Tech-Security Electronic Technology Co., Ltd

wireless video door phone

Model: TA-888

26 April 2010
Report No.: 1002198
(This report supersedes NONE)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:	
Alex wang	Jackson. chen
Alex Wang **Compliance Engineer**	**Jackson Chen** **Technical Manager**

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Test result presented in this test report is applicable to the representative sample only.

RF Test Report
TO: FCC 15.247:2009
SIEMIC, INC.
Accessing global markets

Laboratory Introduction

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In addition to testing and certification, SIEMIC provides initial design reviews and compliance management through out a project. Our extensive experience with China, Asia Pacific, North America, European, and international compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom

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CONTENTS

1 Executive Summary & EUT information

The purpose of this test programme was to demonstrate compliance of the Tech-Security Electronic Technology Co., Ltd , wireless video door phone, and model: TA-888 against the current Stipulated Standards. The wireless video door phone have demonstrated compliance with the FCC 15.247:2009.

EUT Information

EUT Description	wireless video door phone
Model No	TA-888
Input Power	3.6-4.2VDC
Classification Per Stipulated Test Standard	Spread Spectrum System/Device

2 TECHNICAL DETAILS

Purpose	**Compliance testing of wireless video door phone with stipulated standard**
Applicant / Client	**Tech-Security Electronic Technology Co., Ltd**
Manufacturer	**Tech-Security Electronic Technology Co., Ltd Zhongxin Road 7,He TanGang, Beizha, Humen Town, Dongguan City**
Laboratory performing the tests	**SIEMIC Nanjing (China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email:info@siemic.com**
Test report reference number	**1002198**
Date EUT received	**04 April 2010**
Standard applied	**FCC 15.247:2009**
Dates of test (from – to)	**19~23 April 2010**
No of Units:	**4**
Equipment Category:	**FHSS**
RF Operating Frequency (ies)	**2401.830MHz -2477.880MHz**
Number of Channels :	**19**
Modulation :	**GFSK**
FCC ID：	**YDH-TA-888**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications. All Testing has been performed according to below product classification:

Spread Spectrum System/Device

Test Results Summary

Test Standard	Description	Pass / Fail
CFR 47 Part 15.247: 2008		
15.203	Antenna Requirement	Pass
15.205	Restricted Band of Operation	Pass
15.207(a)	Conducted Emissions Voltage	Pass
15.247(a)(1)	Channel Separation	Pass
15.247(a)(1)	Occupied Bandwidth	Pass
15.247(a)(2)	Bandwidth	Pass
15.247(a)(1)	Number of Hopping Channels	Pass
15.247(a)(1)	Time of Occupancy	Pass
15.247(b)	Output Power	Pass
15.247(c)	Antenna Gain > 6 dBi	N/A
15.247(d)	Conducted Spurious Emissions	Pass
15.209; 15.247(d)	Radiated Spurious Emissions	Pass
15.247(e)	Power Spectral Density	N/A
15.247(f)	Hybrid System Requirement	N/A
15.247(g)	Hopping Capability	Pass
15.247(h)	Hopping Coordination Requirement	Pass
15.247(i)	RF Exposure requirement	Pass

ANSI C63.4: 2003

PS: All measurement uncertainties are not taken into consideration for all presented test result.

Preliminary AC line and radiated emissions testing has been performed on all models, only worst case test result is presented in this test report.

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 Antenna Requirement

Requirement(s): 47 CFR §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna requirement must meet at least one of the following:

a) Antenna must be permanently attached to the device.

b) Antenna must use a unique type of connector to attach to the device.

c) Device must be professionally installed. Installer shall be responsible for ensuring that the correct antenna is employed with the device.

The antenna is permanently attached to the device.

5.2 Conducted Emissions Voltage

Requirement:

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

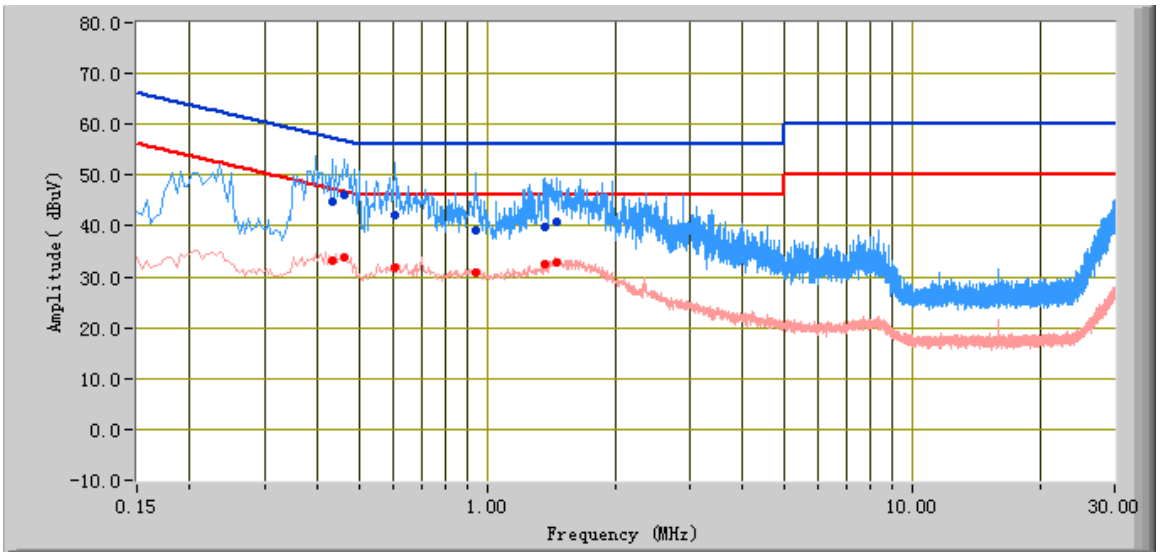
1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : 19~23 April 2010
   Tested By : Alex Wang

Test result:

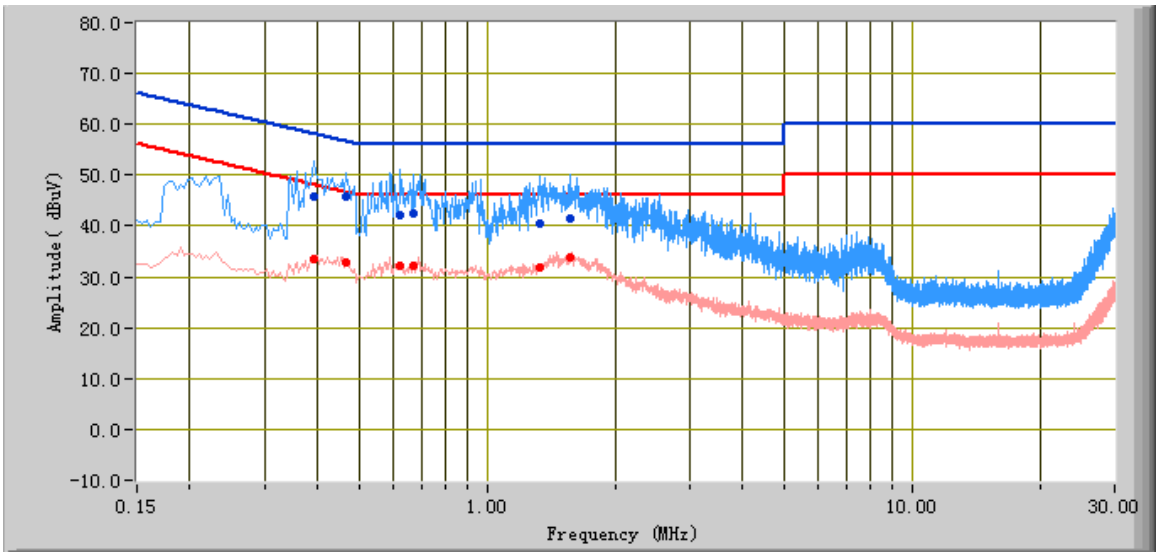
Line-operating mode: transmitting



Test Data

Frequency (MHz)	Quasi Peak (dBuV)	Limit (dBuV)	Margin (dB)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Factors (dB)
0.61	42.09	56.00	-13.91	31.91	46.00	-14.09	10.15
0.46	45.99	56.66	-10.68	33.94	46.66	-12.73	10.17
0.43	44.73	57.19	-12.47	33.32	47.19	-13.87	10.17
0.94	39.30	56.00	-16.70	30.92	46.00	-15.08	10.17
1.46	40.71	56.00	-15.29	32.69	46.00	-13.31	10.18
1.37	39.85	56.00	-16.15	32.36	46.00	-13.64	10.18

Line-operating mode: transmitting



Test Data

Frequency (MHz)	Quasi Peak (dBuV)	Limit (dBuV)	Margin (dB)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Factors (dB)
0.63	42.29	56.00	-13.71	32.09	46.00	-13.91	10.14
0.39	45.66	58.10	-12.44	33.62	48.10	-14.48	10.17
1.57	41.64	56.00	-14.36	33.84	46.00	-12.16	10.18
0.67	42.46	56.00	-13.54	32.20	46.00	-13.80	10.13
0.47	45.84	56.59	-10.75	32.85	46.59	-13.74	10.17
1.33	40.38	56.00	-15.62	31.83	46.00	-14.17	10.17

5.3 Channel Separation

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

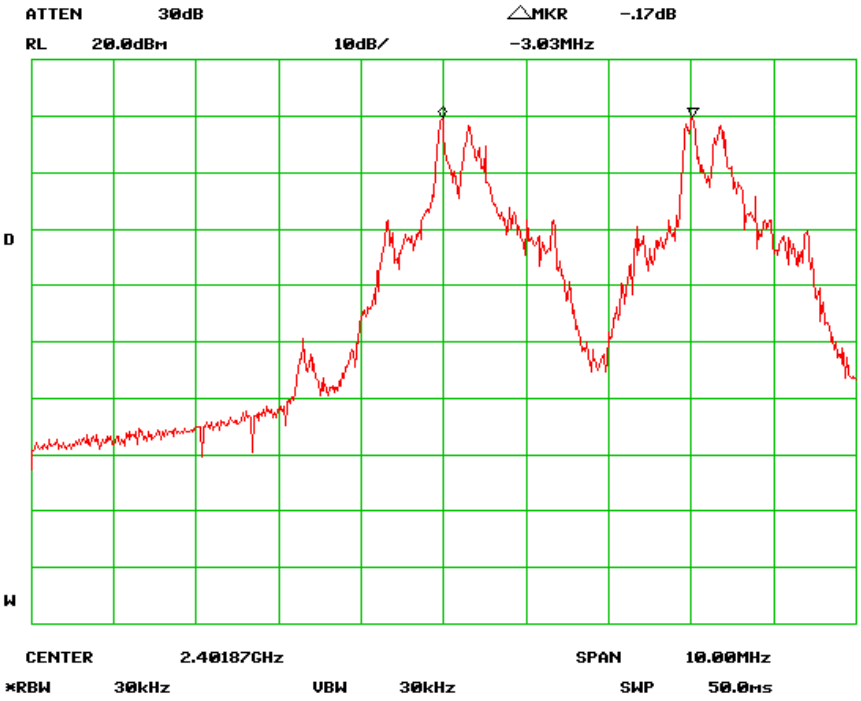
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : 19~23 April 2010
   Tested By : Alex Wang

Requirement(s): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

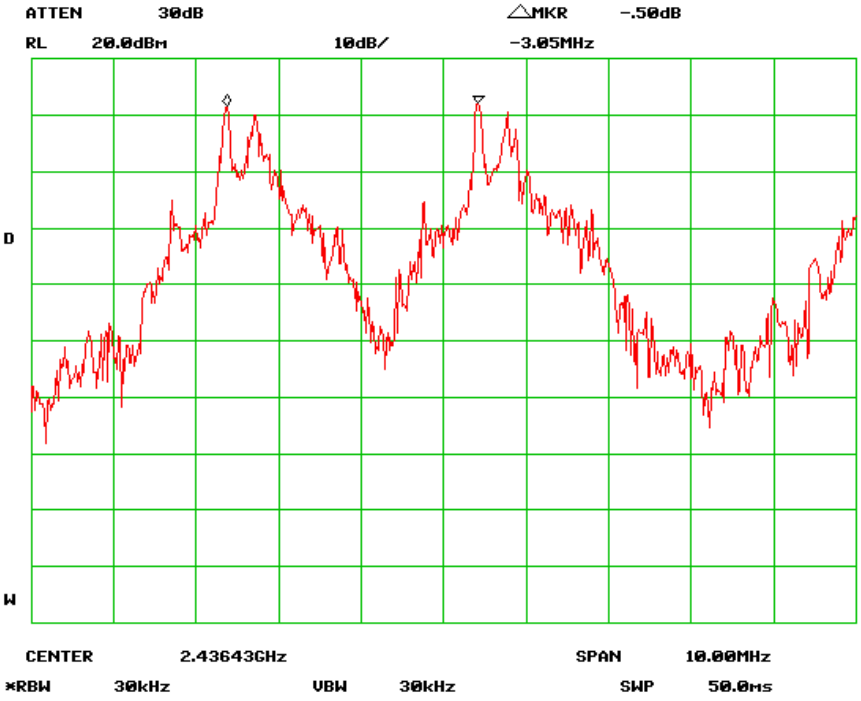
Procedures: The Channel Separation was measured conducted using a spectrum analyzer at low, mid, and hi channels.

Channel	Channel Frequency (MHz)	Channel Separation(MHz)
Low	2401.870	3.03
Mid	2436.430	3.05
High	2477.880	3.07

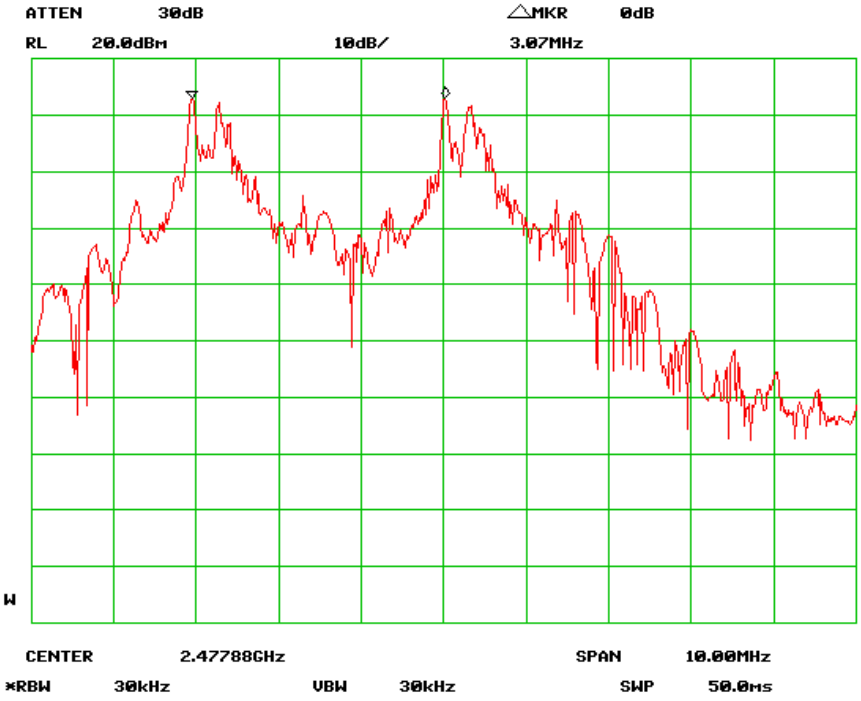
Channel Separation - Low Channel



Channel Separation – Mid Channel



Channel Separation – High Channel



5.4 20dB & 99% Occupied Bandwidth

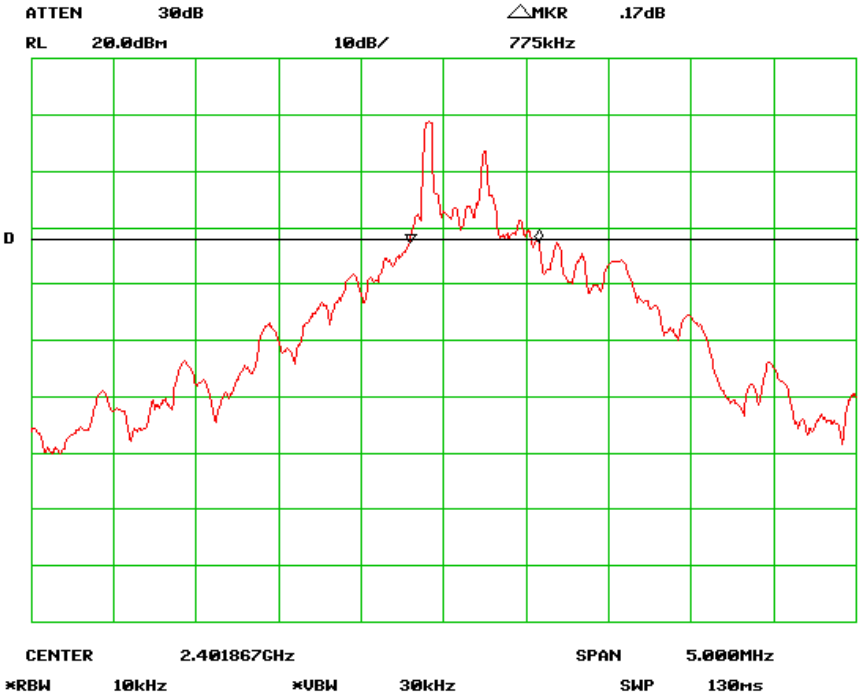
1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions
   Temperature 23°C
   Relative Humidity 50%
   Atmospheric Pressure 1019mbar
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : 19~23 April 2010
   Tested By : Alex Wang

Requirement(s): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

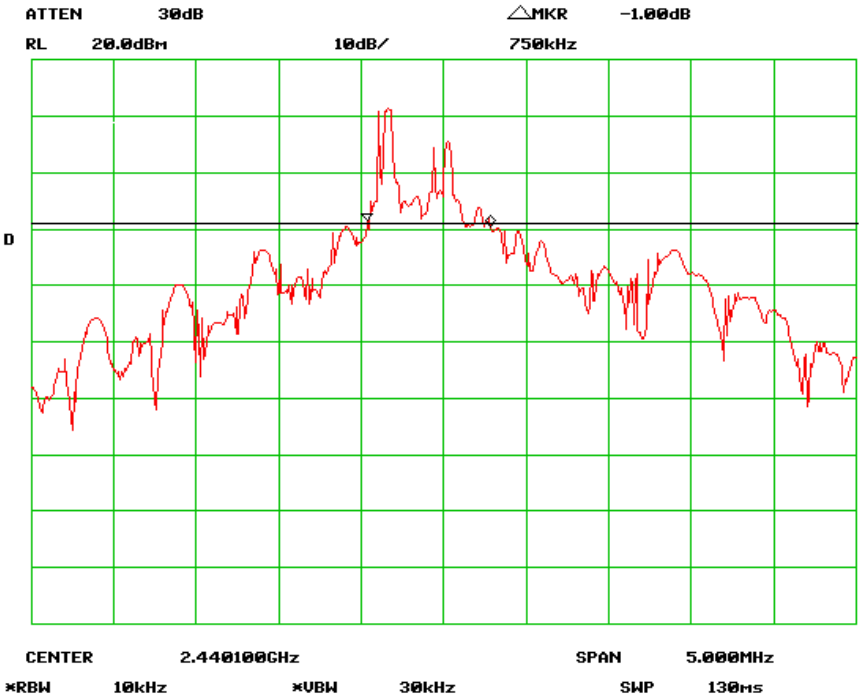
Procedures: The 20dB bandwidths were measured conducted using a spectrum analyzer at low, mid, and hi channels.

Channel	Channel Frequency (MHz)	20 dB Channel Bandwidth (KHz)
Low	2401.870	775
Mid	2436.430	750
High	2477.880	708

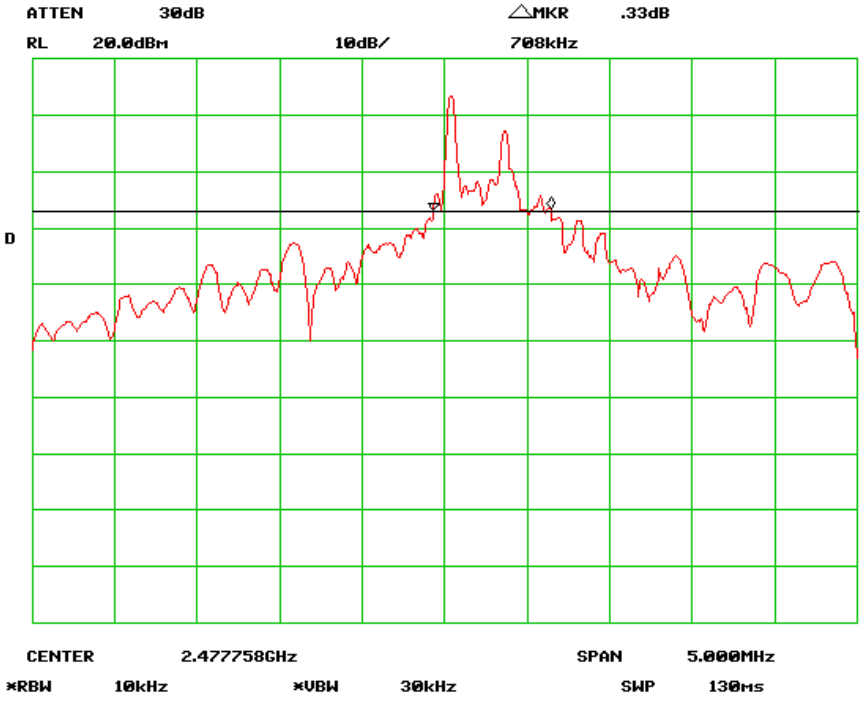
20 dB Bandwidth - Low Channel



20 dB Bandwidth - Mid Channel



20 dB Bandwidth - High Channel



5.5 Number of Hopping Channel

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power. The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : 19~23 April 2010
   Tested By : Alex Wang

Standard Requirement:

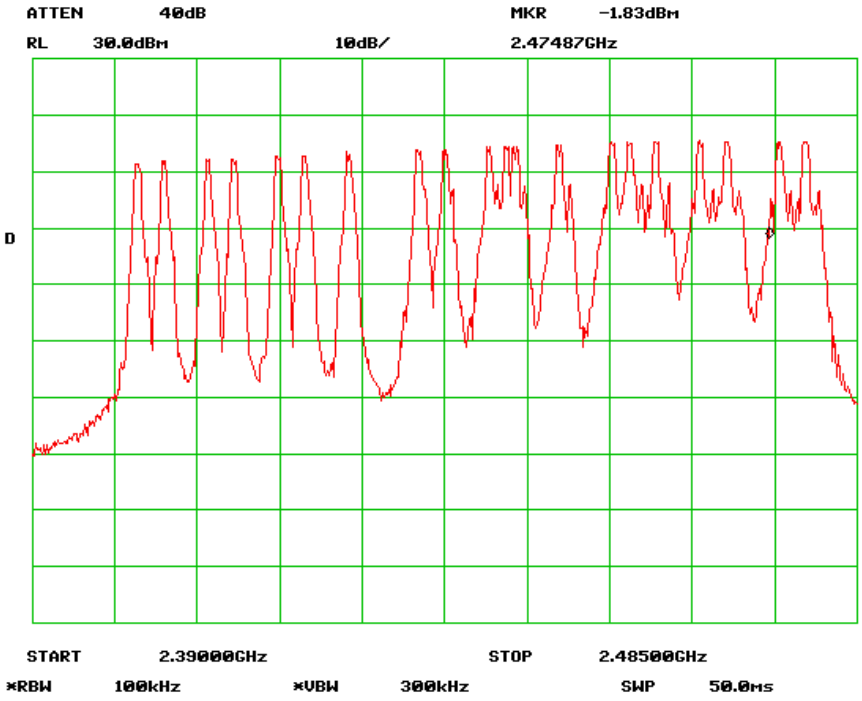
Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

Procedures: The Number of Hopping Channel measurement was taken conducted using a spectrum analyzer.

RBW=100 KHz, VBW > RBW

Test Result:
Total Channel: 19 Channels

Number of Hopping Channel



5.6 Time of Occupancy

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power. The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : 19~23 April 2010
   Tested By : Alex Wang

Standard Requirement:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used

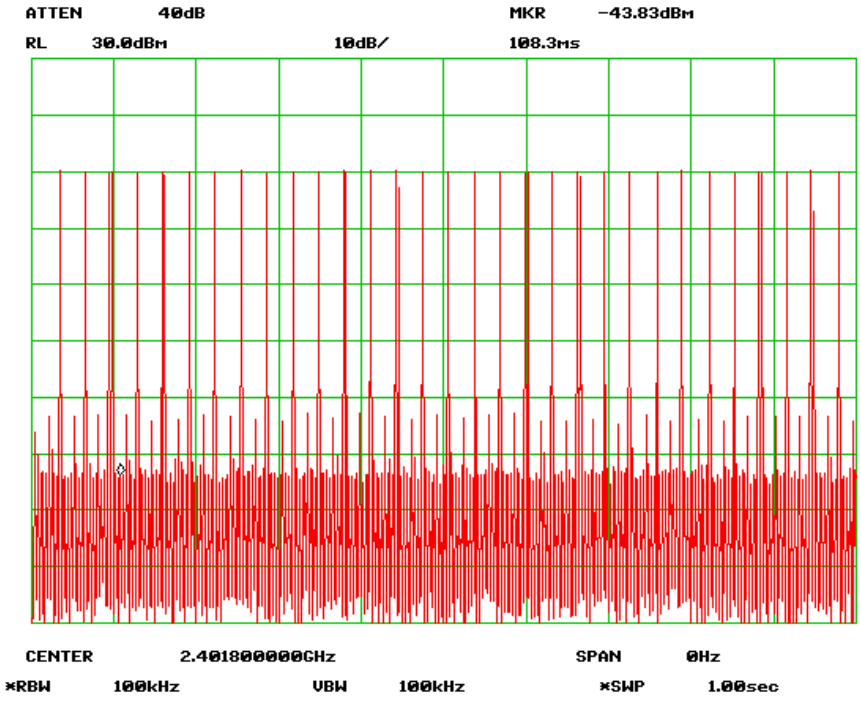
Procedures: The Time of Occupancy measurement was taken conducted using a spectrum analyzer.

Test Result:

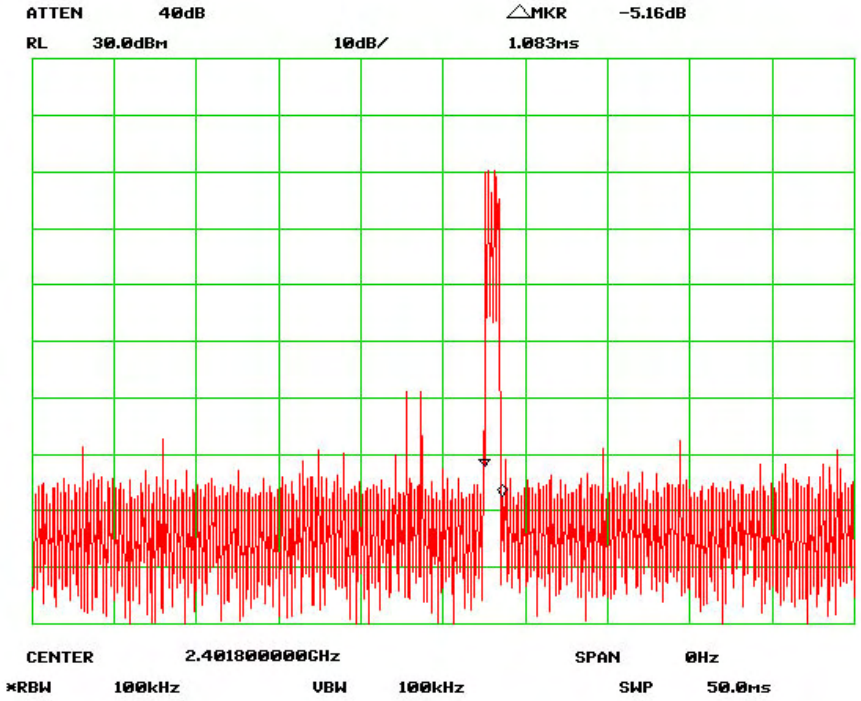
Channel	Channel Frequency (MHz)	Dwell Time (sec)	Limit (sec)
Low	2401.870	0.255	0.4
Mid	2436.430	0.255	0.4
High	2477.880	0.314	0.4

Note: *Dwell Time* = On-time * number of times the specific channel on during 24 sec sweep.

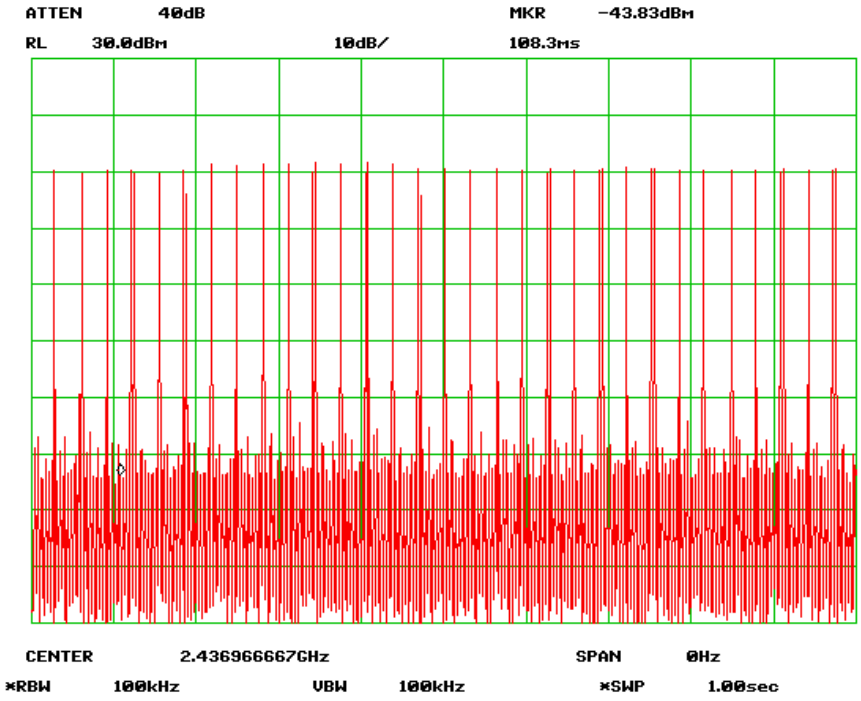
Low Channel (Sweep in 1sec)



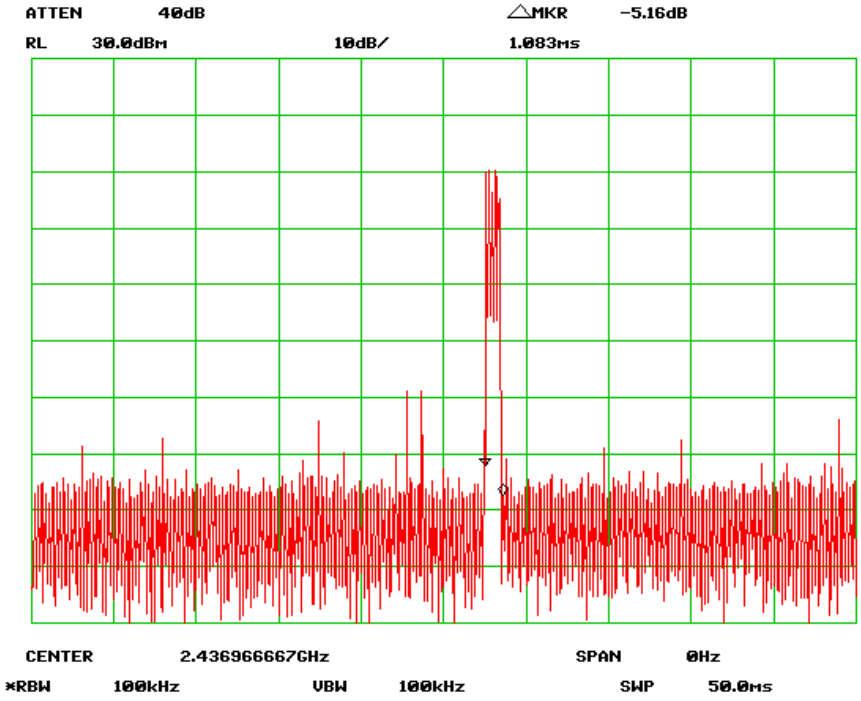
Low Channel (Sweep in 50msec)



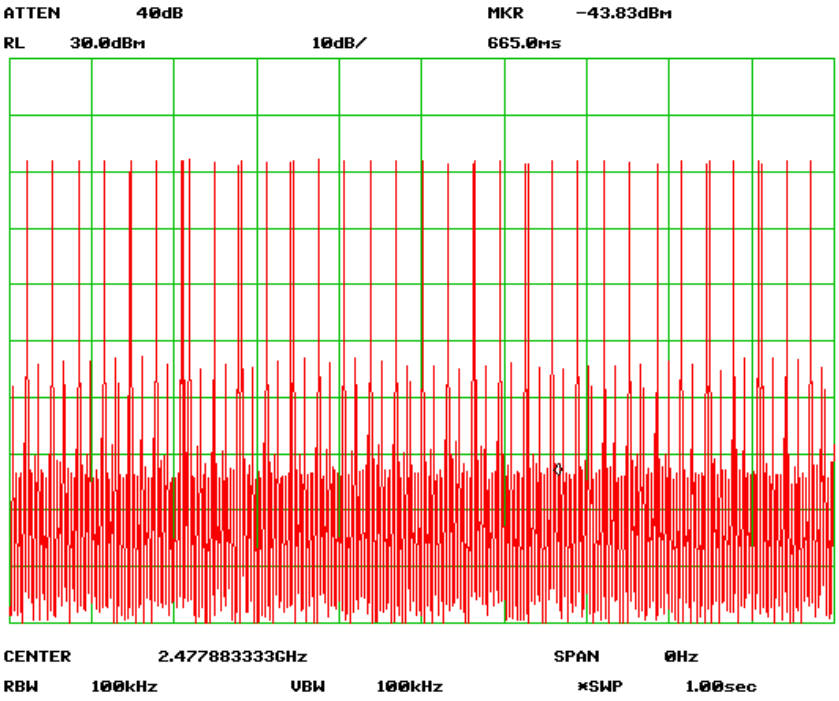
Mid Channel (Sweep in 1sec)



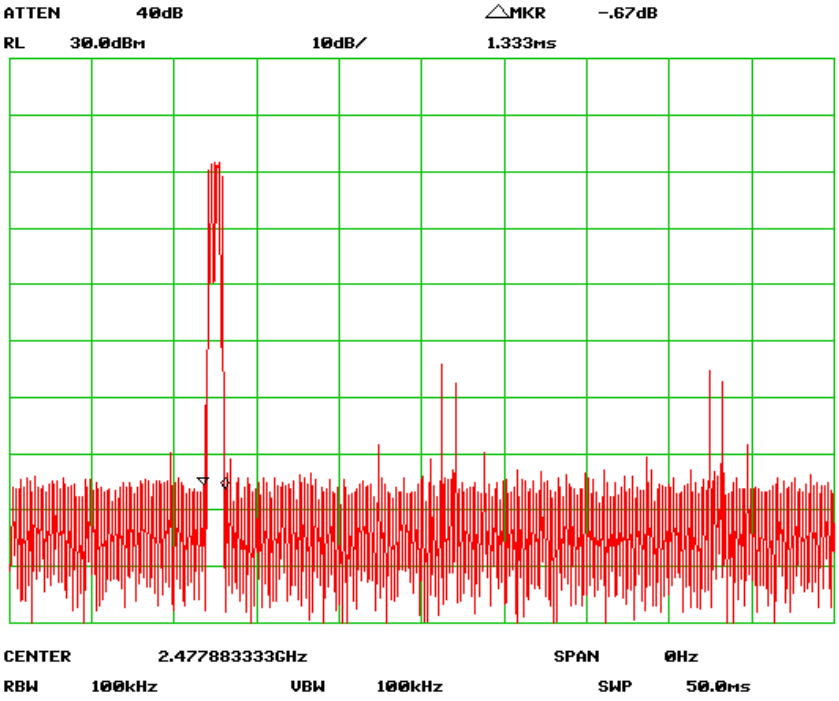
Mid Channel (Sweep in 50msec)



High Channel (Sweep in 1sec)



High Channel (Sweep in 50msec)



5.7 Peak Output Power

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power. The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : 19~23 April 2010
   Tested By : Alex Wang

Standard Requirement:

For frequency hopping systems in the 2400-2483.5 MHz band employing at least 75hopping channels,and all frequency hopping systems in the 5725-5850 MHz band: 1Watt.

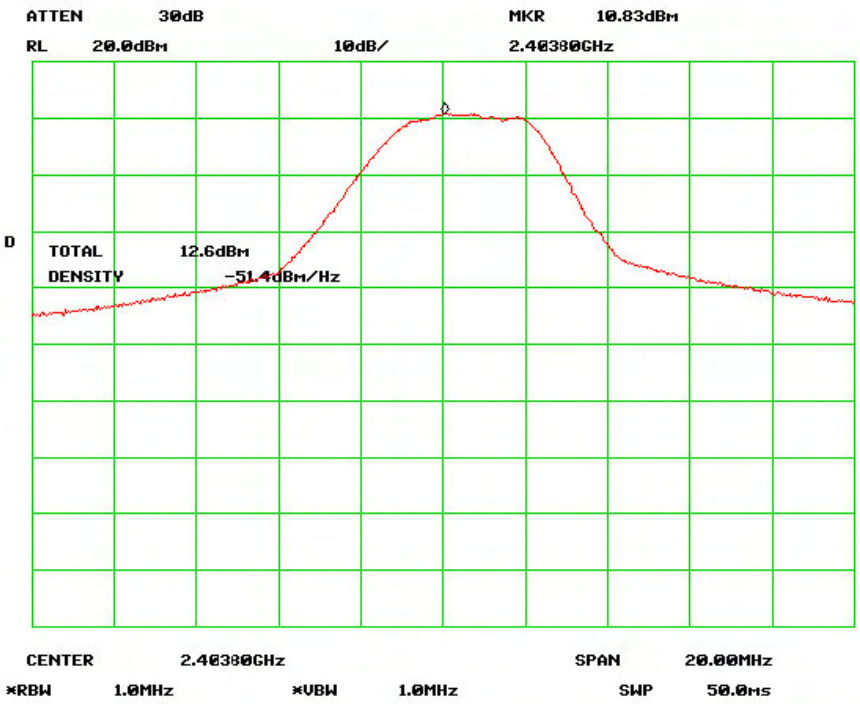
Procedures: The peak output power was measured conducted using a spectrum analyzer at low, mid, and hi channels. Peak detector was set to measure the power output. The power is converted from watt to dBm, therefore, 1 watt = 30 dBm. The highest antenna gain that will be used is 2.64dBi.

Note: For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt.

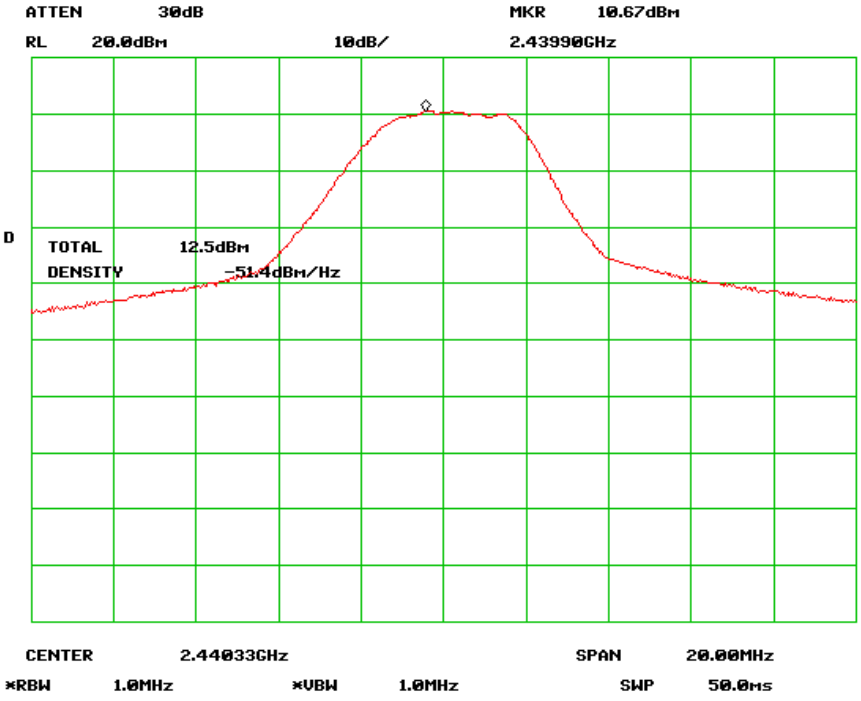
Test Result:

Channel	Channel Frequency (MHz)	Measured Output Power (dBm)	Peak Output Power Limit (dBm)
Low	2401.870	10.83	30
Mid	2436.430	10.67	30
High	2477.880	11.00	30

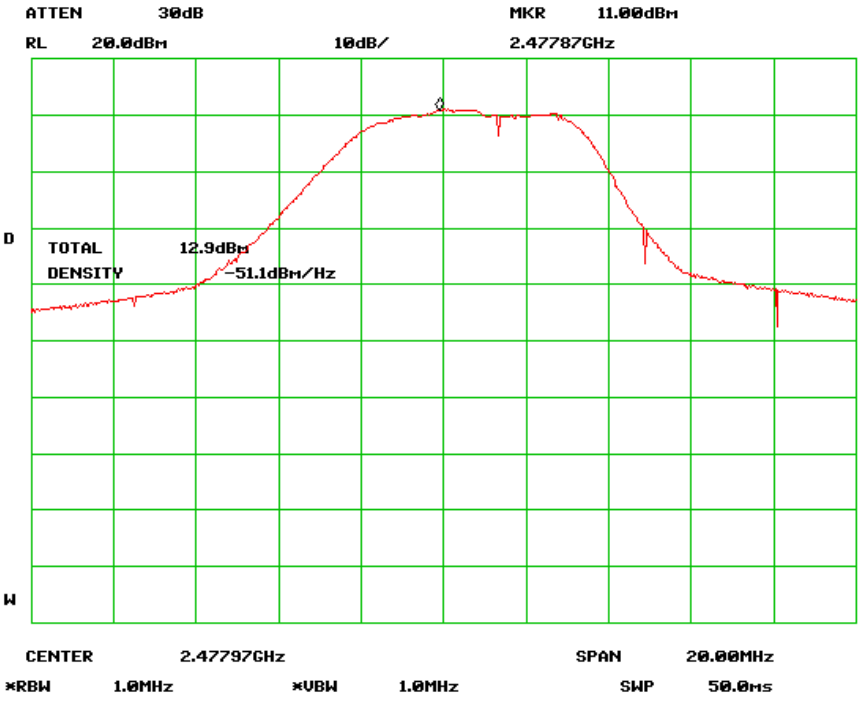
Output Power Low Channel



Output Power Mid Channel



Output Power High Channel



5.8 Antenna Port Emission

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

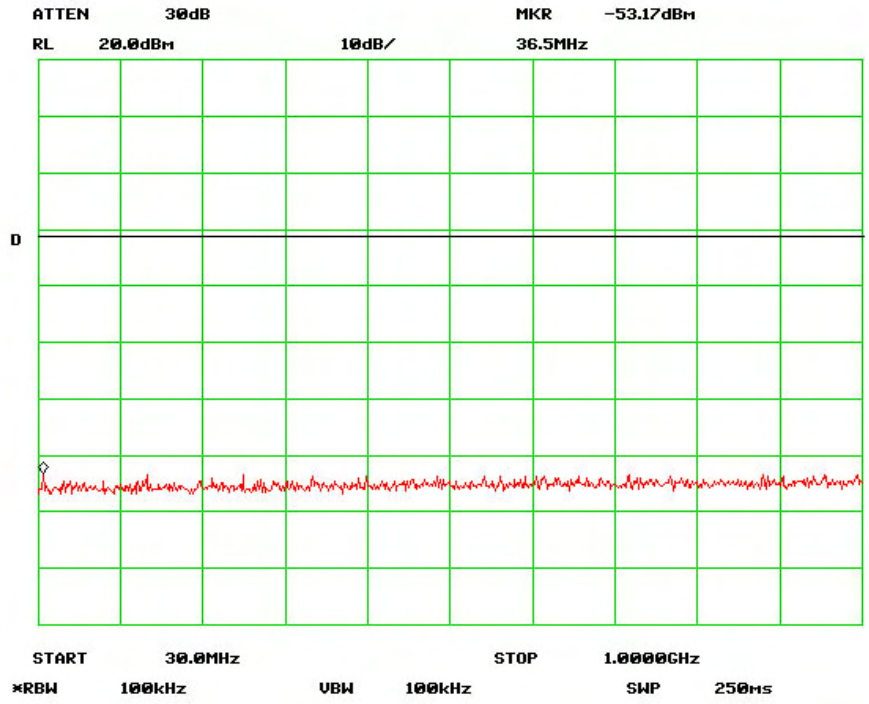
4. Test date : 19~23 April 2010
   Tested By : Alex Wang

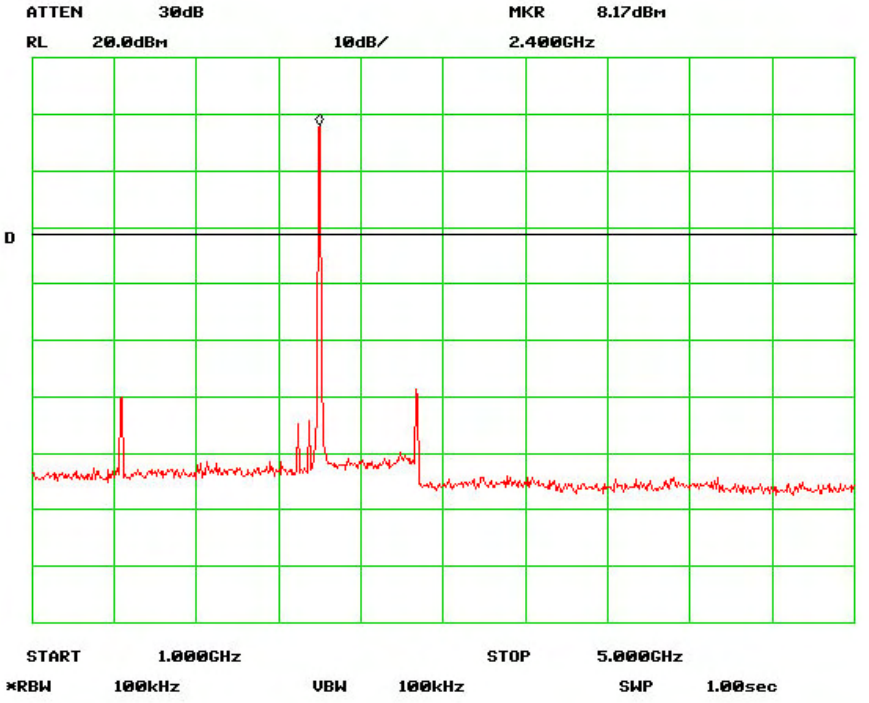
Standard Requirement: Radiated emission limits: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

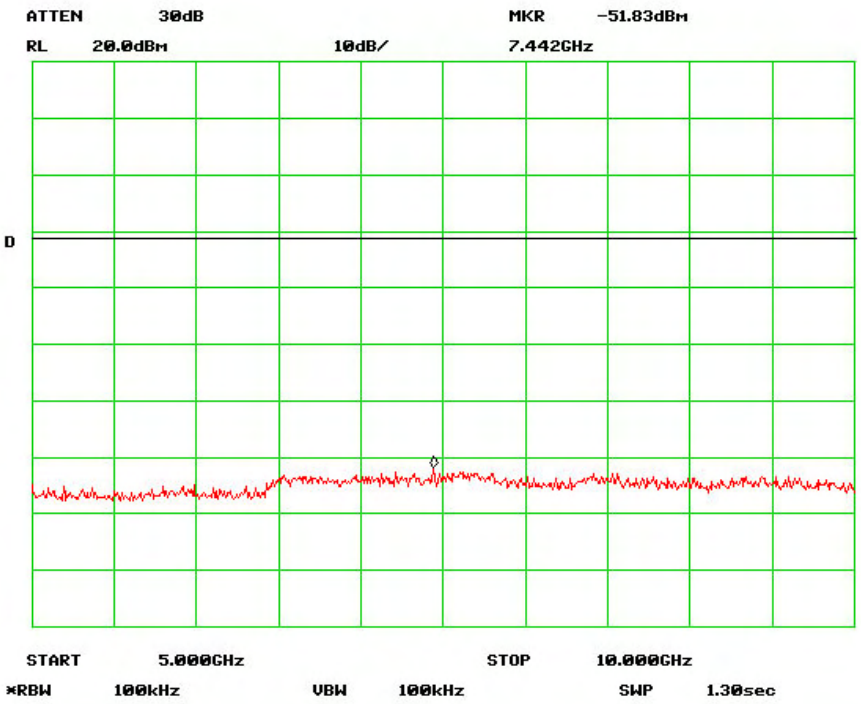
Procedures: The conducted spurious emissions were measured conducted using a spectrum analyzer at low, mid, and hi channels. The limit was determined by attenuating 20 dB of the RF peak power output

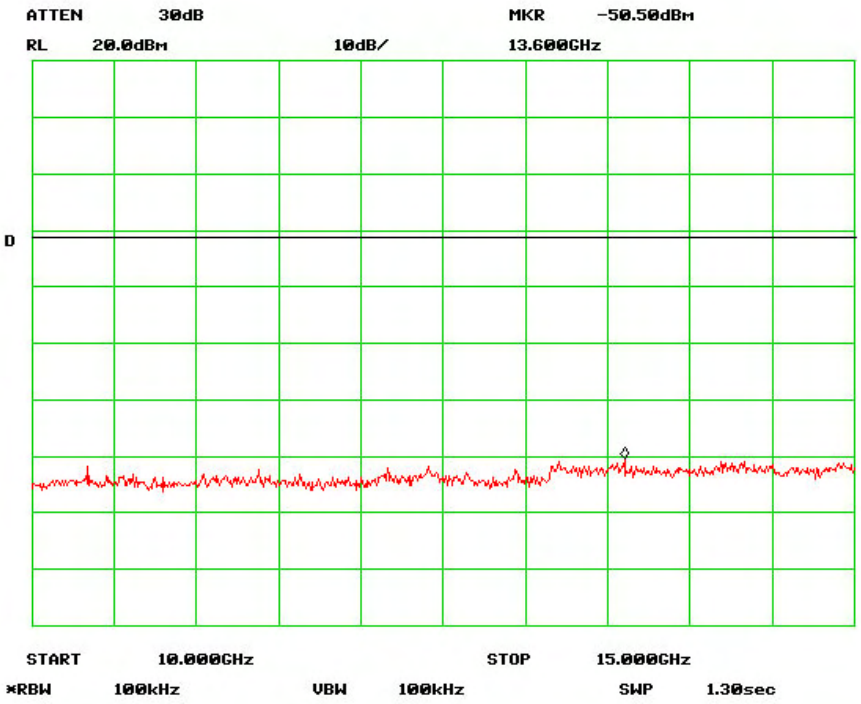
Test Result:

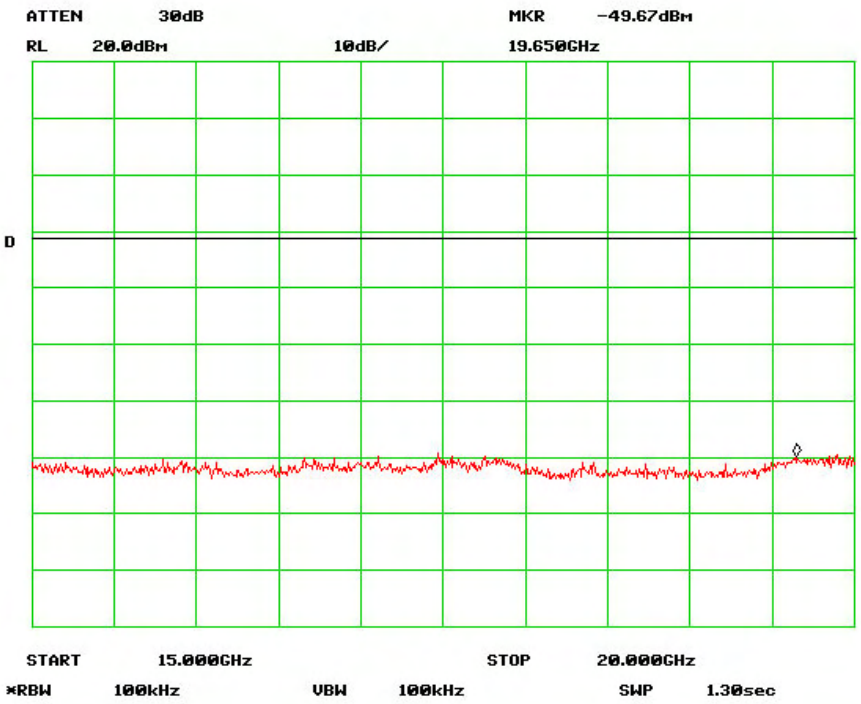
Spurious Emission-Low channel

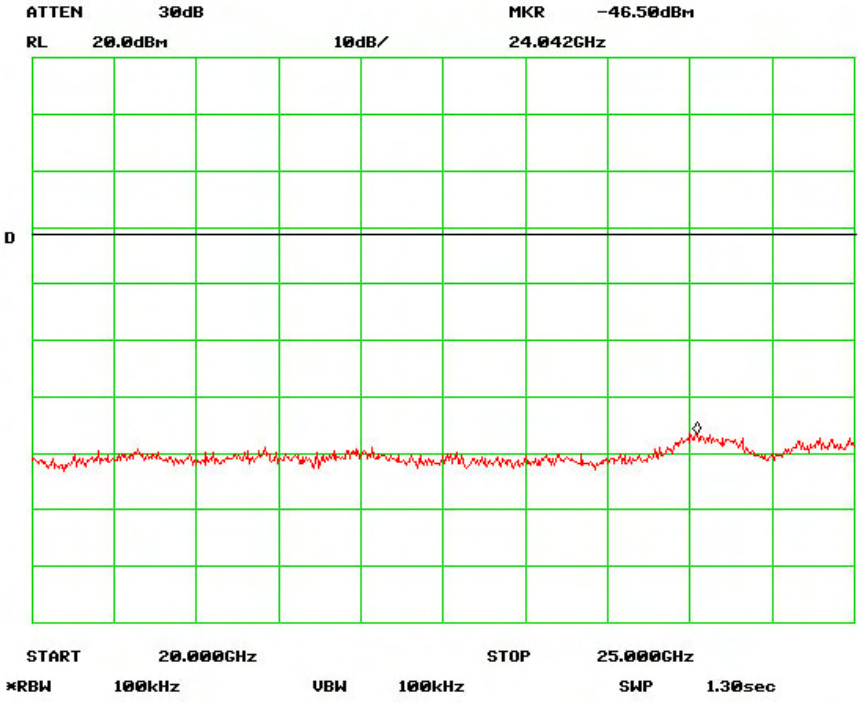




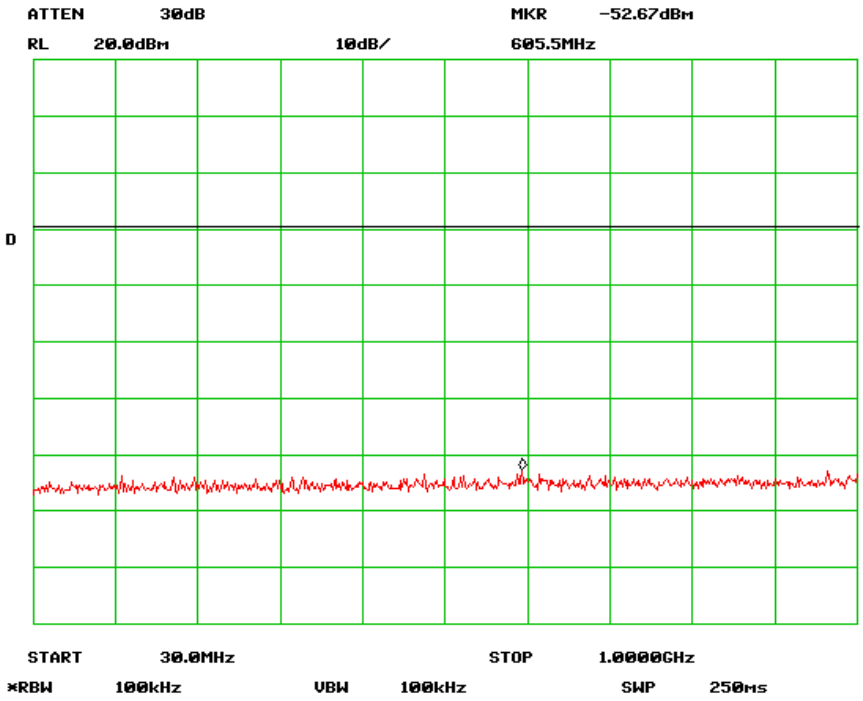

ATTEN 30dB
MKR -51.83dBm
RL 20.0dBm
10dB/
7.442GHz
D
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

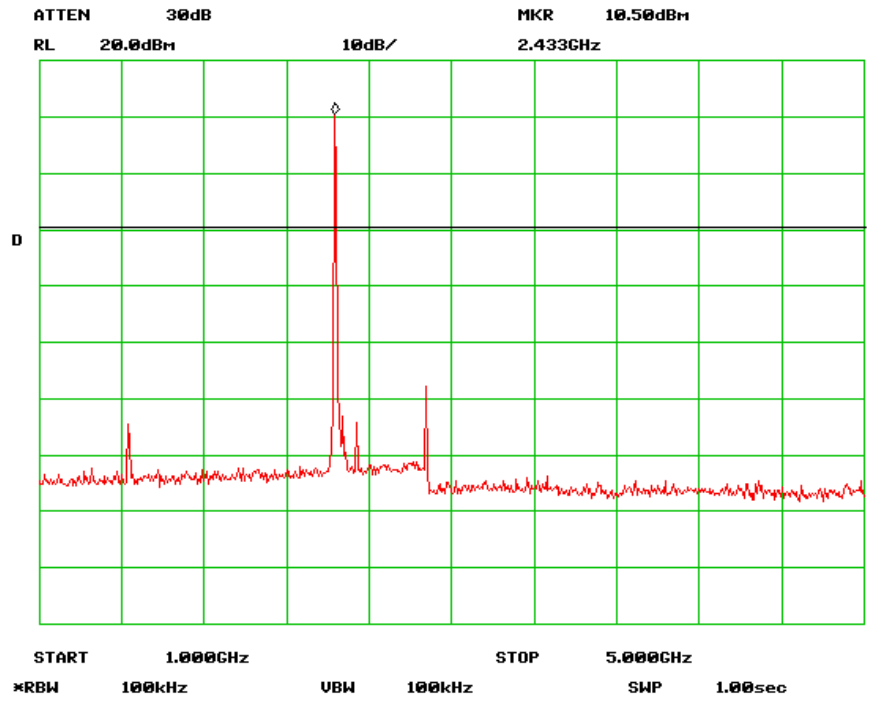

ATTEN 30dB
MKR -50.50dBm
RL 20.0dBm
10dB/
13.600GHz
D
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

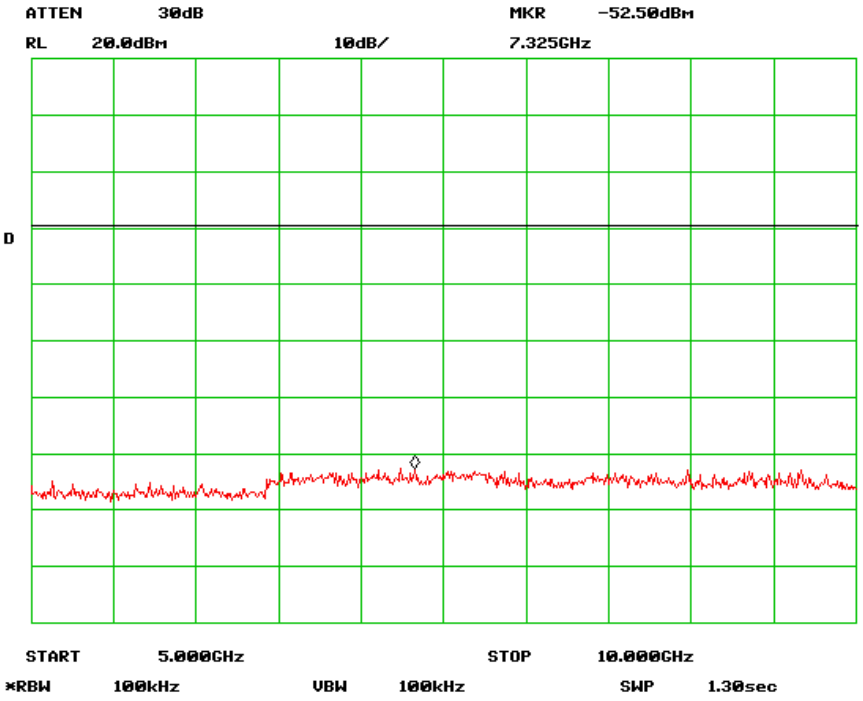

ATTEN 30dB
MKR -49.67dBm
RL 20.0dBm
10dB/
19.650GHz
D
START 15.000GHz
STOP 20.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

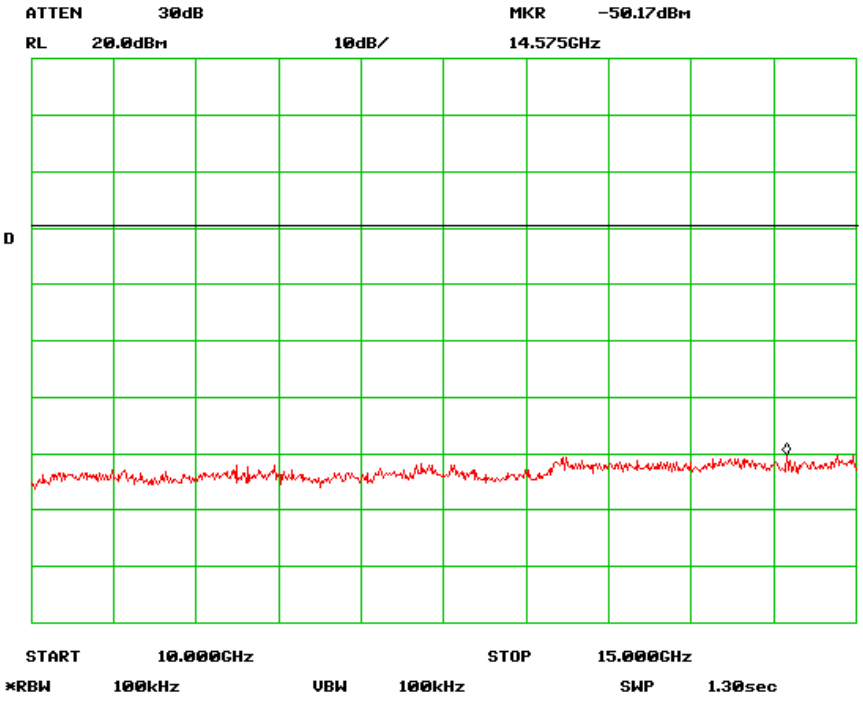

ATTEN 30dB
MKR -46.50dBm
RL 20.0dBm
10dB/
24.042GHz
D
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

Spurious Emission-Middle channel






ATTEN 30dB
MKR -52.50dBm
RL 20.0dBm
10dB/
7.325GHz
D
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec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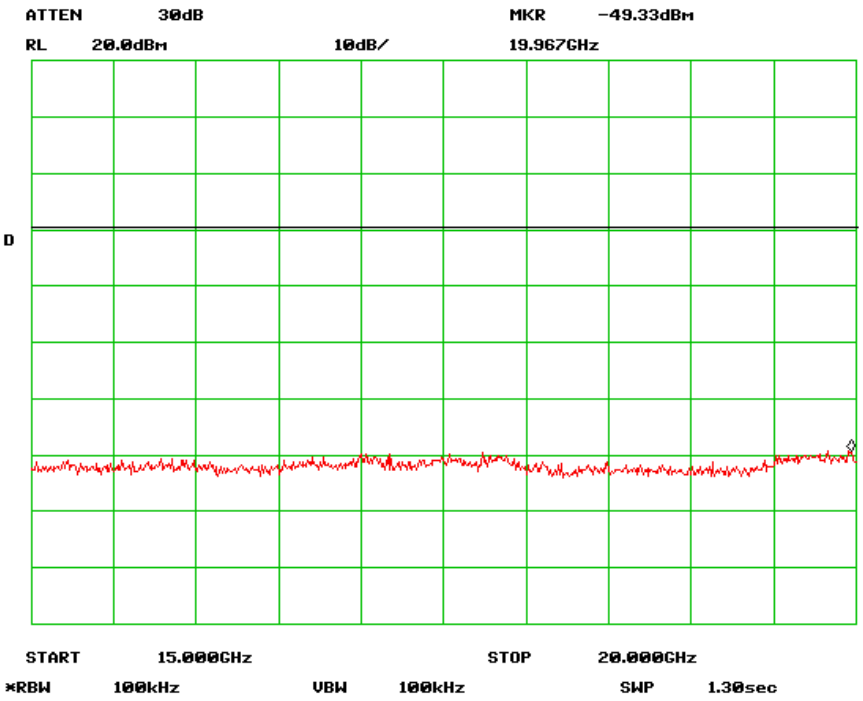
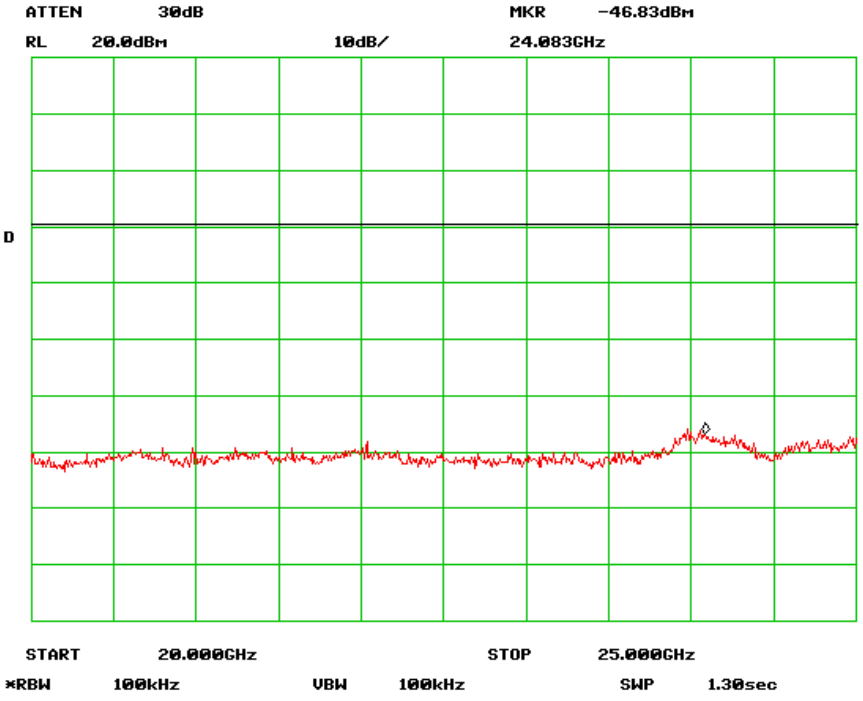
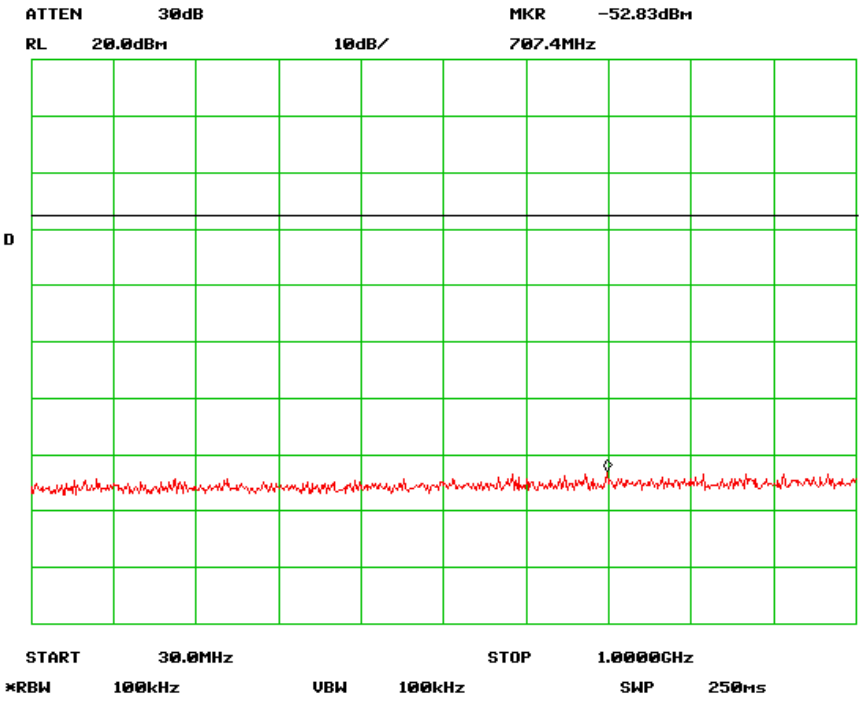
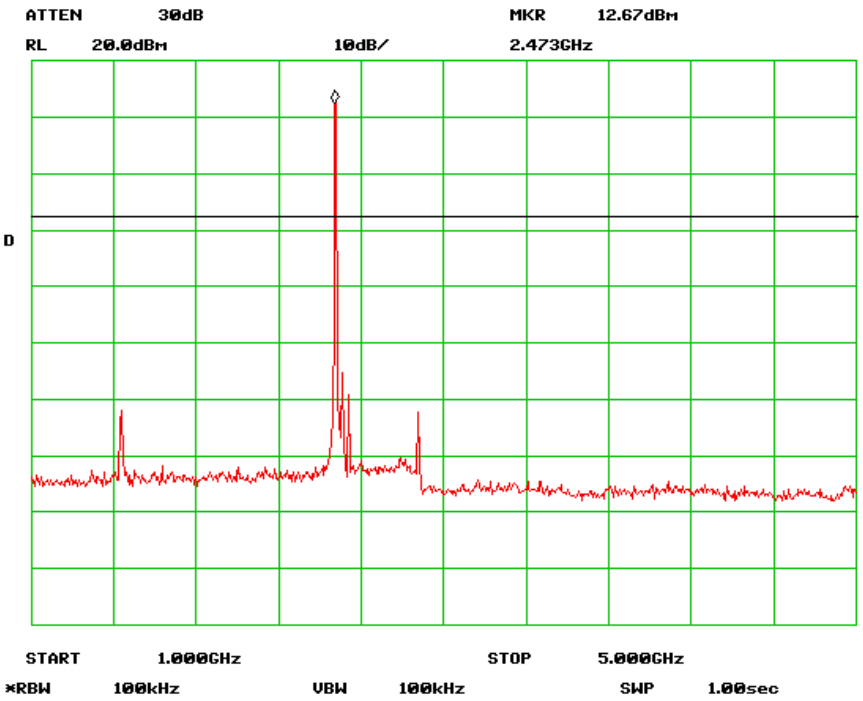
MKR -50.17dBm
RL 20.0dBm
10dB/
14.575GHz
D
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

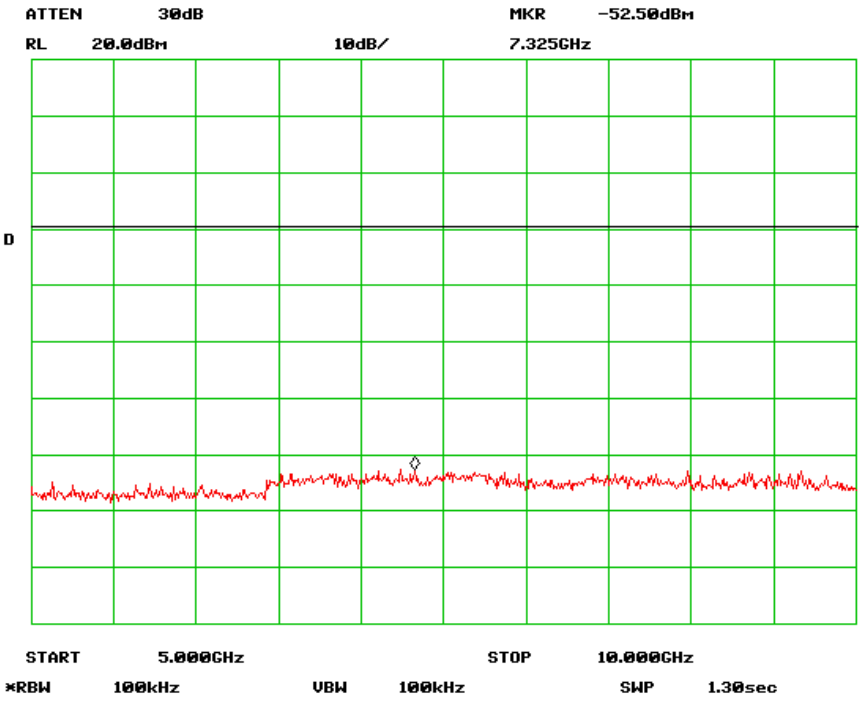

ATTEN 30dB
MKR -49.33dBm
RL 20.0dBm
10dB/
19.967GHz
D
START 15.000GHz
STOP 20.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

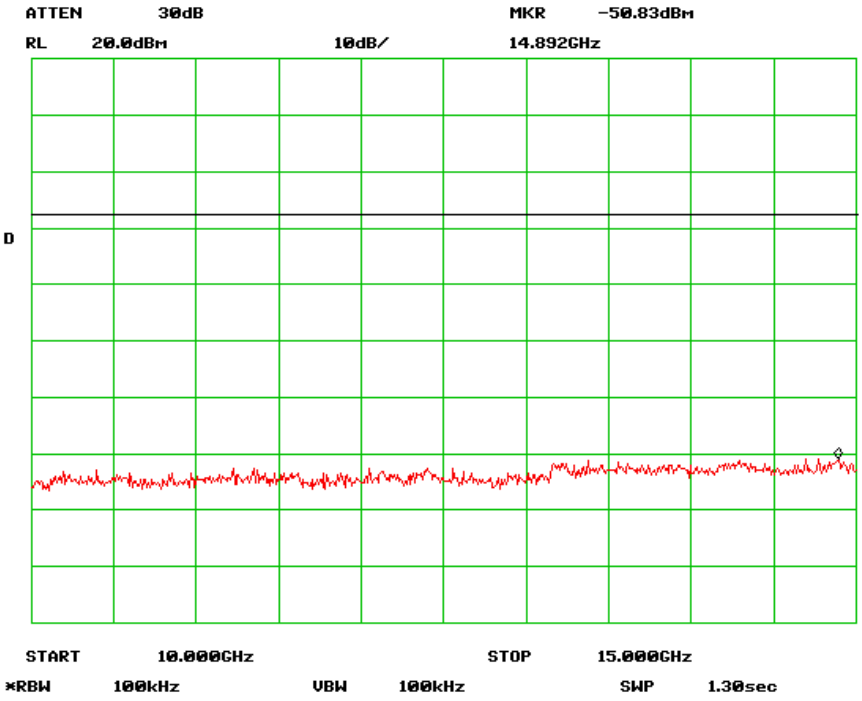

ATTEN 30dB
MKR -46.83dBm
RL 20.0dBm
10dB/
24.083GHz
D
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

Spurious Emission-High channel






ATTEN 30dB
MKR -52.50dBm
RL 20.0dBm
10dB/
7.325GHz
D
START 5.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec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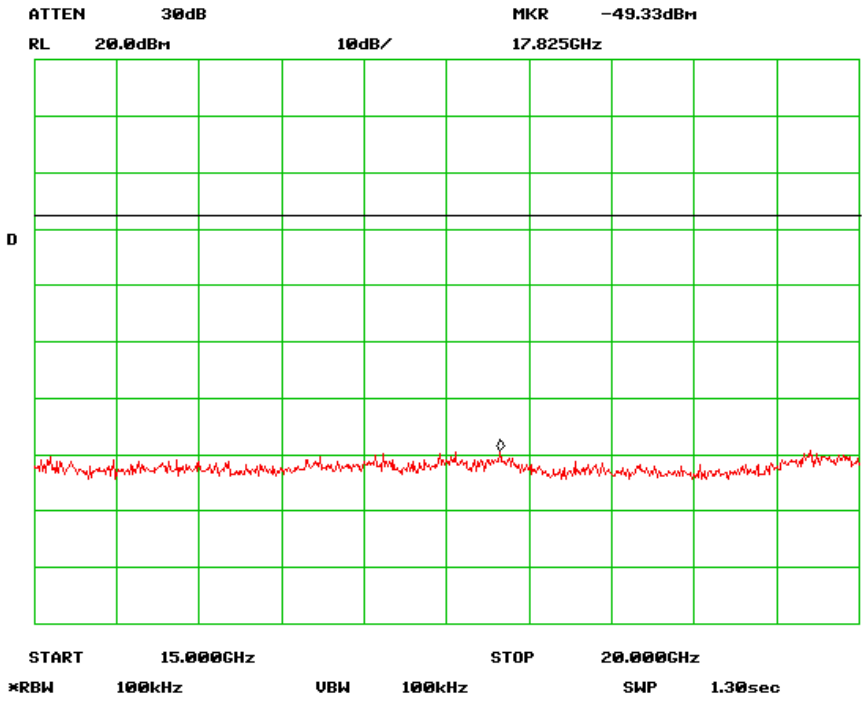
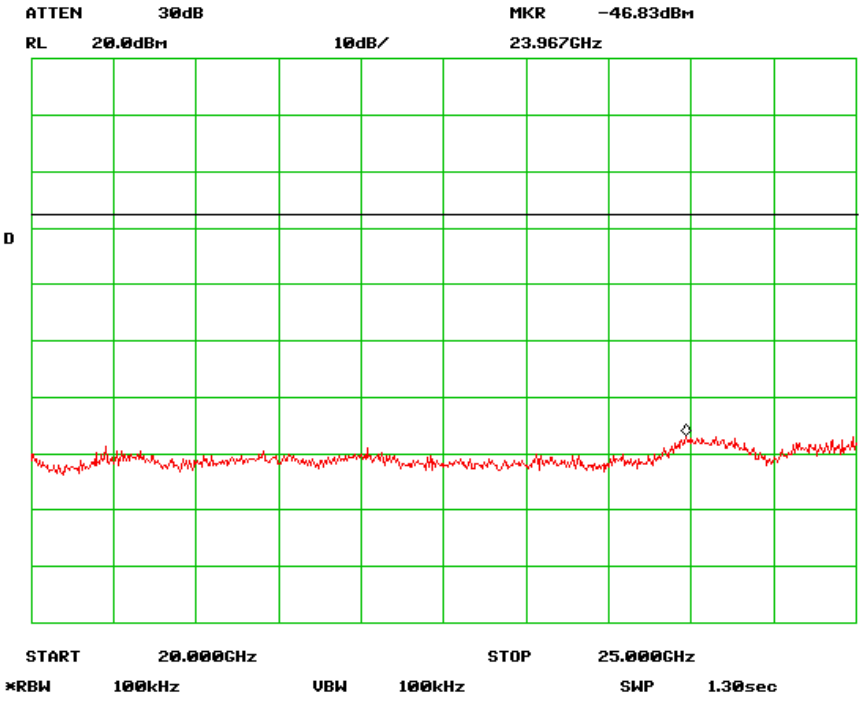
MKR -50.83dBm
RL 20.0dBm
10dB/
14.892GHz
D
START 10.000GHz
STOP 15.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec


ATTEN 30dB
MKR -49.33dBm
RL 20.0dBm
10dB/
17.825GHz
D
START 15.000GHz
STOP 20.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec


ATTEN 30dB
MKR -46.83dBm
RL 20.0dBm
10dB/
23.967GHz
D
START 20.000GHz
STOP 25.000GHz
*RBW 100kHz
VBW 100kHz
SWP 1.30sec

5.9 Radiated Spurious Emission < 1GHz

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz & 1GHz above (3m & 10m) is +/-6dB.
4. Environmental Conditions

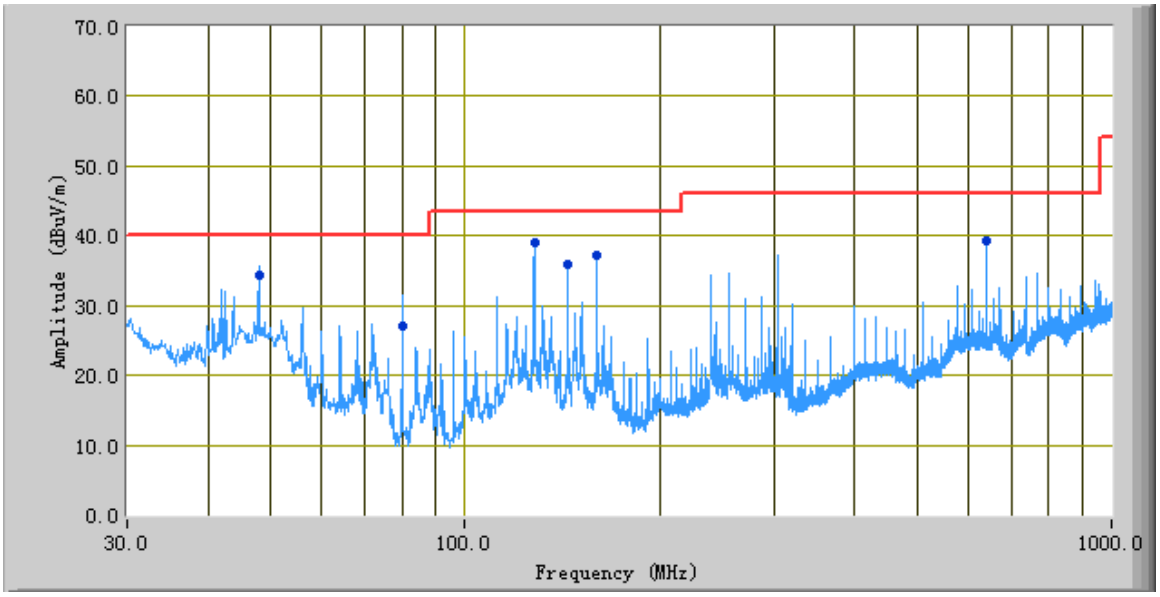
Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : 19~23 April 2010
   Tested By : Alex Wang

Standard Requirement: The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Test Result:

Operating mode: transmitting



Test Data

Frequency (MHz)	Quasi Peak (dBuV/m)	Azimuth	Polarity(H /V)	Height (cm)	Factors (dB)	Limit (dBuV/m)	Margin (dB)
128.03	39.07	31.00	V	102.00	-31.78	43.50	-4.43
48.00	34.22	6.00	V	107.00	-34.88	40.00	-5.78
160.01	37.29	43.00	H	106.00	-32.15	43.50	-6.21
640.06	39.30	89.00	V	101.00	-24.03	46.00	-6.70
143.99	35.79	34.00	H	104.00	-32.49	43.50	-7.71
80.01	27.07	278.00	V	100.00	-38.18	40.00	-12.93

5.10 Radiated Spurious Emissions > 1GHz & Band Edge

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz & 1GHz above (3m & 10m) is +/-6dB.
4. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : 19~23 April 2010
   Tested By : Alex Wang

Standard Requirement: The emissions from the Low-power radio-frequency devices shall not exceed the field strength levels specified in the following table and the level of any unwanted emissions shall not exceed the level of the fundamental emission. The tighter limit applies at the band edges.

Test Result:

@ 2403.962MHz @ 3 Meter

Frequency	Reading	Direction	Height	Polar	Factor	Corrected Reading	15.247/15.209	15.247/15.209	
GHz	(dBuV/m)	Degree	Meter	H / V	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin	Comments
4.80	48.12	120.00	1.10	v	4.64	52.76	74.00	-21.24	Peak
4.80	47.22	102.00	1.20	h	4.64	51.86	74.00	-22.14	Peak
4.80	41.31	315.00	1.30	v	4.64	45.95	54.00	-8.05	Ave
4.80	37.12	180.00	1.30	h	4.64	41.76	54.00	-12.24	Ave

Emission was scanned up to 25GHz.

@ 2439.930MHz @ 3Meter

Frequency	Reading	Direction	Height	Polar	Factor	Corrected Reading	15.247/15.209	15.247/15.209	
GHz	(dBuV/m)	Degree	Meter	H / V	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin	Comments
4.88	51.12	223.00	1.10	v	4.64	55.76	74.00	-18.24	Peak
4.88	50.68	112.00	1.00	h	4.64	55.32	74.00	-18.68	Peak
4.88	39.31	223.00	1.10	v	4.64	43.95	54.00	-10.05	Ave
4.88	37.33	110.00	1.30	h	4.64	41.97	54.00	-12.03	Ave
7.32	50.20	204.00	1.10	v	8.83	59.03	74.00	-14.97	Peak
7.32	47.65	110.00	1.10	h	8.83	56.48	74.00	-17.52	Peak
7.32	34.12	216.00	1.30	v	8.83	42.95	54.00	-11.05	Ave
7.32	29.23	168.00	1.40	h	8.83	38.06	54.00	-15.94	Ave

Emission was scanned up to 25GHz.

@ 2477.484MHz @ 3Meter

Frequency	Reading	Direction	Height	Polar	Factor	Corrected Reading	15.247/15.209	15.247/15.209	
GHz	(dBuV/m)	Degree	Meter	H / V	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin	Comments
4.95	49.12	262.00	1.30	v	4.64	53.76	74.00	-20.24	Peak
4.95	51.68	102.00	1.20	h	4.64	56.32	74.00	-17.68	Peak
4.95	40.33	255.00	1.10	v	4.64	44.97	54.00	-9.03	Ave
4.95	39.22	150.00	1.30	h	4.64	43.86	54.00	-10.14	Ave
7.43	51.20	271.00	1.40	v	8.83	60.03	74.00	-13.97	Peak
7.43	50.67	170.00	1.50	h	8.83	59.5	74.00	-14.5	Peak
7.43	36.12	271.00	1.30	v	8.83	44.95	54.00	-9.05	Ave
7.43	28.23	119.00	1.40	h	8.83	37.06	54.00	-16.94	Ave

Emission was scanned up to 25GHz.

Band Edge

Channel	Polarity	Detector	Frequency	Result	Limit	Margin
Low Channel	V	Peak	2400	37.56	74	-36.44
Low Channel	H	Peak	2400	43.12	74	-30.88
Low Channel	V	Avg	2400	24.15	54	-29.85
Low Channel	H	Avg	2400	24.73	54	-29.27

Channel	Polarity	Detector	Frequency	Result	Limit	Margin
High Channel	V	Peak	2483.5	42.23	74	-31.77
High Channel	H	Peak	2483.5	45.57	74	-28.43
High Channel	V	Avg	2483.5	27.75	54	-26.25
High Channel	H	Avg	2483.5	31.33	54	-22.67

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Manufacturer	Model	CAL Due Date
Spectrum Analyzer	HP	8564 E	2011.04.26
EMI Receiver	Rohde & Schwarz	ESPI 3	2011.02.19
Antenna (30MHz~2GHz)	Sunol Sciences	JB1	2010.10.04
Horn Antenna (1~18GHz)	A-INFOMW	JXTXLB-10180	2010.11.18
Horn Antenna (1~18GHz)	N/A	N/A	2010.10.04
Pre-Amplifier(0.01 ~ 1.3GHz)	HP	8447F	2011.04.24
Pre-Amplifier(0.1 ~ 18GHz)	MITEQ	AMF-7D-00101800-30-10P	2011.03.05
Horn Antenna (18~40GHz)	Com Power	AH-840	2010.05.21
Microwave Pre-Amp (18~40GHz)	Com Power	PA-840	2010.05.21

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 KHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

Annex A. iii RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic , was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

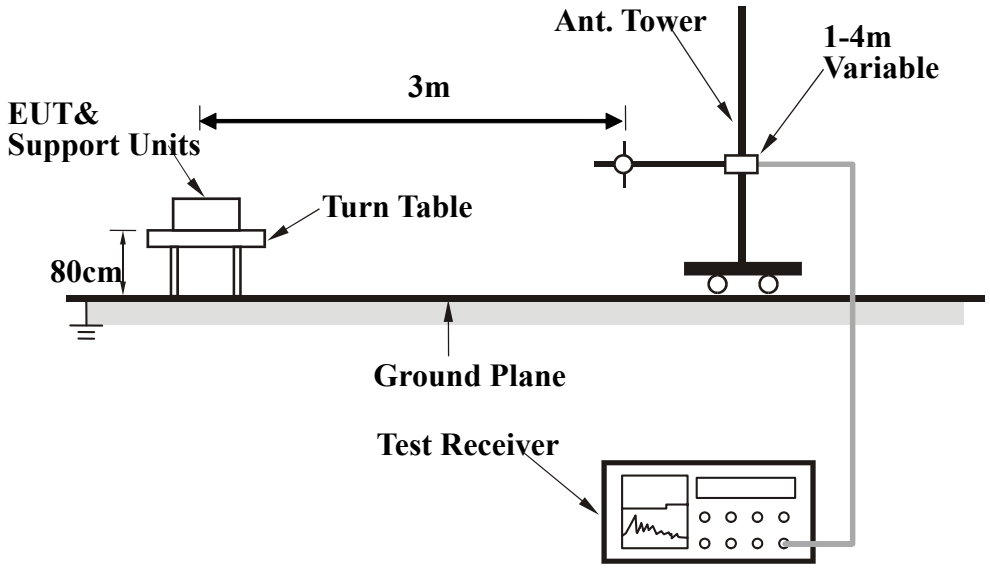
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS).

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured were complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

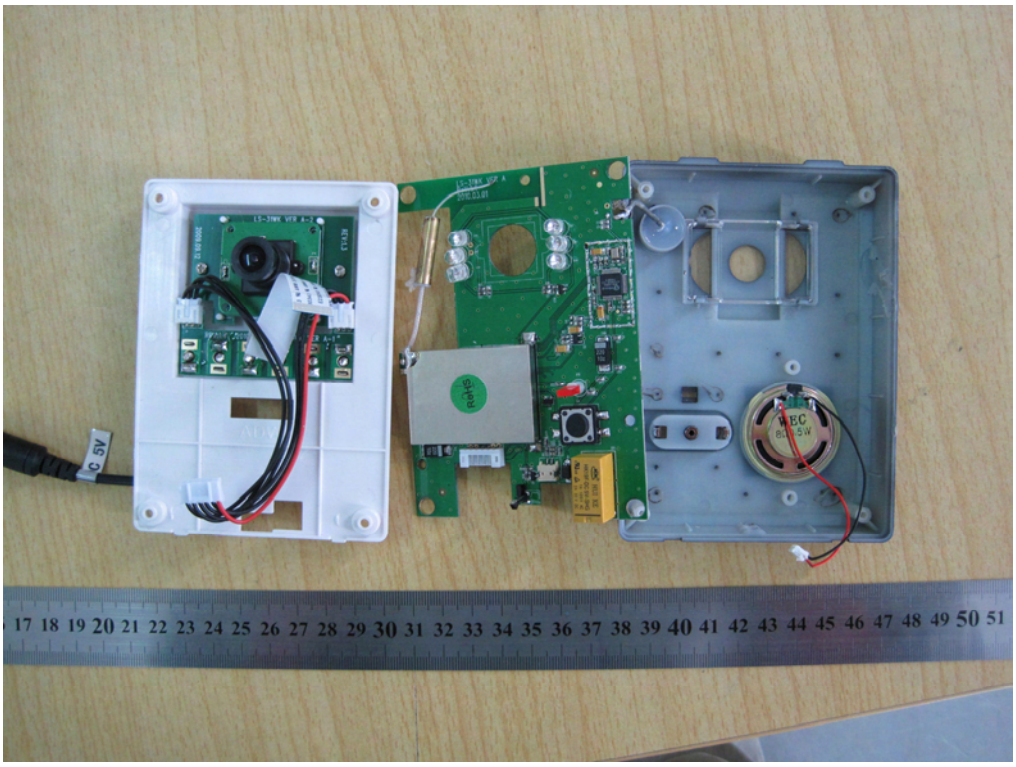
where
Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)
And the average value is

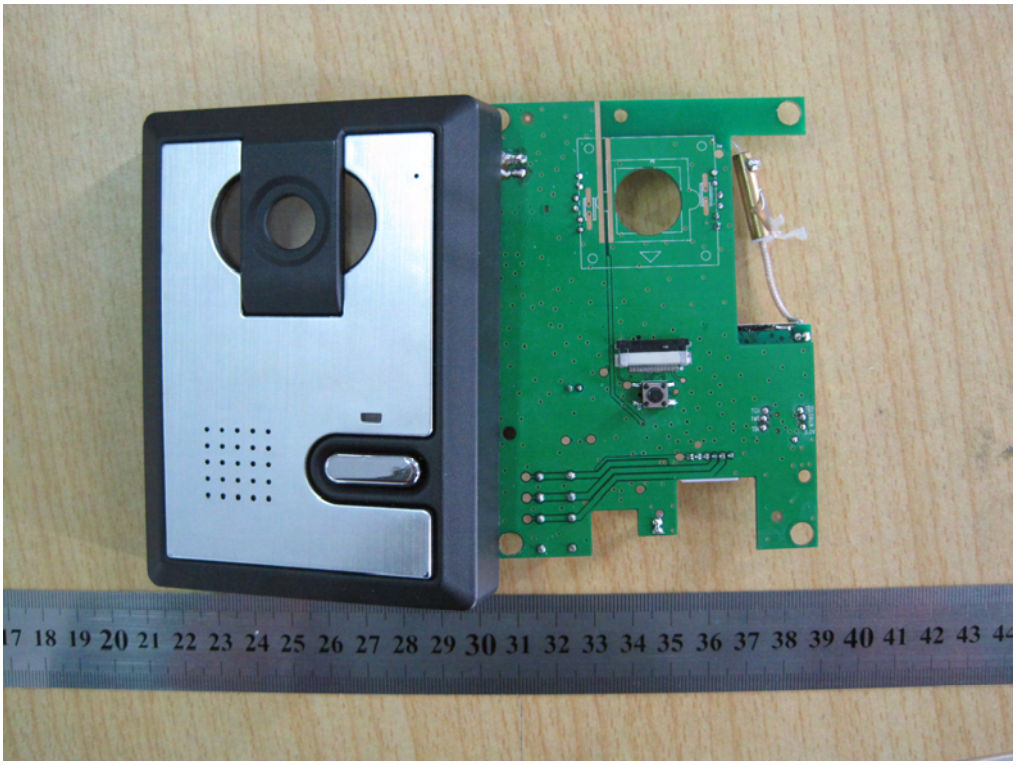
Average = Peak Value + Duty Factor or
Set RBW = 1MHz, VBW = 10Hz.

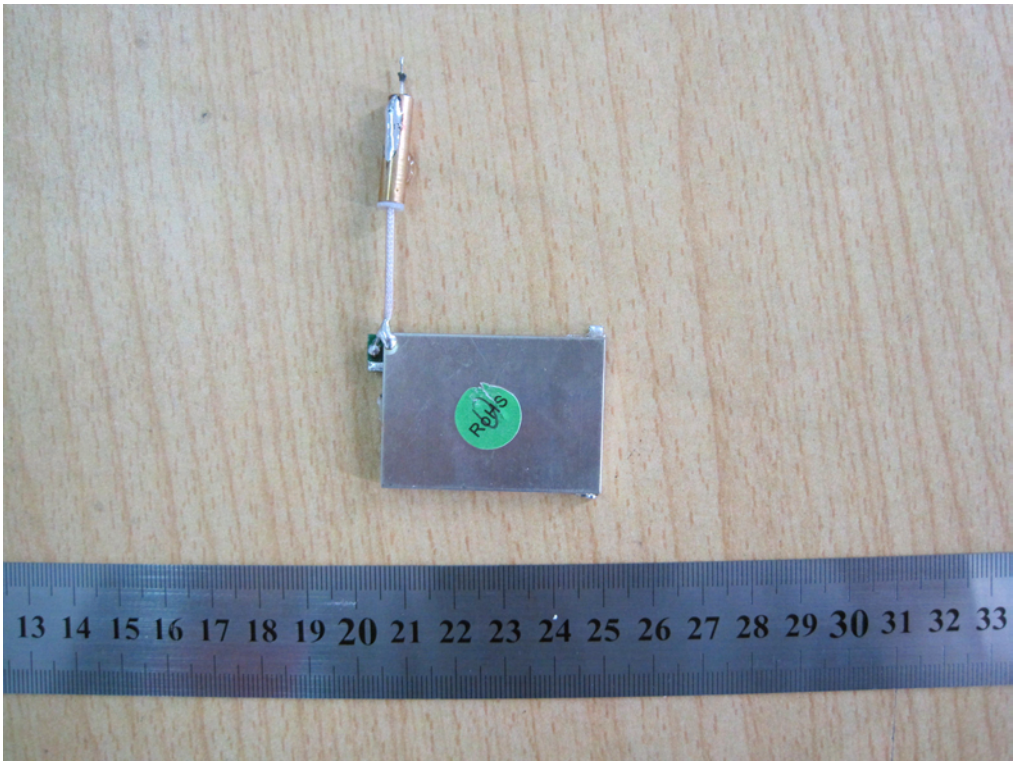
Note :
If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

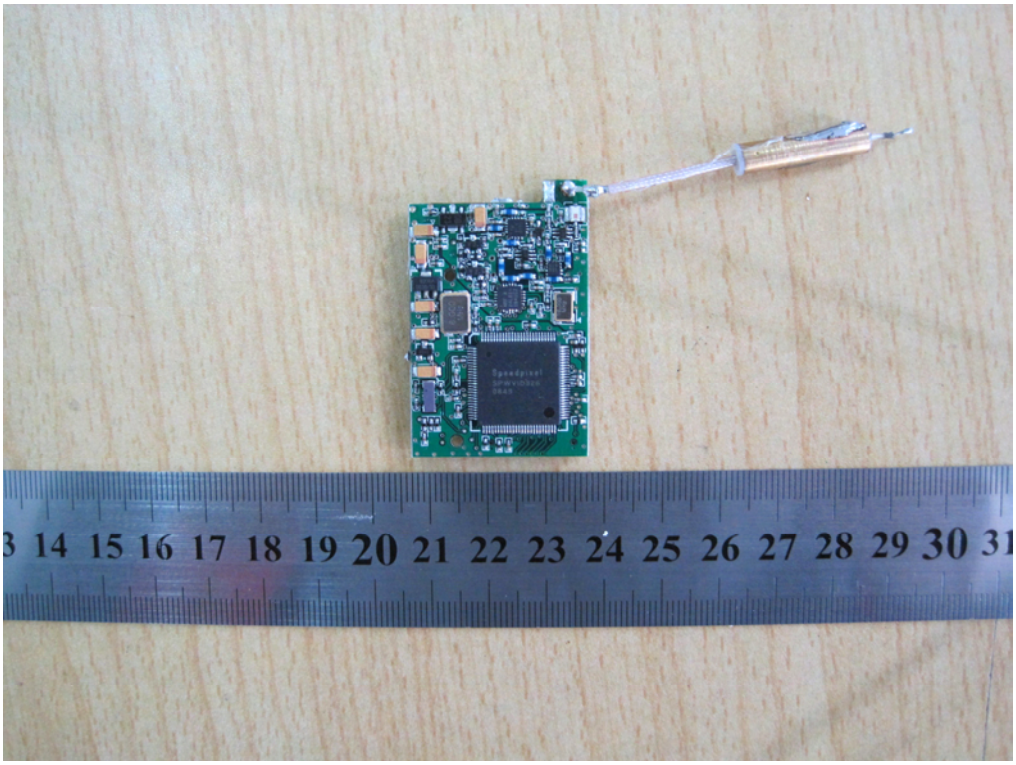
Annex B. EUT AND TEST SETUP PHOTOGRAPHS

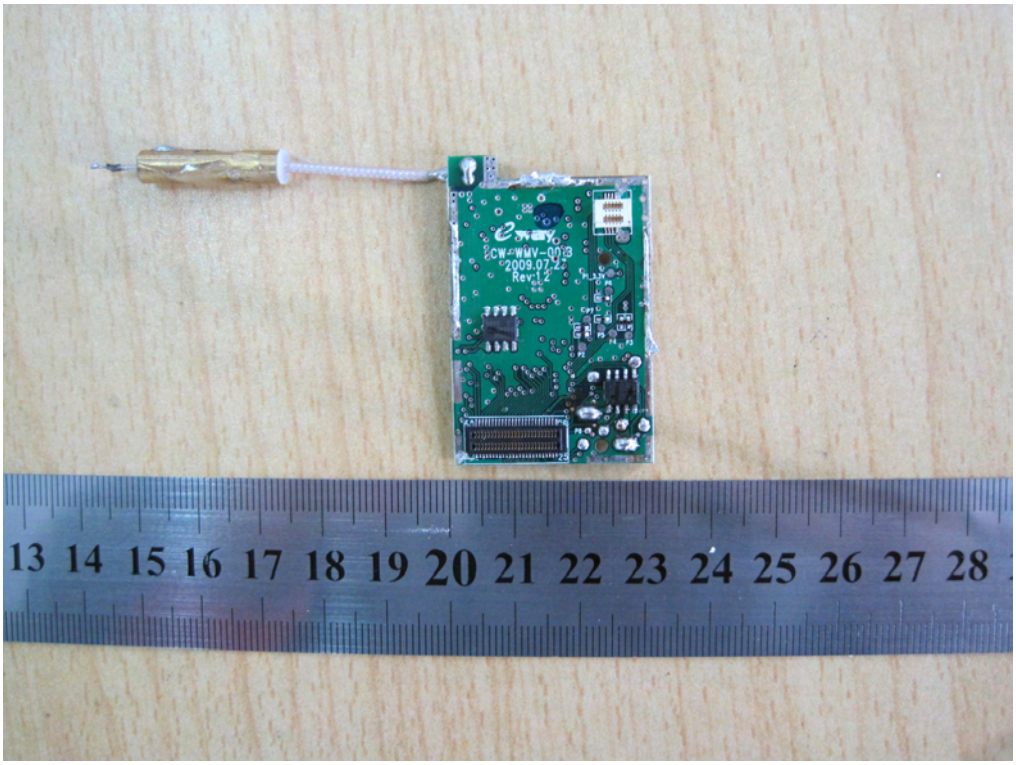
Annex B.i. Photograph : EUT External Photo






RoHS


3 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31


13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28