TEST REPORT

of

FCC Part 15 Subpart B & C

Product : **Personal Computer**

Model(s): **MP57-D;MP57-DR; MP57-BDR; MP57-DU; MP55-D; MP55-DR; MP55-BDR; MP55-DU**

Applicant: **AOpen Inc.**

Address: **N0. 68 , Ruiguang Rd., Neihu District, Taipei, 114, Taiwan, R. O. C.**

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; TAF: 0997;IC: IC4164-1 ;
VCCI: R-1435, C-1440, T-299, R-2598, C-2845; NEMKO: ELA 113B
*Address:
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Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
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Report No.: **ISL-10LR010FC**
Issue Date : **2010/05/11**

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)
Test Procedure:	ANSI C63.4:2003 DA 00-705
Equipment Tested:	Personal Computer
Model:	MP57-D;MP57-DR; MP57-BDR; MP57-DU; MP55-D MP55-DR; MP55-BDR; MP55-DU
Applied by:	AOpen Inc.
Sample received Date:	2010/04/02
Final test Date :	2010/05/11
Test Result	PASS
Test Site:	Chamber 14, 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

Jim Chu/ Director

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 94 pages, including 1 cover page , 2 contents page, and 91 pages for the test description.

1.2 Test Results Summary

The Bluetooth 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(a)	AC Power Line Emissions	Pass	
15.247(b) (1)	Max. Peak Output Power	Pass	
15.209(a)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (d)	Conducted Emissions 30MHz – 25 GHz	Pass	
15.247 (d)	Band Edge Measurement	Pass	
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass	
15.247(a) (1)(ii)	Spectrum Bandwidth Of FHSS device	Pass	
15.247(a)(1)	Hopping Channel Separation	Pass	
15.247(a)(1)(iii)	Dwell Time	Pass	

2. Description of Equipment Under Test (EUT)

Description:	Personal Computer
Condition:	Pre-Production
Model:	MP57-D;MP57-DR; MP57-BDR; MP57-DU; MP55-D; MP55-DR; MP55-BDR; MP55-DU
Brand:	AOpen
Bluetooth Module:	Qcom (Model: QBTM400)
Frequency Range of Bluetooth:	2400 - 2483.5 MHz
Support channel:	79 Channels
Modulation Skill:	GFSK (1Mbps) DQPSK(2Mbps), 8DPSK(3Mbps)
Antennas Type: 81.EEU15.003),	IFA Antenna (WNC P/N: 69.B0002.0030 / made by WNC.
Antenna Connected:	Connected to RF connector on the PCB of the Bluetooth module .The user is not possible to change the antenna without disassembling the PC.
Antenna peak Gain:	-0.03 dBi
Power Type of Bluetooth module:	3.3V DC from PC

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:	Intel® Core™ i7 2.66GHz FSB: 1066MHz
Motherboard:	Aopen (Model: i57QMx-vP) or Aopen (Model: i57QMx-55)
Power Adapter Type:	Delta (Model: ADP-90CD BD) 90W Input: 100-240V, 1.5A, 50-60Hz Output: 20V, 4.5A
Serial ATA Hard Disk Driver:	Western Digital (Model: WD5000BEVT-00A0RT0)500GB
Optical Device:	BD Combo Driver Lite-On (Model: DL-4ETS)or DVD Super Milti Driver Lite-On (Model: DL-8ATS)
DIMM Memory:	Apacer 2GB DDR3 1066 x 2
IrDA Receiver:	one
Remote Control:	one
Front panel:	
USB 2.0 Port:	two 4-pins
Back panel:	
DVI Port:	one 29-pin
HDMI Port:	one 19-pin
USB 2.0 Port:	four 4-pins
RJ45 Port:	one 8-pin (10/100/1000Mbps)
Microphone Port:	one
Line-out Port:	one
Optical Coaxial Connector:	one
Y-Cable:	one (29-pin to 15-pin & 29-pin)
DVI & D-sub adapter:	one (29-pin to 15-pin)
Power Cord:	Non-shielded, Detachable
Maximum Display Resolution:	1920x1200

All types of component of the EUT have been tested. We present the worst case test data in the report. The test configurations are listed below:

Motherboard	Optical Device	Display mode	Display Resolution
Aopen (Model: i57QMx-vP)	Lite-On (Model: DL-4ETS)	DVI	1920x1200

Due to marketing demands, there are several models with alternative components listed below. All these models have built in the same Bluetooth module and the same Antenna in the same place.

Model	Motherboard	BD Combo Driver	DVD Super Milti Driver	Remote Control
MP57-BDR	i57QMx-vP	V	--	V
MP57-DR		--	V	V
MP57-D		--	V	--
MP57-DU		--	--	--
MP55-BDR	i57QMx-55	V	--	V
MP55-DR		--	V	V
MP55-D		--	V	--
MP55-DU		--	--	--

3. Description of Support Equipment

3.1 Description of Support Equipment

No	Unit	Model / Serial No.	Brand	Power Cord	FCC ID
1	24” LCD Monitor	2408FPW S/N: NA	DELL	Non-shielded, Detachable	FCC DoC
2	USB Keyboard	KU-0355 S/N: NA	acer	N/A	FCC DoC
3	USB Mouse	M-UVACR1 S/N: NA	acer	N/A	FCC DoC
4	Wireless Connectivity Test Set 01	N4010A S/N: MY48100200	Agilent	Non-shielded Detachable	

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 transceiver continuously transmit/receive RF signals
C. Repeat the above steps.

	Filename	Issued Date
InstallBlueSuite2.3	BlueTest3.exe	03/031/2010

3.1.2 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cable	100V~240V to EUT SPS	1.8M	Non-shielded, Detachable	Plastic Head
USB Data Cable	USB Mouse to EUT USB Port	1.8M	Shielded, Un-detachable	Metal Head
USB Data Cable	USB Keyboard to EUT USB Port	2.0M	Shielded, Un-detachable	Metal Head
Monitor Data Cable	Monitor D-SUB Port to EUT DVI Port	1.8M	Shielded, Detachable (with core)	Metal Head

4. TEST RESULTS

4.1 Powerline Conducted Emissions

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.

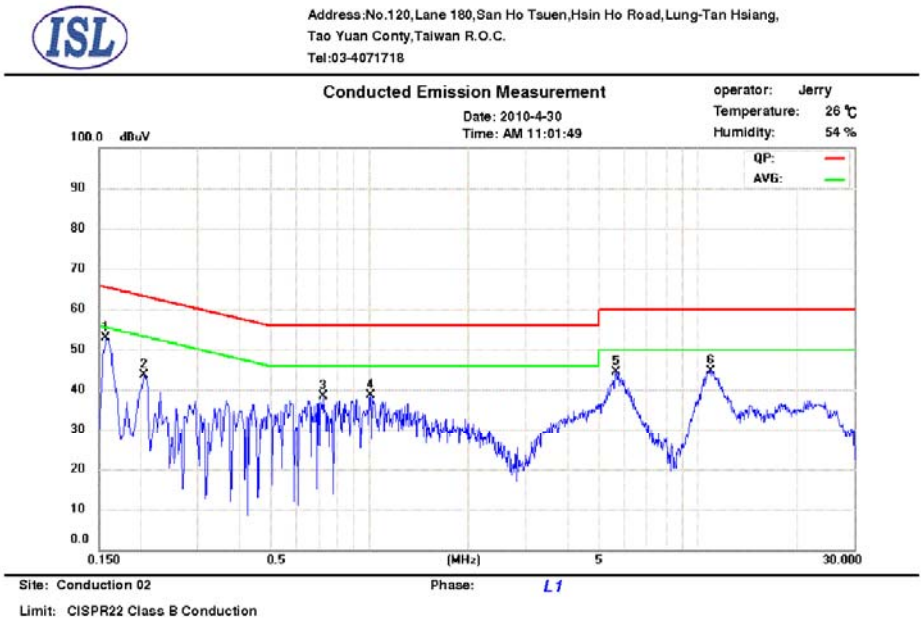
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

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

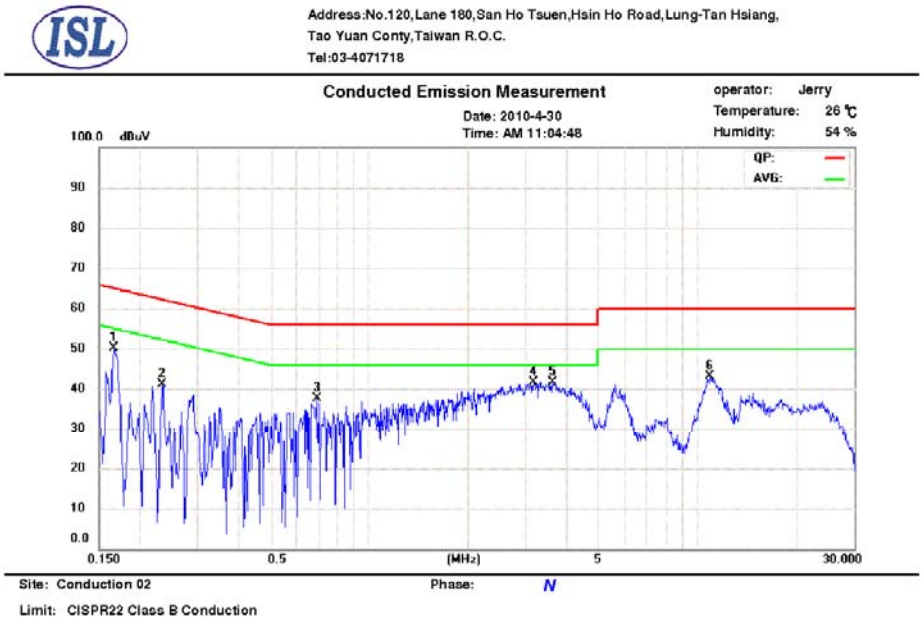
4.1.4 Test Data:

Power Line Conducted Emissions (Hot) Channel 00, 39, 78



No.	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
1	0.1580	0.14	0.02	37.15	65.5	-28.4	22.16	55.5	-33.4	
2	0.2060	0.14	0.02	31.79	63.3	-31.5	16.33	53.3	-37.0	
3	0.7260	0.17	0.04	33.06	56.0	-22.9	23.24	46.0	-22.7	
4	1.0060	0.18	0.04	32.32	56.0	-23.6	23.53	46.0	-22.4	
5	5.6740	0.32	0.14	39.55	60.0	-20.4	29.62	50.0	-20.3	
6	10.9740	0.48	0.18	40.64	60.0	-19.3	35.32	50.0	-14.6	

Power Line Conducted Emissions (Neutral) Channel 00, 39, 78



No.	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
1	0.1660	0.24	0.02	46.90	65.1	-18.2	30.76	55.1	-24.4	
2	0.2358	0.24	0.03	39.37	62.2	-22.8	28.57	52.2	-23.6	
3	0.6900	0.26	0.04	34.58	56.0	-21.4	21.68	46.0	-24.3	
4	3.1620	0.34	0.1	37.87	56.0	-18.1	30.13	46.0	-15.8	
5	3.6100	0.35	0.11	37.11	56.0	-18.8	29.16	46.0	-16.8	
6	10.9380	0.51	0.18	38.92	60.0	-21.0	33.66	50.0	-16.3	

* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 00, 39, 78 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

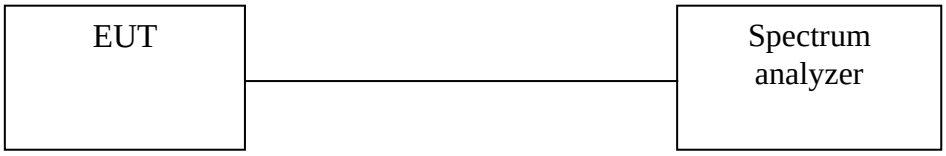
4.2 FHSS Maximum Peak Output Power

4.2.1 Test Procedure

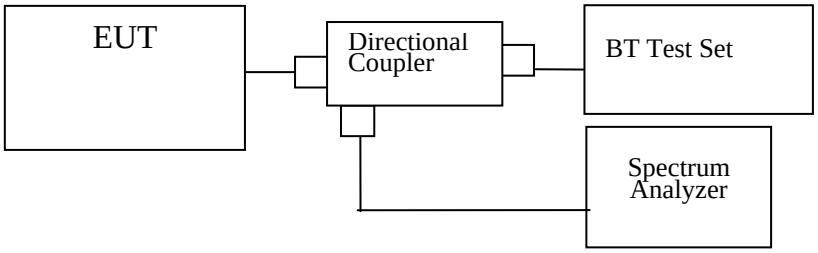
The Transmitter output of EUT was connected to the peak power analyzer.

4.2.2 Test Setup

Condition 1:



Condition 2:



4.2.3 Test Data

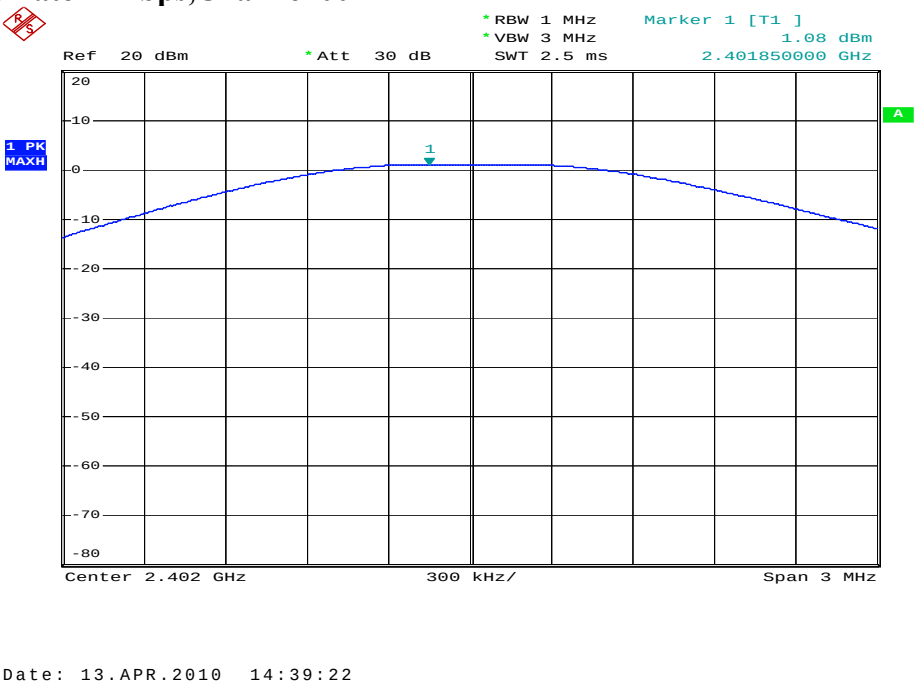
Maximum Peak Output Power

Data Rate: 1Mbps Temperature (℃):25

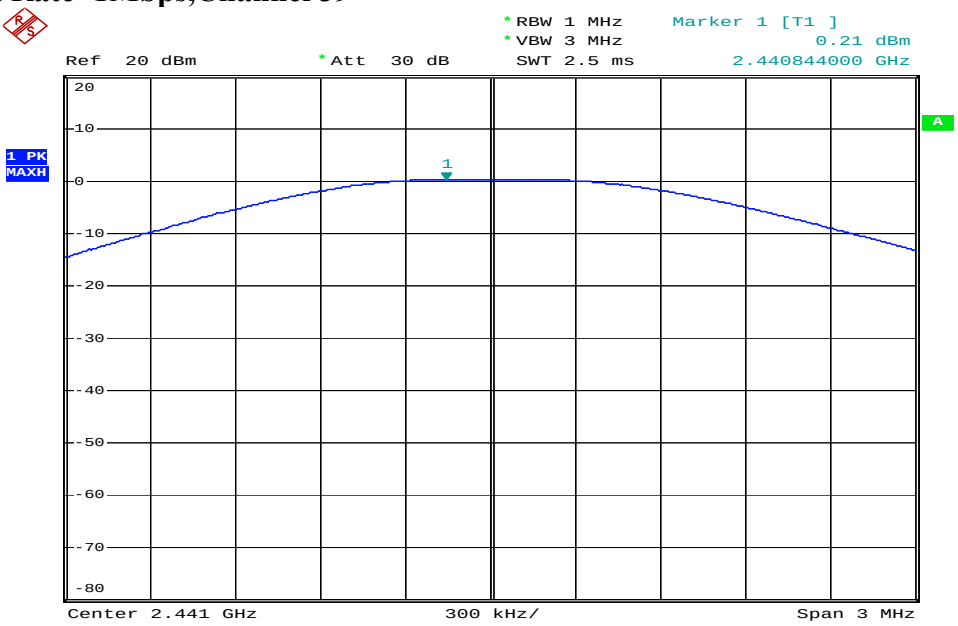
Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
00	**2402**	1.08	1.10	1.65	**2.18**	30	Pass
39	**2441**	0.21	1.10	1.35	1.31	30	Pass
78	**2480**	-0.65	1.10	1.11	0.45	30	Pass

Data Rate=1Mbps,Channel 00

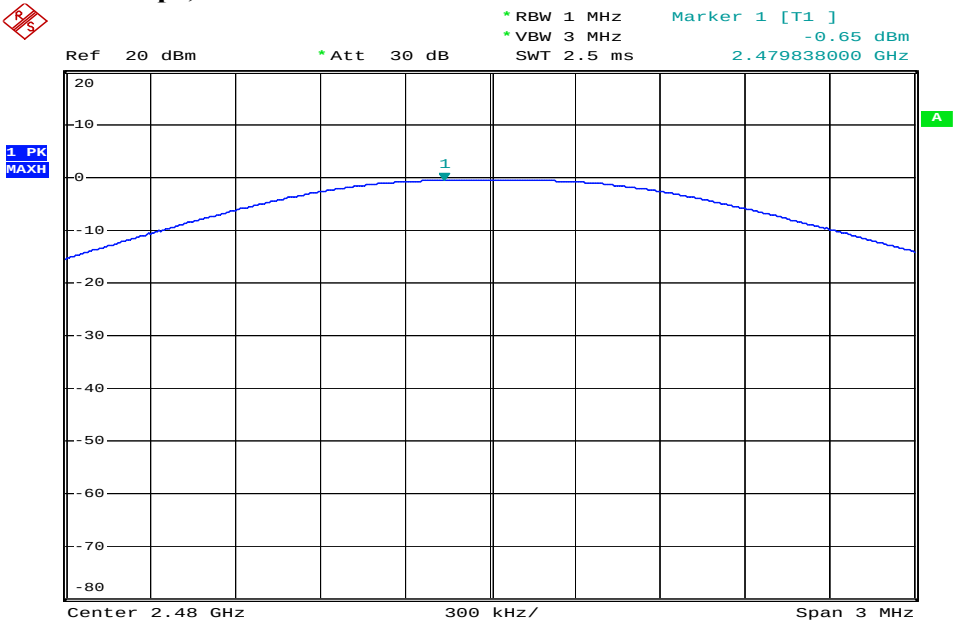


Data Rate=1Mbps,Channel 39



Date: 13.APR.2010 15:06:35

Data Rate=1Mbps,Channel 78



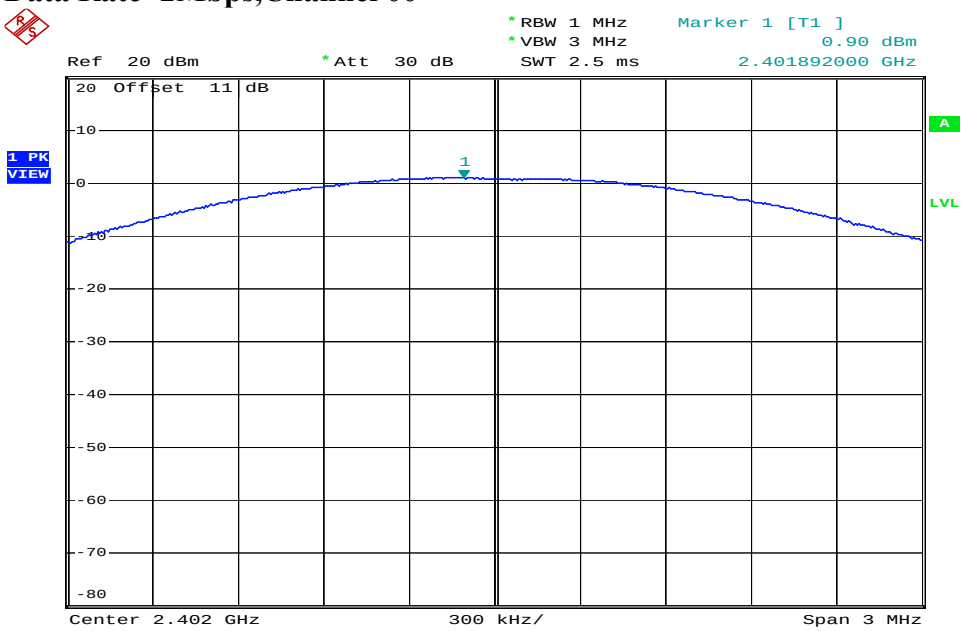
Date: 13.APR.2010 15:07:13

Data Rate: 2Mbps Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

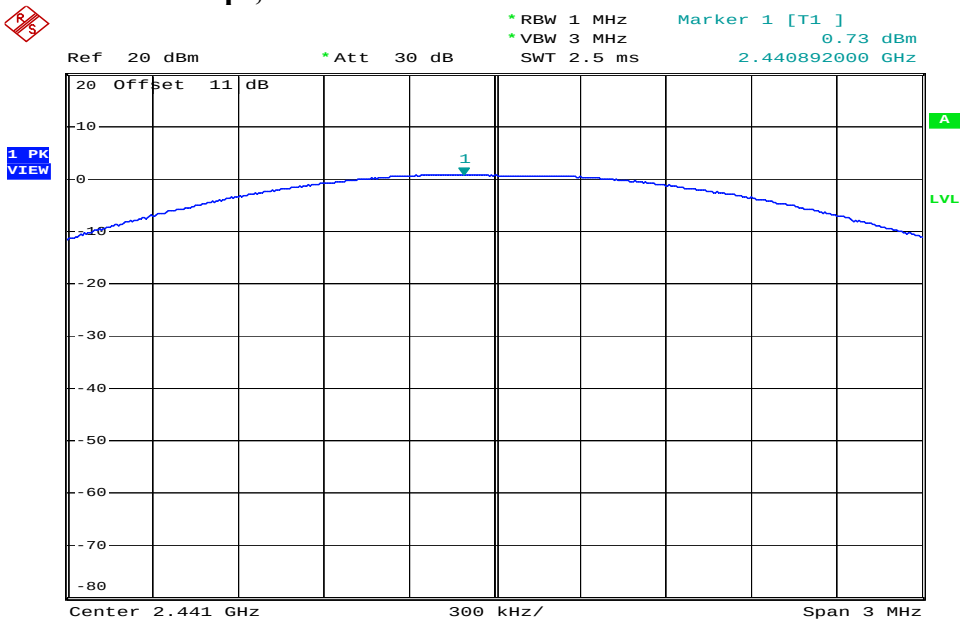
Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
00	**2402**	0.90	1.10	1.58	2.00	30	Pass
39	**2441**	0.73	1.10	1.52	1.83	30	Pass
78	**2480**	-0.79	1.10	1.07	0.31	30	Pass

Data Rate=2Mbps,Channel 00



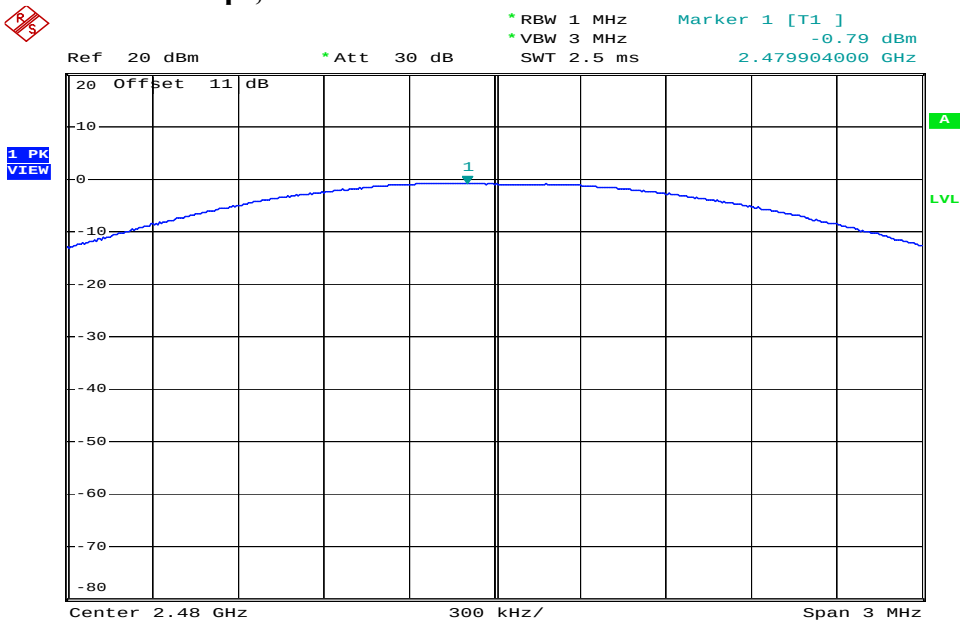
Date: 13.APR.2010 18:47:15

Data Rate=2Mbps,Channel 39



Date: 13.APR.2010 18:47:56

Data Rate=2Mbps,Channel 78



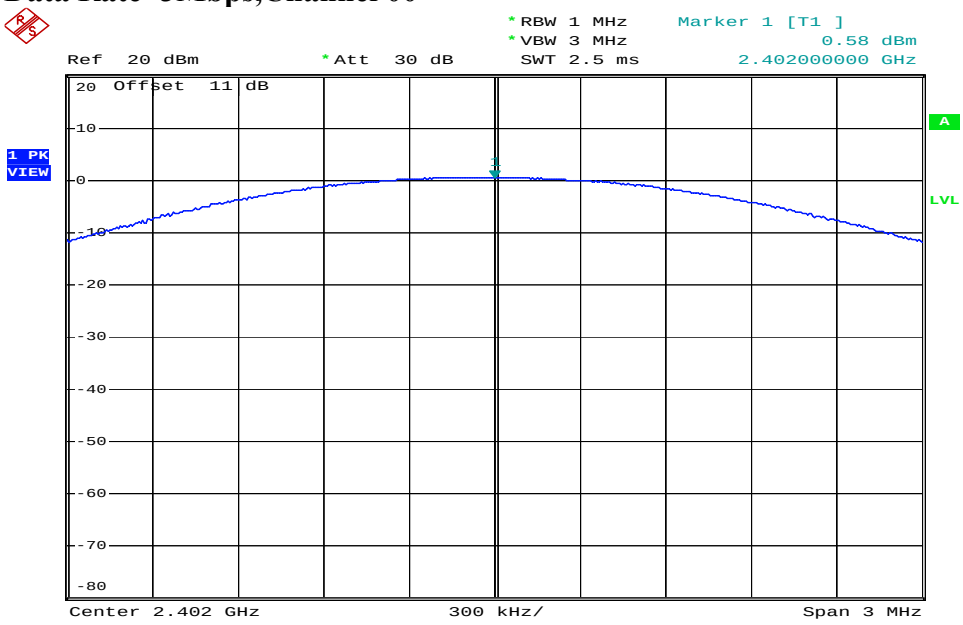
Date: 13.APR.2010 18:48:42

Data Rate: 3Mbps Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
00	**2402**	0.58	1.10	1.47	1.68	30	Pass
39	**2441**	0.41	1.10	1.42	1.51	30	Pass
78	**2480**	-0.91	1.10	1.04	0.19	30	Pass

Data Rate=3Mbps,Channel 00



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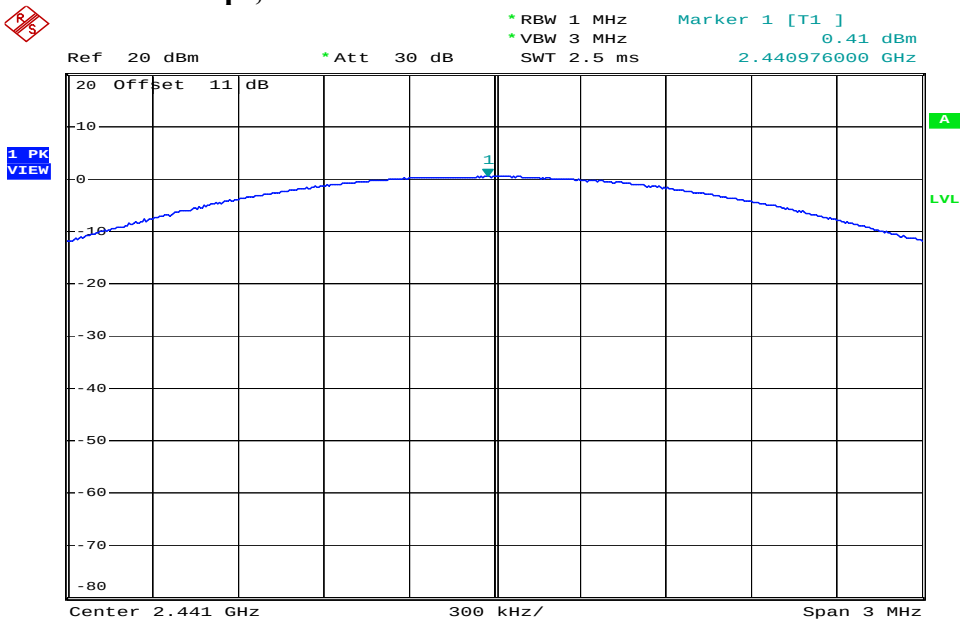
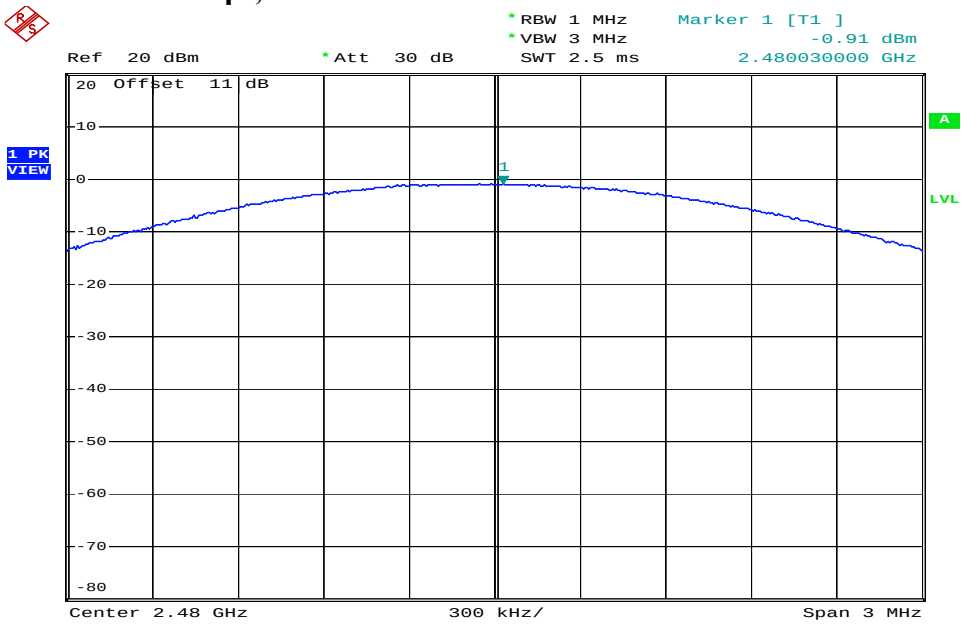
Data Rate=3Mbps,Channel 39



Date: 13.APR.2010 19:49:55

Data Rate=3Mbps,Channel 78



Date: 13.APR.2010 19:50:51

4.3 Radiated Emission Measurement

4.3.1 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.

4.3.2 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 according to EMI Receiver/Spectrum Analyzer Configuration.

For the test of 2^{nd} to 10^{th} harmonics frequencies, the equipment setup was also referred 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.

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

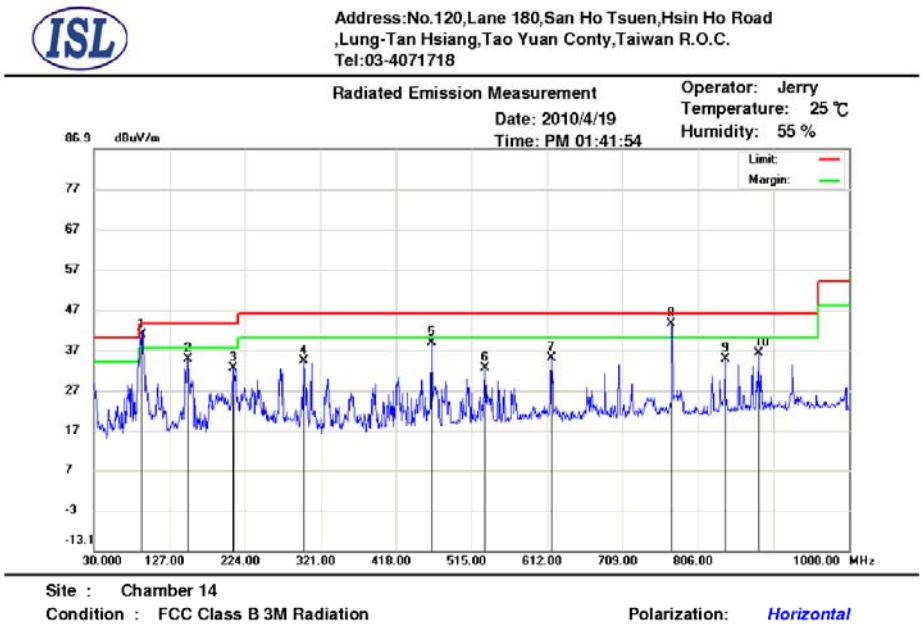
Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz

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)	10 Hz

4.3.4 Test Data (30MHz – 1GHz):

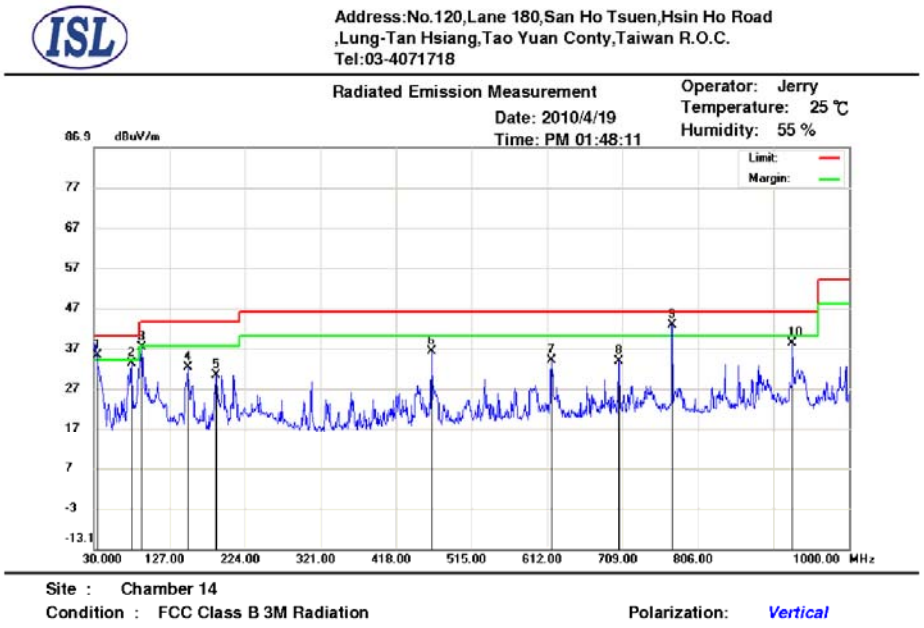
30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 00, 39, 78



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
1	91.1100	61.98	9.42	0.6	31.28	40.72	43.50	-2.78	254	113	peak
2	150.2800	53.99	11.08	0.8	31.15	34.72	43.50	-8.78	351	256	peak
3	209.4500	52.07	10.49	0.9	30.99	32.47	43.50	-11.03	100	60	peak
4	299.6600	50.16	13.79	1	30.72	34.23	46.00	-11.77	322	328	peak
5	463.5900	50.71	17.26	1.3	30.6	38.67	46.00	-7.33	231	57	peak
6	532.4600	43.45	18.35	1.36	30.55	32.61	46.00	-13.39	100	175	peak
7	617.8200	44.94	19.11	1.5	30.55	35.00	46.00	-11.00	247	53	peak
8	772.0500	52.01	20.32	1.64	30.53	43.44	46.00	-2.56	298	246	peak
9	840.9200	42.47	21.09	1.78	30.49	34.85	46.00	-11.15	168	1	peak
10	884.5700	43.56	21.41	1.8	30.43	36.34	46.00	-9.66	187	223	peak

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

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 00, 39, 78



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
1	33.8800	48.59	17.37	0.4	31.1	35.26	40.00	-4.74	100	100	peak
2	78.5000	56.64	7.38	0.6	31.26	33.36	40.00	-6.64	309	230	peak
3	91.1100	58.61	9.42	0.6	31.28	37.35	43.50	-6.15	100	323	peak
4	150.2800	51.59	11.08	0.8	31.15	32.32	43.50	-11.18	279	50	peak
5	187.1400	50.87	9.66	0.87	31.05	30.35	43.50	-13.15	143	307	peak
6	463.5900	48.23	17.26	1.3	30.6	36.19	46.00	-9.81	100	102	peak
7	617.8200	43.85	19.11	1.5	30.55	33.91	46.00	-12.09	100	152	peak
8	704.1500	43.02	19.64	1.6	30.5	33.76	46.00	-12.24	376	168	peak
9	773.0200	51.29	20.33	1.65	30.53	42.74	46.00	-3.26	365	244	peak
10	927.2500	45.03	21.77	1.85	30.39	38.26	46.00	-7.74	113	313	peak

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

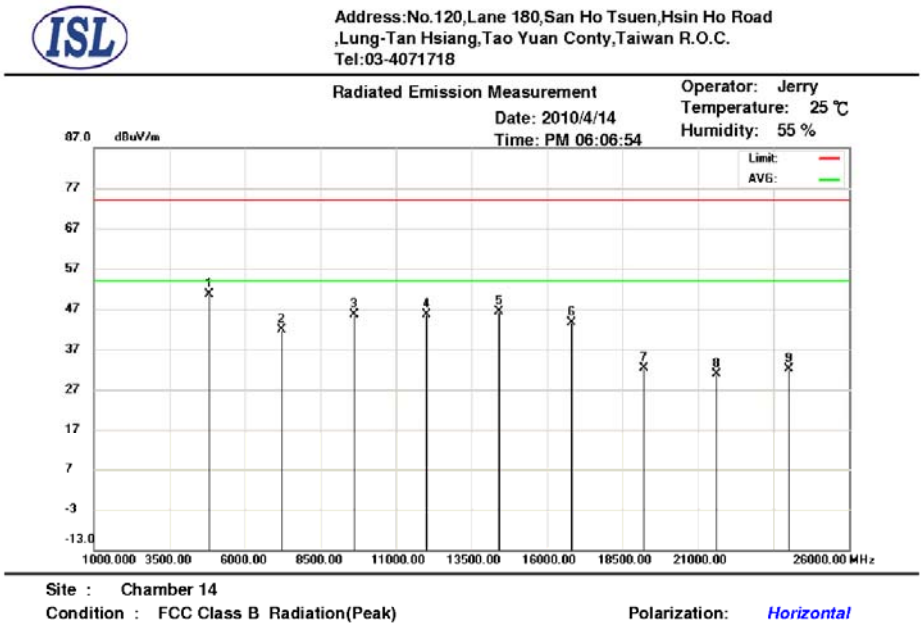
NOTE:

- During the Pre-test, the EUT has been tested for Channel 00, 39, 78 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

4.3.5 Test Data (1GHz – 25 GHz)

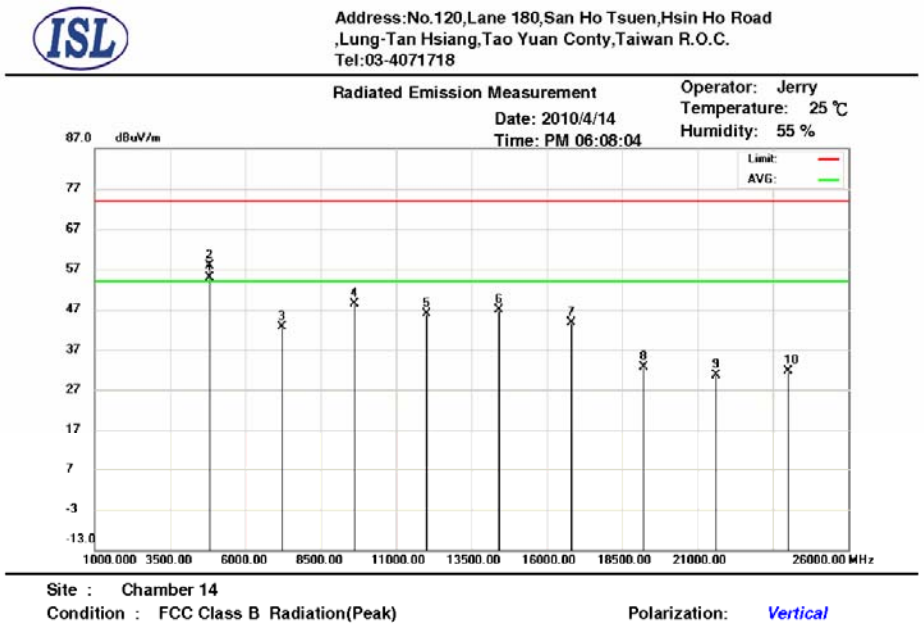
1GHz~ 25 GHz (Horizontal), Channel 00: 2402 MHz



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
1	4804.000	49.80	33.29	2.82	35.24	50.67	74.00	-23.33	280	5	peak
2	7206.000	36.26	37.73	3.38	35.44	41.93	74.00	-32.07	159	148	peak
3	9608.000	37.77	39.78	3.92	35.78	45.69	74.00	-28.31	155	27	peak
4	12010.000	34.84	41.41	4.4	35.09	45.56	74.00	-28.44	100	16	peak
5	14412.000	32.15	43.45	4.72	33.98	46.34	74.00	-27.66	188	117	peak
6	16814.000	30.83	41.5	5.26	34.06	43.53	74.00	-30.47	334	166	peak
7	19216.000	29.00	31.99	5.7	34.2	32.49	74.00	-41.51	100	53	peak
8	21618.000	26.96	32.45	6.02	34.67	30.76	74.00	-43.24	158	252	peak
9	24020.000	27.72	33.11	6.4	35.04	32.19	74.00	-41.81	100	2	peak

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

1GHz~ 25 GHz (Vertical), Channel 00: 2402 MHz



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
1	4803.940	54.04	33.29	2.82	35.24	54.91	54.00	* 0.91	100	0	AVG
2	4803.975	56.95	33.29	2.82	35.24	57.82	74.00	-16.18	100	0	peak
3	7206.000	36.99	37.73	3.38	35.44	42.66	74.00	-31.34	300	322	peak
4	9608.000	40.41	39.78	3.92	35.78	48.33	74.00	-25.67	139	152	peak
5	12010.000	35.25	41.41	4.4	35.09	45.97	74.00	-28.03	200	144	peak
6	14412.000	32.81	43.45	4.72	33.98	47.00	74.00	-27.00	338	81	peak
7	16814.000	30.97	41.5	5.26	34.06	43.67	74.00	-30.33	389	235	peak
8	19216.000	29.04	31.99	5.7	34.2	32.53	74.00	-41.47	294	315	peak
9	21618.000	26.92	32.45	6.02	34.67	30.72	74.00	-43.28	100	156	peak
10	24020.000	27.19	33.11	6.4	35.04	31.66	74.00	-42.34	138	70	peak

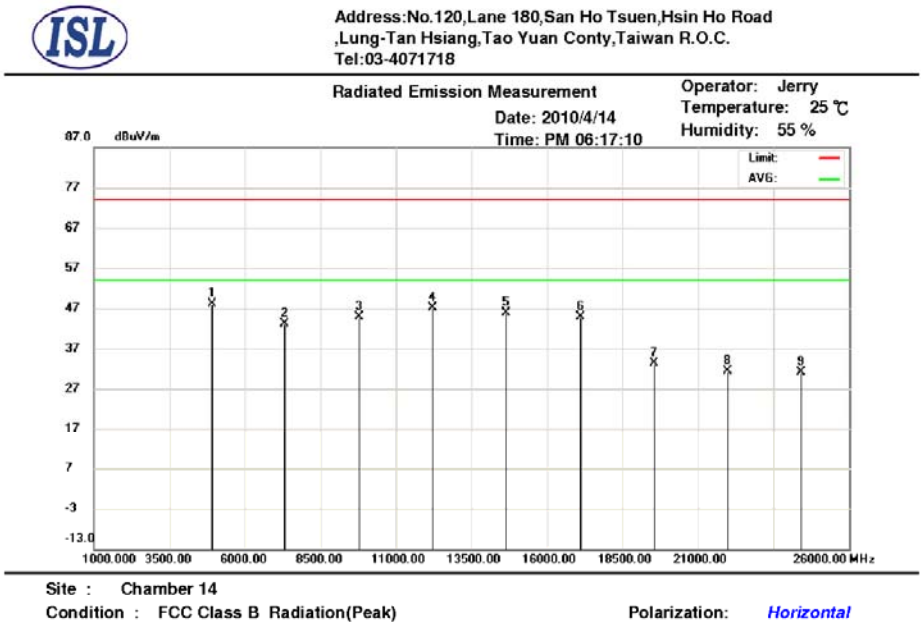
*:Maximum data x:Over limit !:over margin

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 /100)= -30.1 dB.
  Average value = Average Emission + duty cycle correlation factor = 54.91- 30.1 = 24.81, Margin = -29.19.
- 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.

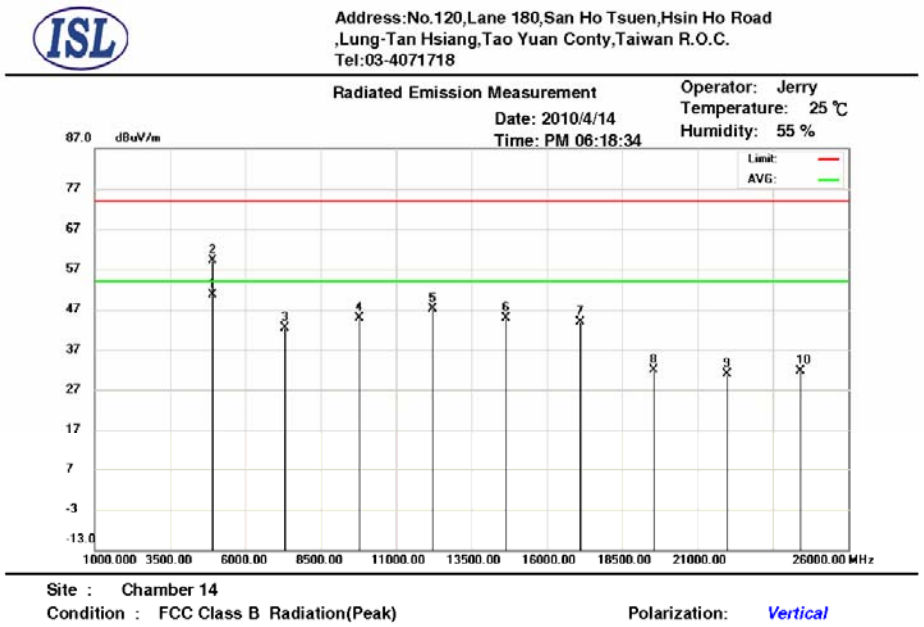
1GHz~ 25 GHz (Horizontal), Channel 39: 2441 MHz



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
1	4882.000	47.13	33.49	2.85	35.22	48.25	74.00	-25.75	100	46	peak
2	7323.000	37.13	37.92	3.43	35.46	43.02	74.00	-30.98	213	199	peak
3	9764.000	36.96	39.75	3.95	35.75	44.91	74.00	-29.09	100	56	peak
4	12205.000	35.93	41.52	4.44	34.85	47.04	74.00	-26.96	225	36	peak
5	14646.000	31.94	43.36	4.76	34.25	45.81	74.00	-28.19	100	19	peak
6	17087.000	30.39	43.02	5.32	33.87	44.86	74.00	-29.14	100	226	peak
7	19528.000	30.21	32.1	5.71	34.62	33.40	74.00	-40.60	166	144	peak
8	21969.000	27.62	32.59	6.09	34.88	31.42	74.00	-42.58	370	120	peak
9	24410.000	27.10	33.26	6.48	35.74	31.10	74.00	-42.90	236	203	peak

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

1GHz~ 25 GHz (Vertical) Channel 39: 2441 MHz



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
1	4881.875	49.56	33.49	2.85	35.22	50.68	54.00	*-3.32	100	0	AVG
2	4881.960	58.01	33.49	2.85	35.22	59.13	74.00	-14.87	100	0	peak
3	7323.000	36.39	37.92	3.43	35.46	42.28	74.00	-31.72	396	42	peak
4	9764.000	36.99	39.75	3.95	35.75	44.94	74.00	-29.06	213	59	peak
5	12205.000	35.96	41.52	4.44	34.85	47.07	74.00	-26.93	100	189	peak
6	14646.000	30.93	43.36	4.76	34.25	44.80	74.00	-29.20	100	107	peak
7	17087.000	29.48	43.02	5.32	33.87	43.95	74.00	-30.05	241	340	peak
8	19528.000	28.66	32.1	5.71	34.62	31.85	74.00	-42.15	225	300	peak
9	21969.000	27.08	32.59	6.09	34.88	30.88	74.00	-43.12	105	133	peak
10	24410.000	27.64	33.26	6.48	35.74	31.64	74.00	-42.36	100	284	peak

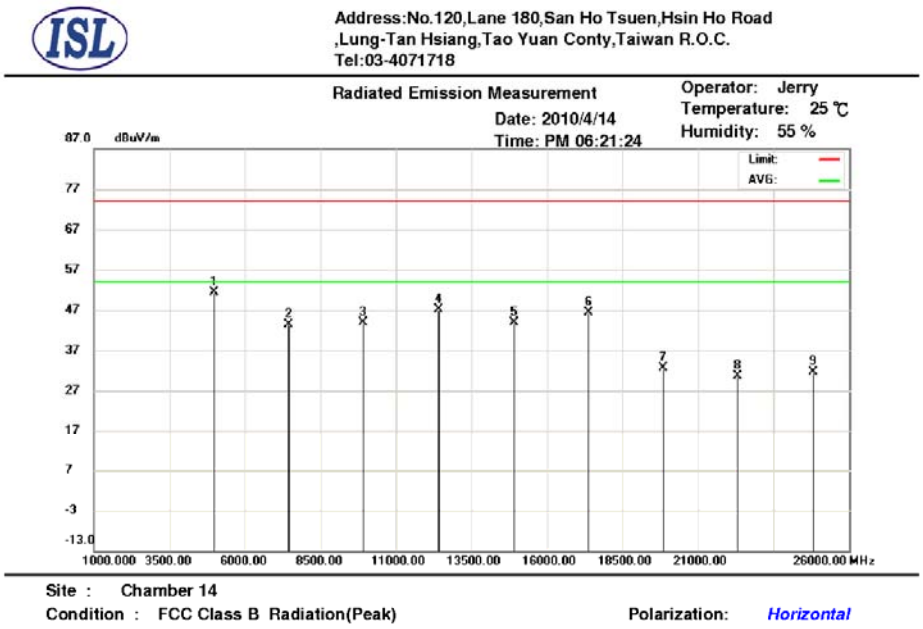
*:Maximum data x:Over limit !:over margin

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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 /100)= -30.1 dB.
  Average value = Average Emission + duty cycle correlation factor = 50.68 - 30.1 = 20.58, Margin = -33.42.
- 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.

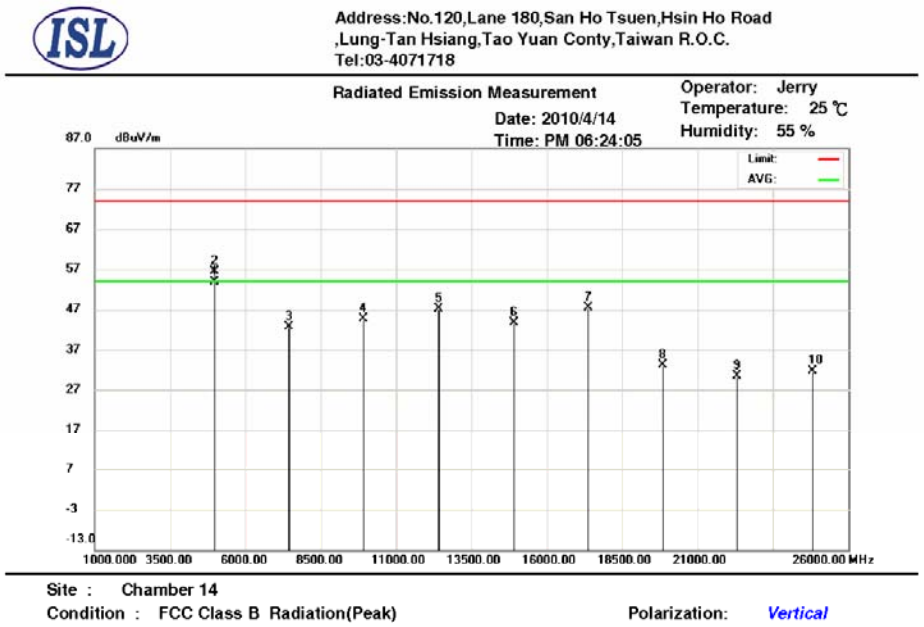
1GHz~ 25 GHz (Horizontal), Channel 78: 2480 MHz



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
1	4960.000	50.10	33.7	2.88	35.21	51.47	74.00	-22.53	294	4	peak
2	7440.000	37.25	38.1	3.48	35.49	43.34	74.00	-30.66	300	216	peak
3	9920.000	36.02	39.72	3.98	35.72	44.00	74.00	-30.00	246	288	peak
4	12400.000	35.58	41.64	4.48	34.62	47.08	74.00	-26.92	325	292	peak
5	14880.000	30.77	42.66	4.85	34.48	43.80	74.00	-30.20	228	268	peak
6	17360.000	30.41	44.66	5.37	34.09	46.35	74.00	-27.65	350	8	peak
7	19840.000	29.64	32.1	5.77	34.87	32.64	74.00	-41.36	293	119	peak
8	22320.000	27.01	32.73	6.1	35.09	30.75	74.00	-43.25	100	239	peak
9	24800.000	27.26	33.48	6.56	35.66	31.64	74.00	-42.36	269	3	peak

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

1GHz~ 25 GHz (Vertical), Channel 78 : 2480 MHz



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
1	4959.890	52.39	33.7	2.88	35.21	53.76	54.00	-0.24	100	0	AVG
2	4959.965	55.02	33.7	2.88	35.21	56.39	74.00	-17.61	100	0	peak
3	7440.000	36.56	38.1	3.48	35.49	42.65	74.00	-31.35	318	258	peak
4	9920.000	36.55	39.72	3.98	35.72	44.53	74.00	-29.47	214	46	peak
5	12400.000	35.73	41.64	4.48	34.62	47.23	74.00	-26.77	234	340	peak
6	14880.000	30.48	42.66	4.85	34.48	43.51	74.00	-30.49	190	113	peak
7	17360.000	31.43	44.66	5.37	34.09	47.37	74.00	-26.63	131	302	peak
8	19840.000	30.04	32.1	5.77	34.87	33.04	74.00	-40.96	311	215	peak
9	22320.000	26.68	32.73	6.1	35.09	30.42	74.00	-43.58	202	314	peak
10	24800.000	27.26	33.48	6.56	35.66	31.64	74.00	-42.36	334	159	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 DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: 20log(3.125 /100)= -30.1 dB.
  Average value = Average Emission + duty cycle correlation factor = 53.76 - 30.1 = 23.66, Margin = -31.34.
- 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.

4.4 Conducted Emissions Measurement

4.4.1 Test Procedure

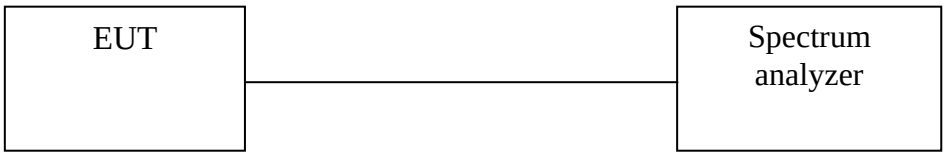
Conducted

1. The transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   RBW: 100KHz
   VBW: 100KHz
   Frequency: 30MHz ~ 25GHz.
   Sweep time: auto
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed

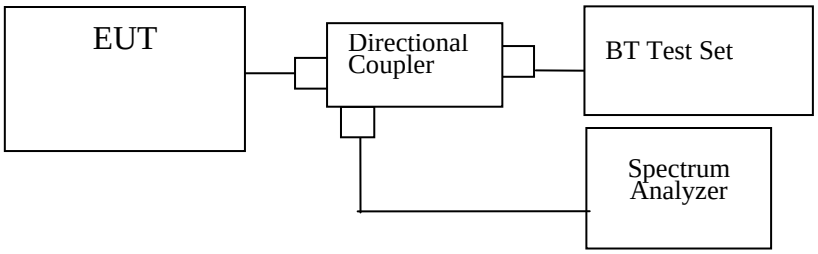
4.4.2 Test Setup

Conducted

Condition 1:

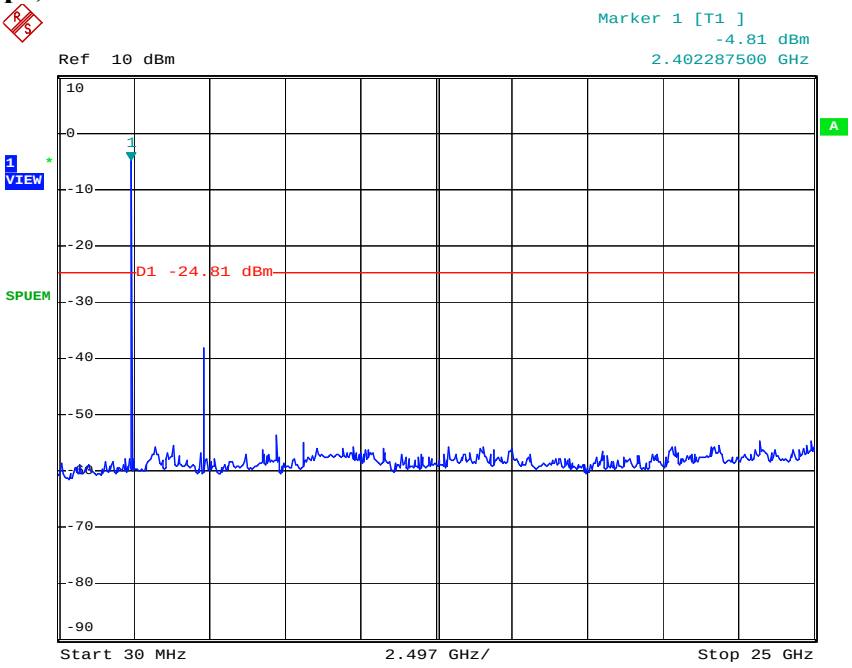


Condition 2:



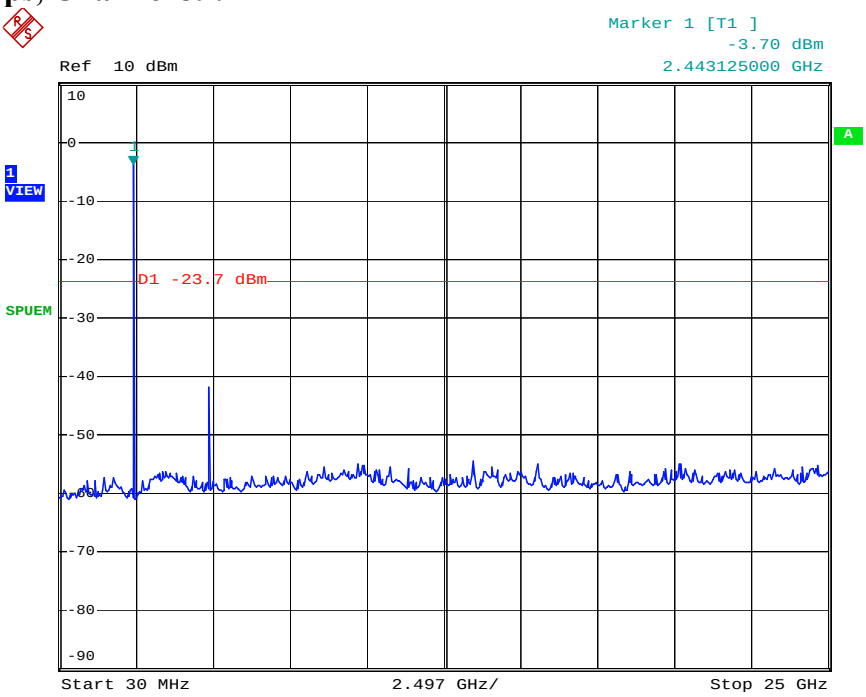
4.4.3 Test Data:

1Mbps, Channel 00: 2402 MHz



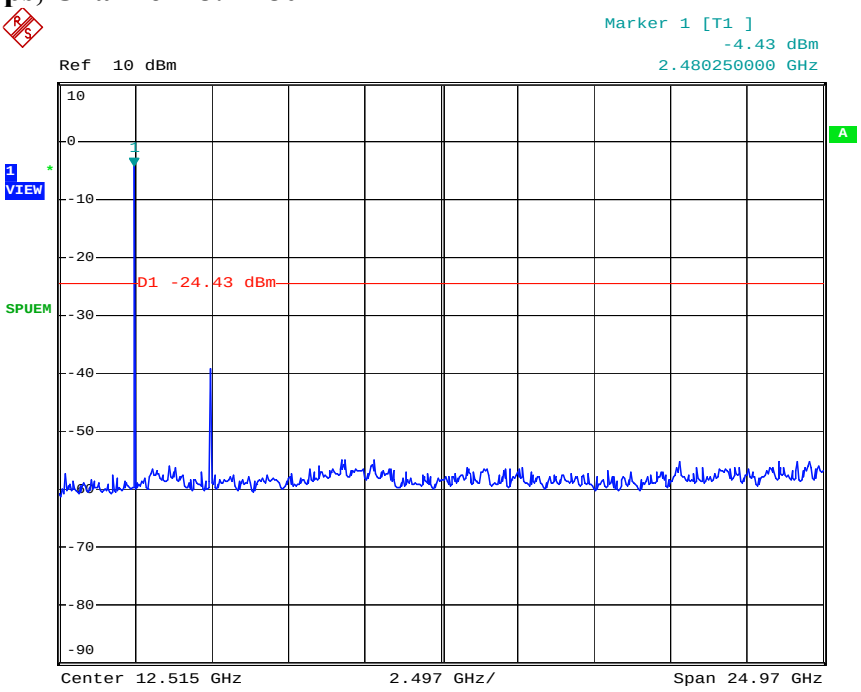
Date: 18.MAY.2010 16:15:39

1Mbps, Channel 39: 2441 MHz



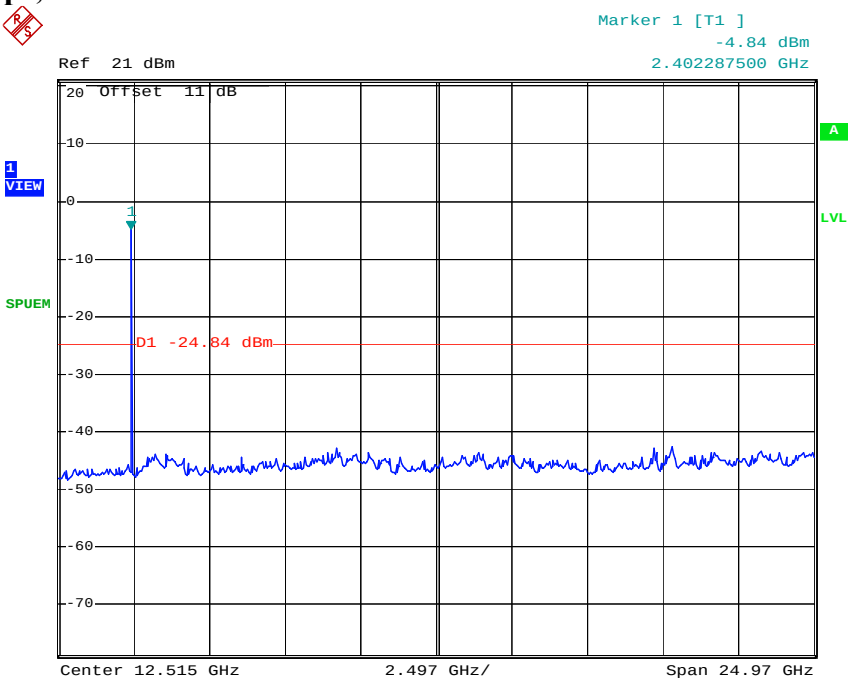
Date: 18.MAY.2010 17:43:02

1Mbps, Channel 78: 2480 MHz



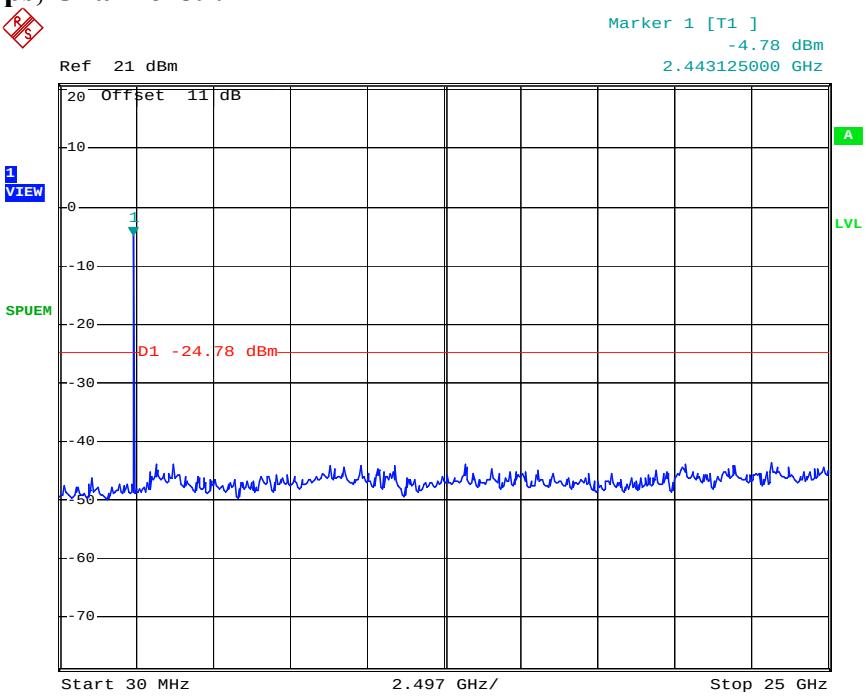
Date: 18.MAY.2010 16:19:12

2Mbps, Channel 00: 2402 MHz



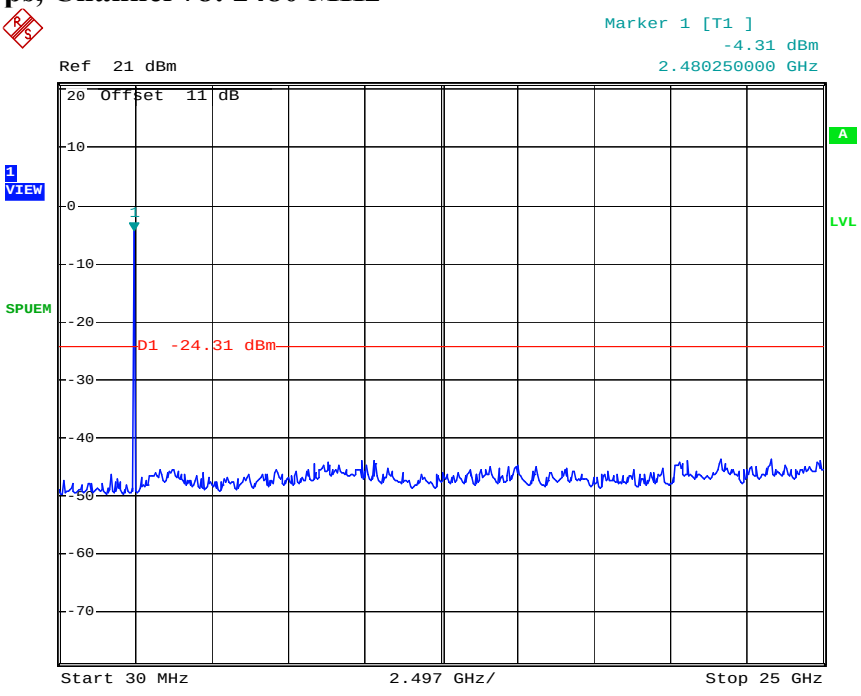
Date: 18.MAY.2010 16:57:41

2Mbps, Channel 39: 2441 MHz



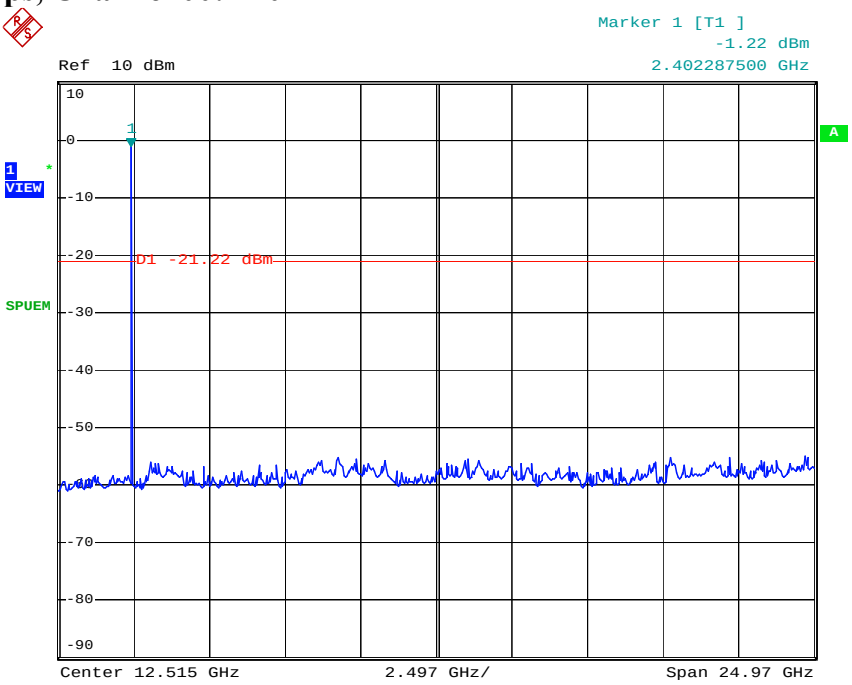
Date: 18.MAY.2010 17:36:15

2Mbps, Channel 78: 2480 MHz



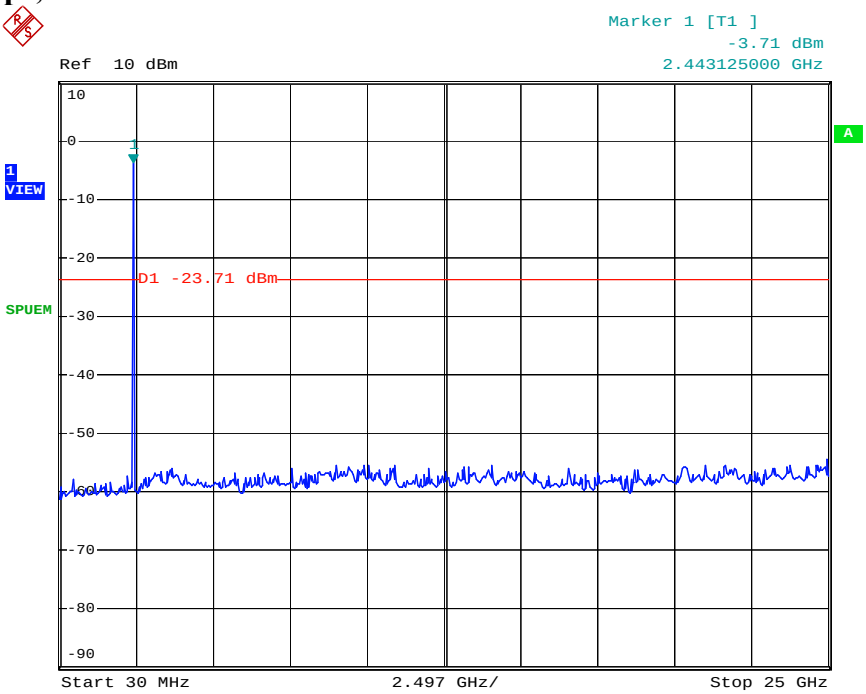
Date: 18.MAY.2010 17:38:10

3Mbps, Channel 00: 2402 MHz



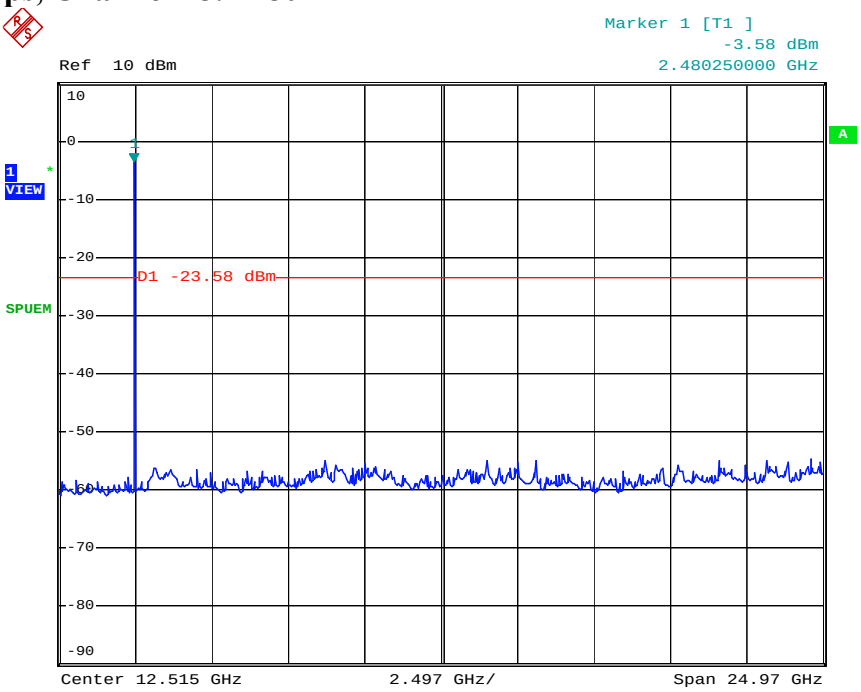
Date: 18.MAY.2010 16:29:21

3Mbps, Channel 39: 2441 MHz



Date: 18.MAY.2010 17:45:18

3Mbps, Channel 78: 2480 MHz



Date: 18.MAY.2010 16:37:47

4.5 Band Edge Measurement

4.5.1 Test Procedure

Conducted

3. 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: 2.375GHz, 2.5GHz.
4. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
5. Find the next peak frequency outside the operation frequency band

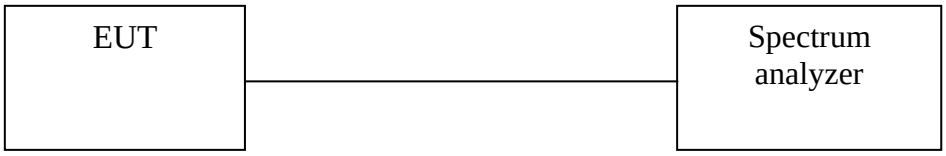
Radiated

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: 2.375GHz, 2.5GHz.
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

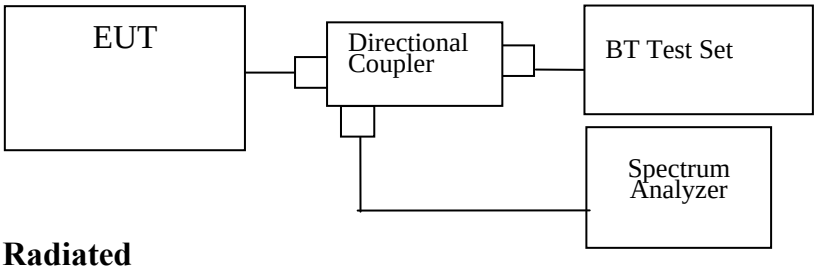
4.5.2 Test Setup

Conducted

Condition 1:



Condition 2:



Radiated

Same as *Radiated Emission Measurement*

4.5.3 Test Data:

Table: Band Edge measurement

Conducted Test

Data Rate: **1Mbps** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2403	107.93	---	---
Outside band	2400	71.43	36.5	Pass
78	2479.98	106.32	---	---
Outside band	2484	63.02	43.3	Pass

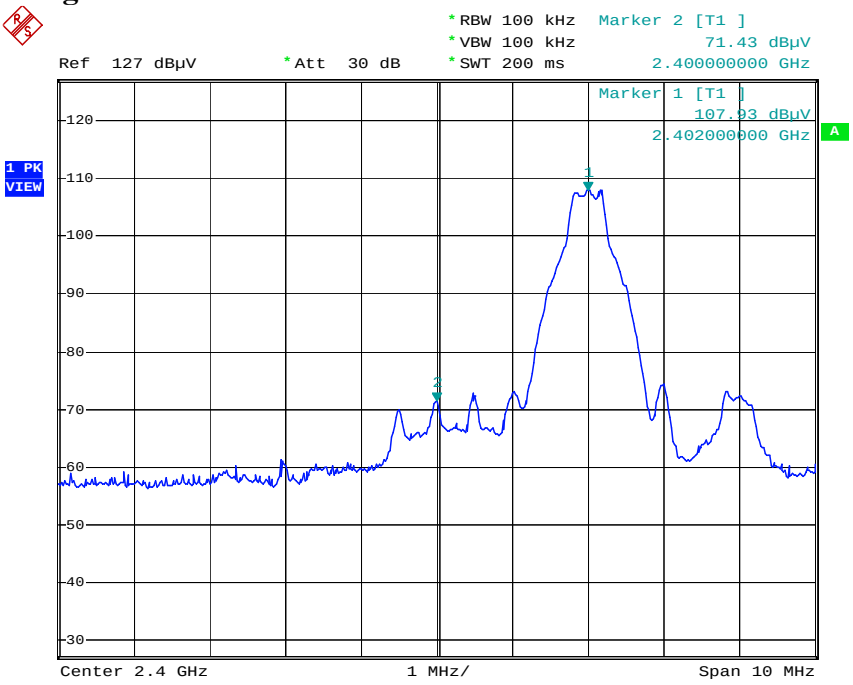
Radiated Test

Data Rate: **1Mbps** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):60

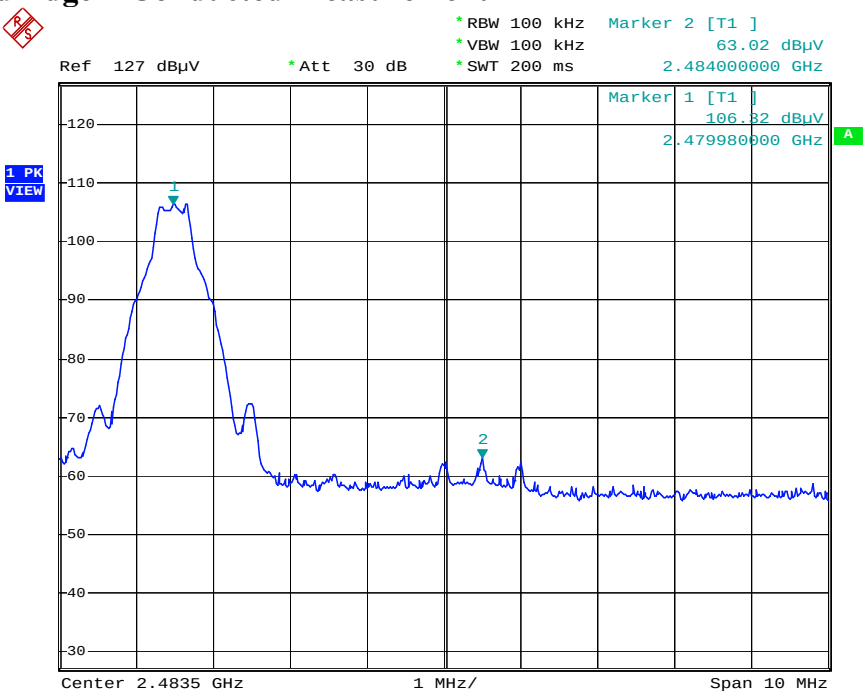
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402	58.7	---	---
Outside band	2400	21.79	36.91	Pass
78	2480	52.65	---	---
Outside band	2483.5	13.76	38.89	Pass

Band Edge Conducted Measurement



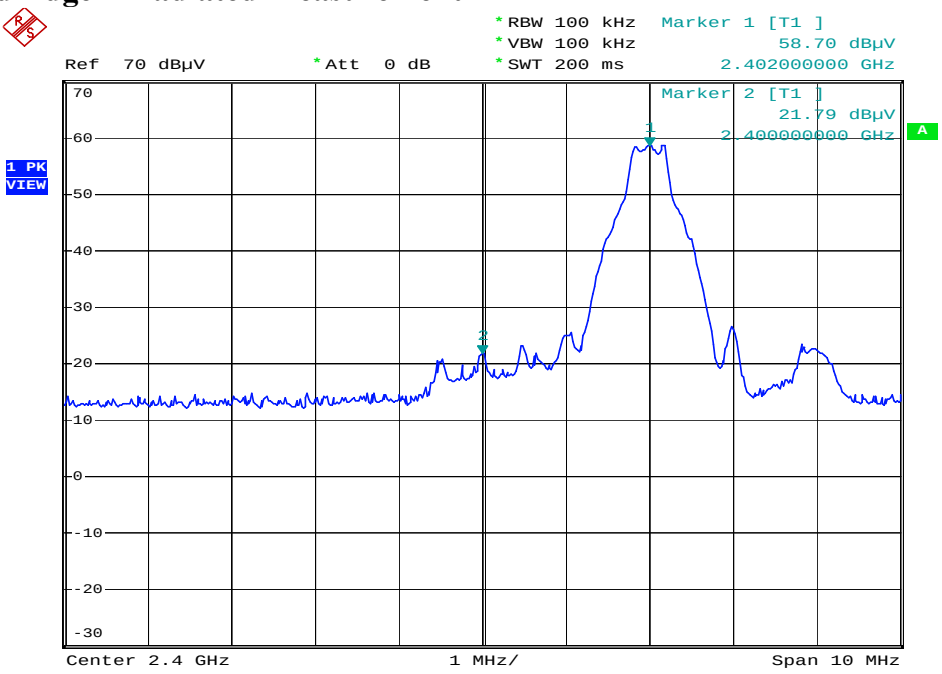
Date: 13.APR.2010 15:30:39

Band Edge Conducted Measurement



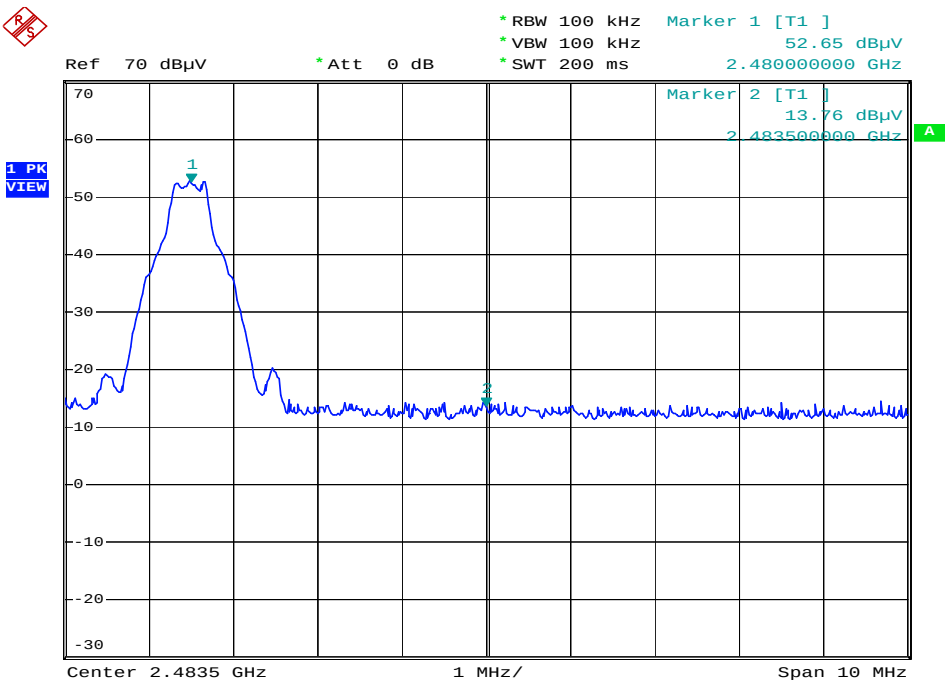
Date: 13.APR.2010 15:32:52

Band Edge Radiated Measurement



Date: 14.APR.2010 14:53:10

Band Edge Radiated Measurement



Date: 14.APR.2010 15:26:53

Table: Band Edge measurement

Conducted Test

Data Rate: **2Mbps** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402.02	107.78	---	---
Outside band	2400	62.3	45.48	Pass
78	2480.02	105.76	---	---
Outside band	2483.5	64.75	41.01	Pass

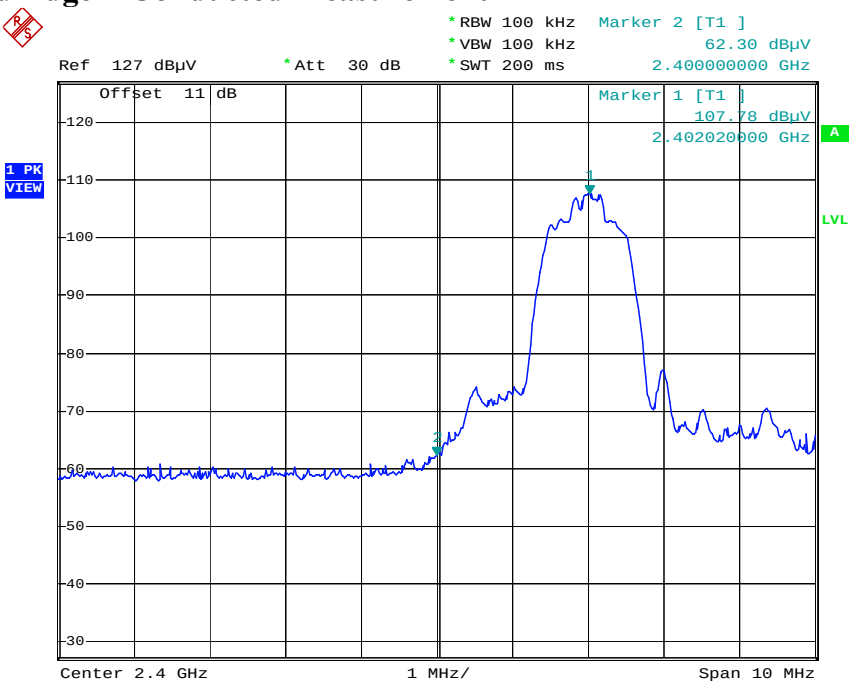
Radiated Test

Data Rate: **2Mbps** **EDR Mode** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):60

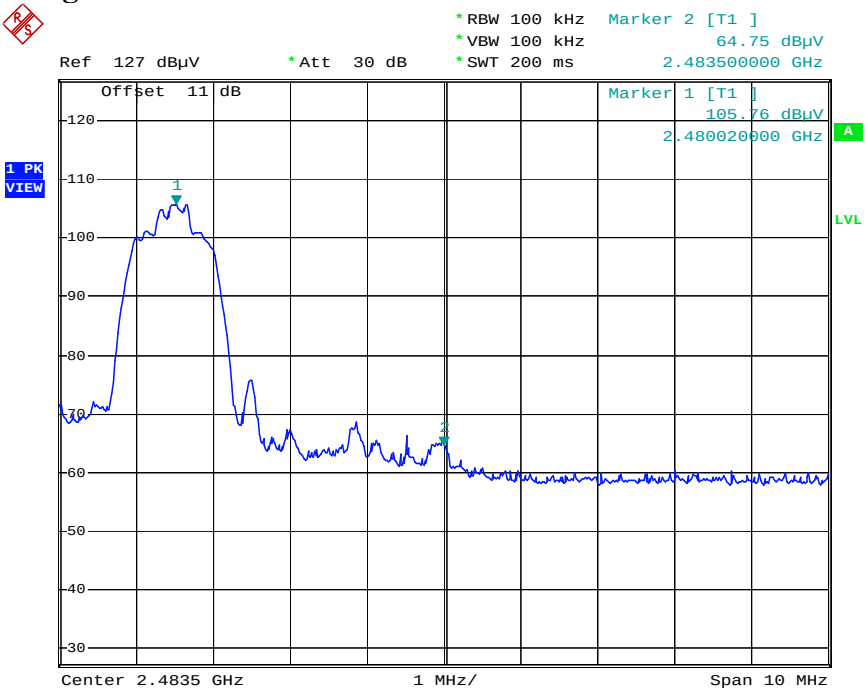
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402	59.82	---	---
Outside band	2400	17.6	42.22	Pass
78	2480	54.15	---	---
Outside band	2483.5	15.57	38.58	Pass

Band Edge Conducted Measurement



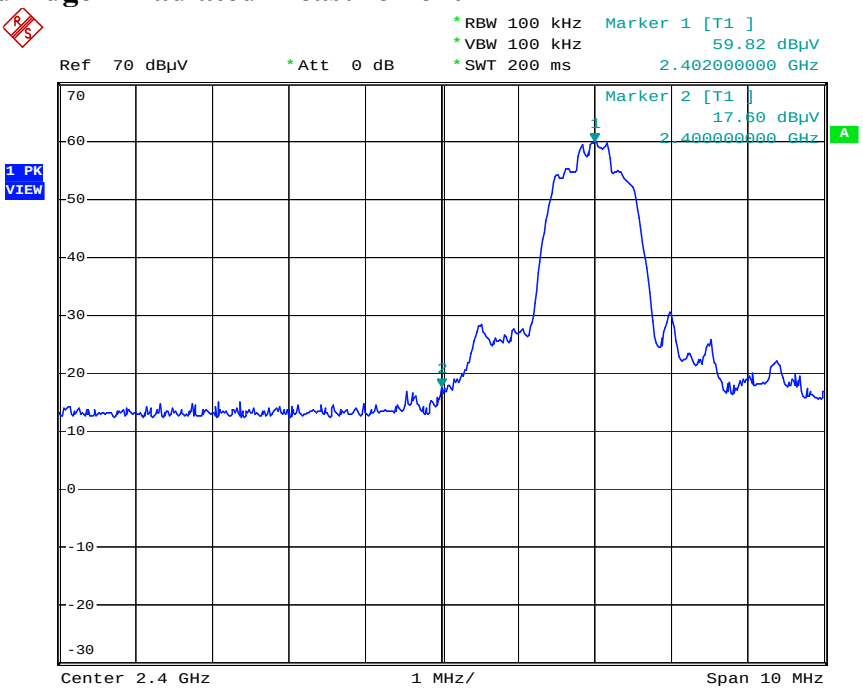
Date: 13.APR.2010 19:02:52

Band Edge Conducted Measurement



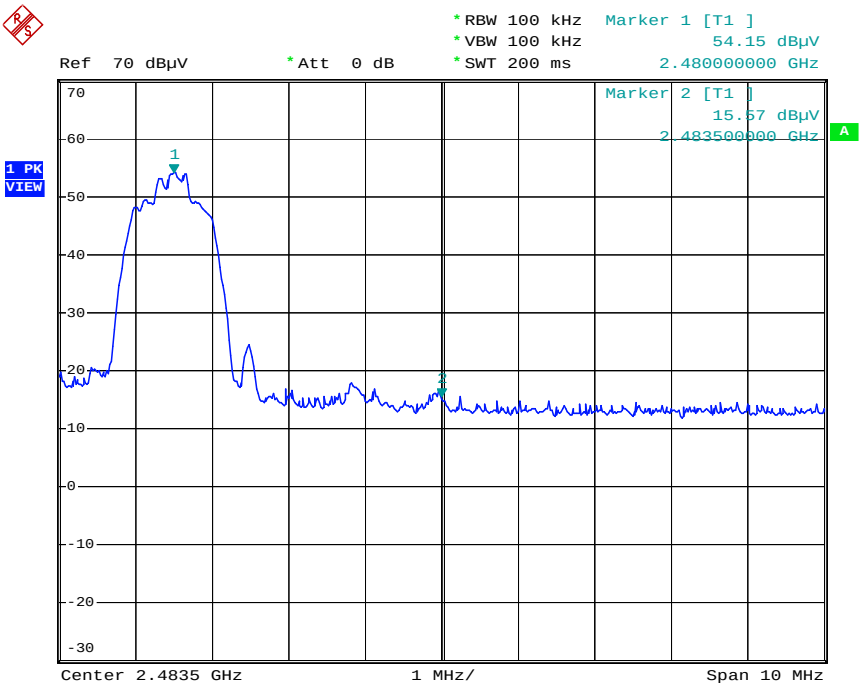
Date: 13.APR.2010 19:00:53

Band Edge Radiated Measurement



Date: 14.APR.2010 16:34:12

Band Edge Radiated Measurement



Date: 14.APR.2010 17:23:56

Table: Band Edge measurement

Conducted Test

Data Rate: **3Mbps** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402.02	107.31	---	---
Outside band	2400	64.1	43.21	Pass
78	2480	105.76	---	---
Outside band	2483.5	64.09	41.67	Pass

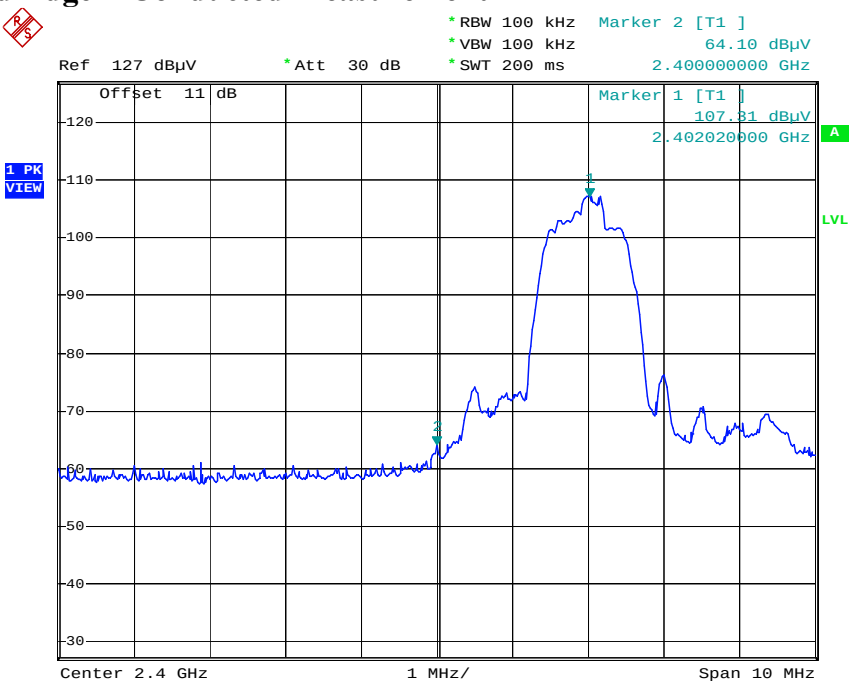
Radiated Test

Data Rate: **3Mbps** **EDR Mode** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):60

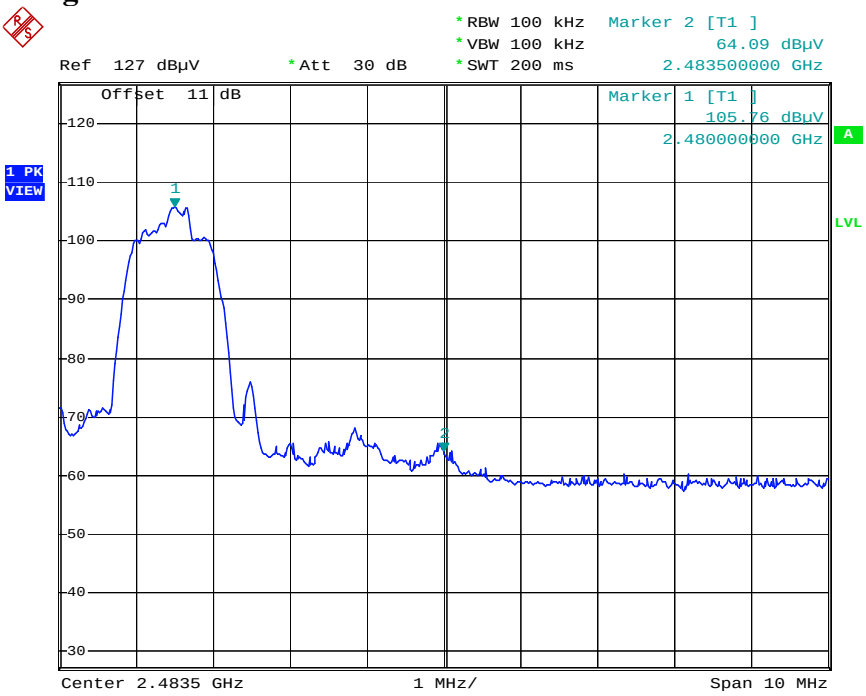
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402	59.75	---	---
Outside band	2400	17.32	42.43	Pass
78	2480	54.16	---	---
Outside band	2483.5	14.96	39.2	Pass

Band Edge Conducted Measurement



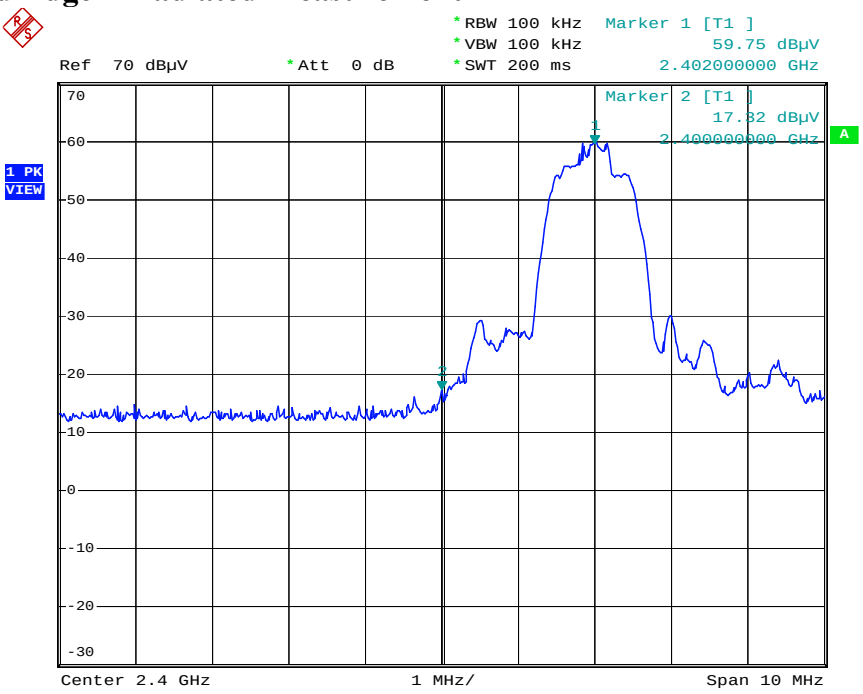
Date: 13.APR.2010 19:40:45

Band Edge Conducted Measurement



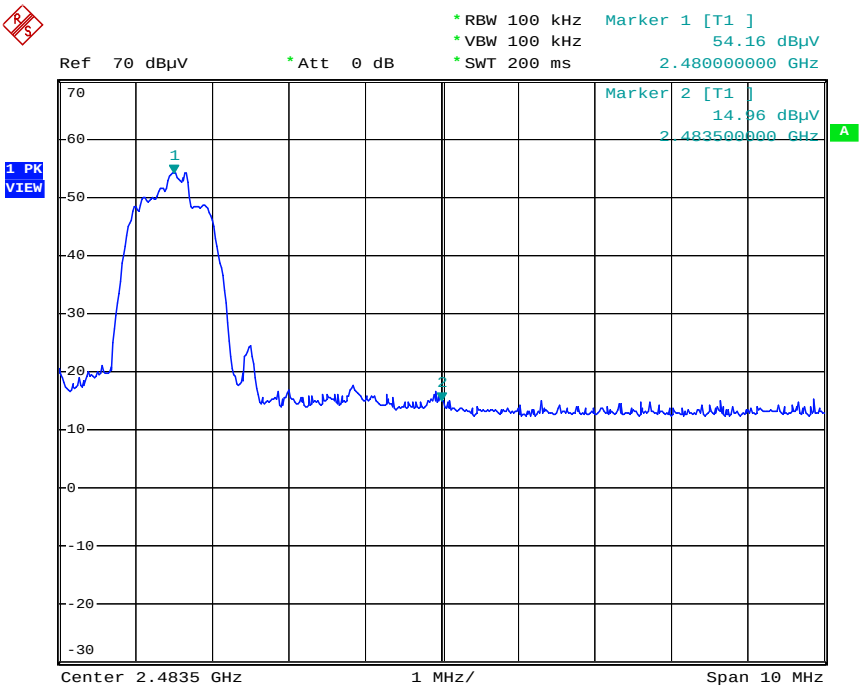
Date: 13.APR.2010 19:33:47

Band Edge Radiated Measurement



Date: 14.APR.2010 16:43:51

Band Edge Radiated Measurement



Date: 14.APR.2010 17:15:55

4.6 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: 2.375GHz, 2.5GHz.
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. For peak frequency emission level measurement in Restricted Band,
   Change RBW: 1MHz
   VBW: 10Hz
   Span: 100MHz.
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 Test Data

Table Band Edge measurement (Radiated)

Data Rate: **1Mbps** Temp. (° C): 25

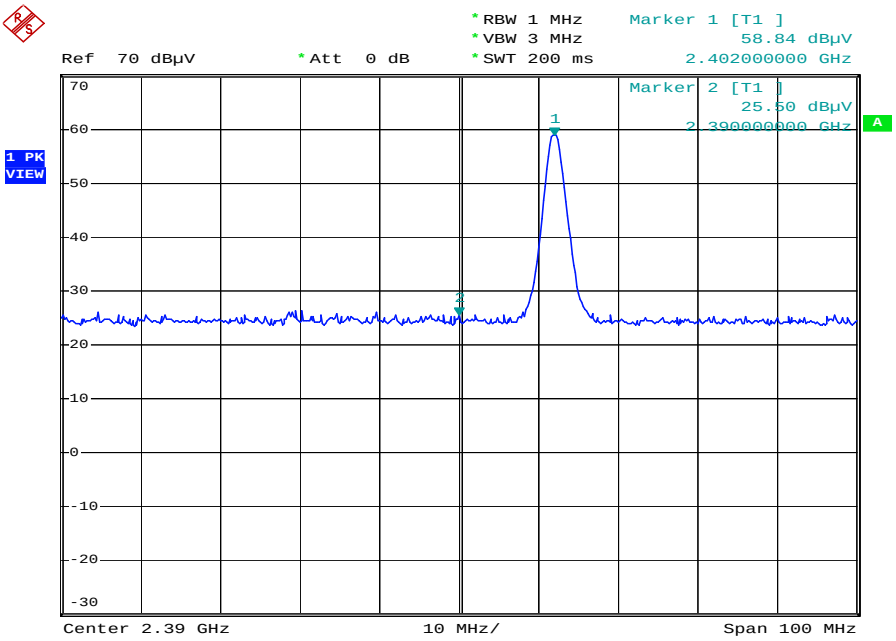
Test Engineer:Jerry Chiou Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_00 (peak mode)	2402	58.84	33.82	92.66	---	3MHz	---
Channel_00 (average mode)	2402	58.35	33.82	92.17	---	10Hz	---
Channel_78 (peak mode)	2480	52.85	33.9	86.75	---	3MHz	---
Channel_78 (average mode)	2480	52.27	33.9	86.17	---	10Hz	---
Channel_00 Restricted band (peak mode)	2390	25.5	33.81	59.31	74	3MHz	Pass
Restricted band (average mode)	2386.4	13.05	33.81	46.86	54	10Hz	Pass
Channel_78 Restricted band (peak mode)	2483.5	25.44	33.9	59.34	74	3MHz	Pass
Restricted band (average mode)	2483.5	14.5	33.9	48.4	54	10Hz	Pass

Note:

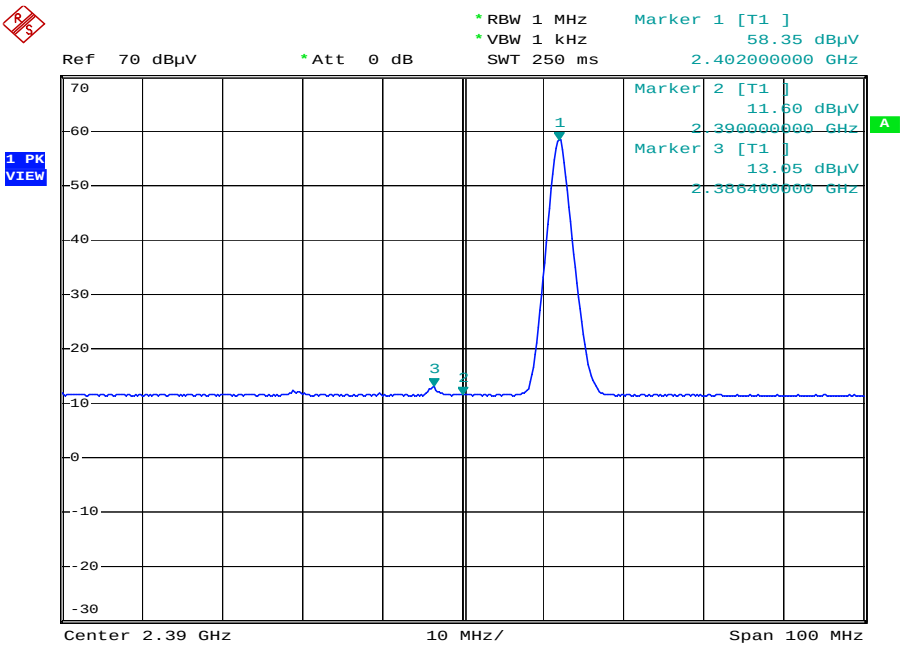
- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

Restricted Band (Radiated)-Peak Mode (Channel 00)



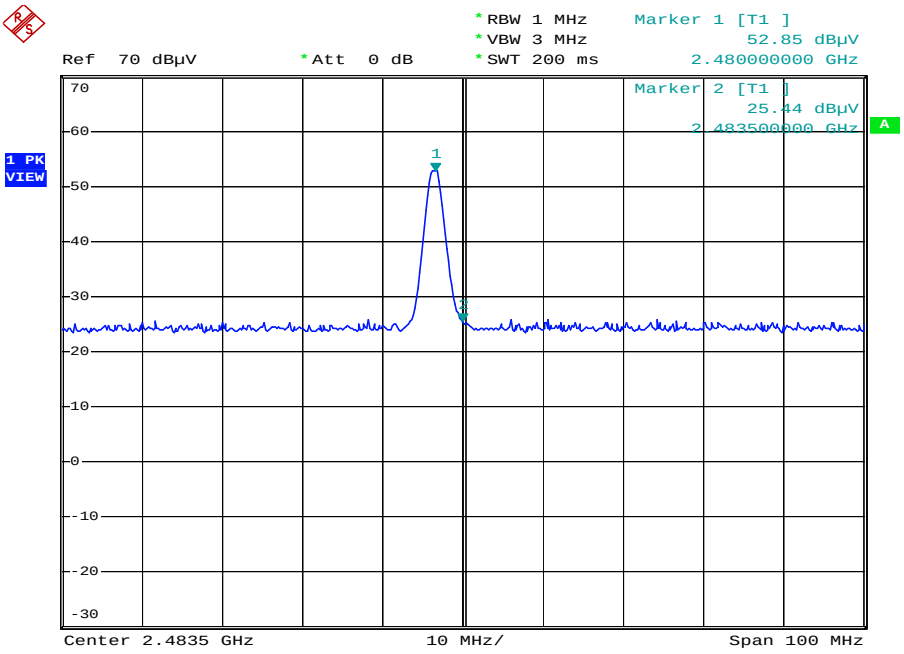
Date: 14.APR.2010 15:07:14

Restricted Band (Radiated)-Average Mode (Channel 00)



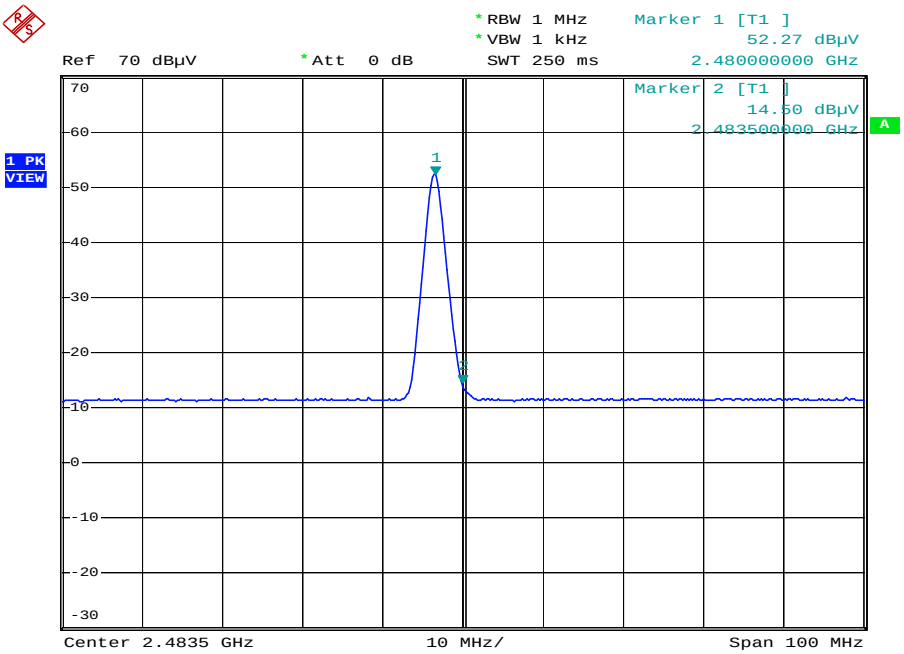
Date: 14.APR.2010 15:09:59

Restricted Band (Radiated)-Peak Mode (Channel 78)



Date: 14.APR.2010 15:31:00

Restricted Band (Radiated)-Average Mode (Channel 78)



Date: 14.APR.2010 15:30:03

Table Band Edge measurement (Radiated)

Data Rate: **2Mbps** Temp. (°C): 25

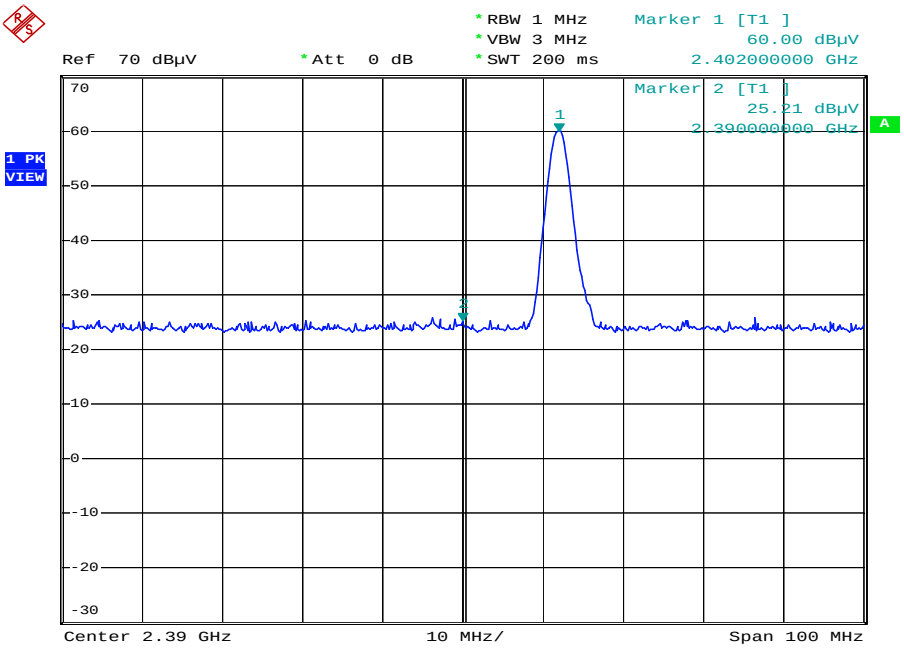
Test Engineer:Jerry Chiou Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_00 (peak mode)	2402	60	33.82	93.82	---	3MHz	---
Channel_00 (average mode)	2402	56.77	33.82	90.59	---	10Hz	---
Channel_78 (peak mode)	2480	54.22	33.9	88.12	---	3MHz	---
Channel_78 (average mode)	2480	50.82	33.9	84.72	---	10Hz	---
Channel_00 Restricted band (peak mode)	2390	25.21	33.81	59.02	74	3MHz	Pass
Restricted band (average mode)	2386.4	13.11	33.81	46.92	54	10Hz	Pass
Channel_78 Restricted band (peak mode)	2483.5	26.22	33.9	60.12	74	3MHz	Pass
Restricted band (average mode)	2483.5	15.28	33.9	49.18	54	10Hz	Pass

Note:

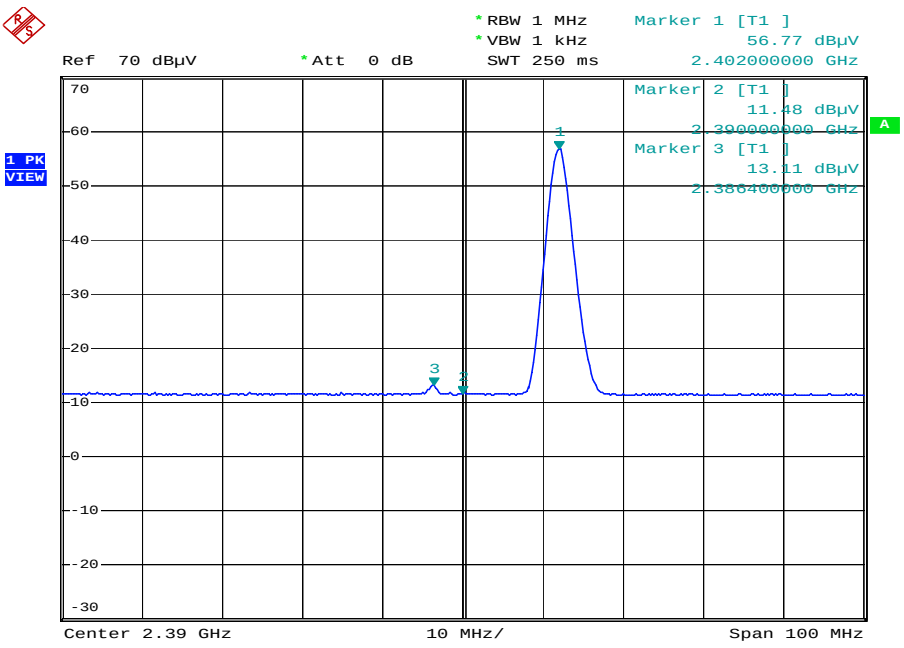
- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

Restricted Band (Radiated)-Peak Mode (Channel 00)



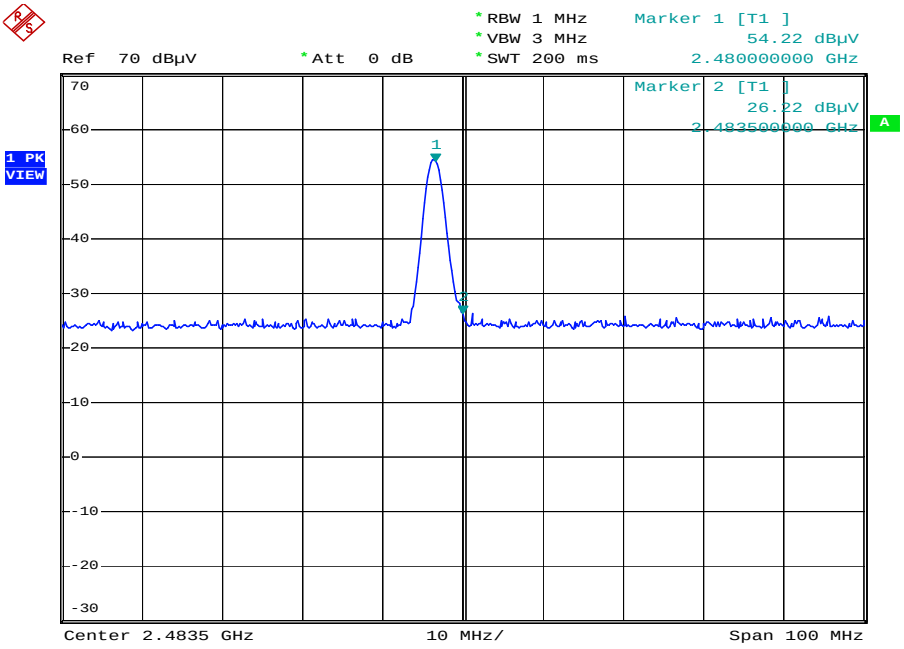
Date: 14.APR.2010 16:36:43

Restricted Band (Radiated)-Average Mode (Channel 00)



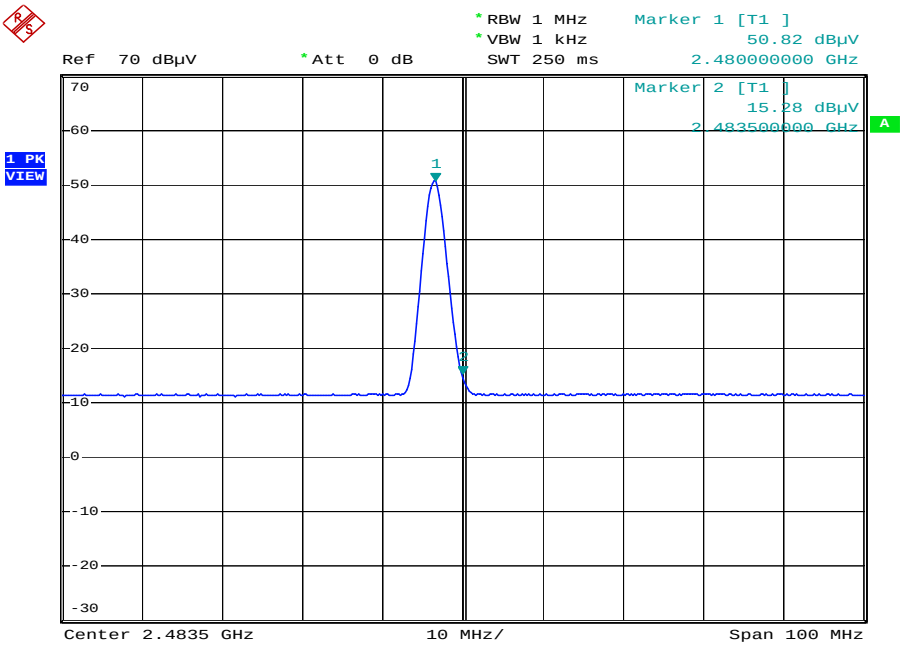
Date: 14.APR.2010 16:38:35

Restricted Band (Radiated)-Peak Mode (Channel 78)



Date: 14.APR.2010 17:22:30

Restricted Band (Radiated)-Average Mode (Channel 78)



Date: 14.APR.2010 17:21:00

Table Band Edge measurement (Radiated)

Data Rate: **3Mbps** Temp. (°C): 25

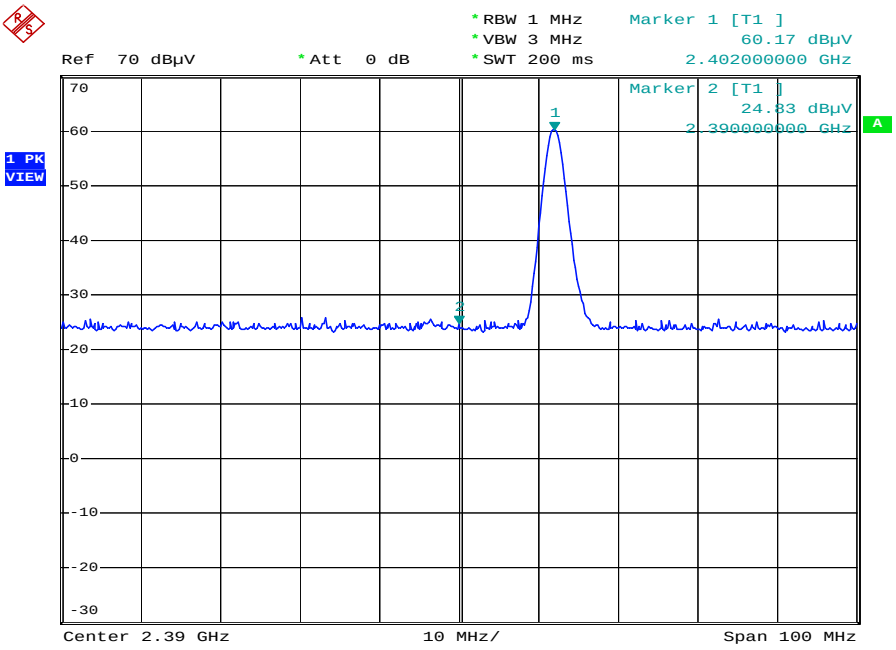
Test Engineer:Jerry Chiou Humidity (%): 55

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_00 (peak mode)	2402	60.17	33.82	93.99	---	3MHz	---
Channel_00 (average mode)	2402	56.76	33.82	90.58	---	10Hz	---
Channel_78 (peak mode)	2480	54.52	33.9	88.42	---	3MHz	---
Channel_78 (average mode)	2480	50.58	33.9	84.48	---	10Hz	---
Channel_00 Restricted band (peak mode)	2390	24.83	33.81	58.64	74	3MHz	Pass
Restricted band (average mode)	2386.4	13.44	33.81	47.25	54	10Hz	Pass
Channel_78 Restricted band (peak mode)	2483.5	26.72	33.9	60.62	74	3MHz	Pass
Restricted band (average mode)	2483.5	15.45	33.9	49.35	54	10Hz	Pass

Note:

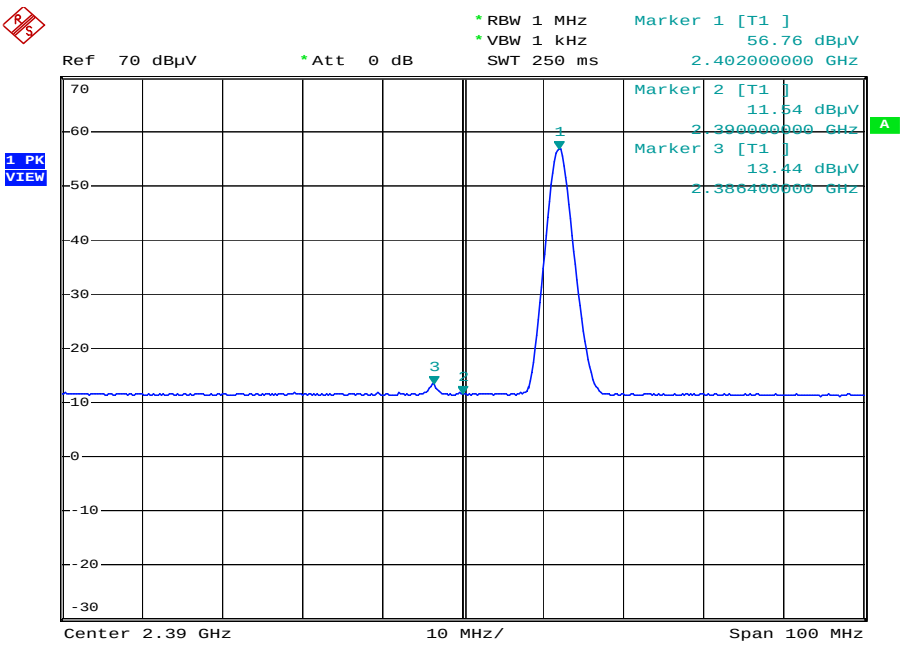
- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

Restricted Band (Radiated)-Peak Mode (Channel 00)



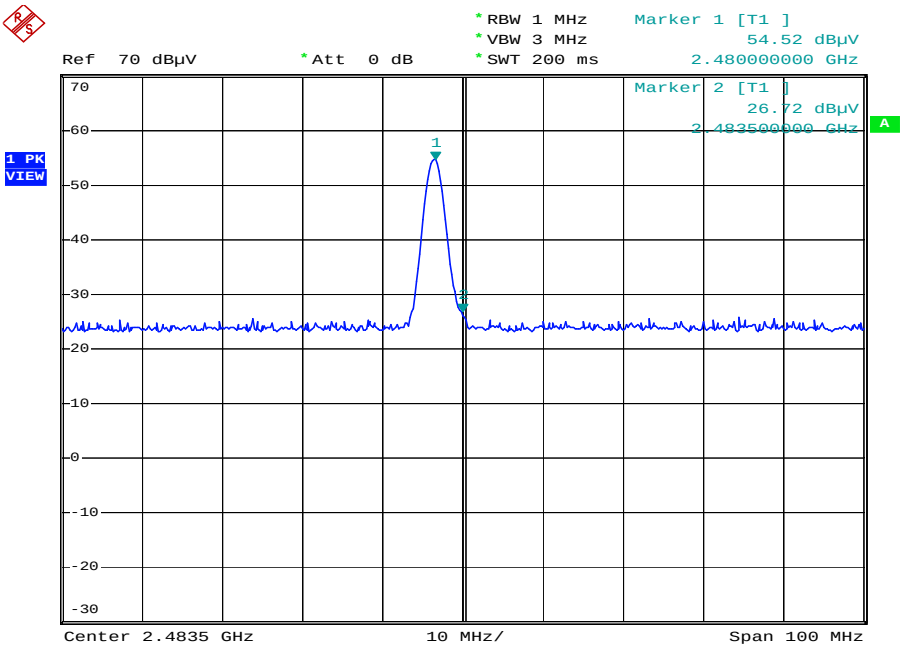
Date: 14.APR.2010 16:42:09

Restricted Band (Radiated)-Average Mode (Channel 00)



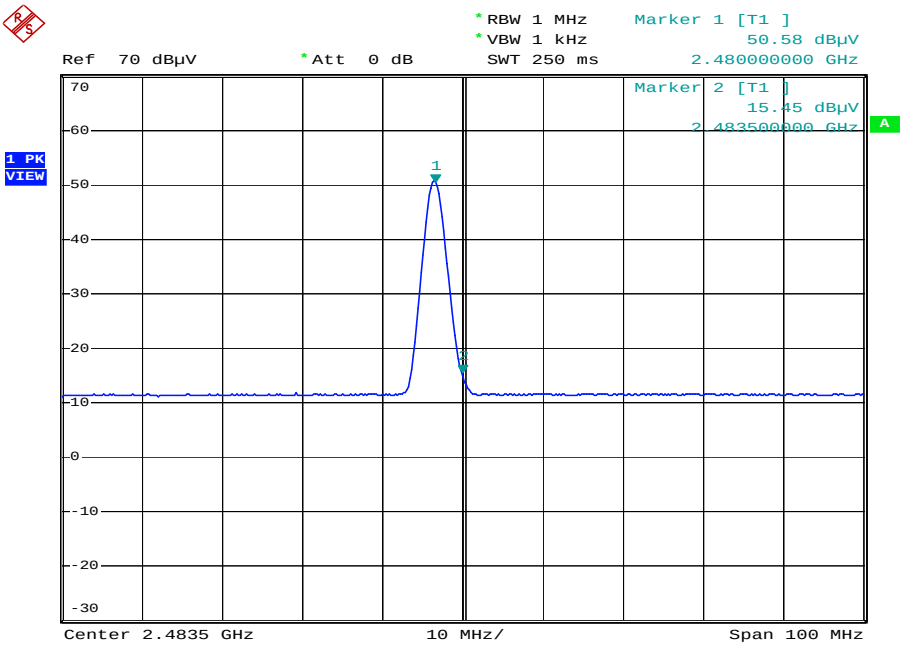
Date: 14.APR.2010 16:40:19

Restricted Band (Radiated)-Peak Mode (Channel 78)



Date: 14.APR.2010 17:17:29

Restricted Band (Radiated)-Average Mode (Channel 78)



Date: 14.APR.2010 17:18:29

4.7 Bandwidth & Hopping Channel Separation

4.7.1 Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

4.7.2 Test Procedure

■ Bandwidth Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 20 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

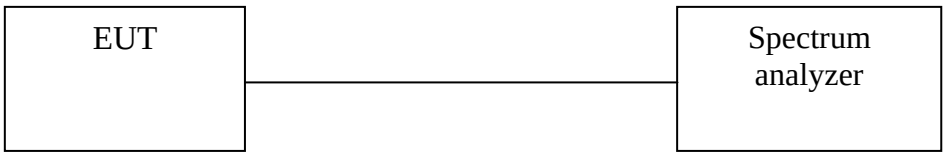
Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	30KHz
VBW	100KHz

■ Hopping Channel Separation Test Procedure

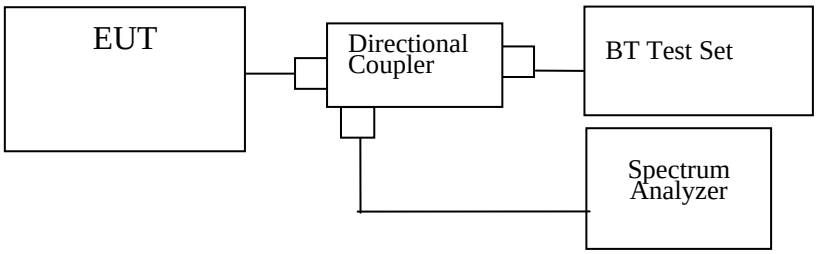
1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: Spectrum analyzer
   RBW: 100KHz
   VBW: 300KHz
   SPAN:3MHz
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

4.7.3 Test Setup

Condition 1:



Condition 2:



4.7.4 Test Data

Test condition: Data Rate= 1MBps, DH5

20dB Bandwidth

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	20dB Bandwidth (KHz)
00	**2402**	944
39	**2441**	944
78	**2480**	940

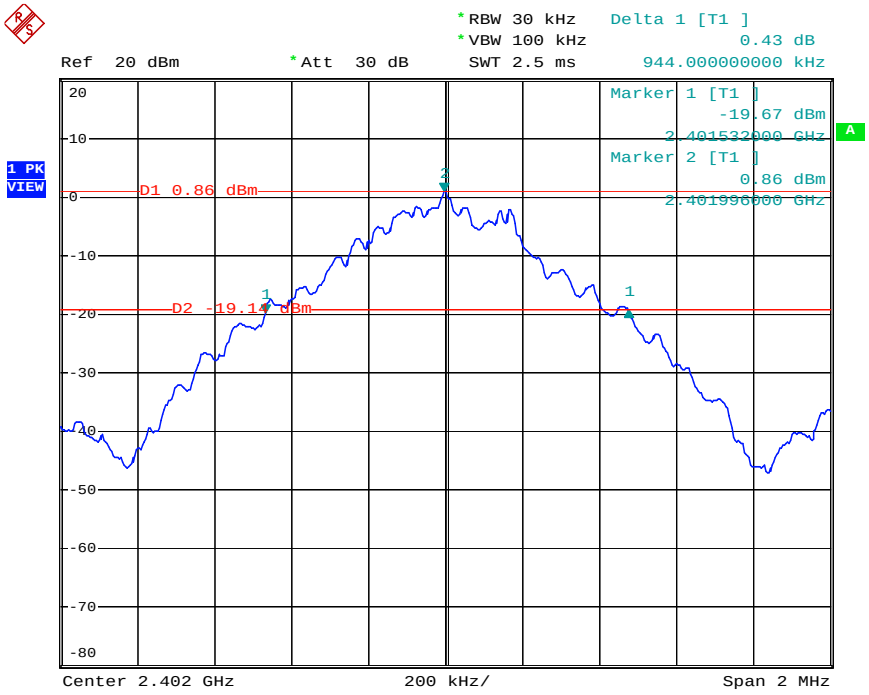
Hopping Channel Separation

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

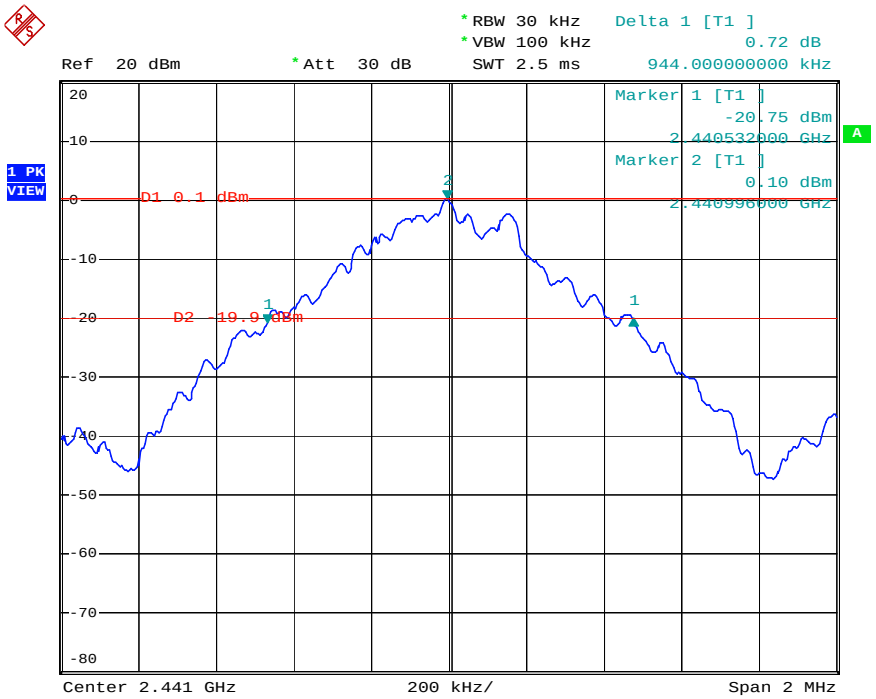
Channel	Frequency (MHz)	Separation (KHz)	Limit (KHz)	Pass/Fail
00	**2402**	1000	≧ 629.33	Pass
39	**2441**	1000	≧ 629.33	Pass
78	**2480**	1000	≧ 626.67	Pass

20dB Bandwidth Channel 00:



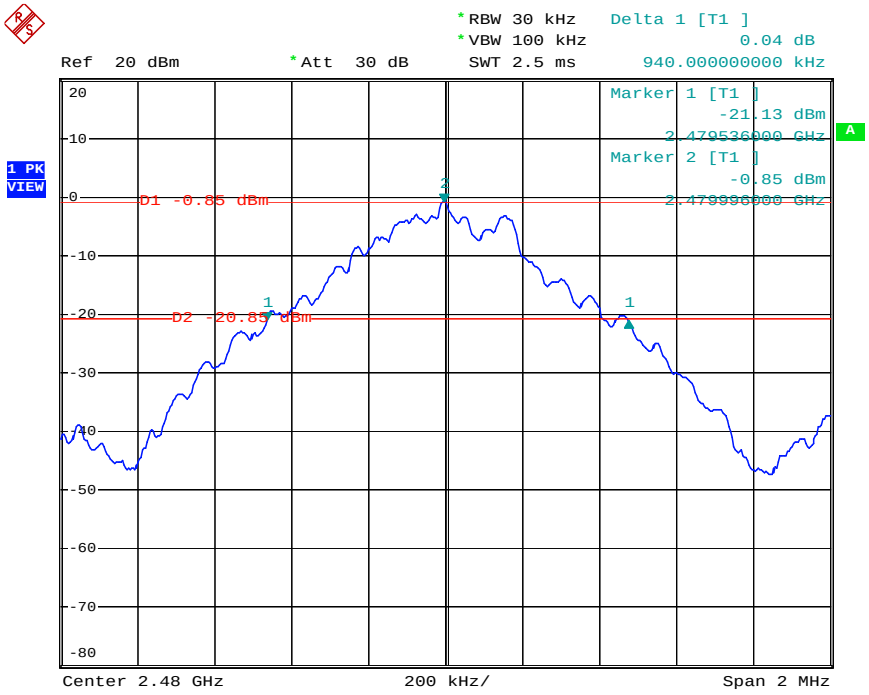
Date: 13.APR.2010 15:13:19

20dB Bandwidth Channel 39:



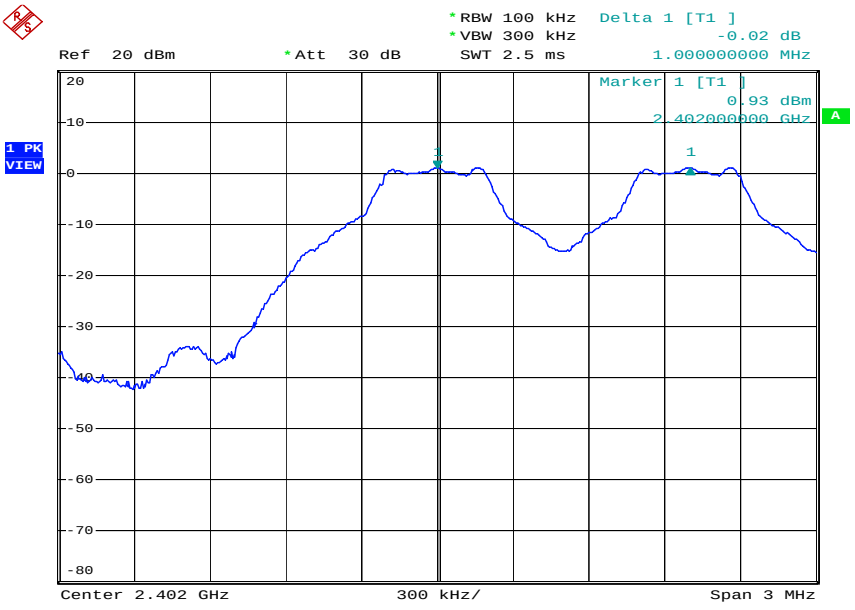
Date: 13.APR.2010 15:15:37

20dB Bandwidth Channel 78:



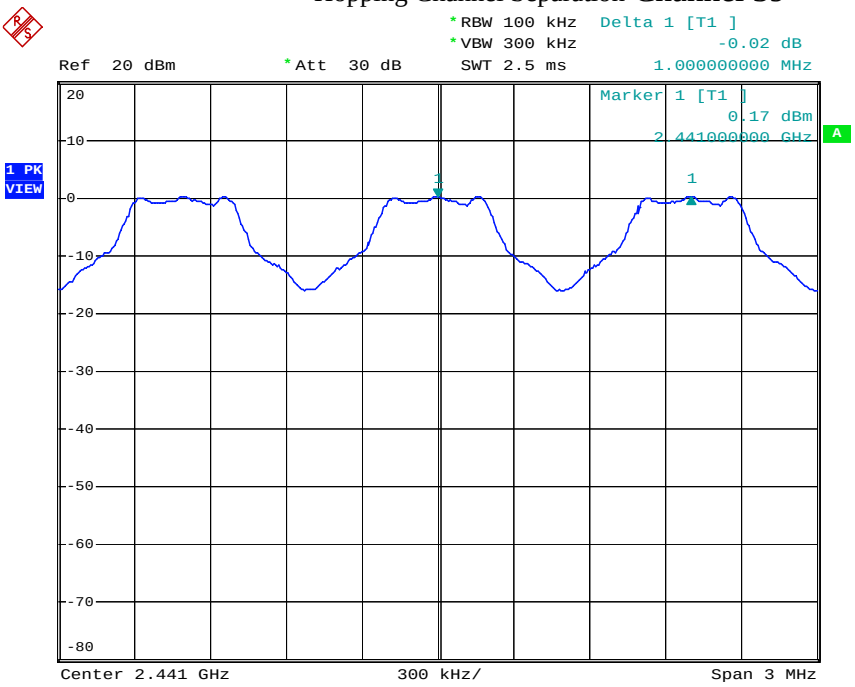
Date: 13.APR.2010 15:17:28

Hopping Channel Separation Channel 00



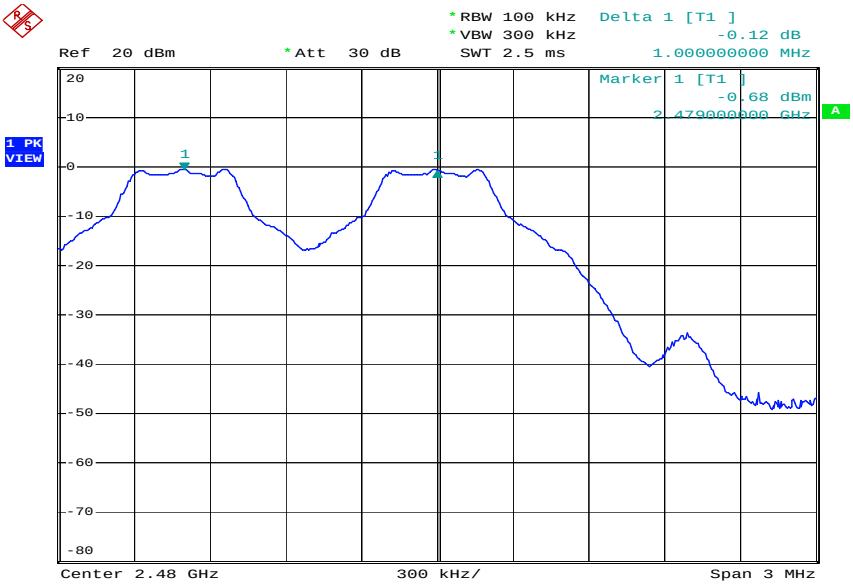
Date: 13.APR.2010 15:25:39

Hopping Channel Separation Channel 39



Date: 13.APR.2010 15:23:37

Hopping Channel Separation Channel 78



Date: 13.APR.2010 15:26:58

Test condition: Data Rate= 2MBps, DH5

20dB Bandwidth

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	20dB Bandwidth (KHz)
00	**2402**	1264
39	**2441**	1264
78	**2480**	1264

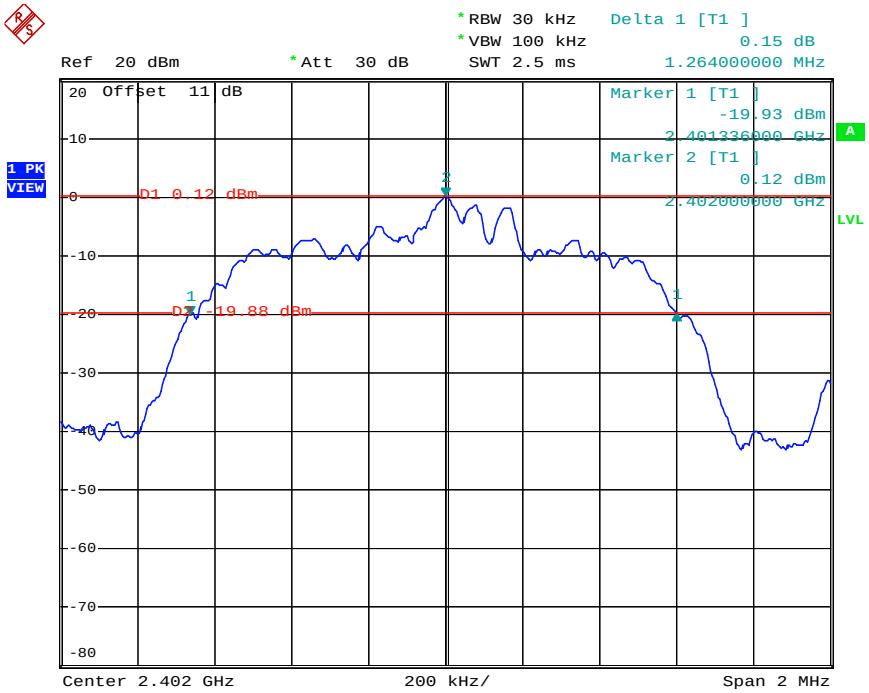
Hopping Channel Separation

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

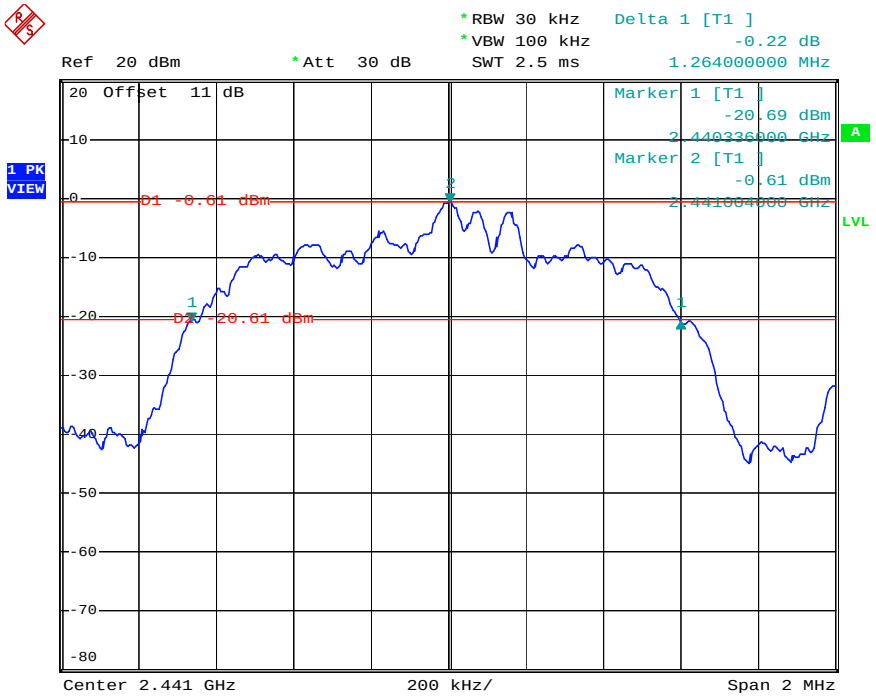
Channel	Frequency (MHz)	Separation (KHz)	Limit (KHz)	Pass/Fail
00	**2402**	1000	≧ 842.67	Pass
39	**2441**	1000	≧ 842.67	Pass
78	**2480**	1000	≧ 842.67	Pass

20dB Bandwidth Channel 00:



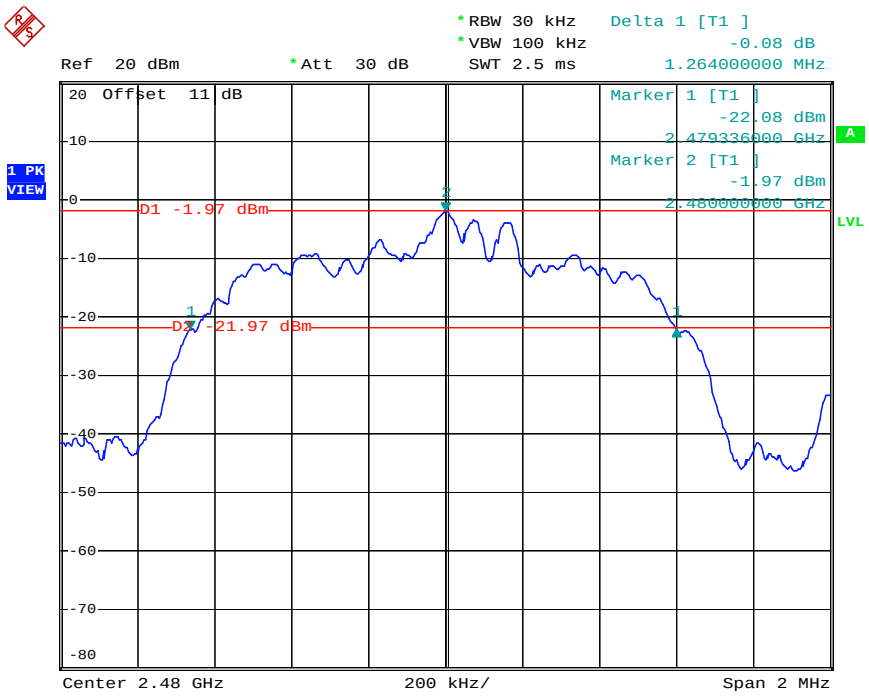
Date: 13.APR.2010 19:13:09

20dB Bandwidth Channel 39:



Date: 13.APR.2010 19:15:57

20dB Bandwidth Channel 78:



Date: 13.APR.2010 19:18:39

Test condition: Data Rate= 3MBps, DH5

20dB Bandwidth

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	20dB Bandwidth (KHz)
00	**2402**	1276
39	**2441**	1272
78	**2480**	1280

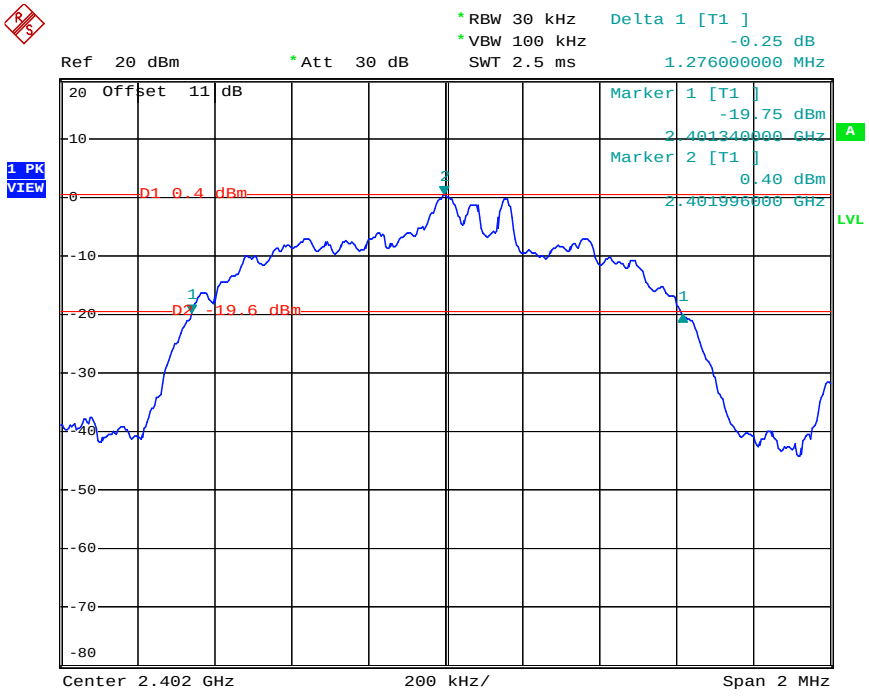
Hopping Channel Separation

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

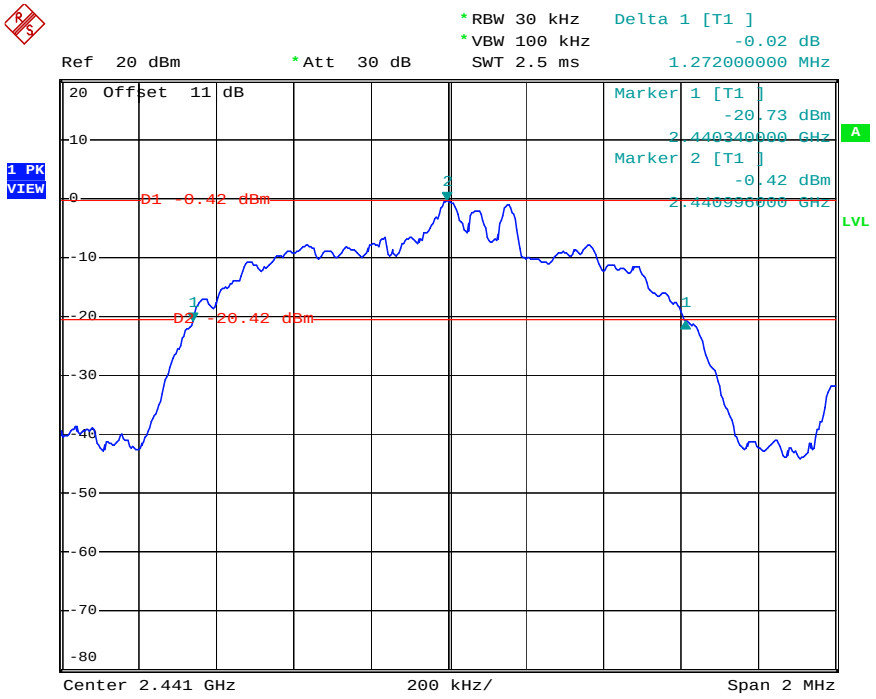
Channel	Frequency (MHz)	Separation (KHz)	Limit (KHz)	Pass/Fail
00	**2402**	1000	≧ 850.67	Pass
39	**2441**	1000	≧ 848.00	Pass
78	**2480**	1000	≧ 853.33	Pass

20dB Bandwidth Channel 00:



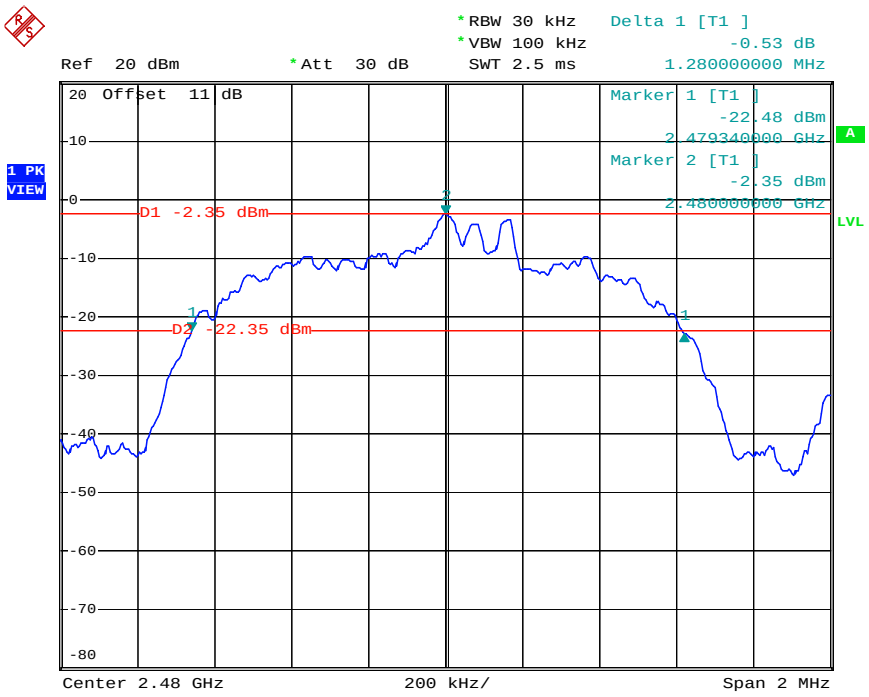
Date: 13.APR.2010 19:24:00

20dB Bandwidth Channel 39:



Date: 13.APR.2010 19:25:47

20dB Bandwidth Channel 78:



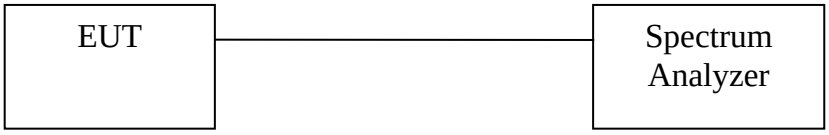
Date: 13.APR.2010 20:47:40

4.8 Number of Hopping Frequency Used

4.8.1 Test Procedure

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: Spectrum analyzer
   RBW: 300KHz
   VBW: 1MHz
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
3. Repeat above procedures until all frequencies measured were complete.

4.8.2 Test Setup



4.8.3 Test Data

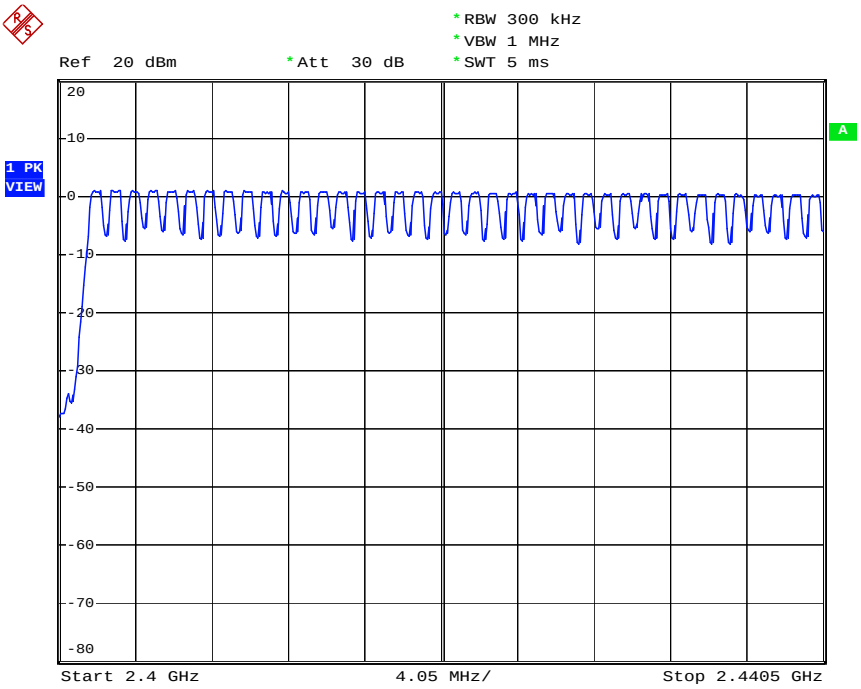
Number of Hopping Frequency Used

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

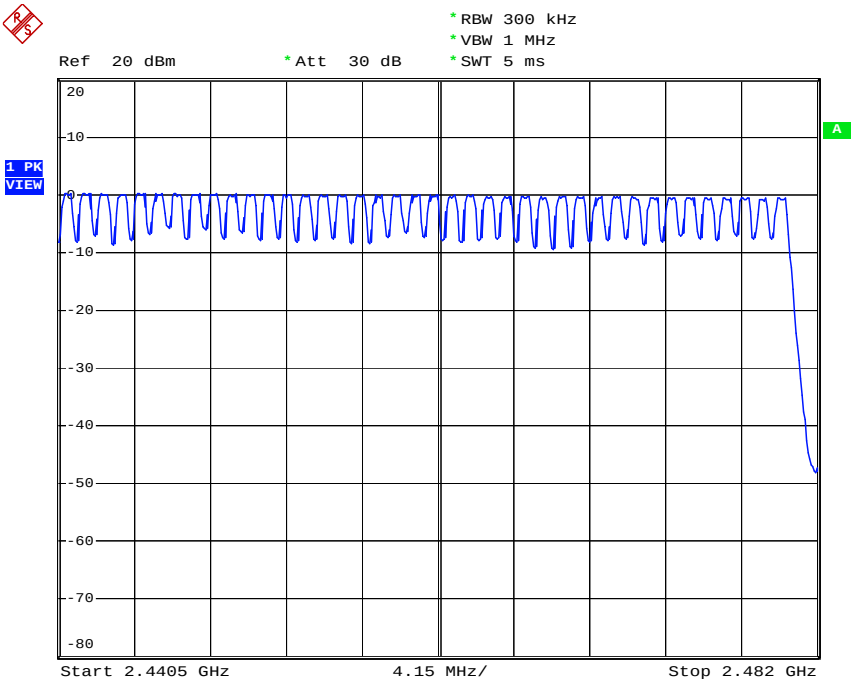
Test result	Limit (Channels)	Pass/Fail
79	>75	Pass

2400~2405MHz



Date: 13.APR.2010 15:04:18

2405~2482MHz



Date: 13.APR.2010 15:05:02

4.9 Dwell Time

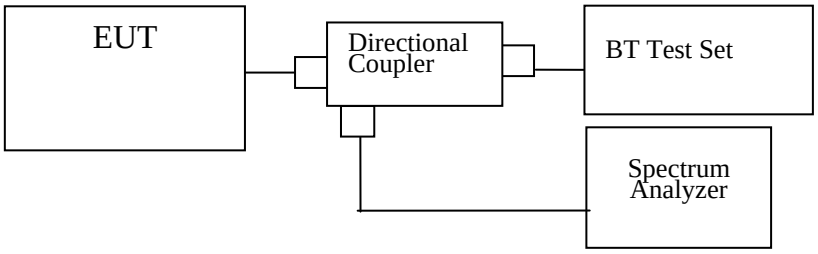
4.9.1 Test Procedure

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: Spectrum analyzer
   RBW: 1MHz
   VBW: 1MHz
   SPAN: Zero Span
2. Adjust the center frequency of spectrum analyzer on any frequency be measured.
3. Measure the Dwell Time by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

4.9.2 Test Setup

Condition 1:

Condition 2:



4.9.3 Test Data

Dwell Time

Data Rate: 1Mbps Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2402**	396	253.44	< 400	Pass
DH3	**2402**	1664	354.99	< 400	Pass
DH5	**2402**	2904	371.71	< 400	Pass

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2441**	396	253.44	< 400	Pass
DH3	**2441**	1664	354.99	< 400	Pass
DH5	**2441**	2904	371.71	< 400	Pass

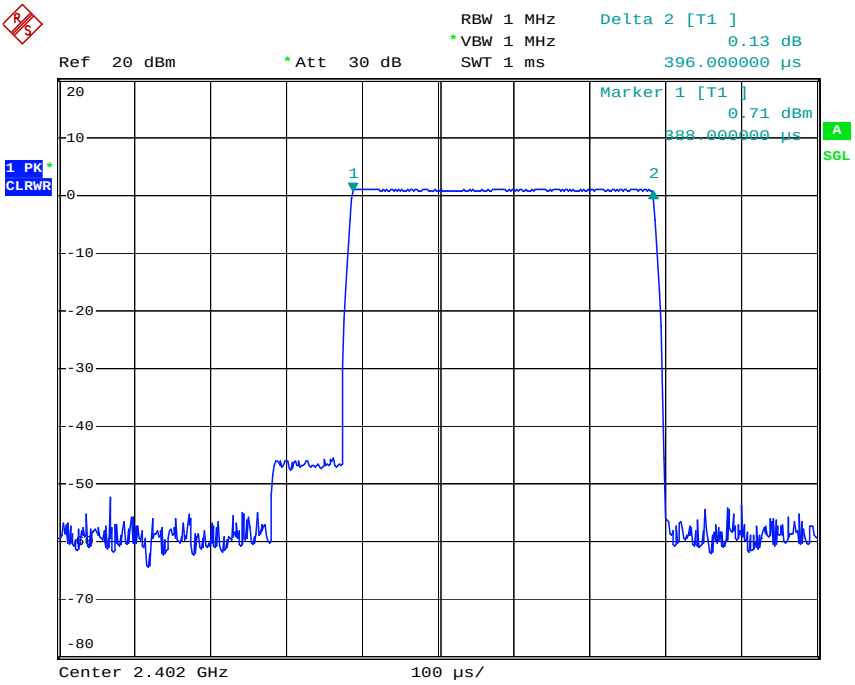
Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2480**	396	253.44	< 400	Pass
DH3	**2480**	1664	354.99	< 400	Pass
DH5	**2480**	2904	371.71	< 400	Pass

Note:

A period time=79x0.4(s)=31.6(s)

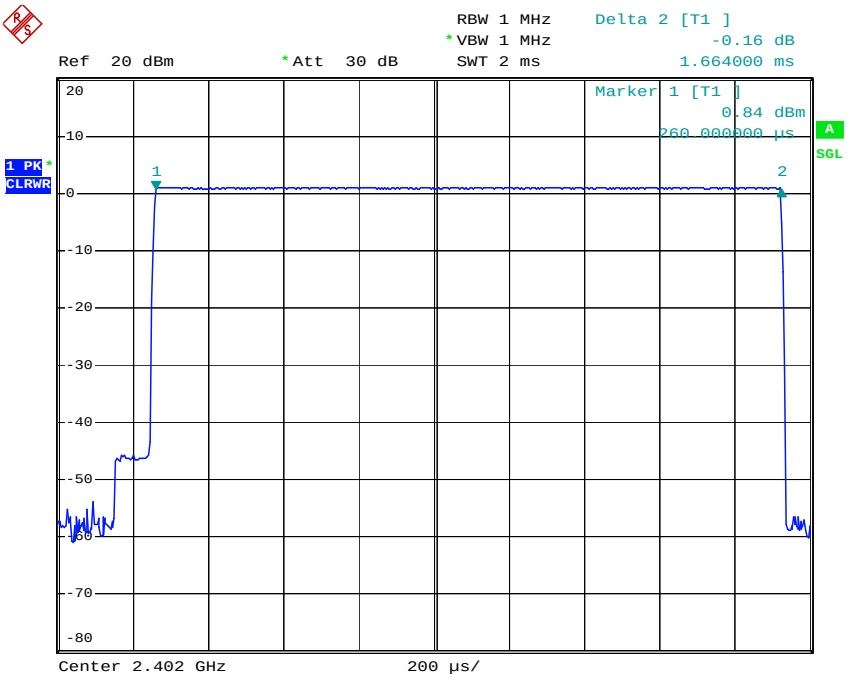
CH00	DH1 time slot=	396 (μs)*(1600/(1*79))*31.6=	253.44 (ms)
	DH3 time slot=	1664 (μs)*(1600/(3*79))*31.6=	354.99 (ms)
	DH5 time slot=	2904 (μs)*(1600/(5*79))*31.6=	371.71 (ms)
CH39	DH1 time slot=	396 (μs)*(1600/(1*79))*31.6=	253.44 (ms)
	DH3 time slot=	1664 (μs)*(1600/(3*79))*31.6=	354.99 (ms)
	DH5 time slot=	2904 (μs)*(1600/(5*79))*31.6=	371.71 (ms)
CH78	DH1 time slot=	396 (μs)*(1600/(1*79))*31.6=	253.44 (ms)
	DH3 time slot=	1664 (μs)*(1600/(3*79))*31.6=	354.99 (ms)
	DH5 time slot=	2904 (μs)*(1600/(5*79))*31.6=	371.71 (ms)

Channel 00 DH1:



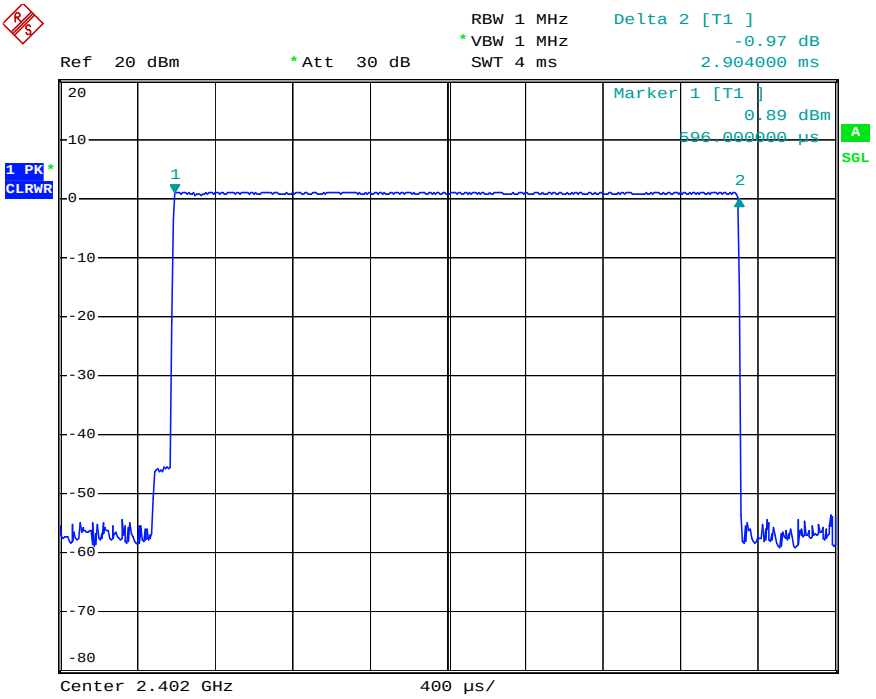
Date: 13.APR.2010 14:50:41

Channel 00 DH3:



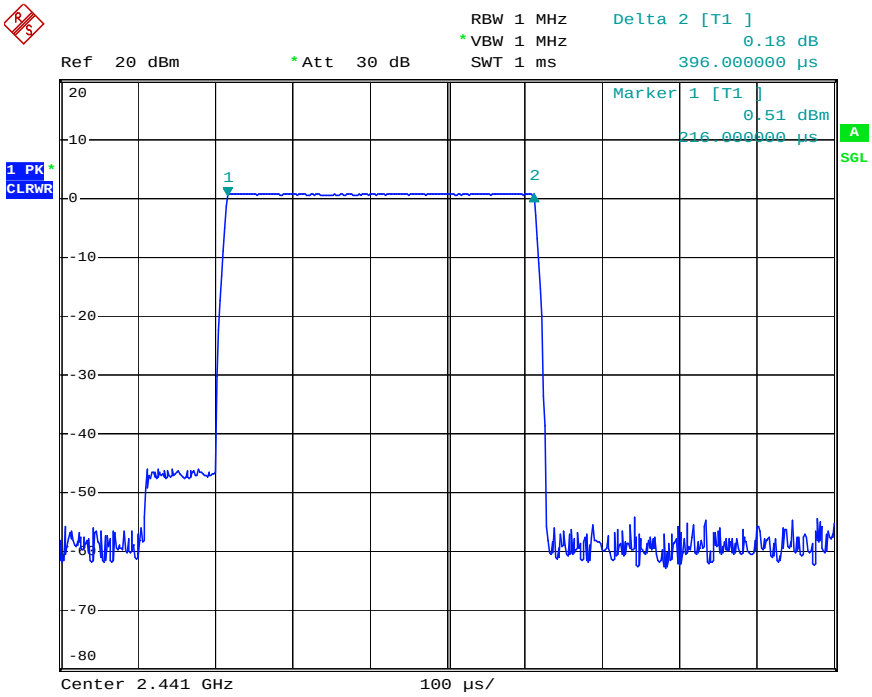
Date: 13.APR.2010 14:51:52

Channel 00 DH5:



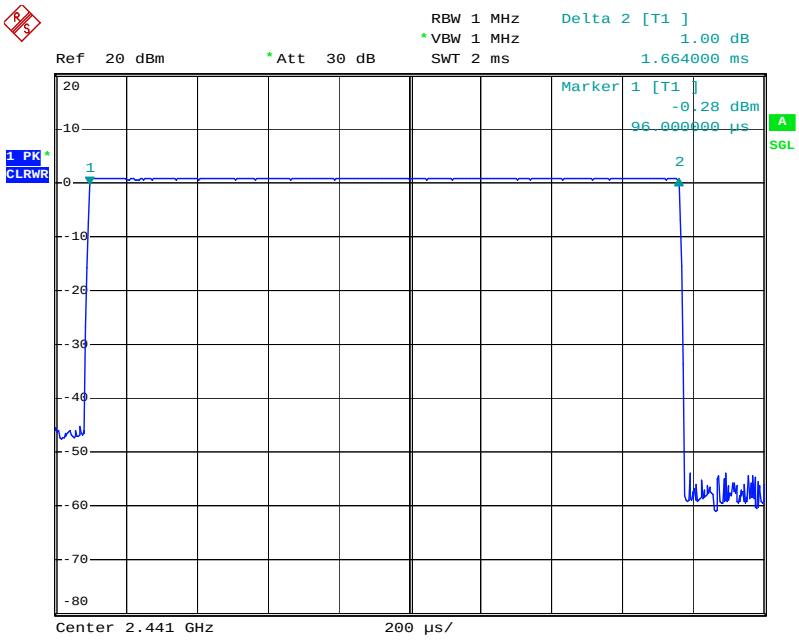
Date: 13.APR.2010 14:52:54

Channel 39 DH1:



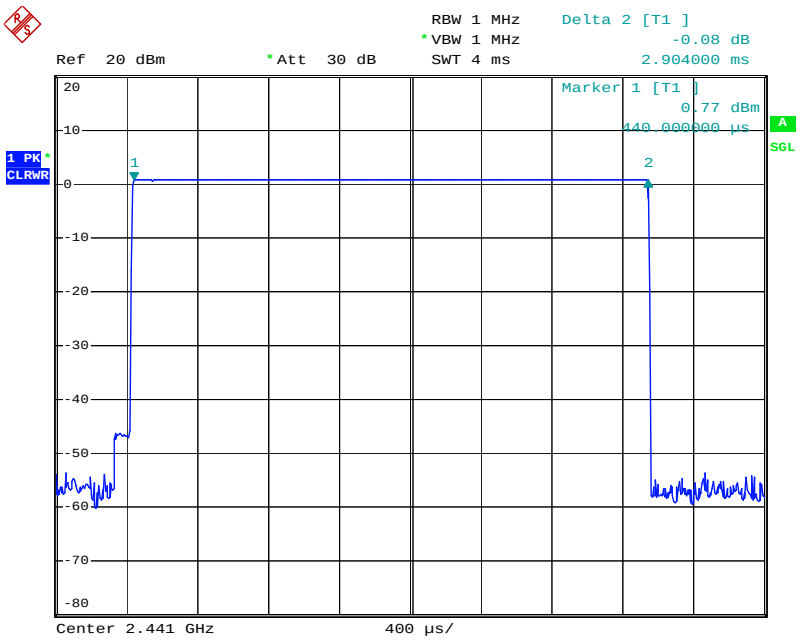
Date: 13.APR.2010 14:54:32

Channel 39 DH3:



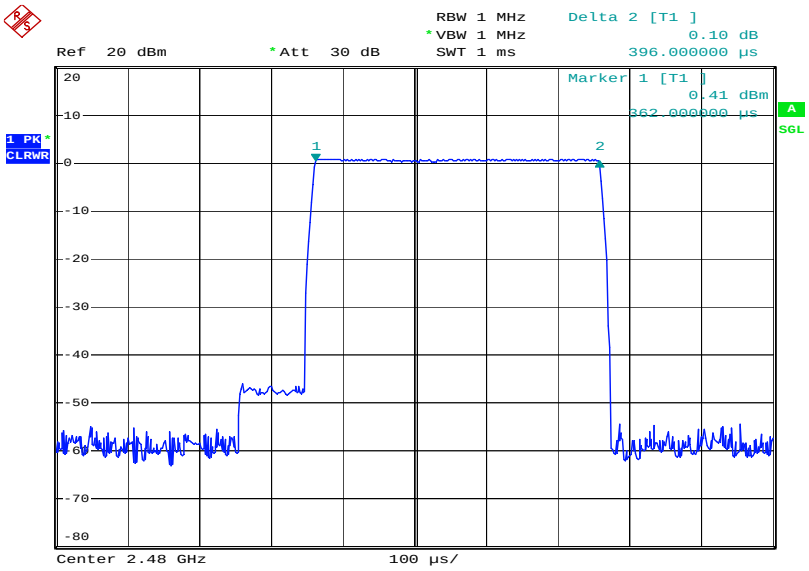
Date: 13.APR.2010 14:56:30

Channel 39 DH5:



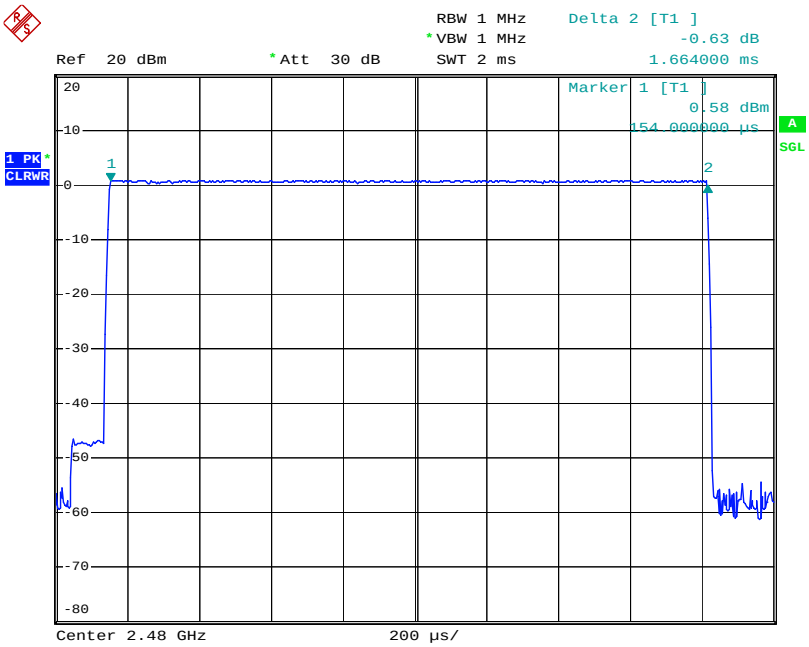
Date: 13.APR.2010 14:57:32

Channel 78 DH1:



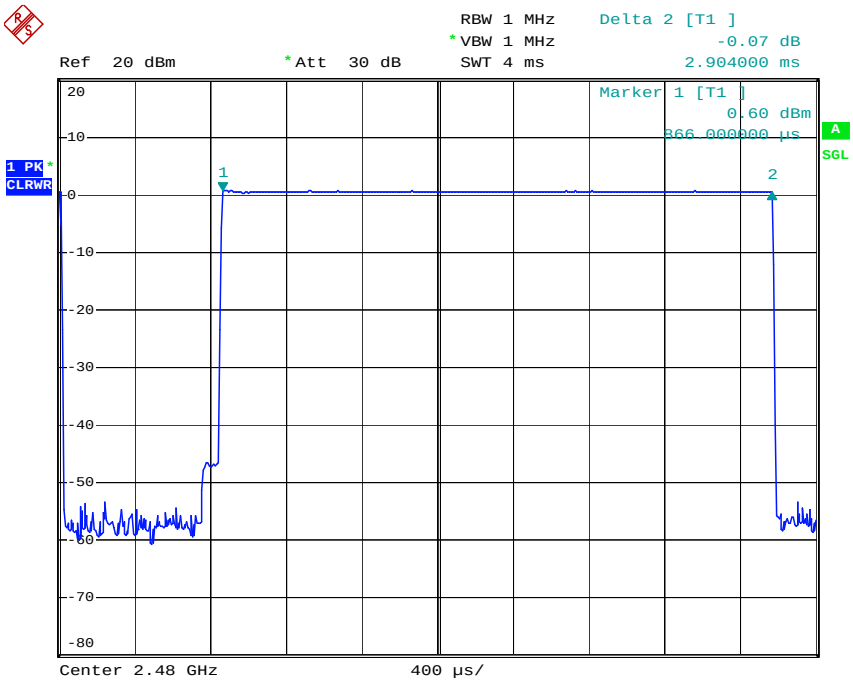
Date: 13.APR.2010 14:58:47

Channel 78 DH3:



Date: 13.APR.2010 14:59:42

Channel 78 DH5:



Date: 13.APR.2010 15:00:27

Dwell Time

Data Rate: **2Mbps** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2402**	414	264.96	< 400	Pass
DH3	**2402**	1680	358.40	< 400	Pass
DH5	**2402**	2928	374.78	< 400	Pass

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2441**	414	264.96	< 400	Pass
DH3	**2441**	1678	357.97	< 400	Pass
DH5	**2441**	2926	374.53	< 400	Pass

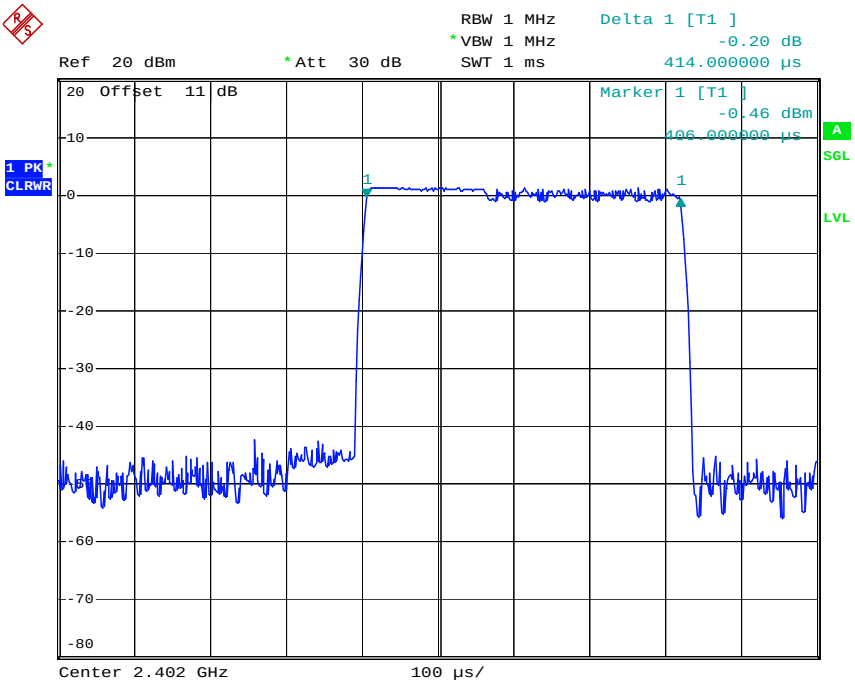
Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2480**	416	266.24	< 400	Pass
DH3	**2480**	1682	358.83	< 400	Pass
DH5	**2480**	2928	374.78	< 400	Pass

Note:

A period time=79x0.4(s)=31.6(s)

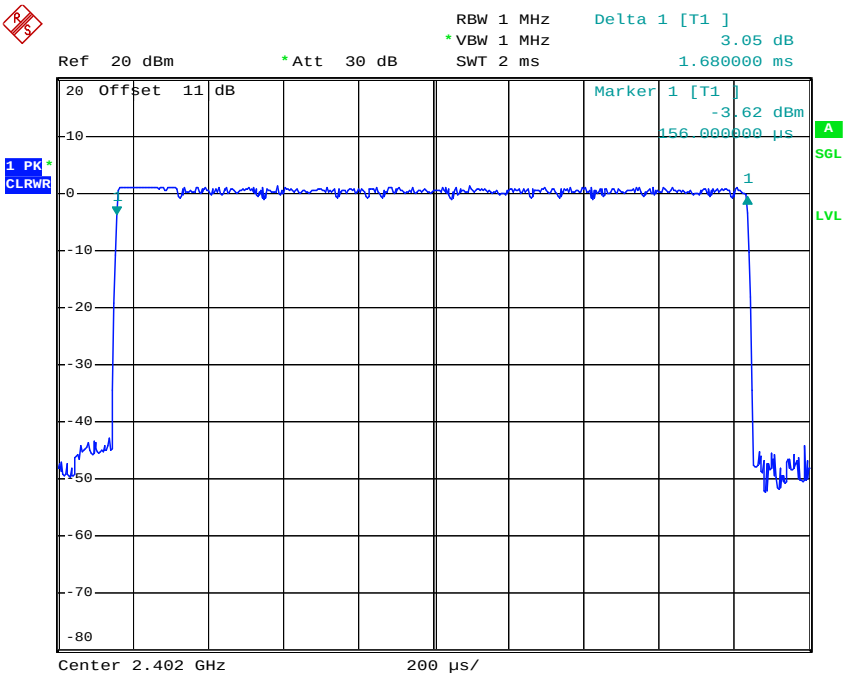
CH00	DH1 time slot=	414 (μs)*(1600/(1*79))*31.6=	264.96 (ms)
	DH3 time slot=	1680 (μs)*(1600/(3*79))*31.6=	358.40 (ms)
	DH5 time slot=	2928 (μs)*(1600/(5*79))*31.6=	374.78 (ms)
CH39	DH1 time slot=	414 (μs)*(1600/(1*79))*31.6=	264.96 (ms)
	DH3 time slot=	1678 (μs)*(1600/(3*79))*31.6=	357.97 (ms)
	DH5 time slot=	2926 (μs)*(1600/(5*79))*31.6=	374.53 (ms)
CH78	DH1 time slot=	416 (μs)*(1600/(1*79))*31.6=	266.24 (ms)
	DH3 time slot=	1682 (μs)*(1600/(3*79))*31.6=	358.83 (ms)
	DH5 time slot=	2928 (μs)*(1600/(5*79))*31.6=	374.78 (ms)

Channel 00 DH1:



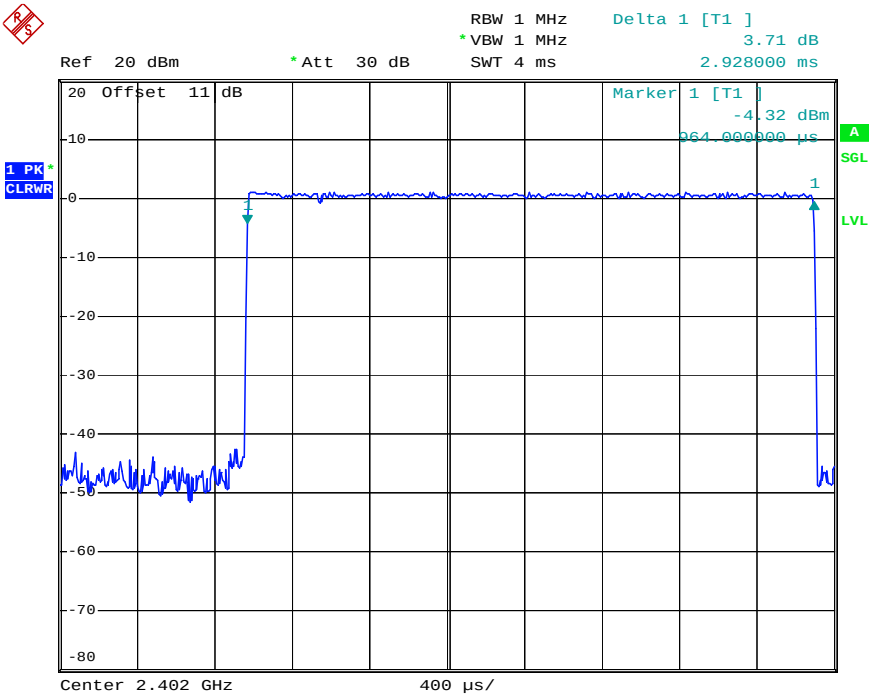
Date: 13.APR.2010 20:15:56

Channel 00 DH3:



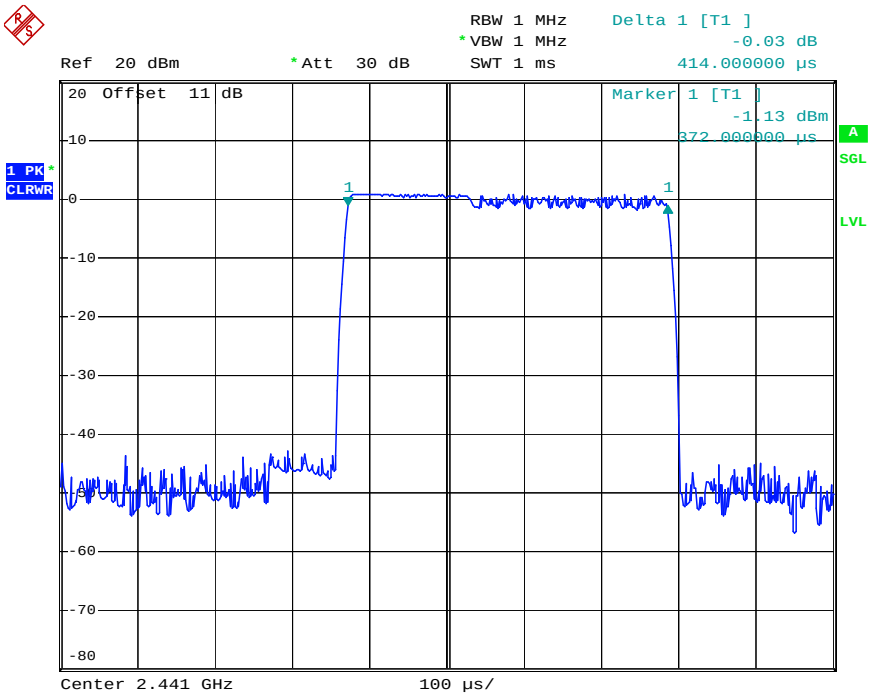
Date: 13.APR.2010 20:15:07

Channel 00 DH5:



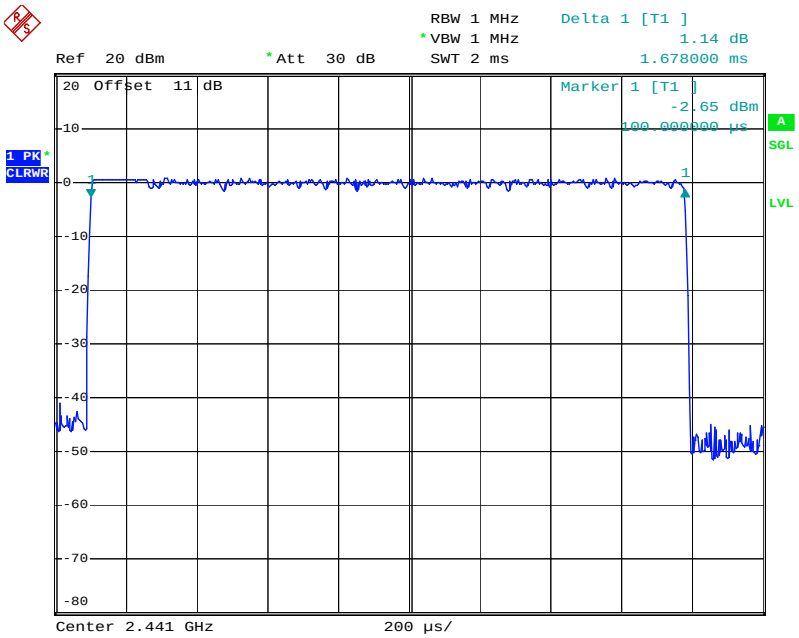
Date: 13.APR.2010 20:13:51

Channel 39 DH1:



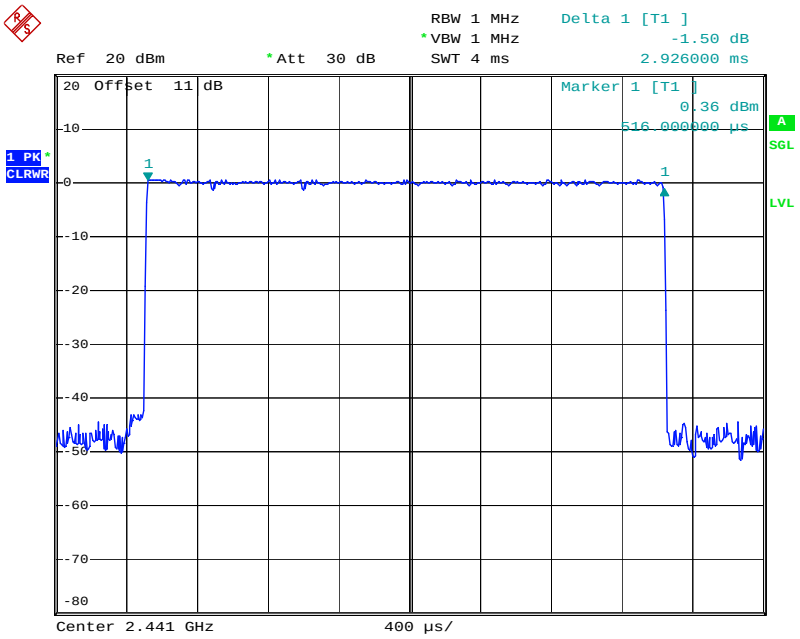
Date: 13.APR.2010 20:16:59

Channel 39 DH3:



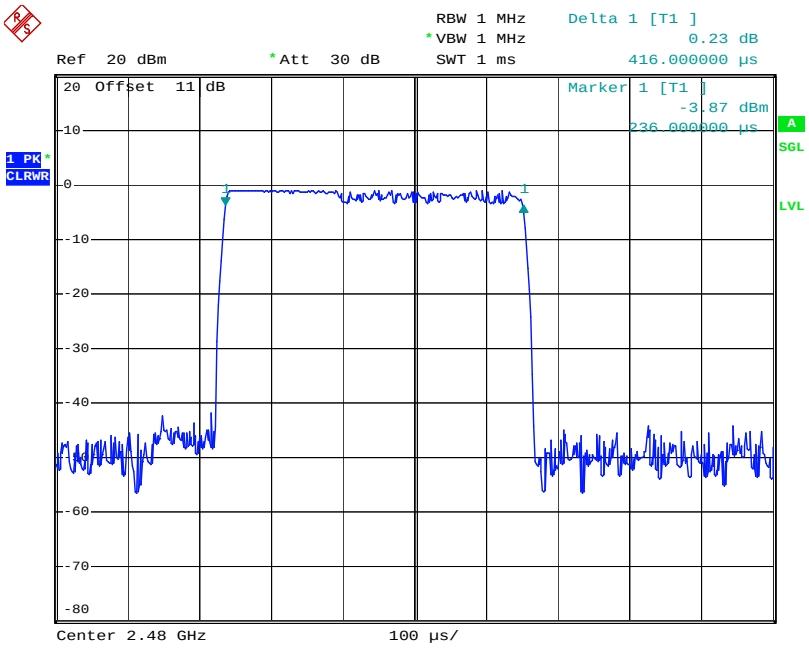
Date: 13.APR.2010 20:17:58

Channel 39 DH5:



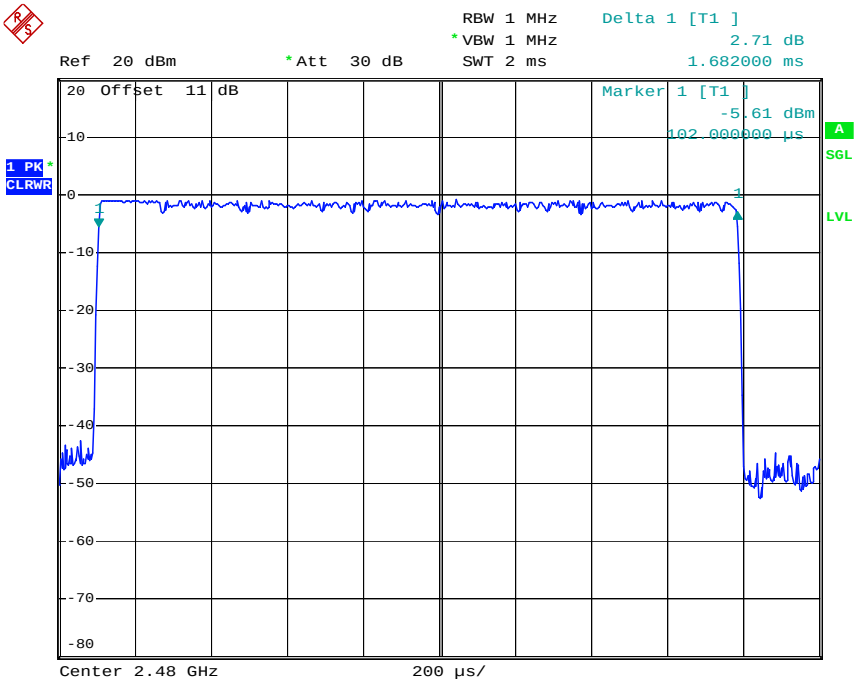
Date: 13.APR.2010 20:18:58

Channel 78 DH1:



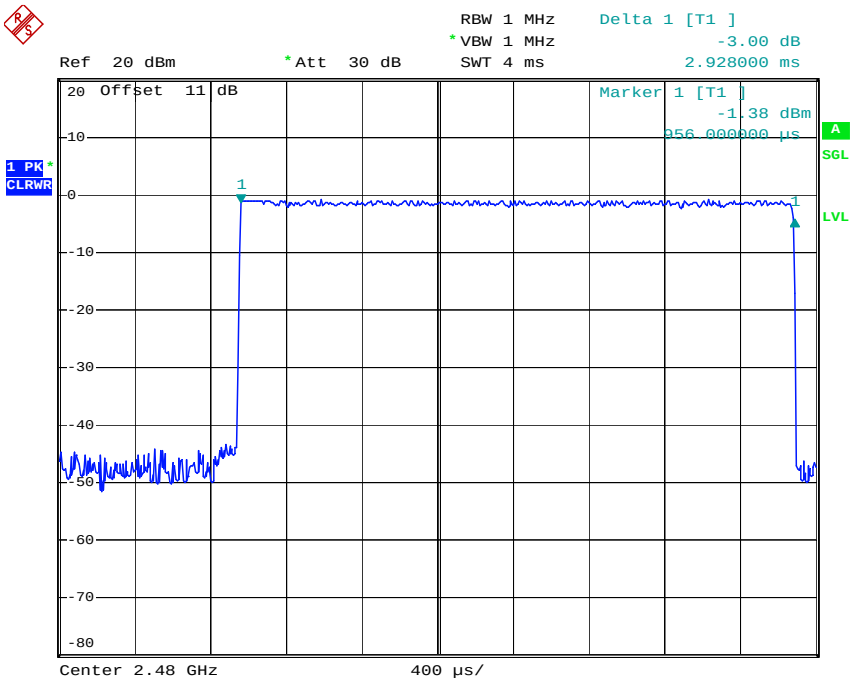
Date: 13.APR.2010 20:11:46

Channel 78 DH3:



Date: 13.APR.2010 20:10:51

Channel 78 DH5:



Date: 13.APR.2010 20:12:40

Dwell Time

Data Rate: **3Mbps** Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2402**	416	266.24	< 400	Pass
DH3	**2402**	1676	357.55	< 400	Pass
DH5	**2402**	2924	374.27	< 400	Pass

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2441**	416	266.24	< 400	Pass
DH3	**2441**	1676	357.55	< 400	Pass
DH5	**2441**	2926	374.53	< 400	Pass

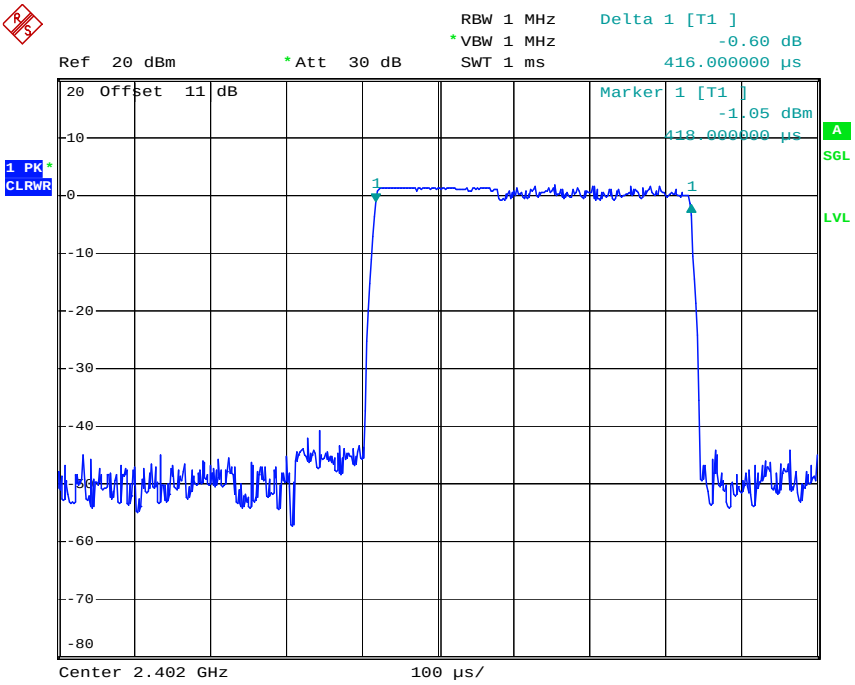
Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2480**	416	266.24	< 400	Pass
DH3	**2480**	1676	357.55	< 400	Pass
DH5	**2480**	2926	374.53	< 400	Pass

Note:

A period time=79x0.4(s)=31.6(s)

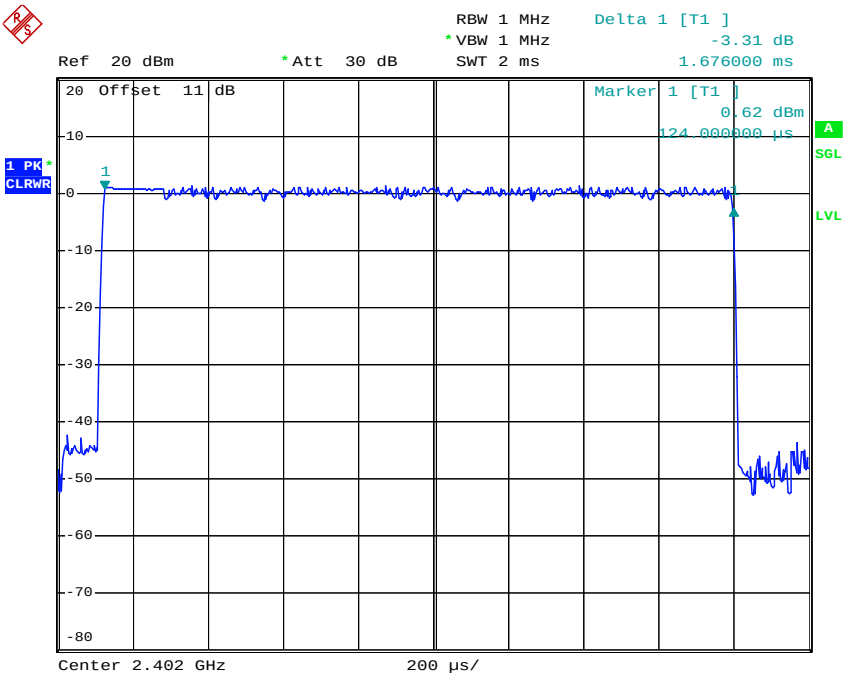
CH00	DH1 time slot=	416 (μs)*(1600/(1*79))*31.6=	266.24 (ms)
	DH3 time slot=	1676 (μs)*(1600/(3*79))*31.6=	357.55 (ms)
	DH5 time slot=	2924 (μs)*(1600/(5*79))*31.6=	374.27 (ms)
CH39	DH1 time slot=	416 (μs)*(1600/(1*79))*31.6=	266.24 (ms)
	DH3 time slot=	1676 (μs)*(1600/(3*79))*31.6=	357.55 (ms)
	DH5 time slot=	2926 (μs)*(1600/(5*79))*31.6=	374.53 (ms)
CH78	DH1 time slot=	416 (μs)*(1600/(1*79))*31.6=	266.24 (ms)
	DH3 time slot=	1676 (μs)*(1600/(3*79))*31.6=	357.55 (ms)
	DH5 time slot=	2926 (μs)*(1600/(5*79))*31.6=	374.53 (ms)

Channel 00 DH1:



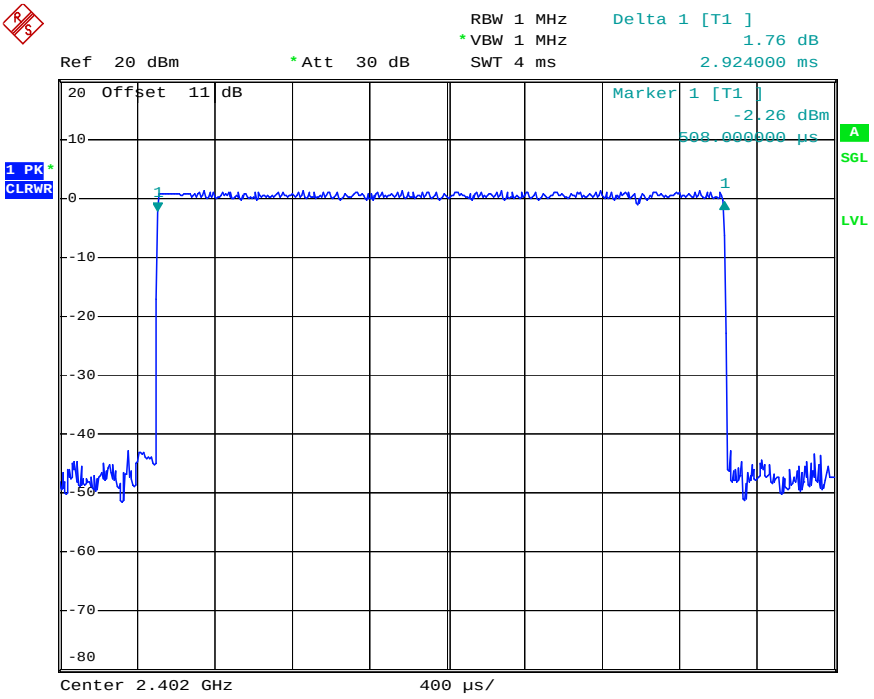
Date: 13.APR.2010 19:59:34

Channel 00 DH3:



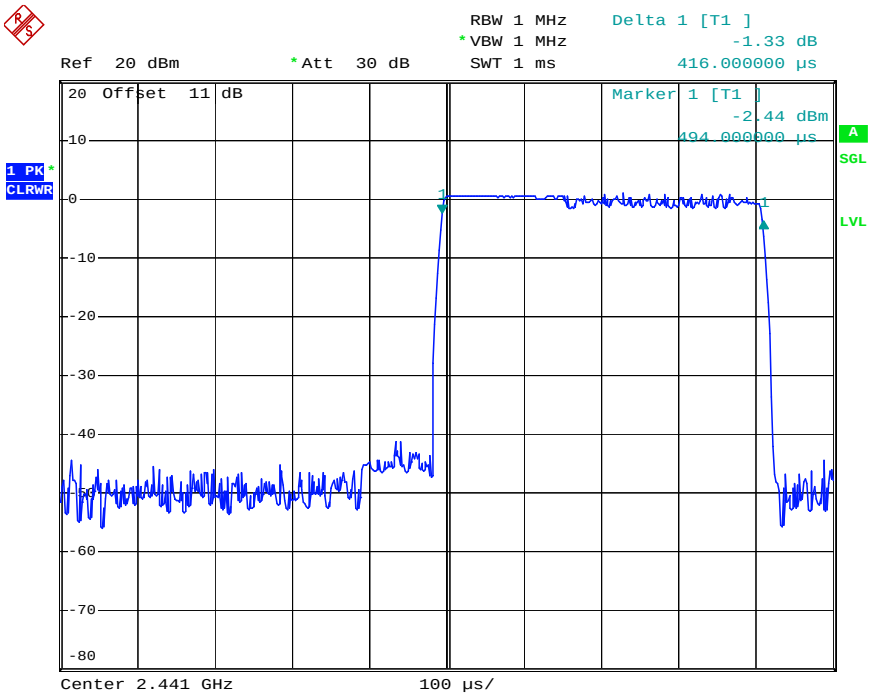
Date: 13.APR.2010 19:57:39

Channel 00 DH5:



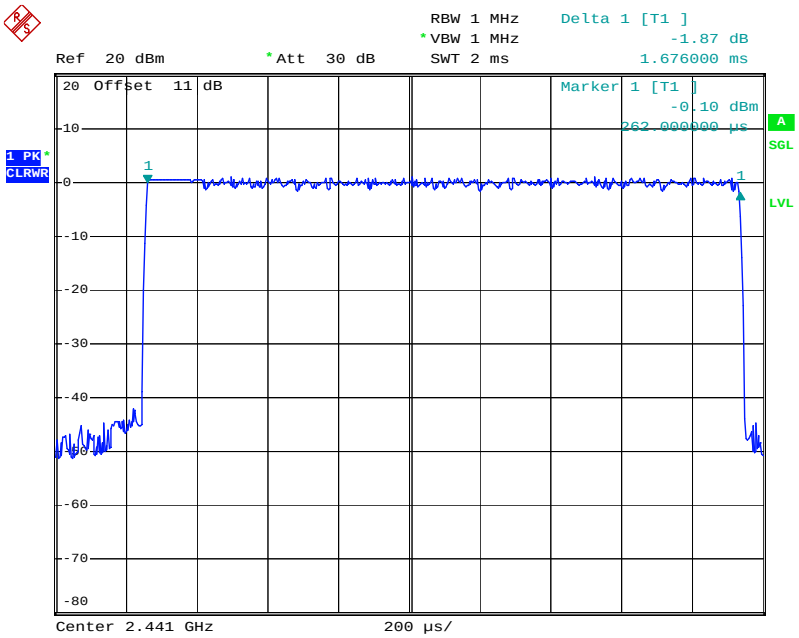
Date: 13.APR.2010 19:56:06

Channel 39 DH1:



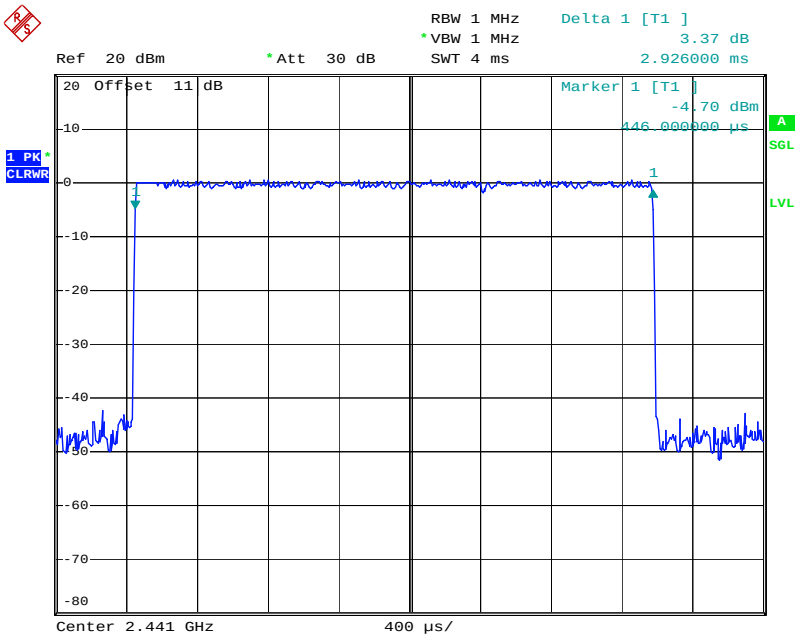
Date: 13.APR.2010 20:01:14

Channel 39 DH3:



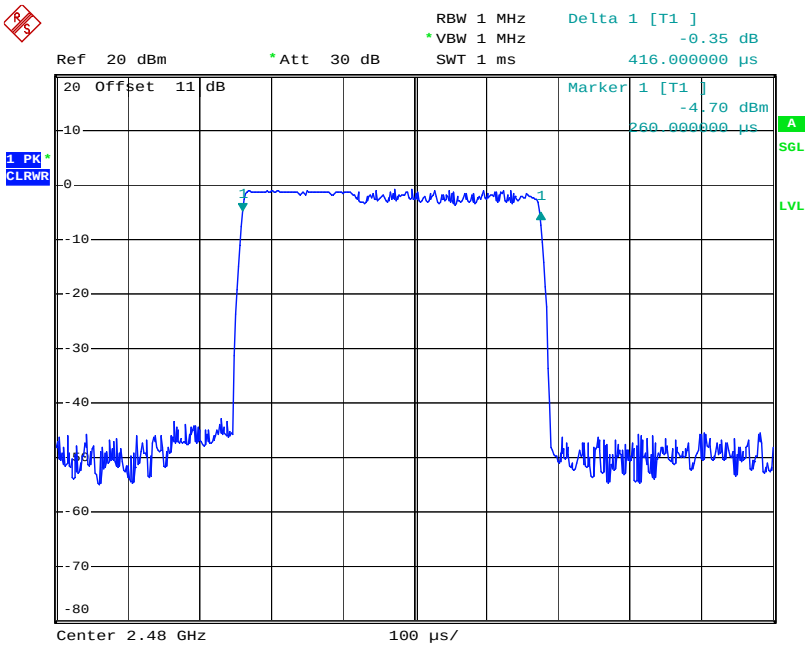
Date: 13.APR.2010 20:02:52

Channel 39 DH5:



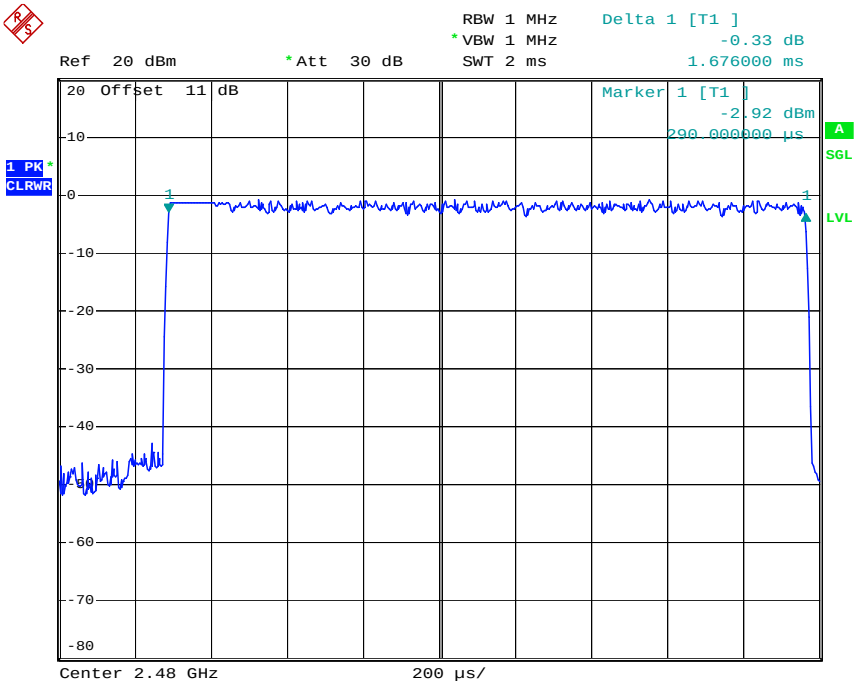
Date: 13.APR.2010 20:04:19

Channel 78 DH1:



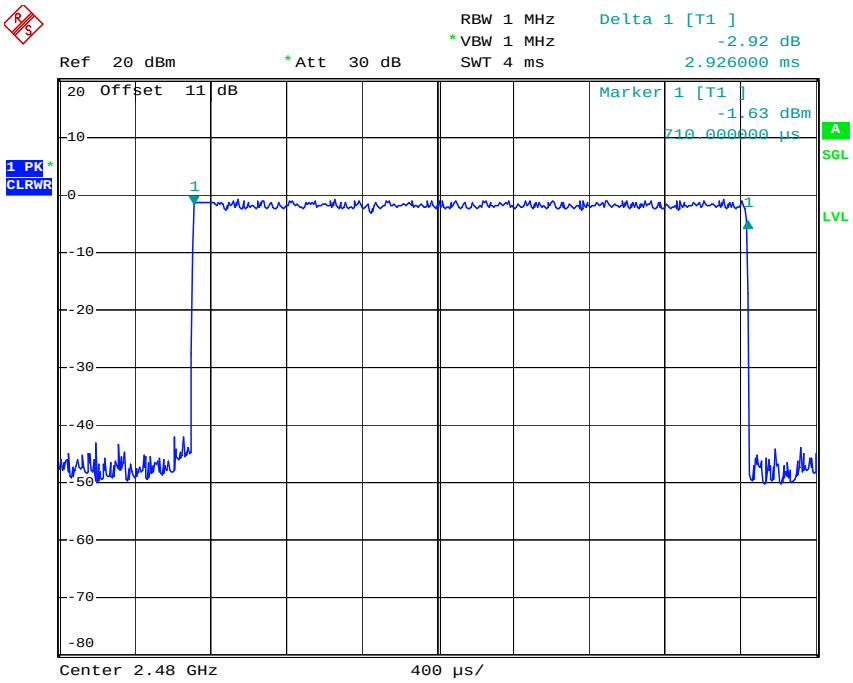
Date: 13.APR.2010 20:08:06

Channel 78 DH3:



Date: 13.APR.2010 20:06:59

Channel 78 DH5:



Date: 13.APR.2010 20:05:42

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°. 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 Con02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	Conduction 02 -1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	06/15/2009	06/15/2010
Conduction 02	EMI Receiver 14	ROHDE& SCHWARZ	ESCI	101034	03/02/2010	03/02/2011
Conduction 02	ISN T2 01	FCC	FCC-TLISN-T2-02	20253	07/20/2009	07/20/2010
Conduction 02	ISN T4 03	FCC	FCC-TLISN-T4-02	20254	07/20/2009	07/20/2010
Conduction 02	ISN T8 01	FCC	FCC-TLINS-T8-02	20255	07/20/2009	07/20/2010
Conduction 02	LISN 01	R&S	ESH2-Z5	890485/013	01/07/2010	01/07/2011
Conduction 02	LISN 04	EMCO	3810/2	9604-1429	05/13/2009	05/13/2010

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber14)	BILOG Antenna 14	Schaffner	CBL6112D	22612	03/19/2010	03/19/2011
Radiation (Chamber14)	Coaxial Cable Chmb 14-3M	NOKIA KABEL	M17/74-RG213	Chmb 14-3M	07/08/2009	07/08/2010
Radiation (Chamber14)	EMI Receiver 06	Schwarzbeck Mess-Elektronik	FCVU 1534	1534-149	07/02/2009	07/02/2010
Radiation (Chamber14)	Spectrum Analyzer 21	Agilent	N9010A	MY49060537	07/03/2009	07/03/2010
Rad. Above 1GHz (Chamber14)	SUCOFLEX 1GHz~18GHz cable	HUBER+SUHNER AG.	Sucoflex 106 & 104	60404/6 & 286303/4	07/06/2009	07/06/2010
Rad. Above 1GHz (Chamber14)	SUCOFLEX 1GHz~40GHz cable	HUBER+SUHNER AG.	Sucoflex 102	27963/2	09/16/2009	09/16/2010

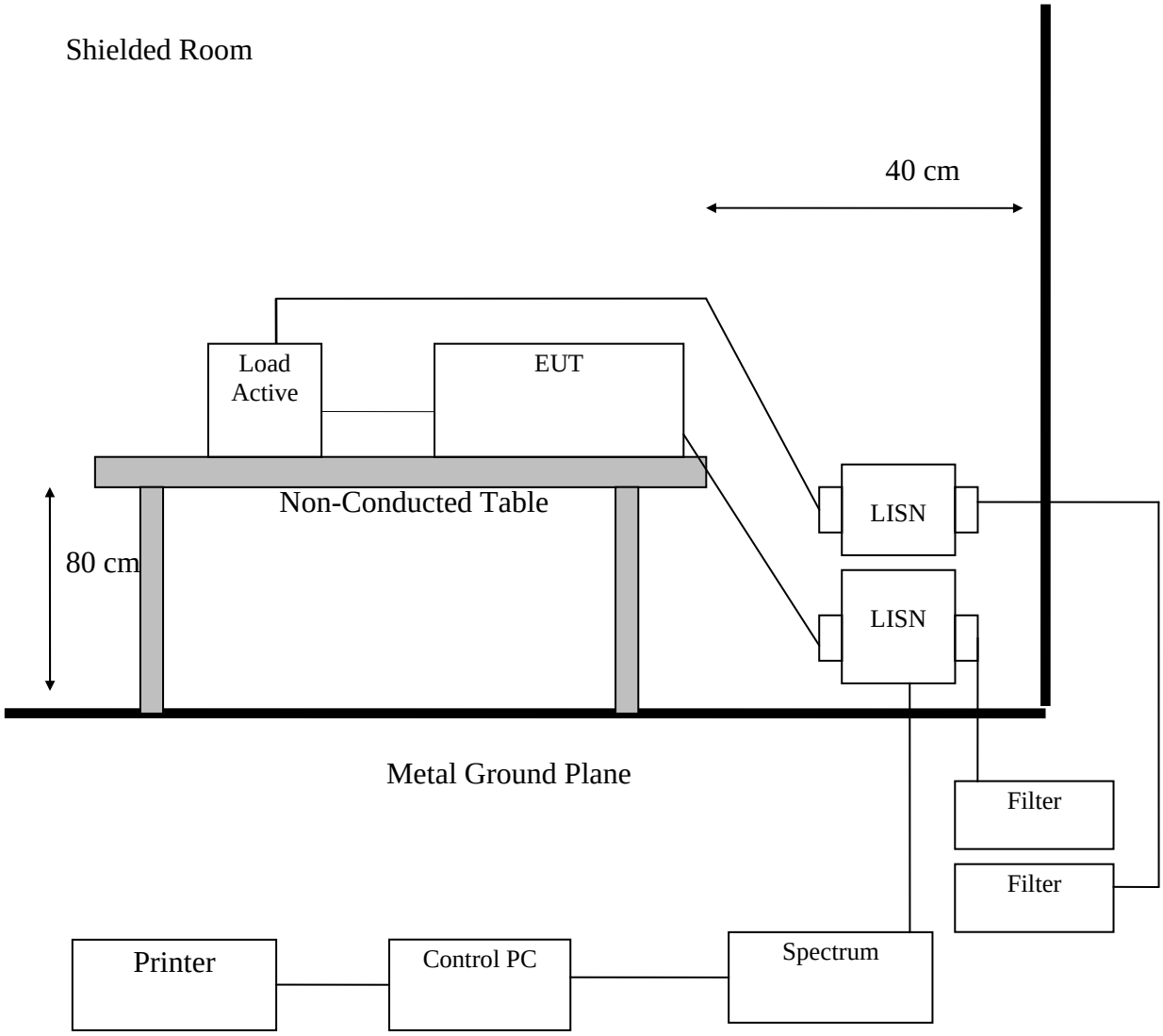
Note: Calibration is traceable to NIST or national or international standards.

5.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

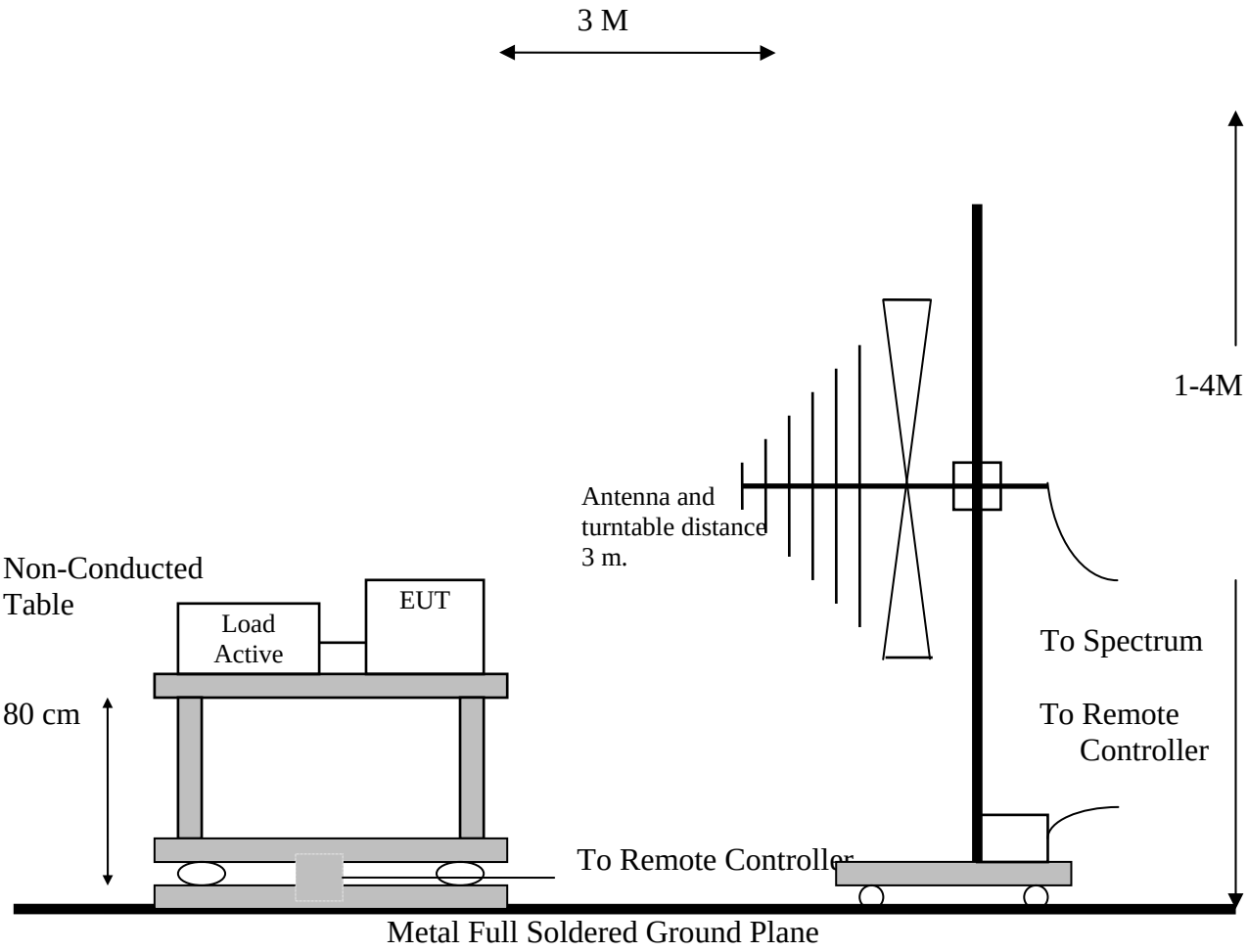
Radiation/Conduction	Filename	Version	Issued Date
Lung_Tan Conduction	EZ EMC	1.1.4.2	2/10/2007
Lung_Tan Radiation	EZ EMC	1.1.4.2	1/24/2007

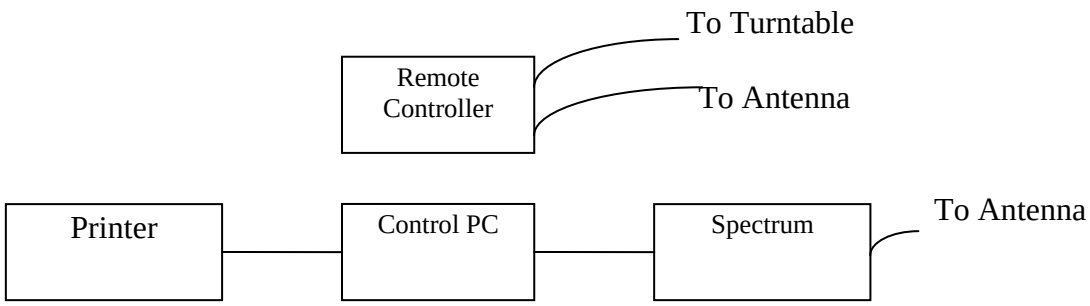
5.4 Appendix D: Layout of EUT and Support Equipment

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.

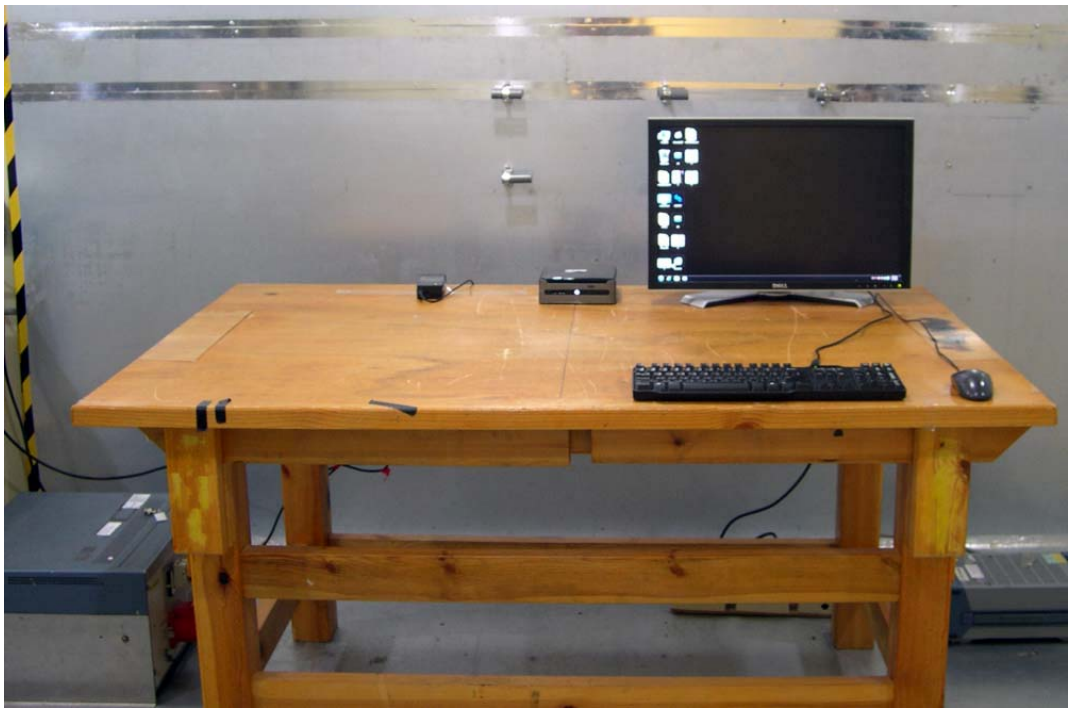
<Conduction 02>: ±3.263dB

<Chamber 14 (3M)>
Horizontal
30MHz~200MHz: ±4.316 dB
200MHz~1GHz: ±4.587 dB
Vertically
30MHz~200MHz: ±4.420 dB
200MHz~1GHz: ±4.573 dB

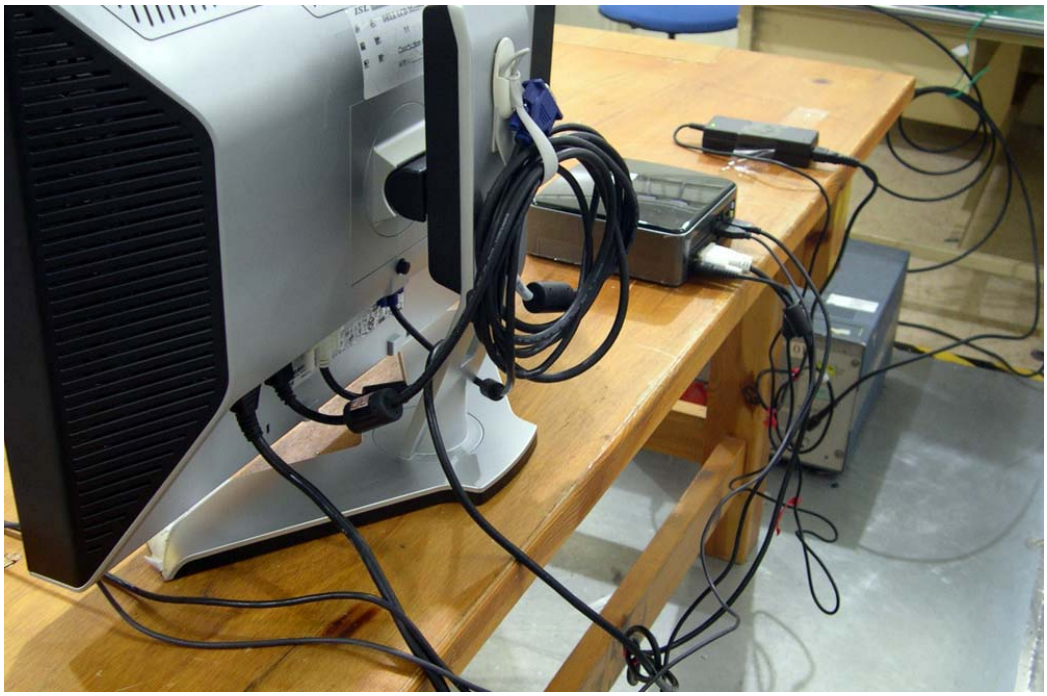
1GHz~26.5GHz ±3.722 dB

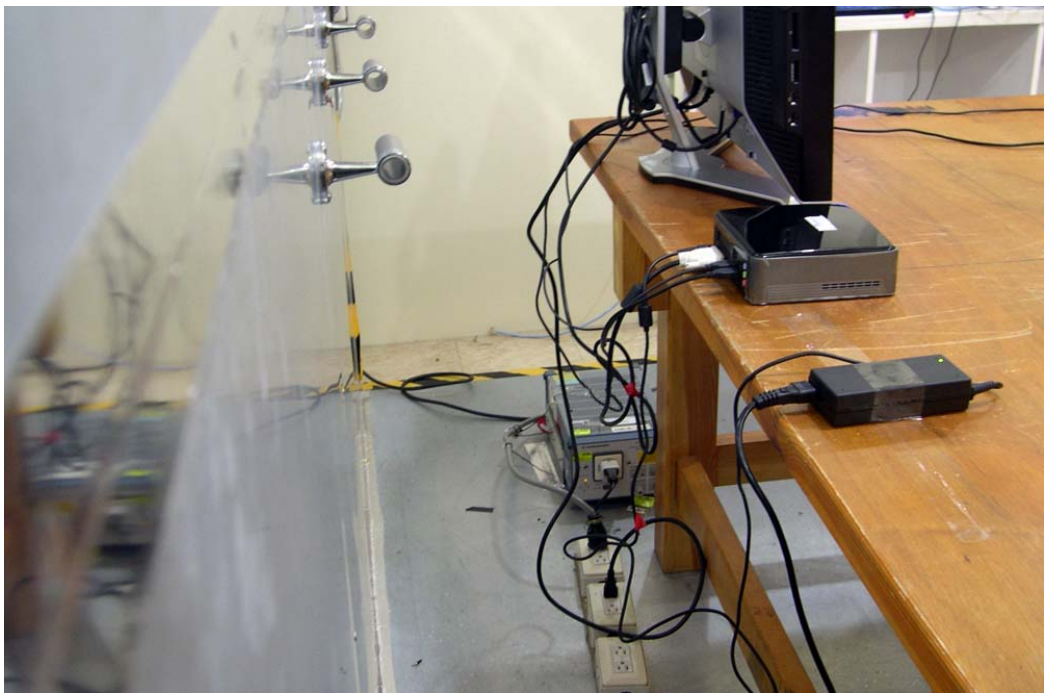
5.6 Appendix F: Photographs of EUT Configuration Test Set Up

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.