

# 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

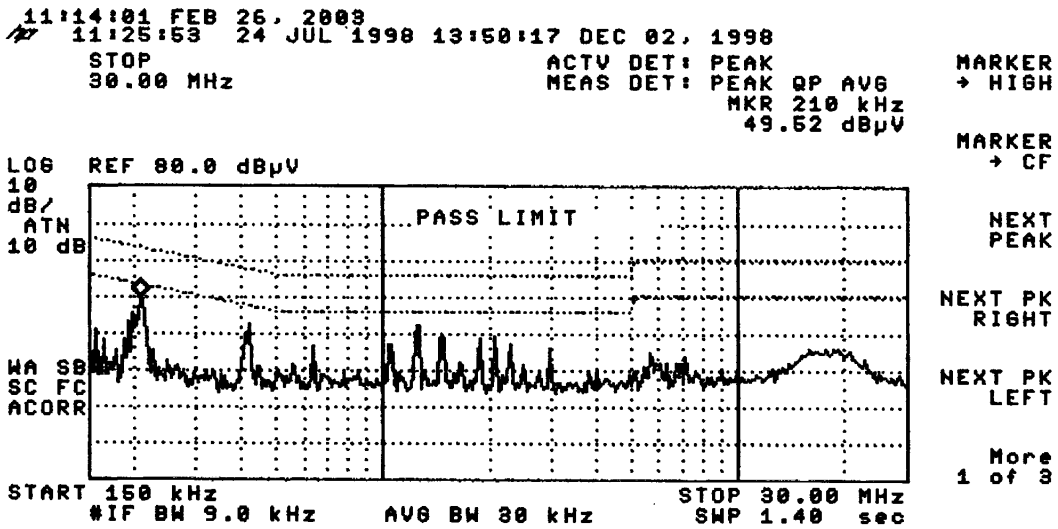
<b>Instrument</b>	<b>Model</b>	<b>Serial number</b>	<b>Calibration date</b>
<b>Desktop PC</b>	<b>HP 723D</b>	<b>TW23420337</b>	<b>N/A</b>
<b>Spectrum Analyser</b>	<b>Agilent 7405A</b>	<b>US40240202</b>	<b>May 22, 2002</b>
<b>Antenna</b>	<b>Schwarzbeck BBHA9170A</b>	<b>145/146</b>	<b>July 01, 2002</b>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

# 4. Measurements

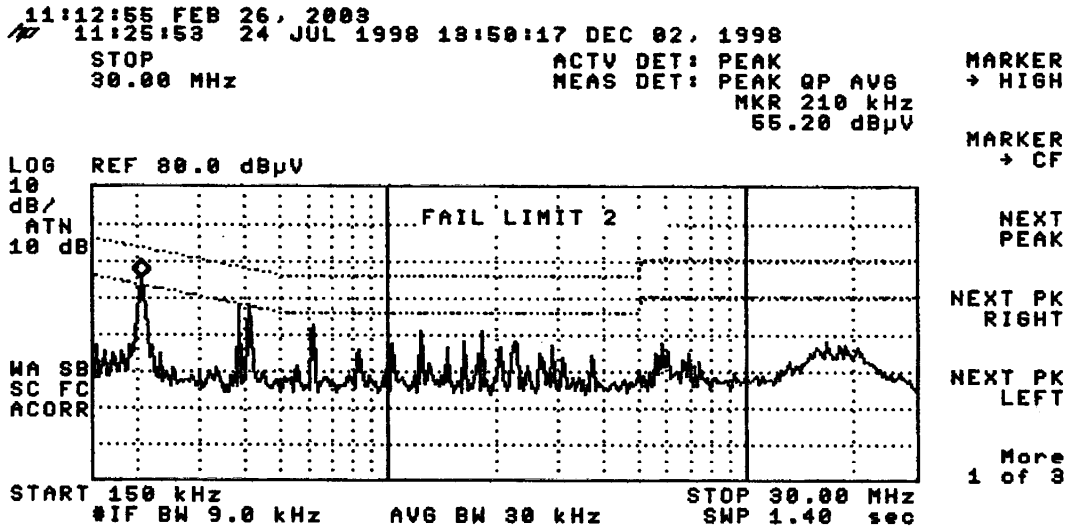
## 4.1 Conducted Limits

SUBCLAUSE 15.207

### Line (Delta)



### Neural(Delta)







**Line (Phihong)**

10:54:21 FEB 26, 2003

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

STOP  
30.00 MHz

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 150 kHz  
52.99 dB $\mu$ V

MARKER  
+ HIGH

MARKER  
+ CF

NEXT  
PEAK

NEXT PK  
RIGHT

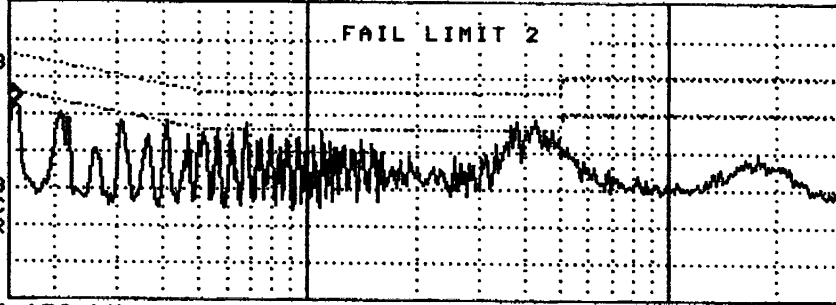
NEXT PK  
LEFT

More  
1 of 3

LOG REF 80.0 dB $\mu$ V

10  
dB/  
ATN  
10 dB

WA SB  
SC FC  
ACORR



START 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 MHz

ACTV DET: PEAK  
MEAS DET: PEAK QP AVG  
MKR 150 kHz  
47.48 dB $\mu$ V

MARKER  
+ HIGH

MARKER  
+ CF

NEXT  
PEAK

NEXT PK  
RIGHT

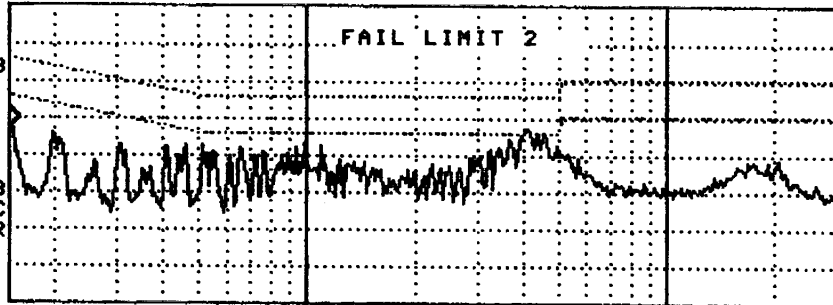
NEXT PK  
LEFT

More  
1 of 3

LOG REF 80.0 dB $\mu$ V

10  
dB/  
ATN  
10 dB

WA SB  
SC FC  
ACORR



START 150 kHz #IF BW 9.0 kHz AVG BW 30 kHz STOP 30.00 MHz SWP 1.40 sec



**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**

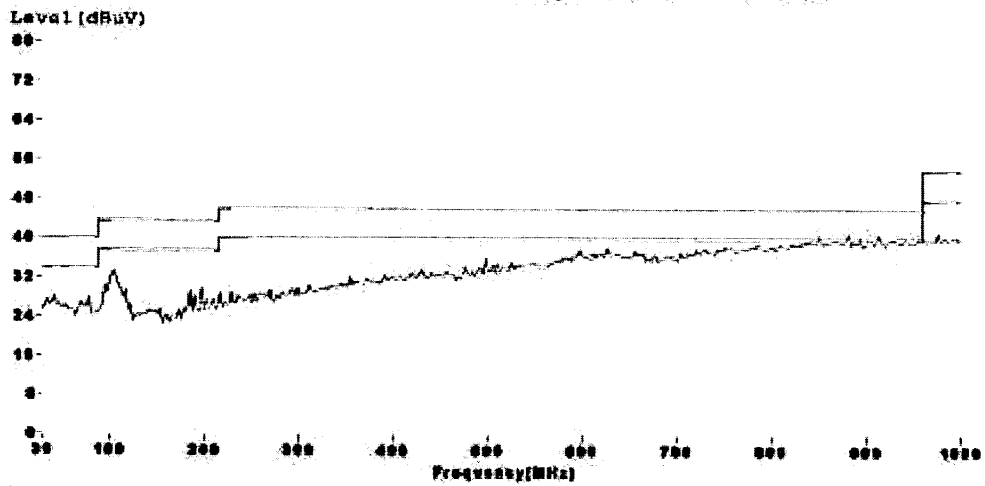
EUT transmit at Lowest channel, 2402Mhz

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



MEMO:

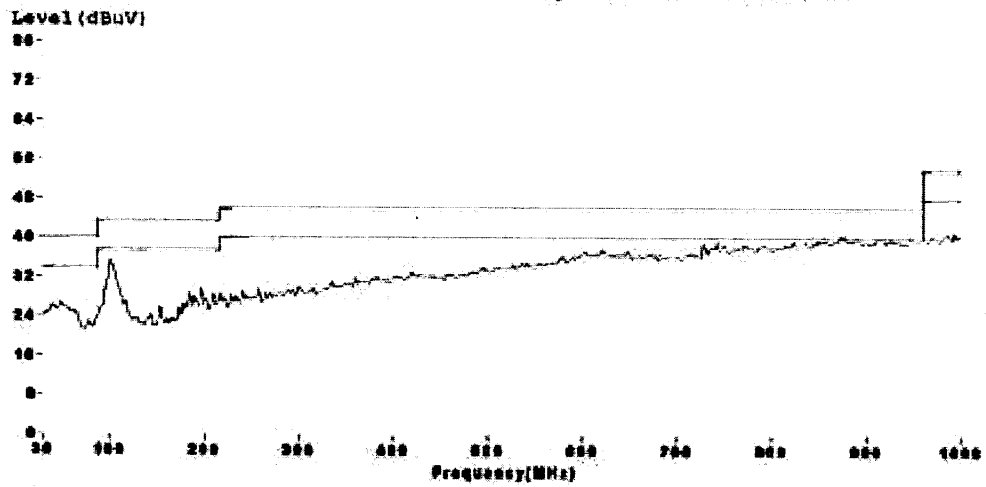
Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
MHz	dB	dB	dB	dB	dB	dB	dB

Horizontal

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

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

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



REMO:

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

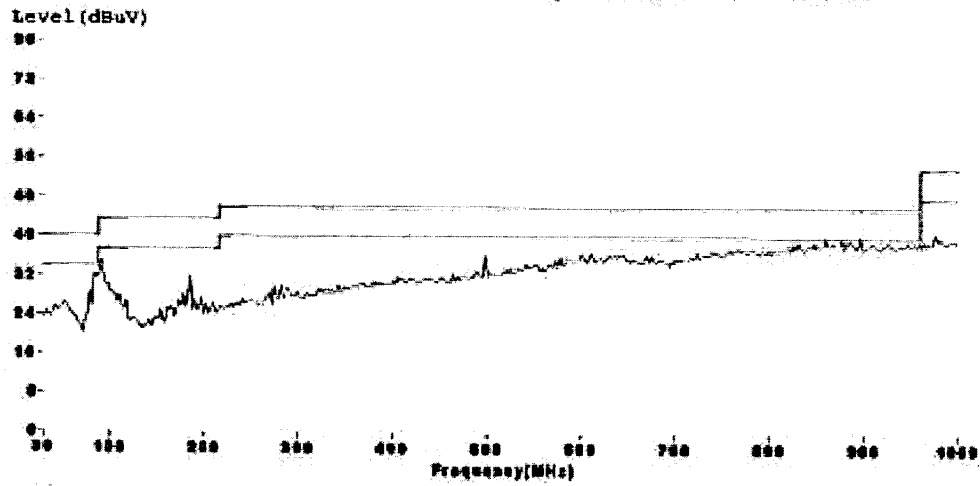
EUT transmit at middle channel, 2441Mhz

Vertical

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

Customer: BFC  
Model : EE2050A  
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  
Temp. (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



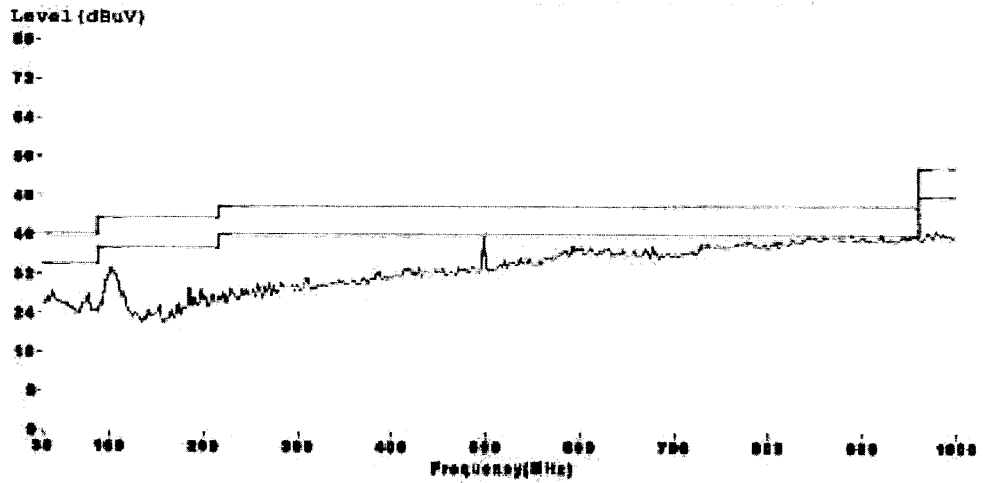
EUT transmit at highest channel, 2480Mhz

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



MEMO:

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

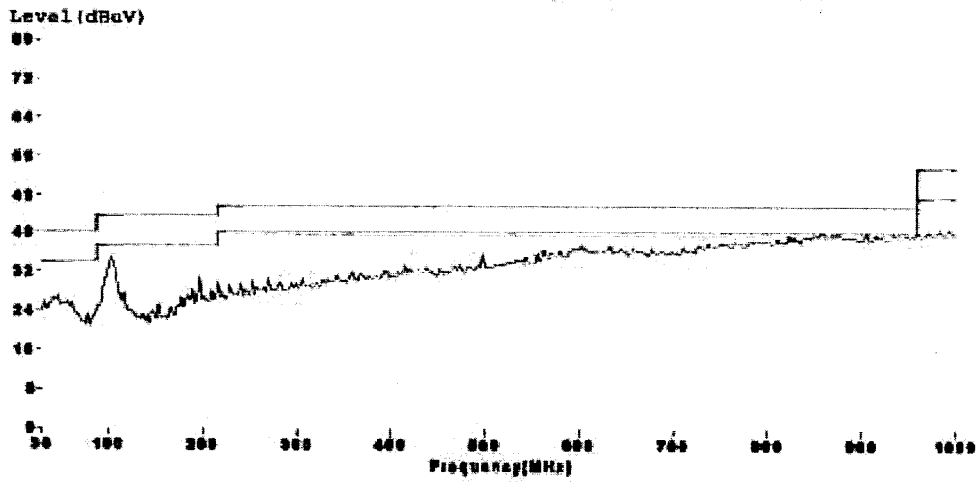


Horizontal

**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



MEMO:

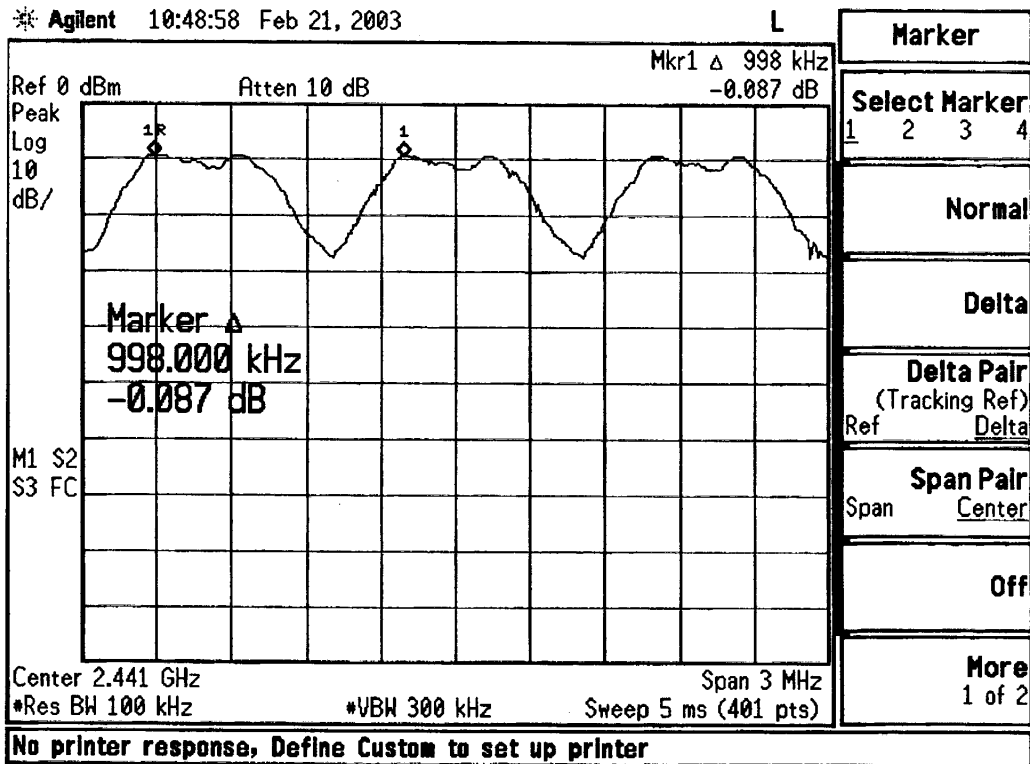
Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Factor	Other Factor
MHz	dB	dB	dB	dB	dB	dB	dB

#### 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

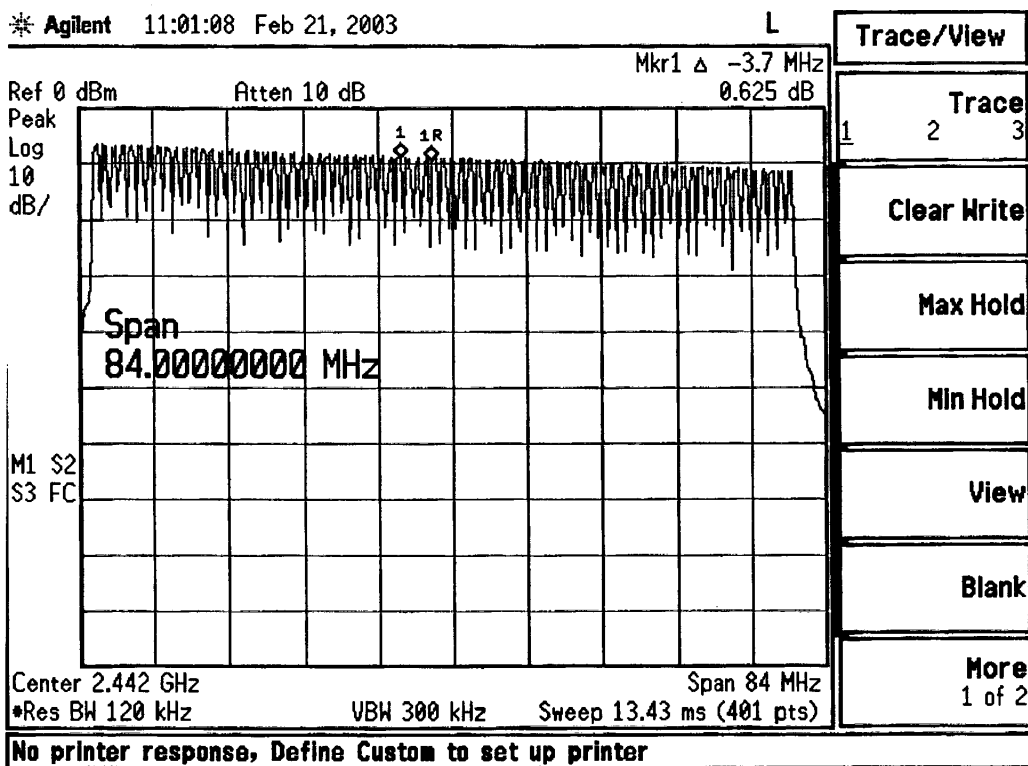
SUBCLAUSE15.247(a)(1)



The channel spacing is 998Khz

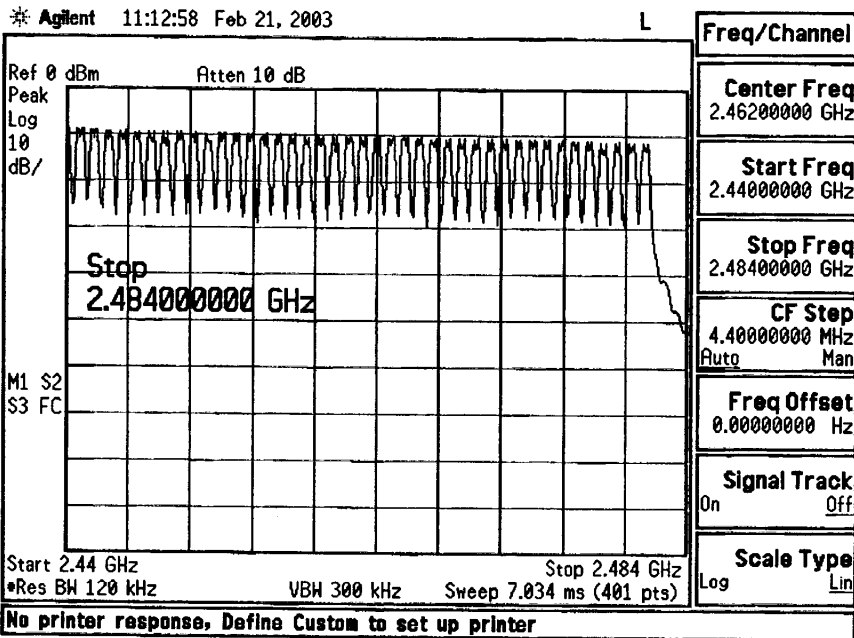
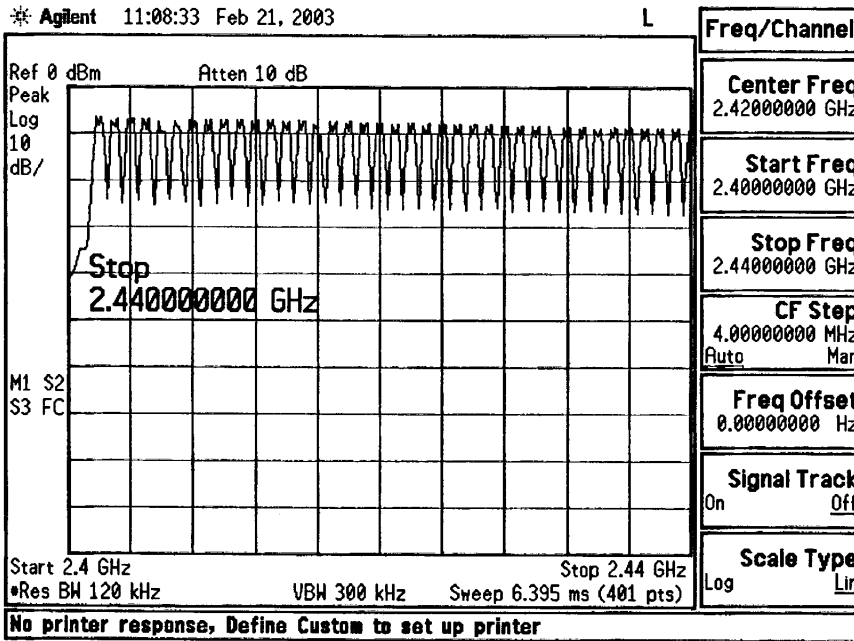
4.4 No. of carrier frequency / 20db Bandwidth

SUBCLAUSE15.247(a)(1)(ii)

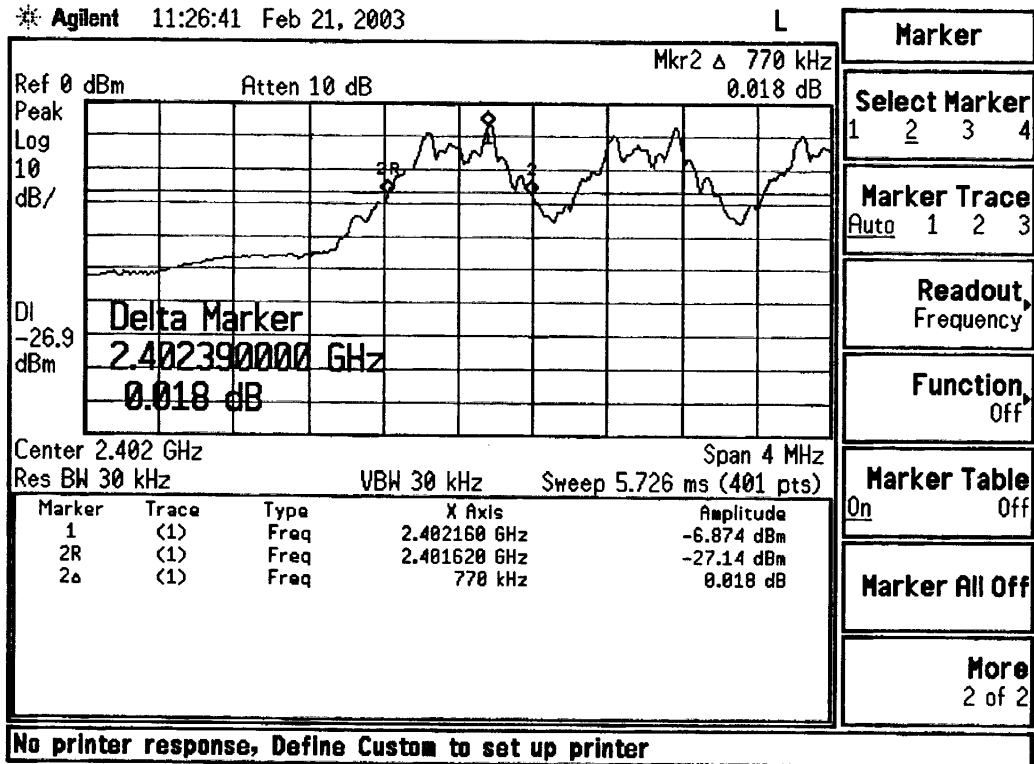


The Number of Channels= 79

Split the whole frequency band into two.

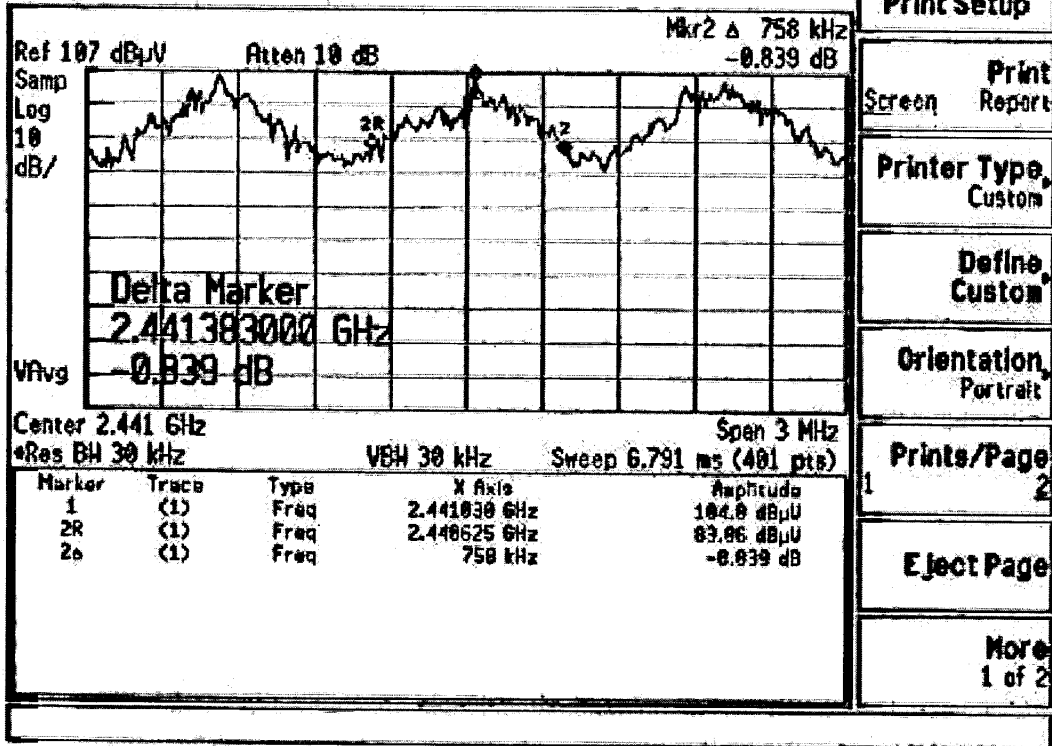


20dB bandwidth at lowest (2402Mhz), middle (2441Mhz), highest channel(2480Mhz)

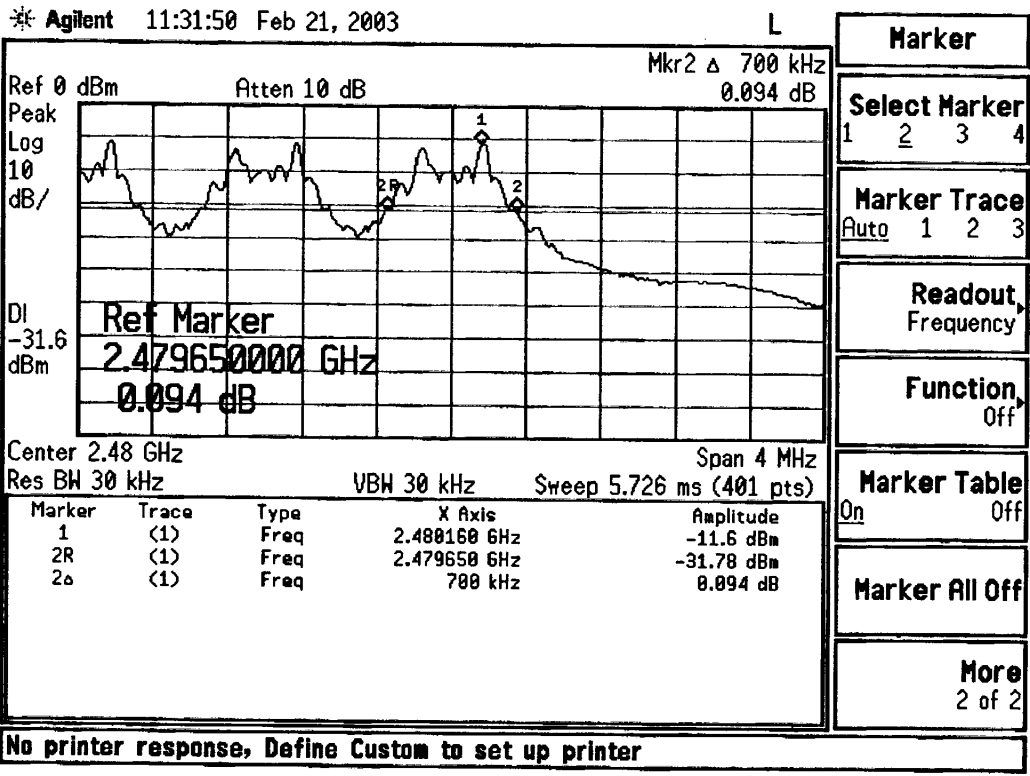


channel bandwidth = 770 Khz

\* Agilent 11:08:11 Mar 8, 2003



channel bandwidth = 750 Khz

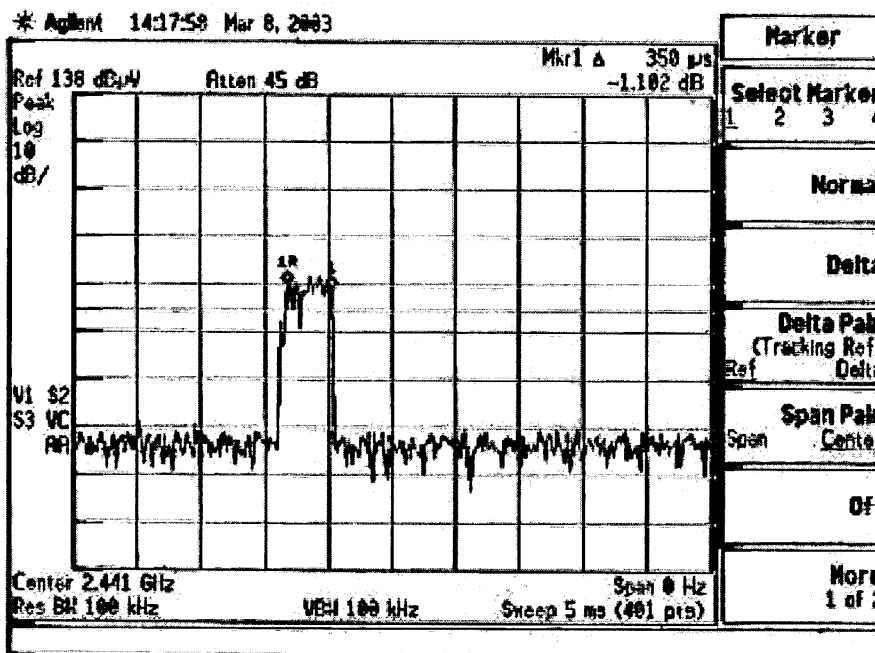
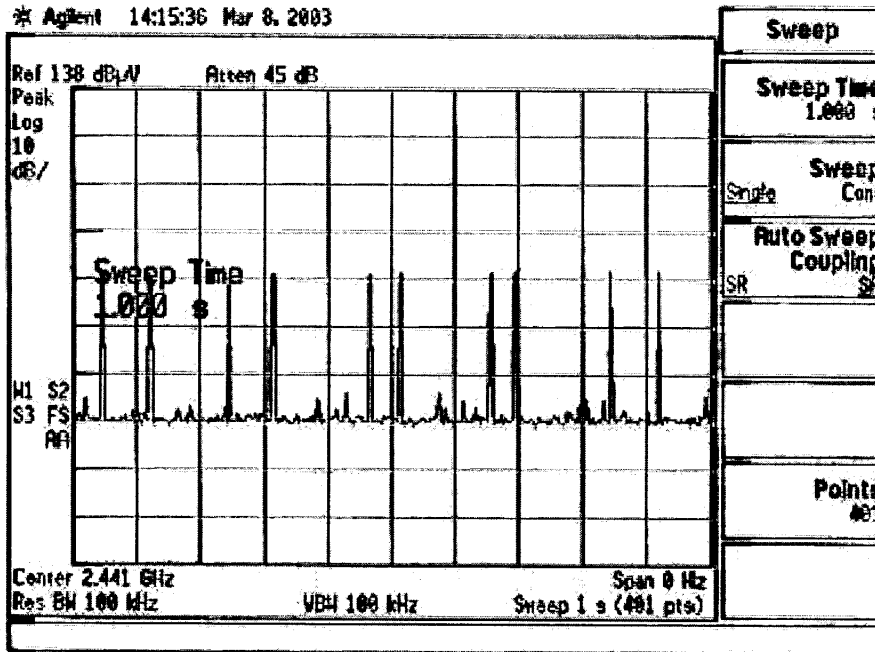


channel bandwidth = 700 Khz



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  $\mu$  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**

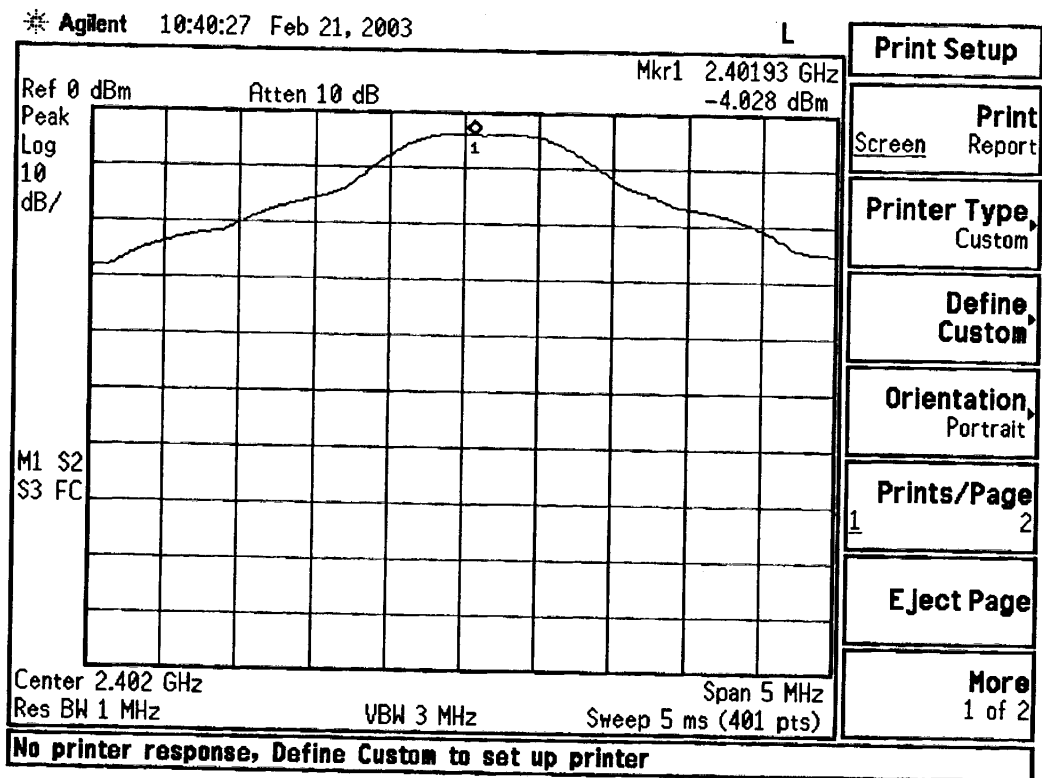
The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

**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**

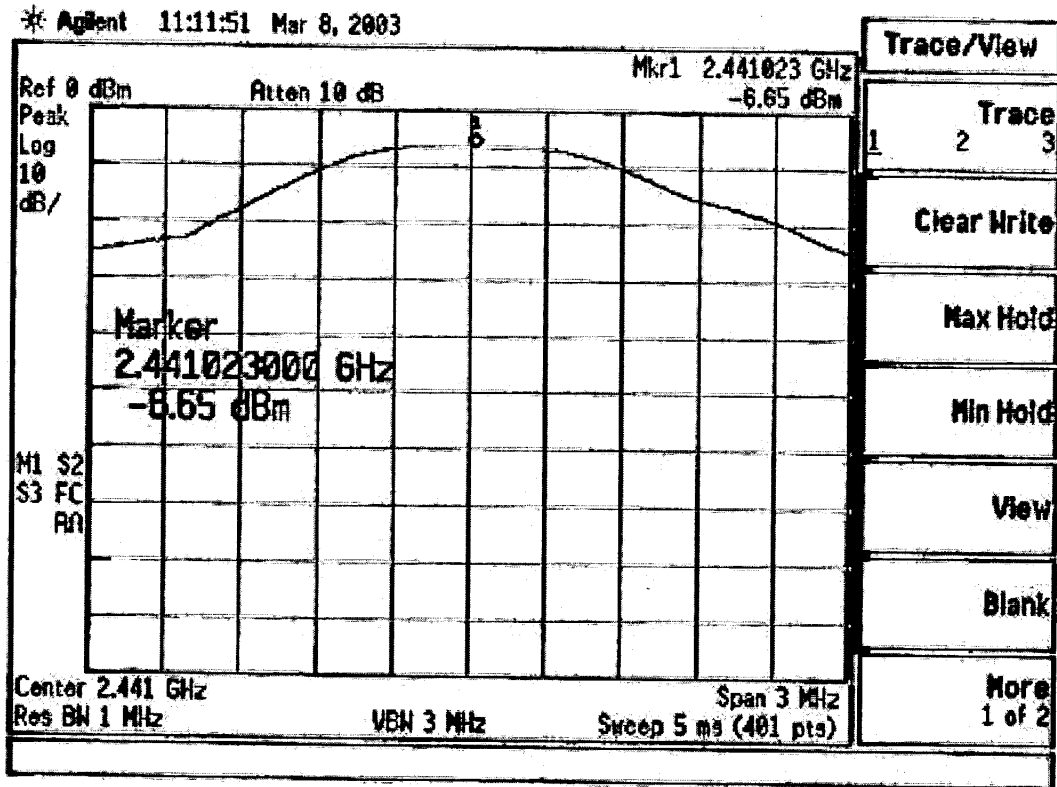
**SUBCLAUSE 15.247(b)(1)**

Transmitter transmit at lowest channel (2402Mhz)



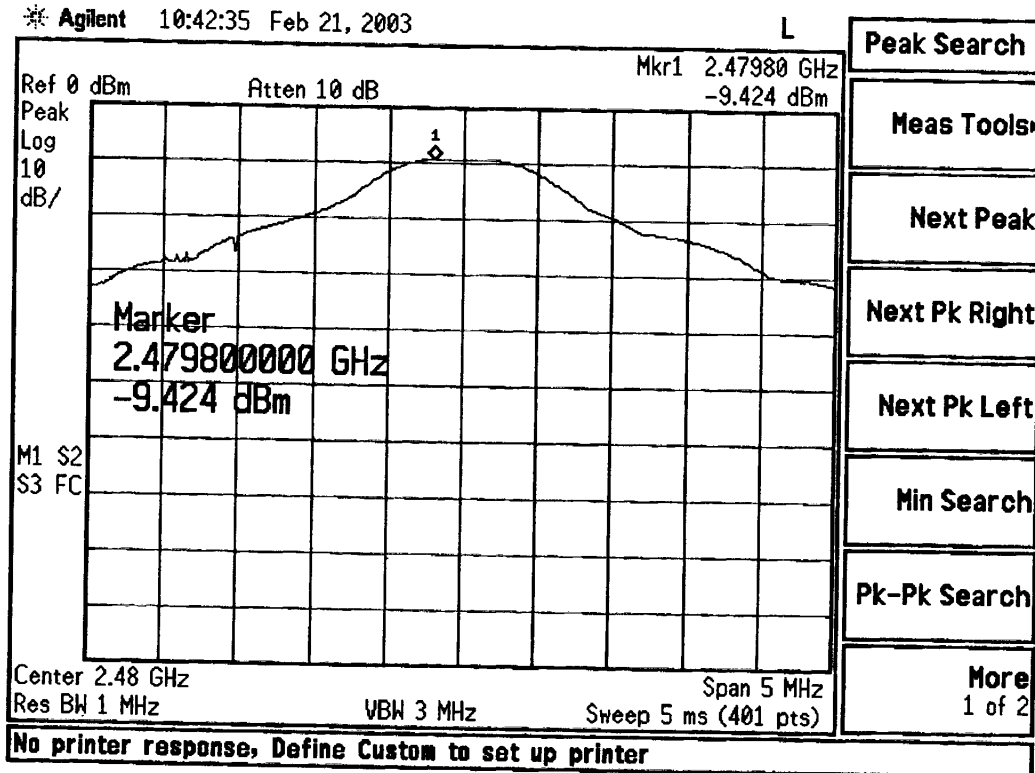
Peak Power =  $-4.028 + 2.2$  (cable loss) =  $-1.828$  (dbm)

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)

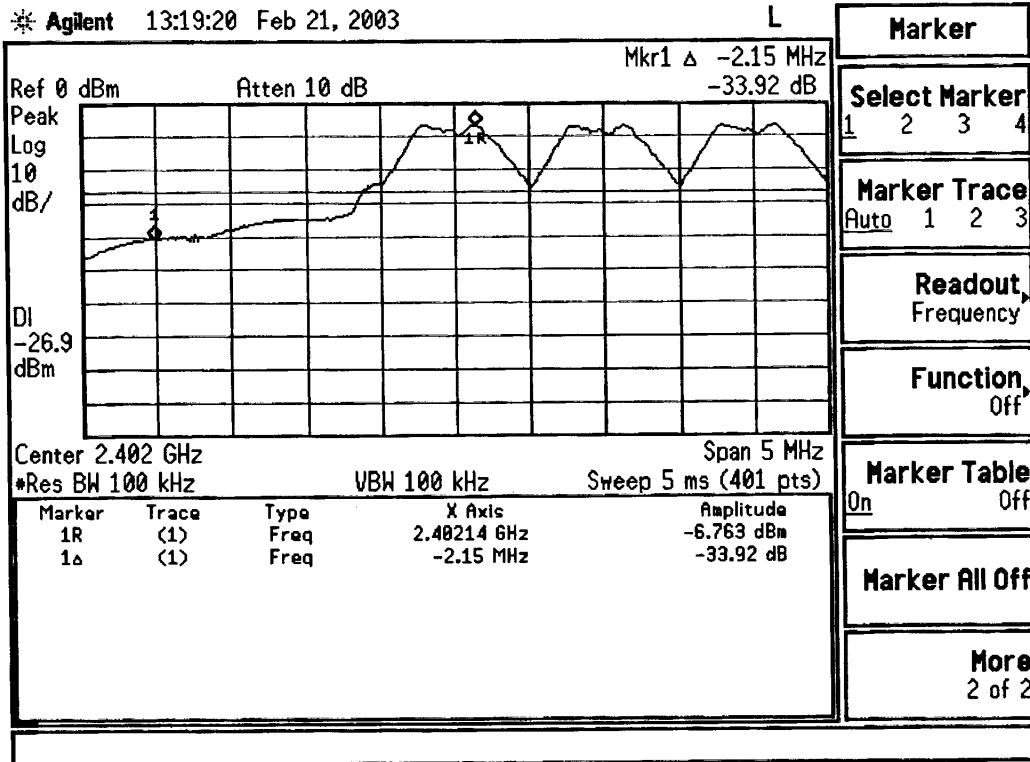
The Maximum power at these three channels is  $-1.828$  dbm = 0.656mW

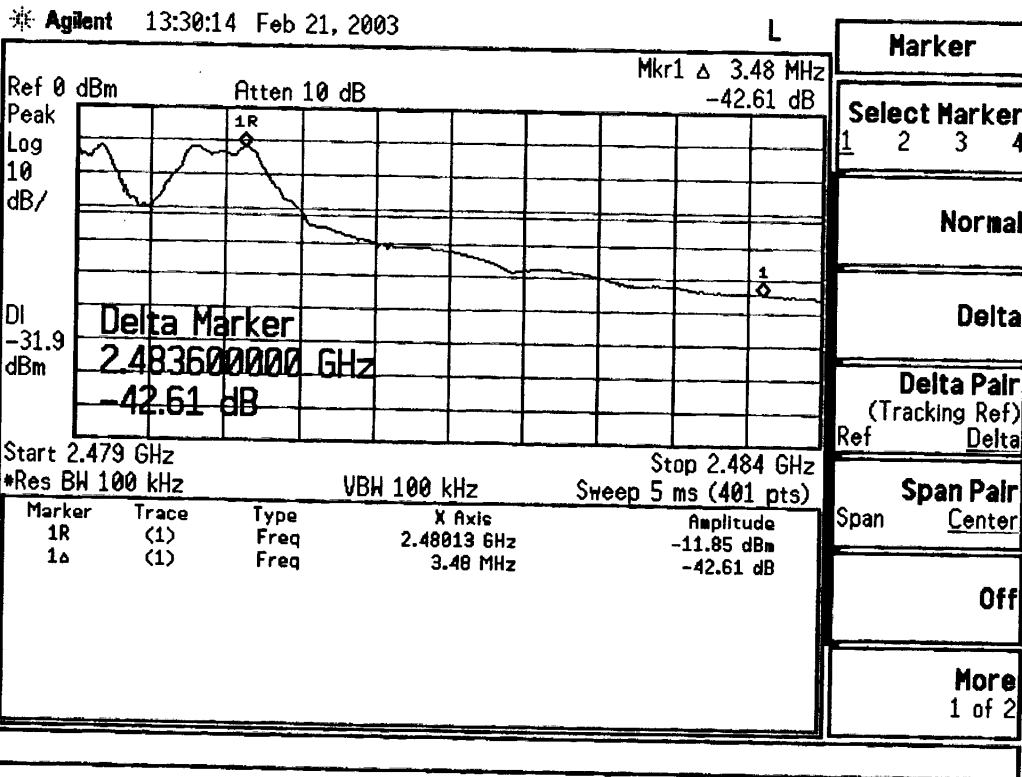
**Limits:**

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)





#### 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,

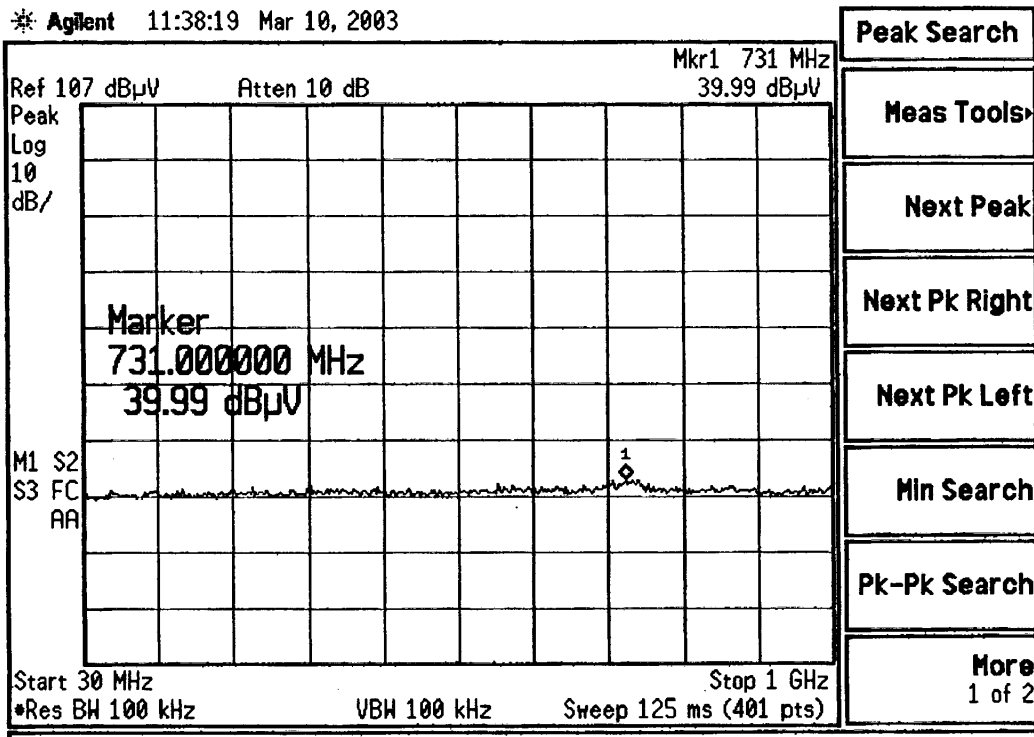
### 4.8 Spurious Emission under 25Ghz

### SUBCLAUSE15.247(c)

4.8.1 conducted measurement

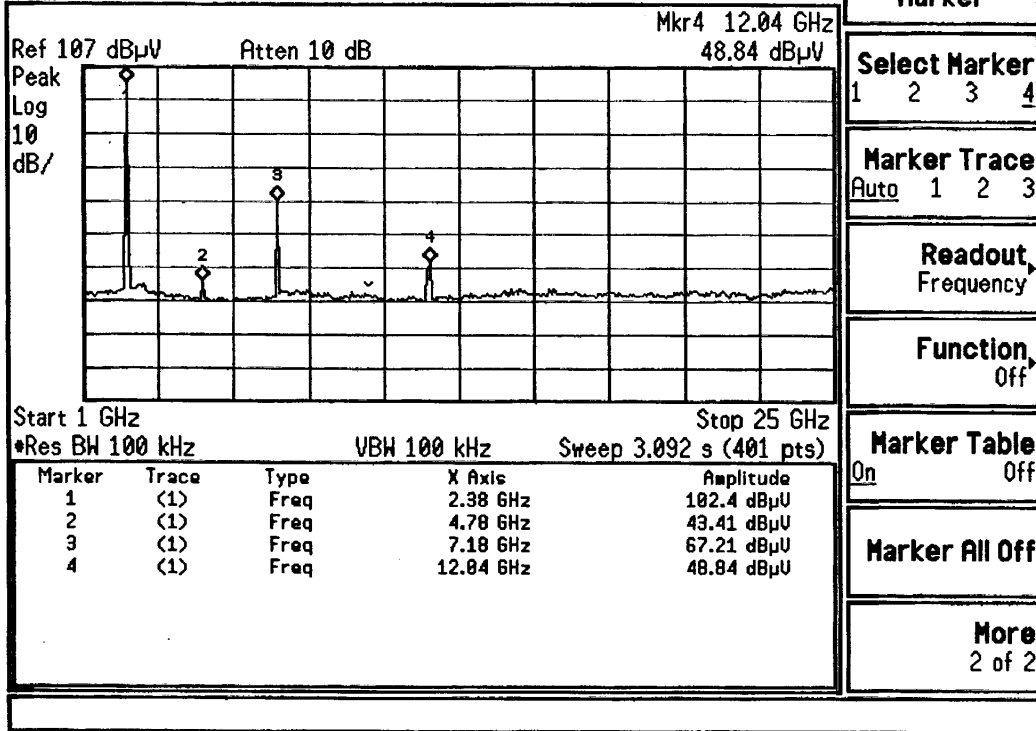
EUT operating at lowest frequency ,2402Mhz

\* 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**  
Frequency

**Function**  
Off

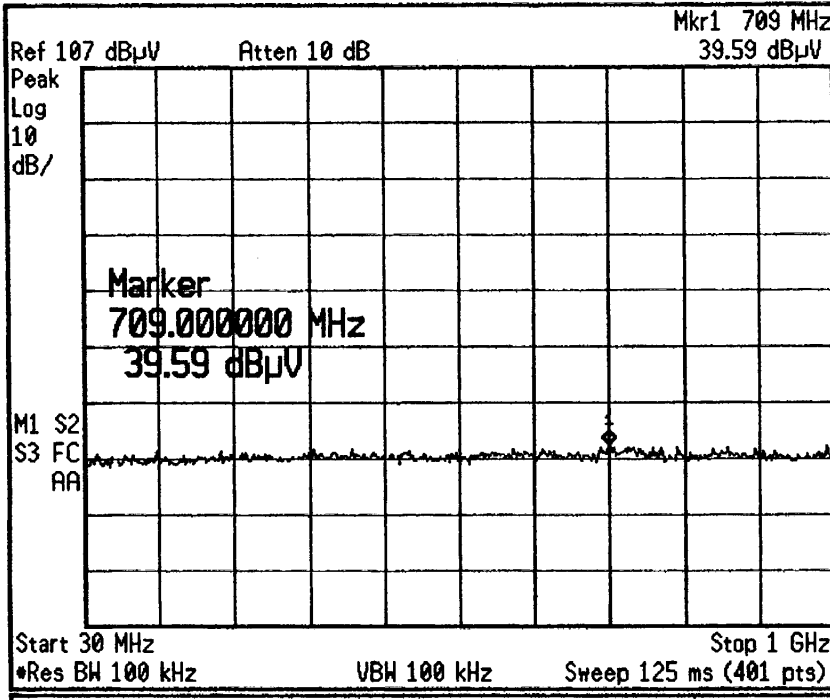
**Marker Table**  
On Off

**Marker All Off**

**More**  
2 of 2

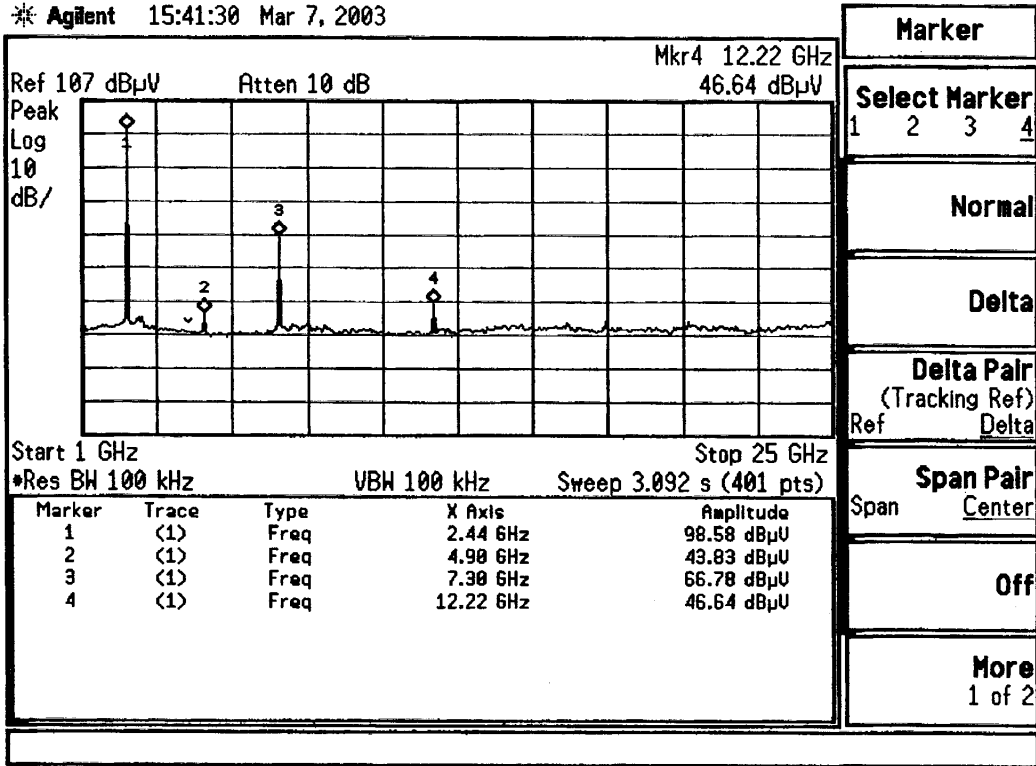
EUT operating at middle frequency ,2441Mhz

\* Agilent 11:39:47 Mar 10, 2003



Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2

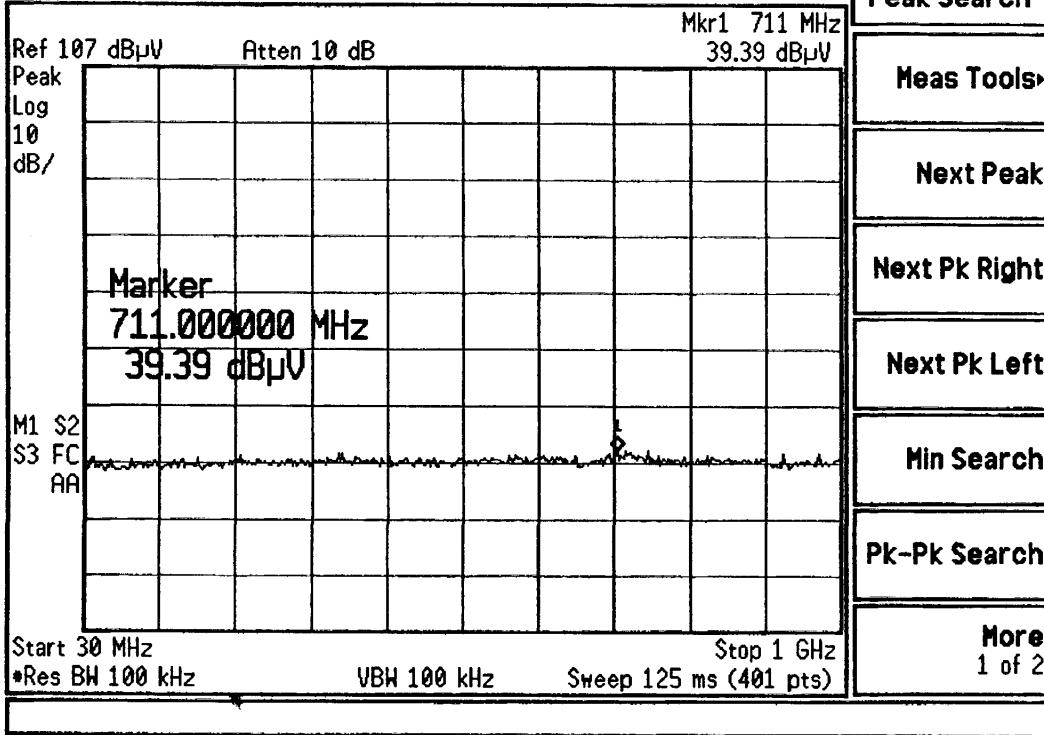
\* Agilent 15:41:30 Mar 7, 2003



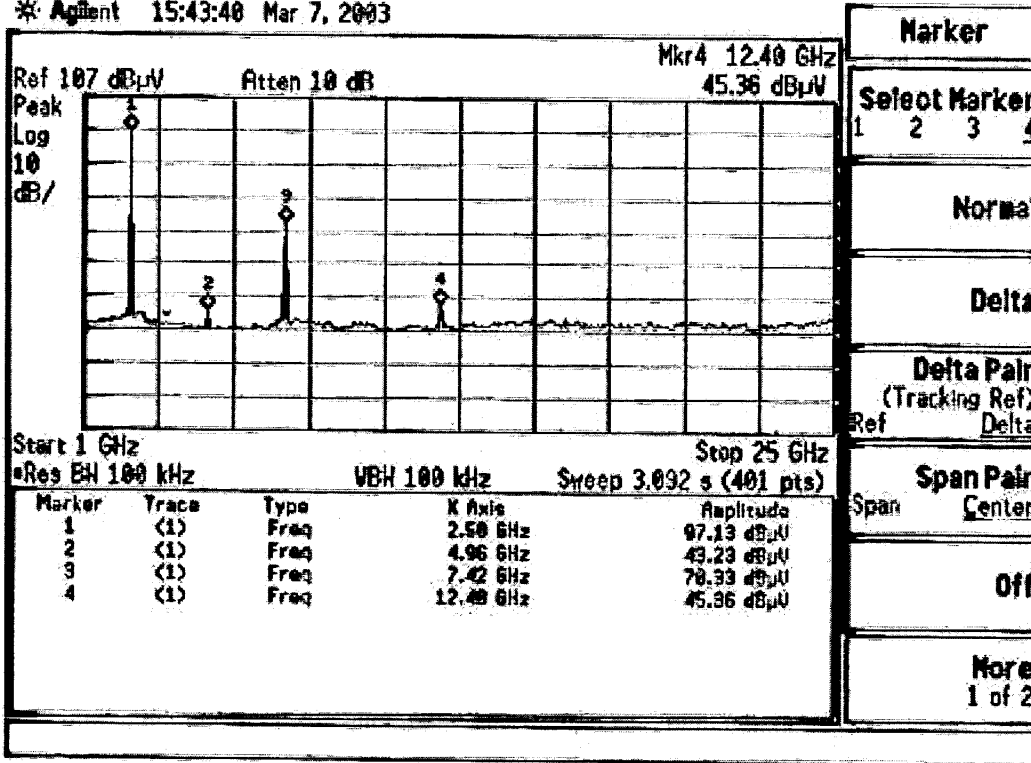
<b>Marker</b>			
<b>Select Marker</b>			
1	2	3	4
<b>Normal</b>			
<b>Delta</b>			
<b>Delta Pair</b> (Tracking Ref)			
Ref	Delta		
<b>Span Pair</b>			
Span	Center		
<b>Off</b>			
<b>More</b> 1 of 2			

EUT operating at highest frequency ,2480Mhz

\* Agilent 11:49:39 Mar 10, 2003



\* Agilent 15:43:40 Mar 7, 2003



#### 4.8.2 Radiated measurement

EUT 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

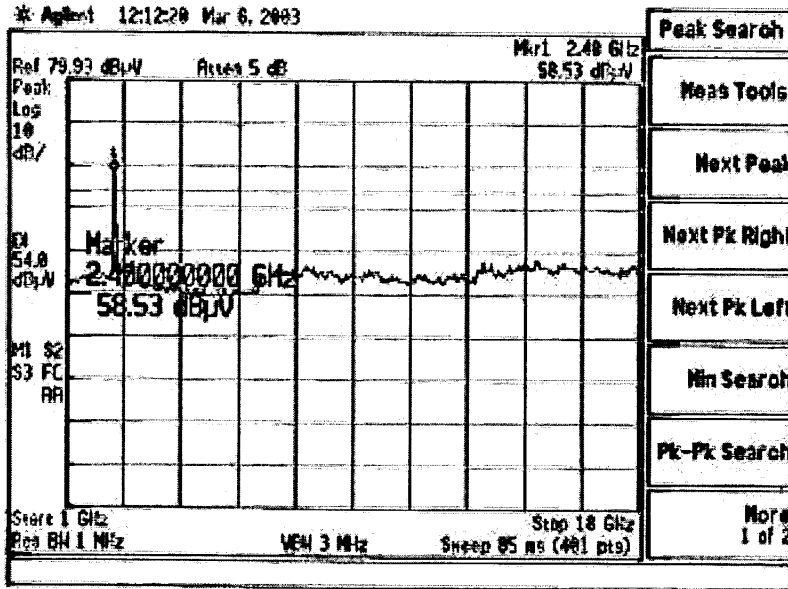
Frequency (Mhz)	Read value (dBuV/m)	Antenna factor	Cable loss (dB)	Real Value (dBuV/m)	Limit (dBuV/m)
4882	Not Detectable	31.26	7.02	N/A	54
7323	Not Detectable	36.53	9.09	N/A	54

EUT operating at highest frequency .2480Mhz

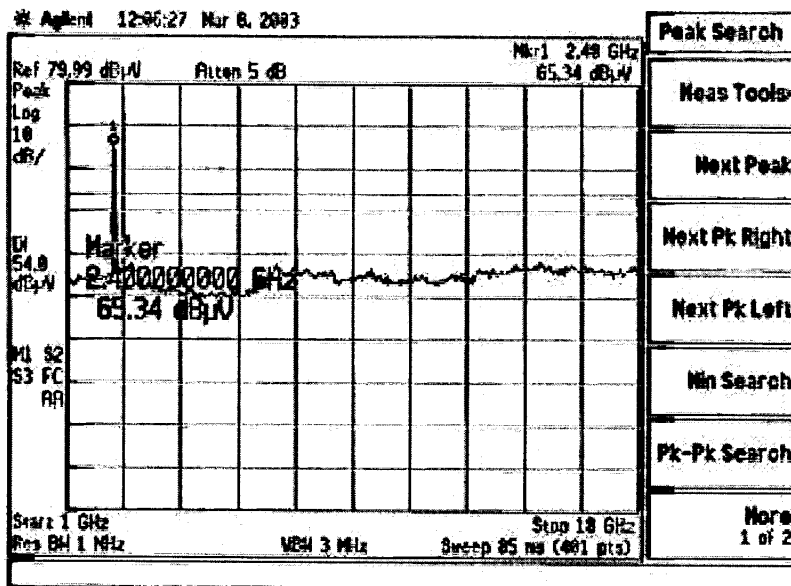
Frequency (Mhz)	Read value (dBuV/m)	Antenna factor	Cable loss (dB)	Real Value (dBuV/m)	Limit (dBuV/m)
4960	Not Detectable	31.26	7.02	N/A	54
7440	Not Detectable	36.53	9.09	N/A	54

EUT operating at lowest frequency .2402Mhz

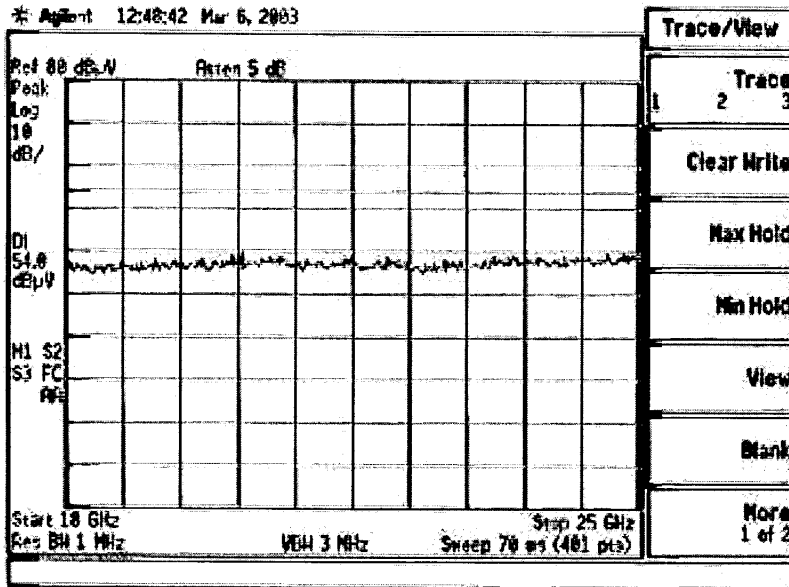
Vertical



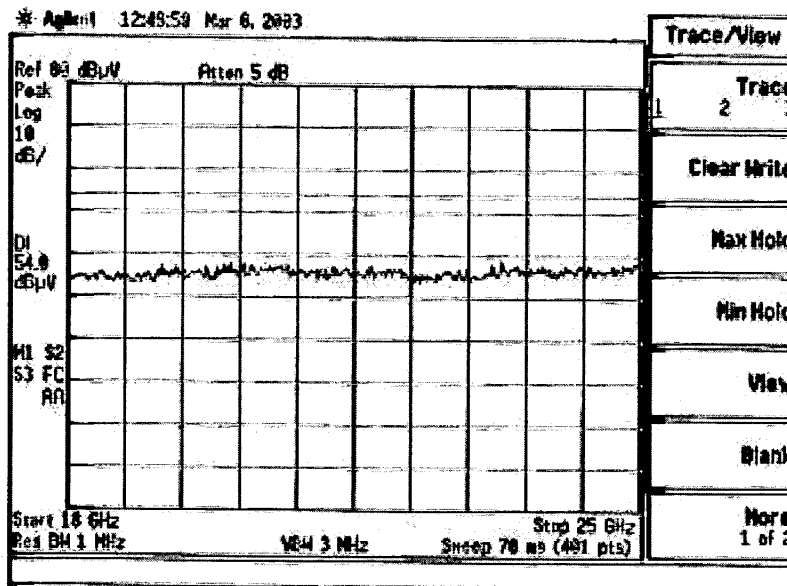
Horizontal



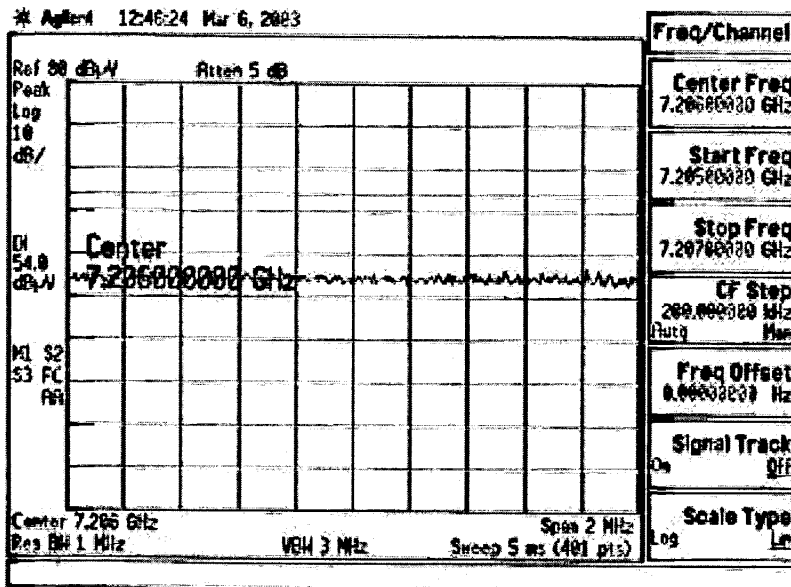
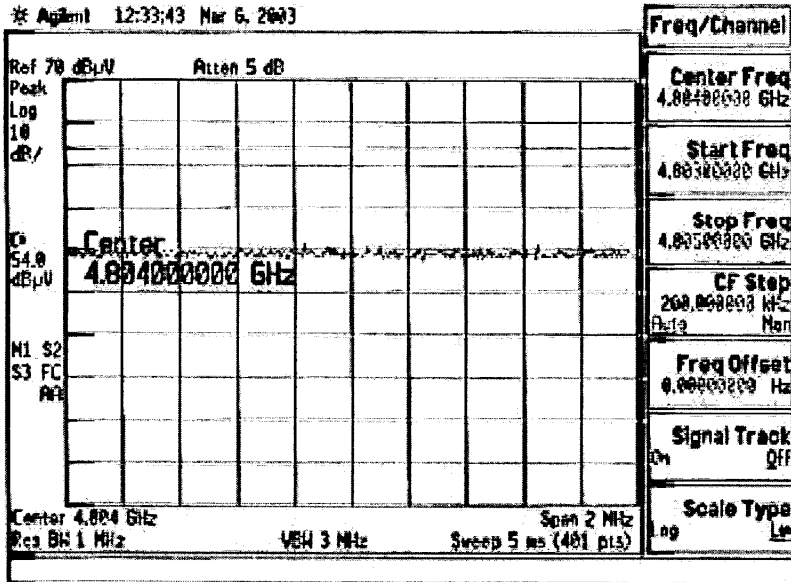
Vertical



Horizontal

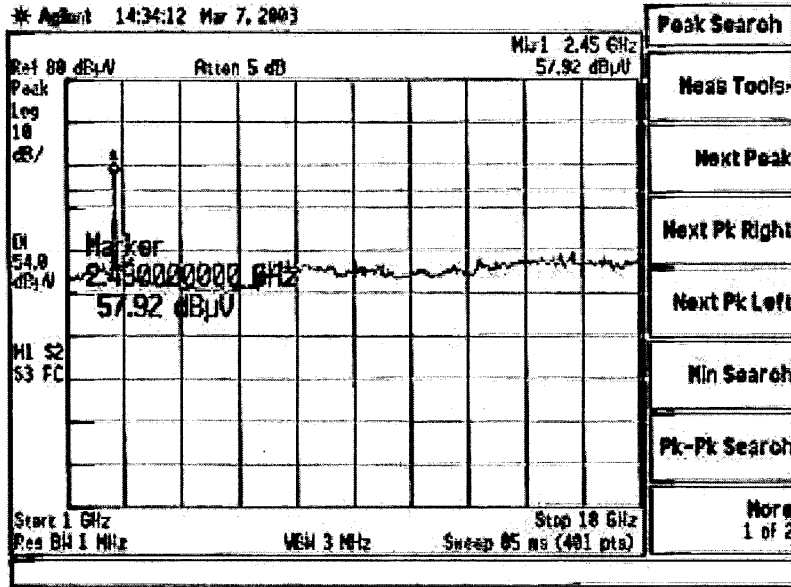




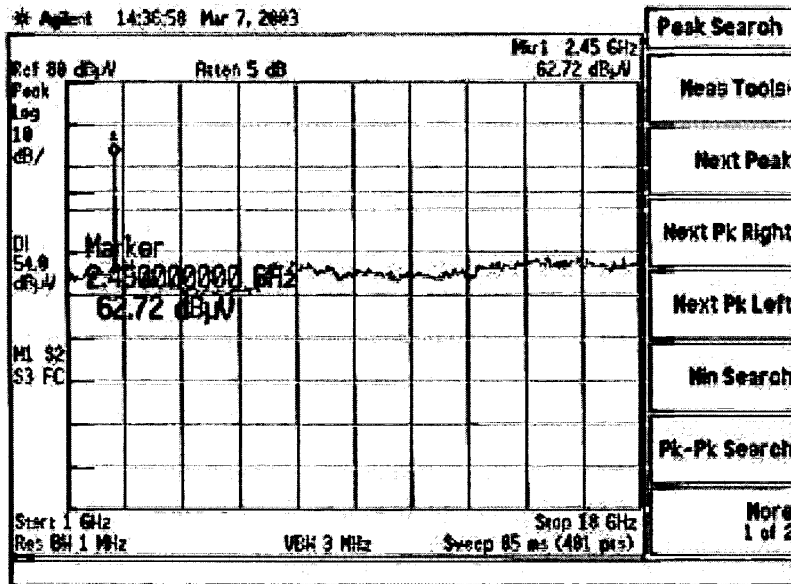


EUT operating at middle frequency .2441Mhz

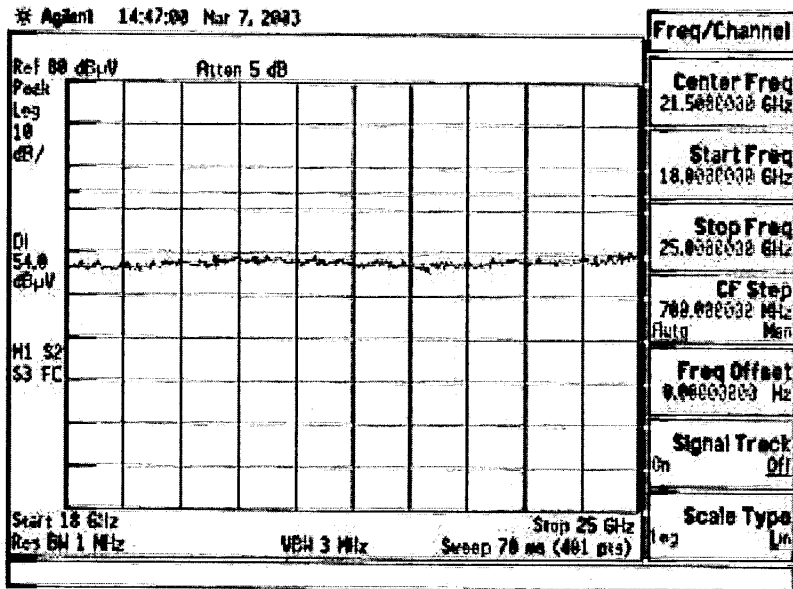
Vertical



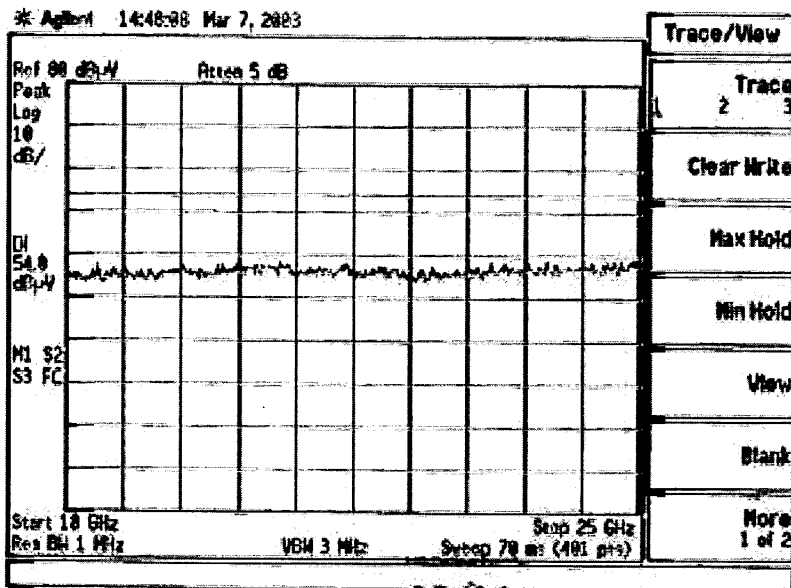
Horizontal

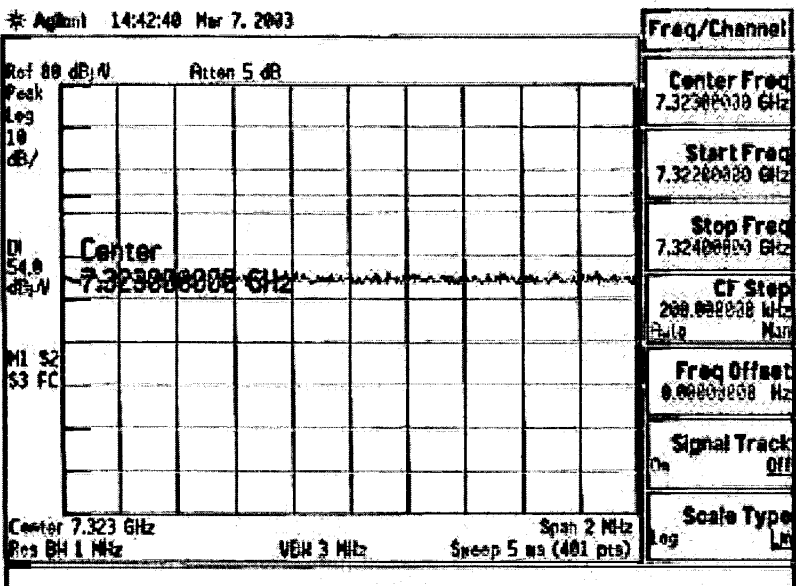
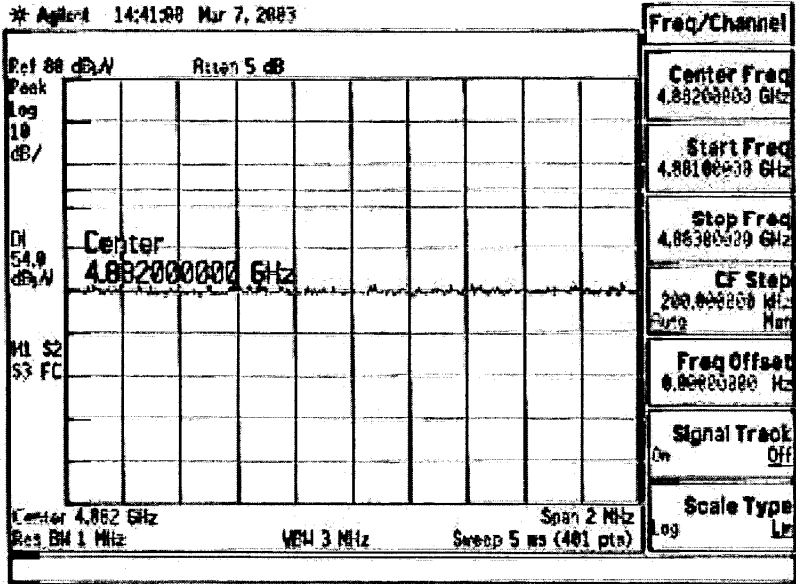


Vertical



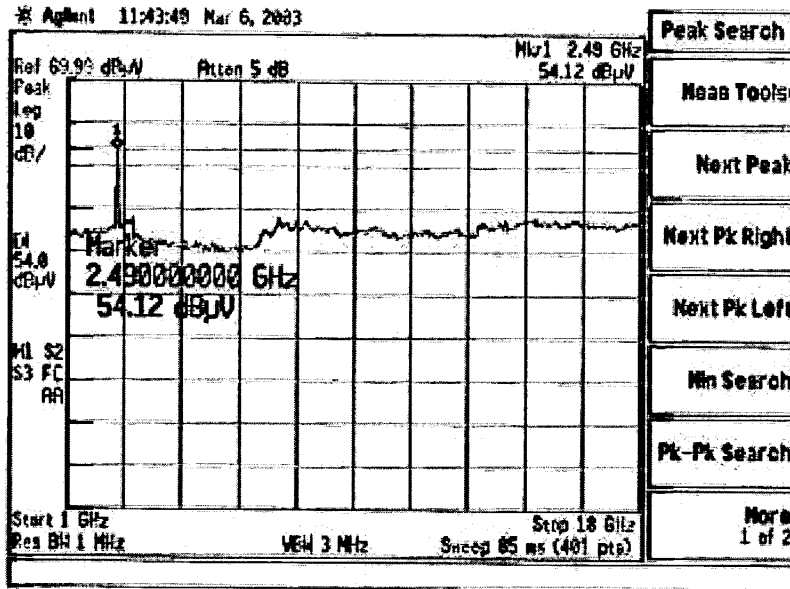
Horizontal



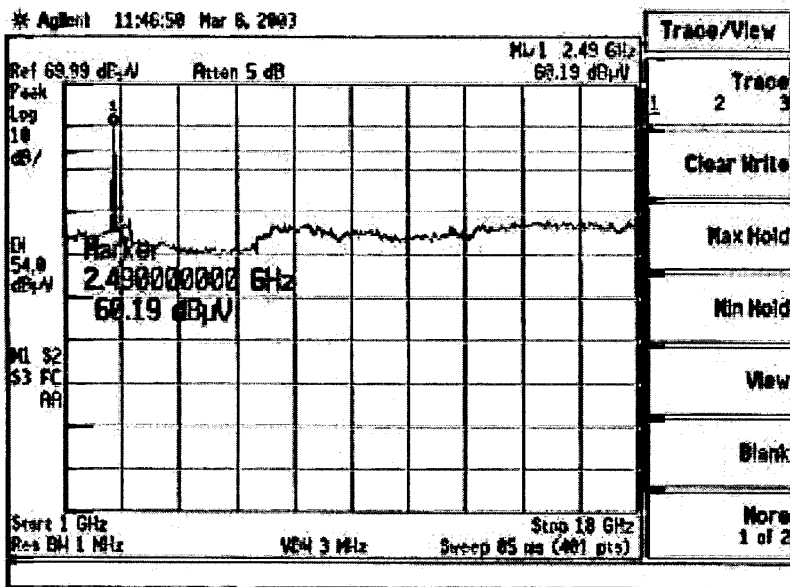


EUT operating at highest frequency .2480Mhz

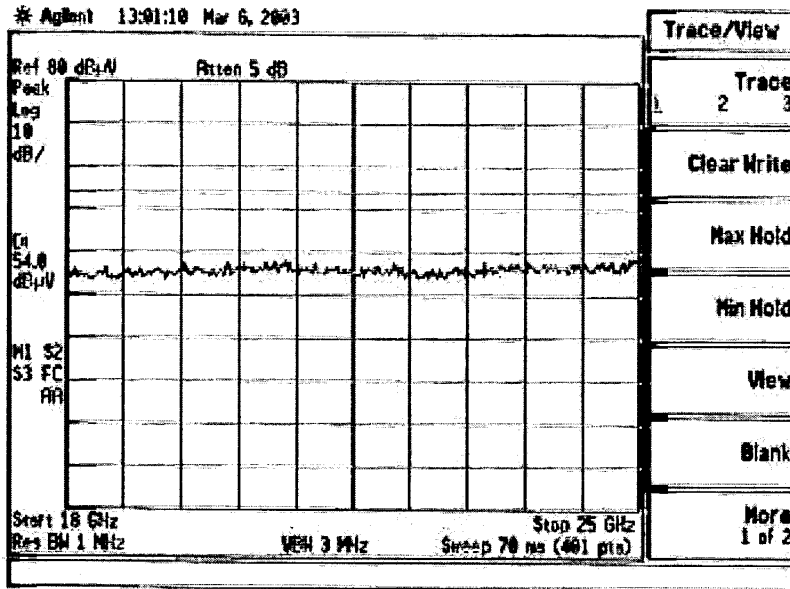
Vertical



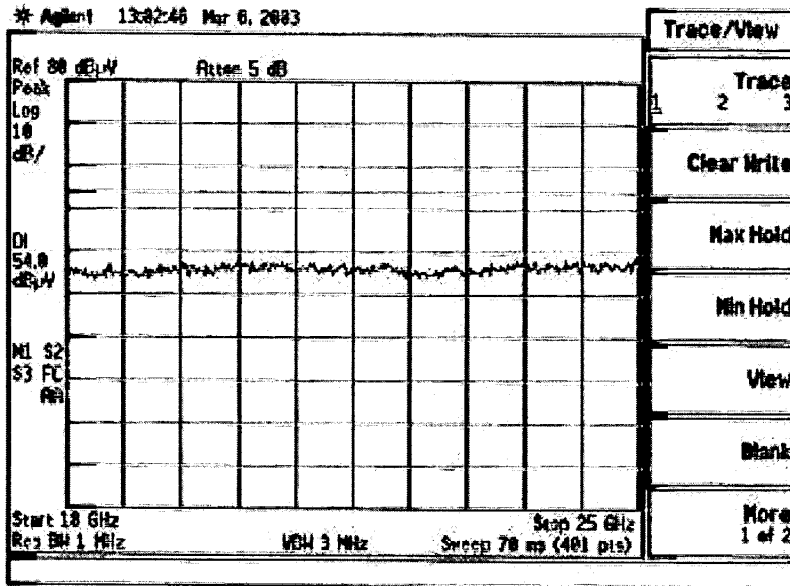
Horizontal

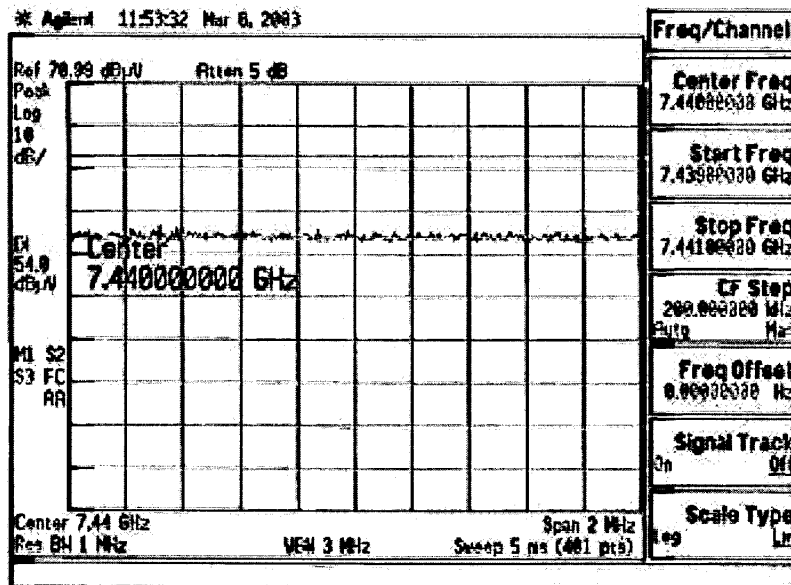
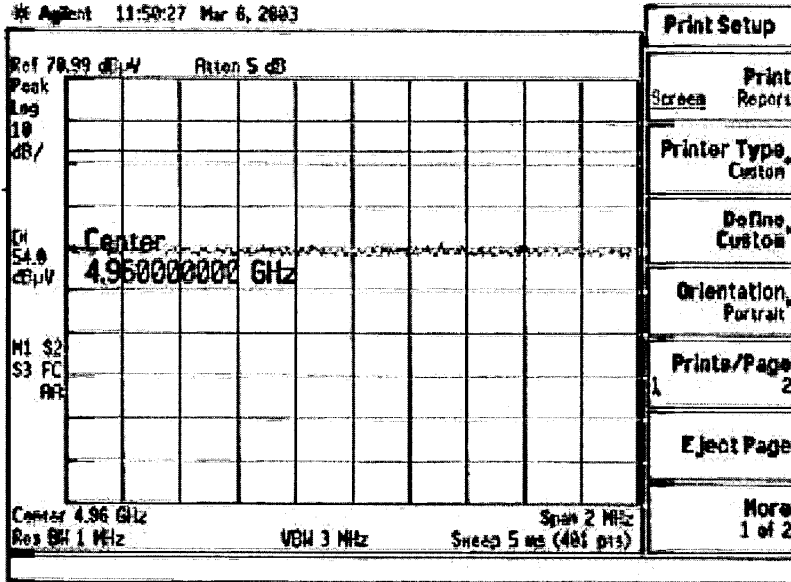


Vertical

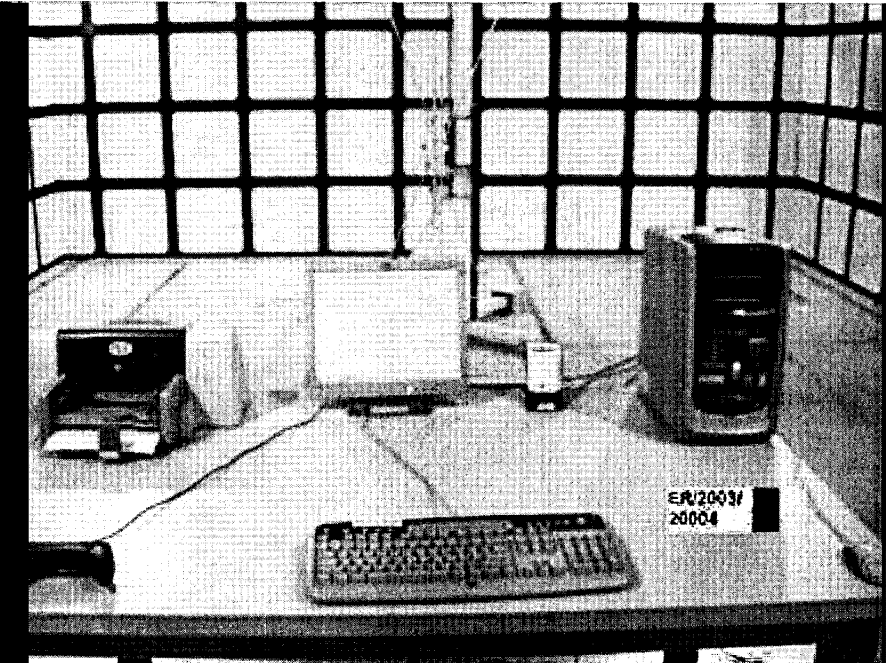


Horizontal





**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>**