FCC PART 15 SUBPART C

EMI MEASUREMENT AND TEST REPORT

For

smartBridges Pte Ltd

745 Toa Payoh Lorong 5, #04-01 HBM Building
Singapore 319455

FCC ID: PWGAIRPOINTPRO

2003-10-06

This Report Concerns:	**Equipment Type:**
☒ Permissive Report	AirBridge TOTAL, airPointPRO TOTAL

Test Engineer:	Ling Zhang /
Report No.:	R0309153
Test Date:	2003-09-23
Reviewed By:	Ming Jing /
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The s*martBridges Pte Ltd'*s product, FCC ID: PWGAIRPOINTPRO or the "EUT" as referred to in this report is a wireless client device (airBridge TOTAL), wireless access point (airPointPRO TOTAL). The EUT is measured approximately 7" L x 7" W x 2.45" H and confirming to IEEE 802.11b specification.

** The test data gather is from typical production samples provided by the manufacturer*

1.2 Objective

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

The objective of the manufacturer is to demonstrate compliance with FCC rules of Antenna Requirements, conducted emission, and Spurious Radiated Emission for following permissive II change application.

The circuit and PCB of these units are identical to airPointPRO (FCC ID:AIRPOINTPRO) which is granted on 2002-04-30. The differences are as following:

1. The PCB is housed in a weatherproof NEMA 4 rated Plastic Housing and has a 13 dBi antenna connected integrally to one RF port . The second RF port is terminated on an N Type connector mounted on the cabinet through an internal RF cable which enables external antenna connection. In airPoint PRO both these ports were terminated on two SMA connectors mounted on the cabinet.
2. A resistor R 401 180 Ohms, 5%, 20 W, is connected between DC power supply input and ground.
3. Reset switch SW 201 is located inside powerShot provided.
4. 12 V Power supply is provided through Ethernet cable (POE, GND IN) instead of power Jack CN 203
5. RJ 45 connector CN 201 is removed from main PCB and placed inside a weatherproof connector and is joined to the main PCB by CAT 5 cable.

All the changes done are only in power and Ethernet connections. No changes in the radio portion of the circuit (please refer to revised schematics diagram and internal photos). In addition, the EUT is also seeking approval for the following internal antenna and external antennas:

Internal Antenna:

PACIFIC WIRELESS ANTENNAS:

1. PAWPM24-13a, 13 dBi Integral Panel Antenna

External Antennas:

PACIFIC WIRELESS ANTENNAS:

1. PMANT 15 15 dBi Parabolic Grid Antenna
2. PMANT 19 19 dBi Parabolic Grid Antenna
3. PMANT 21 21 dBi Parabolic Grid Antenna
4. PAWSA 24 – 12 12 dBi 90 Deg Sector Antenna
5. PAWSA 24 – 16 16.5 dBi 90 Deg Sector Antenna
6. PMANT 25 24 dBi Parabolic Grid Antenna

MAX RAD ANTENNA:

1.WISP24018PTNF – 18 dBi Panel Antenna17

According to TCB training note for multiple antennas, test the highest gain of each type. Therefore only the following antennas were tested in this permissive change application.

PAWSA 24 – 16 16.5 dBi 90 Deg Sector Antenna
PMANT 25 24 dBi Parabolic Grid Antenna
WISP24018PTNF – 18 dBi Panel Antenna17

1.3 Related Submittal(s)/Grant(s)

This Class II Permissive Change is for the original grant of 2002-04-30. Please refer to BACL report, R0203252.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –2001, 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 Corporation. The radiated testing was performed at an antenna-to-EUT distance of 3 Meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation 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 Bay Area Compliance Laboratory Corporation 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 C63.4-2001.

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, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2517A01610	2003-10-30
HP	Spectrum Analyzer	8593A	29190A00242	2004-05-01
HP	Amplifier	8447E	1937A01054	2004-05-01
HP	Quasi-Peak Adapter	85650A	2521A00718	2004-05-01
Com-Power	Biconical Antenna	AB-100	14012	2004-05-01
Com-Power	Log Periodic Antenna	AL-100	16091	2004-05-01
Com-Power	Log Periodic Antenna	AB-900	15049	2004-05-01
Agilent	Spectrum Analyzer (9KHz – 40GHz)	8564E	08303	2004-08-01
Agilent	Spectrum Analyzer (9KHz – 50GHz)	8565EC	06042	2004-05-03
HP	Amplifier (1-26.5GHz)	8449B	3147A00400	2004-03-14
A.H.System	Horn Antenna (700MHz-18GHz)	SAS-200/571	261	2004-05-31

*** Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NIST.

1.7 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
ACER	Notebook PC	SKU-3	N/A	DOC
HP	Printer	2225C	N/A	DOC
SmartBridges	Powershot	SB2820	N/A	DOC

1.8 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Cross serial cable	1.5	Powershot	EUT
Shielded Printer Cable	2.0	Parallel Port/Notebook PC	Printer

1.9 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number	FCC ID
smartBridges	AC Adapter	WA-12A12U	276135009	DOC

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing in a typical fashion (as a normally used by a typical user).

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

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The test software, smartBridge testing software, provided by the customer, is started the Windows 200 terminal program under the Windows 200 operating system. Once loaded, the program sequentially exercises each system component.

2.3 Special Accessories

As shown in section 2.6, all interface cables used for compliance testing are shielded as normally supplied by INMAC and their respective support equipment manufacturers.

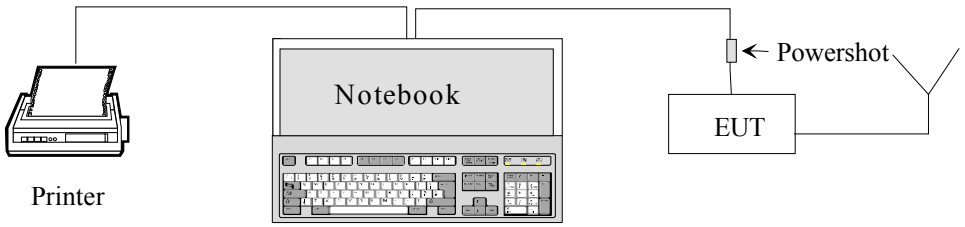
2.4 Schematics / Block Diagram

Appendix A contains a copy of the EUT's schematics diagram as reference.

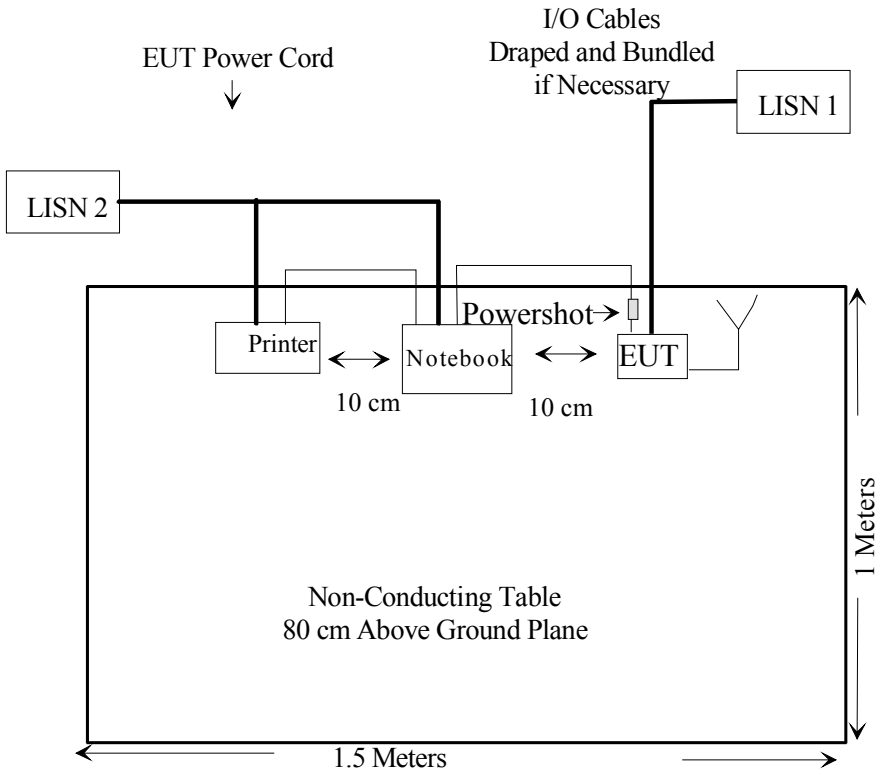
2.5 Equipment Modifications

No modifications were made by BACL Corporation to ensure the EUT to comply with the applicable limits and requirements.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC Rules	Description	Result
§ 2.1091	RF Safety Requirements	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.209 (a)	Radiated Emission	Compliant

4 - 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 maximum gain of antenna used for transmitting is 24 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

5 - RF EXPOSURE

According to §15.247(b)(4) 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 Maximum Permissive Exposure (MPE)

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
1500-15000	/	/	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: 19.98 (dBm)
Maximum peak output power at antenna input terminal: 99.54 (mW)
Prediction distance: 20 (cm)
Predication frequency: 2400 (MHz)

1. PAWSA24-16, 16.5dBi 90 Degree Sector Antenna, Antenna Gain (typical): 16.5 (dBi)
antenna gain: 44.67 (numeric)
Minimum safe distance at predication frequency : 18.81 cm

2. PMANT 25, 24dBi Parabolic Grid Antenna, Antenna Gain (typical): 24 (dBi)
antenna gain: 251.19 (numeric)
Minimum safe distance at predication frequency : 44.61 cm

3. WISP24018PTNF, 18 dBi Panel Antenna, Antenna Gain (typical): 18 (dBi)
antenna gain: 63.10 (numeric)
Minimum safe distance at predication frequency : 39.63 cm

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)

Test Result

The predicted minimum safe distance are as following:

1. PAWSA24-16, 16.5dB 90 Degree Sector Antenna: predicted minimum safe distance is 18.81 cm.
2. PMANT 25, 24dBi Parabolic Grid Antenna: predicted minimum safe distance is 44.61 cm.
3. WISP24018PTNF, 18dBi Panel Antenna: predicted minimum safe distance is 39.63 cm.

6 - SPURIOUS RADIATED EMISSION DATA

6.1 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 BACL is $\pm$4.0 dB.

6.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2001. 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 host PC system was connected with 120Vac/60Hz power source.

6.3 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:

Start Frequency	30 MHz
Stop Frequency	25GHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

6.4 Test Procedure

For the radiated emissions test, the Host PC system and all support equipment power cords were connected to the AC floor outlet since the power supply used in the EUT 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 dBµV of specification limits), and are distinguished with a "**Qp**" in the data table.

6.5 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 -7dBµV means the emission is 7dBµV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

6.6 Summary of Test Results

According to the data in section 11.7, 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:

WISP24018PTNF - 18dBi Panel Antenna, 30 MHz to 25GHz, 3 meter

-5.6 dBµV at 2400.00 MHz in the Horizontal polarization, Low Channel
-12.5 dBµV at 7311.00 MHz in the Vertical polarization, Middle Channel
-12.1 dBµV at 2483.50 MHz in the Vertical polarization, High Channel
-7.5 dBµV at 220.80 MHz in the Vertical polarization, Unwanted Emission

PMANT 25, 24dBi Parabolic Grid Antenna, 30MHz to 25GHz, 3 meters

-5.5 dBµV at 2400.00 MHz in the Vertical polarization, Low Channel
-12.2 dBµV at 7311.00 MHz in the Vertical polarization, Middle Channel
-8.9 dBµV at 2483.50 MHz in the Vertical polarization, High Channel
-6.0 dBµV at 147.15 MHz in the Horizontal polarization, Unwanted Emission

PAWSA24-16, 16.5dBi 90 Deg Sector Antenna, 30MHz to 25GHz, 3 meters

-3.7 dBµV at 2400.00 MHz in the Vertical polarization, Low Channel
-12.2 dBµV at 7311.00 MHz in the Vertical polarization, Middle Channel
-9.0 dBµV at 2483.50 MHz in the Horizontal polarization, High Channel
-6.9 dBµV at 220.10 MHz in the Vertical polarization, Unwanted Emission

PAWPM-13a, 13dBi Integral Antenna, 30MHz to 25GHz, 3 meters

-12.6 dBµV at 7236.00 MHz in the Vertical polarization, Low Channel
-12.6 dBµV at 7311.00 MHz in the Vertical polarization, Middle Channel
-12.5 dBµV at 7386.00 MHz in the Vertical polarization, High Channel
-8.1 dBµV at 145.98 MHz in the Horizontal polarization, Unwanted Emission

6.7 Final Test Result

6.7.1 WISP24018PTNF - 18dBi Panel Antenna, 30MHz to 25GHz

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2412.00	118.2	0	1.5	V	28.1	3.4	35.2	114.5			FUND/ PEAK
2412.00	95.8	0	1.2	H	28.1	3.4	35.2	92.1			FUND/ PEAK
2412.00	113.5	0	1.5	V	28.1	3.4	35.2	109.8			FUND/ AVE
2412.00	90.2	0	1.2	H	28.1	3.4	35.2	86.4			FUND/ AVE
2400.00	70.2	0	1.3	H	28.1	3.4	35.2	66.5	72.1	-5.6	PEAK
2400.00	90.0	0	1.3	V	28.1	3.4	35.2	86.3	94.5	-8.2	PEAK
2390.00	68.8	0	1.3	V	28.1	3.4	35.2	65.1	74.0	-9.0	PEAK
2390.00	45.8	0	1.3	V	28.1	3.4	35.2	42.1	54.0	-12.0	AVE
7236.00	34.3	0	1.4	V	35.1	5.6	33.5	41.6	54.0	-12.4	AVE
7236.00	34.1	0	1.2	H	35.1	5.6	33.5	41.3	54.0	-12.7	AVE
2390.00	43.2	0	1.1	H	28.1	3.4	35.2	39.5	54.0	-14.6	AVE
2390.00	61.5	0	1.1	H	28.1	3.4	35.2	57.8	74.0	-16.3	PEAK
4824.00	32.1	0	1.4	V	32.5	4.9	33.0	36.5	54.0	-17.5	AVE
4824.00	31.6	0	1.2	H	32.5	4.9	33.0	36.0	54.0	-18.0	AVE
2400.00	51.5	0	1.3	H	28.1	3.4	35.2	47.8	66.4	-18.7	AVE
7236.00	46.5	0	1.4	V	35.1	5.6	33.5	53.7	74.0	-20.3	PEAK
7236.00	46.0	0	1.2	H	35.1	5.6	33.5	53.2	74.0	-20.8	PEAK
4824.00	45.3	0	1.4	V	32.5	4.9	33.0	49.7	74.0	-24.3	PEAK
4824.00	44.2	0	1.2	H	32.5	4.9	33.0	48.6	74.0	-25.4	PEAK
2400.00	65.7	0	1.3	V	28.1	3.4	35.2	62.0	89.8	-27.8	AVE
Middle Channel											
2437.00	119.0	0	1.3	V	28.1	3.4	35.2	115.3			FUND/ PEAK
2437.00	96.2	0	1.2	H	28.1	3.4	35.2	92.5			FUND/ PEAK
2437.00	114.3	0	1.3	V	28.1	3.4	35.2	110.6			FUND/ AVE
2437.00	90.5	0	1.2	H	28.1	3.4	35.2	86.8			FUND/ AVE
7311.00	34.3	0	1.3	V	35.1	5.6	33.5	41.5	54.0	-12.5	AVE
7311.00	34.1	0	1.2	H	35.1	5.6	33.5	41.3	54.0	-12.7	AVE
4874.00	31.9	0	1.4	V	32.5	4.9	33.0	36.3	54.0	-17.7	AVE
4874.00	31.6	0	1.4	H	32.5	4.9	33.0	36.0	54.0	-18.0	AVE
7311.00	46.8	0	1.3	V	35.1	5.6	33.5	54.0	74.0	-20.0	PEAK
7311.00	45.7	0	1.2	H	35.1	5.6	33.5	52.9	74.0	-21.1	PEAK
4874.00	44.8	0	1.4	V	32.5	4.9	33.0	49.2	74.0	-24.8	PEAK
4874.00	43.5	0	1.4	H	32.5	4.9	33.0	47.9	74.0	-26.1	PEAK

6.7.1 WISP24018PTNF - 18dBi Panel Antenna, 30MHz to 25GHz (Continued)

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
High Channel											
2462.00	118.1	0	1.4	V	28.1	3.4	35.2	114.4			FUND/ PEAK
2462.00	95.2	0	1.2	H	28.1	3.4	35.2	91.5			FUND/ PEAK
2462.00	113.2	0	1.4	V	28.1	3.4	35.2	109.5			FUND/ AVE
2462.00	90.5	0	1.2	H	28.1	3.4	35.2	86.8			FUND/ AVE
2483.50	65.7	0	1.6	V	28.1	3.4	35.2	61.9	74.0	-12.1	PEAK
7386.00	34.6	0	1.3	V	35.1	5.6	33.5	41.8	54.0	-12.2	AVE
7386.00	34.4	0	1.2	H	35.1	5.6	33.5	41.6	54.0	-12.4	AVE
2483.50	42.5	0	1.6	V	28.1	3.4	35.2	38.8	54.0	-15.3	AVE
4924.00	31.6	0	1.4	V	32.5	4.9	33.0	36.0	54.0	-18.0	AVE
4924.00	31.5	0	1.2	H	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
7386.00	46.3	0	1.3	V	35.1	5.6	33.5	53.6	74.0	-20.4	PEAK
7386.00	45.8	0	1.2	H	35.1	5.6	33.5	53.0	74.0	-21.0	PEAK
2483.50	36.1	0	1.5	H	28.1	3.4	35.2	32.4	54.0	-21.6	AVE
2483.50	55.4	0	1.5	H	28.1	3.4	35.2	51.7	74.0	-22.4	PEAK
4924.00	45.6	0	1.4	V	32.5	4.9	33.0	50.0	74.0	-24.0	PEAK
4924.00	44.3	0	1.2	H	32.5	4.9	33.0	48.7	74.0	-25.3	PEAK
Unintentional Emission, 30 - 1000 MHz											
220.80	49.5	0	1.8	V	11.8	2.2	25.0	38.5	46.0	-7.5	
146.40	45.3	30	1.3	H	12.6	1.7	25.0	34.5	43.5	-9.0	
411.50	42.7	270	1.0	H	16.4	2.6	25.0	36.7	46.0	-9.3	
675.10	36.4	60	1.6	V	21.2	3.2	25.0	35.8	46.0	-10.2	
295.67	43.8	180	1.2	V	13.7	2.3	25.0	34.8	46.0	-11.2	
46.20	37.2	90	1.5	H	11.1	1.1	25.0	24.4	43.5	-19.2	

6.7.2 PMANT25 - 24dBi Parabolic Grid Antenna, 30MHz to 25GHz

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2412.00	122.3	0	1.5	V	28.1	3.4	35.2	118.6			FUND/ PEAK
2412.00	98.2	0	1.4	H	28.1	3.4	35.2	94.4			FUND/ PEAK
2412.00	117.7	0	1.5	V	28.1	3.4	35.2	114.0			FUND/ AVE
2412.00	93.5	0	1.4	H	28.1	3.4	35.2	89.8			FUND/ AVE
2400.00	96.8	0	1.5	V	28.1	3.4	35.2	93.1	98.6	-5.5	PEAK
2400.00	72.0	0	1.4	H	28.1	3.4	35.2	68.3	74.4	-6.2	PEAK
2390.00	70.5	0	1.4	V	28.1	3.4	35.2	66.8	74.0	-7.3	PEAK
2390.00	46.8	0	1.4	V	28.1	3.4	35.2	43.1	54.0	-11.0	AVE
7236.00	34.7	0	1.5	V	35.1	5.6	33.5	41.9	54.0	-12.1	AVE
7236.00	34.5	0	1.3	H	35.1	5.6	33.5	41.7	54.0	-12.3	AVE
2390.00	44.5	0	1.3	H	28.1	3.4	35.2	40.8	54.0	-13.3	AVE
2390.00	63.8	0	1.3	H	28.1	3.4	35.2	60.1	74.0	-13.9	PEAK
4824.00	31.5	0	1.4	V	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
4824.00	31.4	0	1.2	H	32.5	4.9	33.0	35.8	54.0	-18.2	AVE
2400.00	54.3	0	1.4	H	28.1	3.4	35.2	50.6	69.8	-19.2	AVE
7236.00	46.3	0	1.5	V	35.1	5.6	33.5	53.6	74.0	-20.4	PEAK
7236.00	45.7	0	1.3	H	35.1	5.6	33.5	52.9	74.0	-21.1	PEAK
4824.00	45.8	0	1.4	V	32.5	4.9	33.0	50.2	74.0	-23.8	PEAK
4824.00	45.3	0	1.2	H	32.5	4.9	33.0	49.7	74.0	-24.3	PEAK
2400.00	68.4	0	1.5	V	28.1	3.4	35.2	64.7	94.0	-29.3	AVE
Middle Channel											
2437.00	122.5	0	1.4	V	28.1	3.4	35.2	118.8			FUND/ PEAK
2437.00	98.7	0	1.2	H	28.1	3.4	35.2	94.9			FUND/ PEAK
2437.00	118.0	0	1.4	V	28.1	3.4	35.2	114.3			FUND/ AVE
2437.00	93.8	0	1.2	H	28.1	3.4	35.2	90.1			FUND/ AVE
7311.00	34.6	0	1.5	V	35.1	5.6	33.5	41.8	54.0	-12.2	AVE
7311.00	34.4	0	1.2	H	35.1	5.6	33.5	41.6	54.0	-12.4	AVE
4874.00	31.8	0	1.4	V	32.5	4.9	33.0	36.2	54.0	-17.8	AVE
4874.00	31.5	0	1.4	H	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
7311.00	46.5	0	1.5	V	35.1	5.6	33.5	53.7	74.0	-20.3	PEAK
7311.00	44.8	0	1.2	H	35.1	5.6	33.5	52.0	74.0	-22.0	PEAK
4874.00	45.8	0	1.4	V	32.5	4.9	33.0	50.2	74.0	-23.8	PEAK
4874.00	44.3	0	1.4	H	32.5	4.9	33.0	48.7	74.0	-25.3	PEAK

6.7.2 PMANT25 - 24dBi Parabolic Grid Antenna, 30MHz to 25GHz (Continued)

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
High Channel											
2462.00	121.3	0	1.5	V	28.1	3.4	35.2	117.6			FUND/ PEAK
2462.00	97.3	0	1.3	H	28.1	3.4	35.2	93.6			FUND/ PEAK
2462.00	116.5	0	1.5	V	28.1	3.4	35.2	112.8			FUND/ AVE
2462.00	92.6	0	1.3	H	28.1	3.4	35.2	88.9			FUND/ AVE
2483.50	68.9	0	1.4	V	28.1	3.4	35.2	65.2	74.0	-8.9	PEAK
7386.00	34.7	0	1.5	V	35.1	5.6	33.5	41.9	54.0	-12.1	AVE
7386.00	34.5	0	1.4	H	35.1	5.6	33.5	41.7	54.0	-12.3	AVE
2483.50	44.1	0	1.4	V	28.1	3.4	35.2	40.4	54.0	-13.7	AVE
4924.00	31.5	0	1.6	V	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
4924.00	31.5	0	1.4	H	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
2483.50	38.5	0	1.3	H	28.1	3.4	35.2	34.8	54.0	-19.3	AVE
7386.00	46.5	0	1.4	H	35.1	5.6	33.5	53.7	74.0	-20.3	PEAK
2483.50	57.5	0	1.3	H	28.1	3.4	35.2	53.8	74.0	-20.3	PEAK
7386.00	46.3	0	1.5	V	35.1	5.6	33.5	53.5	74.0	-20.5	PEAK
4924.00	45.5	0	1.6	V	32.5	4.9	33.0	49.9	74.0	-24.1	PEAK
4924.00	45.0	0	1.4	H	32.5	4.9	33.0	49.4	74.0	-24.6	PEAK
Unintentional Emission, 30 - 1000 MHz											
147.15	48.3	0	1.5	H	12.6	1.7	25.0	37.5	43.5	-6.0	
219.67	49.2	0	2.0	V	11.9	2.2	25.0	38.3	46.0	-7.7	
411.50	43.0	220	1.0	H	16.4	2.6	25.0	37.0	46.0	-9.0	
296.10	45.5	150	1.0	V	13.7	2.3	25.0	36.5	46.0	-9.5	
675.25	35.6	90	1.8	V	21.2	3.2	25.0	35.0	46.0	-11.0	
46.33	40.5	270	1.2	H	11.1	1.1	25.0	27.7	43.5	-15.9	

6.7.3 PAWSA24 – 16, 16.5dBi 90 Deg Sector Antenna, 30MHz to 25GHz

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2412.00	92.2	0	1.6	V	28.1	3.4	35.2	88.4			FUND/ PEAK
2412.00	117.8	0	1.8	H	28.1	3.4	35.2	114.1			FUND/ PEAK
2412.00	87.3	0	1.6	V	28.1	3.4	35.2	83.6			FUND/ AVE
2412.00	113.2	0	1.8	H	28.1	3.4	35.2	109.5			FUND/ AVE
2400.00	68.5	15	1.6	V	28.1	3.4	35.2	64.8	68.4	-3.7	PEAK
2390.00	70.5	100	1.8	H	28.1	3.4	35.2	66.8	74.0	-7.3	PEAK
2400.00	88.2	90	1.7	H	28.1	3.4	35.2	84.4	94.1	-9.7	PEAK
2390.00	66.7	0	1.5	V	28.1	3.4	35.2	63.0	74.0	-11.1	PEAK
7236.00	34.8	0	1.5	V	35.1	5.6	33.5	42.0	54.0	-12.0	AVE
7236.00	34.6	0	1.8	H	35.1	5.6	33.5	41.8	54.0	-12.2	AVE
2390.00	44.3	100	1.8	H	28.1	3.4	35.2	40.6	54.0	-13.5	AVE
4824.00	31.6	0	1.6	V	32.5	4.9	33.0	36.0	54.0	-18.0	AVE
4824.00	31.5	0	1.8	H	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
2400.00	48.7	15	1.6	V	28.1	3.4	35.2	45.0	63.6	-18.6	AVE
2390.00	38.2	0	1.5	V	28.1	3.4	35.2	34.5	54.0	-19.6	AVE
7236.00	46.1	0	1.8	H	35.1	5.6	33.5	53.3	74.0	-20.7	PEAK
7236.00	45.8	0	1.5	V	35.1	5.6	33.5	53.0	74.0	-21.0	PEAK
4824.00	45.1	0	1.6	V	32.5	4.9	33.0	49.5	74.0	-24.5	PEAK
4824.00	44.3	0	1.8	H	32.5	4.9	33.0	48.7	74.0	-25.3	PEAK
2400.00	62.8	90	1.7	H	28.1	3.4	35.2	59.1	89.5	-30.4	AVE
Middle Channel											
2437.00	92.5	0	1.5	V	28.1	3.4	35.2	88.8			FUND/ PEAK
2437.00	117.5	0	1.8	H	28.1	3.4	35.2	113.8			FUND/ PEAK
2437.00	87.3	0	1.5	V	28.1	3.4	35.2	83.6			FUND/ AVE
2437.00	112.8	0	1.8	H	28.1	3.4	35.2	109.1			FUND/ AVE
7311.00	34.6	0	1.6	V	35.1	5.6	33.5	41.8	54.0	-12.2	AVE
7311.00	34.5	0	1.8	H	35.1	5.6	33.5	41.7	54.0	-12.3	AVE
4874.00	31.7	0	1.6	V	32.5	4.9	33.0	36.1	54.0	-17.9	AVE
4874.00	31.6	0	1.8	H	32.5	4.9	33.0	36.0	54.0	-18.0	AVE
7311.00	46.1	0	1.6	V	35.1	5.6	33.5	53.3	74.0	-20.7	PEAK
7311.00	46.0	0	1.8	H	35.1	5.6	33.5	53.2	74.0	-20.8	PEAK
4874.00	46.5	0	1.6	V	32.5	4.9	33.0	50.9	74.0	-23.1	PEAK
4874.00	45.0	0	1.8	H	32.5	4.9	33.0	49.4	74.0	-24.6	PEAK

6.7.3 PAWSA24 – 16, 16.5dBi 90 Deg. Sector Antenna, 30MHz to 25GHz (Continued)

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
High Channel											
2462.00	91.7	0	1.6	V	28.1	3.4	35.2	87.9			FUND/ PEAK
2462.00	116.8	0	1.7	H	28.1	3.4	35.2	113.1			FUND/ PEAK
2462.00	86.5	0	1.6	V	28.1	3.4	35.2	82.8			FUND/ AVE
2462.00	111.7	0	1.7	H	28.1	3.4	35.2	107.9			FUND/ AVE
2483.50	68.8	0	1.8	H	28.1	3.4	35.2	65.1	74.0	-9.0	PEAK
7386.00	34.6	0	1.5	V	35.1	5.6	33.5	41.8	54.0	-12.2	AVE
7386.00	34.5	0	1.8	H	35.1	5.6	33.5	41.7	54.0	-12.3	AVE
2483.50	40.4	0	1.8	H	28.1	3.4	35.2	36.7	54.0	-17.4	AVE
4924.00	31.6	0	1.8	H	32.5	4.9	33.0	36.0	54.0	-18.0	AVE
4924.00	31.5	0	1.6	V	32.5	4.9	33.0	35.9	54.0	-18.1	AVE
7386.00	45.8	0	1.5	V	35.1	5.6	33.5	53.0	74.0	-21.0	PEAK
2483.50	36.7	0	1.6	V	28.1	3.4	35.2	33.0	54.0	-21.1	AVE
7386.00	45.5	0	1.8	H	35.1	5.6	33.5	52.7	74.0	-21.3	PEAK
2483.50	55.6	0	1.6	V	28.1	3.4	35.2	51.9	74.0	-22.2	PEAK
4924.00	44.2	0	1.6	V	32.5	4.9	33.0	48.6	74.0	-25.4	PEAK
4924.00	43.5	0	1.8	H	32.5	4.9	33.0	47.9	74.0	-26.1	PEAK
Unintentional Emission, 30 - 1000 MHz											
220.10	50.1	330	2.0	V	11.8	2.2	25.0	39.1	46.0	-6.9	
147.33	47.2	30	1.8	H	12.6	1.7	25.0	36.4	43.5	-7.1	
412.17	41.8	0	1.5	H	16.4	2.6	25.0	35.8	46.0	-10.2	
677.83	36.2	270	2.0	V	21.2	3.2	25.0	35.6	46.0	-10.4	
296.25	43.5	180	1.4	V	13.7	2.3	25.0	34.5	46.0	-11.5	
46.67	38.7	60	1.5	H	11.1	1.1	25.0	25.8	43.5	-17.7	

6.7.4 PAWPM24-13a, 13 dBi Integral Antenna, 30MHz to 25GHz

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2412.00	114.3	0	1.4	V	28.1	3.4	35.2	110.6			FUND/ PEAK
2412.00	104.3	0	1.3	H	28.1	3.4	35.2	100.6			FUND/ PEAK
2412.00	108.7	0	1.4	V	28.1	3.4	35.2	105.0			FUND/ AVE
2412.00	99.1	0	1.3	H	28.1	3.4	35.2	95.4			FUND/ AVE
7236.00	34.2	0	1.2	V	35.1	5.6	33.5	41.4	54	-12.6	AVE
7236.00	34.2	0	1.3	H	35.1	5.6	33.5	41.4	54	-12.6	AVE
4824.00	31.9	0	1.4	V	32.5	4.9	33.0	36.3	54	-17.7	AVE
4824.00	31.8	0	1.3	H	32.5	4.9	33.0	36.2	54	-17.8	AVE
7236.00	46.5	0	1.2	V	35.1	5.6	33.5	53.7	74	-20.3	PEAK
7236.00	45.7	0	1.3	H	35.1	5.6	33.5	52.9	74	-21.1	PEAK
4824.00	45.5	0	1.4	V	32.5	4.9	33.0	49.9	74	-24.1	PEAK
4824.00	45.1	0	1.3	H	32.5	4.9	33.0	49.5	74	-24.5	PEAK
Middle Channel											
2437.00	114.7	0	1.4	V	28.1	3.4	35.2	110.9			FUND/ PEAK
2437.00	105.5	0	1.3	H	28.1	3.4	35.2	101.8			FUND/ PEAK
2437.00	109.5	0	1.4	V	28.1	3.4	35.2	105.8			FUND/ AVE
2437.00	100.2	0	1.3	H	28.1	3.4	35.2	96.5			FUND/ AVE
7311.00	34.2	0	1.3	V	35.1	5.6	33.5	41.4	54	-12.6	AVE
7311.00	34.0	0	1.5	H	35.1	5.6	33.5	41.2	54	-12.8	AVE
4874.00	31.7	0	1.4	V	32.5	4.9	33.0	36.1	54	-17.9	AVE
4874.00	31.6	0	1.2	H	32.5	4.9	33.0	36.0	54	-18.0	AVE
7311.00	46.2	0	1.5	H	35.1	5.6	33.5	53.4	74	-20.6	PEAK
7311.00	45.8	0	1.3	V	35.1	5.6	33.5	53.0	74	-21.0	PEAK
4874.00	45.7	0	1.4	V	32.5	4.9	33.0	50.1	74	-23.9	PEAK
4874.00	43.3	0	1.2	H	32.5	4.9	33.0	47.7	74	-26.3	PEAK

6.7.4 PAWPM24-13a, 13 dBi Integral Antenna, 30MHz to 25GHz (Continued)

Indicated			Table	Antenna		Correction Factor			FCC Subpart C		
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBµV/m	Degree	Meter	H/V	dBµV/m	dBµV/m	dB	dBµV/m	dBµV/m	dB	
High Channel											
2462.00	114.2	0	1.2	V	28.1	3.4	35.2	110.4			FUND/ PEAK
2462.00	106.7	0	1.3	H	28.1	3.4	35.2	102.9			FUND/ PEAK
2462.00	108.7	0	1.2	V	28.1	3.4	35.2	104.9			FUND/ AVE
2462.00	101.5	0	1.3	H	28.1	3.4	35.2	97.8			FUND/ AVE
7386.00	34.3	0	1.4	V	35.1	5.6	33.5	41.5	54	-12.5	AVE
7386.00	34.2	0	1.2	H	35.1	5.6	33.5	41.4	54	-12.6	AVE
4924.00	31.7	0	1.3	V	32.5	4.9	33.0	36.1	54	-17.9	AVE
4924.00	31.4	0	1.3	H	32.5	4.9	33.0	35.8	54	-18.2	AVE
7386.00	46.2	0	1.4	V	35.1	5.6	33.5	53.4	74	-20.6	PEAK
7386.00	46.0	0	1.2	H	35.1	5.6	33.5	53.2	74	-20.8	PEAK
4924.00	44.8	0	1.3	V	32.5	4.9	33.0	49.2	74	-24.8	PEAK
4924.00	44.5	0	1.3	H	32.5	4.9	33.0	48.9	74	-25.1	PEAK
Unintentional Emission, 30 - 1000 MHz											
145.98	46.2	45	1.5	H	12.6	1.7	25.0	35.4	43.5	-8.1	
221.00	48.8	180	1.6	V	11.8	2.2	25.0	37.8	46	-8.2	
412.10	43.2	250	1.2	H	16.4	2.6	25.0	37.2	46	-8.8	
295.75	44.3	150	1.4	V	13.7	2.3	25.0	35.3	46	-10.7	
675.12	35.8	0	1.8	V	21.2	3.2	25.0	35.2	46	-10.8	
46.50	38.3	0	1.4	H	11.1	1.1	25.0	25.5	43.5	-18.1	

7 - CONDUCTED EMISSIONS TEST DATA

7.1 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 BACL is ±2.4 dB.

7.2 EUT Setup

The measurement was performed in the shield room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was FCC 15 Subpart B limits.

The spacing between the peripherals was 10 centimeters.

Input / Output cables were draped along the edge of the test table and bundle when necessary.

The notebook system was connected with 120Vac/60Hz power source.

7.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

7.4 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**".

7.5 Summary of Test Results

According to the data in section 12.6, the EUT complied with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-2.9 dBμV at **0.360 MHz** in the **Line** mode

7.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.360	45.1	AVG	Line	48	-2.9
0.335	45.1	AVG	Line	49	-3.9
0.380	42.0	AVG	Line	47	-5.0
0.360	44.7	QP	Line	58	-13.3
0.335	45.0	QP	Line	59	-14.0
0.380	41.8	QP	Line	57	-15.2
0.335	32.6	AVG	Neutral	49	-16.4
0.360	27.6	AVG	Neutral	48	-20.4
0.160	43.7	QP	Neutral	65	-21.3
0.160	32.2	AVG	Neutral	55	-22.8
0.335	33.1	QP	Neutral	59	-25.9
0.360	29.8	QP	Neutral	58	-28.2

7.7 Plot of Conducted Emissions Test Data

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

Bay Area Compliance Laboratory Corp 23. Sep 03 11:51
CISPR CLASS B

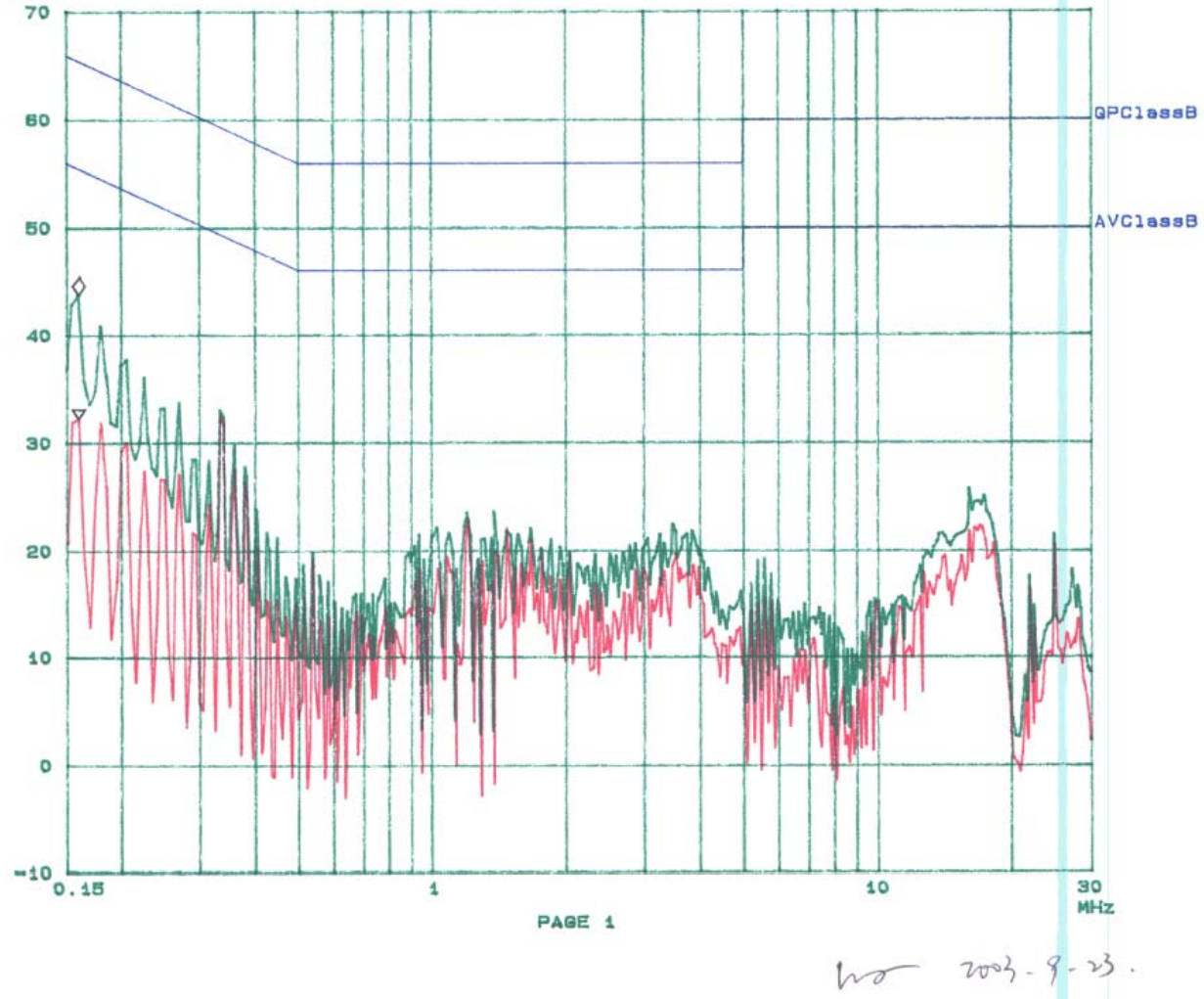
EUT: airBridge TOTAL airPointPRO TOTAL
Manuf: smartBridges
Op Cond: Normal
Operator: LING
Comment: N

Scan Settings (3 Ranges)

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

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB

◊ Mkr : 160.00 kHz 43.7 dBuV
▽ Mkr : 160.00 kHz 32.2 dBuV



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Bay Area Compliance Laboratory Corp 23. Sep 03 13:20
CISPR CLASS B

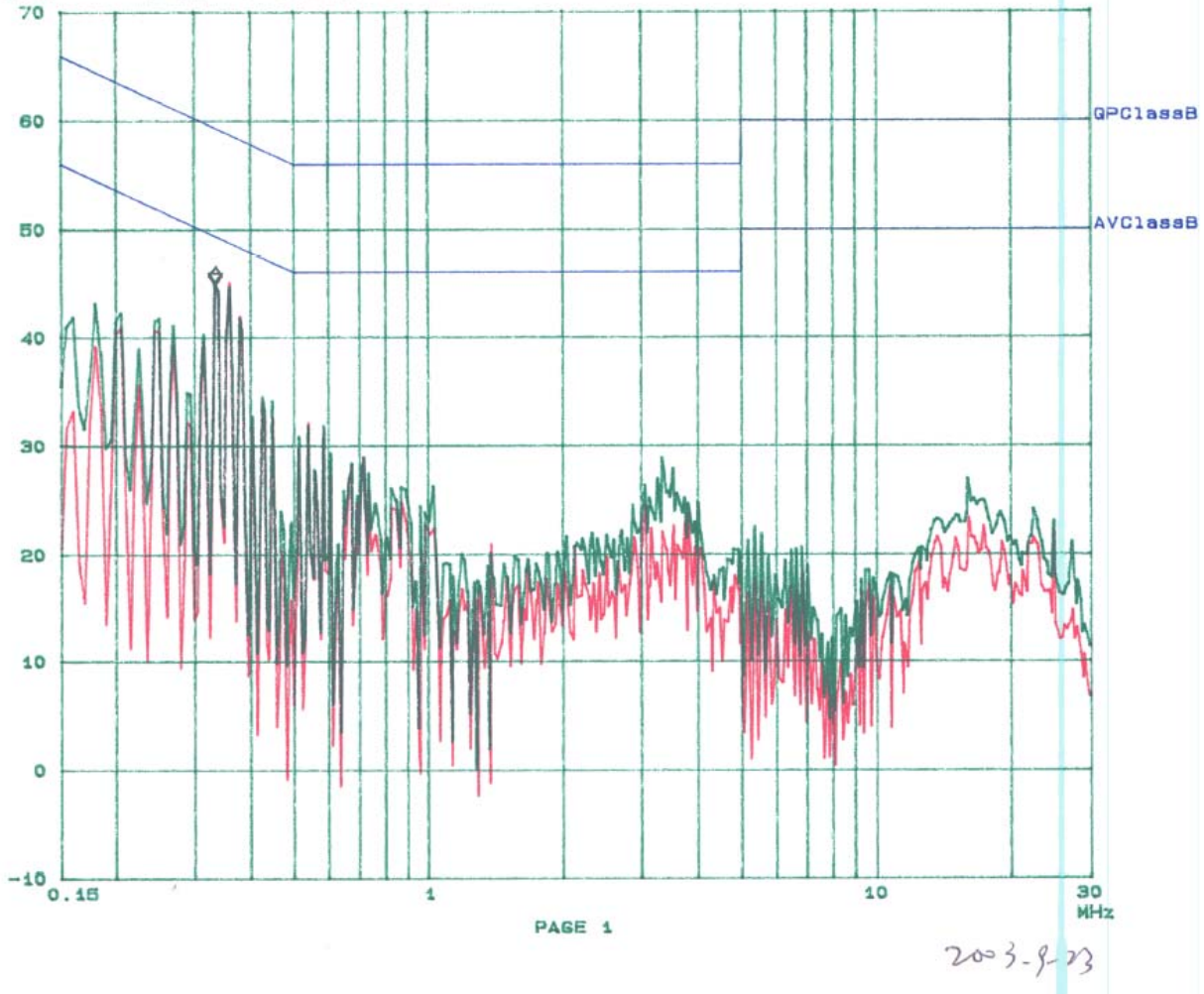
EUT: airBridge TOTAL airPointPRO TOTAL
Manuf: smartBridges
Op Cond: Normal
Operator: LING
Comment: L

Scan Settings (3 Ranges)

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

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB

◊ Mkr : 335.00 kHz 44.9 dBuV
▽ Mkr : 335.00 kHz 45.1 dBuV



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