FCC TEST REPORT

CATEGORY	:	Outdoor Portable End Product
PRODUCT NAME	:	Dongle
FCC ID.	:	QLHCAI0803
FILING TYPE	:	Certification
BRAND NAME	:	EPOX
MODEL NAME	:	BT-DG04A
APPLICANT	:	**EPOX COMPUTER CO., LTD.** 10F, No. 346, Sec. 2, Chung San Rd., Chung Ho City, Taipei Hsien, 235 Taiwan, R.O.C.
MANUFACTURER	:	The same as Applicant.
ISSUED BY	:	**SPORTON INTERNATIONAL INC.** 6F, No. 106, Sec. 1, Hsin Tai Wu Rd., His Chih, Taipei Hsien, Taiwan, R.O.C.

Statements:

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.

Certificate or Test Report could not be used by the applicant to claim the product endorsement by CNLA, NVLAP or any agency of U.S. government.

The test equipment used to perform the test are calibrated and traceable to NML/ROC or NIST/USA.

Dr. Alan Lane
Vice General Manager
Sporton International Inc.

Lab Code: 200079-0

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History of this test report

■ No additional attachment.

☐ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

1. General Description of Equipment under Test

1.1. General Description

This product is an USB adapter with BlueTooth wireless solution. It is able to be connected with the USB port and has to be powered by the USB port. Please reference section “Technical Features” for detail technical information.

1.2. Technical Features

Items	Description
Radio Interface	BlueTooth
Modulation	GFSK (FHSS)
Number of Channels	79
Frequency Band	2.4G~2.4835GHz
Carrier Frequencies	See table below
Channel Bandwidth	1MHz
Maximum Conducted Power	13.42 dBm
Type of Antenna / Gain	Chip antenna / 0dBi
Function Type	Transceiver
Power Rating (DC/AC, Voltage)	3.3 VDC

Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	27	2429 MHz	54	2456 MHz
01	2403 MHz	28	2430 MHz	55	2457 MHz
02	2404 MHz	29	2431 MHz	56	2458 MHz
03	2405 MHz	30	2432 MHz	57	2459 MHz
04	2406 MHz	31	2433 MHz	58	2460 MHz
05	2407 MHz	32	2434 MHz	59	2461 MHz
06	2408 MHz	33	2435 MHz	60	2462 MHz
07	2409 MHz	34	2436 MHz	61	2463 MHz
08	2410 MHz	35	2437 MHz	62	2464 MHz
09	2411 MHz	36	2438 MHz	63	2465 MHz
10	2412 MHz	37	2439 MHz	64	2466 MHz
11	2413 MHz	38	2440 MHz	65	2467 MHz
12	2414 MHz	39	2441 MHz	66	2468 MHz
13	2415 MHz	40	2442 MHz	67	2469 MHz
14	2416 MHz	41	2443 MHz	68	2470 MHz
15	2417 MHz	42	2444 MHz	69	2471 MHz
16	2418 MHz	43	2445 MHz	70	2472 MHz
17	2419 MHz	44	2446 MHz	71	2473 MHz
18	2420 MHz	45	2447 MHz	72	2474 MHz
19	2421 MHz	46	2448 MHz	73	2475 MHz
20	2422 MHz	47	2449 MHz	74	2476 MHz
21	2423 MHz	48	2450 MHz	75	2477 MHz
22	2424 MHz	49	2451 MHz	76	2478 MHz
23	2425 MHz	50	2452 MHz	77	2479 MHz
24	2426 MHz	51	2453 MHz	78	2480 MHz
25	2427 MHz	52	2454 MHz		
26	2428 MHz	53	2455 MHz		

2. Test Configuration of The Equipment under Test

2.1. Description of the Test

a) Testing was done while the highest date rate, 11Mbps, was selected as it is the worst emission case.

b) For 15.247(g), during data transmission, the carrier frequency is repeatly switched on 79 hopping frequencies, any 2 hopping frequencies will not be available on the spectrum simultaneously. So, this device can be taken as true frequency hopping device.

c) For 15.247(h), the hopping sequence is determined by the address of piconet master. Each piconet master will have its unique address at any moment, so re-use of the hopping sequence is completely not possible. Within the piconet, one master can be communicated with many slaves via the same hopping sequence, but at any moment only one (master or slave) can be "talk". It is determined by the master that who should be "listen" or "talk". Any slave who want to "talk" has to sent "inquiry" to master first. So, 2 slaves (or one slave one master) is not possible to be on "talk" mode simultaneously.

d) The used peripherals as well as the configuration fulfill the requirements of ANSI C63.4:2001. The configuration is operated in a manner which tends to maximize its emission characteristics in a typical application.

e) 3 meters measurement distance was used in this test.

f) Spurious emission below 1GHz is independent of channel selection, so only CH00 was tested.

2.2. Frequency Range Investigated

a) Conducted power line test: from 150 kHz to 30 MHz

b) Radiated emission test: from 30 MHz to 25000 MHz

2.3. Details of the Supporting Units

Support Unit 1. –Monitor (VIEWSONIC)

FCC ID	: Doc
Model No.	: VCDTS21553-3P
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. –PS/2 Keyboard (LOGITECH)

FCC ID	: Doc
Model No.	: Y-SJ17
Power Supply Type	: NA
Power Cord	: NA
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 3. –PS/2 Mouse (LOGITECH)

FCC ID	: DZL211029
Model No.	: M-S34
Power Supply Type	: NA
Power Cord	: NA
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 4. –Printer (EPSON)

FCC ID	: NA
Model No.	: STYLUS COLOR 680
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Data Cable	: Shielded, 1..35m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

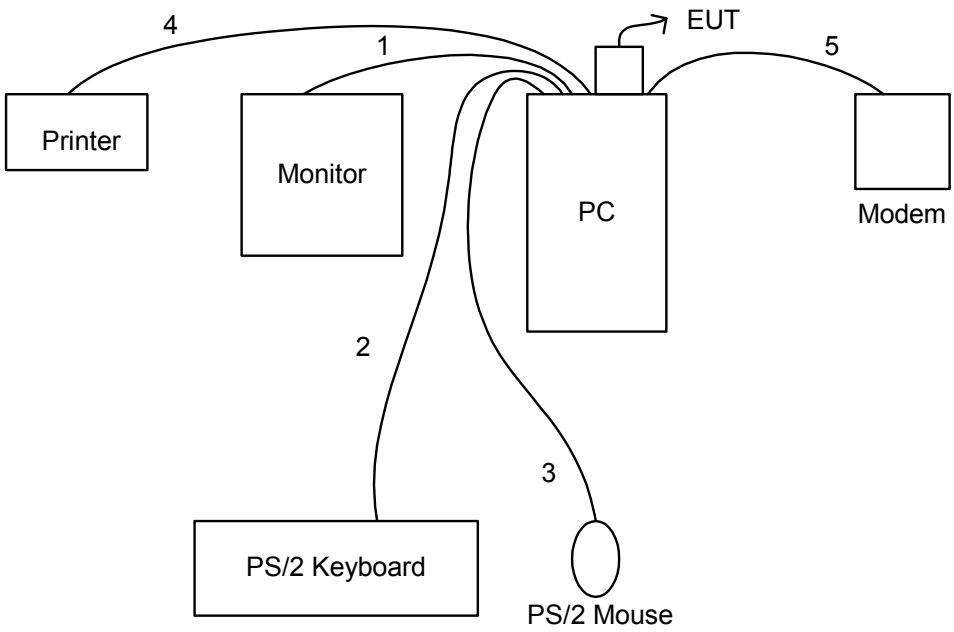
Support Unit 5. –Modem (ACEEX)

FCC ID	: IFAXDM1414
Model No.	: DM1414
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Data Cable	: Shielded, 1.15m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 6. –PC (COMPAQ)

FCC ID	: NA
Model No.	: Evo D380mx
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Data Cable	: NA
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

2.4. Connection Diagram of Test System



3. Test Software

There are 2 software may be used in the testing.

A) Channel & Power Controlling Software: This was provided by the manufacturer and is able to let the test engineer select the operating channel as well as the RF output power. The parameters for channel selection is trying to offer the test engineer the ability to fix the operating channel for testing, both normal data and continuously transmitting modes are allowed, and that for 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.

B) “H” Pattern Generator: Except Access Point, the supporting equipment such as monitor or printer is always available. Under testing, these supporting equipment has to also under working condition. “H” Pattern Generator is able to continuously transmitting “H” character to those supporting equipments.

4. Test Location and Standards

4.1. Test Location

Test Location	:	Sporton Hwa Ya Testing Building
Address	:	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. Tel: +886 3 327 3456 Fax: +886 3 318 0055
Test Site No.	:	CO01-HY, 03CH03-HY

4.2. Test Standards

Here is the list of the standards followed in this test report.

ANSI C63.4-2001

47 CFR Part 15 Subpart C (Section 15.247)

4.3. DoC Statement

This EUT is also classified as a device of computer peripheral Class B which DoC has to be followed. It has been verified according to the rule of 47 CFR part 15 Subpart B, and found that all the requirements has been fulfilled.

5. Test Result and Details

5.1. Summary of the Test Results

FCC Rule	Description of Test	Result
15.247(a)(1)(ii)	Hopping Channel Bandwidth	Pass
15.247(a)(1)	Hopping Channel Separation	Pass
15.247(a)(1)(ii)	Number of Hopping Frequency Used	Pass
15.247(a)(1)(ii)	Dwell Time of Each Frequency	Pass
15.247(b)	Output Power	Pass
15.247(c)	100KHz Bandwidth of Frequency Band Edges	Pass
15.107/15.207	Conducted Emission	Pass
15.209	Radiated Emission	Pass
15.203	Antenna Requirement	Pass

5.2. Hopping Channel Separation

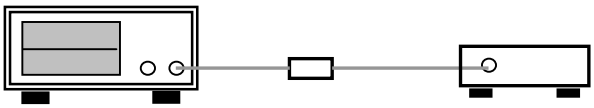
5.2.1 Measuring Instruments

As described in chapter 10 of this test report.

5.2.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The Hopping Channel Separation is defined as the spacing between 2 neighboring channels.

5.2.3 Test Setup Layout



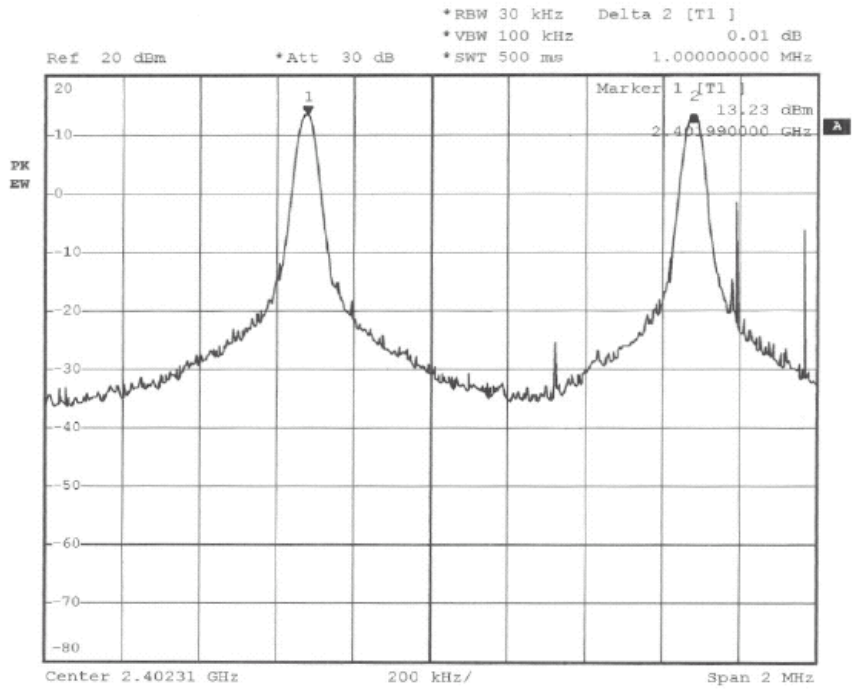
Spectrum analyzer **EUT**

5.2.4 Test Result：The spectrum analyzer plots are attached as below

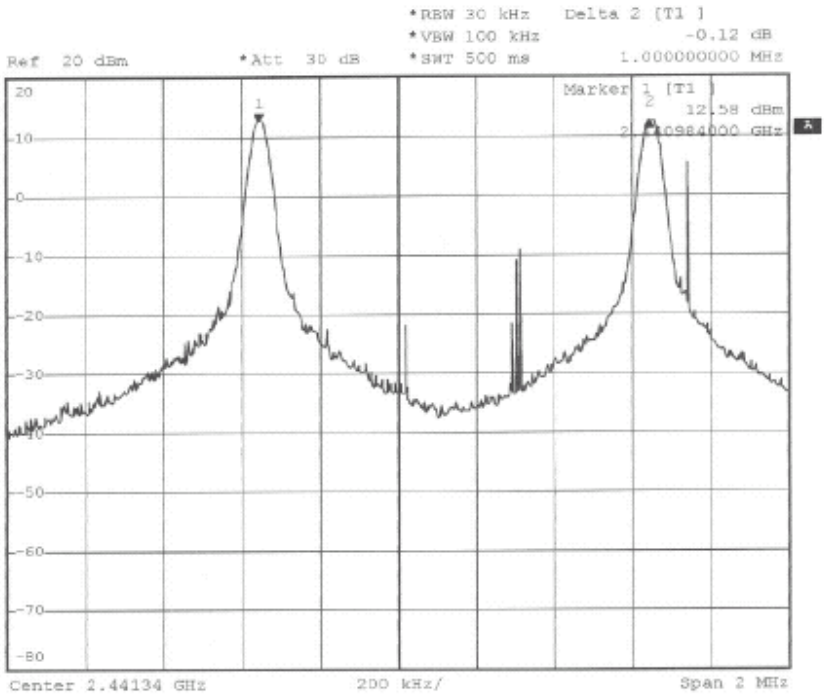
- Temperature: 27°C
- Relative Humidity: 58 %
- Duty cycle of the equipment during the test X ＝ 100%

Channel	Frequency (MHz)	Hopping Channel Separation (KHz)	Min. Limits (KHz)
00	2402	1000.0000	25
39	2441	1000.0000	25
78	2480	1000.0000	25

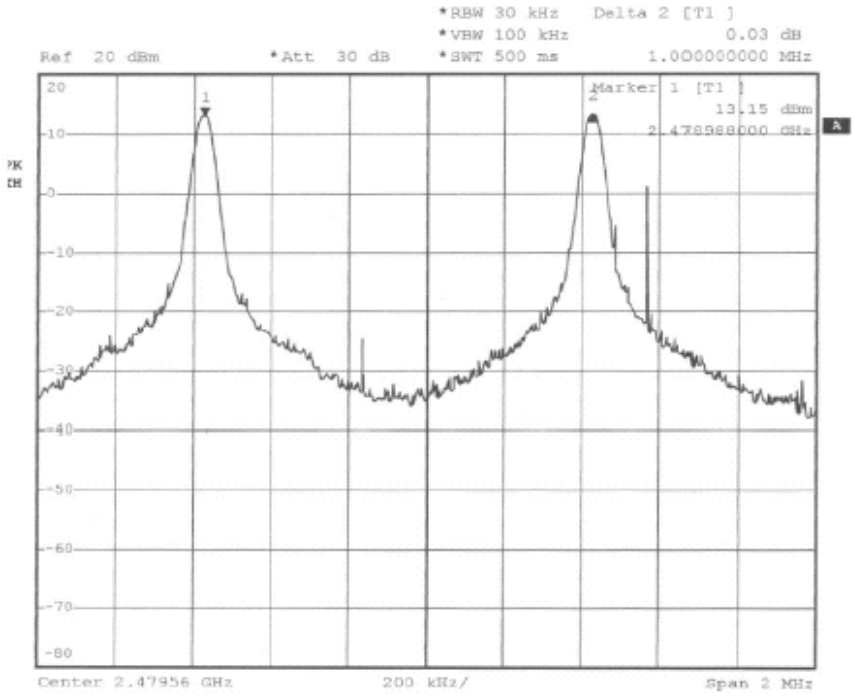
(Channel 00)：



(Channel 39)：



(Channel 78)：


*RBW 30 kHz
*VBW 100 kHz
*SWT 500 ms
Delta 2 [T1]
0.03 dB
1.000000000 MHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
13.15 dBm
2.478988000 GHz
PK
CH
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.47956 GHz
200 kHz/
Span 2 MHz

5.3. Number of Hopping Frequency

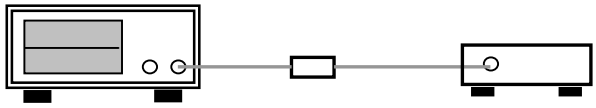
5.3.1 Measuring Instruments

As described in chapter 10 of this test report.

5.3.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The number of hopping frequencies used is defined as the total channel numbers available on the spectrum.

5.3.3 Test Setup Layout

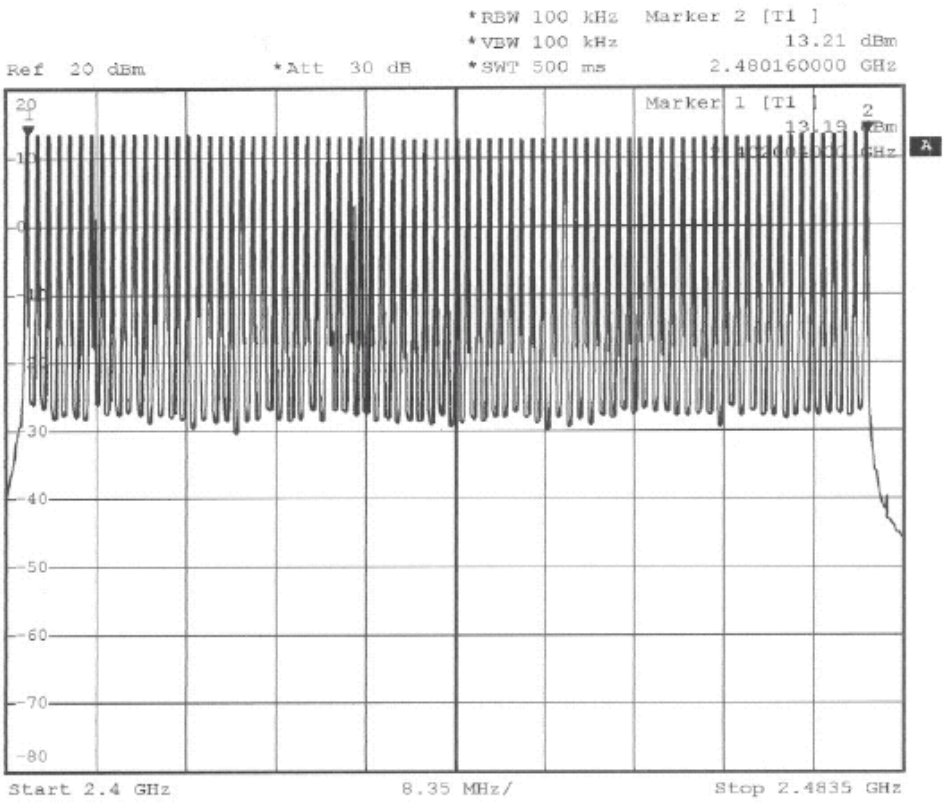


Spectrum analyzer **EUT**

5.3.4 Test Result：See spectrum analyzer plots below

- Temperature: 27°C
- Relative Humidity: 58 %
- Duty cycle of the equipment during the test X ＝ 100%

Number of Hopping Frequency (Channel)	Min. Limit (Channel)
79	75


*RBW 100 kHz
*VBW 100 kHz
*SWT 500 ms
Marker 2 [T1]
13.21 dBm
2.480160000 GHz
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
13.19 dBm
2.400160000 GHz
20
10
0
-10
-30
-40
-50
-60
-70
-80
Start 2.4 GHz
8.35 MHz/
Stop 2.4835 GHz

5.4. Hopping Channel Bandwidth

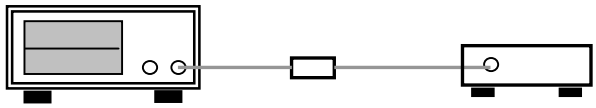
5.4.1 Measuring Instruments

As described in chapter 10 of this test report.

5.4.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 100KHz and VBW to 100KHz.
3. The Hopping Channel bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

5.4.3 Test Setup Layout



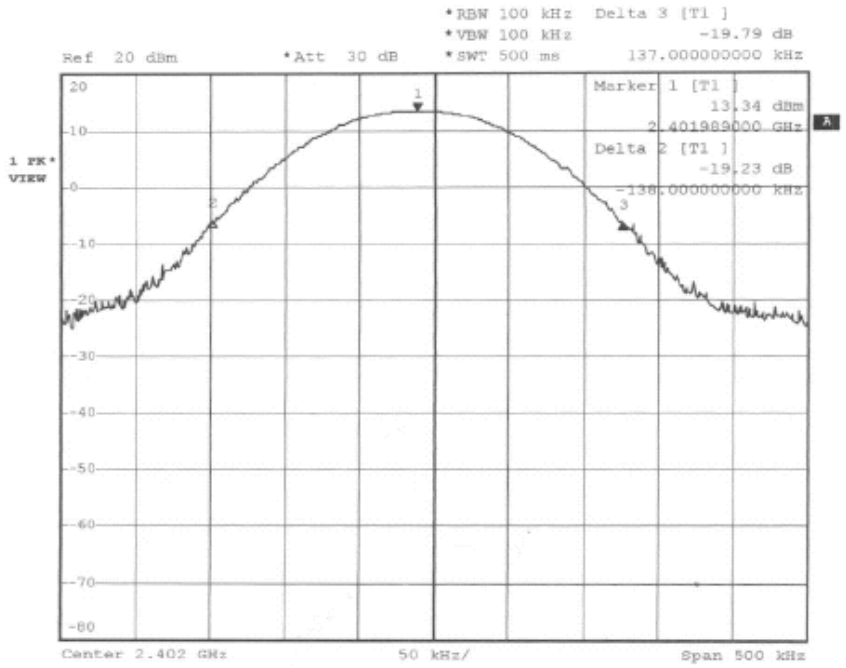
Spectrum analyzer **EUT**

5.4.4 Test Result：See spectrum analyzer plots below

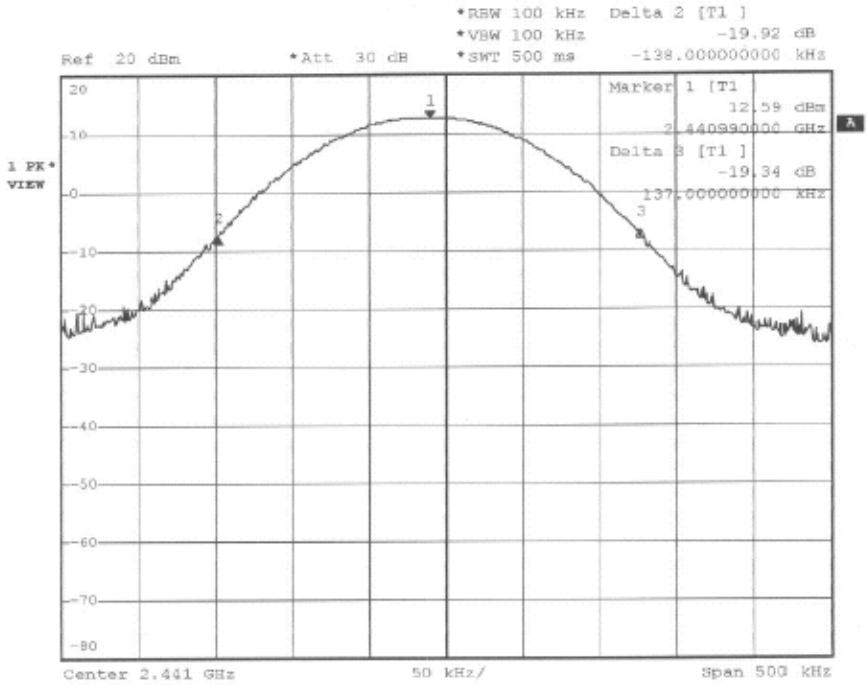
- Temperature: 27°C
- Relative Humidity: 58 %
- Duty cycle of the equipment during the test X = 100%

Channel	Frequency (MHz)	Hopping Channel Bandwidth (MHz)	Limit (MHz)
00	2402	0.2750	1.0
39	2441	0.2750	1.0
78	2480	0.2760	1.0

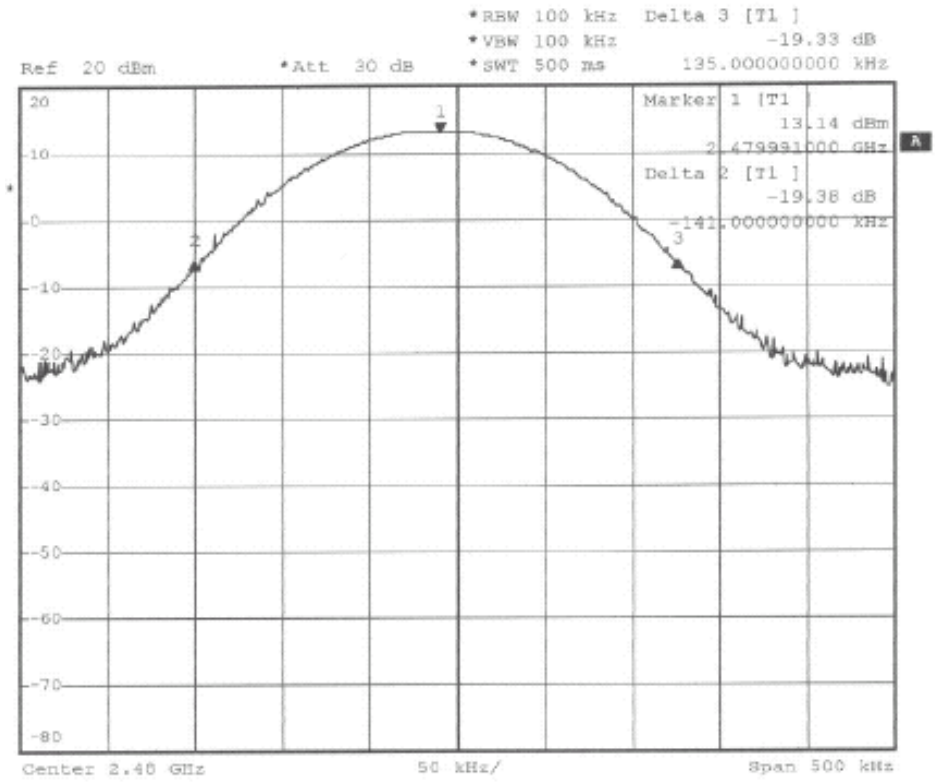
(Channel 00)：



(Channel 39)：



(Channel 78)：



Observation： All emissions in any 100kHz bandwidth outside the band edge are attenuated more then 20dB from the carrier.

5.5. Dwell Time of Each Frequency

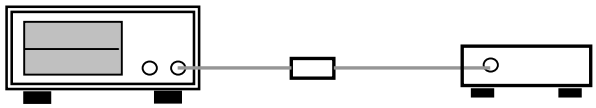
5.5.1 Measuring Instruments

As described in chapter 10 of this test report.

5.5.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
4. The Dwell Time = 30*(1600/79)*t (ie: t = the time duration of one single pulse)

5.5.3 Test Setup Layout



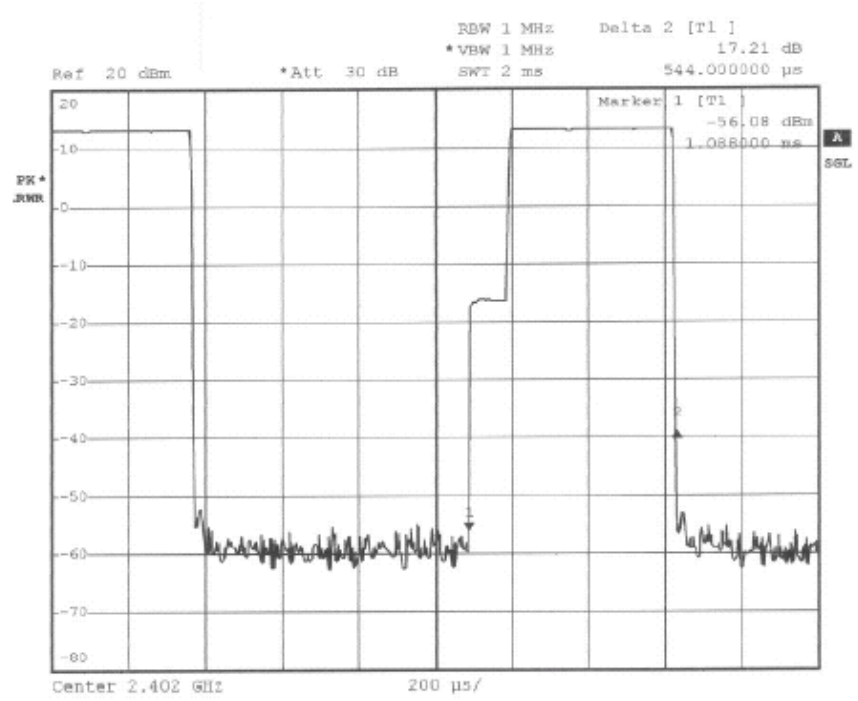
Spectrum analyzer **EUT**

5.5.4 Test Result：See spectrum analyzer plots below

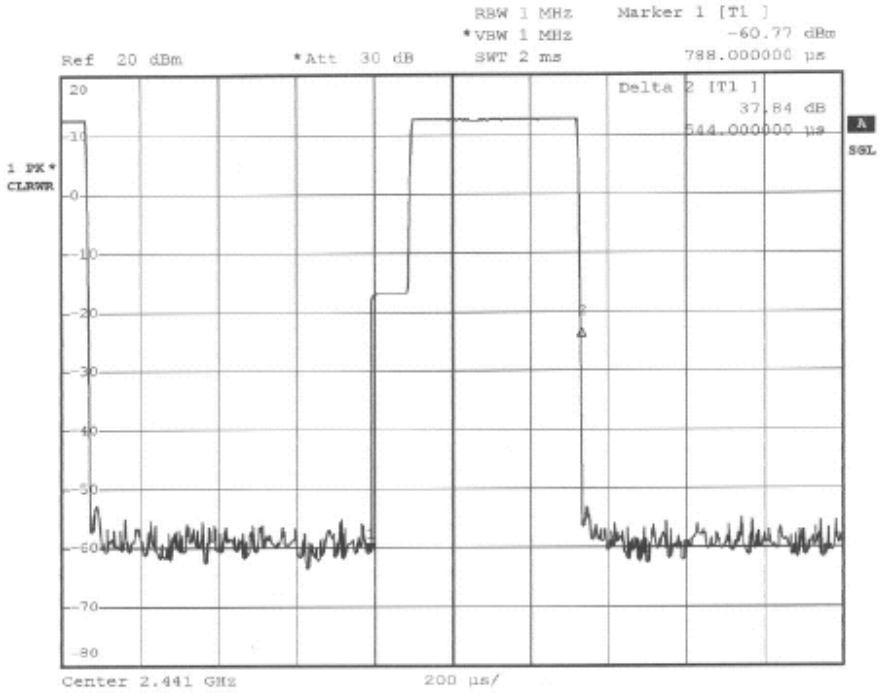
- Temperature: 27°C
- Relative Humidity: 58 %
- Duty cycle of the equipment during the test X = 100%

Channel	Frequency (MHz)	Dwell Time (s)	Limits (s)
00	2402	0.330531646	0.4
39	2441	0.330531646	0.4
78	2480	0.330531646	0.4

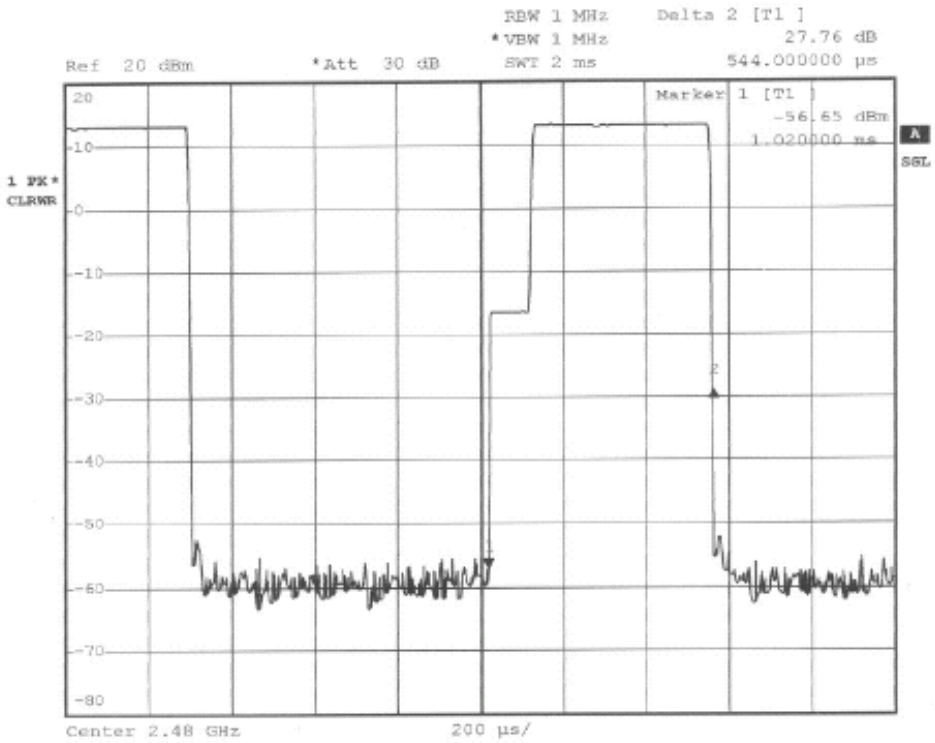
(Channel 00)：



(Channel 39)：



(Channel 78) :


RBW 1 MHz
*VBW 1 MHz
SWT 2 ms
Delta 2 [T1]
27.76 dB
544.000000 µs
Ref 20 dBm
*Att 30 dB
Marker 1 [T1]
-56.65 dBm
1.020000 ms
A
SGL
1 PK*
CLRWR
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Center 2.48 GHz
200 µs/

5.6. Output Power

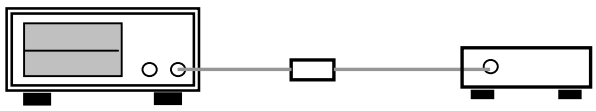
5.6.1 Measuring Instruments

As described in chapter 10 of this test report.

5.6.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The center frequency of the spectrum analyzer was set to the fundamental frequency and set RBW to 1MHz and VBW to 1MHz.

5.6.3 Test Setup Layout



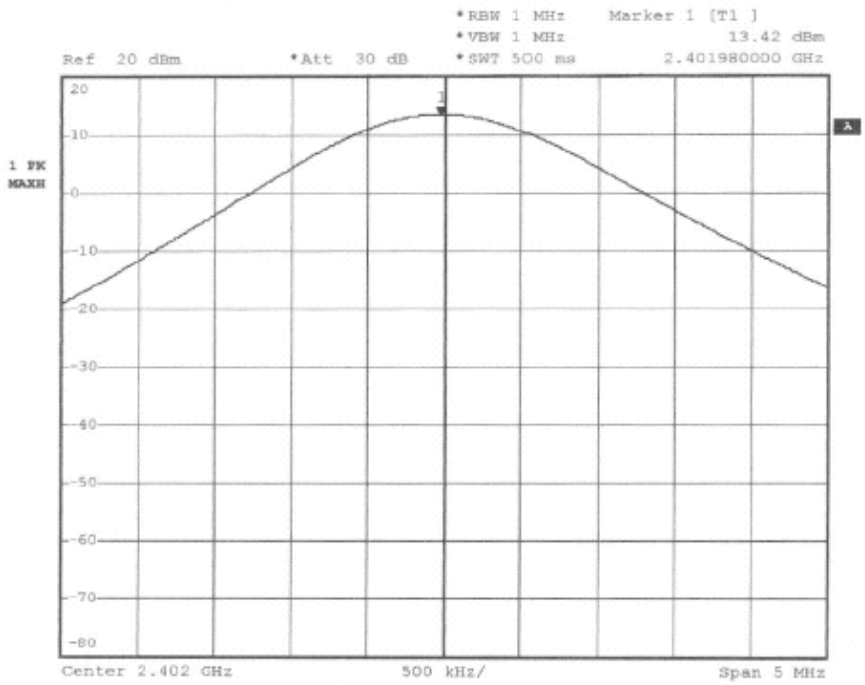
Spectrum analyzer **EUT**

5.6.4 Test Result：See spectrum analyzer plots below

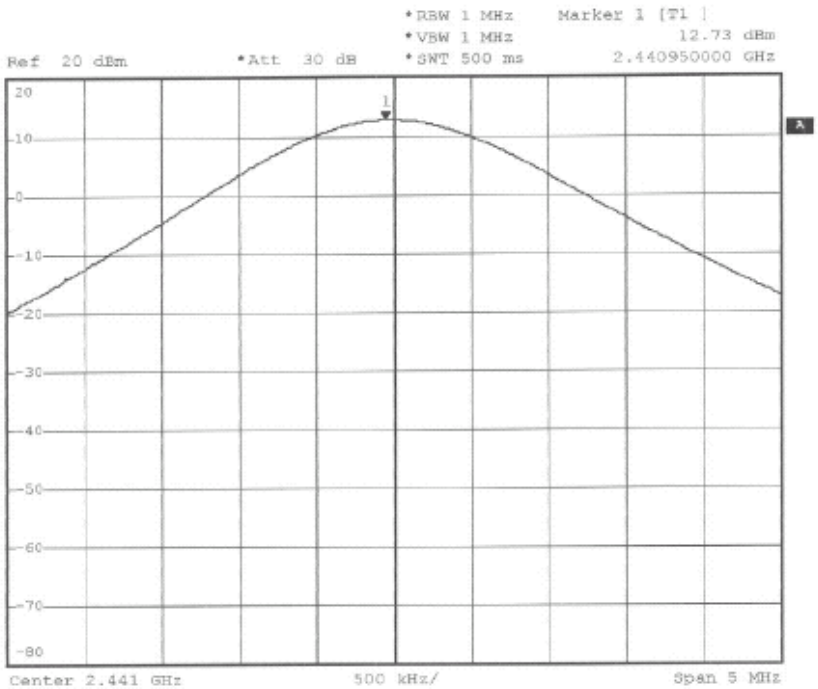
- Temperature: 27°C
- Relative Humidity: 58 %
- Duty cycle of the equipment during the test X ＝ 100%

Channel	Frequency (MHz)	Measured Output Power (dBm)	Measured Output Power (mWatt)	Limit (Watt/dBm)
00	2402	13.42	21.97859873	1W/30dBm
39	2441	12.73	18.74994508	1W/30dBm
78	2480	13.27	21.23244462	1W/30dBm

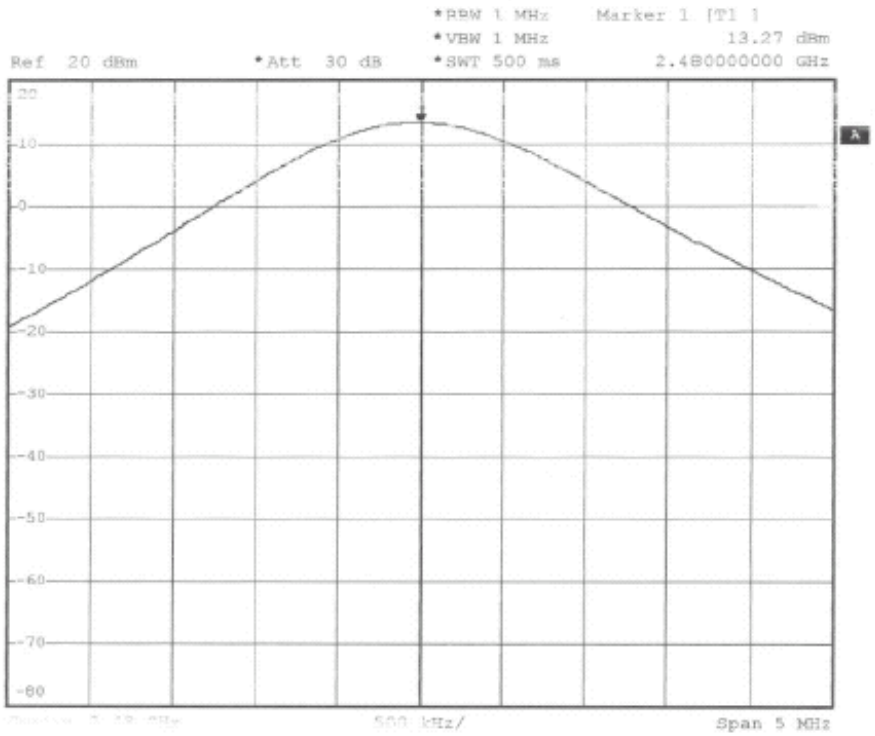
(Channel 00) :



(Channel 39) :



(Channel 78) :


*RBW 1 MHz
*VBW 1 MHz
*SWT 500 ms
Marker 1 [T1]
13.27 dBm
2.480000000 GHz
Ref 20 dBm
*Att 30 dB
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
A
500 kHz/
Span 5 MHz

5.7. 100KHz Bandwidth of Frequency Band Edges

5.7.1 Measuring Instruments

As described in chapter 10 of this test report.

5.7.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100 KHz bandwidth from band edge.
3. The band edges was measured and recorded.

5.7.3 Test Result

Test Result in lower band (Channel 00)： PASS

Test Result in higher band(Channel 78)： PASS

5.7.4 Note on Band edge Emission

(a) Left Edge

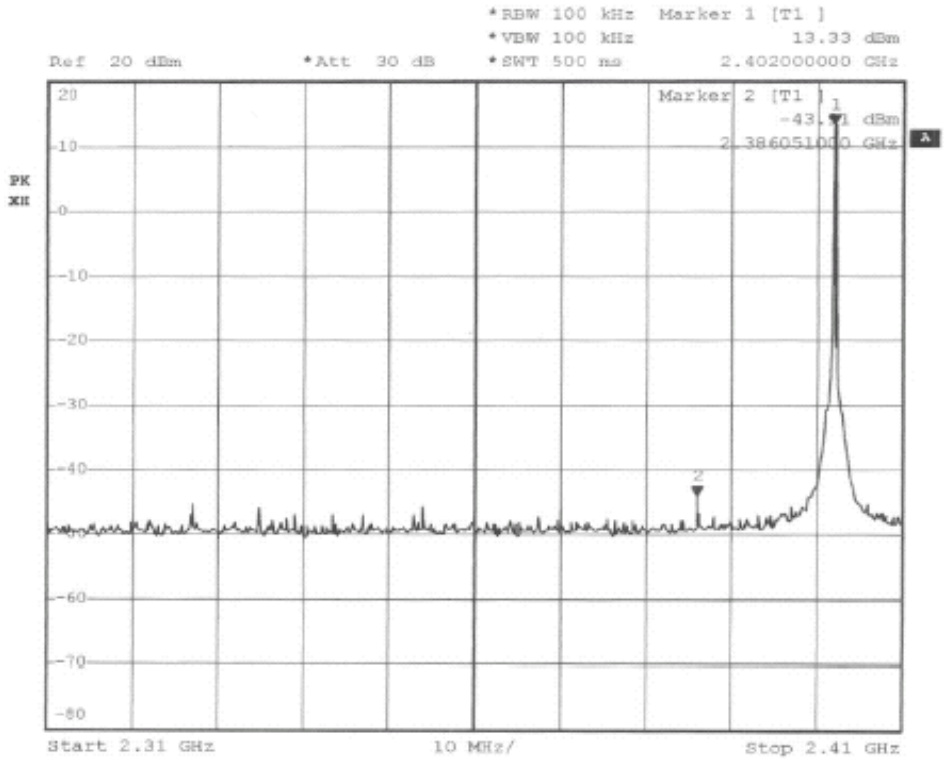
CH00 carrier power strength	Delta	The max. field strength in restrict band	Limit	Margin
(dB μ V/m)	dB	(dB μ V/m)	(dB μ V/m)	(dB)
79.06	56.64	22.42	54.00	-31.58

(b) Right Edge

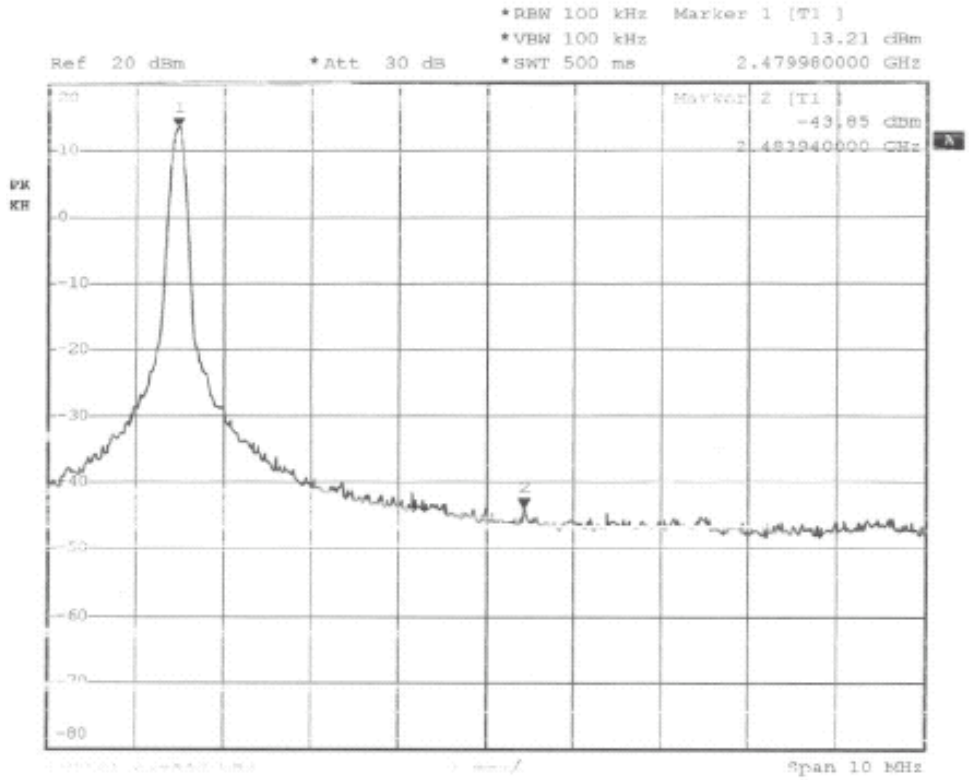
CH78 carrier power strength	Delta	The maximum field strength in restrict band	Limit	Margin
(dB μ V/m)	dB	(dB μ V/m)	(dB μ V/m)	(dB)
82.24	57.06	25.18	54.00	-28.82

＊The maximum field strength in restricted band is the emission of carrier power strength subtract to the delta between carrier maximum power and local maximum emission in the restricted band.

(Channel 00)：


*RBW 100 kHz
*VBW 100 kHz
*SWT 500 ms
Marker 1 [T1]
13.33 dBm
2.402000000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-43.71 dBm
2.386051000 GHz
PK
MXH
20
10
0
-10
-20
-30
-40
-60
-70
-80
Start 2.31 GHz
10 MHz/
Stop 2.41 GHz

(Channel 78)：


*RBW 100 kHz
*VBW 100 kHz
*SWT 500 ms
Marker 1 [T1]
13.21 dBm
2.479960000 GHz
Ref 20 dBm
*Att 30 dB
Marker 2 [T1]
-43.85 dBm
2.483940000 GHz
PK
MXH
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Span 10 MHz

5.8. AC Powerline Conducted Emission

5.8.1 Measuring Instruments

Please reference item 1~7 in chapter 6 for the instruments used for testing.

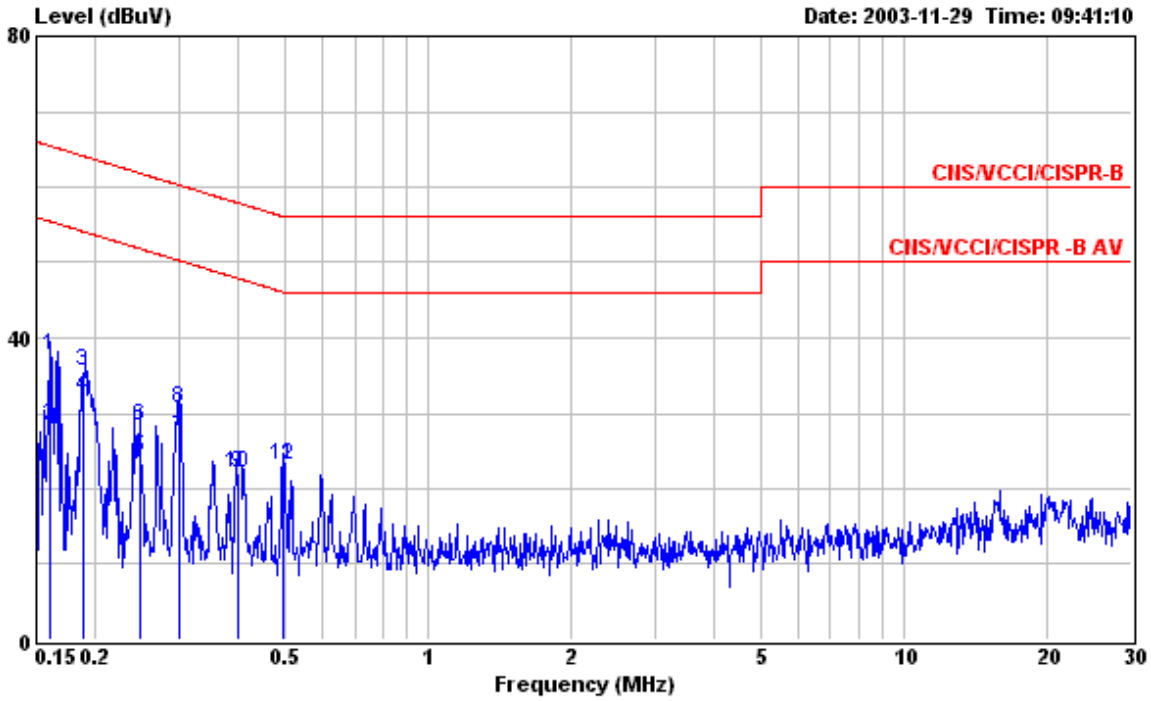
5.8.2 Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connected to the other LISNs. The LISN should provides 50uH/50ohms coupling impedance.
5. The frequency range from 150 KHz to 30 MHz was searched.
6. Use the Channel & Power Controlling software to make the EUT working on selected channel and expected output power, then use the “H” Patter Generator software to make the supporting equipments stay on working condition.
7. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
8. The measurement has to be done between each power line and ground at the power terminal for each RF channel. Only one RF channel has to be investigated since this test is independent with the RF channel selection.

5.8.3 Test Result of Conducted Emission

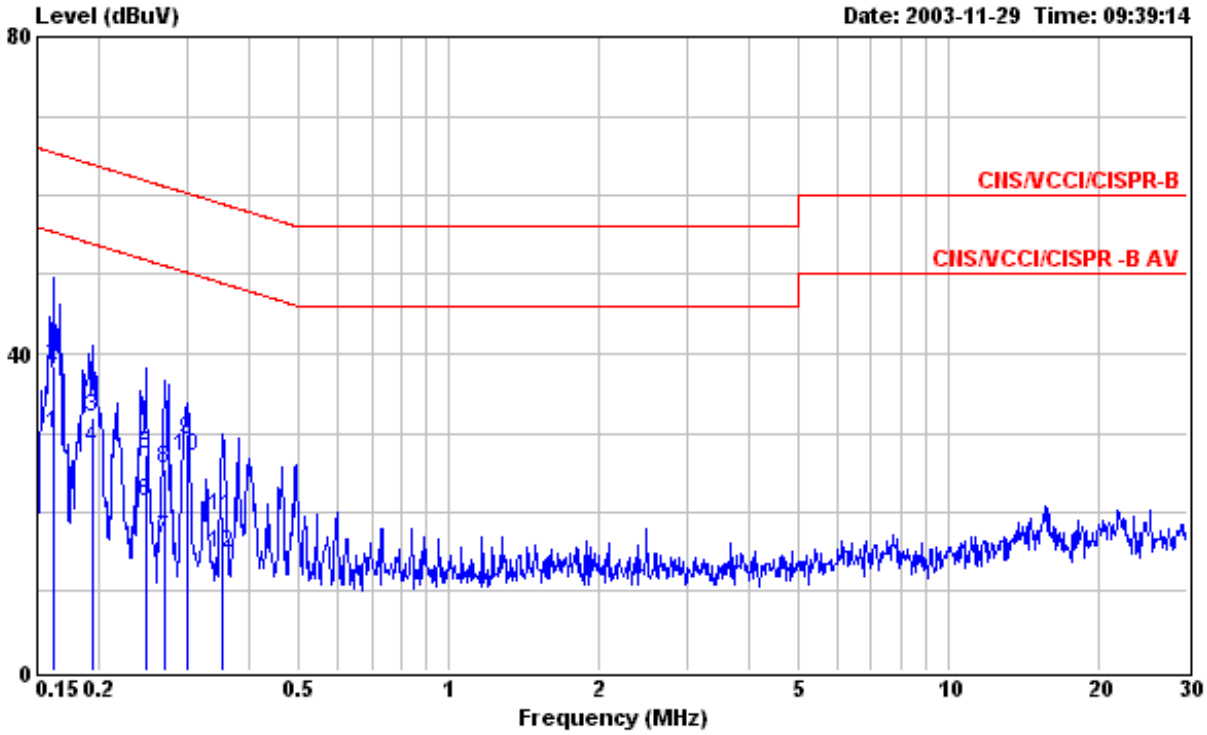
Test Mode	CH 00	Tested By	John Huang
Temperature / Humidity	27 deg. C / 58%		

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.161	37.72	-27.69	65.41	37.46	0.10	0.16	QP
2	0.161	28.29	-27.12	55.41	28.03	0.10	0.16	Average
3	0.189	35.63	-28.45	64.08	35.35	0.10	0.18	QP
4	0.189	32.32	-21.76	54.08	32.04	0.10	0.18	Average
5	0.247	24.27	-27.59	51.86	24.01	0.10	0.16	Average
6	0.247	28.30	-33.56	61.86	28.04	0.10	0.16	QP
7	0.299	26.80	-23.47	50.27	26.57	0.10	0.13	Average
8	0.299	30.62	-29.65	60.27	30.39	0.10	0.13	QP
9	0.398	22.11	-35.79	57.90	21.91	0.10	0.10	QP
10	0.398	21.95	-25.95	47.90	21.75	0.10	0.10	Average
11	0.494	23.12	-32.98	56.10	22.94	0.10	0.08	QP
12	0.494	23.20	-22.90	46.10	23.02	0.10	0.08	Average

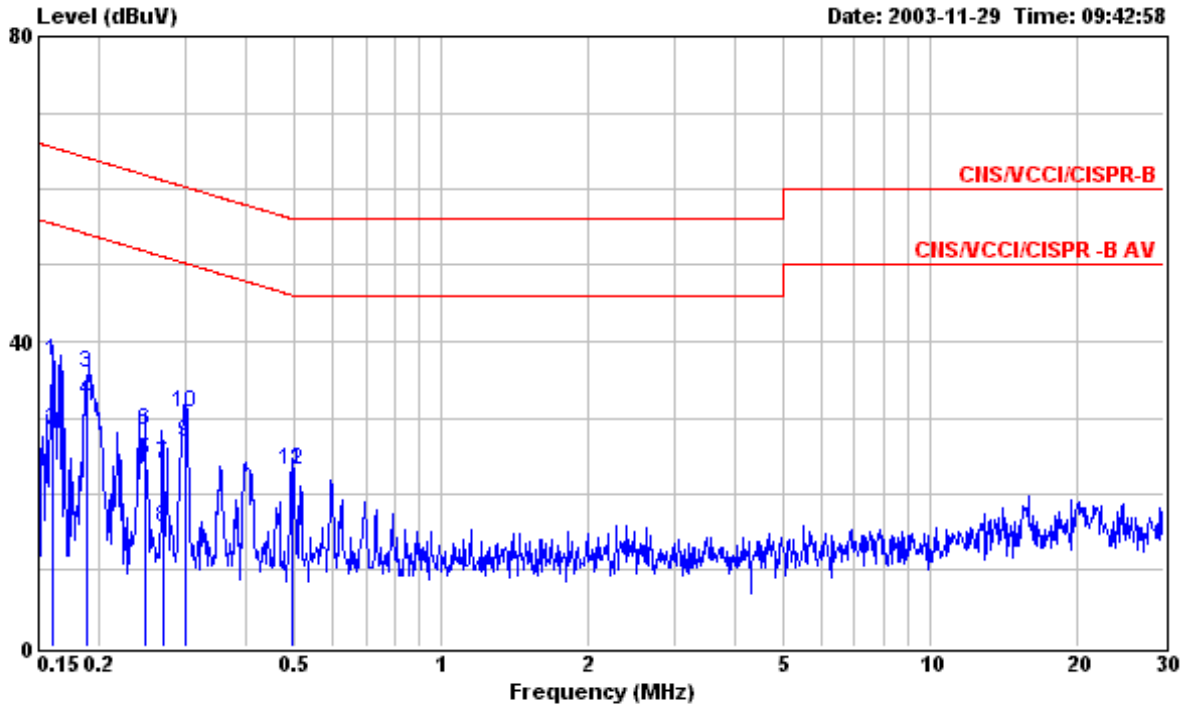
Neutral to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	29.99	-25.37	55.36	29.73	0.10	0.16	Average
2	0.162	38.47	-26.89	65.36	38.21	0.10	0.16	QP
3	0.194	31.89	-31.97	63.86	31.61	0.10	0.18	QP
4	0.194	27.94	-25.92	53.86	27.66	0.10	0.18	Average
5	0.247	27.30	-34.56	61.86	27.04	0.10	0.16	QP
6	0.247	21.26	-30.60	51.86	21.00	0.10	0.16	Average
7	0.270	16.54	-34.58	51.12	16.29	0.10	0.15	Average
8	0.270	25.55	-35.57	61.12	25.30	0.10	0.15	QP
9	0.299	29.18	-31.09	60.27	28.95	0.10	0.13	QP
10	0.299	27.01	-23.26	50.27	26.78	0.10	0.13	Average
11	0.352	19.51	-39.41	58.92	19.30	0.10	0.11	QP
12	0.352	14.69	-34.23	48.92	14.48	0.10	0.11	Average

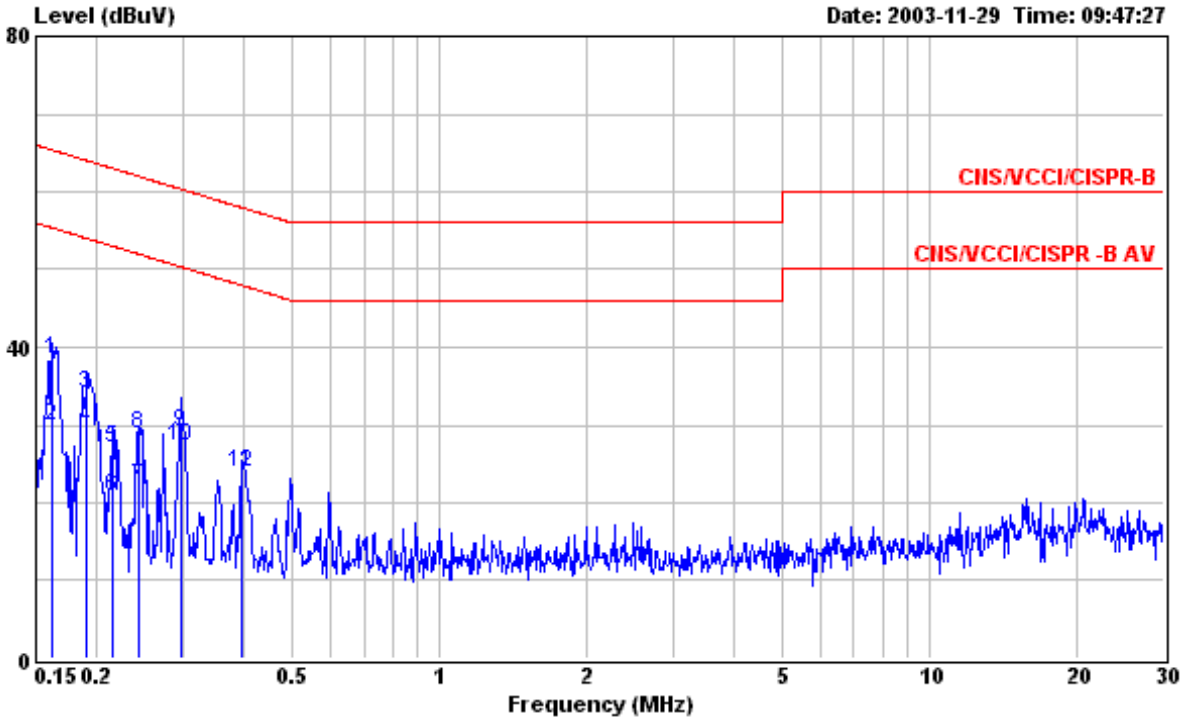
Test Mode	CH 39	Tested By	John Huang
Temperature / Humidity	27 deg. C / 58%		

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.161	37.50	-27.91	65.41	37.24	0.10	0.16	QP
2	0.161	28.20	-27.21	55.41	27.94	0.10	0.16	Average
3	0.189	35.75	-28.33	64.08	35.47	0.10	0.18	QP
4	0.189	32.32	-21.76	54.08	32.04	0.10	0.18	Average
5	0.247	24.34	-27.52	51.86	24.08	0.10	0.16	Average
6	0.247	28.28	-33.58	61.86	28.02	0.10	0.16	QP
7	0.269	24.03	-37.12	61.15	23.78	0.10	0.15	QP
8	0.269	15.56	-35.59	51.15	15.31	0.10	0.15	Average
9	0.299	26.86	-23.41	50.27	26.63	0.10	0.13	Average
10	0.299	30.52	-29.75	60.27	30.29	0.10	0.13	QP
11	0.494	23.14	-32.96	56.10	22.96	0.10	0.08	QP
12	0.494	23.20	-22.90	46.10	23.02	0.10	0.08	Average

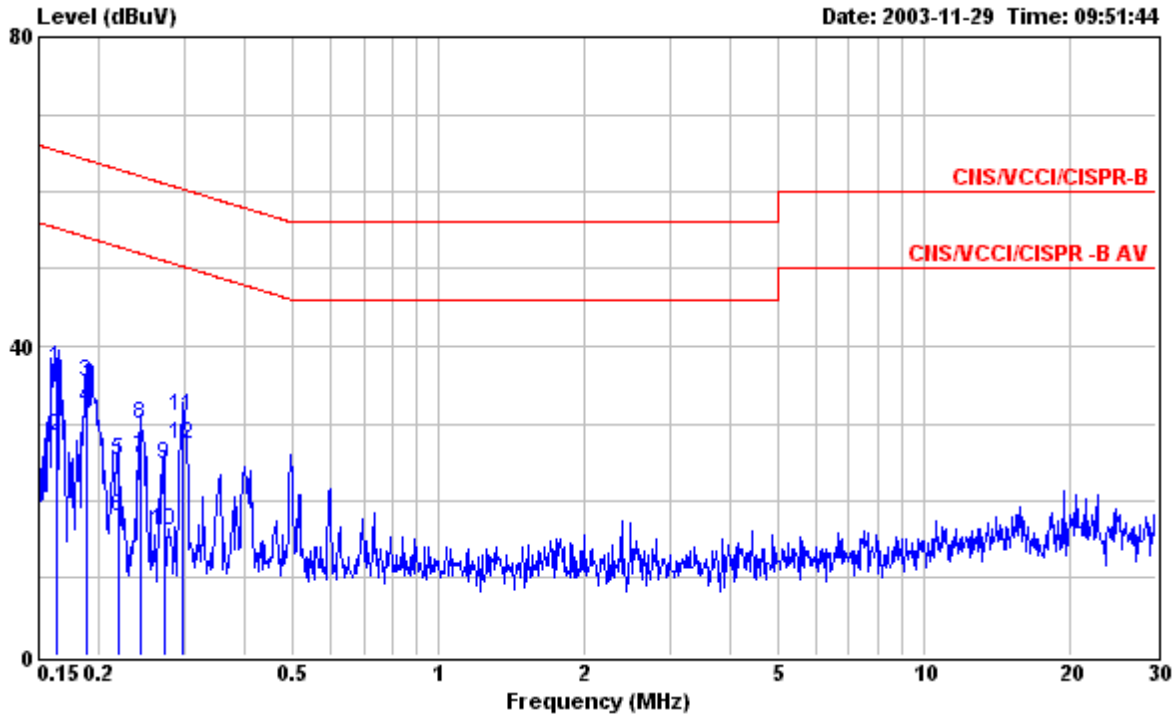
Neutral to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	38.51	-26.85	65.36	38.25	0.10	0.16	QP
2	0.162	29.92	-25.44	55.36	29.66	0.10	0.16	Average
3	0.190	33.90	-30.14	64.04	33.62	0.10	0.18	QP
4	0.190	29.69	-24.35	54.04	29.41	0.10	0.18	Average
5	0.215	26.91	-36.10	63.01	26.64	0.10	0.17	QP
6	0.215	20.79	-32.22	53.01	20.52	0.10	0.17	Average
7	0.243	22.19	-29.80	51.99	21.93	0.10	0.16	Average
8	0.243	28.71	-33.28	61.99	28.45	0.10	0.16	QP
9	0.296	29.15	-31.20	60.35	28.92	0.10	0.13	QP
10	0.296	27.17	-23.18	50.35	26.94	0.10	0.13	Average
11	0.396	24.01	-33.93	57.94	23.81	0.10	0.10	QP
12	0.396	23.98	-23.96	47.94	23.78	0.10	0.10	Average

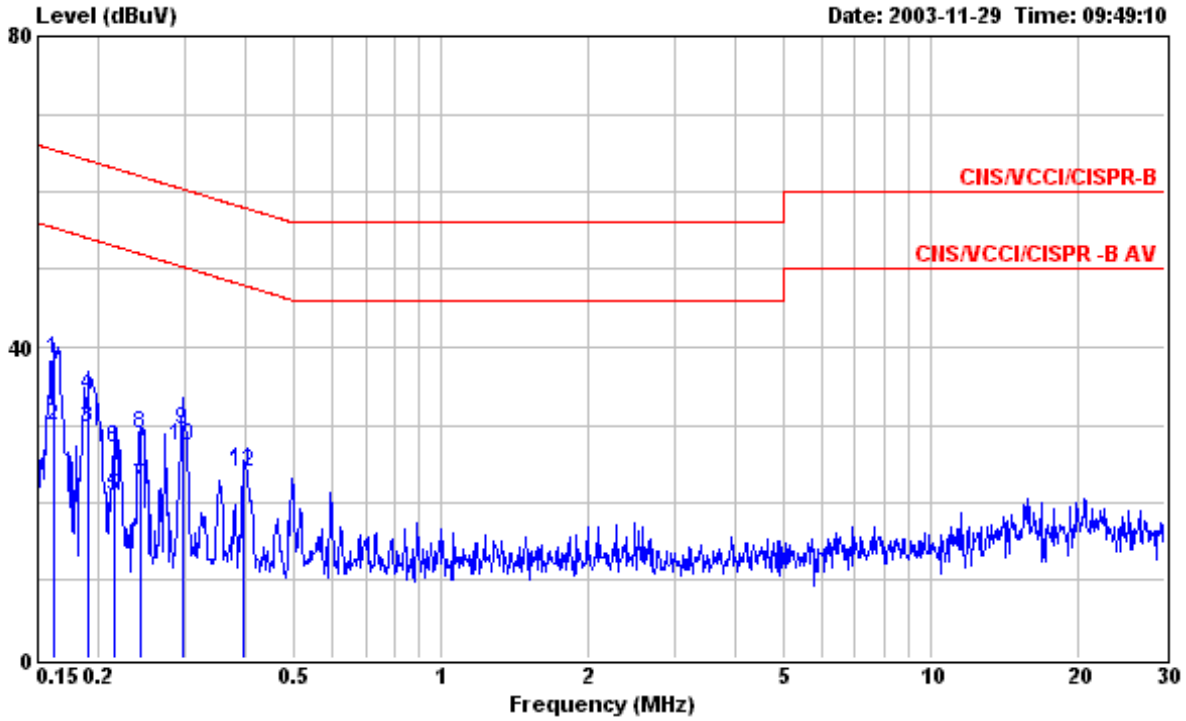
Test Mode	CH 78	Tested By	John Huang
Temperature / Humidity	27 deg. C / 58%		

Line to Ground



	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.164	37.25	-28.01	65.26	36.99	0.10	0.16	QP
2	0.164	28.23	-27.03	55.26	27.97	0.10	0.16	Average
3	0.188	35.45	-28.67	64.12	35.17	0.10	0.18	QP
4	0.188	31.97	-22.15	54.12	31.69	0.10	0.18	Average
5	0.219	25.11	-37.75	62.86	24.84	0.10	0.17	QP
6	0.219	18.00	-34.86	52.86	17.73	0.10	0.17	Average
7	0.243	25.46	-26.53	51.99	25.20	0.10	0.16	Average
8	0.243	29.90	-32.09	61.99	29.64	0.10	0.16	QP
9	0.272	24.71	-36.35	61.06	24.47	0.10	0.14	QP
10	0.272	15.99	-35.07	51.06	15.75	0.10	0.14	Average
11	0.297	30.86	-29.47	60.33	30.63	0.10	0.13	QP
12	0.297	27.21	-23.12	50.33	26.98	0.10	0.13	Average

Neutral to Ground



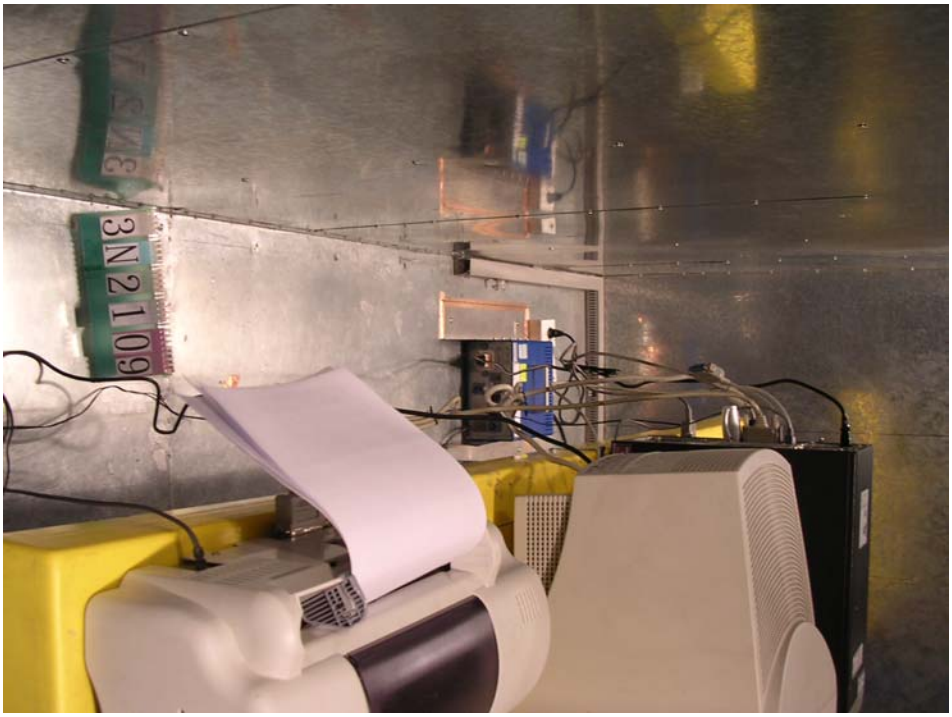
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.162	38.43	-26.93	65.36	38.17	0.10	0.16	QP
2	0.162	29.84	-25.52	55.36	29.58	0.10	0.16	Average
3	0.190	29.69	-24.35	54.04	29.41	0.10	0.18	Average
4	0.190	33.72	-30.32	64.04	33.44	0.10	0.18	QP
5	0.215	20.79	-32.22	53.01	20.52	0.10	0.17	Average
6	0.215	27.05	-35.96	63.01	26.78	0.10	0.17	QP
7	0.243	22.15	-29.84	51.99	21.89	0.10	0.16	Average
8	0.243	28.75	-33.24	61.99	28.49	0.10	0.16	QP
9	0.296	29.23	-31.12	60.35	29.00	0.10	0.13	QP
10	0.296	27.17	-23.18	50.35	26.94	0.10	0.13	Average
11	0.396	24.03	-33.91	57.94	23.83	0.10	0.10	QP
12	0.396	23.98	-23.96	47.94	23.78	0.10	0.10	Average

5.8.4 Photographs of Radiated Emission Test Configuration

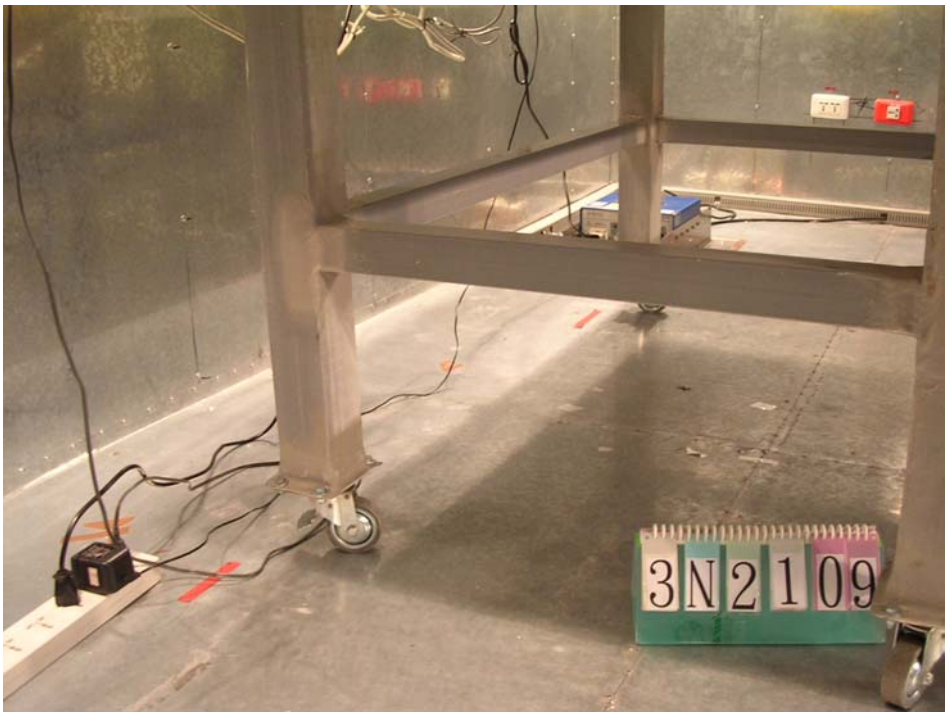
- The photographs show the configuration that generates the maximum emission.

FRONT VIEW

REAR VIEW



SIDE VIEW



5.9. Test of Radiated Emission

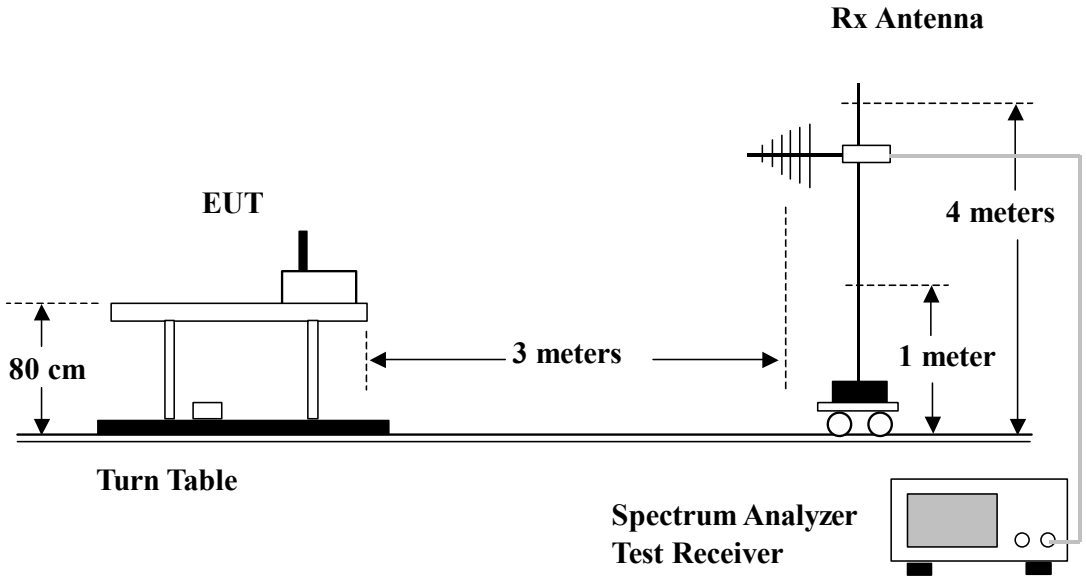
5.9.1 Measuring Instruments

Please reference item 8~19 in chapter 6 for the instruments used for testing.

5.9.2 Test Procedures

1. Configure the EUT according to ANSI C63.4.
2. The EUT was placed on the top of the turn table 0.8 meter above ground.
3. 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 turn table.
4. Power on the EUT and all the supporting units.
5. The turn table was rotated 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
9. For emission above 1GHz, use 1MHz VBW & RBW for peak reading and 1MHz RBW & 300Hz VBW for average reading in spectrum analyzer.
10. If the emission level of the EUT in peak mode was 3 dB lower than the 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 and reported.
11. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission 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.

5.9.3 Test Setup Layout



5.9.4 Test Results and Limit

Note:
Emission level (dBuV/m) = 20 log Emission level (uV/m)
Corrected Reading: Probe Factor + Cable Loss + Read Level - Preamp Factor = Level

Test Mode	CH00	**Temperature**	27 deg. C	**Tested By**	Steve Chen
Freq. Range	30MHz~1GHz	**Humidity**	61%		

(A) Polarization: Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	98.580	28.60	-14.90	43.50	45.50	9.28	1.72	27.90	Peak	---	---
2	219.810	20.36	-25.64	46.00	36.26	9.13	2.59	27.62	Peak	---	---
3	228.450	18.88	-27.12	46.00	33.97	9.91	2.59	27.59	Peak	---	---
1	528.200	23.12	-22.88	46.00	31.45	16.33	4.07	28.73	Peak	---	---
2	575.800	23.11	-22.89	46.00	30.71	16.98	4.20	28.78	Peak	---	---
3	623.400	24.34	-21.66	46.00	31.28	17.46	4.38	28.78	Peak	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	42.690	20.58	-19.42	40.00	38.07	9.63	0.90	28.02	Peak	---	---
2	87.780	19.77	-20.23	40.00	37.93	8.32	1.44	27.92	Peak	---	---
3	219.810	20.27	-25.73	46.00	36.17	9.13	2.59	27.62	Peak	---	---
1	500.200	24.86	-21.14	46.00	33.60	16.03	3.93	28.70	Peak	---	---
2	623.400	25.39	-20.61	46.00	32.33	17.46	4.38	28.78	Peak	---	---
3	778.100	26.56	-19.44	46.00	31.68	18.62	5.04	28.78	Peak	---	---

Test Mode	CH00	Temperature	27 deg. C	Tested By	
Freq. Range	1GHz~25GHz	Humidity	61%		

(A) Polarization: Horizontal

		Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1		2212.000	50.04	-23.96	74.00	57.27	27.84	5.96	41.03	Peak	---	---
2		2212.000	38.45	-15.55	54.00	45.68	27.84	5.96	41.03	Average	---	---
3	X	2404.000	106.08			112.79	28.23	6.21	41.15	Peak	---	---
4	X	2404.000	79.06			85.77	28.23	6.21	41.15	Average	---	---
5		2596.000	52.98	-21.02	74.00	58.92	28.74	6.52	41.20	Peak	---	---
6		2596.000	40.68	-13.32	54.00	46.62	28.74	6.52	41.20	Average	100	125
7		2628.000	50.79	-23.21	74.00	56.58	28.84	6.57	41.20	Peak	---	---
8		2628.000	38.38	-15.62	54.00	44.17	28.84	6.57	41.20	Average	---	---
9		2644.000	51.10	-22.90	74.00	56.81	28.89	6.60	41.20	Peak	---	---
10		2644.000	36.90	-17.10	54.00	42.61	28.89	6.60	41.20	Average	---	---
11		2660.000	49.21	-24.79	74.00	54.84	28.94	6.63	41.20	Peak	---	---
12		2660.000	38.00	-16.00	54.00	43.63	28.94	6.63	41.20	Average	---	---

(B) Polarization: Vertical

		Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1		2212.000	45.95	-28.05	74.00	53.18	27.84	5.96	41.03	Peak	---	---
2		2212.000	35.13	-18.87	54.00	42.36	27.84	5.96	41.03	Average	---	---
3	X	2404.000	74.76			81.47	28.23	6.21	41.15	Average	---	---
4	X	2404.000	104.67			111.38	28.23	6.21	41.15	Peak	---	---
5		2596.000	49.36	-24.64	74.00	55.30	28.74	6.52	41.20	Peak	---	---
6		2596.000	38.60	-15.40	54.00	44.54	28.74	6.52	41.20	Average	---	---
7		2628.000	50.93	-23.07	74.00	56.72	28.84	6.57	41.20	Peak	---	---
8		2628.000	38.67	-15.33	54.00	44.46	28.84	6.57	41.20	Average	---	---
9		2644.000	50.43	-23.57	74.00	56.14	28.89	6.60	41.20	Peak	---	---
10		2644.000	36.82	-17.18	54.00	42.53	28.89	6.60	41.20	Average	---	---
11		2660.000	48.54	-25.46	74.00	54.17	28.94	6.63	41.20	Peak	---	---
12		2660.000	38.23	-15.77	54.00	43.86	28.94	6.63	41.20	Average	---	---
1		4804.000	51.57	-22.43	74.00	51.83	33.03	9.05	42.34	Peak	---	---
2		4804.000	41.55	-12.45	54.00	41.81	33.03	9.05	42.34	Average	---	---

Remark : X : Fundamental Frequency

Test Mode	CH39	Temperature	27 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	61%		

(A) Polarization: Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2198.000	48.33	-25.67	74.00	55.61	27.81	5.94	41.03	Peak	---	---
2	2198.000	35.99	-18.01	54.00	43.27	27.81	5.94	41.03	Average	---	---
3	2214.000	48.77	-25.23	74.00	56.00	27.84	5.96	41.03	Peak	---	---
4	2214.000	36.95	-17.05	54.00	44.18	27.84	5.96	41.03	Average	---	---
5	2246.000	52.27	-21.73	74.00	59.40	27.91	6.01	41.05	Peak	---	---
6	2246.000	40.71	-13.29	54.00	47.84	27.91	6.01	41.05	Average	100	105
7 X	2444.000	106.19	32.19	74.00	112.78	28.31	6.27	41.17	Peak	---	---
8 X	2444.000	79.16	25.16	54.00	85.75	28.31	6.27	41.17	Average	---	---
9	2636.000	48.38	-25.62	74.00	54.13	28.86	6.59	41.20	Peak	---	---
10	2636.000	36.78	-17.22	54.00	42.53	28.86	6.59	41.20	Average	---	---
11	2668.000	48.35	-25.65	74.00	53.95	28.96	6.64	41.20	Peak	---	---
12	2668.000	37.66	-16.34	54.00	43.26	28.96	6.64	41.20	Average	---	---

(B) Polarization: Vertical

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2198.000	45.12	-28.88	74.00	52.40	27.81	5.94	41.03	Peak	---	---
2	2198.000	33.23	-20.77	54.00	40.51	27.81	5.94	41.03	Average	---	---
3	2252.000	48.67	-25.33	74.00	55.80	27.92	6.01	41.06	Peak	---	---
4	2252.000	35.56	-18.44	54.00	42.69	27.92	6.01	41.06	Average	---	---
5 X	2444.000	103.34	29.34	74.00	109.93	28.31	6.27	41.17	Peak	---	---
6 X	2444.000	74.18	20.18	54.00	80.77	28.31	6.27	41.17	Average	---	---
7	2636.000	48.11	-25.89	74.00	53.86	28.86	6.59	41.20	Peak	---	---
8	2636.000	35.48	-18.52	54.00	41.23	28.86	6.59	41.20	Average	---	---
9	2668.000	47.24	-26.76	74.00	52.84	28.96	6.64	41.20	Peak	---	---
10	2668.000	34.60	-19.40	54.00	40.20	28.96	6.64	41.20	Average	---	---
11	2700.000	45.36	-28.64	74.00	50.80	29.06	6.70	41.20	Peak	---	---
12	2700.000	34.42	-19.58	54.00	39.86	29.06	6.70	41.20	Average	---	---
1	4884.000	51.24	-22.76	74.00	51.40	33.19	9.10	42.45	Peak	---	---
2	4884.000	39.99	-14.01	54.00	40.15	33.19	9.10	42.45	Average	---	---

Remark : X : Fundamental Frequency

Test Mode	CH78	Temperature	27 deg. C	Tested By	Steve Chen
Freq. Range	1GHz~25GHz	Humidity	61%		

(A) Polarization: Horizontal

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2238.000	52.76	-21.24	74.00	59.93	27.89	5.99	41.05	Peak	---	---
2	2238.000	40.37	-13.63	54.00	47.54	27.89	5.99	41.05	Average	---	---
3	2254.000	53.38	-20.62	74.00	60.50	27.92	6.02	41.06	Peak	---	---
4	2254.000	40.85	-13.15	54.00	47.97	27.92	6.02	41.06	Average	---	---
5	2270.000	52.23	-21.77	74.00	59.30	27.96	6.04	41.07	Peak	---	---
6	2270.000	38.60	-15.40	54.00	45.67	27.96	6.04	41.07	Average	---	---
7	2286.000	56.96	-17.04	74.00	63.99	27.99	6.06	41.08	Peak	---	---
8	2286.000	44.23	-9.77	54.00	51.26	27.99	6.06	41.08	Average	100	120
9	2326.000	52.10	-21.90	74.00	59.02	28.07	6.11	41.10	Peak	---	---
10	2326.000	40.07	-13.93	54.00	46.99	28.07	6.11	41.10	Average	---	---
11 X	2478.000	108.72	34.72	74.00	115.22	28.38	6.31	41.19	Peak	---	---
12 X	2478.000	82.24	28.24	54.00	88.74	28.38	6.31	41.19	Average	---	---

(B) Polarization: Vertical

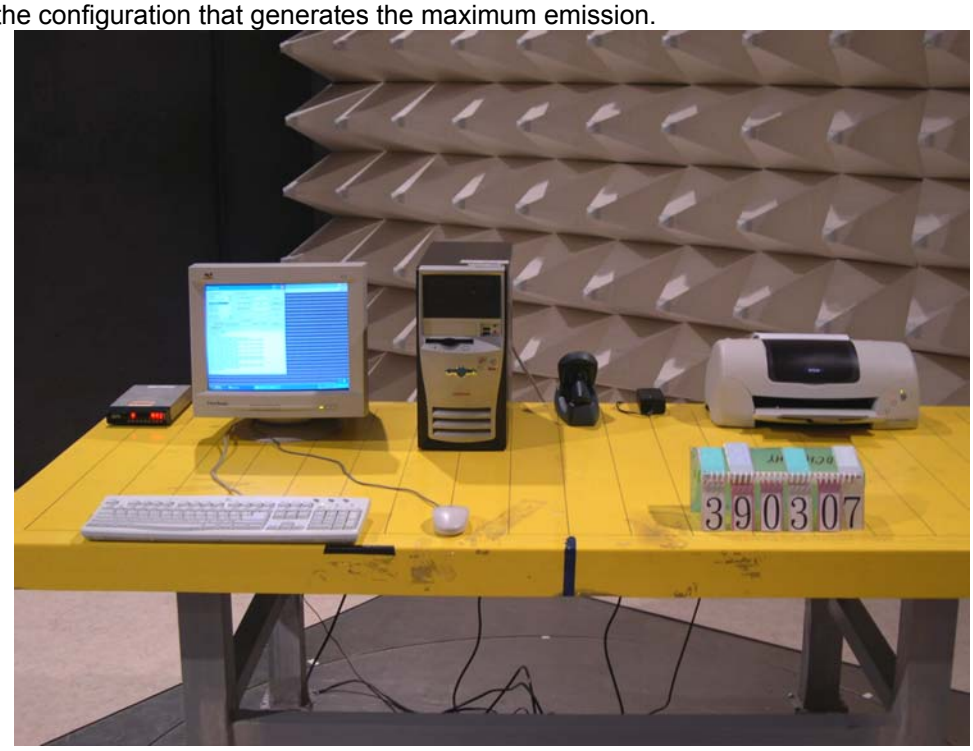
	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		cm	deg
1	2254.000	48.75	-25.25	74.00	55.87	27.92	6.02	41.06	Peak	---	---
2	2254.000	36.16	-17.84	54.00	43.28	27.92	6.02	41.06	Average	---	---
3	2270.000	47.87	-26.13	74.00	54.94	27.96	6.04	41.07	Peak	---	---
4	2270.000	34.48	-19.52	54.00	41.55	27.96	6.04	41.07	Average	---	---
5	2286.000	52.83	-21.17	74.00	59.86	27.99	6.06	41.08	Peak	---	---
6	2286.000	38.25	-15.75	54.00	45.28	27.99	6.06	41.08	Average	---	---
7	2302.000	46.41	-27.59	74.00	53.40	28.02	6.08	41.09	Peak	---	---
8	2302.000	34.23	-19.77	54.00	41.22	28.02	6.08	41.09	Average	---	---
9	2326.000	47.92	-26.08	74.00	54.84	28.07	6.11	41.10	Peak	---	---
10	2326.000	34.15	-19.85	54.00	41.07	28.07	6.11	41.10	Average	---	---
11 X	2478.000	102.78	28.78	74.00	109.28	28.38	6.31	41.19	Peak	---	---
12 X	2478.000	75.97	21.97	54.00	82.47	28.38	6.31	41.19	Average	---	---
1	4964.000	52.88	-21.12	74.00	52.95	33.35	9.14	42.56	Peak	---	---
2	4964.000	40.12	-13.88	54.00	40.19	33.35	9.14	42.56	Average	---	---

Remark : X : Fundamental Frequency

5.9.5 Photographs of Radiated Emission Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW

5.10. Antenna Requirements

5.10.1 Standard Applicable

47 CFR Part15 Section 15.203:

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

47 CFR Part15 Section 15.247 (b):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.10.2Antenna Connected Construction

The maximum Gain antenna used in this product is Chip antenna, there is no antenna connector.

5.11. RF Exposure

5.11.1 Limit For Maximum Permissible Exposure (MPE)

This product can be classified as mobile device, so the 20cm separation distance warning is required.

In this section, the power density at 20cm location is calculated to examine if it is lower than the limit.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

F = frequency in MHz

*Plane-wave equivalent power density

5.11.2 MPE Calculation Method

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd\ (mW/cm^2) = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the gain of the used antenna, the RF power density can be obtained.

5.11.3 Calculated Result and Limit

Channel No.	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)
Channel 00	0	1.00	13.4200	21.9786	0.0044	1
Channel 39	0	1.00	12.7300	18.7499	0.0037	1
Channel 78	0	1.00	13.2700	21.2324	0.0042	1

From the calculated result shown in above table, the power density is lower than limit at location 20cm far away.

6. List of Measuring Equipments Used

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	EMC Receiver	R&S	ESCS 30	100132	9 KHz – 2.75 GHz	Jun. 23, 2004	Conduction (CO01-HY)
2	LISN	MessTec	NNB-2/16Z	2001/008	9 KHz – 30 MHz	May 03, 2004	Conduction (CO01-HY)
3	LISN	MessTec	NNB-2/16Z	2001/009	9 KHz – 30 MHz	Apr. 19, 2004	Conduction (CO01-HY)
4	EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction (CO01-HY)
5	EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction (CO01-HY)
6	RF Cable-CON	Suhner Switzerland	RG223/U	CB029	9KHz~30MHz	Dec. 24, 2003	Conduction (CO01-HY)
7	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz~1GHz 3m	Jun. 21, 2004	Radiation (03CH03-HY)
8	Spectrum analyzer	R&S	FSP40	100004	9KHZ~40GHz	Aug. 23, 2003	Radiation (03CH03-HY)
9	Amplifier	HP	8447D	2944A09072	100KHz – 1.3GHz	Nov. 05, 2003	Radiation (03CH03-HY)
10	Biconical Antenna	SCHWARZBECK	VHBB 9124	301	30MHz –200MHz	Jul. 28, 2004	Radiation (03CH03-HY)
11	Log Antenna	SCHWARZBECK	VUSLP 9111	221	200MHz -1GHz	Jul. 28, 2004	Radiation (03CH03-HY)
12	RF Cable-R03m	Jye Bao	RG142	CB021	30MHz~1GHz	Dec. 03, 2003	Radiation (03CH03-HY)
13	Amplifier	MITEQ	AFS44	849984	100MHz~26.5GHz	Mar. 26, 2004	Radiation (03CH03-HY)
14	Horn Antenna	EMCO	3115	6821	1GHz – 18GHz	Sep. 12, 2003	Radiation (03CH03-HY)
15	Turn Table	HD	DS 420	420/650/00	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
16	Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
17	Horn Antenna	Schwarzbeck	BBHA9170	154	15GHz~40GHz	Jun. 09, 2004	Radiation (03CH03-HY)
18	RF Cable-HIGH	Jye Bao	RG142	CB030-HIGH	1GHz~29.5GHz	Dec. 05, 2003	Radiation (03CH03-HY)

Items	Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
1	Spectrum analyzer	R&S	FSP7	838858/014	9KHZ~7GHZ	Sep. 03, 2003	Conducted (TH01-HY)
2	Power meter	R&S	NRVS	100444	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
3	Power sensor	R&S	NRV-Z55	100049	DC~40GHz	Jun. 15, 2004	Conducted (TH01-HY)
4	Power Sensor	R&S	NRV-Z32	100057	30MHz-6GHz	Jun. 15, 2004	Conducted (TH01-HY)
5	AC power source	HPC	HPA-500W	HPA-9100024	AC 0~300V	Jun. 16, 2004	Conducted (TH01-HY)
6	AC power source	G.W.	GPC-6030D	C671845	DC 1V~60V	Nov. 06, 2003	Conducted (TH01-HY)
7	Temp. and Humidity Chamber	KSON	THS-C3L	612	N/A	Oct. 01, 2003	Conducted (TH01-HY)
8	RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz~7GHz	Jan. 01, 2004	Conducted (TH01-HY)
9	RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz~1GHz	Jan. 01, 2004	Conducted (TH01-HY)

※ Calibration Interval of instruments listed above is one year.