

FCC TEST REPORT

Equipment Under Test : Pocket PC
Model No. : PE2050A

Applicant : High Tech Computer Corp.
Address of Applicant : 1F, 6-3, Bau-Chian Rd., Hsin-Tien,, Taipei, 231,
Taiwan, R.O.C.

Manufacturer : High Tech Computer Corp.
Address of Manufacturer : 23, HsinHua Rd., Taoyuan City, 330, Taiwan, R.O.C.

Standards:

FCC Part 15 subpart C

In the configuration tested, the EUT complied with the standards specified above. The test data, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4(1992).

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan E&E Services or testing done by SGS Taiwan E&E Services in connection with distribution or use of the product described in this report must be approved by SGS Taiwan E&E Services in writing.

Tested by : Robert Chang **Date** : 2003. Mar. 7

Approved by : Jason Lin **Date** : 2003. Mar. 8

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1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. (FCC Registration number: 573967)
 1F, No. 134, Wukung Road, Wuku industrial zone
 Taipei county , Taiwan , R.O.C.
 Telephone : +886-2-2299-3279
 Fax : +886-2-2298-2698
 Internet : <http://www.sgs.com.tw>

1.2 Details of Applicant

Name : High Tech Computer Corp.
 Address : 23, HsinHua Rd., Taoyuan City, 330, Taiwan, R.O. C.

Contact : Mr. Jesse Kuo
 Telephone : +886-2-89124138

1.3 Description of EUT(s)

1	Product name	Pocket PC
2	Product ID	PE2050A
3	Antenna Type	Integral L type
4	Antenna Gain	1 dbi
5	RF output power	-2 dbm
6	Supply Voltage	AC input: 100-240 VAC 0.4A 50~60Hz, DC output: 5V 2A
7	Battery voltage	3.7V to 4.2V
8	Carrier Frequency	2402MHz to 2480MHz
9	Modulation Method	GFSK,1Mbps,0.5BT Gaussian
10	Hopping	1600hops/sec, 1MHz channel space
11	Operation Temperature	0 to +40 degree
12	Compliant	Bluetooth Specification Ver1.1

1.4 Operation Procedure

Since Bluetooth is a FHSS system, it is difficult to measure the parameters under hopping mode. The output power and operating frequency are NOT End-user adjustable. Applicant offer a engineering software "BlueDolphin" to control the EUT. Setting of the software parameters are set as default. Operating frequency are set as testing required.

The lowest operating frequency within Bluetooth specification is 2402Mhz, and highest operating frequency is 2480Mhz. So the frequency above are used as the lowest and highest frequency in the testing, and the middle frequency is set as 2441Mhz.

The pocket PC is powered by internal battery. During the testing period, it also connects the external power adapter. The manufacturer provide two brands of power adaptor, Phihong and Delta, when they ship out the PDA to customers. So we test both in conducted emission.

1.5 Testing Method

The testing standard follows CFR 47, Part 15.247 , and measurement method according to Public Notice DA00-705 (March 2000).

2.Summary of Results

subclause	Parameter to be measures	Verdict	Page
15.207	Conducted Limits	<i>PASS</i>	7
15.209	Radiated emission Limits, general requirement	<i>PASS</i>	12
15.247(a)(1)	Channel Spacing	<i>PASS</i>	19
15.247(a)(1)(ii)	20db bandwidth / No. of channels	<i>PASS</i>	20
15.247(a)(1)(ii)	Average Time of Occupancy	<i>PASS</i>	25
15.247(b)(1)	Peak Output power	<i>PASS</i>	27
15.247(c)	Band-Edge Emission	<i>PASS</i>	30
15.247(c)	Spurious Emission under 25Ghz	<i>PASS</i>	32

3. Instruments List

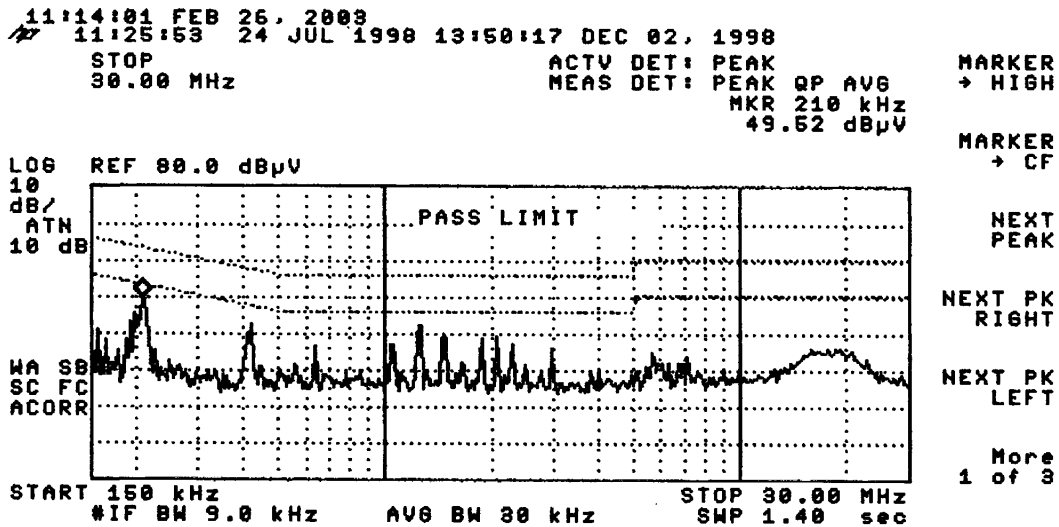
Instrument	Model	Serial number	Calibration date
Desktop PC	HP 723D	TW23420337	N/A
Spectrum Analyser	Agilent 7405A	US40240202	May 22, 2002
Antenna	Schwarzbeck BBHA9170A	145/146	July 01, 2002
Antenna	Schwarzbeck BBHA9120A	309/320	July 01, 2002
Antenna	Schwarzbeck VULB9163	152	July 01, 2002
RF Signal generator	Agilent 83752A	3601A02720	Sep. 04, 2002
EMC Analyser	HP 8594EM	3624A00203	Dec. 13, 2002
EMI Test Receiver	R&S ESCS 30	828985/004	Oct. 11, 2002
Transient Limiter	HP 11947A	3107A02062	Jul. 24, 2002
L.I.S.N	Rolf-Heine NNB-2/16Z	99012	Oct. 08, 2002

4. Measurements

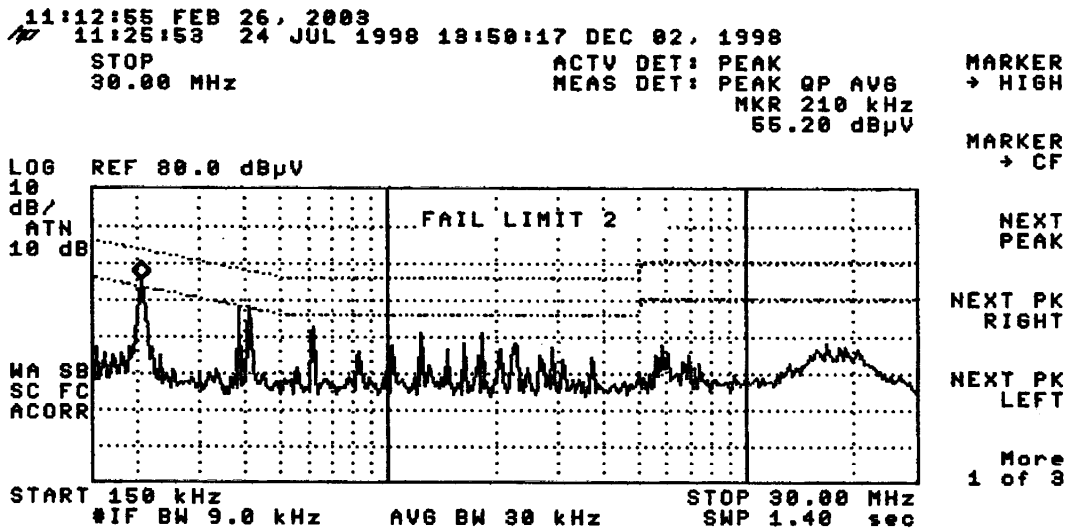
4.1 Conducted Limits

SUBCLAUSE 15.207

Line (Delta)



Neural(Delta)



Product Name: Pocket PC

Test Date: Feb. 26. 2003

Model No.: PE2050A

Tester : Gallon

Test Mode: Operating

Temperature 22 °C

Test Result: PASS

Humidity: 57 %

Main Terminals:L

FREQ MHz	QP1 dBuV	AVG1 dBuV	Factor	QP2 dBuV	AVG 2	QP Limit	AV Limit	QP Offset	AV Offset
0.22	44.6	39.8	2.88	47.48	42.68	62.94	55.02	-15.46	-12.34
0.9	41.6	33.2	2.82	44.42	36.02	56.00	46.00	-11.58	-9.98
1.8	38.3	24.6	3.04	41.34	27.64	56.00	46.00	-14.66	-18.36
5.6	34.9	26.2	3.21	38.11	29.41	60.00	50.00	-21.89	-20.59
10.67	23	16.7	3.32	26.32	20.02	60.00	50.00	-33.68	-29.98
20.73	29	22.7	3.62	32.62	26.32	60.00	50.00	-27.38	-23.68

Product Name: Pocket PC

Test Date: Feb. 26. 2003

Model No.: PE2050A

Tester : Gallon

Test Mode: Operating

Temperature 22 °C

Test Result: PASS

Humidity: 57 %

Main Terminals:N

FREQ MHz	QP1 dBuV	AVG1 dBuV	Factor	QP2 dBuV	AVG 2	QP Limit	AV Limit	QP Offset	AV Offset
0.23	43.1	35.4	2.87	45.97	38.27	62.6	54.58	-16.6	-16.31
0.90	40.60	32.10	2.82	43.42	34.92	56.00	46.00	-12.58	-11.08
1.80	38.30	22.60	3.04	41.34	25.64	56.00	46.00	-14.66	-20.36
3.18	24.10	16.80	3.14	27.24	19.94	57.57	47.57	-30.33	-27.63
5.60	33.10	25.40	3.21	36.31	28.61	60.00	50.00	-23.69	-21.39
20.74	30.60	21.80	3.62	34.22	25.42	60.00	50.00	-25.78	-24.58

1. "-" denotes the emission level was - 10 dB beneath the Average limit,so nothing need to re-check anymore.

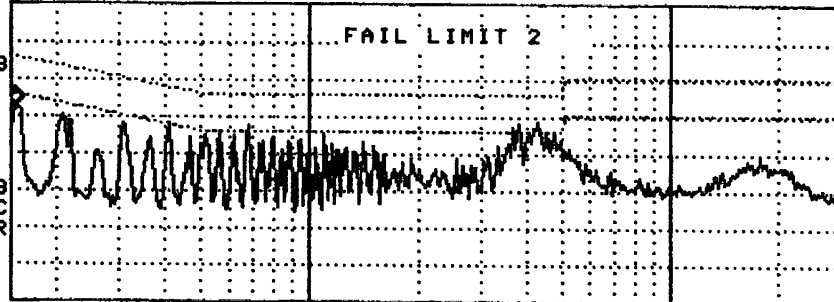
2. QP1/ AVG1 value means the QP/AV reading without the factor.

3. QP2/AVG2 value means the QP/AV final reading with the factor.

Line (Phihong)

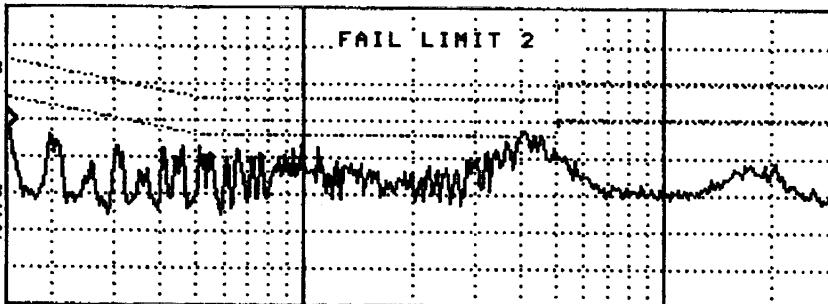
10:54:21 FEB 26, 2003

11:25:53 24 JUL 1998 13:50:17 DEC 02, 1998

STOP
30.00 MHzACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 150 kHz
52.99 dB μ VMARKER
+ HIGHMARKER
+ CFNEXT
PEAKNEXT PK
RIGHTNEXT PK
LEFTMore
1 of 3LOG REF 80.0 dB μ V10
dB/
ATN
10 dBWA SB
SC FC
ACORRSTART 150 kHz
#IF BW 9.0 kHz
AVG BW 30 kHz
STOP 30.00 MHz
SWP 1.40 sec**Neural(Phihong)**

10:53:20 FEB 26, 2003

11:25:53 24 JUL 1998 13:50:17 DEC 02, 1998

STOP
30.00 MHzACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 150 kHz
47.48 dB μ VMARKER
+ HIGHMARKER
+ CFNEXT
PEAKNEXT PK
RIGHTNEXT PK
LEFTMore
1 of 3LOG REF 80.0 dB μ V10
dB/
ATN
10 dBWA SB
SC FC
ACORRSTART 150 kHz
#IF BW 9.0 kHz
AVG BW 30 kHz
STOP 30.00 MHz
SWP 1.40 sec

Product Name: Pocket PC

Test Date: Feb. 26. 2003

Model No.: PE2050A

Tester : Gallon

Test Mode: Operating

Temperature 22 °C

Test Result: PASS

Humidity: 57 %

Main Terminals:L

FREQ MHz	QP1 dBuV	AVG1 dBuV	Factor	QP2 dBuV	AVG 2	QP Limit	AV Limit	QP Offset	AV Offset
0.52	39.7	32.7	2.90	42.60	35.60	56.00	46.00	-13.40	-10.40
0.93	34	24.1	2.81	36.81	26.91	56.00	46.00	-19.19	-19.09
1.31	34.4	25.7	2.89	37.29	28.59	56.00	46.00	-18.71	-17.41
3.61	36.5	27.8	3.15	39.65	30.95	58.15	48.15	-18.49	-17.19
5.67	30.6	25.1	3.21	33.81	28.31	60.00	50.00	-26.19	-21.69
19.87	31.1	24.6	3.60	34.70	28.20	60.00	50.00	-25.30	-21.80

Product Name: Pocket PC

Test Date: Feb. 26. 2003

Model No.: PE2050A

Tester : Gallon

Test Mode: Operating

Temperature 22 °C

Test Result: PASS

Humidity: 57 %

Main Terminals:N

FREQ MHz	QP1 dBuV	AVG1 dBuV	Factor	QP2 dBuV	AVG 2	QP Limit	AV Limit	QP Offset	AV Offset
0.23	31.6	25.4	2.87	34.47	28.27	62.6	54.58	-28.1	-26.31
1.01	30.60	23.10	2.80	33.40	25.90	56.00	46.00	-22.60	-20.10
1.33	32.80	26.70	2.90	35.70	29.60	56.00	46.00	-20.30	-16.40
3.18	35.40	26.70	3.14	38.54	29.84	57.57	47.57	-19.03	-17.73
5.60	28.70	22.10	3.21	31.91	25.31	60.00	50.00	-28.09	-24.69
20.74	30.60	24.20	3.62	34.22	27.82	60.00	50.00	-25.78	-22.18

1. " -" denotes the emission level was - 10 dB beneath the Average limit,so nothing need to re-check anymore.

2. QP1/ AVG1 value means the QP/AV reading without the factor.

3. QP2/AVG2 value means the QP/AV final reading with the factor.

4.1.1 Limits (EN55022)

Frequency range Mhz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

4.2 Radiated emission Limits, general requirement SUBCLAUSE 15.209

EUT transmit at Lowest channel, 2402Mhz

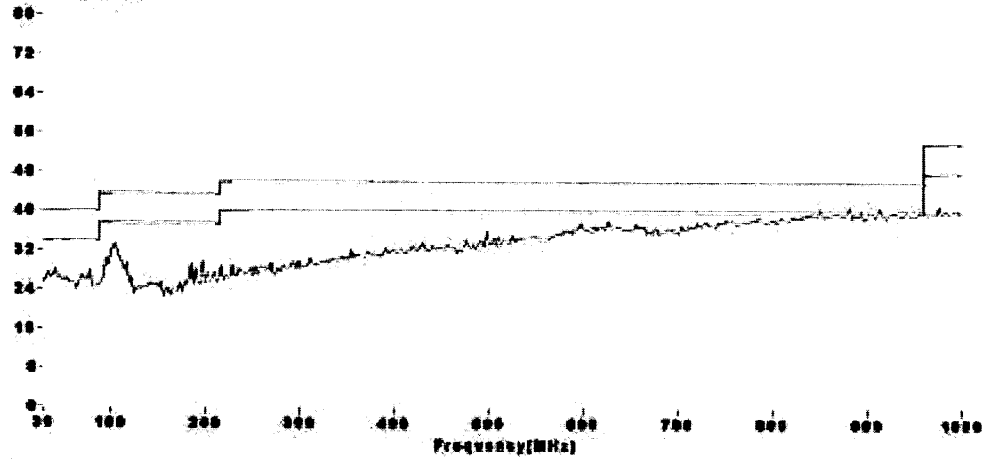
Vertical

**SGS EMC Lab. Site 2
EMI TESTING REPORT**

Customer: HTC
 Model : PE2050A
 Spec. :
 Ser. No. :
 Limit : FCC B

Date: 2003-03-06 Time: 11:17
 Polar. : Vertical- 3M
 Report No.: ER/20004
 File : 1-1
 Tester : Robert
 Temp. (C): 21.0 Humid. (%): 61

Level (dBuV)

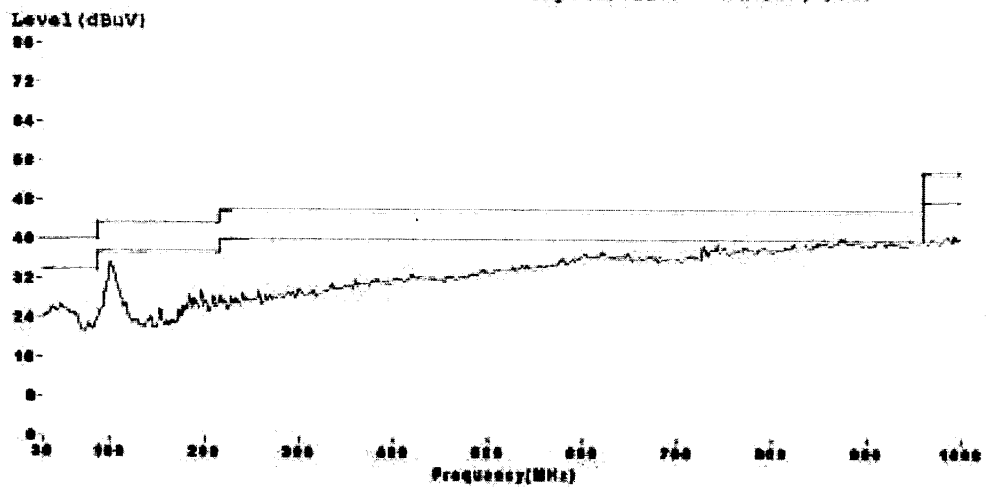


MEMO:

Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
MHz	dB	dB	dB	dB	dB	dB	dB

SGS EMC Lab. Site 2
EMI TESTING REPORT

Date:2003-03-06 Time:11:13
Polar. :Horizontal- 3M
Report No.:ER/20004
File :1
Tester :Robert
Tmp.(C):21.0 Humid.(%):61



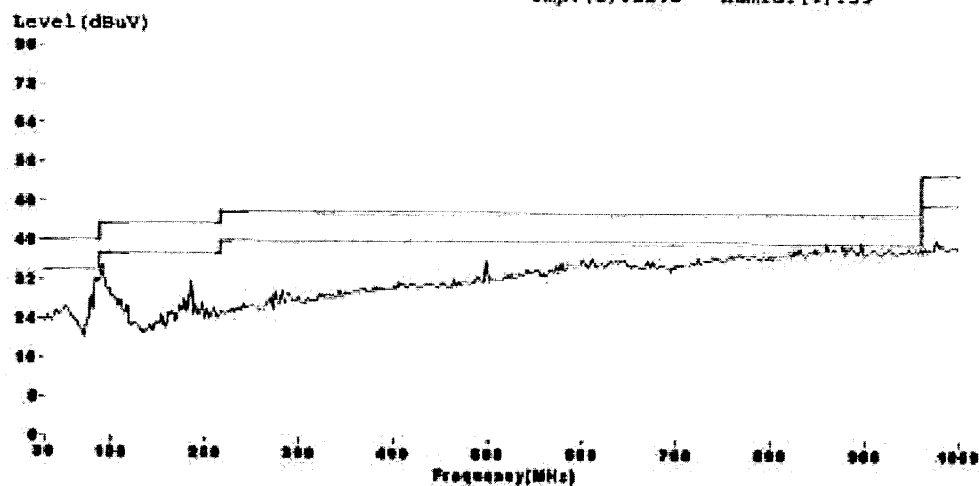
MEMO :

Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dB	dB	dB	dB	dB	dB	dB

Vertical

Customer: BTC
Model : PE2050A
Spec. :
Ser. No.:
Limit : FCC B

Date:2003-03-07 Time:14:22
Polar. :Vertical- 3M
Report No.:ER/20004
File :r-1
Tester :Robert
Tmp. (C):22.0 Humid.(%):59



MEMO:

Freq	Level	Over limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
MHz	dB	dB	dB	dB	dB	dB	dB

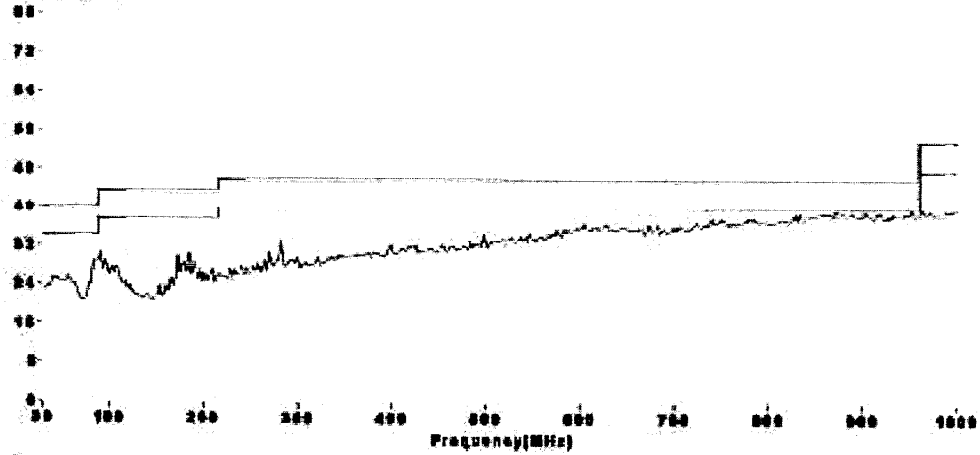
Horizontal

SGS EMC Lab. Site 2
EMI TESTING REPORT

Customer: HTC
 Model : PE2050A
 Spec. :
 Ser. No.:
 Limit : FCC B

Date: 2003-03-07 Time: 13:54
 Polar. : Horizontal- 3M
 Report No.: ER/20004
 File : -1
 Tester : Robert
 Temp. (C): 22.0 Humid. (%): 59

Level (dBuV)



MEMO:

Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
MHz	dB	dB	dB	dB	dB	dB	dB

EUT transmit at highest channel, 2480Mhz

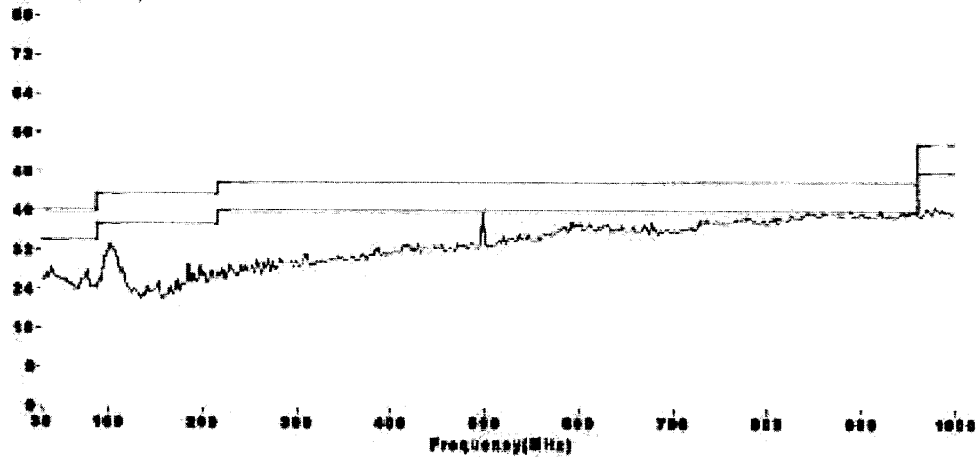
Vertical

SGS EMC Lab. Site 2
EMI TESTING REPORT

Customer: HTC
Model : PE2050A
Spec. :
Ser. No.:
Limit : FCC B

Date: 2003-03-06 Time: 11:30
Polar. : Vertical- 3M
Report No.: ER/20004
File : -1
Tester : Robert
Temp. (C): 21.0 Humid. (%): 61

Level (dBuV)



MEMO:

Freq	Level	Over	Limit	Read	Antenna	Cable	Other
----	-----	Limit	Line	Level	Factor	Factor	Factor
MHz	dB	dB	dB	dB	dB	dB	dB

Horizontal

SGS EMC Lab. Site 2
EMI TESTING REPORT

Customer: NTC
 Model : PE2050A
 Spec. :
 Ser. No.:
 Limit : FCC B

Date: 2003-03-06 Time: 11:26
 Polar. : Horizontal- 3M
 Report No.: ER/20004
 File : r-1
 Tester : Robert
 Temp. (C): 21.0 Humid. (%): 61

Level (dBuV)

69-

72-

64-

66-

48-

49-

32-

24-

16-

8-

0-

Frequency (MHz)

MEMO:

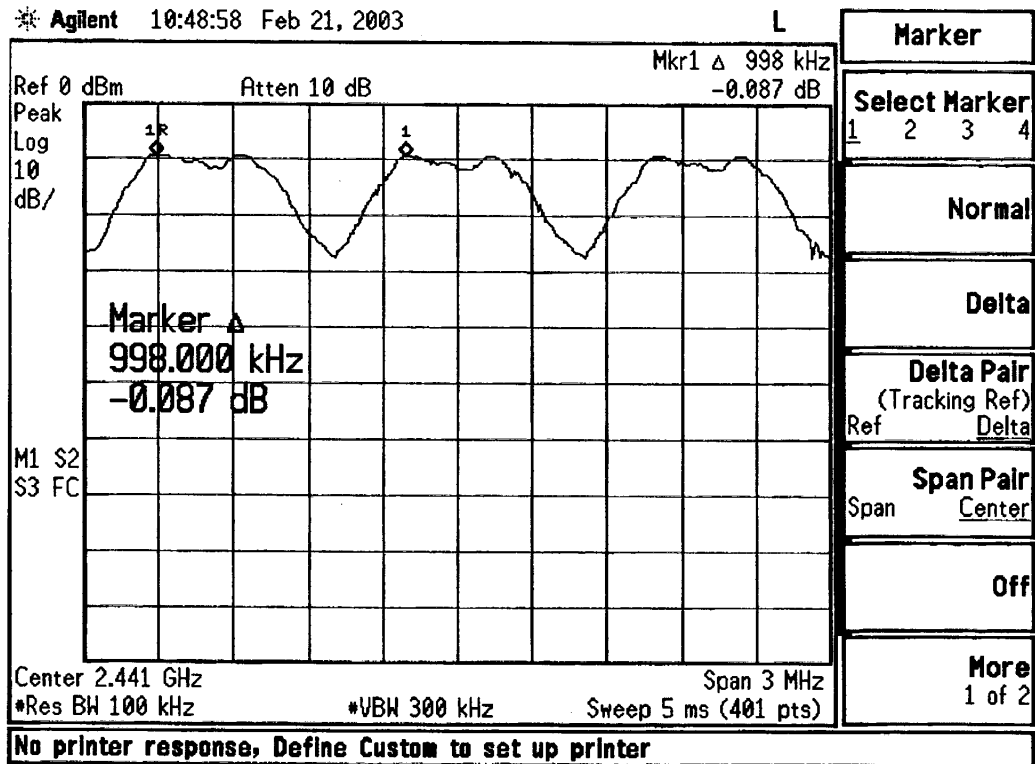
Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
MHz	dB	dB	dB	dB	dB	dB	dB

4.2.1 Limits

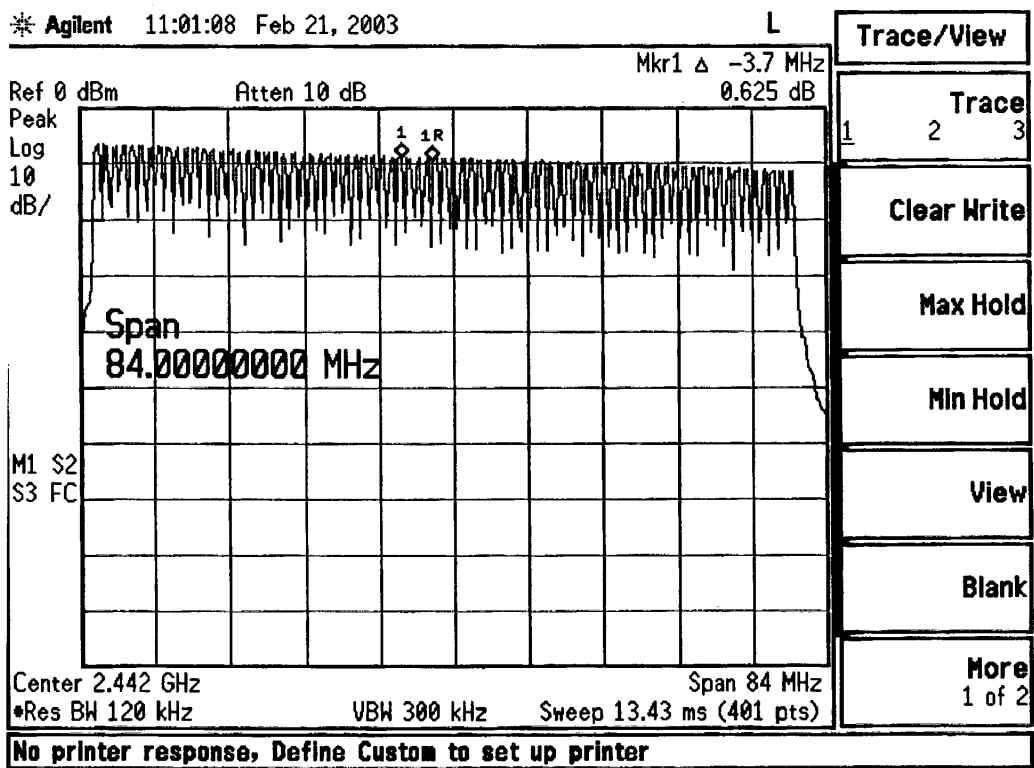
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

4.3 Channel Spacing

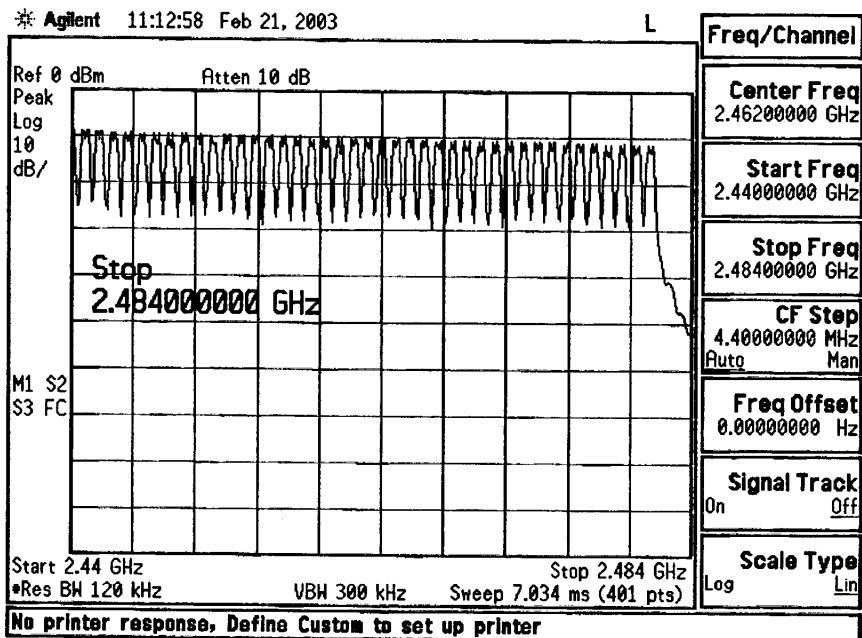
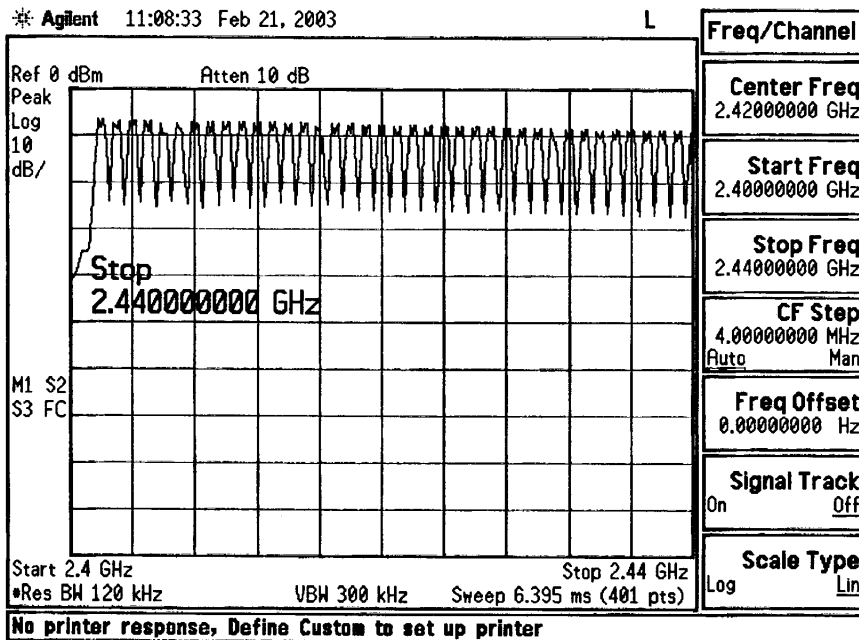
SUBCLAUSE15.247(a)(1)



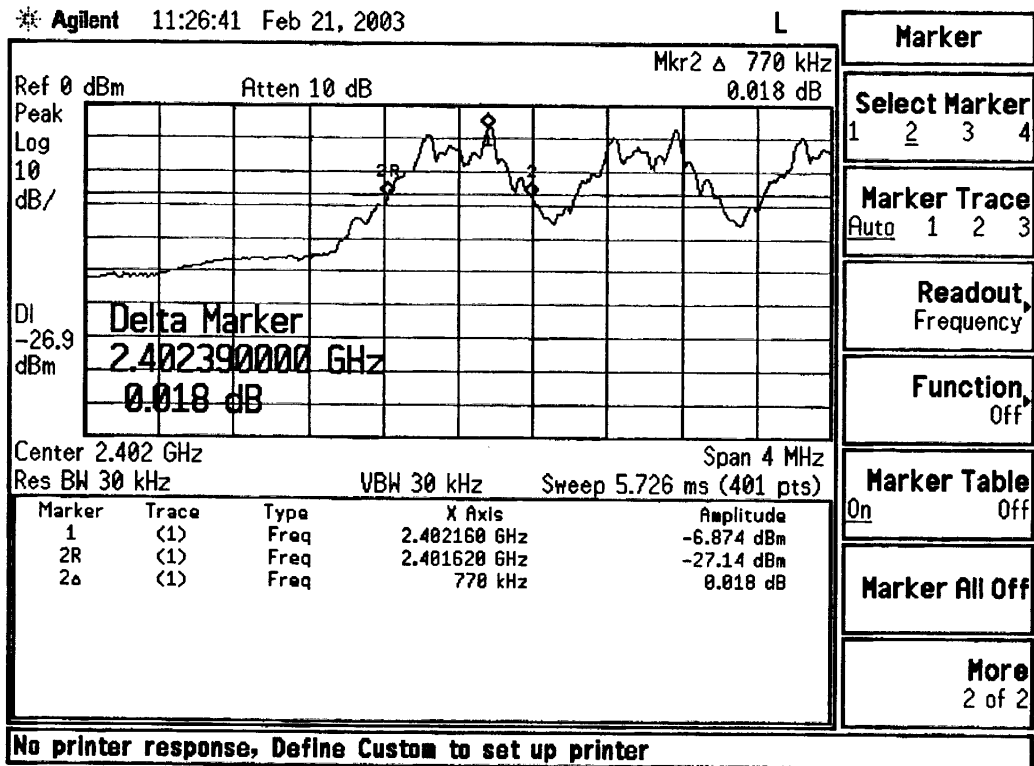
The channel spacing is 998Khz

4.4 No. of carrier frequency / 20db Bandwidth**SUBCLAUSE15.247(a)(1)(ii)*****The Number of Channels= 79***

Split the whole frequency band into two.

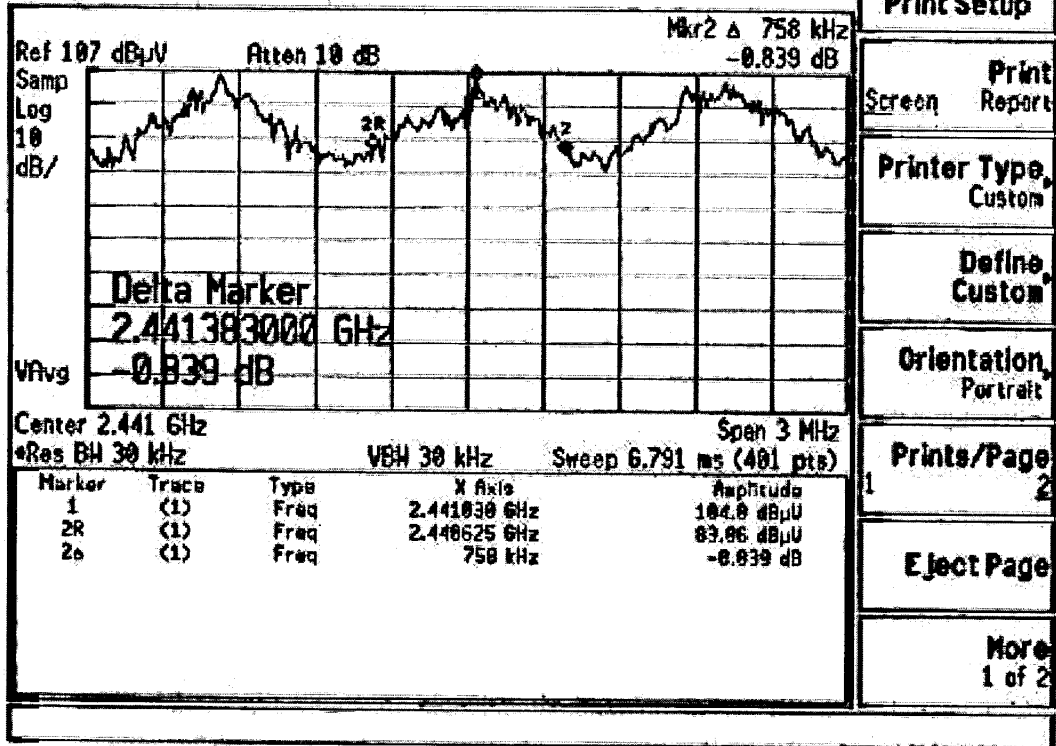


20dB bandwidth at lowest (2402Mhz), middle (2441Mhz), highest channel(2480Mhz)



channel bandwidth = 770 Khz

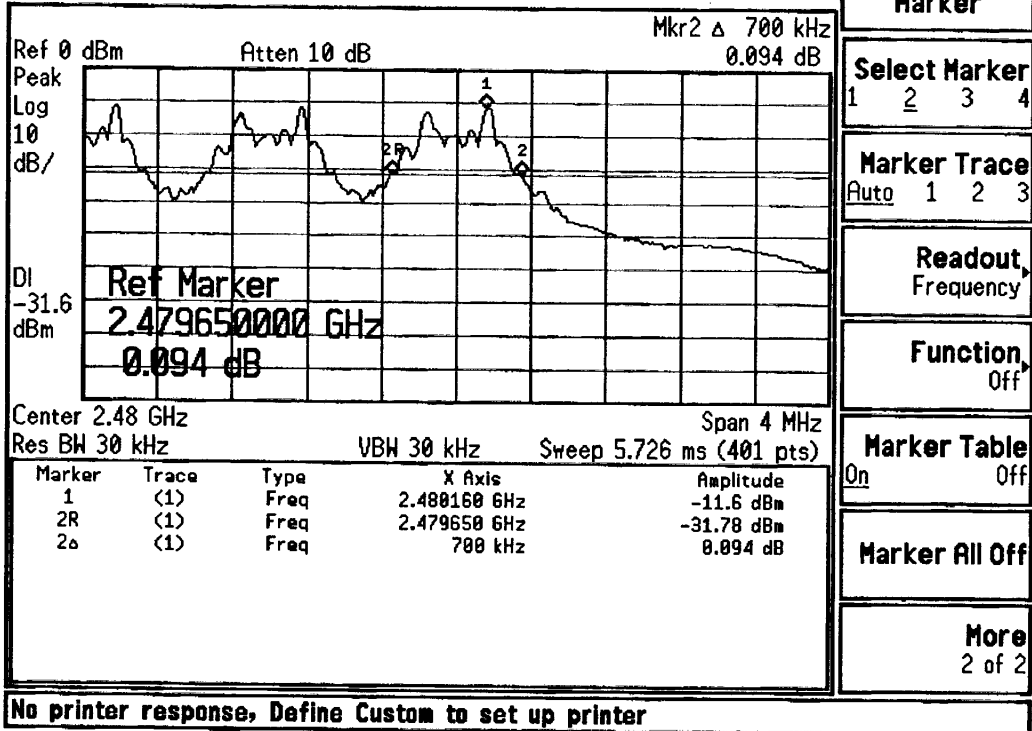
* Agilent 11:08:11 Mar 8, 2003



channel bandwidth = 750 Khz

* Agilent 11:31:50 Feb 21, 2003

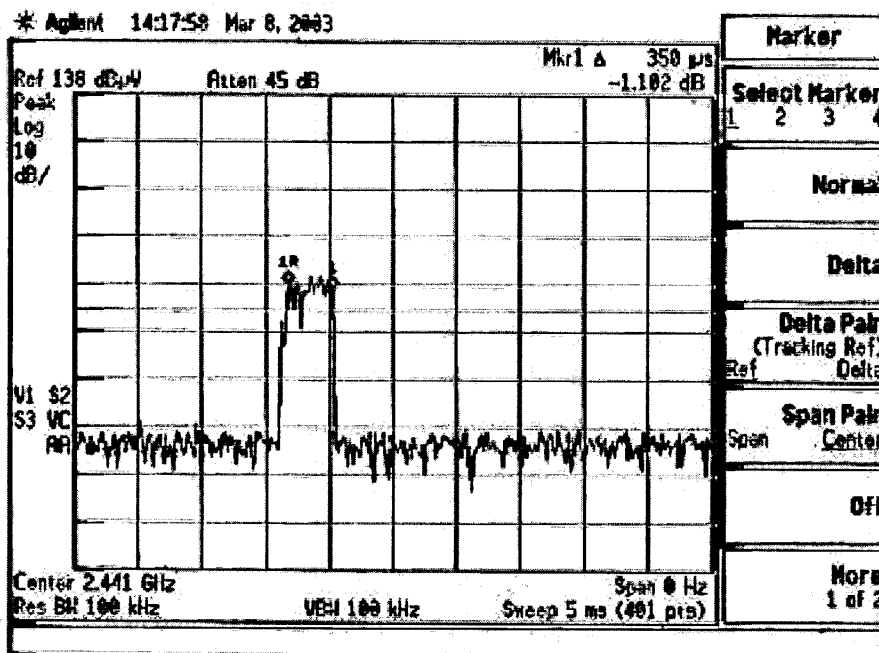
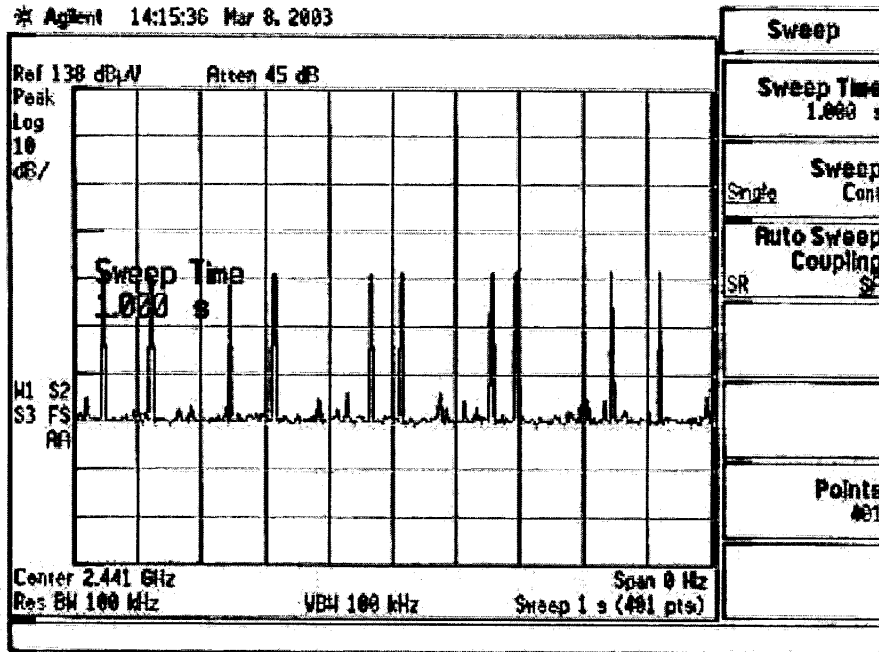
L



channel bandwidth = 700 KHz

4.5 Average Time of Occupancy

SUBCLAUSE 15.247(a)(1)(ii)



4.5.1 calculation

At channel 2441Mhz, there are 10 bursts in 1 sec. Time period of each burst is 350 μ Sec. So the occupancy time within 30 second is $350 \times 10 \times 30 = 105000 \mu$ Sec = 105 mSec = 0.105 Sec.

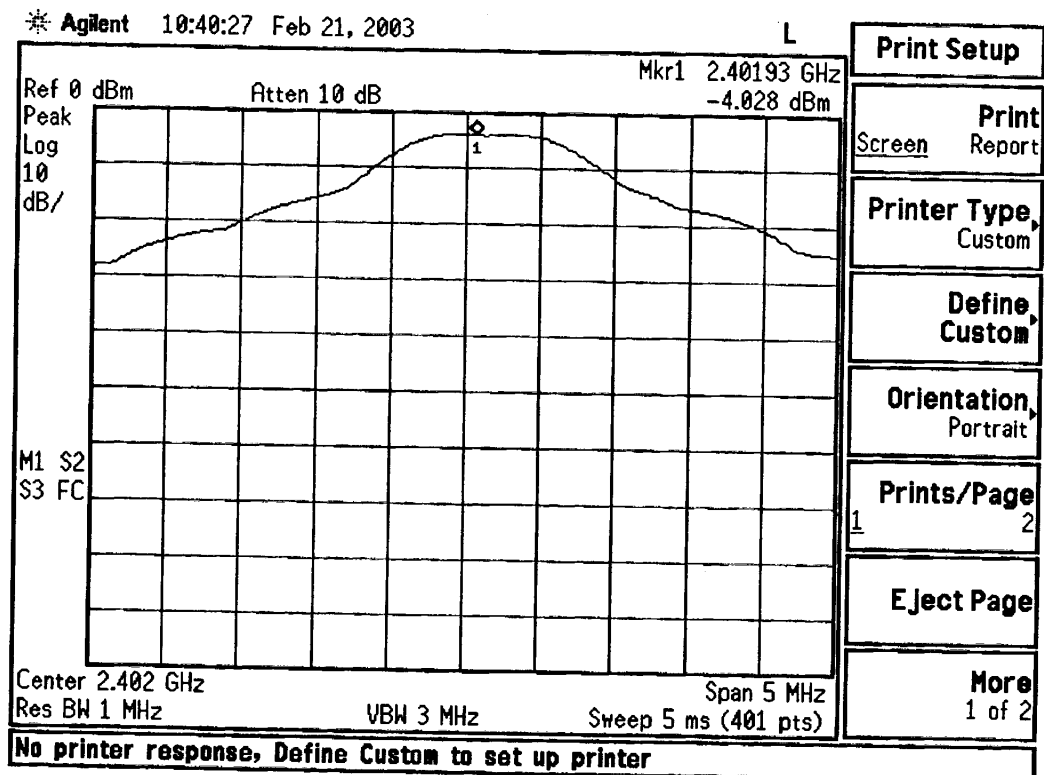
4.5.2 Limits

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

The EUT comply with the requirement in Sec 15.247 (a)(1) that use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

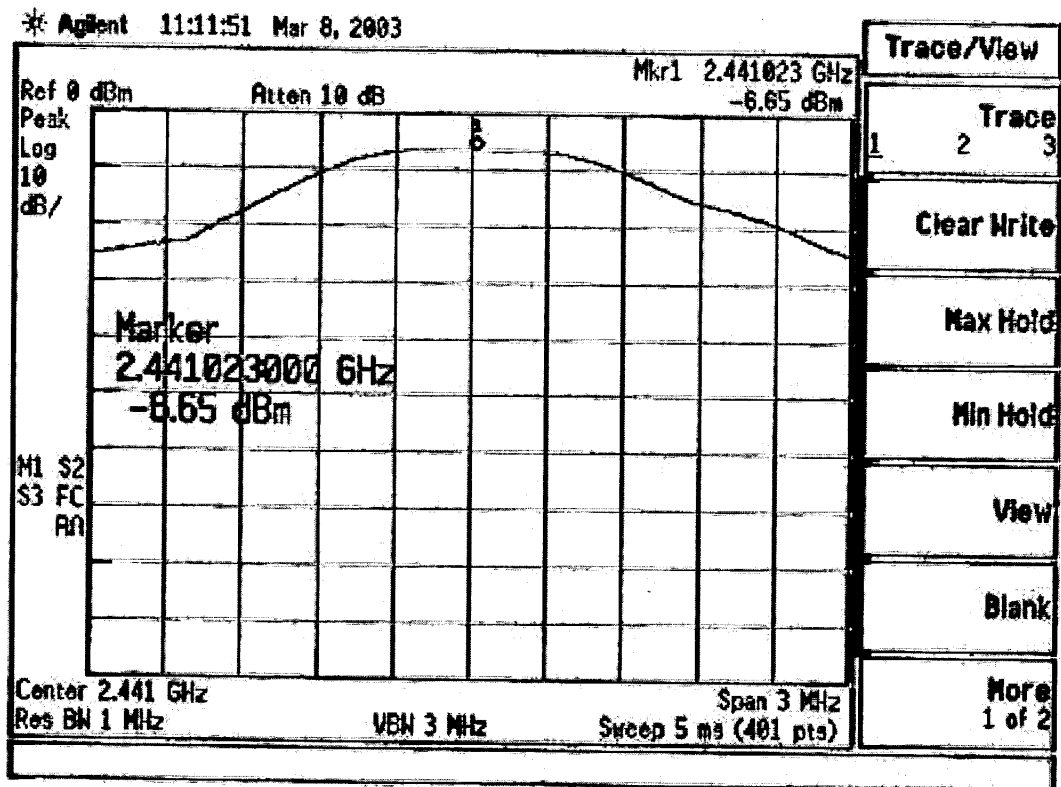
4.6 Peak output Power**SUBCLAUSE 15.247(b)(1)**

Transmitter transmit at lowest channel (2402Mhz)



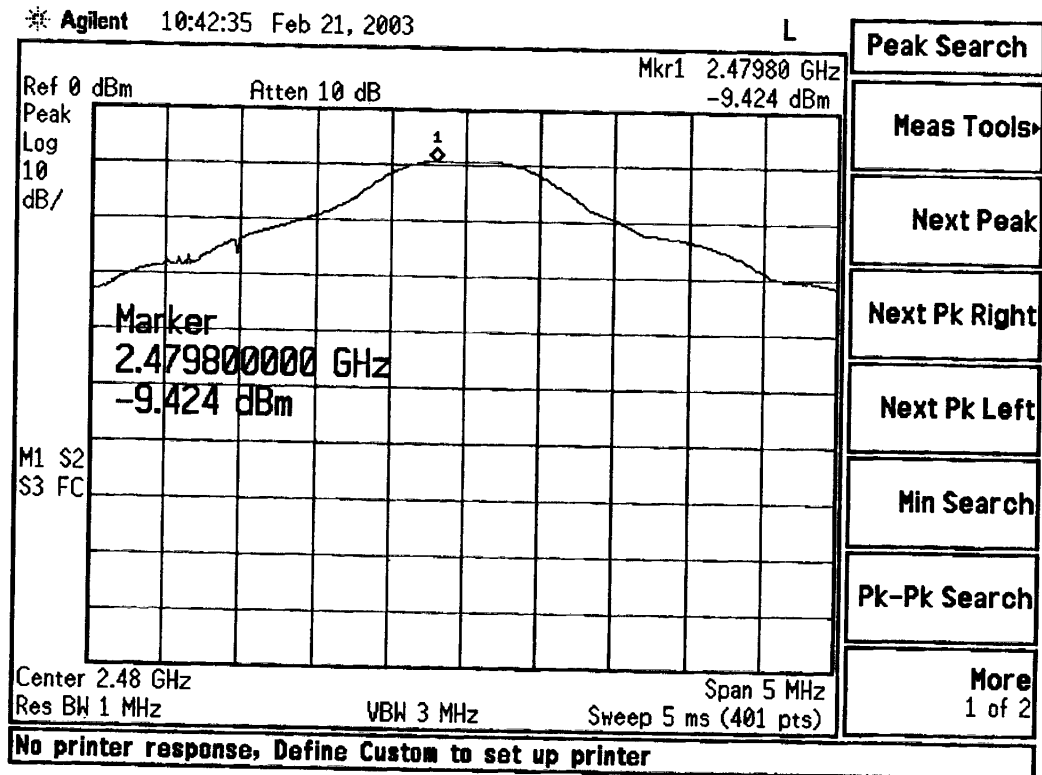
$$\text{Peak Power} = -4.028 + 2.2 \text{ (cable loss)} = -1.828 \text{ (dbm)}$$

Transmitter transmit at middle channel (2441Mhz)



$$\text{Peak Power} = -6.65 + 2.2 \text{ (cable loss)} = -4.45 \text{ (dbm)}$$

Transmitter transmit at highest channel (2480Mhz)



Peak Power = $-9.424 + 2.2 = -7.224$ (dbm)

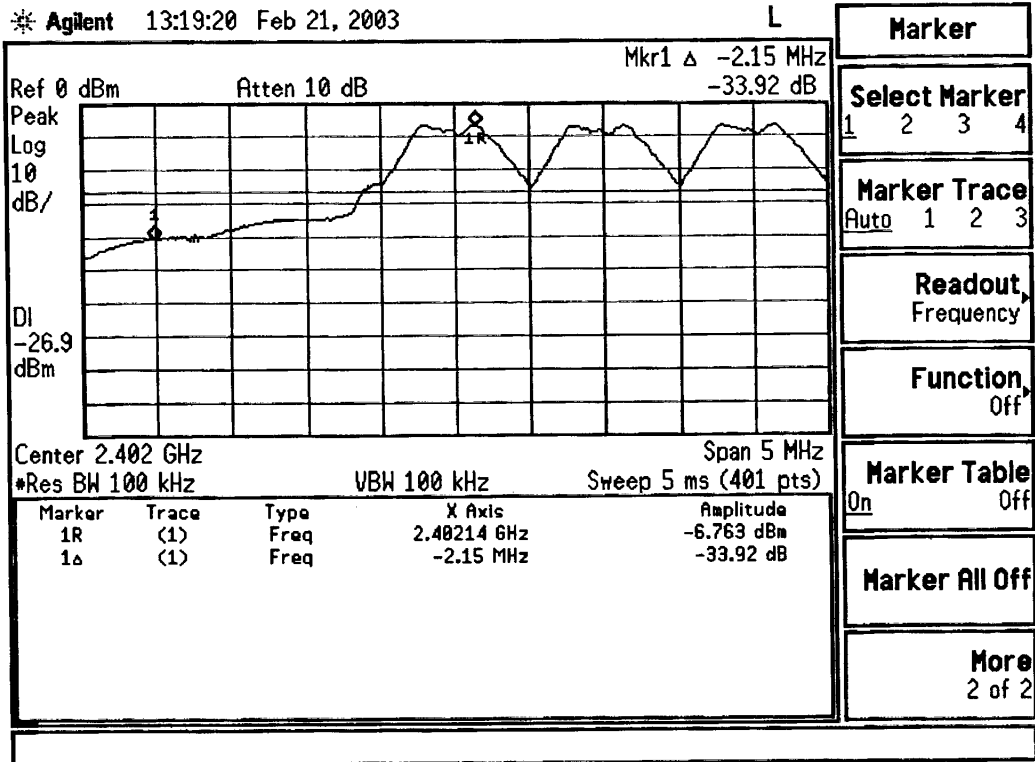
The Maximum power at these three channels is -1.828 dbm = 0.656mW

Limits:

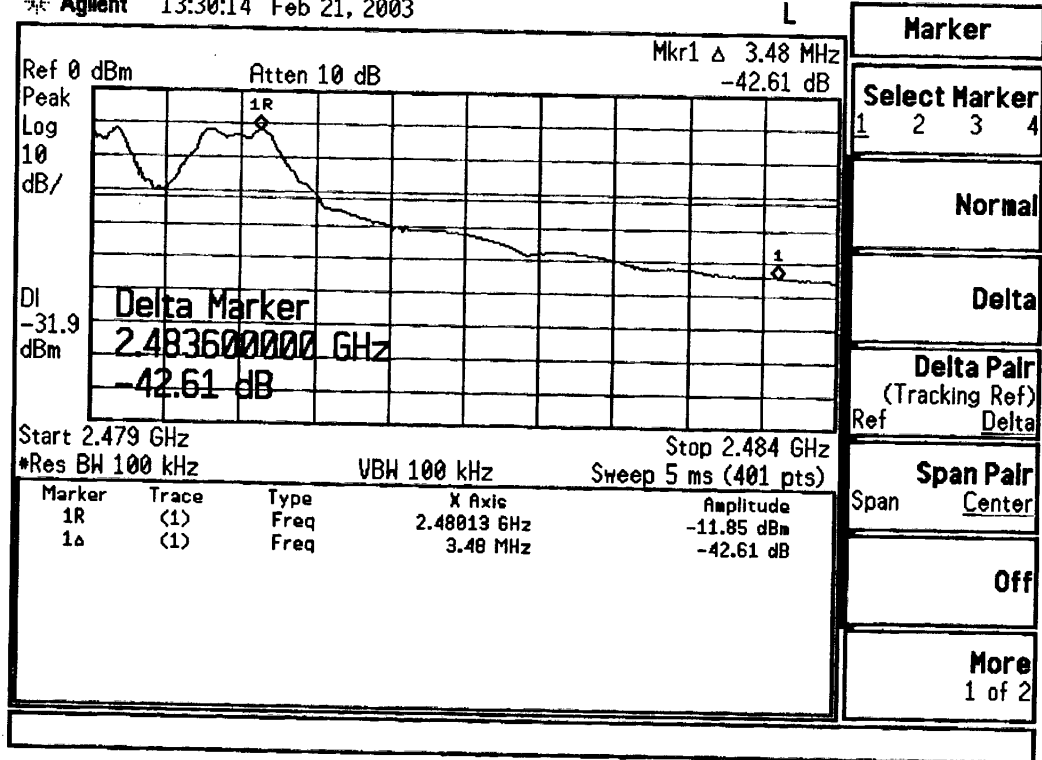
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, all frequency hopping systems in the 5725-5850 MHz band, and all direct sequence systems: 1 watt.

4.7 Band Edge emission

SUBCLAUSE15.247(c)



* Agilent 13:30:14 Feb 21, 2003



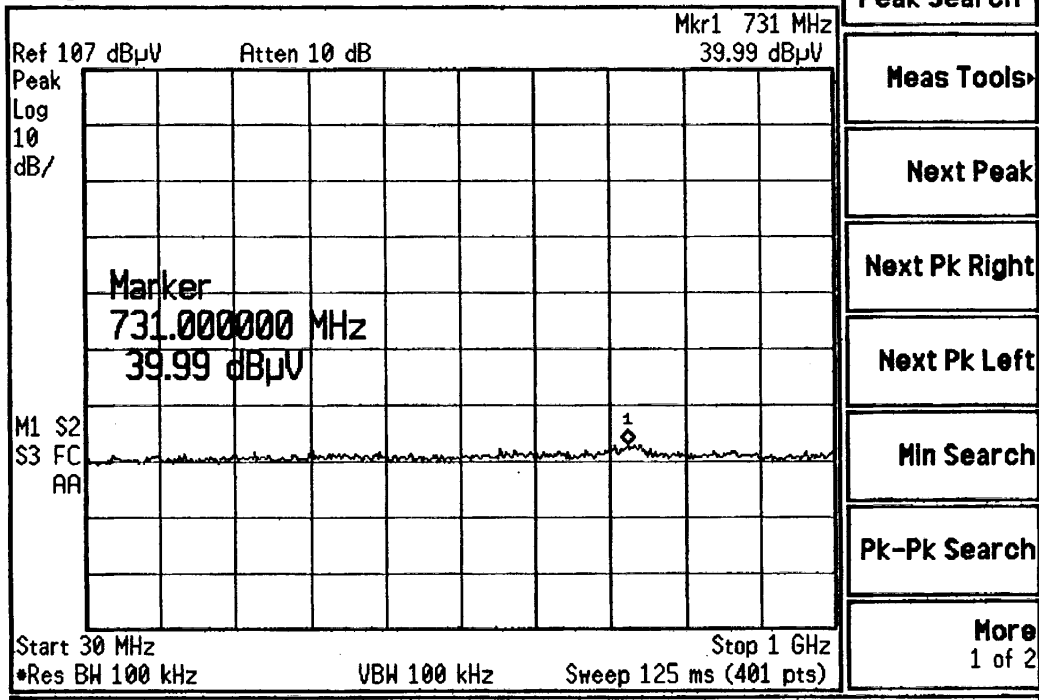
4.7.1 Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,

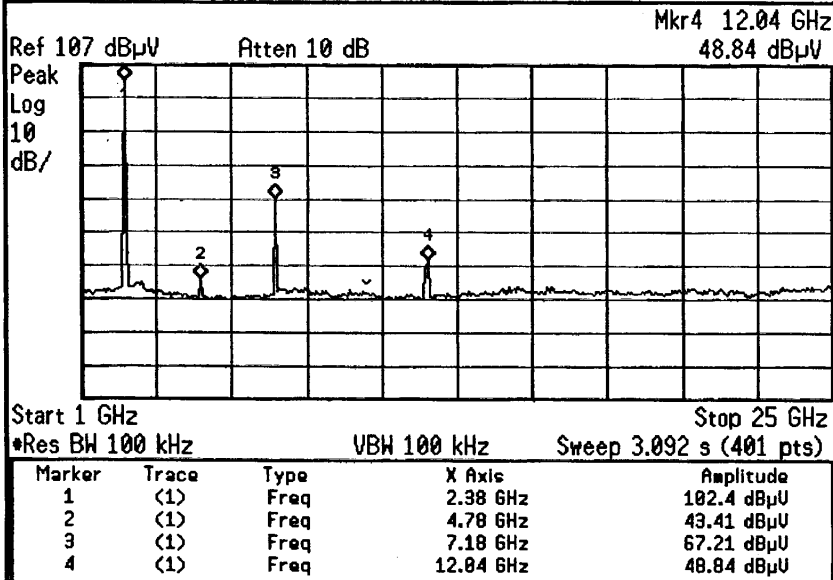
4.8 Spurious Emission under 25Ghz**SUBCLAUSE15.247(c)****4.8.1 conducted measurement**

EUT operating at lowest frequency ,2402Mhz

* Agilent 11:38:19 Mar 10, 2003



* Agilent 15:38:32 Mar 7, 2003



Marker

Select Marker

1 2 3 4

Marker Trace

Auto 1 2 3

Readout
FrequencyFunction
Off

Marker Table

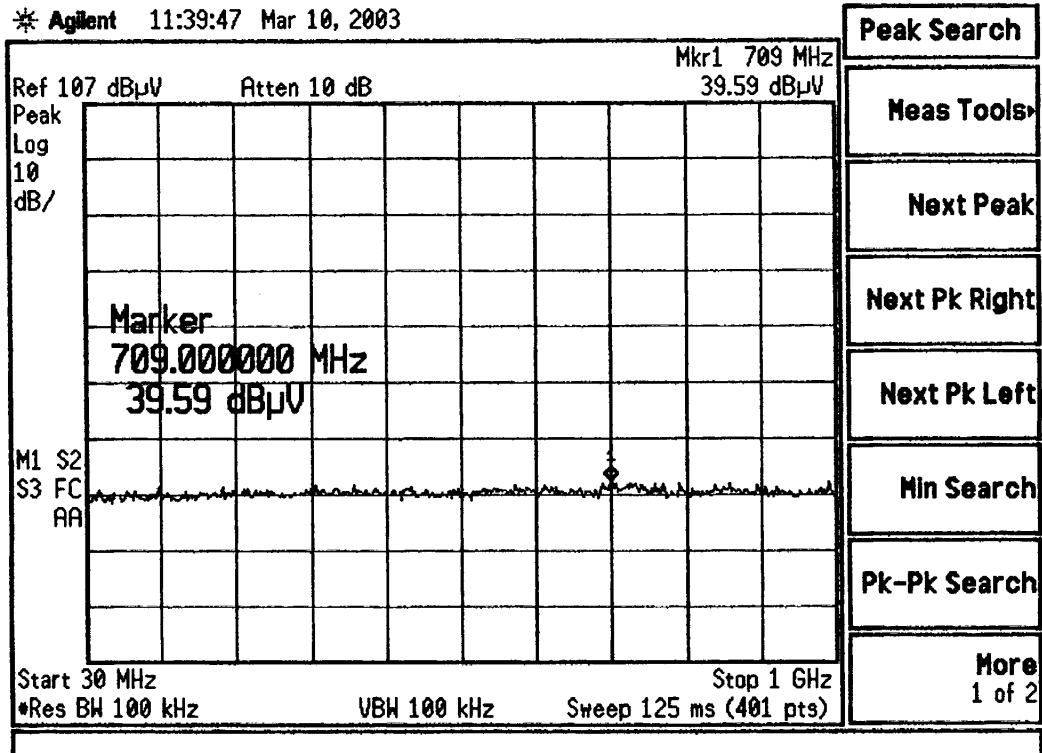
On Off

Marker All Off

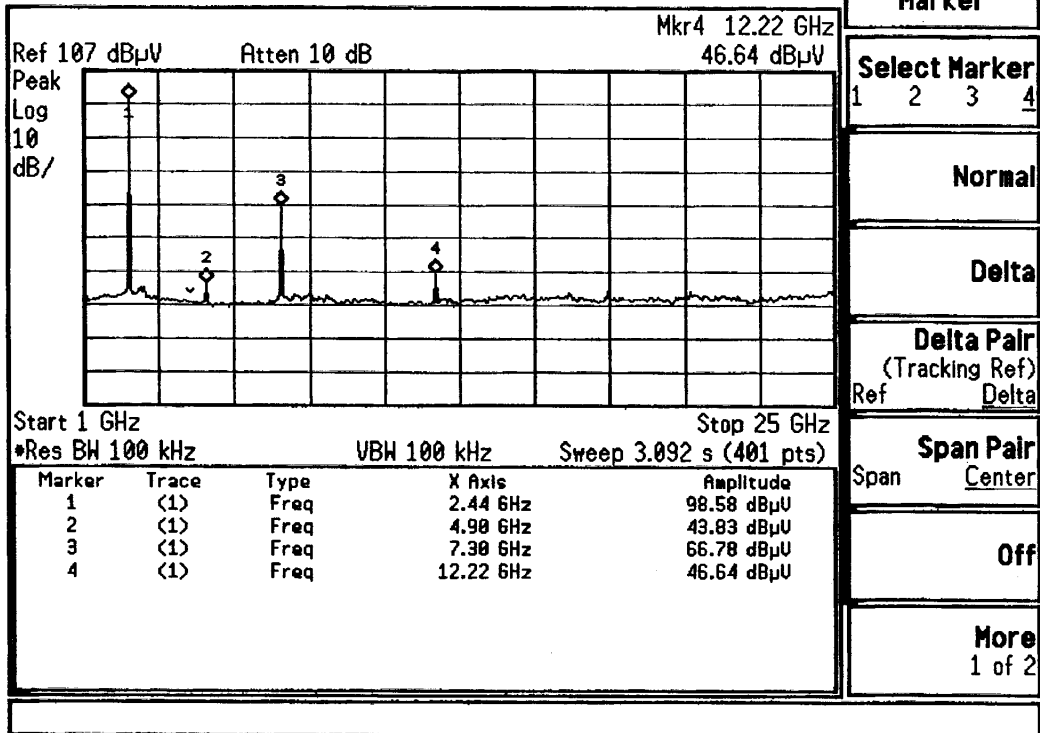
More
2 of 2

EUT operating at middle frequency ,2441Mhz

* Agilent 11:39:47 Mar 10, 2003

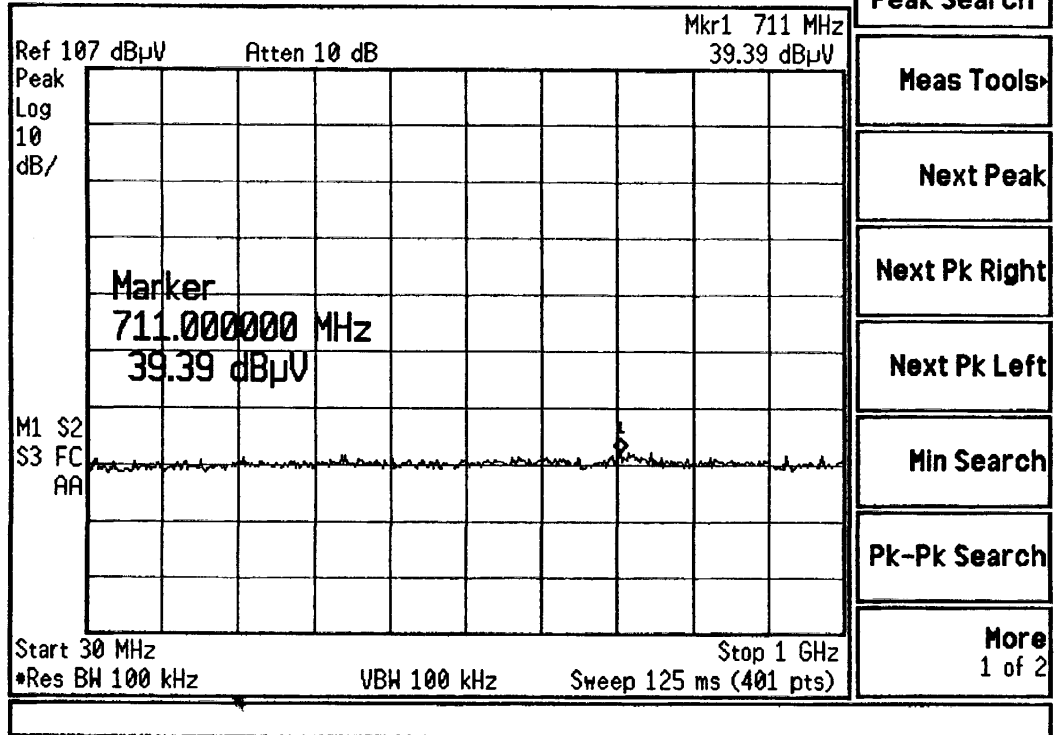


* Agilent 15:41:30 Mar 7, 2003

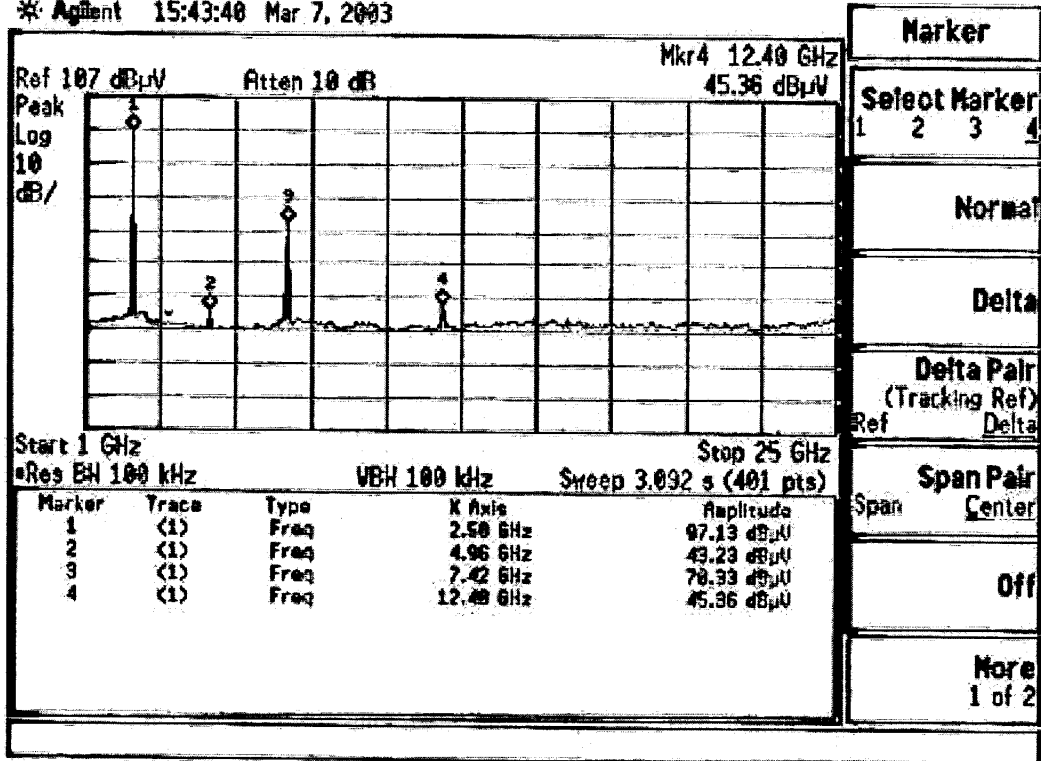


EUT operating at highest frequency ,2480Mhz

* Agilent 11:49:39 Mar 10, 2003



* Agilent 15:43:40 Mar 7, 2003



4.8.2 Radiated measurementEUT operating at lowest frequency .2402Mhz

Frequency (Mhz)	Read value (dBuV/m)	Antenna factor	Cable loss (dB)	Real Value (dBuV/m)	Limit (dBuV/m)
4804	Not Detectable	31.26	7.02	N/A	54
7206	Not Detectable	36.53	9.09	N/A	54

EUT operating at middle frequency .2441Mhz

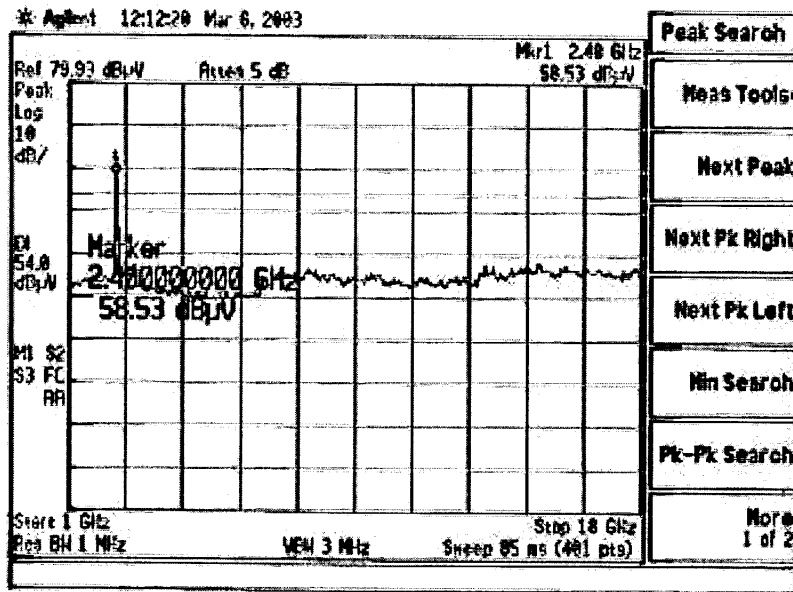
Frequency (Mhz)	Read value (dBuV/m)	Antenna factor	Cable loss (dB)	Real Value (dBuV/m)	Limit (dBuV/m)
4882	Not Detectable	31.26	7.02	N/A	54
7323	Not Detectable	36.53	9.09	N/A	54

EUT operating at highest frequency .2480Mhz

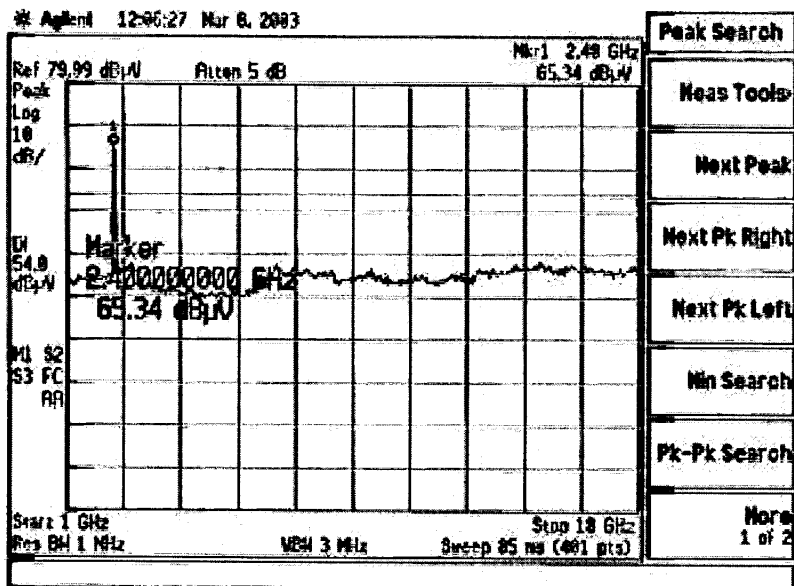
Frequency (Mhz)	Read value (dBuV/m)	Antenna factor	Cable loss (dB)	Real Value (dBuV/m)	Limit (dBuV/m)
4960	Not Detectable	31.26	7.02	N/A	54
7440	Not Detectable	36.53	9.09	N/A	54

EUT operating at lowest frequency ,2402Mhz

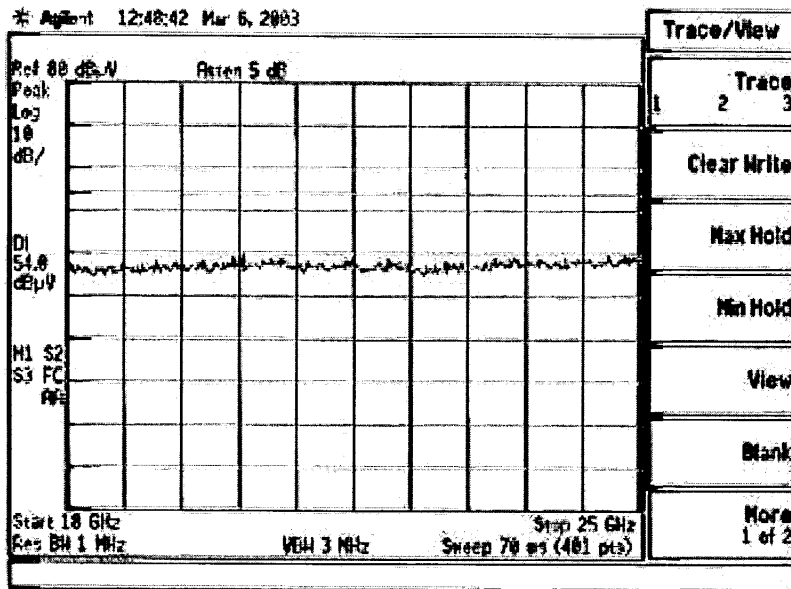
Vertical



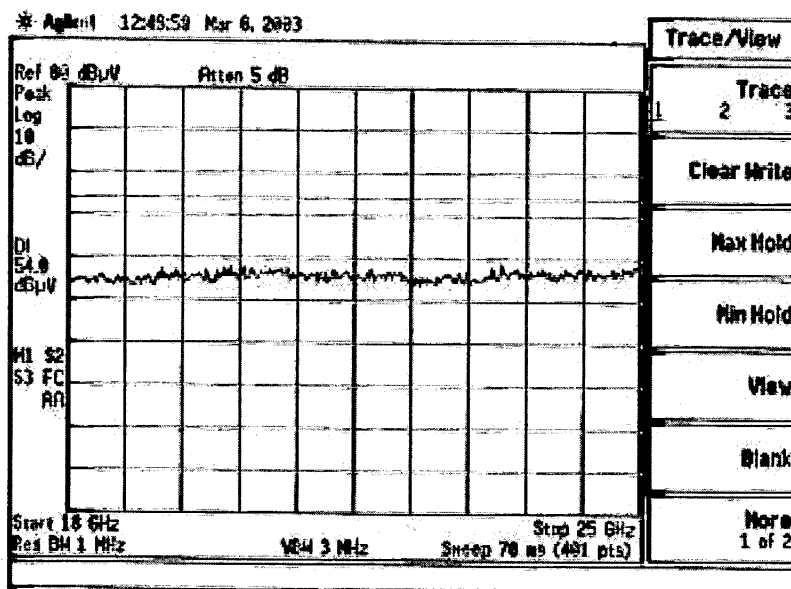
Horizontal

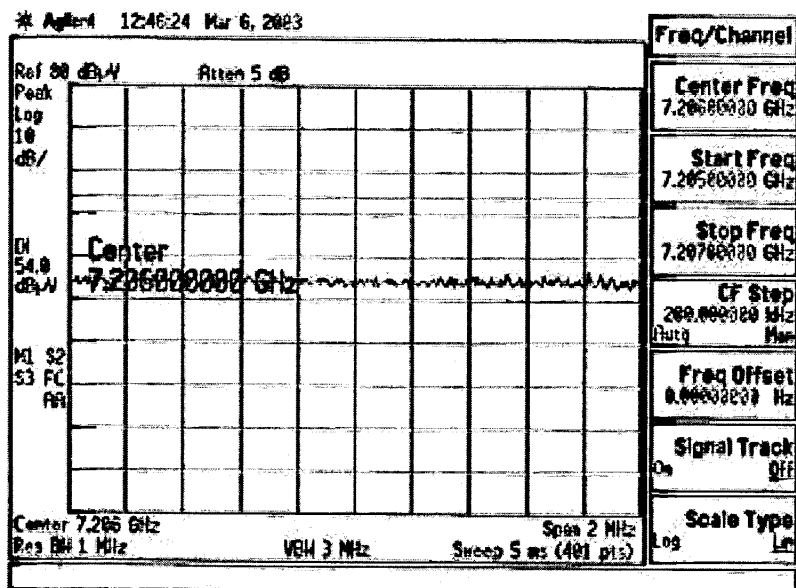
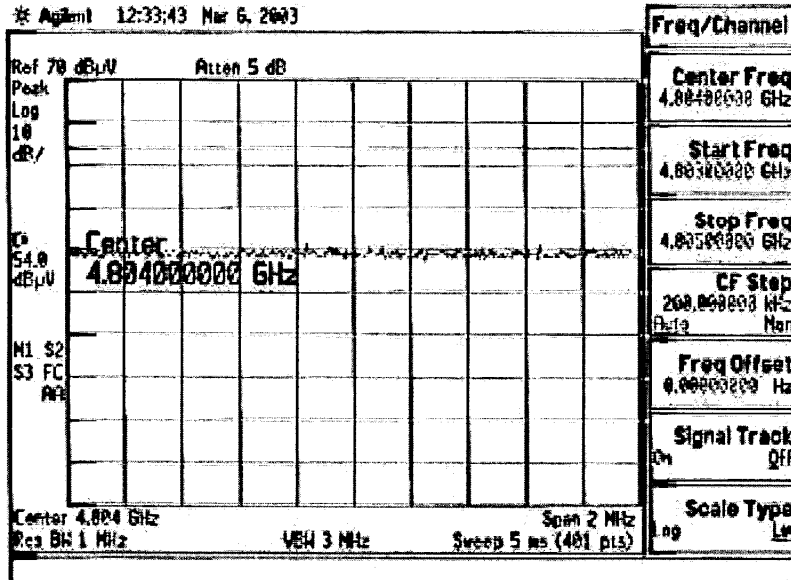


Vertical



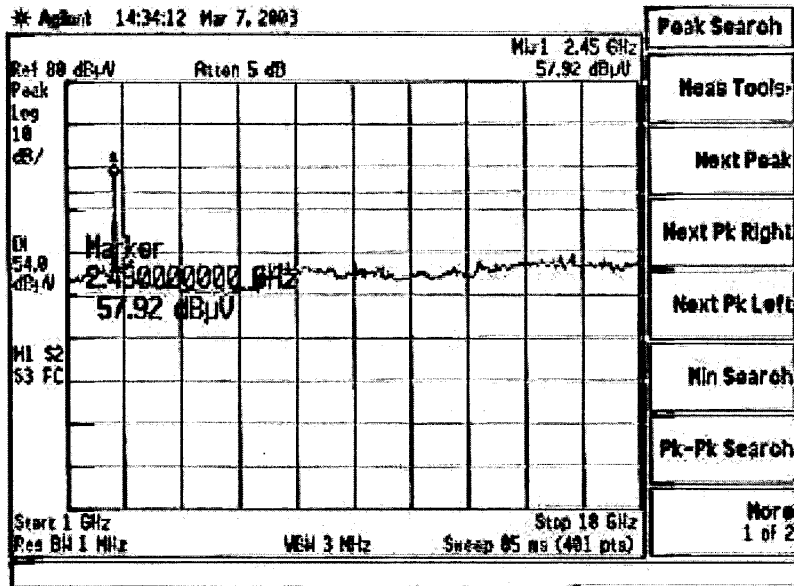
Horizontal



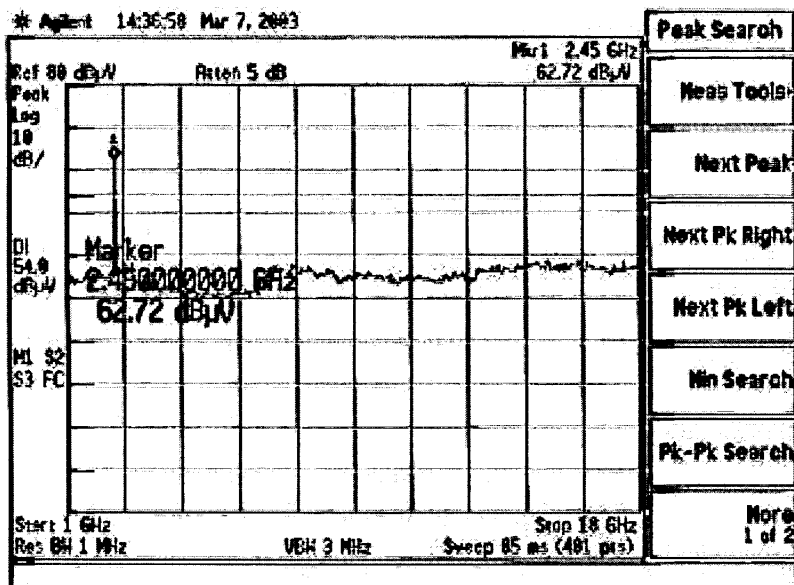


EUT operating at middle frequency .2441Mhz

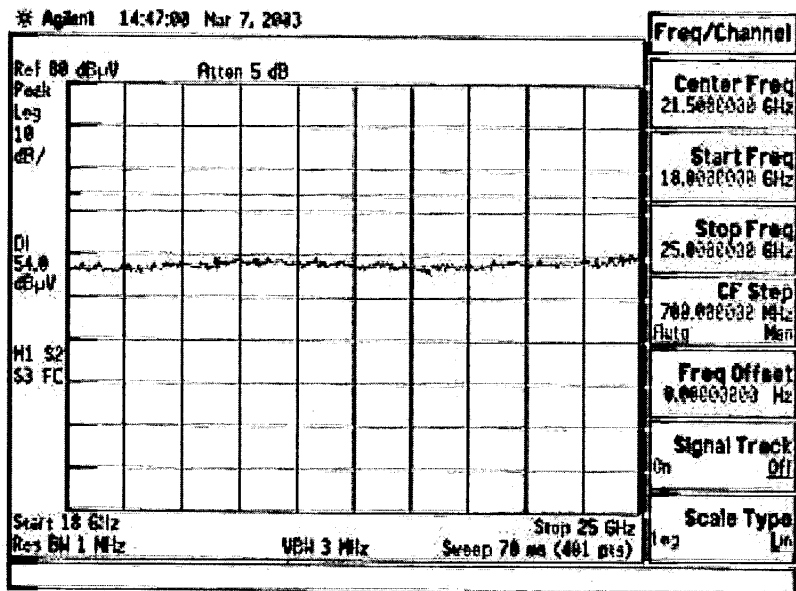
Vertical



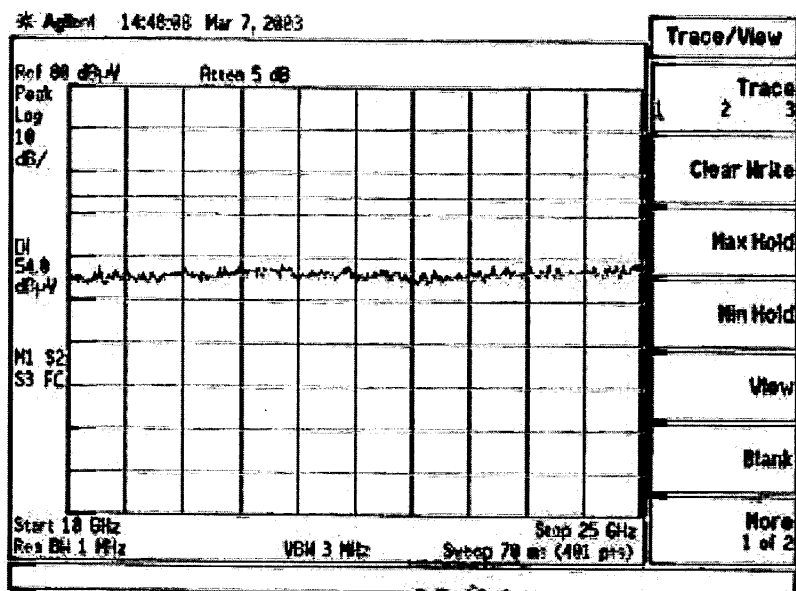
Horizontal

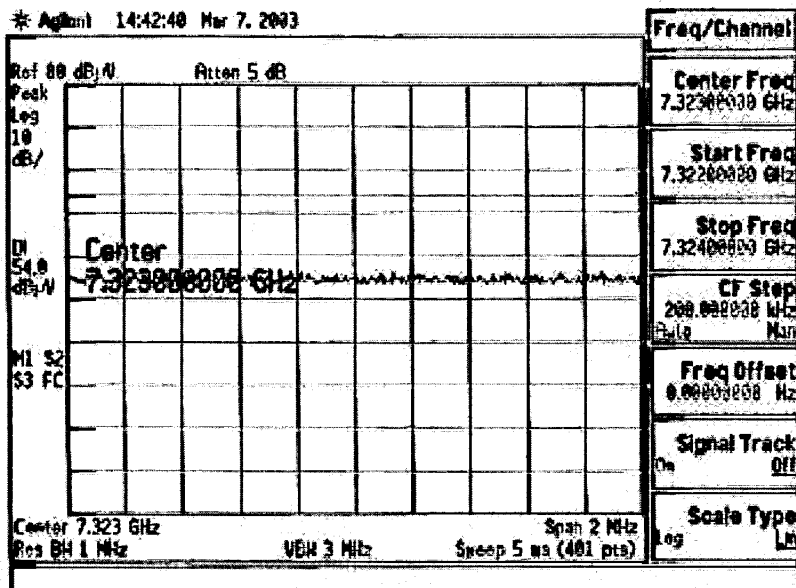
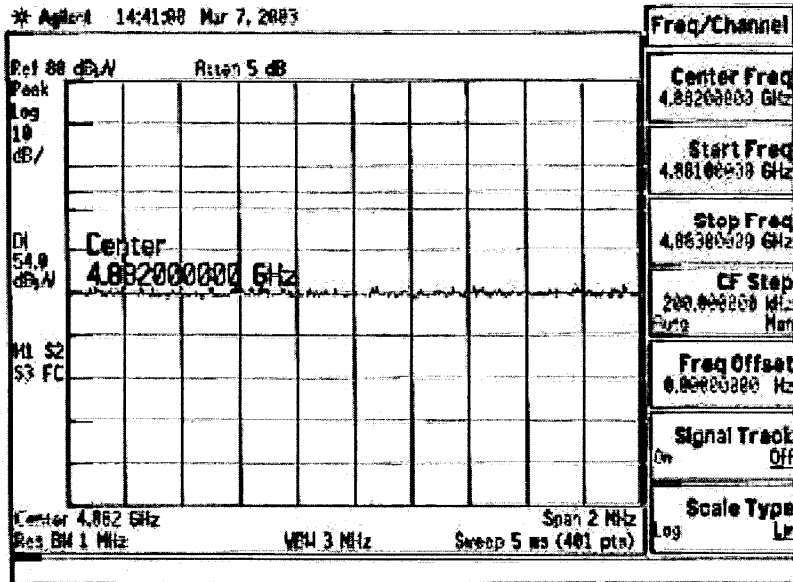


Vertical



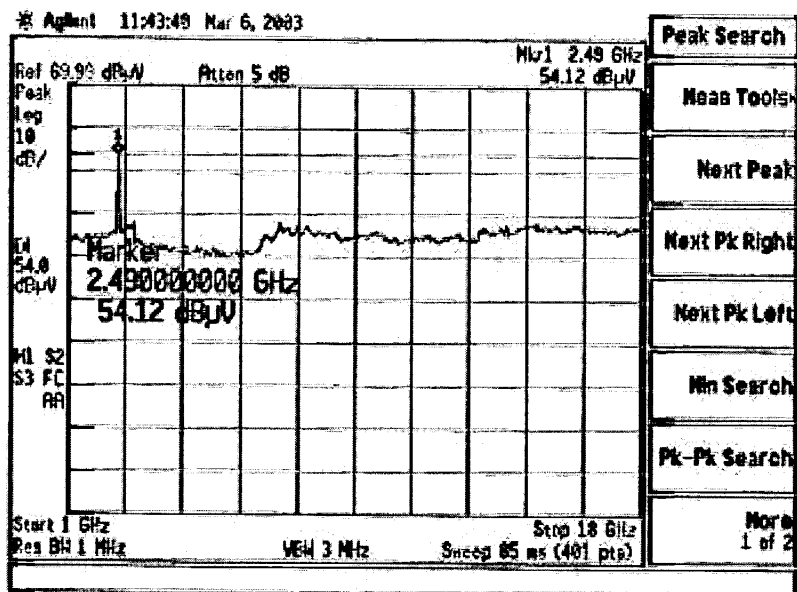
Horizontal



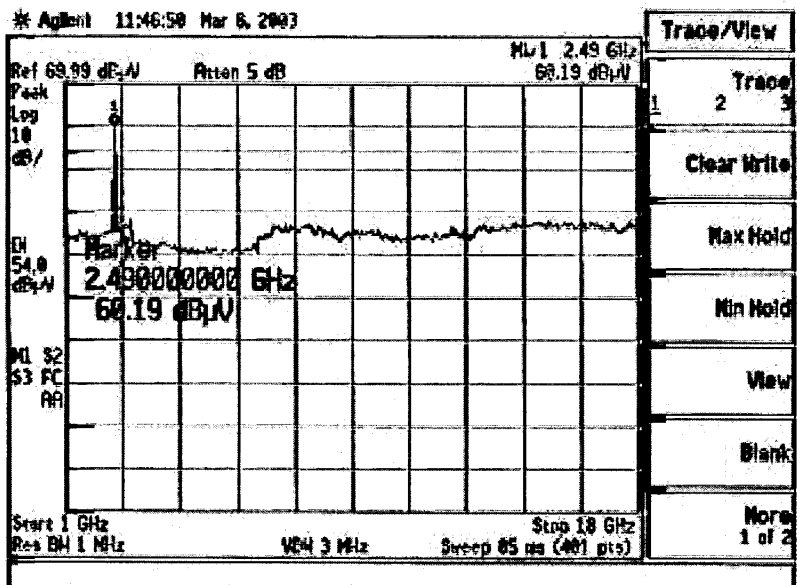


EUT operating at highest frequency .2480Mhz

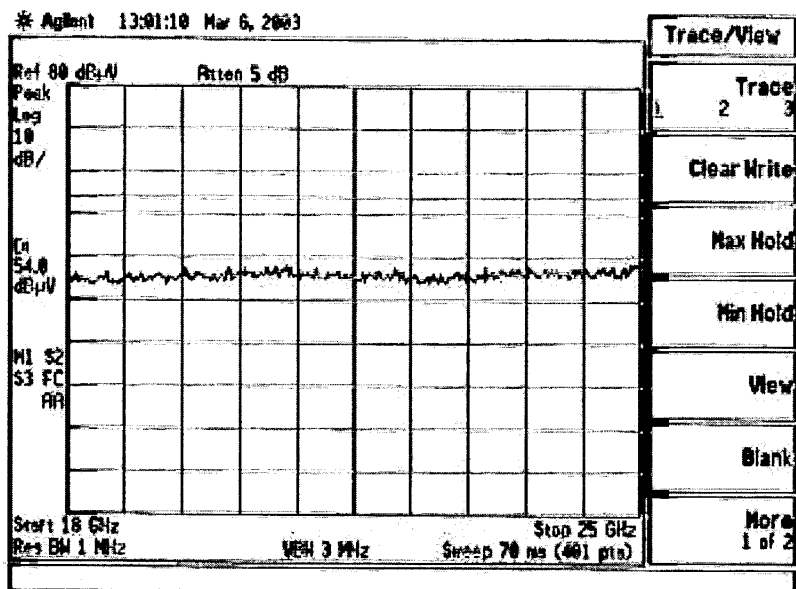
Vertical



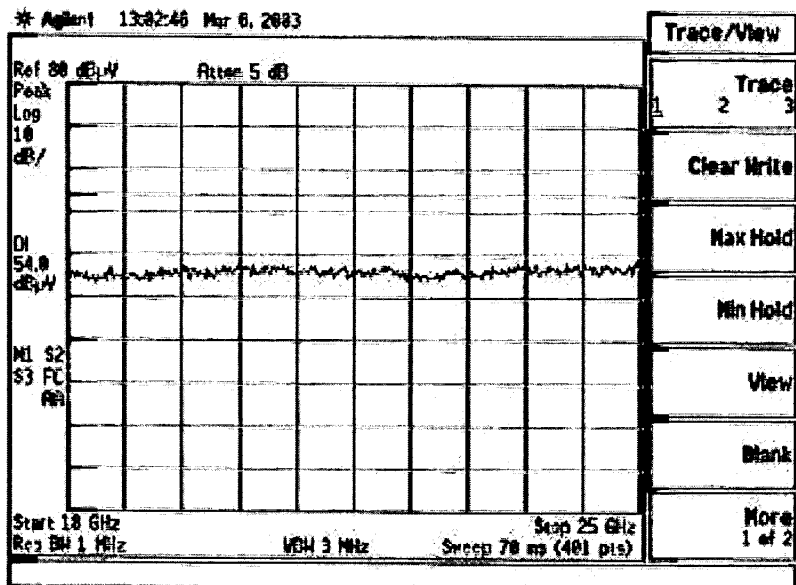
Horizontal



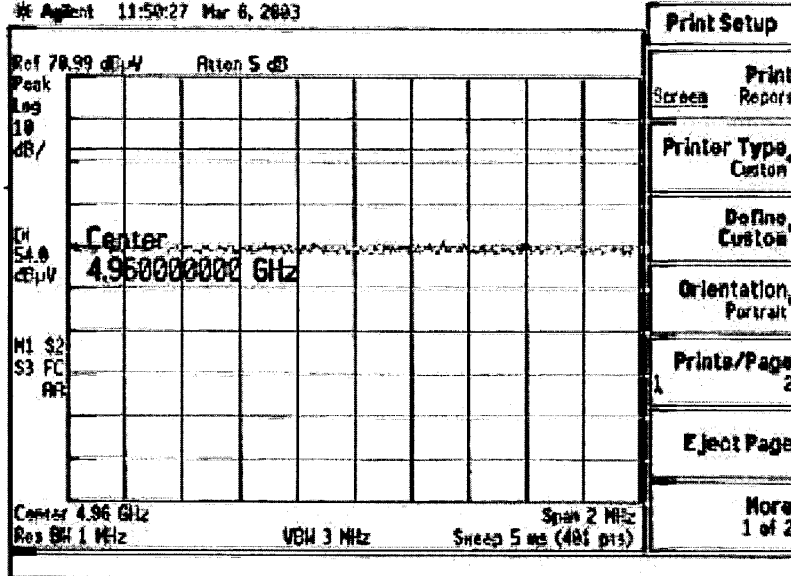
Vertical



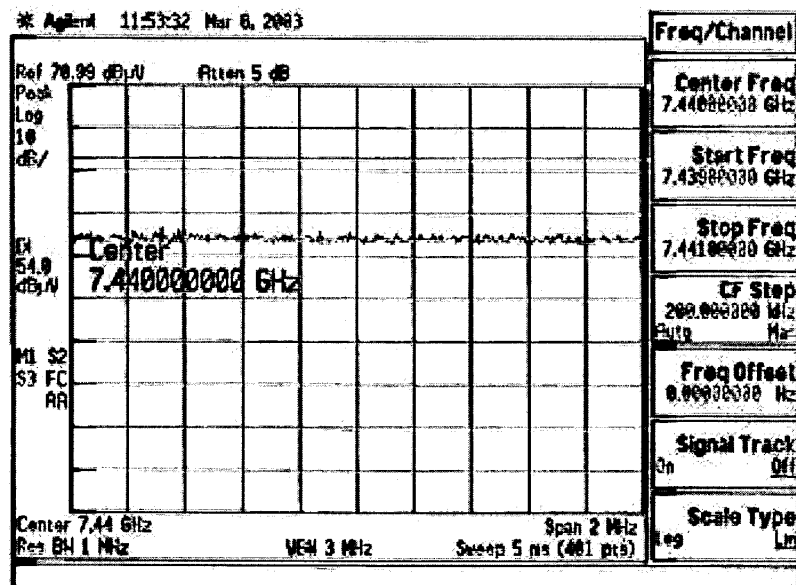
Horizontal



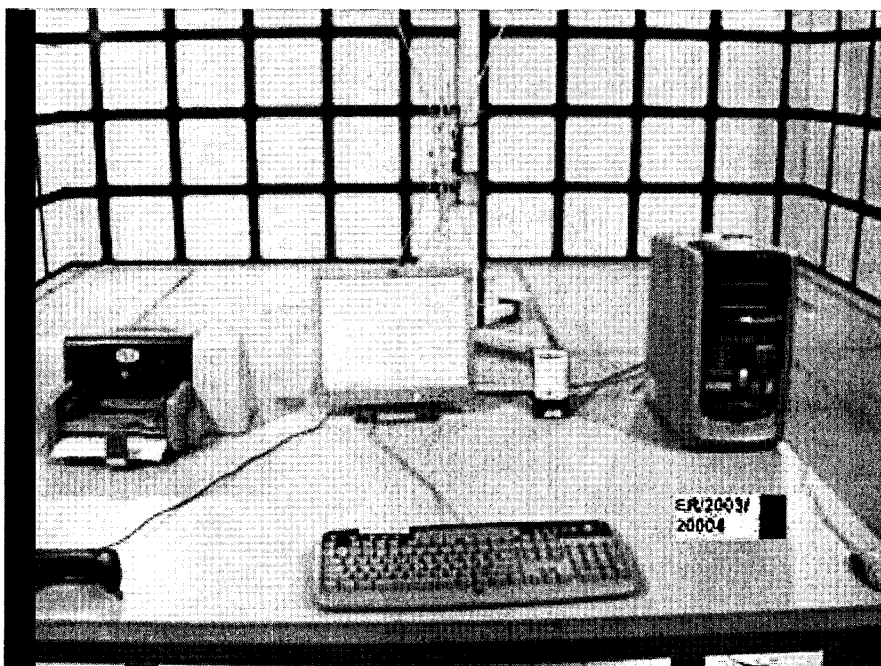
* Agilent 11:50:27 Mar 6, 2003



* Agilent 11:53:32 Mar 6, 2003



APPENDIX: Photographs of Test Setup



APPENDIX : Photographs of EUT

Internal Photos

<The internal photos been saved separately>

External Photos

<The external photos been saved separately>