FCC Test Report

(Part 24: WCDMA Band 2 & LTE Band 2_Spot Check)

Report No.:	RF171206E01C-4
FCC ID:	NKRM14Q2SG
Test Model:	M14Q2SG
Received Date:	Jan. 02, 2019
Test Date:	Jan. 08 ~ Jan. 14, 2019
Issued Date:	Jan. 24, 2019
Applicant:	Wistron NeWeb Corporation
Address:	20 Park Ave. II, Hsinchu Science Park, Hsichu 308, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C)
Test Location:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Issue No.	Description	Date Issued
RF171206E01C-4	Original Release	Jan. 24, 2019

1 Certificate of Conformity

Product: LGA Module

Brand: Wistron NeWeb Corporation

Test Model: M14Q2SG

Sample Status: Engineering Sample

Applicant: Wistron NeWeb Corporation

Test Date: Jan. 08 ~ Jan. 14, 2019

Standards: FCC Part 24, Subpart E

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 : _____ , **Date:** Jan. 24, 2019

Polly Chien / Specialist

Approved by : _____ , **Date:** Jan. 24, 2019

Bruce Chen / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	**Test Item**	**Result**	**Remarks**
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	NA	Refer to note 1
2.1049 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	NA	Refer to note
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -41.0 dB at 59.10 MHz.

Note:

1. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot–check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit. The original report please refer to report no.: RF171206E01B-1.
2. 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	Expended Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 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 ROHDE & SCHWARZ	ESIB7	100187	May 29, 2018	May 28, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 25, 2018	Sep. 24, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 21, 2018	Nov. 20, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Aug. 08, 2018	Aug. 07, 2019
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jul. 02, 2018	Jul. 01, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 08, 2018	Aug. 07, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Aug. 08, 2018	Aug. 07, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 04, 2018	Jun. 03, 2019
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

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 4.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is 7450F-4.

3 General Information

3.1 General Description of EUT

Product	LGA Module	
Brand	Wistron NeWeb Corporation	
Test Model	M14Q2SG	
Model Difference	Refer to Note	
Status of EUT	Engineering Sample	
Power Supply Rating	5.0 Vdc (host equipment)	
Modulation Type	WCDMA	QPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	1852.4 ~ 1907.6 MHz
	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	WCDMA	218.776mW (23.4dBm)
	LTE Band 2 (Channel Bandwidth: 20 MHz)	338.844mW (25.3dBm)
Emission Designator	WCDMA	4M16F9W
	LTE Band 2 (Channel Bandwidth: 20 MHz)	17M9W7D
Antenna Type	Dipole Antenna with 0.6 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

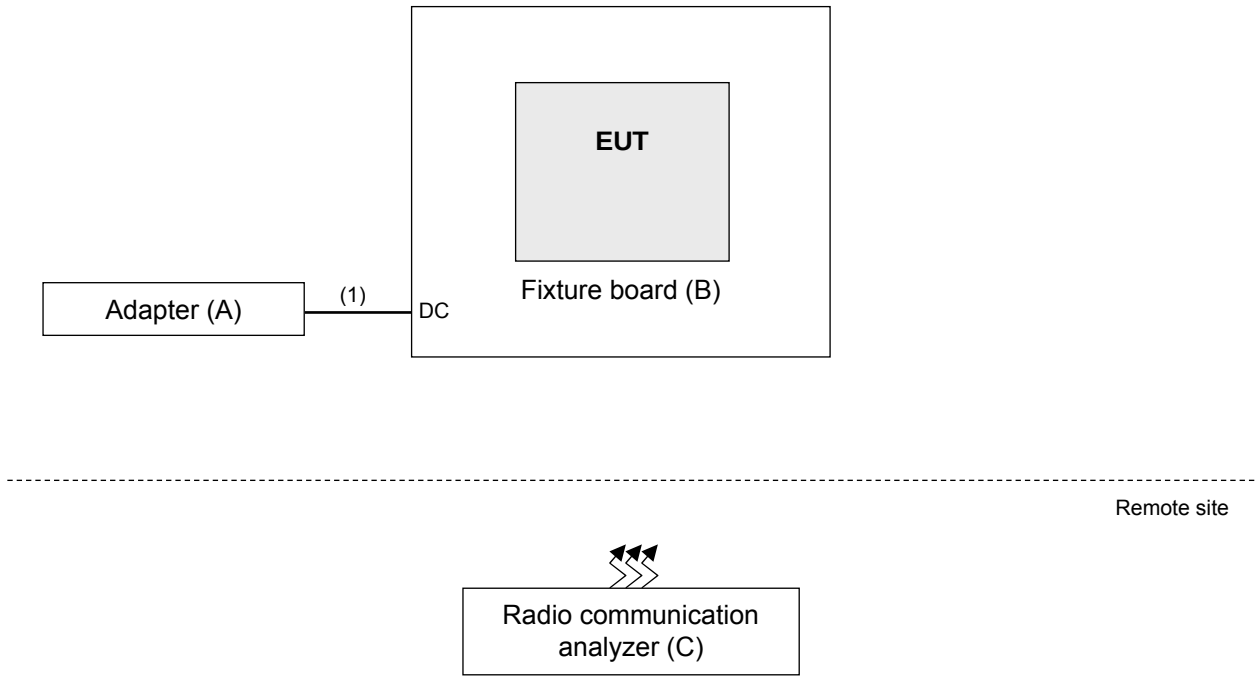
Note:

1. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot–check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit. The original report please refer to report no.: RF171206E01B-1.
2. The EUT uses following adapter. (For support unit only)

Brand	I.T.E POWER SUPPLY
Model	MU24-Y120200-A1
Input Power	100-240Vac, 50/60Hz, 0.7A
Output Power	12Vdc, 2A
Power Line	1.5m cable without core attached on adapter

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

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
1.	Adapter	I.T.E POWER SUPPLY	MU24-Y120200-A1	NA	NA	Provided by manufacturer
2.	Fixture board	NA	NA	NA	NA	Provided by manufacturer
3.	Radio Communication Analyzer	Anritsu	MT8860C	1702001	NA	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	-	0	Attached on adapter

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.

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	Conducted Output Power	9262 to 9538	9262 (1852.4MHz), 9400 (1880.0MHz), 9538 (1907.6MHz)	WCDMA
	EIRP	9262 to 9538	9400 (1880.0MHz),	WCDMA
-	Occupied Bandwidth	9262 to 9538	9400 (1880.0MHz)	WCDMA
-	Peak to Average Ratio	9262 to 9538	9400 (1880.0MHz)	WCDMA
-	Conducted Emission	9262 to 9538	9400 (1880.0MHz)	WCDMA
-	Radiated Emission	9262 to 9538	9400 (1880.0MHz)	WCDMA

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Conducted Output Power	18607 to 19193	18607 (1850.70MHz), 18900 (1880.00MHz), 19193 (1909.30MHz)	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18615 to 19185	18615 (1851.50MHz), 18900 (1880.00MHz), 19185 (1908.50MHz)	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18625 to 19175	18625 (1852.50MHz), 18900 (1880.00MHz), 19175 (1907.50MHz)	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18650 to 19150	18650 (1855.00MHz), 18900 (1880.00MHz), 19150 (1905.00MHz)	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18675 to 19125	18675 (1857.50MHz), 18900 (1880.00MHz), 19125 (1902.50MHz)	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		18700 to 19100	18700 (1860.00MHz), 18900 (1880.00MHz), 19100 (1900.00MHz)	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	EIRP	18700 to 19100	18900 (1880.00MHz),	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Occupied Bandwidth	18700 to 19100	118900 (1880.00MHz),	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
-	Peak to Average Ratio	18700 to 19100	118900 (1880.00MHz)	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-	Conducted Emission	18700 to 19100	118900 (1880.00MHz)	20 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	18700 to 19100	118900 (1880.00MHz)	20 MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power (System)	Tested By
EIRP	25deg. C, 70%RH	120Vac, 60Hz	Noah Chang
Occupied Bandwidth	25deg. C, 70%RH	120Vac, 60Hz	Noah Chang
Peak to Average Ratio	25deg. C, 70%RH	120Vac, 60Hz	Noah Chang
Conducted Emission	25deg. C, 70%RH	120Vac, 60Hz	Noah Chang
Radiated Emission	25deg. C, 70%RH	120Vac, 60Hz	Luis Lee

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards

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

FCC 47 CFR Part 2
FCC 47 CFR Part 24
KDB 971168 D01 Power Meas License Digital Systems v03r01
ANSI/TIA/EIA-603-E 2016
ANSI 63.26-2015

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

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

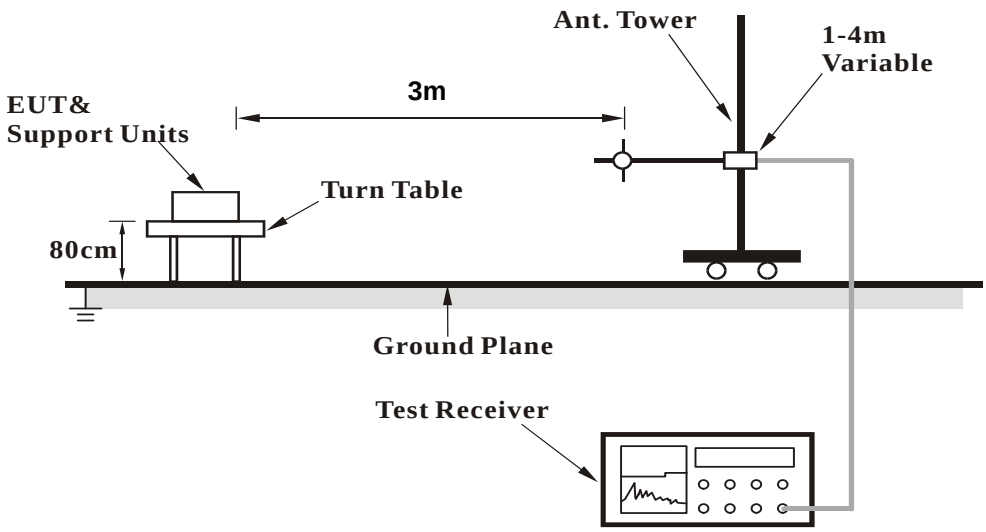
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5 MHz for WCDMA, and 10 MHz for LTE mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15 dBi.

Conducted Power Measurement:

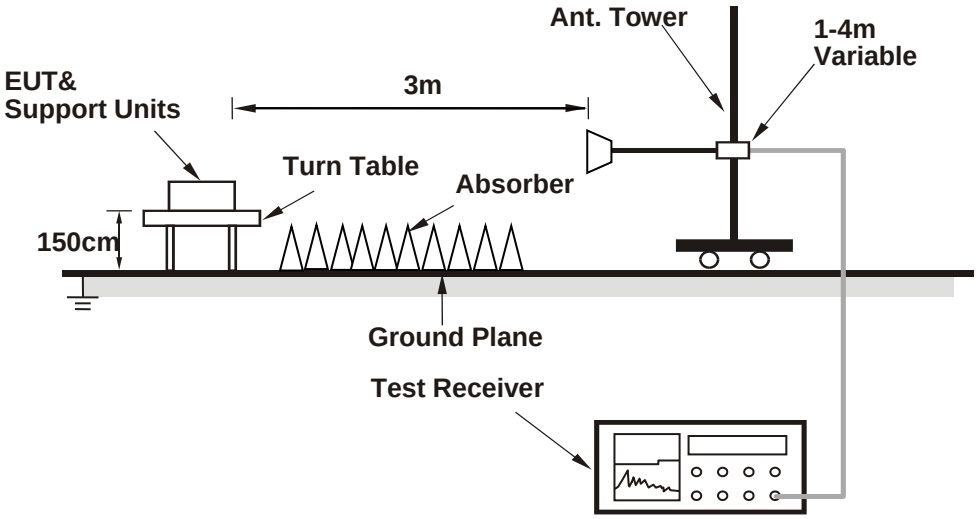
The EUT was set up for the maximum power with WCDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup

EIRP / ERP Measurement:
<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



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

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
	22.38	22.45	22.20

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18607	Mid Ch 18900	High Ch 19193		Low Ch 18607	Mid Ch 18900	High Ch 19193	
			1850.7 MHz	1880.0 MHz	1909.3 MHz		1850.7 MHz	1880.0 MHz	1909.3 MHz	
2 / 1.4M	1	0	22.88	23.10	22.49	0	22.50	23.08	22.48	1
	1	2	22.78	23.03	22.54	0	22.76	23.00	22.48	1
	1	5	22.50	22.75	22.37	0	22.05	23.05	22.50	1
	3	0	21.96	21.79	21.54	0	21.96	21.75	21.80	1
	3	1	21.63	22.04	21.48	0	22.11	21.83	21.59	1
	3	3	22.01	21.88	22.01	0	22.28	21.88	21.74	1
	6	0	21.93	21.75	21.67	1	21.11	21.07	20.64	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18615	Mid Ch 18900	High Ch 19185		Low Ch 18615	Mid Ch 18900	High Ch 19185	
			1851.5 MHz	1880.0 MHz	1908.5 MHz		1851.5 MHz	1880.0 MHz	1908.5 MHz	
2 / 3M	1	0	22.18	23.15	22.56	0	22.08	22.14	21.66	1
	1	7	22.15	23.04	22.62	0	22.13	21.91	21.60	1
	1	14	22.08	23.08	22.58	0	22.09	21.91	21.62	1
	8	0	22.07	22.10	21.54	1	22.01	21.11	21.24	2
	8	3	22.21	22.30	21.47	1	21.19	20.95	20.60	2
	8	7	21.93	21.84	21.13	1	21.08	20.90	20.46	2
	15	0	21.20	20.90	20.56	1	21.01	20.86	20.65	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18625 1852.5 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19175 1907.5 MHz		Low Ch 18625 1852.5 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19175 1907.5 MHz	
2 / 5M	1	0	22.88	23.14	22.32	0	21.98	22.01	21.62	1
	1	12	23.14	22.99	22.75	0	21.99	21.81	21.62	1
	1	24	22.77	22.76	22.34	0	21.97	21.81	21.50	1
	12	0	21.94	22.00	21.60	1	21.58	21.70	21.41	2
	12	6	21.61	21.74	21.35	1	20.98	20.94	20.50	2
	12	13	21.95	21.86	21.63	1	20.88	20.84	20.70	2
	25	0	20.76	20.79	20.63	1	21.03	20.89	20.62	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18650 1855.0 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19150 1905.0 MHz		Low Ch 18650 1855.0 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19150 1905.0 MHz	
2 / 10M	1	0	22.87	23.04	22.82	0	21.93	22.01	21.87	1
	1	24	22.87	22.92	22.80	0	21.95	21.83	21.90	1
	1	49	22.90	22.74	22.65	0	21.89	21.80	21.78	1
	25	0	21.88	21.81	21.88	1	22.00	21.81	21.70	2
	25	12	22.06	21.71	21.81	1	20.94	20.83	20.84	2
	25	25	22.32	22.14	21.99	1	21.04	20.90	20.84	2
	50	0	20.83	20.70	20.89	1	21.00	20.79	20.82	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18675 1857.5 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19125 1902.5 MHz		Low Ch 18675 1857.5 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19125 1902.5 MHz	
2 / 15M	1	0	23.11	23.27	22.65	0	21.95	21.97	21.58	1
	1	37	23.06	22.66	22.75	0	21.87	21.85	21.63	1
	1	74	22.94	22.50	22.55	0	21.94	21.81	21.43	1
	36	0	22.54	22.36	22.56	1	21.67	21.43	21.20	2
	36	19	21.41	21.55	21.11	1	21.56	21.41	21.30	2
	36	39	22.13	21.97	21.37	1	21.58	21.40	21.22	2
	75	0	21.31	21.84	21.49	1	21.00	20.79	21.52	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 18700 1860.0 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19100 1900.0 MHz		Low Ch 18700 1860.0 MHz	Mid Ch 18900 1880.0 MHz	High Ch 19100 1900.0 MHz	
2 / 20M	1	0	22.83	23.40	22.57	0	22.03	22.97	21.70	1
	1	50	22.10	23.13	22.84	0	21.92	21.92	21.60	1
	1	99	22.71	23.21	22.56	0	21.99	21.82	21.48	1
	50	0	21.80	21.54	21.35	1	21.81	21.76	21.40	2
	50	25	21.90	21.38	21.37	1	21.78	21.48	21.21	2
	50	50	22.13	21.91	21.55	1	21.77	21.58	21.13	2
	100	0	21.80	21.78	21.11	1	21.67	21.70	21.20	2

EIRP Power (dBm)
WCDMA Band 2

MODE		TX channel 9400					
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	1880.00	-22.2	17.9	1.1	19.0	33.0	-14.0
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	1880.00	-16.2	22.3	1.1	**23.4**	33.0	-9.6

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

Modulation Type: QPSK
LTE Band 2, Channel Bandwidth 20MHz

MODE		TX channel 18900					
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	1880.00	-16.7	23.4	1.1	24.5	33.0	-8.5
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	1880.00	-14.3	24.2	1.1	**25.3**	33.0	-7.7

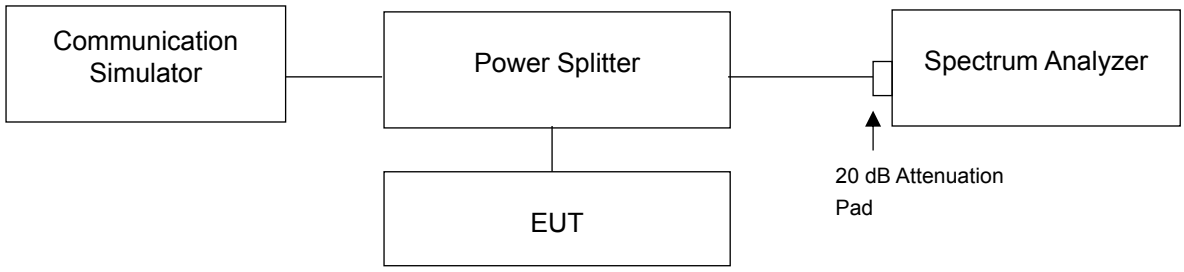
Note: EIRP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

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.

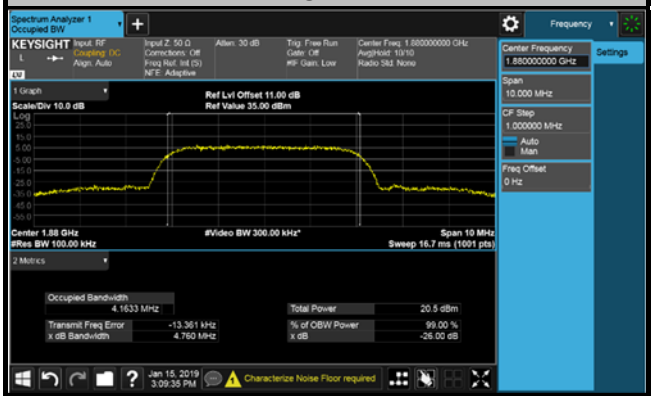
4.2.2 Test Setup



4.2.3 Test Result

Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		WCDMA
9400	1880.0	4.16

Spectrum Plot of Worst Value
WCDMA



LTE Band 2			
Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
18900	1880.0	17.91	17.93

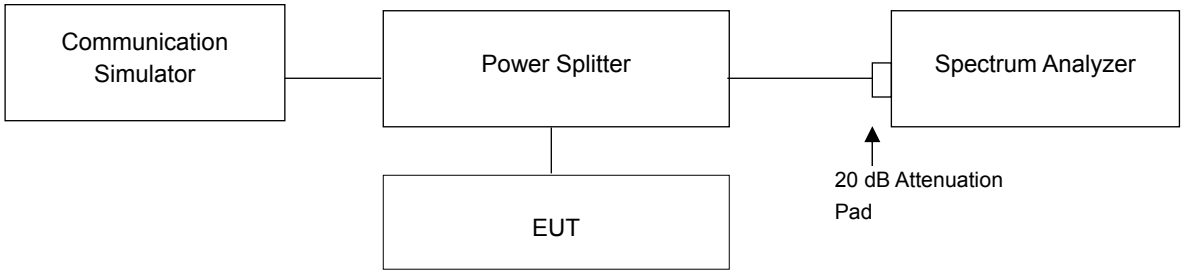
Spectrum Plot of Worst Value
20 MHz / 16QAM

4.3 Peak to Average Ratio

4.3.1 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.

4.3.2 Test Setup



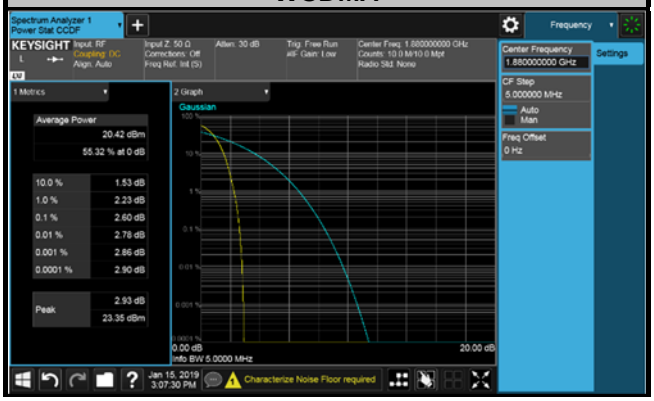
4.3.3 Test Procedures

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.3.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		WCDMA
9400	1880.0	2.60

Spectrum Plot of Worst Value
WCDMA



LTE Band 2			
Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
18900	1880.0	4.66	4.68

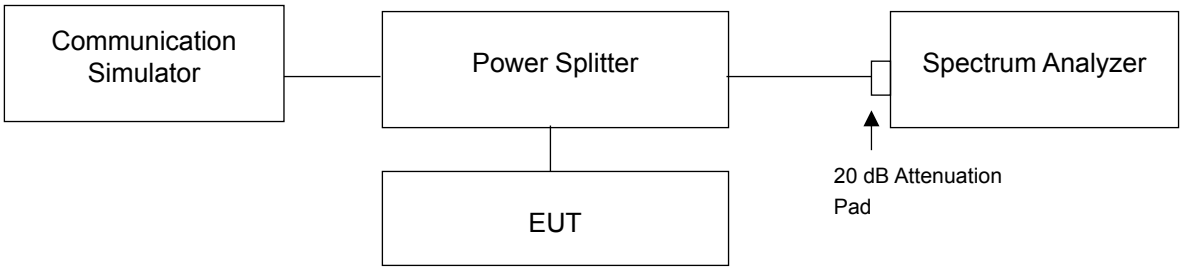
Spectrum Plot of Worst Value
20 MHz / 16QAM

4.4 Conducted Spurious Emissions

4.4.1 Limits of Conducted Spurious Emissions 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. The emission limit equal to -13 dBm.

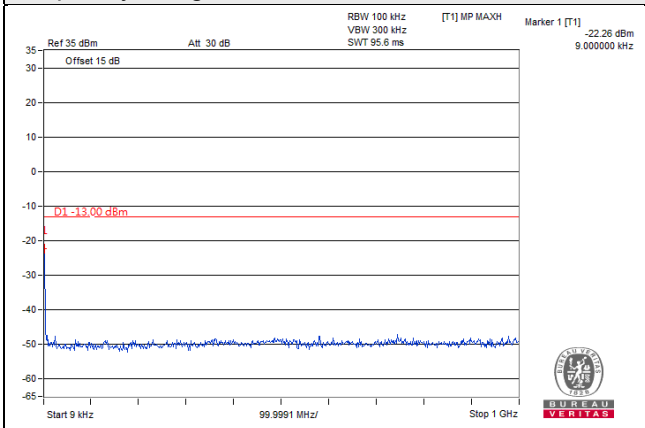
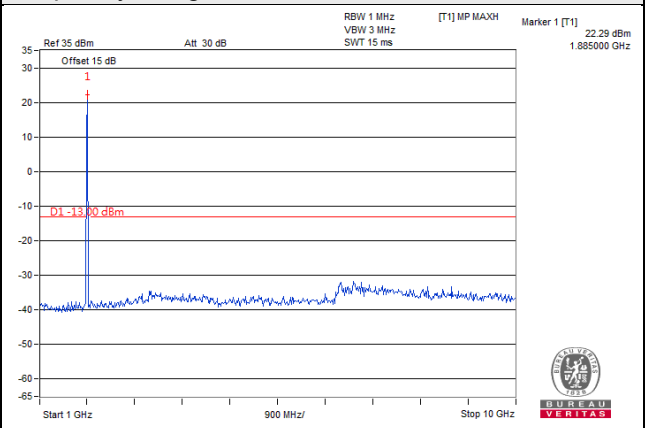
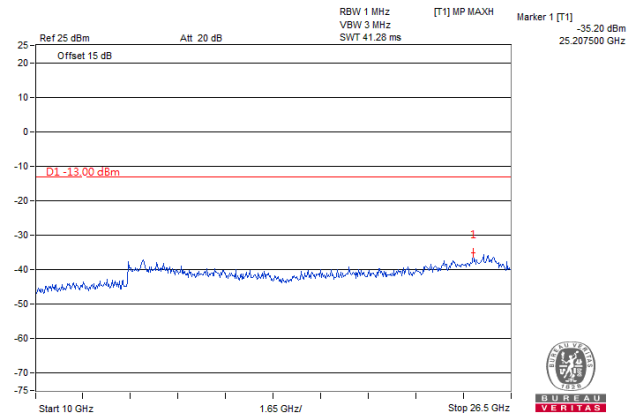
4.4.2 Test Setup

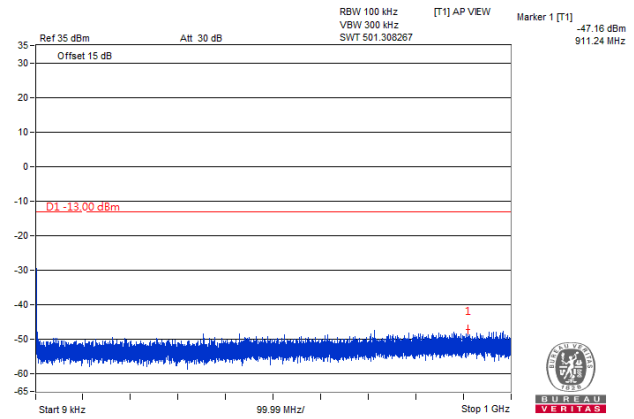
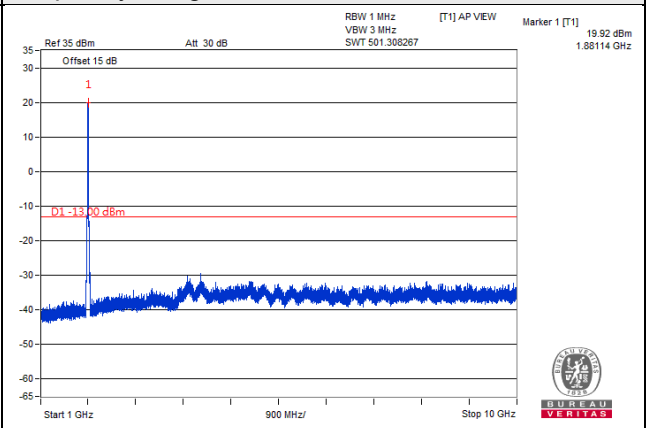
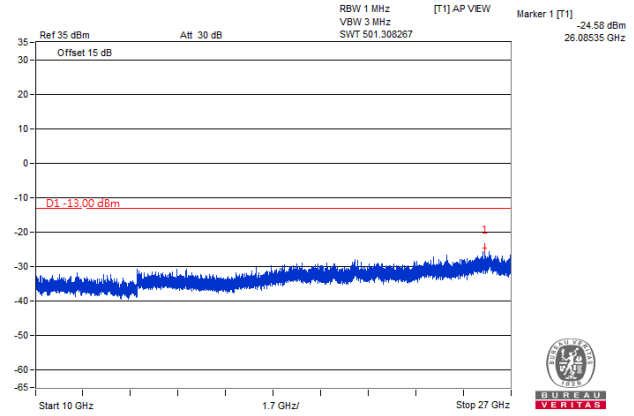


4.4.3 Test Procedure

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9 kHz to 1GHz. 20dB attenuation pad is connected with spectrum. RBW=100kHz and VBW=300kHz is used for conducted emission measurement.
c. Measuring frequency range is from 1GHz to 27GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

4.4.4 Test Results

WCDMA	
Channel 9400 (1880.0MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~10GHz
	
Frequency Range : 10GHz~26.5GHz	
	

LTE Band 2, Channel Bandwidth 20MHz	
Channel 18900 (1880.00MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~10GHz
	
Frequency Range : 10GHz~27GHz	
	

4.5 Radiated Emission Measurement

4.5.1 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. The emission limit is equal to -13 dBm.

4.5.2 Test Procedure

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
c. EIRP = Output power level of S.G – TX cable loss + 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 power = E.I.P.R power - 2.15 dBi.

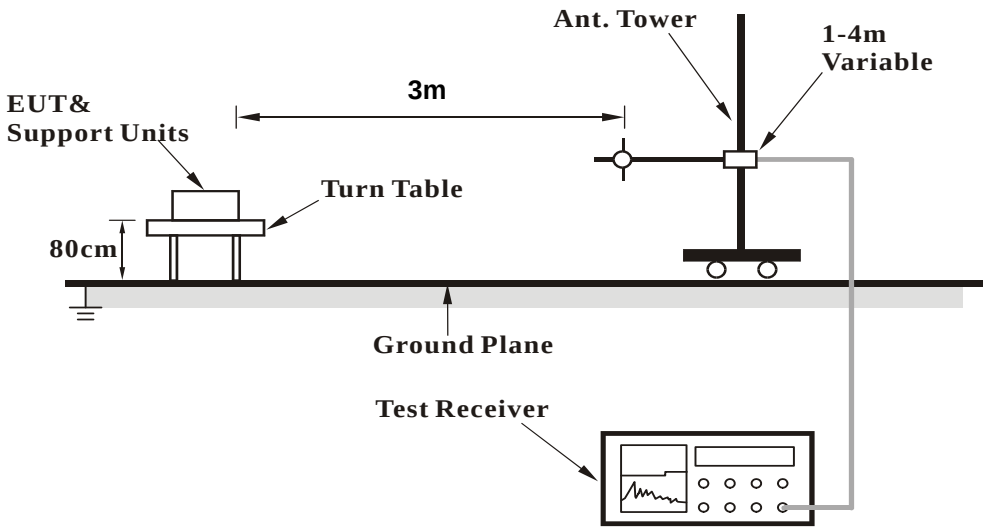
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.5.3 Deviation from Test Standard

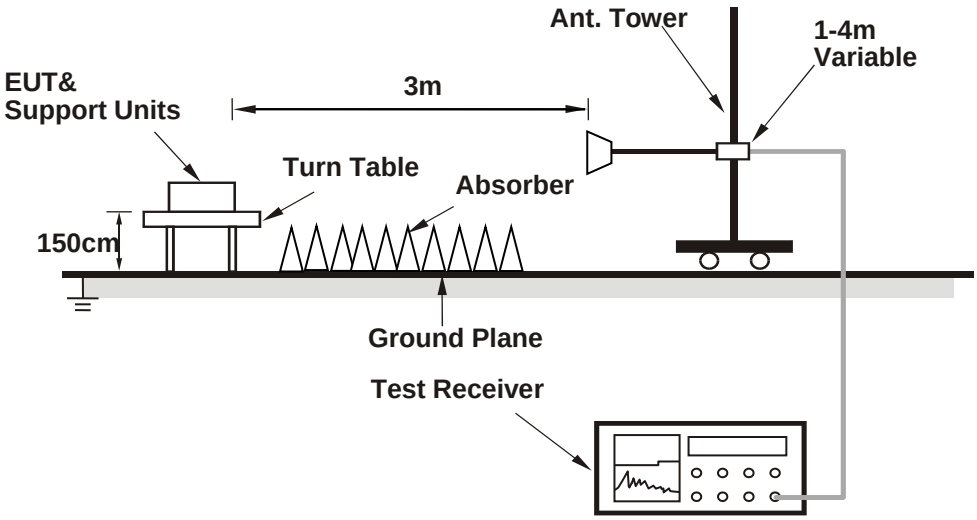
No deviation.

4.5.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



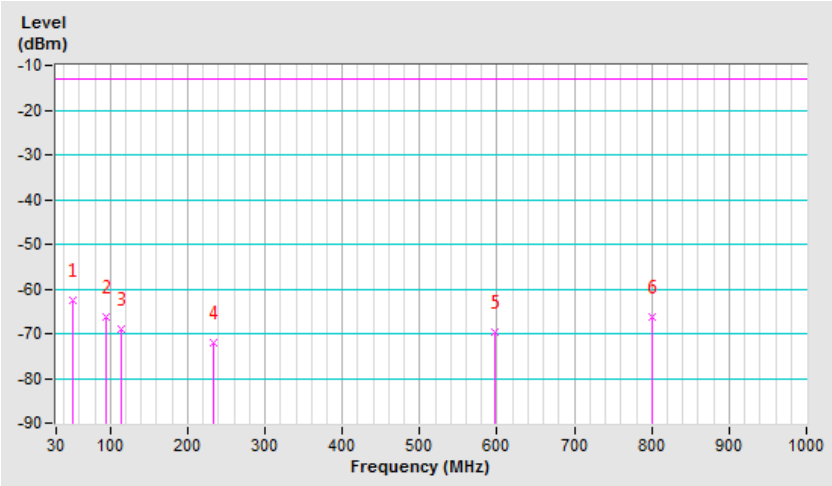
For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.5.5 Test Results
Below 1GHz
WCDMA Band 2

Mode	TX channel 9400 (1880.00MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	51.34	-61.2	-53.5	-8.9	-62.4	-13.0	-49.4
2	94.02	-58.4	-67.2	1.0	-66.2	-13.0	-53.2
3	113.42	-61.5	-69.4	0.3	-69.1	-13.0	-56.1
4	233.70	-63.6	-77.5	5.4	-72.1	-13.0	-59.1
5	596.48	-70.0	-74.0	4.4	-69.6	-13.0	-56.6
6	800.18	-71.5	-70.2	4.0	-66.2	-13.0	-53.2

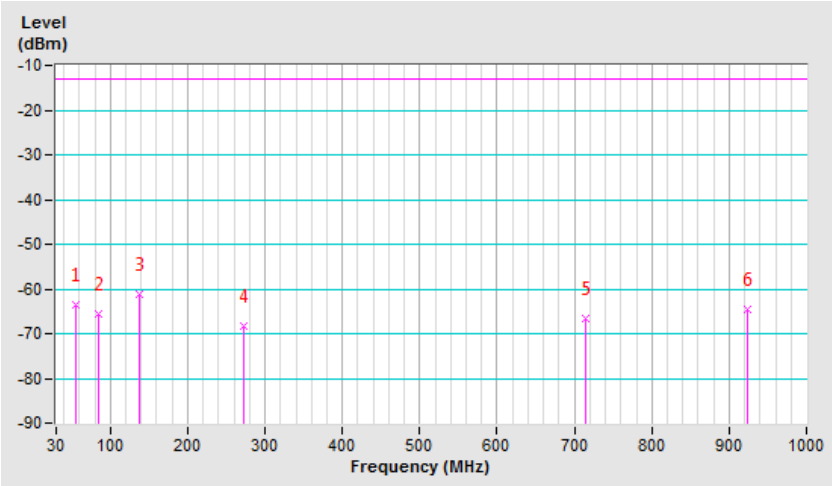
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX channel 9400 (1880.00MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	55.22	-57.0	-54.9	-8.7	-63.6	-13.0	-50.6
2	84.32	-61.5	-65.2	-0.5	-65.7	-13.0	-52.7
3	136.70	-57.0	-60.9	-0.3	-61.2	-13.0	-48.2
4	272.50	-71.3	-73.5	5.3	-68.2	-13.0	-55.2
5	714.82	-72.0	-71.6	5.0	-66.6	-13.0	-53.6
6	924.34	-72.8	-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).

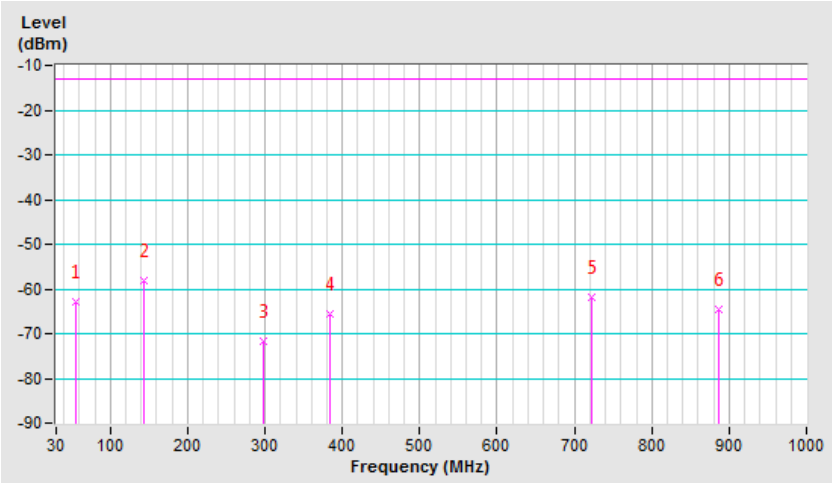


LTE Band 2, Channel Bandwidth: 20MHz

Mode	TX channel 18900 (1880.00MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	55.22	-60.6	-54.1	-8.7	-62.8	-13.0	-49.8
2	142.52	-52.8	-57.8	-0.3	-58.1	-13.0	-45.1
3	297.72	-68.3	-76.9	5.1	-71.8	-13.0	-58.8
4	383.08	-64.6	-70.8	5.3	-65.5	-13.0	-52.5
5	722.58	-64.7	-67.0	5.0	-62.0	-13.0	-49.0
6	887.48	-71.1	-68.4	3.9	-64.5	-13.0	-51.5

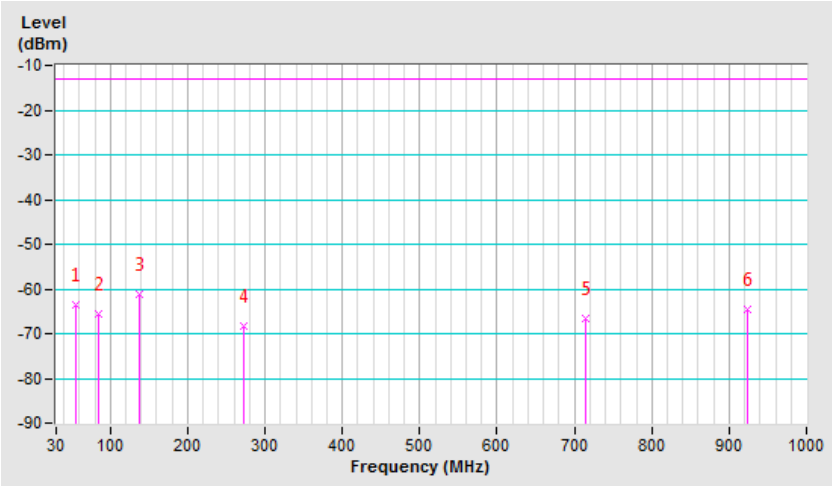
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX channel 18900 (1880.00MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	-54.1	-52.0	-11.7	-63.7	-13.0	-50.7
2	**59.10**	**-46.8**	**-46.2**	**-7.8**	**-54.0**	**-13.0**	**-41.0**
3	95.96	-57.0	-63.7	1.0	-62.7	-13.0	-49.7
4	136.70	-51.6	-55.5	-0.3	-55.8	-13.0	-42.8
5	241.46	-68.8	-74.5	5.5	-69.0	-13.0	-56.0
6	747.80	-67.3	-66.4	4.7	-61.7	-13.0	-48.7

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 2

Mode	TX channel 9400 (1880.0MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	3760.00	-75.0	-68.5	7.1	-61.4	-13.0	-48.4
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	3760.00	-74.8	-67.4	7.1	-60.3	-13.0	-47.3

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, Channel Bandwidth 20MHz

Mode	TX channel 18900 (1880.00MHz)	Frequency Range	1GHz ~ 18GHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

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	3760.00	-75.3	-68.8	7.1	-61.7	-13.0	-48.7
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	3760.00	-74.9	-67.5	7.1	-60.4	-13.0	-47.4

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:

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Fax: 886-2-26051924

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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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