

***Electromagnetic Emissions Test Report
and
Application for Grant of Equipment Authorization
pursuant to
Industry Canada RSS-Gen Issue 1 / RSS 210 Issue 6
FCC Part 15 Subpart C
on the
Hewlett Packard Company
Transmitter
Model: RSVLD-0602***

UPN: 466F-RSVLD602
FCC ID: B94RSVLD0602

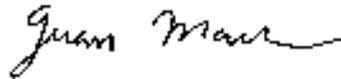
GRANTEE: Hewlett Packard Company
3000 Hanover Street
Palo Alto, CA 94304

TEST SITE: Elliott Laboratories, Inc.
684 W. Maude Ave
Sunnyvale, CA 94086

REPORT DATE: January 9, 2007

REISSUE DATE: January 29, 2007

FINAL TEST DATE: November 27, December 12, December 13,
December 22, 2006 and January 4, 2007



AUTHORIZED SIGNATORY: _____

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2016-01

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REVISION HISTORY

Revision #	Date	Comments	Modified By
1	January 12, 2007	Initial Release	David Guidotti
2	January 29, 2007	Revised to change the listed power	David Guidotti

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SCOPE

An electromagnetic emissions test has been performed on the Hewlett Packard Company model RSVLD-0602 pursuant to the following rules:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003
RSS-212 Issue 1 Test Facilities and Test Methods for Radio Equipment

The intentional radiator above has been tested in a simulated typical installation to demonstrate compliance with the relevant Industry Canada performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the Hewlett Packard Company model RSVLD-0602 and therefore apply only to the tested sample. The sample was selected and prepared by Russ Carlson of Hewlett Packard Company

The report was reissued on January 29, 2007 to revise the listed power.

OBJECTIVE

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Prior to marketing in the USA, all unlicensed transmitters and transceivers require certification. Receive-only devices operating between 30 MHz and 960 MHz are subject to either certification or a manufacturer's declaration of conformity, with all other receive-only devices exempt from the technical requirements.

Prior to marketing in Canada, Class I transmitters, receivers and transceivers require certification. Class II devices are required to meet the appropriate technical requirements but are exempt from certification requirements.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

STATEMENT OF COMPLIANCE

The tested sample of Hewlett Packard Company model RSVLD-0602 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 1
RSS 210 Issue 6 "Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"
FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

TEST RESULTS SUMMARY**FREQUENCY HOPPING SPREAD SPECTRUM (2400 – 2483.5 MHz, 75 channels or more)**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247 (a) (1)	RSS 210 A8.1 (1)	20dB Bandwidth	975 kHz	Channel spacing > 20dB bandwidth	Complies
15.247 (a) (1)	RSS 210 A8.1 (2)	Channel Separation	1060 kHz		Complies
15.247 (a) (1) (iii)	RSS 210 A8.1 (4)	Channel Dwell Time (average time of occupancy)	.4 seconds per 31.6 seconds	<0.4 second within a period of 0.4 x number of channels	Complies
15.247 (a) (1) (iii)	RSS 210 A8.1 (4)	Number of Channels	79	75 or more	Complies
15.247 (a) (1)	RSS 210 A8.1 (1)	Channel Utilization	The system uses the Bluetooth algorithm and, therefore, meets all requirements for channel utilization.	All channels shall, on average, be used equally	Complies
15.247 (b) (3)	RSS 210 A8.4 (2)	Output Power (multipoint systems)	-0.4 dBm (.00091 Watts) EIRP = 0.00145 W ^{Note 1}	1Watt, EIRP limited to 4 Watts.	Complies
15.247(c)	RSS 210 A8.5	Spurious Emissions – 30MHz – 25GHz	All spurious emissions < -20dBc	< -20dBc	Complies
15.247(c) / 15.209	RSS 210 A8.5 Table 2, 3	Radiated Spurious Emissions 30MHz – 25GHz	46.8dBµV/m (218.8µV/m) @ 7322.5MHz	15.207 in restricted bands, all others < -20dBc	Complies (- 7.2 dB)
	RSS 210 A8.1(2)	Receiver bandwidth	Refer to operational description	Shall match the channel bandwidth	Complies

Note 1: EIRP calculated using antenna gain of 2 dBi for the highest EIRP multi-point system.

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antenna is part of the PCB board and cannot be removed		Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	35.2dB μ V/m (57.5 μ V/m) @ 397.621MHz		Complies (- 1.8 dB)
15.207	RSS GEN Table 2	AC Conducted Emissions	53.1dB μ V @ 0.178MHz	Refer to standard	Complies (- 1.5 dB)
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in Exhibit 11, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding non-interference	
	RSP 100 RSS GEN 7.1.5	User Manual		Statement required regarding detachable antenna	

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	0.015 to 30	± 3.0
Radiated Emissions	30 to 1000	± 3.6
Radiated Emissions	1000 to 40000	± 6.0

EQUIPMENT UNDER TEST (EUT) DETAILS**GENERAL**

The Hewlett Packard Company model RSVLD-0602 is a bluetooth module that is designed to be installed in a printer. Since the printer would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.3 Volts.

The sample was received on November 27, 2006 and tested on November 27, December 12, December 13, December 22, 2006 and January 4, 2007. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard Company	RSVLD-0602	Bluetooth module	-	

ANTENNA SYSTEM

The EUT antenna is printed on the PCB. Gain is 2dBi.

ENCLOSURE

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a printer.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with emissions specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	PP01L	Laptop	71K9821	-

No remote support equipment was used during emissions testing.

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB	Laptop USB	Multiwire	Shielded	2.0
Laptop AC Power	AC Mains	Three Wire	Unshielded	1.2
Laptop DC Power	Laptop PS	Two wire	Unshielded	2.0

EUT OPERATION

During emissions testing the EUT was set to transmit continuously on the selected channel in either 8PSK or GFSK modulation.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on November 27, December 12, December 13, December 22, 2006 and January 4, 2007 at the Elliott Laboratories Anechoic Chambers 4 and 5 located at 41039 Boyce Road, Fremont, California Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission.

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003 and RSS 212.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4:2003 and RSS 212. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003 / RSS 212.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

ANTENNAS

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 and RSS 212 specify that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

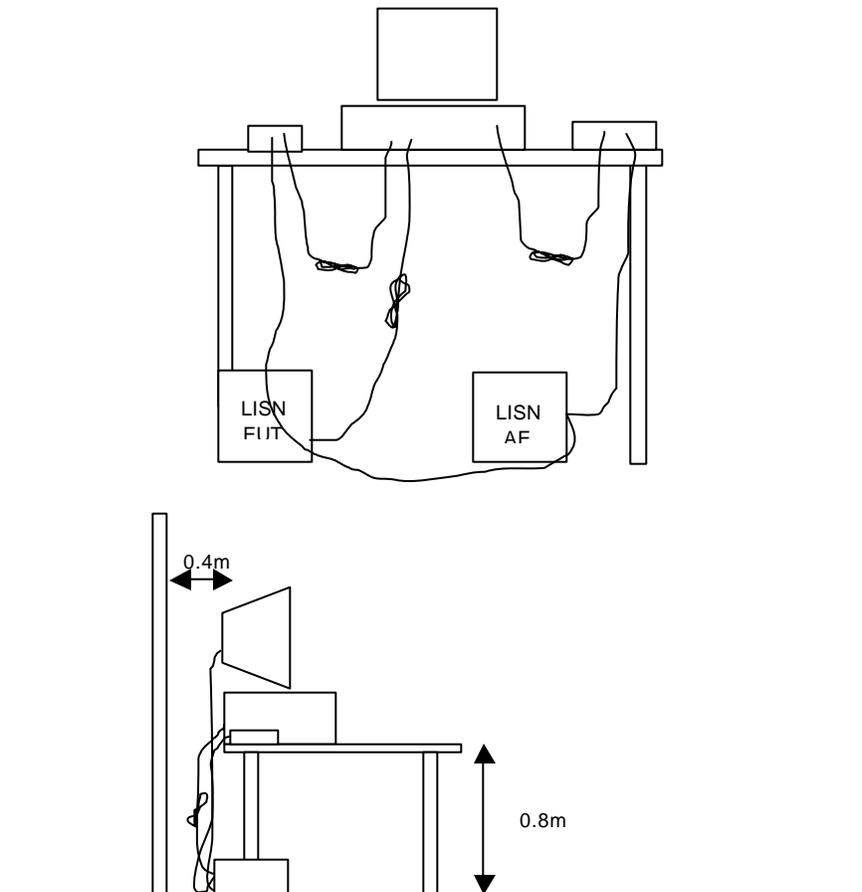
TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

Conducted emissions are measured at the plug end of the power cord supplied with the EUT. Excess power cord length is wrapped in a bundle between 30 and 40 centimeters in length near the center of the cord. Preliminary measurements are made to determine the highest amplitude emission relative to the specification limit for all the modes of operation. Placement of system components and varying of cable positions are performed in each mode. A final peak mode scan is then performed in the position and mode for which the highest emission was noted on all current carrying conductors of the power cord.

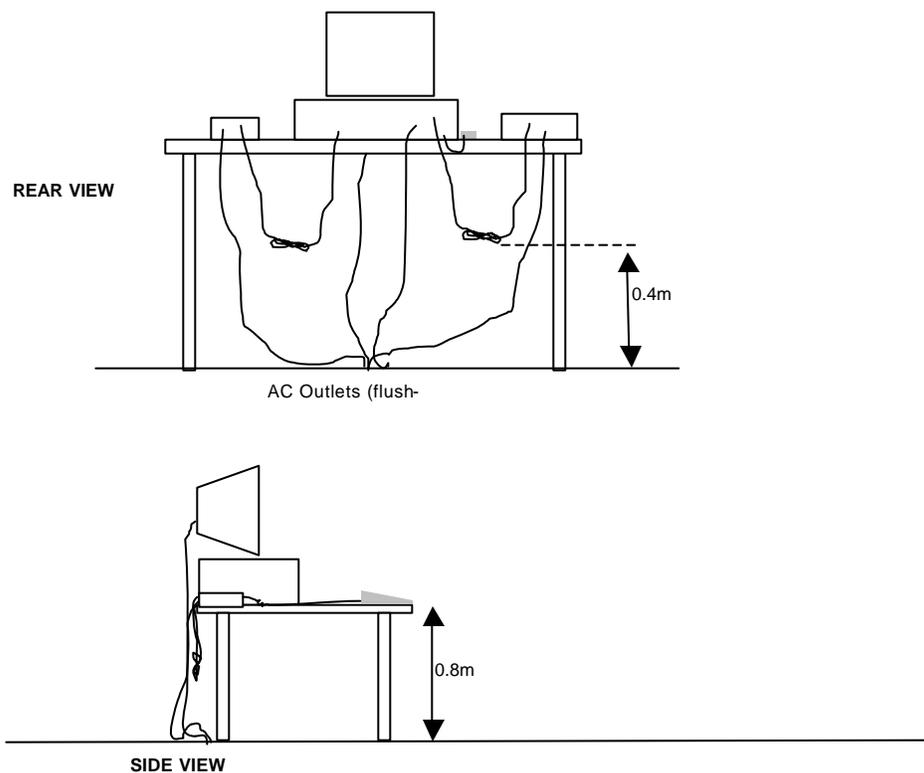


RADIATED EMISSIONS

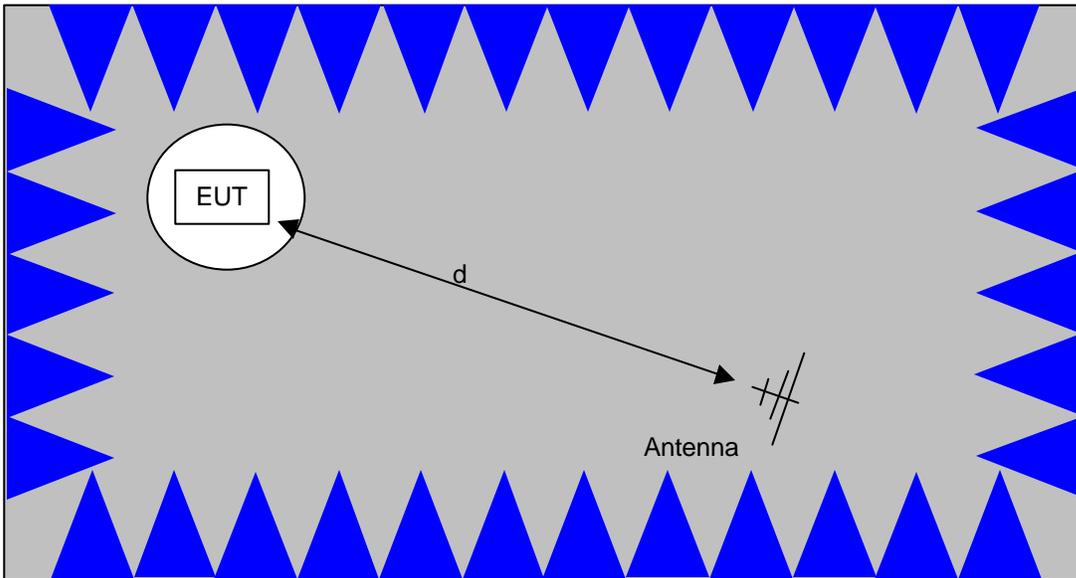
A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

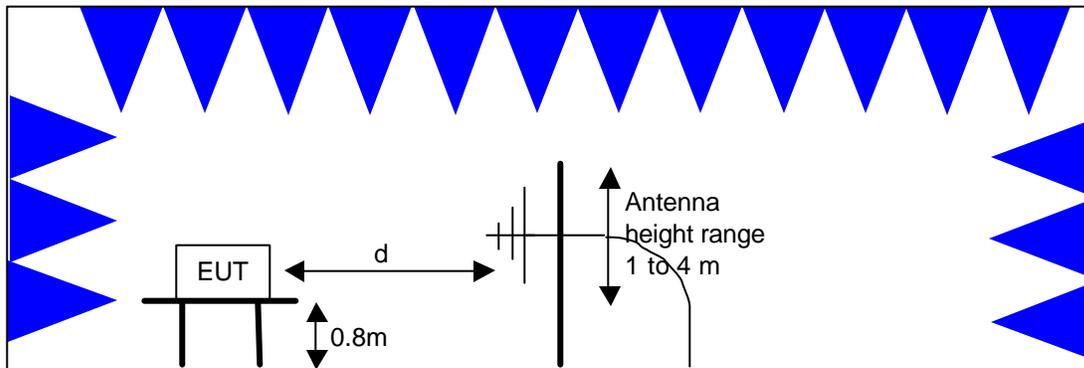


Typical Test Configuration for Radiated Field Strength Measurements



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements
Semi-Anechoic Chamber, Plan and Side Views

BANDWIDTH MEASUREMENTS

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands¹ (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	2400/F _{KHz} @ 300m	67.6-20*log ₁₀ (F _{KHz}) @ 300m
0.490-1.705	24000/F _{KHz} @ 30m	87.6-20*log ₁₀ (F _{KHz}) @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

¹ The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2

RECEIVER RADIATED SPURIOUS EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from receivers as detailed in FCC Part 15.109, RSS 210 Table 2, RSS GEN Table 1 and RSS 310 Table 3. Note that receivers operating outside of the frequency range 30 MHz – 960 MHz are exempt from the requirements of 15.109.

Frequency Range (MHz)	Limit (uV/m @ 3m)	Limit (dBuV/m @ 3m)
30 to 88	100	40
88 to 216	150	43.5
216 to 960	200	46.0
Above 960	500	54.0

OUTPUT POWER LIMITS – DIGITAL TRANSMISSION SYSTEMS

The table below shows the limits for output power and output power density. Where the signal bandwidth is less than 20 MHz the maximum output power is reduced to the power spectral density limit plus 10 times the log of the bandwidth (in MHz).

Operating Frequency (MHz)	Output Power	Power Spectral Density
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

OUTPUT POWER LIMITS – FHSS SYSTEMS

The table below shows the limits for output power based on the number of channels available for the hopping system.

Operating Frequency (MHz)	Number of Channels	Output Power
902 – 928	≥ 50	1 Watt (30 dBm)
902 – 928	25 to 49	0.25 Watts (24 dBm)
2400 – 2483.5	≥ 75	1 Watt (30 dBm)
2400 – 2483.5	< 75	0.125 Watts (21 dBm)
5725 – 5850	75	1 Watt (30 dBm)

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band are not subject to this restriction.

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

The limits for unwanted (spurious) emissions from the transmitter falling in the restricted bands are those specified in the general limits sections of FCC Part 15 and RSS 210. All other unwanted (spurious) emissions shall be at least 20dB below the level of the highest in-band signal level (30dB if the power is measured using the sample detector/power averaging method).

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

Receiver readings are compared directly to the conducted emissions specification limit (decibel form) as follows:

$$R_r - S = M$$

where:

R_r = Receiver Reading in dBuV

S = Specification Limit in dBuV

M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

$$F_d = \text{Distance Factor in dB}$$

$$D_m = \text{Measurement Distance in meters}$$

$$D_s = \text{Specification Distance in meters}$$

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \text{ microvolts per meter}$$

where P is the eirp (Watts)

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 30 - 26,500 MHz, 13-Dec-06

Engineer: Mehran Birgani

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	16-Jan-07
EMCO	Antenna, Horn, 1-18 GHz	3115	487	24-May-08
EMCO	Antenna, Horn, 18-26.5 GHz (SA40)	3160-09 (84125C)	1387	10-Jan-07
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FMT (SA40) Blue	8564E (84125C)	1393	10-Jan-07
Com-Power Corp.	Pre Amplifier, 30-1000 MHz	PA-103	1543	04-Nov-07
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1548	31-Mar-07
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1731	09-Jun-07

EXHIBIT 2: Test Measurement Data

T66411_FCC 40 Pages
AC Conducted Emissions 8 Pages



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	Test-Log Number:	T66411
		Project Manager:	Dean Erikson
Contact:	David Boldy		
Emissions Spec:	-	Class:	-
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Hewlett Packard Company

Model

RSVLD-0602

Date of Last Test: 1/4/2007



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	Test-Log Number:	T66411
		Project Manager:	Dean Erikson
Contact:	David Boldy		
Emissions Spec:	-	Class:	-
Immunity Spec:	-	Environment:	-

EUT INFORMATION

The following information was collected during the test sessions(s).

General Description

The EUT is a bluetooth module that is designed to be installed in a printer. Since the printer would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 3.3 Volts.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	RSVLD-0602	Bluetooth module	-	

Other EUT Details

The following EUT details should be noted: _____

EUT Antenna (Intentional Radiators Only)

The EUT antenna is printed on the PCB. Gain is 2dBi.

EUT Enclosure

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a printer.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
Contact:	David Boldy	Project Manager:	Dean Erikson
Emissions Spec:	-	Class:	-
Immunity Spec:	-	Environment:	-

Test Configuration #1

The following information was collected during the test sessions(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	PP01L	Laptop	71K9821	-
HP	HP Photosmart 8100	Printer	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Printer	AC Mains	Three Wire	Unshielded	2.0
USB	Laptop USB	Multiwire	Shielded	2.0
Laptop AC Power	AC Mains	Three Wire	Unshielded	1.2
Laptop DC Power	Laptop PS	Two wire	Unshielded	2.0

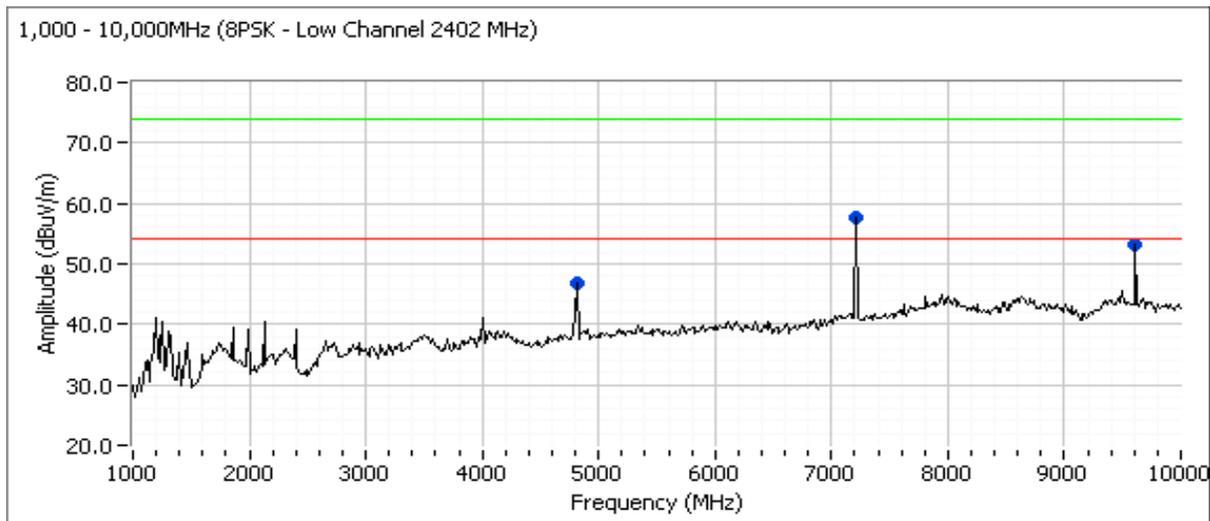
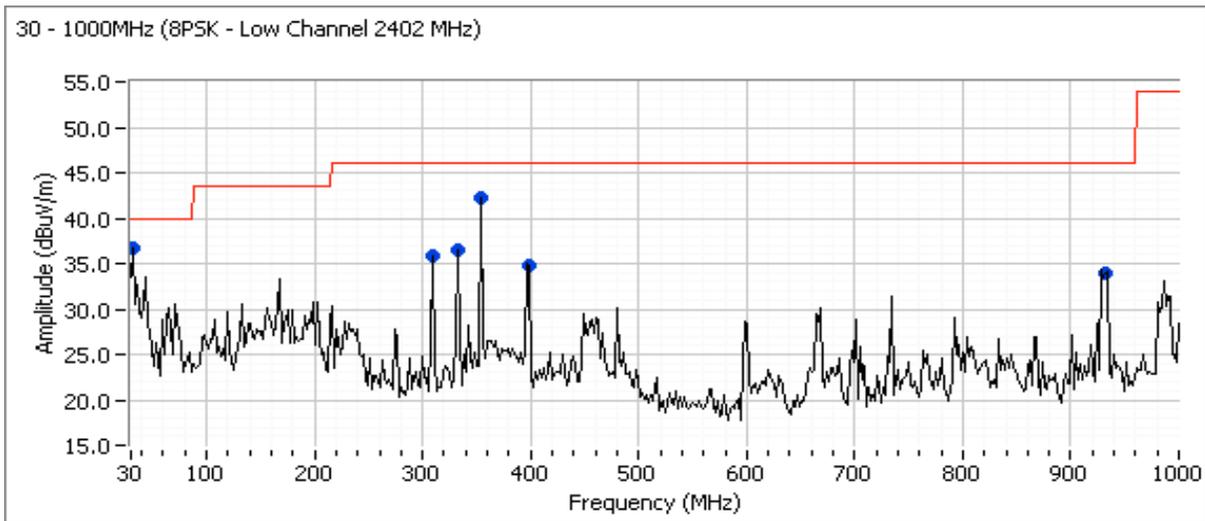
EUT Operation During Emissions Tests

During emissions testing the EUT was set to transmit continuously on the selected channel in either 8PSK or GFSK modulation.

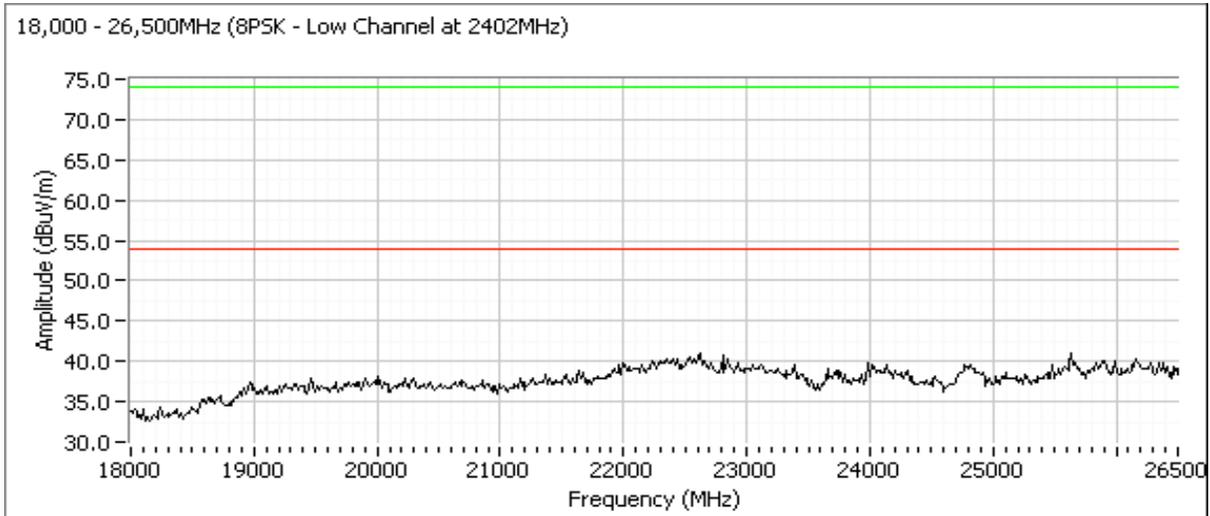
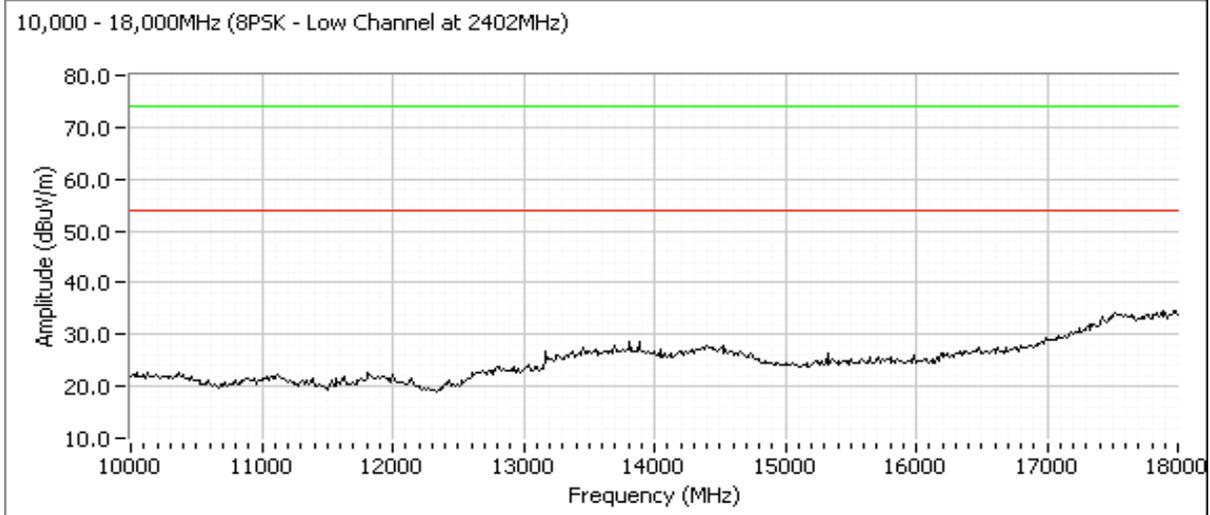
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1: Radiated Spurious Emissions, 30 - 10,000 MHz. Tx Mode, 8PSK Modulation

Run #1a: Low Channel @ 2402 MHz



Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
Contact:	David Boldy	Account Manager:	Dean Erikson
Standard:	-	Class:	N/A

Run #1a: Low Channel @ 2402 MHz

Preliminary Readings

Frequency MHz	Level dB μ V/m	Pol V/H	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
31.944	36.6	V	40.0	-3.4	Peak	196	1.0	
354.629	42.3	H	46.0	-3.7	Peak	81	3.0	
71.663	33.6	H	40.0	-6.4	Peak	274	2.0	
333.246	36.4	H	46.0	-9.6	Peak	9	1.0	
309.920	35.9	H	46.0	-10.1	Peak	81	3.0	
399.339	34.8	H	46.0	-11.2	Peak	124	1.0	
931.964	34.0	H	46.0	-12.0	Peak	110	1.0	

Note 1

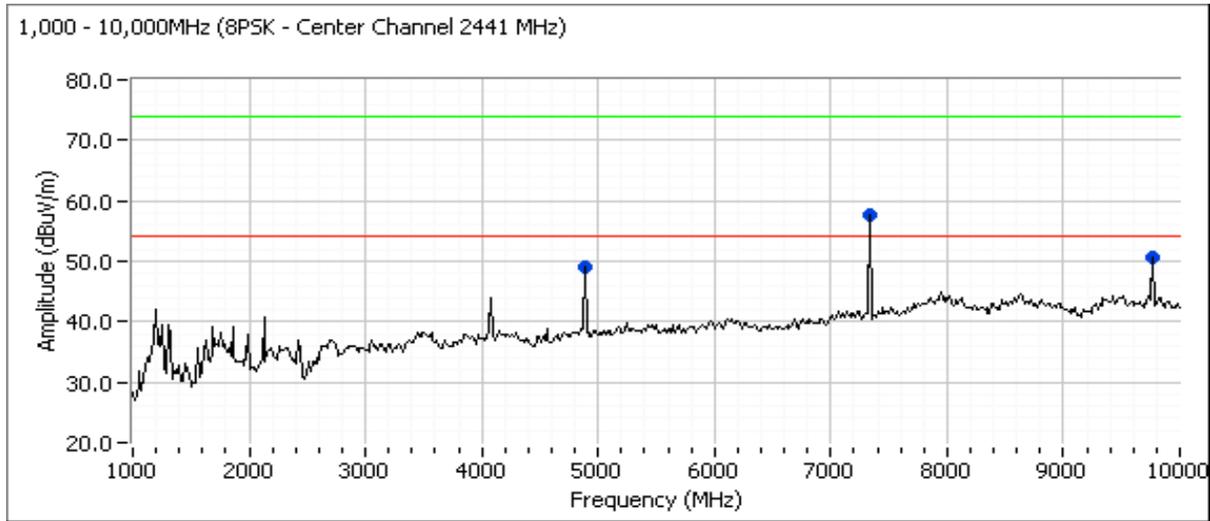
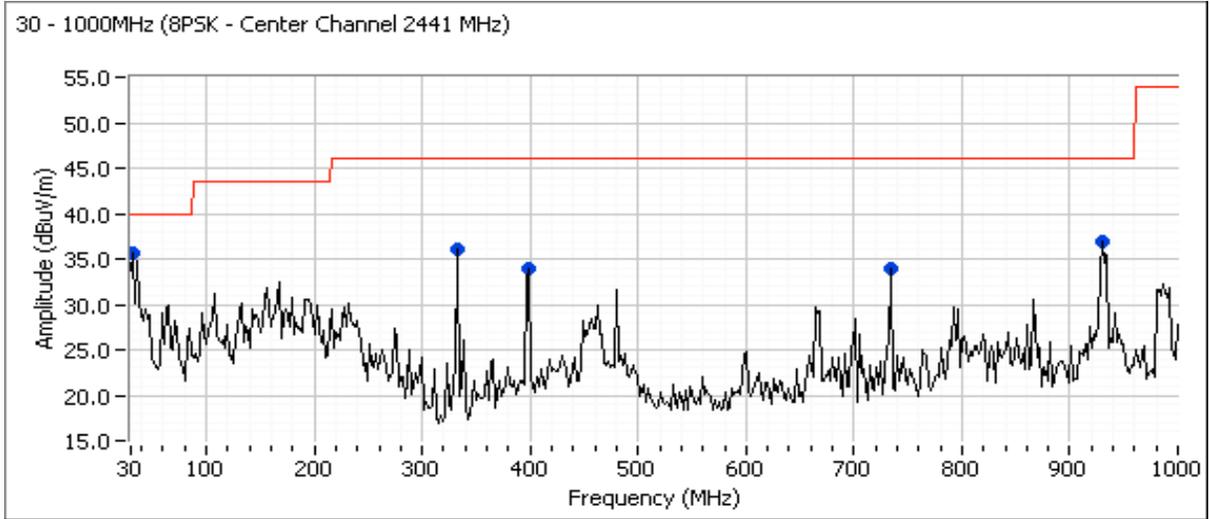
There is a 20dB correction factor for average reading. Therefore, margin of peak reading is the same as margin for average reading.

Maximized Readings

Frequency MHz	Level dB μ V/m	Pol V/H	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
31.197	34.1	V	40.0	-5.9	QP	157	1.0	
398.357	38.4	H	46.0	-7.6	QP	69	1.0	
72.128	24.3	H	40.0	-15.7	QP	280	1.0	
932.476	28.2	H	46.0	-17.8	QP	109	1.0	
311.901	22.9	H	46.0	-23.1	QP	96	1.0	
356.363	20.5	H	46.0	-25.5	QP	16	1.0	
7210.000	57.8	V	74.0	-16.2	Peak	331	2.0	
7210.000	37.8	V	54.0	-16.2	Avg	331	2.0	
9610.000	53.2	V	74.0	-20.8	Peak	242	1.0	
9610.000	33.2	V	54.0	-20.8	Avg	242	1.0	
4810.000	26.8	V	54.0	-27.2	Avg	17	2.0	
4810.000	46.8	V	74.0	-27.2	Peak	17	2.0	

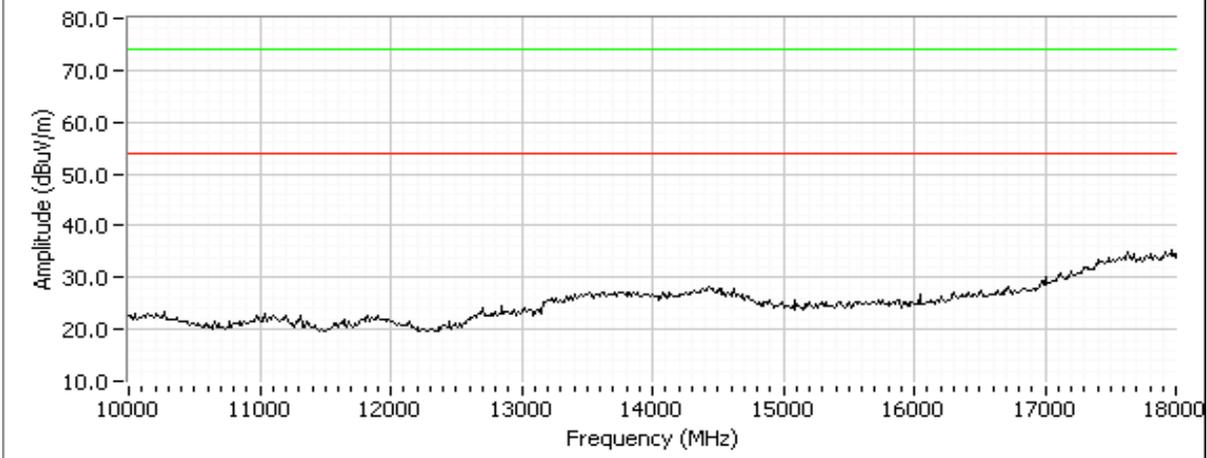
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1b: Center Channel @ 2441 MHz

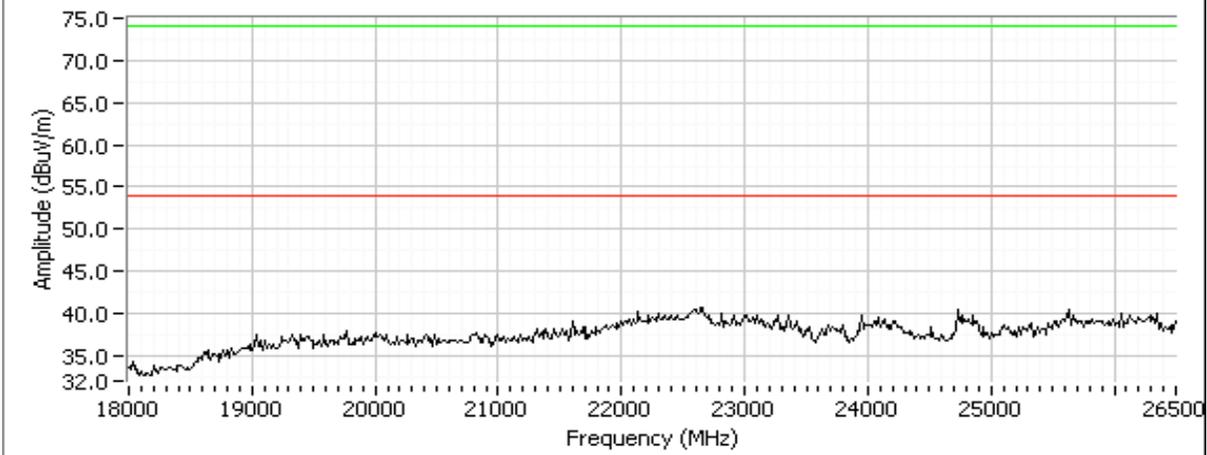


Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

10,000 - 18,000MHz (8PSK - Center Channel at 2441MHz)



18,000 - 26,500MHz (8PSK - Center Channel at 2441MHz)





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
Contact:	David Boldy	Account Manager:	Dean Erikson
Standard:	-	Class:	N/A

Run #1b: Center Channel @ 2441 MHz

Preliminary Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
31.944	35.7	V	40.0	-4.3	Peak	174	1.0	
71.663	33.6	H	40.0	-6.4	Peak	274	2.0	
930.020	37.0	H	46.0	-9.0	Peak	110	1.0	
333.246	36.0	H	46.0	-10.0	Peak	14	1.0	
733.687	34.0	H	46.0	-12.0	Peak	298	1.0	
399.339	34.0	H	46.0	-12.0	Peak	139	1.0	

Note 1

There is a 20dB correction factor for average reading. Therefore, margin of peak reading is the same as margin for average reading.

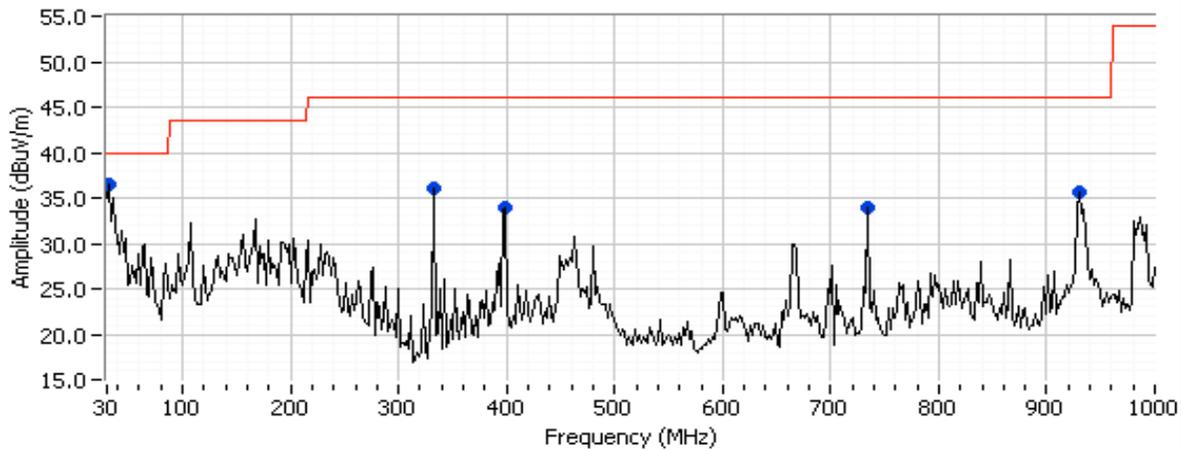
Maximized Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
31.197	34.2	V	40.0	-5.9	QP	158	1.0	
398.357	38.2	H	46.0	-7.6	QP	71	1.0	
72.128	24.3	H	40.0	-15.7	QP	280	1.0	
932.476	28.1	H	46.0	-17.8	QP	109	1.0	
333.246	22.8	H	46.0	-23.2	QP	67	1.0	
733.687	18.2	H	46.0	-27.8	QP	239	1.0	
7330.000	57.6	V	74.0	-16.4	Peak	358	1.0	
7330.000	37.6	V	54.0	-16.4	Avg	358	1.0	
9760.000	50.7	V	74.0	-23.3	Peak	358	1.0	
9760.000	30.7	V	54.0	-23.3	Avg	358	1.0	
4885.000	48.9	V	74.0	-25.1	Peak	358	1.0	
4885.000	28.9	V	54.0	-25.1	Avg	358	1.0	

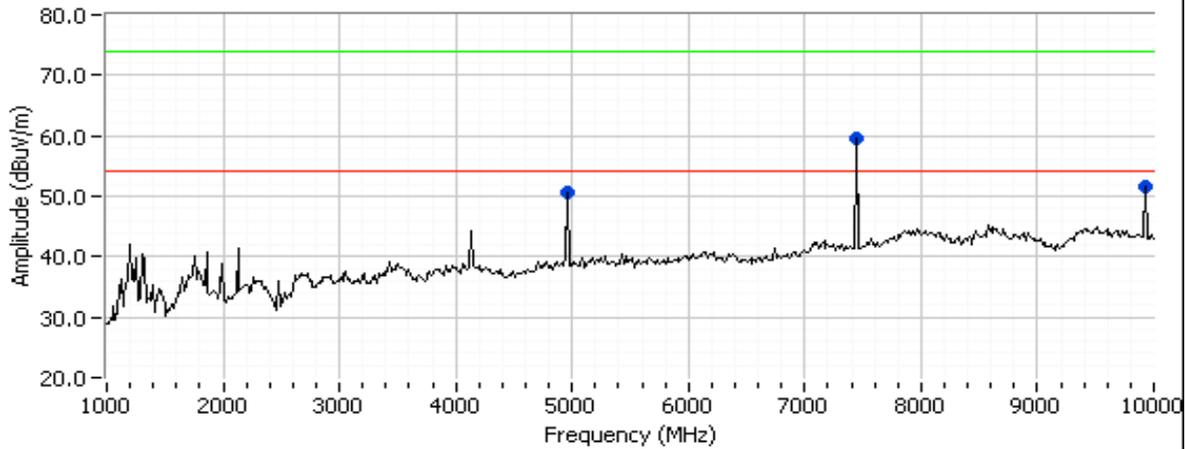
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A

Run #1c: High Channel @ 2480 MHz

30 - 1000MHz (8PSK - High Channel 2480 MHz)

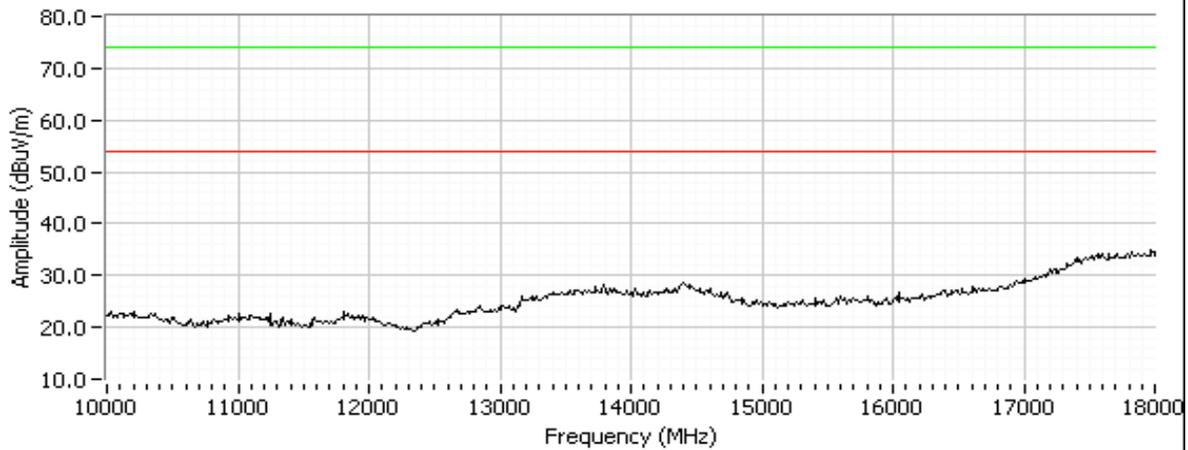


1,000 - 10,000MHz (8PSK - High Channel 2480 MHz)

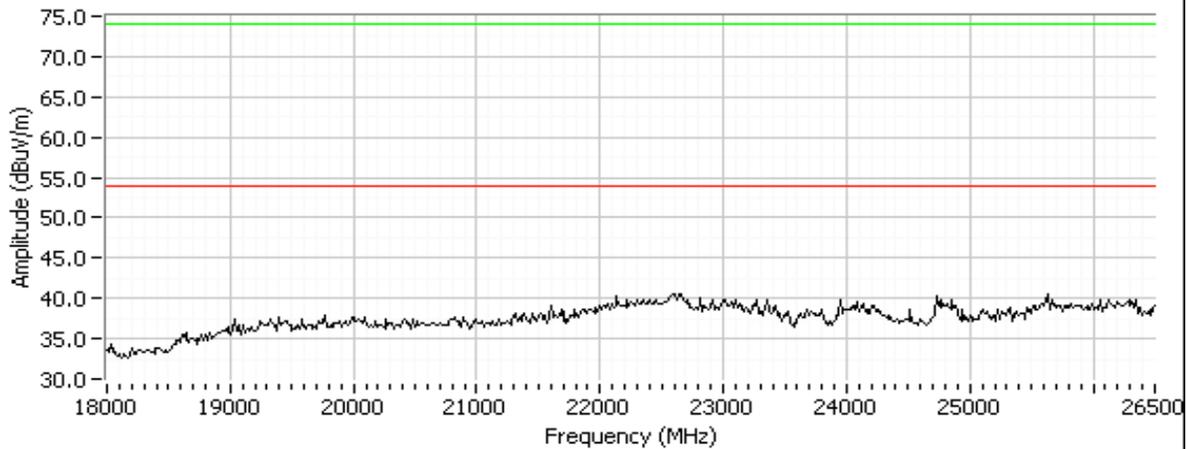


Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

10,000 - 18,000MHz (8PSK - High Channel at 2480MHz)



18,000 - 26,500MHz (8PSK - High Channel at 2480MHz)





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
Contact:	David Boldy	Account Manager:	Dean Erikson
Standard:	-	Class:	N/A

Run #1c: High Channel @ 2480 MHz

Preliminary Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
31.944	36.5	V	40.0	-3.5	Peak	260	1.0	
333.246	36.1	H	46.0	-9.9	Peak	8	1.0	
930.020	35.7	H	46.0	-10.3	Peak	66	1.0	
399.339	33.9	H	46.0	-12.1	Peak	139	1.0	
733.687	33.9	H	46.0	-12.1	Peak	283	1.0	

Note 1

There is a 20dB correction factor for average reading. Therefore, margin of peak reading is the same as margin for average reading.

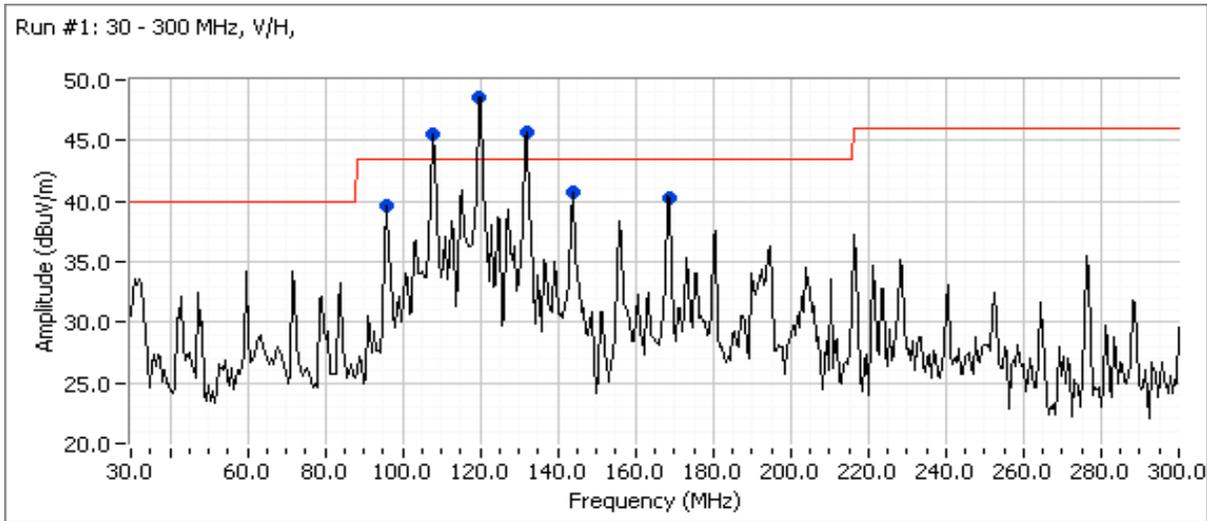
Maximized Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
7450.000	59.5	V	74.0	-14.5	Peak	334	1.9	
7450.000	39.5	V	54.0	-14.5	Avg	334	1.9	
9925.000	51.5	V	74.0	-22.5	Peak	229	1.3	
9925.000	31.5	V	54.0	-22.5	Avg	229	1.3	
4960.000	50.7	V	74.0	-23.3	Peak	155	1.0	
4960.000	30.7	V	54.0	-23.3	Avg	155	1.0	
31.197	34.1	V	40.0	-5.9	QP	157	1.0	
398.357	38.4	H	46.0	-7.6	QP	69	1.0	
72.128	24.3	H	40.0	-15.7	QP	280	1.0	
932.476	28.2	H	46.0	-17.8	QP	109	1.0	
333.246	22.8	H	46.0	-23.2	QP	67	1.0	
733.687	18.2	H	46.0	-27.8	QP	239	1.0	

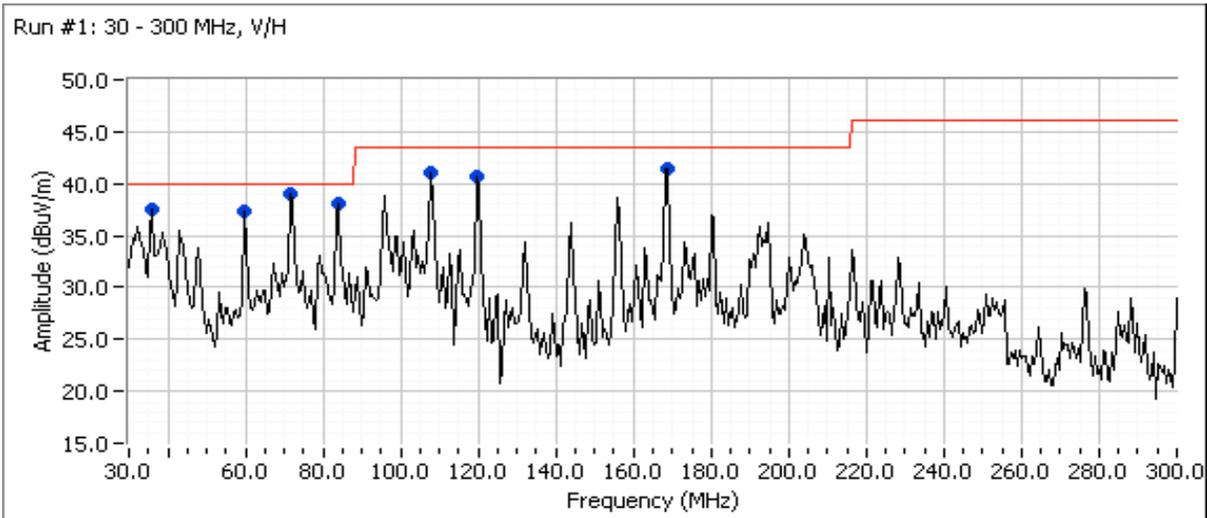
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A

Run #1: Radiated Spurious Emissions, 30 - 26500 MHz. Tx Mode, GFSK Modulation

Run #1a: Low Channel @ 2402 MHz

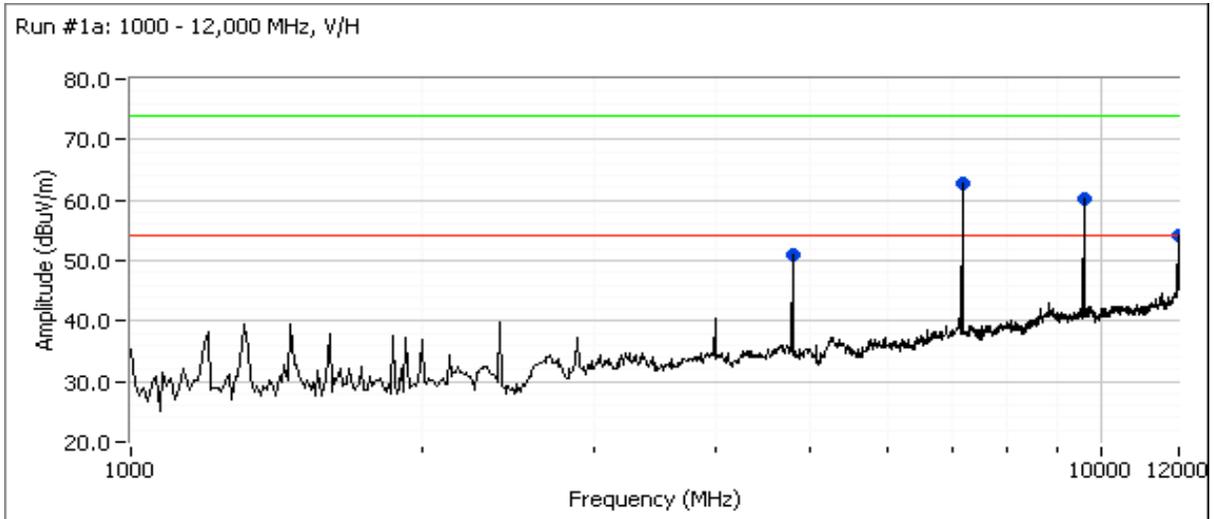
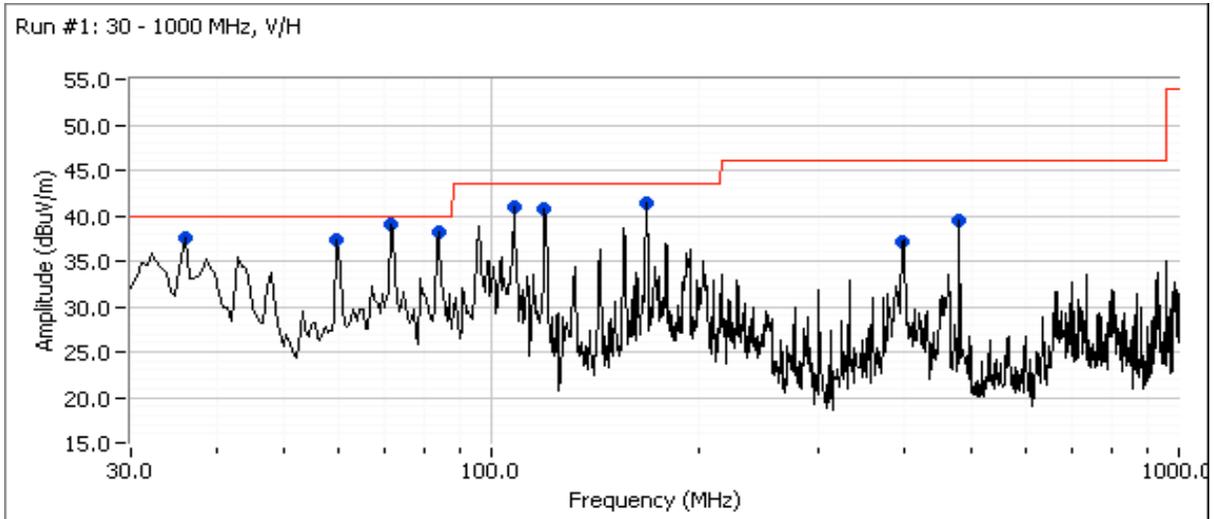


Added Steward ferrite P/N: 28A0640-0A0 to USB cable



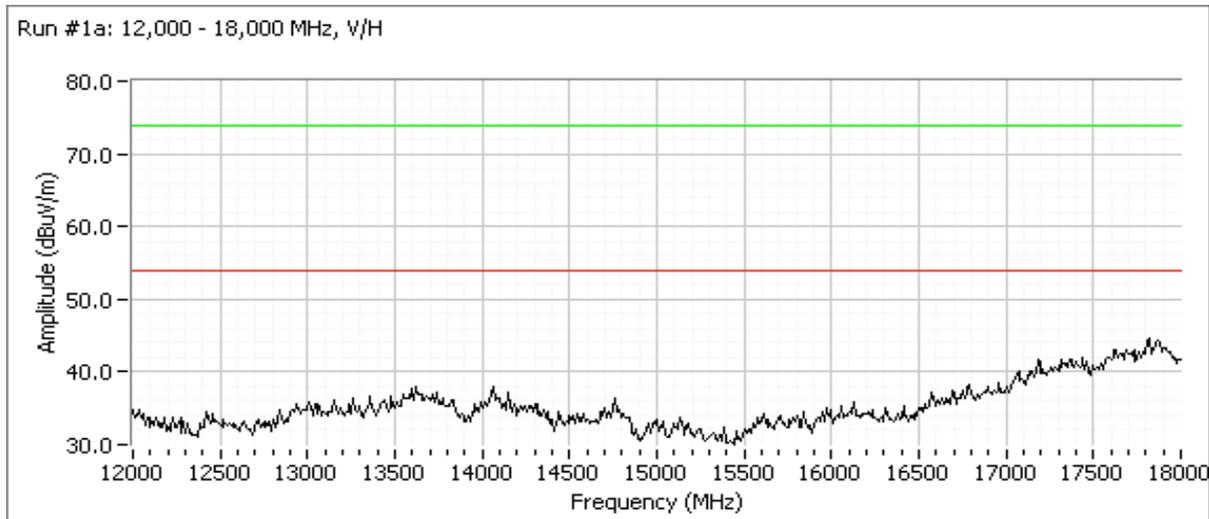
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1a: Continued



Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A

Run #1a: Continued



Preliminary Readings

Initial run

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
96.012	39.6	H	43.5	-3.9	Peak	10	3.0	
107.916	45.6	H	43.5	2.1	Peak	7	3.0	
119.820	48.6	H	43.5	5.1	Peak	181	3.0	
132.265	45.7	H	43.5	2.2	Peak	168	2.0	
144.168	40.7	H	43.5	-2.8	Peak	267	1.5	
168.517	40.2	H	43.5	-3.3	Peak	269	1.0	

Added Steward ferrite P/N: 28A0640-0A0 To USB cable

36.007	37.5	V	40.0	-2.5	Peak	145	1.0	
60.003	37.4	H	40.0	-2.6	Peak	316	4.0	
72.010	39.0	V	40.0	-1.0	Peak	266	1.0	
84.007	38.1	H	40.0	-1.9	Peak	288	2.5	
108.004	41.0	V	43.5	-2.5	Peak	227	1.0	
120.005	40.7	V	43.5	-2.8	Peak	331	1.0	
168.007	41.4	V	43.5	-2.1	Peak	214	1.0	
399.664	37.1	H	46.0	-8.9	Peak	245	2.0	
480.022	39.5	H	46.0	-6.5	Peak	154	1.5	
4804.190	50.9	V	54.0	-3.1	Peak	201	1.6	
7205.460	62.9	H	54.0	8.9	Peak	276	1.1	
9608.580	60.1	H	54.0	6.1	Peak	299	1.1	
12009.460	54.2	H	54.0	0.2	Peak	295	1.1	

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1a: Continued

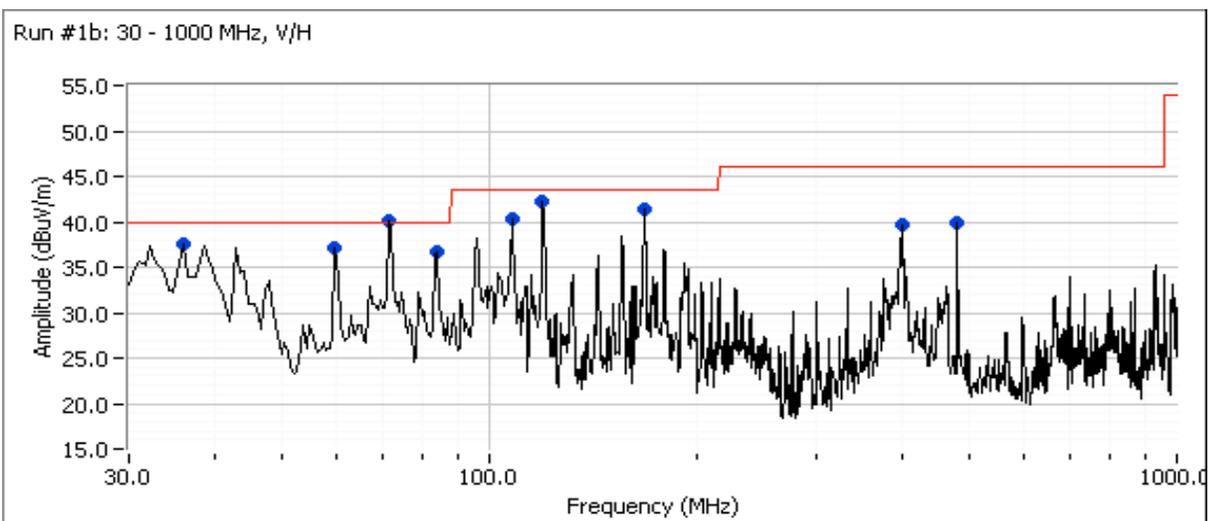
Maximized Readings

Frequency MHz	Level dBµV/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
36.007	35.8	V	40.0	-4.2	QP	145	1.0	
60.003	35.8	H	40.0	-4.2	QP	316	4.0	
72.010	38.9	V	40.0	-1.1	QP	266	1.0	
84.007	36.8	H	40.0	-3.2	QP	287	2.5	
108.004	40.4	V	43.5	-3.1	QP	227	1.0	
120.005	41.3	V	43.5	-2.2	QP	331	1.0	
168.007	41.4	V	43.5	-2.1	QP	213	1.0	
399.664	30.3	H	46.0	-15.7	QP	249	2.0	
480.022	39.0	H	46.0	-7.0	QP	154	1.5	
4803.860	33.7	V	54.0	-20.3	AVG	201	1.6	
4803.860	53.7	V	74.0	-20.3	PK	201	1.6	
7206.090	45.2	H	54.0	-8.8	AVG	275	1.1	
7206.090	65.2	H	74.0	-8.8	PK	275	1.1	
9607.490	43.1	H	54.0	-10.9	AVG	298	1.1	
9607.490	63.1	H	74.0	-10.9	PK	298	1.1	
12009.370	36.7	H	54.0	-17.3	AVG	292	1.1	
12009.370	56.7	H	74.0	-17.3	PK	292	1.1	

Note 1

There is a 20dB correction factor for average reading. Therefore, margin of peak reading is the same as margin for average reading.

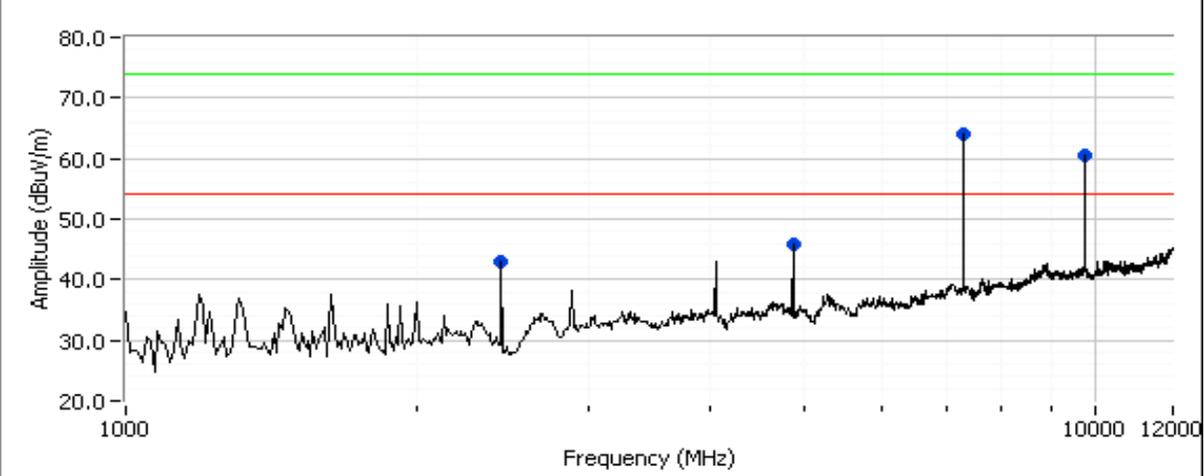
Run #1b: Center Channel @ 2441 MHz



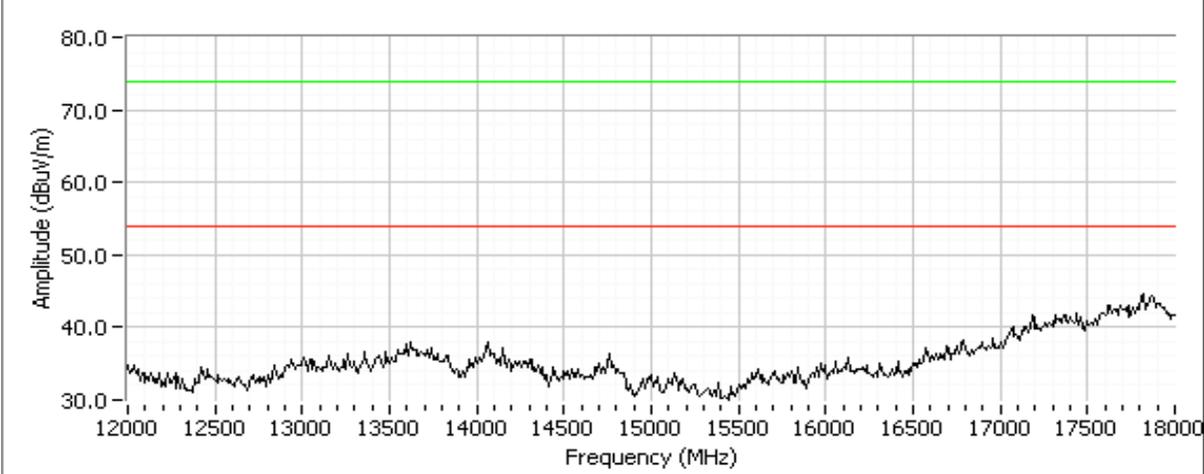
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1b: Continued

Run #1b: 1000 - 12,000 MHz, V/H



Run #1b: 12,000 - 18,000 MHz, V/H





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
Contact:	David Boldy	Account Manager:	Dean Erikson
Standard:	-	Class:	N/A

Run #1b: Continued

Preliminary Readings

Frequency MHz	Level dBµV/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
72.004	40.2	H	40.0	0.2	Peak	302	2.0	
120.012	42.2	V	43.5	-1.3	Peak	266	1.0	
36.007	37.5	V	40.0	-2.5	Peak	63	1.0	
60.003	37.2	H	40.0	-2.8	Peak	85	4.0	
84.007	36.6	H	40.0	-3.4	Peak	292	2.0	
108.010	40.4	V	43.5	-3.1	Peak	227	1.0	
168.005	41.3	V	43.5	-2.2	Peak	214	1.0	
399.641	39.7	H	46.0	-6.3	Peak	272	1.5	
480.022	39.9	H	46.0	-6.1	Peak	166	1.5	
2441.200	42.9	V	54.0	-11.1	Peak	263	1.3	
4882.080	46.0	H	54.0	-8.0	Peak	230	1.7	
7323.540	64.1	H	54.0	10.1	Peak	280	1.1	
9764.580	60.6	H	54.0	6.6	Peak	295	1.1	

Maximized Readings

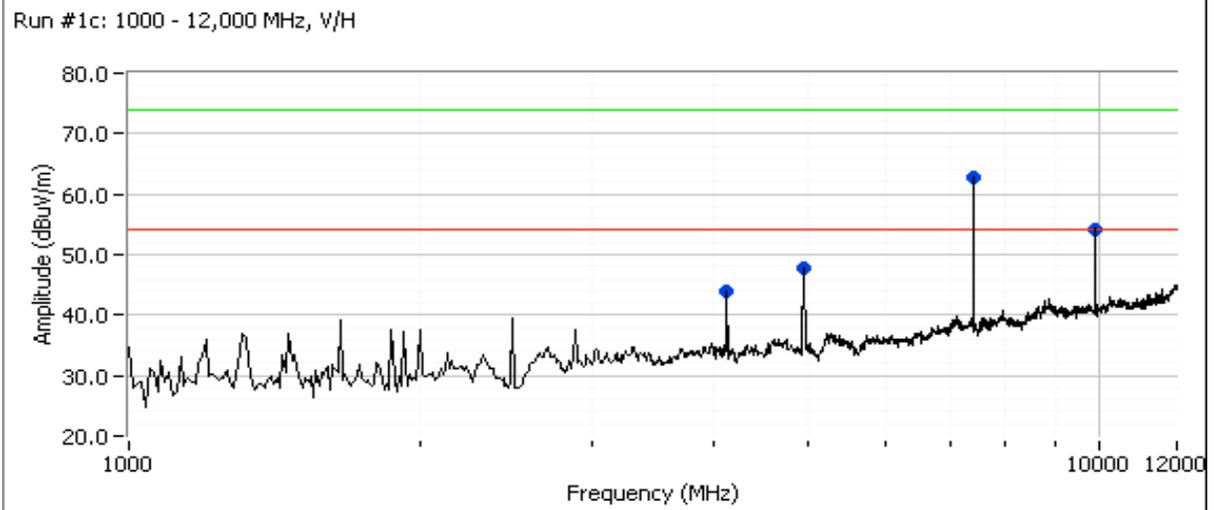
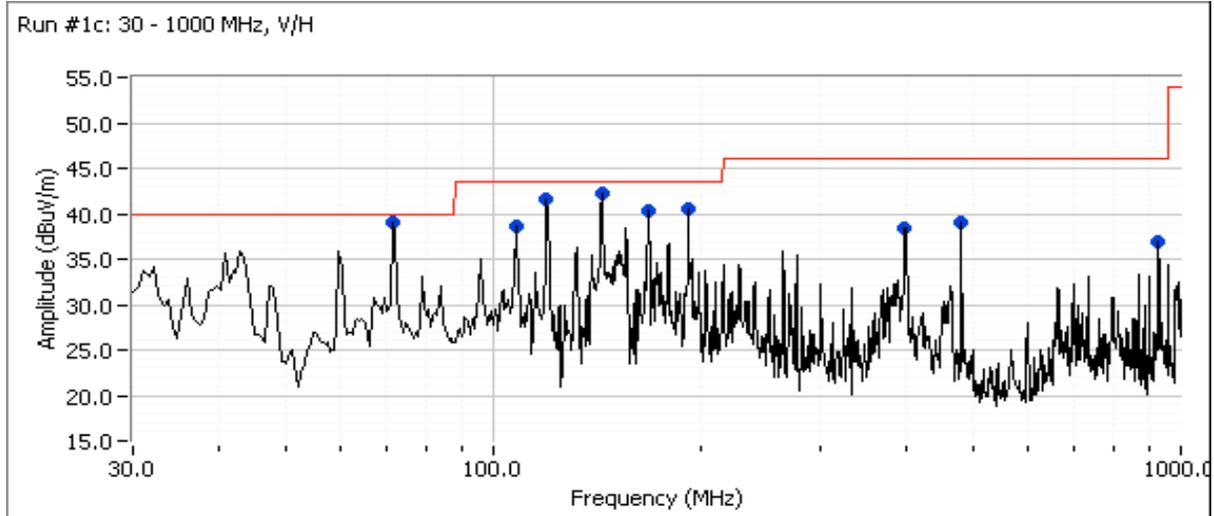
Frequency MHz	Level dBµV/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
7322.490	46.8	H	54.0	-7.2	AVG	280	1.1	
7322.490	66.8	H	74.0	-7.2	PK	280	1.1	
9764.700	43.1	H	54.0	-10.9	AVG	294	1.1	
9764.700	63.1	H	74.0	-10.9	PK	294	1.1	
4882.170	30.6	H	54.0	-23.4	AVG	230	1.7	
4882.170	50.6	H	74.0	-23.4	PK	230	1.7	
72.004	39.5	H	40.0	-0.5	QP	301	2.0	
120.012	41.1	V	43.5	-2.4	QP	266	1.0	
36.007	36.5	V	40.0	-3.5	QP	62	1.0	
60.003	33.0	H	40.0	-7.0	QP	85	4.0	
84.007	36.5	H	40.0	-3.5	QP	292	2.0	
108.010	40.5	V	43.5	-3.0	QP	227	1.0	
168.005	41.3	V	43.5	-2.2	QP	214	1.0	
399.641	28.6	H	46.0	-17.4	QP	272	1.5	
480.022	39.2	H	46.0	-6.8	QP	166	1.5	

Note 1

There is a 20dB correction factor for average reading. Therefore, margin of peak reading is the same as margin for average reading.

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1c: High Channel @ 2480 MHz

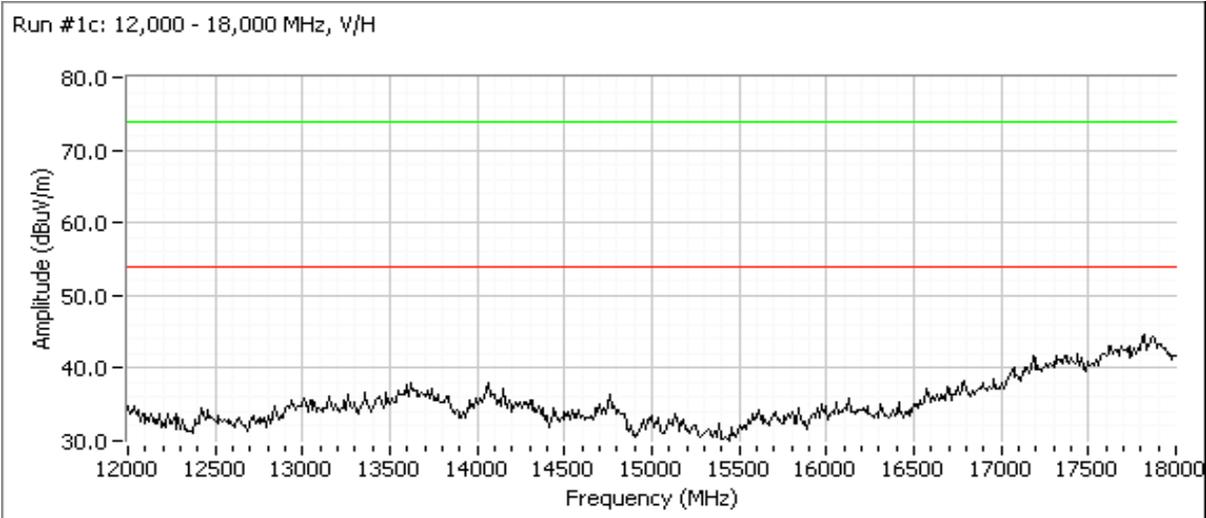




EMC Test Data

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1c: Continued



Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
72.010	39.0	V	40.0	-1.0	Peak	337	1.0	
120.005	41.7	H	43.5	-1.8	Peak	124	3.0	
144.002	42.3	H	43.5	-1.2	Peak	263	1.5	
168.005	40.3	H	43.5	-3.2	Peak	276	1.5	
192.004	40.5	H	43.5	-3.0	Peak	235	1.0	
108.004	38.7	H	43.5	-4.8	Peak	306	3.0	
399.832	38.5	H	46.0	-7.5	Peak	192	1.0	
480.022	39.0	V	46.0	-7.0	Peak	314	1.0	
932.489	36.9	V	46.0	-9.1	Peak	228	1.5	
4959.900	47.9	V	54.0	-6.1	Peak	207	1.0	
4130.000	43.8	H	54.0	-10.2	Peak	220	1.3	
7440.300	62.7	H	54.0	8.7	Peak	242	1.4	
9887.160	54.3	H	54.0	0.3	Peak	282	1.1	



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Standard:	-	Class:	N/A

Run #1c: Continued

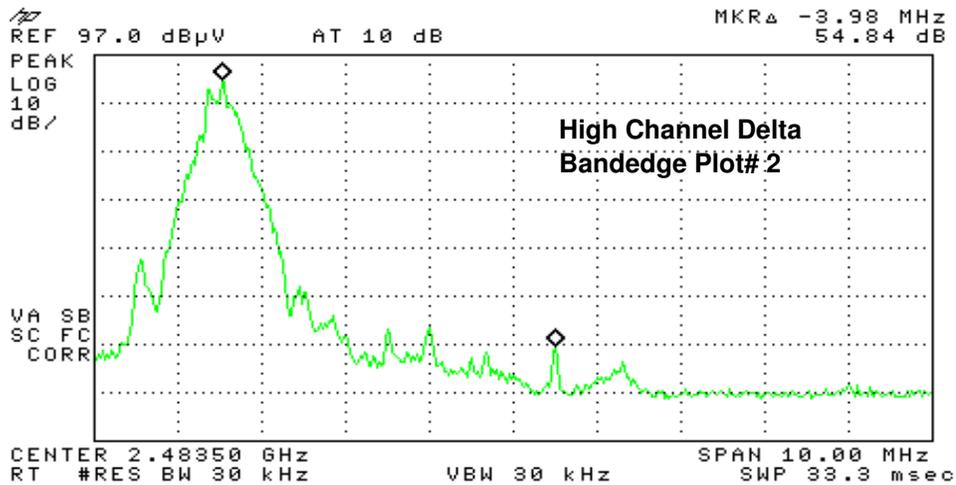
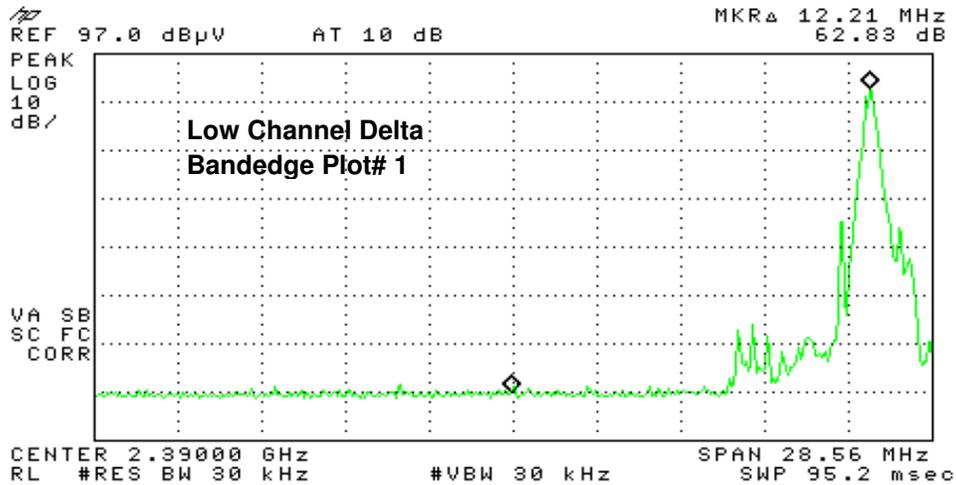
Maximized Readings

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4959.820	32.3	V	54.0	-21.7	AVG	207	1.0	
4959.820	52.3	V	74.0	-21.7	PK	207	1.0	
7439.740	45.5	H	54.0	-8.5	AVG	241	1.4	
7439.740	65.5	H	74.0	-8.5	PK	241	1.4	
9919.580	39.9	H	54.0	-14.1	AVG	282	1.1	
9919.580	59.9	H	74.0	-14.1	PK	282	1.1	

Note 1 | There is a 20dB correction factor for average reading. Therefore, margin of peak reading is the same as margin for average reading.

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Run #1: Bandedges





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Standard:	-	Class:	N/A

Bandedge Measurements

Bandedge MHz	Fundamental Level (dBuV/m @3m)	Detector Pk/Avg	Spurious Level		Limit dBuV/m	Margin dB	Polarization	Comment
			-dBc	dBuV/m				
2390.00	97.8	Pk	62.8	35.0	74.0	-39.0	v	Note 1, 3
2390.00	97.1	Avg	62.8	34.3	54.0	-19.7	v	Note 1, 3
2390.00	92.9	Pk	62.8	30.1	74.0	-43.9	h	Note 1, 3
2390.00	92.2	Avg	62.8	29.4	54.0	-24.6	h	Note 1, 3
2483.50	91.5	Pk	54.8	36.6	74.0	-37.4	v	Note 2, 3
2483.50	90.8	Avg	54.8	36.0	54.0	-18.0	v	Note 2, 3
2483.50	99.6	Pk	54.8	44.7	74.0	-29.3	h	Note 2, 3
2483.50	99.1	Avg	54.8	44.3	54.0	-9.7	h	Note 2, 3

Note 1:	EUT operating on the lowest channel 2402 MHz. Bandedge compliance level, at 2390 MHz, was calculated using the relative delta measurement in Plot# 1, of the spreadsheet (-62.8 dBc), and applied to the peak and average field strength measurements of the fundamental signal level.
Note 2:	EUT operating on highest channel available 2480 MHz. Bandedge compliance level, at 2483.5 MHz, was calculated using the relative delta measurement in Plot# 2, of the spreadsheet (-54.8 dBc), and applied to the peak and average field strength measurements of the fundamental signal level.
Note 3:	Peak Fundamental was measured with RBW=1MHz and VBW=1MHz. Average Fundamental was measured with RBW=1MHz and VBW=10Hz.

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Standard:	-	Class:	N/A

RSS 210 and FCC 15.247 Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 12/13/2006	Config. Used: 1
Test Engineer: Mehran Birgani	Config Change: None
Test Location: Fremont Chamber #5	Host Unit Voltage 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 18 °C
 Rel. Humidity: 42 %

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result / Margin
1 (8PSK Mode)	RE, 30 - 18,000 MHz Spurious Emissions	FCC Part 15.209 / 15.247(c)	Pass	35.2dBµV/m (57.5µV/m) @ 397.621MHz (-1.8dB)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

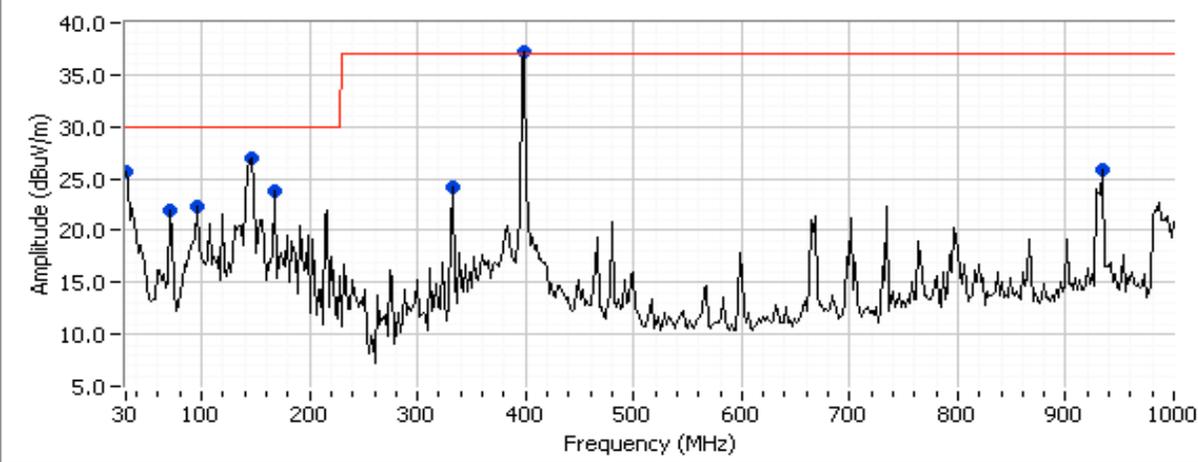
Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	5	10	-6.0
1000 - 10000 MHz	3	3	0.0
10000 - 18000 MHz	1	3	-9.5

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

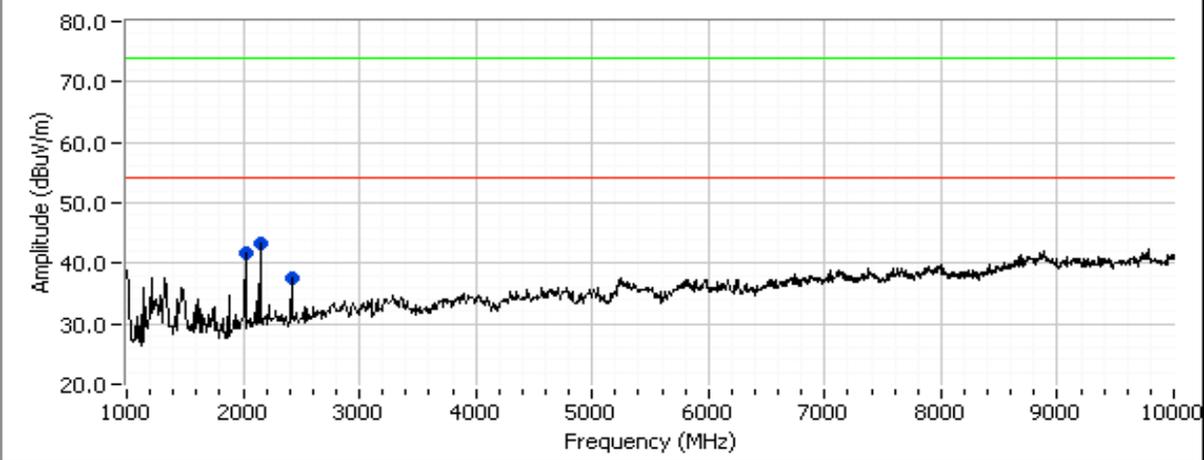
Run #1: Radiated Spurious Emissions, 30 - 18,000 MHz. Rx Mode, 8PSK Modulation

Run #1a: Center Channel @ 2441 MHz

30 - 1000MHz (8PSK - Receive Mode, Center Channel at 2441MHz)



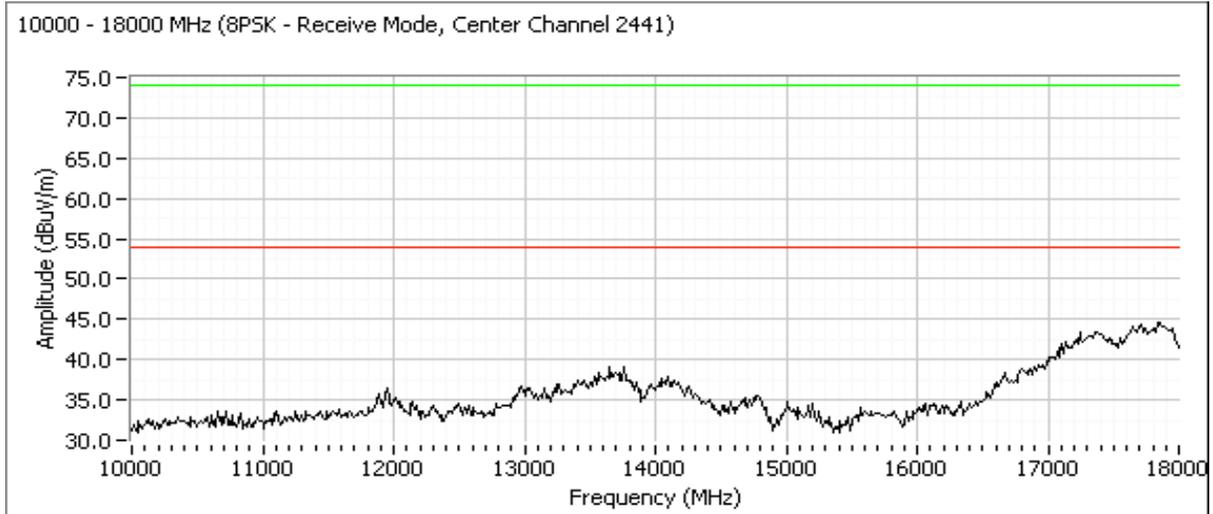
1000 - 10000MHz (8PSK - Receive Mode, Center Channel at 2441MHz)





EMC Test Data

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A



Run #1a: Center Channel @ 2441MHz

Preliminary Readings

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
397.621	37.2	H	37.0	0.2	Peak	244	1.0	
144.153	26.9	V	30.0	-3.1	Peak	194	1.0	
31.221	25.7	V	30.0	-4.3	Peak	223	1.0	
168.133	23.8	H	30.0	-6.2	Peak	278	3.0	
96.006	22.4	H	30.0	-7.6	Peak	79	4.0	
71.996	22.0	H	30.0	-8.0	Peak	326	4.0	
2145.830	43.4	V	54.0	-10.6	Peak	359	1.3	
931.925	25.8	V	37.0	-11.2	Peak	16	1.0	
934.429	25.8	V	37.0	-11.2	Peak	16	1.0	
2017.500	41.7	V	54.0	-12.3	Peak	1	1.0	
333.036	24.1	H	37.0	-12.9	Peak	200	1.0	
2420.830	37.6	H	54.0	-16.4	Peak	190	2.5	

Maximized Readings

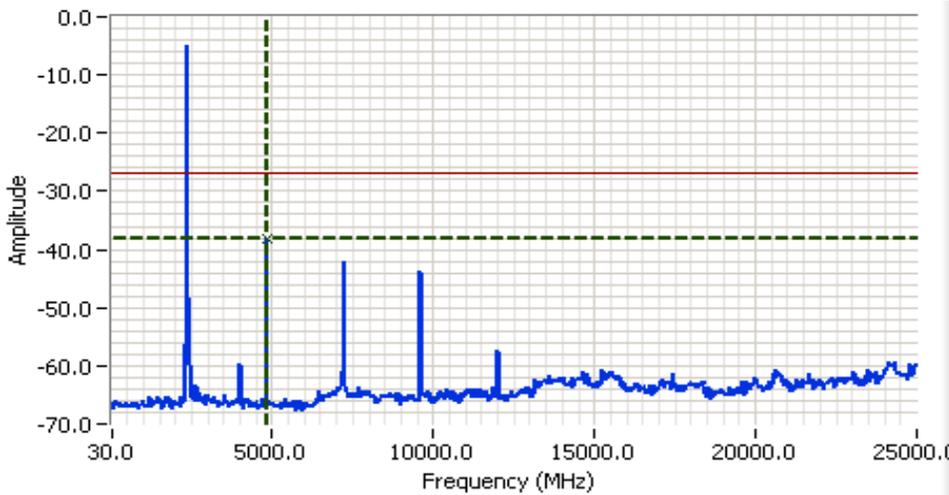
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
397.621	35.2	H	37.0	-1.8	QP	250	1.0	
96.006	22.7	H	30.0	-7.3	QP	100	4.0	
144.153	22.3	V	30.0	-7.7	QP	188	1.0	
168.133	22.3	H	30.0	-7.7	QP	281	3.0	
31.221	20.9	V	30.0	-9.1	QP	234	1.0	
71.996	19.8	H	30.0	-10.2	QP	323	3.9	

Note 1: There is only one mode for receive mode, and all three channels were test, scan showed all were identical, center channel was selected and tested.

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A

Run #1d: Antenna Conducted Spurious Emissions, 30 - 25,000 MHz.

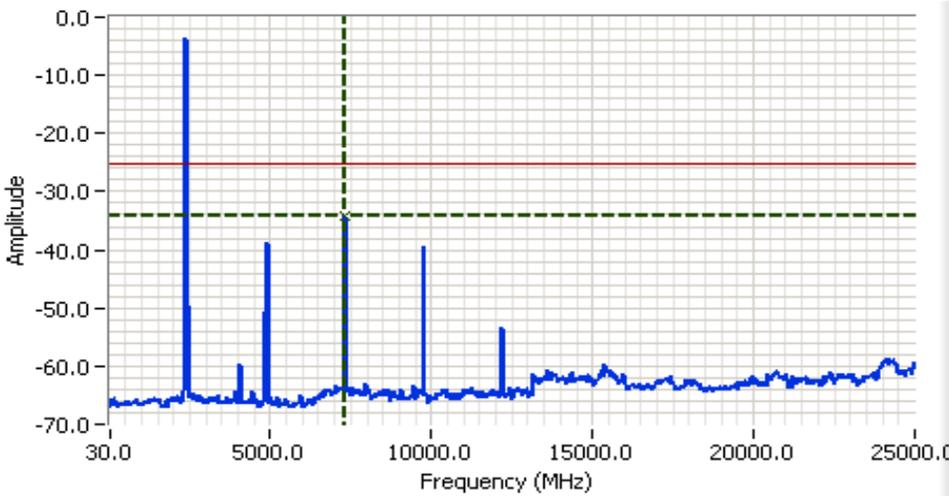
Refer to plots below. Scans made using RBW=VB=100 KHz with the limit line set at 20dB below the highest in-band signal level.



Analyzer Settings
 HP8564E,006,EMI,UK6
 CF: 12515.00 MHz
 SPAN:24970.00 MHz
 RB 100 kHz
 VB 100 kHz
 Detector POS
 Att 20
 RL Offset 0.00
 Sweep Time 33.0s
 Ref Lvl:10.00DBM

Comments
 Conducted out of band emissions

Cursor 1 4815.91; -38.00 Delta Freq. 4915.97
 Cursor 2 -100.052; -27.00 Delta Amplitude 11.00



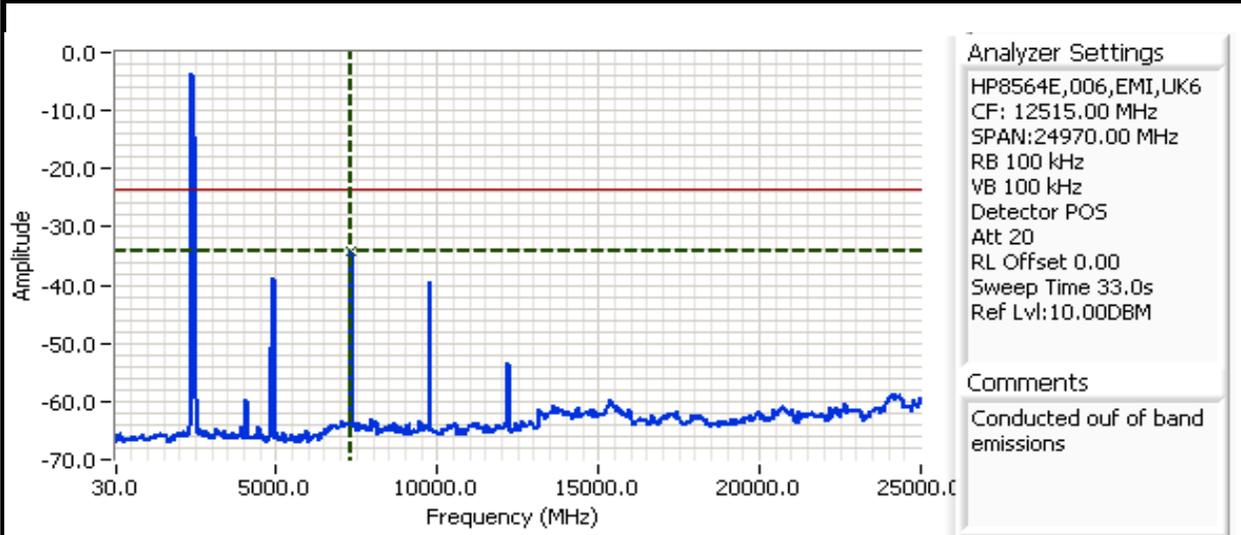
Analyzer Settings
 HP8564E,006,EMI,UK6
 CF: 12515.00 MHz
 SPAN:24970.00 MHz
 RB 100 kHz
 VB 100 kHz
 Detector POS
 Att 20
 RL Offset 0.00
 Sweep Time 33.0s
 Ref Lvl:10.00DBM

Comments
 Conducted out of band emissions

Cursor 1 7312.97; -34.17 Delta Freq. 7412.97
 Cursor 2 -100.052; -25.20 Delta Amplitude 8.97



Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A



Cursor 1 7312.91: -34.17 Delta Freq. 7412.97

Cursor 2 -100.052: -23.67 Delta Amplitude 10.50

Run #2: Output Power

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

Maximum antenna gain: 2 dBi

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Output Power (W)	EIRP (W)
Low	2402	-	-1	0.00079	0.00126
Mid	2441	-	-0.6	0.00087	0.00138
High	2480	-	-0.4	0.00091	0.00145

Note: Used Peak Power meter



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66411
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Standard:	-	Class:	N/A

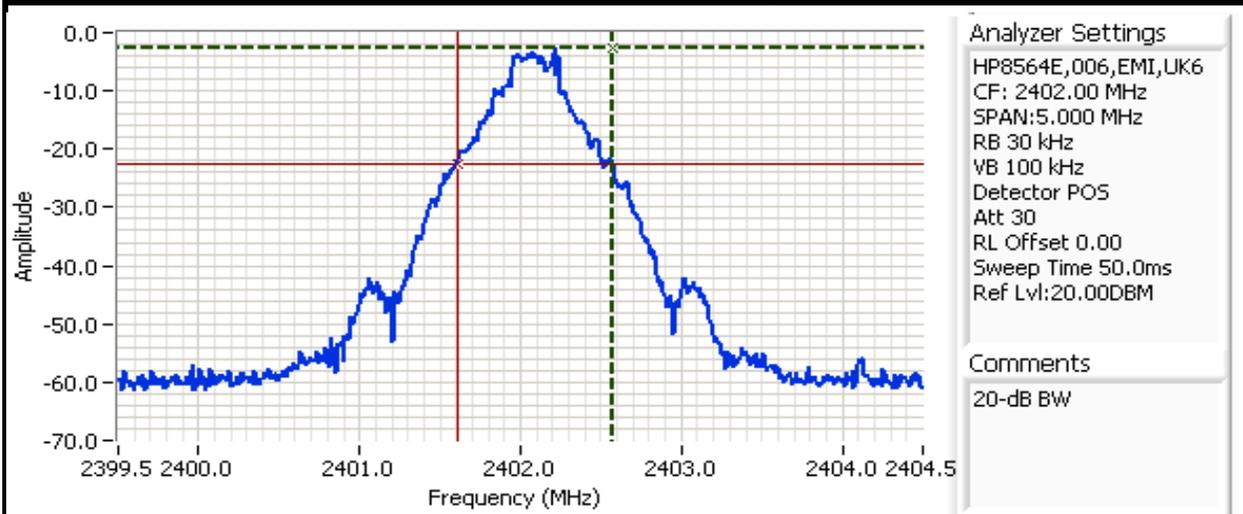
Run #3: Bandwidth, Channel Occupancy, Spacing and Number of Channels

Channel	Frequency (MHz)	Resolution Bandwidth	20dB Bandwidth (kHz)	Resolution Bandwidth	99% Bandwidth (kHz)
Low	2402	30kHz	958	100 kHz	973
Mid	2441	30kHz	975	100 kHz	965
High	2480	30kHz	942	100 kHz	965

Note 1: 20dB bandwidth measured using RB = 30kHz, VB = 100kHz (VB > RB)

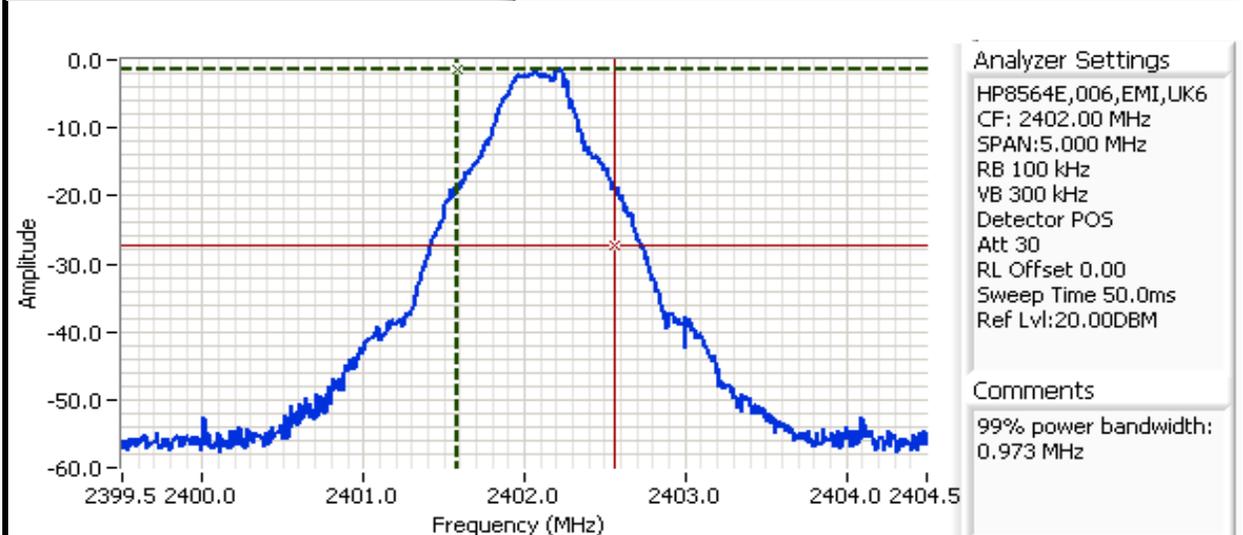
Note 2: 99% bandwidth measured using RB = 100kHz, VB = 300kHz (VB >=3RB)

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A



Cursor 1 2402.56: -2.67 ⊕ ⊖ 🔒 Delta Freq. 0.958

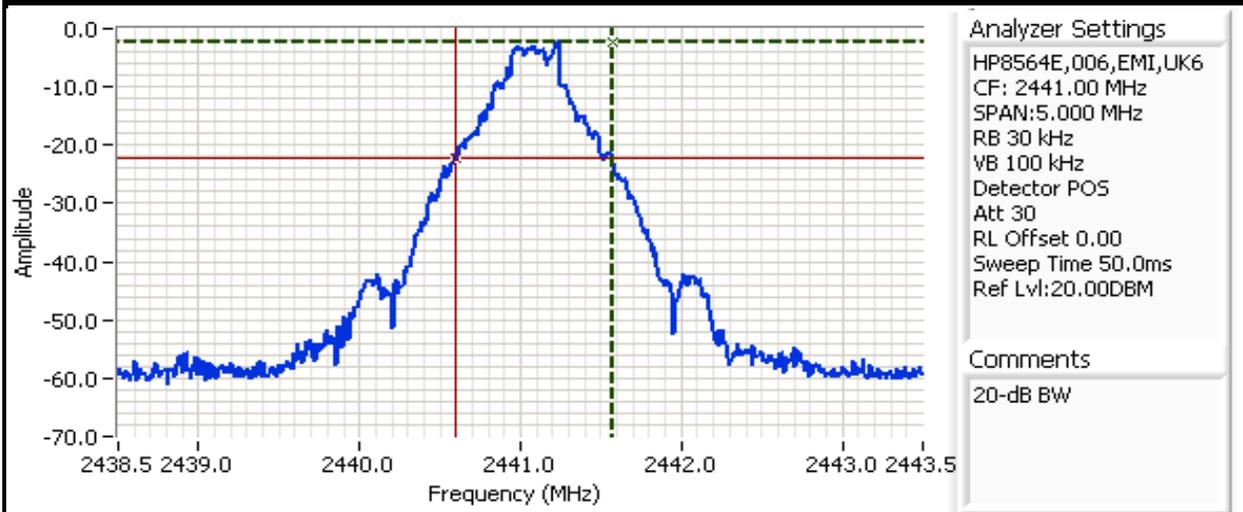
Cursor 2 2401.60: -22.67 ⊕ ⊖ 🔒 Delta Amplitude 20.00



Cursor 1 2401.58: -1.33 ⊕ ⊖ 🔒 Delta Freq. 0.973

Cursor 2 2402.56: -27.33 ⊕ ⊖ 🔒 Delta Amplitude 26.00

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A

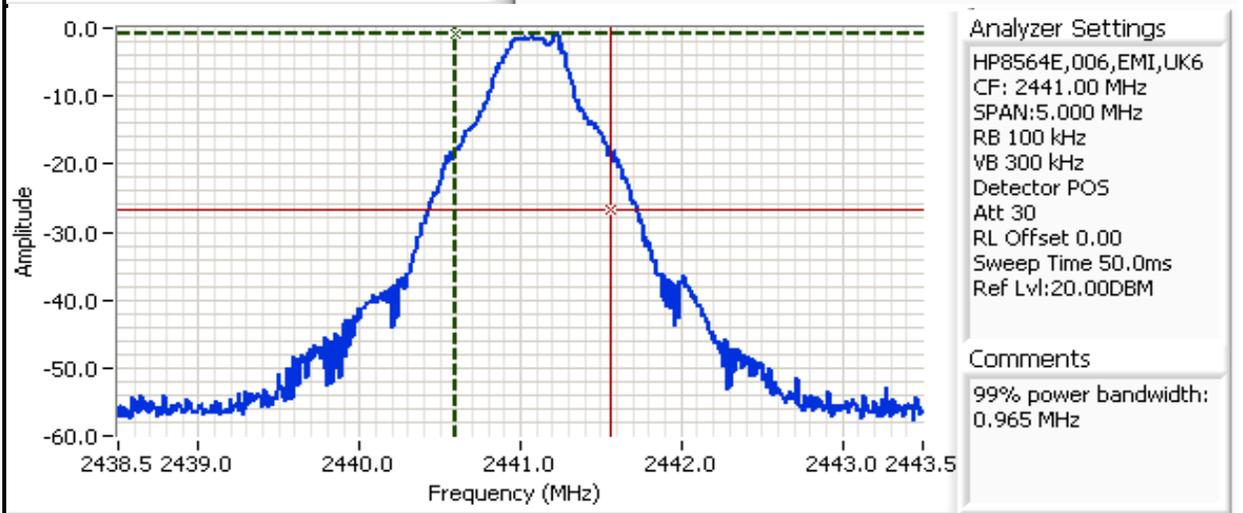


Cursor 1 2441.56; -2.17

Cursor 2 2440.59; -22.17

Delta Freq. 0.975

Delta Amplitude 20.00



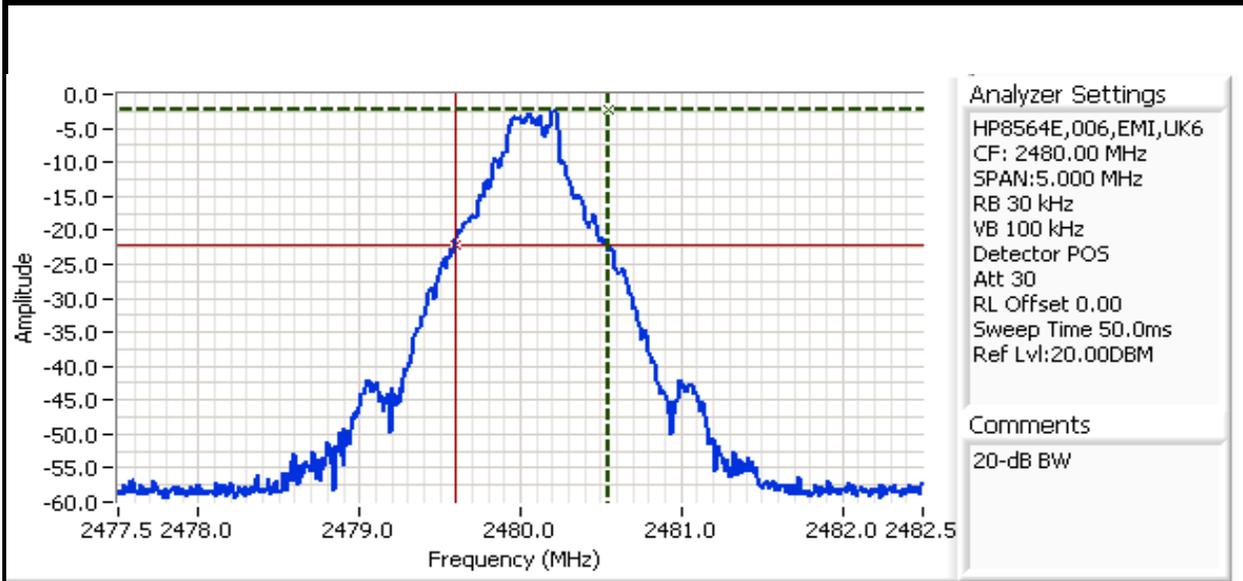
Cursor 1 2440.59; -0.83

Cursor 2 2441.56; -26.83

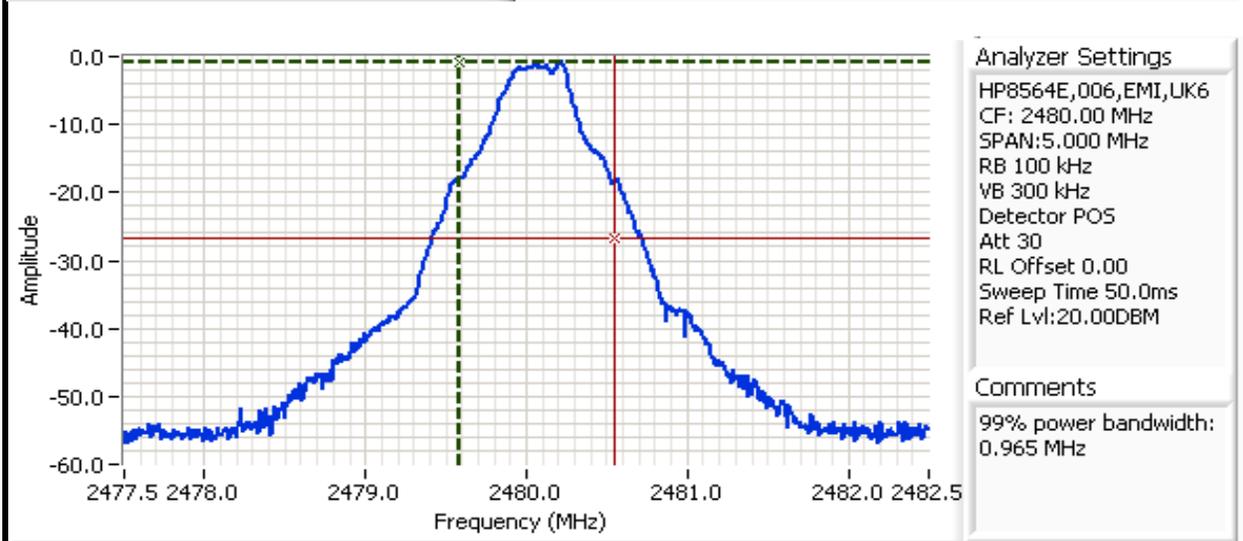
Delta Freq. 0.965

Delta Amplitude 26.00

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A

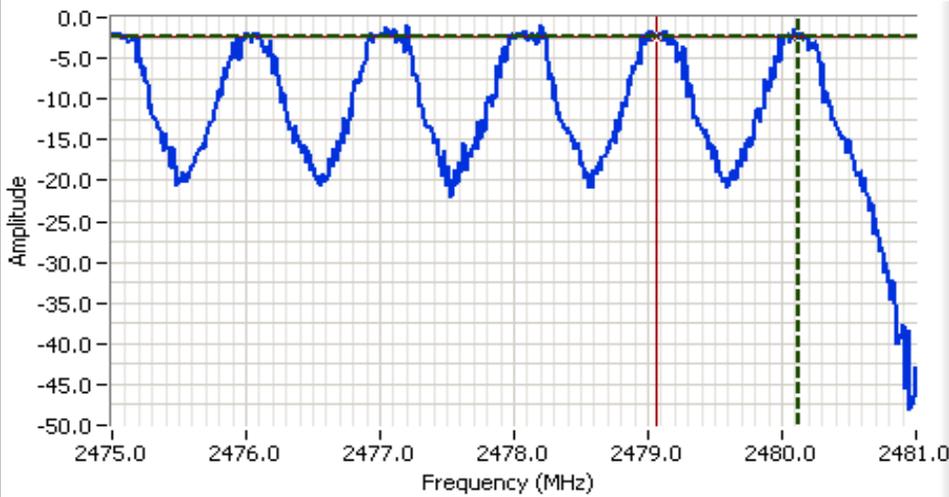


Cursor 1	2480.54	-2.17		Delta Freq.	0.942	
Cursor 2	2479.60	-22.17		Delta Amplitude	20.00	



Cursor 1	2479.58	-0.83		Delta Freq.	0.965	
Cursor 2	2480.54	-26.83		Delta Amplitude	26.00	

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A



Analyzer Settings

- HP8564E,006,EMI,UK6
- CF: 2478.00 MHz
- SPAN:6.000 MHz
- RB 100 kHz
- VB 100 kHz
- Detector POS
- Att 30
- RL Offset 0.00
- Sweep Time 50.0ms
- Ref Lvl:20.00DBM

Comments

Channel Separation

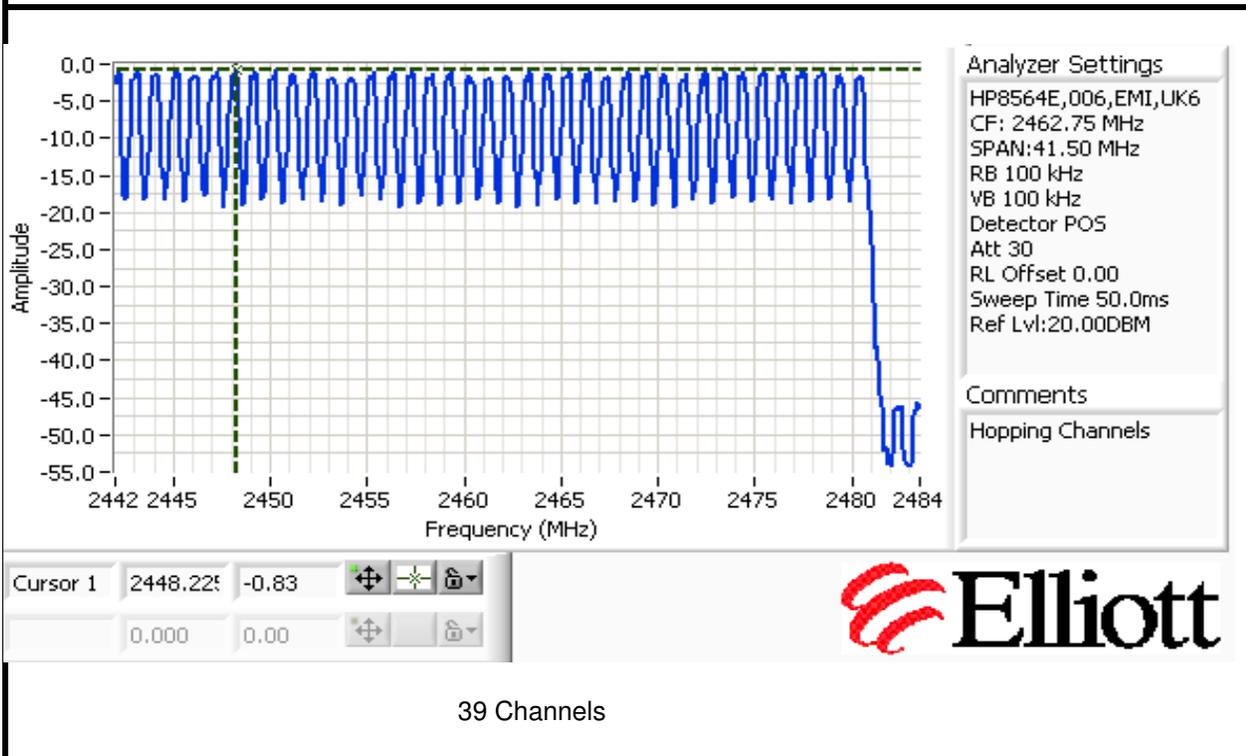
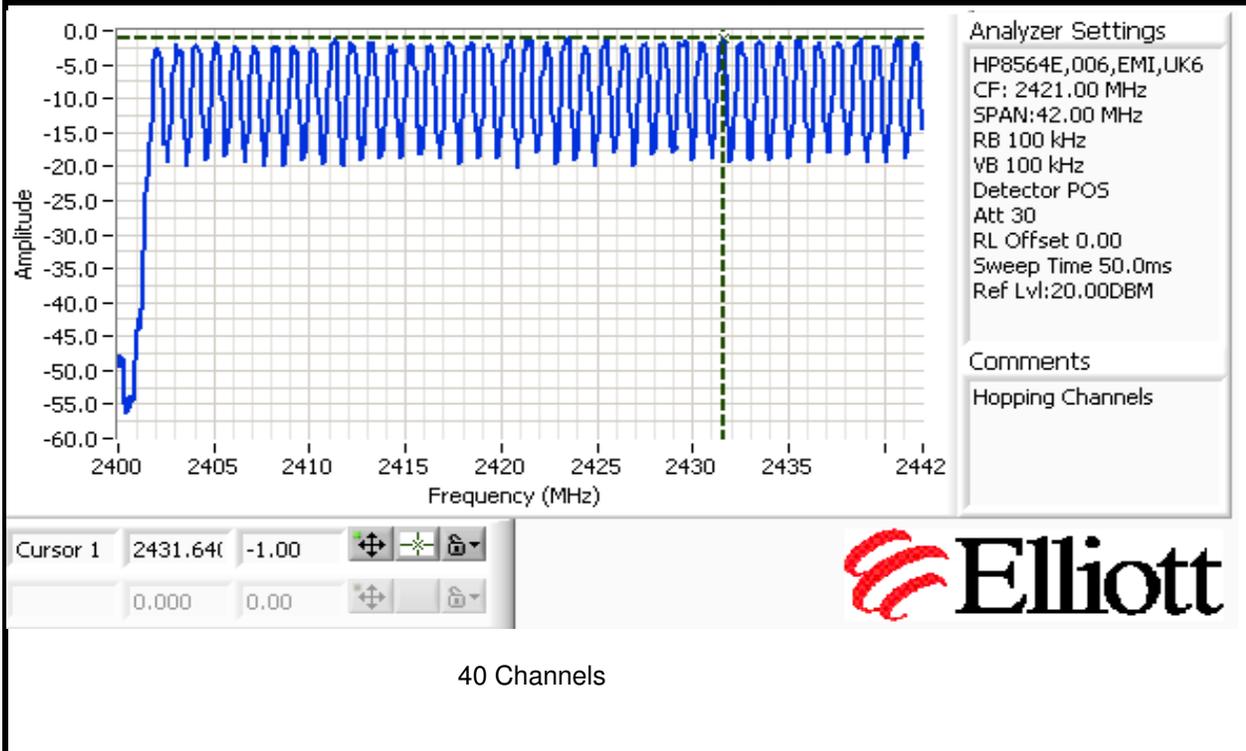
Cursor 1	2480.12	-2.33	
Cursor 2	2479.06	-2.33	

Delta Freq. 1.060

Delta Amplitude 0.00



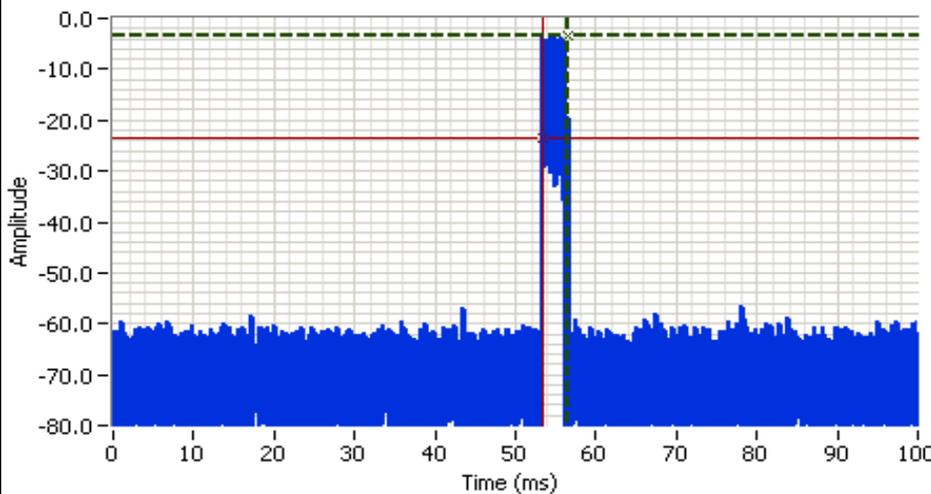
Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A



Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
	Account Manager: Dean Erikson
Contact: David Boldy	
Standard: -	Class: N/A

Frequency hopping systems in the **2400-2483.5 MHz** band shall use at least 15 channels.
 The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. (Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.)
 The channel dwell time is calculated from the transmit time on a channel multiplied by the number of times a channel could be used in a period of 0.4 times the number of channels, N (i.e. $0.4N$ divided by the time between successive hops, rounded up to the closest integer), unless the time between successive hops exceeds $0.4N$, in which case the channel dwell time is the transmit time on a channel.

The channel spacing was: 975 kHz
 The transmit time on a single channel per transmission: 3 ms
 The time between successive hops on a channel was: 300 ms
 The number of channels was: 79
 Channel dwell time in 31.6 seconds is: 0.400 s
 Channel dwell time in 0.4 seconds multiplied by the number of channels (79) is: 0.4 s



Analyzer Settings

HP8564E,006,EMI,UK6
 CF: 2480.00 MHz
 SPAN:0.00 MHz
 RB 30 kHz
 VB 100 kHz
 Detector Normal
 Att 30
 RL Offset 0.00
 Sweep Time 100.0ms
 Ref Lvl:20.00DBM

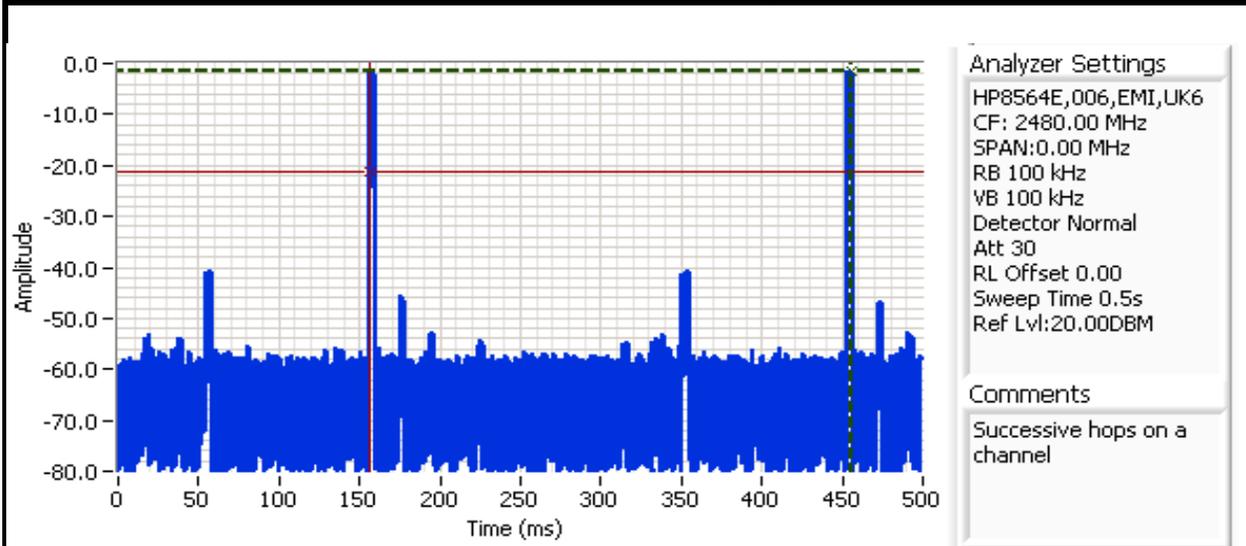
Comments

Transmission time per hop

Cursor 1	56.500	-3.50		Delta Time (ms)	3.00
Cursor 2	53.500	-23.50		Delta Amplitude	20.00



Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66411
Contact: David Boldy	Account Manager: Dean Erikson
Standard: -	Class: N/A



Analyzer Settings
 HP8564E,006,EMI,UK6
 CF: 2480.00 MHz
 SPAN:0.00 MHz
 RB 100 kHz
 VB 100 kHz
 Detector Normal
 Att 30
 RL Offset 0.00
 Sweep Time 0.5s
 Ref Lvl:20.00DBM

Comments
 Successive hops on a channel

Cursor 1	455.833	-1.33	+	-	+	-	Delta Time (ms)	300.00
Cursor 2	155.833	-21.33	+	-	+	-	Delta Amplitude	20.00





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	Test-Log Number:	T66468
		Project Manager:	Dean Erikson
Contact:	David Boldy		
Emissions Spec:	EN 300 328	Class:	-
Immunity Spec:	EN 301 489-17	Environment:	Radio

EMC Test Data

For The

Hewlett Packard Company

Model

RSVLD-0602

Date of Last Test: 1/9/2007



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	Test-Log Number:	T66468
		Project Manager:	Dean Erikson
Contact:	David Boldy		
Emissions Spec:	EN 300 328	Class:	-
Immunity Spec:	EN 301 489-17	Environment:	Radio

EUT INFORMATION

The following information was collected during the test sessions(s).

General Description

The EUT is a bluetooth module that is designed to be installed in a printer. Since the printer would be placed on a table top during operation, the EUT was treated as table-top equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 5 Volts.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Hewlett Packard	RSVLD-0602	Bluetooth module	-	

Other EUT Details

The following EUT details should be noted: _____

EUT Antenna (Intentional Radiators Only)

The EUT antenna is printed on the PCB. Gain is 2dBi.

EUT Enclosure

The EUT does not have an enclosure as it is designed to be installed within the enclosure of a printer.

Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66468
Contact:	David Boldy	Project Manager:	Dean Erikson
Emissions Spec:	EN 300 328	Class:	-
Immunity Spec:	EN 301 489-17	Environment:	Radio

Test Configuration #1

The following information was collected during the test sessions(s).

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Dell	PP01L	Laptop	71K9821	-
HP	HP Photosmart 8100	Printer	-	-

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None	-	-	-	-

Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Printer	AC Mains	Three Wire	Shielded	2.0
USB	Laptop USB	Multiwire	Shielded	2.0
Laptop AC Power	AC Mains	Three Wire	Unshielded	1.2
Laptop DC Power	Laptop PS	Two wire	Unshielded	2.0

EUT Operation During Emissions Tests

During emissions testing the EUT was set to transmit continuously on the selected channel in either 8PSK or GFSK modulation.

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66468
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Spec:	EN 300 328	Class:	-

Conducted Emissions - Power Ports

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 1/3/2007 18:56
 Test Engineer: Rafael Varelas
 Test Location: SVOATS #2

Config. Used: 1
 Config Change: None
 EUT Voltage: Refer to individual runs

General Test Configuration

The host system was located on a wooden table, 40 cm from a vertical coupling plane and 80cm from the LISN. Remote support equipment was located approximately 30 meters from the test area.

Ambient Conditions: Temperature: 14 °C
 Rel. Humidity: 72 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	EN55022 Class B	Pass	47.1dBµV @ 0.190MHz (-6.9dB)
2	CE, AC Power, 120V/60Hz	EN55022 Class B	Pass	53.1dBµV @ 0.178MHz (-1.5dB)

Modifications Made During Testing:

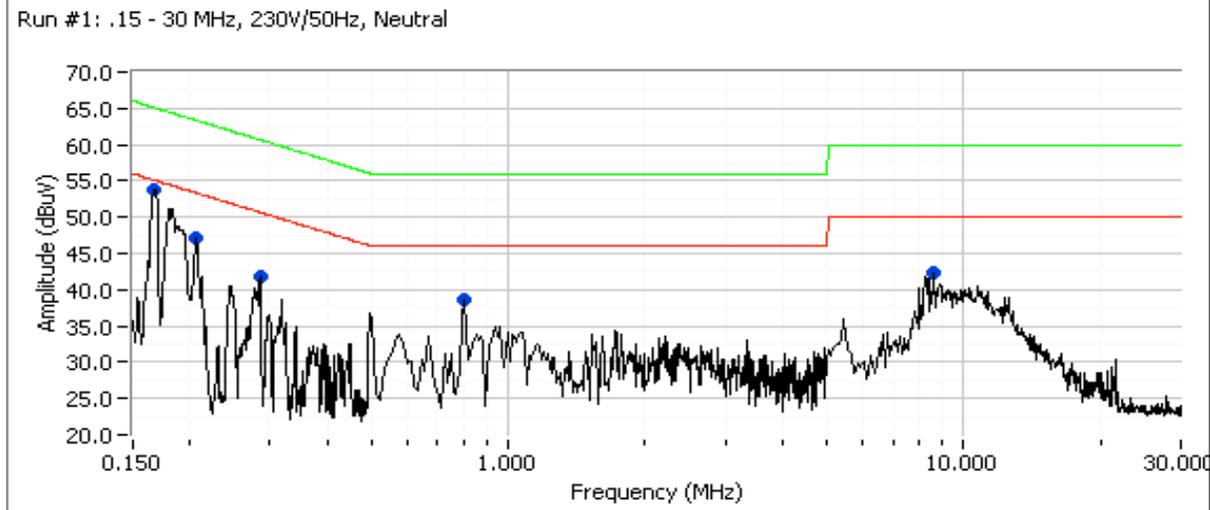
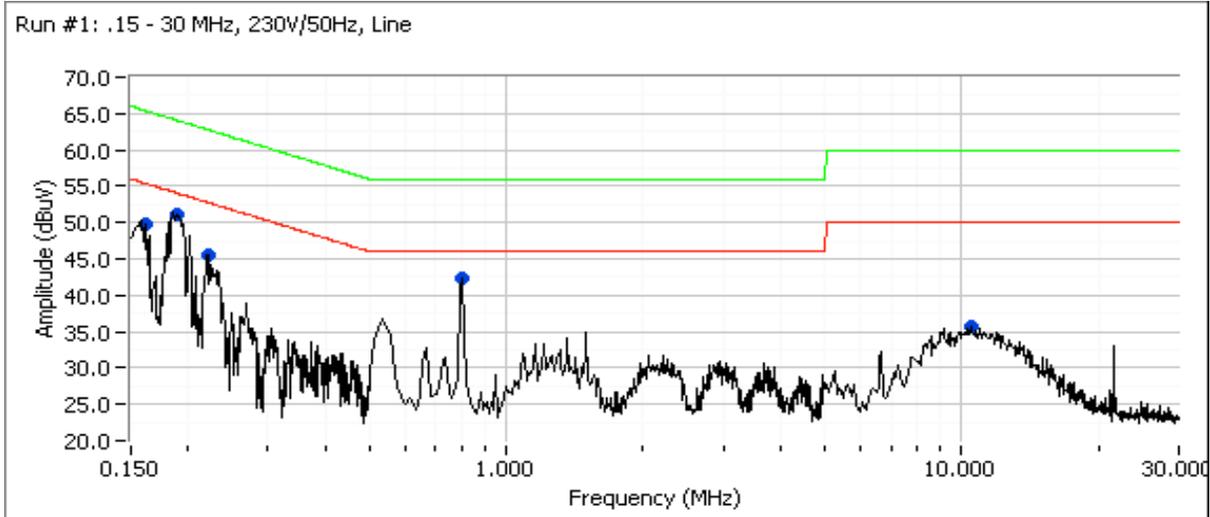
No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66468
Contact: David Boldy	Account Manager: Dean Erikson
Spec: EN 300 328	Class: -

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66468
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Spec:	EN 300 328	Class:	-

Run #1: Continued

Preliminary Readings

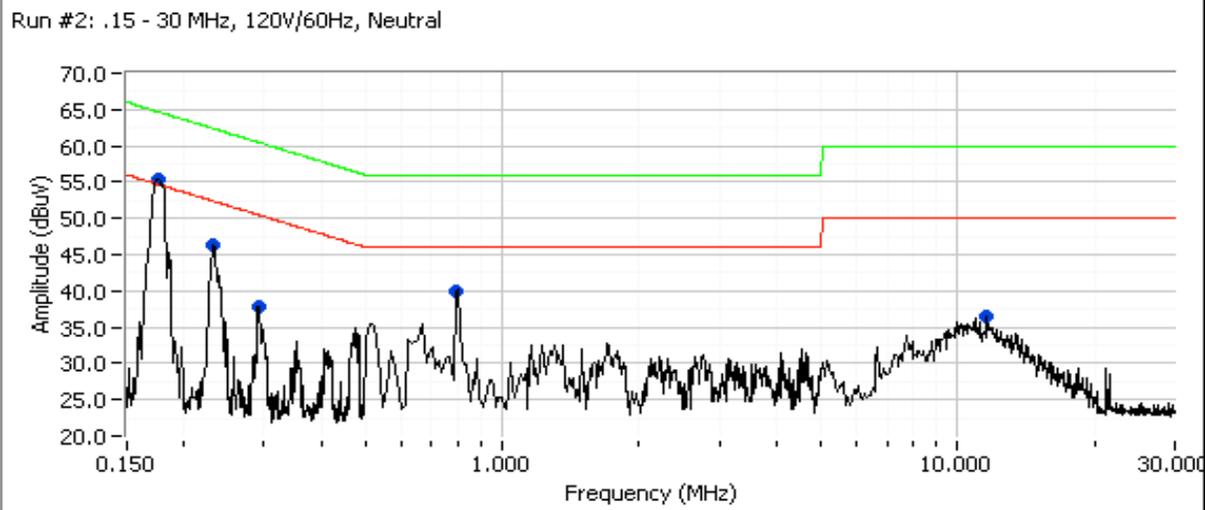
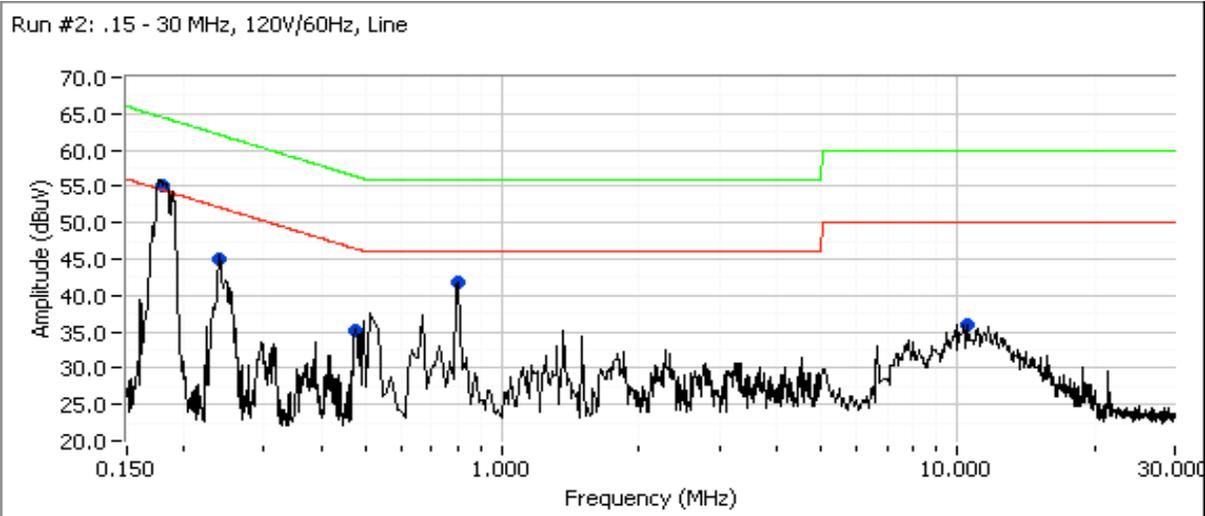
Frequency MHz	Level dB μ V	AC Line	EN55022 B		Detector QP/Ave	Comments
			Limit	Margin		
0.161	49.9	Line 1	55.4	-5.5	Peak	
0.190	51.2	Line 1	54.0	-2.8	Peak	
0.222	45.5	Line 1	52.8	-7.3	Peak	
0.811	42.3	Line 1	46.0	-3.7	Peak	
10.582	35.6	Line 1	50.0	-14.4	Peak	
0.166	53.9	Neutral	55.1	-1.2	Peak	
0.207	47.1	Neutral	53.3	-6.2	Peak	
0.284	41.7	Neutral	50.7	-9.0	Peak	
0.809	38.5	Neutral	46.0	-7.5	Peak	Ambient
8.804	42.4	Neutral	50.0	-7.6	Peak	

Maximized Readings

Frequency MHz	Level dB μ V	AC Line	EN55022 B		Detector QP/Ave	Comments
			Limit	Margin		
0.190	47.1	Line 1	54.0	-6.9	Average	
0.155	46.2	Neutral	55.7	-9.5	Average	
0.153	45.7	Line 1	55.8	-10.1	Average	
0.190	50.3	Line 1	64.0	-13.7	QP	
0.189	40.2	Neutral	54.1	-13.9	Average	
0.155	50.8	Neutral	65.7	-14.9	QP	
0.222	37.5	Line 1	52.7	-15.2	Average	
0.153	49.1	Line 1	65.8	-16.7	QP	
0.189	43.6	Neutral	64.1	-20.5	QP	
0.222	41.5	Line 1	62.7	-21.2	QP	
8.804	27.6	Neutral	50.0	-22.4	Average	
8.804	32.7	Neutral	60.0	-27.3	QP	

Client: Hewlett Packard Company	Job Number: J66410
Model: RSVLD-0602	T-Log Number: T66468
Contact: David Boldy	Account Manager: Dean Erikson
Spec: EN 300 328	Class: -

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J66410
Model:	RSVLD-0602	T-Log Number:	T66468
		Account Manager:	Dean Erikson
Contact:	David Boldy		
Spec:	EN 300 328	Class:	-

Run #2: Continued

Preliminary Readings

Frequency MHz	Level dB μ V	AC Line	EN55022 B		Detector QP/Ave	Comments
			Limit	Margin		
0.178	55.1	Line 1	54.5	0.6	Peak	
0.238	45.0	Line 1	52.1	-7.1	Peak	
0.478	35.2	Line 1	46.4	-11.2	Peak	
0.811	41.9	Line 1	46.0	-4.1	Peak	Ambient
10.569	36.0	Line 1	50.0	-14.0	Peak	
0.175	55.5	Neutral	54.7	0.8	Peak	
0.233	46.3	Neutral	52.4	-6.1	Peak	
0.291	37.9	Neutral	50.5	-12.6	Peak	
0.811	40.0	Neutral	46.0	-6.0	Peak	Ambient
11.607	36.4	Neutral	50.0	-13.6	Peak	

Maximized Readings

Frequency MHz	Level dB μ V	AC Line	EN55022 B		Detector QP/Ave	Comments
			Limit	Margin		
0.178	53.1	Line 1	54.6	-1.5	Average	
0.175	52.7	Neutral	54.7	-2.0	Average	
0.178	55.0	Line 1	64.6	-9.6	QP	
0.175	54.5	Neutral	64.7	-10.2	QP	
0.238	40.3	Line 1	52.2	-11.9	Average	
0.233	39.5	Neutral	52.4	-12.9	Average	
0.233	44.3	Neutral	62.4	-18.1	QP	
0.478	27.8	Line 1	46.4	-18.6	Average	
0.238	42.9	Line 1	62.2	-19.3	QP	
0.478	33.9	Line 1	56.4	-22.5	QP	
0.291	35.6	Neutral	60.5	-24.9	QP	
0.291	24.8	Neutral	50.5	-25.7	Average	

Note 1: The Host system power supply was placed on the ground since the power cable was less than 80cm.

EXHIBIT 3: Photographs of Test Configurations

2 Pages

EXHIBIT 4: Proposed FCC ID Label & Label Location

***EXHIBIT 5: Detailed Photographs
of Hewlett Packard Company Model RSVLD-0602 Construction***

2 Pages

EXHIBIT 6: Operator's Manual
for Hewlett Packard Company Model RSVLD-0602

12 Pages

***EXHIBIT 7: Block Diagram
of Hewlett Packard Company Model RSVLD-0602***

1 Page

EXHIBIT 8: Schematic Diagrams
for Hewlett Packard Company Model RSVLD-0602

1 Page

***EXHIBIT 9: Theory of Operation
for Hewlett Packard Company Model RSVLD-0602***

2 Pages

EXHIBIT 10: RF Exposure Information

Antenna Report 2 Pages
IC Exposure DoC 2 Pages
MPE 1 Page