

FCC TEST REPORT

Equipment Under Test: Bluetooth USB Dongle**Model No.**: GL2BDG92**Applicant**: Global Sun Technology Inc.**Address of Applicant**: No.13, Tung Yuan Rd., Jung Li Industrial Park,
Jung Li city, Tao Yuan Hsien, Taiwan, R.O. C.**Standards:****FCC Part 15 subpart C**

In the configuration tested, the EUT complied with the standards specified above.

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 : Alex Lee**Date** : Jan. 23,2003**Approved by** : Jason Lin**Date** : Jan. 30,2003

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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 : Global Sun Technology Inc.
 Address No.13, Tung Yuan Rd., Jung Li Industrial Park,
 Jung Li city, Tao Yuan Hsien, Taiwan, R.O. C.
 Contact : Miss. Amber Huang
 Telephone : +886-2-85227155 ext. 666

1.3 Description of EUT(s)

1	Product name	Bluetooth USB Dongle
2	Product ID	GL2BDG92
3	Supply Voltag	USB Power Supply 5V±10%
4	Carrier Frequency	2402MHz to 2480MHz
5	Modulation Method	GFSK,1Mbps,0.5BT Gaussian
6	Hopping	1600hops/sec, 1MHz channel space
7	Output Interface	USB
8	Operation Temperature	-20 to +70 degree
9	Compliant	Bluetooth Specification Ver1.1
10	Storage Temperature	-40 to +85 degree

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 "BlueSuite" to control the EUT. Setting of the software parameters are set as default. Operating frequency are set as testing required. The output power is set as Ext=255, Int=60 (at max. power)

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.

Due to cable loss, the real value will equal to measured value(show on the instrument) add cable loss.

2. Summary of Results

subclause	Parameter to be measures	Verdict	Page
15.207	Conducted Limits	PASS	7
15.209	Radiated emission Limits, general requirement	PASS	9
15.247(a)(1)	Channel Spacing	PASS	12
15.247(a)(1)(ii)	20db bandwidth / No. of channels	PASS	13
15.247(a)(1)(ii)	Average Time of Occupancy	PASS	18
15.247(b)(1)	Peak Output power	PASS	20
15.247(c)	Band-Edge Emission	PASS	22
15.247(c)	Spurious Emission under 25Ghz	PASS	24

3. Instruments List

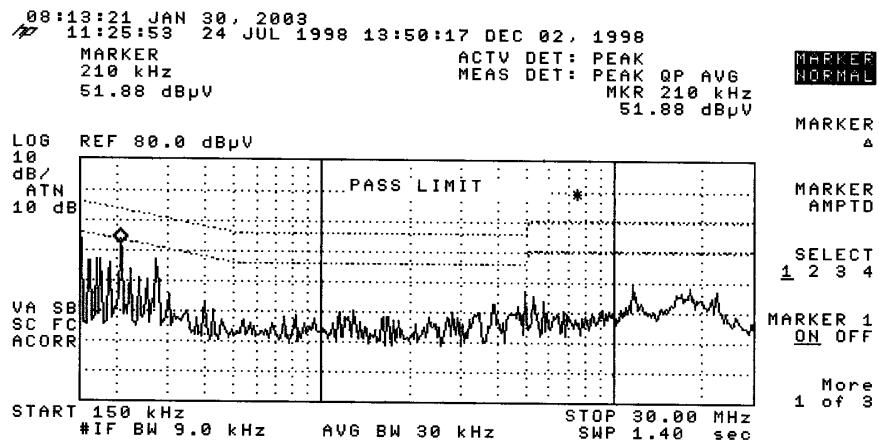
Instrument	Model	Serial number	Calibration date
Desktop PC	Acer Veriton 7200	N/A	N/A
Spectrum Analyzer	Agilent 7405A	US40240202	May 22, 2002
Climatic chamber	Terchy MHG-120L	911009	Oct. 15, 2002
Antenna	Schwarzbeck BBHA9120A	309/320	July 01, 2002
Antenna	Schwarzbeck VULB9163	152	July 01, 2002
RF Signal generator	Agilent 83752A	3601A02720	Sep. 04, 2002
EMC Analyzer	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

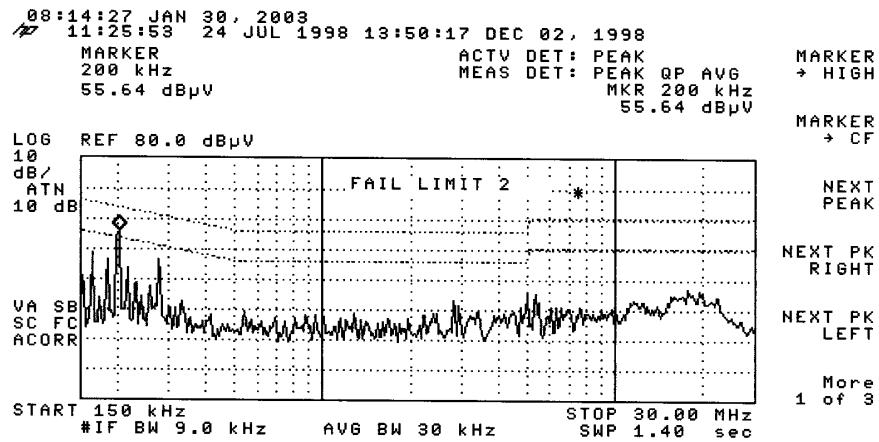
4.1 Conducted Limits

SUBCLAUSE 15.207

Line



Neural



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

30Mhz-1000 Mhz

Vertical

SGS EMC Lab. Site 2
EMI TESTING REPORT

Customer:Global Sun
 Model :GL2BDG92
 Spec. :
 Ser. No.:
 Limit :FCC B

Date:2003-03-06 Time:13:49
 Polar. :Vertical- 3M
 Report No.:ER/2003/10004
 File : -1
 Tester :ALEX LEE
 Tmp. (C):21.0 Humid. (%):61

Level (dBuV)

88

72

64

56

48

40

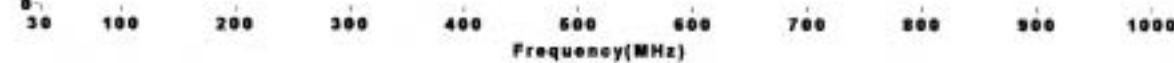
32

24

16

8

0



MEMO:

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

30Mhz-1000 Mhz

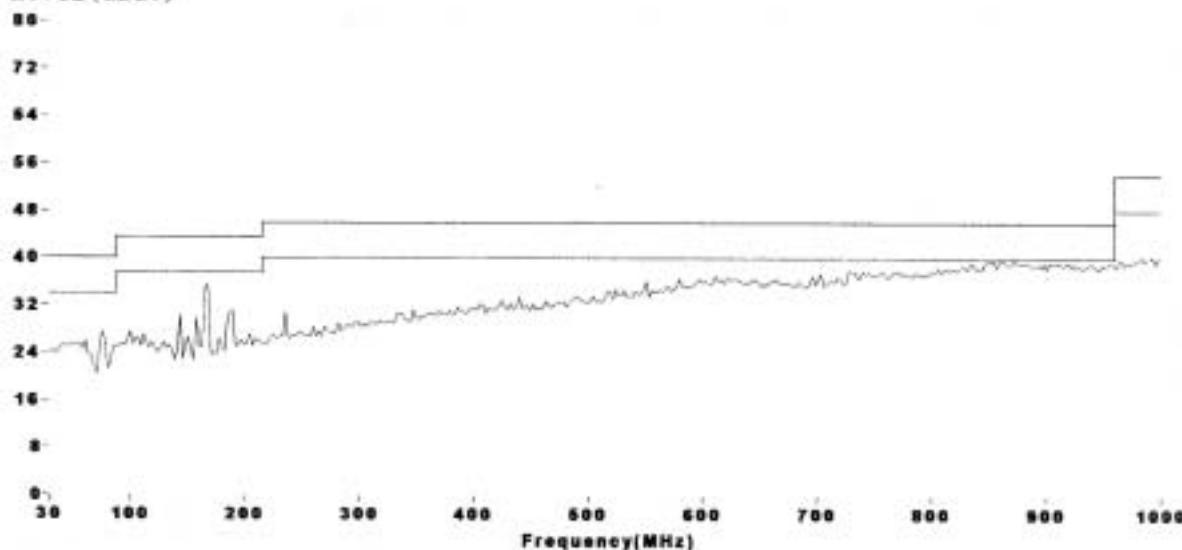
Horizontal

SGS EMC Lab. Site 2
EMI TESTING REPORT

Customer:Global Sun
 Model :GL2BDG92
 Spec. :
 Ser. No.:
 Limit :FCC B

Date:2003-03-06 Time:13:48
 Polar. :Horizontal- 3M
 Report No.:ER/20003/10004
 File :1-1
 Tester :ALEX LEE
 Tmp. (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

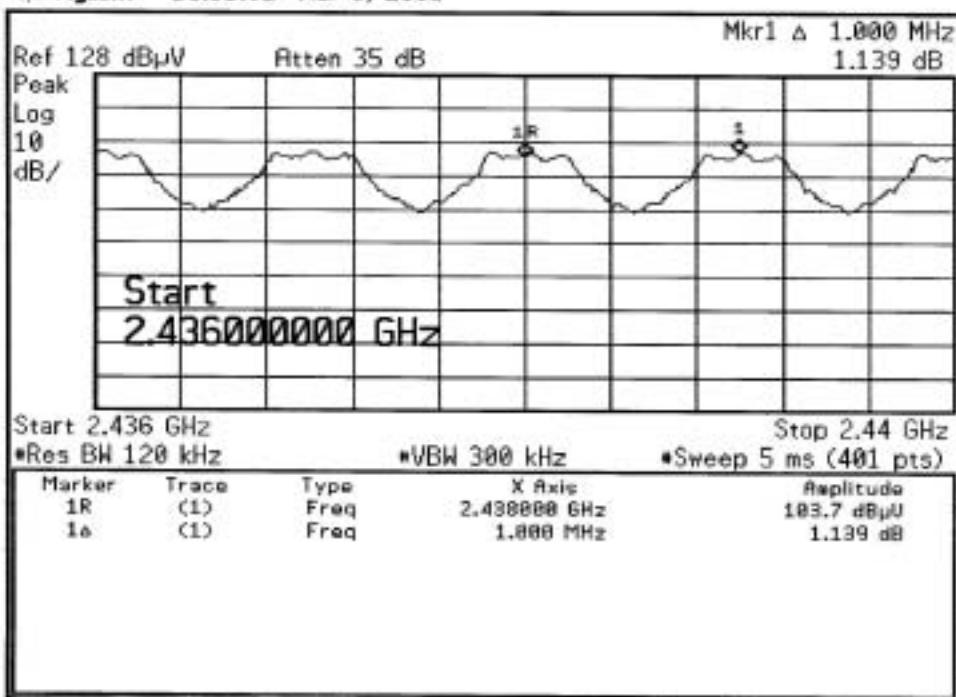
4.2.1 Limits

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)

* Agilent 15:31:02 Mar 6, 2003



Freq/Channel

Center Freq 2.43600000 GHz

Start Freq 2.43600000 GHz

Stop Freq 2.44000000 GHz

CF Step 400.000000 kHz Auto Man

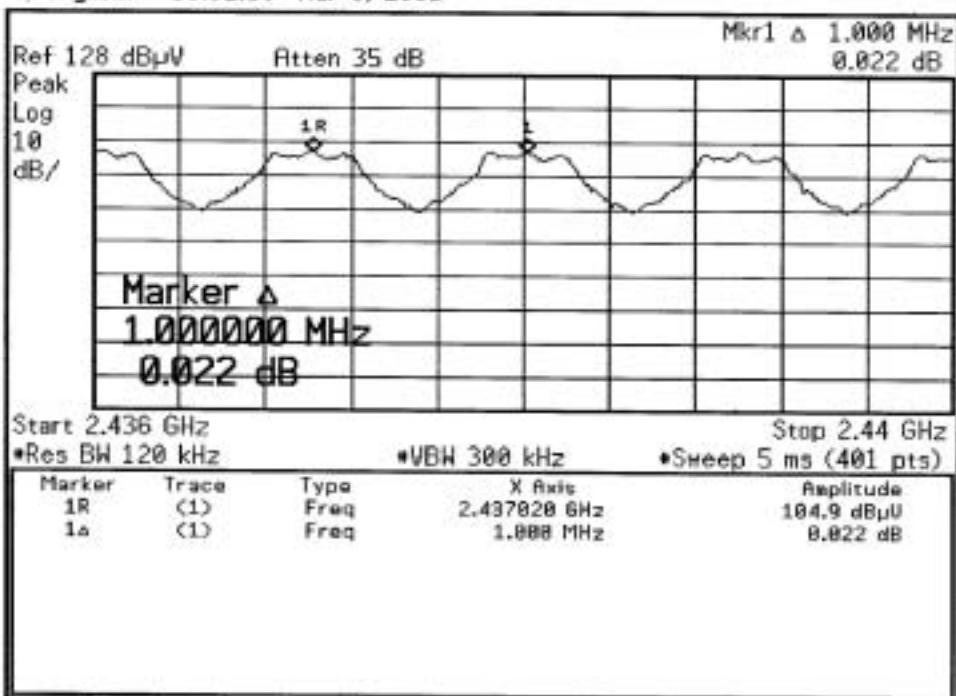
Freq Offset 0.00000000 Hz

Signal Track On Off

Scale Type Log Lin

No Peak Found

* Agilent 15:32:56 Mar 6, 2003



Marker

Select Marker 1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref Delta

Span Pair Span Center

Off

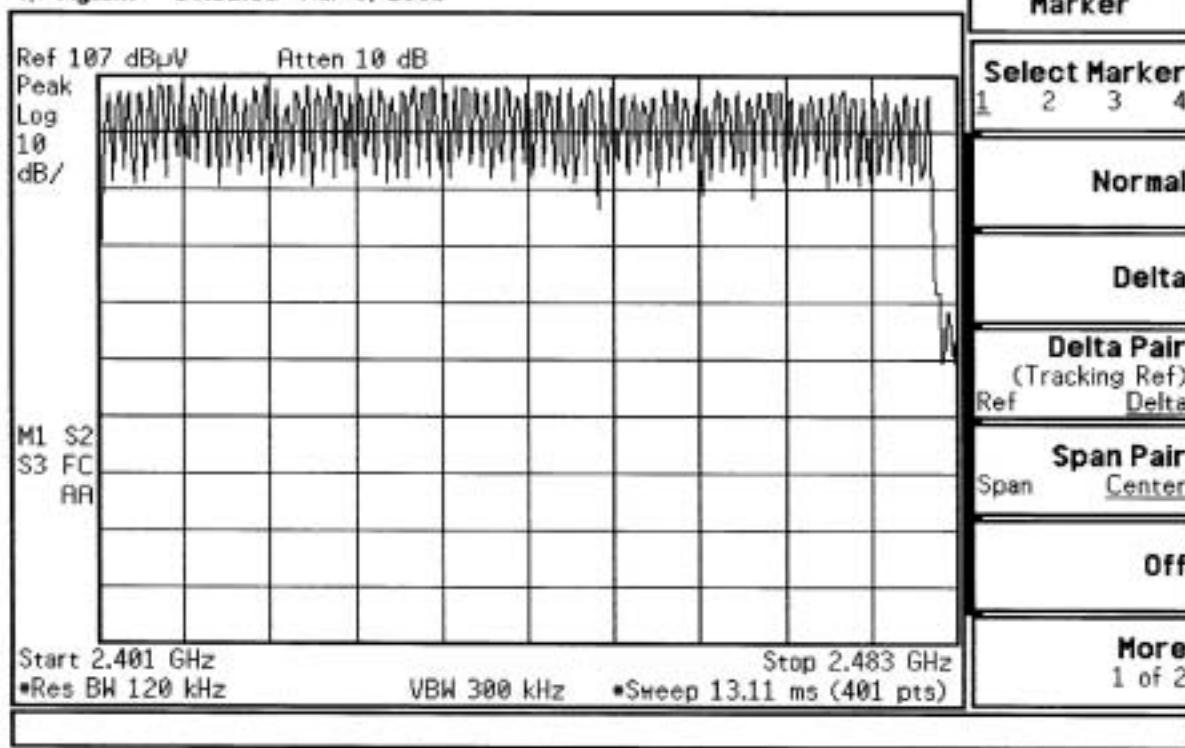
More 1 of 2

No Peak Found

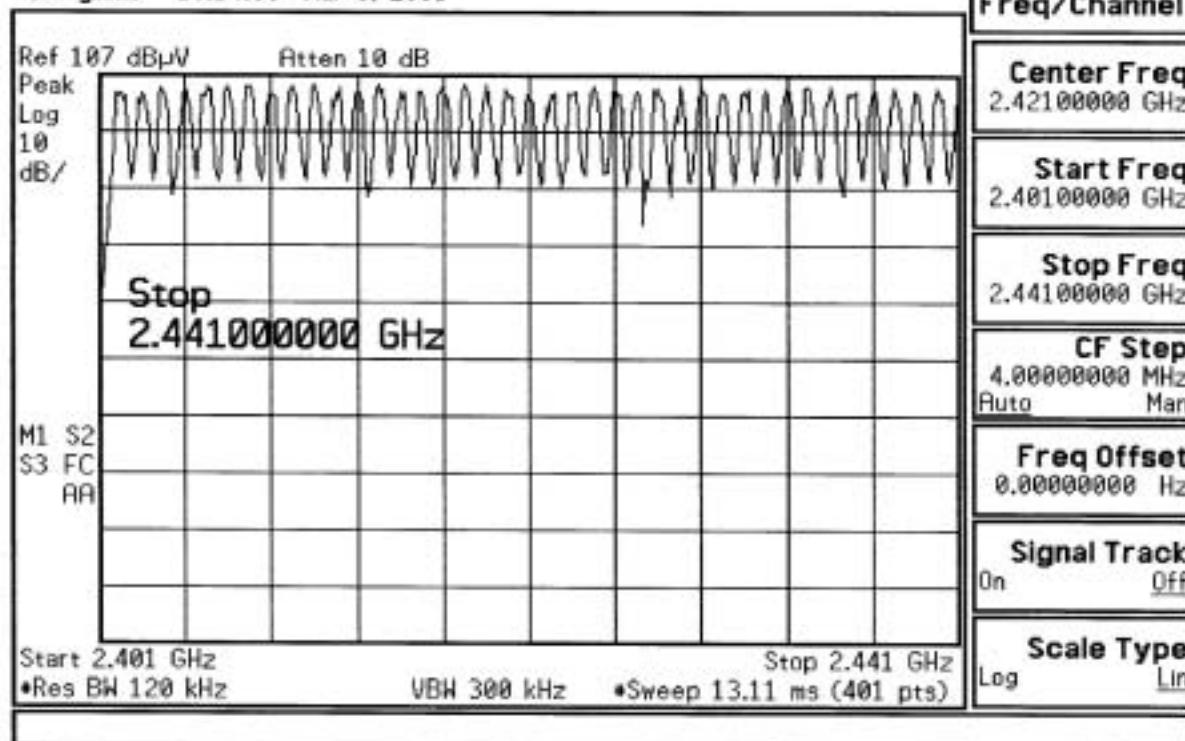
4.4 No. of carrier frequency / 20db Bandwidth

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

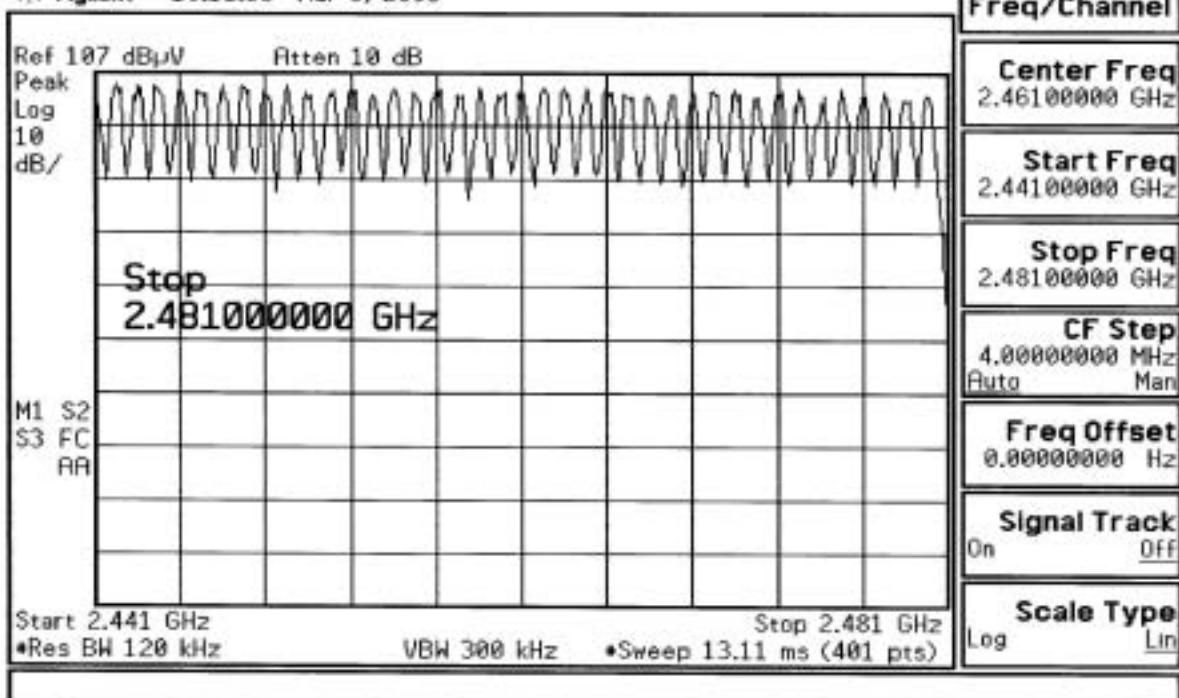
* Agilent 16:12:55 Mar 6, 2003



* Agilent 16:14:09 Mar 6, 2003

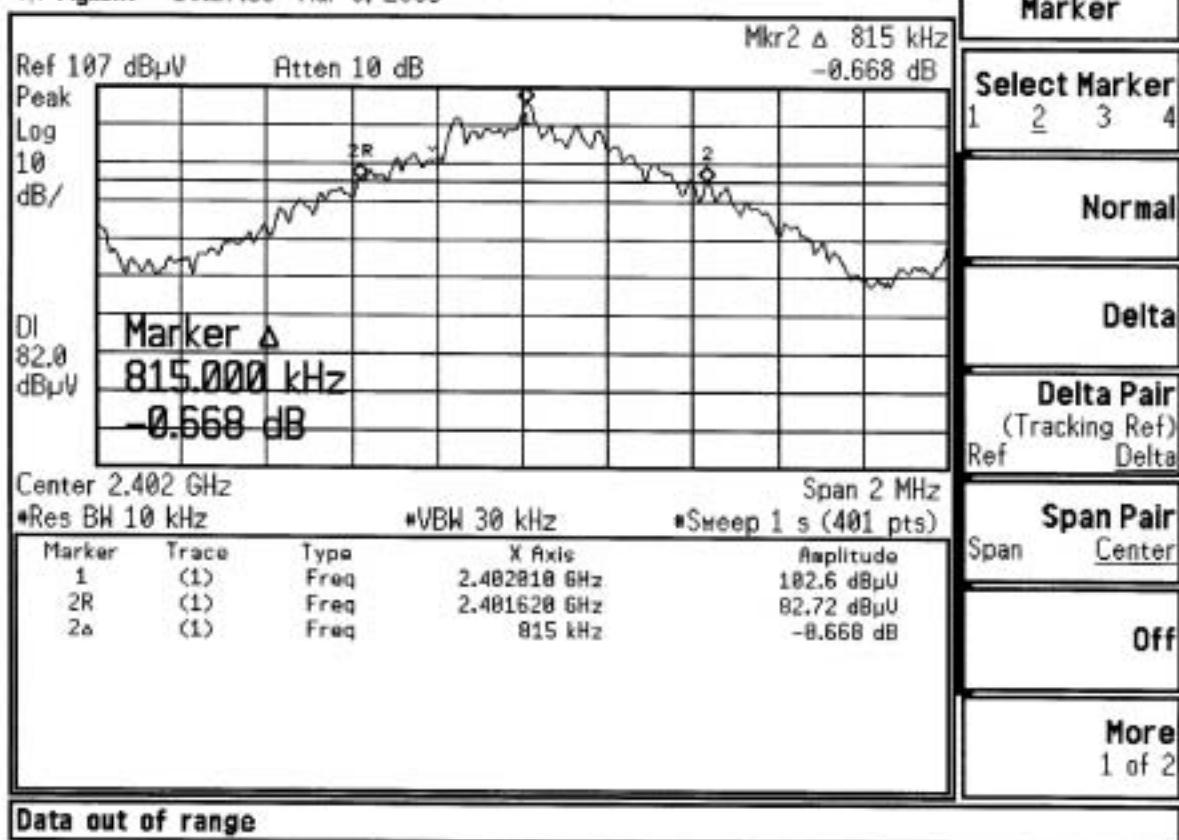


Agilent 16:15:33 Mar 6, 2003



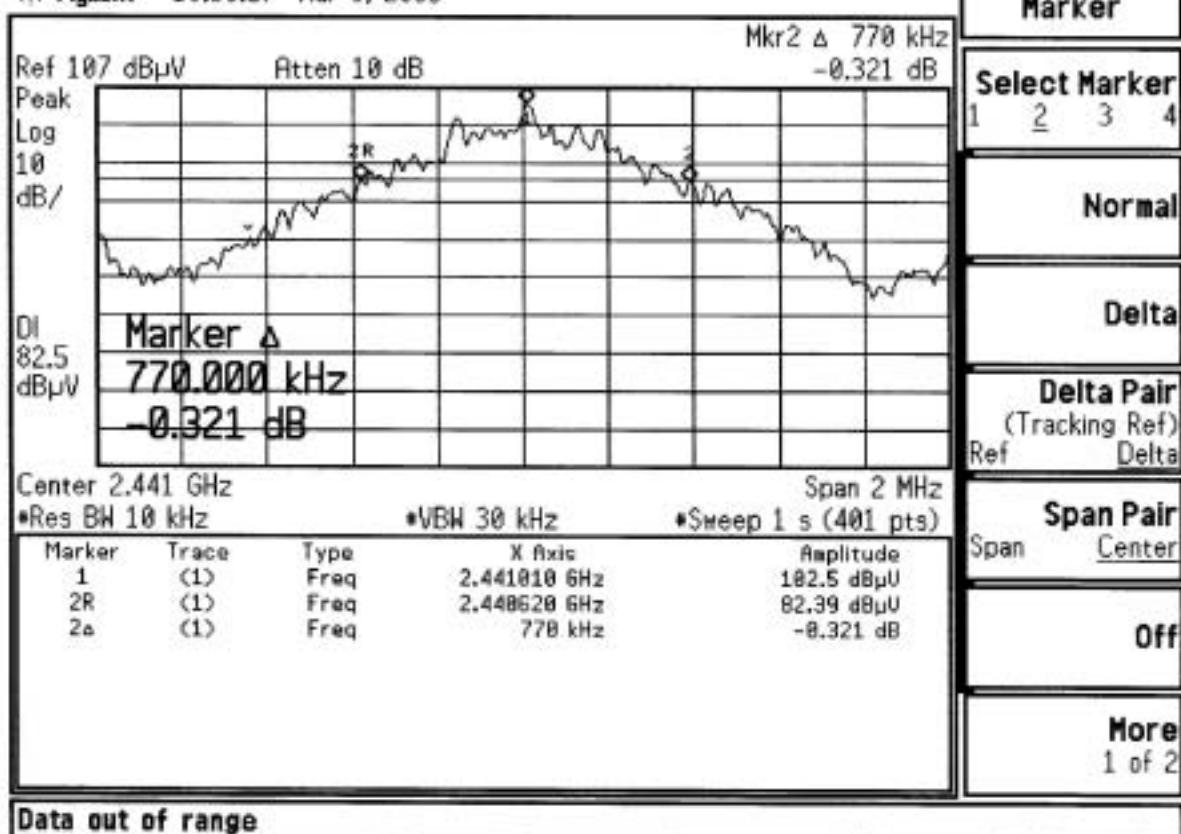
20dB bandwidth at lowest (2402Mhz), middle(2441Mhz), highest channel(2480Mhz)

* Agilent 16:27:53 Mar 6, 2003



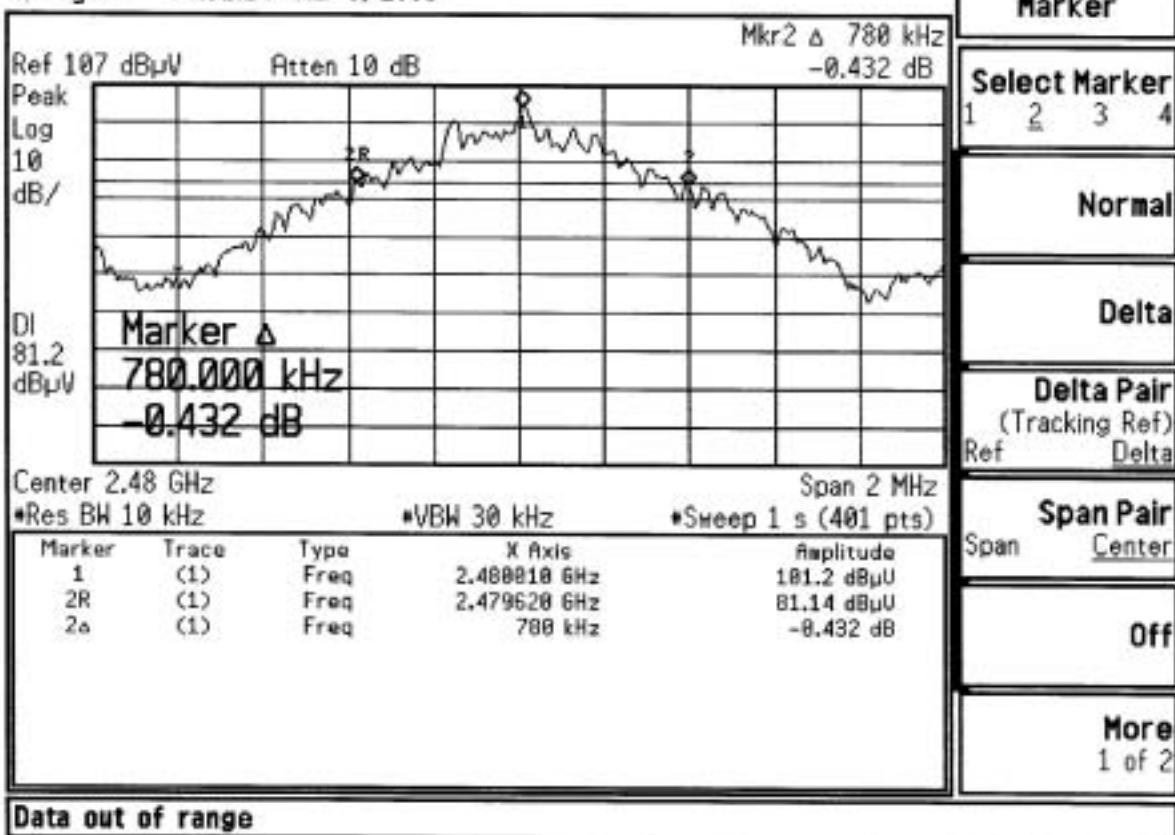
Channel bandwidth = 815 KHZ

Agilent 16:30:57 Mar 6, 2003



Channel bandwidth = 770KHZ

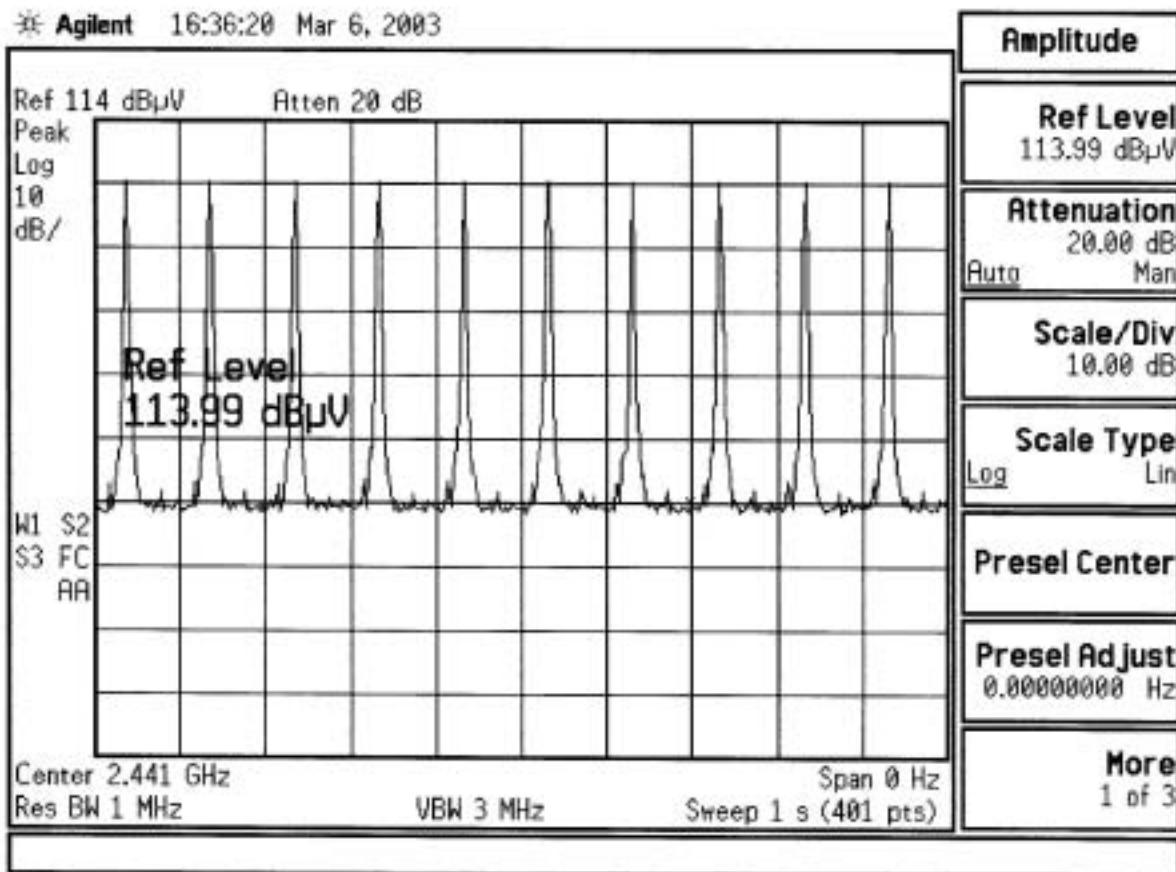
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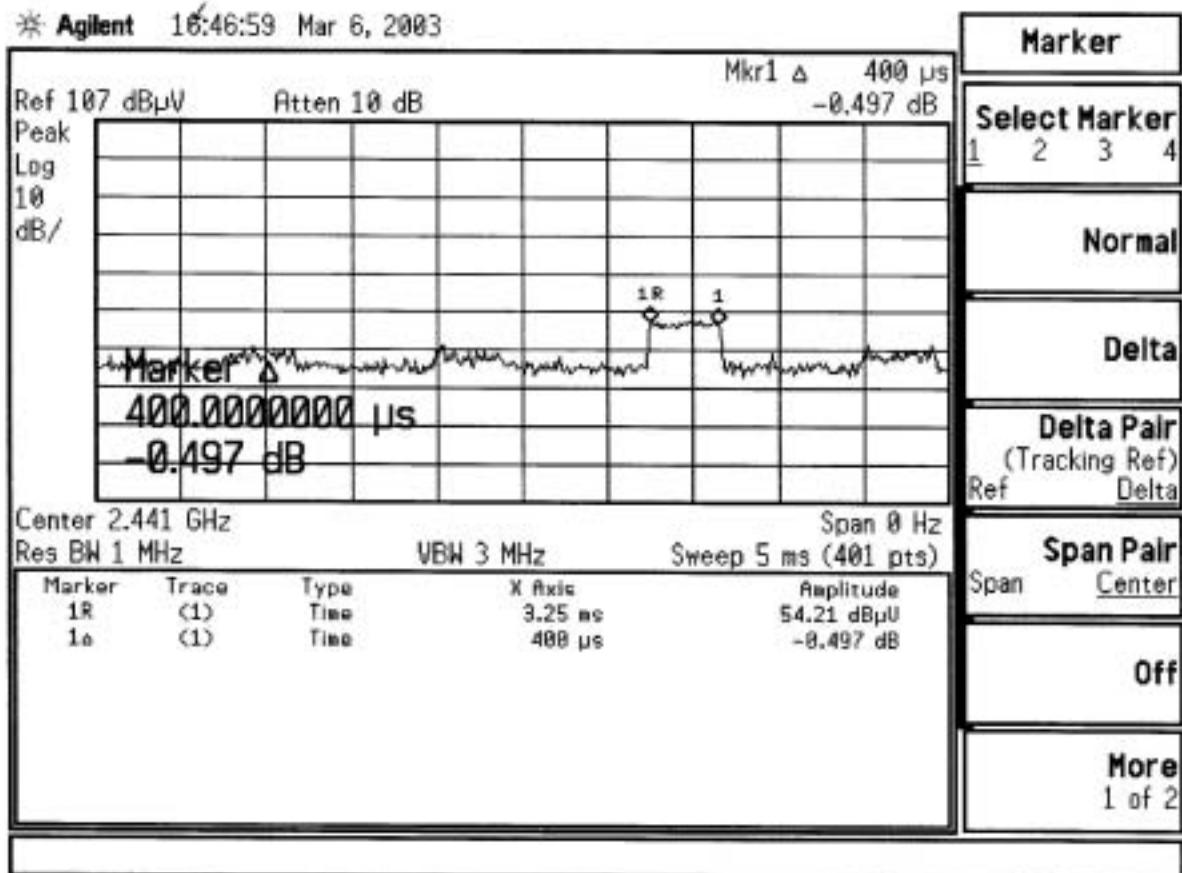


Channel bandwidth = 780KHZ

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 400 μ Sec. So the occupancy time within 30 second is $400 \times 10 \times 30 = 120000 \mu$ Sec = 120 mSec = 0.12 Sec.

4.5.2 Limits

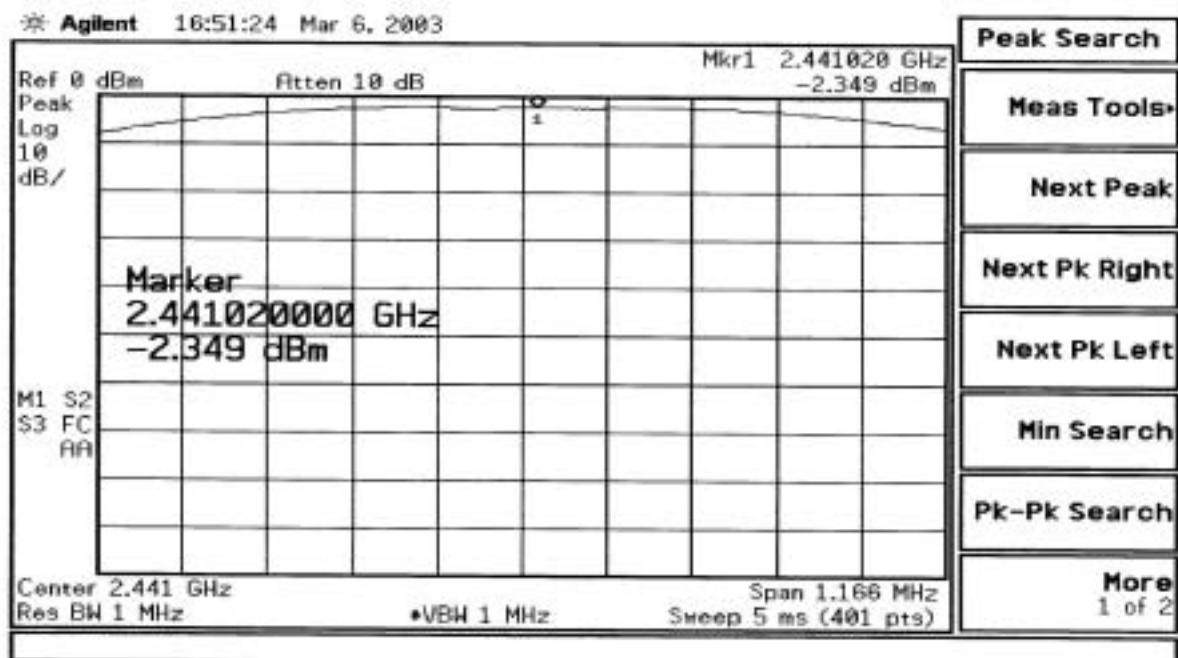
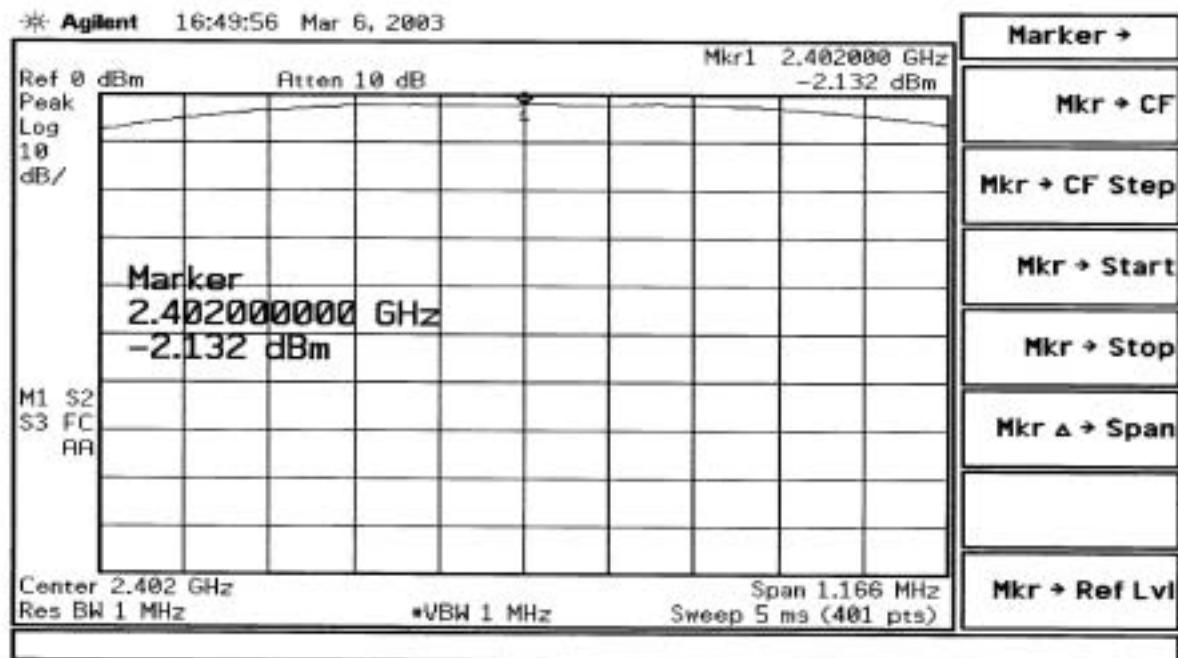
The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

The EUT comply with the requirement in Sec 15.247(a)(1) that use at least 75 hopping frequencies. The maximum 20dB 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

SUBCLAUSE15.247(b)(1)

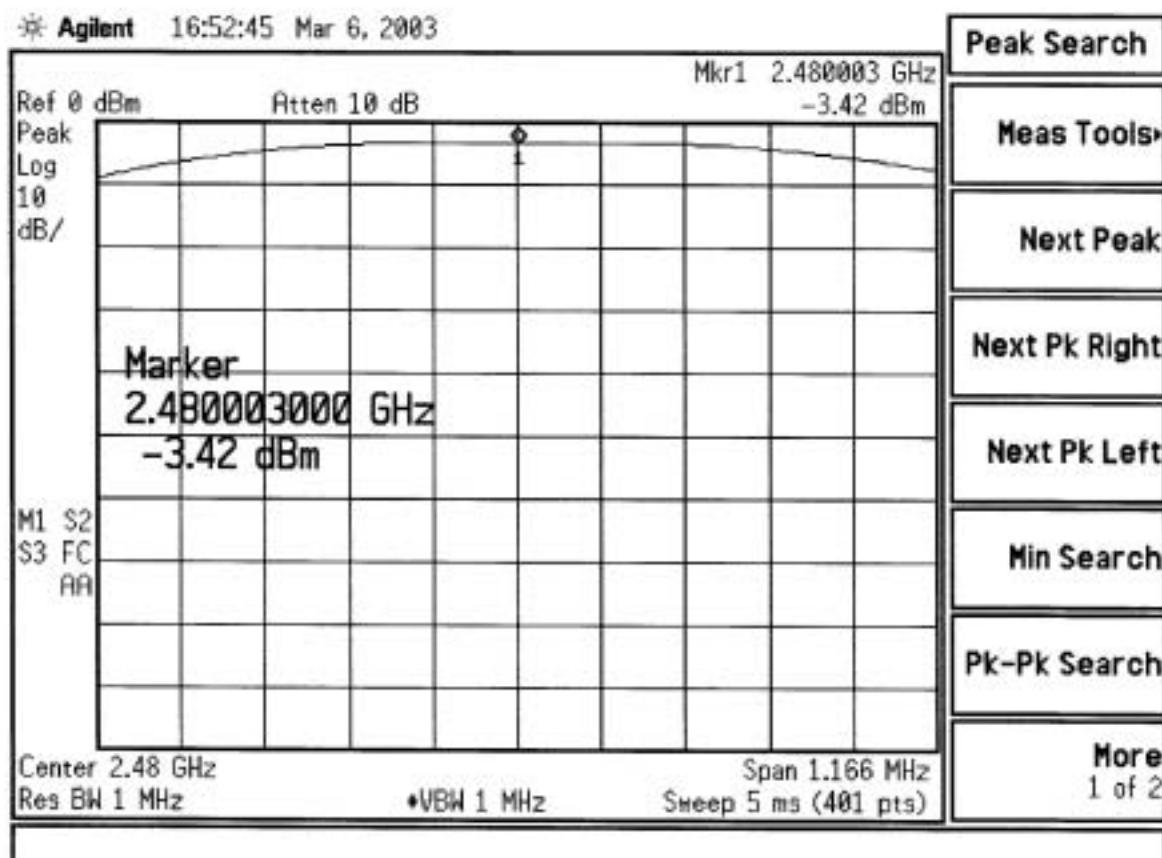
Transmitter transmit at lowest channel (2402Mhz and 2441 MHz)



At the 2402Mhz , The measured output power is -2.132 dbm.

$$-2.132 \text{ dbm} + 1.4\text{db(cable loss)} = -0.732 \text{ dbm} = 0.845 \text{ mW}$$

Transmitter transmit at highest channel (2480Mhz)



At the 2480 Mhz , The measured output power is -3.42 dbm.

$$-3.42 \text{ dbm} + 1.4 \text{ db (cable loss)} = -2.02 \text{ dbm} = 0.628 \text{ mW}$$

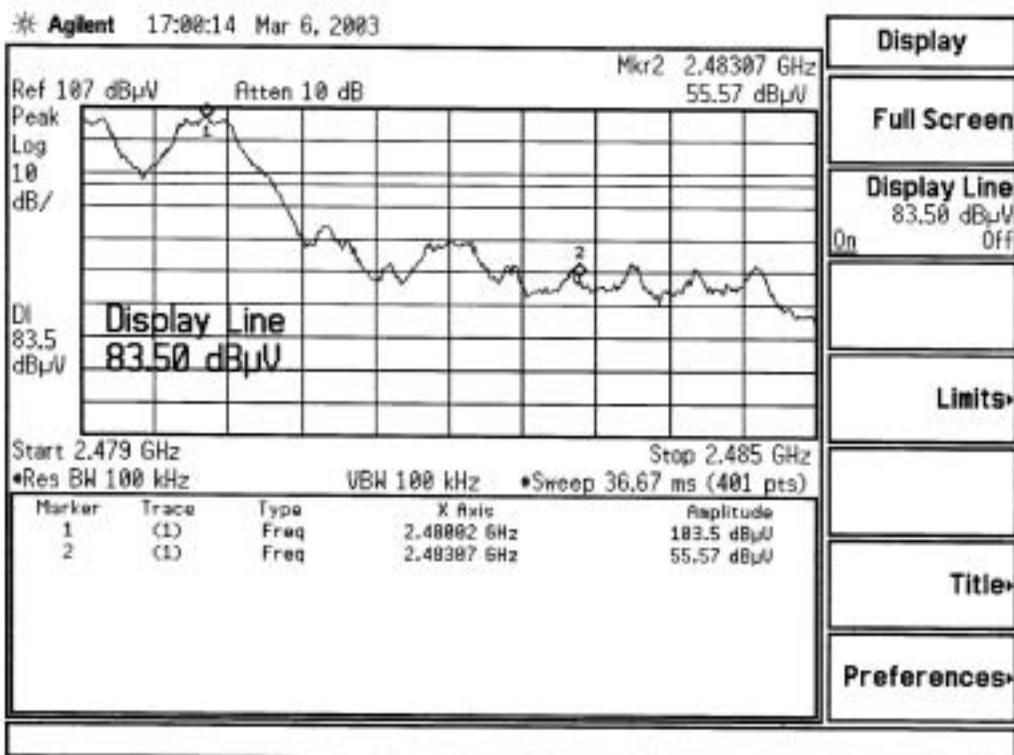
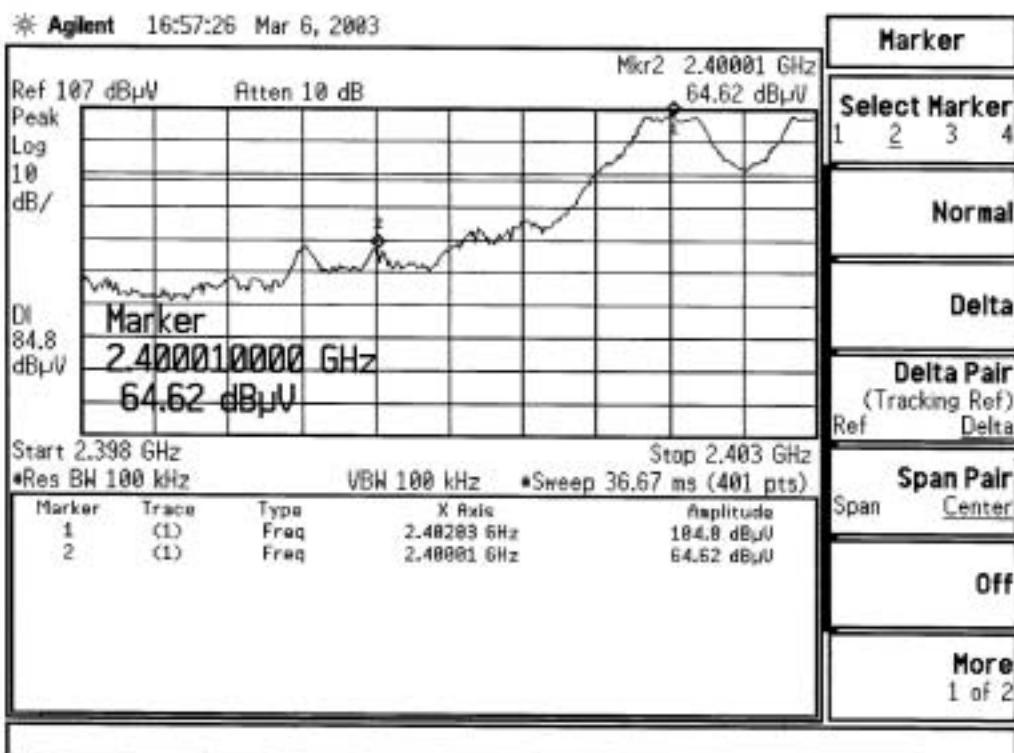
The ERP worst case was in 2402MHz and its value is 0.845 mW.

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 5725-5850MHz 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)**Selected frequencies

Low= Yes (2.402000 GHz)

Mid= Yes (2.441000 GHz)

High= Yes (2.480000 GHz)

Spectrum Analyzer setup

Start frequency	0.030 GHz
Stop frequency	25.000 GHz
Center frequency	2.441 GHz
Low frequency	2.402 GHz
Mid frequency	2.441 GHz
High frequency	2.480 GHz
Resolution bandwidth	100 kHz
Video bandwidth	100 kHz
Sweep time	500ms

Frequency(MHz)	Read value(dBuV/m)	Antenna factor	Cable loss(db)	Real Value(dbuV/m)	Limit(dbuV/m)
2401.992	53.52	27.2	4.55	85.27	In band
4802.99	N/A	31.26	7.02	N/A	54
7205.99	N/A	36.53	9.09	N/A	54

N/A means the emission value the same as background noise.

EUT operating at middle frequency

Frequency(MHz)	Read value(dBuV/m)	Antenna factor	Cable loss(db)	Real Value(dbuV/m)	Limit(dbuV/m)
2440.982	56.01	27.6	4.62	88.23	In band
4881.99	N/A	31.41	7.24	N/A	54
7324.993	N/A	36.55	9.13	N/A	54

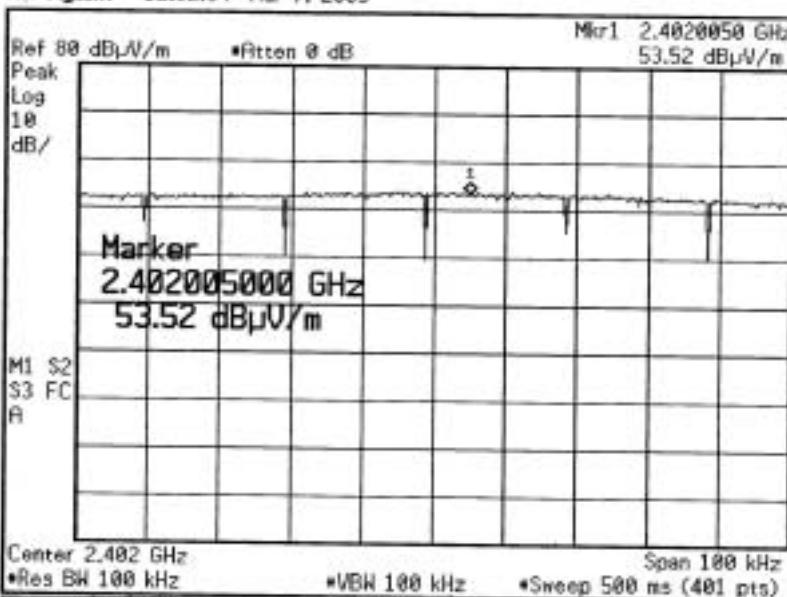
N/A means the emission value the same as background noise.

EUT operating at highest frequency

Frequency(MHz)	Read value(dBuV/m)	Antenna factor	Cable loss(db)	Real Value(dbuV/m)	Limit(dbuV/m)
2478.99	64.25	27.58	4.67	96.5	In band
4957.99	N/A	31.55	7.31	N/A	54
7439.99	N/A	36.59	9.24	N/A	54

N/A means the emission value the same as background noise.

* Agilent 12:02:04 Mar 7, 2003



Peak Search

Meas Tools

Next Peak

Next Pk Right

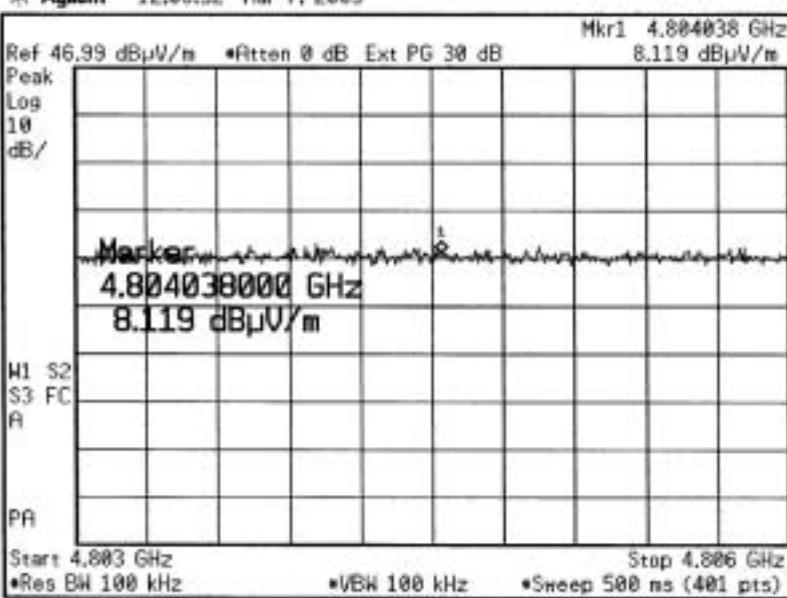
Next Pk Left

Min Search

Pk-Pk Search

More
1 of 2

* Agilent 12:08:52 Mar 7, 2003



Marker

Select Marker
1 2 3 4

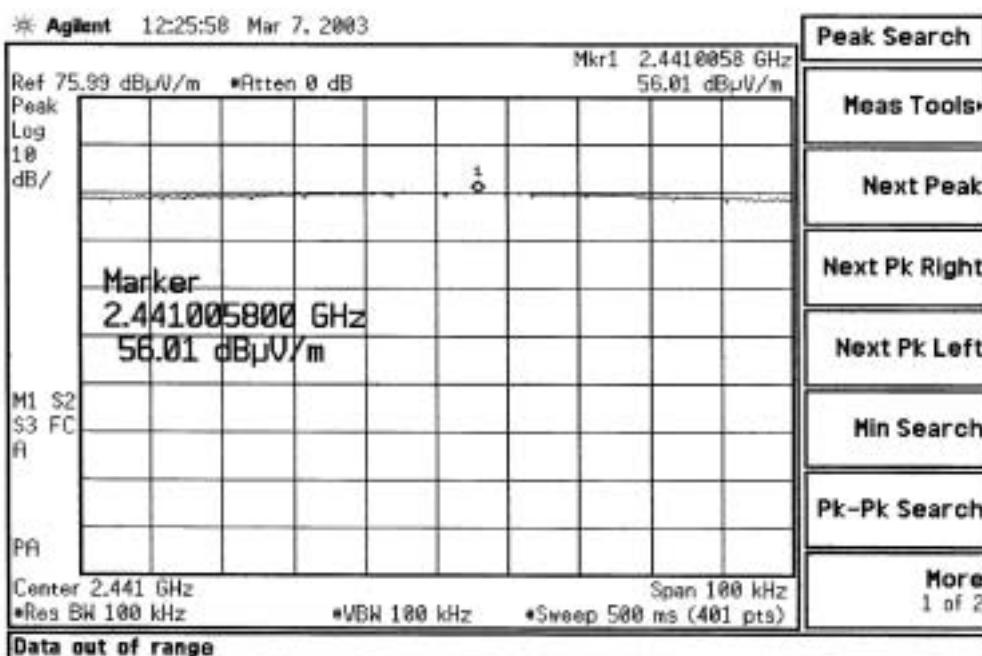
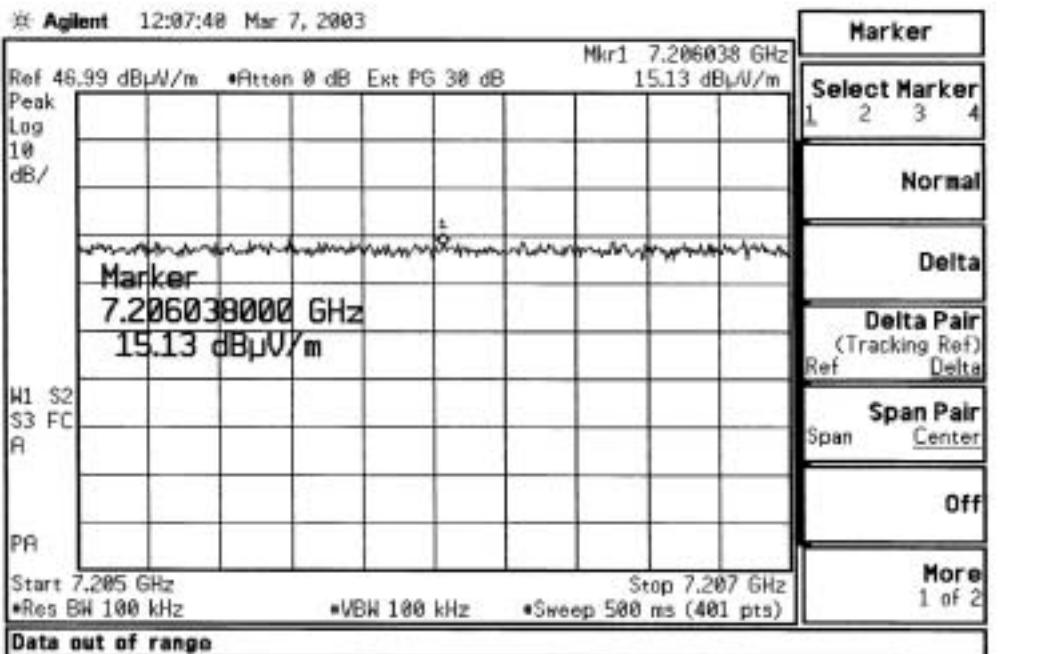
Normal

Delta

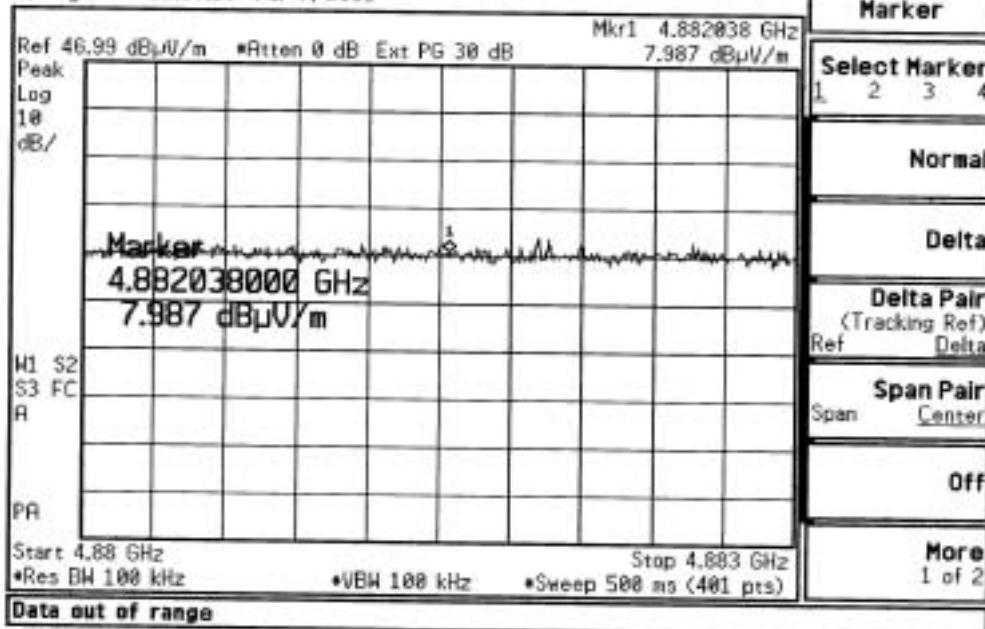
Delta Pair
(Tracking Ref)
Ref DeltaSpan Pair
Span Center

Off

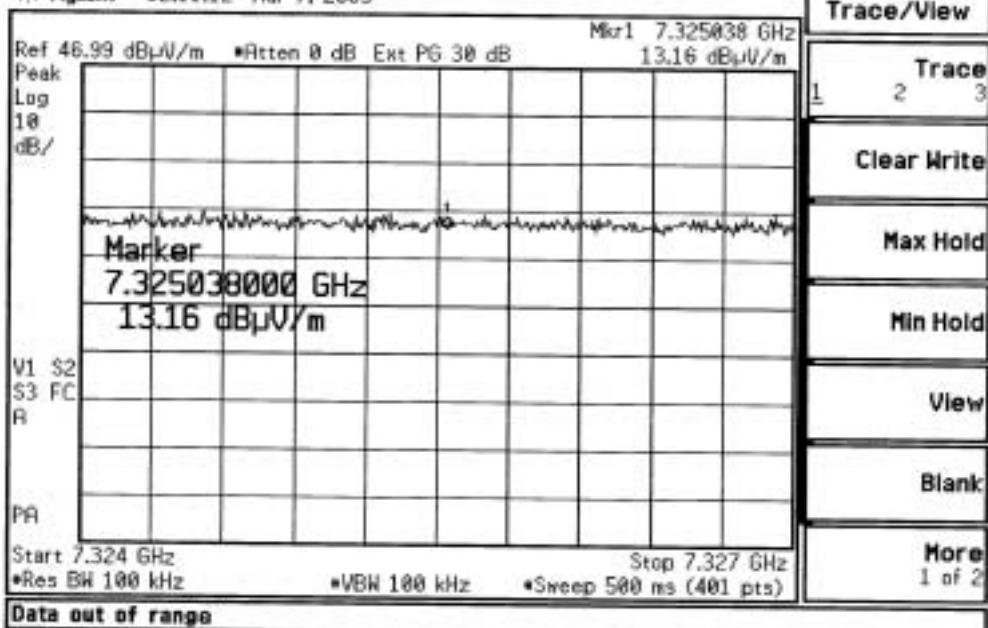
More
1 of 2

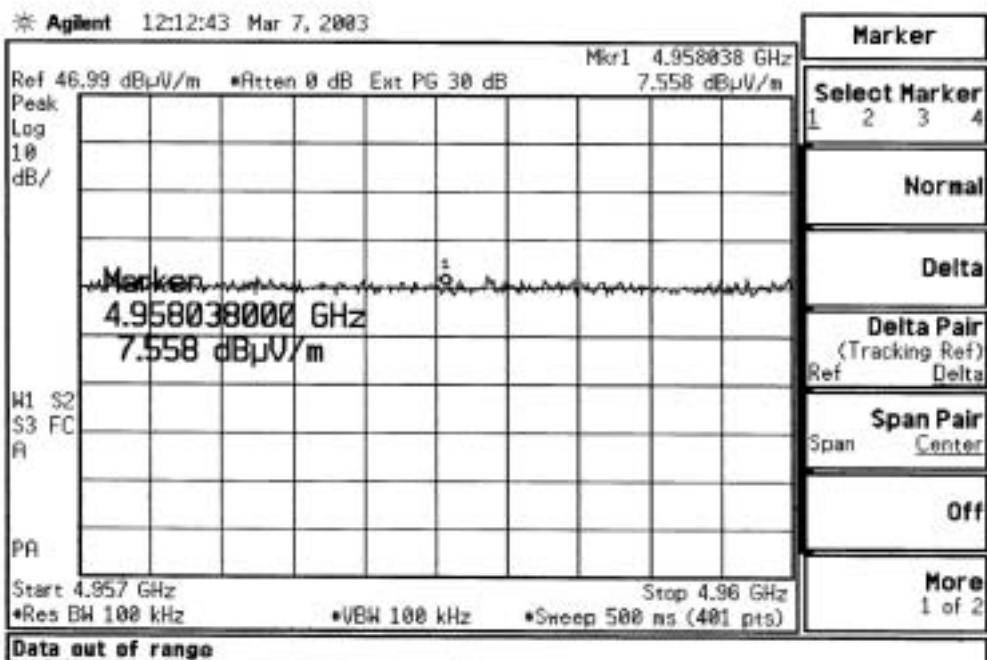
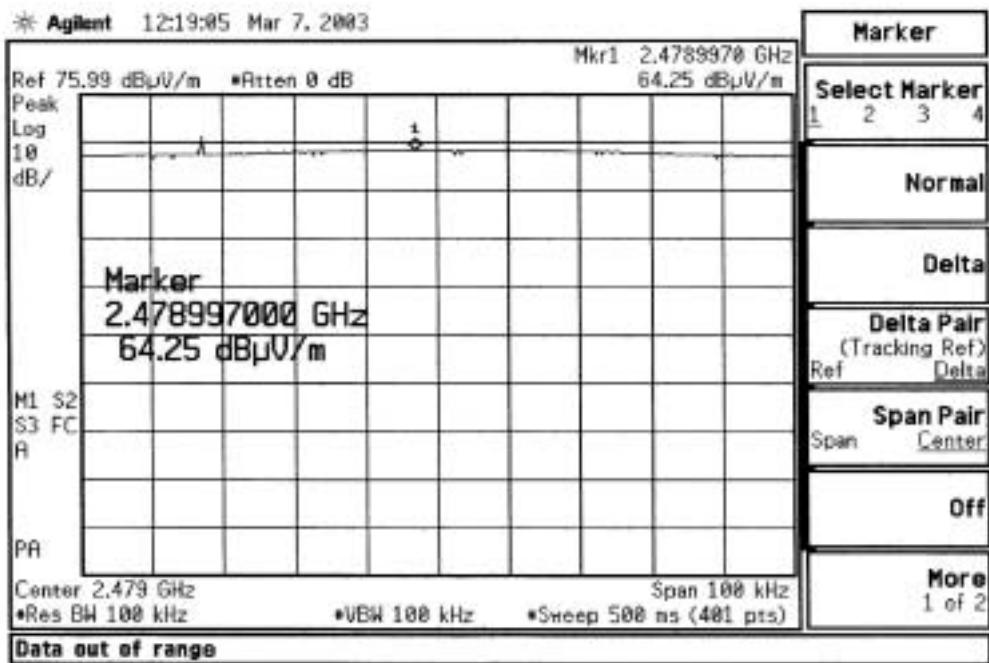


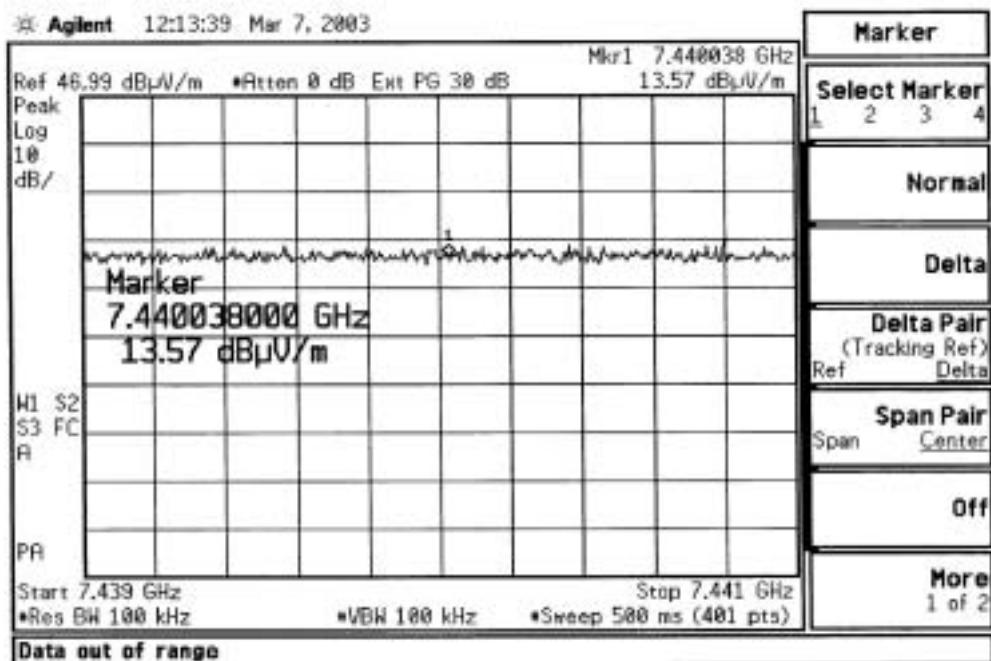
* Agilent 12:10:18 Mar 7, 2003



* Agilent 12:11:12 Mar 7, 2003







APPENDIX: Photographs of Test Setup

(The Photos are saved separately)

APPENDIX : Photographs of EUT

External Photos

(The Photos are saved separately)

Internal Photos

(The Photos are saved separately)