FCC TEST REPORT

(PART 25)

REPORT NO.: RF981218L08-2

MODEL NO.: WIXFBR-103 (refer to item 3.1 for detail)

RECEIVED: Dec. 18, 2009

TESTED: Feb. 22 ~ Mar. 12, 2010

ISSUED: Mar. 13, 2010

APPLICANT: Gemtek Technology Co., Ltd.

ADDRESS: No. 15-1, Zhonghua Rd, Hsinchu Industrial Park , Hsinchu County, Taiwan, R.O.C. 303

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, 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.

TABLE OF CONTENTS

1 CERTIFICATION

PRODUCT: WiMAX Indoor CPE (refer to item 3.1 for detail)
MODEL: WIXFBR-103 (refer to item 3.1 for detail)
BRAND: Gemtek (refer to item 3.1 for detail)
APPLICANT: Gemtek Technology Co., Ltd.
TESTED: Feb. 22 ~ Mar. 12, 2010
TEST SAMPLE: ENGINEERING SAMPLE
TEST STANDARDS: **FCC Part 25 Subpart C**

The above equipment (Model: WIXFBR-103) 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	: Peggy Chen / Specialist	**, DATE :**	Mar. 13, 2010
TECHNICAL ACCEPTANCE Responsible for RF	: Long Chen / Senior Engineer	**, DATE :**	Mar. 13, 2010
APPROVED BY	: Gary Chang / Assistant Manager	**, DATE :**	Mar. 13, 2010

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

STANDARD SECTION FCC Part 25	TEST TYPE AND LIMIT	RESULT	REMARK
25.254 (b)(2)	Peak EIRP Peak EIRP limit of 1.0 dBW in 1.25 MHz	PASS	Meet the requirement of limit.
25.254 (b)(3)	Out of channel EIRP Limit is -57.1 dBW/30 kHz	PASS	Meet the requirement of limit.
25.254 (b)(1)	Out of channel emission in 1610.6 – 1613.8 MHz band Meet the requirements to protect radio astronomy service (RAS) observations in the1610.6–1613.8 MHz band from un acceptable interference	PASS	Meet the requirement of limit.
FCC 08-254 (35)	EIRP density in 1559 – 1610 MHz band EIRP density limit for wideband emissions of -90 dBW/MHz and an EIRP density limit of -100 dBW/kHz for narrowband emissions	PASS	Meet the requirement of limit.

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	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~1000MHz	3.21 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.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	WiMAX Indoor CPE (refer to note for detail)
MODEL NO.	WIXFBR-103 (refer to note for detail)
FCC ID	MXF-WIXFBR-103
POWER SUPPLY	12Vdc
MODULATION TYPE	QPSK, 16QAM, 64QAM (refer to NOTE for more details)
CODING RATE	1/2, 2/3, 3/4, 5/6 (refer to NOTE for more details)
MODULATION TECHNOLOGY	OFDMA
DUPLEX METHOD	TDD
OPERATING RANGE	2487.5MHz ~ 2492.5MHz
CHANNEL BANDWIDTH	5MHz, 10MHz
MAX. E.I.R.P. POWER	33.54dBm (2.259W)
ANTENNA TYPE	Refer to NOTE 4 as below
OPERATION TEMPERATURE RANGE	0°C ~ 45°C
DATA CABLE	NA
I/O PORTS	RJ45, RJ11
ACCESSORY DEVICES	AC Adapter

NOTE:

1. The EUT is a WiMAX Indoor CPE. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g	FCC Part 15, Subpart C (Section 15.247)	RF981218L08
WiMAX (2496~2690MHz)	FCC Part 27, Subpart C & M	RF981218L08-1
WiMAX (2483.5~2495MHz)	FCC Part 25	RF981218L08-2

2. All models are electrically identical, different model names are for marketing purpose.

BRAND	MODEL	PRODUCT NAME	REMARK
Gemtek	WIXFBR-103	WiMAX Indoor CPE	-
Alvarion	4M-CPE4000-Si-2D-2V-WiFi-2.5	CPE4000-Si	For marketing different

3. The EUT was powered by the following adapter:

BRAND:	DVE
MODEL:	DSA-26PFA-15 FUS 120200
INPUT:	100-240Vac, 50/60Hz, 0.8A
OUTPUT:	12Vdc, 2A
POWER LINE:	1.5 m non-shielded cable without core

4. The EUT used two antennas listed as below:

ANTENNA ITEM	ANTENNA TYPE	ANTENNA CONNECTER	ANTENNA GAIN (dBi)
MAIN ANTENNA	Dipole Antenna (omni-directional)	IPEX-PLUG	7
AUX. ANTENNA	Dipole Antenna (omni-directional)	IPEX-PLUG	7

**For final tested, Aux. antenna was chosen for tested and presented in the test report.

5. For the EUT with modulation type and coding rate. After pre-testing in test items of output power and spurious emissions, 16QAM was found to be worst case and was selected for the final test configuration.

DOWN LINK		UP LINK	
MODULATION	CODING RATE	MODULATION	CODING RATE
QPSK	1/2	QPSK	1/2
	3/4		3/4
16QAM	1/2	16QAM	1/2
	3/4		3/4
64QAM	1/2		
	2/3		
	3/4		
	5/6		

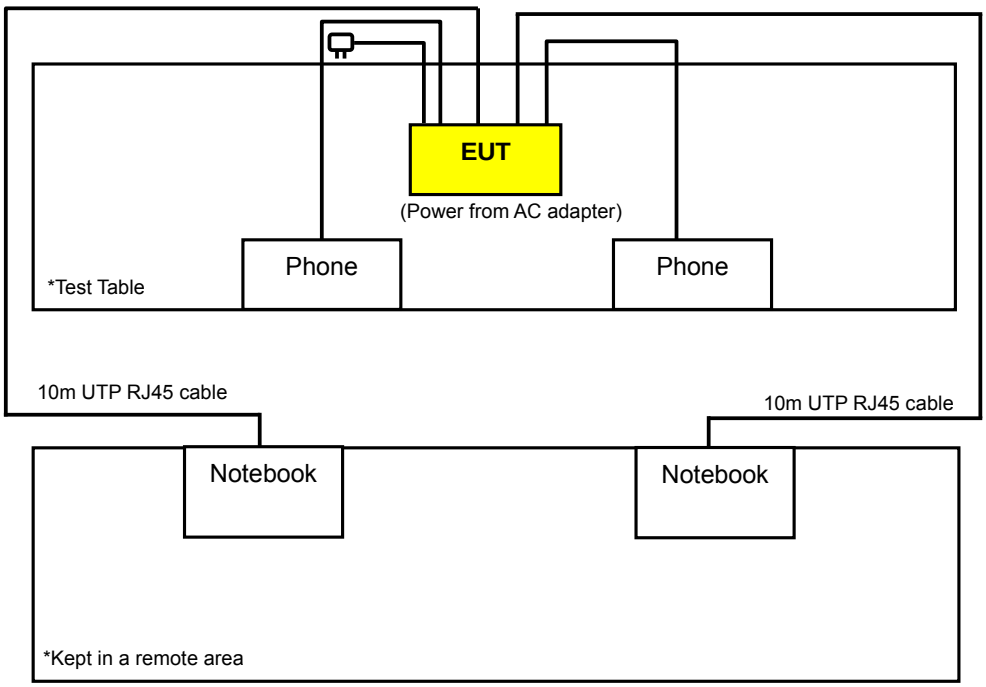
6. The EUT can supports different UL / DL ratio, max transmit ratio is up to 18 (UL): 29 (DL). After pretesting of output power and spurious emission, 18 (UL): 29 (DL) was found to be worst case and was selected for the final test configuration.
7. The above EUT information was declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Three channels had been tested for each channel bandwidth.

CHANNEL BANDWIDTH: 5MHz	CHANNEL BANDWIDTH: 10MHz
Low channel (L): 2487.5MHz.	**Channel**: 2490.0MHz.
High channel (H): 2492.5MHz.	

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	OB	CE	CSE	RE<1G	RE≥1G	
-	√	√	√	√	√	√	√	-

Where **OP:** Output power **FS:** Frequency stability
OB: Occupied bandwidth **CE:** Channel edge
CSE: Conducted spurious emissions **RE<1G:** Radiated emission below 1GHz
RE≥1G: Radiated emission above 1GHz

OUTPUT POWER MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2487.5 & 2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

FREQUENCY STABILITY MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

EMISSION BANDWIDTH MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2487.5 & 2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

CHANNEL EDGE MEASUREMENT:

☒□ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2487.5 & 2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

☒□ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate, and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2487.5 & 2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

☒□ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

☒□ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, coding rate and antenna ports (if EUT with antenna diversity architecture).

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

TESTED FREQUENCY (MHZ)	MODULATION TECHNOLOGY	CHANNEL BANDWIDTH	MODULATION TYPE	CODING RATE
2487.5 & 2492.5	OFDMA	5MHz	16QAM	1/2
2490	OFDMA	10MHz	16QAM	1/2

3.3 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 25

ANSI/TIA/EIA-603-C-2004

FCC KDB 273109 D01 Equip Auth Guide Part 25 TXReceiver v02

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.

3.4 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	TELEPHONE	WONDER	WD-303	5C17DA09835	NA
2	TELEPHONE	WONDER	WD-303	5C17DA09279	NA
3	NOTEBOOK COMPUTER	DELL	PP05L	12130898320	E2K24CLNS
4	NOTEBOOK COMPUTER	DELL	D531	CN-0XM006-48643-81U-2973	QDS-BRCM1020

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8m UTP RJ11 cable.
2	1.8m UTP RJ11 cable.
3	10m UTP RJ45 cable.
4	10m UTP RJ45 cable.

NOTE: 1. All power cords of the above support units are non shielded (1.8m).
2. Item 3, 4 acted as communication partners to transfer data.

3.5 TESTINSTRUCMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 29, 2009	Dec. 28, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	May 13, 2009	May 12, 2010
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 29, 2009	Apr. 28, 2010
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-209	Jul. 01, 2009	Jun. 30, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Dec. 25, 2009	Dec. 24, 2010
Preamplifier Agilent	8449B	3008A01961	Nov. 04, 2009	Nov. 03, 2010
Preamplifier Agilent	8447D	2944A10738	Nov. 04, 2009	Nov. 03, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274041/4	Aug. 28, 2009	Aug. 27, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Aug. 28, 2009	Aug. 27, 2010
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller ADT.	SC100.	SC93021704	NA	NA
* WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 26, 2008	Jun. 25, 2009

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 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 988962.

5. The IC Site Registration No. is IC7450F-4.

4 TEST TYPES AND RESULTS

4.1 PEAK EIRP MEASUREMENT

4.1.1 LIMITS OF PEAK EIRP MEASUREMENT

Per FCC Part 25.254(b)(2) and FCC KDB 273109 D01 Equip Auth Guide Part 25 TXReceiver v02, the limit is as below table.

Phone type and Mode	Power Available (dBW)	Antenna Gain (dBic or dBi)	EIRP (dBW)	Density (dBW/1.25MHz)	Density (dBW/4kHz)
Handheld ATC	-7	2	-5	-5	-29.9
Fixed ATC	-2	12	10	1	-23.9

Note : 1dBW/1.25MHz = 31dBm/1.25MHz
-23.9dBW/4kHz= 6.1dBm/4kHz

4.1.2 TEST PROCEDURES

MAX EIRP MEASUREMENT

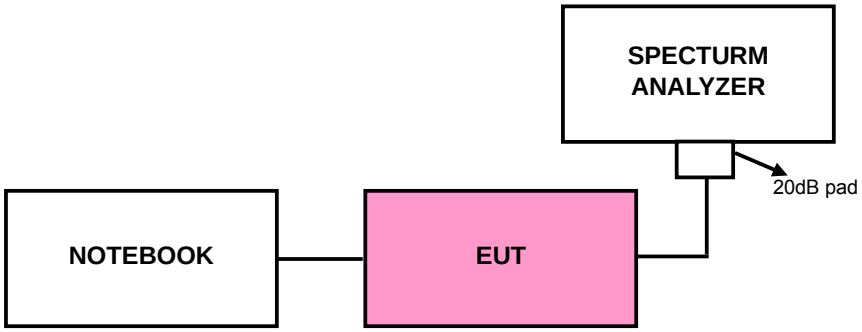
a. The transmitter output was connected to the spectrum analyzer through an attenuator.
b. Using channel power function to measure the conducted power
c. EIRP= Measured power of Step2 +Antenna gain

MAX EIRP DENSITY MEASUREMENT

a. The transmitter output was connected to the spectrum analyzer through an attenuator.
b. Using channel power function to measure the conducted power density
c. EIRP DENSITY= Measured power of Step2 +Antenna gain

4.1.3 TEST SETUP

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



4.1.4 EUT OPERATING CONDITIONS

a. Placed the EUT on a testing table.
b. Prepared a notebook computer and placed it outside of testing area to act as communication partner for EUT.
c. The EUT ran a test program (provided by manufacturer) to enable all functions under transmission condition continuously at specific channel frequency.

4.1.5 TEST RESULTS

INPUT POWER	120Vac, 60Hz	**CHANNEL BANDWIDTH**	5MHz
ENVIRONMENTAL CONDITIONS	22deg°C, 60%RH 991hPa	**TESTED BY**	Dean Wang

PEAK EIRP					
FREQUENCY (MHz)	**CONDUCTED POWER (dBm)**	**ANTENNA GAIN (dBi)**	**EIRP (dBm)**	**EIRP (W)**	**LIMIT (W)**
2487.5	23.51	7	30.51	1.125	10
2492.5	23.58	7	30.58	1.143	10

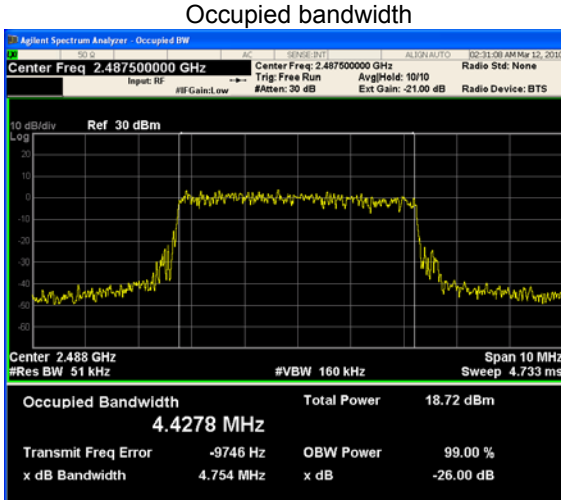
PEAK EIRP DENSITY PER 1.25MHz				
FREQUENCY (MHz)	**CONDUCTED POWER (dBm)**	**ANTENNA GAIN (dBi)**	**EIRP DENSITY (dBm)**	**LIMIT (dBm)**
2487.5	18.74	7	25.74	31
2492.5	18.67	7	25.67	31

PEAK EIRP DENSITY PER 4KHz				
FREQUENCY (MHz)	**CONDUCTED POWER (dBm)**	**ANTENNA GAIN (dBi)**	**EIRP DENSITY (dBm)**	**LIMIT (dBm)**
2487.5	-10.08	7	-3.08	6.1
2492.5	-9.91	7	-2.91	6.1

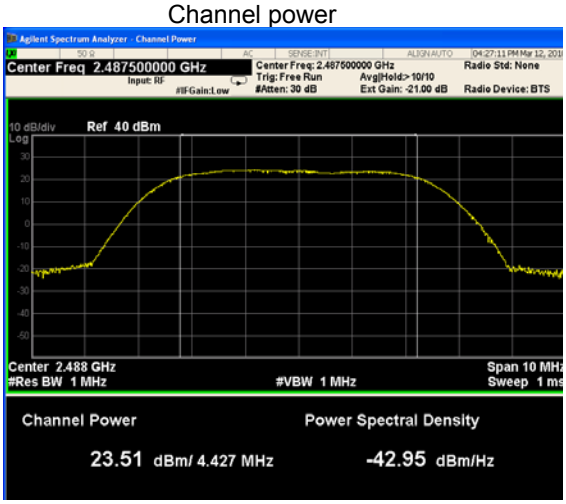
Conducted power

Frequency: 2487.5MHz

Occupied bandwidth

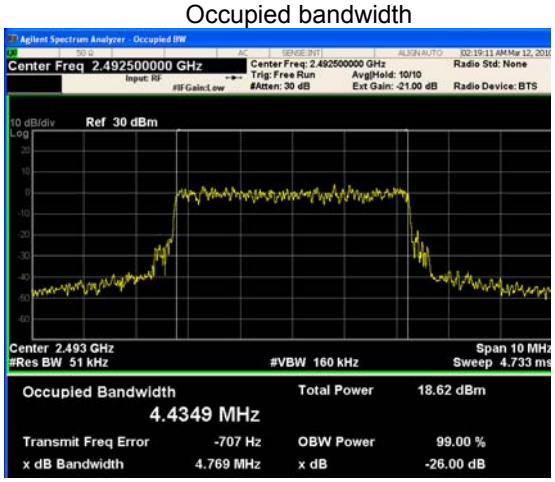


Channel power

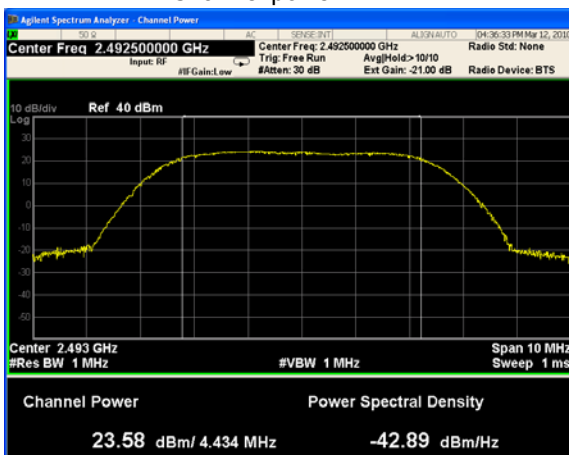


Frequency: 2492.5MHz

Occupied bandwidth

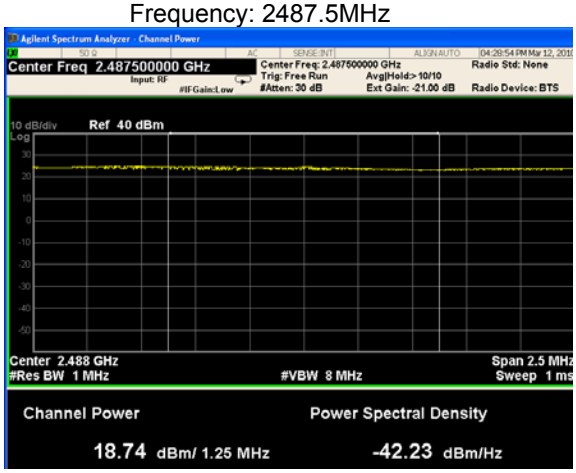


Channel power

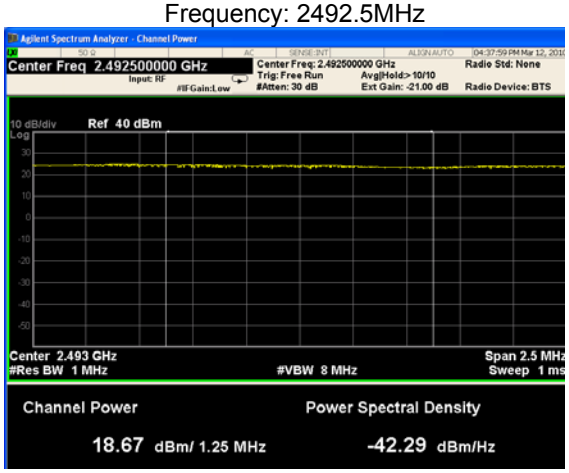


Conducted power density per 1.25MHz

Frequency: 2487.5MHz

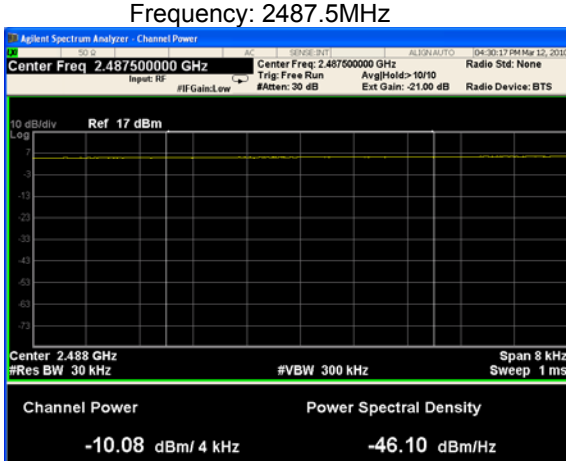


Frequency: 2492.5MHz

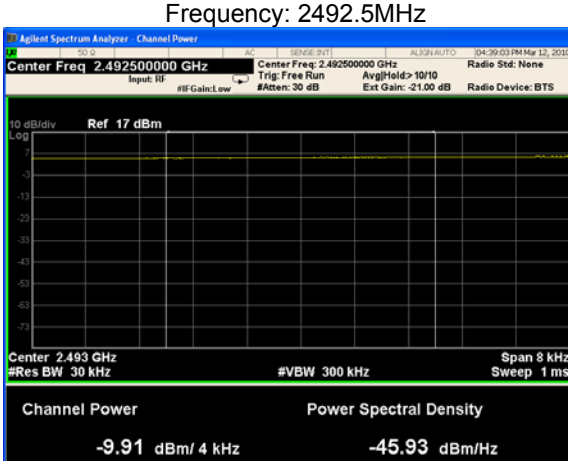


Conducted power density per 4kHz

Frequency: 2487.5MHz



Frequency: 2492.5MHz



INPUT POWER	120Vac, 60Hz	**CHANNEL BANDWIDTH**	10MHz
ENVIRONMENTAL CONDITIONS	22deg°C, 60%RH 991hPa	**TESTED BY**	Dean Wang

PEAK EIRP					
FREQUENCY (MHz)	**CONDUCTED POWER (dBm)**	**ANTENNA GAIN (dBi)**	**EIRP (dBm)**	**EIRP (W)**	**LIMIT (W)**
2490	26.54	7	33.54	2.259	10

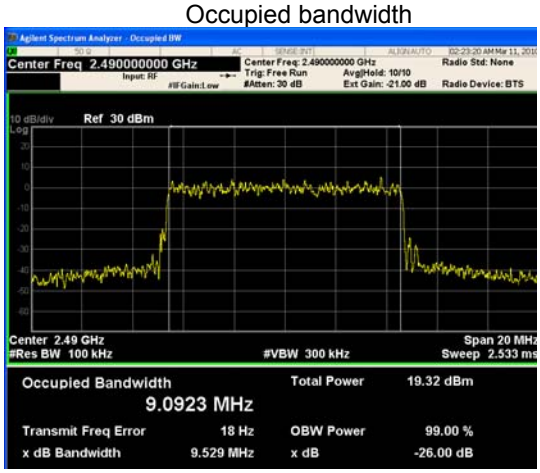
PEAK EIRP DENSITY PER 1.25MHz				
FREQUENCY (MHz)	**CONDUCTED POWER (dBm)**	**ANTENNA GAIN (dBi)**	**EIRP DENSITY (dBm)**	**LIMIT (dBm)**
2490	18.75	7	25.75	31

PEAK EIRP DENSITY PER 4KHz				
FREQUENCY (MHz)	**CONDUCTED POWER (dBm)**	**ANTENNA GAIN (dBi)**	**EIRP DENSITY (dBm)**	**LIMIT (dBm)**
2490	-9.03	7	-2.03	6.1

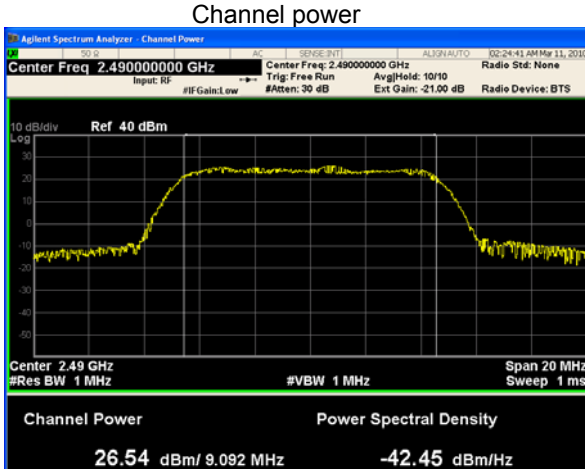
Conducted power

Frequency: 2490MHz

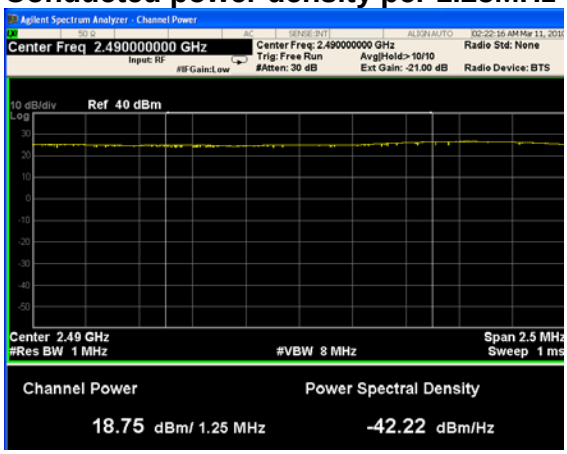
Occupied bandwidth



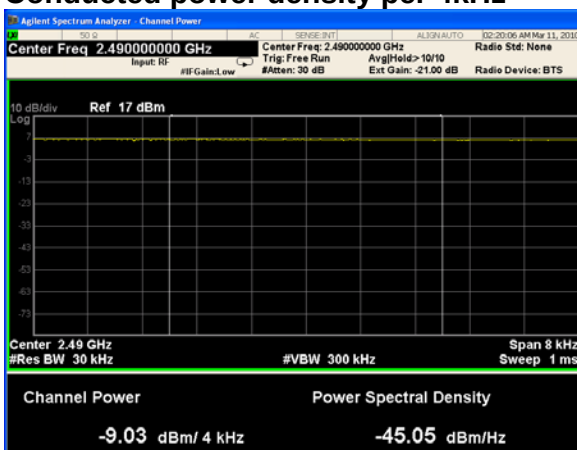
Channel power



Conducted power density per 1.25MHz



Conducted power density per 4kHz



4.2 OUT OF CHANNAL EIRP MEASUREMENT

4.2.1 LIMITS OF OUT OF CHANNAL MEASUREMENT

Per FCC PART 25.254(b)(3),out-of-channel EIRP limit of -57.1 dBW/30 kHz at the edge of the licensed MSS frequency assignment.

4.2.2 TEST PROCEDURES

RADIATED MEASUREMENT

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of 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 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 antenna.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 30kHz/100kHz

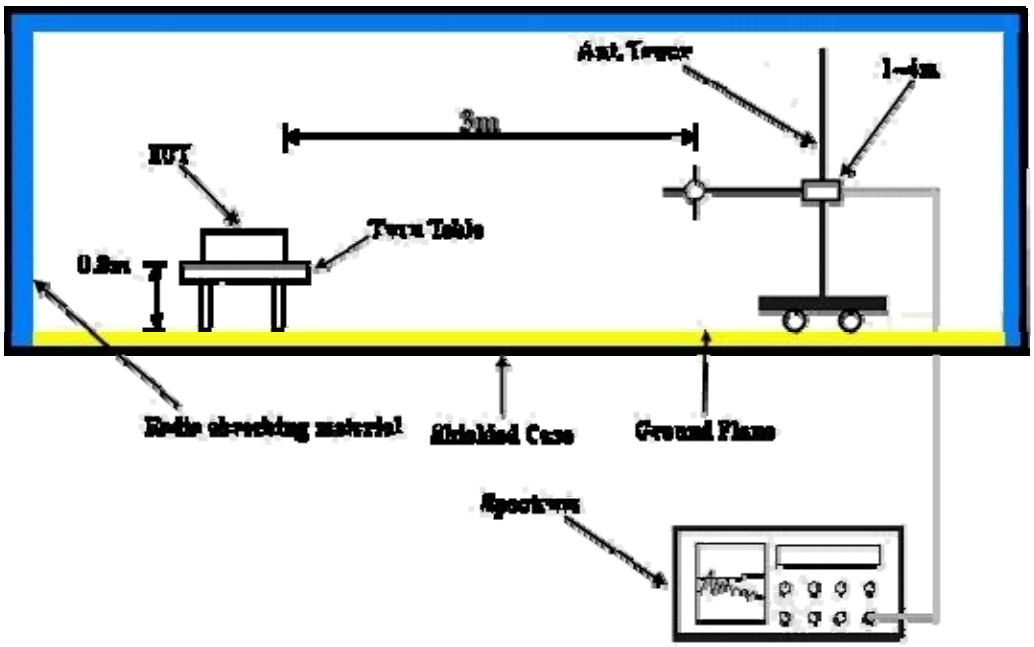
CONDUCTED MEASRUEMENT

a. The transmitter output was connected to the spectrum analyzer through an attenuator.

b. Measure the emission of EUT and record the test plot.

4.2.3 TEST SETUP

RADIATED MEASUREMENT



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

CONDUCTED MEASUREMENT

Same as 4.1.3

4.2.4 EUT OPERATING CONDITIONS

Same as 4.1.4

4.2.5 TEST RESULTS

RADIATED EMISSIONS

BELOW 1000MHz

CHANNEL BANDWIDTH	5MHz	**FREQUENCY RANGE**	Below 1000MHz
INPUT POWER	120Vac, 60Hz	**ENVIRONMENTAL CONDITIONS**	25deg°C, 63%RH 991hPa
TEST FREQUENCY	2492.5MHz	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	133.03	44.6	-27.1	-42.0	-7.7	-49.7
2	164.13	36.2	-27.1	-50.7	-7.7	-58.4
3	238.00	37.2	-27.1	-49.4	-7.7	-57.1
4	401.28	28.6	-27.1	-57.7	-7.8	-65.5
5	650.10	27.3	-27.1	-60.0	-7.8	-67.8
6	961.12	33.5	-27.1	-52.6	-7.9	-60.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	59.16	41.4	-27.1	-45.1	-7.7	-52.8
2	133.03	36.6	-27.1	-50.0	-7.7	-57.7
3	179.68	37.9	-27.1	-48.5	-7.7	-56.2
4	341.02	29.6	-27.1	-56.7	-7.8	-64.5
5	634.55	27.6	-27.1	-58.8	-7.8	-66.6
6	949.46	33.7	-27.1	-52.8	-7.9	-60.7

NOTE 1: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

NOTE 2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

CHANNEL BANDWIDTH	10MHz	**FREQUENCY RANGE**	Below 1000MHz
INPUT POWER	120Vac, 60Hz	**ENVIRONMENTAL CONDITIONS**	25deg°C, 63%RH 991hPa
TEST FREQUENCY	2490MHz	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	133.03	44.7	-27.1	-41.7	-7.7	-49.4
2	179.68	34.5	-27.1	-52.1	-7.7	-59.8
3	239.94	36.2	-27.1	-51.2	-7.7	-58.9
4	399.34	28.5	-27.1	-57.8	-7.8	-65.6
5	790.06	30.8	-27.1	-55.7	-7.9	-63.6
6	961.12	34.5	-27.1	-52.8	-7.9	-60.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	59.16	42.2	-27.1	-44.8	-7.7	-52.5
2	131.08	36.9	-27.1	-50.3	-7.7	-58.0
3	179.68	37.1	-27.1	-49.2	-7.7	-56.9
4	337.13	30.5	-27.1	-55.7	-7.8	-63.5
5	799.78	28.9	-27.1	-58.1	-7.9	-66.0
6	959.14	35.7	-27.1	-50.4	-7.9	-58.3

NOTE 1: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

NOTE 2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

ABOVE 1000MHz

CHANNEL BANDWIDTH	5MHz	**FREQUENCY RANGE**	Above 1000MHz
INPUT POWER	120Vac, 60Hz	**ENVIRONMENTAL CONDITIONS**	25deg°C, 63%RH 991hPa
TEST FREQUENCY	2487.5MHz	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	2485	64.7	-27.1	-39.3	8.4	-30.9
2	2490	64.5	-27.1	-39.5	8.4	-31.1
3	4975	40.9	-27.1	-63.1	9.5	-53.6
4	7462.5	48.9	-27.1	-53.6	7.8	-45.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	2485	67.9	-27.1	-36.0	8.4	-27.6
2	2490	67.8	-27.1	-36.1	8.4	-27.7
3	4975	43.9	-27.1	-60.2	9.5	-50.7
4	7462.5	51.9	-27.1	-50.2	7.8	-42.4

NOTE 1: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).
NOTE 2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

CHANNEL BANDWIDTH	5MHz	**FREQUENCY RANGE**	Above 1000MHz
INPUT POWER	120Vac, 60Hz	**ENVIRONMENTAL CONDITIONS**	25deg°C, 63%RH 991hPa
TEST FREQUENCY	2492.5MHz	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	2490	65.1	-27.1	-38.8	8.4	-30.4
2	2495	64.1	-27.1	-39.9	8.4	-31.5
3	4985	41.2	-27.1	-63.4	9.7	-53.7
4	7477.5	48.6	-27.1	-53.5	7.8	-45.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	2490	67.7	-27.1	-36.3	8.4	-27.9
2	2495	67.9	-27.1	-36.0	8.4	-27.6
3	4985	44.2	-27.1	-59.9	9.7	-50.2
4	7477.5	51.7	-27.1	-51.0	7.8	-43.2

NOTE 1: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).
NOTE 2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

CHANNEL BANDWIDTH	10MHz	**FREQUENCY RANGE**	Above 1000MHz
INPUT POWER	120Vac, 60Hz	**ENVIRONMENTAL CONDITIONS**	25deg°C, 63%RH 991hPa
TEST FREQUENCY	2490MHz	**TESTED BY**	Dean Wang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	2485	63.6	-27.1	-40.8	8.4	-32.4
2	2495	63.6	-27.1	-40.3	8.4	-31.9
3	4980	40.4	-27.1	-63.4	9.5	-53.9
4	7470	48.2	-27.1	-54.1	7.8	-46.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3m						
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBm)**	**S.G POWER VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**POWER VALUE (dBm)**
1	2485	67.9	-27.1	-36.1	8.4	-27.7
2	2495	67.9	-27.1	-36.2	8.4	-27.8
3	4980	42.7	-27.1	-60.8	9.5	-51.3
4	7470	51.3	-27.1	-50.3	7.8	-42.5

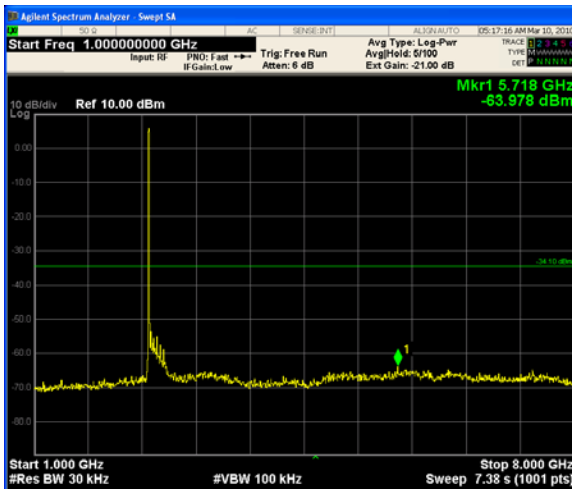
NOTE 1: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).
NOTE 2: Correction Factor = Antenna gain of substitution antenna- tx cable loss

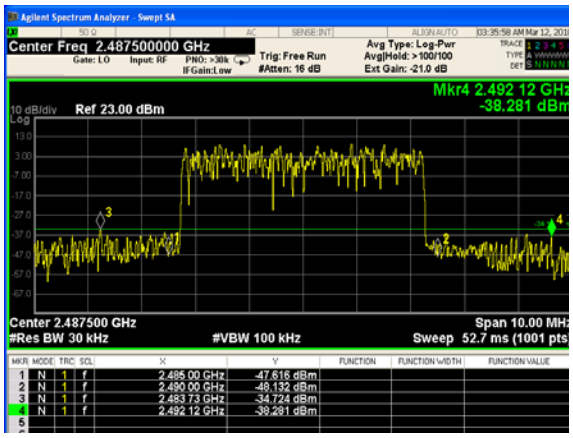
CONDUCTED EMISSION

Emission limit for out of channel is EIRP-27.1dBm/30kHz.When measuring the conducted emission, antenna gain should be applied to the limit.
Limit of conducted emissions is -27.1-7=-34.1dBm / 30kHz

For 5MHz bandwidth

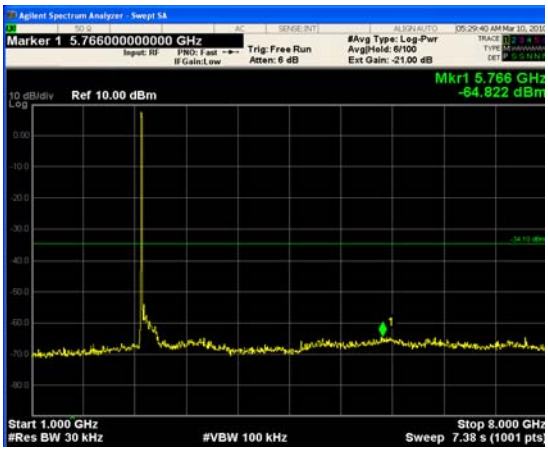
Frequency 2487.5MHz

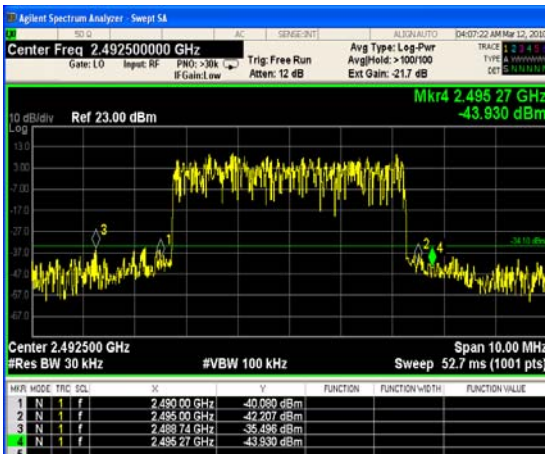




For 5MHz bandwidth

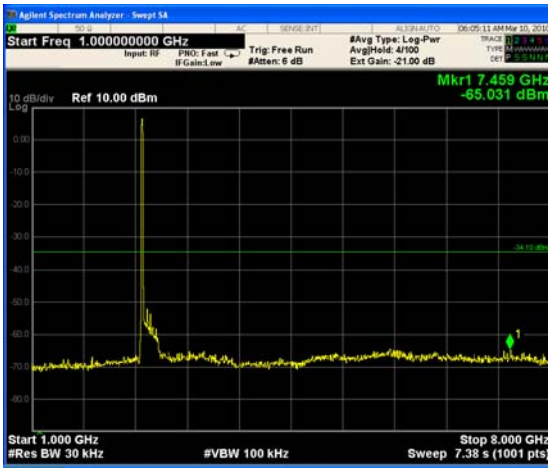
Frequency 2492.5MHz

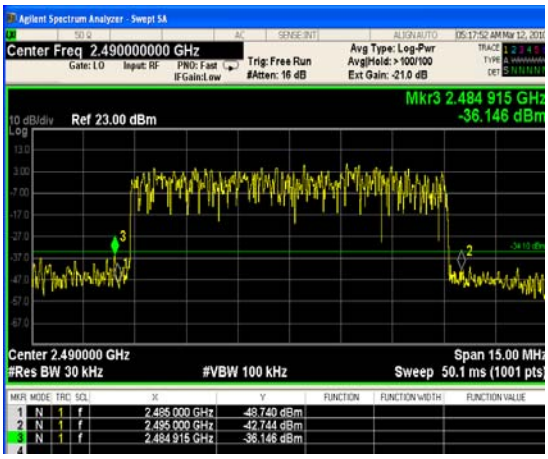




For 10MHz bandwidth

Frequency 2490MHz





4.3 FREQUENCY STABILITY MEASUREMENT

4.3.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT 0℃ ~ 45℃.

4.3.2 TEST PROCEDURE

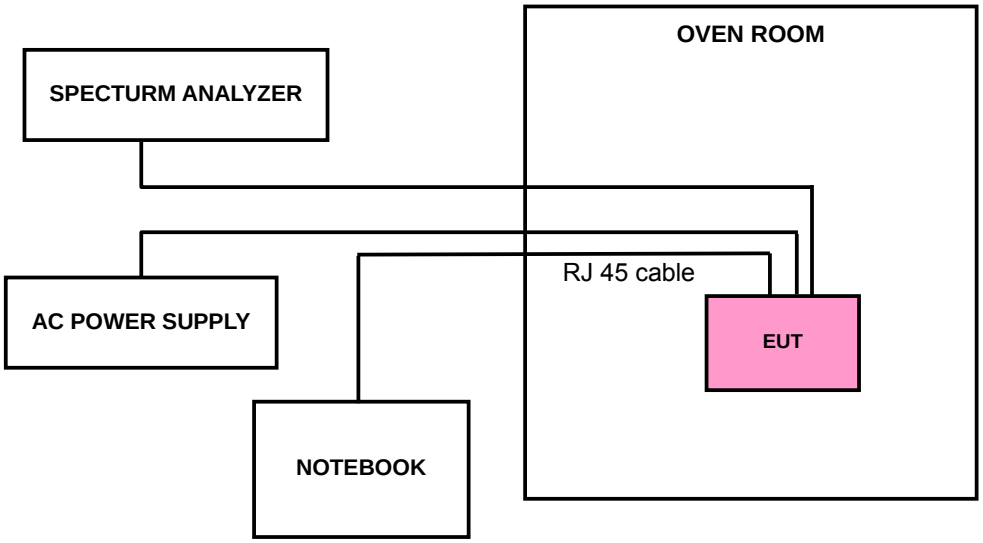
a. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The various Volts from the minimum 93.5 Volts to 126.5 Volts. 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.

d. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

4.3.3 TEST SETUP



4.3.4 EUT OPERATING CONDITIONS

The EUT connected to the notebook. Use software to control the EUT channel and transmit a single tone.

4.3.5 TEST RESULTS

MODE	Low channel	INPUT POWER	120Vac, 60Hz
ENVIRONMENTAL CONDITIONS	25deg°C, 63%RH 991hPa	TESTED BY	Dean Wang

AFC FREQUENCY ERROR VS. VOLTAGE				
VOLTAGE (Volts)	CHANNEL BANDWIDTH : 5MHz		CHANNEL BANDWIDTH : 10MHz	
	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
126.5	2492.498066	-0.776	2489.998823	-0.473
110.0	2492.495431	-1.833	2489.995903	-1.645
93.5	2492.495218	-1.919	2489.995307	-1.885

AFC FREQUENCY ERROR VS. TEMP.				
TEMP. (℃)	CHANNEL BANDWIDTH : 5MHz		CHANNEL BANDWIDTH : 10MHz	
	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)	FREQUENCY (MHz)	FREQUENCY ERROR (ppm)
45	2492.482131	-7.169	2489.982582	-6.995
40	2492.487887	-4.860	2489.988222	-4.730
30	2492.498057	-0.780	2489.998377	-0.652
20	2492.495431	-1.833	2489.995903	-1.645
10	2492.494598	-2.167	2489.994878	-2.057
0	2492.494603	-2.165	2489.994433	-2.236

4.4 EIRP DENSITY IN 1559-1610MHz BAND

4.4.1 LIMITS OF EIRP DENSITY MEASUREMENT

Per FCC PART 25.254(b) and FCC KDB 273109 D01 Equip Auth Guide Part 25 TXReceiver v02, the limit is as below table

FREQUENCY BAND	WIDE BAND EMISSION	NARROW BAND EMISSION
1559 ~ 1610MHz	-90dBW/MHz	-100dBW/MHz

4.4.2 TEST SETUP

Same as Item 4.2.3

4.4.3 TEST PROCEDURES

Same as Item 4.2.2

4.4.4 EUT OPERATING CONDITION

Same as 4.1.4

4.4.5 TEST RESULTS

CONDUCTED MEASUREMENT

For 5MHz
Frequency: 2487.5MHz

Frequency (MHz)	Narrow band EIRP (dBm)	Wide band EIRP (dBm)	Limit (dBm)
1591.538	-93.118	-	-70
1590.059	-	-63.908	-60

Frequency: 2492.5MHz

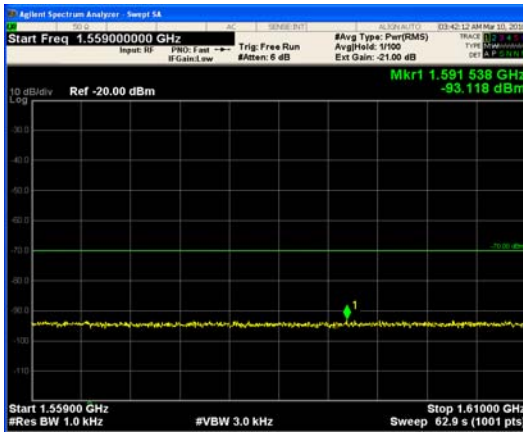
Frequency (MHz)	Narrow band EIRP (dBm)	Wide band EIRP (dBm)	Limit (dBm)
1605.002	-93.051	-	-70
1583.327	-	-63.799	-60

For 10MHz
Frequency: 2490MHz

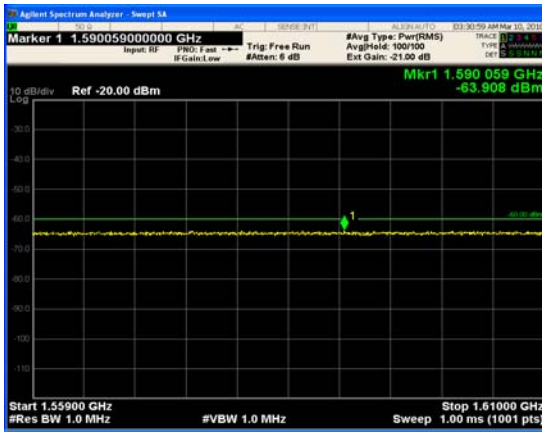
Frequency (MHz)	Narrow band EIRP (dBm)	Wide band EIRP (dBm)	Limit (dBm)
1579.859	-93.091	-	-70
1589.600	-	-63.684	-60

For 5MHz
Frequency: 2487.5MHz

Narrow band EIRP

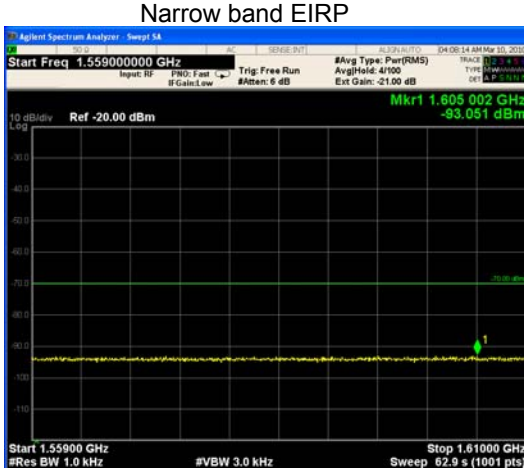


Wideband EIRP

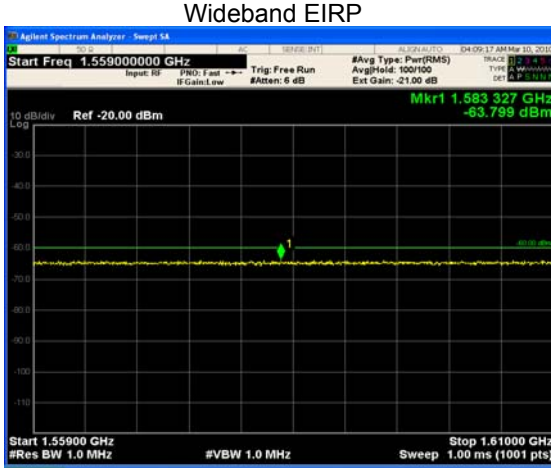


Frequency: 2492.5MHz

Narrow band EIRP

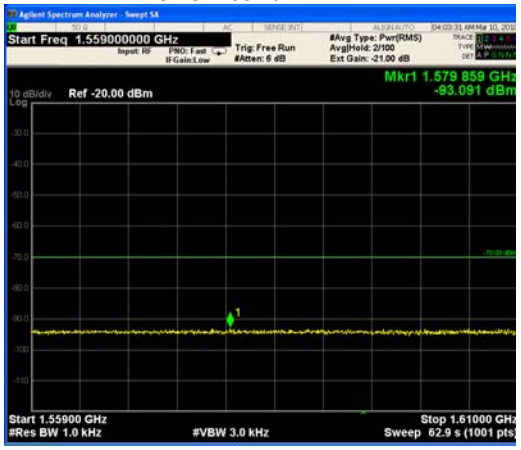


Wideband EIRP

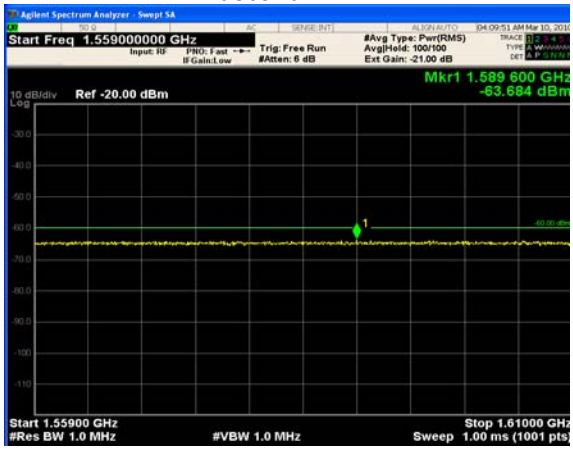


For 10MHz
Frequency: 2490MHz

Narrow band EIRP



Wideband EIRP



RADIATED MEASUREMENT

For this test item , test distance is 1 m

For 5MHz
Frequency: 2487.5MHz

Frequency (MHz)	Narrow band EIRP (dBuV/ dBm)	Wide band EIRP (dBuV/ dBm)	Limit (dBm)
1588.427	12.415 / -92.385	-	-70
1591.742	-	38.153 / -66.647	-60

Frequency: 2492.5MHz

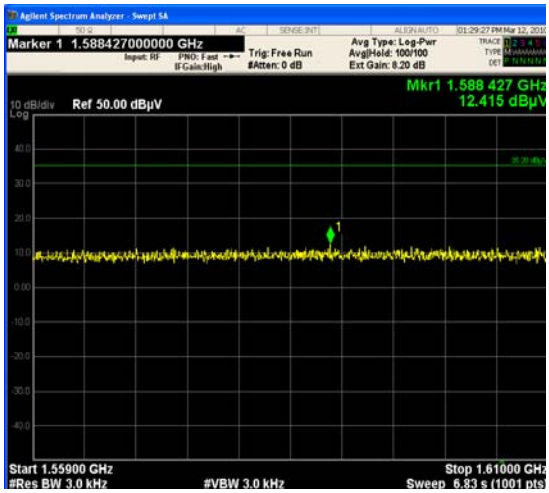
Frequency (MHz)	Narrow band EIRP (dBuV/ dBm)	Wide band EIRP (dBuV/ dBm)	Limit (dBm)
1581.338	12.33 / -92.47	-	-70
1602.248	-	38.381 / -66.419	-60

For 10MHz
Frequency: 2490MHz

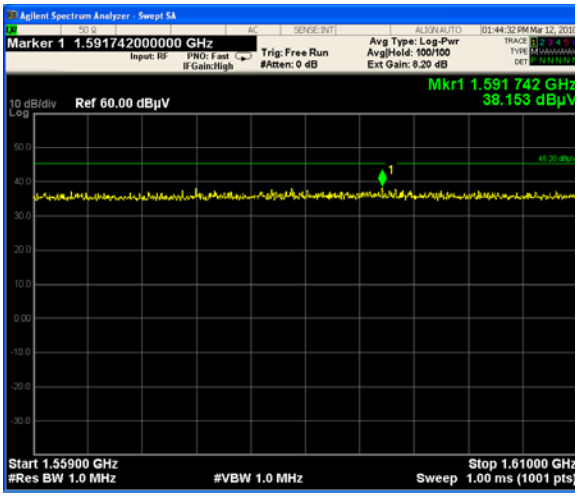
Frequency (MHz)	Narrow band EIRP (dBuV/ dBm)	Wide band EIRP (dBuV/ dBm)	Limit (dBm)
1572.923	12.496 / -92.304	-	-70
1608.419	-	38.119 / -66.681	-60

For 5MHz
Frequency: 2487.5MHz

Narrow band EIRP

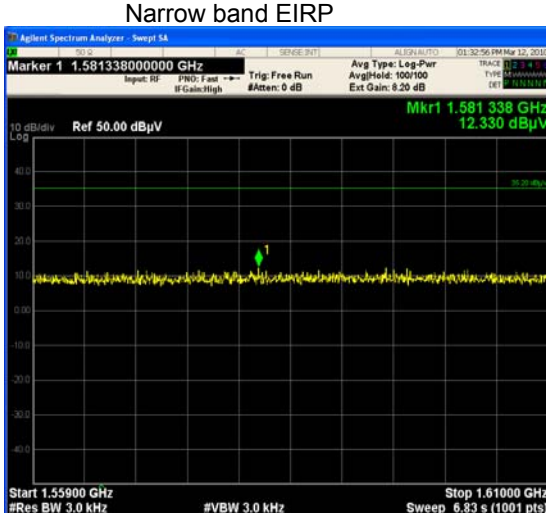


Wideband EIRP

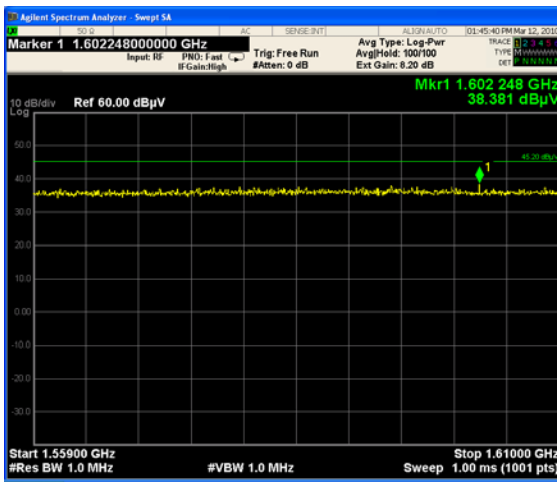


Frequency: 2492.5MHz

Narrow band EIRP

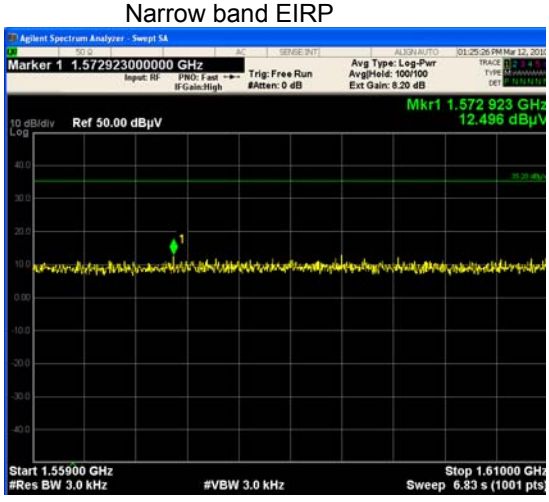


Wideband EIRP

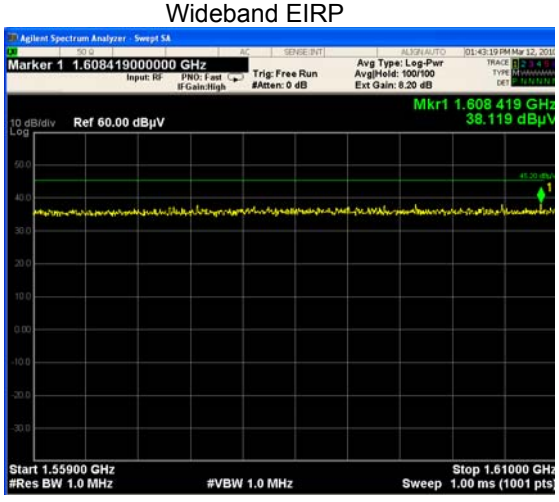


For 10MHz
Frequency: 2490MHz

Narrow band EIRP



Wideband EIRP



4.5 OUT OF CHANNEL EMISISON IN 1610.6-1613.8MHz BAND

4.5.1 LIMITS OF OUT OF CHANNEL EMISISON MEASUREMENT

Per FCC PART 25.254(b)(1) ,meet the requirements to protect radio astronomy service (RAS) observations in the1610.6–1613.8 MHz band from un acceptable interference.

4.5.2 TEST PROCEDURE

Same as Item 4.2.2

4.5.3 TEST SETUP

Same as Item 4.2.3

4.5.4 EUT OPERATING CONDITIONS

Same as 4.1.4

4.5.5 TEST RESULTS

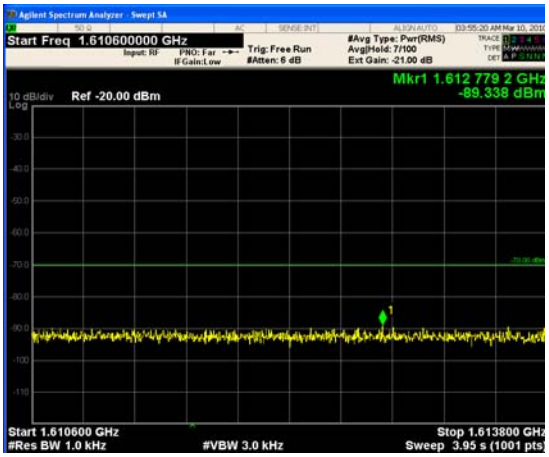
No any emissions from EUT are higher than the SA Noise floor -89dBm / kHz for narrow band emission and -63dBm/MHz for wide band emission

CONDUCTED MEASUREMENT

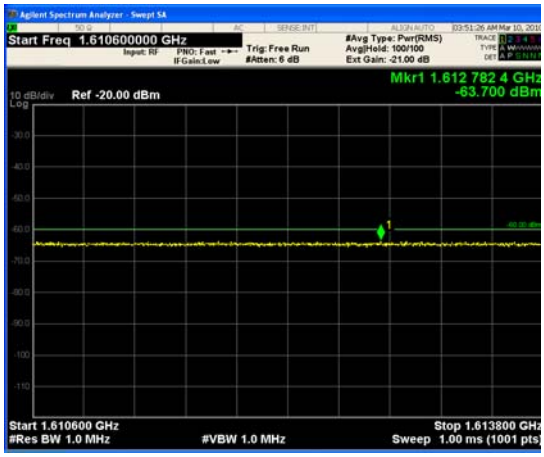
For 5MHz

Frequency: 2487.5MHz

Narrow band EIRP

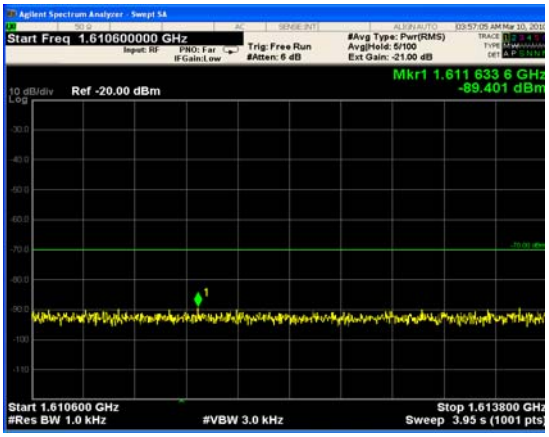


Wideband EIRP

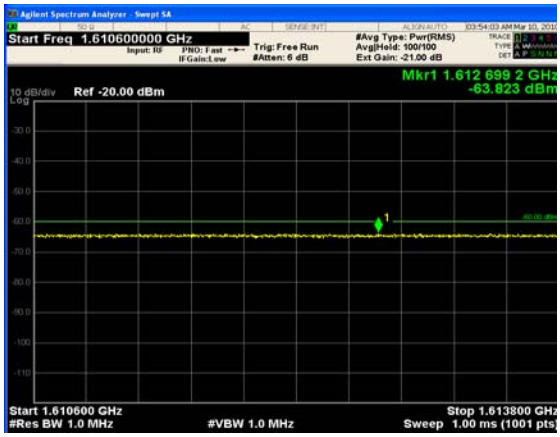


Frequency: 2492.5MHz

Narrow band EIRP



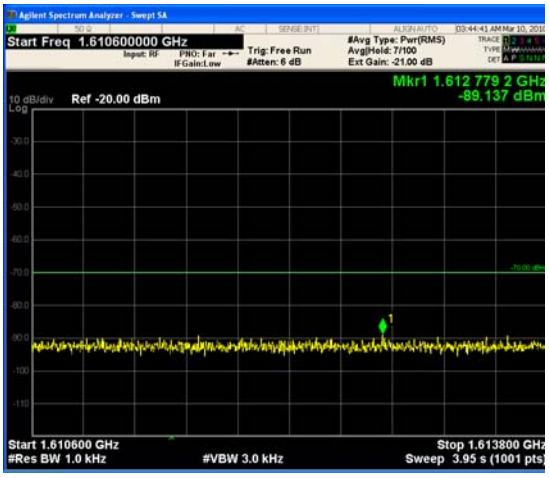
Wideband EIRP



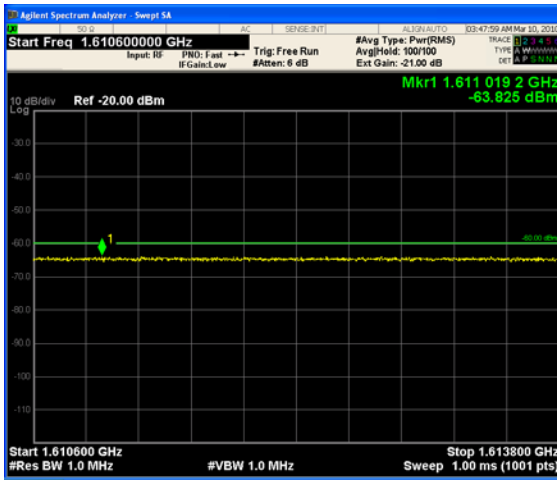
For 10MHz

Frequency: 2490MHz

Narrow band EIRP



Wideband EIRP

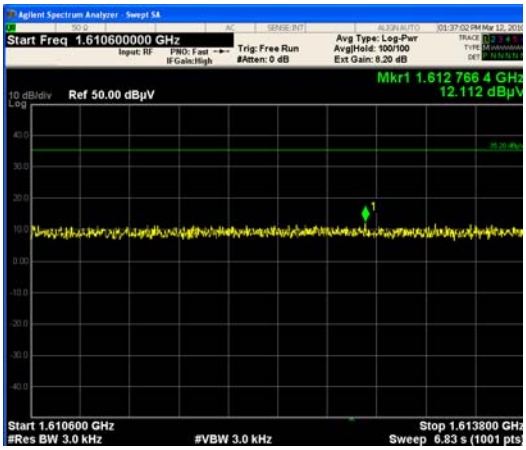


RADIATED MEASUREMENT

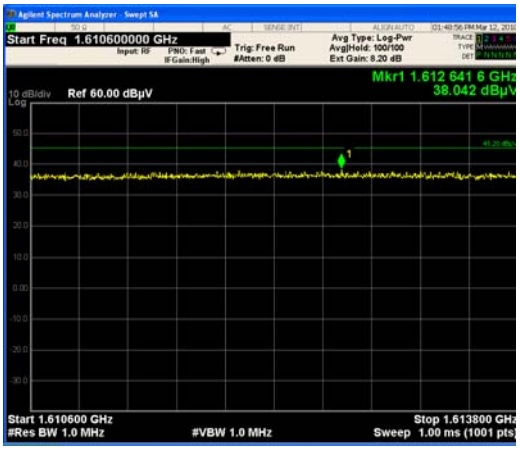
For 5MHz

Frequency: 2487.5MHz

Narrow band EIRP

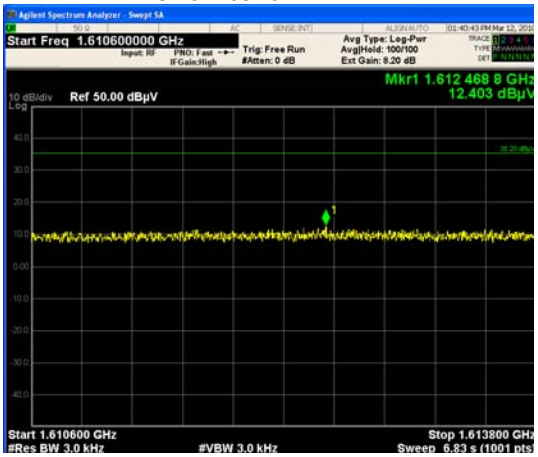


Wideband EIRP

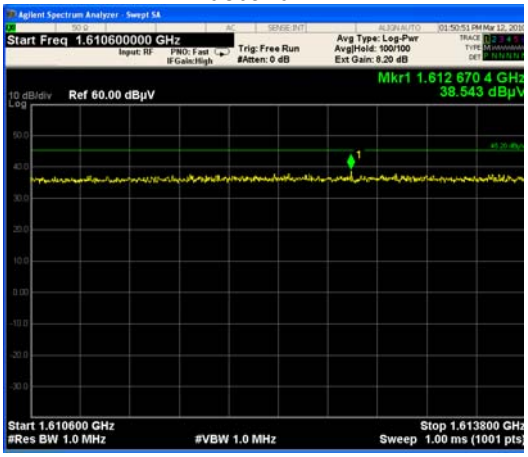


Frequency: 2492.5MHz

Narrow band EIRP



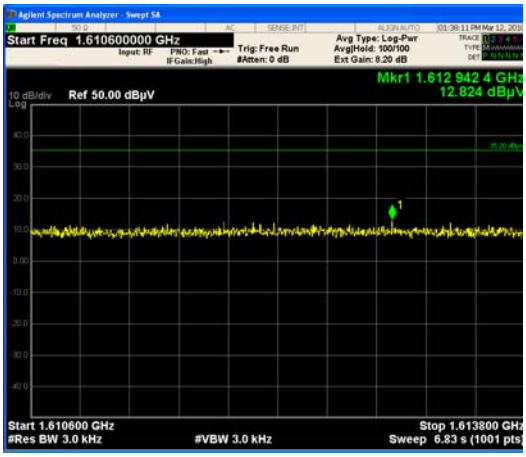
Wideband EIRP



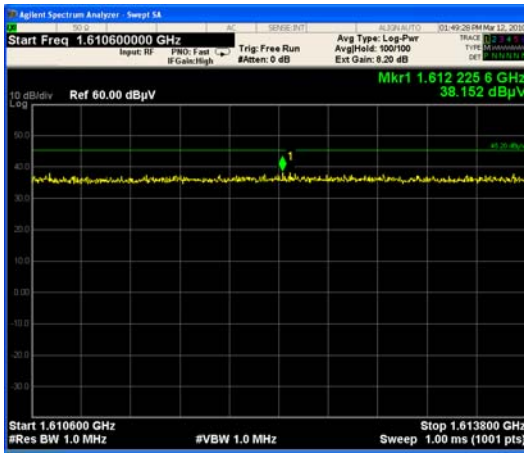
For 10MHz

Frequency: 2490MHz

Narrow band EIRP



Wideband EIRP



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 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:

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

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

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