Amber Helm Development L.C.
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Sister Lakes, MI 49047

EMC Test Report

#1702159FX247
Issued 9/19/17

Regarding the FCC Part 15 testing

Truck Diagnostic Monitor

Model Number: IOS-1020

Category: 15.247 Transceiver Device
FCC ID 2AICQ-1020
Judgments: FCC Part 15.247 – Compliant

NVLAP LAB CODE 200129-0

Prepared for: *IOSix LLC*
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Test Date(s): 6/10/2017-9/19/2017

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Test Engineer, AHD

Table of Contents

Statements concerning this report

NVLAP Accreditation: NVLAP Lab Code 200129-0

The scope of AHD accreditation are the test methods of:

IEC/CISPR11:	Limits and methods of measurement of electrical disturbance characteristics of Industrial, Scientific, and Medical Radio-Frequency Equipment
IEC/CISPR 22:	Limits and methods measurement of radio disturbance characteristics of information technology equipment.
EN 55032	EMC for Multimedia Devices
FCC:	Method 47 CFR Part 15 Subpart B: Unintentional Radiators.
FCC:	Method 47 CFR Part 15: Subpart C: Intentional Radiators.
FCC:	Method 47 CFR Part 18 – Industrial, Scientific, and Medical Equipment
AS/NZS 3548:	Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment.
IEC61000-4-2:	Electrostatic Discharge Immunity
IEC61000-4-5:	Surge Immunity

Test Data:
This test report contains data included in the scope of NVLAP accreditation.

Subcontracted Testing:
This report does not contain data produced under subcontract.

Test Traceability:
The calibration of all measuring and test equipment and the measured data using this equipment are traceable to the National Institute for Standards and Technology (NIST).

Limitations on results:
The test results contained in this report relate only to the Item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require an evaluation to verify continued compliance.

Limitations on copying:
This report shall not be reproduced, except in full, without the written approval of AHD.

Limitations of the report:
This report shall not be used to claim product endorsement by NVLAP, FCC, or any agency of the US Government.

Retention of Records:
For equipment verified to comply with FCC regulations, the manufacturer is obliged to retain this report with the product records for ten years following the manufacture of the equipment that was tested.

For equipment verified to comply with RSS-210, the manufacturer is obliged to retain this report with the product records for as long as the model is being marketed in Canada.

FCC Required user statements:

FCC Part 18 ISM Devices:

1. For all industrial, scientific, medical (ISM) devices, the instruction manual or, if no instruction manual is provided, the product packaging, must provide information that addresses the following: (1) interference potential of the device, (2) maintenance of the system and (3) simple measures that can be taken to correct interference. RF lighting devices must add a statement similar to the following: "This product may cause interference to radio equipment and should not be installed near maritime safety communications equipment, ships at sea or other critical navigation or communications equipment operating between 0.45-30 MHz." (Section 18.213)

   In addition, Part 18 devices that are authorized under the DoC procedure shall also include in the instruction manual, on a separate sheet, or on the packaging the following: (1) identification of the product (e.g. name and model number), (2) a statement similar to "This device complies with Part 18 of the FCC Rules" (Section 18.212), and (3) the name and address of the responsible party (Section 2.909).

2. For products certified using the Declaration of Conformity approach, this FCC conformity LOGO is to be placed on the ISM Device.

FCC Part 15 Class A or B Digital Devices or Peripherals:

For products satisfying the FCC Part 15 Class A or Class B requirements the following are to be satisfied:

1. The following statement is required to be labeled on the product or, if the device is too small, in the user's manual:

   This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2. A statement is required to be placed in the User's Manual shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For an FCC Part 15 Class A digital device or peripheral, the user instructions shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may

cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operated the equipment under FCC rules.

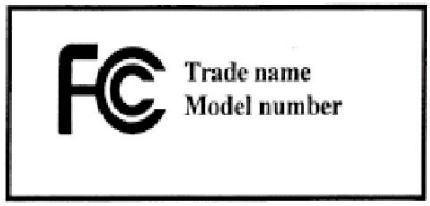
Additionally, for products satisfying the FCC Part 15 Class B requirements the following are to be satisfied:

1. The User's Manual shall include this or similar statement:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

i. *Reorient or relocate the receiving antenna.*
ii. *Increase the separation between the equipment and receiver.*
iii. *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
iv. *Consult the dealer or an experienced radio/TV technician for help.*

2. For products certified using the Declaration of Conformity approach,
   a. The FCC conformity LOGO is to be placed on the Class B Digital Device.



   b. The FCC requires a Compliance Information statement (Declaration of Conformity) to accompany each product to the end user.

Industry Canada Required user statements:

Applies to: [Category II Equipment]

1. For products satisfying the ICES-003, RSS-Gen and RSS-210 Issue 6 requirements the following are to be satisfied:

   User manuals for license-exempt LPDs shall contain the following or equivalent statements in a conspicuous position:

   "Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

If the antenna is detachable (i.e. selectable by the user), see the user manual requirement in Section 7.1.4. The following instructions in the user manual are also required:

"To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (e.i.r.p.) is not more than that permitted for successful communication."

The above statements may be placed on the device instead of the manual.

2. User Manual:

   User manual shall also contain text declaring compliance to the limits found in this Standard in both English and French.

3. Equipment Labels:

   Equipment subject to certification under the applicable RSS's, shall be permanently labeled on each item, or as an inseparable combination. The label must contain the following information for full compliance:

   (a) the certification number, prefixed by the term "IC:";
   (b) the manufacturer's name, trade name or brand name; and
   (c) a model name or number.

   Equipment for which a certificate has been issued is not considered certified if it is not properly labeled.

   The information on the Canadian label can be combined with the manufacturer's other labeling requirements.

   If the device size is too small to put a label, the label can be included in the user's manual, upon agreement with Industry Canada.

Summary of Results

1. The device model number IOS-1020 was tested for compliance with FCC Regulations, Part 15.247 These tests were performed at AHD EMC Laboratory following the procedures outlined in FCC part 15.247.d and ANSI C63.4 as applicable.
2. The device FCCID is 2AICQ-1020.
3. The transmitter test results apply to ELD V2.
4. This device operates in low power Bluetooth BLE, Wifi N20, Wifi B, and Wifi G modes. The device also includes a GPS receiver.
5. This device is compliant as a 15.247 DTS device in the frequency range of 2400-2483.5 MHz.
6. The PCB antenna used in this product has -10.28 dBi gain maximum within the operational frequency range.
7. The equipment under test was received on 6/10/17 and this test series commenced on 6/10/2017.
8. In BLE mode 120VAC operation, the conducted emission level nearest the limit occurred at 1.6 MHz. The signal was measured to be 7.8 dB below the Class B Quasi-Peak limit and 7.4 dB below the Class B Average limit when measuring phase to ground.
9. In BLE mode 240VAC operation, the conducted emission level nearest the limit occurred at 1.7 MHz. The signal was measured to be 9 dB below the Class B Quasi-Peak limit and 10 dB below the Class B Average limit when measuring L1 to ground.
10. In Wifi mode 120VAC operation, the conducted emission level nearest the limit occurred at 1.7 MHz. The signal was measured to be 9.4 dB below the Class B Quasi-Peak limit and 9.5 dB below the Class B Average limit when measuring phase to ground.
11. In Wifi mode 240VAC operation, the conducted emission level nearest the limit occurred at 1.7 MHz. The signal was measured to be 9 dB below the Class B Quasi-Peak limit and 9 dB below the Class B Average limit when measuring L2 to ground.
12. Testing all modes the spurious radiated emission level nearest the limit below 1 GHz occurred at 49 MHz horizontally polarized in BLE Mode. This signal was measured to be 1.1 dB below the Class B Quasi-peak limit.
13. In BLE Mode, fundamental peak was measured at 2480 MHz, and the tabulated power has a margin of 0.88 W to the 1 Watt limit using a peak detector.
14. In Wifi Mode, the worst case fundamental peak was measured at 2437 MHz in Wifi B mode, and the tabulated power has a margin of 0.79 W to the 1 Watt limit using a peak detector.
15. In BLE Mode, the worst case restricted band spurious emission over 1 GHz was measured at 4996 MHz. The emission was measured to be 3 dB under the average limit and 12 dB under the peak limit.
16. In BLE Mode, the worst case non-restricted band conducted spurious emission over 1 GHz was measured at 3283 MHz. The emission was measured to be 27.25 dB below the 20dBc limit.

17. In Wifi Mode, the worst case restricted band spurious emission over 1 GHz was measured at 4837 MHz in Wifi G mode. The emission was measured to be 0.1 dB under the average limit and 11 dB under the peak limit.
18. In Wifi Mode, the worst case non-restricted band conducted spurious emission over 1 GHz was measured at 3249 MHz in Wifi G mode. The emission was measured to be 27.05 dB below the 20dBc limit.
19. In BLE mode, the worst case 6 dB bandwidth was found to have a margin of 175 kHz against the limit of 500 kHz minimum.
20. In Wifi mode, the worst case 6 dB bandwidth was found in Wifi B mode to have a margin of 5700 kHz against the limit of 500 kHz minimum.
21. In BLE Mode, the worst case conducted band edge was found at 2400 MHz to have 43.75 dB margin against the limit.
22. In Wifi Mode, the worst case conducted band edge was found in Wifi G mode at 2400 MHz to have 38.05 dB margin against the limit.
23. In BLE Mode, the worst case restricted band edge was found at 2483.5 MHz to have 49.6 dB margin against the average limit and 53.8 dB margin against the peak limit.
24. In Wifi Mode, the worst case restricted band edge was found in Wifi N20 mode at 2390 MHz to have 45.8 dB margin against the average limit and 51.6 dB margin against the peak limit.
25. The worst case Power Density measurement was found in BLE mode at 2480 MHz using a 3 kHz RBW to be 13.6 dB under the 8 dBm limit.
26. As an FCC 2.1091 mobile device, FCC 1.310 maximum power density limit of 1 mw/cm^2 at 20 cm applies. Given the device peak EIRP of 210 mW, power density can be calculated as S =EIRP/4*pi*20cm^2 = .042 mW/cm^2, which is well under the limit of 1 mW/cm^2.

Changes Made to Achieve Compliance:

1. None

EUT Description

Model: Truck Diagnostic Monitor

Model number: IOS-1020

Serial/ID No: 18FE346CF8F0

Description: : Serial IO Connected Diagnostic monitor which communicates via Low Power Bluetooth, WIFI N20, WIFI B, and WIFI G Modes.

Antenna: PCB Integrated -10.28 dBi

PCB: WIFI/BT/GPS J1939/J1708 LC v1.2

Transmit Device:

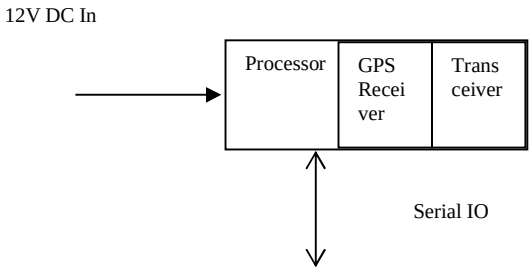
MFG: Espressif Ble / Wifi
Model: ESP32
Frequency Range: BLE Mode: 2402-2480 MHz Wifi B Mode: 2416-2460 MHz, Wifi G Mode: 2417-2457 MHz, Wifi N20 Mode: 2417-2457 MHz

Specifications:

Input Power: 12VDC Power Source

Input / Output Signals: Serial IO, 2400-2483.5 MHz 15.247 DSS device
Input Signals: GPS Receiver

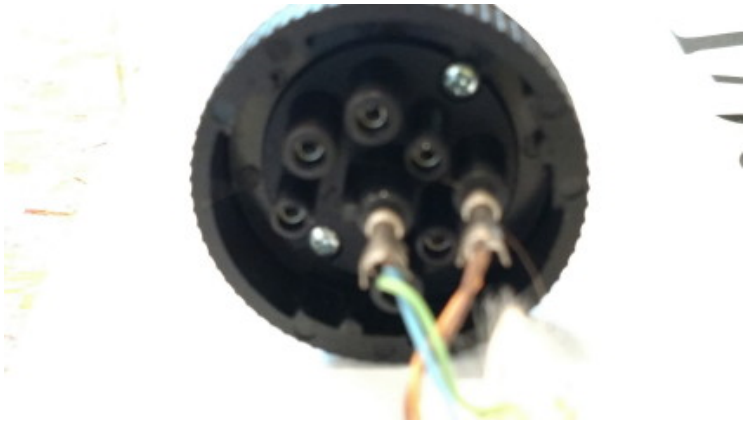
EUT Block Diagram:



EUT Pictures

Exterior View Front

Exterior View Rear



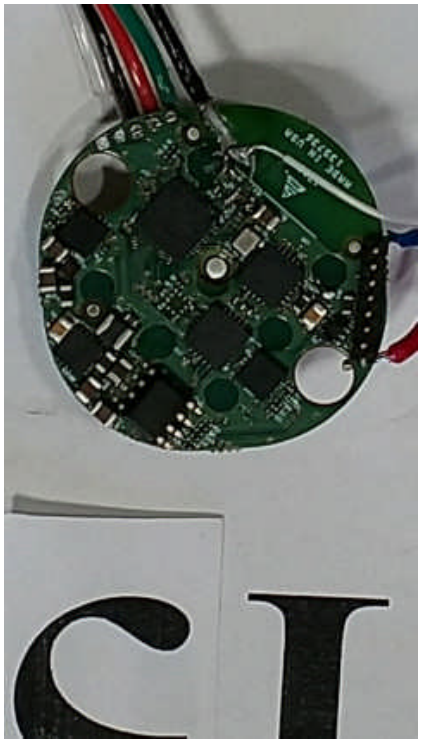
Exterior Left Side View

Exterior Right Side View

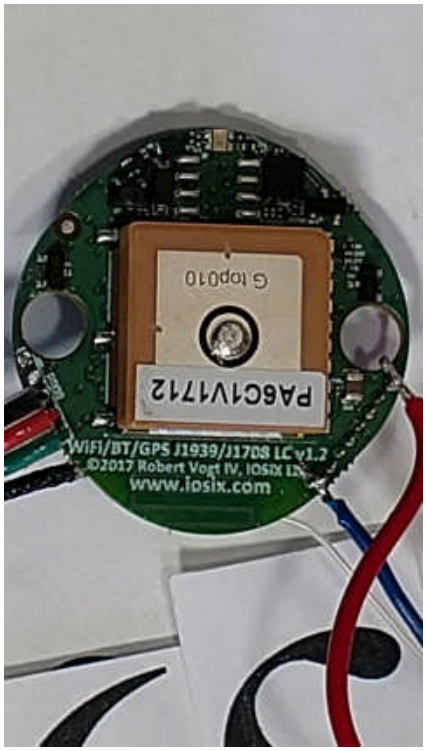
Exterior Top View

Exterior Bottom View

PCB Top View



PCB Bottom View

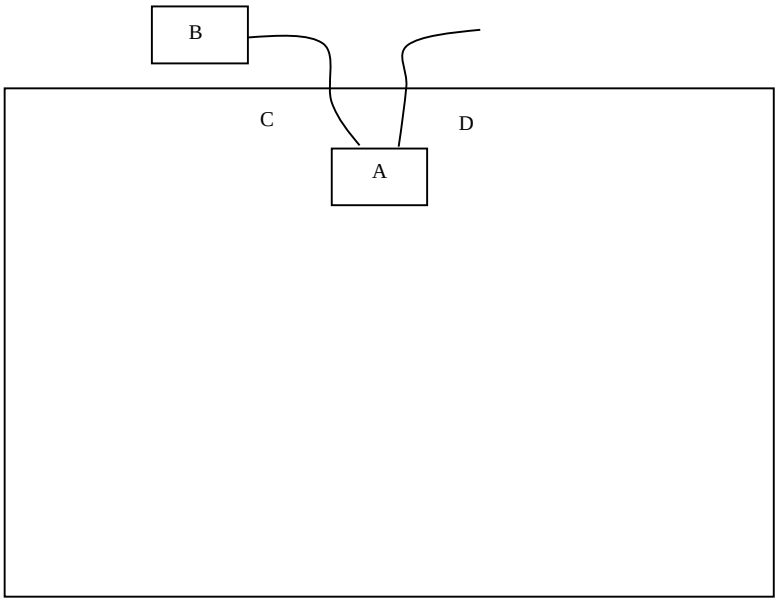


Equipment Test Setup:

Support Equipment & Cabling

Setup Diagram Legend	Description	Model	Serial No. / Part No.	EMC Consideration
A	**EUT – Bluetooth / Wifi / USB Truck Diagnostic Interface**	ELD V2	18FE346C F8F0	15.247 transceiver device
B	**12VDC 1.5A Power Supply**	Shenzen Honor Electronics	ADS-1BE-12N	Switching PS
C	**Power Cord**			3M Unshielded
D	**USB Communications Cable**			3M Unshielded

Block Diagram



Setup Pictures

Radiated Prescreen Setup

Front Conducted Setup

Rear Conducted Setup

Front Radiated Setup below 1 GHz

Rear Radiated Setup Below 1 GHz

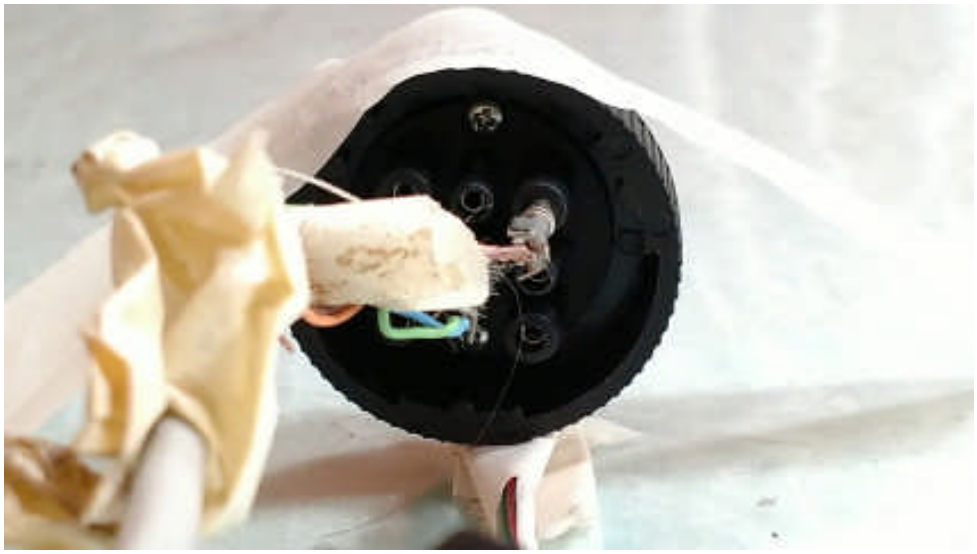
Front Spurious Testing Above 1 GHz

Rear Spurious Testing Above 1 GHz

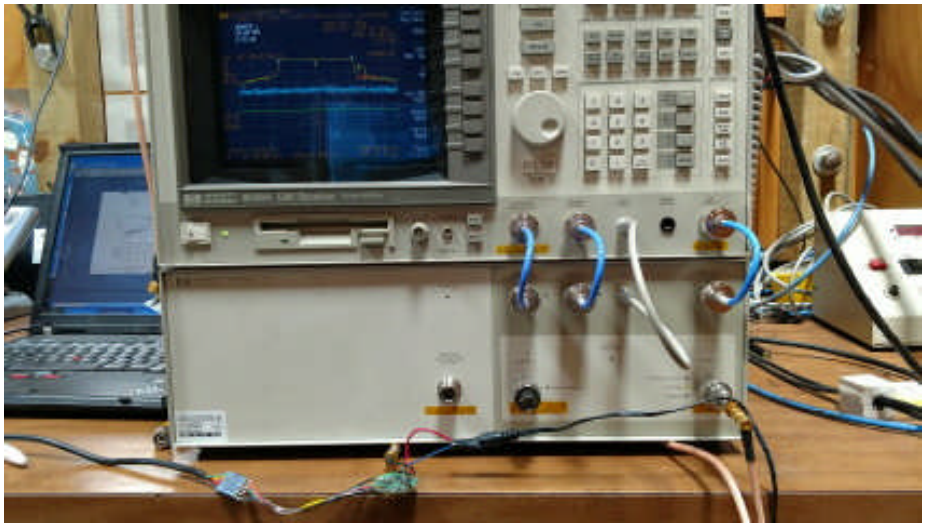
Flat Orientation Setup Above 1 GHz

End Orientation Above 1 GHz

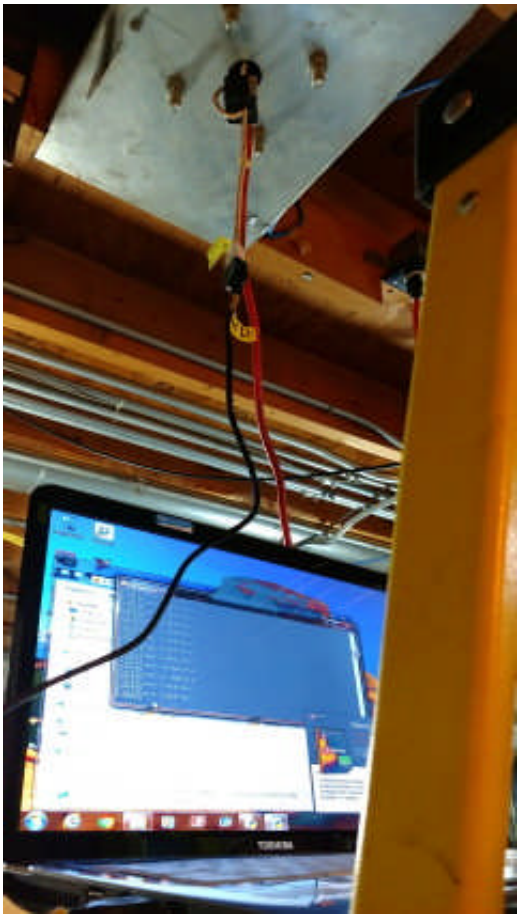
Side Orientation Above 1 GHz



Conducted Power Test Setup



Controlling Device View



Measurement Report

Standards Applied to Test

ANSI C63.4 – Radio Noise Emissions 2014
ANSI C63.10 – Intentional Radiators 2013
CFR47 FCC Part 15, SubPart B/C
AHD/SEI test procedures TP0101LC, TP0102RA
EN55032:2012 EMC for Multimedia Devices
EN61000-6-3 Generic 2007.2
KDB 558074 D01 V04 April 5 2017

Equipment Configuration

For the testing, the placement of the EUT and the support equipment was selected to –

- Be a representation of a configuration typical of user installation, and
- Comply with the minimum system configuration of ANSI C63.4.

Test Methodology

Transmit:

Transmit radiated testing was performed at a 3 meter open field test site, and completed according to the procedures in FCC 15.247 with supporting instructions from ANSI C63.4, C63.10, and KDB558074.

Note that distances less than 3 meters (i.e. 1 and 0.1 meter) may be used if signals are not detectable at specified distances, and distances compensated for within the tabulated measurements.

For intentional radiated emissions testing, the system was placed upon a 1 x 1.5 meter non-metallic table 150cm from the open field site ground plane in the prescribed setup per ANSI C63.10-2013.

Device fundamental and harmonic measurements were made by accumulating low, mid, and high band maximum peak hold measurements across the frequency range. Of the three frequencies, the highest signal was recorded at each harmonic frequency.

Conducted Signal Strength Measurements were calculated by measuring peak radiated field strength at 3 Meters in dBuV/M, and converting to equivalent conducted power using the formula P=(ED)^2/30, where P is the power in watts, E is field strength in V/M, D is distance in Meters.

The device operated continuously during testing.

All measurements were performed by manipulating the device orientation until a maximum signal strength measurement was recorded.

The following 15.247 test parameter setups apply to transmit test:

Radiated Measurements:

Note that descriptions of specific KDB test procedures used are included in individual sections of this report. Spurious radiated testing was performed at a 3 meter open field test site, and completed according to the procedures in FCC 15, SubPart B with supporting instructions from ANSI C63.4. Please reference Appendix A for further details on Test Methodology.

For spurious radiated emissions testing, the system was placed upon a 1 x 1.5 meter non-metallic table 80cm from the open field site ground plane in the prescribed setup per ANSI C63.4, Figure 9(c).

For intentional radiated emissions testing, the system was placed upon a 1 x 1.5 meter non-metallic table 150cm from the open field site ground plane in the prescribed setup per ANSI C63.10-2013.

A scan of the EUT was made in a shielded room to study the emission profile of this EUT. This scan indicated low level spurious emissions from the unit.

The suspect signals recorded in the shielded room prescan for each module were then measured at the 3-meter open area test site.

The EUT was scanned for radiated energy up to 26 GHz to meet FCC 15.33.a.1 requirements.

The EUT under test was placed per ANSI C63.4

The EUT was exercised as follows:

1. Device was powered via Power Supply
2. The device was activated with external USB control
3. Evidence of operation was provided by signal measurement

The cables were manipulated to produce the highest signal level relative to the limit.

The pictures, in the preceding pages, show the position of the equipment and cabling that produced the maximum signal level.

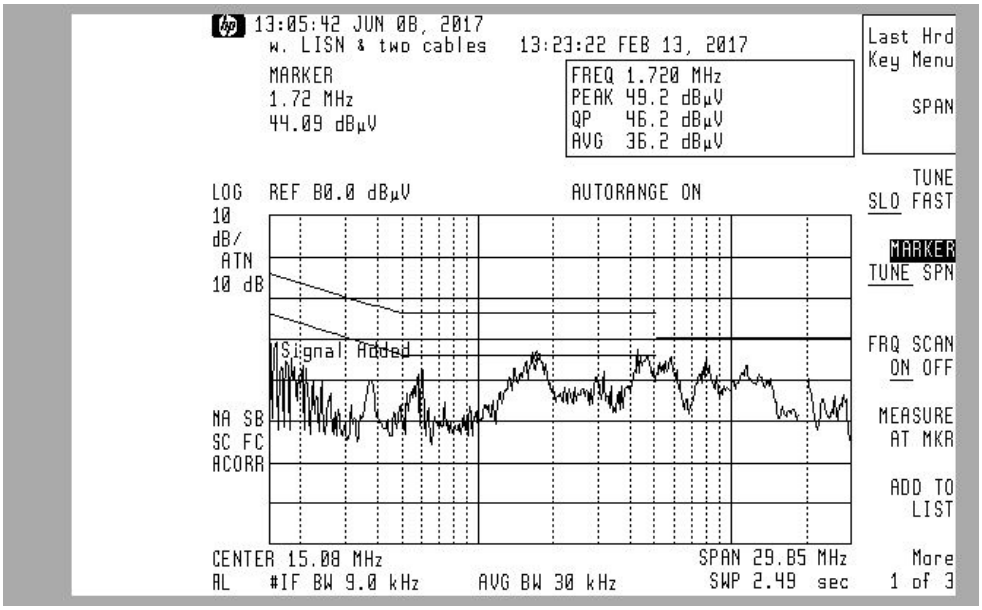
Variance from Test Procedure:

None

Test Data

Line Conducted:

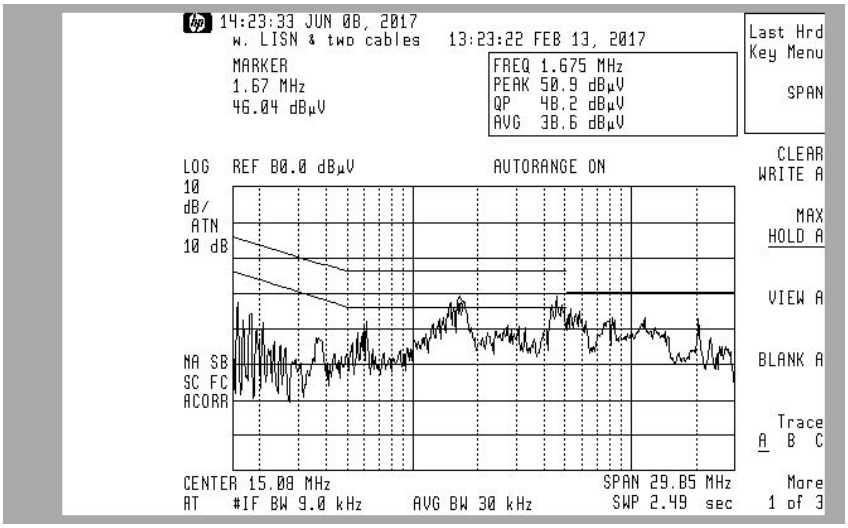
BLE Mode NEUTRAL to Ground Measurement.
Class B Plot of Peak Values



BLE Mode NEUTRAL to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.15	**45.00**	**22.00**	66.00	56.00	21.00	34.00
1.70	**46.00**	**36.00**	56.00	46.00	10.00	10.00
4.20	**42.00**	**29.00**	56.00	46.00	14.00	17.00
4.50	**46.00**	**33.00**	56.00	46.00	10.00	13.00
5.30	**38.00**	**27.00**	60.00	50.00	22.00	23.00
7.70	**37.00**	**29.00**	60.00	50.00	23.00	21.00

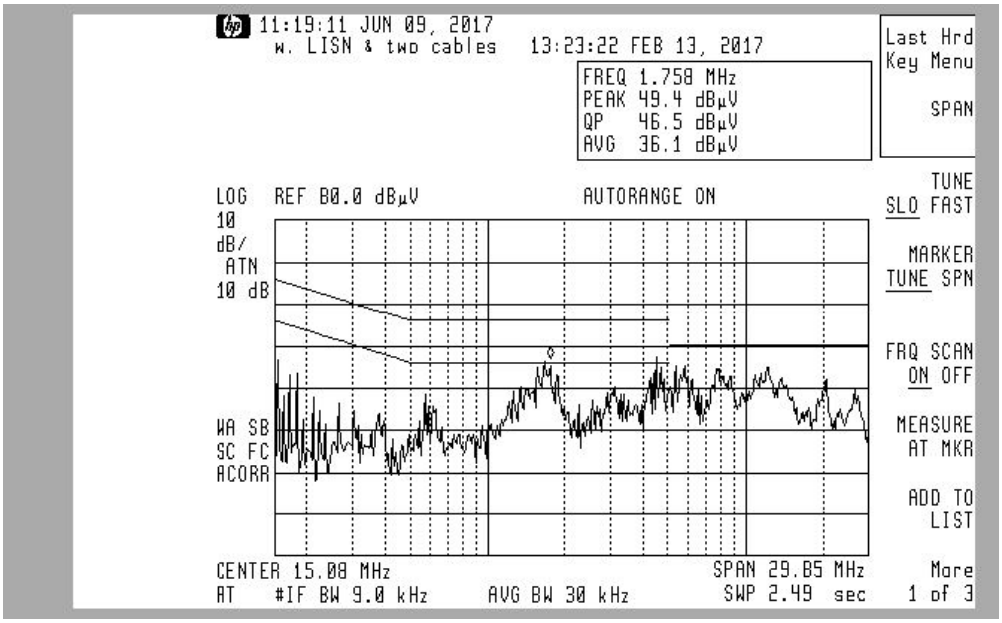
BLE Mode PHASE to Ground Measurement.
Class B Plot of Peak Values



BLE Mode PHASE to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.50	**38.00**	**24.00**	56.00	46.00	18.00	22.00
1.60	**48.20**	**38.60**	56.00	46.00	7.80	7.40
4.50	**47.00**	**34.00**	56.00	46.00	9.00	12.00
5.50	**39.00**	**30.00**	60.00	50.00	21.00	20.00
8.10	**37.00**	**27.00**	60.00	50.00	23.00	23.00
20.00	**36.00**	**26.00**	60.00	50.00	24.00	24.00

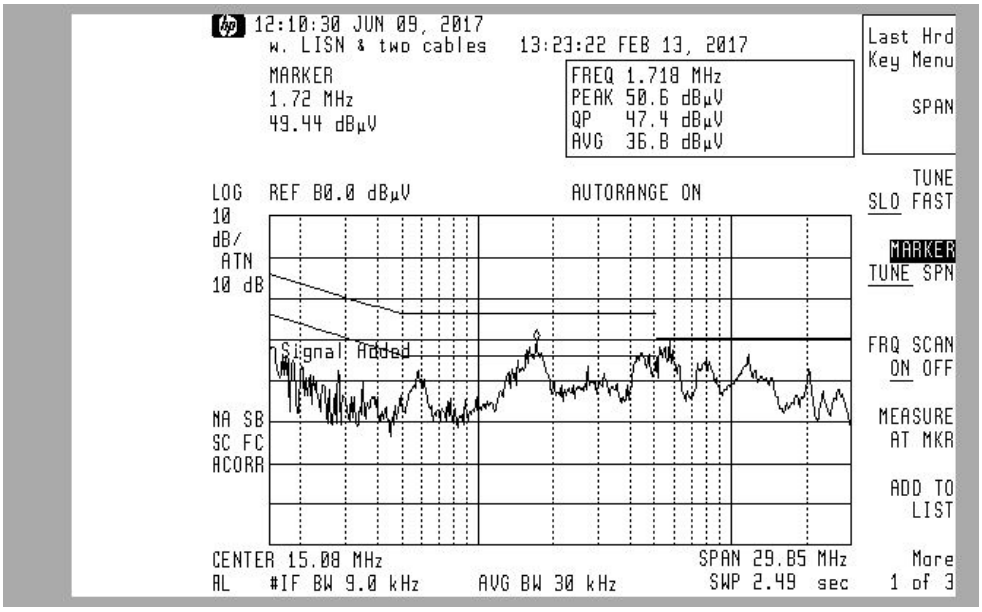
BLE Mode L2 to Ground Measurement.
Class B Plot of Peak Values



BLE Mode L2 to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.58	**35.00**	**23.00**	56.00	46.00	21.00	23.00
1.30	**42.00**	**33.00**	56.00	46.00	14.00	13.00
1.70	**46.50**	**36.10**	56.00	46.00	9.50	9.90
4.40	**44.00**	**31.00**	56.00	46.00	12.00	15.00
7.90	**39.00**	**31.00**	60.00	50.00	21.00	19.00
12.00	**38.00**	**25.00**	60.00	50.00	22.00	25.00

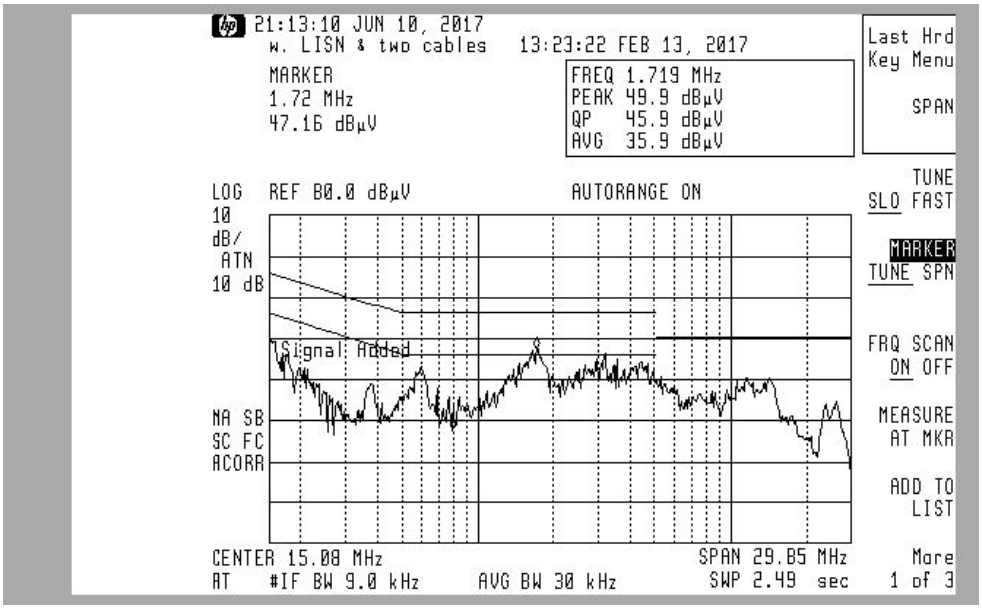
BLE Mode L1 to Ground Measurement.
Class B Plot of Peak Values



BLE Mode L1 to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.60	**37.00**	**23.00**	56.00	46.00	19.00	23.00
1.70	**47.00**	**36.00**	56.00	46.00	9.00	10.00
4.50	**45.00**	**32.00**	56.00	46.00	11.00	14.00
5.30	**39.00**	**27.00**	60.00	50.00	21.00	23.00
8.20	**38.00**	**28.00**	60.00	50.00	22.00	22.00
11.20	**36.00**	**28.00**	60.00	50.00	24.00	22.00

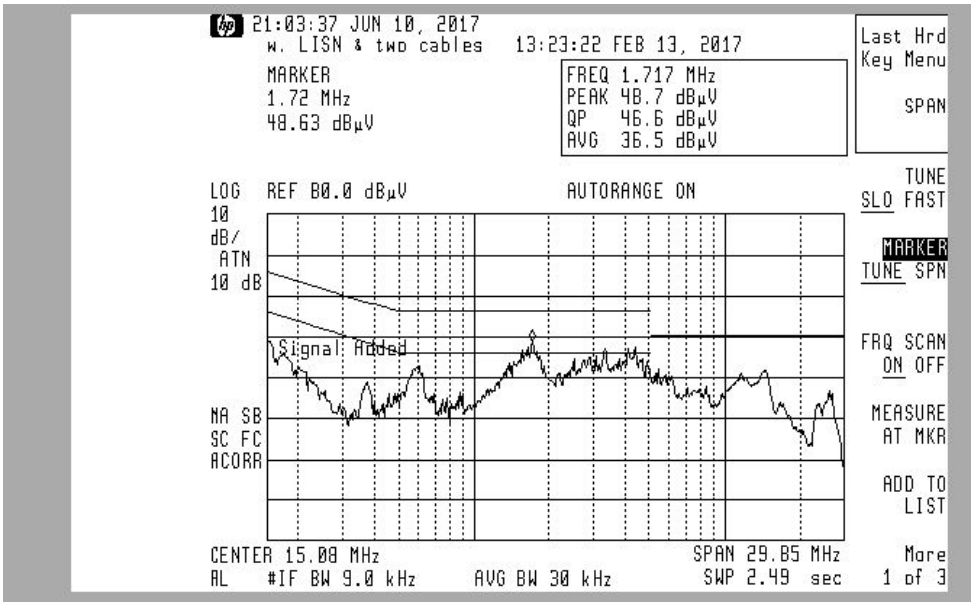
Wifi Mode NEUTRAL to Ground Measurement.
Class B Plot of Peak Values



Wifi Mode NEUTRAL to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.15	**45.00**	**23.00**	66.00	56.00	21.00	33.00
1.70	**46.00**	**35.00**	56.00	46.00	10.00	11.00
3.19	**38.00**	**27.00**	56.00	46.00	18.00	19.00
4.40	**43.00**	**32.00**	56.00	46.00	13.00	14.00
11.00	**34.00**	**23.00**	60.00	50.00	26.00	27.00
25.90	**28.00**	**14.00**	60.00	50.00	32.00	36.00

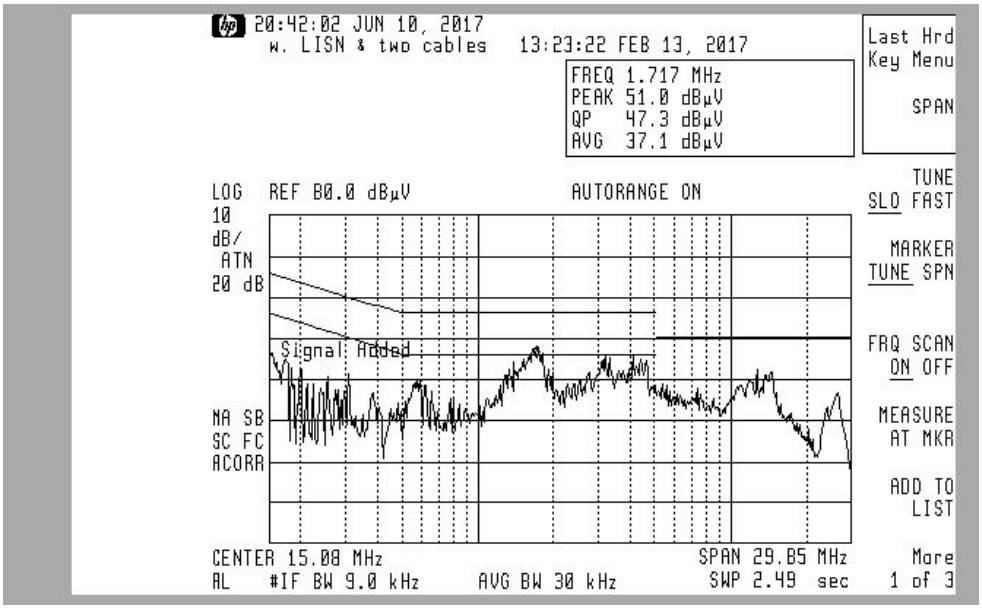
Wifi Mode PHASE to Ground Measurement.
Class B Plot of Peak Values



Wifi Mode PHASE to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.15	**45.00**	**20.00**	66.00	56.00	21.00	36.00
1.70	**46.60**	**36.50**	56.00	46.00	9.40	9.50
3.20	**36.00**	**26.00**	56.00	46.00	20.00	20.00
4.20	**40.00**	**31.00**	56.00	46.00	16.00	15.00
4.40	**44.00**	**32.00**	56.00	46.00	12.00	14.00
13.70	**33.00**	**25.00**	60.00	50.00	27.00	25.00

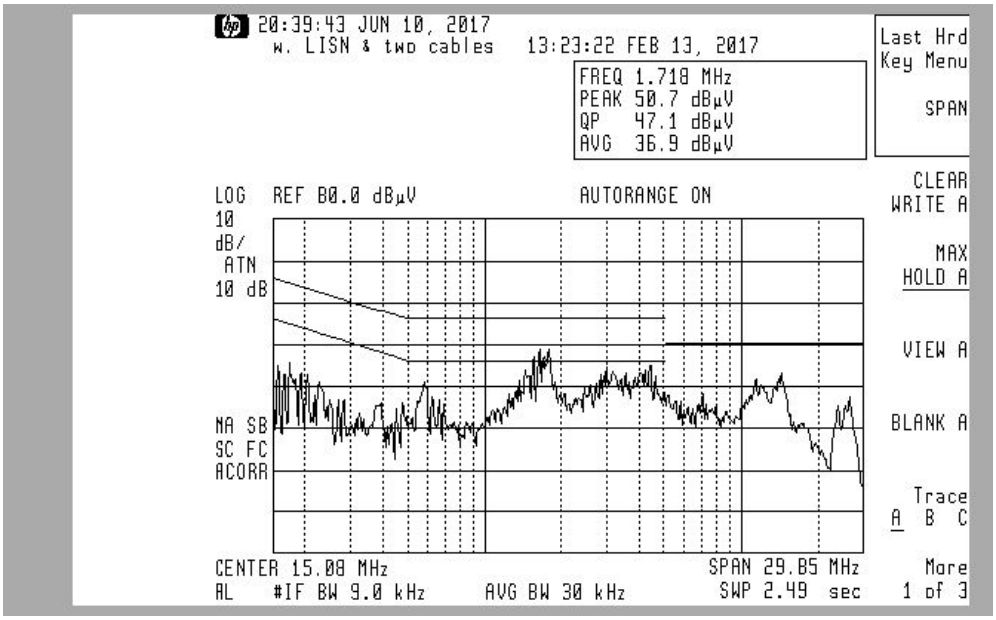
Wifi Mode L2 to Ground Measurement.
Class B Plot of Peak Values



Wifi Mode L2 to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.15	**40.00**	**11.00**	66.00	56.00	26.00	45.00
1.60	**45.00**	**36.00**	56.00	46.00	11.00	10.00
1.70	**47.00**	**37.00**	56.00	46.00	9.00	9.00
3.19	**38.00**	**28.00**	56.00	46.00	18.00	18.00
3.50	**36.00**	**25.00**	56.00	46.00	20.00	21.00
4.40	**43.00**	**31.00**	56.00	46.00	13.00	15.00

Wifi Mode L1 to Ground Measurement.
Class B Plot of Peak Values



Wifi Mode L1 to Ground Conducted
Class B Tabulated Measurements

Frequency	dBuV Reading		FCC / EN55032 dBuV Class B Limit		dB Margin	
MHz	QP	Avg	QP	Avg	QP	Avg
0.60	**36.00**	**20.00**	56.00	46.00	20.00	26.00
1.70	**47.00**	**36.90**	56.00	46.00	9.00	9.10
4.40	**46.00**	**32.00**	56.00	46.00	10.00	14.00
5.70	**39.00**	**30.00**	60.00	50.00	21.00	20.00
8.00	**41.00**	**31.00**	60.00	50.00	19.00	19.00
12.00	**36.00**	**27.00**	60.00	50.00	24.00	23.00

Radiated Spurious Emissions

All Mode Worst Case Vertically Polarized
Class B Tabulated Spurious Quasi-Peak Measurements at 3 Meters

Mode	Frequency	Corrected Quasipeak Measurement	Turntable Azimuth	Antenna Height	FCC Class B Limit	Margin Class B
	MHz	dBuV/m	deg	Mtr	dBuV/m	dBuV/m
wifi b	**64.00**	**33.60**	**220**	**1.0**	**40.00**	**6.40**
wifi g	**80.00**	**38.40**	**45**	**1.0**	**40.00**	**1.60**
wifi b	**400.00**	**40.40**	**90**	**1.0**	**46.00**	**5.60**
wifi n20	**480.00**	**43.20**	**30**	**1.0**	**46.00**	**2.80**
ble	**640.00**	**36.00**	**0**	**1.0**	**46.00**	**10.00**
wifi b	**720.00**	**40.60**	**90**	**1.0**	**46.00**	**5.40**

All Mode Worst Case Horizontally Polarized
Class B Tabulated Quasi-Peak Measurements at 3 Meters

Mode	Frequency	Corrected Quasipeak Measurement	Turntable Azimuth	Antenna Height	FCC Class B Limit	Margin
	MHz	dBuV/m	deg	Mtr	dBuV/m	dBuV/m
ble	**49.00**	**38.90**	**0**	**3.2**	**40.00**	**1.10**
ble	**160.00**	**27.00**	**120**	**2.3**	**43.50**	**16.50**
ble	**325.00**	**27.00**	**140**	**1.5**	**46.00**	**19.00**
ble	**400.00**	**42.40**	**90**	**1.3**	**46.00**	**3.60**
ble	**480.00**	**28.00**	**135**	**2.0**	**46.00**	**18.00**
ble	**640.00**	**38.80**	**110**	**1.0**	**46.00**	**7.20**

Fundamental Transmit Power

Conducted fundamental power measurements were made using the procedure described in KDB558074 9.2.2.2 trace averaging with full power transmitting. The device was placed in "continuous transmit" mode with a duty cycle of 100%. The span was set to greater than 1.5x the 99% OBW) and the RBW was set to between 1% to 5% of the OBW.

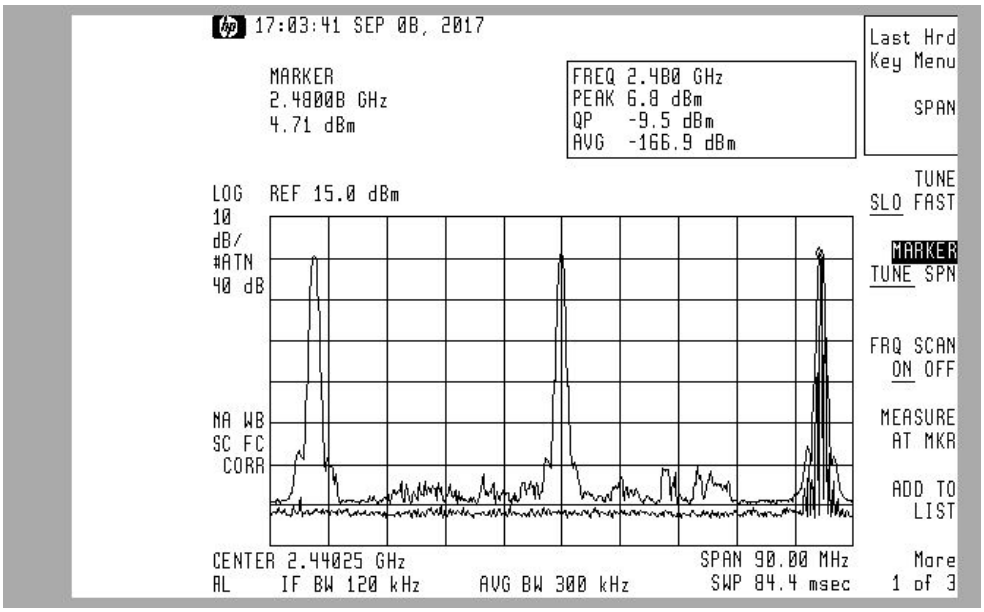
To demonstrate worst case compliance, rather than summing OBW/RBW measurement points using a sample detector, a single peak measurement was taken and the linear power measurement was multiplied by OBW/RBW. This represents the equivalent of adding linear peak measurements across a broad square spectrum, demonstrating the device's compliance within the stated limit of 1 Watt.

The table of peak measurements followed by supporting plots is presented below:

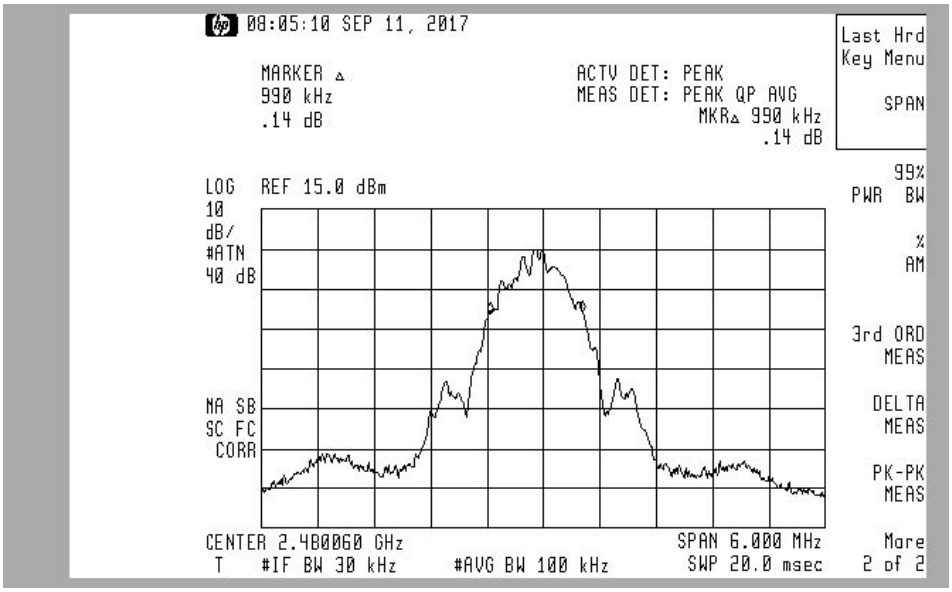
Tabulated Conducted Transmit Power Measurements

Mode	Frequency	Meas Peak	Meas Peak	OBW 99%	RBW	Points	Peak X Points	Limit	Margin
	MHz	dBm	W	MHz	MHz	OBW/RBW	W	W	W
BLE	2480.00	5.50	0.0035	0.99	0.03	33	0.12	1.00	0.88
WB	2437.00	7.30	0.0054	11.52	0.30	38	0.21	1.00	0.79
WG	2466.00	2.10	0.0016	16.70	0.30	56	0.09	1.00	0.91
WN	2418.00	3.30	0.0021	18.10	0.30	60	0.13	1.00	0.87

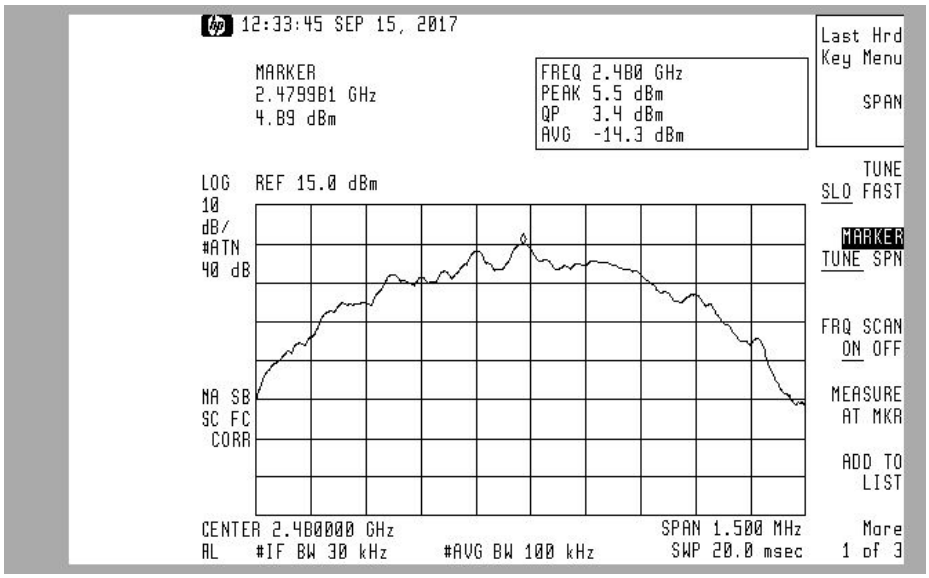
BLE Plot of Low, Medium, and High Peaks



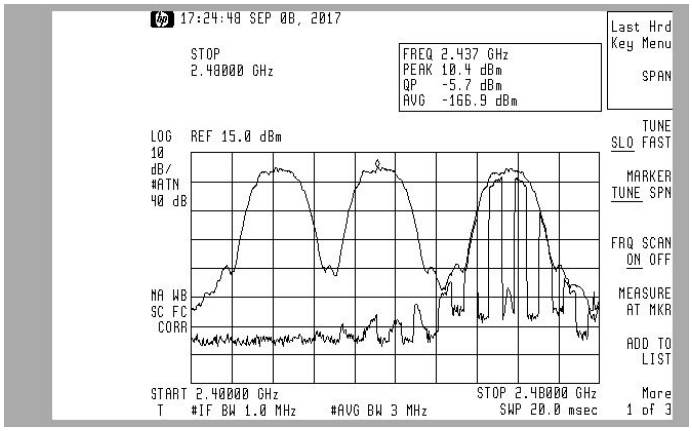
BLE Plot of Measured Peak 99% OBW Span



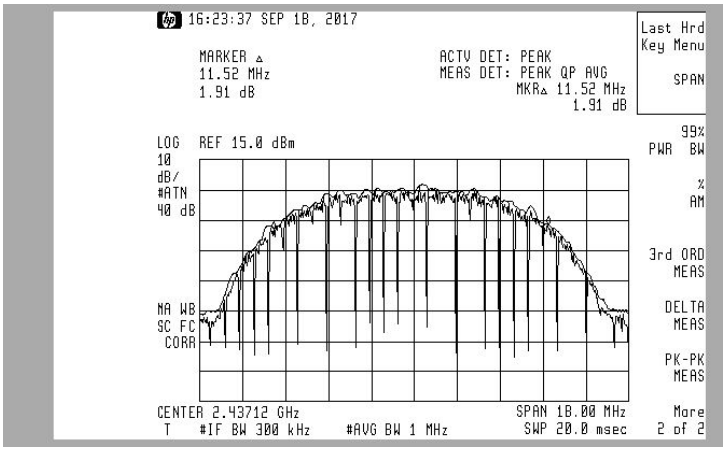
BLE Mode Peak Measurement Plot



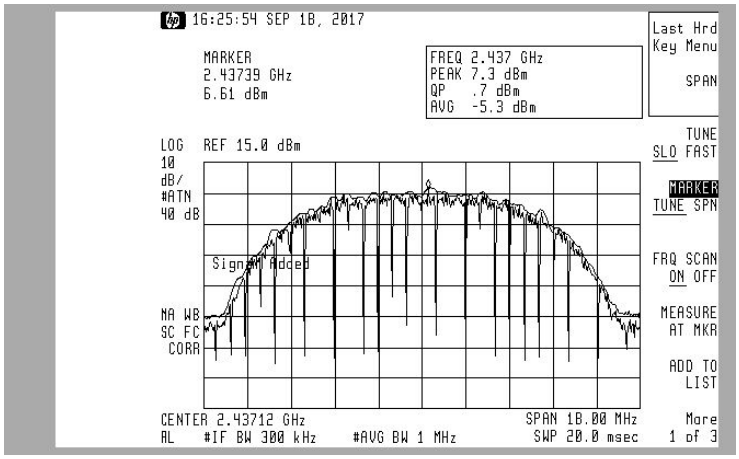
Wifi B Plot of Low, Medium, and High Peaks



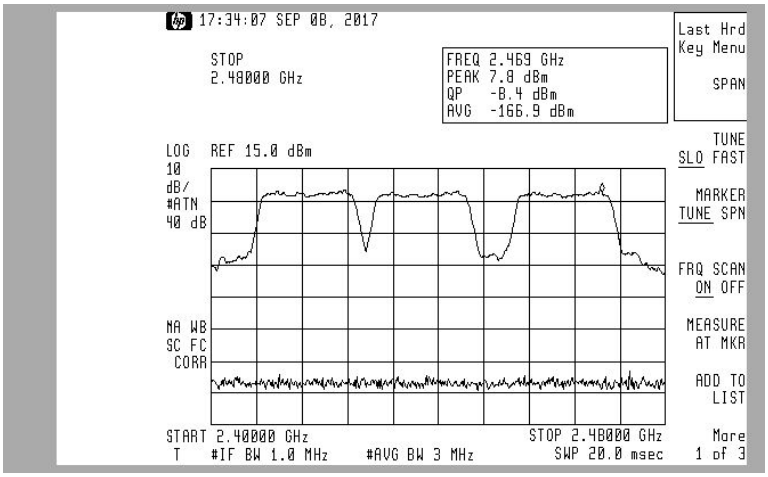
Wifi B Plot of Measured Peak 99% OBW Span



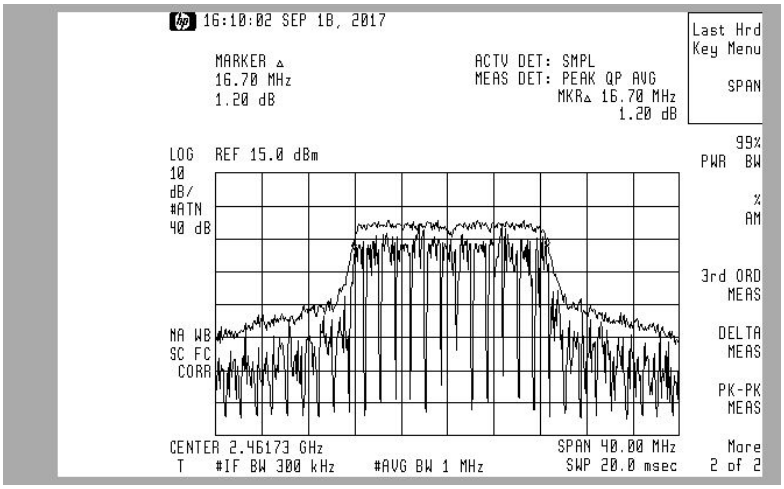
Wifi B Mode Peak Measurement Plot



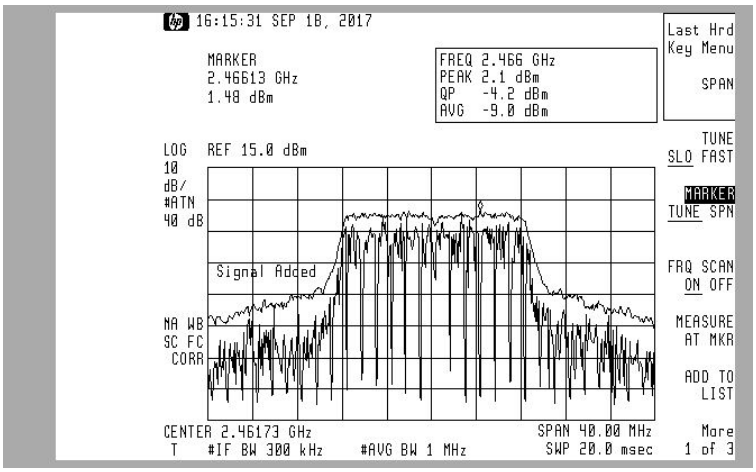
Wifi G Plot of Low, Medium, and High Peaks



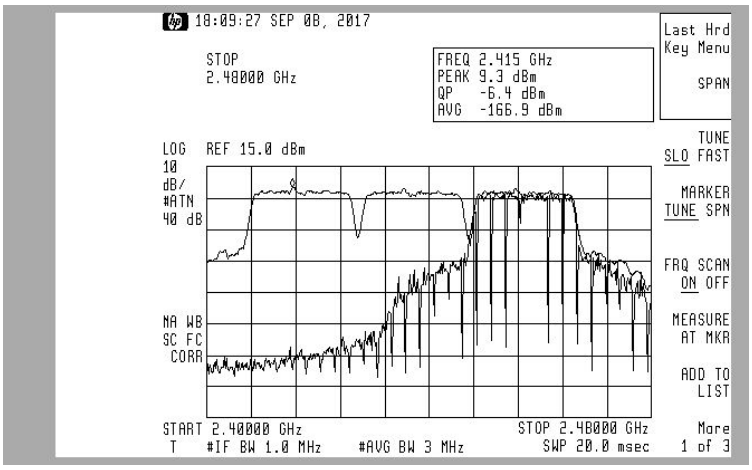
Wifi G Plot of Measured Peak 99% OBW Span



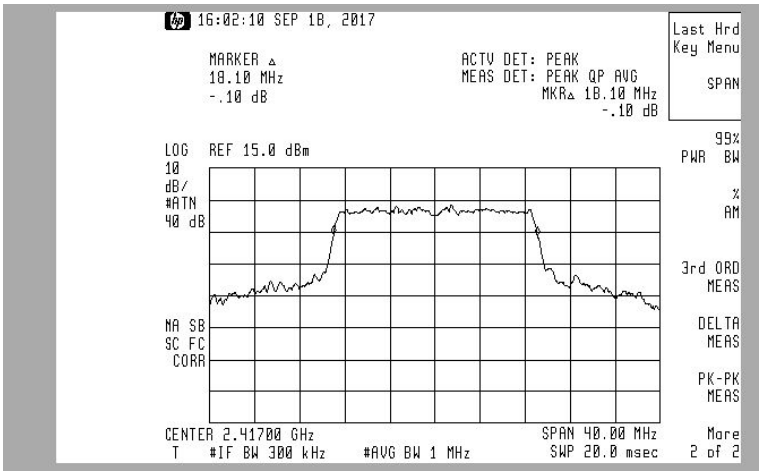
Wifi G Mode Peak Measurement Plot



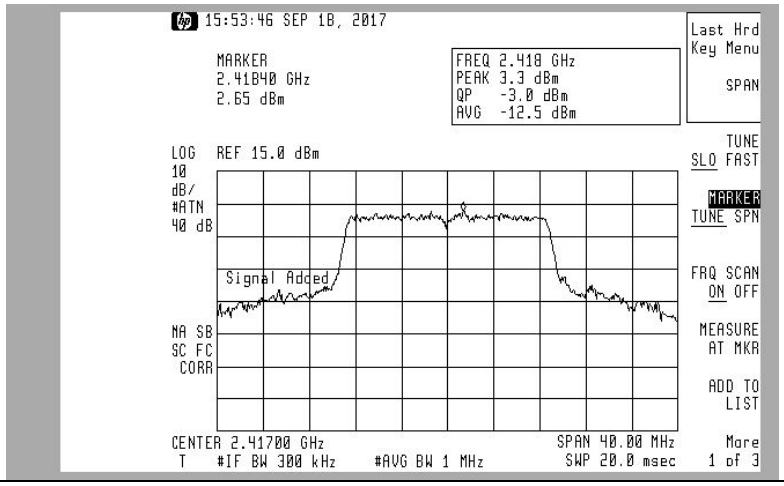
Wifi N20 Plot of Low, Medium, and High Peaks



Wifi N20 Plot of Measured Peak 99% OBW Span



Wifi N20 Mode Peak Measurement Plot



BLE Restricted Band Emissions above 1 GHz at 3M

Notes	Freq	Adjusted Measure	*Correction Factor	Adjusted Measure	Detector	Azimuth	Height	Limit	Margin
	MHz	dBuV	dB	dBuV/m		deg	M	dBuV/M	dB
	4803.00	61.00	0.00	61.00	Peak	10.00	1.50	74.00	13.00
	4803.00	50.00	0.00	50.00	Avg	10.00	1.50	54.00	4.00
	4890.00	61.00	0.00	61.00	Peak	10.00	1.50	74.00	13.00
	4890.00	51.00	0.00	51.00	Avg	10.00	1.50	54.00	3.00
	4996.00	62.00	0.00	62.00	Peak	10.00	1.50	74.00	12.00
	4996.00	51.00	0.00	51.00	Avg	10.00	1.50	54.00	3.00
	7323.00	46.00	-2.90	43.10	Peak	10.00	1.50	74.00	30.90
a	7323.00	46.00	-2.90	43.10	Peak	10.00	1.50	54.00	10.90

Notes: 1 MHz RBW, 3 MHz VBW,
* Correction Factor includes Antenna, coax, and preamp CFs
a. Peak detector measurement represents worst case to Average limits

BLE Conducted Spurious Emissions above 1 GHz at 3M

Freq	Peak Meas	Correction Factor *	Antenna Gain CF	Adjusted Measurement	EIRP =(ED)^2/30)	Limit = peak - 20	Margin
MHz	dBuV	dB	dB	dBuV/m	dBm	dBm	dB
3130.00	32.00	0.00	-10.28	42.28	-52.95	-14.50	38.45
3283.00	43.20	0.00	-10.28	53.48	-41.75	-14.50	27.25
14430.00	38.20	1.30	-10.28	47.18	-48.05	-14.50	33.55

Notes: 100 kHz RBW, 300 kHz VBW, EIRP Calculation used per KDB 558074 3.0 and subtracting Antenna Gain

Wifi B Restricted Band Emissions above 1 GHz at 3M

Notes	Freq	Adjusted Measure	*Correction Factor	Adjusted Measure	Detector	Azimuth	Height	Limit	Margin
	MHz	dBuV	dB	dBuV/m		deg	M	dBuV/M	dB
	4833.00	61.00	0.00	61.00	Peak	10.00	1.50	74.00	13.00
	4833.00	53.00	0.00	53.00	Avg	10.00	1.50	54.00	1.00
	4883.00	61.00	0.00	61.00	Peak	10.00	1.50	74.00	13.00
	4883.00	51.00	0.00	51.00	Avg	10.00	1.50	54.00	3.00
	4923.00	62.00	0.00	62.00	Peak	10.00	1.50	74.00	12.00
	4923.00	51.00	0.00	51.00	Avg	10.00	1.50	54.00	3.00
	7386.00	48.90	-2.90	46.00	Peak	10.00	1.50	74.00	28.00
a	7386.00	48.90	-2.90	46.00	Avg	10.00	1.50	54.00	8.00

Notes: 1 MHz RBW, 3 MHz VBW,
* Correction Factor includes Antenna, coax, and preamp CFs
a. Peak detector measurement represents worst case to Average limits

Wifi B Conducted Spurious Emissions above 1 GHz at 3M

Freq	Peak Meas	Correction Factor *	Antenna Gain CF	Adjusted Measurement	EIRP =(ED)^2/30)	Limit = 7.3 - 20	Margin
MHz	dBuV	dB	dB	dBuV/m	dBm	dBm	dB
3283.00	43.00		-10.28	53.28	-41.95	-12.70	29.25
14880.00	38.20	1.30	-10.28	47.18	-48.05	-16.70	31.35

Notes: 100 kHz RBW, 300 kHz VBW, EIRP Calculation used per KDB 558074 3.0 and subtracting Antenna Gain

Wifi G Restricted Band Emissions above 1 GHz at 3M

Notes	Freq	Adjusted Measure	*Correction Factor	Adjusted Measure	Detector	Azimuth	Height	Limit	Margin
	MHz	dBuV	dB	dBuV/m		deg	M	dBuV/M	dB
	4837.00	63.00	0.00	63.00	Peak	340.00	1.90	74.00	11.00
	4837.00	53.90	0.00	53.90	Avg	340.00	1.90	54.00	0.10
	4890.00	61.00	0.00	61.00	Peak	340.00	1.90	74.00	13.00
	4890.00	51.00	0.00	51.00	Avg	340.00	1.90	54.00	3.00
	4912.00	61.00	0.00	61.00	Peak	340.00	1.90	74.00	13.00
	4912.00	51.00	0.00	51.00	Avg	340.00	1.90	54.00	3.00
	7323.00	46.00	-2.90	43.10	Peak	10.00	1.50	74.00	30.90
a	7323.00	46.00	-2.90	43.10	Peak	10.00	1.50	54.00	10.90

Notes: 1 MHz RBW, 3 MHz VBW,
* Correction Factor includes Antenna, coax, and preamp CFs
a. Peak detector measurement represents worst case to Average limits

Wifi G Conducted Spurious Emissions above 1 GHz at 3M

Freq	Peak Meas	Correction Factor *	Antenna Gain CF	Adjusted Measurement	EIRP =(ED)^2/30)	Limit = 2.1 - 20	Margin
MHz	dBuV	dB	dB	dBuV/m	dBm	dBm	dB
3249.00	40.00		-10.28	50.28	-44.95	-17.90	27.05

Notes: 100 kHz RBW, 300 kHz VBW, EIRP Calculation used per KDB 558074 3.0 and subtracting Antenna Gain

Wifi N20 Restricted Band Emissions above 1 GHz at 3M

Notes	Freq	Adjusted Measure	*Correction Factor	Adjusted Measure	Detector	Azimuth	Height	Limit	Margin
	MHz	dBuV	dB	dBuV/m		deg	M	dBuV/M	dB
	3912.00	60.00	0.00	60.00	Peak	340.00	1.90	74.00	14.00
	3912.00	49.00	0.00	49.00	Avg	340.00	1.90	54.00	5.00
	4828.00	61.00	0.00	61.00	Peak	340.00	1.90	74.00	13.00
	4828.00	51.00	0.00	51.00	Avg	340.00	1.90	54.00	3.00
	4890.00	61.00	0.00	61.00	Peak	340.00	1.90	74.00	13.00
	4890.00	51.00	0.00	51.00	Avg	340.00	1.90	54.00	3.00
	4926.00	61.00	0.00	61.00	Peak	340.00	1.90	74.00	13.00
	4926.00	51.00	0.00	51.00	Avg	340.00	1.90	54.00	3.00
	7253.00	48.00	-2.90	45.10	Peak	10.00	1.50	74.00	28.90
a	7253.00	48.00	-2.90	45.10	Peak	10.00	1.50	54.00	8.90
	7300.00	51.00	-2.90	48.10	Peak	10.00	1.50	74.00	25.90
a	7300.00	51.00	-2.90	48.10	Peak	10.00	1.50	54.00	5.90
	7393.00	49.00	-2.90	46.10	Peak	10.00	1.50	74.00	27.90
a	7393.00	49.00	-2.90	46.10	Peak	10.00	1.50	54.00	7.90

Notes: 1 MHz RBW, 3 MHz VBW,
* Correction Factor includes Antenna, coax, and preamp CFs
a. Peak detector measurement represents worst case to Average limits

Wifi N20 Conducted Spurious Emissions above 1 GHz at 3M

Freq	Peak Meas	Correction Factor *	Antenna Gain CF	Adjusted Measurement	EIRP =(ED)^2/30)	Limit = 3.3 - 20	Margin
MHz	dBuV/M	dB	dB	dBuV/m	dBm	dBm	dB
3276.00	40.00		-10.28	50.28	-44.95	-16.70	28.25
14460.00	38.00	1.30	-10.28	46.98	-48.25	-16.70	31.55

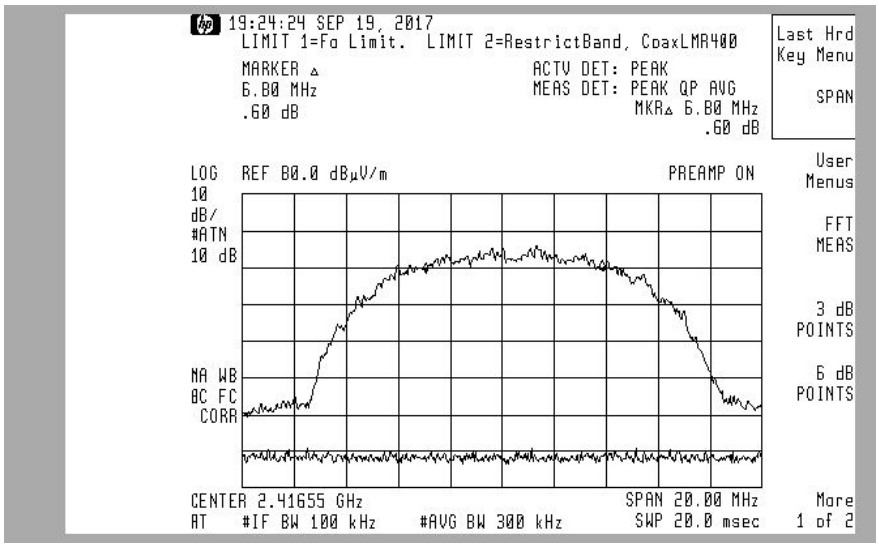
Notes: 100 kHz RBW, 300 kHz VBW, EIRP Calculation used per KDB 558074 3.0 and subtracting Antenna Gain

Transmit 6dB DTW BW Measurements

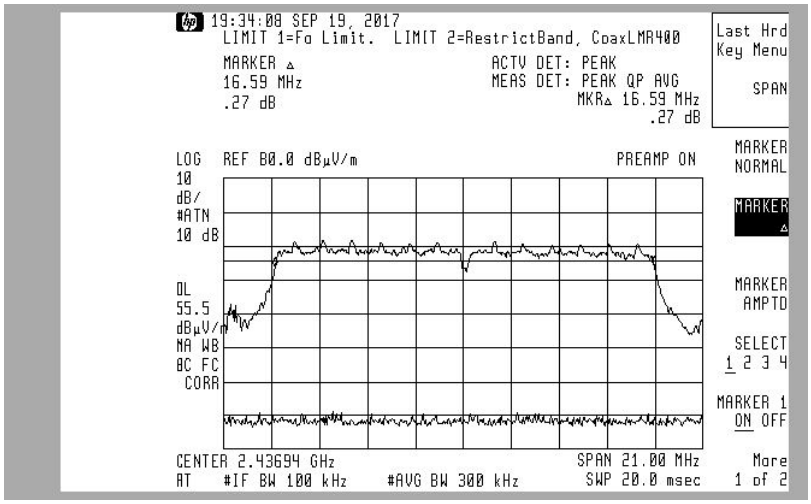
6dB BW measurements were made using the procedure described in KDB558074 8.1 with RBW set to 100 kHz and VBW to 300 kHz.

Mode	Measured Frequency	6 dBc Bandwidth Measurement	FCC min Limit	Margin
	MHz	kHz	kHz	kHz
wifi b	2416	**6800.00**	**500**	**6300**
	2437	**6200.00**	**500**	**5700**
	2460	**6450.00**	**500**	**5950**
wifi g	2417	**16540.00**	**500**	**16040**
	2437	**16590.00**	**500**	**16090**
	2457	**16590.00**	**500**	**16090**
wifi n20	2417	**17690.00**	**500**	**17190**
	2437	**17750.00**	**500**	**17250**
	2457	**17690.00**	**500**	**17190**
ble	2402	**715.00**	**500**	**215**
	2438	**675.00**	**500**	**175**
	2480	**730.00**	**500**	**230**

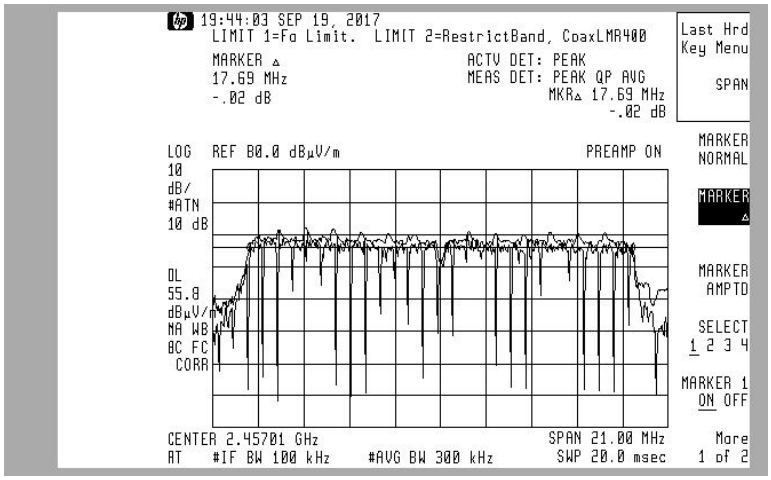
6 dB Bandwidth Plot – Wifi B



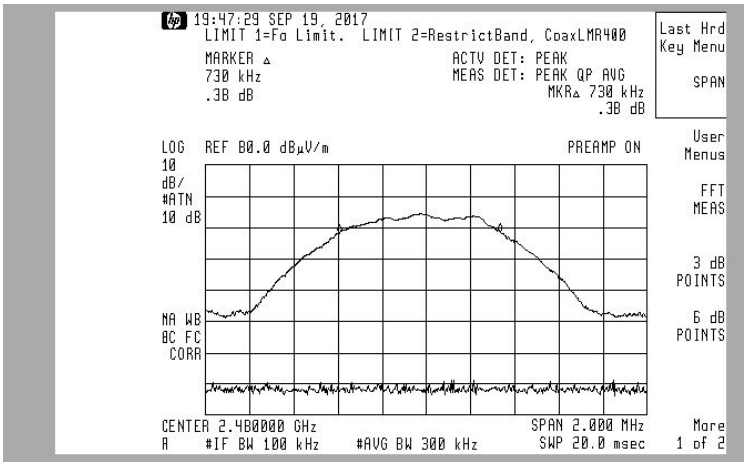
6 dB Bandwidth Plot – Wifi G



6 dB Bandwidth Plot – Wifi N20



6 dB Bandwidth Plot – BLE



Radiated GPS Receiver Local Oscillator Emissions

No Receive Mode Oscillator signals were observed.

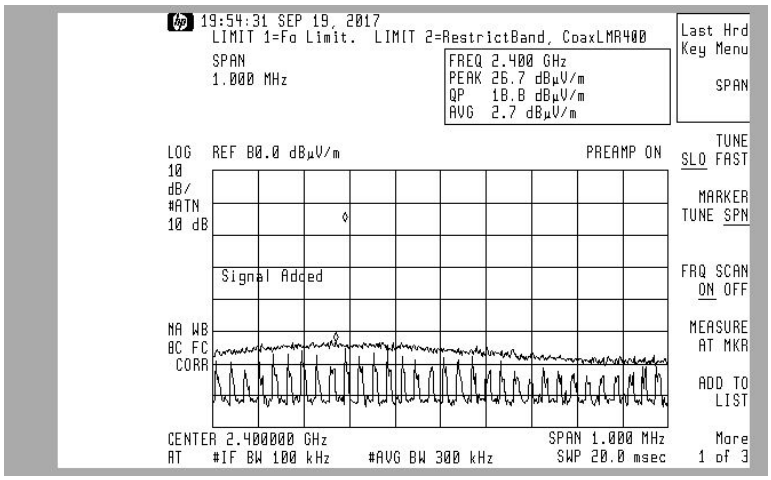
15.247 Specific Transmit Emissions

Tabulated Conducted Band Edge Data

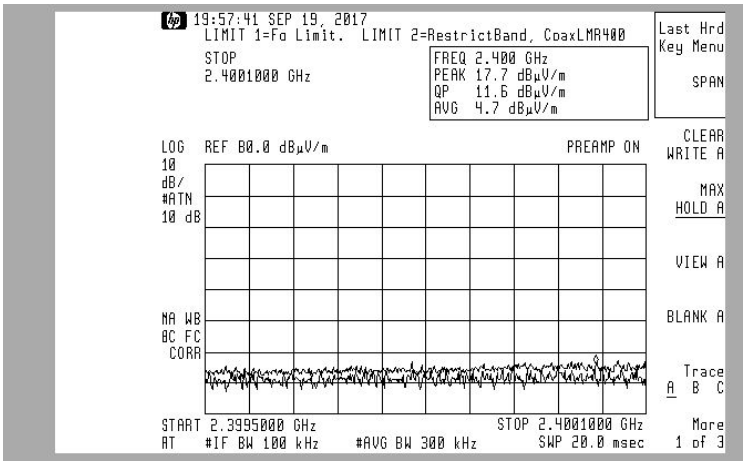
Mode	Measured Frequency	Peak Measure	Antenna Gain CF	Adjusted Measure	EIRP = (ED)^2)/30	Peak Measure	Limit = Peak - 20dB	Margin
	MHz	dBuV/M	dB	dBuV/M	dBm	dBm	dBm	dB
BLE	**2400.00**	**26.70**	**-10.28**	**36.98**	**-58.25**	**5.50**	**-14.50**	**43.75**
Wifi B	**2400.00**	**17.70**	**-10.28**	**27.98**	**-67.25**	**7.30**	**-12.70**	**54.55**
Wifi G	**2400.00**	**29.00**	**-10.28**	**39.28**	**-55.95**	**2.10**	**-17.90**	**38.05**
Wifi N20	**2400.00**	**29.20**	**-10.28**	**39.48**	**-55.75**	**3.30**	**-16.70**	**39.05**

Note: EIRP Calculation used per KDB 558074 3.0 and subtracting Antenna Gain

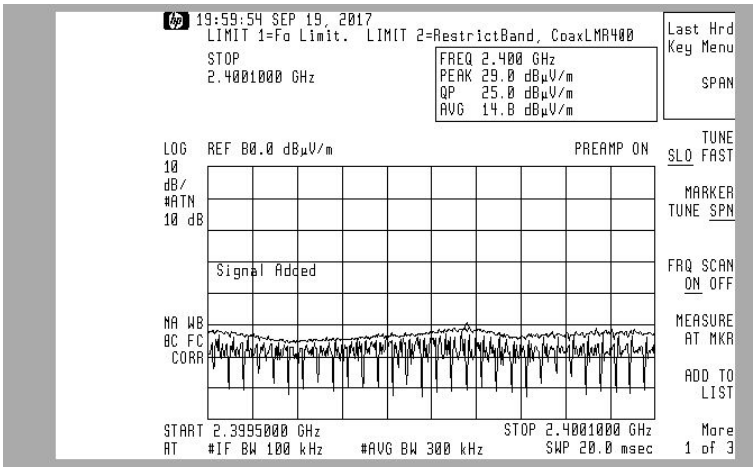
100 kHz Low Band Edge Plot BLE Mode



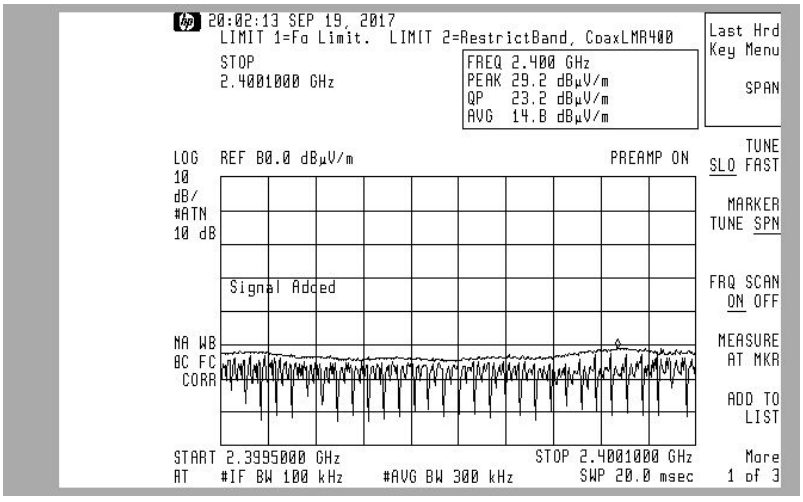
100 kHz Low Band Edge Plot Wifi B Mode



100 kHz Low Band Edge Plot Wifi G Mode



100 kHz High Band Edge Plot Wifi N20 Mode

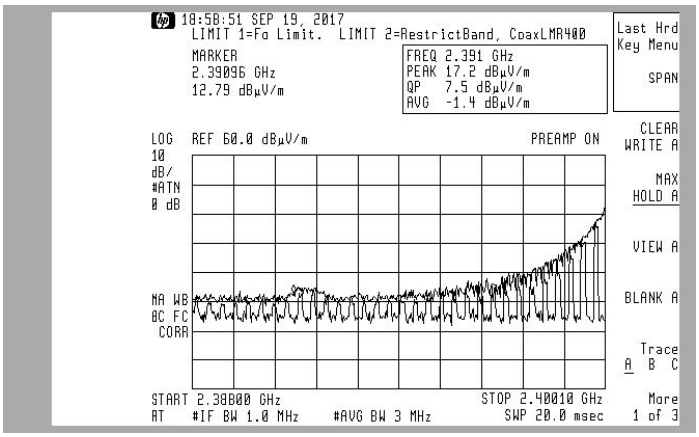


Tabulated Restricted Band Edge Data

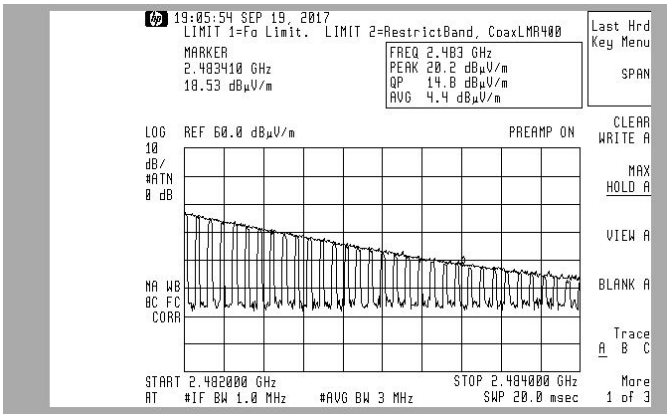
Measurements were taken at 1 MHz RBW with highest and lowest channels transmitting continuously.

Mode	Transmit Frequency	Measured Frequency	Adjusted Measurement	Detector	FCC Limit	Margin
	MHz	MHz	dBuV		dBuV	dB
ble	**2402.00**	**2390.00**	**-1.40**	**Avg**	**54.00**	**55.40**
ble	**2402.00**	**2390.00**	**17.20**	**Peak**	**74.00**	**56.80**
ble	**2480.00**	**2483.50**	**4.40**	**Avg**	**54.00**	**49.60**
ble	**2480.00**	**2483.50**	**20.20**	**Peak**	**74.00**	**53.80**
wifi b	**2416.00**	**2390.00**	**1.70**	**Avg**	**54.00**	**52.30**
wifi b	**2416.00**	**2390.00**	**15.20**	**Peak**	**74.00**	**58.80**
wifi b	**2460.00**	**2483.50**	**1.10**	**Avg**	**54.00**	**52.90**
wifi b	**2460.00**	**2483.50**	**14.50**	**Peak**	**74.00**	**59.50**
wifi g	**2417.00**	**2390.00**	**7.30**	**Avg**	**54.00**	**46.70**
wifi g	**2417.00**	**2390.00**	**22.40**	**Peak**	**74.00**	**51.60**
wifi g	**2457.00**	**2483.50**	**4.80**	**Avg**	**54.00**	**49.20**
wifi g	**2457.00**	**2483.50**	**21.00**	**Peak**	**74.00**	**53.00**
wifi n20	**2417.00**	**2390.00**	**8.20**	**Avg**	**54.00**	**45.80**
wifi n20	**2417.00**	**2390.00**	**22.40**	**Peak**	**74.00**	**51.60**
wifi n20	**2457.00**	**2483.50**	**4.80**	**Avg**	**54.00**	**49.20**
wifi n20	**2457.00**	**2483.50**	**21.00**	**Peak**	**74.00**	**53.00**

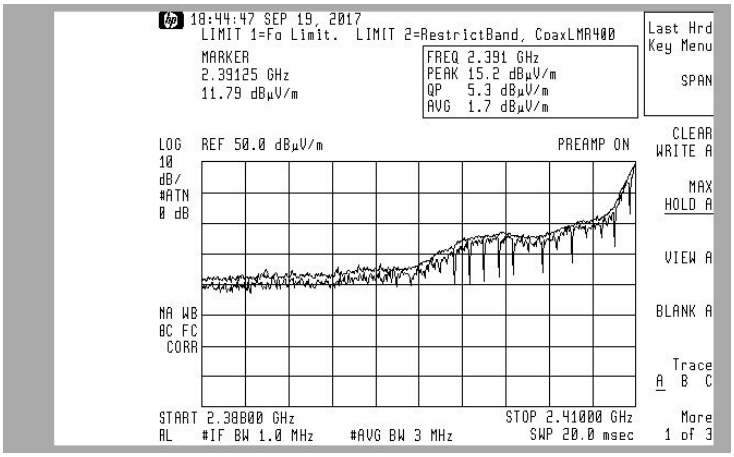
Low Band Edge Plot BLE



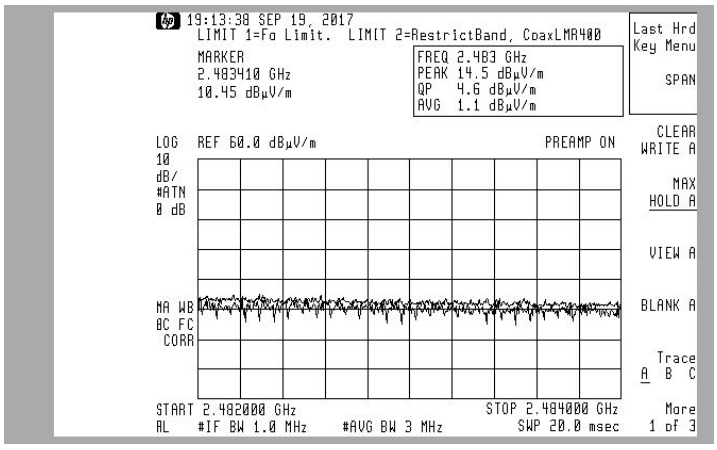
High Band Edge Plot BLE



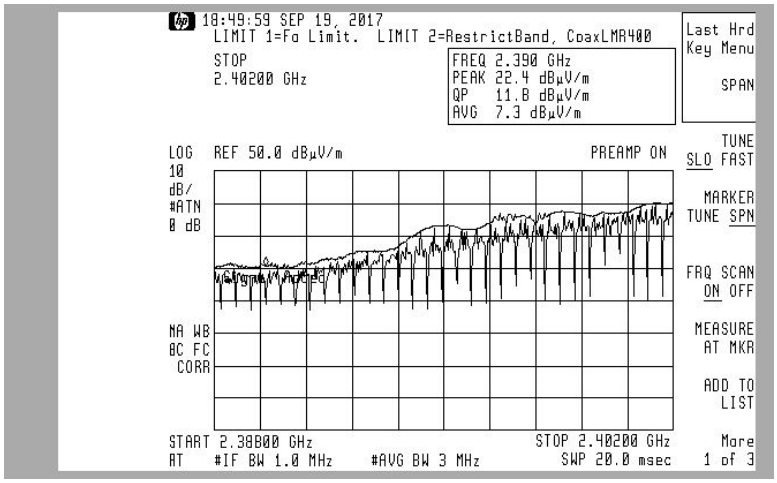
Low Band Edge Plot Wifi B



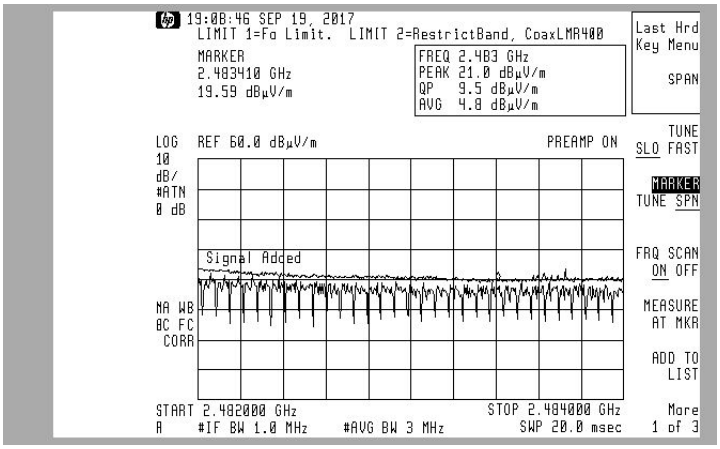
High Band Edge Plot Wifi B



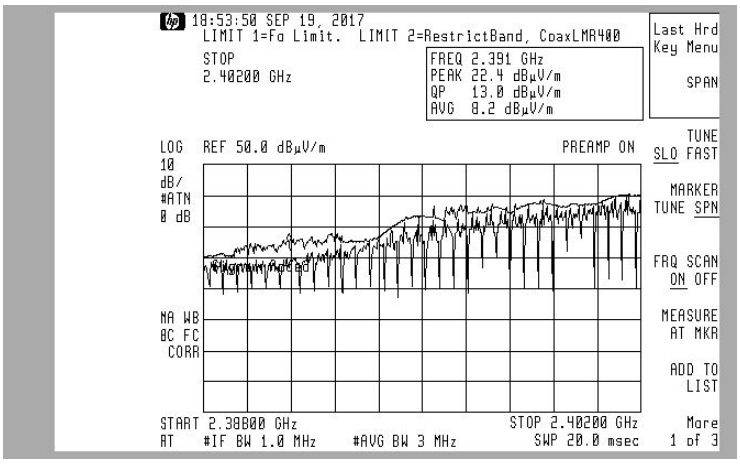
Low Band Edge Plot Wifi G



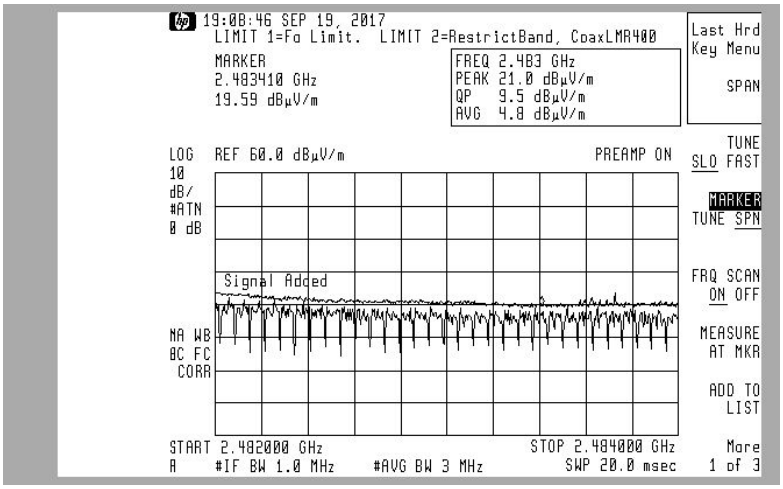
High Band Edge Plot Wifi G



Low Band Edge Plot Wifi N20



High Band Edge Plot Wifi N20

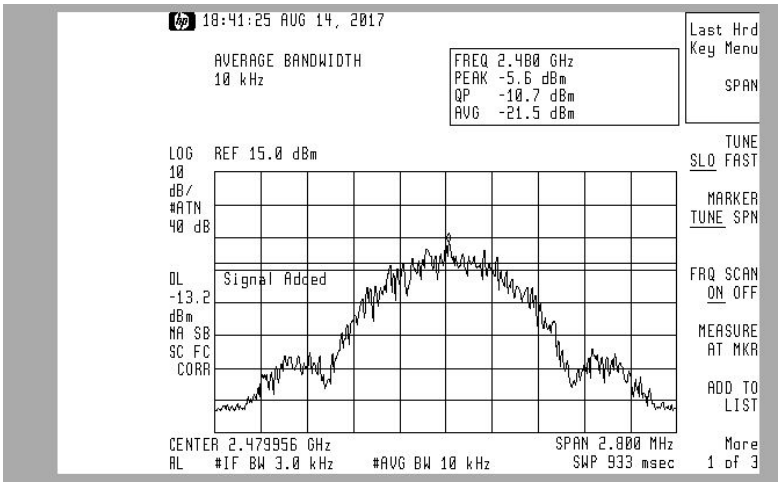


Tabulated Power Density Measurements

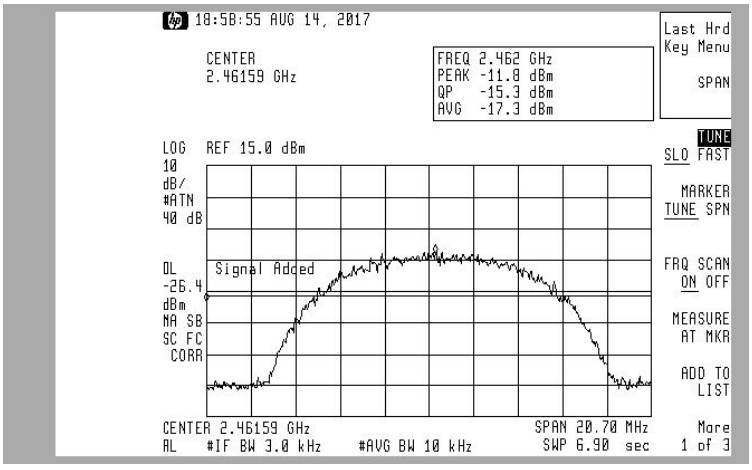
PSD measurements were made using the procedure described in KDB558074 10.2.

Mode	Measured Frequency	Peak Conducted Measurement	RBW	FCC Limit	Margin
	MHz	dBm	kHz	dBm	dB
ble	**2401.00**	**-8.60**	**3.00**	**8.00**	**16.60**
ble	**2438.00**	**-6.30**	**3.00**	**8.00**	**14.30**
ble	**2480.00**	**-5.60**	**3.00**	**8.00**	**13.60**
wifi b	**2417.00**	**-11.90**	**3.00**	**8.00**	**19.90**
wifi b	**2437.00**	**-12.30**	**3.00**	**8.00**	**20.30**
wifi b	**2462.00**	**-11.80**	**3.00**	**8.00**	**19.80**
wifi g	**2423.00**	**-17.00**	**3.00**	**8.00**	**25.00**
wifi g	**2443.00**	**-16.00**	**3.00**	**8.00**	**24.00**
wifi g	**2462.00**	**-15.00**	**3.00**	**8.00**	**23.00**
wifi n20	**2422.00**	**-15.50**	**3.00**	**8.00**	**23.50**
wifi n20	**2442.00**	**-15.20**	**3.00**	**8.00**	**23.20**
wifi n20	**2461.00**	**-15.30**	**3.00**	**8.00**	**23.30**

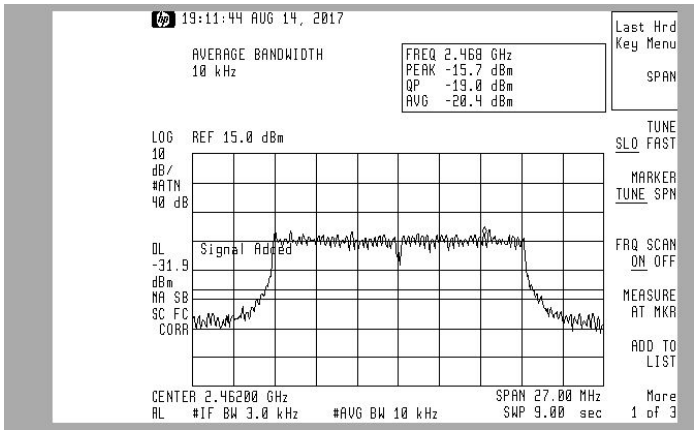
Worst Case BLE Mode Power Density Plot



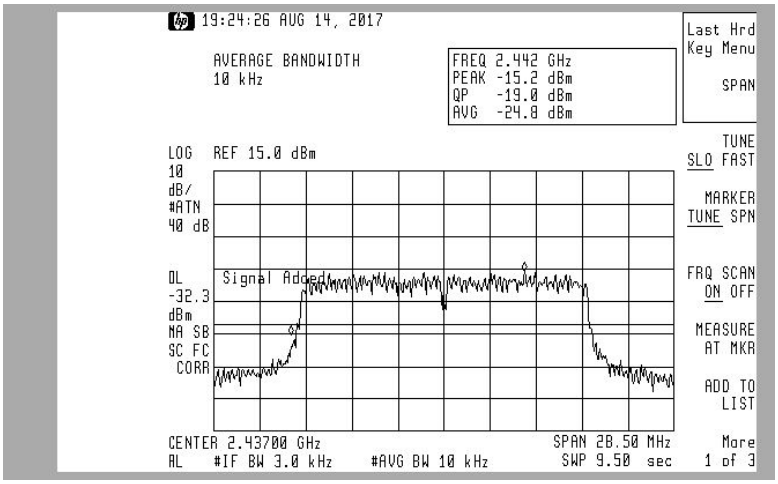
Worst Case Wifi b Mode Power Density Plot



Worst Case wifi g Mode Power Density Plot



Worst Case wifi n20 Mode Power Density Plot



Exposure Exclusion Factor Calculation

As an FCC 2.1091 mobile device, FCC 1.310 maximum power density limit of 1 mw/cm^2 at 20 cm applies. Given the device peak EIRP of 210 mW, power density can be calculated as S =EIRP/4*pi*20cm^2 = .042 mW/cm^2, which is well under the limit of 1 mW/cm^2.

Environment

The test was performed with the equipment under test, and measurement equipment inside the all-weather enclosure. Ambient temperature was 76 deg F, the relative humidity 35%.

APPENDIX A

Measurement Procedures

Line Conducted

The system was placed upon a 1 x 1.5 meter non-metallic table 80cm from the ground floor and 40cm from the vertical conducting plane in the prescribed setup per ANSI C63.4. This table is housed in a shielded enclosure to prevent the detection of unwanted ambients.

The EUT, or host unit if applicable, was connected to the LISN being monitored by the EMI Receiver. The remaining support devices requiring mains power were connected to a second LISN.

The EUT was continuously exercised by methods supplied by the manufacturer.

While monitoring the display of the EMI Receiver, via remote video monitor, the cables were manipulated to determine a position that maximized the emissions being observed. Once the highest amplitude relative to the limit was determined for the Phase current carrying line the procedure was repeated for the Neutral current carrying line.

The configuration that created an emission closest to the limit was used during the course of taking final measurements. Pictures of this final configuration are recorded in this report.

The principal settings of the EMI Receiver for line conducted testing include:

Bandwidth = 9kHz

Detector Function: scanning and signal search = Peak Detection Mode
measurements = Quasi Peak Detection and Average Detection

The cable losses of the coax used in line conducted testing are charted in this appendix.

Radiated

The system was placed upon a 1 x 1.5 meter non-metallic table 80cm from the open field site ground plane in the prescribed setup per ANSI C63.4, Figure 9(c).

The table sits upon a remote controlled turntable. The receiving antenna, located at the appropriate standards distance of 3 or 10 meters from the table center, is also remote controlled.

The EUT was continuously exercised by software supplied by the manufacturer.

Preliminary tests were done at the 3 meter open field test site. The final tests are done at the appropriate standards distance of 3 or 10 meters. The "Biconical/Log Periodic" broadband antenna connected to an EMI Receiver, meeting CISPR 16, is used throughout the testing.

During the preliminary scans and while monitoring the display of the EMI Receiver, the turntable was rotated 360 degrees and the receiving antenna height varied from 1 to 4 meters to search out the highest emissions. At the significant emissions, the cables were manipulated to determine a position that maximized the emissions being observed. Once the cable position was determined that presented the highest amplitude relative to the limit for Vertical polarized emissions the procedure was repeated for the Horizontal polarization.

The configuration that created an emission closest to the limit was used during the course of taking final measurements. Pictures of this final configuration are recorded in this report.

The principal settings of the EMI Receiver for radiated signal testing between 30 MHz and 1 GHz include:

Bandwidth:	120kHz
Detector Function:	scanning and signal search = Peak Mode measurements = Quasi Peak Mode.
Search Range:	30MHz to 1000MHz or to 2GHz as appropriate

The principal settings of the EMI Receiver for radiated testing above 1 GHz include:

Bandwidth:	1 MHz
Detector Function:	scanning and signal search = Peak Mode Duty Cycle Compensated Measurements = Peak Mode Direct Signal Measurements = Average Mode.
Search Range:	Above 1000MHz as required

The cable loss of the coax used in radiated scanning is charted in this appendix.
The antenna factors, for the test distance used, are charted in this appendix.

The resultant Field Strength (FS) is a summation in decibels (dB) of the Indicated Receiver Level (RF), the Antenna Correction Factor (AF), and the Cable Loss Factor (CF). If a PreAmplifier (PA) is used, its gain (dB) is subtracted from the above sum.

Formula 1: FS(dBuV/m) = RF(dBuV) + AF(dB/m) +CF(dB) - PA(dB)

To convert the Field Strength dBuV/m term to uV/m, the dBuV/m is first divided by 20. The Base 10 AntiLog is taken of this quotient. The result is the Field Strength value in uV/m terms.

Formula 2: FS(uV/m) = AntiLog[(FS(dBuV/m))/20]

Measurement Facilities & Equipment

Test Site

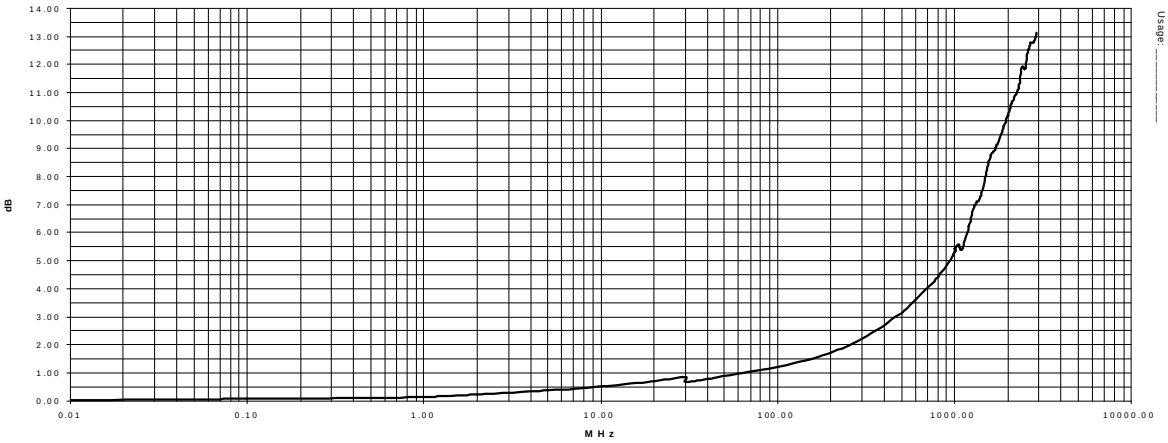
The AHD test facility is centered on 9 acres of rural property near Sister Lakes, Michigan. The mailing address is 92723 Michigan Hwy152, Sister Lakes, 49047. This test facility is NVLAP accredited (LabCode 200129-0). It has been fully described in a report filed with the FCC (No.90413) and Industry Canada (file:IC3161).

Measurement Equipment Used

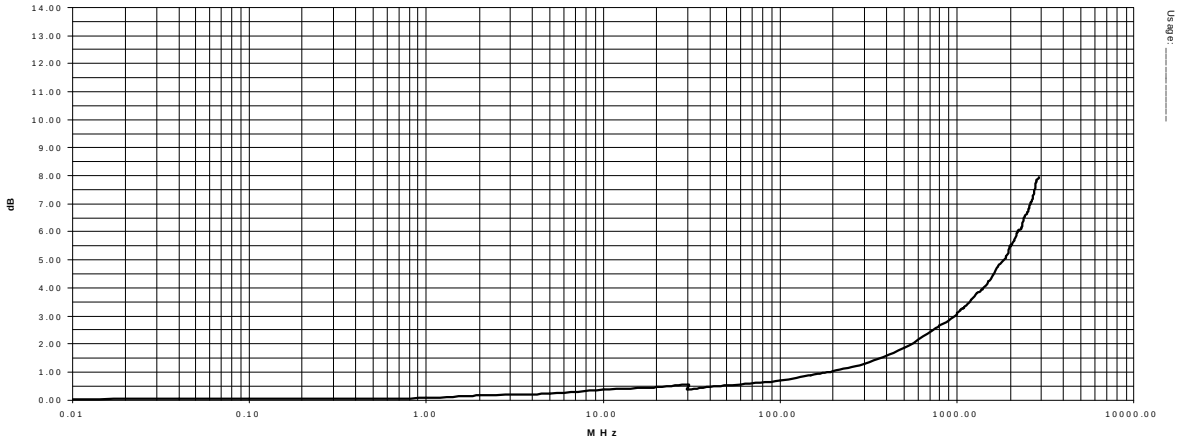
			Date	Interval
HP EMI Receiver system	HP 8546A			
RF Filter Section	HP-85460A	3704A00422	21 Apr-17	12 months
RF Receiver Section	HP-85462A	3807A00465	21 Apr-17	12 months
EMCO Double Ridged Horn	3115	2788	2-Jul-17	12 months
EMCO BiconiLog Antenna	3142	1077	1-May-17	12 months
Solar LISN	8012-50-R-24-BNC	962137	4 May-17	24 months
(3-m) LMR-400 Ultra Flex	LMR400	C090804	23-Sep-17	6 months
(3-m) CS-3227 RG8	CS-3227	C060914	23-Sep-17	6 months
(LCI) Double shielded 50ohm Coax	RG58/U	920809	1-Jan-17	12 months
HP Oscilloscope	54100D	2510A00511	21-Jul-17	12 months
Keytek Surge	711B	8511854	31-Jul-17	12 months
Schaffner ESD	NSG432	01027	10-Aug-17	12 months
Schaffner EFT	NSG600/641	0113	15-Aug-17	12 months
Compliance Design Biconical Antenna	B100	016460	6-August-15	36 months
Compliance Design Biconical Antenna	B200	A10102	14-August-15	36 months
Compliance Design Biconical Antenna	B300	A10103	6-August-15	36 months

Cable Loss

Line Conducted 150KHz through 30MHz, Coax #920809
Last Calibration date: 1-Jan-17

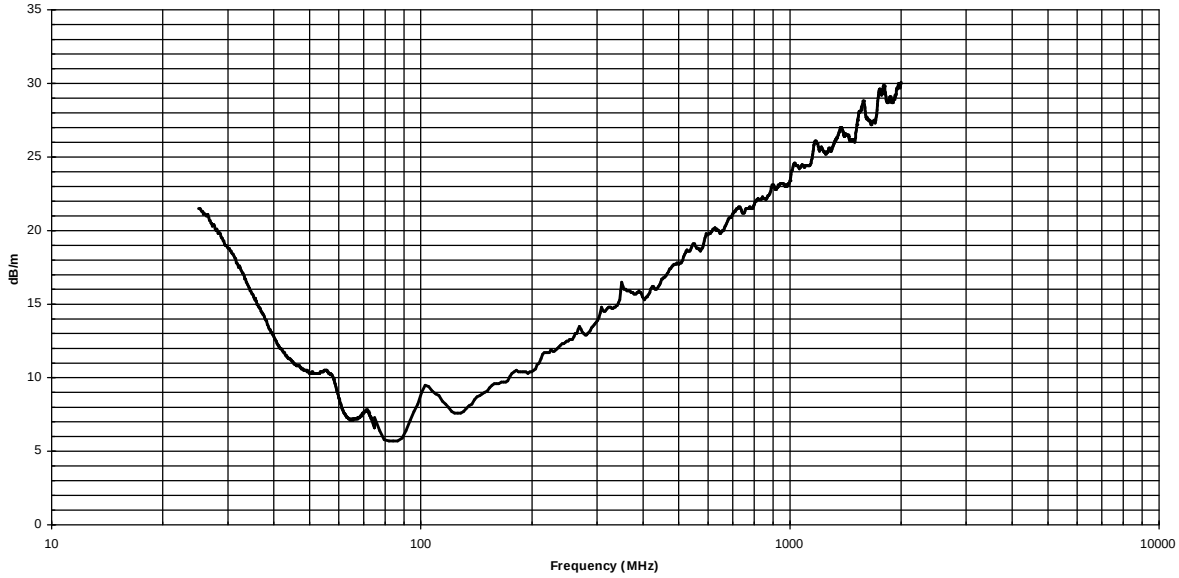


Radiated at 3 meters; 30MHz through 3000MHz, Coax #C090804
Last Calibration date: 23-Sep-17

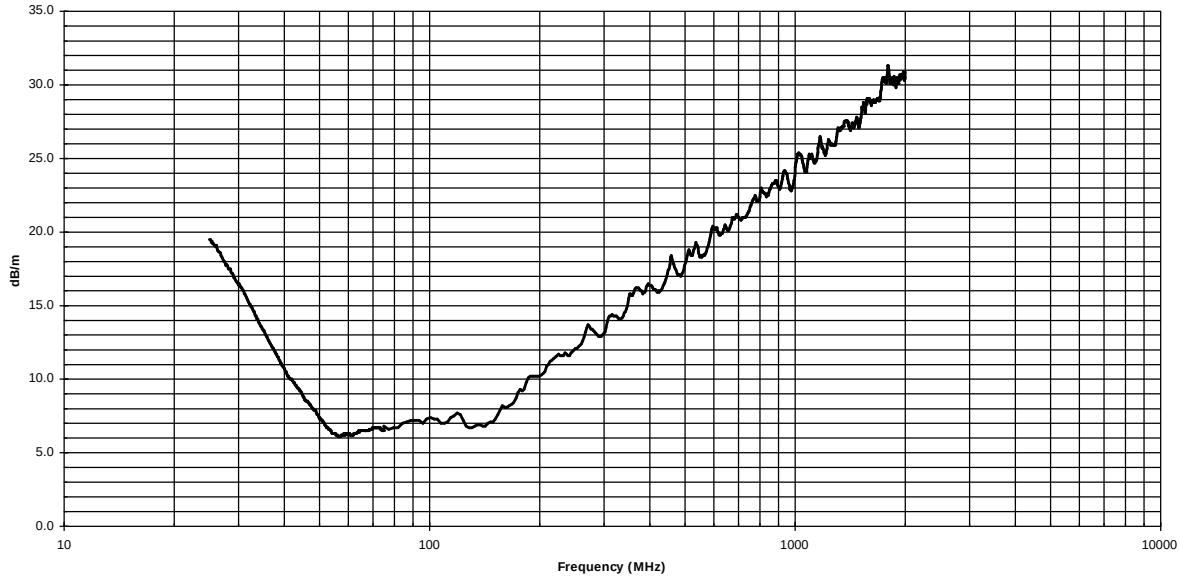


Antenna Factors

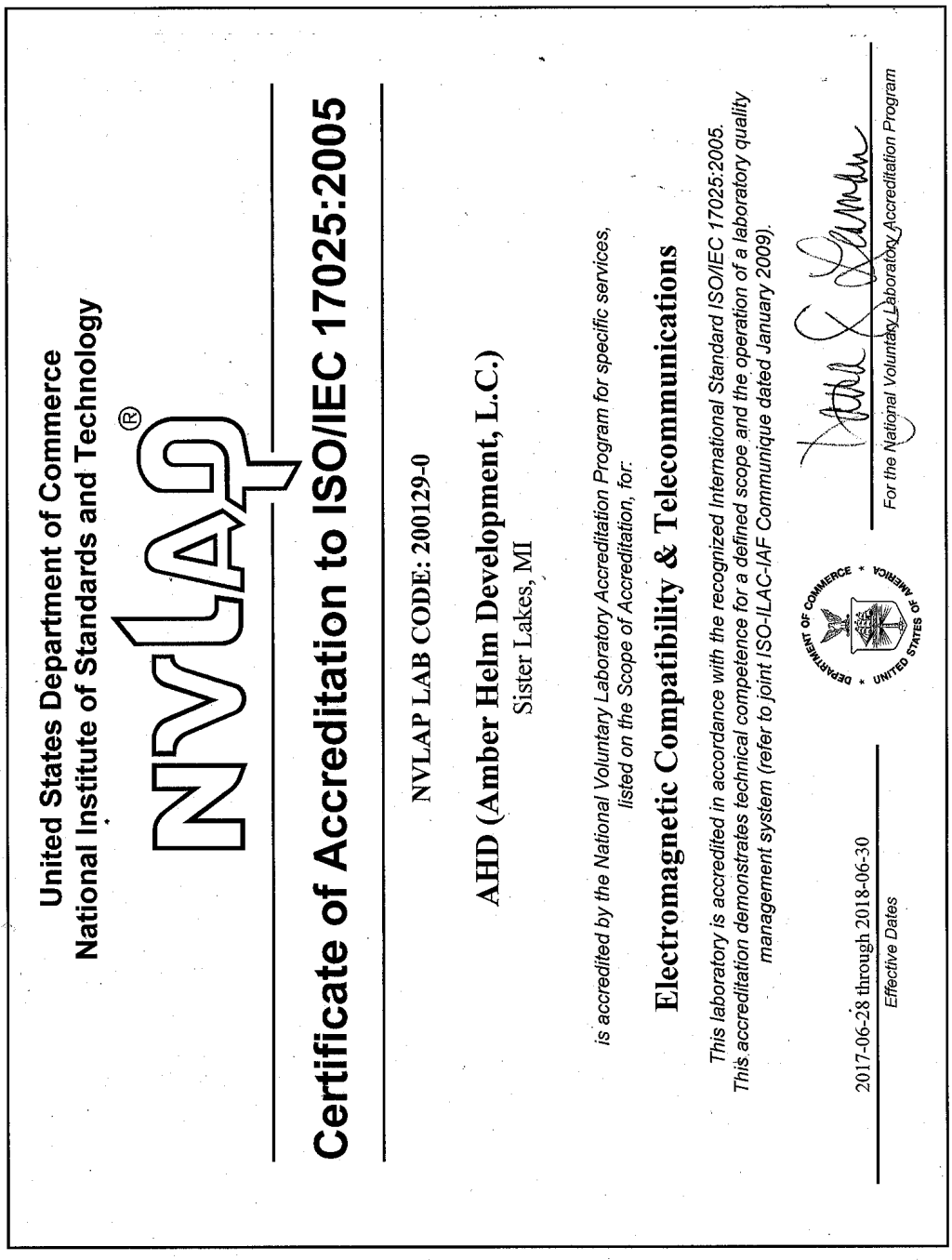
EMCO Model 3142 Antenna
Last Calibration Date; 1- May-17
3 Meter Distance Factors



10 Meter Distance Factors



AHD Accreditation



United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200129-0

AHD (Amber Helm Development, L.C.)
Sister Lakes, MI

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2017-06-28 through 2018-06-30
Effective Dates

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

For the National Voluntary Laboratory Accreditation Program

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

December 06, 2016

AHD (Amber Helm Development, L.C.)
92723 Michigan Highway 152,
Sister Lakes, MI 49047

Attention: Gordon Helm

Re: Accreditation of AHD (Amber Helm Development, L.C.)
Designation Number: US5348
Test Firm Registration #: 639064

Dear Sir or Madam:

We have been notified by National Voluntary Laboratory Accreditation Program that AHD (Amber Helm Development, L.C.) has been accredited as a Conformity Assessment Body (CAB).

At this time AHD (Amber Helm Development, L.C.) is hereby designated to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Parts 15 and 18 of the Commission's Rules.

This designation will expire upon expiration of the accreditation or notification of withdrawal of designation.

Sincerely,

Dave Galosky

Dave Galosky
Electronics Engineer

NARTE SEAL