NTS Silicon Valley
www.nts.com
41039 Boyce Road
Fremont, CA 94538
510-578-3500 Phone
510-440-9525 Fax

EMC Test Report

Application for FCC Grant of Equipment Authorization
Canada Certification

Innovation, Science and Economic Development Canada
RSS-Gen Issue 4 / RSS 247 Issue 1
FCC Part 15 Subpart C

Model: H0ME

IC CERTIFICATION #:	10395A-H0ME
FCC ID:	A4RH0ME
APPLICANT:	Google Inc. 1600 Amphitheatre Pky Mountain View, CA 94043
TEST SITE(S):	National Technical Systems - Silicon Valley 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-7
REPORT DATE:	September 13, 2016
REISSUE DATE:	September 22, 2016
FINAL TEST DATES:	July 8 thru 26 and August 10, 2016
TOTAL NUMBER OF PAGES:	96

PROGRAM MGR /
TECHNICAL REVIEWER:

Mark E Hill
Staff Engineer

QUALITY ASSURANCE DELEGATE /
FINAL REPORT PREPARER:

David Guidotti
Senior Technical Writer

ACCREDITED
Testing Cert #0214.26

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	September 13, 2016	First release	
1.0	September 19, 2016	Clarified power vs. data rate and duty cycle information. Clarified BLE Tx spurious emissions testing. Clarified antenna conducted spurious emissions.	MEH
2.0	September 22, 2016	Removed power vs data rate results	MEH

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Google Inc. model H0ME, pursuant to the following rules:

RSS-Gen Issue 4 "General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 1 "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices"
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 C63.10-2013
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 Google Inc. model H0ME complied with the requirements of the following regulations:

RSS-Gen Issue 4 "General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 1 "Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices"
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 Google Inc. model H0ME and therefore apply only to the tested sample. The sample was selected and prepared by Dominik Mente of Google Inc..

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) – Bluetooth Low Energy

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 247 5.2	Digital Modulation	Systems uses DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 247 5.2 (1)	6dB Bandwidth	0.695 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 247 5.4 (4)	Output Power (multipoint systems)	BLE: 5.6 dBm (3.6mW)	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	BLE: -4.1 dBm/10kHz	8dBm/3kHz	Complies
15.247(d)	RSS 247 5.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	> 20dB margin	< -20dBc	Complies
15.247(d) / 15.209	RSS 247 5.5	Radiated Spurious Emissions 30MHz – 25 GH	65.4 dBµV/m @ 2483.7 MHz (-8.6 dB)	Refer to the limits section (p20) for restricted bands, all others < -20dBc	Complies

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz) – IEEE 802.11bgn

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 247 5.2	Digital Modulation	Systems uses OFDM / DSSS techniques	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 247 5.2 (1)	6dB Bandwidth	WiFi: 10.1 MHz	>500kHz	Complies
15.247 (b) (3)	RSS 247 5.4 (4)	Output Power (multipoint systems)	11b: 18.1dBm (64.6mW) 11g: 17.0dBm (50.1mW) n20: 17.2dBm (52.5mW)	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	11b: -0.2 dBm/10kHz 11g: -3.3 dBm/10kHz n20: -2.5 dBm/10kHz	8dBm/3kHz	Complies
15.247(d)	RSS 247 5.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	> 20dB margin	< -30dBc Note 2	Complies
15.247(d) / 15.209	RSS 247 5.5	Radiated Spurious Emissions 30MHz – 25 GHz	53.7 dBµV/m @ 2487.8 MHz (-0.3 dB)	Refer to the limits section (p20) for restricted bands, all others <-30dBc Note 2	Complies

Note 2: Limit of -30dBc used because the power was measured using the UNII test procedure (maximum power averaged over a transmission burst).

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antennas are internal	Unique or integral antenna required	Complies
15.407 (b) (6)	RSS-Gen Table 3	AC Conducted Emissions	Chicony: 38.6 dBµV @ 0.358 MHz (-10.2 dB) TenPao: 44.4 dBµV @ 0.156 MHz (-21.3 dB)	Refer to page 19	Complies
15.247 (i) 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	BLE: 1.02MHz b: 13.3MHz g: 16.8MHz n20: 17.7MHz	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)	dBµV/m	25 to 1000 MHz	± 3.6 dB
		1000 to 40000 MHz	± 6.0 dB
Conducted Emissions (AC Power)	dBµV	0.15 to 30 MHz	± 2.4 dB

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Google Inc. H0ME is an interactive media streaming device. 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 electrical rating of the EUT is 100-240 Volts, 50-60 Hz, 1.1 Amps.

The sample was received on July 8, 2016 and tested on July 8 thru 26 and August 10, 2016. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Google	H0ME	Streaming Media Device (RF conducted)	6629AZZB6W	A4RH0ME
Google	H0ME	Streaming Media Device (radiated)	6629AZZB75	A4RH0ME
Chicony	W16-033N1A	External power supply	F185081624001224	-
TenPao	S033BU1650200	External power supply	prototype	-

ANTENNA SYSTEM

Two Internal Antennas: 2.7dBi and 3.3dBi max @ 2.4GHz, 5.3dBi and 5.7dBi @ 5GHz. Tx/Rx diversity.

ENCLOSURE

The EUT enclosure is primarily constructed of plastic. It measures approximately 10 cm in diameter by 14 cm high.

MODIFICATIONS

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

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Dell	Latitude	Laptop	27175981753	-
-	PA-12FAMILY	Laptop Power Supply	-	-
Google	Chromecast	USB AC/DC Adapter	-	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

EUT

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC power	External power supply	2 wire	Unshielded	2
AC in (external supply)	AC mains	Direct plug in	NA	NA
USB	USB splitter	Multiwire	Shielded	0.3

Additional on Support Equipment

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
USB charger out	USB splitter	Multiwire	Shielded	0.3
USB charger, AC in	AC mains	Direct plug in	NA	NA
USB splitter	USB-serial adaptor cable			

EUT OPERATION

The EUT was configured to transmit continuously at the maximum output power setting. Specifics for the channel and mode are described in the test data.

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 4	US0027	2845B-4	41039 Boyce Road Fremont, CA 94538-2435
Chamber 7	US0027	2845B-7	

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

Software is used to view and convert 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 software used for radiated and conducted emissions measurements is NTS EMI Test Software (rev 2.10)

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 for measurements below 1GHz and 1.5m for measurements above 1GHz. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor as specified in ANSI C63.4. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

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

TEST PROCEDURES

EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.10, and the worst-case orientation is used for final measurements.

CONDUCTED EMISSIONS

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

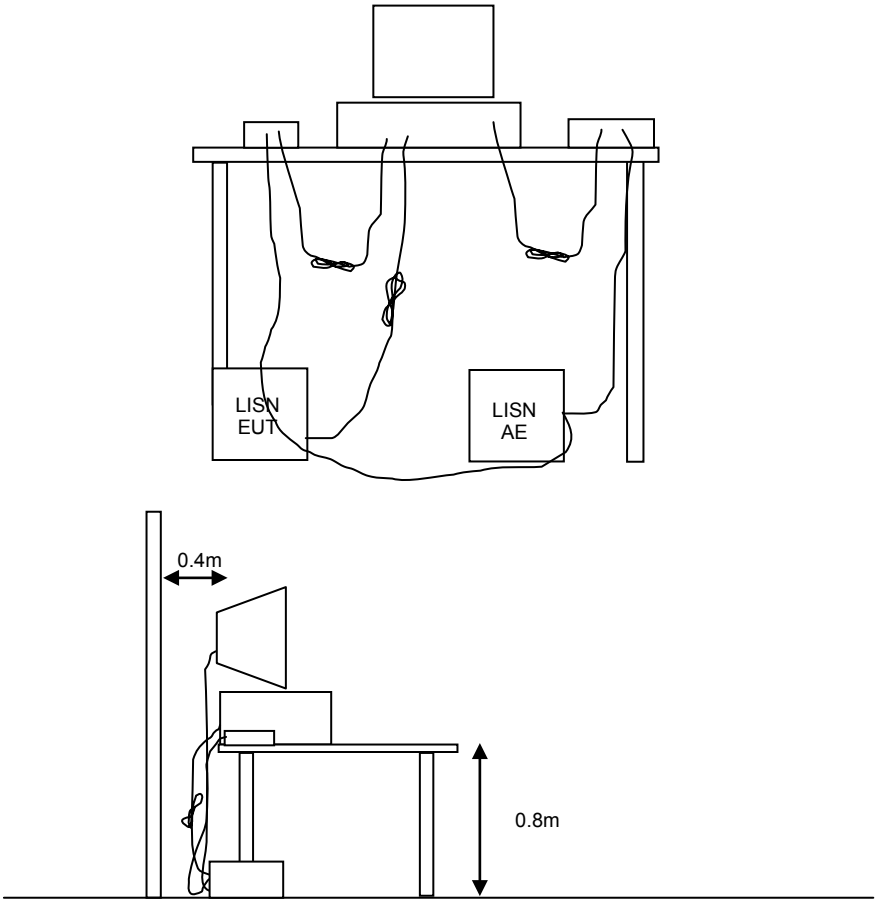


Figure 1 Typical Conducted Emissions Test Configuration

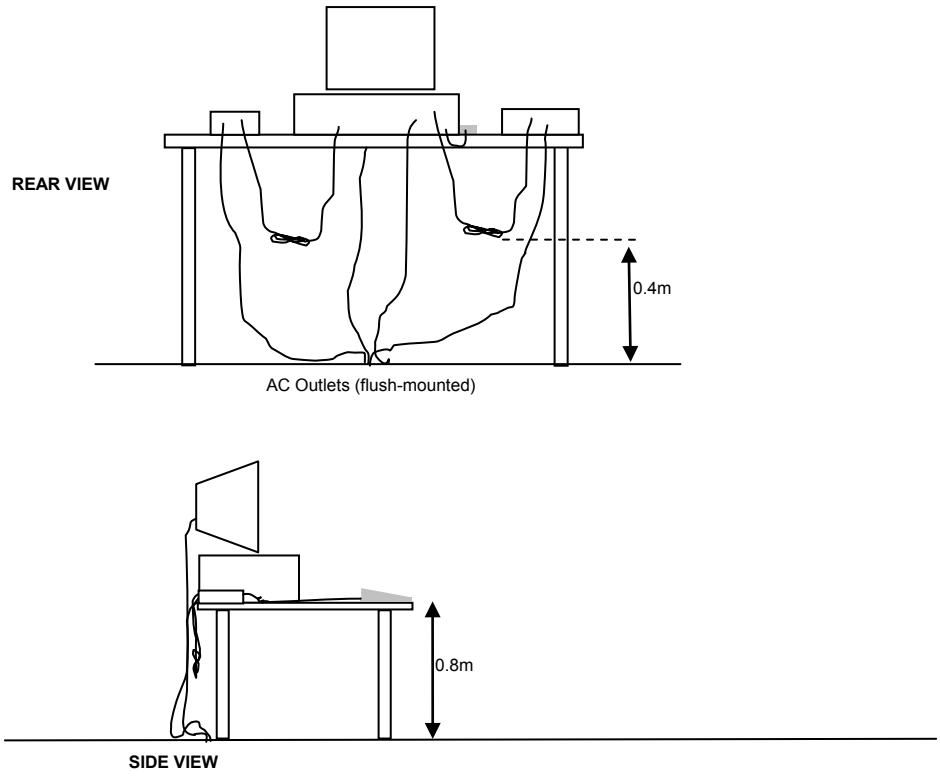
RADIATED EMISSIONS

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

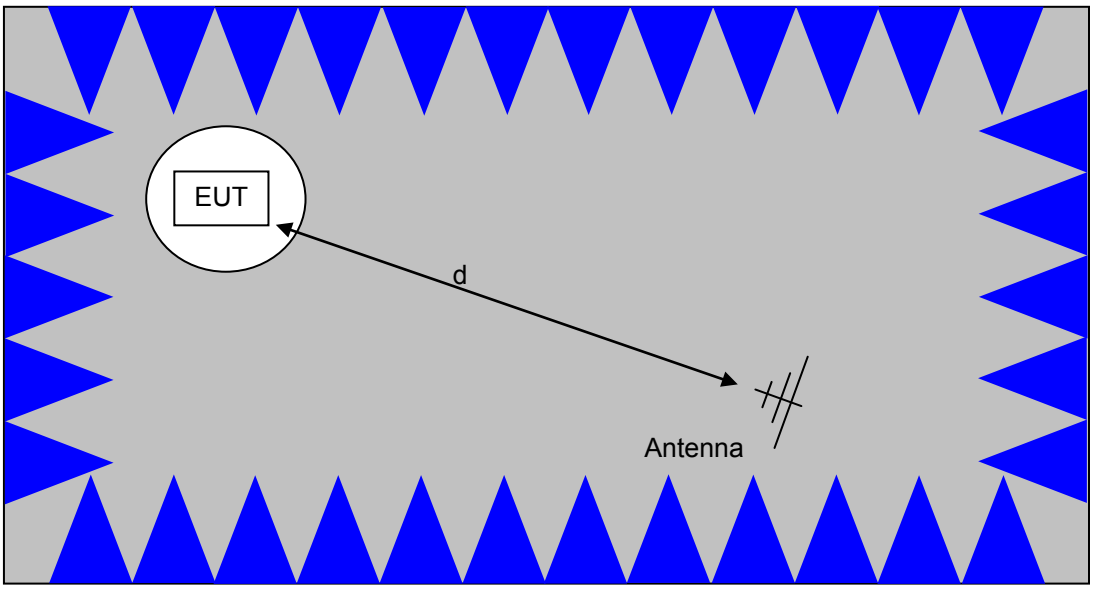
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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

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

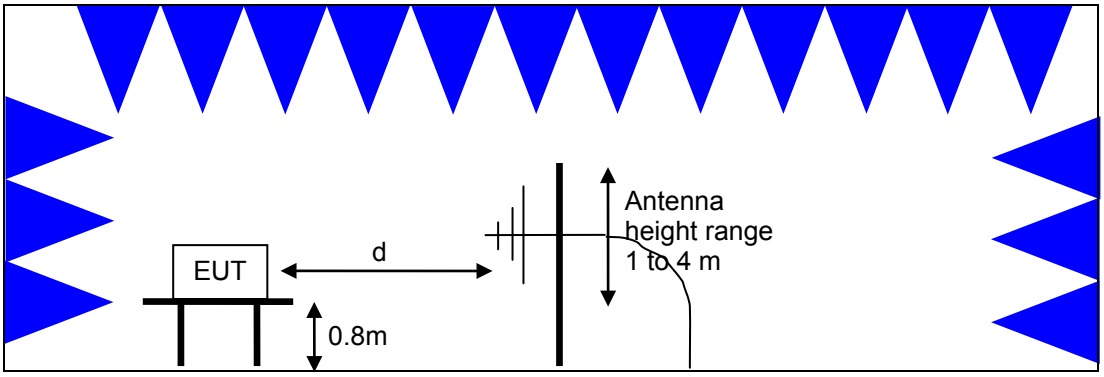


Typical Test Configuration for Radiated Field Strength Measurements



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

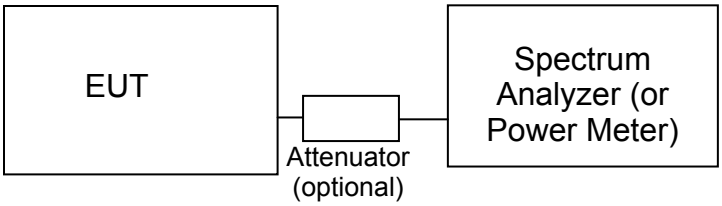
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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

CONDUCTED EMISSIONS FROM ANTENNA PORT

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



Test Configuration for Antenna Port Measurements

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

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

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

BANDWIDTH MEASUREMENTS

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

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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

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

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

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

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

GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands[1].

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
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz

The maximum permitted output power is reduced by 1dB for every dB the antenna gain exceeds 6dBi.

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 247. 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 15.205 and RSS-Gen Table 6

SAMPLE CALCULATIONS - CONDUCTED EMISSIONS

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

$$R_r - S = M$$

where:
R_r = Receiver Reading in dBuV
S = Specification Limit in dBuV
M = Margin to Specification in +/- dB

SAMPLE CALCULATIONS - RADIATED EMISSIONS

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

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

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

where:
F_d = Distance Factor in dB
D_m = Measurement Distance in meters
D_s = Specification Distance in meters

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

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

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

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

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:
R_r = Receiver Reading in dBuV/m
F_d = Distance Factor in dB
R_c = Corrected Reading in dBuV/m
L_s = Specification Limit in dBuV/m
M = Margin in dB Relative to Spec

SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION

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

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

where P is the eirp (Watts)

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

Appendix A Test Equipment Calibration Data

T101744

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 1000 - 6,500 MHz, 08-Jul-16					
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/17/2015	10/17/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016
Radiated Emissions, 1000 - 25,000 MHz, 12-Jul-16					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	1/21/2016	1/21/2017
HP / Miteq	SA40 Head (Red)	TTA1840-45-5P-HG-S	1145	7/17/2015	8/17/2016
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/17/2015	10/17/2016
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	6/29/2016	6/29/2017
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/28/2014	8/28/2017
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016
Radiated Spurious Emissions, 1000 - 40,000 MHz, 12-Jul-16					
NTS	NTS EMI Software (rev 2.10)	N/A	0		N/A
Narda West	High Pass Filter, 8 GHz	HPF 180	821	1/27/2016	1/27/2017
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	1/21/2016	1/21/2017
HP / Miteq	SA40 Head (Red)	TTA1840-45-5P-HG-S	1145	7/17/2015	8/17/2016
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/17/2015	10/17/2016
Micro-Tronics	Band Reject Filter, 5470-5725 MHz	BRC50704-02	1681	5/11/2016	5/11/2017
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/28/2014	8/28/2017
Micro-Tronics	Band Reject Filter, 5725-5875 MHz	BRC50705-02	2241	9/16/2015	9/16/2016
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2251	9/16/2015	9/16/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016
Radiated Emissions, 1000 - 6,000 MHz, 13-Jul-16					
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/19/2015	12/19/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016
Radiated Spurious Emissions, 1000 - 12,000 MHz, 15-Jul-16					
NTS	NTS EMI Software (rev 2.10)	N/A	0		N/A
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	1/21/2016	1/21/2017
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/17/2015	10/17/2016
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2251	9/16/2015	9/16/2016
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radiated Emissions, 1000 - 25,000 MHz, 26-Jul-16					
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	1/21/2016	1/21/2017
HP / Miteq	SA40 Head (Red)	TTA1840-45-5P-HG-S	1145	7/17/2015	8/17/2016
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/17/2015	10/17/2016
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	1683	6/29/2016	6/29/2017
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/28/2014	8/28/2017
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	2251	9/16/2015	9/16/2016
Radiated Spurious Emissions, 12 - 25 GHz, 27-Jul-16					
NTS	NTS EMI Software (rev 2.10)	N/A	0		N/A
Narda West	High Pass Filter, 8 GHz	HPF 180	821	1/27/2016	1/27/2017
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	870	1/21/2016	1/21/2017
HP / Miteq	SA40 Head (Red)	TTA1840-45-5P-HG-S	1145	7/17/2015	8/17/2016
Hewlett Packard	Spectrum Analyzer (SA40) Red 30 Hz -40 GHz	8564E (84125C)	1148	10/17/2015	10/17/2016
A. H. Systems	Purple System Horn, 18-40GHz	SAS-574, p/n: 2581	2160	8/28/2014	8/28/2017
EMCO	Antenna, Horn, 1-18 GHz	3115	2733	11/18/2014	11/18/2016

Conducted Emissions - AC Power Ports, 10-Aug-16

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
NTS	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	8/1/2016	8/1/2017
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1401	4/26/2016	4/26/2017
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	12/19/2015	12/19/2016

T102213

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Radio Antenna Port (Power and Spurious Emissions), 25-Jul-16					
Rohde & Schwarz	Power Sensor, 1 uW-100 mW, DC-18 GHz, 50ohms	NRV-Z51	1070	8/3/2015	8/3/2016
Rohde & Schwarz	Power Meter, Single Channel, +1795+1796	NRVS	1534	7/22/2016	7/22/2017
Rohde & Schwarz	Signal Analyzer 20 Hz - 26.5 GHz	FSQ26	2327	6/17/2016	6/17/2017
Radio Antenna Port (Power and Spurious Emissions), 26-Jul-16					
Agilent Technologies	PSA, Spectrum Analyzer, (installed options, 111, 115, 123, 1DS, B7J, HYX,	E4446A	2139	6/24/2016	6/24/2017

Appendix B Test Data

T101744 Pages 26 – 71
T102213 Pages 72 – 95

Client:	Google Inc	Job Number:	JD101591
Product	H0ME	T-Log Number:	T101744
System Configuration:	-	Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Emissions Standard(s):	FCC 15.247/15.407/RSS-247	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Google Inc

Product

H0ME

Date of Last Test: 9/9/2016

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Power vs. Data Rate

An assessment of the output power was done over the supported data rates for each mode of operation, 11b, 11g, and HT20.

Results: The lowest data rates for each mode resulted in the highest output power. All testing was performed at these data rates.
11b - 1Mb/s
11g - 6Mb/s
n20 - MSC0

Sample Notes

Sample S/N: 6629AZZB75
Driver: 1.21

Date of Test: 7/8/2016
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Duty Cycle

Date of Test: 7/11/2016
Test Engineer: John Caizzi
Test Location: Lab 4A

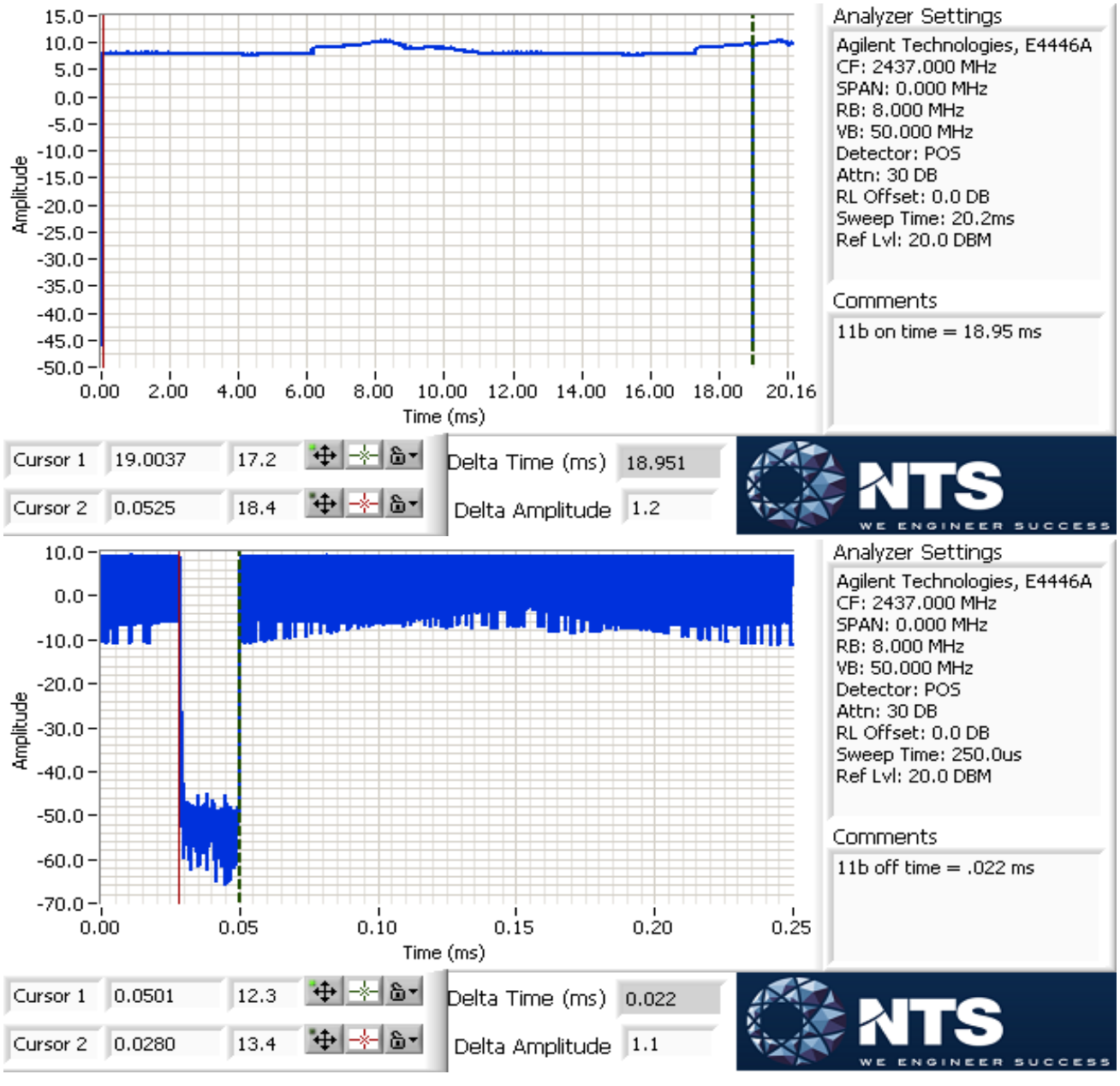
Duty cycle measurements performed on the worse case data rate for power.

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

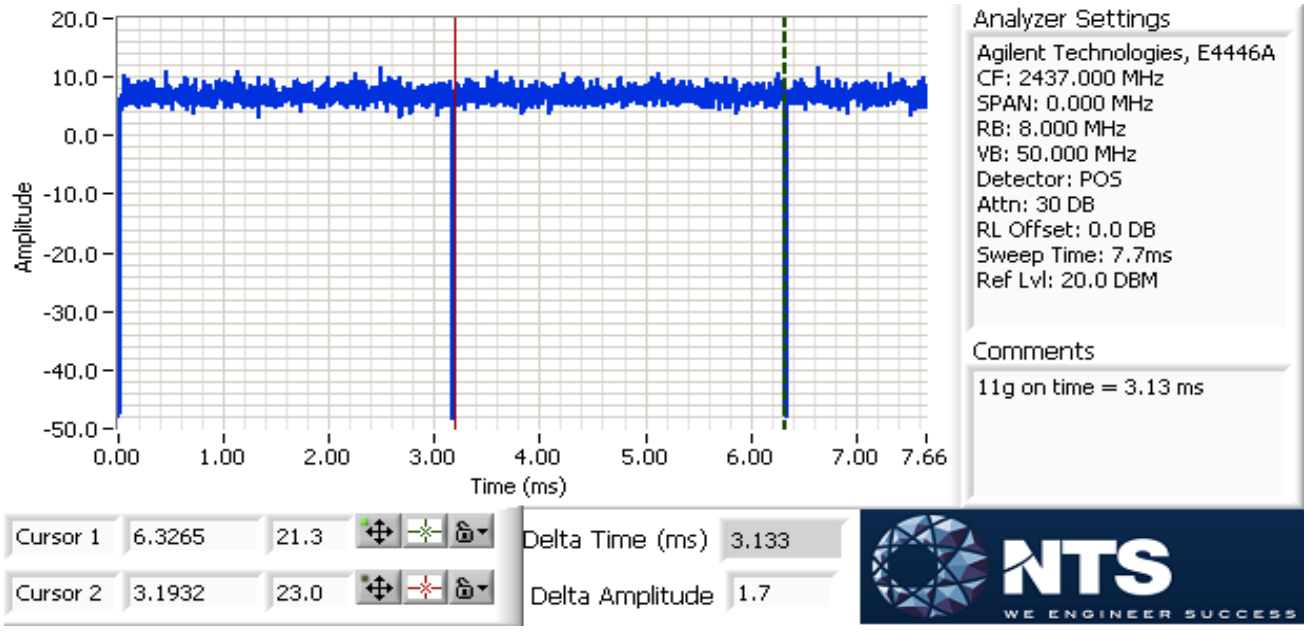
Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11b	1	1.00	Yes	18.95	0	0	53
11g	6	0.99	Yes	3.13	0	0	319
n20	MCS0	1.00	Yes	9.92	0	0	101
BLE	1Mbps	0.61	Yes	0.383	2.2	4.3	2611

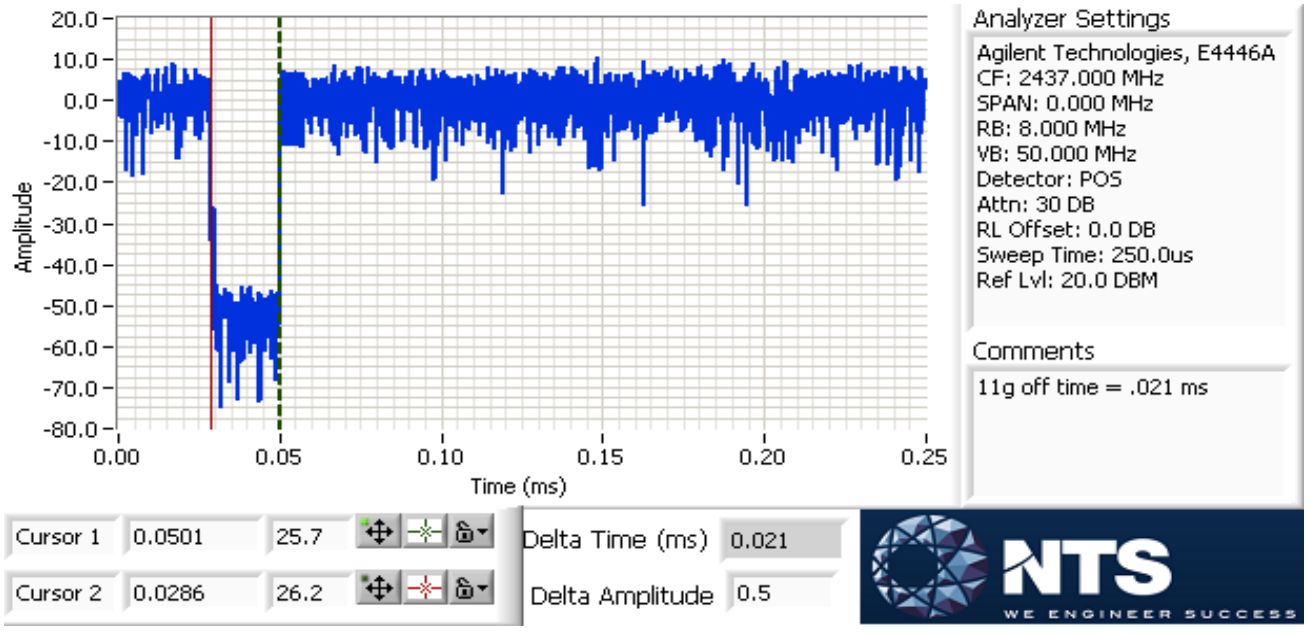
* Correction factor when using RMS/Power averaging - 10*log(1/x)
** Correction factor when using linear voltage average - 20*log(1/x)
T = Minimum transmission duration

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

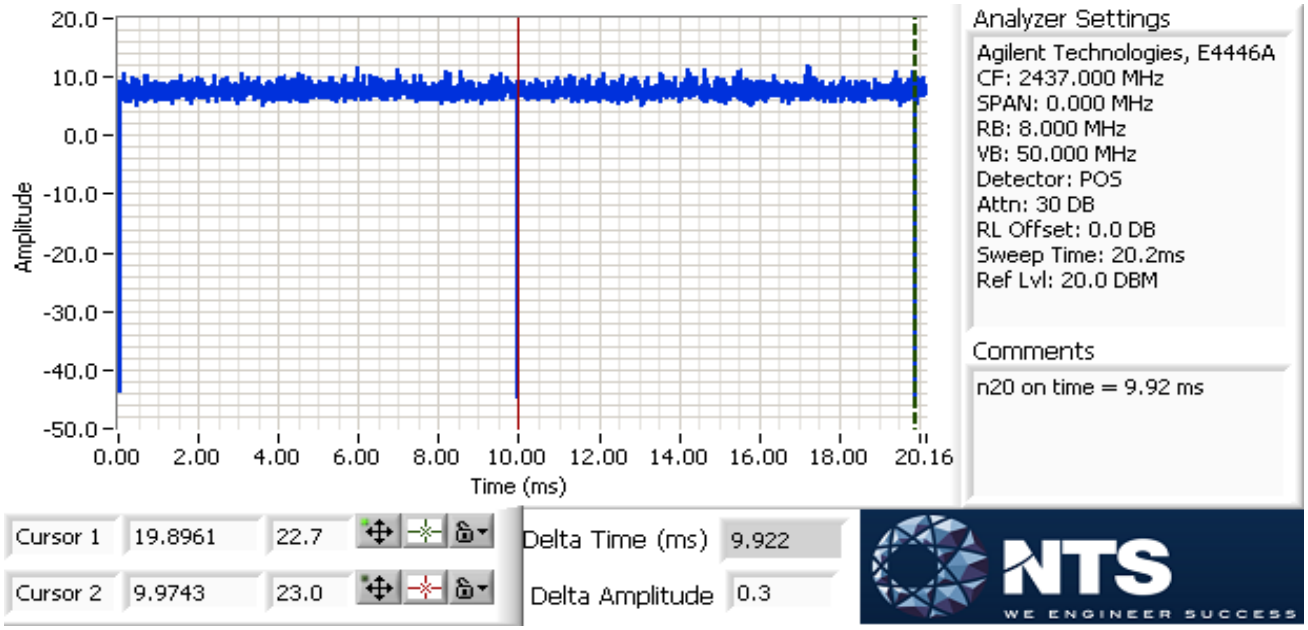


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

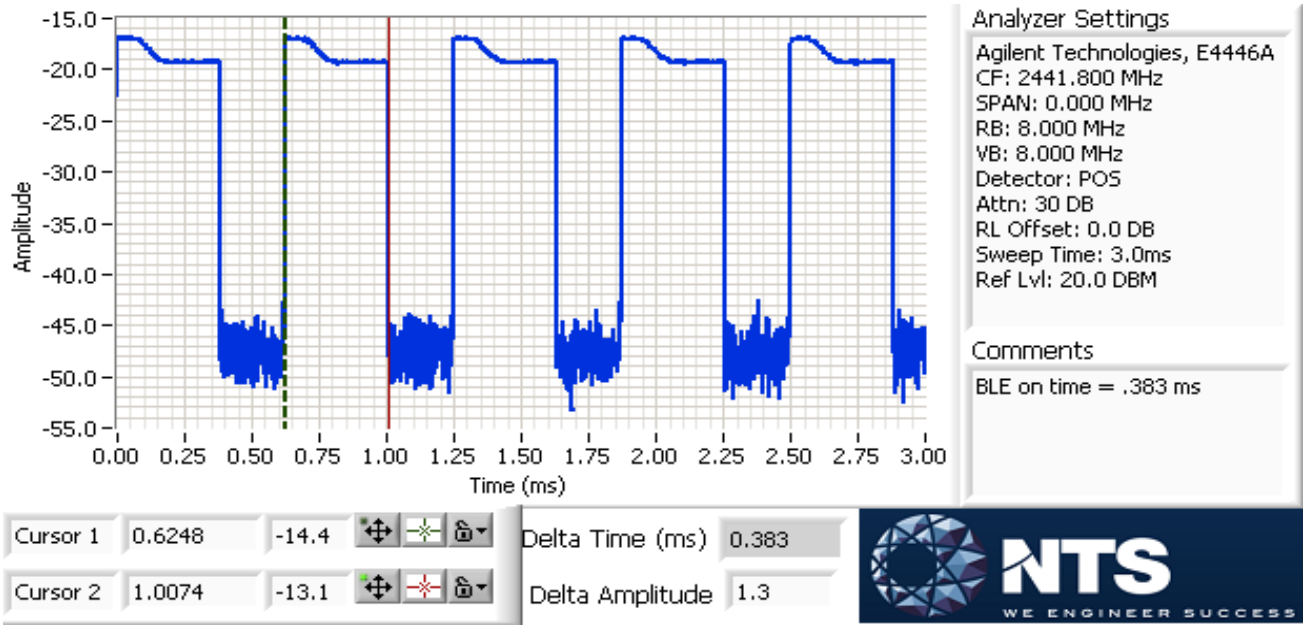


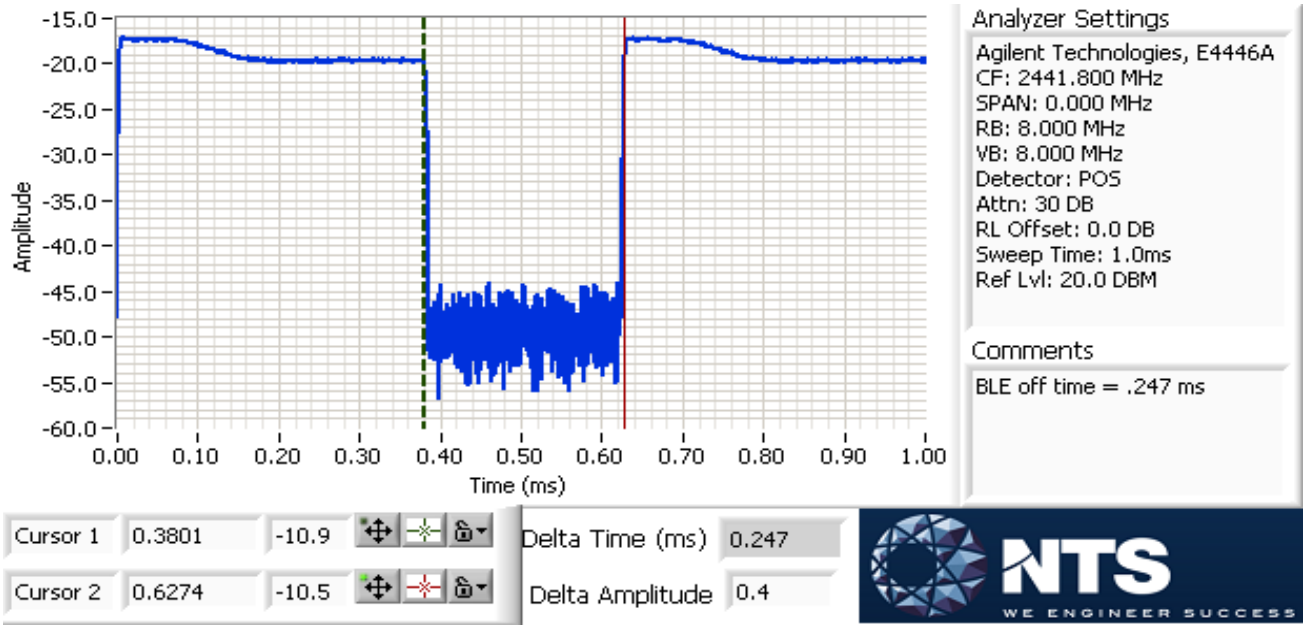


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A





Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	B

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: 8/10/2016
Test Engineer: John Caizzi
Test Location: Fremont Chamber #7

Config. Used: 1
Config Change: No support equipment.
EUT Voltage: 120V/60Hz

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.

Ambient Conditions:

Temperature: 23 °C
Rel. Humidity: 40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2a	CE, AC Power, 120V/60Hz	Class B	Pass	38.6 dBµV @ 0.358 MHz (-10.2 dB)
2b	CE, AC Power, 120V/60Hz	Class B	Pass	44.4 dBµV @ 0.156 MHz (-21.3 dB)

Modifications Made During Testing

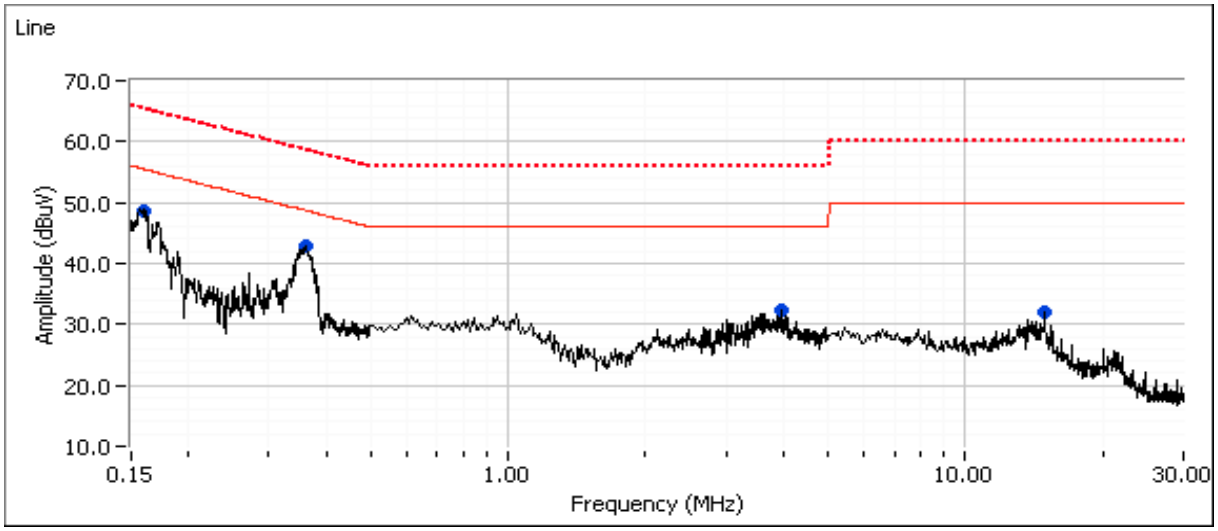
No modifications were made to the EUT during testing

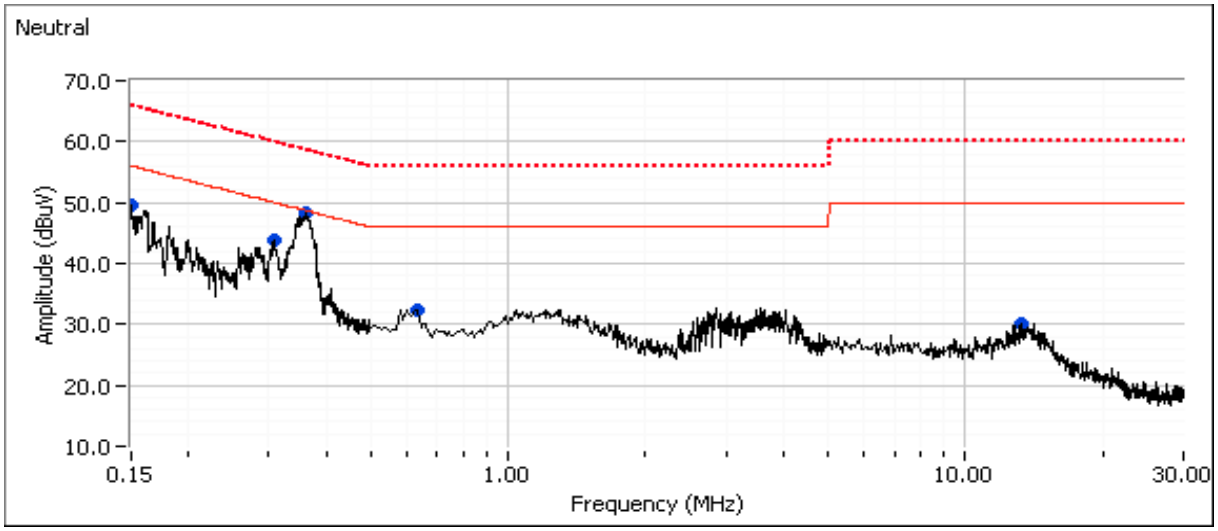
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	B

Run #2a: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz. Chicony W16-033N1A power supply.





Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	B

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

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.161	48.7	Line	55.4	-6.7	Peak	
0.361	42.9	Line	48.7	-5.8	Peak	
3.958	32.4	Line	46.0	-13.6	Peak	
14.920	*32.0*	*Line*	*50.0*	*-18.0*	*Peak*	
0.152	49.7	Neutral	56.0	-6.3	Peak	
0.306	43.8	Neutral	50.0	-6.2	Peak	
0.358	48.2	Neutral	48.7	-0.5	Peak	
0.635	*32.4*	*Neutral*	*46.0*	*-13.6*	*Peak*	
13.317	*30.1*	*Neutral*	*50.0*	*-19.9*	*Peak*	

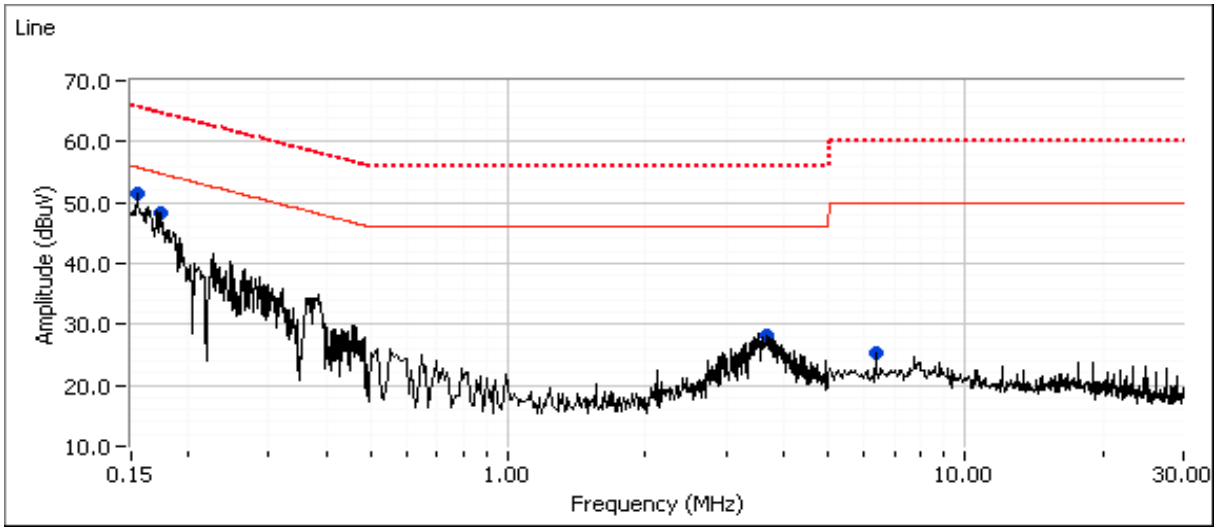
Final quasi-peak and average readings

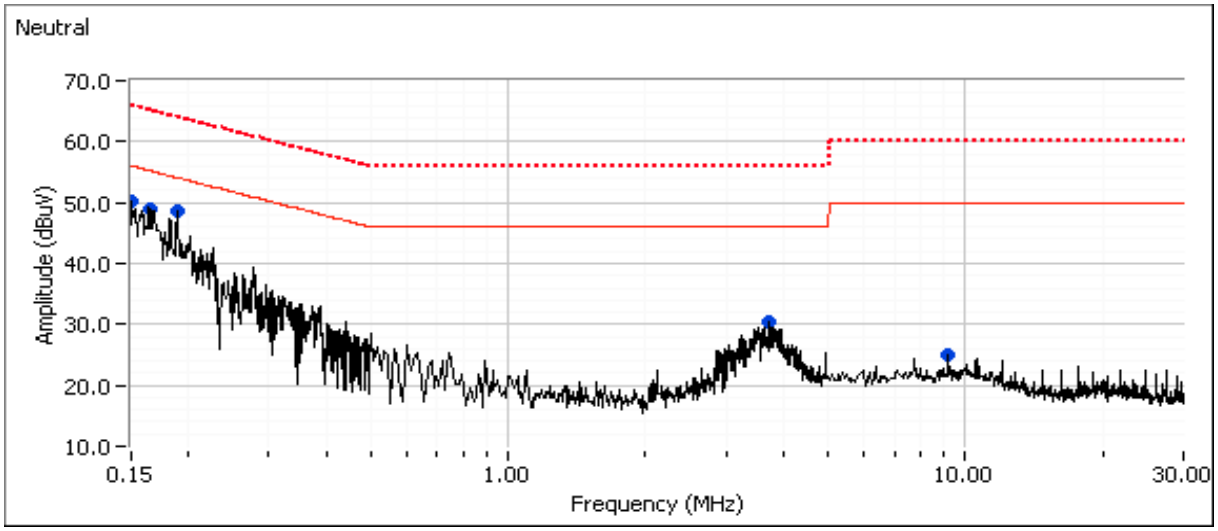
Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.161	27.4	Line	55.4	-28.0	AVG	
0.161	43.0	Line	65.4	-22.4	QP	
0.361	33.1	Line	48.7	-15.6	AVG	
0.361	40.5	Line	58.7	-18.2	QP	
3.958	16.2	Line	46.0	-29.8	AVG	
3.958	25.5	Line	56.0	-30.5	QP	
0.152	43.3	Neutral	65.9	-22.6	QP	
0.152	27.9	Neutral	55.9	-28.0	AVG	
0.306	31.6	Neutral	50.1	-18.5	AVG	
0.306	40.4	Neutral	60.1	-19.7	QP	
0.358	38.6	Neutral	48.8	-10.2	AVG	
0.358	45.3	Neutral	58.8	-13.5	QP	

Note 1:	EUT transmitting on CH6, power setting = 19 dBm, 11b mode at 1 Mbps.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	B

Run #2b: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz. TenPao S033BU1650200 power supply, sample 2.





Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	B

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

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.156	51.4	Line	55.7	-4.3	Peak	
0.172	48.4	Line	54.8	-6.4	Peak	
3.630	28.2	Line	46.0	-17.8	Peak	
6.353	*25.4*	*Line*	*50.0*	*-24.6*	*Peak*	
0.151	50.1	Neutral	56.0	-5.9	Peak	
0.166	49.0	Neutral	55.2	-6.2	Peak	
0.184	48.5	Neutral	54.1	-5.6	Peak	
3.737	*30.4*	*Neutral*	*46.0*	*-15.6*	*Peak*	
9.158	*24.9*	*Neutral*	*50.0*	*-25.1*	*Peak*	

Final quasi-peak and average readings

Frequency	Level	AC	Class B		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.156	26.7	Line	55.7	-29.0	AVG	
0.156	44.4	Line	65.7	-21.3	QP	
0.172	24.5	Line	54.9	-30.4	AVG	
0.172	41.3	Line	64.9	-23.6	QP	
3.630	12.7	Line	46.0	-33.3	AVG	
3.630	23.3	Line	56.0	-32.7	QP	
0.151	25.6	Neutral	55.9	-30.3	AVG	
0.151	44.6	Neutral	65.9	-21.3	QP	
0.166	25.0	Neutral	55.2	-30.2	AVG	
0.166	42.2	Neutral	65.2	-23.0	QP	
0.184	22.3	Neutral	54.3	-32.0	AVG	
0.184	39.2	Neutral	64.3	-25.1	QP	

Note 1:	EUT transmitting on CH6, power setting = 19 dBm, 11b mode at 1 Mbps.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 22.6 °C
Rel. Humidity: 35 %

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	BLE	2402MHz	-	6	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	55.3 dBµV/m @ 2388.0 MHz (-18.7 dB)
	BLE	2480MHz	-	6	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	65.4 dBµV/m @ 2483.7 MHz (-8.6 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample S/N: 6629AZZB75
Driver: 1.21
Antenna: Internal

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	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 a duty cycle ≥ 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	1Mbps	0.61	Yes	0.383	2.2	4.3	2611

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 4:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor
Note 6:	Emission has non constant duty cycle < 98%, 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 8:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

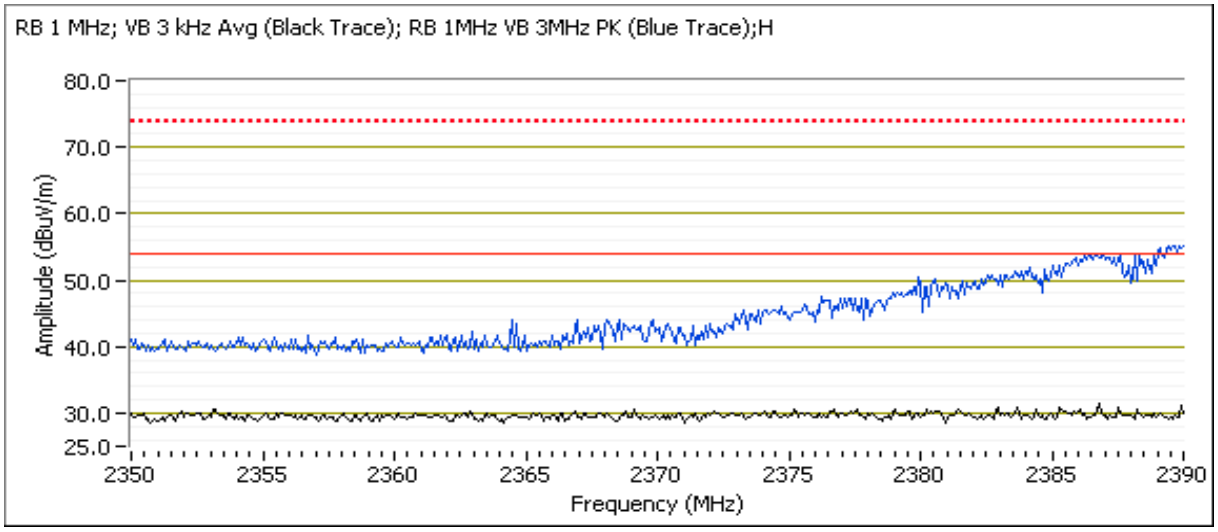
Run #1: Radiated Bandedge Measurements

Date of Test: 7/26/2016 0:00 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: None
Test Location: FT Chamber #7 EUT Voltage: 120V/60Hz

Channel: 2402MHz Mode: BLE
Tx Chain: Antenna 2 Data Rate: 1Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2379.270	34.3	H	54.0	-19.7	Avg	174	1.0	Note 4,POS Vavg:100; VB: 3 kHz
2387.960	55.3	H	74.0	-18.7	PK	174	1.0	POS; RB 1 MHz; VB: 3 MHz
2389.760	34.6	V	54.0	-19.4	Avg	102	1.0	Note 4,POS Vavg:100; VB: 3 kHz
2383.910	52.1	V	74.0	-21.9	PK	102	1.0	POS; RB 1 MHz; VB: 3 MHz

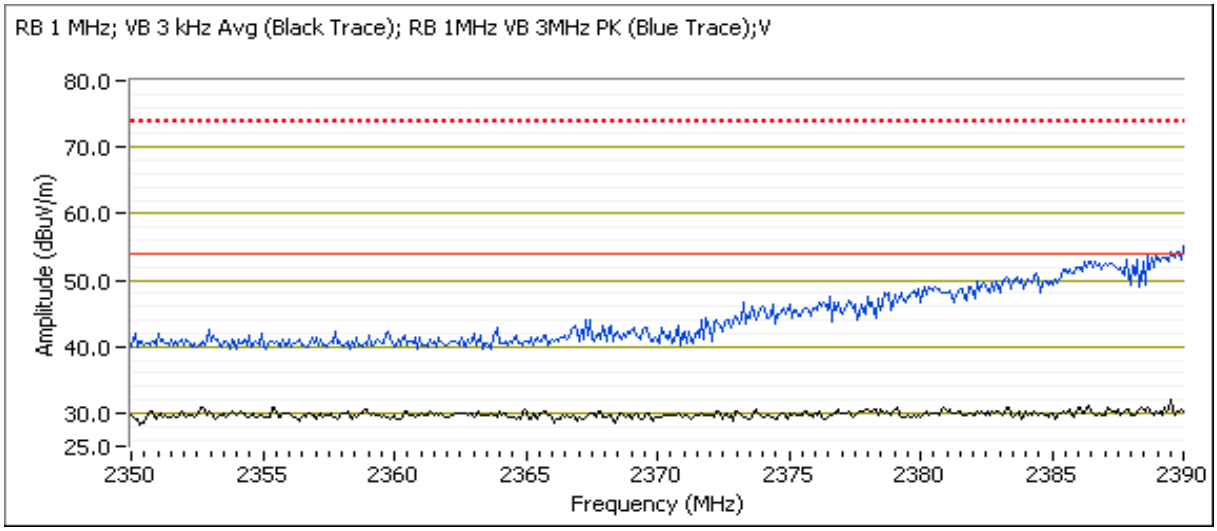


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Channel: 2402MHz Mode: BLE
Tx Chain: Antenna 1 Data Rate: 1Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2386.960	34.3	H	54.0	-19.7	Avg	162	1.0	Note 4,POS Vavg:100; VB: 3 kHz
2387.510	54.1	H	74.0	-19.9	PK	162	1.0	POS; RB 1 MHz; VB: 3 MHz
2389.120	34.8	V	54.0	-19.2	Avg	105	1.2	Note 4,POS Vavg:100; VB: 3 kHz
2389.840	54.6	V	74.0	-19.4	PK	105	1.2	POS; RB 1 MHz; VB: 3 MHz

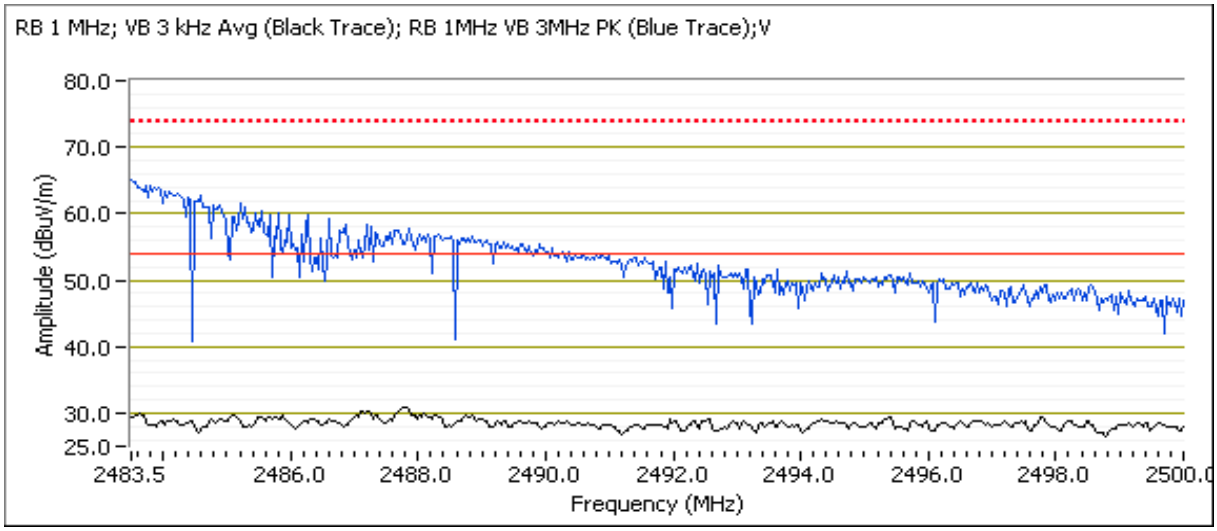


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Channel: 2480MHz Mode: BLE
Tx Chain: Antenna 2 Data Rate: 1Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.570	35.3	H	54.0	-18.7	Avg	152	1.1	Note 4,POS Vavg:100; VB: 3 kHz
2484.060	63.0	H	74.0	-11.0	PK	152	1.1	POS; RB 1 MHz; VB: 3 MHz
2483.550	35.8	V	54.0	-18.2	Avg	87	1.2	Note 4,POS Vavg:100; VB: 3 kHz
2483.640	64.9	V	74.0	-9.1	PK	87	1.2	POS; RB 1 MHz; VB: 3 MHz

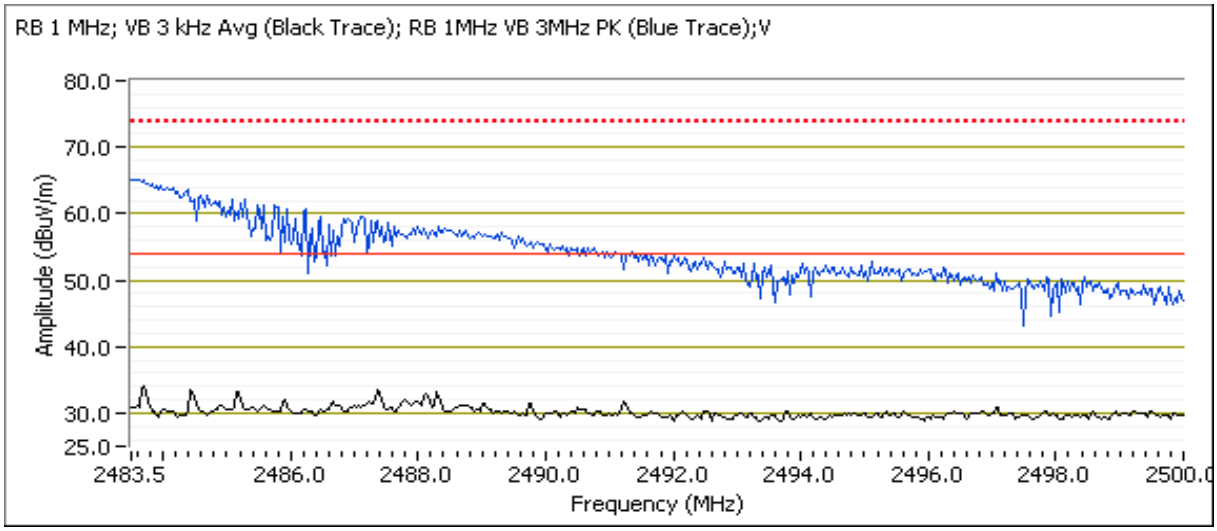


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Channel: 2480MHz Mode: BLE
Tx Chain: Antenna 1 Data Rate: 1Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2483.500	35.1	H	54.0	-18.9	Avg	189	1.1	Note 4,POS Vavg:100; VB: 3 kHz
2483.730	64.3	H	74.0	-9.7	PK	189	1.1	POS; RB 1 MHz; VB: 3 MHz
2487.510	35.9	V	54.0	-18.1	Avg	107	1.2	Note 4,POS Vavg:100; VB: 3 kHz
2483.670	65.4	V	74.0	-8.6	PK	107	1.2	POS; RB 1 MHz; VB: 3 MHz



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 22.6 °C
Rel. Humidity: 35 %

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 - Antenna 2	BLE	2402MHz	-	6	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	41.3 dBµV/m @ 4803.8 MHz (-12.7 dB)
	BLE	2440MHz		6	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	40.5 dBµV/m @ 4879.6 MHz (-13.5 dB)
	BLE	2480MHz		6	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	41.0 dBµV/m @ 4959.6 MHz (-13.0 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: 6629AZZB75
Driver: 1.21
Antenna: Internal

Note: All testing performed on the Antenna 2 port (wifi set to 10 1 1, which forces BT to Antenna 2), as this was worse case from preliminary measurements.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	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 ≥ 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	1Mbps	0.61	Yes	0.383	2.2	4.3	2611

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 a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces
Note 4:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor

Preliminary measurement demonstrated no spurious emissions below 1GHz.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

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

Date of Test: 7/26/2016 0:00
Test Engineer: Rafael Varelas
Test Location: FT Chamber #7

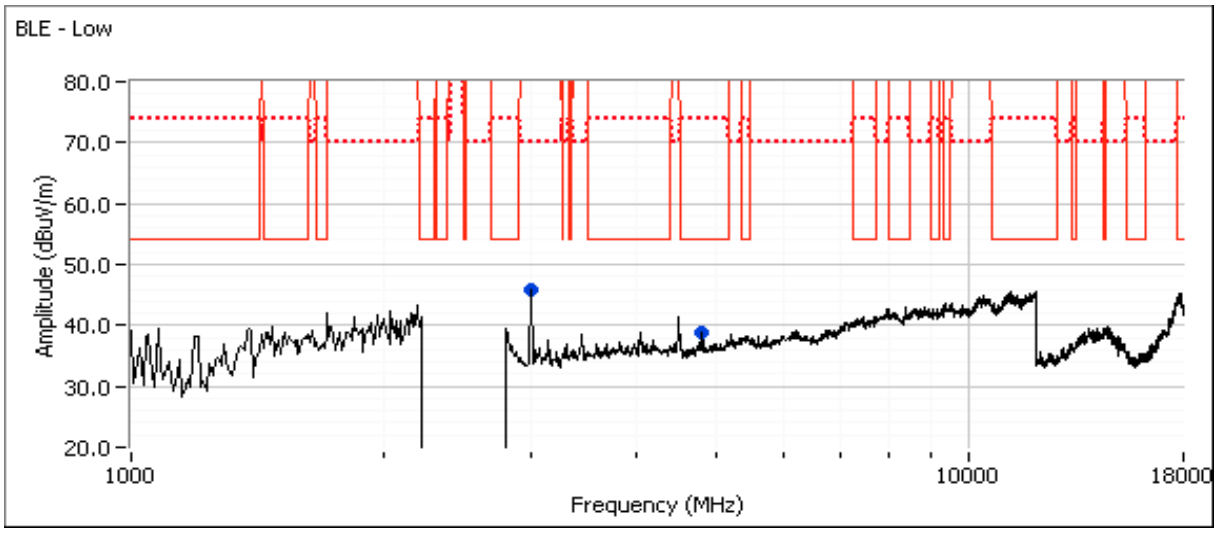
Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

Run #1a: Low Channel

Channel: 2402MHz
Tx Chain: Antenna 2

Mode: BLE
Data Rate: 1Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4803.830	41.3	V	54.0	-12.7	Avg	66	1.0	Note 4;VB 3 kHz;Peak VAVG 100
4804.230	46.5	V	74.0	-27.5	PK	66	1.0	RB 1 MHz;VB 3 MHz;Peak
3000.000	45.8	V	70.0	-24.2	Peak	255	1.0	Not radio signal



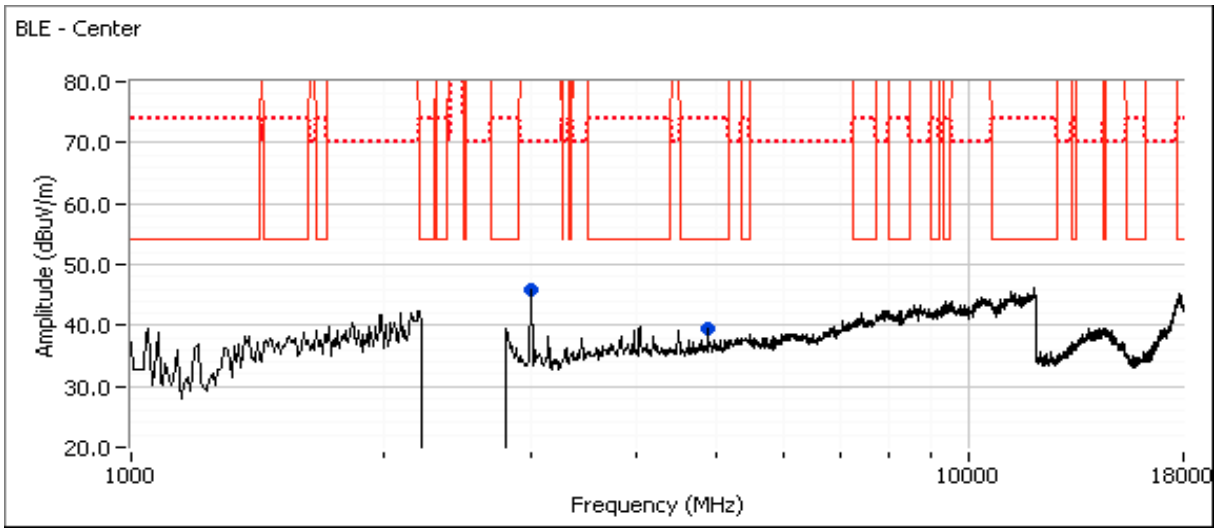
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1b: Center Channel

Channel: 2440MHz Mode: BLE
Tx Chain: Antenna 2 Data Rate: 1Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4879.610	40.5	H	54.0	-13.5	Avg	76	1.0	Note 4;VB 3 kHz;Peak VAVG 100
4880.520	46.7	H	74.0	-27.3	PK	76	1.0	RB 1 MHz;VB 3 MHz;Peak
3000.000	45.9	V	70.0	-24.1	Peak	249	1.0	Not radio signal

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

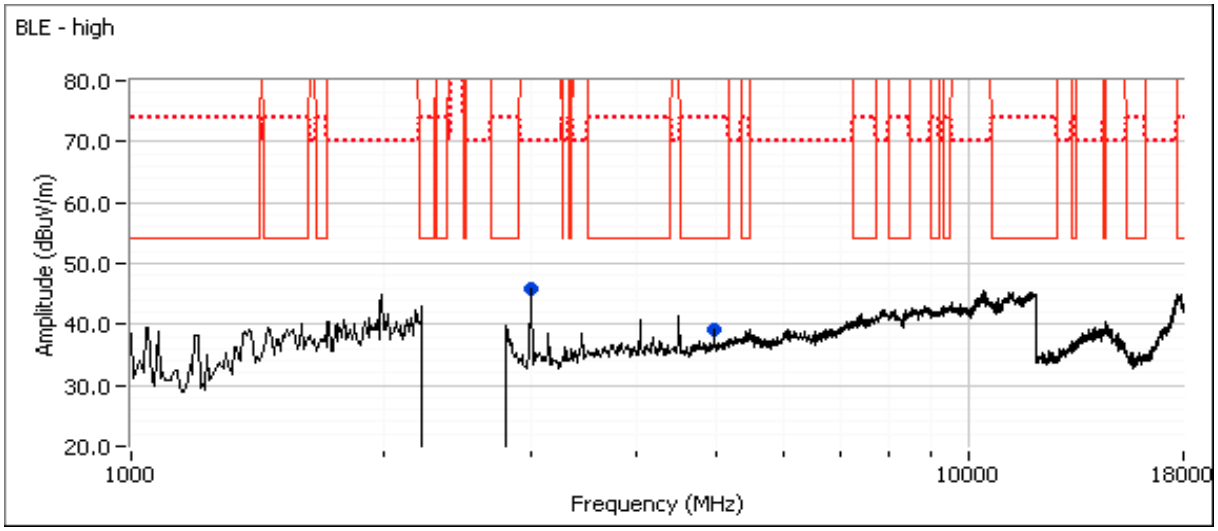


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1c: High Channel

Channel: 2480MHz Mode: BLE
Tx Chain: Antenna 2 Data Rate: 1Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4959.560	41.0	H	54.0	-13.0	Avg	68	1.0	Note 4;VB 3 kHz;Peak VAVG 100
4959.100	47.0	H	74.0	-27.0	PK	68	1.0	RB 1 MHz;VB 3 MHz;Peak
2991.670	45.9	V	70.0	-24.1	Peak	254	1.0	



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 23.4 °C
Rel. Humidity: 35 %

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

Run #	Mode	Channel	Target Power (dBm)	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	-	17	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	53.2 dBµV/m @ 2386.3 MHz (-0.8 dB)
	b	11 - 2462MHz	-	18	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.7 dBµV/m @ 2487.8 MHz (-0.3 dB)
2	g	1 - 2412MHz	-	15	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	-	16	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.1 dBµV/m @ 2483.5 MHz (-0.9 dB)
3	n20	1 - 2412MHz	-	14	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	52.7 dBµV/m @ 2390.0 MHz (-1.3 dB)
	n20	11 - 2462MHz	-	17	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	53.0 dBµV/m @ 2483.5 MHz (-1.0 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.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Sample Notes

Sample S/N: 6629AZZB75
Driver: 1.21
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 a duty cycle ≥ 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	1 Mbps	1.00	Yes	18.95	0	0	53
11g	6 Mbps	0.99	Yes	3.13	0	0	319
n20	MCS0	1.00	Yes	9.92	0	0	101

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: All testing performed on the Antenna 2 port (wifi set to 10 2 2), as this was worse case from preliminary measurements.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1: Radiated Bandedge Measurements

Date of Test: 7/12/2016 0:00
Test Engineer: Rafael Varelas
Test Location: Chamber 7

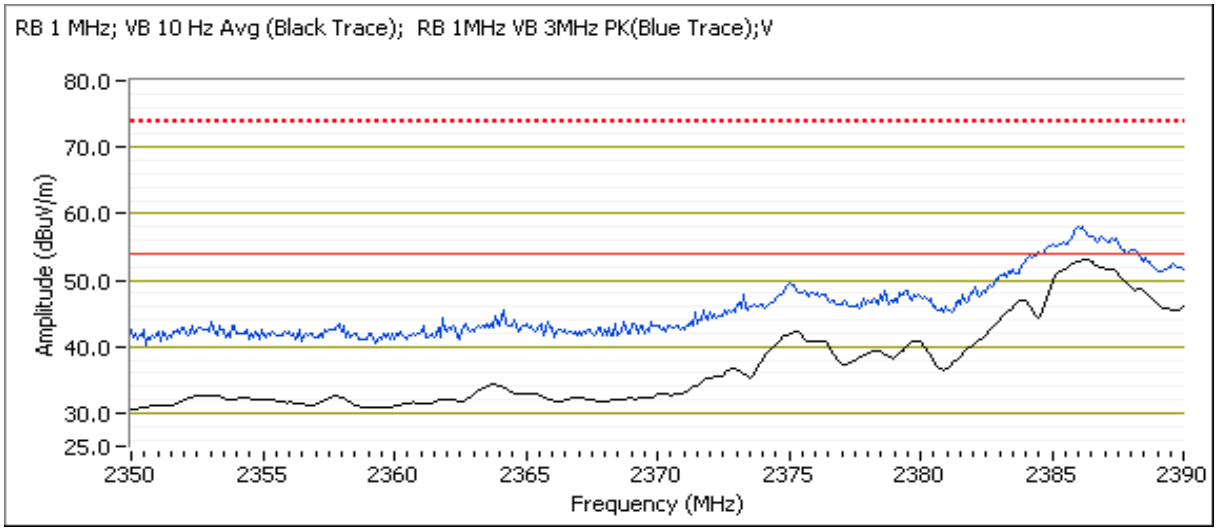
Config. Used: 1
Config Change: none
EUT Voltage: 120V / 60Hz

Channel: 1
Tx Chain: Antenna 2

Mode: b
Data Rate: 1 Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power setting = 17								
2386.270	53.2	V	54.0	-0.8	AVG	188	2.1	
2386.030	58.1	V	74.0	-15.9	PK	188	2.1	
2386.250	52.2	H	54.0	-1.8	AVG	204	1.1	
2386.070	57.2	H	74.0	-16.8	PK	204	1.1	

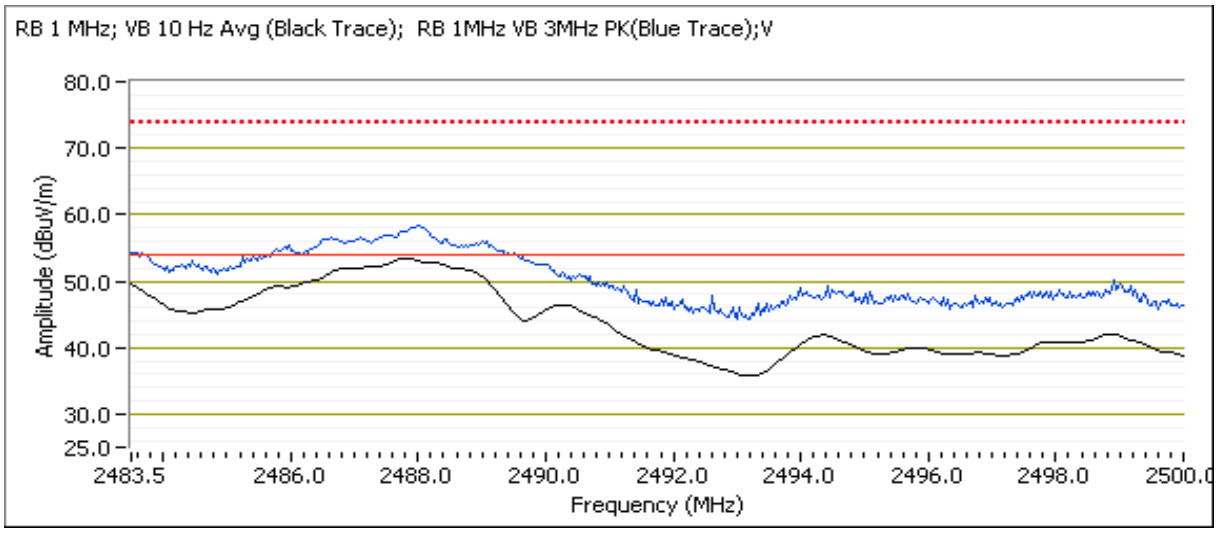


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Channel: 11 Mode: b
Tx Chain: Antenna 2 Data Rate: 1 Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power setting = 18								
2487.770	53.7	V	54.0	-0.3	AVG	183	1.9	POS; RB 1 MHz; VB: 10 Hz
2487.930	58.3	V	74.0	-15.7	PK	183	1.9	POS; RB 1 MHz; VB: 3 MHz
2487.830	48.8	H	54.0	-5.2	AVG	322	1.0	POS; RB 1 MHz; VB: 10 Hz
2487.960	54.1	H	74.0	-19.9	PK	322	1.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

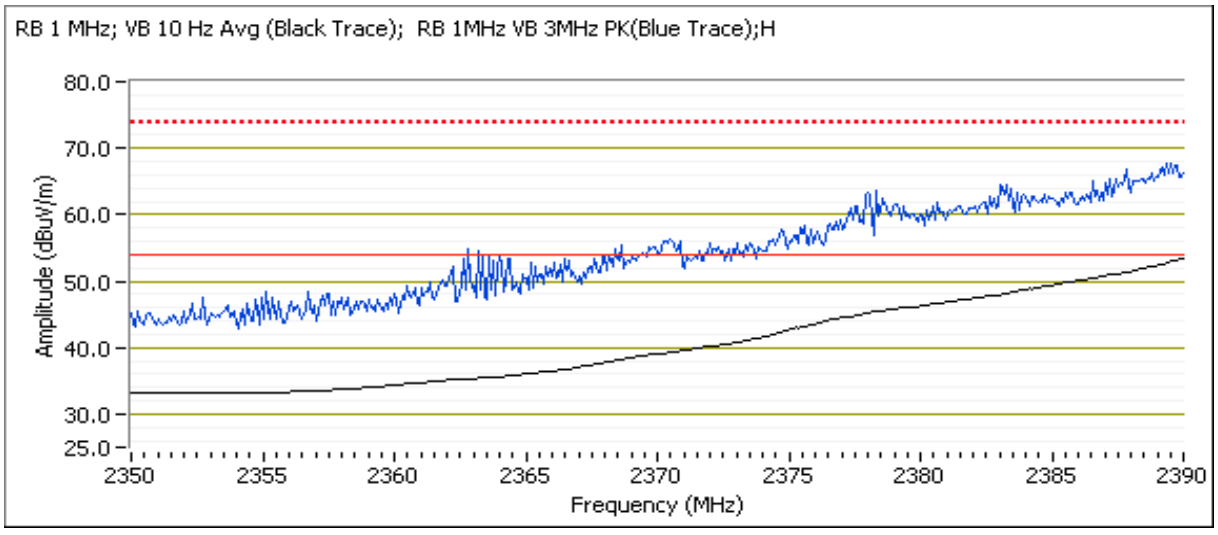
Run #2: Radiated Bandedge Measurements

Date of Test: 7/12/2016 0:00 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: none
Test Location: Chamber 7 EUT Voltage: 120V / 60Hz

Channel: 1 Mode: g
Tx Chain: Antenna 2 Data Rate: 6 Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power setting = 15								
2390.000	53.3	H	54.0	-0.7	AVG	180	1.3	
2389.760	70.2	H	74.0	-3.8	PK	180	1.3	
2390.000	50.0	V	54.0	-4.0	AVG	83	1.0	
2389.760	63.4	V	74.0	-10.6	PK	83	1.0	

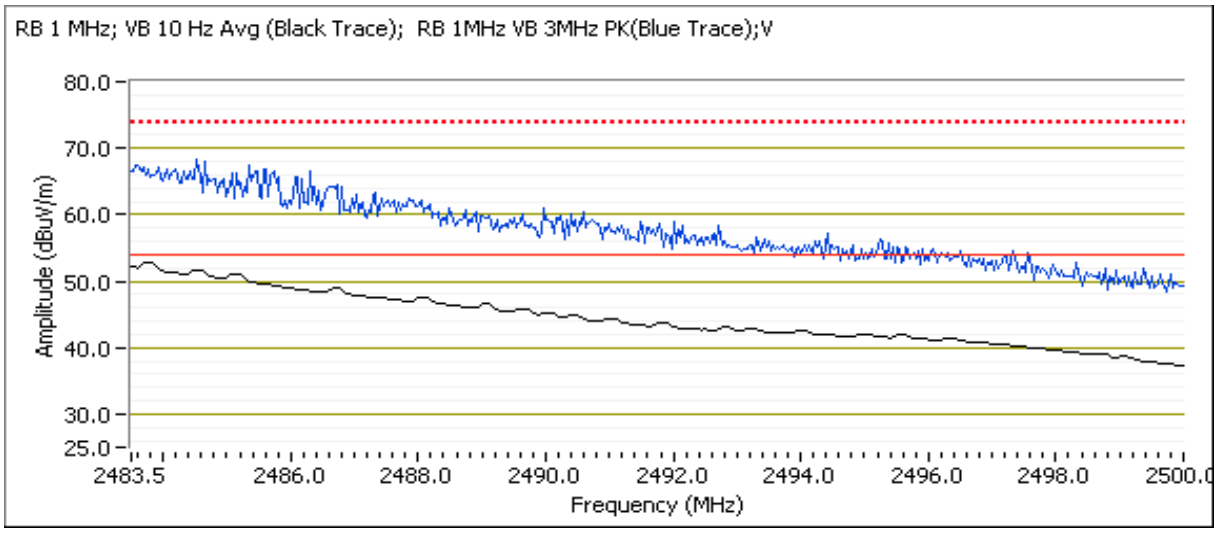


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Channel: 11 Mode: g
Tx Chain: Antenna 2 Data Rate: 6 Mbps

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power setting = 16								
2483.500	53.1	V	54.0	-0.9	AVG	182	2.0	POS; RB 1 MHz; VB: 10 Hz
2484.690	68.3	V	74.0	-5.7	PK	182	2.0	POS; RB 1 MHz; VB: 3 MHz
2483.630	51.1	H	54.0	-2.9	AVG	322	2.0	POS; RB 1 MHz; VB: 10 Hz
2483.930	66.2	H	74.0	-7.8	PK	322	2.0	POS; RB 1 MHz; VB: 3 MHz



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

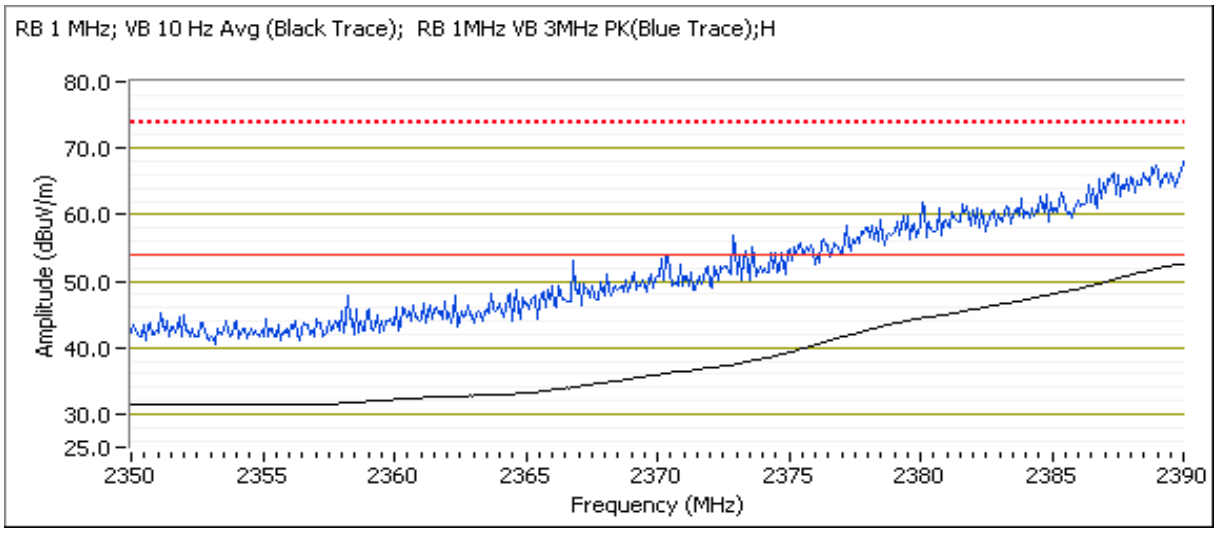
Run #3: Radiated Bandedge Measurements

Date of Test: 7/12/2016 0:00 Config. Used: 1
Test Engineer: Rafael Varelas Config Change: none
Test Location: Chamber 7 EUT Voltage: 120V / 60Hz

Channel: 1 Mode: n20
Tx Chain: Antenna 2 Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power setting = 14								
2390.000	52.7	H	54.0	-1.3	AVG	179	1.0	POS; RB 1 MHz; VB: 10 Hz
2389.840	67.9	H	74.0	-6.1	PK	179	1.0	POS; RB 1 MHz; VB: 3 MHz
2390.000	51.6	V	54.0	-2.4	AVG	84	1.5	POS; RB 1 MHz; VB: 10 Hz
2388.720	65.2	V	74.0	-8.8	PK	84	1.5	POS; RB 1 MHz; VB: 3 MHz

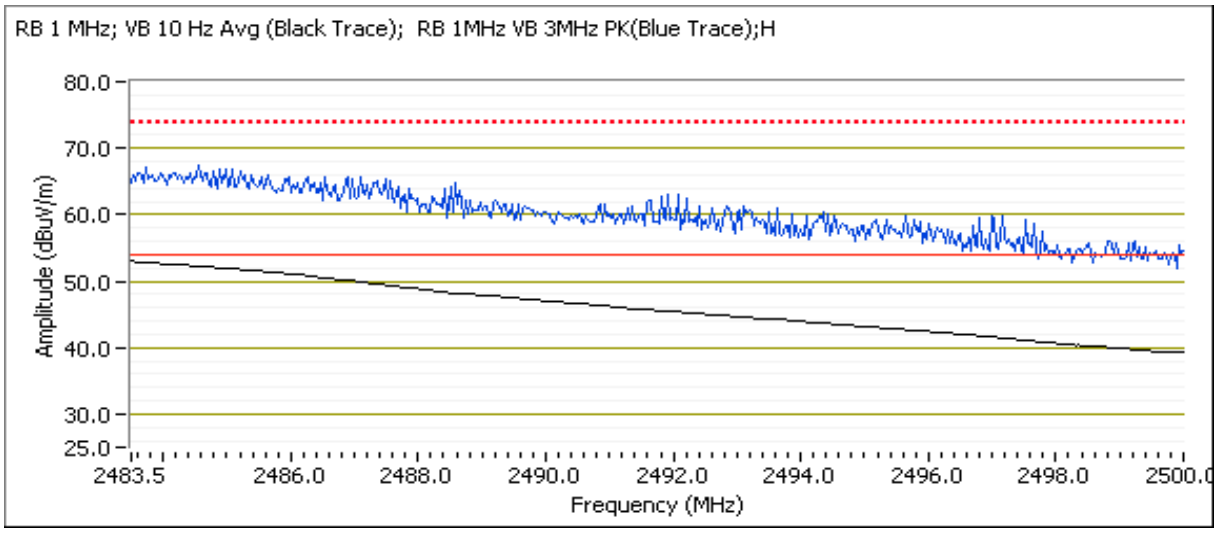


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Channel: 11 Mode: n20
Tx Chain: Antenna 2 Data Rate: MCS0

Band Edge Signal Field Strength - Direct measurement of field strength

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power setting = 17								
2483.500	53.0	H	54.0	-1.0	AVG	323	1.9	POS; RB 1 MHz; VB: 10 Hz
2485.250	67.8	H	74.0	-6.2	PK	323	1.9	POS; RB 1 MHz; VB: 3 MHz
2483.500	50.3	V	54.0	-3.7	AVG	128	2.3	POS; RB 1 MHz; VB: 10 Hz
2484.560	66.5	V	74.0	-7.5	PK	128	2.3	POS; RB 1 MHz; VB: 3 MHz



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 22.8 °C
Rel. Humidity: 37 %

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

Run #	Mode	Channel	Target Power (dBm)	Passing Power Setting	Test Performed	Limit	Result / Margin
1	b	1 - 2412MHz	-	18	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	49.7 dBµV/m @ 7235.3 MHz (-4.3 dB)
	b	6 - 2437MHz		18			47.1 dBµV/m @ 7310.2 MHz (-6.9 dB)
	b	11 - 2462MHz		18			46.9 dBµV/m @ 4924.0 MHz (-7.1 dB)
Scans on center channel in both OFDM modes to determine the worse case mode.							
2	g	6 - 2437MHz	-	17	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	43.5 dBµV/m @ 7310.2 MHz (-10.5 dB)
	n20	6 - 2437MHz	-	17			43.1 dBµV/m @ 7308.8 MHz (-10.9 dB)
Measurements on low and high channels in worst-case OFDM mode.							
3	g	1 - 2412MHz	-	17	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	45.3 dBµV/m @ 7232.1 MHz (-8.7 dB)
	g	11 - 2462MHz	-	17			42.8 dBµV/m @ 7385.5 MHz (-11.2 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.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Sample Notes

Sample S/N: 6629AZZB75
Driver: 1.21
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 ≥ 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	1 Mbps	1.00	Yes	18.95	0	0	53
11g	6 Mbps	0.99	Yes	3.13	0	0	319
n20	MCS0	1.00	Yes	9.92	0	0	101

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: All testing performed on the Antenna 2 port (wifi set to 10 2 2), as this was worse case from preliminary measurements.

Preliminary measurement demonstrated no spurious emissions below 1GHz.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

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

Date of Test: 7/11/2016 0:00
Test Engineer: Rafael Varelas
Test Location: Chamber 7

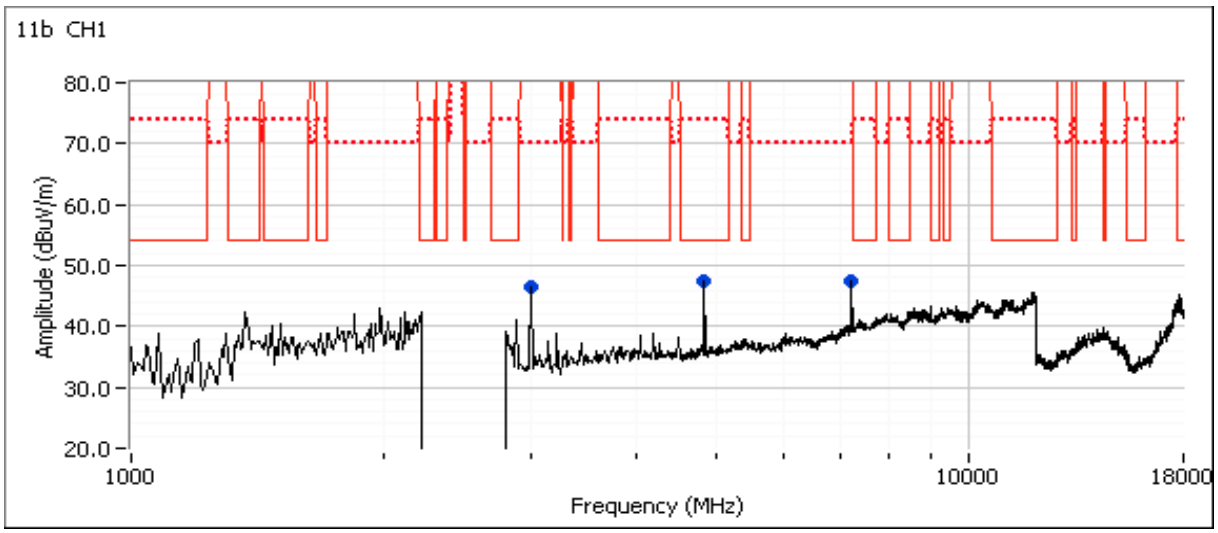
Config. Used: 1
Config Change: none
EUT Voltage: 120V / 60Hz

Run #1a: Low Channel

Channel: 1
Tx Chain: Antenna 2

Mode: b
Data Rate: 1 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7235.260	49.7	V	54.0	-4.3	AVG	51	1.0	Note 1
7234.960	55.5	V	74.0	-18.5	PK	51	1.0	Note 1
3019.440	30.4	V	54.0	-23.6	AVG	178	1.8	Note 1
3016.770	42.1	V	74.0	-31.9	PK	178	1.8	Note 1
4824.020	45.3	V	54.0	-8.7	AVG	54	1.0	
4824.040	49.5	V	74.0	-24.5	PK	54	1.0	



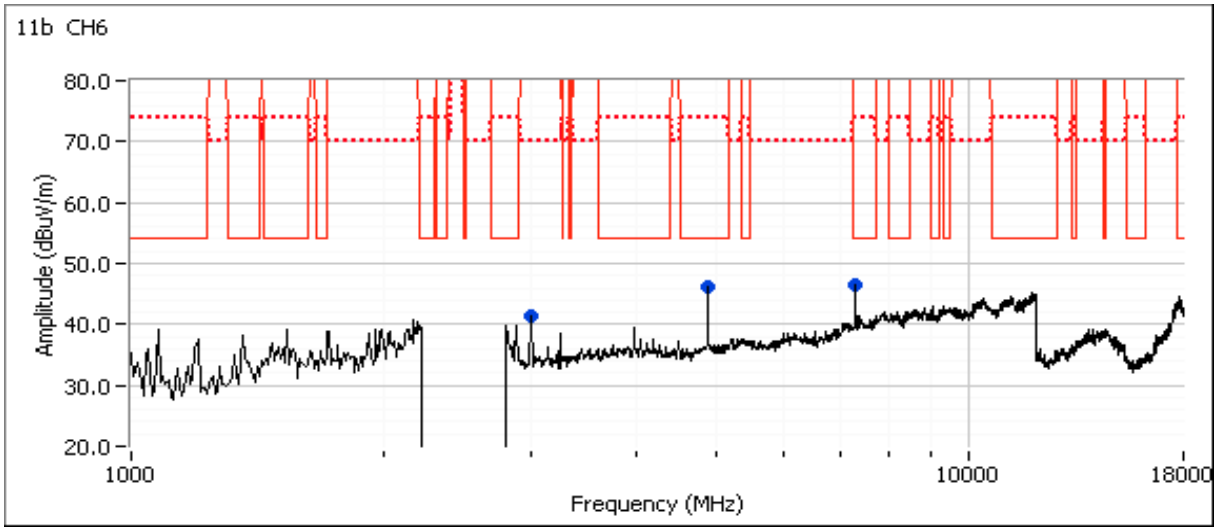
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1b: Center Channel

Channel: 6 Mode: b
Tx Chain: Antenna 2 Data Rate: 1 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7310.230	47.1	V	54.0	-6.9	AVG	36	1.27	
7309.530	53.7	V	74.0	-20.3	PK	36	1.27	
3000.000	41.3	V	54.0	-12.7	Peak	193	1.5	Note 1, pk measurement vs avg limit
4874.020	45.9	V	54.0	-8.1	AVG	72	1.99	
4873.980	50.1	V	74.0	-23.9	PK	72	1.99	

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

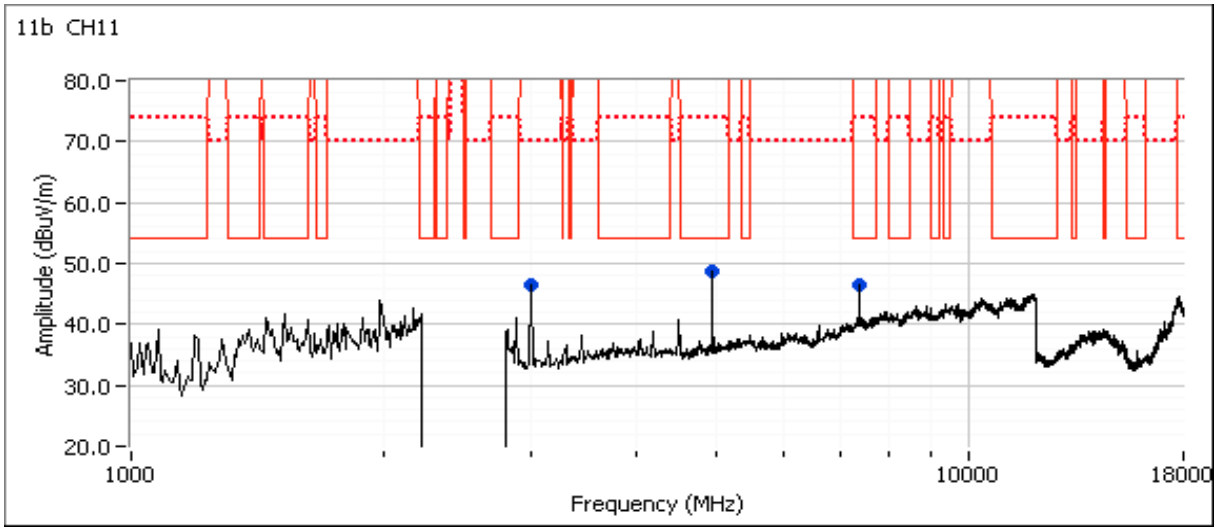


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1c: High Channel

Channel: 11 Mode: b
Tx Chain: Antenna 2 Data Rate: 1 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4923.960	46.9	V	54.0	-7.1	AVG	40	1.5	
4924.020	51.0	V	74.0	-23.0	PK	40	1.5	
7385.230	46.3	V	54.0	-7.7	AVG	35	1.0	
7384.760	54.2	V	74.0	-19.8	PK	35	1.0	
2994.790	36.5	V	54.0	-17.5	AVG	182	1.0	Note 1
2993.270	53.8	V	74.0	-20.2	PK	182	1.0	Note 1



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

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

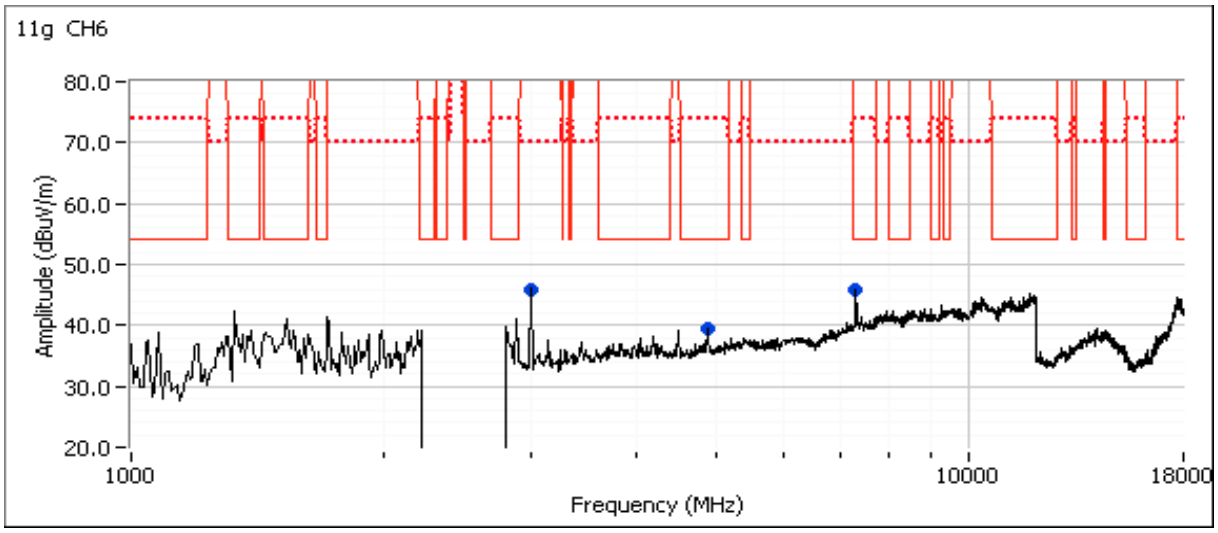
Date of Test: 7/11/2016 0:00 Config. Used: 1
Test Engineer: John Caizzi / R. Varelas Config Change: none
Test Location: Chamber 7 EUT Voltage: 120V / 60Hz

Run #2a: Center Channel

Channel: 6 Mode: g
Tx Chain: Antenna 2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7310.220	43.5	V	54.0	-10.5	AVG	40	1.2	
7312.020	58.3	V	74.0	-15.7	PK	40	1.2	
2997.930	30.3	V	54.0	-23.7	AVG	172	1.0	Note 1
2998.030	41.8	V	74.0	-32.2	PK	172	1.0	Note 1
4874.110	36.0	V	54.0	-18.0	AVG	132	1.6	
4870.650	47.3	V	74.0	-26.7	PK	132	1.6	

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



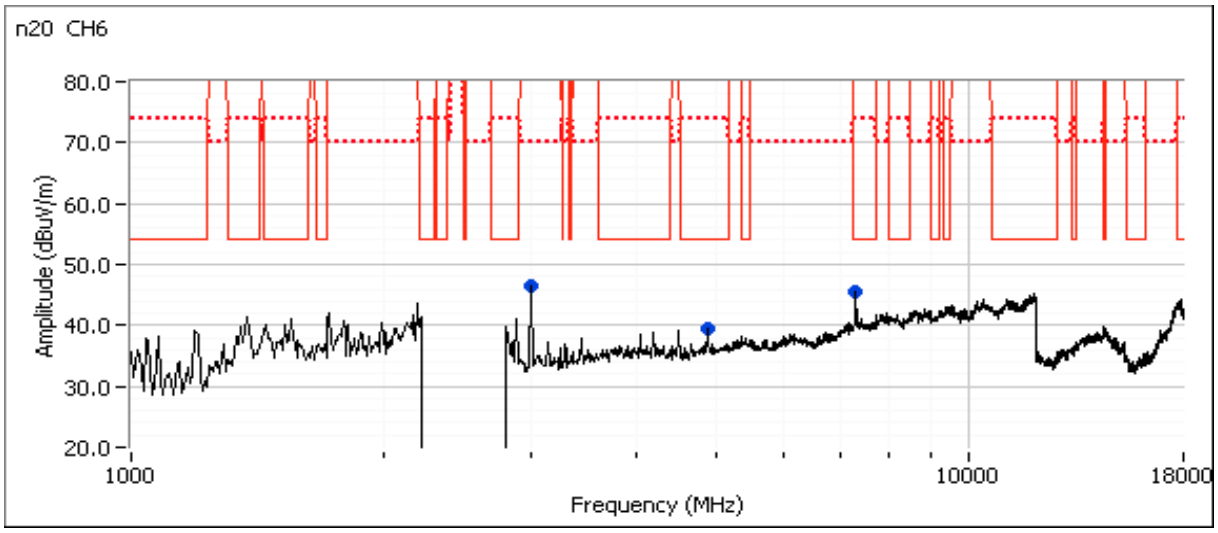
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #2b: Center Channel

Channel: 6 Mode: n20
Tx Chain: Antenna 2 Data Rate: MCS0

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7308.750	43.1	V	54.0	-10.9	AVG	40	1.0	
7305.050	58.2	V	74.0	-15.8	PK	40	1.0	
4873.820	35.9	V	54.0	-18.1	AVG	38	1.5	
4868.320	48.3	V	74.0	-25.7	PK	38	1.5	
2996.800	30.2	V	54.0	-23.8	AVG	178	1.1	Note 1
2998.380	42.2	V	74.0	-31.8	PK	178	1.1	Note 1

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:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

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

Date of Test: 7/11/2016 0:00
Test Engineer: Rafael Varelas
Test Location: Chamber 7

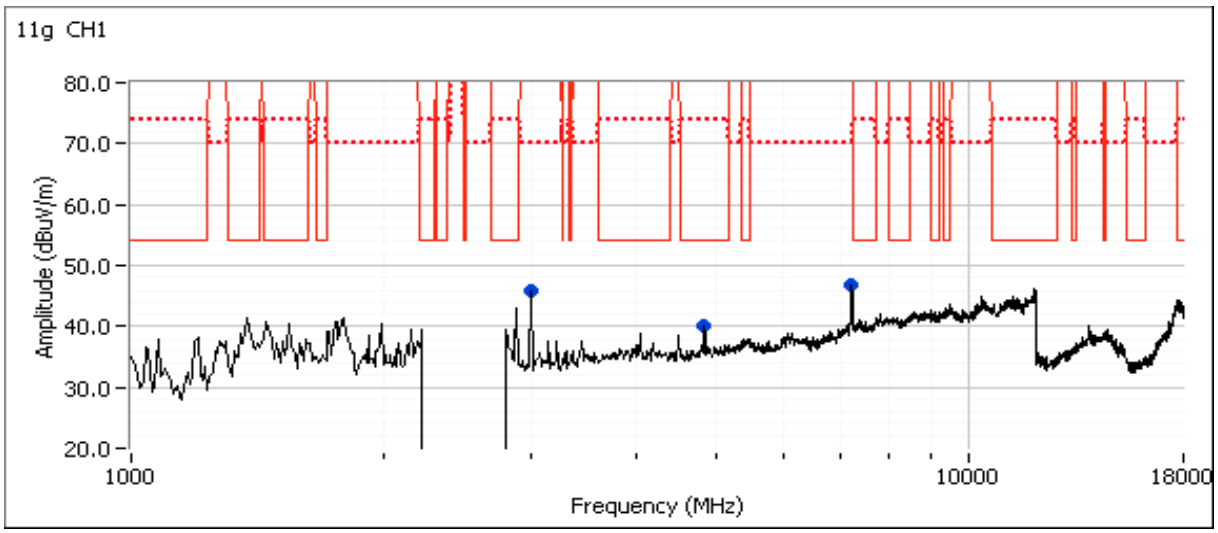
Config. Used: 1
Config Change: none
EUT Voltage: 120V / 60Hz

Run #3a: Low Channel

Channel: 1
Tx Chain: Antenna 2

Mode: g
Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7232.120	45.3	V	54.0	-8.7	AVG	48	1.0	Note 1
7232.590	60.3	V	74.0	-13.7	PK	48	1.0	Note 1
4823.950	35.8	V	54.0	-18.2	AVG	45	1.1	
4823.680	47.6	V	74.0	-26.4	PK	45	1.1	
2998.160	30.3	V	54.0	-23.7	AVG	180	1.0	Note 1
3000.510	42.2	V	74.0	-31.8	PK	180	1.0	Note 1

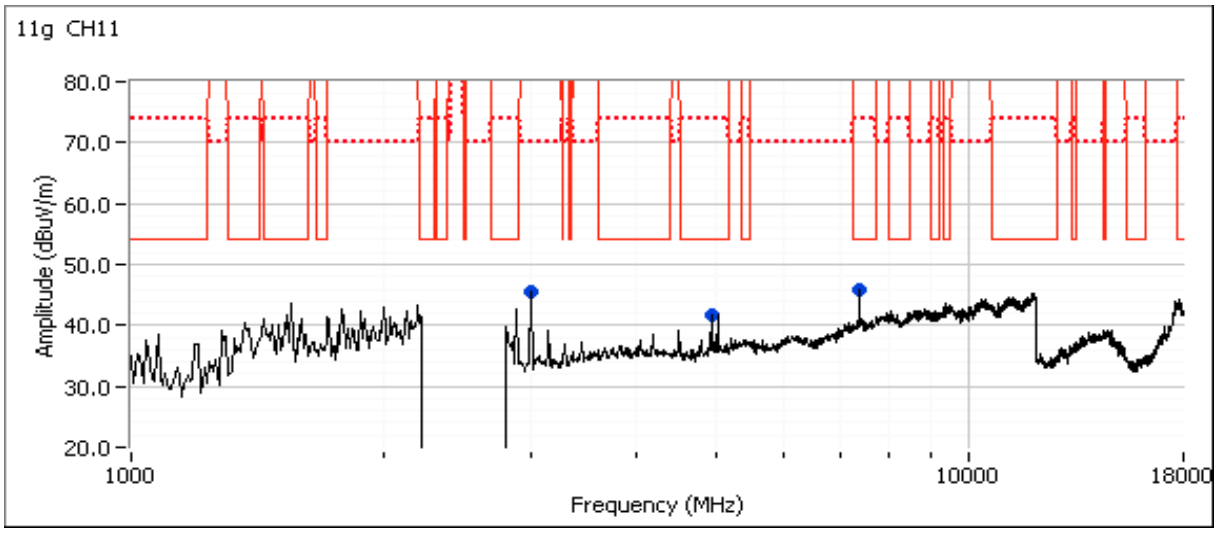


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #3b: High Channel

Channel: 11 Mode: g
Tx Chain: Antenna 2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7385.490	42.8	V	54.0	-11.2	AVG	33	1.3	
7381.790	57.5	V	74.0	-16.5	PK	33	1.3	
4924.040	36.1	V	54.0	-17.9	AVG	46	1.9	
4927.140	48.3	V	74.0	-25.7	PK	46	1.9	
2992.630	39.1	V	54.0	-14.9	AVG	179	1.0	Note 1
2992.580	53.6	V	74.0	-20.4	PK	179	1.0	Note 1



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 22.6 °C
Rel. Humidity: 35 %

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

Run #	Mode	Channel	Target Power (dBm)	Passing Power Setting	Test Performed	Limit	Result / Margin
1	BLE + 11b	2402MHz 2462MHz	-	6 18	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	49.4 dBµV/m @ 4924.0 MHz (-4.6 dB)
	BLE + 11a	2480MHz 5200MHz	-	6 19	Radiated Emissions, 1 - 25 GHz	FCC Part 15.209 / 15.247(c)	46.5 dBµV/m @ 20800.1 MHz (-7.5 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample S/N: 6629AZZB75
Driver: 1.21
Antenna: Internal

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	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 ≥ 98% and was measured using RBW=1MHz, VBW=10Hz, peak detector, linear average mode, auto sweep time, max hold.
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	1Mbps	0.61	Yes	0.383	2.2	4.3	2611
11b	1 Mbps	1.00	Yes	18.95	0	0	53
11g/a	6 Mbps	0.99	Yes	3.13	0	0	319

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 4:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear averaging, auto sweep, trace average 100 traces, measurement corrected by Linear voltage correction factor
Note 6:	Emission has non constant duty cycle < 98%, 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

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

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

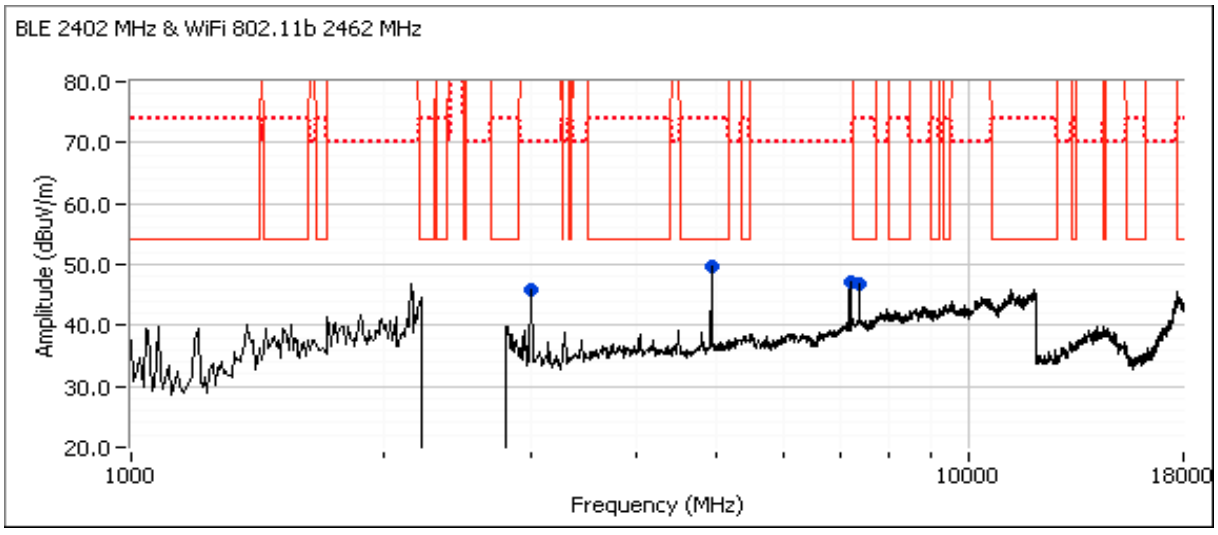
Date of Test: 7/26/2016 & 7/27/16 — Config. Used: 1
Test Engineer: Rafael Varelas & John Caizzi — Config Change: None
Test Location: FT Chamber #7 — EUT Voltage: 120V/60Hz

Run #1a: Radiated Spurious Emissions

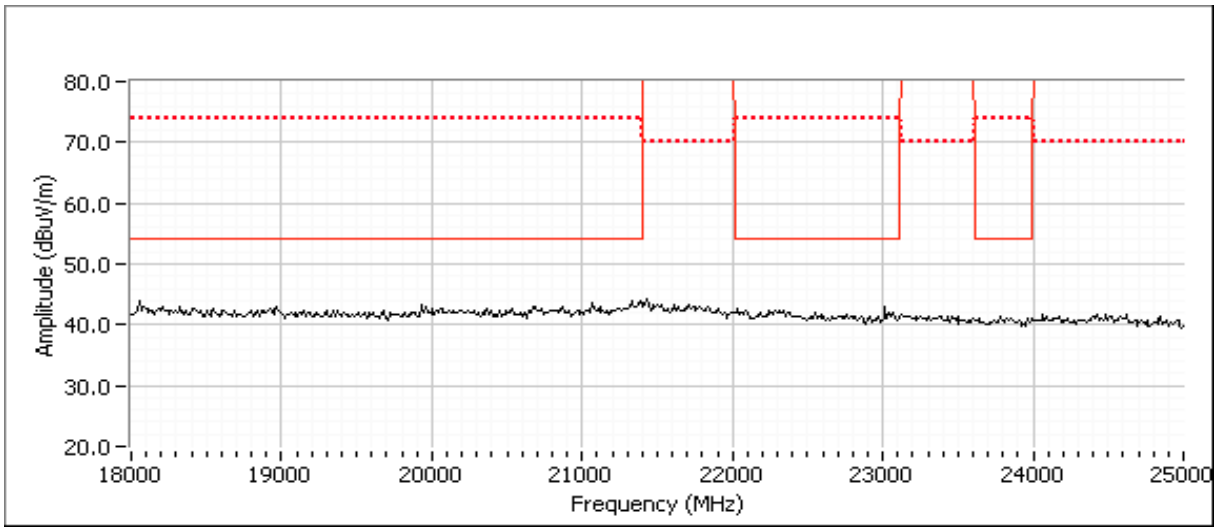
Channel: 2402MHz — Mode: BLE
Tx Chain: Aux — Data Rate: 1Mbps

Channel: 2462 MHz — Mode: b
Tx Chain: Aux — Data Rate: 1Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
7385.180	46.3	V	54.0	-7.7	AVG	32	1.0	RB 1 MHz;VB 10 Hz;Peak
7384.840	53.9	V	74.0	-20.1	PK	32	1.0	RB 1 MHz;VB 3 MHz;Peak
4924.010	49.4	V	54.0	-4.6	AVG	33	1.6	RB 1 MHz;VB 10 Hz;Peak
4924.150	53.0	V	74.0	-21.0	PK	33	1.6	RB 1 MHz;VB 3 MHz;Peak
7205.460	47.3	V	54.0	-6.7	Avg	334	1.6	Note 4,1, VB 3 kHz;Peak VAVG 100
7206.670	52.5	V	74.0	-21.5	PK	334	1.6	RB 1 MHz;VB 3 MHz;Peak
2991.670	45.9	V	-	-	Peak	254	1.0	Not radio signal



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A



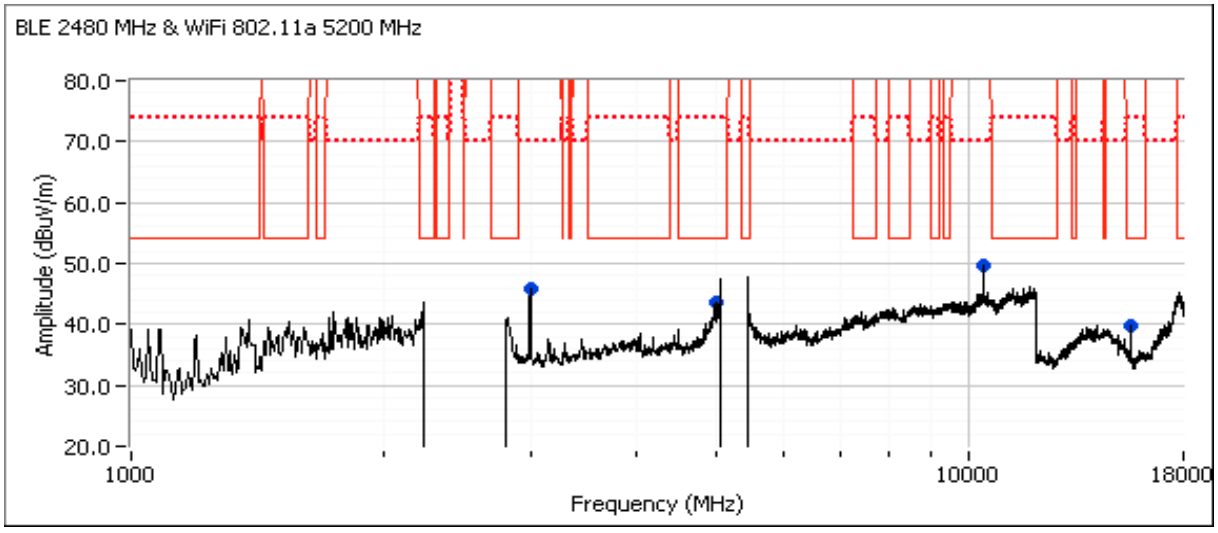
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1b: Radiated Spurious Emissions

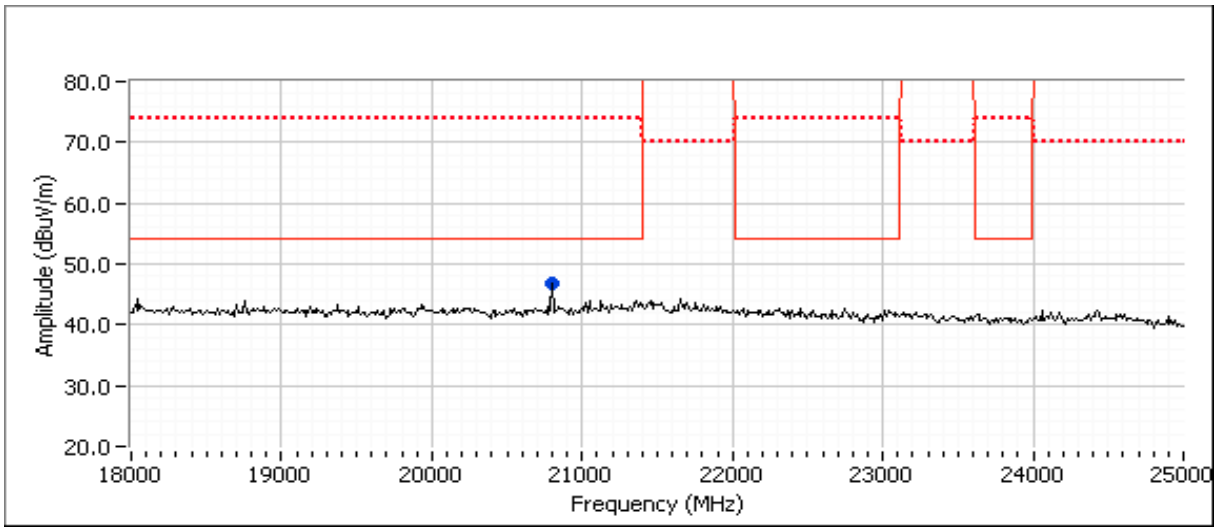
Channel: 2480MHz Mode: BLE
Tx Chain: Aux Data Rate: 1Mbps

Channel: 5200 MHz Mode: 11a
Tx Chain: Aux Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
2996.160	45.9	V	-	-	Peak	244	1.0	Not radio signal
4973.200	43.9	V	54.0	-10.1	Avg	254	1.9	Note 4;VB 3 kHz;Peak VAVG 100
4973.470	51.8	V	74.0	-22.2	PK	254	1.9	RB 1 MHz;VB 3 MHz;Peak
10406.440	57.4	H	68.3	-10.9	PK	94	1.1	RB 1 MHz;VB 3 MHz;Peak
15600.130	42.8	V	54.0	-11.2	AVG	55	1.8	
15602.800	54.8	V	74.0	-19.2	PK	55	1.8	
20800.120	46.5	H	54.0	-7.5	AVG	266	1.6	
20800.070	52.9	H	74.0	-21.1	PK	266	1.6	



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T101744
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A



Client:	Google Inc	Job Number:	JD101591
Product	H0ME	T-Log Number:	T102213
System Configuration:	-	Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Emissions Standard(s):	FCC 15.247/15.407/RSS-247	Class:	B
Immunity Standard(s):	-	Environment:	-

EMC Test Data

For The

Google Inc

Product

H0ME

Date of Last Test: 8/1/2016

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 7/26/2016
Test Engineer: Mehran Birgani
Test Location: Lab 4

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

General Test Configuration

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

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

Ambient Conditions:

Temperature: 20-22 °C
Rel. Humidity: 35-40 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	6		Output Power	15.247(b)	Pass	5.6 dBm (3.6mW)
2	6		Power spectral Density (PSD)	15.247(d)	Pass	-4.1 dBm/10kHz
3	6		Minimum 6dB Bandwidth	15.247(a)	Pass	0.695 MHz
3	6		99% Bandwidth	RSS GEN	-	1.02 MHz
4	6		Spurious emissions	15.247(b)	Pass	> 20dB margin

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: 6629AZZB6W
Driver: 1.21
Measurements performed on the worse case output (Antenna 2) based on preliminary measurements. All calculations using the highest antenna gain.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	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	1Mbps	0.61	Yes	0.383	2.2	4.3	2611

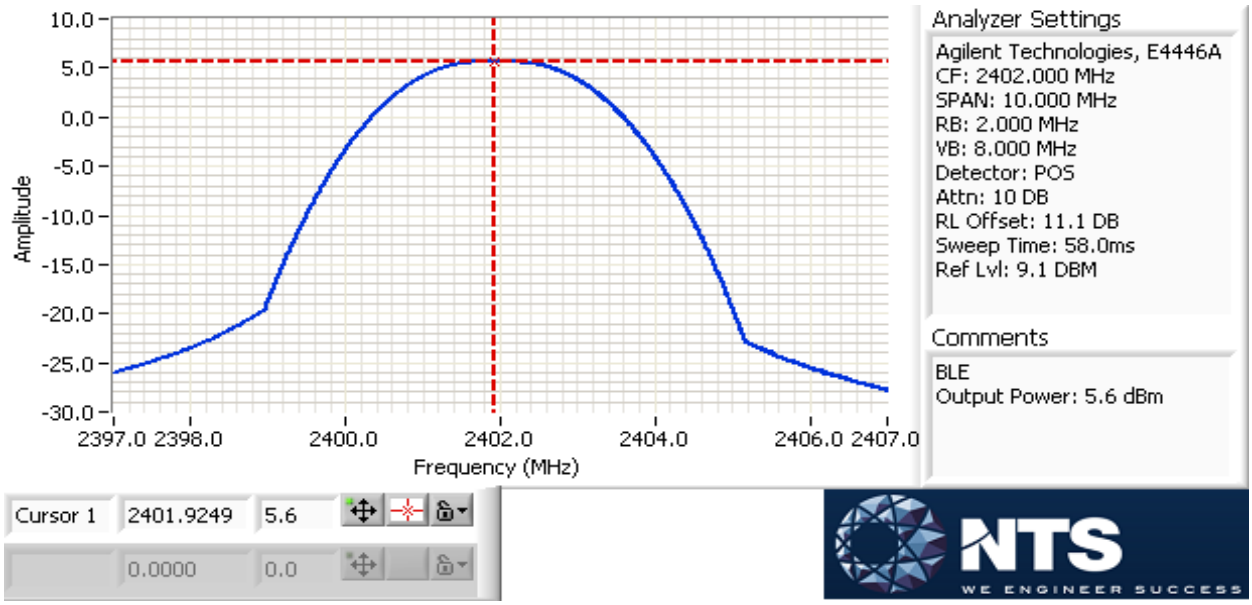
Note: Only plots of the worse case results are provided

Run #1: Output Power

Mode: BLE

Power Setting[2]	Frequency (MHz)	Output Power (dBm)[1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm)[3]	Output Power mW
6	2402	5.6	3.6	3.3	Pass	8.9	0.008		
6	2442	5.4	3.5	3.3	Pass	8.7	0.007		
6	2480	5.2	3.3	3.3	Pass	8.5	0.007		

Note 1:	Output power measured using a spectrum analyzer with RBW > OBW and VB ≥3* RBW, Span ≥ 1.5 of OBW, auto sweep time, Peak detector and max hold. Spurious limit becomes -20dBc.



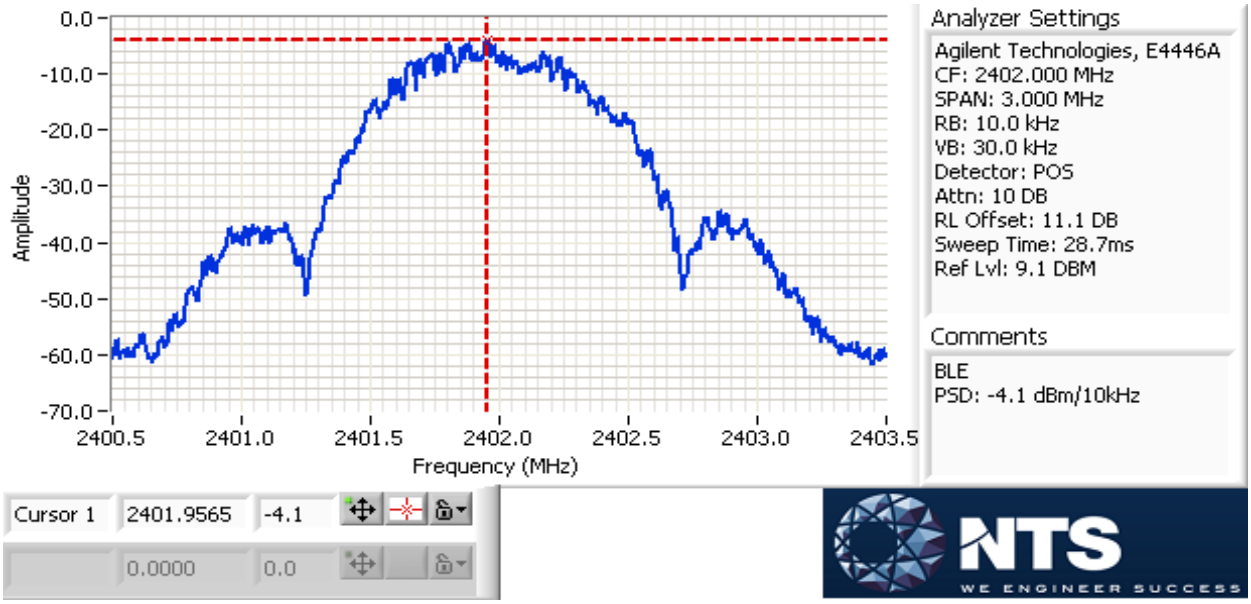
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #2: Power spectral Density

Mode: BLE

Power Setting	Frequency (MHz)	PSD (dBm/10kHz) Note 1	Limit dBm/3kHz	Result
6	2402	-4.1	8.0	Pass
6	2440	-4.3	8.0	Pass
6	2480	-4.4	8.0	Pass

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



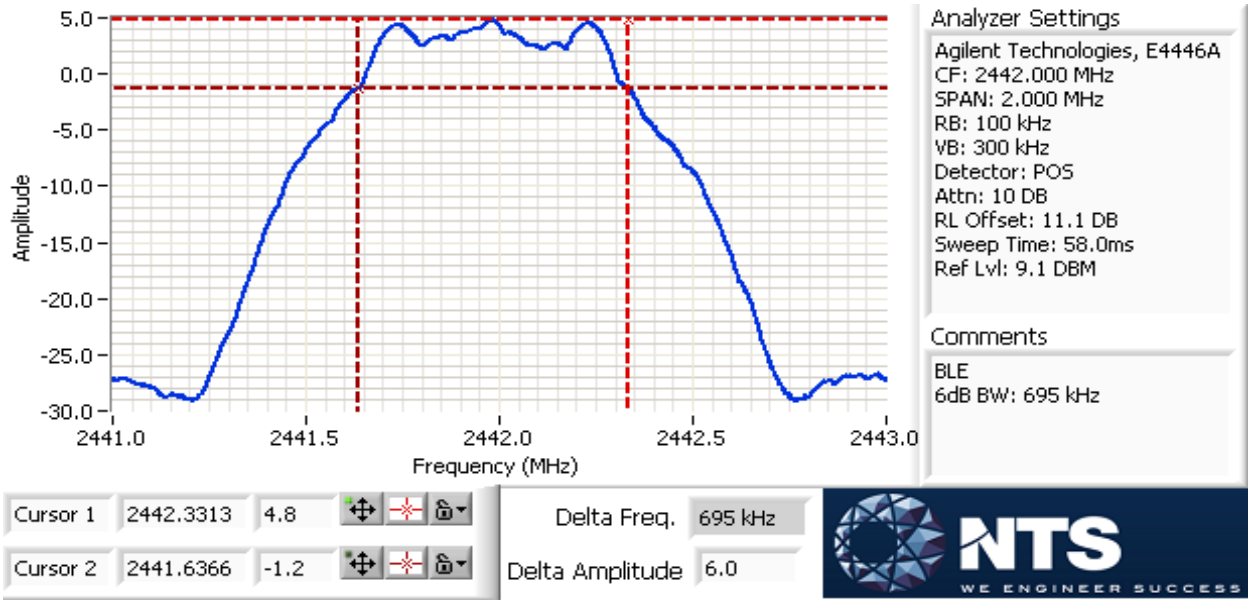
Run #3: Signal Bandwidth

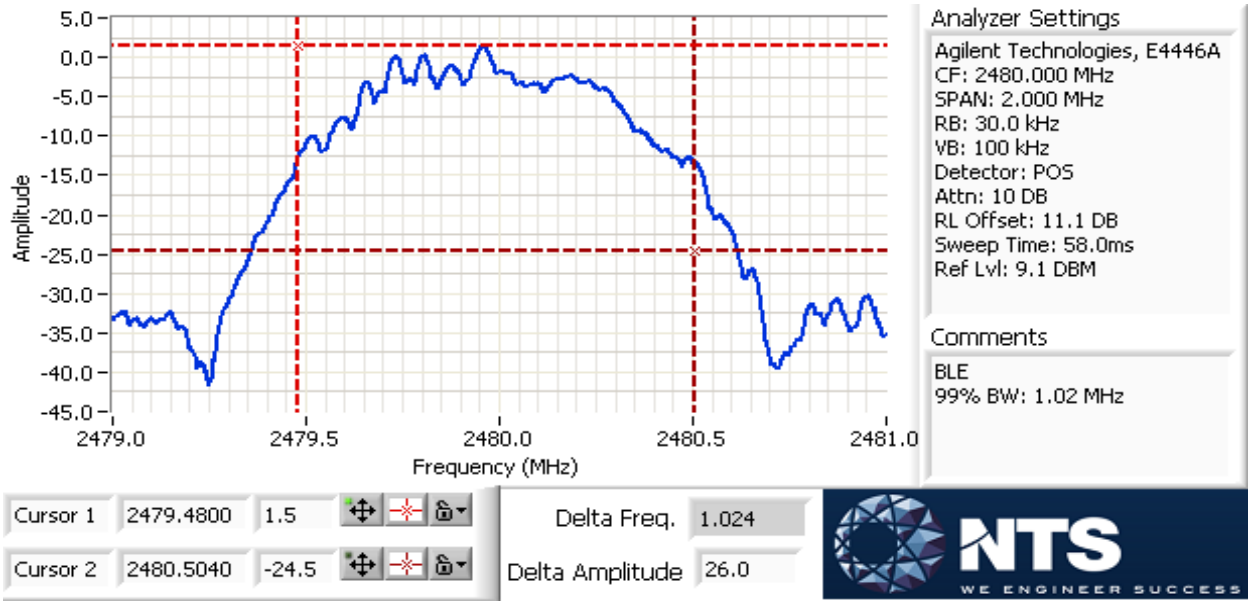
Mode: BLE

Power Setting	Frequency (MHz)	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	RBW Setting (kHz) 6dB	RBW Setting (kHz) 99%
6	2402	0.695	1.02	100	30
6	2440	0.695	1.02	100	30
6	2480	0.697	1.02	100	30

Note 1:	DTS BW: RBW=100kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time, Span 2-5 times measured BW. 99% BW: RBW=1-5% of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. Span 1.5-5 times OBW.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A





Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

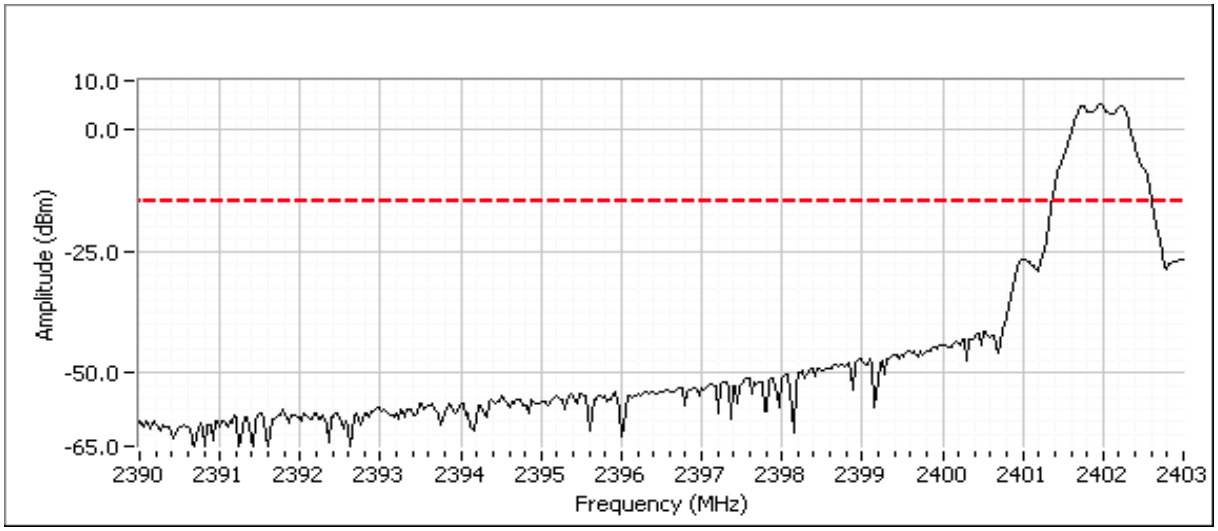
Run #4a: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting	Mode	Limit	Result
2402	6	BLE	-20dBc	Pass
2440	6	BLE	-20dBc	Pass
2480	6	BLE	-20dBc	Pass

RBW = 100 kHz and VBW = 300 kHz for all plots.

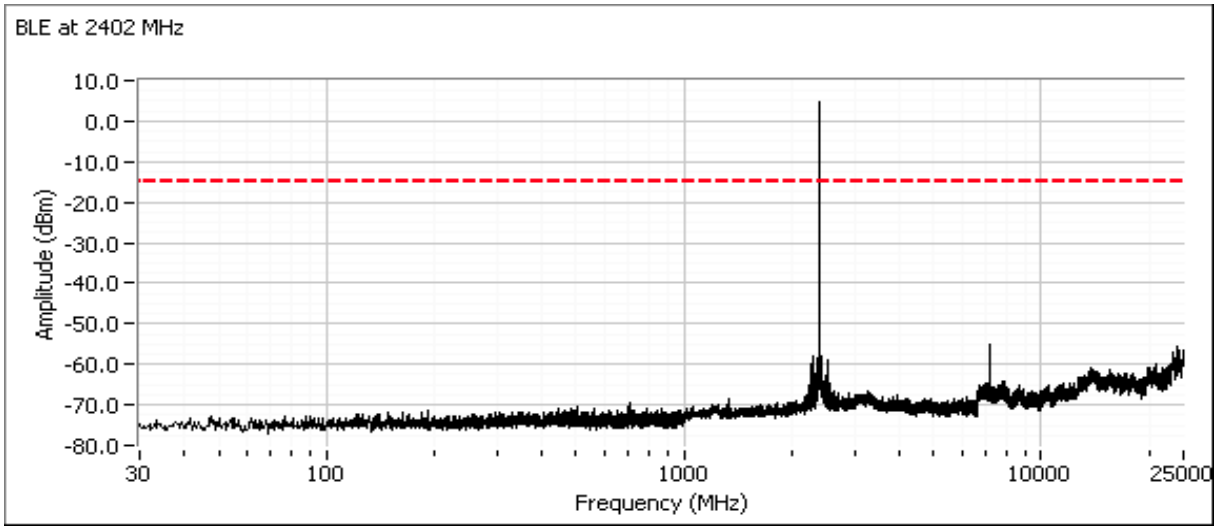
Plots for low channel

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

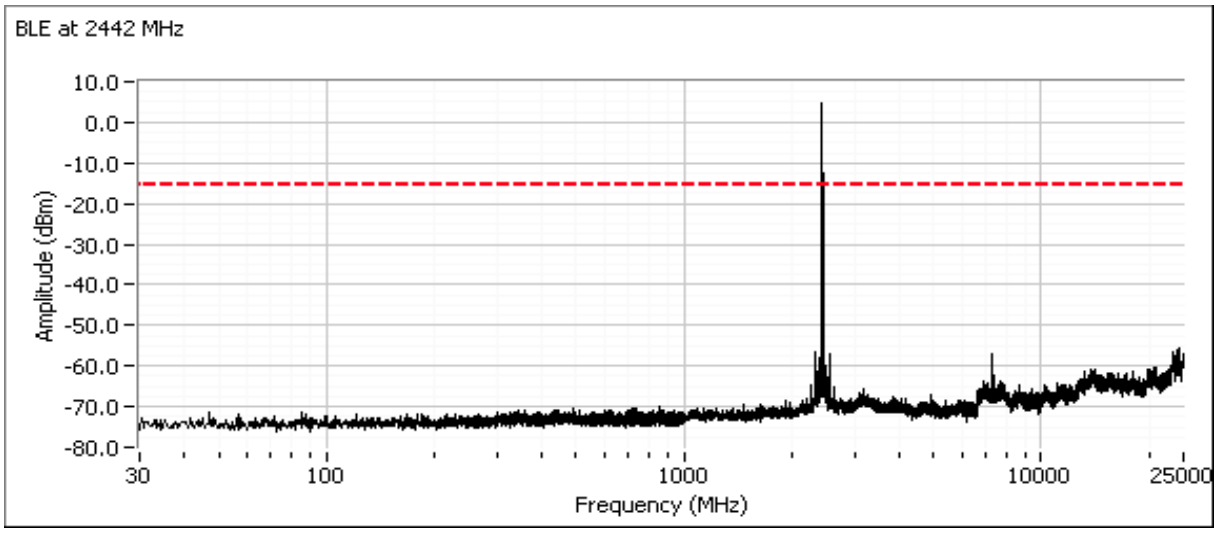


Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Plots for low channel

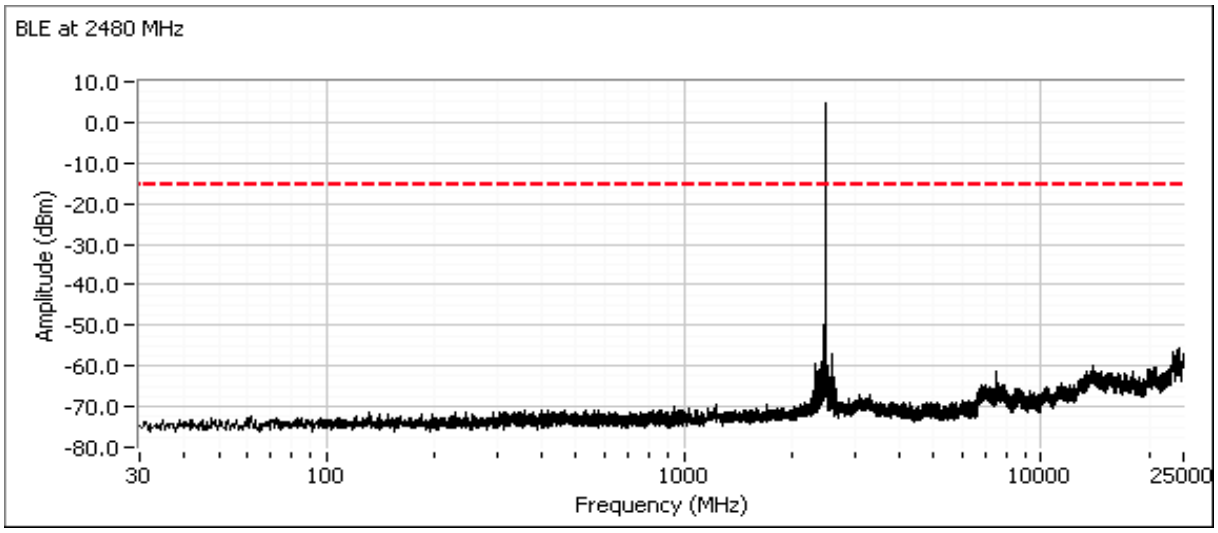


Plots for center channel



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Plots for high channel



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

RSS-247 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: 7/25/2016
Test Engineer: Rafael Varelas
Test Location: FT Lab #3

Config. Used: 1
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: 22.4 °C
Rel. Humidity: 33 %

Summary of Results

Run #	Pwr setting	Avg Pwr	Test Performed	Limit	Pass / Fail	Result / Margin
1	-	-	Output Power	15.247(b)	Pass	11b: 18.1dBm (64.6mW) 11g: 17.0dBm (50.1mW) n20: 17.2dBm (52.5mW)
2	-	-	Power spectral Density (PSD)	15.247(d)	Pass	11b: -0.2 dBm/10kHz 11g: -3.3 dBm/10kHz n20: -2.5 dBm/10kHz
3	-	-	Minimum 6dB Bandwidth	15.247(a)	Pass	10.1 MHz
3	-	-	99% Bandwidth	RSS GEN	-	b: 13.3MHz g: 16.8MHz n20: 17.7MHz
4	-	-	Spurious emissions	15.247(b)	Pass	All emissions below -30dBc

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	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	1 Mbps	1.00	Yes	18.95	0	0	53
11g	6 Mbps	0.99	Yes	3.13	0	0	319
n20	MCS0	1.00	Yes	9.92	0	0	101

Sample Notes

Sample S/N: 6629AZZB6W

Driver: 1.21

Measurements performed on the worse case output (Aux) based on preliminary measurements. All calculations using the highest antenna gain.

Note: Only plots of the worse case results are provided

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #1: Output Power

Mode: 11b

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm)	Output Power mW
17	2412	17.1	51.3	3.3	Pass	20.4	0.110		
18	2437	18.1	64.6	3.3	Pass	21.4	0.138		
18	2462	17.8	60.3	3.3	Pass	21.1	0.129		

Mode: 11g

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm)	Output Power mW
15	2412	15.2	33.1	3.3	Pass	18.5	0.071		
17	2437	17.0	50.1	3.3	Pass	20.3	0.107		
16	2462	16.0	39.8	3.3	Pass	19.3	0.085		

Mode: n20

Power Setting[2]	Frequency (MHz)	Output Power (dBm) [1]	Output Power mW	Antenna Gain (dBi)	Result	EIRP dBm	EIRP W	Output Power (dBm)	Output Power mW
14	2412	14.4	27.5	3.3	Pass	17.7	0.059		
17	2437	17.2	52.5	3.3	Pass	20.5	0.112		
17	2462	17.1	51.3	3.3	Pass	20.4	0.110		

Note 1:	Power measured using average power meter
Note 2:	Power setting - the software power setting used during testing, included for reference only.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #2: Power spectral Density

Mode: 11b

Power Setting	Frequency (MHz)	PSD (dBm/10kHz) Note 1	Limit dBm/3kHz	Result
17	2412	-1.1	8.0	Pass
18	2437	-0.2	8.0	Pass
18	2462	-0.4	8.0	Pass

Mode: 11g

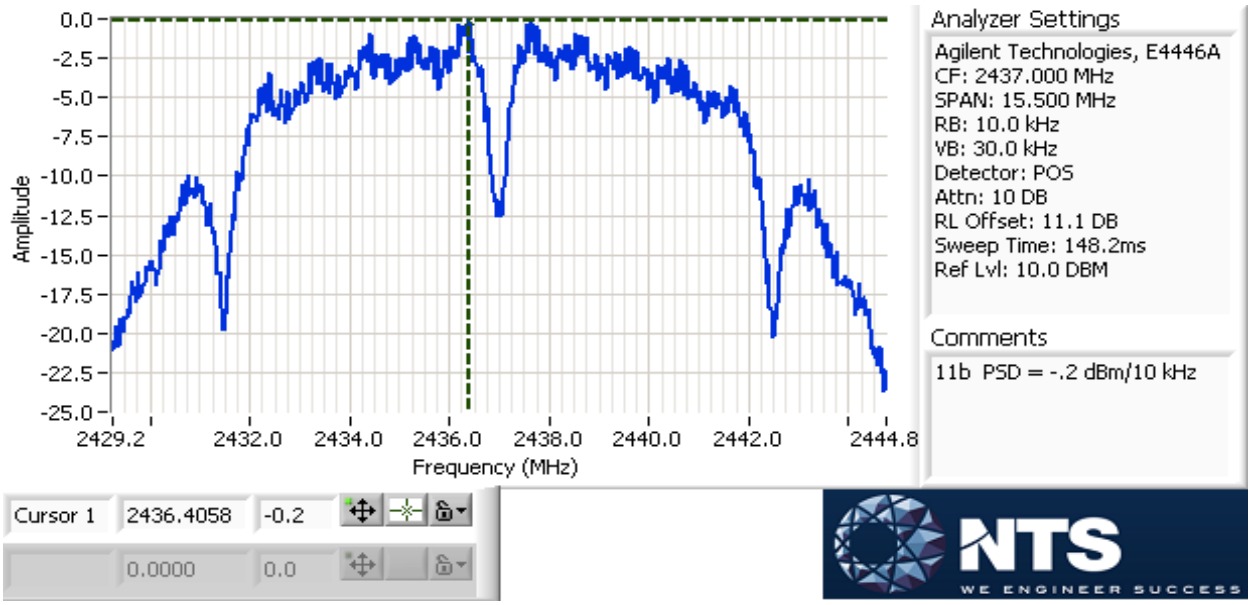
Power Setting	Frequency (MHz)	PSD (dBm/10kHz) Note 1	Limit dBm/3kHz	Result
15	2412	-4.8	8.0	Pass
17	2437	-3.3	8.0	Pass
16	2462	-4.2	8.0	Pass

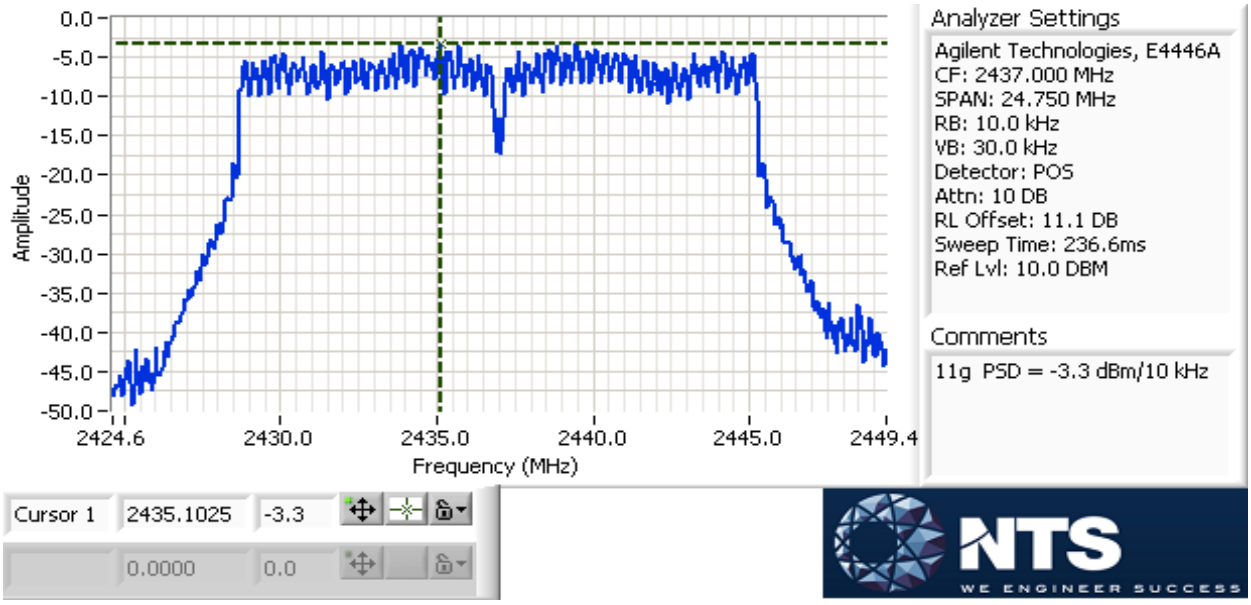
Mode: n20

Power Setting	Frequency (MHz)	PSD (dBm/10kHz) Note 1	Limit dBm/3kHz	Result
14	2412	-5.2	8.0	Pass
17	2437	-2.5	8.0	Pass
17	2462	-2.8	8.0	Pass

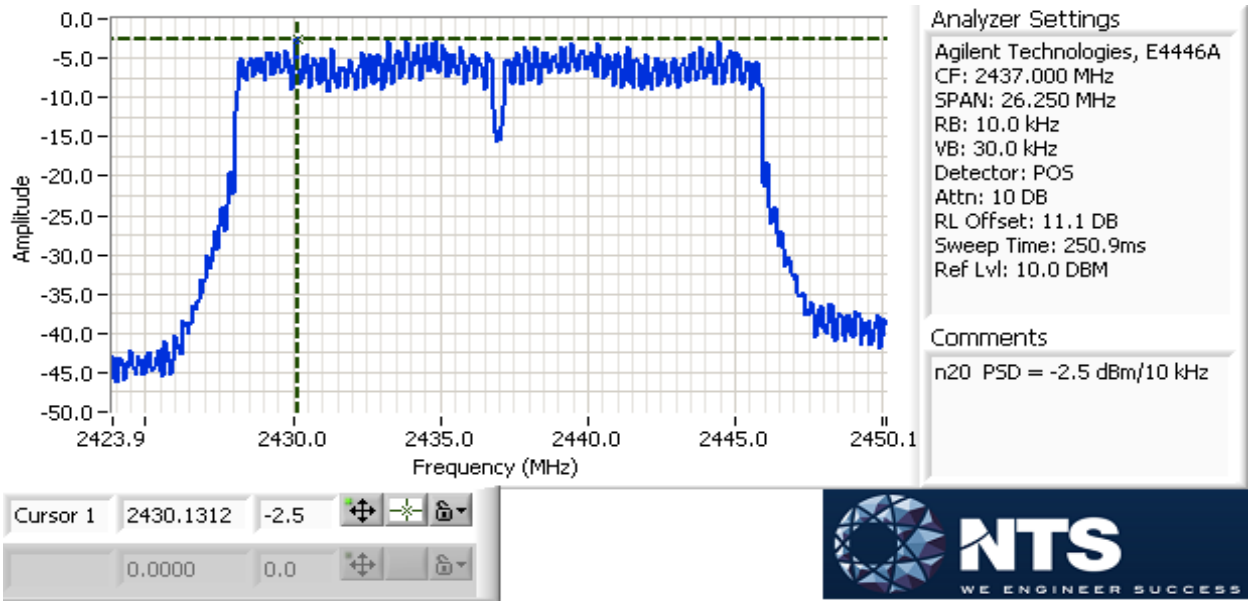
Note 1:	Test performed per method PKSPD, in KDB 558074. Power spectral density measured using: 3kHz ≤ RBW ≤ 100kHz, VBW=3*RBW, peak detector, span = 1.5*DTS BW, auto sweep time, max hold.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A





Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Run #3: Signal Bandwidth (Aux Port)

Mode: 11b

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
18	2412	10.1	13.3	100	300
18	2437	10.1	13.3	100	300
18	2462	10.1	13.3	100	300

Mode: 11g

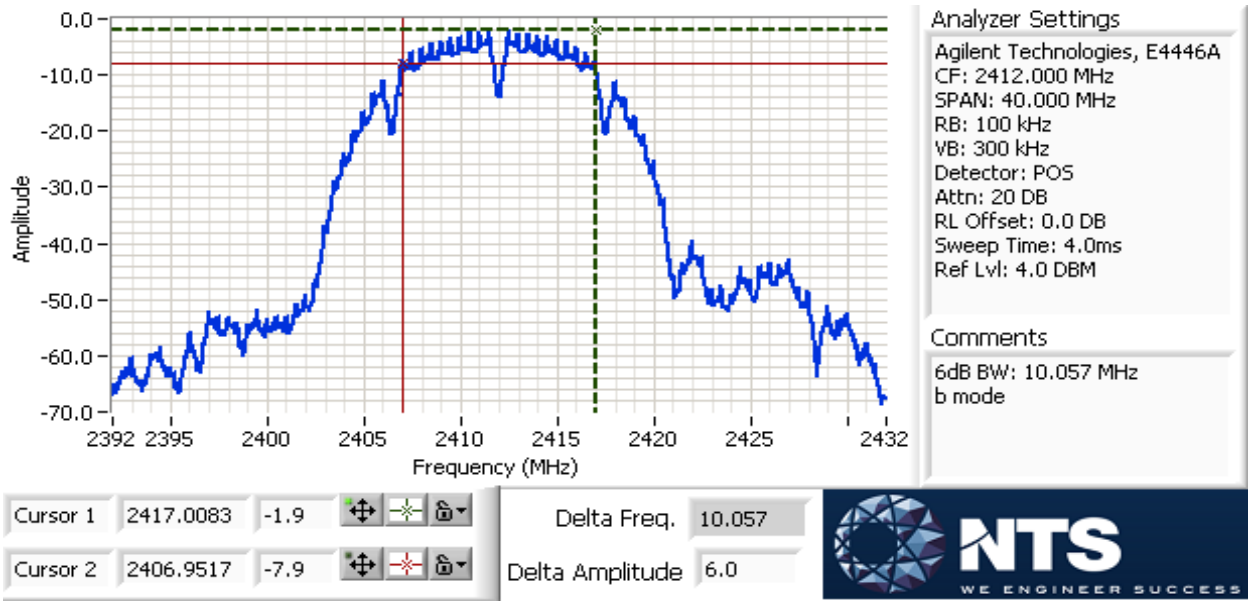
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
17	2412	16.3	16.8	100	300
17	2437	16.4	16.8	100	300
17	2462	16.3	16.8	100	300

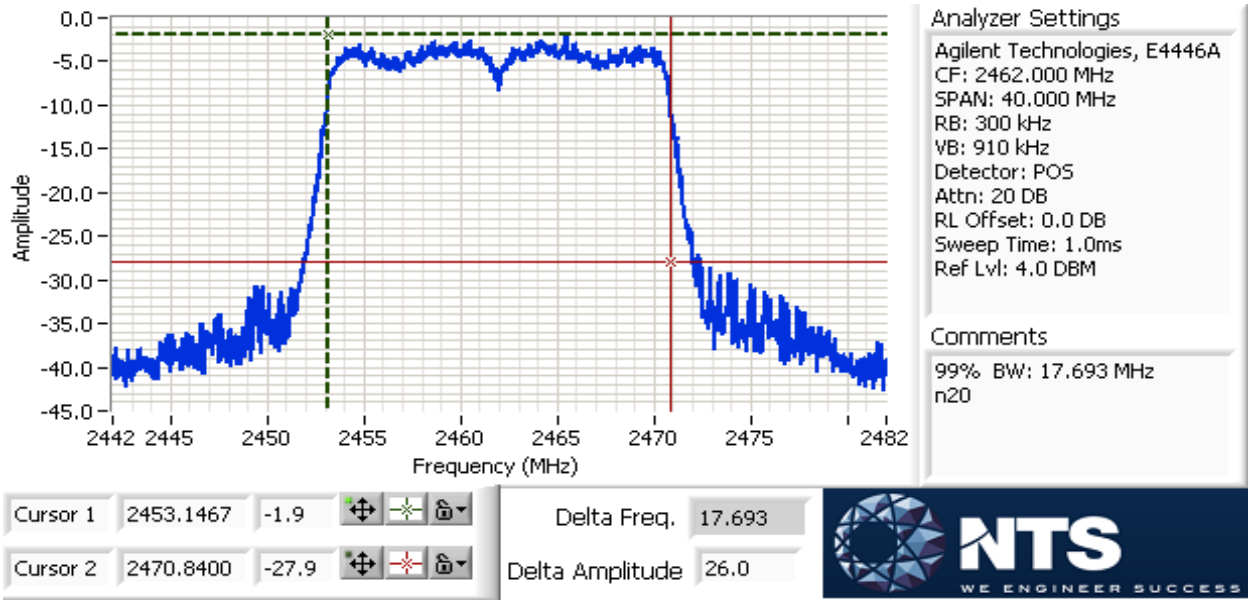
Mode: n20

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (kHz)	
		6dB	99%	6dB	99%
17	2412	17.5	17.7	100	300
17	2437	17.5	17.7	100	300
17	2462	17.5	17.7	100	300

Note 1:	DTS BW: RBW=100kHz, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time, Span 2-5 times measured BW. 99% BW: RBW=1-5% of 99%BW, VBW ≥ 3*RBW, peak detector, max hold, auto sweep time. Span 1.5-5 times OBW.

Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A





Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

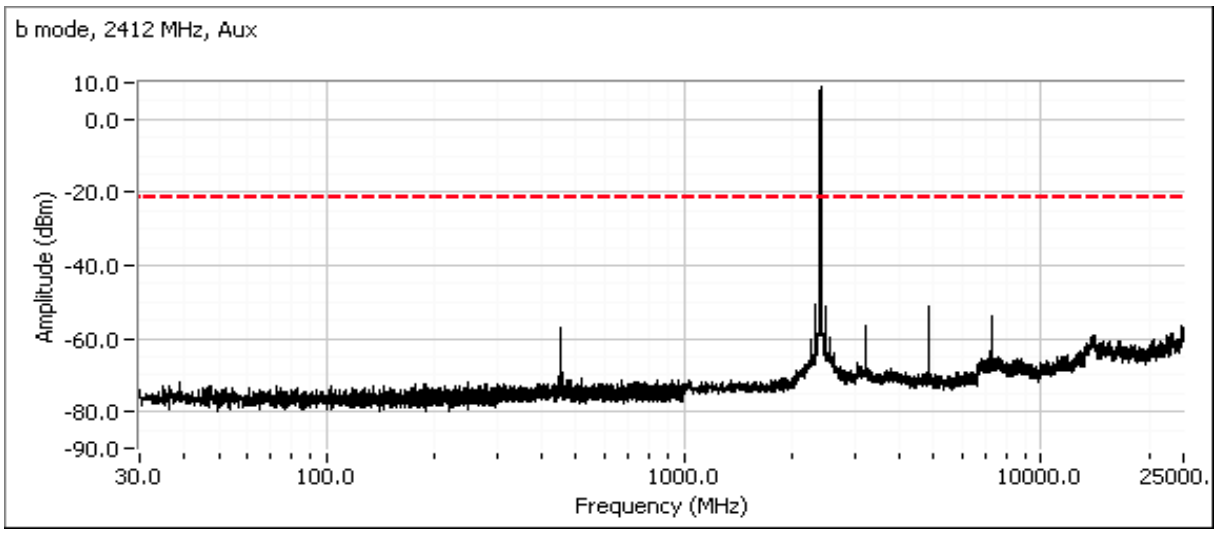
Run #4a: Out of Band Spurious Emissions

Frequency (MHz)	Power Setting	Mode	Limit	Result
2412	18	b	-30dBc	Pass
2437	18	b	-30dBc	Pass
2462	18	b	-30dBc	Pass
2412	17	g	-30dBc	Pass
2437	17	g	-30dBc	Pass
2462	17	g	-30dBc	Pass
2412	17	n20	-30dBc	Pass
2437	17	n20	-30dBc	Pass
2462	17	n20	-30dBc	Pass

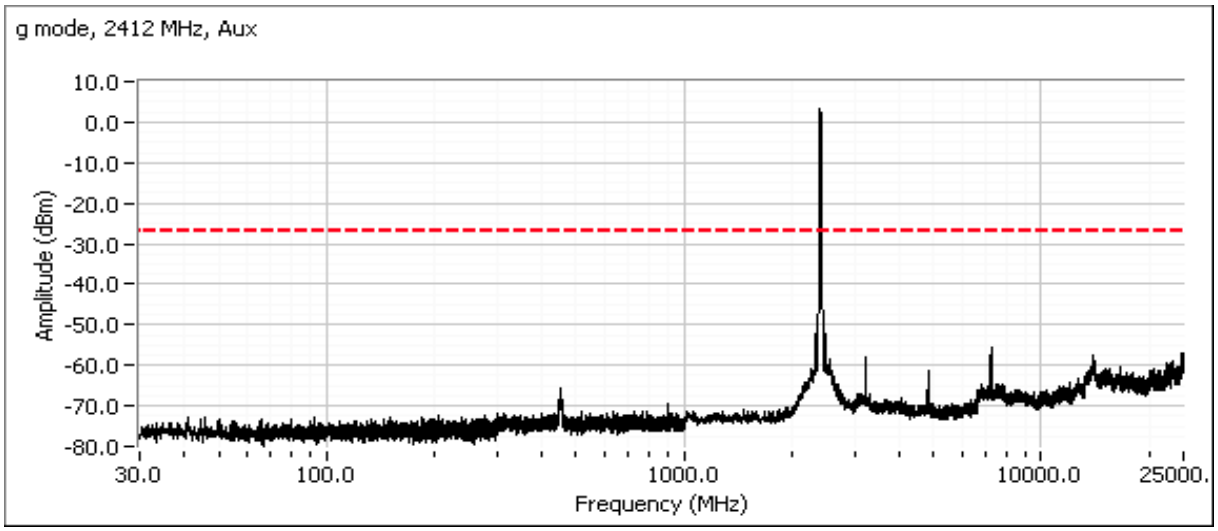
RBW = 100 kHz and VBW = 300 kHz for all plots.

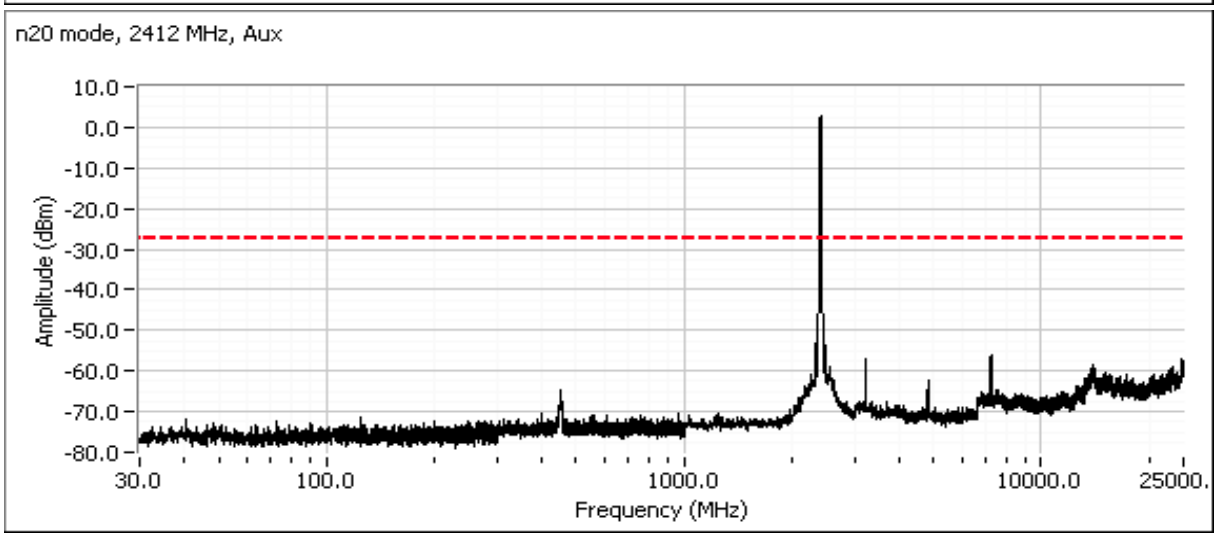
Note: All measurements performed on Aux port as this was worse case in a preliminary measurements. Additional measurements were performed for the low channel to show compliance with the restriction at 2400MHz on the Main port.

Plots for low channel



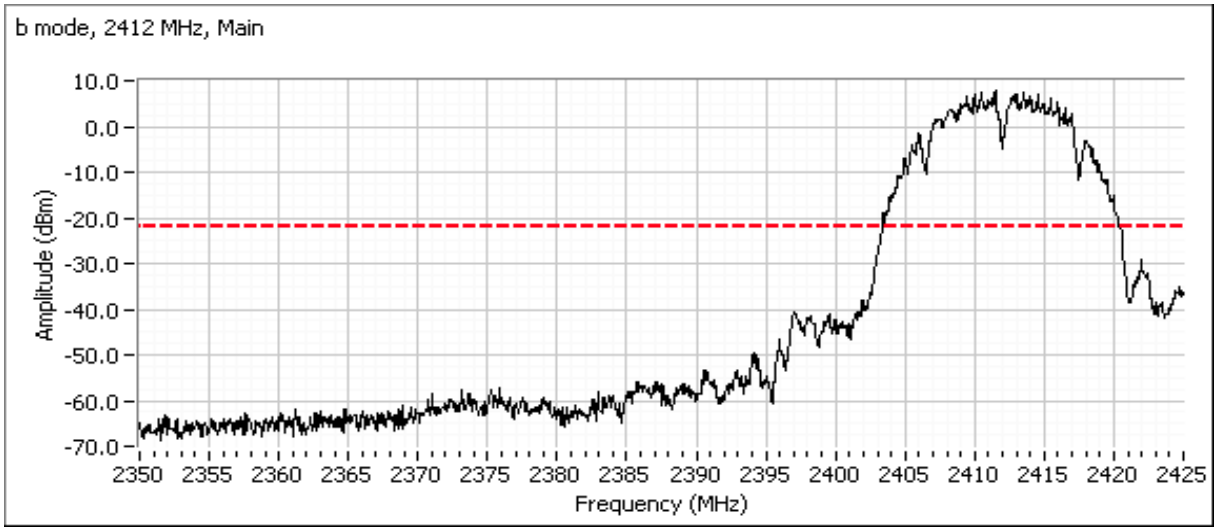
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

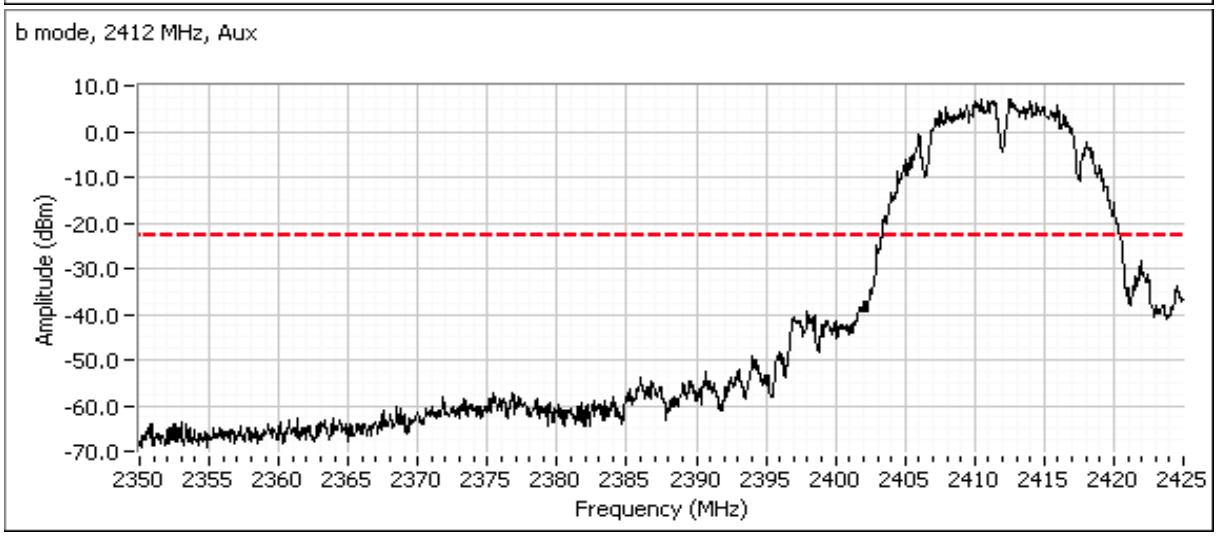




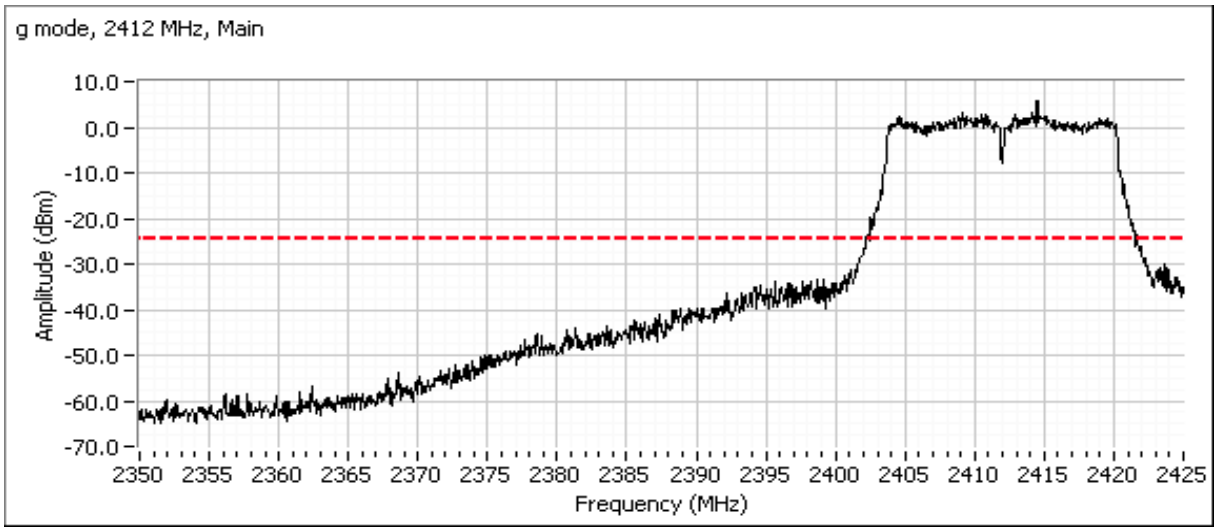
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

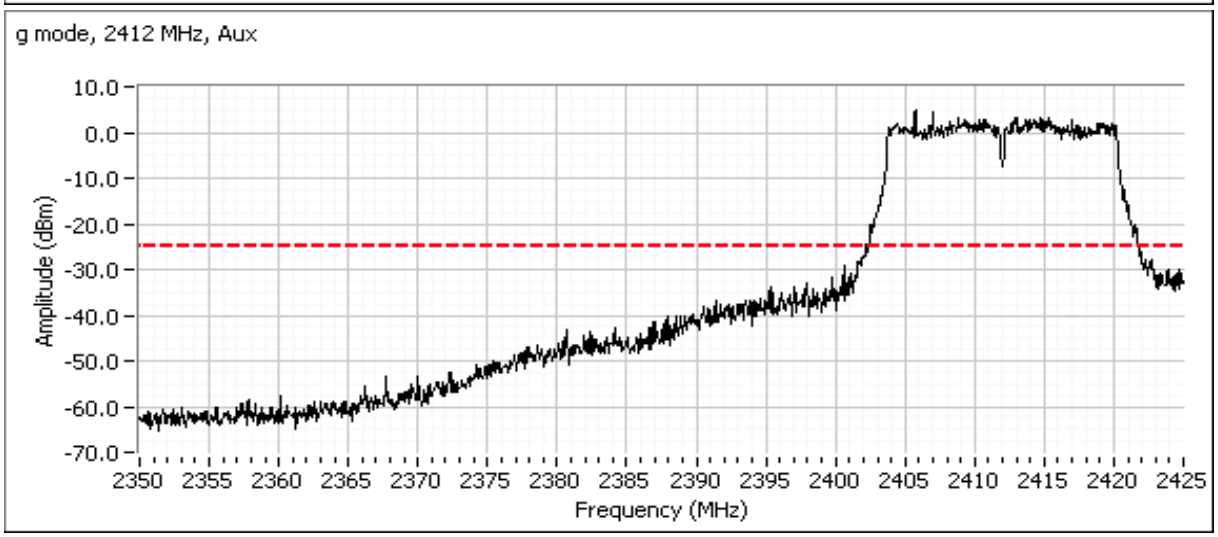
Additional plot showing compliance with -30dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



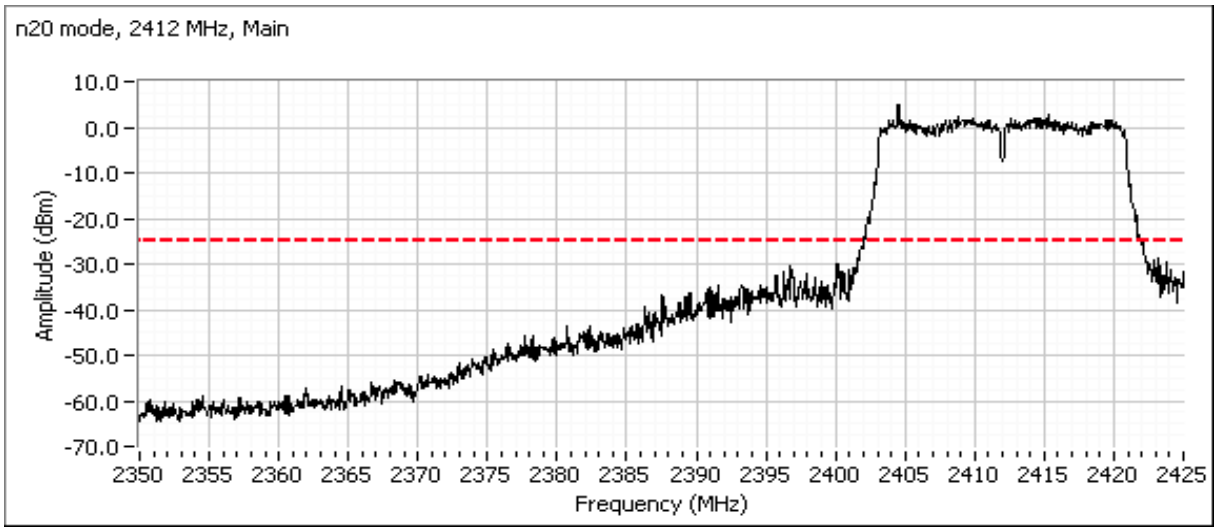


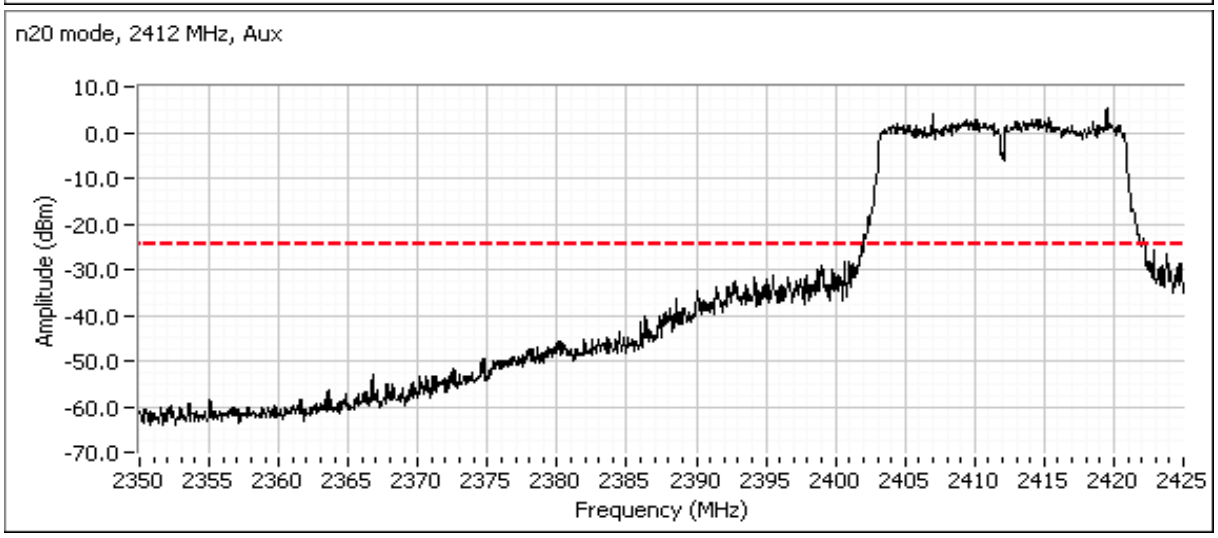
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A





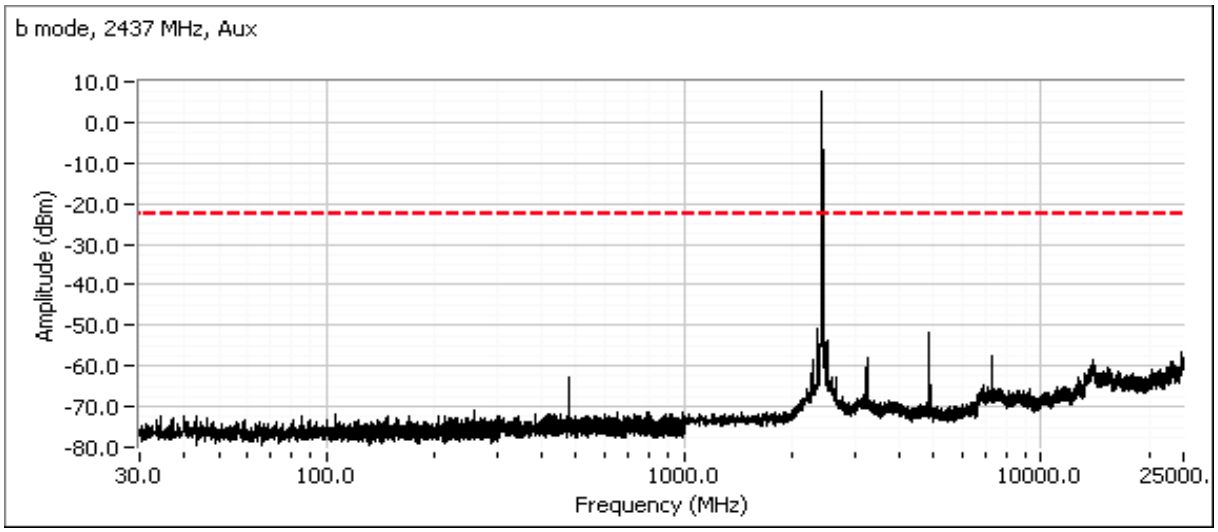
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

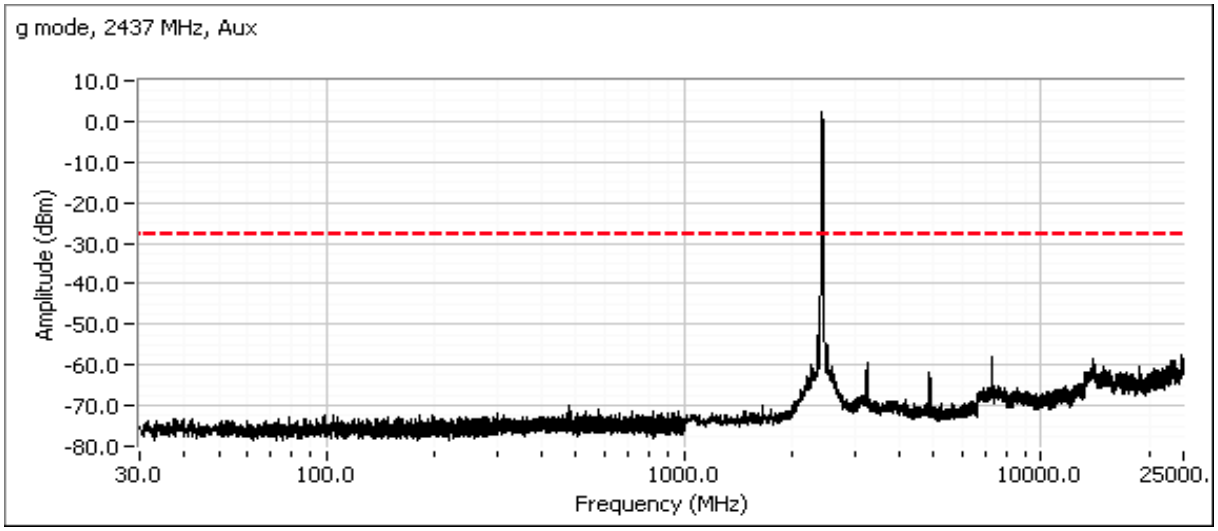




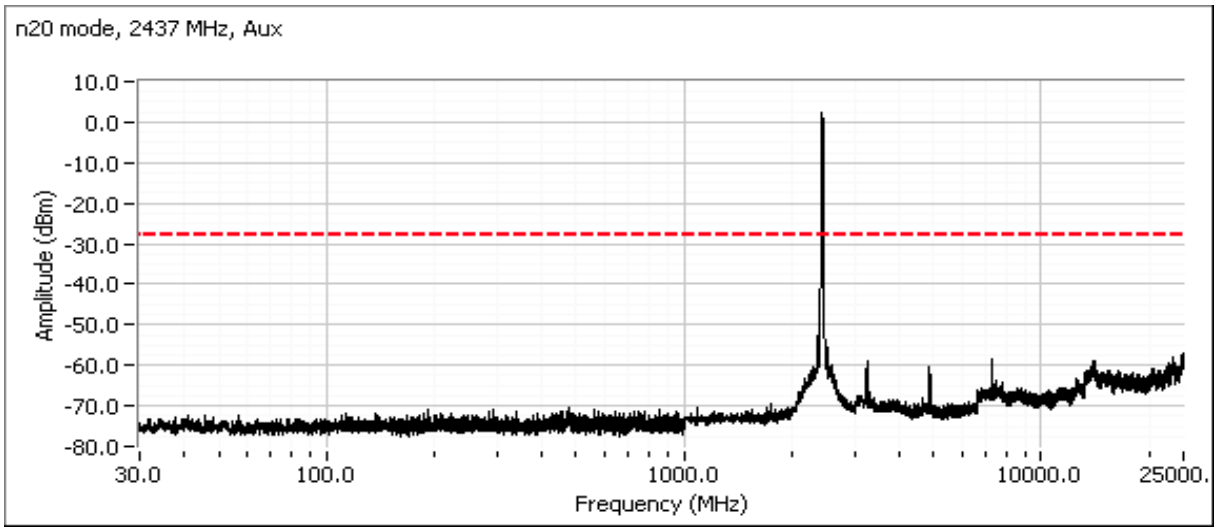
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

Plots for center channel

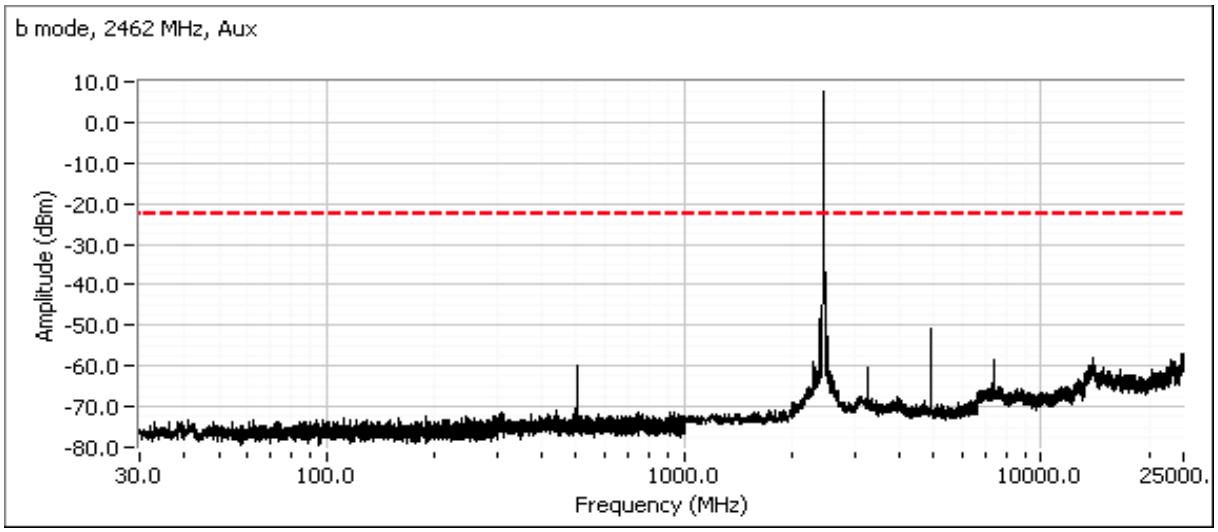




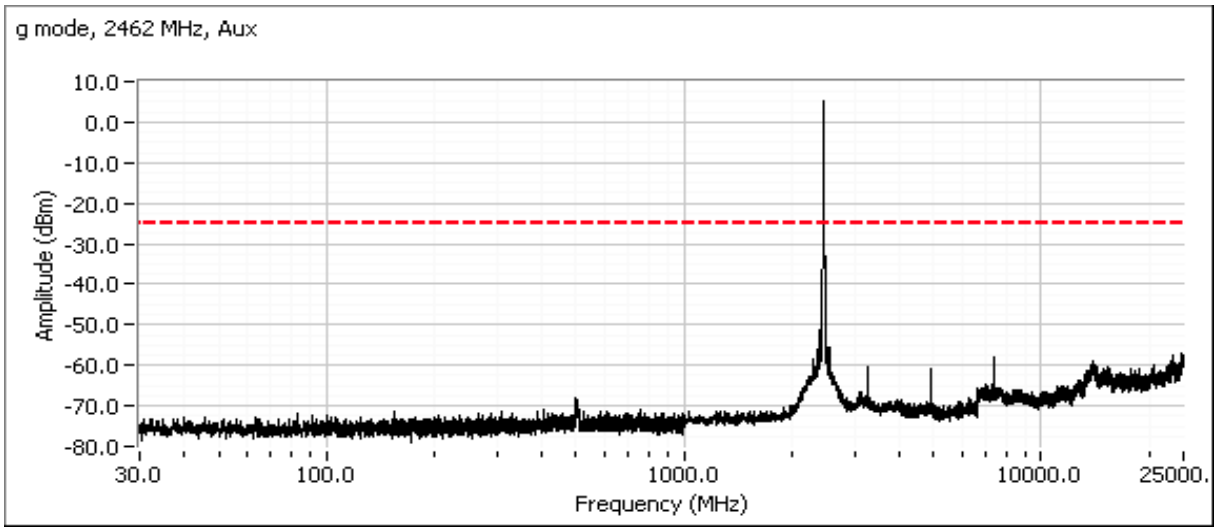
Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A

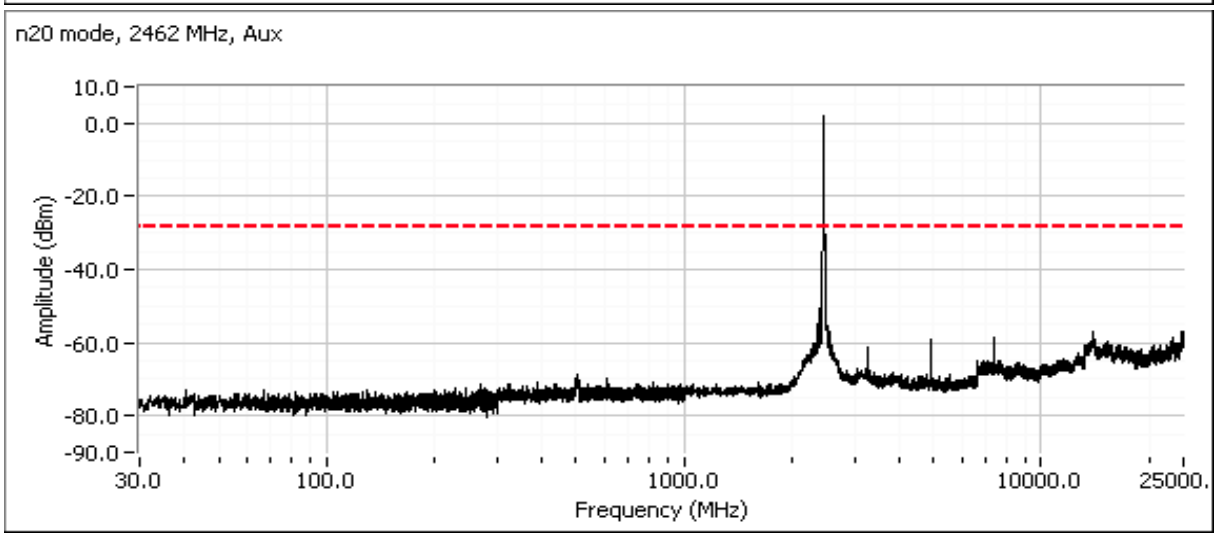


Plots for high channel



Client:	Google Inc	Job Number:	JD101591
Model:	H0ME	T-Log Number:	T102213
		Project Manager:	Deepa Shetty
Contact:	Dominik Mente	Project Coordinator:	-
Standard:	FCC 15.247/15.407/RSS-247	Class:	N/A





End of Report

This page is intentionally blank and
marks the last page of this test report.