

PEP Testing Laboratory

12-3Fl, No. 27-1, Lane 169, Kang-Ning St., Hsi-Chih,

Taipei Hsien, Taiwan, R. O. C.

TEL: 886-2-26922097 FAX: 886-2-26956236

FCC ID : SHBBS4100

REPORT NO. : E940857

RFI / EMI TEST REPORT

APPLICANT : **ROYALDIGITAL INC.**

E U T Type : **Bluetooth GPS**

MODEL NO. : **BS4100**

FCC ID : **SHBBS4100**

REGULATION : **CFR 47 , Part 15 Subpart C , Class B**

TEST SITE : **PEP Testing Laboratory**

TEST ENGINEER : **JASON KUNG**

TEST DATE : **DEC. 05, 2005**

ISSUED DATE : **DEC. 13, 2005**

REPORT NO. : **E940857**

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FCC ID : SHBBS4100

REPORT NO. : E940857

VERIFICATION

WE HEREBY VERIFY THAT:

The EUT listed below has completed RFI testing by PEP Testing Laboratory and it does comply with the limitation of FCC Part 15, Section 15.247 limitations .

The tested configurations and the facility complies with the radiated and AC line conducted test site criteria in ANSI C63 .4 - 2003 .

Any data in this RFI report is “ **reference** ” only .

APPLICANT : ROYALDIGITAL INC.
PRODUCT : Bluetooth GPS
FCC ID : SHBBS4100
MODEL : BS4100

M. Y. Tsui

M. Y. TSUI / President

PEP Testing Laboratory

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I . General Information

The equipment under test (EUT) is Bluetooth GPS, FCC ID SHBBS4100, model BS4100. The EUT is designed for the applications such as car navigation purpose. The working frequency is 2400-2483.5MHz. 3.7V lithium battery, vehicle charger or alternate adapter model TCR are used as power source to EUT. For more detail specification about EUT, please refer to the user's manual.

Test method: According to the major function designed, the placement and operational function of EUT and support device PDA were set to proceed with test. The test was respectively carried out on the operational condition of Tx-On mode: continuous transmission state between PDA and EUT that was supplied by vehicle charger, adaptor model TCR. The worst-case test result of each test mode was recorded and provided in this report.

At the frequencies where the peak values of the emission exceeded the quasi-peak limit, the emissions were also measured with the quasi-peak detectors. The average detector also measured the emission either (A) quasi-peak values were under quasi-peak limit but exceeded average limit, or (B) peak values were under quasi-peak limit but exceeded average limit.

1.1 Description of EUT

EUT Type	:	Bluetooth GPS
FCC ID	:	SHBBS4100
EUT Model No.	:	BS4100
Frequency Range	:	2.402~2.480GHz
Support Channel	:	79 channels
Modulation	:	GFSK
Antenna Type	:	Comply with FCC Part 15, Section 15.203;
Power Supply	:	1) Manufacturer : CHANNEX TECHNOLOGY CO., LTD.
		Model No. : TCR
		Input : AC 100-240V 50/60Hz
		Output : DC 5V 650mA
		2) DC 12V ----- Car Charge
		3) DC 3.7V ----- From Battery
Power Cord	:	N/A

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1.2 Supporting Devices for EUT testing

1. DC Power Supply

Manufacturer : SCHMIDT

Model Number : EPS-3030SD (DC-0-30V)

2. PDA

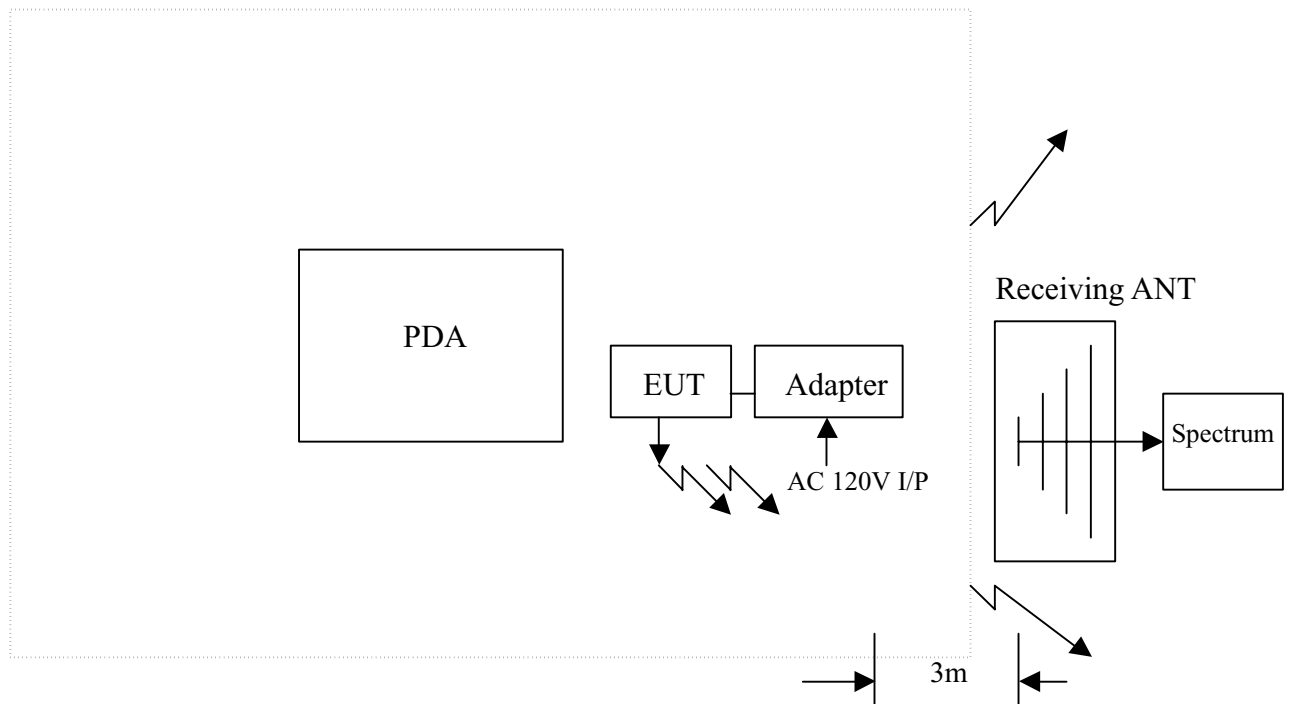
Manufacturer : HP

Model Number : iPAQ 2100

1.3 EUT Test Setup Configuration

- (A)Test Procedure: As required by ANSI C63.4 (2003)
- (B)Channel Verification: In order to force selection of the typical channels for testing, Dungle was connected PC through USB interface and using the driver “CSR BlueSuite”, under WinXP to force the channel selection by control PC, then set the EUT in high power and continuously transmitting mode for detecting the operating frequency, the test result for 79 channels is operating within 2400-2483.5MHz band.
- (C)Measurement Procedure: As required by FCC Part15, Section 15.31(m) measurements on intentional radiators or receiver should be performed at three frequencies for operating frequency over 10MHz, one near top, one near middle and one near bottom.
- (D)Test Channel: Due to the support channels are 79 channels, the selected three frequencies for testing would be 2.402GHz near top for CH LOW, 2.441GHz near middle for CH MID and 2.480GHz near bottom for CH HIGH.
- (E) At the frequencies where the peak values of the emission exceeded the quasi-peak limit, the emissions were also measured with the quasi-peak detectors. The average detector also measured the emission either (a) quasi-peak values were under quasi-peak limit but exceeded average limit, or (b) peak values were under quasi-peak limit but exceeded average limit.
- (F)In this RFI test report, we provided the worst case conducted emission test data and radiated emission test data. The entire testing data was recorded and provided in this report.

1.4 Channels Verification



FCC ID : SHBBS4100

REPORT NO. : E940857

a. EUT Type : Bluetooth GPS**b. EUT Model : BS4100****c. TX Channel No. : 79**

Channel 01: 2402 MHz

Channel 02: 2403 MHz

Channel 03: 2404 MHz

Channel 04: 2405 MHz

Channel 05: 2406 MHz

Channel 06: 2407 MHz

Channel 07: 2408 MHz

Channel 08: 2409 MHz

Channel 09: 2410 MHz

Channel 10: 2411 MHz

Channel 11: 2412 MHz

Channel 12: 2413 MHz

Channel 13: 2414 MHz

Channel 14: 2415 MHz

Channel 15: 2416 MHz

Channel 16: 2417 MHz

Channel 17: 2418 MHz

Channel 18: 2419 MHz

Channel 19: 2420 MHz

Channel 20: 2421 MHz

Channel 21: 2422 MHz

Channel 22: 2423 MHz

Channel 23: 2424 MHz

Channel 24: 2425 MHz

Channel 25: 2426 MHz

Channel 26: 2427 MHz

Channel 27: 2428 MHz

Channel 28: 2429 MHz

Channel 29: 2430 MHz

Channel 30: 2431 MHz

Channel 31: 2432 MHz

Channel 32: 2433 MHz

Channel 33: 2434 MHz

Channel 34: 2435 MHz

Channel 35: 2436 MHz

Channel 36: 2437 MHz

Channel 37: 2438 MHz

Channel 38: 2439 MHz

Channel 39: 2440 MHz

Channel 40: 2441 MHz

Channel 41: 2442 MHz

Channel 42: 2443 MHz

Channel 43: 2444 MHz

Channel 44: 2445 MHz

Channel 45: 2446 MHz

Channel 46: 2447 MHz

Channel 47: 2448 MHz

Channel 48: 2449 MHz

Channel 49: 2450 MHz

Channel 50: 2451 MHz

Channel 51: 2452 MHz

Channel 52: 2453 MHz

Channel 53: 2454 MHz

Channel 54: 2455 MHz

Channel 55: 2456 MHz

Channel 56: 2457 MHz

Channel 57: 2458 MHz

Channel 58: 2459 MHz

Channel 59: 2460 MHz

Channel 60: 2461 MHz

Channel 61: 2462 MHz

Channel 62: 2463 MHz

Channel 63: 2464 MHz

Channel 64: 2465 MHz

Channel 65: 2466 MHz

Channel 66: 2467 MHz

Channel 67: 2468 MHz

Channel 68: 2469 MHz

Channel 69: 2470 MHz

Channel 70: 2471 MHz

Channel 71: 2472 MHz

Channel 72: 2473 MHz

Channel 73: 2474 MHz

Channel 74: 2475 MHz

Channel 75: 2476 MHz

Channel 76: 2477 MHz

Channel 77: 2478 MHz

Channel 78: 2479 MHz

Channel 79: 2480 MHz

Frequency Range : 2.402 GHz to 2.480 GHz

Note :

1. All channels located in the frequency range as below :

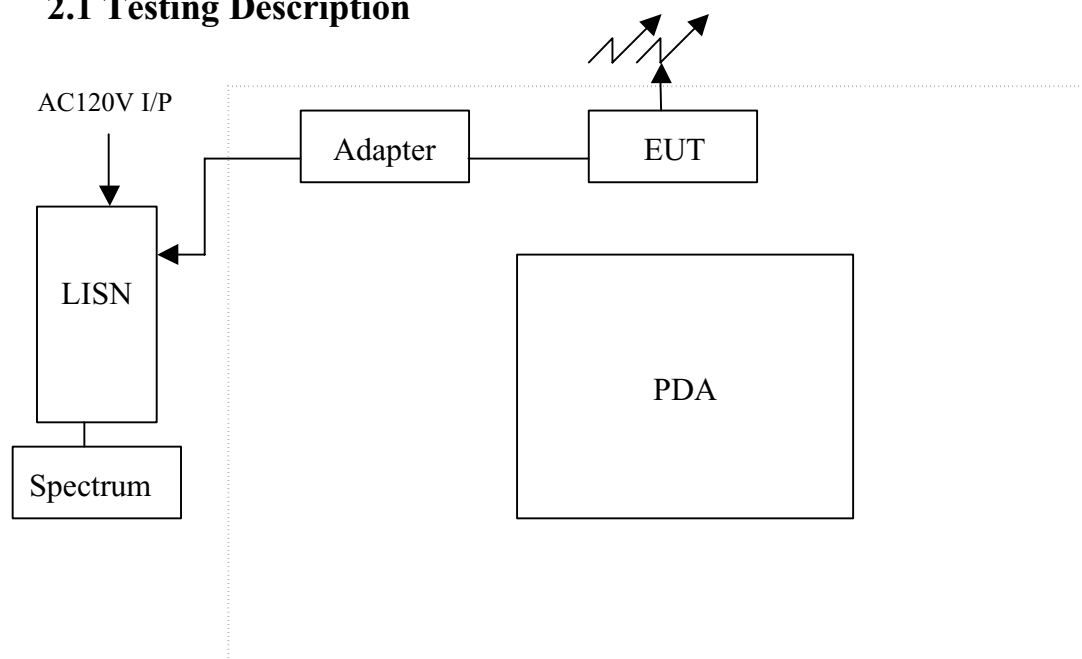
2.4 GHz --- 2.4835 GHz ☒ Yes ☐ No

Typical Channel for testing :

Channel	Channel Number	Frequency (GHz)
LOW	1	2.402
MID	40	2.441
HIGH	79	2.480

II . 15.207 Power Line Conducted Emission Test

2.1 Testing Description



2.2 Software Using

The driver of “CSR BlueSuite” is used to select the support channel as mentioned on section 1.3 (b) listed above

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FCC ID : SHBBS4100

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2.3 Test Result

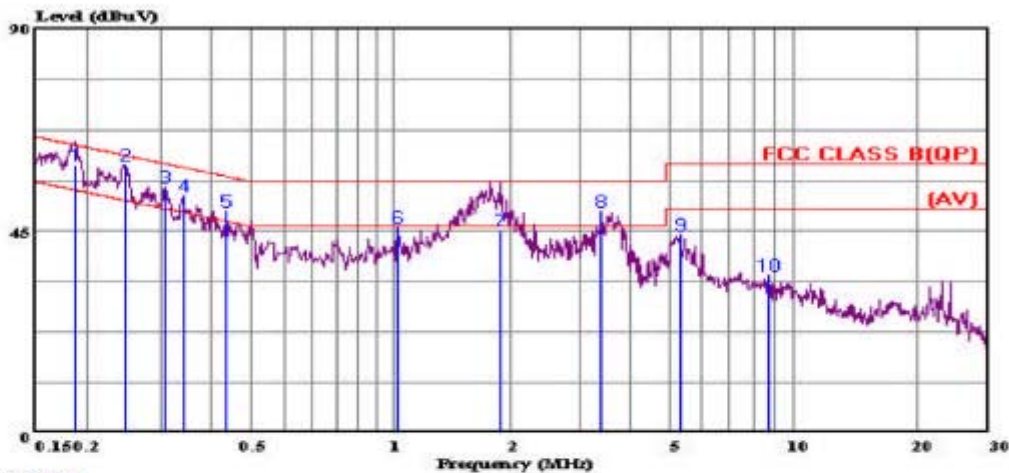
EUT Model No. BS4100 (LINE)

Detector : Peak Value



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Data#: 560 File#: FCC CLASS B(QP).EMI Date: 2005-12-05 Time: 14:36:22



Trace: 559
Site : Shih-Chi : Conduction No.1(Long)
Condition: FCC CLASS B(QP) LISN.L(16A) LINE
eut : E940857
power : AC 120V 60Hz
memo : Peak Value
: Final Test
: TCR

Page: 1

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.186	59.60	-4.60	64.20	59.40	0.10	0.10	QP
2	0.248	59.60	-2.22	61.82	59.31	0.10	0.19	
3	0.308	54.75	-5.27	60.02	54.55	0.10	0.10	
4	0.341	52.98	-6.20	59.18	52.78	0.10	0.10	
5	0.435	49.20	-7.95	57.15	49.00	0.10	0.10	
6	1.123	45.69	-10.31	56.00	45.39	0.10	0.20	
7	2.001	45.30	-10.70	56.00	45.00	0.10	0.20	QP
8	3.491	49.20	-6.80	56.00	48.85	0.10	0.25	
9	5.390	44.19	-15.81	60.00	43.77	0.16	0.26	
10	8.869	35.05	-24.95	60.00	34.48	0.27	0.30	

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FCC ID : SHBBS4100

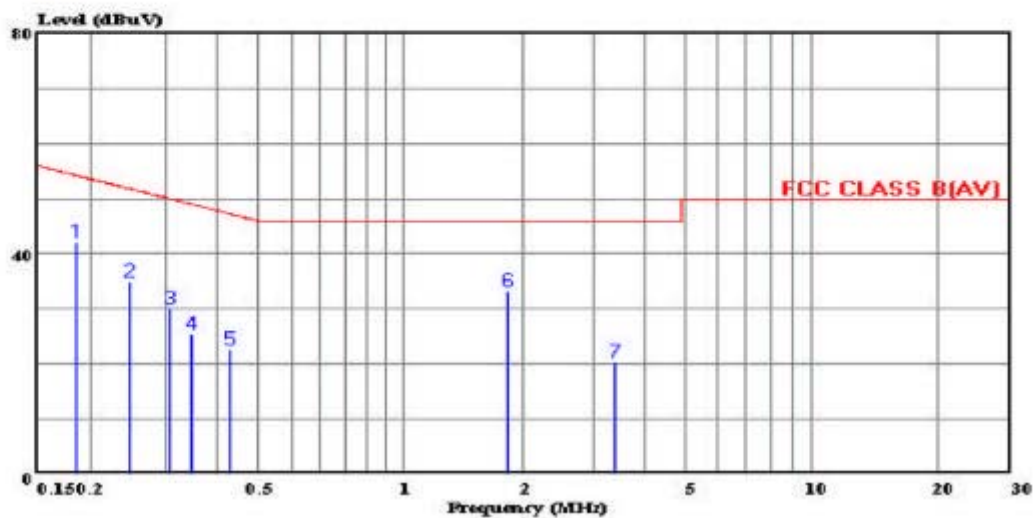
REPORT NO. : E940857



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Data#: 47 File#: FCC CLASS B(AV).EMI

Date: 2005-12-05 Time: 14:37:18



Site : Shih-Chi : Conduction No.1(Long)
Condition: FCC CLASS B(AV) LISN.L(16A) LINE
eut : E940857
power : AC 120V 60Hz
memo : Peak Value
memo : Final Test
memo : TCR

Page: 1

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.185	42.20	-12.06	54.26	42.00	0.10	0.10	Average
2	0.248	34.99	-16.83	51.82	34.70	0.10	0.19	Average
3	0.307	30.00	-20.05	50.05	29.80	0.10	0.10	Average
4	0.347	25.40	-23.63	49.03	25.20	0.10	0.10	Average
5	0.428	22.60	-24.69	47.29	22.40	0.10	0.10	Average
6	1.940	33.40	-12.60	46.00	33.10	0.10	0.20	Average
7	3.489	20.35	-25.65	46.00	20.00	0.10	0.25	Average

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FCC ID : SHBBS4100

REPORT NO. : E940857

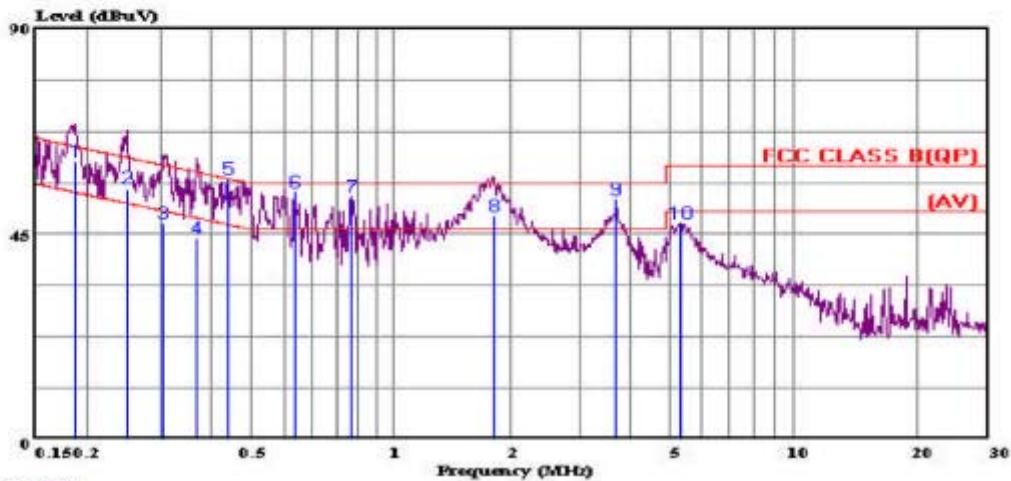
EUT Model No.: BS4100 (NEUTRAL)

Detector : Peak Value



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Data#: 555 File#: FCC CLASS B(QP).EMI Date: 2005-12-05 Time: 14:23:44



Trace: 554
Site : Shih-Chi : Conduction No.1(Long)
Condition: FCC CLASS B(QP) LISN.N(16A) NEUTRAL
eut : E940857
power : AC 120V 60Hz
memo : Peak Value
: Final Test
: TCR

Page: 1

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.186	61.00	-3.20	64.20	60.80	0.10	0.10	QP
2	0.249	55.00	-6.78	61.78	54.70	0.10	0.20	QP
3	0.305	47.30	-12.80	60.10	47.10	0.10	0.10	QP
4	0.369	44.30	-14.22	58.52	44.10	0.10	0.10	QP
5	0.440	57.03	-0.04	57.07	56.83	0.10	0.10	
6	0.634	54.08	-1.92	56.00	53.88	0.10	0.10	
7	0.871	53.10	-2.90	56.00	52.83	0.10	0.17	
8	1.928	49.00	-7.00	56.00	48.70	0.10	0.20	QP
9	3.779	52.52	-3.48	56.00	52.14	0.10	0.28	
10	5.390	47.48	-12.52	60.00	47.06	0.16	0.26	

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FCC ID : SHBBS4100

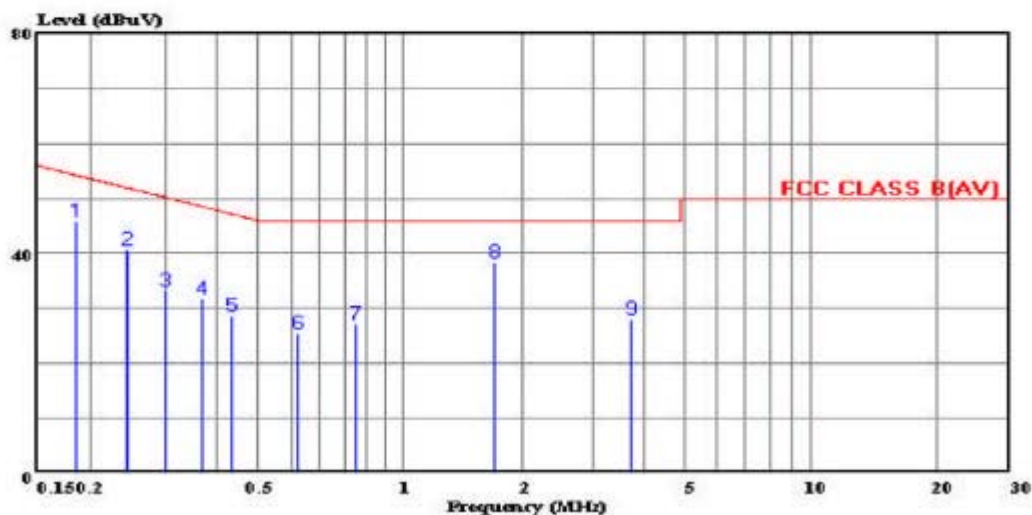
REPORT NO. : E940857



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Data#: 46 File#: FCC CLASS B(AV).EMI

Date: 2005-12-05 Time: 14:24:20



Site : Shih-Chi : Conduction No.1(Long)
Condition: FCC CLASS B(AV) LISN.N(16A) NEUTRAL
eut : E940857
power : AC 120V 60Hz
memo : Peak Value
memo : Final Test
memo : TCR

Page: 1

	Freq	Level	Over	Limit	Read	Probe	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.185	45.90	-8.36	54.26	45.70	0.10	0.10	Average
2	0.246	40.69	-11.20	51.89	40.40	0.10	0.19	Average
3	0.303	33.30	-16.86	50.16	33.10	0.10	0.10	Average
4	0.366	31.70	-16.89	48.59	31.50	0.10	0.10	Average
5	0.433	28.60	-18.59	47.19	28.40	0.10	0.10	Average
6	0.622	25.50	-20.50	46.00	25.30	0.10	0.10	Average
7	0.854	27.35	-18.65	46.00	27.10	0.10	0.15	Average
8	1.820	38.30	-7.70	46.00	38.00	0.10	0.20	Average
9	3.840	27.99	-18.01	46.00	27.60	0.10	0.29	Average

2.4 Conducted Emission Test Photo

EUT Model No. BS4100

< FRONT VIEW >



III. §15.247(a)(1) : Hopping Channel Frequency Separation

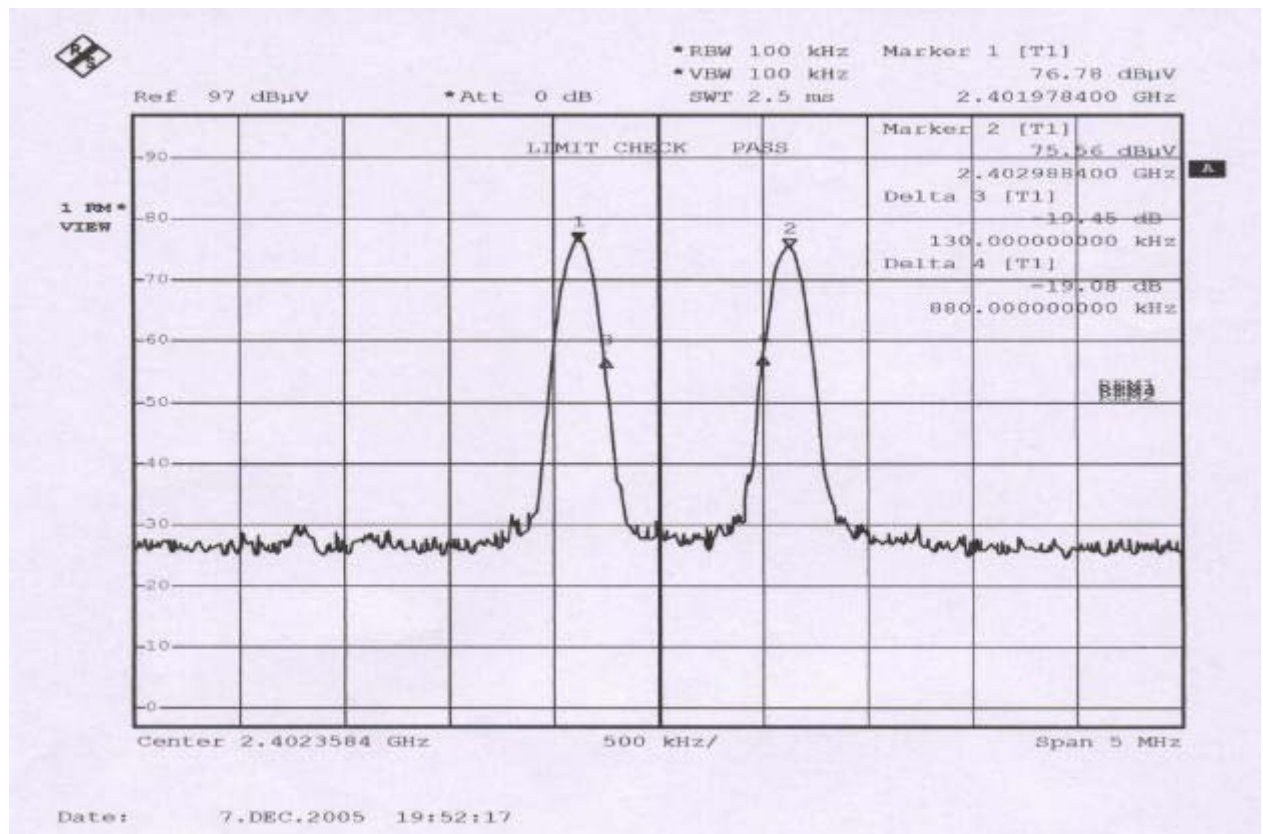
3.1 Test Procedure

- (1) The Hopping Channel Frequency Separation was measured in max hold analyzer mode with span wide enough to capture the peaks of two adjacent channels.
- (2) Set the Spectrum as RBW=VBW=100KHz
- (3) 3.3 Spectrum Plot Data show the Frequency Separation test results.

3.2 Test result of Frequency Separation

	Measured Separation (KHz)	Limit (KHz)	Pass/Fail
Channel Separation	1010	25	Pass
Separation at -20dB	750	25	Pass

3.3 Spectrum Plot Data



IV. §15.247(a)(1) : 20dB Bandwidth

4.1 Test Procedure

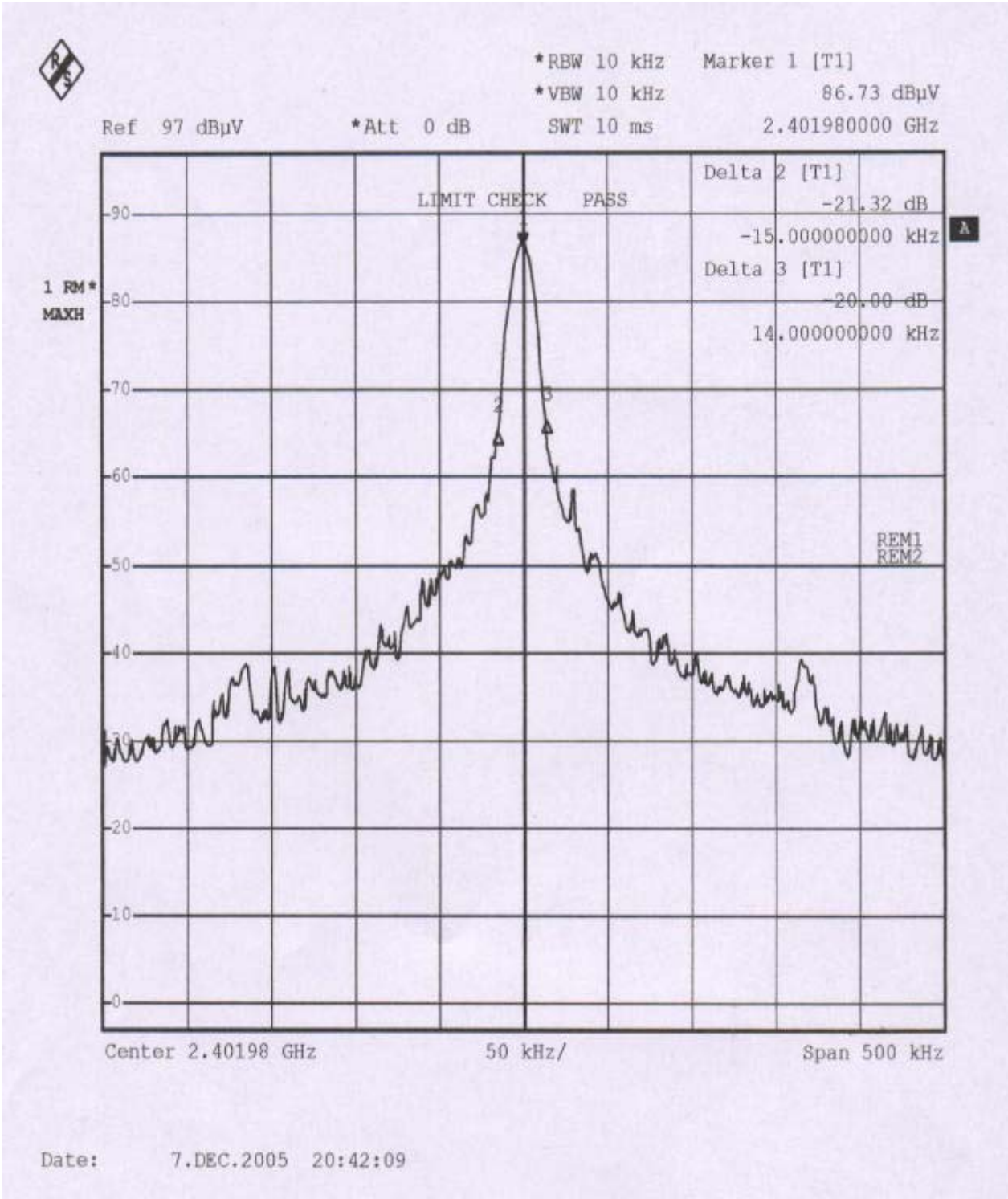
- (1)The 20dB bandwidth was measured at the EUT antenna terminal in max hold analyzer mode with span wide enough to capture the hopping channel emissions.
- (2)Set the Spectrum as RBW=VBW=10KHz
- (3) 4.2 Spectrum Plot Data show the 20dB Bandwidth test results.

4.2 Test result of Bandwidth

EUT Model No. BS4100

Channel	Bandwidth (KHz)	Limit (KHz)	Pass/Fail
LOW	29	1000	Pass
MID	28	1000	Pass
HIGH	28	1000	Pass

4.3 Spectrum Plot Data
Channel : CH LOW



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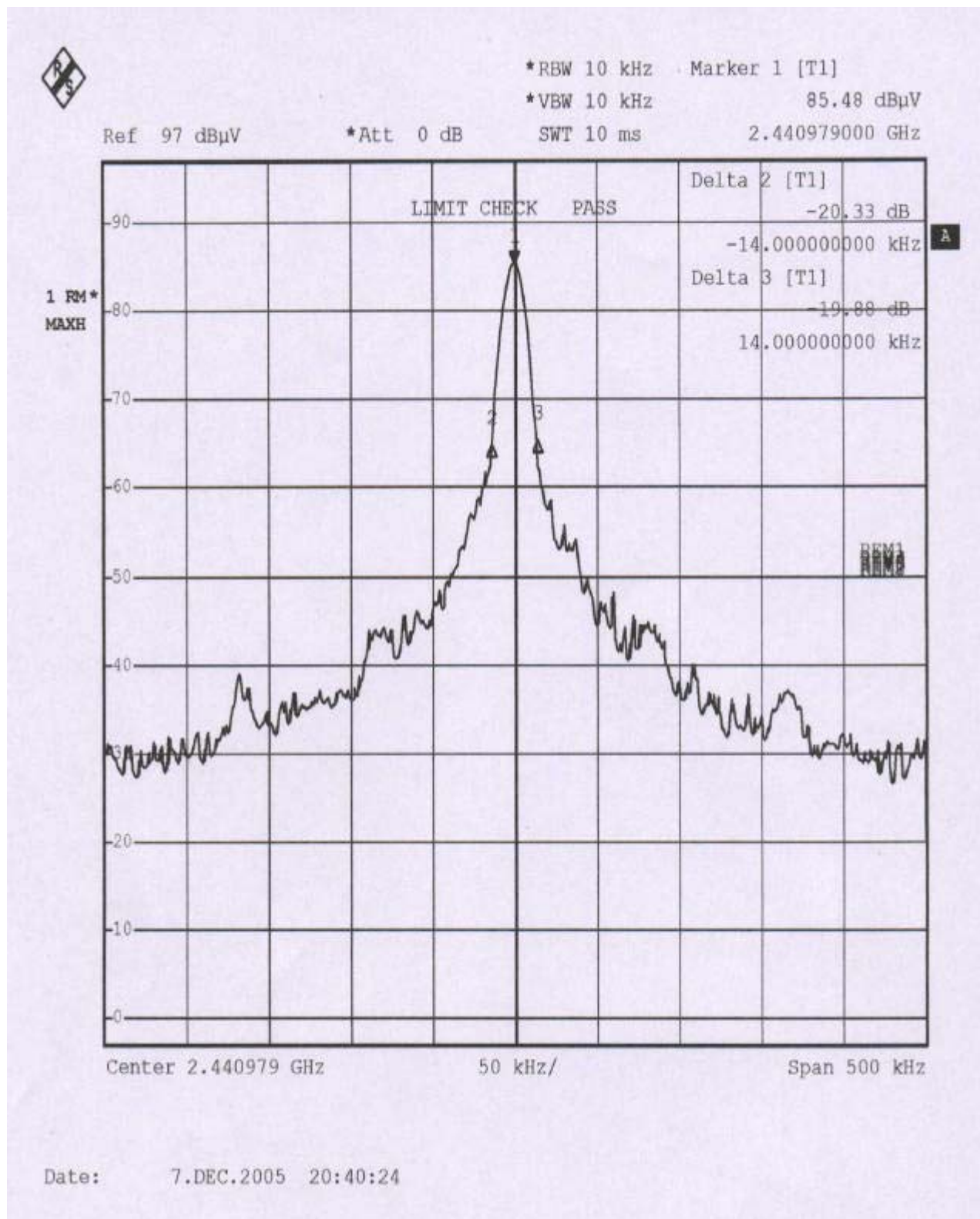
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FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH MID

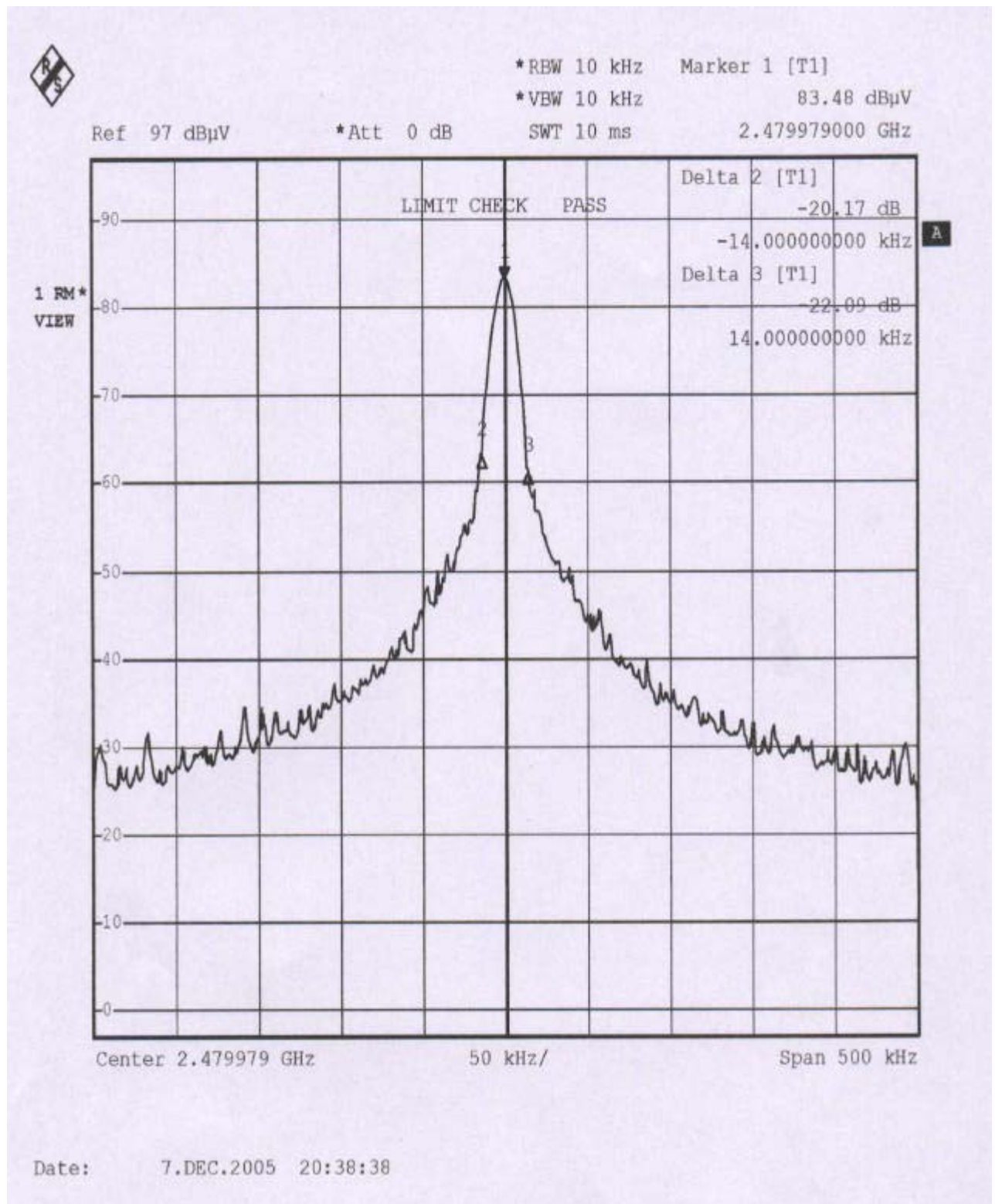


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FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH HIGH



V. §15.247(a) (1): Time of Occupancy(Dwell Time)

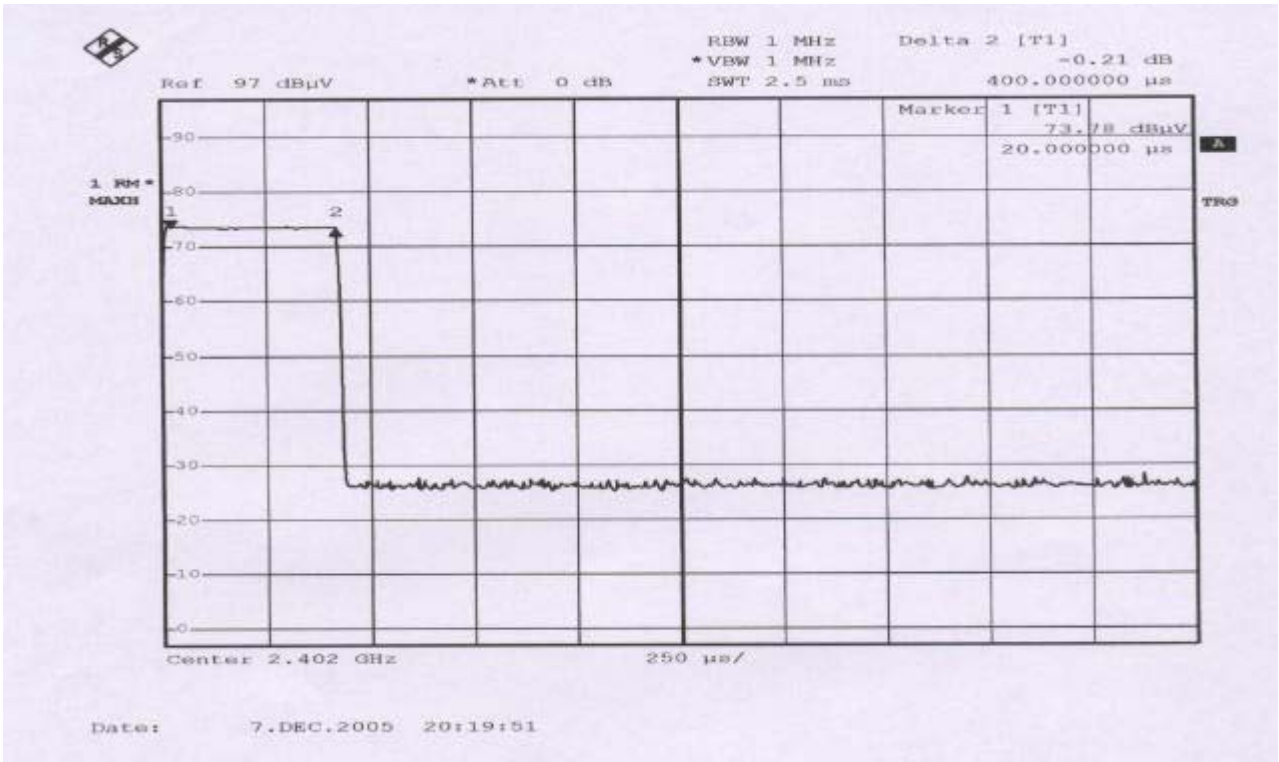
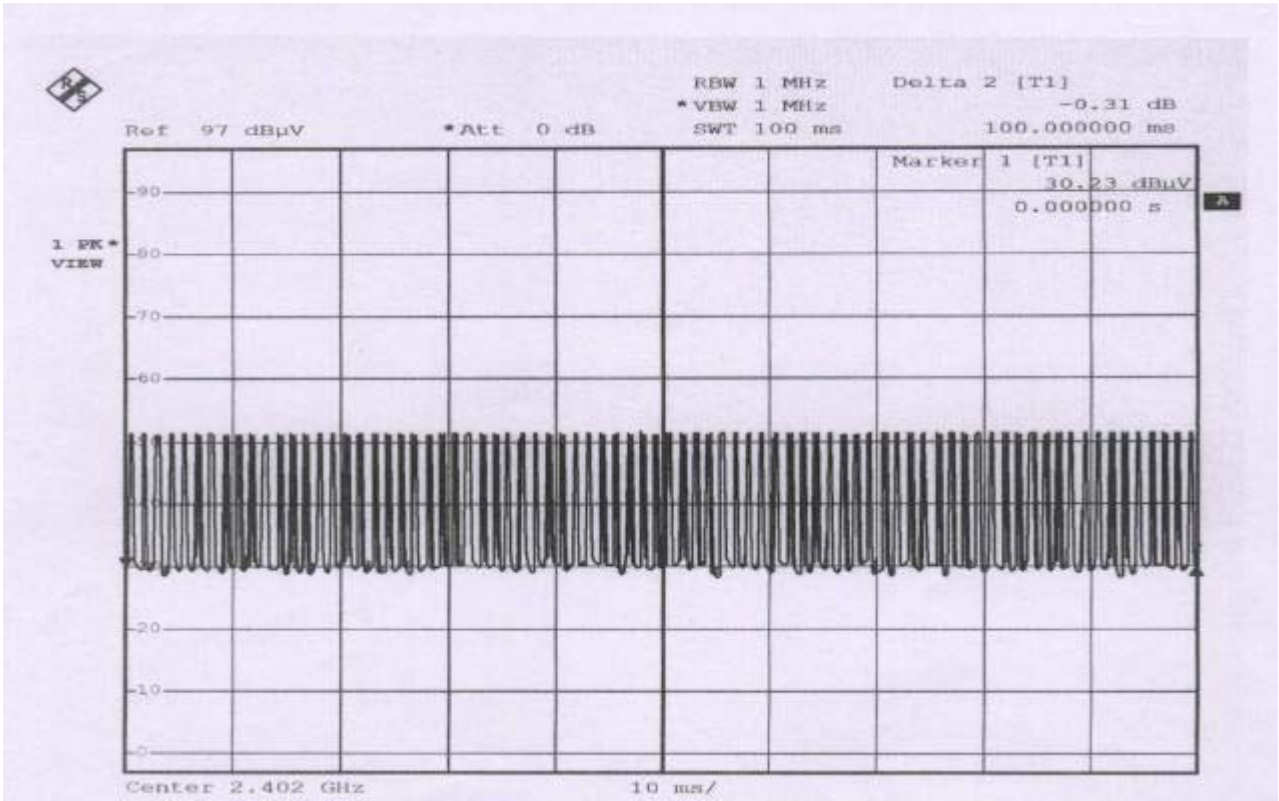
5.1 Test Procedure

- (1)The Time of Occupancy was measured in “max hold” analyzer mode with zero span and different sweep time to calculate the Time of Occupancy.
- (2)Set the Spectrum as RBW=VBW=1MHz
- (3)5.3 Spectrum Plot Data show the Time of Occupancy test results.

5.2 Test Result of Dwell Time

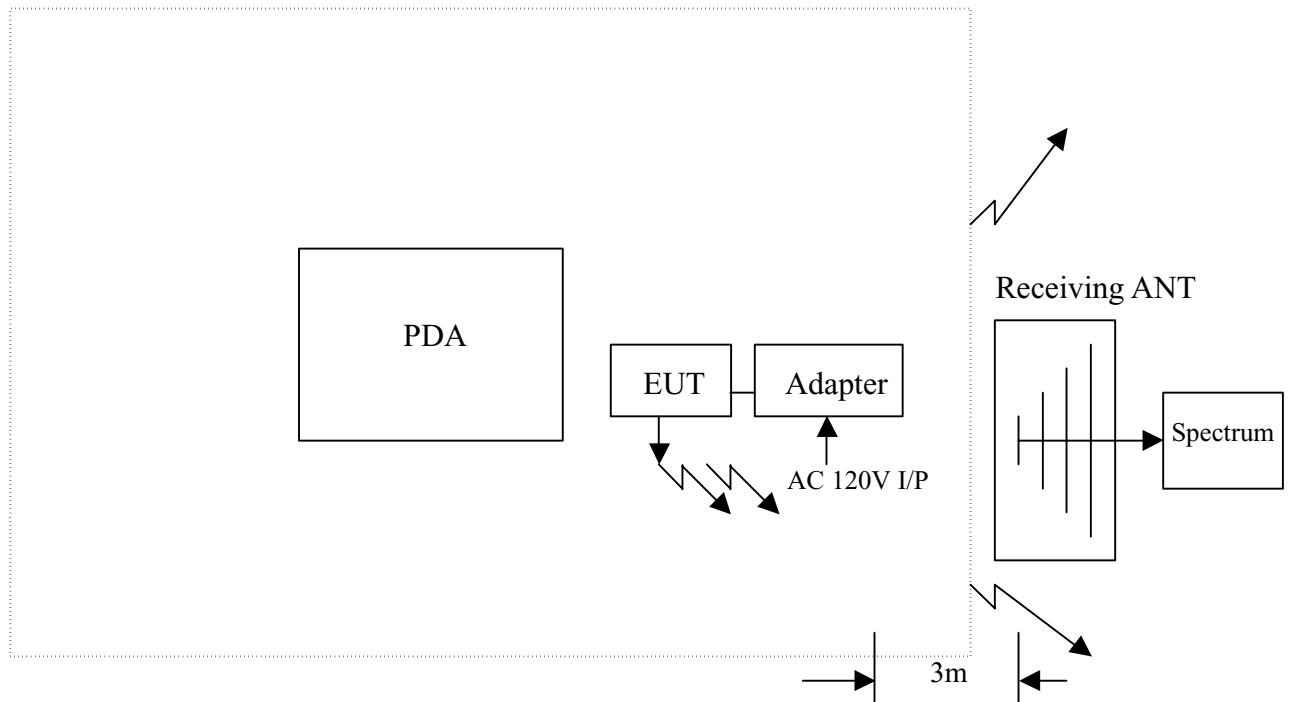
Dwell Time= $0.40 \times 80 = 32.0\text{ms} < 0.4\text{s}$

5.3 Spectrum Plot Data



VI. §15.247(b) : The maximum peak output power ($\leq 1\text{watt}$)

6.1 Testing Description



Three channels were tested : CH LOW, CH MID AND CH HIGH Measurements were taken by using both horizontal and vertical antenna polarization, and the antenna was raised and lowered from one to four meters to find the worst emission levels.

6.2 Software Using

The driver of “CSR BlueSuite” is used to select the support channel as mentioned on section 1.3 (b) listed above

6.3 Test Result of Fundamental Emissions

EUT Model No. BS4100

Channel	Frequency (MHz)	Antenna Polarity (H/V)	Spectrum Read (dBuV/m)	C.F. (dB)	Level (dBuV/m)	E.I.R.P. (W)
LOW	2401.95	H	66.00	-2.10	63.90	7.364×10^{-7}
	2401.95	V	65.03	-2.10	59.44	5.890×10^{-7}
MID	2440.96	H	63.78	-2.01	61.77	4.509×10^{-7}
	2440.97	V	63.67	-2.01	61.66	4.397×10^{-7}
HIGH	2479.95	H	59.93	-1.94	61.87	2.952×10^{-6}
	2479.95	V	62.95	-1.94	61.01	3.785×10^{-7}

Note :

1. "C.F." means corrected factor = antenna factor + cable loss — Preamplifier Gain .
2. Level means emission amplitude = S.P. + C.F. + duty cycle factor
3. Conducted output power : $P = (E d)^2 / 30G$

where $E (V) = \text{Level} (V)$

$d (m) = \text{measurement distance} = 3m$

$G = 1$ (the gain of the transmitting antenna over isotropic antenna)

$P = \text{E.I.R.P.}$

4. Example :

If Level = 120 dBuV/m

$$10^{(120/20)} \times 10^{-6} = 1 \text{ V}$$

$$\text{E.I.R.P.} = (1 \times 3)^2 / 30 = 300 \text{ mW}$$

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FCC ID : SHBBS4100

REPORT NO. : E940857

EUT Model No. BS4100

Channel : CH LOW

Polarity : Horizontal



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA H.3 HORIZONTAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The maximum peak output power
Memo : CH LOW : 2402Hz

Freq	Level	Over	Limit	Read
MHz	dBuV/m	Limit	Line	Level Factor
1	2401.950	63.90	-----	66.00 -2.10

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FCC ID : SHBBS4100

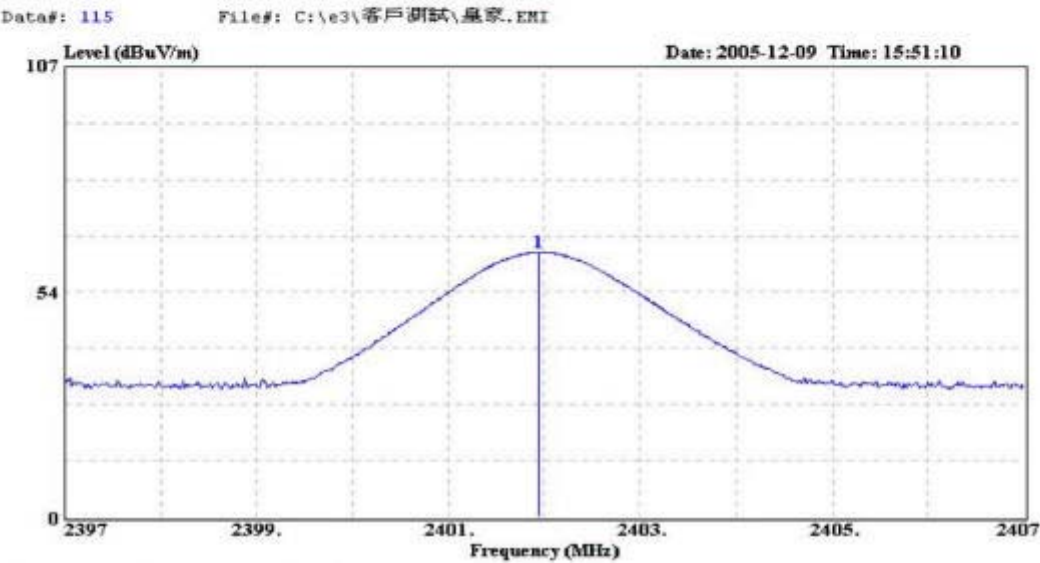
REPORT NO. : E940857

Channel : CH LOW

Polarity : Vertical



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA V.3 VERTICAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The maximum peak output power
Memo : CH LOW : 2402Hz

Freq	Level	Over	Limit	Read	
MHz	dBuV/m	Limit	Line	Level	Factor
1	2401.950	62.93	-----	65.03	-2.10

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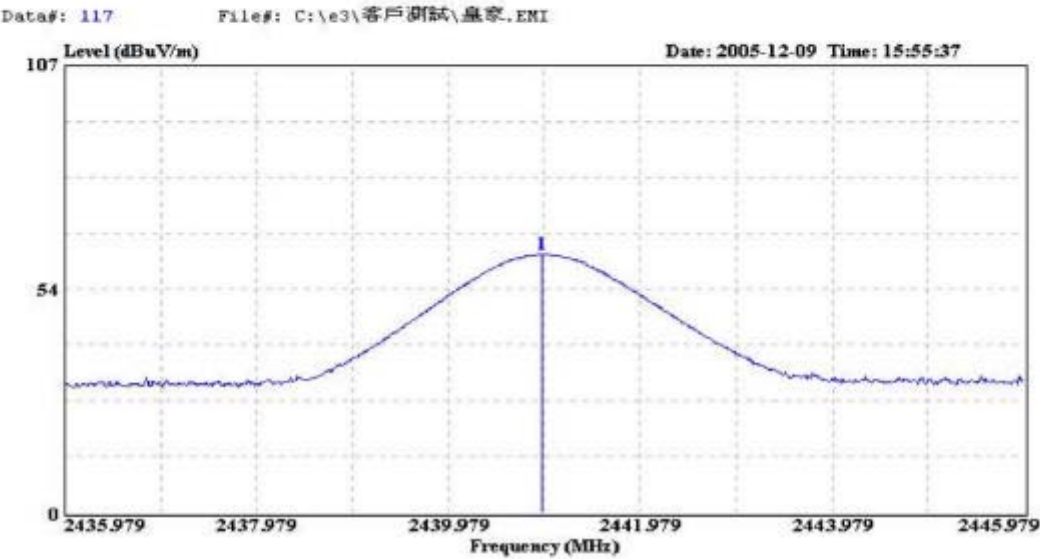
FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH MID
Polarity : Horizontal



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA H.3 HORIZONTAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The maximum peak output power
Memo : CH MID : 2441Hz

Over	Limit	Read	
Freq	Level	Limit	Line
MHz	dBuV/m	dB	dBuV/m
2440.960	61.77	-----	-----
1	2440.960	61.77	63.78 -2.01

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FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH MID

Polarity : Vertical



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA V.3 VERTICAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The maximum peak output power
Memo : CH MID : 2441Hz

Freq	Level	Over	Limit	Read
MHz	dBuV/m	Limit	Line	Level Factor
1 2440.970	61.66	-----	-----	63.67 -2.01

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FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH HIGH

Polarity : Horizontal



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA H.3 HORIZONTAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The maximum peak output power
Memo : CH HIGH : 2480Hz

Freq	Level	Over	Limit	Read	
MHz	dBuV/m	Limit	Line	Level	Factor
1 2479.950	59.93	-----	-----	61.87	-1.94

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FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH HIGH

Polarity : Vertical



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PEP Testing Laboratory



Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA V.3 VERTICAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The maximum peak output power
Memo : CH HIGH : 2480Hz

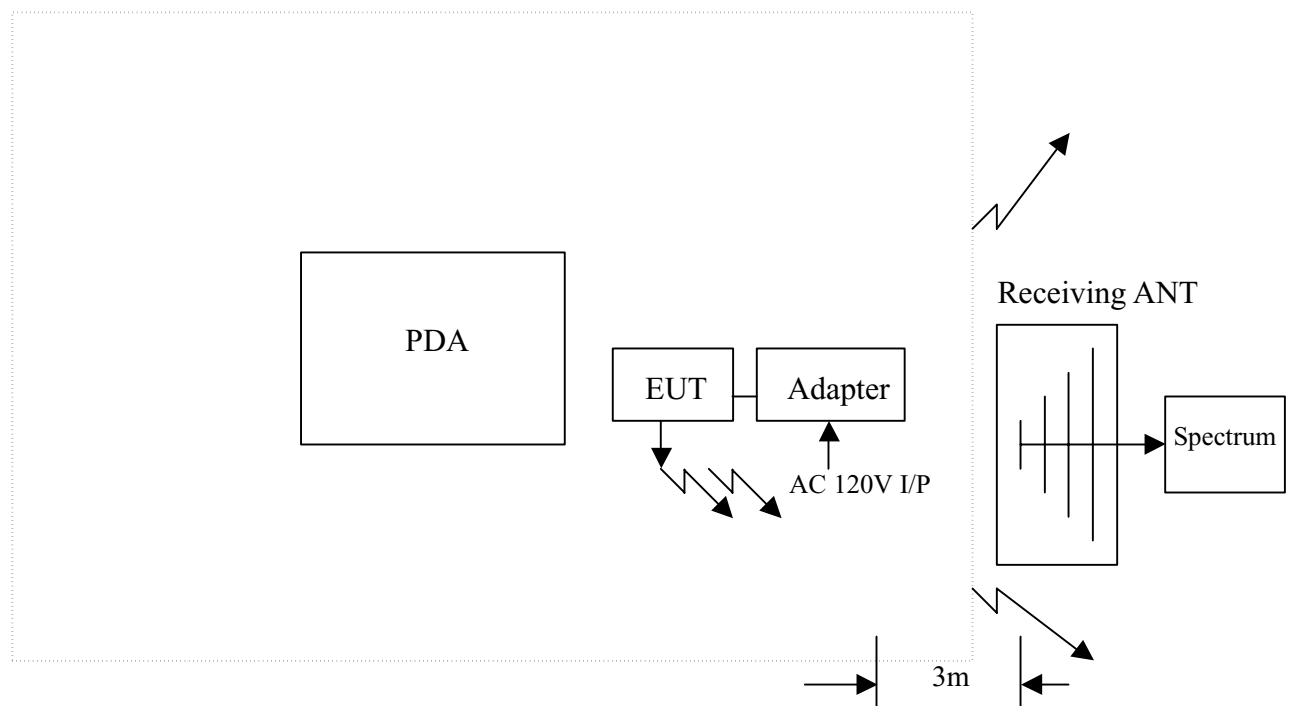
Freq	Level	Limit	Read	Line	Level	Factor
MHz	dBuV/m	dB	dBuV/m	dBuV	dB	
1	2479.950	61.01	-----	-----	62.95	-1.94

VII. §15.247(b)(4) Maximum Permissible Exposure (MPE)

7.1 MPE distance calculation

$$d = \frac{\sqrt{30G \text{ EIRP}}}{E}$$

7.2 Device operating configurations exposure conditions



7.3 Maximum Permissible Exposure (MPE)**EUT Model No. BS4100**

Channel	Frequency (MHz)	A.P. (H/V)	S.P. Read (dBuV/m)	C.F. (dB)	Level (dBuV/m)	Power density at 20cm (m W / cm ²)
LOW	2401.95	H	66.00	-2.10	63.90	3.27*10 ⁻⁹
	2401.95	V	65.03	-2.10	59.44	1.17*10 ⁻⁹
MID	2440.96	H	63.78	-2.01	61.77	2.00*10 ⁻⁹
	2440.97	V	63.67	-2.01	61.66	1.95*10 ⁻⁹
HIGH	2479.95	H	59.93	-1.94	61.87	2.05*10 ⁻⁹
	2479.95	V	62.95	-1.94	61.01	1.68*10 ⁻⁹

Note :

1. "A.P." means antenna polarity .
2. "S.P." Read means amplitude read by spectrum analyzer .
3. "C.F." means corrected factor = antenna factor + cable loss - Preamplifier Gain .
4. Level means emission amplitude = S.P. + C.F. + duty cycle factor
5. Conducted output power : $P = (E d)^2 / 30G$

where E (V) = Level (V)

d (m) = distance = 20 cm

G = 1 (the gain of the transmitting antenna over isotropic antenna)

P = E.I.R.P.

6. Example :

If Level = 120 dBuV/m

$$10^{(120/20)} \times 10^{-6} = 1 \text{ V}$$

$$E.I.R.P. = (1 \times 3)^2 / 30 = 300 \text{ mW}$$

VIII. §15.247(c) : Spurious Radiated Emissions**8.1 Out side band below 1GHz****Test Results :****Model No. : BS4100****Frequency range : 30MHz - 1GHz****Detector : Quasi-Peak Value****Temperature : 20° C****Humidity : 54 %****Antenna polarization : HORIZONTAL ; Test distance : 3 m ;**

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Remark
165.863	28.47	-15.03	43.5	31.39	16.98	1.50	21.40	
239.410	29.13	-16.87	46.0	36.31	12.15	1.97	21.30	
264.233	29.66	-16.34	46.0	35.74	12.85	2.19	21.12	
399.640	28.40	-17.60	46.0	30.80	15.90	2.70	21.00	
497.549	30.95	-15.05	46.0	31.06	17.60	3.09	20.80	
596.222	37.84	- 8.16	46.0	35.60	19.46	3.39	20.61	

Antenna polarization : VERTICAL ; Test distance : 3 m ;

Freq. (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Remark
165.911	28.47	-15.03	43.5	31.39	16.98	1.50	21.40	
196.910	29.81	-13.69	43.5	36.76	12.75	1.60	21.30	
274.342	28.27	-17.73	46.0	33.99	13.15	2.25	21.12	
497.498	36.03	- 9.97	46.0	36.14	17.60	3.09	20.80	
547.927	35.49	-10.51	46.0	34.38	18.56	3.25	20.70	
596.247	38.74	- 7.26	46.0	36.50	19.46	3.39	20.61	

Note :

1. Level = Read Level + Probe Factor + Cable Loss – Preamp Factor

2. Over Limit = Level – Limit Line

3. All the other frequencies are under the limits more than 20dB

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FCC ID : SHBBS4100

REPORT NO. : E940857

8.2 Out side band above 1GHz

Test Results :

Model No. : BS4100

Frequency range : above 1GHz

Temperature : 20° C

Channel : LOW

Detector : Peak / Average Value

Humidity : 54 %

Antenna polarization : HORIZONTAL ; Test distance : 3 m ;

Freq.	Level	Over	Limit	Read	Probe	Cable	Preamp	
(MHz)	(dBuV/m)	Limit	Line	Level	Factor	Loss	Factor	Remark
		(dB)	(dBuV/m)	(dBuV)	(dB/m)	(dB)	(dB)	
4803.500	49.64	-24.36	74	45.03	32.79	5.93	34.11	PK

Antenna polarization : VERTICAL ; Test distance : 3 m ;

Freq.	Level	Over	Limit	Read	Probe	Cable	Preamp	
(MHz)	(dBuV/m)	Limit	Line	Level	Factor	Loss	Factor	Remark
		(dB)	(dBuV/m)	(dBuV)	(dB/m)	(dB)	(dB)	
4803.500	49.90	-24.10	74	45.29	32.79	5.93	34.11	PK

Note :

1. Level = Read Level + Probe Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line
3. All the other frequencies are under the limits more than 20dB

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FCC ID : SHBBS4100

REPORT NO. : E940857

Model No. : BS4100

Frequency range : above 1GHz

Detector : Peak / Average Value

Temperature : 20° C

Humidity : 54 %

Channel : MID

Antenna polarization : HORIZONTAL ; Test distance : 3 m ;

		Over	Limit	Read	Probe	Cable	Preamp	
Freq.	Level	Limit	Line	Level	Factor	Loss	Factor	Remark
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB/m)	(dB)	(dB)	
4881.500	53.22	-20.78	74	48.23	33.09	5.96	34.06	PK

Antenna polarization : VERTICAL ; Test distance : 3 m ;

		Over	Limit	Read	Probe	Cable	Preamp	
Freq.	Level	Limit	Line	Level	Factor	Loss	Factor	Remark
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB/m)	(dB)	(dB)	
4881.500	53.16	-20.84	74	48.17	33.09	5.96	34.06	PK

Note :

1. Level = Read Level + Probe Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line
3. All the other frequencies are under the limits more than 20dB

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FCC ID : SHBBS4100

REPORT NO. : E940857

Model No. : BS4100

Frequency range : above 1GHz

Detector : Peak / Average Value

Temperature : 20° C

Humidity : 54 %

Channel : HIGH

Antenna polarization : HORIZONTAL ; Test distance : 3 m ;

		Over	Limit	Read	Probe	Cable	Preamp	
Freq.	Level	Limit	Line	Level	Factor	Loss	Factor	Remark
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB/m)	(dB)	(dB)	
4959.500	57.00	-17.00	74	51.64	33.39	5.99	34.02	PK
4959.500	53.53	- 0.47	54	48.17	33.39	5.99	34.02	AV

Antenna polarization : VERTICAL ; Test distance : 3 m ;

		Over	Limit	Read	Probe	Cable	Preamp	
Freq.	Level	Limit	Line	Level	Factor	Loss	Factor	Remark
(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV)	(dB/m)	(dB)	(dB)	
4959.500	54.68	-19.32	74	49.32	33.39	5.99	34.02	PK
4959.500	51.45	- 2.55	54	46.09	33.39	5.99	34.02	AV

Note :

1. Level = Read Level + Probe Factor + Cable Loss – Preamp Factor
2. Over Limit = Level – Limit Line
3. All the other frequencies are under the limits more than 20dB

8.3 Spurious Radiate Emission Testing Photos

EUT Model No. BS4100

< FRONT VIEW >



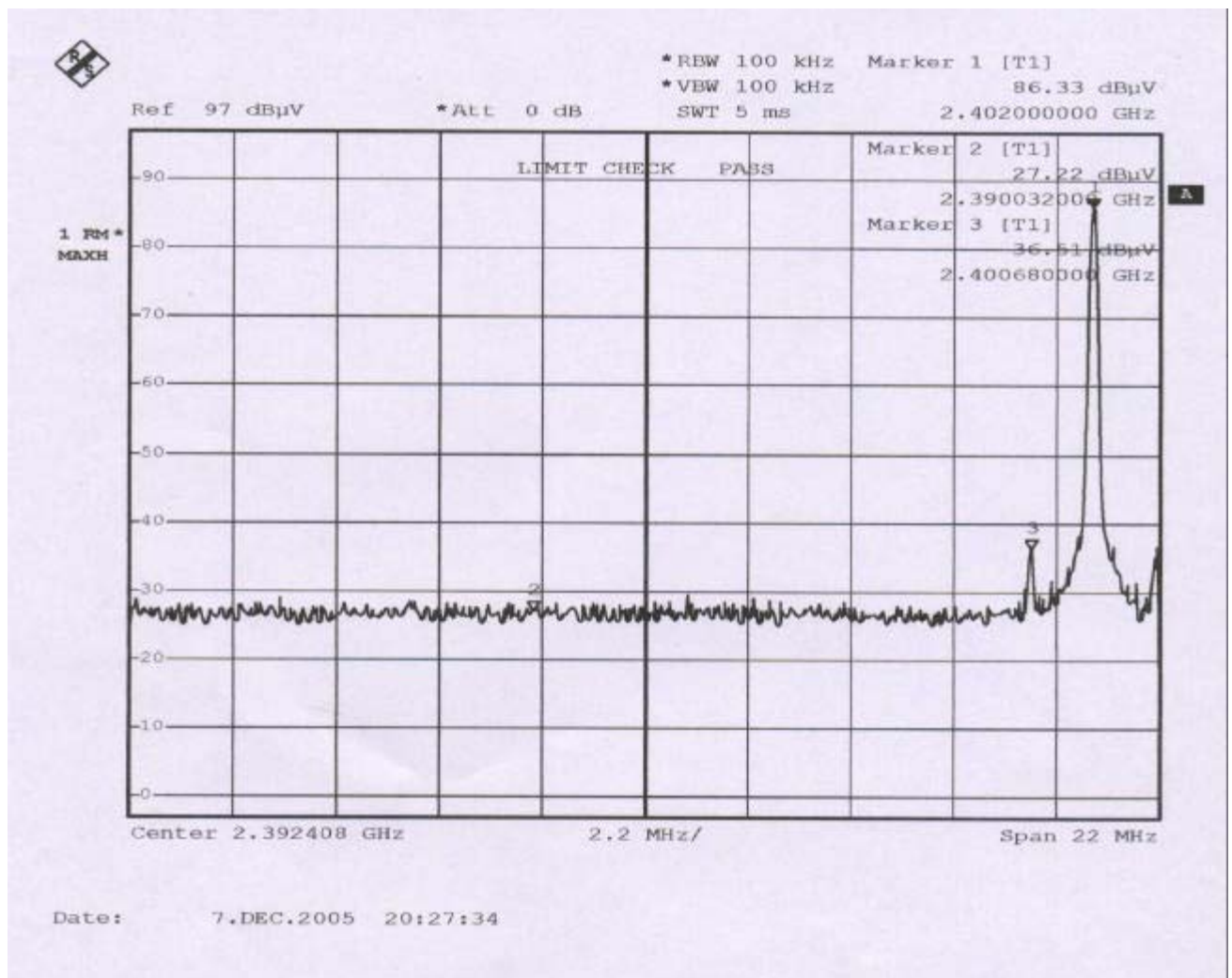
< REAR VIEW >



IX. §15.247(c) : Band-edges Compliance

Channel : CH LOW

Polarity : Horizontal



Test method : Public Notice DA 00-705

Detect : Peak Value

Marker-Delta method :

$86.33\text{dBuV/m} - 27.22\text{ dBuV/m} = 59.11\text{dBuV/m}$

$86.93\text{ dBuV/m} - 59.11\text{ dBuV/m} = 27.28\text{ dBuV/m}$

$*27.28\text{dBuV/m} < \text{Average Limit (54dBuV/m)}$

PEP Testing Laboratory

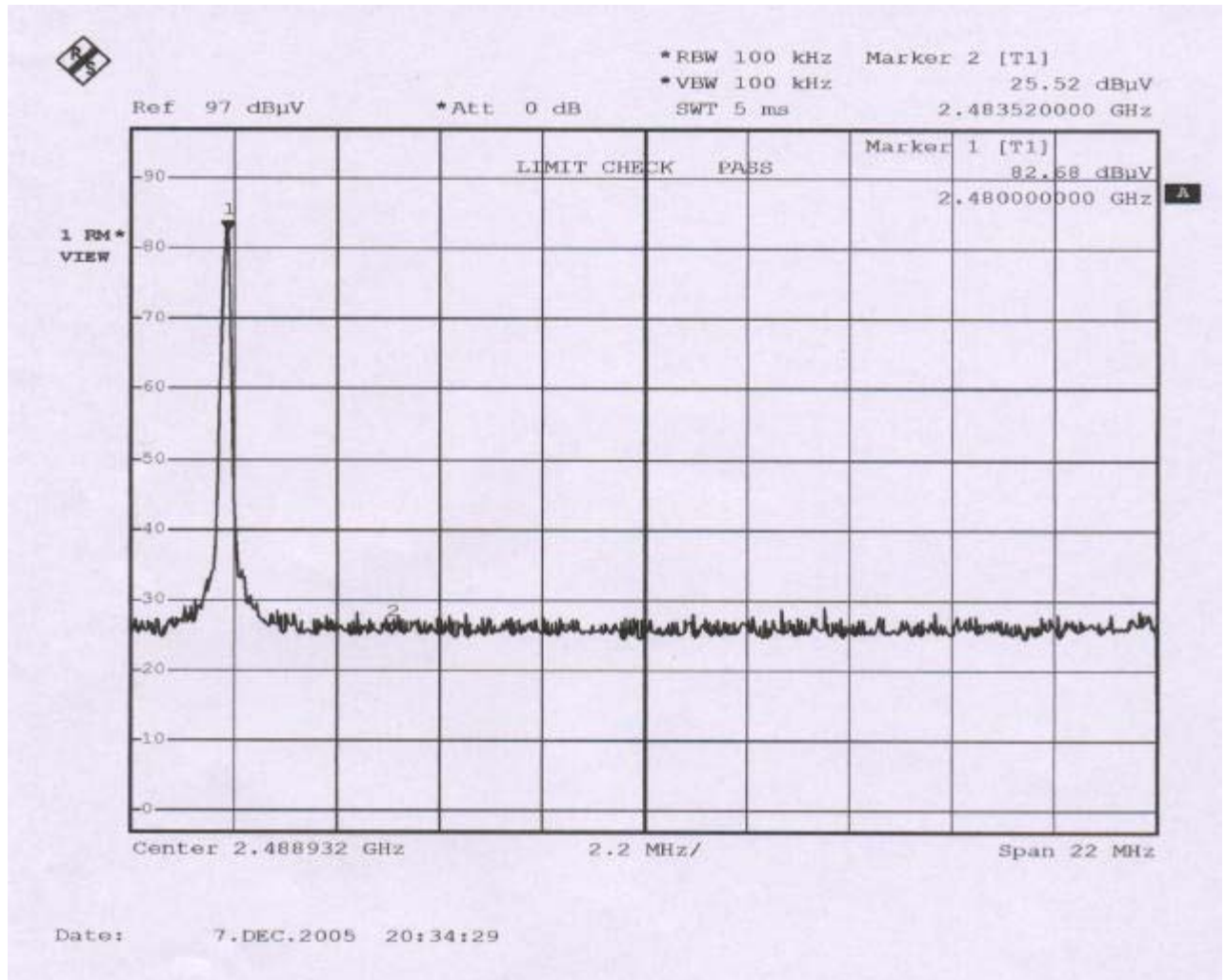
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Taipei Hsien, Taiwan, R. O. C.
TEL: 886-2-26922097 FAX: 886-2-26956236

FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH HIGH

Polarity : Horizontal



Test method : Public Notice DA 00-705

Detect : Peak Value

Marker-Delta method :

$82.68\text{dBuV/m} - 25.52\text{ dBuV/m} = 57.16\text{dBuV/m}$

$81.10\text{ dBuV/m} - 57.16\text{ dBuV/m} = 23.94\text{ dBuV/m}$

$*23.94\text{dBuV/m} < \text{Average Limit (54dBuV/m)}$

PEP Testing Laboratory

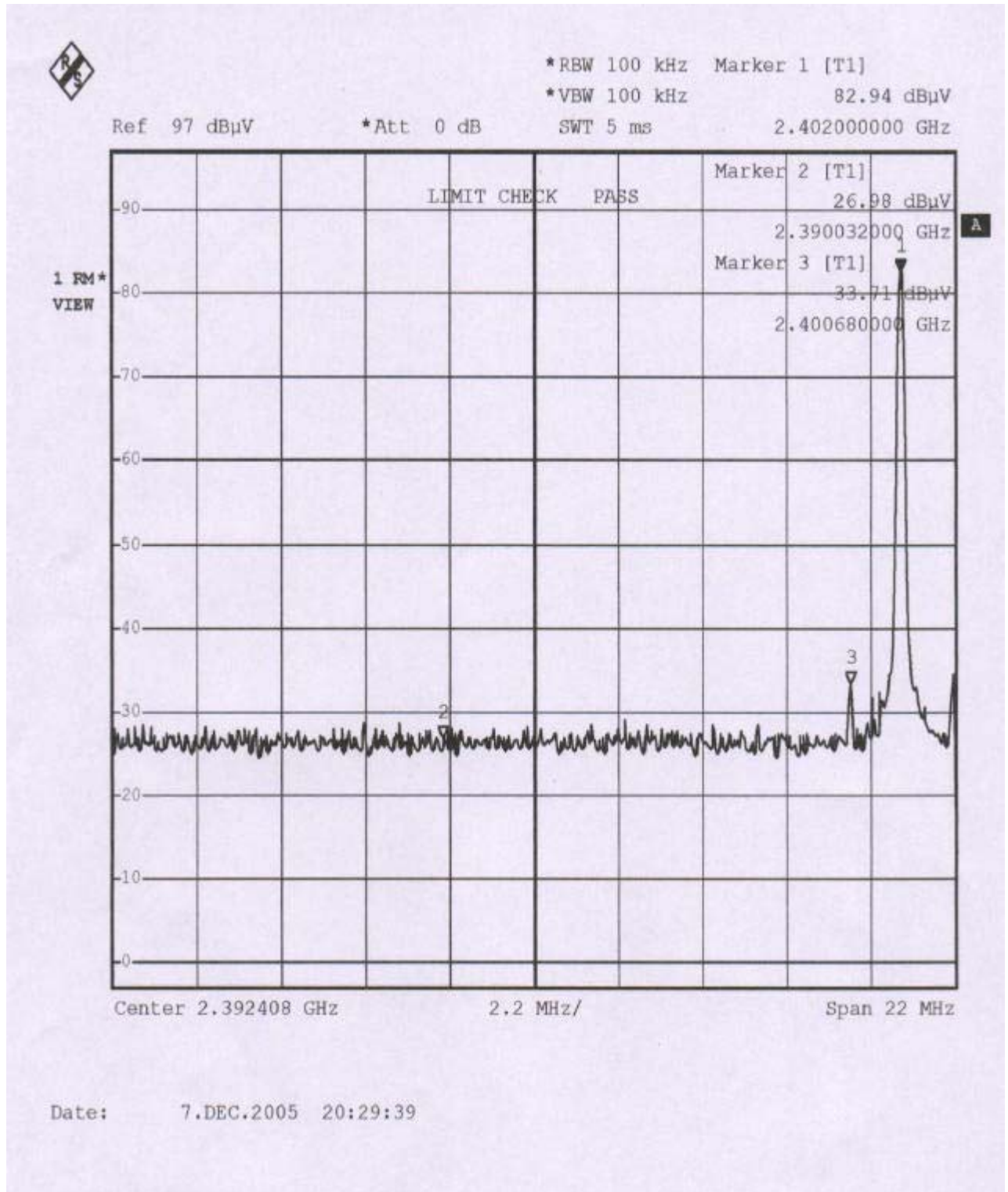
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TEL: 886-2-26922097 FAX: 886-2-26956236

FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH LOW

Polarity : Vertical



PEP Testing Laboratory

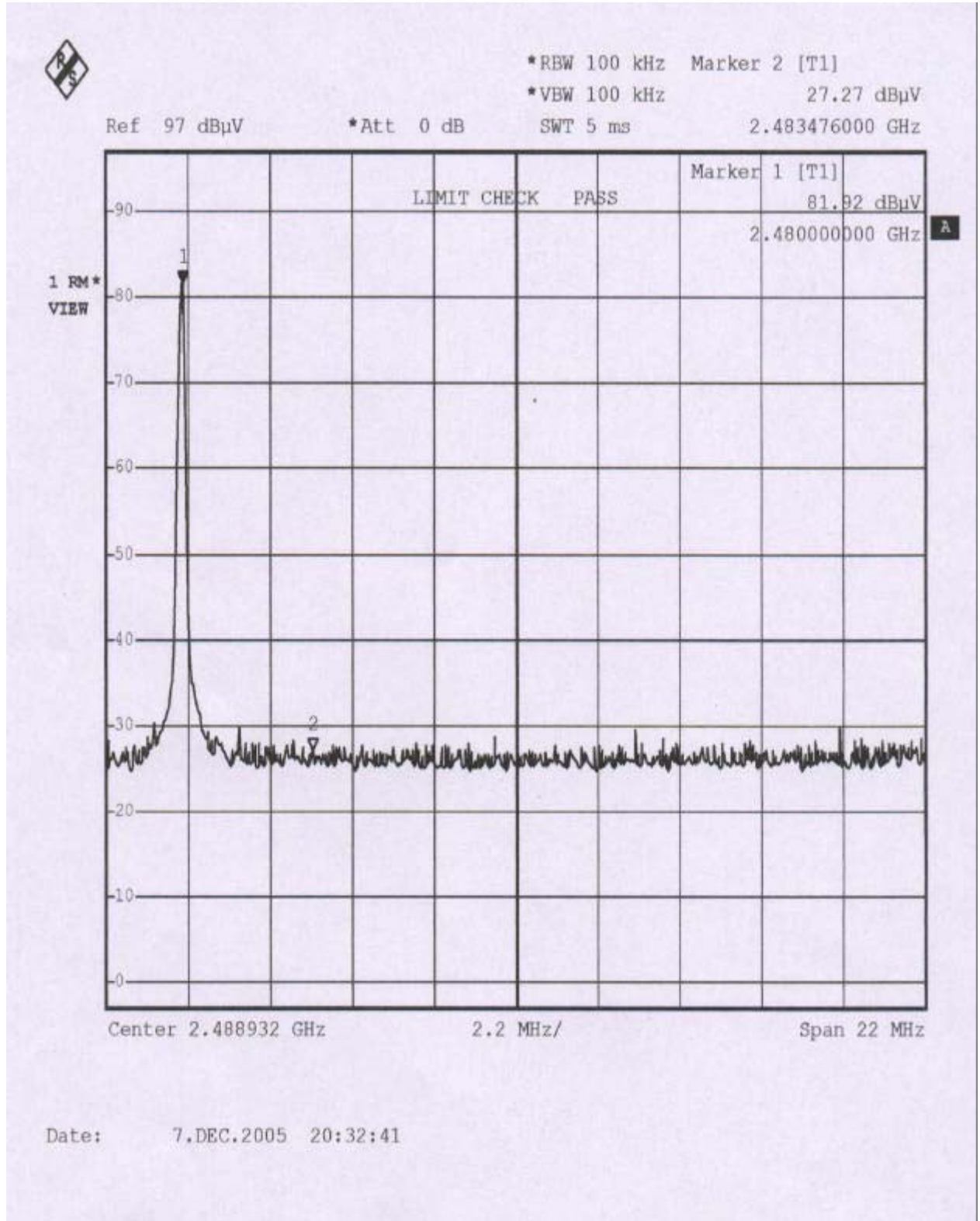
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FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH HIGH

Polarity : Vertical



X. §15.247(d) : Peak Power Spectral Density

10.1 Test Procedure

- (1) The Peak Power Spectral Density was measured at the EUT antenna terminal in max hold analyzer mode with span wide enough to capture the hopping channel emissions.
- (2) Set Spectrum as RBW=VBW=3KHz , Sweptime:auto.
- (3) 10.3 Spectrum Plot Data show the Peak Power Spectral Density test results.

10.2 Test result of Peak Power Spectral Density

Channel	Frequency (MHz)	Level (dBm)	Limit (dBm)	Pass/Fail
LOW	2401.98	-30.71	8	Pass
MID	2440.98	-33.10	8	Pass
HIGH	2479.98	-35.16	8	Pass

Note:

1. "S.P. read" means spectrum analyzer read power density.
2. "C.F." means correct factor = antenna factor + cable loss – Preamplifier Gain.
3. "Level" means power spectral density.

$$E.R.P. = (E d)^2 / 30G$$

where E (V) = S.P. read + C.F.

d (m) = measurement distance = 3m

G = 1 (the gain of the transmitting antenna over isotropic antenna)

Example :

If Level = 120 dBuV/m

$$10^{(120 / 20)} \times 10^{-6} = 1 \text{ V}$$

$$\begin{aligned} E.R.P. &= (1 \times 3)^2 / 30 = 300 \text{ mW} = 10 \text{ Log } (300\text{mW}/1\text{mW}) \\ &= 24.77\text{dBm} \end{aligned}$$

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REPORT NO. : E940857

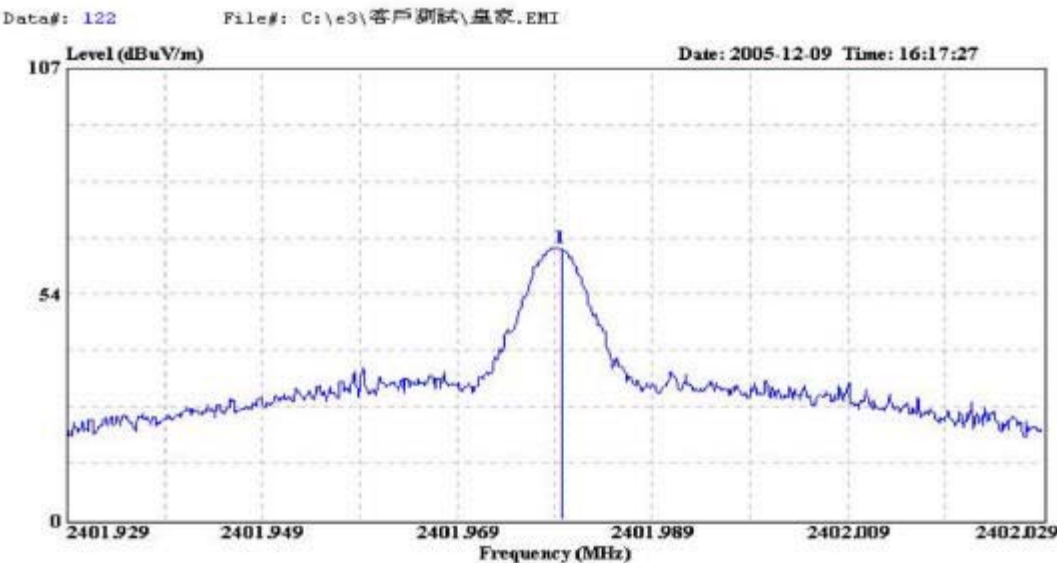
10.3 Spectrum Plot Data

Channel : CH LOW

Polarity : Horizontal



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Site	: chamber no3 (Bear)				
Condition	: 3m HORN ANTENNA H.3 HORIZONTAL				
EUT	: E940857				
Power	: AC 120V 50Hz				
Memo	: Peak Value				
Memo	: The Peak Power Density				
	: CH LOW : 2441Hz				
	Freq	Level	Over Limit	Read	
	MHz	dBuV/m	dB dBuV/m	dBuV	dB
1	2401.980	64.53	-----	66.65	-2.12

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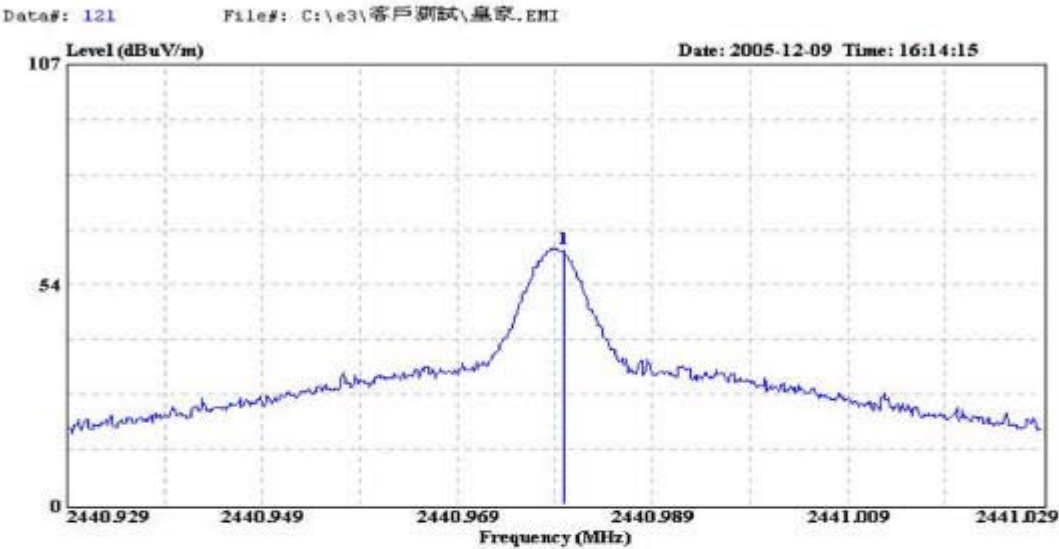
FCC ID : SHBBS4100

REPORT NO. : E940857

Channel : CH MID
Polarity : Horizontal



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA H.3 HORIZONTAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The Peak Power Density
Memo : CH MID : 2441Hz

	Over	Limit	Read	
Freq	Level	Limit	Line	Level Factor
MHz	dBuV/m	dB	dBuV/m	dBuV dB
1 2440.980	62.13	-----	64.14	-2.01

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FCC ID : SHBBS4100

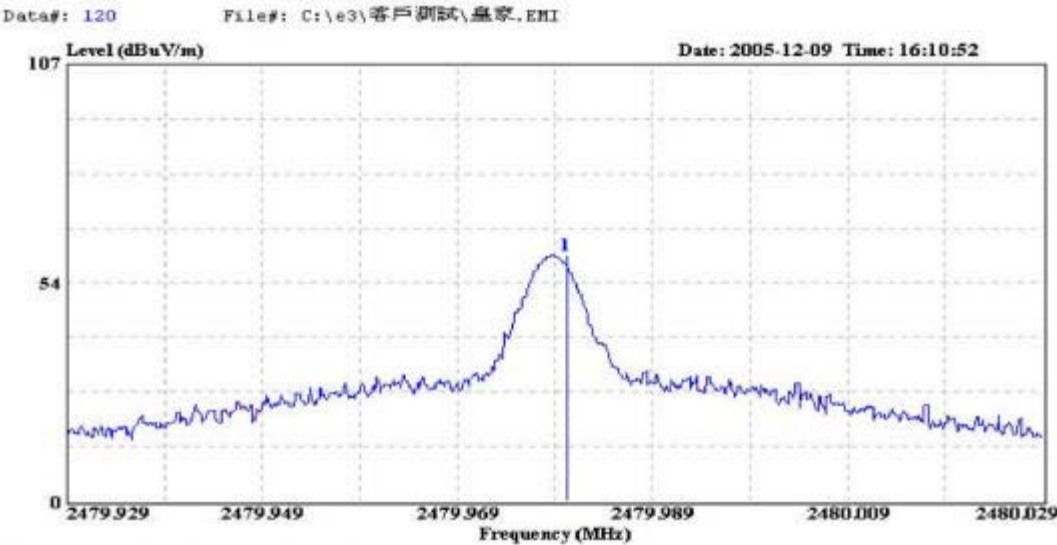
REPORT NO. : E940857

Channel : CH HIGH

Polarity : Horizontal



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Site : chamber no3 (Bear)
Condition : 3m HORN ANTENNA H.3 HORIZONTAL
EUT : E940857
Power : AC 120V 50Hz
Memo : Peak Value
Memo : The Peak Power Density
Memo : CH HIGH : 2480Hz

Freq	Level	Over	Limit	Read	
MHz	dBuV/m	Limit	Line	Level	Factor
1	2479.980	60.07	-----	62.01	-1.94

FCC ID : SHBBS4100

REPORT NO. : E940857

XI. List of Test Instruments

Test Mode	Instrument	Model No.	Serial No.	Next Cal. Date	Cal. Interval
Conduction (No.1)	R & S Receiver	ESHS10	830223/008	May 22, 2006	1Year
	Rolf Heine LISN	NNB-4/63TL	98008	May 01, 2006	1Year
	R & S LISN	ESH3-Z5	844982/039	Aug. 06, 2006	1Year
	Spectrum Analyzer	R3261A	91720076	June 08, 2006	1Year
	RF Cable	Rg400	N/A	May 12, 2006	1Year
	Schaffner ISN	T411	N/A	June 29, 2006	1Year
Radiation (OP No.1)	R & S Receiver	ESVS30	863342/012	Apr. 23, 2006	1Year
	Schaffner Pre-amplifier	CPA9232	1028	May 20, 2006	1Year
	COM-Power Horn Ant.	AH-118 (1GHz~18GHz)	10095	May 21, 2007	2Year
	Schwarzbeck Precision Dipole Ant	VHAP (30MHz~1GHz)	970 + 971 953 + 954	June 26, 2006	3Year
	R &S Signal Generator	SMY01	841104/037	Apr. 29, 2007	2Year
	RF Cable	No. 1	N/A	May 11, 2006	1Year
	EMCO Antenna	3142B (26MHz~2GHz)	9904-1370	Aug. 24, 2006	1Year
Chamber (No. 3)	Pre-Amplifier	CPA-9232	1027	Feb. 24, 2006	1Year
	Antenna	VULB9160	3074	July 24, 2006	1Year
	Signal Generator	SMY02	829846/0358	Jane 29, 2007	2Year
	RF Cable	NO.3	N/A	Feb. 19, 2006	1Year
	HORN ANTENNA	AH-118	10095	May 13, 2006	1Year

XII. EUT Photos

EUT Model No. BS4100



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FCC ID : SHBBS4100

REPORT NO. : E940857



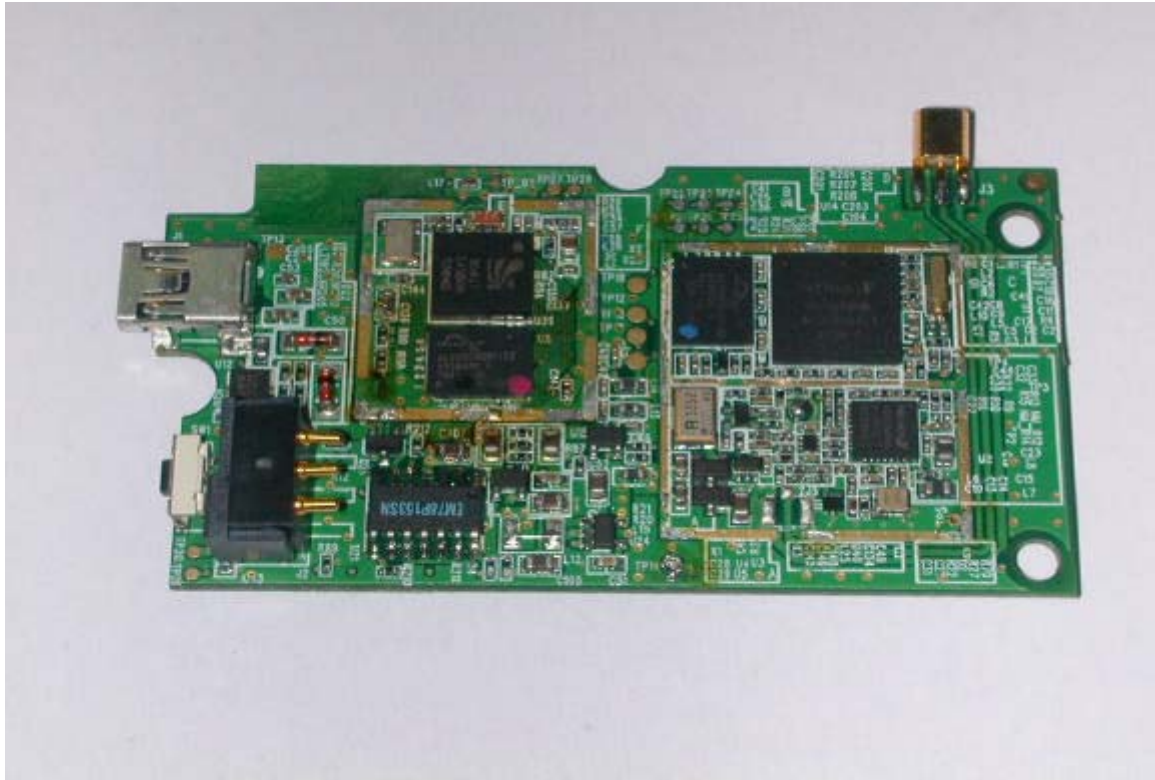
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PEP Testing Laboratory

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FCC ID : SHBBS4100

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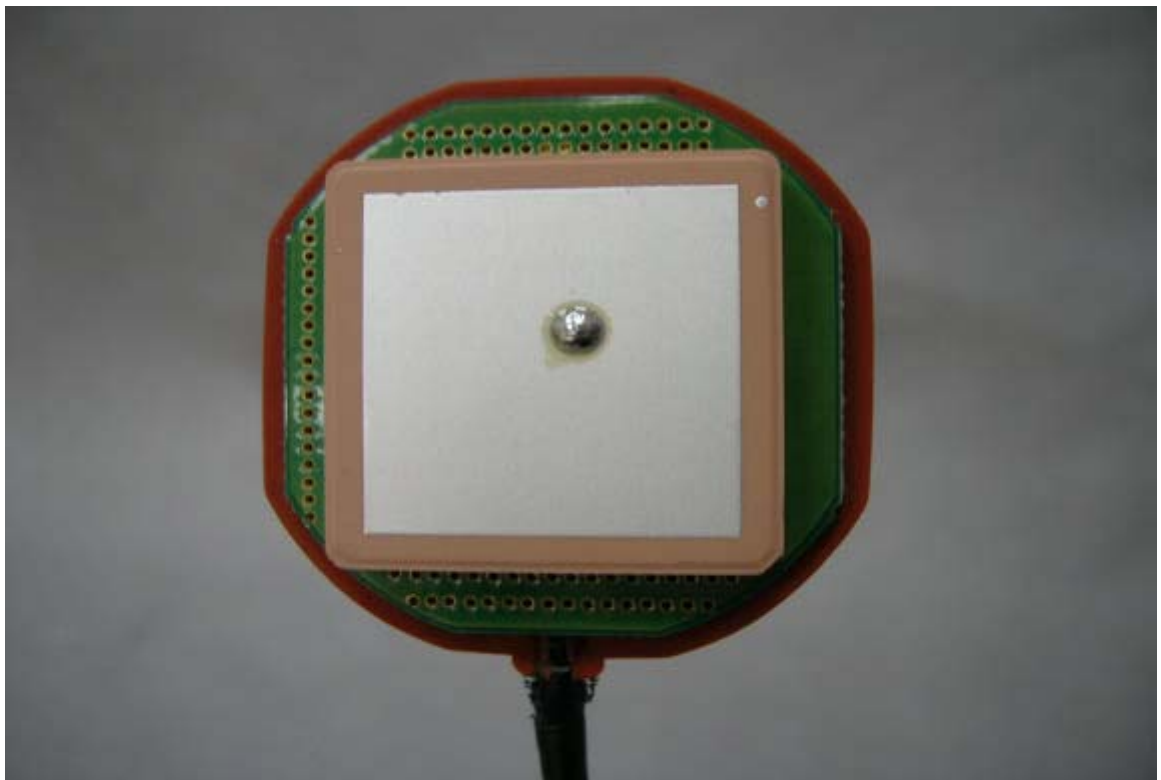
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