TEST REPORT

of

FCC Part 15 Subpart B & C& E

<Part3: tested with WLAN 802.11a(5725MHz-5850MHz) **/b/g>**

Product : **Notebook Personal Computer**

Model(s): **W190**

(with WLAN a/b/g Module, INTEL, Model:WM3945ABG)
(with Bluetooth Module, BILLIONTON, Model:GUBTCR42M)

Brand: MTC; GETAC

Applicant: **MITAC Technology Corporation**

Address: **4F, No.1, R&D Road 2,**
Hsinchu Science-Based industrial Park,
Hsinchu 300
Taiwan

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; TAF: 0997; NVLAP: 200234-0;IC: IC4164-1 ;
VCCI: R-1435, C-1440, T-299, R-2598, C-2845; NEMKO: ELA 113B
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-08LR001FCBG**
Issue Date : **2008/01/18**

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247) CFR 47 Part 15 Subpart E (Section 15.407)
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	Notebook Personal Computer
Model:	W190
Applied by:	MITAC Technology Corporation
Sample received Date:	2007/12/21
Final test Date :	2008/01/04-2008/01/17
Test Result	PASS
Test Site:	Chamber 12, Conduction 02
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
Test Engineer:	Jerry Chiou

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature

Roy Hsieh / Manager

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 99 pages, including 1 cover page , 2 contents page, and 96 pages for the test description. This report must not be use to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

1.2 Applicant & Manufacturer Information

Applicant: Mitac Technology Corp
No. 1, R&D 2nd RD., Hsin-Chu Science Based Industrial Park
Hsin-Chu Hsien,
Taiwan

Manufacturer 1: Mitac Technology Corp
No. 1, R&D 2nd RD., Hsin-Chu Science Based Industrial Park
Hsin-Chu Hsien,
Taiwan

Manufacturer 2: Getac Technology (Kunshan) Co., Ltd
No. 269, 2nd Road, Export Processing Zone,
Changjiang South, Road,
Kunshan, Jiangsu, P.R.C Zip code: 215300

1.3 Test Results Summary

The 802.11b/g and 802.11a (5725MHz-5850MHz) functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

2. Description of Equipment Under Test (EUT)

Description:	Notebook Personal Computer
Condition:	Pre-Production
Model:	W190
Brand:	MTC;GETAC
Wireless LAN Module:	Intel, Model: WM3945ABG (MOW1 Driver:V.11.1.1.1)
Bluetooth Module:	BILLIONTON(Model:GUBTCR42M)
Frequency Range of 802.11a:	5150 - 5250 MHz 5250 - 5350 MHz 5725 - 5850 MHz
Frequency Range of 802.11b/g:	2400 - 2483.5 MHz
Frequency Range of Bluetooth:	2400 - 2483.5 MHz
Support channel:	
802.11a	13 Channels
802.11b/g	11 Channels
Bluetooth	79 Channels
Modulation Skill:	
802.11a	OFDM (6 Mbps – 54 Mbps)
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Bluetooth	GFSK (1Mbps) DQPSK(2Mbps), 8DPSK(3Mbps)
Antennas Type:	
WLAN Main antenna:	PIFA (Model: W190 WLAN Antenna) Black made by JOINSOON ELECTRONICS MFG. CO., LTD
WLAN Aux antenna:	PIFA (P/N: W190 WLAN Antenna) Grey made by JOINSOON ELECTRONICS MFG. CO., LTD
Bluetooth antenna:	Chip Antenna(Model: RFANT5220), made by Walsin Technology Corporation.
Antenna Connected:	Connected to RF connector on the PCB of the Bluetooth or WLAN module .The user is not possible to change the antenna without disassembling the notebook computer.
Antenna peak Gain:	
WLAN Main antenna	0.04dBi(11b,11g), -0.1dBi(11a)
WLAN Aux antenna	-0.3 dBi (11b,11g), -0.54 dBi (11a)
Bluetooth antenna	2.66 dBi
Power Type of wireless module:	3.3V DC from Notebook PC
Power Type of Bluetooth module:	3.3V DC from Notebook PC

The channel and the operation frequency of 802.11a listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	5180	02	5200
03	5220	04	5240
05	5260	06	5280
07	5300	08	5320
09	5745	10	5765
11	5785	12	5805
13	5825		

The channel and the operation frequency of 802.11b and 802.11g listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

The channels and the operation frequency of Bluetooth listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	01	2403
02	2404	03	2405
04	2406	05	2407
……			
75	2477	76	2478
77	2479	78	2480

CPU:	Genuine intel U7600 1.2GHz
Memory:	Hynix (Model:HY5PS12821C FP-Y5) 1GB
Power Supply Type:	DELTA(Model:ADP-90SB BB INPUT:100~240V ~ 1.5A 50-60HZ OUTPUT:19V~4.74A
Hard Disk Drive:	Toshiba(Model:4032GSX) 40G or Toshiba(Model:8032GSX) 80G or Toshiba(Model:1234GSX) 120G
LCD Panel:	Toshiba(Model:LTD121EC5S)
USB 2.0 Connector:	two
LAN Connector:	one
Modem Port:	one
Serial Port:	one
D-SUB Port:	one
Microphone Port:	one
Earphone Port:	one
PCMCIA Connector:	one
Docking Connector:	one
Battery:	GTK P/N:338911120050
Power cord:	Non-shielded, Detachable 3-pin

All types of device listed above have been tested. We present the worst case test data in the report. The test configuration is listed below

For EMI **Configuration:**

Configuration	
CPU	Genuine intel U7600 1.2GHz
LCD	Toshiba(Model:LTD121EC5S)
Hard Disk Device	Toshiba(Model:1234GSX) 120G
Memory	Hynix (Model:HY5PS12821C FP-Y5)
Wireless LAN card	Intel(Model:WM3945ABG)
Battery	GTK P/N:338911120050
Bluetooth	BILLIONTON(Model:GUBTCR42M)
Power Supply Type	DELTA(Model:ADP-90SB BB

EMI Noise Source:

Crystal: 32.768KHz(X1) 25MHz(X2) 10MHz(X501) 14.318MHz(X502)

Clock Generator: U517

EMI Solution:

1. Add Gasket behind LCD Panel
2. Add Gasket behind Computer
3. Add shielded tape on LCD Signal cable
4. Add aluminum foil behind LCD Panel
5. Add Gasket on LCD Panel Right and Left
6. Add shielded tape behind Computer

3. Description of Support Equipment

3.1 Description of Support Equipment

Unit	Model Serial No.	Brand	Power Cord	FCC ID
24" LCD Monitor	2407WFPb S/N: N/A	DELL	Non-shielded Detachable	FCC DOC
Dell USB Mouse	MO56UC S/N: 511001742	DELL	NA	FCC DOC
802.11a/b/g Access Point (for DFS test)	AIR-AP1242AG-A-K9 S/N: FTX1120B6SQ	Cisco	Non-shielded, Detachable	LDK102056
Notebook Personal Computer (for DFS test)	X40 S/N: NA	IBM	Non-shielded Detachable	FCC DOC

3.1.1 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

A. Read and write to the disk drives.
B. The RF software makes the transmitter continuously sending RF signals
C. Eut link to the support PC , and play the "TestFile.mpeg" (NTIA approved) which save at the support PC (for DFS test).
D. Repeat the above steps.

	Filename	Issued Date
Media player with the V2.61 Codec package (for DFS test)	mplayerc.exe	--
CRTU 3945ABG version 4.0.18.0000	CRTU.exe	2005/10/16

3.1.2 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to EUT SPS	1.8M	Nonshielded, Detachable	Plastic Head
Monitor D-SUB Data Cable	Monitor D-SUB Port to EUT VGA Port	1.8M	Shielded, Detachable(with core)	Metal Head
USB Mouse Cable	USB Mouse to Docking USB Port	1.7M	Shielded, Un-detachable	Metal Head

4. Test Results (802.11b&g)

4.1 Powerline Conducted Emissions [Section 15.207]

4.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

4.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dß below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dß below the applicable average limits, the emissions were also measured with the average detectors.

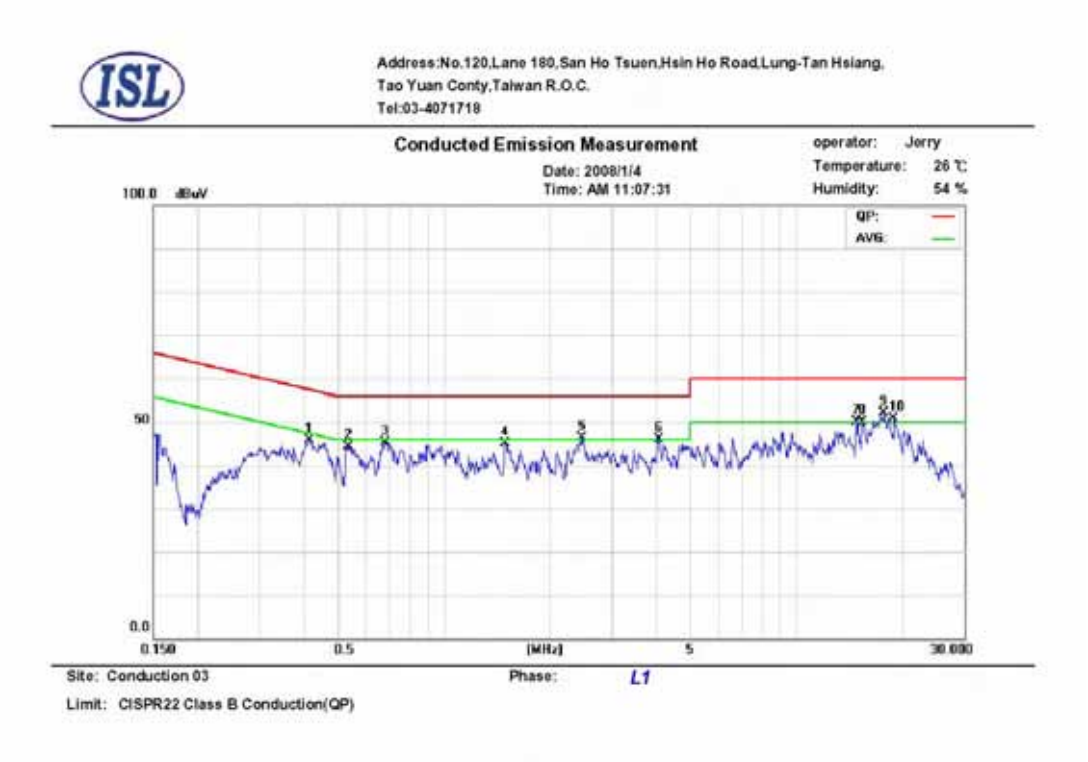
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

4.1.4 802.11b Test Data:

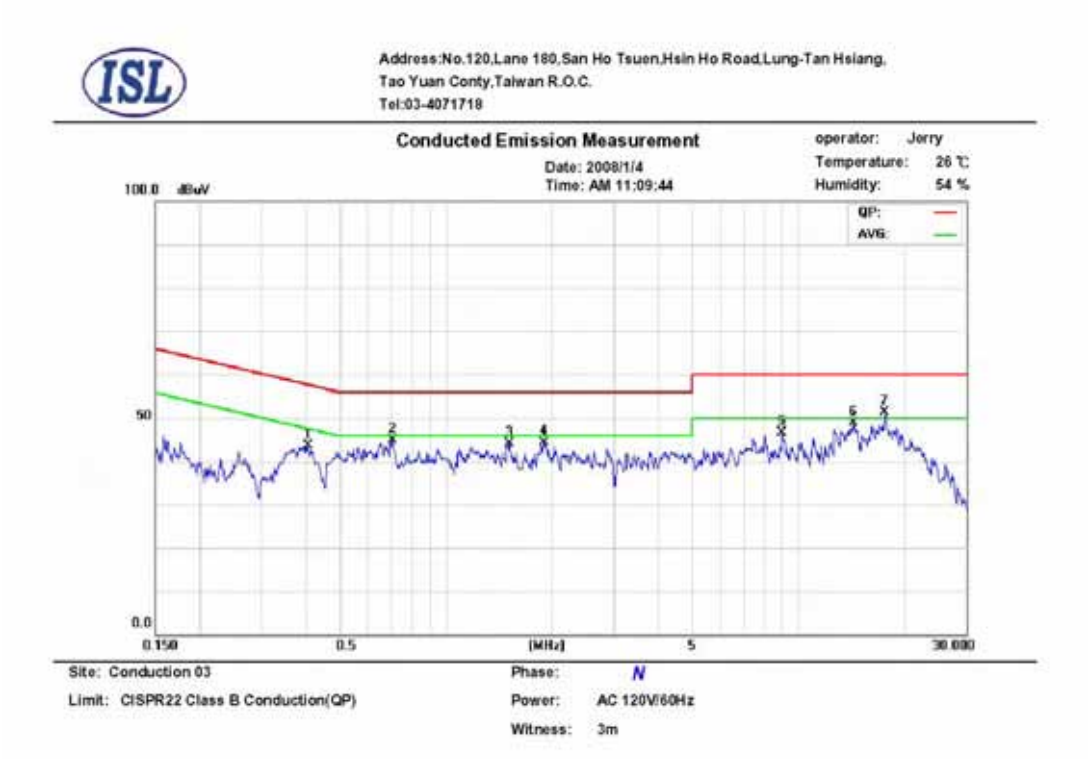
802.11b Power Line Conducted Emissions (Hot) Channel 1, 6, 11



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.4148	0.2	0.08	32.80	57.5	-24.7	21.90	47.5	-25.6	
0.5350	0.2	0.07	38.70	56.0	-17.3	25.90	46.0	-20.1	
* 0.6824	0.2	0.07	34.92	56.0	-21.0	30.23	46.0	-15.7	
1.4953	0.2	0.08	32.46	56.0	-23.5	26.71	46.0	-19.2	
2.4735	0.25	0.1	37.98	56.0	-18.0	27.21	46.0	-18.7	
4.0704	0.4	0.14	37.19	56.0	-18.8	26.50	46.0	-19.5	
14.8277	0.89	0.3	36.95	60.0	-23.0	31.04	50.0	-18.9	
15.3879	0.9	0.3	35.97	60.0	-24.0	31.42	50.0	-18.5	
17.7545	0.9	0.32	39.74	60.0	-20.2	30.66	50.0	-19.3	
18.9205	0.9	0.33	36.86	60.0	-23.1	28.86	50.0	-21.1	

*Maximum data x:Over limit

802.11b Power Line Conducted Emissions (Neutral) Channel 1, 6, 11



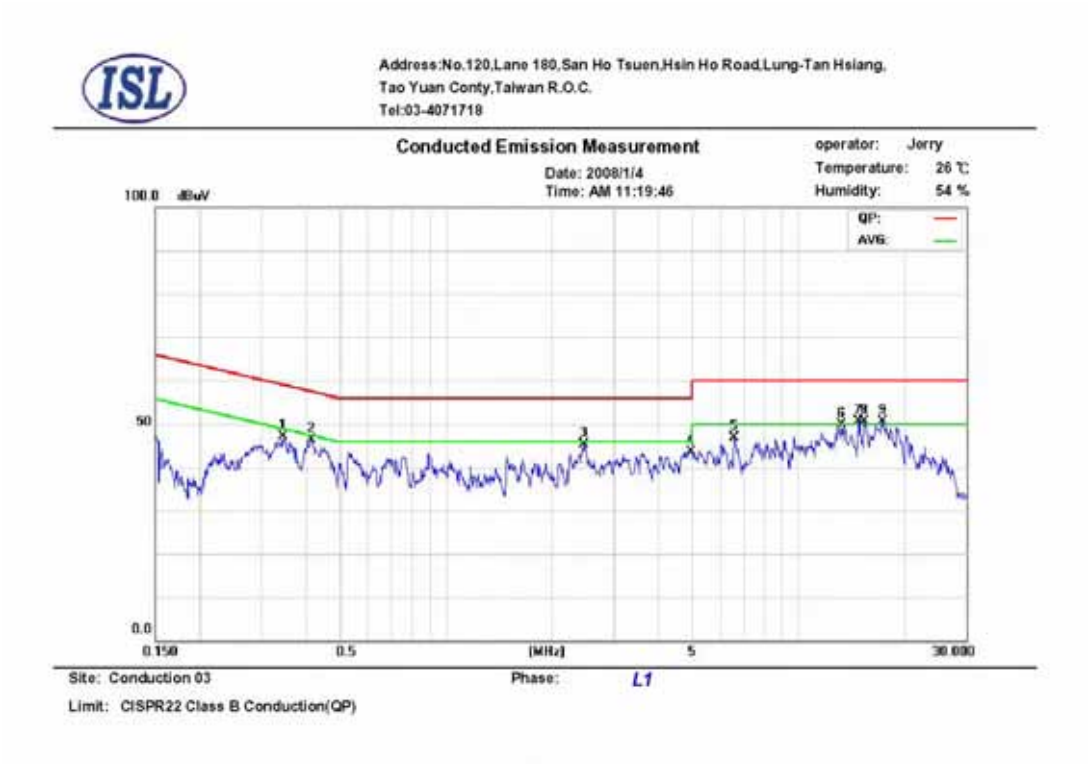
Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.4061	0.2	0.08	34.02	57.7	-23.7	26.91	47.7	-20.8	
* 0.7046	0.2	0.07	33.68	56.0	-22.3	28.89	46.0	-17.1	
1.5113	0.2	0.08	33.01	56.0	-22.9	25.01	46.0	-20.9	
1.8973	0.2	0.09	37.01	56.0	-18.9	23.02	46.0	-22.9	
9.0113	0.37	0.2	38.19	60.0	-21.8	26.19	50.0	-23.8	
14.3641	0.4	0.29	39.20	60.0	-20.8	29.31	50.0	-20.6	
17.5672	0.45	0.32	37.50	60.0	-22.5	30.29	50.0	-19.7	

* Maximum data x Over limit

* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1 , 6, 11 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

4.1.5 802.11g Test Data:

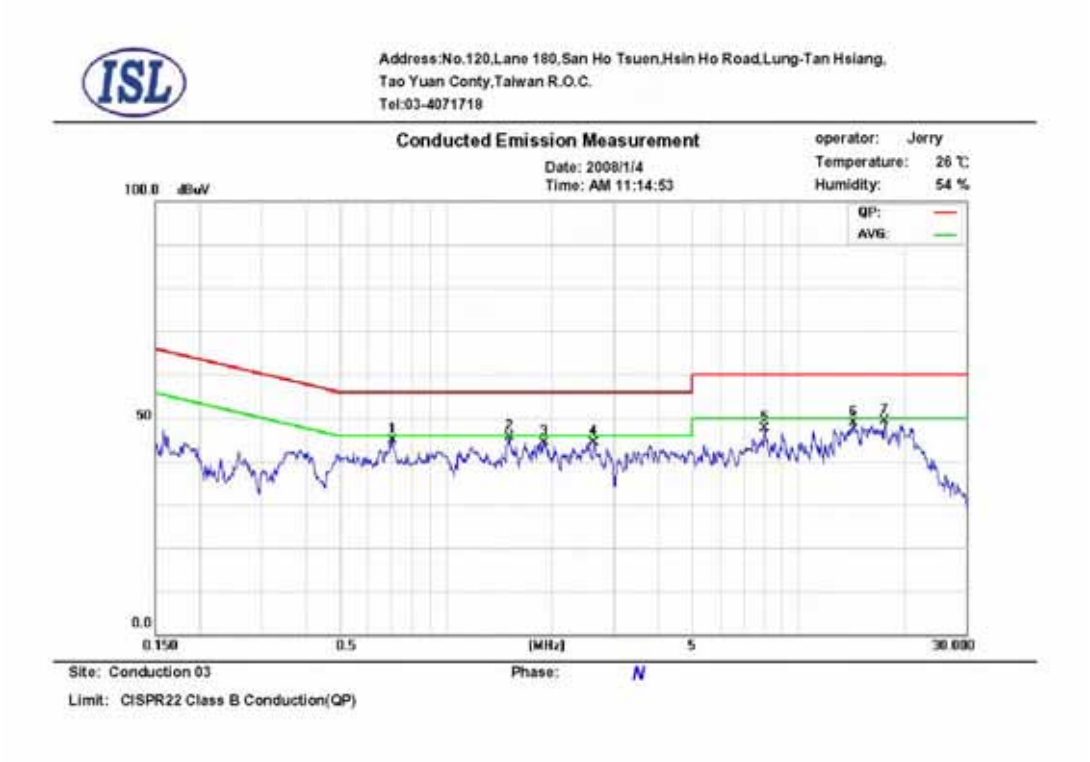
802.11g Power Line Conducted Emissions (Hot) Channel 1, 6, 11



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.3462	0.17	0.09	33.09	59.0	-25.9	25.73	49.0	-23.3	
0.4148	0.2	0.08	34.46	57.5	-23.0	27.86	47.5	-19.6	
* 2.4735	0.25	0.1	35.92	56.0	-20.0	30.22	46.0	-15.7	
4.9782	0.42	0.15	38.44	56.0	-17.5	27.31	46.0	-18.6	
6.5921	0.44	0.17	33.78	60.0	-26.2	22.99	50.0	-27.0	
13.2667	0.76	0.27	39.41	60.0	-20.5	25.60	50.0	-24.4	
14.8277	0.89	0.3	35.74	60.0	-24.2	28.73	50.0	-21.2	
15.3879	0.9	0.3	38.59	60.0	-21.4	26.77	50.0	-23.2	
17.2908	0.9	0.32	36.57	60.0	-23.4	27.97	50.0	-22.0	

*Maximum data x:Over limit

802.11g Power Line Conducted Emissions (Neutral) Channel 1, 6, 11



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.7046	0.2	0.07	33.01	56.0	-22.9	22.81	46.0	-23.1	
* 1.5113	0.2	0.08	37.02	56.0	-18.9	29.70	46.0	-16.3	
1.8972	0.2	0.09	34.74	56.0	-21.2	28.03	46.0	-17.9	
2.6221	0.2	0.11	37.94	56.0	-18.0	25.94	46.0	-20.0	
8.0198	0.33	0.19	36.25	60.0	-23.7	29.25	50.0	-20.7	
14.3641	0.4	0.29	34.64	60.0	-25.3	29.31	50.0	-20.6	
17.5671	0.45	0.32	33.75	60.0	-26.2	30.31	50.0	-19.6	

* Maximum data x Over limit

* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1 , 6, 11 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

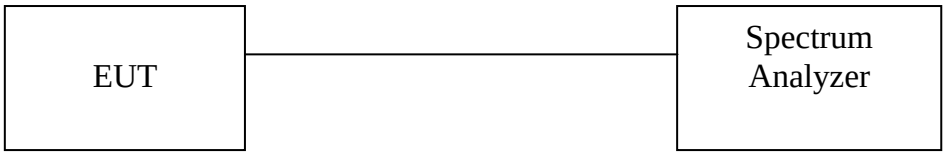
4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz
SPAN	20MHz

4.2.2 Test Setup



4.2.3 802.11b Test Data:

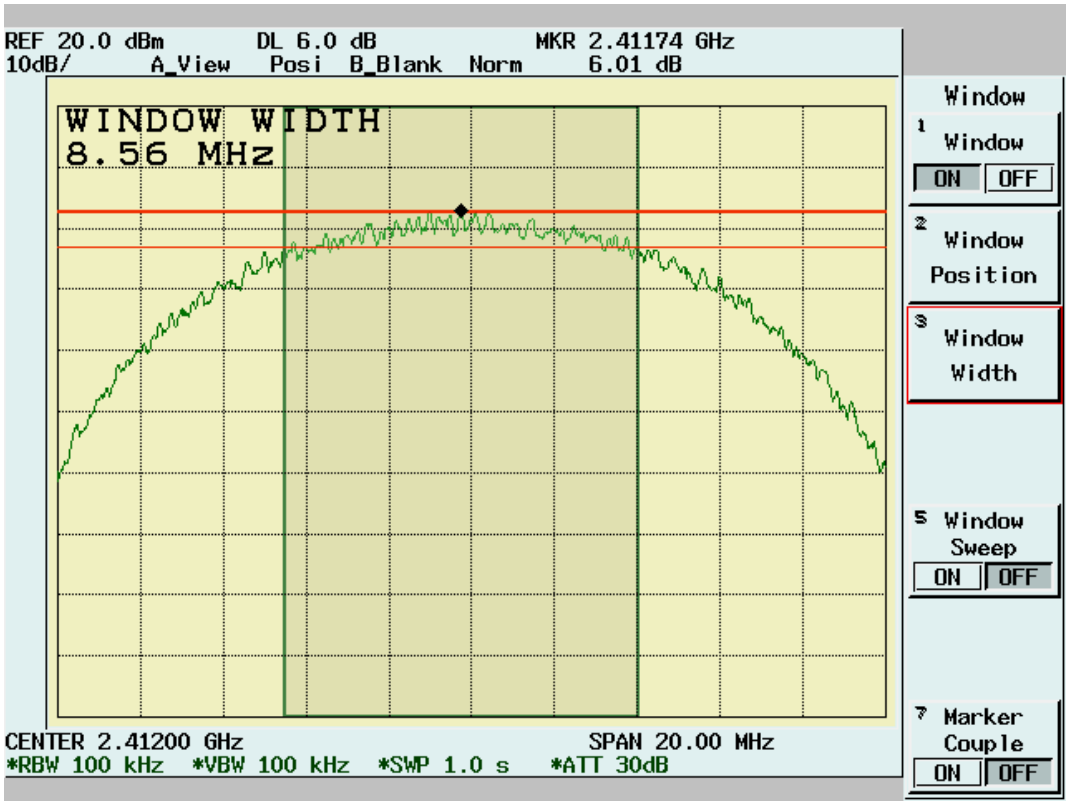
802.11b 6dB Bandwidth

Temp. (° C): 25

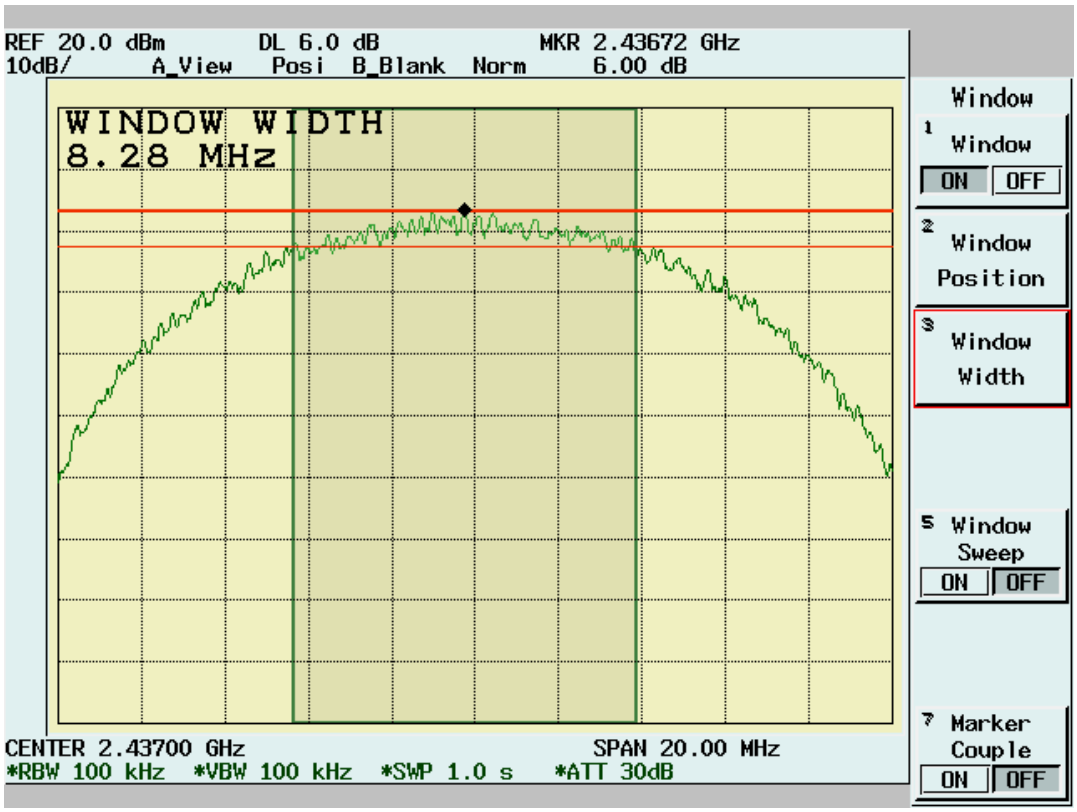
Test Engr: Jerry Humidity (%): 55

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	8.56	0.5	Pass
6	2437	8.28	0.5	Pass
11	2462	8.28	0.5	Pass

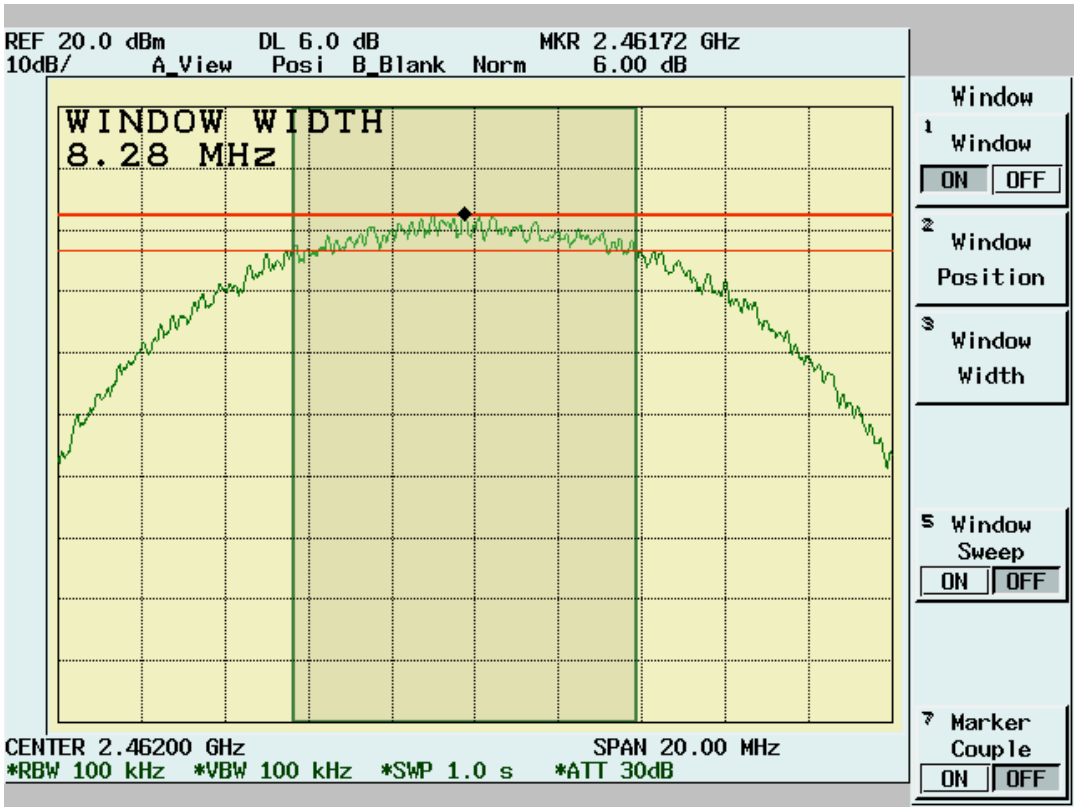
802.11bChannel 1:



802.11b Channel 6:



802.11b Channel 11:



4.2.4 802.11g Test Data:

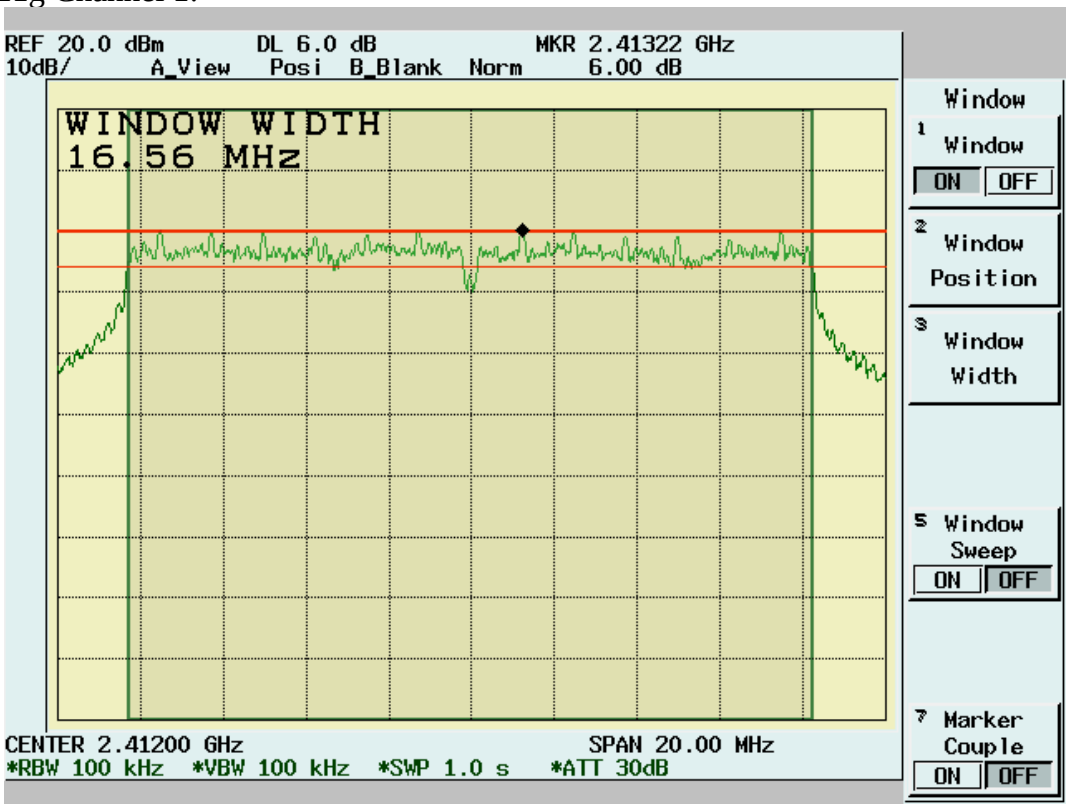
802.11g 6dB Bandwidth

Temp. (° C): 25

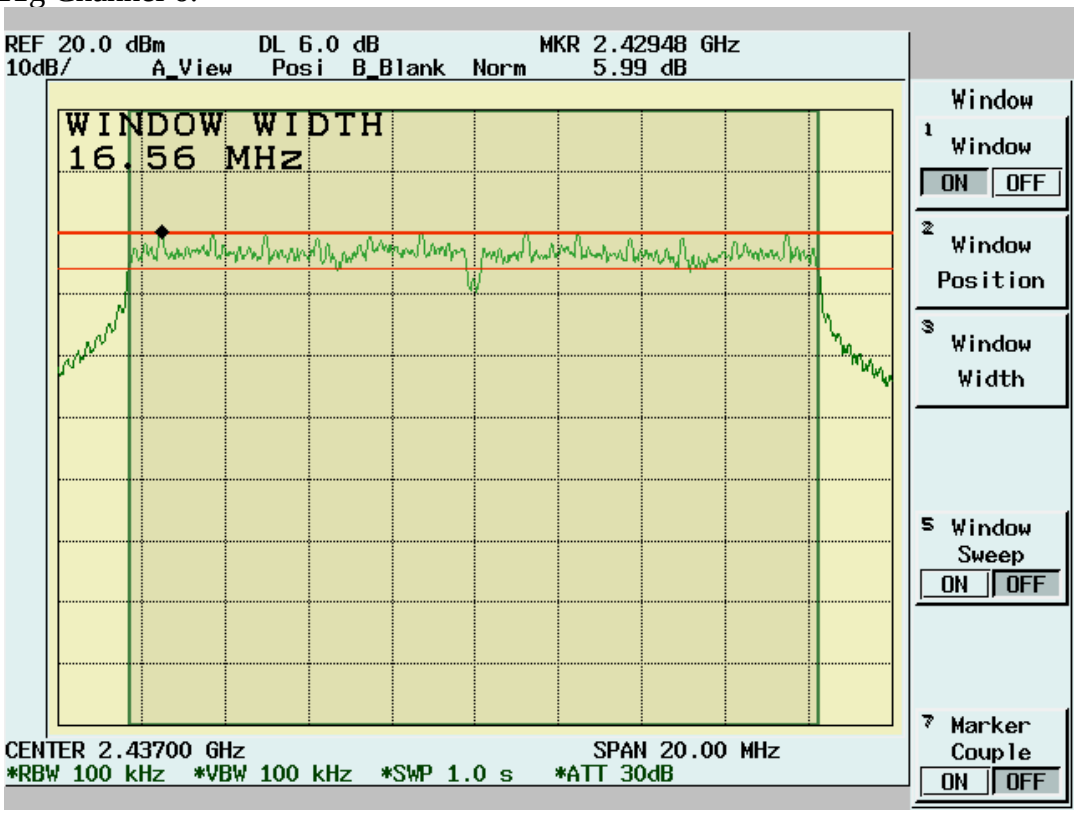
Test Engr: Jerry Humidity (%): 55

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.56	0.5	Pass
6	2437	16.56	0.5	Pass
11	2462	16.56	0.5	Pass

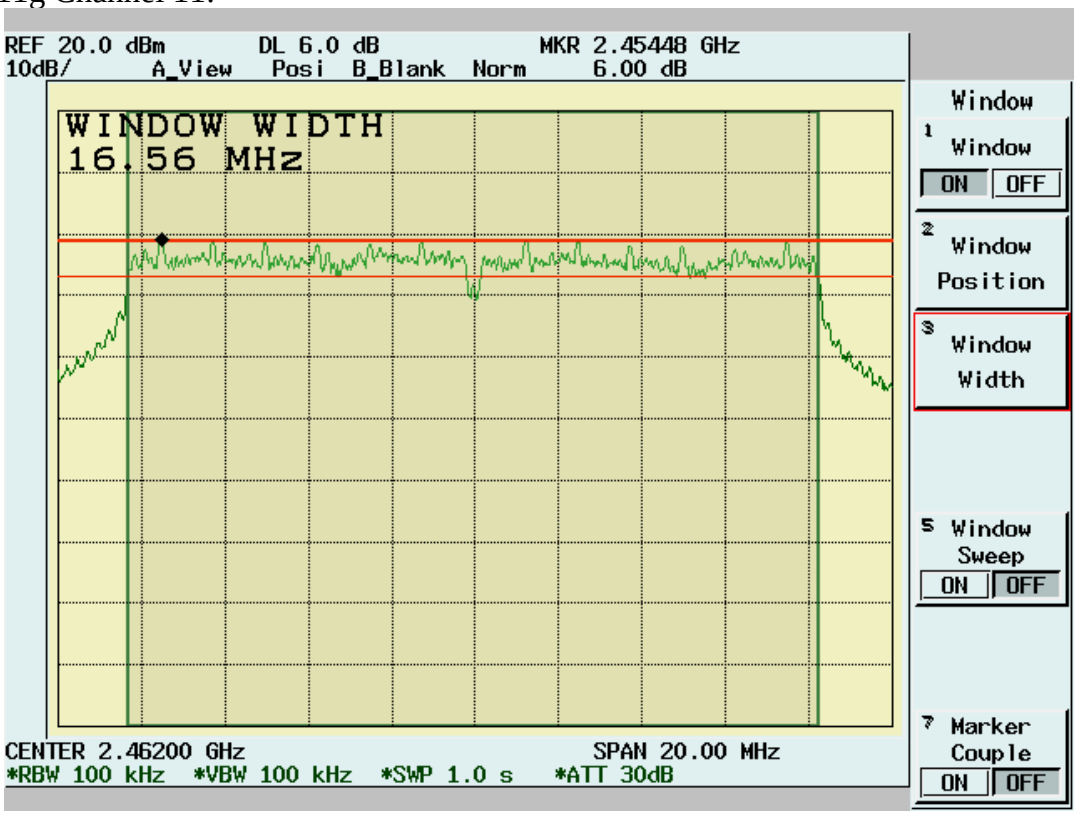
802.11g Channel 1:



802.11g Channel 6:



802.11g Channel 11:



4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

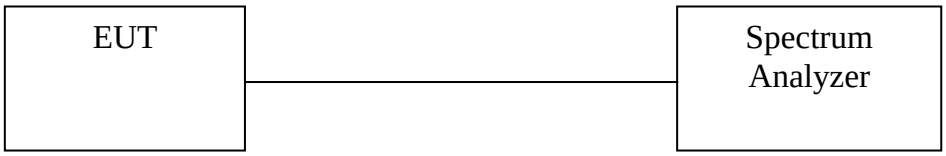
4.3.1 Test Procedure

The Transmitter output of EUT was connected to the Spectrum analyzer.

The test is performed in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

Equipment mode	Spectrum analyzer
Detector function	Channel Power
Channel BW	22MHz
RBW	1MHz
VBW	3MHz
SPAN	20MHz
Center frequency	fundamental frequency tested
Sweep time	auto
Average times	100

4.3.2 Test Setup



4.3.3 802.11b Test Data

802.11b Maximum Peak Output Power

Temp. (° C): 25

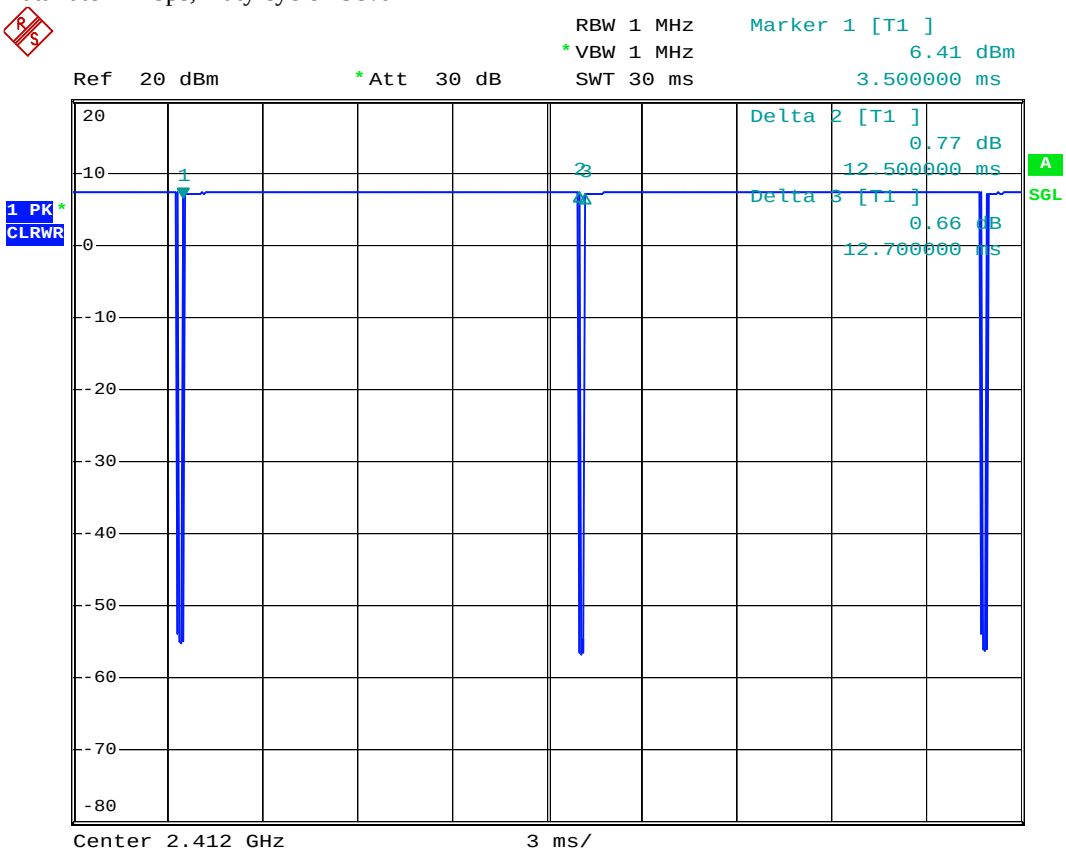
Test Engr: Jerry Humidity (%): 55

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Maximum Output Power (mW)	Maximum Output Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	12.33	2.1	27.73	14.43	30	Pass
6	2437	12.39	2.1	28.12	14.49	30	Pass
11	2462	11.82	2.1	24.66	13.92	30	Pass

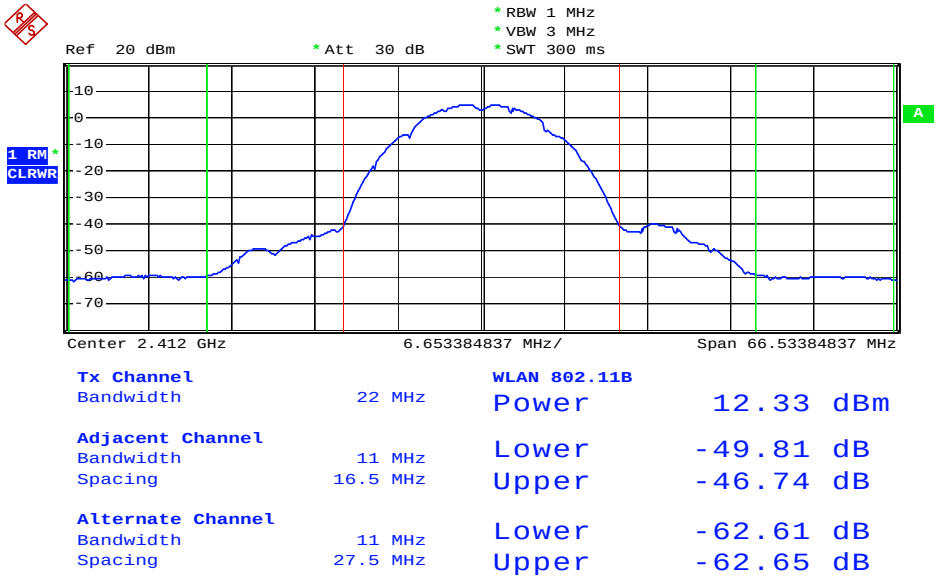
802.11b (dBm)							
Freq.	Bit rate (mbps) / Duty cycle (%)						
(MHz)	1 / 98	2 / 97	5.5 / 92	11 / 87			
2412	14.43	14.36	14.2	13.95			
2437	14.49	14.49	14.31	14.05			
2462	13.92	13.96	13.79	13.53			

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

Data rate=1Mbps, Duty cycle =98%



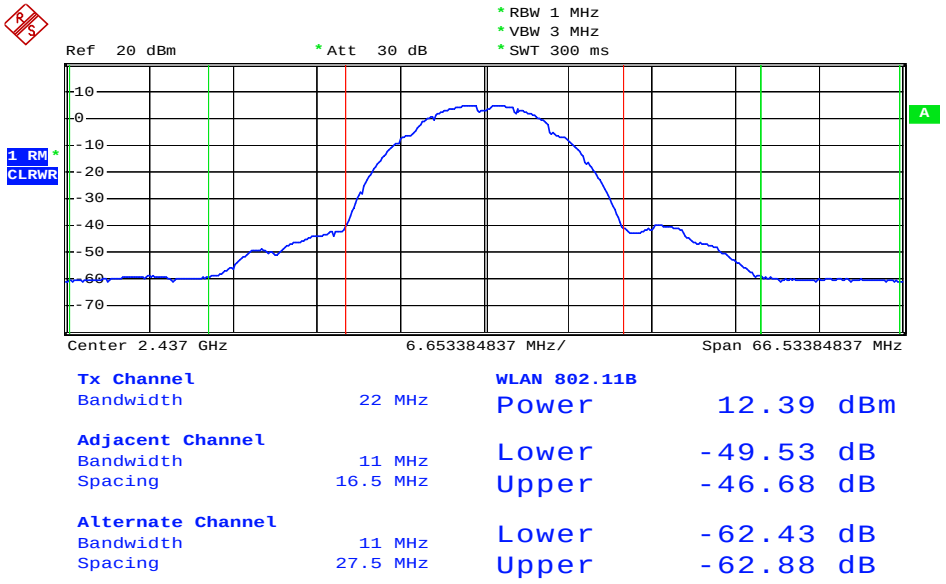
802.11b Channel 1:



Tx Channel		WLAN 802.11B	
Bandwidth	22 MHz	Power	12.33 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-49.81 dB
Spacing	16.5 MHz	Upper	-46.74 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-62.61 dB
Spacing	27.5 MHz	Upper	-62.65 dB

Date: 11.MAR.2008 18:24:15

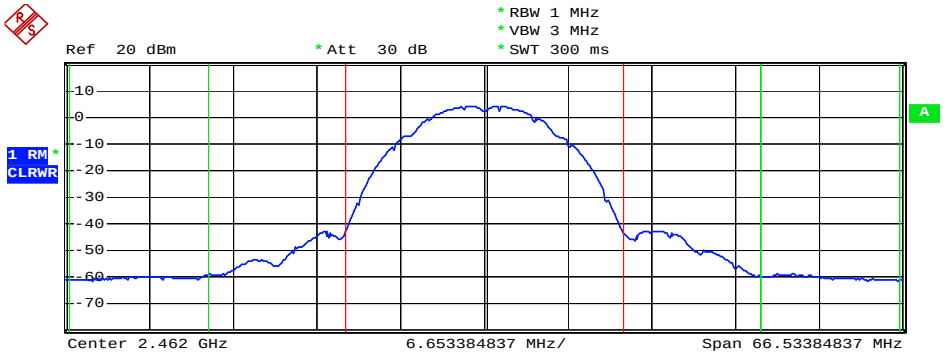
802.11b Channel 6:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	12.39 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-49.53 dB
Spacing	16.5 MHz	Upper	-46.68 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-62.43 dB
Spacing	27.5 MHz	Upper	-62.88 dB

Date: 11.MAR.2008 18:24:43

802.11b Channel 11:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	11.82 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-50.90 dB
Spacing	16.5 MHz	Upper	-48.74 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-62.42 dB
Spacing	27.5 MHz	Upper	-62.18 dB

Date: 11.MAR.2008 18:25:32

4.3.4 802.11g Test Data

802.11g Maximum Peak Output Power

Temp. (° C): 25

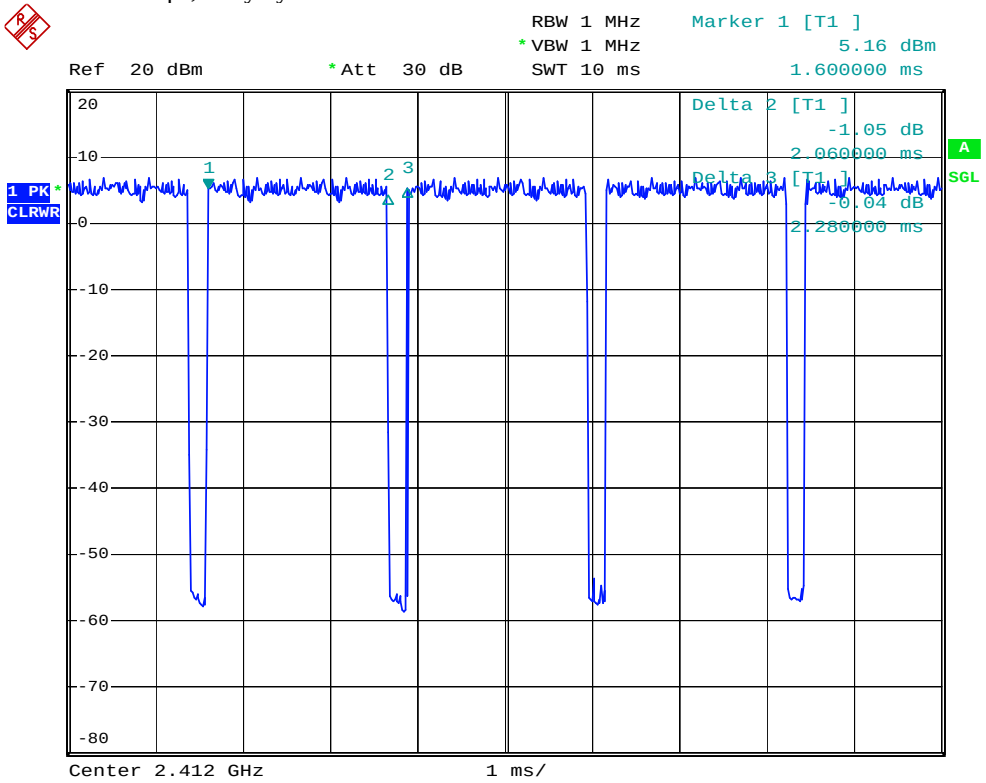
Test Engr: Jerry Humidity (%): 55

Channel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Maximum Output Power (mW)	Maximum Output Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	12.08	2.1	26.18	14.18	30	Pass
6	2437	11.83	2.1	24.72	13.93	30	Pass
11	2462	11.43	2.1	22.54	13.53	30	Pass

802.11g (dBm)								
Freq.	Bit rate (mbps) / Duty cycle(%)							
(MHz)	6 / 91	9 / 87	12 / 84	18 / 78	24 / 73	36 / 64	48 / 58	54 / 55
2412	14.18	14.06	13.99	13.69	13.28	12.72	12.44	12.11
2437	13.93	13.95	13.81	13.52	13.12	12.58	12.22	11.96
2462	13.53	12.56	12.45	12.13	11.66	11.1	10.73	10.44

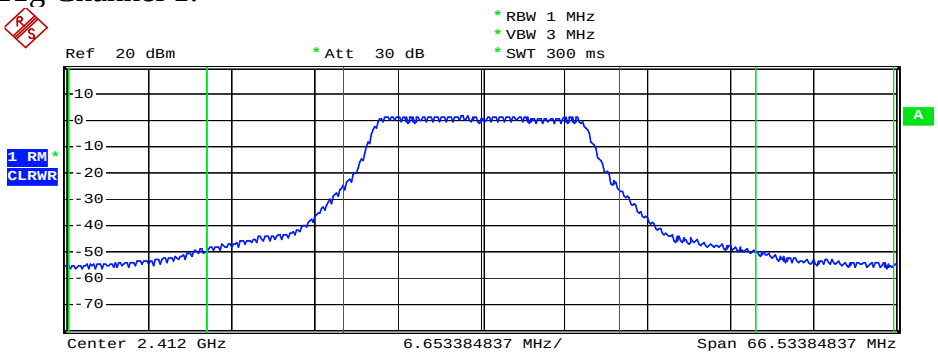
Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

Data rate=6Mbps, Duty cycle =91%



Date: 11.MAR.2008 22:06:20

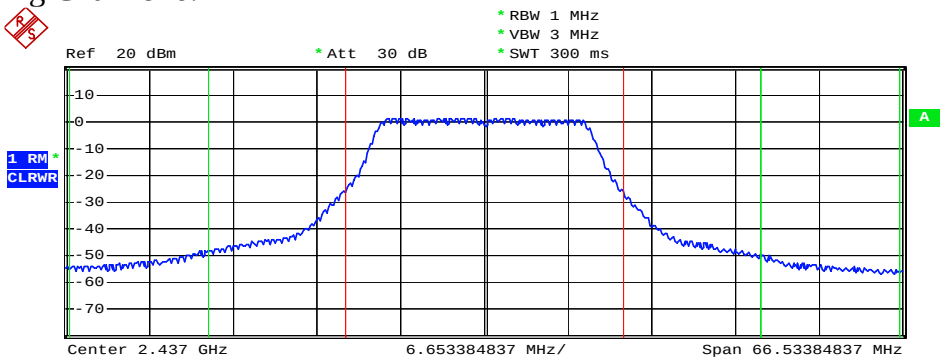
802.11g Channel 1:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	12.08 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-38.73 dB
Spacing	16.5 MHz	Upper	-39.30 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-55.40 dB
Spacing	27.5 MHz	Upper	-55.43 dB

Date: 11.MAR.2008 20:33:04

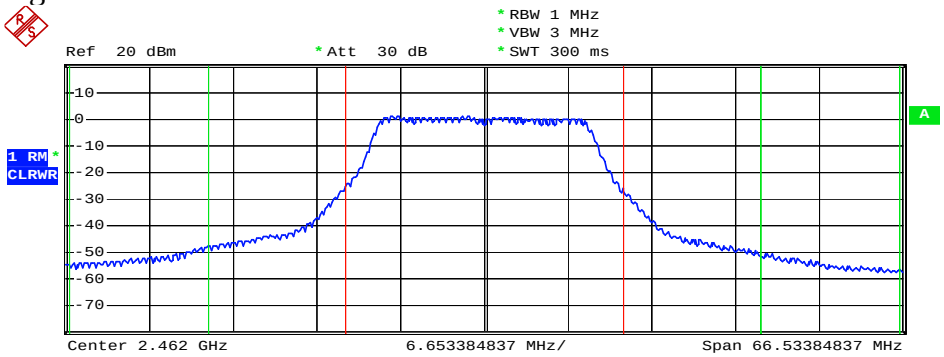
802.11g Channel 6:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	11.83 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-38.45 dB
Spacing	16.5 MHz	Upper	-39.24 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-54.33 dB
Spacing	27.5 MHz	Upper	-55.77 dB

Date: 11.MAR.2008 18:27:06

802.11g Channel 11:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	11.43 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-38.45 dB
Spacing	16.5 MHz	Upper	-39.30 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-53.83 dB
Spacing	27.5 MHz	Upper	-55.73 dB

Date: 11.MAR.2008 18:27:34

4.4 Radiated Emission Measurement [Section [15.247(c)(4)]

4.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

4.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup ac*cording to EMI Receiver/Spectrum Analyzer Configuration.*

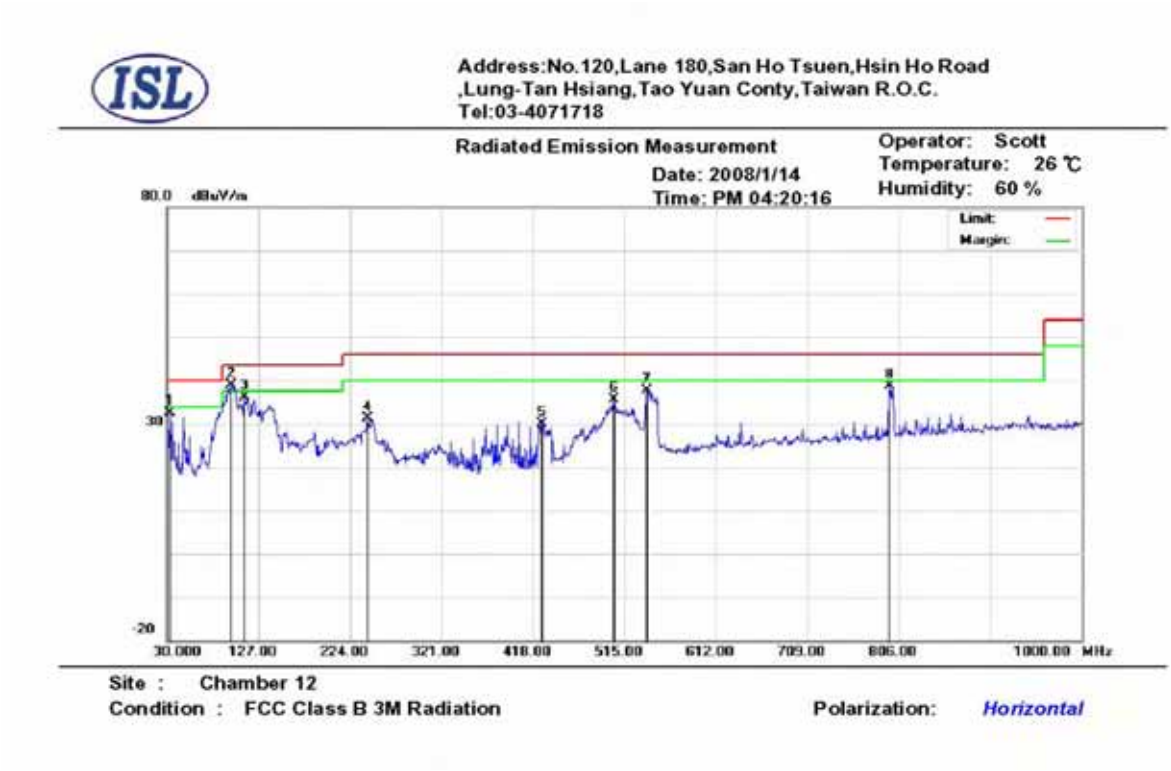
For the test of 2^{nd} to 10^{th} harmonics frequencies , the equipment setup was also refer to EMI Receiver/Spectrum Analyzer Configuration. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	360KHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	100 Hz for 802.11b, 1 KHz for 802.11a/g

4.4.4 802.11b Test Data (30MHz – 1GHz):

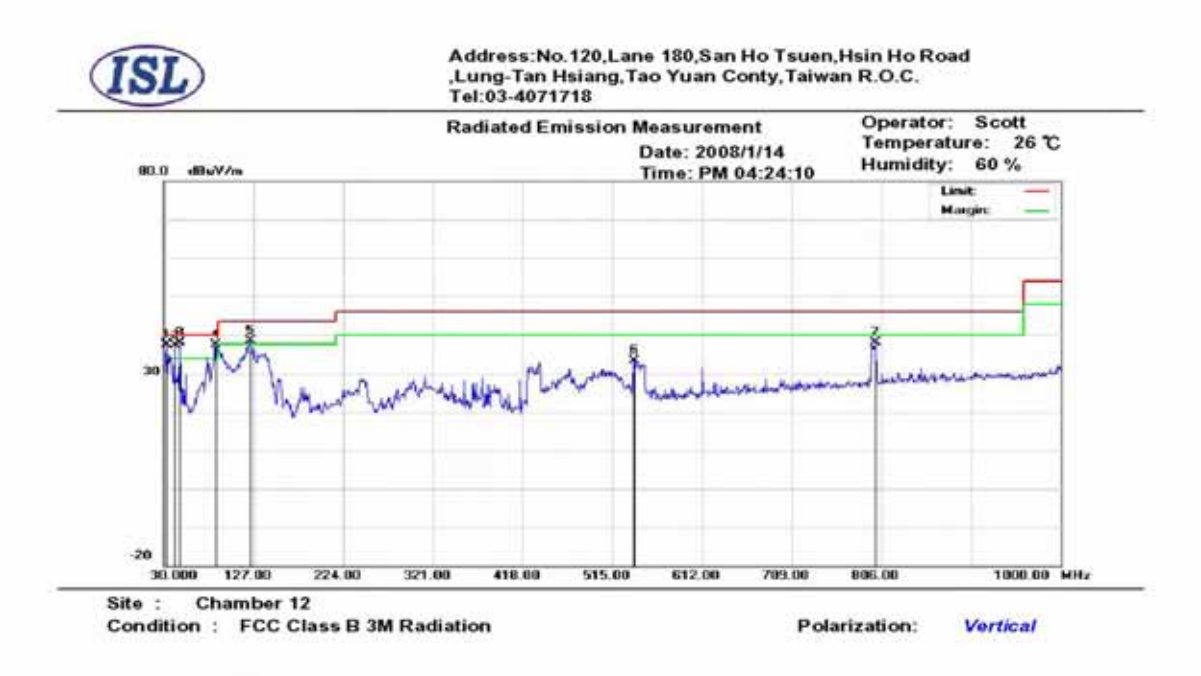
30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	32.9100	13.96	17.56	1.17	0	32.69	40.00	-7.31	400	135	peak
*	97.9000	27.99	8.82	2.08	0	38.89	43.50	-4.61	400	316	peak
	112.4500	24.43	9.43	2.2	0	36.06	43.50	-7.44	234	32	peak
	242.4300	19.53	9.04	2.92	0	31.49	46.00	-14.51	143	114	peak
	427.7000	12.25	13.98	3.91	0	30.14	46.00	-15.86	347	256	peak
	503.3600	15.87	15.52	4.21	0	35.60	46.00	-10.40	321	217	peak
	539.2500	17.08	16.07	4.36	0	37.51	46.00	-8.49	128	345	peak
	796.3000	13.90	19.42	5.29	0	38.61	46.00	-7.39	213	13	peak

*:Maximum data x:Over limit !:over margin

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
!	32.9100	18.66	17.56	1.17	0	37.39	40.00	-2.61	100	321	peak
!	41.6400	22.85	12.86	1.43	0	37.14	40.00	-2.86	100	124	peak
*	47.4600	27.02	9.25	1.55	0	37.82	40.00	-2.18	134	216	peak
!	86.2600	26.92	8.46	1.96	0	37.34	40.00	-2.66	123	241	peak
!	123.1200	26.60	9.46	2.23	0	38.29	43.50	-5.21	136	193	peak
	539.2500	12.88	16.07	4.36	0	33.31	46.00	-12.69	245	231	peak
	800.1800	13.20	19.47	5.3	0	37.97	46.00	-8.03	214	245	peak

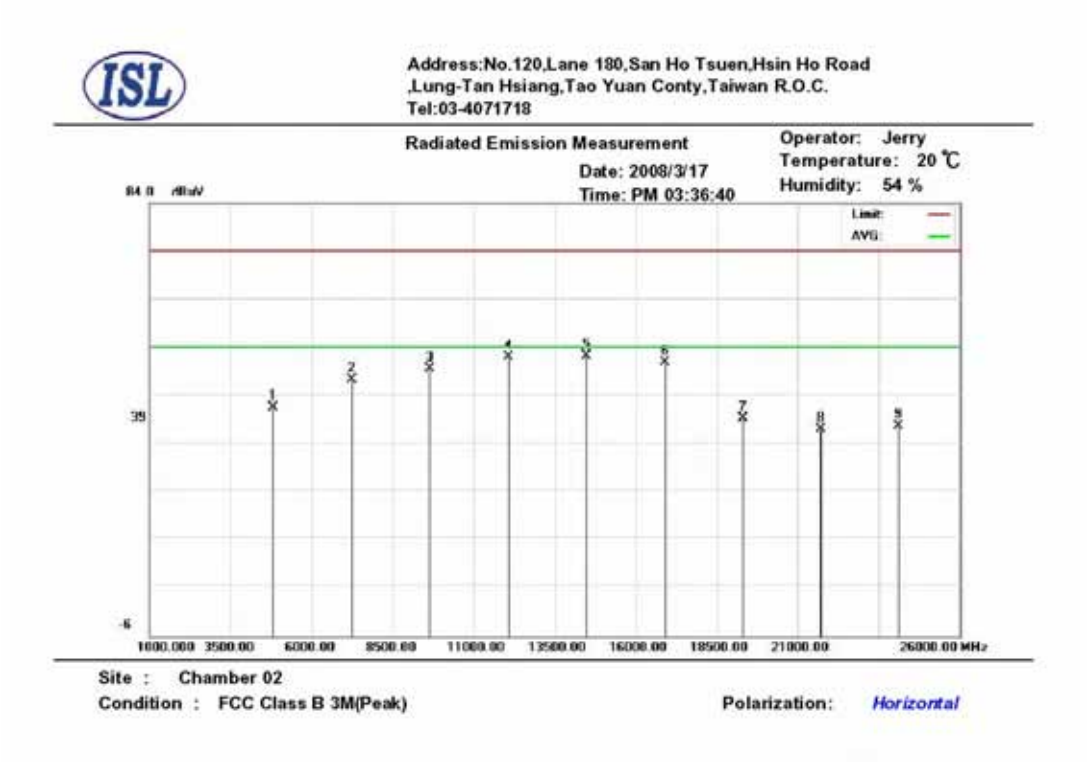
*:Maximum data x:Over limit !:over margin

NOTE:

- During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.
- Margin = Corrected Amplitude – Limit
  Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
  A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

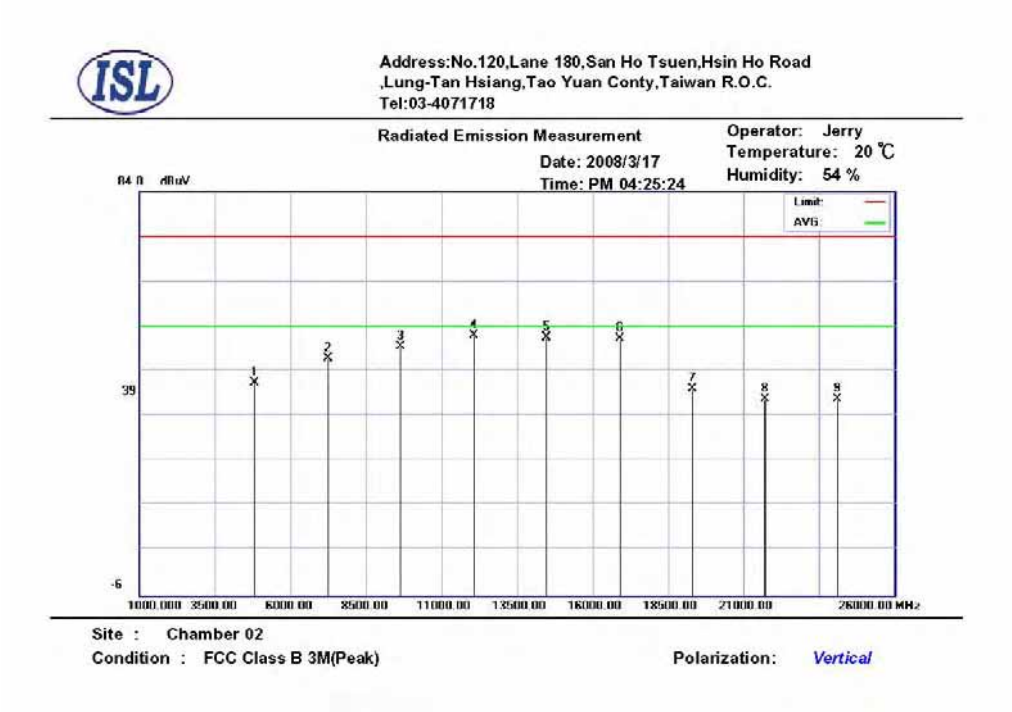
1GHz~ 26 GHz (Horizontal), Channel 1: 2412 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4824.000	31.66	34.66	2.83	27.48	41.67	74.00	-32.33	307	49	peak
	7236.000	31.57	38.82	3.37	26.59	47.17	74.00	-26.83	281	315	peak
	9646.000	30.18	40.19	4	24.84	49.53	74.00	-24.47	100	244	peak
	12060.000	33.73	42.15	4.49	28.45	51.92	74.00	-22.08	374	111	peak
*	14472.000	30.89	44.8	4.86	28.49	52.06	74.00	-21.94	187	321	peak
	16884.000	28.72	44.38	5.39	27.79	50.70	74.00	-23.30	102	198	peak
	19296.000	27.94	32.42	5.68	26.77	39.27	74.00	-34.73	295	96	peak
	21708.000	24.48	33.1	6.03	26.58	37.03	74.00	-36.97	100	287	peak
	24120.000	25.53	33.35	5.78	26.8	37.86	74.00	-36.14	225	220	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 26 GHz (Vertical), Channel 1: 2412 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4824.000	31.46	34.66	2.83	27.48	41.47	74.00	-32.53	100	117	peak
	7236.000	31.10	38.82	3.37	26.59	46.70	74.00	-27.30	273	270	peak
	9646.000	30.02	40.19	4	24.84	49.37	74.00	-24.63	300	96	peak
*	12060.000	33.69	42.15	4.49	28.45	51.88	74.00	-22.12	265	142	peak
	14472.000	30.24	44.8	4.86	28.49	51.41	74.00	-22.59	278	176	peak
	16884.000	29.33	44.38	5.39	27.79	51.31	74.00	-22.69	100	80	peak
	19296.000	28.66	32.42	5.68	26.77	39.99	74.00	-34.01	262	253	peak
	21708.000	25.32	33.1	6.03	26.58	37.87	74.00	-36.13	100	37	peak
	24120.000	25.36	33.35	5.78	26.8	37.69	74.00	-36.31	200	309	peak

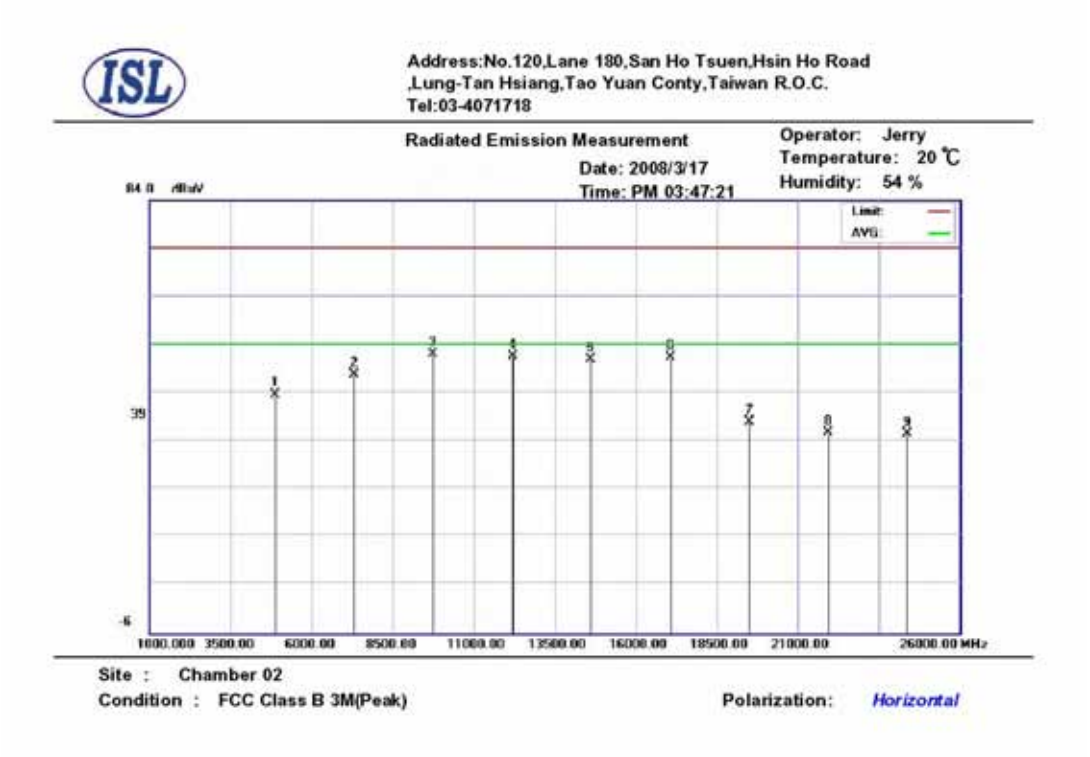
*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 26 GHz have been tested.

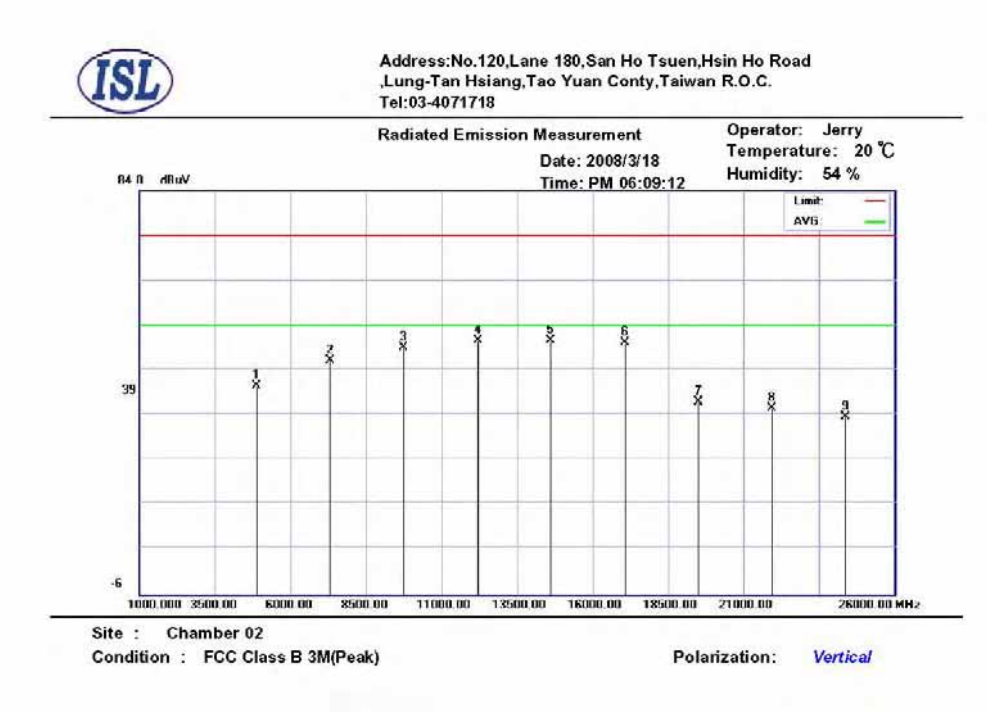
1GHz~ 26 GHz (Horizontal), Channel 6: 2437 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	33.36	34.87	2.82	27.41	43.64	74.00	-30.36	100	77	peak
	7311.000	31.86	38.96	3.38	26.56	47.64	74.00	-26.36	169	49	peak
*	9748.000	32.38	40.25	4.03	24.77	51.89	74.00	-22.11	205	335	peak
	12185.000	33.07	42.25	4.52	28.29	51.55	74.00	-22.45	194	149	peak
	14622.000	29.19	45.07	4.87	28.41	50.72	74.00	-23.28	371	160	peak
	17059.000	28.33	45.28	5.43	27.79	51.25	74.00	-22.75	100	338	peak
	19496.000	26.55	32.5	5.71	26.86	37.90	74.00	-36.10	217	245	peak
	21933.000	23.21	33.1	6.07	26.54	35.84	74.00	-38.16	360	78	peak
	24370.000	23.26	33.45	5.56	26.73	35.54	74.00	-38.46	229	158	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 26 GHz (Vertical), Channel 6: 2437 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	30.29	34.87	2.82	27.41	40.57	74.00	-33.43	100	177	peak
	7311.000	30.36	38.96	3.38	26.56	46.14	74.00	-27.86	174	225	peak
	9748.000	29.48	40.25	4.03	24.77	48.99	74.00	-25.01	207	316	peak
	12185.000	32.09	42.25	4.52	28.29	50.57	74.00	-23.43	386	199	peak
*	14622.000	29.14	45.07	4.87	28.41	50.67	74.00	-23.33	380	221	peak
	17059.000	27.32	45.28	5.43	27.79	50.24	74.00	-23.76	151	338	peak
	19496.000	25.46	32.5	5.71	26.86	36.81	74.00	-37.19	125	70	peak
	21933.000	22.96	33.1	6.07	26.54	35.59	74.00	-38.41	100	340	peak
	24370.000	21.29	33.45	5.56	26.73	33.57	74.00	-40.43	371	359	peak

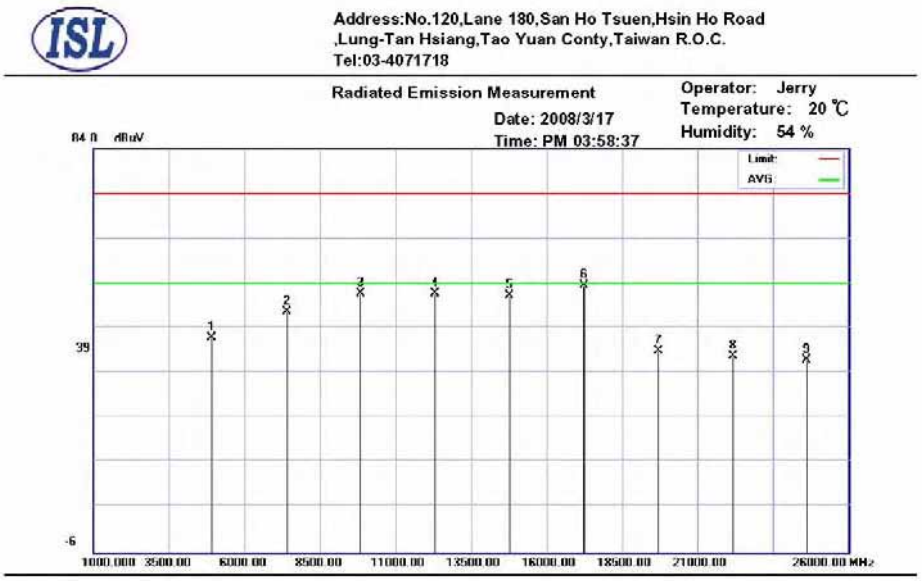
*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 26 GHz have been tested.

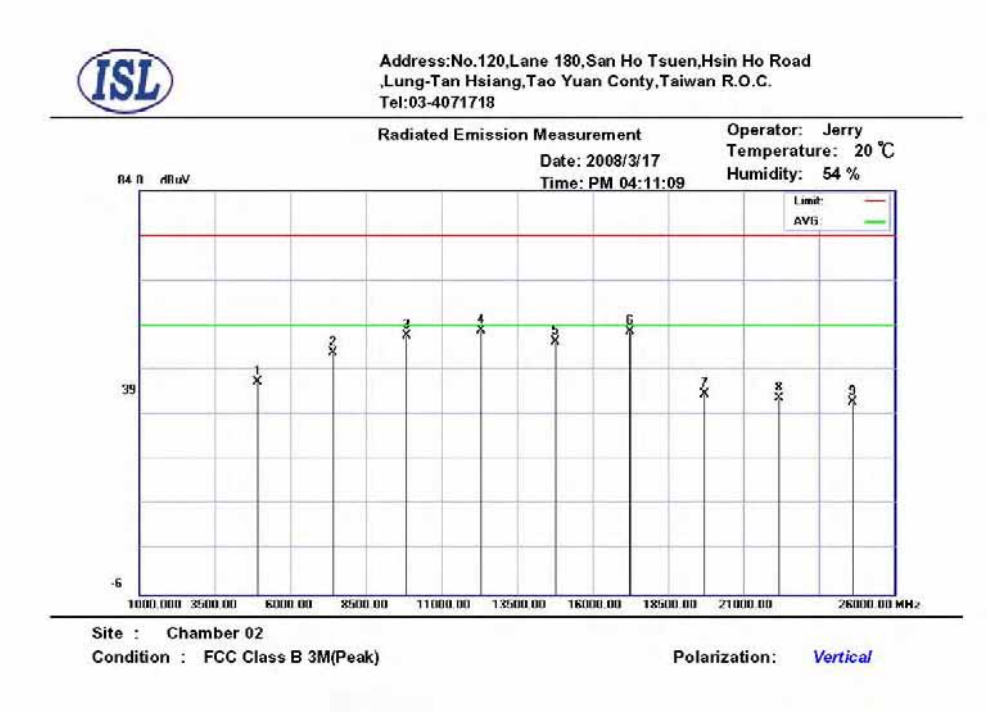
1GHz~ 26 GHz (Horizontal), Channel 11: 2462 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	31.21	35.08	2.81	27.34	41.76	74.00	-32.24	295	53	peak
	7386.000	31.81	39.09	3.39	26.53	47.76	74.00	-26.24	218	306	peak
	9848.000	31.96	40.31	4.06	24.7	51.63	74.00	-22.37	160	210	peak
	12310.000	32.87	42.35	4.56	28.14	51.64	74.00	-22.36	389	85	peak
	14772.000	29.30	45.28	4.88	28.27	51.19	74.00	-22.81	100	280	peak
*	17234.000	29.85	45.8	5.44	27.64	53.45	74.00	-20.55	153	203	peak
	19696.000	27.42	32.5	5.74	26.79	38.87	74.00	-35.13	100	74	peak
	22158.000	24.93	33.35	6.11	26.56	37.83	74.00	-36.17	349	178	peak
	24620.000	24.25	33.84	5.43	26.73	36.79	74.00	-37.21	100	124	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 26 GHz (Vertical), Channel 11: 2462 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	30.81	35.08	2.81	27.34	41.36	74.00	-32.64	296	167	peak
	7386.000	31.83	39.09	3.39	26.53	47.78	74.00	-26.22	166	339	peak
	9848.000	32.05	40.31	4.06	24.7	51.72	74.00	-22.28	142	160	peak
*	12310.000	34.13	42.35	4.56	28.14	52.90	74.00	-21.10	340	26	peak
	14772.000	28.49	45.28	4.88	28.27	50.38	74.00	-23.62	224	347	peak
	17234.000	28.97	45.8	5.44	27.64	52.57	74.00	-21.43	100	264	peak
	19696.000	27.13	32.5	5.74	26.79	38.58	74.00	-35.42	100	199	peak
	22158.000	24.94	33.35	6.11	26.56	37.84	74.00	-36.16	365	185	peak
	24620.000	24.30	33.84	5.43	26.73	36.84	74.00	-37.16	157	140	peak

*:Maximum data x:Over limit !:over margin

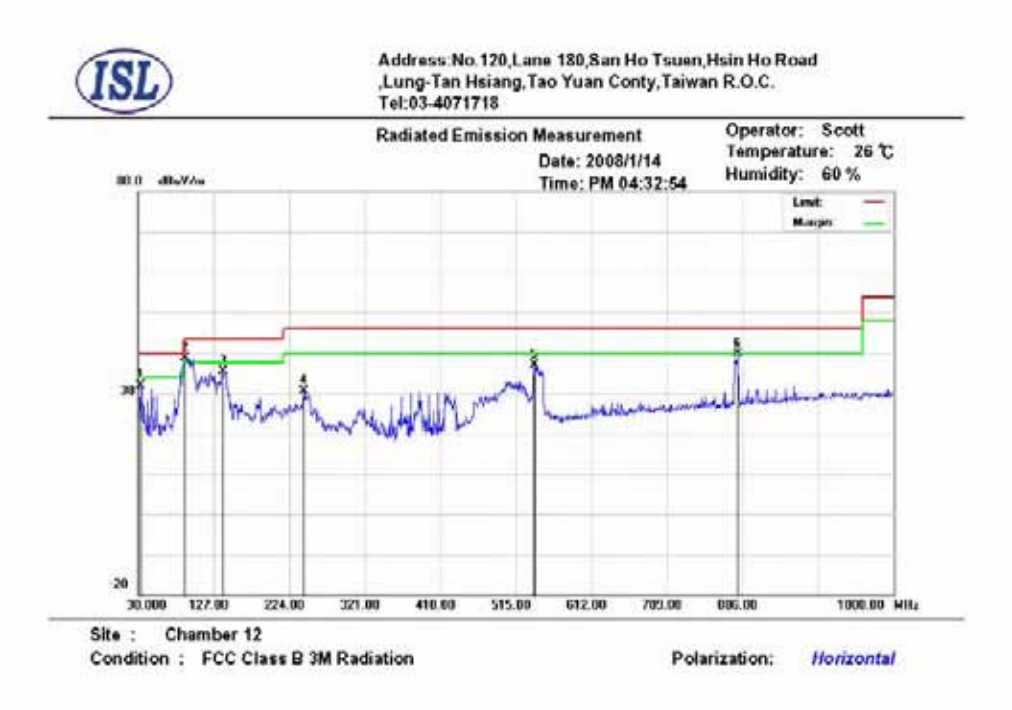
Note:

- According to the standards used, where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 26 GHz have been tested.

4.4.5 802.11g Test Data

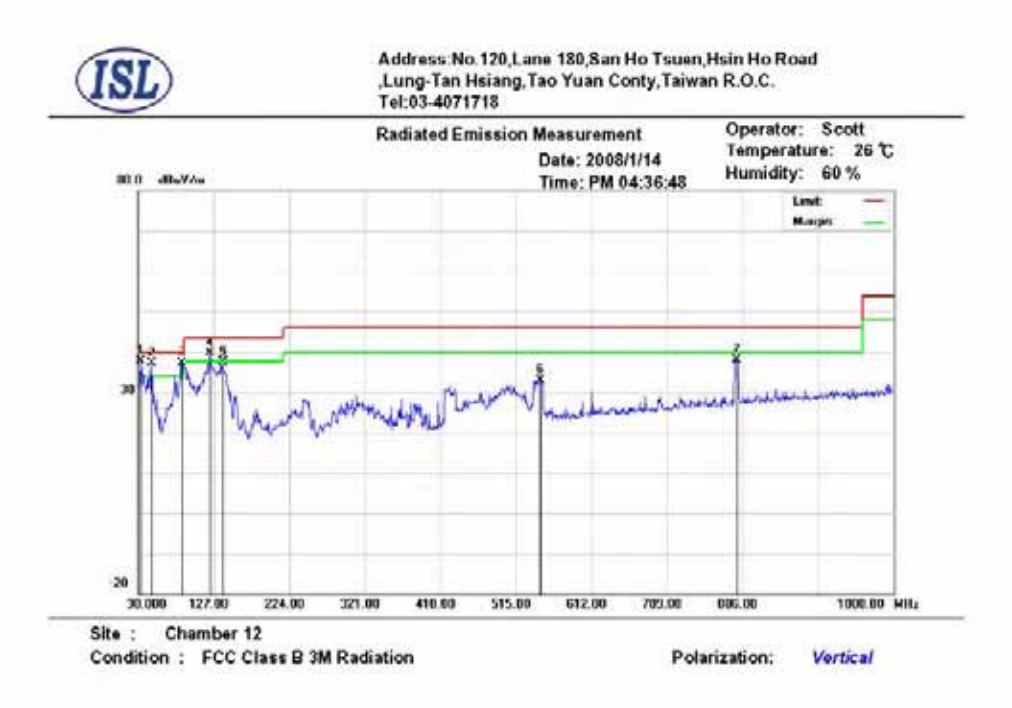
30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	32.9100	13.17	17.56	1.17	0	31.90	40.00	-8.10	400	321	peak
*	90.1400	28.15	8.57	2	0	38.72	43.50	-4.78	400	325	peak
	138.6400	24.70	8.18	2.39	0	35.27	43.50	-8.23	321	246	peak
	242.4300	18.56	9.04	2.92	0	30.52	46.00	-15.48	124	75	peak
	538.2800	16.59	16.06	4.35	0	37.00	46.00	-9.00	321	321	peak
	800.1800	14.92	19.47	5.3	0	39.69	46.00	-6.31	128	214	peak

*:Maximum data x:Over limit !:over margin

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	32.9100	18.97	17.56	1.17	0	37.70	40.00	-2.30	102	321	peak
!	47.4600	26.23	9.25	1.55	0	37.03	40.00	-2.97	104	100	peak
!	86.2600	26.79	8.46	1.96	0	37.21	40.00	-2.79	143	321	peak
!	122.1500	27.86	9.54	2.22	0	39.62	43.50	-3.88	213	33	peak
	138.6400	26.89	8.18	2.39	0	37.46	43.50	-6.04	235	341	peak
	547.0100	12.40	16.15	4.39	0	32.94	46.00	-13.06	321	232	peak
	799.2100	13.18	19.46	5.3	0	37.94	46.00	-8.06	211	111	peak

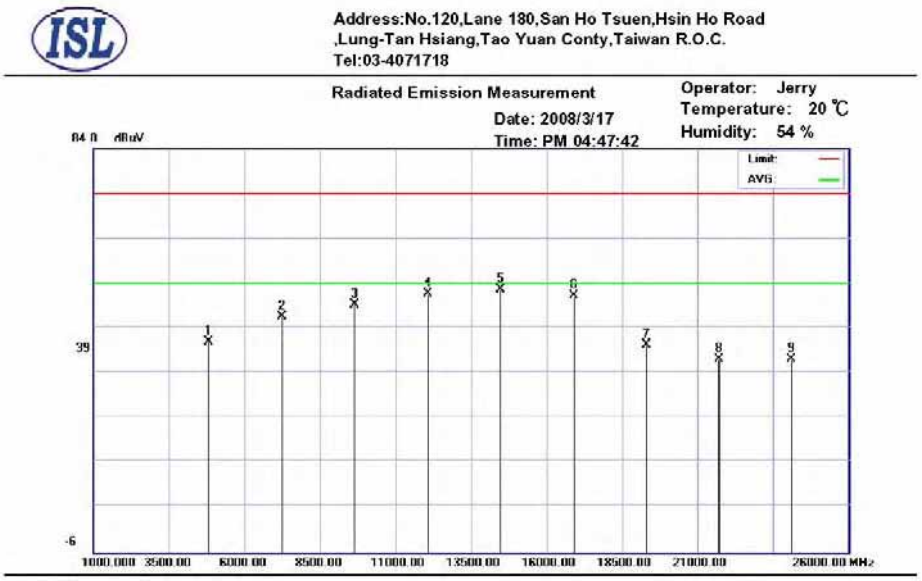
*:Maximum data x:Over limit !:over margin

NOTE:

- During the Pre-test, the EUT has been tested for Channel 1 , 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.
- Margin = Corrected Amplitude – Limit
  Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
  A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

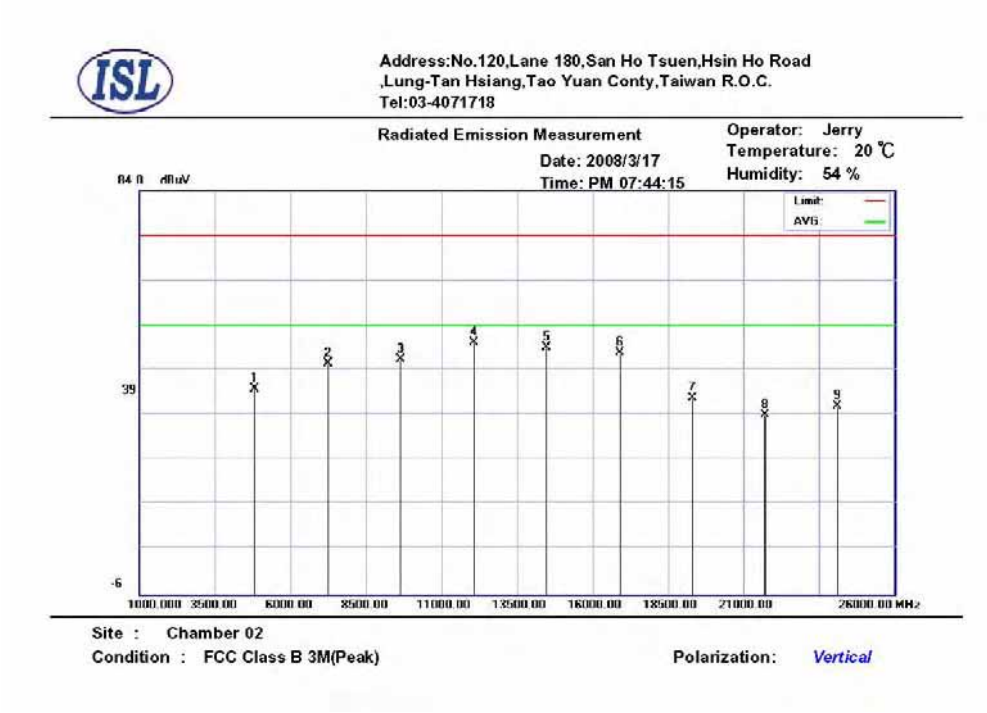
1GHz~ 26 GHz (Horizontal), Channel 1: 2412 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4824.000	31.00	34.66	2.83	27.48	41.01	74.00	-32.99	112	66	peak
	7236.000	30.96	38.82	3.37	26.59	46.56	74.00	-27.44	290	40	peak
	9646.000	29.85	40.19	4	24.84	49.20	74.00	-24.80	204	295	peak
	12060.000	33.54	42.15	4.49	28.45	51.73	74.00	-22.27	100	116	peak
*	14472.000	31.45	44.8	4.86	28.49	52.62	74.00	-21.38	348	256	peak
	16884.000	29.22	44.38	5.39	27.79	51.20	74.00	-22.80	174	106	peak
	19296.000	28.85	32.42	5.68	26.77	40.18	74.00	-33.82	394	249	peak
	21708.000	24.43	33.1	6.03	26.58	36.98	74.00	-37.02	274	206	peak
	24120.000	24.74	33.35	5.78	26.8	37.07	74.00	-36.93	389	265	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4824.000	29.71	34.66	2.83	27.48	39.72	74.00	-34.28	100	128	peak
	7236.000	29.76	38.82	3.37	26.59	45.36	74.00	-28.64	137	31	peak
	9648.000	26.90	40.19	4	24.84	46.25	74.00	-27.75	313	358	peak
*	12060.000	32.02	42.15	4.49	28.45	50.21	74.00	-23.79	100	188	peak
	14472.000	27.83	44.8	4.86	28.49	49.00	74.00	-25.00	162	329	peak
	16884.000	25.88	44.38	5.39	27.79	47.86	74.00	-26.14	226	69	peak
	19296.000	26.38	32.42	5.68	26.77	37.71	74.00	-36.29	249	170	peak
	21708.000	21.38	33.1	6.03	26.58	33.93	74.00	-40.07	100	319	peak
	24120.000	23.56	33.35	5.78	26.8	35.89	74.00	-38.11	100	311	peak

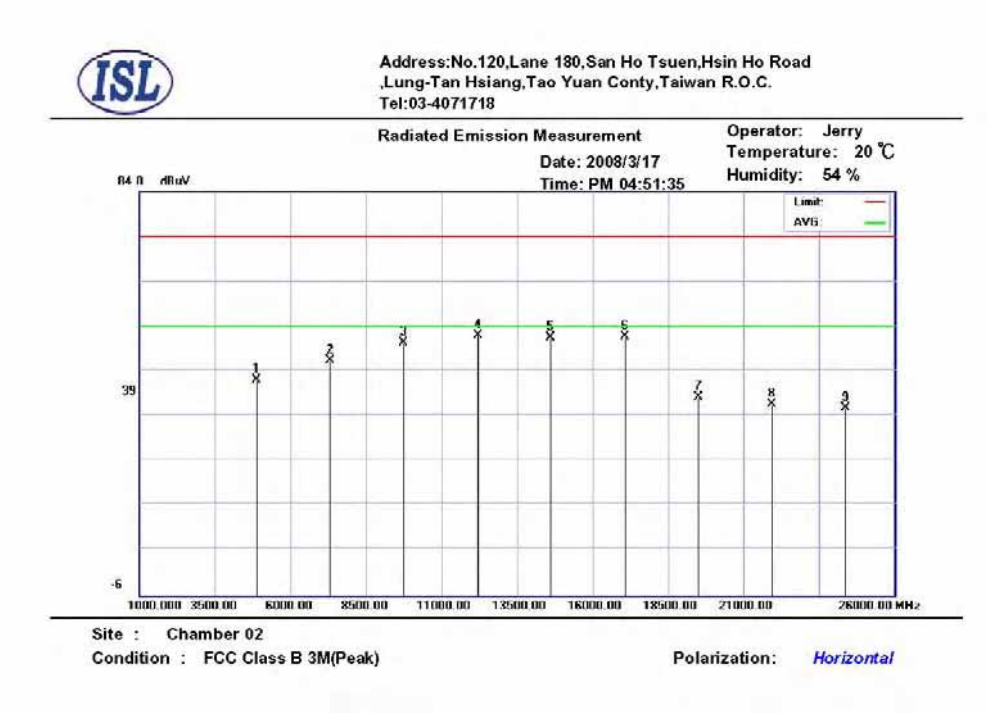
*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 26 GHz have been tested.

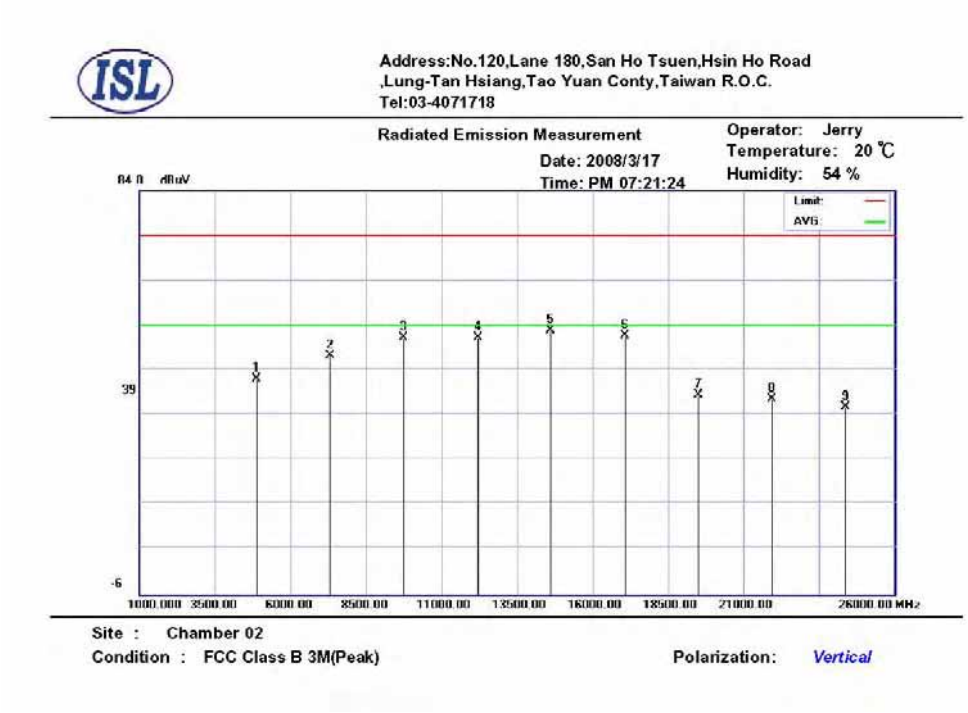
1GHz~ 26 GHz (Horizontal) , Channel 6 : 2437 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	31.78	34.87	2.82	27.41	42.06	74.00	-31.94	206	132	peak
	7311.000	30.60	38.96	3.38	26.56	46.38	74.00	-27.62	100	164	peak
	9748.000	30.92	40.25	4.03	24.77	50.43	74.00	-23.57	256	289	peak
*	12185.000	33.39	42.25	4.52	28.29	51.87	74.00	-22.13	100	339	peak
	14622.000	30.01	45.07	4.87	28.41	51.54	74.00	-22.46	100	96	peak
	17059.000	28.79	45.28	5.43	27.79	51.71	74.00	-22.29	244	243	peak
	19496.000	26.83	32.5	5.71	26.86	38.18	74.00	-35.82	100	310	peak
	21933.000	24.03	33.1	6.07	26.54	36.66	74.00	-37.34	129	331	peak
	24370.000	23.46	33.45	5.56	26.73	35.74	74.00	-38.26	105	68	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4874.000	31.67	34.87	2.82	27.41	41.95	74.00	-32.05	391	10	peak
	7311.000	31.32	38.96	3.38	26.56	47.10	74.00	-26.90	186	136	peak
	9748.000	31.73	40.25	4.03	24.77	51.24	74.00	-22.76	100	261	peak
	12185.000	32.87	42.25	4.52	28.29	51.35	74.00	-22.65	100	164	peak
*	14622.000	31.21	45.07	4.87	28.41	52.74	74.00	-21.26	276	288	peak
	17059.000	28.76	45.28	5.43	27.79	51.68	74.00	-22.32	397	174	peak
	19496.000	27.13	32.5	5.71	26.86	38.48	74.00	-35.52	205	271	peak
	21933.000	24.90	33.1	6.07	26.54	37.53	74.00	-36.47	236	206	peak
	24370.000	23.45	33.45	5.56	26.73	35.73	74.00	-38.27	100	219	peak

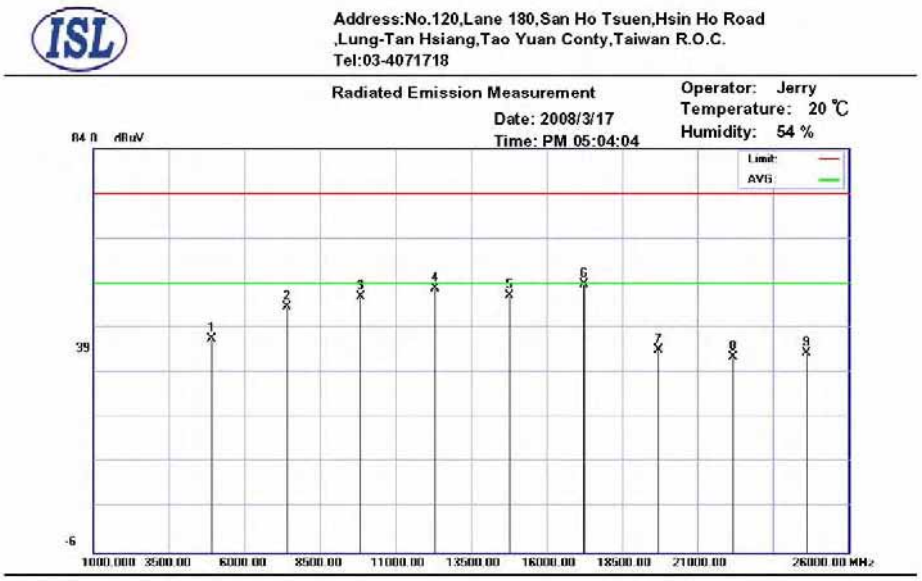
*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 26 GHz have been tested.

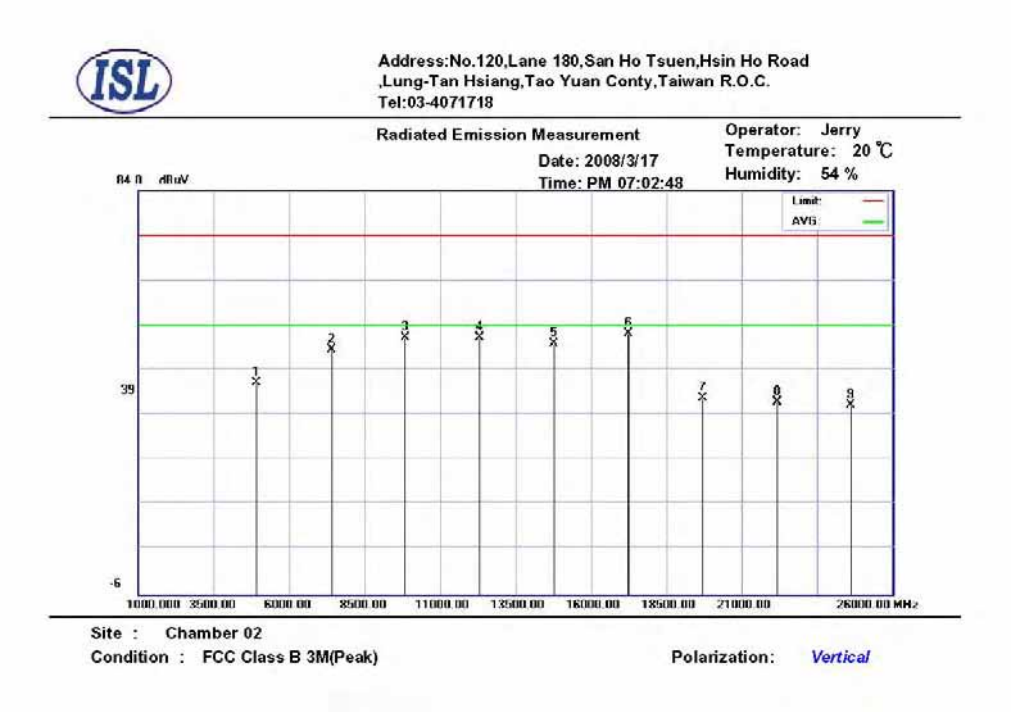
1GHz~ 26 GHz (Horizontal), Channel 11: 2462 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	31.00	35.08	2.81	27.34	41.55	74.00	-32.45	271	350	peak
	7386.000	32.83	39.09	3.39	26.53	48.78	74.00	-25.22	280	318	peak
	9848.000	31.48	40.31	4.06	24.7	51.15	74.00	-22.85	250	292	peak
	12310.000	34.08	42.35	4.56	28.14	52.85	74.00	-21.15	150	246	peak
	14772.000	29.41	45.28	4.88	28.27	51.30	74.00	-22.70	191	288	peak
*	17234.000	30.04	45.8	5.44	27.64	53.64	74.00	-20.36	165	224	peak
	19696.000	27.72	32.5	5.74	26.79	39.17	74.00	-34.83	371	326	peak
	22158.000	24.57	33.35	6.11	26.56	37.47	74.00	-36.53	173	32	peak
	24620.000	25.80	33.84	5.43	26.73	38.34	74.00	-35.66	100	132	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 25 GHz (Vertical), Channel 11: 2462 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	4924.000	30.49	35.08	2.81	27.34	41.04	74.00	-32.96	167	168	peak
	7386.000	32.62	39.09	3.39	26.53	48.57	74.00	-25.43	215	334	peak
	9848.000	31.58	40.31	4.06	24.7	51.25	74.00	-22.75	216	31	peak
	12310.000	32.42	42.35	4.56	28.14	51.19	74.00	-22.81	181	245	peak
	14772.000	27.93	45.28	4.88	28.27	49.82	74.00	-24.18	384	325	peak
*	17234.000	28.63	45.8	5.44	27.64	52.23	74.00	-21.77	292	291	peak
	19696.000	26.28	32.5	5.74	26.79	37.73	74.00	-36.27	259	25	peak
	22158.000	23.92	33.35	6.11	26.56	36.82	74.00	-37.18	145	170	peak
	24620.000	23.58	33.84	5.43	26.73	36.12	74.00	-37.88	385	287	peak

*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 26 GHz have been tested.

4.5 Band Edge Measurement

4.5.1 Test Procedure

Conducted

1. The transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 100KHz
   VBW: 100KHz
   Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

Radiated

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 100KHz
   VBW: 100KHz
   Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

4.5.2 Test Setup

Conducted

Radiated

Same as *Radiated Emission Measurement*

4.5.3 802.11b Test Data:

Table: Band Edge measurement

Conducted Test

Temp. (°C): 25

Test Engr: Jerry Humidity (%): 55

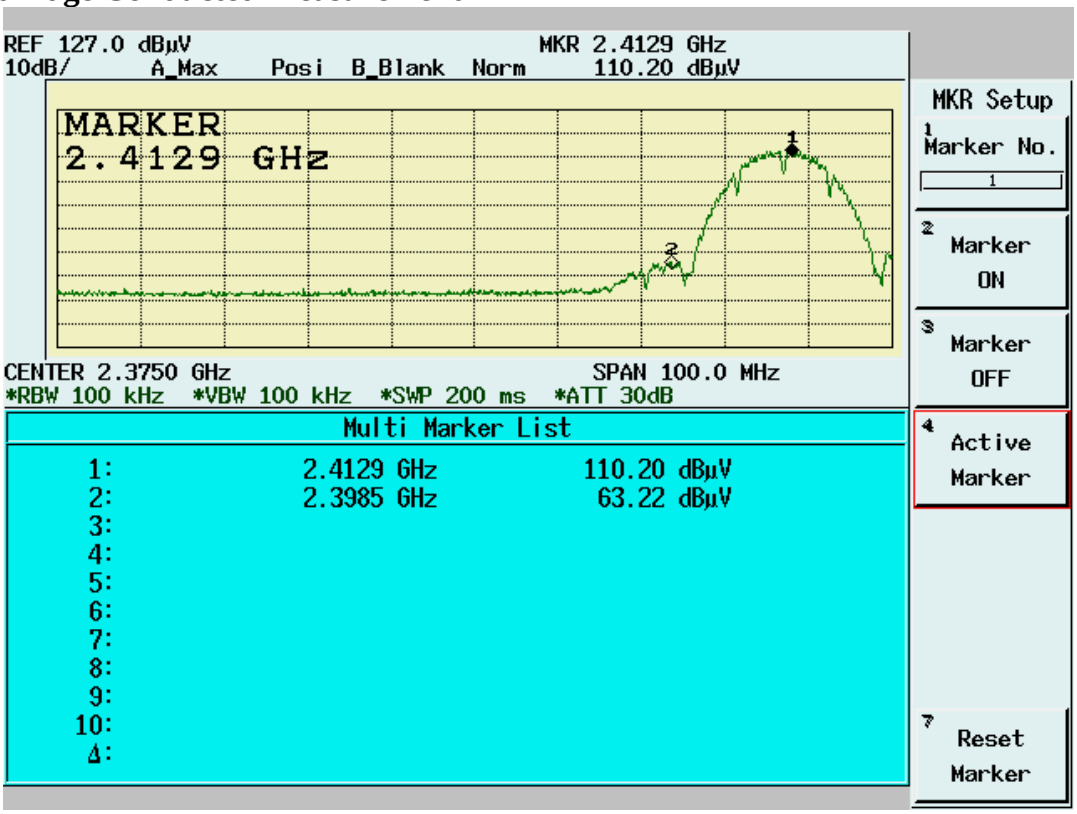
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2412.9	110.2	---	---
Outside band	2398.5	63.22	46.98	Pass
11	2460.9	109.52	---	---
Outside band	2484.4	50.35	59.17	Pass

Radiated Test

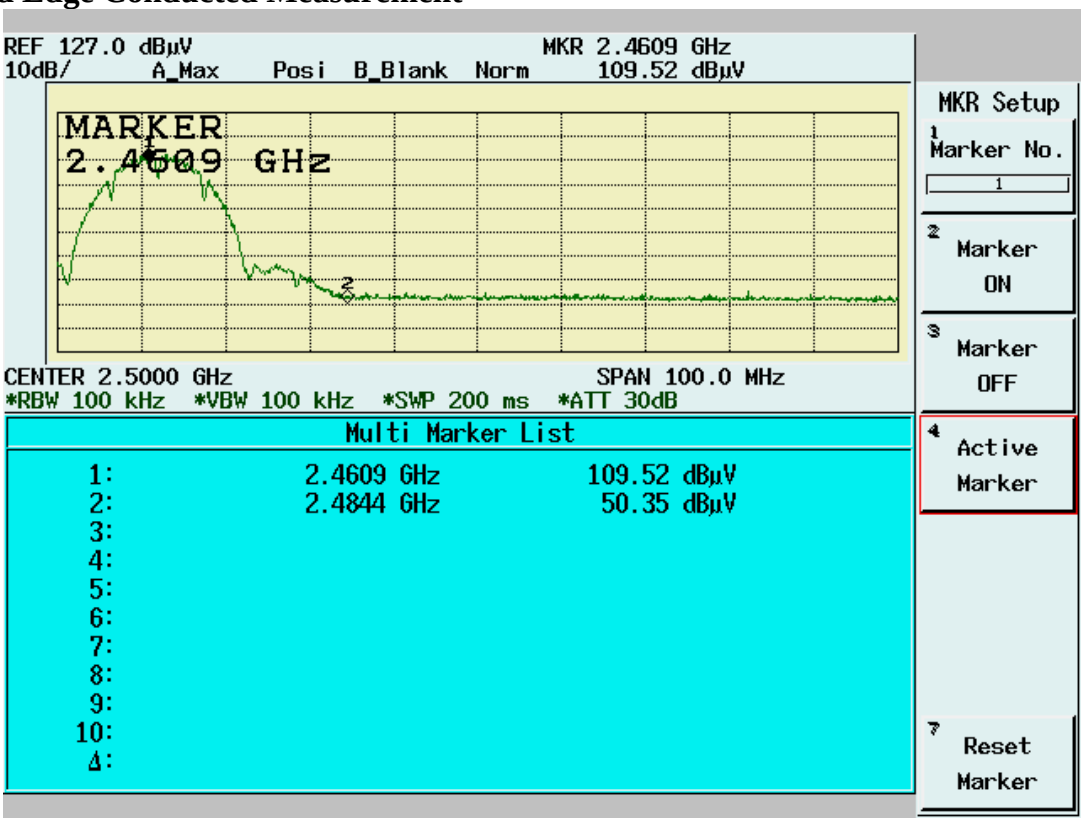
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2409.9	64.13	---	---
Outside band	2399.4	19.05	45.08	Pass
11	2461.4	64.73	---	---
Outside band	2483.5	5.47	59.26	Pass

Note: Two RF output (MAIN & AUX) have been tested,the worse data shown above.

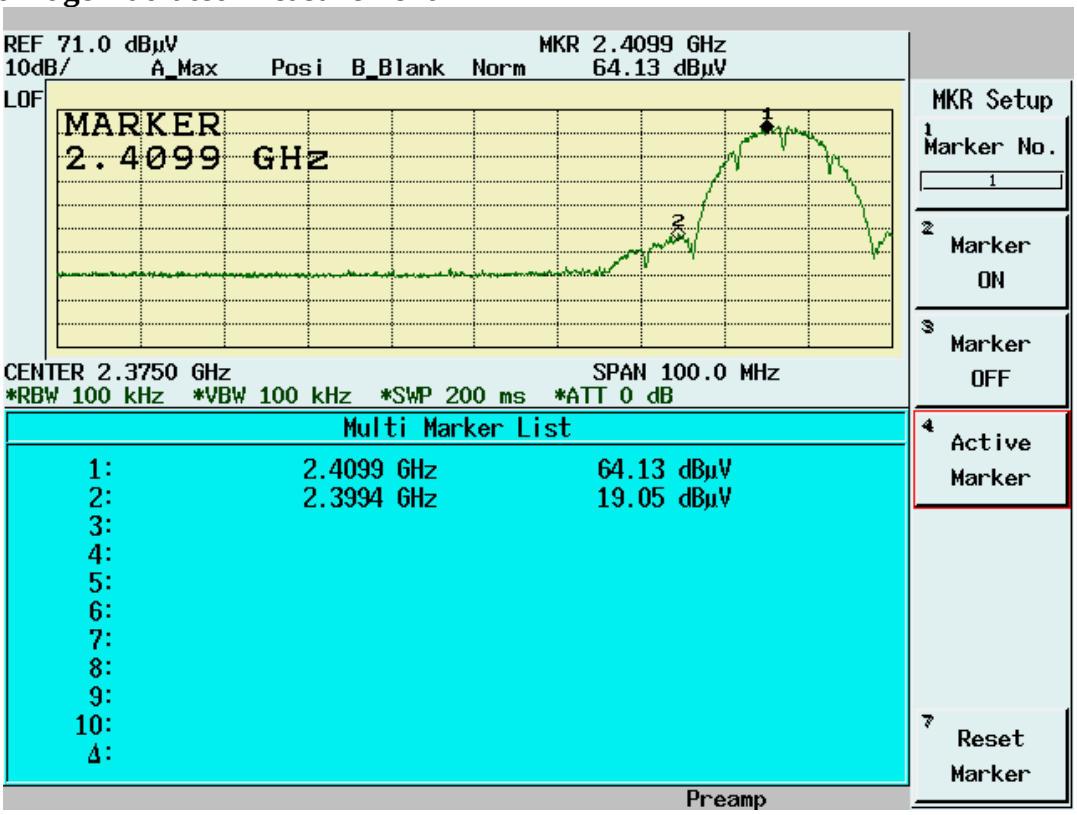
Band Edge Conducted Measurement



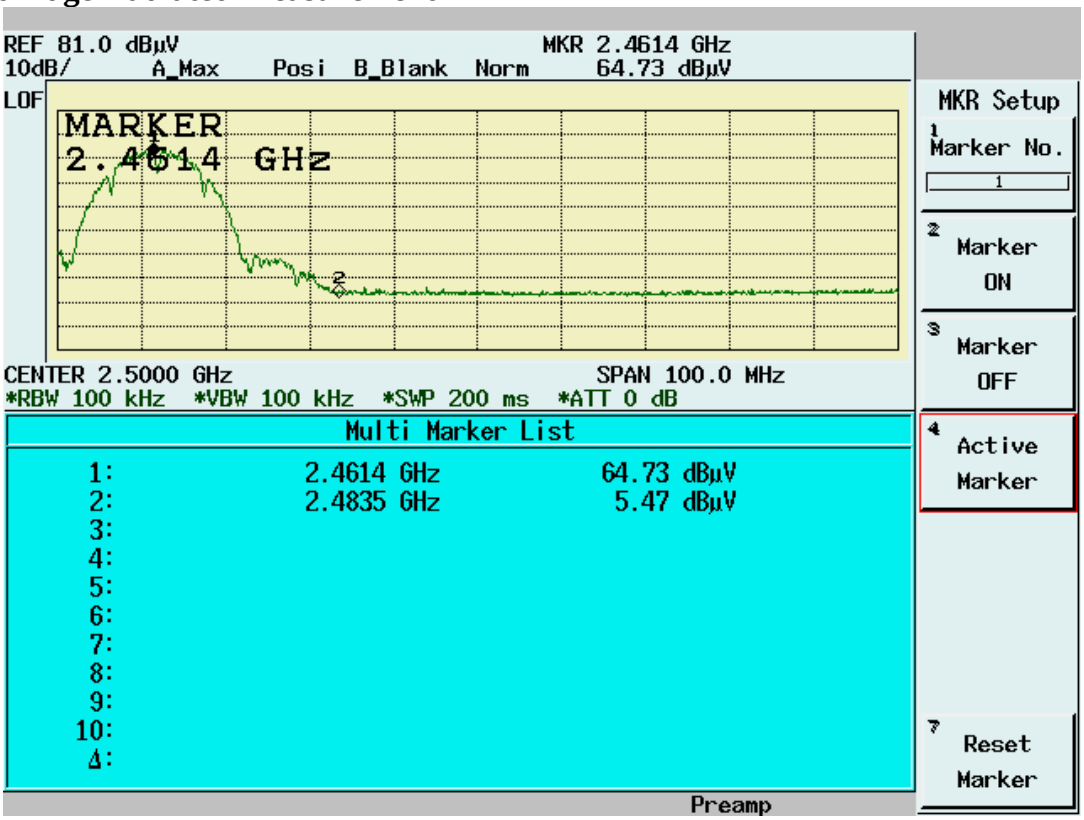
Band Edge Conducted Measurement



Band Edge Radiated Measurement



Band Edge Radiated Measurement



4.5.4 802.11g Test Data:

Table: Band Edge measurement

Conducted Test

Temp. (°C): 25

Test Engr: Jerry Humidity (%): 55

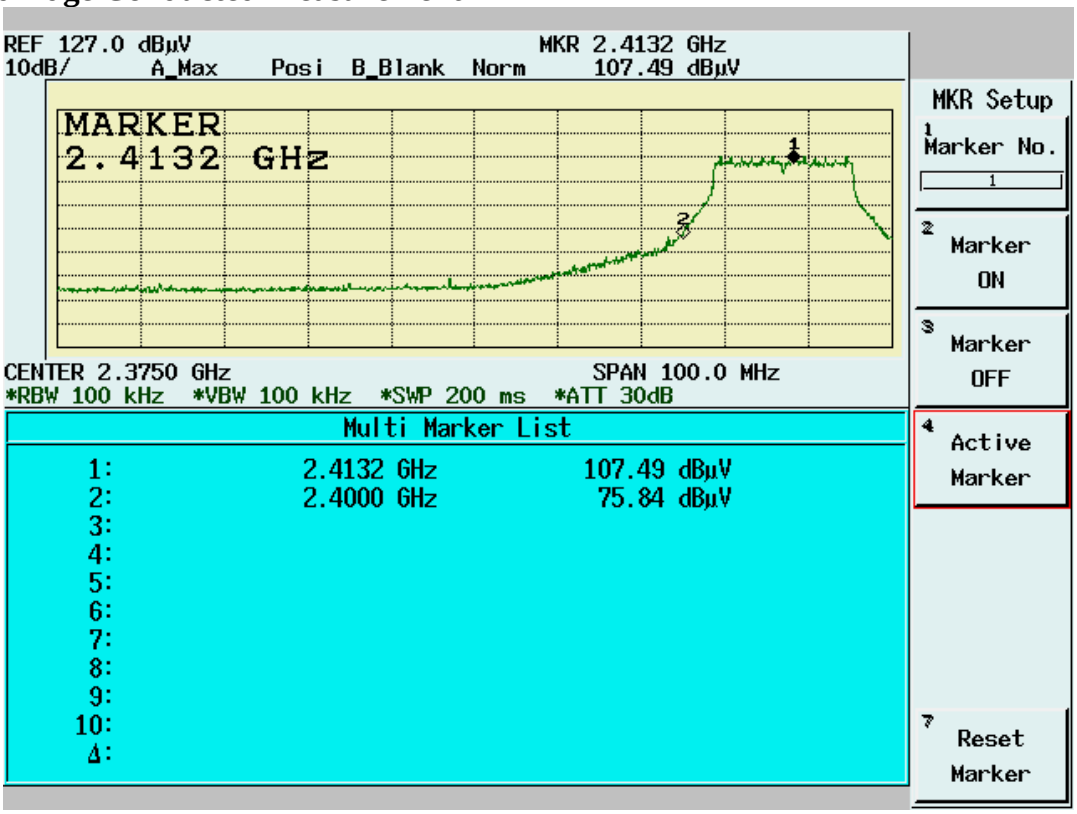
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2413.2	107.49	---	---
Outside band	2400	75.84	31.65	Pass
11	2454.4	106.14	---	---
Outside band	2484.1	55.96	50.18	Pass

Radiated Test

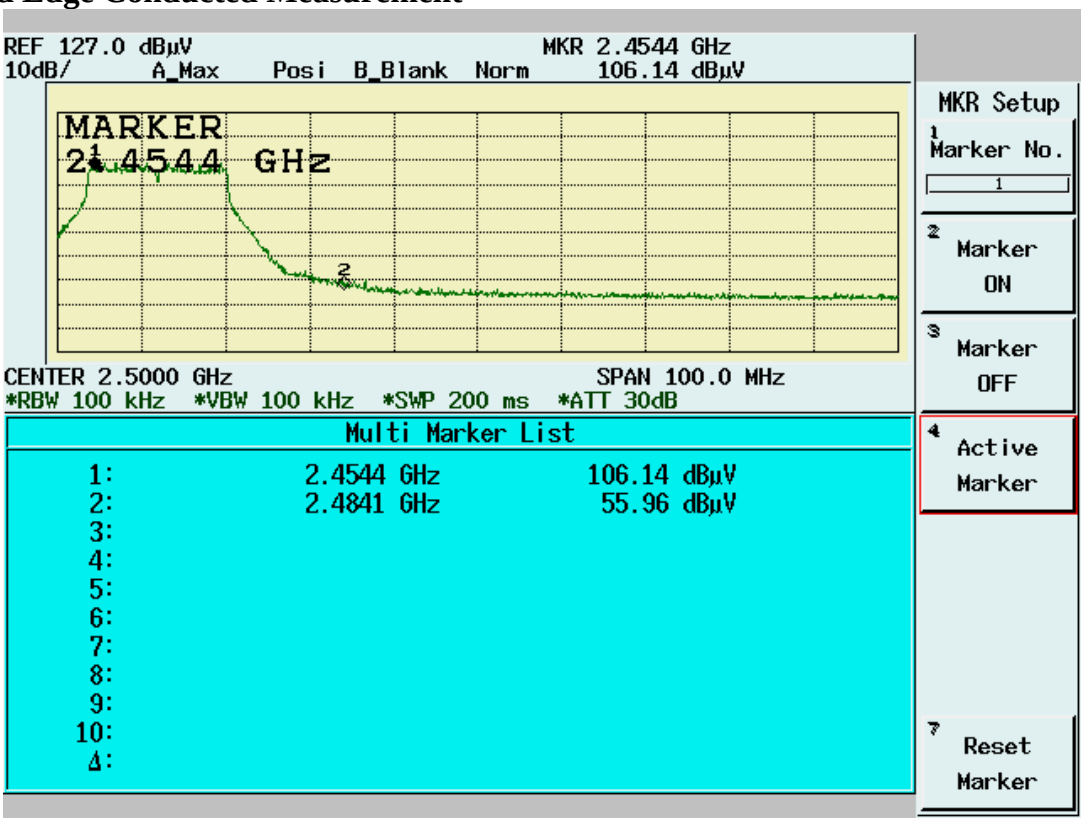
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >30dB (dB)	Pass/Fail
1	2404.5	61.84	---	---
Outside band	2400	30.46	31.38	Pass
11	2454.4	62.38	---	---
Outside band	2484.6	13.51	48.87	Pass

Note: Two RF output (MAIN & AUX) have been tested,the worse data shown above.

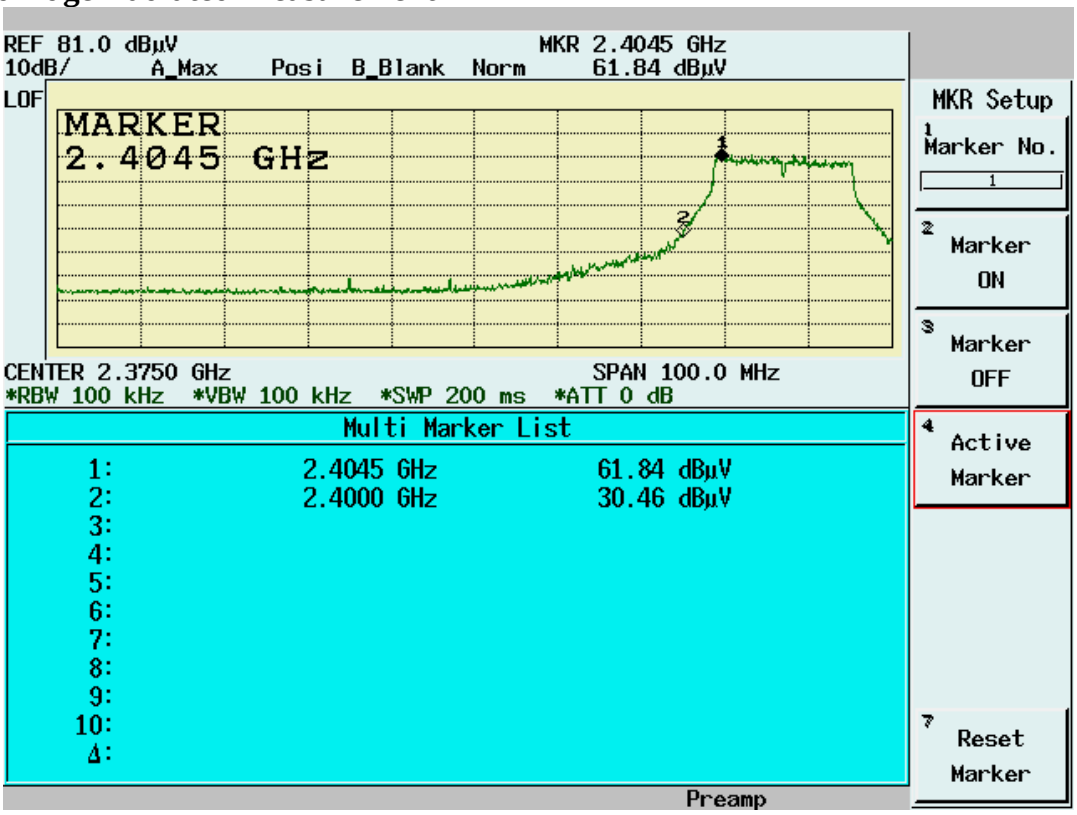
Band Edge Conducted Measurement



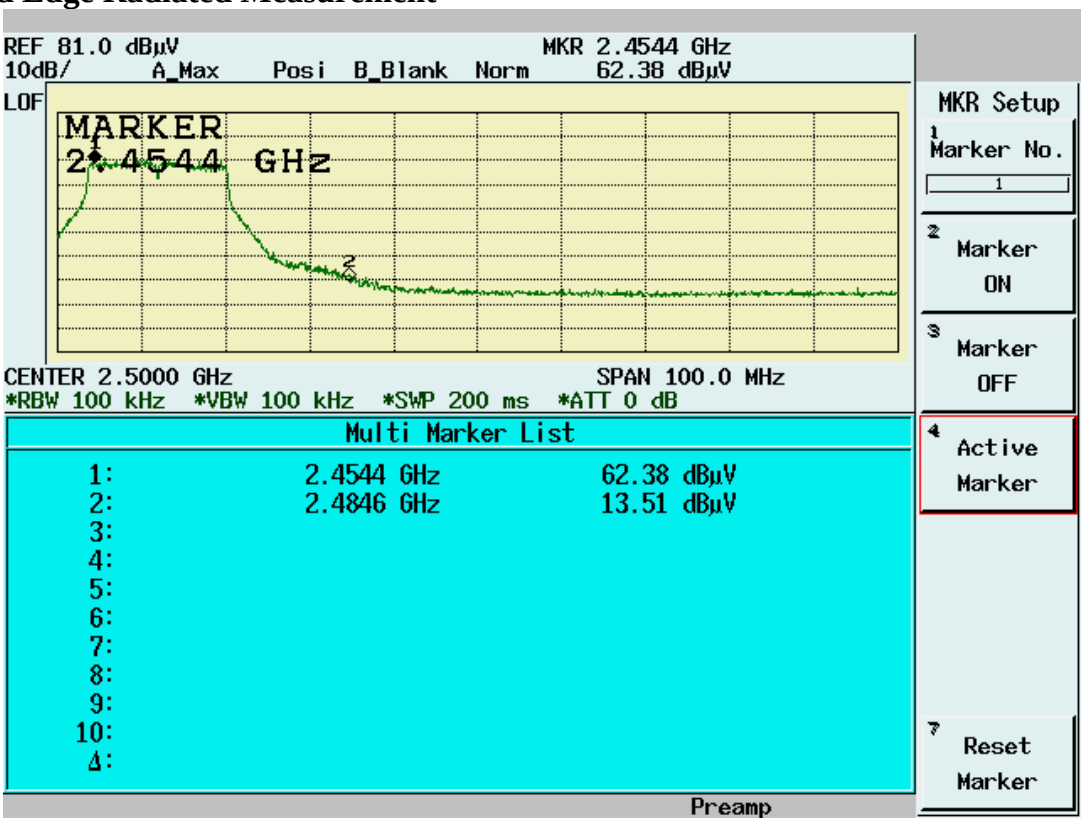
Band Edge Conducted Measurement



Band Edge Radiated Measurement



Band Edge Radiated Measurement



4.6 Band Edge Restricted Bands Measurement

4.6.1 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 1MHz
   VBW: 3MHz
   Center frequency: 2.4GHz, 2.48GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band, but inside the restricted band.
4. Change to test average mode as below setting:
   RBW: 1MHz
   VBW: 100Hz for 802.11b, 1KHz for 802.11g
5. Get the spectrum reading after Maximum Hold function is completed.

4.6.2 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.6.3 802.11b Test Data

Table Band Edge Measurement (Radiated)

Temp. (° C): 25

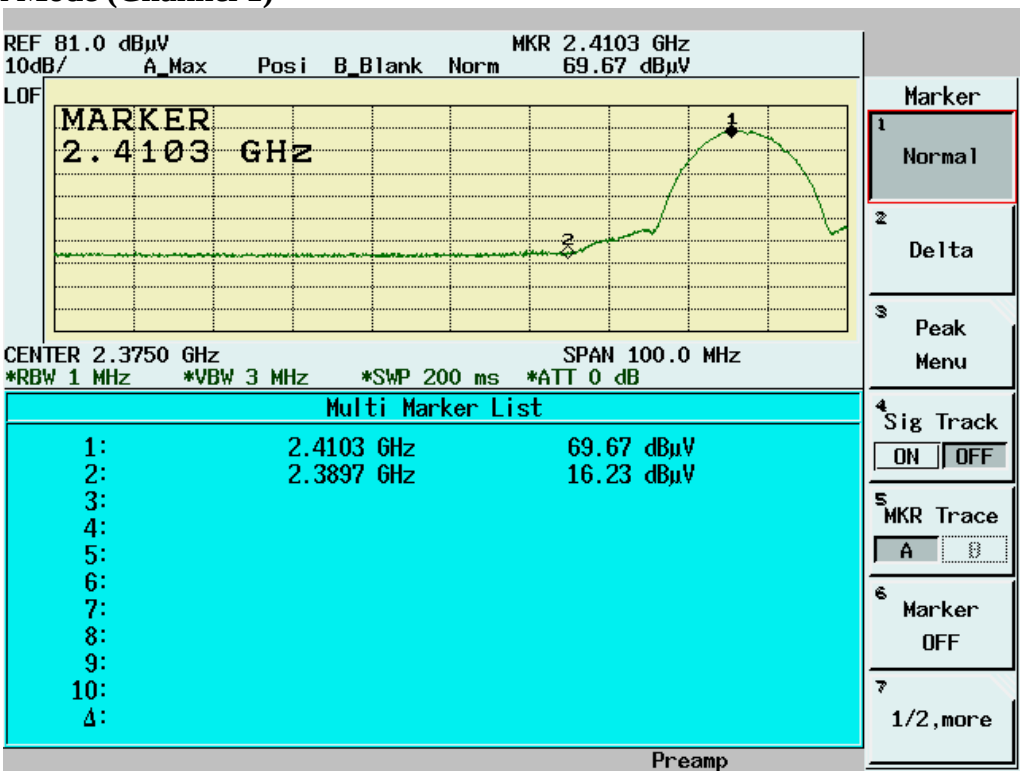
Test Engr: Jerry Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (peak mode)	2410.3	69.67	35.48	105.15	---	3MHz	---
Channel_1 (average mode)	2410.8	65.47	35.48	100.95	---	100Hz	---
Channel_11 (peak mode)	2461.7	70.46	35.5	105.96	---	3MHz	---
Channel_11 (average mode)	2460.7	65.88	35.5	101.38	---	100Hz	---
Channel_1 Restricted band (peak mode)	2389.7	16.23	35.47	51.7	74	3MHz	Pass
Restricted band (average mode)	2390	5.48	35.47	40.95	54	100Hz	Pass
Channel_11 Restricted band (peak mode)	2484.2	15.93	35.51	51.44	74	3MHz	Pass
Restricted band (average mode)	2483.5	6.4	35.51	41.91	54	100Hz	Pass

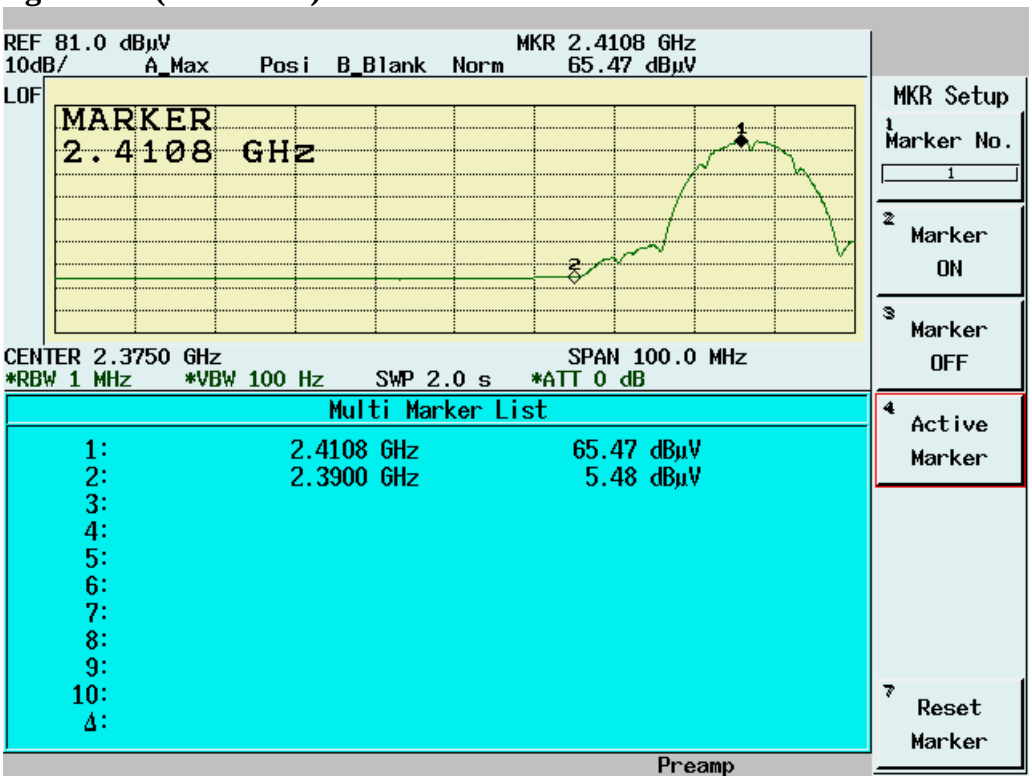
Note:

- The spectrum plot of emission level measurement in restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

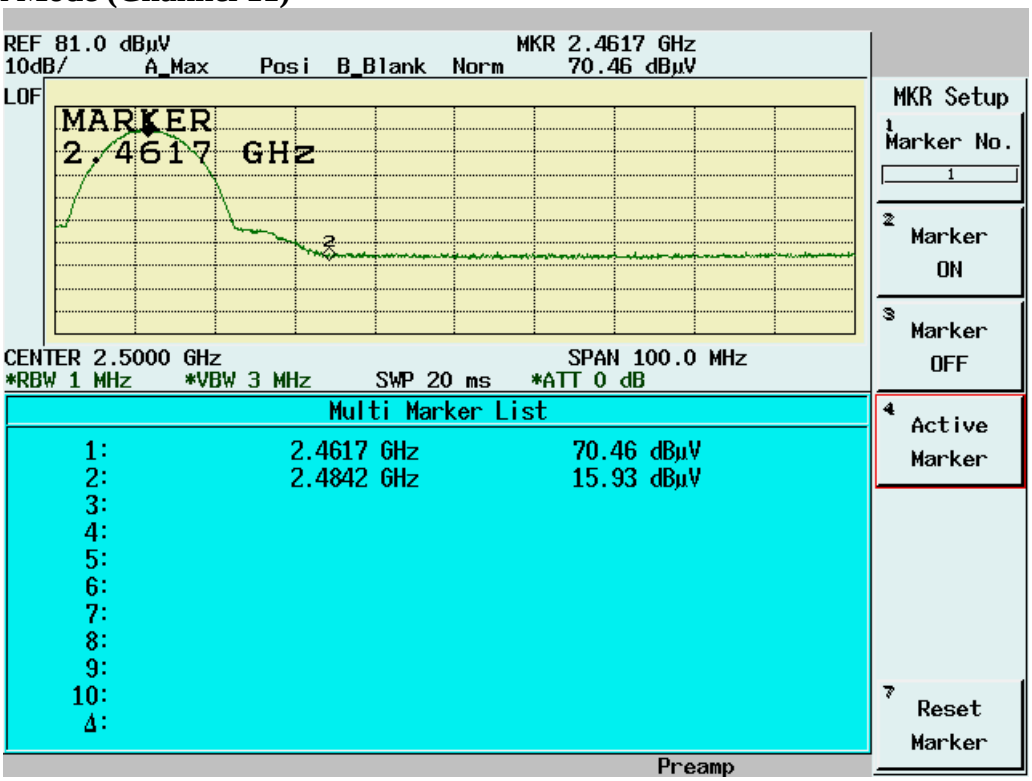
Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 1)



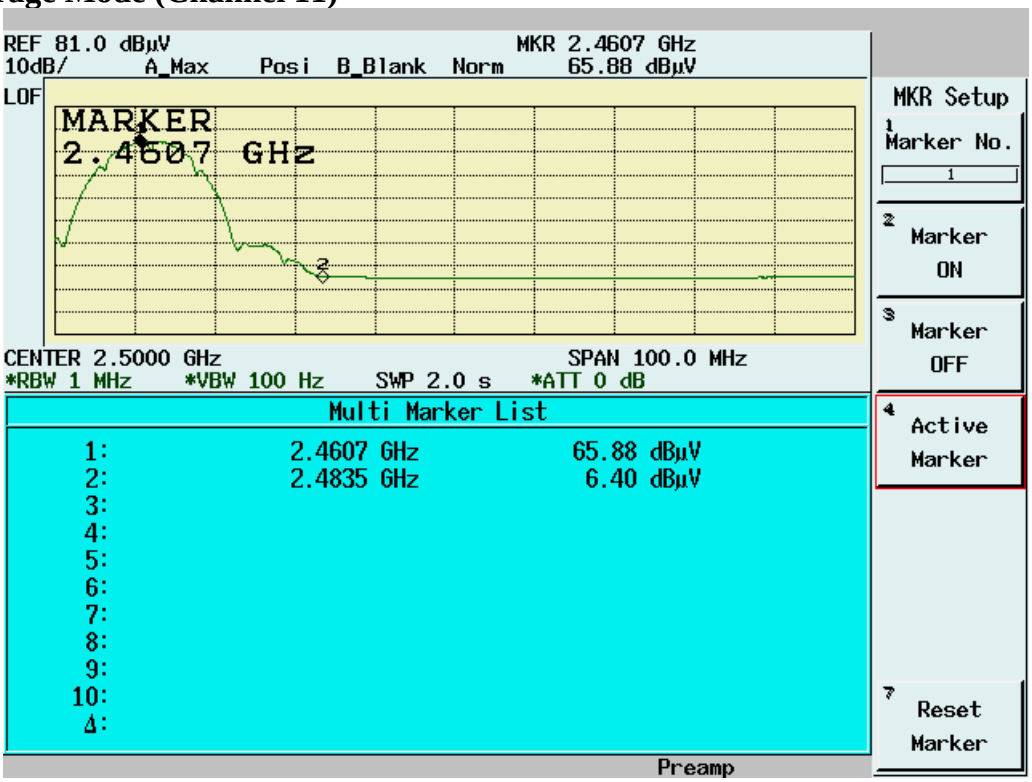
Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 1)



Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 11)



Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 11)



4.6.4 802.11g Test Data

Table Band Edge Measurement (Radiated)

Temp. (° C): 25

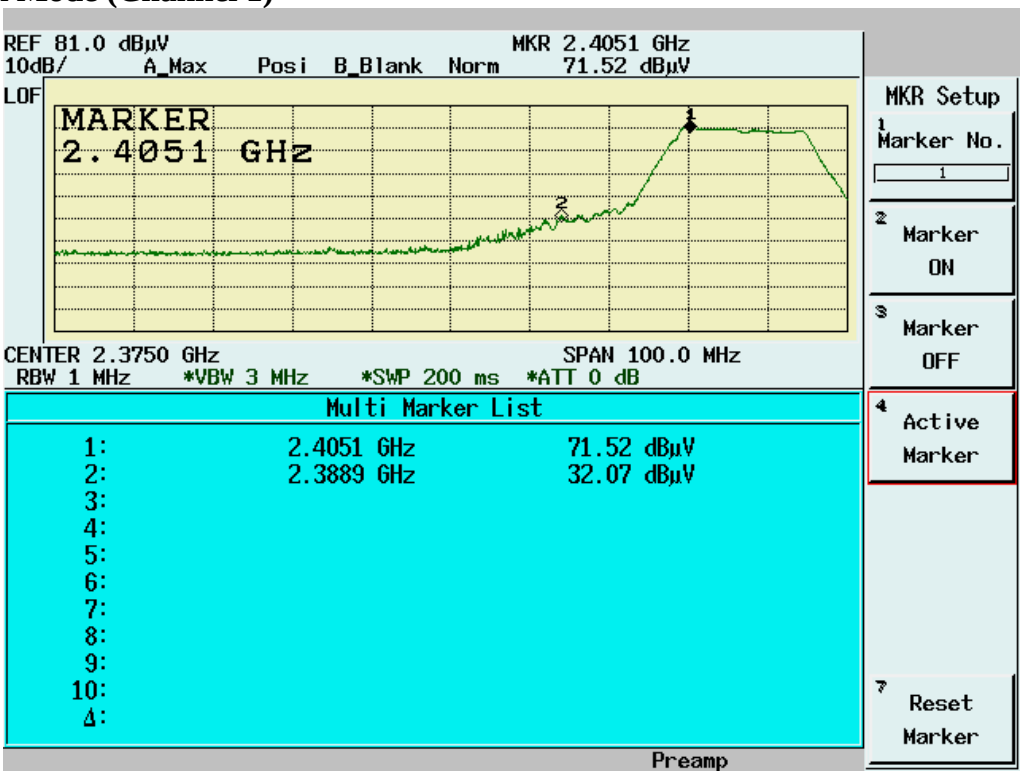
Test Engr: Jerry Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (peak mode)	2405.1	71.52	35.48	107	---	3MHz	---
Channel_1 (average mode)	2404.8	61.92	35.48	97.4	---	1KHz	---
Channel_11 (peak mode)	2405.1	71.52	35.5	107.02	---	3MHz	---
Channel_11 (average mode)	2460.8	61.73	35.5	97.23	---	1KHz	---
Channel_1 Restricted band (peak mode)	2388.9	32.07	35.47	67.54	74	3MHz	Pass
Restricted band (average mode)	2390	13.01	35.47	48.48	54	1KHz	Pass
Channel_11 Restricted band (peak mode)	2388.9	32.07	35.51	67.58	74	3MHz	Pass
Restricted band (average mode)	2483.5	12.96	35.51	48.47	54	1KHz	Pass

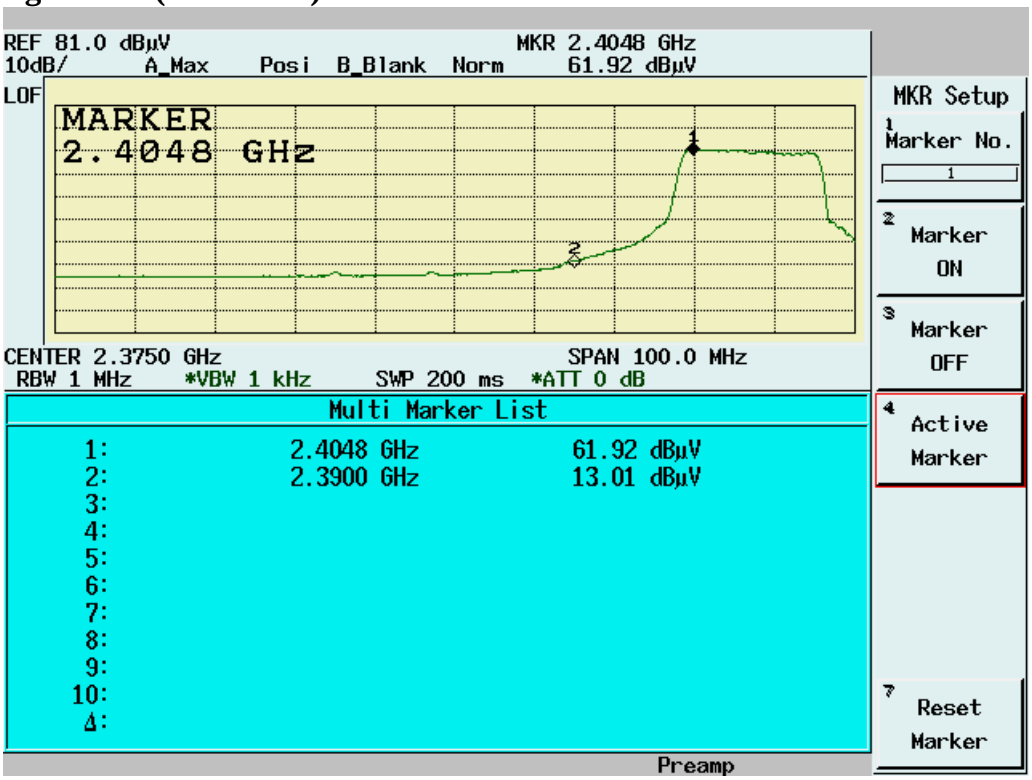
Note:

- The Spectrum plot of emission level measurement in restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

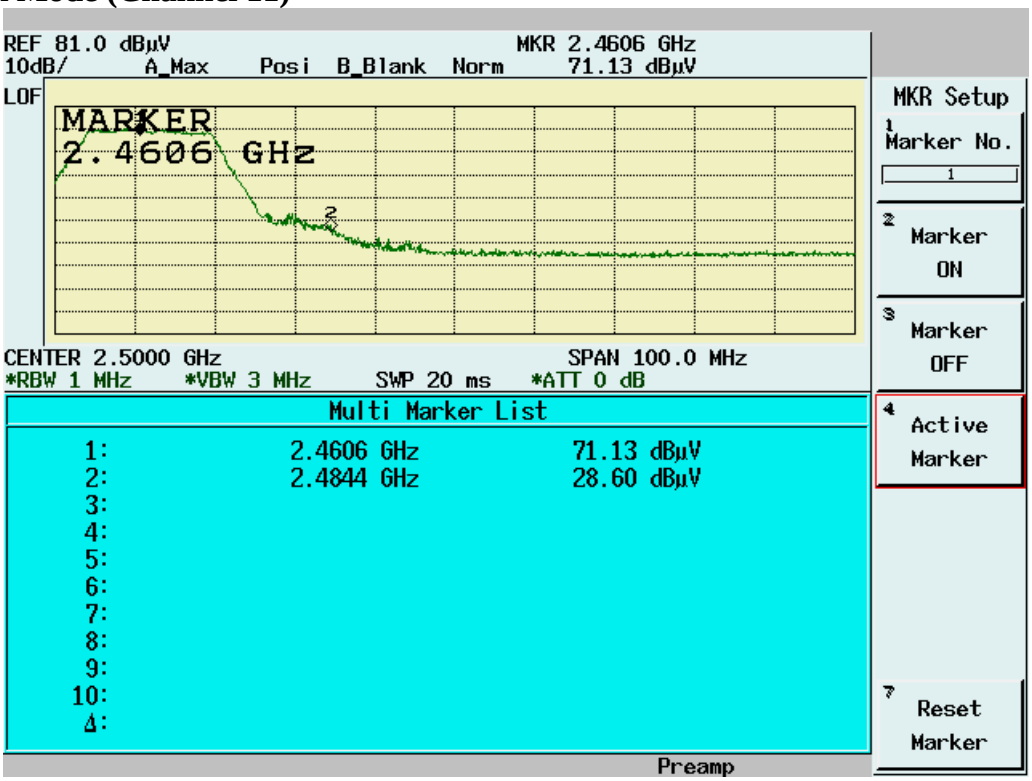
Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 1)



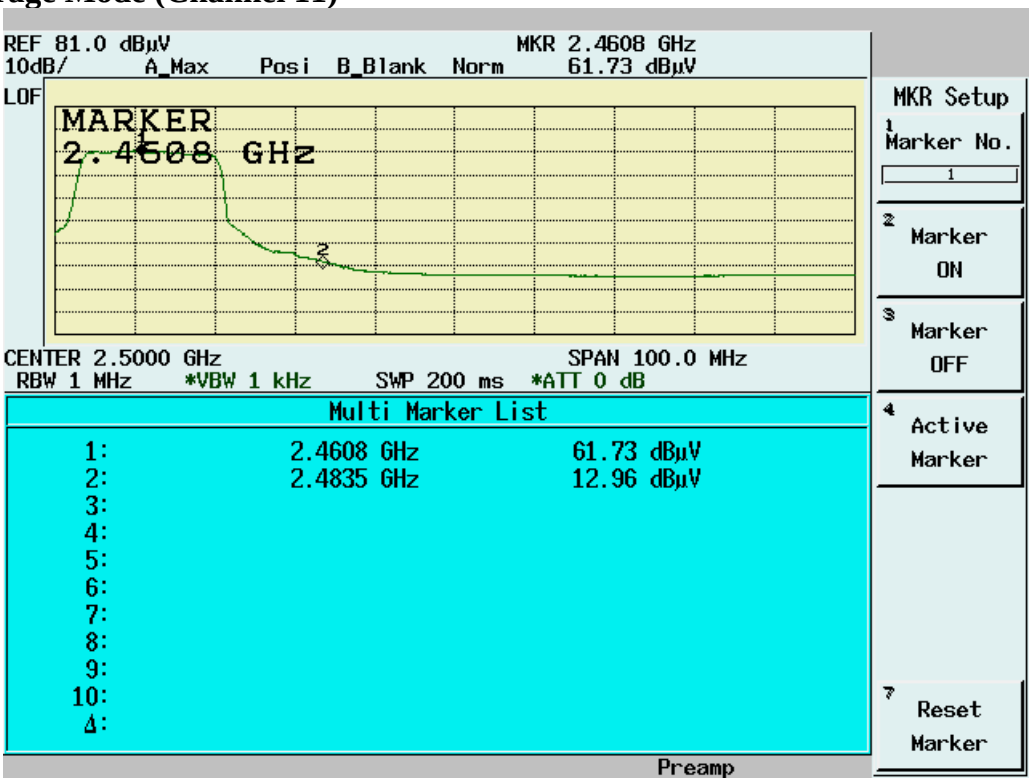
Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 1)



Band Edge measurement for radiated emission in Restricted Band (Radiated) Peak Mode (Channel 11)



Band Edge measurement for radiated emission in Restricted Band (Radiated) Average Mode (Channel 11)



4.7 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

See MPE report

4.8 DSSS Peak Power Spectral Density [Section 15.247(d)]

4.8.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN:1.5MHz
   RBW: 3KHz
   VBW: 30KHz
   Center frequency: fundamental frequency tested.
   Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

4.8.2 Test Setup

4.8.3 802.11b Test Data

802.11b Maximum Peak Output Power Density

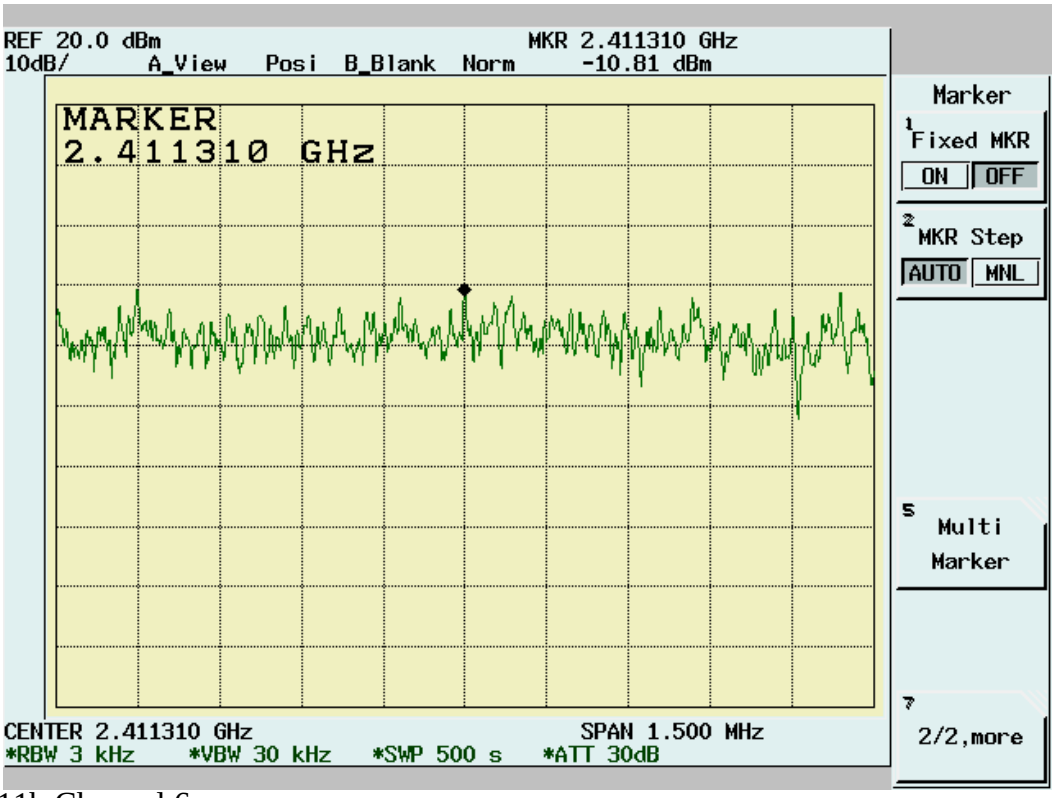
Temp. (°C): 25

Test Engr: Jerry Humidity (%): 55

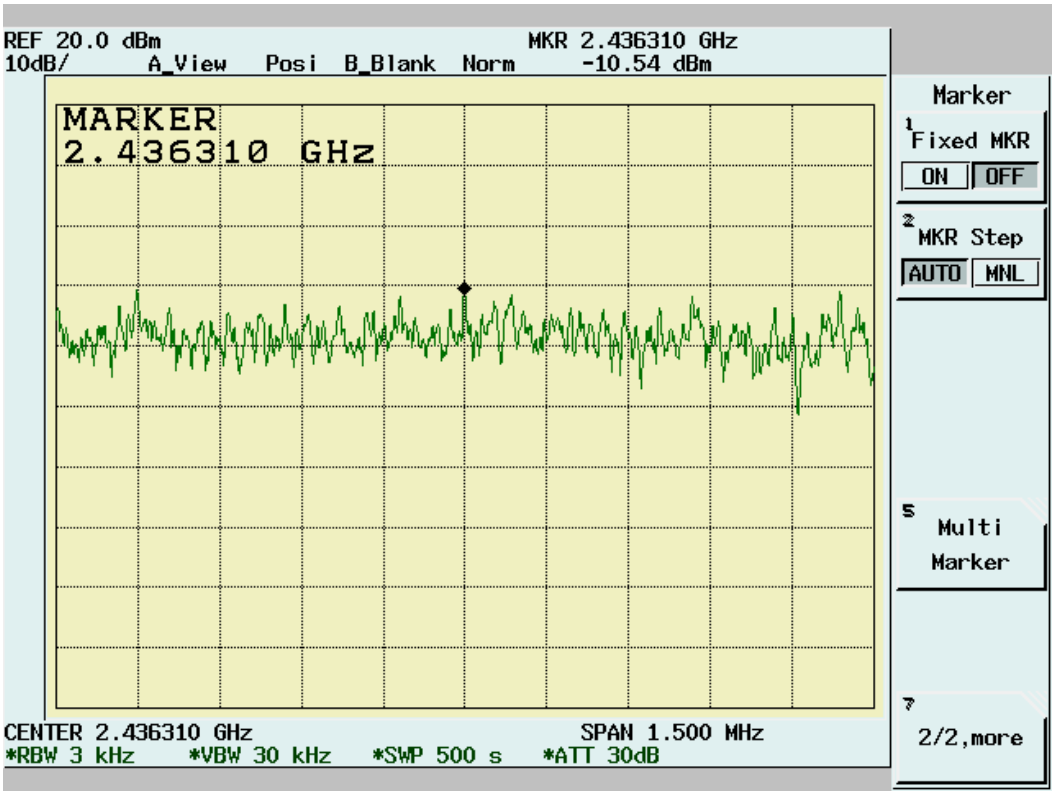
Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-10.81	1.1	-9.71	8	Pass
6	2437	-10.54	1.1	-9.44	8	Pass
11	2462	-11.16	1.1	-10.06	8	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

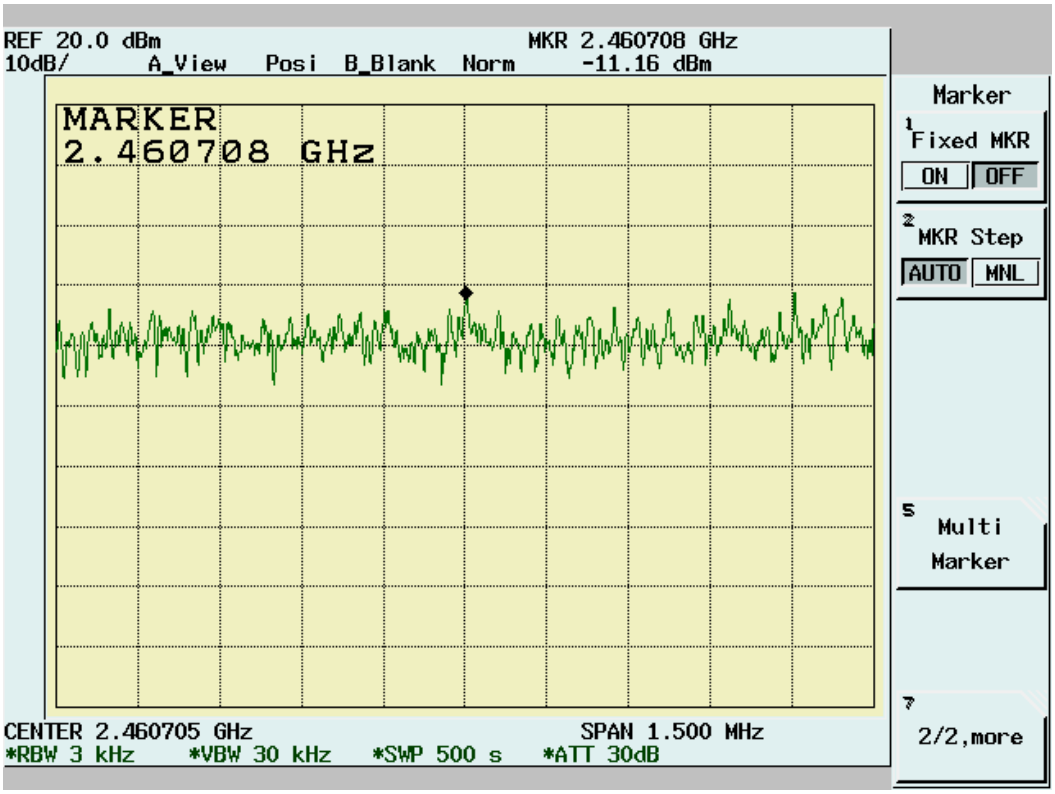
802.11b Channel 1



802.11b Channel 6



802.11b Channel 11



4.8.4 802.11g Test Data

802.11g Maximum Peak Output Power Density

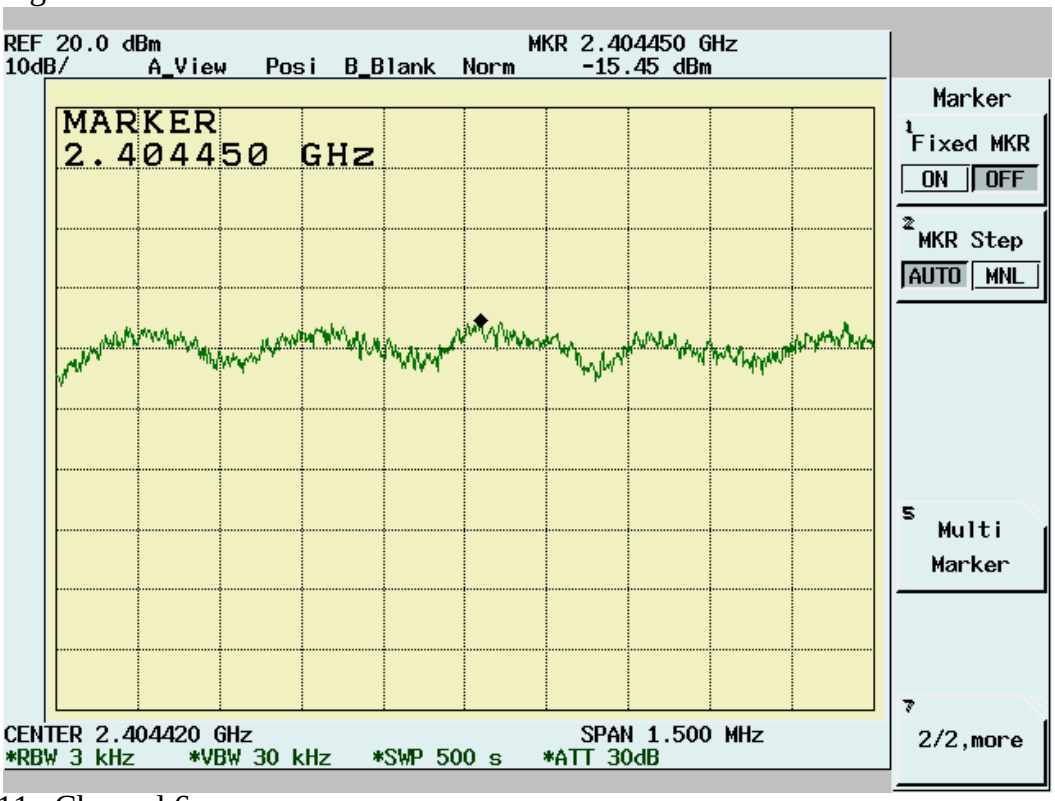
Temp. (°C): 25

Test Engr: Jerry Humidity (%): 55

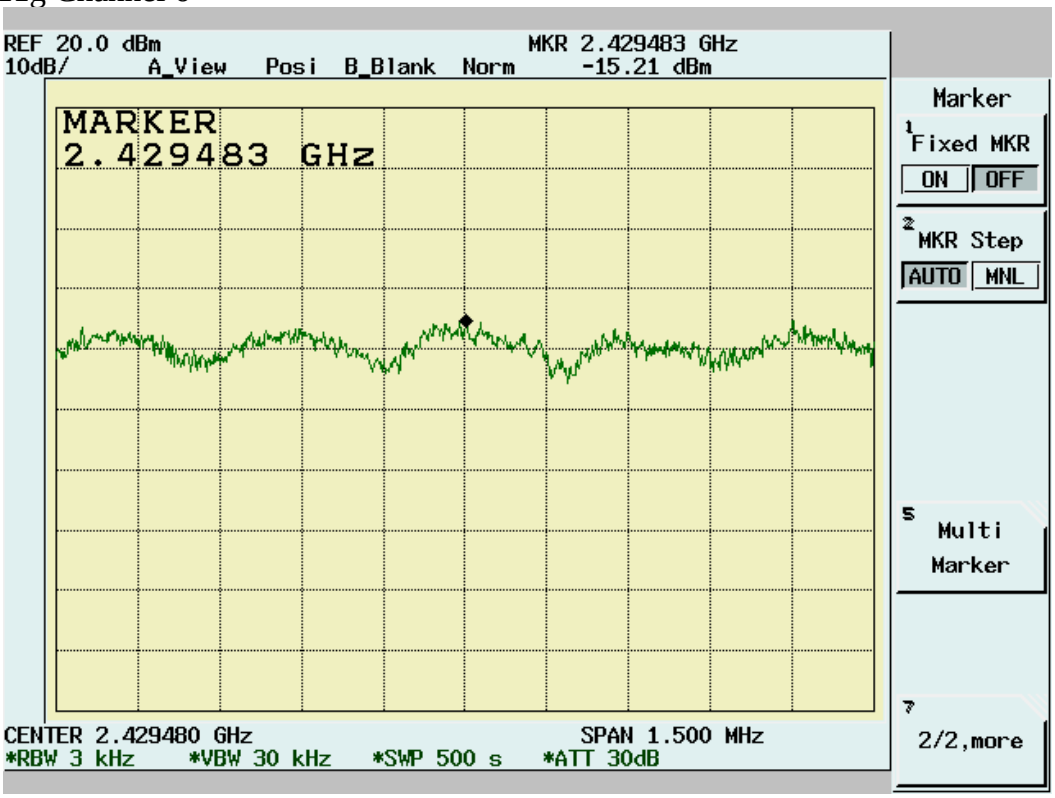
Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Power Density (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-15.45	1.1	-14.35	8	Pass
6	2437	-15.21	1.1	-14.11	8	Pass
11	2462	-16.2	1.1	-15.1	8	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

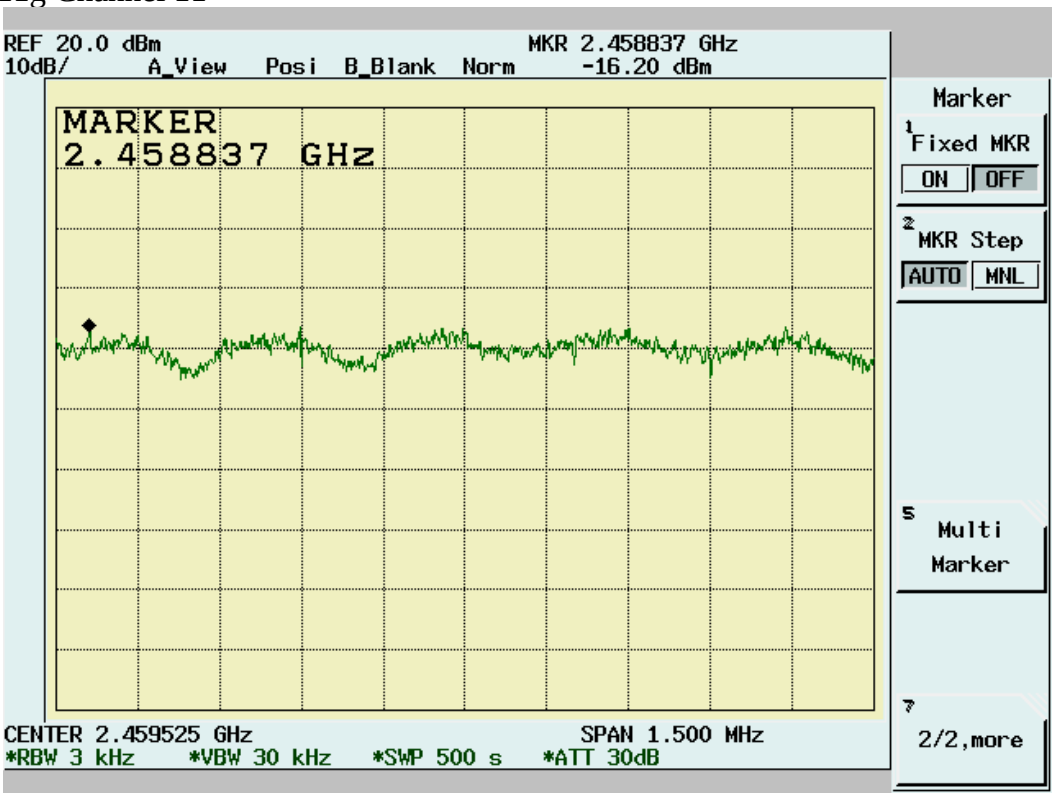
802.11g Channel 1



802.11g Channel 6



802.11g Channel 11



5. TEST RESULTS (802.11a 5725MHz-5850MHz)

5.1 Powerline Conducted Emissions [Section 15.207]

5.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

5.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dß below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dß below the applicable average limits, the emissions were also measured with the average detectors.

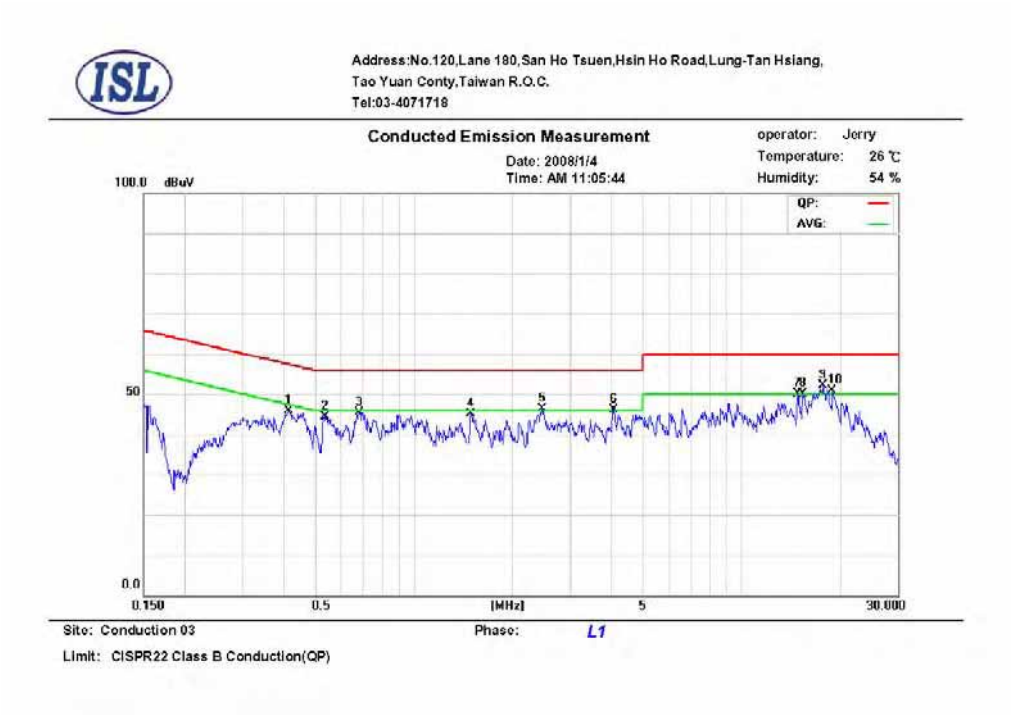
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

5.1.4 Test Data:

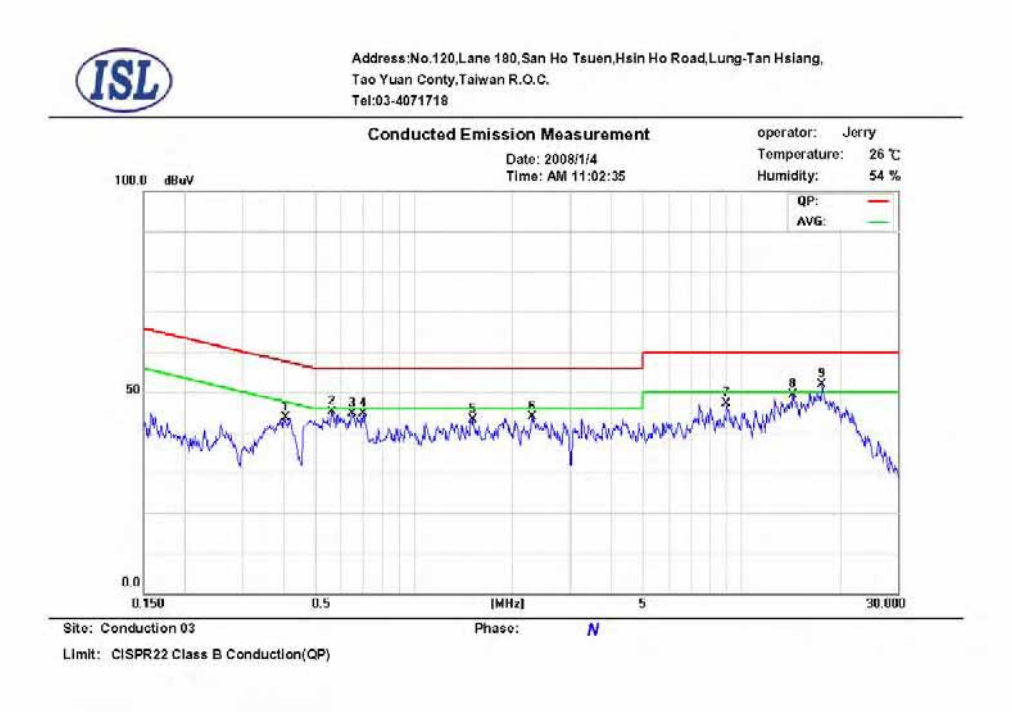
Power Line Conducted Emissions (Hot)



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.4148	0.2	0.08	32.80	57.5	-24.7	21.90	47.5	-25.6	
0.5350	0.2	0.07	38.70	56.0	-17.3	25.90	46.0	-20.1	
* 0.6824	0.2	0.07	34.92	56.0	-21.0	30.23	46.0	-15.7	
1.4953	0.2	0.08	32.46	56.0	-23.5	26.71	46.0	-19.2	
2.4735	0.25	0.1	37.98	56.0	-18.0	27.21	46.0	-18.7	
4.0704	0.4	0.14	37.19	56.0	-18.8	26.50	46.0	-19.5	
14.8277	0.89	0.3	36.95	60.0	-23.0	31.04	50.0	-18.9	
15.3879	0.9	0.3	35.97	60.0	-24.0	31.42	50.0	-18.5	
17.7545	0.9	0.32	39.74	60.0	-20.2	30.66	50.0	-19.3	
18.9205	0.9	0.33	36.86	60.0	-23.1	28.86	50.0	-21.1	

*:Maximum data x:Over limit

Power Line Conducted Emissions (Neutral)



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
0.4061	0.2	0.08	33.90	57.7	-23.8	25.02	47.7	-22.7	
0.5641	0.2	0.07	33.03	56.0	-22.9	27.89	46.0	-18.1	
0.6471	0.2	0.07	38.79	56.0	-17.2	23.81	46.0	-22.1	
0.7006	0.2	0.07	36.90	56.0	-19.1	28.79	46.0	-17.2	
1.5113	0.2	0.08	34.72	56.0	-21.2	27.90	46.0	-18.1	
* 2.2968	0.2	0.1	36.82	56.0	-19.1	29.02	46.0	-16.9	
9.0113	0.37	0.2	36.19	60.0	-23.8	27.19	50.0	-22.8	
14.3641	0.4	0.29	37.13	60.0	-22.8	24.32	50.0	-25.6	
17.5672	0.45	0.32	34.29	60.0	-25.7	30.51	50.0	-19.4	

*.Maximum data x.Over limit

* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between frequency of 802.11a to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

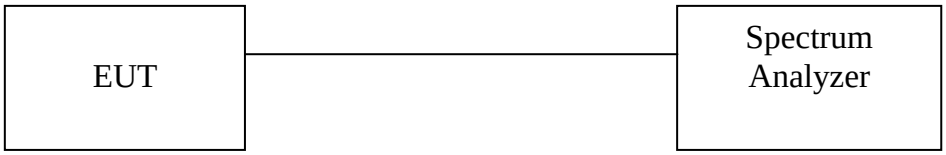
5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

5.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz
SPAN	20MHz

5.2.2 Test Setup



5.2.3 Test Data:

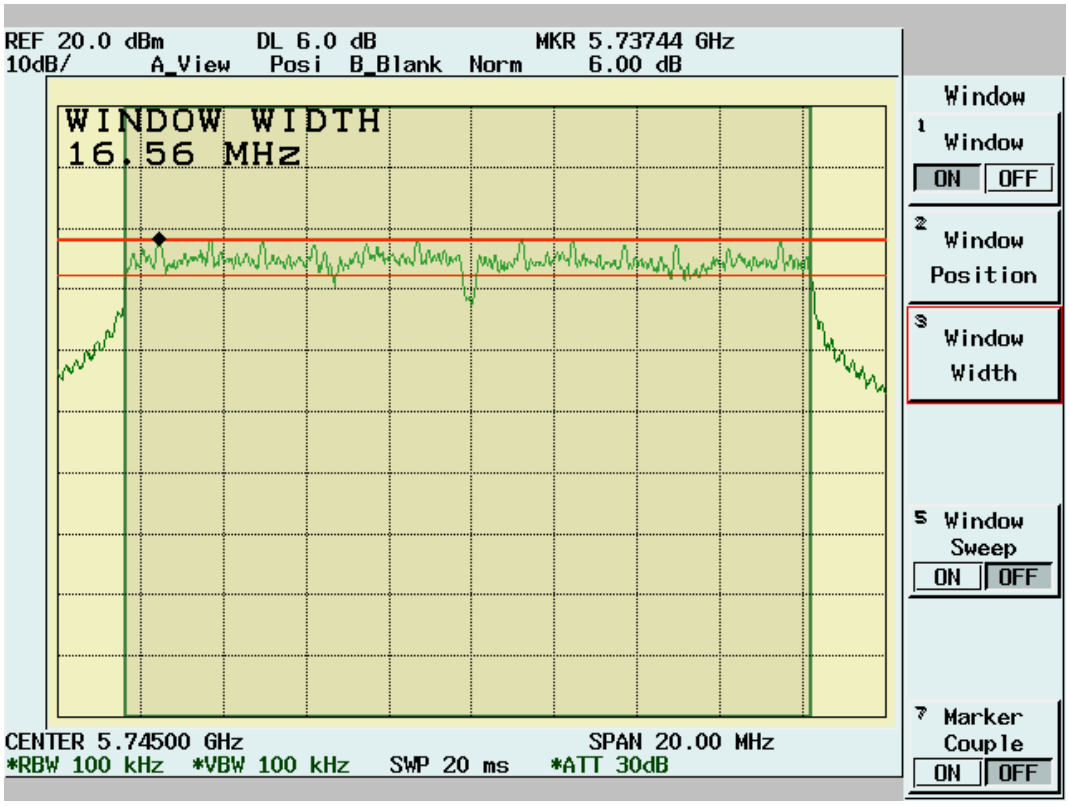
6dB Bandwidth

Temp. (° C): 25

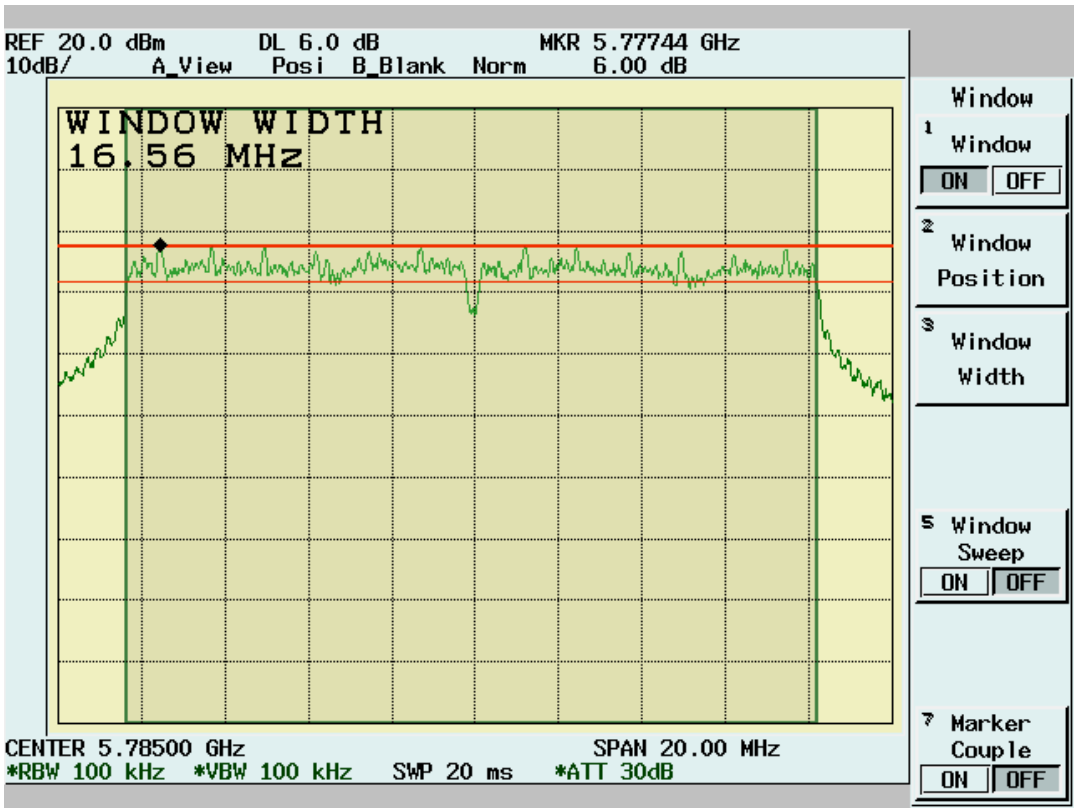
Test Engr: Jerry Chiou Humidity (%): 50

Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
5745	16.56	0.5	Pass
5785	16.56	0.5	Pass
5825	16.56	0.5	Pass

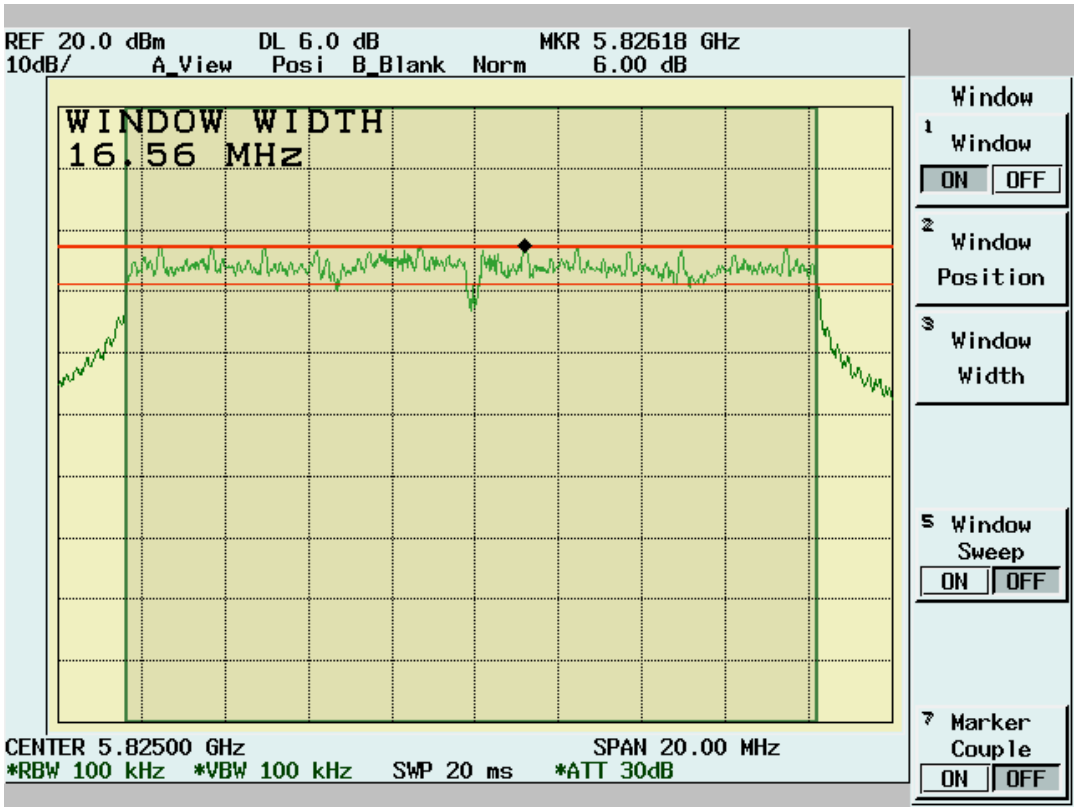
5745 MHz:



5785 MHz:



5825 MHz:


REF 20.0 dBm
DL 6.0 dB
MKR 5.82618 GHz
10dB/
A_View
Posi
B_Blank
Norm
6.00 dB
WINDOW WIDTH
16.56 MHz
CENTER 5.82500 GHz
SPAN 20.00 MHz
*RBW 100 kHz
*VBW 100 kHz
SWP 20 ms
*ATT 30dB
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF

5.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

5.3.1 Test Procedure

The Transmitter output of EUT was connected to the Spectrum analyzer.

The test is performed in accordance with FCC document "Measurement of Digital Transmission Systems Operating under Section 15.247", March 23, 2005. The transmitter operates continuously therefore Power Output Option 2, Method # 1 is used.

Equipment mode	Spectrum analyzer
Detector function	Channel Power
Channel BW	22MHz
RBW	1MHz
VBW	3MHz
SPAN	20MHz
Center frequency	fundamental frequency tested
Sweep time	auto
Average times	100

5.3.2 Test Setup

5.3.3 Test Data

Maximum Peak Output Power

Temp. (° C): 25

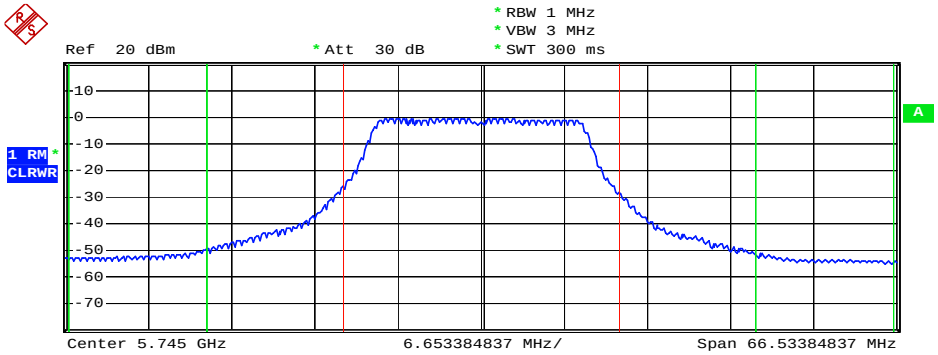
Test Engr: Jerry Humidity (%): 55

Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Power Output (mW)	Power Output (dBm)	Limit (dBm)	Pass/Fail
5745	10.16	2.3	17.62	12.46	30	Pass
5785	10.41	2.3	18.66	12.71	30	Pass
5825	10.84	2.3	20.61	13.14	30	Pass

802.11a (dBm)								
Freq.	Bit rate (mbps) / Duty cycle(%)							
(MHz)	6 / 91	9 / 87	12 / 84	18 / 78	24 / 73	36 / 64	48 / 58	54 / 55
5745	12.46	12.35	12.18	11.91	12.05	11.43	9.9	8
5785	12.71	12.62	12.4	12.18	11.73	11.11	9.75	7.71
5825	13.14	12.57	12.39	12.58	12.18	11.71	10.2	8.24

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

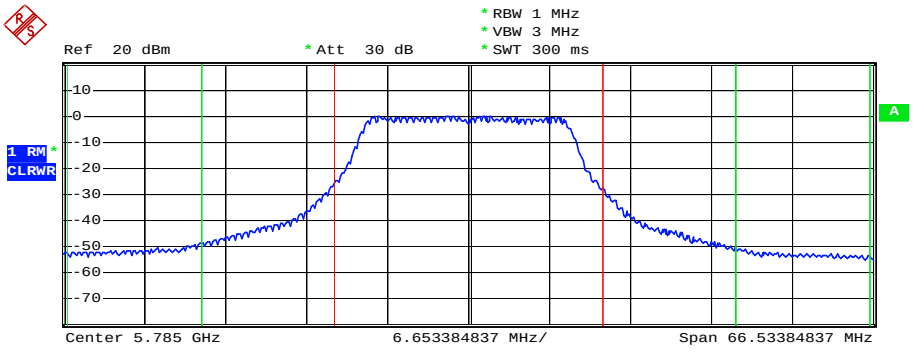
5745 MHz:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	10.16 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-37.54 dB
Spacing	16.5 MHz	Upper	-39.09 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-52.78 dB
Spacing	27.5 MHz	Upper	-53.82 dB

Date: 11.MAR.2008 18:31:03

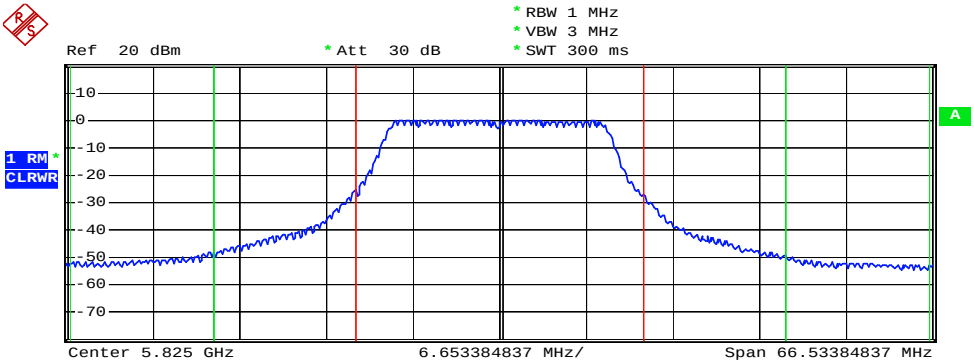
5785 MHz:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	10.41 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-37.66 dB
Spacing	16.5 MHz	Upper	-39.12 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-52.37 dB
Spacing	27.5 MHz	Upper	-53.62 dB

Date: 11.MAR.2008 18:31:26

5825 MHz:



Tx Channel		**WLAN 802.11B**	
Bandwidth	22 MHz	Power	10.84 dBm
Adjacent Channel			
Bandwidth	11 MHz	Lower	-37.45 dB
Spacing	16.5 MHz	Upper	-38.89 dB
Alternate Channel			
Bandwidth	11 MHz	Lower	-52.42 dB
Spacing	27.5 MHz	Upper	-53.53 dB

Date: 11.MAR.2008 18:31:52

5.4 Radiated Emission Measurement [Section [15.247(c)(4)]

5.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

5.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup ac*cording to EMI Receiver/Spectrum Analyzer Configuration.*

For the test of 2^{nd} to 10^{th} harmonics frequencies , the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

5.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

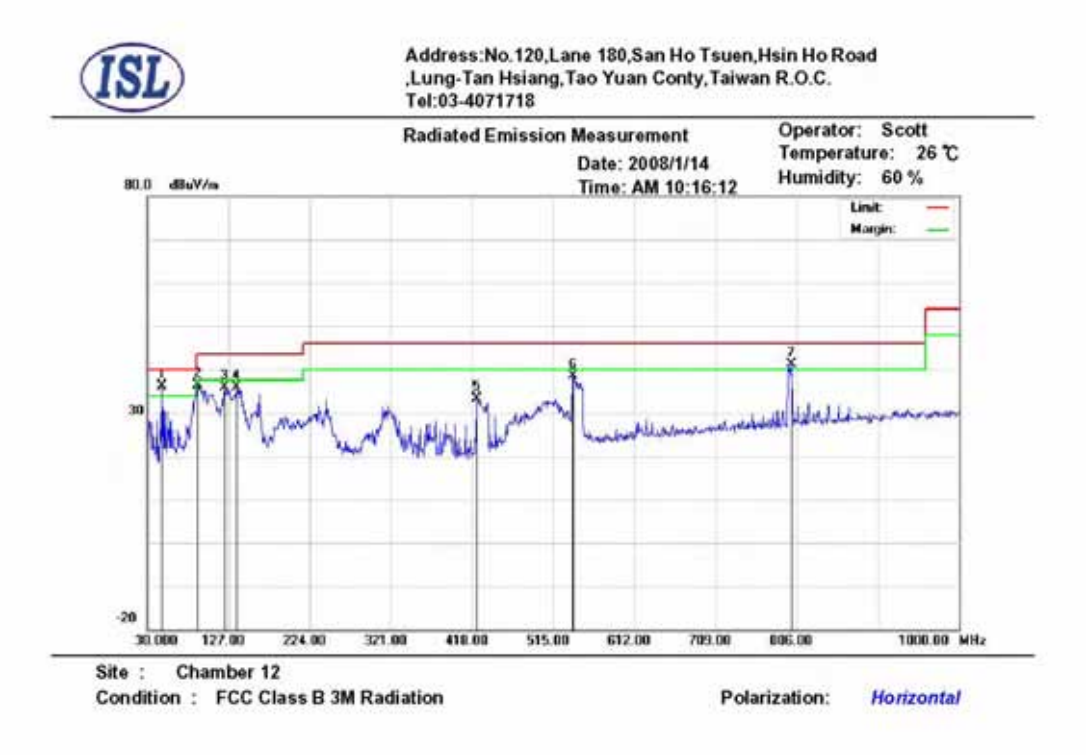
Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	100 Hz for 802.11b, 1 KHz for 802.11a/g

5.4.4 Test Data (30MHz – 1GHz):

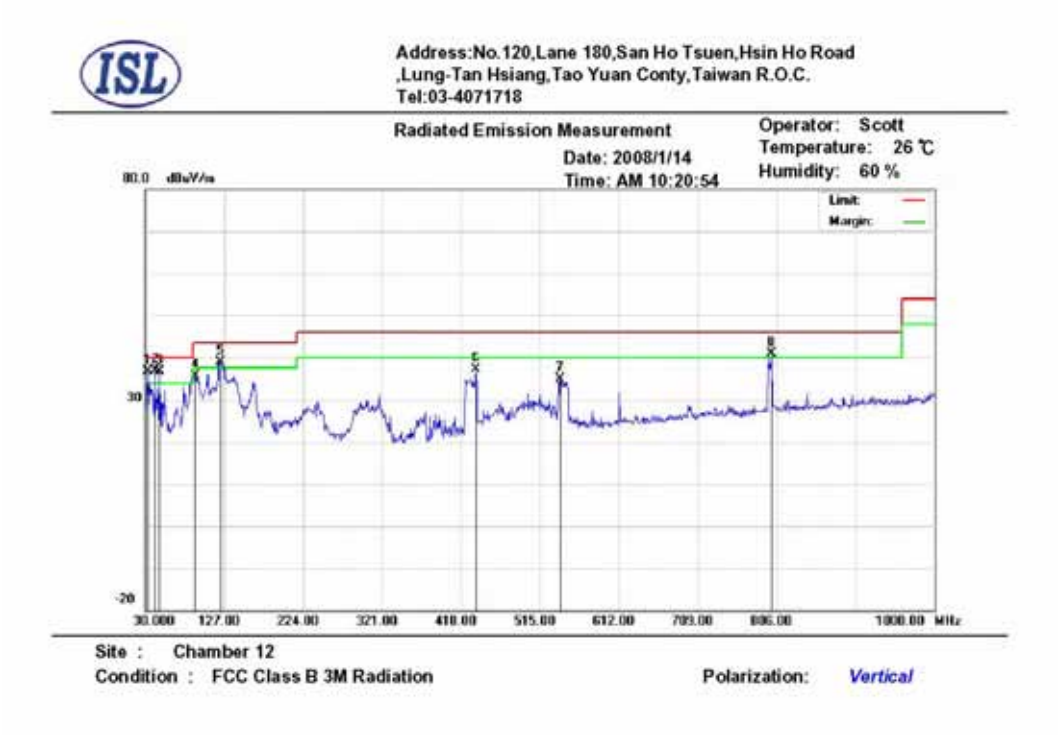
30M – 1GHz Open Field Radiated Emissions (Horizontal) 5745,5785,5825MHz



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
*	47.4600	25.21	9.25	1.55	0	36.01	40.00	-3.99	400	55	peak
	90.1400	25.85	8.57	2	0	36.42	43.50	-7.08	400	78	peak
	122.1500	24.09	9.54	2.22	0	35.85	43.50	-7.65	124	190	peak
	136.7000	25.09	8.3	2.37	0	35.76	43.50	-7.74	322	223	peak
	423.8200	15.48	13.89	3.9	0	33.27	46.00	-12.73	345	211	peak
	539.2500	17.84	16.07	4.36	0	38.27	46.00	-7.73	332	342	peak
!	800.1800	16.41	19.47	5.3	0	41.18	46.00	-4.82	177	123	peak

*:Maximum data x:Over limit !:over margin

30M – 1GHz Open Field Radiated Emissions (Vertical) 5745,5785,5825MHz



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
!	32.9100	17.90	17.56	1.17	0	36.63	40.00	-3.37	100	232	peak
*	41.6400	22.56	12.86	1.43	0	36.85	40.00	-3.15	100	242	peak
!	47.4600	25.91	9.25	1.55	0	36.71	40.00	-3.29	123	134	peak
	91.1100	25.13	8.61	2.01	0	35.75	43.50	-7.75	222	325	peak
!	122.1500	27.00	9.54	2.22	0	38.76	43.50	-4.74	124	242	peak
	436.4300	18.96	14.18	3.95	0	37.09	46.00	-8.91	232	125	peak
	540.2200	14.39	16.08	4.36	0	34.83	46.00	-11.17	124	130	peak
!	800.1800	16.01	19.47	5.3	0	40.78	46.00	-5.22	103	34	peak

*:Maximum data x:Over limit !:over margin

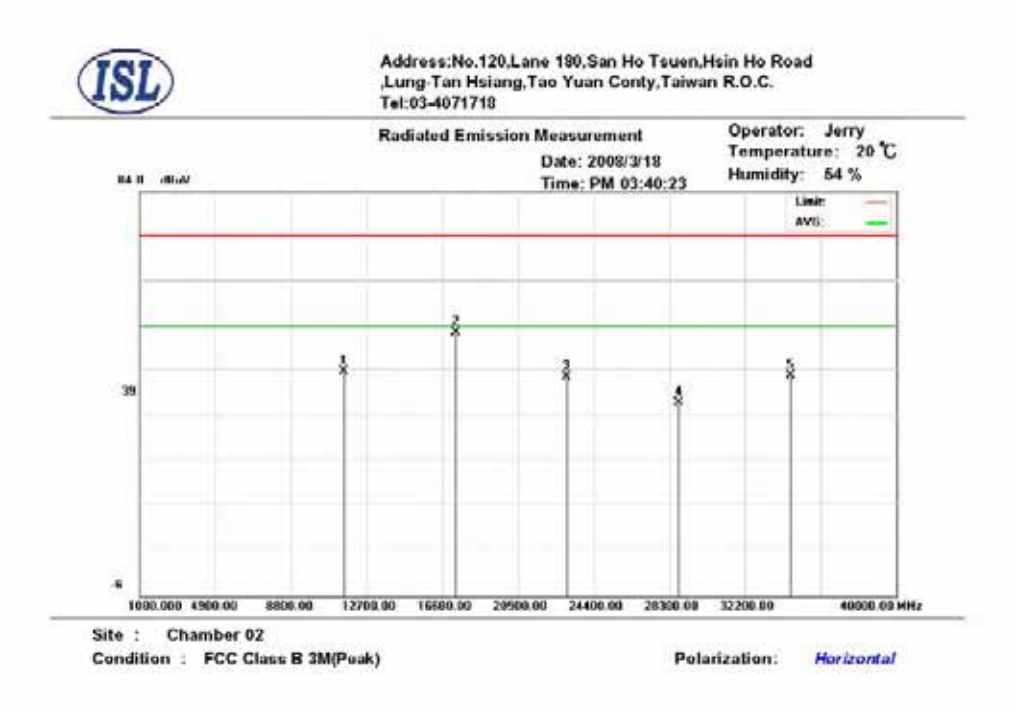
NOTE:

- During the Pre-test, the EUT has been tested for 5745,5785,5825MHz transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.
- Margin = Corrected Amplitude – Limit
  Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
  A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

5.4.5 Test Data (1GHz – 40 GHz) .

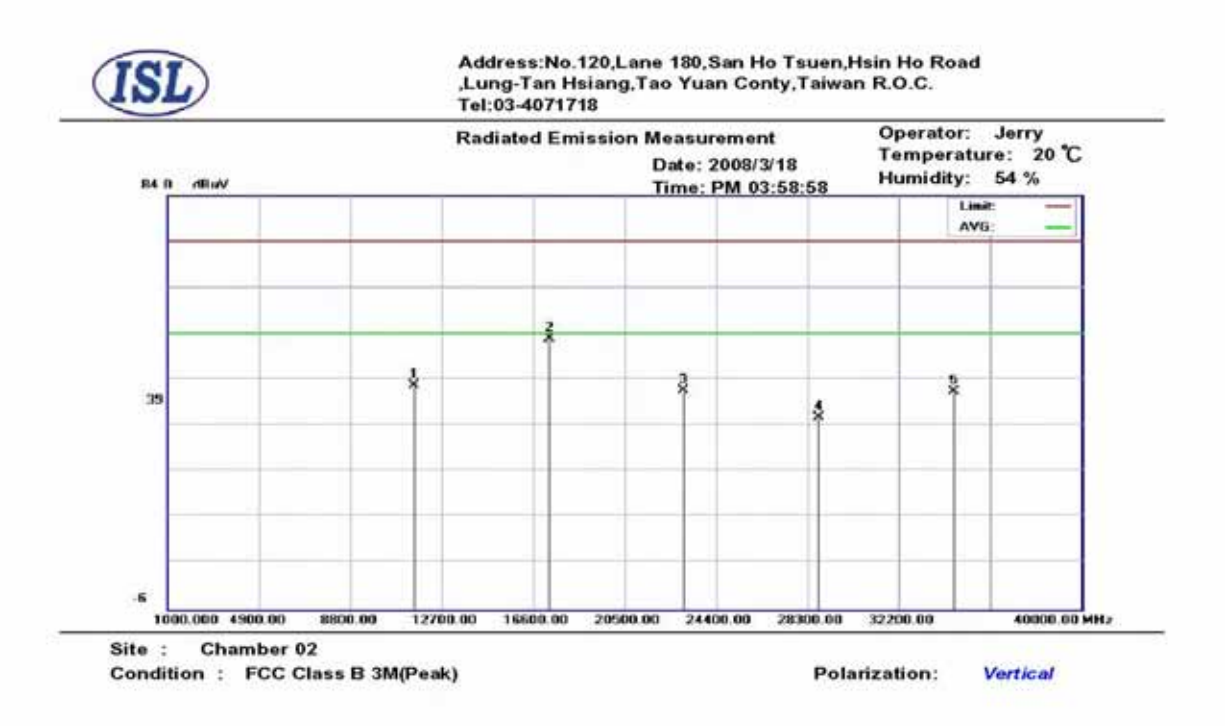
1GHz~ 40 GHz (Horizontal), 5745 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	11490.000	32.55	41.47	4.39	28.52	43.89	74.00	-30.11	197	173	peak
*	17235.000	35.01	45.8	5.44	27.64	52.61	74.00	-21.39	285	242	peak
	22980.000	35.93	33.32	6.23	26.7	42.78	74.00	-31.22	292	144	peak
	28725.000	37.11	36.13	5.3	35.41	37.13	74.00	-36.87	279	103	peak
	34470.000	39.18	38.03	5.95	34.2	42.96	74.00	-31.04	100	38	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 40 GHz (Vertical), 5745 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	11490.000	31.43	41.47	4.39	28.52	42.77	74.00	-31.23	338	346	peak
*	17235.000	35.34	45.8	5.44	27.64	52.94	74.00	-21.06	297	348	peak
	22980.000	34.72	33.32	6.23	26.7	41.57	74.00	-32.43	349	303	peak
	28725.000	35.64	36.13	5.3	35.41	35.66	74.00	-38.34	221	291	peak
	34470.000	37.52	38.03	5.95	34.2	41.30	74.00	-32.70	155	30	peak

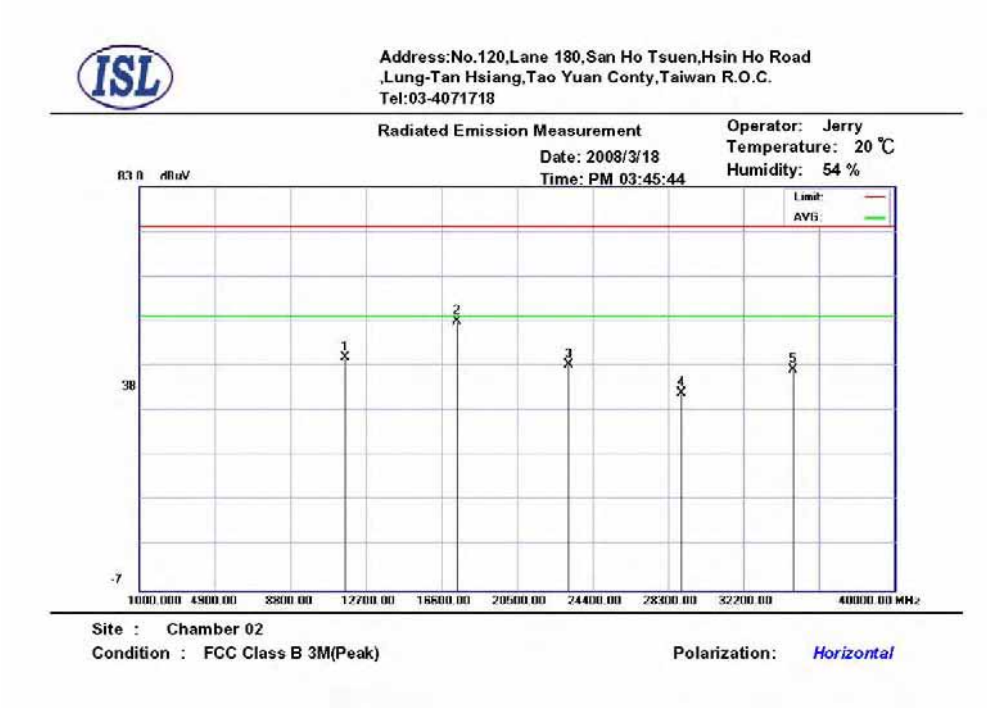
*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

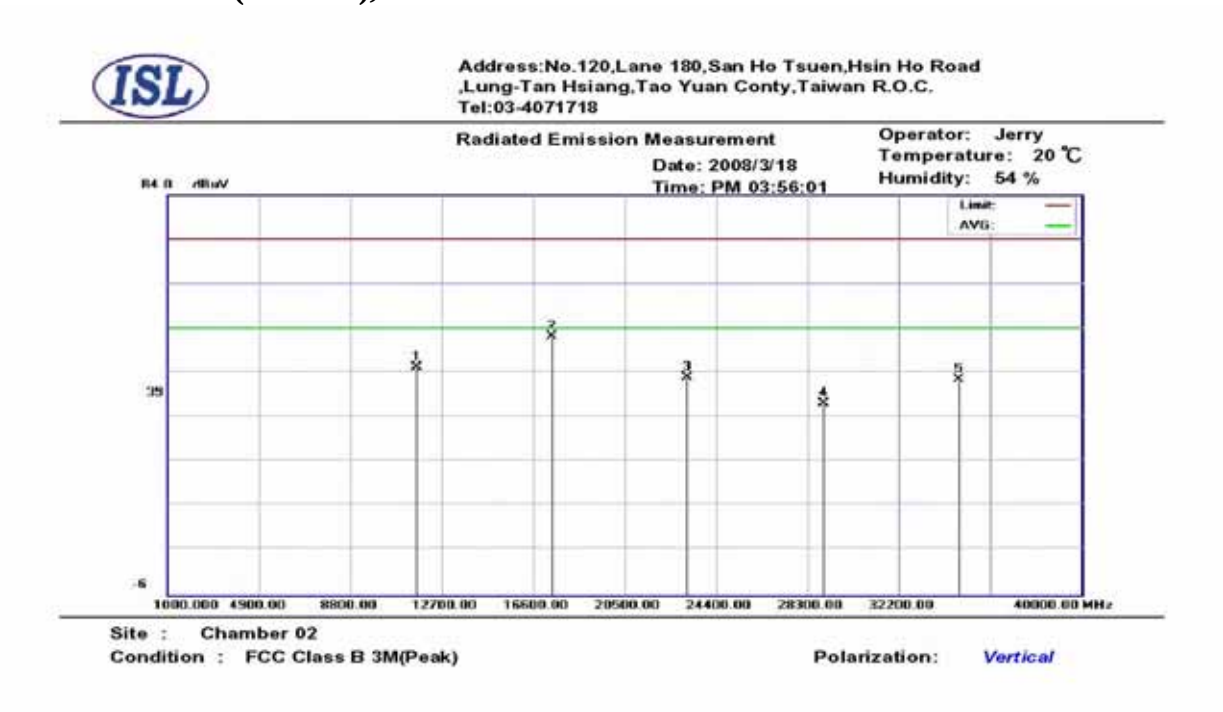
1GHz~ 40 GHz (Horizontal) , 5785 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	11570.000	33.36	41.58	4.4	28.55	44.79	74.00	-29.21	374	173	peak
*	17355.000	34.96	46.16	5.46	27.53	53.05	74.00	-20.95	100	162	peak
	23140.000	36.47	33.33	6.19	26.59	43.40	74.00	-30.60	189	274	peak
	28925.000	36.97	36.25	5.12	35.33	37.01	74.00	-36.99	219	160	peak
	34710.000	38.45	38.18	5.69	34.24	42.08	74.00	-31.92	390	343	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 40 GHz (Vertical), 5785 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	11570.000	33.78	41.58	4.4	28.55	45.21	74.00	-28.79	100	57	peak
*	17355.000	34.08	46.16	5.46	27.53	52.17	74.00	-21.83	336	328	peak
	23140.000	35.90	33.33	6.19	26.59	42.83	74.00	-31.17	295	88	peak
	28925.000	37.02	36.25	5.12	35.33	37.06	74.00	-36.94	133	284	peak
	34710.000	38.76	38.18	5.69	34.24	42.39	74.00	-31.61	331	204	peak

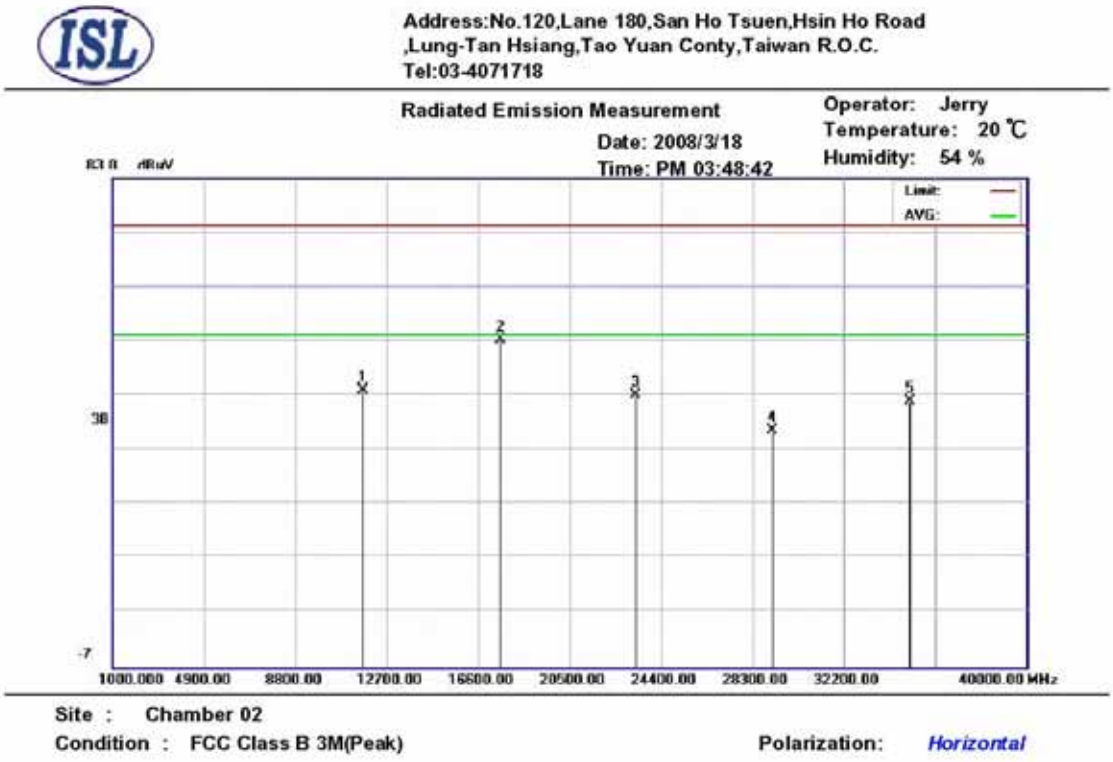
*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " pk": peak mode
- "av": average mode
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

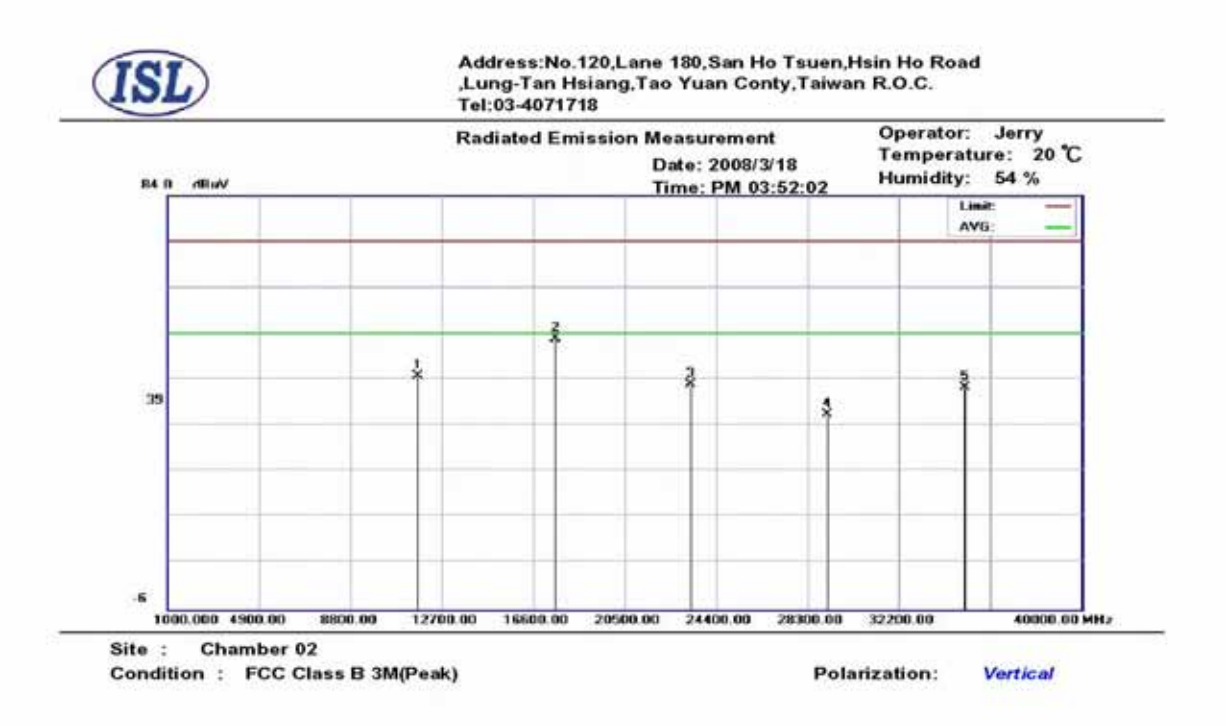
1GHz~ 40 GHz (Horizontal), 5825 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	11650.000	32.47	41.68	4.41	28.55	44.01	74.00	-29.99	287	251	peak
*	17475.000	34.57	46.52	5.47	27.43	53.13	74.00	-20.87	310	278	peak
	23300.000	36.02	33.36	6.15	26.46	43.07	74.00	-30.93	314	356	peak
	29125.000	36.37	36.42	5.1	35.27	36.62	74.00	-37.38	366	134	peak
	34950.000	38.49	38.28	5.44	34.29	41.92	74.00	-32.08	361	143	peak

*:Maximum data x:Over limit !:over margin

1GHz~ 40 GHz (Vertical), 5825 MHz



Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	11650.000	33.14	41.68	4.41	28.55	44.68	74.00	-29.32	267	263	peak
*	17475.000	34.33	46.52	5.47	27.43	52.89	74.00	-21.11	193	251	peak
	23300.000	35.84	33.36	6.15	26.46	42.89	74.00	-31.11	121	251	peak
	29125.000	36.09	36.42	5.1	35.27	36.34	74.00	-37.66	153	31	peak
	34950.000	38.78	38.28	5.44	34.29	42.21	74.00	-31.79	123	167	peak

*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " pk": peak mode
- "av": average mode
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

5.5 Band Edge Measurement

5.5.1 Test Procedure (Conducted)

4. The transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 100KHz
   VBW: 100KHz
   Center frequency: 5.725GHz, 5.850GHz.
5. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
6. Find the next peak frequency outside the operation frequency band

5.5.2 Test Setup (Conducted)

Conducted

Radiated

Same as *Radiated Emission Measurement*

5.5.3 Test Data:

Table: Band Edge measurement (Conducted)

Temp. (deg. C): 25

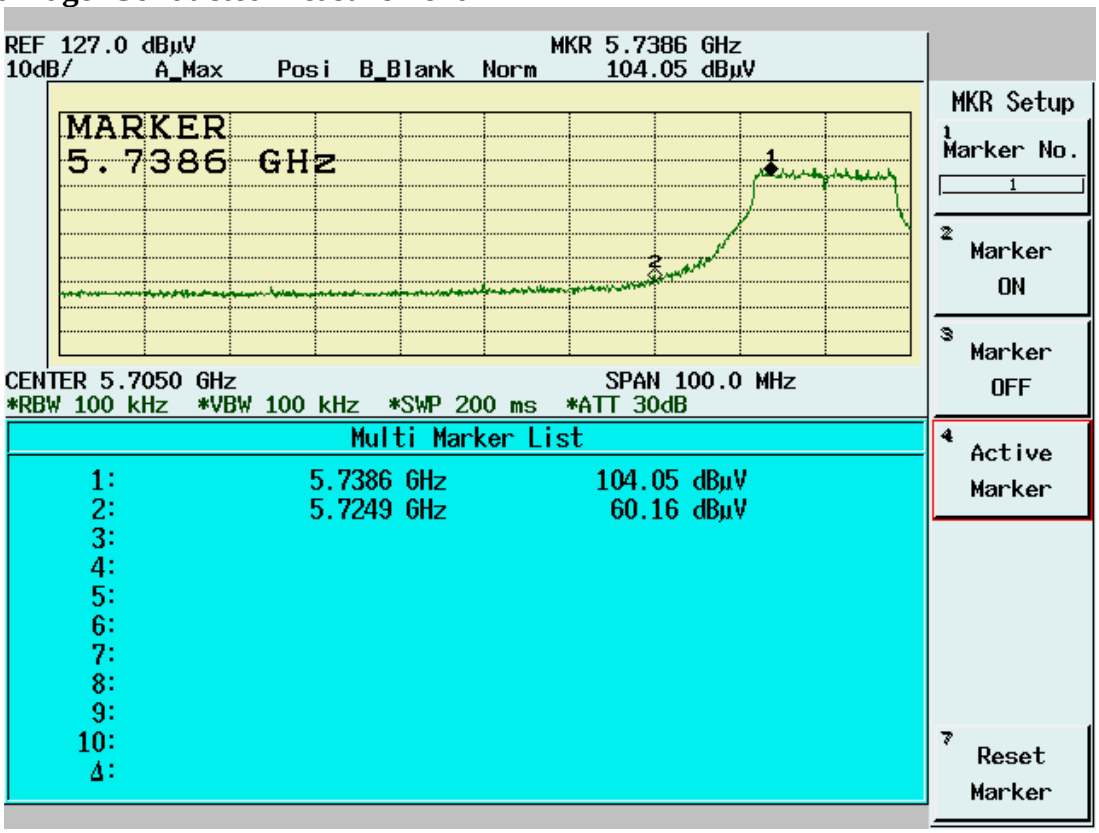
Test Engr: Jerry Chiou Humidity (%): 50

Conducted Mode

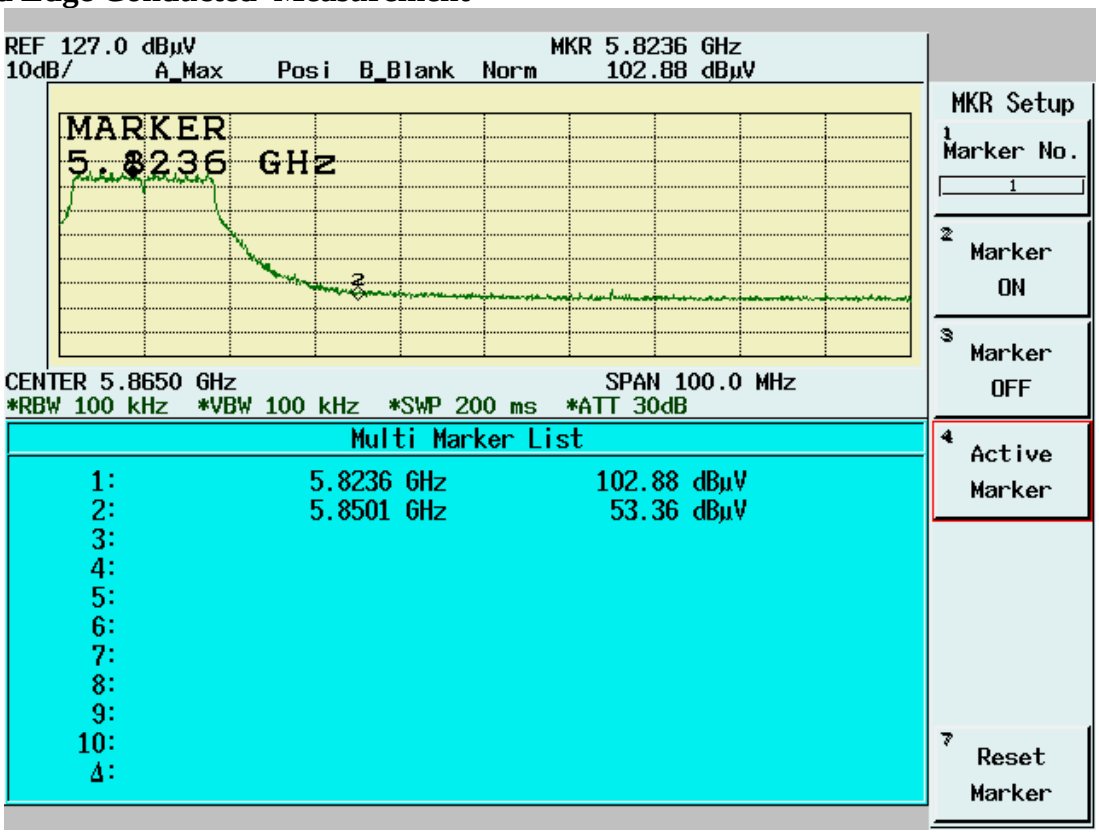
Channel	**Frequency (MHz)**	**Spectrum Reading (dBuV)**	**Carrier - Outsideband Limit: >30dB (dB)**	Pass/Fail
5745 MHz	5738.6	104.05	---	---
Outside band	5724.9	60.16	43.89	Pass
5825 MHz	5823.6	102.88	---	---
Outside band	5850.1	53.36	49.52	Pass
Radiated Mode				
Channel	**Frequency (MHz)**	**Spectrum Reading (dBuV)**	**Carrier - Outsideband Limit: >30dB (dB)**	**Pass/Fail**
5745 MHz	5737.4	52.17	---	---
Outside band	5725	11.6	40.57	Pass
5825 MHz	5826.2	50.78	---	---
Outside band	5850	11.05	39.73	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

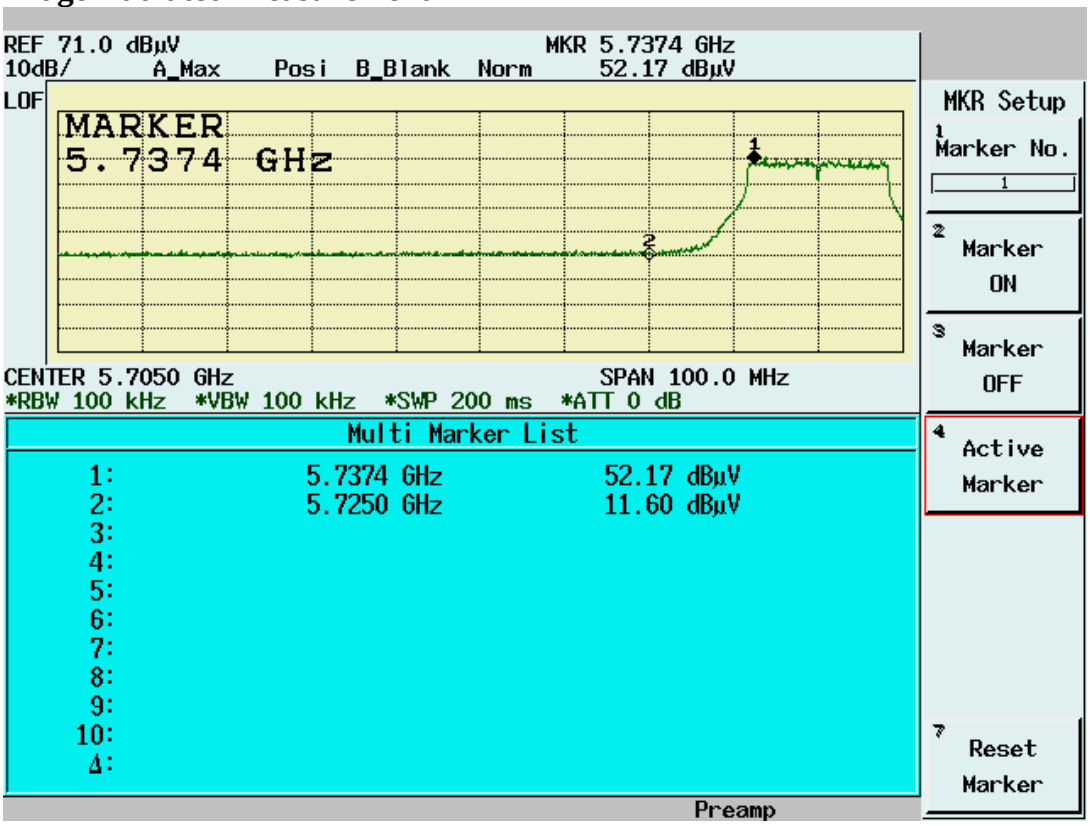
Band Edge Conducted measurement



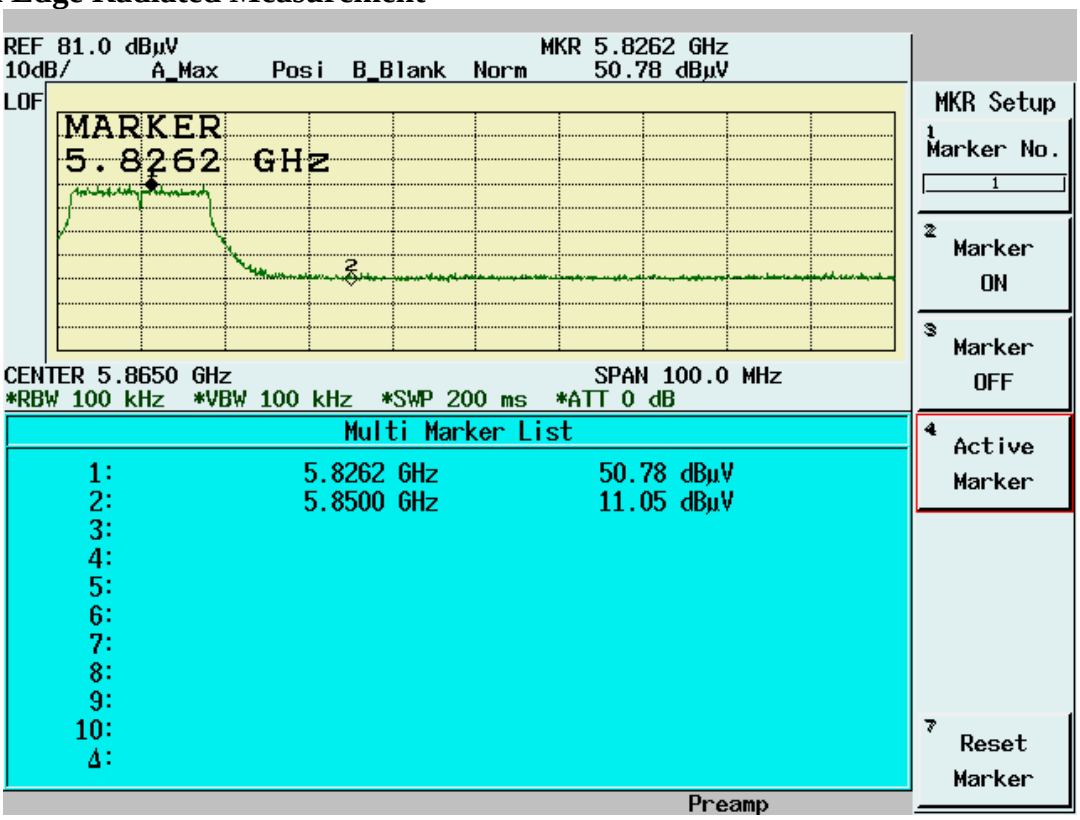
Band Edge Conducted Measurement



Band Edge Radiated Measurement



Band Edge Radiated Measurement



5.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

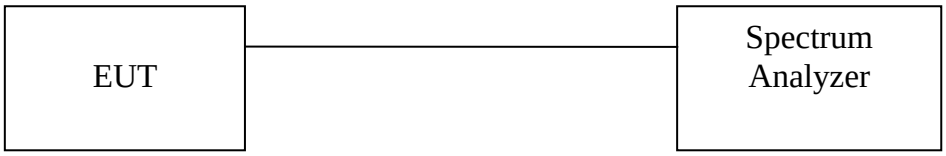
See MPE report

5.7 DSSS Peak Power Spectral Density [Section 15.247(d)]

5.7.1 Test Procedure

3. The Transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN:1.5MHz
   RBW: 3KHz
   VBW: 30KHz
   Center frequency: fundamental frequency tested.
   Sweep time= 500 sec.
4. Using Peak Search to read the peak power after Maximum Hold function is completed.

5.7.2 Test Setup



5.7.3 Test Data

Maximum Peak Output Power Density

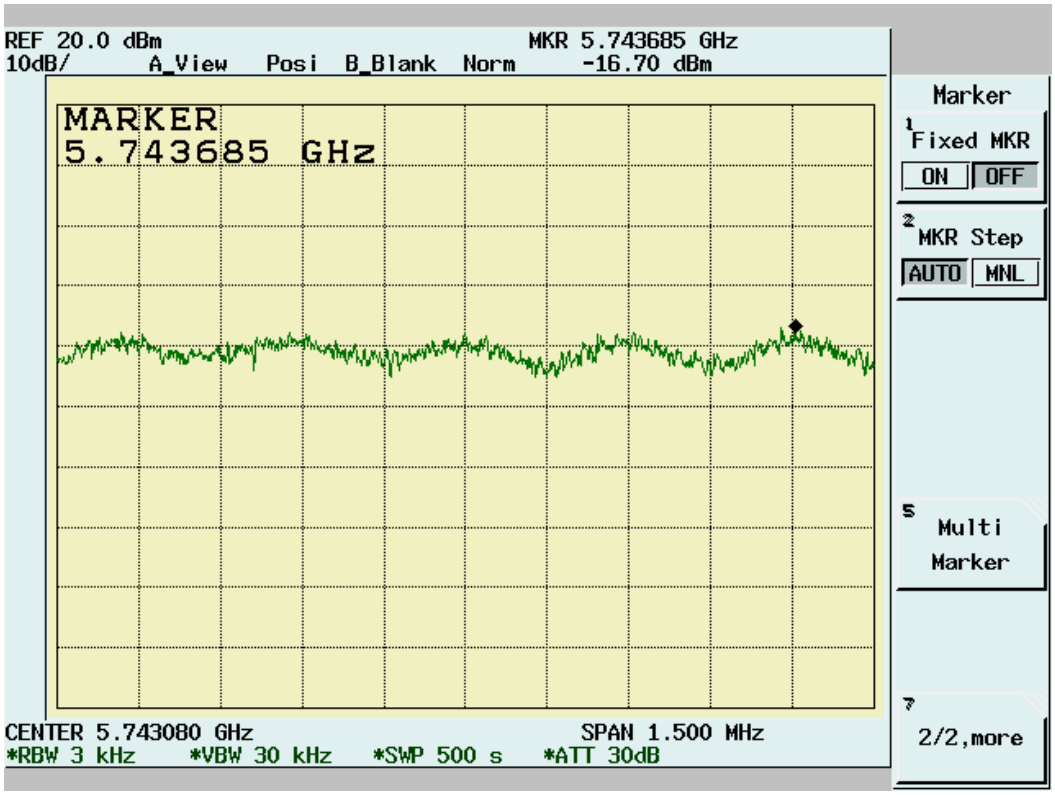
Temp. (° C): 25

Test Engr: Jerry Chiou Humidity (%): 50

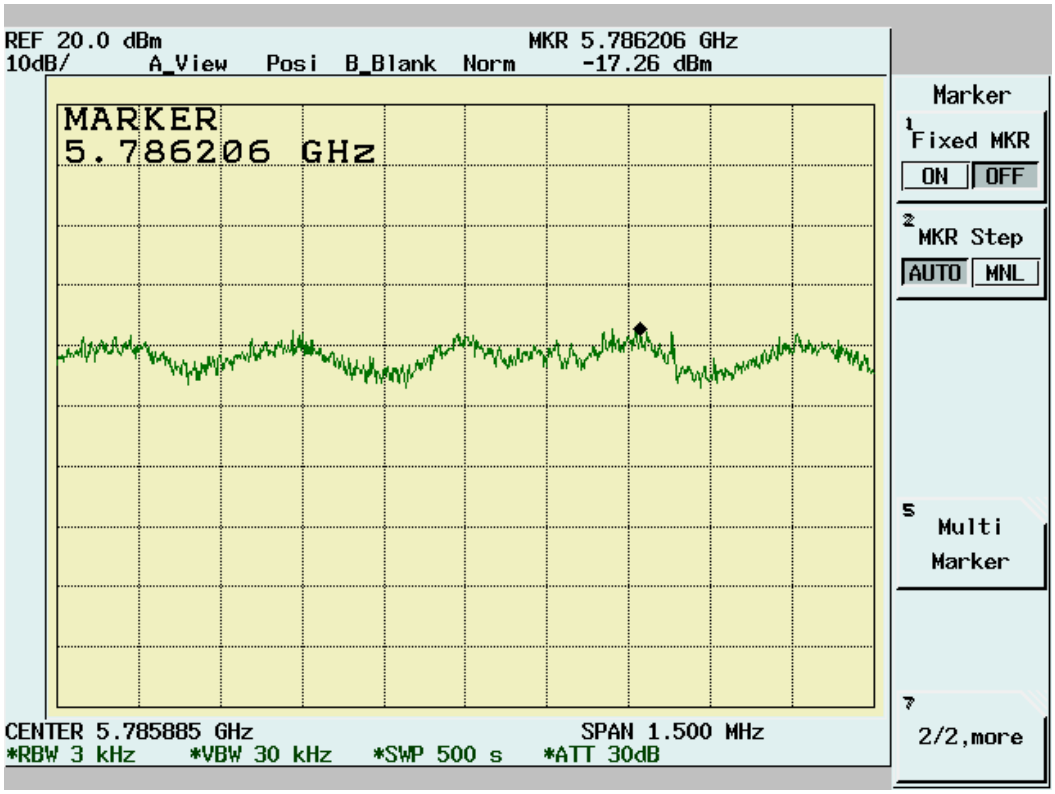
Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
5745	-16.7	1.3	-15.4	8	Pass
5785	-17.26	1.3	-15.96	8	Pass
5825	-17.3	1.3	-16	8	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

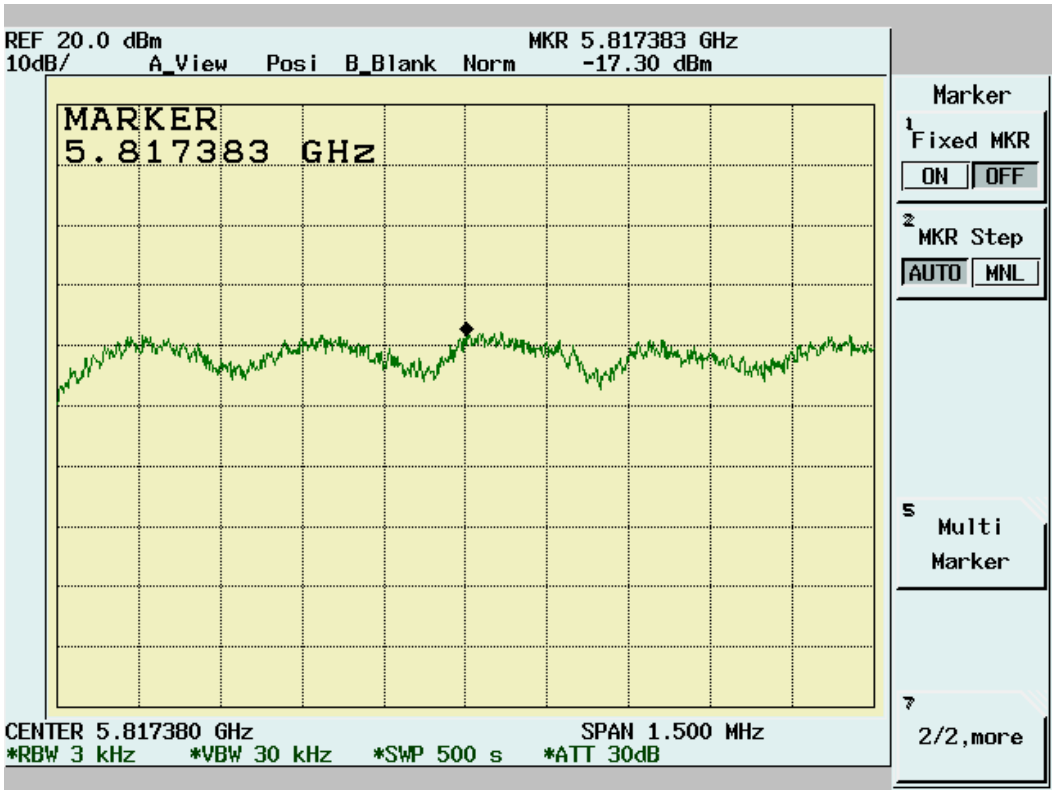
5745 MHz



5785 MHz



5825 MHz


REF 20.0 dBm
MKR 5.817383 GHz
10dB/ A_View Posi B_Blank Norm -17.30 dBm
MARKER
5.817383 GHz
Marker
1 Fixed MKR
ON OFF
2 MKR Step
AUTO MNL
5 Multi Marker
7 2/2,more
CENTER 5.817380 GHz
SPAN 1.500 MHz
*RBW 3 kHz *VBW 30 kHz *SWP 500 s *ATT 30dB

6. Appendix

6.1 Appendix A: Measurement Procedure for Power line Conducted Emissions

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the required standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum emission. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

6.2 Appendix B: Test Procedure for Radiated Emissions

Preliminary Measurements in the Anechoic Chamber

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

Measurements on the Open Site or 10m EMC Chamber

The radiated emissions test will then be repeated on the open site or 10m EMC chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of the 3 or 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum emission. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

6.3 Appendix C: Test Equipment

6.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	02/13/2008	02/13/2009
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	12/26/2007	12/26/2008
Conduction	EMI Receiver 07	Schwarzbeck Mess-Elektronik	FCKL 1528	1528-201	08/31/2007	08/30/2008
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	01/03/2008	01/03/2009
Conduction	LISN 06	R&S	ESH3-Z5	828874/009	12/14/2007	12/14/2008
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/13/2007	06/12/2008
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	02/13/2008	02/12/2009
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	12/26/2006	12/26/2008
Radiation	EMI Receiver 02	HP	85460A	3448A00183	12/29/2007	12/28/2008
Radiation	Spectrum Analyzer 13	Advantest	R3132	121200411	03/16/2007	03/15/2008
Radiation	Horn Antenna 02	Com-Power	AH-118	10088	01/14/2008	01/14/2009
Radiation	Horn Antenna 04	Com-Power	AH-826	081-001	03/13/2008	03/13/2009
Radiation	Horn Antenna 05	Com-Power	AH-640	100A	11/16/2007	11/15/2008
Radiation	Microwave Cable RF SK-01	HUBER+SUHNERAG.	Sucoflex 102	22139 /2	06/01/2007	06/01/2008
Radiation	Preamplifier 09	MITEQ	AFS44-00102650-40-10P-44	858687	04/02/2007	04/02/2008
Radiation	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	12/28/2007	12/28/2008
Radiation	High Pass Filter 01	HEWLETT-PACKARD	84300-80038	001	N/A	N/A
Radiation	High Pass Filter 02	HEWLETT-PACKARD	84300-80039	005	N/A	N/A
Radiation	Spectrum Analyzer 14	Advantest	R3182	140600028	12/06/2007	12/06/2008
Radiation	Spectrum Analyzer 19	R&S	FSP40	100116	09/12/2007	09/12/2008

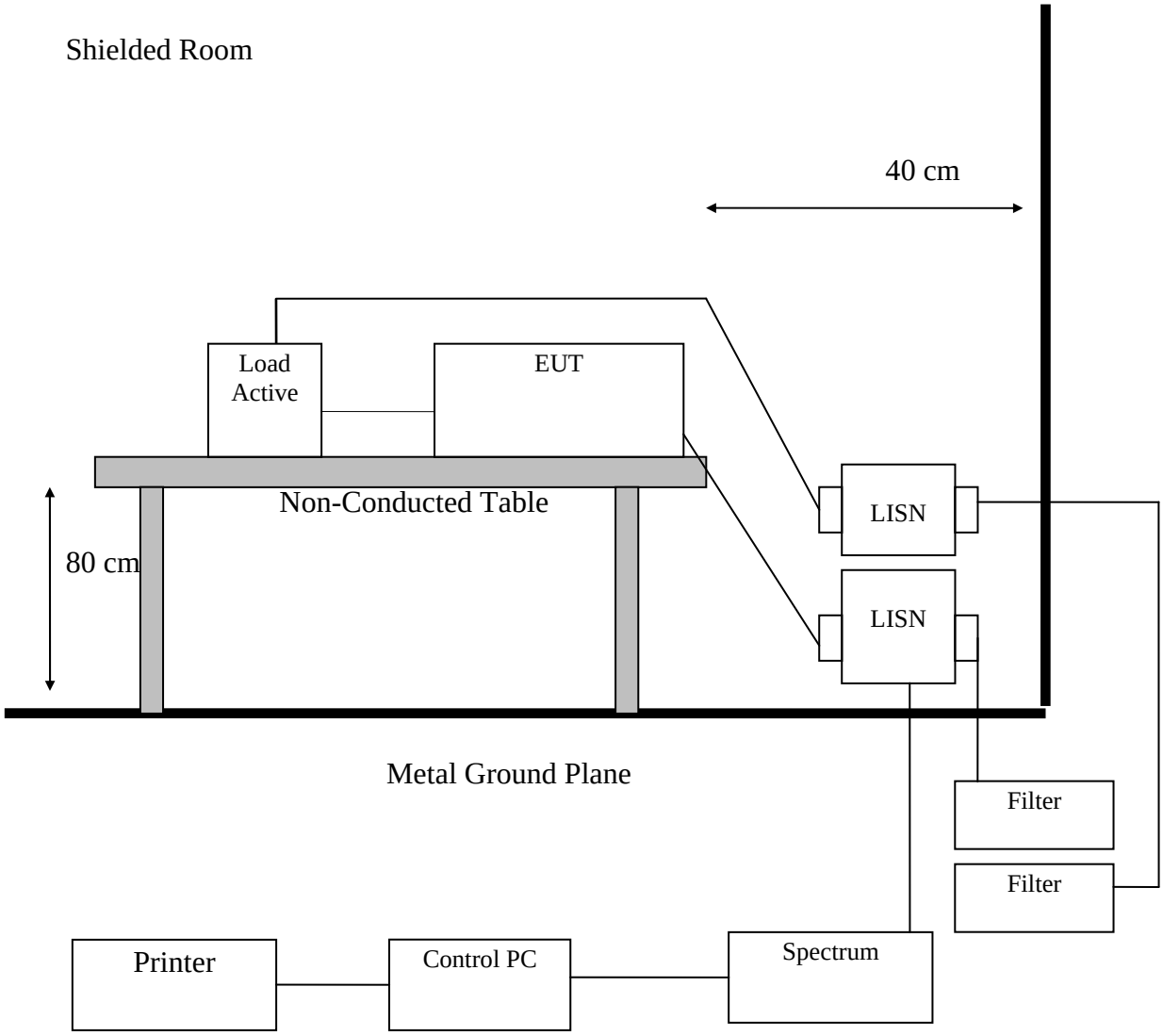
Note: Calibration is traceable to NIST or national or international standards.

6.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

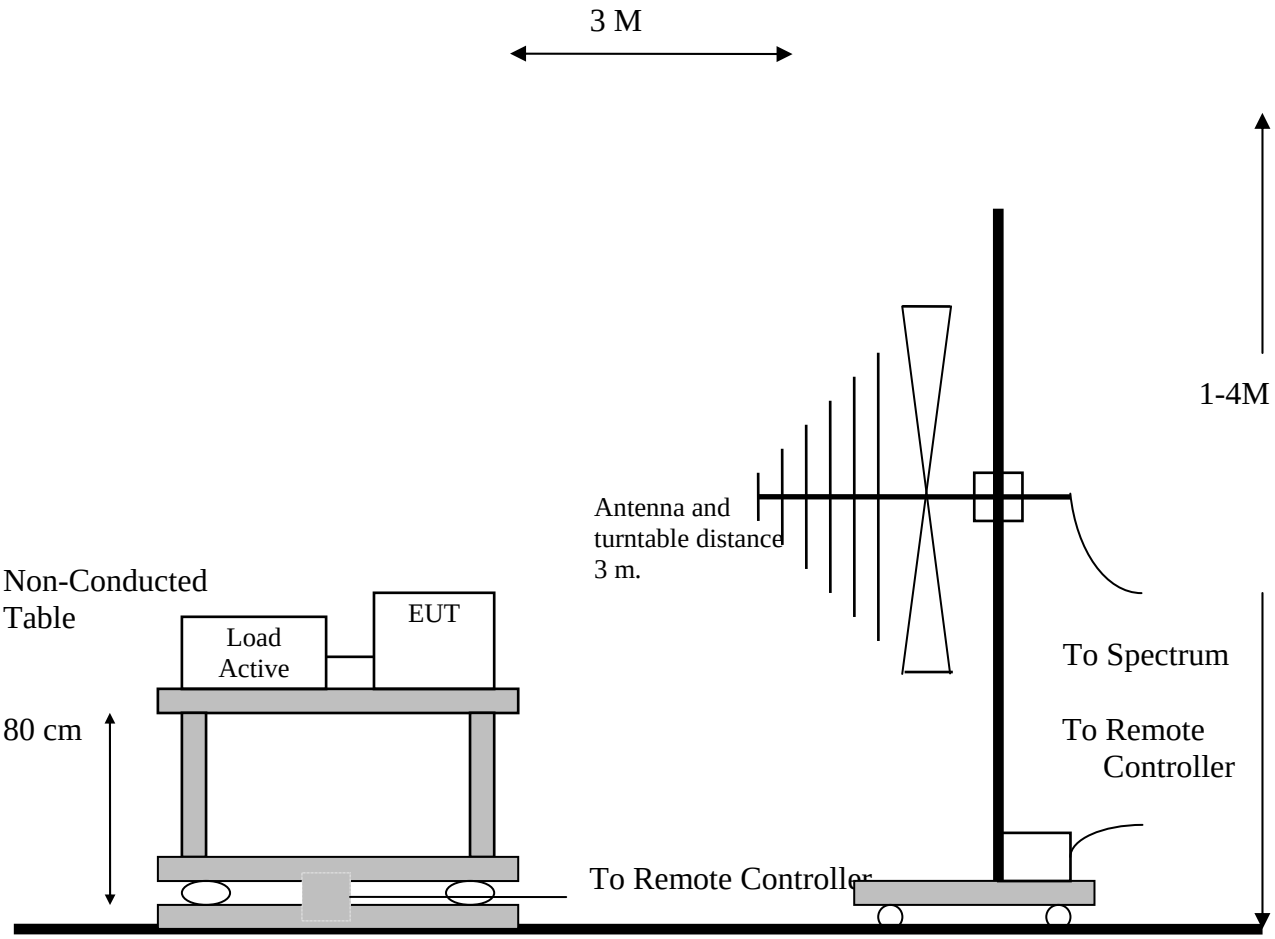
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

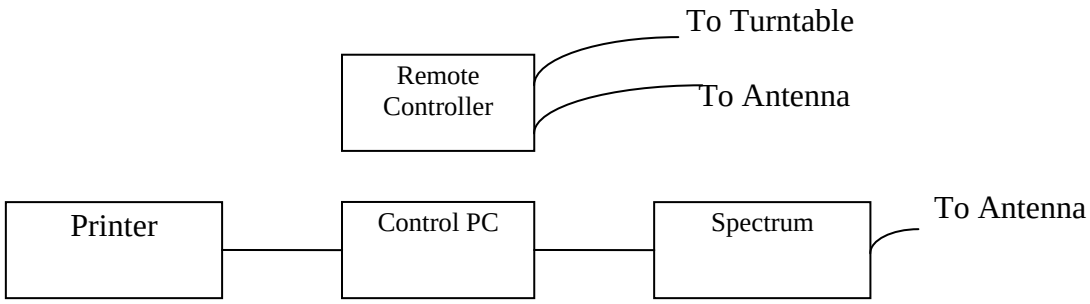
6.4 Appendix D: Layout of EUT and Support Equipment

6.4.1 General Conducted Test Configuration



6.4.2 General Radiation Test Configuration





6.5 Appendix E: Accuracy of Measurement

The measurement uncertainty refers to CISPR 16-4-2:2003. The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 02>: ±1.77dB

<Chamber 12 (3M)>
30MHz~1GHz: ±3.306 dB
1GHz~18GHz: ±2.62 dB
18GHz~26GHz: ±3.609 dB
26GHz~40GHz: ±2.702 dB

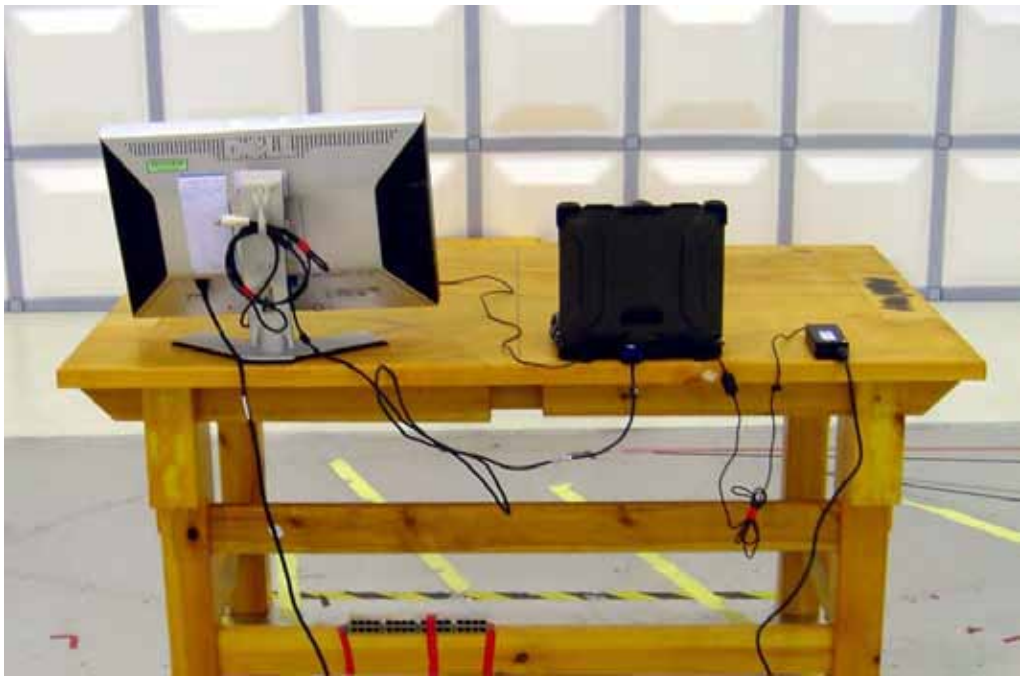
6.6 Appendix F: Photographs of EUT Configuration Test Set Up

The Front View of Highest Conducted Set-up For EUT

The Back View of Highest Conducted Set-up For EUT

The Front View of Highest Radiated Set-up For EUT

The Back View of Highest Radiated Set-up For EUT



6.7 Appendix G: Antenna Spec.

Please refer to the attached file.