Industrial Technology Research Institute
Electronics Research & Service Organization
Bldg. 17, 195-4 Sec. 4, Chung Hsing Rd., Chutung,Hsinchu, 310
Taiwan,Republic Of China
TEL : 886-3-5917069 FAX : 886-3-5825720

ELECTROMAGNETIC COMPATIBILITY TEST REPORT

Company : Billionton Systems Inc.

Address : No. 21,Sui-Lih Rd, Hsin-Chu,300,Taiwan

Sample Name : Bluetooth USB dongle

Model NO : USBBT02

Date Received : May 14, 2002

Date Tested : May 14 to Jun. 04, 2002

MEASUREMENT REQUIREMENT USED :
47 CFR Part 15, Subpart B and Subpart C (Section 15.247),
ANSI C63.4-1992

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.

	Name	Signature	Date
Testing Engineer	M. C. Huang	M.C Huang	July 29, 2002
Approving Manager	C. F. Wu	C. F. Wu	Aug. 02, 2002

Notes :
1. This report will be invalid if duplicated or photocopied in part.
2. This report refers only to the specimen(s) submitted to test, and is invalid as seperately used.
3. This report is invalid without examination stamp and signature of this institute.
4. The tested specimen(s) will be preserved for thirty days from the data issued.
5. The report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

TABLE OF CONTENTS

TITLE PAGE NO.

TABLE OF CONTENTS

TITLE PAGE NO.

1. GENERAL INFORMATION

1.1 DESCRIPTION OF EUT & POWER

MANUFACTURER : Billionton System Inc.
SAMPLE NAME : Bluetooth USB dongle
MODEL NO : USBBT02
EUT DESCRIPTION : 2.4GHz FREQUENCY HOPPING SPREAD SPECTRUM DATA TRANSCEIVER FOR USB BLUETOOTH DONGLE
FREQUENCY RANGE : 2402 MHz TO 2480MHz
CHANNEL Spacing : 1MHz
AIR DATA RATE : 723Kbps
TYPE OF MODULATION : Frequency Hopping Spread Spectrum
FEQUENCY SELECTION : BY SOFTWARE
ANTENNA TYPE : CERAMIC MULTILAYER ANTENNA
POWER SOURCE : DC 5V FROM USB INTERFACE OF PC

Data applies to :

1. Company name : DYNALINK
   Model name : USBBT02-N-2L1
2. Company name : CONCEPTRONIC
   Model name : USBBT02-N-2L2
3. Company name : COM 1
   Model name : USBBT02-N-COM
4. Company name : ROPER
   Model name : USBBT02-N-RO
5. Company name : SITECOM
   Model name : USBBT02-N-SC
6. Company name : VERACOMP
   Model name : USBBT02-N-VO
7. Company name : ASHTEL
   Model name : USBBT02-N-AS
8. Company name : DYNALINK
   Model name : USBBT02-N-DY
9. Company name : KORTEX
   Model name : USBBT02-N-KX
10. Company name : IPC
    Model name : USBBT02-N-AT
11. Company name : SCM
    Model name : USBBT02-N-SCM
12. Company name : GRAVIS
    Model name : USBBT02-N-GV
13. Company name : HAMA
    Model name : USBBT02-N-HM
14. Company name : TYPHOON
    Model name : USBBT02-N-AN
15. Company name : HIGHSCREEN
    Model name : USBBT02-N-AN2
16. Company name : MAGITEX
    Model name : USBBT02-N-MG
17. Company name : HAMLET
    Model name : USBBT02-N-HA
18. Company name : AASHIMA
    Model name : USBBT02-N-AA

1.2 DESCRIPTION OF PERIPHERALS

（1）NOTEBOOK PC

MODEL NUMBER ：PPO1L
SERIAL NUMBER ：CN-09C748-48155-1AP-6630
MANUFACTURER ：DELL
F.C.C. ID ：D.O.C
POWER SOURCE ：20VDC (from power adapter)

（2）MODEM

MODEL NUMBER ：Omni 56K
SERIAL NUMBER ：S1Z4107729
MANUFACTURER ：ZYXEL CORP.
F.C.C. ID ：I88MNI56K

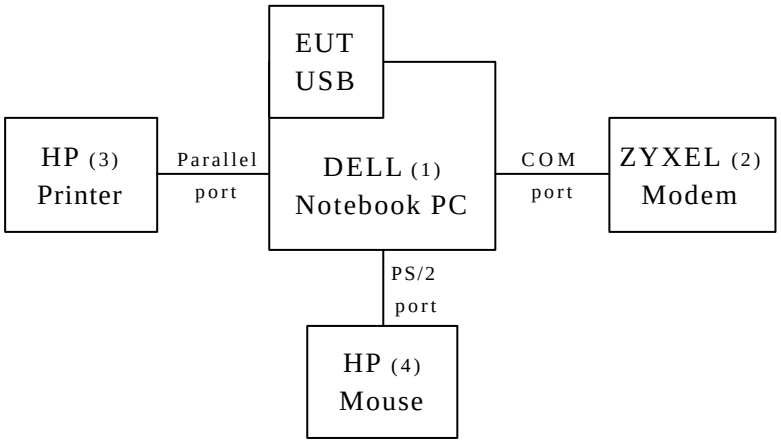
（3）PRINTER

MODEL NUMBER ：C6431D
SERIAL NUMBER ：CN19T6S011
MANUFACTURER ：HP CORP.
F.C.C. ID ：D.O.C
POWER CORD ：Unshielded , Undetachable , 1.8m

（4）MOUSE

MODEL NUMBER ：MS34
SERIAL NUMBER ：CN19T6S011
MANUFACTURER ：HP CORP.
F.C.C. ID ：D.O.C
POWER CORD ：Unshielded , Undetachable , 1.8m

1.3 EUT & PERIPHERALS SETUP DIAGRAM



1.4 DESCRIPTION OF TEST SITE

SITE DESCRIPTION ：FCC certificate NO. : 31040/PRV
TUV certificate NO. : I9664582-9911
BSMI certificate NO. : SL2-IN-E-0002
NVLAP Lab code : 200118-0
CNLA certificate NO. : CNLA-ZL97018
VCCI certificate NO. : R-1229, C-1250

NAME OF SITE ：Electronics Research & Service Organization
Industrial Technology Research Institute

SITE LOCATION ：R1500, 195-4 , sec. 4, Chung Hsing Rd.,
Chu-Tung Chen. Hsin-Chu, Taiwan 310 R.O.C.

1.5 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications :

APPLIED STANDARD：47 CFR Part 15, Subpart B and Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.107 15.207	AC Power Conducted Emission Limit : 48dBuV	PASS	Meet the requirement of limit
15.109 15.205 15.209	Transmitter Radiated Emissions Limit : Table 15.209	PASS	Meet the requirement of limit
15.247(a) 1(i)-(ii)	Transmitter 20dB Bandwidth Limit < 1MHz	PASS	Meet the requirement of limit
15.247(b)	Maximum Peak Output Power Limit : max. 30dBm	PASS	Meet the requirement of limit
15.247(a)1	Carrier Frequency Separation	PASS	Meet the requirement of limit
15.247(a) 1(ii)	Number of Hopping Frequency	PASS	Meet the requirement of limit
15.247(a) 1(ii)	Time of Occupancy (dwell time)	PASS	Meet the requirement of limit
15.247(c)	Band Edge Compliens	PASS	Meet the requirement of limit
15.247(c)	Out of Band Measurements	PASS	Meet the requirement of limit

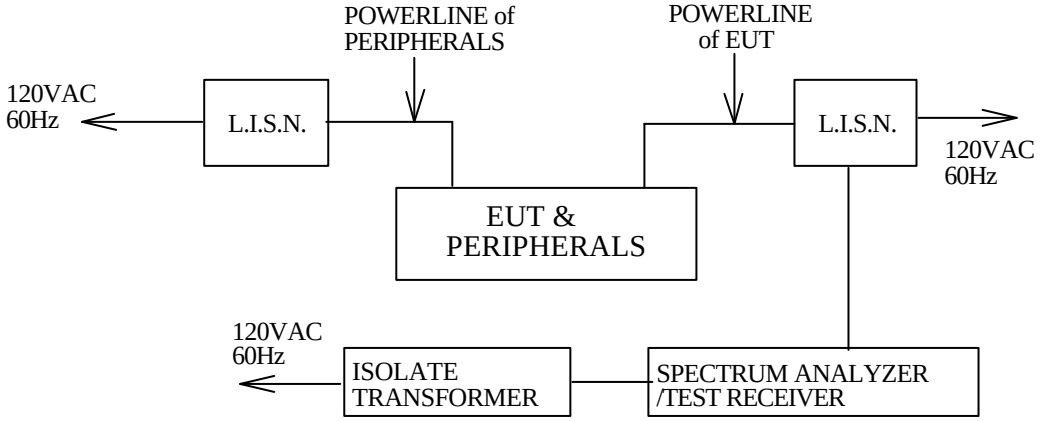
2. CONDUCTED POWERLINE TEST

2.1 TEST EQUIPMENTS

The following test equipments are used during the conducted powerline tests :

MANUFACTURER OR TYPE	MODEL No	SERIAL NO.	DATE OF CALIBRATION	CALIBRA-TION PERIOD	REMARK
SPECTRUM ANALYZER & DISPLAY	HP 8568A	2235A02320	MAR. 29, 2002	1 Year	PRETEST
QUASI-PEAK ADAPTER	HP 85650 A	2341A00672	MAR. 29, 2002	1 Year	PRETEST
ISOLATION TRANSFORMER	SOLAR 7032-1	N/A	N/A	N/A	FINAL
L.I.S.N.	EMCO 3850/2	9311-1025 9401-1028	JAN. 08, 2002 For Characteristic impedance MAY 18, 2002 For Insertion loss	1 Year	FINAL
TEST RECEIVER	R/S ESHS30	838550/003	JAN. 14, 2002	1 Year	FINAL
SHIELDED ROOM	KEENE 5983	NO.1	N/A	N/A	FINAL
PULSE LIMIT	R/S EHS3Z2	357.8810.52	JUL. 10, 2001	1 Year	FINAL
N TYPE COAXIAL CABLE	----------	----------	JUL. 10, 2001	1 Year	FINAL
50Ω TERMINATOR	----------	----------	JUL. 10, 2001	1 Year	FINAL

2.2 TEST SETUP



2.3 CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following：

Frequency (MHz)	Emissions (μV)	Emissions (dBμV)
0.45 – 30.0	250	48.0

For intentional device, according to § 15.207(a) Line Conducted Emission Limit is same as above table.

2.4 TEST PROCEDURE

The test procedure is performed in a 12ft×12ft×8ft(L×W×H) shielded room. the EUT along with its peripherals were placed on a 1.0m(W)× 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chasis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chasis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

2.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of conducted emission is ±1.36dB.

2.6 LINE CONDUCTED RF VOLTAGE MEASUREMENT

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

Temperature：26 ℃ Humidity：65 % RH

FREQUENCY	READING(dBμV)				LIMITS	
	ONE END & GRD'D		THE OTHER END & GRD'D		(dBμV)	
(MHz)	Q.P.	Ave.	Q.P.	Ave.	Q.P.	Ave.
0.150	*	*	*	*	66.00	56.00
0.174	47.80	*	47.70	*	64.70	54.70
0.348	25.70	*	31.50	*	59.00	49.00
0.573	22.80	*	*	*	56.00	46.00
0.624	*	*	17.20	*	56.00	46.00
1.230	*	*	11.50	*	56.00	46.00
1.377	15.00	*	*	*	56.00	46.00
3.550	31.50	*	*	*	56.00	46.00
3.770	*	*	31.20	*	56.00	46.00
4.236	24.30	*	*	*	56.00	46.00
4.860	*	*	24.80	*	56.00	46.00
10.695	*	*	26.00	*	60.00	50.00
12.015	22.70	*	*	*	60.00	50.00
16.389	26.90	*	*	*	60.00	50.00
18.951	*	*	25.50	*	60.00	50.00
30.000	*	*	*	*	60.00	50.00

REMARKS ：1. * Undetectable or the Q.P.values is lower than the limits of Ave.

2.7 PHOTOS OF CONDUCTION TEST

3. RADIATED EMISSION TEST

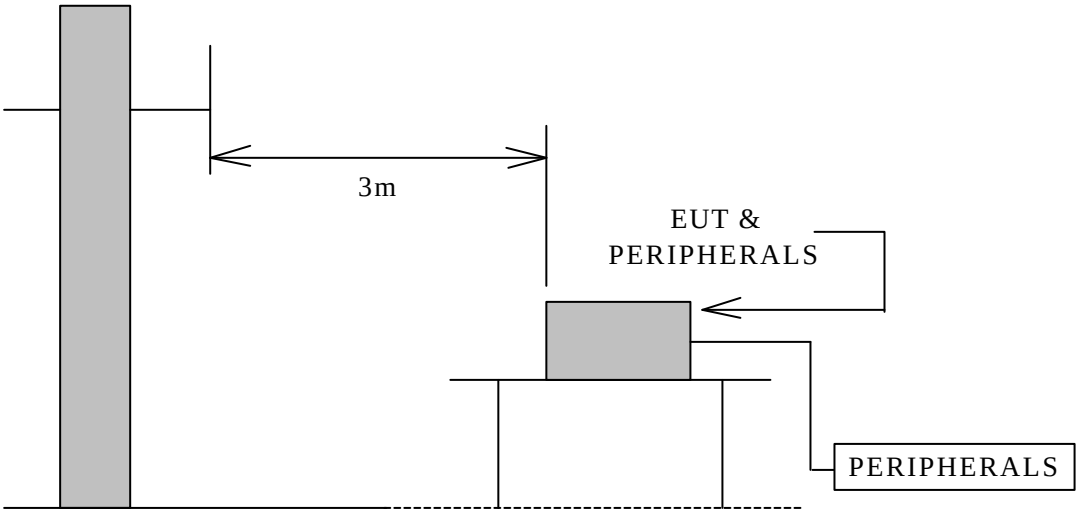
3.1 TEST EQUIPMENTS

The following test equipments are utilized in making the measurements contained in this report.

MANUFACTURER OR TYPE	MODEL NO	SERIAL NO	DATE OF CALIBRATION	CALIBRA-TION PERIOD	REMARK
CHASE BI-LOG ANTENNA	CBL6112B	2421	MAY 07, 2002	1 Year	FINAL
R/S TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2002	1 Year	FINAL
OPEN SITE	----------	No.1	JUL. 10~12, 2002	1 Year	FINAL
N TYPE COAXIAL CABLE	CHA9525	4	JUL. 13, 2002	1 Year	FINAL
Horn Antenna	AH-118	10089	FEB. 25, 2002	1 Year	FINAL
HP 8499B Amp	HP8449B	3008A01471	OCT. 11, 2001	1 Year	FINAL
High pass filter	84300/80038	011	cal. on use	1 Year	FINAL
Horn Antenna	AH-840	03077	FEB. 25, 2002	1 Year	FINAL

3.2 TEST SETUP

The diagram below shows the test setup which is utilized to make these measurements.
Antenna Elevation Variable



3.3 RADIATION LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

FREQUENCY (MHz)	DISTANCE (METERS)	Radiated (dBμV/M)	Radiated (μV/M)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

3.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE：

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

3.5 UNCERTAINTY OF RADIATED EMISSION

The uncertainty of radiated emission is ±2.72dB.

3.6 RADIATED RF NOISE MEASUREMENT

Test Requirement: 15.109, 15.209
The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.
All readings are quasi-peak values.

Temperature：27 ℃ Humidity：68 %RH

FREQ-UENCY (MHz)	ANTENNA FACTOR (dB)	CABLE LOSS (dB)	METER READING AT3m(dBμV/M) HORIZON-TAL	METER READING AT3m(dBμV/M) VERTICAL	LIMITS (dBμV/M)	EMISSION LEVEL AT3m(dBμV/M) HORIZON-TAL	EMISSION LEVEL AT3m(dBμV/M) VERTICAL
30.00	18.96	0.90	*	*	40.00	*	*
36.10	17.36	1.02	15.50	5.10	43.50	33.88	23.48
80.13	9.24	1.70	12.30	7.80	43.00	23.24	18.74
132.00	12.42	2.25	10.30	9.40	46.00	24.97	*
176.00	10.82	2.60	5.60	6.40	46.00	19.02	19.82
240.00	12.75	3.00	8.40	9.40	46.00	24.15	25.15
264.00	13.43	3.16	15.20	12.30	46.00	31.79	28.89
308.00	14.24	3.35	20.40	14.50	46.00	37.99	32.09
352.00	15.75	3.61	15.40	13.40	46.00	34.76	32.76
396.00	17.27	3.88	16.40	11.00	46.00	37.55	32.15
440.00	17.88	4.06	12.40	12.00	46.00	34.34	33.94
484.00	18.39	4.24	14.30	10.60	46.00	36.93	33.23
1000.00	21.79	6.40	*	*	54.00	*	*

REMARKS：1. *Undetectable

2. Emission level (dBμV/M) =Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

Test Requirement: 15.205
The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

Operation Mode:	Transmitting	Test Date :	2002/5/25
Fundamental Frequency:	2402MHz (Low)	Test By:	M.C. Huang
Temperature :	26 ℃	Humidity :	65%

Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark	Pol	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)	(Meter)
4803.95*	41.20	36.50	8.82	35.40	1	52.12	74	-21.88	P	H	1.5
4803.95*	33.60	36.50	8.82	35.40	1	44.52	54	-9.48	A	H	1.5
7206	---	39.40	11.20	35.50	1	---	74	---	---	---	---
7206	---	39.40	11.20	35.50	1	---	54	---	---	---	---
9608	---	40.10	12.50	35.80	1	---	74	---	---	---	---
9608	---	40.10	12.50	35.80	1	---	54	---	---	---	---
12010	---	42.60	15.20	35.30	1	---	74	---	---	---	---
12010	---	42.60	15.20	35.30	1	---	54	---	---	---	---
14412	---	43.40	16.80	34.00	1	---	74	---	---	---	---
14412	---	43.40	16.80	34.00	1	---	54	---	---	---	---
16814	---	45.20	17.60	34.30	1	---	74	---	---	---	---
16814	---	45.20	17.60	34.30	1	---	54	---	---	---	---
19216*	---	36.30	18.50	34.30	1	---	74	---	---	---	---
19216*	---	36.30	18.50	34.30	1	---	54	---	---	---	---
21618	---	36.20	19.20	34.60	1	---	74	---	---	---	---
21618	---	36.20	19.20	34.60	1	---	54	---	---	---	---
24020	---	36.80	21.00	34.20	1	---	74	---	---	---	---
24020	---	36.80	21.00	34.20	1	---	54	---	---	---	---

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)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
4. Remark "*" means that Restricted band.

Test Requirement: 15.205
The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

Operation Mode:	Transmitting	Test Date :	2002/5/25
Fundamental Frequency:	2402MHz (Low)	Test By:	M.C. Huang
Temperature :	26 ℃	Humidity :	65%

Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark	Pol	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)	(Meter)
4803.95*	40.80	36.50	8.82	35.4	1	51.72	74	-22.28	P	V	1.5
4803.95*	32.60	36.50	8.82	35.4	1	43.52	54	-10.48	A	V	1.5
7206.00	---	39.40	11.20	35.5	1	---	74	---	---	---	---
7206.00	---	39.40	11.20	35.5	1	---	54	---	---	---	---
9608.00	---	40.10	12.50	35.8	1	---	74	---	---	---	---
9608.00	---	40.10	12.50	35.8	1	---	54	---	---	---	---
12010*	---	42.60	15.20	35.3	1	---	74	---	---	---	---
12010*	---	42.60	15.20	35.3	1	---	54	---	---	---	---
14412	---	43.40	16.80	34.0	1	---	74	---	---	---	---
14412	---	43.40	16.80	34.0	1	---	54	---	---	---	---
16814	---	45.20	17.60	34.3	1	---	74	---	---	---	---
16814	---	45.20	17.60	34.3	1	---	54	---	---	---	---
19216*	---	36.30	18.50	34.3	1	---	74	---	---	---	---
19216*	---	36.30	18.50	34.3	1	---	54	---	---	---	---
21618	---	36.20	19.20	34.6	1	---	74	---	---	---	---
21618	---	36.20	19.20	34.6	1	---	54	---	---	---	---
24020	---	36.80	21.00	34.2	1	---	74	---	---	---	---
24020	---	36.80	21.00	34.2	1	---	54	---	---	---	---

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)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
4. Remark "*" means that Restricted band.

Test Requirement: 15.205
The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

Operation Mode:	Transmitting	Test Date :	2002/5/25
Fundamental Frequency:	2441MHz (Mid)	Test By:	M.C. Huang
Temperature :	26 ℃	Humidity :	65%

Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark	Pol	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)	(Meter)
4881*	42.60	36.5	8.82	35.4	1	53.52	74	-20.48	P	H	1.5
4881*	31.50	36.5	8.82	35.4	1	42.42	54	-11.58	A	H	1.5
7323	---	39.4	11.20	35.5	1	---	74	---	---	---	---
7323	---	39.4	11.20	35.5	1	---	54	---	---	---	---
9764	---	40.1	12.50	35.8	1	---	74	---	---	---	---
9764	---	40.1	12.50	35.8	1	---	54	---	---	---	---
12205*	---	42.6	15.20	35.3	1	---	74	---	---	---	---
12205*	---	42.6	15.20	35.3	1	---	54	---	---	---	---
14646	---	43.4	16.80	34.0	1	---	74	---	---	---	---
14646	---	43.4	16.80	34.0	1	---	54	---	---	---	---
17087	---	45.2	17.60	34.3	1	---	74	---	---	---	---
17087	---	45.2	17.60	34.3	1	---	54	---	---	---	---
19528*	---	36.3	18.50	34.3	1	---	74	---	---	---	---
19528*	---	36.3	18.50	34.3	1	---	54	---	---	---	---
21969	---	36.2	19.20	34.6	1	---	74	---	---	---	---
21969	---	36.2	19.20	34.6	1	---	54	---	---	---	---
24410	---	36.8	21.00	34.2	1	---	74	---	---	---	---
24410	---	36.8	21.00	34.2	1	---	54	---	---	---	---

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)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
4. Remark "*" means that Restricted band.

Test Requirement: 15.205
The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

Operation Mode:	Transmitting	Test Date :	2002/5/25
Fundamental Frequency:	2441MHz (Mid)	Test By:	M.C. Huang
Temperature :	26 ℃	Humidity :	65%

Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark	Pol	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)	(Meter)
4881*	42.60	36.50	8.82	35.40	1	53.52	74	-20.48	P	V	1.5
4881*	31.50	36.50	8.82	35.40	1	42.42	54	-11.58	A	V	1.5
7323*	---	39.40	11.20	35.50	1	---	74	---	---	---	---
7323*	---	39.40	11.20	35.50	1	---	54	---	---	---	---
9764	---	40.10	12.50	35.80	1	---	74	---	---	---	---
9764	---	40.10	12.50	35.80	1	---	54	---	---	---	---
12205*	---	42.60	15.20	35.30	1	---	74	---	---	---	---
12205*	---	42.60	15.20	35.30	1	---	54	---	---	---	---
14646	---	43.40	16.80	34.00	1	---	74	---	---	---	---
14646	---	43.40	16.80	34.00	1	---	54	---	---	---	---
17087	---	45.20	17.60	34.30	1	---	74	---	---	---	---
17087	---	45.20	17.60	34.30	1	---	54	---	---	---	---
19528*	---	36.30	18.50	34.30	1	---	74	---	---	---	---
19528*	---	36.30	18.50	34.30	1	---	54	---	---	---	---
21969*	---	36.20	19.20	34.60	1	---	74	---	---	---	---
21969*	---	36.20	19.20	34.60	1	---	54	---	---	---	---
24410	---	36.80	21.00	34.20	1	---	74	---	---	---	---
24410	---	36.80	21.00	34.20	1	---	54	---	---	---	---

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)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
4. Remark "*" means that Restricted band.

Test Requirement: 15.205
The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

Operation Mode:	Transmitting	Test Date :	2002/5/25
Fundamental Frequency:	2480MHz (High)	Test By:	M.C. Huang
Temperature :	26 ℃	Humidity :	65%

Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark	Pol	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)	(Meter)
4960＊	35.32	36.50	8.90	35.40	1	46.32	74	-27.68	P	H	1.5
4960＊	24.32	36.50	8.90	35.40	1	35.32	54	-18.68	A	H	1.5
7440＊	---	39.40	11.20	35.50	1	---	74	---	---	---	---
7440＊	---	39.40	11.20	35.50	1	---	54	---	---	---	---
9920	---	40.10	12.50	35.80	1	---	74	---	---	---	---
9920	---	40.10	12.50	35.80	1	---	54	---	---	---	---
12400＊	---	42.60	15.20	35.30	1	---	74	---	---	---	---
12400＊	---	42.60	15.20	35.30	1	---	54	---	---	---	---
14880	---	43.40	16.80	34.00	1	---	74	---	---	---	---
14880	---	43.40	16.80	34.00	1	---	54	---	---	---	---
17360	---	45.20	17.60	34.30	1	---	74	---	---	---	---
17360	---	45.20	17.60	34.30	1	---	54	---	---	---	---
19840＊	---	36.30	18.50	34.30	1	---	74	---	---	---	---
19840＊	---	36.30	18.50	34.30	1	---	54	---	---	---	---
22320＊	---	36.20	19.20	34.60	1	---	74	---	---	---	---
22320＊	---	36.20	19.20	34.60	1	---	54	---	---	---	---
24800	---	36.80	21.00	34.20	1	---	74	---	---	---	---
24800	---	36.80	21.00	34.20	1	---	54	---	---	---	---

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)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
4. Remark "*" means that Restricted band.

Test Requirement: 15.205
The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

Operation Mode:	Transmitting	Test Date :	2002/5/25
Fundamental Frequency:	2480MHz (High)	Test By:	M.C. Huang
Temperature :	26 ℃	Humidity :	65%

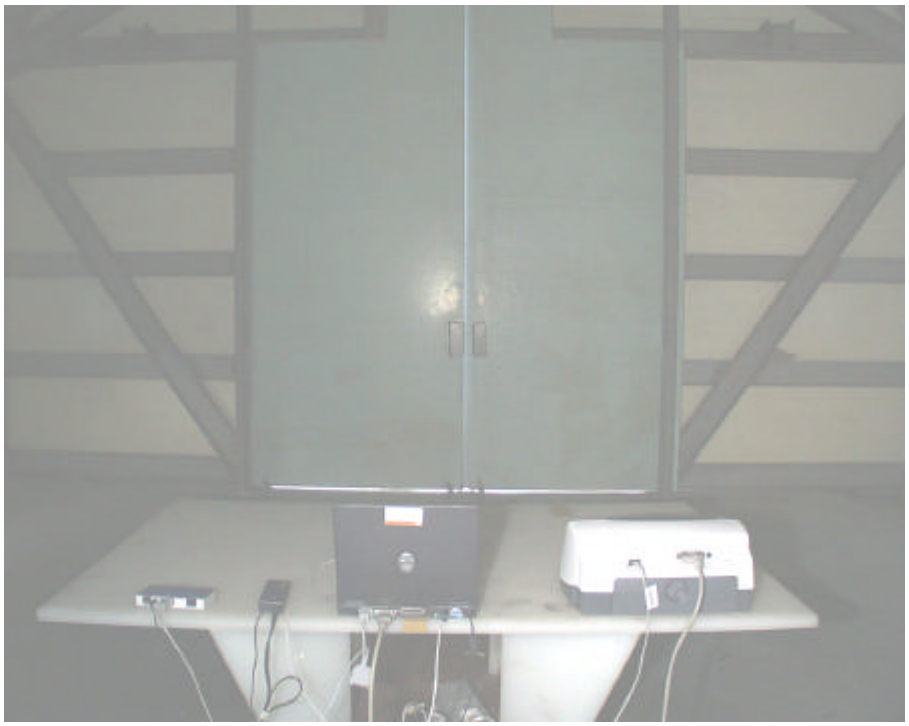
Freq.	Reading	AF	Closs	Pre-amp	Filter	Level	Limit	Margin	Mark	Pol	Height
(MHz)	(dBuV)	(dBuV)	(dB)	(dB)	dB	(dBuV/m)	FCC_B	(dB)	(P/Q/A)	(H/V)	(Meter)
4960＊	36.62	36.50	8.90	35.40	1	47.62	74	-26.38	P	V	1.5
4960＊	24.32	36.50	8.90	35.40	1	35.32	54	-18.68	A	V	1.5
7440＊	---	39.40	11.20	35.50	1	---	74	---	---	---	---
7440＊	---	39.40	11.20	35.50	1	---	54	---	---	---	---
9920	---	40.10	12.50	35.80	1	---	74	---	---	---	---
9920	---	40.10	12.50	35.80	1	---	54	---	---	---	---
12400＊	---	42.60	15.20	35.30	1	---	74	---	---	---	---
12400＊	---	42.60	15.20	35.30	1	---	54	---	---	---	---
14880	---	43.40	16.80	34.00	1	---	74	---	---	---	---
14880	---	43.40	16.80	34.00	1	---	54	---	---	---	---
17360	---	45.20	17.60	34.30	1	---	74	---	---	---	---
17360	---	45.20	17.60	34.30	1	---	54	---	---	---	---
19840＊	---	36.30	18.50	34.30	1	---	74	---	---	---	---
19840＊	---	36.30	18.50	34.30	1	---	54	---	---	---	---
22320＊	---	36.20	19.20	34.60	1	---	74	---	---	---	---
22320＊	---	36.20	19.20	34.60	1	---	54	---	---	---	---
24800	---	36.80	21.00	34.20	1	---	74	---	---	---	---
24800	---	36.80	21.00	34.20	1	---	54	---	---	---	---

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)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz
4. Remark "*" means that Restricted band.

3.7 PHOTOS OF OPEN SITE

3.7 PHOTOS OF OPEN SITE



4. 20dB Bandwidth for hopping

Test Requirement: 15.247(a)1(i)-(ii)

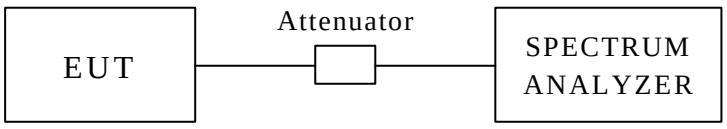
4.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.2 TEST SETUP



4.3 LIMITS OF 20dB BANDWIDTH MEASUREMENT

Limit: 20dB band width < 1MHz

4.4 TEST PROCEDURE

The 20dB band width was measured with a spectrum analyzer connected to RF antenna connector(conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency.
The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

4.5 UNCERTAINTY OF CONDUCTED EMISSION

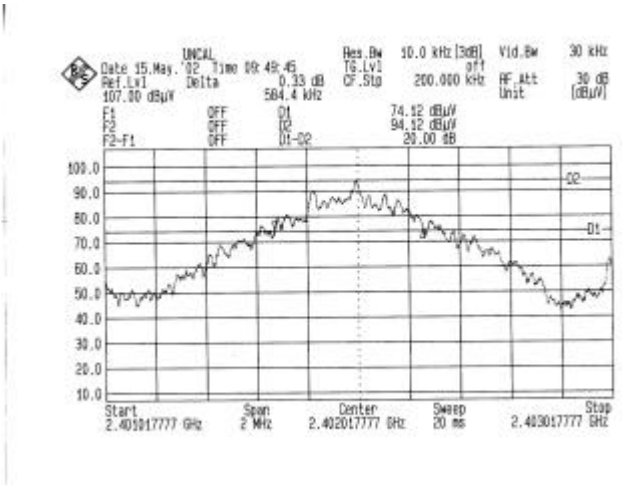
The uncertainty of conducted emission is ± 10KHz.

4.6 TEST RESULTS

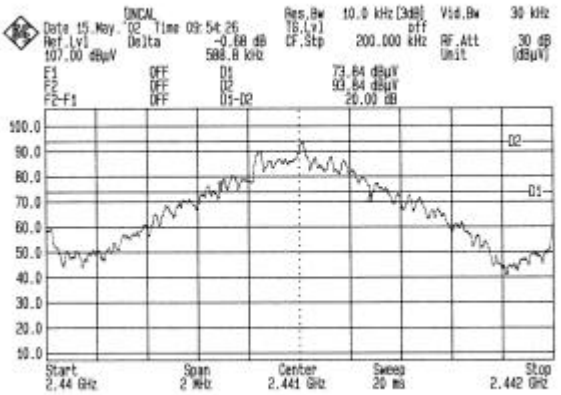
Refer to attached spectrum analyzer data chart.

(1) 2402 MHz (Low)	584.4kHz
(2) 2441MHz (Mid)	588.8kHz
(3) 2480MHz (High)	588.8kHz

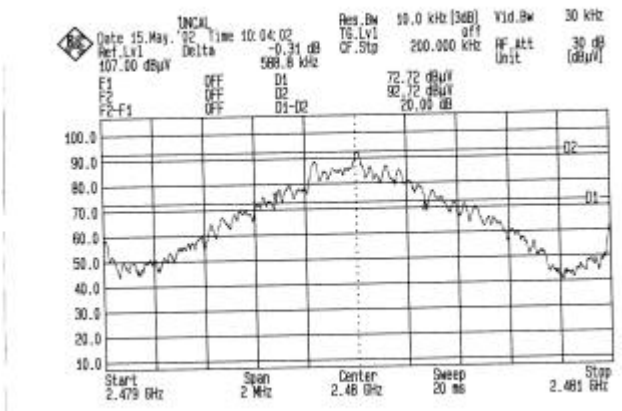
4.7 PHOTO OF 20DB BANDWIDTH MEASURERMENT



Channel Low



Channel middle



Channel high

5. MAXIMUM PEAK OUTPUT POWER

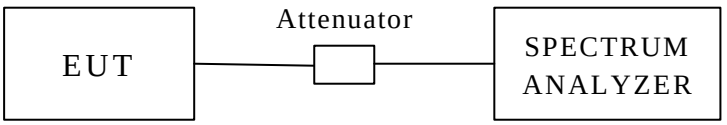
5.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

5.2 TEST SETUP



5.3 LIMITS OF MAXIMUM PEAK OUTPUT POWER

The Maximum Peak Output Power Measurement is 30dBm.

5.4 TEST PROCEDURE

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency, A spectrum analyzer was used to record the shape of the transmit signal see 5.7 for the measurement set up.

5.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of conducted emission is ± 1.82dB.

5.6 TEST RESULTS

TX Freq.(MHz)	Power Output (dBm)	Limit (dBm)
2402 (Low)	7.50dBm	30
2441 (Mid)	7.07dBm	30
2480 (High)	7.08dBm	30

P=Pout + attenuator and cable loss
Pout = measured power

6. HOPPING CHANNEL SEPARATION

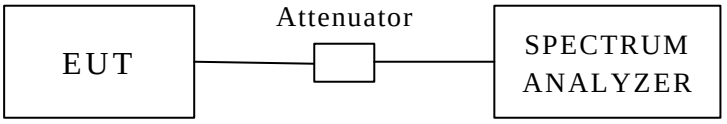
6.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

6.2 TEST SETUP



6.3 LIMITS OF HOPPING CHANNEL SEPARATION

According to 15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

6.4 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of adjacent channels.
4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.

Repeat above procedures until all frequencies measured were complete.

6.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of conducted emission is ± 10KHz.

6.6 TEST RESULTS

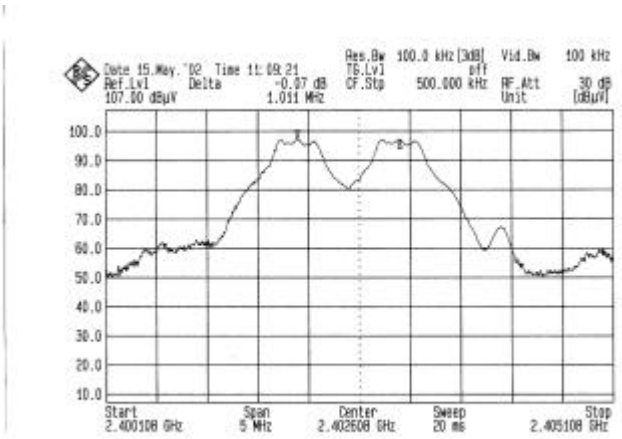
Refer to attached graph.

(1) Channel (Low) : Adjacent Hopping Channel Separation is 1011kHz

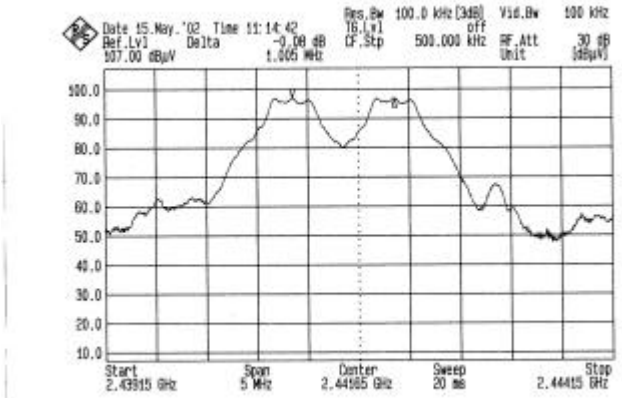
(2) Channel (Mid) : Adjacent Hopping Channel Separation is 1005kHz

(3) Channel (High) : Adjacent Hopping Channel Separation is 1005kHz

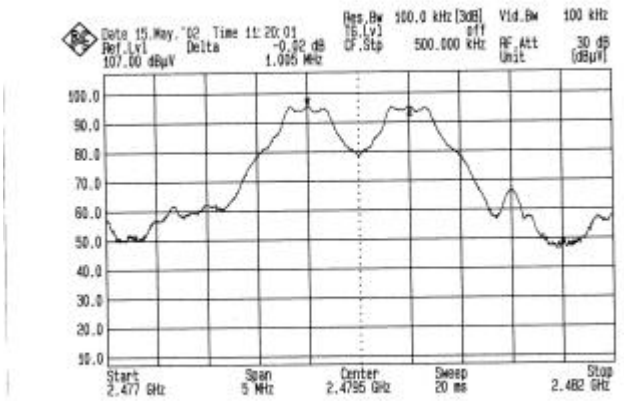
6.7 PHOTO OF HOPPING CHANNEL SEPARATION



Channel (Low)



Channel (Mid)



Channel (Hi)

7. NUMBER OF HOPPING FREQUENCY USED

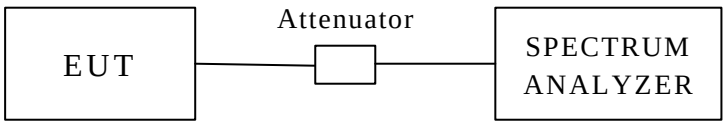
7.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

3. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
4. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

7.2 TEST SETUP



7.3 LIMITS OF NUMBER OF HOPPING FREQUENCY USED

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5MHz and 5725-5850 MHz bands shall use at least 75 hopping frequencies

7.4 TEST PROCEDURE

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument.Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.

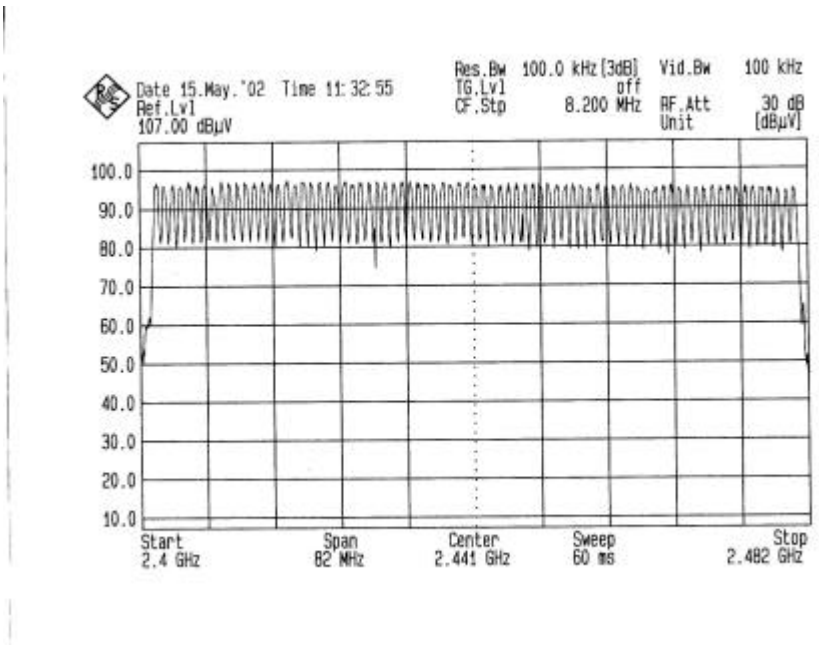
7.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty is not applicable.

7.6 TEST RESULTS

Refer to attached graph.
There are 79 hopping frequencies in a hopping sequence.

7.7 PHOTO OF NUMBER OF HOPPING FREQUENCY USED



8. DWELL TIME ON EACH CHANNEL

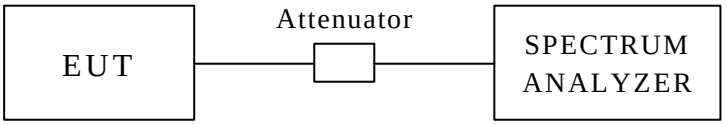
8.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

3. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
4. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

8.2 TEST SETUP



8.3 LIMITS OF DWELL TIME ON EACH CHANNEL

According to 15.247(a)(1)(ii), for frequency hopping system operating in the 2400-2483.5MHz and 5725-5850 MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 30-second period

8.4 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

8.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of time is ± 5.25ms.

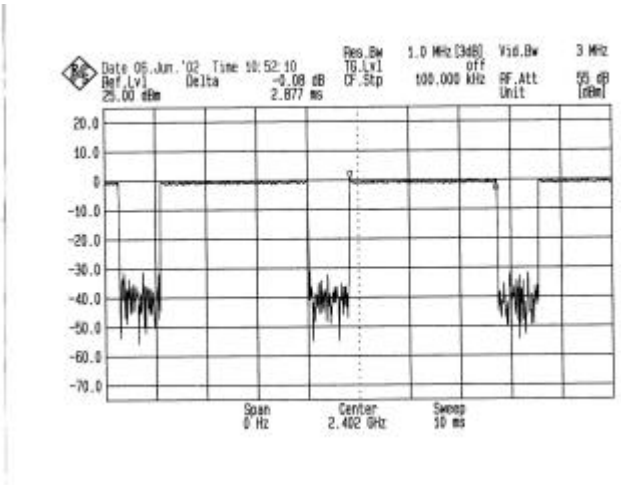
8.6 TEST RESULTS

Refer to attached graph.

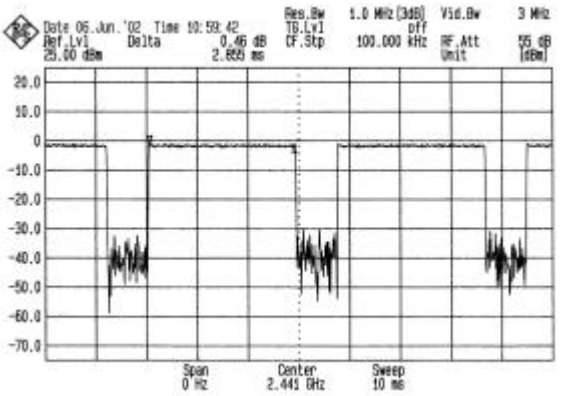
Channel (Low) : the dwell time is 2.877mSec × 110 =316.47mSec
Channel (Mid) : the dwell time is 2.855mSec × 110 =314.05mSec
Channel (Hi) : the dwell time is 2.877mSec × 110 =316.47mSec

In normal operation, for there is a dwell time of 2.877mSec, therefore the total hopping duration time between two transmission. And there are only 110 transmissions is a dwell time of 2.877mSec × 110 =316.47msec in a 30-second period.

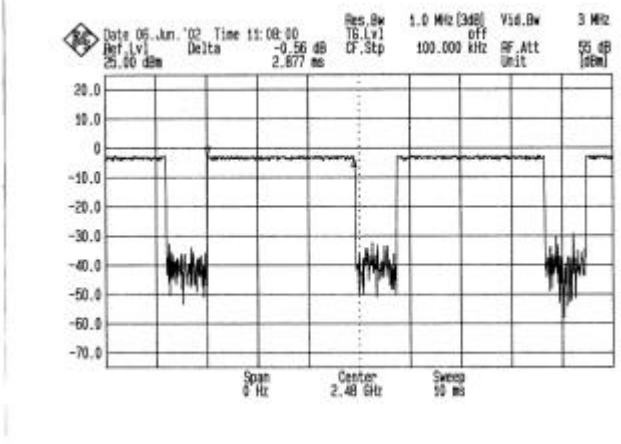
8.7 PHOTO OF DWELL TIME ON EACH CHANNEL



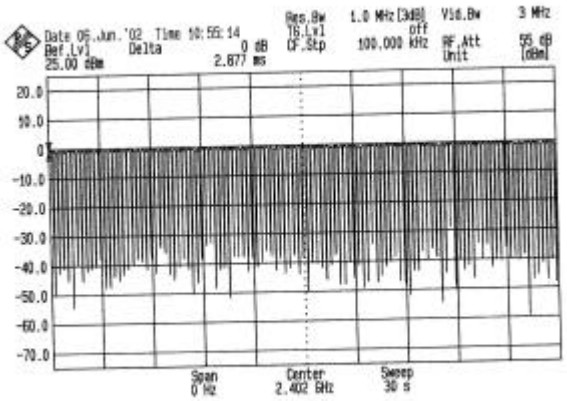
Channel (Low)



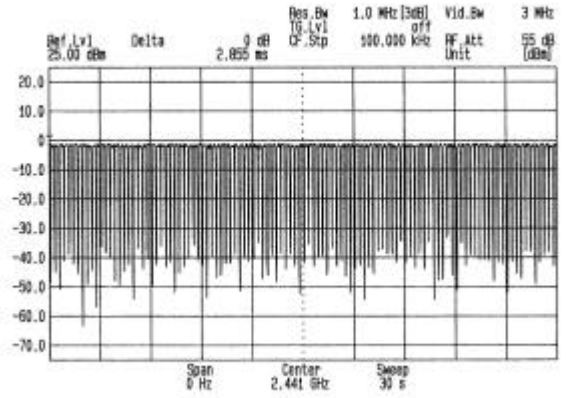
Channel (Mid)



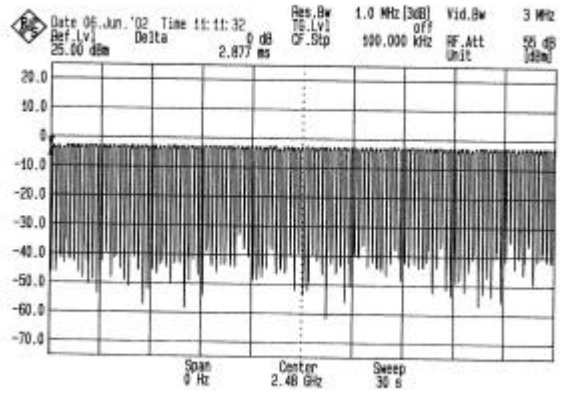
Channel (Hi)



Channel (Low)



Channel (Mid)



Channel (Hi)

9. 100 kHz BANDWIDTH OF BAND EDGES MEASURMENT

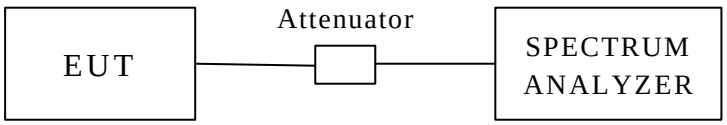
9.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

5. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
6. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

9.2 TEST SETUP



9.3 LIMITS OF 100 kHz BANDWIDTH OF BAND EDGES MEASURMENT

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in § 15.209(a), whichever results in the lesser attenuation.

9.4 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear rage.
3. Set both RBW and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

9.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of conducted emission is ± 1.82dB.

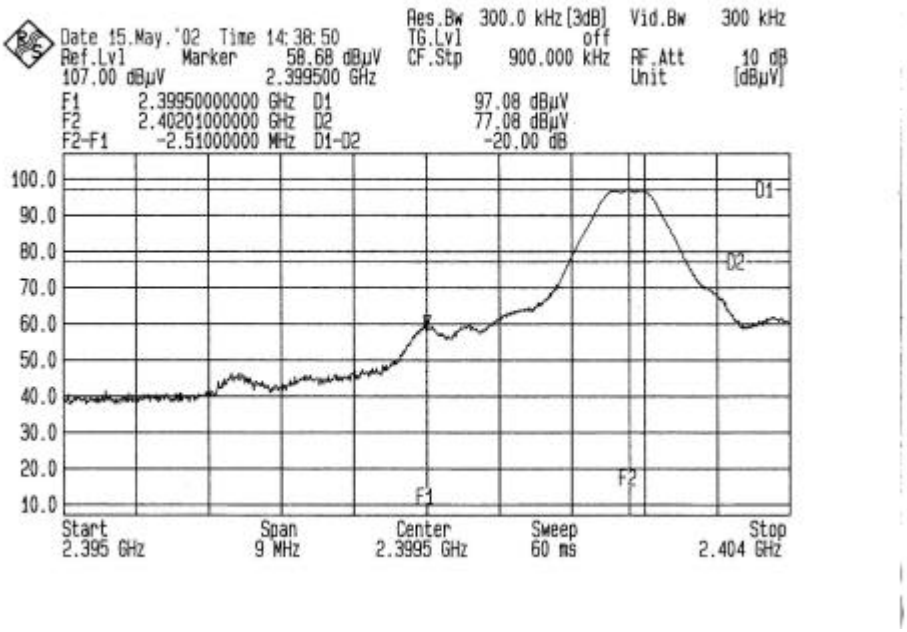
9.6 TEST RESULTS

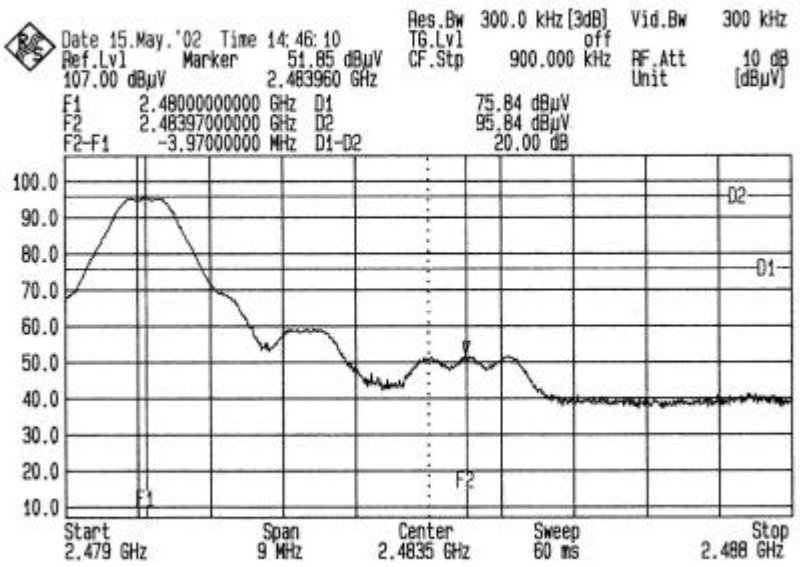
Refer to attached graph.

a) Lower Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 20dB from the carrier.

b) Upper Band Edge : All emissions in this 100kHz bandwidth are attenuated more than 20dB from the carrier.

9.7 PHOTO OF 100 kHz BANDWIDTH OF BAND EDGES MEASURMENT




Date 15.May.'02 Time 14:46:10
Ref.Lvl
107.00 dBµV
Marker
51.85 dBµV
2.483960 GHz
Res.Bw 300.0 kHz [3dB]
TG.Lvl
off
CF.Stp
900.000 kHz
Vid.Bw 300 kHz
RF.Att 10 dB
Unit [dBµV]
F1 2.48000000000 GHz D1 75.84 dBµV
F2 2.48397000000 GHz D2 95.84 dBµV
F2-F1 -3.97000000 MHz D1-D2 20.00 dB
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
D2
D1
F1
F2
Start 2.479 GHz
Span 9 MHz
Center 2.4835 GHz
Sweep 60 ms
Stop 2.488 GHz

Back

10. Out of Band Spurious Emissions Conducted And Radiated Measurements

Test Requirement: 15.247(c)

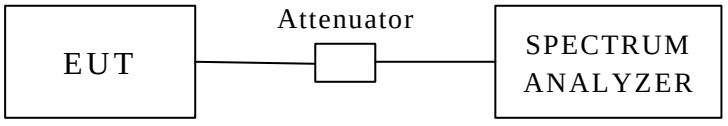
10.1 TEST EQUIPMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ TEST RECEIVER	ESMI	842088/005 841978/008	JUL. 18, 2001
HP ATTENUATOR	8496B	3247A18505	Cal. on use
HP PLOTTER	HP7750A	725A 852141	N/A

NOTE：

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

10.2 TEST SETUP



10.3 LIMITS OF Out of Band Measurements

a. Conducted
Refer to attached spectrum analyzer data chart.

b. Radiated
Refer to the section of " Radiated Emissions(General Requirements)". Test requirement: 15.205

10.4 TEST PROCEDURE

Section 15.247(c): Spurious emissions. The following tests ate required:

1. RF antenna conducted test: Set RBW= 100kHz, Video bandwidth (VBW) > RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz RBW.
2. Radiated emission test: Applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp (and possibly a high-pass filter) is necessary for this measurement. For measurements above 1 GHz, set RBW= 1MHz, VBW= 10Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation, use the setting shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See Section 15.35(b) and (c).

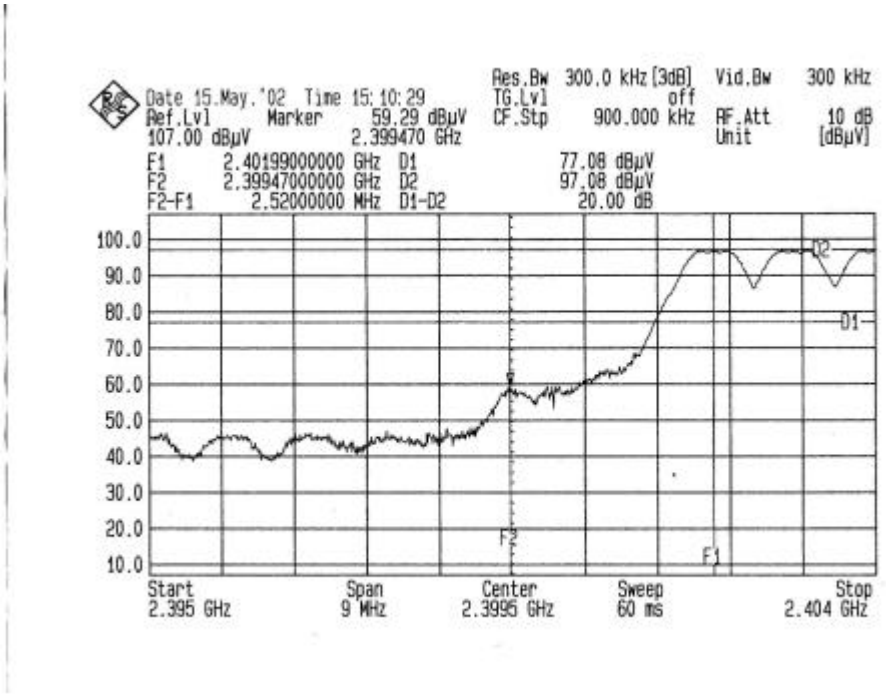
10.5 UNCERTAINTY OF CONDUCTED EMISSION

The uncertainty of Frequency : ± 100kHz.
The uncertainty of Amplitude : ± 2dB.

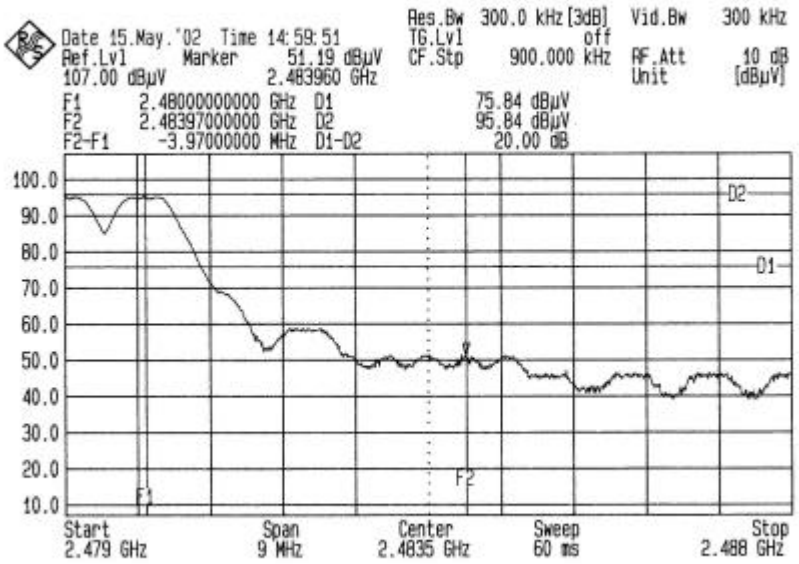
10.6 TEST RESULTS

Refer to attached spectrum analyzer data chart.

10.7 PHOTO OF Out of Band Measurements



Front


Res.Bw 300.0 kHz [3dB]
Vid.Bw 300 kHz
Date 15.May.'02 Time 14:59:51
TG.Lvl off
Ref.Lvl Marker 51.19 dBµV
CF.Stp 900.000 kHz
RF.Att 10 dB
107.00 dBµV 2.483960 GHz
Unit [dBµV]
F1 2.480000000000 GHz D1 75.84 dBµV
F2 2.483970000000 GHz D2 95.84 dBµV
F2-F1 -3.970000000 MHz D1-D2 20.00 dB
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
D2
D1
F1
F2
Start 2.479 GHz
Span 9 MHz
Center 2.4835 GHz
Sweep 60 ms
Stop 2.488 GHz

Back

11. ANTENNA REQUIREMENT

11.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR 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.

And according to FCC 47 CFR Section 15.247 (b), 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 6dBi.

11.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product is ceramic multilayer antenna. The antenna connector is directly mount on PCB. And the maximum Gain of this antenna is only –0.6dBi MAX.

12. RF EXPOSURE EVALUATION

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)
LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Average Time**
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

12.1 FRIIS FORMULA

Friis transmission formula : $Pd = (Pout*G)/(4*pi*r^2)$

Where
Pd = power density in mW/cm^2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

12.2 EUT OPERATING CONDITION

A software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

12.3 TEST RESULT OF RF EXPOSURE EVALUATION

Product ： Wireless Access Point
Test Item ： RF Exposure Evaluation Data
Test Mode：Normal Operation

12.3.1 ANTENNA GAIN

Antenna Gain：The maximum Gain measured in fully anechoic chamber is 0.5dB MAX linear scale.

12.3.2 OUTPUT POWER INTO ANTENNA & RF EXPOSURE EVALUATION DISTANCE

Channel	Channel Frequency (MHz)	Output Power to Antenna (dBm)	Minimum Allowable Distance Ò From Skin (cm)
CH(low)	2402.00	7.5	0.708
CH(mid)	2441.00	7.07	0.674
CH(high)	2480.00	7.08	0.675

The distance r (4th column) calculated from the Friis transmission formula is far shorter than 20cm separation requirement. So, RF exposure limit warning or SAR test are not required.