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 5 / RSS-247 Issue 2
FCC Part 15 Subpart C

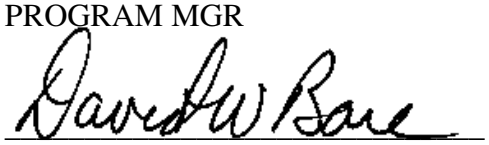
Model: ARCN9004

IC CERTIFICATION #:	4675A-ARCN9004
FCC ID:	Q9DARCN9004
APPLICANT:	Aruba, a Hewlett Packard Enterprise company 3333 Scott Blvd. Santa Clara, CA 95054
TEST SITE(S):	National Technical Systems 41039 Boyce Road. Fremont, CA. 94538-2435
PROJECT NUMBER:	PR090857
REPORT DATE:	May 1, 2019
REISSUE DATE:	June 11, 2019
FINAL TEST DATES:	April 2, 3 and 5, 2019
TOTAL NUMBER OF PAGES:	49

A2LA ACCREDITED
Testing Cert #0214.26

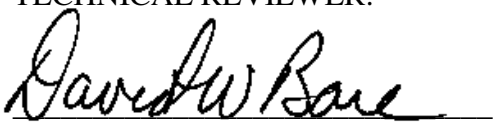
VALIDATING SIGNATORIES

PROGRAM MGR



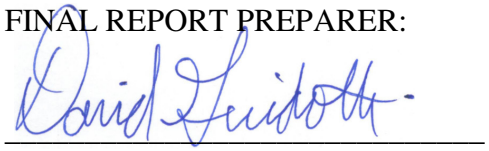
David W. Bare
Chief Engineer

TECHNICAL REVIEWER:



David W. Bare
Chief Engineer

FINAL REPORT PREPARER:



David Guidotti
Senior Technical Writer

QUALITY ASSURANCE DELEGATE

Gary Izard
Technical Writer

REVISION HISTORY

Rev#	Date	Comments	Modified By
-	May 1, 2019	First release	
1	June 11, 2019	Revised report to add statement about Radiated Spurious Emissions from 30kHz – 30MHz on page 7, d plots for band-edge measurements and add enginer's name for conducted emissions	David Guidotti

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Aruba, a Hewlett Packard Enterprise company model ARCN9004, pursuant to the following rules:

RSS-Gen Issue 5 " General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 2 "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 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.

National Technical Systems is accredited by the A2LA, certificate number 0214.26, to perform the test(s) listed in this report, except where noted otherwise.

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 samples of Aruba, a Hewlett Packard Enterprise company model ARCN9004 complied with the requirements of the following regulations:

RSS-Gen Issue 5 " General Requirements for Compliance of Radio Apparatus"
RSS 247 Issue 2 "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 Aruba, a Hewlett Packard Enterprise company model ARCN9004 and therefore apply only to the tested samples. The samples were selected and prepared by Jack Liu of Aruba, a Hewlett Packard Enterprise company.

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

DIGITAL TRANSMISSION SYSTEMS (2400 – 2483.5MHz)

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.247(a)	RSS 247 5.2	Digital Modulation	Systems uses GFSK modulation	System must utilize a digital transmission technology	Complies
15.247 (a) (2)	RSS 247 5.2 (1)	Minimum 6dB Bandwidth	739 kHz	>500kHz	Complies
15.247 (b) (3)	RSS 247 5.4 (4)	Output Power (multipoint systems)	7.1 dBm (0.0051 Watts) EIRP = 0.00014 W Note 1	1Watt, EIRP limited to 4 Watts.	Complies
15.247(e)	RSS 247 5.2 (2)	Power Spectral Density	Total power < 8 dBm	8dBm/3kHz	Complies
15.247(d)	RSS 247 5.5	Antenna Port Spurious Emissions 30MHz – 25 GHz	All < -20 dBc	< -20dBc	Complies
15.247(d) / 15.209	RSS 247 5.5	Radiated Spurious Emissions 30MHz – 25 GHz	44.5 dBµV/m @ 2380.1 MHz (-9.5 dB)	Refer to the limits section (p20) for restricted bands, all others < -20dBc	Complies
15.209	RSS 247	Radiated Spurious Emissions 30kHz – 30MHz	No emissions found below 30MHz	Refer to the limits section (p20) for restricted bands, all others < -20dBc	Complies
Note 1: EIRP calculated using antenna gains of -15.6 dBi for the highest EIRP system.					

GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Integral antenna	Unique or integral antenna required	Complies
15.407 (b) (6)	RSS-Gen Table 4	AC Conducted Emissions	49.6 dBµV @ 0.166 MHz (-15.6 dB)	Refer to page 19	Complies
15.247 (i) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to SAR exclusion calculations in separate exhibit and RSS 102 declaration	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSS-Gen 6.8	User Manual	Antenna is not detachable	Statement for products with detachable antenna	Complies
-	RSS-Gen 8.4	User Manual	(User Manual pages 19-20)	Statement for all products	Complies
-	RSP-100 RSS-Gen 6.7	Occupied Bandwidth	1.068 MHz	Information only	N/A

MEASUREMENT UNCERTAINTIES

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

Measurement Type	Measurement Unit	Frequency Range	Expanded Uncertainty
RF power, conducted (power meter)	dBm	25 to 7000 MHz	± 0.52 dB
RF power, conducted (Spectrum analyzer)	dBm	25 to 7000 MHz	± 0.7 dB
Conducted emission of transmitter	dBm	25 to 26500 MHz	± 0.7 dB
Conducted emission of receiver	dBm	25 to 26500 MHz	± 0.7 dB
Radiated emission (substitution method)	dBm	25 to 26500 MHz	± 2.5 dB
Radiated emission (field strength)	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 Aruba, a Hewlett Packard Enterprise company model ARCN9004 is a controller that is designed to control access points. It incorporates a BLE radio. Since the EUT could be placed in any position during operation, the EUT was treated as tabletop equipment during testing to simulate the end-user environment. The electrical rating of the EUT is 12 Volts DC, 2.5 Amps. It is supplied with an AC adapter rated 100-240V, 50-60 Hz, 1 Amp.

The sample was received on April 2, 2019 and tested on April 2, 3 and 5, 2019. The following samples were used during testing:

Company	Model	Description	Serial Number	FCC ID
Aruba	ARCN9004	Controller	CNH8KL8001	
Aruba	ARCN9004	Controller	CNH8KL800B	

ANTENNA SYSTEM

The antenna system consists of integral PCB antenna mounted on the enclosure with coax cable to the main PCB.

ENCLOSURE

The EUT enclosure is primarily constructed of metal. It measures approximately 20 cm wide by 15 cm deep by 4 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
CUI, Inc.	SDI30-12-U	Power Supply	-	-
HP	Elitebook 745 G4	Laptop	5CG7296JK5	-

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC power	Power Supply	Two wire with ferrite at each end	Unshielded	1
RJ45 Console	Laptop	Multiwire with USB adapter	Shielded and Unshielded	2.5
Eth0	Eth1	Cat 5	Unshielded	1.5
Eth2	Eth3	Cat 5	Unshielded	1
USB	Not connected	-	-	-
µUSB console	Not connected	-	-	-

EUT OPERATION

During emissions testing the EUT was set to transmit a continuous modulated signal at the selected power and frequency.

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 6.2 of RSS-GEN, NTS has been recognized as an accredited test laboratory by the Commission and Innovation, Science and Economic Development Canada. A description of the facilities employed for testing is maintained by NTS.

Site	Designation / Registration Numbers		Location
	FCC	Canada	
Chamber 3	US1031	US0027	41039 Boyce Road Fremont, CA 94538-2435
Chamber 4			
Chamber 5			
Chamber 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. Results from testing performed in this chamber have been correlated with results from an open area test site. 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 C63.4. 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 or another method is stated as required by the applicable FCC KDBs or ANSI C63 standards.

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 testing below 1 GHz and 1.5m for testing above 1 GHz. 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.

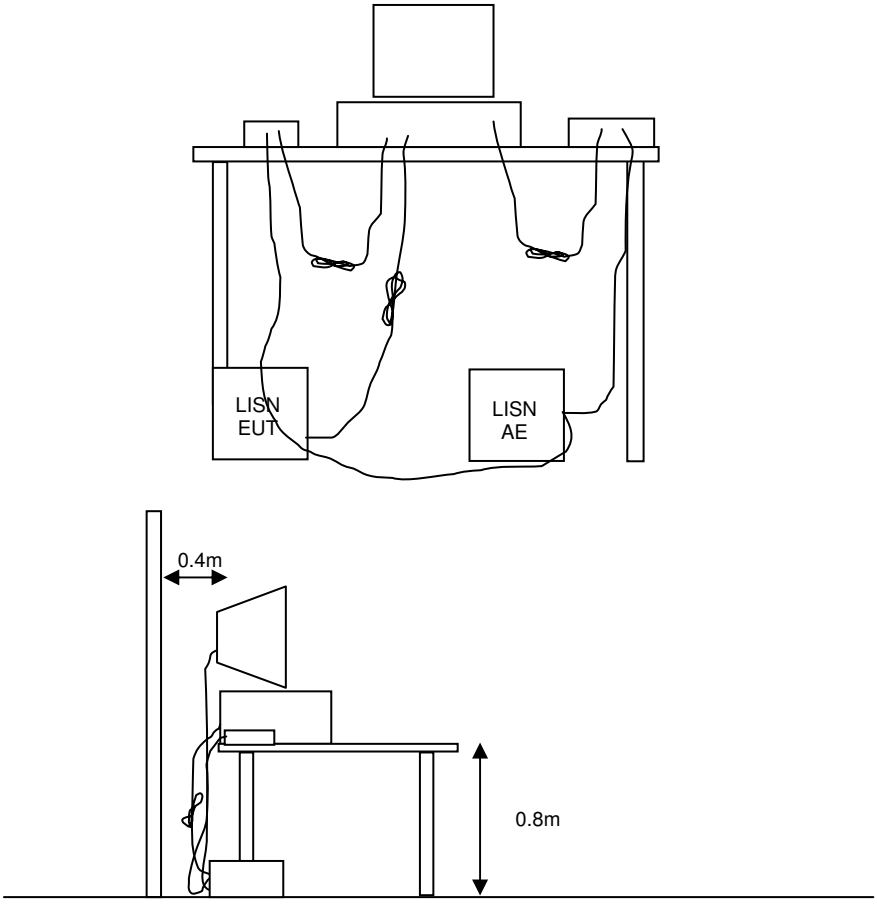


Figure 1 Typical Conducted Emissions Test Configuration

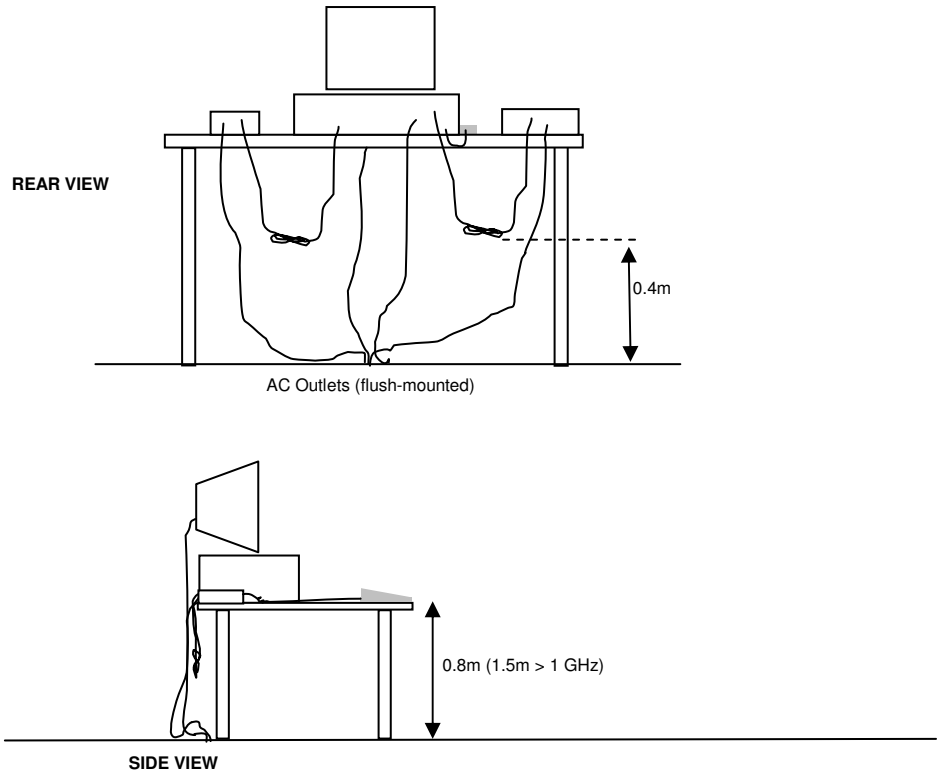
RADIATED EMISSIONS

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.

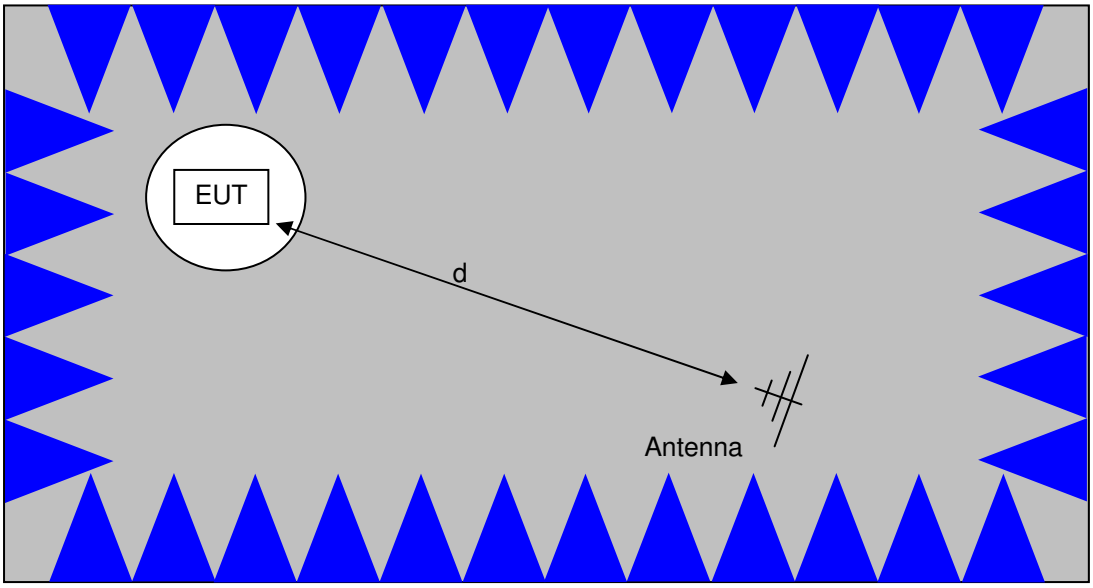
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

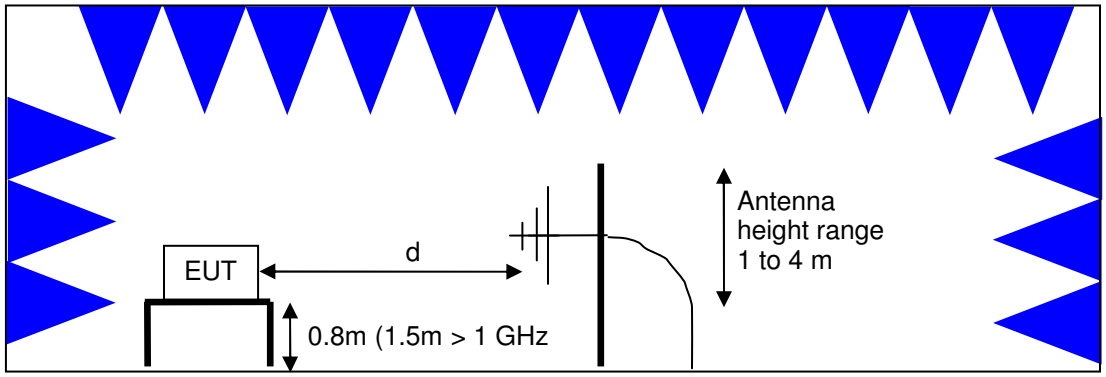


Typical Test Configuration for Radiated Field Strength Measurements



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.

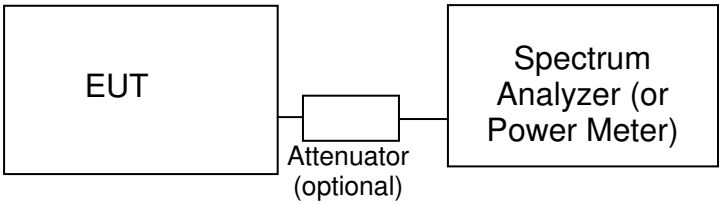
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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
902 – 928	1 Watt (30 dBm)	8 dBm/3kHz
2400 – 2483.5	1 Watt (30 dBm)	8 dBm/3kHz
5725 – 5850	1 Watt (30 dBm)	8 dBm/3kHz

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

TRANSMIT MODE SPURIOUS RADIATED EMISSIONS LIMITS – FHSS and DTS SYSTEMS

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

[1] The restricted bands are detailed in FCC 15.205 and RSS-Gen Table 7

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

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
Conducted Emissions - AC Power Ports, 02-Apr-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	LISN, 10 kHz-100 MHz	3825/2	1292	8/16/2018	8/16/2019
Rohde & Schwarz	Pulse Limiter	ESH3 Z2	1398	12/26/2018	12/26/2019
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1538	2/9/2019	2/9/2020
Radio Antenna Port (Power and Spurious Emissions), 03-Apr-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
National Technical Systems	NTS Capture Analyzer Software (rev 3.8)	N/A	0		N/A
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1538	2/9/2019	2/9/2020
Agilent Technologies	MXG Analog Signal Generator 6 GHz	N5181A	2146	1/10/2019	1/10/2020
Radiated Emissions, 1,000 - 25,000 MHz, 03-Apr-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	Antenna, Horn, 1-18 GHz (SA40-Blu)	3115	1386	10/8/2018	10/8/2020
Hewlett Packard	Spectrum Analyzer (SA40) Blue 9 kHz - 40 GHz	8564E (84125C)	1393	12/8/2018	12/8/2019
HP / Miteq	SA40 B Head HF preAmplifier, 18-40 GHz (w/1393)	TTA1840-45-5P-HG-S	1620	1/9/2019	1/9/2020
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	8/30/2018	8/30/2019
A. H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	9/5/2017	8/8/2020
Band Edge and Polar Plots, 05-Apr-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	Antenna, Horn, 1-18 GHz (SA40-Red)	3115	1142	9/18/2018	9/18/2020
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1538	2/9/2019	2/9/2020
Radiated Emissions, 1,000 - 18,000 MHz, 05-Apr-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
EMCO	Antenna, Horn, 1-18 GHz	3115	1242	4/11/2017	4/19/2019
Hewlett Packard	Spectrum Analyzer (SA40) Blue 9 kHz - 40 GHz	8564E (84125C)	1393	12/8/2018	12/8/2019
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	1780	8/30/2018	8/30/2019

Radiated Emissions, 18,000 - 25,000 MHz, 05-Apr-19

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Hewlett Packard	Spectrum Analyzer (SA40) Blue 9 kHz - 40 GHz	8564E (84125C)	1393	12/8/2018	12/8/2019
HP / Miteq	SA40 B Head HF preAmplifier, 18-40 GHz (w/1393)	TTA1840-45-5P-HG-S	1620	1/9/2019	1/9/2020
A. H. Systems	Blue System Horn, 18-40GHz	SAS-574, p/n: 2581	2159	9/5/2017	8/8/2020
Radiated Emissions, 30 - 1,000 MHz, 05-Apr-19					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	0		N/A
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB 7	1538	2/9/2019	2/9/2020
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1657	8/1/2018	8/1/2020
Com-Power	Preamplifier, 1-1000 MHz	PAM-103	2885	8/21/2018	8/21/2019

Appendix B Test Data

TL090857-RA Pages 26 – 48

Client:	Aruba, a Hewlett Packard Enterprise company	PR Number:	PR090857
Product	ARCN9004	T-Log Number:	TL090857-RA
System Configuration:		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Engineer:	David Bare
Emissions Standard(s):	FCC 15.247, EN 300 328, LP0002	Class:	B
Immunity Standard(s):	-	Environment:	Radio

EMC Test Data

For The

Aruba, a Hewlett Packard Enterprise company

Product

ARCN9004

Date of Last Test: 4/17/2019

EMC Test Data

Client:	Aruba, a Hewlett Packard Enterprise company	PR Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Engineer:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	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: 4/2/2019
Test Engineer: Yew-Kwong Soo
Test Location: Fremont Chamber #4

Config. Used: 1
Config Change: -
EUT Voltage: 110V/60Hz

General Test Configuration

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

Ambient Conditions:

Temperature: 24 °C
Rel. Humidity: 44 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,110V/60Hz	FCC 15.207	Pass	49.6 dBµV @ 0.166 MHz (-15.6 dB)

Modifications Made During Testing

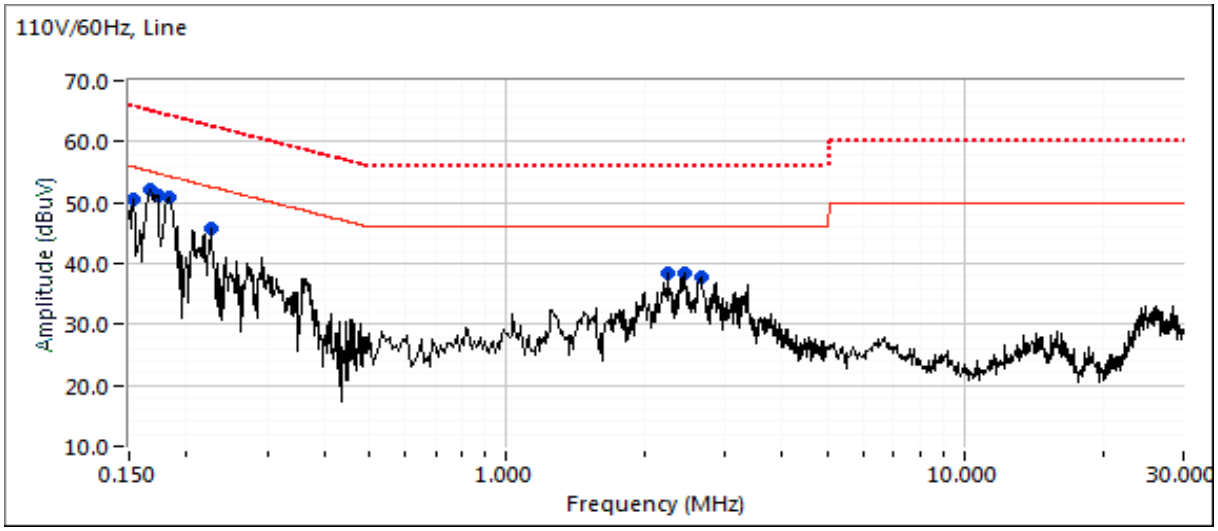
No modifications were made to the EUT during testing

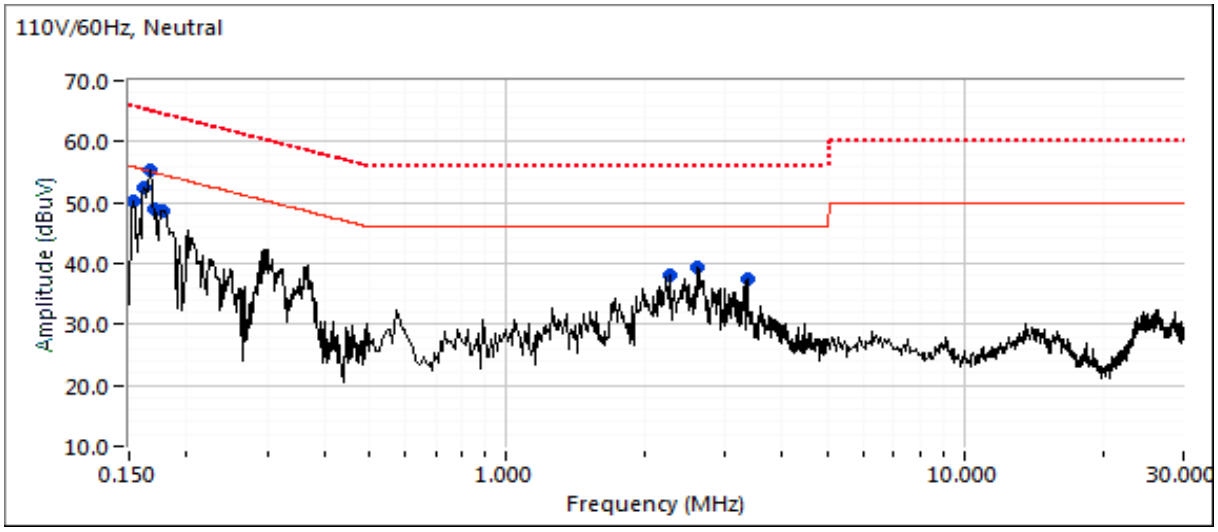
Deviations From The Standard

No deviations were made from the requirements of the standard.

Client:	Aruba, a Hewlett Packard Enterprise company	PR Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Engineer:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	B

Run #1: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz





Client:	Aruba, a Hewlett Packard Enterprise company	PR Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Engineer:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	B

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

Frequency	Level	AC	FCC 15.207		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.167	*55.2*	*Neutral*	*55.1*	*0.1*	*Peak*	
0.162	*52.4*	*Neutral*	*55.4*	*-3.0*	*Peak*	
0.167	*52.1*	*Line 1*	*55.1*	*-3.0*	*Peak*	
0.183	*50.9*	*Line 1*	*54.3*	*-3.4*	*Peak*	
0.173	*51.2*	*Line 1*	*54.8*	*-3.6*	*Peak*	
0.153	*50.4*	*Line 1*	*55.8*	*-5.4*	*Peak*	
0.154	*50.1*	*Neutral*	*55.8*	*-5.7*	*Peak*	
0.178	*48.7*	*Neutral*	*54.6*	*-5.9*	*Peak*	
0.170	*48.9*	*Neutral*	*54.9*	*-6.0*	*Peak*	
2.619	*39.5*	*Neutral*	*46.0*	*-6.5*	*Peak*	
0.227	*45.6*	*Line 1*	*52.6*	*-7.0*	*Peak*	
2.249	*38.3*	*Line 1*	*46.0*	*-7.7*	*Peak*	
2.439	*38.3*	*Line 1*	*46.0*	*-7.7*	*Peak*	
2.268	*38.2*	*Neutral*	*46.0*	*-7.8*	*Peak*	
2.655	*37.8*	*Line 1*	*46.0*	*-8.2*	*Peak*	
3.350	*37.3*	*Neutral*	*46.0*	*-8.7*	*Peak*	

Client:	Aruba, a Hewlett Packard Enterprise company	PR Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Engineer:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	B

Final quasi-peak and average readings

Frequency MHz	Level dBµV	AC Line	FCC 15.207 Limit	FCC 15.207 Margin	Detector QP/Ave	Comments
0.166	**49.6**	Neutral	65.2	**-15.6**	QP	QP (1.00s)
0.163	49.5	Neutral	65.3	-15.8	QP	QP (1.00s)
0.167	48.8	Line 1	65.1	-16.3	QP	QP (1.00s)
0.170	48.1	Neutral	65.0	-16.9	QP	QP (1.00s)
0.166	37.5	Neutral	55.2	-17.7	AVG	AVG (0.10s)
0.178	46.4	Neutral	64.6	-18.2	QP	QP (1.00s)
0.167	36.7	Line 1	55.1	-18.4	AVG	AVG (0.10s)
0.182	45.5	Line 1	64.4	-18.9	QP	QP (1.00s)
0.174	45.9	Line 1	64.8	-18.9	QP	QP (1.00s)
0.170	35.6	Neutral	55.0	-19.4	AVG	AVG (0.10s)
0.163	35.8	Neutral	55.3	-19.5	AVG	AVG (0.10s)
0.174	31.9	Line 1	54.8	-22.9	AVG	AVG (0.10s)
0.178	31.5	Neutral	54.6	-23.1	AVG	AVG (0.10s)
0.154	42.4	Line 1	65.8	-23.4	QP	QP (1.00s)
0.153	42.1	Neutral	65.8	-23.7	QP	QP (1.00s)
2.618	32.1	Neutral	56.0	-23.9	QP	QP (1.00s)
0.182	30.2	Line 1	54.4	-24.2	AVG	AVG (0.10s)
2.441	31.5	Line 1	56.0	-24.5	QP	QP (1.00s)
2.254	31.4	Neutral	56.0	-24.6	QP	QP (1.00s)
2.660	31.2	Line 1	56.0	-24.8	QP	QP (1.00s)
0.227	37.7	Line 1	62.6	-24.9	QP	QP (1.00s)
2.618	20.8	Neutral	46.0	-25.2	AVG	AVG (0.10s)
2.237	30.0	Line 1	56.0	-26.0	QP	QP (1.00s)
2.660	19.3	Line 1	46.0	-26.7	AVG	AVG (0.10s)
2.441	19.2	Line 1	46.0	-26.8	AVG	AVG (0.10s)
2.254	19.2	Neutral	46.0	-26.8	AVG	AVG (0.10s)
3.339	29.2	Neutral	56.0	-26.8	QP	QP (1.00s)
2.237	18.1	Line 1	46.0	-27.9	AVG	AVG (0.10s)
3.339	18.1	Neutral	46.0	-27.9	AVG	AVG (0.10s)
0.227	20.2	Line 1	52.6	-32.4	AVG	AVG (0.10s)
0.154	23.2	Line 1	55.8	-32.6	AVG	AVG (0.10s)
0.153	22.7	Neutral	55.8	-33.1	AVG	AVG (0.10s)

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	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: 4/3/2019
Test Engineer: David Bare
Test Location: Fremont Chamber #4
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 have been corrected to allow for the external attenuators used.

Ambient Conditions:

Temperature: 20 °C
Rel. Humidity: 42 %

Summary of Results

Run #	Pwr setting		Test Performed	Limit	Pass / Fail	Result / Margin
1	8		Output Power	15.247(b)	Pass	7.1 dBm
2	8		Power spectral Density (PSD)	15.247(d)	Pass	-
3	8		Minimum 6dB Bandwidth	15.247(a)	Pass	0.739 MHz
3	8		99% Bandwidth	RSS GEN	-	1.068 MHz
4	8		Spurious emissions	15.247(b)	Pass	All < -20 dBc

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

Sample Notes

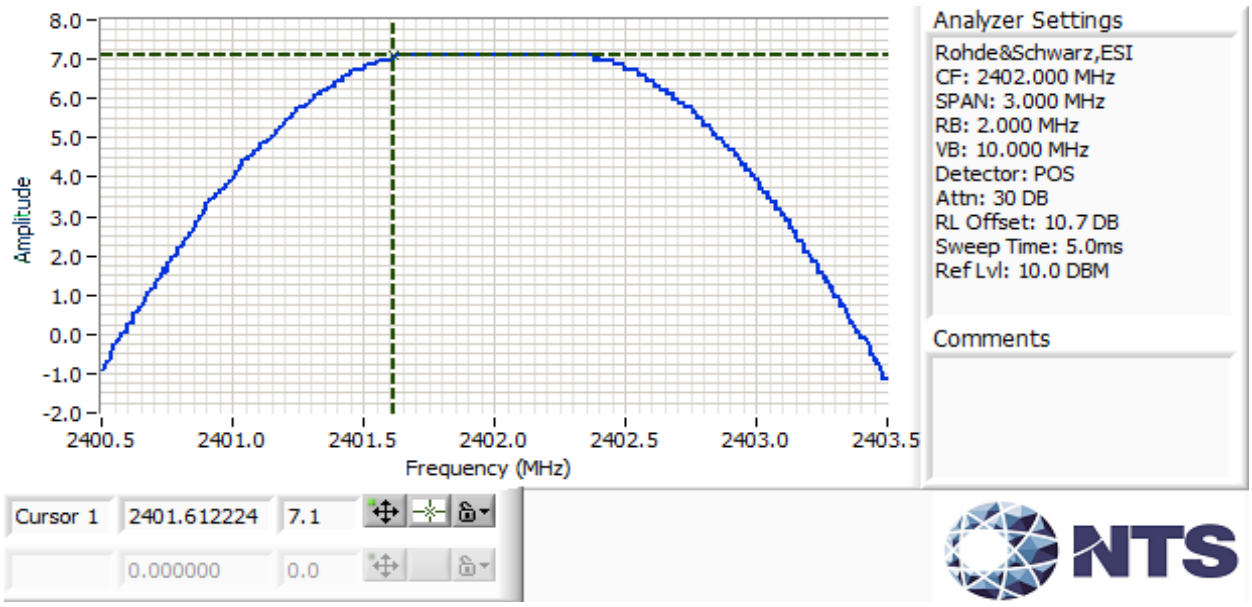
Sample S/N: CNHBKLB00B
EUT Software Build: DIAG Image

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Run #1: Output Power

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
8	2402	7.1	5.1	-15.6	Pass	-8.5	0.00014		
8	2440	6.8	4.8	-15.5	Pass	-8.7	0.00013		
8	2480	6.4	4.4	-15.3	Pass	-8.9	0.00013		

Note 1:	Duty Cycle ≥ 98%. Output power measured using a spectrum analyzer (see plots below) with RBW > OBW, VBW ≥ 3* RBW, Span ≥ 1.5 of OBW, auto sweep time, Peak detector.
Note 2:	Power setting - the software power setting used during testing, included for reference only.
Note 3:	Power measured using average power meter (non-gated), if requested and is included for reference only.



Run #2: Power spectral Density

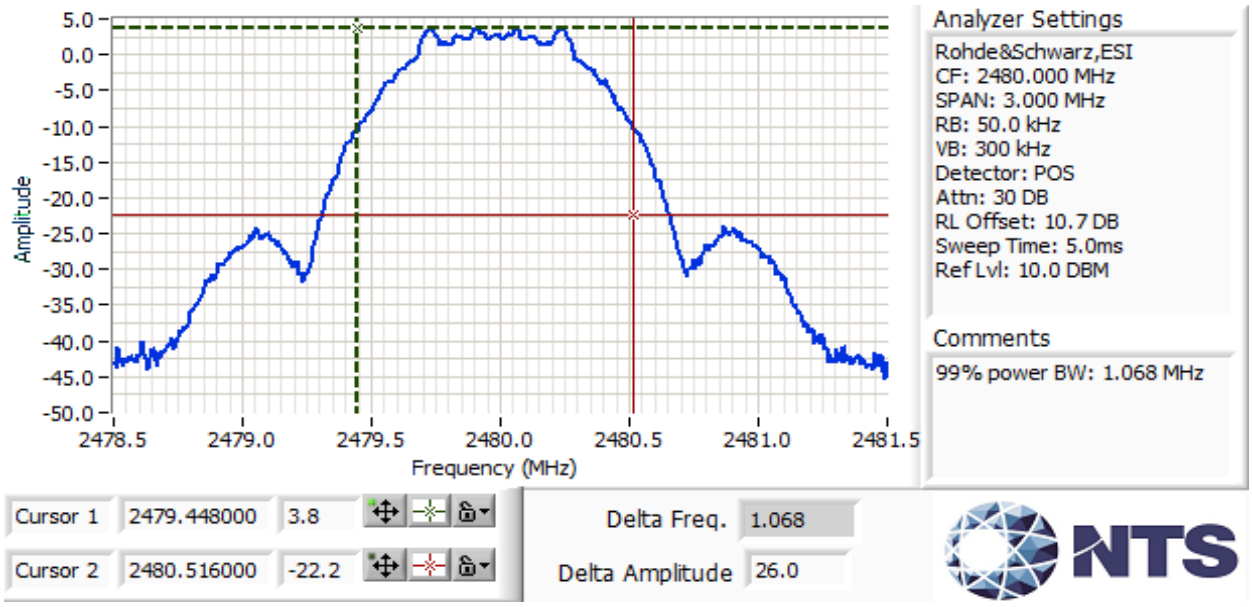
Power less than 8 dBm, no separate PSD test required

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Run #3: Signal Bandwidth

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
8	2402	0.739	1.068	0.1	0.05
8	2440	0.739	1.068	0.1	0.05
8	2480	0.745	1.068	0.1	0.05

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.



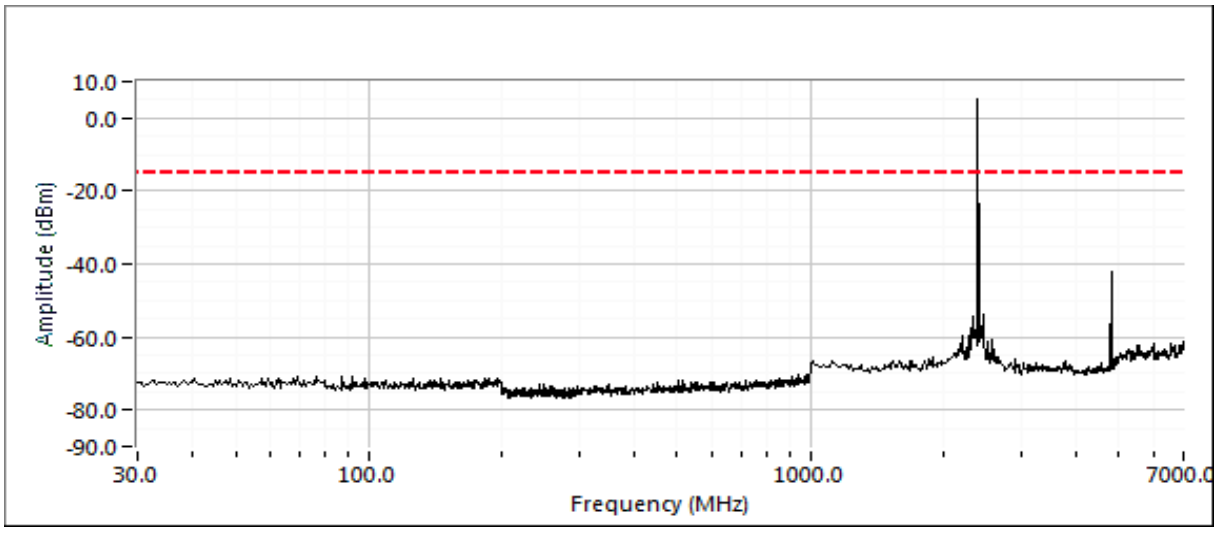
Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Run #4: Out of Band Spurious Emissions

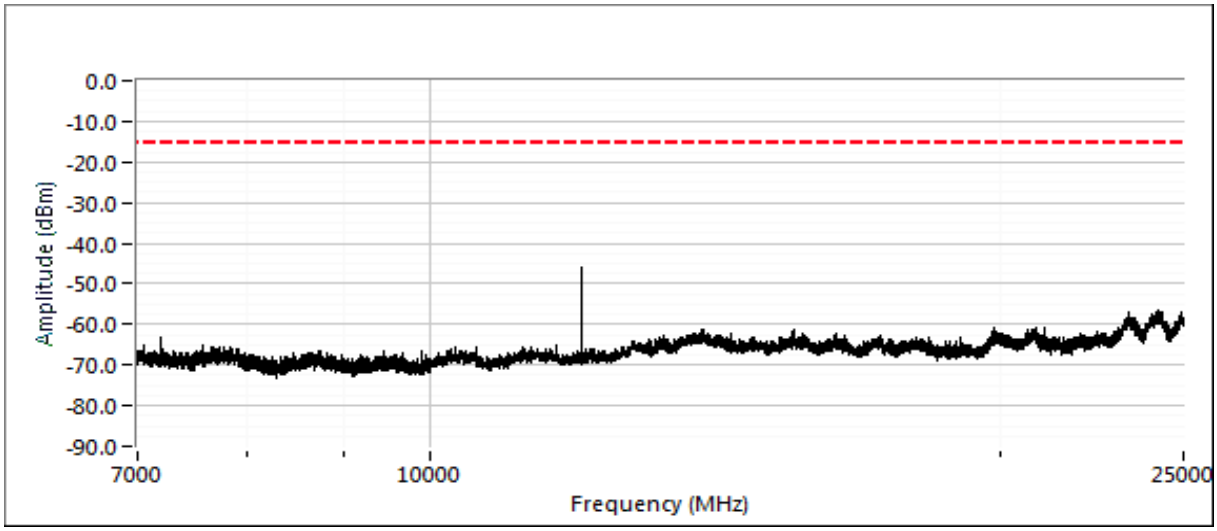
Frequency (MHz)	Power Setting		Limit	Result
2402	8		-20dBc	Pass
2440	8		-20dBc	Pass
2480	8		-20dBc	Pass

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

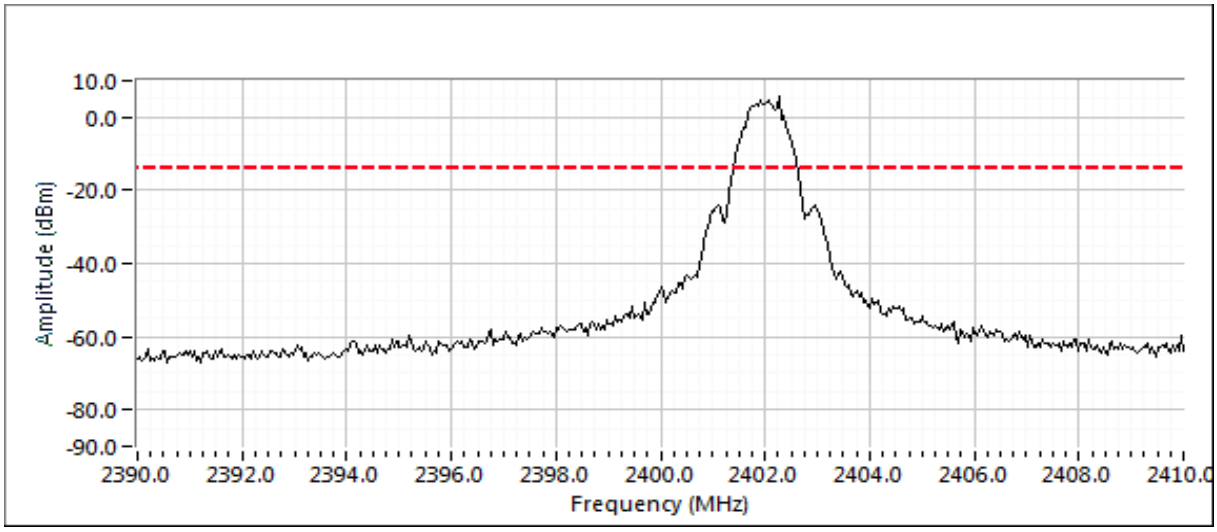
Plots for low channel



Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

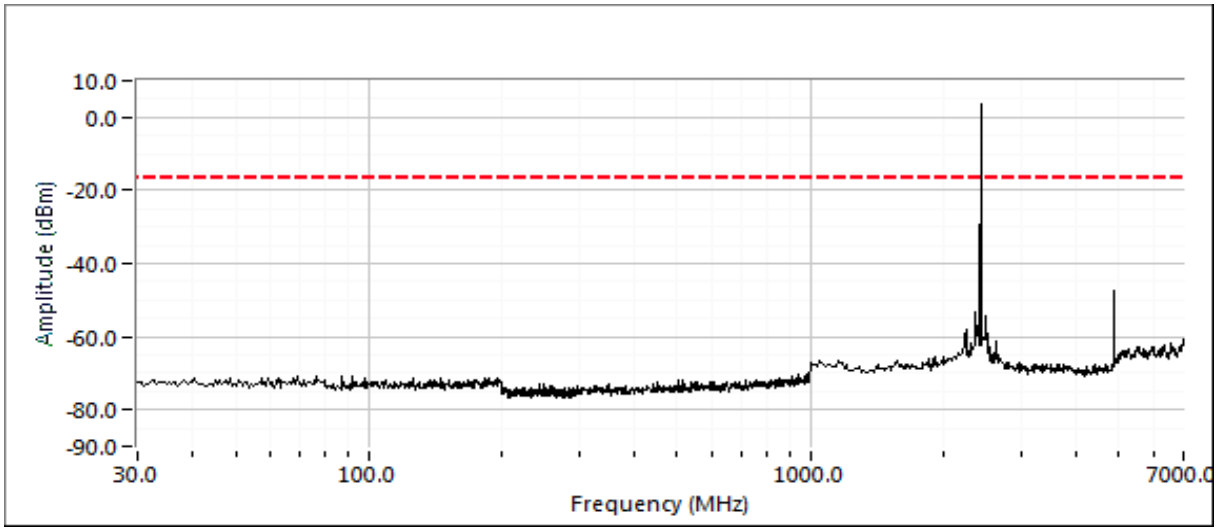


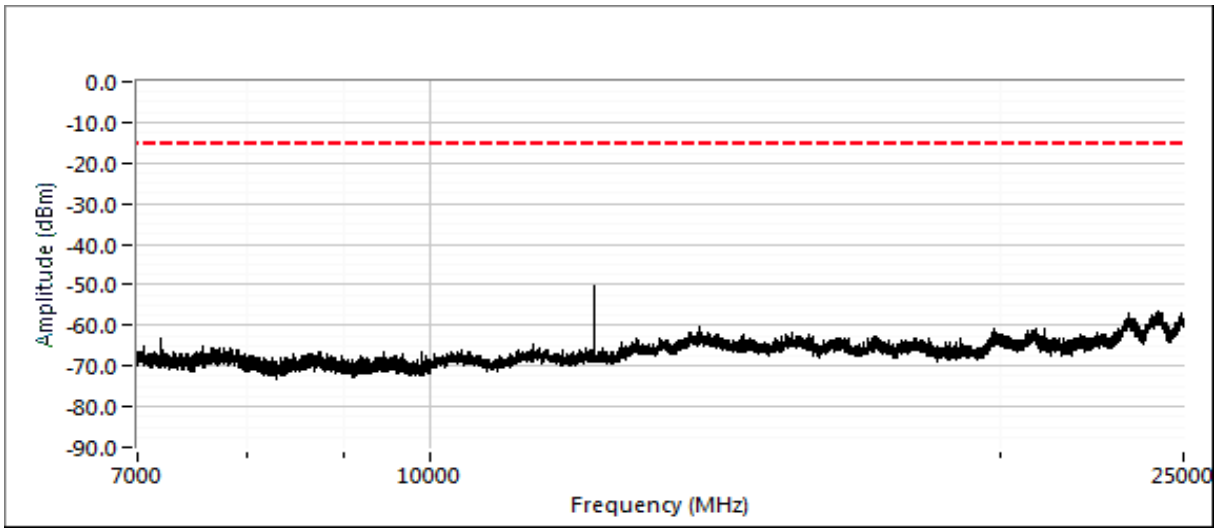
Additional plot showing compliance with -20dBc limit from 2390 MHz to 2400 MHz. Radiated measurements used to show compliance with the limits in the restricted band below 2390 MHz.



Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

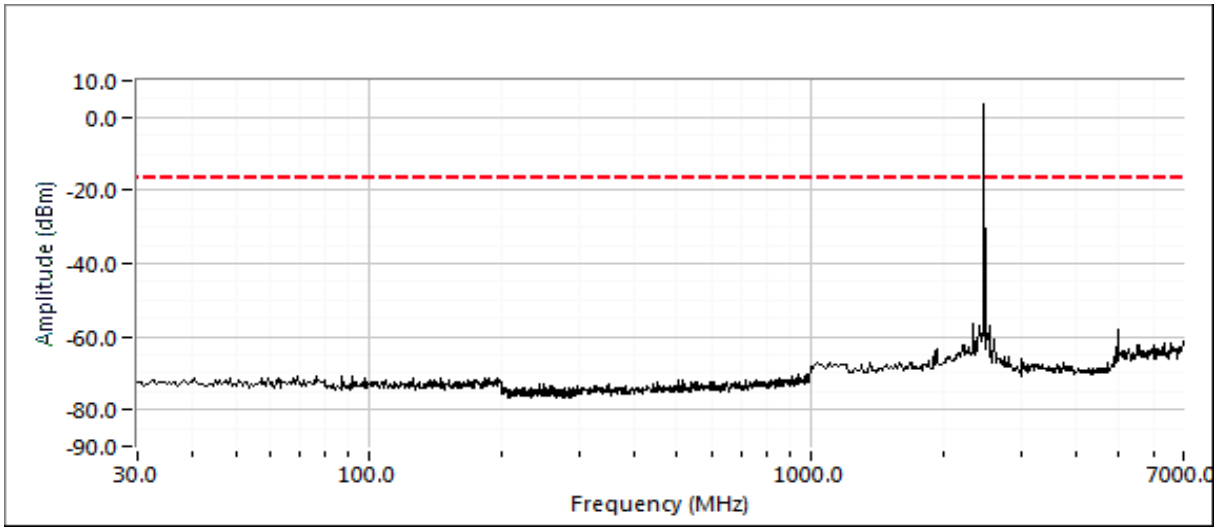
Plots for center channel

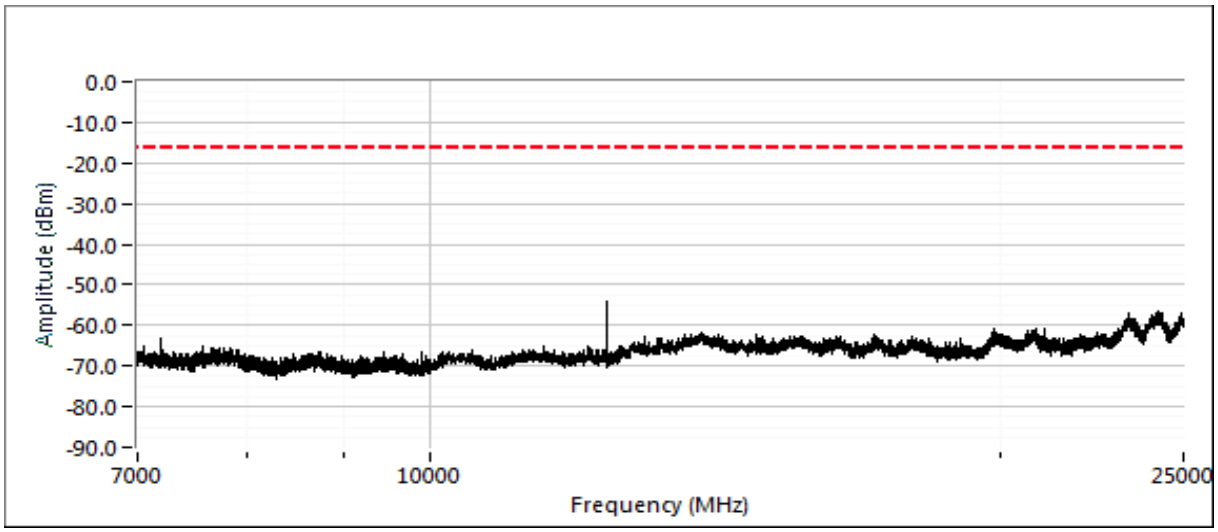




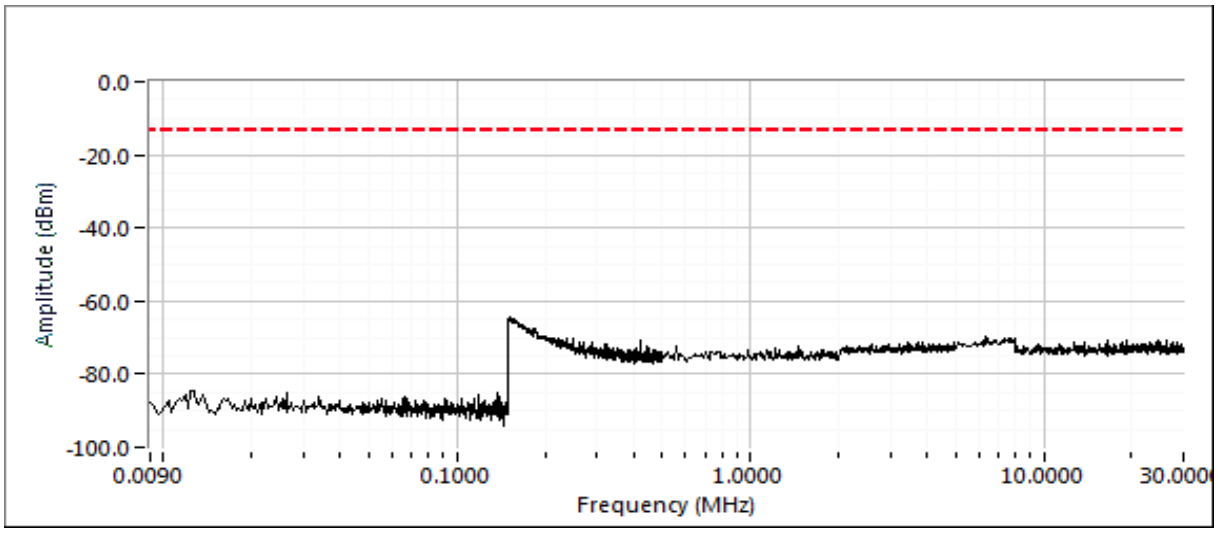
Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Plots for high channel





Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A



Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	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 °C
Rel. Humidity: 42 %

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

Run #	Mode	Channel		Power Setting	Test Performed	Limit	Result / Margin
1	BLE	37 - 2402MHz		8	Restricted Band Edge (2390 MHz)	FCC Part 15.209 / 15.247(c)	44.5 dBµV/m @ 2380.1 MHz (-9.5 dB)
	BLE	39 - 2480MHz		8	Restricted Band Edge (2483.5 MHz)	FCC Part 15.209 / 15.247(c)	43.6 dBµV/m @ 2493.2 MHz (-10.4 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

Sample Notes

Sample S/N: CNH8KLB001
EUT Software Build: DIAG Image
Antenna: Molex Bluetooth Antenna

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has a duty cycle ≥ 98% and average 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	1 Mb/s	1.00	Yes	100	0	0	10

Measurement Specific Notes:

Note 1:	Peak emisisons were below the Average limit, no average measurments taken.

Run #1: Radiated Bandedge Measurements

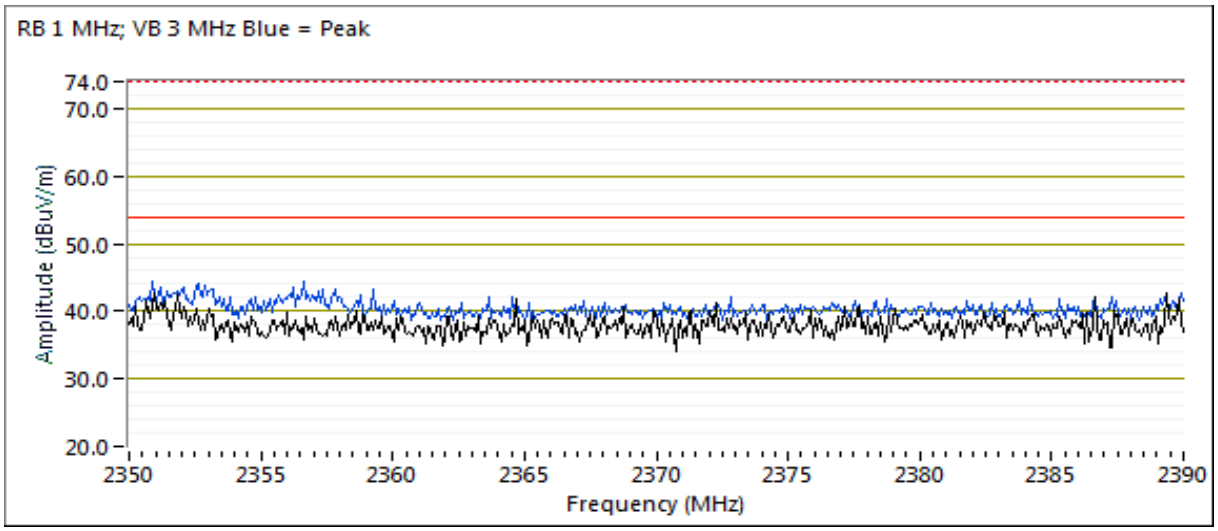
Date of Test: 4/5/2019 Config. Used: 1
Test Engineer: YK Soo Config Change: None
Test Location: Fremont Chamber #4 EUT Voltage: 110V/60Hz

Channel: 37 Mode: BLE

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	
2380.060	44.5	V	54.0	-9.5	PK	345	1.5	POS; RB 1 MHz; VB: 3 MHz
2402.230	86.2	V	N/A	N/A	PK	360	1.5	POS; RB 1 MHz; VB: 3 MHz

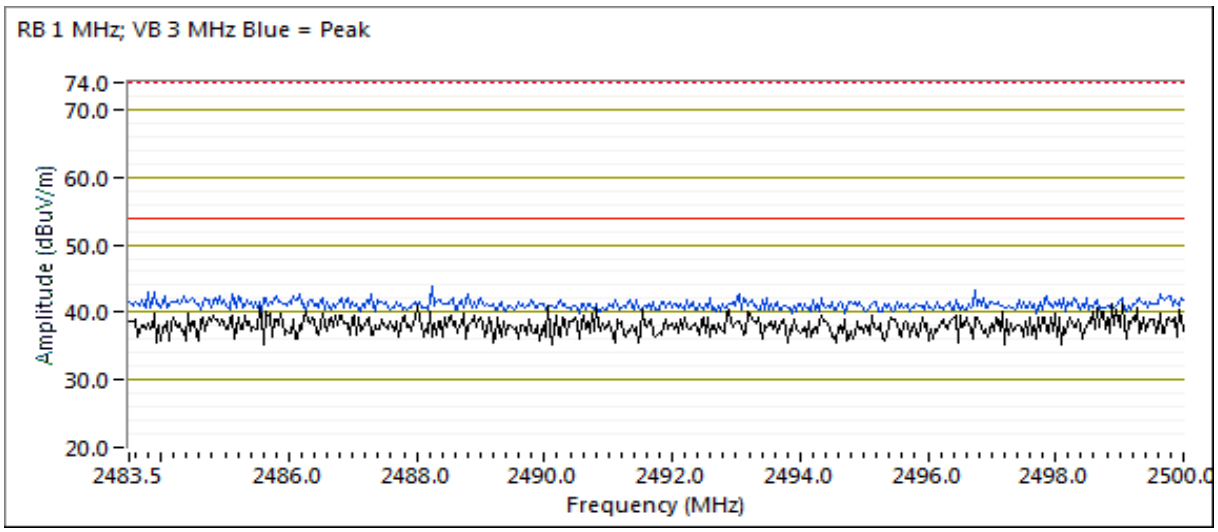
Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A



Channel: 39 Mode: BLE

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	
2493.190	43.6	V	54.0	-10.4	PK	355	1.6	POS; RB 1 MHz; VB: 3 MHz
2479.720	78.4	V	N/A	N/A	PK	355	1.4	POS; RB 1 MHz; VB: 3 MHz



Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	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 °C
Rel. Humidity: 43 %

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

Run #	Mode	Channel		Power Setting	Test Performed	Limit	Result / Margin
1	BLE	37 - 2402MHz		8	Radiated Emissions, 30 MHz - 25 GHz	FCC Part 15.209 / 15.247(c)	51.1 dBµV/m @ 12011.0 MHz (-2.9 dB)
	BLE	17 - 2440MHz		8	Radiated Emissions, 30 MHz - 25 GHz	FCC Part 15.209 / 15.247(c)	46.5 dBµV/m @ 12201.0 MHz (-7.5 dB)
	BLE	39 - 2480MHz		8	Radiated Emissions, 30 MHz - 25 GHz	FCC Part 15.209 / 15.247(c)	45.5 dBµV/m @ 12398.7 MHz (-8.5 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: CNH8KLB008
Driver: DIAG Image
Antenna: Molex Bluetooth Antenna

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC KDB 558074
Peak measurements performed with: RBW=1MHz, VBW=3MHz, peak detector, max hold, auto sweep time
Unless otherwise stated/noted, emission has duty cycle ≥ 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	1 Mb/s	1.00	Yes	100	0	0	10

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
Note 5:	Emission has constatnt duty cycle < 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces, measurement corrected by Pwr 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 7:	Emission has non constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW> 1/T, RMS detector, sweep time auto, max hold. Max hold for 50*(1/DC) traces

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

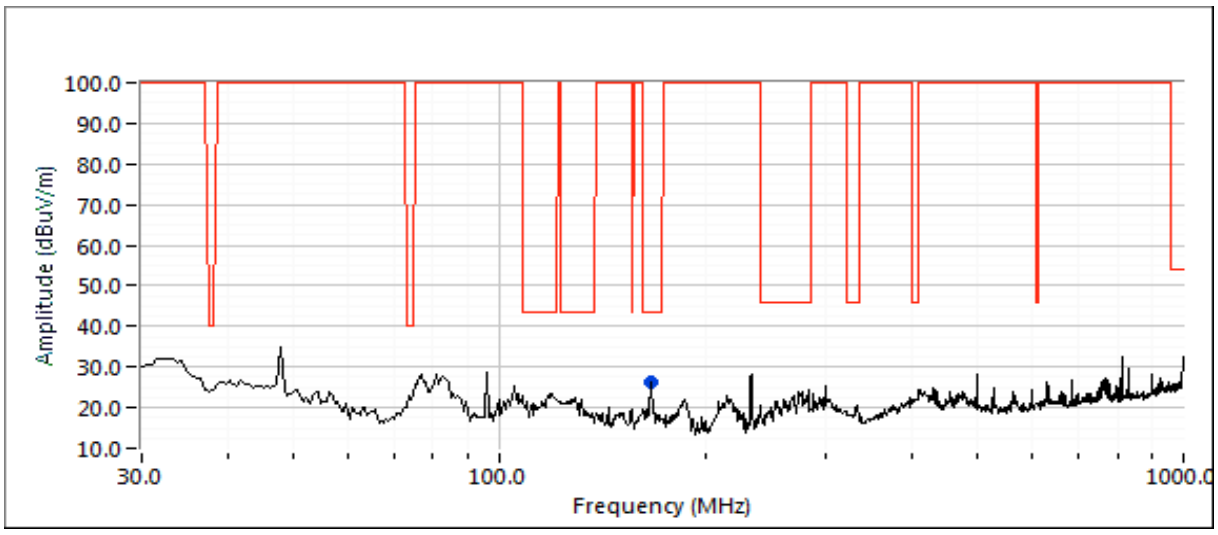
Run #1: Radiated Spurious Emissions, 30 - 25,000 MHz.

Date of Test: 4/5/2019 Config. Used: 1
Test Engineer: YK Soo Config Change: -
Test Location: Fremont Chamber #4 EUT Voltage: 110V/60Hz

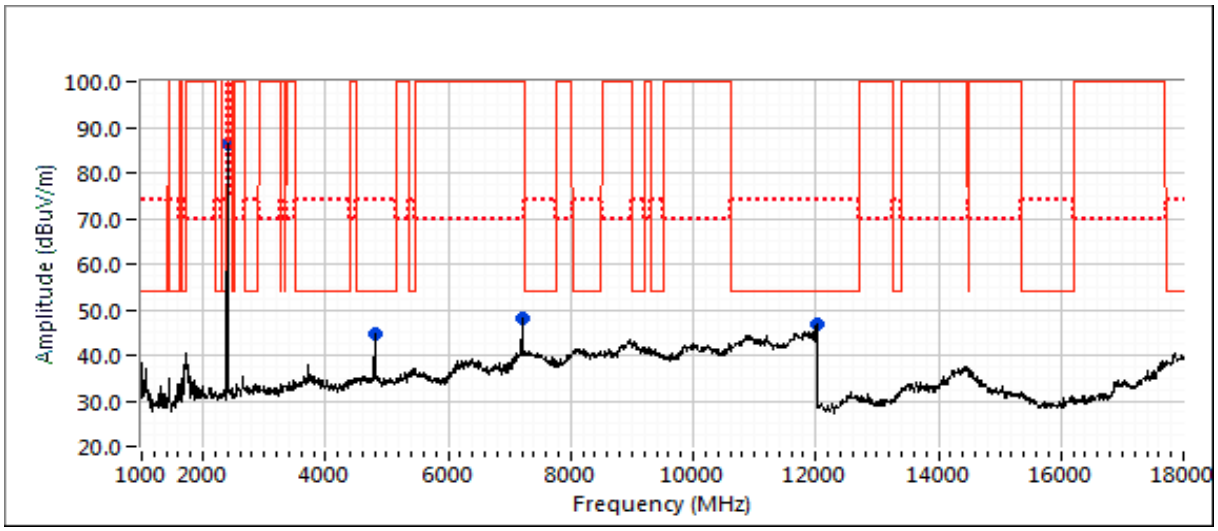
Run #1a: Low Channel

Channel: 37 Mode: BLE

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12010.990	51.1	H	54.0	-2.9	AVG	20	1.1	RB 1 MHz;VB 10 Hz;Peak
12008.600	60.6	H	74.0	-13.4	PK	20	1.1	RB 1 MHz;VB 3 MHz;Peak
4803.800	40.9	H	54.0	-13.1	AVG	340	1.2	RB 1 MHz;VB 10 Hz;Peak
4803.530	48.3	H	74.0	-25.7	PK	340	1.2	RB 1 MHz;VB 3 MHz;Peak
7205.320	45.0	V	54.0	-9.0	AVG	352	1.1	Note 1, RB 1 MHz;VB 10 Hz;Peak
7204.990	54.4	V	74.0	-19.6	PK	352	1.1	Note 1, RB 1 MHz;VB 3 MHz;Peak
2391.670	*86.2*	*H*	*N/A*	*N/A*	*Peak*	*345*	*1.0*	
166.095	22.4	V	43.5	-21.1	QP	0	1.0	QP (1.00s)



Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

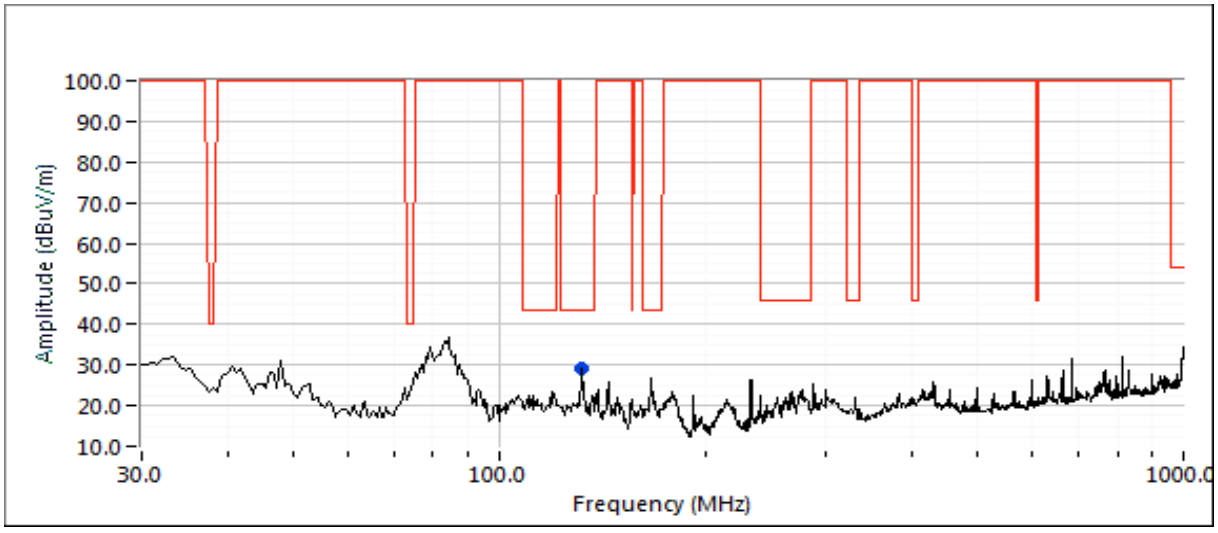


Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

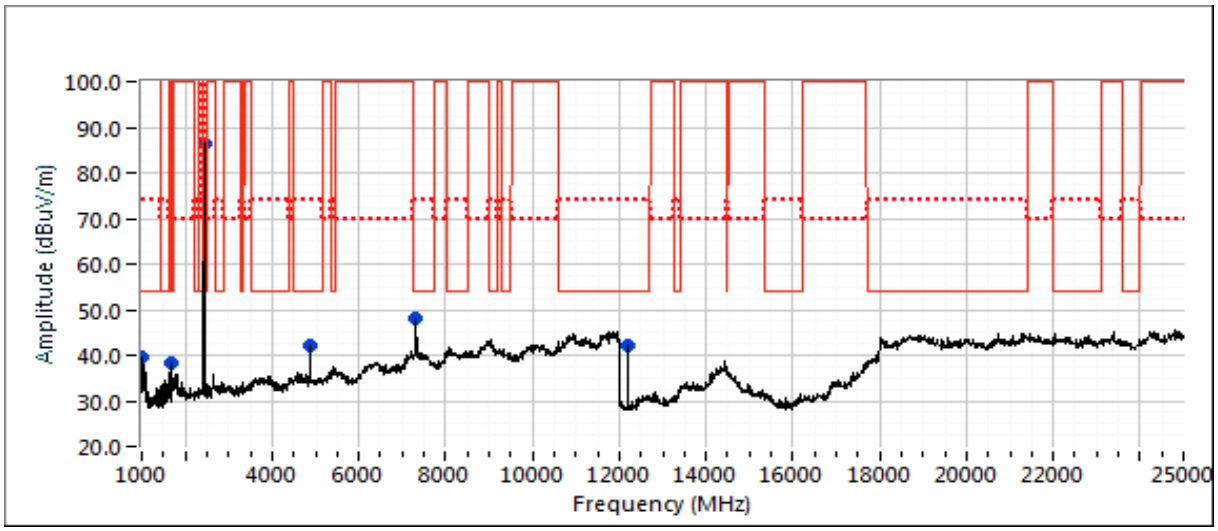
Run #1b: Center Channel

Channel: 17 Mode: BLE

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12201.030	46.5	H	54.0	-7.5	AVG	5	1.0	RB 1 MHz;VB 10 Hz;Peak
12201.150	55.5	H	74.0	-18.5	PK	5	1.0	RB 1 MHz;VB 3 MHz;Peak
7319.310	44.9	V	54.0	-9.1	AVG	0	2.5	RB 1 MHz;VB 10 Hz;Peak
7319.210	54.5	V	74.0	-19.5	PK	0	2.5	RB 1 MHz;VB 3 MHz;Peak
4880.120	39.1	V	54.0	-14.9	AVG	12	1.5	RB 1 MHz;VB 10 Hz;Peak
4880.450	47.1	V	74.0	-26.9	PK	12	1.5	RB 1 MHz;VB 3 MHz;Peak
1000.000	33.3	V	54.0	-20.7	AVG	117	2.5	RB 1 MHz;VB 10 Hz;Peak
1000.000	49.8	V	74.0	-24.2	PK	117	2.5	RB 1 MHz;VB 3 MHz;Peak
1662.830	27.5	V	54.0	-26.5	AVG	60	1.6	RB 1 MHz;VB 10 Hz;Peak
1666.250	49.6	V	74.0	-24.4	PK	60	1.6	RB 1 MHz;VB 3 MHz;Peak
2433.330	*86.3*	*H*	*N/A*	*N/A*	*Peak*	*338*	*1.0*	
132.116	23.6	V	43.5	-19.9	QP	360	1.0	QP (1.00s)



Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A



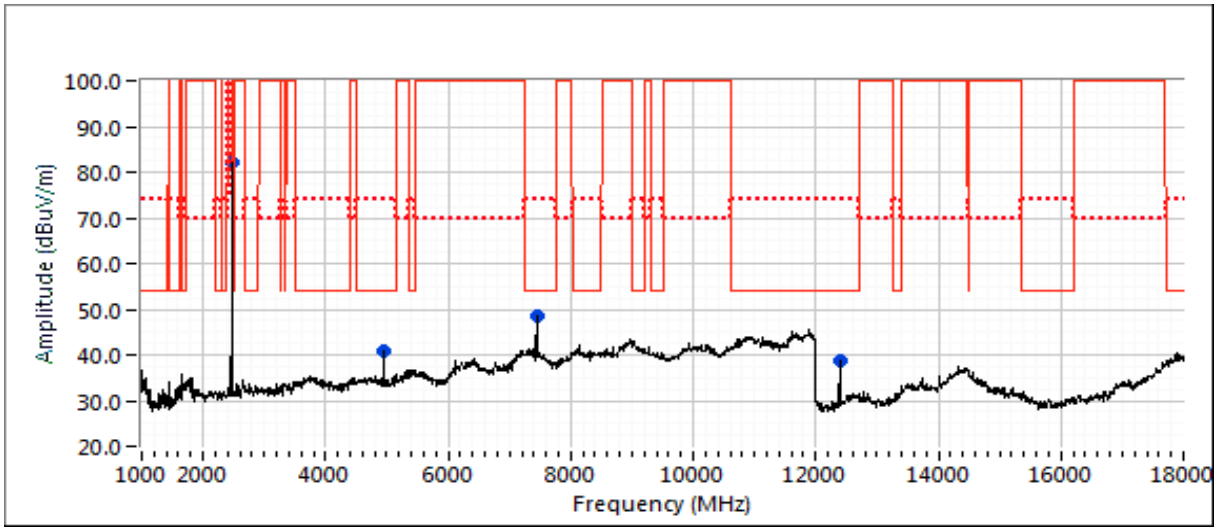
Note:	Scan made between 18 - 25 GHz with the measurement antenna located 3m from the device indicated there were no significant emissions in this frequency range so testing of low and high channels only was performed up to 18 GHz.

Client:	Aruba, a Hewlett Packard Enterprise company	Job Number:	PR090857
Model:	ARCN9004	T-Log Number:	TL090857-RA
		Project Manager:	Christine Krebill
Contact:	Jack Liu	Project Coordinator:	David Bare
Standard:	FCC 15.247, EN 300 328, LP0002	Class:	N/A

Run #1c: High Channel

Channel: 39 Mode: BLE

Frequency	Level	Pol	15.209 / 15.247		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
12398.700	45.5	H	54.0	-8.5	AVG	9	1.0	RB 1 MHz;VB 10 Hz;Peak
12398.600	55.8	H	74.0	-18.2	PK	9	1.0	RB 1 MHz;VB 3 MHz;Peak
7439.290	44.6	V	54.0	-9.4	AVG	0	2.5	RB 1 MHz;VB 10 Hz;Peak
7439.190	54.4	V	74.0	-19.6	PK	0	2.5	RB 1 MHz;VB 3 MHz;Peak
4959.730	37.9	V	54.0	-16.1	AVG	308	1.3	RB 1 MHz;VB 10 Hz;Peak
4959.540	46.6	V	74.0	-27.4	PK	308	1.3	RB 1 MHz;VB 3 MHz;Peak
2475.000	*82.1*	*H*	*120.0*	*-37.9*	*Peak*	*340*	*1.5*	



End of Report

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