FCC Test Report

(PART 22)

Report No.:	RF191008C34-2
FCC ID:	2AAFX-JDCGNUS3110
Test Model:	ROBOTIC MOWER CONNECTIVITY MODULE
Received Date:	Oct. 08, 2019
Test Date:	Nov. 21, 2019 ~ Jan. 25, 2020
Issued Date:	Feb. 24, 2020
Applicant:	Deere & Company
Address:	One John Deere Place, Moline, IL 61265
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF191008C34-2	Original Release	Feb. 24, 2020

1 Certificate of Conformity

Product:	Robotic Mower Connectivity Module
Brand:	John Deere
Test Model:	ROBOTIC MOWER CONNECTIVITY MODULE
Sample Status:	Production Unit
Applicant:	Deere & Company
Test Date:	Nov. 21, 2019 ~ Jan. 25, 2020
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 : Lena Wang , **Date:** Feb. 24, 2020

Lena Wang / Specialist

Approved by : , **Date:** Feb. 24, 2020

Dylan Chiou / Senior 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.
2.1047	Modulation Characteristics	Pass	Meet the requirement.
2.1046 22.913 (d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	Pass	Meet the requirement of limit.
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 -11.2 dB at 33.88 MHz.

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

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	**Frequency**	**Expanded Uncertainty (k=2) (±)**
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 22, 2019	Jan. 21, 2020
			Jan. 18, 2020	Jan. 17, 2021
MXG Vector signal generator Agilent	N5182B	MY53050162	Jan. 16, 2019	Jan. 15, 2020
			Jan. 14, 2020	Jan. 13, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 25, 2018	Nov. 24, 2019
			Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
			Nov. 24, 2019	Nov. 23, 2020
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jul. 11, 2019	Jul. 10, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 19, 2019	Feb. 18, 2020
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 19, 2019	Jan. 18, 2020
			Jan. 18, 2020	Jan. 17, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jul. 11, 2019	Jul. 10, 2020
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 30, 2019	Jul. 29, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 03, 2019	Jun. 02, 2020
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	May 21, 2019	May 20, 2020
DC power supply, low-cost. 30V/5A, 150 W Keysight	U8002A	MY56330015	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 9.

3 General Information

3.1 General Description of EUT

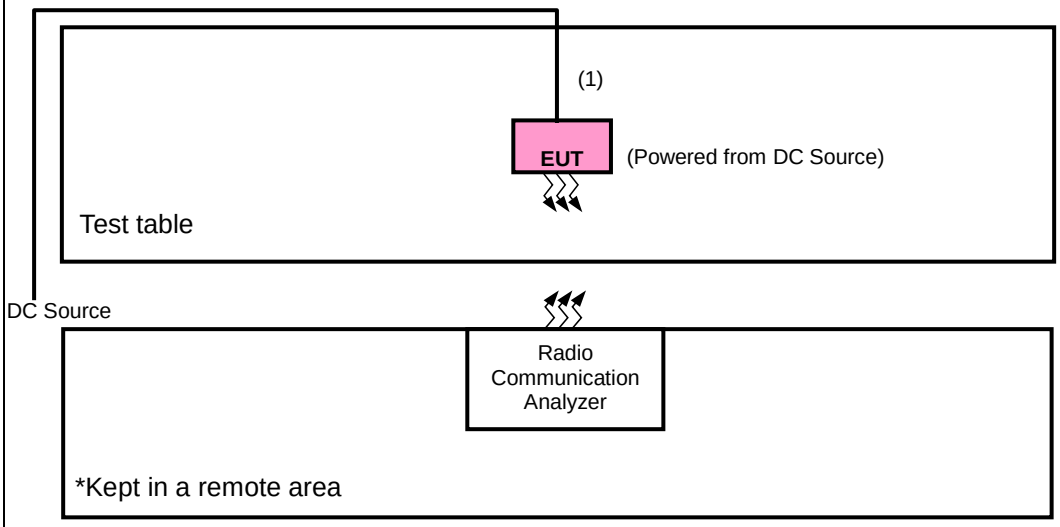
Product	Robotic Mower Connectivity Module	
Brand	John Deere	
Test Model	ROBOTIC MOWER CONNECTIVITY MODULE	
Status of EUT	Production Unit	
Power Supply Rating	18.5Vdc ~ 30 Vdc (DC Power Supply)	
Modulation Type	GSM/GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA	QPSK
Frequency Range	GSM/GPRS/EDGE	824.2 ~ 848.8 MHz
	WCDMA	826.4 ~ 846.6 MHz
Max. ERP Power	GSM/GPRS	537.032 mW (27.3 dBm)
	EDGE	218.776 mW (23.4 dBm)
	WCDMA	141.254 mW (21.5 dBm)
Emission Designator	GSM/GPRS	245KGXW
	EDGE	245KG7W
	WCDMA	4M15F9W
Antenna Type	Metal stamp Antenna with 1.16 dBi gain	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

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

3.2 Configuration of System under Test

<Radiated Emission Test> & <E.R.P. 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.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	DC power supply	Keysight	U8002A	MY56330015	--
2.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	--

No.	Signal Cable Description Of The Above Support Units
1.	Cable: 2.1m

Note:

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

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

Band	ERP	Radiated Emission
GSM / EDGE	Y-plane	Y-axis
WCDMA	Y-plane	Y-axis

GSM

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	128 to 251	128, 189, 251	GSM, EDGE
-	Modulation Characteristics	128 to 251	189	GSM, EDGE
-	Frequency Stability	128 to 251	128, 251	GSM, EDGE
-	Occupied Bandwidth	128 to 251	128, 189, 251	GSM, EDGE
-	Band Edge	128 to 251	128, 251	GSM, EDGE
-	Peak to Average Ratio	128 to 251	128, 189, 251	GSM, EDGE
-	Conducted Emission	128 to 251	128, 189, 251	GSM, EDGE
-	Radiated Emission	128 to 251	128, 189, 251	GSM

Note:
1. According ERP power test, pre-tested GSM, EDGE modulation type and found GSM was the worst.
2. For radiated emission test, pre-tested GSM, EDGE modulation type and found GSM was the worst, therefore chosen for the final test.
3 "For radiated emission below 1 GHz, choose the maximum ERP power worst one channel for final.

WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	4132 to 4233	4132, 4182, 4233	WCDMA
-	Modulation Characteristics	4132 to 4233	4182	WCDMA
-	Frequency Stability	4132 to 4233	4132, 4233	WCDMA
-	Occupied Bandwidth	4132 to 4233	4132, 4182, 4233	WCDMA
-	Band Edge	4132 to 4233	4132, 4233	WCDMA
-	Peak to Average Ratio	4132 to 4233	4132, 4182, 4233	WCDMA
-	Conducted Emission	4132 to 4233	4132, 4182, 4233	WCDMA
-	Radiated Emission	4132 to 4233	4132, 4182, 4233	WCDMA

Note: For radiated emission below 1 GHz, choose the maximum ERP power worst one channel for final test.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25 deg. C, 65 % RH	24 Vac	Han Wu
Modulation Characteristics	25 deg. C, 65 % RH	24 Vac	Vincent Huang
Frequency Stability	25 deg. C, 65 % RH	24 Vac	Vincent Huang
Occupied Bandwidth	25 deg. C, 65 % RH	24 Vac	Vincent Huang
Band Edge	25 deg. C, 65 % RH	24 Vac	Vincent Huang
Peak to Average Ratio	25 deg. C, 65 % RH	24 Vac	Vincent Huang
Conducted Emission	25 deg. C, 65 % RH	24 Vac	Vincent Huang
Radiated Emission	25 deg. C, 65 % RH	24 Vac	Greg Lin, Han Wu

3.4 EUT Operating Conditions

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

3.5 General Description of Applied Standards 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 22
ANSI 63.26-2015

Note: 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-E 2016

Note: 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

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

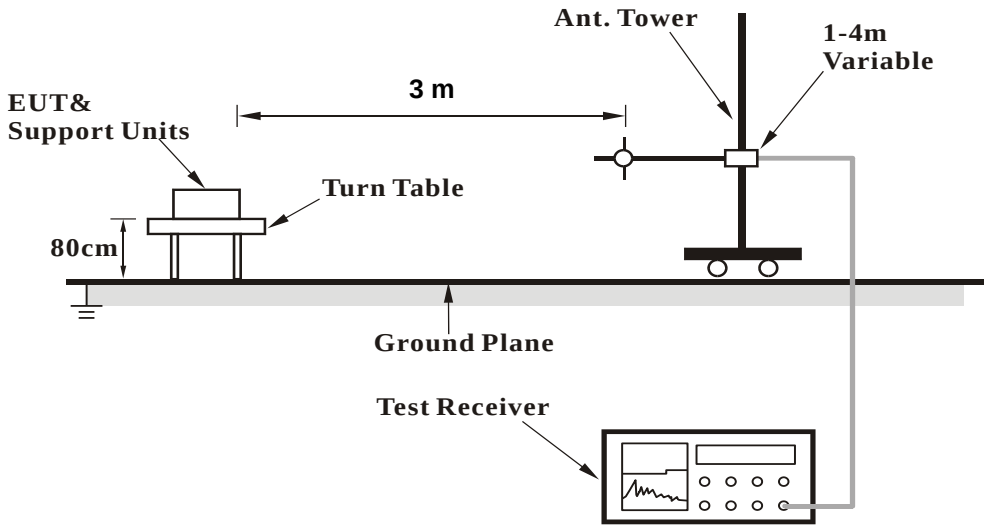
a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, and 5 MHz for WCDMA mode.
b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 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.R.P power - 2.15 dB.

Conducted Power Measurement:

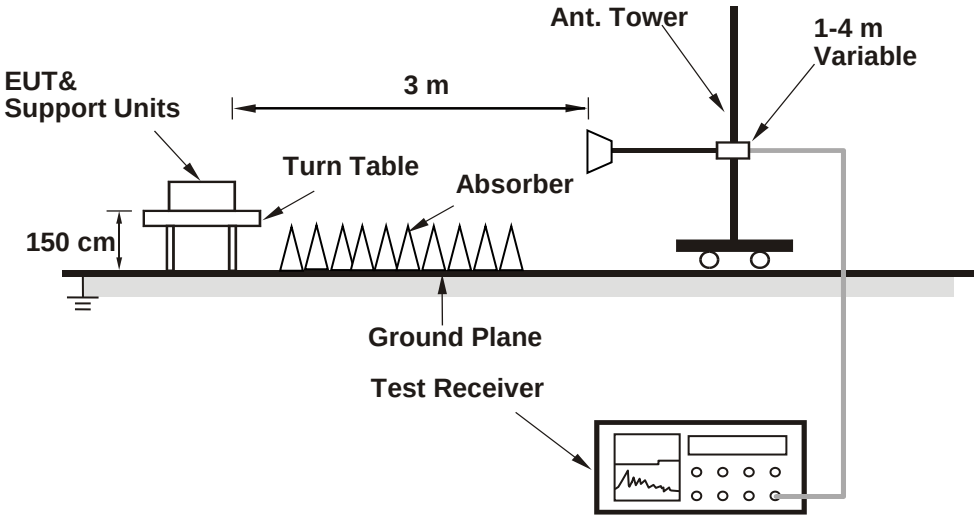
The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

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	GSM850		
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM (GMSK, 1Tx-slot)	32.89	33.15	33.07
EDGE (8PSK, 1Tx-slot)	26.89	26.74	26.69

Band	WCDMA V		
Channel	4132	4182	4233
Frequency (MHz)	826.4	836.4	846.6
RMC 12.2K	24.29	24.40	24.20
HSDPA Subtest-1	23.29	23.41	23.30
HSDPA Subtest-2	22.90	23.07	22.90
HSDPA Subtest-3	22.49	22.64	22.46
HSDPA Subtest-4	22.13	22.21	21.98
HSUPA Subtest-1	23.35	23.50	23.28
HSUPA Subtest-2	21.50	21.60	21.46
HSUPA Subtest-3	22.40	22.56	22.33
HSUPA Subtest-4	21.43	21.60	21.40
HSUPA Subtest-5	23.18	23.36	23.14

ERP Power (dBm)

GSM 850

MODE	TX Channel 128						
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	824.20	-7.90	19.70	3.90	23.60	38.50	-14.90
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	**824.20**	**-4.90**	**23.40**	**3.90**	**27.30**	**38.50**	**-11.20**

MODE	TX Channel 189						
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	836.40	-7.20	20.20	3.80	24.00	38.50	-14.50
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	836.40	-4.80	23.30	3.80	27.10	38.50	-11.40

MODE	TX Channel 251						
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	848.80	-7.20	20.50	3.40	23.90	38.50	-14.60
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	848.80	-4.60	23.50	3.40	26.90	38.50	-11.60

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

EDGE850

MODE		TX Channel 128					
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	824.20	-12.90	14.70	3.90	18.60	38.50	-19.90
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	824.20	-9.90	18.40	3.90	22.30	38.50	-16.20

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

MODE		TX Channel 189					
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	836.40	-11.80	15.70	3.80	19.50	38.50	-19.00
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	**836.40**	**-8.50**	**19.60**	**3.80**	**23.40**	**38.50**	**-15.10**

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

MODE		TX Channel 251					
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	848.80	-11.90	15.80	3.40	19.20	38.50	-19.30
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	848.80	-9.50	18.60	3.40	22.00	38.50	-16.50

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

WCDMA Band V

MODE	TX Channel 4132						
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	826.40	-10.20	17.40	3.90	21.30	38.50	-17.20
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	826.40	-14.40	13.90	3.90	17.80	38.50	-20.70

MODE	TX Channel 4182						
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	836.40	-9.80	17.70	3.80	21.50	38.50	-17.00
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	836.40	-13.80	14.30	3.80	18.10	38.50	-20.40

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	-10.10	17.50	3.40	20.90	38.50	-17.60
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	-13.60	14.60	3.40	18.00	38.50	-20.50

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

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

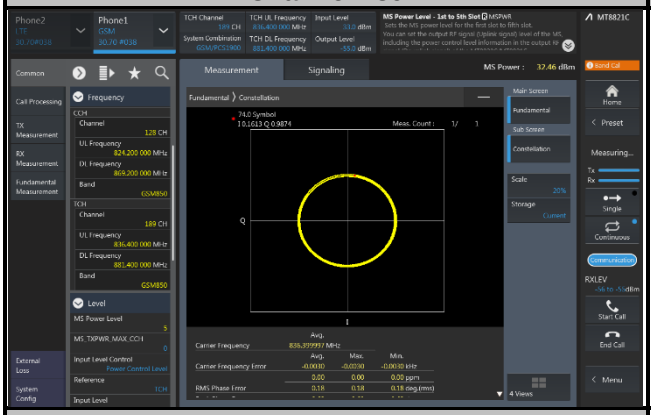
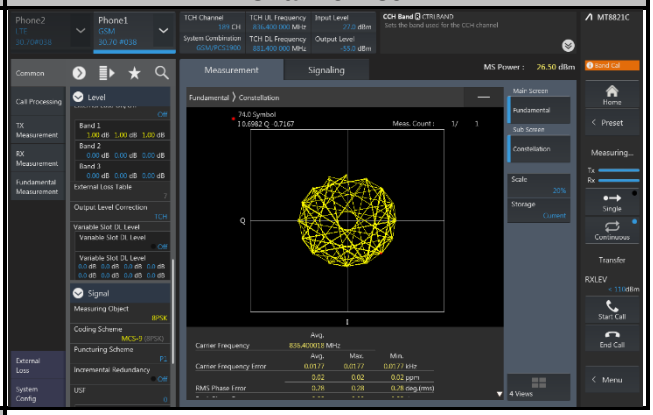
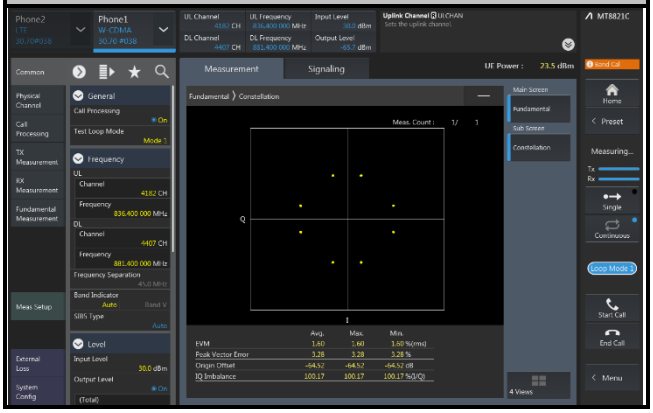
N/A

4.2.2 Test Setup

4.2.3 Test Procedure

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

4.2.4 Test Results

Spectrum Plot of Measurement	
GSM	**EDGE**
Channel 189	**Channel 189**
	
WCDMA	
Channel 4182	
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

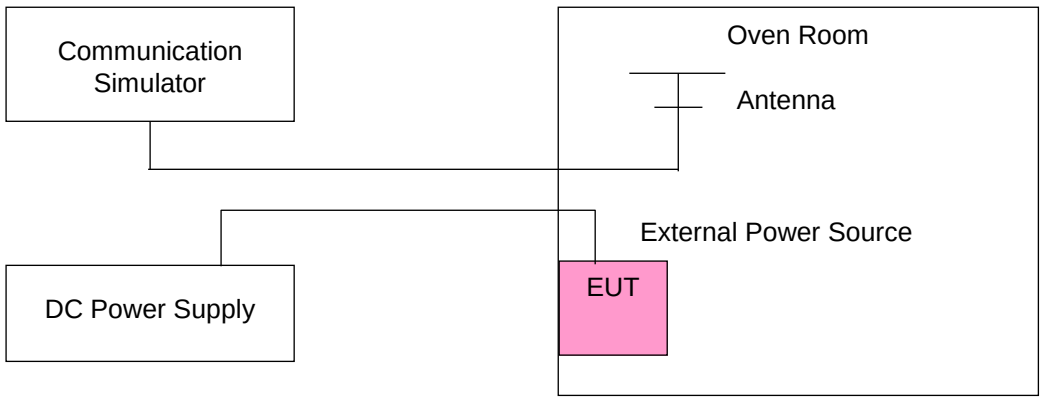
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.3.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

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

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
27.6	824.200002	0.002	848.800004	0.004	2.5
24.0	824.200002	0.002	848.800003	0.004	2.5
20.4	824.200003	0.004	848.800002	0.002	2.5

Note: The applicant defined the normal working voltage of the power supply is from 27.6 Vdc to 20.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	GSM				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	824.200003	0.004	848.800004	0.004	2.5
-20	824.200003	0.004	848.800002	0.002	2.5
-10	824.200003	0.004	848.800002	0.002	2.5
0	824.200004	0.004	848.800002	0.002	2.5
10	824.200002	0.003	848.800003	0.003	2.5
20	824.200003	0.003	848.800001	0.002	2.5
30	824.199999	-0.001	848.799999	-0.001	2.5
40	824.199998	-0.002	848.799996	-0.005	2.5
50	824.199997	-0.004	848.799999	-0.002	2.5
60	824.199998	-0.002	848.799999	-0.002	2.5
70	824.199999	-0.002	848.799998	-0.003	2.5

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -30˚C to 70˚C.
2. The EUT would shut down automatically as below -30˚C.

Frequency Error vs. Voltage

Voltage (Volts)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
27.6	824.200003	0.003	848.800003	0.004	2.5
24.0	824.200002	0.003	848.800003	0.004	2.5
20.4	824.200003	0.003	848.800001	0.001	2.5

Note: The applicant defined the normal working voltage of the power supply is from 27.6 Vdc to 20.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	EDGE				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	824.200004	0.004	848.800003	0.004	2.5
-20	824.200003	0.004	848.800003	0.003	2.5
-10	824.200004	0.005	848.800001	0.001	2.5
0	824.200002	0.003	848.800003	0.004	2.5
10	824.200002	0.003	848.800002	0.002	2.5
20	824.200003	0.003	848.800004	0.004	2.5
30	824.199998	-0.003	848.799998	-0.003	2.5
40	824.199997	-0.004	848.799998	-0.003	2.5
50	824.199998	-0.002	848.799996	-0.004	2.5
60	824.199999	-0.001	848.799997	-0.004	2.5
70	824.199998	-0.002	848.799996	-0.004	2.5

Note:

1. The applicant declared that the normal operating temperature of the EUT is from -30°C to 70°C.
2. The EUT would shut down automatically as below -30°C.

Frequency Error vs. Voltage

Voltage (Volts)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
27.6	826.400002	0.003	846.600004	0.005	2.5
24.0	826.400004	0.004	846.600001	0.001	2.5
20.4	826.400003	0.004	846.600003	0.003	2.5

Note: The applicant defined the normal working voltage of the power supply is from 27.6 Vdc to 20.4 Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA				Limit (ppm)
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	826.400003	0.003	846.600002	0.002	2.5
-20	826.400002	0.003	846.600003	0.004	2.5
-10	826.400004	0.004	846.600003	0.004	2.5
0	826.400003	0.004	846.600003	0.003	2.5
10	826.400004	0.005	846.600004	0.005	2.5
20	826.400003	0.004	846.600001	0.002	2.5
30	826.399996	-0.004	846.599996	-0.004	2.5
40	826.399996	-0.005	846.599997	-0.004	2.5
50	826.399997	-0.004	846.599999	-0.001	2.5
60	826.399997	-0.004	846.599996	-0.004	2.5
70	826.399999	-0.002	846.599999	-0.001	2.5

Note:

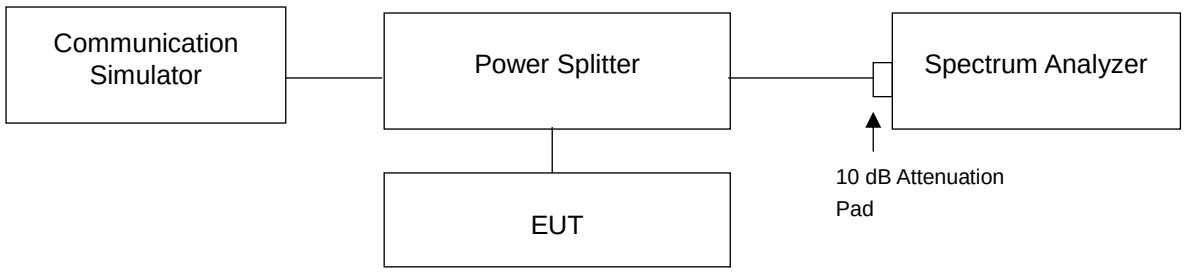
1. The applicant declared that the normal operating temperature of the EUT is from -30°C to 70°C.
2. The EUT would shut down automatically as below -30°C.

4.4 Occupied Bandwidth Measurement

4.4.1 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.

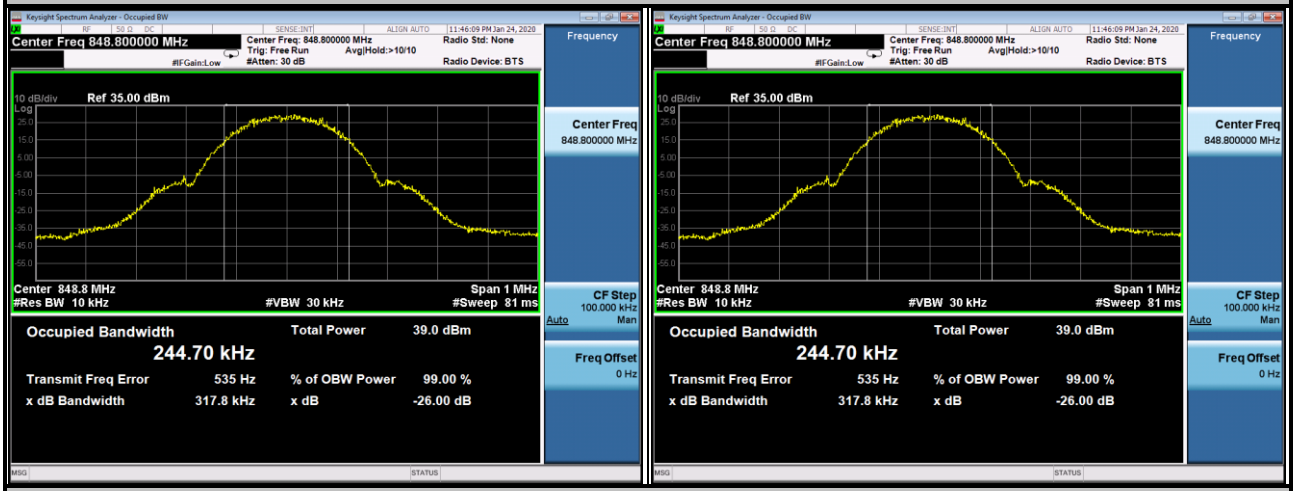
4.4.2 Test Setup



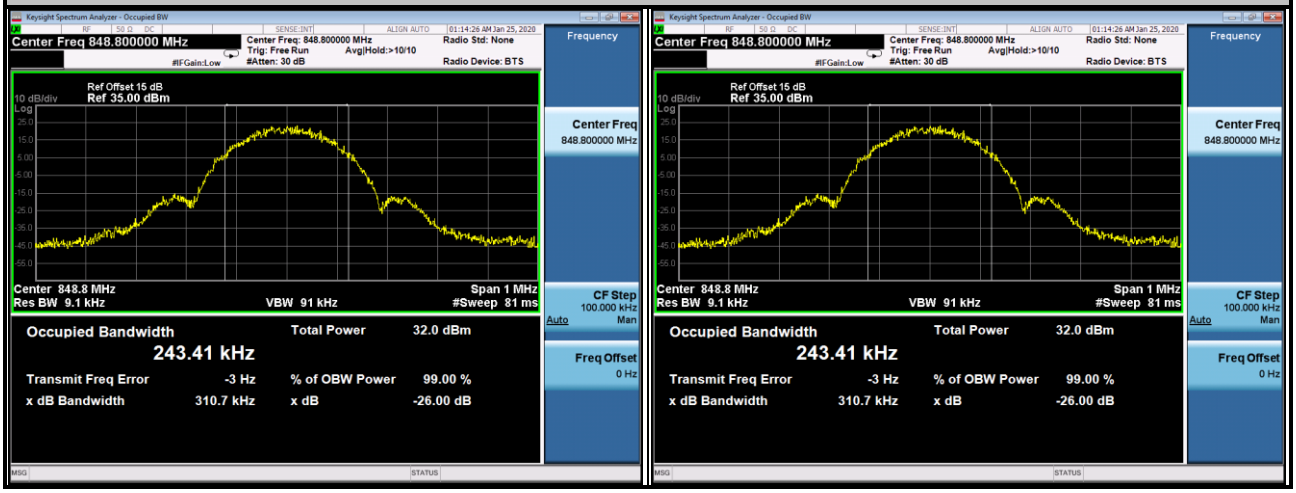
4.4.3 Test Result

GSM				EDGE			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)	Channel	Frequency (MHz)	99 % Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	244.23	313.10	128	824.2	242.78	304.90
189	836.4	243.94	316.20	189	836.4	244.85	302.40
251	848.8	244.70	317.80	251	848.8	243.41	310.70

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
GSM	

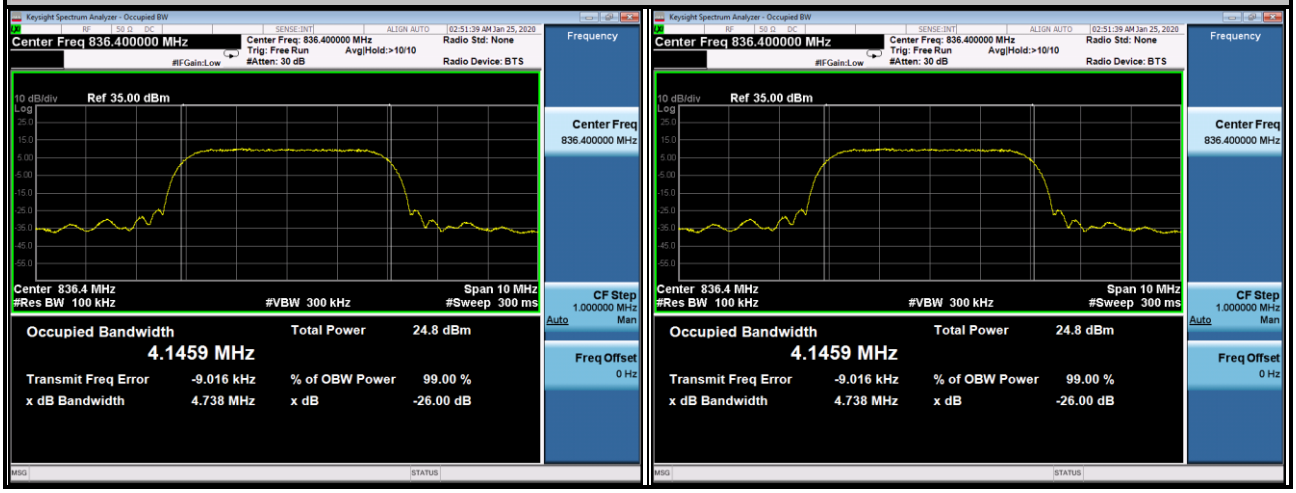


Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
EDGE	



WCDMA			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.1407	4.7330
4182	836.4	4.1459	4.7380
4233	846.6	4.1321	4.7250

Spectrum Plot of Worst Value	
99 % Occupied Bandwidth	26 dB Bandwidth
WCDMA	

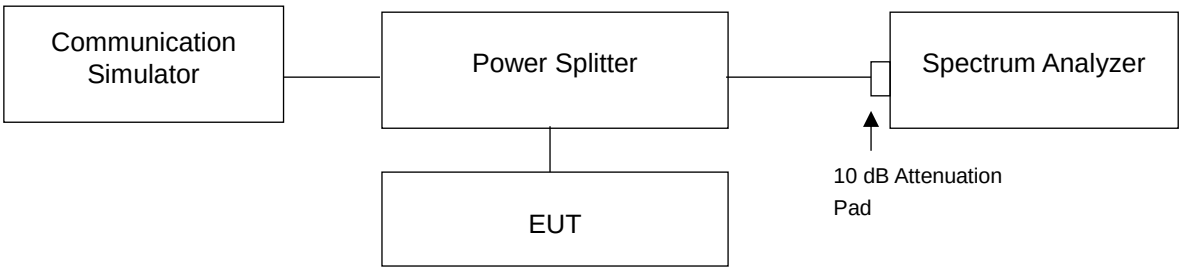


4.5 Band Edge Measurement

4.5.1 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.

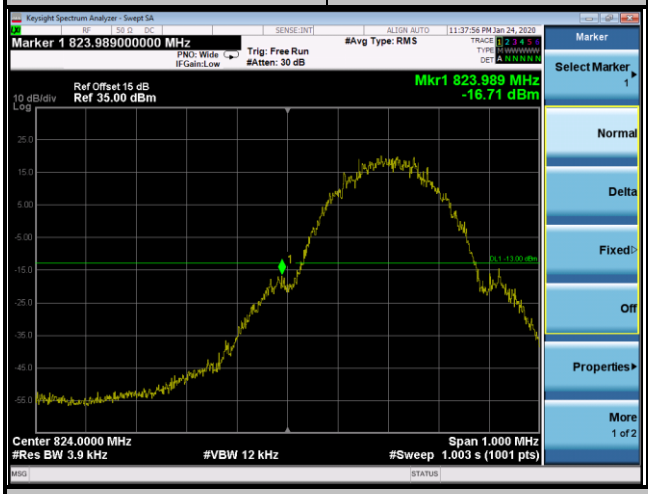
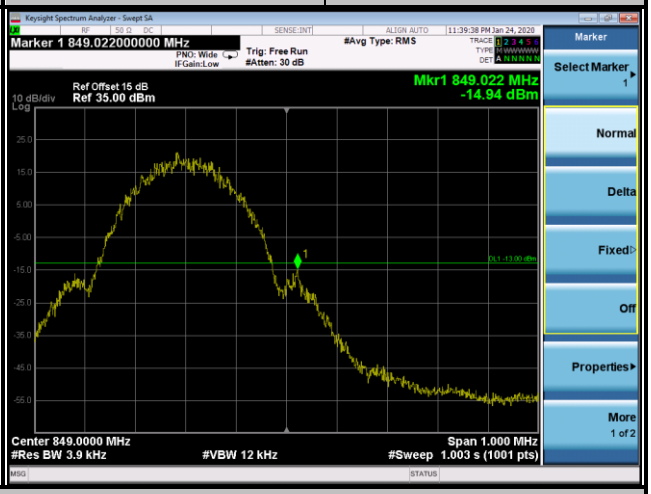
4.5.2 Test Setup

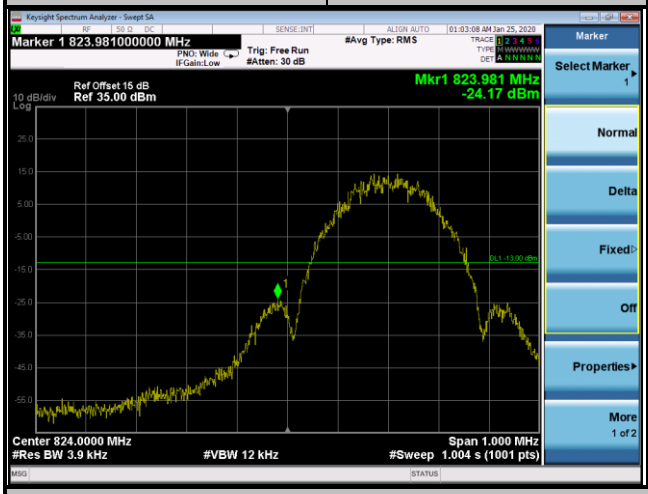


4.5.3 Test Procedures

a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 3.9 kHz and VB of the spectrum is 12 kHz (GSM/GPRS/EDGE).
c. The center frequency of spectrum is the band edge frequency and span is 5 MHz. RB of the spectrum is 51 kHz and VB of the spectrum is 160 kHz (WCDMA).
d. Record the max trace plot into the test report.

4.5.4 Test Results

GSM			
Channel	128	Channel	251
			

EDGE			
Channel	128	Channel	251
			

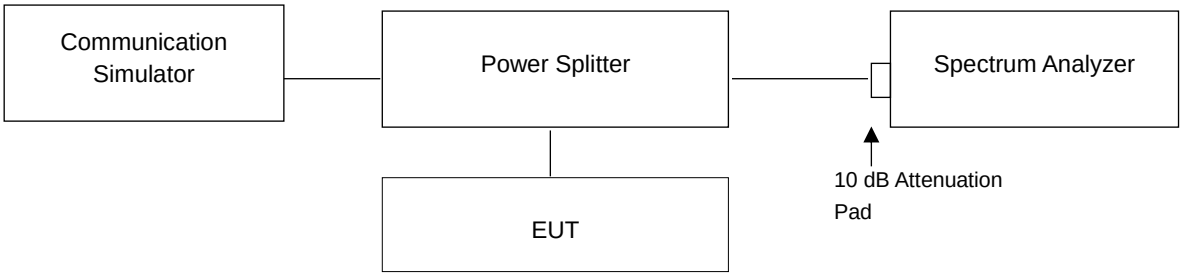
WCDMA			
Channel	4132	Channel	4233
			

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

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

4.6.2 Test Setup



4.6.3 Test Procedures

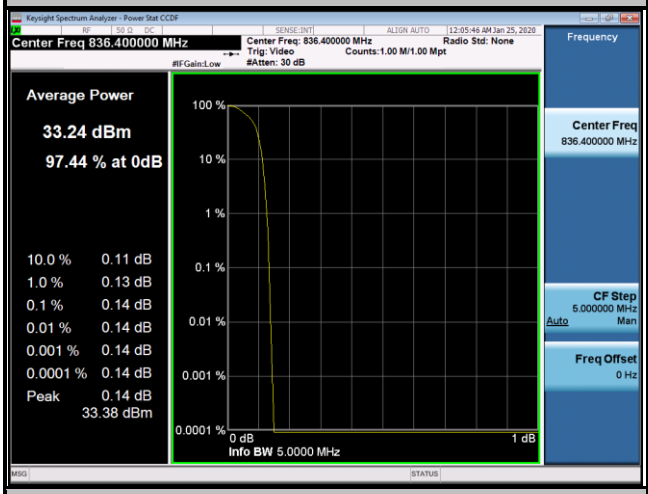
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

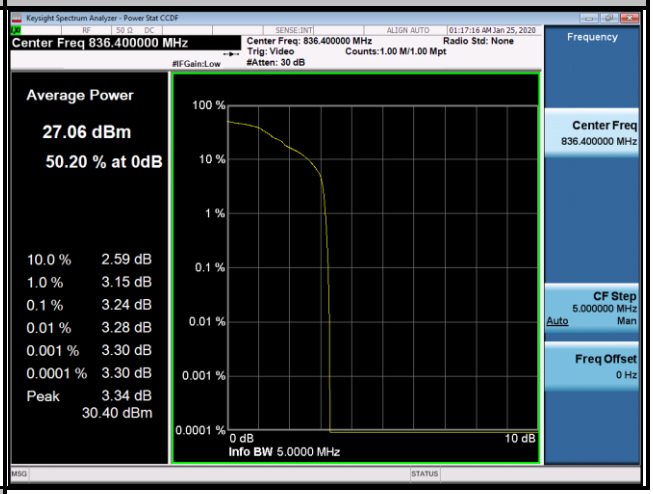
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		GSM	EDGE			WCDMA
128	824.2	0.13	3.24	4132	826.4	3.01
189	836.4	0.14	3.25	4182	836.4	2.89
251	848.8	0.14	3.24	4233	846.6	2.95

Spectrum Plot of Worst Value

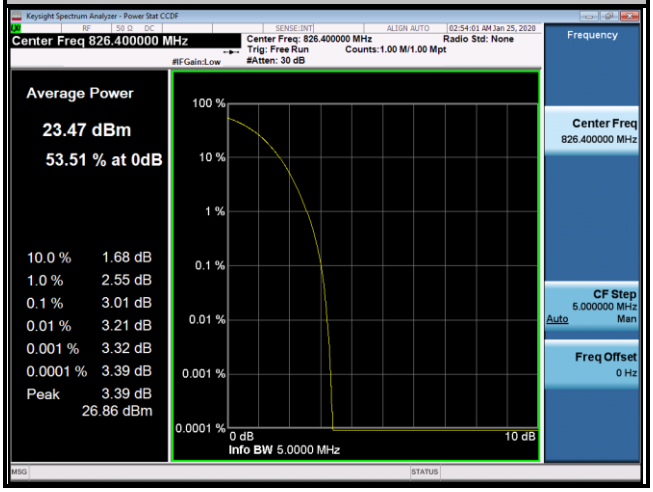
GSM



EDGE



WCDMA

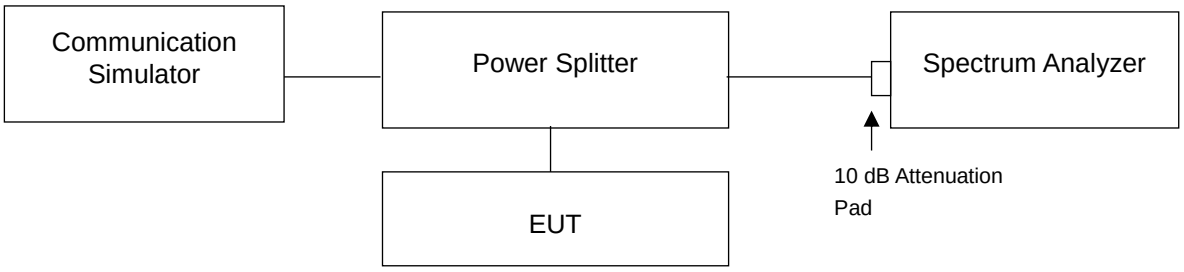


4.7 Conducted Spurious Emissions

4.7.1 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.

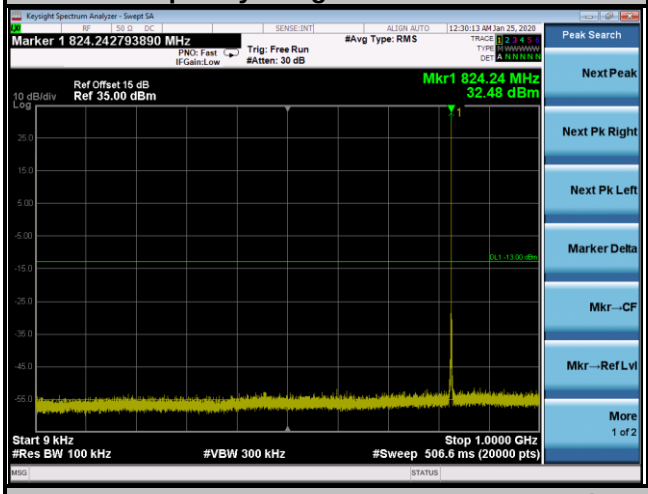
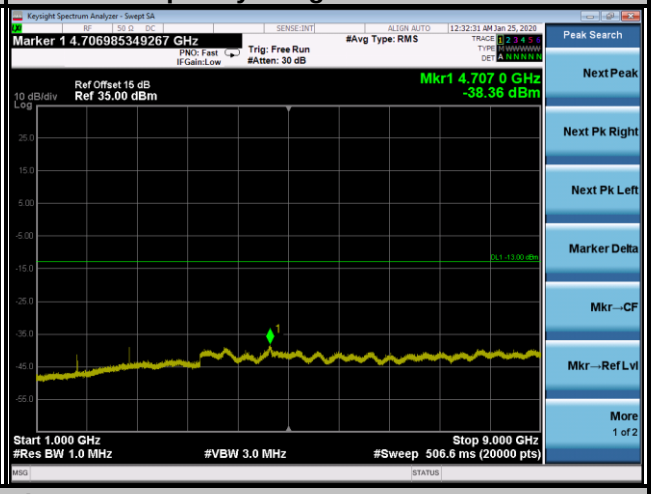
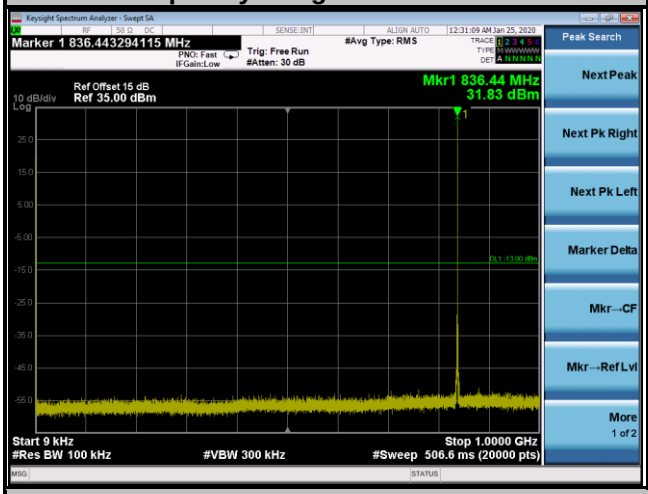
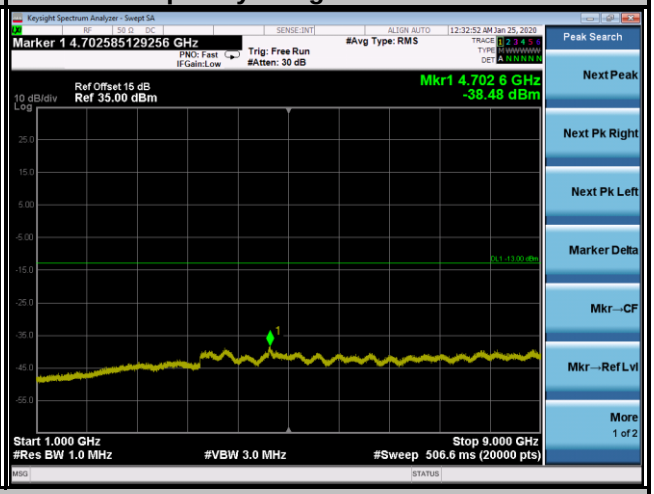
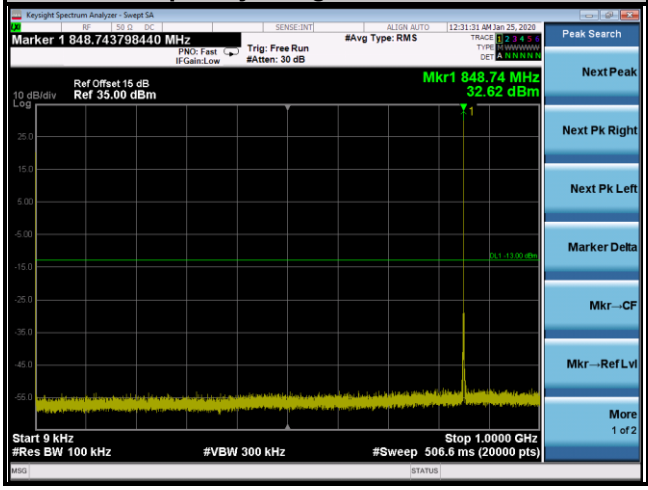
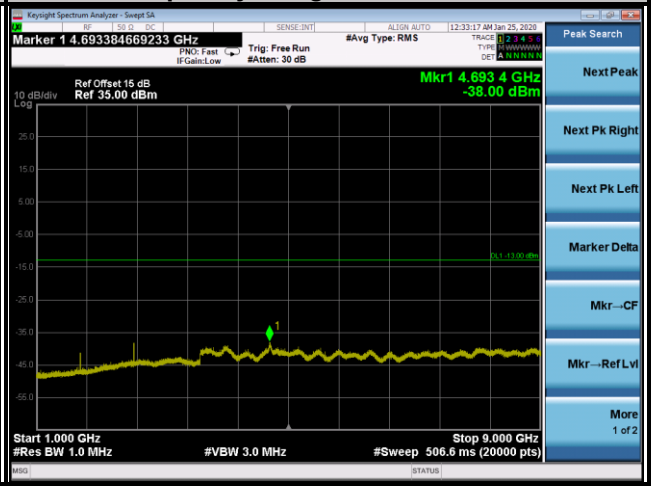
4.7.2 Test Setup



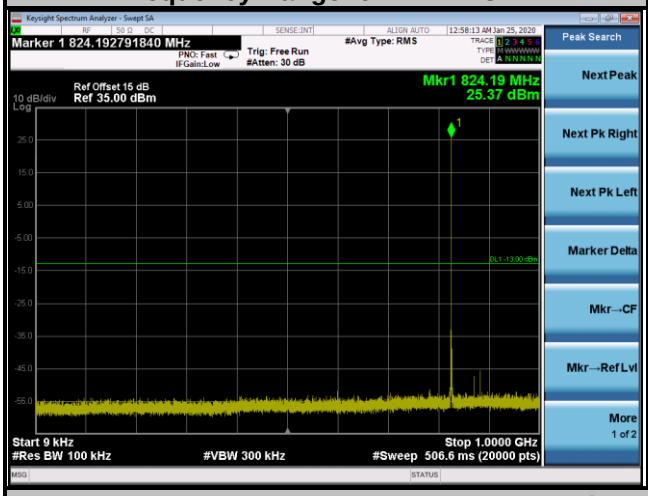
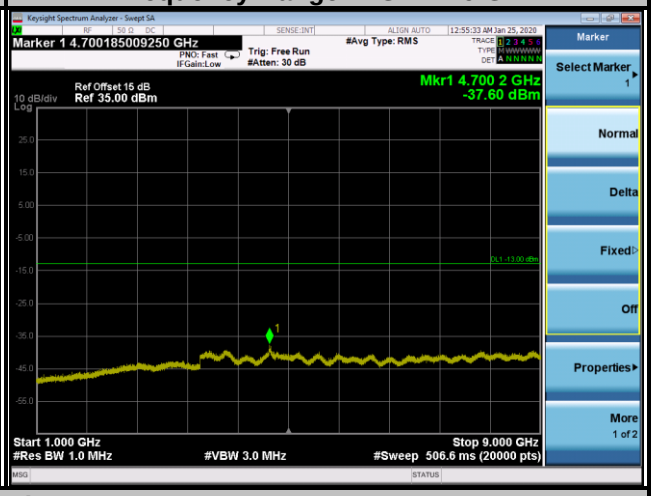
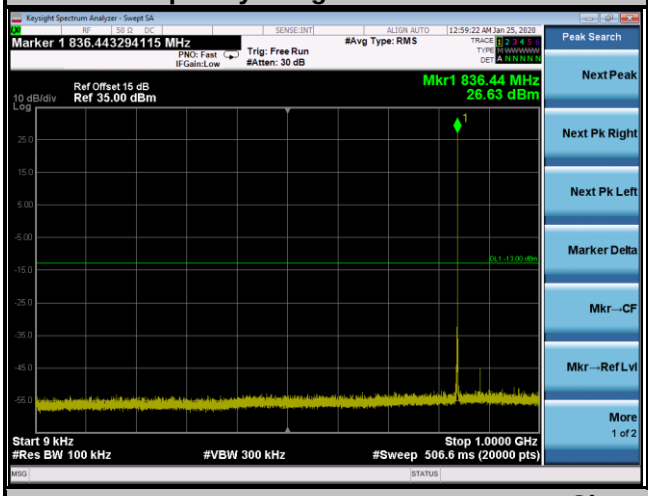
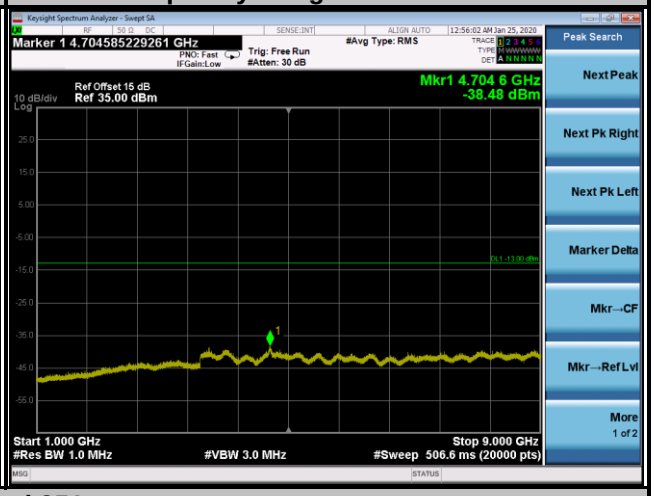
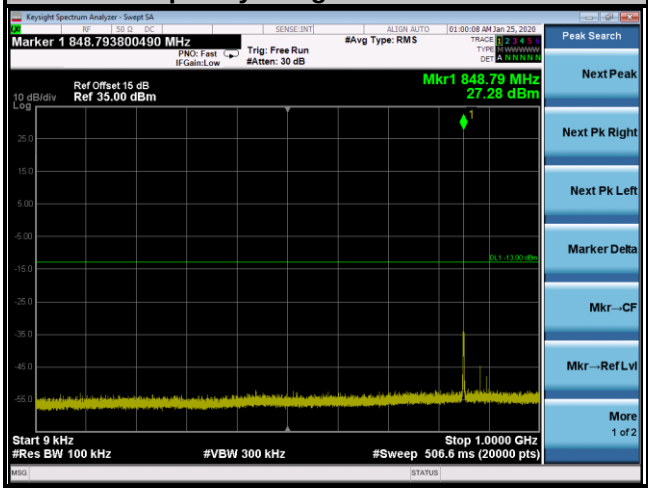
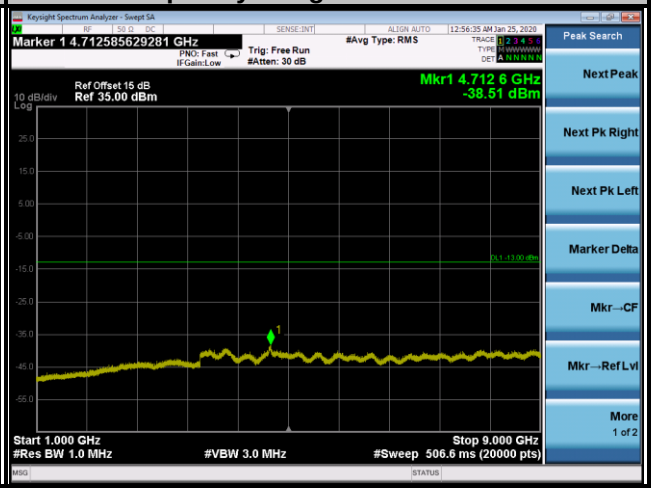
4.7.3 Test Procedure

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 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz is used for conducted emission measurement.
c. Measuring frequency range is from 1 GHz to 9 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

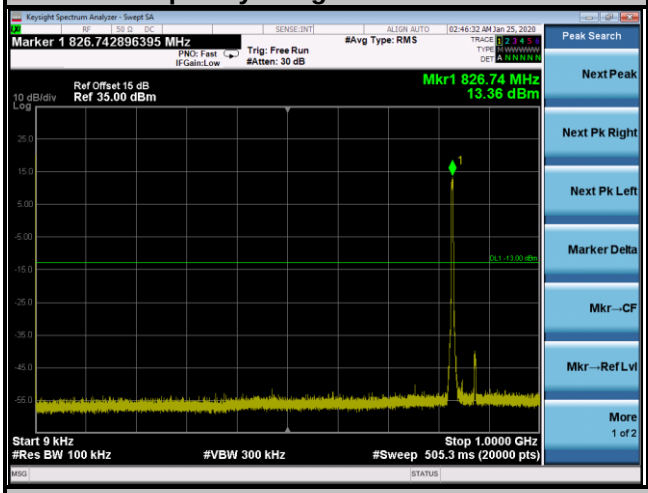
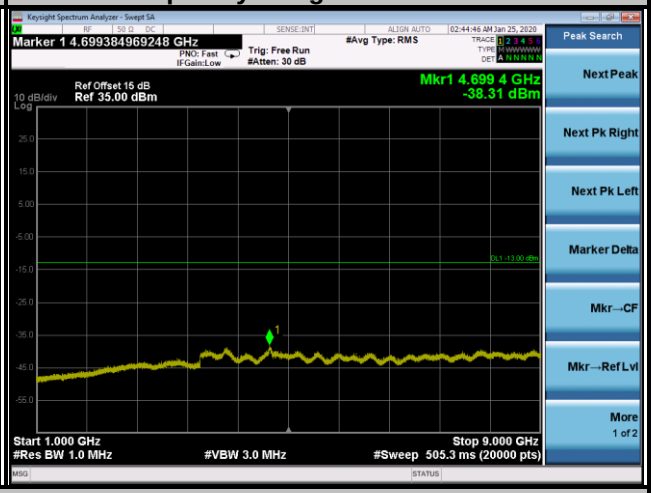
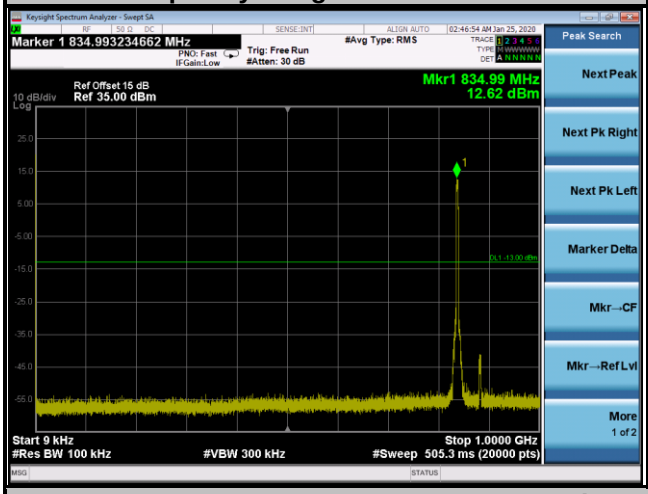
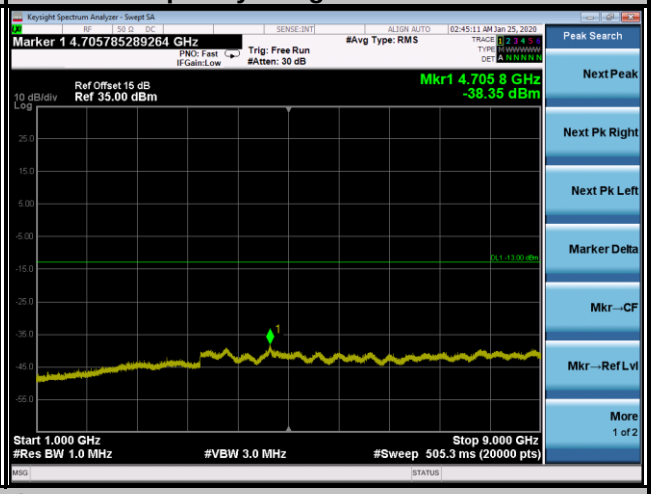
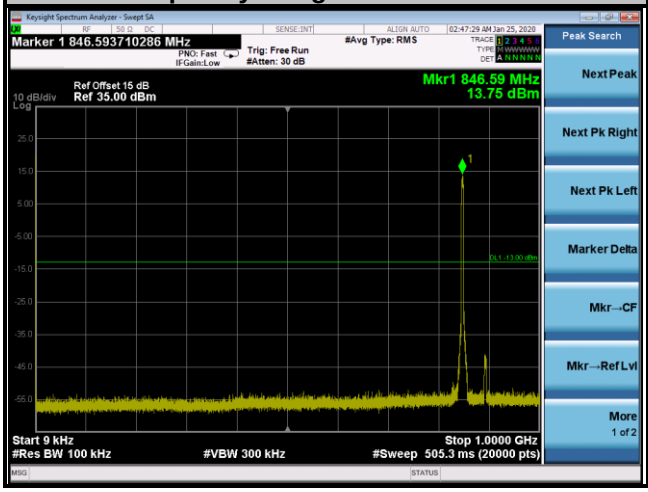
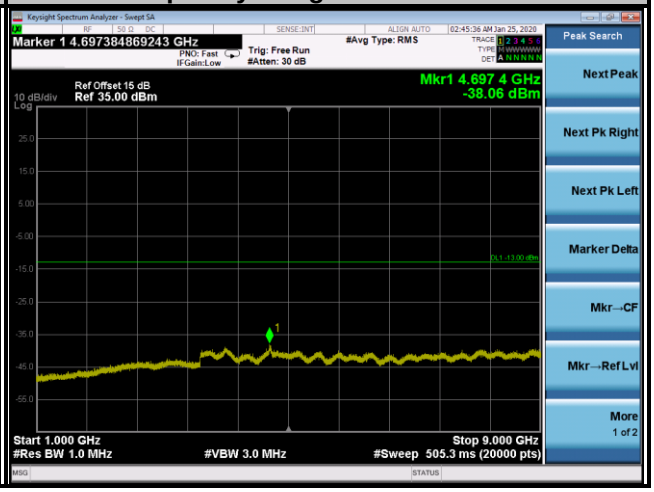
4.7.4 Test Results

GSM	
Channel 128	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	
Channel 189	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	
Channel 251	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

EDGE	
Channel 128	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	
Channel 189	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	
Channel 251	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA	
Channel 4132	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	
Channel 4182	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	
Channel 4233	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 9 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.

4.8 Radiated Emission Measurement

4.8.1 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.

4.8.2 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.R.P power - 2.15 dB.

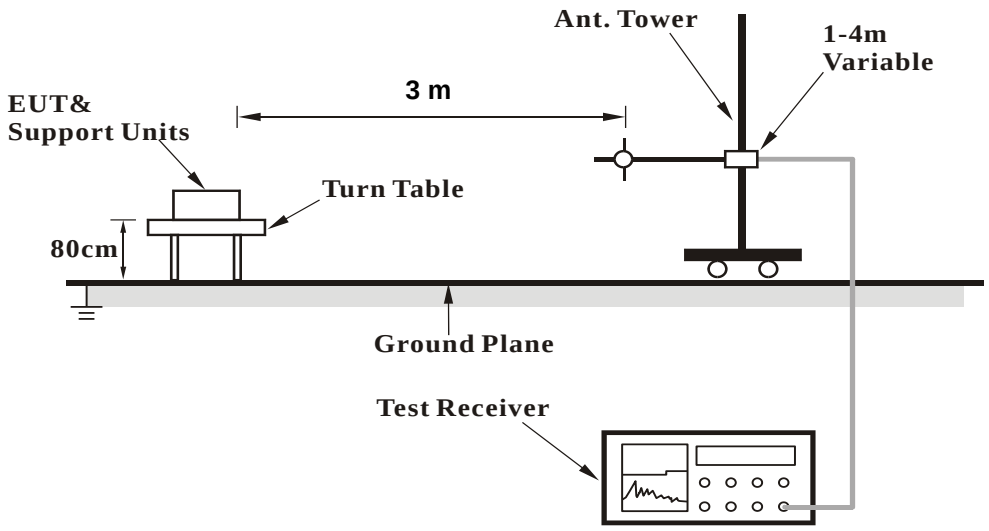
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.8.3 Deviation from Test Standard

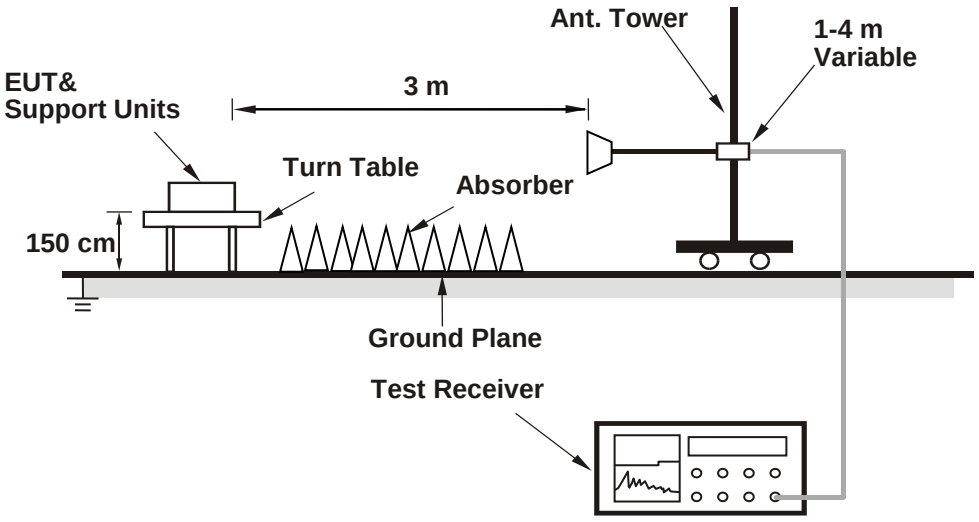
No deviation.

4.8.4 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).

4.8.5 Test Results

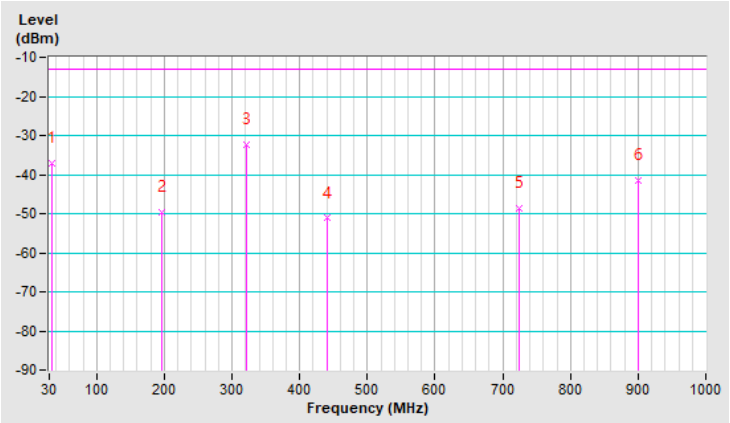
Below 1GHz

GSM850:

Mode	TX channel 128 (824.2MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 66%RH	Input Power	24Vdc
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-37.9	-20.0	-17.1	-37.1	-13.0	-24.1
2	195.87	-39.1	-47.2	-2.5	-49.7	-13.0	-36.7
3	321.00	-26.2	-36.4	4.0	-32.4	-13.0	-19.4
4	440.31	-48.9	-54.7	3.5	-51.2	-13.0	-38.2
5	723.55	-49.9	-52.1	3.6	-48.5	-13.0	-35.5
6	901.06	-47.0	-45.1	3.5	-41.6	-13.0	-28.6

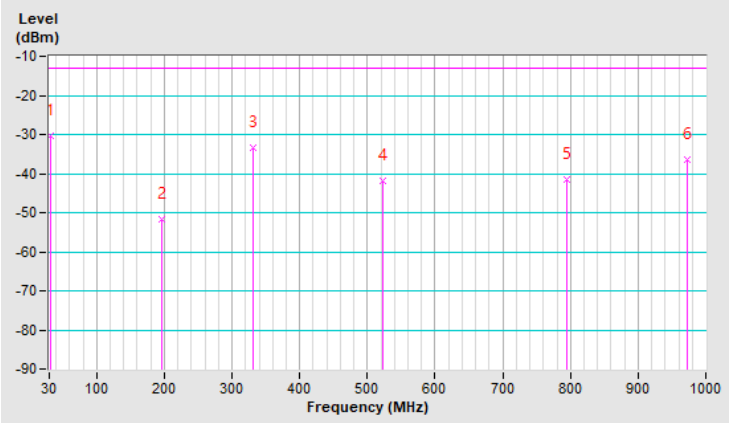
Remarks:
1. ERP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX channel 128 (824.2MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 66%RH	Input Power	24Vdc
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-17.5	-11.9	-18.3	-30.2	-13.0	-17.2
2	195.87	-48.8	-49.3	-2.5	-51.8	-13.0	-38.8
3	331.67	-30.5	-37.3	4.0	-33.3	-13.0	-20.3
4	523.73	-40.5	-45.8	3.8	-42.0	-13.0	-29.0
5	794.36	-46.0	-45.4	4.0	-41.4	-13.0	-28.4
6	971.87	-43.5	-40.2	3.7	-36.5	-13.0	-23.5

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

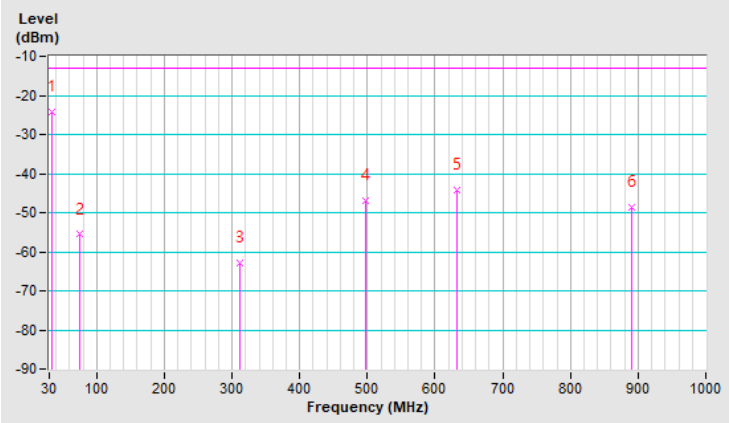


WCDMA Band 5:

Mode	TX channel 4182 (836.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 66%RH	Input Power	24Vdc
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	33.88	-24.9	-7.1	-17.1	-24.2	-13.0	-11.2
2	75.59	-47.7	-55.8	0.2	-55.6	-13.0	-42.6
3	312.27	-56.5	-66.8	4.0	-62.8	-13.0	-49.8
4	496.57	-44.4	-50.6	3.8	-46.8	-13.0	-33.8
5	632.37	-44.3	-47.9	3.6	-44.3	-13.0	-31.3
6	890.39	-53.9	-52.2	3.5	-48.7	-13.0	-35.7

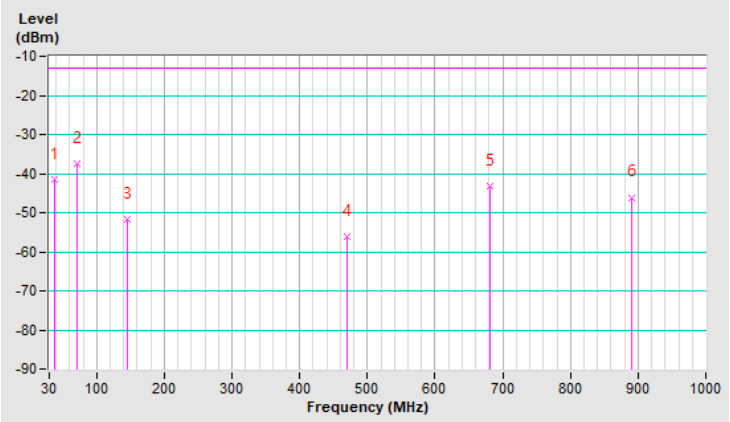
Remarks:
1. ERP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



Mode	TX channel 4182 (836.4MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	23deg. C, 66%RH	Input Power	24Vdc
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	38.73	-29.8	-27.2	-14.2	-41.4	-13.0	-28.4
2	71.71	-29.1	-37.0	-0.3	-37.3	-13.0	-24.3
3	144.46	-47.2	-48.4	-3.2	-51.6	-13.0	-38.6
4	469.41	-53.9	-59.7	3.5	-56.2	-13.0	-43.2
5	680.87	-46.8	-46.8	3.5	-43.3	-13.0	-30.3
6	890.39	-52.2	-49.6	3.5	-46.1	-13.0	-33.1

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



Above 1GHz

GSM850:

Mode	TX channel 128 (824.2MHz)	Frequency Range	1GH~9GHz
Environmental Conditions	22deg. C, 66%RH	Input Power	24Vdc
Tested By	Han Wu		

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	1648.40	-51.1	-43.4	0.9	-42.5	-13.0	-29.5
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	1648.40	-51.0	-43.7	0.9	-42.8	-13.0	-29.8

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 189 (836.4MHz)	Frequency Range	1GH~9GHz
Environmental Conditions	22deg. C, 66%RH	Input Power	24Vdc
Tested By	Han Wu		

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	1672.80	-50.5	-42.9	0.8	-42.1	-13.0	-29.1
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	1672.80	-50.4	-43.0	0.8	-42.2	-13.0	-29.2

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 251 (848.8MHz)	Frequency Range	1GH~9GHz
Environmental Conditions	22deg. C, 66%RH	Input Power	24Vdc
Tested By	Han Wu		

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	1697.60	-50.5	-43.0	0.7	-42.3	-13.0	-29.3
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	1697.60	-50.6	-43.3	0.7	-42.6	-13.0	-29.6

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

WCDMA Band 5:

Mode	TX channel 4132 (826.4MHz)	Frequency Range	1GH~9GHz
Environmental Conditions	22deg. C, 66%RH	Input Power	24Vdc
Tested By	Han Wu		

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	1652.80	-58.5	-50.8	0.9	-49.9	-13.0	-36.9
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	1652.80	-58.1	-50.9	0.9	-50.0	-13.0	-37.0

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 4182 (836.4MHz)	Frequency Range	1GH~9GHz
Environmental Conditions	22deg. C, 66%RH	Input Power	24Vdc
Tested By	Han Wu		

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	1672.80	-57.76	-50.13	0.83	-49.3	-13.0	-36.3
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	1672.80	-57.74	-50.43	0.83	-49.6	-13.0	-36.6

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 4233 (846.6MHz)	Frequency Range	1GH~9GHz
Environmental Conditions	22deg. C, 66%RH	Input Power	24Vdc
Tested By	Han Wu		

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	-57.2	-49.7	0.7	-49.0	-13.0	-36.0
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	-57.8	-50.5	0.7	-49.8	-13.0	-36.8

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 according to ISO/IEC 17025.

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

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

--- END ---