

FCC 15.247



EMI MEASUREMENT AND TEST REPORT

For

SmartBridges Pte Ltd

745, TOA PAYOH LORONG 5,
#04-01 HBM BUILDING, SINGAPORE 319455

FCC ID: PWGNEXUS1

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: IEEE 802.11a MiniPCI WLAN Card
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Report No.: R0501203	
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Note: The test report is specially limited to the above company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

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
BLOCK DIAGRAM.....	6
EQUIPMENT MODIFICATIONS	6
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	6
EXTERNAL I/O CABLING LIST AND DETAILS	6
CONFIGURATION OF TEST SYSTEM	7
TEST SETUP BLOCK DIAGRAM.....	7
SUMMARY OF TEST RESULTS FOR FCC PART 15.....	8
§1.1307(B)(1) & §2.1093 - RF EXPOSURE.....	9
ANTENNA REQUIREMENT	10
§15.207(A) - CONDUCTED EMISSION.....	11
MEASUREMENT UNCERTAINTY	11
TEST SETUP.....	11
RECEIVER SETUP.....	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST PROCEDURE	11
ENVIRONMENTAL CONDITIONS	12
SUMMARY OF TEST RESULTS	12
CONDUCTED EMISSIONS TEST DATA	12
PLOT OF CONDUCTED EMISSIONS TEST DATA	13
§15.205 & §15.209 - RADIATED EMISSION.....	18
MEASUREMENT UNCERTAINTY	18
TEST SETUP.....	18
SPECTRUM ANALYZER SETUP	18
TEST EQUIPMENT LIST AND DETAILS.....	18
ENVIRONMENTAL CONDITIONS	19
TEST PROCEDURE	19
CORRECTED AMPLITUDE & MARGIN CALCULATION	19
SUMMARY OF TEST RESULTS	19
ANTENNA PA58.....	21
ANTENNA DA58	22
ANTENNA GD58	23
§2.1051 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	24
STANDARD APPLICABLE	24
EQUIPMENT LISTS	24
MEASUREMENT RESULT	24
§15.247(A)(2) – 6 DB BANDWIDTH	28
STANDARD APPLICABLE	28
MEASUREMENT PROCEDURE.....	28
EQUIPMENT LISTS	28
MEASUREMENT RESULT	28
§15.247(B)(3) - PEAK OUTPUT POWER MEASUREMENT.....	31
STANDARD APPLICABLE	31
MEASUREMENT PROCEDURE.....	31

EQUIPMENT LISTS	31
MEASUREMENT RESULT	31
§15.247(C) - 100 KHZ BANDWIDTH OF BAND EDGES	32
STANDARD APPLICABLE	32
MEASUREMENT PROCEDURE.....	32
EQUIPMENT LISTS	32
MEASURE RESULTS.....	32
§15.247(D) - POWER SPECTRAL DENSITY	34
STANDARD APPLICABLE	34
MEASUREMENT PROCEDURE.....	34
EQUIPMENT LISTS	34
MEASUREMENT RESULTS.....	35

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *SmartBridges Pte Ltd's* product, FCC ID: *PWGNEXUS1*, or the "EUT" as referred to in this report is a Transceiver, IEEE 802.11a MiniPCI WLAN Card. The EUT operates at the frequency range of 5725 – 5850 MHz, maximum output power is 23.05 dBm (0.201W).

* *The test data gathered are from production sample, serial number: 00301A xxxxxx, provided by the manufacturer.*

Objective

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

The objective is to determine compliance with FCC 15.247 rules for the DTS:

- Antenna Requirement
- AC Line Conduction
- 6 dB Bandwidth
- RF Output Power
- 100 kHz Bandwidth of Frequency Band Edge
- Peak Power Spectral Density
- Spurious Emission
- Spurious Emission at Antenna Port
- RF Exposure

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003.

Test Facility

The Open Area Test site used by BACL Corp. 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 Corp. 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 test methods and procedures 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 final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

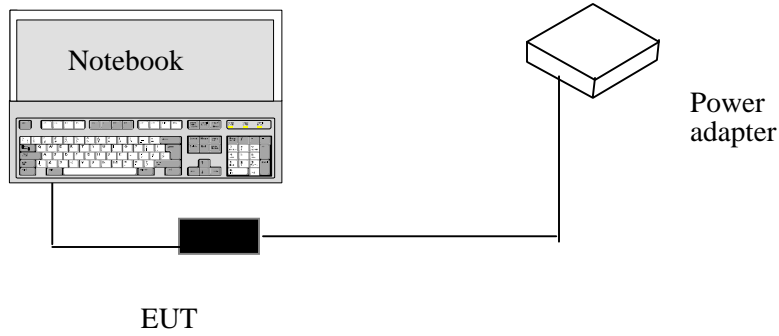
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Notebook PC	300M	CN-0X0024-36521-377-0003	None
SPI Sparkle Power	Ac to DC power supply	FSP 300-60GT	S01949987	None

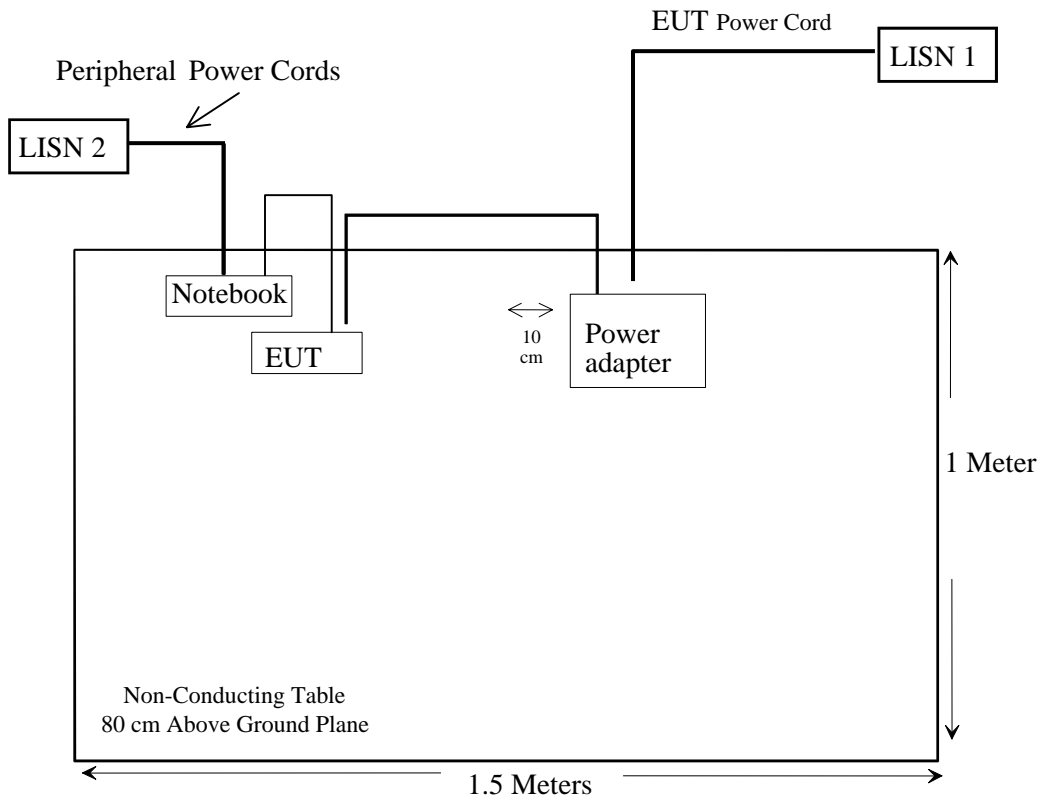
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
28 AWG DC power cables	1.5m	Power supply	EUT
MiniPCI extender	8cm	Laptop MiniPCI port	EUT

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1093, §15.247(b)(4)	RF Exposure Requirement	Compliant
§15.203	Antenna Requirement	Compliant
§ 15.207(a)	AC Line Conduction	Compliant
§ 15.205 & § 15.209	Radiated Emission	Compliant
§15.247(a)(2)	6 dB Bandwidth	Compliant
§15.247(b)(3)	RF Output Power	Compliant
§ 15.247(c)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(d)	Peak Power Spectral Density	Compliant
§2.1051	Spurious Emission at Antenna Port	Compliant

§1.1307(b)(1) & §2.1093 - RF EXPOSURE

According to §15.247(b)(5) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 11.83 (dBm)

Maximum peak output power at antenna input terminal: 15.24 (mW)

Predication frequency: 5800 (MHz)

Antenna Gain (typical): 32.5 (dBi)

antenna gain: 1778.28 (numeric)

Prediction distance: 47(cm)

Power density at predication frequency at 47 cm: 0.98 (mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm²)

Test Result

The EUT is a outdoor device. The prediction distance is 47cm. The Power density at predication frequency at 47 cm is 0.98 mW/cm² within the limit of 1.0 mW/cm².

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.

There are three antennas tested with the EUT. Model names are listed as follows:

1. GD58
2. PA58
3. DA58

The maximum gain of antenna used for transmitting is 32.5 dBi. They are outdoor antennas.

§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. 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 BAEL is ± 2.4 dB.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

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

The EUT was connected to AC adapter, which is connected with LISN-1 of 120Vac/60Hz power source.

Receiver Setup

The 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
Fluke	Calibrated Voltmeter	189	18485-38	2004-07-18

* **Statement of Traceability:** BAEL 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 mains outlet of the LISN-1.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Environmental Conditions

Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

The testing was performed by Snell Leong on 2005-02-02.

Summary of Test Results

According to the data in the table hereinafter, the EUT complied with the FCC 15.247, and had the worst margin of:

-9.0 dB at 0.395 MHz in the **Neutral** conductor, MiniPCI port power supply (laptop)

-8.4 dB at 0.315 MHz in the **Neutral** conductor, External Power Supply

Conducted Emissions Test Data

MiniPCI port power supply (laptop)

Frequency MHz	LINE CONDUCTED EMISSIONS			FCC CLASS B	
	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
0.395	39.0	Ave	Neutral	47.96	-9.0
0.330	40.0	Ave	Neutral	49.45	-9.5
0.155	53.5	QP	LINE	65.73	-12.2
0.920	40.2	QP	LINE	56.00	-15.8
0.270	33.7	Ave	LINE	51.12	-17.4
0.330	41.4	QP	Neutral	59.45	-18.1
0.395	39.7	QP	Neutral	57.96	-18.3
0.150	45.4	QP	Neutral	66.00	-20.6
0.270	39.6	QP	LINE	61.12	-21.5
0.155	32.1	Ave	LINE	55.73	-23.6
0.150	30.7	Ave	Neutral	56.00	-25.3
0.920	20.4	Ave	LINE	46.00	-25.6

Conducted Emission External Power Supply

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
0.315	41.4	Ave	Neutral	49.84	-8.4
0.315	39.6	Ave	LINE	49.84	-10.2
0.175	41.2	Ave	Neutral	54.72	-13.5
0.175	41.0	Ave	LINE	54.72	-13.7
0.210	38.6	Ave	Neutral	53.21	-14.6
0.210	34.9	Ave	LINE	53.21	-18.3
0.315	41.4	QP	Neutral	59.84	-18.4
0.315	39.8	QP	LINE	59.84	-20.0
0.175	40.7	QP	Neutral	64.72	-24.0
0.175	40.2	QP	LINE	64.72	-24.5
0.210	38.0	QP	Neutral	63.21	-25.2
0.210	34.4	QP	LINE	63.21	-28.8

Plot of Conducted Emissions Test Data

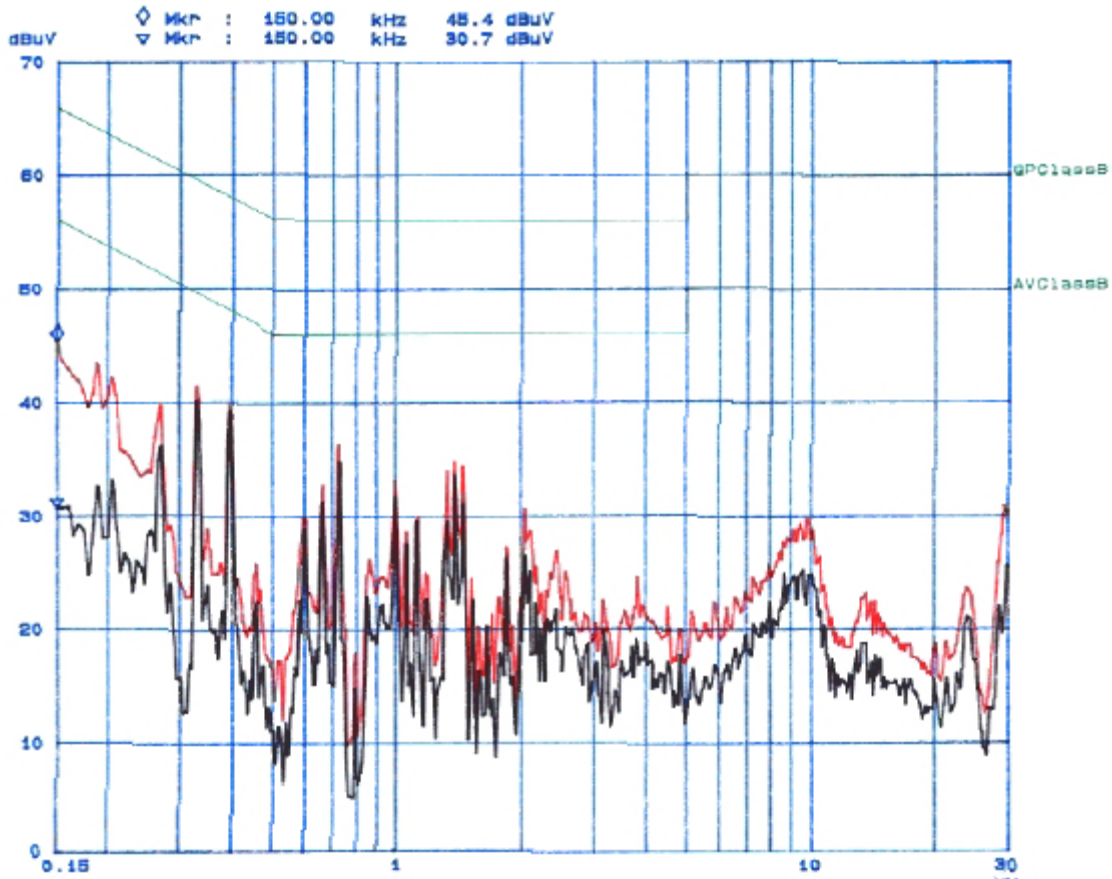
Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Laboratory Corp.
Class B

02. Feb 05 11: 05

EUT: SB3000
Manuf: Smart Bridge
Op Cond: Normal
Operator: Shell
Comment: N
MiniPCI power by PC

Scan Settings (3 Ranges)			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF	
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF	
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF	



PAGE 1

02/Feb/05
Shell

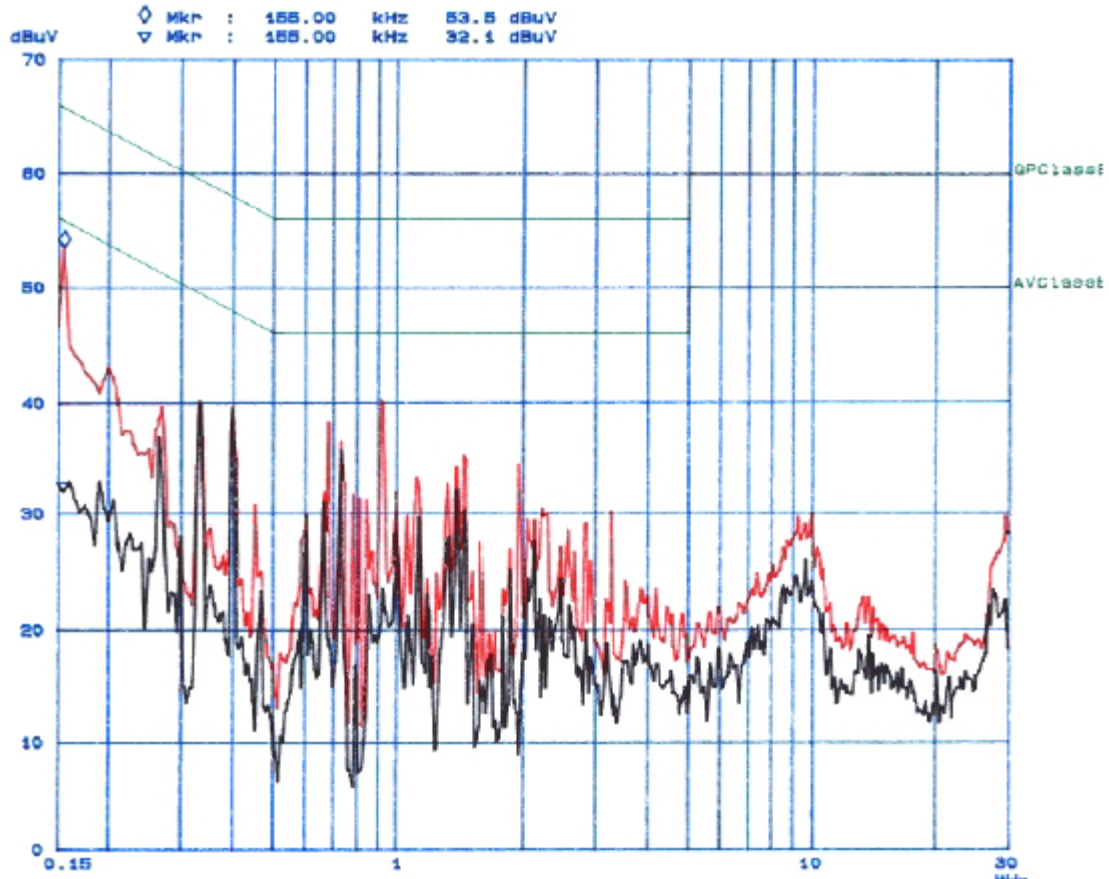
Bay Area Compliance Laboratory Corp.
Class B

02. Feb 05 10:46

EUT: 983000
Manuf: Smart Bridge
Op Cond: Normal
Operator: Shell
Comment: L
MiniPCI power by PC

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
180k	1M	5k	9k	QP+AV	20ms	15dB LN	OFF	
1M	5M	10k	9k	QP+AV	1ms	15dB LN	OFF	
5M	30M	100k	9k	QP+AV	1ms	15dB LN	OFF	



PAGE 1

02/Feb/05
Shell

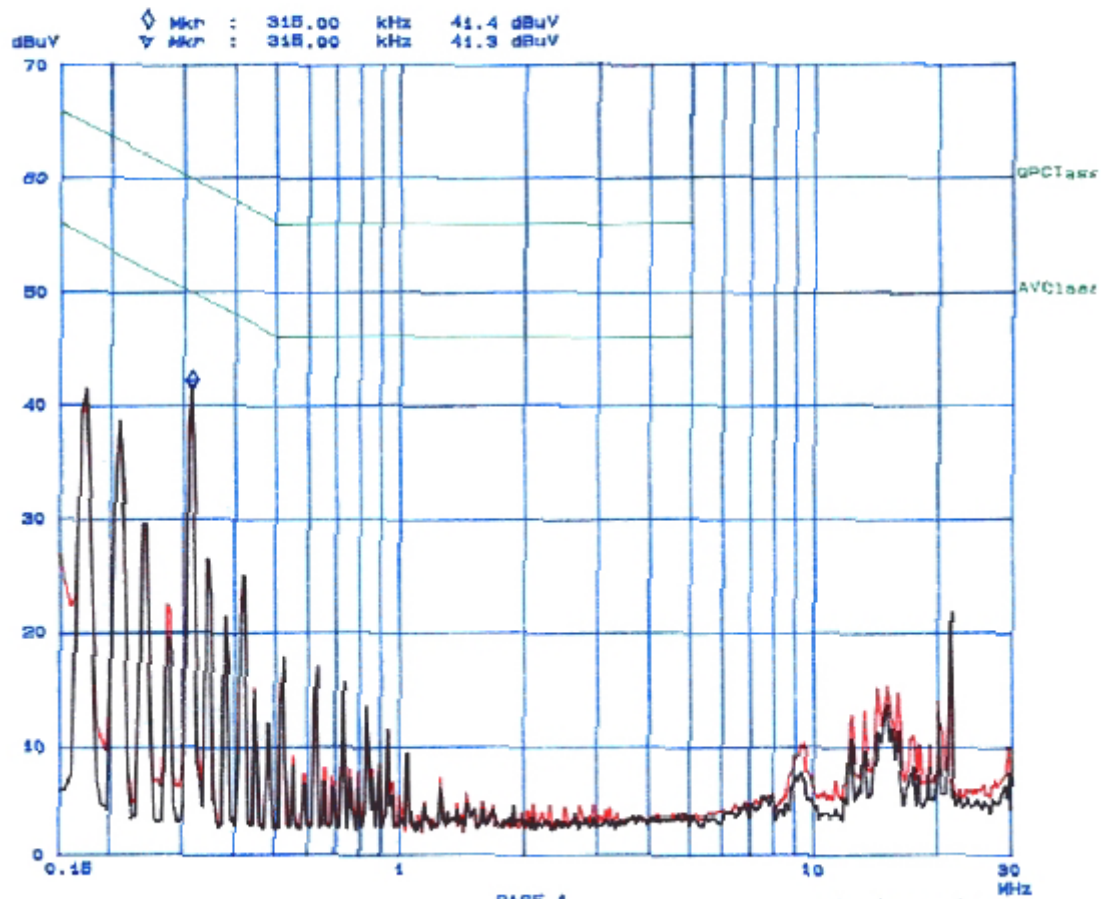
Bay Area Compliance Laboratory Corp.
Class B

02. Feb 05 11:56

EUT: SR3000
Manuf: Smart Bridge
Op Cond: Normal
Operator: Shell
Comment: N
External Power Supply

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	1M	8k	8k	QP+AV	20ms	15dB LN	OFF	
1M	5M	10k	8k	QP+AV	1ms	15dB LN	OFF	
5M	30M	100k	8k	QP+AV	1ms	15dB LN	OFF	



02 Feb 05
Shell

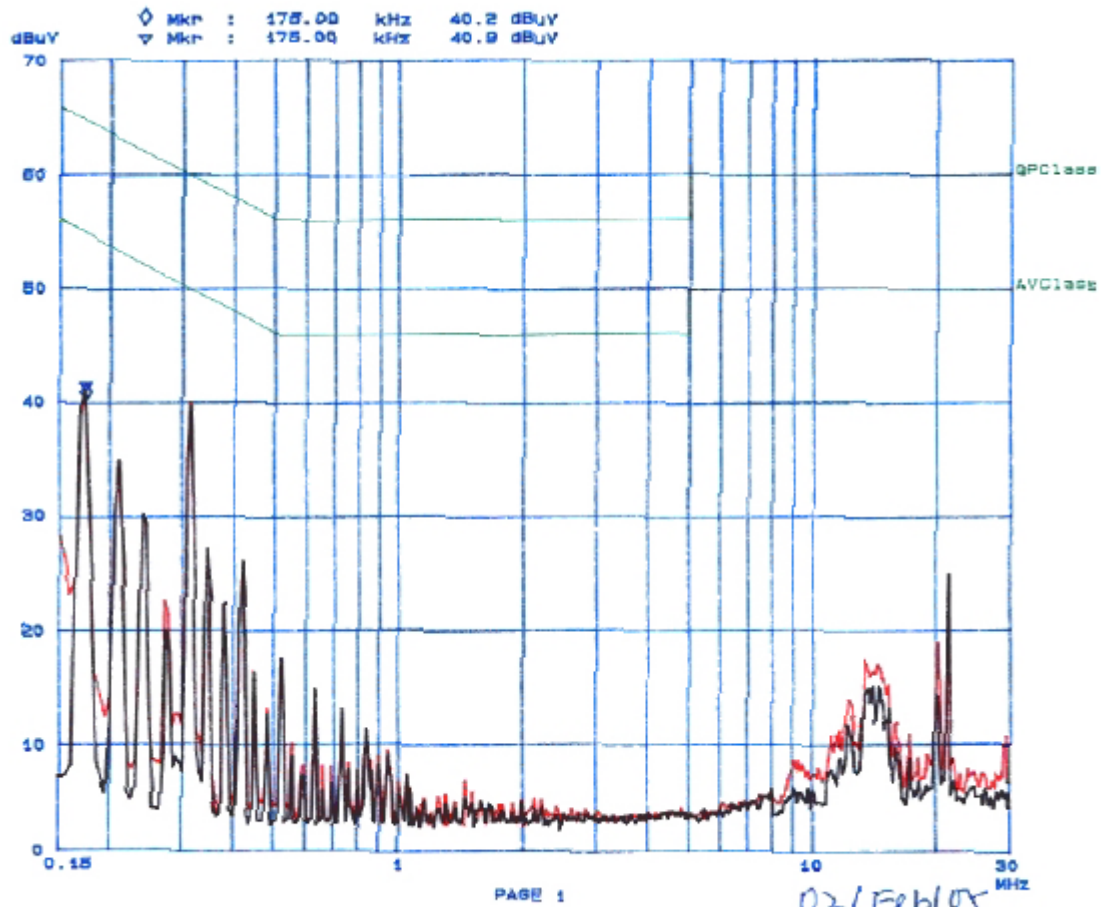
Bay Area Compliance Laboratory Corp. Class B

02. Feb 05 13:10

EUT: 883000
 Manuf: Smart Bridge
 Op Cond: Normal
 Operator: Shell
 Comment: L
 External Power Supply

Scan Settings (3 Ranges)

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



§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 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 BAEL 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.

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 EUT was connected to support board, which powered by the AC adapter. And the AC adapter was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 40GHz.

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

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

For average measurement: RBW = 1 MHz, VBW = 10Hz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	2004-03-14
HP	Amplifier, Pre	8447E	1937A01057	2004-07-26
HP	Analyzer, Spectrum	8565EC	3946A00131	2004-08-06
ETS	Antenna, Biconical	3110B	9603-2315	2004-01-11
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	2004-09-30
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	2004-08-01
ETS	Antenna, logperiodic	3148	0004-1155	2004-12-14

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

Environmental Conditions

Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Snell Leong on 2005-02-03.

Test Procedure

For the radiated emissions test, both the laptop and all peripheral power cords were connected to the AC floor outlet since the power supply used in the laptop did not provide an accessory power outlet.

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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

Summary of Test Results

According to the data in the table 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:

Antenna PA58:

-4.6 dB at 11490.00 MHz in the **Vertical** polarization, Low Channel.

-5.0 dB at 11570.00 MHz in the **Vertical** polarization, Mid Channel.

-1.9 dB at 11650.00 MHz in the **Vertical** polarization, High Channel.

-0.5 dB at 240.00 MHz in the **Horizontal** polarization, Unintentional Emission.

Antenna DA58:

- 2.3 dB at 11490.00 MHz in the **Horizontal** polarization, Low Channel.
- 3.1 dB at 11570.00 MHz in the **Vertical** polarization, Mid Channel.
- 1.9 dB at 11650.00 MHz in the **Horizontal** polarization, High Channel.
- 6.0 dB at 300.00 MHz in the **Horizontal** polarization, Unintentional Emission.

Antenna GD58:

- 3.3 dB at 11490.00 MHz in the **Horizontal** polarization, Low Channel.
- 3.1 dB at 11570.00 MHz in the **Vertical** polarization, Mid Channel.
- 2.2 dB at 11650.00 MHz in the **Vertical** polarization, High Channel.
- 7.2 dB at 240.00 MHz in the **Horizontal** polarization, Unintentional Emission.

Antenna PA58

Frequency MHz	Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15 Subpart C		
	Ampl. dBμV/m	Direction Degree		Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Comments
Low Channel											
5745.00	82.5	0	1.8	v	34.1	3.4	0.0	120.0			Fund/Peak
5745.00	76.9	0	1.8	h	34.1	3.4	0.0	114.4			Fund/Peak
5745.00	73.2	0	1.8	v	34.1	3.4	0.0	110.7			Fund/Ave
5745.00	67.7	0	1.8	h	34.1	3.4	0.0	105.2			Fund/Ave
11490.00	37.2	0	1.8	v	39.6	5.6	33.0	49.4	54	-4.6	Ave
11490.00	37.2	0	1.8	h	39.6	5.6	33.0	49.4	54	-4.6	Ave
11490.00	48.2	0	1.8	v	39.6	5.6	33.0	60.4	74	-13.6	Peak
11490.00	46.9	0	1.8	h	39.6	5.6	33.0	59.1	74	-14.9	Peak
Middle Channel											
5785.00	79.4	0	1.8	v	34.1	3.4	0.0	116.9			Fund/Peak
5785.00	76.0	0	1.8	h	34.1	3.4	0.0	113.5			Fund/Peak
5785.00	70.0	0	1.8	v	34.1	3.4	0.0	107.5			Fund/Ave
5785.00	67.8	0	1.8	h	34.1	3.4	0.0	105.3			Fund/Ave
11570.00	36.7	0	1.8	v	39.1	5.4	32.2	49.0	54	-5.0	Ave
11570.00	36.4	0	1.8	h	39.1	5.4	32.2	48.7	54	-5.3	Ave
11570.00	48.6	0	1.8	h	39.1	5.4	32.2	60.9	74	-13.1	Peak
11570.00	47.8	0	1.8	v	39.1	5.4	32.2	60.1	74	-13.9	Peak
High Channel											
582.00	75.7	0	1.8	v	34.1	3.4	0.0	113.2			Fund/Peak
5825.00	74.9	0	1.8	h	34.1	3.4	0.0	112.4			Fund/Peak
5825.00	67.2	0	1.8	v	34.1	3.4	0.0	104.7			Fund/Ave
5825.00	65.5	0	1.8	h	34.1	3.4	0.0	103.0			Fund/Ave
11650.00	39.8	0	1.8	v	39.1	5.4	32.2	52.1	54	-1.9	Ave
11650.00	38.3	0	1.8	h	39.1	5.4	32.2	50.6	54	-3.4	Ave
11650.00	50.1	0	1.8	v	39.1	5.4	32.2	62.4	74	-11.6	Peak
11650.00	48.2	0	1.8	h	39.1	5.4	32.2	60.5	74	-13.5	Peak
Unintentional Emission											
240.00	58.43	145	2	H	11.3	3.3	27.5	45.5	46	-0.5	Peak
365.83	51.4	0	1.6	H	14.9	4.1	27.8	42.6	46	-3.4	Peak
240.00	51.87	116	1.6	V	11.3	3.3	27.5	39.0	46	-7.0	Peak
365.83	47.7	0	1.6	V	14.9	4.1	27.8	38.9	46	-7.1	Peak
300.00	42.94	0	1.6	H	13.9	3.6	27.4	33.0	46	-13.0	Peak
300.00	39.3	0	1.3	V	13.9	3.6	27.4	29.4	46	-16.6	Peak

Note:

Note:

- 1) FUND: Fundamental
- 2) AVG: Average

Antenna DA58

Frequency MHz	Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15 Subpart C		
	Ampl. dBμV/m	Direction Degree		Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Comments
Low Channel											
5745.00	100.6	0	3.1	v	34.1	3.4	0.0	138.1			Fund/Peak
5745.00	89.0	0	3.1	h	34.1	3.4	0.0	126.5			Fund/Peak
5745.00	90.4	0	3.1	v	34.1	3.4	0.0	127.9			Fund/Ave
5745.00	78.4	0	3.1	h	34.1	3.4	0.0	115.9			Fund/Ave
11490.00	39.5	0	3.1	h	39.6	5.6	33.0	51.7	54	-2.3	Ave
11490.00	38.0	0	3.1	v	39.6	5.6	33.0	50.2	54	-3.8	Ave
11490.00	48.8	0	3.1	v	39.6	5.6	33.0	61.0	74	-13.0	Peak
11490.00	48.7	0	3.1	h	39.6	5.6	33.0	60.9	74	-13.1	Peak
Middle Channel											
5785.00	99.2	0	3.1	v	34.1	3.4	0.0	136.7			Fund/Peak
5785.00	88.1	0	3.1	h	34.1	3.4	0.0	125.6			Fund/Peak
5785.00	88.2	0	3.1	v	34.1	3.4	0.0	125.7			Fund/Ave
5785.00	77.1	0	3.1	h	34.1	3.4	0.0	114.6			Fund/Ave
11570.00	38.6	0	3.1	v	39.1	5.4	32.2	50.9	54	-3.1	Ave
11570.00	38.2	0	3.1	h	39.1	5.4	32.2	50.5	54	-3.5	Ave
11570.00	48.0	0	3.1	h	39.1	5.4	32.2	60.3	74	-13.7	Peak
11570.00	47.9	0	3.1	v	39.1	5.4	32.2	60.2	74	-13.8	Peak
High Channel											
5825.00	98.0	0	3.1	v	34.1	3.4	0.0	135.5			Fund/Peak
5825.00	87.2	0	3.1	h	34.1	3.4	0.0	124.7			Fund/Peak
5825.00	87.6	0	3.1	v	34.1	3.4	0.0	125.1			Fund/Ave
5825.00	76.4	0	3.1	h	34.1	3.4	0.0	113.9			Fund/Ave
11650.00	39.8	0	3.1	h	39.1	5.4	32.2	52.1	54	-1.9	Ave
11650.00	39.3	0	3.1	v	39.1	5.4	32.2	51.6	54	-2.4	Ave
11650.00	48.7	0	3.1	v	39.1	5.4	32.2	61.0	74	-13.0	Peak
11650.00	48.5	0	3.1	h	39.1	5.4	32.2	60.8	74	-13.2	Peak
Unintentional Emission											
300.00	49.9	340	1	H	13.9	3.6	27.4	40.0	46	-6.0	Peak
240.00	52.6	180	2.4	H	11.3	3.3	27.5	39.7	46	-6.3	Peak
365.83	46.2	330	2	H	14.9	4.1	27.8	37.4	46	-8.6	Peak
365.83	44.5	320	2.7	V	14.9	4.1	27.8	35.7	46	-10.3	Peak
300.00	44.6	180	1.7	V	13.9	3.6	27.4	34.7	46	-11.3	Peak
240.00	47.5	45	1.8	V	11.3	3.3	27.5	34.6	46	-11.4	Peak

Note:

Note:

- 1) FUND: Fundamental
- 2) AVG: Average

Antenna GD58

Frequency MHz	Indicated		Antenna Height Meter	Antenna		Correction Factor			FCC 15 Subpart C		
	Ampl. dB μ V/m	Direction Degree		Polar H/V	Antenna dB	Cable Loss dB	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB	Comments
Low Channel											
5745.00	93.3	0	3.1	v	34.1	3.4	0.0	130.8			Fund/Peak
5745.00	73.8	0	3.1	h	34.1	3.4	0.0	111.3			Fund/Peak
5745.00	83.9	0	3.1	v	34.1	3.4	0.0	121.4			Fund/Ave
5745.00	63.7	0	3.1	h	34.1	3.4	0.0	101.2			Fund/Ave
11490.00	38.5	0	3.1	h	39.6	5.6	33.0	50.7	54	-3.3	Ave
11490.00	37.5	0	3.1	v	39.6	5.6	33.0	49.7	54	-4.3	Ave
11490.00	47.1	0	3.1	v	39.6	5.6	33.0	59.3	74	-14.7	Peak
11490.00	46.4	0	3.1	h	39.6	5.6	33.0	58.6	74	-15.4	Peak
Middle Channel											
5785.00	89.1	0	3.1	v	34.1	3.4	0.0	126.6			Fund/Peak
5785.00	71.0	0	3.1	h	34.1	3.4	0.0	108.5			Fund/Peak
5785.00	81.6	0	3.1	v	34.1	3.4	0.0	119.1			Fund/Ave
5785.00	60.0	0	3.1	h	34.1	3.4	0.0	97.5			Fund/Ave
11570.00	38.6	0	3.1	v	39.1	5.4	32.2	50.9	54	-3.1	Ave
11570.00	38.1	0	3.1	h	39.1	5.4	32.2	50.4	54	-3.6	Ave
11570.00	48.1	0	3.1	h	39.1	5.4	32.2	60.4	74	-13.6	Peak
11570.00	47.5	0	3.1	v	39.1	5.4	32.2	59.8	74	-14.2	Peak
High Channel											
5825.00	88.7	0	3.1	v	34.1	3.4	0.0	126.2			Fund/Peak
5825.00	69.5	0	3.1	h	34.1	3.4	0.0	107.0			Fund/Peak
5825.00	79.8	0	3.1	v	34.1	3.4	0.0	117.3			Fund/Ave
5825.00	59.0	0	3.1	h	34.1	3.4	0.0	96.5			Fund/Ave
11650.00	39.5	0	3.1	v	39.1	5.4	32.2	51.8	54	-2.2	Ave
11650.00	39.2	0	3.1	h	39.1	5.4	32.2	51.5	54	-2.5	Ave
11650.00	48.6	0	3.1	h	39.1	5.4	32.2	60.9	74	-13.1	Peak
11650.00	48.5	0	3.1	v	39.1	5.4	32.2	60.8	74	-13.2	Peak
Unintentional Emission											
240.00	51.75	180	2.4	H	11.3	3.3	27.5	38.9	46	-7.2	Peak
300.00	48.1	340	1	H	13.9	3.6	27.4	38.2	46	-7.8	Peak
365.83	45.06	330	2	H	14.9	4.1	27.8	36.3	46	-9.7	Peak
365.83	43.9	320	2.7	V	14.9	4.1	27.8	35.1	46	-10.9	Peak
240.00	46.17	45	1.8	V	11.3	3.3	27.5	33.3	46	-12.7	Peak
300.00	42.1	180	1.7	V	13.9	3.6	27.4	32.2	46	-13.8	Peak

Note:

Note:

- 1) FUND: Fundamental
- 2) AVG: Average

§2.1051 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Standard Applicable

Requirements: CFR 47, § 2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency or to 40GHz whichever is lower as specified in § 2.1057.

Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. 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 40GHz.

Equipment Lists

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-10-04
HP	Plotter	HP7470A	2541A49659	Not Required

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

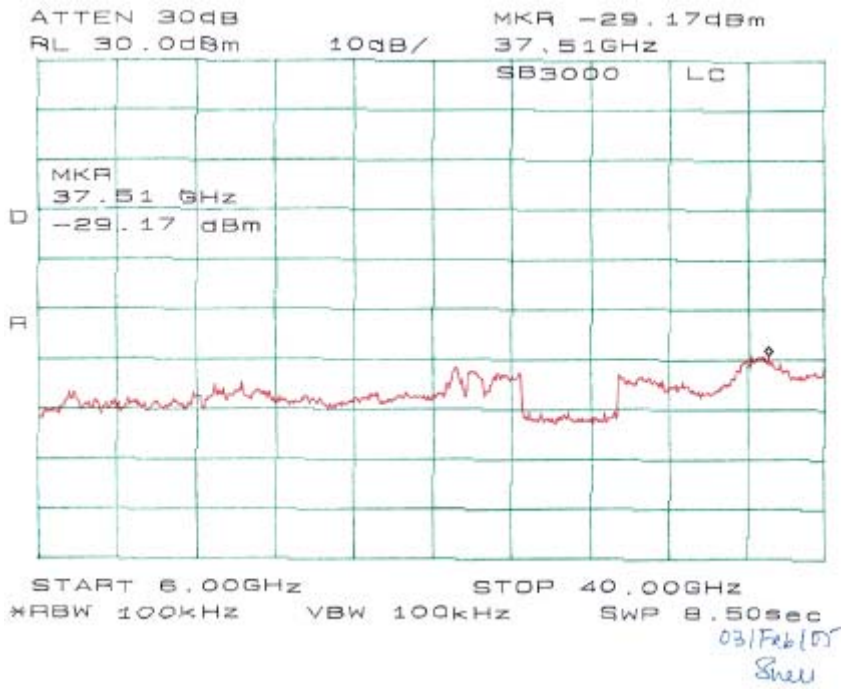
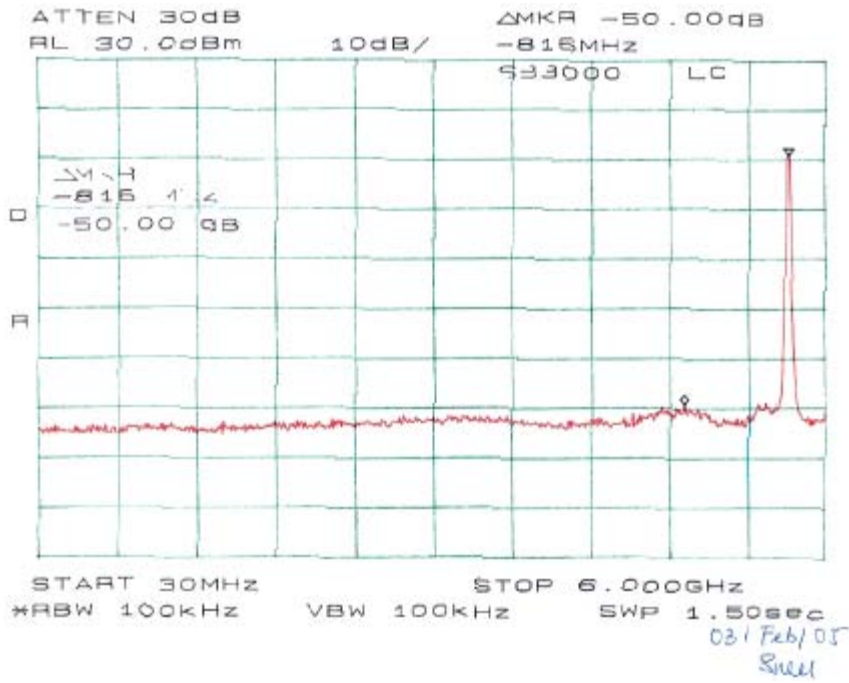
Measurement Result

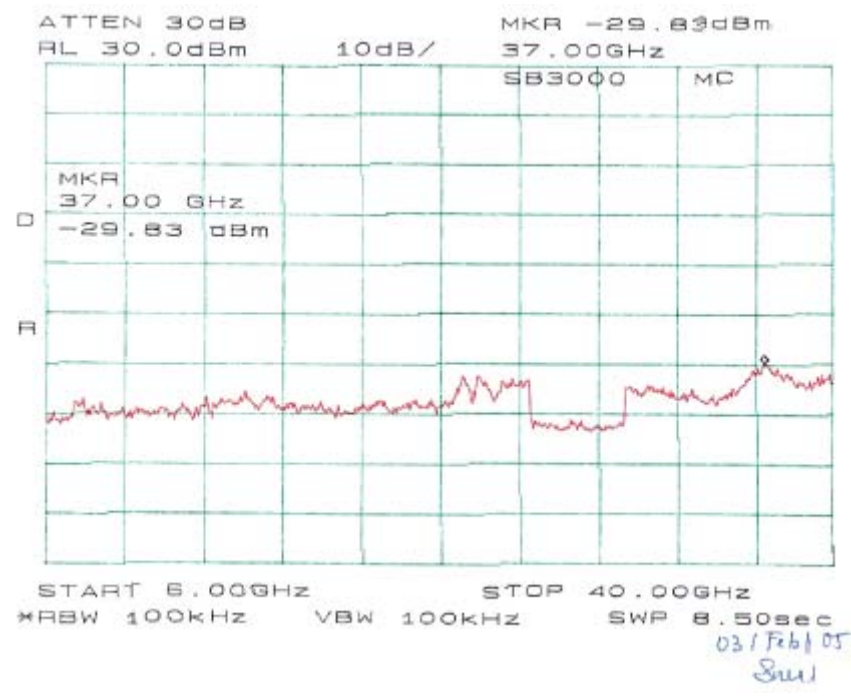
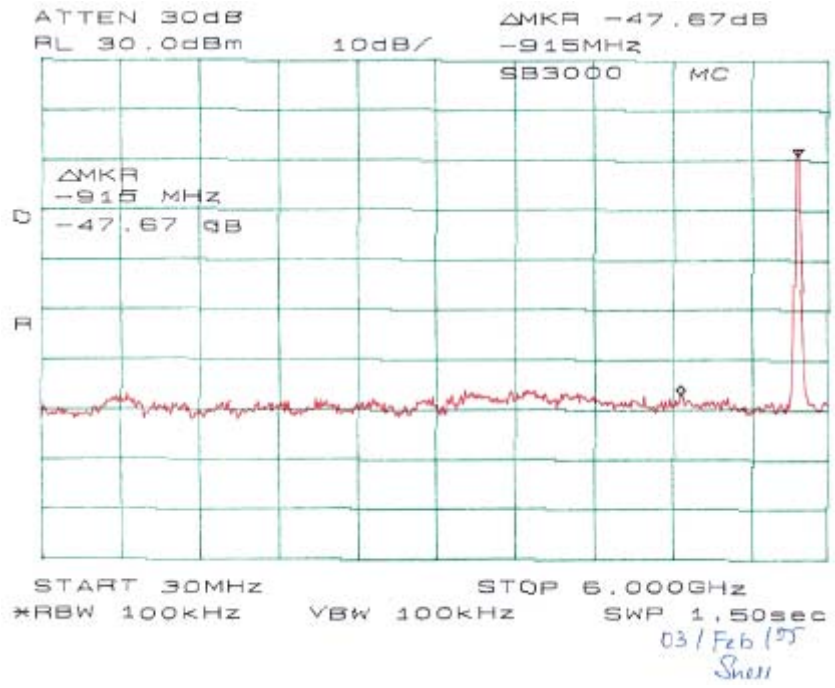
Environmental Conditions

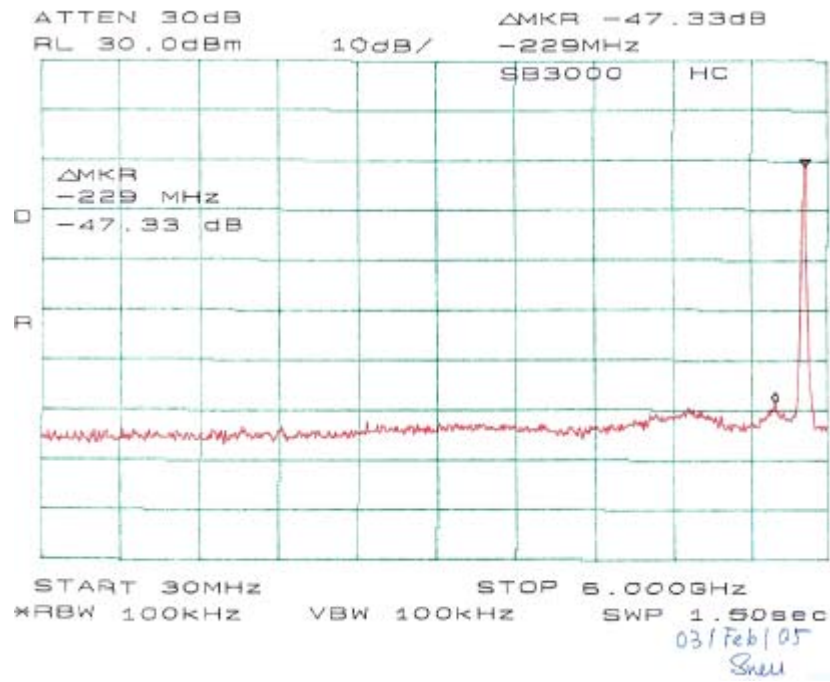
Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Snell Leong on 2005-02-03.

Please refer to following pages for plots of spurious emission.







§15.247(a)(2) – 6 dB BANDWIDTH

Standard Applicable

According to §15.247(a)(2), for direct sequence systems, 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	Model No.	Description	Calibration Date
HP	8565EC	Spectrum Analyzer	2004-08-06

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

Measurement Result

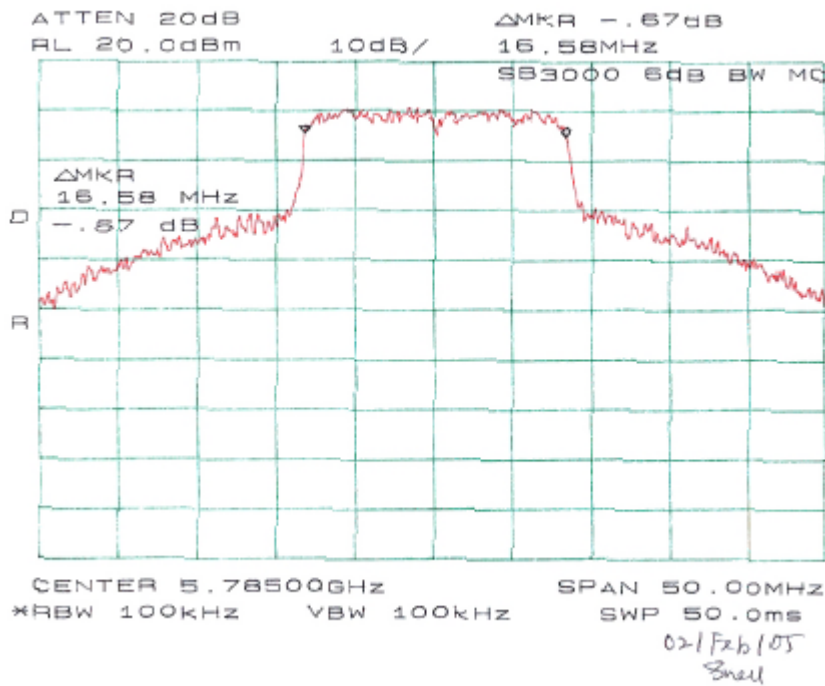
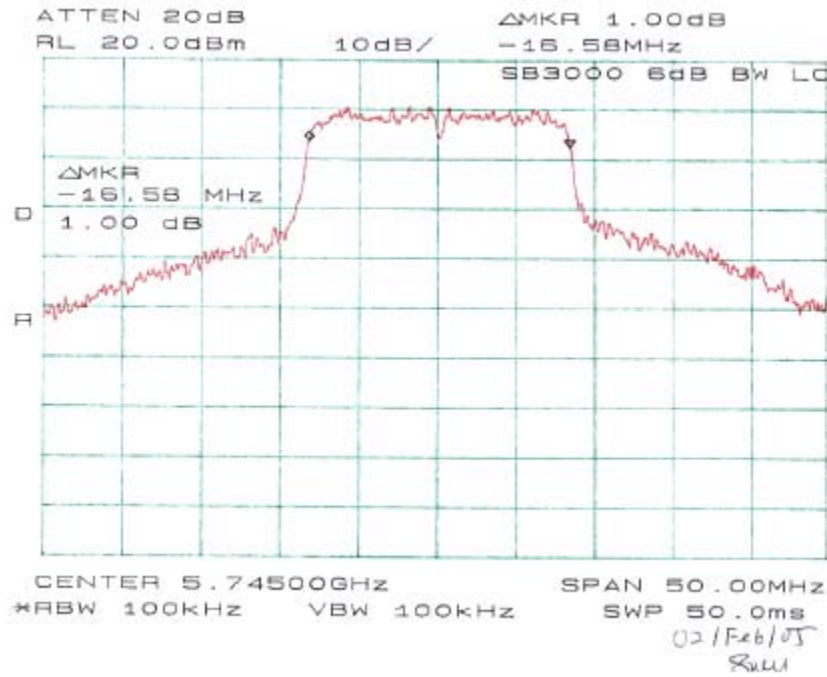
Environmental Conditions

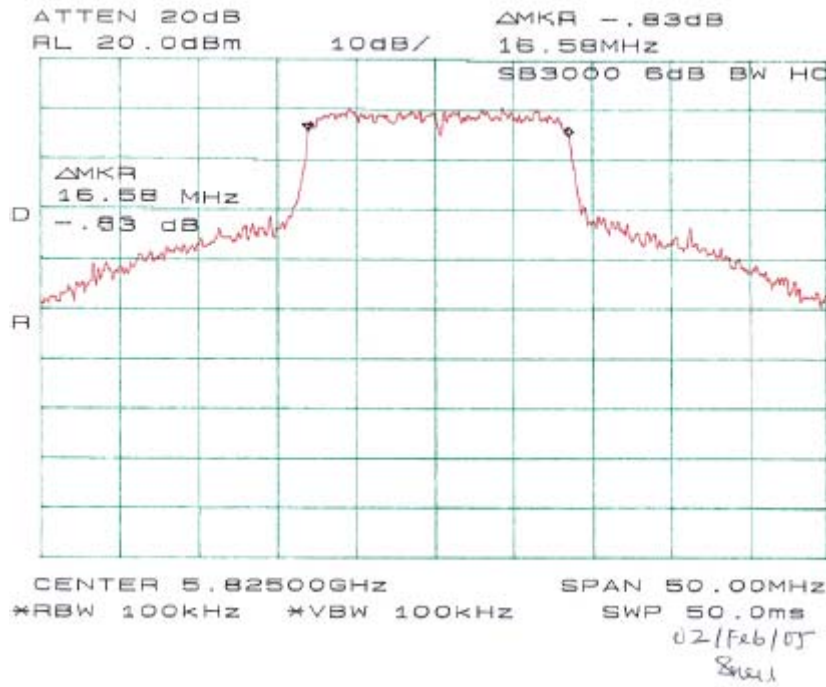
Temperature:	13° C
Relative Humidity:	82%
ATM Pressure:	1018 mbar

The testing was performed by Snell Leong on 2005-02-02.

Test Result

Channel	Frequency (MHz)	Measured (MHz)	Standard (kHz)	Result
Low	5745	16.58 MHz	≥ 500	Compliant
Mid	5785	16.58 MHz	≥ 500	Compliant
High	5825	16.58 MHz	≥ 500	Compliant





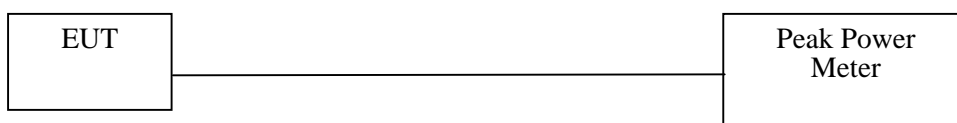
§15.247(b)(3) - PEAK OUTPUT POWER MEASUREMENT

Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz & 5725 – 5850MHz: 1 Watt

Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the UFL port of EUT to a Peak Power Meter.



Equipment Lists

Manufacturer	Model No.	Description	Calibration Date
HP	432A	Peak Power Meter	2004-09-26

* **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:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Snell Leong on 2005-02-03.

Channel	Frequency MHz	Max Peak Output Power DBm	Limit dBm	Result
Low	5745	22.87	30	pass
Mid	5785	23.05	30	pass
High	5825	22.80	30	pass

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

Standard Applicable

According to §15.247(c), 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	Model No.	Description	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-10-04

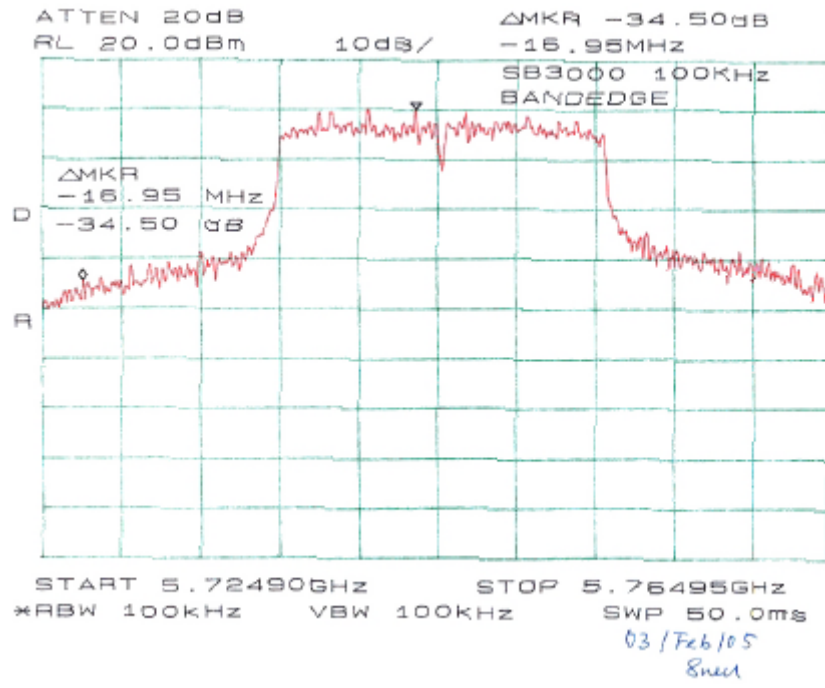
* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Measure Results

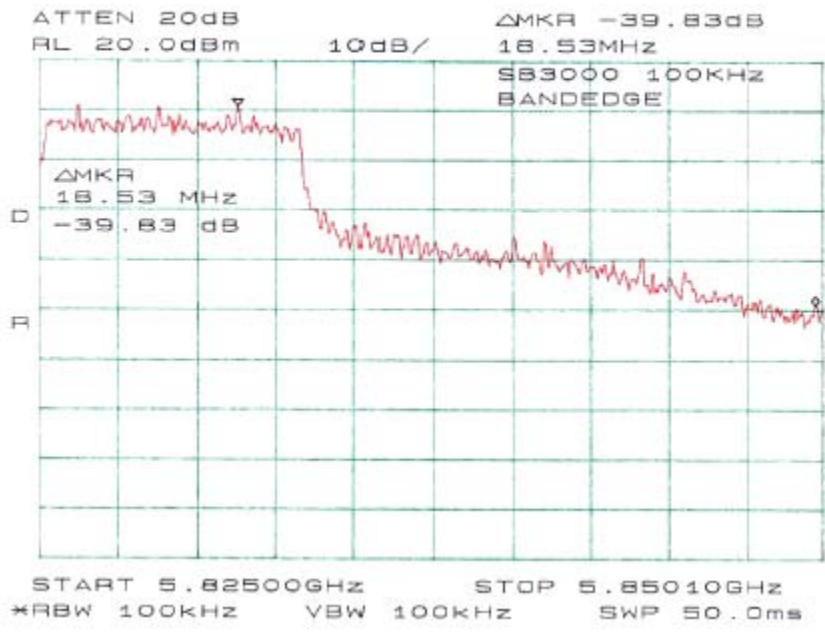
Environmental Conditions

Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Snell Leong on 2005-02-03.



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§15.247(d) - POWER SPECTRAL DENSITY

Standard Applicable

According to §15.247 (d), 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. 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 1MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

Equipment Lists

Manufacturer	Model No.	Description	Calibration Date
Agilent	8564E	Spectrum Analyzer	2004-10-04

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

Measurement Results

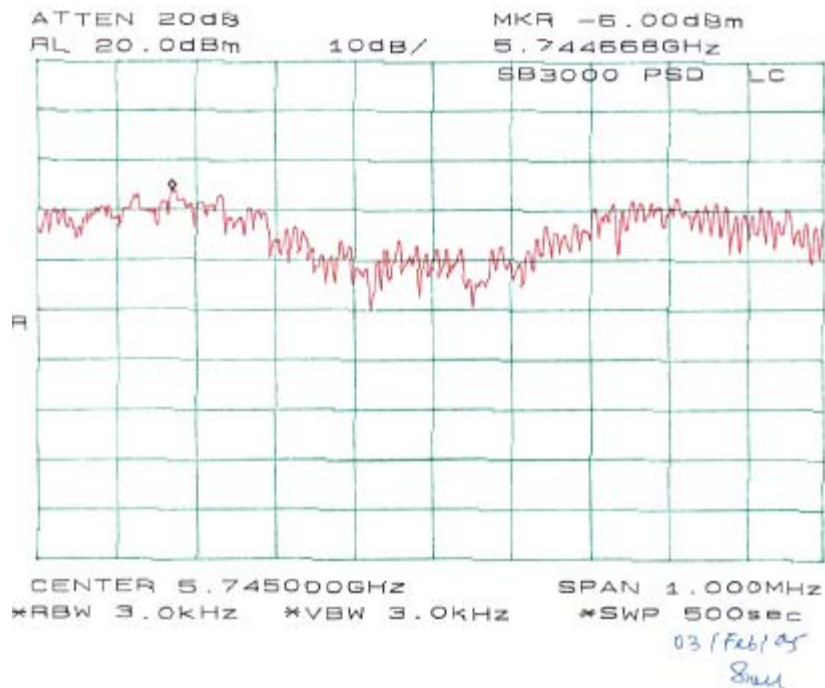
Environmental Conditions

Temperature:	16° C
Relative Humidity:	85%
ATM Pressure:	1016 mbar

The testing was performed by Snell Leong on 2005-02-03.

Test Result

Channel	Frequency (MHz)	Peak Power Spectral Density (dBm)	Standard (dBm)	Result
Low	5745	-6.00	≤ 8	Compliant
Mid	5785	-6.17	≤ 8	Compliant
High	5825	-4.67	≤ 8	Compliant



Sheet

