

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: SDGOB-1504

IC CERTIFICATION #: 466D-SDGOB1504
FCC ID: B94SDGOB1504

APPLICANT: Hewlett Packard Company
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Palo Alto, CA 94304

TEST SITE(S): National Technical Systems - Silicon Valley
41039 Boyce Road.
Fremont, CA. 94538-2435

IC SITE REGISTRATION #: 2845B-5

REPORT DATE: April 17, 2015

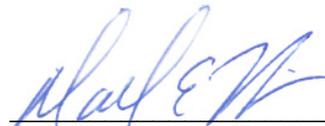
REISSUE DATE: June 5, 2015

FINAL TEST DATES: February 26, 27, March 2, 10, 18, 19, 20, 25 and
27, 2015

TOTAL NUMBER OF PAGES: 141

PROGRAM MGR /
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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	April 17, 2015	First release	
1.0	May 20, 2015	Clarified spurious emissions and output power measurement procedure. Fixed standard references. Corrected model name	MEH
2.0	June 5, 2015	Fixed reference in antenna power measurements	MEH

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SCOPE

An electromagnetic emissions test has been performed on the Hewlett Packard Company model SDGOB-1504, 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 SDGOB-1504 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 SDGOB-1504 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	8.0 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems) WiFi Internal	11b: 19.2 dBm (83.2mW) 11g: 16.7dBm (46.8mW) n20: 16.6dBm (45.7mW) EIRP = 0.148 W <small>Note 1</small>	1Watt, EIRP limited to 4 Watts.	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems) WiFi External	11b: 19.8 dBm (95.5mW) 11g: 17.5dBm (56.2mW) n20: 16.6dBm (45.7mW) EIRP = 0.112 W <small>Note 1</small>	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 210 A8.2 (2)	Power Spectral Density	4.5 dBm/10 kHz	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	53.9 dBμV/m @ 2483.5 MHz (-0.1 dB)	15.207 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	771 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 210 A8.2 (4)	Output Power (multipoint systems) BLE	2.0 dBm (1.6 mW) EIRP = 0.003 W <small>Note 1</small>	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 210 A8.2 (2)	Power Spectral Density	-7.3 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	51.7 dB μ V/m @ 4803.8 MHz (-2.3 dB)	15.207 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	37.1 dB μ V @ 24.265 MHz (-12.9 dB)	Refer to page 22	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: 12.5 MHz 11g: 16.8 MHz n20: 17.7 MHz BLE: 1107 kHz	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 SDGOB-1504 is an 802.11bgn + BLE module that uses a SDIO 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 February 26, 2015 and tested on February 26, 27, March 2, 10, 18, 19, 20, 25 and 27, 2015. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Hewlett Packard	SDGOB-1504	802.11bgn + BLE module	ACD1B81E8B1D	B94SDGOB1504
Hewlett Packard	SDGOB-1504	802.11bgn + BLE module	ACD1B81E8B0D	B94SDGOB1504
Hewlett Packard	SDGOB-1504	802.11bgn + BLE module	ACD1B81E8B63	B94SDGOB1504

OTHER EUT DETAILS

The following EUT details should be noted:

SDIO 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, ANTX300P002B24553, 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:

Wifi Operation

Company	Model	Description	Serial Number	FCC ID
Dell	Latitude D430	Computer	-	-
Broadcom	-	SDIO Extender Board	-	-

BLE Operation

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

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	SpectraBlue system	Test Computer	None	-
logitech	K120	Keyboard	None	-
Wise Wing	F199	Monitor	None	-
Microsoft	1020	Mouse	SC20817	-
Hewlett Packard	5650	Printer	MY3883K42P	-

The following equipment was used as remote support equipment for testing:

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

EUT INTERFACE PORTS (RF Testing)

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

Wifi Operation

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

BLE Operation

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
SpectraBlue Test Fixture	EUT	Ribbon	Unshielded	0.5
SpectraBlue Test Fixture	Monitor	VGA	Shielded	1.0
SpectraBlue Test Fixture	Keyboard	USB	Shielded	0.5
SpectraBlue Test Fixture	Mouse	USB	Shielded	0.5

EUT INTERFACE PORTS (AC Conducted Emissions)

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

EUT cabling

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
EUT Module	Extender card / Test Computer	Ribbon cable	unshielded	

Additional Cabling

Port	Connected To	Description	Cable(s)	
			Shielded or Unshielded	Length(m)
USB EUT Module	Mouse	USB	Shielded	
VGA	Monitor	VGA	Shielded	
USB	Keyboard	USB	Shielded	
SCSI	Printer	SCSI	Shielded	
Ethernet	Remote Hub	RJ-45	Unshielded	
Power / Monitor	AC Mains	3Wire	Unshielded	
Power / Monitor	AC Mains	3Wire	Unshielded	

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.

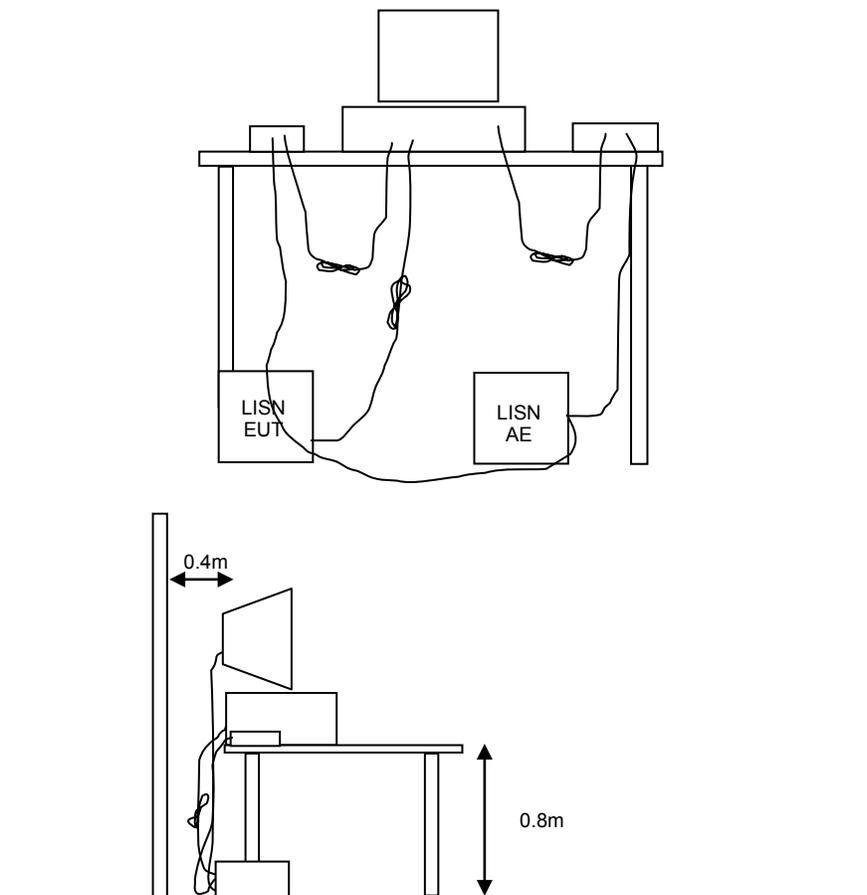


Figure 1 Typical Conducted Emissions Test Configuration

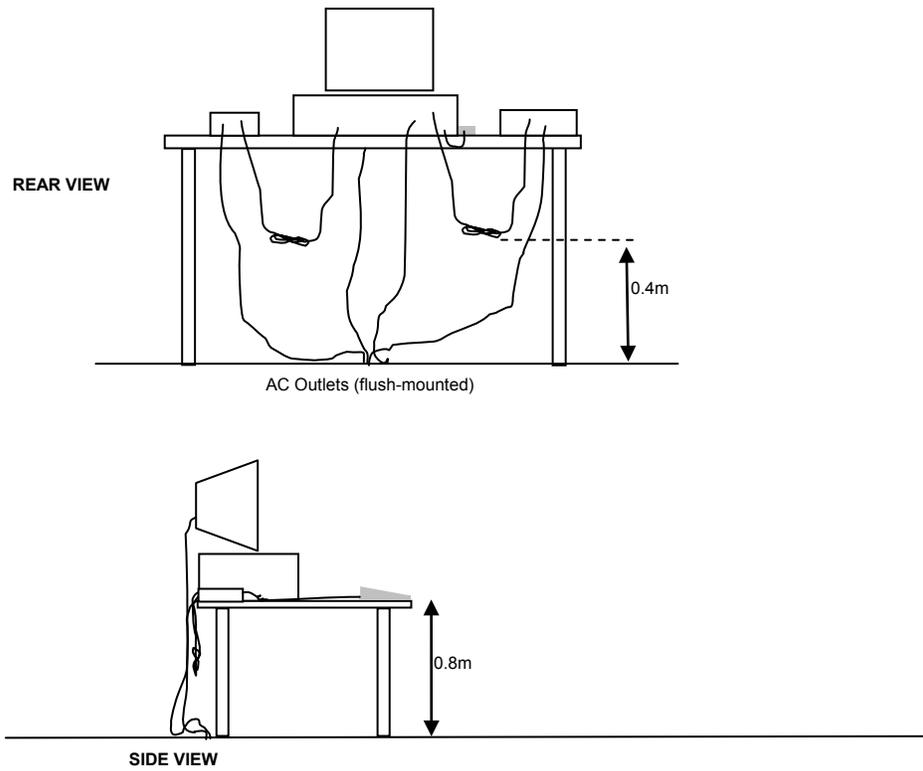
RADIATED EMISSIONS

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.

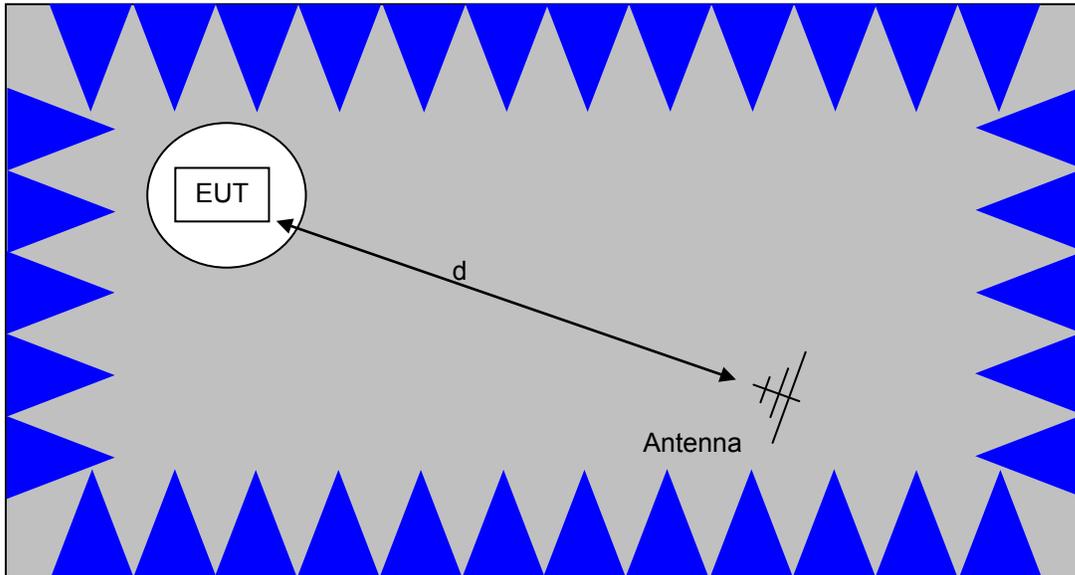
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.

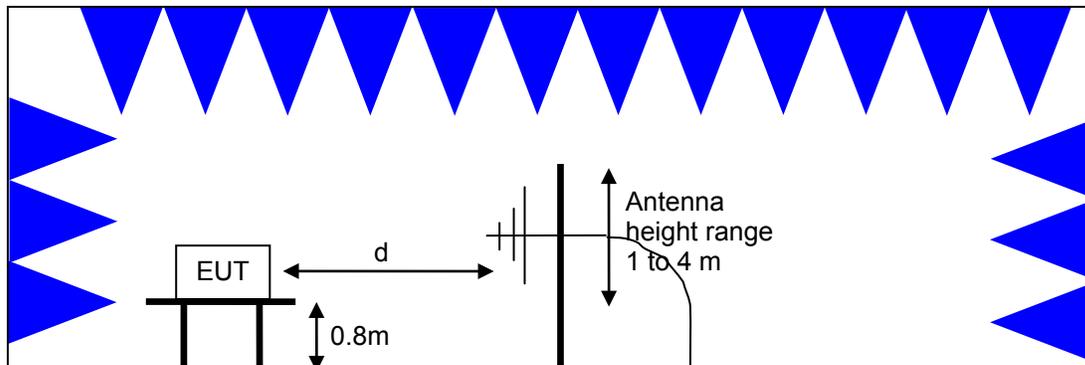


Typical Test Configuration for Radiated Field Strength Measurements



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.

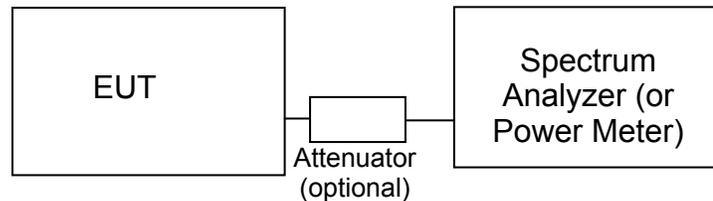
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

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:

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

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:

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

R_r = 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 - 6,000 MHz, 26-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	1561	6/27/2014	6/27/2016
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, 27-Feb-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/4/2014	8/4/2015
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039	1767	11/14/2014	11/14/2015
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
Hewlett Packard	SpecAn 9 kHz - 40 GHz, (SA40) Purple	8564E (84125C)	2415	2/27/2014	3/26/2015
Band Edge Radiated Emissions, 1,000 - 6,500 MHz, 02-Mar-15					
EMCO	Antenna, Horn, 1-18 GHz	3115	487	7/29/2014	7/29/2016
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, 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	Head (Inc flex cable, 1143, 2198) Red	84125C	1145	6/17/2014	6/17/2015
Hewlett Packard	SpecAn 9 kHz - 40 GHz, FT (SA40) Blue	8564E (84125C)	1393	5/6/2014	5/6/2015
Hewlett Packard	High Pass filter, 8.2 GHz (Purple System)	P/N 84300-80039	1767	11/14/2014	11/14/2015
A. H. Systems	Red System Horn, 18-40GHz	SAS-574, p/n: 2581	2161	7/9/2014	7/9/2015
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, 1,000 - 25,000MHz, 18-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, (SA40) Purple	8564E (84125C)	2415	3/7/2015	3/7/2016



<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
RF Conducted Measurements, 19-Mar-15					
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	Power Meter, Dual Channel	NRVD	1539	9/9/2014	9/9/2015
Agilent Technologies	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HXX,	E4446A	2139	4/8/2014	4/8/2015
Agilent Technologies	USB Average Power Sensor	U2001A	2442	12/19/2014	12/19/2015
Radiated Emissions, 1,000 - 12,000 MHz, 19-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	1683	8/4/2014	8/4/2015
Radiated Emissions, 1,000 - 12,000 MHz, 20-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	1683	8/4/2014	8/4/2015
Radiated Spurious Emissions, 30 - 25,000 MHz, 20-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
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	5/30/2013	5/30/2015
Hewlett Packard	Head (Inc flex cable, (1742,1743) Blue)	84125C	1620	5/6/2014	5/6/2015
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	8/4/2014	8/4/2015
A. H. Systems	Spare System Horn, 18-40GHz	SAS-574, p/n: 2581	2162	7/24/2014	7/24/2015
Com-Power	Preamplifier, 30-1000 MHz	PA-103A	2359	12/22/2014	12/22/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016
Radiated Emissions, 30 - 1,000 MHz, 25-Mar-15					
<u>Manufacturer</u>	<u>Description</u>	<u>Model</u>	<u>Asset #</u>	<u>Calibrated</u>	<u>Cal Due</u>
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	5/30/2013	5/30/2015
Com-Power	Preamplifier, 30-1000 MHz	PA-103A	2359	12/22/2014	12/22/2015
Rohde & Schwarz	EMI Test Receiver, 20 Hz-40 GHz	ESIB40 (1088.7490.40)	2493	1/23/2015	1/23/2016



T97775

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

T97693 Pages 30 – 134

T97775 Pages 135 – 140



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Product:	SDGOB-1504	T-Log Number:	T97693
		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

SDGOB-1504

Date of Last Test: 3/25/2015



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	Class:	N/A

Power vs. Data Rate

In normal operating modes the card uses power settings stored on EEPROM to set the output power. For a given nominal output power the actual transmit power normally is reduced as the data rate increases, therefore testing was performed at the data rate in the mode with highest power to determine compliance with the requirements.

The following power measurements were made using a GATED average power meter and with the device configured in a continuous transmit mode on Chain 1 at the various data rates in each mode to verify the highest power mode:

Sample Notes

Sample S/N: ACD1B81E8B1D

Driver: 6.10 RC198.8

Date of Test: 3/19/2015

Test Engineer: Deniz Demirci

Test Location: FT Lab 4A

Mode	Data Rate	Power (dBm)	Power setting
802.11b	1	19.8	-
	2	19.7	
	5.5	19.7	
	11	19.7	
802.11g	6	16.7	-
	9	16.6	
	12	16.5	
	18	16.5	
	24	16.4	
	36	16.2	
	48	16.0	
	54	16.0	



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Mode	Data Rate	Power (dBm)	Power setting
802.11n 20MHz	6.5	16.6	-
	13	16.5	
	19.5	16.4	
	26	16.3	
	39	16.1	
	52	16.1	
	58.5	16.0	
	65	15.9	
	78	-	

<<-11ac mode only

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

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Duty Cycle

Date of Test: 2/26/2015
 Test Engineer: Rafael Varelas
 Test Location: FT Chamber #5

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

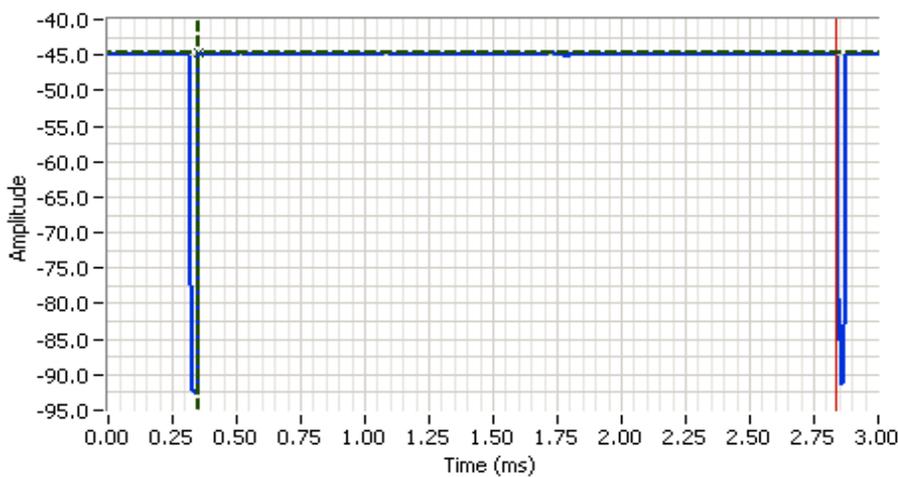
Notes: Measurements taken with maximum RBW/VBW settings allowed.

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	0.985	Yes	2.526	0	0	396
11g	6Mb/s	0.960	Yes	1.437	0.18	0.35	696
n20	MCS0	0.97	Yes	1.346	0.13	0.26	743
BLE	-	0.6172	Yes	0.387	2.10	4.19	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

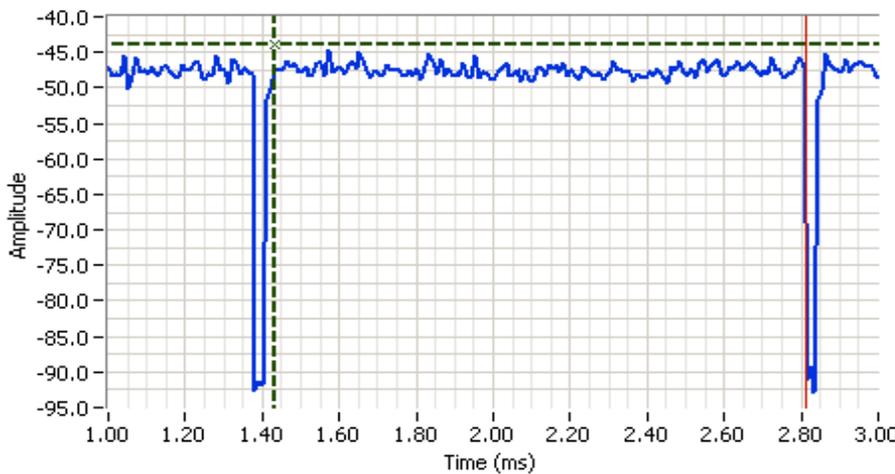
Rohde&Schwarz,ESI
 CF: 2412.000 MHz
 SPAN: 0.000 MHz
 RB: 3.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 5.0ms
 Ref Lvl: -35.0 DBM

Comments

802.11b
 Tx On: 2.487ms
 Tx Off: 0.039ms
 Duty Cycle: 98.5%

Cursor 1	0.3503	-44.73	+	-	+	Delta Time (ms)	2.487
Cursor 1	2.8372	0.00	+	-	-	Delta Amplitude	44.73

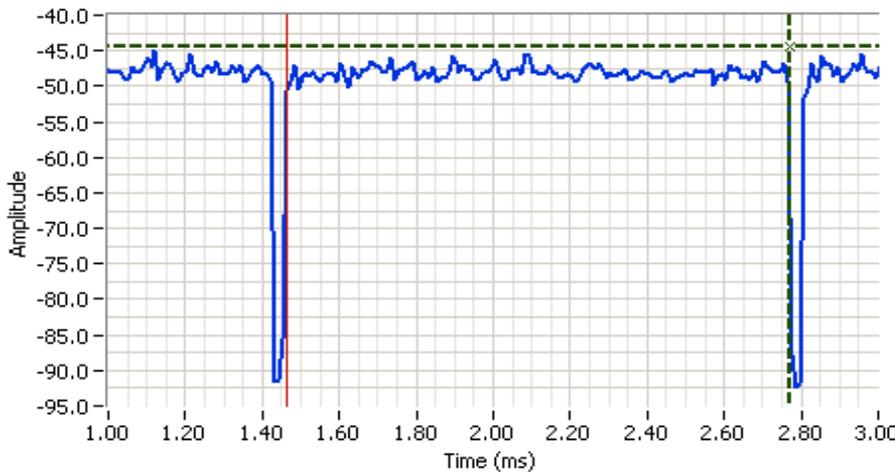
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A



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: 5.0ms
 Ref Lvl: -35.0 DBM

Comments
 802.11g
 Tx On: 1.38ms
 Tx Off: 0.057ms
 Duty Cycle: 96%

Cursor 1 1.4323 -43.89 Delta Time (ms) 1.380
 Cursor 1 2.8125 0.00 Delta Amplitude 43.89



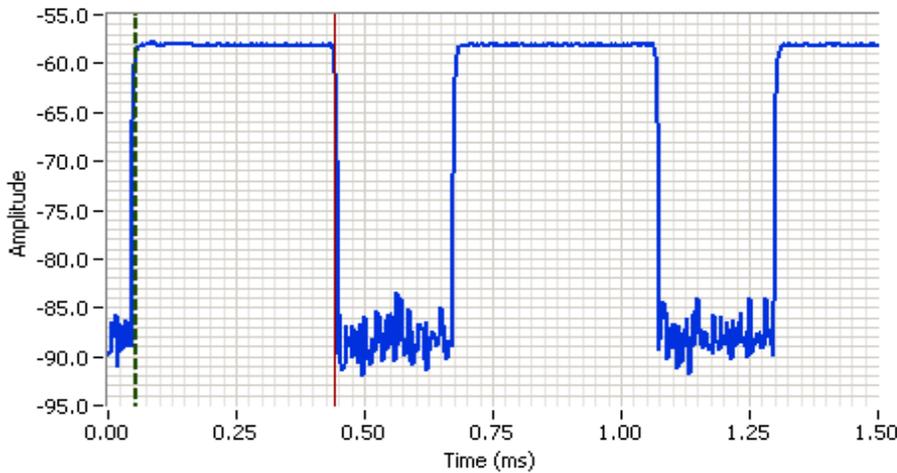
Analyzer Settings
 Rohde&Schwarz,ESI
 CF: 2412.000 MHz
 SPAN: 0.000 MHz
 RB: 3.000 MHz
 VB: 3.000 MHz
 Detector: POS
 Attn: 0 DB
 RL Offset: 0.0 DB
 Sweep Time: 5.0ms
 Ref Lvl: -35.0 DBM

Comments
 802.11n20
 Tx On: 1.307ms
 Tx Off: 0.039ms
 Duty Cycle: 97%

Cursor 1 2.7708 -44.48 Delta Time (ms) 1.307
 Cursor 1 1.4635 0.00 Delta Amplitude 44.48



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
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

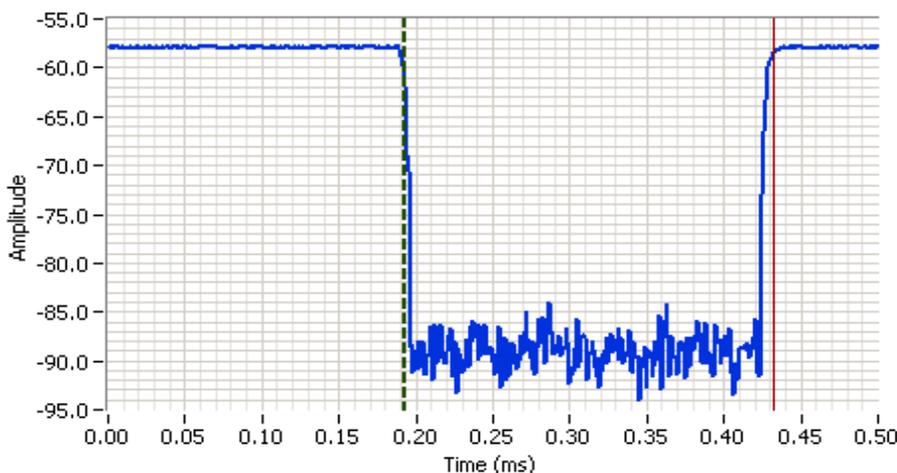
Comments
 BLE on time = .387 ms

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





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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: 39 %

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)	53.7 dBµV/m @ 2385.4 MHz (-0.3 dB)
	b	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.2 dBµV/m @ 2488.8 MHz (-0.8 dB)
2	g	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.6 dBµV/m @ 2390.0 MHz (-0.4 dB)
	g	2 - 2417MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.6 dBµV/m @ 2390.0 MHz (-0.4 dB)
	g	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.8 dBµV/m @ 2483.6 MHz (-0.2 dB)
	g	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.9 dBµV/m @ 2483.5 MHz (-0.1 dB)
3	n20	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.3 dBµV/m @ 2390.0 MHz (-0.7 dB)
	n20	2 - 2417MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.6 dBµV/m @ 2390.0 MHz (-0.4 dB)
	n20	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.8 dBµV/m @ 2483.5 MHz (-0.2 dB)
	n20	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.9 dBµV/m @ 2483.6 MHz (-0.1 dB)



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	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: ACD1B81E8B1D

Driver: 6.10 RC198.8

Antenna: Internal Antenna

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	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	98.5%	Yes	2.526	0	0	396
11g	6Mb/s	96.0%	Yes	1.437	0.18	0.352	696
n20	MCS0	97.1%	Yes	1.346	0.13	0.255	743

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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

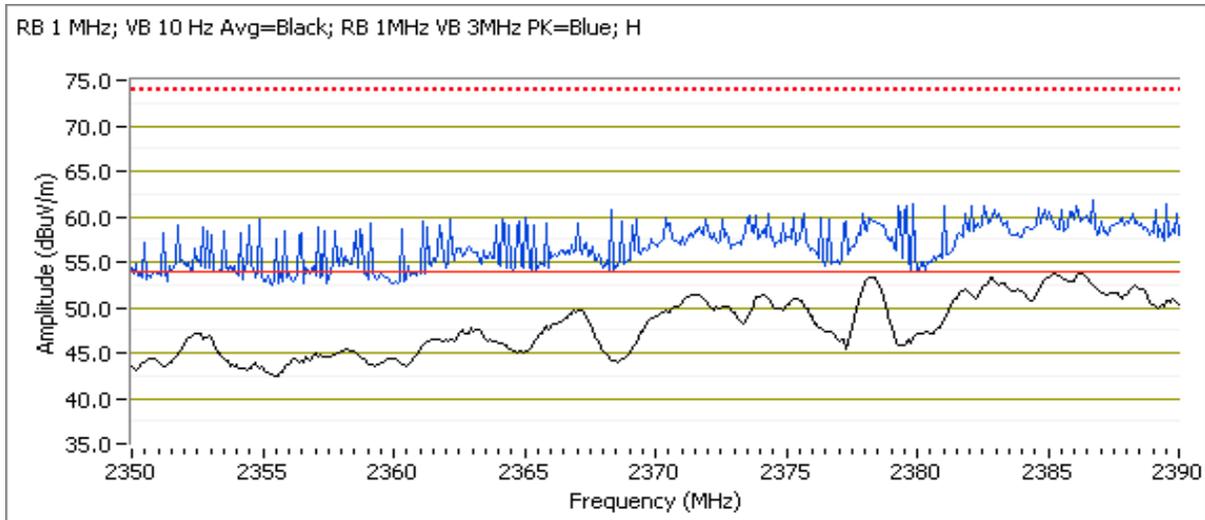
Run #1: Radiated Bandedge Measurements

Date of Test: 2/26/2015 0:00 Config. Used: 1
 Test Engineer: Rafael Varelas Config Change: None
 Test Location: FT Chamber #5 EUT Voltage: 120V/60Hz

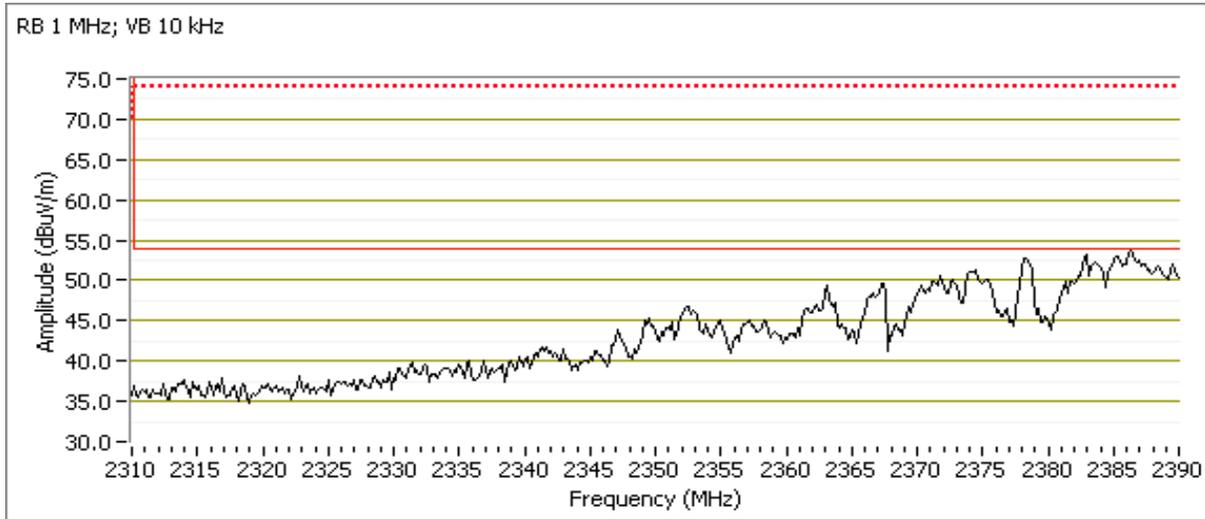
Channel: 1 Mode: b pwr setting: -
 Tx Chain: Main Data Rate: 1Mb/s

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	
2385.350	53.7	H	54.0	-0.3	AVG	269	1.9	POS; RB 1 MHz; VB: 10 Hz
2388.160	61.1	H	74.0	-12.9	PK	269	1.9	POS; RB 1 MHz; VB: 3 MHz
2386.390	39.6	V	54.0	-14.4	AVG	66	1.0	POS; RB 1 MHz; VB: 10 Hz
2385.830	47.7	V	74.0	-26.3	PK	66	1.0	POS; RB 1 MHz; VB: 3 MHz



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





EMC Test Data

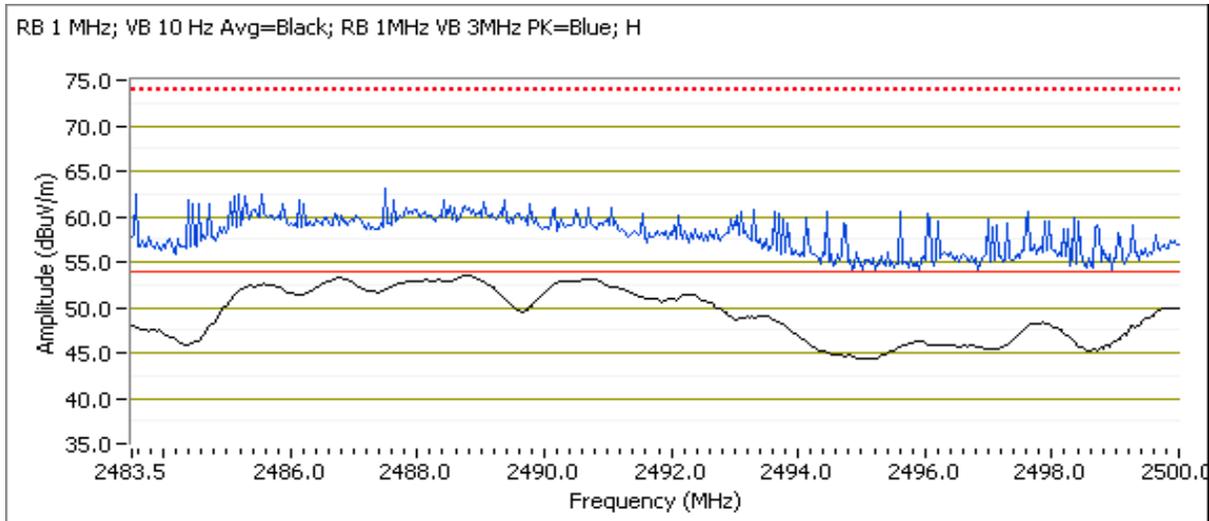
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

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

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2488.820	53.2	H	54.0	-0.8	AVG	261	1.1	POS; RB 1 MHz; VB: 10 Hz
2484.790	63.0	H	74.0	-11.0	PK	261	1.1	POS; RB 1 MHz; VB: 3 MHz
2492.300	43.3	V	54.0	-10.7	AVG	73	1.5	POS; RB 1 MHz; VB: 10 Hz
2500.000	50.0	V	74.0	-24.0	PK	73	1.5	POS; RB 1 MHz; VB: 3 MHz

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





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

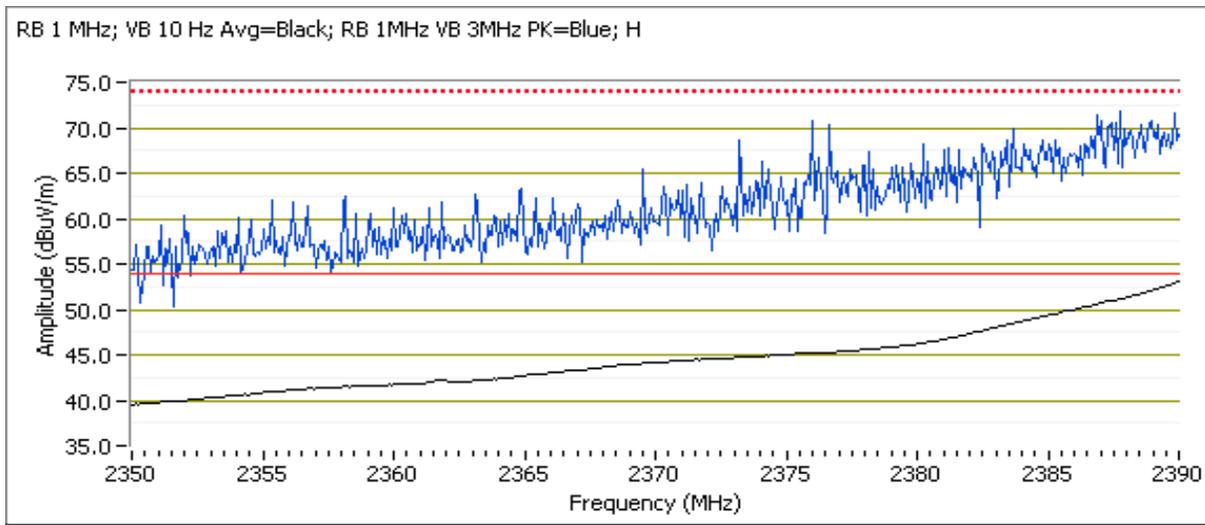
Run #2: Radiated Bandedge Measurements

Date of Test: 2/26/2015 0:00 Config. Used: 1
 Test Engineer: Rafael Varelas Config Change: None
 Test Location: FT Chamber #5 EUT Voltage: 120V/60Hz

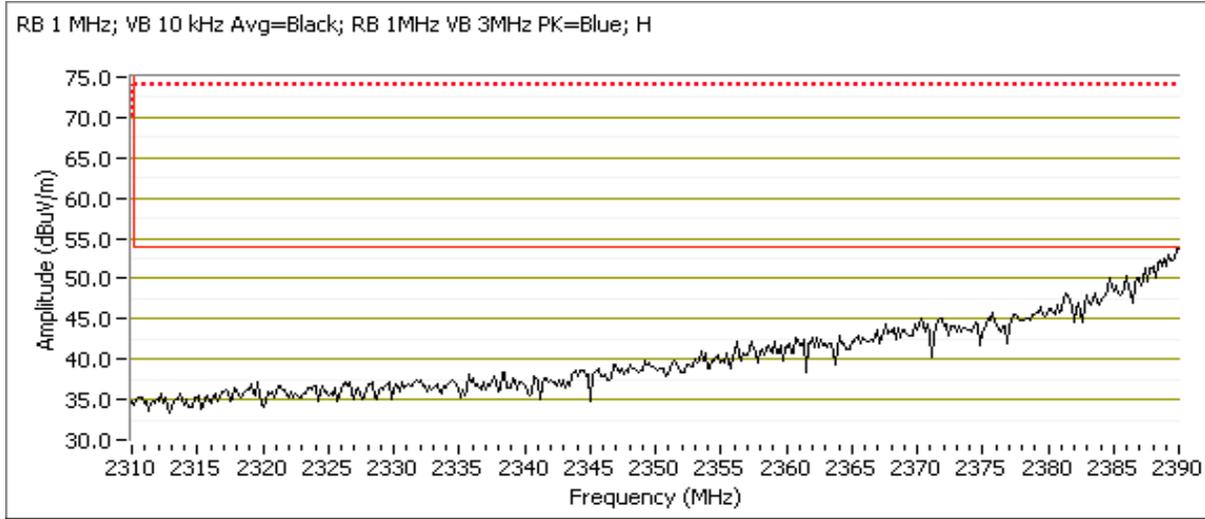
Channel: 1 Mode: g pwr setting: -
 Tx Chain: Main Data Rate: 6Mb/s

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	53.6	H	54.0	-0.4	AVG	262	1.5	Note3,POS; RB 1 MHz; VB: 10 Hz
2384.870	72.5	H	74.0	-1.5	PK	262	1.5	POS; RB 1 MHz; VB: 3 MHz
2390.000	39.1	V	54.0	-14.9	AVG	194	1.2	Note3,POS; RB 1 MHz; VB: 10 Hz
2387.030	55.1	V	74.0	-18.9	PK	194	1.2	POS; RB 1 MHz; VB: 3 MHz



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





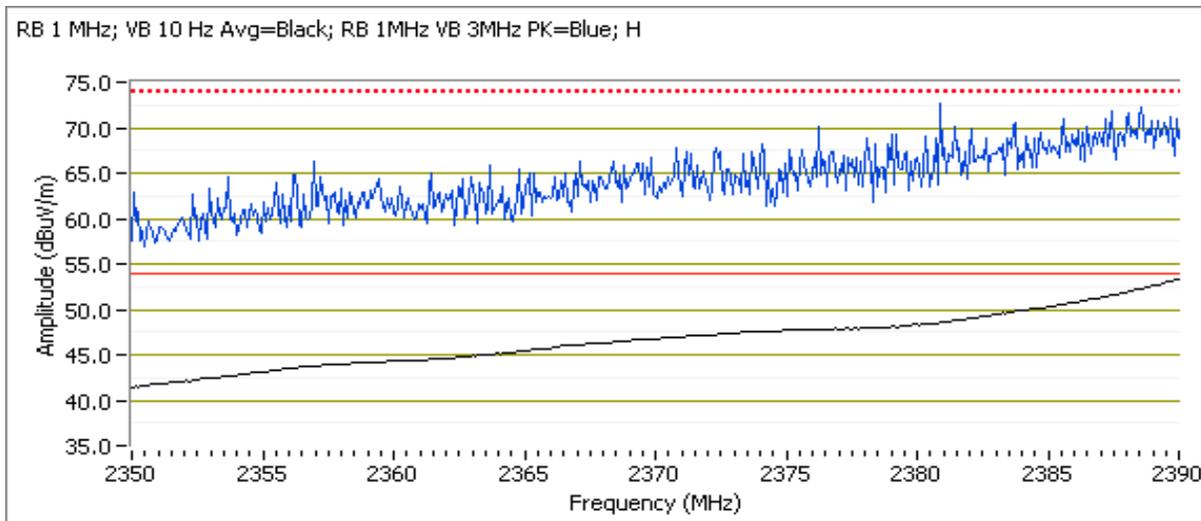
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

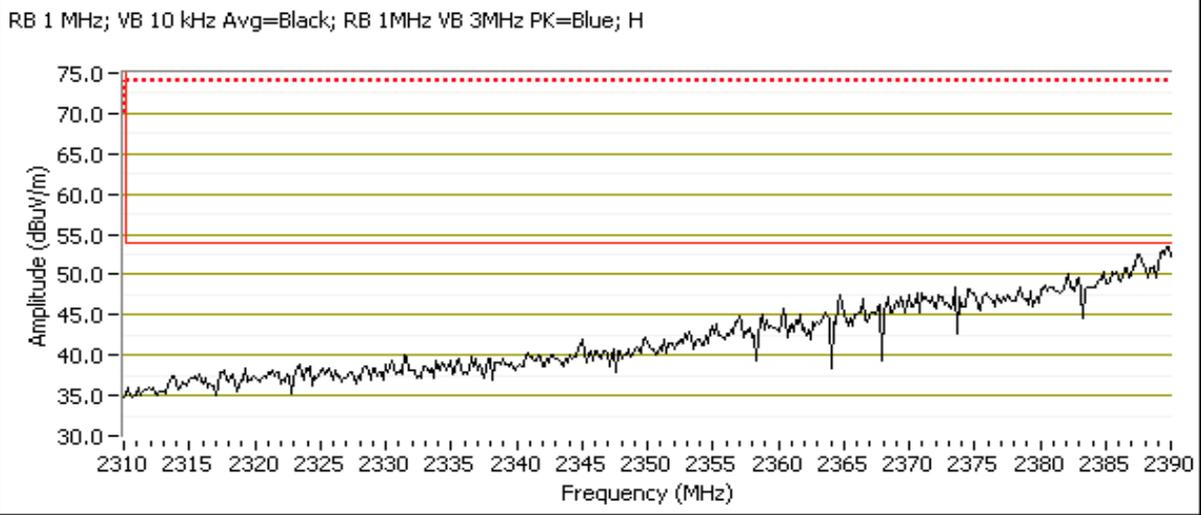
Channel: 2 Mode: g pwr setting: -
 Tx Chain: Main Data Rate: 6Mb/s

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2390.000	53.6	H	54.0	-0.4	AVG	277	1.5	Note 1,POS; RB 1 MHz; VB: 10 Hz
2381.260	72.6	H	74.0	-1.4	PK	277	1.5	POS; RB 1 MHz; VB: 3 MHz
2390.000	43.9	V	54.0	-10.1	AVG	174	2.2	Note 1,POS; RB 1 MHz; VB: 10 Hz
2387.270	59.4	V	74.0	-14.6	PK	174	2.2	POS; RB 1 MHz; VB: 3 MHz



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





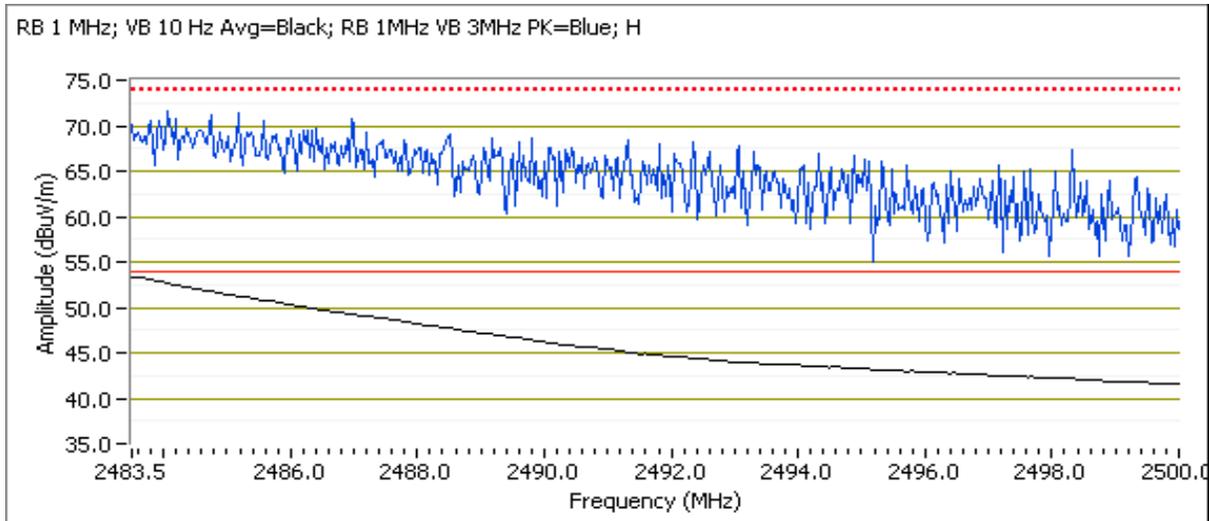
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

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

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.570	53.8	H	54.0	-0.2	AVG	260	1.2	Note 3,POS; RB 1 MHz; VB: 10 Hz
2483.600	72.4	H	74.0	-1.6	PK	260	1.2	POS; RB 1 MHz; VB: 3 MHz
2483.530	43.9	V	54.0	-10.1	AVG	189	2.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2487.370	60.3	V	74.0	-13.7	PK	189	2.0	POS; RB 1 MHz; VB: 3 MHz





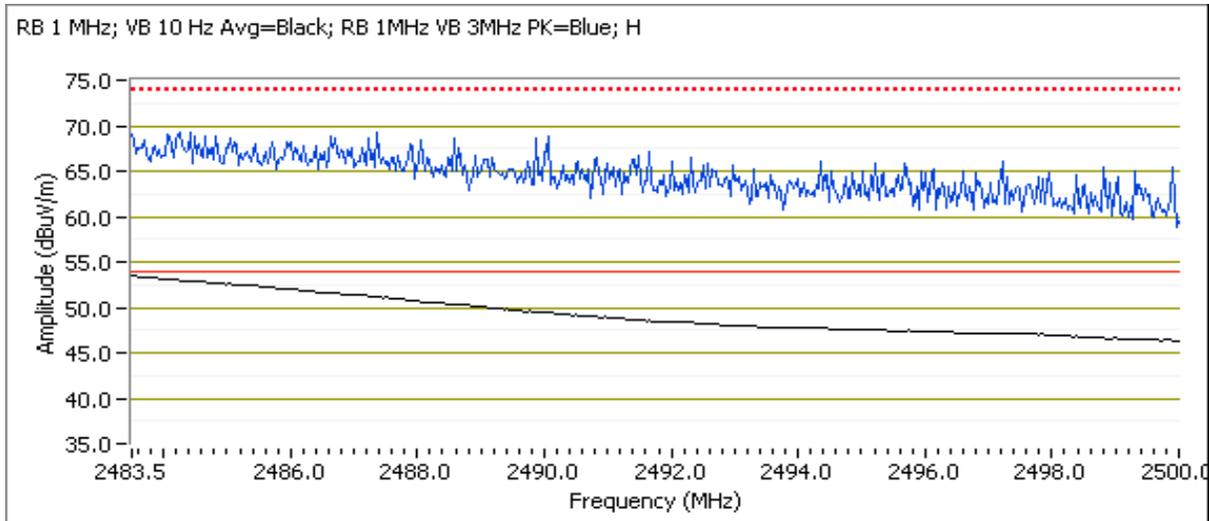
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

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

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.530	53.9	H	54.0	-0.1	AVG	269	1.4	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.130	69.5	H	74.0	-4.5	PK	269	1.4	POS; RB 1 MHz; VB: 3 MHz
2483.500	42.7	V	54.0	-11.3	AVG	192	2.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2488.590	56.7	V	74.0	-17.3	PK	192	2.0	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

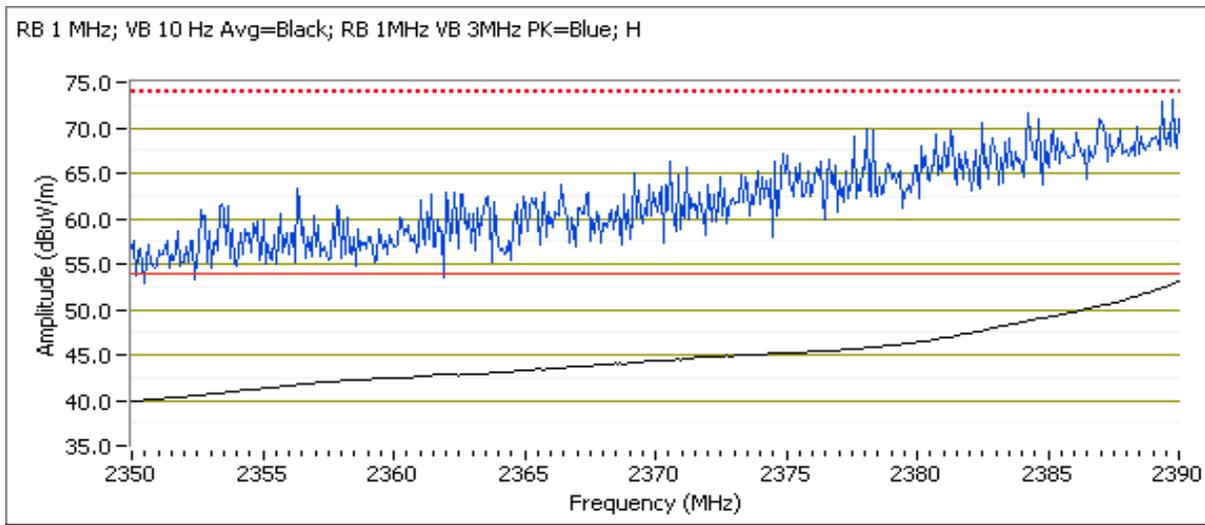
Run #3: Radiated Bandedge Measurements

Date of Test: 2/26/2015 0:00 Config. Used: 1
 Test Engineer: Rafael Varelas Config Change: None
 Test Location: FT Chamber #5 EUT Voltage: 120V/60Hz

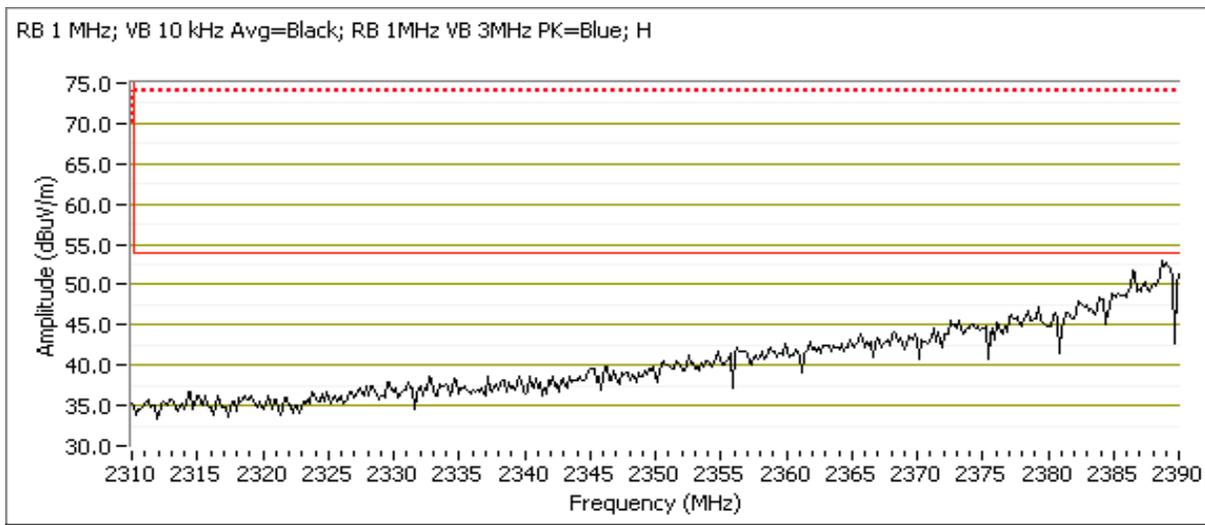
Channel: 1 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

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	53.3	H	54.0	-0.7	AVG	270	1.5	Note 3,POS; RB 1 MHz; VB: 10 Hz
2390.000	72.8	H	74.0	-1.2	PK	270	1.5	POS; RB 1 MHz; VB: 3 MHz
2390.000	43.9	V	54.0	-10.1	AVG	180	2.2	Note 3,POS; RB 1 MHz; VB: 10 Hz
2387.760	57.0	V	74.0	-17.0	PK	180	2.2	POS; RB 1 MHz; VB: 3 MHz



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





EMC Test Data

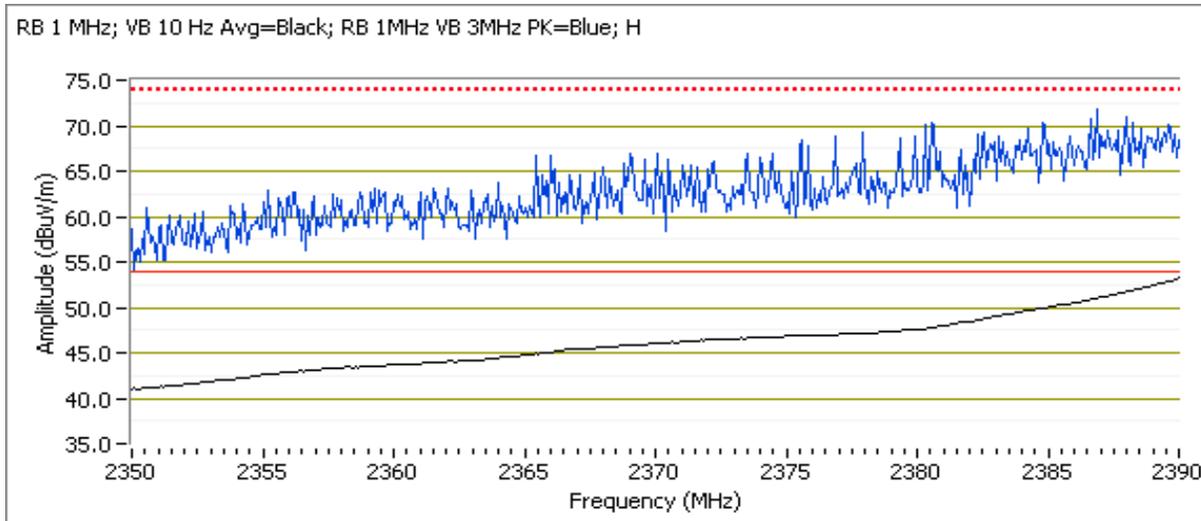
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Channel: 2 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

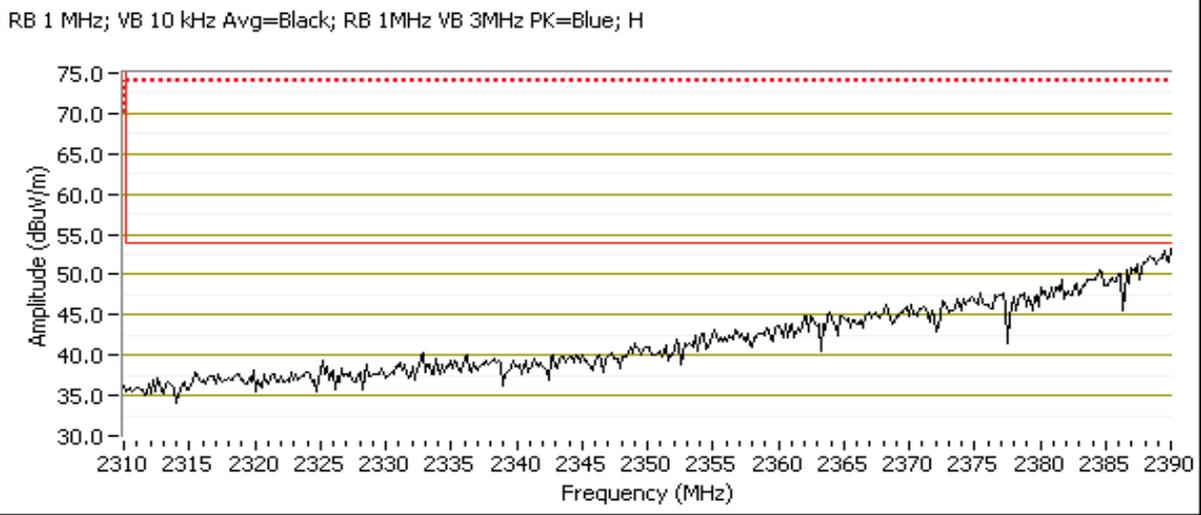
Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2390.000	53.6	H	54.0	-0.4	AVG	260	1.5	Note 3,POS; RB 1 MHz; VB: 10 Hz
2385.270	72.1	H	74.0	-1.9	PK	260	1.5	POS; RB 1 MHz; VB: 3 MHz
2390.000	43.4	V	54.0	-10.6	AVG	182	2.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2388.960	57.4	V	74.0	-16.6	PK	182	2.1	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: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





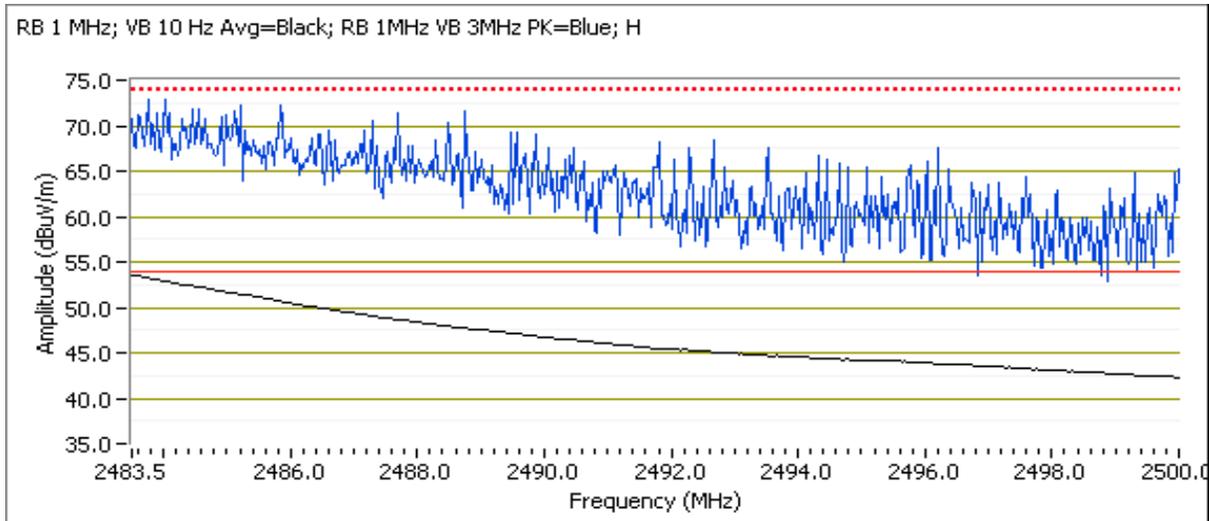
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Channel: 11 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.500	53.8	H	54.0	-0.2	AVG	271	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2483.570	73.6	H	74.0	-0.4	PK	271	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.570	42.3	V	54.0	-11.7	AVG	193	2.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2486.480	59.2	V	74.0	-14.8	PK	193	2.0	POS; RB 1 MHz; VB: 3 MHz





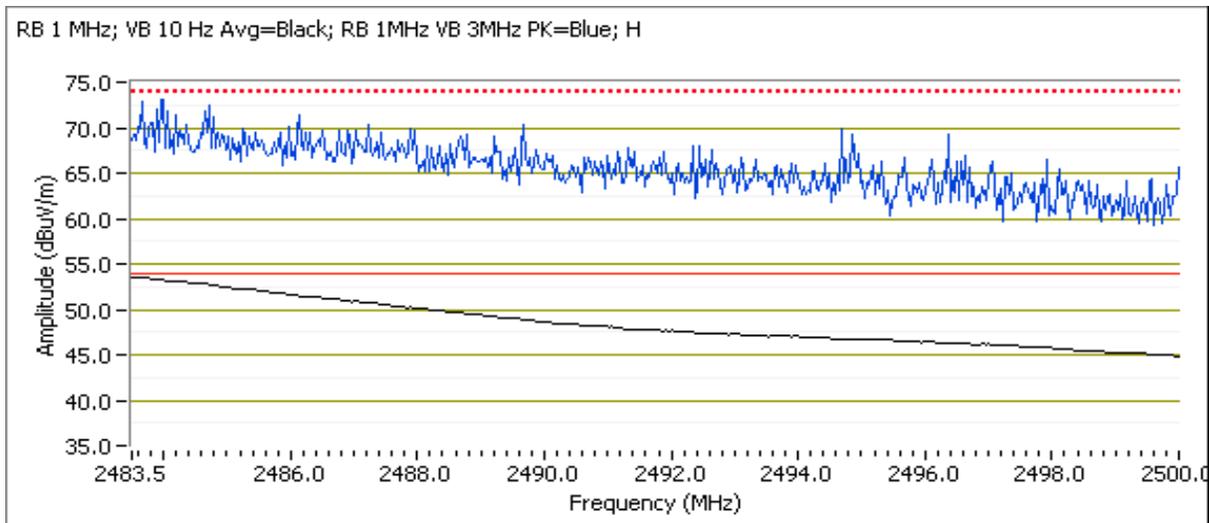
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Channel: 10 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.570	53.9	H	54.0	-0.1	AVG	268	1.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2484.950	72.6	H	74.0	-1.4	PK	268	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.500	42.1	V	54.0	-11.9	AVG	189	2.1	Note 3,POS; RB 1 MHz; VB: 10 Hz
2485.480	58.1	V	74.0	-15.9	PK	189	2.1	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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: 35 %

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)	53.1 dBµV/m @ 2381.7 MHz (-0.9 dB)
	b	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.1 dBµV/m @ 2485.0 MHz (-0.9 dB)
2	g	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.3 dBµV/m @ 2390.0 MHz (-0.7 dB)
	g	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	72.7 dBµV/m @ 2487.3 MHz (-1.3 dB)
additional-2	g	10 - 2457MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.9 dBµV/m @ 2483.5 MHz (-0.1 dB)
3	n20	1 - 2412MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.3 dBµV/m @ 2390.0 MHz (-1.7 dB)
	n20	11 - 2462MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	73.3 dBµV/m @ 2483.8 MHz (-0.7 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample S/N: MAC Address:ACD1B81E8B0D

Driver: 6.10 RC198.8

Antenna: External Antenna

Pk Size: 37 1000

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

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	98.5%	Yes	2.526	0	0	396
11g	6Mb/s	96.0%	Yes	1.437	0.18	0.35	696
n20	MCS0	97.1%	Yes	1.346	0.13	0.26	743

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 $50*(1/DC)$ 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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1: Radiated Bandedge Measurements

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

Test Engineer: Jack Liu

Test Location: FT Chamber# 5

Config. Used: 1

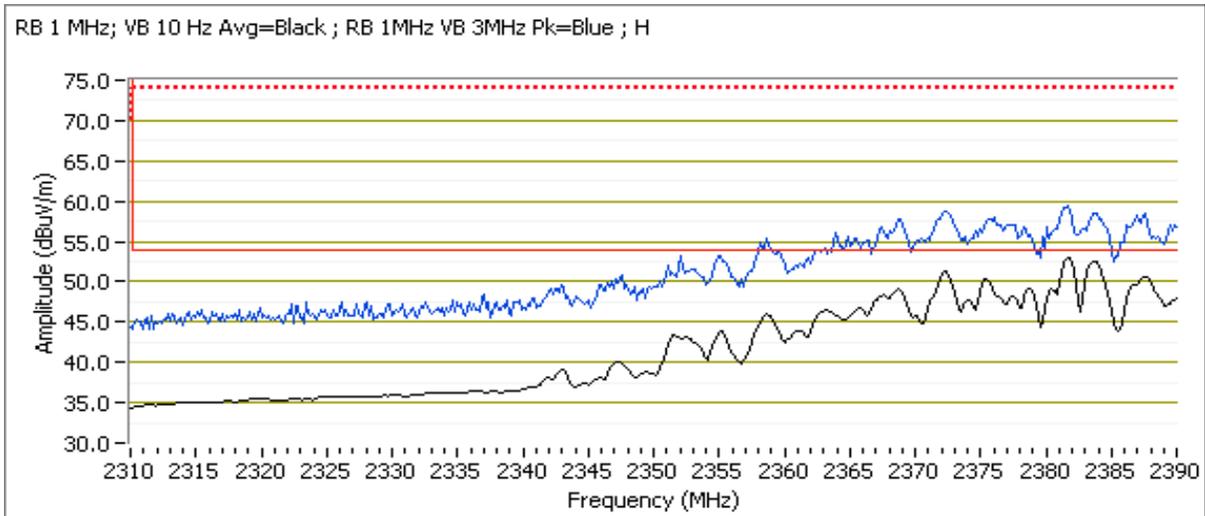
Config Change: None

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	
2381.660	53.1	H	54.0	-0.9	AVG	270	1.3	POS; RB 1 MHz; VB: 10 Hz
2381.660	59.6	H	74.0	-14.4	PK	270	1.3	POS; RB 1 MHz; VB: 3 MHz
2381.660	47.0	V	54.0	-7.0	AVG	205	1.2	POS; RB 1 MHz; VB: 10 Hz
2373.970	55.2	V	74.0	-18.8	PK	205	1.2	POS; RB 1 MHz; VB: 3 MHz





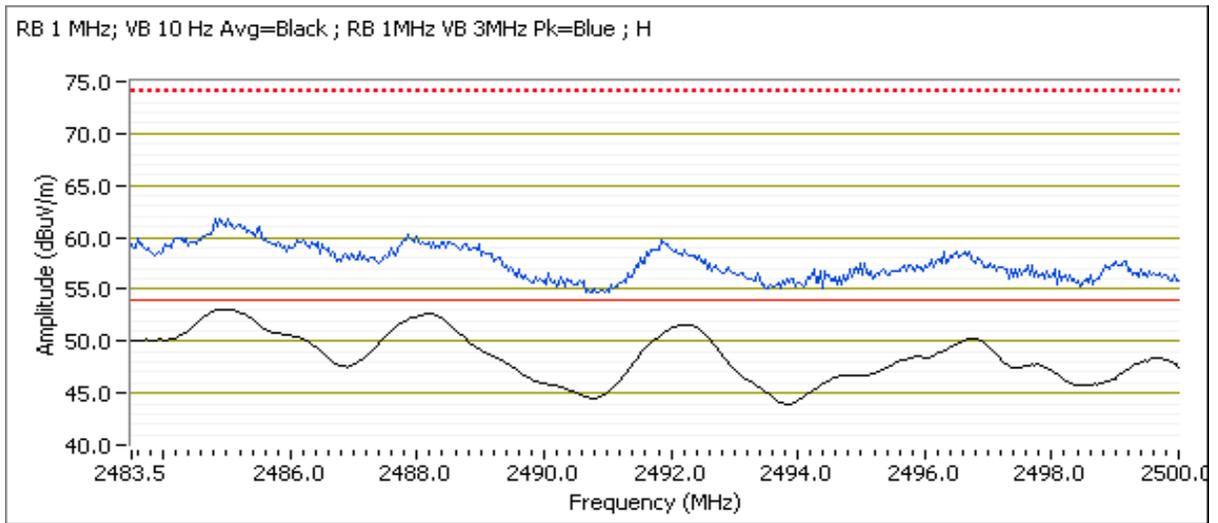
EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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	
2484.950	53.1	H	54.0	-0.9	AVG	69	1.2	POS; RB 1 MHz; VB: 10 Hz
2485.120	61.3	H	74.0	-12.7	PK	69	1.2	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

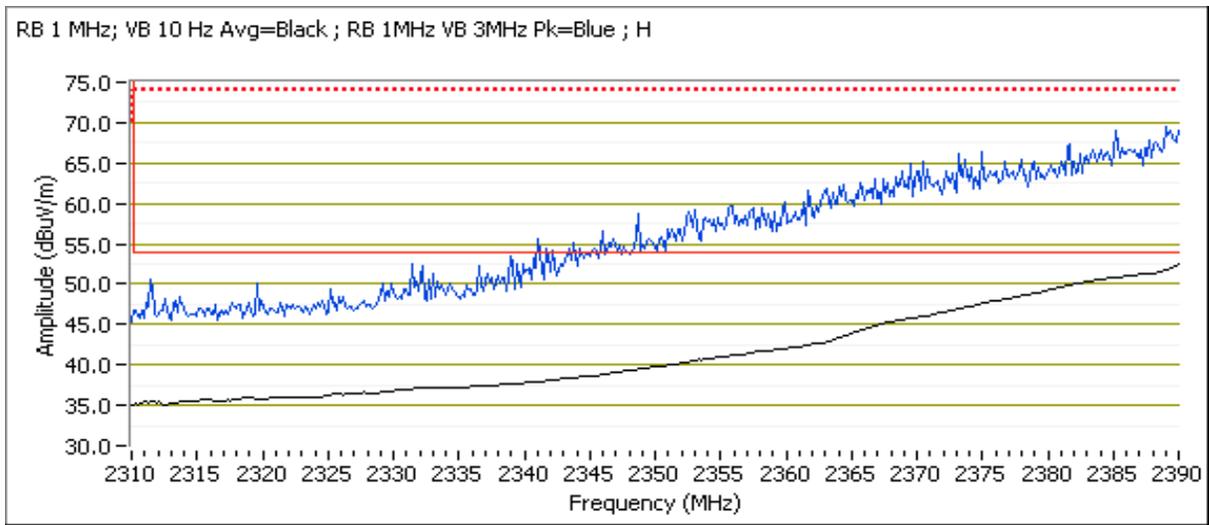
Run #2: Radiated Bandedge Measurements

Date of Test: 3/2/2015 0:00 Config. Used: 1
 Test Engineer: Jack Liu Config Change: None
 Test Location: FT Chamber# 5 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	53.3	H	54.0	-0.7	AVG	279	1.3	Note3;POS; RB 1 MHz; VB: 10 Hz
2388.240	71.0	H	74.0	-3.0	PK	279	1.3	POS; RB 1 MHz; VB: 3 MHz
2390.000	47.3	V	54.0	-6.7	AVG	212	1.2	Note3;POS; RB 1 MHz; VB: 10 Hz
2388.480	65.2	V	74.0	-8.8	PK	212	1.2	POS; RB 1 MHz; VB: 3 MHz





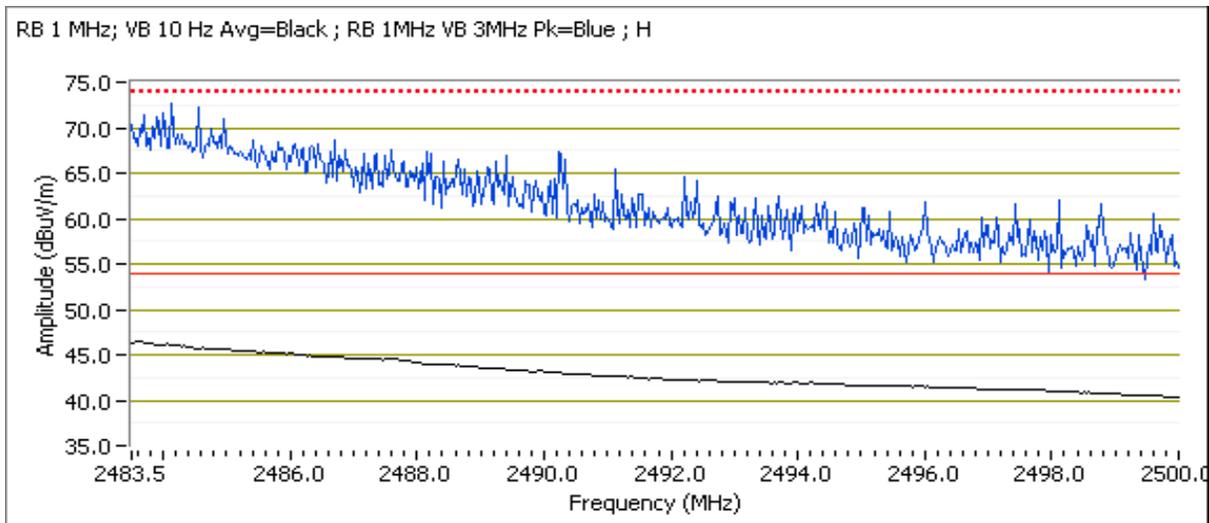
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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 MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.500	47.1	H	54.0	-7.0	AVG	66	1.3	Note3;POS; RB 1 MHz; VB: 10 Hz
2487.270	72.7	H	74.0	-1.3	PK	66	1.3	POS; RB 1 MHz; VB: 3 MHz
2483.630	43.1	V	54.0	-11.0	AVG	284	1.7	Note3;POS; RB 1 MHz; VB: 10 Hz
2485.350	67.6	V	74.0	-6.4	PK	284	1.7	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

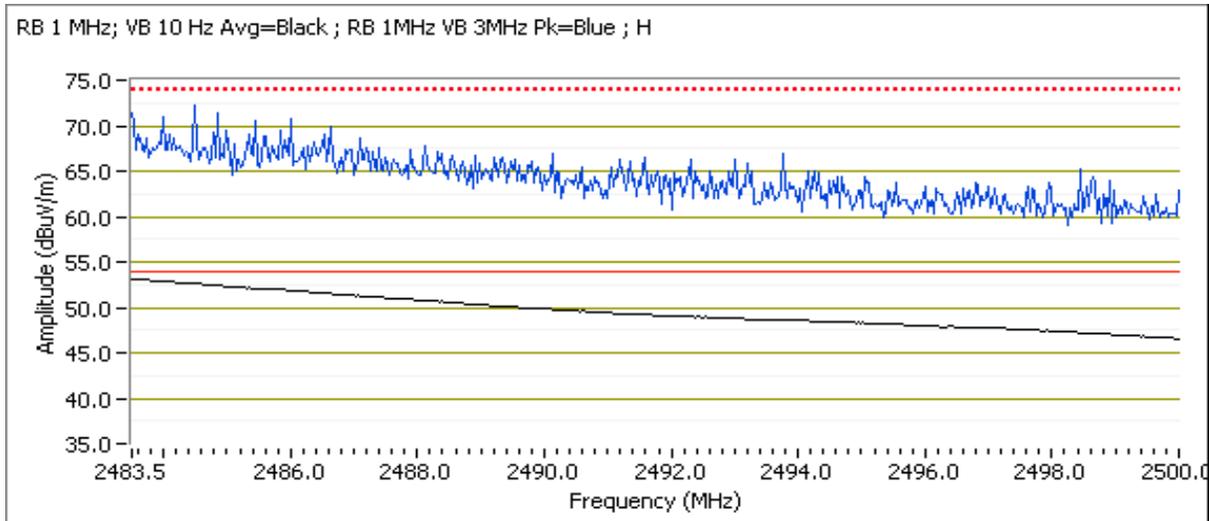
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

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

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.500	53.9	H	54.0	-0.1	AVG	65	1.0	Note 3,POS; RB 1 MHz; VB: 10 Hz
2486.210	72.7	H	74.0	-1.3	PK	65	1.0	POS; RB 1 MHz; VB: 3 MHz
2483.500	50.9	V	54.0	-3.2	AVG	326	1.7	Note 3,POS; RB 1 MHz; VB: 10 Hz
2486.180	68.3	V	74.0	-5.7	PK	326	1.7	POS; RB 1 MHz; VB: 3 MHz

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





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

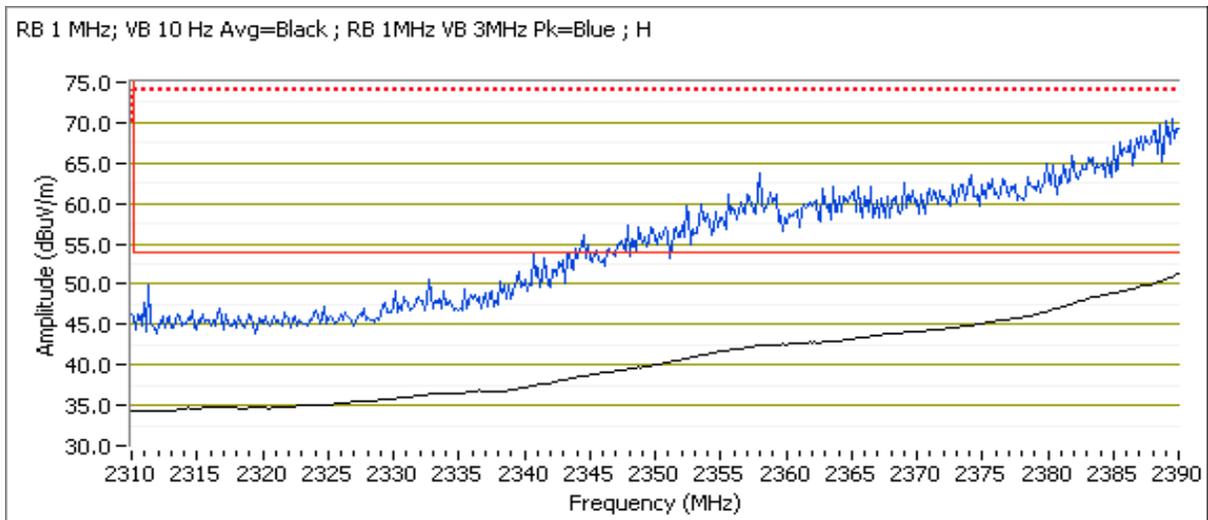
Run #3: Radiated Bandedge Measurements

Date of Test: 3/2/2015 0:00 Config. Used: 1
 Test Engineer: Jack Liu Config Change: None
 Test Location: FT Chamber# 5 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	52.3	H	54.0	-1.7	AVG	278	1.6	Note3;POS; RB 1 MHz; VB: 10 Hz
2389.760	72.6	H	74.0	-1.4	PK	278	1.6	POS; RB 1 MHz; VB: 3 MHz
2390.000	45.8	V	54.0	-8.2	AVG	211	1.0	Note3;POS; RB 1 MHz; VB: 10 Hz
2389.360	65.3	V	74.0	-8.7	PK	211	1.0	POS; RB 1 MHz; VB: 3 MHz





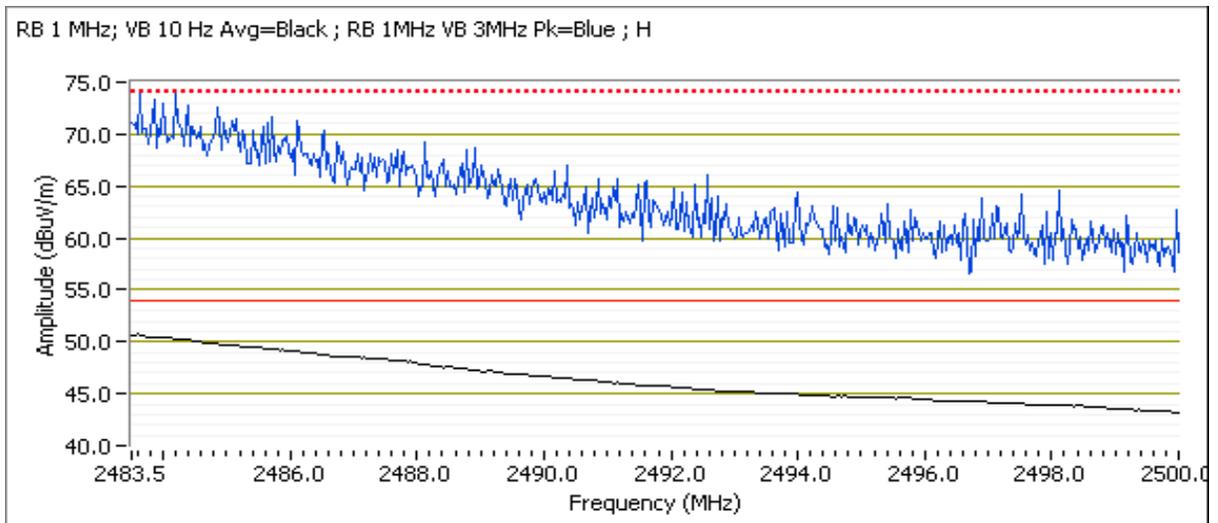
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
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 MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.530	51.4	H	54.0	-2.6	AVG	60	1.5	Note3;POS; RB 1 MHz; VB: 10 Hz
2483.760	73.3	H	74.0	-0.7	PK	60	1.5	POS; RB 1 MHz; VB: 3 MHz
2483.500	45.9	V	54.0	-8.1	AVG	80	1.1	Note3;POS; RB 1 MHz; VB: 10 Hz
2483.630	68.1	V	74.0	-5.9	PK	80	1.1	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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: 20.6 °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	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	51.6 dBµV/m @ 4823.9 MHz (-2.4 dB)
	b	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	51.4 dBµV/m @ 4874.0 MHz (-2.6 dB)
	b	11 - 2462MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	50.8 dBµV/m @ 4924.0 MHz (-3.2 dB)
Scans on center channel in 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)	37.1 dBµV/m @ 4873.1 MHz (-16.9 dB)
	n20	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	37.5 dBµV/m @ 1594.8 MHz (-16.5 dB)
Measurements on low and high channels in worst-case OFDM mode.							
3	n20	1 - 2412MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	37.0 dBµV/m @ 1598.8 MHz (-17.0 dB)
	n20	11 - 2462MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	36.0 dBµV/m @ 4923.8 MHz (-18.3 dB)



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	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: ACD1B81E8B1D

Driver: 6.10 RC198.8

Antenna: Internal

Notes:

Preliminary testing demonstrated that the main antenna port is worse case

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	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	98.5%	Yes	2.526	0	0	396
11g	6Mb/s	96.0%	Yes	1.437	0.18	0.352	696
n20	MCS0	97.1%	Yes	1.346	0.13	0.255	743

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.



EMC Test Data

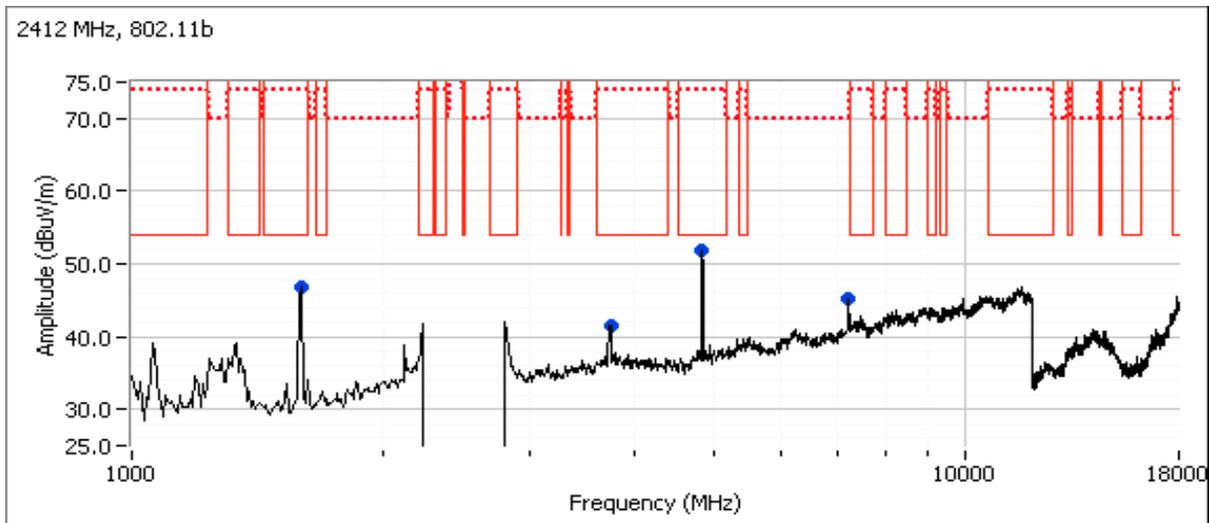
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: 802.11b
 Date of Test: 2/27/2015 0:00 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 Mode: b pwr setting: -
 Tx Chain: Main 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	
4823.940	51.6	H	54.0	-2.4	AVG	162	1.0	RB 1 MHz;VB 10 Hz;Peak
4823.840	54.2	H	74.0	-19.8	PK	162	1.0	RB 1 MHz;VB 3 MHz;Peak
1597.450	36.7	H	54.0	-17.3	AVG	9	1.5	RB 1 MHz;VB 10 Hz;Peak
1596.710	53.9	H	74.0	-20.1	PK	9	1.5	RB 1 MHz;VB 3 MHz;Peak
7235.330	45.0	H	54.0	-9.0	AVG	261	1.0	Note 1, RB 1 MHz;VB 10 Hz;Peak
7234.660	52.5	H	74.0	-21.5	PK	261	1.0	Note 1, RB 1 MHz;VB 3 MHz;Peak
3736.970	34.3	V	54.0	-19.7	AVG	341	1.5	RB 1 MHz;VB 10 Hz;Peak
3739.340	50.9	V	74.0	-23.1	PK	341	1.5	RB 1 MHz;VB 3 MHz;Peak



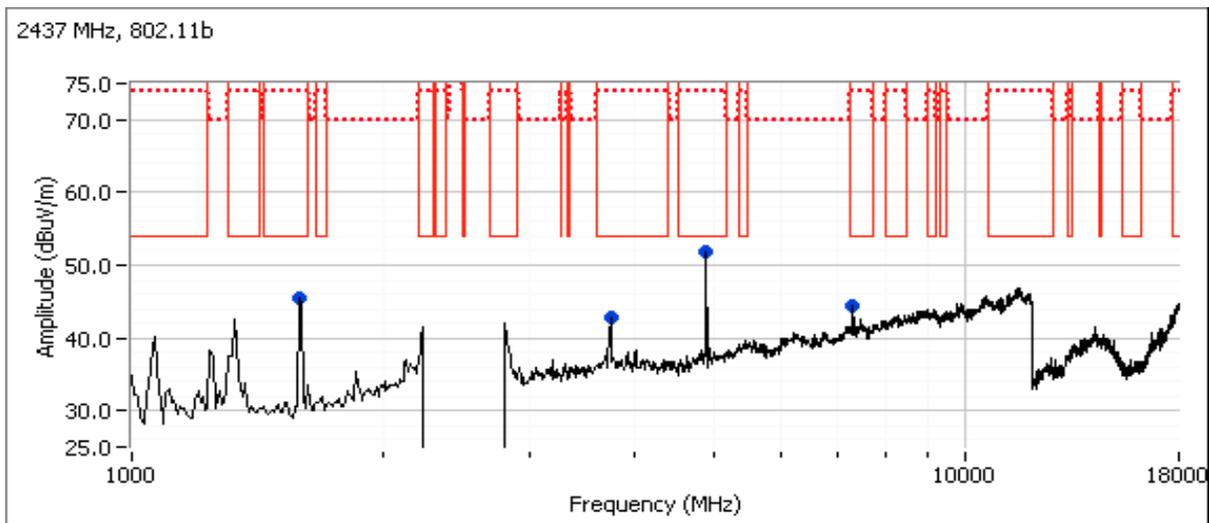
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1b: Center Channel

Channel: 6 Mode: b pwr setting: -
 Tx Chain: Main 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	
4873.970	51.4	H	54.0	-2.6	AVG	158	1.0	RB 1 MHz;VB 10 Hz;Peak
4873.960	54.1	H	74.0	-19.9	PK	158	1.0	RB 1 MHz;VB 3 MHz;Peak
1595.740	34.3	H	54.0	-19.7	AVG	153	1.1	RB 1 MHz;VB 10 Hz;Peak
1596.440	50.6	H	74.0	-23.4	PK	153	1.1	RB 1 MHz;VB 3 MHz;Peak
7310.180	42.8	H	54.0	-11.2	AVG	270	1.2	RB 1 MHz;VB 10 Hz;Peak
7311.910	52.2	H	74.0	-21.8	PK	270	1.2	RB 1 MHz;VB 3 MHz;Peak
3739.260	34.4	V	54.0	-19.6	AVG	341	1.5	RB 1 MHz;VB 10 Hz;Peak
3738.930	51.1	V	74.0	-22.9	PK	341	1.5	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

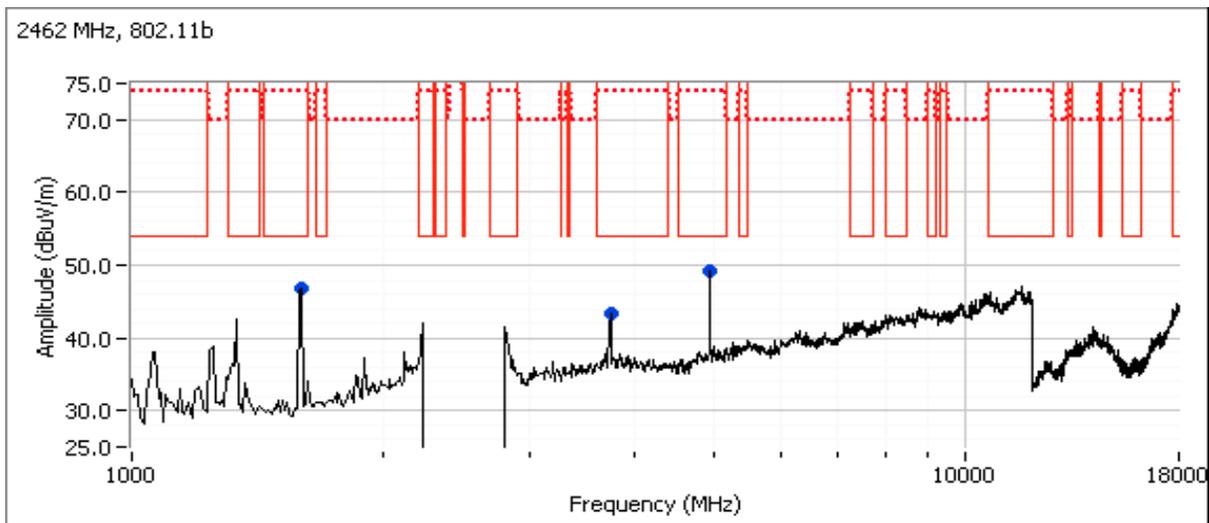


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1c: High Channel

Channel: 11 Mode: b pwr setting: -
 Tx Chain: Main 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	
4923.980	50.8	H	54.0	-3.2	AVG	284	1.2	RB 1 MHz;VB 10 Hz;Peak
4923.840	53.9	H	74.0	-20.1	PK	284	1.2	RB 1 MHz;VB 3 MHz;Peak
1598.040	34.7	H	54.0	-19.3	AVG	43	1.8	RB 1 MHz;VB 10 Hz;Peak
1598.810	50.7	H	74.0	-23.3	PK	43	1.8	RB 1 MHz;VB 3 MHz;Peak
3744.960	34.3	V	54.0	-19.7	AVG	332	1.5	RB 1 MHz;VB 10 Hz;Peak
3738.500	51.3	V	74.0	-22.7	PK	332	1.5	RB 1 MHz;VB 3 MHz;Peak



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

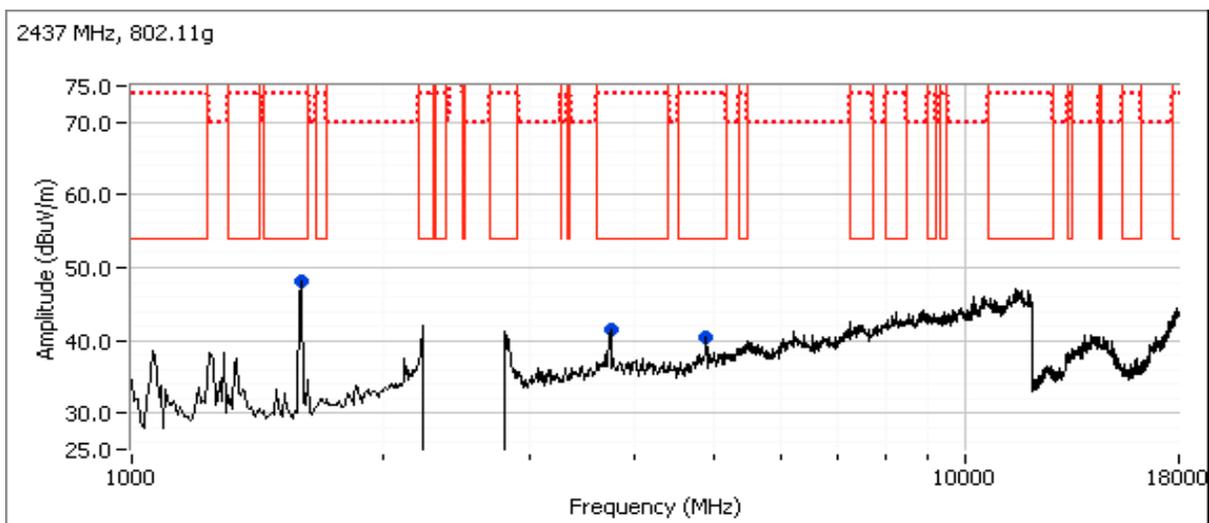
Run #2: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: OFDM
 Date of Test: 2/27/2015 0:00 Config. Used: 1
 Test Engineer: Rafael Varelas Config Change: None
 Test Location: FT Chamber #5 EUT Voltage: 120V/60Hz

Run #2a: Center Channel

Channel: 6 Mode: g pwr setting: -
 Tx Chain: Main 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	
4873.060	37.1	H	54.0	-16.9	AVG	235	1.1	Note 3, RB 1 MHz; VB 10 Hz; Peak
4872.200	48.7	H	74.0	-25.3	PK	235	1.1	RB 1 MHz; VB 3 MHz; Peak
1598.080	36.0	V	54.0	-18.0	AVG	177	1.8	RB 1 MHz; VB 10 Hz; Peak
1599.200	53.4	V	74.0	-20.6	PK	177	1.8	RB 1 MHz; VB 3 MHz; Peak
3735.380	34.1	V	54.0	-19.9	AVG	168	1.0	RB 1 MHz; VB 10 Hz; Peak
3735.510	49.5	V	74.0	-24.5	PK	168	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





EMC Test Data

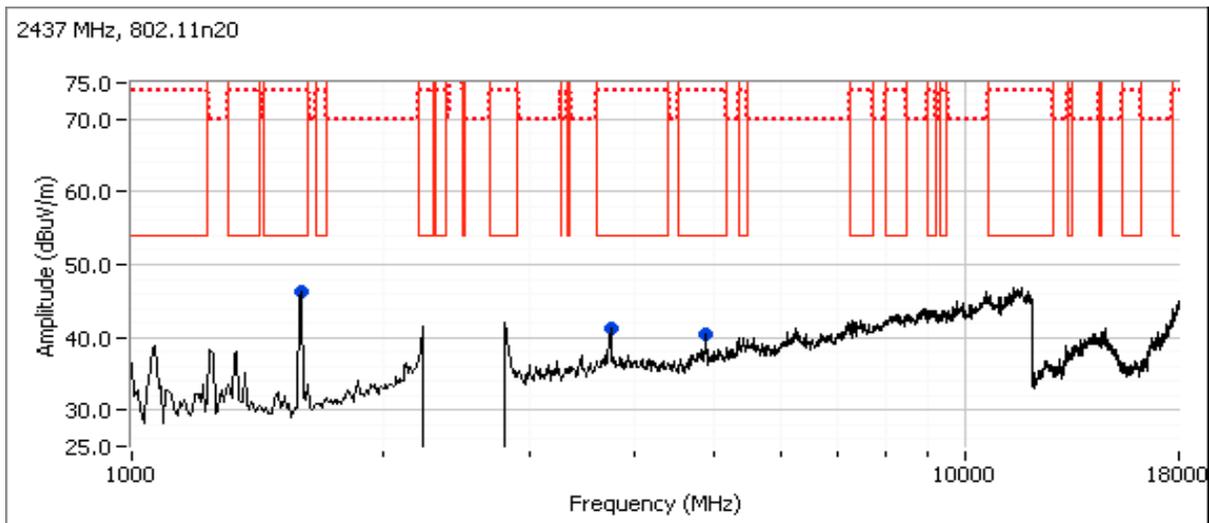
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #2b: Center Channel

Channel: 6 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

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	
1594.800	37.5	H	54.0	-16.5	AVG	145	1.3	RB 1 MHz;VB 10 Hz;Peak
1594.060	52.9	H	74.0	-21.1	PK	145	1.3	RB 1 MHz;VB 3 MHz;Peak
4872.860	37.2	H	54.0	-16.8	AVG	159	1.0	Note 3, RB 1 MHz;VB 10 Hz;Peak
4874.920	49.0	H	74.0	-25.0	PK	159	1.0	RB 1 MHz;VB 3 MHz;Peak
3746.080	33.8	V	54.0	-20.2	AVG	326	1.3	RB 1 MHz;VB 10 Hz;Peak
3740.180	49.1	V	74.0	-24.9	PK	326	1.3	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





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

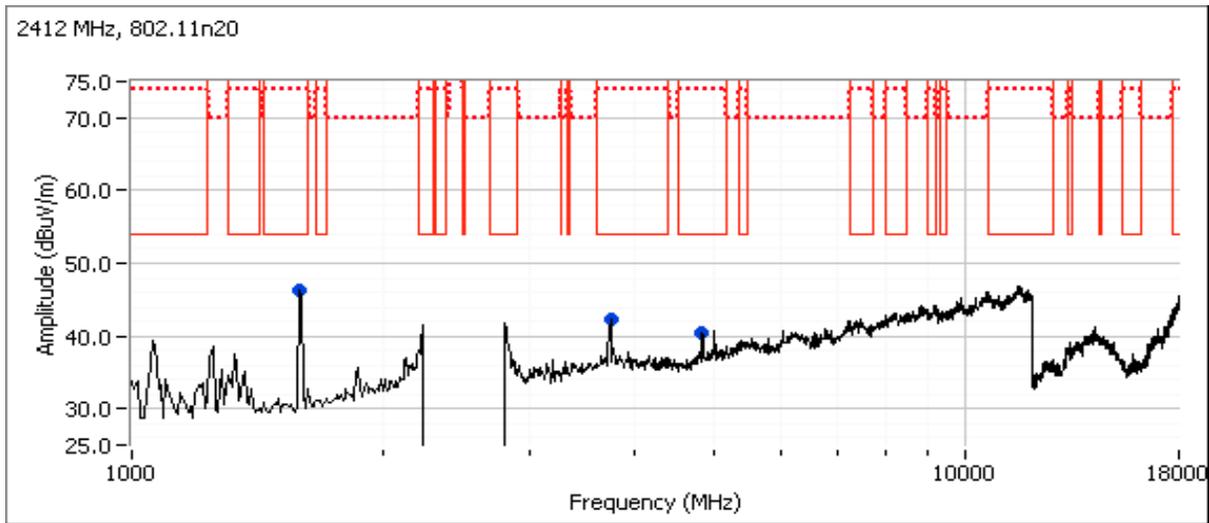
Run #3: Radiated Spurious Emissions, 1,000 - 25000 MHz. Operating Mode: Worse case from Run #2

Date of Test: 2/27/2015 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 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

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	
1598.800	37.0	V	54.0	-17.0	AVG	169	1.4	RB 1 MHz;VB 10 Hz;Peak
1598.600	53.8	V	74.0	-20.2	PK	169	1.4	RB 1 MHz;VB 3 MHz;Peak
4823.660	36.5	H	54.0	-17.5	AVG	202	1.1	Note 3, RB 1 MHz;VB 10 Hz;Peak
4825.760	47.6	H	74.0	-26.4	PK	202	1.1	RB 1 MHz;VB 3 MHz;Peak
3746.800	34.3	V	54.0	-19.7	AVG	343	1.5	RB 1 MHz;VB 10 Hz;Peak
3748.300	50.7	V	74.0	-23.3	PK	343	1.5	RB 1 MHz;VB 3 MHz;Peak

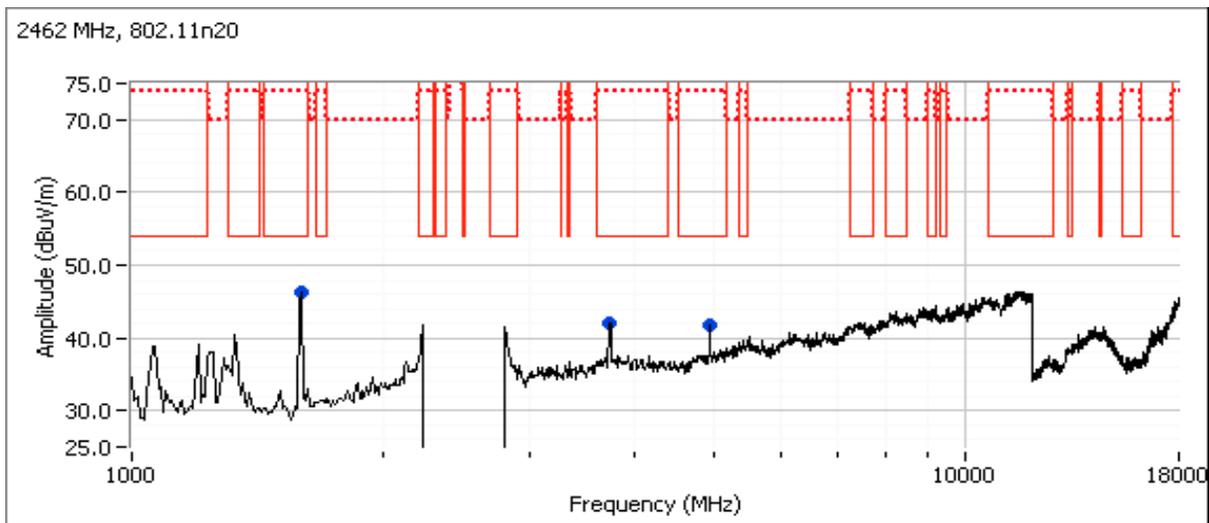


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #3b: High Channel

Channel: 11 Mode: n20 pwr setting: -
 Tx Chain: Main Data Rate: MCS0

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	
4923.760	36.0	H	54.0	-18.3	AVG	152	1.1	Note 3, RB 1 MHz; VB 10 Hz; Peak
4924.430	46.6	H	74.0	-27.4	PK	152	1.1	RB 1 MHz; VB 3 MHz; Peak
3736.000	34.1	V	54.0	-19.9	AVG	171	1.0	RB 1 MHz; VB 10 Hz; Peak
3744.100	50.3	V	74.0	-23.7	PK	171	1.0	RB 1 MHz; VB 3 MHz; Peak
1595.090	34.9	V	54.0	-19.1	AVG	182	1.7	RB 1 MHz; VB 10 Hz; Peak
1594.760	51.0	V	74.0	-23.0	PK	182	1.7	RB 1 MHz; VB 3 MHz; Peak





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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: 37 %

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)	42.0 dBµV/m @ 7236.9 MHz (-12.0 dB)
	b	6 - 2437MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.8 dBµV/m @ 7310.3 MHz (-8.2 dB)
	b	11 - 2462MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	41.5 dBµV/m @ 7386.8 MHz (-12.5 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.

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	Class:	N/A

Sample Notes

Sample S/N: MAC Address:ACD1B81E8B0D
 Driver: 6.10 RC198.8
 Antenna: External Antenna
 Pk Size: 37 1000

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	98.5%	Yes	2.526	0	0	396

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 $50*(1/DC)$ 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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

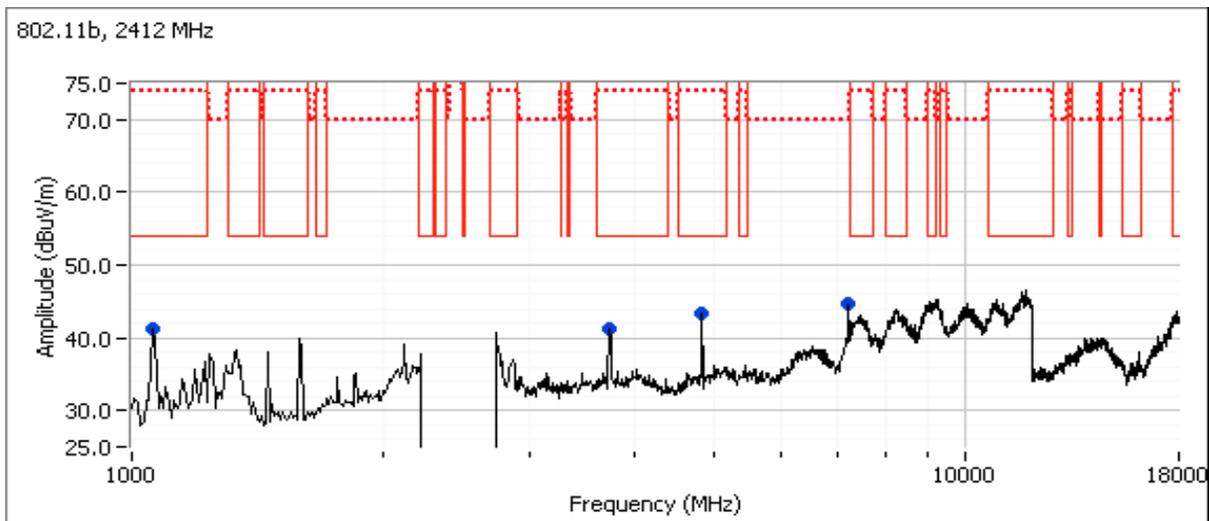
Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz.

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

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	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7236.920	42.0	V	54.0	-12.0	AVG	270	2.3	Note 1, RB 1 MHz; VB 10 Hz; Peak
7236.520	52.4	V	74.0	-21.6	PK	270	2.3	Note 1, RB 1 MHz; VB 3 MHz; Peak
4824.000	40.4	V	54.0	-13.6	AVG	12	1.2	RB 1 MHz; VB 10 Hz; Peak
4823.890	45.0	V	74.0	-29.0	PK	12	1.2	RB 1 MHz; VB 3 MHz; Peak
1064.490	33.6	V	54.0	-20.4	AVG	283	1.8	RB 1 MHz; VB 10 Hz; Peak
1064.800	50.4	V	74.0	-23.6	PK	283	1.8	RB 1 MHz; VB 3 MHz; Peak
3734.910	31.3	V	54.0	-22.7	AVG	164	1.0	RB 1 MHz; VB 10 Hz; Peak
3734.910	47.0	V	74.0	-27.0	PK	164	1.0	RB 1 MHz; VB 3 MHz; Peak



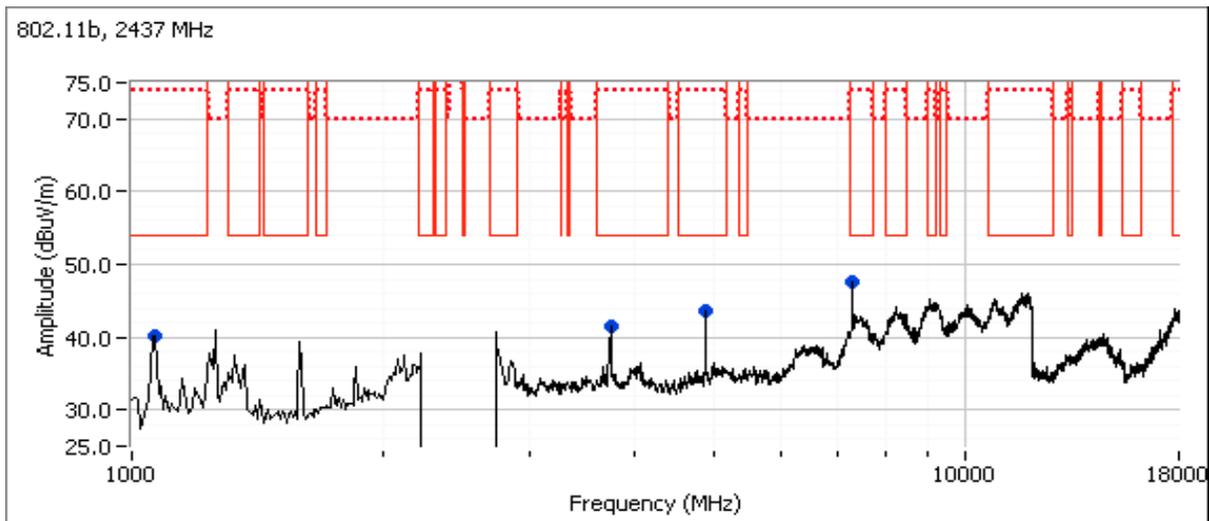
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #1b: Center Channel

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

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
7310.300	45.8	V	54.0	-8.2	AVG	80	1.9	RB 1 MHz;VB 10 Hz;Peak
7312.200	53.6	V	74.0	-20.4	PK	80	1.9	RB 1 MHz;VB 3 MHz;Peak
4873.930	39.4	V	54.0	-14.6	AVG	348	1.5	RB 1 MHz;VB 10 Hz;Peak
4873.710	45.6	V	74.0	-28.4	PK	348	1.5	RB 1 MHz;VB 3 MHz;Peak
1065.310	33.4	V	54.0	-20.6	AVG	283	1.0	RB 1 MHz;VB 10 Hz;Peak
1065.840	50.1	V	74.0	-23.9	PK	283	1.0	RB 1 MHz;VB 3 MHz;Peak
3735.770	31.2	V	54.0	-22.8	AVG	165	1.1	RB 1 MHz;VB 10 Hz;Peak
3735.570	46.4	V	74.0	-27.6	PK	165	1.1	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





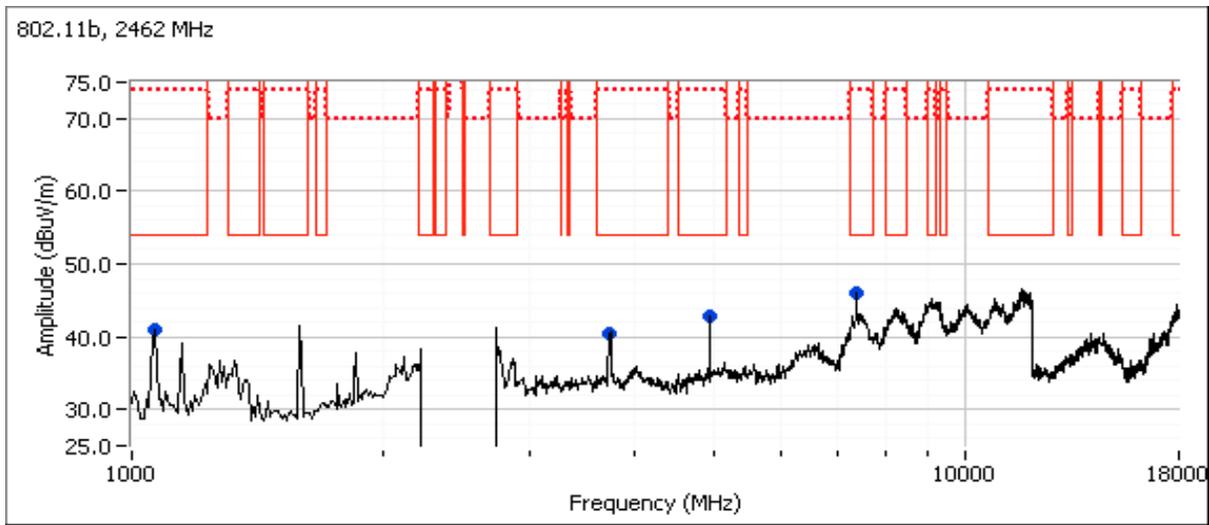
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1c: High Channel

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

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
7386.840	41.5	V	54.0	-12.5	AVG	44	1.0	RB 1 MHz;VB 10 Hz;Peak
7384.640	51.9	V	74.0	-22.1	PK	44	1.0	RB 1 MHz;VB 3 MHz;Peak
3734.550	31.6	V	54.0	-22.4	AVG	167	1.5	RB 1 MHz;VB 10 Hz;Peak
3738.280	48.0	V	74.0	-26.0	PK	167	1.5	RB 1 MHz;VB 3 MHz;Peak
1064.690	32.6	V	54.0	-21.4	AVG	277	1.9	RB 1 MHz;VB 10 Hz;Peak
1065.970	49.7	V	74.0	-24.3	PK	277	1.9	RB 1 MHz;VB 3 MHz;Peak
4923.970	40.4	V	54.0	-13.6	AVG	355	1.4	RB 1 MHz;VB 10 Hz;Peak
4924.000	45.5	V	74.0	-28.5	PK	355	1.4	RB 1 MHz;VB 3 MHz;Peak





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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	2402MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	34.3 dBµV/m @ 2351.2 MHz (-19.7 dB)
	LE	2480MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	36.0 dBµV/m @ 2500.0 MHz (-18.0 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: ACD1B81E8B1D
Driver: 6.10 RC198.8
Antenna: Internal

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	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)
BLE	-	0.6172	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 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.



EMC Test Data

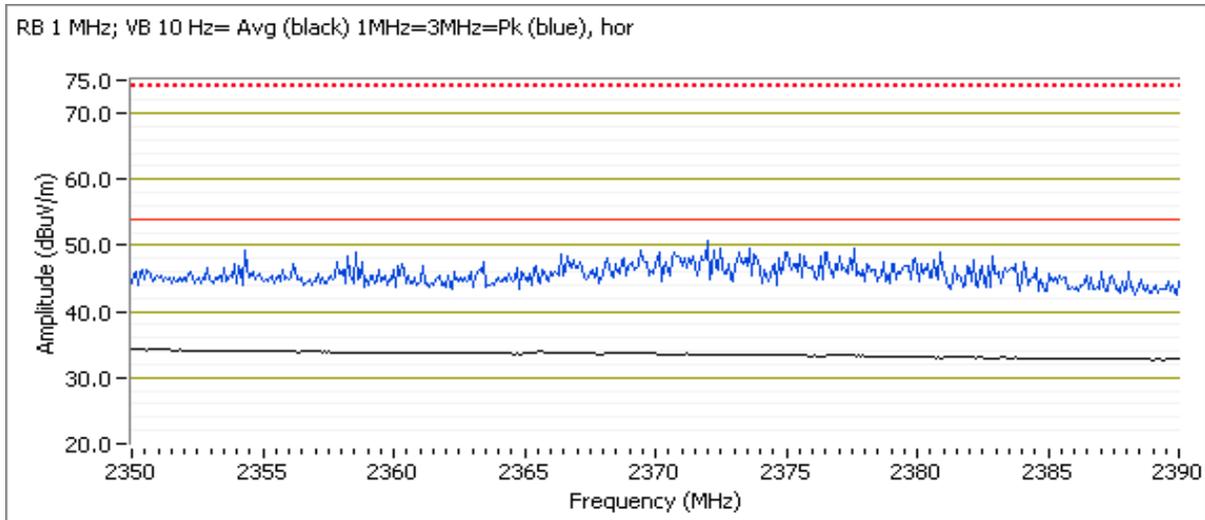
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1: Radiated Bandedge Measurements
 Date of Test: 3/18/2015 0:00 Config. Used: 1
 Test Engineer: Joseph Cadigal Config Change: none
 Test Location: FT Chamber#5 EUT Voltage: 120V/60Hz

Channel: 2402MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
2351.200	34.3	H	54.0	-19.7	AVG	157	1.0	POS; RB 1 MHz; VB: 10 Hz, note 3
2377.580	50.7	H	74.0	-23.3	PK	157	1.0	POS; RB 1 MHz; VB: 3 MHz
2351.440	33.7	V	54.0	-20.3	AVG	239	1.0	POS; RB 1 MHz; VB: 10 Hz, note 3
2374.770	47.4	V	74.0	-26.6	PK	239	1.0	POS; RB 1 MHz; VB: 3 MHz





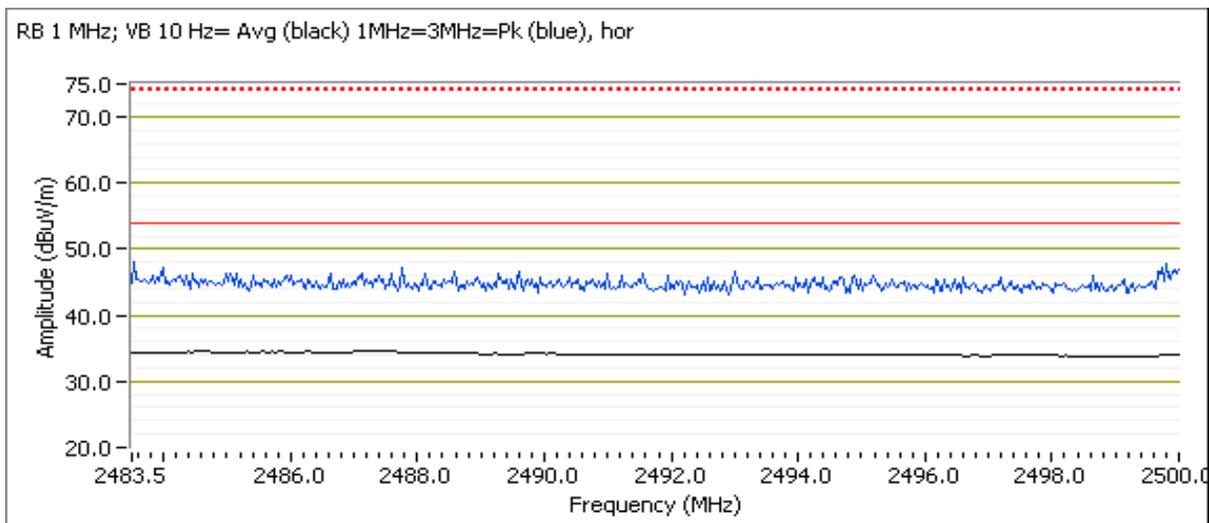
EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Channel: 2480MHz Mode: LE
 Tx Chain: Aux Data Rate: -

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2500.000	36.0	H	54.0	-18.0	AVG	187	1.1	POS; RB 1 MHz; VB: 10 Hz, note 3
2483.570	52.6	H	74.0	-21.4	PK	187	1.1	POS; RB 1 MHz; VB: 3 MHz
2487.430	34.6	V	54.0	-19.4	AVG	150	1.0	POS; RB 1 MHz; VB: 10 Hz, note 3
2499.640	46.5	V	74.0	-27.5	PK	150	1.0	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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)	39.7 dBµV/m @ 4666.8 MHz (-14.3 dB)
	LE	2440MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	39.6 dBµV/m @ 7329.7 MHz (-14.4 dB)
	LE	2480MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	43.0 dBµV/m @ 7333.4 MHz (-11.0 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: ACD1B81E8B1D
Driver: 6.10 RC198.8
Antenna: Internal



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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)
BLE	-	0.6172	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 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 $50*(1/DC)$ 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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

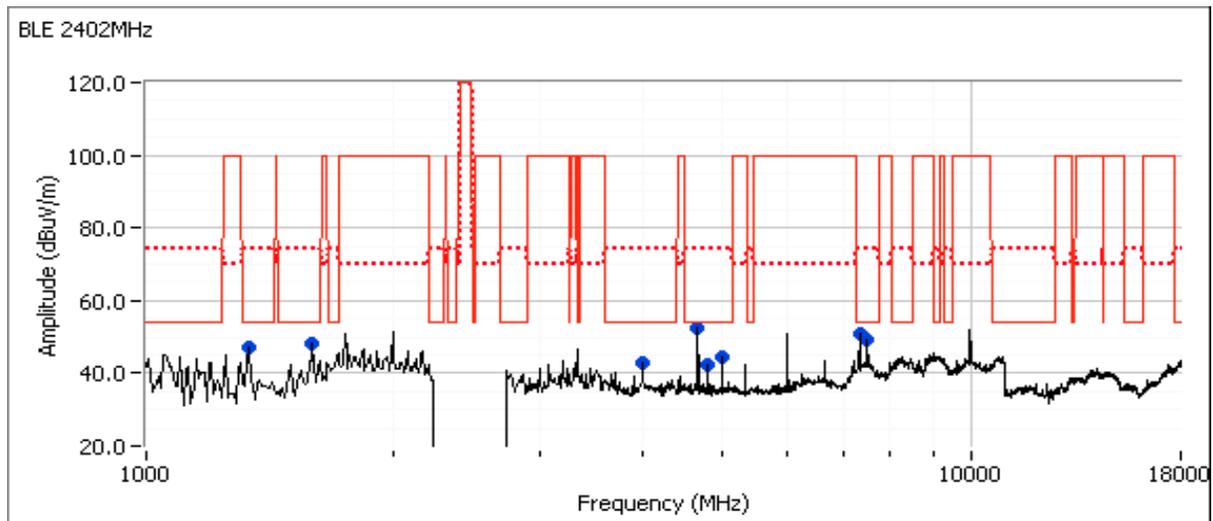
Run #1: Radiated Spurious Emissions, 1,000 - 25000 MHz.
 Date of Test: 3/18/2015 0:00 Config. Used: 1
 Test Engineer: Joseph Cadigal Config Change: none
 Test Location: FT Chamber#5 EUT Voltage: 120V/60Hz

Run #1a: Low Channel

Channel: 2402MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
4666.810	39.7	H	54.0	-14.3	AVG	171	1.0	RB 1 MHz;VB 10 Hz;Peak
4666.810	59.5	H	74.0	-14.5	PK	171	1.0	RB 1 MHz;VB 3 MHz;Peak
4803.560	34.0	H	54.0	-20.0	AVG	20	1.0	RB 1 MHz;VB 10 Hz;Peak
4804.160	44.2	H	74.0	-29.8	PK	20	1.0	RB 1 MHz;VB 3 MHz;Peak
7328.320	39.3	V	54.0	-14.7	AVG	171	1.6	RB 1 MHz;VB 10 Hz;Peak
7327.460	51.7	V	74.0	-22.3	PK	171	1.6	RB 1 MHz;VB 3 MHz;Peak
3999.960	35.3	V	54.0	-18.7	AVG	182	1.3	RB 1 MHz;VB 10 Hz;Peak
3999.870	47.5	V	74.0	-26.5	PK	182	1.3	RB 1 MHz;VB 3 MHz;Peak
7504.390	39.5	H	54.0	-14.5	AVG	182	1.0	RB 1 MHz;VB 10 Hz;Peak
7505.890	51.7	H	74.0	-22.3	PK	182	1.0	RB 1 MHz;VB 3 MHz;Peak
5001.980	29.1	V	54.0	-24.9	AVG	189	2.2	RB 1 MHz;VB 10 Hz;Peak
5002.270	40.4	V	74.0	-33.6	PK	189	2.2	RB 1 MHz;VB 3 MHz;Peak
1333.330	47.1	V	54.0	-6.9	Peak	233	1.6	note 4
1599.960	48.0	H	54.0	-6.0	Peak	297	1.9	note 4

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



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

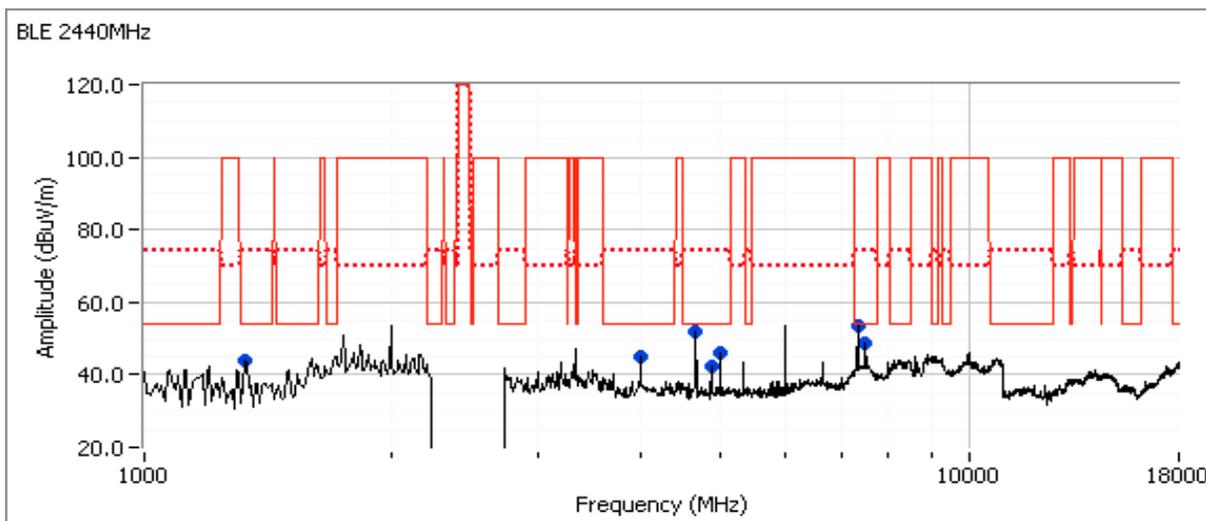
Run #1b: Center Channel

Channel: 2440MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
7329.680	39.6	V	54.0	-14.4	AVG	162	1.6	RB 1 MHz;VB 10 Hz;Peak
7330.930	50.9	V	74.0	-23.1	PK	162	1.6	RB 1 MHz;VB 3 MHz;Peak
1325.030	43.7	V	54.0	-10.3	Peak	262	1.6	note 4
4879.540	35.3	H	54.0	-18.7	AVG	48	1.0	RB 1 MHz;VB 10 Hz;Peak
4880.730	44.8	H	74.0	-29.2	PK	48	1.0	RB 1 MHz;VB 3 MHz;Peak
4666.830	31.7	V	54.0	-22.3	AVG	150	1.9	RB 1 MHz;VB 10 Hz;Peak
4666.770	57.9	V	74.0	-16.1	PK	150	1.9	RB 1 MHz;VB 3 MHz;Peak
4000.120	36.6	H	54.0	-17.4	AVG	185	1.6	RB 1 MHz;VB 10 Hz;Peak
3999.930	50.1	H	74.0	-23.9	PK	185	1.6	RB 1 MHz;VB 3 MHz;Peak
5000.150	32.0	V	54.0	-22.0	AVG	208	1.3	RB 1 MHz;VB 10 Hz;Peak
4999.520	42.5	V	74.0	-31.5	PK	208	1.3	RB 1 MHz;VB 3 MHz;Peak
7502.190	39.6	V	54.0	-14.4	AVG	220	1.0	RB 1 MHz;VB 10 Hz;Peak
7503.650	51.0	V	74.0	-23.0	PK	220	1.0	RB 1 MHz;VB 3 MHz;Peak

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



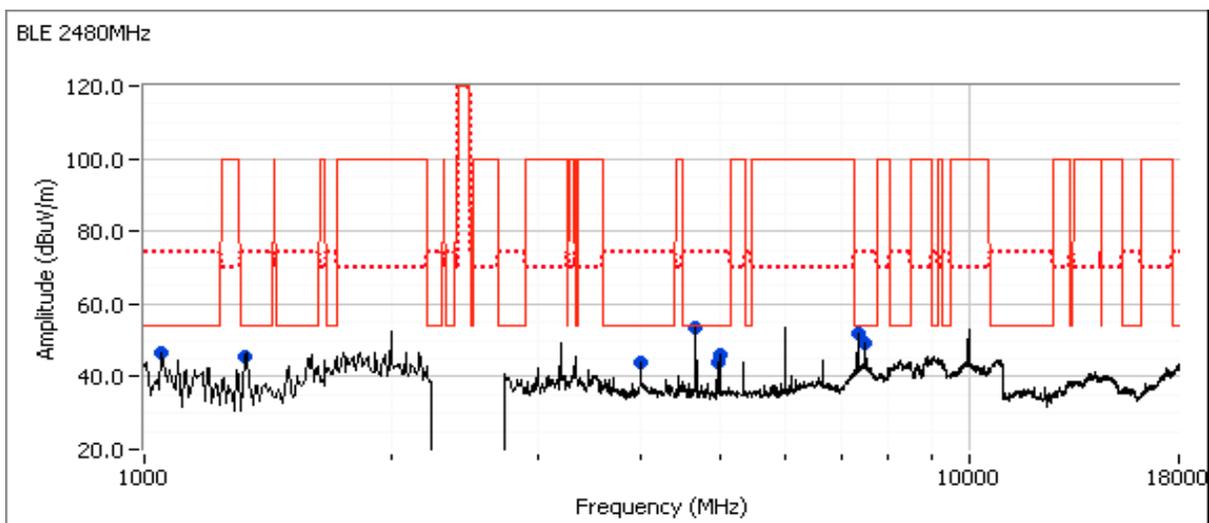
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1c: High Channel

Channel: 2480MHz Mode: b
 Tx Chain: Aux Data Rate: -

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
7333.390	43.0	V	54.0	-11.0	AVG	162	1.6	RB 1 MHz;VB 10 Hz;Peak
7333.270	62.6	V	74.0	-11.4	PK	162	1.6	RB 1 MHz;VB 3 MHz;Peak
4959.600	32.9	H	54.0	-21.1	AVG	31	1.6	RB 1 MHz;VB 10 Hz;Peak
4960.470	43.3	H	74.0	-30.7	PK	31	1.6	RB 1 MHz;VB 3 MHz;Peak
4000.010	35.7	H	54.0	-18.3	AVG	175	1.0	RB 1 MHz;VB 10 Hz;Peak
3999.940	51.1	H	74.0	-22.9	PK	175	1.0	RB 1 MHz;VB 3 MHz;Peak
4666.750	34.6	H	54.0	-19.4	AVG	180	1.0	RB 1 MHz;VB 10 Hz;Peak
4666.610	59.0	H	74.0	-15.0	PK	180	1.0	RB 1 MHz;VB 3 MHz;Peak
7500.000	41.9	H	54.0	-12.1	AVG	185	1.3	RB 1 MHz;VB 10 Hz;Peak
7500.040	53.2	H	74.0	-20.8	PK	185	1.3	RB 1 MHz;VB 3 MHz;Peak
5000.070	31.7	V	54.0	-22.3	AVG	206	1.3	RB 1 MHz;VB 10 Hz;Peak
4999.610	42.1	V	74.0	-31.9	PK	206	1.3	RB 1 MHz;VB 3 MHz;Peak
1333.320	45.6	V	54.0	-8.4	Peak	195	1.0	note 4
1056.460	46.5	V	54.0	-7.5	Peak	207	1.3	note 4

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





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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	2402MHz	-	-	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	35.3 dBµV/m @ 2351.0 MHz (-18.7 dB)
	LE	2480MHz	-	-	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	36.7 dBµV/m @ 2483.5 MHz (-17.3 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.

Sample Notes

Sample S/N: MAC Address:ACD1B81E8B0D
Driver: 6.10 RC198.8
Antenna: External Antenna

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
		Project Manager:	-
Contact:	Sachin Sawalapurkar	Project Coordinator:	Sheareen Jacobs
Standard:	FCC 15.247 / RSS-210 / LP0002	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)
BLE	-	0.6172	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 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.



EMC Test Data

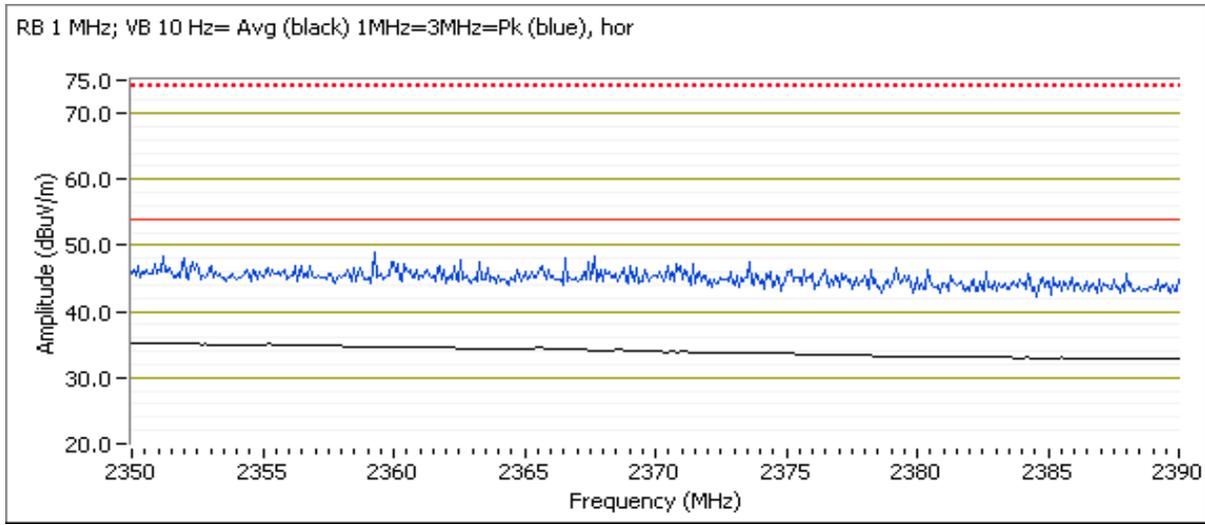
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1: Radiated Bandedge Measurements
 Date of Test: 3/18/2015 0:00 Config. Used: 1
 Test Engineer: Joseph Cadigal Config Change: none
 Test Location: FT Chamber#5 EUT Voltage: 120V/60Hz

Channel: 2402MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
2351.040	35.3	H	54.0	-18.7	AVG	153	1.0	POS; RB 1 MHz; VB: 10 Hz, note 3
2354.010	45.8	H	74.0	-28.2	PK	153	1.0	POS; RB 1 MHz; VB: 3 MHz
2350.240	35.0	V	54.0	-19.0	AVG	175	2.0	POS; RB 1 MHz; VB: 10 Hz, note 3
2362.180	45.5	V	74.0	-28.5	PK	175	2.0	POS; RB 1 MHz; VB: 3 MHz





EMC Test Data

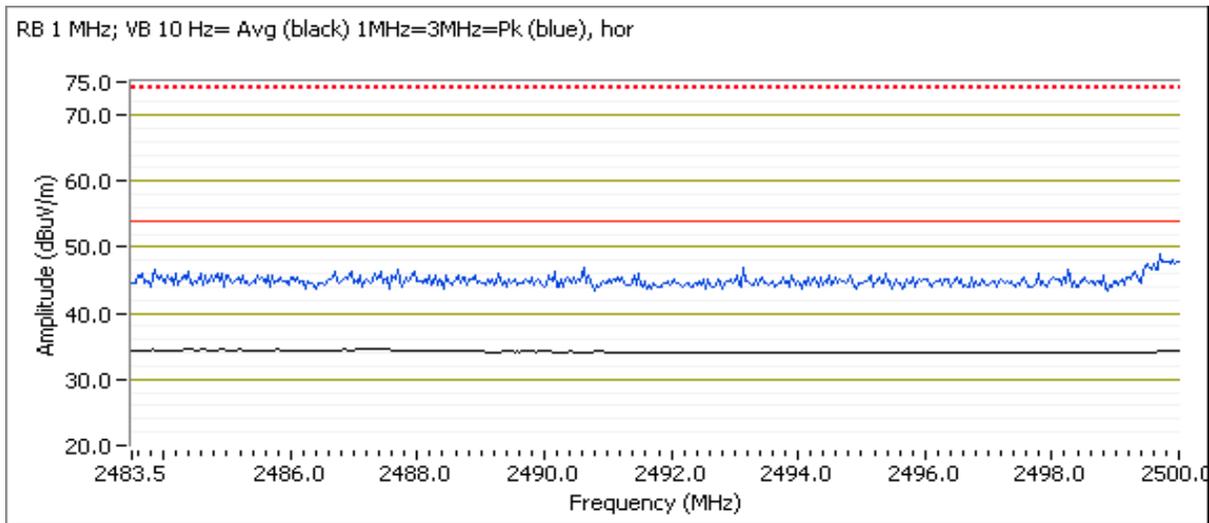
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Channel: 2480MHz Mode: LE
 Tx Chain: Aux Data Rate: -

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector PK/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
2483.500	36.7	H	54.0	-17.3	AVG	181	1.1	POS; RB 1 MHz; VB: 10 Hz, note 3
2483.670	56.6	H	74.0	-17.4	PK	181	1.1	POS; RB 1 MHz; VB: 3 MHz
2487.500	34.6	V	54.0	-19.4	AVG	151	1.0	POS; RB 1 MHz; VB: 10 Hz, note 3
2487.200	48.4	V	74.0	-25.6	PK	151	1.0	POS; RB 1 MHz; VB: 3 MHz

RB 1 MHz; VB 10 Hz= Avg (black) 1MHz=3MHz=Pk (blue), hor





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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: 26 °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	LE	2402MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	51.7 dBµV/m @ 4803.8 MHz (-2.3 dB)
	LE	2440MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	48.3 dBµV/m @ 4879.8 MHz (-5.7 dB)
	LE	2480MHz	-	-	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	47.8 dBµV/m @ 7439.4 MHz (-6.2 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: ACD1B81E8B0D
Driver: 6.10 RC198.8
Antenna: External



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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.

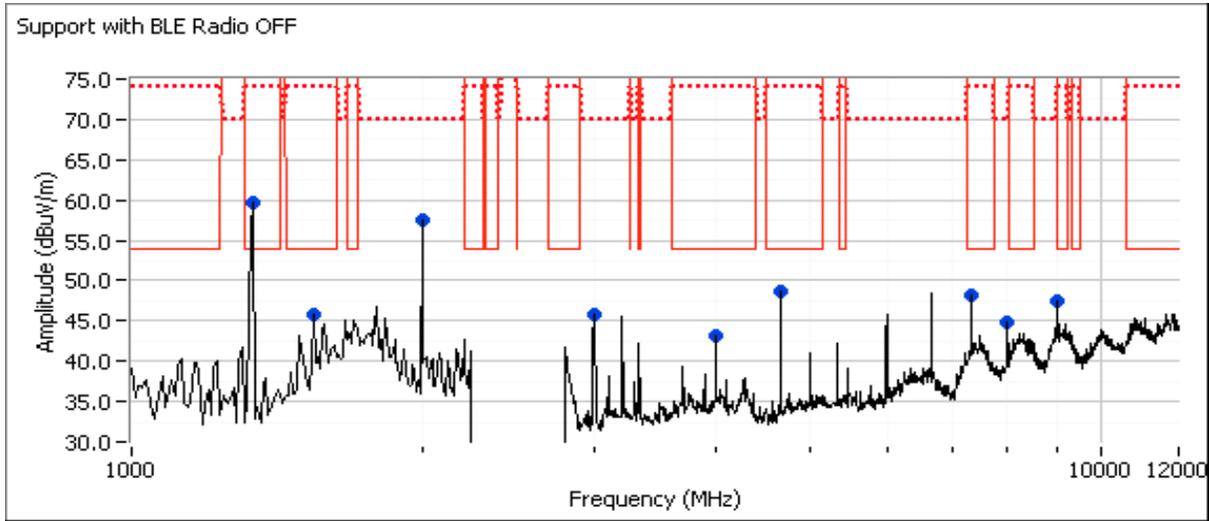
2.4GHz band reject filter used

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
BLE	-	0.62	Yes	0.387	2.1	4.2	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 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 $50*(1/DC)$ 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.
Note 7:	The emission signal is not related with radio transmit. Based on the Support equipment noise scan, also when the channel is changed the emission signal does not change.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A



Frequency MHz	Level dBµV/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
1333.330	59.8	V	-	-	Peak	79	1.0	
1552.430	45.9	V	-	-	Peak	110	1.5	
1999.990	57.6	V	-	-	Peak	126	1.0	
3000.000	45.9	V	-	-	Peak	105	1.0	
4000.110	43.1	H	-	-	Peak	183	2.0	
4666.840	48.7	V	-	-	Peak	148	1.0	
7328.800	48.2	V	-	-	Peak	103	1.5	
8000.070	44.8	V	-	-	Peak	73	1.5	
9000.200	47.5	V	-	-	Peak	106	1.0	



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

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

1 to 12GHz

Date of Test: 3/19/2015 0:00
 Test Engineer: Jack Liu
 Test Location: FT Chamber#5

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

12 to 25GHz

Date of Test: 3/19/2015 0:00
 Test Engineer: Joseph Cadigal
 Test Location: FT Chamber#5

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

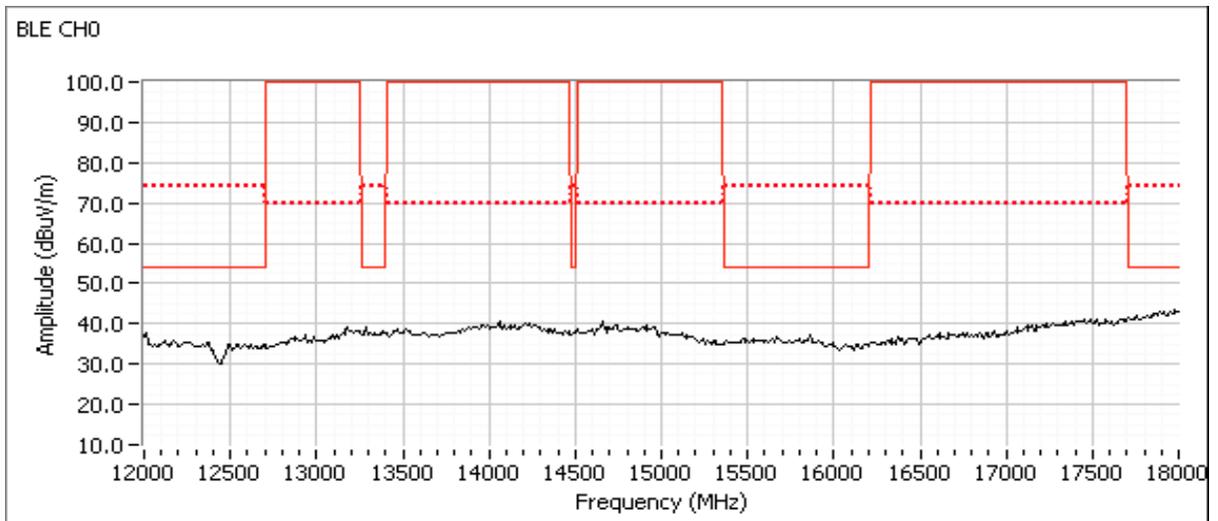
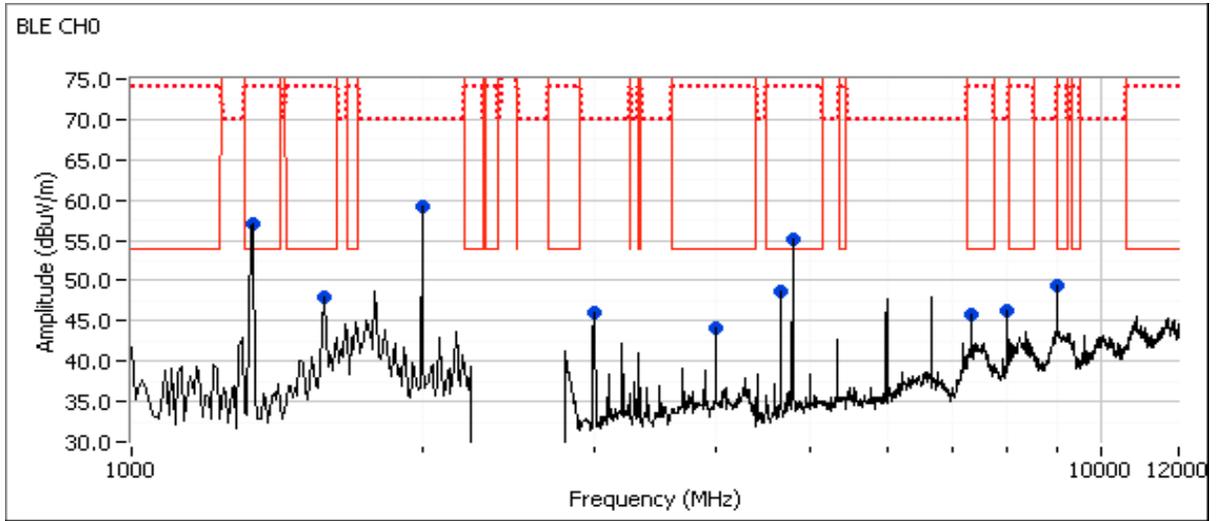
Run #1a: Low Channel

Channel: 2402MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
4803.770	51.7	V	54.0	-2.3	AVG	79	1.5	Note3;RB 1 MHz;VB 10 Hz;Peak
4803.450	55.3	V	74.0	-18.7	PK	79	1.5	RB 1 MHz;VB 3 MHz;Peak

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	
1333.360	57.0	V	-	-	Peak	115	1.0	Note 7
1582.860	47.9	V	-	-	Peak	120	1.5	
1999.910	59.1	V	-	-	Peak	121	1.0	
3000.060	46.1	V	-	-	Peak	115	1.0	
3999.860	44.1	H	-	-	Peak	139	1.0	
4666.750	48.7	V	-	-	Peak	159	1.0	
7333.530	45.9	V	-	-	Peak	125	1.0	
8000.230	46.3	V	-	-	Peak	120	1.5	
9000.170	49.3	V	-	-	Peak	121	1.0	

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1b: Center Channel

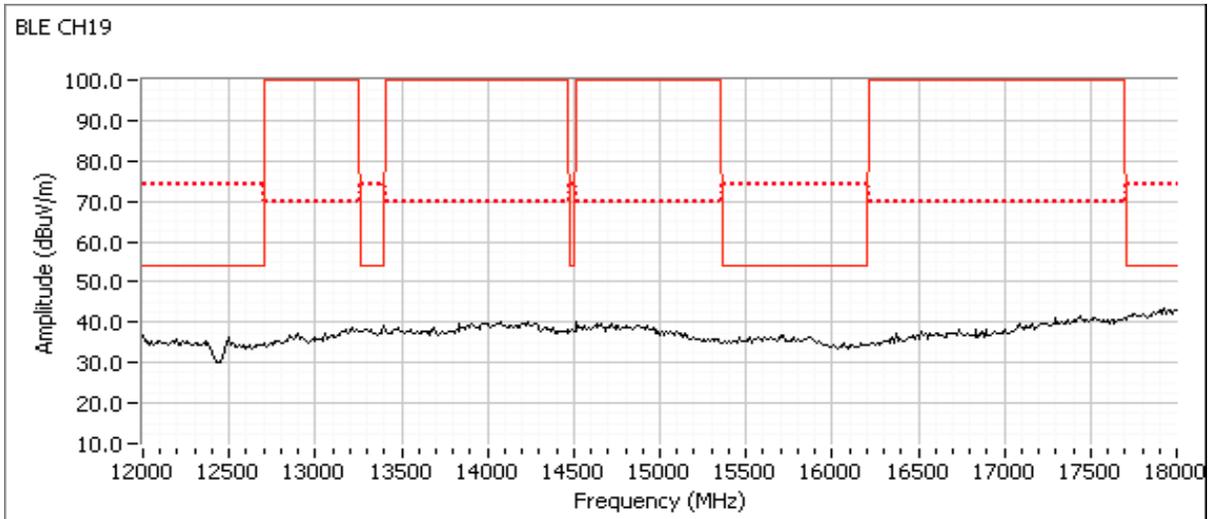
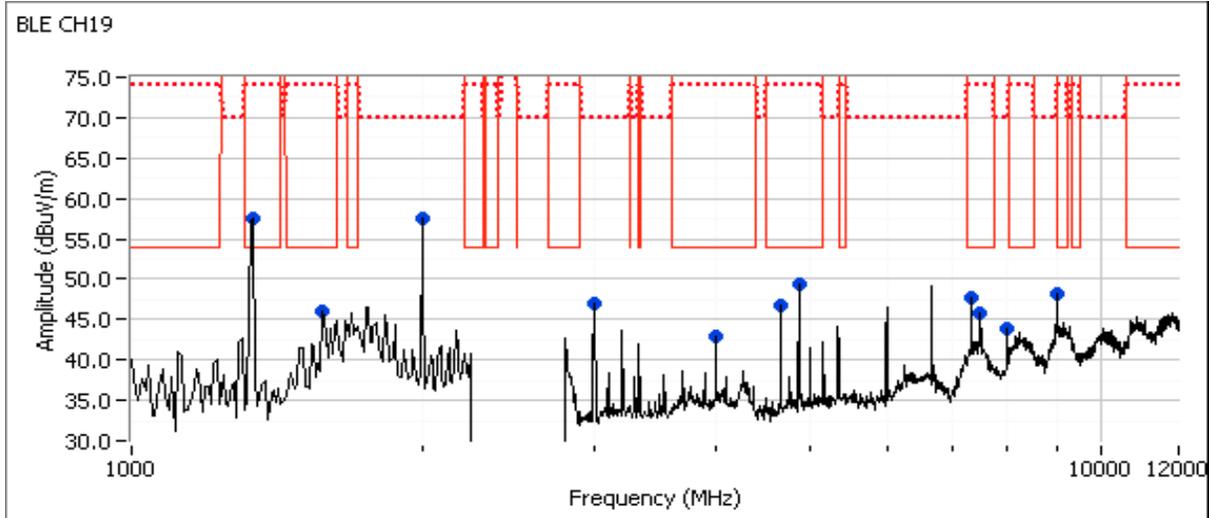
Channel: 2440MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
4879.840	48.3	V	54.0	-5.7	AVG	293	1.3	Note3;RB 1 MHz;VB 10 Hz;Peak
4879.440	51.9	V	74.0	-22.1	PK	293	1.3	RB 1 MHz;VB 3 MHz;Peak
7500.330	37.6	V	54.0	-16.4	AVG	171	1.2	RB 1 MHz;VB 10 Hz;Peak
7496.830	50.0	V	74.0	-24.0	PK	171	1.2	RB 1 MHz;VB 3 MHz;Peak

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	
1347.310	57.6	V	-	-	Peak	84	1.5	Note 7
1575.000	46.0	V	-	-	Peak	121	2.5	
1999.990	57.6	V	-	-	Peak	122	1.0	
3000.000	47.1	V	-	-	Peak	317	1.5	
4000.110	43.0	H	-	-	Peak	120	1.5	
4666.780	46.7	V	-	-	Peak	151	1.0	
7331.080	47.8	V	-	-	Peak	132	1.0	
8000.230	44.0	V	-	-	Peak	60	1.0	
9000.270	48.3	V	-	-	Peak	138	1.0	

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: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

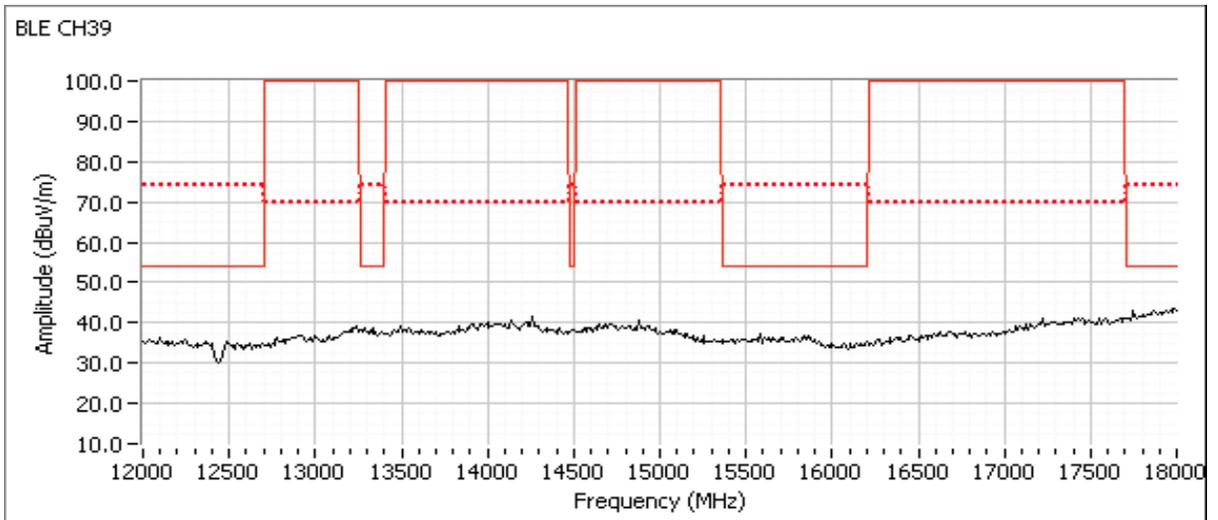
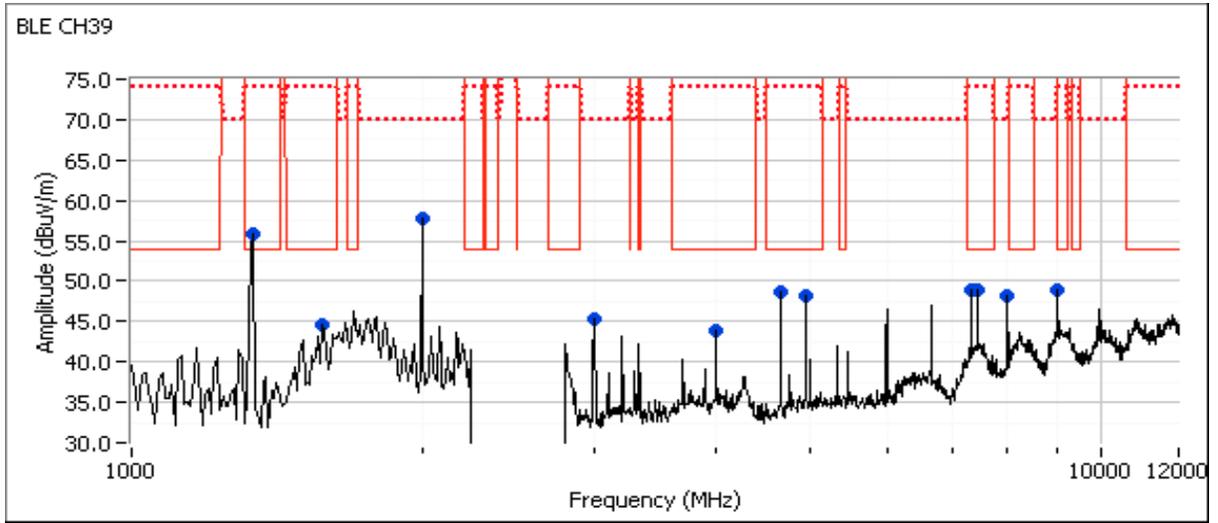
Run #1c: High Channel

Channel: 2480MHz Mode: LE
 Tx Chain: Aux Data Rate: -

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	
7439.410	47.8	H	54.0	-6.2	AVG	269	1.2	Note3;RB 1 MHz;VB 10 Hz;Peak
7440.550	54.8	H	74.0	-19.2	PK	269	1.2	RB 1 MHz;VB 3 MHz;Peak
4959.890	44.3	V	54.0	-9.7	AVG	51	2.0	Note3;RB 1 MHz;VB 10 Hz;Peak
4959.440	48.9	V	74.0	-25.1	PK	51	2.0	RB 1 MHz;VB 3 MHz;Peak

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	
1333.330	55.8	V	54.0	1.8	Peak	114	1.5	Note 7
1571.390	44.5	V	54.0	-9.5	Peak	142	1.5	
1999.990	57.8	V	70.0	-12.2	Peak	121	1.0	
3000.000	45.3	V	70.0	-24.7	Peak	326	1.0	
4000.110	44.0	H	54.0	-10.0	Peak	138	1.0	
4666.780	48.7	V	54.0	-5.3	Peak	151	1.0	
7331.000	48.9	V	54.0	-5.1	Peak	96	2.0	
7999.470	48.2	V	70.0	-21.8	Peak	119	1.0	
9000.200	49.0	V	70.0	-21.0	Peak	113	1.0	

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A



Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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)	no radio related emissions observed
	wifi: +BLE	wifi: 1 BL: 2480MHz	-	-	Radiated Emissions, 1 - 25 GHz		43.4 dBµV/m @ 4824.0 MHz (-10.6 dB)
2	wifi: +BLE	wifi: 11 BL: 2402MHz	-	-	Radiated Emissions, 30 - 1000 MHz		no radio related emissions observed
	wifi: +BLE	wifi: 11 BL: 2402MHz	-	-	Radiated Emissions, 1 - 25 GHz		44.2 dBµV/m @ 4823.9 MHz (-9.8 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.



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Sample Notes

Sample S/N: ACD1B81E8B1D
 Driver: 6.10 RC198.8
 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

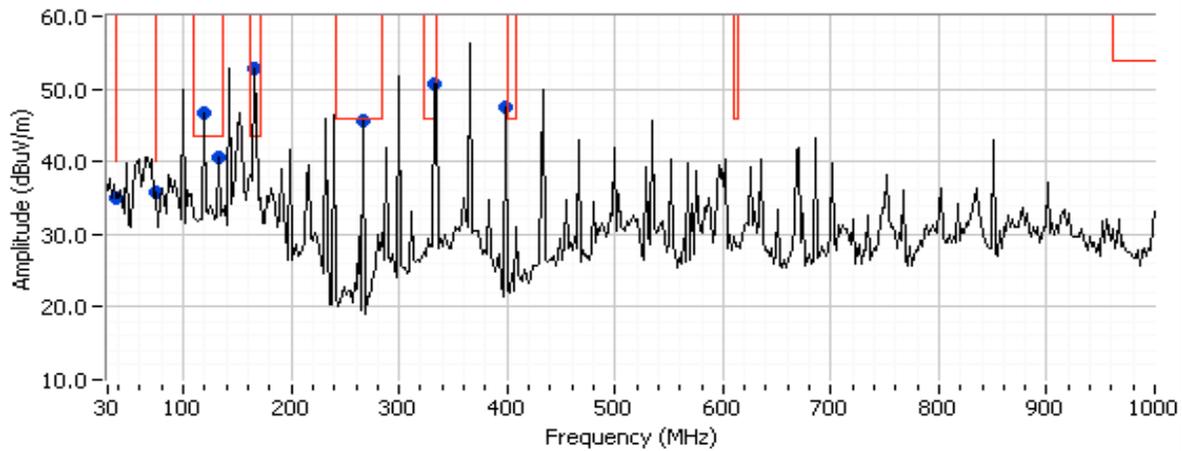
Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1Mb/s	98.5%	Yes	2.526	0	0	396
BLE	1Mb/s	0.62	Yes	0.387	2.1	4.2	2584

Measurement Specific Notes:

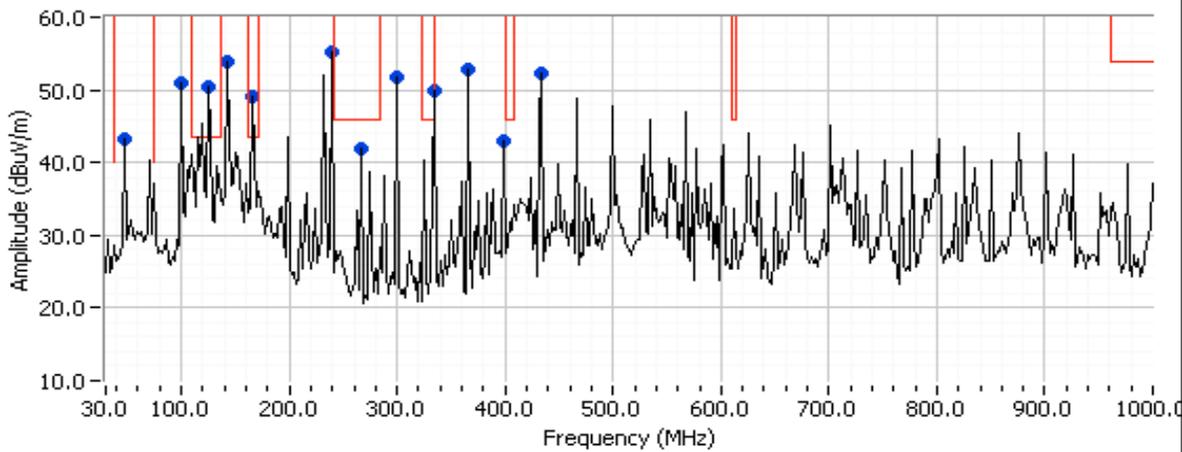
Note 1:	Emission in non-restricted band, but limit of 15.209 used.
Note 2:	Emission in non-restricted band, the limit was set 30dB below the level of the fundamental and measured in 100kHz.
Note 3:	Emission has duty cycle $< 98\%$, but constant, average measurement performed: RBW=1MHz, VBW=10Hz, peak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

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Support equipment with all radios off & radio module removed from test fixture.



Support equipment On, Radios Off





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A

Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
37.776	34.9	V	-	-	Peak	53	1.0	
74.709	35.8	V	-	-	Peak	264	1.0	
119.419	46.6	H	-	-	Peak	72	3.0	
133.026	40.7	H	-	-	Peak	100	3.5	
166.072	52.9	H	-	-	Peak	272	1.5	
267.154	45.6	H	-	-	Peak	57	1.5	
333.246	50.8	H	-	-	Peak	141	1.0	
399.339	47.5	H	-	-	Peak	100	1.0	



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1: Radiated Spurious Emissions, 30 - 25000 MHz
 Date of Test: 3/19/2015 0:00
 Test Engineer: Joseph Cadigal
 Test Location: FT Chamber#5
 Config. Used:
 Config Change: -
 EUT 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

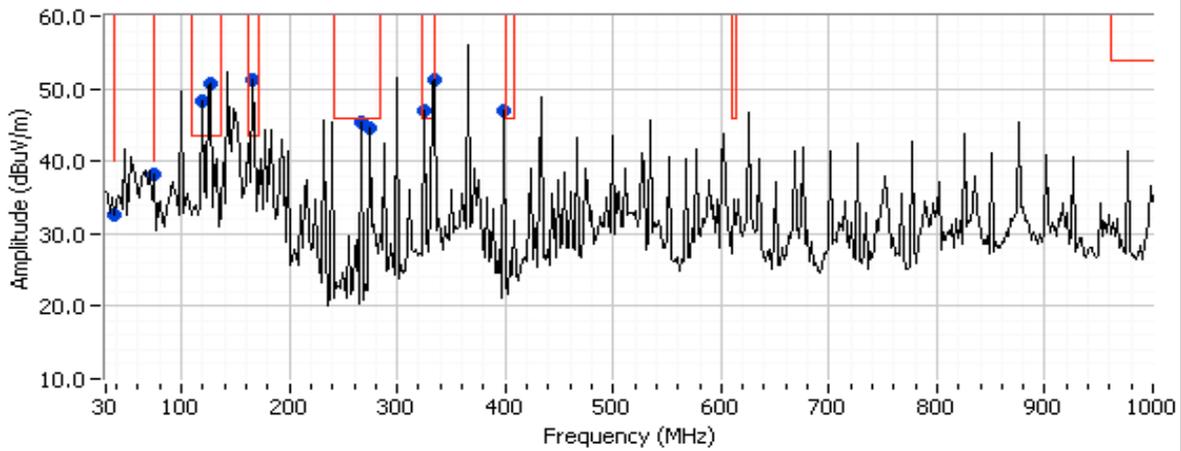
Frequency MHz	Level dBµV/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
4823.970	43.4	H	54.0	-10.6	AVG	279	1.0	RB 1 MHz;VB 10 Hz;Peak
4823.920	48.1	H	74.0	-25.9	PK	279	1.0	RB 1 MHz;VB 3 MHz;Peak
4666.690	34.8	V	54.0	-19.2	AVG	167	1.0	RB 1 MHz;VB 10 Hz;Peak
4666.610	56.7	V	74.0	-17.3	PK	167	1.0	RB 1 MHz;VB 3 MHz;Peak
12263.330	41.2	H	54.0	-12.8	AVG	285	1.0	
12265.070	51.0	H	74.0	-23.0	PK	285	1.0	
7333.590	48.6	V	-	-	Peak	99	1.5	Note 4
2208.930	50.8	H	-	-	Peak	115	2.0	Note 4
1999.930	55.1	V	-	-	Peak	122	1.5	Note 4
1333.330	60.5	V	-	-	Peak	144	1.0	Note 4
2999.940	49.4	V	-	-	Peak	173	1.0	Note 4
3989.630	43.6	V	-	-	Peak	201	1.5	Note 4
37.776	32.6	V	-	-	Peak	94	1.0	Note 4
74.709	38.3	V	-	-	Peak	270	1.0	Note 4
119.419	48.4	H	-	-	Peak	106	3.0	Note 4
127.194	50.8	H	-	-	Peak	88	3.5	Note 4
166.072	51.2	H	-	-	Peak	274	2.0	Note 4
267.154	45.5	H	-	-	Peak	56	1.5	Note 4
274.930	44.7	H	-	-	Peak	239	1.0	Note 4
325.471	46.9	H	-	-	Peak	229	1.0	Note 4
335.190	51.3	H	-	-	Peak	85	1.0	Note 4
399.339	47.0	H	-	-	Peak	91	1.0	Note 4
12485.070	38.9	V	-	-	AVG	208	2.5	Note 5
12484.530	50.3	V	-	-	PK	208	2.5	Note 5

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

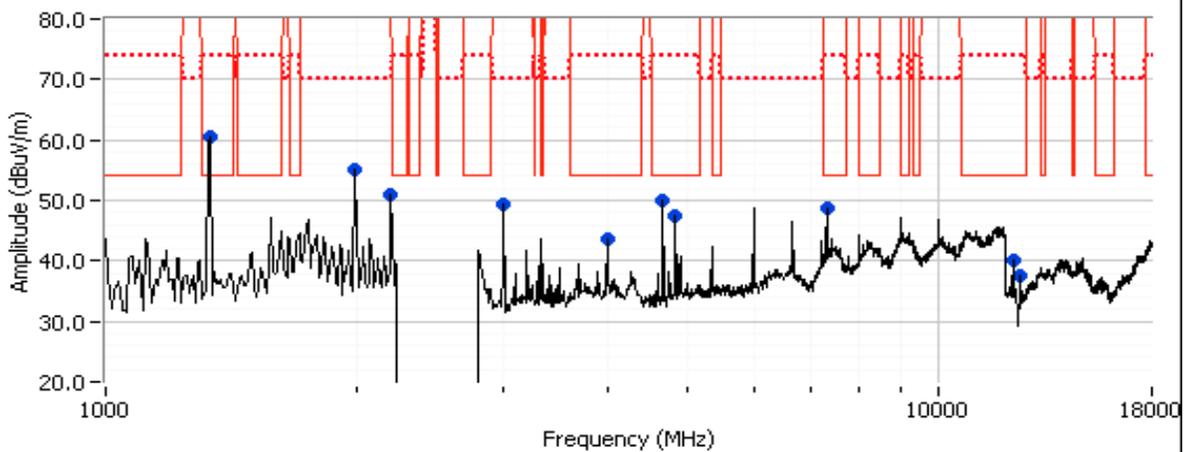
Note 5 Signal below noise floor of measurement system.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

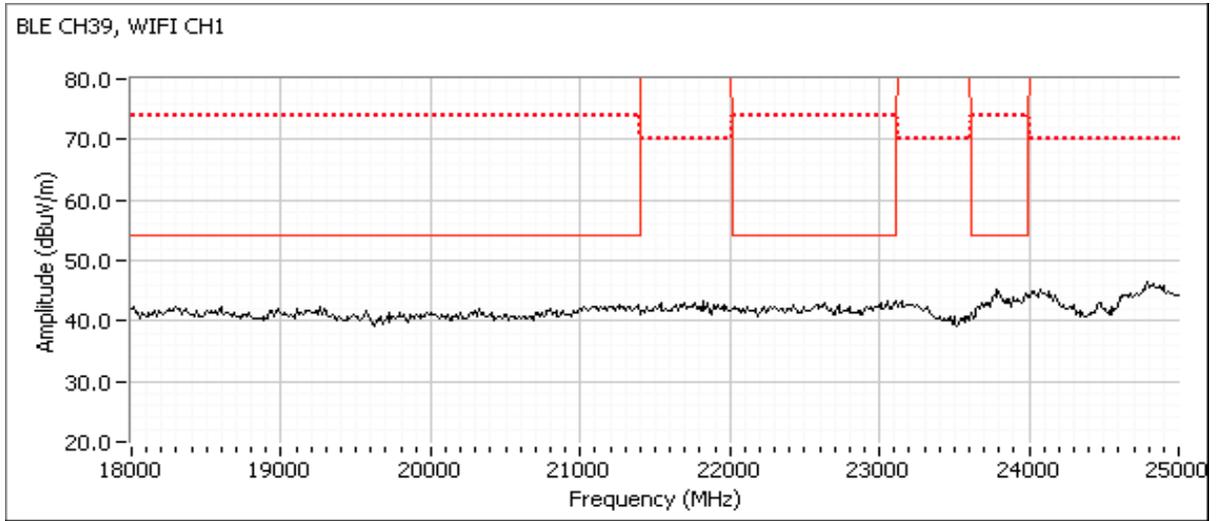
BLE CH39, WIFI CH1



BLE CH39, WIFI CH1



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #2: Radiated Spurious Emissions, 30 - 25000 MHz
 Date of Test: 3/19/ & 3/25/2015 12:00:00 AM
 Test Engineer: Joseph Cadigal / R. Varelas
 Test Location: FT Chamber#5
 Config. Used:
 Config Change: -
 EUT Voltage: 120V/60Hz

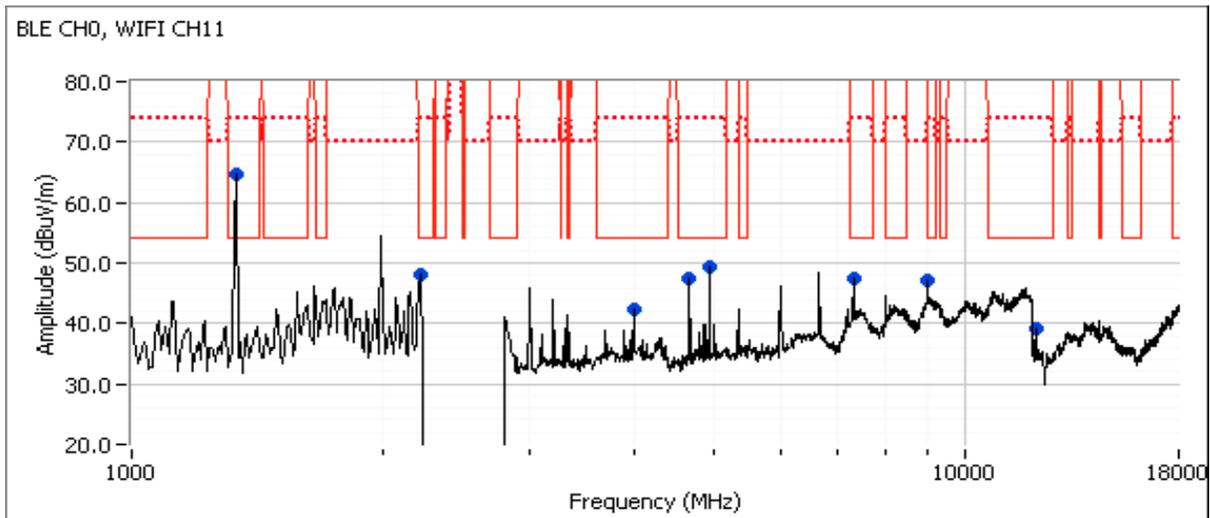
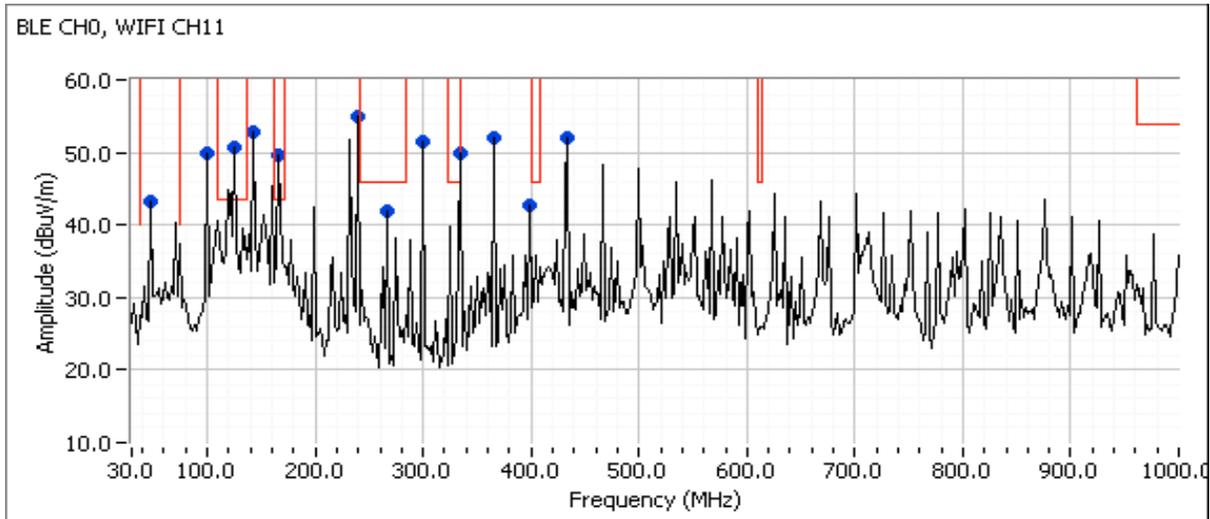
Channel: 11 Mode: 11b
 Tx Chain: Main Data Rate: 1Mb/s

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

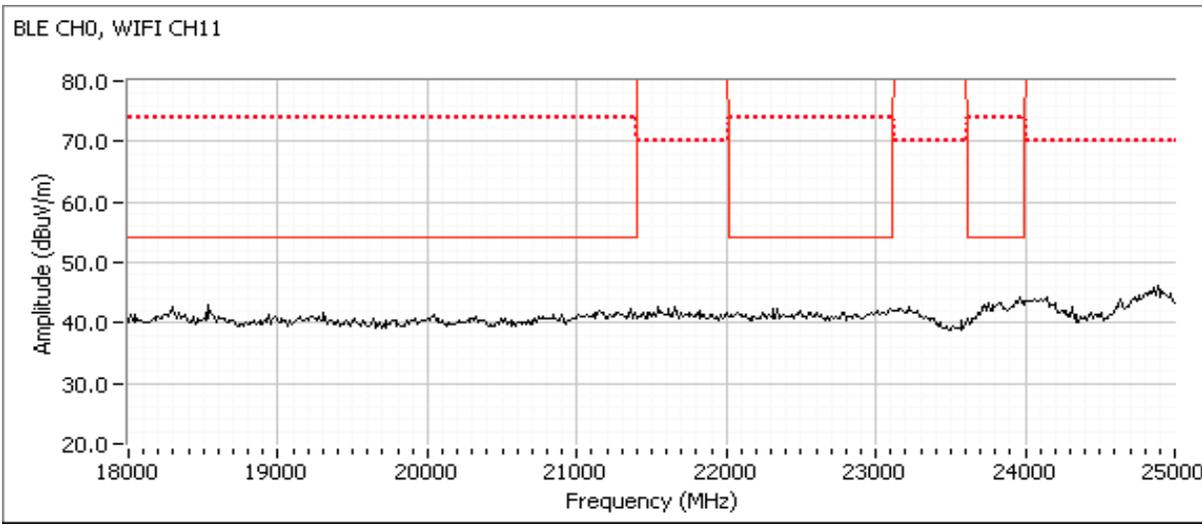
Frequency MHz	Level dB μ V/m	Pol v/h	15.209 / 15.247		Detector Pk/QP/Avg	Azimuth degrees	Height meters	Comments
			Limit	Margin				
47.495	43.2	V	-	-	Peak	54	1.0	Note 4
99.980	49.9	V	-	-	Peak	50	1.0	Note 4
125.251	50.8	V	-	-	Peak	360	1.5	Note 4
142.745	52.9	V	-	-	Peak	54	1.0	Note 4
166.072	49.5	V	-	-	Peak	136	1.0	Note 4
239.940	55.0	H	-	-	Peak	62	2.0	Note 4
267.154	41.8	H	-	-	Peak	52	2.5	Note 4
300.200	51.4	H	-	-	Peak	45	2.0	Note 4
335.190	49.8	V	-	-	Peak	321	1.0	Note 4
366.293	52.1	H	-	-	Peak	127	2.5	Note 4
399.339	42.8	H	-	-	Peak	70	1.5	Note 4
434.329	51.9	H	-	-	Peak	176	1.0	Note 4
4923.940	44.2	H	54.0	-9.8	AVG	275	1.0	RB 1 MHz;VB 10 Hz;Peak
4924.030	48.6	H	74.0	-25.4	PK	275	1.0	RB 1 MHz;VB 3 MHz;Peak
2218.330	48.1	H	-	-	Peak	119	2.0	Note 4
7333.590	47.4	V	-	-	Peak	133	1.0	Note 4
1333.330	64.8	V	-	-	Peak	140	1.0	Note 4
9001.130	47.1	V	-	-	Peak	158	1.0	Note 4
4000.060	42.3	V	-	-	Peak	215	1.5	Note 4
4659.570	28.8	V	54.0	-25.2	AVG	149	1.0	RB 1 MHz;VB 10 Hz;Peak
4660.870	40.3	V	74.0	-33.7	PK	149	1.0	RB 1 MHz;VB 3 MHz;Peak
12129.130	40.7	H	54.0	-13.3	AVG	282	1.3	RB 1 MHz;VB 10 Hz;Peak
12129.330	50.7	H	74.0	-23.3	PK	282	1.3	RB 1 MHz;VB 3 MHz;Peak

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

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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, 3/19/2015
 Test Engineer: Rafael Varelas, Deniz Demirci
 Test Location: FT Lab 4A

Config. Used: Conducted
 Config Change: None
 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: 20-23 °C
 Rel. Humidity: 35-40 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	-	-	Output Power - Internal	15.247(b)	Pass	11b: 19.2 dBm (83.2mW) 11g: 16.7dBm (46.8mW) n20: 16.6dBm (45.7mW)
1	-	-	Output Power - External	15.247(b)	Pass	11b: 19.8 dBm (95.5mW) 11g: 17.5dBm (56.2mW) n20: 16.6dBm (45.7mW)
2	-	-	Power spectral Density (PSD)	15.247(d)	Pass	11b: 4.5 dBm/10 kHz
3	-	-	Minimum 6dB Bandwidth	15.247(a)	Pass	8.0 MHz
3	-	-	99% Bandwidth	RSS GEN	-	17.7 MHz
4	-	-	Spurious emissions	15.247(b)	Pass	All emissions are 30dB below the limit



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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	0.98	Yes	2.526	0.0	0.0	396
11g	6Mb/s	0.96	Yes	1.437	0.2	0.4	696
n20	MCS0	0.97	Yes	1.346	0.1	0.3	743

Sample Notes

Sample S/N: MAC ID: ACD1B81E8B63 P108

Driver: 6.10.RC198.8

Notes:

Preliminary testing demonstrated that the main antenna port is worse case



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1a: Output Power - Internal Antenna

Mode: 11b

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
-	2412	18.1	64.6	2.5	Pass	20.6	0.115		
-	2437	19.2	83.2	2.5	Pass	21.7	0.148		
-	2462	17.2	52.5	2.5	Pass	19.7	0.093		

Mode: 11g

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ⁴	mW			dBm	W	(dBm) ³	mW
-	2412	12.5	17.8	2.5	Pass	15.0	0.032		
-	2437	16.7	46.8	2.5	Pass	19.2	0.083		
-	2462	11.8	15.1	2.5	Pass	14.3	0.027		

Mode: n20

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ⁴	mW			dBm	W	(dBm) ³	mW
-	2412	11.8	15.1	2.5	Pass	14.3	0.027		
-	2437	16.6	45.7	2.5	Pass	19.1	0.081		
-	2462	10.4	11.0	2.5	Pass	12.9	0.019		

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 -30 dBc.

Note 4: Duty Cycle < 98%, constant duty cycle. 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 Pwr Cor Factor. 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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #1b: Output Power - External Antenna

Mode: 11b

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
-	2412	19.0	79.4	0.7	Pass	19.7	0.093		
-	2437	19.8	95.5	0.7	Pass	20.5	0.112		
-	2462	19.5	89.1	0.7	Pass	20.2	0.105		

Mode: 11g

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ¹	mW			dBm	W	(dBm) ³	mW
-	2412	17.5	56.2	0.7	Pass	18.2	0.066		
-	2437	16.8	47.9	0.7	Pass	17.5	0.056		
-	2462	14.9	30.9	0.7	Pass	15.6	0.036		

Mode: n20

Power Setting ²	Frequency (MHz)	Output Power		Antenna Gain (dBi)	Result	EIRP		Output Power	
		(dBm) ⁴	mW			dBm	W	(dBm) ³	mW
-	2412	16.6	45.7	0.7	Pass	17.3	0.054		
-	2437	16.5	44.7	0.7	Pass	17.2	0.052		
-	2462	15.9	38.9	0.7	Pass	16.6	0.046		

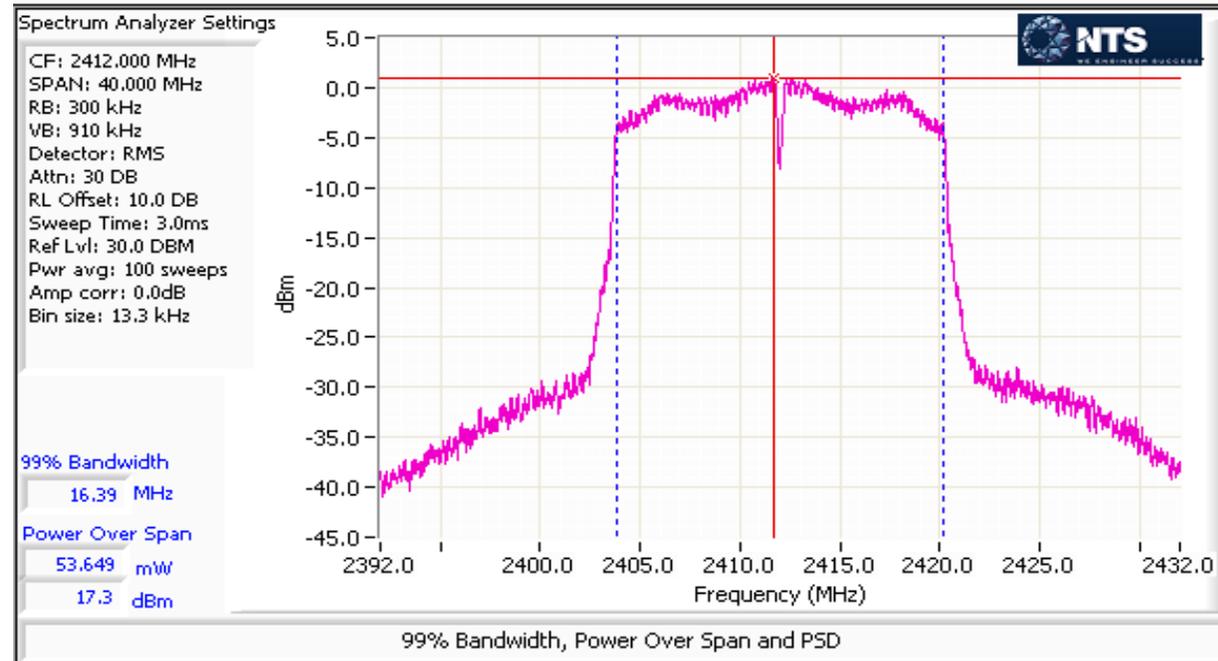
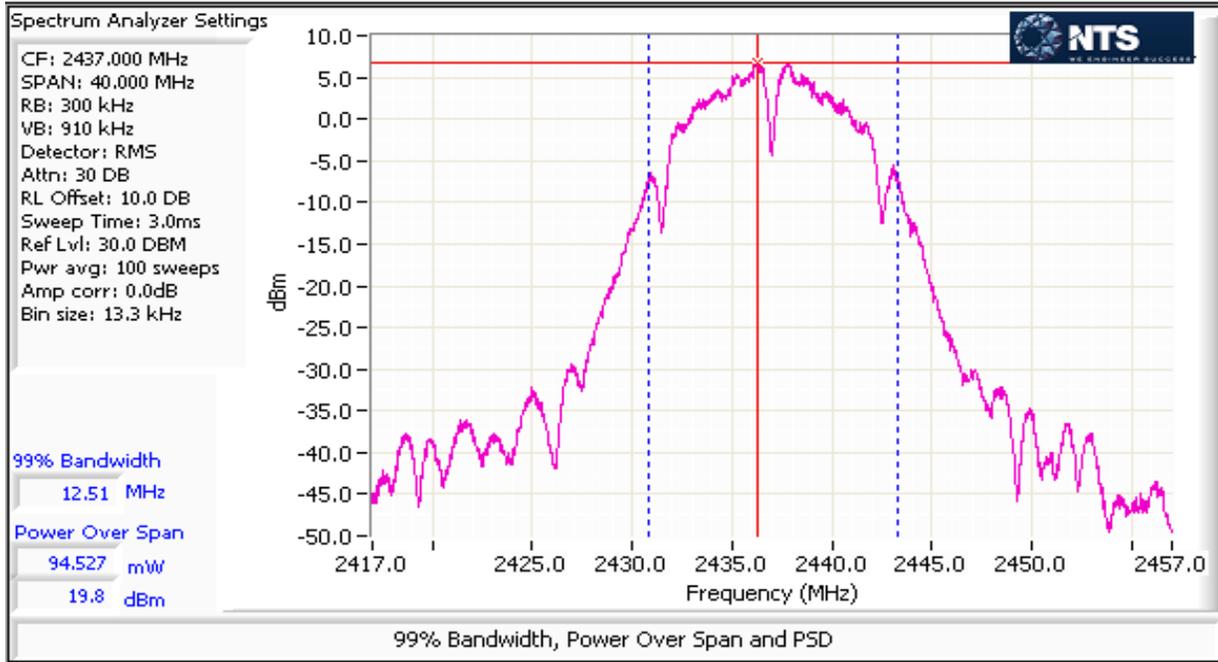
Note 1: Duty Cycle \geq 98%. Output power measured using a spectrum analyzer (see plots below) with RBW= 1-5% of OBW, VB \geq 3* RBW, RMS detector, power averaging on, and power integration over the OBW, trace average 100 traces (option AVGSA-1, in KDB 558074). Spurious limit becomes -30 dBc.

Note 4: Duty Cycle < 98%, constant duty cycle. 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). Measurement corrected by Pwr Cor Factor. Spurious limit becomes -30 dBc.

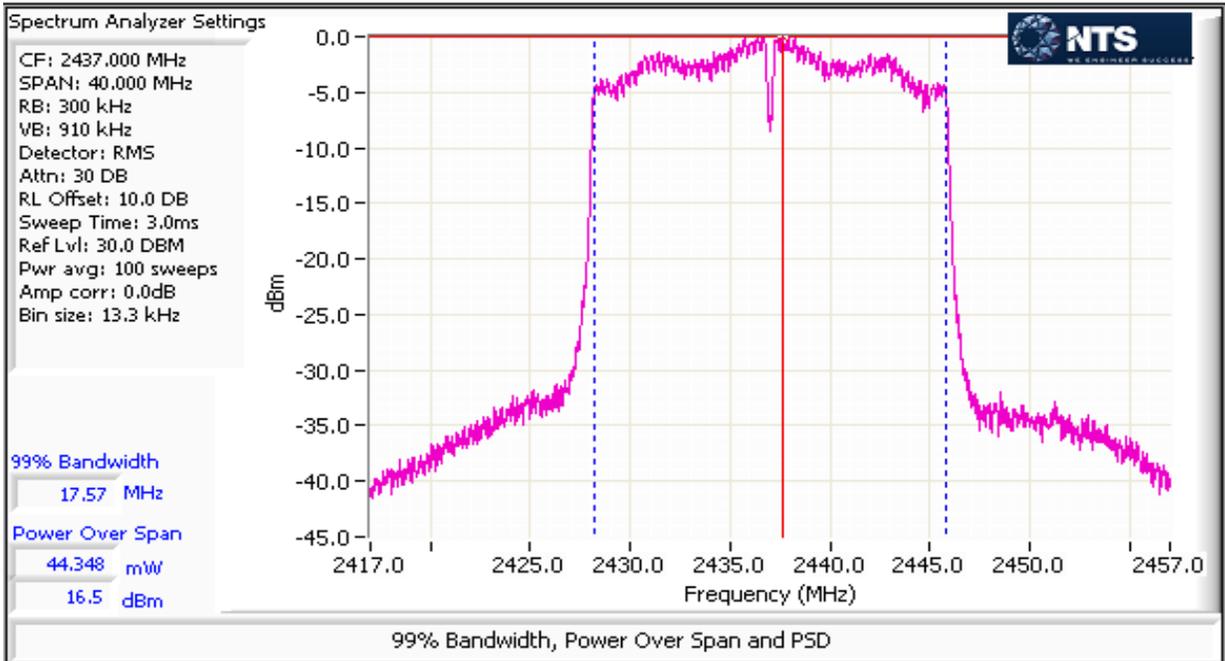
Note 2: Power setting - the software power setting used during testing, included for reference only.

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

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
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:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A





EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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	Limit dBm/3kHz	Result
		(dBm/10 kHz) ^{Note 1}		
-	2412	3.3	8.0	Pass
-	2437	4.5	8.0	Pass
-	2462	3.8	8.0	Pass

Mode: 11g

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/10 kHz) ^{Note 1}		
-	2412	-0.1	8.0	Pass
-	2437	-0.8	8.0	Pass
-	2462	-1.6	8.0	Pass

Mode: n20

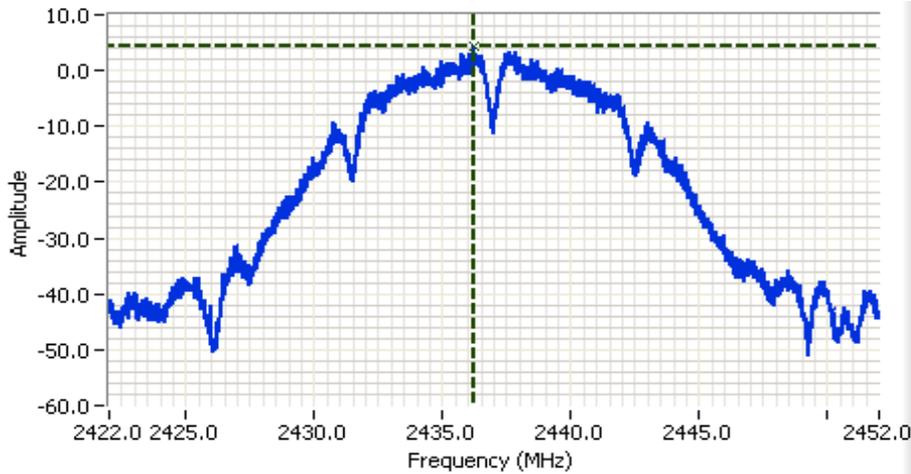
Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/10 kHz) ^{Note 1}		
-	2412	-1.9	8.0	Pass
-	2437	-1.2	8.0	Pass
-	2462	-1.1	8.0	Pass

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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
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: 2437.000 MHz
SPAN: 30.000 MHz
RB: 10.0 kHz
VB: 30.0 kHz
Detector: POS
Attn: 20 DB
RL Offset: 10.0 DB
Sweep Time: 286.9ms
Ref Lvl: 20.0 DBM

Comments
802.11b
PSD: 4.46 dBm/ 10 kHz

Cursor 1 2436.1847 4.46 [Icons]
0.0000 0.00 [Icons]



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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	8.0	12.5	100	300
-	2437	8.0	12.5	100	300
-	2462	8.0	12.5	100	300

Mode: 11g

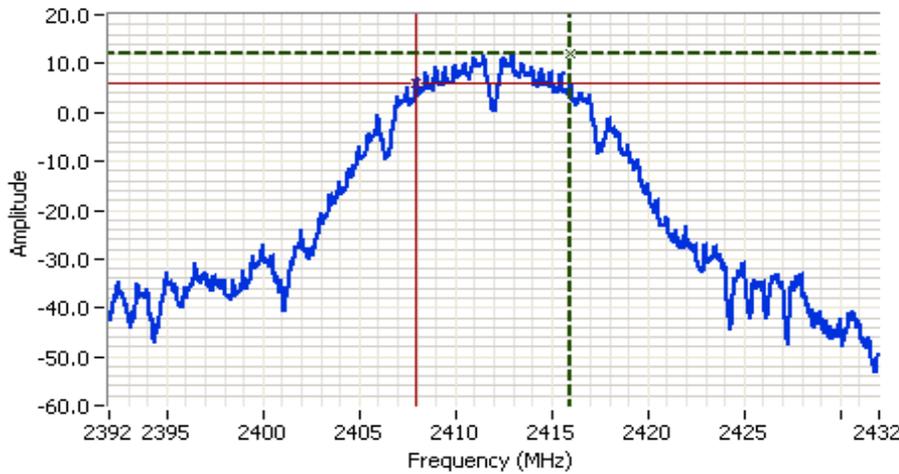
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
-	2412	15.1	16.8	100	300
-	2437	15.1	16.8	100	300
-	2462	15.1	16.8	100	300

Mode: n20

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
-	2412	15.1	17.7	100	300
-	2437	15.1	17.6	100	300
-	2462	15.1	17.6	100	300

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

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
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: 10.0 DB
 Sweep Time: 4.0ms
 Ref Lvl: 20.0 DBM

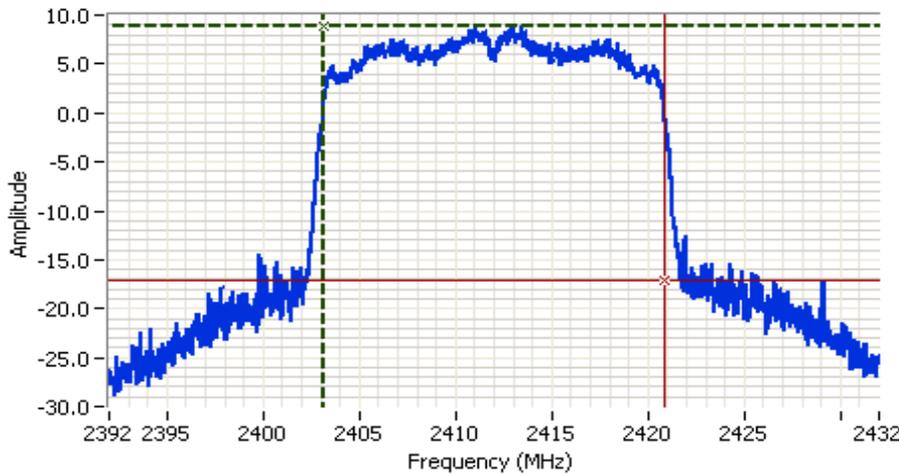
Comments
 6dB BW: 8.016 MHz
 802.11b

Cursor 1 2415.9813 11.98

Cursor 2 2407.9653 5.98

Delta Freq. 8.016

Delta Amplitude 6.00



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 2412.000 MHz
 SPAN: 40.000 MHz
 RB: 300 kHz
 VB: 910 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.0 DB
 Sweep Time: 1.0ms
 Ref Lvl: 20.0 DBM

Comments
 99% BW: 17.667 MHz
 802.11n20

Cursor 1 2403.1733 8.92

Cursor 2 2420.8400 -17.08

Delta Freq. 17.667

Delta Amplitude 26.00



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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	-30 dBc	Pass
2437	-	b	-30 dBc	Pass
2462	-	b	-30 dBc	Pass

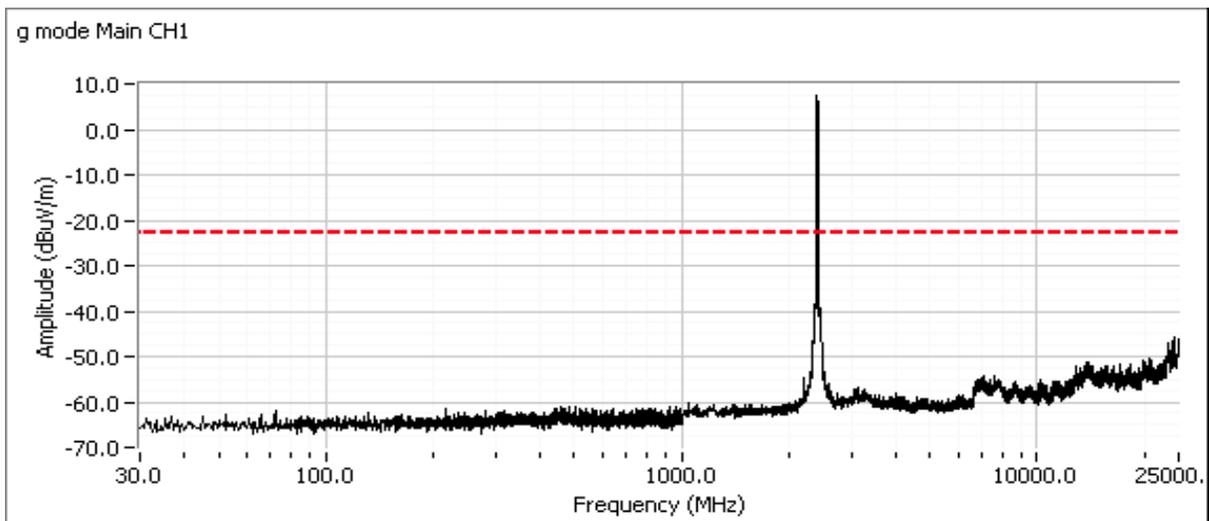
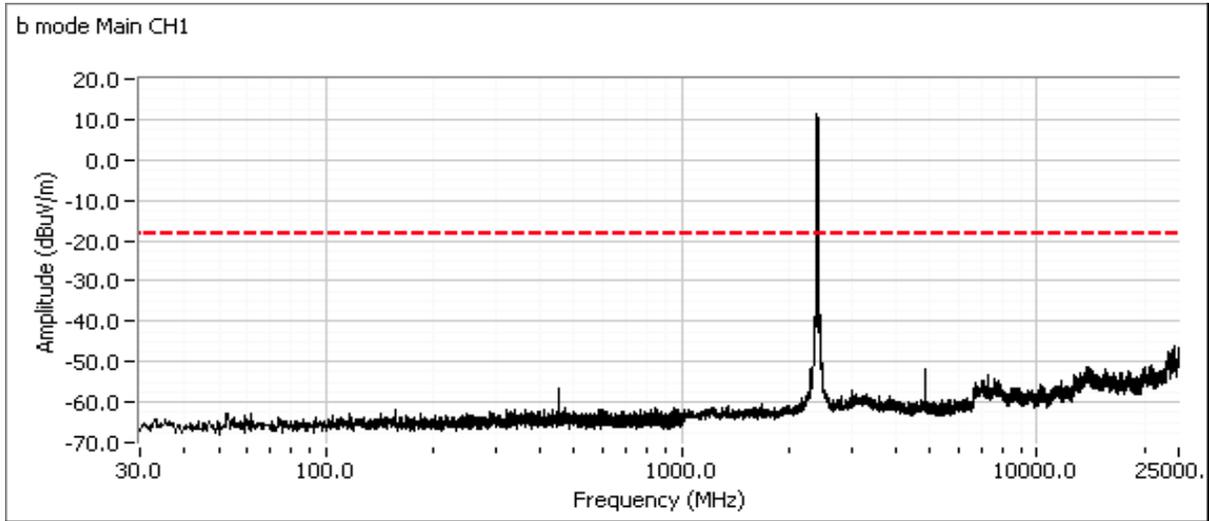
Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	-	g	-30 dBc	Pass
2437	-	g	-30 dBc	Pass
2462	-	g	-30 dBc	Pass

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

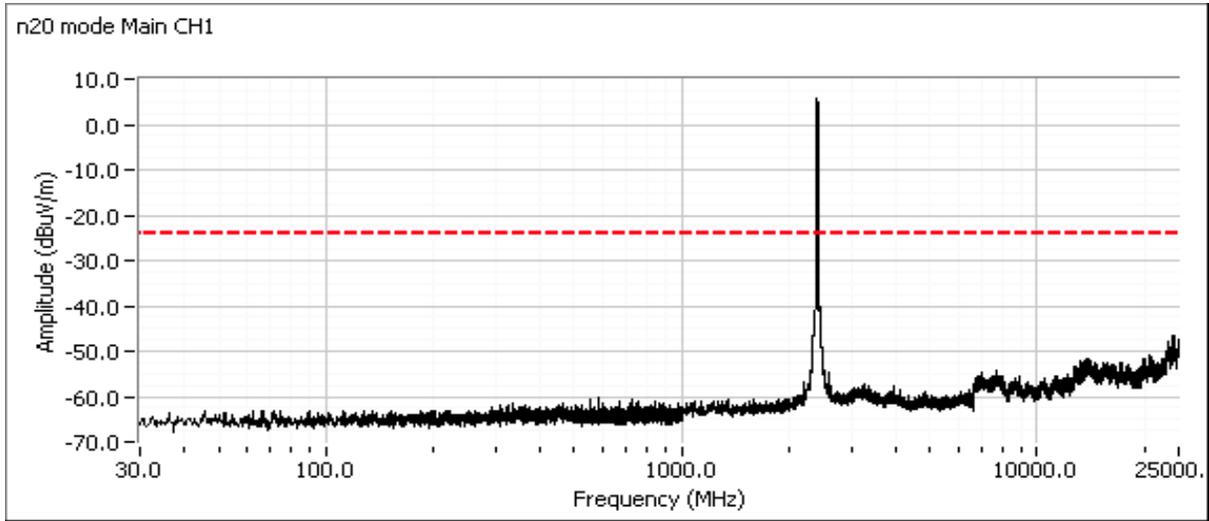
Note 1: Measurements performed using RBW=100kHz, VBW=300kHz, peak detector, sweep time auto, max hold.

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

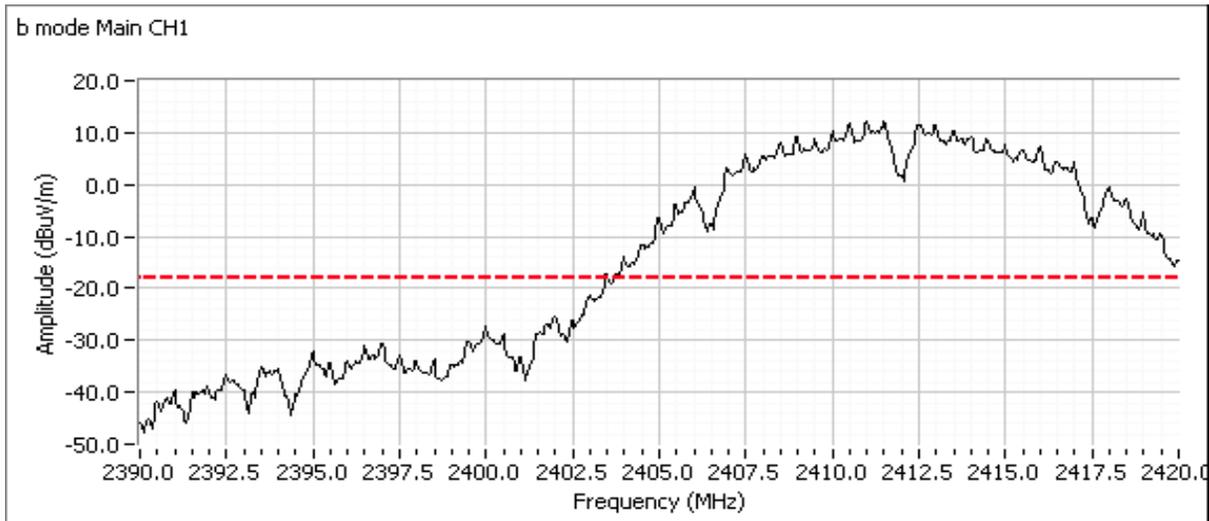
Plots for low channel



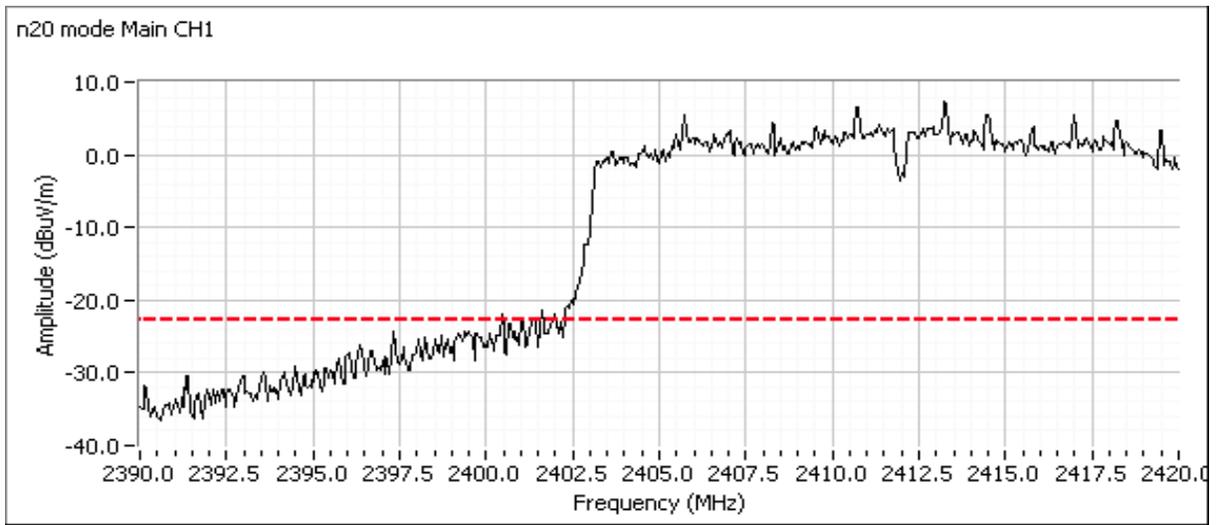
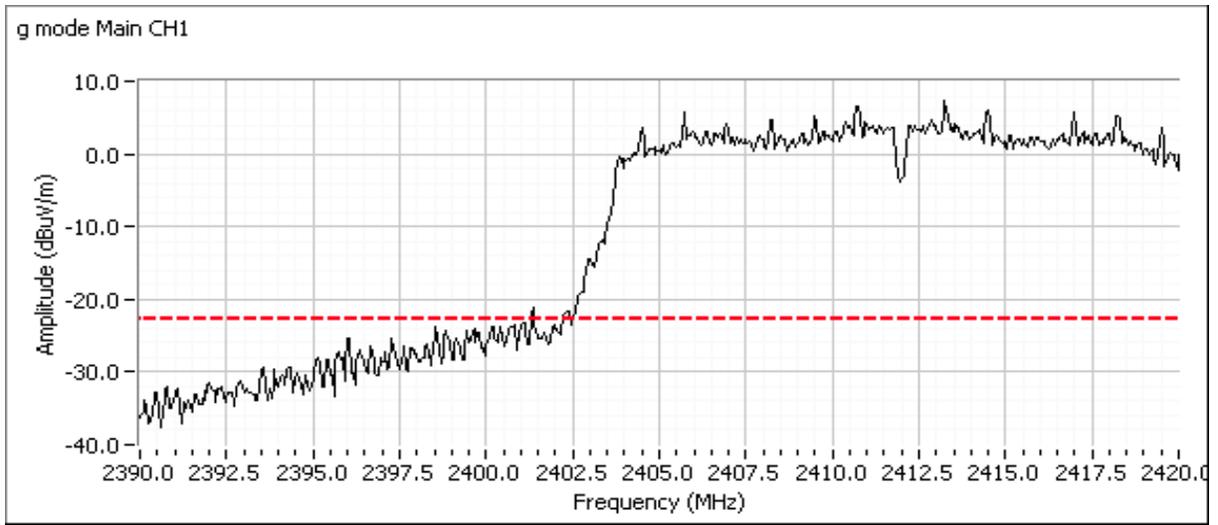
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A



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

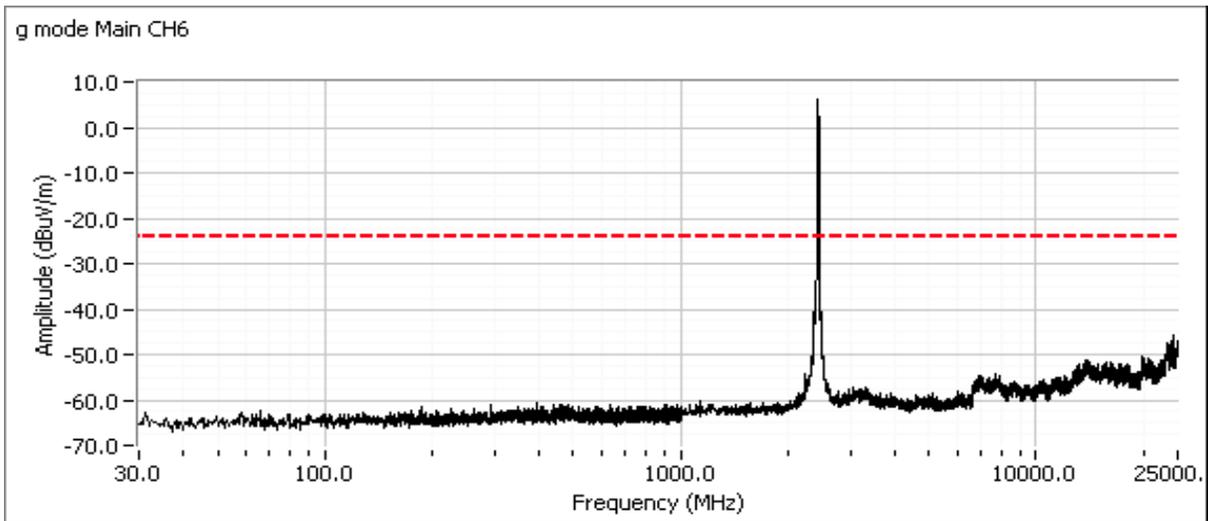
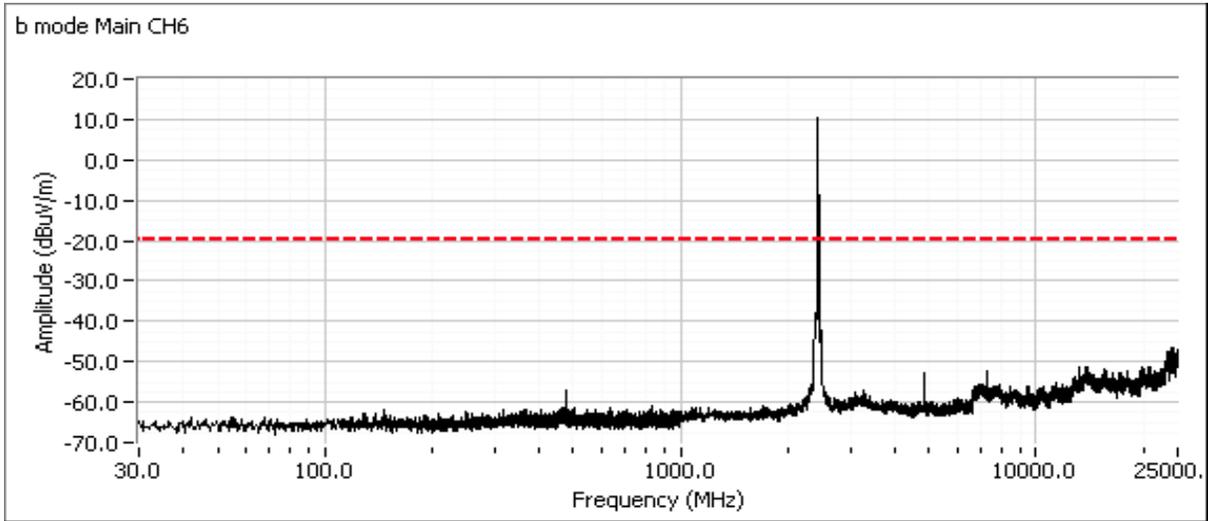


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

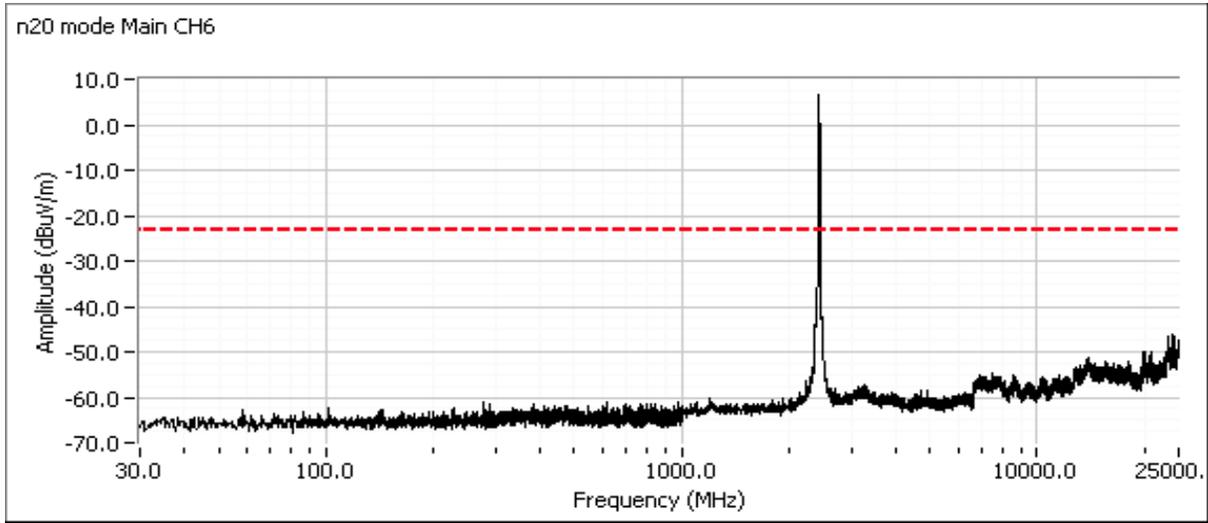


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

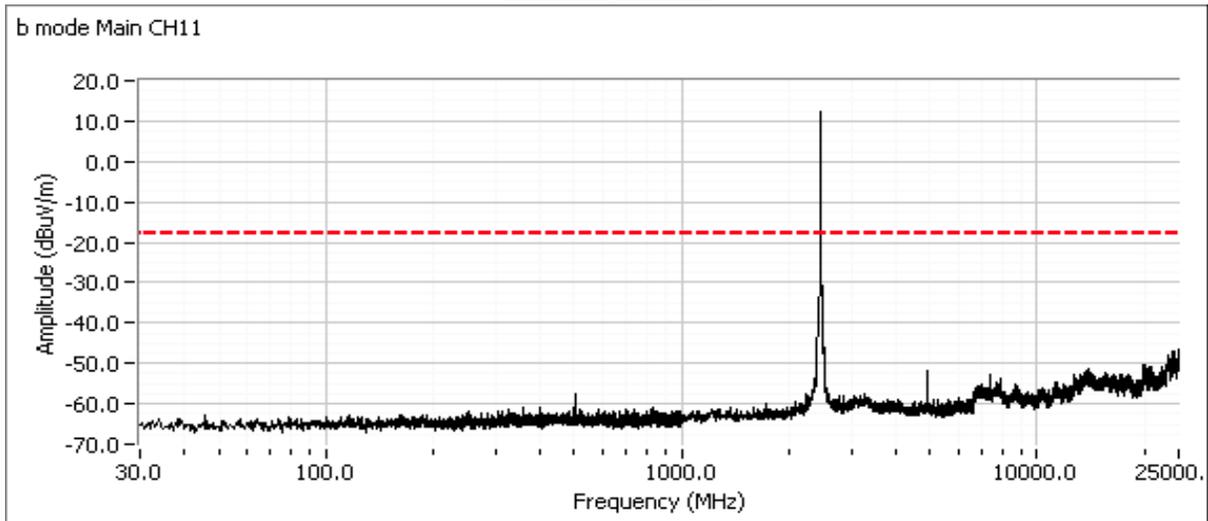
Plots for center channel



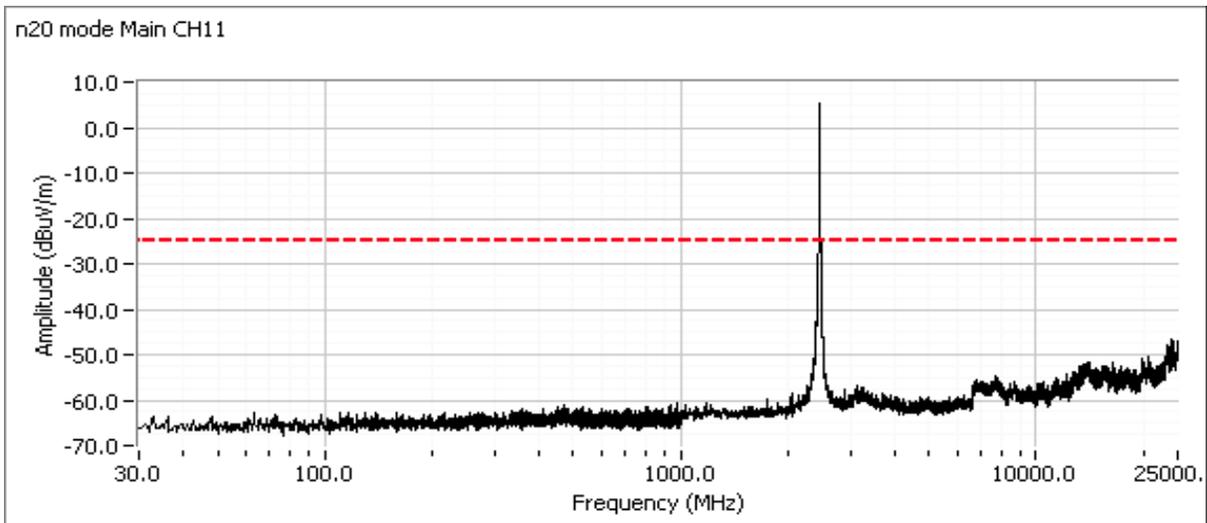
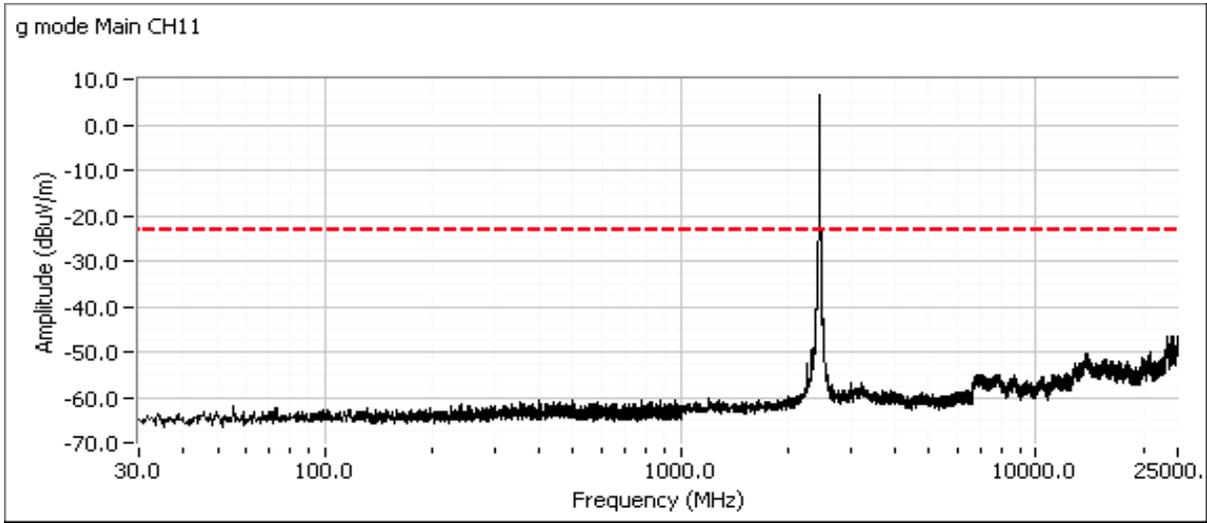
Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
Contact:	Sachin Sawalapurkar	Project Manager:	-
Standard:	FCC 15.247 / RSS-210 / LP0002	Project Coordinator:	Sheareen Jacobs
		Class:	N/A



Plots for high channel



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97693
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: 3/20 & 3/25/2015
 Test Engineer: Rafael Varelas
 Test Location: FT Lab #4A

Config. Used: Conducted
 Config Change: None
 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: 20-23 °C
 Rel. Humidity: 35-40 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	-	-	Output Power	15.247(b)	Pass	2.0 dBm (1.6mW)
2	-	-	Power spectral Density (PSD)	15.247(d)	Pass	-7.3 dBm/3kHz
3	-	-	Minimum 6dB Bandwidth	15.247(a)	Pass	771 kHz
3	-	-	99% Bandwidth	RSS GEN	-	1107 kHz
4	-	-	Spurious emissions	15.247(b)	Pass	All emissions are more than 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.



EMC Test Data

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	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	-	0.62	Yes	0.387	2.1	4.2	2584

Sample Notes

Sample S/N: MAC ID: ACD1B81E8B0D

Driver: 6.10 RC198.8

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
-	2402	1.3	1.3	2.5	Pass	3.8	0.002		
-	2440	2.0	1.6	2.5	Pass	4.5	0.003		
-	2480	2.1	1.6	2.5	Pass	4.6	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.

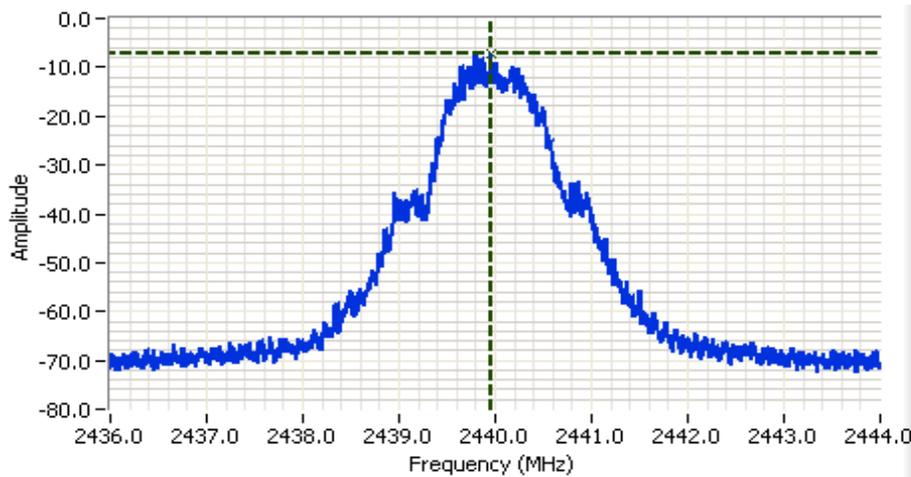
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

Run #2: Power spectral Density

Mode: LE

Power Setting	Frequency (MHz)	PSD	Limit dBm/3kHz	Result
		(dBm/10kHz) <small>Note 1</small>		
-	2402	-8.7	8.0	Pass
-	2440	-7.3	8.0	Pass
-	2480	-7.6	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: 2440.000 MHz
 SPAN: 8.000 MHz
 RB: 10.0 kHz
 VB: 30.0 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 76.6ms
 Ref Lvl: 18.5 DBM

Comments
 PSD: -7.26 dBm/10kHz
 BLE

Cursor 1	2439.9613	-7.26	
	0.0000	0.00	

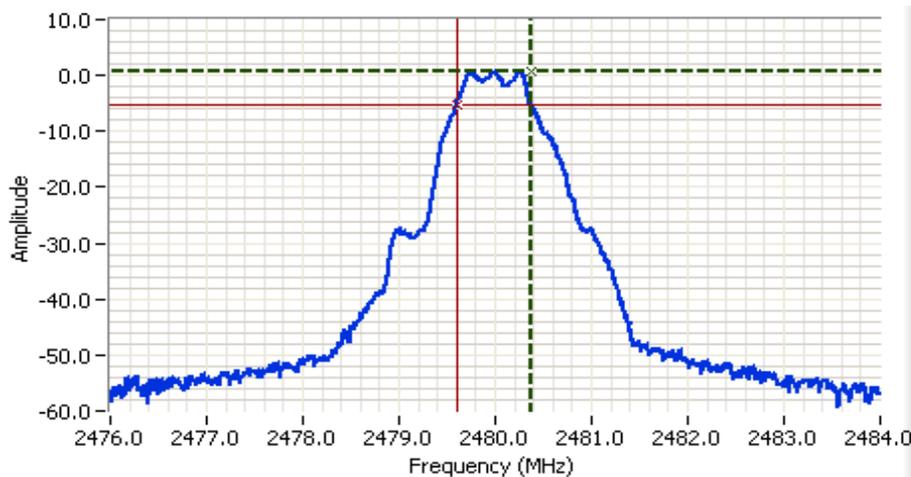
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #3: Signal Bandwidth

Mode: LE

Power Setting	Frequency (MHz)	Bandwidth (kHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
-	2402	795	1101	100	20
-	2440	779	1107	100	20
-	2480	771	1091	100	20

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



Analyzer Settings
 Agilent Technologies, E4446A
 CF: 2480.000 MHz
 SPAN: 8.000 MHz
 RB: 100 kHz
 VB: 300 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 1.0ms
 Ref Lvl: 18.5 DBM

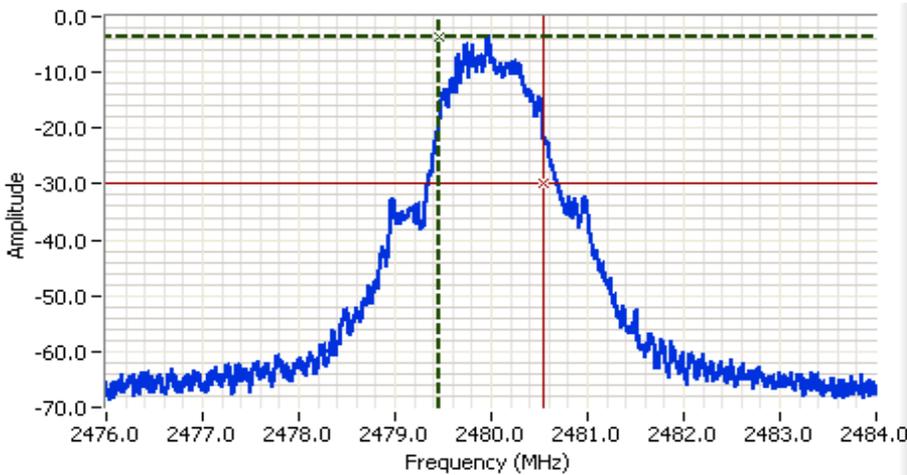
Comments
 6dB BW: 771 kHz
 BLE

Cursor 1	2480.3721	0.81	
Cursor 2	2479.6012	-5.19	

Delta Freq, 771 kHz
 Delta Amplitude 6.00



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
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: 2480.000 MHz
 SPAN: 8.000 MHz
 RB: 20.0 kHz
 VB: 62.0 kHz
 Detector: POS
 Attn: 20 DB
 RL Offset: 10.5 DB
 Sweep Time: 19.2ms
 Ref Lvl: 18.5 DBM

Comments

99% power BW: 1.091 MHz
 BLE

Cursor 1	2479.4587	-3.73	
Cursor 2	2480.5493	-29.73	

Delta Freq.	1.091
Delta Amplitude	26.00

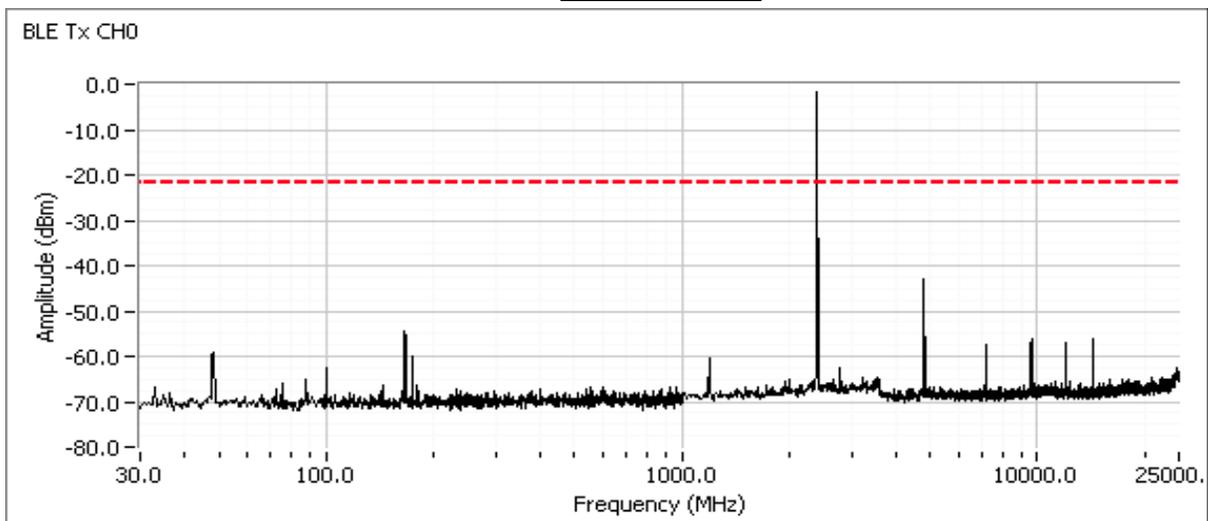
Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Run #4a: Out of Band Spurious Emissions

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

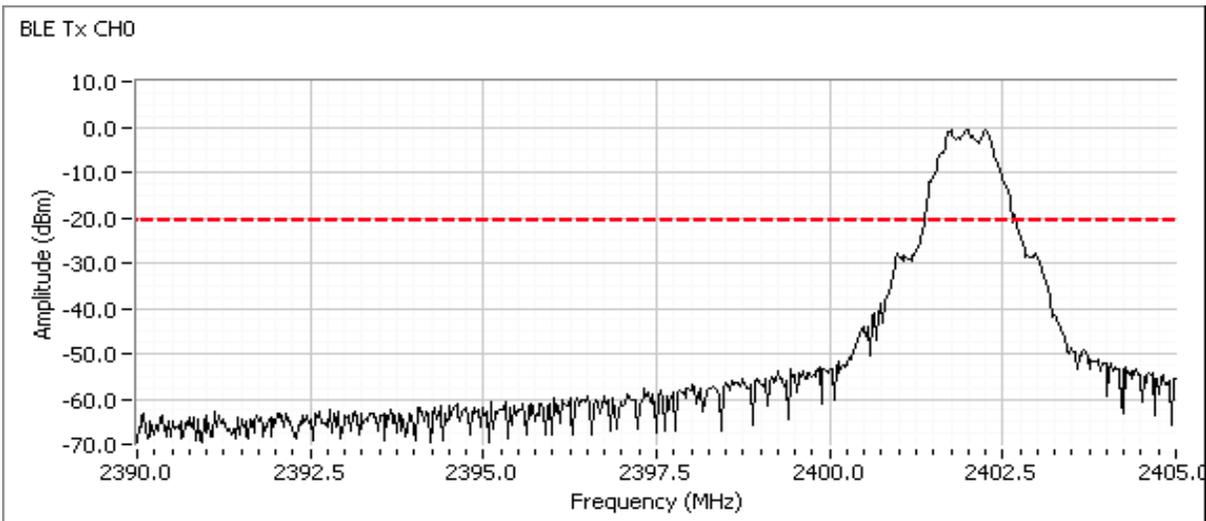
Note 1: Measurements performed using RBW=100kHz, VBW=300kHz, peak detector, sweep time auto, max hold.

Plots for low channel

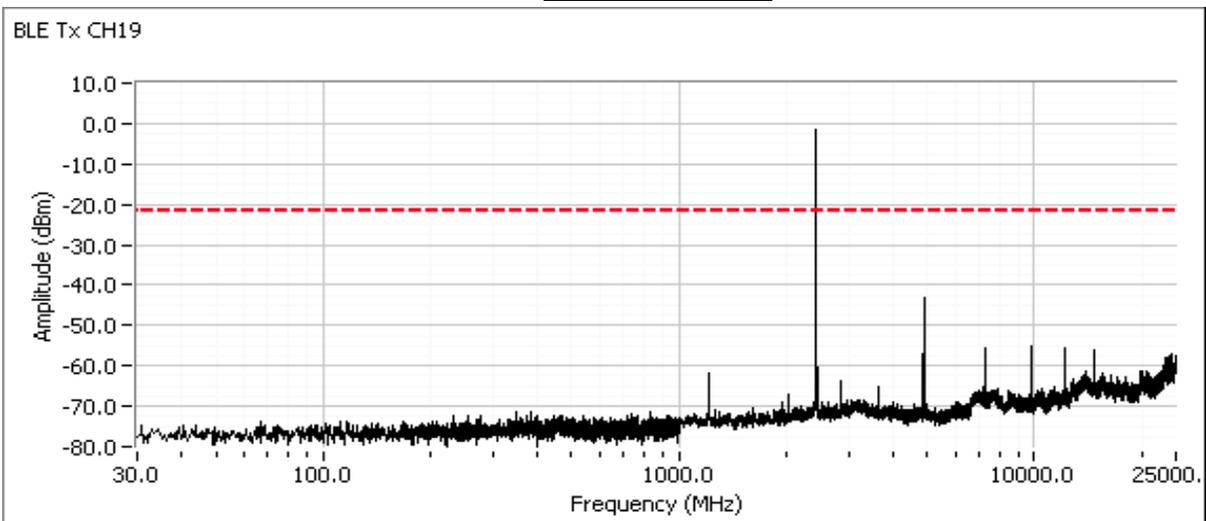


Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
Contact: Sachin Sawalapurkar	Project Manager: -
Standard: FCC 15.247 / RSS-210 / LP0002	Project Coordinator: Sheareen Jacobs
	Class: N/A

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.

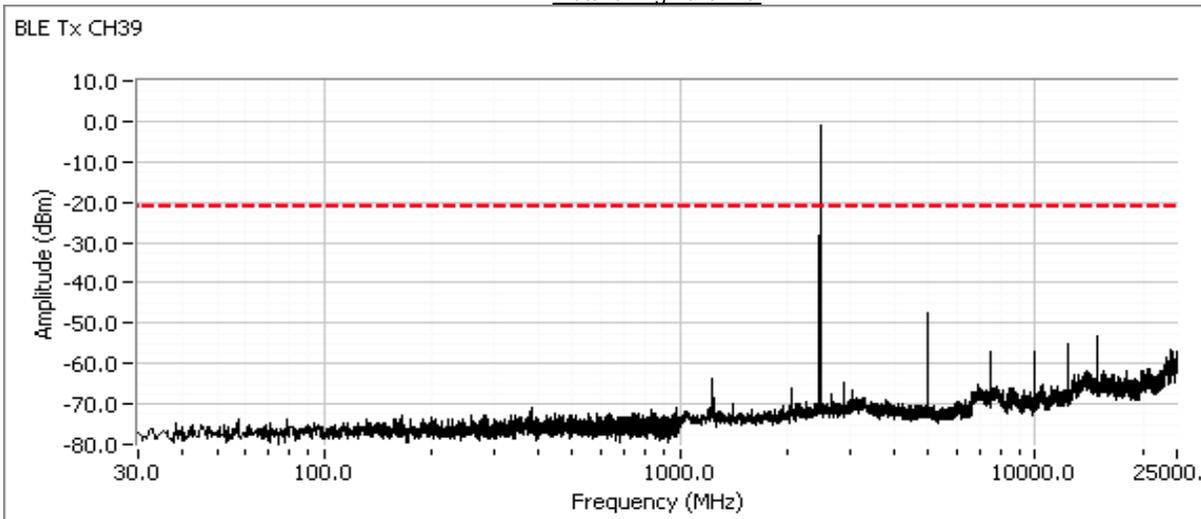


Plots for center channel



Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97693
	Project Manager: -
Contact: Sachin Sawalapurkar	Project Coordinator: Sheareen Jacobs
Standard: FCC 15.247 / RSS-210 / LP0002	Class: N/A

Plots for high channel





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Product:	SDGOB-1504	T-Log Number:	T97775
Contact:	Susan Checchi	Project Manager:	Sheareen Jacobs
Emissions Standard(s):	EN 300 328 v1.8.1	Project Coordinator:	-
Immunity Standard(s):	-	Class:	-
		Environment:	-

EMC Test Data

For The

Hewlett Packard Company

Product

SDGOB-1504

Date of Last Test: 4/9/2015



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97775
		Project Manager:	Sheareen Jacobs
Contact:	Susan Checchi	Project Coordinator:	-
Standard:	EN 300 328 v1.8.1	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	Config. Used: CE AC
Test Engineer: Rafael Varelas	Config Change: None
Test Location: Fremont Chamber #5	EUT Host 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	37.1 dB μ V @ 24.265 MHz (-12.9 dB)
2	CE, AC Power, 120V/60Hz	Class B	Pass	37.1 dB μ V @ 24.265 MHz (-12.9 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.



EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97775
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

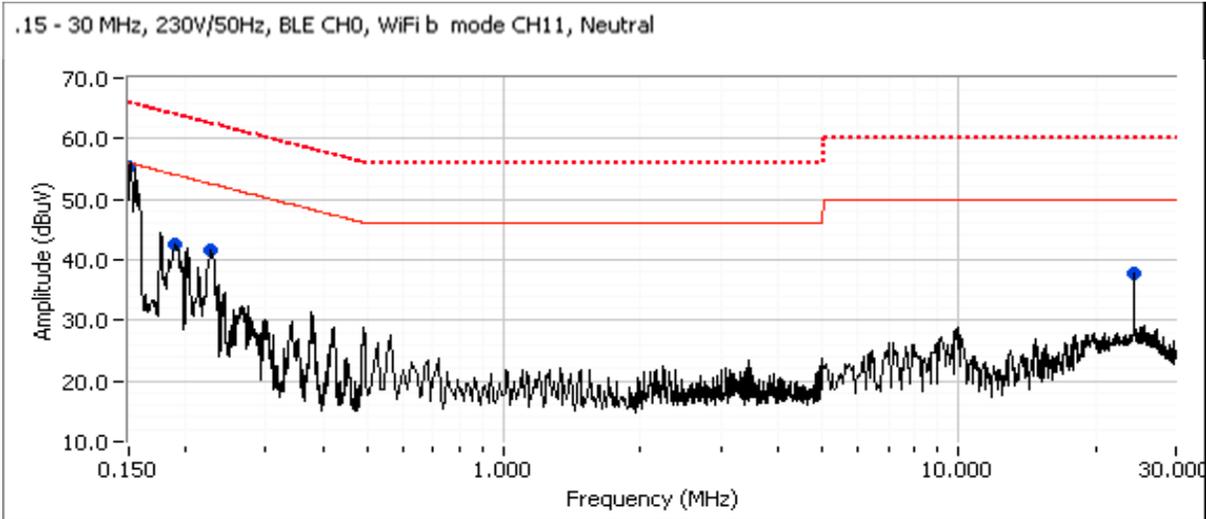
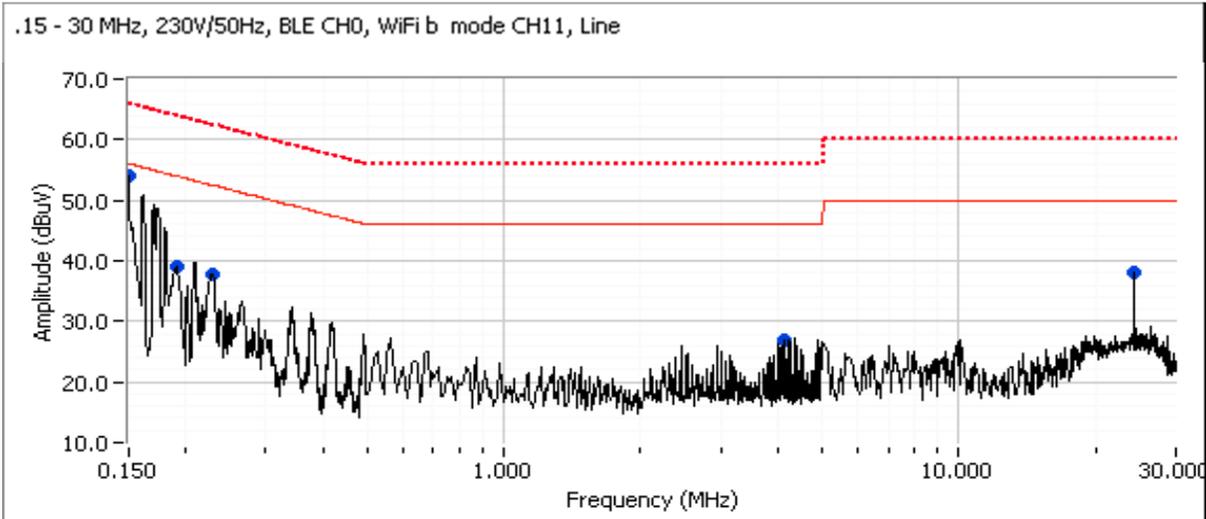
Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.151	54.1	Line 1	56.0	-1.9	Peak	
0.190	39.1	Line 1	54.0	-14.9	Peak	
0.227	37.8	Line 1	52.5	-14.7	Peak	
4.135	26.8	Line 1	46.0	-19.2	Peak	
24.265	38.2	Line 1	50.0	-11.8	Peak	
0.151	55.2	Neutral	56.0	-0.8	Peak	
0.189	42.7	Neutral	54.0	-11.3	Peak	
0.227	41.7	Neutral	52.6	-10.9	Peak	
24.265	37.7	Neutral	50.0	-12.3	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
24.265	37.1	Line 1	50.0	-12.9	AVG	AVG (0.10s)
24.265	37.6	Line 1	60.0	-22.4	QP	QP (1.00s)
0.151	33.4	Line 1	55.9	-22.5	AVG	AVG (0.10s)
0.151	48.2	Line 1	65.9	-17.7	QP	QP (1.00s)
0.190	30.7	Line 1	54.0	-23.3	AVG	AVG (0.10s)
0.190	37.9	Line 1	64.0	-26.1	QP	QP (1.00s)
0.227	30.8	Line 1	52.6	-21.8	AVG	AVG (0.10s)
0.227	36.6	Line 1	62.6	-26.0	QP	QP (1.00s)
0.151	37.2	Neutral	55.9	-18.7	AVG	AVG (0.10s)
0.151	49.0	Neutral	65.9	-16.9	QP	QP (1.00s)
0.189	34.4	Neutral	54.1	-19.7	AVG	AVG (0.10s)
0.189	42.0	Neutral	64.1	-22.1	QP	QP (1.00s)
0.227	31.6	Neutral	52.6	-21.0	AVG	AVG (0.10s)
0.227	40.5	Neutral	62.6	-22.1	QP	QP (1.00s)
24.265	37.1	Neutral	50.0	-12.9	AVG	AVG (0.10s)
24.265	37.6	Neutral	60.0	-22.4	QP	QP (1.00s)

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97775
Contact: Susan Checchi	Project Manager: Sheareen Jacobs
Standard: EN 300 328 v1.8.1	Project Coordinator: -
	Class: -





EMC Test Data

Client:	Hewlett Packard Company	Job Number:	J97665
Model:	SDGOB-1504	T-Log Number:	T97775
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

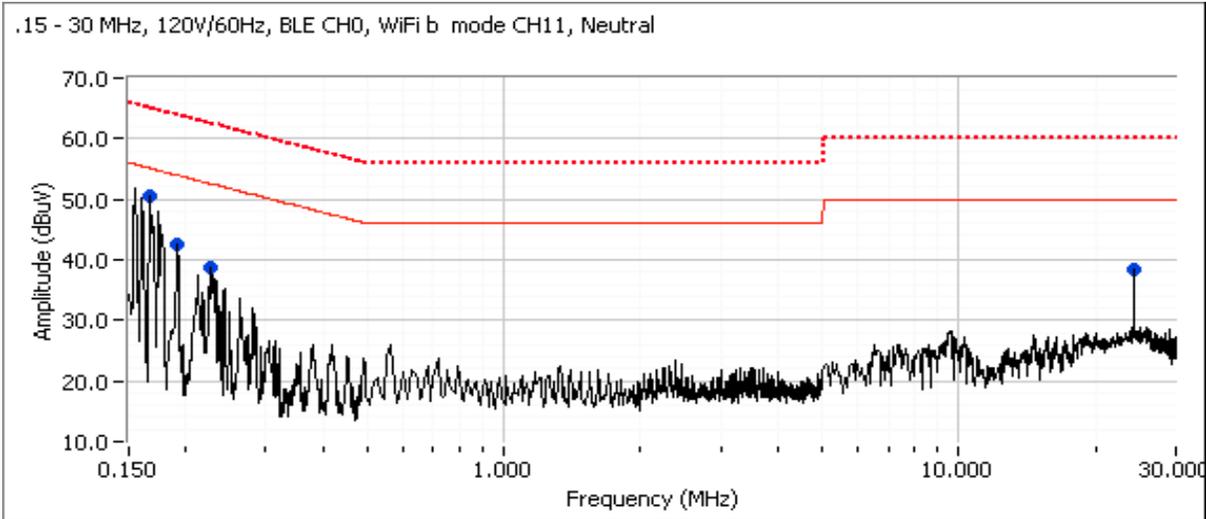
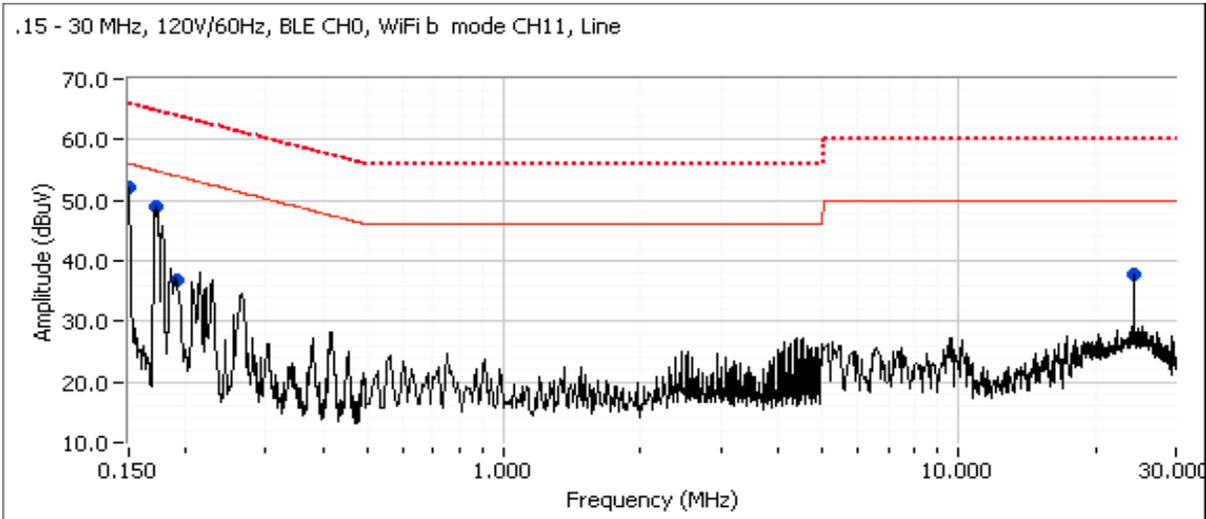
Preliminary peak readings captured during pre-scan (peak readings vs. average limit)

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
0.151	52.0	Line 1	56.0	-4.0	Peak	
0.172	48.8	Line 1	54.8	-6.0	Peak	
0.189	36.9	Line 1	54.0	-17.1	Peak	
24.265	37.8	Line 1	50.0	-12.2	Peak	
0.165	50.4	Neutral	55.1	-4.7	Peak	
0.191	42.6	Neutral	53.9	-11.3	Peak	
0.227	38.7	Neutral	52.6	-13.9	Peak	
24.265	38.4	Neutral	50.0	-11.6	Peak	

Final quasi-peak and average readings

Frequency MHz	Level dB μ V	AC Line	Class B		Detector QP/Ave	Comments
			Limit	Margin		
24.265	37.1	Neutral	50.0	-12.9	AVG	AVG (0.10s)
24.265	37.6	Neutral	60.0	-22.4	QP	QP (1.00s)
0.151	25.2	Line 1	55.9	-30.7	AVG	AVG (0.10s)
0.151	48.3	Line 1	65.9	-17.6	QP	QP (1.00s)
0.172	15.8	Line 1	54.9	-39.1	AVG	AVG (0.10s)
0.172	40.4	Line 1	64.9	-24.5	QP	QP (1.00s)
0.189	33.8	Line 1	54.1	-20.3	AVG	AVG (0.10s)
0.189	36.8	Line 1	64.1	-27.3	QP	QP (1.00s)
24.265	37.0	Line 1	50.0	-13.0	AVG	AVG (0.10s)
24.265	37.5	Line 1	60.0	-22.5	QP	QP (1.00s)
0.165	16.8	Neutral	55.2	-38.4	AVG	AVG (0.10s)
0.165	43.5	Neutral	65.2	-21.7	QP	QP (1.00s)
0.191	21.2	Neutral	54.0	-32.8	AVG	AVG (0.10s)
0.191	36.0	Neutral	64.0	-28.0	QP	QP (1.00s)
0.227	28.9	Neutral	52.6	-23.7	AVG	AVG (0.10s)
0.227	31.8	Neutral	62.6	-30.8	QP	QP (1.00s)

Client: Hewlett Packard Company	Job Number: J97665
Model: SDGOB-1504	T-Log Number: T97775
Contact: Susan Checchi	Project Manager: Sheareen Jacobs
Standard: EN 300 328 v1.8.1	Project Coordinator: -
	Class: -



End of Report

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