

FCC RADIO TEST REPORT

Applicant's company	Ralink Technology Corporation
Applicant Address	5F., No.36, Taiyuan St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.
FCC ID	VQF-RT2700E
Manufacturer's company	Ralink Technology Corporation
Manufacturer Address	5F., No.36, Taiyuan St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.

Product Name	11b/g/n 1T2R WLAN Mini Card
Brand Name	Ralink
Model Name	RT2700E
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Oct. 9, 2007
Final Test Date	Nov. 27, 2007
Submission Type	Class II Change
Multiple Listing	Please refer to section 3.7



Statement

Test result included is only for the Draft n part of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Table of Contents

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	4
3.3. Table for Filed Antenna.....	5
3.4. Table for Carrier Frequencies	6
3.5. Table for Test Modes	6
3.6. Table for Testing Locations.....	6
3.7. Table for Multiple Listing & Class II Change	7
3.8. Table for Supporting Units	7
3.9. Table for Parameters of Test Software Setting	8
3.10. Test Configurations	9
4. TEST RESULT	11
4.1. Radiated Emissions Measurement	11
4.2. Band Edge Emissions Measurement	29
4.3. Antenna Requirements	32
5. LIST OF MEASURING EQUIPMENTS	33
6. TEST LOCATION.....	34
7. TAF CERTIFICATE OF ACCREDITATION	35
APPENDIX A. PHOTOGRAPHS OF EUT.....	A1 ~ A6
APPENDIX B. TEST PHOTOS.....	B1 ~ B6
APPENDIX C. MAXIMUM PERMISSIBLE EXPOSURE.....	C1 ~C3

History of This Test Report

Original Issue Date: Dec. 17, 2007

Report No.: FR7O1204-01AA

☒ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description



1. CERTIFICATE OF COMPLIANCE

Product Name : 11b/g/n 1T2R WLAN Mini Card
Brand Name : Ralink
Model Name : RT2700E
Applicant : Ralink Technology Corporation
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Oct. 9, 2007 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.


Wayne Hsu
SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	Rule Section	Description of Test	Result	Under Limit
-	15.207	AC Power Line Conducted Emissions	Complies	-
-	15.247(b)(3)	Maximum Peak Conducted Output Power	Complies	-
-	15.247(e)	Power Spectral Density	Complies	-
-	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.1	15.247(d)	Radiated Emissions	Complies	3.38 dB
4.2	15.247(d)	Band Edge Emissions	Complies	4.19 dB
4.3	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	$\pm 2.3\text{dB}$	Confidence levels of 95%
Maximum Peak Conducted Output Power	$\pm 0.8\text{dB}$	Confidence levels of 95%
Power Spectral Density	$\pm 0.5\text{dB}$	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5 \times 10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	$\pm 0.8\text{dB}$	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	$\pm 1.9\text{dB}$	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	$\pm 1.9\text{dB}$	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	$\pm 1.9\text{dB}$	Confidence levels of 95%
Temperature	$\pm 0.7^{\circ}\text{C}$	Confidence levels of 95%
Humidity	$\pm 3.2\%$	Confidence levels of 95%
DC / AC Power Source	$\pm 1.4\%$	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (1TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
Modulation	see the below table for draft n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for Draft n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Conducted Output Power	MCS0 (20MHz) : 24.40 dBm MCS0 (40MHz) : 21.30 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)	
Band width Mode	20 MHz	40 MHz
802.11b	V	X
802.11g	V	X
Draft n	V	V

Draft n spec

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	$\frac{1}{2}$	1	52	108	26	54	6.5	13.5
1	1	QPSK	$\frac{1}{2}$	2	104	216	52	108	13.0	27.0
2	1	QPSK	$\frac{3}{4}$	2	104	216	78	162	19.5	40.5
3	1	16-QAM	$\frac{1}{2}$	4	208	432	104	216	26.0	54.0
4	1	16-QAM	$\frac{3}{4}$	4	208	432	156	324	39.0	81.0
5	1	64-QAM	$\frac{2}{3}$	6	312	648	208	432	52.0	108.0
6	1	64-QAM	$\frac{3}{4}$	6	312	648	234	486	58.5	121.5
7	1	64-QAM	$\frac{5}{6}$	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

3.2. Accessories

N/A

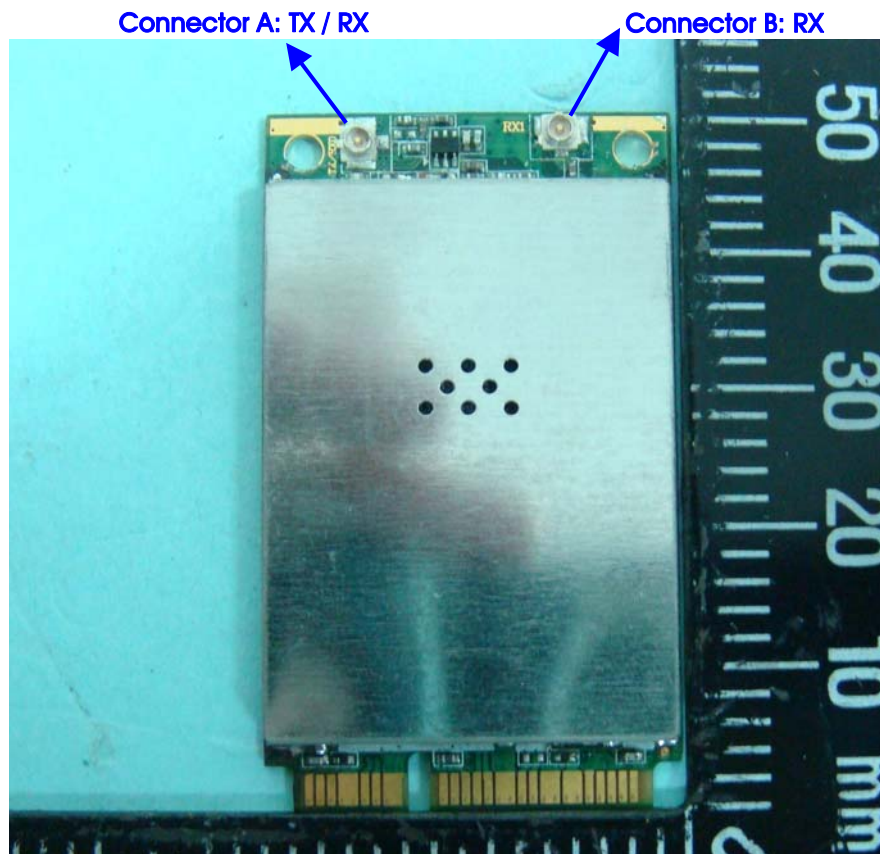
3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
A	Tyco	1909966-1	PIFA Antenna	N/A	2.99
B	Tyco	1909967-1	PIFA Antenna	N/A	1.04
C	ACON	APP8P-700003	PIFA Antenna	N/A	1.82
D	ACON	APP8P-700004	PIFA Antenna	N/A	1.60

Note: The EUT has 30 antennas. Due to Ant. A ~ Ant. D is the same type antenna, only the higher gain antenna "Ant. A and Ant. B" was tested and recorded in this report.

Please refer to appendix D for all 30 antennas.

Connect A & Connect B could receive simultaneously.



3.4. Table for Carrier Frequencies

There are two bandwidth systems for draft n.

For both 20MHz bandwidth systems, use Channel 1~Channel 11.

For both 40MHz bandwidth systems, use Channel 3~Channel 9.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz		

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
Radiated Emissions 9kHz~1GHz	Normal Link	Auto	-	A+B
Radiated Emissions 1GHz~10 th Harmonic	MCS0/20MHz	6.5 Mbps	1/6/11	A+B
	MCS0/40MHz	13.5 Mbps	3/6/9	A+B
Band Edge Emissions	MCS0/20MHz	6.5 Mbps	1/11	A+B
	MCS0/40MHz	13.5 Mbps	3/9	A+B

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	101377	IC 4088	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

3.7. Table for Multiple Listing & Class II Change

This product is an extension of original one reported under Sporton project number: 7O1204

Below is the table for the change of the product with respect to the original one.

Modifications	Description	Performance Checking
Add 2 antennas	<p>Original report has 28 antennas.</p> <p>And the highest antenna gain is 4dBi.</p> <p>New antennas:</p> <p>PIFA antenna: 1909966-1, Antenna gain: 2.99dBi</p> <p>PIFA antenna: 1909967-1, Antenna gain: 1.04dBi</p> <p>PIFA antenna: APP8P-700003,</p> <p>Antenna gain: 1.82dBi</p> <p>PIFA antenna: APP8P-700004,</p> <p>Antenna gain: 1.60dBi</p> <p>Due to Ant. A ~ Ant. D is the same type antenna, only the higher gain antenna "Ant. A and Ant. B" was tested and recorded in this report.</p>	Radiated Emissions

3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	ASUS	A8H	PPD-AR5BxB61
Mouse	QSKY	Lx-619B	DOC
Modem	ACEEX	DM1414	IFAXDM1414
Printer	EPSON	LQ-300	DOC
AP	PLANEX	GW-AP54SGX	N/A

3.9. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters of Draft n MCS0 20MHz

Test Software Version	RALINK		
Frequency	2412 MHz	2437 MHz	2462 MHz
Draft n	9	0E	0D

Power Parameters of Draft n MCS0 40MHz

Test Software Version	RALINK		
Frequency	2422 MHz	2437 MHz	2452 MHz
Draft n	3	8	0B

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

- Turn on the power of all equipment.
- The NB sends " H " messages to the panel, and the panel displays " H " patterns on the screen.
- The NB sends " H " messages to the printer, then the printer prints them on the paper.
- The NB sends " H " messages to the modem.
- Repeat the steps from b to d.

At the same time, the following programs were executed:

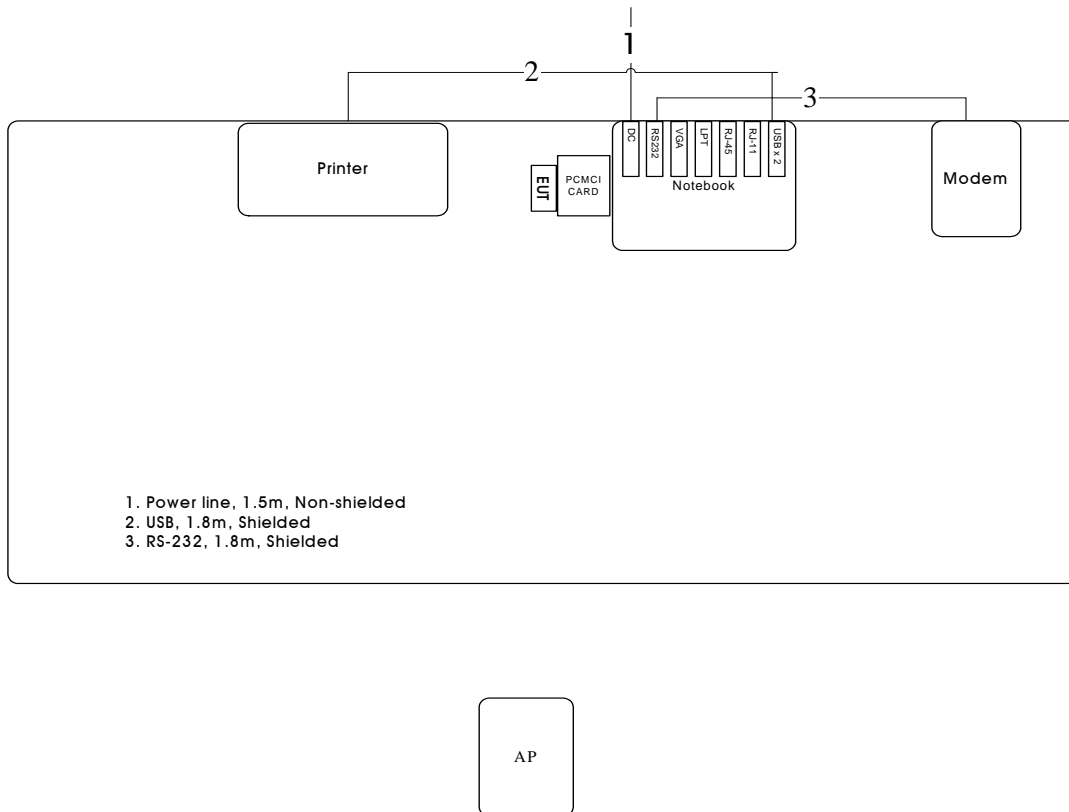
Executed "ping.exe" to link with the remote workstation to receive and transmit data by LAN and WLAN.

Executed " RALINK" to control the EUT continuously transmit RF signal.

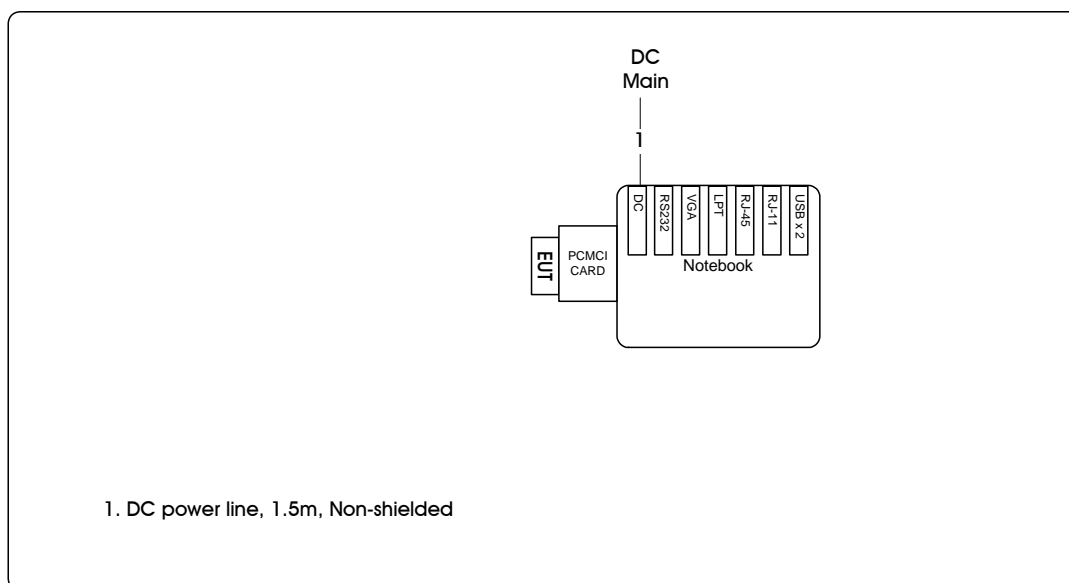
3.10. Test Configurations

3.10.1. Radiation Emissions Test Configuration

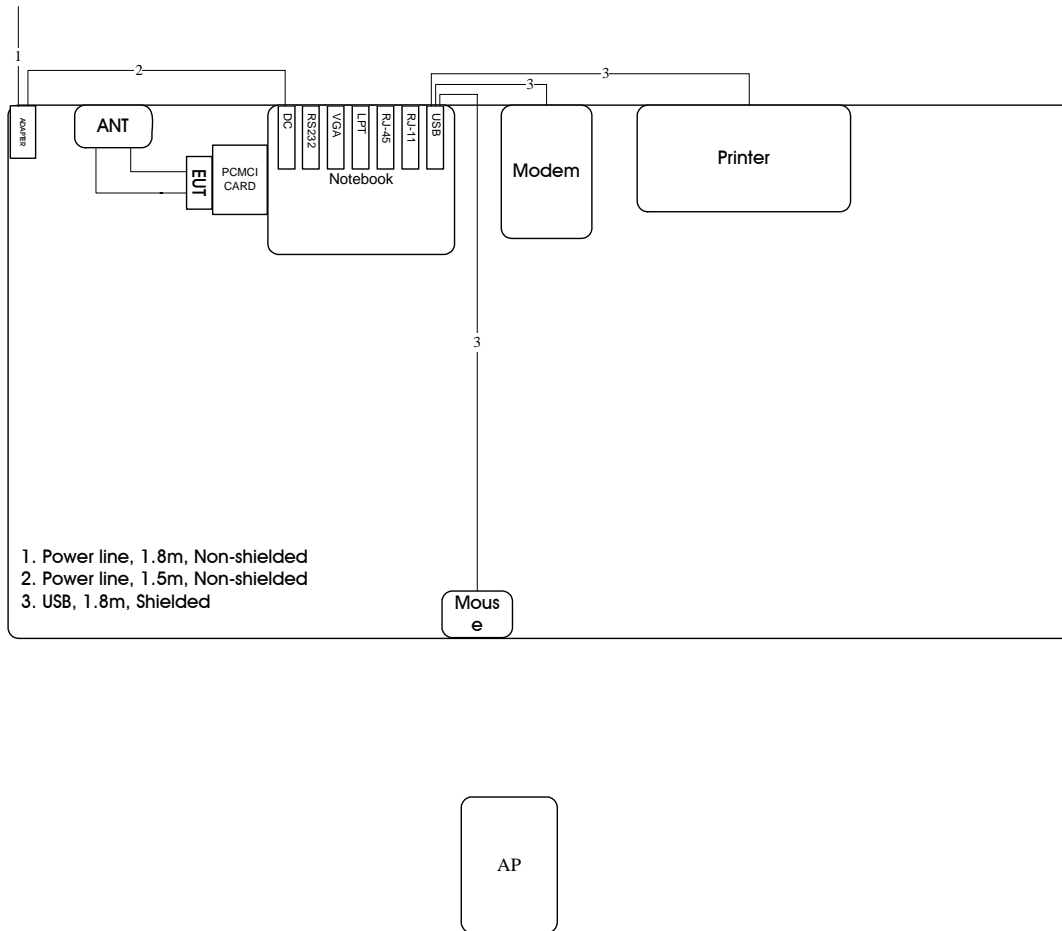
Test Configuration: 9KHz~1GHz



Test Configuration: Above 1GHz



3.10.2. AC Power Line Conduction Emissions Test Configuration



4. TEST RESULT

4.1. Radiated Emissions Measurement

4.1.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.1.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1000KHz / 1000KHz for peak

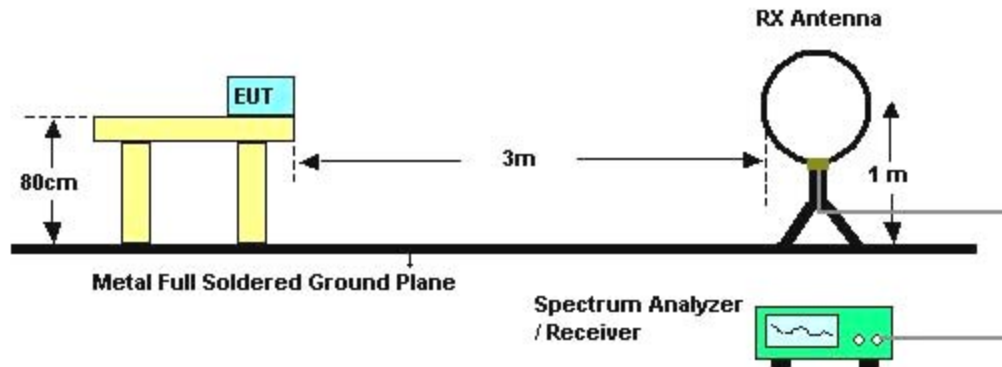
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.1.3. Test Procedures

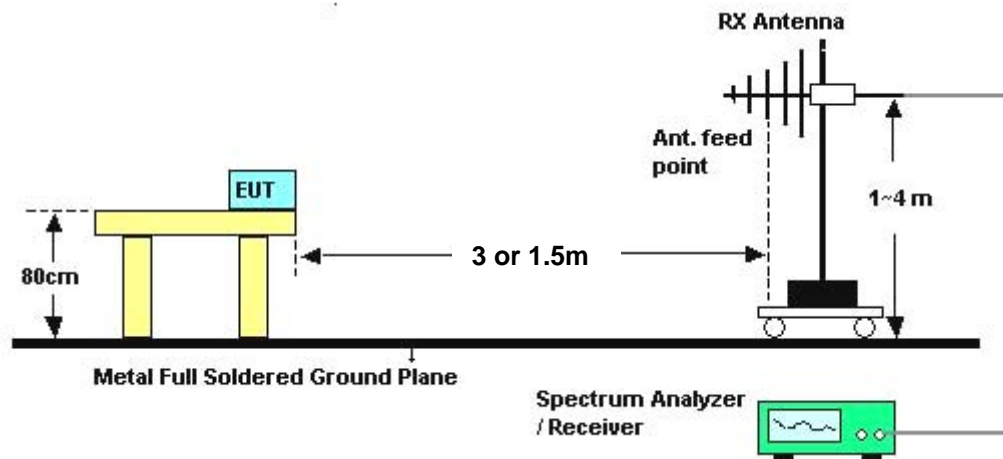
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.1.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	23℃	Humidity	56%
Test Engineer	Aric Lee	Configurations	Normal Link

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

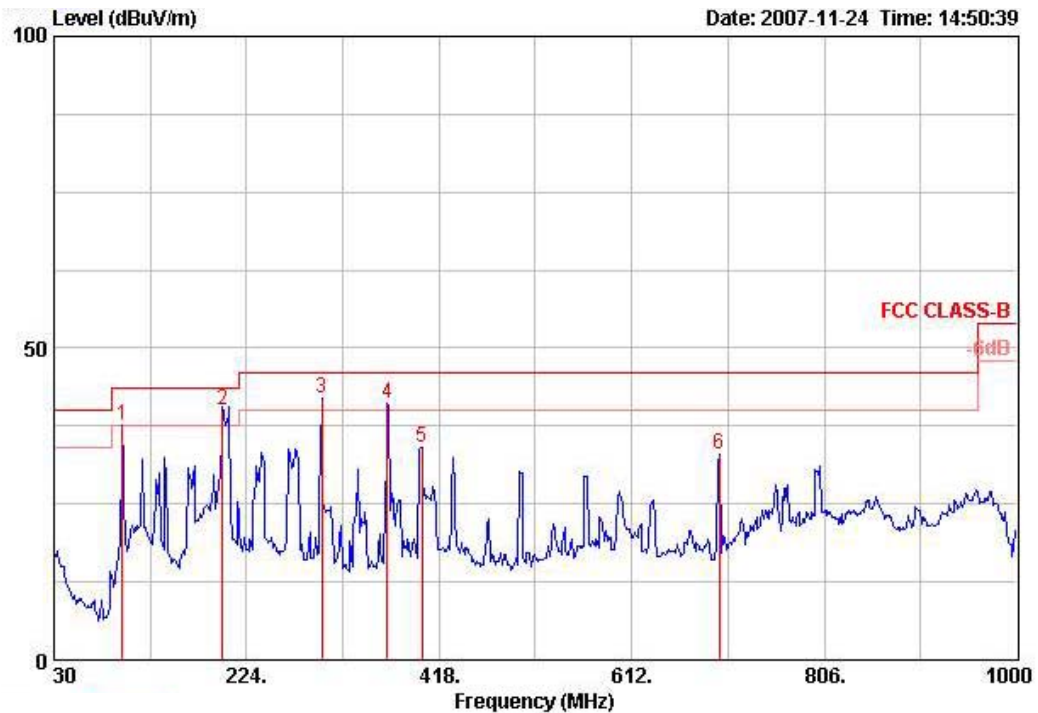
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.1.8. Results of Radiated Emissions (30MHz~1GHz)

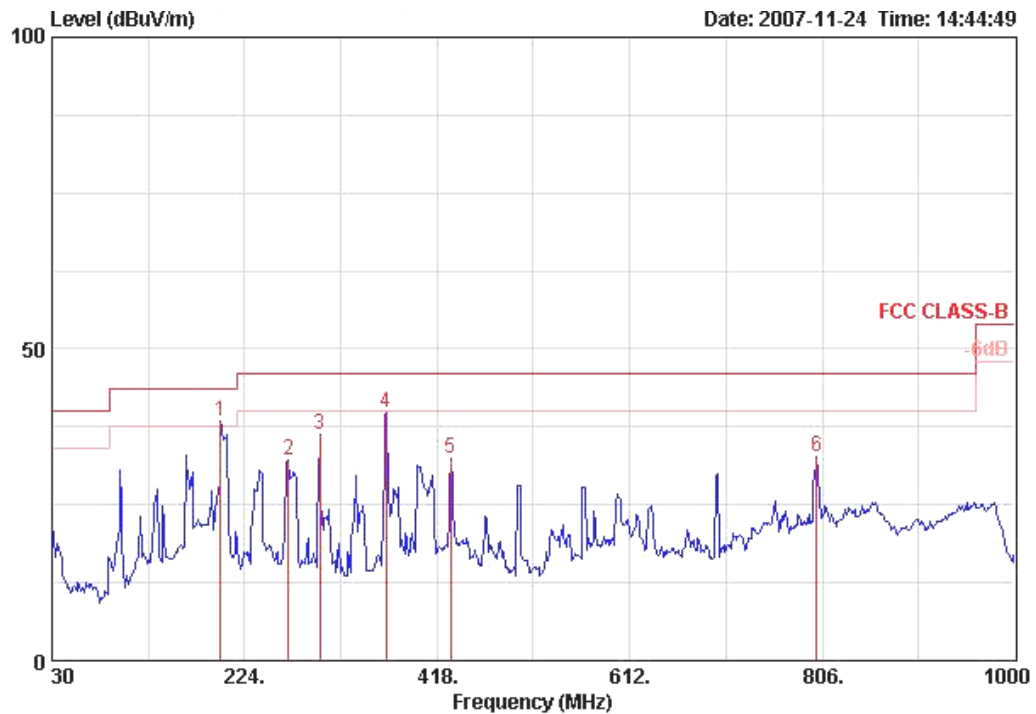
Temperature	23℃	Humidity	56%
Test Engineer	Aric Lee	Configurations	Normal Link

Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	98.870	37.49	-6.01	43.50	52.09	11.01	0.36	25.96	Peak	100	0
2 @	199.700	40.12	-3.38	43.50	54.32	10.30	0.96	25.46	QP	100	248
3 !	299.660	41.91	-4.09	46.00	51.81	13.90	1.14	24.94	Peak	100	0
4 !	365.620	41.15	-4.85	46.00	49.34	15.68	1.30	25.16	Peak	100	0
5	400.540	34.09	-11.91	46.00	41.52	16.51	1.61	25.55	Peak	100	0
6	700.270	32.94	-13.06	46.00	37.04	19.70	2.13	25.93	Peak	100	0

Vertical



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 !	199.750	38.34	-5.16	43.50	52.54	10.30	0.96	25.46	Peak	100	46
2	268.620	32.16	-13.84	46.00	42.71	13.55	1.15	25.24	Peak	400	0
3	299.660	36.11	-9.89	46.00	46.01	13.90	1.14	24.94	Peak	400	0
4	366.590	39.70	-6.30	46.00	47.87	15.70	1.31	25.17	Peak	400	0
5	431.580	32.44	-13.56	46.00	39.80	16.94	1.49	25.79	Peak	400	0
6	800.180	32.63	-13.37	46.00	34.62	20.70	2.50	25.19	Peak	400	0

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

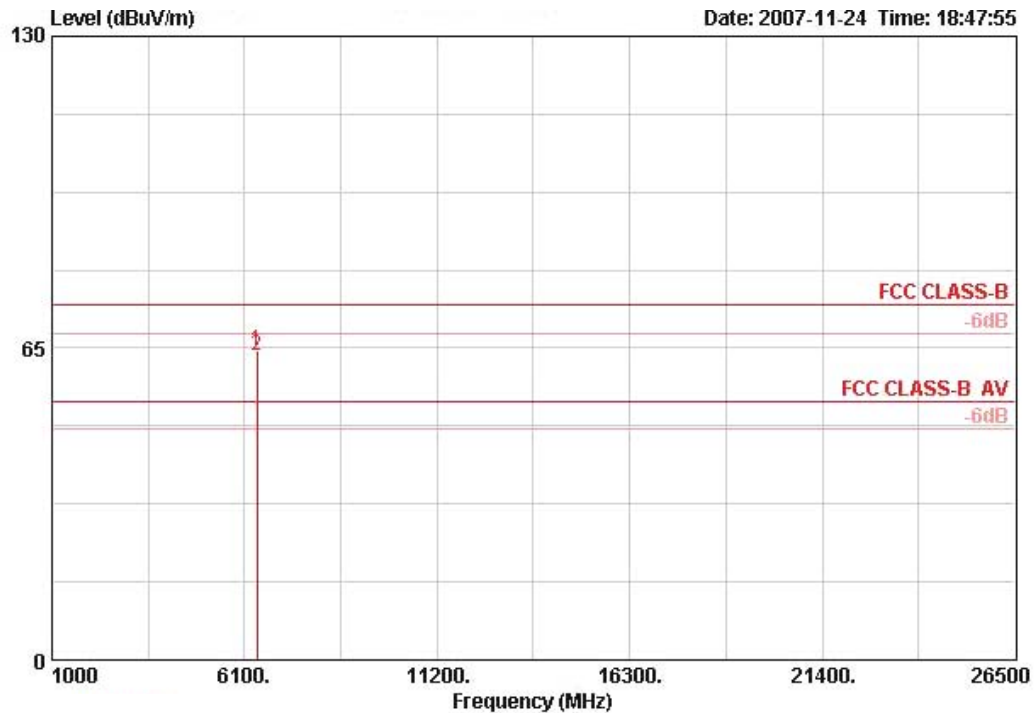
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.1.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	23°C	Humidity	56%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 20MHz Ch 1 Ant. A

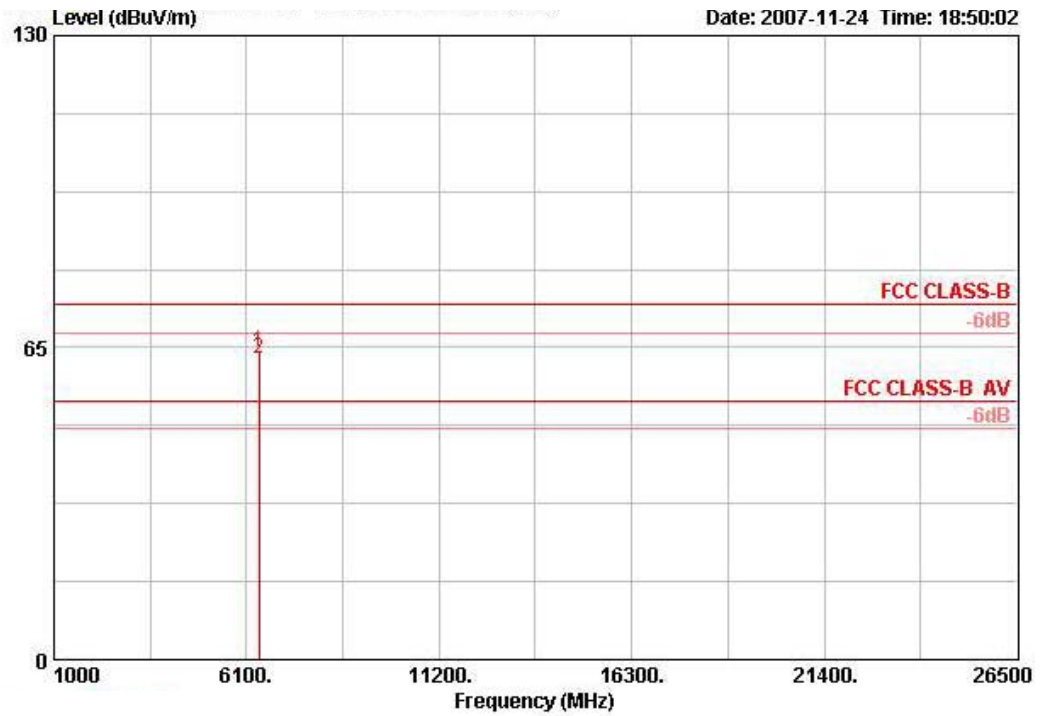
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	6431.940	64.54			59.20	35.01	5.59	35.26	PEAK	146	254	HORIZONTAL

Note: Item 1 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Vertical

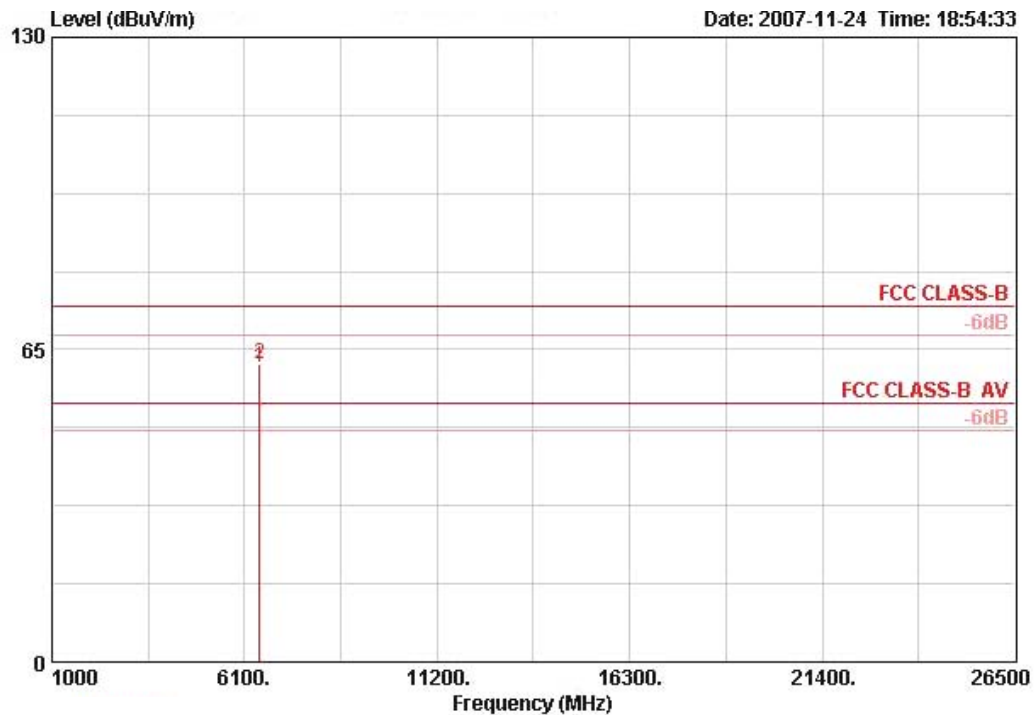


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	6431.960	64.07			58.73	35.01	5.59	35.26	PEAK	100	226	VERTICAL

Note: Item 1 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Temperature	23°C	Humidity	56%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 20MHz Ch 6 Ant. A

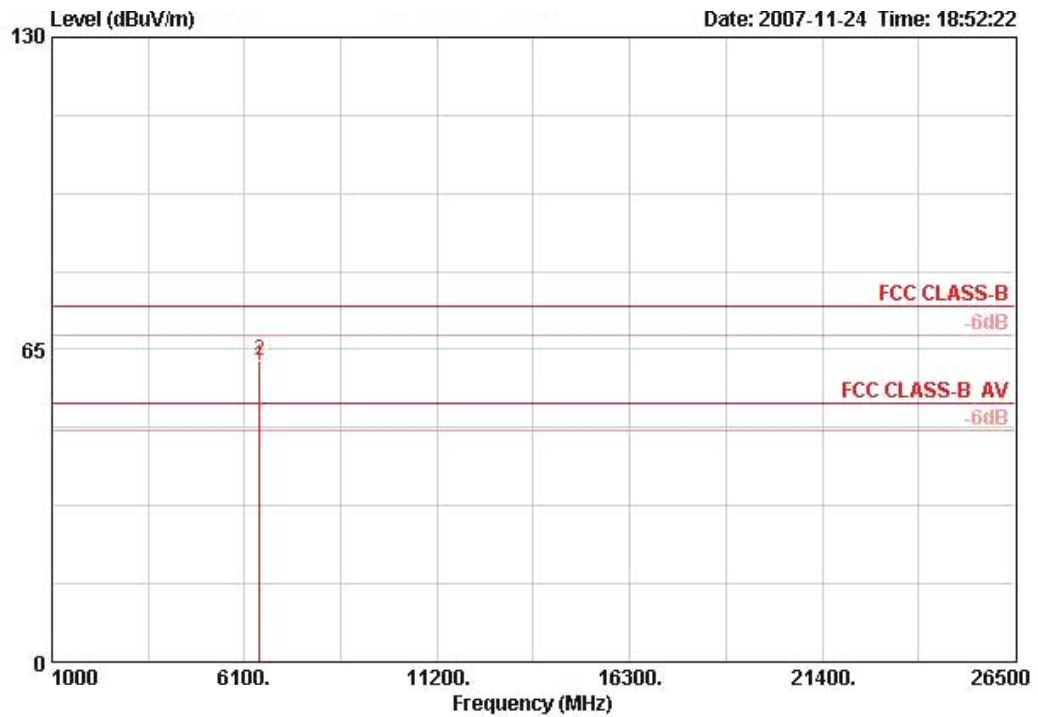
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6498.720	62.07			56.69	35.00	5.61	35.23	PEAK	120	250	HORIZONTAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Vertical

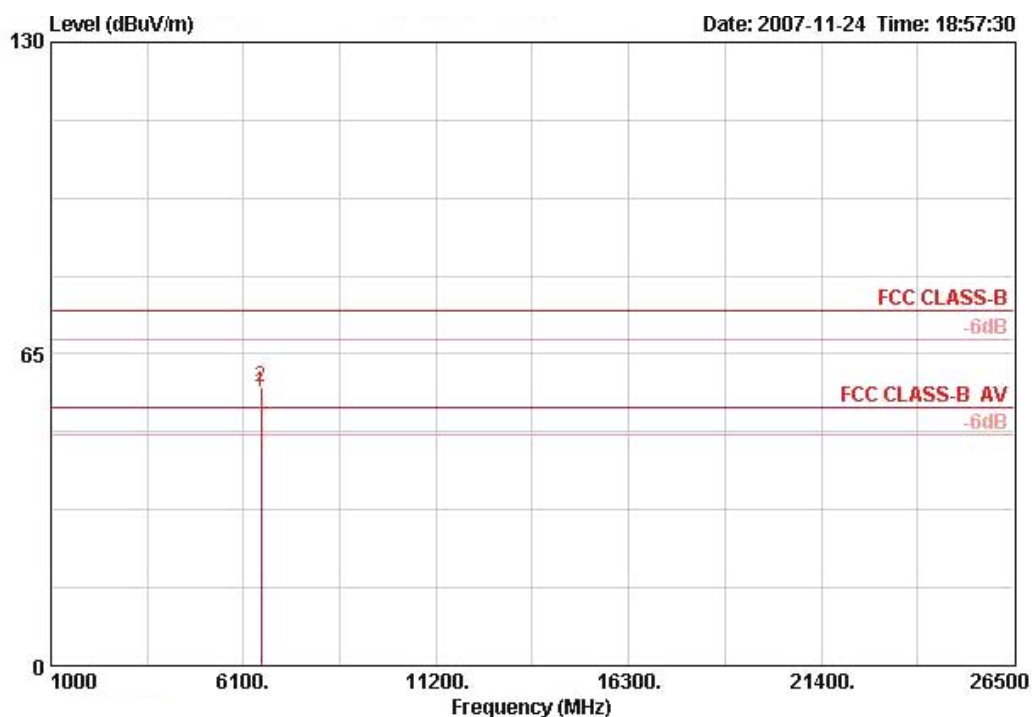


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6498.760	62.58			57.20	35.00	5.61	35.23	PEAK	108	227	VERTICAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Temperature	23°C	Humidity	56%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 20MHz Ch11 Ant. A

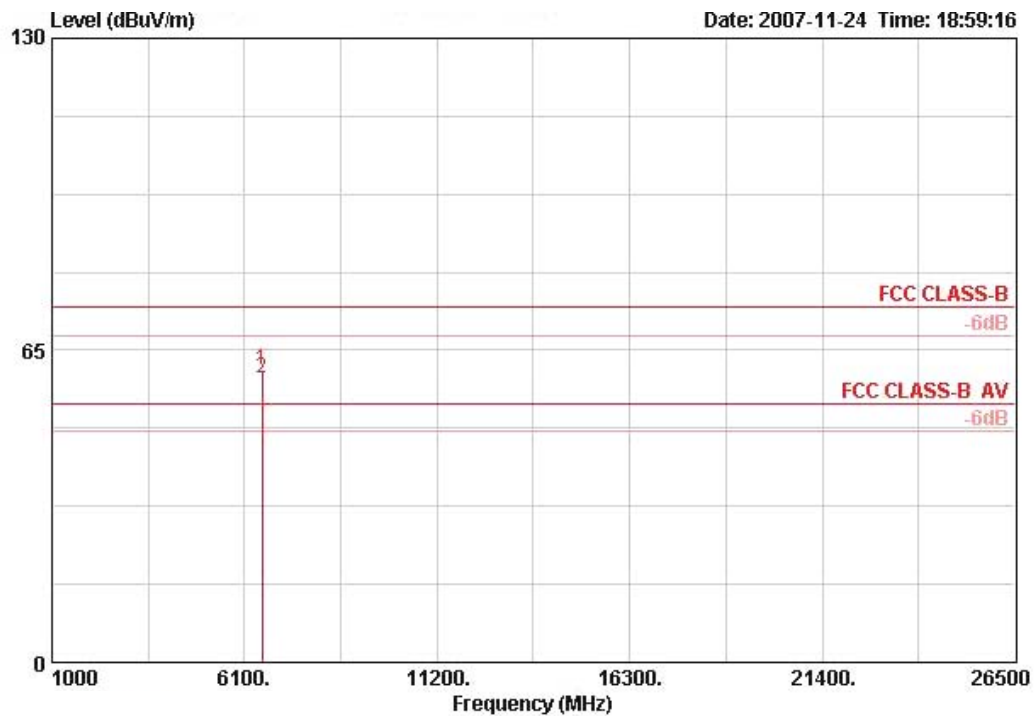
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamplifier	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6565.350	58.09			52.64	35.10	5.65	35.30	PEAK	100	207	HORIZONTAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Vertical

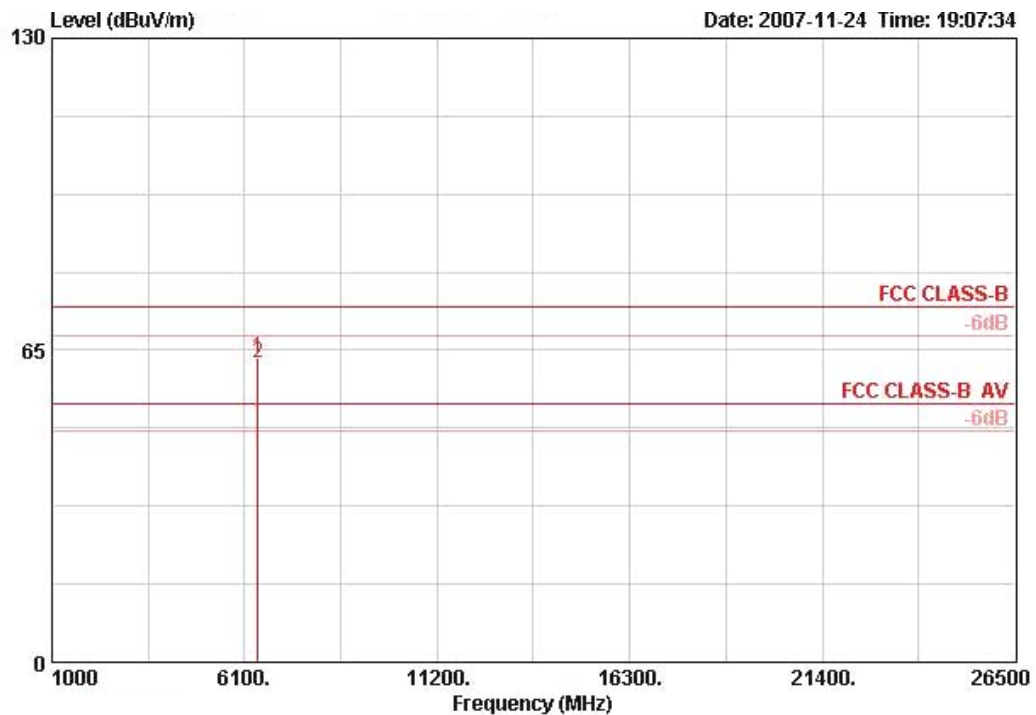


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	6565.180	60.90			55.44	35.10	5.65	35.30	PEAK	119	229	VERTICAL

Note: Item 1 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Temperature	23°C	Humidity	56%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 40MHz Ch 3 Ant. A

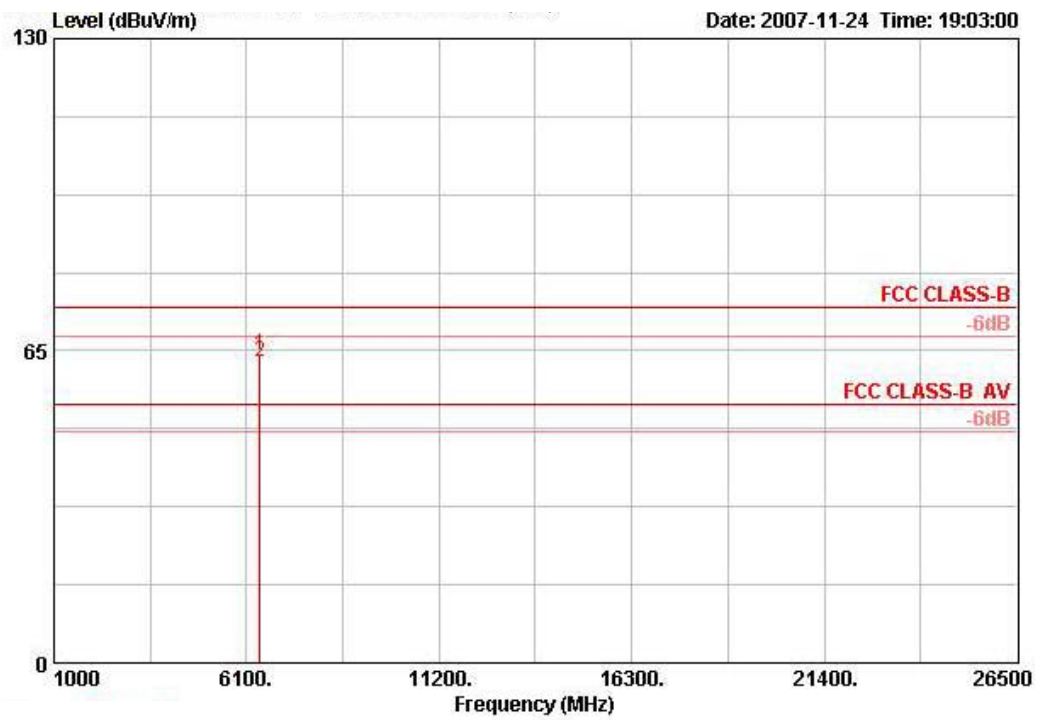
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	6458.580	63.39			58.03	35.01	5.60	35.25	PEAK	124	251	HORIZONTAL

Note: Item 1 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Vertical

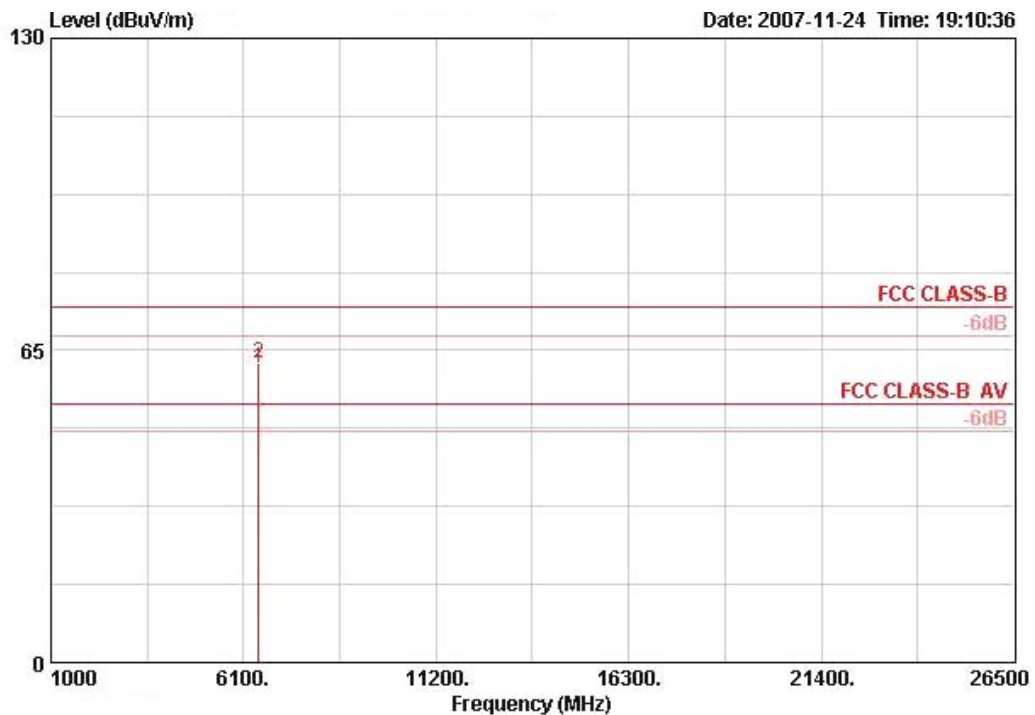


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	6458.620	64.00			58.64	35.01	5.60	35.25	PEAK	110	226	VERTICAL

Note: Item 1 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Temperature	23°C	Humidity	56%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 40MHz Ch 6 Ant. A

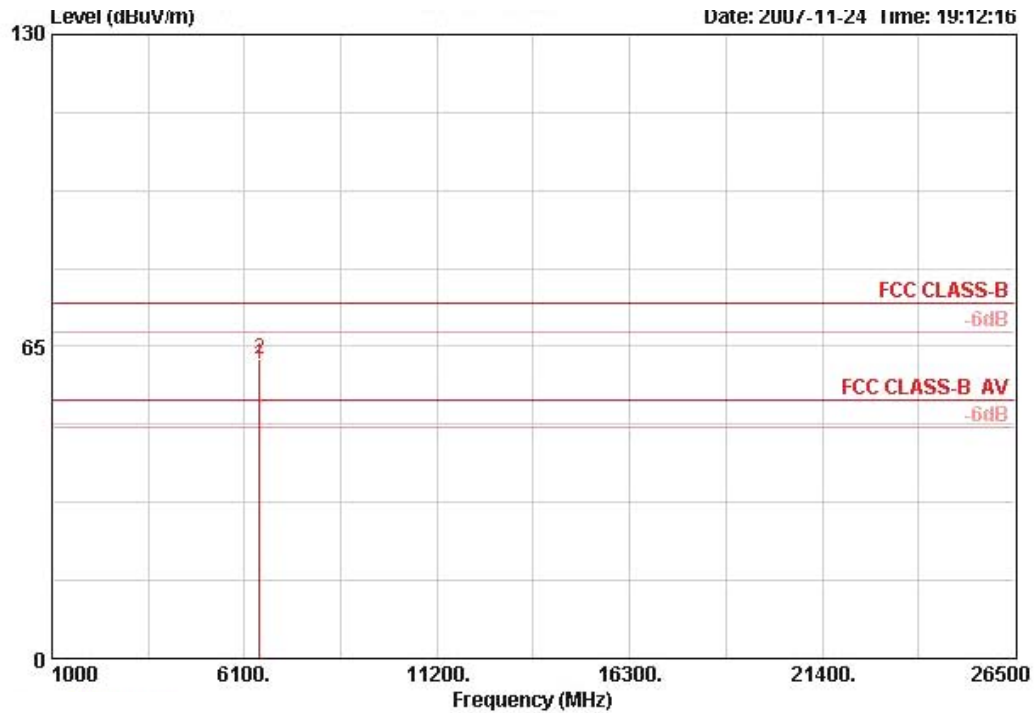
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6498.700	62.41			57.02	35.00	5.61	35.23	PEAK	119	251	HORIZONTAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Vertical

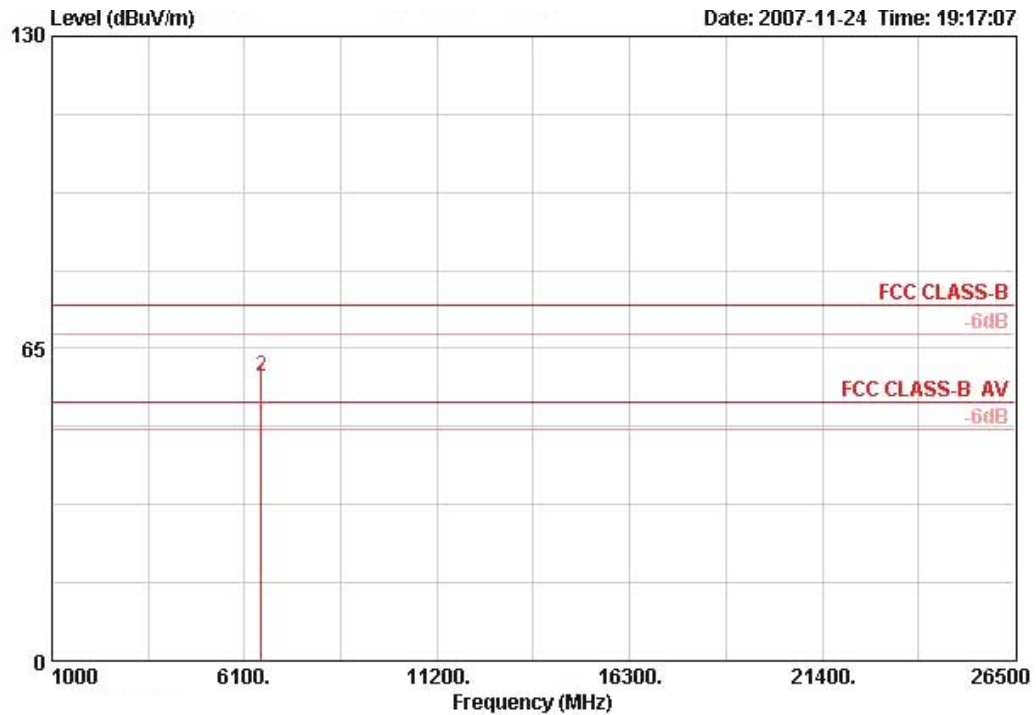


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6498.720	62.23			56.85	35.00	5.61	35.23	PEAK	108	226	VERTICAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Temperature	23°C	Humidity	56%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 40MHz Ch 9 Ant. A

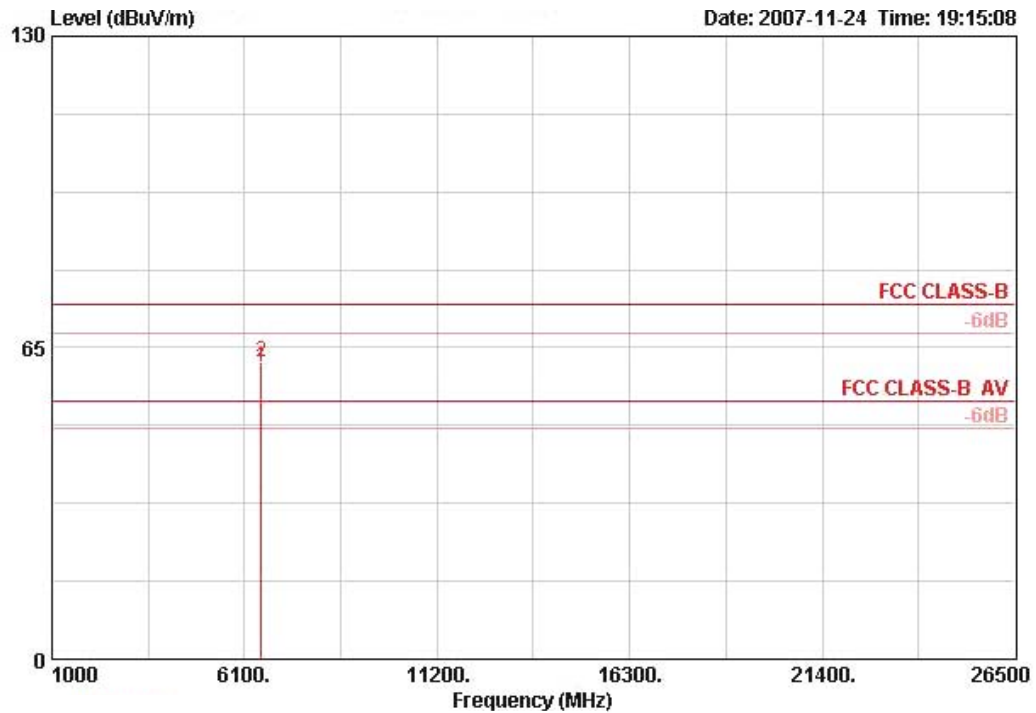
Horizontal



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6538.710	59.07			53.64	35.07	5.63	35.27	PEAK	100	206	HORIZONTAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Vertical



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
2	6538.710	61.83			56.39	35.07	5.63	35.27	PEAK	109	227	VERTICAL

Note: Item 2 is on un-restricted band, so the limit is -20dBc for the field strength of fundamental emission.

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.2. Band Edge Emissions Measurement

4.2.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.2.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 KHz /100 KHz for Peak

4.2.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.2.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Band Edge and Fundamental Emissions

Temperature	23°C	Humidity	62%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 20MHz Ch 1, 6, 11 Ant. A

Channel 1

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	2389.800	54.41	-19.59	74.00	23.02	28.05	3.33	0.00 PEAK	100	30	VERTICAL
2	2390.000	44.38	-9.62	54.00	12.99	28.05	3.33	0.00 AVERAGE	100	30	VERTICAL
3 @	2419.000	84.28			52.84	28.09	3.35	0.00 AVERAGE	100	30	VERTICAL
4 @	2419.200	93.24			61.80	28.09	3.35	0.00 PEAK	100	30	VERTICAL

Item 3, 4 are the fundamental frequency at 2412 MHz

Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2442.400	101.59			70.06	28.18	3.36	0.00 PEAK	100	33	VERTICAL
2 @	2444.000	92.61			61.07	28.18	3.36	0.00 AVERAGE	100	33	VERTICAL

Item 1, 2 are the fundamental frequency at 2437MHz.

Channel 11

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2469.000	92.66			61.07	28.22	3.38	0.00 AVERAGE	100	62	VERTICAL
2 @	2469.800	101.36			69.77	28.22	3.38	0.00 PEAK	100	62	VERTICAL
3	2483.500	62.05	-11.95	74.00	30.42	28.26	3.38	0.00 PEAK	100	62	VERTICAL
4	2483.650	47.36	-6.64	54.00	15.72	28.26	3.38	0.00 AVERAGE	100	62	VERTICAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	23°C	Humidity	62%
Test Engineer	Aric Lee	Configurations	Draft n MCS0 40MHz Ch 3, 6, 9 Ant. A

Channel 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	2390.000	47.19	-6.81	54.00	15.80	28.05	3.33	0.00 AVERAGE	100	331	VERTICAL
2	2390.000	58.24	-15.76	74.00	26.85	28.05	3.33	0.00 PEAK	100	331	VERTICAL
3 @	2435.600	85.35			53.87	28.13	3.35	0.00 AVERAGE	100	331	VERTICAL
4 @	2439.200	97.77			66.25	28.18	3.35	0.00 PEAK	100	331	VERTICAL

Item 3, 4 are the fundamental frequency at 2422 MHz.

Channel 6

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2449.000	100.70			69.17	28.18	3.36	0.00 PEAK	100	33	VERTICAL
2 @	2450.600	90.04			58.50	28.18	3.36	0.00 AVERAGE	100	33	VERTICAL

Item 1, 2 are the fundamental frequency at 2437MHz.

Channel 9

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos	Pol/Phase
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2458.400	101.68			70.10	28.22	3.36	0.00 PEAK	100	34	VERTICAL
2 @	2458.800	90.99			59.41	28.22	3.36	0.00 AVERAGE	100	34	VERTICAL
3 !	2483.500	49.81	-4.19	54.00	18.17	28.26	3.38	0.00 AVERAGE	100	34	VERTICAL
4	2489.900	62.56	-11.44	74.00	30.88	28.30	3.38	0.00 PEAK	100	34	VERTICAL

Item 1, 2 are the fundamental frequency at 2452 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.3. Antenna Requirements

4.3.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.3.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2007	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	CPA9231A	1886	9 kHz - 2 GHz	Jan. 22, 2007	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jun. 07, 2007	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	923364	26.5 GHz - 40 GHz	Jan. 22, 2007*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP40	100305	9 kHz - 40 GHz	Dec. 15, 2006	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	May 23, 2006*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz - 1 GHz	Jul. 21, 2007	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 04, 2007	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	NCR	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Dec. 02, 2006	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Dec. 02, 2006	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 - 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)

Note: Calibration Interval of instruments listed above is one year.


* Calibration Interval of instruments listed above is two year.

NCR means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C. TEL : 886-2-2631-4739 FAX : 886-2-2631-9740
JUNGHE	ADD : 7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C. TEL : 886-2-8227-2020 FAX : 886-2-8227-2626
NEIHU	ADD : 4Fl., No. 339, Hsin Hu 2 nd Rd., Taipei 114, Taiwan, R.O.C. TEL : 886-2-2794-8886 FAX : 886-2-2794-9777
JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

7. TAF CERTIFICATE OF ACCREDITATION



Certificate No. : L1190-070110

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	: ISO/IEC 17025:2005
Accreditation Number	: 1190
Originally Accredited	: December 15, 2003
Effective Period	: January 10, 2007 to January 09, 2010
Accredited Scope	: Testing Field, see described in the Appendix
Specific Accreditation Program	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory



Jay-San Chen
President, Taiwan Accreditation Foundation
Date : January 10, 2007

PI, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.