

EMC Test Report

Application for Grant of Equipment Authorization

Industry Canada RSS-Gen Issue 4 / RSS 210 Issue 8 FCC Part 15 Subpart C

Model: SDGOB1503

IC CERTIFICATION #: 466D-SDGOB1503
FCC ID: B94SDGOB1503

APPLICANT: Hewlett Packard Company
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Palo Alto, CA 94304

TEST SITE(S): National Technical Systems - Silicon Valley
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Fremont, CA. 94538-2435

IC SITE REGISTRATION #: 2845B-3; 2845B-4, 2845B-5, 2845B-7

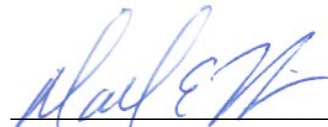
REPORT DATE: April 17, 2015

REISSUE DATE: May 5, 2015

FINAL TEST DATES: March 2, 3, 4, 6, 10, 13, 14, 16, 17, 25 and 27,
2015

TOTAL NUMBER OF PAGES: 137

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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	April 17, 2015	First release	
1.0	May 5, 2015	Clarified spurious emissions and output power measurement procedure. Fixed standard references.	MEH

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SCOPE

An electromagnetic emissions test has been performed on the Hewlett Packard Company model SDGOB1503, pursuant to the following rules:

Industry Canada RSS-Gen Issue 4
RSS 210 Issue 8 “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 National Technical Systems - Silicon Valley test procedures:

ANSI C63.10-2009
FCC DTS Measurement Guidance KDB558074

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.

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 SDGOB1503 complied with the requirements of the following regulations:

Industry Canada RSS-Gen Issue 4
RSS 210 Issue 8 "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 modifications to the product should be assessed to determine their potential impact on the compliance status of the device with respect to the standards detailed in this test report.

The test results recorded herein are based on a single type test of Hewlett Packard Company model SDGOB1503 and therefore apply only to the tested sample. The sample was selected and prepared by Sachin Sawalapurkar of Broadcom Corporation on behalf of Hewlett Packard Company

DEVIATIONS FROM THE STANDARDS

No deviations were made from the published requirements listed in the scope of this report.

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz) – Wifi Operation

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	8.03 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems) WiFi Internal	11b: 20.4dBm (109.6mW) 11g: 18.5dBm (70.8mW) n20: 18.5dBm (70.8mW) EIRP = 0.195 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems) WiFi External	11b: 20.4 dBm (109.6mW) 11g: 18.5dBm (70.8mW) n20: 18.5dBm (70.8mW) EIRP = 0.129 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 210 A8.2 (2)	Power Spectral Density	4.9 dBm/10kHz	8dBm/3kHz	Complies
15.247(d)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions are 30dB below the limit	< -30dBc	Complies
15.247(d) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.8 dBμV/m @ 2488.7 MHz (-0.2 dB)	15.209 in restricted bands, all others <-30dBc	Complies
Note 1: EIRP calculated using antenna gain of 2.5 dBi for the internal antenna and 0.7dBi for the external antenna					

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz) – BLE Operation

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 210 A8.2	Digital Modulation	Systems uses DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 210 A8.2 (1)	6dB Bandwidth	795 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems) BLE	1.8 dBm (1.5mW) EIRP = 0.003 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 210 A8.2 (2)	Power Spectral Density	-8.2 dBm/3kHz	8dBm/3kHz	Complies
15.247(d)	RSS 210 A8.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All emissions are 20dB below the limit	< -20dBc	Complies
15.247(d) / 15.209	RSS 210 A8.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.9 dBμV/m @ 4803.9 MHz (-0.1 dB)	15.209 in restricted bands, all others < -20dBc	Complies
Note 1: EIRP calculated using antenna gain of 2.5 dBi for the internal antenna and 0.7dBi for the external antenna					

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Internal antenna or u.FL connector for the external antenna option	Unique or integral antenna required	Complies
15.207	RSS GEN Table 3	AC Conducted Emissions	49.9 dBμV @ 0.156 MHz (-15.8 dB)	Refer to page 21	Complies
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in separate exhibit, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSP 100 RSS GEN 6.6	Occupied Bandwidth	11b: 12.3MHz 11g: 16.9MHz n20: 17.8MHz BLE: 1.168 MHz	Information only	N/A

MEASUREMENT UNCERTAINTIES

ISO/IEC 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	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	dB μ V/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dB μ V	0.15 to 30 MHz	± 2.4 dB

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

The Hewlett Packard Company model SDGOB1503 is an 802.11bgn + BLE module that uses a USB interface. Since the EUT would be placed on a tabletop during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The EUT is powered from a host device.

The sample was received on March 2, 2015 and tested on March 2, 3, 4, 6, 10, 13, 14, 16, 17, 25 and 27, 2015. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Hewlett Packard	SDGOB1503	802.11bgn + BLE module	2C337A9996DB	B94SDGOB1503
Hewlett Packard	SDGOB1503	802.11bgn + BLE module	2C337A999621	B94SDGOB1503
Hewlett Packard	SDGOB1503	802.11bgn + BLE module	2C337A99973D	B94SDGOB1503

OTHER EUT DETAILS

The following EUT details should be noted:

USB Module

Wifi + BLE operation supported

Wifi operation 2.4GHz band only

802.11 b/g/n20 1x1 operation

BT Low Energy only

WiFi+BT simultaneous Tx supported (Wifi on Main / BT on Aux)

Two configurations: one using fixed internal/onboard antennas, and one with u.FL connectors to allow for external antennas.

ANTENNA SYSTEM

Internal antenn, pcb trace, 2.5dBi

External antenna, Yageo, ANT300P002B24553, 0.7dBi

ENCLOSURE

The EUT has no enclosure. It is designed to be installed within the enclosure of a host computer.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Silicon Valley.

SUPPORT EQUIPMENT (RF Testing)

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Dell	G560	Laptop Computer	CB06427462	-
Broadcom	-	USB Fixture	-	-

No remote support equipment was used during testing.

SUPPORT EQUIPMENT (AC Conducted Emissions)

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Broadcom	UltraBlue System	Test Computer	-	-
logitech	K120	Keyboard	None	-
Wise Wing	F199	Monitor	None	-
Microsoft	1020	Mouse	SC20817	-

The following remote support equipment was used during testing:

Company	Model	Description	Serial Number	FCC ID
Netgear	DS104	Hub	None	-

EUT INTERFACE PORTS (RF Testing)

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
EUT	Fixture	Direct Connection	-	-
USB Fixture	Laptop	Multiconductor	Shielded	1.5

EUT INTERFACE PORTS (AC Conducted Emissions)

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

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
USB	Mouse	USB	Shielded	0.5
HDMI	Monitor	HDMI/DVI	Shielded	1.0
USB	Keyboard	USB	Shielded	0.5
Ethernet	Remote Hub	RJ-45	Unshielded	5.0
Power / AC adapter	AC Mains	3Wire	Unshielded	0.8
AC/DC adapter	Test Computer	2Wire	Unshielded	0.5
Power / Monitor	AC Mains	3Wire	Unshielded	1.0

EUT OPERATION

During testing, the EUT was configured to continuously transmit at maximum output power and noted data rate on the channel indicated. For AC conducted emissions, the EUT was configured to transmit on channel 11, 802.11b mode, 1Mb/s, maximum power and BLE channel 0.

TEST SITE**GENERAL INFORMATION**

Final test measurements were taken at the test sites listed below. 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 and with industry Canada.

Site	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 5	US0027	2845B-5	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain 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.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.10. 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 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 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 C63.10 specifies 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 as specified in ANSI C63.4. 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 C63.10, 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.

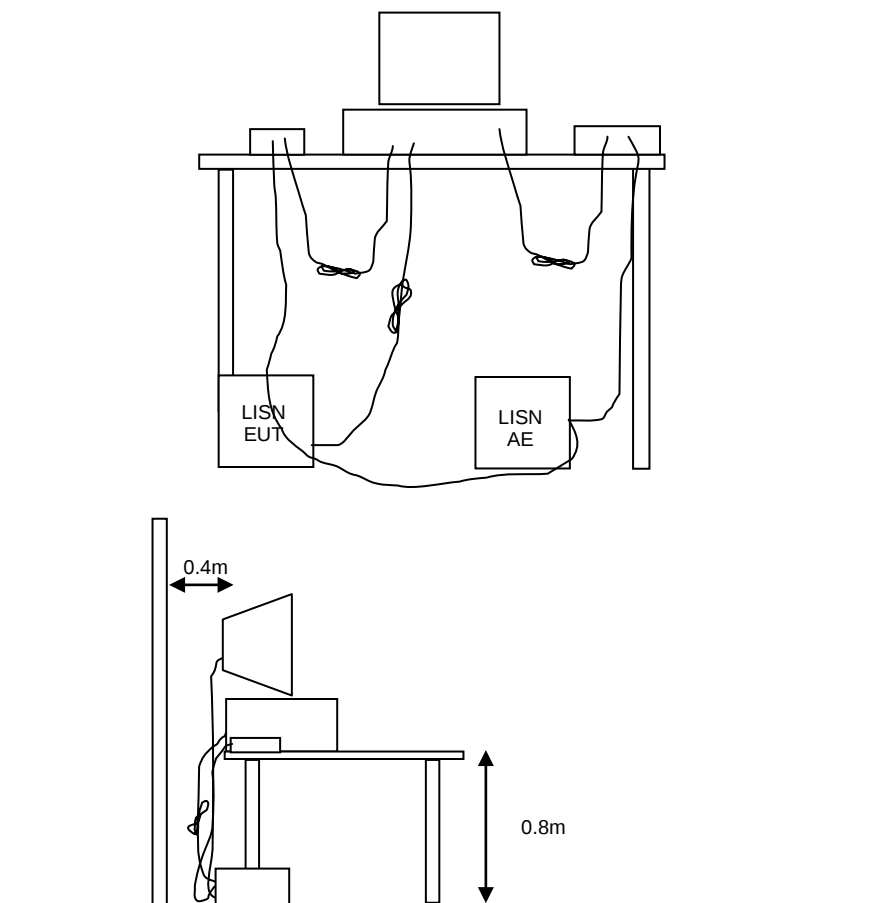


Figure 1 Typical Conducted Emissions Test Configuration

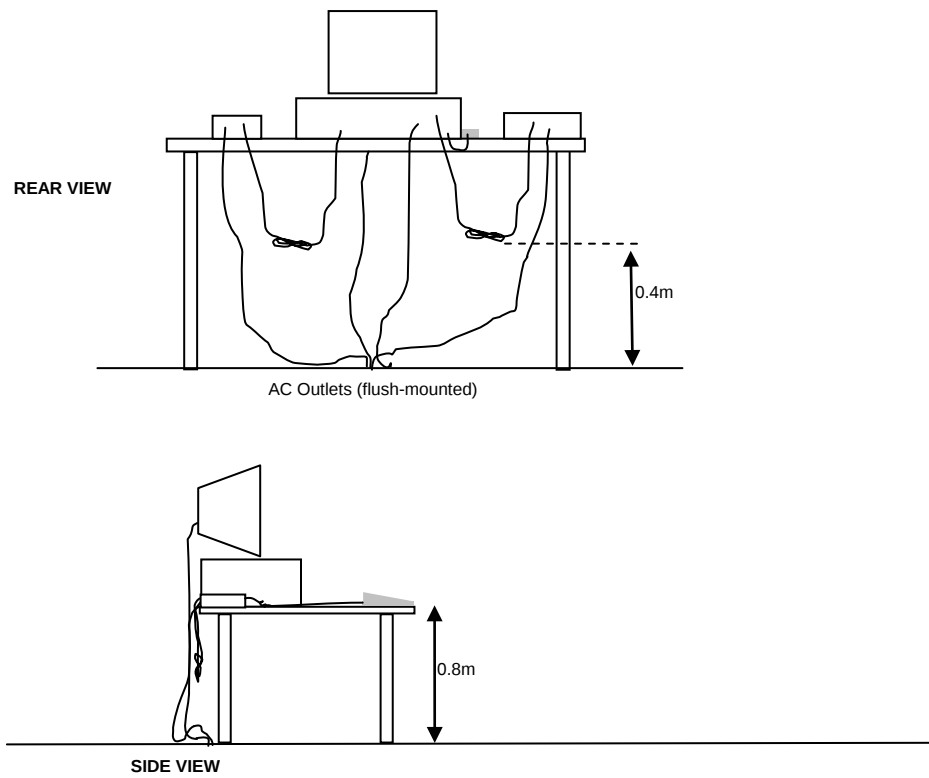
RADIATED EMISSIONS

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.

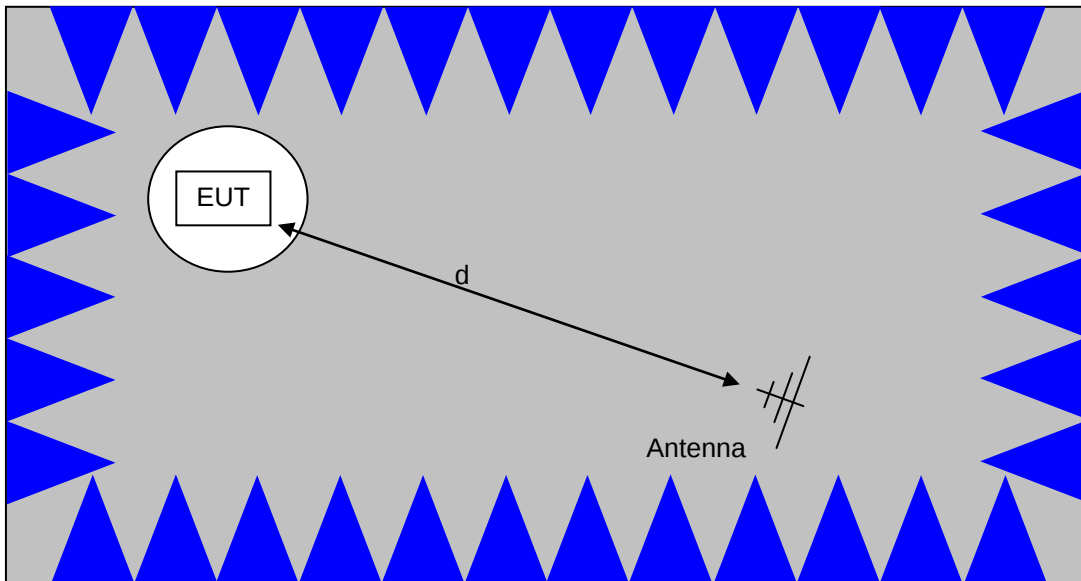
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

When testing above 18 GHz, the receive antenna is located at 1meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

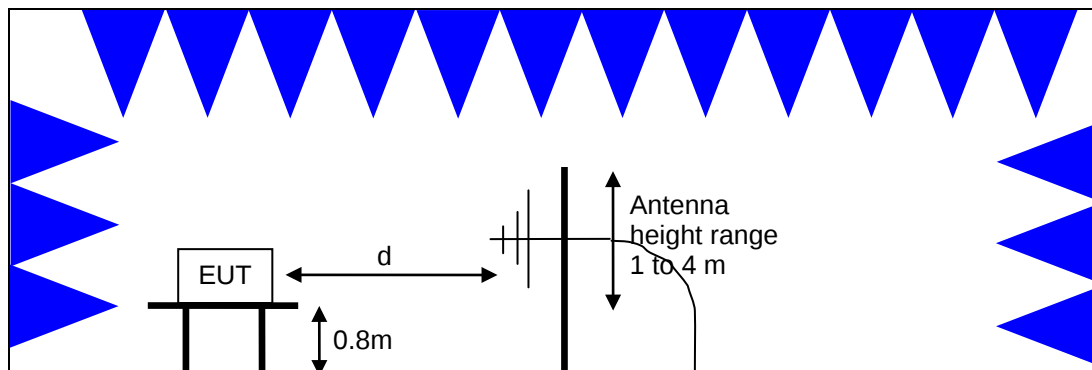


Typical Test Configuration for Radiated Field Strength Measurements



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.

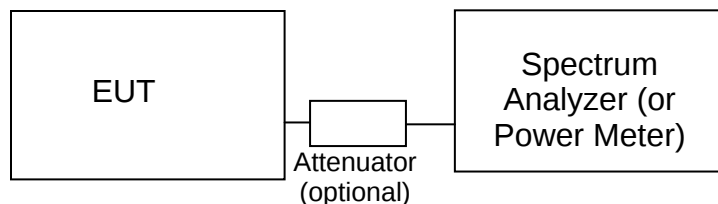
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements of power, bandwidth and power spectral density are performed, where possible, with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

**Test Configuration for Antenna Port Measurements**

Measurement bandwidths (video and resolution) are set in accordance with the relevant standards and NTS Silicon Valley's test procedures for the type of radio being tested. When power measurements are made using a resolution bandwidth less than the signal bandwidth the power is calculated by summing the power across the signal bandwidth using either the analyzer channel power function or by capturing the trace data and calculating the power using software. In both cases the summed power is corrected to account for the equivalent noise bandwidth (ENBW) of the resolution bandwidth used.

If power averaging is used (typically for certain digital modulation techniques), the EUT is configured to transmit continuously. Power averaging is performed using either the built-in function of the analyzer or, if the analyzer does not feature power averaging, using external software. In both cases the average power is calculated over a number of sweeps (typically 100). When the EUT cannot be configured to continuously transmit then either the analyzer is configured to perform a gated sweep to ensure that the power is averaged over periods that the device is transmitting or power averaging is disabled and a max-hold feature is used.

If a power meter is used to make output power measurements the sensor head type (peak or average) is stated in the test data table.

BANDWIDTH MEASUREMENTS

The 6dB, 20dB, 26dB and/or 99% signal bandwidth are measured using the bandwidths recommended by ANSI C63.10 and 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:

CONDUCTED EMISSIONS SPECIFICATION LIMITS: FCC 15.207; FCC 15.107(a), RSS GEN

The table below shows the limits for the emissions on the AC power line from an intentional radiator and a receiver.

Frequency (MHz)	Average Limit (dBuV)	Quasi Peak Limit (dBuV)
0.150 to 0.500	Linear decrease on logarithmic frequency axis between 56.0 and 46.0	Linear decrease on logarithmic frequency axis between 66.0 and 56.0
0.500 to 5.000	46.0	56.0
5.000 to 30.000	50.0	60.0

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	$2400/F_{\text{KHz}} @ 300\text{m}$	$67.6-20*\log_{10}(F_{\text{KHz}}) @ 300\text{m}$
0.490-1.705	$24000/F_{\text{KHz}} @ 30\text{m}$	$87.6-20*\log_{10}(F_{\text{KHz}}) @ 30\text{m}$
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

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.

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).

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

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:

$$F_d = 20 * \log_{10} (D_m/D_s)$$

where:

F_d = Distance Factor in dB

D_m = Measurement Distance in meters

D_s = 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:

$$F_d = 40 * \log_{10} (D_m/D_s)$$

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 = Receiver Reading in dBuV/m

F_d = Distance Factor in dB

R_C = Corrected Reading in dBuV/m

L_S = Specification Limit in dBuV/m

M = 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 d (meters) from the equipment under test:

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

where P is the eirp (Watts)

For a measurement at 3m the conversion from a logarithmic value for field strength (dBuV/m) to an eirp power (dBm) is -95.3dB.

Appendix A Test Equipment Calibration Data

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Radiated Emissions, 1000 - 18,000 MHz, 02-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Radiated Emissions, 1000 - 12,000 MHz, 03-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Radiated Emissions, 1000 - 25,000 MHz, 04-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Hewlett Packard	Head (Inc flex cable, (1742,1743) Blue)	84125C	1620	5/6/2014	5/6/2015
A. H. Systems	Spare System Horn, 18-40GHz	SAS-574, p/n: 2581	2162	7/24/2014	7/24/2015
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039	1767	11/14/2014	11/14/2015
Radiated Emissions, 1,000 - 26,000 MHz, 06-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
Hewlett Packard	Head (Inc flex cable, (1742,1743) Blue)	84125C	1620	5/6/2014	5/6/2015
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1742	5/6/2014	5/6/2015
Hewlett Packard	HF Amplifier, 45 MHz -50 GHz (with 1620)	83051A (84125C)	1743	5/6/2014	5/6/2015
A. H. Systems	Spare System Horn, 18-40GHz	SAS-574, p/n: 2581	2162	7/24/2014	7/24/2015



<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Radiated Emissions, 1000 - 8,000 MHz, 10-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
Radiated Emissions, 1000 - 25,000 MHz, 13-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/27/2014	6/27/2016
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Radiated Emissions, 1,000 - 25,000 MHz, 14-Mar-15					
Hewlett Packard	Head (Inc W1-W4, 1946 , 1947) Purple	84125C	1772	1/20/2015	1/20/2016
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/11/2014	8/11/2015
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	2199	2/20/2015	2/20/2016
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	3/7/2015	3/7/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	2870	8/20/2013	8/20/2015
Radiated Spurious Emissions, 1000 - 12,000 MHz, 16-Mar-15					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	3/25/2014	3/25/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/27/2014	6/27/2016
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	2238	9/16/2014	9/16/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Radio Antenna Port (Power and Spurious Emissions), 17-Mar-15					
Agilent Technologies	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	4/8/2014	4/8/2015
Radio Antenna Port (Power and Spurious Emissions), 25-Mar-15					
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	1/22/2015	1/22/2016
Rohde & Schwarz	Power Sensor 100 uW - 2 Watts (w/ 20 dB pad, SN BJ5155)	NRV-Z32	1536	1/15/2015	1/15/2016
Rohde & Schwarz	Signal Analyzer 20 Hz - 26.5 GHz	FSQ26	2327	4/28/2014	4/28/2015



T97732

Conducted Emissions - AC Power Ports, 27-Mar-15

<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
EMCO	LISN, 10 kHz-100 MHz, 25A	3825/2	1292	5/24/2014	5/24/2015
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	5/15/2014	5/15/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Com-Power	9KHz-30MHz, 50uH, 15Aac, 10Adc, max	LI-215A	2672	5/24/2014	5/24/2015

Appendix B Test Data

T97680 Pages 29 – 130

T97732 Pages 131 – 136



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Product	SDGOB1503	T-Log Number:	T97680
		Project Manager:	
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Emissions Standard(s):	FCC 15.247 / RSS-210 / LP0002	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Hewlett Packard Company

Product

SDGOB1503

Date of Last Test: 3/25/2015

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Duty Cycle

Date of Test: 2/3/2015
 Test Engineer: Rafael Varelas
 Test Location: FT Chamber #5

Duty cycle measurements performed on the worse case data rate for power.

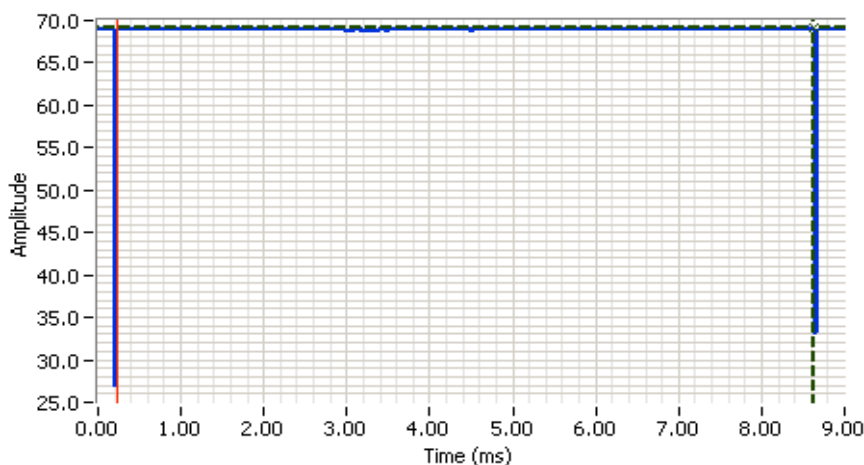
Notes: Measurements taken with maximum RBW/VBW settings allowed.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	0.995	Yes	8.459	0.0	0.0	118
11g	6Mb/s	0.980	Yes	2.866	0.1	0.2	349
n20	MCS0	0.9767	Yes	2.660	0.1	0.2	376
BLE	1Mb/s	0.6172	Yes	0.387	2.1	4.2	2584

* Correction factor when using RMS/Power averaging - $10 \cdot \log(1/x)$

** Correction factor when using linear voltage average - $20 \cdot \log(1/x)$

T = Minimum transmission duration



Analyzer Settings

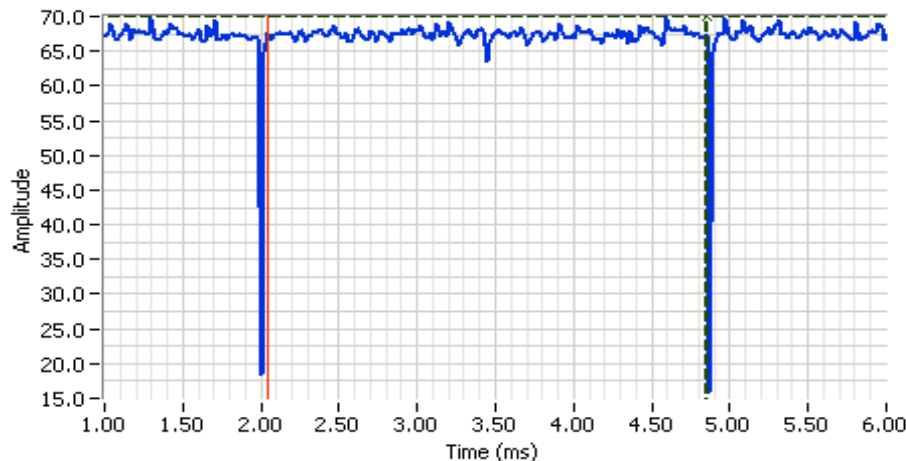
Rohde&Schwarz, ESI
 CF: 2412.000 MHz
 SPAN: 0.000 MHz
 RB: 3.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 10.0ms
 Ref Lvl: 70.0 DBUW

Comments

802.11b
 Tx Off: 0.041ms
 Tx On: 8.418ms
 Duty Cycle: 99.5%

Cursor 1	8.6392	69.08		Delta Time (ms)	8.418
Cursor 1	0.2216	0.00		Delta Amplitude	69.08

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



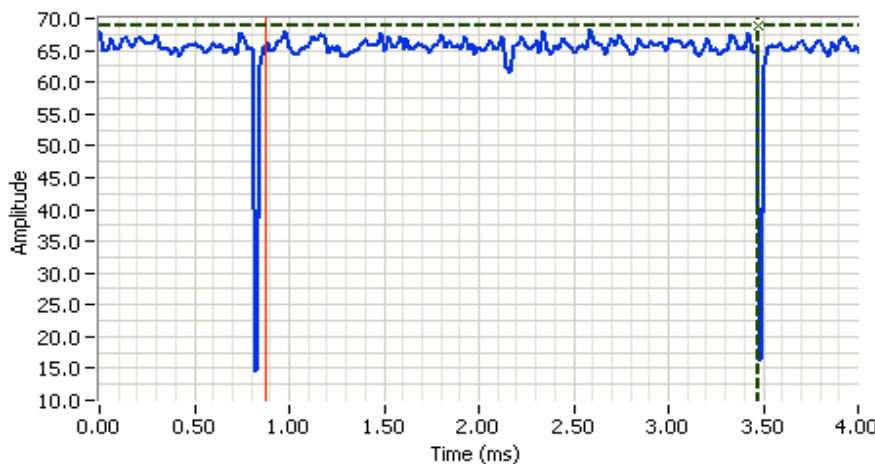
Analyzer Settings

Rohde&Schwarz, ESI
 CF: 2412.000 MHz
 SPAN: 0.000 MHz
 RB: 3.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 10.0ms
 Ref Lvl: 70.0 DBUV

Comments

802.11g
 Tx Off: 0.058ms
 Tx On: 2.808ms
 Duty Cycle: 97.9%

Cursor 1	4.8518	69.92		Delta Time (ms)	2.808
Cursor 1	2.0438	0.00		Delta Amplitude	69.92



Analyzer Settings

Rohde&Schwarz, ESI
 CF: 2412.000 MHz
 SPAN: 0.000 MHz
 RB: 3.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 10.0ms
 Ref Lvl: 70.0 DBUV

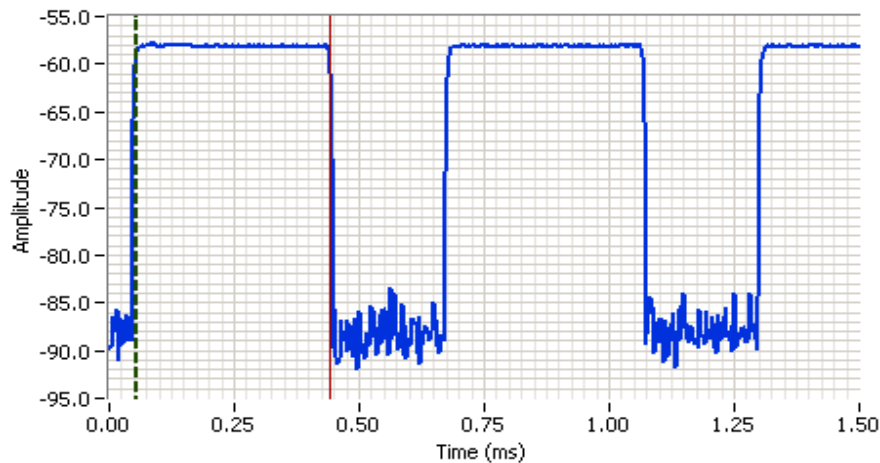
Comments

802.11n20
 Tx Off: 0.062ms
 Tx On: 2.598ms
 Duty Cycle: 97.7%

Cursor 1	3.4742	68.96		Delta Time (ms)	2.598
Cursor 1	0.8763	0.00		Delta Amplitude	68.96



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



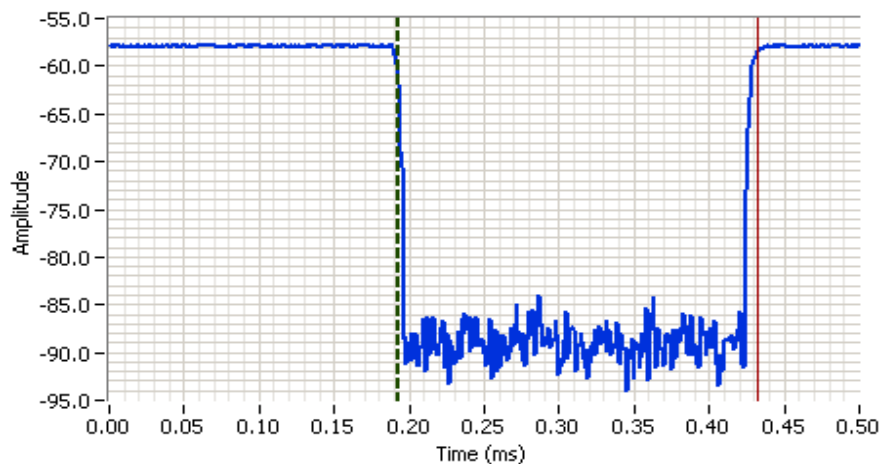
Analyzer Settings

Rohde&Schwarz, ESI
 CF: 2402.000 MHz
 SPAN: 0.000 MHz
 RB: 10.000 MHz
 VB: 10.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 1.5ms
 Ref Lvl: -50.0 DBM

Comments

BLE on time = .387 ms

Cursor 1 0.0547 -53.29
 Cursor 2 0.4414 -53.10
 Delta Time (ms) 0.387
 Delta Amplitude 0.19



Analyzer Settings

Rohde&Schwarz, ESI
 CF: 2402.000 MHz
 SPAN: 0.000 MHz
 RB: 10.000 MHz
 VB: 10.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 0.5ms
 Ref Lvl: -50.0 DBM

Comments

BLE off time = .240

Cursor 1 0.1927 -52.73
 Cursor 2 0.4323 -52.73
 Delta Time (ms) 0.240
 Delta Amplitude 0.00



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 21.6 °C
 Rel. Humidity: 38 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.6 dBµV/m @ 2371.6 MHz (-0.4 dB)
	b	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.8 dBµV/m @ 2488.7 MHz (-0.2 dB)
2	g	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.5 dBµV/m @ 2390.0 MHz (-0.5 dB)
	g	2 - 2417MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	72.2 dBµV/m @ 2389.8 MHz (-1.8 dB)
	g	3 - 2422MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.8 dBµV/m @ 2390.0 MHz (-0.2 dB)
	g	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.6 dBµV/m @ 2483.5 MHz (-0.4 dB)
	g	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.6 dBµV/m @ 2483.6 MHz (-0.4 dB)
3	n20	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	72.8 dBµV/m @ 2384.8 MHz (-1.2 dB)
	n20	2 - 2417MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	73.2 dBµV/m @ 2390.0 MHz (-0.8 dB)
	n20	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	73.3 dBµV/m @ 2484.7 MHz (-0.7 dB)
	n20	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.0 dBµV/m @ 2483.5 MHz (-1.0 dB)

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

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.

Sample Notes

Sample S/N: 2C337A999621

Driver: 6.30 RC255.0

Antenna: Internal Antenna

Pk Size: 37 1000

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	0.995	Yes	8.459	0	0	118
11g	6Mb/s	0.980	Yes	2.866	0.09	0.18	349
n20	MCS0	0.977	Yes	2.660	0.10	0.20	376

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$, peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \times (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1: Radiated Bandedge Measurements

Date of Test: 3/2/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

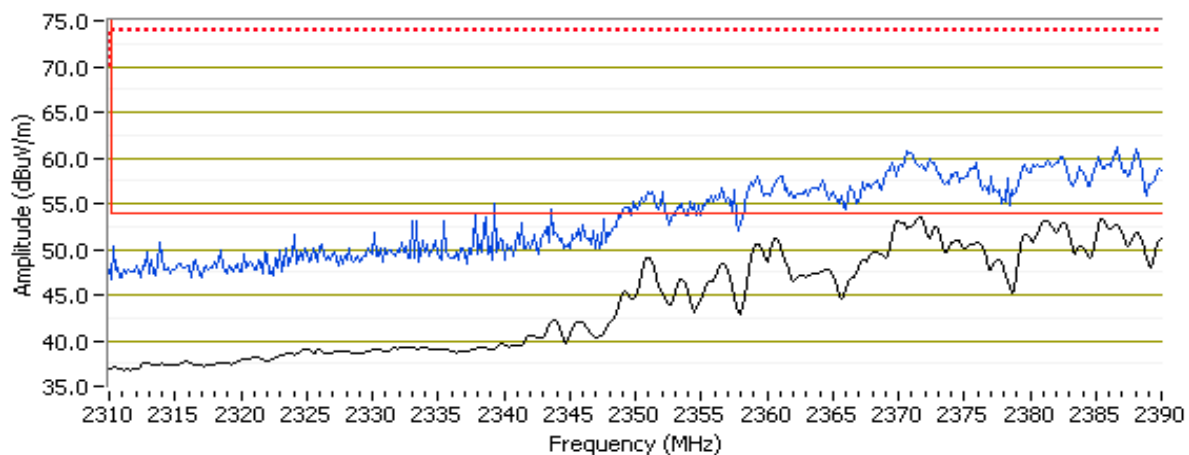
EUT Voltage: 120V/60Hz

Channel: 1 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2371.560	53.6	H	54.0	-0.4	AVG	340	1.9	POS; RB 1 MHz; VB: 10 Hz
2370.360	60.6	H	74.0	-13.4	PK	340	1.9	POS; RB 1 MHz; VB: 3 MHz
2371.560	42.3	V	54.0	-11.7	AVG	234	2.3	POS; RB 1 MHz; VB: 10 Hz
2370.760	50.3	V	74.0	-23.7	PK	234	2.3	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



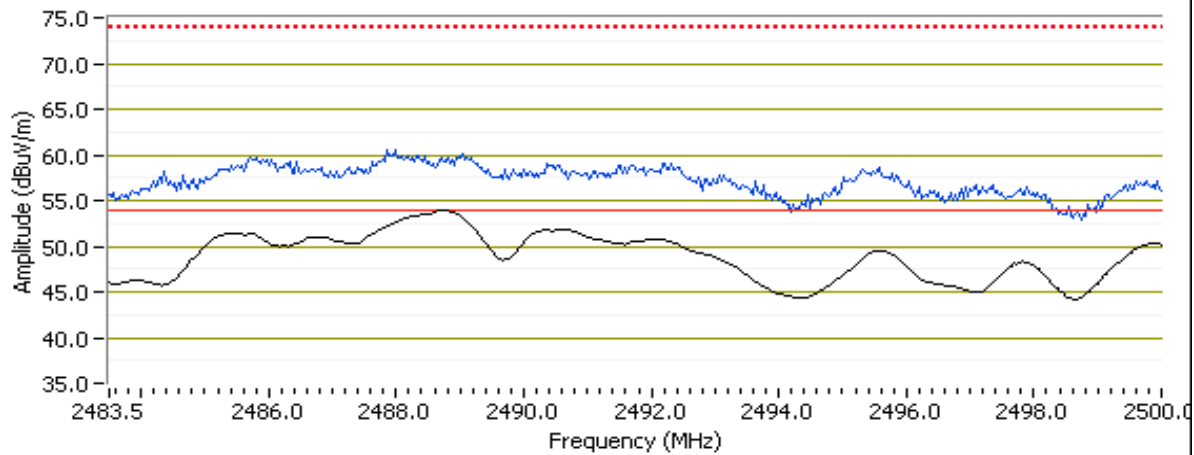
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Channel: 11 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2488.720	53.8	H	54.0	-0.2	AVG	360	1.1	POS; RB 1 MHz; VB: 10 Hz
2488.230	59.8	H	74.0	-14.2	PK	360	1.1	POS; RB 1 MHz; VB: 3 MHz
2488.760	43.3	V	54.0	-10.7	AVG	258	2.0	POS; RB 1 MHz; VB: 10 Hz
2489.090	50.5	V	74.0	-23.5	PK	258	2.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #2: Radiated Bandedge Measurements

Date of Test: 3/2/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

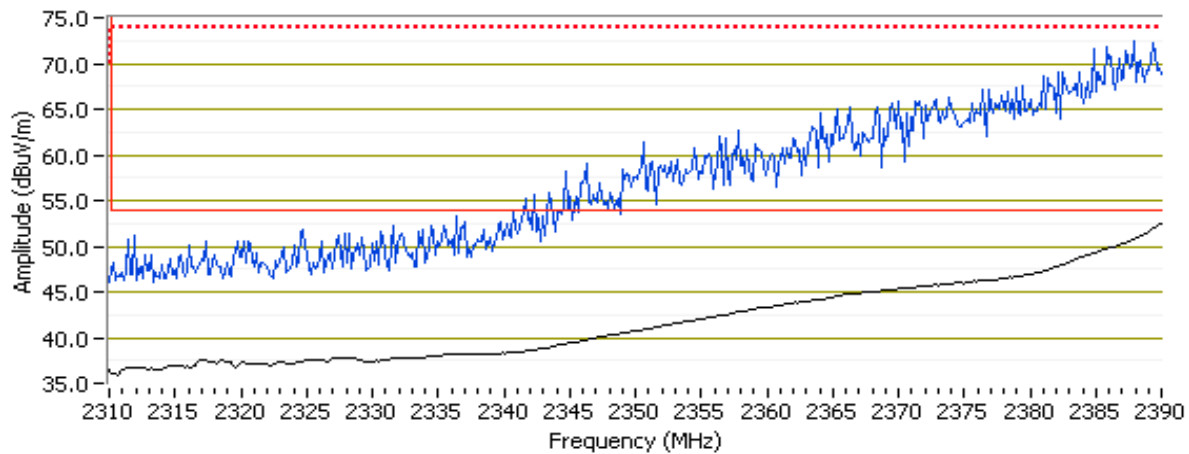
EUT Voltage: 120V/60Hz

Channel: 1 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2390.000	53.5	H	54.0	-0.5	AVG	344	1.9	Note 3,POS; RB 1 MHz; VB: 10 Hz
2388.320	73.2	H	74.0	-0.8	PK	344	1.9	POS; RB 1 MHz; VB: 3 MHz
2390.000	42.4	V	54.0	-11.6	AVG	269	2.2	Note 3,POS; RB 1 MHz; VB: 10 Hz
2384.870	57.1	V	74.0	-16.9	PK	269	2.2	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Date of Test: 3/3/2015 0:00
 Test Engineer: Rafael Varelas
 Test Location: FT Chamber #5

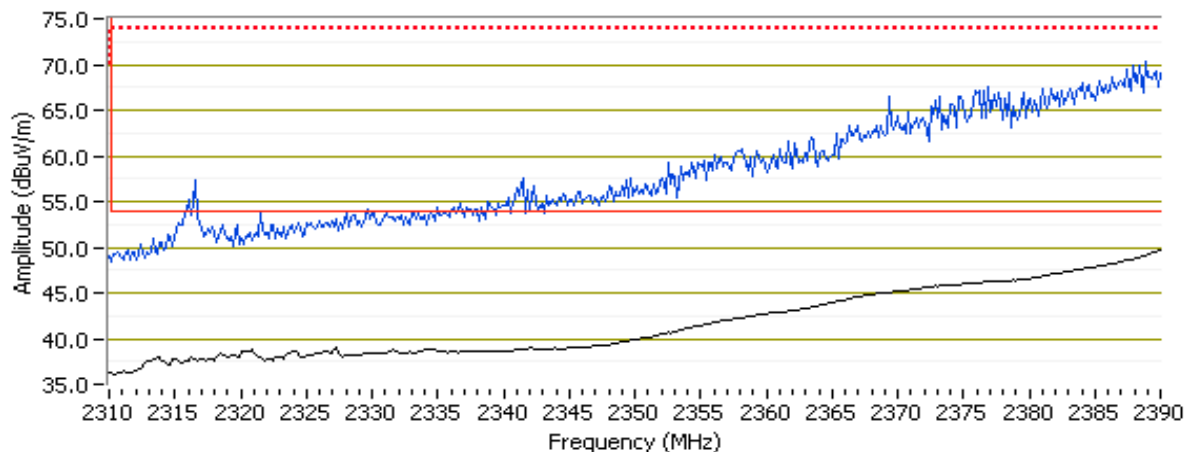
Config. Used: 1
 Config Change: None
 EUT Voltage: 120V/60Hz

Channel: 2 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2390.000	50.3	H	54.0	-3.7	AVG	346	1.9	Note 3,POS; RB 1 MHz; VB: 10 Hz
2389.840	72.2	H	74.0	-1.8	PK	346	1.9	POS; RB 1 MHz; VB: 3 MHz
2390.000	39.6	V	54.0	-14.4	AVG	231	1.9	Note 3,POS; RB 1 MHz; VB: 10 Hz
2387.840	53.9	V	74.0	-20.1	PK	231	1.9	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 kHz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



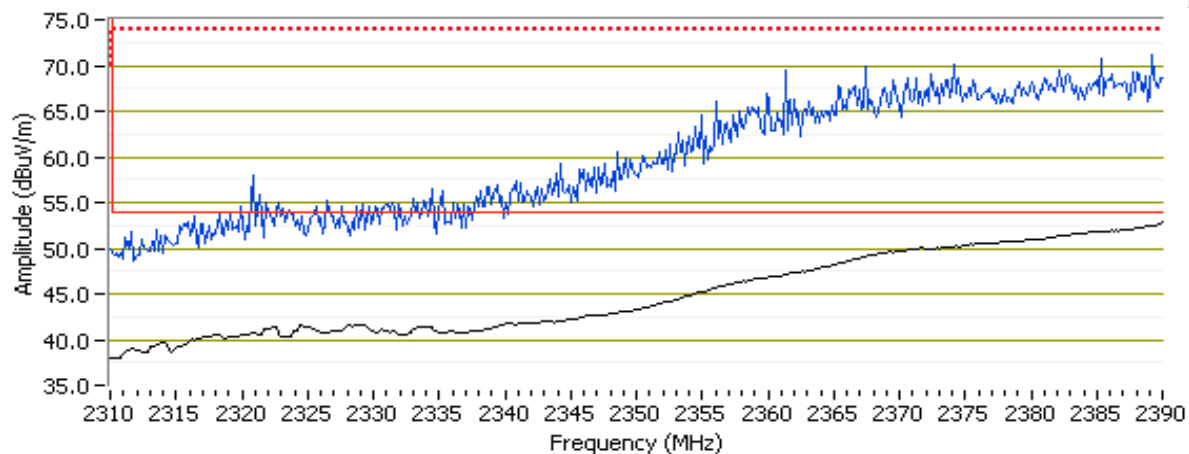
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 3 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2390.000	53.8	H	54.0	-0.2	AVG	0	2.0	Note 1,POS; RB 1 MHz; VB: 10 Hz
2383.190	72.6	H	74.0	-1.4	PK	0	2.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	44.2	V	54.0	-9.8	AVG	254	2.0	Note 1,POS; RB 1 MHz; VB: 10 Hz
2379.820	61.2	V	74.0	-12.8	PK	254	2.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 kHz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



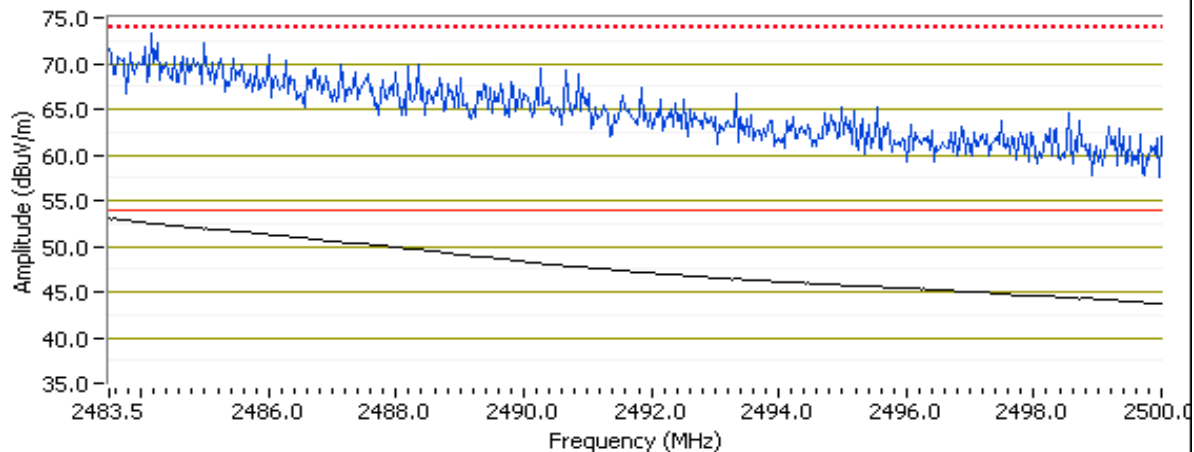
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 11 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.530	53.6	H	54.0	-0.4	AVG	336	1.8	Note 3,POS; RB 1 MHz; VB: 10 Hz q
2484.760	73.2	H	74.0	-0.8	PK	336	1.8	POS; RB 1 MHz; VB: 3 MHz
2483.530	41.8	V	54.0	-12.2	AVG	176	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz q
2483.630	55.9	V	74.0	-18.1	PK	176	1.1	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



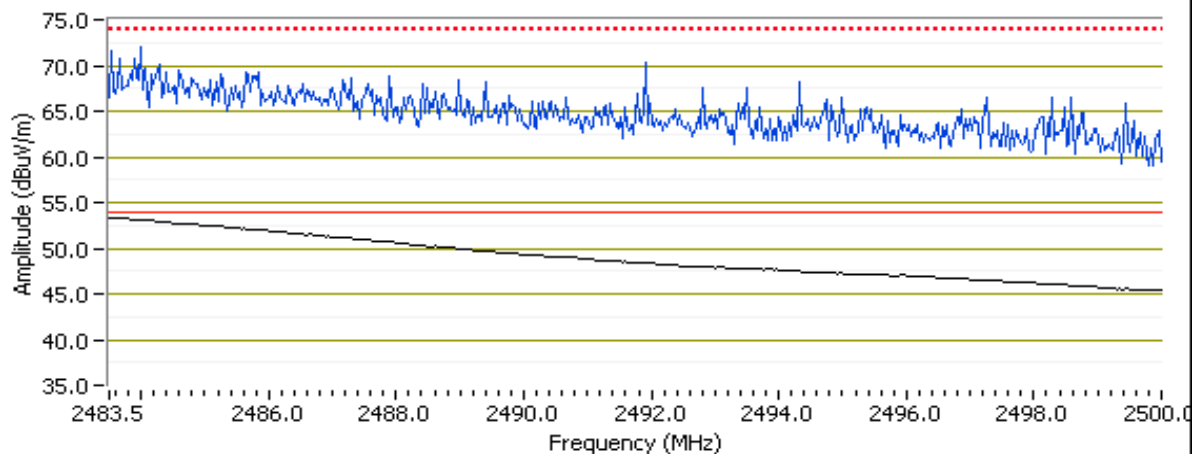
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Channel: 10 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.570	53.6	H	54.0	-0.4	AVG	331	1.8	Note 1,POS; RB 1 MHz; VB: 10 Hz
2486.870	73.4	H	74.0	-0.6	PK	331	1.8	POS; RB 1 MHz; VB: 3 MHz
2483.500	41.9	V	54.0	-12.1	AVG	226	1.5	Note 1,POS; RB 1 MHz; VB: 10 Hz
2483.670	55.2	V	74.0	-18.8	PK	226	1.5	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #3: Radiated Bandedge Measurements

Date of Test: 3/3/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

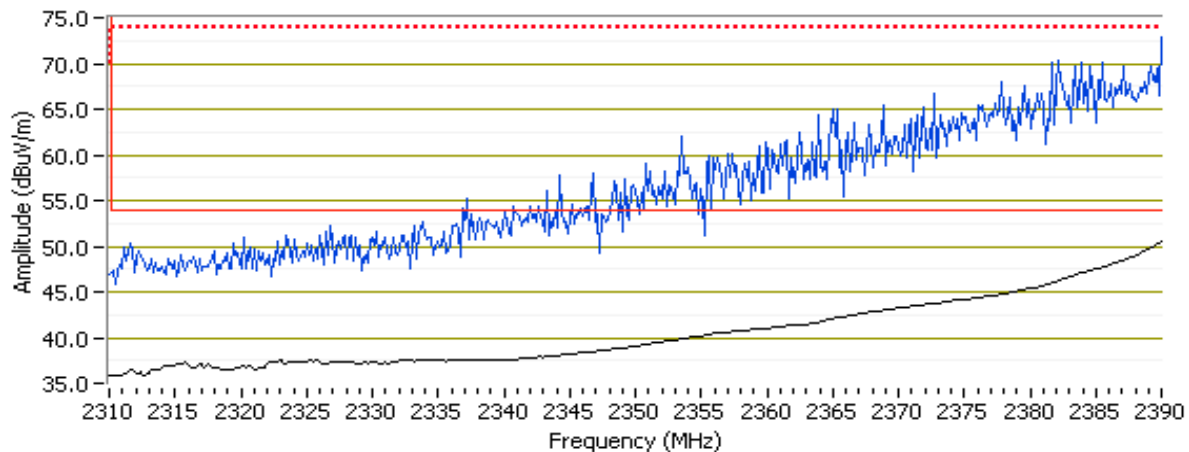
EUT Voltage: 120V/60Hz

Channel: 1 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2390.000	50.8	H	54.0	-3.2	AVG	353	1.9	Note 3,POS; RB 1 MHz; VB: 10 Hz
2384.790	72.8	H	74.0	-1.2	PK	353	1.9	POS; RB 1 MHz; VB: 3 MHz
2390.000	41.4	V	54.0	-12.6	AVG	232	1.9	Note 3,POS; RB 1 MHz; VB: 10 Hz
2388.800	55.4	V	74.0	-18.6	PK	232	1.9	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



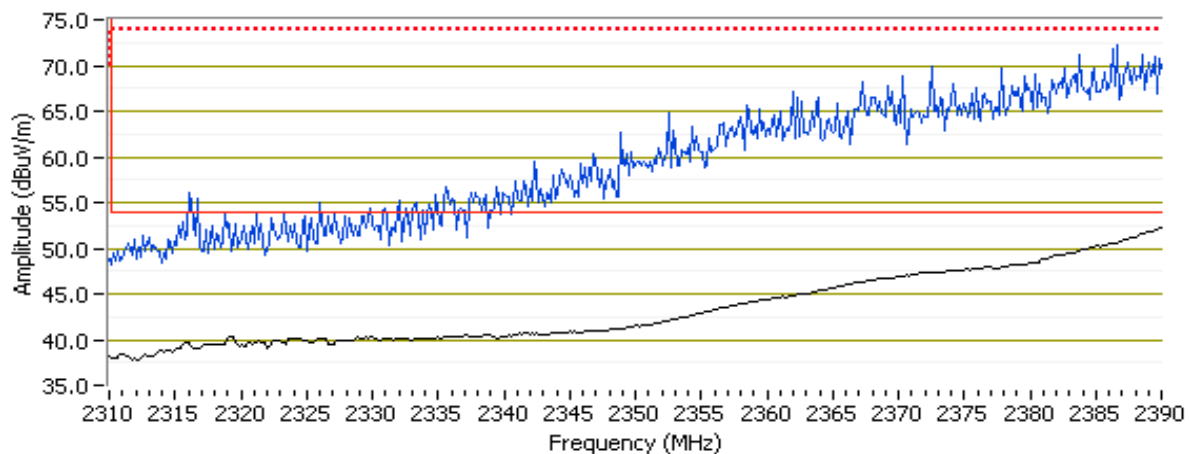
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 2 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2390.000	52.7	H	54.0	-1.3	AVG	351	2.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2390.000	73.2	H	74.0	-0.8	PK	351	2.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	42.8	V	54.0	-11.2	AVG	231	1.9	Note 3,POS; RB 1 MHz; VB: 10 Hz
2387.680	57.3	V	74.0	-16.7	PK	231	1.9	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



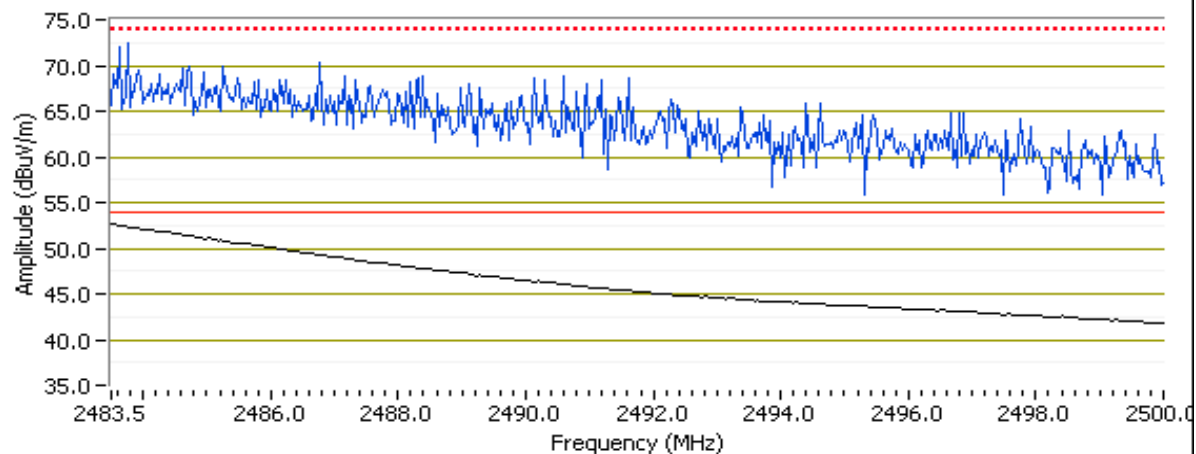
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 11 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.500	52.8	H	54.0	-1.2	AVG	17	1.2	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.690	73.3	H	74.0	-0.7	PK	17	1.2	POS; RB 1 MHz; VB: 3 MHz
2483.600	40.5	V	54.0	-13.5	AVG	37	1.1	POS; RB 1 MHz; VB: 10 Hz
2483.800	53.3	V	74.0	-20.7	PK	37	1.1	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



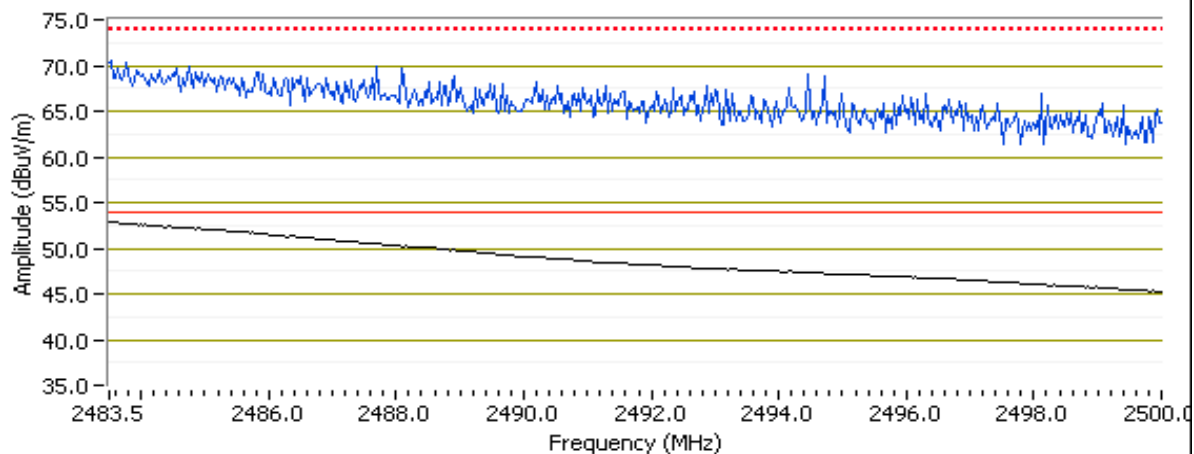
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 10 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.530	53.0	H	54.0	-1.0	AVG	329	1.8	Note 3,POS; RB 1 MHz; VB: 10 Hz
2483.900	71.3	H	74.0	-2.7	PK	329	1.8	POS; RB 1 MHz; VB: 3 MHz
2483.500	41.1	V	54.0	-12.9	AVG	221	1.5	POS; RB 1 MHz; VB: 10 Hz
2486.540	53.7	V	74.0	-20.3	PK	221	1.5	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black ; RB 1MHz VB 3MHz Pk=Blue ; H



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 21.4 °C
Rel. Humidity: 38 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.0 dBµV/m @ 2386.6 MHz (-1.0 dB)
	b	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.2 dBµV/m @ 2487.9 MHz (-0.8 dB)
2	g	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	73.8 dBµV/m @ 2389.4 MHz (-0.2 dB)
	g	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	73.6 dBµV/m @ 2484.4 MHz (-0.4 dB)
	g	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.4 dBµV/m @ 2483.5 MHz (-0.6 dB)
3	n20	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	73.2 dBµV/m @ 2383.4 MHz (-0.8 dB)
	n20	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	73.7 dBµV/m @ 2484.8 MHz (-0.3 dB)
	n20	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	52.8 dBµV/m @ 2483.5 MHz (-1.2 dB)

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

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.

Sample Notes

Sample S/N: 2C337A99973D

Driver: 6.30 RC255.0

Antenna: External Antenna

Pk Size: 37 1000

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	0.995	Yes	8.459	0	0	118
11g	6Mb/s	0.980	Yes	2.866	0.09	0.18	349
n20	MCS0	0.977	Yes	2.660	0.10	0.20	376

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$, peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \times (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1: Radiated Bandedge Measurements

Date of Test: 3/4/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

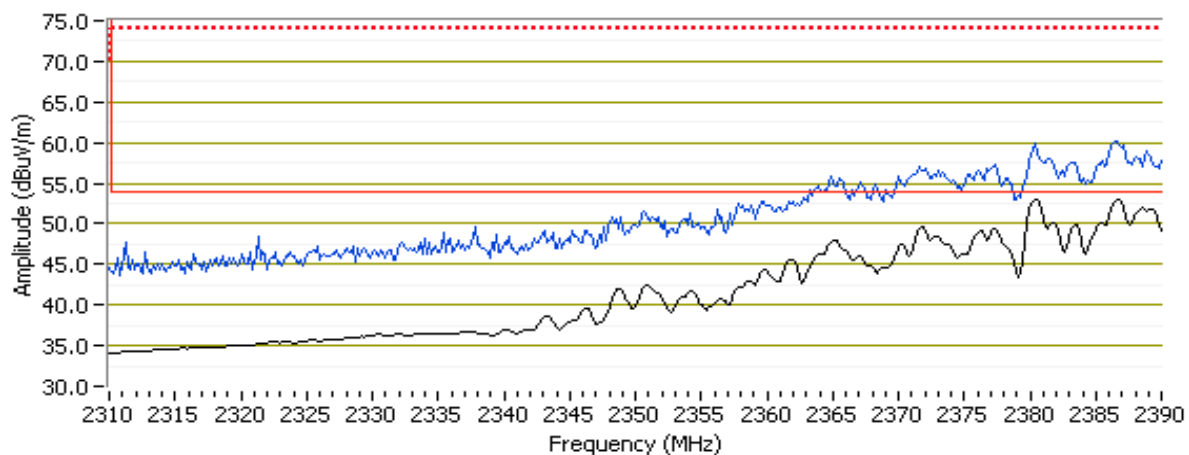
EUT Voltage: 120V/60Hz

Channel: 1 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2386.550	53.0	V	54.0	-1.0	AVG	78	1.1	POS; RB 1 MHz; VB: 10 Hz
2386.790	60.0	V	74.0	-14.0	PK	78	1.1	POS; RB 1 MHz; VB: 3 MHz
2384.790	46.8	H	54.0	-7.2	AVG	79	1.0	POS; RB 1 MHz; VB: 10 Hz
2378.300	54.2	H	74.0	-19.8	PK	79	1.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



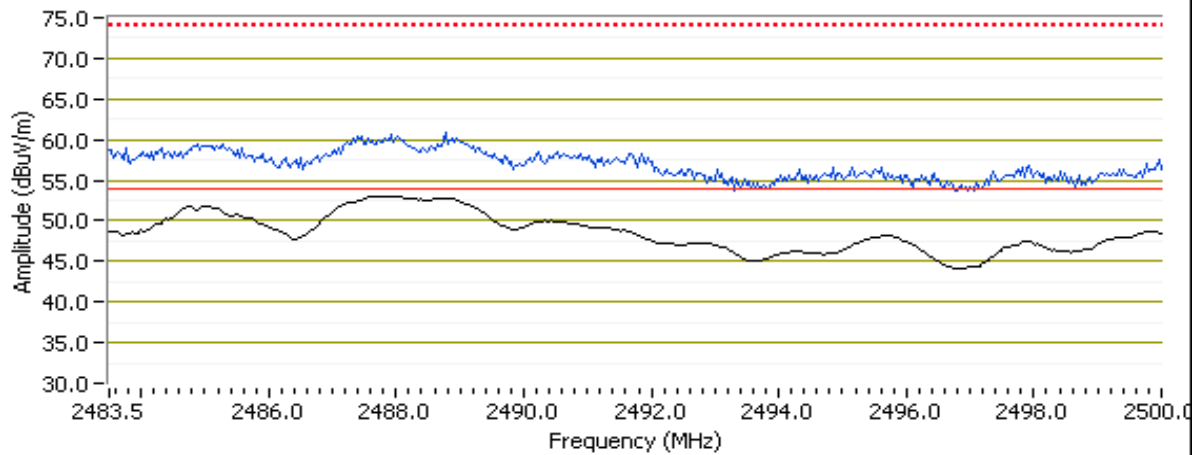
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 11 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2487.860	53.2	V	54.0	-0.8	AVG	279	1.1	POS; RB 1 MHz; VB: 10 Hz
2487.530	59.7	V	74.0	-14.3	PK	279	1.1	POS; RB 1 MHz; VB: 3 MHz
2486.710	46.3	H	54.0	-7.7	AVG	84	1.0	POS; RB 1 MHz; VB: 10 Hz
2488.560	53.9	H	74.0	-20.1	PK	84	1.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #2: Radiated Bandedge Measurements

Date of Test: 3/4/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

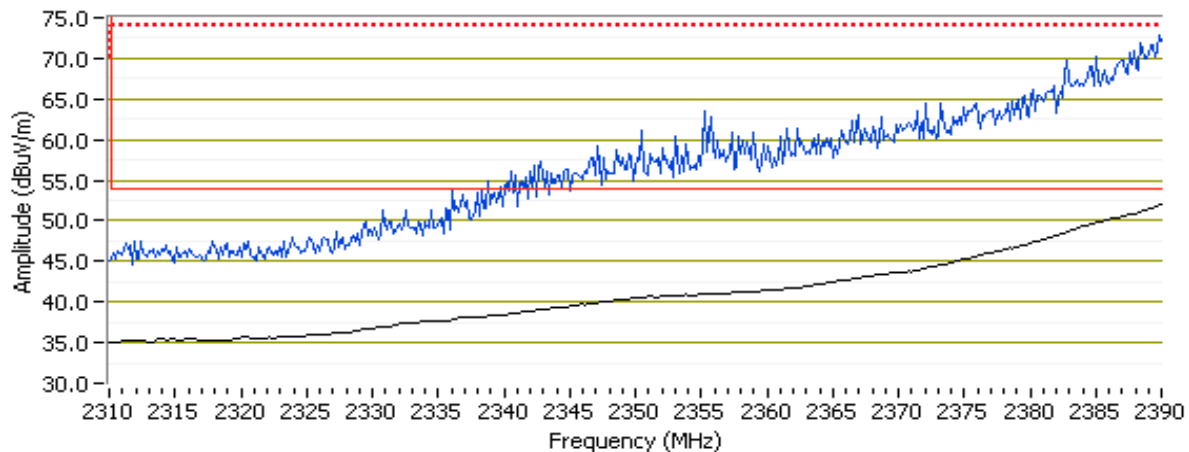
EUT Voltage: 120V/60Hz

Channel: 1 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2390.000	53.5	V	54.0	-0.5	AVG	74	1.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2389.360	73.8	V	74.0	-0.2	PK	74	1.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	49.5	H	54.0	-4.5	AVG	248	1.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2389.680	65.4	H	74.0	-8.6	PK	248	1.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



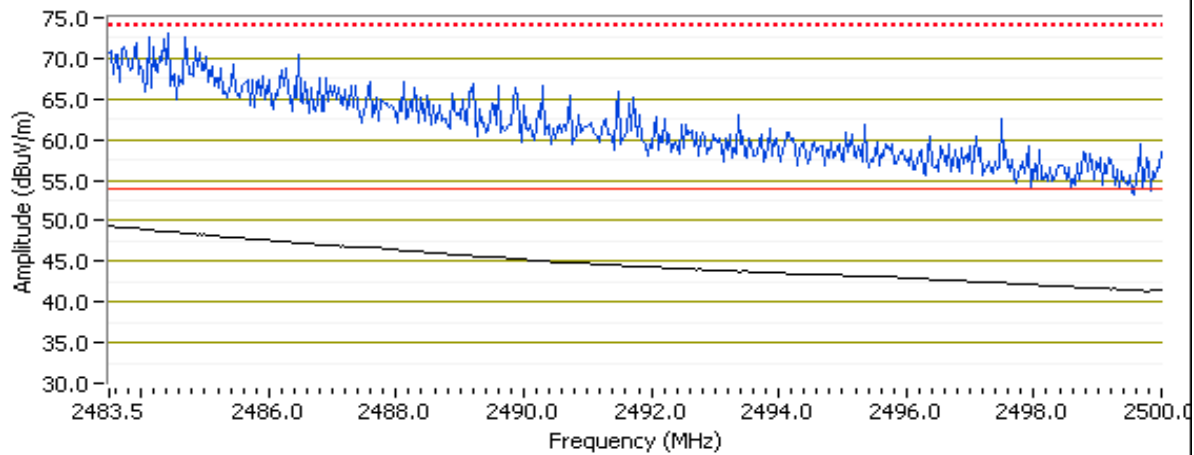
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 11 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.570	49.6	V	54.0	-4.4	AVG	282	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.390	73.6	V	74.0	-0.4	PK	282	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.500	43.9	H	54.0	-10.1	AVG	262	1.6	Note 3,POS; RB 1 MHz; VB: 10 Hz
2487.400	66.3	H	74.0	-7.7	PK	262	1.6	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



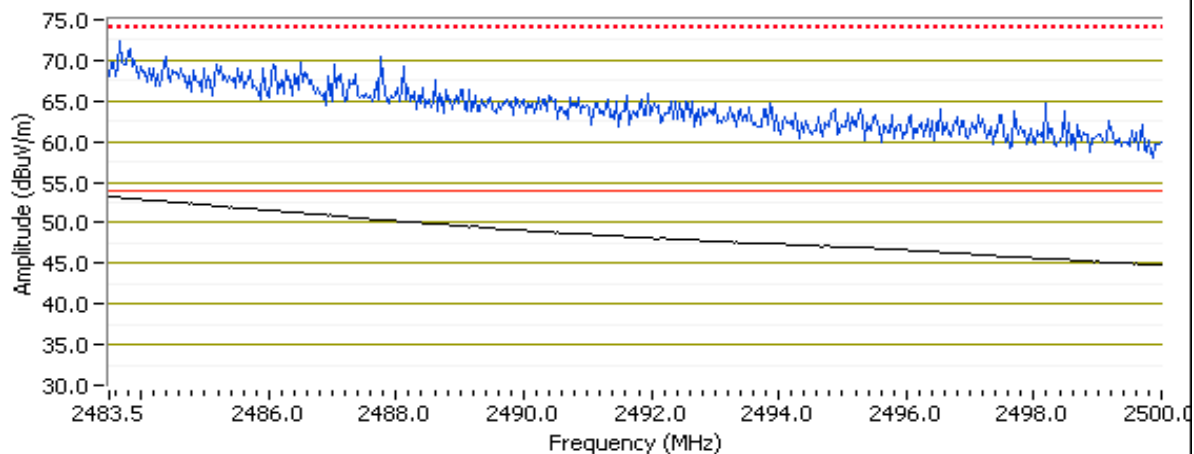
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 10 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.500	53.4	V	54.0	-0.6	AVG	281	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2485.320	72.1	V	74.0	-1.9	PK	281	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.600	46.3	H	54.0	-7.7	AVG	265	1.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2485.650	63.6	H	74.0	-10.4	PK	265	1.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #3: Radiated Bandedge Measurements

Date of Test: 3/4/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

Config Change: None

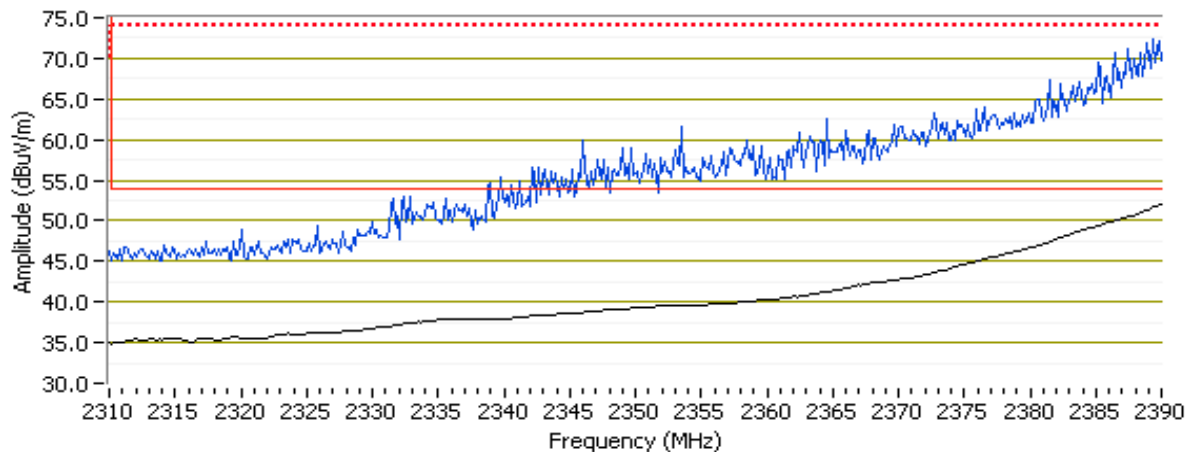
EUT Voltage: 120V/60Hz

Channel: 1 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2390.000	52.5	V	54.0	-1.5	AVG	79	1.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2383.350	73.2	V	74.0	-0.8	PK	79	1.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	48.9	H	54.0	-5.1	AVG	247	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2388.560	68.1	H	74.0	-5.9	PK	247	1.1	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



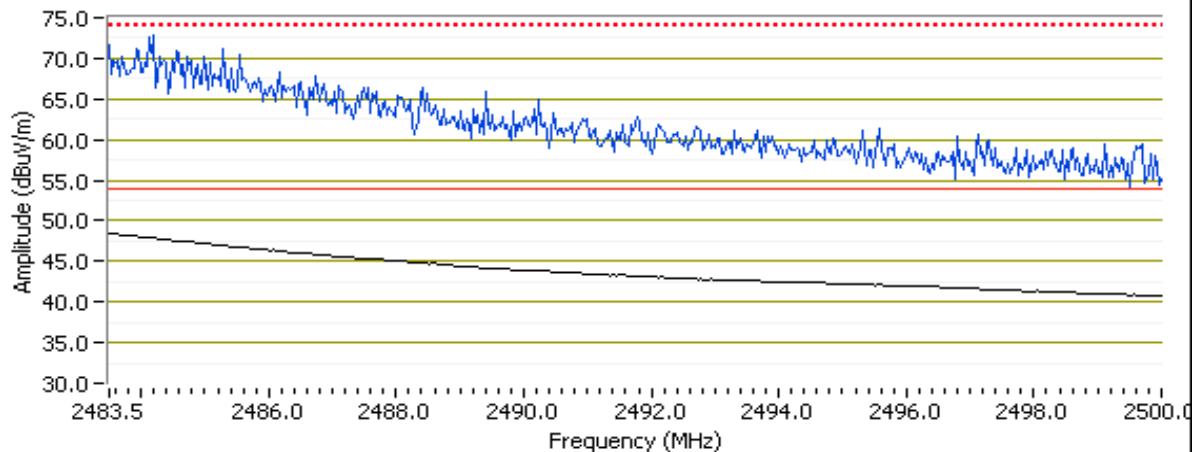
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 11 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.500	48.6	V	54.0	-5.4	AVG	266	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.790	73.7	V	74.0	-0.3	PK	266	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.500	44.2	H	54.0	-9.8	AVG	264	1.3	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.190	67.0	H	74.0	-7.0	PK	264	1.3	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



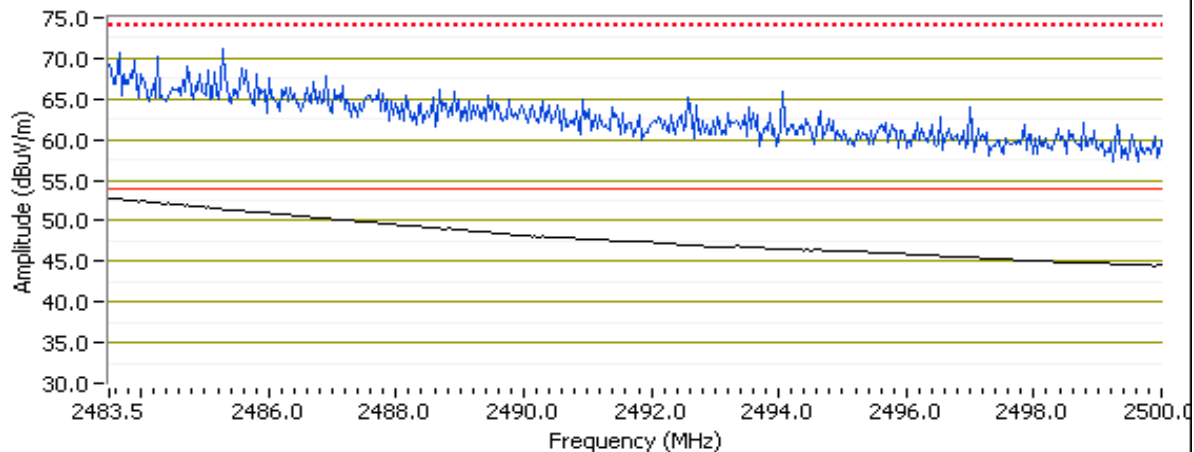
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 10 Mode: n20
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.500	52.8	V	54.0	-1.2	AVG	266	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.460	72.5	V	74.0	-1.5	PK	266	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.500	48.6	H	54.0	-5.4	AVG	265	1.3	Note 3,POS; RB 1 MHz; VB: 10 Hz
2488.030	65.3	H	74.0	-8.7	PK	265	1.3	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz Avg=Black; RB 1MHz VB 3MHz PK=Blue; V



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 21.8 °C
 Rel. Humidity: 40 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	50.0 dBµV/m @ 4824.0 MHz (-4.0 dB)
	b	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	49.2 dBµV/m @ 4874.0 MHz (-4.8 dB)
	b	11 - 2462MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	50.9 dBµV/m @ 4924.0 MHz (-3.1 dB)
Scans on center channel for both OFDM modes to determine the worst case mode.							
2	g	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	46.2 dBµV/m @ 3000.0 MHz (-7.8 dB)
	n20	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.4 dBµV/m @ 3000.0 MHz (-8.6 dB)
Measurements on low and high channels in worst-case OFDM mode.							
3	g	1 - 2412MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.1 dBµV/m @ 2999.9 MHz (-8.9 dB)
	g	11 - 2462MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	46.0 dBµV/m @ 2999.9 MHz (-8.0 dB)

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

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.

Sample Notes

Sample S/N: 2C337A999621

Driver: 6.30 RC255.0

Antenna: Internal Antenna

Pk Size: 37 1000

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	0.995	Yes	8.459	0	0	118
11g	6Mb/s	0.980	Yes	2.866	0.09	0.18	349
n20	MCS0	0.977	Yes	2.660	0.10	0.20	376

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$, peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \times (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: 802.11b

Date of Test: 3/3 & 3/4/2015 12:00:00 AM

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: None

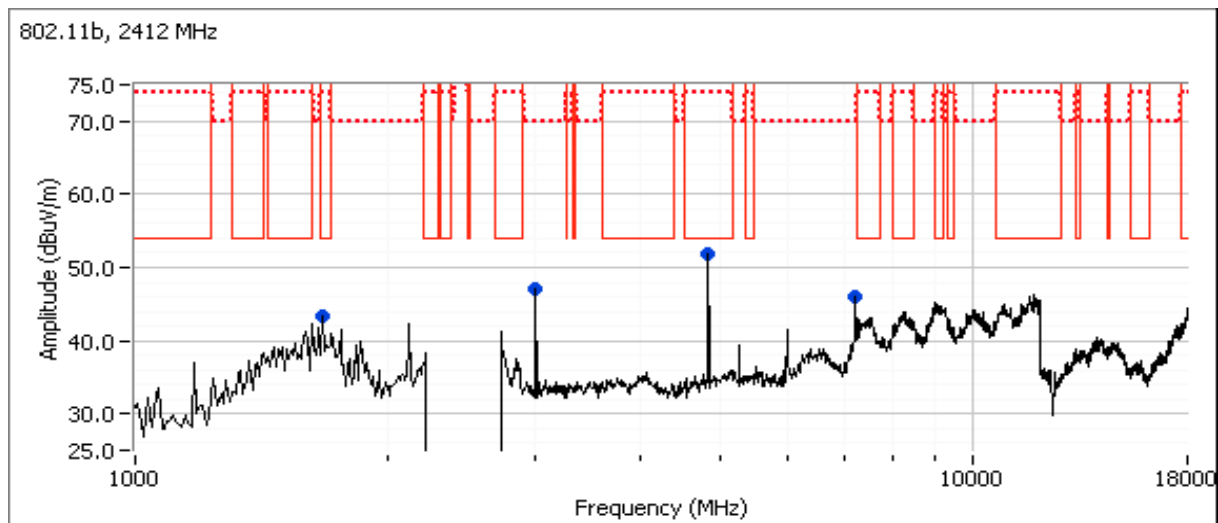
Test Location: FT Chamber #5

EUT Voltage: 120V/60Hz

Run #1a: Low Channel

Channel: 1
 Tx Chain: Main
 Mode: b
 Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4824.000	50.0	H	54.0	-4.0	AVG	239	1.0	RB 1 MHz;VB 10 Hz;Peak
4823.960	51.9	H	74.0	-22.1	PK	239	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.780	35.1	V	54.0	-18.9	AVG	167	1.4	RB 1 MHz;VB 10 Hz;Peak
1667.270	49.4	V	74.0	-24.6	PK	167	1.4	RB 1 MHz;VB 3 MHz;Peak
2999.950	45.2	V	54.0	-8.8	AVG	250	1.1	Note 1, RB 1 MHz;VB 10 Hz;Peak
2999.970	47.9	V	74.0	-26.1	PK	250	1.1	Note 1, RB 1 MHz;VB 3 MHz;Peak
7235.210	45.0	H	54.0	-9.0	AVG	333	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
7235.480	52.3	H	74.0	-21.7	PK	333	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak



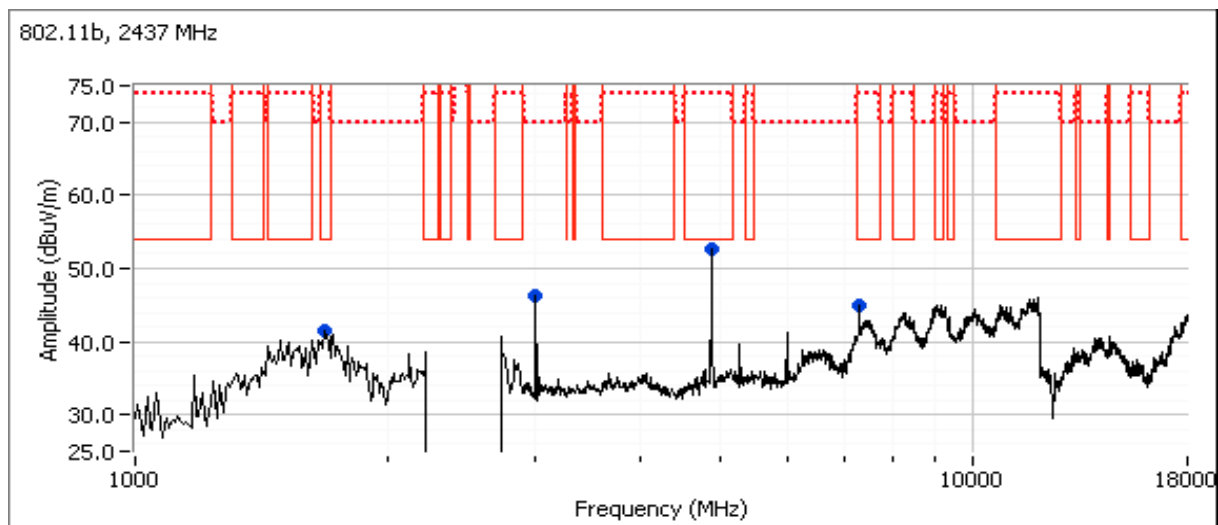
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1b: Center Channel

Channel: 6 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
4873.980	49.2	H	54.0	-4.8	AVG	17	1.0	RB 1 MHz;VB 10 Hz;Peak
4874.020	52.5	H	74.0	-21.5	PK	17	1.0	RB 1 MHz;VB 3 MHz;Peak
7310.270	43.4	H	54.0	-10.6	AVG	331	1.0	RB 1 MHz;VB 10 Hz;Peak
7312.030	53.0	H	74.0	-21.0	PK	331	1.0	RB 1 MHz;VB 3 MHz;Peak
2999.970	46.0	V	54.0	-8.0	AVG	238	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
2999.890	48.7	V	74.0	-25.3	PK	238	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak
1673.000	31.0	V	54.0	-23.0	AVG	166	1.0	RB 1 MHz;VB 10 Hz;Peak
1674.090	52.4	V	74.0	-21.6	PK	166	1.0	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

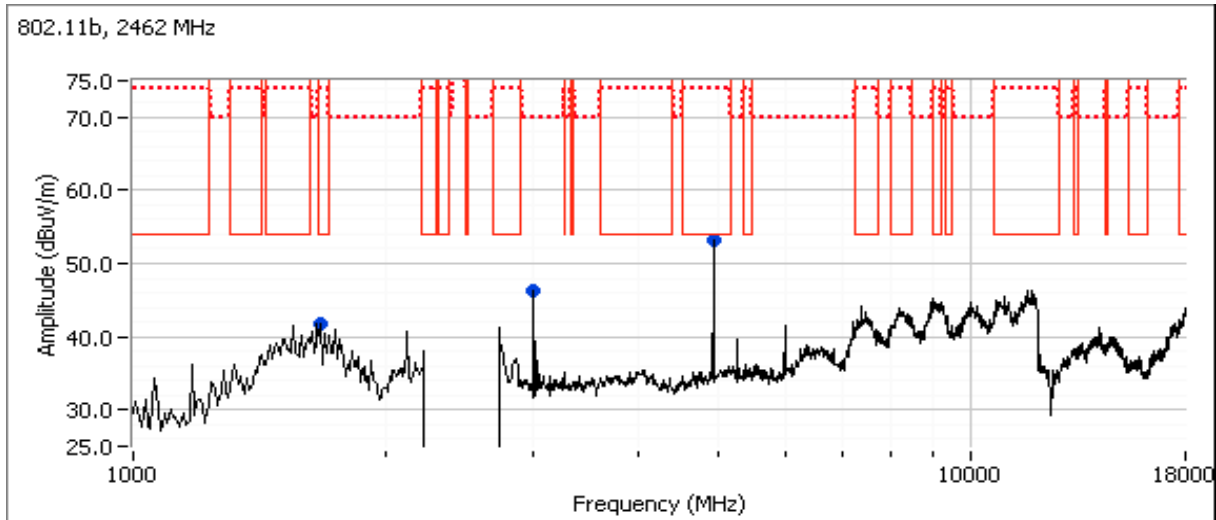


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1c: High Channel

Channel: 11 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
4923.990	50.9	H	54.0	-3.1	AVG	29	1.0	RB 1 MHz;VB 10 Hz;Peak
4923.960	54.0	H	74.0	-20.0	PK	29	1.0	RB 1 MHz;VB 3 MHz;Peak
1669.050	29.1	V	54.0	-24.9	AVG	164	1.2	RB 1 MHz;VB 10 Hz;Peak
1670.350	50.7	V	74.0	-23.3	PK	164	1.2	RB 1 MHz;VB 3 MHz;Peak
2999.970	46.0	V	54.0	-8.0	AVG	246	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
2999.990	48.7	V	74.0	-25.3	PK	246	1.0	note 1, RB 1 MHz;VB 3 MHz;Peak



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #2: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: OFDM

Date of Test: 3/3 & 3/4/2015 12:00:00 AM

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: None

Test Location: FT Chamber #5

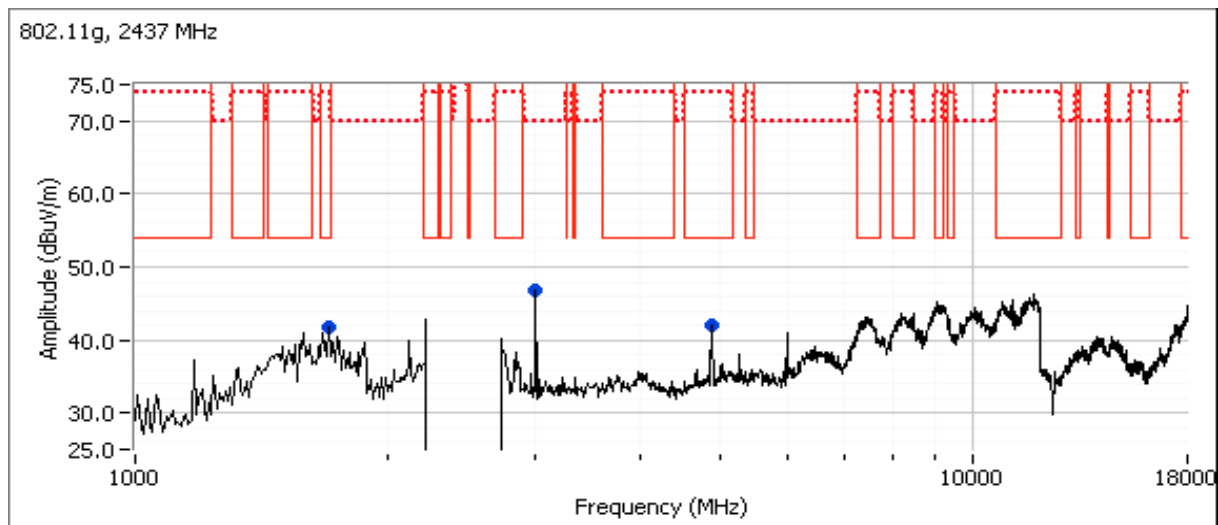
EUT Voltage: 120V/60Hz

Run #2a: Center Channel

Channel: 6
 Tx Chain: Main
 Mode: g
 Data Rate: 6Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2999.970	46.2	V	54.0	-7.8	AVG	244	1.0	Note 1,RB 1 MHz;VB 10 Hz;Peak
2999.860	48.9	V	74.0	-25.1	PK	244	1.0	Note 1,RB 1 MHz;VB 3 MHz;Peak
1697.640	30.3	V	54.0	-23.7	AVG	159	1.6	RB 1 MHz;VB 10 Hz;Peak
1698.390	51.5	V	74.0	-22.5	PK	159	1.6	RB 1 MHz;VB 3 MHz;Peak
4872.930	36.2	H	54.0	-17.8	AVG	22	1.0	RB 1 MHz;VB 10 Hz;Peak
4874.270	47.9	H	74.0	-26.1	PK	22	1.0	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #2b: Center Channel

Date of Test: 3/4/2015 0:00

Test Engineer: Rafael Varelas

Test Location: FT Chamber #5

Config. Used: 1

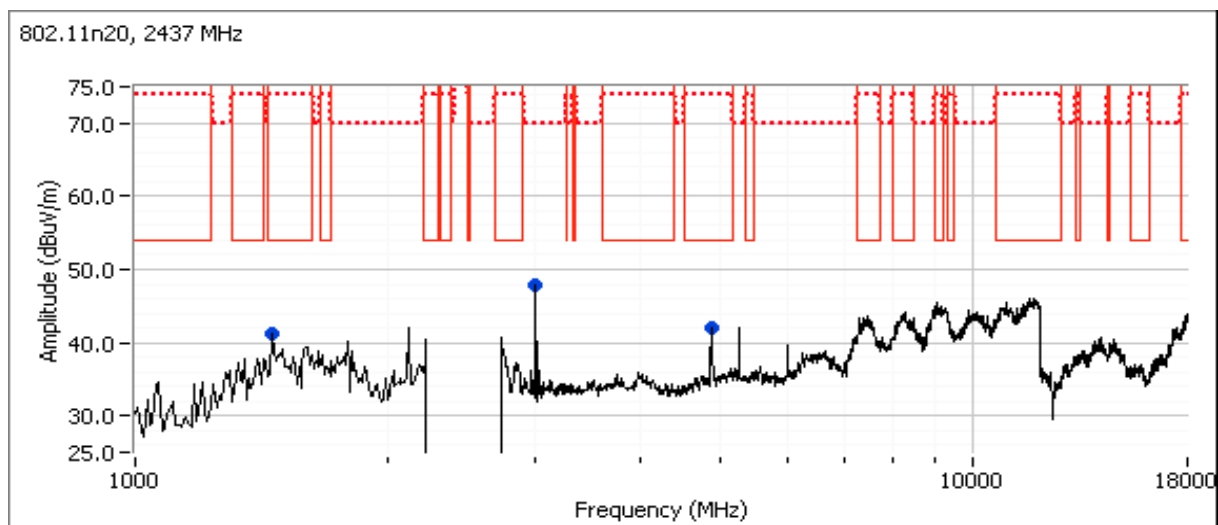
Config Change: None

EUT Voltage: 120V/60Hz

Channel: 6
Tx Chain: Main
Mode: n20
Data Rate: MCS0

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2999.950	45.4	V	54.0	-8.6	AVG	246	1.0	Note 1,RB 1 MHz;VB 10 Hz;Peak
2999.980	48.5	V	74.0	-25.5	PK	246	1.0	Note 1,RB 1 MHz;VB 3 MHz;Peak
4873.270	35.4	H	54.0	-18.6	AVG	22	1.3	RB 1 MHz;VB 10 Hz;Peak
4869.740	48.8	H	74.0	-25.2	PK	22	1.3	RB 1 MHz;VB 3 MHz;Peak
1450.020	26.3	V	54.0	-27.7	AVG	228	1.2	RB 1 MHz;VB 10 Hz;Peak
1451.180	42.9	V	74.0	-31.1	PK	228	1.2	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #3: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: Worse case from Run #2

Date of Test: 3/4/2015 0:00

Config. Used: 1

Test Engineer: Rafael Varelas

Config Change: None

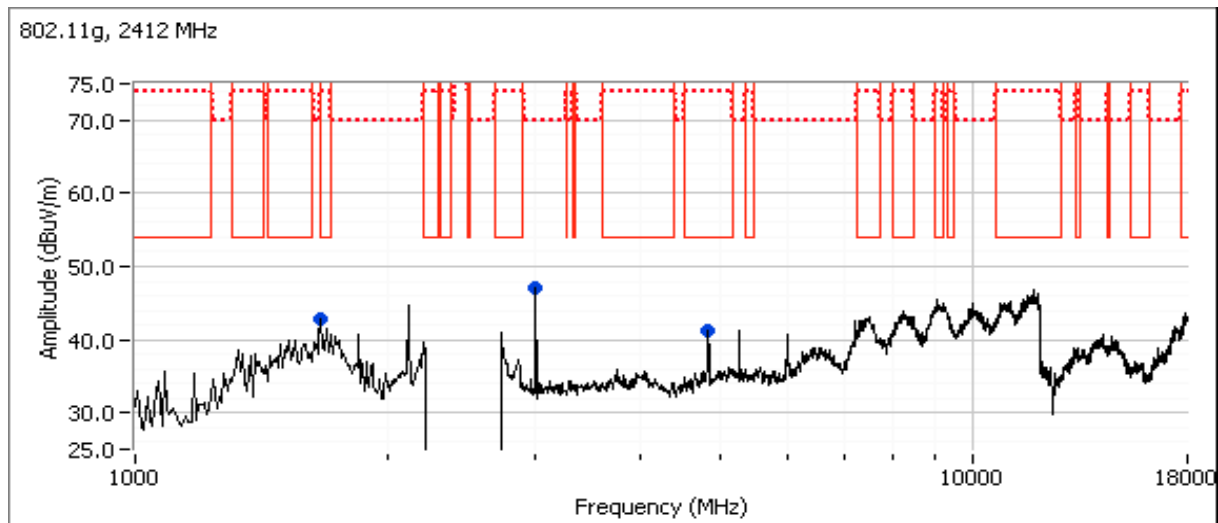
Test Location: FT Chamber #5

EUT Voltage: 120V/60Hz

Run #3a: Low Channel

Channel: 1
 Tx Chain: Main
 Mode: g
 Data Rate: 6Mb/s

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	
2999.940	45.1	V	54.0	-8.9	AVG	256	1.0	Note 1,RB 1 MHz;VB 10 Hz;Peak
2999.860	47.9	V	74.0	-26.1	PK	256	1.0	Note 1,RB 1 MHz;VB 3 MHz;Peak
4825.080	34.2	H	54.0	-19.8	AVG	250	1.0	RB 1 MHz;VB 10 Hz;Peak
4824.440	46.1	H	74.0	-27.9	PK	250	1.0	RB 1 MHz;VB 3 MHz;Peak
1666.670	29.7	V	54.0	-24.3	AVG	143	1.0	RB 1 MHz;VB 10 Hz;Peak
1667.440	50.3	V	74.0	-23.7	PK	143	1.0	RB 1 MHz;VB 3 MHz;Peak

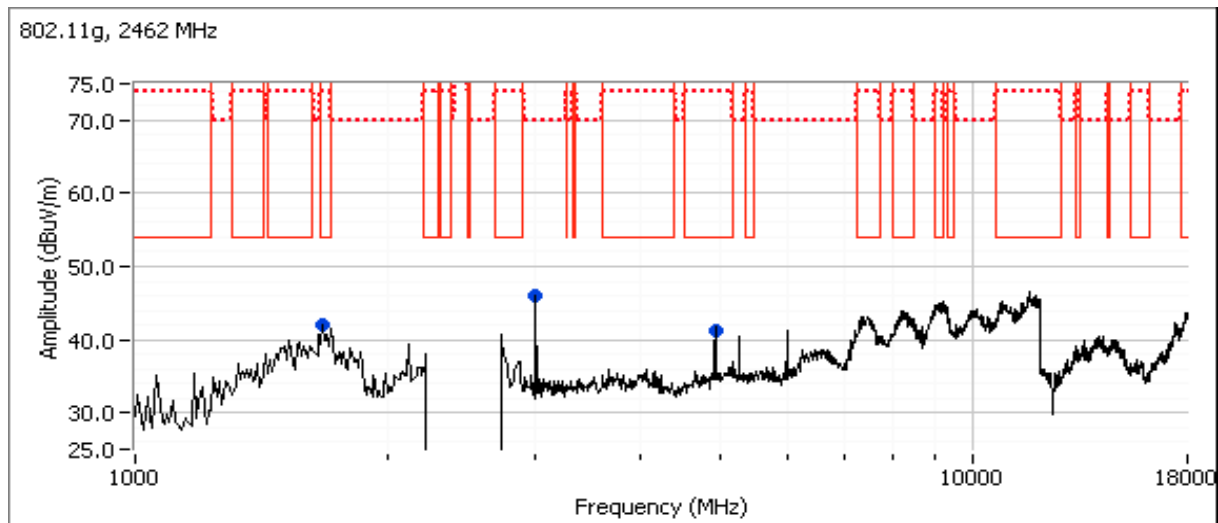


Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #3b: High Channel

Channel: 11 Mode: g
 Tx Chain: Main Data Rate: 6Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2999.930	46.0	V	54.0	-8.0	AVG	238	1.0	Note 1, RB 1 MHz; VB 10 Hz; Peak
2999.940	49.0	V	74.0	-25.0	PK	238	1.0	Note 1, RB 1 MHz; VB 3 MHz; Peak
4922.760	37.0	H	54.0	-17.0	AVG	24	1.1	RB 1 MHz; VB 10 Hz; Peak
4921.190	49.7	H	74.0	-24.3	PK	24	1.1	RB 1 MHz; VB 3 MHz; Peak
1672.490	28.8	V	54.0	-25.2	AVG	150	1.5	RB 1 MHz; VB 10 Hz; Peak
1671.610	49.6	V	74.0	-24.4	PK	150	1.5	RB 1 MHz; VB 3 MHz; Peak



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 24 °C
 Rel. Humidity: 38 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
Testing performed using worse case mode from internal antenna testing							
1	b	1 - 2412MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	42.5 dBµV/m @ 4824.0 MHz (-11.5 dB)
	b	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	53.4 dBµV/m @ 7310.3 MHz (-0.6 dB)
	b	11 - 2462MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	50.6 dBµV/m @ 7385.3 MHz (-3.4 dB)

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.

Sample Notes

Sample S/N: 2C337A99973D
 Driver: 6.30 RC255.0
 Antenna: External Antenna
 Pk Size: 37 1000

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Notes:

Preliminary testing demonstrated that the main antenna port is worse case
 Testing performed in worse case mode from Internal Antenna testing

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	0.995	Yes	8.459	0	0	118
11g	6Mb/s	0.980	Yes	2.866	0.09	0.18	349
n20	MCS0	0.977	Yes	2.660	0.10	0.20	376

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 2:	Emission has duty cycle $\geq 98\%$, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 4:	Emission has duty cycle $< 98\%$ and is NOT constant, average measurement performed: RBW=1MHz, VBW $> 1/T$, peak detector, linear average mode, sweep time auto, max hold. Max hold for $50 \cdot (1/DC)$ traces
Note 5:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz.

Date of Test: 3/6/2015 0:00

Test Engineer: Jack Liu

Test Location: FT Chamber #5

Config. Used: 1

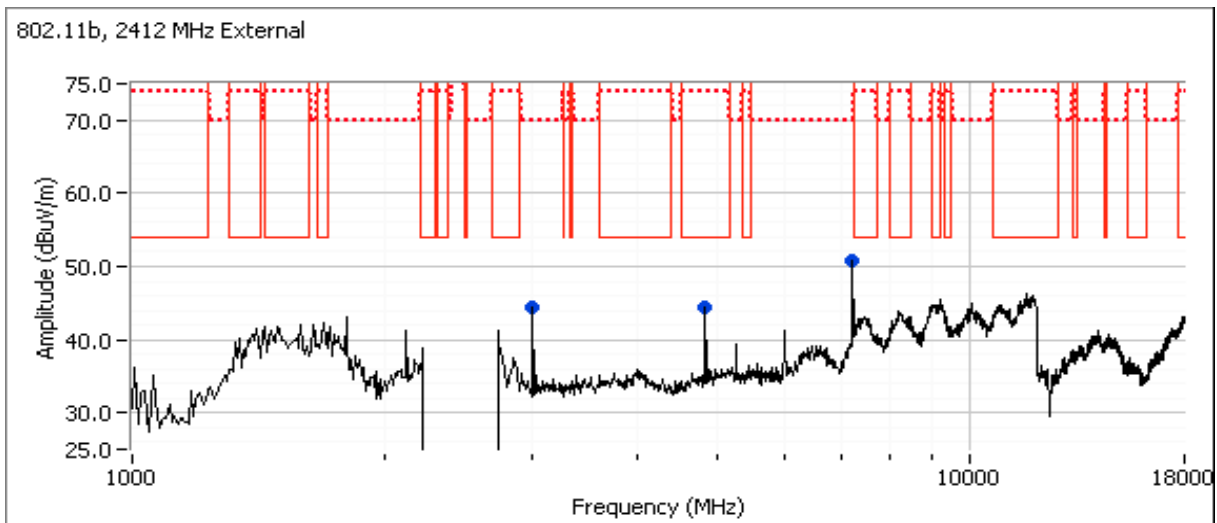
Config Change: None

EUT Voltage: 120V/60Hz

Run #1a: Low Channel

Channel: 1
 Tx Chain: Main
 Mode: b
 Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4823.960	42.5	V	54.0	-11.5	AVG	177	1.9	RB 1 MHz;VB 10 Hz;Peak
4823.910	46.9	V	74.0	-27.1	PK	177	1.9	RB 1 MHz;VB 3 MHz;Peak
2999.950	42.4	V	54.0	-11.6	AVG	139	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
2999.940	47.0	V	74.0	-27.0	PK	139	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak
7235.300	43.3	V	54.0	-10.7	AVG	356	1.9	Note 1, RB 1 MHz;VB 10 Hz;Peak
7234.630	53.3	V	74.0	-20.7	PK	356	1.9	Note 1, RB 1 MHz;VB 3 MHz;Peak



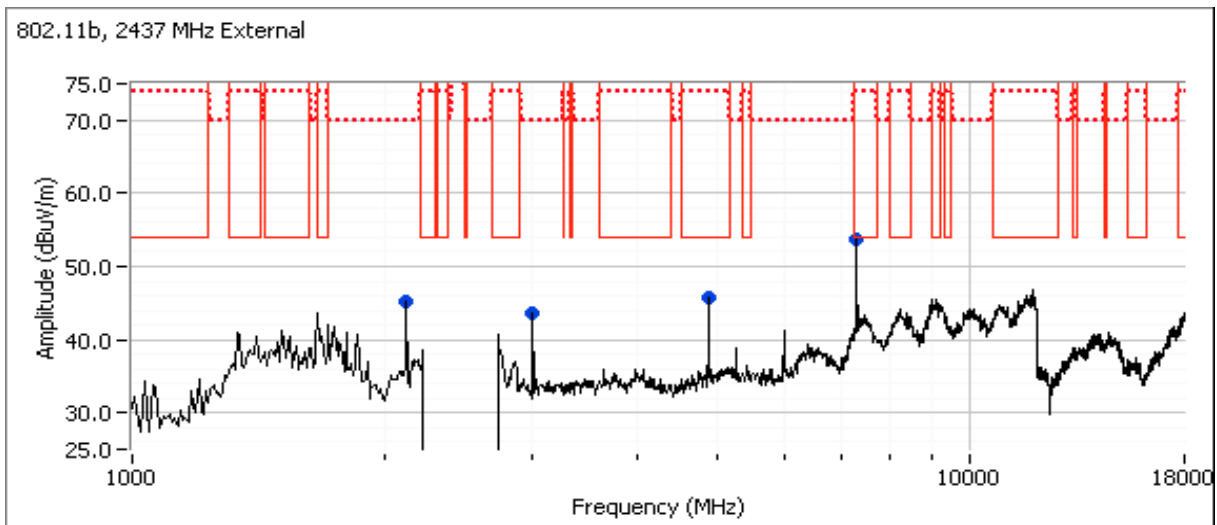
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1b: Center Channel

Channel: 6 Mode: b
 Tx Chain: Main Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7310.300	53.4	V	54.0	-0.6	AVG	8	1.9	RB 1 MHz;VB 10 Hz;Peak
7310.030	59.2	V	74.0	-14.8	PK	8	1.9	RB 1 MHz;VB 3 MHz;Peak
2109.670	30.5	V	54.0	-23.5	AVG	165	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
2128.400	47.4	V	74.0	-26.6	PK	165	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak
2999.970	42.1	V	54.0	-11.9	AVG	137	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
2999.930	46.7	V	74.0	-27.3	PK	137	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak
4874.000	42.6	V	54.0	-11.4	AVG	174	1.6	RB 1 MHz;VB 10 Hz;Peak
4874.130	48.3	V	74.0	-25.7	PK	174	1.6	RB 1 MHz;VB 3 MHz;Peak

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

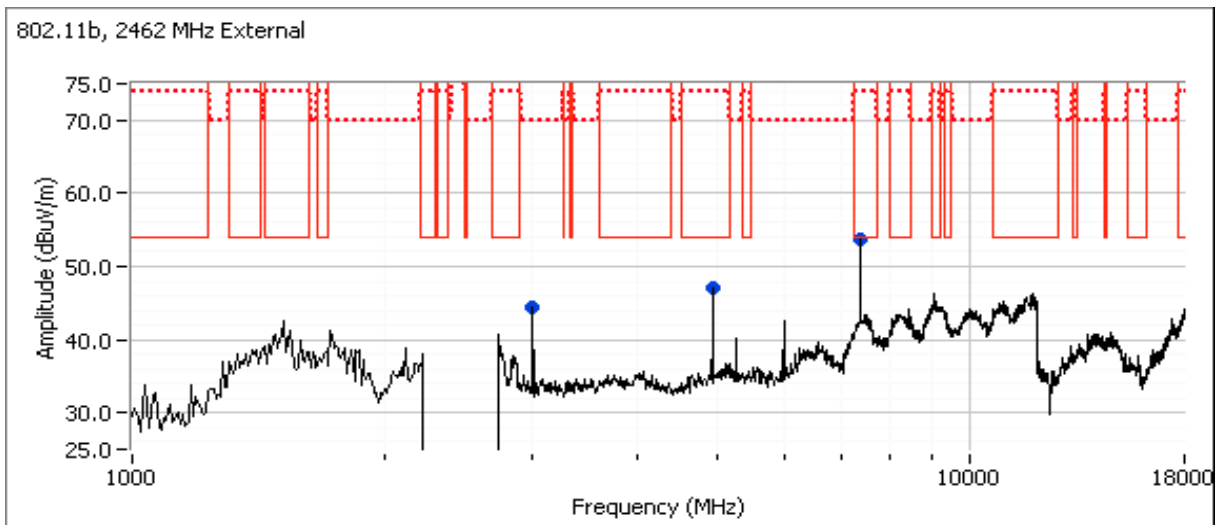


Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1c: High Channel

Channel: 11
 Tx Chain: Main
 Mode: b
 Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7385.330	50.6	V	54.0	-3.4	AVG	96	1.7	RB 1 MHz;VB 10 Hz;Peak
7386.630	57.7	V	74.0	-16.3	PK	96	1.7	RB 1 MHz;VB 3 MHz;Peak
2999.960	44.5	V	54.0	-9.5	AVG	139	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
2999.850	48.1	V	74.0	-25.9	PK	139	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak
4923.980	44.8	V	54.0	-9.2	AVG	198	1.0	RB 1 MHz;VB 10 Hz;Peak
4924.030	49.2	V	74.0	-24.8	PK	198	1.0	RB 1 MHz;VB 3 MHz;Peak



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 23 °C
 Rel. Humidity: 34 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	LE	2402MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	37.7 dBμV/m @ 2352.9 MHz (-16.3 dB)
		2480MHz	-	-	Restricted Band Edge (2483.5 MHz)		39.9 dBμV/m @ 2483.5 MHz (-14.1 dB)

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.

Sample Notes

Sample S/N: 2C337A999621
 Driver: 6.30 RC255.0
 Antenna: internal

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
LE	1Mb/s	0.62	Yes	0.387	2.10	4.19	2584

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1: Radiated Bandedge Measurements

Date of Test: 3/13/2015 0:00
 Test Engineer: John Caizzi
 Test Location: Chamber 5

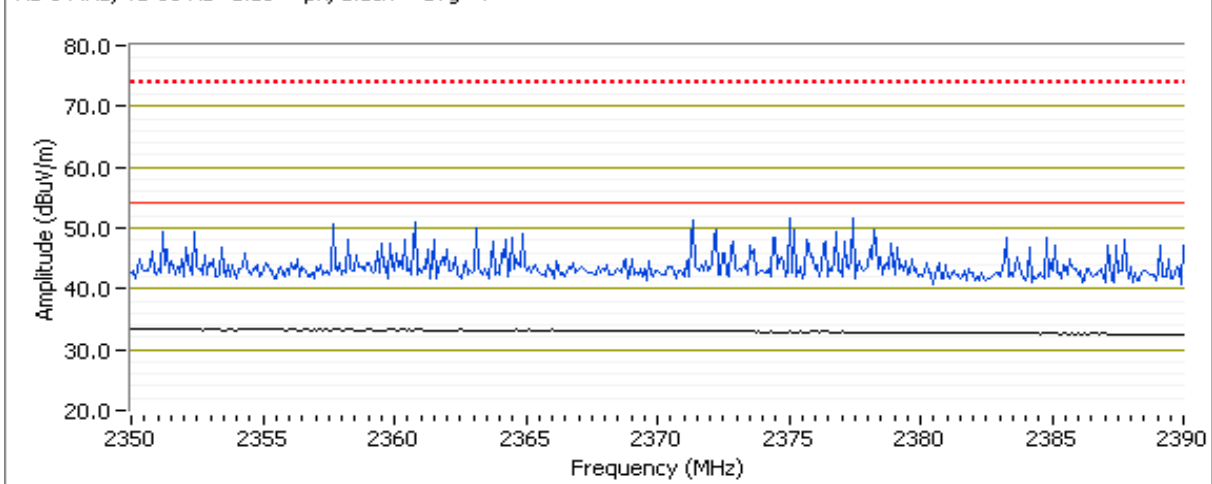
Config. Used: 1
 Config Change: none
 Host Voltage: 120V / 60Hz

Channel: 2402 MHz Mode: BLE
 Tx Chain: Aux Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2350.640	37.7	H	54.0	-16.3	AVG	185	1.01	Note 3
2370.280	46.1	H	74.0	-27.9	PK	185	1.01	
2352.890	37.7	V	54.0	-16.3	AVG	179	1.00	Note 3
2351.440	51.9	V	74.0	-22.1	PK	179	1.00	

RB 1 MHz; VB 10 Hz Blue = pk, black = avg V



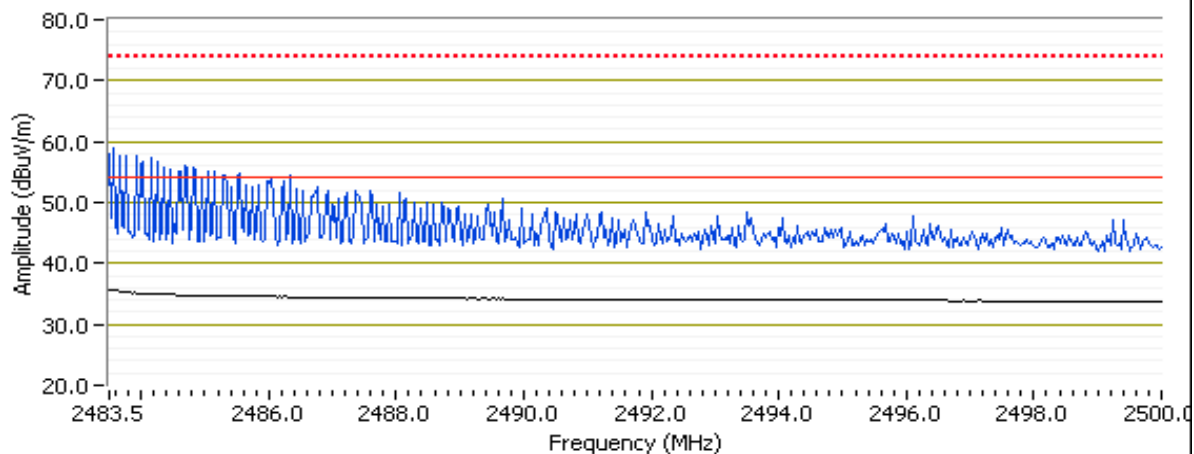
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 2480 MHz Mode: BLE
 Tx Chain: Aux Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2483.500	39.9	H	54.0	-14.1	AVG	295	1.39	Note 3
2484.000	58.7	H	74.0	-15.3	PK	295	1.39	
2484.130	38.7	V	54.0	-15.3	AVG	226	1.00	Note 3
2491.370	47.2	V	74.0	-26.8	PK	226	1.00	

RB 1 MHz; VB 10 Hz Blue = pk, black = avg H



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 23 °C
 Rel. Humidity: 34 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	LE	2402MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	48.7 dBµV/m @ 12009.8 MHz (-5.3 dB)
		2440MHz	-	-			47.0 dBµV/m @ 12199.9 MHz (-7.0 dB)
		2480MHz	-	-			48.5 dBµV/m @ 4959.9 MHz (-5.5 dB)

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.

Sample Notes

Sample S/N: 2C337A999621
 Driver: 6.30 RC255.0
 Antenna: internal

Notes:

Bluetooth LE operation is limited to Aux Port

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
LE	1Mb/s	0.62	Yes	0.387	2.10	4.19	2584

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz.

Date of Test: 3/13/2015 0:00
 Test Engineer: John Caizzi
 Joseph Cadigal
 Test Location: Chamber 5

Config. Used: 1
 Config Change: none
 Host Voltage: 120V / 60Hz

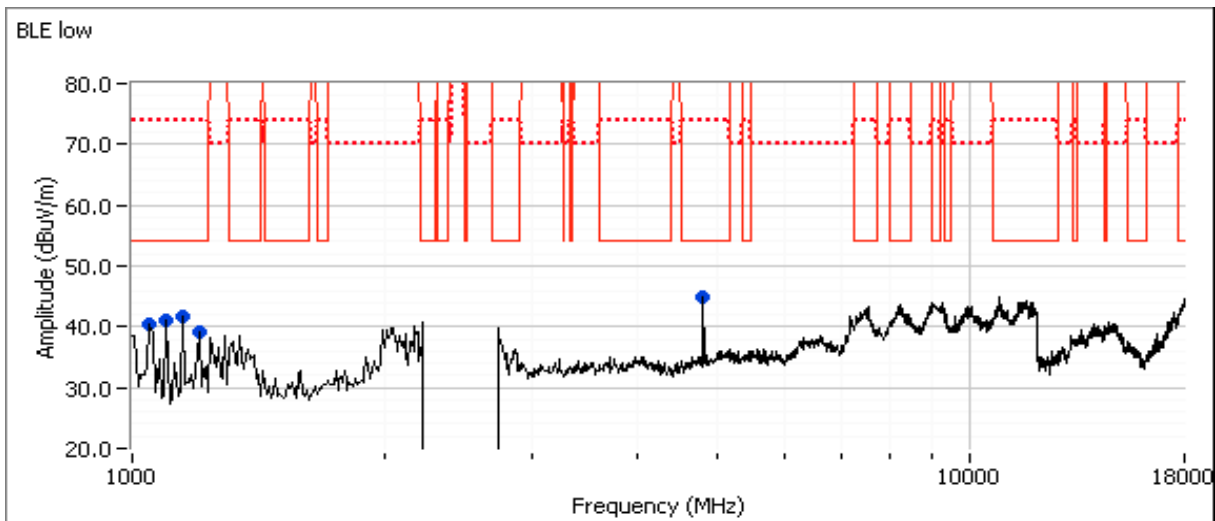
Run #1a: Low Channel

Channel: 2402 MHz
 Tx Chain: Aux

Mode: LE
 Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
12009.820	48.7	V	54.0	-5.3	AVG	343	1.76	Note 3
12009.430	52.4	V	74.0	-21.6	PK	343	1.76	
1050.000	40.5	V	54.0	-13.5	Peak	118	1.0	Note 4
1100.000	41.1	V	54.0	-12.9	Peak	118	1.0	Note 4
1150.000	41.6	V	54.0	-12.4	Peak	174	1.0	Note 4
1200.000	39.3	V	54.0	-14.7	Peak	174	1.0	Note 4
4803.920	43.8	H	54.0	-10.2	AVG	30	1.42	Note 3
4803.830	46.3	H	74.0	-27.7	PK	30	1.42	

Note 4 | Emission does not change when channel is changed. Not radio related.

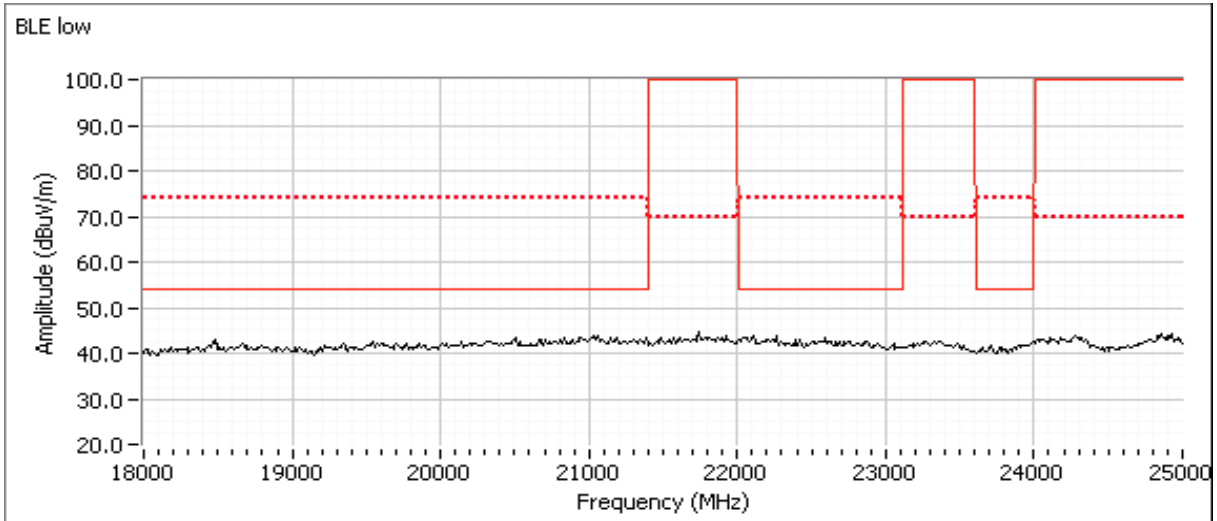


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

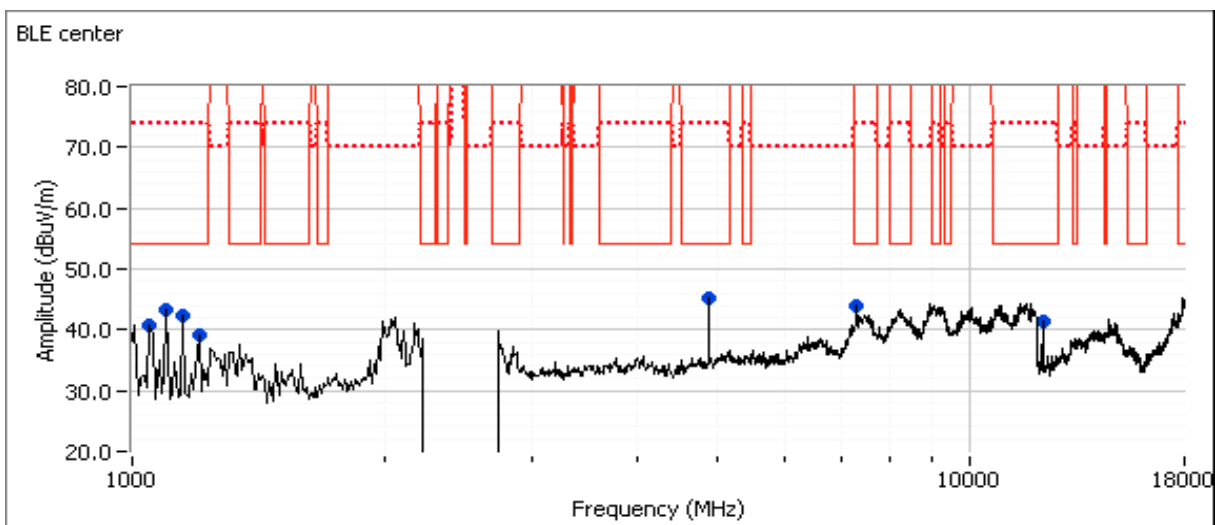
Run #1b: Center Channel

Channel: 2440 MHz Mode: LE
 Tx Chain: Aux Data Rate: 1Mb/s

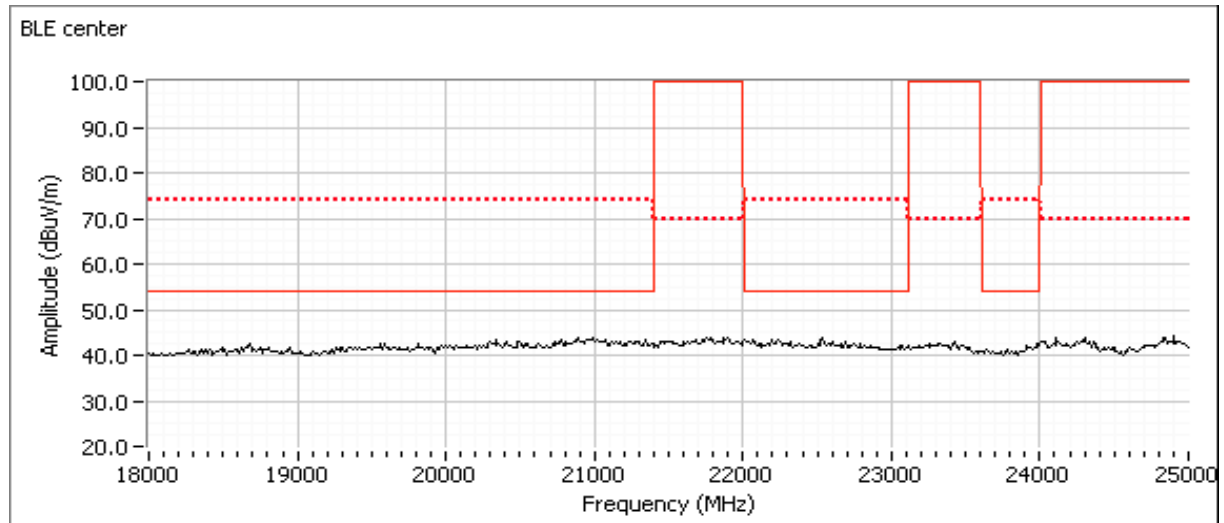
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12199.850	47.0	H	54.0	-7.0	AVG	14	1.44	Note 3
12199.930	50.9	H	74.0	-23.1	PK	14	1.44	
1050.000	40.9	V	54.0	-13.1	Peak	46	1.0	Note 4
1100.000	43.4	V	54.0	-10.6	Peak	145	1.0	Note 4
1150.000	42.4	V	54.0	-11.6	Peak	133	1.0	Note 4
1200.000	39.1	V	54.0	-14.9	Peak	65	1.0	Note 4
4879.930	46.3	H	54.0	-7.7	AVG	30	1.09	Note 3
4879.930	48.6	H	74.0	-25.4	PK	30	1.09	
7319.930	45.1	H	54.0	-8.9	AVG	356	1.59	Note 3
7319.750	49.9	H	74.0	-24.1	PK	356	1.59	

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

Note 4 Emission does not change when channel is changed. Not radio related.



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



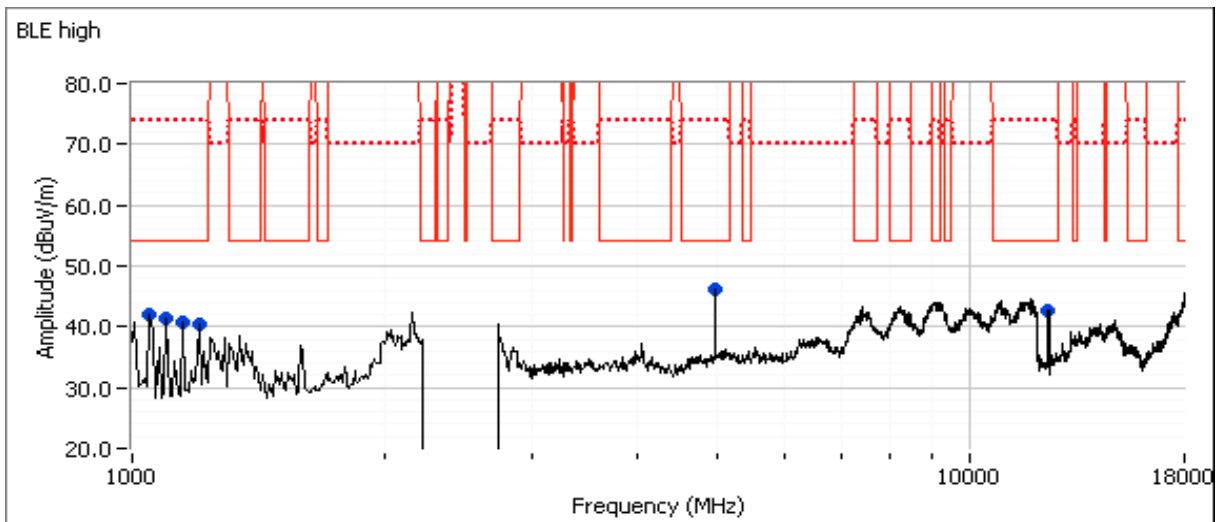
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1c: High Channel

Channel: 2480 MHz Mode: LE
 Tx Chain: Aux Data Rate: 1Mb/s

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	
4959.910	48.5	H	54.0	-5.5	AVG	34	1.07	Note 3
4959.930	49.7	H	74.0	-24.3	PK	34	1.07	
1050.000	41.9	V	54.0	-12.1	Peak	30	1.0	Note 4
1100.000	41.4	V	54.0	-12.6	Peak	130	1.0	Note 4
1150.000	40.9	V	54.0	-13.1	Peak	190	2.0	Note 4
1200.000	40.5	V	54.0	-13.5	Peak	56	1.0	Note 4
12399.900	47.9	H	54.0	-6.1	AVG	21	1.00	Note 3
12400.200	52.7	H	74.0	-21.3	PK	21	1.00	

Note 4 Emission does not change when channel is changed. Not radio related.

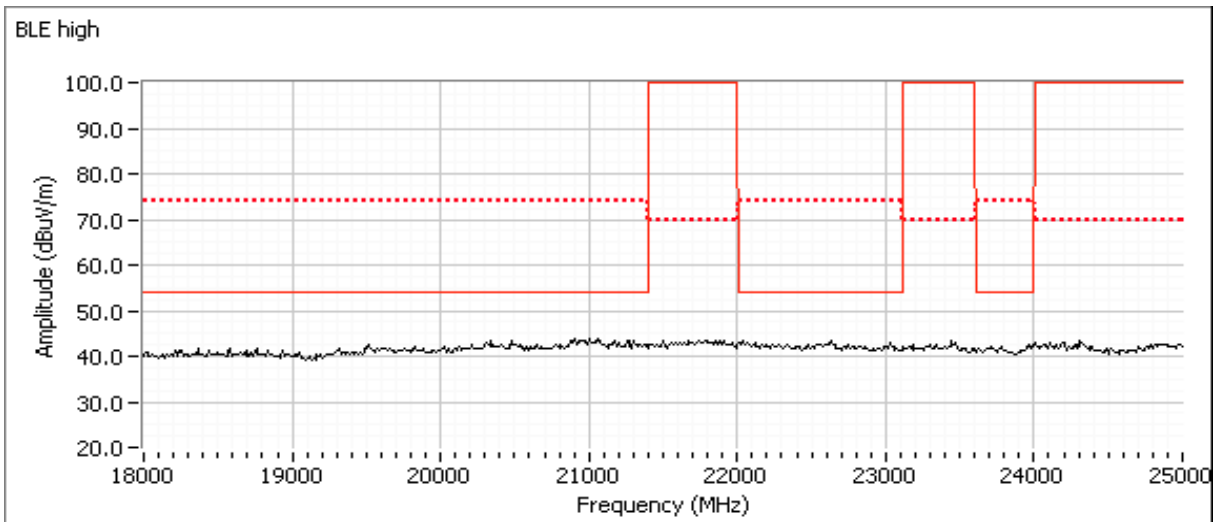


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 25 °C
Rel. Humidity: 30 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
1	LE	2402 MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	38.1 dBµV/m @ 2346.0 MHz (-15.9 dB)
		2480 MHz	-	-	Restricted Band Edge (2483.5 MHz)		40.1 dBµV/m @ 2483.5 MHz (-13.9 dB)

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.

Sample Notes

Sample S/N: 2C337A99973D
Driver: 6.30 RC255.0
Antenna: External Antenna

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
LE	1Mb/s	0.62	Yes	0.387	2.10	4.19	2584

Measurement Specific Notes:

Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1: Radiated Bandedge Measurements

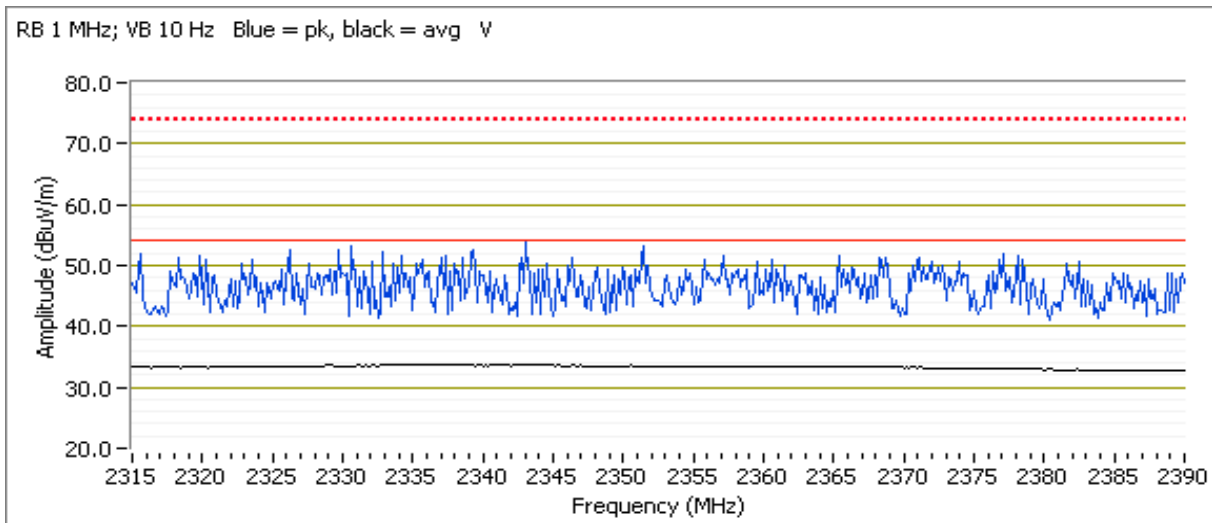
Date of Test: 3/16/2015 0:00
 Test Engineer: John Caizzi
 Test Location: Chamber 5

Config. Used: 1
 Config Change: none
 Host Voltage: 120V / 60Hz

Channel: 2402 MHz Mode: BLE
 Tx Chain: Aux Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

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	
2334.540	37.9	H	54.0	-16.1	AVG	85	1.00	Note 3
2360.090	50.6	H	74.0	-23.4	PK	85	1.00	
2345.960	38.1	V	54.0	-15.9	AVG	196	1.01	Note 3
2335.890	53.8	V	74.0	-20.2	PK	196	1.01	

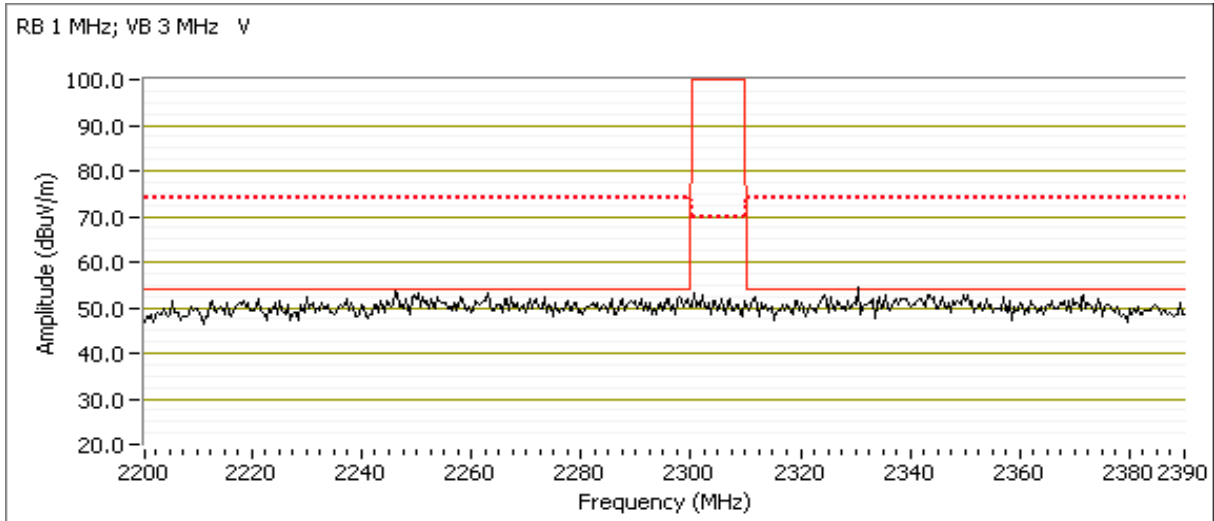


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

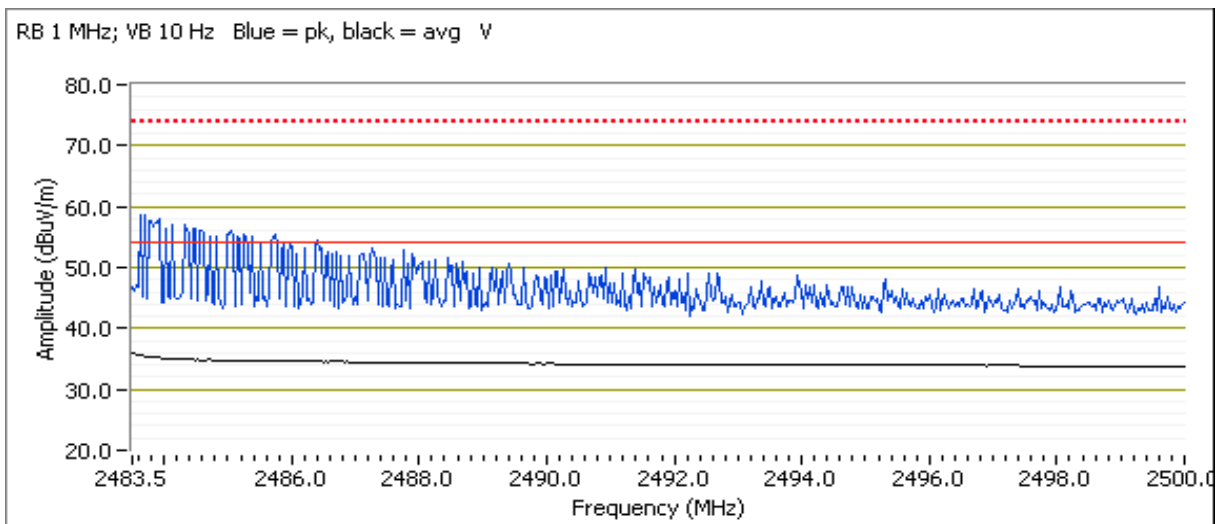


Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Channel: 2480 MHz Mode: BLE
 Tx Chain: Aux Data Rate: 1Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	40.1	V	54.0	-13.9	AVG	25	1.01	Note 3
2483.730	58.9	V	74.0	-15.1	PK	25	1.01	
2484.460	38.6	H	54.0	-15.4	AVG	204	1.98	Note 3
2493.550	46.3	H	74.0	-27.7	PK	204	1.98	

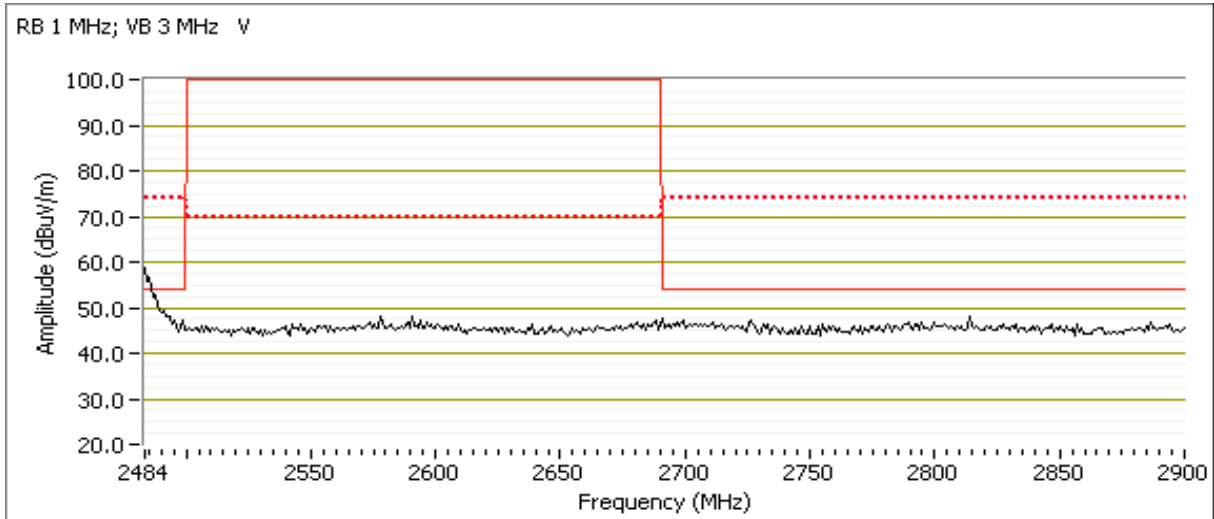


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 25 °C
 Rel. Humidity: 30 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Passing Power Setting	Test Performed	Limit	Result / Margin
1	LE	2402MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	53.9 dBµV/m @ 4803.9 MHz (-0.1 dB)
	LE	2440MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	51.8 dBµV/m @ 4879.9 MHz (-2.2 dB)
	LE	2480MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	47.4 dBµV/m @ 4959.9 MHz (-6.6 dB)

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.

Sample Notes

Sample S/N: 2C337A99973D
 Driver: 6.30 RC255.0
 Antenna: External Antenna

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Notes:

Bluetooth LE operation is limited to Aux Port

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
LE	1Mb/s	0.62	Yes	0.387	2.10	4.19	2584

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor
Note 6:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz.

Date of Test: 3/13/2015 0:00

Test Engineer: Joseph Cadigal

Test Location: FT Chamber#5

Config. Used: 1

Config Change: none

EUT Voltage: 120V/60Hz

Run #1a: Low Channel

Channel: 2402MHz

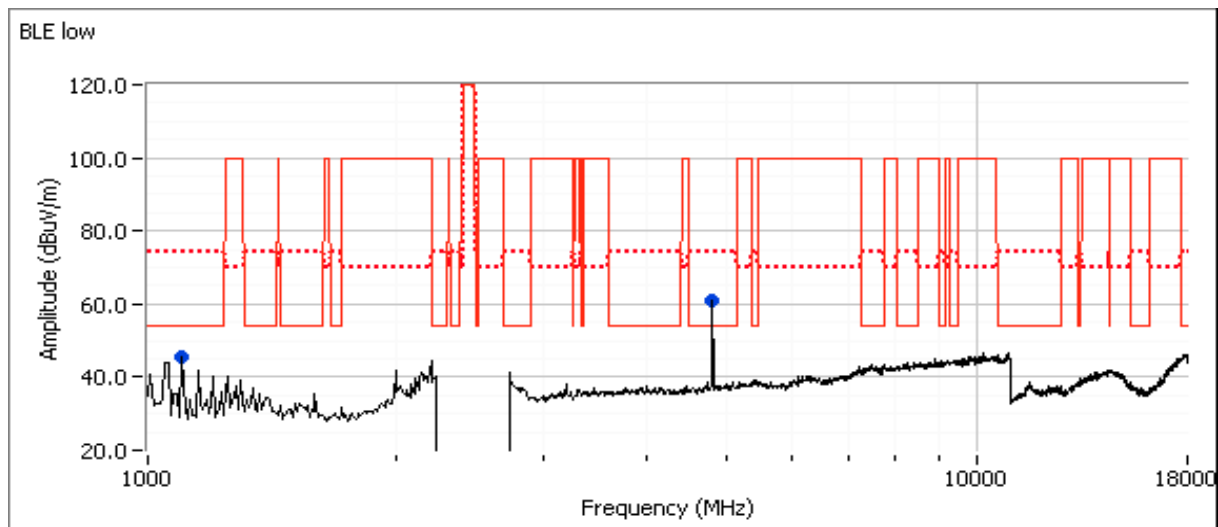
Mode: LE

Tx Chain: Aux

Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4803.900	53.9	V	54.0	-0.1	AVG	265	1.0	RB 1 MHz;VB 10 Hz;Peak, note 3
4804.460	61.6	V	74.0	-12.4	PK	265	1.0	RB 1 MHz;VB 3 MHz;Peak
1104.440	45.5	H	54.0	-8.5	Peak	153	1.0	note 4

Note 4 Emission does not change when channel is changed. Not radio related.

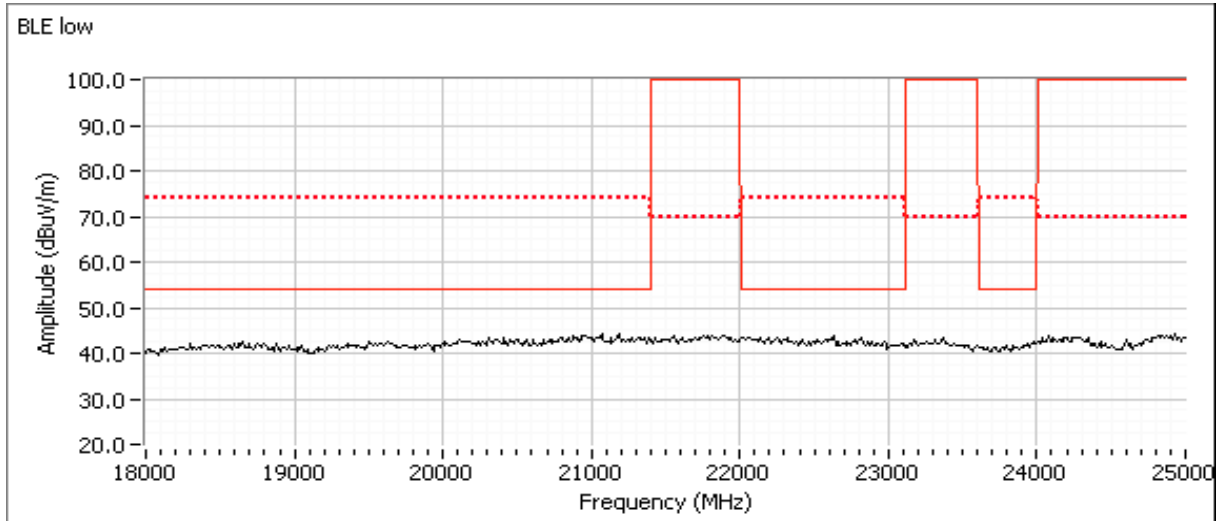


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

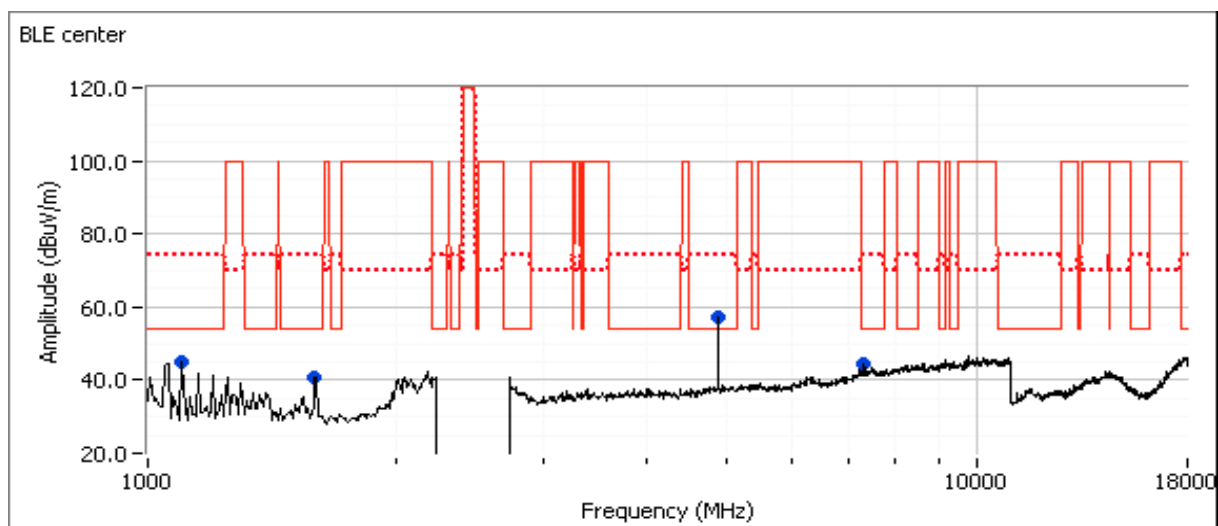
Run #1b: Center Channel

Channel: 2440MHz Mode: LE
 Tx Chain: Aux Data Rate: 1Mb/s

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	
4879.850	51.8	V	54.0	-2.2	AVG	282	1.0	RB 1 MHz;VB 10 Hz;Peak,note 3
4879.450	58.8	V	74.0	-15.2	PK	282	1.0	RB 1 MHz;VB 3 MHz;Peak
7327.560	39.6	V	54.0	-14.4	AVG	274	1.3	RB 1 MHz;VB 10 Hz;Peak,note 3
7325.900	50.8	V	74.0	-23.2	PK	274	1.3	RB 1 MHz;VB 3 MHz;Peak
1104.490	45.2	H	54.0	-8.8	Peak	149	1.0	note 4
1588.760	40.9	V	54.0	-13.1	Peak	165	1.6	note 4

Note 4 Emission does not change when channel is changed. Not radio related.

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

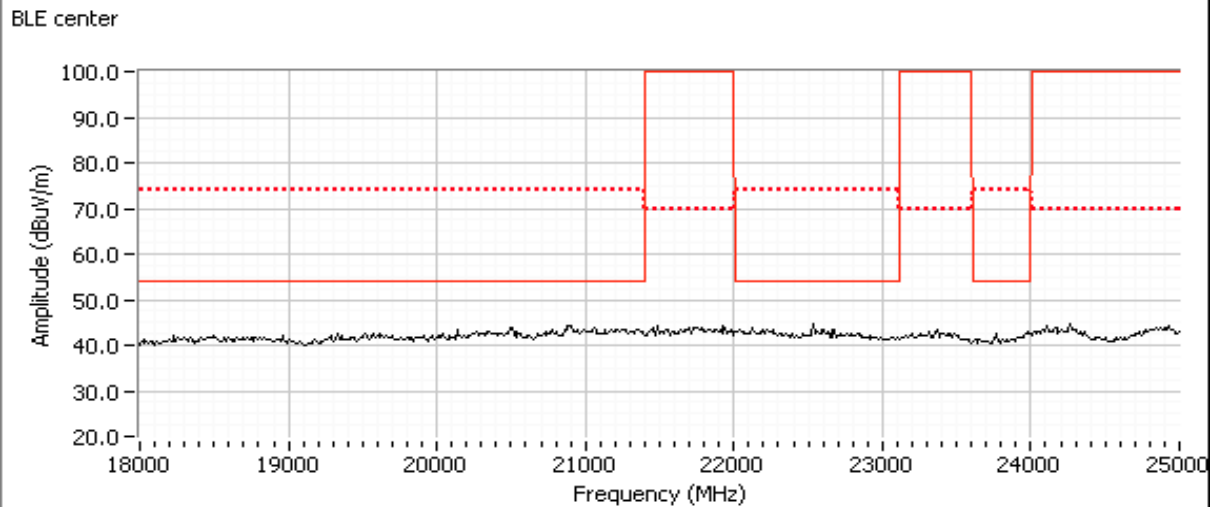


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



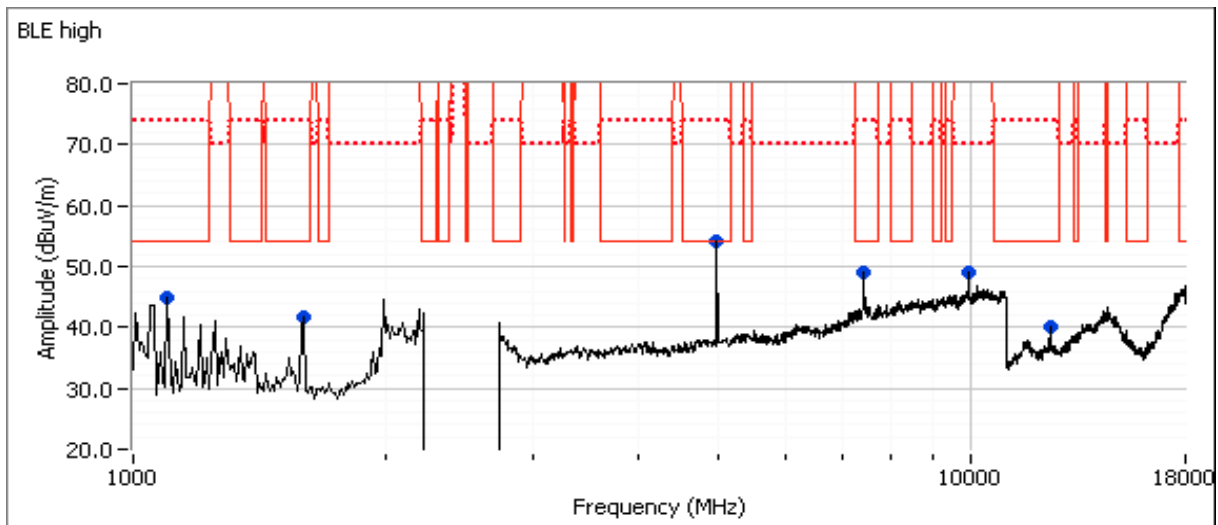
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1c: High Channel

Channel: 2480MHz Mode: LE
 Tx Chain: Aux Data Rate: 1Mb/s

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	PK/QP/Avg	degrees	meters	
4959.860	47.4	V	54.0	-6.6	AVG	282	1.0	RB 1 MHz;VB 10 Hz;Peak, note 3
4959.460	54.6	V	74.0	-19.4	PK	282	1.0	RB 1 MHz;VB 3 MHz;Peak
7440.810	41.1	V	54.0	-12.9	AVG	315	2.2	RB 1 MHz;VB 10 Hz;Peak, note 3
7440.920	52.2	V	74.0	-21.8	PK	315	2.2	RB 1 MHz;VB 3 MHz;Peak
9919.830	54.4	V	68.3	-13.9	PK	0	1.3	RB 1 MHz;VB 3 MHz;Peak
12397.790	43.6	V	54.0	-10.4	AVG	285	1.9	RB 1 MHz;VB 10 Hz;Peak, note 3
12395.160	55.5	V	74.0	-18.5	PK	285	1.9	RB 1 MHz;VB 3 MHz;Peak
4959.490	54.2	V	-	-	Peak	279	1.0	note 4
7442.310	49.1	V	-	-	Peak	311	2.2	note 4

Note 4 Emission does not change when channel is changed. Not radio related.



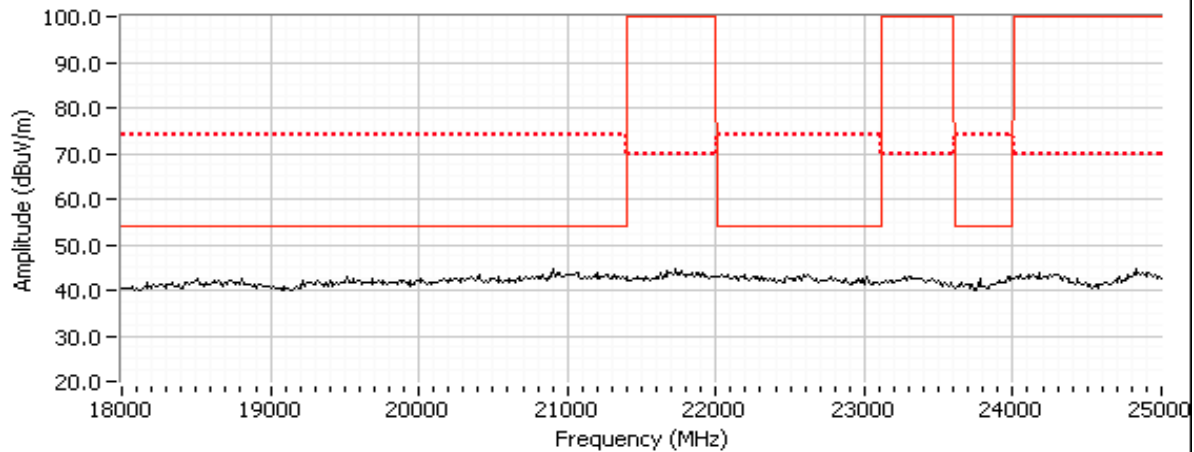
**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

BLE high



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Radiated Spurious Emissions

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.

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, unless otherwise noted.

Ambient Conditions:

Temperature: 25 °C
 Rel. Humidity: 30 %

Summary of Results - Device Operating in the 2400-2483.5 MHz Band

Run #	Mode	Channel	Target Power	Power Setting	Test Performed	Limit	Result / Margin
Worse case wifi mode + BLE operation - Internal Antenna							
1	wifi: +BLE	wifi: 1 BL: 2480MHz	-	-	Radiated Emissions, 30 - 1000 MHz	FCC Part 15.209 / 15.247(c)	40.9 dBµV/m @ 408.18 MHz (-5.1 dB)
			-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.8 dBµV/m @ 2751.1 MHz (-8.2 dB)
2		wifi: 11 BL: 2402MHz	-	-	Radiated Emissions, 30 - 1000 MHz	FCC Part 15.209 / 15.247(c)	39.0 dBµV/m @ 408.18 MHz (-7.0 dB)
			-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	43.7 dBµV/m @ 4924.0 MHz (-10.3 dB)

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.

**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Sample Notes

Sample S/N: 2C337A999621

Driver: 6.30 RC255.0

Antenna: internal

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time

Unless otherwise stated/noted, emission has duty cycle $\geq 98\%$ and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.

2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	1.00	Yes	8.418	0	0	119
LE	1Mb/s	0.62	Yes	0.387	2.0955658	4.1911315	2584

Measurement Specific Notes:

Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear Voltage correction factor



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1: Radiated Spurious Emissions, 30 - 25000 MHz

Date of Test: 3/16/2015 0:00
 Test Engineer: John Caizzi
 Joseph Cadigal
 Test Location: Chamber 5

Config. Used: 2
 Config Change: none
 Host Voltage: 120V / 60Hz

Channel: 1 Mode: 11b
 Tx Chain: Main Data Rate: 1Mb/s
 Channel: 2480MHz Mode: LE
 Tx Chain: Aux Data Rate: 1Mb/s

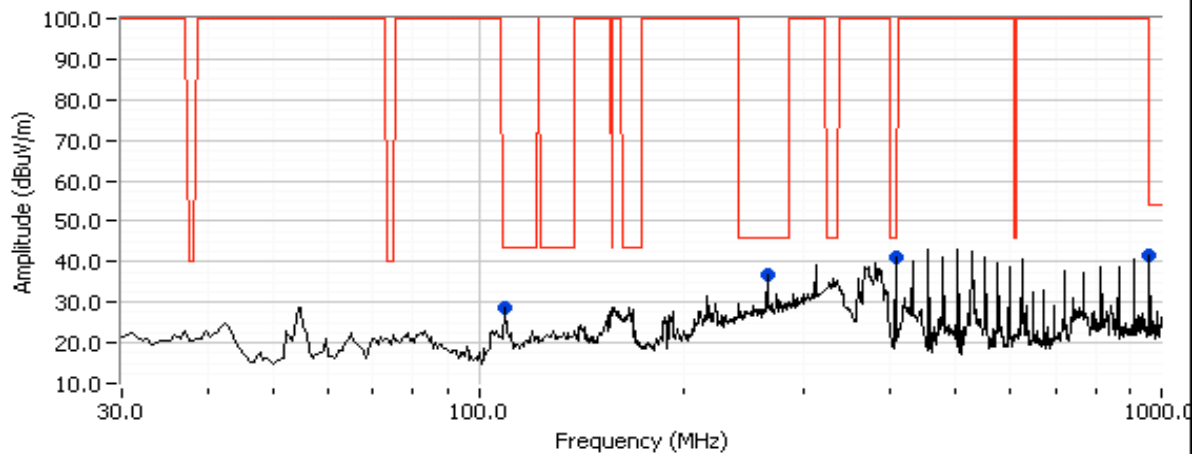
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBμV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2751.140	45.8	H	54.0	-8.2	AVG	300	1.01	
2750.800	53.9	H	74.0	-20.1	PK	300	1.01	
1100.000	44.1	V	54.0	-9.9	Peak	149	1.0	Note 4
1150.000	43.8	V	54.0	-10.2	Peak	162	1.0	Note 4
4823.980	48.5	H	54.0	-5.5	AVG	241	1.09	
4824.030	52.0	H	74.0	-22.0	PK	241	1.09	
4959.830	39.2	H	54.0	-14.8	AVG	176	1.14	
4960.810	56.0	H	74.0	-18.0	PK	176	1.14	
4890.370	39.5	H	54.0	-14.5	AVG	26	1.09	
4892.570	48.4	H	74.0	-25.6	PK	26	1.09	
2208.600	43.9	H	54.0	-10.1	AVG	206	1.00	
2208.670	57.2	H	74.0	-16.8	PK	206	1.00	
7304.000	41.7	H	54.0	-12.3	AVG	20	1.00	
7304.170	50.8	H	74.0	-23.2	PK	20	1.00	
7235.330	41.8	H	54.0	-12.2	AVG	15	1.39	Note 1
7237.130	50.6	H	74.0	-23.4	PK	15	1.39	Note 1
264.119	36.2	V	46.0	-9.8	QP	14	1.49	QP (1.00s)
960.410	38.1	V	54.0	-15.9	QP	70	0.98	QP (1.00s)
408.176	40.9	V	46.0	-5.1	QP	148	0.99	QP (1.00s)
109.365	25.3	V	43.5	-18.2	QP	244	0.99	QP (1.00s)

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

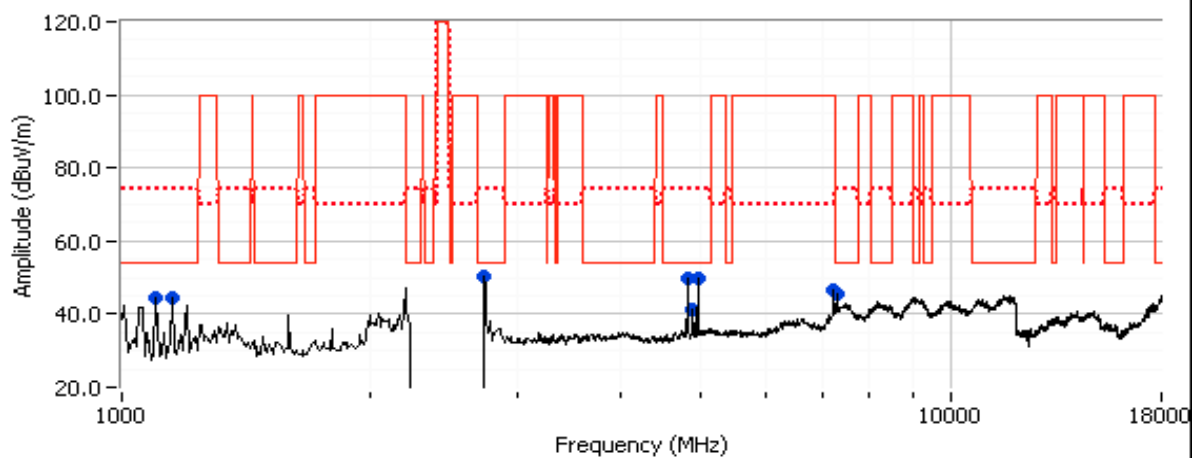
Note 4 Not radio related. See BLE Spurious - Internal.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

BLE CH39, Wi-Fi CH1



BLE CH39, Wi-Fi CH1



**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #2: Radiated Spurious Emissions, 30 - 25000 MHz

Date of Test: 3/16/2015 0:00
 Test Engineer: John Caizzi
 Joseph Cadigal
 Test Location: Chamber 5

Config. Used: 2
 Config Change: none
 Host Voltage: 120V / 60Hz

Channel: 11 Mode: 11b
 Tx Chain: Main Data Rate: 1Mb/s

Channel: 2402MHz Mode: LE
 Tx Chain: Aux Data Rate: 1Mb/s

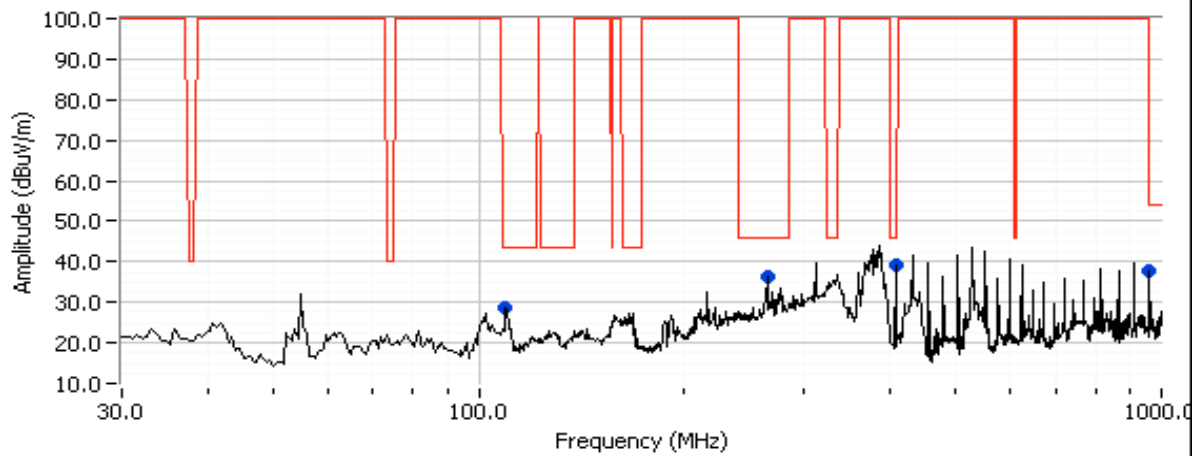
Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.960	43.7	H	54.0	-10.3	AVG	50	1.0	RB 1 MHz;VB 10 Hz;Peak
4924.080	48.0	H	74.0	-26.0	PK	50	1.0	RB 1 MHz;VB 3 MHz;Peak
1050.000	43.0	V	54.0	-11.0	Peak	146	1.0	Note 4
1100.000	43.1	V	54.0	-10.9	Peak	154	1.0	Note 4
1150.000	43.1	V	54.0	-10.9	Peak	158	1.0	Note 4
2758.330	46.6	H	54.0	-7.4	Peak	296	1.0	
4800.000	42.5	H	54.0	-11.5	Peak	203	1.5	
4858.330	42.6	H	54.0	-11.4	Peak	39	1.0	
4925.000	50.2	H	54.0	-3.8	Peak	49	1.0	
4864.820	35.9	H	54.0	-18.1	AVG	39	1.0	RB 1 MHz;VB 10 Hz;Peak
4864.540	45.6	H	74.0	-28.4	PK	39	1.0	RB 1 MHz;VB 3 MHz;Peak
4803.430	29.9	H	54.0	-24.1	AVG	207	1.5	RB 1 MHz;VB 10 Hz;Peak
4803.680	44.4	H	74.0	-29.6	PK	207	1.5	RB 1 MHz;VB 3 MHz;Peak
2763.110	42.5	H	54.0	-11.5	AVG	299	1.0	RB 1 MHz;VB 10 Hz;Peak
2762.900	51.7	H	74.0	-22.3	PK	299	1.0	RB 1 MHz;VB 3 MHz;Peak
7326.040	46.9	H	54.0	-7.1	Peak	26	1.0	Note 4
408.176	39.0	V	46.0	-7.0	QP	130	1.0	QP (1.00s)
264.119	36.3	V	46.0	-9.7	QP	14	1.0	QP (1.00s)
109.847	25.7	V	43.5	-17.8	QP	96	1.0	QP (1.00s)
960.415	33.8	V	54.0	-20.2	QP	41	1.0	QP (1.00s)

Note: Scans made between 18 - 25 GHz with the measurement antenna moved around the card and its antennas 20-50cm from the device indicated there were no significant emissions in this frequency range

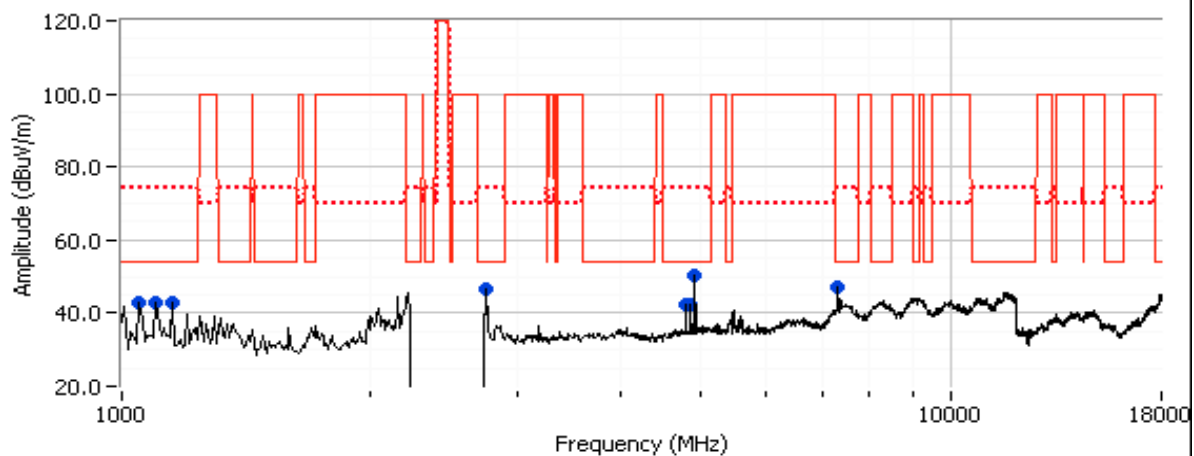
Note 4 Not radio related. See BLE Spurious - Internal.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

BLE CH0, Wi-Fi CH11



BLE CH0, Wi-Fi CH11





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements Power, PSD, Bandwidth and Spurious Emissions

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: 3/17/2015
Test Engineer: J.Liu
Test Location: FT Lab 4A

Config. Used: Conducted
Config Change: -
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:
Temperature: 23 °C
Rel. Humidity: 35 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	-	-	Output Power - Internal	15.247(b)	Pass	11b: 20.4dBm (109.6mW) 11g: 18.5dBm (70.8mW) n20: 18.5dBm (70.8mW)
1	-	-	Output Power - External	15.247(b)	Pass	11b: 20.4 dBm (109.6mW) 11g: 18.5dBm (70.8mW) n20: 18.5dBm (70.8mW)
2	-	-	Power spectral Density (PSD)	15.247(d)	Pass	11b: 4.9 dBm/10kHz
3	-	-	Minimum 6dB Bandwidth	15.247(a)	Pass	8.03 MHz
3	-	-	99% Bandwidth	RSS GEN	-	17.75 MHz
4	-	-	Spurious emissions	15.247(b)	Pass	All emissions are 30dB below the limit

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

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.

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	100%	Yes	8.459	0	0	118
11g	6Mb/s	98%	Yes	2.866	0.09	0.18	349
n20	MCS0	98%	Yes	2.660	0.10	0.20	376

Sample Notes

Sample S/N: 2C337A9996DB

Driver: 6.30 RC255.0

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1a: Output Power - Internal Antenna

Mode: 11b

Power Setting ²	Frequency (MHz)	Output Power (dBm) ¹	mW	Antenna Gain (dBi)	Result	EIRP dBm	W	Output Power (dBm) ³	mW
-	2412	18.2	66.1	2.5	Pass	20.7	0.117		
-	2437	20.4	109.6	2.5	Pass	22.9	0.195		
-	2462	17.4	55.0	2.5	Pass	19.9	0.098		

Mode: 11g

Power Setting ²	Frequency (MHz)	Output Power (dBm) ¹	mW	Antenna Gain (dBi)	Result	EIRP dBm	W	Output Power (dBm) ³	mW
-	2412	14.1	25.7	2.5	Pass	16.6	0.046		
-	2437	18.5	70.8	2.5	Pass	21.0	0.126		
-	2462	13.8	24.0	2.5	Pass	16.3	0.043		

Mode: n20

Power Setting ²	Frequency (MHz)	Output Power (dBm) ⁴	mW	Antenna Gain (dBi)	Result	EIRP dBm	W	Output Power (dBm) ³	mW
-	2412	12.2	16.6	2.5	Pass	14.7	0.030		
-	2437	18.5	70.8	2.5	Pass	21.0	0.126		
-	2462	11.8	15.1	2.5	Pass	14.3	0.027		

Note 1:	Duty Cycle $\geq 98\%$. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB $\geq 3^*$ RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-1, in KDB 558074). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power meter (non-gated) and is included for reference only.
Note 4:	Duty Cycle $< 98\%$. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB $\geq 3^*$ RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-2, in KDB 558074). Measurement corrected by the Pwr Cor Factor. Spurious limit becomes -30dBc.

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #1b: Output Power - External Antenna

Mode: 11b

Power Setting ²	Frequency (MHz)	Output Power (dBm) ¹	mW	Antenna Gain (dBi)	Result	EIRP dBm	W	Output Power (dBm) ³	mW
-	2412	19.1	81.3	0.7	Pass	19.8	0.095		
-	2437	20.4	109.6	0.7	Pass	21.1	0.129		
-	2462	19.0	79.4	0.7	Pass	19.7	0.093		

Mode: 11g

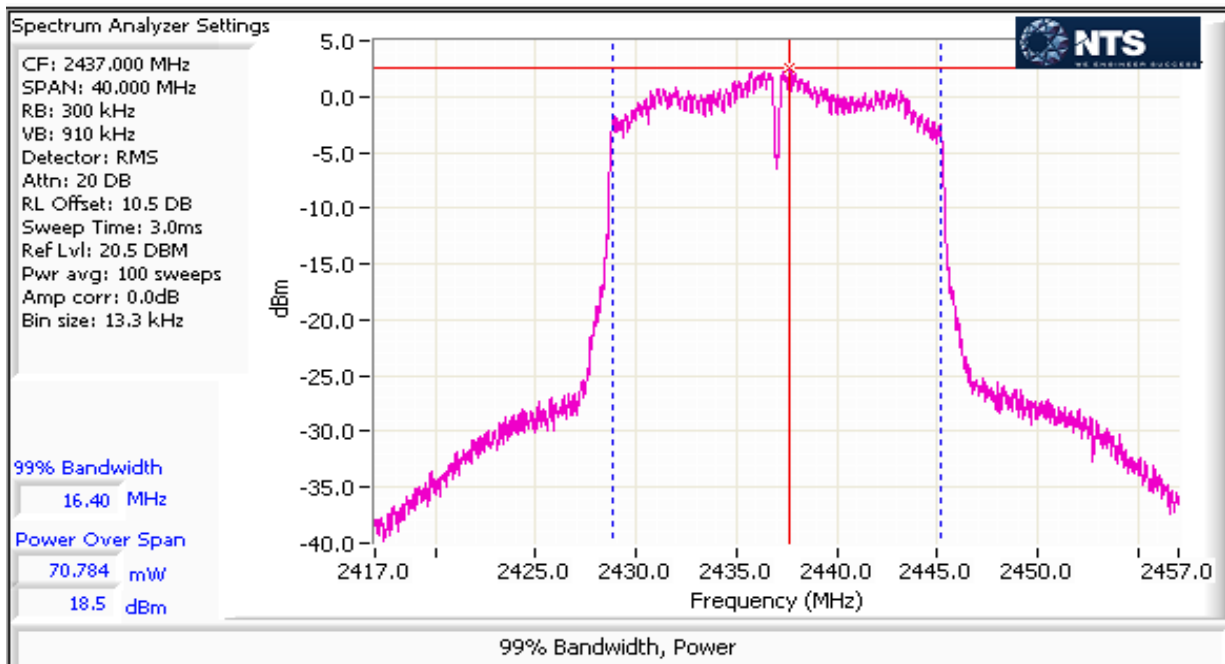
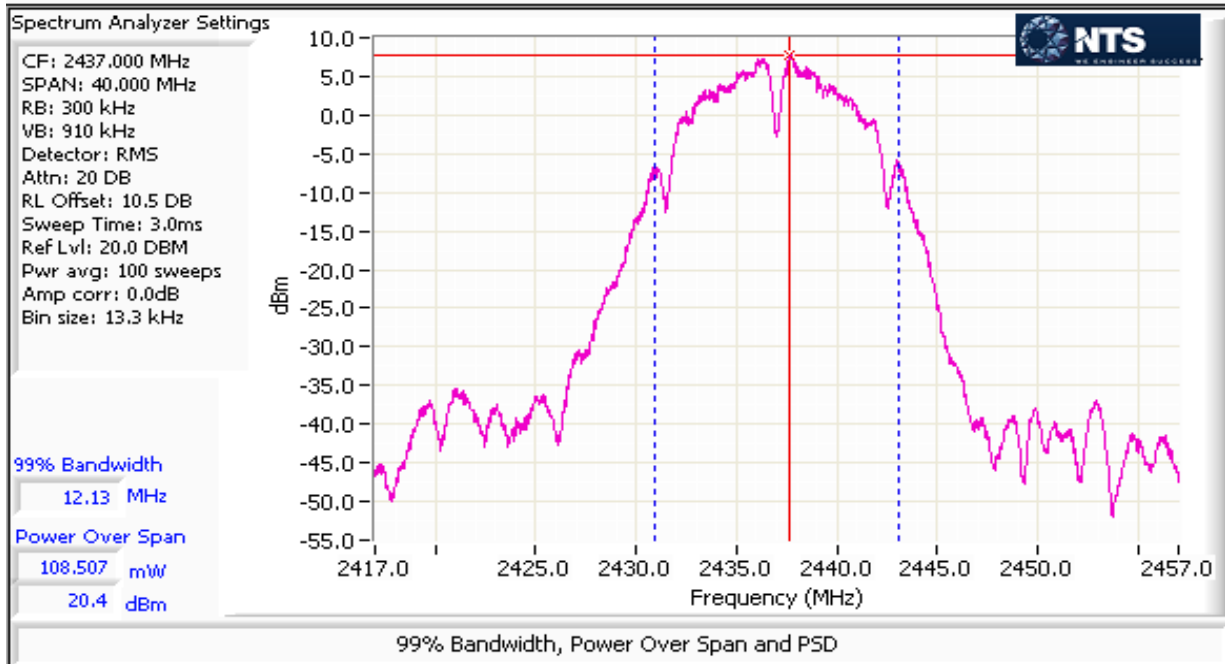
Power Setting ²	Frequency (MHz)	Output Power (dBm) ¹	mW	Antenna Gain (dBi)	Result	EIRP dBm	W	Output Power (dBm) ³	mW
-	2412	16.5	44.7	0.7	Pass	17.2	0.052		
-	2437	18.5	70.8	0.7	Pass	19.2	0.083		
-	2462	14.1	25.7	0.7	Pass	14.8	0.030		

Mode: n20

Power Setting ²	Frequency (MHz)	Output Power (dBm) ⁴	mW	Antenna Gain (dBi)	Result	EIRP dBm	W	Output Power (dBm) ³	mW
-	2412	16.7	46.8	0.7	Pass	17.4	0.055		
-	2437	18.5	70.8	0.7	Pass	19.2	0.083		
-	2462	13.5	22.4	0.7	Pass	14.2	0.026		

Note 1:	Duty Cycle $\geq$ 98%. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB $\geq$ 3* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-1, in KDB 558074). Spurious limit becomes -30dBc.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power meter (non-gated) and is included for reference only.
Note 4:	Duty Cycle < 98%. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB $\geq$ 3* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-2, in KDB 558074). Measurement corrected by the Pwr Cor Factor. Spurious limit becomes -30dBc.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

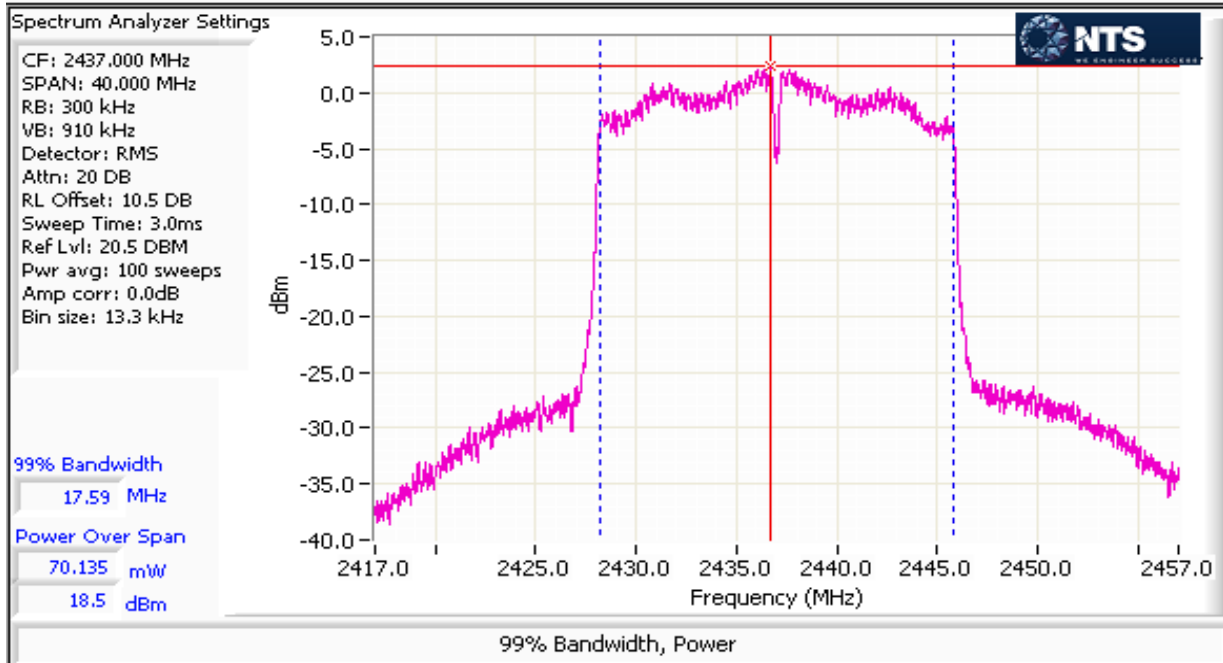


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #2: Power spectral Density

Testing performed using the highest power setting from either antenna option

Mode: 11b

Power Setting	Frequency (MHz)	PSD (dBm/10kHz) ^{Note 1}	Limit dBm/3kHz	Result
-	2412	4.9	8.0	Pass
-	2437	3.2	8.0	Pass
-	2462	4.0	8.0	Pass

Mode: 11g

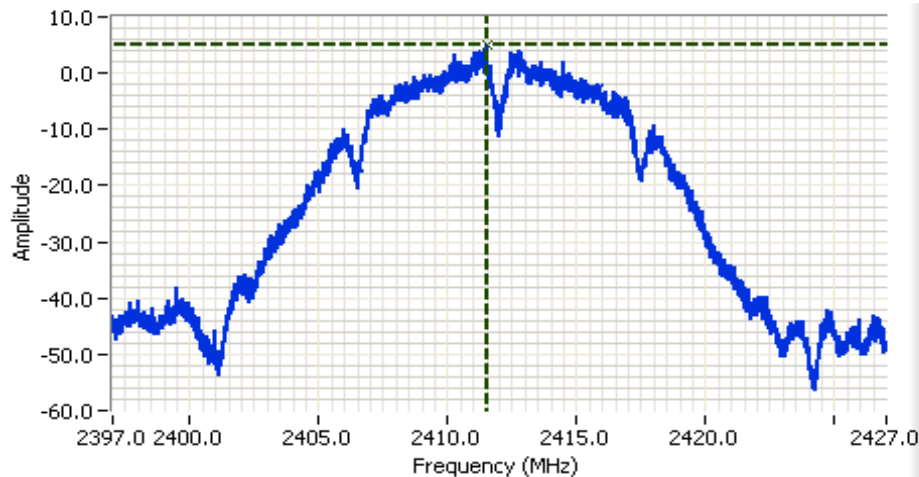
Power Setting	Frequency (MHz)	PSD (dBm/10kHz) ^{Note 1}	Limit dBm/3kHz	Result
-	2412	0.1	8.0	Pass
-	2437	-0.7	8.0	Pass
-	2462	0.6	8.0	Pass

Mode: n20

Power Setting	Frequency (MHz)	PSD (dBm/10kHz) ^{Note 1}	Limit dBm/3kHz	Result
-	2412	0.3	8.0	Pass
-	2437	-1.7	8.0	Pass
-	2462	-0.7	8.0	Pass

Note 1: Test performed per method PKSPD, in KDB 558074. Power spectral density measured using: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$, $\text{VBW}=3*\text{RBW}$, peak detector, span = $1.5*\text{DTS BW}$, auto sweep time, max hold.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

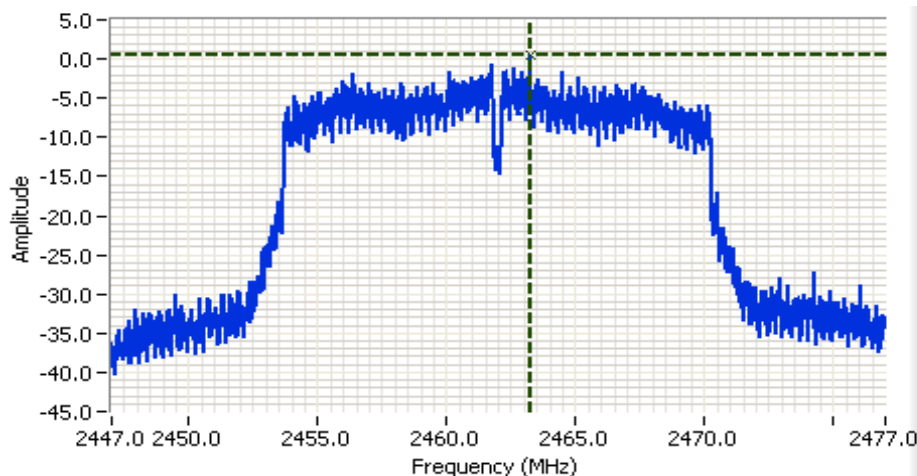
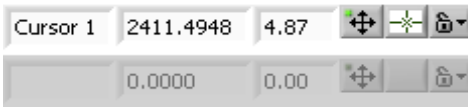


Analyzer Settings

Agilent Technologies, E4446A
 CF: 2412.000 MHz
 SPAN: 30.000 MHz
 RB: 10.0 kHz
 VB: 30.0 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 286.9ms
 Ref Lvl: 20.0 DBM

Comments

PSD :4.87/10kHz
 b CH1

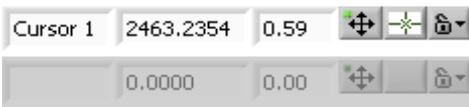


Analyzer Settings

Agilent Technologies, E4446A
 CF: 2462.000 MHz
 SPAN: 30.000 MHz
 RB: 10.0 kHz
 VB: 30.0 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 286.9ms
 Ref Lvl: 20.0 DBM

Comments

PSD :0.59/10kHz
 g CH11

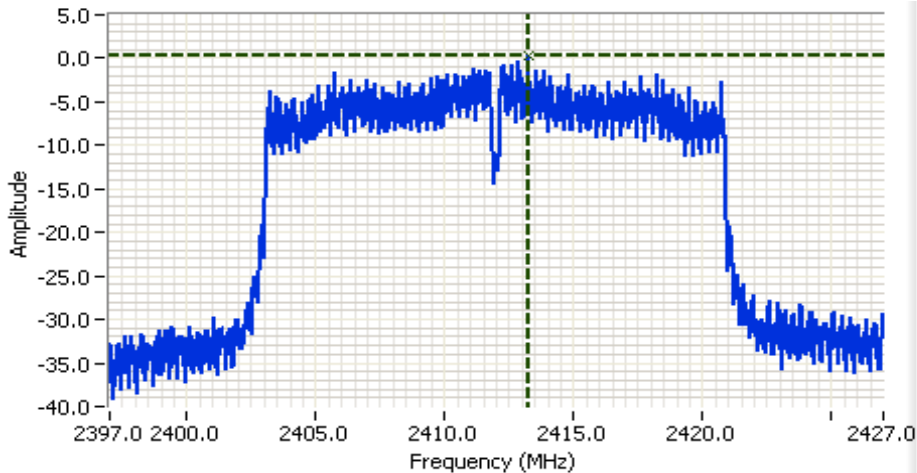


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Analyzer Settings

Agilent Technologies, E4446A
CF: 2412.000 MHz
SPAN: 30.000 MHz
RB: 10.0 kHz
VB: 30.0 kHz
Detector: POS
Attn: 20 DB
RL Offset: 10.5 DB
Sweep Time: 286.9ms
Ref Lvl: 20.0 DBM

Comments

PSD :0.27/10kHz
n20 CH1

Cursor 1 2413.2354 0.27

0.0000 0.00



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Run #3: Signal Bandwidth

Testing performed using the highest power setting from either antenna option

Mode: 11b

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
-	2412	8.03	12.23	100	300
-	2437	8.04	12.27	100	300
-	2462	8.03	12.27	100	300

Mode: 11g

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
-	2412	15.10	15.79	100	300
-	2437	15.07	16.87	100	300
-	2462	15.09	16.85	100	300

Mode: n20

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
-	2412	15.10	17.73	100	300
-	2437	15.10	17.75	100	300
-	2462	15.11	17.73	100	300

Note 1: DTS BW: RBW=100kHz, VBW $\geq 3 \times$ RBW, peak detector, max hold, auto sweep time.
 99% BW: RBW=1-5% of 99%BW, VBW $\geq 3 \times$ RBW, peak detector, max hold, auto sweep time.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2412.000 MHz
 SPAN: 40.000 MHz
 RB: 100 kHz
 VB: 300 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 4.0ms
 Ref Lvl: 20.0 DBM

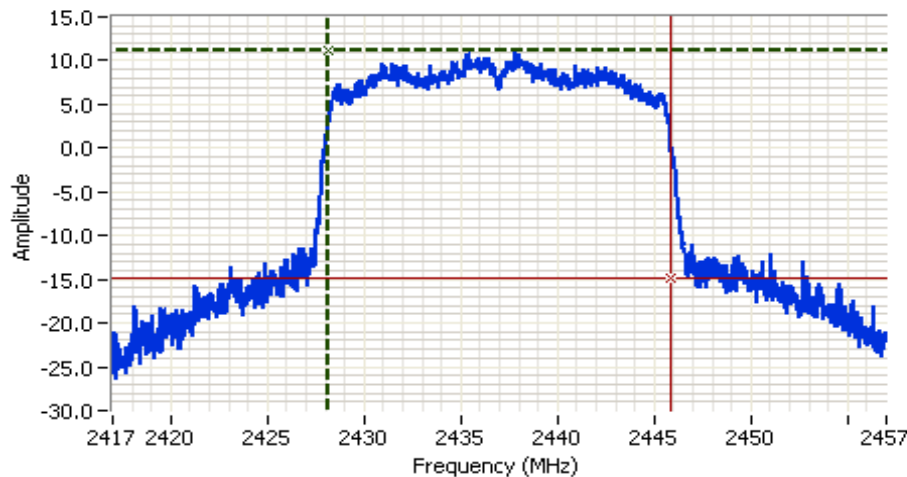
Comments

6dB BW: 8.029 MHz
 b CH1

Cursor 1	2416.0080	13.11	
Cursor 2	2407.9787	7.11	

Delta Freq. 8.029

Delta Amplitude 6.00



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2437.000 MHz
 SPAN: 40.000 MHz
 RB: 300 kHz
 VB: 910 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 20.0 DBM

Comments

99% power BW: 17.747 MHz
 n20 CH6

Cursor 1	2428.1200	11.16	
Cursor 2	2445.8667	-14.84	

Delta Freq. 17.747

Delta Amplitude 26.00



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #4a: Out of Band Spurious Emissions

Testing performed using the highest power setting from either antenna option

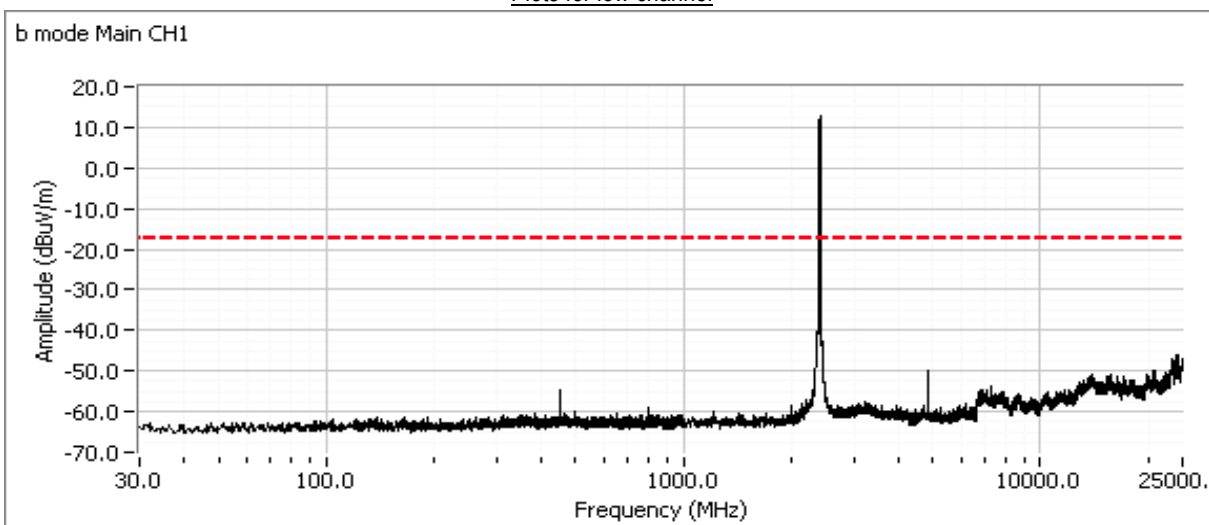
Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	b	-30dBc	Pass
2437	-	b	-30dBc	Pass
2462	-	b	-30dBc	Pass

Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	g	-30dBc	Pass
2437	-	g	-30dBc	Pass
2462	-	g	-30dBc	Pass

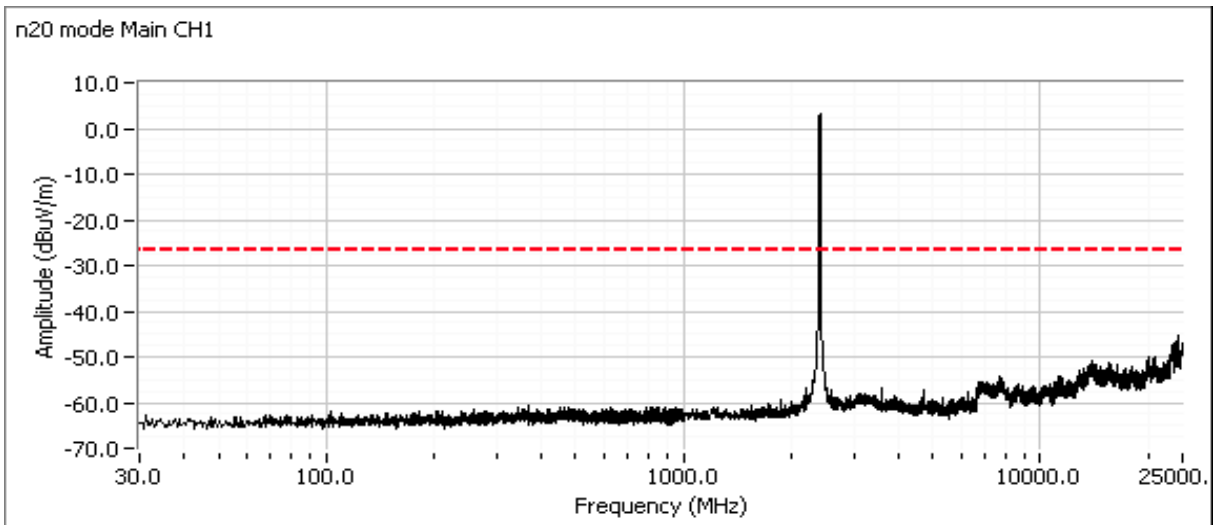
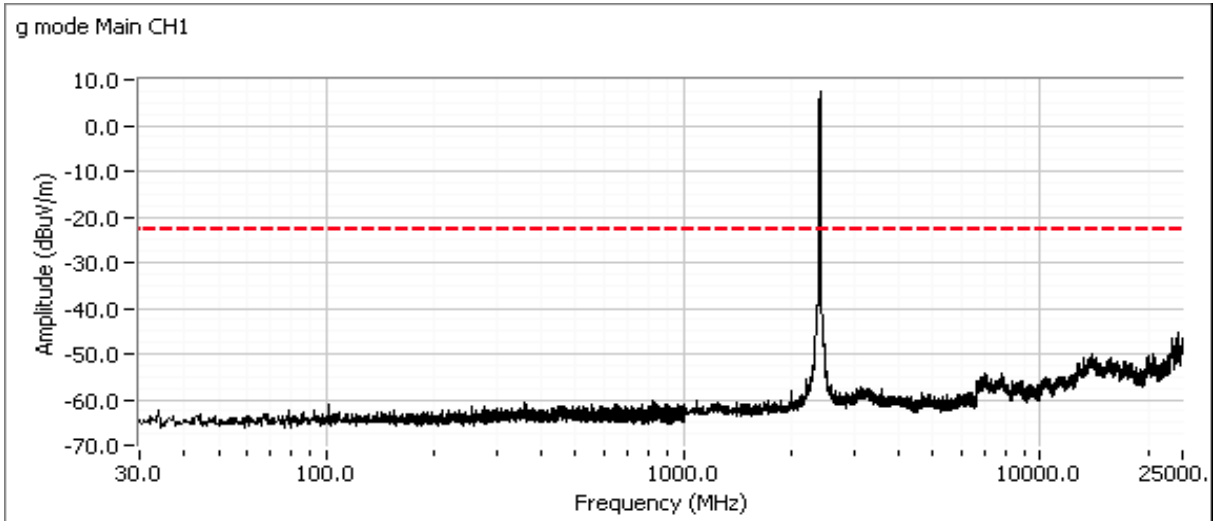
Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	n20	-30dBc	Pass
2437	-	n20	-30dBc	Pass
2462	-	n20	-30dBc	Pass

Note 1: Measurements performed using RBW=100kHz, VBW=300kHz, peak detector, sweep time auto, max hold.

Plots for low channel

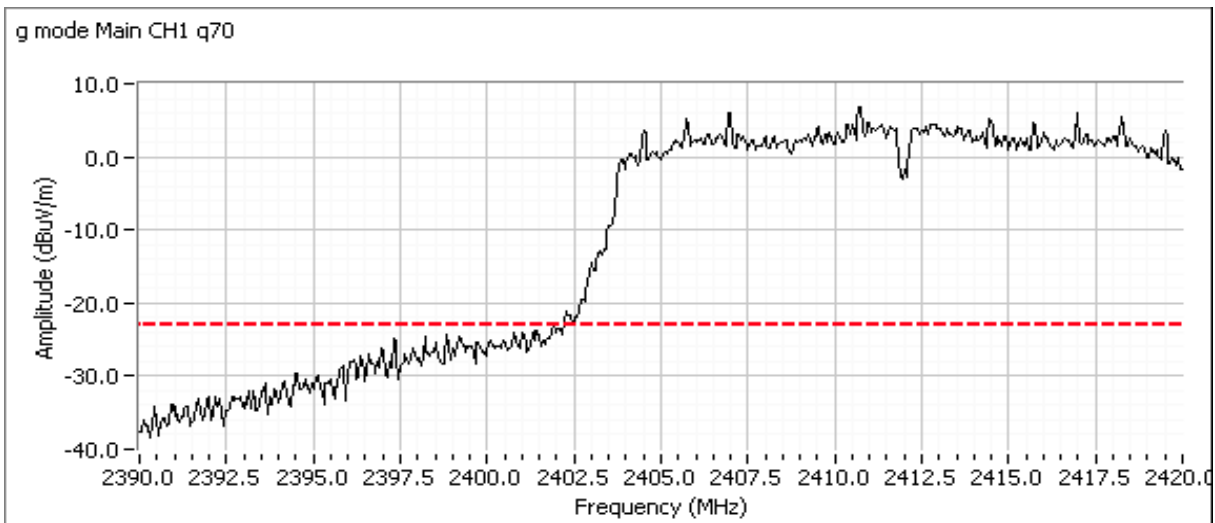


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

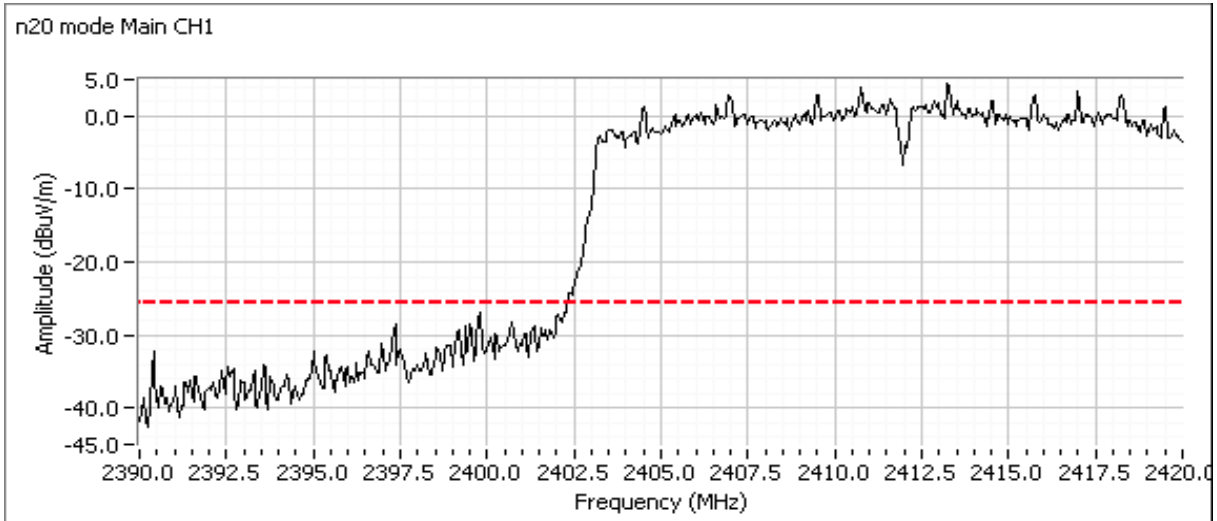


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

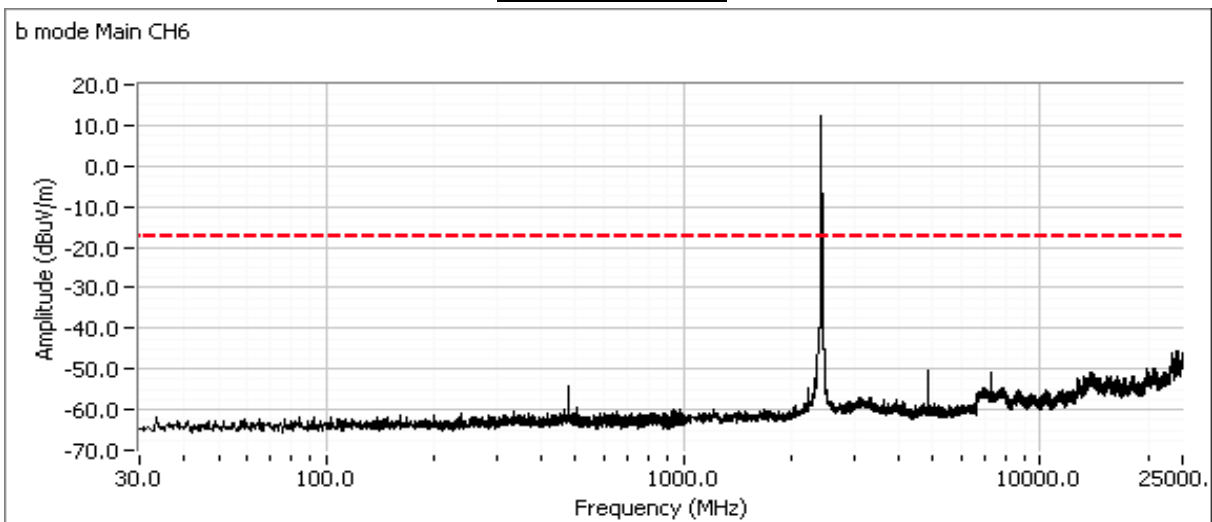
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



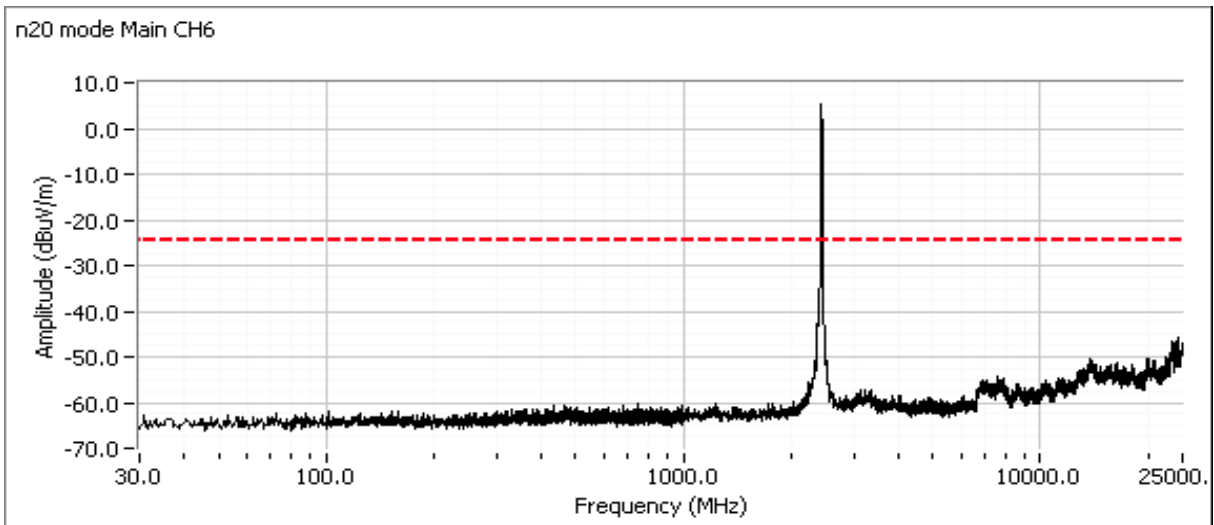
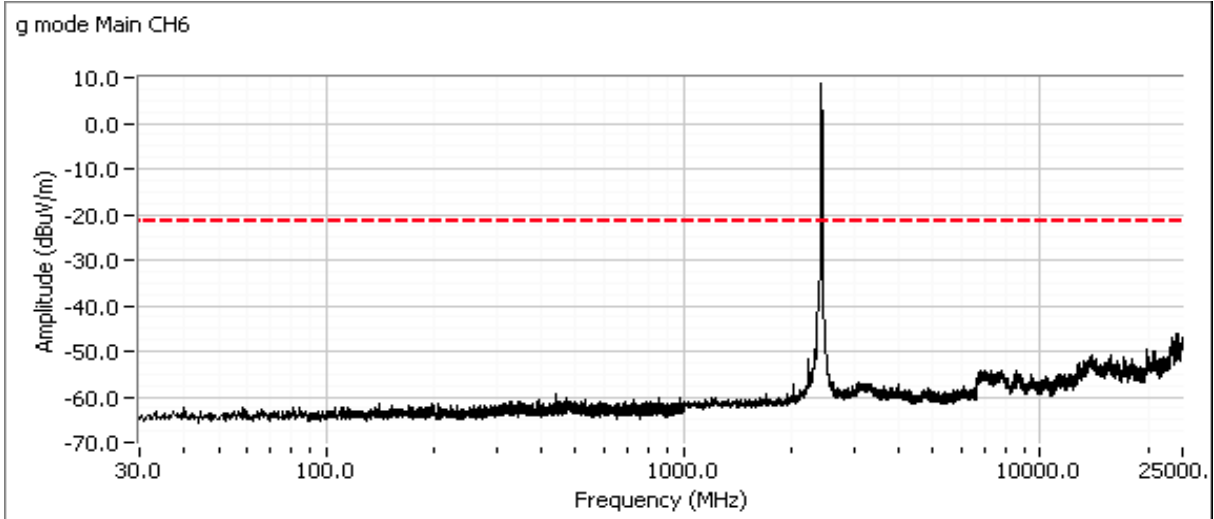
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



Plots for center channel



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



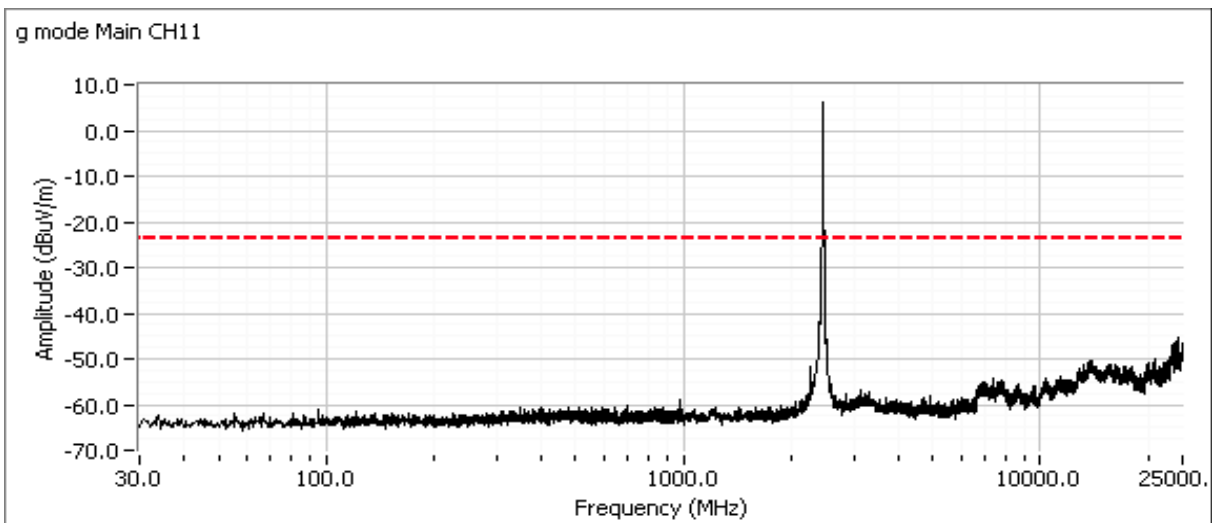
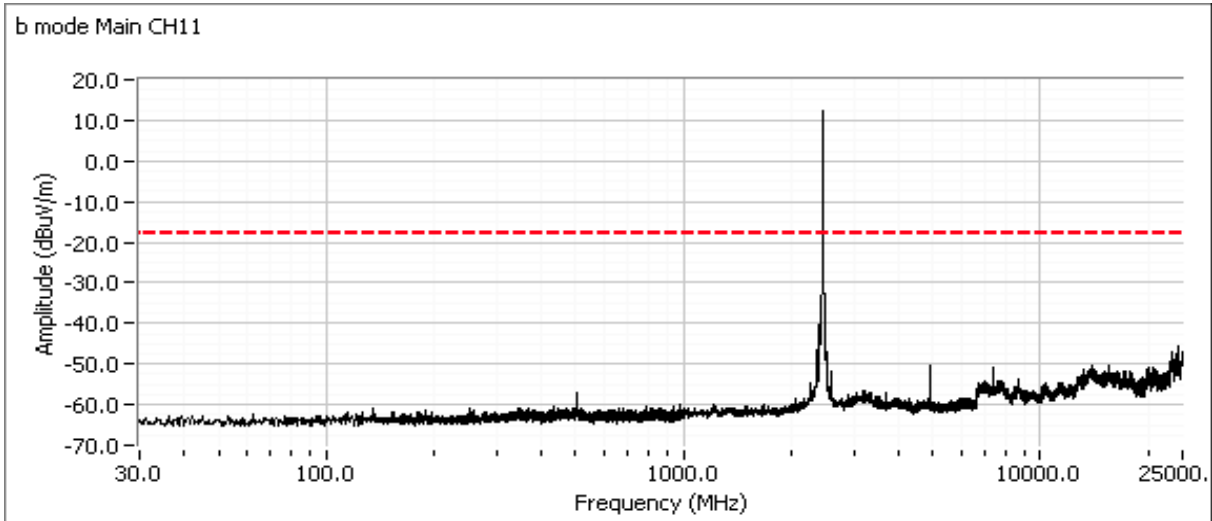
**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Plots for high channel

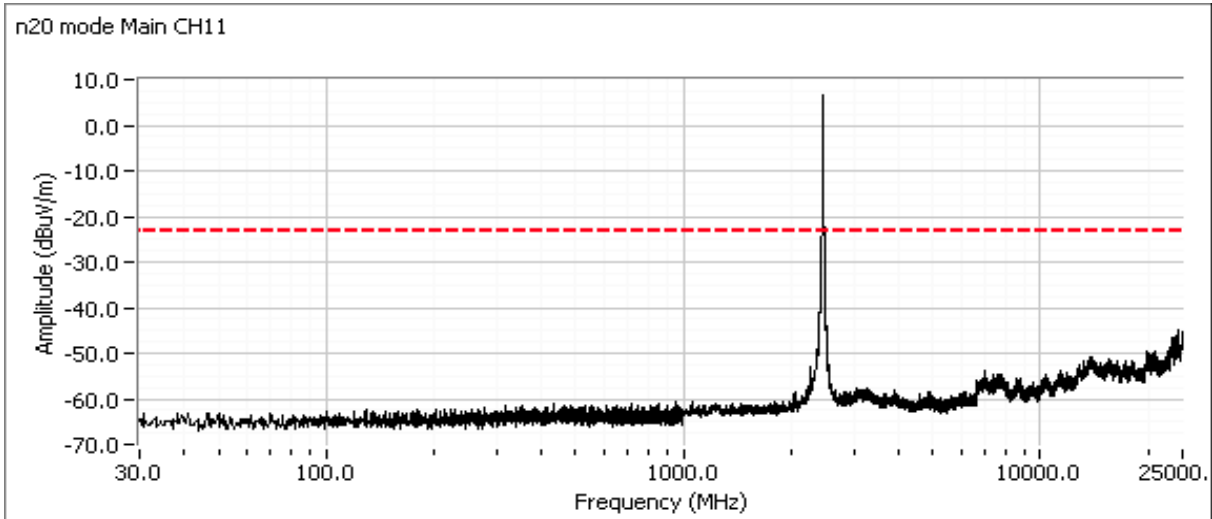


**NTS**

WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

RSS 210 and FCC 15.247 (DTS) Antenna Port Measurements

Power, PSD, Bandwidth and Spurious Emissions

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: 3/16/15, 3/17/15, 3/25/15
 Test Engineer: M. Birgani, J. Liu, J. Caizzi
 Test Location: FT Lab4A

Config. Used: Conducted
 Config Change: -
 EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was connected to the spectrum analyzer or power meter via a suitable attenuator. All measurements were made on a single chain.

All measurements have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 18-20 °C
 Rel. Humidity: 30-35 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	Default	-	Output Power	15.247(b)	Pass	1.8 dBm (1.5mW)
2		-	Power spectral Density (PSD)	15.247(d)	Pass	-8.2 dBm/3kHz
3		-	Minimum 6dB Bandwidth	15.247(a)	Pass	795 kHz
3		-	99% Bandwidth	RSS GEN	-	1.168 MHz
4		-	Spurious emissions	15.247(b)	Pass	All emissions are 20dB below the limit

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:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
BLE		0.6172	Yes	0.387	2.0955658	4.1911315	2584

Sample Notes

Sample S/N: 2C337A9996DB

Driver: 6.30 RC255.0

Notes:

LE only transmits on Aux port.

Run #1: Output Power

Mode: LE

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
Max	2402	1.7	1.5	2.5	Pass	4.2	0.003		
Max	2440	1.7	1.5	2.5	Pass	4.2	0.003		
Max	2480	1.8	1.5	2.5	Pass	4.3	0.003		

Note 1: Output power measured using a peak power meter, spurious limit is -20dBc.

Note 2: Power setting - the software power setting used during testing, included for reference only.

Note 3: Power measured using average power meter (non-gated) and is included for reference only.

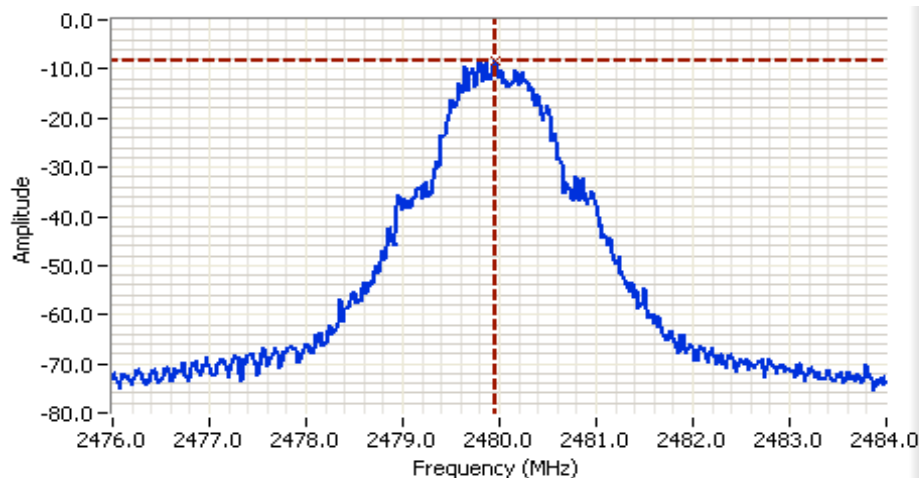
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #2: Power spectral Density

Mode: LE

Power Setting	Frequency (MHz)	PSD (dBm/10kHz) Note 1	Limit dBm/3kHz	Result
Max	2402	-9.1	8.0	Pass
Max	2440	-8.2	8.0	Pass
Max	2480	-8.2	8.0	Pass

Note 1: Test performed per method PKSPD, in KDB 558074. Power spectral density measured using: $3\text{kHz} \leq \text{RBW} \leq 100\text{kHz}$, $\text{VBW}=3*\text{RBW}$, peak detector, span = $1.5*\text{DTS BW}$, auto sweep time, max hold.



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2480.000 MHz
 SPAN: 8.000 MHz
 RB: 10.0 kHz
 VB: 30.0 kHz
 Detector: POS
 Attn: 10 DB
 RL Offset: 10.5 DB
 Sweep Time: 76.5ms
 Ref Lvl: 5.0 DBM

Comments

PSD: -8.2dBm/10kHz
 BLE

Cursor 1	2479.9600	-8.16		
	0.0000	0.00		

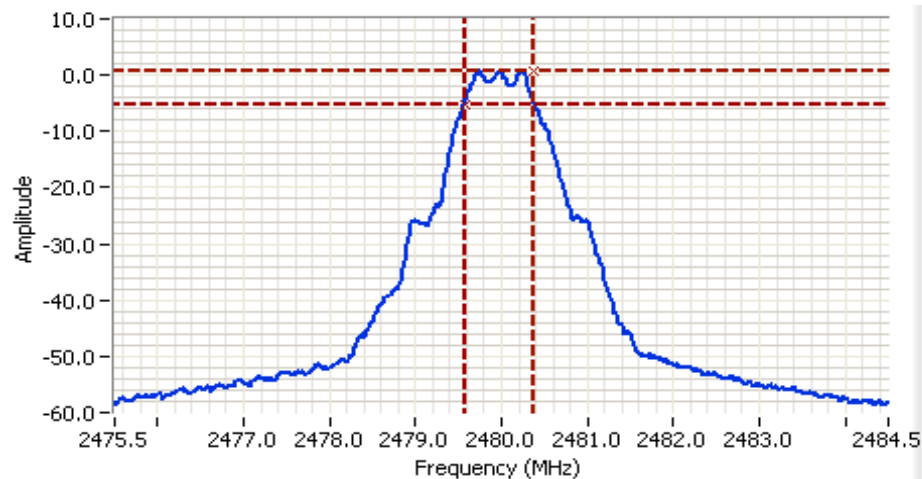
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #3: Signal Bandwidth

Mode: **LE**

Power Setting	Frequency (MHz)	Bandwidth (kHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
Max	2402	816	1167	100	20
Max	2440	810	1168	100	20
Max	2480	795	1153	100	20

Note 1: DTS BW: RBW=100kHz, VBW $\geq 3 \times$ RBW, peak detector, max hold, auto sweep time.
 99% BW: RBW=1-5% of 99%BW, VBW $\geq 3 \times$ RBW, peak detector, max hold, auto sweep time.



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2480.000 MHz
 SPAN: 9.000 MHz
 RB: 100 kHz
 VB: 300 kHz
 Detector: POS
 Attn: 10 DB
 RL Offset: 10.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 5.0 DBM

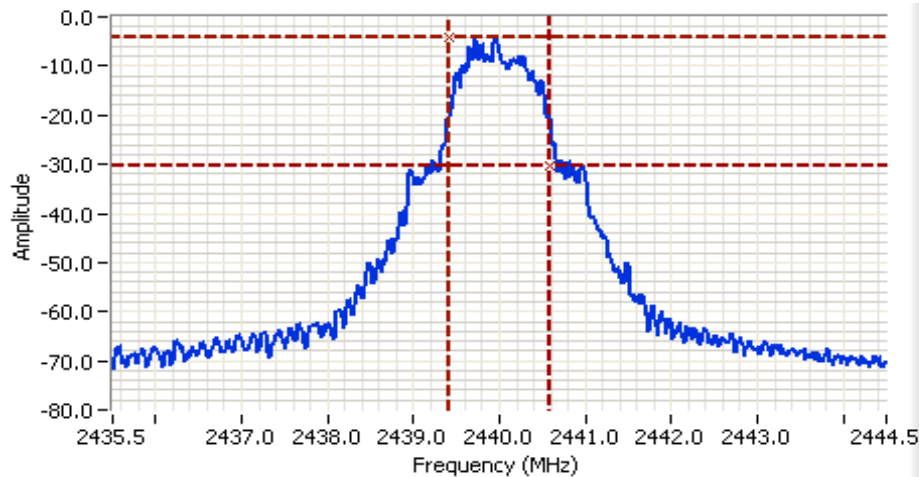
Comments

6dB BW: 795 kHz
 BLE

Cursor 1	2480.3750	0.79	
Cursor 2	2479.5800	-5.21	

Delta Freq. 795 kHz
 Delta Amplitude 6.00

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



Analyzer Settings

Agilent Technologies, E4446A
 CF: 2440.000 MHz
 SPAN: 9.000 MHz
 RB: 20.0 kHz
 VB: 62.0 kHz
 Detector: POS
 Attn: 10 DB
 RL Offset: 10.5 DB
 Sweep Time: 21.5ms
 Ref Lvl: 5.0 DBM

Comments

99% BW: 1.168 MHz
 BLE

Cursor 1	2439.4085	-4.33			
Cursor 2	2440.5765	-30.33			

Delta Freq. 1.168

Delta Amplitude 26.00

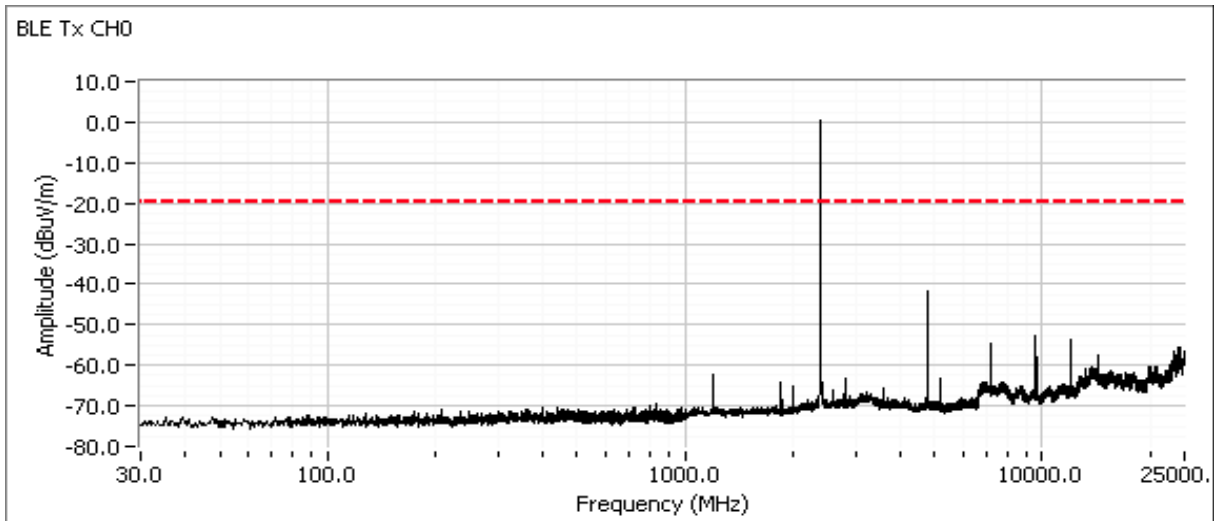
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #4a: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting	Mode	Limit	Result
2402	Max	LE	-20dBc	Pass
2440	Max	LE	-20dBc	Pass
2480	Max	LE	-20dBc	Pass

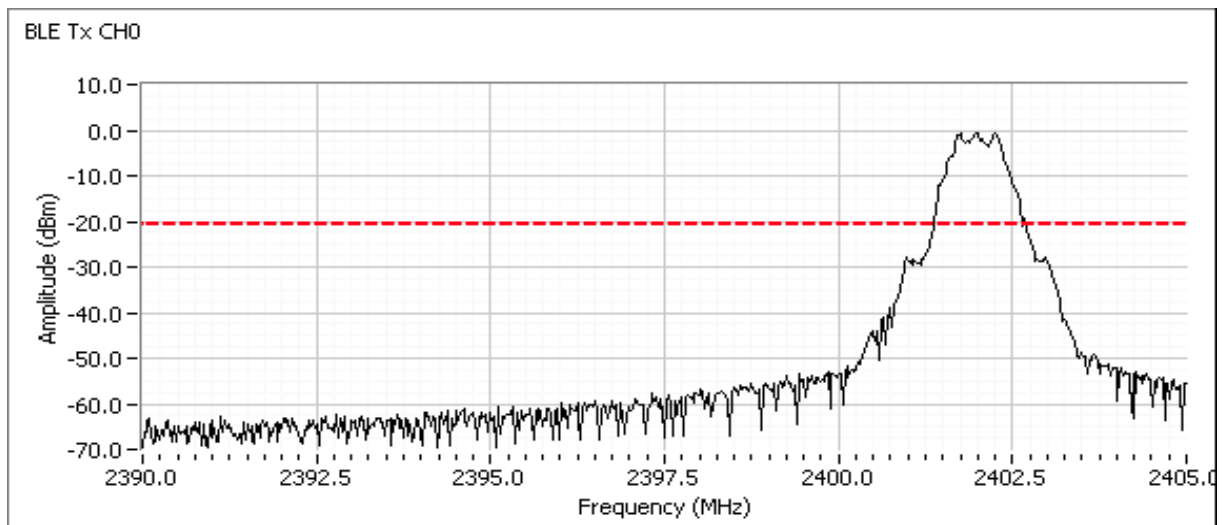
Note 1: Measurements performed using RBW=100kHz, VBW=300kHz, peak detector, sweep time auto, max hold.

Plots for low channel

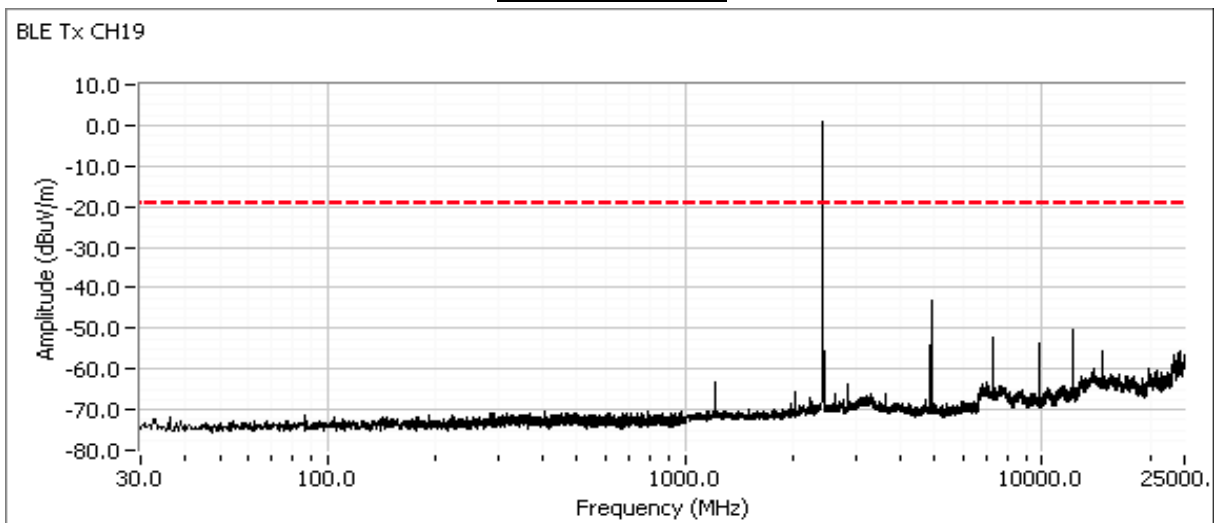


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97680
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Additional plot showing compliance with -20dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



Plots for center channel



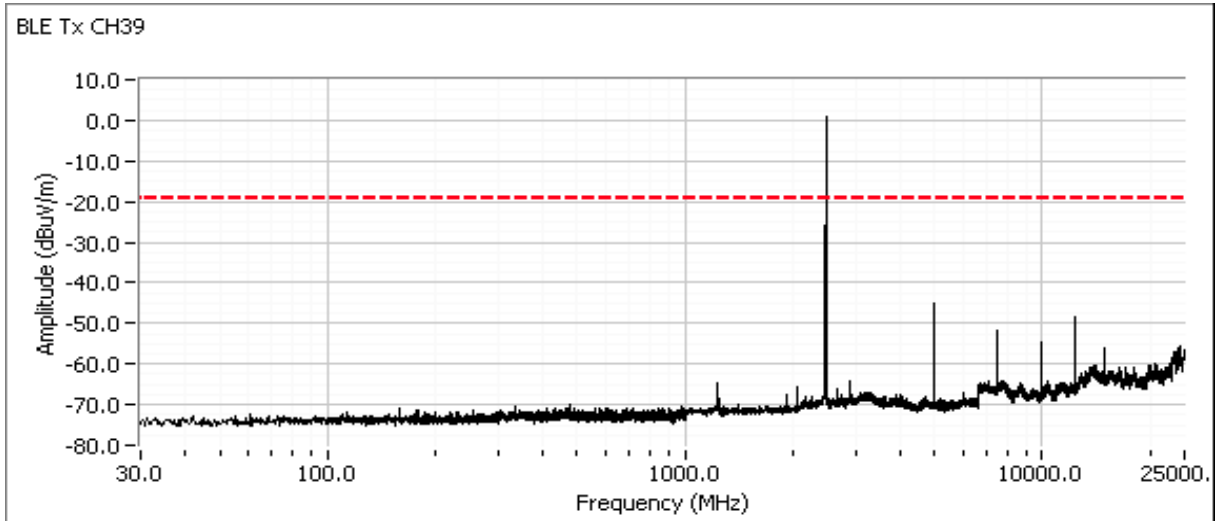
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WE ENGINEER SUCCESS

EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97680
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Plots for high channel





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Product	SDGOB1503	T-Log Number:	T97732
		Project Manager:	Sheareen Jacobs
Contact:	Susan Checchi	Project Coordinator:	-
Emissions Standard(s):	EN 300 328 v1.8.1	Class:	-
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Hewlett Packard Company

Product

SDGOB1503

Date of Last Test: 4/8/2015

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97732
Contact:	Susan Checchi	Project Manager:	Sheareen Jacobs
Standard:	EN 300 328 v1.8.1	Project Coordinator:	-
		Class:	-

Conducted Emissions

(NTS Silicon Valley, Fremont Facility, Semi-Anechoic Chamber)

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: 3/27/2015
 Test Engineer: Rafael Varelas
 Test Location: Fremont Chamber #5

Config. Used: 1
 Config Change: None
 EUT Voltage: 230V/50Hz

General Test Configuration

For tabletop equipment, the EUT was located on a wooden table inside the semi-anechoic chamber, 40 cm from a vertical coupling plane and 80cm from the LISN. A second LISN was used for all local support equipment. Remote support equipment was located outside of the semi-anechoic chamber. Any cables running to remote support equipment were routed through metal conduit and when possible passed through a ferrite clamp upon exiting the chamber.

Ambient Conditions:

Temperature: 21.9 °C
 Rel. Humidity: 42 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power, 230V/50Hz	Class B	Pass	26.9 dBµV @ 0.676 MHz (-19.1 dB)
2	CE, AC Power, 120V/60Hz	Class B	Pass	49.9 dBµV @ 0.156 MHz (-15.8 dB)

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:	J97665
Model:	SDGOB1503	T-Log Number:	T97732
Contact:	Susan Checchi	Project Manager:	Sheareen Jacobs
Standard:	EN 300 328 v1.8.1	Project Coordinator:	-
		Class:	-

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 230V/50Hz
Configured to transmit BLE Ch0 and WiFi b mode Ch11

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

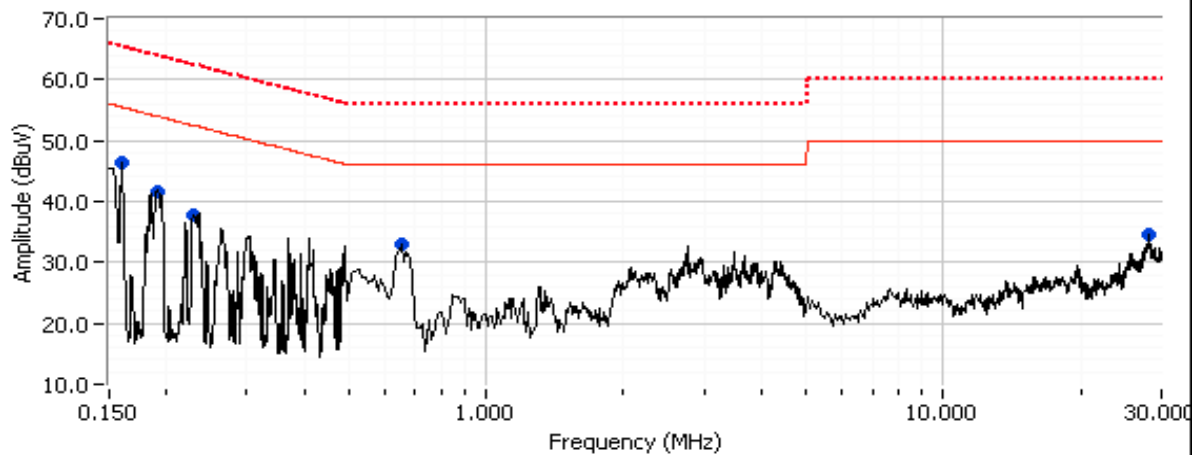
Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.159	46.3	Line 1	55.5	-9.2	Peak	
0.191	41.7	Line 1	53.9	-12.2	Peak	
0.231	37.8	Line 1	52.5	-14.7	Peak	
0.648	33.1	Line 1	46.0	-12.9	Peak	
28.173	34.5	Line 1	50.0	-15.5	Peak	
0.154	50.9	Neutral	55.7	-4.8	Peak	
0.188	47.0	Neutral	54.2	-7.2	Peak	
0.265	36.5	Neutral	51.3	-14.8	Peak	
0.676	32.1	Neutral	46.0	-13.9	Peak	
27.985	32.9	Neutral	50.0	-17.1	Peak	

Final quasi-peak and average readings

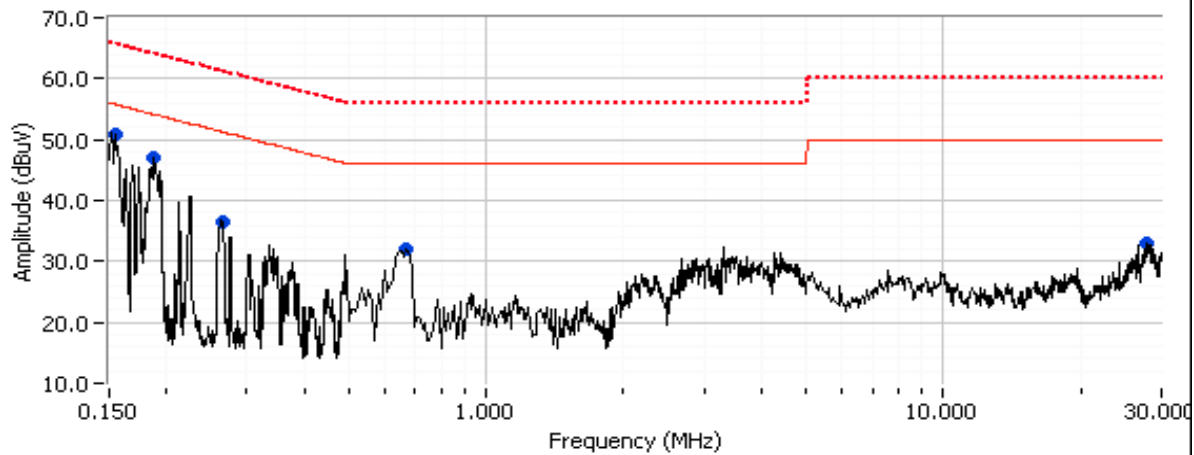
Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.676	26.9	Neutral	46.0	-19.1	AVG	AVG (0.10s)
0.676	30.6	Neutral	56.0	-25.4	QP	QP (1.00s)
0.159	17.4	Line 1	55.5	-38.1	AVG	AVG (0.10s)
0.159	38.9	Line 1	65.5	-26.6	QP	QP (1.00s)
0.191	24.0	Line 1	54.0	-30.0	AVG	AVG (0.10s)
0.191	39.8	Line 1	64.0	-24.2	QP	QP (1.00s)
0.230	19.8	Line 1	52.4	-32.6	AVG	AVG (0.10s)
0.230	35.3	Line 1	62.4	-27.1	QP	QP (1.00s)
0.648	22.0	Line 1	46.0	-24.0	AVG	AVG (0.10s)
0.648	31.9	Line 1	56.0	-24.1	QP	QP (1.00s)
28.173	22.0	Line 1	50.0	-28.0	AVG	AVG (0.10s)
28.173	29.0	Line 1	60.0	-31.0	QP	QP (1.00s)
0.154	26.3	Neutral	55.8	-29.5	AVG	AVG (0.10s)
0.154	43.5	Neutral	65.8	-22.3	QP	QP (1.00s)
0.188	26.4	Neutral	54.1	-27.7	AVG	AVG (0.10s)
0.188	41.5	Neutral	64.1	-22.6	QP	QP (1.00s)
0.265	20.6	Neutral	51.3	-30.7	AVG	AVG (0.10s)
0.265	34.9	Neutral	61.3	-26.4	QP	QP (1.00s)

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97732
Contact: Susan Checchi	Project Manager: Sheareen Jacobs
Standard: EN 300 328 v1.8.1	Project Coordinator: -
	Class: -

.15 - 30 MHz, 230V/50Hz, BLE CH0, WiFi b mode CH11, Line



.15 - 30 MHz, 230V/50Hz, BLE CH0, WiFi b mode CH11, Neutral



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB1503	T-Log Number:	T97732
Contact:	Susan Checchi	Project Manager:	Sheareen Jacobs
Standard:	EN 300 328 v1.8.1	Project Coordinator:	-
		Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz
Configured to transmit BLE Ch0 and WiFi b mode Ch11

Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.156	50.3	Line 1	55.6	-5.3	Peak	
0.234	41.9	Line 1	52.3	-10.4	Peak	
0.663	31.4	Line 1	46.0	-14.6	Peak	
24.266	32.4	Line 1	50.0	-17.6	Peak	
0.155	51.5	Neutral	55.6	-4.1	Peak	
0.194	44.7	Neutral	53.8	-9.1	Peak	
0.661	32.7	Neutral	46.0	-13.3	Peak	
25.772	32.3	Neutral	50.0	-17.7	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.156	34.0	Line 1	55.7	-21.7	AVG	AVG (0.10s)
0.156	49.9	Line 1	65.7	-15.8	QP	QP (1.00s)
0.234	25.9	Line 1	52.3	-26.4	AVG	AVG (0.10s)
0.234	40.9	Line 1	62.3	-21.4	QP	QP (1.00s)
0.663	26.9	Line 1	46.0	-19.1	AVG	AVG (0.10s)
0.663	30.2	Line 1	56.0	-25.8	QP	QP (1.00s)
24.266	26.7	Line 1	50.0	-23.3	AVG	AVG (0.10s)
24.266	29.7	Line 1	60.0	-30.3	QP	QP (1.00s)
0.155	33.6	Neutral	55.7	-22.1	AVG	AVG (0.10s)
0.155	49.4	Neutral	65.7	-16.3	QP	QP (1.00s)
0.194	29.6	Neutral	53.9	-24.3	AVG	AVG (0.10s)
0.194	44.8	Neutral	63.9	-19.1	QP	QP (1.00s)
0.661	28.0	Neutral	46.0	-18.0	AVG	AVG (0.10s)
0.661	30.7	Neutral	56.0	-25.3	QP	QP (1.00s)
25.772	17.9	Neutral	50.0	-32.1	AVG	AVG (0.10s)
25.772	24.8	Neutral	60.0	-35.2	QP	QP (1.00s)

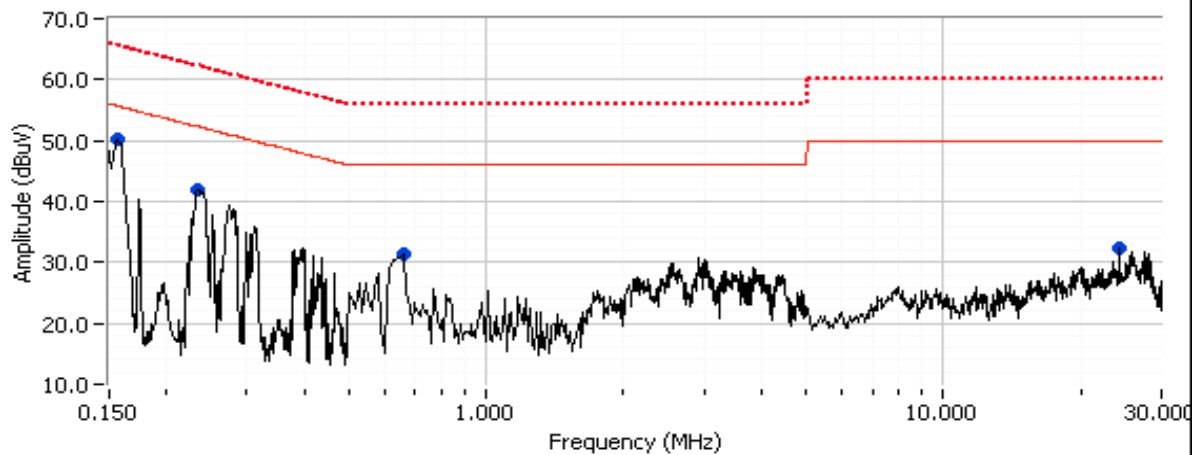
**NTS**

WE ENGINEER SUCCESS

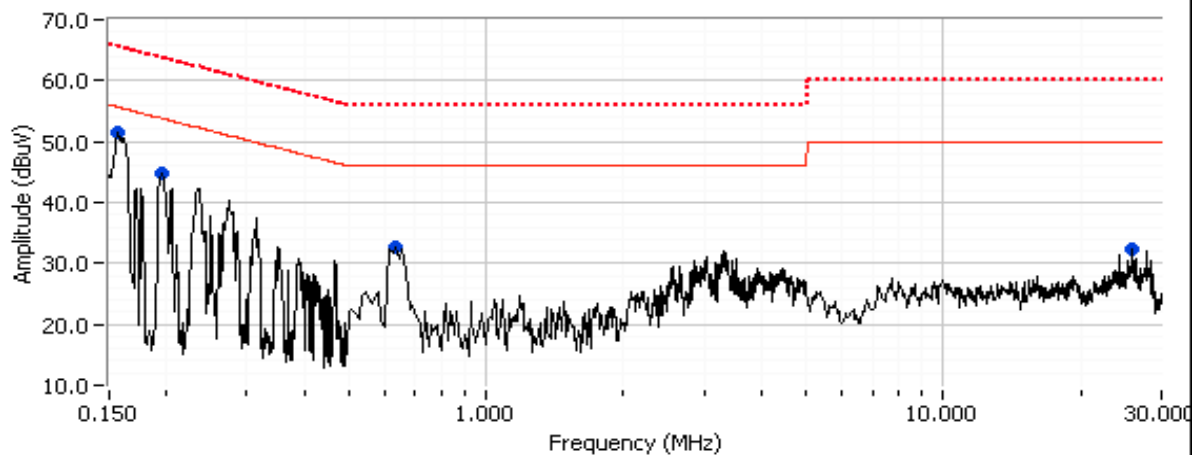
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB1503	T-Log Number: T97732
Contact: Susan Checchi	Project Manager: Sheareen Jacobs
Standard: EN 300 328 v1.8.1	Project Coordinator: -
	Class: -

.15 - 30 MHz, 120V/60Hz, BLE CH0, WiFi b mode CH11, Line



.15 - 30 MHz, 120V/60Hz, BLE CH0, WiFi b mode CH11, Neutral



End of Report

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