FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

TEN TECHNOLOGY, INC.

568 Weddell Drive, Suite 6
Sunnyvale, CA 94089

FCC ID: SIO-NSHP10

This Report Concerns:	**Equipment Type:**
☒ Original Report	2.4GHz Bluetooth Ipod Headphone

Test Engineer:	Snell Leong
Report No.:	R0508041
Report Date:	2005-09-01
Reviewed By:	Daniel Deng
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *TEN TECHNOLOGY, INC.*, FCC ID: *SIO-NSHP10*, or the "EUT" as referred to in this report is a 2.4GHz Bluetooth Ipod Headphone, which measures approximately 60mmL x 20mm W x 170mm H. The EUT is a frequency hopping device, which operates at the frequency range of 2402 – 2480MHz with emission designator 903KG1D.

** The test data gathered are from a production sample, S/N: HM053000003, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *TEN TECHNOLOGY, INC.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003& TIA/EIA-603.

Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA with registration number: 90464.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components.

Once loaded, set the Tx channel to low, mid and high for testing.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

Schematics / Block Diagram

Please refer to Appendix A.

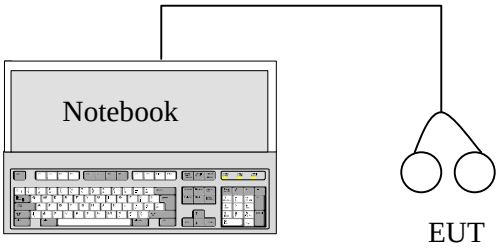
Equipment Modifications

No modifications were made to the EUT.

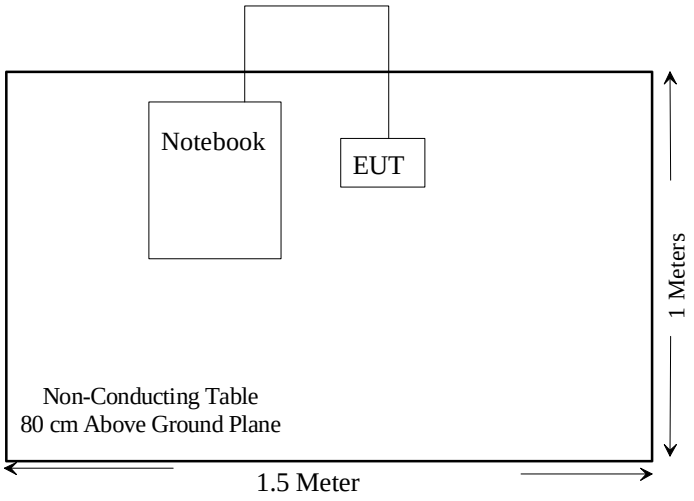
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	LAptop	300M	CN-03Y645-36521-361-0070	None

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Bands	Compliant
§15.209	Radiated Emission	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (iii)	Dwell Time of Each Frequency within a 35.2 Second Period of time (0.4 x Number of Channel)	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(4) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§ 2.1051	Spurious Emission at Antenna Port	Compliant

ANTENNA REQUIREMENT

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna connectors are designed with permanent attachment and no consideration of replacement. The gain of antenna used for transmitting is 2.7dBi. Please see EUT photo for details. Please refer to antenna specification, file name: R0508041Antenna.

§15.205 & §15.209 - RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

Test Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Pre (.1 ~1300MHz)	8447D	2944A10198	2004-09-20
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	2005-05-10
Sunol Science	30Mhz ~ 2 GHz Antenna	JB1	A03105-3	2005-02-11
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2005-04-20

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2005-08-22.*

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, and had the worst margin of:

-14.1 dB at **7206.00 MHz** in the **Vertical** polarization, Low Channel, 3 meters

-14.8 dB at **7326.00 MHz** in the **Vertical** polarization, Middle Channel, 3 meters

-15.1 dB at **7440.00 MHz** in the **Vertical** polarization, High Channel, 3 meters

-8.3 dB at **792.03 MHz** in the **Vertical** polarization, Unintentional Emission, 3 meters

3 Meters Radiated Emission Test Data

Indicated			Antenna	Antenna		Correction Factor			FCC 15.247		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Comments
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2402.0000	96.8	90	1.0	V	28.7	2.0	35.8	91.6			FUND/PEAK
2402.0000	92.0	0	1.2	H	28.7	2.0	35.8	86.8			FUND/PEAK
2402.0000	68.8	180	1.2	V	28.7	2.0	35.8	63.6			AVE
2402.0000	71.8	0	1.2	H	28.7	2.0	35.8	66.6			AVE
7206.0000	33.6	180	2.0	V	36.7	4.3	34.7	39.9	54	-14.1	AVE
7206.0000	32.3	90	2.0	H	36.7	4.3	34.7	38.7	54	-15.3	AVE
7206.0000	47.6	90	2.0	V	36.7	4.3	34.7	53.9	74	-20.1	PEAK
7206.0000	46.1	180	2.0	H	36.7	4.3	34.7	52.4	74	-21.6	PEAK
4804.0000	31.3	270	2.4	V	32.5	3.1	34.8	32.1	54	-21.9	AVE
4804.0000	30.3	180	2.3	H	32.5	3.1	34.8	31.1	54	-23.0	AVE
4804.0000	46.7	270	2.4	V	32.5	3.1	34.8	47.5	74	-26.5	PEAK
4804.0000	44.1	180	2.3	H	32.5	3.1	34.8	44.9	74	-29.1	PEAK
Middle Channel											
2442.0000	94.9	90	1.0	V	28.7	2.0	35.8	89.7			FUND/PEAK
2442.0000	90.2	0	1.2	H	28.7	2.0	35.8	85.0			FUND/PEAK
2442.0000	68.0	180	1.2	V	28.7	2.0	35.8	62.8			AVE
2442.0000	71.0	0	1.2	H	28.7	2.0	35.8	65.8			AVE
7326.0000	32.9	270	2.4	V	36.7	4.3	34.7	39.2	54	-14.8	AVE
7326.0000	31.7	180	2.1	H	36.7	4.3	34.7	38.0	54	-16.0	AVE
7326.0000	46.6	270	2.4	V	36.7	4.3	34.7	52.9	74	-21.1	PEAK
4884.0000	30.7	270	2.4	V	32.5	3.1	34.8	31.5	54	-22.5	AVE
7326.0000	45.2	180	2.3	H	36.7	4.3	34.7	51.5	74	-22.5	PEAK
4884.0000	29.6	180	2.2	H	32.5	3.1	34.8	30.4	54	-23.6	AVE
4884.0000	45.8	270	2.4	V	32.5	3.1	34.8	46.6	74	-27.4	PEAK
4884.0000	43.2	180	2.2	H	32.5	3.1	34.8	44.0	74	-30.0	PEAK
High Channel											
2480.0000	93.9	90	1.0	V	28.7	2.0	35.8	88.7			FUND/PEAK
2480.0000	89.2	0	1.2	H	28.7	2.0	35.8	84.0			FUND/PEAK
2480.0000	67.6	180	1.2	V	28.7	2.0	35.8	62.4			AVE
2480.0000	70.6	0	1.2	H	28.7	2.0	35.8	65.4			AVE
7440.0000	32.6	270	2.4	V	36.7	4.3	34.7	38.9	54	-15.1	AVE
7440.0000	31.4	90	2.1	H	36.7	4.3	34.7	37.7	54	-16.3	AVE
7440.0000	46.2	270	2.4	V	36.7	4.3	34.7	52.5	74	-21.5	PEAK
4960.0000	30.4	270	2.4	V	32.5	3.1	34.8	31.2	54	-22.8	AVE
7440.0000	44.7	90	2.1	H	36.7	4.3	34.7	51.0	74	-23.0	PEAK
4960.0000	29.3	90	2.1	H	32.5	3.1	34.8	30.1	54	-23.9	AVE
4960.0000	45.3	270	2.4	V	32.5	3.1	34.8	46.1	74	-27.9	PEAK
4960.0000	42.8	90	2.1	H	32.5	3.1	34.8	43.6	74	-30.4	PEAK

Note:

FUND: Fundamental
AVG: Average

Unintentional Emission @ 3 M

Indicated			Antenna	Antenna		Correction Factor			FCC 15B	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB
792.03	40.1	250	1.0	V	20.5	6.2	28.1	38.7	47	-8.3
792.03	39.6	280	2.8	H	20.5	6.2	28.1	38.2	47	-8.8
744.02	39.8	280	2.8	H	20.3	6.0	28.3	37.8	47	-9.2
626.00	41.2	270	2.1	H	19.0	5.5	28.4	37.3	47	-9.7
626.00	40.5	330	1.2	V	19.0	5.5	28.4	36.6	47	-10.4
744.02	38.4	250	1.0	V	20.3	6.0	28.3	36.4	47	-10.6
360.00	45.1	270	3.2	H	14.8	4.1	27.8	36.2	47	-10.8
360.00	44.2	75	1.8	V	14.8	4.1	27.8	35.3	47	-11.7

§15.247 (a) (1) - HOPPING CHANNEL SEPARATION

Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2005-08-22.*

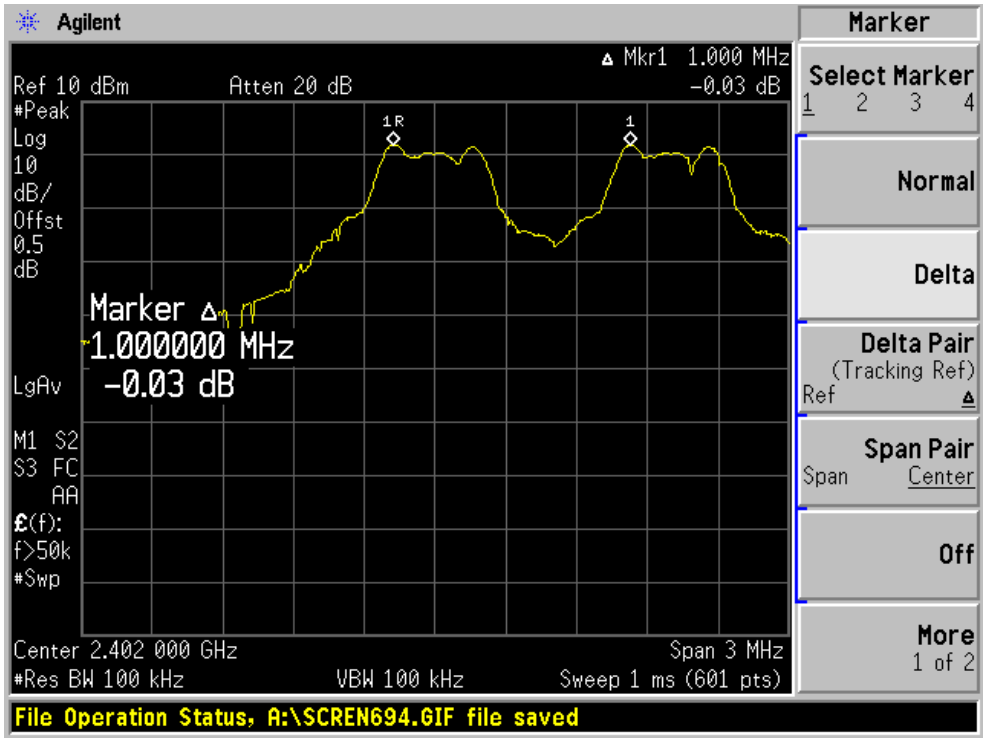
Measurement Results

Channel	Frequency MHz	Channel Separation (MHz)
Low	2402	1
Mid	2442	1
High	2480	1

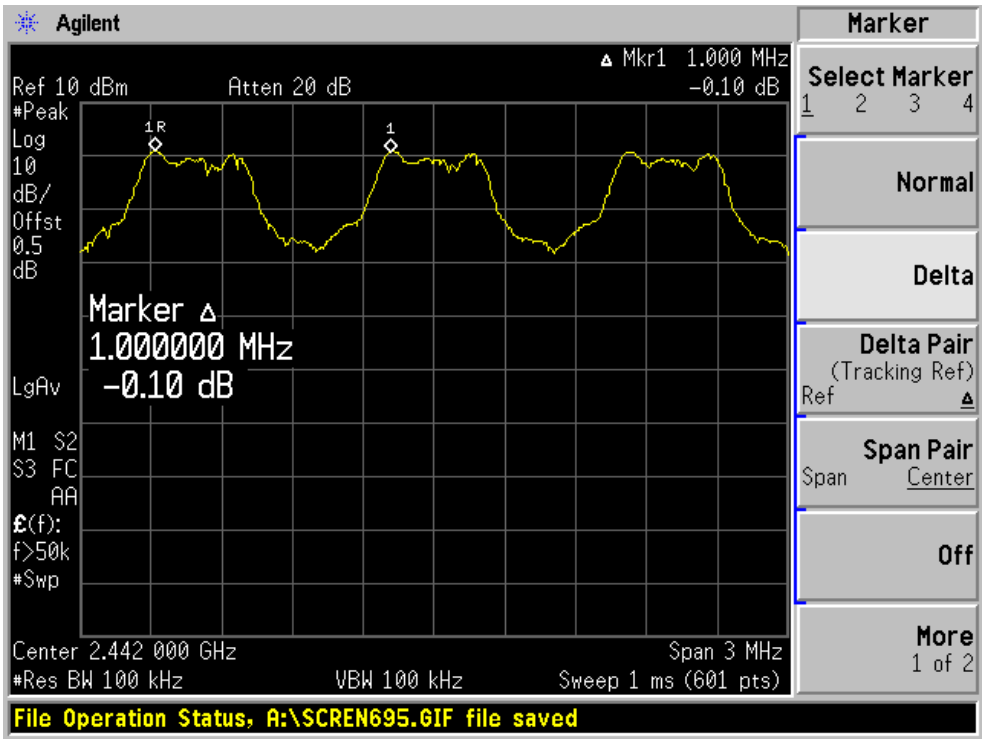
Plots of Hopping Channel Separation

Please refer to the following plots.

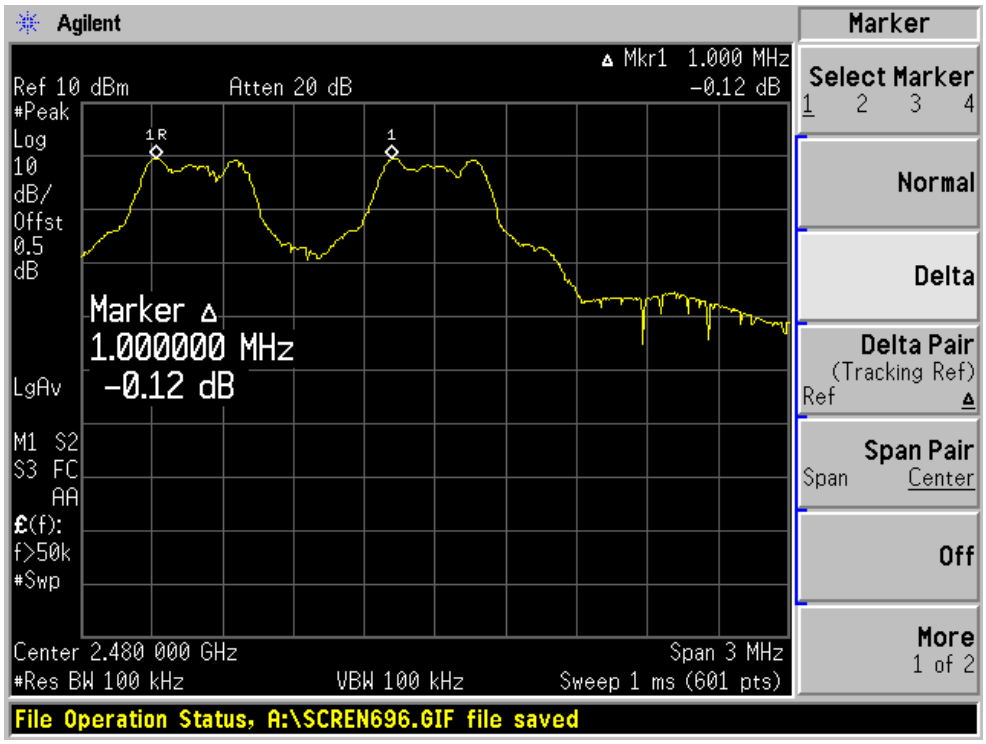
Low Channel



Middle Channel



High Channel



§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

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

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2005-08-22.*

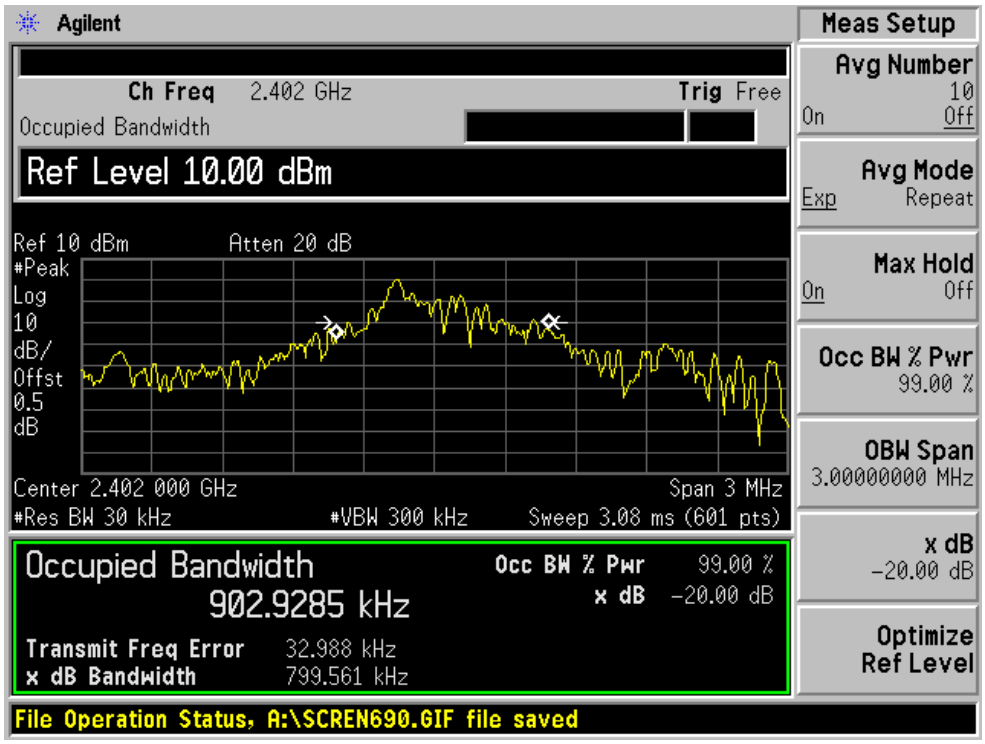
Measurement Result

Channel	Frequency MHz	Channel Bandwidth (KHz)
Low	2402	799.5
Mid	2442	775.3
High	2480	781.9

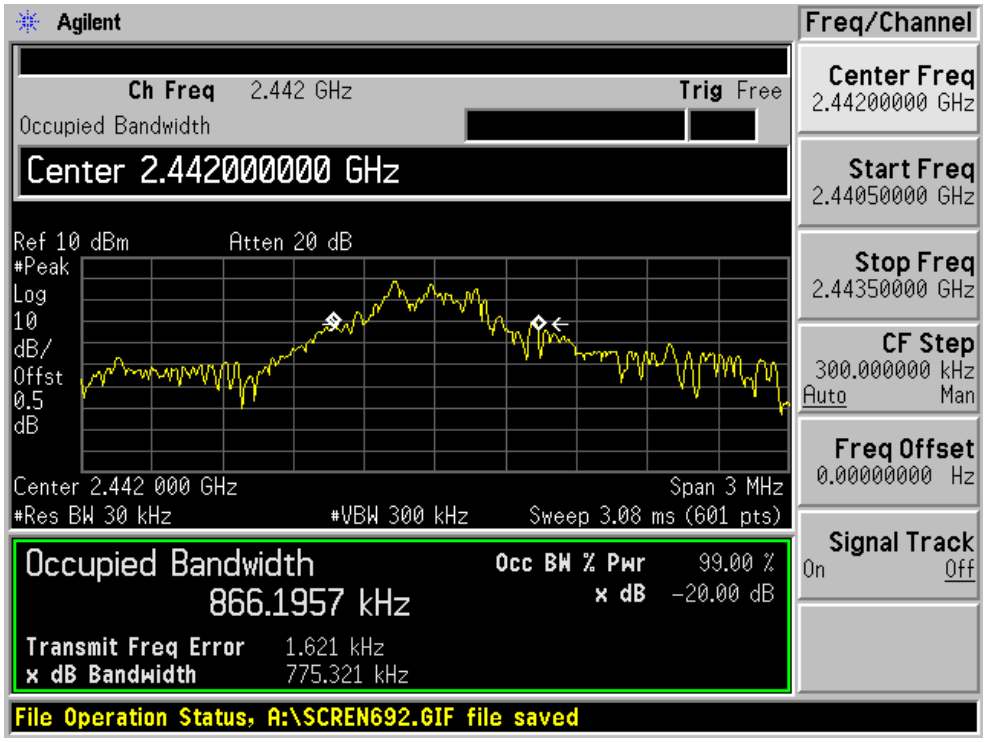
Plot of Channel Bandwidth

Please see the following plots

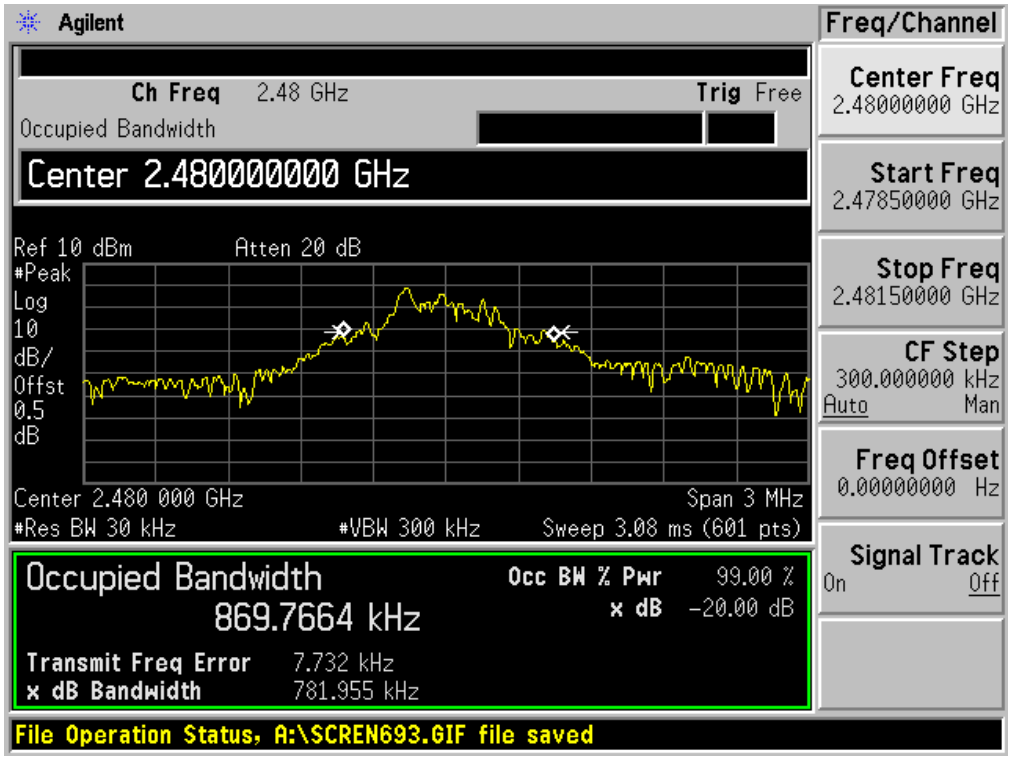
Low Channel



Middle Channel



High Channel



§15.247 (a) (1) (iii) - NUMBER OF HOPPING FREQUENCY USED

Standard Applicable

According to §15.247(a)(1)(iii), frequency-hopping systems operating in the 2400-2483.5Mhz band shall use at least 15 hopping frequencies.

Measurement Procedure

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

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

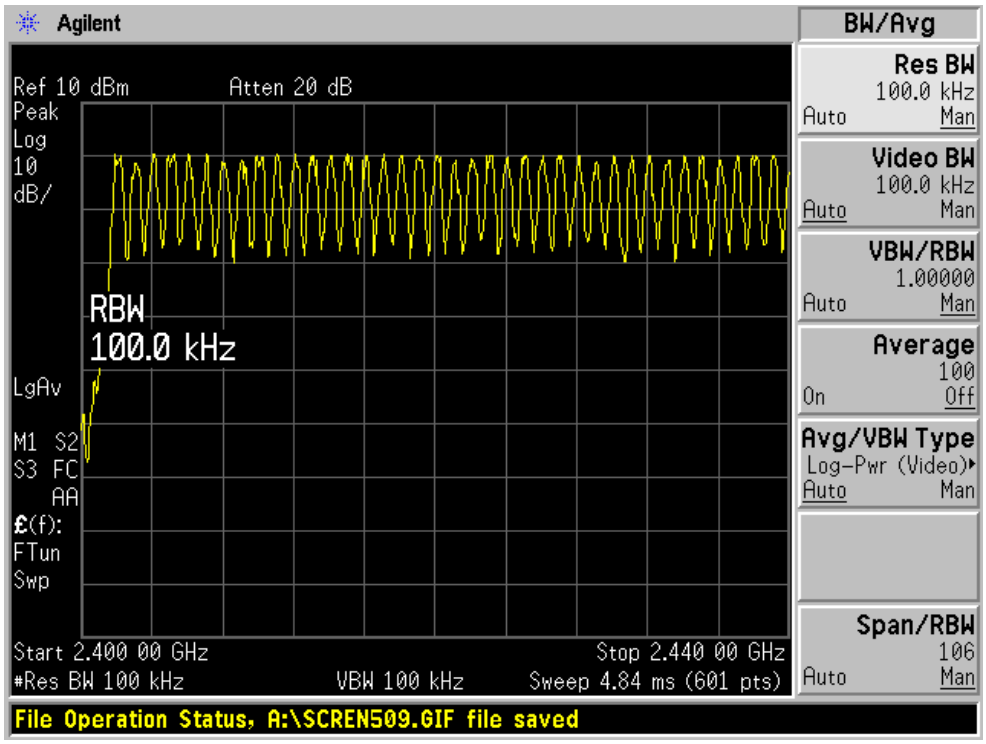
**The testing was performed by Snell Leong on 2005-08-22.*

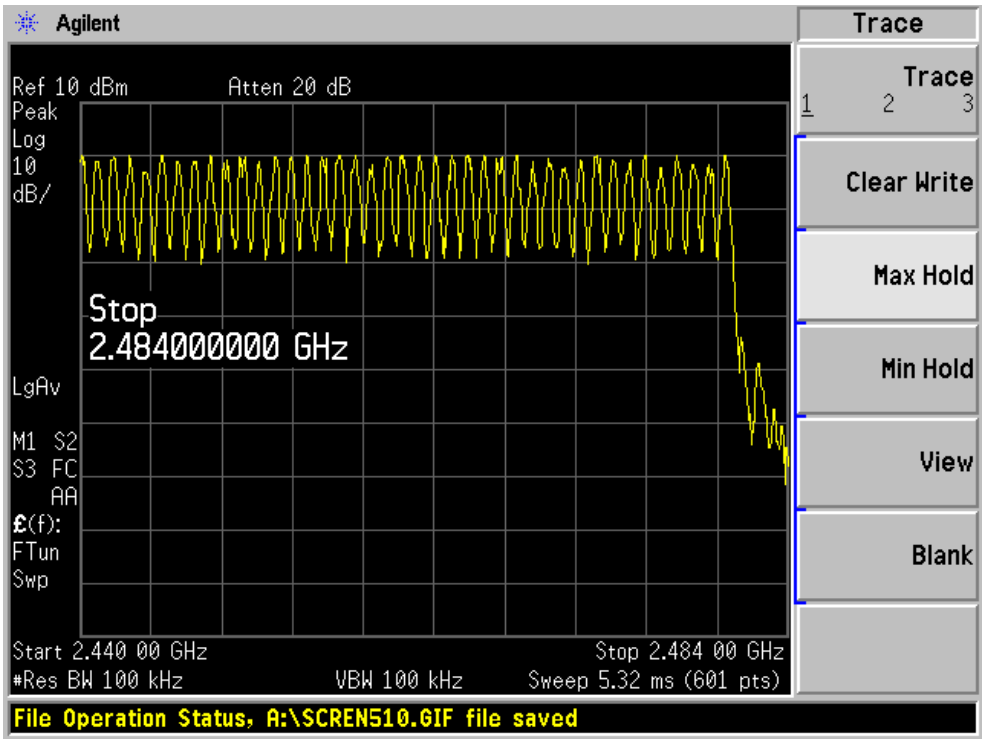
Measurement Results

Measurement	Standard	Result
79	>15	Compliant

Plots of Number of Hopping Frequency

Please refer to the attached plots.


Agilent
BW/Avg
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
RBW
100.0 kHz
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.400 00 GHz
Stop 2.440 00 GHz
#Res BW 100 kHz
VBW 100 kHz
Sweep 4.84 ms (601 pts)
Res BW
100.0 kHz
Auto Man
Video BW
100.0 kHz
Auto Man
VBW/RBW
1.00000
Auto Man
Average
100
On Off
Avg/VBW Type
Log-Pwr (Video)
Auto Man
Span/RBW
106
Auto Man
File Operation Status, A:\SCREN509.GIF file saved


Agilent
Trace
Ref 10 dBm
Atten 20 dB
Peak
Log
10
dB/
Stop
2.484000000 GHz
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.440 00 GHz
Stop 2.484 00 GHz
#Res BW 100 kHz
VBW 100 kHz
Sweep 5.32 ms (601 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN510.GIF file saved

§15.247 (a) (1) (iii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(iii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Measurement Procedure

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

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2005-08-22.*

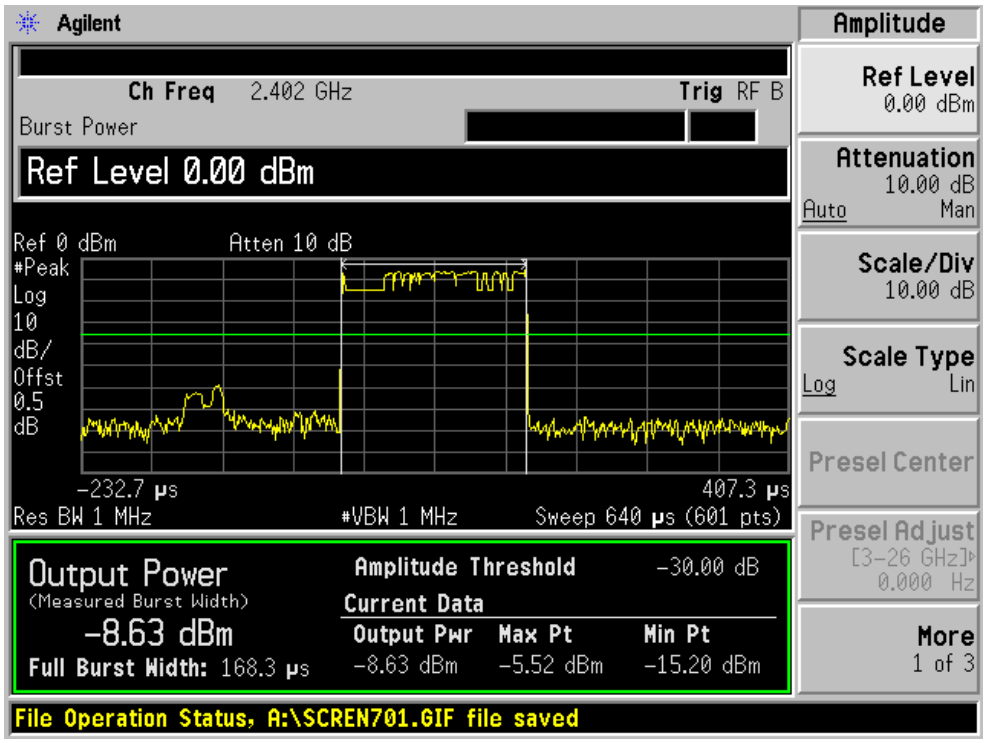
Measurement Results

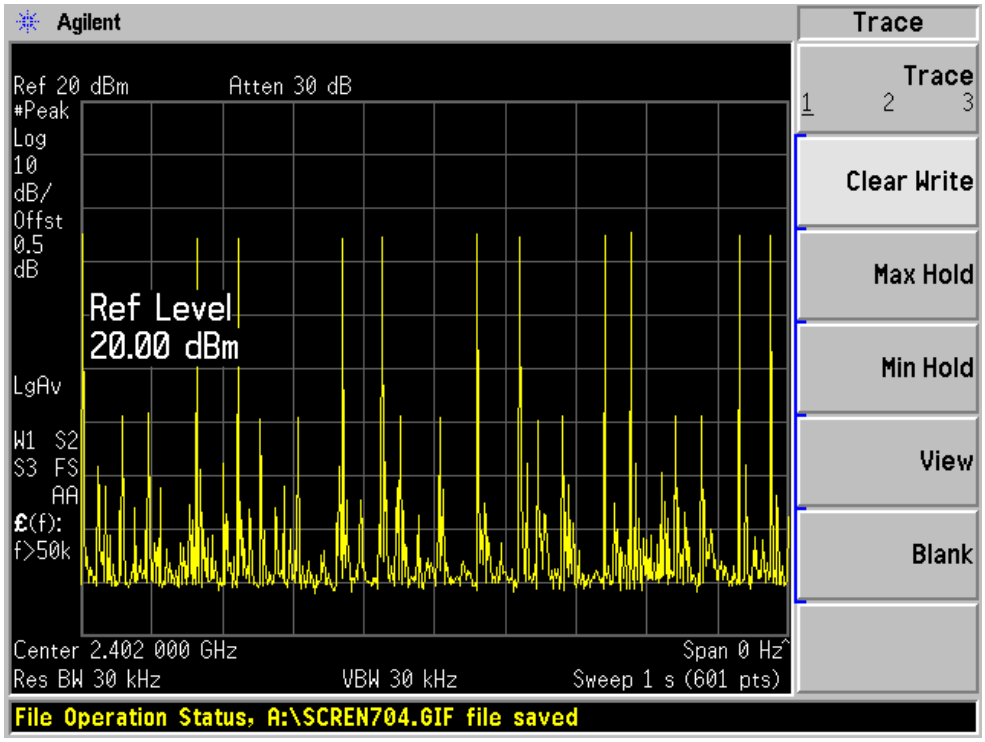
Channel	Frequency MHz	Pulse Wide uSec	Occupied time per 1 Sec	Dwell Time Sec	Limit Sec
Low	2402	168.3	11	0.059	0.4
Mid	2442	168.3	11	0.059	0.4
High	2480	168.3	11	0.059	0.4

Plots of Dwell Time

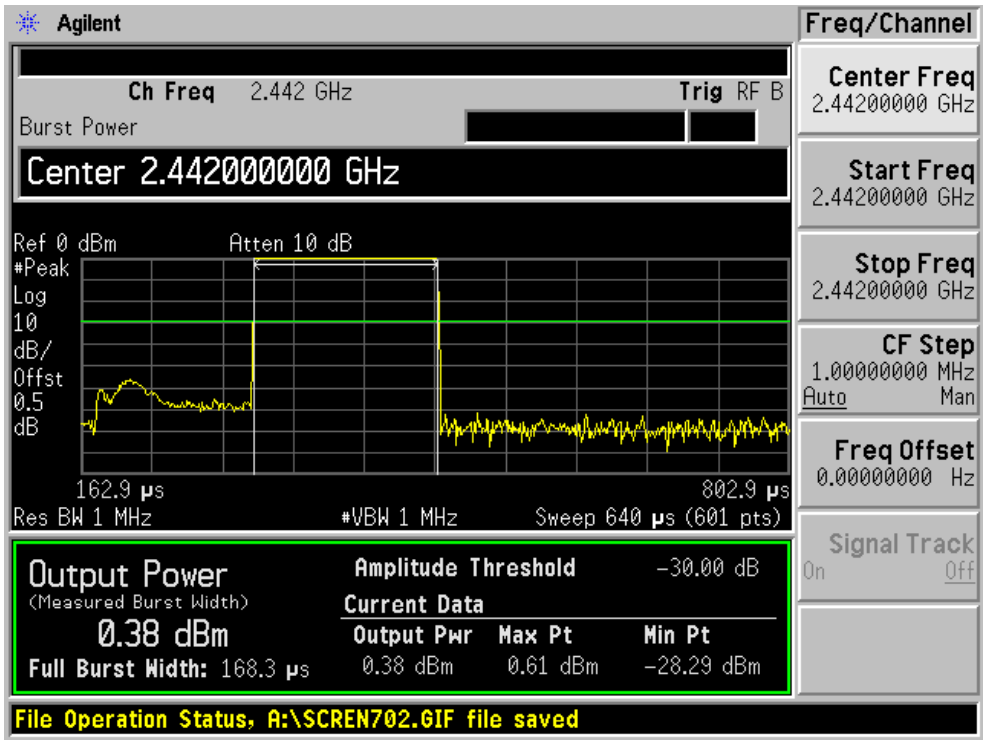
Please refer the following plots.

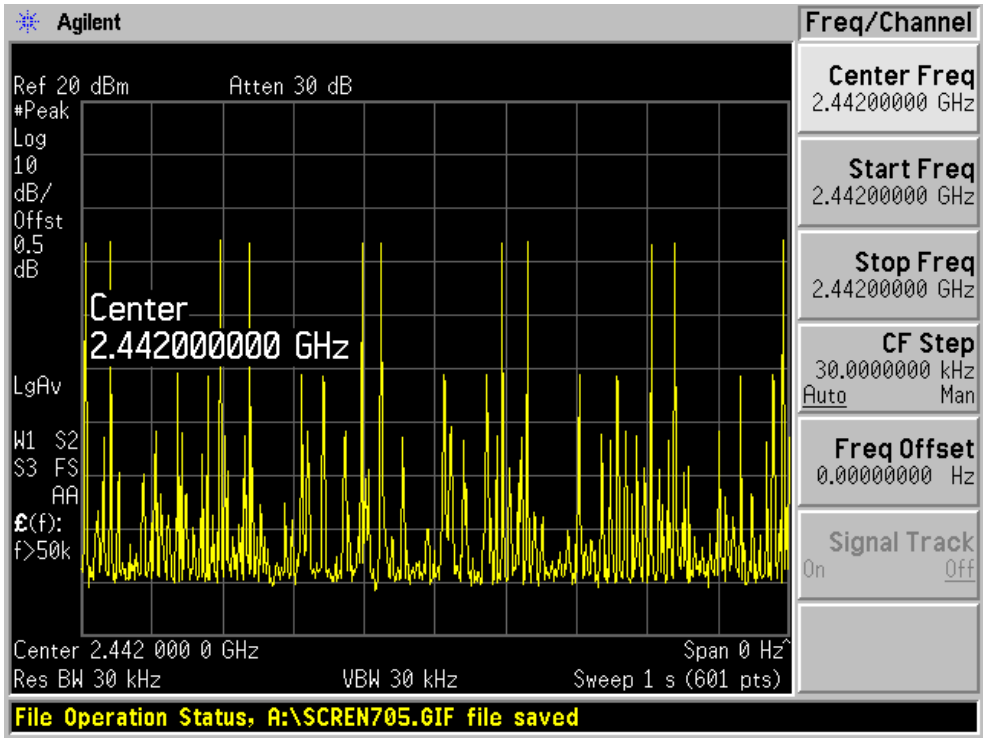
Low Channel


Agilent
Amplitude
Ch Freq 2.402 GHz
Trig RF B
Burst Power
Ref Level 0.00 dBm
Ref Level
0.00 dBm
Attenuation
10.00 dB
Auto Man
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Scale/Div
10.00 dB
Scale Type
Log Lin
Presel Center
-232.7 µs
407.3 µs
Res BW 1 MHz
#VBW 1 MHz
Sweep 640 µs (601 pts)
Presel Adjust
[3-26 GHz]
0.000 Hz
Output Power
(Measured Burst Width)
-8.63 dBm
Full Burst Width: 168.3 µs
Amplitude Threshold -30.00 dB
Current Data
Output Pwr Max Pt Min Pt
-8.63 dBm -5.52 dBm -15.20 dBm
More
1 of 3
File Operation Status, A:\SCREN701.GIF file saved

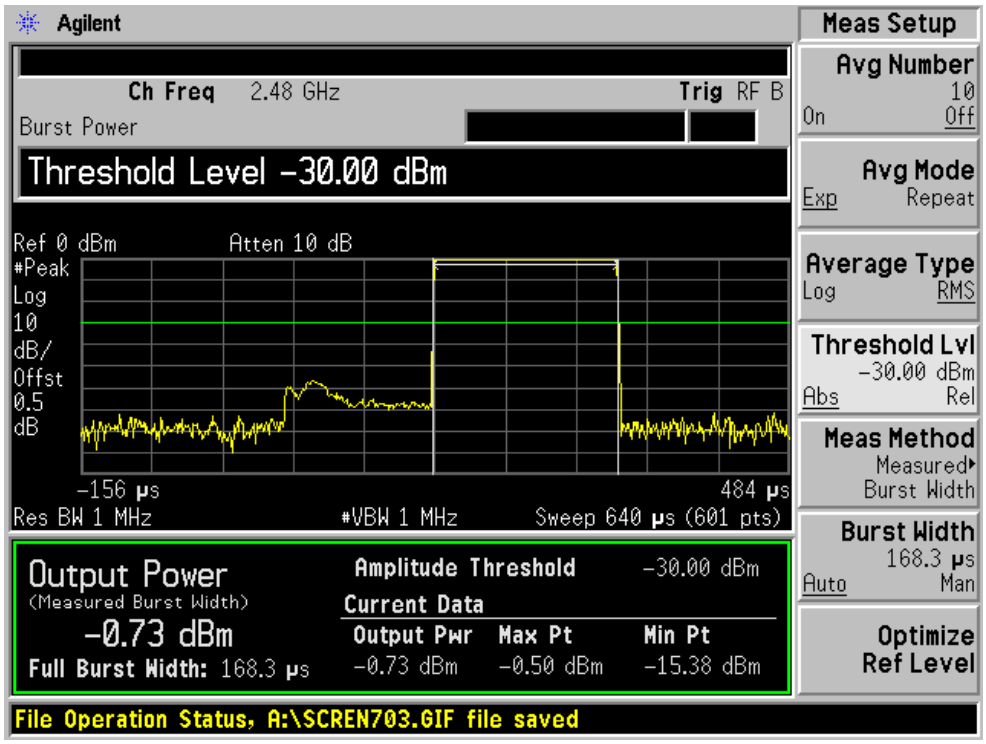

Agilent
Trace
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Ref Level
20.00 dBm
LgAv
W1 S2
S3 FS
AA
£(f):
f>50k
Center 2.402 000 GHz
Span 0 Hz
Res BW 30 kHz
VBW 30 kHz
Sweep 1 s (601 pts)
File Operation Status, A:\SCREN704.GIF file saved

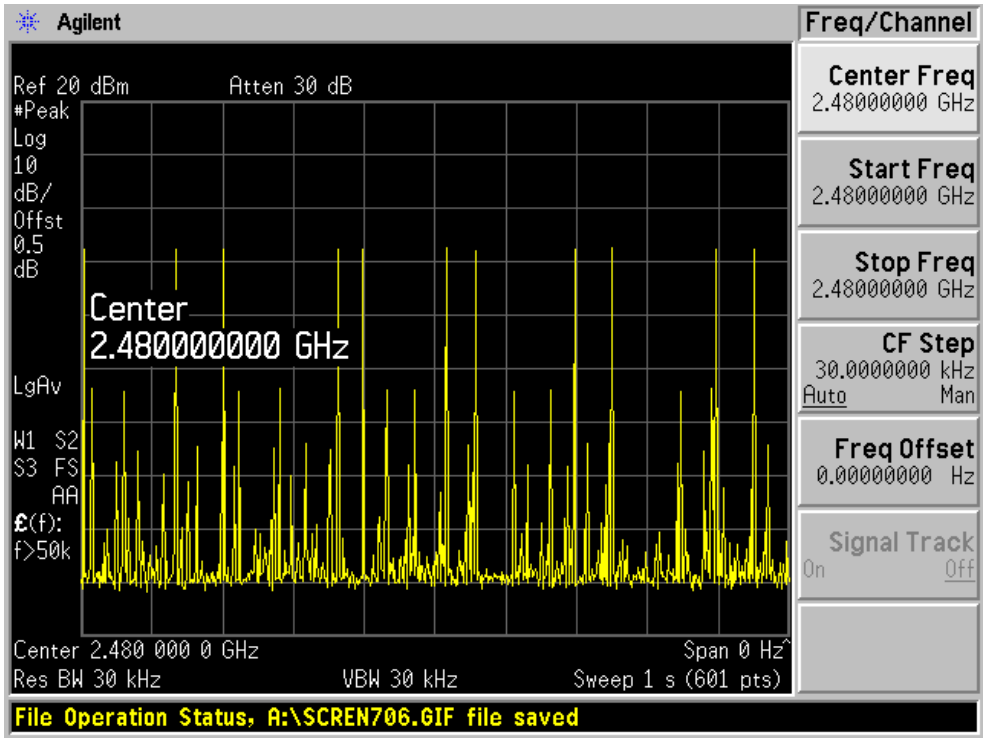
Middle Channel





High Channel





§15.247 (b) (1) - MAXIMUM PEAK OUTPUT POWER

Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt.

Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2005-08-22.*

Measurement Result

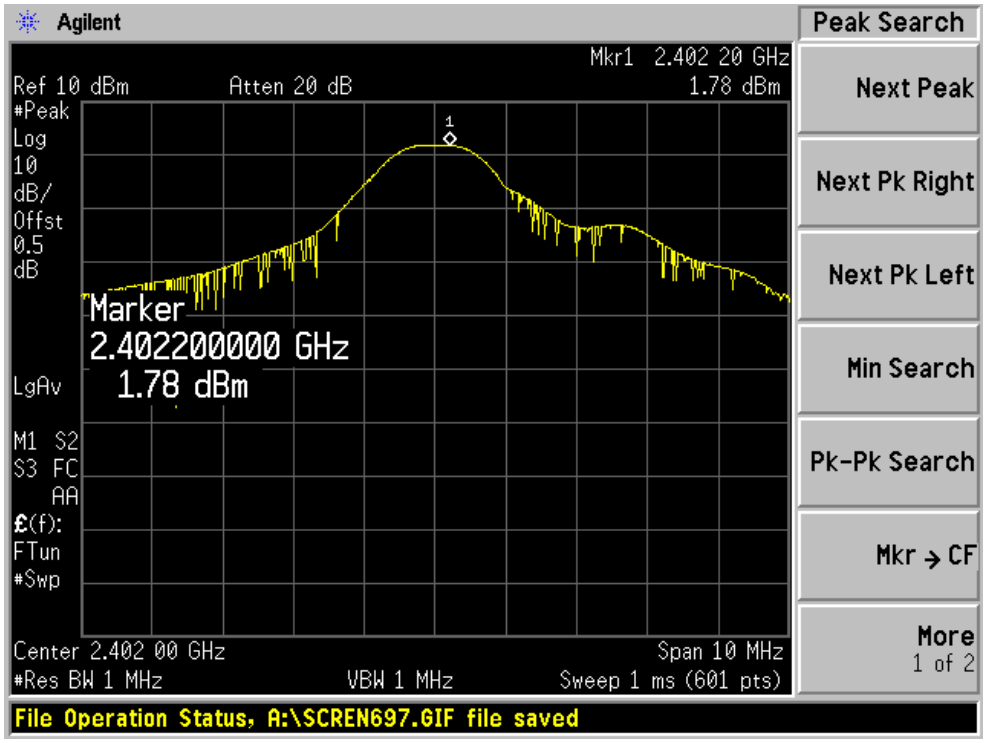
Channel	Frequency	Max Peak Output Power		Limit	Result
	MHz	(dBm)	(mW)	(mW)	
Low	2402	1.78	1.51	1000	pass
Mid	2442	0.8	1.20	1000	pass
High	2480	-0.48	0.90	1000	pass

Offset = 0.5 dB (cable loss + connector)

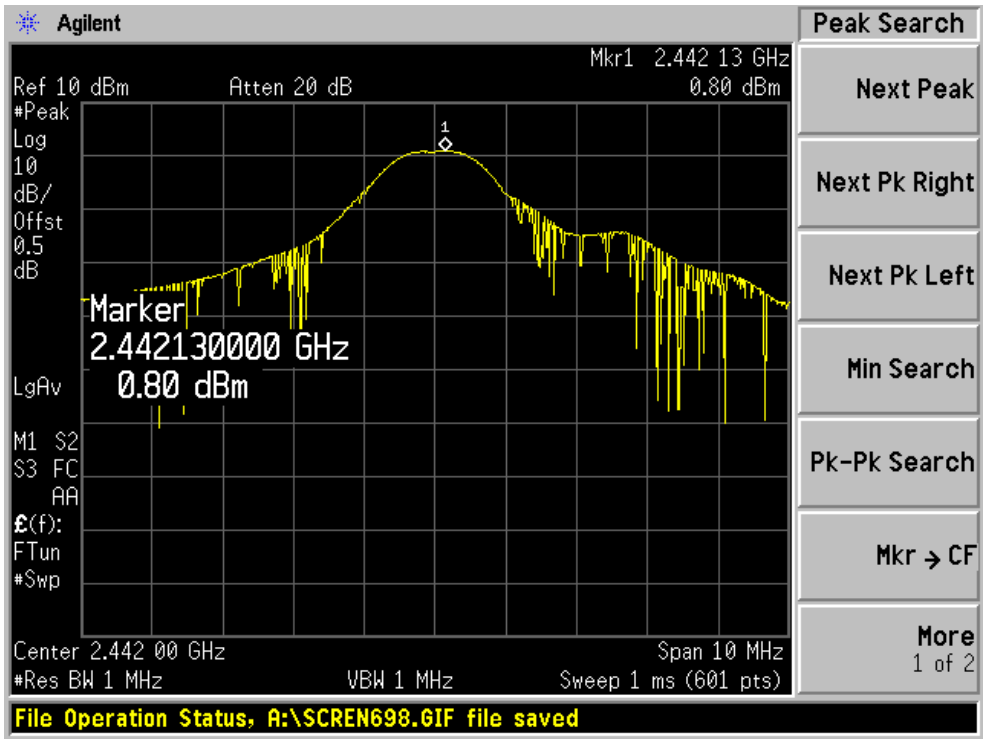
Plots of Maximum Peak Output Power

Please see the following plots

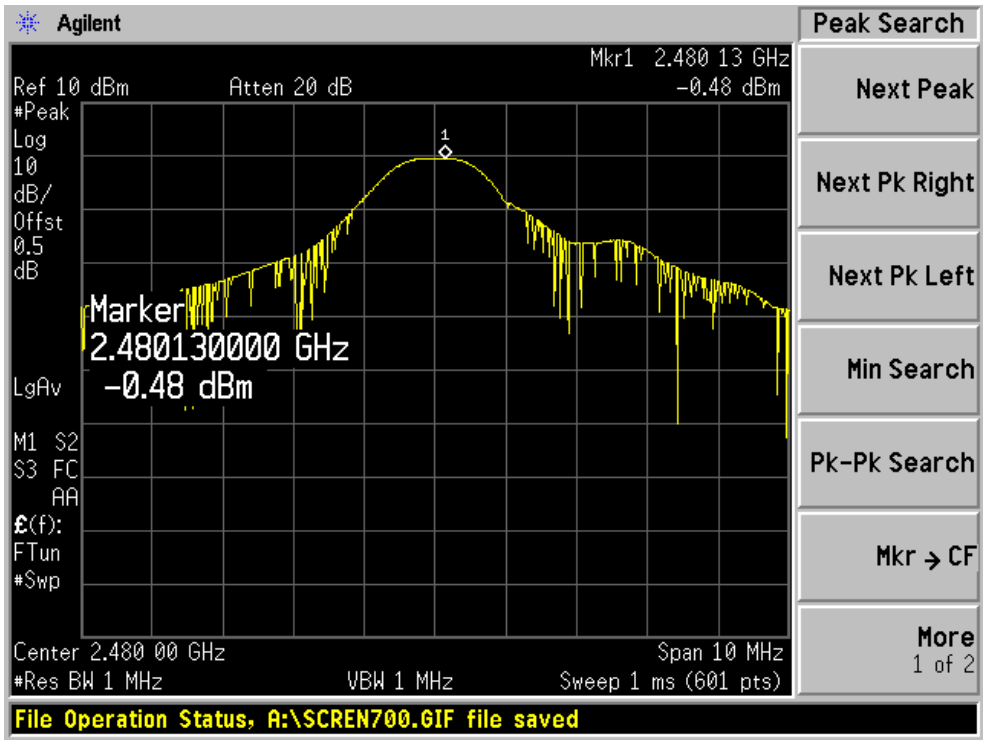
Low Channel



Middle Channel



High Channel



§15.247 (d) - 100 KHZ BANDWIDTH OF BAND EDGES

Standard Applicable

According to §15.247(c), 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, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

Measurement Procedure

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

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

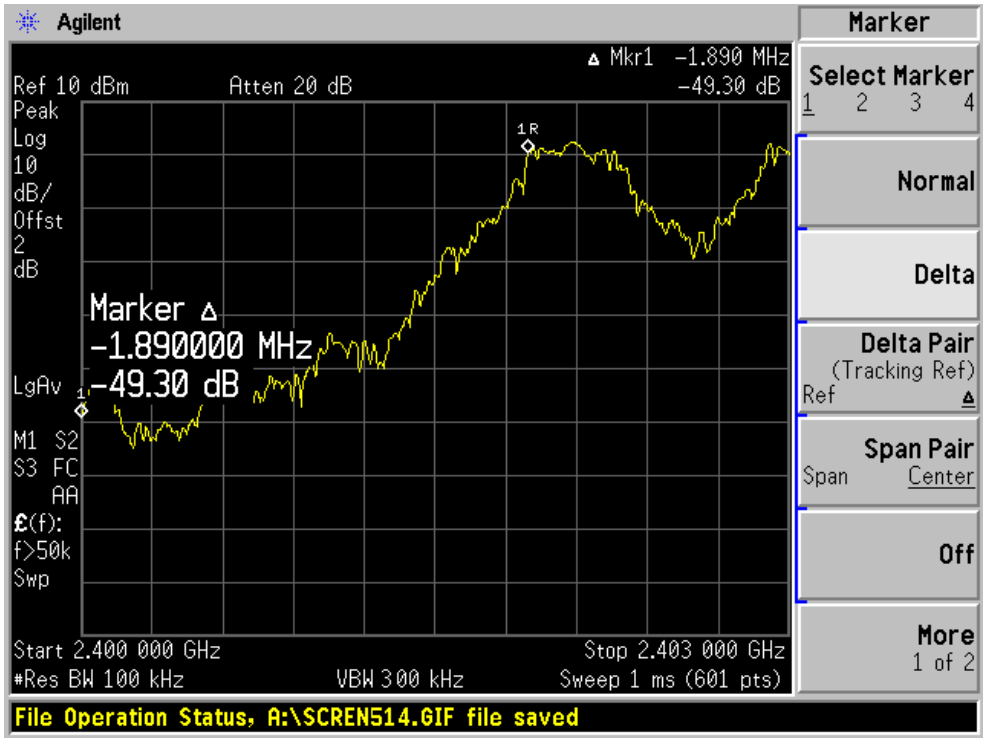
Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

**The testing was performed by Snell Leong on 2005-08-22.*

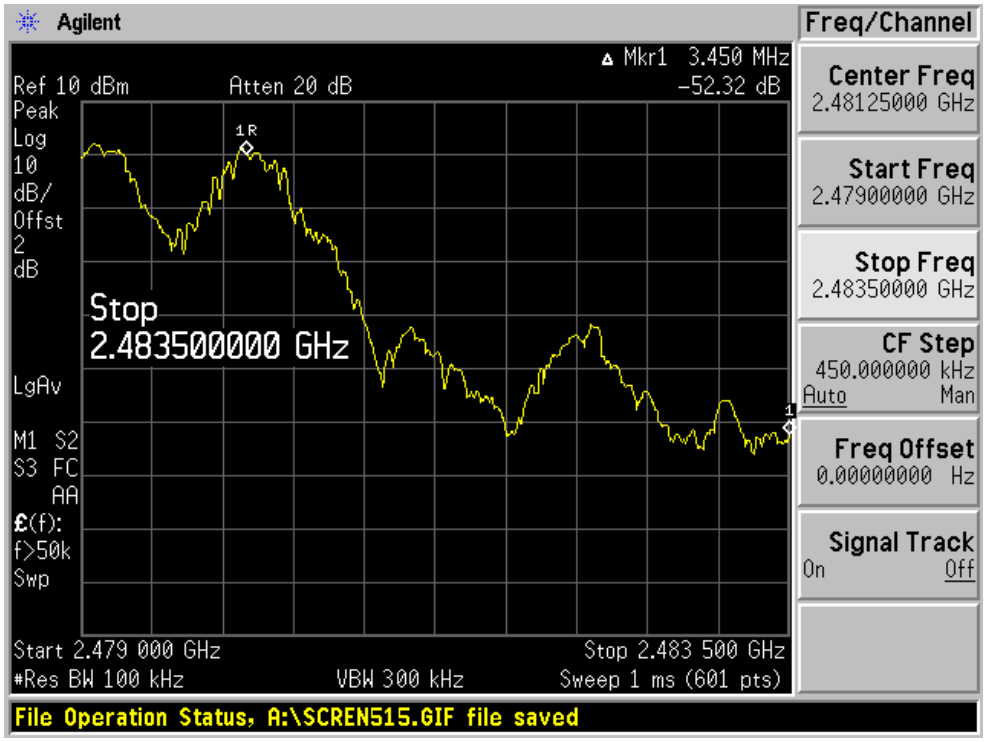
Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.

Low Channel



High Channel



§2.1051 - SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2004-11-10

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

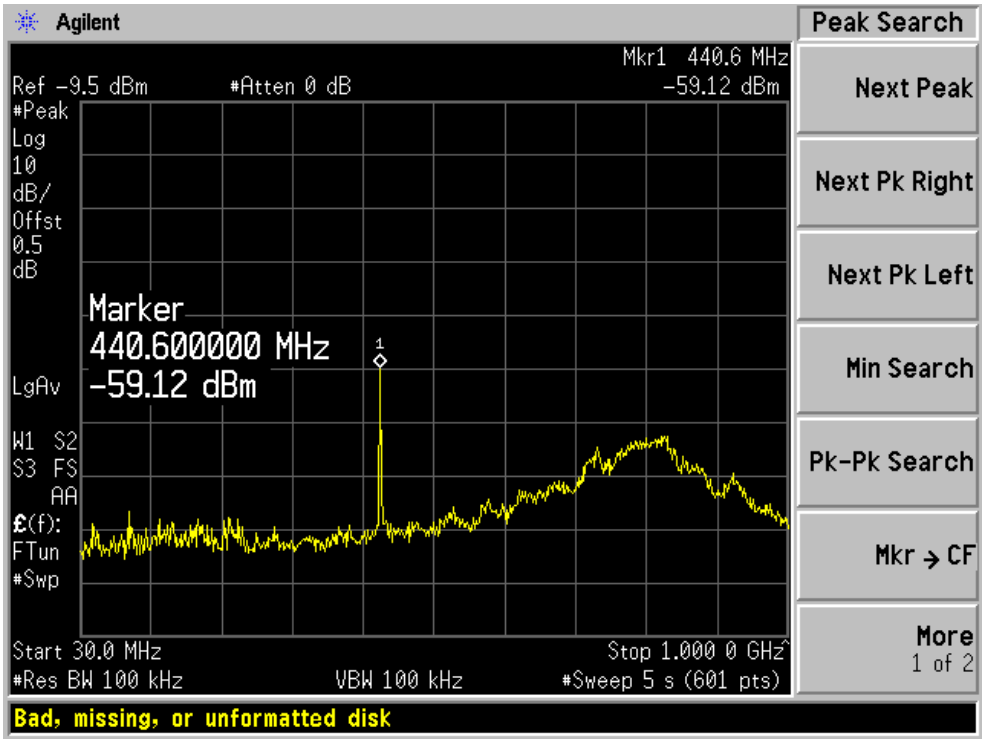
Temperature:	28° C
Relative Humidity:	70%
ATM Pressure:	1026 mbar

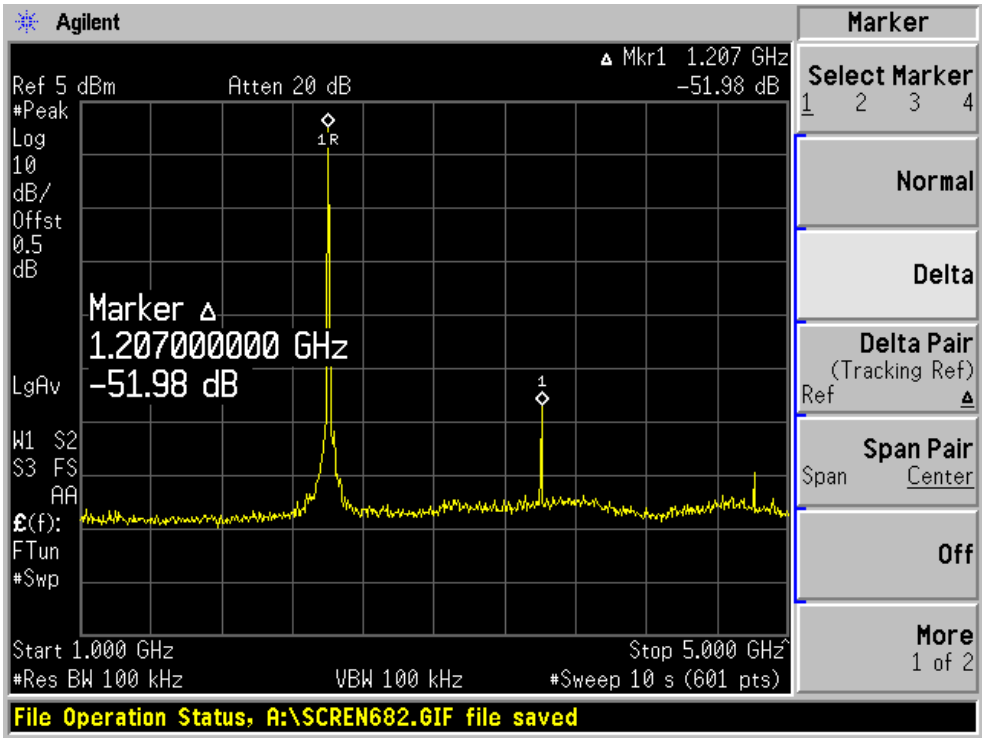
**The testing was performed by Snell Leong on 2005-08-22.*

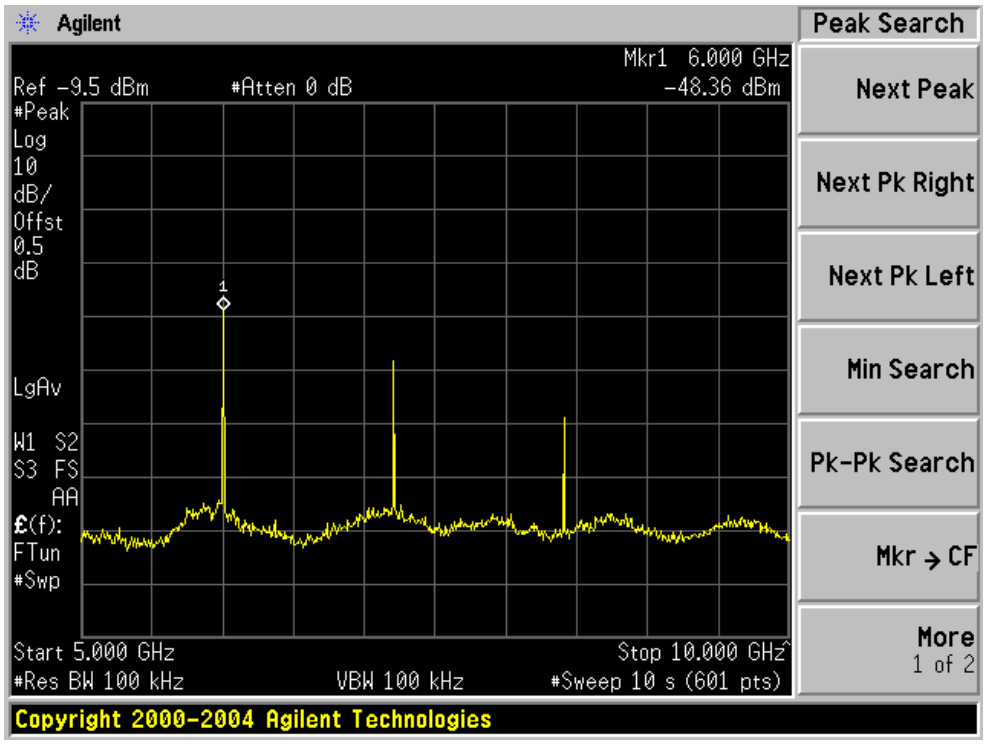
Measurement Results

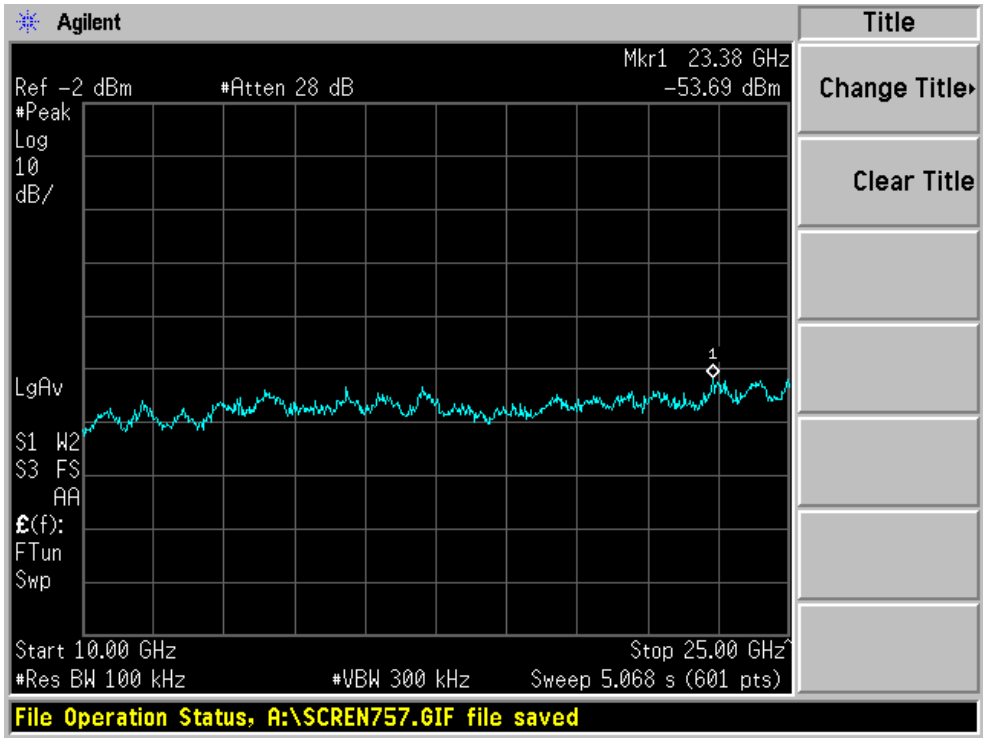
Please refer to the following plots.

Low Channel

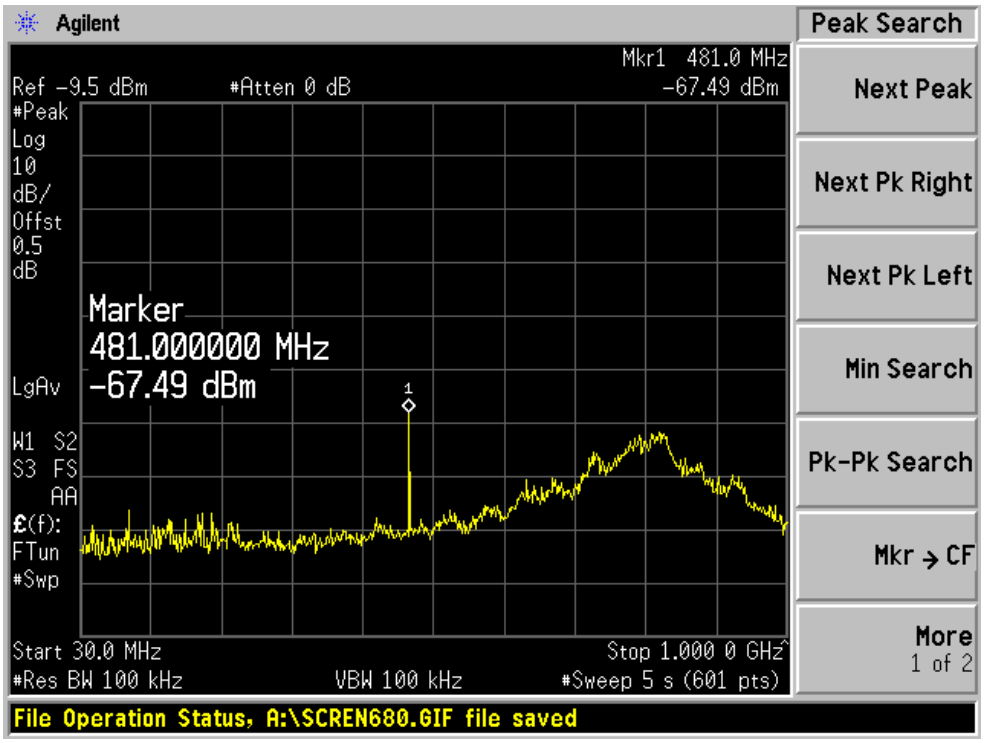

Agilent
Peak Search
Mkr1 440.6 MHz
Ref -9.5 dBm
#Atten 0 dB
-59.12 dBm
#Peak
Log
10
dB/
Offst
0.5
dB
Marker
440.600000 MHz
-59.12 dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30.0 MHz
#Res BW 100 kHz
VBW 100 kHz
Stop 1.000 0 GHz
#Sweep 5 s (601 pts)
Bad, missing, or unformatted disk

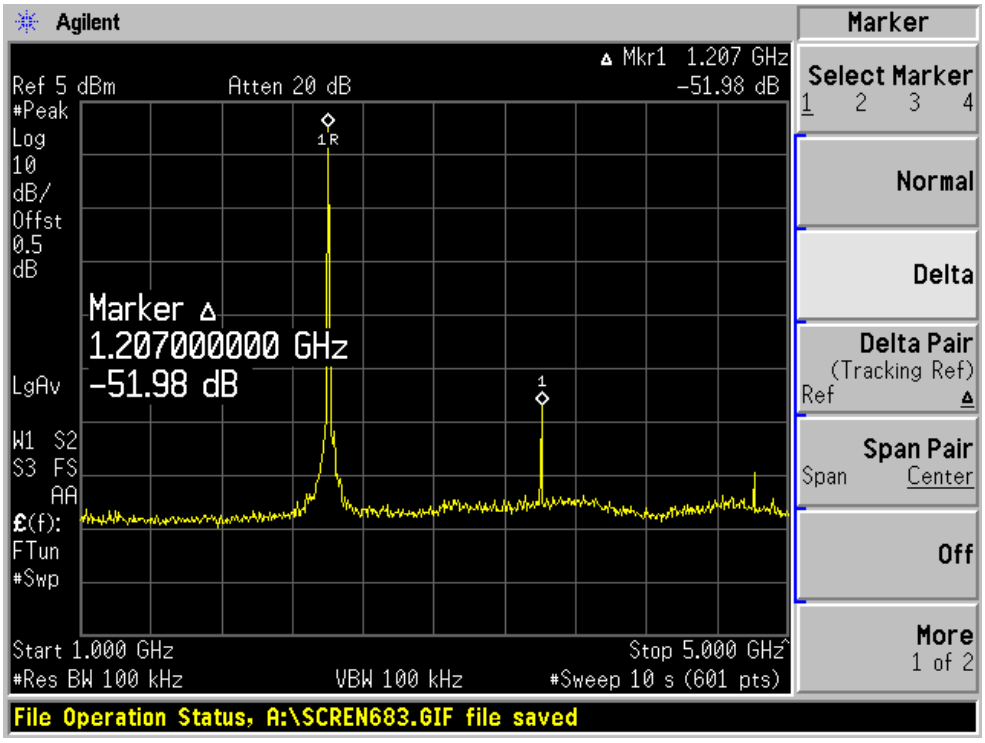

Agilent
Marker
Δ Mkr1 1.207 GHz
Ref 5 dBm
Atten 20 dB
-51.98 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Marker Δ
1.207000000 GHz
-51.98 dB
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2
Start 1.000 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 5.000 GHz
#Sweep 10 s (601 pts)
File Operation Status, A:\SCREN682.GIF file saved

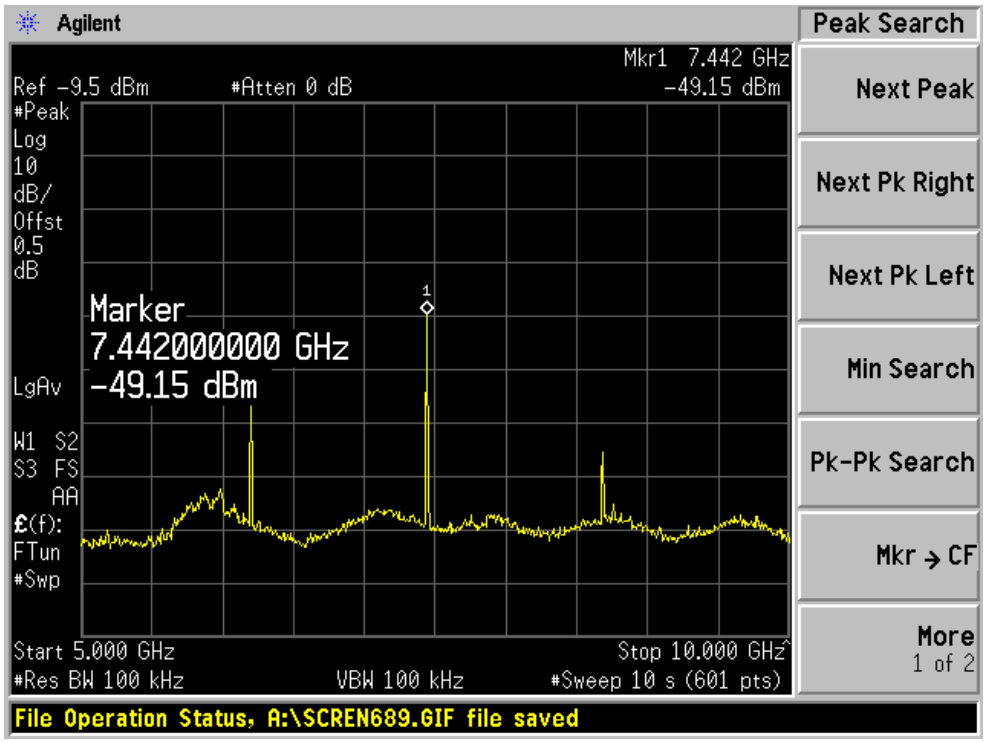

Agilent
Peak Search
Mkr1 6.000 GHz
Ref -9.5 dBm
#Atten 0 dB
-48.36 dBm
#Peak
Log
10
dB/
Offst
0.5
dB
1
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Copyright 2000-2004 Agilent Technologies

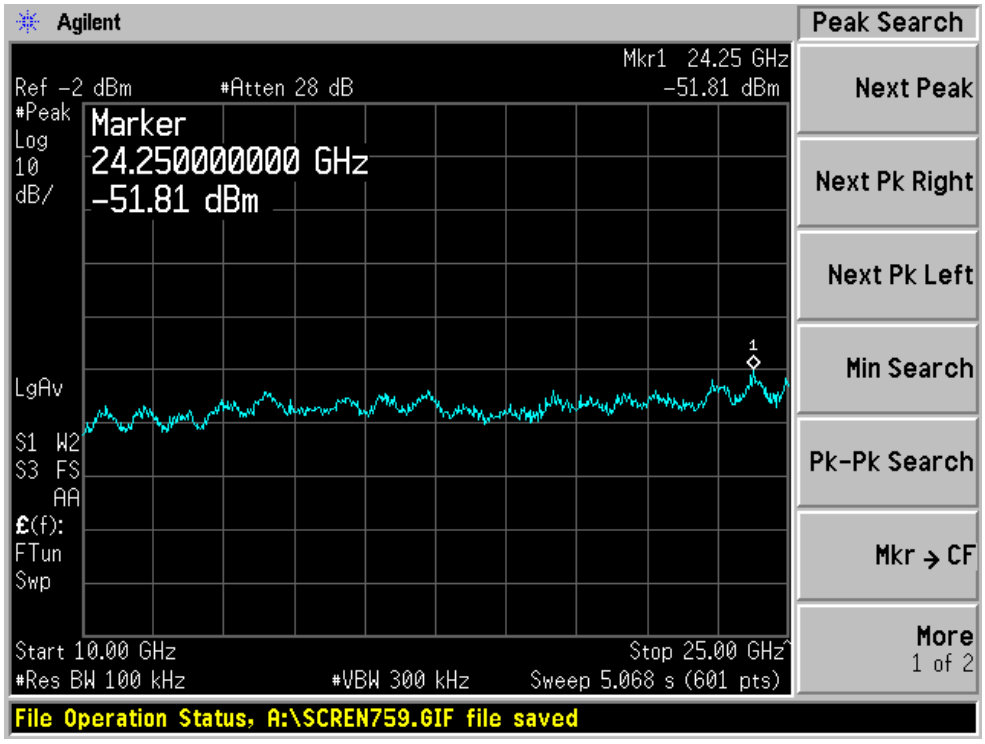

Agilent
Title
Mkr1 23.38 GHz
Ref -2 dBm
#Atten 28 dB
-53.69 dBm
#Peak
Log
10
dB/
1
LgAv
S1 W2
S3 FS
AA
£(f):
FTun
Swp
Change Title
Clear Title
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5.068 s (601 pts)
File Operation Status, A:\SCREN757.GIF file saved

Mid Channel

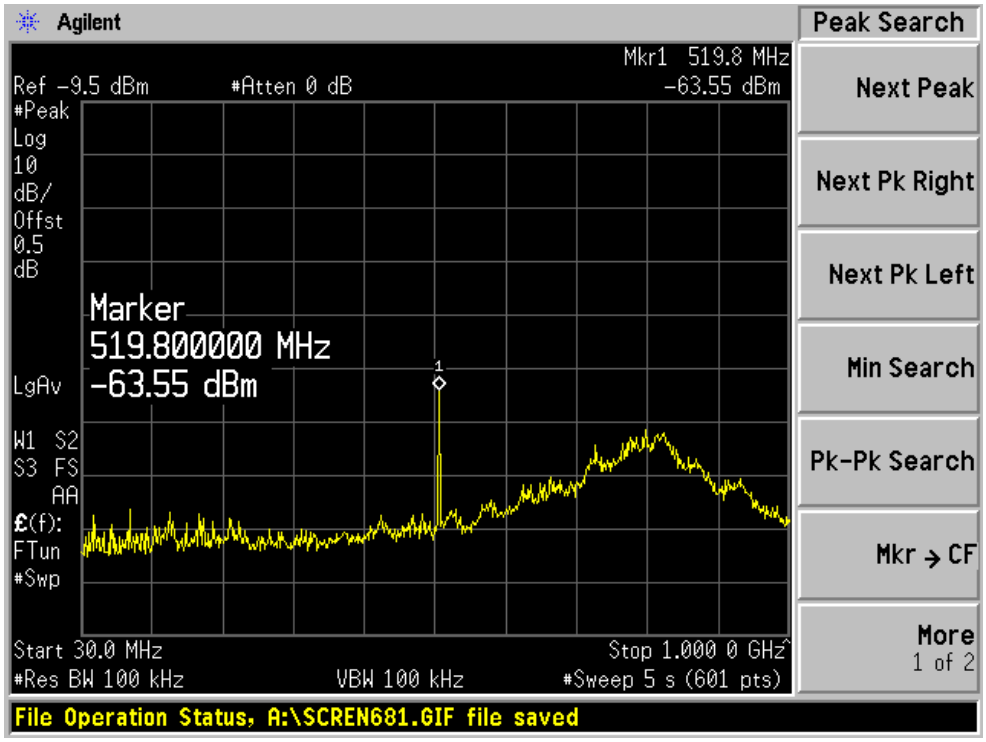

Agilent
Peak Search
Mkr1 481.0 MHz
Ref -9.5 dBm
#Atten 0 dB
-67.49 dBm
#Peak
Log
10
dB/
Offst
0.5
dB
Marker
481.000000 MHz
-67.49 dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 30.0 MHz
#Res BW 100 kHz
VBW 100 kHz
Stop 1.000 0 GHz
#Sweep 5 s (601 pts)
File Operation Status, A:\SCREN680.GIF file saved

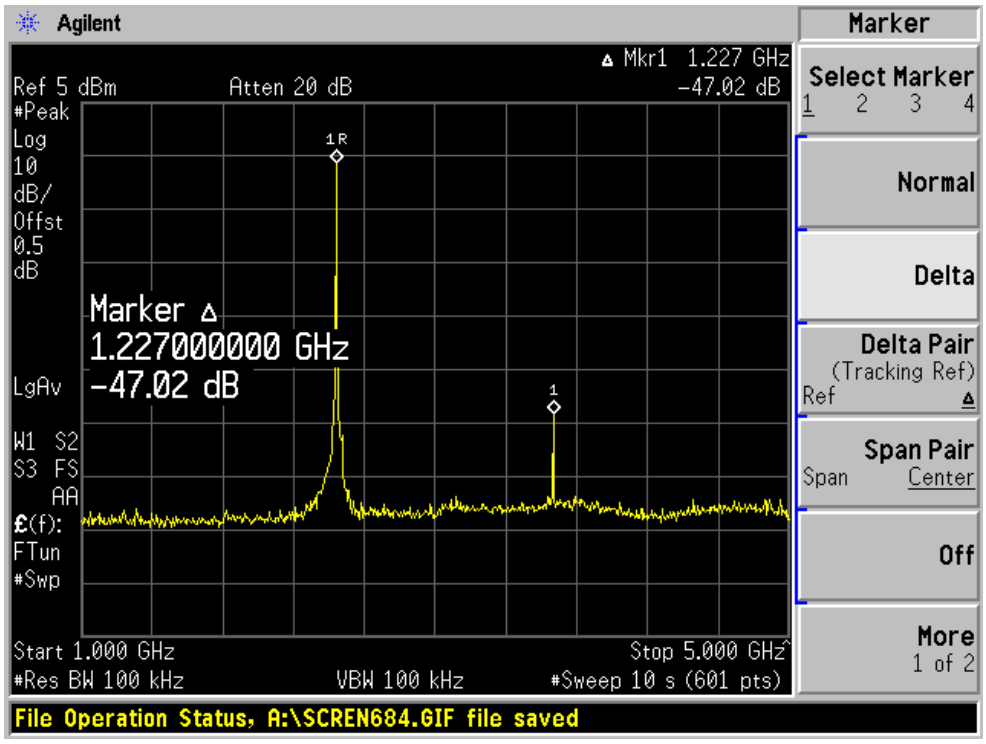

Agilent
Marker
Δ Mkr1 1.207 GHz
Ref 5 dBm
Atten 20 dB
-51.98 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Marker Δ
1.207000000 GHz
-51.98 dB
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2
Start 1.000 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 5.000 GHz
#Sweep 10 s (601 pts)
File Operation Status, A:\SCREN683.GIF file saved

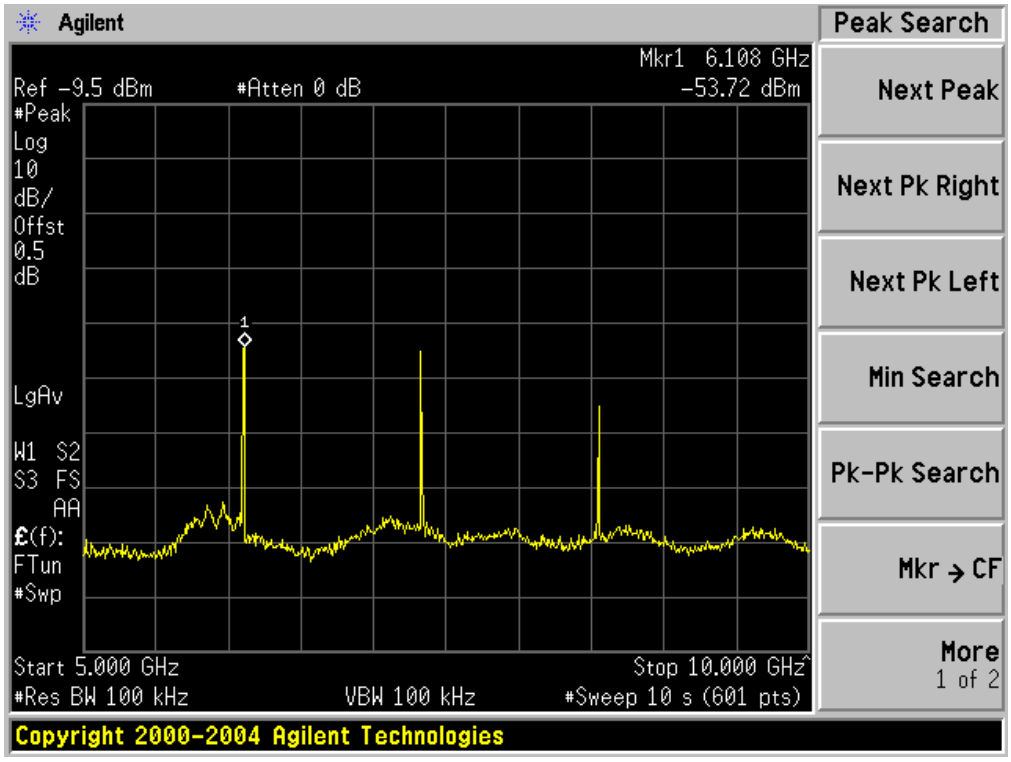

Agilent
Peak Search
Mkr1 7.442 GHz
Ref -9.5 dBm
#Atten 0 dB
-49.15 dBm
#Peak
Log
10
dB/
Offst
0.5
dB
Marker
7.442000000 GHz
-49.15 dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN689.GIF file saved

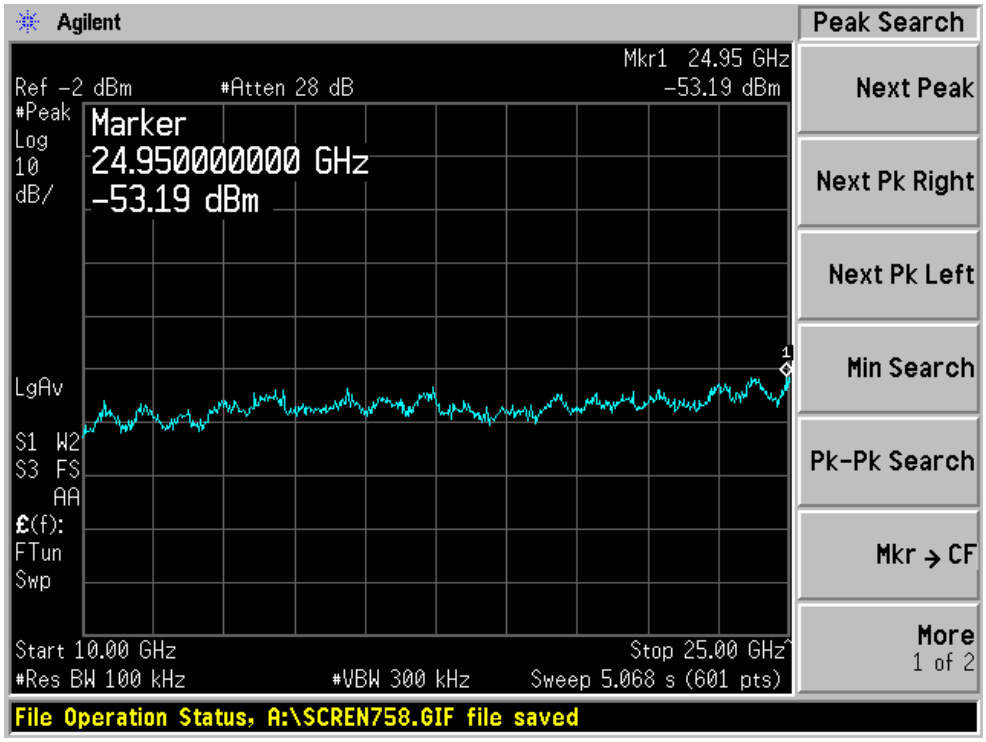

Agilent
Peak Search
Mkr1 24.25 GHz
Ref -2 dBm
#Atten 28 dB
-51.81 dBm
#Peak
Log
10
dB/
Marker
24.250000000 GHz
-51.81 dBm
LgAv
S1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5.068 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN759.GIF file saved

High Channel






Agilent
Peak Search
Mkr1 6.108 GHz
Ref -9.5 dBm
#Atten 0 dB
-53.72 dBm
#Peak
Log
10
dB/
Offst
0.5
dB
1
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
#Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Copyright 2000-2004 Agilent Technologies


Agilent
Peak Search
Mkr1 24.95 GHz
Ref -2 dBm
#Atten 28 dB
-53.19 dBm
#Peak
Log
10
dB/
Marker
24.950000000 GHz
-53.19 dBm
1
LgAv
S1 W2
S3 FS
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5.068 s (601 pts)
File Operation Status, A:\SCREN758.GIF file saved