TEST REPORT

of

FCC Part 15 Subpart B & C& E

<Part2: tested with WLAN 802.11a>

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-08LR001FCA**
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

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 802.11a functions of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart E			
Standard Section	Test Type	Result	Remarks
15.407 (a)(1)(2)(3)	Peak Transmit Power	Pass	
15.407 (a)(1)(2)(3)	Peak Power Spectral Density	Pass	
15.407 (a)(6)	Peak Power Excursion	Pass	
15.407 (b)(5)	AC Power Line Emissions	Pass	
15.407 (b)(5)	Radiated Emissions 30MHz – 40 GHz	Pass	
15.407(f)	Radiation exposure	Pass	MPE report attached
15.407 (g)	Frequency Stability	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)
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 (802.11a 5150MHz~5350MHz)

4.1 Maximum Peak Output Power [Section 15.407 (a)(1)(2)(3)]

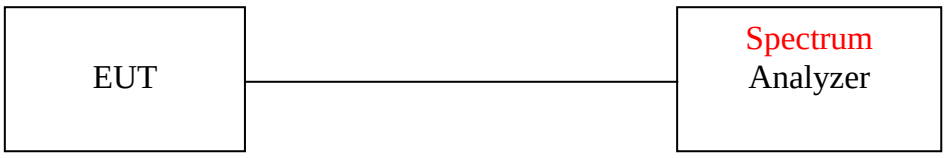
4.1.1 Test Procedure

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

The test is performed in accordance with FCC document "Measurement Procedure Updated for Peak Transmit Power in the U-NII Bands", August 30, 2002. The transmitter operates continuously therefore Power Output Method # 1 is used.

Equipment mode	Spectrum analyzer
Detector function	Channel Power
Channel BW	20MHz
RBW	1MHz
VBW	3MHz
SPAN	30MHz
Center frequency	fundamental frequency tested
Sweep time	auto
Average times	100

4.1.2 Test Setup



Frequency Band	Limit
5.15 – 5.25 GHz	The lesser of 50mW (17dBm) or 4dBm+10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm+10logB
5.725-5.825GHz	The lesser of 1W (30dBm) or 17dBm+10logB

NOTE: B is the 26dB emission bandwith in MHz

4.1.3 Test Data: (Normal Mode)

Maximum Peak Output Power

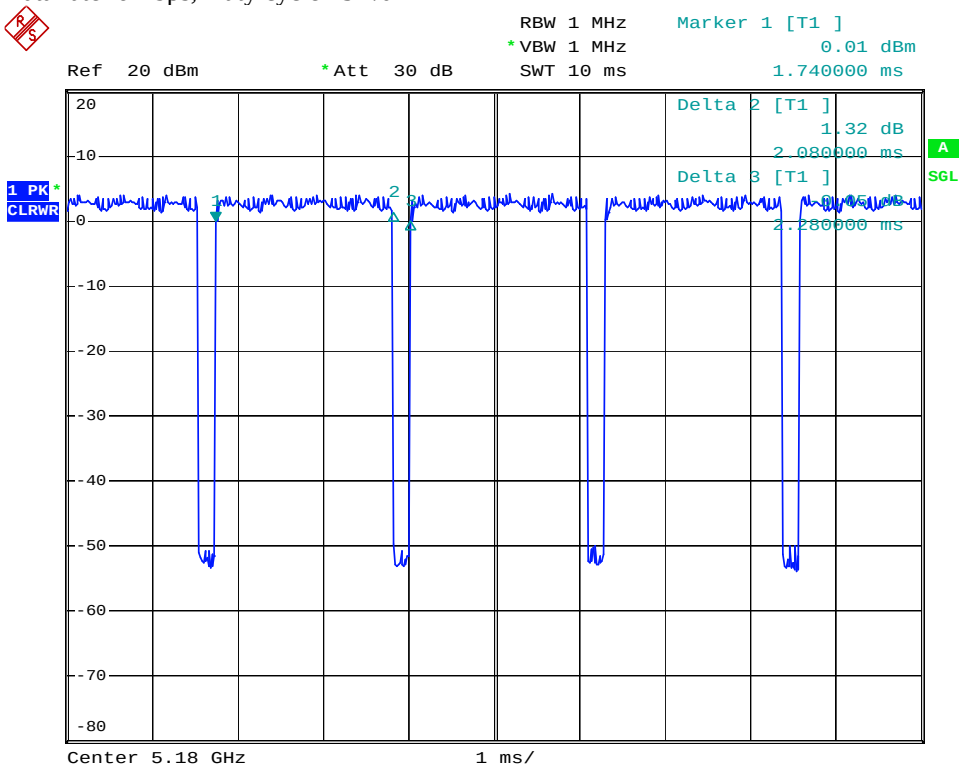
Temperature (° C): 25

Test Engineer: Jerry Chiou Humidity (%): 50

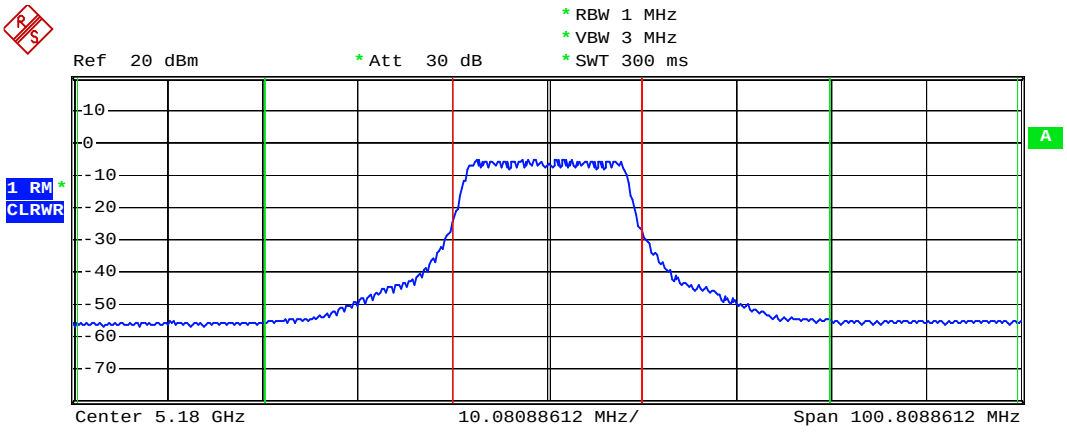
Chennel	Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (dBm)	26 dBc BW/Limit MHz/dBm	The lesser Limit (dBm)	Pass/Fail
1	5180	5.25	2.3	7.55	23.73/ 17.75	17.00	Pass
2	5200	5.29	2.3	7.59	23.73/ 17.75	17.00	Pass
4	5240	5.74	2.3	8.04	23.73/ 17.75	17.00	Pass
5	5260	9.1	2.3	11.4	23.73/ 24.75	24.00	Pass
6	5280	9.02	2.3	11.32	23.73/ 24.75	24.00	Pass
8	5320	9.48	2.3	11.78	23.73/ 24.75	24.00	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
5180	**7.55**	7.09	7.04	6.63	6.7	5.64	5.77	5.46
5200	**7.59**	7.24	7.05	7.14	6.72	5.82	5.75	5.5
5240	**8.04**	7.51	7.34	7.01	6.54	5.96	5.56	5.42
5260	**11.4**	11.36	11.25	10.91	10.49	9.92	9.49	9.2
5280	**11.32**	11.31	11.14	10.91	10.41	9.83	9.44	9.23
5320	**11.78**	11.6	11.52	11.1	10.73	10.22	9.77	9.63

Data rate=6Mbps, Duty cycle =91%

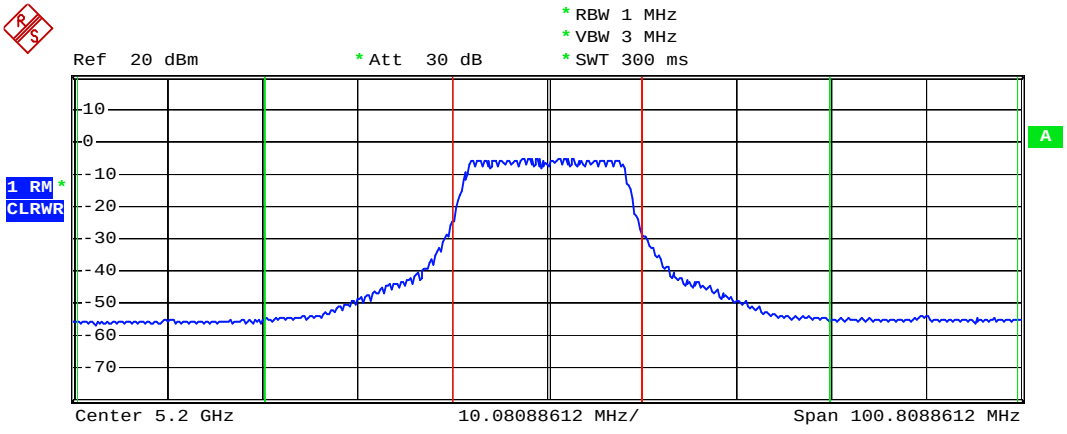


5180MHz



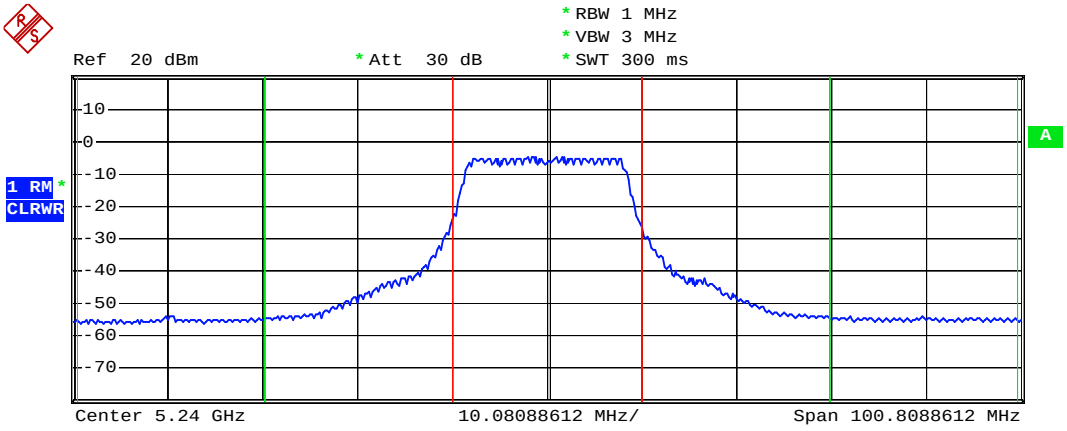
Tx Channel		**WLAN 802.11A**	
Bandwidth	20 MHz	Power	5.25 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-32.80 dB
Spacing	20 MHz	Upper	-33.45 dB
Alternate Channel			
Bandwidth	20 MHz	Lower	-48.90 dB
Spacing	40 MHz	Upper	-48.31 dB

5200MHz



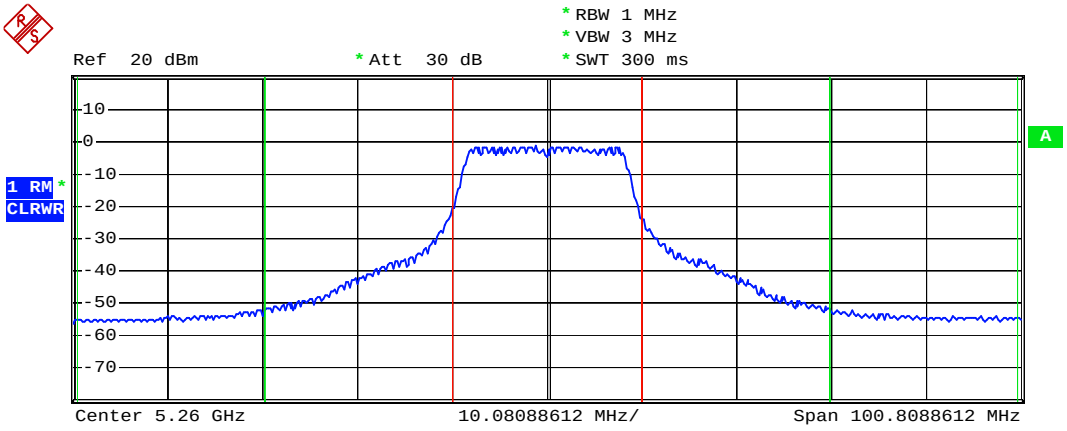
Tx Channel		**WLAN 802.11A**	
Bandwidth	20 MHz	Power	5.29 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-32.62 dB
Spacing	20 MHz	Upper	-33.46 dB
Alternate Channel			
Bandwidth	20 MHz	Lower	-48.81 dB
Spacing	40 MHz	Upper	-48.06 dB

5240MHz



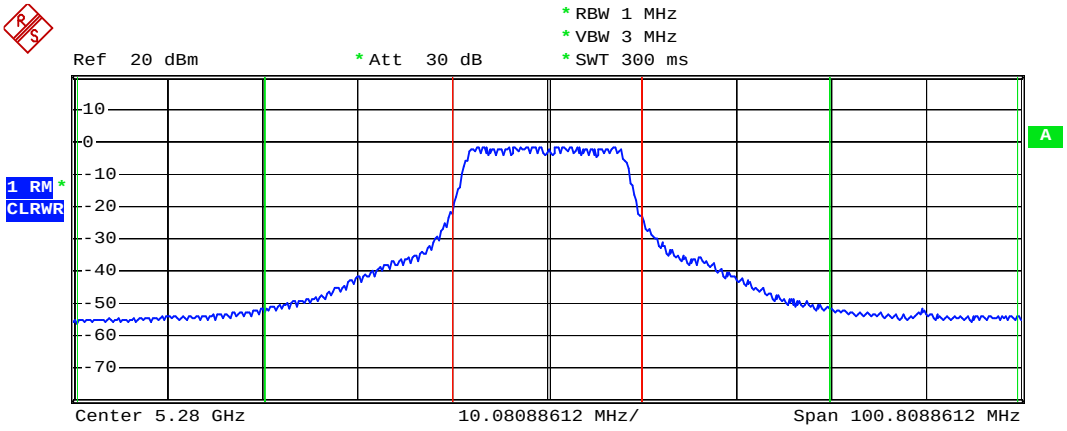
Tx Channel		**WLAN 802.11A**	
Bandwidth	20 MHz	Power	5.74 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-32.49 dB
Spacing	20 MHz	Upper	-33.03 dB
Alternate Channel			
Bandwidth	20 MHz	Lower	-48.76 dB
Spacing	40 MHz	Upper	-48.23 dB

5260MHz



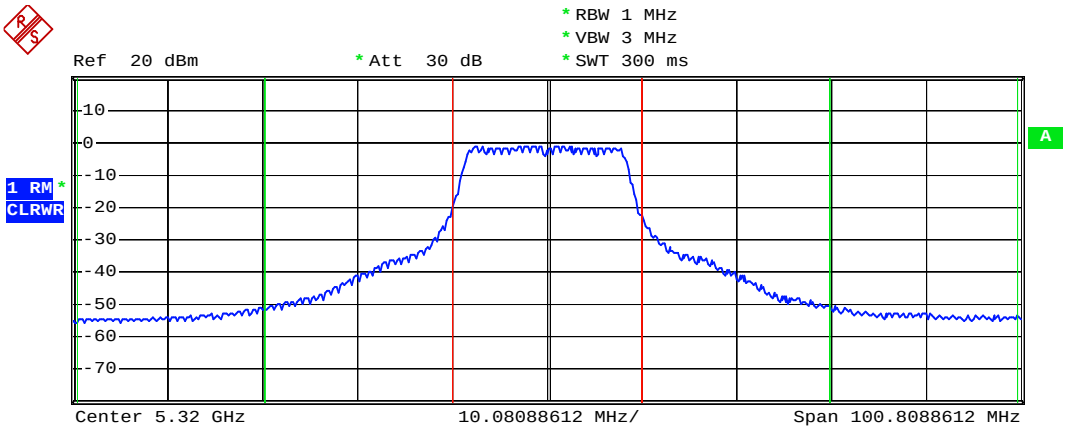
Tx Channel		**WLAN 802.11A**	
Bandwidth	20 MHz	Power	9.10 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-31.78 dB
Spacing	20 MHz	Upper	-32.11 dB
Alternate Channel			
Bandwidth	20 MHz	Lower	-51.30 dB
Spacing	40 MHz	Upper	-50.78 dB

5280MHz

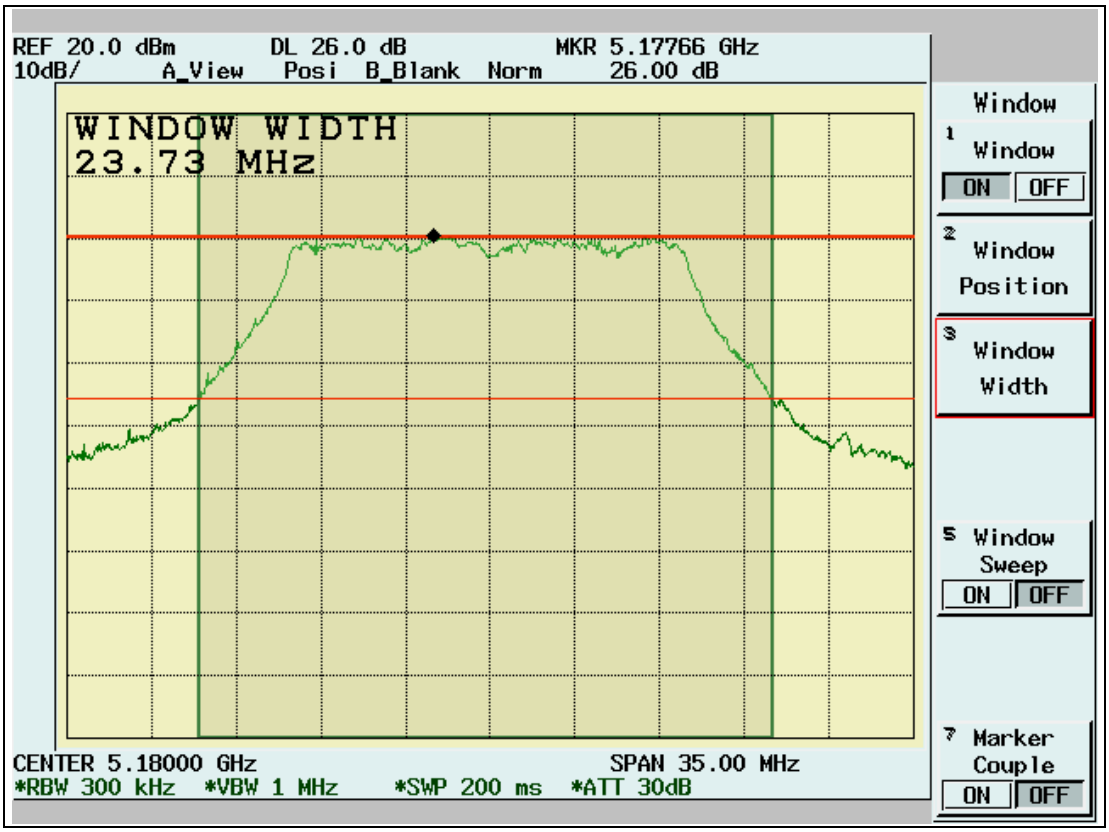


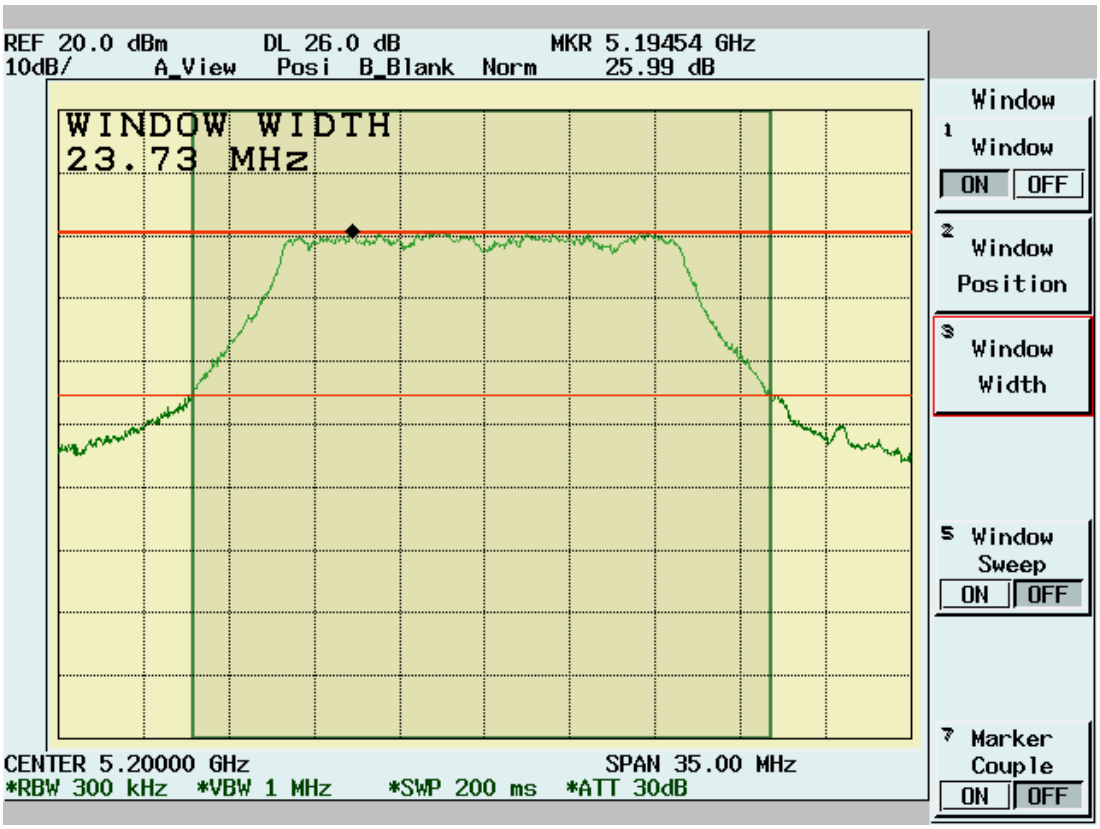
Tx Channel		**WLAN 802.11A**	
Bandwidth	20 MHz	Power	9.02 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-31.53 dB
Spacing	20 MHz	Upper	-32.19 dB
Alternate Channel			
Bandwidth	20 MHz	Lower	-50.94 dB
Spacing	40 MHz	Upper	-50.33 dB

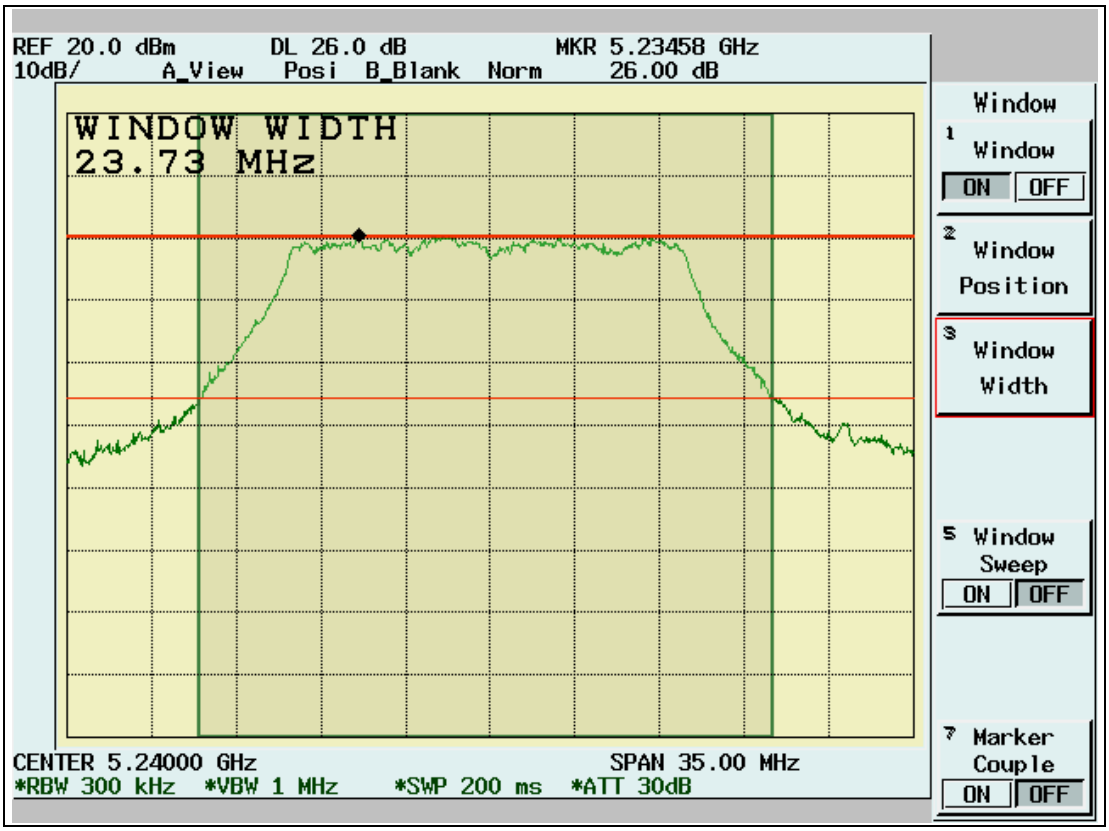
5320MHz

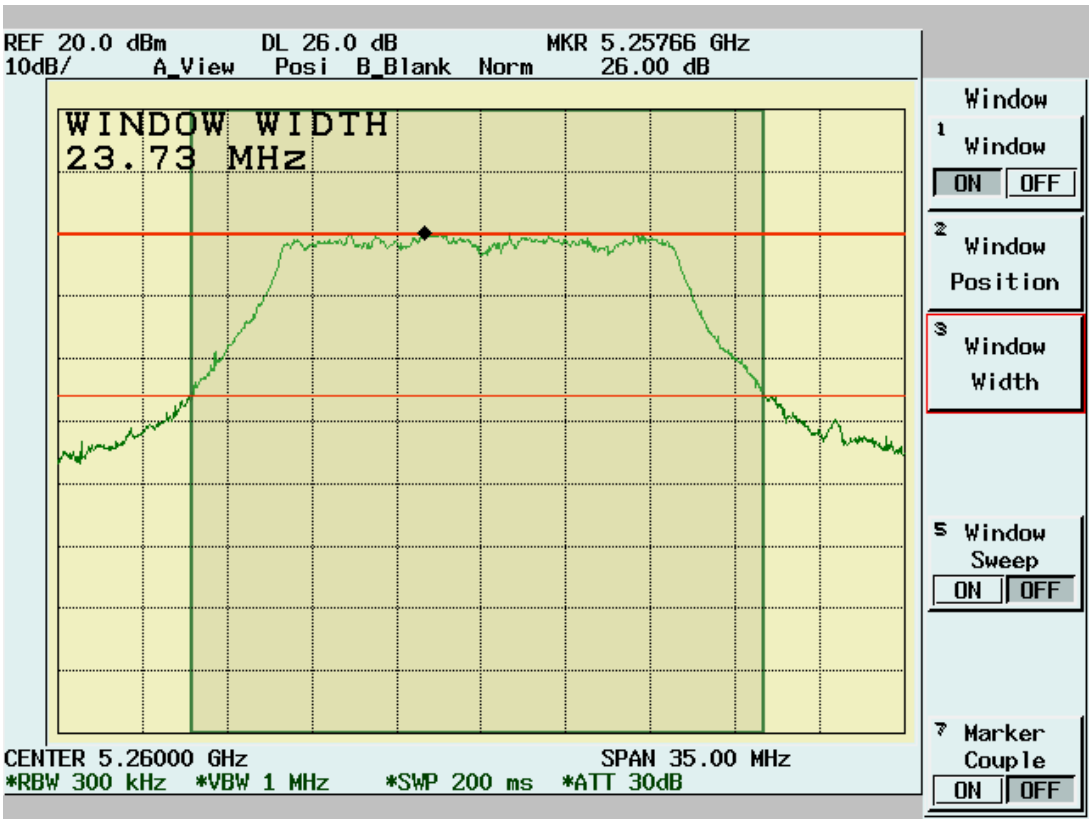


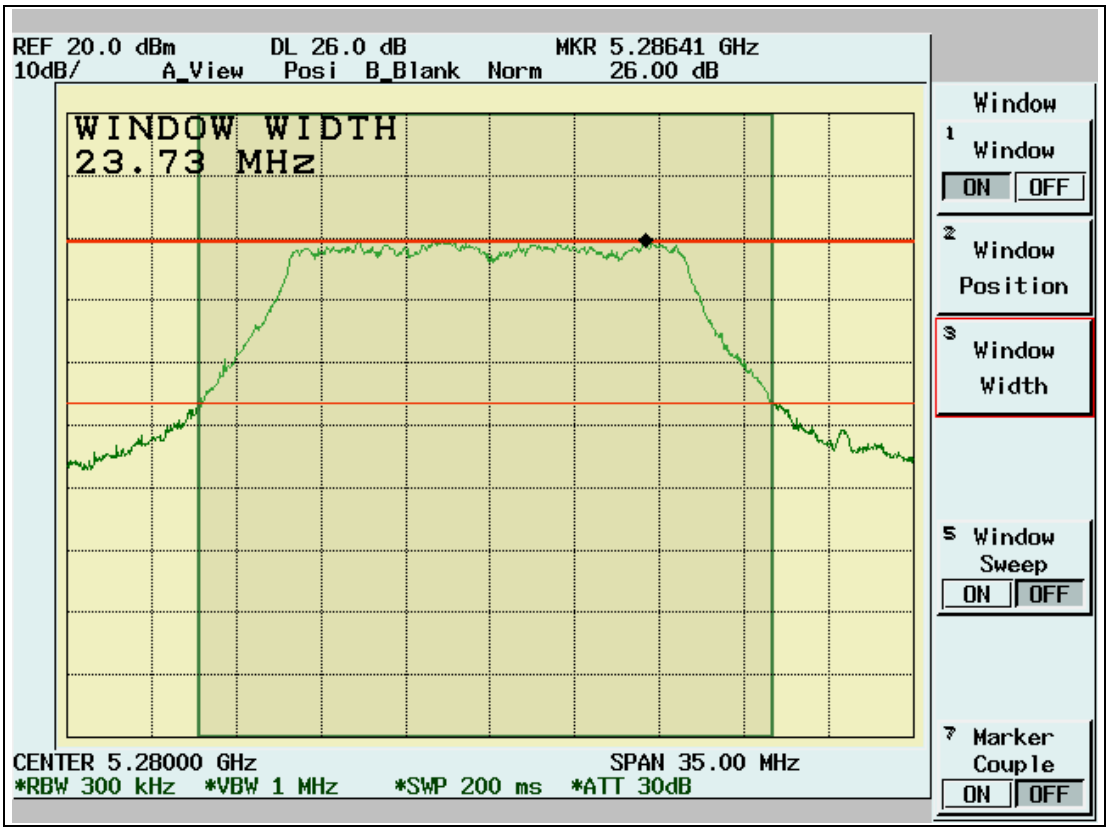
Tx Channel		**WLAN 802.11A**	
Bandwidth	20 MHz	Power	9.48 dBm
Adjacent Channel			
Bandwidth	20 MHz	Lower	-31.56 dB
Spacing	20 MHz	Upper	-31.86 dB
Alternate Channel			
Bandwidth	20 MHz	Lower	-51.00 dB
Spacing	40 MHz	Upper	-50.31 dB

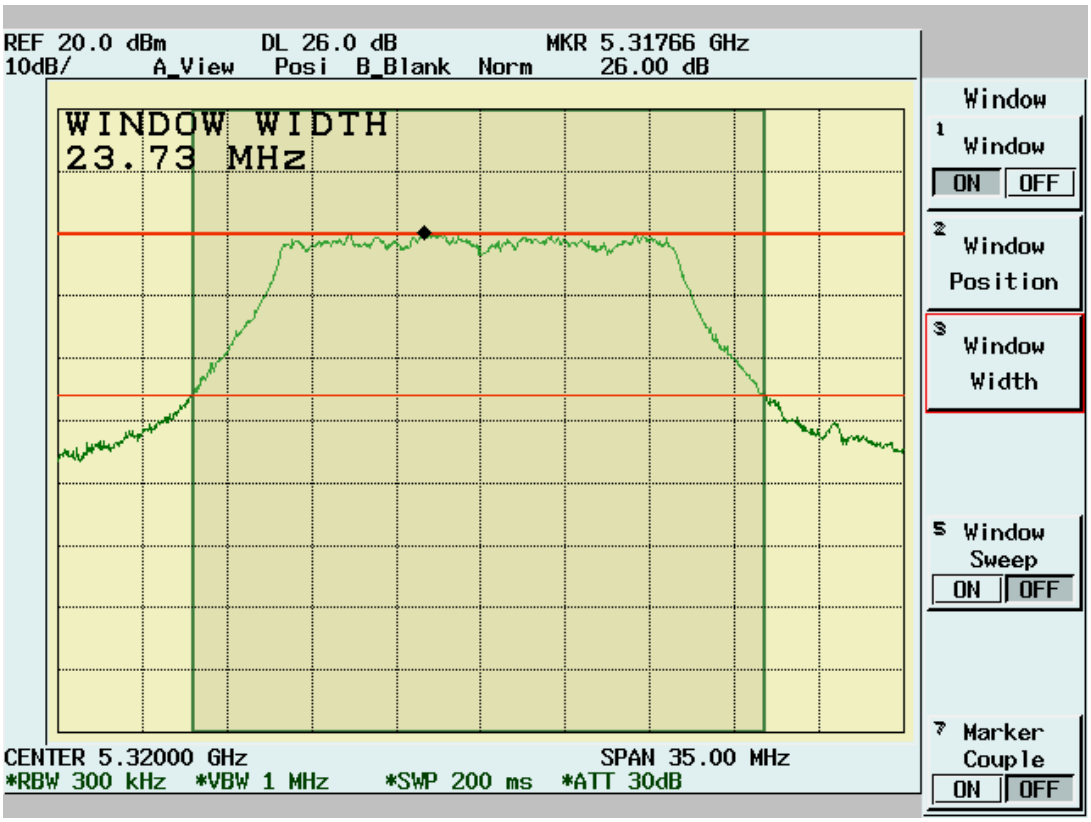

REF 20.0 dBm
DL 26.0 dB
MKR 5.17766 GHz
10dB/
A_View
Posi
B_Blank
Norm
26.00 dB
WINDOW WIDTH
23.73 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 5.18000 GHz
SPAN 35.00 MHz
*RBW 300 kHz
*VBW 1 MHz
*SWP 200 ms
*ATT 30dB


REF 20.0 dBm
DL 26.0 dB
MKR 5.19454 GHz
10dB/
A_View
Posi
B_Blank
Norm
25.99 dB
WINDOW WIDTH
23.73 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 5.20000 GHz
SPAN 35.00 MHz
*RBW 300 kHz
*VBW 1 MHz
*SWP 200 ms
*ATT 30dB


REF 20.0 dBm
DL 26.0 dB
MKR 5.23458 GHz
10dB/
A_View
Posi
B_Blank
Norm
26.00 dB
WINDOW WIDTH
23.73 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 5.24000 GHz
SPAN 35.00 MHz
*RBW 300 kHz
*VBW 1 MHz
*SWP 200 ms
*ATT 30dB


REF 20.0 dBm
DL 26.0 dB
MKR 5.25766 GHz
10dB/
A_View
Posi
B_Blank
Norm
26.00 dB
WINDOW WIDTH
23.73 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 5.26000 GHz
SPAN 35.00 MHz
*RBW 300 kHz
*VBW 1 MHz
*SWP 200 ms
*ATT 30dB


REF 20.0 dBm
DL 26.0 dB
MKR 5.28641 GHz
10dB/
A_View
Posi
B_Blank
Norm
26.00 dB
WINDOW WIDTH
23.73 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 5.28000 GHz
SPAN 35.00 MHz
*RBW 300 kHz
*VBW 1 MHz
*SWP 200 ms
*ATT 30dB

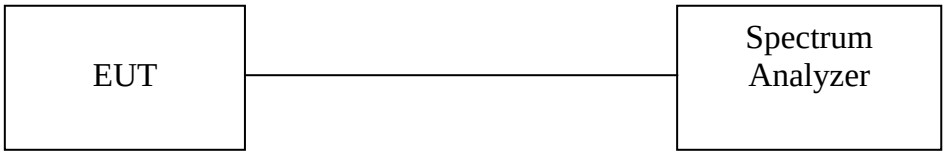

REF 20.0 dBm
DL 26.0 dB
MKR 5.31766 GHz
10dB/
A_View
Posi
B_Blank
Norm
26.00 dB
WINDOW WIDTH
23.73 MHz
Window
1 Window
ON OFF
2 Window Position
3 Window Width
5 Window Sweep
ON OFF
7 Marker Couple
ON OFF
CENTER 5.32000 GHz
SPAN 35.00 MHz
*RBW 300 kHz
*VBW 1 MHz
*SWP 200 ms
*ATT 30dB

4.2 Peak Power Spectral Density [Section 15.407(a)(1)(2)(3)]

4.2.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 30MHz or 50MHz
   RBW: 1MHz
   VBW: 3MHz
   Sweep time: 30 or 50 sec.
   Center frequency: fundamental frequency tested
2. Peak search was read to the peak power after maximum hold function is completed.

4.2.2 Test Setup



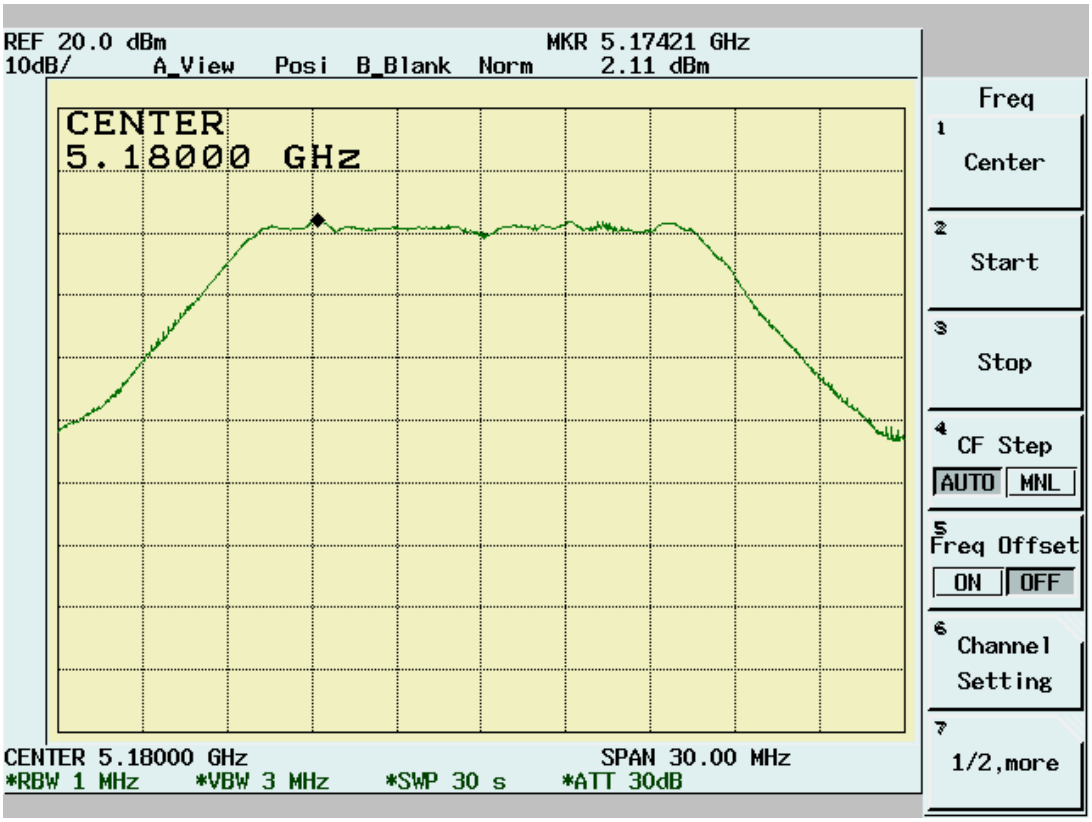
4.2.3 Test Data: (Normal Mode)

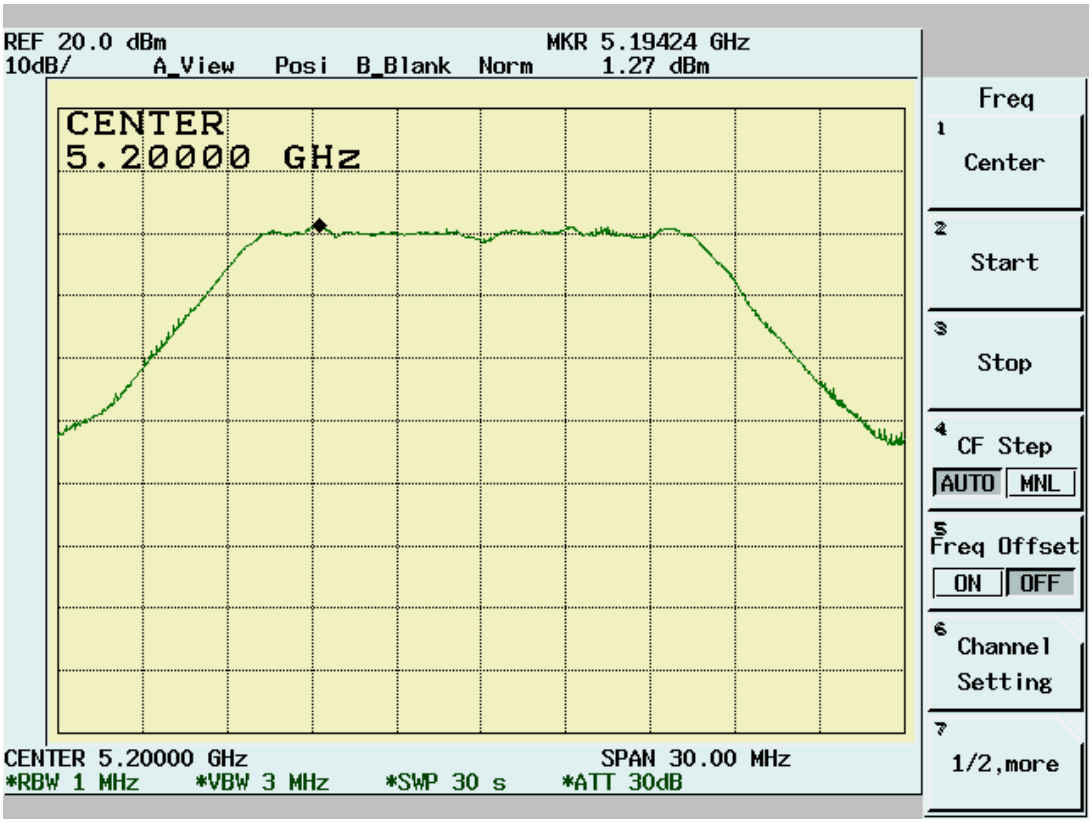
Maximum Peak Output Power Density

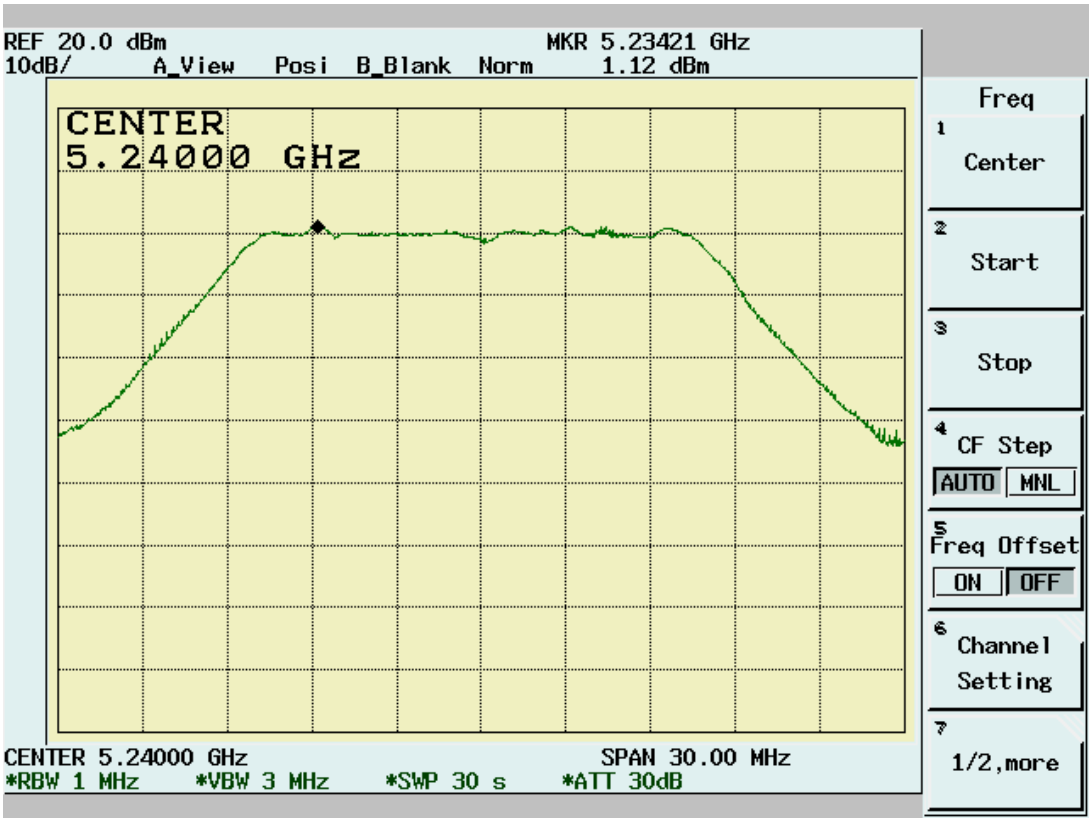
Temperature (° C): 25

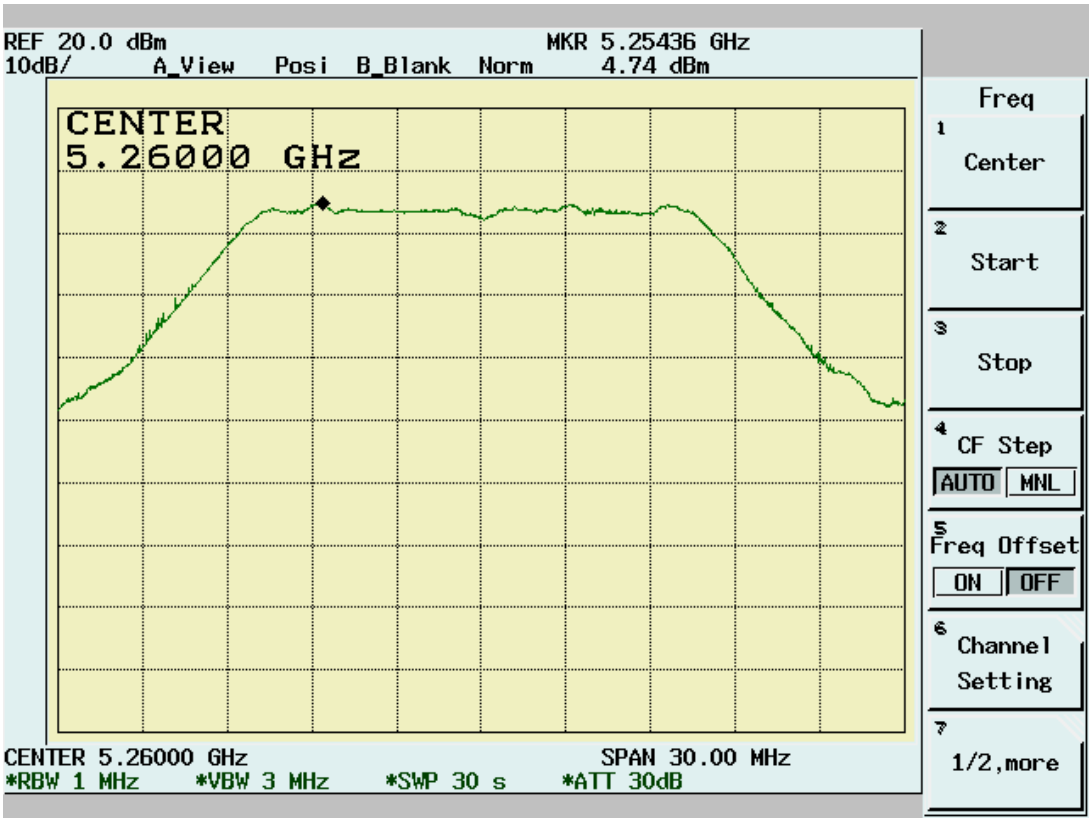
Test Engineer: Jerry Chiou Humidity (%): 50

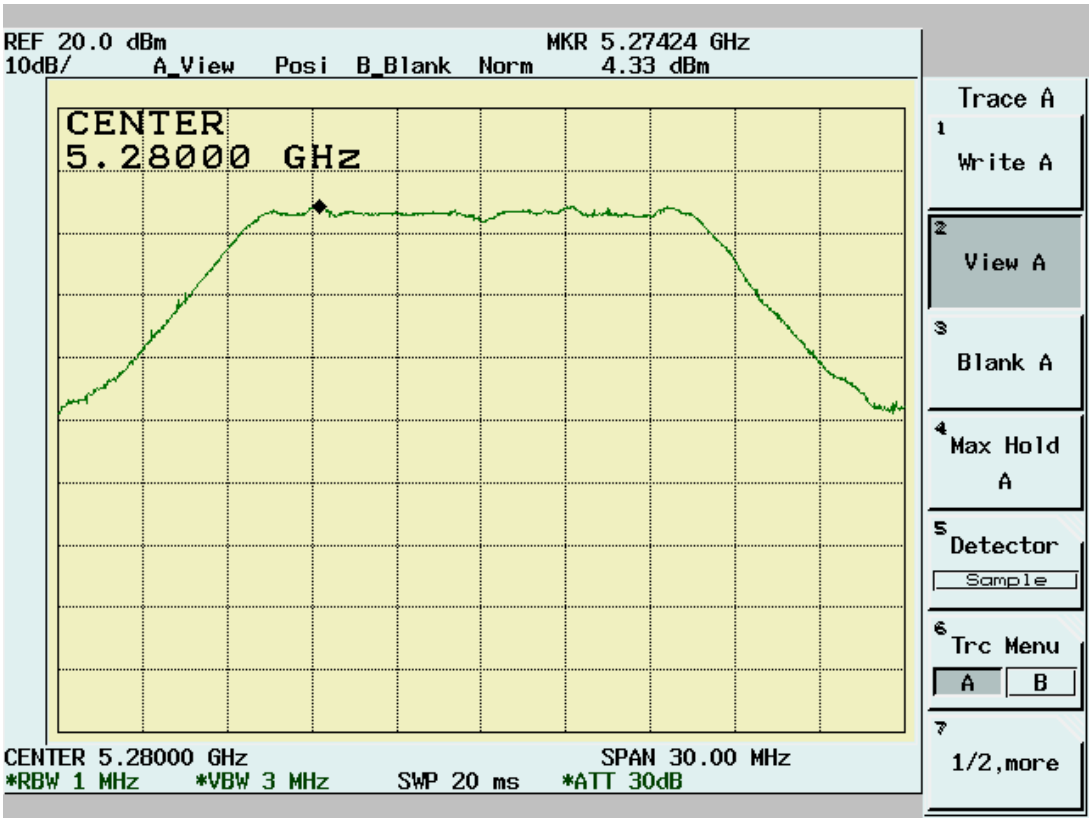
Channel	Frequency (MHz)	Spectrum Reading (dBm)	Cable Loss(dB)	Peak Power Output (dBm/MHz)	Limit (dBm/MHz)	Pass/Fail
1	5180	2.11	1.30	3.41	4.00	Pass
2	5200	1.27	1.30	2.57	4.00	Pass
4	5240	1.12	1.30	2.42	4.00	Pass
5	5260	4.74	1.30	6.04	11.00	Pass
6	5280	4.33	1.30	5.63	11.00	Pass
8	5320	4.38	1.30	5.68	11.00	Pass

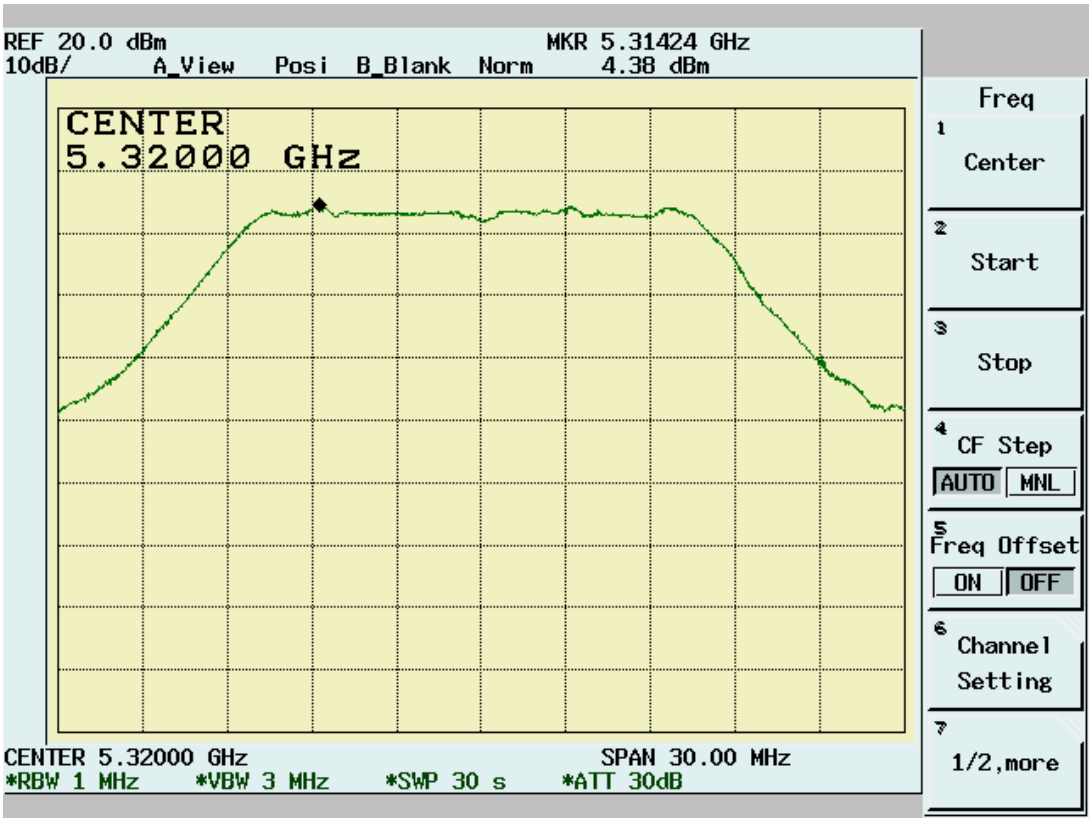

REF 20.0 dBm
MKR 5.17421 GHz
10dB/ A_View Posi B_Blank Norm 2.11 dBm
CENTER
5.18000 GHz
CENTER 5.18000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 3 MHz *SWP 30 s *ATT 30dB
Freq
1 Center
2 Start
3 Stop
4 CF Step
AUTO MNL
5 Freq Offset
ON OFF
6 Channel Setting
7 1/2,more


REF 20.0 dBm
MKR 5.19424 GHz
10dB/ A_View Posi B_Blank Norm 1.27 dBm
CENTER
5.20000 GHz
CENTER 5.20000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 3 MHz *SWP 30 s *ATT 30dB
Freq
1 Center
2 Start
3 Stop
4 CF Step
AUTO MNL
5 Freq Offset
ON OFF
6 Channel Setting
7 1/2,more


REF 20.0 dBm
MKR 5.23421 GHz
10dB/ A_View Posi B_Blank Norm 1.12 dBm
CENTER
5.24000 GHz
CENTER 5.24000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 3 MHz *SWP 30 s *ATT 30dB
Freq
1 Center
2 Start
3 Stop
4 CF Step
AUTO MNL
5 Freq Offset
ON OFF
6 Channel Setting
7 1/2,more


REF 20.0 dBm
MKR 5.25436 GHz
10dB/ A_View Posi B_Blank Norm 4.74 dBm
CENTER
5.26000 GHz
CENTER 5.26000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 3 MHz *SWP 30 s *ATT 30dB
Freq
1 Center
2 Start
3 Stop
4 CF Step
AUTO MNL
5 Freq Offset
ON OFF
6 Channel Setting
7 1/2,more


REF 20.0 dBm
MKR 5.27424 GHz
10dB/ A_View Posi B_Blank Norm 4.33 dBm
CENTER
5.28000 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Sample
6 Trc Menu
A B
7 1/2,more
CENTER 5.28000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 3 MHz SWP 20 ms *ATT 30dB

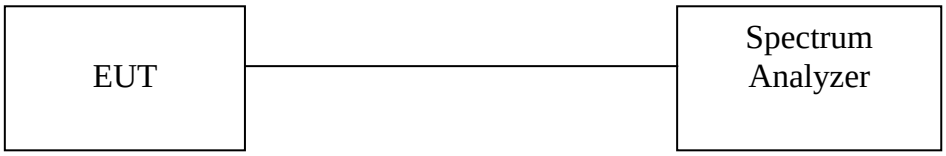

REF 20.0 dBm
MKR 5.31424 GHz
10dB/ A_View Posi B_Blank Norm 4.38 dBm
CENTER
5.32000 GHz
Freq
1 Center
2 Start
3 Stop
4 CF Step
AUTO MNL
5 Freq Offset
ON OFF
6 Channel Setting
7 1/2,more
CENTER 5.32000 GHz
SPAN 30.00 MHz
*RBW 1 MHz *VBW 3 MHz *SWP 30 s *ATT 30dB

4.3 Peak Power Excursion Measurement [Section 15.407(a)(6)]

4.3.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
2. Frequency SPAN of Spectrum: 30MHz or 50MHz.
3. Trace 1 : RBW: 1MHz, VBW: 3MHz. Using positive detector and Max -hold
4. Trace 2 : RBW: 1MHz, VBW: 3MHz. Using Power average mode 100 times
5. Record the largest difference between Trace 1 and Trace 2.

4.3.2 Test Setup



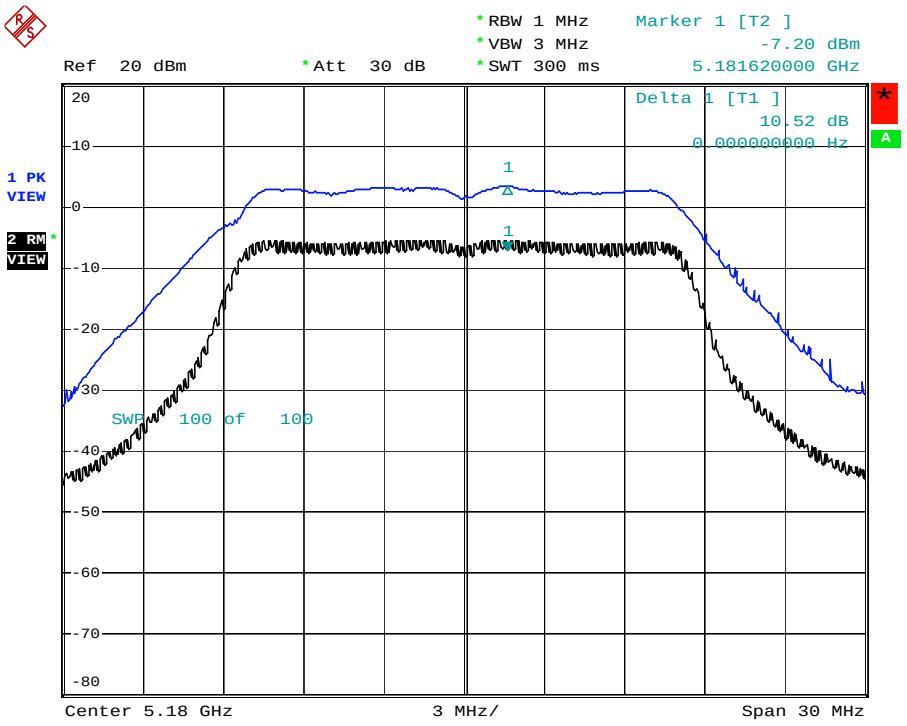
4.3.3 Test Data: (Normal Mode)

Peak Power Excursion

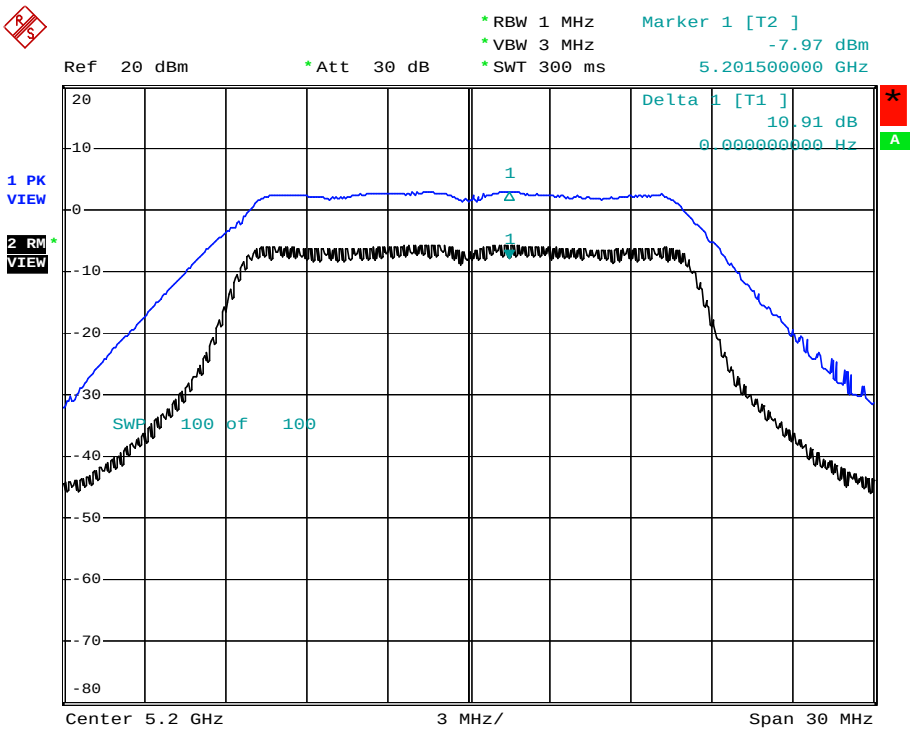
Temperature (° C): 25

Test Engineer: Jerry Chiou Humidity (%): 50

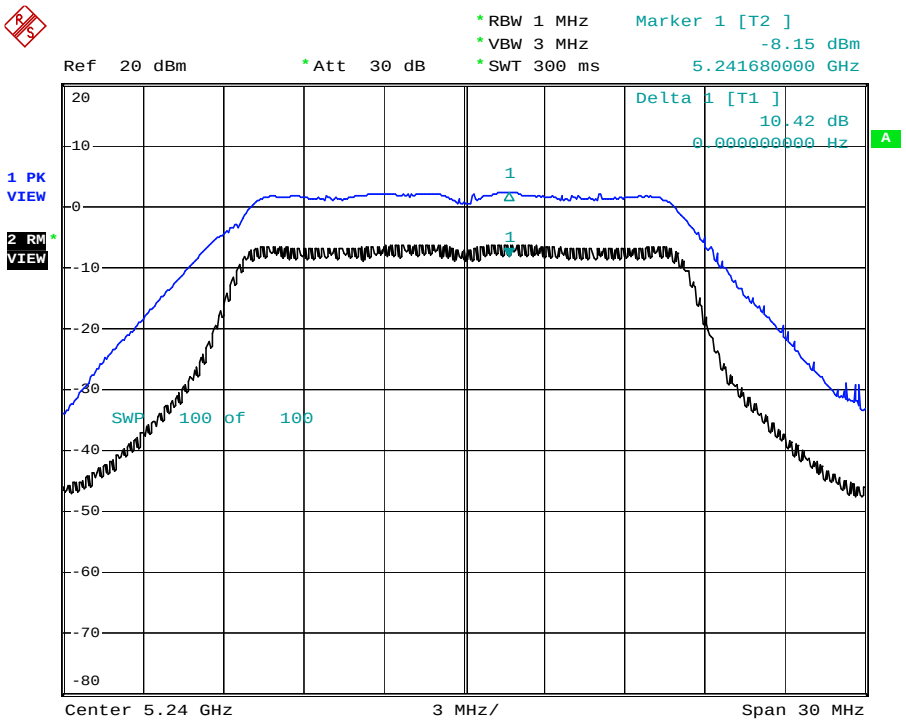
Channel	Frequency (MHz)	Peak Power Excursion (dBm)	Limit (dBm)	Pass/Fail
1	5180	10.52	13	Pass
2	5200	10.91	13	Pass
4	5240	10.42	13	Pass
5	5260	10.41	13	Pass
6	5280	10.56	13	Pass
8	5320	10.49	13	Pass



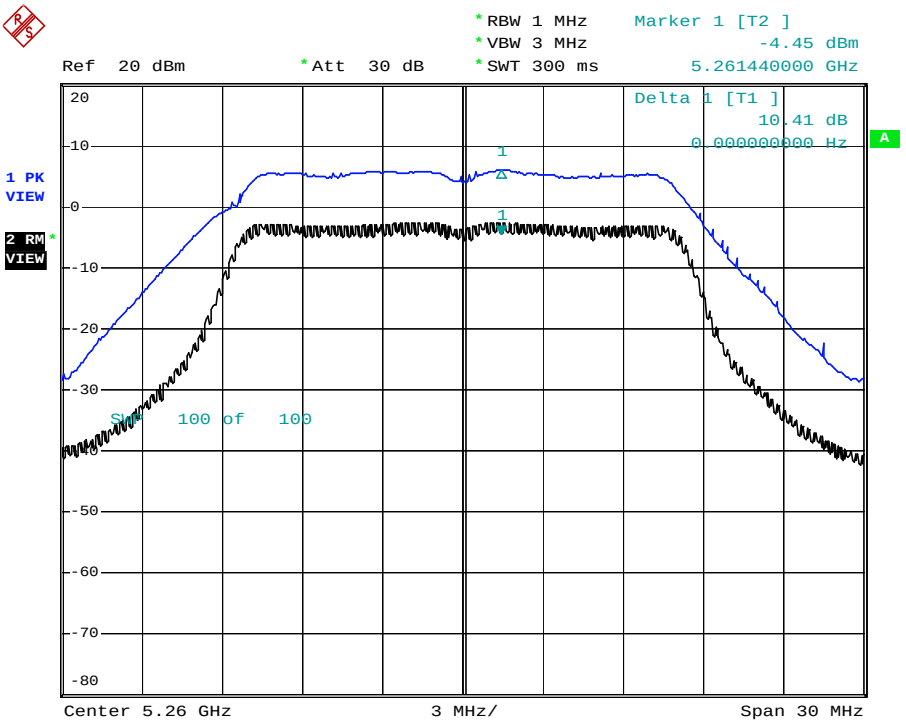
Date: 17.MAR.2008 19:19:14



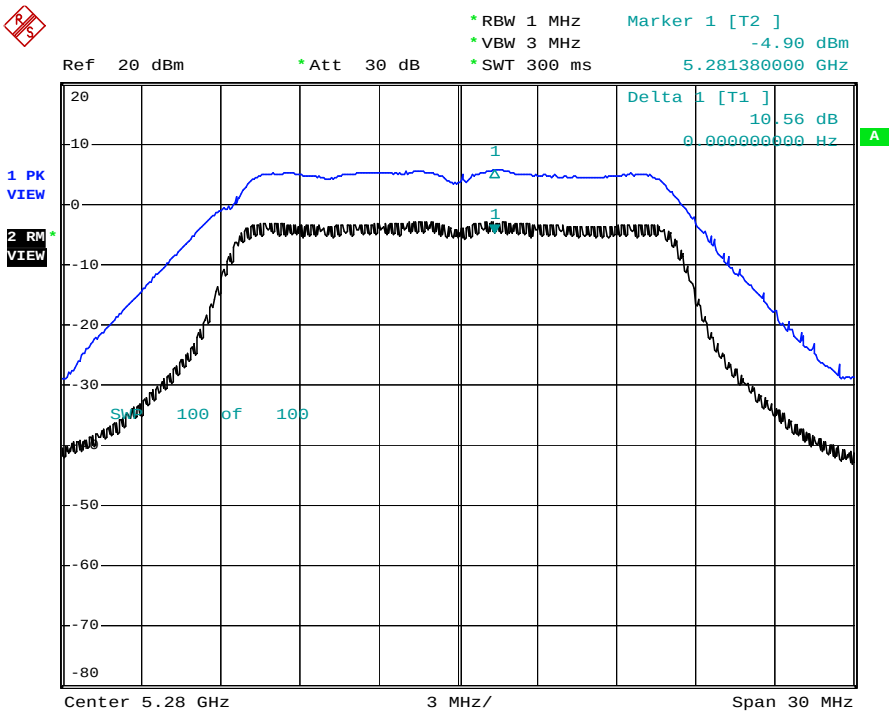
Date: 17.MAR.2008 18:00:39



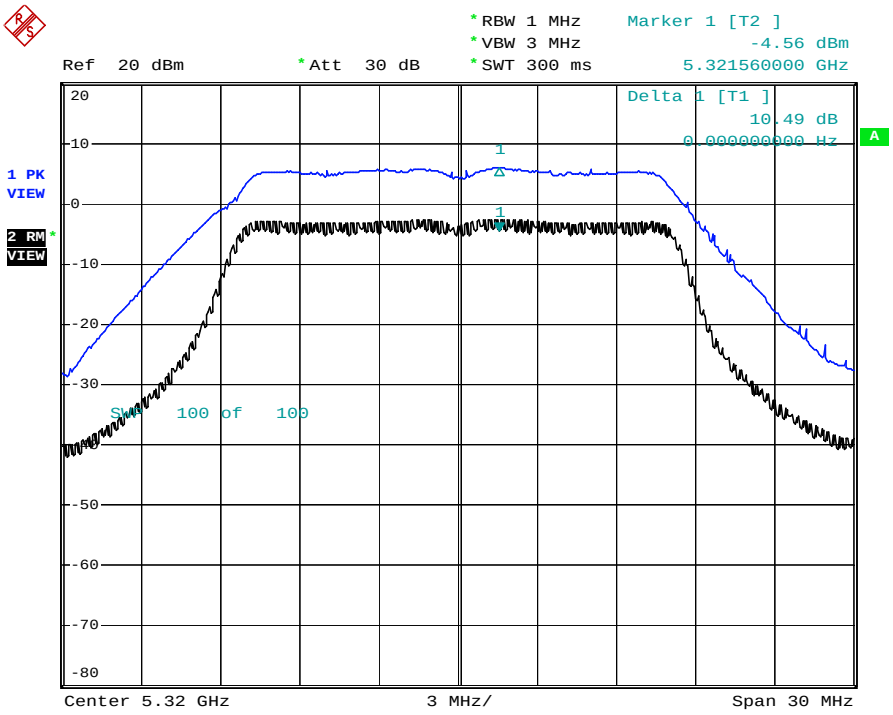
Date: 17.MAR.2008 18:04:52



Date: 17.MAR.2008 18:07:25



Date: 17.MAR.2008 18:35:03



Date: 17.MAR.2008 19:07:40

4.4 Powerline Conducted Emissions [Section 15.207 & 15.407 (b)(5)]

4.4.1 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.

4.4.2 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.

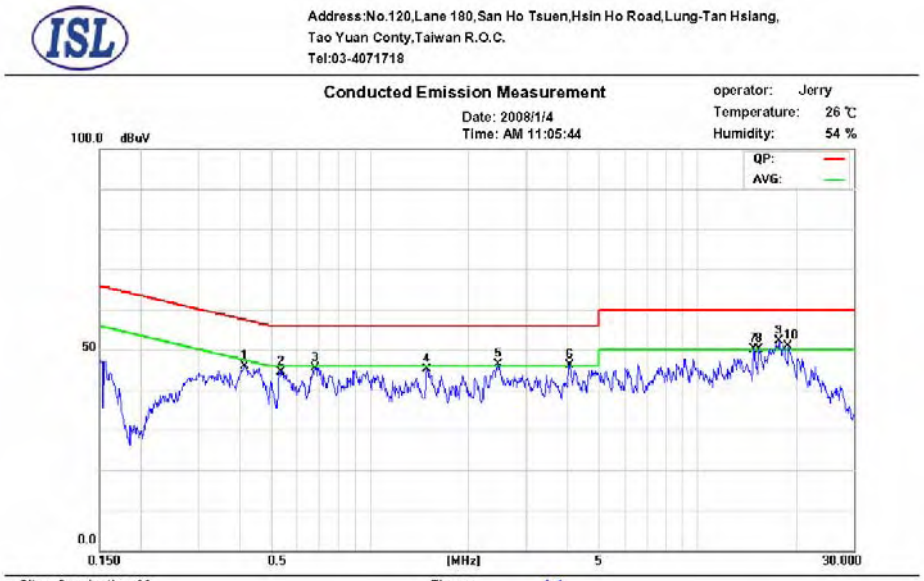
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

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

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

4.4.4 Test Data:

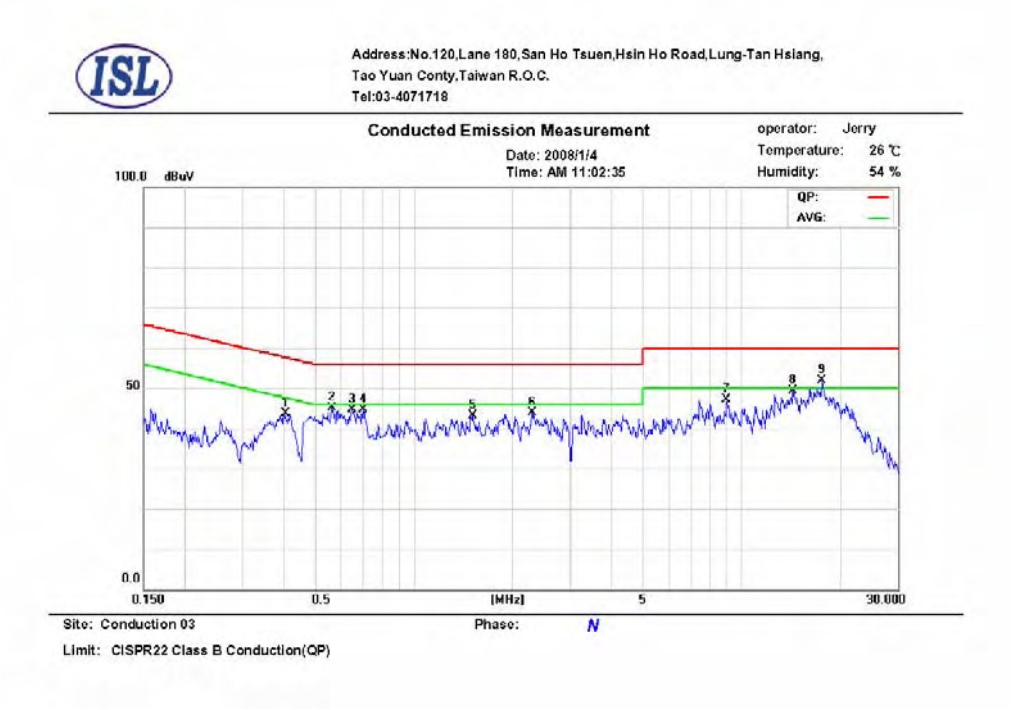
Power Line Conducted Emissions (Hot)



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 between Main antenna, Aux antenna ,lowest, middle, and highest Channel 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

4.5 Radiated Emission Measurement [Section 15.209 & 15.407(b)(5)]

4.5.1 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.

4.5.2 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 – 40GHz: 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 according to para. 6.5.3.

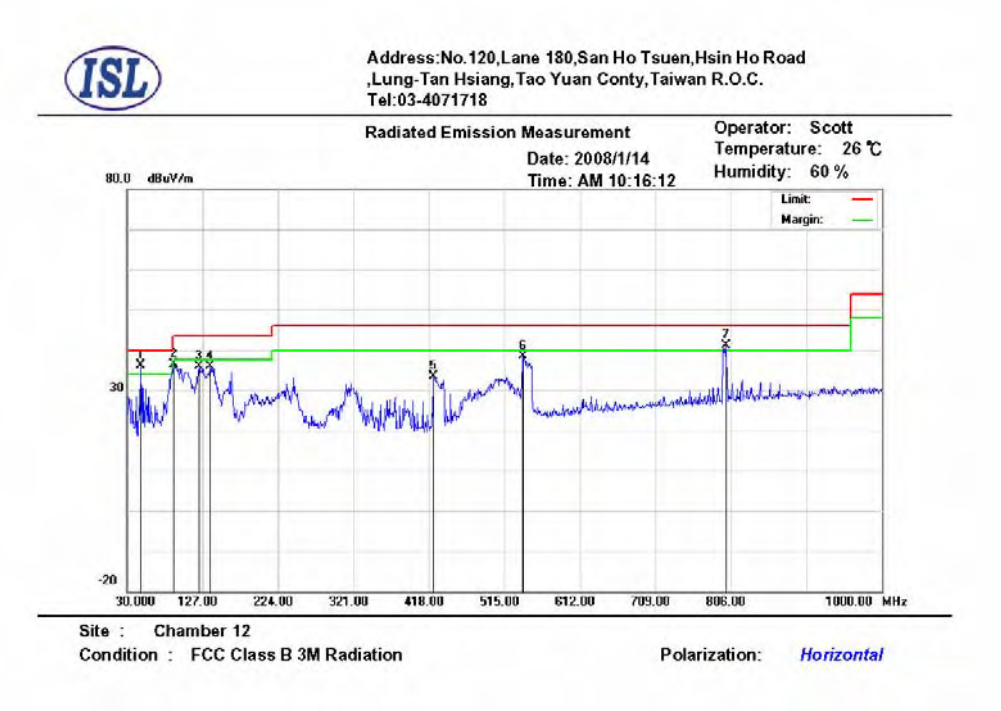
For the test of 2^{nd} to 10^{th} harmonics frequencies, the equipment setup was also refer to para.6.5.3. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

4.5.3 EMI Receiver/Spectrum Analyzer Configuration

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 40 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz
Frequency Range Tested:	30MHz – 40 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	100 Hz for 802.11b, 1 KHz for 802.11a/g

4.5.4 Test Data (30MHz – 1GHz) .

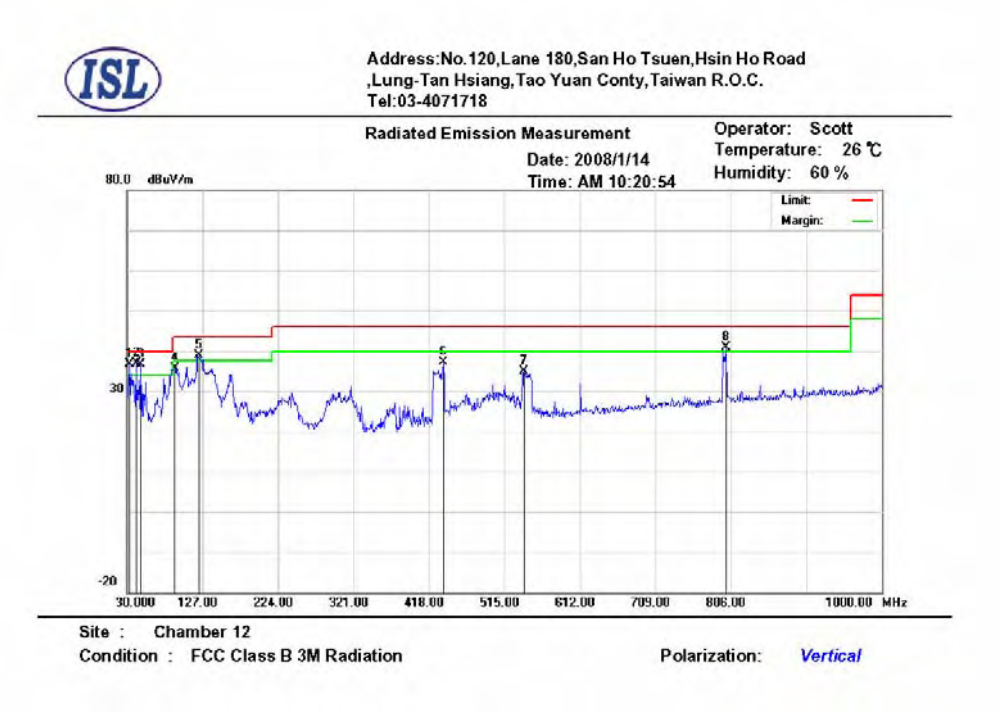
30M – 1GHz Open Field Radiated Emissions (Horizontal)



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)



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

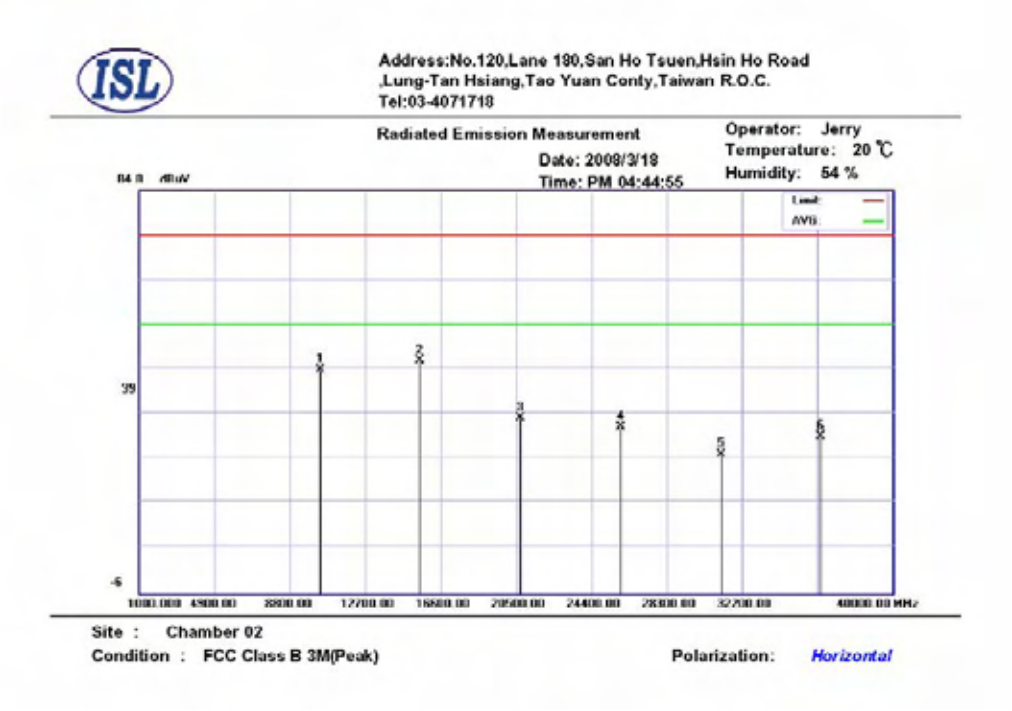
*:Maximum data x:Over limit !:over margin

NOTE: During the pre-test, the EUT has been tested for lowest, middle, and highest Channel and 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

4.5.5 Test Data (1GHz – 40 GHz, Transmitting) .

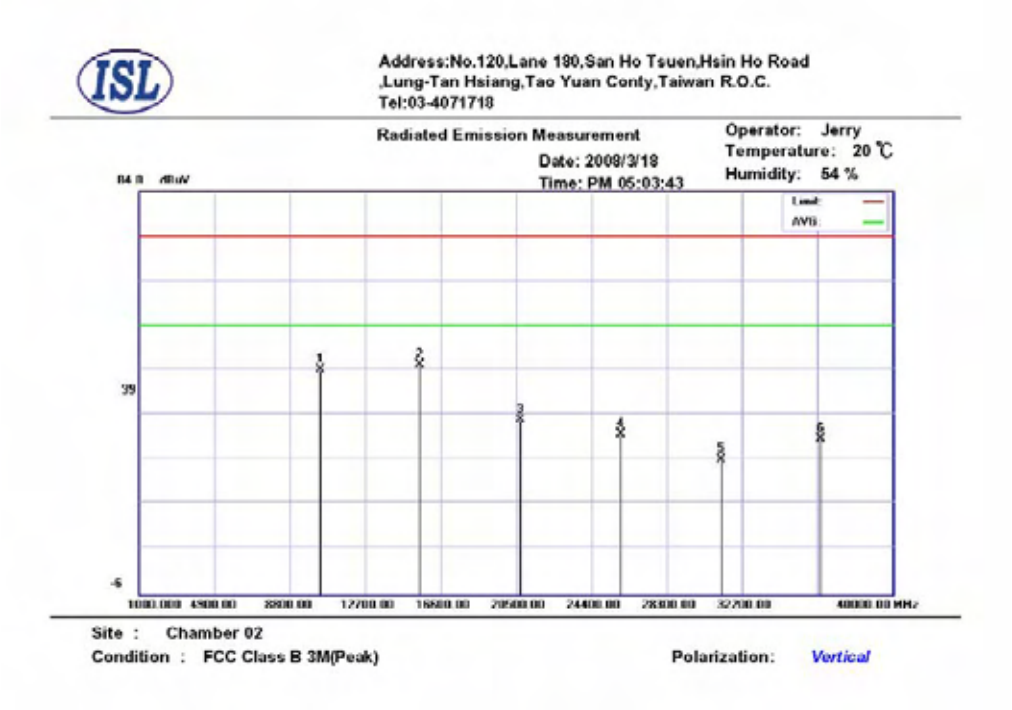
1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 1: 5180 MHz



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
	10360.000	30.95	40.18	4.18	25.41	43.90	74.00	-30.10	333	229	peak
*	15540.000	29.68	44.67	5.05	27.52	45.88	74.00	-28.12	297	285	peak
	20720.000	26.24	33.58	5.89	26.7	33.01	74.00	-40.99	100	220	peak
	25900.000	24.12	34.06	5.51	26.69	31.00	74.00	-43.00	334	166	peak
	31080.000	24.15	37.02	5.02	35.35	24.84	74.00	-49.16	370	223	peak
	36260.000	23.86	38.54	5.57	32.94	29.03	74.00	-44.97	142	195	peak

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

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 1: 5180 MHz



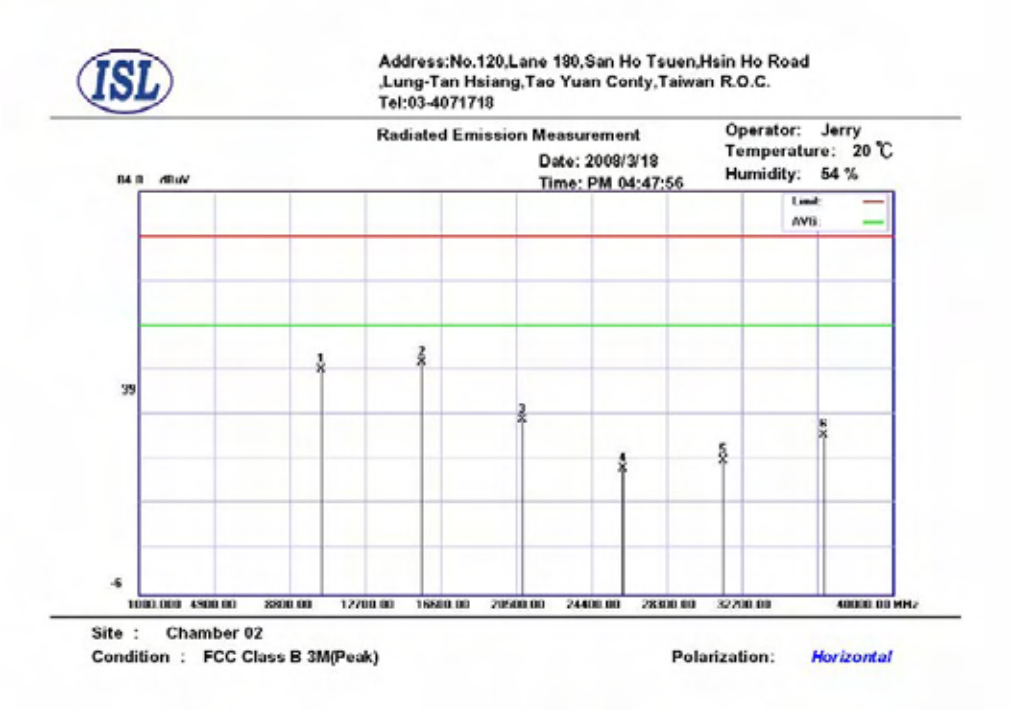
Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	10360.000	31.21	40.18	4.18	25.41	44.16	74.00	-29.84	327	227	peak
*	15540.000	29.01	44.67	5.05	27.52	45.21	74.00	-28.79	100	97	peak
	20720.000	25.98	33.58	5.89	26.7	32.75	74.00	-41.25	155	85	peak
	25900.000	22.70	34.06	5.51	26.69	29.58	74.00	-44.42	395	78	peak
	31080.000	23.31	37.02	5.02	35.35	24.00	74.00	-50.00	379	54	peak
	36260.000	23.37	38.54	5.57	32.94	28.54	74.00	-45.46	164	289	peak

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

NOTE: 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 40 GHz have been tested.

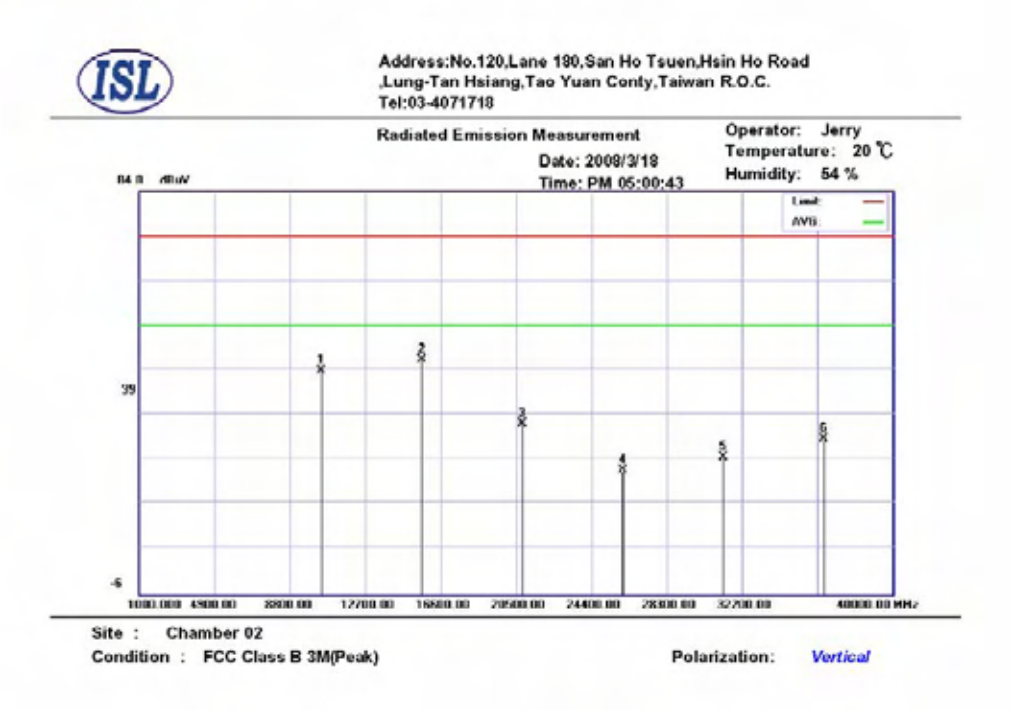
1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 2: 5200 MHz



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
	10400.000	31.11	40.16	4.19	25.5	43.96	74.00	-30.04	100	7	peak
*	15600.000	29.60	44.48	5.07	27.45	45.70	74.00	-28.30	191	289	peak
	20800.000	25.85	33.64	5.9	26.68	32.71	74.00	-41.29	135	352	peak
	26000.000	15.11	34.1	5.53	26.66	22.08	74.00	-51.92	172	335	peak
	31200.000	23.11	36.9	5.1	35.28	23.83	74.00	-50.17	100	158	peak
	36400.000	24.20	38.46	5.47	32.8	29.33	74.00	-44.67	212	271	peak

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

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 2: 5200 MHz



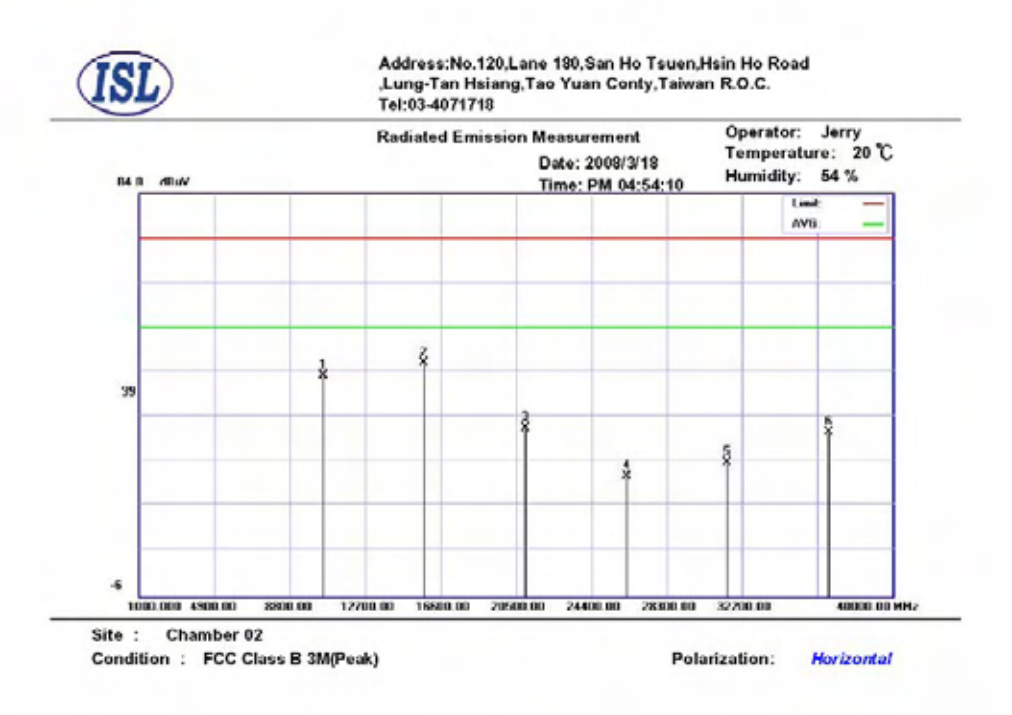
Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	10400.000	30.89	40.16	4.19	25.5	43.74	74.00	-30.26	317	4	peak
*	15600.000	30.10	44.48	5.07	27.45	46.20	74.00	-27.80	199	281	peak
	20800.000	24.96	33.64	5.9	26.68	31.82	74.00	-42.18	208	222	peak
	26000.000	14.67	34.1	5.53	26.66	21.64	74.00	-52.36	378	6	peak
	31200.000	23.77	36.9	5.1	35.28	24.49	74.00	-49.51	333	251	peak
	36400.000	23.52	38.46	5.47	32.8	28.65	74.00	-45.35	172	37	peak

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

NOTE: 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 40 GHz have been tested.

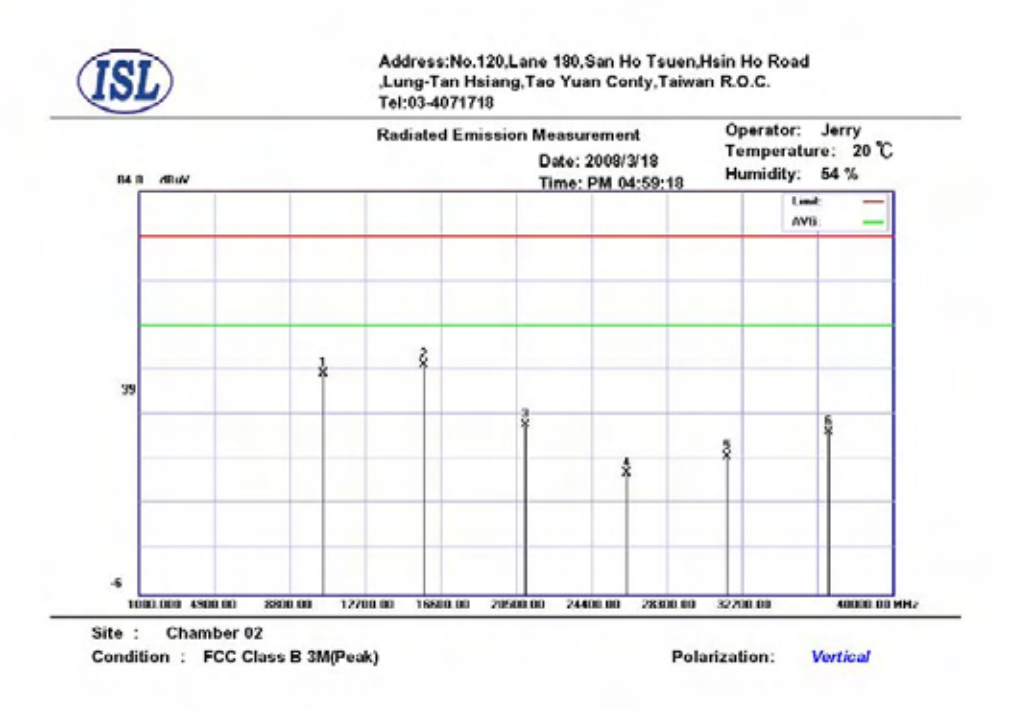
1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 4: 5240 MHz



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
	10480.000	30.52	40.11	4.21	25.68	43.16	74.00	-30.84	376	201	peak
*	15720.000	30.19	44.1	5.11	27.33	46.07	74.00	-27.93	100	46	peak
	20960.000	24.32	33.77	5.92	26.64	31.37	74.00	-42.63	100	355	peak
	26200.000	22.45	34.22	5.55	35.5	20.72	74.00	-53.28	357	23	peak
	31440.000	23.05	36.66	5.25	35.14	23.82	74.00	-50.18	362	182	peak
	36680.000	25.43	38.44	5.27	32.48	30.66	74.00	-43.34	140	53	peak

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

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 4: 5240 MHz



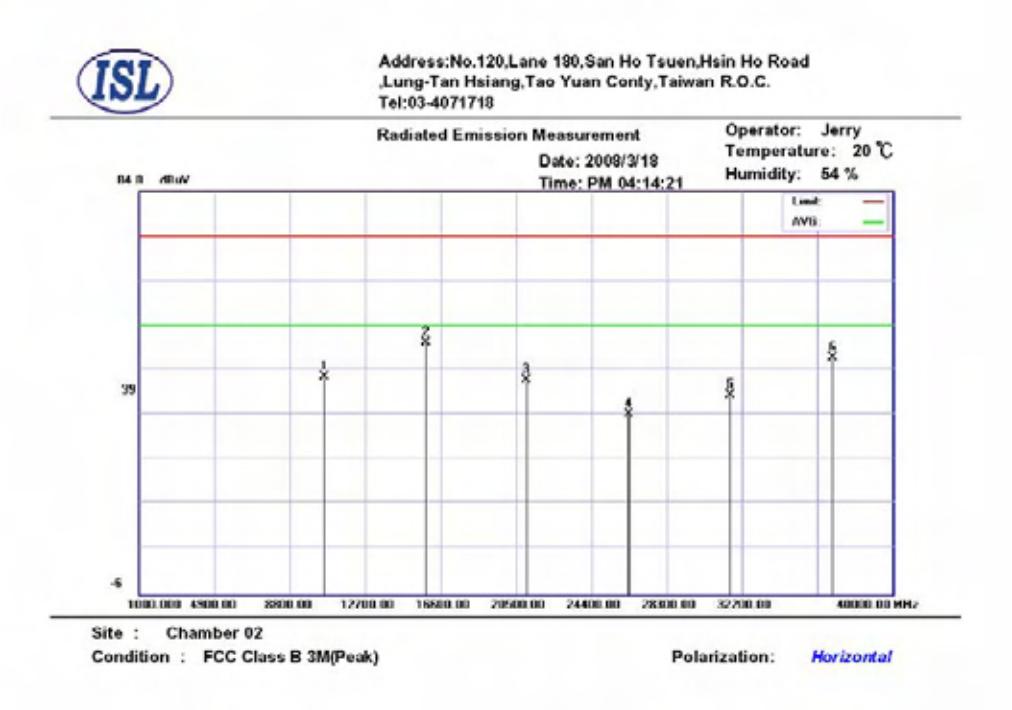
Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	10480.000	30.44	40.11	4.21	25.68	43.08	74.00	-30.92	180	320	peak
*	15720.000	29.37	44.1	5.11	27.33	45.25	74.00	-28.75	361	86	peak
	20960.000	24.59	33.77	5.92	26.64	31.64	74.00	-42.36	139	227	peak
	26200.000	22.69	34.22	5.55	35.5	20.96	74.00	-53.04	100	151	peak
	31440.000	23.89	36.66	5.25	35.14	24.66	74.00	-49.34	100	297	peak
	36680.000	24.86	38.44	5.27	32.48	30.09	74.00	-43.91	389	310	peak

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

NOTE: 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 40 GHz have been tested.

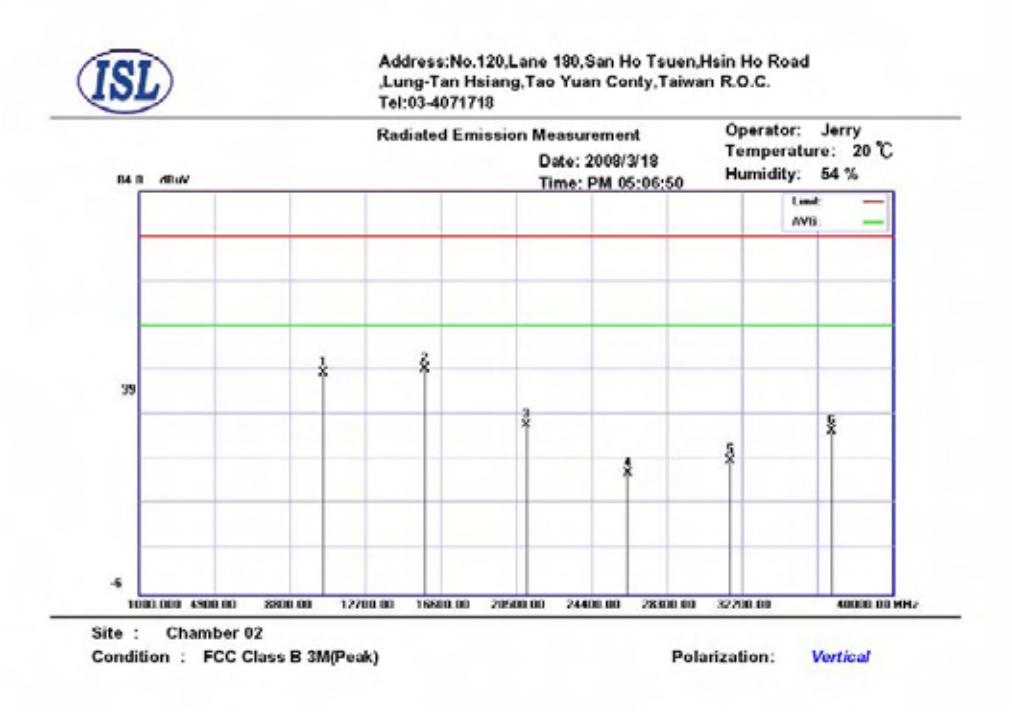
1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 5: 5260 MHz



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
	10520.000	30.00	40.1	4.21	25.74	42.57	74.00	-31.43	321	234	peak
*	15780.000	34.39	43.9	5.12	27.26	50.15	74.00	-23.85	187	51	peak
	21040.000	34.72	33.74	5.94	26.63	41.77	74.00	-32.23	285	225	peak
	26300.000	35.95	34.28	5.57	35.6	34.20	74.00	-39.80	100	318	peak
	31560.000	37.45	36.65	5.33	35.05	38.38	74.00	-35.62	309	107	peak
	36820.000	41.44	38.46	5.17	32.32	46.75	74.00	-27.25	395	298	peak

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

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 5: 5260 MHz



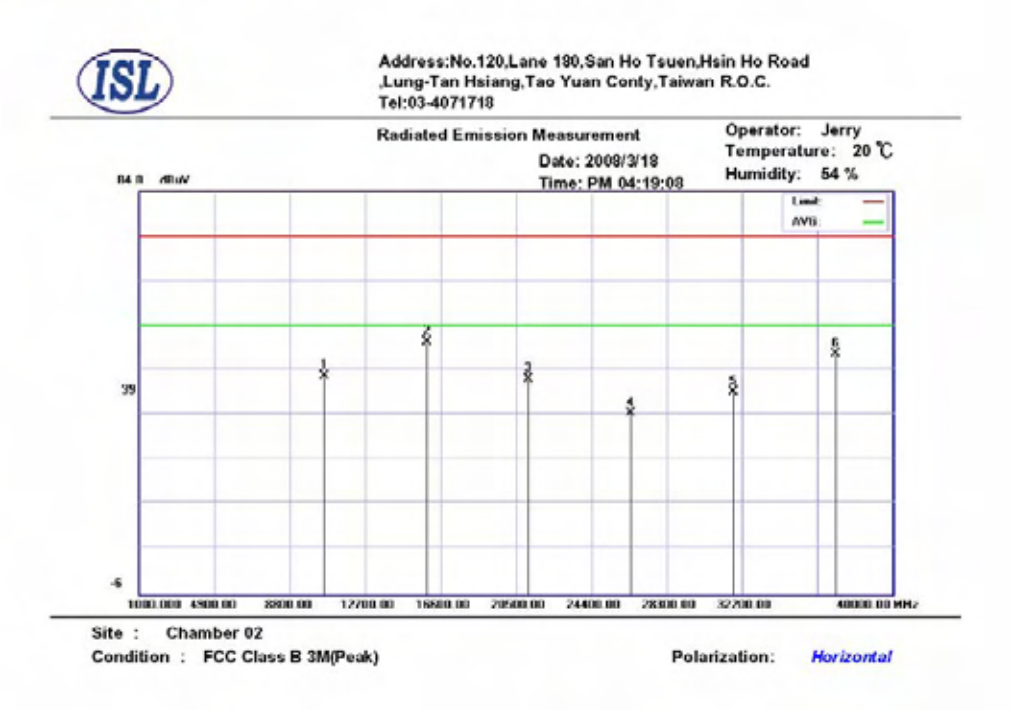
Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	10520.000	30.72	40.1	4.21	25.74	43.29	74.00	-30.71	100	51	peak
*	15780.000	28.42	43.9	5.12	27.26	44.18	74.00	-29.82	100	210	peak
	21040.000	24.62	33.74	5.94	26.63	31.67	74.00	-42.33	313	85	peak
	26300.000	22.75	34.28	5.57	35.6	21.00	74.00	-53.00	294	317	peak
	31560.000	22.94	36.65	5.33	35.05	23.87	74.00	-50.13	130	271	peak
	36820.000	24.97	38.46	5.17	32.32	30.28	74.00	-43.72	374	356	peak

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

NOTE: 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 40 GHz have been tested.

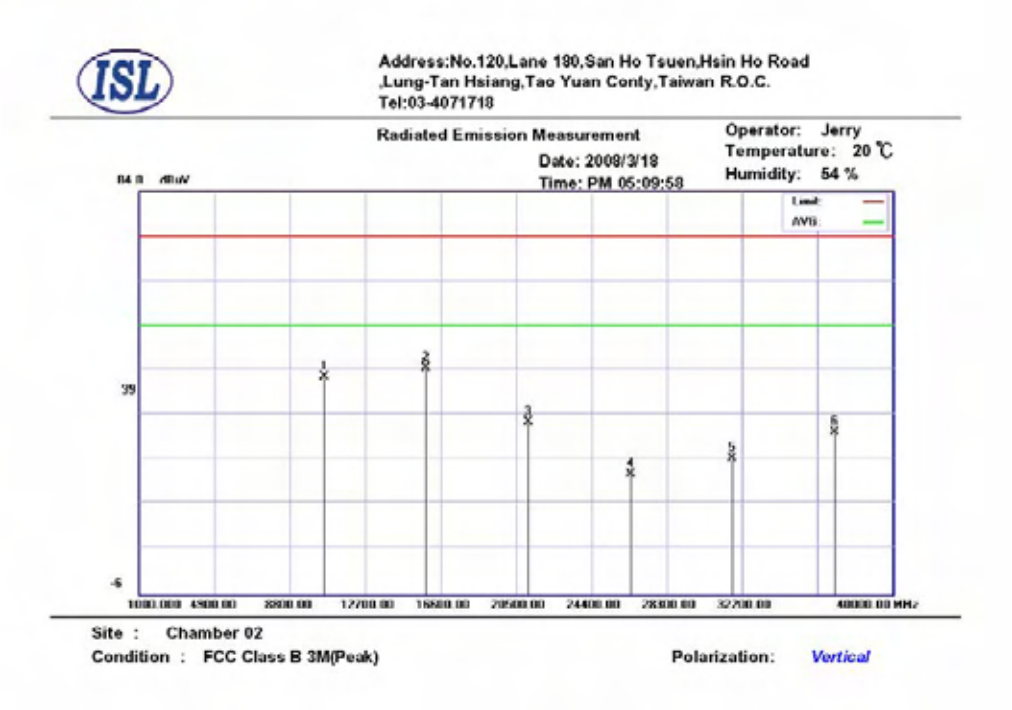
1GHz~ 40 GHz (Horizontal), Normal Mode Channel 6: 5280 MHz



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
	10560.000	30.23	40.09	4.22	25.79	42.75	74.00	-31.25	100	348	peak
*	15840.000	34.74	43.71	5.14	27.2	50.39	74.00	-23.61	379	165	peak
	21120.000	35.00	33.63	5.95	26.63	41.95	74.00	-32.05	370	172	peak
	26400.000	36.21	34.34	5.58	35.7	34.43	74.00	-39.57	139	330	peak
	31680.000	38.00	36.74	5.41	34.96	39.19	74.00	-34.81	100	229	peak
	36960.000	42.16	38.49	5.07	32.15	47.57	74.00	-26.43	211	9	peak

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

1GHz~ 40 GHz (Vertical) Normal Mode, Channel 6: 5280 MHz



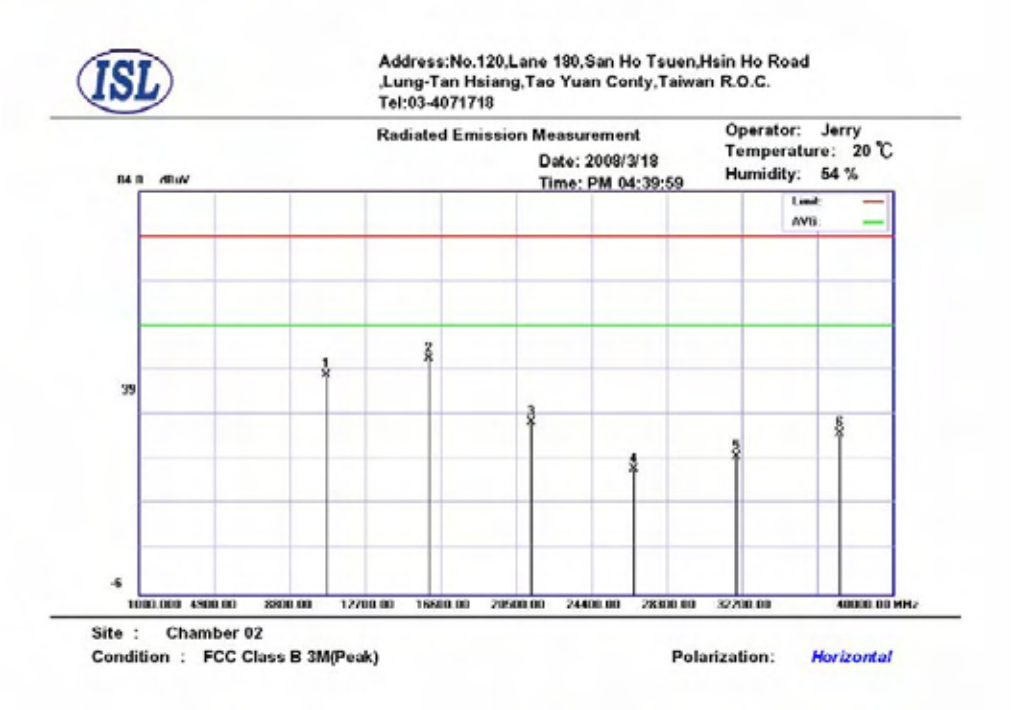
Mk.	Frequency (MHz)	RX_R (dBuV)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
	10560.000	29.89	40.09	4.22	25.79	42.41	74.00	-31.59	374	315	peak
*	15840.000	28.85	43.71	5.14	27.2	44.50	74.00	-29.50	372	306	peak
	21120.000	25.40	33.63	5.95	26.63	32.35	74.00	-41.65	100	234	peak
	26400.000	22.52	34.34	5.58	35.7	20.74	74.00	-53.26	343	359	peak
	31680.000	23.18	36.74	5.41	34.96	24.37	74.00	-49.63	129	5	peak
	36960.000	24.68	38.49	5.07	32.15	30.09	74.00	-43.91	327	226	peak

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

NOTE: 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 40 GHz have been tested.

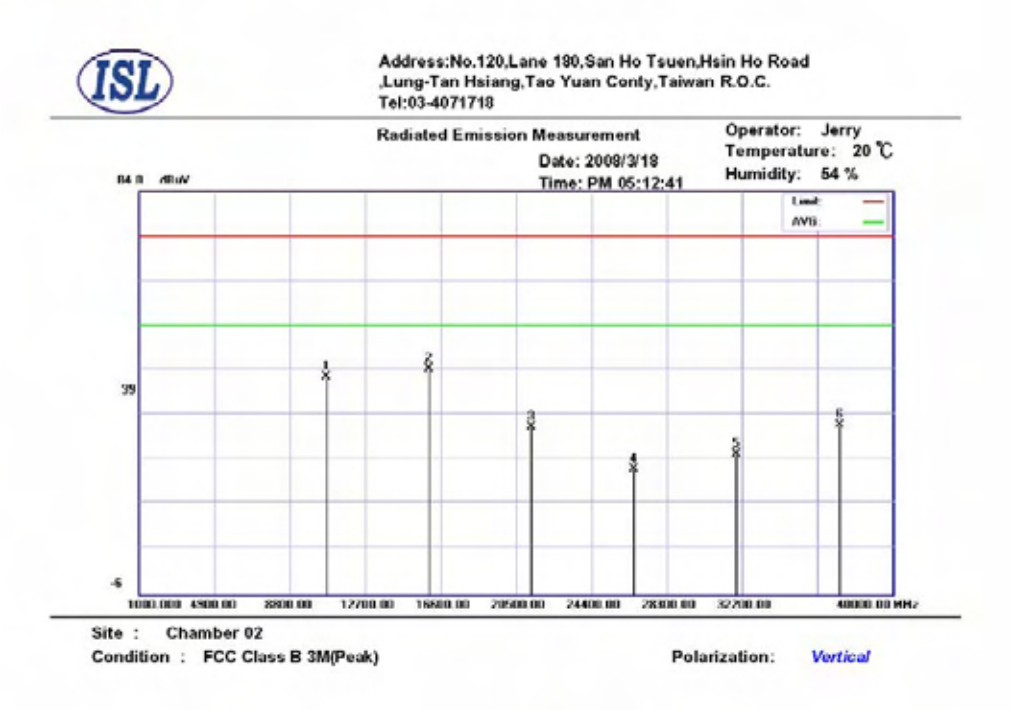
1GHz~ 40 GHz (Horizontal), Normal Mode Channel 8: 5320 MHz



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
	10640.000	30.44	40.07	4.24	25.89	42.86	74.00	-31.14	327	226	peak
*	15960.000	30.99	43.33	5.18	27.07	46.43	74.00	-27.57	286	191	peak
	21280.000	25.65	33.41	5.97	26.62	32.41	74.00	-41.59	378	353	peak
	26600.000	23.35	34.68	5.6	35.78	21.85	74.00	-52.15	296	70	peak
	31920.000	23.01	36.94	5.56	34.76	24.75	74.00	-49.25	100	29	peak
	37240.000	24.21	38.79	4.92	32	29.92	74.00	-44.08	100	92	peak

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

1GHz~ 40 GHz (Vertical) Normal Mode, Channel 8: 5320 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
	10640.000	30.14	40.07	4.24	25.89	42.56	74.00	-31.44	100	50	peak
*	15960.000	28.76	43.33	5.18	27.07	44.20	74.00	-29.80	315	150	peak
	21280.000	24.44	33.41	5.97	26.62	31.20	74.00	-42.80	383	124	peak
	26600.000	23.18	34.68	5.6	35.78	21.68	74.00	-52.32	163	120	peak
	31920.000	23.37	36.94	5.56	34.76	25.11	74.00	-48.89	265	136	peak
	37240.000	26.05	38.79	4.92	32	31.76	74.00	-42.24	100	124	peak

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

NOTE: 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 40 GHz have been tested.

4.6 Band Edge Measurement (Section 15.407 (b) (1) (2))

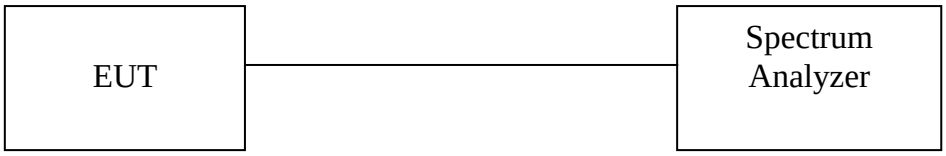
4.6.1 Test Procedure (Conducted)

1. The Transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer

Peak Mode:	
SPAN	100MHz
RBW	1MHz
VBW	1MHz
Sweep Time	200msec.

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.

4.6.2 Test Setup (Conducted)



4.6.3 Test Data (conducted):

Band Edge measurement (Conducted)

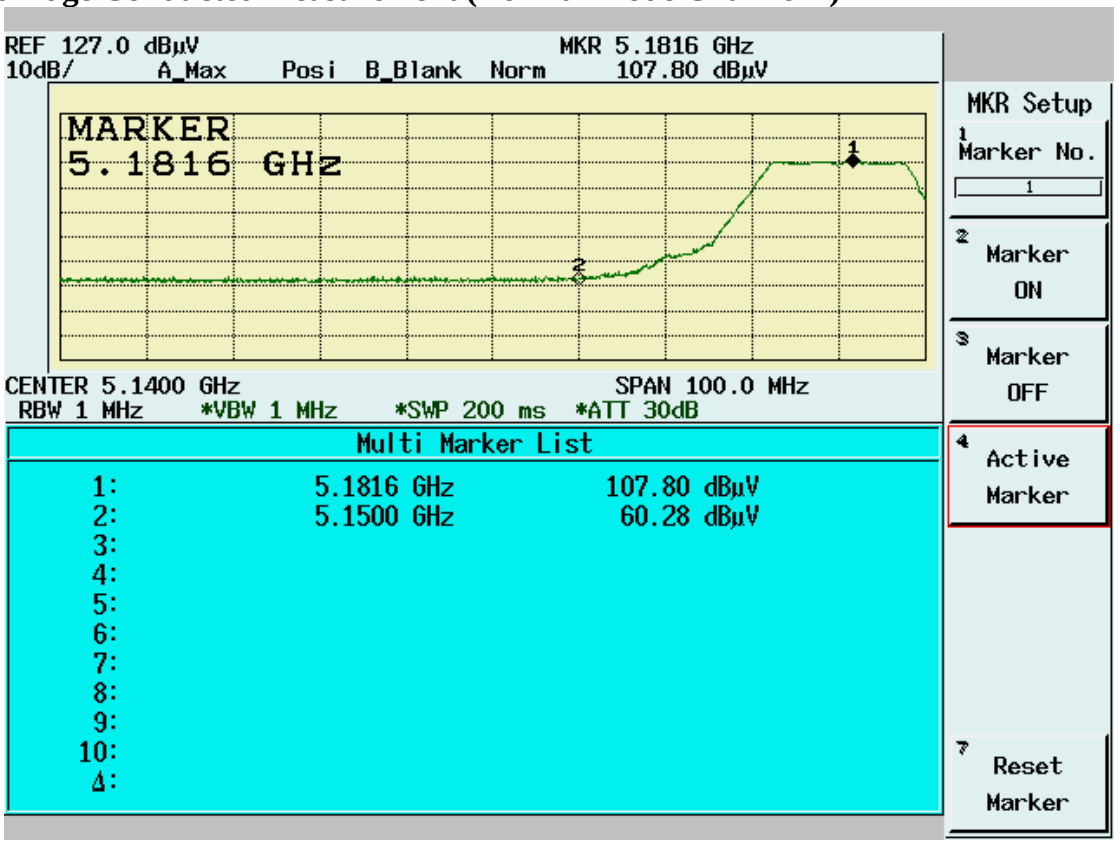
Temperature (° C): 25

Test Engineer: Jerry Chiou Humidity (%): 50

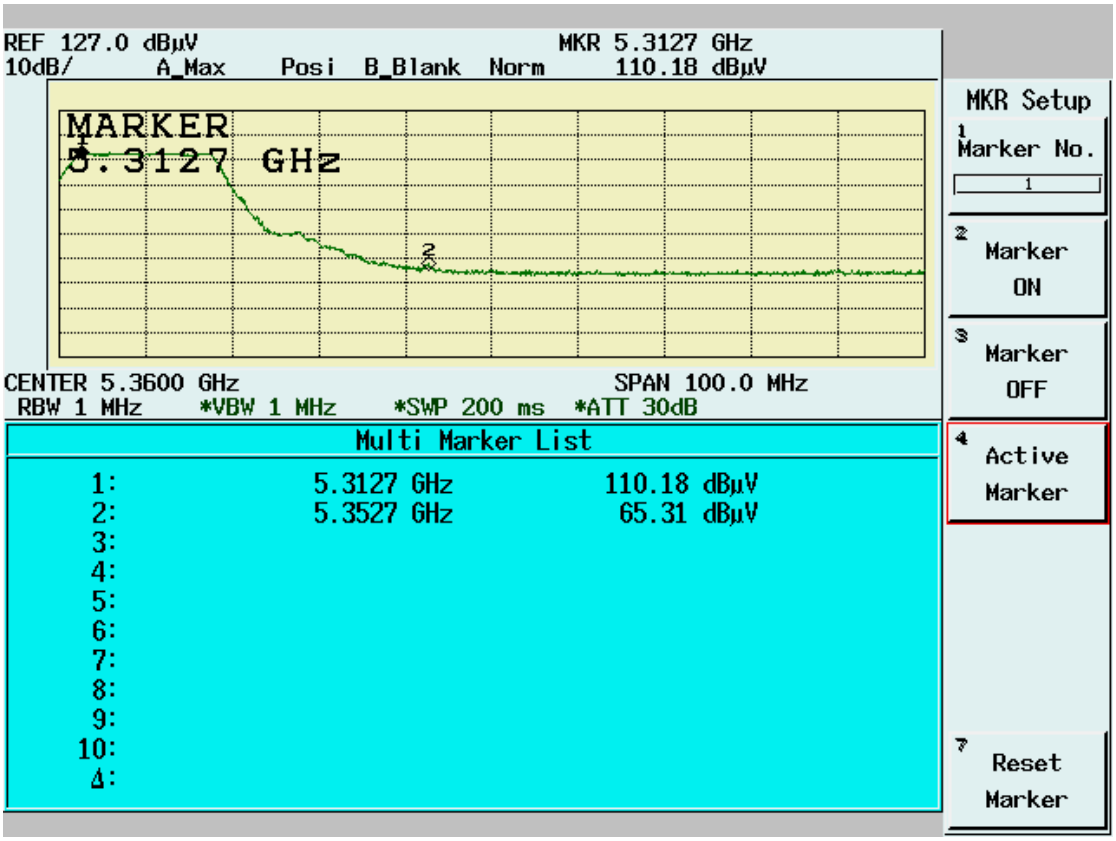
Outside Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Corrected Factor (dB)	Corrected Emissions (dBuV EIRP)	Limit: (dBuV EIRP)	Pass or Fail
1	5150	60.28	2.2	62.48	80	Pass
8	5352.7	65.31	2.2	67.51	80	Pass

NOTE: Corrected Emissions=Spectrum + Corrected Factor
Corrected Factor=Cable Loss+Antenna Peak Gain (dBi)

Band Edge Conducted measurement (Normal Mode Channel 1)



Band Edge Conducted Measurement (Normal Mode Channel 8)



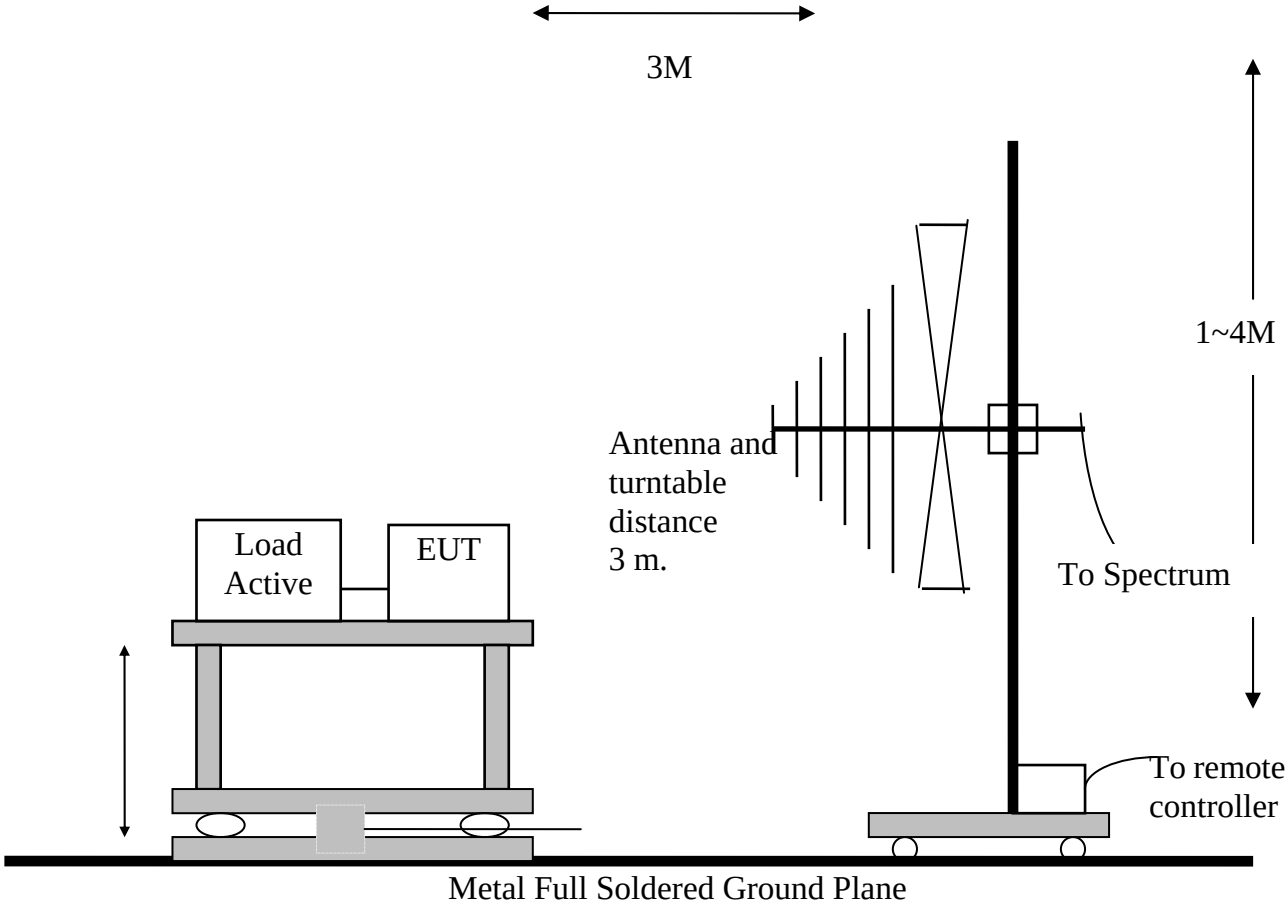
4.6.4 Band edge Restricted band Measurement Test Procedure (Radiated)

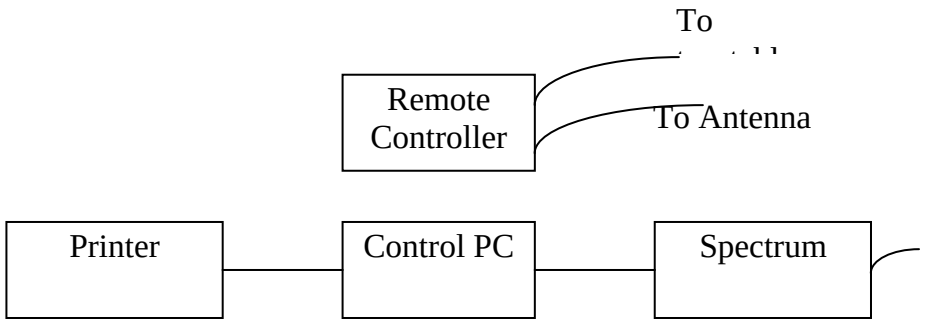
1. Antenna and Turntable test procedure same as Radiated Emissions measurement listed in Para. 6.5
   Equipment mode: Spectrum analyzer

Peak Mode:	
SPAN	100MHz
RBW	1MHz
VBW	3MHz
Sweep Time	200msec.
AVE Mode:	
SPAN	100MHz
RBW	1MHz
VBW	1KHz
Sweep Time	200msec.

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. Get the spectrum reading after Maximum Hold function is completed.

4.6.5 Test Setup (Radiated)





4.6.6 Test Data (Radiated):

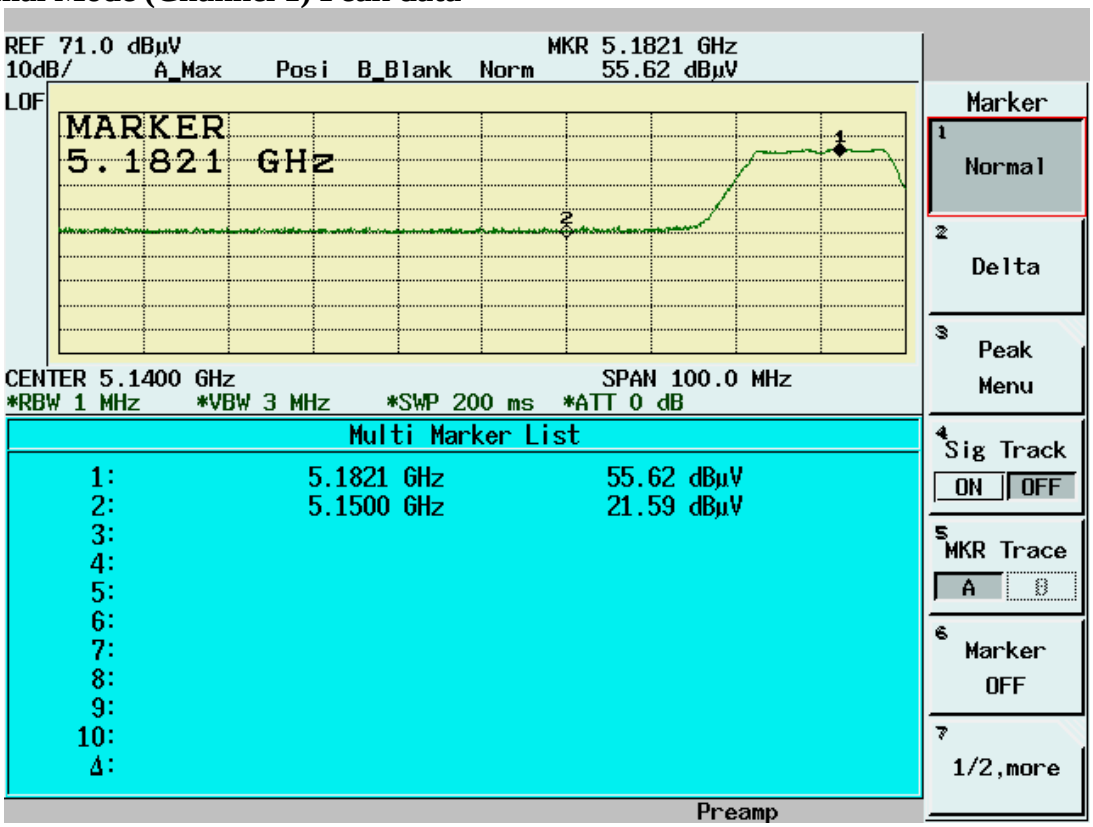
Restricted band measurement (Radiated)

Test Engineer: Jerry Chiou Temperature (deg. C): 25 Humidity (%): 50

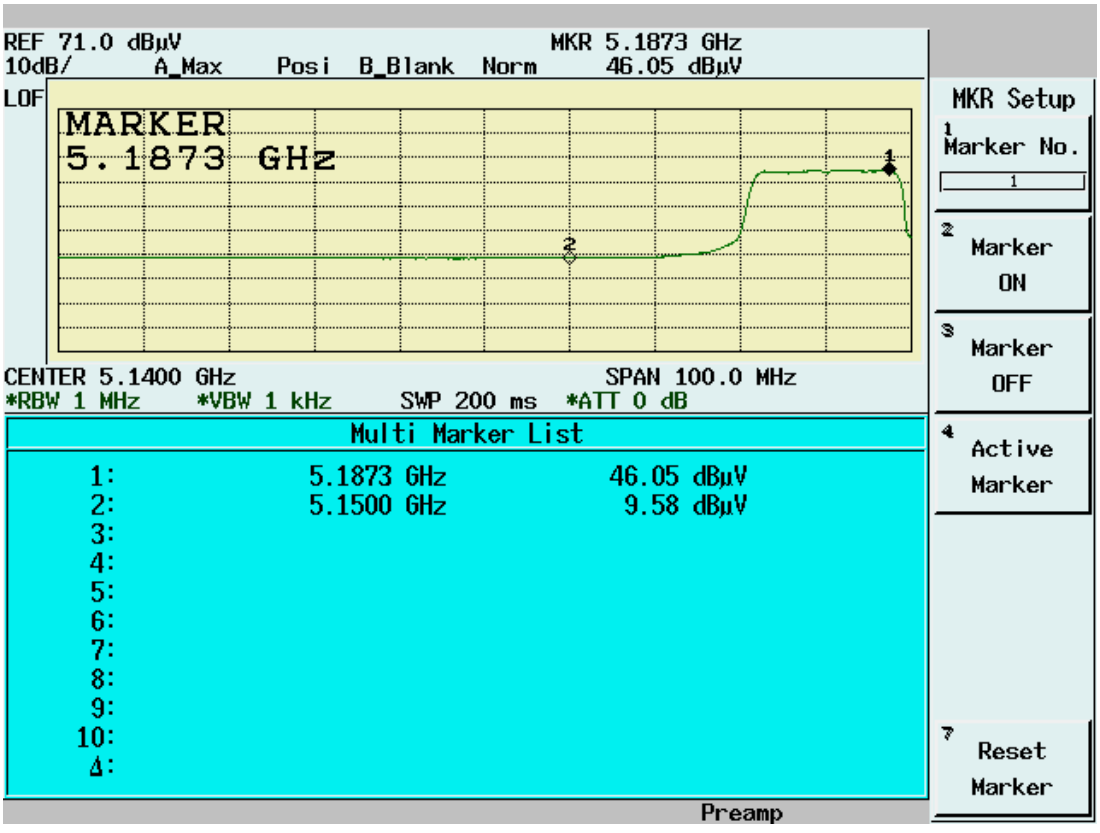
Outside Channel **(Normal)**	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Pass/Fail
1 (Peak)	5150	21.59	39.03	60.62	74	Pass
1 (Average)	5150	9.58	39.03	48.61	54	Pass
8 (Peak)	5350	22.09	39.34	61.43	74	Pass
8 (Average)	5350	9.74	39.34	49.08	54	Pass

NOTE: "pk": peak reading; "av": average reading
Emission Level=Spectrum Reading+Correction Factor
Correction Factor =Antenna Factor+cable loss
Both Horizontal and Vertical polarization have been tested and the worst data is listed above.

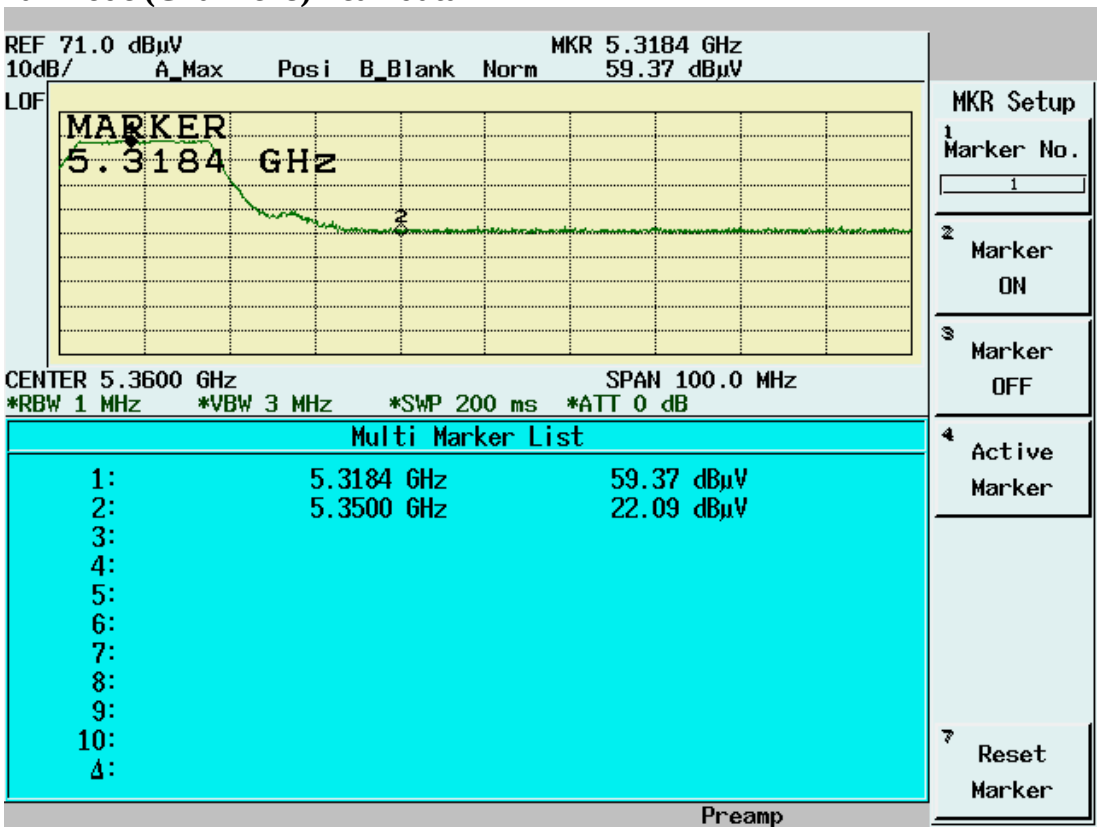
Band Edge measurement for radiated emission in Restricted Band(Radiated)
Normal Mode (Channel 1) Peak data



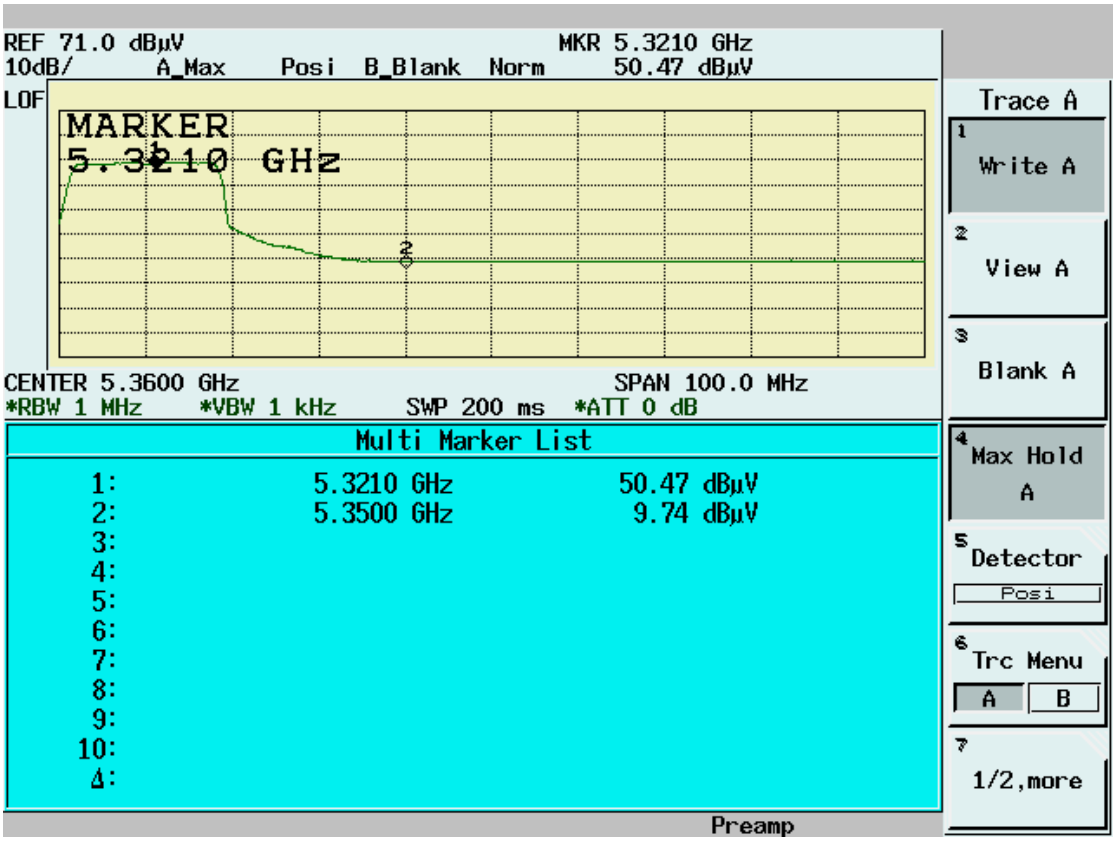
Normal Mode (Channel 1) Average Data



Normal Mode (Channel 8) Peak data



Normal Mode (Channel 8) Average data



4.7 RF Exposure Measurement [Section 15.407(f)(4) & 1.1307(b)]

Refer to MPE Test Report

4.8 Frequency Stability [Section 15.407(g)]

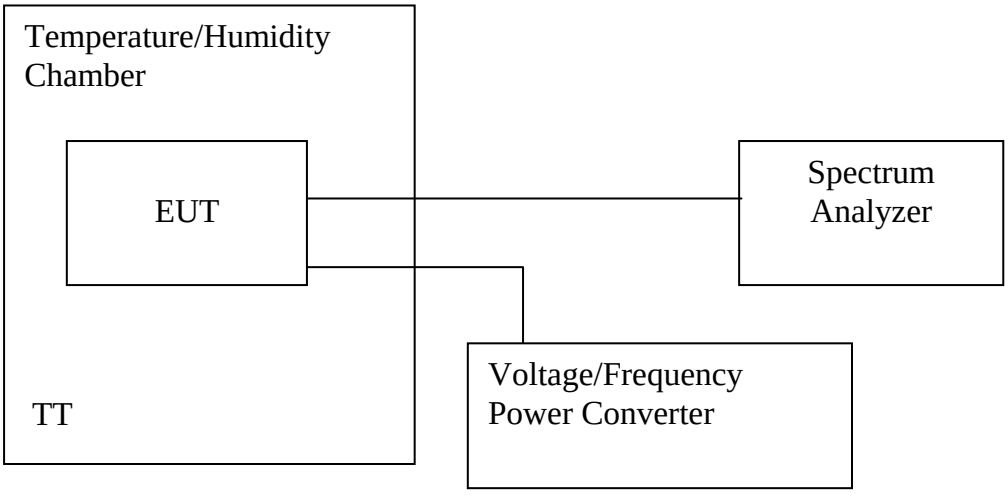
4.8.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier sing shall be maintained within +/- 0.02% of the operating frequency over the operation temperature range of EUT (0^0C~35^0C), and variation in the primary supply voltage from 85% to 115% of the rated supply voltage (115V AC) at 20^0C.

4.8.2 Test Procedure

1. The EUT was placed in the Temperature/Humidity Chamber and powered by a Voltage/Frequency Power converter.
2. Connect the RF output of EUT to Spectrum. Turn on the EUT.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the chamber temperature to stabilize. Turn the EUT on and measure the operating frequency after 2, 5, 10 minutes.
5. Set the Voltage/Frequency Power Converter to 85% and 115% of supply voltage, then repeat step 2, 3, 4 respectively.
6. Repeat step 2 , 3, 4, 5 with the temperature of chamber set to the lowest temperature.
7. Repeat step 2 , 3, 4, 5 with the temperature of chamber set to 20^0C.

4.8.3 Test Setup



4.8.4 Test Data

Test Engineer: Jerry Chiou

Operating Frequency:		5320 (Mhz)		Limit: +/- 0.02%					
Temp.	Power Supply	0 minutes		2 minutes		5 minutes		10 minutes	
(^{0}C)	(V AC)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)	(MHz)	
50	138	5319.9660	-0.0006	5319.9610	-0.0007	5319.9620	-0.0007	5319.9410	-0.0011
	120	5319.9700	-0.0006	5320.0060	0.0001	5319.9810	-0.0004	5319.9790	-0.0004
	102	5319.9690	-0.0006	5319.9410	-0.0011	5319.9890	-0.0002	5319.9660	-0.0006
20	138	5319.9410	-0.0011	5319.9410	-0.0011	5319.9730	-0.0005	5319.9610	-0.0007
	120	5319.9460	-0.0010	5319.9840	-0.0003	5319.9560	-0.0008	5319.9980	0.0000
	102	5319.9410	-0.0011	5319.9540	-0.0009	5319.9340	-0.0012	5319.9660	-0.0006
-30	138	5319.9690	-0.0006	5320.0240	0.0005	5320.0290	0.0005	5319.9520	-0.0009
	120	5319.9600	-0.0008	5319.9550	-0.0008	5319.9810	-0.0004	5319.9930	-0.0001
	102	5319.9570	-0.0008	5319.9950	-0.0001	5319.9960	-0.0001	5319.9940	-0.0001

4.9 Dynamic Frequency Selection (DFS)

Tables 1 lists the DFS related essential requirements and their applicability for each of the operational modes.

The manufacturer shall state whether the EUT is capable of operating as a Master and/or a Slave. If the EUT is capable of operating in more than one operating mode then each operating mode shall be tested separately.

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	**Operational Mode**		
	Master	**Slave (without radar detection)**	**Slave (with radar detection)**
Non-Occupancy Period	V	NA	V
DFS Detection Threshold	V	NA	V
Channel Availability Check Time	V	NA	NA
Uniform Spreading	V	NA	NA
U-NII Detection Bandwidth	V	NA	V

Table 2: Applicability of DFS requirements during normal operation

Requirement	**Operational Mode**		
	Master	**Slave (without radar detection)**	**Slave (with radar detection)**
DFS Detection Threshold	V	NA	V
Channel Closing Transmission Time	V	V	V
Channel Move Time	V	V	V
U-NII Detection Bandwidth	V	NA	V

Table 3: Operating frequency range of EUT.

Operational Mode	**Operating Frequency Range**	
	5250~5350MHz	**5470~5725MHz**
Master	NA	NA
Slave (without radar detection)	V	NA
Slave (with radar detection)	NA	NA

4.9.1 Test Limits and Radar Signal Parameter

4.9.1.1 Interference Threshold

Table 4:DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection.

Maximum Transmit Power	**Value (See Notes 1 and 2)**
>200mW (>23dBm)	-64dBm
<200mW (<23dBm)	-62dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.	

4.9.1.2 DFS Response Requirement

Table 5:DFS Response Requirement Values.

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 80% of the UNII 99% transmission power bandwidth. SeeNote 3.

Note 1: The instant that the Channel Move Time and the Channel Closing Transmission Time begins is as follows:

- For the Short Pulse Radar Test Signals this instant is the end of the Burst.
- For the Frequency Hopping radar Test Signal, this instant is the end of the last radar Burst generated.
- For the Long Pulse Radar Test Signal this instant is the end of the 12 second period defining the Radar Waveform.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 1 is used and for each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

4.9.1.3 The Radar Test Waveform

Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Table 6 – Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
1	1	1428	18	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Table 7 –Long Pulse Radar Test Waveform

Radar Type	Pulse Width (µsec)	Chirp Width (MHz)	PRI (µsec)	Number of Pulses per Burst	Number of Burst	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Table 8 –Frequency Hopping Radar Test Waveform

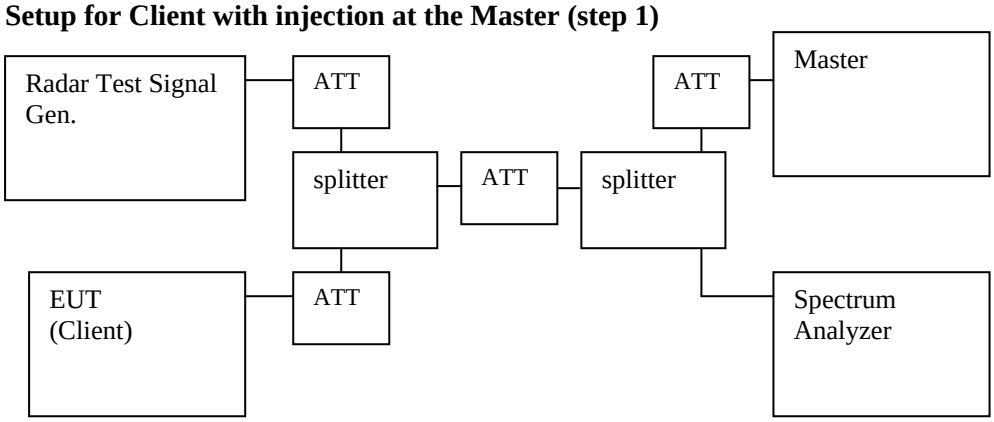
Radar Type	Pulse Width (µsec)	PRI (µsec)	Pulse per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

4.9.2 Test Procedure

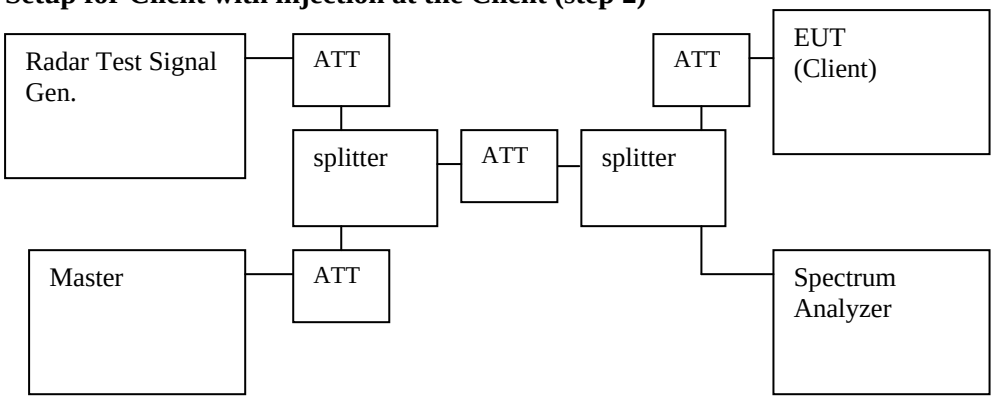
1. The measured channel is 5320MHz. The radar signal was the same as transmitted channels, and injected into the antenna port of AP (master) with interference threshold power level, measured the channel closing transmission time and channel move time. The slave transfers the test data to master, the transmitted duty cycle is 10%.
2. Exchange the position of Master and Client, and repeat step 1 to recheck the transfer data near Client.

4.9.3 Test Configuration

Setup for Client with injection at the Master (step 1)



Setup for Client with injection at the Client (step 2)



4.9.4 List of Measurement

Clause	Requirement	Test Parameter	Remarks	Pass / Fail
4.6.2.3	Channel Shutdown	Channel Closing Transmission Time	Applicable	Pass
		Channel Move Time	Applicable	Pass

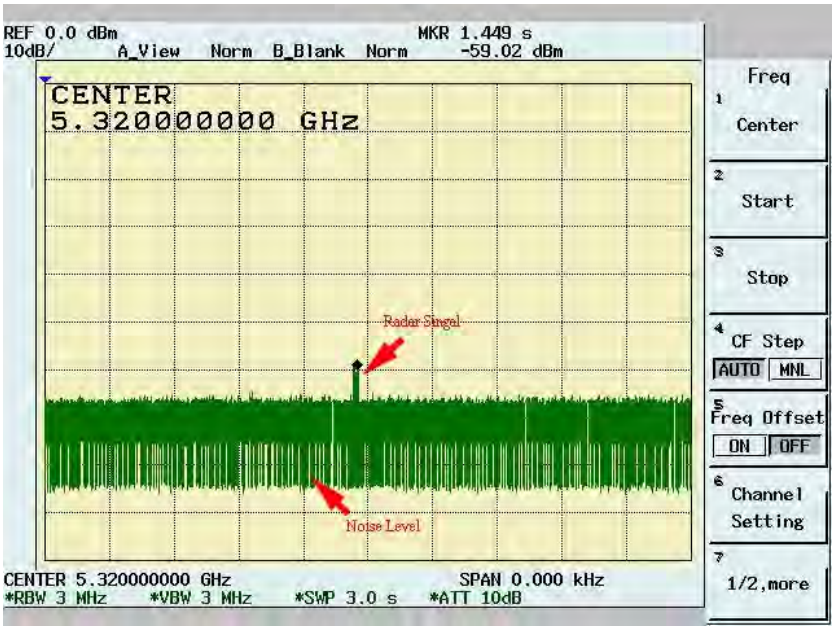
NOTE: This EUT is capable of operating as a Slave (without radar detection).

4.9.5 Test Results

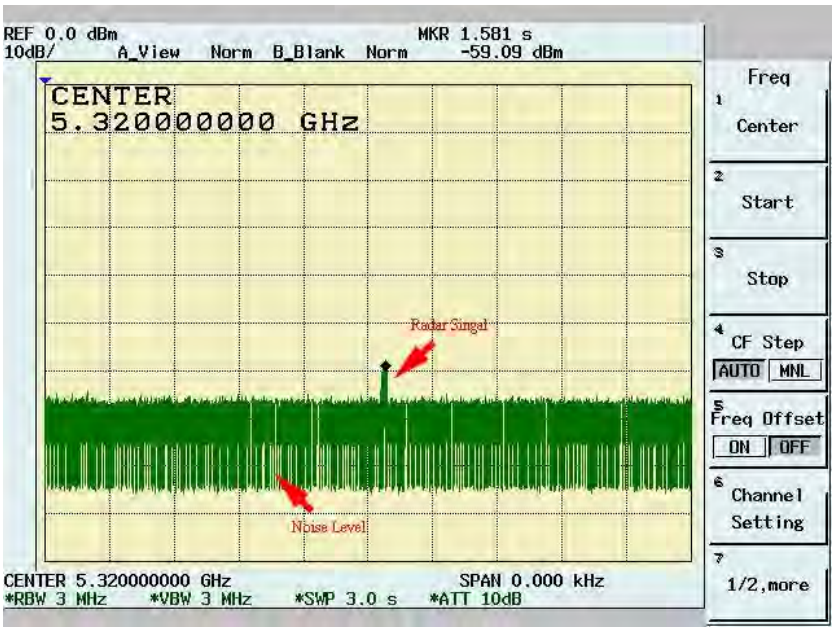
4.9.5.1 Detection Threshold Values Injected Into AP

The Required detection threshold is -58dBm (= -62 +1+3)dBm. The Radar Burst signal level to the AP connector is–59dBm. The tested level is lower than required level hence it provides margin to the limit.

5320MHz Radar Signal 1(Step 1)



5320MHz Radar Signal 1(Step 2)

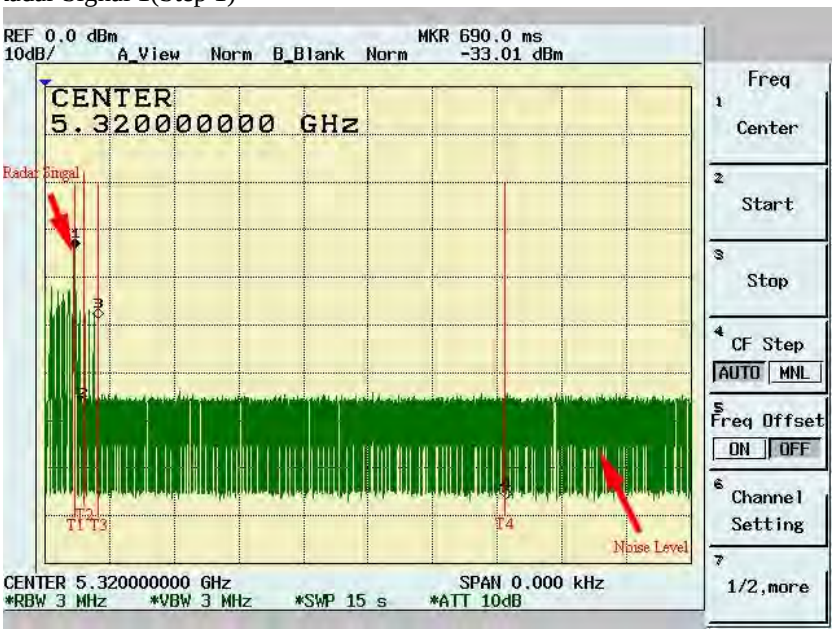


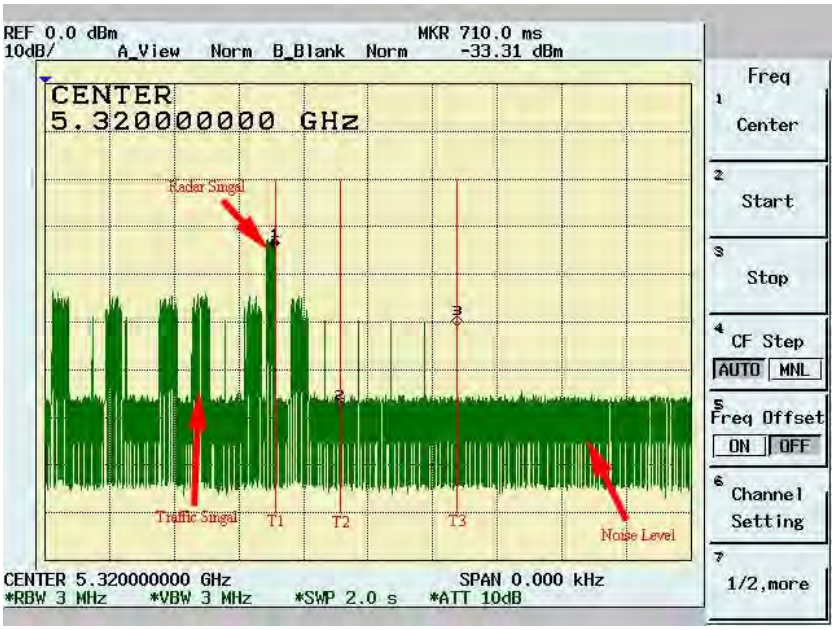
4.9.5.2 Channel Closing Transmission Time and Channel Move Time

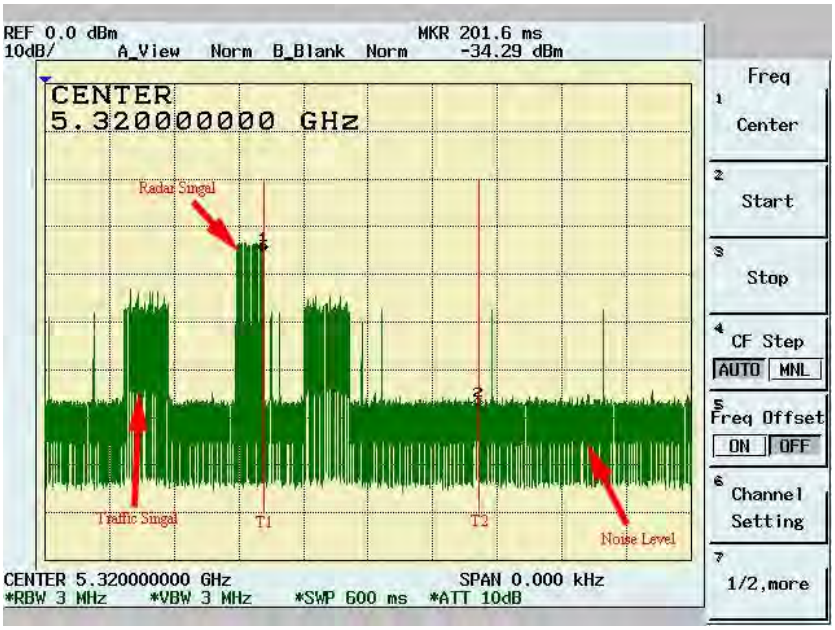
The channel closing time is aggregated duration of all transmissions from the EUT during the channel move time. The Aggregate duration of all transmission of the EUT does not include quiet periods in between transmissions of the EUT.

<Test Data>

5320MHz Radar Signal 1(Step 1)







T1: Channel moving start.
T2: Normal transmissions complete.
T3: Channel moving complete.
T4: Channel moving time limit.

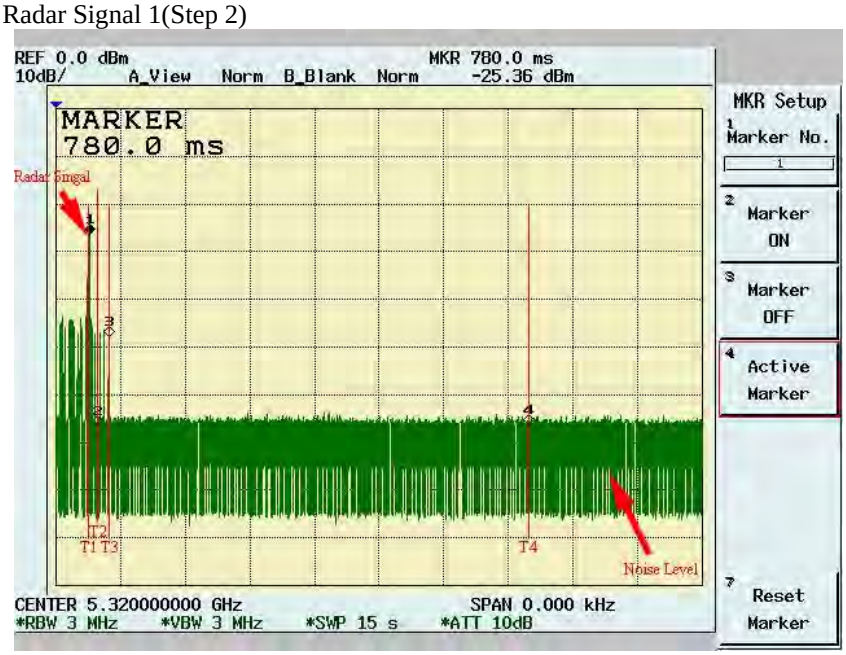
T3 – T1: Channel moving time = 16ms
T2 – T1: 260ms

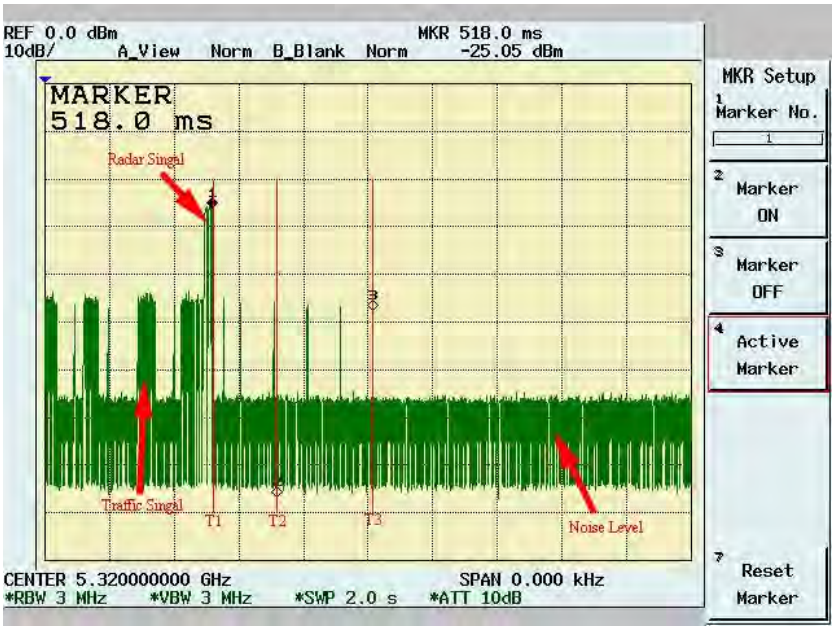
NOTE: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

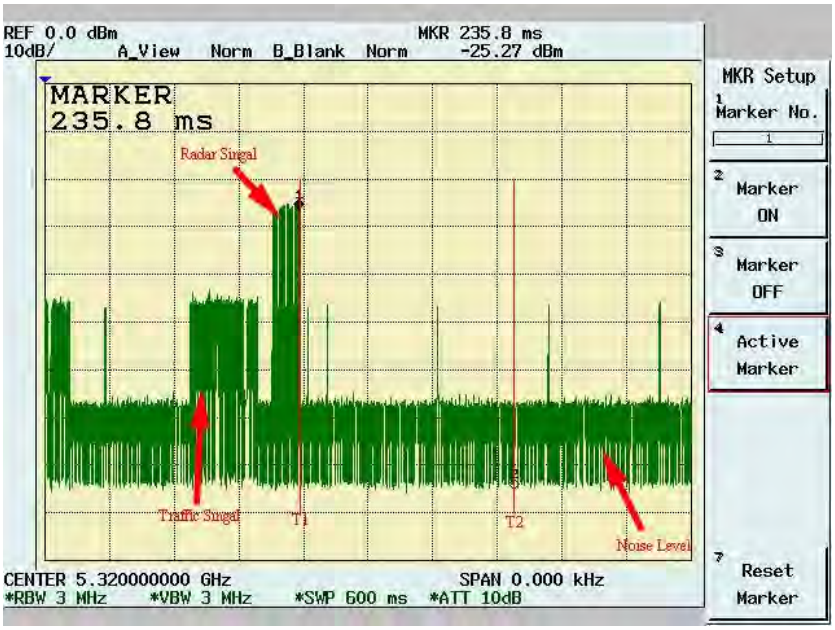
Frequency : 5320

Radar Type 1 Statistical Performances				
Trial #	Pulse Width	PRI (μsec)	Number of Pulses	Detection
1	1	1428	18	Yes
2	1	1428	18	Yes
3	1	1428	18	Yes
4	1	1428	18	Yes
5	1	1428	18	No
6	1	1428	18	Yes
7	1	1428	18	Yes
8	1	1428	18	Yes
9	1	1428	18	Yes
10	1	1428	18	Yes
11	1	1428	18	Yes
12	1	1428	18	Yes
13	1	1428	18	Yes
14	1	1428	18	Yes
15	1	1428	18	Yes
16	1	1428	18	Yes
17	1	1428	18	Yes
18	1	1428	18	Yes
19	1	1428	18	Yes
20	1	1428	18	Yes
21	1	1428	18	Yes
22	1	1428	18	No
23	1	1428	18	Yes
24	1	1428	18	Yes
25	1	1428	18	Yes
26	1	1428	18	Yes
27	1	1428	18	Yes
28	1	1428	18	Yes
29	1	1428	18	No
30	1	1428	18	Yes
			Detection Rate(%):	90.00

5320MHz Radar Signal 1(Step 2)







T1: Channel moving start.
T2: Normal transmissions complete.
T3: Channel moving complete.
T4: Channel moving time limit.

T3 – T1: Channel moving time = 21ms
T2 – T1: 260ms

NOTE: T1 denotes the start of Channel Move Time upon the end of the last Radar burst. T2 denotes the data transmission time of 200ms from T1. T3 denotes the 10 second from T1 to observe the aggregate duration of transmissions.

Frequency : 5320

Radar Type 1 Statistical Performances				
Trial #	Pulse Width	PRI (μsec)	Number of Pulses	Detection
1	1	1428	18	Yes
2	1	1428	18	Yes
3	1	1428	18	Yes
4	1	1428	18	Yes
5	1	1428	18	Yes
6	1	1428	18	Yes
7	1	1428	18	No
8	1	1428	18	No
9	1	1428	18	Yes
10	1	1428	18	Yes
11	1	1428	18	Yes
12	1	1428	18	Yes
13	1	1428	18	Yes
14	1	1428	18	Yes
15	1	1428	18	Yes
16	1	1428	18	Yes
17	1	1428	18	No
18	1	1428	18	Yes
19	1	1428	18	Yes
20	1	1428	18	Yes
21	1	1428	18	Yes
22	1	1428	18	Yes
23	1	1428	18	Yes
24	1	1428	18	Yes
25	1	1428	18	No
26	1	1428	18	Yes
27	1	1428	18	Yes
28	1	1428	18	Yes
29	1	1428	18	Yes
30	1	1428	18	Yes
			Detection Rate(%):	86.67

5. Appendix

5.1 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.

5.2 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.

5.3 Appendix C: Test Equipment

5.3.1 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

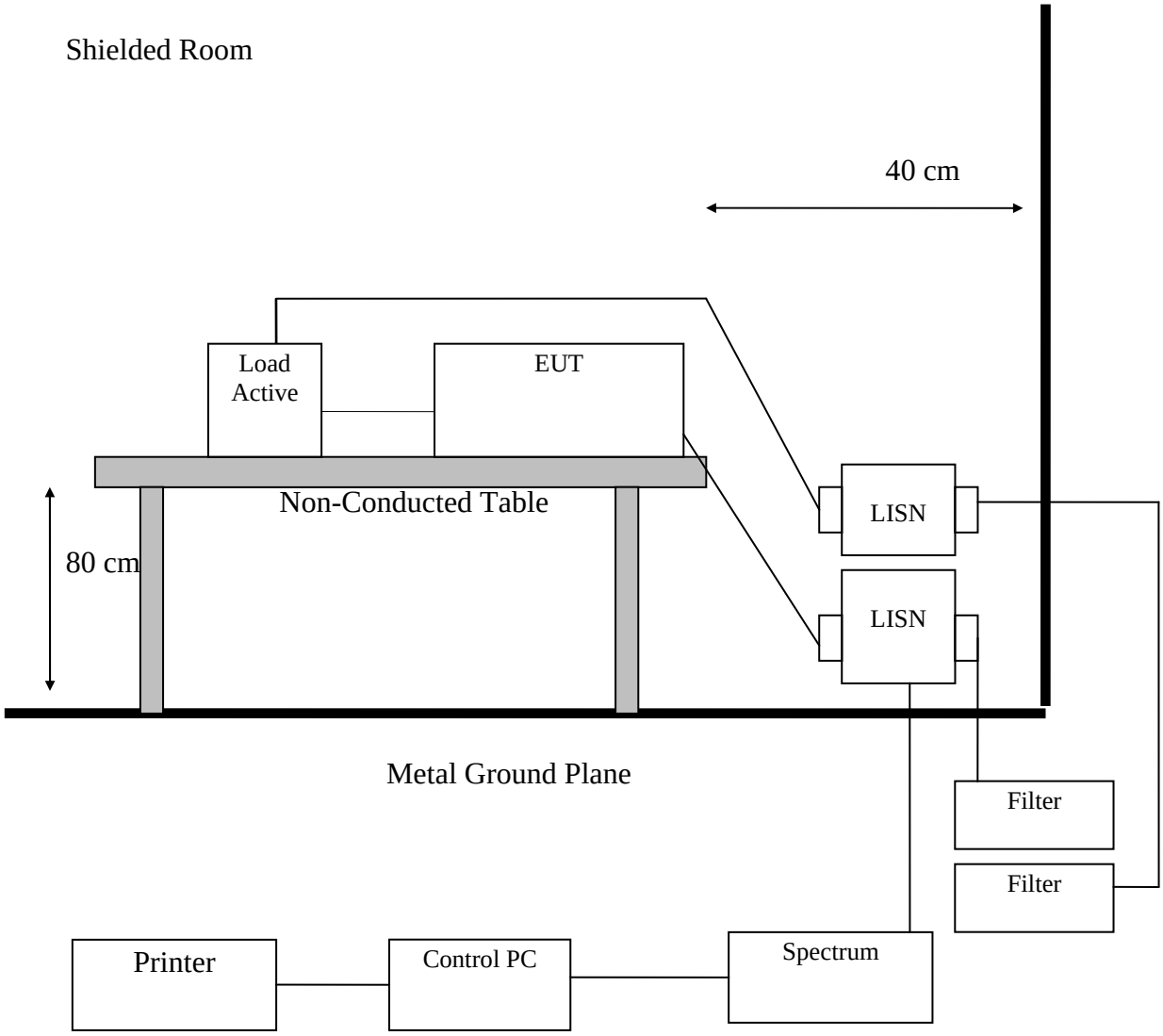
Note: Calibration is traceable to NIST or national or international standards.

5.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

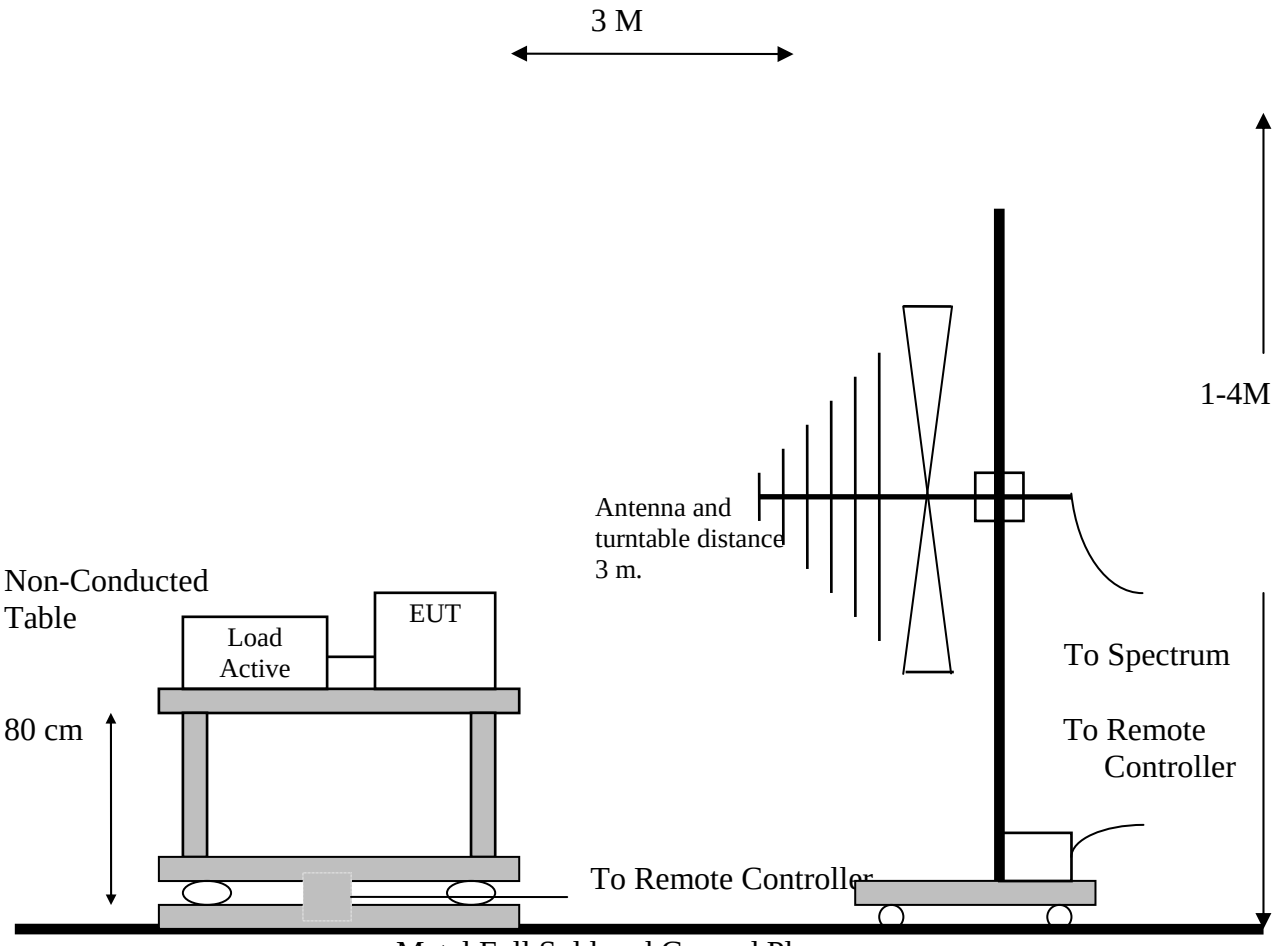
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

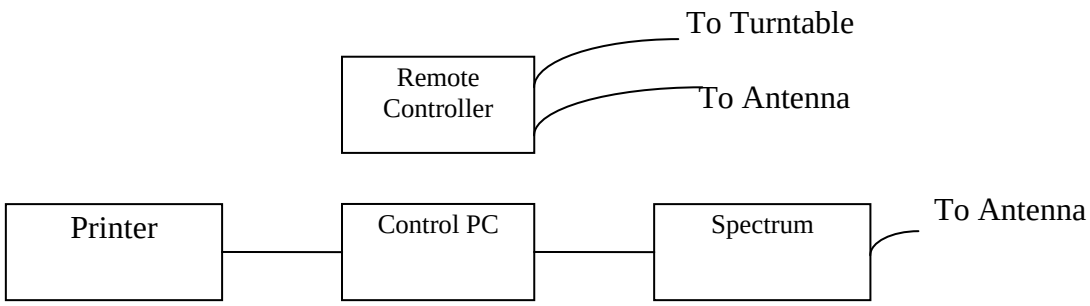
5.4 Appendix D: Layout of EUT and Support Equipment

5.4.1 General Conducted Test Configuration



5.4.2 General Radiation Test Configuration





5.5 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

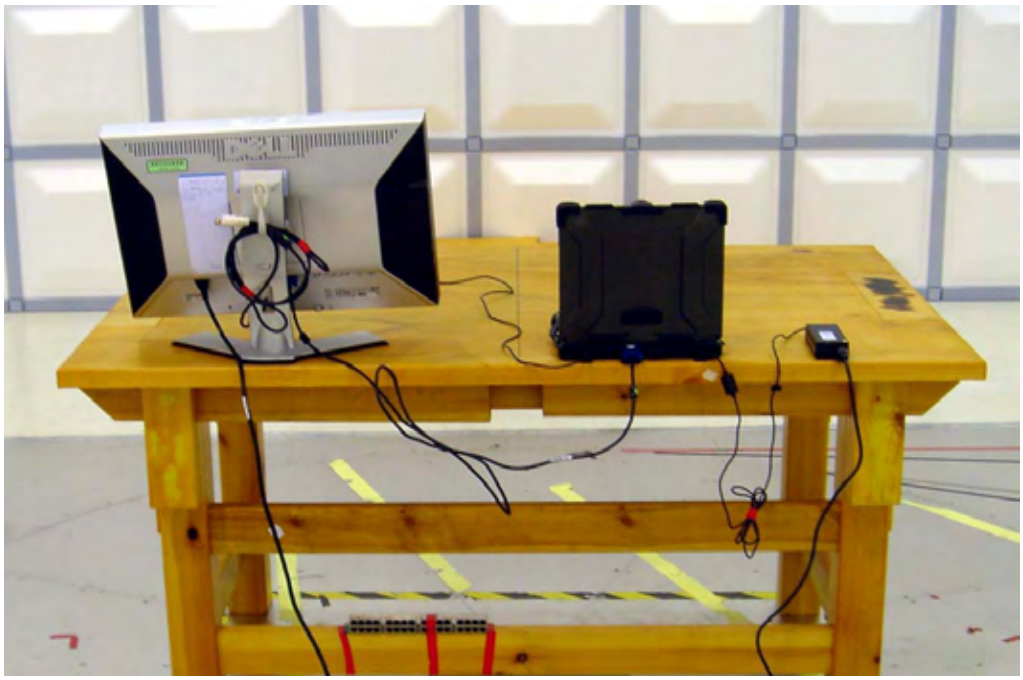
5.6 Appendix F: Photographs of EUT Configuration Test Set Up

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



5.7 Appendix G: Antenna Spec.

Please refer to the attached file.