FCC TEST REPORT

(PART 27)

REPORT NO.:	RF120816C10-1
MODEL NO.:	IMW-C870W
FCC ID:	YCO-IMW-C870W
RECEIVED:	Aug. 16, 2012
TESTED:	Aug. 21 ~ Oct. 01, 2012
ISSUED:	Oct. 03, 2012

APPLICANT:	INFOMARK
ADDRESS:	#801, KINS Tower, #25-1, Jeongja-dong, Bundang-gu, Seongnam-si, Gyonggi-do, 463-847, Korea

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 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.

This report should 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.	REASON FOR CHANGE	DATE ISSUED
RF120816C10-1	Original release	Oct. 03, 2012

1 CERTIFICATION

PRODUCT:	WiMAX Jacket for IPod
MODEL NO.:	IMW-C870W
BRAND:	Jacket Router
APPLICANT:	INFOMARK
TESTED:	Aug. 21 ~ Oct. 01, 2012
TEST SAMPLE:	ENGINEERING SAMPLE
TEST STANDARDS:	**FCC Part 27, Subpart C & M**

The above equipment (model: IMW-C870W) 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 EMC characteristics under the conditions specified in this report.

PREPARED BY : Andrea Hsia / Specialist , **DATE :** Oct. 03, 2012

APPROVED BY : Gary Chang / Technical Manager , **DATE :** Oct. 03, 2012

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 27 & Part 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
2.1046 27.50(h)(2)	Equivalent isotropically radiated power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 27.53(m)(6)	Emission Bandwidth	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(m)(4)(6)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(m)(4)(6)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -16.7dB at 8060.25MHz.

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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 19, 2012	Apr. 18, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jan. 30, 2012	Jan. 29, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 03, 2012	Apr. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Sep. 12, 2012	Sep. 11, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Preamplifier Agilent	8449B	3008A01911	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10638	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 11, 2012	Aug. 10, 2013
Software	ADT_Radiated_ V7.6.15.9.2	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 Table Controller EMCO	2090	NA	NA	NA
Communication Tester R&S	CMU200	104484	Dec. 30, 2011	Dec. 29, 2012
Standard Temperature & Humidity Chamber WIT	MHU-225AU	920842	Jun. 21, 2012	Jun. 20, 2013
Mini-Circuits Power Splitter	ZN2PD-9G	NA	May 25, 2012	May 24, 2013
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 9.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 460141.

5. The IC Site Registration No. is IC 7450F-4.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	WiMAX Jacket for IPod
MODEL NO.	IMW-C870W
POWER SUPPLY	5Vdc (adapter, host equipment) 3.7Vdc (battery)
CODED TYPE/MODULATION/ CODING RATE	QPSK: 1/2, 3/4 16QAM: 1/2, 3/4 64QAM: 1/2, 2/3, 3/4, 5/6
MODULATION TECHNOLOGY	OFDMA
DUPLEX METHOD	TDD
OPERATING RANGE	Channel Bandwidth 5MHz: 2499MHz ~ 2686.75MHz Channel Bandwidth 10MHz: 2508.5MHz ~ 2683.5MHz
CHANNEL BANDWIDTH	5MHz, 10MHz
MAX. EIRP POWER	Channel Bandwidth: 5MHz: 18.0dBm (0.063W) Channel Bandwidth: 10MHz: 17.3dBm (0.054W)
ANTENNA TYPE	Chip antenna with -3.3dBi gain
DATA CABLE	1m non-shielded USB cable with one core
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter, Battery

NOTE:

1. The EUT consumes power from the following adapter & battery.

ADAPTER	
BRAND:	Phihong
MODEL:	PSAA10R-050
INPUT:	100-240Vac, 0.3A
OUTPUT:	5Vdc, 2000mA
POWER LINE:	1.5m non-shielded cable with one core

BATTERY	
RATING:	3.7Vdc, 1390mA

2. The above EUT information is declared by manufacturer and for more detailed feature description please refers to the manufacturer's specifications or User's Manual.

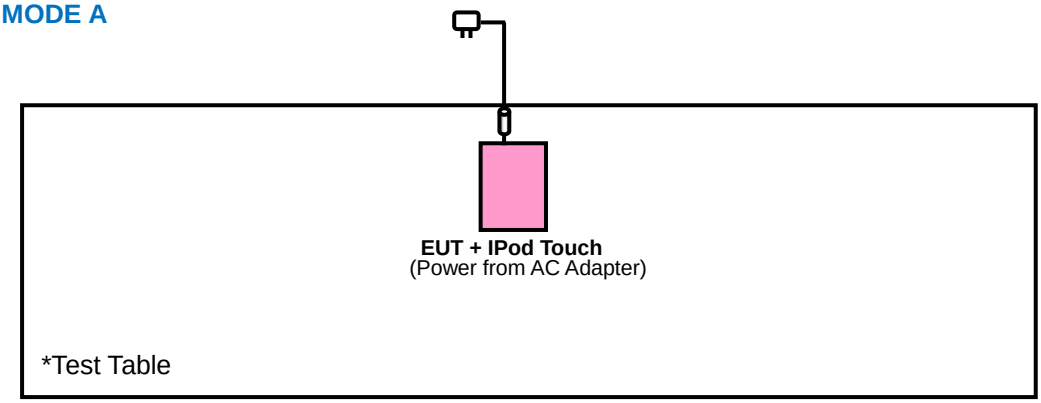
3.2 DESCRIPTION OF TEST MODES

Three channels of each channel bandwidth had been tested.

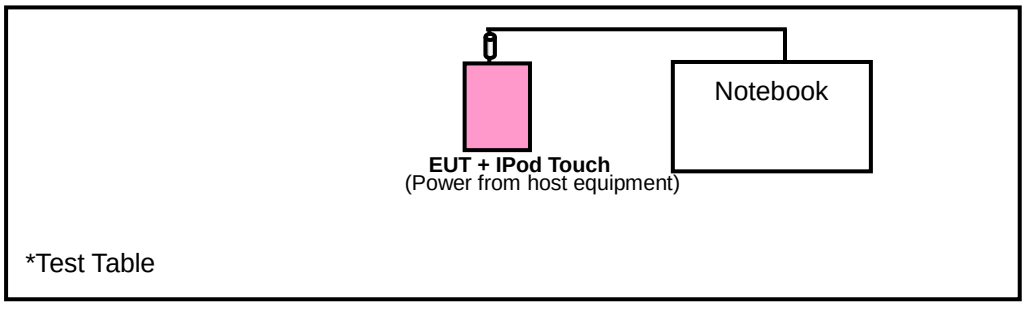
CHANNEL (MHz)	CHANNEL BANDWIDTH	
	5.0 MHz	10.0 MHz
LOW	2499.00MHz	2508.5MHz
MIDDLE	2600.00MHz	2600.0MHz
HIGH	2686.75MHz	2683.5MHz

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A



TEST MODE B



3.3 TEST ITEM AND TEST CONFIGURATION

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 Y-plane for EIRP and radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	Power from AC Adapter
B	Power from host equipment via USB cable

EUT CONFIGURE MODE	TEST ITEM	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION TYPE
A	EIRP	L, M, H	5MHz	QPSK
A		L, M, H	10MHz	QPSK
A	FREQUENCY STABILITY	L	5MHz	QPSK
A		M	10MHz	QPSK
A	EMISSION BANDWIDTH	L, M, H	5MHz	QPSK
A		L, M, H	10MHz	QPSK
A	BAND EDGE	L, M, H	5MHz	QPSK
A		L, M, H	10MHz	QPSK
A	CONDCUDETED EMISSION	L, M, H	5MHz	QPSK
A		L, M, H	10MHz	QPSK
A & B	RADIATED EMISSION	L	5MHz	QPSK
A & B	Below 1 GHz	L	10MHz	QPSK
A	RADIATED EMISSION	L, M, H	5MHz	QPSK
A	Above 1 GHz	L, M, H	10MHz	QPSK

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	25deg. C, 65%RH	120Vac, 60Hz	Sun Lin
FREQUENCY STABILITY	25deg. C, 65%RH	120Vac, 60Hz	Sun Lin
EMISSION BANDWIDTH	25deg. C, 65%RH	120Vac, 60Hz	Sun Lin
BAND EDGE	25deg. C, 65%RH	120Vac, 60Hz	Sun Lin
CONDCUDETED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Sun Lin
RADIATED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Sun Lin

3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI/TIA/EIA-603-C-2004

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.5 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	NOTEBOOK	DELL	E5410	1HC2XM1	NA
2	iPod	Apple	NA	NA	BCG-E2407

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 2 was supplied from client.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

4.1.2 TEST PROCEDURES

EIRP MEASUREMENT:

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational frequency range.)

b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution 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

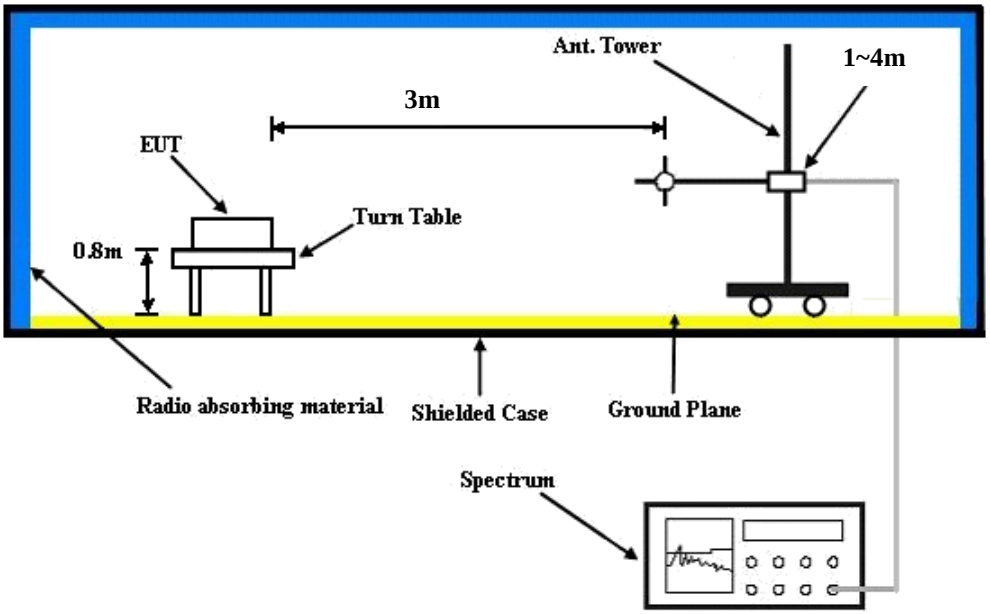
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with WiMAX 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.

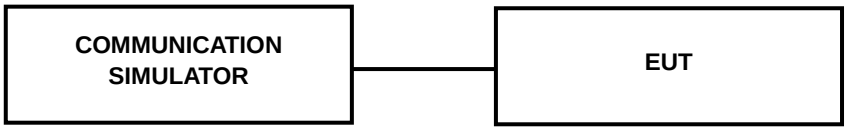
4.1.3 TEST SETUP

EIRP MEASUREMENT:



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

CONDUCTED POWER MEASUREMENT:



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

4.1.4 TEST RESULTS

CONDUCTED OUTPUT POWER (dBm)

Modulation	Coding Rate	Frequency (MHz)	Main Antenna		Aux Antenna	
			Average Power (dBm)	Average Power (mW)	Average Power (dBm)	Average Power (mW)
QPSK (BW 5MHz)	1/2	2499.00	22.87	193.64	22.87	193.64
		2600.00	23.00	199.53	22.98	198.61
		2686.75	22.84	192.31	22.84	192.31
	3/4	2499.00	22.96	197.70	22.93	196.34
		2600.00	22.97	198.15	22.96	197.70
		2686.75	22.94	196.79	22.94	196.79
16QAM (BW 5MHz)	1/2	2499.00	22.87	193.64	22.79	190.11
		2600.00	22.95	197.24	22.95	197.24
		2686.75	22.77	189.23	22.72	187.07
	3/4	2499.00	22.87	193.64	22.79	190.11
		2600.00	22.92	195.88	22.92	195.88
		2686.75	22.91	195.43	22.91	195.43
64QAM (BW 5MHz)	1/2	2499.00	22.86	193.20	22.87	193.64
		2600.00	22.87	193.64	22.89	194.54
		2686.75	22.80	190.55	22.81	190.99
	2/3	2499.00	22.72	187.07	22.81	190.99
		2600.00	22.85	192.75	22.87	193.64
		2686.75	22.63	183.23	22.63	183.23
	3/4	2499.00	22.77	189.23	22.71	186.64
		2600.00	22.81	190.99	22.79	190.11
		2686.75	22.70	186.21	22.63	183.23
	5/6	2499.00	22.66	184.50	22.73	187.50
		2600.00	22.78	189.67	22.75	188.36
		2686.75	22.74	187.93	22.63	183.23
QPSK (BW 10MHz)	1/2	2508.50	22.74	187.93	22.71	186.64
		2600.00	22.76	188.80	22.73	187.50
		2683.50	22.72	187.07	22.70	186.21
	3/4	2508.50	22.71	186.64	22.69	185.78
		2600.00	22.74	187.93	22.72	187.07
		2683.50	22.64	183.65	22.58	181.13
16QAM (BW 10MHz)	1/2	2508.50	22.67	184.93	22.68	185.35
		2600.00	22.73	187.50	22.70	186.21
		2683.50	22.61	182.39	22.59	181.55
	3/4	2508.50	22.66	184.50	22.66	184.50
		2600.00	22.71	186.64	22.68	185.35
		2683.50	22.67	184.93	22.67	184.93
64QAM (BW 10MHz)	1/2	2508.50	22.68	185.35	22.62	182.81
		2600.00	22.69	185.78	22.64	183.65
		2683.50	22.66	184.50	22.55	179.89
	2/3	2508.50	22.60	181.97	22.61	182.39
		2600.00	22.65	184.08	22.63	183.23
		2683.50	22.36	172.19	22.33	171.00
	3/4	2508.50	22.57	180.72	22.49	177.42
		2600.00	22.62	182.81	22.59	181.55
		2683.50	22.45	175.79	22.42	174.58
	5/6	2508.50	22.51	178.24	22.48	177.01
		2600.00	22.60	181.97	22.56	180.30
		2683.50	22.54	179.47	22.50	177.83

CHANNEL BANDWIDTH: 5MHz

EIRP POWER

FREQUENCY		2499.0MHz					
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	2499.00	-25.0	13.5	0.7	14.2	33.0	-18.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	2499.00	-23.9	17.3	0.7	18.0	33.0	-15.0

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

FREQUENCY		2600.0MHz					
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	2600.00	-26.8	13.1	0.8	13.9	33.0	-19.1
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	2600.00	-24.2	16.7	0.8	17.5	33.0	-15.5

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

FREQUENCY		2686.75MHz					
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	2686.75	-29.0	11.9	0.8	12.7	33.0	-20.3
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	2686.75	-25.8	15.6	0.8	16.4	33.0	-16.6

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

CHANNEL BANDWIDTH: 10MHz

EIRP POWER

FREQUENCY	2508.5MHz						
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	2508.50	-25.7	13.0	0.7	13.7	33.0	-19.3
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	2508.50	-24.6	16.6	0.7	17.3	33.0	-15.7

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

FREQUENCY	2600.00MHz						
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	2600.00	-27.5	12.4	0.8	13.2	33.0	-19.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	**Freq. (MHz)**	**Reading (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**
1	2600.00	-24.6	16.3	0.8	17.1	33.0	-15.9

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

FREQUENCY	2683.5MHz						
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	2683.5	-29.3	11.6	0.8	12.4	33.0	-20.6
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	2683.5	-26.0	15.4	0.8	16.2	33.0	-16.8

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

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.2.2 TEST PROCEDURE

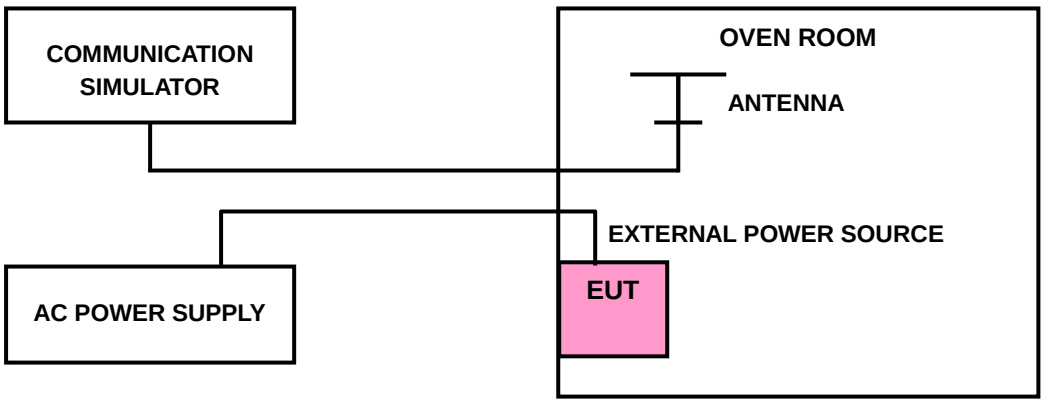
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC 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.

4.2.3 TEST SETUP



4.2.4 EUT OPERATING CONDITIONS

Same as 4.1.5

4.2.5 TEST RESULTS

CHANNEL BANDWIDTH	5MHz	MODE	Low Channel

AFC FREQUENCY ERROR VS. VOLTAGE			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
93.5	20	2499.001956	0.783
110.0	20	2499.002327	0.931
126.5	20	2499.001137	0.455

AFC FREQUENCY ERROR VS. TEMP.			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
110.0	50	2499.002844	1.138
110.0	40	2499.001631	0.653
110.0	30	2499.001826	0.731
110.0	20	2499.002327	0.931
110.0	10	2499.001065	0.426
110.0	0	2499.001335	0.534
110.0	-10	2499.000848	0.339
110.0	-20	2499.001284	0.514
110.0	-30	2499.001310	0.524

CHANNEL BANDWIDTH	10MHz	MODE	Mid. channel

AFC FREQUENCY ERROR VS. VOLTAGE			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
93.5	20	2600.002183	0.840
110.0	20	2600.000951	0.366
126.5	20	2600.001708	0.657

AFC FREQUENCY ERROR VS. TEMP.			
VOLTAGE (Volts)	TEMP. (℃)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
110.0	50	2600.000767	0.295
110.0	40	2600.001050	0.404
110.0	30	2600.002003	0.770
110.0	20	2600.000951	0.366
110.0	10	2600.000972	0.374
110.0	0	2600.001076	0.414
110.0	-10	2600.000490	0.188
110.0	-20	2600.001726	0.664
110.0	-30	2600.000772	0.297

4.3 EMISSION BANDWIDTH MEASUREMENT

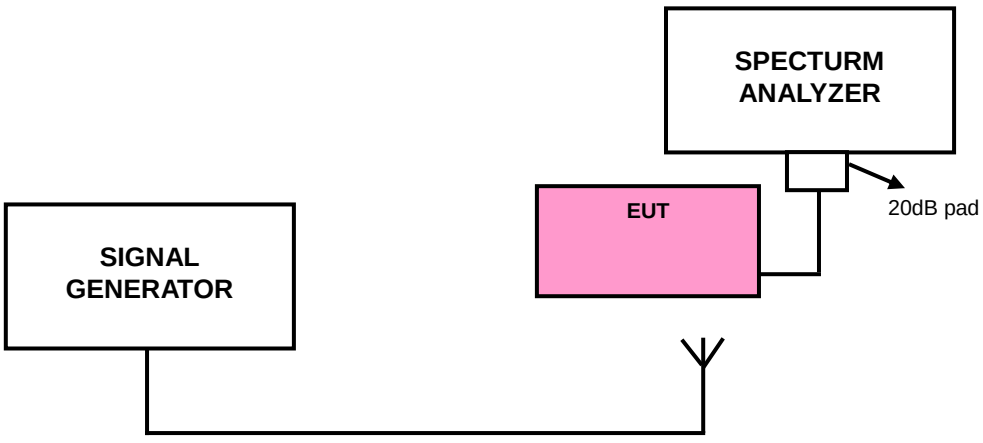
4.3.1 LIMITS OF EMISSION BANDWIDTH MEASUREMENT

According to FCC 27.53(m)(6) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.3.2 TEST PROCEDURE

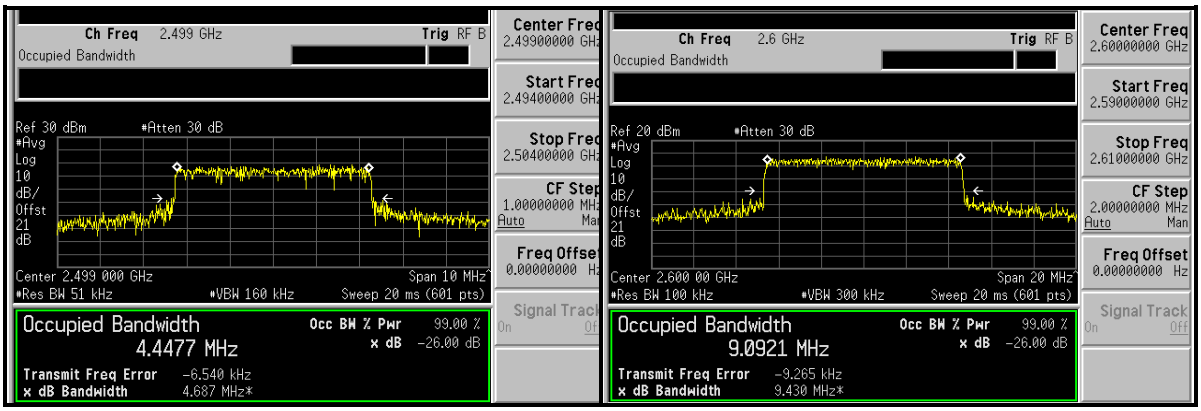
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 51kHz, VBW = 160kHz. The 26dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 26dB.

4.3.3 TEST SETUP



4.3.4 TEST RESULTS

CHANNEL	-26dBc BANDWIDTH (MHz)	
	CHANNEL BANDWIDTH 5MHz	CHANNEL BANDWIDTH 10MHz
Low	4.4477	9.0831
Middle	4.4468	9.0921
High	4.4352	9.0877



4.4 CHANNEL EDGE MEASUREMENT

4.4.1 LIMITS OF CHANNEL EDGE MEASUREMENT

According to FCC 27.53(m)(4) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor shall be not less than 43 + 10 log (P) dB at the channel edge, the limit of emission equal to –13dBm. And 55 + 10 log (P) dB at 5.5 MHz from the channel edges, the limit of emission equal to –25dBm.In the 1MHz 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.

4.4.2 TEST SETUP

Same as Item 4.3.4

4.4.3 TEST PROCEDURES

a. The EUT was set up for the rated peak power. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

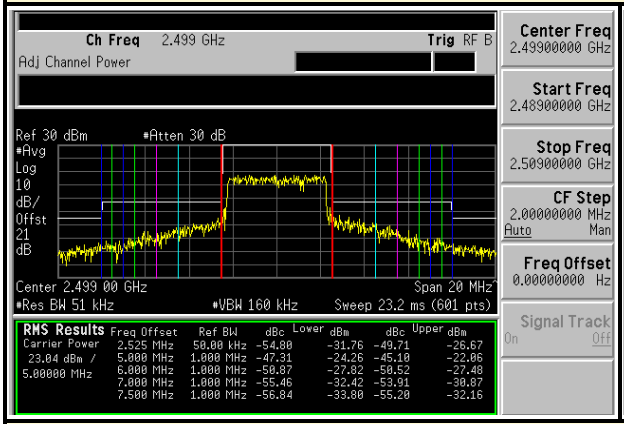
b. The center frequency of spectrum is the band edge frequency and span is 20MHz (Channel Bandwidth: 5MHz) / 30MHz (Channel Bandwidth: 10MHz). RBW of the spectrum is 51kHz (Channel Bandwidth: 5MHz) / 100kHz (Channel Bandwidth: 10MHz).

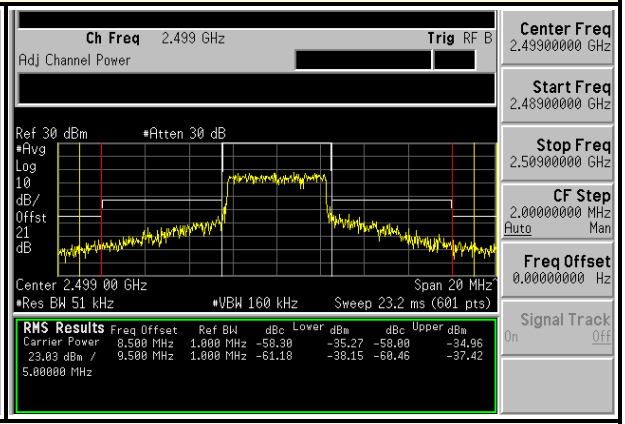
c. Record the max trace plot into the test report.

4.4.4 TEST RESULTS

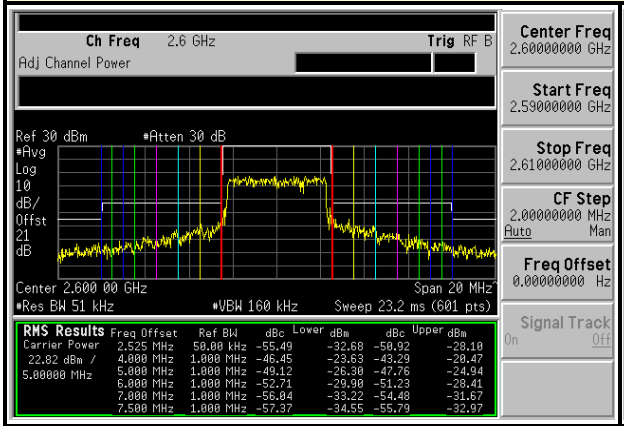
CHANNEL BANDWIDTH: 5MHz

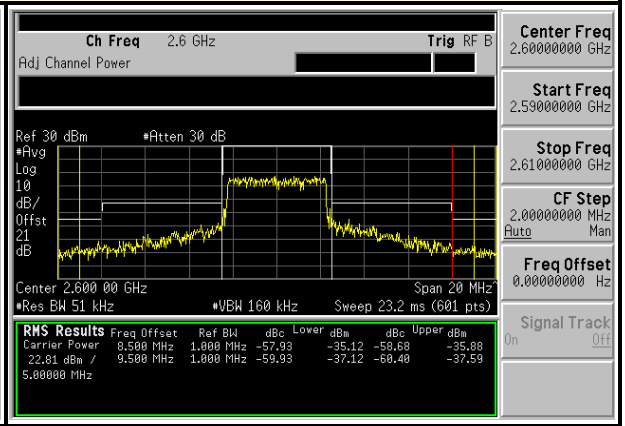
LOW CHANNEL



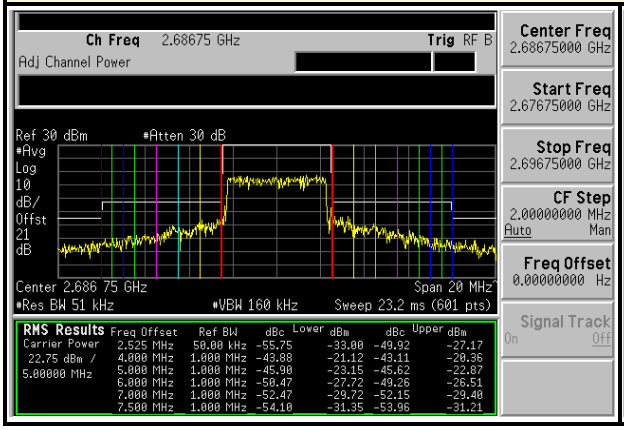


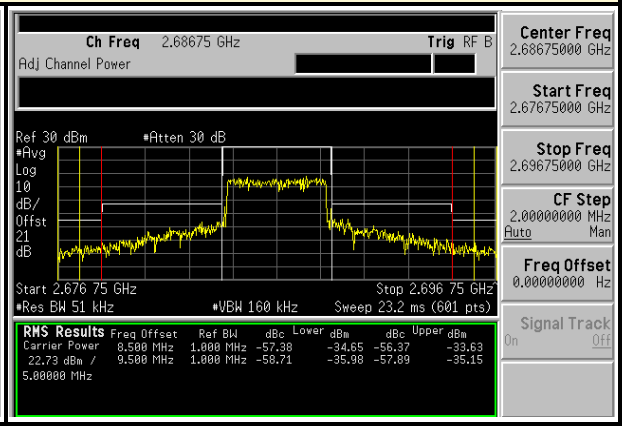
MIDDLE CHANNEL





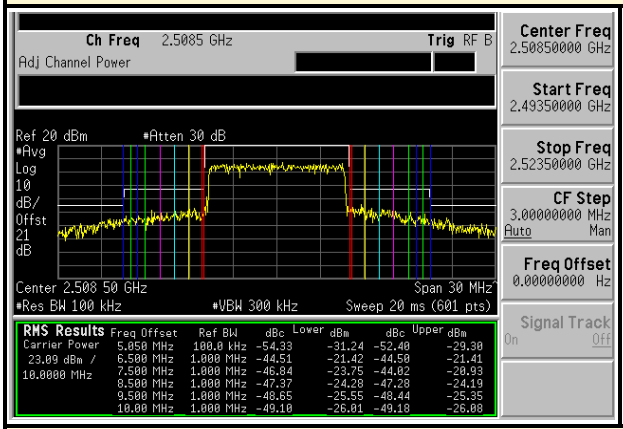
HIGH CHANNEL

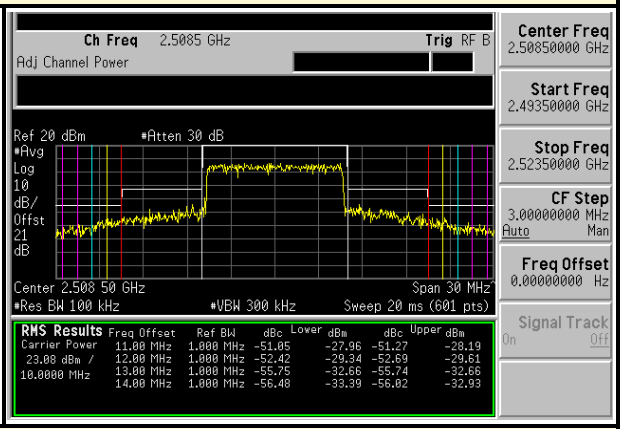




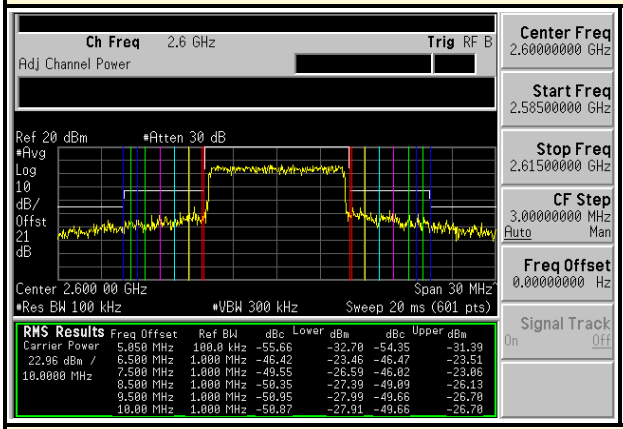
CHANNEL BANDWIDTH: 10MHz

LOW CHANNEL

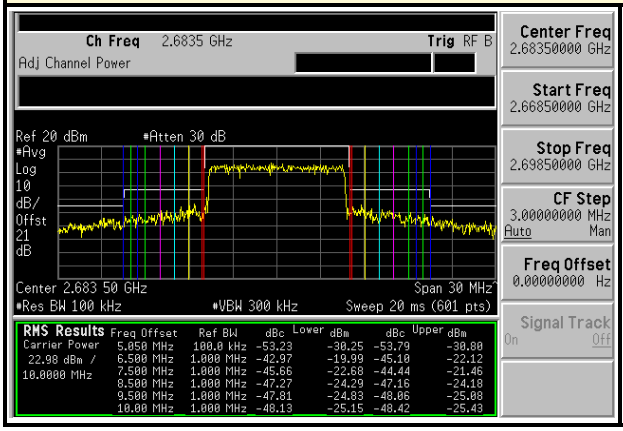


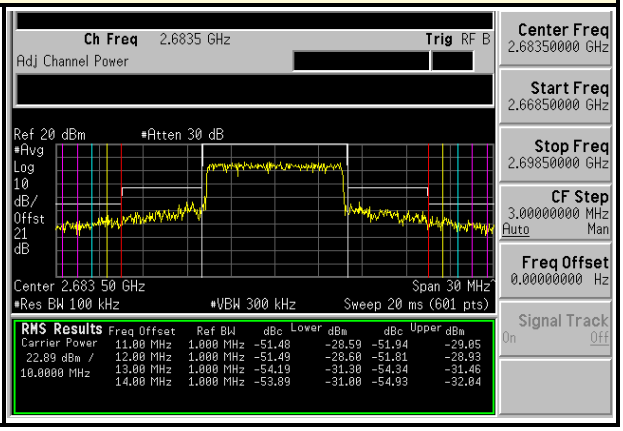


MIDDLE CHANNEL



HIGH CHANNEL





4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 27.53(m)(4), On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 55 +10 log (P)dB. The limit of emission equal to –25dBm.

4.5.2 TEST PROCEDURE

a. All measurements were done at 3 channels: low, middle and high operational frequency range.

b. When the spectrum scanned from 30MHz to 27GHz, it shall be connected to the 20dB pad attenuated the carried frequency. The spectrum set RB = 1MHz, VB = 3MHz.

4.5.3 TEST SETUP

Same as 4.3.4

4.5.4 EUT OPERATING CONDITIONS

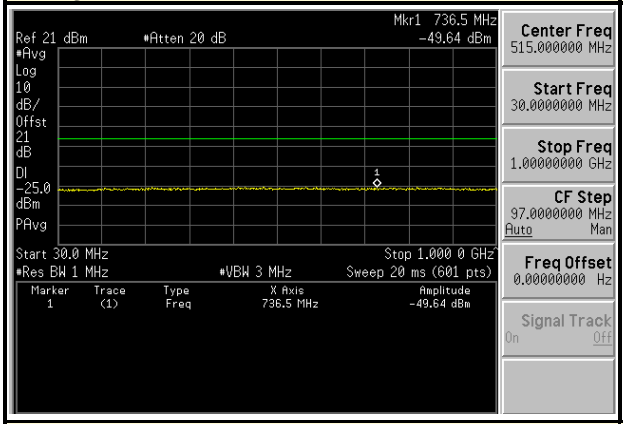
Same as 4.1.5

4.5.5 TEST RESULTS

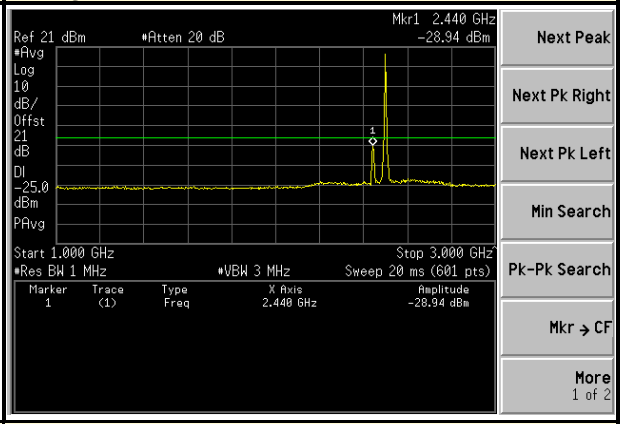
CHANNEL BANDWIDTH: 5MHz

LOW CHANNEL:

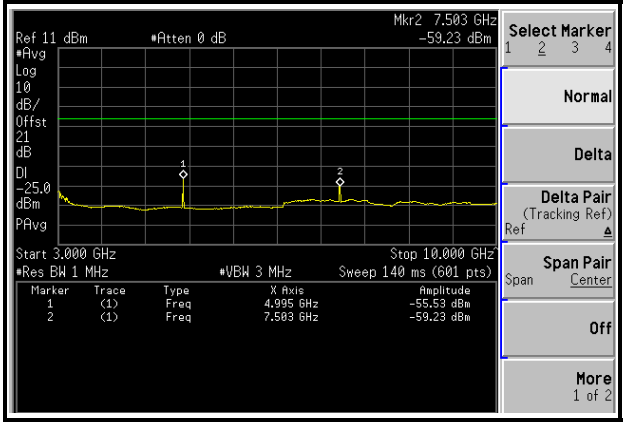
FREQUENCY RANGE : 30MHz~1GHz



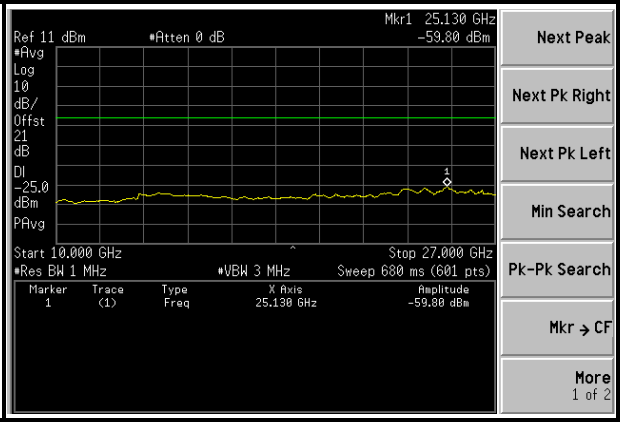
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~10GHz

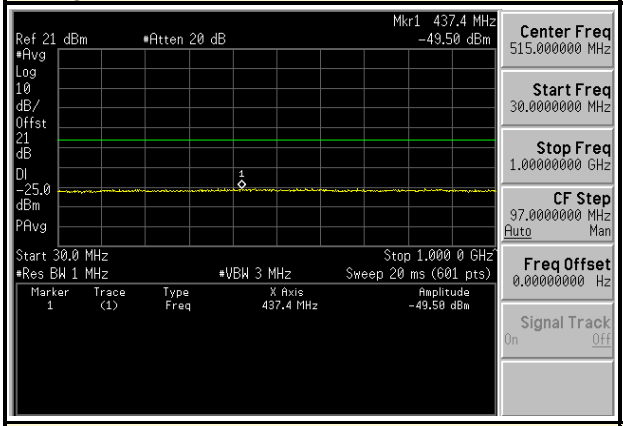


FREQUENCY RANGE : 10GHz~27GHz

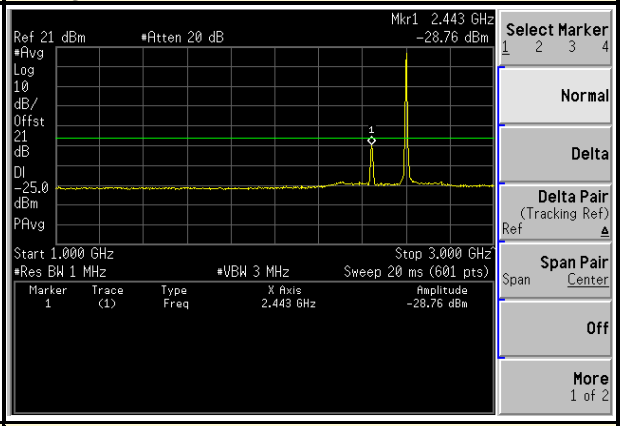


MIDDLE CHANNEL:

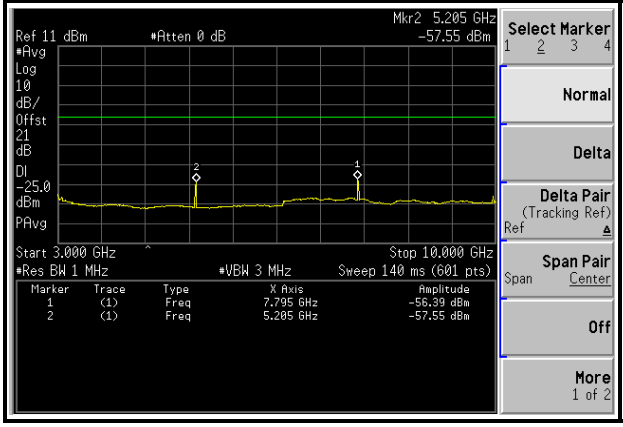
FREQUENCY RANGE : 30MHz~1GHz



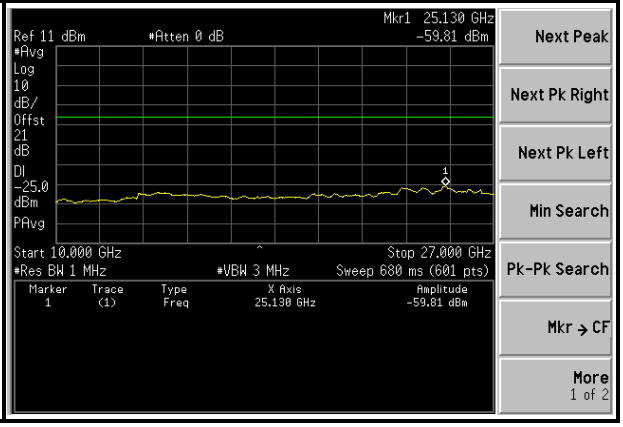
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~10GHz

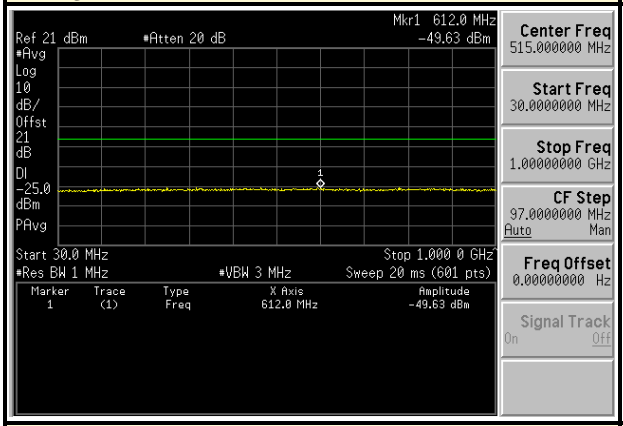


FREQUENCY RANGE : 10GHz~27GHz

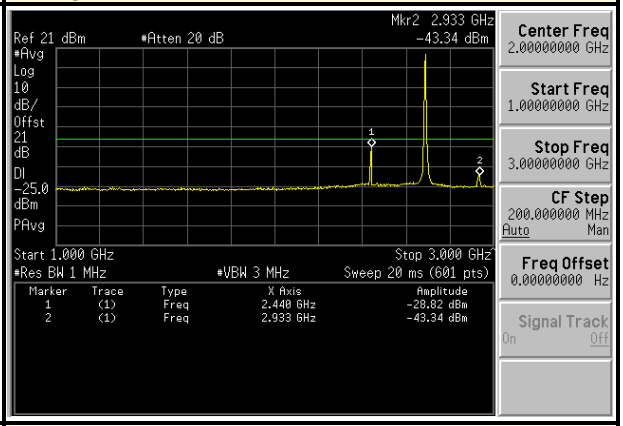


HIGH CHANNEL:

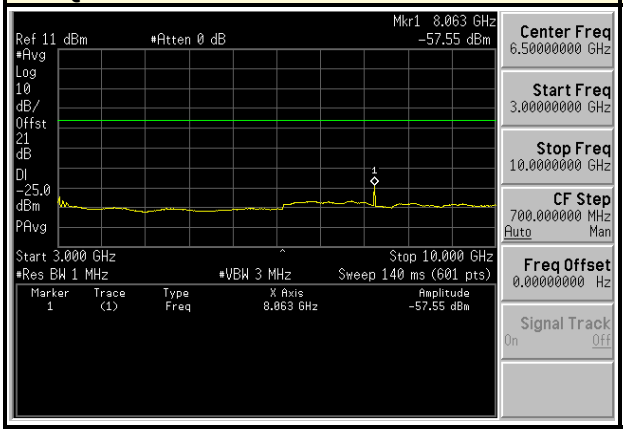
FREQUENCY RANGE : 30MHz~1GHz



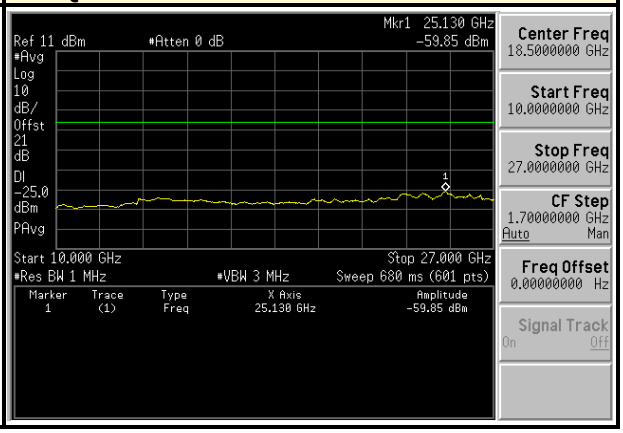
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~10GHz



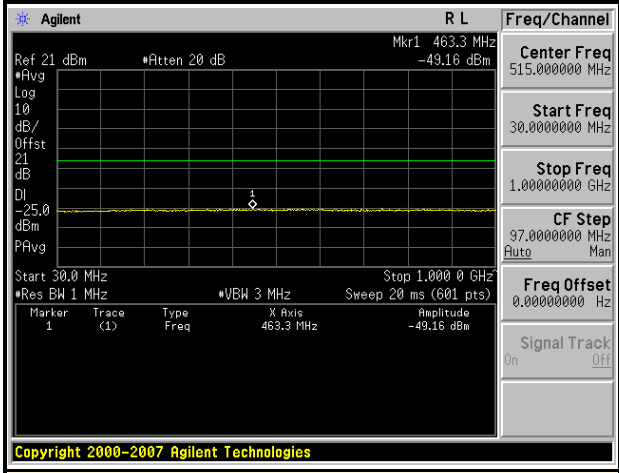
FREQUENCY RANGE : 10GHz~27GHz



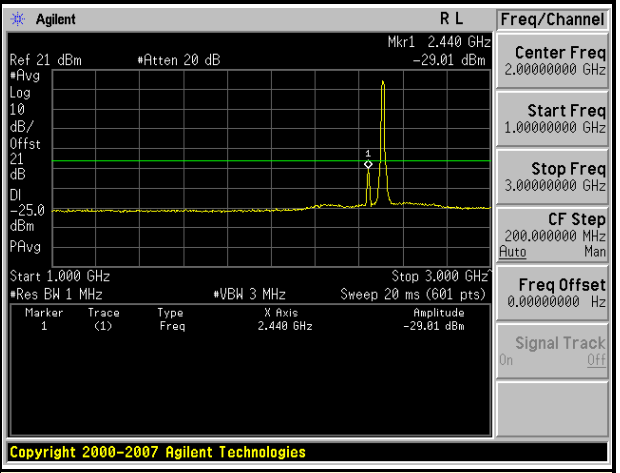
CHANNEL BANDWIDTH: 10MHz

LOW CHANNEL:

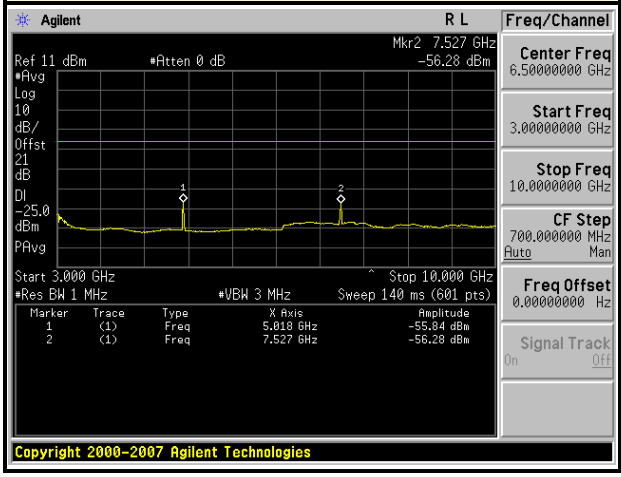
FREQUENCY RANGE : 30MHz~1GHz



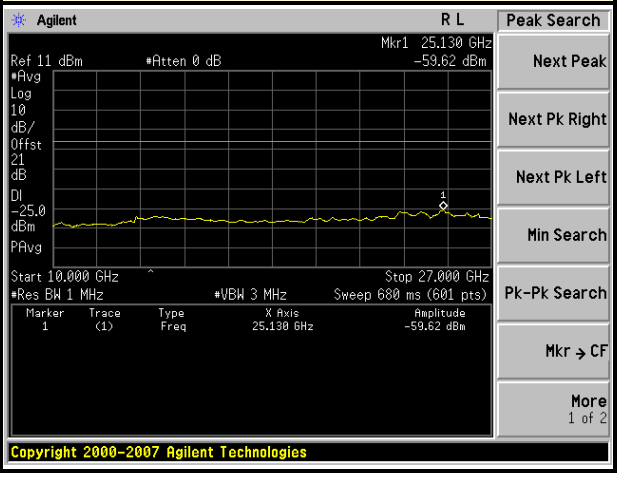
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~10GHz

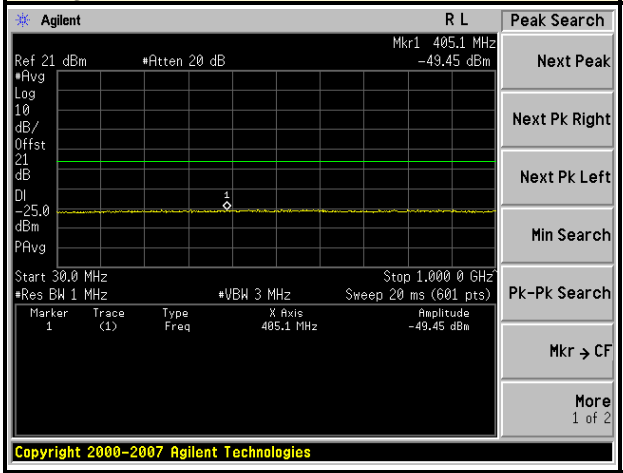


FREQUENCY RANGE : 10GHz~27GHz

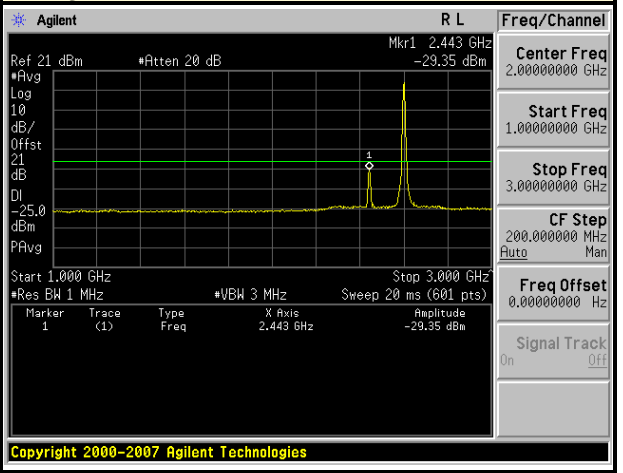


MIDDLE CHANNEL:

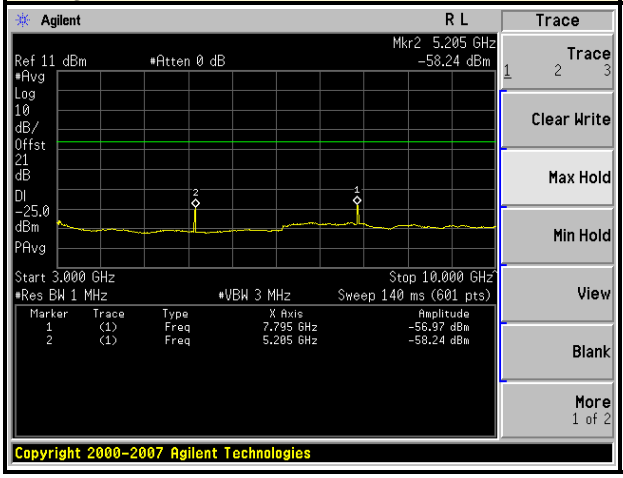
FREQUENCY RANGE : 30MHz~1GHz



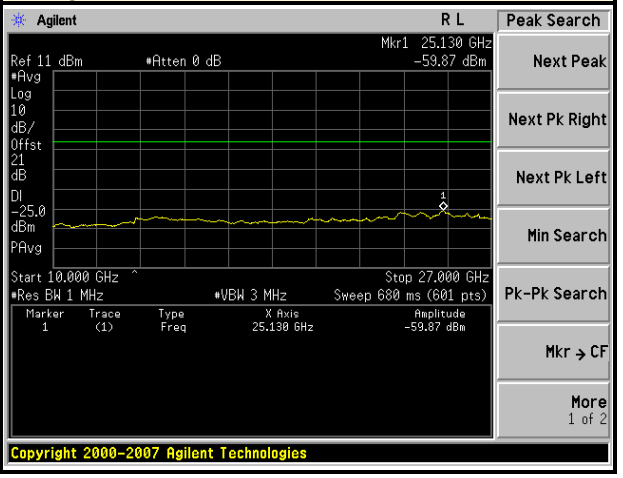
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~10GHz

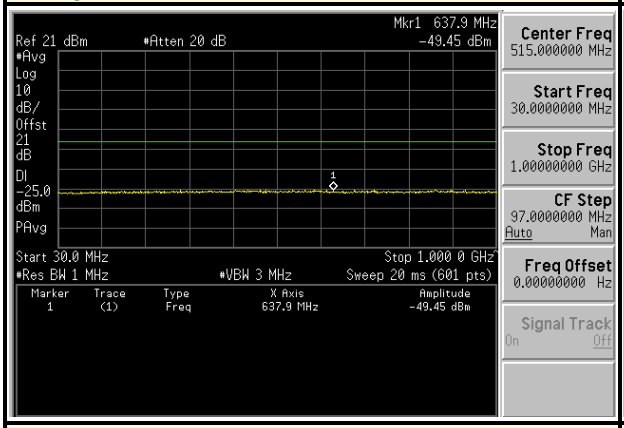


FREQUENCY RANGE : 10GHz~27GHz

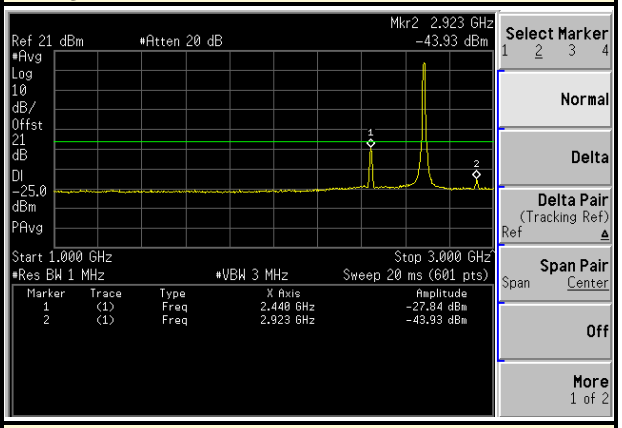


HIGH CHANNEL:

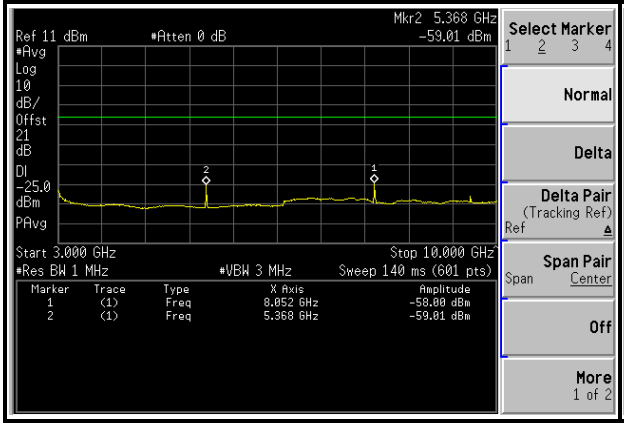
FREQUENCY RANGE : 30MHz~1GHz



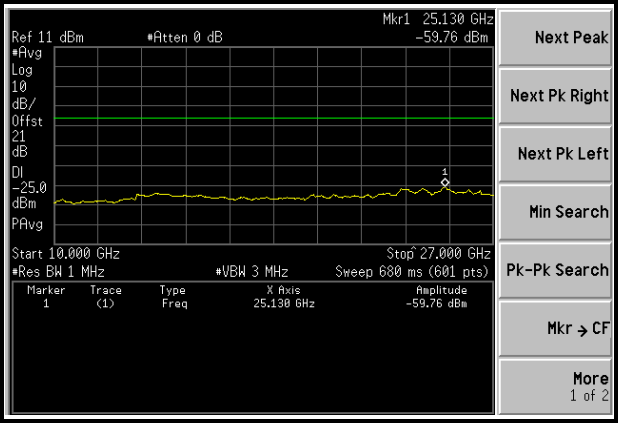
FREQUENCY RANGE : 1GHz~3GHz



FREQUENCY RANGE : 3GHz~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 equal to –13dBm.

4.6.2 TEST PROCEDURES

a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.

b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G

c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

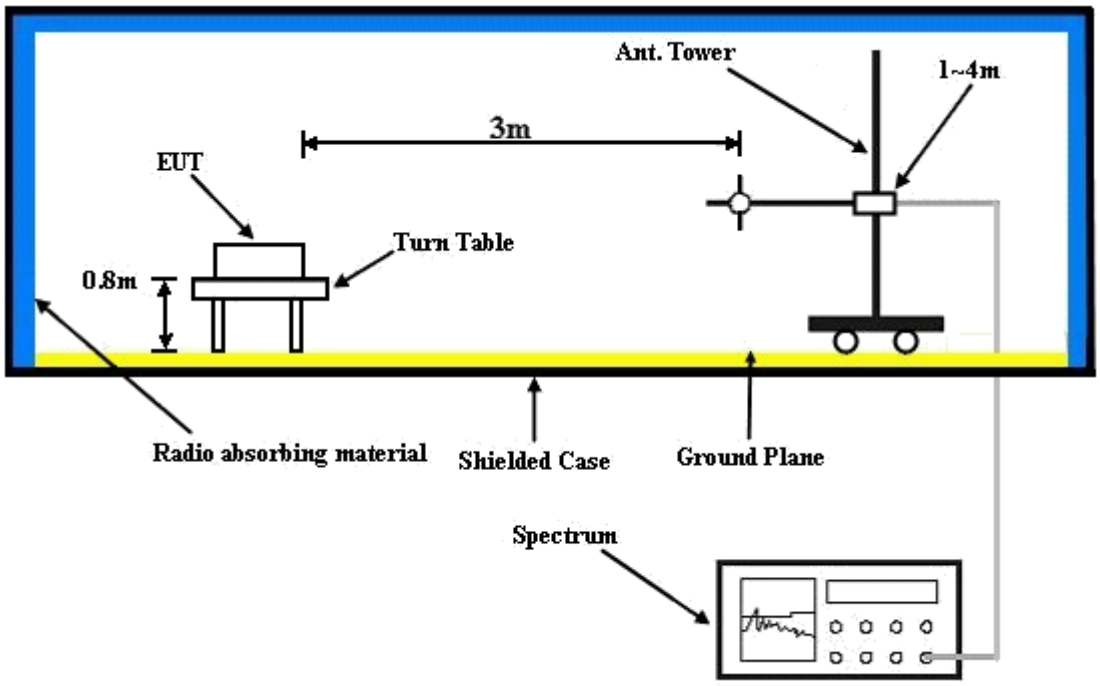
d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

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

4.6.3 DEVIATION FROM TEST STANDARD

No deviation

4.6.4 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.6.5 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

MODE	Low channel	FREQUENCY RANGE	Below 1000MHz
CHANNEL BANDWIDTH	5MHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-59.5	-41.5	-12.6	-54.1	-13.0	-41.1
2	55.22	-60.0	-52.4	-8.6	-61.0	-13.0	-48.0
3	150.28	-51.3	-55.8	0.0	-55.8	-13.0	-42.8
4	202.66	-47.8	-58.9	5.5	-53.4	-13.0	-40.4
5	359.80	-65.5	-71.4	5.2	-66.2	-13.0	-53.2
6	798.24	-58.4	-56.8	4.0	-52.8	-13.0	-39.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-48.3	-40.5	-12.6	-53.1	-13.0	-40.1
2	55.22	-51.7	-46.5	-8.6	-55.1	-13.0	-42.1
3	123.12	-52.3	-49.0	0.0	-49.0	-13.0	-36.0
4	208.48	-56.1	-53.9	5.5	-48.4	-13.0	-35.4
5	245.34	-56.5	-54.6	5.4	-49.2	-13.0	-36.2
6	359.80	-65.5	-65.6	5.2	-60.4	-13.0	-47.4

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

MODE	Low channel	FREQUENCY RANGE	Below 1000MHz
CHANNEL BANDWIDTH	5MHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-58.4	-40.9	-12.4	-53.3	-13.0	-40.3
2	175.50	-52.4	-59.1	2.3	-56.8	-13.0	-43.8
3	214.30	-49.5	-61.0	5.5	-55.5	-13.0	-42.5
4	414.12	-58.8	-63.8	5.2	-58.6	-13.0	-45.6
5	596.48	-57.8	-60.9	4.5	-56.4	-13.0	-43.4
6	664.38	-54.6	-56.9	5.0	-51.9	-13.0	-38.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-42.8	-35.0	-12.6	-47.6	-13.0	-34.6
2	90.14	-51.0	-46.6	1.1	-45.5	-13.0	-32.5
3	206.54	-54.7	-52.5	5.5	-47.0	-13.0	-34.0
4	276.38	-56.9	-55.7	5.3	-50.4	-13.0	-37.4
5	365.62	-58.3	-58.7	5.2	-53.5	-13.0	-40.5
6	476.20	-58.5	-61.0	5.0	-56.0	-13.0	-43.0

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

MODE	Low channel	FREQUENCY RANGE	Below 1000MHz
CHANNEL BANDWIDTH	10MHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-59.4	-41.4	-12.6	-54.0	-13.0	-41.0
2	55.22	-60.1	-52.5	-8.6	-61.1	-13.0	-48.1
3	150.28	-53.2	-57.7	0.0	-57.7	-13.0	-44.7
4	218.18	-48.6	-60.2	5.5	-54.7	-13.0	-41.7
5	229.82	-52.0	-63.3	5.4	-57.9	-13.0	-44.9
6	359.80	-65.4	-71.3	5.2	-66.1	-13.0	-53.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-47.1	-39.3	-12.6	-51.9	-13.0	-38.9
2	70.74	-56.7	-50.8	-4.8	-55.6	-13.0	-42.6
3	123.12	-52.6	-49.3	0.0	-49.3	-13.0	-36.3
4	206.54	-55.7	-53.5	5.5	-48.0	-13.0	-35.0
5	295.78	-67.3	-66.5	5.2	-61.3	-13.0	-48.3
6	357.86	-65.9	-65.9	5.2	-60.7	-13.0	-47.7

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

MODE	Low channel	FREQUENCY RANGE	Below 1000MHz
CHANNEL BANDWIDTH	10MHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-58.3	-40.8	-12.4	-53.2	-13.0	-40.2
2	175.50	-53.3	-60.0	2.3	-57.7	-13.0	-44.7
3	231.76	-51.0	-62.2	5.4	-56.8	-13.0	-43.8
4	553.80	-61.8	-66.0	4.6	-61.4	-13.0	-48.4
5	666.32	-56.4	-58.7	5.0	-53.7	-13.0	-40.7
6	722.58	-62.1	-62.6	5.0	-57.6	-13.0	-44.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-45.3	-37.5	-12.6	-50.1	-13.0	-37.1
2	90.14	-52.5	-48.1	1.1	-47.0	-13.0	-34.0
3	212.36	-54.9	-52.7	5.5	-47.2	-13.0	-34.2
4	336.52	-61.8	-61.9	5.2	-56.7	-13.0	-43.7
5	470.38	-63.7	-66.3	5.0	-61.3	-13.0	-48.3
6	664.38	-59.7	-66.9	5.0	-61.9	-13.0	-48.9

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

ABOVE 1GHz

MODE	Low channel	FREQUENCY RANGE	Above 1000MHz
CHANNEL BANDWIDTH	5MHz		

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	4998.00	-58.7	-52.2	6.6	-45.6	-13.0	-32.6
2	7497.00	-66.2	-52.7	4.2	-48.5	-13.0	-35.5
3	9996.00	-62.7	-44.9	3.5	-41.4	-13.0	-28.4
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	4998.00	-56.9	-52.1	6.6	-45.5	-13.0	-32.5
2	7497.00	-63.8	-50.6	4.2	-46.4	-13.0	-33.4
3	9996.00	-68.2	-53.0	3.5	-49.5	-13.0	-36.5

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

MODE	Mid. channel	FREQUENCY RANGE	Above 1000MHz
CHANNEL BANDWIDTH	5MHz		

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	5200.00	-57.7	-50.7	6.7	-44.0	-13.0	-31.0
2	7800.00	-62.7	-48.7	4.1	-44.6	-13.0	-31.6
3	10400.00	-65.0	-46.2	3.0	-43.2	-13.0	-30.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5200.00	-59.8	-55.0	6.7	-48.3	-13.0	-35.3
2	7800.00	-69.8	-56.0	4.1	-51.9	-13.0	-38.9
3	10400.00	-69.7	-51.4	3.0	-48.4	-13.0	-35.4

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

MODE	High channel	FREQUENCY RANGE	Above 1000MHz
CHANNEL BANDWIDTH	5MHz		

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	5373.50	-54.2	-46.8	6.8	-40.0	-13.0	-27.0
2	8060.25	-48.1	-33.8	4.1	-29.7	-13.0	-16.7
3	10747.00	-56.5	-36.8	2.4	-34.4	-13.0	-21.4
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	5373.50	-54.5	-49.8	6.8	-43.0	-13.0	-30.0
2	8060.25	-66.8	-52.8	4.1	-48.7	-13.0	-35.7
3	10747.00	-66.8	-47.8	2.4	-45.4	-13.0	-32.4

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

MODE	Low channel	FREQUENCY RANGE	Above 1000MHz
CHANNEL BANDWIDTH	10MHz		

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	5017.00	-57.4	-50.8	6.6	-44.2	-13.0	-31.2
2	7525.50	-61.3	-47.8	4.2	-43.6	-13.0	-30.6
3	10034.00	-68.7	-50.9	3.5	-47.4	-13.0	-34.4
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	5017.00	-50.2	-45.4	6.6	-38.8	-13.0	-25.8
2	7525.00	-62.9	-49.6	4.2	-45.4	-13.0	-32.4
3	10034.00	-65.8	-50.4	3.5	-46.9	-13.0	-33.9

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

MODE	Mid. channel	FREQUENCY RANGE	Above 1000MHz
CHANNEL BANDWIDTH	10MHz		

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	5200.00	-53.4	-46.4	6.7	-39.7	-13.0	-26.7
2	7800.00	-55.1	-41.1	4.1	-37.0	-13.0	-24.0
3	10400.00	-63.7	-44.9	3.0	-41.9	-13.0	-28.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	5200.00	-54.2	-49.4	6.7	-42.7	-13.0	-29.7
2	7800.00	-62.4	-48.6	4.1	-44.5	-13.0	-31.5
3	10400.00	-69.5	-51.2	3.0	-48.2	-13.0	-35.2

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

MODE	High channel	FREQUENCY RANGE	Above 1000MHz
CHANNEL BANDWIDTH	10MHz		

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	5367.00	-48.4	-41.0	6.8	-34.2	-13.0	-21.2
2	8050.50	-52.3	-38.1	4.1	-34.0	-13.0	-21.0
3	10734.00	-58.5	-38.9	2.5	-36.4	-13.0	-23.4
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	5367.00	-50.7	-46.0	6.8	-39.2	-13.0	-26.2
2	8050.50	-58.9	-44.9	4.1	-40.8	-13.0	-27.8
3	10734.00	-64.1	-45.1	2.5	-42.6	-13.0	-29.6

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

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).

6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml. If you have any comments, please feel free to contact us at the following:

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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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