



**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

Bluetooth Headset

MODEL No.: H1010

BRAND NAME: WNI

FCC ID: QOX-H1010

REPORT NO: 020077-RF-ID

ISSUE DATE: October 11, 2002

Prepared for

**Wireless Networks Inc.
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Calgary, Alberta, Canada T2A 6K4**

Prepared by

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VERIFICATION OF COMPLIANCE

Applicant: **Wireless Networks Inc.**
#300, 3016, Fifth Avenue NE, Calgary, Alberta, Canada T2A 6K4

Equipment Under Test: Bluetooth Headset

BRAND NAME: WNI

MODEL No.: H1010

Serial Number: N/A

File Number: 020077-RF-ID

Date of test: Sep. 20 ~ Sep. 27, 2002

We hereby certify that:

The above equipment was tested by C&C Laboratory Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.

The test results of this report relate only to the tested sample identified in this report.

Approved By

A handwritten signature in black ink, appearing to read 'Vincent Su', is written over a horizontal line.

Vincent Su / RF Dept. Vice Manager
C&C Laboratory Co., Ltd

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1. GENERAL INFORMATION

1.1 Product Description

The Wireless Networks Inc. Model: H1010 (referred to as the EUT in this report) is a Bluetooth headset transceiver for cell phone.

The EUT is compliance with Bluetooth Standard.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402 – 2480MHz, 79 channels
- B). Modulation type: Frequency Hopping Spread Spectrum (FHSS)
- C). Antenna Designation: Non-User Replaceable (Fixed)
- D). Power Supply: 5Vdc Chargeable Battery via 110V AC/DC Power Adaptor.
- E). Receiver type : Super heterodyne

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **QOX-H1010** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx / Rx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992, conducted emissions from the EUT are measured in the **frequency range between 0.15 MHz and 30 MHz** using **CISPR Quasi-Peak and Average detector mode**.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) were rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Bluetooth headset	WNI	H1010	QOX-H1010	N/A	EUT

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)	Peak Output Power	Compliant
§15.247(a)(1)(ii)	20dB Bandwidth	Compliant
§15.247(c)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) (f)	Spurious Emission Radiated	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(ii)	Number of hopping frequency	Compliant
§15.247(a)(1)(ii)	Time of Occupancy	Compliant
§15.247(f)	Peak Power Spectral Density	Compliant
§15.203	Antenna Requirement	Compliant
§1.1307	RF Exposure	Compliant

4. DESCRIPTION OF TEST MODES

The EUT (Bluetooth headset) has been tested under engineering test mode.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz), mid (2442MHz) and high(2480MHz) with highest data rate are chosen for testing.

5. CONDUCTED EMISSION TEST

5.1 Standard Applicable

According to §15.207, frequency within 150KHz to 30MHz shall not exceed below

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

5.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was plug-in the AC/DC Power Adaptor was placed on the center of the back edge on the test table.
3. External I/O cables were draped along the edge of the test table and bundle when necessary.

5.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

5.4 Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NO.	SERIAL NO.	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCS30	847793/012	12/19/2001	12/18/2002
LISN	R&S	ESH2-Z5	843285/010	12/10/2001	12/09/2002
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003
Spectrum Analyzer	ADVANTEST	R3261C	71720533	08/06/2002	08/05/2003
2X2 WIRE ISN	R&S	ENY22	100020	06/20/2002	06/19/2003
FOUR WIRE ISN	R&S	ENY41	100006	06/20/2002	06/19/2003

5.5 Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

LINE CONDUCTED TEST

Model Number: H1010

Tested by: Markba Lee

Test Mode: TX CH-Low

Detector Function: Quasi-Peak

Temperature: 33 °C

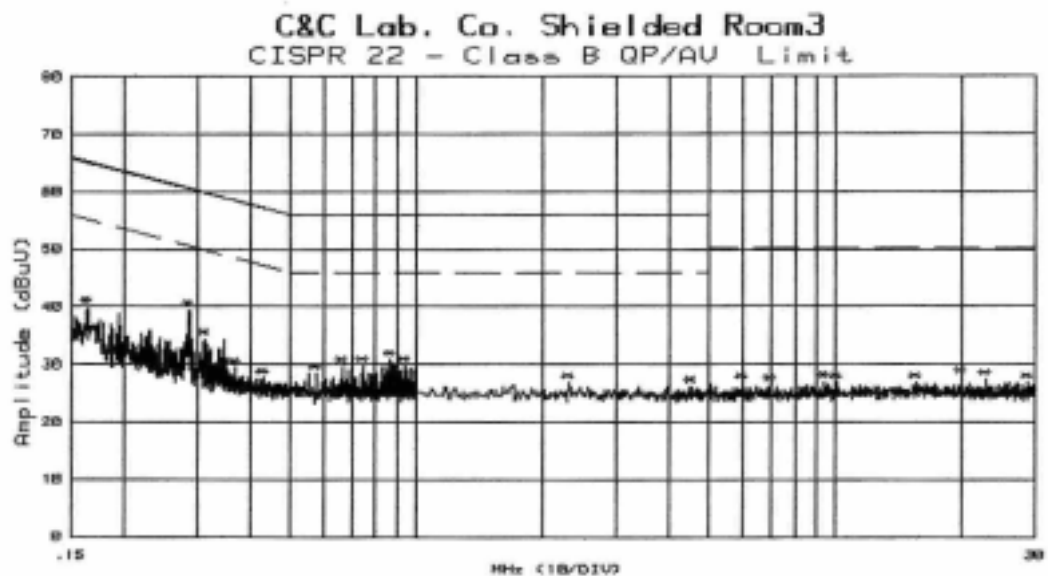
Humidity: 50%RH

(The chart below shows the highest readings taken from the final data)

FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw dBuV	Raw dBuV	Limit dBuV	Limit dBuV	Margin dB	Margin dB	
0.164	40.00	---	65.26	55.26	-25.26	---	L1
0.287	39.40	---	60.61	50.61	-21.21	---	L1
0.312	33.90	---	59.92	49.92	-26.02	---	L1
0.751	29.40	---	56.00	46.00	-26.60	---	L1
0.869	30.40	---	56.00	46.00	-25.60	---	L1
0.939	29.40	---	56.00	46.00	-26.60	---	L1
0.186	41.40	---	64.21	54.21	-22.81	---	L2
0.252	36.70	---	61.69	51.69	-24.99	---	L2
0.310	37.70	---	59.97	49.97	-22.27	---	L2
0.360	34.00	---	58.73	48.73	-24.73	---	L2
0.472	29.80	---	56.48	46.48	-26.68	---	L2
0.574	32.50	---	56.00	46.00	-23.50	---	L2

Remark :

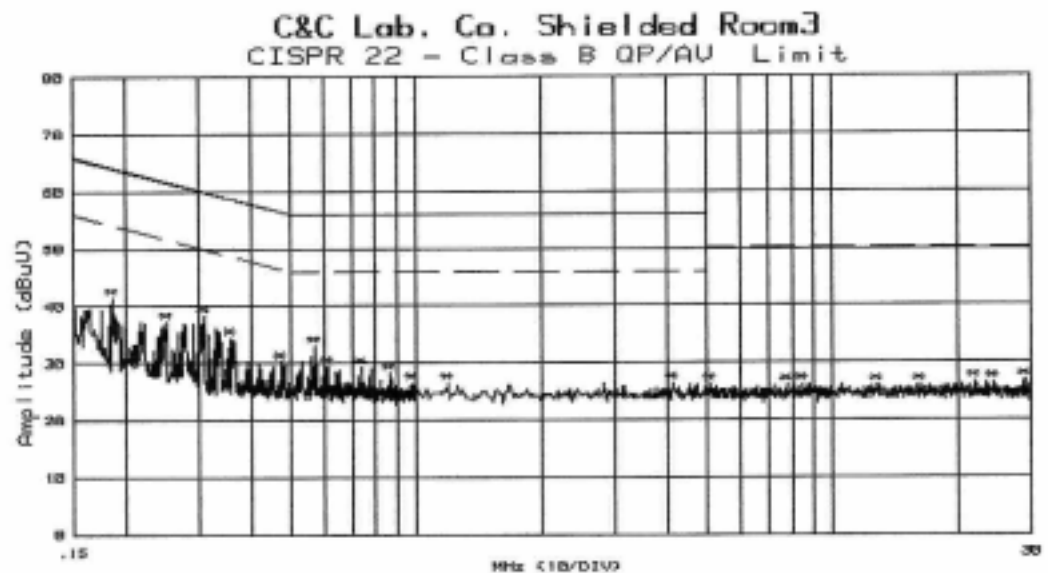
- (1) Measuring frequencies from 0.15 MHz to 30MHz.
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-Peak detector and Average detector.
- (3) “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

Conducted Emission Test Plot (TX CH Low)

Customer: Cal_Comp
Model : BT1000
Mode :
Reading : Peak(R3261C SPA)
Remark : TX CH-0

File#: 1467
Humd.: 50 (%)
Port : L1

Date : 18 Sep 2002 10:15:22
Temp. : 33 (C)
Tested by: markba_lee



Customer: Cal_Comp
Model : BT1000
Mode :
Reading : Peak(R3261C SPA)
Remark : TX CH-0

File#: 1468
Humd.: 50 (%)
Port : L2

Date : 18 Sep 2002 10:17:46
Temp. : 33 (C)
Tested by: markba_lee

LINE CONDUCTED TEST

Model Number: H1010

Tested by: Markba Lee

Test Mode: TX CH-Mid

Detector Function: Quasi-Peak

Temperature: 33°C

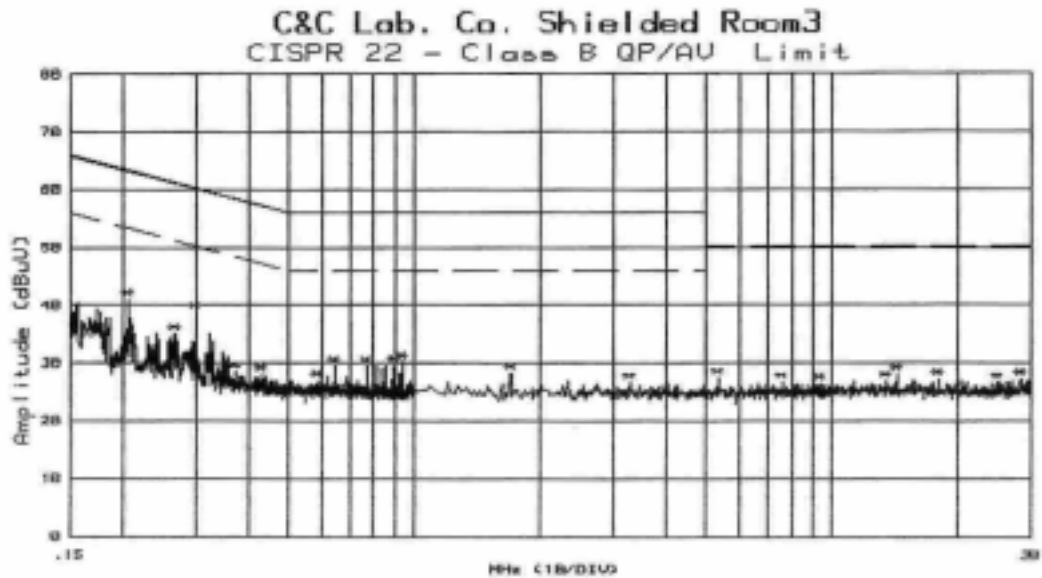
Humidity: 50%RH

(The chart below shows the highest readings taken from the final data)

FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw dBuV	Raw dBuV	Limit dBuV	Limit dBuV	Margin dB	Margin dB	
0.207	41.00	---	63.33	53.33	-22.33	---	L1
0.269	35.00	---	61.15	51.15	-26.15	---	L1
0.301	38.80	---	60.22	50.22	-21.42	---	L1
0.649	29.40	---	56.00	46.00	-26.60	---	L1
0.775	29.40	---	56.00	46.00	-26.60	---	L1
0.899	29.60	---	56.00	46.00	-26.40	---	L1
0.160	39.40	---	65.46	55.46	-26.06	---	L2
0.231	39.00	---	62.41	52.41	-23.41	---	L2
0.320	34.20	---	59.71	49.71	-25.51	---	L2
0.892	30.80	---	56.00	46.00	-25.20	---	L2
0.976	30.80	---	56.00	46.00	-25.20	---	L2
1.064	29.80	---	56.00	46.00	-26.20	---	L2

Remark :

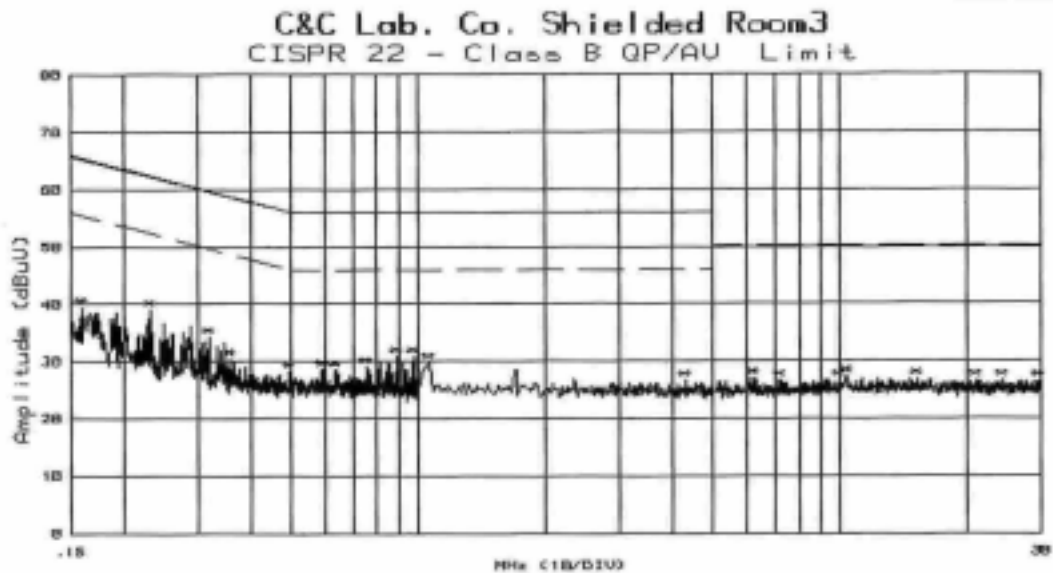
- (1) Measuring frequencies from 0.15 MHz to 30MHz.
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-Peak detector and Average detector.
- (3) “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

Conducted Emission Test Plot (TX CH Mid)

Customer: Cal_Comp
Model : BT1000
Mode :
Reading : Peak (R3261C SPA)
Remark : TX CH-40

File#: 1470
Humd.: 50 (%)
Port : L1

Date : 18 Sep 2002 10:22:09
Temp. : 33 (C)
Tested by: markba_lee



Customer: Cal_Comp
Model : BT1000
Mode :
Reading : Peak (R3261C SPA)
Remark : TX CH-40

File#: 1471
Humd.: 50 (%)
Port : L2

Date : 18 Sep 2002 10:24:55
Temp. : 33 (C)
Tested by: markba_lee

LINE CONDUCTED TEST

Model Number: H1010

Tested by: Markba Lee

Test Mode: TX CH-High

Detector Function: Quasi-Peak

Temperature: 33°C

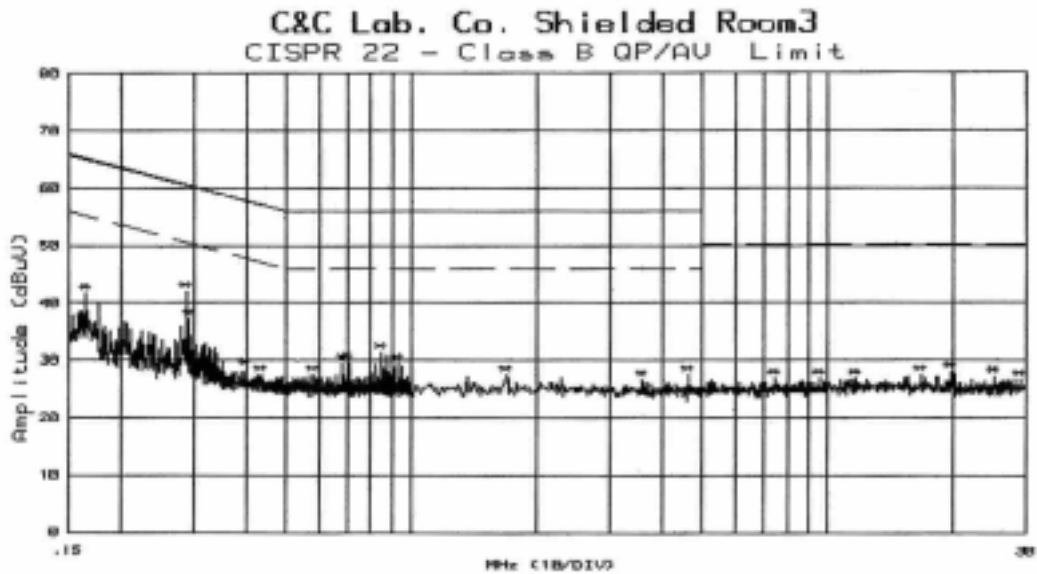
Humidity: 50%RH

(The chart below shows the highest readings taken from the final data)

FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw dBuV	Raw dBuV	Limit dBuV	Limit dBuV	Margin dB	Margin dB	
0.166	41.60	---	65.16	55.16	-23.56	---	L1
0.288	41.50	---	60.58	50.58	-19.08	---	L1
0.230	37.20	---	62.45	52.45	-25.25	---	L1
0.583	27.40	---	56.00	46.00	-28.60	---	L1
0.685	29.40	---	56.00	46.00	-26.60	---	L1
0.851	31.40	---	56.00	46.00	-24.60	---	L1
0.168	42.40	---	65.06	55.06	-22.66	---	L2
0.260	42.60	---	61.43	51.43	-18.83	---	L2
0.322	37.20	---	59.66	49.66	-22.46	---	L2
0.491	30.80	---	56.15	46.15	-25.35	---	L2
0.550	33.00	---	56.00	46.00	-23.00	---	L2
0.664	31.60	---	56.00	46.00	-24.40	---	L2

Remark :

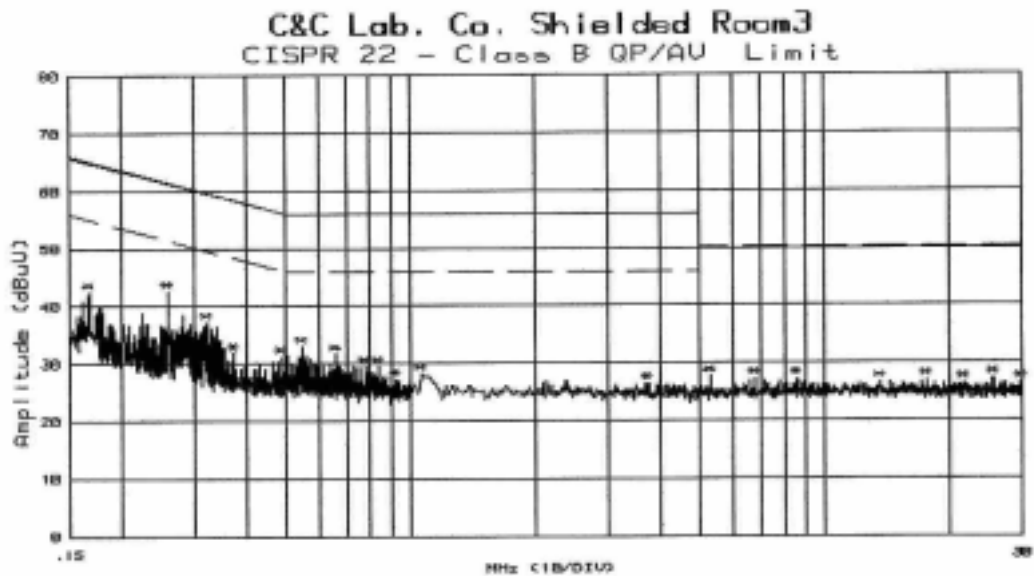
- (1) Measuring frequencies from 0.15 MHz to 30MHz.
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-Peak detector and Average detector.
- (3) “---” denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

Conducted Emission Test Plot (TX CH High)

Customer: Cal_Comp
Model : BT1000
Mode :
Reading : Peak (R3261C SPA)
Remark : TX CH-78

File#: 1479
Humd.: 50 (%)
Port : L1

Date : 18 Sep 2002 10:45:15
Temp. : 33 (C)
Tested by: markba_lee



Customer: Cal_Comp
Model : BT1000
Mode :
Reading : Peak (R3261C SPA)
Remark : TX CH-78

File#: 1478
Humd.: 50 (%)
Port : L2

Date : 18 Sep 2002 10:43:19
Temp. : 33 (C)
Tested by: markba_lee

6. PEAK OUTPUT POWER MEASUREMENT

6.1 Standard Applicable

According to §15.247(b)(2), for direct sequence systems, the maximum peak output power of the intentional radiator shall not exceed 1 Watt.

6.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Adjacent channel power function)
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

6.3 Measurement Result

CH	Reading Power dBm	Cable Loss dB	Output Power dBm	Output Power W	Limit (W)	Result
Low	-0.96	1.28	0.32	0.00108	1	PASS
Mid	-0.94	1.28	0.34	0.00108	1	PASS
High	-0.87	1.28	0.41	0.00110	1	PASS

6.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Power Meter	HP	436A	2709A29027	03/16/2002	03/15/2003
Power Sensor	HP	8481A	2702A61366	03/16/2002	03/15/2003
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A

7. 20dB BAND WIDTH

7.1 Standard Applicable

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz and 5725MHz – 5850MHz bands. The Maximum 20dB bandwidth of the hopping channel is 1MHz.

7.2 Measurement Procedure

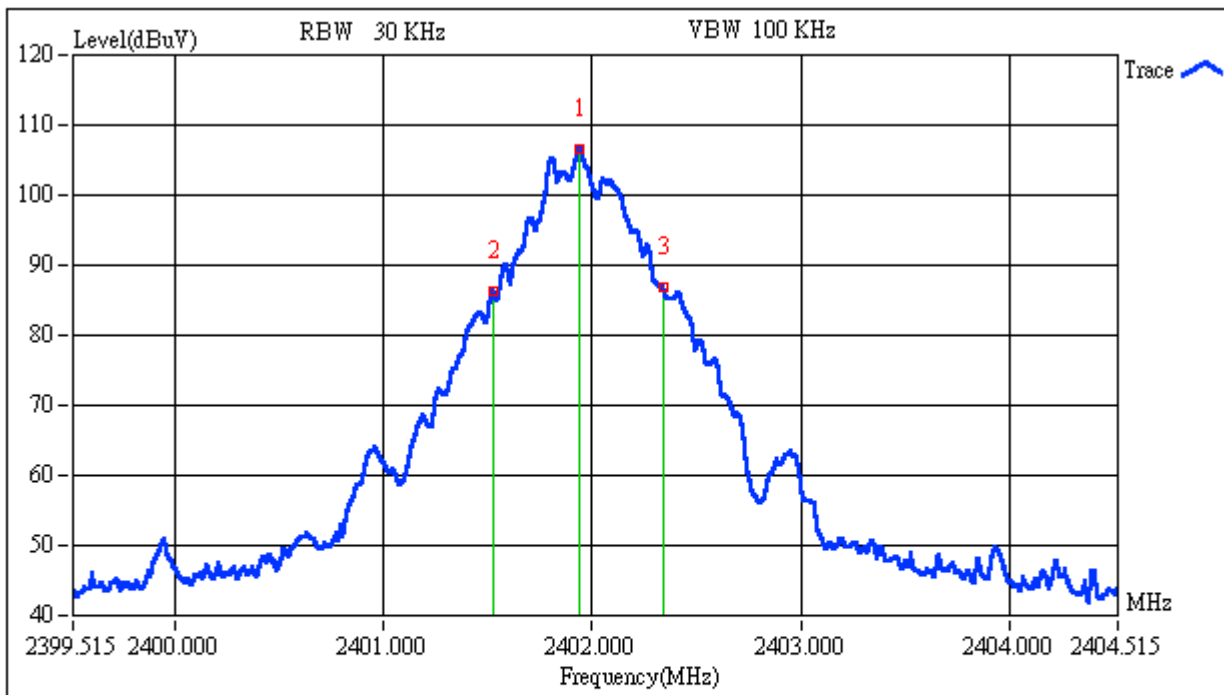
1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=30KHz (1 % of Bandwidth.), Span= 2MHz, Sweep=auto
4. Mark the peak frequency and –20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

7.3 Measurement Result

CH	Upper Frequency (MHz)	Lower Frequency (MHz)	Bandwidth (MHz)	Limit (MHz)	Result
Lower (2402MHz)	2402.34	2401.52	0.82	1	PASS
Mid (2442MHz)	2441.31	2440.56	0.75	1	PASS
Higher (2480MHz)	2480.32	2479.55	0.77	1	PASS

7.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003
cable loss	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A

20dB Band Width Test Data CH-Low

Custom Name:

C-TECH

Engineer:

markba_lee

Peak 2401.93 MHz

Band Width

106.61 dBuV

0.820 MHz

Model Name:

BT101

Report No.:

020062-R

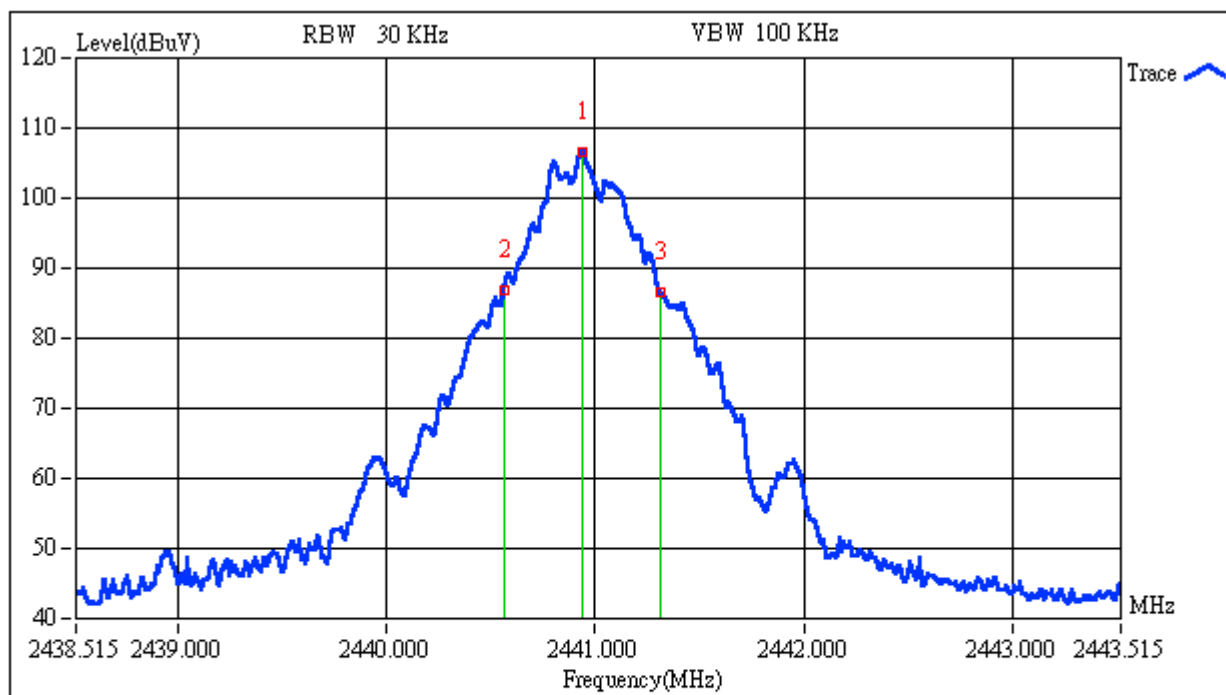
Delta1 2401.52 MHz Delta2 2402.34 MHz

Test Mode:

TX CH LOW

86.18 dBuV

86.81 dBuV

20dB Band Width Test Data CH-Mid

Custom Name:

C-TECH

Engineer:

markba_lee

Peak 2440.93 MHz

Band Width

106.57 dBuV

0.750 MHz

Model Name:

BT101

Report No.:

020062-R

Delta1 2440.56 MHz

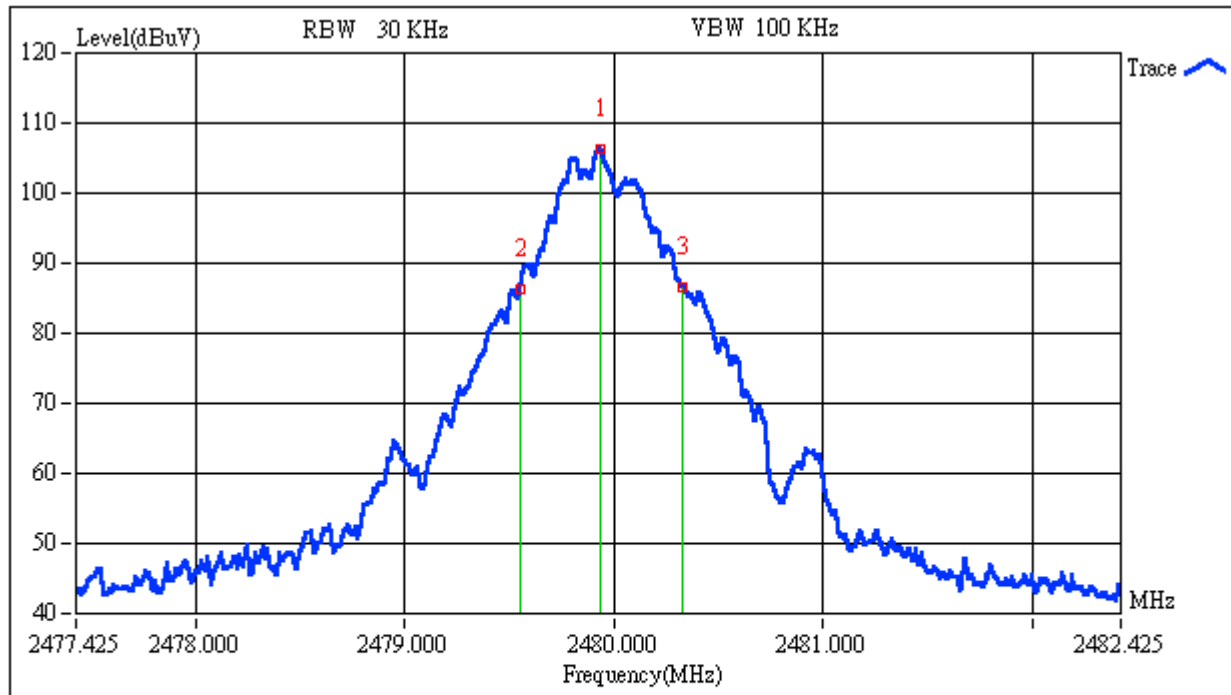
Delta2 2441.31 MHz

Test Mode:

TX CH MID

86.98 dBuV

86.46 dBuV

20dB Band Width Test Data CH-High

Custom Name:

C-TECH

Engineer:

markba_lee

Peak 2479.93 MHz

Band Width

106.42 dBuV

0.770 MHz

Model Name:

BT101

Report No.:

020062-R

Delta1 2479.55 MHz

Delta2 2480.32 MHz

Test Mode:

TX CH HIGH

86.34 dBuV

86.54 dBuV

8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

8.1 Standard Applicable

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

8.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Start = 2.483GHz, Stop = 2.403GHz or Start = 2.479GHz, Stop = 2.499GHz,Sweep = auto.
5. Mark Peak ,2.4GHz and 2.4835GHz and record the max. level.
6. Repeat above procedures until all frequency measured were complete.

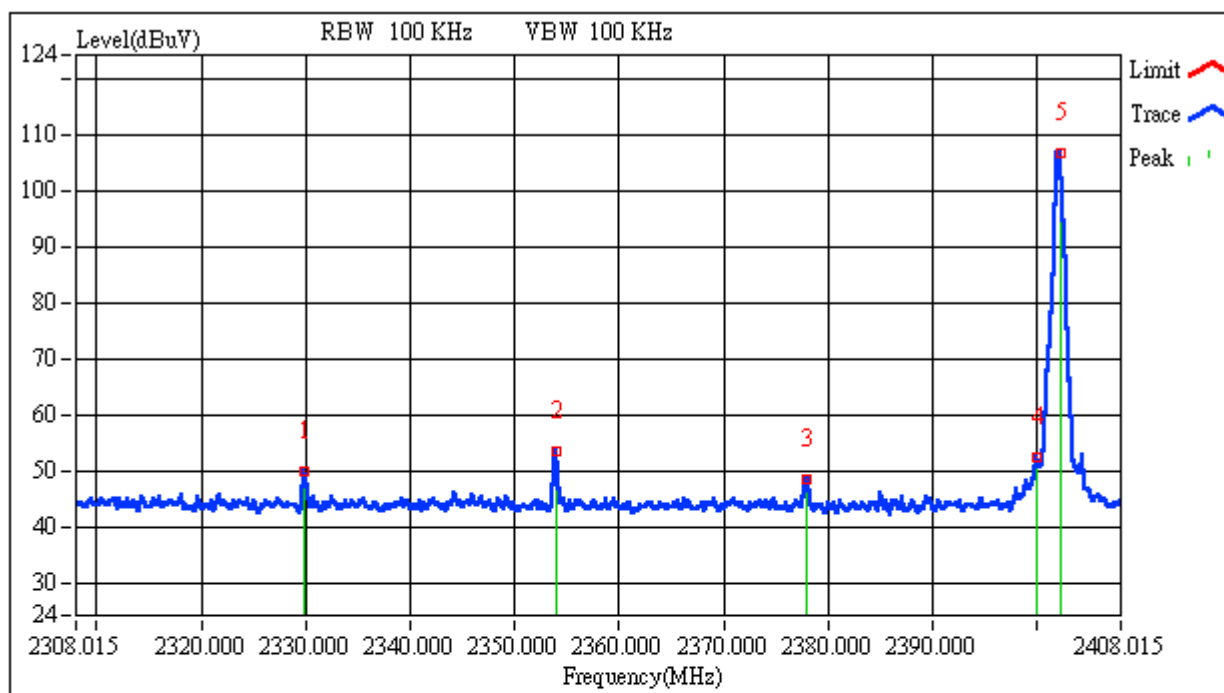
8.3 Measurement Result

Refer to attach spectrum analyzer data chart.

8.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A

Out of Band Test Data CH-Low



Custom Name:

C-TECH

Engineer:

markba_lee

Model Name:

BT101

Report No.:

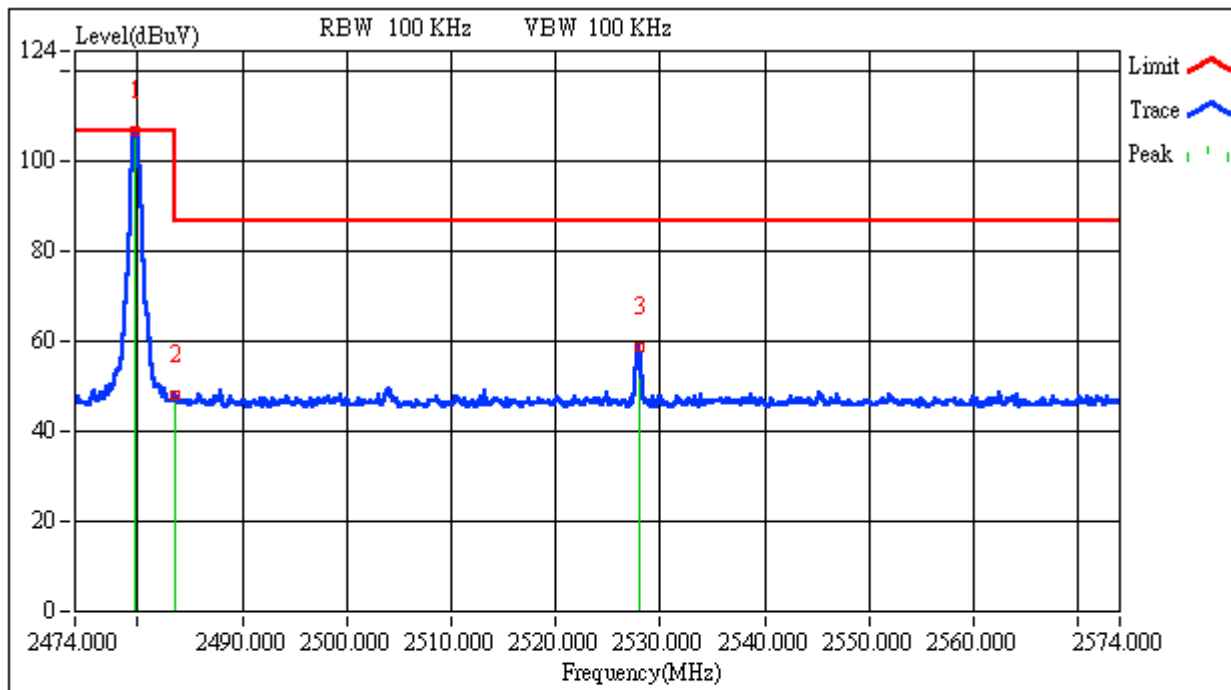
020062-R

Test Mode:

TX CH LOW

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2329.8148	50.09	0.00	0.00	50.09
2	2354.0148	53.56	0.00	0.00	53.56
3	2378.0148	48.77	0.00	0.00	48.77
4	2400.0148	52.79	0.00	0.00	52.79
5	2402.2148	107.11	0.00	0.00	107.11

Out of Band Test Data CH-High



Custom Name:

C-TECH

Engineer:

markba_lee

Model Name:

BT101

Report No.:

020062-R

Test Mode:

TX CH HIGH

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2479.8000	106.67	0.00	0.00	106.67
2	2483.6000	47.98	0.00	0.00	47.98
3	2528.0000	58.54	0.00	0.00	58.54

9. SPURIOUS RADIATED EMISSION TEST

9.1 Standard Applicable

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

9.2 EUT Setup

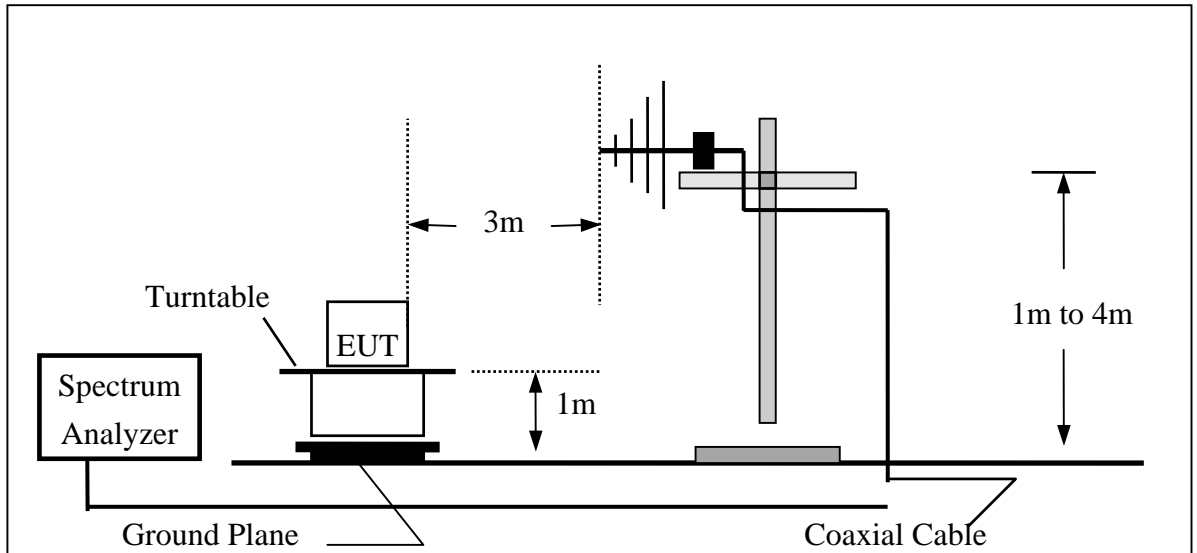
1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was put on the front of the test table.

9.3 Measurement Procedure

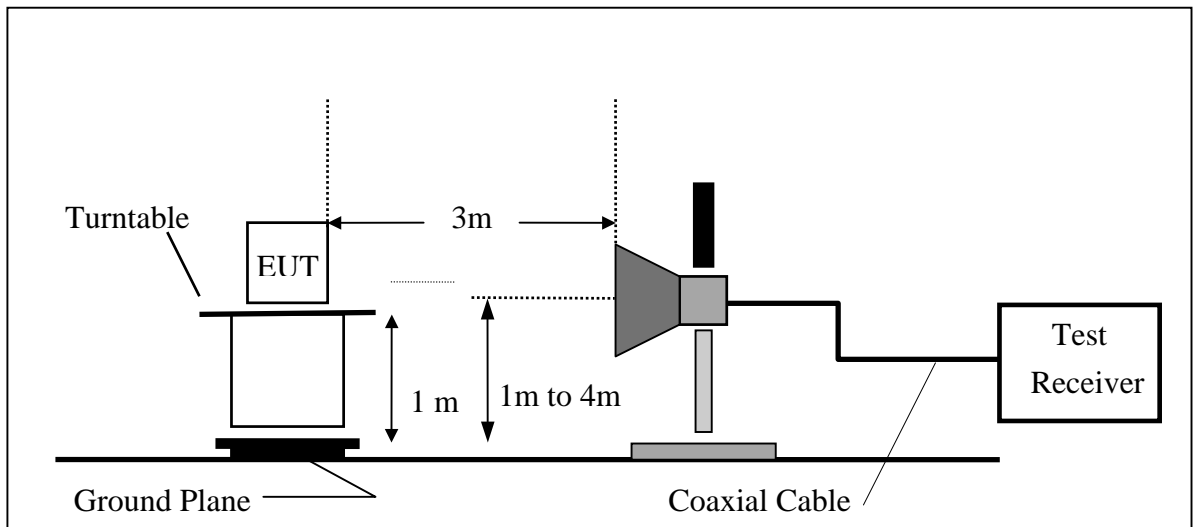
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until all frequency measured were complete.

9.4 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



9.5 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/19/2002	03/18/2003
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003
EMI Test Receiver	R&S	ESVS20	838804/004	01/05/2002	01/04/2003
Pre-Amplifier	HP	8447D	2944A09173	03/04/2002	03/03/2003
Bilog Antenna	SCHWAZBECK	VULB9163	145	07/06/2002	07/05/2003
Horn Antenna	EMCO	3115	9602-4659	04/16/2002	04/15/2003
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/17/2001	11/16/2002
Horn antenna	Schwarzbeck	BBHA 9120	D210	2/24/2002	2/23/2003
Pre-Amplifier	HP	8449B	3008B00965	10/01/2001	10/02/2002

9.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

9.7 Measurement Result (below 1GHz)

Operation Mode: TX CH Low Mode

Test Date : Sep. 27, 2002

Fundamental Frequency: 2402MHz

Test By: Markba

Temperature : 23

Pol: Horizontal

Humidity : 65 %

Judgement : Passed by -0.72 dB at 527.50 MHz

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
264.55	H	Peak	14.60	15.96	30.56	46.00	-15.44
288.48	H	Peak	18.69	16.23	26.06	46.00	-19.94
479.63	H	Peak	16.99	21.56	38.55	46.00	-7.45
527.50	H	Peak	21.80	23.48	45.28	46.00	-0.72
599.31	H	Peak	12.49	25.36	37.85	46.00	-8.15
624.66	H	Peak	17.56	25.13	42.69	46.00	-3.31
672.53	H	Peak	11.04	25.28	36.32	46.00	-9.68
696.46	H	Peak	8.93	25.71	34.64	46.00	-11.36
720.40	H	Peak	9.91	25.81	35.72	46.00	-10.28

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB
- (4) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (5) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

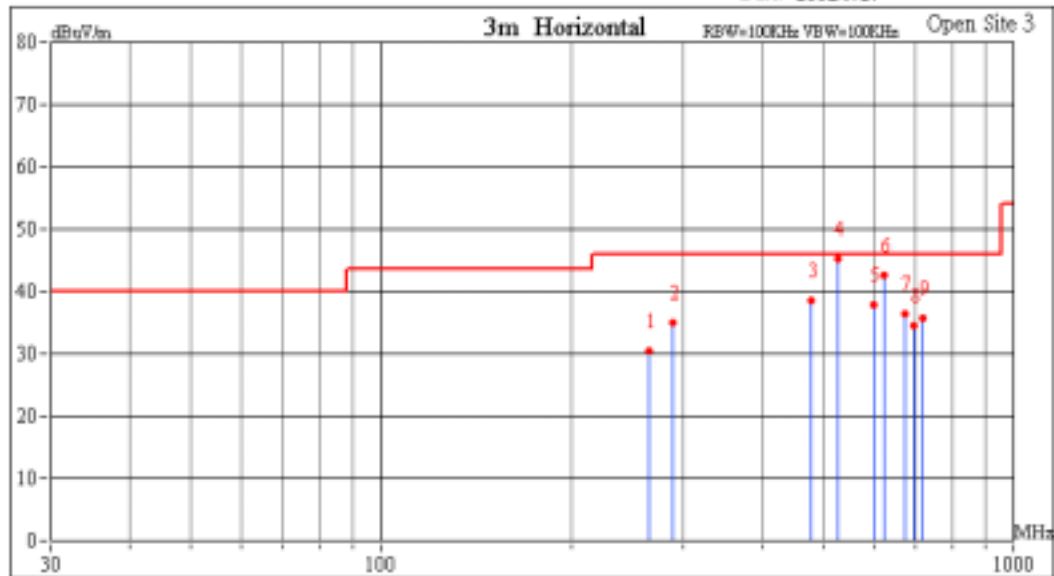
15.209 Radiated Test Data – TX CH-Low Horizontal

C&C LABORATORY CO., LTD.

Test Mode: TX CH LOW

Engineer Name: Markba

Date: 2002/9/27

[illegible]

Operation Mode: TX CH Low Mode
Fundamental Frequency: 2402MHz
Temperature : 23
Humidity : 65 %

Test Date : Sep. 27, 2002
Test By: Markba
Pol: Vertical

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
264.55	V	---	---	---	---	---	---
288.48	V	---	---	---	---	---	---
479.63	V	---	---	---	---	---	---
527.50	V	---	---	---	---	---	---
599.31	V	---	---	---	---	---	---
624.66	V	---	---	---	---	---	---
672.53	V	---	---	---	---	---	---
696.46	V	---	---	---	---	---	---
720.40	V	---	---	---	---	---	---

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB
- (4) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (5) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

Operation Mode: TX CH Mid Mode

Test Date : Sep. 27, 2002

Fundamental Frequency: 2442MHz

Test By: Markba

Temperature : 23

Pol: Horizontal

Humidity : 65 %

Judgement : Passed by -2.72 dB at 527.50 MHz

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
264.55	H	Peak	15.89	15.96	31.85	46.00	-14.15
288.48	H	Peak	18.09	16.23	26.06	46.00	-19.94
479.63	H	Peak	16.38	21.56	37.94	46.00	-8.06
527.50	H	Peak	19.80	23.48	43.28	46.00	-2.72
551.44	H	Peak	16.49	24.31	40.80	46.00	-5.20
575.37	H	Peak	14.12	24.83	38.95	46.00	-7.05
600.72	H	Peak	8.96	25.36	34.32	46.00	-11.68
624.65	H	Peak	11.14	25.13	36.27	46.00	-9.73
672.52	H	Peak	10.66	25.28	35.94	46.00	-10.06

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB
- (4) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (5) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

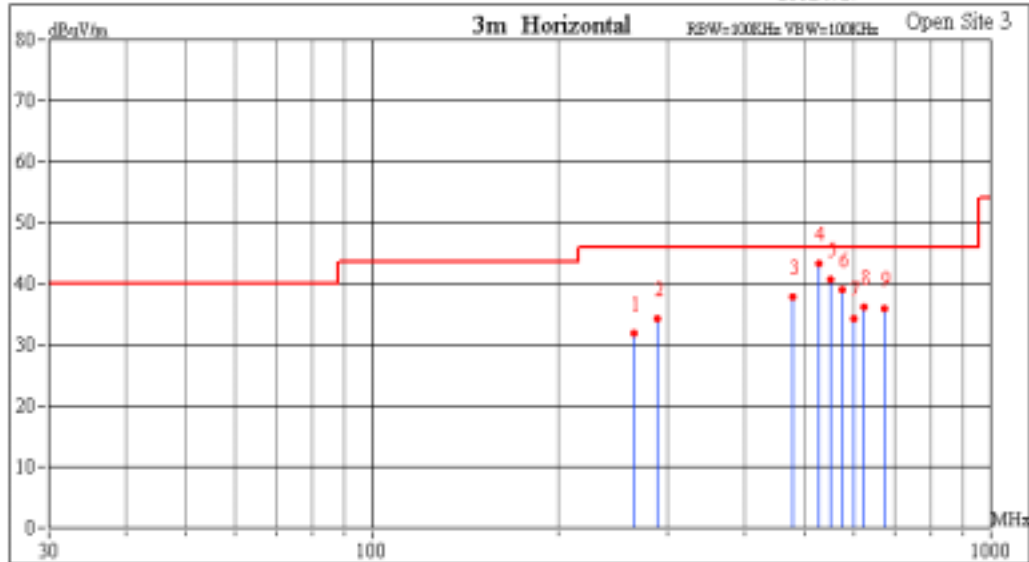
15.209 Radiated Test Data – TX CH-Mid Horizontal

C&C LABORATORY CO., LTD.

Test Mode: TX CH MID

Engineer Name: Markba

Date: 2002/9/17

[illegible]

Operation Mode: TX CH Mid Mode

Test Date : Sep. 27, 2002

Fundamental Frequency: 2442MHz

Test By: Markba

Temperature : 23

Pol: Vertical

Humidity : 65 %

Judgement : Passed by -19.94 dB at 288.49 MHz

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)	Note
240.07	H	Peak	6.92	15.92	22.84	46.00	-23.16	H
288.49	H	Peak	8.57	16.23	26.06	46.00	-19.94	H

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB
- (4) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (5) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

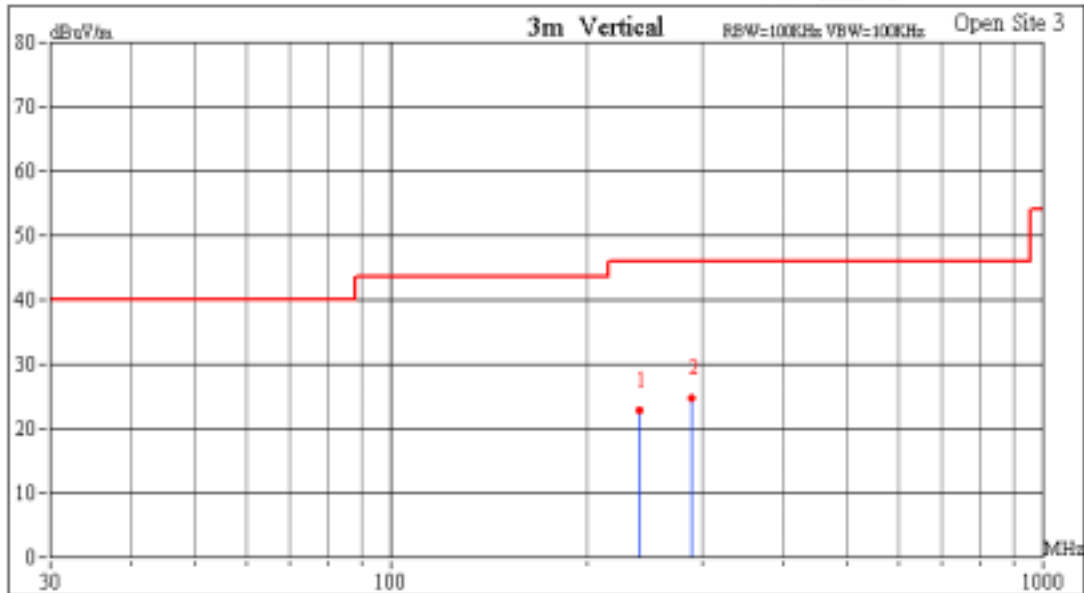
15.209 Radiated Test Data – TX CH-Mid Vertical

C&C LABORATORY CO., LTD.

Test Mode: TX CH MID

Engineer Name: Markba

Date: 2002/9/27

[illegible]

Operation Mode: TX CH High Mode

Test Date : Sep. 27, 2002

Fundamental Frequency: 2480MHz

Test By: Markba

Temperature : 23

Pol: Horizontal

Humidity : 65 %

Judgement : Passed by -2.32 dB at 527.50 MHz

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
264.55	H	Peak	15.11	51.96	67.07	46.00	21.07
288.48	H	Peak	18.87	16.23	26.06	46.00	-19.94
479.63	H	Peak	18.56	21.56	40.12	46.00	-5.88
527.50	H	Peak	20.20	23.48	43.68	46.00	-2.32
624.66	H	Peak	16.54	25.13	41.67	46.00	-4.33
672.53	H	Peak	11.82	25.28	37.10	46.00	-8.90
720.40	H	Peak	9.61	25.81	35.42	46.00	-10.58
768.27	H	Peak	11.42	25.98	37.40	46.00	-8.60

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB
- (4) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (5) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

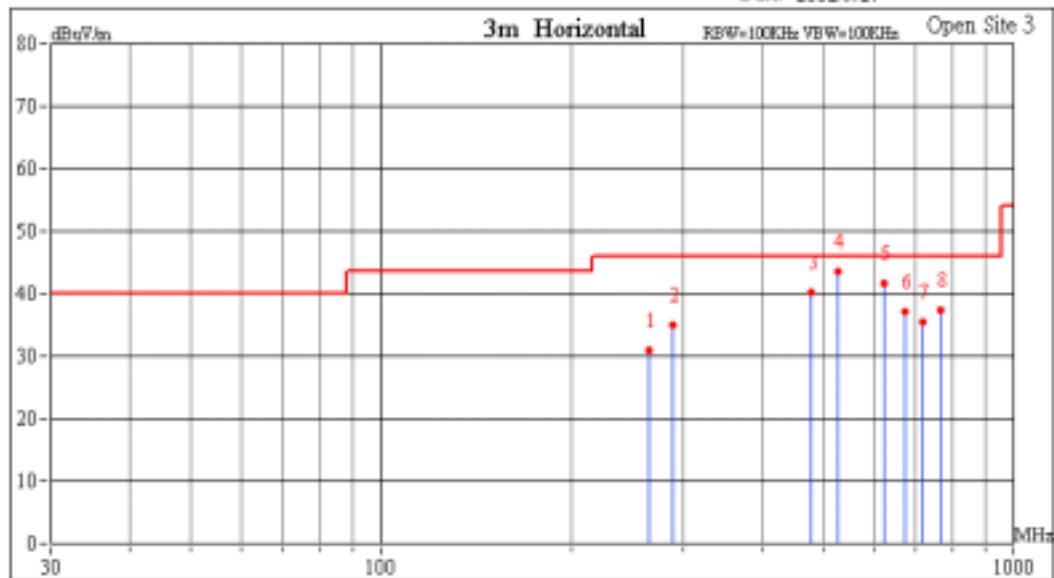
15.209 Radiated Test Data – TX CH-High Horizontal

C&C LABORATORY CO., LTD.

Test Mode: TX CH HIGH

Engineer Name: Markba

Date: 2002/9/27

[illegible]

Operation Mode: TX CH High Mode
 Fundamental Frequency: 2480MHz
 Temperature : 23
 Humidity : 65 %

Test Date : Sep. 27, 2002
 Test By: Markba
 Pol: Vertical

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
264.55	V	---	---	---	---	---	---
288.48	V	---	---	---	---	---	---
479.63	V	---	---	---	---	---	---
527.50	V	---	---	---	---	---	---
599.31	V	---	---	---	---	---	---
624.66	V	---	---	---	---	---	---
672.53	V	---	---	---	---	---	---
696.46	V	---	---	---	---	---	---
720.40	V	---	---	---	---	---	---

Remark :

- (1) Measuring frequencies from 30 MHz to the 1GHz.
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
- (3) Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB
- (4) * denotes emission frequency which appearing within the Restricted Bands specified in provision of 15.205, then the general radiated emission limits in 15.209 apply.
- (5) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (6) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

9.8 Measurement Result (above 1GHz)

Operation Mode: TX Mode
 Fundamental Frequency: 2402MHz (CH Low)
 Temperature : 23
 Humidity : 65 %

Test Date : 9/27/2002
 Test By: Markba Lee
 Pol: Vertical

Freq.	Reading	AF	Closs	Pre-amp	Filter	Dist	Level	Limit	Margin	Mark	Pol
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)
1100.00	47.42	24.78	3.29	38.71	0.00	0.00	36.78	54.00	-17.22	P	3mV
1292.00	46.30	25.13	3.56	38.34	0.00	0.00	36.65	54.00	-17.35	P	3mV
1340.00	47.16	25.21	3.62	38.34	0.00	0.00	37.65	54.00	-16.35	P	3mV
4800.00	44.83	31.84	7.23	37.04	0.00	0.00	46.86	54.00	-7.14	P	3mV
7210.00	42.83	36.71	9.61	37.39	0.00	0.00	51.76	54.00	-2.24	P	3mV
9608.00	---	---	---	---	---	---	---	54.00	---	P	3mV
12010.00	---	---	---	---	---	---	---	54.00	---	P	3mV
14412.00	---	---	---	---	---	---	---	54.00	---	P	3mV
16814.00	---	---	---	---	---	---	---	54.00	---	P	3mV
19216.00	---	---	---	---	---	---	---	54.00	---	P	3mV
21618.00	---	---	---	---	---	---	---	54.00	---	P	3mV
24020.00	---	---	---	---	---	---	---	54.00	---	P	3mV

Note :

1. Measurement was up to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamp gain, Filter: High Pass Filter Insertion Loss (3.5GHz) Dist: Correction to extra plate reading to 3m specification distance 1M measurement distance: -9.5dB
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

Operation Mode: TX Mode
 Fundamental Frequency: 2402MHz (CH Low)
 Temperature : 23
 Humidity : 65 %

Test Date : 9/27/2002
 Test By: Markba Lee
 Pol: Horizontal

Freq.	Reading	AF	Closs	Pre-amp	Filter	Dist	Level	Limit	Margin	Mark	Pol
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)
1056.00	48.02	24.70	2.77	38.87	0.00	0.00	36.62	54.00	-17.38	P	3mV
1104.00	48.90	24.79	2.82	38.70	0.00	0.00	37.81	54.00	-16.19	P	3mV
1248.00	47.03	25.05	2.90	38.34	0.00	0.00	36.64	54.00	-17.36	P	3mV
4804.00	---	---	---	---	---	---	---	54.00	---	P	3mV
7206.00	---	---	---	---	---	---	---	54.00	---	P	3mV
9608.00	---	---	---	---	---	---	---	54.00	---	P	3mV
12010.00	---	---	---	---	---	---	---	54.00	---	P	3mV
14412.00	---	---	---	---	---	---	---	54.00	---	P	3mV
16814.00	---	---	---	---	---	---	---	54.00	---	P	3mV
19216.00	---	---	---	---	---	---	---	54.00	---	P	3mV
21618.00	---	---	---	---	---	---	---	54.00	---	P	3mV
24020.00	---	---	---	---	---	---	---	54.00	---	P	3mV

Note :

4. Measurement was up to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.

5. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamp gain, Filter: High Pass Filter Insertion Loss (3.5GHz) Dist: Correction to extra plate reading to 3m specification distance 1M measurement distance: -9.5dB

6. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

Operation Mode: TX Mode
 Fundamental Frequency: 2442MHz (CH Mid)
 Temperature : 23
 Humidity : 65 %

Test Date : 9/27/2002
 Test By: Markba Lee
 Pol: Vertical

Freq.	Reading	AF	Closs	Pre-amp	Filter	Dist	Level	Limit	Margin	Mark	Pol
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)
1556.00	46.92	25.60	3.20	37.90	0.00	0.00	37.82	54.00	-16.18	P	3mV
1652.00	46.98	25.77	3.29	37.80	0.00	0.00	38.24	54.00	-15.76	P	3mV
2052.00	46.74	26.52	4.41	37.59	0.00	0.00	40.08	54.00	-13.92	P	3mV
4880.00	47.33	31.90	5.53	37.08	0.00	0.00	47.68	54.00	-6.32	P	3mV
7330.00	45.37	36.83	6.99	37.40	0.00	0.00	51.79	54.00	-2.21	P	3mV
9768.00	---	---	---	---	---	---	---	54.00	---	P	3mV
12210.00	---	---	---	---	---	---	---	54.00	---	P	3mV
14652.00	---	---	---	---	---	---	---	54.00	---	P	3mV
17094.00	---	---	---	---	---	---	---	54.00	---	P	3mV
19536.00	---	---	---	---	---	---	---	54.00	---	P	3mV
21978.00	---	---	---	---	---	---	---	54.00	---	P	3mV
24420.00	---	---	---	---	---	---	---	54.00	---	P	3mV

Note :

7. Measurement was up to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.

8. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamp gain, Filter: High Pass Filter Insertion Loss (3.5GHz) Dist: Correction to extra plate reading to 3m specification distance 1M measurement distance: -9.5dB

9. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

Operation Mode: TX Mode
 Fundamental Frequency: 2442MHz (CH Mid)
 Temperature : 23
 Humidity : 65 %

Test Date : 9/27/2002
 Test By: Markba Lee
 Pol: Horizontal

Freq.	Reading	AF	Closs	Pre-amp	Filter	Dist	Level	Limit	Margin	Mark	Pol
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)
1184.00	48.02	24.93	3.41	38.40	0.00	0.00	37.96	54.00	-16.04	P	3mV
2204.00	47.33	26.89	4.54	37.52	0.00	0.00	41.24	54.00	-12.76	P	3mV
4880.00	42.60	31.90	0.53	37.08	0.00	0.00	37.95	54.00	-16.05	P	3mV
7330.00	46.30	36.83	6.99	37.40	0.00	0.00	52.72	55.00	-2.28	P	3mV
9768.00	---	---	---	---	---	---	---	54.00	---	P	3mV
12210.00	---	---	---	---	---	---	---	54.00	---	P	3mV
14652.00	---	---	---	---	---	---	---	54.00	---	P	3mV
17094.00	---	---	---	---	---	---	---	54.00	---	P	3mV
19536.00	---	---	---	---	---	---	---	54.00	---	P	3mV
21978.00	---	---	---	---	---	---	---	54.00	---	P	3mV
24420.00	---	---	---	---	---	---	---	54.00	---	P	3mV

Note :

10. Measurement was up to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.

11. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamp gain, Filter: High Pass Filter Insertion Loss (3.5GHz) Dist: Correction to extra plate reading to 3m specification distance 1M measurement distance: -9.5dB

12. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

Operation Mode: TX Mode
 Fundamental Frequency: 2480MHz (CH High)
 Temperature : 23
 Humidity : 65 %

Test Date : 9/27/2002
 Test By: Markba Lee
 Pol: Vertical

Freq.	Reading	AF	Closs	Pre-amp	Filter	Dist	Level	Limit	Margin	Mark	Pol
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)
4960.00	45.95	31.97	7.42	37.12	0.00	0.00	48.22	54.00	-5.78	P	3mV
7440.00	---	---	---	---	---	---	---	54.00	---	P	3mV
9920.00	---	---	---	---	---	---	---	54.00	---	P	3mV
12400.00	---	---	---	---	---	---	---	54.00	---	P	3mV
14880.00	---	---	---	---	---	---	---	54.00	---	P	3mV
17360.00	---	---	---	---	---	---	---	54.00	---	P	3mV
19840.00	---	---	---	---	---	---	---	54.00	---	P	3mV
22320.00	---	---	---	---	---	---	---	54.00	---	P	3mV
24800.00	---	---	---	---	---	---	---	54.00	---	P	3mV

Note :

1. Measurement was up to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamp gain, Filter: High Pass Filter Insertion Loss (3.5GHz) Dist: Correction to extra plate reading to 3m specification distance 1M measurement distance: -9.5dB
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

Operation Mode: TX Mode
 Fundamental Frequency: 2480MHz (CH High)
 Temperature : 23
 Humidity : 65 %

Test Date : 9/27/2002
 Test By: Markba Lee
 Pol: Horizontal

Freq.	Reading	AF	Closs	Pre-amp	Filter	Dist	Level	Limit	Margin	Mark	Pol
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)
4960.00	---	---	---	---	---	---	---	54.00	---	P	3mV
7440.00	---	---	---	---	---	---	---	54.00	---	P	3mV
9920.00	---	---	---	---	---	---	---	54.00	---	P	3mV
12400.00	---	---	---	---	---	---	---	54.00	---	P	3mV
14880.00	---	---	---	---	---	---	---	54.00	---	P	3mV
17360.00	---	---	---	---	---	---	---	54.00	---	P	3mV
19840.00	---	---	---	---	---	---	---	54.00	---	P	3mV
22320.00	---	---	---	---	---	---	---	54.00	---	P	3mV
24800.00	---	---	---	---	---	---	---	54.00	---	P	3mV

Note :

4. Measurement was up to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
5. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamp gain, Filter: High Pass Filter Insertion Loss (3.5GHz) Dist: Correction to extra plate reading to 3m specification distance 1M measurement distance: -9.5dB
6. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz

10. FREQUENCY SEPARATION

10.1 Standard Applicable

According to §15.247(a), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

10.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = middle of hopping channel .
4. Set the spectrum analyzer as RBW,VBW=100KHz, Adjust Span to 3.5 MHz, Sweep = auto.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

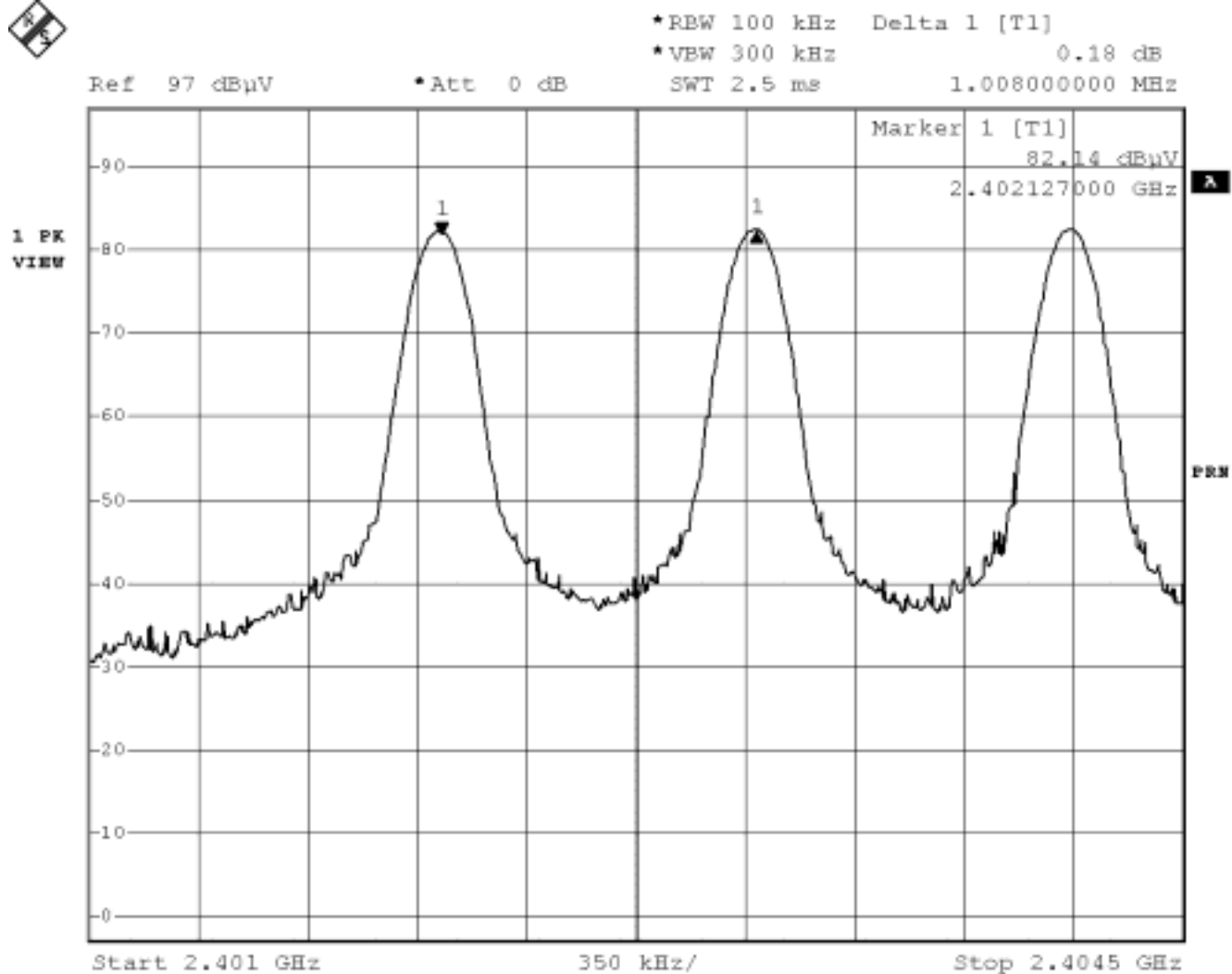
10.3 Measurement Result

Channel separation	Limit	Result
MHz	kHz	
1.008	≥ 25	PASS

10.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A

Frequency Separation Test Data



Date: 26.SEP.2002 07:08:59

11. NUMBER OF HOPPING FREQUENCY

11.1 Standard Applicable

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz and 5725MHz – 5850MHz bands shall use at least 75 hopping frequencies.

11.2 Measurement Procedure

1. Place the EUT on the table and set it in hopping in mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
4. Set the spectrum analyzer as RBW, VBW=100KHz,
5. Max hold, view and count how many channel in the band.

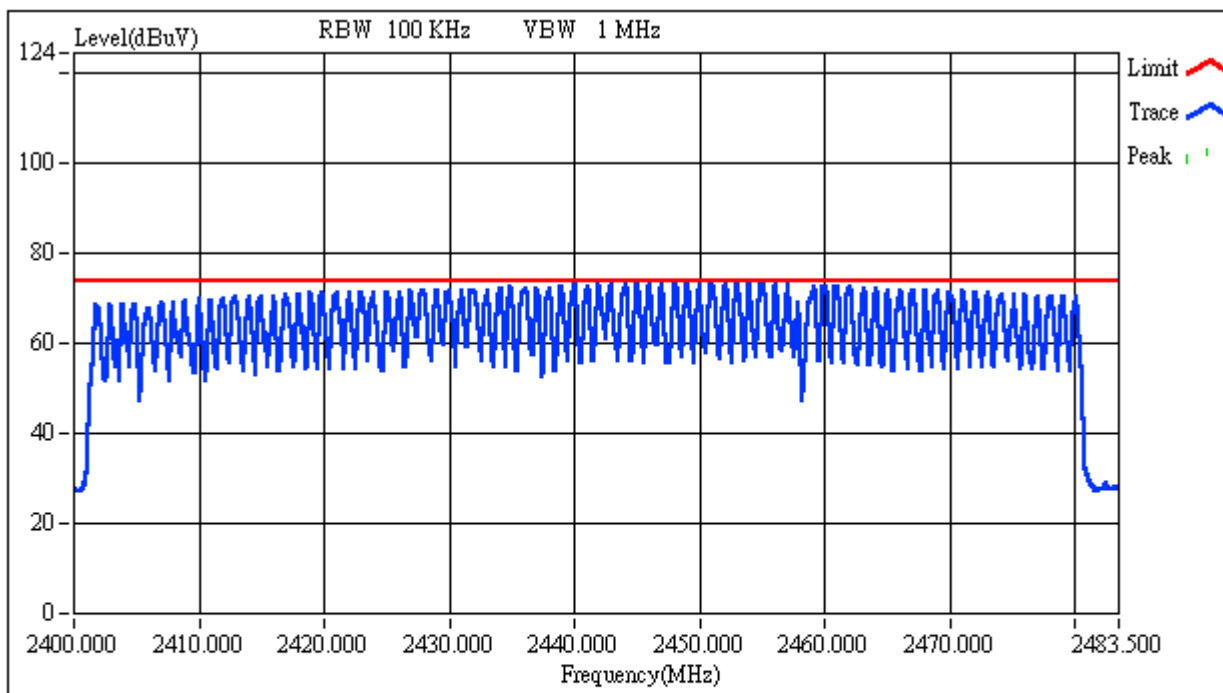
11.3 Measurement Result

Limit (CH)	Hopping channel Measurement result (CH)	Result
75	79	PASS

11.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003

Channel Number



Custom Name:

C-TECH

Engineer:

markba_lee

Result 79 CH

Model Name:

BT101

Report No.:

020062-R

Test Mode:

Hopping On

12. TIME OF OCCUPANCY (DWEELL TIME)

12.1 Standard Applicable

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz and 5725MHz – 5850MHz bands. The average time of occupancy on any frequency shall not greater than 0.4 s within a 30s period.

12.2 Measurement Procedure

1. Place the EUT on the table and set it in hopping on mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW,VBW=100KHz, Span = 0Hz , Adjust Sweep = 30s.
5. Repeat above procedures until all frequency measured were complete.

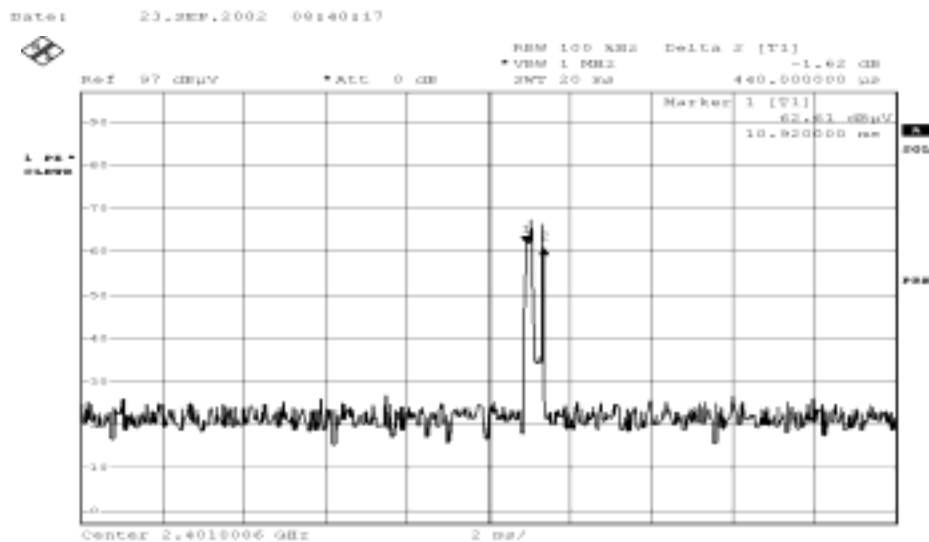
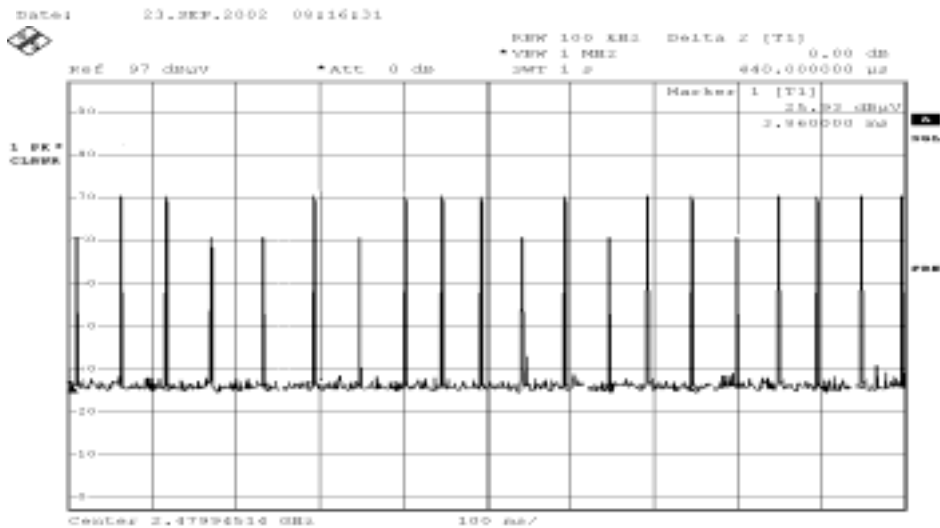
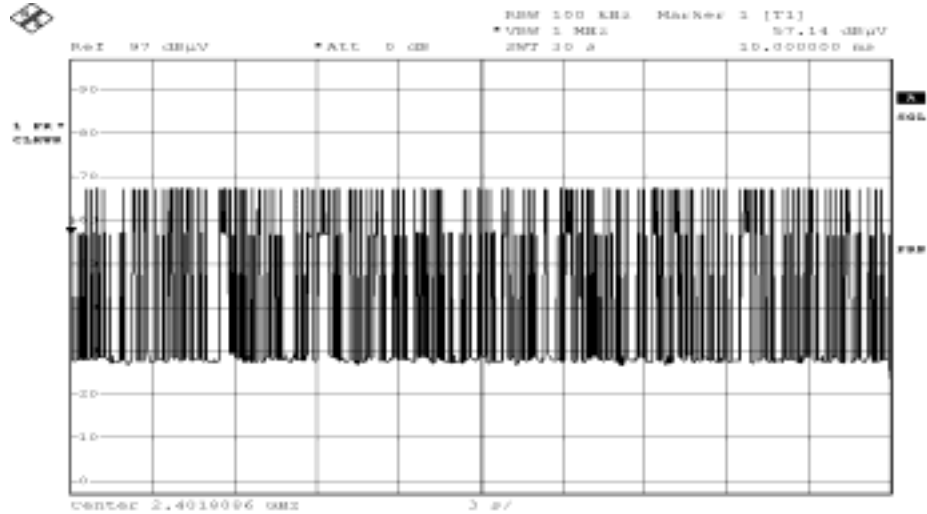
12.3 Measurement Result

$$0.440 \text{ (mS)} * 20 * 30 \text{ (S)} = 264 \text{ (mS)}$$

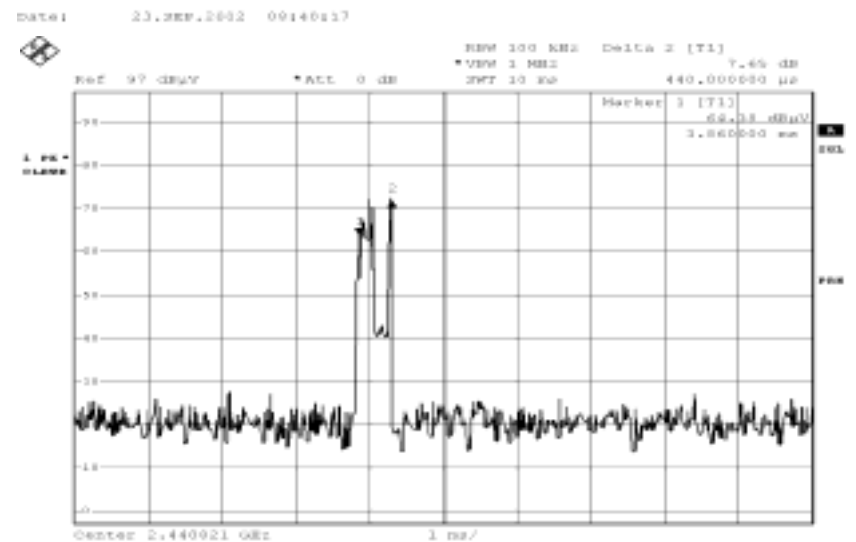
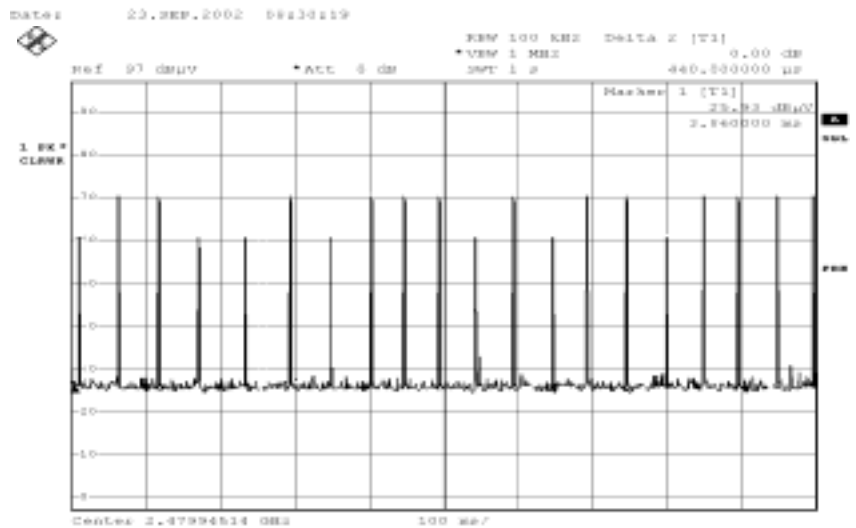
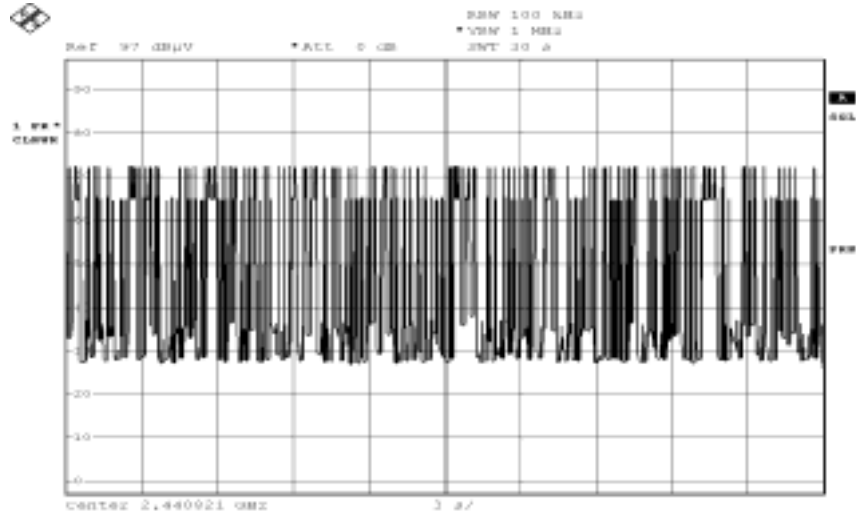
CH	Total of Dwell Time (ms)	Limit (ms)	Result
Low	264.00	400.00	PASS
Mid	264.00	400.00	PASS
High	257.40	400.00	PASS

12.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003

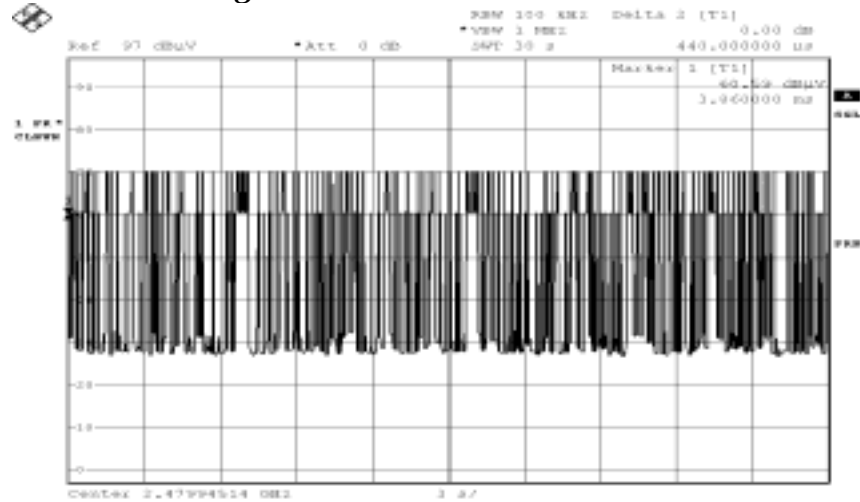
Dwell Time Test Data CH-Low

Date: 23.SEP.2002 08:12:30

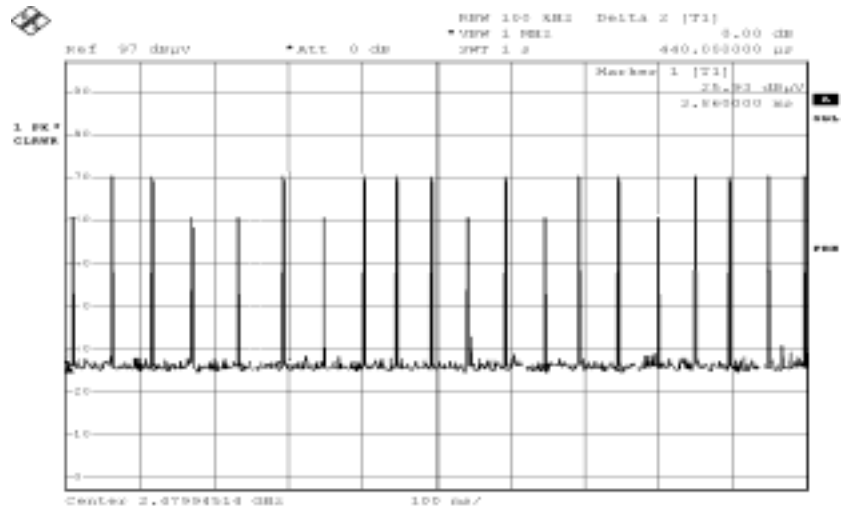
Dwell Time Test Data CH-Mid

DATE 23.SEP.2002 09:36:15

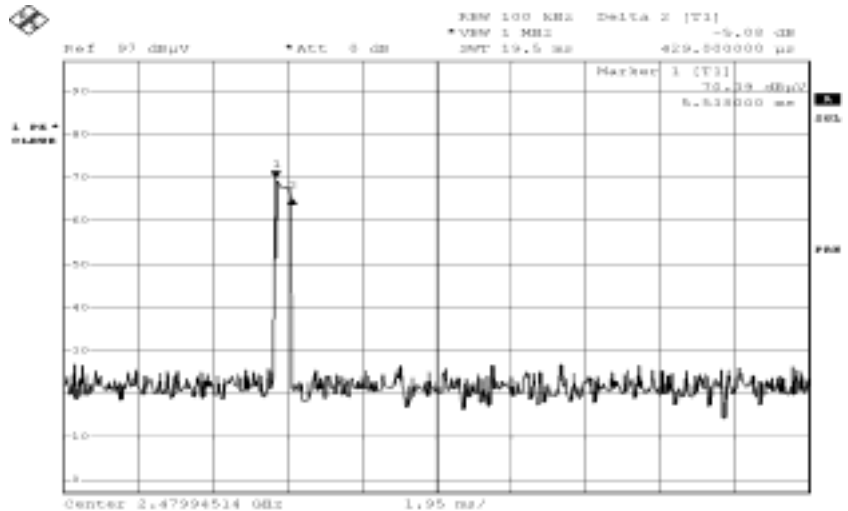
Dwell Time Test Data CH-High



Date: 23.SEP.2002 00:30:33



Date: 23.SEP.2002 00:40:17



Date: 23.SEP.2002 00:43:16

13. Peak Power Spectral Density

13.1 Standard Applicable

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission.

13.2 Measurement Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 3KHz, VBW = 3KHz, Span = 300KHz, Sweep=100s
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

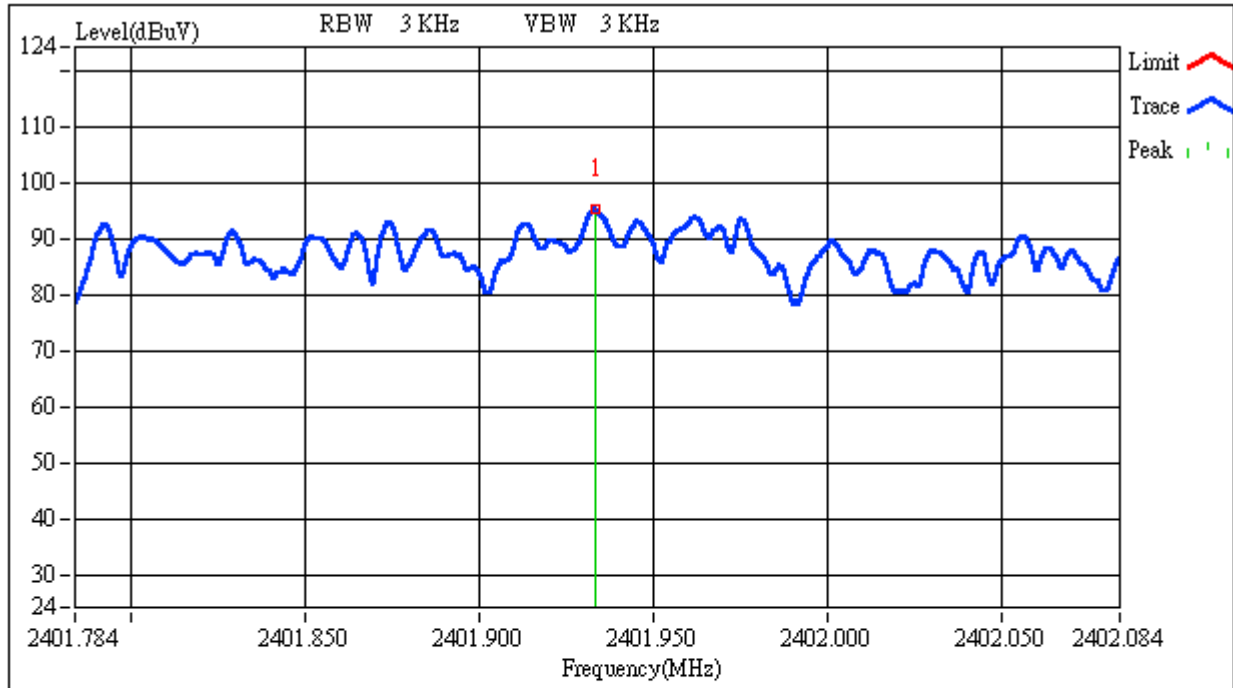
13.3 Measurement Result

	Reading dBm	CL dB	Power Density (dBm)	Limit (dBm)
CH Low	-11.64	1.28	-10.36	8
CH Mid	-11.59	1.28	-10.31	8
CH High	-12.07	1.28	-10.79	8

13.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
low loss cable	Huber + Suhner	Sucoflex 104	N/A	N/A	N/A
Spectrum Analyzer	R&S	FSP 30	1093.4495.30	07/23/2002	07/22/2003

Power Spectral Density Test Plot (CH-Low)



Custom Name:

C-TECH

Engineer:

markba_lee

Model Name:

BT101

Report No.:

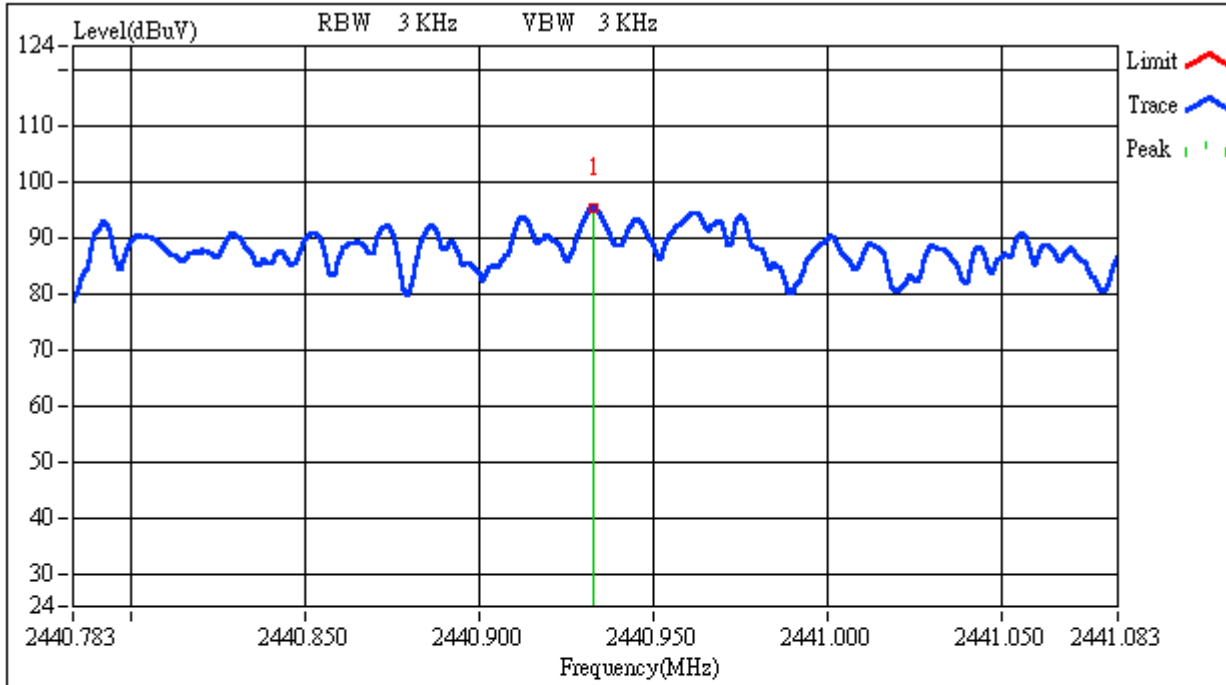
020062-R

Test Mode:

TX CH LOW

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2401.9332	95.36	0.00	0.00	95.36

Power Spectral Density Test Plot (CH-Mid)



Custom Name:

C-TECH

Engineer:

markba_lee

Model Name:

BT101

Report No.:

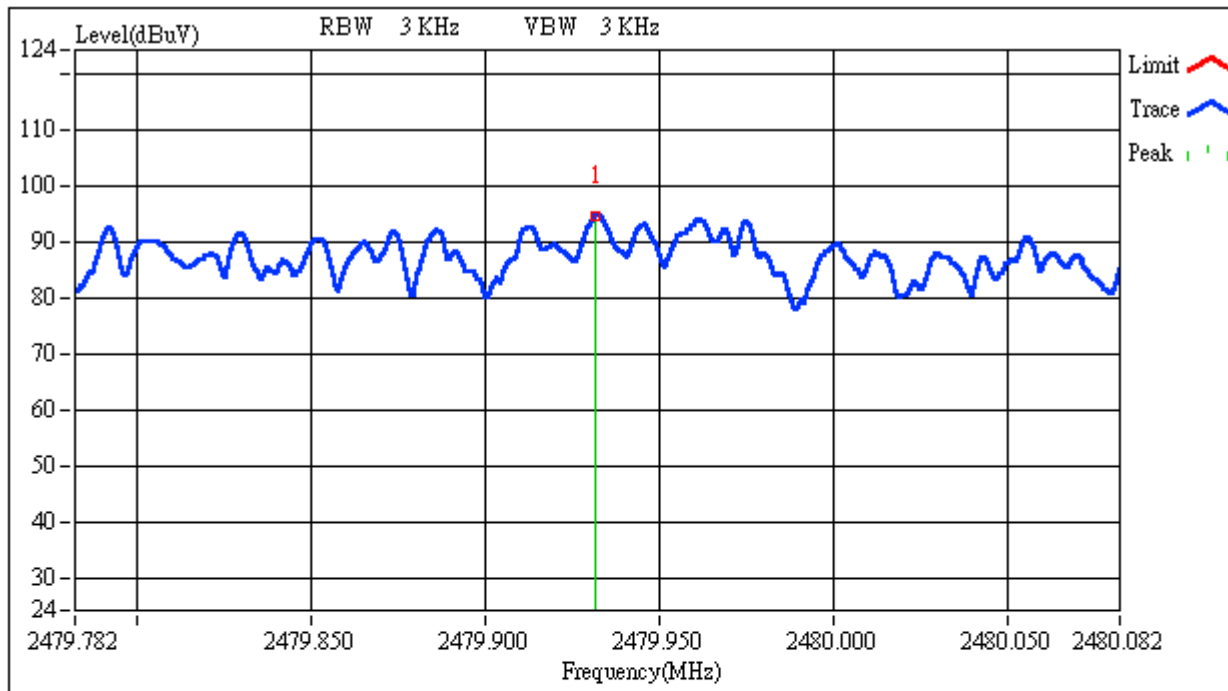
020062-R

Test Mode:

TX CH MID

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2440.9328	95.41	0.00	0.00	95.41

Power Spectral Density Test Plot (CH-High)



Custom Name:

C-TECH

Engineer:

markba_lee

Model Name:

BT101

Report No.:

020062-R

Test Mode:

TX CH HIGH

	Frequency(MHz)	Read Level (dBuV)	Probe (dB)	Cable Loss (dB)	Level(dBuV)
1	2479.9314	94.93	0.00	0.00	94.93



14. ANTENNA REQUIREMENT

14.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.246(1), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

14.2 Antenna Connected Construction

The directional gins of antenna used for transmitting is 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.



15. RF EXPOSURE

15.1 Standard Applicable

According to §15.247(b)(4) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

The separation distance to body is less than 2.5cm The allow max output = $60/F(\text{GHz}) = 60/2.438 = 24.61 \text{ mW}$

The EUT max output power is 1.1mW less than 24.61 mW, The SAR test is not requirement.

15.2 Measurement Result

N/A