FCC PART 15.247

EMI MEASUREMENT AND TEST REPORT

For

Evermore Systems, Inc.

8140 North Mopac Building 1, Suite 135
Texas 78759

FCC ID: SBYCYD001

This Report Concerns:	**Equipment Type:**
☒ Original Report	2.4GHz USB Dongle

Test Engineer:	Snell Leong
Report No.:	R0508161
Report Date:	2005-08-18
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TABLE OF CONTENTS

GENERAL INFORMATION **4**
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 4
OBJECTIVE 4
RELATED SUBMITTAL(S)/GRANT(S) 4
TEST METHODOLOGY 4
TEST FACILITY 4
SYSTEM TEST CONFIGURATION **6**
JUSTIFICATION 6
EUT EXERCISE SOFTWARE 6
SPECIAL ACCESSORIES 6
SCHEMATICS / BLOCK DIAGRAM 6
EQUIPMENT MODIFICATIONS 6
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS 6
CONFIGURATION OF TEST SYSTEM 7
TEST SETUP BLOCK DIAGRAM 7
SUMMARY OF TEST RESULTS **8**
§15.203 - ANTENNA REQUIREMENT **9**
STANDARD APPLICABLE 9
§15.207(A) - CONDUCTED EMISSIONS **10**
MEASUREMENT UNCERTAINTY 10
EUT SETUP 10
SPECTRUM ANALYZER SETUP 10
TEST EQUIPMENT LIST AND DETAILS 10
TEST PROCEDURE 10
SUMMARY OF TEST RESULTS 11
CONDUCTED EMISSIONS TEST DATA 11
PLOT OF CONDUCTED EMISSIONS TEST DATA 11
§2.1051, §15.205, §15.209, §15.247 (C) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS **14**
STANDARD APPLICABLE 14
MEASUREMENT PROCEDURE 14
EQUIPMENT LISTS 14
MEASUREMENT RESULT 14
§15.205 & §15.209 - SPURIOUS RADIATED EMISSION **21**
MEASUREMENT UNCERTAINTY 21
EUT SETUP 22
SPECTRUM ANALYZER SETUP 22
TEST EQUIPMENT LIST AND DETAILS 22
TEST PROCEDURE 23
CORRECTED AMPLITUDE & MARGIN CALCULATION 23
ENVIRONMENTAL CONDITIONS 23
SUMMARY OF TEST RESULTS 23
RADIATED EMISSION TEST RESULT 24
§15.247(A)(2) – 6 DB BANDWIDTH **26**
STANDARD APPLICABLE 26
MEASUREMENT PROCEDURE 26
EQUIPMENT LISTS 26
MEASUREMENT RESULT 26
§15.247(B)(3) - PEAK OUTPUT POWER MEASUREMENT **29**
STANDARD APPLICABLE 29
MEASUREMENT PROCEDURE 29
EQUIPMENT LISTS 29

MEASUREMENT RESULT 29

§15.247(D) - 100 KHZ BANDWIDTH OF BAND EDGES 30

STANDARD APPLICABLE 30
MEASUREMENT PROCEDURE 30
EQUIPMENT LISTS 30
MEASUREMENT RESULT 30

§15.247(E) - POWER SPECTRAL DENSITY 32

STANDARD APPLICABLE 32
MEASUREMENT PROCEDURE 32
EQUIPMENT LISTS 32
MEASUREMENT RESULT 32

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Evermore Systems, Inc.'s* product, FCC ID: *SBYCYD001,* Model: *HID Dongle* or the "EUT" as referred to this report is a 2.4GHz USB Dongle, which measures approximately 60mmL x 25mmW x 5mmH. The EUT operates at the frequency range of 2402– 2479MHz, with maximum output power of 0.00049W (-3.1dBm).

** The test data gathered are from typical production sample, serial number: P48476 provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *Evermore Systems, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A , B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emission, Conducted and Spurious Radiated Emission.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

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.

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 host system 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. The test software, provided by the customer, is started the Windows terminal program under the Windows 98/2000/ME/XP operating system.

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.

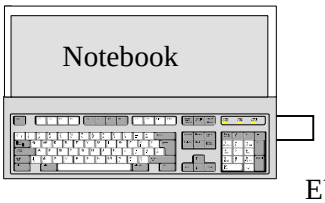
Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

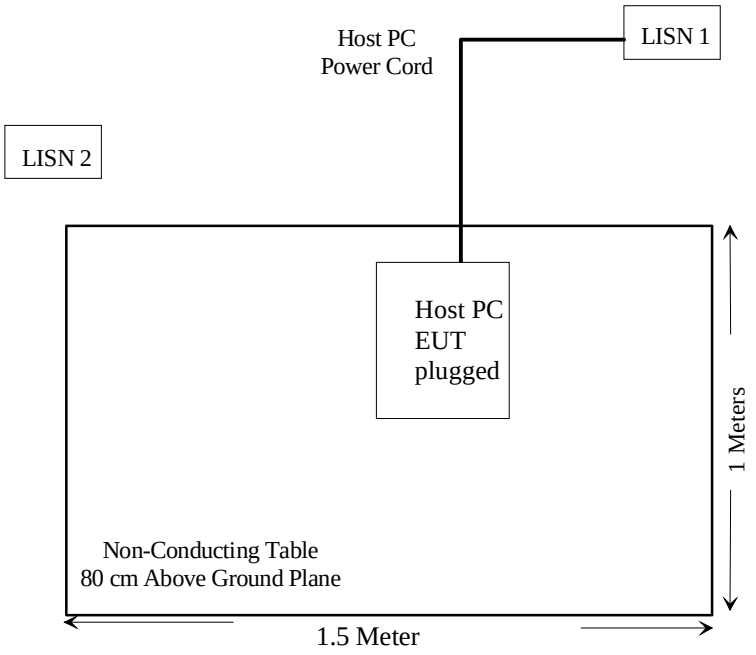
Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Laptop	300M	CN-03Y645-36521-361-0070	None

Configuration of Test System



EUT

Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1091	RF Exposure	Pass
§15.203	Antenna Requirement	Pass
§15.205	Restricted Band	Pass
§ 15.207 (a)	Conducted Emissions	Pass
§2.1051, §15.205, §15.209, §15.247 (c)	Spurious Emission at Antenna Port	Pass
§15.209 (a)	Radiated Emission	Pass
§15.247 (a)(2)	6 dB Bandwidth	Pass
§15.247 (b)(3)	Maximum Peak Output Power	Pass
§ 15.247 (d)	100 kHz Bandwidth of Frequency Band Edge	Pass
§15.247 (e)	Peak Power Spectral Density	Pass

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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 (b) (4), 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 for this device is an integral antenna with gain of 0dBi.

§15.207(a) - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ±2.4 dB.

EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Subpart B limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The notebook PC was connected to 120Vac/60Hz power source.

Spectrum Analyzer Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30Mhz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15

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

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

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

Summary of Test Results

According to the recorded data in following table, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-12.1 dB at 0.440 MHz in the Neutral conductor mode

Environmental Conditions

Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.440	35.0	Ave	Neutral	47.06	-12.1
0.465	33.3	Ave	Line	46.60	-13.3
0.605	31.0	Ave	Line	46.00	-15.0
0.150	49.2	QP	Neutral	66.00	-16.8
0.960	27.1	Ave	Neutral	46.00	-18.9
0.440	36.6	QP	Neutral	57.06	-20.5
0.150	35.5	Ave	Neutral	56.00	-20.5
0.605	34.7	QP	Line	56.00	-21.3
0.465	34.7	QP	Line	56.60	-21.9
0.960	32.2	QP	Neutral	56.00	-23.8
0.150	41.6	QP	Line	66.00	-24.4
0.150	24.1	Ave	Line	56.00	-31.9

Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

Bay Area Compliance Laboratory Corp
Class B

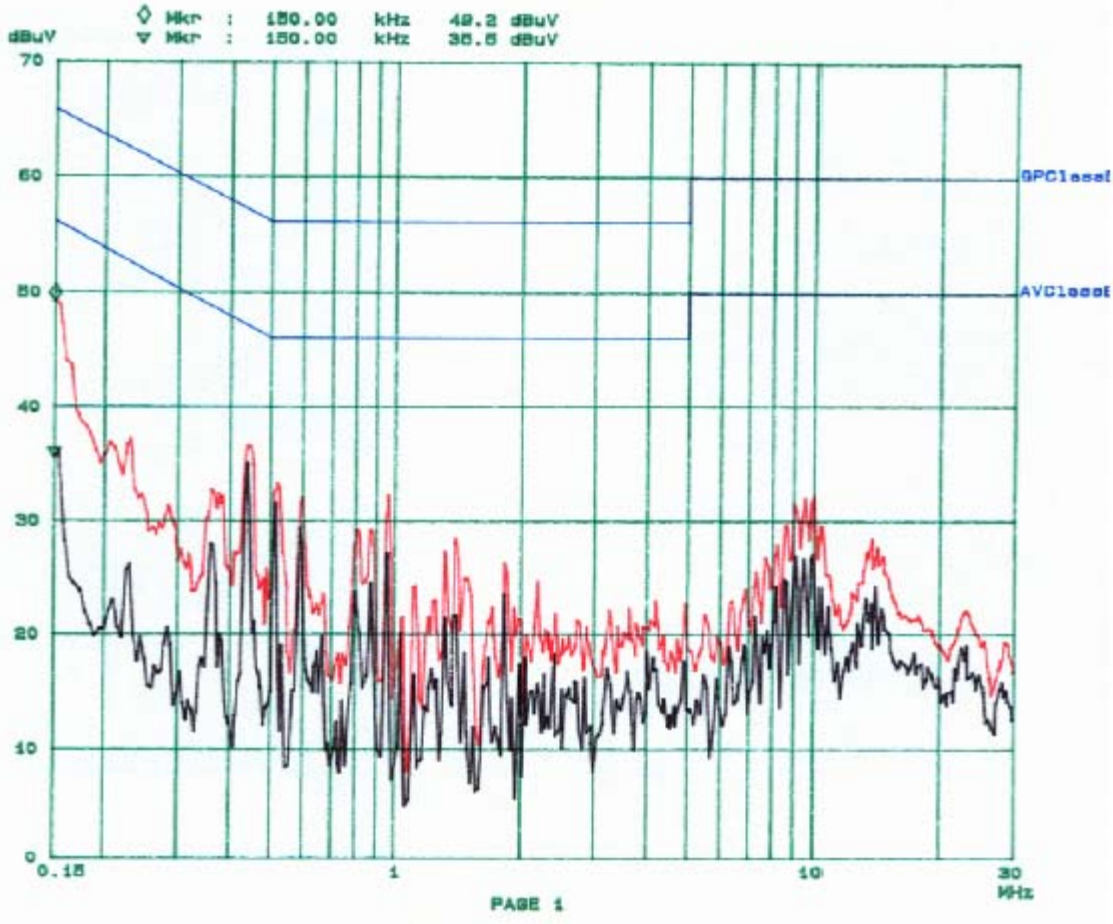
16. Aug 05 13:47

16 / August / 05
Snell

EUT: USB Doogle
Manuf: EVERMORE
Op Cond: Normal
Operator: Snell
Comment: N
120V
File name: NVIDIA.RES

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



Bay Area Compliance Laboratory Corp
Class B

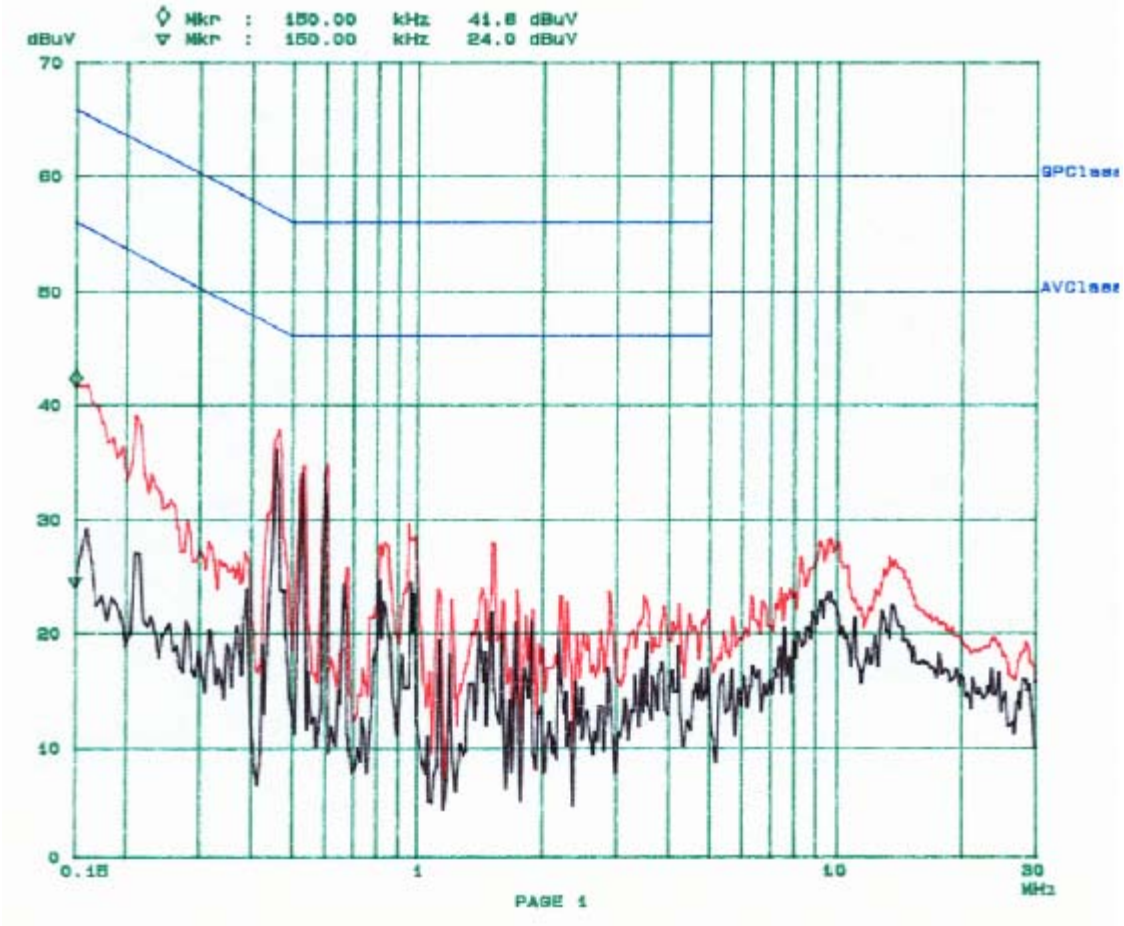
16. Aug 05 14:11

16 / August / 05
Snell

EUT: USB Doogle
Manuf: EVERMORE
Op Cond: Normal
Operator: Snell
Comment: L
120V
File name: NVIDIA.RES

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



§2.1051, §15.205, §15.209, §15.247 (c) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard Applicable

Requirements: CFR 47, §2.1051, §15.205, §15.209, §15.247 (c).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

Measurement Procedure

Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator. 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. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

Measurement Result

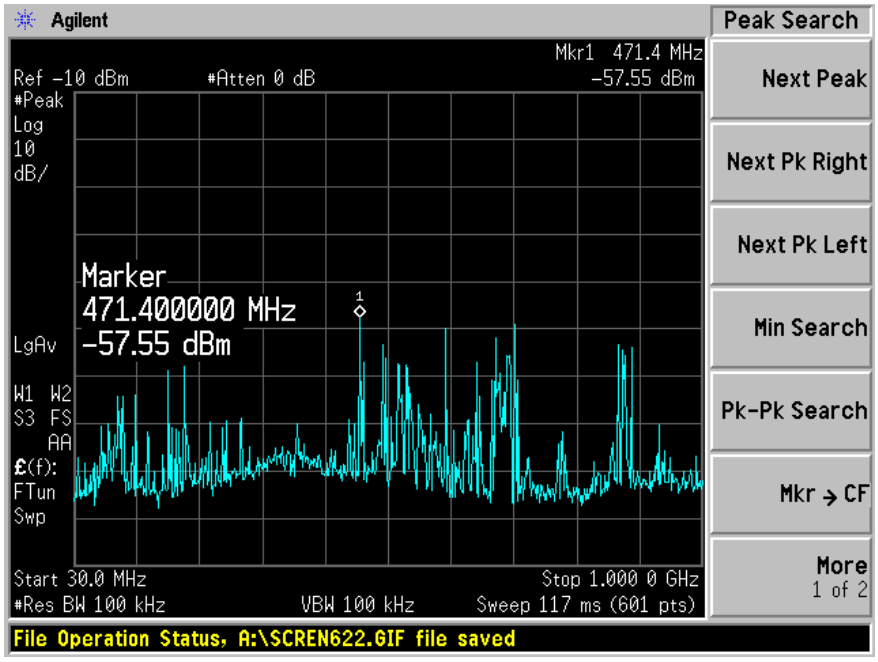
Please refer to following pages for plots of spurious emission.

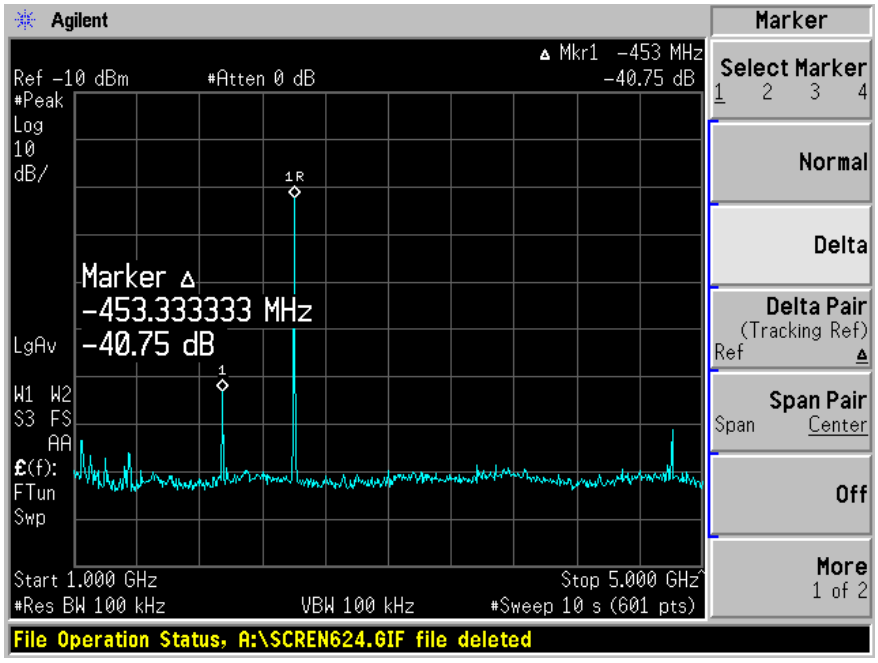
Environmental Conditions

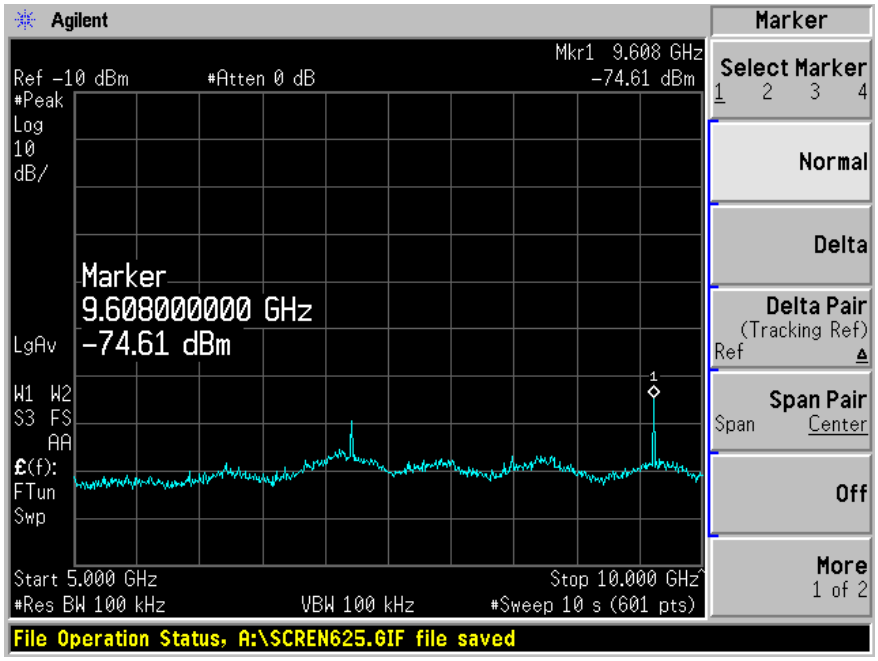
Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Low Channel


Agilent
Peak Search
Mkr1 471.4 MHz
Ref -10 dBm
#Atten 0 dB
-57.55 dBm
#Peak
Log
10
dB/
Marker
471.400000 MHz
-57.55 dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
VBW 100 kHz
Sweep 117 ms (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:\SCREN622.GIF file saved


Agilent
Marker
Δ Mkr1 -453 MHz
Ref -10 dBm
#Atten 0 dB
-40.75 dB
#Peak
Log
10
dB/
Marker Δ
-453.333333 MHz
-40.75 dB
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN624.GIF file deleted


Agilent
Marker
Mkr1 9.608 GHz
Ref -10 dBm
#Atten 0 dB
-74.61 dBm
#Peak
Log
10
dB/
Marker
9.608000000 GHz
-74.61 dBm
LgAv
W1 W2
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)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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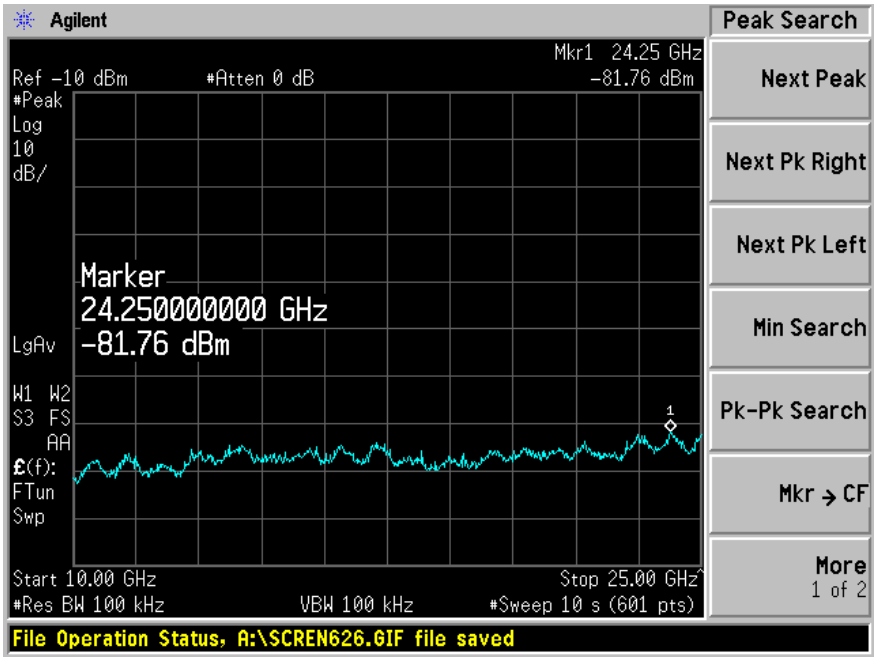
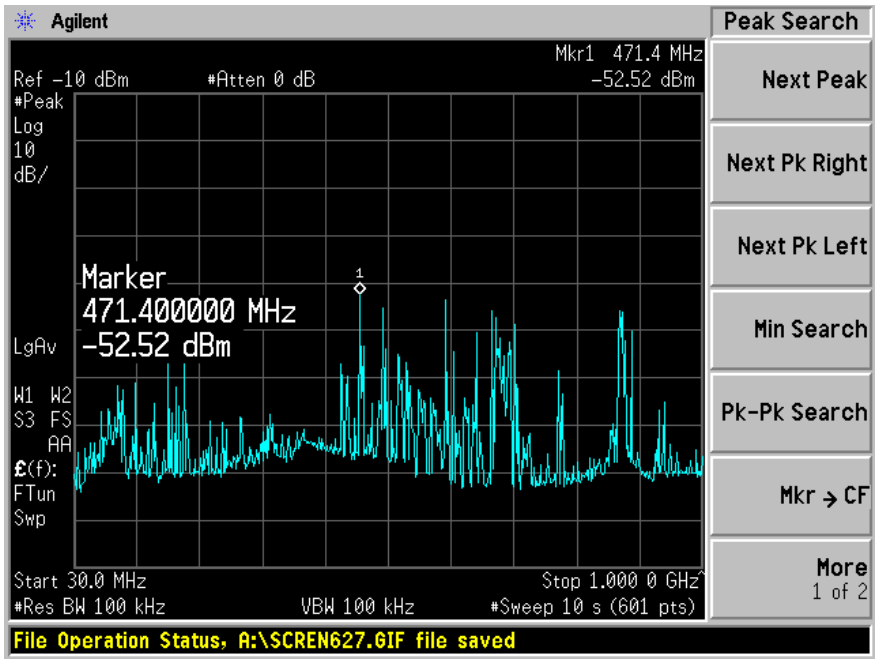
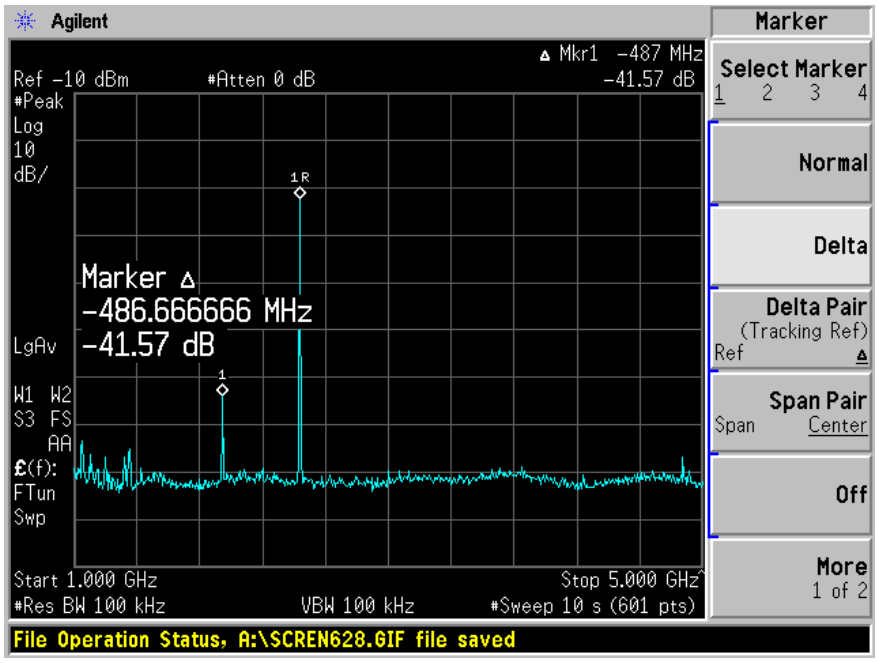
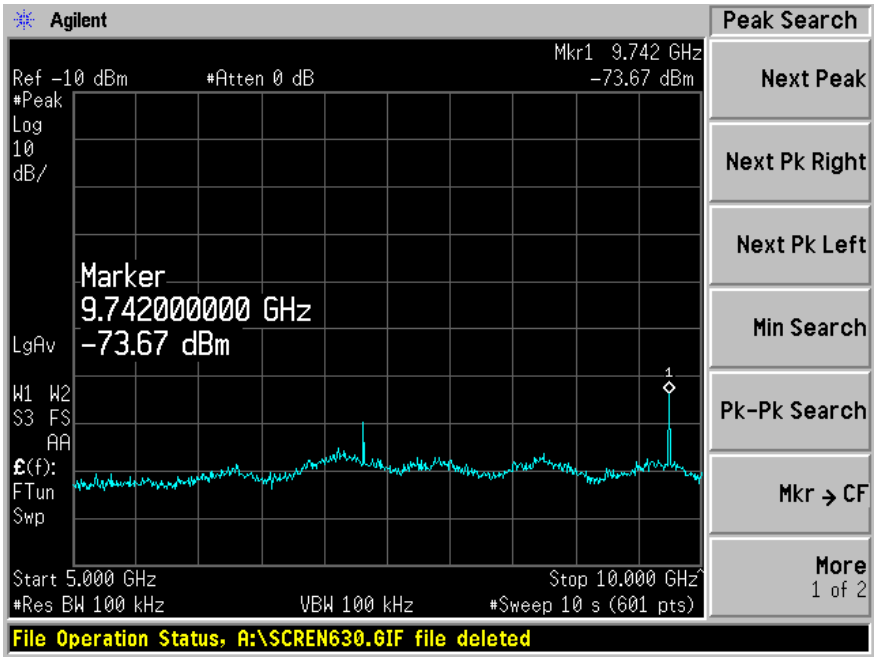
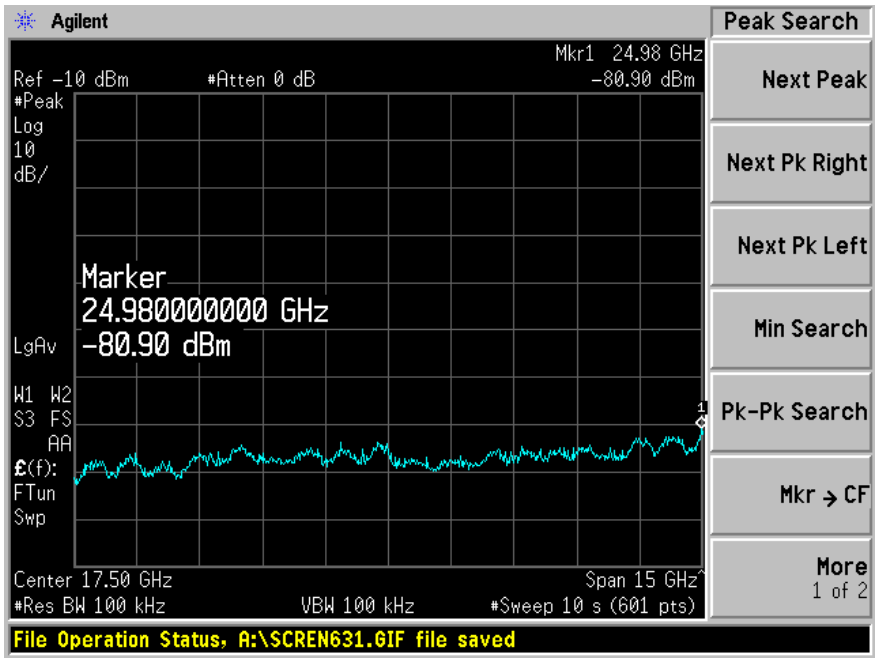

Agilent
Peak Search
Mkr1 24.25 GHz
Ref -10 dBm
#Atten 0 dB
-81.76 dBm
#Peak
Log
10
dB/
Marker
24.250000000 GHz
-81.76 dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN626.GIF file saved

Mid Channel

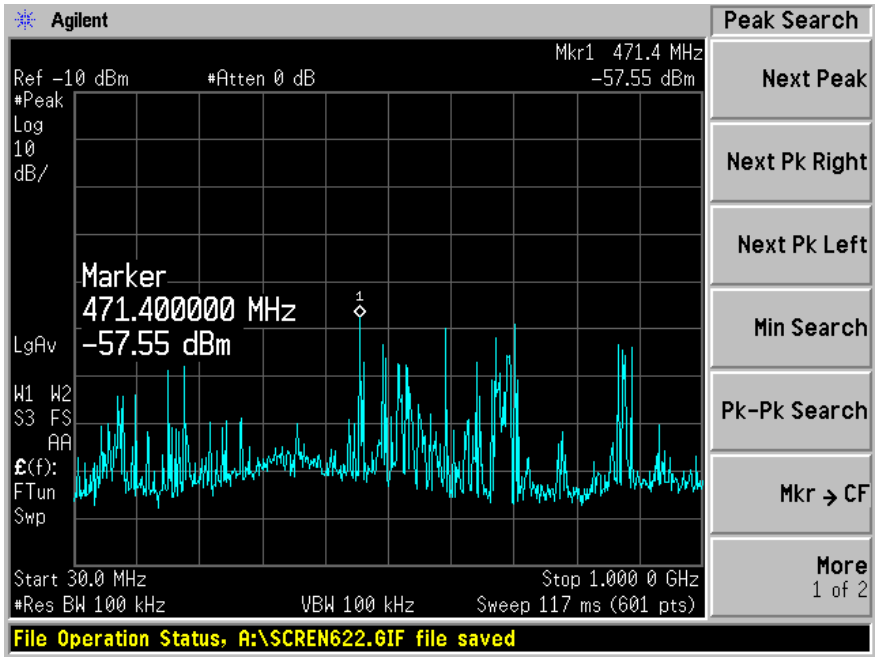

Agilent
Peak Search
Mkr1 471.4 MHz
Ref -10 dBm
#Atten 0 dB
-52.52 dBm
#Peak
Log
10
dB/
Marker
471.400000 MHz
-52.52 dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN627.GIF file saved

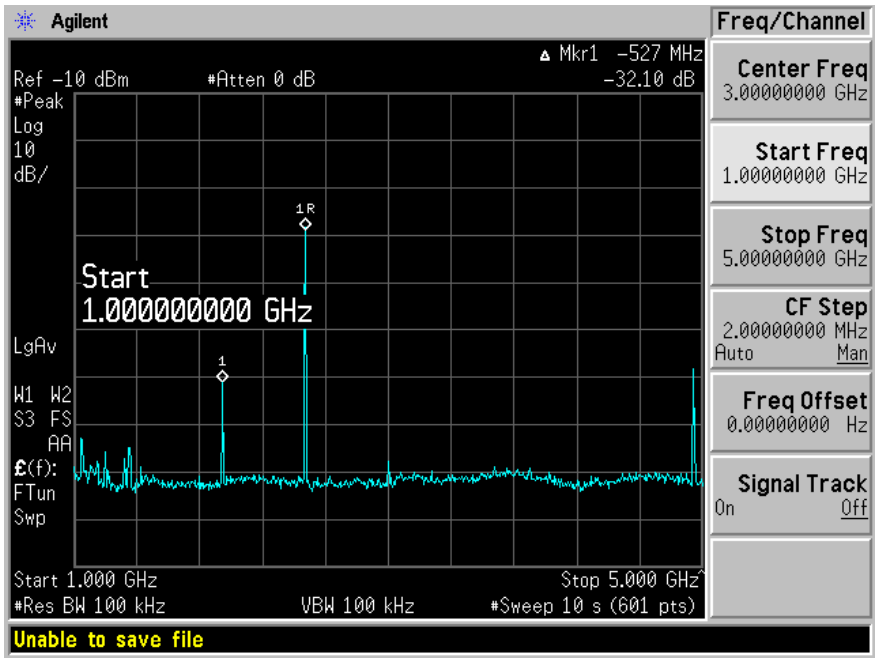

Agilent
Marker
Δ Mkr1 -487 MHz
Ref -10 dBm
#Atten 0 dB
-41.57 dB
#Peak
Log
10
dB/
Marker Δ
-486.666666 MHz
-41.57 dB
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 1.000 GHz
Stop 5.000 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN628.GIF file saved

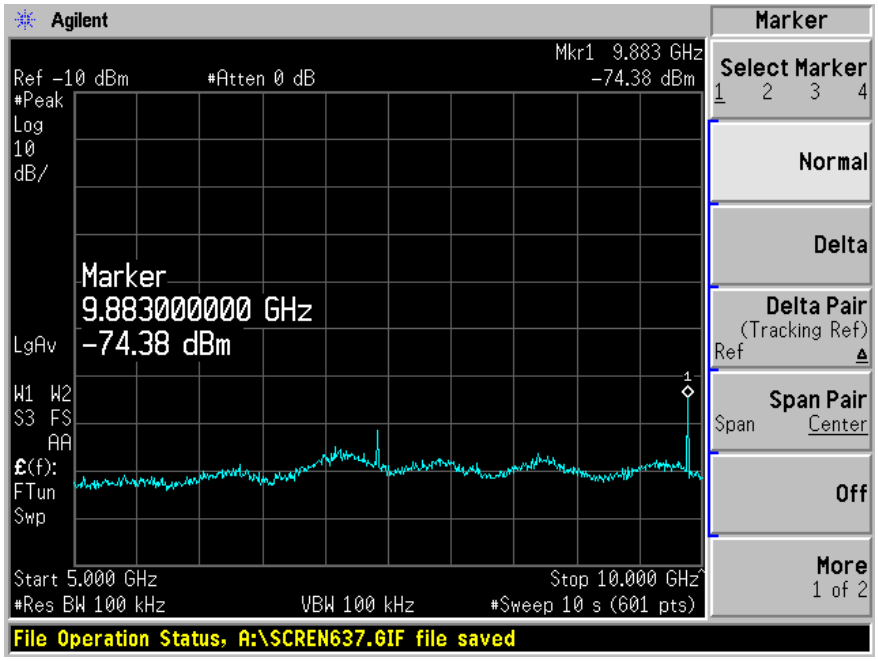

Agilent
Peak Search
Mkr1 9.742 GHz
Ref -10 dBm
#Atten 0 dB
-73.67 dBm
#Peak
Log
10
dB/
Marker
9.742000000 GHz
-73.67 dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 5.000 GHz
Stop 10.000 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
File Operation Status, A:\SCREN630.GIF file deleted

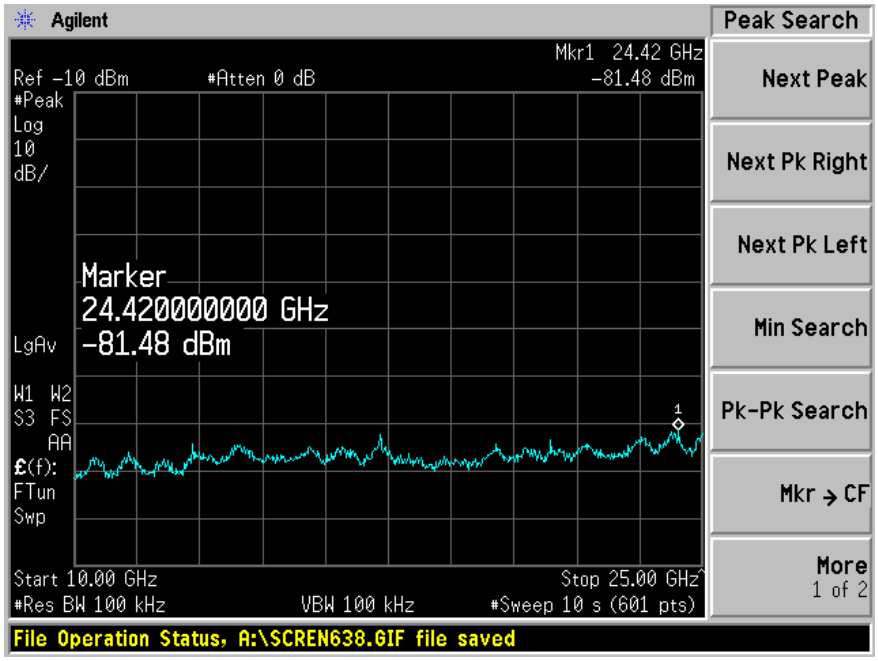

Agilent
Peak Search
Mkr1 24.98 GHz
Ref -10 dBm
#Atten 0 dB
-80.90 dBm
#Peak
Log
10
dB/
Marker
24.980000000 GHz
-80.90 dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Center 17.50 GHz
Span 15 GHz
#Res BW 100 kHz
VBW 100 kHz
#Sweep 10 s (601 pts)
File Operation Status, A:\SCREN631.GIF file saved

High Channel






Agilent
Marker
Mkr1 9.883 GHz
Ref -10 dBm
#Atten 0 dB
-74.38 dBm
#Peak
Log
10
dB/
Marker
9.883000000 GHz
-74.38 dBm
LgAv
W1 W2
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)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN637.GIF file saved


Agilent
Peak Search
Mkr1 24.42 GHz
Ref -10 dBm
#Atten 0 dB
-81.48 dBm
#Peak
Log
10
dB/
Marker
24.420000000 GHz
-81.48 dBm
LgAv
W1 W2
S3 FS
AA
£(f):
FTun
Swp
Start 10.00 GHz
Stop 25.00 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:\SCREN638.GIF file saved

§15.205 & §15.209 - SPURIOUS RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, 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.

According to §15.205, except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
[1]0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	([2])

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510MHz
[2] Above 38.6

Except as provided in paragraph (d) and (e), the filed strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

According to §15.209, the device shall meet radiated emission general requirements.

Except for Class A device, the filed strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (Microvolts/meter)	(dBμV/meter)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The notebook PC was connected to the 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the frequency was investigated from 30 to 25000 MHz.

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

For Average measurement: RBW = 1MHz, VBW = 10Hz (above 1000MHz)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Pre (.1 ~1300MHz)	8447D	2944A10198	8/20/2004
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	03/14/2005
Sunol Science	30MHz – 2 GHz Antenna	JB1	A03105-3	02/11/2005
Wisewave	Antenna, Horn, Std	ARH-2823-02	10555-02	12/13/2004

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

Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dBμV 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. - FCC 15.209 Limit

Environmental Conditions

Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.247, and had the worst margin of:

-10.2 dB at **4804.00 MHz** in the **Horizontal** polarization, Low Channel

-6.2 dB at **4880.00 MHz** in the **Horizontal** polarization, Middle Channel

-10.7 dB at **4958.00 MHz** in the **Horizontal** polarization, High Channel

-8.6 dB at **820.00 MHz** in the **Vertical** polarization, Unintentional Emission

Radiated Emission Test Result

Indicated			Table	Antenna		Correction Factor			Corrected Amplitude	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dB	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Channel, 1-25GHz											
2402.0000	96.2	Fund/Peak	90	1.0	v	28.7	2.0	35.8	91.0		
2402.0000	85.7	Fund/Peak	0	1.2	h	28.7	2.0	35.8	80.5		
2402.0000	95.8	Ave	180	1.2	v	28.7	2.0	35.8	90.6		
2402.0000	84.9	Ave	0	1.2	h	28.7	2.0	35.8	79.7		
4804.0000	43.0	Ave	180	2.3	h	32.5	3.1	34.8	43.8	54	-10.2
4804.0000	41.6	Ave	270	2.4	v	32.5	3.1	34.8	42.4	54	-11.6
7206.0000	35.9	Ave	180	2.0	v	36.7	4.3	34.7	42.2	54	-11.8
7206.0000	35.6	Ave	90	2.0	h	36.7	4.3	34.7	41.9	54	-12.1
4804.0000	49.6	Peak	180	2.3	h	32.5	3.1	34.8	50.4	74	-23.6
4804.0000	46.9	Peak	270	2.4	v	32.5	3.1	34.8	47.7	74	-26.3
7206.0000	41.1	Peak	90	2.0	v	36.7	4.3	34.7	47.4	74	-26.6
7206.0000	40.3	Peak	180	2.0	h	36.7	4.3	34.7	46.6	74	-27.4
Middle Channel, 1-25GHz											
2440.0000	97.3	Fund/Peak	90	1.0	v	28.7	2.0	35.8	92.1		
2440.0000	89.5	Fund/Peak	0	1.2	h	28.7	2.0	35.8	84.3		
2440.0000	96.4	Ave	180	1.2	v	28.7	2.0	35.8	91.2		
2440.0000	84.7	Ave	0	1.2	h	28.7	2.0	35.8	79.5		
4880.0000	47.0	Ave	180	2.2	h	32.5	3.1	34.8	47.8	54	-6.2
4880.0000	42.6	Ave	270	2.4	v	32.5	3.1	34.8	43.4	54	-10.6
7320.0000	33.1	Ave	180	2.1	h	36.7	4.3	34.7	39.4	54	-14.6
7320.0000	32.8	Ave	270	2.4	v	36.7	4.3	34.7	39.1	54	-14.9
4880.0000	51.0	Peak	180	2.2	h	32.5	3.1	34.8	51.8	74	-22.2
4880.0000	49.4	Peak	270	2.4	v	32.5	3.1	34.8	50.2	74	-23.8
7320.0000	41.5	Peak	180	2.3	h	36.7	4.3	34.7	47.8	74	-26.2
7320.0000	40.9	Peak	270	2.4	v	36.7	4.3	34.7	47.2	74	-26.8
High Channel, 1-25GHz											
2479.0000	95.2	Fund/Peak	90	1.0	v	28.7	2.0	35.8	90.0		
2479.0000	90.6	Fund/Peak	0	1.2	h	28.7	2.0	35.8	85.4		
2479.0000	94.6	Ave	180	1.2	v	28.7	2.0	35.8	89.4		
2479.0000	89.6	Ave	0	1.2	h	28.7	2.0	35.8	84.4		
4958.0000	42.5	Ave	90	2.1	h	32.5	3.1	34.8	43.3	54	-10.7
4958.0000	38.7	Ave	270	2.4	v	32.5	3.1	34.8	39.5	54	-14.5
7437.0000	33.1	Ave	270	2.4	v	36.7	4.3	34.7	39.4	54	-14.6
7437.0000	32.5	Ave	90	2.1	h	36.7	4.3	34.7	38.8	54	-15.2
4958.0000	49.9	Peak	90	2.1	h	32.5	3.1	34.8	50.7	74	-23.3
7437.0000	41.9	Peak	270	2.4	v	36.7	4.3	34.7	48.2	74	-25.8
4958.0000	47.1	Peak	270	2.4	v	32.5	3.1	34.8	47.9	74	-26.1
7437.0000	41.2	Peak	90	2.1	h	36.7	4.3	34.7	47.5	74	-26.5

30MHz – 1GHz

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart B	
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
820.00	36.7	250	1.0	V	21.9	6.5	27.7	37.4	46	-8.6
820.00	35.6	280	2.8	H	21.9	6.5	27.7	36.3	46	-9.7
72.00	45.1	270	3.2	H	8.1	1.8	28.4	26.6	40	-13.4
72.00	43.6	75	1.8	V	8.1	1.8	28.4	25.1	40	-14.9
240.00	34.7	270	2.1	H	11.5	3.3	27.5	22.0	46	-24.0
240.00	32.0	330	1.2	V	11.5	3.3	27.5	19.3	46	-26.7

AVG = average

§15.247(a)(2) – 6 dB BANDWIDTH

Standard Applicable

According to §15.247(a)(2), for digital modulation techniques, the minimum 6dB bandwidth shall be at least 500 kHz.

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 6 dB from the reference level. Record the frequency difference as the emission bandwidth. (6 dB bandwidth for DTS)
4. Repeat above procedures until all frequencies measured were complete.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

Measurement Result

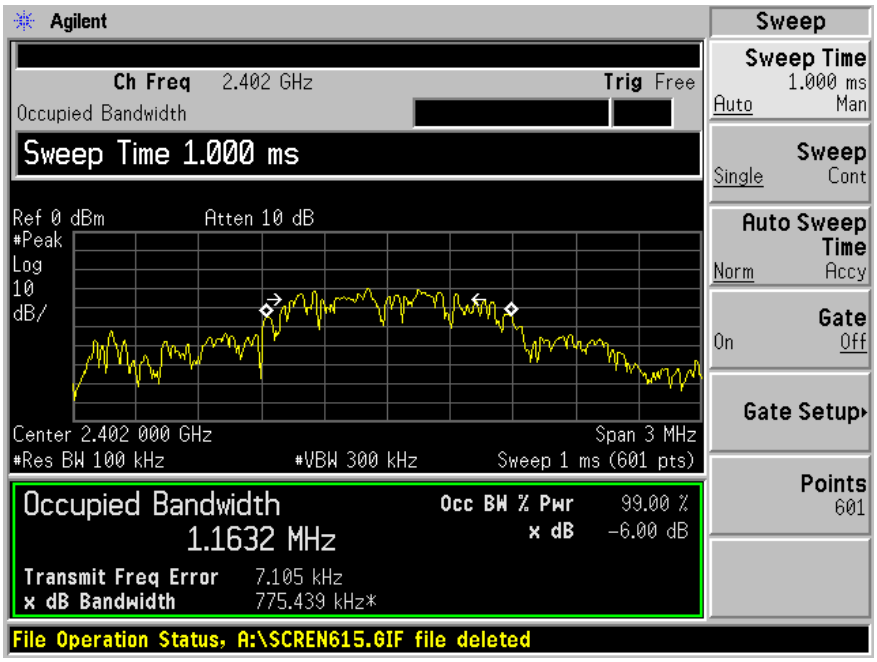
Environmental Conditions

Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Test Result

Channel	Frequency MHz	Channel Bandwidth (KHz)	Limit KHz
Low	2402	775.44	>500
Mid	2440	784.32	>500
High	2479	777.26	>500


Agilent
Sweep
Ch Freq 2.402 GHz
Trig Free
Occupied Bandwidth
Sweep Time 1.000 ms
Sweep Time
1.000 ms
Auto Man
Sweep
Single Cont
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Auto Sweep Time
Norm Accy
Gate
On Off
Gate Setup
Center 2.402 000 GHz
Span 3 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Points
601
Occupied Bandwidth
1.1632 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 7.105 kHz
x dB Bandwidth 775.439 kHz*
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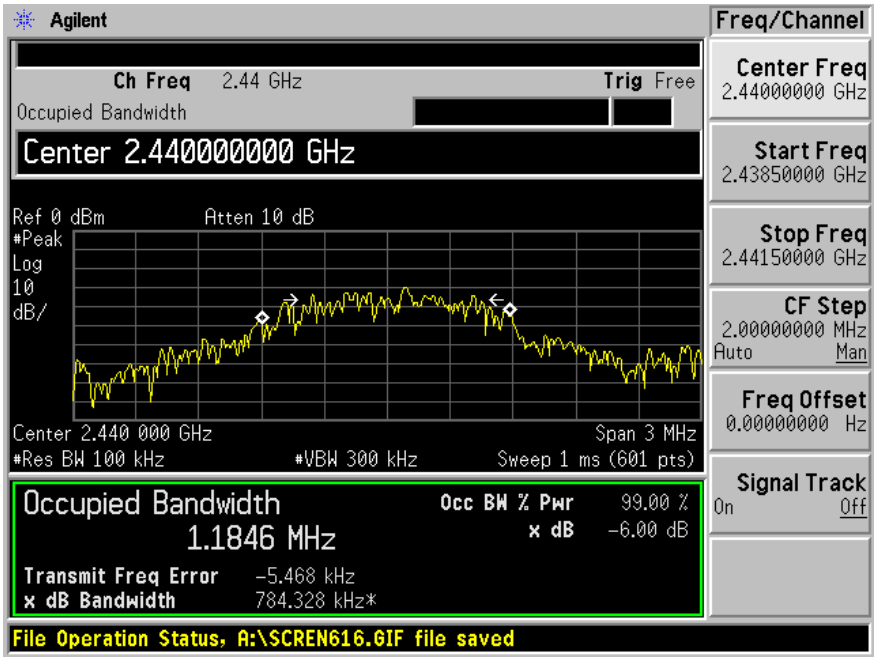
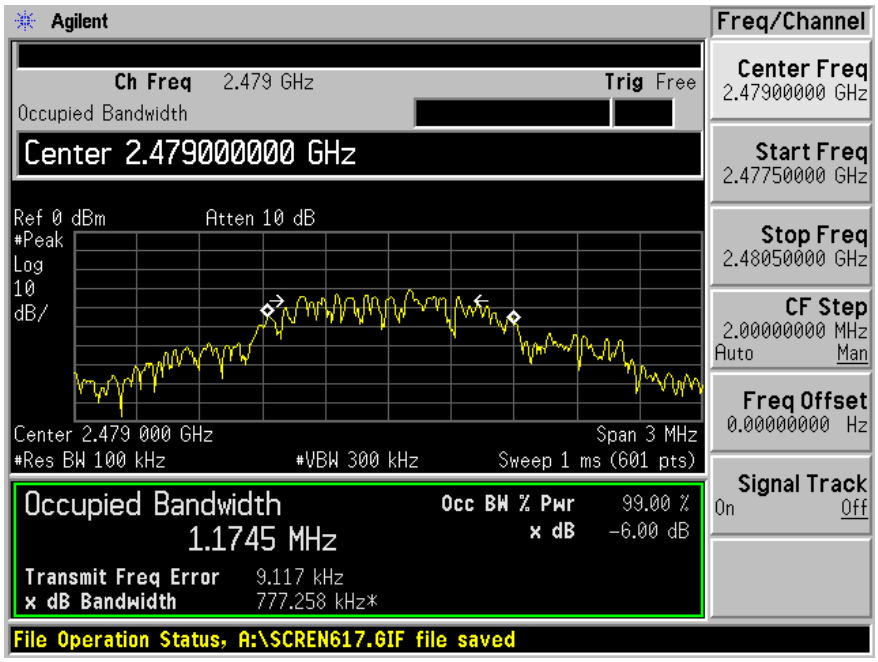

Agilent
Freq/Channel
Ch Freq 2.44 GHz
Trig Free
Occupied Bandwidth
Center 2.440000000 GHz
Center Freq
2.44000000 GHz
Start Freq
2.43850000 GHz
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Stop Freq
2.44150000 GHz
CF Step
2.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Center 2.440 000 GHz
Span 3 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Signal Track
On Off
Occupied Bandwidth
1.1846 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -5.468 kHz
x dB Bandwidth 784.328 kHz*
File Operation Status, A:\SCREN616.GIF file saved


Agilent
Freq/Channel
Ch Freq 2.479 GHz
Trig Free
Occupied Bandwidth
Center 2.479000000 GHz
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Center 2.479 000 GHz
Span 3 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 1 ms (601 pts)
Occupied Bandwidth
1.1745 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error 9.117 kHz
x dB Bandwidth 777.258 kHz*
Center Freq
2.47900000 GHz
Start Freq
2.47750000 GHz
Stop Freq
2.48050000 GHz
CF Step
2.00000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
File Operation Status, A:\SCREN617.GIF file saved

§15.247(b)(3) - PEAK OUTPUT POWER MEASUREMENT

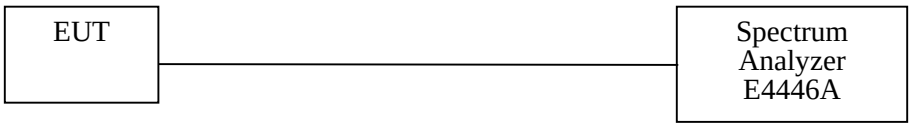
Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz: 1 Watt

Measurement Procedure

1. Calculate peak output power from measured field strength.
2. The test was conducted at 3 meter test site. RBW = 1MHz, VBW ≥ RBW.
3. $P = F^2D^2/(30G)$, F_{mc} = 92.1dBuV/m, F_{lc} = 91dBuV/m, F_{hc} = 90dBuV/m, D = 3m, G = 0dBi

P_{lc} = -4.2dBm, P_{mc} = -3.1dBm, P_{hc} = -5.2dBm



Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	03/14/2005
Wisewave	Antenna, Horn, Std	ARH-2823-02	10555-02	12/13/2004

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

Measurement Result

Environmental Conditions

Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Output Power

Channel	Frequency	Max Peak Output Power		Limit	Result
	MHz	(dBm)	(mW)	(mW)	
Low	2402	-4.2	0.38	1000	pass
Mid	2440	-3.1	0.49	1000	pass
High	2479	-5.2	0.30	1000	pass

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

Standard Applicable

According to §15.247(d), in *any* 100 kHz bandwidth outside the frequency bands 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) see §15.205(c)).

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.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

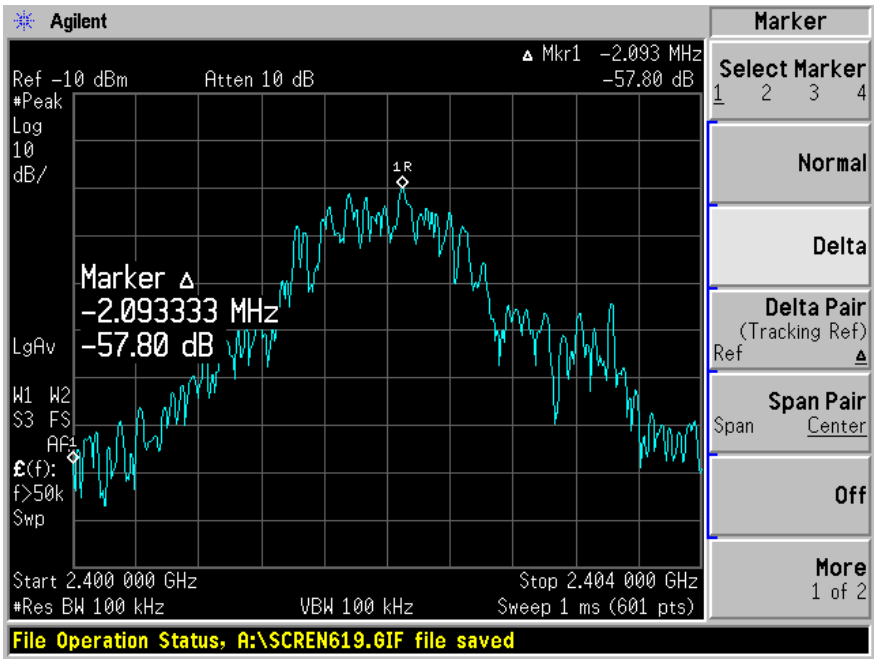
Measurement Result

Environmental Conditions

Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Please refer to following pages for plots of band edge.


Agilent
Marker
Ref -10 dBm
Atten 10 dB
Mkr1 -2.093 MHz
-57.80 dB
#Peak
Log
10
dB/
1R
Marker Δ
-2.093333 MHz
-57.80 dB
LgAv
W1 W2
S3 FS
AA
£(f):
f>50k
Swp
Start 2.400 000 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 2.404 000 GHz
Sweep 1 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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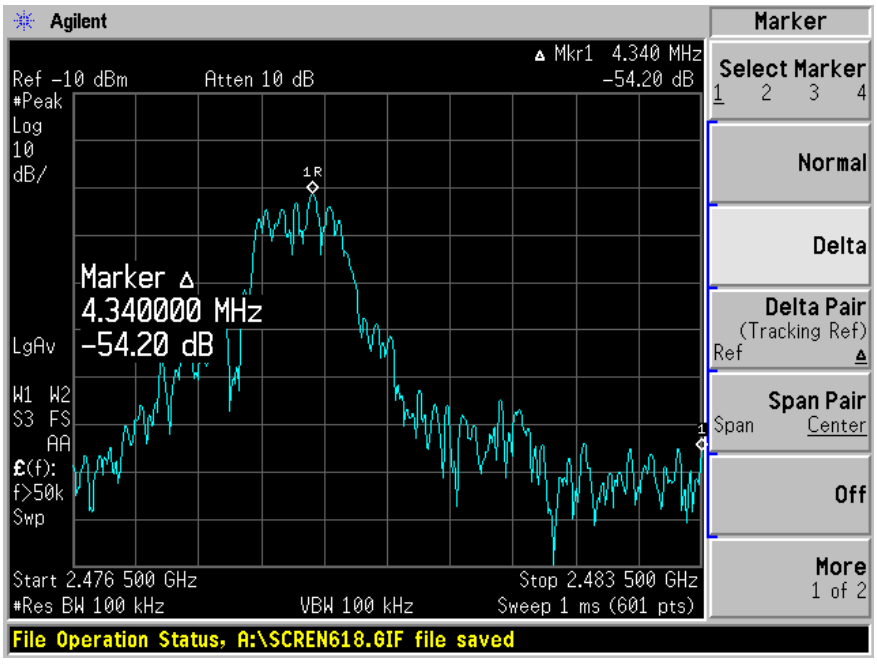
Agilent
Marker
Ref -10 dBm
Atten 10 dB
Mkr1 4.340 MHz
-54.20 dB
#Peak
Log
10
dB/
1R
Marker Δ
4.340000 MHz
-54.20 dB
LgAv
W1 W2
S3 FS
AA
£(f):
f>50k
Swp
Start 2.476 500 GHz
#Res BW 100 kHz
VBW 100 kHz
Stop 2.483 500 GHz
Sweep 1 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN618.GIF file saved

§15.247(e) - POWER SPECTRAL DENSITY

Standard Applicable

According to §15.247 (e), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Measurement Procedure

1. The PSD was computed from measured field strength.
2. The test was conducted at 3 meter test site with SA set to RBW = 3kHz, VBW > RBW, Span = 300kHz, Sweep = 100 sec.
3. $P = F^2D^2/(30G)$, F_{mc} = 57.68dBuV/m, F_{lc} = 57.58dBuV/m, F_{hc} = 56.58dBuV/m, D = 3m, G = 0dBi

PSD_{lc} = -37.65dBm, P_{mc} = -37.54dBm, P_{hc} = -38.65dBm

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	03/14/2005
Wisewave	Antenna, Horn, Std	ARH-2823-02	10555-02	12/13/2004

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

Measurement Result

Environmental Conditions

Temperature:	27° C
Relative Humidity:	68%
ATM Pressure:	1026 mbar

The testing was performed by Snell Leong on 2005-08-16.

Test Result

Channel	Frequency MHz	PSD dBm	Limit dBm
Low	2402	-37.65	8
Mid	2440	-37.54	8
High	2479	-38.65	8