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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 E

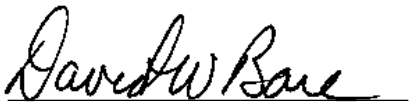
Model: 10503

IC CERTIFICATION #:	29927-61100001
FCC ID:	2AYXT61100001
APPLICANT:	Eight Sleep 212 W 35th, Floor 4 New York, NY 10123
TEST SITE(S):	NTS Labs, LLC 41039 Boyce Road. Fremont, CA. 94538-2435
IC SITE REGISTRATION #:	2845B-3; 2845B-4, 2845B-5, 2845B-7
PROJECT NUMBER:	PR167335
REPORT DATE:	January 24, 2023
RE-ISSUED DATE:	February 17, 2023
FINAL TEST DATES:	December 5, 12, 13, 14, 15, 16, 19 and 20, 2022 and January 10, 11 and 18, 2023
TOTAL NUMBER OF PAGES:	117

ACCREDITED
Testing Cert #0214.26

VALIDATING SIGNATORIES

PROGRAM MGR



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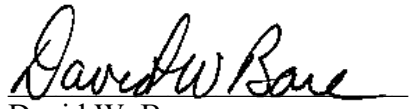

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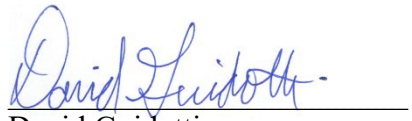

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REVISION HISTORY

Rev#	Date	Comments	Modified By
-	January 24, 2023	First release	
1	February 9, 2023	Updated EUT operation description, sample calculations, updated test notes, cable calibrations and removed references to FCC §15.247, updated power in summary table	David Bare
2	February 17, 2023	Updated power settings table on page 12, corrected 6dB BW limit on page 8, updated units for some readings in summary tables, added note about MIMO mode and nominal bandwidths	David Bare

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SCOPE

An electromagnetic emissions test has been performed on the Eight Sleep model 10503, 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 E requirements for UNII Devices

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 NTS Labs, LLC test procedures:

ANSI C63.10-2013
FCC General UNII Test Procedures KDB789033

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.

NTS Labs, LLC 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 sample of Eight Sleep model 10503 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 E requirements for UNII Devices

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 Eight Sleep model 10503 and therefore apply only to the tested sample. The sample was selected and prepared by Alex Lednev of Eight Sleep.

DEVIATIONS FROM THE STANDARDS

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

TEST RESULTS SUMMARY

UNII / LELAN DEVICES

OPERATION IN THE 5.15 – 5.25 GHZ BAND – CLIENT DEVICE

FCC Rule Part		Description	Measured Value / Comments	Limit / Requirement	Result
15.407(a)(1)(iv)		Output Power	802.11a: 7.8 mW ac20: 7.8 mW ac40: 15.9 mW ac80: 17.1 mW	24 dBm (250 mW)	Complies
15.407(a)(1)(iv)		Power Spectral Density	802.11a: -0.4 dBm/MHz ac20: -0.5 dBm/MHz ac40: -1.0 dBm/MHz ac80: -4.0 dBm/MHz	11 dBm/MHz – Directional gain that exceeds 6 dBi	Complies
15.407(b)(1) / 15.209		Spurious Emissions above 1GHz	53.9 dBµV/m @ 5149.0 MHz (-0.1 dB)	Refer to the limits section (p21) for restricted bands, all others -27 dBm/MHz EIRP	Complies
Note 1 Pass/Fail criteria defined by standards listed above.					

OPERATION IN THE 5.15 – 5.25 GHZ BAND – CLIENT DEVICE

	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
	RSS-247 6.2.1	Indoor operation only	Refer to user's manual	N/A	Complies
	RSS-247 6.2.1 (1)	99% Bandwidth	802.11a: 16.580 MHz ac20: 17.740 MHz ac40: 36.010 MHz ac80: 75.470 MHz	N/A – limits output power if < 20MHz	N/A
	RSS-247 6.2.1 (1)	EIRP Output Power	802.11a: 39.0 mW ac20: 39.0 mW ac40: 79.6 mW ac80: 85.5 mW	23 dBm (200 mW) or $10 + 10*\log_{10}(BW)$	Complies
	RSS-247 6.2.1 (1)	Power Spectral Density	802.11a: -0.4 dBm/MHz ac20: -0.5 dBm/MHz ac40: -1.0 dBm/MHz ac80: -4.0 dBm/MHz	10 dBm/MHz - directional antenna gain	Complies
	RSS-247 6.2.1 (2)	Spurious Emissions above 1GHz	53.9 dBµV/m @ 5149.0 MHz (-0.1 dB)	Refer to the limits section (p21) for restricted bands, all others -27 dBm/MHz EIRP 26 dBc in 5.25-5.35 GHz band	Complies
Note 1 Pass/Fail criteria defined by standards listed above.					

OPERATION IN THE 5.725 – 5.85 GHZ BAND

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.407(e)	RSS-247 6.2.4 (1)	6dB Bandwidth	802.11a: 16.2 MHz ac20: 17.2 MHz ac40: 34.4 MHz ac80: 75.8 MHz	>= 500 kHz	Complies
15.407(a) (3)(i)	RSS-210 A9.2(2)	Output Power (multipoint systems)	802.11a: 0.1527 W ac20: 0.1254 W ac40: 0.1411 W ac80: 0.1238 W (Max eirp: 0.765 W)	30 dBm (1 W) EIRP <= 4W	Complies
15.407(a) (3)(i)	RSS-247 6.2.3 (1)	Power Spectral Density	802.11a: 12.3 dBm/MHz ac20: 11.5 dBm/MHz ac40: 8.6 dBm/MHz ac80: 4.9 dBm/MHz	30 dBm / 500 kHz	Complies
15.407(b) (4) / 15.209	RSS-247 6.2.4 (2)	Spurious Emissions above 1GHz	66.8 dBµV/m @ 5647.5 MHz (-1.5 dB)	Refer to the limits section (p21) for restricted bands, all others -17 dBm/MHz EIRP band edge and -27 dBm/MHz EIRP	Complies
Note 1	Pass/Fail criteria defined by standards listed above.				

REQUIREMENTS FOR 5150-5250 and 5725-5850 MHz U-NII/LELAN BANDS

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.407	RSS-247 6.1	Modulation	OFDM modulation employed	Digital modulation is required	Complies
15.407(b) (6) / 15.209	RSS-247 6.2.1 (2)	Spurious Emissions below 1GHz	36.3 dBµV/m @ 34.33 MHz (-3.7 dB)	Refer to page 24	Complies
15.31 (m)	RSS-247 6.4 (1) RSS-Gen 6.9	Channel Selection	Emissions tested at outermost and middle channels in each band	Device was tested on the top, bottom and center channels in each band	N/A
15.407 (c)	RSS-247 6.4 (2)	Operation in the absence of information to transmit	Operation is discontinued in the absence of information (Operational Description page 2)	Device shall automatically discontinue operation in the absence of information to transmit	Complies
15.407 (g)		Frequency Stability	Frequency stability is better than 10 ppm.	Signal shall remain within the allocated band	Complies
	RSS-247 6.4 (5)	User manual information	Refer to manual for details	Warning regarding Radar as primary user of some bands	Complies
Note 1	Pass/Fail criteria defined by standards listed above.				

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	42.8 dBµV @ 0.276 MHz (-8.1 dB)	Refer to page 21	Complies
15.407 (f)	RSS 102	RF Exposure Requirements	Refer to MPE calculations in separate exhibit, RSS 102 declaration and User Manual statements.	Refer to OET 65, FCC Part 1 and RSS 102	Complies
-	RSS-Gen 6.8	User Manual	Non detachable antennas	Statement for products with detachable antenna	N/A
-	RSS-Gen 8.4	User Manual		Statement for all products	Complies
-	RSP-100 RSS-Gen 6.7	Occupied Bandwidth		Information only	N/A
Note 1	Pass/Fail criteria defined by standards listed above.				

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 Eight Sleep model 10503 is a thermoregulated mattress cover and hub that is designed to aid sleep. The Pod Hub would normally be placed on the floor, but for testing the radio it was treated as table-top equipment during testing. The electrical rating of the Pod is 110-240 Volts, 50-60 Hz, 300 Watts.

The sample was received on December 5, 2022 and tested on December 5, 12, 13, 14, 15, 16, 19 and 20, 2022 and January 10, 11 and 18, 2023. The EUT consisted of the following component(s):

Company	Model	Description	Serial Number	FCC ID
Eight Sleep, Inc.	10503	Pod Hub	000182A5	2AYXT61100001

OTHER EUT DETAILS

The following EUT details should be noted: The EUT employs a MediaTek MT7663BSN Wi-Fi and BLE radio chip with (2) TE 2344656 Wi-Fi antennas and a integrated PCB BLE antenna. The Wi-Fi radio uses 20, 40 and 80 MHz bandwidth modes and 2x2 MIMO operation.

ENCLOSURE

The Pod enclosure is primarily constructed of plastic. It measures approximately 16 cm wide by 37.5 cm deep by 38.5 cm high.

MODIFICATIONS

No modifications were made to the EUT during the time the product was at NTS Labs, LLC.

SUPPORT EQUIPMENT

The following equipment was used as support equipment for testing:

Company	Model	Description	Serial Number	FCC ID
Lenovo	ThinkPad X1	Laptop	PF-3T5W0H	-

No remote support equipment was used during testing.

EUT INTERFACE PORTS

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
AC	Mains	Three wire	Unshielded	1.7
Temporary USB	Laptop	Multiwire	Shielded/Unshielded	2

EUT OPERATION

During emissions testing the EUT was commanded to transmit continuously at the selected power setting and on the channel with commands from the laptop. For the Wi-Fi radio, both chains are active using a single spatial stream. The power settings used during power measurements are detailed below. Settings during radiated tests may exceed these values but the power settings used will be those recorded during the power measurements.

Mode	Data Rate	Frequency (MHZ)	Setting (FCC)	Setting (ISEDC)
a	6 Mbps	5180	7	7
a	6 Mbps	5200	7	7
a	6 Mbps	5240	7	7
ac20	6.5 Mbps	5180	8	8
ac20	6.5 Mbps	5200	8	8
ac20	6.5 Mbps	5240	8	8
ac40	13.5 Mbps	5190	11	11
ac40	13.5 Mbps	5230	11	11
ac80	29.3 Mbps	5210	11	11
a	6 Mbps	5745	21	21
a	6 Mbps	5785	21	21
a	6 Mbps	5825	21	21
ac20	6.5 Mbps	5745	21	21
ac20	6.5 Mbps	5785	21	21
ac20	6.5 Mbps	5825	21	21
ac40	13.5 Mbps	5755	21	21
ac40	13.5 Mbps	5795	21	21
ac80	29.3 Mbps	5775	21	21

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 Labs, LLC 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 Labs, LLC.

Site	Company / Registration Numbers		Location
	FCC	Canada	
Chamber 3, 4, 5 & 7	US1031	2845B (Wireless Test Lab #US0027)	41039 Boyce Road Fremont, CA 94538-2435

ANSI C63.4 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. 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 C63.10. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

INSTRUMENT CONTROL COMPUTER

Software is used to view and convert receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers. The software used for radiated and conducted emissions measurements is NTS Labs, LLC 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.

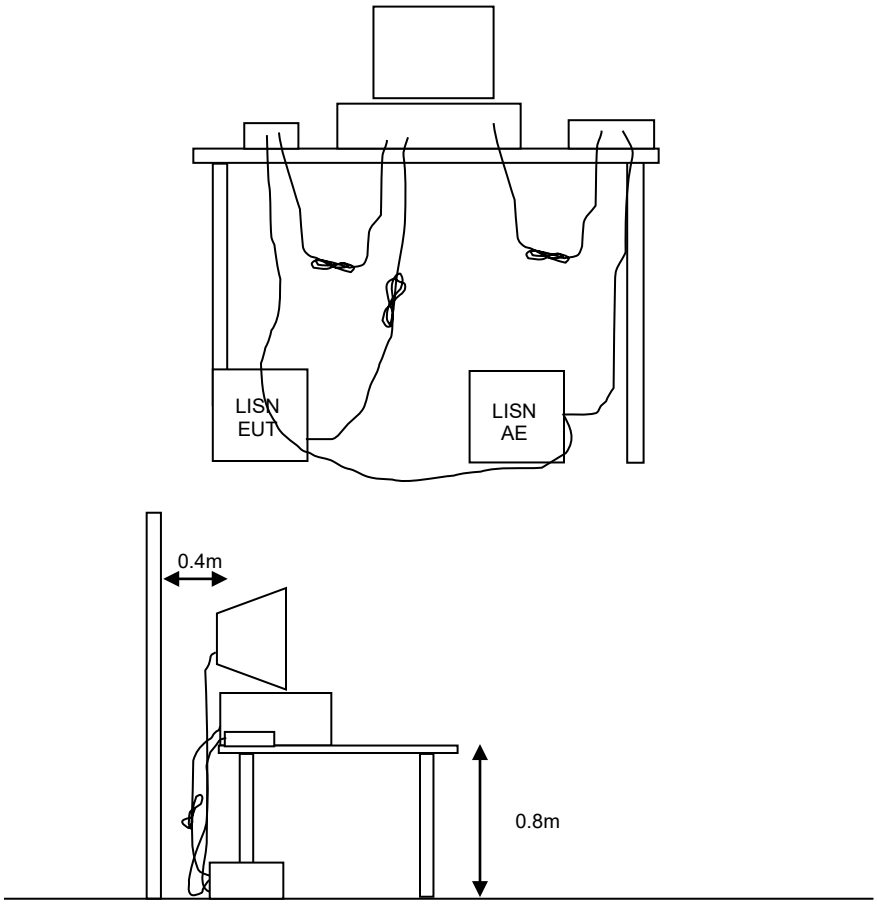


Figure 1 Typical Conducted Emissions Test Configuration

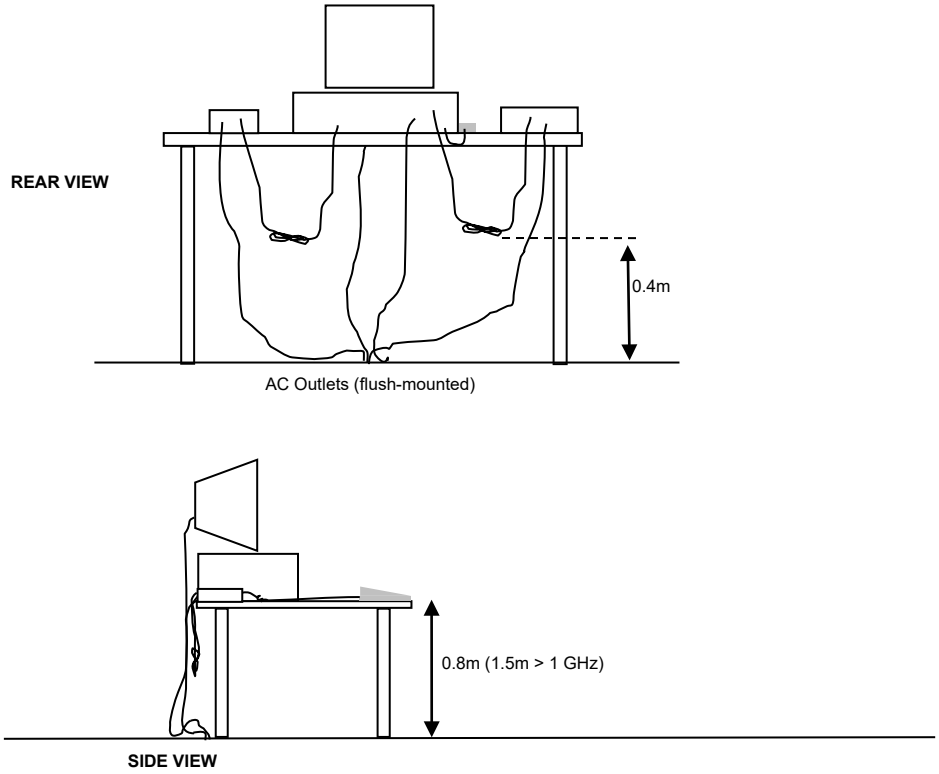
RADIATED EMISSIONS

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.

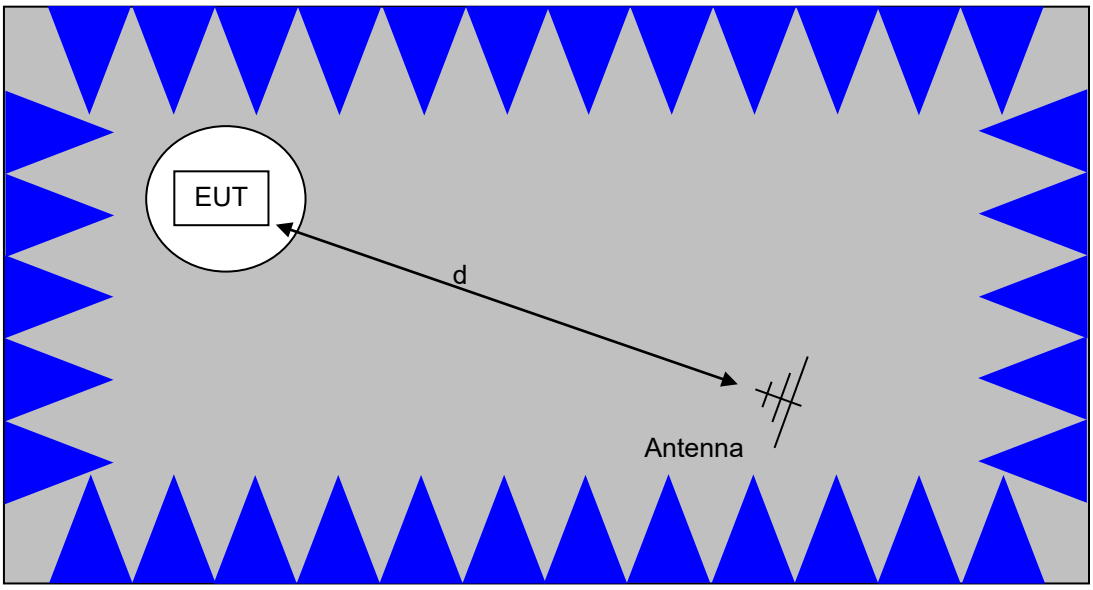
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

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.

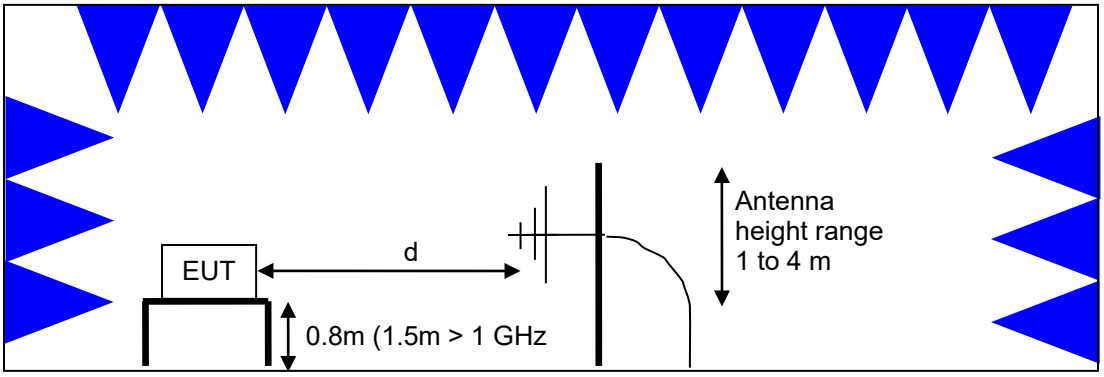


Typical Test Configuration for Radiated Field Strength Measurements



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.

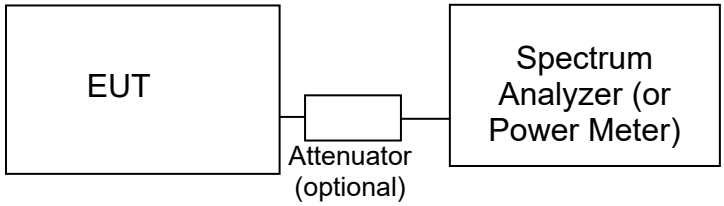
Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



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 Labs, LLC 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; 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

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

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. For FCC, fixed point to point applications using the 2400-2483.5 MHz band may use antennas with more than 6 dBi gain but output power is reduced by 1 dB for every 3dB that the antenna gain exceeds 6 dBi. For Canada, fixed point-to-point applications using the 2400-2483.5 MHz band are not subject to this restriction. Fixed point-to-point applications using the 5725 – 5850 MHz band are also not subject to this restriction. Certification of DTS systems operating in the 5725-5850 MHz band is no longer allowed under FCC Rules per §15.37(h).

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 GEN. 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).

FCC 15.407 (a) OUTPUT POWER LIMITS

The table below shows the limits for output power and output power density. For the 5250-5350 and 5470-5725 MHz bands, 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
5150 – 5250	1Watt (30 dBm)	17 dBm/MHz
5250–5350 and 5470-5725	250 mW (24 dBm)	11 dBm/MHz
5725–5850	1 Watt (30 dBm)	30 dBm/500kHz
5925–6425 and 6525–6875	1Watt (30 dBm)	17 dBm/MHz
6425–6525 and 6875–7125	250 mW (24 dBm)	11 dBm/MHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band may use antennas of any gain without this limitation.

OUTPUT POWER LIMITS –LELAN DEVICES

The table below shows the limits for output power and output power density defined by RSS 247. 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
5150 – 5250	200mW (23 dBm) eirp	10 dBm/MHz eirp
5250 – 5350 and 5470 - 5725	250 mW (24 dBm)2 1W (30dBm) eirp	11 dBm/MHz
5725 – 5850	1 Watt (30 dBm) 4W eirp	30 dBm/500kHz

For system using antennas with gains exceeding 6dBi, the output power and power spectral density limits are reduced by 1dB for every dB the antenna gain exceeds 6dBi. Fixed point-to-point applications using the 5725 – 5850 MHz band may use antennas with any gain without this limitation.

[2] If EIRP exceeds 500mW the device must employ TPC

SPURIOUS EMISSIONS LIMITS –UNII and LELAN DEVICES

The spurious emissions limits for signals below 1GHz are the FCC/RSS-Gen general limits. For emissions above 1GHz, signals in restricted bands are subject to the FCC/RSS-Gen general limits. All other signals have a limit of –27dBm/MHz, which is field strength of 68.3dBuV/m/MHz at a distance of 3m. For devices operating in the 5725-5850 MHz band under the LELAN/UNII rules, the limit within 5 MHz of the allocated band slopes from 27 dBm/MHz to 15.6 dBm/MHz, from 5 MHz to 25 MHz from the allocated band slopes from 15.6 dBm/MHz to 10 dBm/MHz, from 25 MHz to 75 MHz from the allocated band slopes from 10 dBm/MHz to -27 dBm/MHz and for more than 75 MHz from the allocated band is –27dBm/MHz.

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

A computer program reads the receiver levels and 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. The corrected receiver readings are compared directly to the specification limit (decibel form).

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
Radiated Emissions, 30 - 40,000 MHz, Dec 12-16, 2022					
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	8/30/2022	8/31/2023
Hewlett Packard	Microwave Preamplifier Head, 18-40 GHz (Blue)	84125C EMI Test Head (Blue)	WC055663	1/24/2022	1/24/2023
Hewlett Packard	High Pass filter, 8.2 GHz	P/N 84300-80039	WC064433	11/14/2022	11/14/2023
Hewlett Packard	High Pass filter, 3.7 GHz	P/N 84300-80038	WC064434	2/9/2022	2/9/2023
Micro-Tronics	Band Reject Filter, 2400-2500 MHz	BRM50702-02	WC064481	11/15/2022	11/15/2023
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	WC064536	1/29/2021	3/23/2023
A. H. Systems	Antenna, Horn, 18-40GHz	SAS-574	WC064556	11/18/2022	11/18/2024
Micro-Tronics	Band Reject Filter, 5150-5350 MHz	BRC50703-02	WC064594	10/17/2022	10/17/2023
EMCO	Antenna, Horn, 1-18 GHz	3115	WC064725	8/17/2021	8/17/2023
Com-Power	Preamplifier, 1-1000 MHz	PAM-103	WC064733	6/2/2022	6/2/2023
Rohde & Schwarz	EMI Test Receiver, 20Hz-40GHz	ESI	WC068000	7/21/2022	7/21/2023
Micro-Tronics	Band Reject Filter	BRC50705-02	WC068022	1/31/2022	1/31/2023
MITEQ	Preamplifier, 1-18 GHz	AFS44	WC071561	4/22/2022	4/22/2023
Conducted Emissions - AC Power Ports, 16-Dec-22					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Fischer Custom Communications	LISN, 25A, 150kHz to 30MHz, 25 Amp	FCC-LISN-50-25-2-09	WC064532	9/8/2022	9/8/2023
Rohde & Schwarz	EMI Test Receiver, 20Hz-40GHz	ESI	WC068000	7/21/2022	7/21/2023
Rohde & Schwarz	Pulse Limiter	ESH3-Z2	WC072359	6/30/2022	6/30/2023
Radio Antenna Port (Power and Spurious Emissions), 19-20-Dec-2022, 11-Jan-2023					
National Technical Systems	NTS UNII Power Software (rev 4.0)	N/A	WC022700	N/A	
National Technical Systems	NTS Capture Analyzer Software (rev 4.0)	N/A	WC022706	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	8/30/2022	8/31/2023
Agilent Technologies	Signal Generator (Vector) (PSG)	E8267D	WC055673	4/26/2022	4/26/2023
Agilent Technologies	USB Average Power Sensor	U2001A	WC064661	1/26/2021	1/24/2023
BLE Spurious 1000- 18000 MHz, 18-Jan-23					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055670	10/24/2022	10/31/2023
EMCO	Horn Antenna, 1-18 GHz (SA40-Purple)	3115	WC062583	9/12/2022	9/12/2024
Hewlett Packard	High Pass filter, 3.7 GHz	P/N 84300-80038	WC064434	2/9/2022	2/9/2023

Manufacturer	Description	Model	Asset #	Calibrated	Cal Due
MITEQ	Preamplifier, 1-18 GHz	AFS44	WC080962	7/18/2022	7/18/2023
BLE Spurious 1000- 18000 MHz, 18-Jan-23					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055670	10/24/2022	10/31/2023
EMCO	Horn Antenna, 1-18 GHz (SA40-Purple)	3115	WC062583	9/12/2022	9/12/2024
Hewlett Packard	High Pass filter, 3.7 GHz	P/N 84300-80038	WC064434	2/9/2022	2/9/2023
MITEQ	Preamplifier, 1-18 GHz	AFS44	WC080962	7/18/2022	7/18/2023
Radio Antenna Port (Power, Bandwidth and Spurious Emissions), 10-11-Jan-23					
National Technical Systems	NTS EMI Software (rev 2.10)	N/A	WC022452	N/A	
National Technical Systems	NTS Capture Analyzer Software (rev 4.0)	N/A	WC022706	N/A	
Agilent Technologies	PSA Spectrum Analyzer	E4446A	WC055650	8/30/2022	8/31/2023
Rohde & Schwarz	Power Meter	NRVS	WC064428	12/8/2022	12/8/2023
Rohde & Schwarz	Peak Power Sensor 100 uW - 2 Watts use with 20dB attenuator sn:1031.6959.00 only	NRV-Z32	WC064862	12/8/2022	12/8/2023

Note: All cables used during testing are identified and included in the calibration database and are calibrated annually. The factors for the cable loss used by the emissions test software is updated each time calibration is performed.

Appendix B Test Data

TL167335 Pages 30 – 116

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Product	Pod Hub	T-Log Number:	TL167335 Hub 182A5
System Configuration:	-	Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Emissions Standard(s):	FCC part 15.407, RSS-247	Class:	-
Immunity Standard(s):	-	Environment:	Home

EMC Test Data

For The

Eight Sleep, Inc.

Product

Pod Hub

Date of Last Test: 1/25/2023

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Power vs. Data Rate

In normal operating modes the EUT uses power settings stored on EEPROM to set the output power. For a given nominal output power the actual transmit power normally is reduced as the data rate increases, therefore testing was performed at the data rate in the mode with highest power to determine compliance with the requirements.
The following power measurements were made using a **GATED** average power meter and with the device configured in a continuous transmit mode on Chain 1 at the various data rates in each mode to verify the highest power mode:

Sample Notes

Sample S/N: Hub: 000182A5, SOM: 70B651000024
Driver: Wifitest Tool, Ver 1.9.6

Date of Test: 12/5/2022
Test Engineer: David Bare
Test Location: Fremont Chamber #7

Mode	Data Rate	Power (dBm)	Power setting
802.11b	1	**15.3**	17.0
	2	15.2	
	5.5	15.2	
	11	15.2	
802.11g	6	**15.2**	17.0
	9	15.2	
	12	15.2	
	18	15.2	
	24	15.2	
	36	15.2	
	48	15.2	
	54	15.2	

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Mode	Data Rate (800ns GI, 1SS)	Power (dBm)	Power setting	
802.11n/ac 20MHz	6.5	**15.3**	17.0	
	13	15.2		
	19.5	15.2		
	26	14.6		
	39	14.5		
	52	14.0		
	58.5	14.1		
	65	13.6		
	78	12.2		<<-11ac mode only
802.11n/ac 40MHz	13.5	**15.5**	17.0	
	27	15.4		
	40.5	15.2		
	54	14.6		
	81	14.5		
	108	13.3		
	121.5	13.3		
	135	12.8		
	162	11.4		<<-11ac mode only
	180	10.8		<<-11ac mode only
802.11ac 80MHz	29.3	**15.2**	17.0	
	58.5	14.5		
	87.8	14.2		
	117	13.2		
	175.5	13.0		
	234	12.3		
	266.3	12.3		
	292.5	11.5		
	351	10.3		
	390	10.0		

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

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

RSS-247 and FCC 15.407 (UNII) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation 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: 19-20 °C
Rel. Humidity: 38-40 %

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.

Date of Test: 12/13/22
Test Engineer: M. Birgani
Test Location: Chamber 7

Config. Used: 1
Config Change: -
EUT Voltage: 120V/ 60Hz

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Summary of Results

Run #	Mode	Channel Frequency	Power Setting	Test Performed	Limit	Result / Margin
20MHz Bandwith Modes						
1	a	36 5180MHz	17	Restricted Band Edge at 5150 MHz	15.209	53.1 dBµV/m @ 5149.3 MHz (-0.9 dB)
	a	40 5200MHz	21	Restricted Band Edge at 5150 MHz	15.209	49.6 dBµV/m @ 5149.2 MHz (-4.4 dB)
4	a	149 5745MHz	21	Band Edge 5725 MHz	15E	-39.0 dBm/MHz @ 5643.5 MHz (-12.0 dB)
	a	165 5825MHz	21	Band Edge 5850 MHz	15E	-37.8 dBm/MHz @ 5927.0 MHz (-10.8 dB)
6	ac20	36 5180MHz	18	Restricted Band Edge at 5150 MHz	15.209	52.8 dBµV/m @ 5149.9 MHz (-1.2 dB)
	ac20	40 5200MHz	21	Restricted Band Edge at 5150 MHz	15.209	50.1 dBµV/m @ 5148.6 MHz (-3.9 dB)
9	ac20	149 5745MHz	21	Band Edge 5725 MHz	15E	-40.1 dBm/MHz @ 5634.5 MHz (-13.1 dB)
	ac20	165 5825MHz	21	Band Edge 5850 MHz	15E	-40.1 dBm/MHz @ 5931.0 MHz (-13.1 dB)
40MHz Bandwith Modes						
11	ac40	38 5190MHz	14	Restricted Band Edge at 5150 MHz	15.209	52.6 dBµV/m @ 5150.0 MHz (-1.4 dB)
	ac40	46 5230MHz	17	Restricted Band Edge at 5150 MHz	15.209	46.5 dBµV/m @ 5149.9 MHz (-7.5 dB)
14	ac40	151 5755MHz	21	Band Edge 5725 MHz	15E	-28.4 dBm/MHz @ 5647.5 MHz (-1.4 dB)
	ac40	159 5795MHz	21	Band Edge 5850 MHz	15E	-26.6 dBm/MHz @ 5919.5 MHz (-3.8 dB)
80MHz Bandwith Modes						
16	ac80	42 5210MHz	11	Restricted Band Edge at 5150 MHz	15.209	53.9 dBµV/m @ 5149.0 MHz (-0.1 dB)
19	ac80	155 5775MHz	17	Band Edge 5725 MHz	15E	-29.6 dBm/MHz @ 5651.0 MHz (-3.5 dB)
	ac80	155 5775MHz	17	Band Edge 5850 MHz	15E	-34.0 dBm/MHz @ 5931.0 MHz (-7.0 dB)

Note, add channels if the bandedge channels passing power level is ≥ 3dB than the center channel power target.

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC ANSI C63.10
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 voltage average, auto sweep time, max hold 50 traces. (method VB-A of ANSI C63.10)

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)	
11a	6 Mbps	98.1%	Yes	2.677	0.0	0.0	10	
11ac20	MCS 0	98.1%	Yes	2.566	0.0	0.0	10	
11ac40	MCS 0	94.4%	Yes	1.234	0.2	0.5	810	1 kHz
11ac80	MCS 0	87.9%	Yes	0.572	0.6	1.1	1748	3 kHz

Sample Notes

Sample S/N: Hub: 000182A5, SOM: 70B651000006
Driver: Wifitest Tool, Ver 1.9.6

Measurement Specific Notes:

Note 1:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).
Note 2:	Emission has a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces (method AD of ANSI C63.10)
Note 3:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear voltage average, auto sweep,max hold 50*1/DC traces (method VB-A of ANSI C63.10)
Note 4:	Emission has a duty cycle < 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100*1/DC traces, measurement adjusted by Pwr correction factor (method AD of ANSI C63.10)
Note 5:	Plots of the average and peak bandedge do not account for any duty cycle correction. Refer to the tabular results for final measurements.

* Pwr Cor Factor calculated using 10 X log(1/duty cycle)
** Lin Volt Cor Factor is calculated using 20 x log(1/duty cycle)

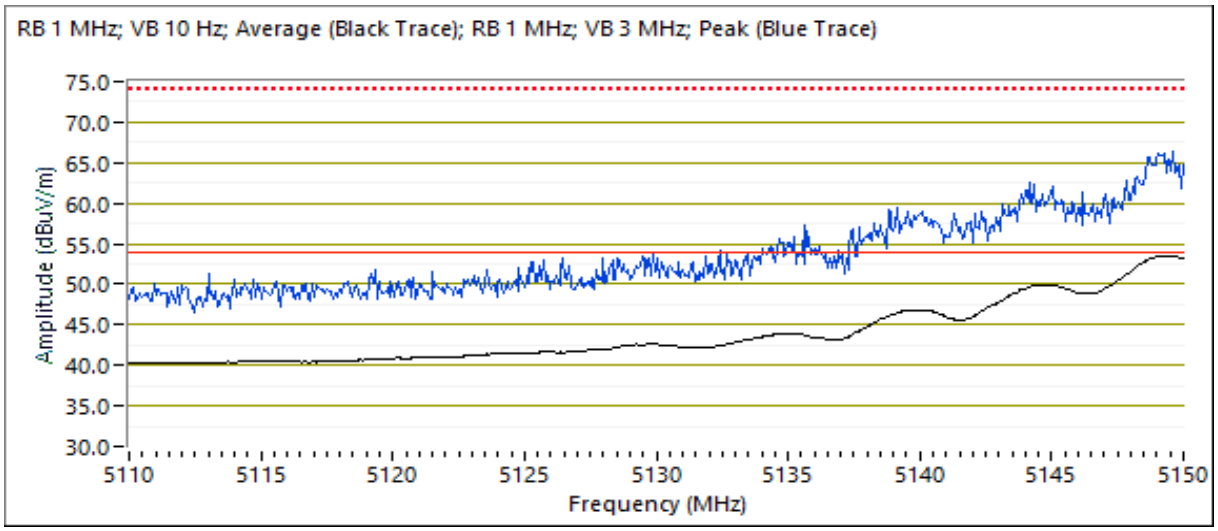
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #1: Radiated Bandedge Measurements, 5150-5250MHz

Channel: 36 Mode: a Pwr Setting: 17
Tx Chain: 2x2 Data Rate: 6 Mbps

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.330	**53.1**	H	54.0	**-0.9**	AVG	83	1.9	RB 1 MHz; VB: 10 Hz
5148.910	50.2	V	54.0	-3.8	AVG	34	2.1	RB 1 MHz; VB: 10 Hz
5149.980	66.5	H	74.0	-7.5	PK	83	1.9	RB 1 MHz; VB: 3 MHz
5149.480	64.7	V	74.0	-9.3	PK	34	2.1	RB 1 MHz; VB: 3 MHz



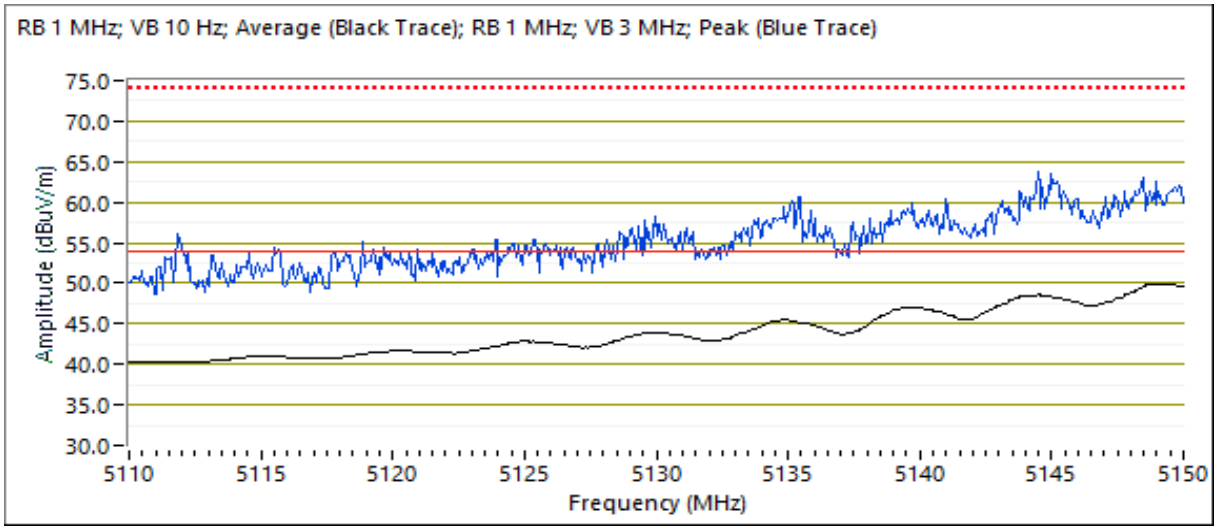
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #1: Radiated Bandedge Measurements, 5150-5250MHz

Channel: 40 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.240	**49.6**	H	54.0	**-4.4**	AVG	80	2.0	RB 1 MHz; VB: 10 Hz
5145.440	63.3	H	74.0	-10.7	PK	80	2.0	RB 1 MHz; VB: 3 MHz



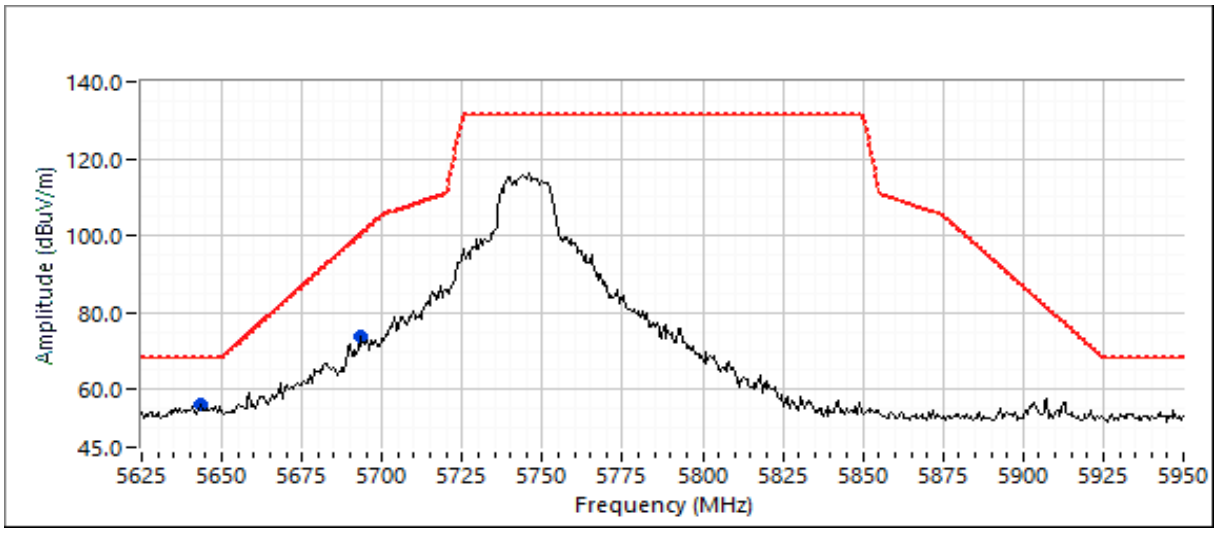
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #4: Radiated Bandedge Measurements, 5725-5850MHz

Channel: 149 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6Mbps

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5643.530	**56.2**	H	68.2	**-12.0**	PK	276	1.9	RB 1 MHz; VB: 3 MHz
5693.100	73.6	H	100.2	-26.6	PK	291	1.9	RB 1 MHz; VB: 3 MHz

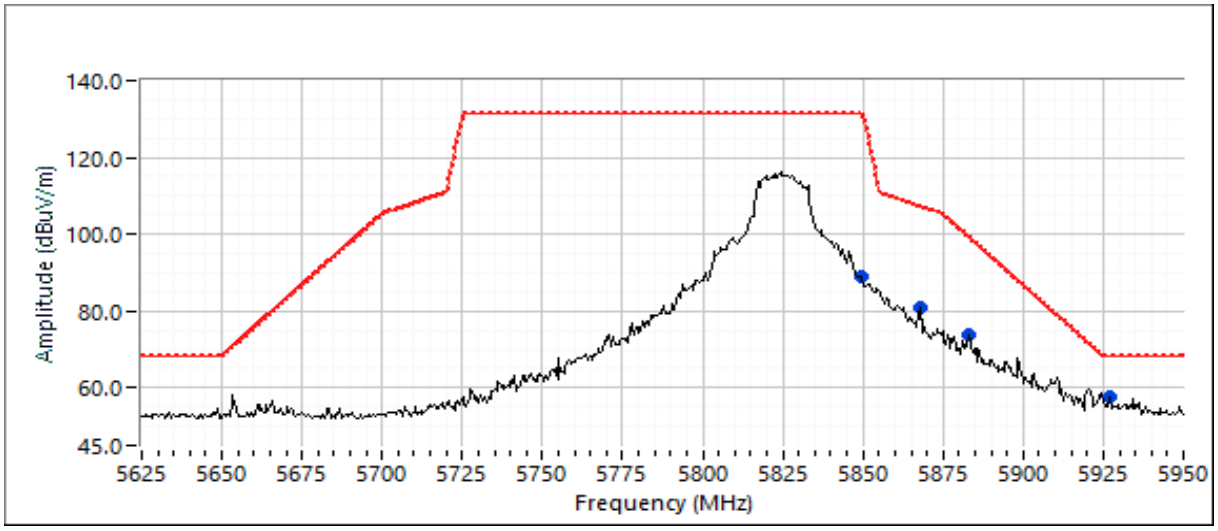


Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Channel: 165 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6Mbps

5850 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5926.960	**57.4**	H	68.2	**-10.8**	PK	256	1.6	RB 1 MHz; VB: 3 MHz
5882.900	73.7	H	99.5	-25.8	PK	84	2.5	RB 1 MHz; VB: 3 MHz
5867.870	81.1	H	107.3	-26.2	PK	92	1.6	RB 1 MHz; VB: 3 MHz
5849.850	89.2	H	131.3	-42.1	PK	65	1.9	RB 1 MHz; VB: 3 MHz



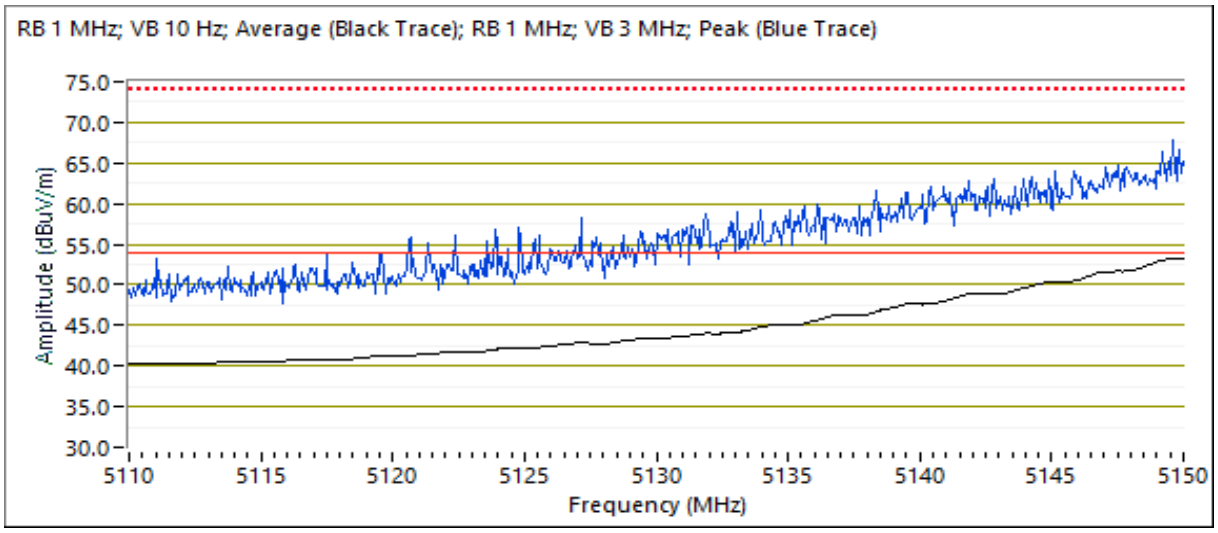
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #6: Radiated Bandedge Measurements, 5150-5250MHz

Channel: 36 Mode: ac20 Pwr Setting: 18
Tx Chain: 2x2 Data Rate: MCS0

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.850	**52.8**	H	54.0	**-1.2**	AVG	280	2.1	RB 1MHz; VB 10Hz
5148.970	67.2	H	74.0	-6.8	PK	280	2.1	RB 1MHz; VB 3MHz



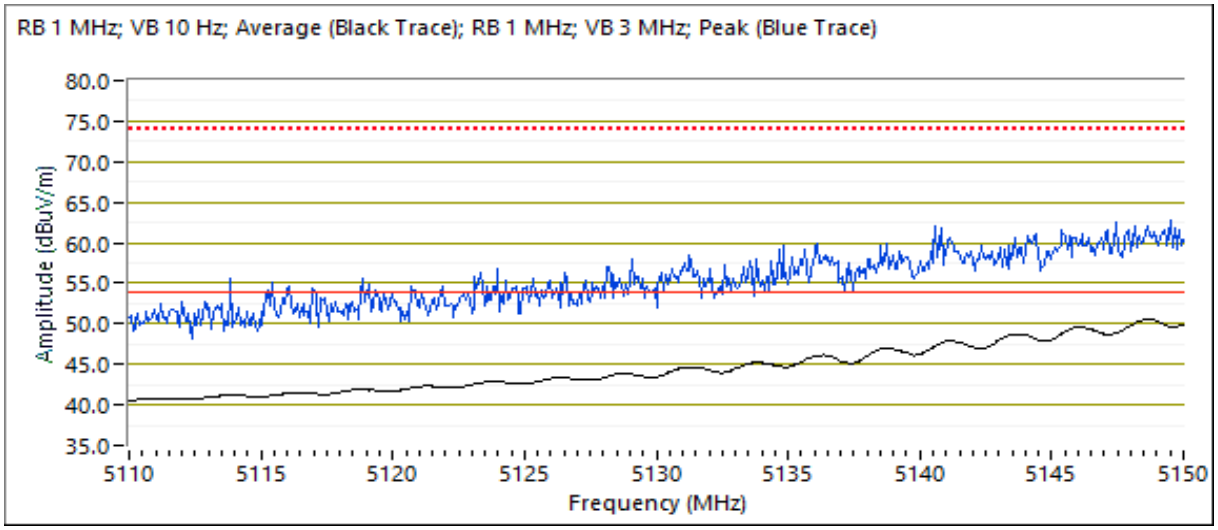
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #6: Radiated Bandedge Measurements, 5150-5250MHz

Channel: 40 Mode: ac20 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS0

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5148.630	**50.1**	H	54.0	**-3.9**	AVG	79	2.0	RB 1 MHz; VB: 10 Hz
5149.470	64.1	H	74.0	-9.9	PK	79	2.0	RB 1 MHz; VB: 3 MHz



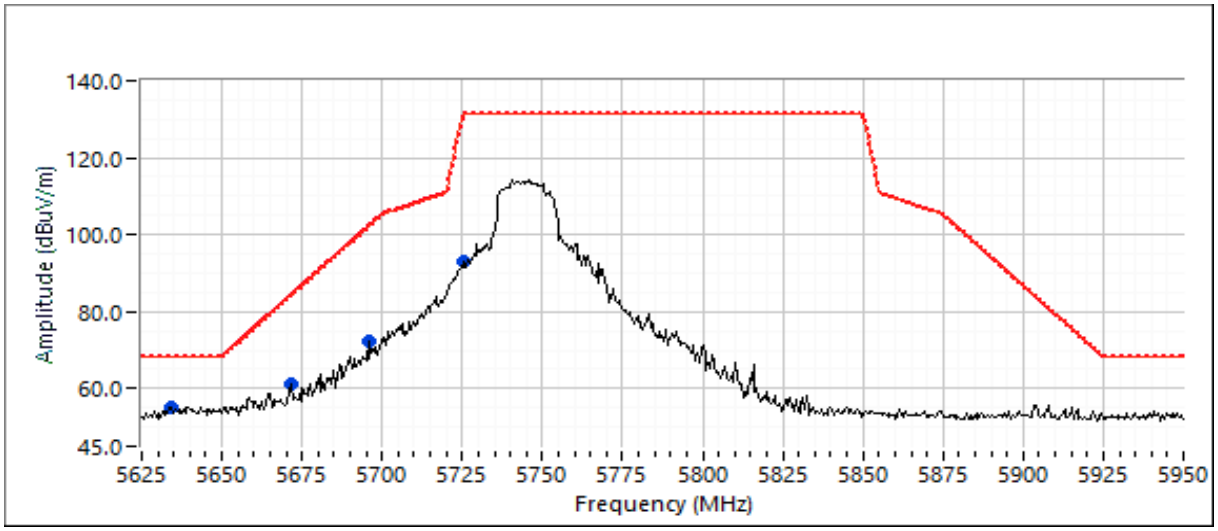
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #9: Radiated Bandedge Measurements, 5725-5850MHz

Channel: 149 Mode: ac20 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5634.510	***55.1***	*H*	*68.2*	**-13.1**	PK	*91*	*1.3*	RB 1 MHz; VB: 3 MHz
5671.570	*61.0*	*H*	*84.3*	-23.3	PK	*260*	*2.5*	RB 1 MHz; VB: 3 MHz
5695.610	*72.1*	*H*	*102.1*	-30.0	PK	*266*	*2.2*	RB 1 MHz; VB: 3 MHz
5725.150	*92.9*	*H*	*131.3*	-38.4	PK	*266*	*1.9*	RB 1 MHz; VB: 3 MHz

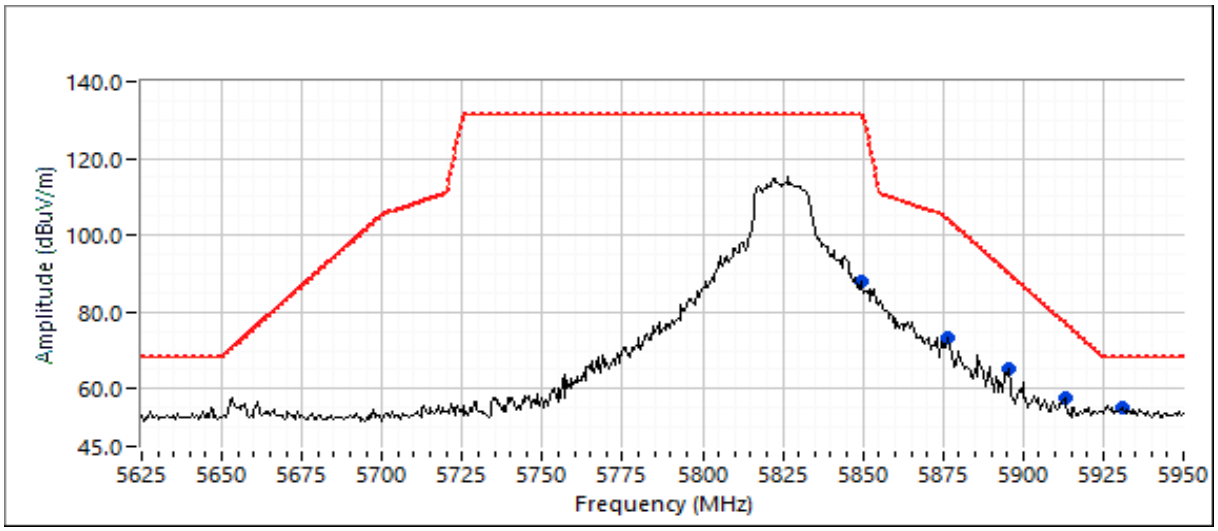


Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Channel: 165 Mode: ac20 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

5850 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5930.970	**55.1**	H	68.2	**-13.1**	PK	88	1.6	RB 1 MHz; VB: 3 MHz
5912.940	57.5	H	77.2	-19.7	PK	72	1.9	RB 1 MHz; VB: 3 MHz
5895.420	65.1	H	90.2	-25.1	PK	264	1.9	RB 1 MHz; VB: 3 MHz
5876.390	73.3	H	104.3	-31.0	PK	85	2.2	RB 1 MHz; VB: 3 MHz
5849.350	87.8	H	131.3	-43.5	PK	62	1.9	RB 1 MHz; VB: 3 MHz



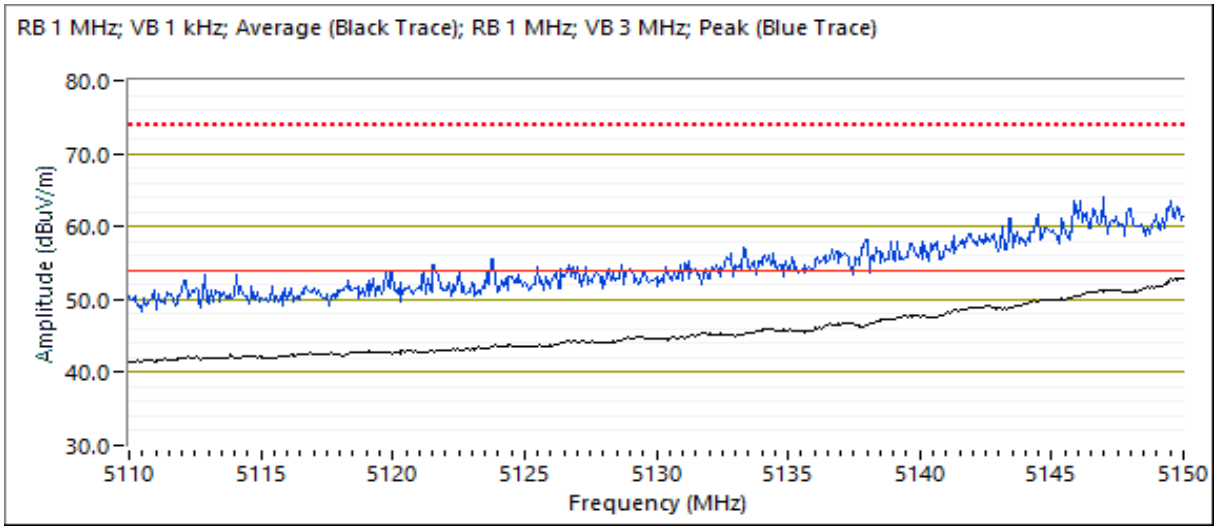
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #11: Radiated Bandedge Measurements, 5150-5250MHz

Channel: 38 Mode: ac40 Pwr Setting: 14
Tx Chain: 2x2 Data Rate: MCS0

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5150.000	**52.6**	H	54.0	**-1.4**	AVG	280	2.1	RB 1MHz; VB 1kHz, Note 3
5149.670	64.1	H	74.0	-9.9	PK	280	2.1	RB 1MHz; VB 3MHz

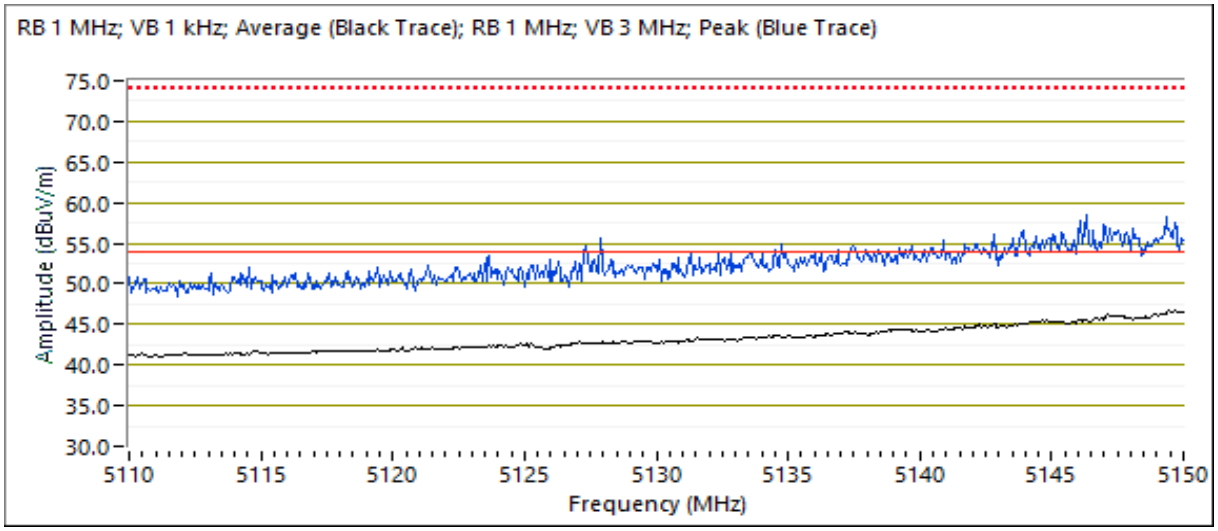


Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Channel: 46 Mode: ac40 Pwr Setting: 17
Tx Chain: 2x2 Data Rate: MCS0

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.910	**46.5**	H	54.0	**-7.5**	AVG	280	2.1	RB 1MHz; VB 1kHz, Note 3
5147.230	57.9	H	74.0	-16.1	PK	280	2.1	RB 1 MHz; VB: 3 MHz



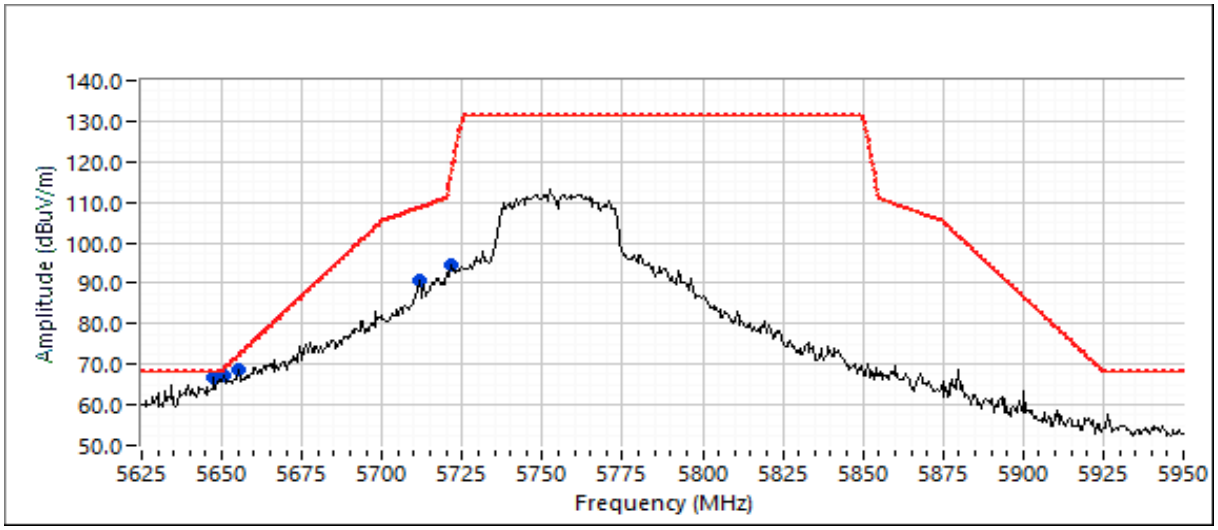
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #14: Radiated Bandedge Measurements, 5725-5850MHz

Channel: 151 Mode: ac40 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5647.530	**66.8**	H	68.2	**-1.4**	PK	264	1.9	RB 1 MHz; VB: 3 MHz
5650.540	67.0	H	68.7	-1.7	PK	288	1.9	RB 1 MHz; VB: 3 MHz
5655.050	68.7	H	72.0	-3.3	PK	262	2.2	RB 1 MHz; VB: 3 MHz
5711.630	90.5	H	108.6	-18.1	PK	274	1.6	RB 1 MHz; VB: 3 MHz
5721.650	94.5	H	117.6	-23.1	PK	276	1.6	RB 1 MHz; VB: 3 MHz

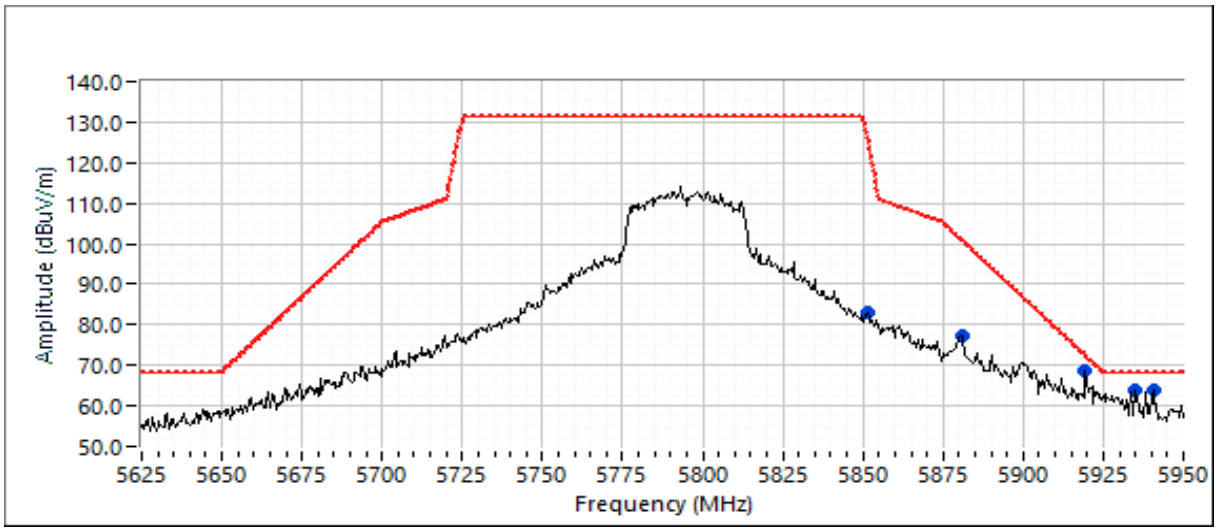


Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Channel: 159 Mode: ac40 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS0

5850 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5919.450	**68.6**	H	72.4	**-3.8**	PK	93	1.3	RB 1 MHz; VB: 3 MHz
5940.490	64.0	H	68.2	-4.2	PK	72	1.3	RB 1 MHz; VB: 3 MHz
5934.980	63.9	H	68.2	-4.3	PK	78	2.2	RB 1 MHz; VB: 3 MHz
5880.890	77.4	H	100.9	-23.5	PK	96	1.6	RB 1 MHz; VB: 3 MHz
5851.350	82.9	H	125.8	-42.9	PK	278	1.6	RB 1 MHz; VB: 3 MHz



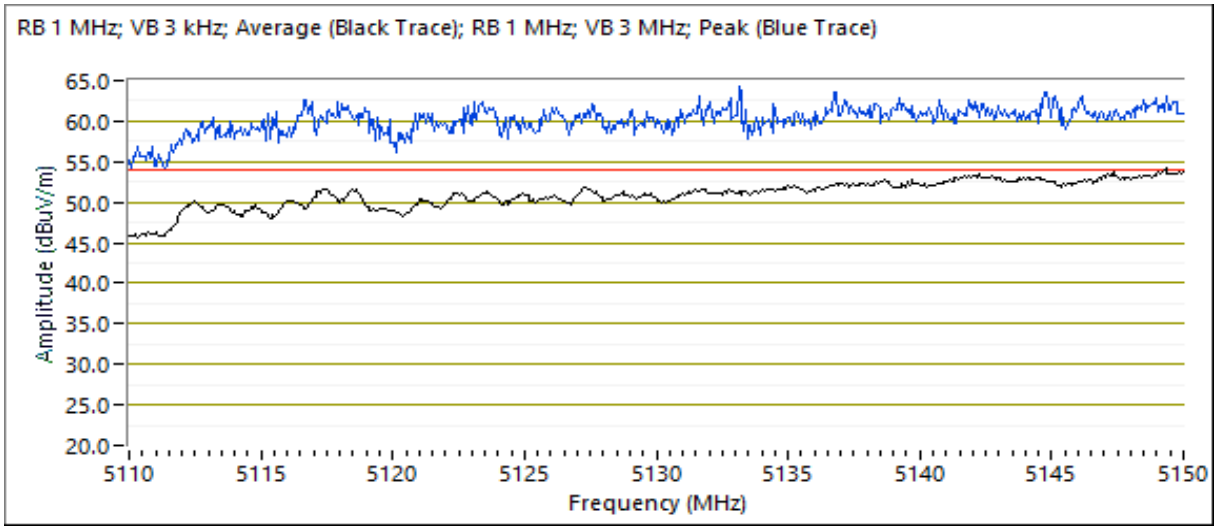
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #16: Radiated Bandedge Measurements, 5150-5250MHz

Channel: 42 Mode: ac80 Pwr Setting: 11
Tx Chain: 2x2 Data Rate: MCS0

5150 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	FCC 15.209		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5149.000	**53.9**	H	54.0	**-0.1**	AVG	280	2.1	RB 1 MHz; VB: 3 kHz, note 3
5138.200	63.4	H	74.0	-10.6	PK	280	2.1	RB 1 MHz; VB: 3 MHz



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #19: Radiated Bandedge Measurements, 5725-5850MHz

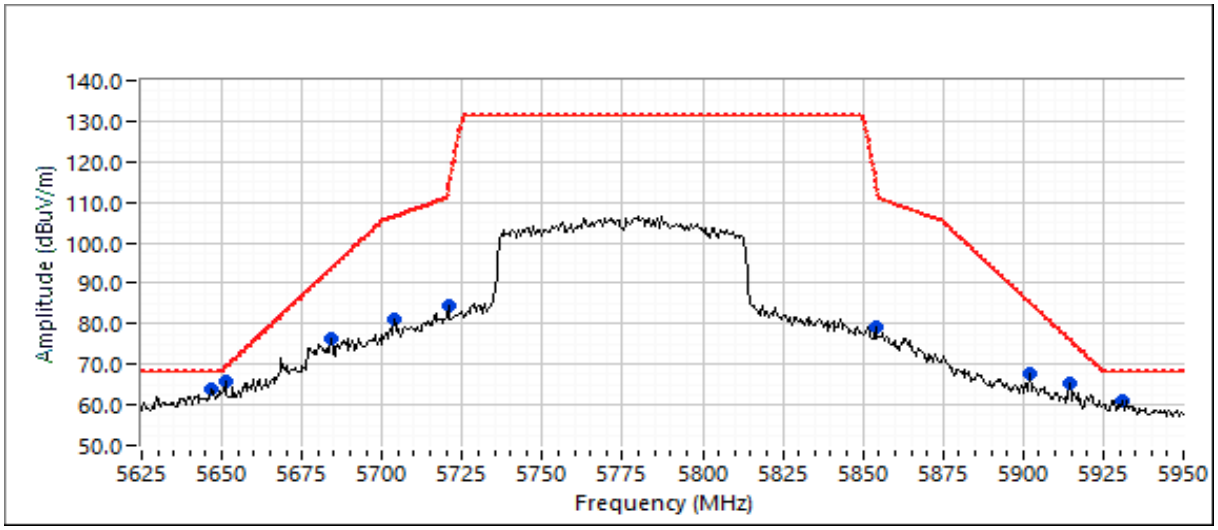
Channel: 155 Mode: ac80 Pwr Setting: 17
Tx Chain: 2x2 Data Rate: MCS 0

5725 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5651.040	***65.6***	*H*	*69.1*	**-3.5**	PK	*258*	*1.9*	RB 1 MHz; VB: 3 MHz
5646.530	*63.7*	*H*	*68.2*	-4.5	PK	*266*	*2.5*	RB 1 MHz; VB: 3 MHz
5684.090	*76.4*	*H*	*93.5*	-17.1	PK	*272*	*2.2*	RB 1 MHz; VB: 3 MHz
5703.620	*81.3*	*H*	*106.3*	-25.0	PK	*266*	*2.2*	RB 1 MHz; VB: 3 MHz
5720.650	*84.6*	*H*	*113.5*	-28.9	PK	*277*	*1.6*	RB 1 MHz; VB: 3 MHz

5850 MHz Band Edge Signal Radiated Field Strength

Frequency	Level	Pol	15.E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5930.970	***61.2***	*H*	*68.2*	**-7.0**	PK	*79*	*2.2*	RB 1 MHz; VB: 3 MHz
5914.450	*65.1*	*H*	*76.1*	-11.0	PK	*72*	*2.2*	RB 1 MHz; VB: 3 MHz
5901.930	*67.9*	*H*	*85.4*	-17.5	PK	*85*	*2.2*	RB 1 MHz; VB: 3 MHz
5853.850	*79.1*	*H*	*115.6*	-36.5	PK	*82*	*1.6*	RB 1 MHz; VB: 3 MHz



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

RSS-247 and FCC 15.407 (UNII) Radiated Spurious Emissions

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated spurious emissions testing.
For radiated emissions testing the measurement antenna was located 3 meters from the EUT, unless otherwise noted.

Ambient Conditions:

Temperature: 20-22 °C
Rel. Humidity: 38-40 %

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.

Date of Test: 12/14-15/2022
Test Engineer: M. Birgani
Test Location: Chamber 7

Config. Used: 1
Config Change: -
EUT Voltage: 120V/ 60Hz

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Summary of Results

Run #	Mode	Channel	Power Setting	Test Performed	Limit	Result / Margin
Scans on "center" channel in all four OFDM modes to determine the worst case mode.						
1	a	40 5200MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	-29.1 dBm/MHz @ 10399.8 MHz (-2.1 dB)
	ac20	40 5200MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	-29.1 dBm/MHz @ 10399.5 MHz (-2.1 dB)
	ac40	38 5190MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	-30.2 dBm/MHz @ 10380.0 MHz (-3.2 dB)
	ac80	42 5210MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	47.4 dBµV/m @ 20840.0 MHz (-6.6 dB)
Measurements on low and high channels in worst-case OFDM mode.						
2	a	36 5180MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	48.5 dBµV/m @ 15540.3 MHz (-5.5 dB)
	a	48 5240MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	49.1 dBµV/m @ 15722.2 MHz (-4.9 dB)
Scans on "center" channel in all four OFDM modes to determine the worst case mode.						
7	a	157 5785MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	52.4 dBµV/m @ 11568.1 MHz (-1.6 dB)
	ac20	157 5785MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	47.8 dBµV/m @ 11569.6 MHz (-6.2 dB)
	ac40	159 5795MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	48.4 dBµV/m @ 11589.7 MHz (-5.6 dB)
	ac80	155 5775MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	47.7 dBµV/m @ 23099.7 MHz (-6.3 dB)
Measurements on low and high channels in worst-case OFDM mode.						
8	a	149 5745MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	51.7 dBµV/m @ 11487.9 MHz (-2.3 dB)
	a	165 5825MHz	21	Radiated Emissions, 1 - 40 GHz	FCC 15.209 / 15 E	51.6 dBµV/m @ 11648.0 MHz (-2.4 dB)

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Procedure Comments:

Measurements performed in accordance with FCC ANSI C63.10
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 average measurment performed using RBW=1MHz, VBW=10Hz, peak detector, linear voltage average, auto sweep time, max hold 50 traces. (method VB-A of ANSI C63.10)

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)	
11a	6 Mbps	98.1%	Yes	2.677	0.0	0.0	10	
11ac20	MCS 0	98.1%	Yes	2.566	0.0	0.0	10	
11ac40	MCS 0	94.4%	Yes	1.234	0.2	0.5	810	1 kHz
11ac80	MCS 0	87.9%	Yes	0.572	0.6	1.1	1748	3 kHz

Sample Notes

Sample S/N: Hub: 000182A5, SOM: 70B651000006
Driver: Wifitest Tool, Ver 1.9.6

Measurement Specific Notes:

Note 1:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).
Note 2:	Emission has a duty cycle ≥ 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100 traces (method AD of ANSI C63.10)
Note 3:	Emission has constant duty cycle < 98%, average measurement performed: RBW=1MHz, VBW>1/T but not less than 10Hz, peak detector, linear voltage average, auto sweep, max hold 50*1/DC traces (method VB-A of ANSI C63.10)
Note 4:	Emission has a duty cycle < 98%, average measurement performed: RBW=1MHz, VBW=3MHz, RMS, Power averaging, auto sweep, trace average 100*1/DC traces, measurement adjusted by Pwr correction factor (method AD of ANSI C63.10)

* Pwr Cor Factor calculated using 10 X log(1/duty cycle)
** Lin Volt Cor Factor is calculated using 20 x log(1/duty cycle)

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

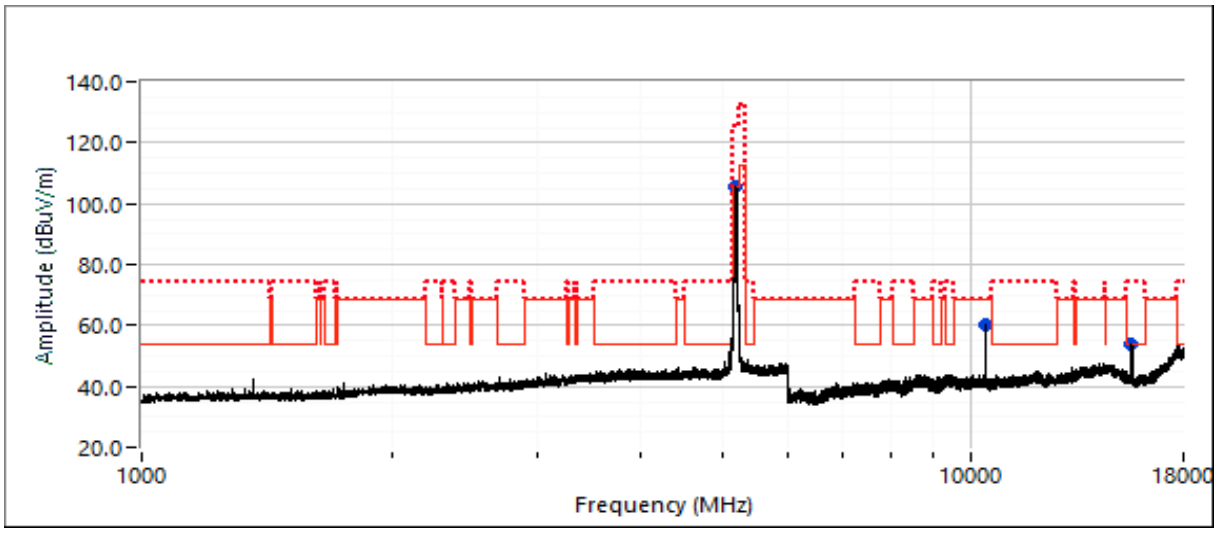
Run #1, Radiated Spurious Emissions, 1,000 - 40,000 MHz. Operation in the 5150-5250 MHz Band

Run #1a: Center Channel

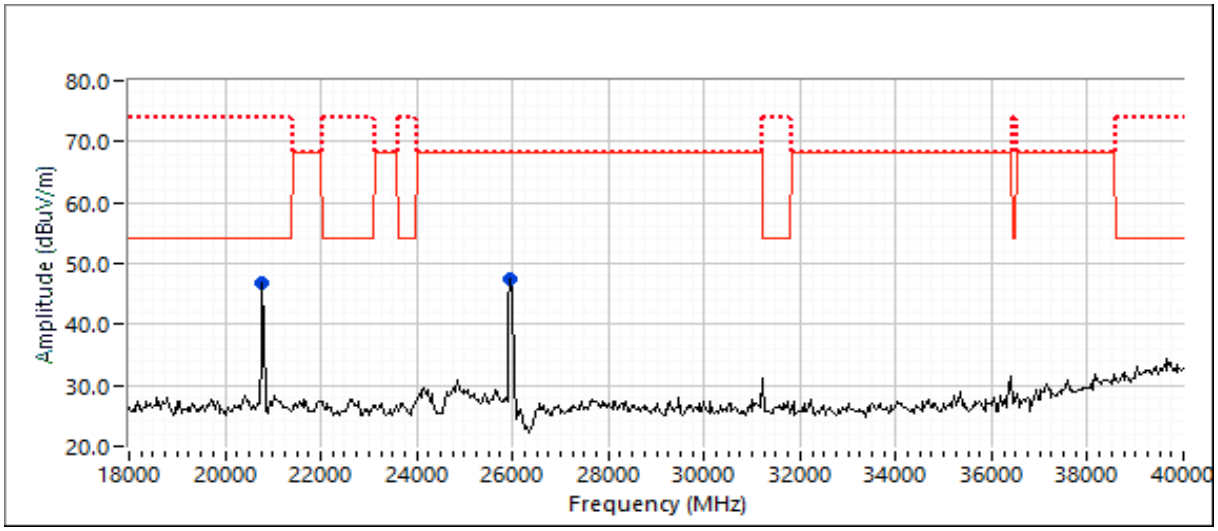
Channel: 40 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10399.820	66.1	V	68.2	-2.1	PK	55	2.5	RB 1 MHz; VB: 3 MHz
15597.220	47.4	V	54.0	-6.6	AVG	35	2.3	RB 1 MHz; VB: 10 Hz
15597.070	59.8	V	74.0	-14.2	PK	35	2.3	RB 1 MHz; VB: 3 MHz
20800.100	47.4	V	54.0	-6.6	AVG	74	2.4	RB 1 MHz; VB: 10 Hz
20799.910	53.7	V	74.0	-20.3	PK	74	2.4	RB 1 MHz; VB: 3 MHz
20800.060	40.4	H	54.0	-13.6	AVG	51	1.8	RB 1 MHz; VB: 10 Hz
20799.940	48.8	H	74.0	-25.2	PK	51	1.8	RB 1 MHz; VB: 3 MHz
25999.690	49.7	V	68.2	-18.5	PK	69	1.6	RB 1 MHz; VB: 3 MHz
25999.530	48.3	H	68.2	-19.9	PK	163	1.6	RB 1 MHz; VB: 3 MHz

Note:	Scans made between 18 - 40 GHz with the measurement antenna moved around the EUT and its antennas 30cm from the device. Final measurements performed at 3m distance.
Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



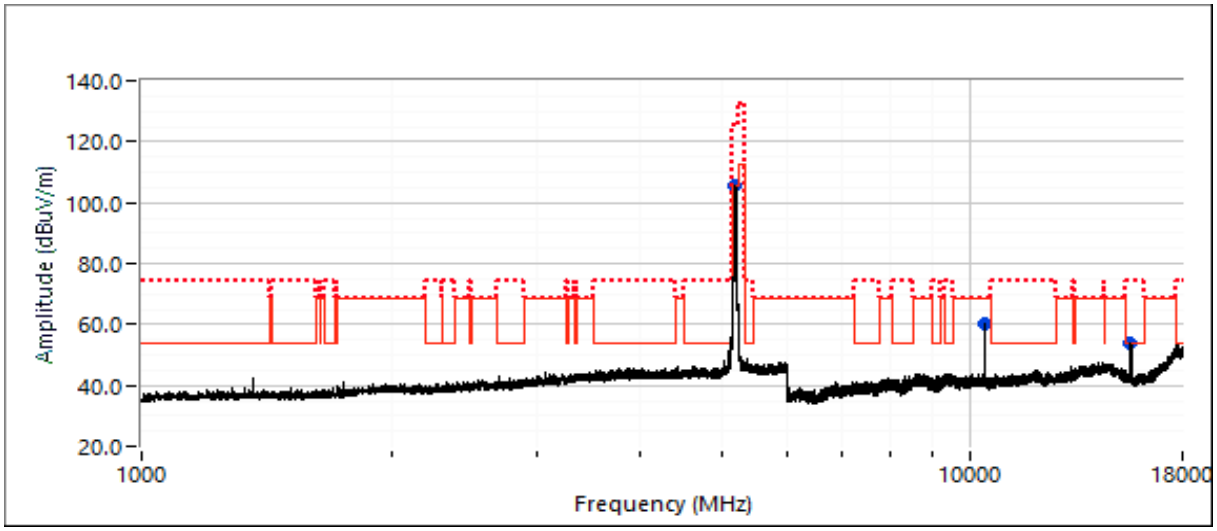
Run #1b: Center Channel

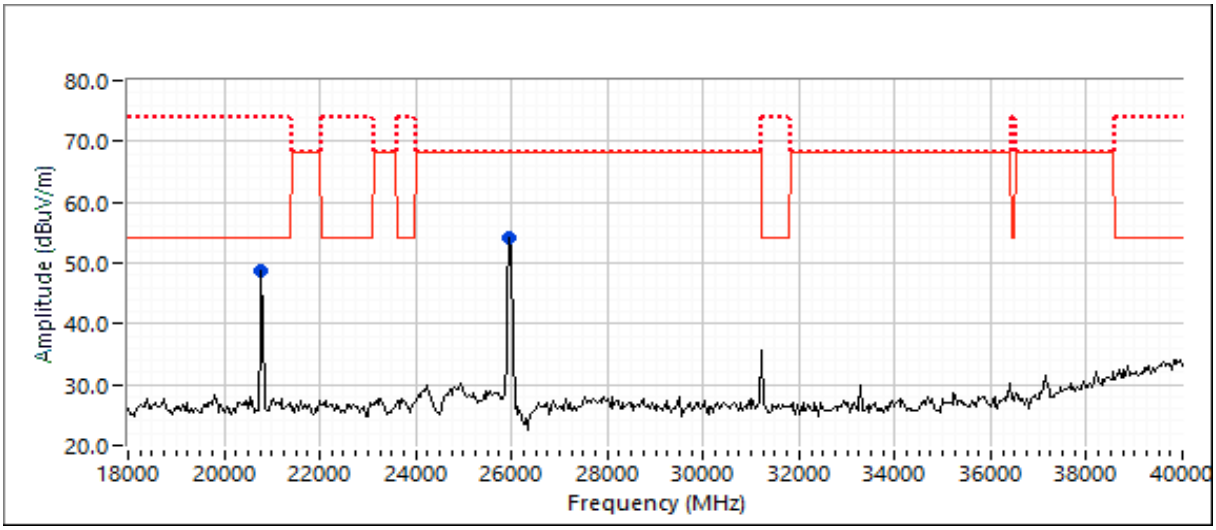
Channel: 40 Mode: 11ac20 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10399.510	66.1	V	68.2	-2.1	PK	55	2.5	RB 1 MHz; VB: 3 MHz
15597.610	47.0	V	54.0	-7.0	AVG	35	2.3	RB 1 MHz; VB: 10 Hz
15596.270	59.3	V	74.0	-14.7	PK	35	2.3	RB 1 MHz; VB: 3 MHz
20800.080	47.3	V	54.0	-6.7	AVG	74	2.1	AVG (CISPR)-RB 1 MHz; VB: 10 Hz
20800.060	53.8	V	74.0	-20.2	PK	74	2.1	PK (CISPR)-RB 1 MHz; VB: 3 MHz
25999.520	52.1	V	68.2	-16.1	PK	208	1.9	PK (CISPR)-RB 1 MHz; VB: 3 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A





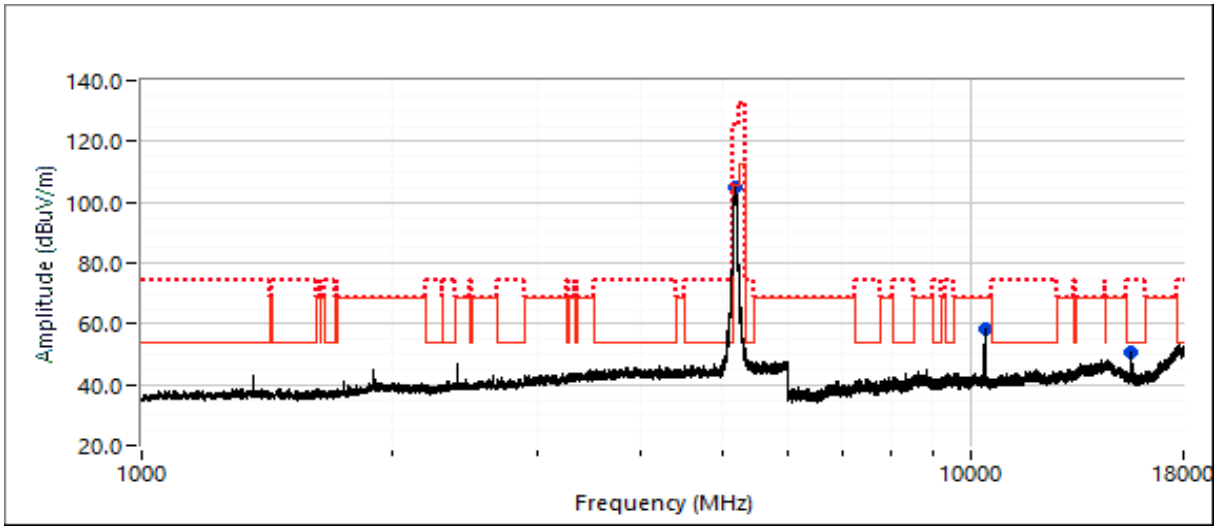
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #1c: Center Channel

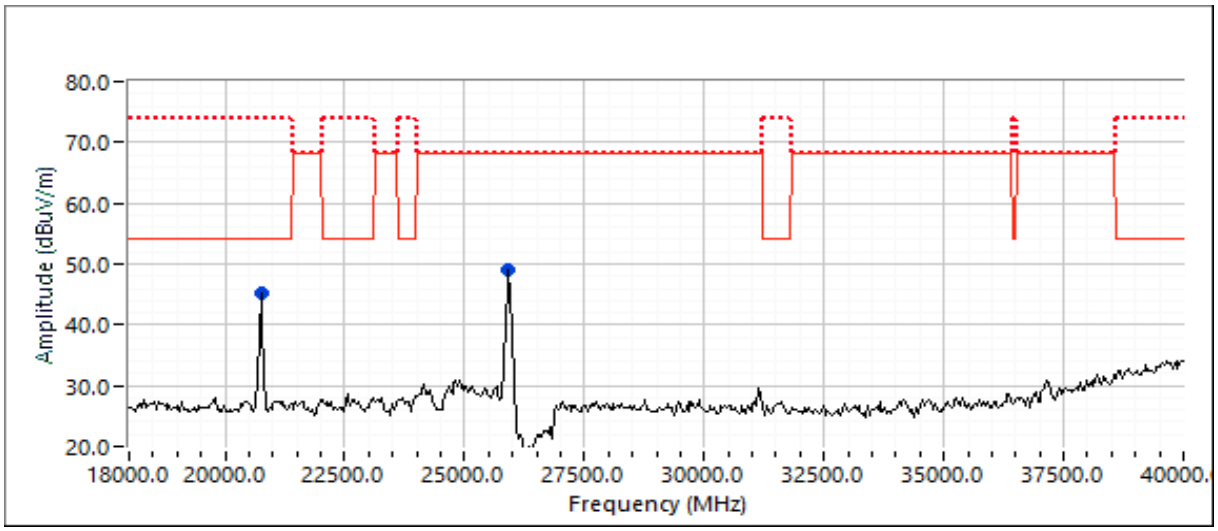
Channel: 38 Mode: 11ac40 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10380.030	65.0	V	68.2	-3.2	PK	58	2.5	RB 1 MHz; VB: 3 MHz
15577.750	45.8	V	54.0	-8.2	AVG	34	2.2	RB 1 MHz; VB: 10 Hz
15578.280	56.2	V	74.0	-17.8	PK	34	2.2	RB 1 MHz; VB: 3 MHz
20760.040	48.0	V	54.0	-6.0	AVG	72	2.4	PK RB 1 MHz; VB: 1 kHz, Note 3
20759.990	54.7	V	74.0	-19.3	PK	72	2.4	PK RB 1 MHz; VB: 3 MHz
25949.250	49.9	V	68.2	-18.3	PK	73	2.3	PK RB 1 MHz; VB: 3 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



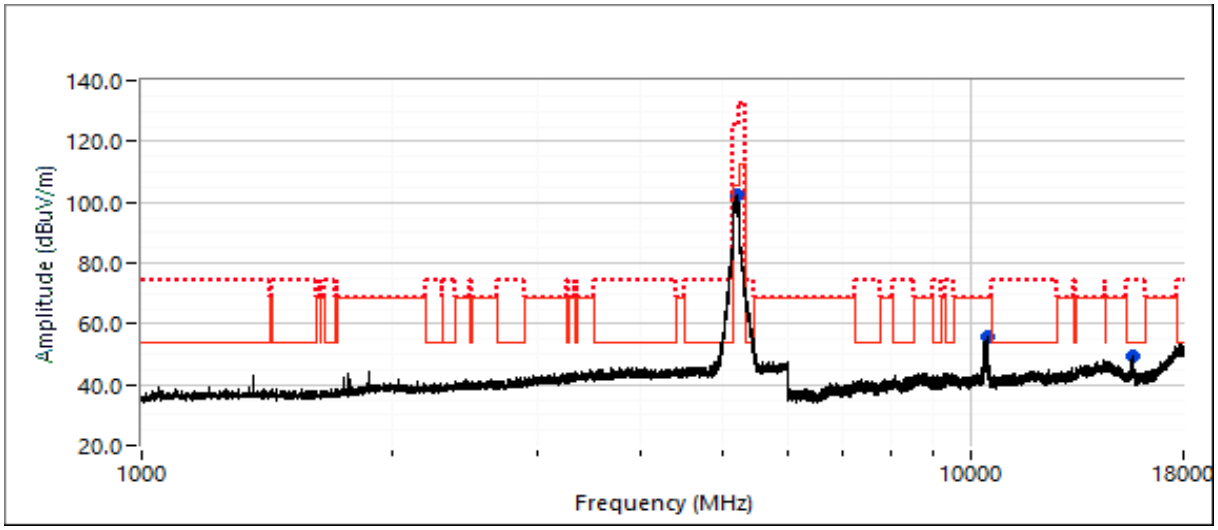
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #1d: Center Channel

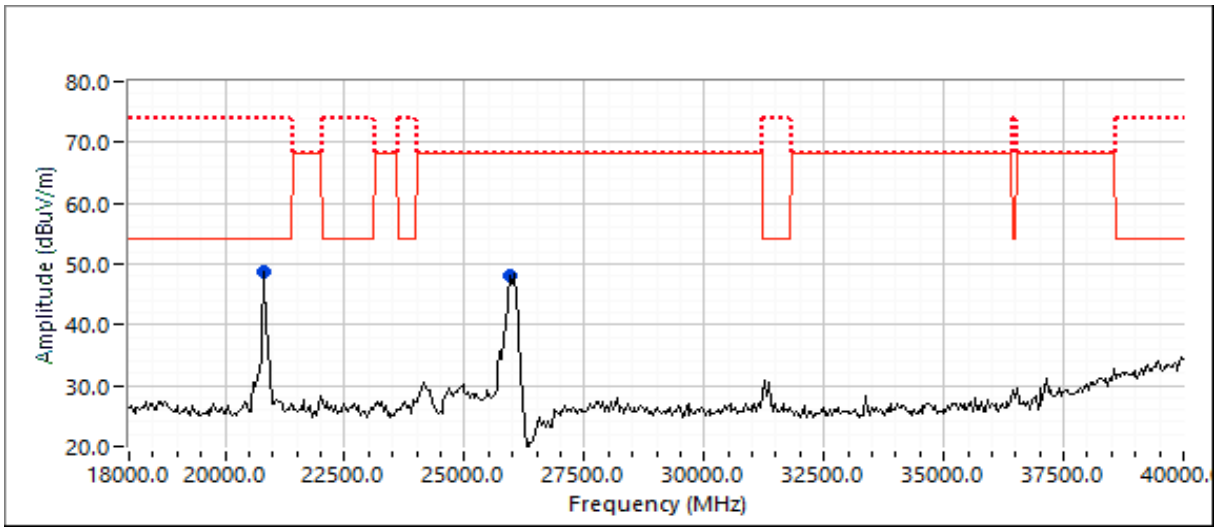
Channel: 42 Mode: ac80 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
10439.960	59.9	V	68.2	-8.3	PK	80	2.5	RB 1 MHz; VB: 3 MHz
15603.290	43.2	V	54.0	-10.8	AVG	37	2.2	RB 1 MHz; VB: 10 Hz
15602.300	55.3	V	74.0	-18.7	PK	37	2.2	RB 1 MHz; VB: 3 MHz
20840.030	47.4	V	54.0	-6.6	AVG	75	2.4	PK RB 1 MHz; VB: 3 kHz, note 3
20839.930	51.8	V	74.0	-22.2	PK	75	2.4	PK RB 1 MHz; VB: 3 MHz
26051.320	47.6	V	68.2	-20.6	PK	210	1.9	PK RB 1 MHz; VB: 3 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #2: Radiated Spurious Emissions, 1,000 - 40000 MHz. Operating Mode: Worse case from Run #1

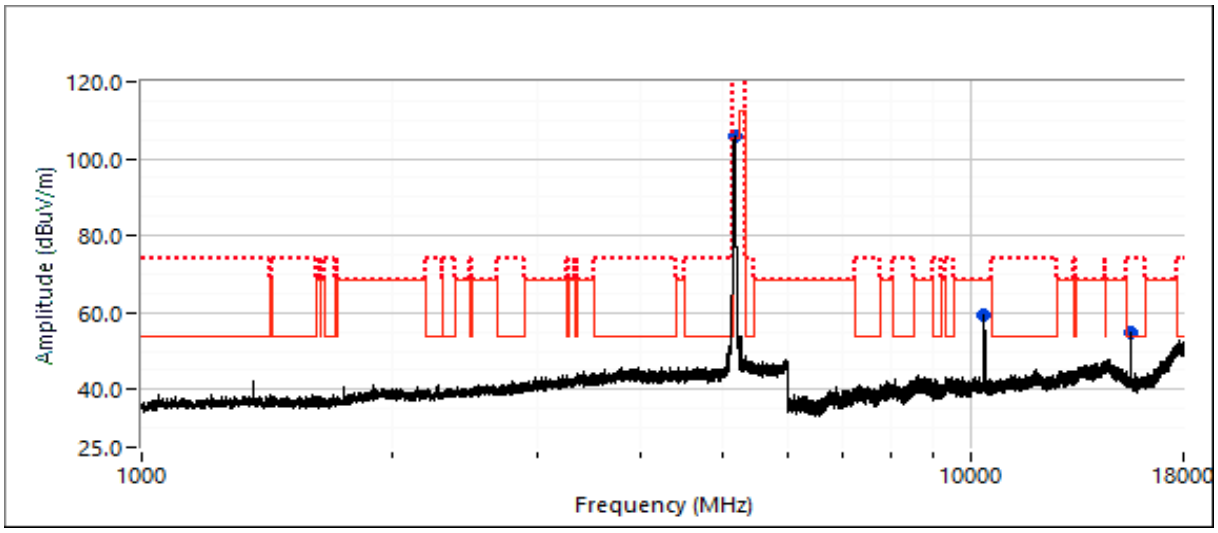
Run #2a: Low Channel

Channel: 36 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

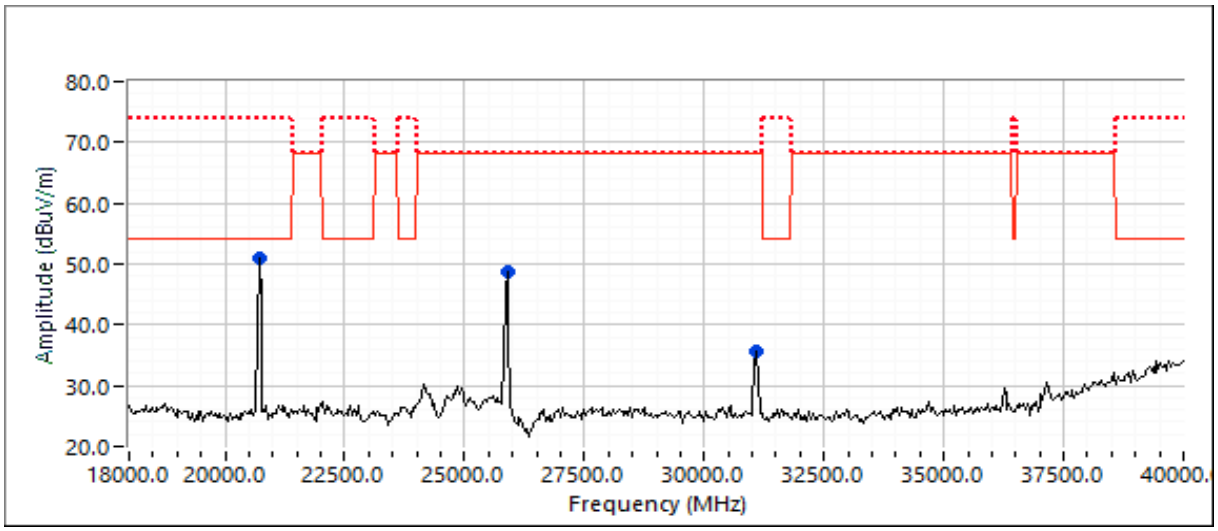
Preliminary readings

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5179.590	106.0	H	-	-	Peak	129	1.9	Fundamental
10359.310	62.0	V	68.2	-6.2	PK	316	2.5	RB 1 MHz; VB: 3 MHz
15539.780	46.9	H	54.0	-7.1	AVG	146	1.9	RB 1 MHz; VB: 10 Hz
15538.950	58.6	H	74.0	-15.4	PK	146	1.9	RB 1 MHz; VB: 3 MHz
15540.250	48.5	V	54.0	-5.5	AVG	86	1.9	RB 1 MHz; VB: 10 Hz
15535.980	59.8	V	74.0	-14.2	PK	86	1.9	RB 1 MHz; VB: 3 MHz
20720.080	47.6	V	54.0	-6.4	AVG	72	2.2	PK RB 1 MHz; VB: 10 Hz
20720.040	53.7	V	74.0	-20.3	PK	72	2.2	PK RB 1 MHz; VB: 3 MHz
25899.370	51.5	V	68.2	-16.7	PK	69	2.3	PK RB 1 MHz; VB: 3 MHz
31079.560	48.4	V	68.2	-19.8	PK	102	2.3	PK RB 1 MHz; VB: 3 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



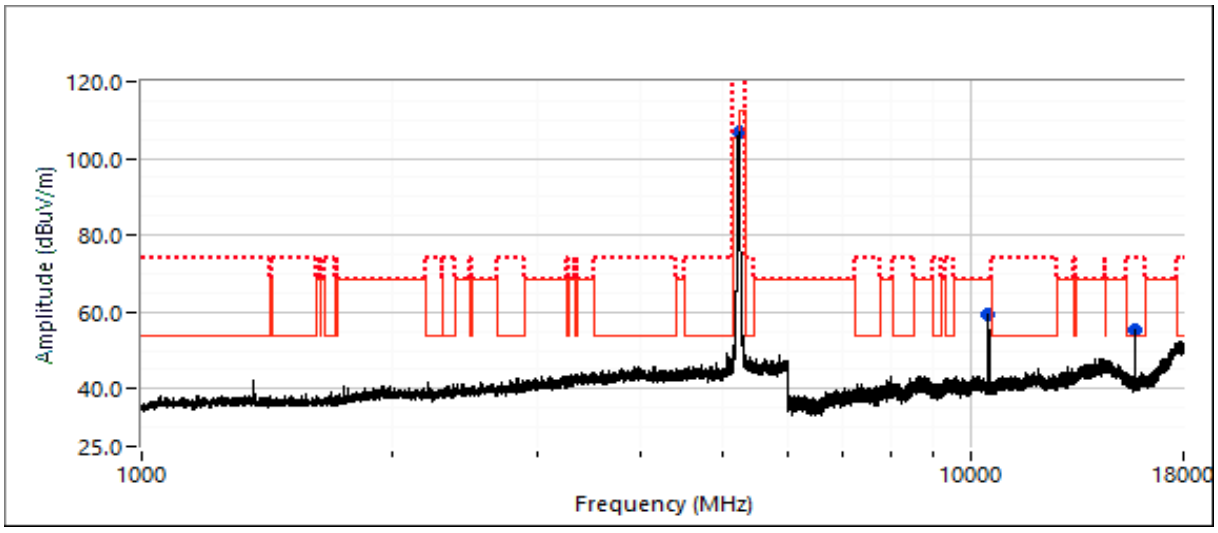
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #2b: High Channel

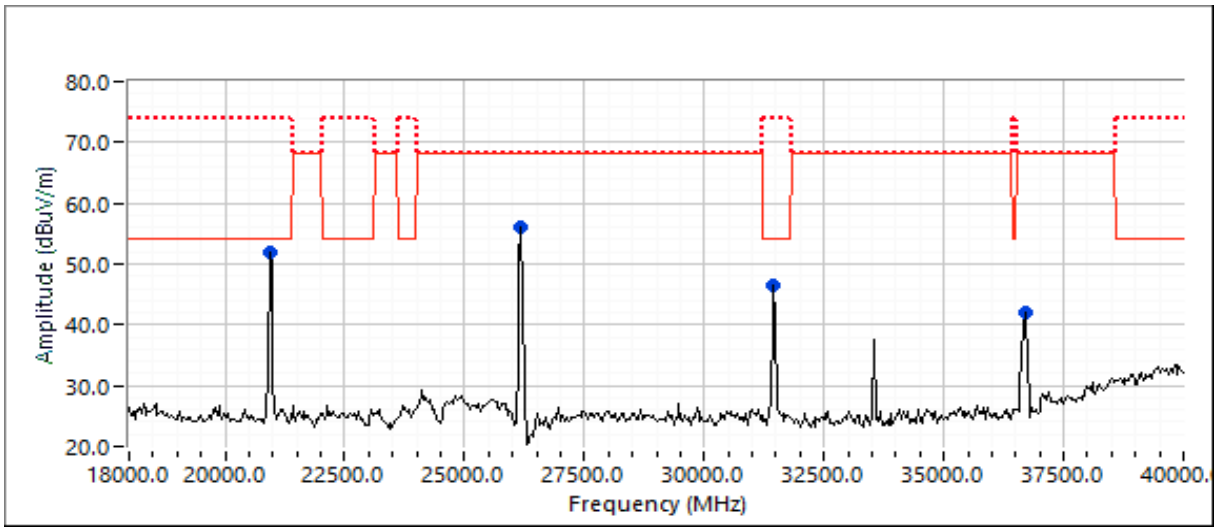
Channel: 48 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
5239.410	106.9	H	-	-	Peak	72	2.2	Fundamental
10474.670	62.1	V	68.2	-6.1	PK	84	2.5	RB 1 MHz; VB: 3 MHz
15722.170	49.1	V	54.0	-4.9	AVG	38	2.2	RB 1 MHz; VB: 10 Hz
15720.230	60.2	V	74.0	-13.8	PK	38	2.2	RB 1 MHz; VB: 3 MHz
20960.080	46.5	V	54.0	-7.5	AVG	74	2.4	PK RB 1 MHz; VB: 10 Hz
20959.870	52.8	V	74.0	-21.2	PK	74	2.4	PK RB 1 MHz; VB: 3 MHz
26199.180	52.1	V	68.2	-16.1	PK	64	2.2	PK RB 1 MHz; VB: 3 MHz
31440.600	34.7	V	54.0	-19.3	AVG	193	1.6	PK RB 1 MHz; VB: 10 Hz
31438.910	46.2	V	74.0	-27.8	PK	193	1.6	PK RB 1 MHz; VB: 3 MHz
36678.660	48.6	V	68.2	-19.6	PK	151	1.6	PK RB 1 MHz; VB: 3 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions outside of the restricted bands the limit is -27dBm/MHz eirp (68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

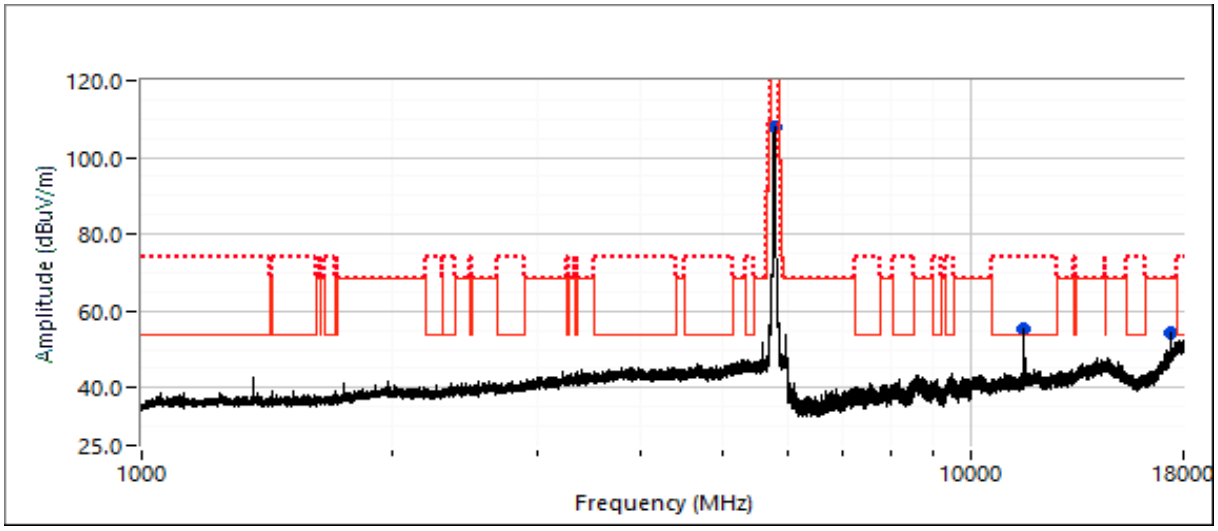
Run #7, Radiated Spurious Emissions, 1,000 - 40,000 MHz. Operation in the 5725-5850 MHz Band

Run #7a: Center Channel

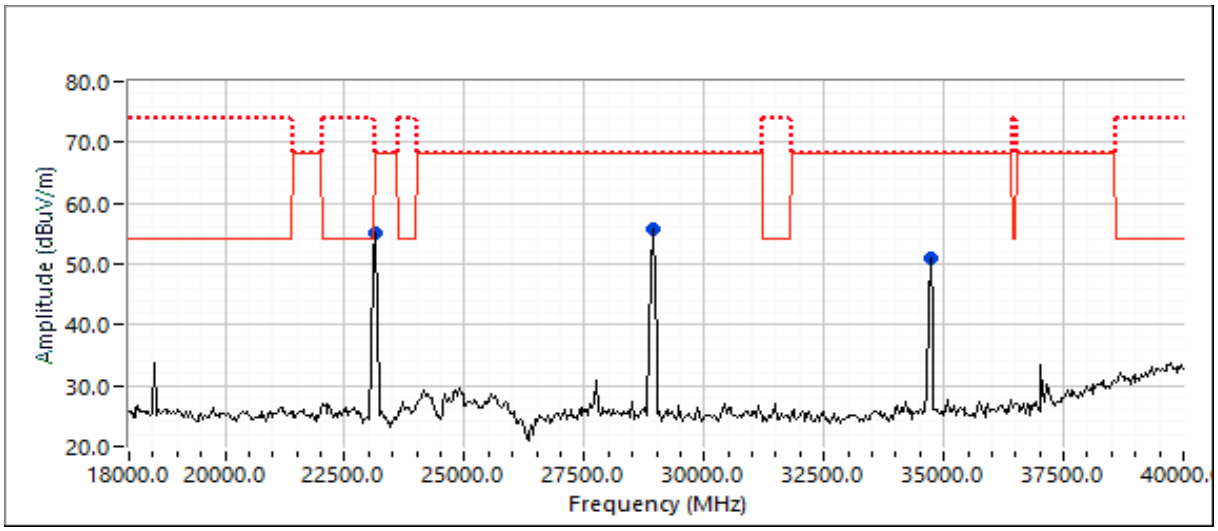
Channel: 157 Mode: 11a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11568.080	52.4	V	54.0	-1.6	AVG	200	1.6	RB 1 MHz; VB: 10 Hz
11573.550	64.6	V	74.0	-9.4	PK	200	1.6	RB 1 MHz; VB: 3 MHz
17348.550	56.8	V	68.2	-11.4	Peak	12	2.2	RB 1 MHz; VB: 3 MHz
23139.950	51.8	V	68.2	-16.4	PK	60	2.2	PK RB 1 MHz; VB: 3 MHz
28926.440	51.6	V	68.2	-16.6	PK	226	2.1	PK RB 1 MHz; VB: 3 MHz
34710.470	51.3	V	68.2	-16.9	PK	84	2.1	PK RB 1 MHz; VB: 3 MHz

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions near the band edge the limit is −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge eirp (-27 dBm ~ 68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



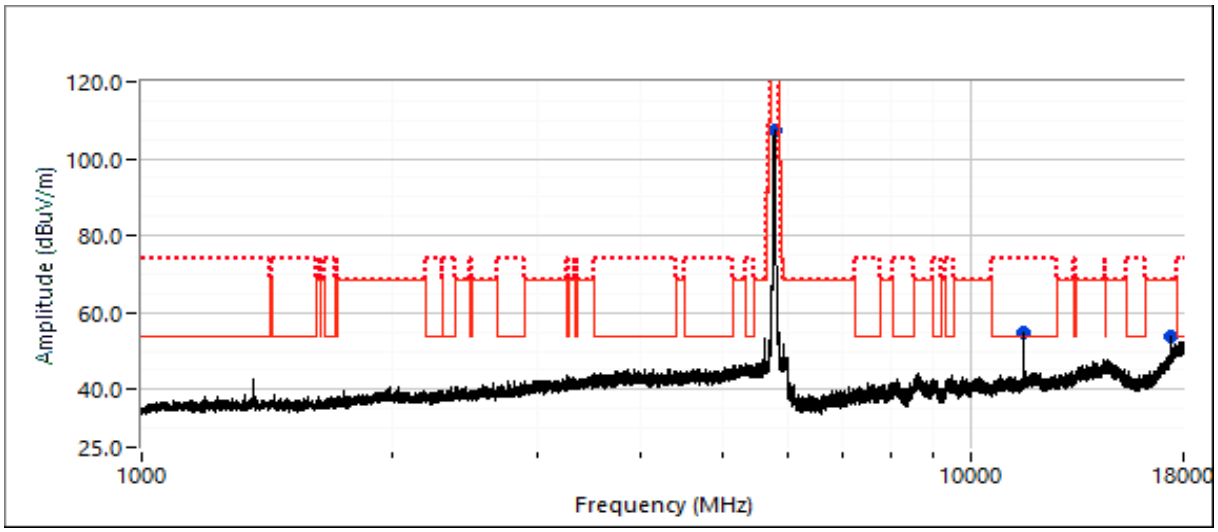
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #7b: Center Channel

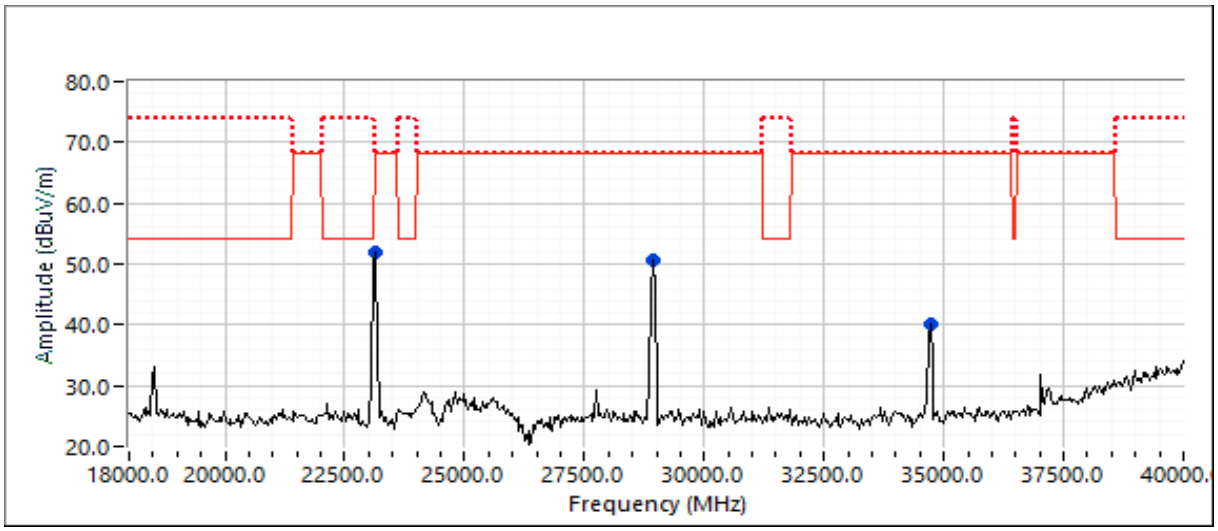
Channel: 157 Mode: 11ac20 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11569.570	47.8	V	54.0	-6.2	AVG	230	2.5	RB 1 MHz; VB: 10 Hz
11569.240	59.0	V	74.0	-15.0	PK	230	2.5	RB 1 MHz; VB: 3 MHz
17356.780	58.8	V	68.2	-9.4	PK	7	2.1	RB 1 MHz; VB: 3 MHz
23139.660	52.0	V	68.2	-16.2	PK	60	2.2	PK RB 1 MHz; VB: 3 MHz
28925.060	50.7	V	68.2	-17.5	PK	226	2.1	PK RB 1 MHz; VB: 3 MHz
34710.850	48.9	V	68.2	-19.3	PK	53	2.4	PK RB 1 MHz; VB: 3 MHz

Note:	Scans made between 18 - 40 GHz with the measurement antenna moved around the EUT and its antennas 30cm from the device. Final measurements performed at 3m distance.
Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions near the band edge the limit is −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge eirp (-27 dBm ~ 68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



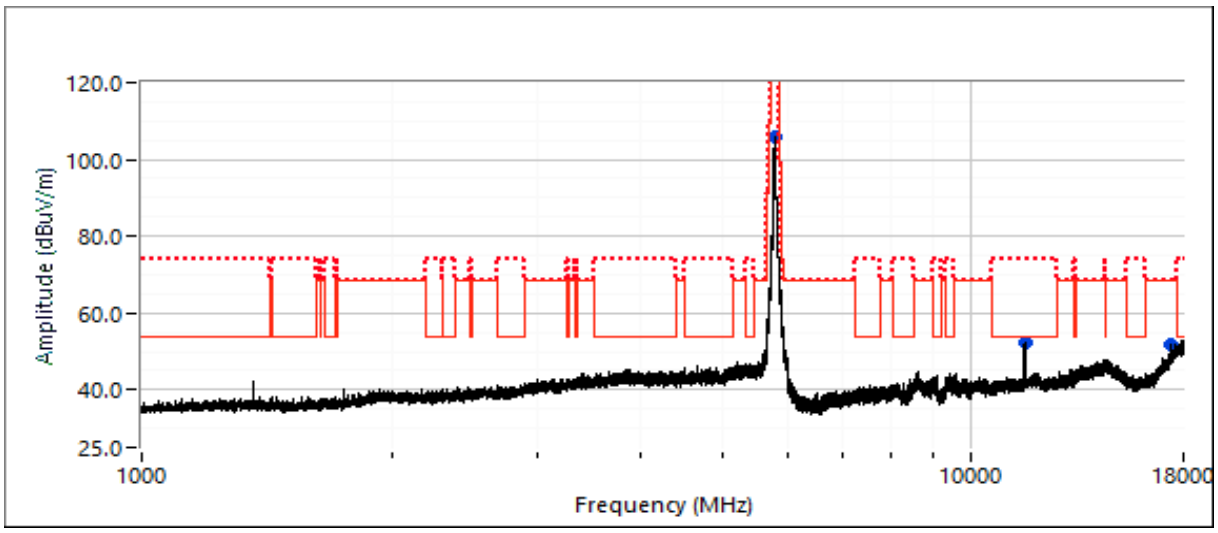
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #7c: Center Channel

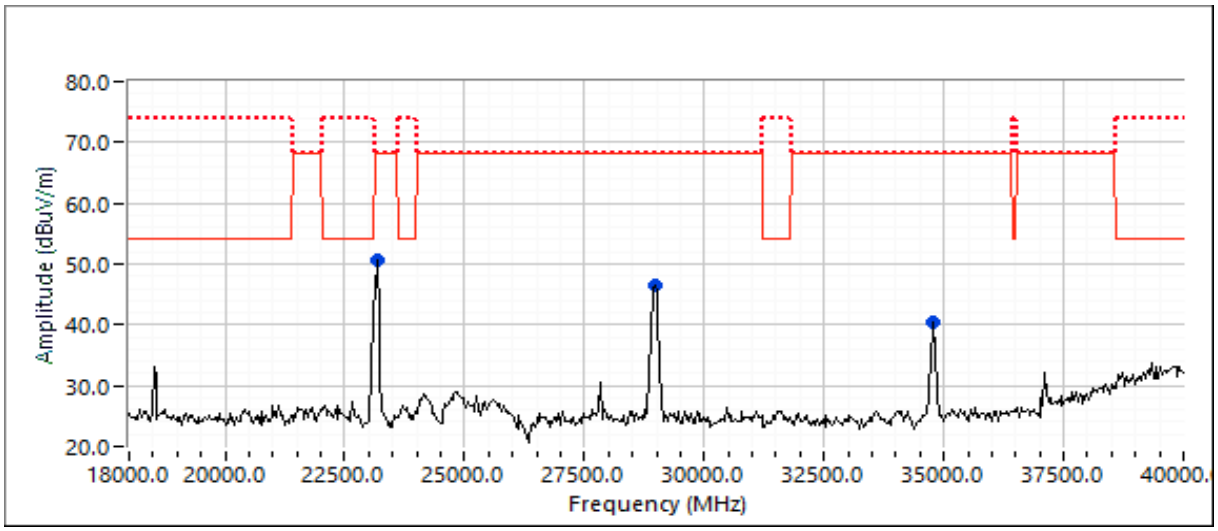
Channel: 159 Mode: 11ac40 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11589.720	48.4	V	54.0	-5.6	AVG	227	2.0	RB 1 MHz; VB: 1 kHz, note 3
11589.520	59.1	V	74.0	-14.9	PK	227	2.0	RB 1 MHz; VB: 3 MHz
17387.620	54.3	V	68.2	-13.9	PK	76	1.9	RB 1 MHz; VB: 3 MHz
23179.550	53.7	V	68.2	-14.5	PK	63	1.7	RB 1 MHz;VB 3 MHz;Peak
28976.220	50.9	V	68.2	-17.3	PK	159	1.7	RB 1 MHz;VB 3 MHz;Peak
34770.020	50.6	V	68.2	-17.6	PK	64	1.8	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions near the band edge the limit is −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge eirp (-27 dBm ~ 68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



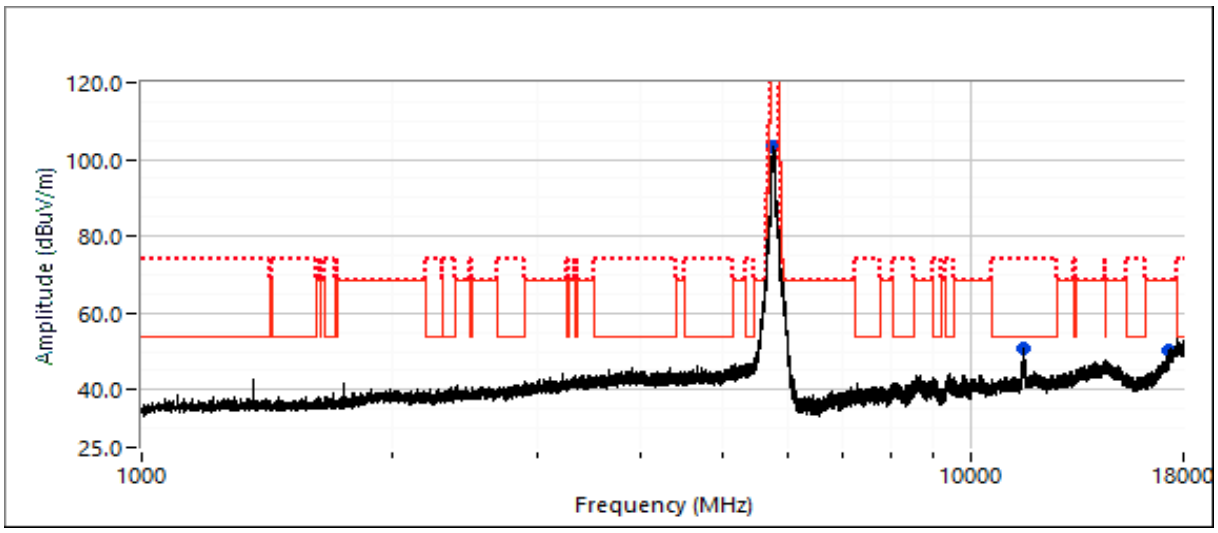
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #7d: Center Channel

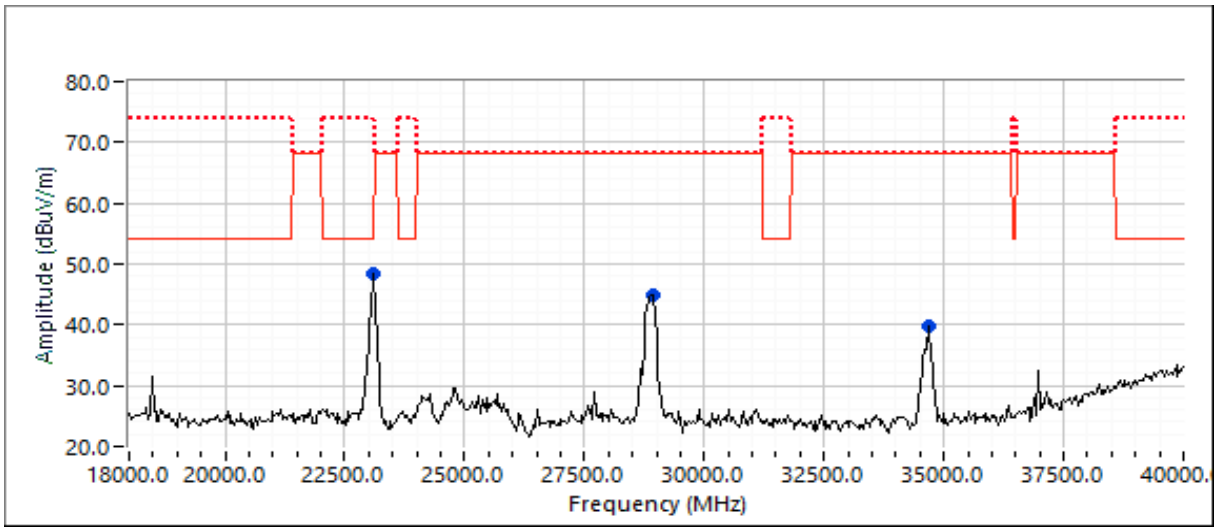
Channel: 155 Mode: 11ac80 Pwr Setting: 21
Tx Chain: 2x2 Data Rate: MCS 0

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
17303.190	46.9	V	54.0	-7.1	AVG	90	1.9	RB 1 MHz; VB: 3 kHz, note 3
17310.290	56.8	V	74.0	-17.2	PK	90	1.9	RB 1 MHz; VB: 3 MHz
23099.680	47.7	V	54.0	-6.3	AVG	61	1.8	RB 1 MHz;VB 3 kHz, note 3
23099.670	53.8	V	74.0	-20.2	PK	61	1.8	RB 1 MHz;VB 3 MHz;Peak
28875.600	50.5	V	68.2	-17.8	PK	158	1.7	RB 1 MHz;VB 3 MHz;Peak
34649.300	50.5	V	68.2	-17.8	PK	48	2.1	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions near the band edge the limit is −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge eirp (-27 dBm ~ 68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

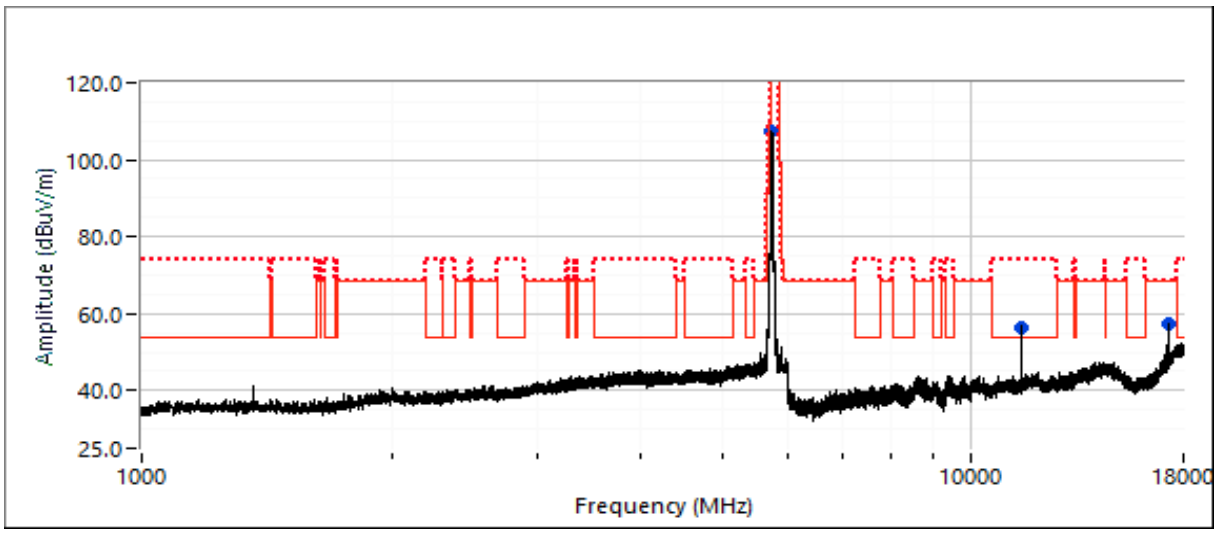
Run #8: Radiated Spurious Emissions, 1,000 - 40000 MHz. Operating Mode: Worse case from Run #7

Run #8a: Low Channel

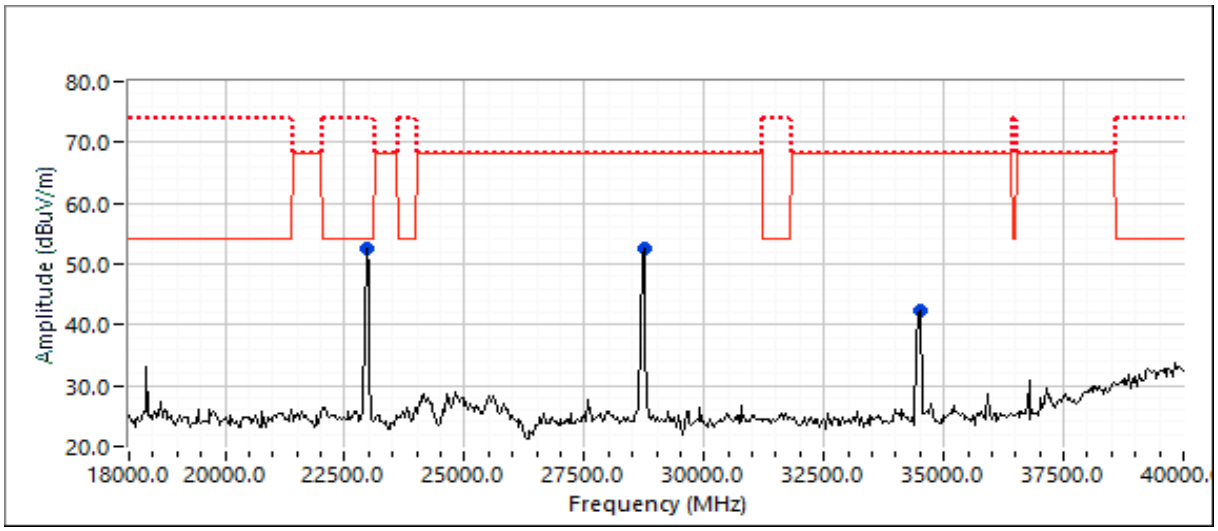
Channel: 149 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11487.910	51.7	V	54.0	-2.3	AVG	200	1.6	RB 1 MHz; VB: 10 Hz
11489.110	63.8	V	74.0	-10.2	PK	200	1.6	RB 1 MHz; VB: 3 MHz
17236.230	59.9	H	68.2	-8.3	Peak	5	2.5	RB 1 MHz; VB: 3 MHz
22979.780	46.5	V	54.0	-7.5	AVG	63	1.8	RB 1 MHz;VB 10 Hz;Peak
22979.870	53.3	V	74.0	-20.7	PK	63	1.8	RB 1 MHz;VB 3 MHz;Peak
28725.330	55.8	V	68.2	-12.4	PK	97	1.7	RB 1 MHz;VB 3 MHz;Peak
34470.580	50.4	V	68.2	-17.8	PK	233	2.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions near the band edge the limit is −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge eirp (-27 dBm ~ 68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



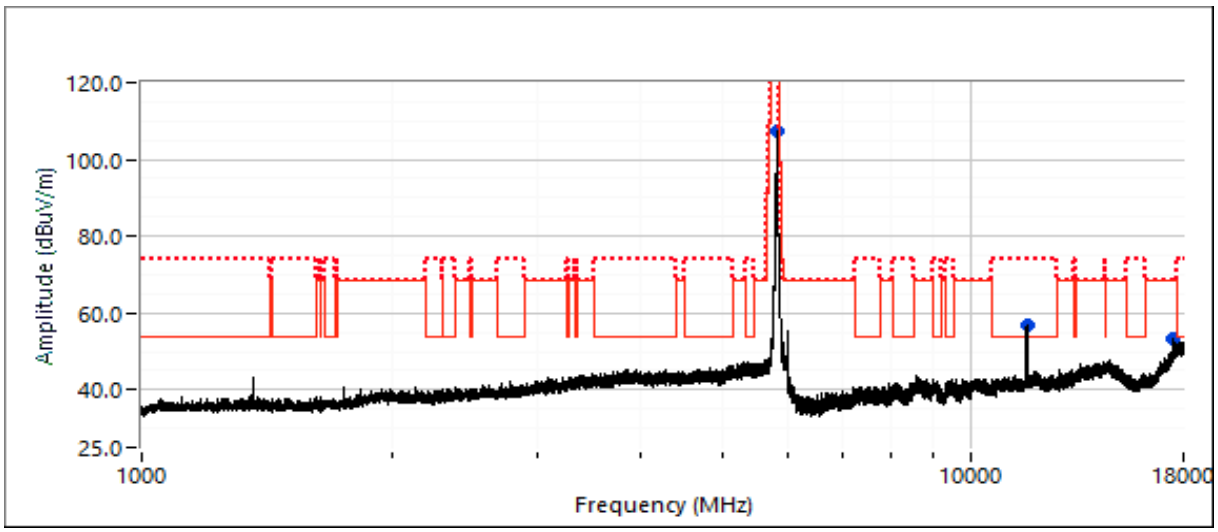
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #8b: High Channel

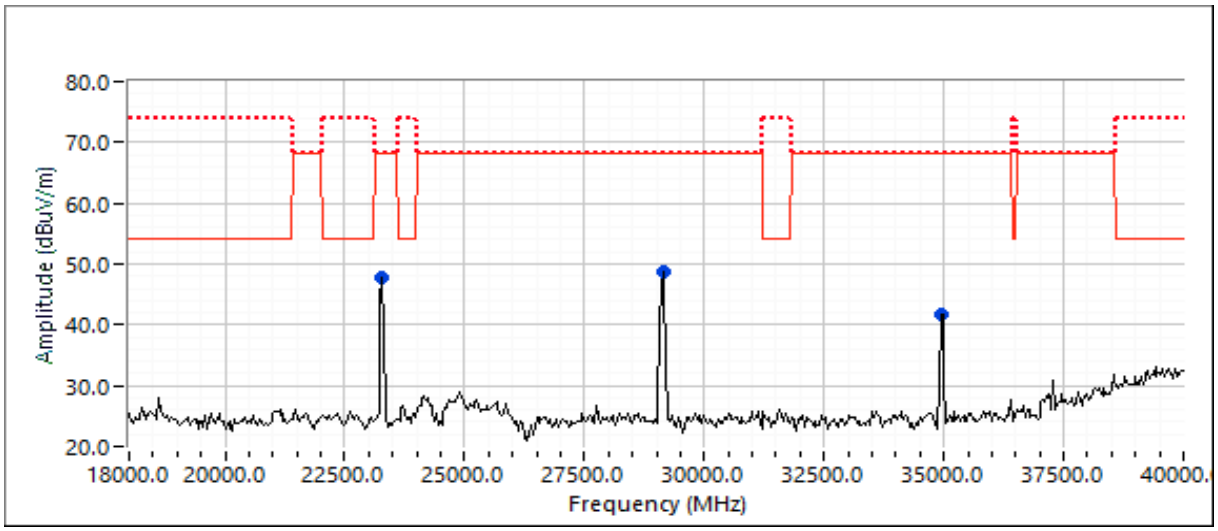
Channel: 165 Mode: a Pwr Setting: 21
Tx Chain: 2x2 Data Rate: 6 Mbps

Frequency	Level	Pol	15.209 / 15E		Detector	Azimuth	Height	Comments
MHz	dBµV/m	V/H	Limit	Margin	Pk/QP/Avg	degrees	meters	
11647.990	51.6	V	54.0	-2.4	AVG	198	1.8	RB 1 MHz; VB: 10 Hz
11648.190	64.1	V	74.0	-9.9	PK	198	1.8	RB 1 MHz; VB: 3 MHz
17469.660	56.1	V	68.2	-12.1	PK	139	1.9	RB 1 MHz; VB: 3 MHz
23299.860	53.9	V	68.2	-14.3	PK	70	2.0	RB 1 MHz;VB 3 MHz;Peak
29125.190	52.0	V	68.2	-16.2	PK	312	2.0	RB 1 MHz;VB 3 MHz;Peak
34950.270	52.6	V	68.2	-15.6	PK	64	2.0	RB 1 MHz;VB 3 MHz;Peak

Note 1:	For emissions in restricted bands, the limit of 15.209 was used which requires average and peak measurements.
Note 2:	For emissions near the band edge the limit is −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge eirp (-27 dBm ~ 68.2dBuV/m). The measurement method required is a peak measurement (RB=1MHz, VB≥3MHz, peak detector).



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-

Radiated Emissions

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

Test Specific Details

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 12/16/2022
Test Engineer: M. Birgani
Test Location: Chamber 7

Config. Used: 1
Config Change: -
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.
The test distance and extrapolation factor (if applicable) are detailed under each run description.
Note, preliminary testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. Maximized testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

Ambient Conditions:

Temperature: 19-20 °C
Rel. Humidity: 38-40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
2	Radiated Emissions 30 - 1000 MHz, Ch 1	FCC §15.209	Pass	36.3 dBµV/m @ 34.33 MHz (-3.7 dB)
	Radiated Emissions 30 - 1000 MHz, Ch 165	FCC §15.209	Pass	36.2 dBµV/m @ 34.87 MHz (-3.8 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.

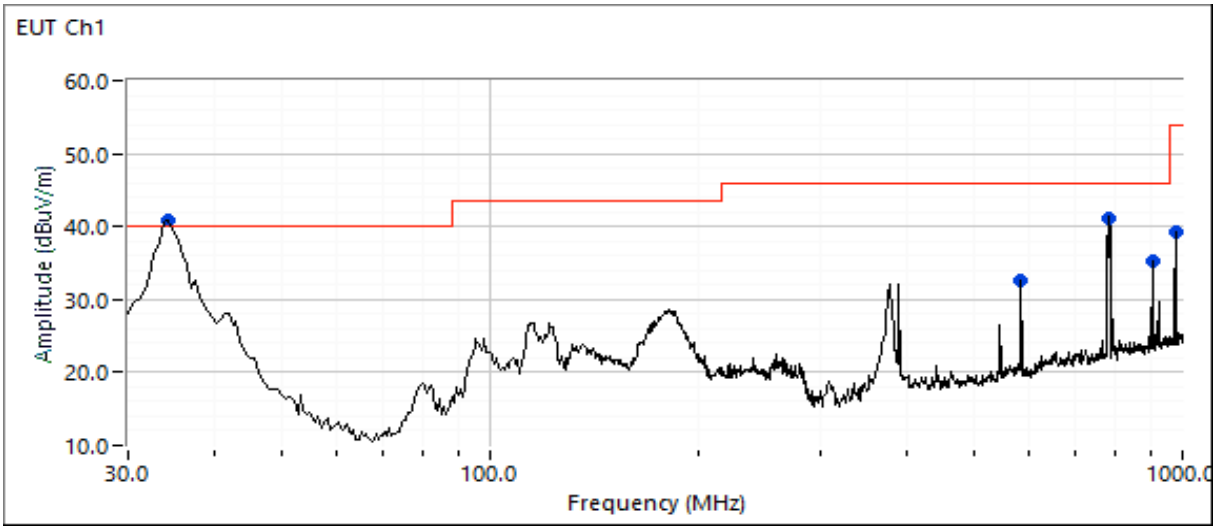
Sample S/N: Hub: 000182A5, SOM: 70B651000006
Driver: Wifitest Tool, Ver 1.9.6

Test Parameters for Preliminary Scan(s)			
Frequency Range (MHz)	Prescan Distance (meters)	Limit Distance (meters)	Extrapolation Factor (dB, applied to data)
30 - 1000	3	3	0.0

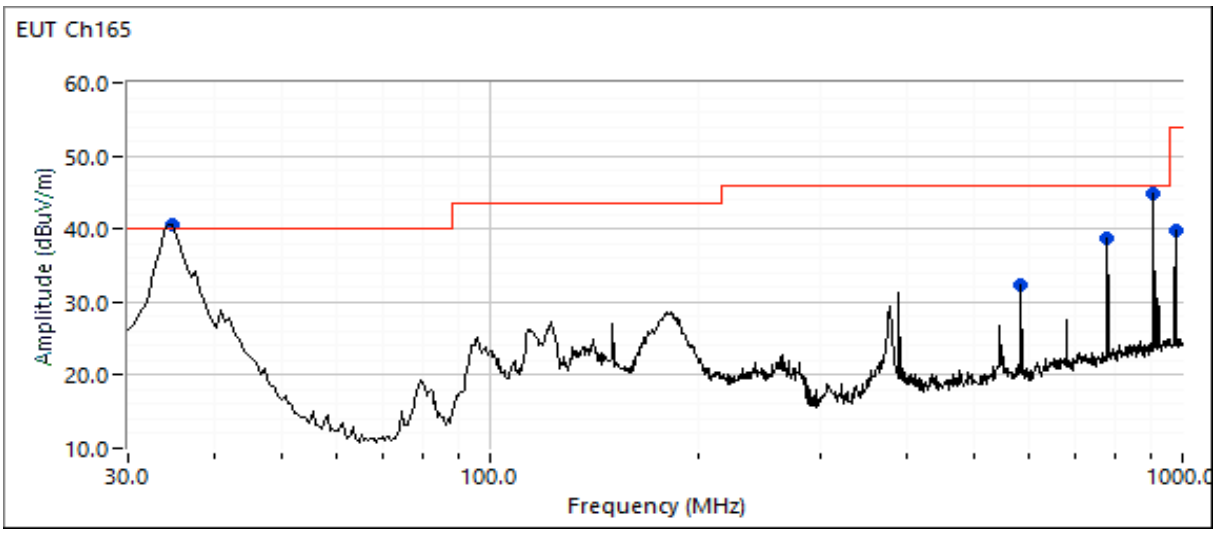
Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-

Run #1: Radiated Emissions, 30 - 1000 MHz

EUT operating in 2.4 GHz band @ Power Setting: 21 in 2x2 MIMO



EUT operating in 5.8 GHz band @ Power Setting: 21 in 2x2 MIMO



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-

Run #1: Radiated Emissions, 30 - 1000 MHz

Preliminary peak readings captured during pre-scan

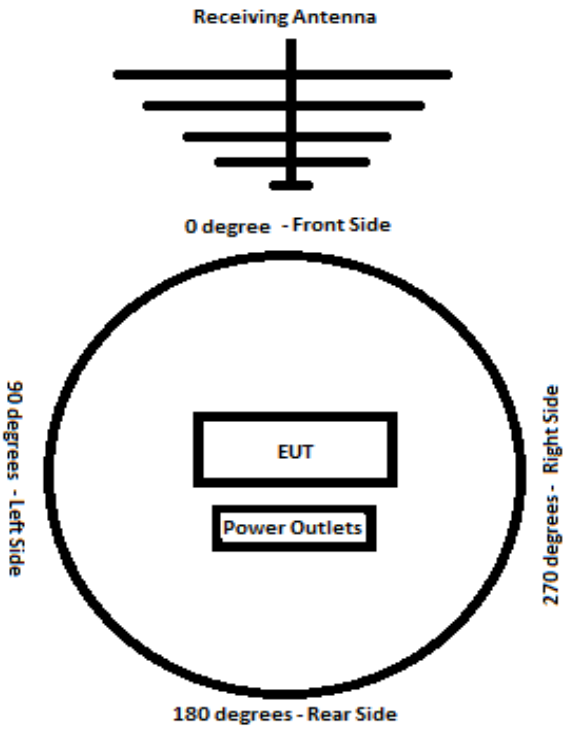
Frequency	Level	Pol	FCC §15.209		Detector	Azimuth	Height	Comments	
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		Channel
34.329	*40.9*	*V*	*40.0*	*0.9*	*Peak*	*31*	*1.0*		*1*
584.770	*32.5*	*V*	*46.0*	*-13.5*	*Peak*	*241*	*1.5*		*1*
783.968	*41.2*	*V*	*46.0*	*-4.8*	*Peak*	*277*	*1.5*		*1*
907.415	*35.2*	*V*	*46.0*	*-10.8*	*Peak*	*233*	*1.0*	*Cellphone Ambient*	*1*
976.152	*39.2*	*V*	*54.0*	*-14.8*	*Peak*	*52*	*1.0*		*1*
34.870	*40.6*	*V*	*40.0*	*0.6*	*Peak*	*340*	*1.0*		165
584.770	*32.4*	*V*	*46.0*	*-13.6*	*Peak*	*162*	*1.5*		165
779.760	*38.8*	*V*	*46.0*	*-7.2*	*Peak*	*36*	*2.0*		165
908.818	*44.8*	*V*	*46.0*	*-1.2*	*Peak*	*307*	*1.0*	*Cellphone Ambient*	165
976.152	*39.7*	*V*	*54.0*	*-14.3*	*Peak*	*56*	*1.0*		165

Run #2: Maximized Readings From Run #1

Maximized quasi-peak readings (includes manipulation of EUT interface cables)

Frequency	Level	Pol			Detector	Azimuth	Height	Comments	
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters		Channel
34.329	36.3	V	40.0	-3.7	QP	32	1.0	QP (1.00s)	1
584.986	32.7	V	46.0	-13.3	QP	238	1.5	QP (1.00s)	1
779.987	37.7	V	46.0	-8.3	QP	293	1.4	QP (1.00s)	1
974.982	39.3	V	54.0	-14.7	QP	52	1.0	QP (1.00s)	1
34.870	36.2	V	40.0	-3.8	QP	360	1.0	QP (1.00s)	165
584.992	32.4	V	46.0	-13.6	QP	162	1.5	QP (1.00s)	165
779.987	38.9	V	46.0	-7.1	QP	36	2.0	QP (1.00s)	165
974.990	39.1	V	54.0	-14.9	QP	56	1.0	QP (1.00s)	165

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

RSS-247 (LELAN) and FCC 15.407(UNII)
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.

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

Ambient Conditions:

Temperature: 19-21 °C
Rel. Humidity: 36-40 %

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.

Date of Test: 12/20/22
Test Engineer: David Bare
Test Location: Fremont Chamber #2

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

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result
1	Power, 5150 - 5250MHz	15.407(a) (1), (2), (3)	Pass	a: 7.8 mW ac20: 7.8 mW ac40: 15.9 mW ac80: 17.1 mW
1	PSD, 5150 - 5250MHz	15.407(a) (1), (2), (3)	Pass	a: 0.9 mW/MHz ac20: 0.9 mW/MHz ac40: 0.8 mW/MHz ac80: 0.4 mW/MHz
1	Power, 5150 - 5250MHz	RSS-247 6.2	Pass	a: 39.0 mW eirp ac20: 39.0 mW eirp ac40: 79.6 mW eirp ac80: 85.5 mW eirp
1	PSD, 5150 - 5250MHz	RSS-247 6.2	Pass	a: 0.9 mW/MHz ac20: 0.9 mW/MHz ac40: 0.8 mW/MHz ac80: 0.4 mW/MHz
1	99% Bandwidth	RSS-247 (Information only)	N/A	a: 16.580 MHz ac20: 17.740 MHz ac40: 36.010 MHz ac80: 75.470 MHz
2	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz		All emissions below the -27dBm/MHz limit

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Procedure Comments:

Measurements performed in accordance with ANSI C63.10

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11a	6 Mbps	98.1%	Yes	2.677	0.0	0.0	10
11ac20	MCS 0	98.1%	Yes	2.566	0.0	0.0	10
11ac40	MCS 0	94.4%	Yes	1.234	0.2	0.5	810
11ac80	MCS 0	87.9%	Yes	0.572	0.6	1.1	1748

Sample Notes

Sample S/N: Hub: 000182A5, SOM: 70B651000006
Driver: Wifitest Tool, Ver 1.9.6

Run #1: Bandwidth, Output Power and Power Spectral Density - MIMO Systems

Note 1:	Duty Cycle ≥ 98% for a and ac20 modes. Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, Span > OBW, # of points in sweep ≥ 2*span/RBW, auto sweep, RMS detector, power averaging on (transmitted signal was continuous, duty cycle ≥ 98%) and power integration over the OBW (method SA-1 of ANSI C63.10).
Note 1:	Duty Cycle < 98% for ac40 and ac80 modes. Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, Span > OBW, # of points in sweep ≥ 2*span/RBW, auto sweep, RMS detector, power averaging on (transmitted signal was not continuous, but the analyzer was configured to trigger only on full power pulses such that the analyzer was only sweeping when the device was transmitting) and power integration over the OBW (method SA-1 of ANSI C63.10).
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	For RSS-247 the limit for the 5150 - 5250 MHz band accounts for the antenna gain as the maximum eirp allowed is 10dBm/MHz.
Note 4:	99% Bandwidth measured in accordance with C63.10 - RB between 1-5 % of OBW and VB ≥ 3*RB, Span between 1.5 and 5 times OBW.
Note 5:	For MIMO systems the total output power and total PSD are calculated from the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Antenna Gain Information

Freq	Antenna Gain (dBi) / Chain				BF	MultiChain Legacy	CDD	Sectorized / Xpol	Dir G (PWR)	Dir G (PSD)
	1	2	3	4						
5150-5250	7.0	7.0			No	Yes	Yes	No	7.0	10.0

For devices that support CDD modes

Min # of spatial streams: 1

Max # of spatial streams: 2

Notes:	BF = beamforming mode supported, Multichain Legacy = 802.11 legacy data rates supported for multichain transmissions, CDD = Cyclic Delay Diversity (or Cyclic Shift Diversity) modes supported, Sectorized / Xpol = antennas are sectorized or cross polarized.
Notes:	Dir G (PWR) = total gain (Gant + Array Gain) for power calculations; GA (PSD) = total gain for PSD calculations based on FCC KDB 662911. Depending on the modes supported, the Array Gain value for power could be different from the PSD value.
Notes:	Array gain for power/psd calculated per KDB 662911 D01.
Notes:	For systems with Beamforming and CDD, choose one the following options: Option 1: Delays are optimized for beamforming, rather than being selected from cyclic delay table of 802.11; Array gains calculated based on beamforming criteria. Option 2: Antennas are paired for beamforming, and the pairs are configured to use the cyclic delay diversity of 802.11; the array gain associated with beamforming with 2 antennas (3dB), and the array gain associated with CDD with two antennas (3dB for PSD and 0 dB for power)

FCC UNII-1 Limits		Pwr	PSD
	Outdoor AP	30	17
	Indoor AP	30	17
X	Station (e.g. Client)	24	11
	Outdoor AP (>30° Elv.)	21	-

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5150-5250 MHz Band - FCC

Mode: 11a Max EIRP (mW): 38.9

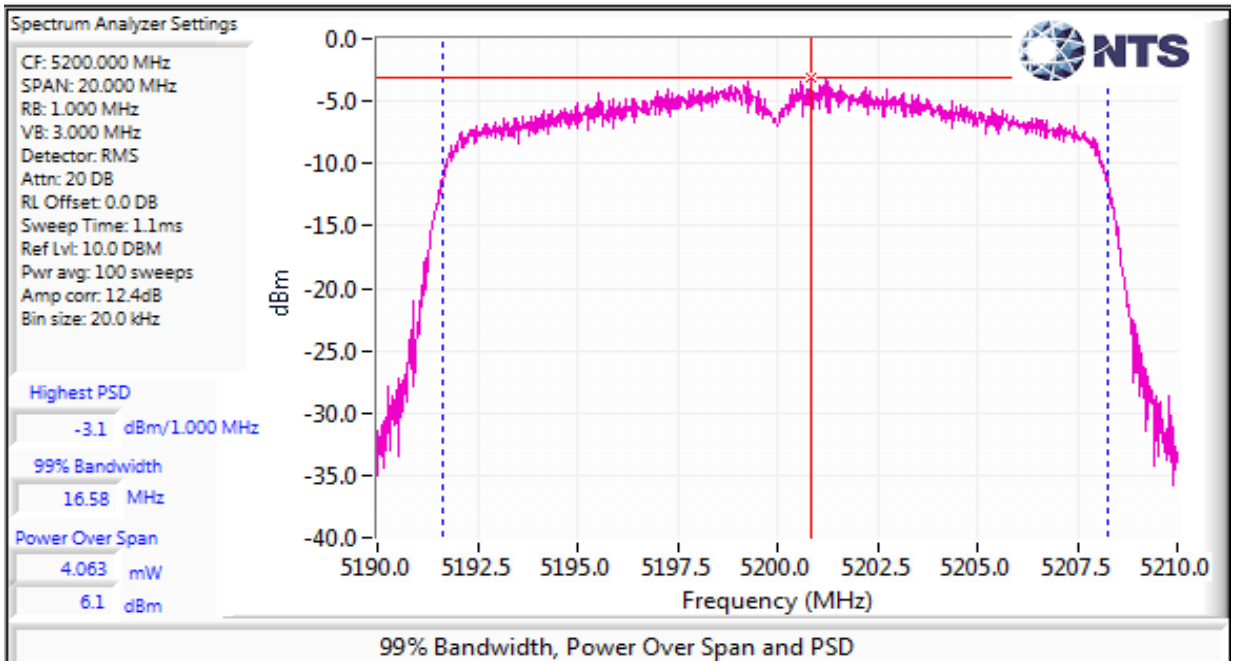
Frequency (MHz)	Chain	Software Setting	26dB BW (MHz)	Duty Cycle %	Power[1] dBm	Total Power mW	Total Power dBm	FCC Limit dBm	Max Power (W)	Result
5180	1	7		98.1	6.0	7.8	8.9	23.0		Pass
	3									
	4									
	2				5.8					
5200	1	7		98.1	6.1	7.8	8.9	23.0	0.008	Pass
	3									
	4									
	2				5.7					
5240	1	7		98.1	6.0	7.8	8.9	23.0		Pass
	3									
	4									
	2				5.8					

MIMO Device - 5150-5250 MHz Band - ISED

Mode: 11a Max EIRP (mW): 38.9

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power[1] dBm	Total Power dBm	Total Power dBm (eirp)	ISED Limit dBm (eirp)	Max Power (W)	Result
5180	1	7	16.560	98.1	6.0	8.9	15.9	22.2		Pass
	3									
	4									
	2				5.8					
5200	1	7	16.580	98.1	6.1	8.9	15.9	22.2	0.008	Pass
	3									
	4									
	2				5.7					
5240	1	7	16.560	98.1	6.0	8.9	15.9	22.2		Pass
	3									
	4									
	2				5.8					

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

5150-5250 PSD - FCC

Mode: 11a

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	Result
5180	1	7		98.1	-3.6	0.9	-0.5	7.0	Pass
	3								
	4								
	2				-3.7				
5200	1	7		98.1	-3.1	0.9	-0.5	7.0	Pass
	3								
	4								
	2				-3.7				
5240	1	7		98.1	-3.2	0.9	-0.5	7.0	Pass
	3								
	4								
	2				-3.9				

5150-5250 PSD - ISED

Mode: 11a

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	ISED Limit dBm/MHz EIRP	Result
5180	1	7		98.1	-3.6	0.9	-0.6	0.0	Pass
	3								
	4								
	2				-3.7				
5200	1	7		98.1	-3.1	0.9	-0.4	0.0	Pass
	3								
	4								
	2				-3.7				
5240	1	7		98.1	-3.2	0.9	-0.5	0.0	Pass
	3								
	4								
	2				-3.9				

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5150-5250 MHz Band - FCC

Mode: **ac20** Max EIRP (mW): 38.9

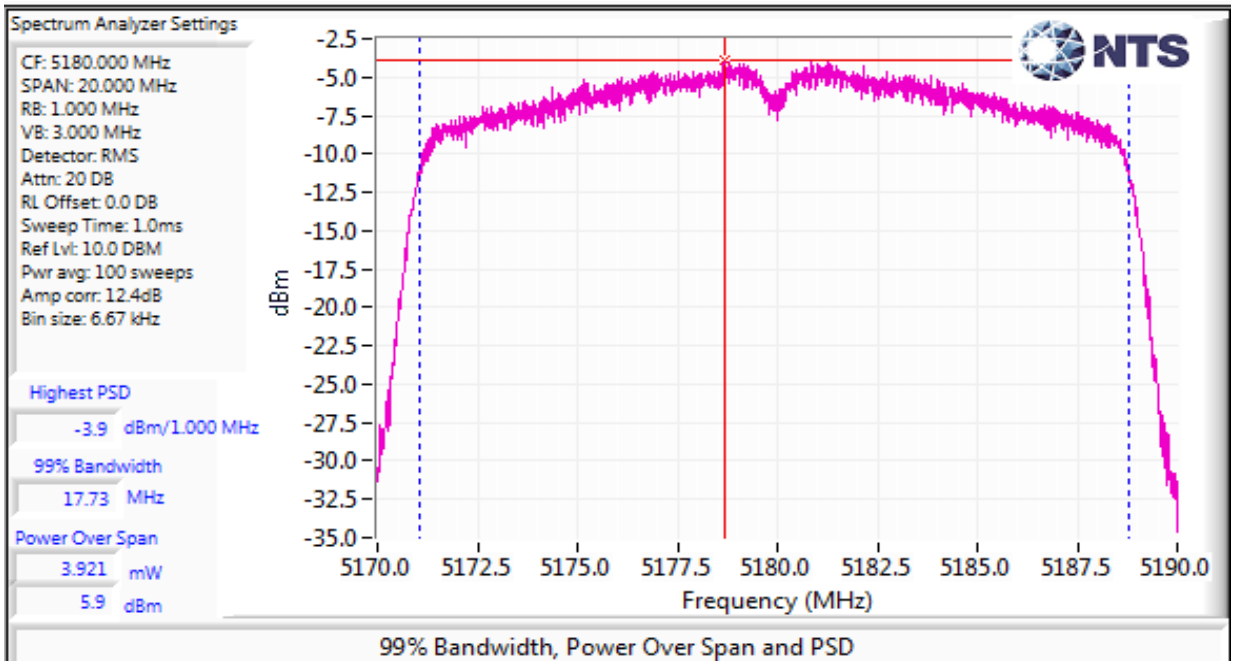
Frequency (MHz)	Chain	Software Setting	26dB BW (MHz)	Duty Cycle %	Power[1] dBm	Total Power mW	Total Power dBm	FCC Limit dBm	Max Power (W)	Result
5180	1	8		98.1	5.9	7.8	8.9	23.0		Pass
	3									
	4									
	2				5.9					
5200	1	8		98.1	5.9	7.7	8.9	23.0	0.008	Pass
	3									
	4									
	2				5.8					
5240	1	8		98.1	5.9	7.6	8.8	23.0		Pass
	3									
	4									
	2				5.7					

MIMO Device - 5150-5250 MHz Band - ISED

Mode: **ac20** Max EIRP (mW): 38.9

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power[1] dBm	Total Power dBm	Total Power dBm (eirp)	ISED Limit dBm (eirp)	Max Power (W)	Result
5180	1	8	17.730	98.1	5.9	8.9	15.9	22.5		Pass
	3									
	4									
	2				5.9					
5200	1	8	17.740	98.1	5.9	8.9	15.9	22.5	0.008	Pass
	3									
	4									
	2				5.8					
5240	1	8	17.730	98.1	5.9	8.8	15.8	22.5		Pass
	3									
	4									
	2				5.7					

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

5150-5250 PSD - FCC

Mode: ac20

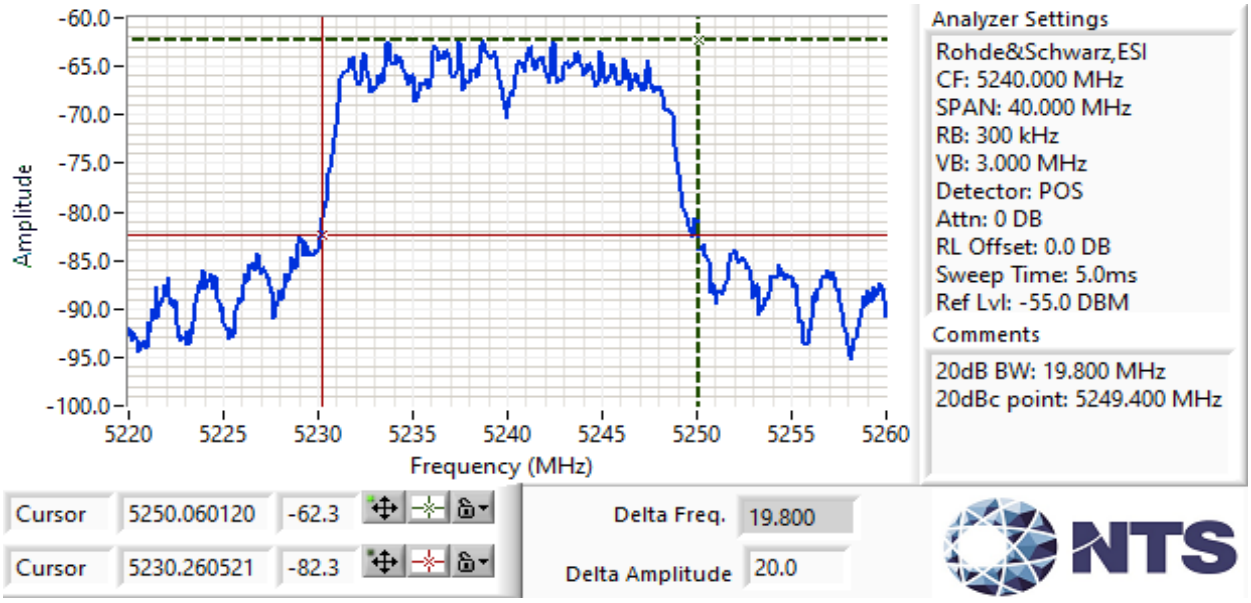
Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	Result
5180	1	8		98.1	-3.9	0.9	-0.5	7.0	Pass
	3								
	4								
	2				-3.4				
5200	1	8		98.1	-3.6	0.8	-1.0	7.0	Pass
	3								
	4								
	2				-3.9				
5240	1	8		98.1	-3.5	0.8	-1.0	7.0	Pass
	3								
	4								
	2				-4.2				

5150-5250 PSD - IC

Mode: ac20

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	ISED Limit dBm/MHz EIRP	Result
5180	1	8		98.1	-3.9	0.9	-0.5	0.0	Pass
	3								
	4								
	2				-3.4				
5200	1	8		98.1	-3.6	0.8	-1.0	0.0	Pass
	3								
	4								
	2				-3.9				
5240	1	8		98.1	-3.5	0.8	-1.0	0.0	Pass
	3								
	4								
	2				-4.2				

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5150-5250 MHz Band - FCC

Mode: ac40 Max EIRP (mW): 79.4

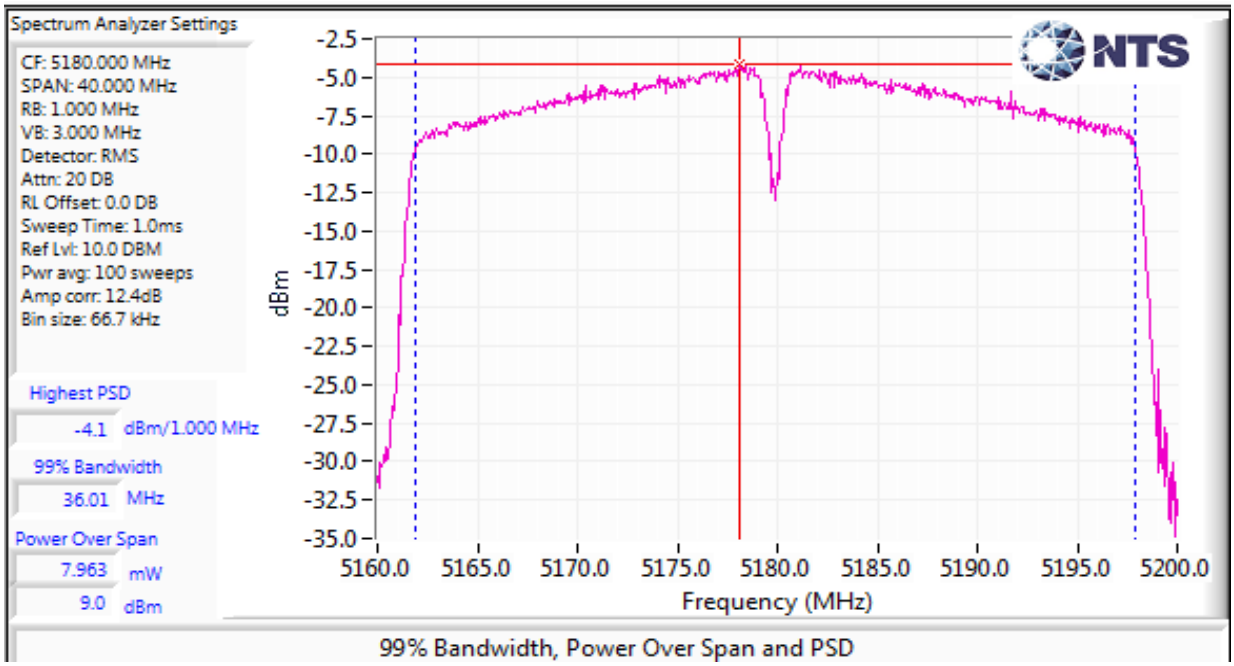
Frequency (MHz)	Chain	Software Setting	26dB BW (MHz)	Duty Cycle %	Power dBm	Total Power[1] mW	Total Power[1] dBm	FCC Limit dBm	Max Power (W)	Result
5190	1	11		100.0	9.0	15.9	12.0	23.0	0.016	Pass
	3									
	4									
	2				9.0					
5230	1	11		100.0	8.9	15.7	12.0	23.0		Pass
	3									
	4									
	2				9.0					

MIMO Device - 5150-5250 MHz Band - ISED

Mode: ac40 Max EIRP (mW): 79.4

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power[1] dBm	Total Power dBm	Total Power dBm (eirp)	ISED Limit dBm (eirp)	Max Power (W)	Result
5190	1	11	36.010	100	9.0	12.0	19.0	23.0	0.016	Pass
	3									
	4									
	2				9.0					
5230	1	11	36.010	100	8.9	12.0	19.0	23.0		Pass
	3									
	4									
	2				9.0					

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

5150-5250 PSD - FCC

Mode: ac40

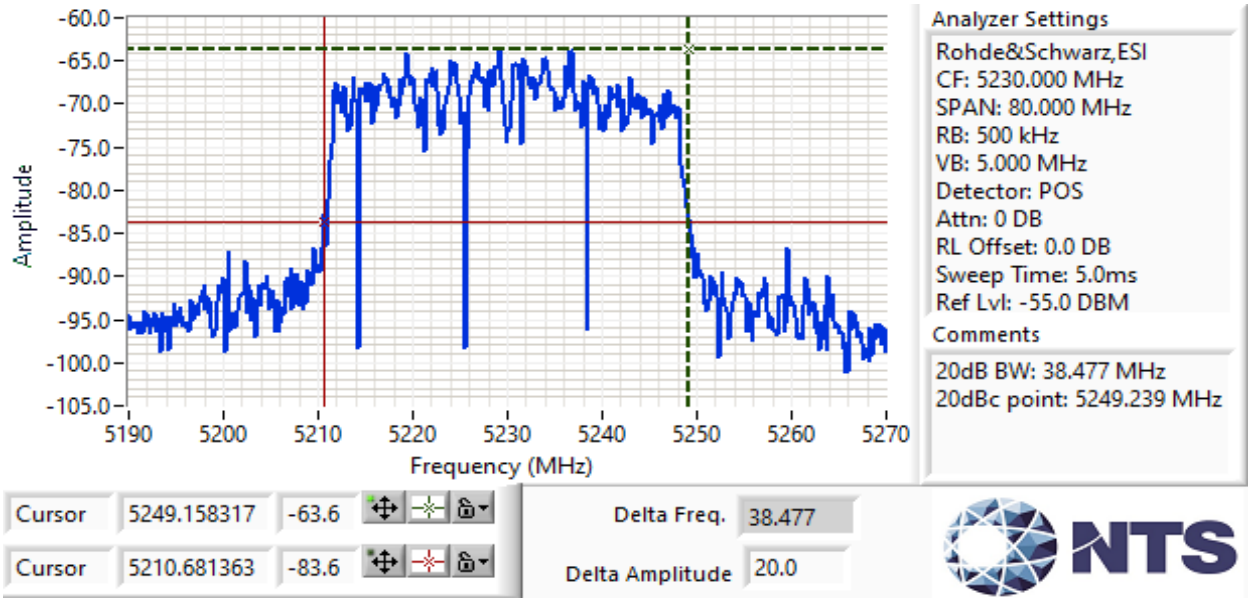
Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	Result
5190	1	11		100	-4.3	0.8	-1.0	7.0	Pass
	3								
	4								
	2				-4.1				
5230	1	11		100	-4.4	0.7	-1.5	7.0	Pass
	3								
	4								
	2				-4.3				

5150-5250 PSD - ISED

Mode: ac40

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	ISED Limit dBm/MHz EIRP	Result
5190	1	11		100	-4.3	0.8	-1.0	0.0	Pass
	3								
	4								
	2				-4.1				
5230	1	11		100	-4.4	0.7	-1.5	0.0	Pass
	3								
	4								
	2				-4.3				

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5150-5250 MHz Band - FCC

Mode: ac80 Max EIRP (mW): 85.1

Frequency (MHz)	Chain	Software Setting	26dB BW (MHz)	Duty Cycle %	Power dBm	Total Power[1] mW	Total Power[1] dBm	FCC Limit dBm	Max Power (W)	Result
5210	1	11		87.9	8.8	17.1	12.3	23.0	0.017	Pass
	3									
	4									
	2				8.7					

MIMO Device - 5150-5250 MHz Band - ISED

Mode: ac80 Max EIRP (mW): 85.1

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power[1] dBm	Total Power dBm	Total Power dBm (eirp)	ISED Limit dBm (eirp)	Max Power (W)	Result
5210	1	11	75.470	87.9	8.8	12.3	19.3	23.0	0.017	Pass
	3									
	4									
	2				8.7					

5150-5250 PSD - FCC

Mode: ac80

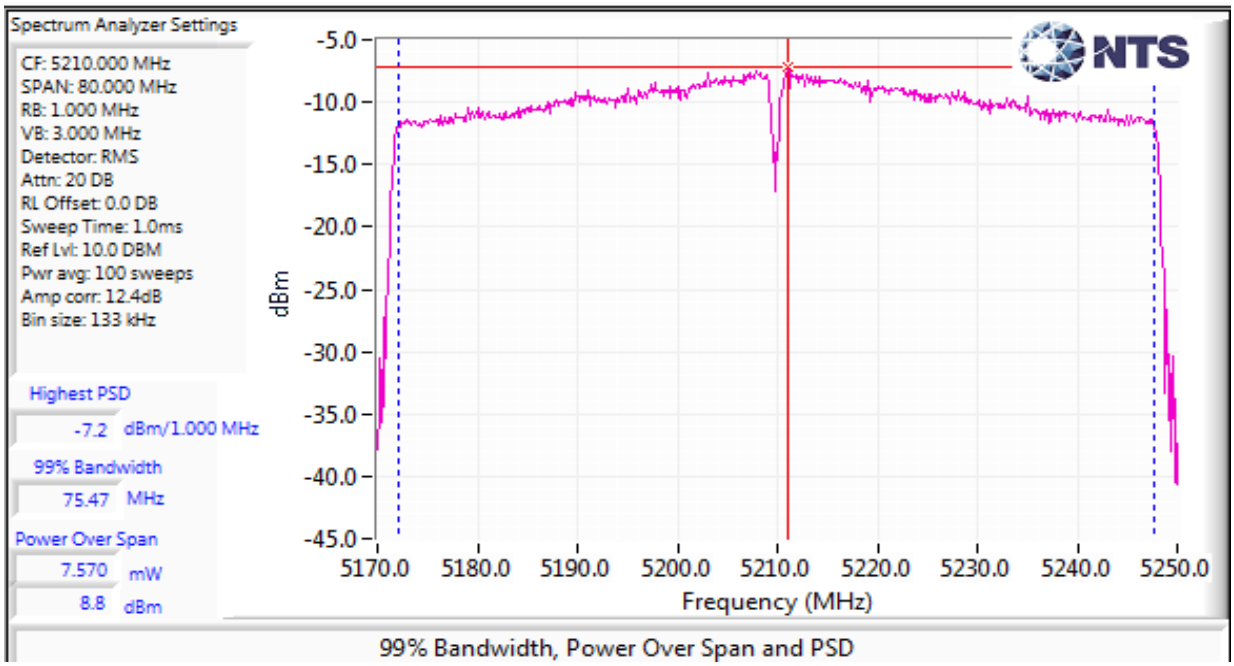
Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	Result
5210	1	11		87.9	-7.2	0.4	-4.0	7.0	Pass
	3								
	4								
	2				-7.4				

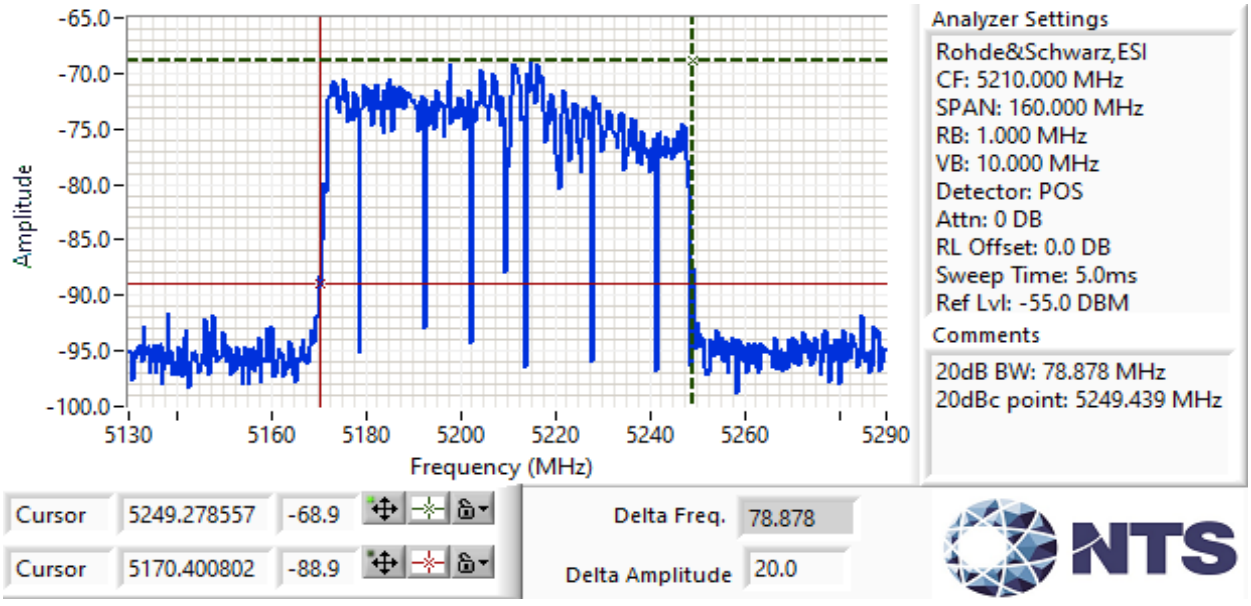
5150-5250 PSD - ISED

Mode: ac80

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	ISED Limit dBm/MHz EIRP	Result
5210	1	11		87.9	-7.2	0.4	-4.0	0.0	Pass
	3								
	4								
	2				-7.4				

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A





Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #2: Out Of Band Spurious Emissions - Antenna Conducted

Date of Test: 1/11/2023 11:00 Config. Used: 1
Test Engineer: David Bare Config Change: None
Test Location: Fremont Chamber #2 EUT Voltage: 120V/60Hz

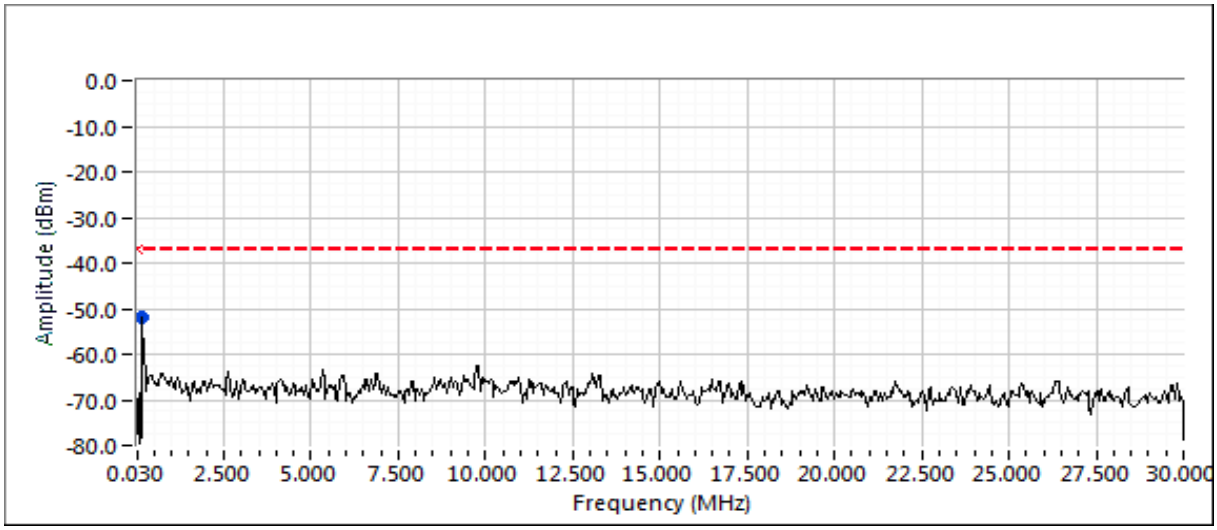
MIMO Devices: Antenna gain used is the effective gain calculated in the power section of this data sheet. The plots were obtained for each chain individually and the limit was adjusted to account for all chains transmitting simultaneously

Number of transmit chains:	2	
Maximum Antenna Gain:	7.0	dBi
Spurious Limit:	-27.0	dBm/MHz eirp
Adjustment for 2 chains:	-3.0	dB adjustment for multiple chains.
Limit Used On Plots [Note 1]:	-37.0	dBm/MHz Peak Limit (RB=VB=1MHz)

Note 1:	The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies.

Plot Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

Compliance with limits above 30 MHz is demonstrated through the radiated emissions tests.



Note1:	Based on preliminary testing, no emisisons were observed related to the fundamental from 30 kHz to 30 MHz, therefore only channel 48, a mode was included in report.

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

RSS-247 (LELAN) and FCC 15.407(UNII)
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.

General Test Configuration

When measuring the conducted emissions from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected to allow for the external attenuators and cables used.

Ambient Conditions:

Temperature: 19-21 °C
Rel. Humidity: 36-40 %

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.

Date of Test: 12/20/22
Test Engineer: D. Bare and M. Birgani
Test Location: Fremont Chamber #2

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

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Summary of Results

Run #	Test Performed	Limit	Pass / Fail	Result
1	Power, 5725 - 5850MHz	15.407(a) (1), (2), (3) RSS-247 6.2	Pass	a: 152.7 mW ac20: 125.4 mW ac40: 141.1 mW ac80: 123.8 mW
1	PSD, 5725 - 5850MHz	15.407(a) (1), (2), (3) RSS-247 6.2	Pass	a: 17.0 mW/MHz ac20: 14.2 mW/MHz ac40: 7.3 mW/MHz ac80: 3.1 mW/MHz
1	99% Bandwidth	RSS-GEN (Information only)	Pass	a: 17.4 MHz ac20: 17.9 MHz ac40: 36.3 MHz ac80: 75.8 MHz
2	Minimum 6 dB Bandwidth	15.407(e) RSS-247	Pass	a: 16.216 MHz ac20: 17.217 MHz ac40: 34.354 MHz ac80: 75.756 MHz
3	Antenna Conducted - Out of Band Spurious	15.407(b) -27dBm/MHz	Pass	All emissions below the -27dBm/MHz limit

Procedure Comments:

Measurements performed in accordance with ANSI C63.10

Mode	Data Rate	Duty Cycle (x)	Constant DC?	T (ms)	Pwr Cor Factor*	Lin Volt Cor Factor**	Min VBW for FS (Hz)
11a	6 Mbps	98.1%	Yes	2.677	0.0	0.0	10
11ac20	MCS 0	98.1%	Yes	2.566	0.0	0.0	10
11ac40	MCS 0	94.4%	Yes	1.234	0.2	0.5	810
11ac80	MCS 0	87.9%	Yes	0.572	0.6	1.1	1748

Sample Notes

Sample S/N: Hub: 000182A5, SOM: 70B651000006

Driver: Wifitest Tool, Ver 1.9.6

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #1: Bandwidth, Output Power and Power Spectral Density - MIMO Systems

Note 1:	Duty Cycle ≥ 98% for a and ac20 modes. Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, Span > OBW, # of points in sweep ≥ 2*span/RBW, auto sweep, RMS detector, power averaging on (transmitted signal was continuous, duty cycle ≥ 98%) and power integration over the OBW (method SA-1 of ANSI C63.10).
Note 1:	Duty Cycle < 98% for ac40 and ac80 modes. Output power measured using a spectrum analyzer (see plots below). RBW=1MHz, VB=3 MHz, Span > OBW, # of points in sweep ≥ 2*span/RBW, auto sweep, RMS detector, power averaging on (transmitted signal was not continuous, but the analyzer was configured to trigger only on full power pulses such that the analyzer was only sweeping when the device was transmitting) and power integration over the OBW (method SA-1 of ANSI C63.10).
Note 2:	Measured using the same analyzer settings used for output power.
Note 3:	99% Bandwidth measured in accordance with C63.10 - RB between 1-5 % of OBW and VB ≥ 3*RB, Span between 1.5 and 5 times OBW.
Note 4:	For MIMO systems the total output power and total PSD are calculated from the sum of the powers of the individual chains (in linear terms). The antenna gain used to determine the EIRP and limits for PSD/Output power depends on the operating mode of the MIMO device. If the signals on the non-coherent between the transmit chains then the gain used to determine the limits is the highest gain of the individual chains and the EIRP is the sum of the products of gain and power on each chain. If the signals are coherent then the effective antenna gain is the sum (in linear terms) of the gains for each chain and the EIRP is the product of the effective gain and total power.

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Antenna Gain Information

Freq	Antenna Gain (dBi) / Chain				BF	MultiChain Legacy	CDD	Sectorized / Xpol	Dir G (PWR)	Dir G (PSD)
	1	2	3	4						
5725-5850	7.0	7.0			No	Yes	Yes	No	7.0	10.0

For devices that support CDD modes

Min # of spatial streams:

Max # of spatial streams:

Notes:	BF = beamforming mode supported, Multichain Legacy = 802.11 legacy data rates supported for multichain transmissions, CDD = Cyclic Delay Diversity (or Cyclic Shift Diversity) modes supported, Sectorized / Xpol = antennas are sectorized or cross polarized.
Notes:	Dir G (PWR) = total gain (Gant + Array Gain) for power calculations; GA (PSD) = total gain for PSD calculations based on FCC KDB 662911. Depending on the modes supported, the Array Gain value for power could be different from the PSD value.
Notes:	Array gain for power/psd calculated per KDB 662911 D01.
Notes:	For systems with Beamforming and CDD, choose one the following options: Option 1: Delays are optimized for beamforming, rather than being selected from cyclic delay table of 802.11; Array gains calculated based on beamforming criteria. Option 2: Antennas are paired for beamforming, and the pairs are configured to use the cyclic delay diversity of 802.11; the array gain associated with beamforming with 2 antennas (3dB), and the array gain associated with CDD with two antennas (3dB for PSD and 0 dB for power)

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5725-5850 MHz Band - FCC/ISED

Mode: 11a Max EIRP (mW): 765.3

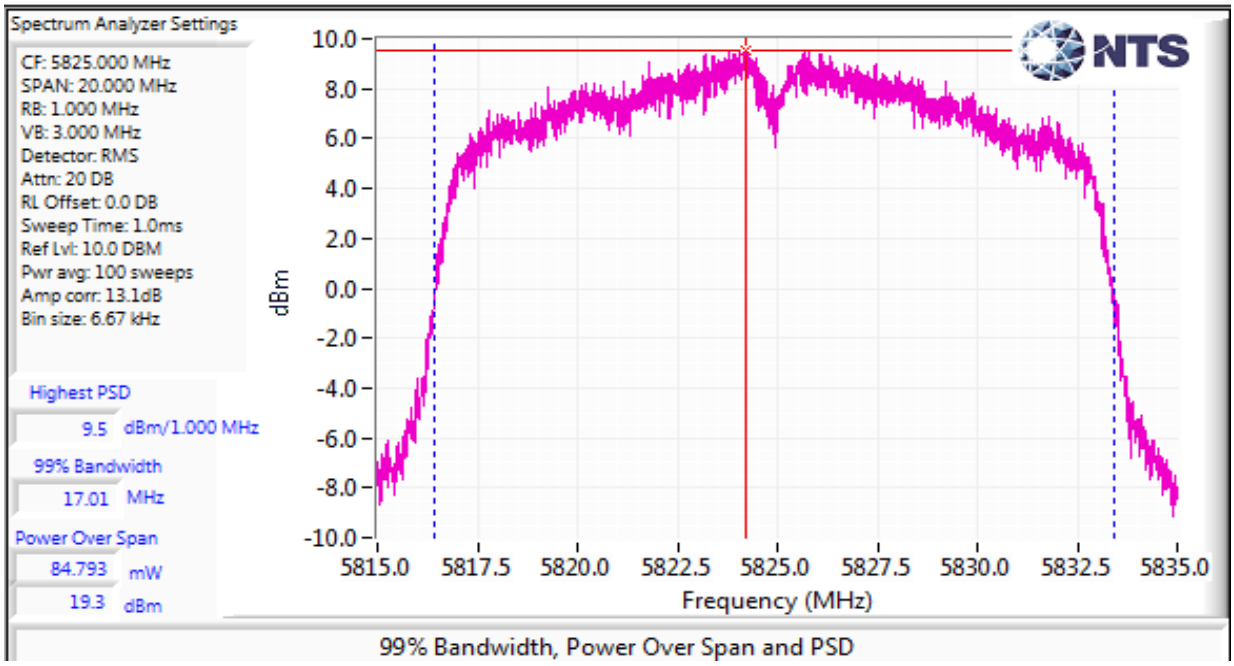
Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power dBm	Total Power[1] mW	Total Power[1] dBm	Limit dBm	Max Power (W)	Result
5745	1	21	17.1	98.1	18.4	150.5	21.8	29.0	0.153	Pass
	3									
	4									
	2				19.1					
5785	1	21	17.1	98.1	18.0	142.5	21.5	29.0		Pass
	3									
	4									
	2				19.0					
5825	1	21	17.4	98.1	18.3	152.7	21.8	29.0		Pass
	3									
	4									
	2				19.3					

MIMO Device 5725-5850 PSD - FCC/ISED

Mode: 11a

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/500kHz	IC Limit dBm/500kHz	Result
5745	1	21		98.1	8.7	15.9	12.0	26.0	26.0	Pass
	3									
	4									
	2				9.3					
5785	1	21		98.1	8.5	16.0	12.0	26.0	26.0	Pass
	3									
	4									
	2				9.5					
5825	1	21		98.1	9.1	17.0	12.3	26.0	26.0	Pass
	3									
	4									
	2				9.5					

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5725-5850 MHz Band - FCC/ISED

Mode: **ac20** Max EIRP (mW): 628.5

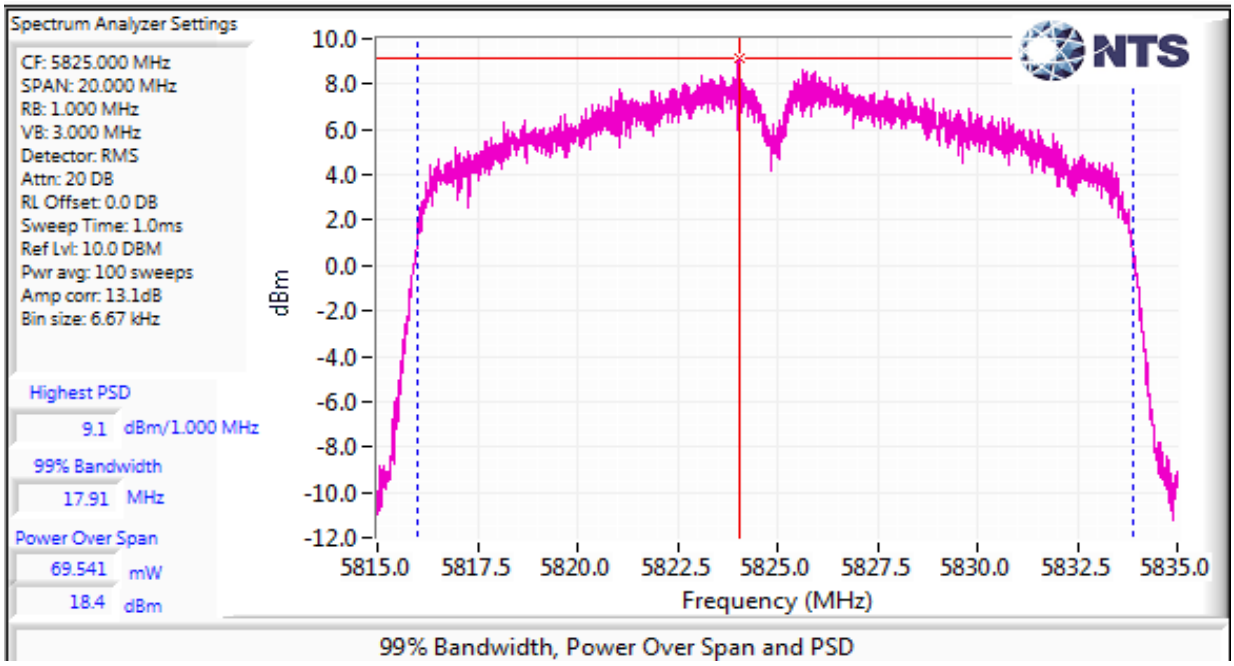
Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power dBm	Total Power[1] mW	Total Power[1] dBm	FCC Limit dBm	Max Power (W)	Result
5745	1	21	17.9	98.1	17.5	123.8	20.9	29.0	0.125	Pass
	3									
	4									
	2				18.3					
5785	1	21	17.9	98.1	17.3	119.8	20.8	29.0		Pass
	3									
	4									
	2				18.2					
5825	1	21	17.9	98.1	17.5	125.4	21.0	29.0		Pass
	3									
	4									
	2				18.4					

MIMO Device 5725-5850 PSD - FCC/ISED

Mode: **ac20**

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	IC Limit dBm/MHz	Result
5745	1	21		98.1	7.6	13.5	11.3	26.0	26.0	Pass
	3									
	4									
	2				8.9					
5785	1	21		98.1	7.4	12.3	10.9	26.0	26.0	Pass
	3									
	4									
	2				8.3					
5825	1	21		98.1	7.8	14.2	11.5	26.0	26.0	Pass
	3									
	4									
	2				9.1					

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5725-5850 MHz Band - FCC/ISED

Mode: **ac40** Max EIRP (mW): 628.5

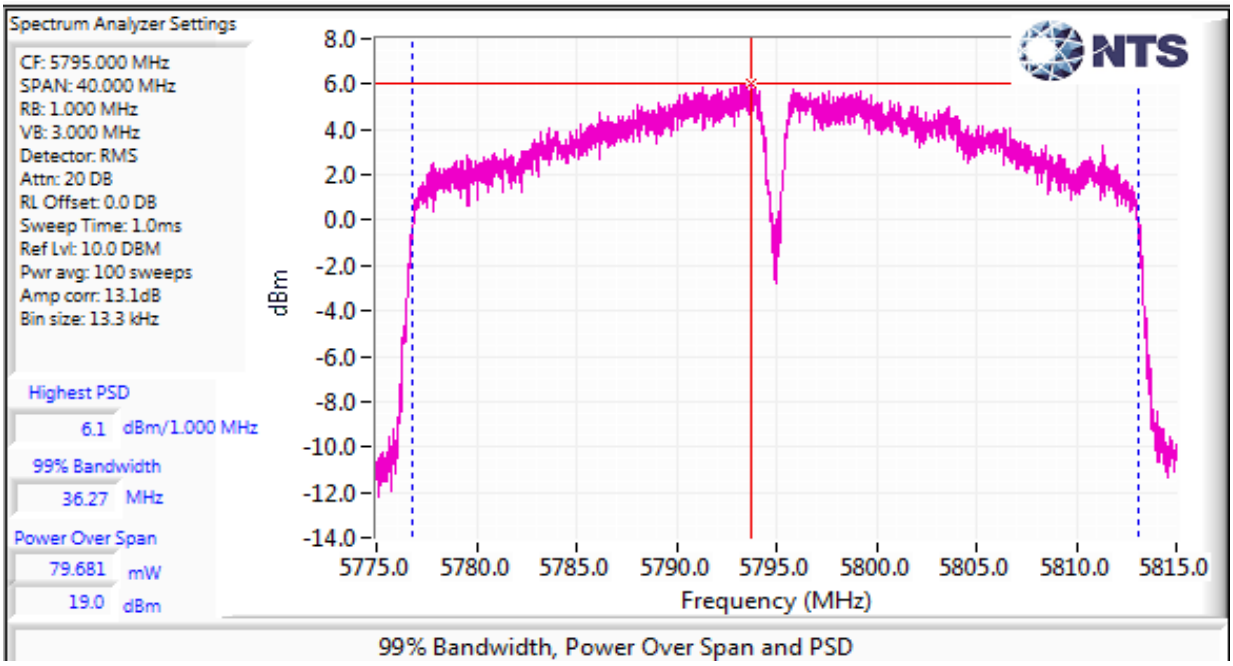
Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power dBm	Total Power[1] mW	Total Power[1] dBm	FCC Limit dBm	Max Power (W)	Result
5755	1	21	36.3	100	18.0	139.0	21.4	29.0	0.125	Pass
	3									
	4									
	2				18.8					
5795	1	21	36.3	100	17.9	141.1	21.5	29.0		Pass
	3									
	4									
	2				19.0					

MIMO Device 5725-5850 PSD - FCC/ISED

Mode: **ac40**

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	IC Limit dBm/MHz	Result
5755	1	21		100	5.0	7.1	8.5	26.0	26.0	Pass
	3									
	4									
	2				6.0					
5795	1	21		100	5.1	7.3	8.6	26.0	26.0	Pass
	3									
	4									
	2				6.1					

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

MIMO Device - 5725-5850 MHz Band - FCC/ISED

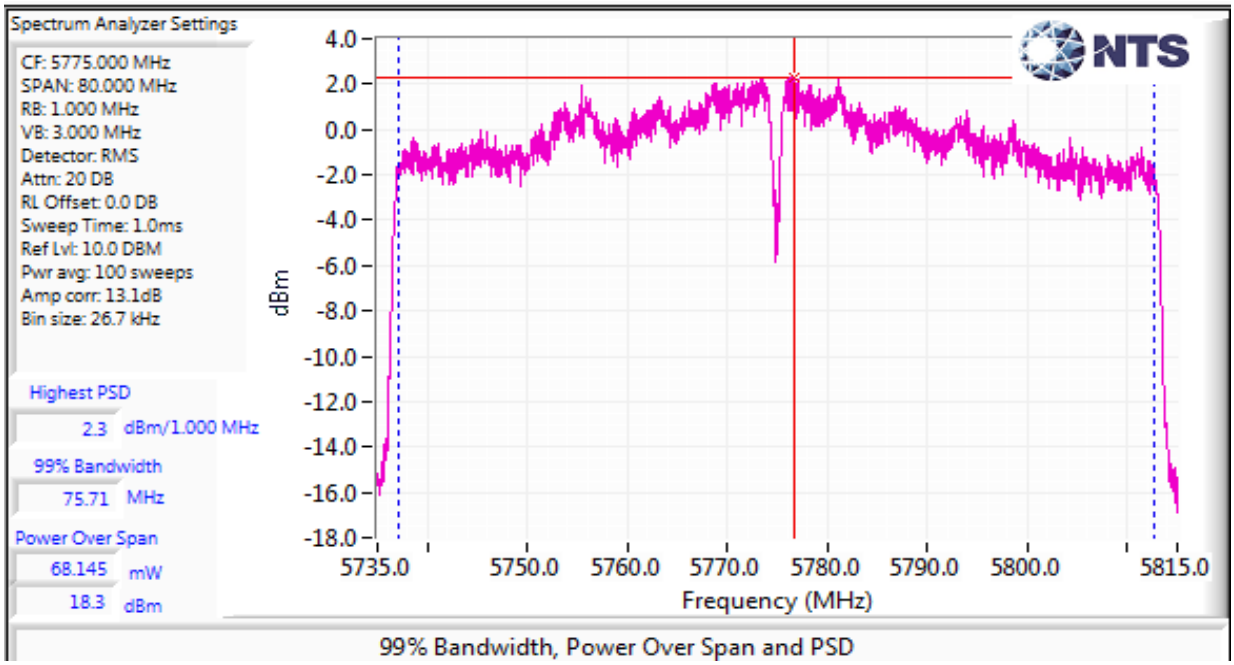
Mode: **ac80** Max EIRP (mW): 628.5

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	Power dBm	Total Power[1] mW	Total Power[1] dBm	FCC Limit dBm	Max Power (W)	Result
5775	1	21	75.8	100	17.5	123.8	20.9	29.0	0.125	Pass
	3									
	4									
	2				18.3					

MIMO Device 5725-5850 PSD - FCC/ISED

Mode: **ac80**

Frequency (MHz)	Chain	Software Setting	99% BW (MHz)	Duty Cycle %	PSD dBm/MHz	Total PSD[1] mW/MHz	Total PSD[1] dBm/MHz	FCC Limit dBm/MHz	IC Limit dBm/MHz	Result
5775	1	21		100	1.5	3.1	4.9	26.0	26.0	Pass
	3									
	4									
	2				2.3					

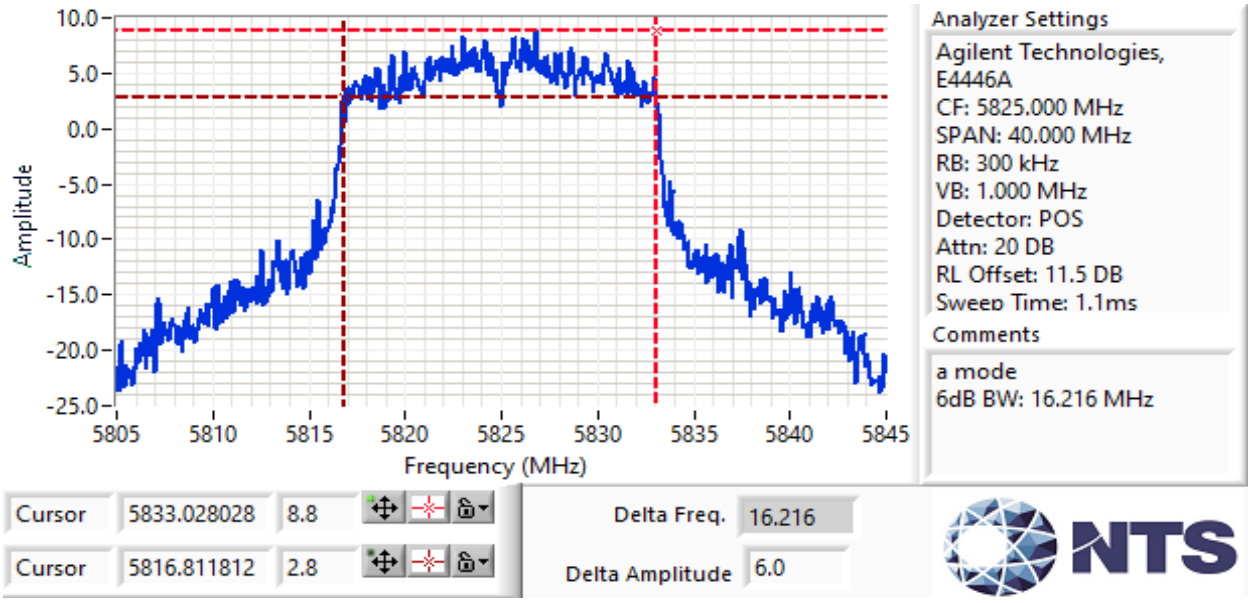


Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #3: Signal Bandwidth

Mode: a

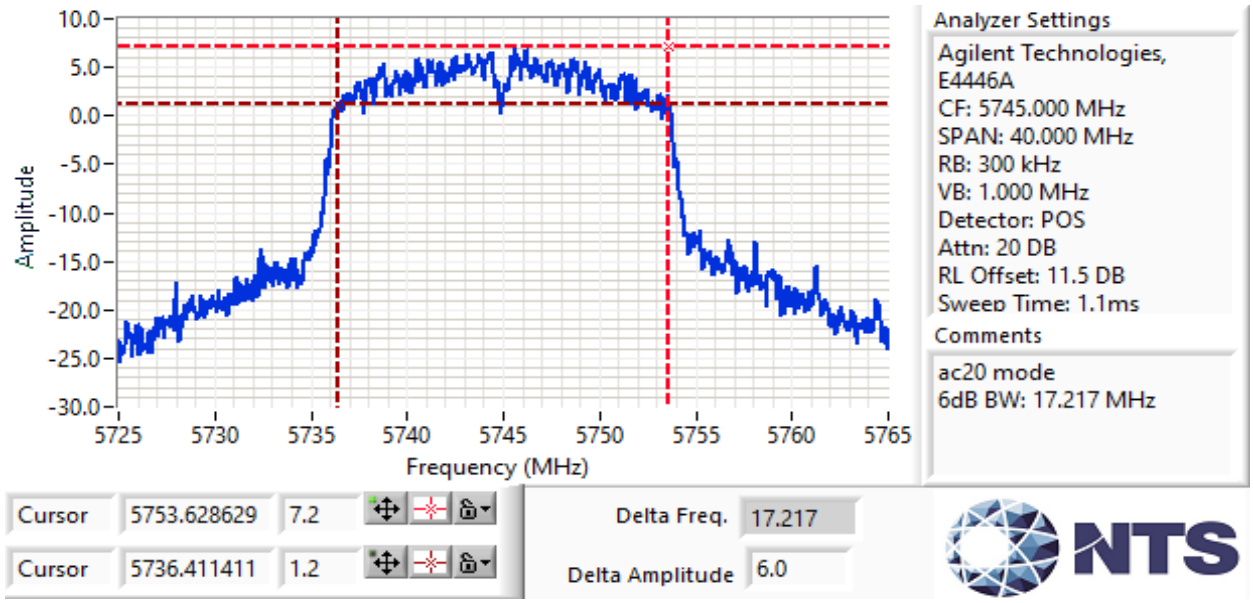
Power Setting	Frequency (MHz)	Bandwidth (MHz) 6dB	Bandwidth (MHz) 99%	RBW Setting (MHz) 6dB	RBW Setting (MHz) 99%
17	5745	16.216		0.3	
17	5785	16.296		0.3	
17	5825	16.216		0.3	



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Mode: **ac20**

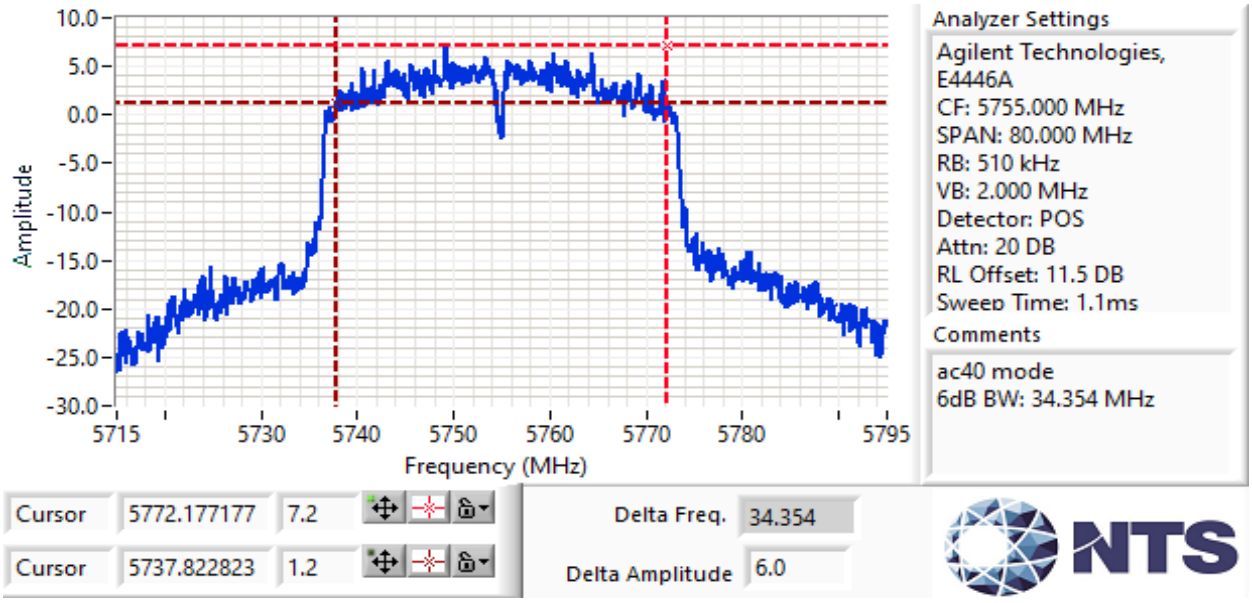
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
17	5745	17.217		0.3	
17	5785	17.457		0.3	
17	5825	17.377		0.3	



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Mode: **ac40**

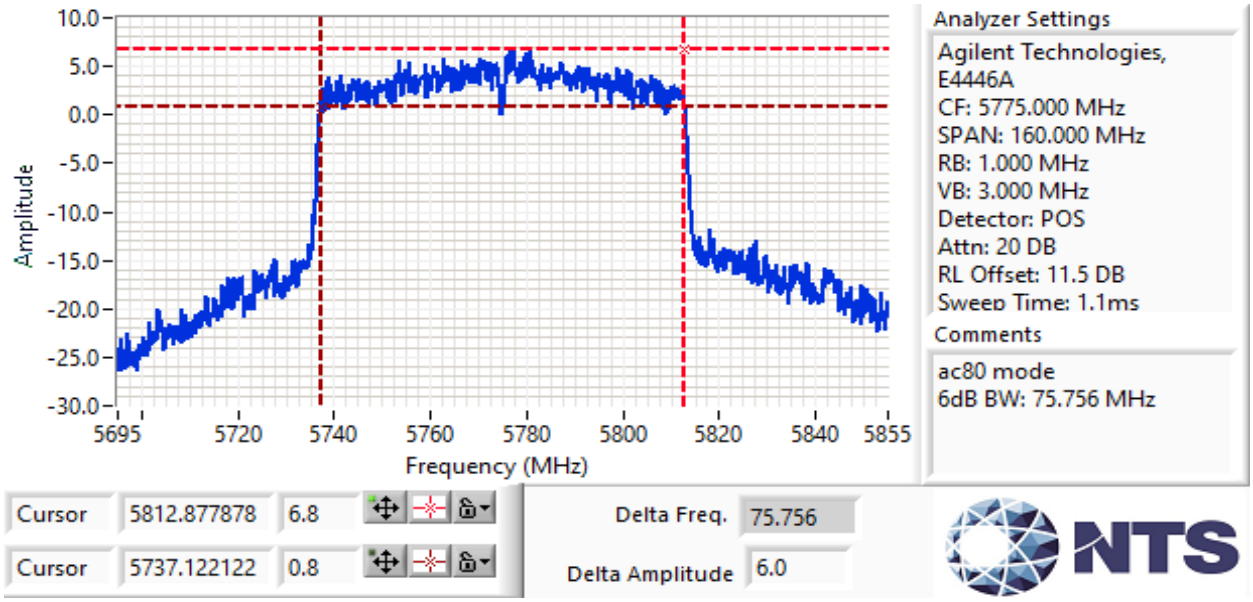
Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
17	5755	34.354		0.5	
17	5795	34.755		0.5	



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Mode: **ac80**

Power Setting	Frequency (MHz)	Bandwidth (MHz)		RBW Setting (MHz)	
		6dB	99%	6dB	99%
17	5775	75.756		1	



Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	N/A

Run #3: Out Of Band Spurious Emissions - Antenna Conducted

Date of Test: 01/11/23 Config. Used: 1
Test Engineer: David Bare Config Change: None
Test Location: Fremont Chamber #2 EUT Voltage: 120V/60Hz

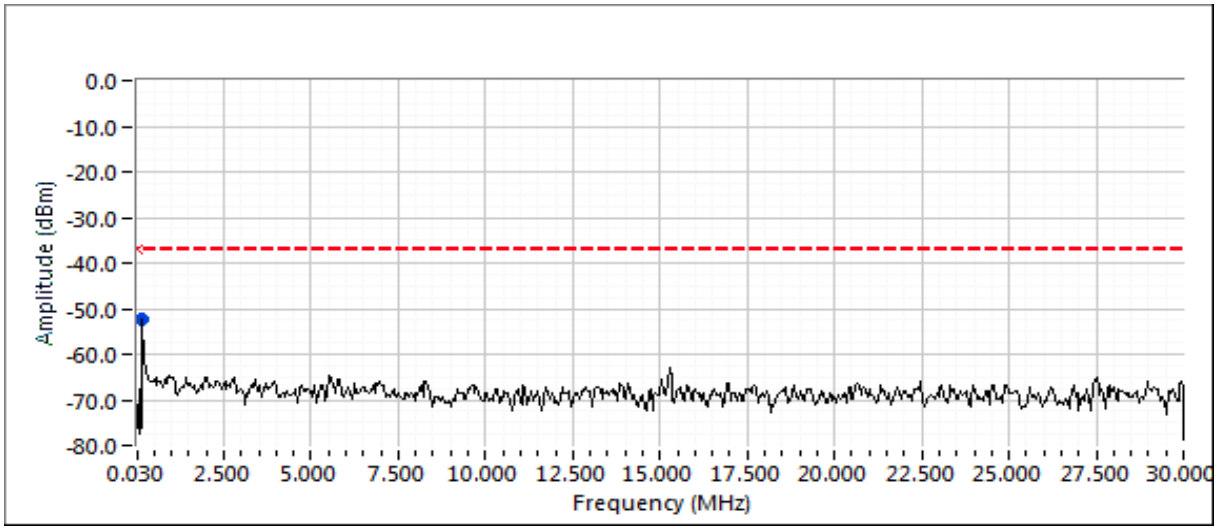
MIMO Devices: Antenna gain used is the effective gain calculated in the power section of this data sheet. The plots were obtained for each chain individually and the limit was adjusted to account for all chains transmitting simultaneously

Number of transmit chains:	2	
Maximum Antenna Gain:	7.0	dBi
Spurious Limit:	-27.0	dBm/MHz eirp
Adjustment for 2 chains:	-3.0	dB adjustment for multiple chains.
Limit Used On Plots [Note 1]:	-37.0	dBm/MHz Peak Limit (RB=VB=1MHz)

Note 1:	The -27dBm/MHz limit is an eirp limit. The limit for antenna port conducted measurements is adjusted to take into consideration the maximum antenna gain (limit = -27dBm - antenna gain). Radiated field strength measurements for signals more than 50MHz from the bands and that are close to the limit are made to determine compliance as the antenna gain is not known at these frequencies.

Plot Showing Out-Of-Band Emissions (RBW=VBW=1MHz)

Compliance with limits above 30 MHz is demonstrated through the radiated emissions tests.



Note1:	Based on preliminary testing, no emisisons were observed related to the fundamental from 30 kHz to 30 MHz, therefore only channel 165, a mode was included in report.

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-

Conducted Emissions

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

Test Specific Details

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 12/16/2022
Test Engineer: M. Birgani
Test Location: Chamber 7

Config. Used: 1
Config Change: -
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT was located above a ground plane inside the semi-anechoic chamber, 80 cm from the LISN.

Ambient Conditions:

Temperature: 19-20 °C
Rel. Humidity: 38-40 %

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	CE, AC Power,120V/60Hz Operating @ Channel 157	FCC 15.207(a)	Pass	36.0 dBµV @ 0.867 MHz (-10.0 dB)

Modifications Made During Testing

No modifications were made to the EUT during testing

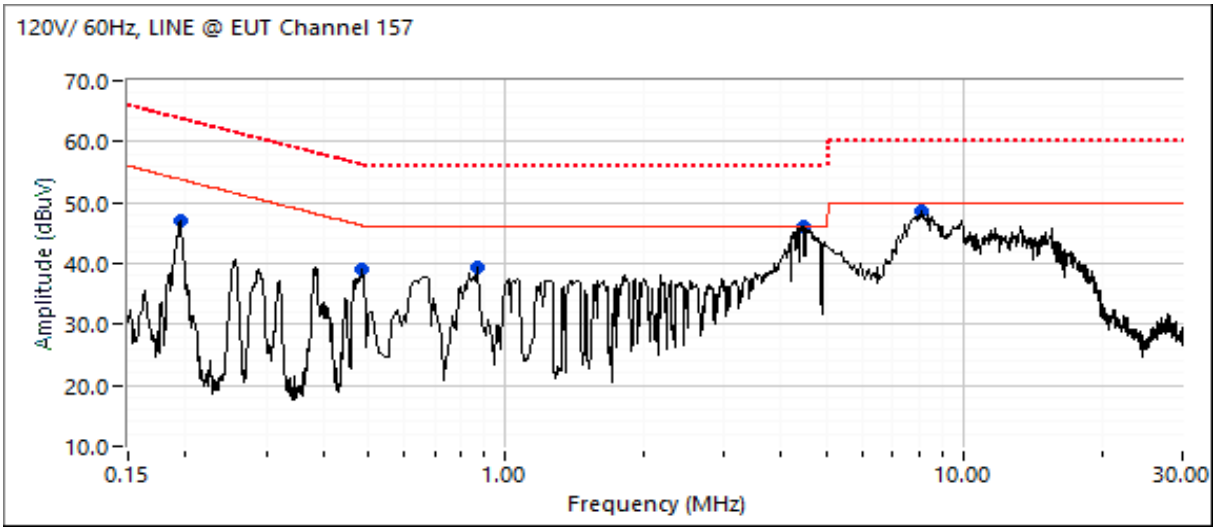
Deviations From The Standard

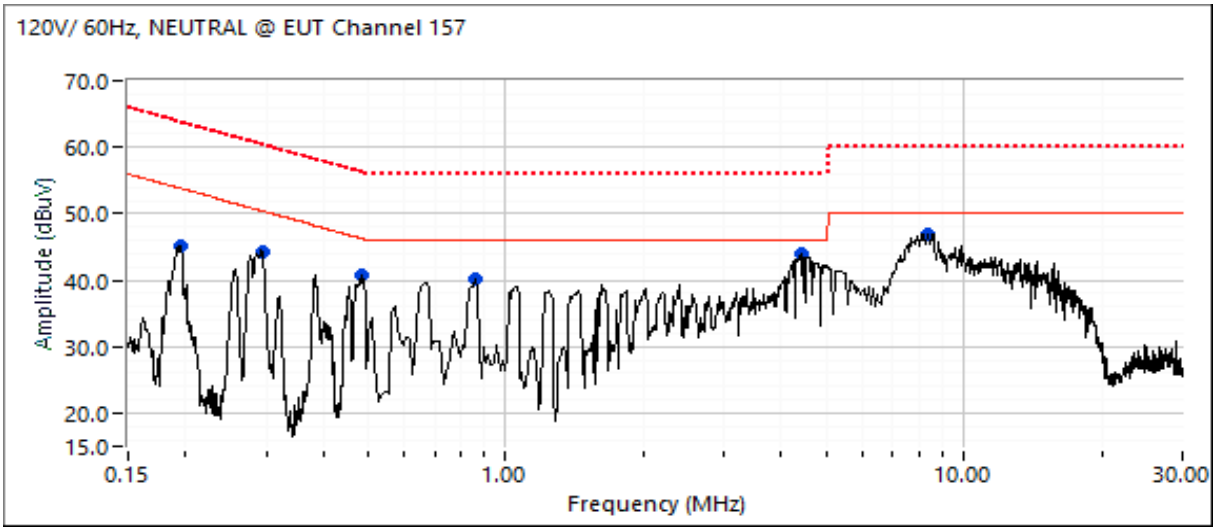
No deviations were made from the requirements of the standard.

Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-

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

EUT operating on Channel 157 at Power setting of 21 in 2x2 MIMO





Client:	Eight Sleep, Inc.	PR Number:	PR167335
Model:	Pod Hub	T-Log Number:	TL167335 Hub 182A5
		Project Manager:	Christine Krebill
Contact:	Alex Lednev, Patrick McCabe	Project Engineer:	David Bare
Standard:	FCC part 15.407, RSS-247	Class:	-

Run #2: AC Power Port Conducted Emissions, 0.15 - 30MHz, 120V/60Hz

EUT operating on Channel 157 at Power setting of 21 in 2x2 MIMO

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

Frequency	Level	AC	FCC §15.207(a)		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.195	45.1	Neutral	53.8	-8.7	Peak	
0.195	46.9	Line	53.8	-6.9	Peak	
0.292	44.4	Neutral	50.4	-6.0	Peak	
0.484	39.1	Line	46.3	-7.2	Peak	
0.487	40.6	Neutral	46.2	-5.6	Peak	
0.867	40.1	Neutral	46.0	-5.9	Peak	
0.869	39.5	Line	46.0	-6.5	Peak	
4.434	43.9	Neutral	46.0	-2.1	Peak	
4.455	46.2	Line	46.0	0.2	Peak	
8.105	48.5	Line	50.0	-1.5	Peak	
8.370	47.0	Neutral	50.0	-3.0	Peak	

Final quasi-peak and average readings

Frequency	Level	AC	FCC §15.207(a)		Detector	Comments
MHz	dBµV	Line	Limit	Margin	QP/Ave	
0.867	**36.0**	Neutral	46.0	**-10.0**	AVG	AVG (0.10s)
4.455	44.4	Line	56.0	-11.6	QP	QP (1.00s)
0.292	38.4	Neutral	50.5	-12.1	AVG	AVG (0.10s)
0.484	34.1	Line	46.3	-12.2	AVG	AVG (0.10s)
0.869	33.7	Line	46.0	-12.3	AVG	AVG (0.10s)
4.434	42.7	Neutral	56.0	-13.3	QP	QP (1.00s)
4.434	32.4	Neutral	46.0	-13.6	AVG	AVG (0.10s)
0.487	32.4	Neutral	46.2	-13.8	AVG	AVG (0.10s)
4.455	31.7	Line	46.0	-14.3	AVG	AVG (0.10s)
8.105	44.9	Line	60.0	-15.1	QP	QP (1.00s)
8.370	43.4	Neutral	60.0	-16.6	QP	QP (1.00s)
0.867	38.1	Neutral	56.0	-17.9	QP	QP (1.00s)
0.195	35.1	Neutral	53.8	-18.7	AVG	AVG (0.10s)
0.869	36.5	Line	56.0	-19.5	QP	QP (1.00s)
8.105	30.4	Line	50.0	-19.6	AVG	AVG (0.10s)
0.292	40.9	Neutral	60.5	-19.6	QP	QP (1.00s)
0.484	36.4	Line	56.3	-19.9	QP	QP (1.00s)
0.487	35.8	Neutral	56.2	-20.4	QP	QP (1.00s)
0.195	33.2	Line	53.8	-20.6	AVG	AVG (0.10s)
8.370	28.3	Neutral	50.0	-21.7	AVG	AVG (0.10s)
0.195	41.5	Neutral	63.8	-22.3	QP	QP (1.00s)
0.195	41.3	Line	63.8	-22.5	QP	QP (1.00s)

End of Report

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