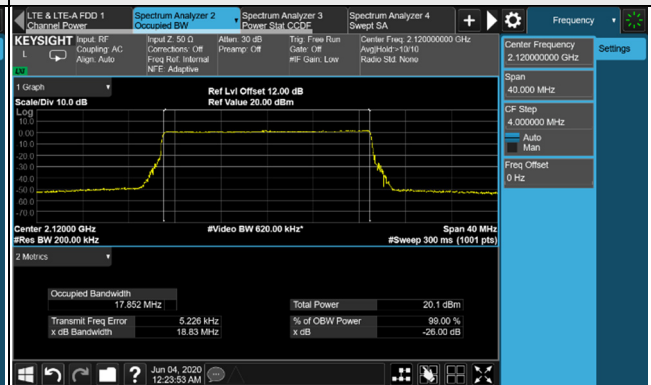


20MHz+20MHz / 16QAM

LTE Band 2: CH 700



LTE Band 4: CH 2050



4.3 Radiated Emission Measurement

4.3.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

4.3.2 Test Procedure

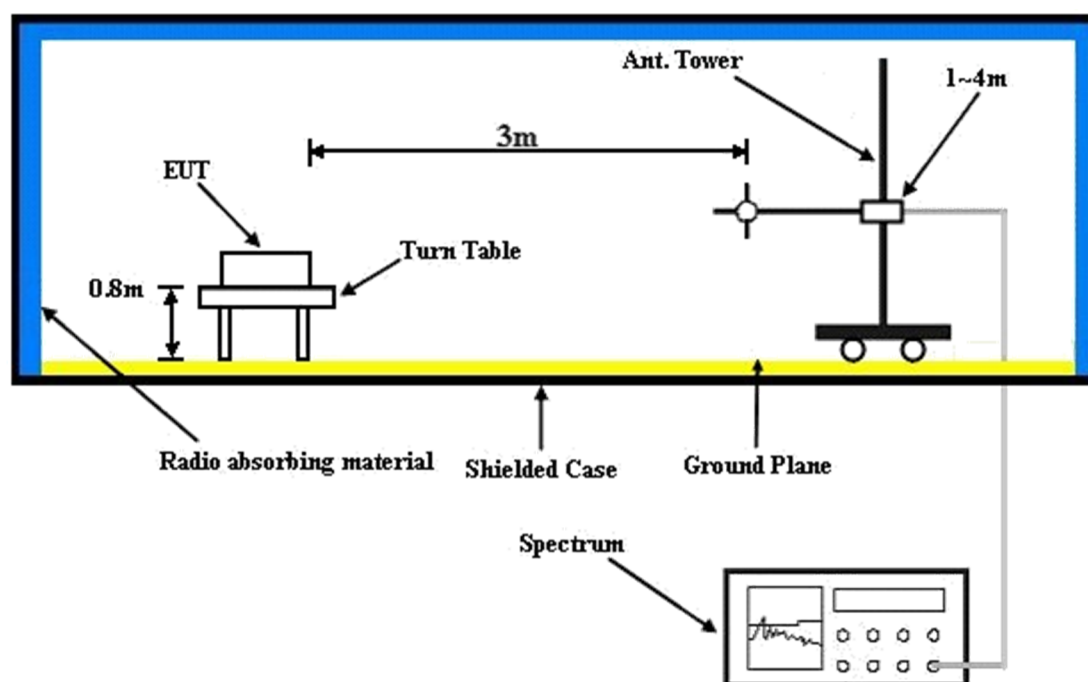
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from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

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

4.3.3 Deviation from Test Standard

No deviation.

4.3.4 Test Setup



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

4.3.5 Test Results

Below 1GHz

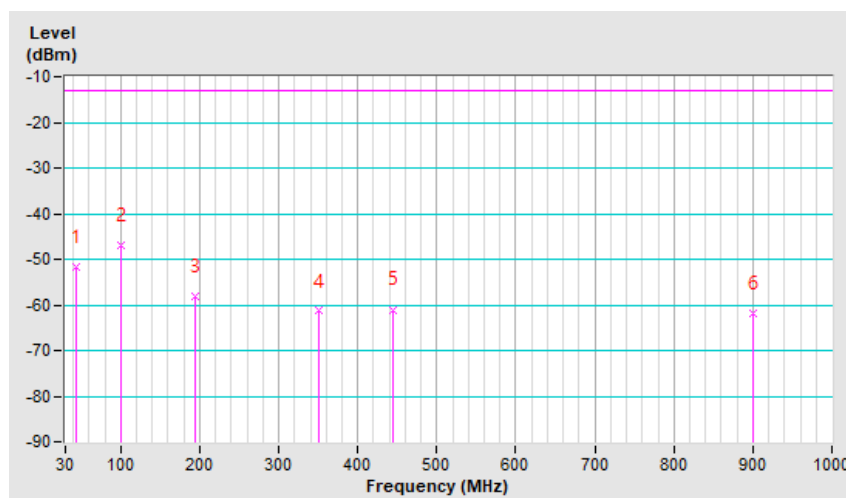
LTE Band 2: 5MHz + LTE Band 4: 5MHz

Mode	TX channel 900 (1960MHz)+ TX channel 2175 (2132.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	James Yang		

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	43.58	-53.4	-40.5	-11.3	-51.8	-13.0	-38.8
2	99.84	-38.6	-45.5	-1.5	-47.0	-13.0	-34.0
3	194.90	-49.8	-55.7	-2.6	-58.3	-13.0	-45.3
4	350.10	-58.1	-65.3	3.9	-61.4	-13.0	-48.4
5	445.16	-60.9	-64.4	3.4	-61.0	-13.0	-48.0
6	901.06	-69.6	-65.5	3.5	-62.0	-13.0	-49.0

Remarks:

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

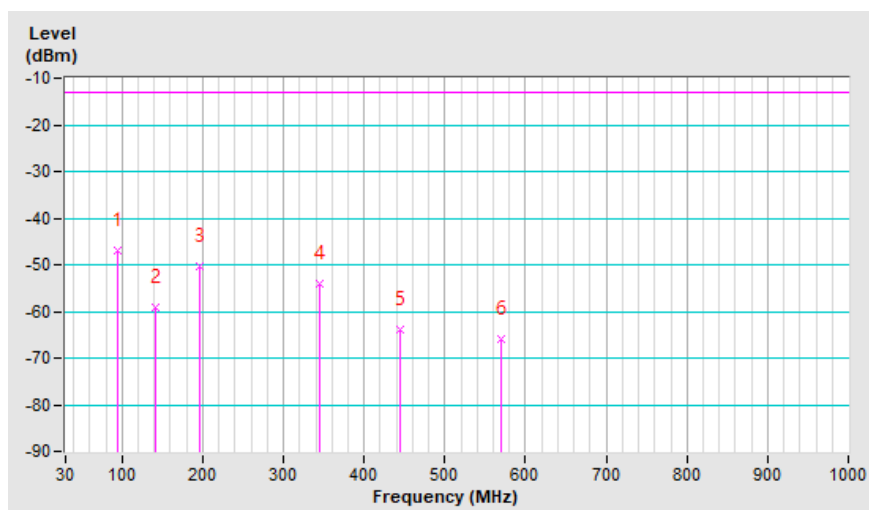


Mode	TX channel 900 (1960MHz)+ TX channel 2175 (2132.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	James Yang		

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	94.02	-39.7	-46.3	-0.7	-47.0	-13.0	-34.0
2	140.58	-56.4	-56.0	-3.0	-59.0	-13.0	-46.0
3	196.84	-49.5	-47.9	-2.5	-50.4	-13.0	-37.4
4	344.28	-53.6	-58.2	4.0	-54.2	-13.0	-41.2
5	445.16	-63.8	-67.4	3.4	-64.0	-13.0	-51.0
6	569.32	-67.6	-69.6	3.8	-65.8	-13.0	-52.8

Remarks:

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



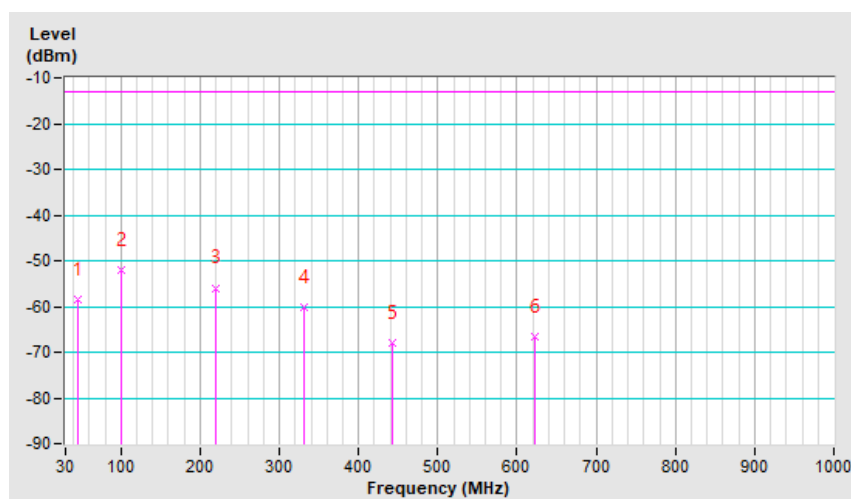
LTE Band 2: 10MHz + LTE Band 4: 10MHz

Mode	TX channel 1150 (1985MHz)+ TX channel 2175 (2132.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	James Yang		

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	45.52	-59.4	-48.2	-10.4	-58.6	-13.0	-45.6
2	99.84	-43.6	-50.5	-1.5	-52.0	-13.0	-39.0
3	220.12	-47.8	-54.0	-1.9	-55.9	-13.0	-42.9
4	330.70	-56.2	-64.1	4.0	-60.1	-13.0	-47.1
5	443.22	-67.8	-71.5	3.5	-68.0	-13.0	-55.0
6	621.70	-68.7	-70.4	3.7	-66.7	-13.0	-53.7

Remarks:

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

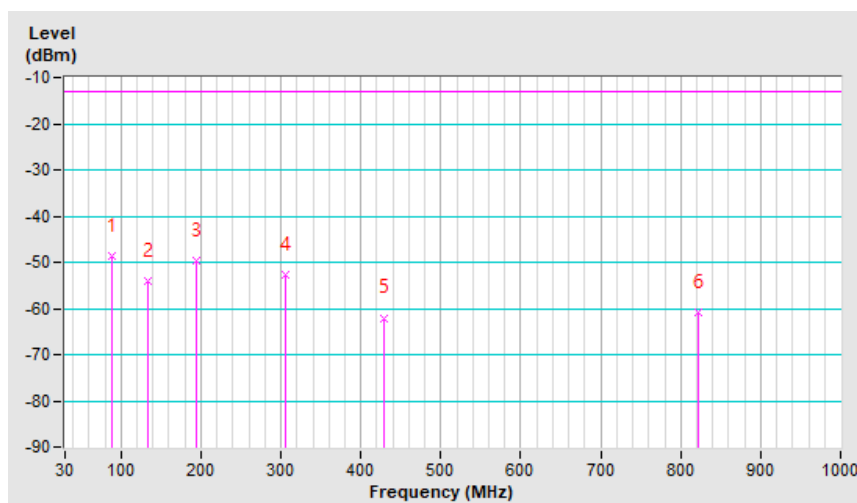


Mode	TX channel 1150 (1985MHz)+ TX channel 2175 (2132.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	James Yang		

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	88.20	-42.2	-48.4	-0.2	-48.6	-13.0	-35.6
2	132.82	-49.7	-50.6	-3.3	-53.9	-13.0	-40.9
3	194.90	-48.5	-47.0	-2.6	-49.6	-13.0	-36.6
4	305.48	-52.8	-56.5	3.8	-52.7	-13.0	-39.7
5	429.64	-61.6	-65.5	3.5	-62.0	-13.0	-49.0
6	821.52	-68.2	-64.7	3.9	-60.8	-13.0	-47.8

Remarks:

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



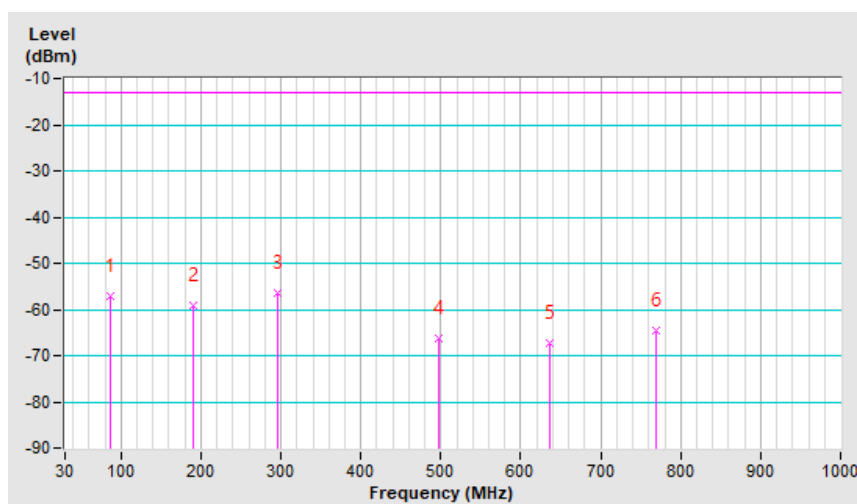
LTE Band 2: 20MHz + LTE Band 4: 20MHz

Mode	TX channel 1100 (1980MHz)+ TX channel 2175 (2132.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	James Yang		

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	86.26	-50.2	-57.1	0.1	-57.0	-13.0	-44.0
2	191.02	-50.7	-56.4	-2.7	-59.1	-13.0	-46.1
3	295.78	-53.4	-54.5	-1.8	-56.3	-13.0	-43.3
4	497.54	-66.3	-70.2	3.8	-66.4	-13.0	-53.4
5	635.28	-69.4	-70.9	3.7	-67.2	-13.0	-54.2
6	769.14	-69.2	-68.5	3.9	-64.6	-13.0	-51.6

Remarks:

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

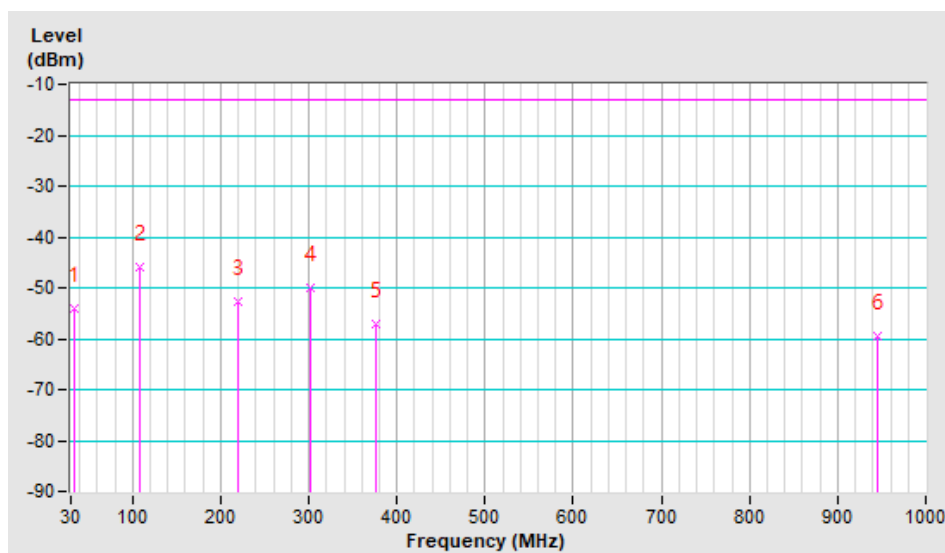


Mode	TX channel 1100 (1980MHz)+ TX channel 2175 (2132.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 66%RH	Input Power	120Vac, 60Hz
Tested By	James Yang		

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	33.88	-43.5	-37.0	-17.1	-54.1	-13.0	-41.1
2	107.60	-37.6	-43.6	-2.3	-45.9	-13.0	-32.9
3	220.12	-48.8	-50.8	-1.9	-52.7	-13.0	-39.7
4	301.60	-50.1	-53.6	3.7	-49.9	-13.0	-36.9
5	375.32	-56.7	-60.8	3.7	-57.1	-13.0	-44.1
6	945.68	-68.7	-63.2	3.8	-59.4	-13.0	-46.4

Remarks:

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



Above 1GHz

Mode	LTE Band 2 5MHz: TX channel 900 + LTE Band 4 5MHz TX channel 2175
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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	3920.00	-47.0	-38.5	1.3	-37.2	-13.0	-24.2
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	3920.00	-50.3	-41.6	1.3	-40.3	-13.0	-27.3

Remarks:

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

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	4265.00	-47.7	-38.9	1.1	-37.8	-13.0	-24.8
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	4265.00	-50.7	-41.2	1.1	-40.1	-13.0	-27.1

Remarks:

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

Mode	LTE Band 2 10MHz: TX channel 1150 + LTE Band 4 10MHz TX channel 2175
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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	3970.00	-46.6	-38.1	1.3	-36.8	-13.0	-23.8
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	3970.00	-50.2	-41.6	1.3	-40.3	-13.0	-27.3

Remarks:

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

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	4265.00	-46.8	-38.0	1.1	-36.9	-13.0	-23.9
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	4265.00	-51.3	-41.8	1.1	-40.7	-13.0	-27.7

Remarks:

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

Mode	LTE Band 2 20MHz: TX channel 1100 + LTE Band 4 20MHz TX channel 2175
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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	3960.00	-46.6	-38.1	1.3	-36.8	-13.0	-23.8
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	3960.00	-47.3	-38.7	1.3	-37.4	-13.0	-24.4

Remarks:

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

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	4265.00	-46.6	-37.8	1.1	-36.7	-13.0	-23.7
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	4265.00	-50.9	-41.4	1.1	-40.3	-13.0	-27.3

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 accredited and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab

Tel: 886-2-26052180

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Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

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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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