

## FCC Test Report

### (Part 22: WCDMA Band 5 & LTE Band 5\_Spot Check)

**Report No.:** RF171206E01C-3

**FCC ID:** NKRM14Q2SG

**Test Model:** M14Q2SG

**Received Date:** Jan. 02, 2019

**Test Date:** Jan. 07 ~ 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 /** 788550 / TW0003

**Designation Number:**



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### Release Control Record

Issue No.	Description	Date Issued
RF171206E01C-3	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. 07 ~ Jan. 14, 2019

**Standards:** FCC Part 22, Subpart H

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 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective Radiated Power	Pass	Meet the requirement of limit.
---	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	NA	Refer to note 1
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
22.917	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -40.6 dB at 55.22 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.
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	Expanded 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

<b>Product</b>	LGA Module	
<b>Brand</b>	Wistron NeWeb Corporation	
<b>Test Model</b>	M14Q2SG	
<b>Status of EUT</b>	Engineering Sample	
<b>Power Supply Rating</b>	5.0 Vdc (host equipment)	
<b>Modulation Type</b>	WCDMA	QPSK
	LTE	QPSK, 16QAM
<b>Frequency Range</b>	WCDMA	826.4 ~ 846.6 MHz
	LTE 5 (Channel Bandwidth: 1.4 MHz)	824.7 ~ 848.3 MHz
	LTE 5 (Channel Bandwidth: 3 MHz)	825.5 ~ 847.5 MHz
	LTE 5 (Channel Bandwidth: 5 MHz)	826.5 ~ 846.5 MHz
	LTE 5 (Channel Bandwidth: 10 MHz)	829 ~ 844 MHz
<b>Max. ERP Power</b>	WCDMA	107.152mW (20.3dBm)
	LTE 5 (Channel Bandwidth: 10 MHz)	112.202mW (20.5dBm)
<b>Emission Designator</b>	WCDMA	4M14F9W
	LTE 5 (Channel Bandwidth: 10 MHz)	8M92W7D
<b>Antenna Type</b>	Dipole Antenna with -3.5 dBi gain	
<b>Accessory Device</b>	N/A	
<b>Data Cable Supplied</b>	N/A	

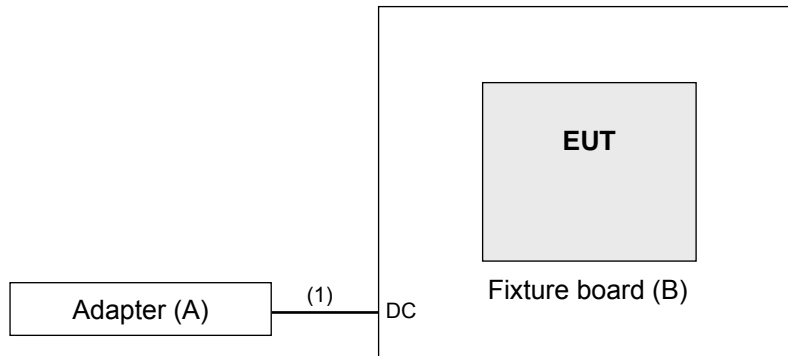
Note:

- 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.
- The EUT uses following adapter. (For support unit only)

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

- 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



Remote site



#### 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	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA
	ERP	4132 to 4233	4233 (846.6MHz)	WCDMA
-	Occupied Bandwidth	4132 to 4233	4233 (846.6MHz)	WCDMA
-	Band Edge	4132 to 4233	4233 (846.6MHz)	WCDMA
-	Peak to Average Ratio	4132 to 4233	4233 (846.6MHz)	WCDMA
-	Conducted Emission	4132 to 4233	4233 (846.6MHz)	WCDMA
-	Radiated Emission	4132 to 4233	4233 (846.6MHz)	WCDMA

#### LTE Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Conducted Output Power	20407 to 20643	20407(824.7MHz), 20525(836.5MHz), 20643(848.3MHz)	1.4 MHz	QPSK, 16QAM	1 RB / 2 RB Offset
		20415 to 20635	20415(825.5MHz), 20525(836.5MHz), 20635(847.5MHz)	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
		20425 to 20625	20425(826.5MHz), 20525(836.5MHz), 20625(846.5MHz)	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		20450 to 20600	20450(829.0MHz), 20525(836.5MHz), 20600(844.0MHz)	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
-	ERP	20450 to 20600	20600(844.0MHz)	10 MHz	QPSK	1 RB / 24 RB Offset
-	Occupied Bandwidth	20450 to 20600	20600(844.0MHz)	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Band Edge	20450 to 20600	20600(844.0MHz)	10 MHz	QPSK	1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	20450 to 20600	20600(844.0MHz)	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Conducted Emission	20450 to 20600	20600(844.0MHz)	10 MHz	QPSK	1 RB / 24 RB Offset
-	Radiated Emission	20450 to 20600	20600(844.0MHz)	10 MHz	QPSK	1 RB / 24 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
ERP/Conducted Output Power	25deg. C, 70%RH	120Vac, 60Hz	Noah Chang
Occupied Bandwidth	25deg. C, 70%RH	120Vac, 60Hz	Noah Chang
Band Edge	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 22**

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

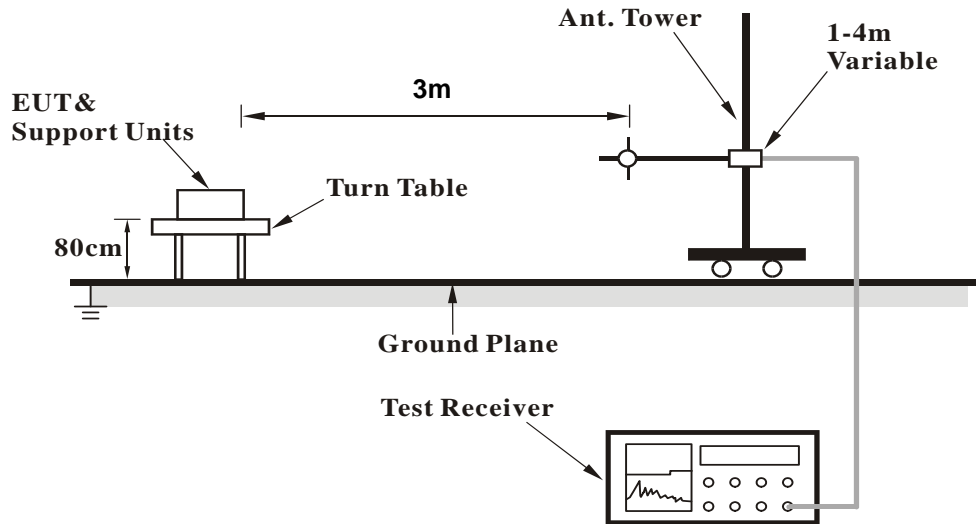
##### **Conducted Power Measurement:**

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.

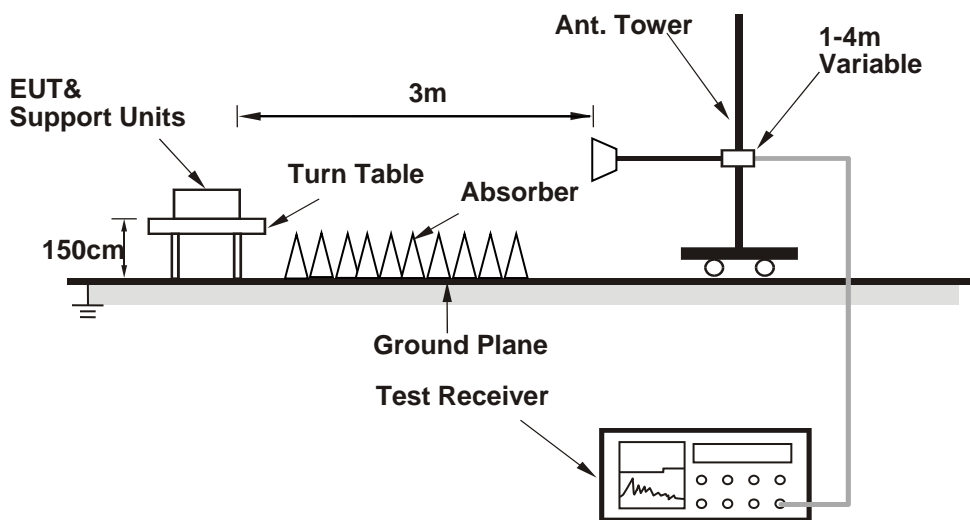
4.1.3 Test Setup

**EIRP / ERP Measurement:**

**<Radiated Emission below or equal 1 GHz>**

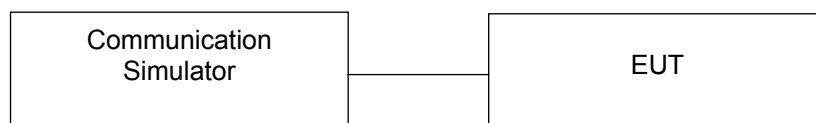


**<Radiated Emission above 1 GHz>**



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 V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
	22.91	23.15	23.86

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20407	Mid Ch 20525	High Ch 20643		Low Ch 20407	Mid Ch 20525	High Ch 20643	
			824.7 MHz	836.5 MHz	848.3 MHz		824.7 MHz	836.5 MHz	848.3 MHz	
5 / 1.4M	1	0	23.78	24.06	23.63	0	23.94	24.02	23.60	1
	1	2	23.80	24.00	23.68	0	23.87	24.01	23.61	1
	1	5	23.98	23.76	23.64	0	23.78	23.72	23.47	1
	3	0	22.91	22.71	22.57	0	22.78	22.58	22.34	1
	3	1	23.05	22.74	22.37	0	23.06	22.59	22.76	1
	3	3	22.48	22.71	22.45	0	22.97	22.79	22.42	1
	6	0	22.83	22.94	22.40	1	21.82	21.69	21.62	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20415	Mid Ch 20525	High Ch 20635		Low Ch 20415	Mid Ch 20525	High Ch 20635	
			825.5 MHz	836.5 MHz	847.5 MHz		825.5 MHz	836.5 MHz	847.5 MHz	
5 / 3M	1	0	23.08	23.88	23.60	0	22.71	22.92	22.73	1
	1	7	23.27	23.50	23.87	0	22.85	22.78	22.66	1
	1	14	23.03	23.66	23.62	0	22.82	22.83	22.61	1
	8	0	22.82	22.65	22.60	1	22.55	22.47	22.30	2
	8	3	22.79	22.49	22.43	1	21.92	21.61	21.57	2
	8	7	22.83	22.88	22.69	1	21.73	21.75	21.57	2
	15	0	21.68	21.62	21.59	1	21.75	21.62	21.51	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20425	Mid Ch 20525	High Ch 20625		Low Ch 20425	Mid Ch 20525	High Ch 20625	
			826.5 MHz	836.5 MHz	846.5 MHz		826.5 MHz	836.5 MHz	846.5 MHz	
5 / 5M	1	0	23.93	23.99	23.47	0	22.83	22.99	22.63	1
	1	12	23.76	23.98	23.93	0	22.89	22.67	22.71	1
	1	24	23.88	23.63	23.54	0	22.58	22.65	22.53	1
	12	0	22.92	22.67	22.49	1	22.53	22.43	22.11	2
	12	6	22.98	22.84	22.25	1	21.88	21.52	21.50	2
	12	13	22.48	22.84	22.53	1	22.00	21.62	21.52	2
	25	0	21.95	21.57	21.36	1	21.87	21.58	21.45	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20450	Mid Ch 20525	High Ch 20600		Low Ch 20450	Mid Ch 20525	High Ch 20600	
			829.0 MHz	836.5 MHz	844.0 MHz		829.0 MHz	836.5 MHz	844.0 MHz	
5 / 10M	1	0	23.76	23.66	24.07	0	22.82	22.70	22.91	1
	1	24	23.87	23.81	23.76	0	22.78	22.66	22.69	1
	1	49	23.76	23.67	23.81	0	22.65	22.64	22.63	1
	25	0	22.84	22.71	22.66	1	22.45	22.78	22.60	2
	25	12	22.64	22.26	22.21	1	21.72	21.51	21.45	2
	25	25	23.12	22.80	22.54	1	21.83	21.67	21.57	2
	50	0	21.63	21.46	21.46	1	21.00	20.79	20.80	2

**ERP Power (dBm)**
**WCDMA Band 5**

MODE		TX channel 4233					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	846.60	-11.8	18.7	0.4	19.1	38.5	-19.4
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	846.60	-11.3	19.9	0.4	<b>20.3</b>	38.5	-18.2

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

**Modulation Type: QPSK**

LTE Band 5, Channel Bandwidth: 10MHz

MODE		TX channel 20600					
Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	844.00	-11.8	18.8	0.4	19.2	38.5	-19.3
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	844.00	-11.4	20.1	0.4	<b>20.5</b>	38.5	-18.0

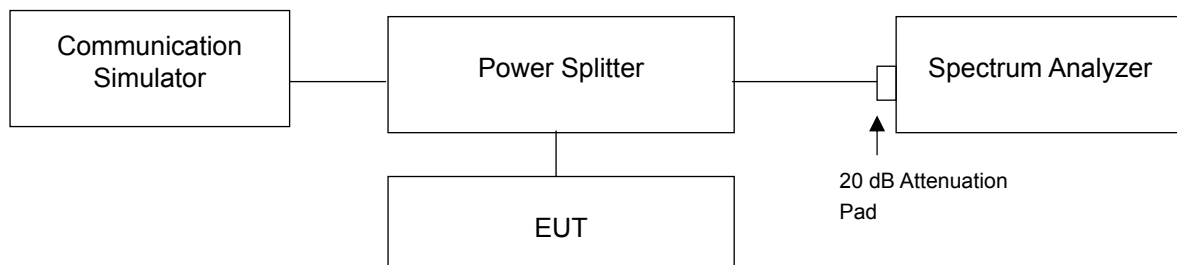
Note: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB).

## 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.

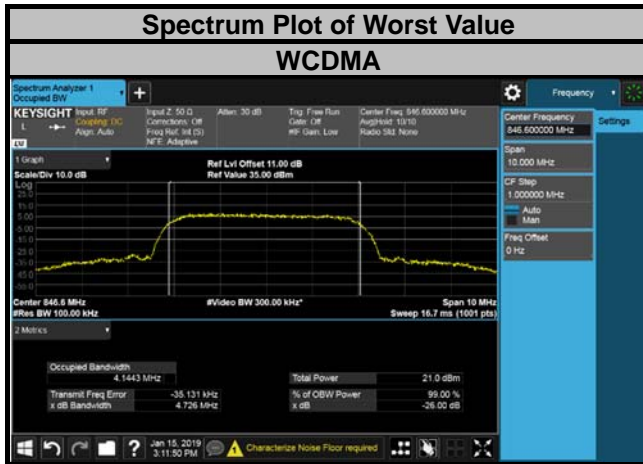
### 4.2.2 Test Setup



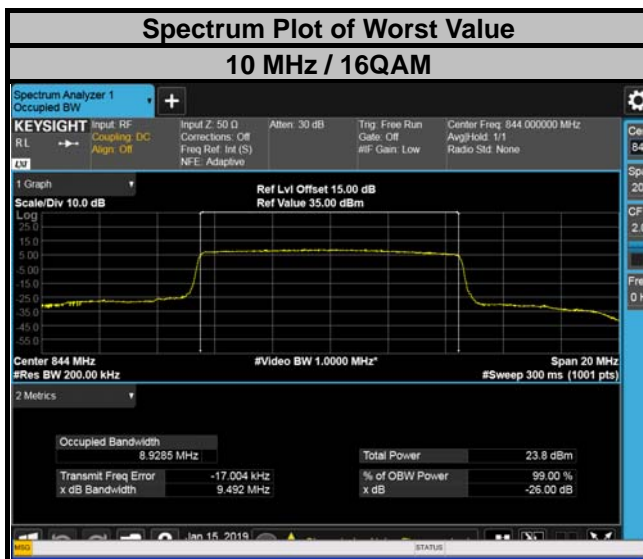


### 4.2.3 Test Result

Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)
		WCDMA
4233	846.6	4.14



LTE Band 5			
Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM
20600	844.0	8.92	8.92

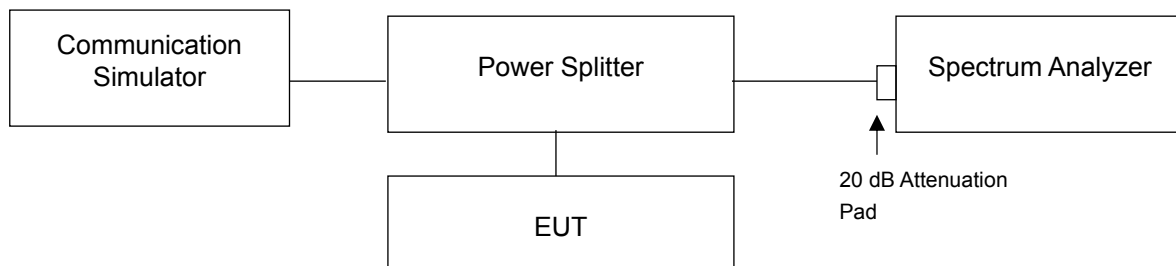


### 4.3 Band Edge Measurement

#### 4.3.1 Limits of Band Edge Measurement

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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

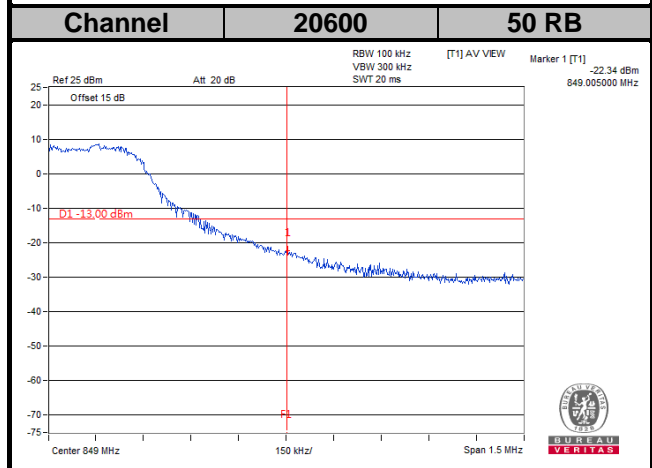
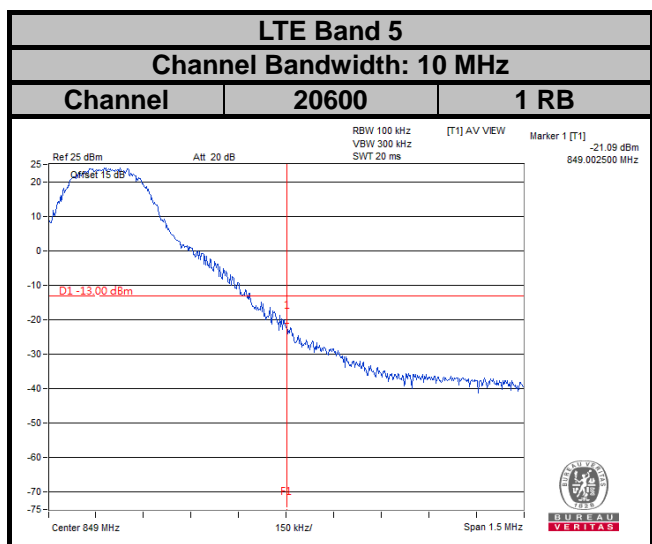
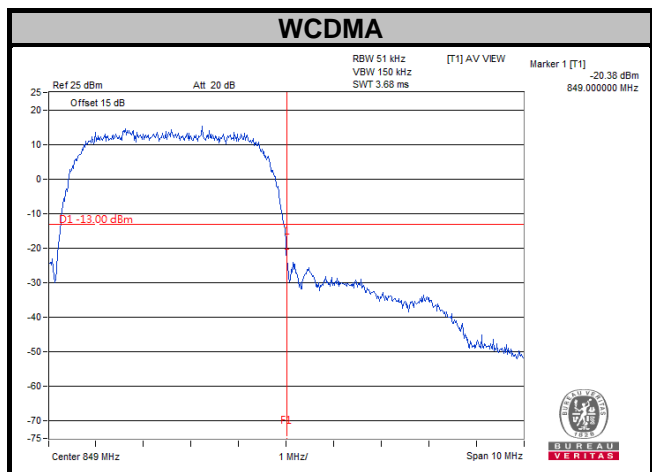
#### 4.3.2 Test Setup



#### 4.3.3 Test Procedures

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 10MHz. RB of the spectrum is 51kHz and VB of the spectrum is 150kHz (WCDMA).
- The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 10MHz).
- Record the max trace plot into the test report.

### 4.3.4 Test Results

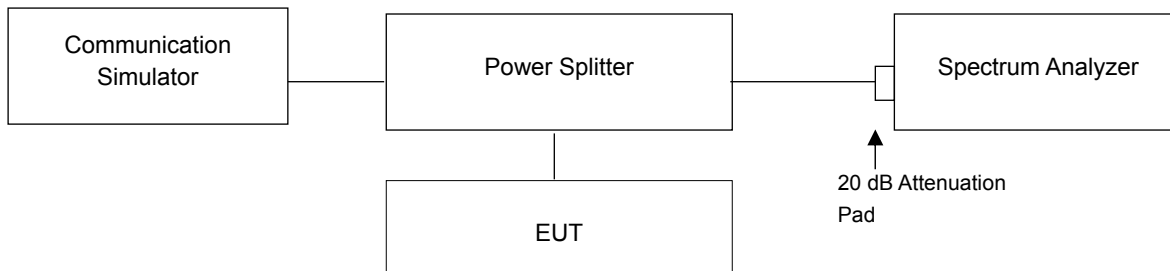


## 4.4 Peak to Average Ratio

### 4.4.1 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.

### 4.4.2 Test Setup

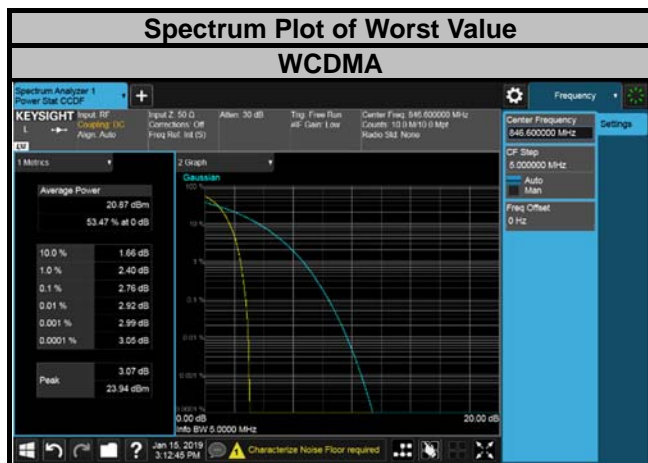


### 4.4.3 Test Procedures

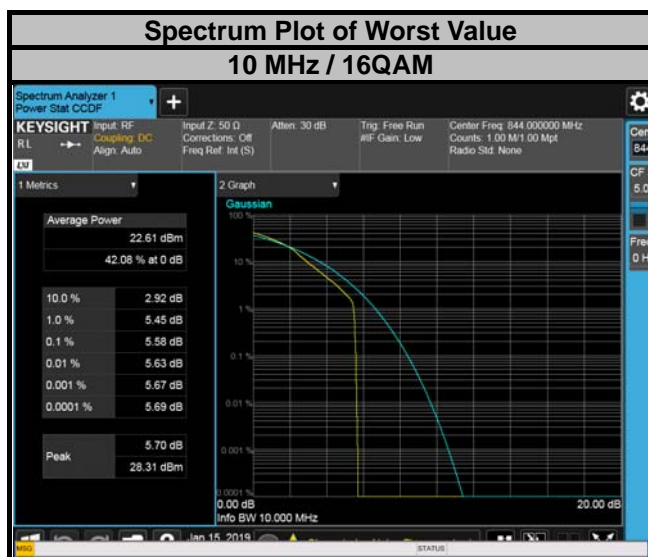
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

#### 4.4.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		WCDMA
4233	846.6	2.76



LTE Band 5			
Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM
20600	844.0	4.80	5.58

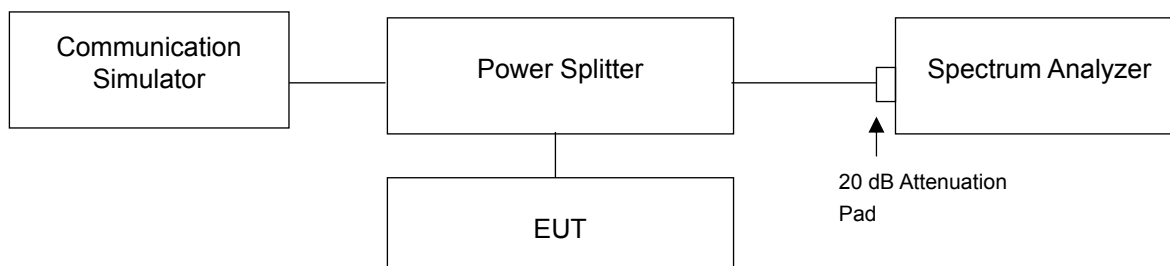


## 4.5 Conducted Spurious Emissions

### 4.5.1 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.

### 4.5.2 Test Setup



### 4.5.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- 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.
- 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.

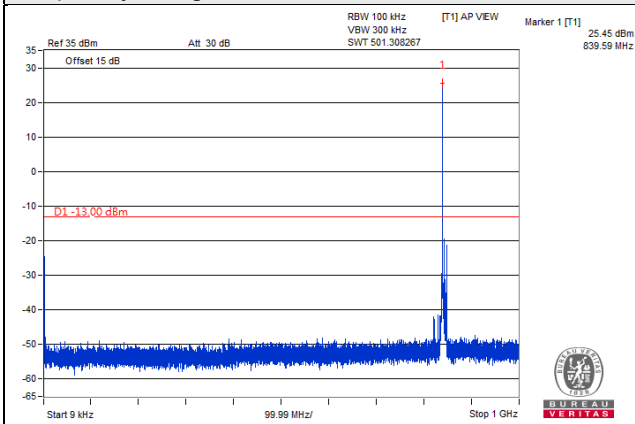
#### 4.5.4 Test Results



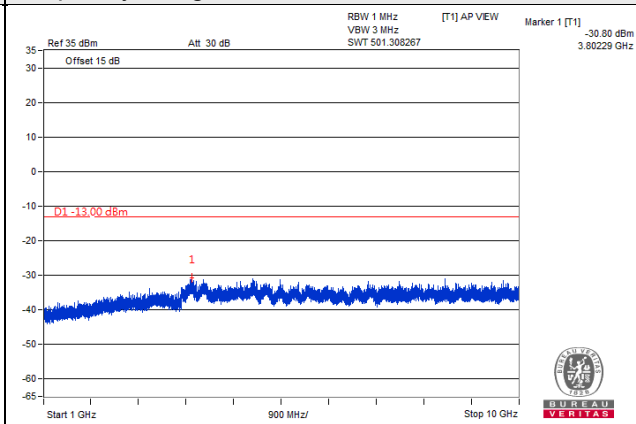
LTE Band 5, Channel Bandwidth 10MHz

Channel 20600 (844.0MHz)

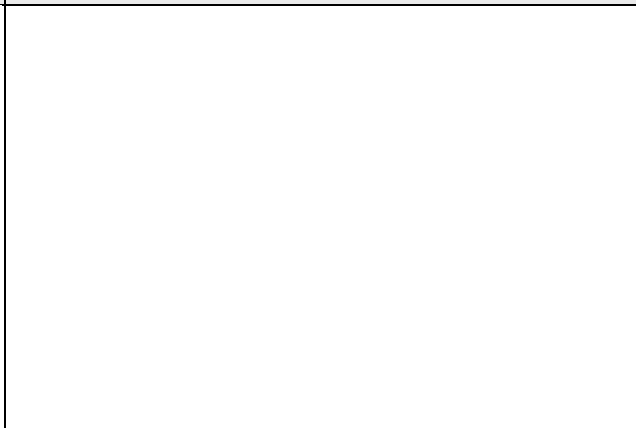
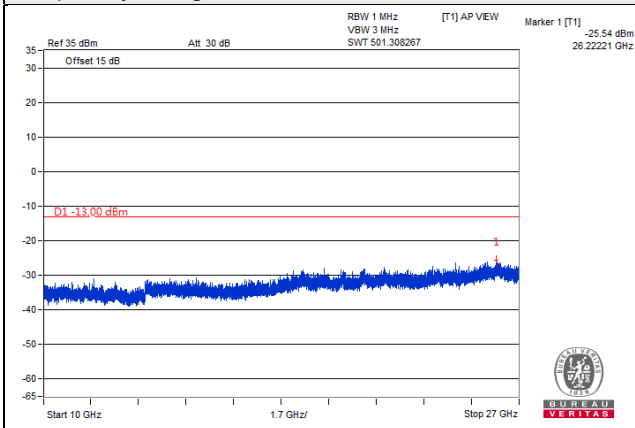
Frequency Range : 9kHz~1GHz



Frequency Range : 1GHz~10GHz



Frequency Range : 10GHz~27GHz





## 4.6 Radiated Emission Measurement

### 4.6.1 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.

### 4.6.2 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.

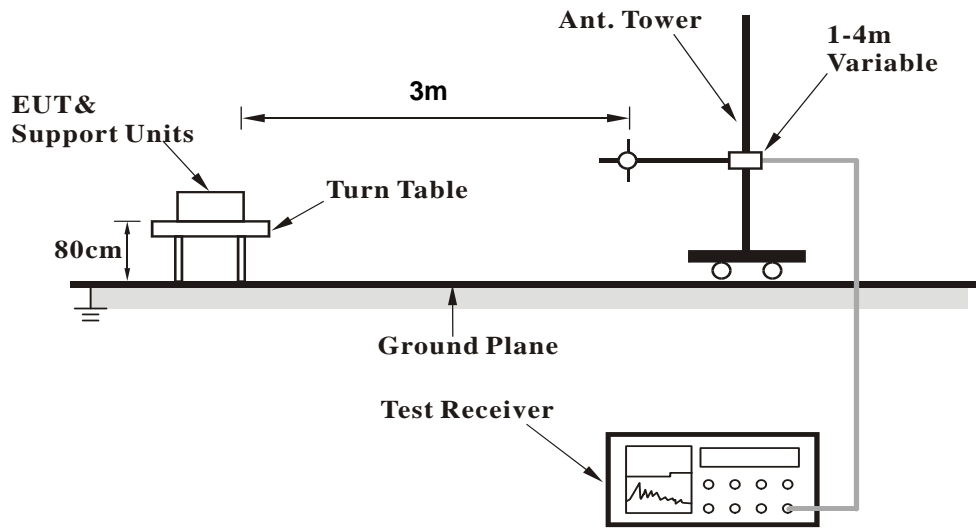
**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

### 4.6.3 Deviation from Test Standard

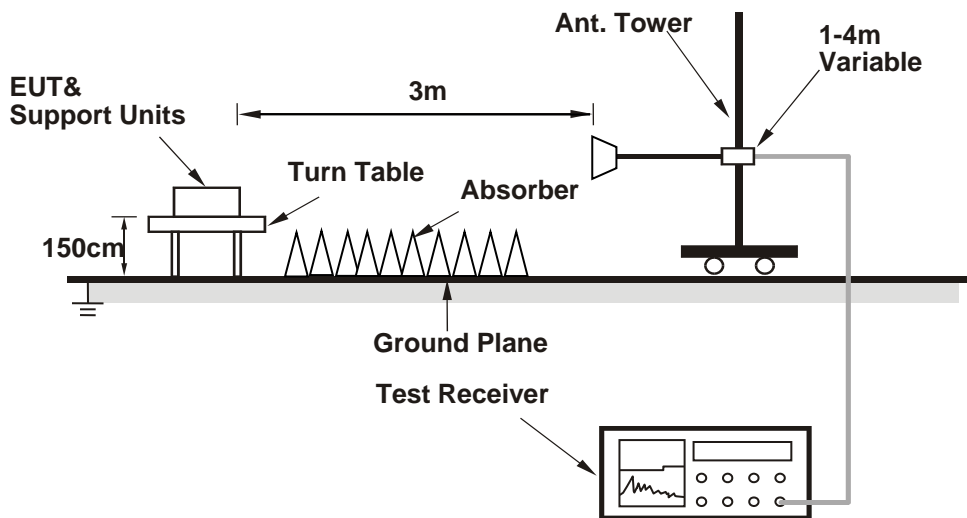
No deviation.

#### 4.6.4 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).

#### 4.6.5 Test Results

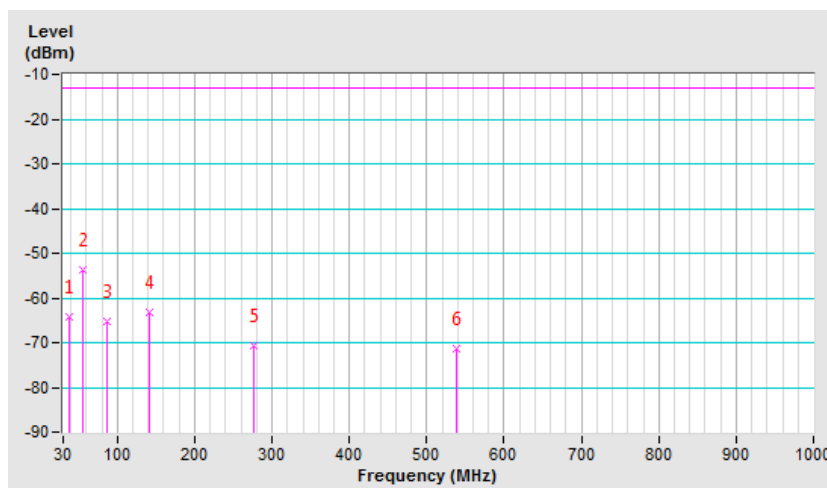
Below 1GHz  
WCDMA Band 5

Mode	TX channel 4233 (846.6MHz)	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)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	35.82	-62.5	-50.0	-11.4	-61.4	-13.0	-48.4
2	107.60	-65.6	-75.9	0.5	-75.4	-13.0	-62.4
3	136.70	-54.0	-62.1	-0.3	-62.4	-13.0	-49.4
4	297.72	-70.6	-81.4	5.1	-76.3	-13.0	-63.3
5	470.38	-69.0	-77.2	5.0	-72.2	-13.0	-59.2
6	635.28	-70.4	-76.3	4.7	-71.6	-13.0	-58.6

Remarks:

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

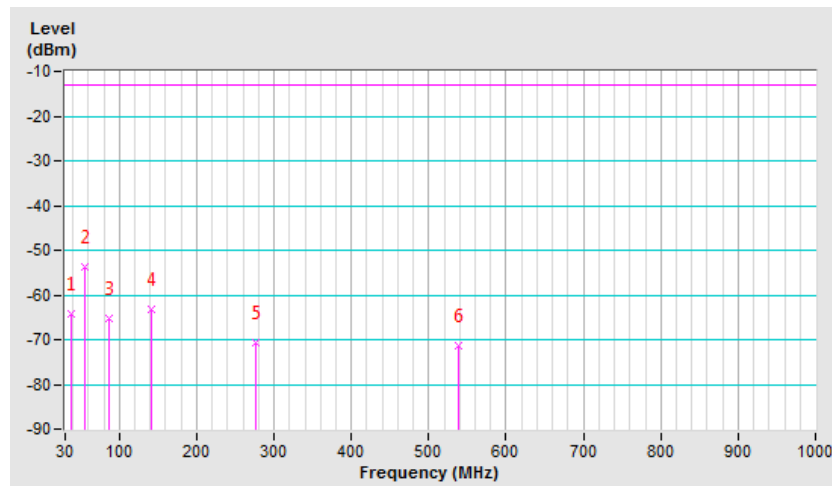


Mode	TX channel 4233 (846.6MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	37.76	-53.8	-53.2	-11.2	-64.4	-13.0	-51.4
<b>2</b>	<b>55.22</b>	<b>-44.9</b>	<b>-44.9</b>	<b>-8.7</b>	<b>-53.6</b>	<b>-13.0</b>	<b>-40.6</b>
3	86.26	-58.6	-65.3	0.1	-65.2	-13.0	-52.2
4	140.58	-57.5	-62.8	-0.3	-63.1	-13.0	-50.1
5	276.38	-70.8	-75.9	5.3	-70.6	-13.0	-57.6
6	538.28	-70.0	-76.1	4.7	-71.4	-13.0	-58.4

Remarks:

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



LTE Band 5, Channel Bandwidth: 10MHz

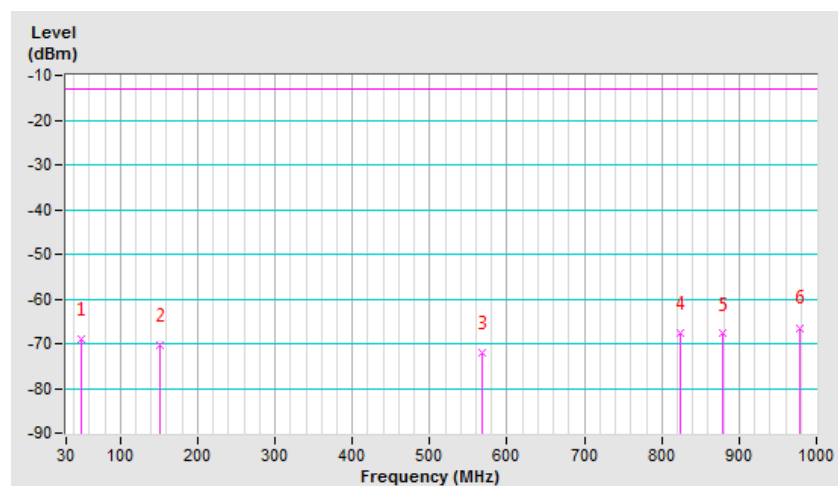
Mode	TX channel 20600 (844MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance: Horizontal at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	49.40	-67.1	-59.8	-9.3	-69.1	-13.0	-56.1
2	150.28	-63.6	-70.3	-0.1	-70.4	-13.0	-57.4
3	567.38	-69.4	-76.4	4.5	-71.9	-13.0	-58.9
4	823.46	-71.4	-71.7	4.0	-67.7	-13.0	-54.7
5	877.78	-71.8	-71.7	3.9	-67.8	-13.0	-54.8
6	978.66	-72.1	-70.3	3.9	-66.4	-13.0	-53.4

Remarks:

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

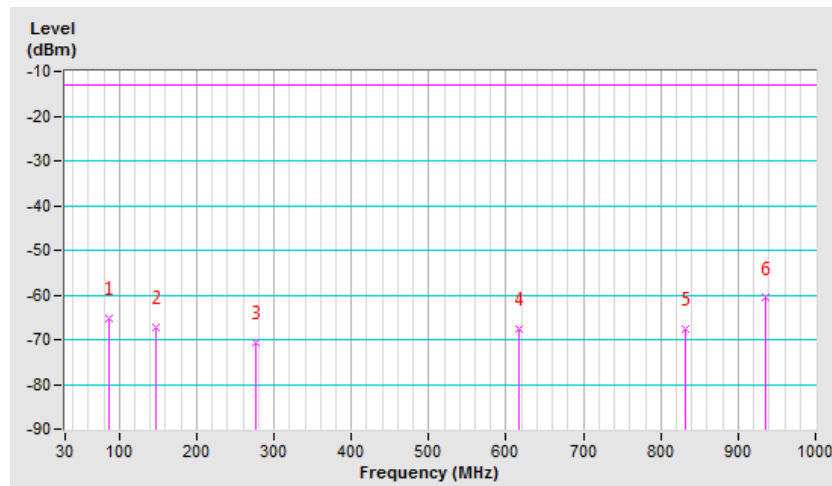


Mode	TX channel 20600 (844MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	25deg. C, 70%RH	Input Power	120Vac, 60Hz
Tested By	Noah Chang		

Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	47.46	-45.80	-44.20	-9.70	-53.90	-13.00	-40.90
2	175.50	-57.60	-62.60	2.30	-60.30	-13.00	-47.30
3	237.58	-56.90	-64.30	5.40	-58.90	-13.00	-45.90
4	538.28	-65.50	-71.70	4.70	-67.00	-13.00	-54.00
5	718.70	-73.00	-74.40	5.00	-69.40	-13.00	-56.40
6	903.00	-72.00	-70.90	3.90	-67.00	-13.00	-54.00

Remarks:

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



Above 1GHz  
 WCDMA Band 5

Mode	TX channel 4233 (846.6MHz)	Frequency Range	1GH~10GHz
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)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1693.20	-70.2	-73.1	5.6	-67.5	-13.0	-54.5
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1693.20	-71.0	-71.5	5.6	-65.9	-13.0	-52.9

Remarks:

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

LTE Band 5, Channel Bandwidth: 10MHz

Mode	TX channel 20600 (844.0MHz)	Frequency Range	1GH~10GHz
Environmental Conditions	25deg. C, 71%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)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1688.00	-70.0	-72.8	5.5	-67.3	-13.0	-54.3
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1688.00	-70.2	-70.7	5.5	-65.2	-13.0	-52.2

Remarks:

1. ERP (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.

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

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