EMC TEST REPORT

(Partial COMPLIANCE)

Report Number: 102837160BOX-001b
Project Number: G102837160

Report Issue Date: 02/06/2017

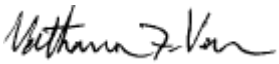
Model(s) Tested:	WhoopStrap 2.0/830-000004 (USB charger)
Model(s) Partially Tested:	None
Model(s) Not Tested but declared equivalent by the client:	None

Standards: CFR47 FCC Part 15 Subpart C (15.247): 10/2016
RSS-247 Issue 1: 05/2015
CFR47 FCC Part 15 Subpart B: 10/2016
ICES 003: 01/2016 updated 06/2016

Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

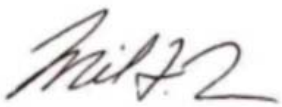
Client:
Whoop Inc.
1325 Boylston Street Suite 401
Boston, MA 02215
USA

Report prepared by



Vathana Ven / Staff Engineer, EMC

Report reviewed by



Michael F. Murphy / Team Leader, EMC

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Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test full name	Result
3	Client Information	
4	Description of Equipment Under Test and Variant Models	
5	System Setup and Method	
6	Output Power and Human RF Exposure (CFR47 FCC Part 15 Subpart C (15.247): 10/2016 RSS-247 Issue 1: 05/2015 RSS-102 Issue 5: 03/2015)	Pass
7	Band Edge Compliance (CFR47 FCC Part 15 Subpart C (15.247): 10/2016 RSS-247 Issue 1: 05/2015)	Pass
8	Radiated Emissions from Digital parts and Receiver (CFR47 FCC Part 15 (15.109): 10/2016 ICES 003: 01/2016 and updated 06/2016)	Pass
9	AC Mains Conducted Emissions (FCC Part 15 Subpart B: 10/2016 ICES 003: 01/2016 and updated 06/2016, FCC Part 15 Subpart C:2016)	Pass
10	Revision History	

Note: Limited testing was performed for permissive change as different wall charger was used with the WhoopStrap 2.0. The WhoopStrap 2.0 was tested and certified (Report # 102743203BOX-001).

3 Client Information

This EUT was tested at the request of:

Client: Whoop Inc.
1325 Boylston Street Suite 401
Boston, MA 02215
USA

Contact: Michael Costa
Telephone: (617) 670-1074 x153
Fax: None
Email: costa@whoop.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Whoop Inc.
1325 Boylston Street Suite 401
Boston, MA 02215
USA

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Wrist worn strap	Whoop Inc.	WhoopStrap 2.0	20D125 6
Dual USB Wall Charger	Whoop Inc.	830-000004	TM16500012

Receive Date:	10/11/2016, 12/08/2016	Test Date:	12/21/2016 – 02/06/2017
Received Condition:	Good	Test Complete Date:	02/06/2017
Type:	Production		

Description of Equipment Under Test (provided by client)
The EUT is a Dual USB Wall Charger uses with wrist worn strap that measures strain and recovery

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
120VAC	2.1A	50/60Hz	1

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	Transmit mode with Frequency hopping enabled.
2	Transmit mode with Frequency hopping disabled. Transmitting in single channel.
3	Receive mode

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics	
Frequency Band(s)	2402 – 2480 MHz
Modulation Type(s)	GFSK, pi/4-DQPSK, 8DPSK
Maximum Output Power	0.000272 W
Test Channels	CH0 – 2402 MHz, CH 39 – 2441 MHz, CH 78 – 2480 MHz
Occupied Bandwidth	Not performed
Frequency Hopper: Number of Hopping Channels	79
Frequency Hopper: Channel Occupancy Time	Not performed
MIMO Information (# of Transmit and Receive antenna ports)	1 – Integral antenna
Equipment Type	Bluetooth
ETSI LBT/Adaptivity	N/A
ETSI Adaptivity Type	N/A
ETSI Temperature Category (I, II, III)	N/A
ETSI Receiver Category (1, 2, 3)	N/A
Antenna Type and Gain	Integral (Gain 0.5 dBi)

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

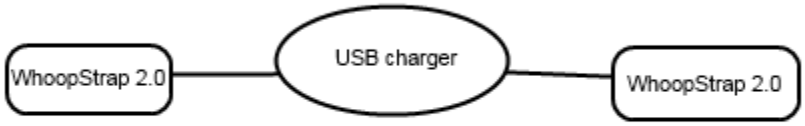
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	USB cable	1	None	None	AC mains

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Laptop	HP	T60M283.00	N/L

5.1 Method:

Configuration as required by FCC CFR47 Part 15 Subpart C (15.247): 10/2016, RSS-247 Issue 1: 05/2015 FCC CDR47 Part 15 Subpart B: 10/2016. ICES 003: 01/2016 updated 06/2016 and ANSI C63.10: 2013.

5.2 EUT Block Diagram:



6 Output Power

6.1 Method

Tests are performed in accordance with CFR47 FCC Part 15 Subpart C (15.247), RSS-247 Issue 1 May 2016 and ANSI C 63.10.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6 Db	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	- dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61 A	05/02/2016	05/02/2017
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/10/2016	03/10/2017
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	02/10/2016	02/10/2017
145014'	Preamplifier (1 GHz to 26.5 GHz)	Hewlett Packard	8449B	3008A00232	05/27/2016	05/27/2017
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	07/30/2016	07/30/2017

Software Utilized:

Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

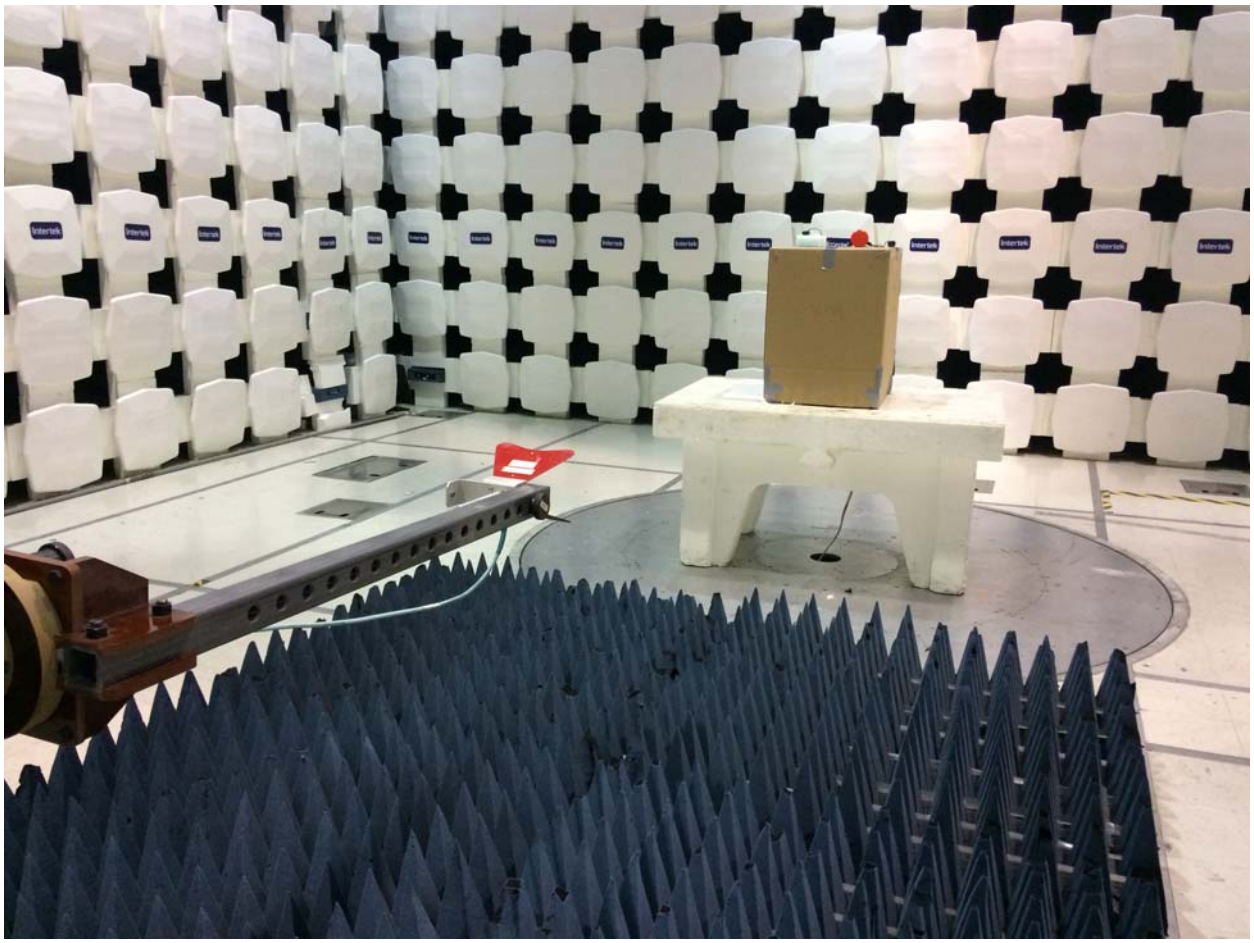
Note: Your Laptop may use a different version of Excel. Record the version you actually used!

6.3 Results:

The sample tested was found to Comply.

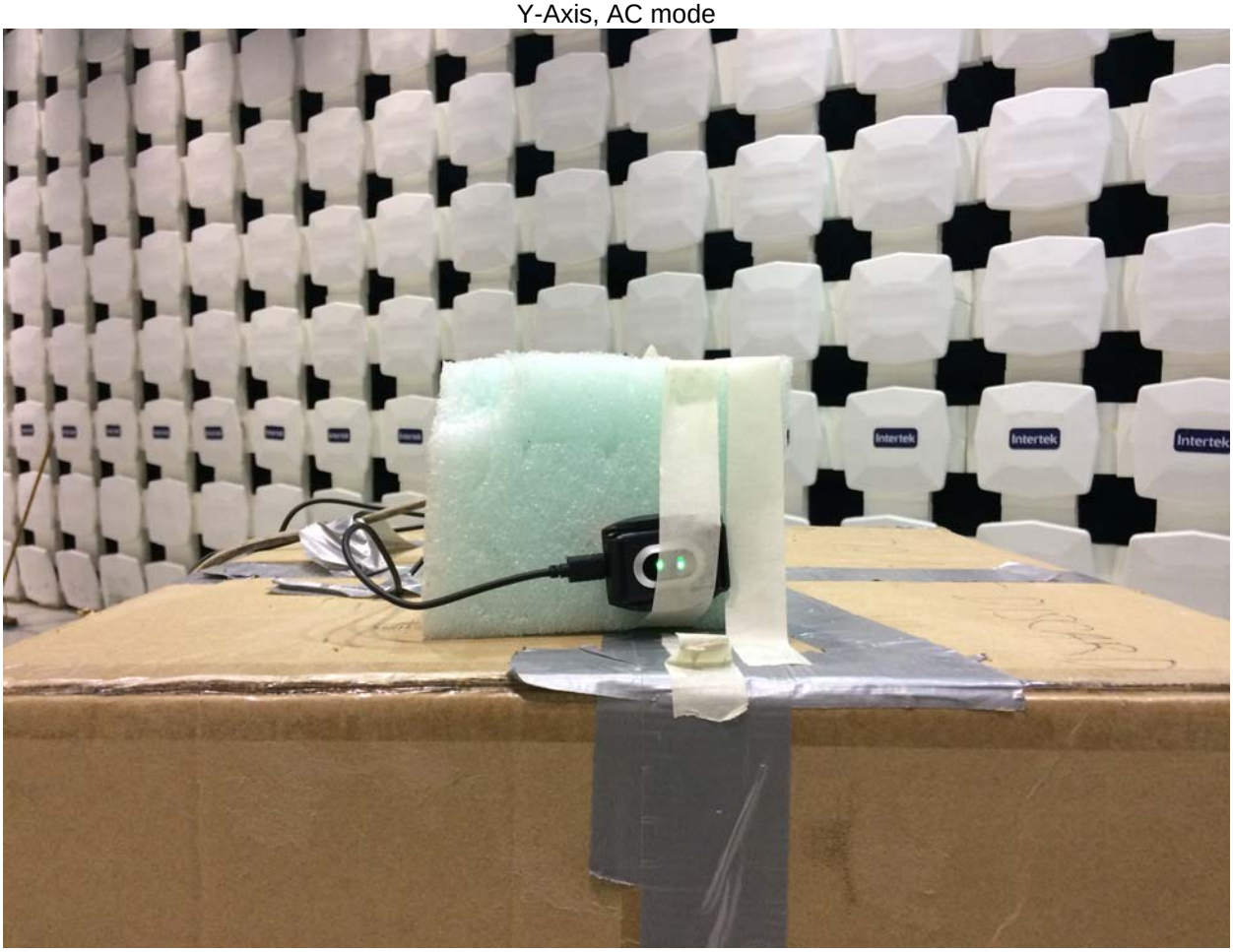
Output power was measured to determine the Class of permissive change.

6.4 Setup Photographs:

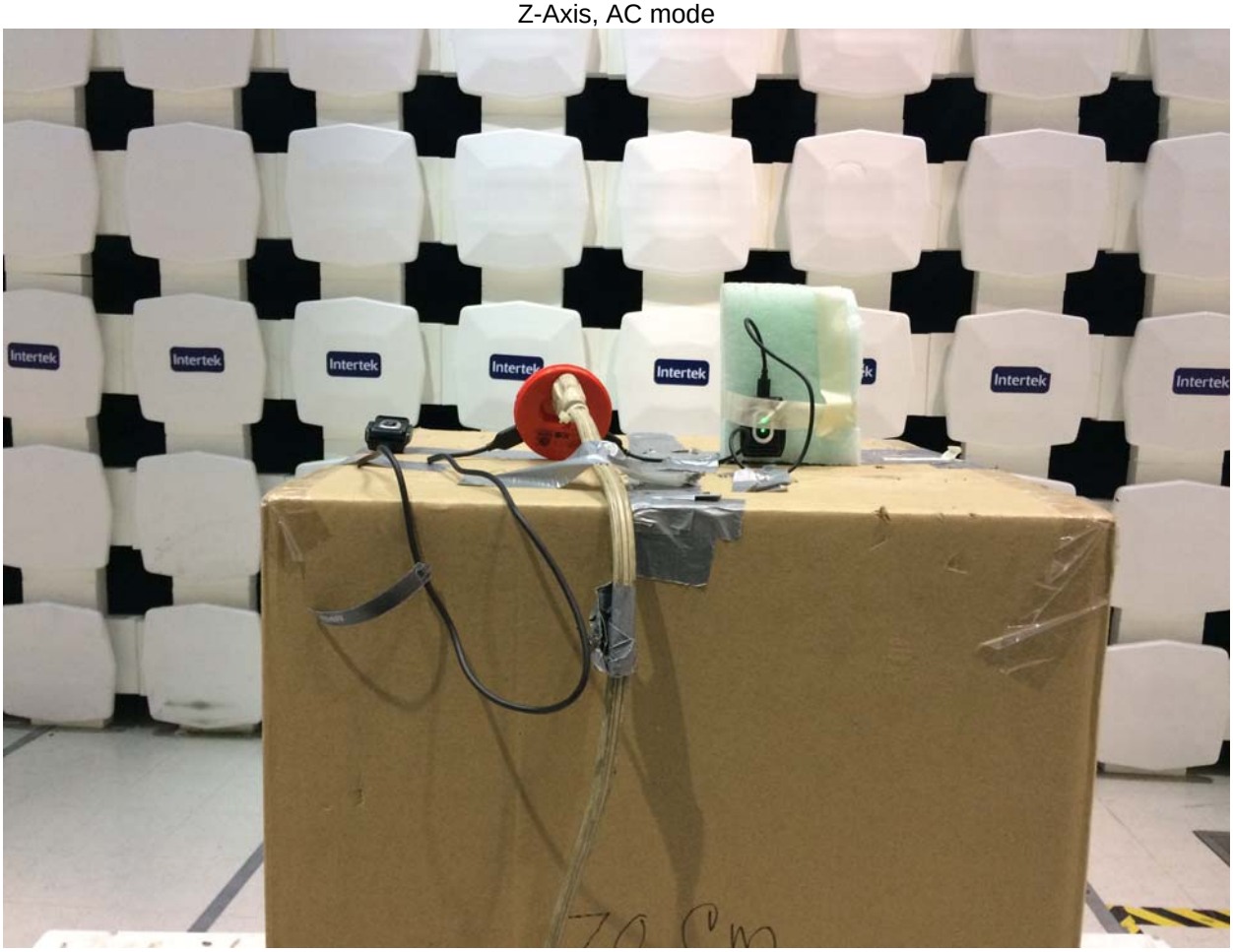


X-Axis, AC mode

Y-Axis, AC mode



Z-Axis, AC mode



Test Data:

Radiated Emissions

Company: Whoop Inc. | Antenna & Cables: HF | Bands: N, LF, HF, SHF
Model #: WhoopStrap 2.0/830-000004 (USB charger) | Antenna: ETS001 02-10-17.txt | ETS001 02-10-17.txt
Serial #: 20D125 6/TM16500012 (USB charger) | Cable(s): 145-416 1-18 GHz 09-17-17.txt | NONE.
Engineers: Vathana Ven | Location: 10M | Barometer: DAV004 | Filter: NONE
Project #: G102837160 | Date(s): 02/06/17
Standard: FCC Part 15 Subpart C 15.247 | Temp/Humidity/Pressure: 20c | 15% | 1009mB
Receiver: R&S ESI (145-128) 03-10-2017 | Limit Distance (m): 3
PreAmp: None | Test Distance (m): 3
PreAmp Used? (Y or N): N | Voltage/Frequency: 120VAC 60Hz | Frequency Range: Frequencies Shown
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	EIRP Net dBm	EIRP Limit dBm	Margin dB	Bandwidth	FCC	IC	Harmonic?
Note: RF Output Power, Channel 0, GFSK, X-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	48.97	32.29	3.67	0.00	0.00	-10.29	30.00	-40.29	5/10 MHz			
PK	H	2402.000	53.60	32.29	3.67	0.00	0.00	-5.66	30.00	-35.66	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	48.33	32.29	3.67	0.00	0.00	-10.93	30.00	-40.93	1/3 MHz			
PK	H	2402.000	50.10	32.29	3.67	0.00	0.00	-9.16	30.00	-39.16	1/3 MHz			
Note: RF Output Power, Channel 0, GFSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	46.80	32.29	3.67	0.00	0.00	-12.46	30.00	-42.46	5/10 MHz			
PK	H	2402.000	52.44	32.29	3.67	0.00	0.00	-6.82	30.00	-36.82	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	46.00	32.29	3.67	0.00	0.00	-13.26	30.00	-43.26	1/3 MHz			
PK	H	2402.000	52.03	32.29	3.67	0.00	0.00	-7.23	30.00	-37.23	1/3 MHz			
Note: RF Output Power, Channel 0, GFSK, Z-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	49.90	32.29	3.67	0.00	0.00	-9.36	30.00	-39.36	5/10 MHz			
PK	H	2402.000	49.00	32.29	3.67	0.00	0.00	-10.26	30.00	-40.26	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	48.80	32.29	3.67	0.00	0.00	-10.46	30.00	-40.46	1/3 MHz			
PK	H	2402.000	47.55	32.29	3.67	0.00	0.00	-11.71	30.00	-41.71	1/3 MHz			
Note: RF Output Power, Channel 39, GFSK, X-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	46.00	32.26	3.73	0.00	0.00	-13.23	30.00	-43.23	5/10 MHz			
PK	H	2441.000	51.37	32.26	3.73	0.00	0.00	-7.86	30.00	-37.86	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	45.00	32.26	3.73	0.00	0.00	-14.23	30.00	-44.23	1/3 MHz			
PK	H	2441.000	50.97	32.26	3.73	0.00	0.00	-8.26	30.00	-38.26	1/3 MHz			
Note: RF Output Power, Channel 39, GFSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	48.80	32.26	3.73	0.00	0.00	-10.43	30.00	-40.43	5/10 MHz			
PK	H	2441.000	50.45	32.26	3.73	0.00	0.00	-8.78	30.00	-38.78	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	48.60	32.26	3.73	0.00	0.00	-10.63	30.00	-40.63	1/3 MHz			
PK	H	2441.000	49.79	32.26	3.73	0.00	0.00	-9.44	30.00	-39.44	1/3 MHz			
Note: RF Output Power, Channel 39, GFSK, Z-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	47.90	32.26	3.73	0.00	0.00	-11.33	30.00	-41.33	5/10 MHz			
PK	H	2441.000	45.88	32.26	3.73	0.00	0.00	-13.35	30.00	-43.35	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	47.00	32.26	3.73	0.00	0.00	-12.23	30.00	-42.23	1/3 MHz			
PK	H	2441.000	44.00	32.26	3.73	0.00	0.00	-15.23	30.00	-45.23	1/3 MHz			
Note: RF Output Power, Channel 78, GFSK, X-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	48.84	32.23	3.78	0.00	0.00	-10.37	30.00	-40.37	5/10 MHz			
PK	H	2480.000	50.97	32.23	3.78	0.00	0.00	-8.24	30.00	-38.24	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	48.20	32.23	3.78	0.00	0.00	-11.01	30.00	-41.01	1/3 MHz			
PK	H	2480.000	50.45	32.23	3.78	0.00	0.00	-8.76	30.00	-38.76	1/3 MHz			
Note: RF Output Power, Channel 78, GFSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	46.00	32.23	3.78	0.00	0.00	-13.21	30.00	-43.21	5/10 MHz			
PK	H	2480.000	48.46	32.23	3.78	0.00	0.00	-10.75	30.00	-40.75	5/10 MHz			
Note: RF Output Power, Channel 78, GFSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	44.90	32.23	3.78	0.00	0.00	-14.31	30.00	-44.31	1/3 MHz			
PK	H	2480.000	47.94	32.23	3.78	0.00	0.00	-11.27	30.00	-41.27	1/3 MHz			
Note: RF Output Power, Channel 78, GFSK, Z-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	49.50	32.23	3.78	0.00	0.00	-9.71	30.00	-38.71	5/10 MHz			
PK	H	2480.000	47.00	32.23	3.78	0.00	0.00	-12.21	30.00	-42.21	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	46.00	32.23	3.78	0.00	0.00	-13.21	30.00	-39.31	1/3 MHz			
PK	H	2480.000	44.00	32.23	3.78	0.00	0.00	-15.21	30.00	-45.21	1/3 MHz			

Radiated Emissions

Company: Whoop Inc. | Antenna & Cables: HF | Bands: N, LF, HF, SHF
Model #: WhoopStrap 2.0/830-000004 (USB charger) | Antenna: ETS001 02-10-17.txt | ETS001 02-10-17.txt
Serial #: 20D125 6/TM16500012 (USB charger) | Cable(s): 145-416 1-18 GHz 09-15-17.txt | NONE.
Engineers: Vathana Ven | Location: 10M | Barometer: DAV004 | Filter: NONE
Project #: G102837160 | Date(s): 02/06/17
Standard: FCC Part 15 Subpart C 15.247 | Temp/Humidity/Pressure: 20c | 15% | 1009mB
Receiver: R&S ESI (145-128) 03-10-2017 | Limit Distance (m): 3
PreAmp: None | Test Distance (m): 3
PreAmp Used? (Y or N): N | Voltage/Frequency: 120VAC 60Hz | Frequency Range: Frequencies Shown
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	EIRP Net dBm	EIRP Limit dBm	Margin dB	Bandwidth	FCC	IC	Harmonic?
Note: RF Output Power, Channel 0, Pi/4-DQPSK, X-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	46.60	32.29	3.67	0.00	0.00	-12.66	30.00	-42.66	5/10 MHz			
PK	H	2402.000	48.20	32.29	3.67	0.00	0.00	-11.06	30.00	-41.06	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	45.40	32.29	3.67	0.00	0.00	-13.86	30.00	-43.86	1/3 MHz			
PK	H	2402.000	38.00	32.29	3.67	0.00	0.00	-21.26	30.00	-51.26	1/3 MHz			
Note: RF Output Power, Channel 0, Pi/4-DQPSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	44.10	32.29	3.67	0.00	0.00	-15.16	30.00	-45.16	5/10 MHz			
PK	H	2402.000	46.50	32.29	3.67	0.00	0.00	-12.76	30.00	-42.76	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	43.90	32.29	3.67	0.00	0.00	-15.36	30.00	-45.36	1/3 MHz			
PK	H	2402.000	46.00	32.29	3.67	0.00	0.00	-13.26	30.00	-43.26	1/3 MHz			
Note: RF Output Power, Channel 0, Pi/4-DQPSK, Z-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	48.00	32.29	3.67	0.00	0.00	-11.26	30.00	-41.26	5/10 MHz			
PK	H	2402.000	43.90	32.29	3.67	0.00	0.00	-15.36	30.00	-45.36	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2402.000	47.50	32.29	3.67	0.00	0.00	-11.76	30.00	-41.76	1/3 MHz			
PK	H	2402.000	45.00	32.29	3.67	0.00	0.00	-14.26	30.00	-44.26	1/3 MHz			
Note: RF Output Power, Channel 39, Pi/4-DQPSK, X-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	41.00	32.26	3.73	0.00	0.00	-18.23	30.00	-48.23	5/10 MHz			
PK	H	2441.000	45.90	32.26	3.73	0.00	0.00	-13.33	30.00	-43.33	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	40.56	32.26	3.73	0.00	0.00	-18.67	30.00	-48.67	1/3 MHz			
PK	H	2441.000	44.50	32.26	3.73	0.00	0.00	-14.73	30.00	-44.73	1/3 MHz			
Note: RF Output Power, Channel 39, Pi/4-DQPSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	43.70	32.26	3.73	0.00	0.00	-15.53	30.00	-45.53	5/10 MHz			
PK	H	2441.000	45.00	32.26	3.73	0.00	0.00	-14.23	30.00	-44.23	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	43.00	32.26	3.73	0.00	0.00	-16.23	30.00	-46.23	1/3 MHz			
PK	H	2441.000	44.80	32.26	3.73	0.00	0.00	-14.43	30.00	-44.43	1/3 MHz			
Note: RF Output Power, Channel 39, Pi/4-DQPSK, Z-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	45.00	32.26	3.73	0.00	0.00	-14.23	30.00	-44.23	5/10 MHz			
PK	H	2441.000	43.00	32.26	3.73	0.00	0.00	-16.23	30.00	-46.23	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2441.000	44.30	32.26	3.73	0.00	0.00	-14.93	30.00	-44.93	1/3 MHz			
PK	H	2441.000	42.30	32.26	3.73	0.00	0.00	-16.93	30.00	-46.93	1/3 MHz			
Note: RF Output Power, Channel 78, Pi/4-DQPSK, X-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	44.20	32.23	3.78	0.00	0.00	-15.01	30.00	-45.01	5/10 MHz			
PK	H	2480.000	45.60	32.23	3.78	0.00	0.00	-13.61	30.00	-43.61	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	43.30	32.23	3.78	0.00	0.00	-15.91	30.00	-45.91	1/3 MHz			
PK	H	2480.000	47.98	32.23	3.78	0.00	0.00	-11.23	30.00	-41.23	1/3 MHz			
Note: RF Output Power, Channel 78, Pi/4-DQPSK, Y-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	43.49	32.23	3.78	0.00	0.00	-15.72	30.00	-45.72	5/10 MHz			
PK	H	2480.000	41.90	32.23	3.78	0.00	0.00	-17.31	30.00	-47.31	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	42.28	32.23	3.78	0.00	0.00	-16.93	30.00	-46.93	1/3 MHz			
PK	H	2480.000	40.60	32.23	3.78	0.00	0.00	-18.61	30.00	-48.61	1/3 MHz			
Note: RF Output Power, Channel 78, Pi/4-DQPSK, Z-axis														
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	47.90	32.23	3.78	0.00	0.00	-11.31	30.00	-41.31	5/10 MHz			
PK	H	2480.000	45.70	32.23	3.78	0.00	0.00	-13.51	30.00	-43.51	5/10 MHz			
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP														
PK	V	2480.000	46.90	32.23	3.78	0.00	0.00	-12.31	30.00	-42.31	1/3 MHz			
PK	H	2480.000	44.00	32.23	3.78	0.00	0.00	-15.21	30.00	-45.21	1/3 MHz			

Radiated Emissions

Company: Whoop Inc. Antenna & Cables: HF Bands: N, LF, HF, SHF
Model #: WhoopStrap 2.0/830-000004 (USB charger) Antenna: ETS001 02-10-17.txt ETS001 02-10-17.txt
Serial #: 20D125 6/TM16500012 (USB charger) Cable(s): 145-416 1-18 GHz 09-15-17.txt NONE.
Engineers: Vathana Ven Location: 10M Barometer: DAV004 Filter: NONE
Project #: G102837160 Date(s): 02/06/17
Standard: FCC Part 15 Subpart C 15.247 Temp/Humidity/Pressure: 19c 13% 1008mB
Receiver: R&S ESI (145-128) 03-10-2017 Limit Distance (m): 3
PreAmp: None Test Distance (m): 3
PreAmp Used? (Y or N): N Voltage/Frequency: 120VAC 60Hz Frequency Range: Frequencies Shown
Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	EIRP Net dBm	EIRP Limit dBm	Margin dB	Bandwidth	FCC	IC
Note: RF Output Power, Channel 0, 8DPSK, X-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2402.000	49.34	32.29	3.67	0.00	0.00	-9.92	30.00	-39.92	5/10 MHz		
PK	H	2402.000	50.50	32.29	3.67	0.00	0.00	-8.76	30.00	-38.76	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2402.000	48.00	32.29	3.67	0.00	0.00	-11.26	30.00	-40.06	1/3 MHz		-13.26
PK	H	2402.000	49.40	32.29	3.67	0.00	0.00	-9.86	30.00	-39.86	1/3 MHz		
Note: RF Output Power, Channel 0, 8DPSK, Y-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2402.000	49.65	32.29	3.67	0.00	0.00	-9.61	30.00	-39.61	5/10 MHz		
PK	H	2402.000	53.00	32.29	3.67	0.00	0.00	-6.26	30.00	-36.26	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2402.000	47.42	32.29	3.67	0.00	0.00	-11.84	30.00	-41.84	1/3 MHz		
PK	H	2402.000	48.90	32.29	3.67	0.00	0.00	-10.36	30.00	-40.36	1/3 MHz		
Note: RF Output Power, Channel 0, 8DPSK, Z-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2402.000	53.38	32.29	3.67	0.00	0.00	-5.88	30.00	-35.88	5/10 MHz		
PK	H	2402.000	49.90	32.29	3.67	0.00	0.00	-9.36	30.00	-39.36	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2402.000	51.50	32.29	3.67	0.00	0.00	-7.76	30.00	-37.76	1/3 MHz		
PK	H	2402.000	46.00	32.29	3.67	0.00	0.00	-13.26	30.00	-37.89	1/3 MHz		
Note: RF Output Power, Channel 39, 8DPSK, X-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2441.000	49.90	32.26	3.73	0.00	0.00	-9.33	30.00	-39.33	5/10 MHz		
PK	H	2441.000	48.50	32.26	3.73	0.00	0.00	-10.73	30.00	-40.73	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2441.000	47.80	32.26	3.73	0.00	0.00	-11.43	30.00	-41.43	1/3 MHz		
PK	H	2441.000	48.00	32.26	3.73	0.00	0.00	-11.23	30.00	-41.23	1/3 MHz		
Note: RF Output Power, Channel 39, 8DPSK, Y-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2441.000	48.84	32.26	3.73	0.00	0.00	-10.39	30.00	-40.39	5/10 MHz		
PK	H	2441.000	52.10	32.26	3.73	0.00	0.00	-7.13	30.00	-37.13	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2441.000	46.77	32.26	3.73	0.00	0.00	-12.46	30.00	-42.46	1/3 MHz		
PK	H	2441.000	51.90	32.26	3.73	0.00	0.00	-7.33	30.00	-37.33	1/3 MHz		
Note: RF Output Power, Channel 39, 8DPSK, Z-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2441.000	51.90	32.26	3.73	0.00	0.00	-7.33	30.00	-37.33	5/10 MHz		
PK	H	2441.000	46.90	32.26	3.73	0.00	0.00	-12.33	30.00	-42.33	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2441.000	49.50	32.26	3.73	0.00	0.00	-9.73	30.00	-39.73	1/3 MHz		
PK	H	2441.000	44.28	32.26	3.73	0.00	0.00	-14.95	30.00	-44.95	1/3 MHz		
Note: RF Output Power, Channel 78, 8DPSK, X-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2480.000	48.71	32.23	3.78	0.00	0.00	-10.50	30.00	-40.50	5/10 MHz		
PK	H	2480.000	49.95	32.23	3.78	0.00	0.00	-9.26	30.00	-39.26	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2480.000	47.00	32.23	3.78	0.00	0.00	-12.21	30.00	-42.21	1/3 MHz		
PK	H	2480.000	50.90	32.23	3.78	0.00	0.00	-8.31	30.00	-38.31	1/3 MHz		
Note: RF Output Power, Channel 78, 8DPSK, Y-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2480.000	47.16	32.23	3.78	0.00	0.00	-12.05	30.00	-42.05	5/10 MHz		
PK	H	2480.000	48.90	32.23	3.78	0.00	0.00	-10.31	30.00	-40.31	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2480.000	44.55	32.23	3.78	0.00	0.00	-14.66	30.00	-44.66	1/3 MHz		
PK	H	2480.000	48.00	32.23	3.78	0.00	0.00	-11.21	30.00	-41.21	1/3 MHz		
Note: RF Output Power, Channel 78, 8DPSK, Z-axis													
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2480.000	48.00	32.23	3.78	0.00	0.00	-11.21	30.00	-41.21	5/10 MHz		
PK	H	2480.000	43.90	32.23	3.78	0.00	0.00	-15.31	30.00	-45.31	5/10 MHz		
Note: EIRP Obtained by applying the path loss correction for a 3m test distance, E(dBuV/m)@3m - 95.22 = dBm EIRP													
PK	V	2480.000	44.80	32.23	3.78	0.00	0.00	-14.41	30.00	-44.41	1/3 MHz		
PK	H	2480.000	42.99	32.23	3.78	0.00	0.00	-16.22	30.00	-46.22	1/3 MHz		

Test Personnel:	Vathana Ven VSV	Test Date:	02/06/2017
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 15C, 15.247, RSS-247	Limit Applied:	Below specified limit
Input Voltage:	120VAC/60Hz	Ambient Temperature:	19 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**Yes**	Relative Humidity:	13 %
		Atmospheric Pressure:	1008 mbars

Deviations, Additions, or Exclusions: None

7 Band Edge Compliance

7.1 Method

Tests are performed in accordance with CFR47 FCC Part 15 Subpart C (15.247), RSS-247 Issue 1 May 2016 and ANSI C 63.10.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	- dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61 A	05/02/2016	05/02/2017
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/10/2016	03/10/2017
ETS001'	1-18GHz DRG Horn Antenna	ETS-Lindgren	3117	00143259	02/10/2016	02/10/2017
145014'	Preamplifier (1 GHz to 26.5 GHz)	Hewlett Packard	8449B	3008A00232	05/27/2016	05/27/2017
145-416'	Cables 145-400 145-402 145-404 145-408	Huber + Suhner	3m Track B cables	multiple	07/30/2016	07/30/2017

Software Utilized:

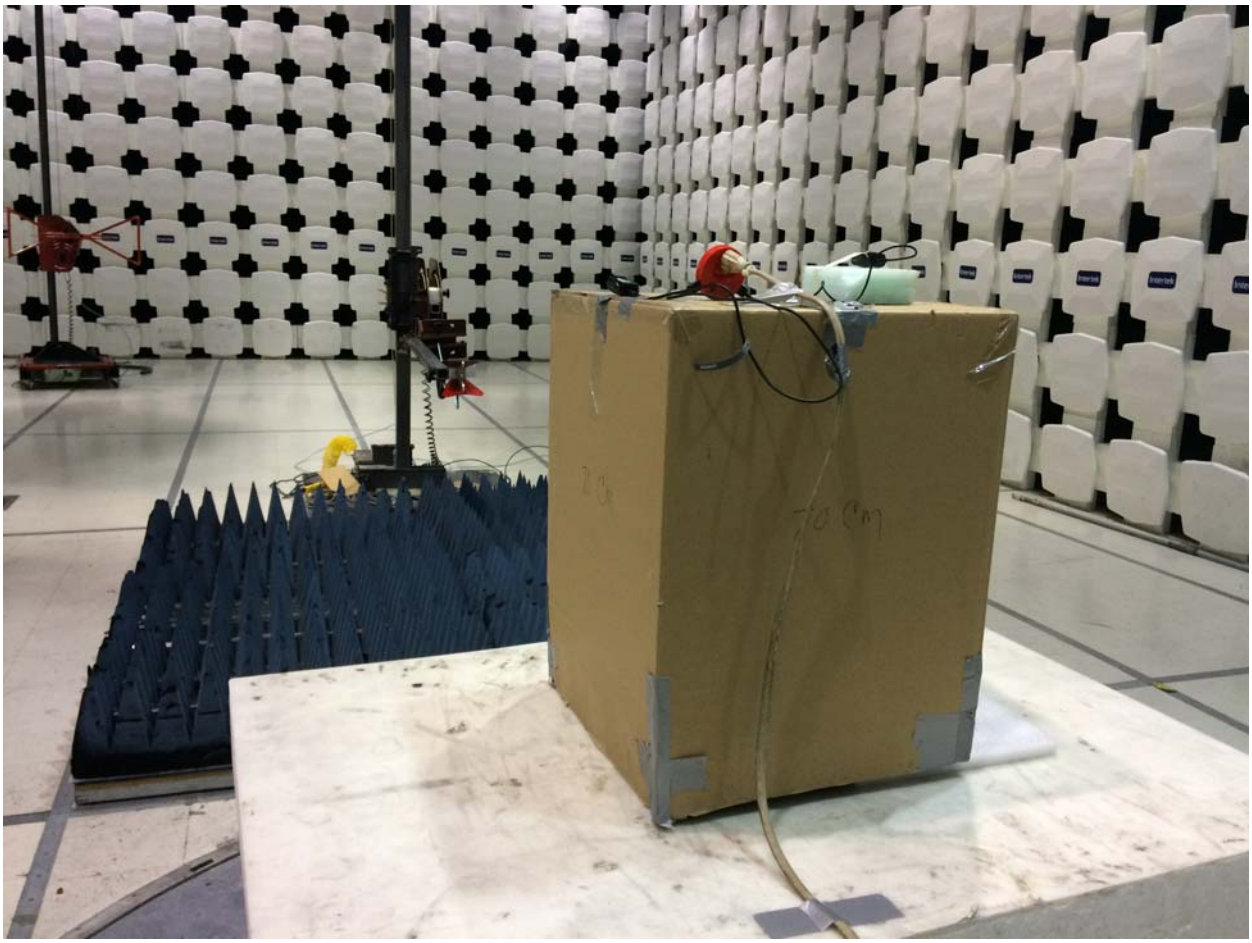
Name	Manufacturer	Version
EMI Boxborough.xls	Intertek	08/27/2010

Note: Your Laptop may use a different version of Excel. Record the version you actually used!

7.3 Results:

The sample tested was found to Comply.

7.4 Setup Photographs:



Test Data:

Special Radiated Emissions

Company: Whoop
Model #: WhoopStrap 2.0/830-000004 (USB charger)
Serial #: 20D125 6/TM16500012 (USB charger)
Engineers: Vathana Ven Location: 10M
Project #: G102837160 Date(s): 12/21/16
Standard: FCC Part 15 Subpart C 15.247
Receiver: R&S ESI (145-128) 03-10-2017 Limit Distance (m): 3
PreAmp: 145014 05-27-17.txt Test Distance (m): 3
PreAmp Used? (Y or N): N Voltage/Frequency: 120VAC 60Hz Frequency Range: See frequencies

Antenna & Cables: HF Bands: N, LF, HF, SHF
Antenna: ETS001 02-10-17.txt ETS001 02-10-17.txt
Cable(s): 145-416 1-18 GHz 10-08-17.txt
Barometer: DAV004 Filter:
Temp/Humidity/Pressure: 21c 29% 999 mB

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)
Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC
Note: Lower Band Edge Compliance, 8DPSK none hopping												
PK	H	2390.000	26.70	32.21	3.66	0.00	0.00	62.57	74.00	-11.43	1/3 MHz	RB
AVG	H	2390.000	16.19	32.21	3.66	0.00	0.00	52.06	54.00	-1.94	1/3 MHz	RB
Note: Lower Band Edge Compliance, 8DPSK hopping												
PK	H	2390.000	29.00	32.21	3.66	0.00	0.00	64.87	74.00	-9.13	1/3 MHz	RB
AVG	H	2390.000	16.00	32.21	3.66	0.00	0.00	51.87	54.00	-2.13	1/3 MHz	RB
Note: Upper Band Edge Compliance, 8DPSK none hopping												
PK	H	2483.500	27.59	32.22	3.79	0.00	0.00	63.60	74.00	-10.40	1/3 MHz	RB
AVG	H	2483.500	15.99	32.22	3.79	0.00	0.00	52.00	54.00	-2.00	1/3 MHz	RB
Note: Upper Band Edge Compliance, 8DPSK hopping												
PK	H	2483.500	29.90	32.22	3.79	0.00	0.00	65.91	74.00	-8.09	1/3 MHz	RB
AVG	H	2483.500	16.90	32.22	3.79	0.00	0.00	52.91	54.00	-1.09	1/3 MHz	RB

Test Personnel: Vathana Ven VJV
Supervising/Reviewing Engineer: (Where Applicable) N/A
Product Standard: FCC Part 15C, 15.247, RSS-247
Input Voltage: 120VAC/60Hz
Pretest Verification w/ Ambient Signals or BB Source: **Yes**

Test Date: 12/21/2016
Limit Applied: Below specified limit
Ambient Temperature: 21 ºC
Relative Humidity: 29 %
Atmospheric Pressure: 999 mbars

Deviations, Additions, or Exclusions: None

8 Radiated Emissions from Digital device and Receiver

8.1 Method

Tests are performed in accordance with CFR47 FCC Part 15B, ICES-003.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6 dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	- dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG
Where FS = Field Strength in dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBμV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 52.0 dBμV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBμV/m

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 μV/m

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV004'	Weather Station	Davis Instruments	7400	PE80529A61 A	05/02/2016	05/02/2017
145128'	EMI Receiver (20 Hz - 40 Ghz)	Rohde & Schwarz	ESIB 40	839283/001	03/10/2016	03/10/2017
145-410'	Cables 145-420 145-421 145-422 145-406	Huber + Suhner	10m Track A Cables	multiple	07/30/2016	07/30/2017
145013	Preamplifier (150 KHz to 1.3 GHz)	Hewlett Packard	8447D	2944A07027	05/02/2016	05/02/2017
145145'	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	03/09/2016	03/09/2017

Software Utilized:

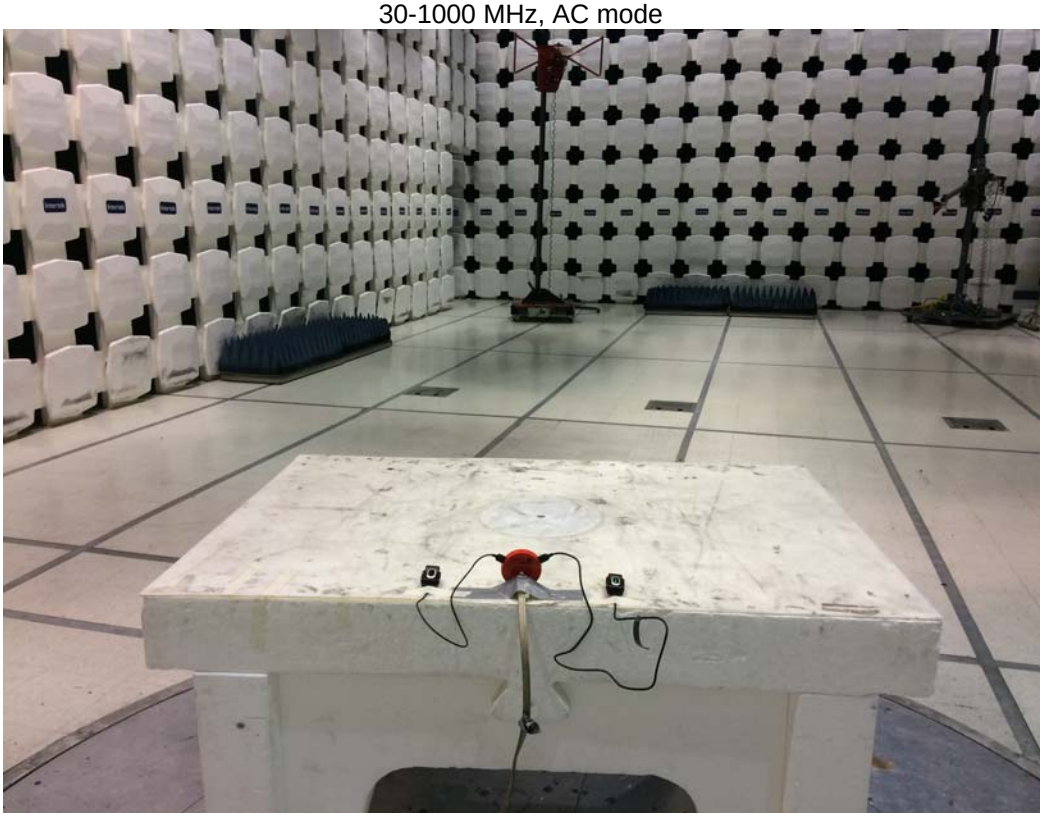
Name	Manufacturer	Version
Compliance 5	Teseq	5.26.46.46

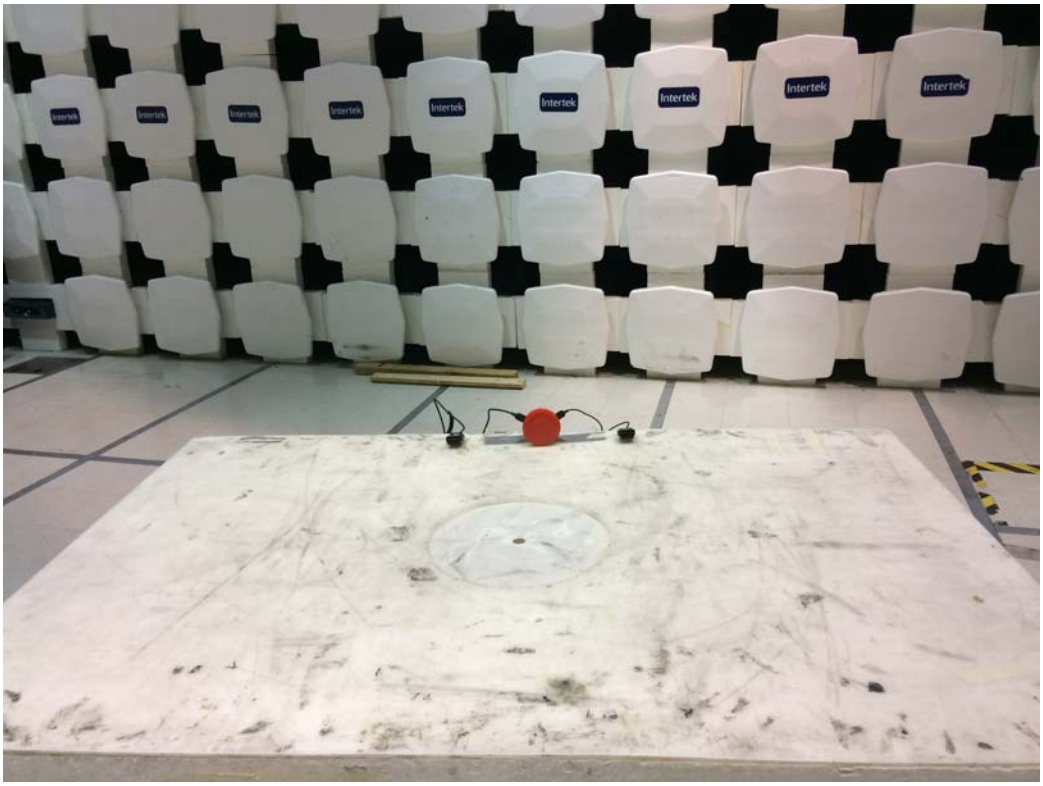
8.3 Results:

The sample tested was found to Comply.

8.4 Setup Photographs:

30-1000 MHz, AC mode



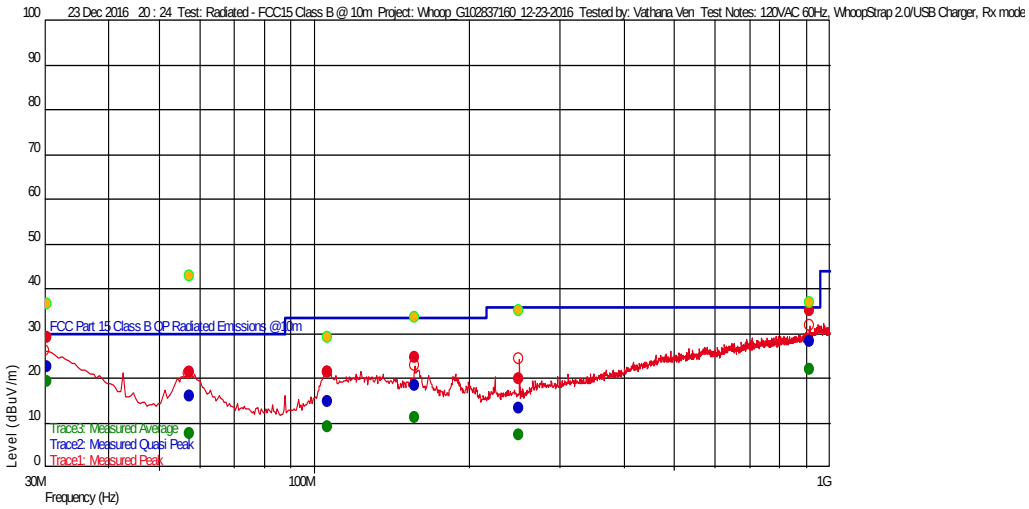


8.5 Test Data:

Test Information

Test Details	User Entry	Additional Information
Test:	Radiated - FCC15 Class B @ 10m	
Project:	Whoop_G102837160_12-23-2016	
Test Notes:	120VAC 60Hz, WhoopStrap 2.0/USB Charger, Rx mode	
Temperature:	19 deg C	
Humidity:	21%, 1015mbar	
Tested by:	Vathana Ven	
Test Started:	23 Dec 2016 20 : 24	

Prescan Emission Graph



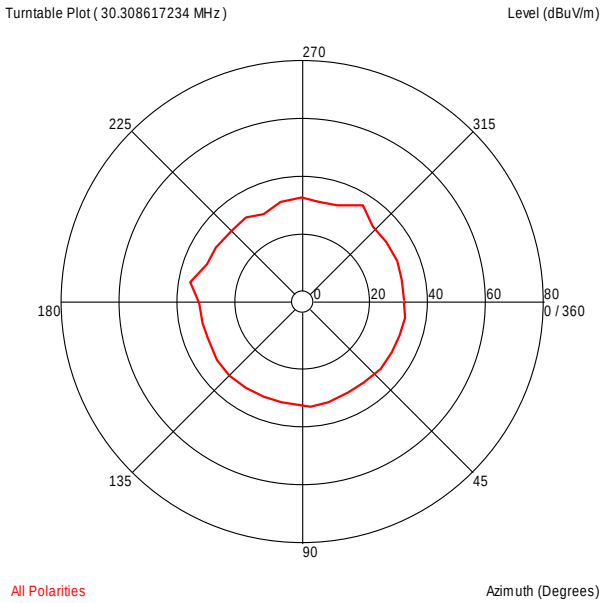
Measured Peak Value
Measured Quasi Peak Value
Measured Average Value
Maximum Value of Mast and Turntable

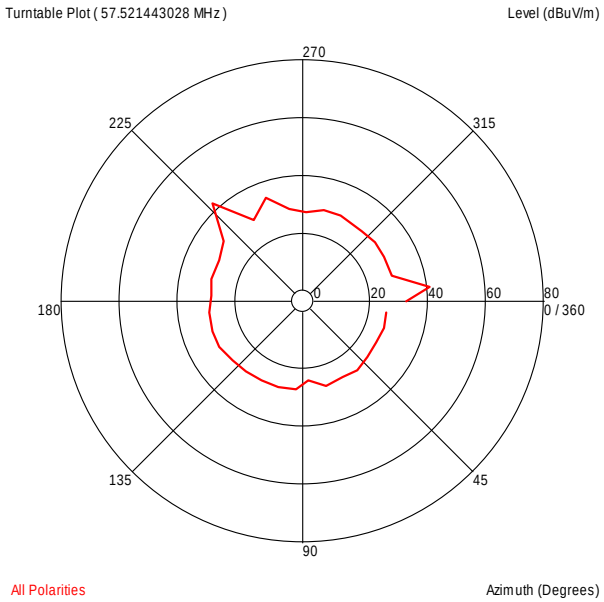
Swept Peak Data
Swept Quasi Peak Data
Swept Average Data

Emissions Test Data
Trace2: Measured Quasi Peak

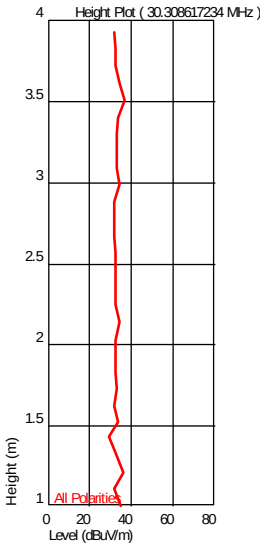
Frequency (Hz)	Level (dBuV/m)	AF	PA+CL	Limit (dBuV/m)	Margin (dBuV/m)	Hor (--), Ver (|)	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
250.158116651 M	13.20	17.700	-25.324	36.020	-22.82	|	349	1.06	120 k	
106.562925661 M	14.90	18.113	-26.729	33.520	-18.62	|	271	1.14	120 k	
156.787374395 M	18.36	18.600	-26.187	33.520	-15.16	|	17	1.57	120 k	
57.521443028 M	16.06	13.300	-27.298	30.000	-13.94	|	217	1.05	120 k	
916.800000349 M	28.21	29.136	-23.091	36.020	-7.81	|	0	2.00	120 k	
30.308617234 M	22.41	27.253	-27.767	30.000	-7.59	--	202	3.62	120 k	

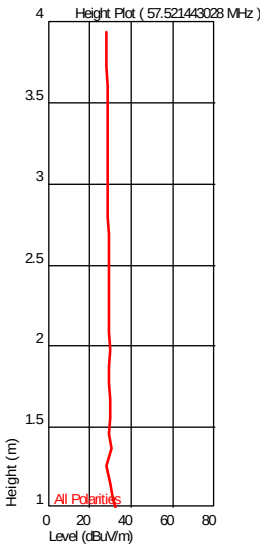
Azimuth Plots

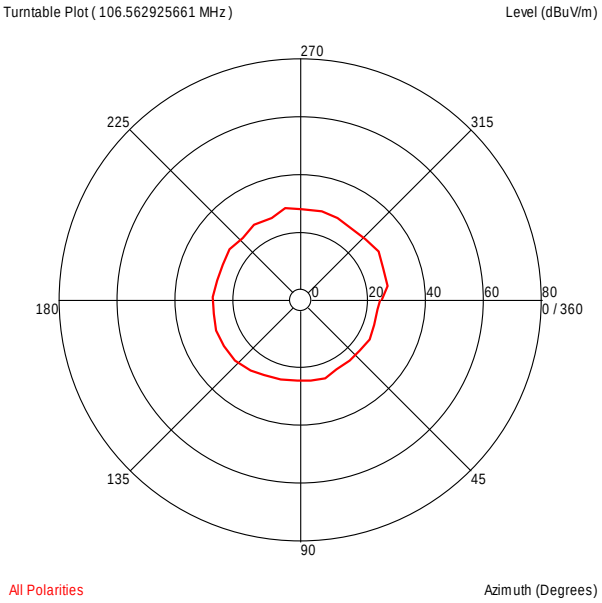


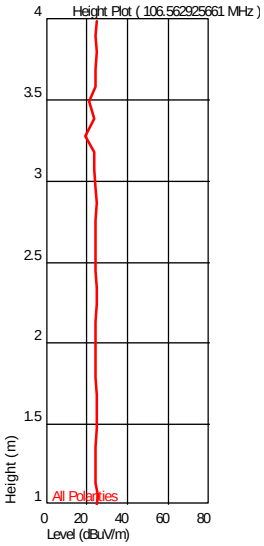


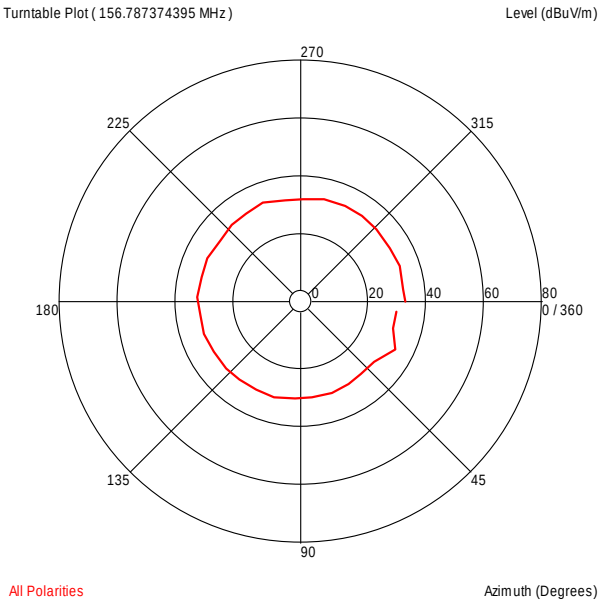
Turntable Plots

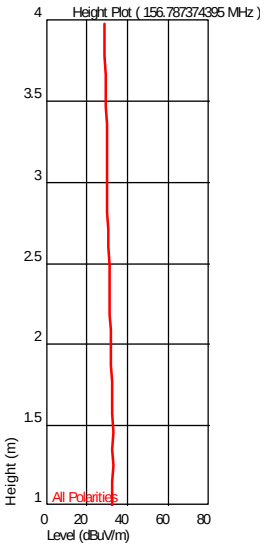


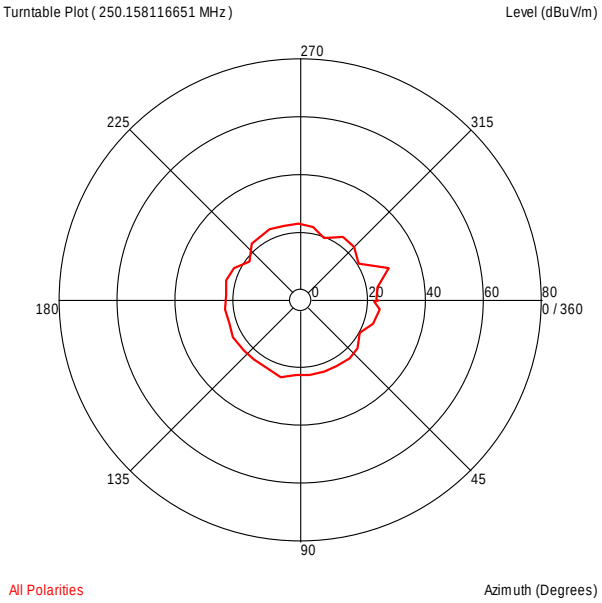


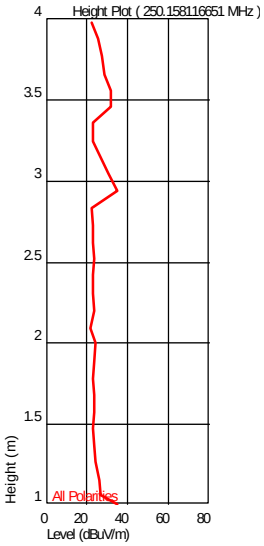

Turntable Plot (106.562925661 MHz)
Level (dBuV/m)
270
225
315
180
0
20
40
60
80
0 / 360
135
45
90
All Polarities
Azimuth (Degrees)

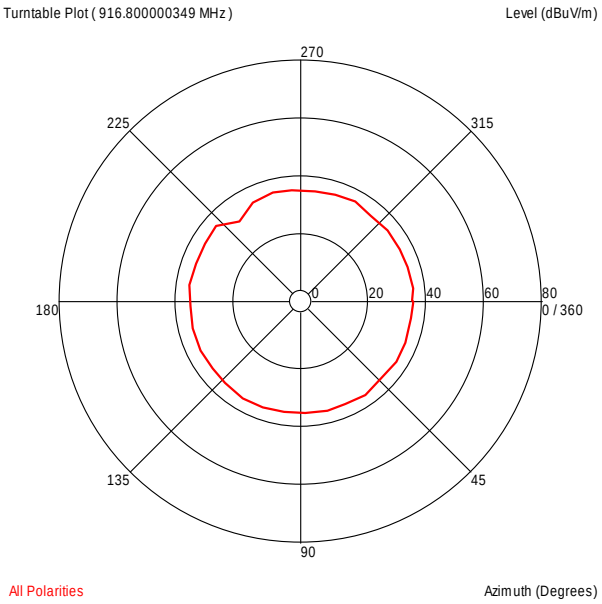

Height Plot (106.562925661 MHz)
4
3.5
3
2.5
2
1.5
1
Height (m)
All Polarities
0
20
40
60
80
Level (dBuV/m)

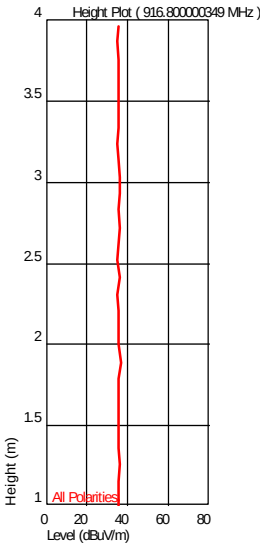

Turntable Plot (156.787374395 MHz)
Level (dBuV/m)
270
225
315
180
0
20
40
60
80
0 / 360
135
45
90
All Polarities
Azimuth (Degrees)


Height Plot (156.787374395 MHz)
4
3.5
3
2.5
2
1.5
1
Height (m)
All Polarities
0
20
40
60
80
Level (dBuV/m)


Turntable Plot (250.158116651 MHz)
Level (dBuV/m)
270
225
315
180
0
20
40
60
80
0 / 360
135
45
90
All Polarities
Azimuth (Degrees)


Height Plot (250.158116651 MHz)
4
3.5
3
2.5
2
1.5
1
Height (m)
All Polarities
0
20
40
60
80
Level (dBuV/m)

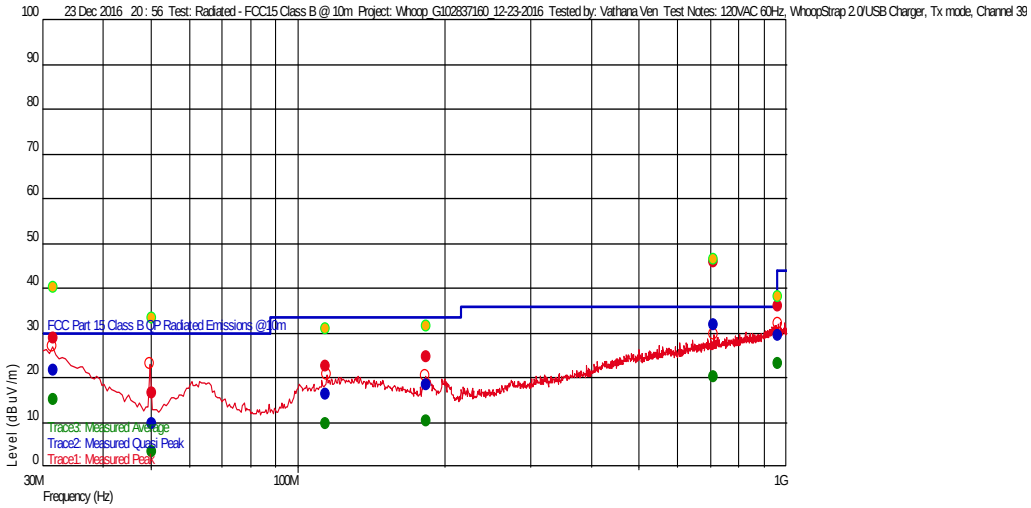

Turntable Plot (916.800000349 MHz)
Level (dBuV/m)
270
225
315
180
0
20
40
60
80
0 / 360
135
45
90
All Polarities
Azimuth (Degrees)


Height Plot (916.800000349 MHz)
4
3.5
3
2.5
2
1.5
1
Height (m)
All Polarities
0
20
40
60
80
Level (dBuV/m)

Test Information

Test Details	User Entry	Additional Information
Test:	Radiated - FCC15 Class B @ 10m	
Project:	Whoop_G102837160_12-23-2016	
Test Notes:	120VAC 60Hz, WhoopStrap 2.0/USB Charger, Tx mode, Channel 39	
Temperature:	19 deg C	
Humidity:	21%, 1015mbar	
Tested by:	Vathana Ven	
Test Started:	23 Dec 2016 20 : 56	

Prescan Emission Graph



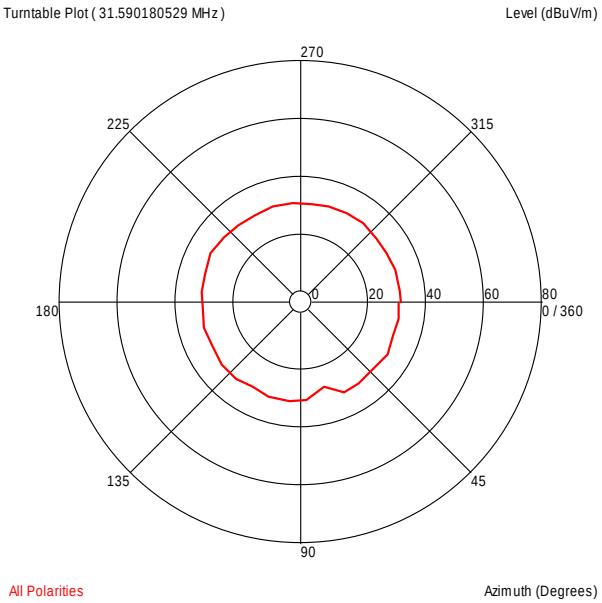
- Measured Peak Value
- Measured Quasi Peak Value
- Measured Average Value
- Maximum Value of Mast and Turntable
- Swept Peak Data
- Swept Quasi Peak Data
- Swept Average Data

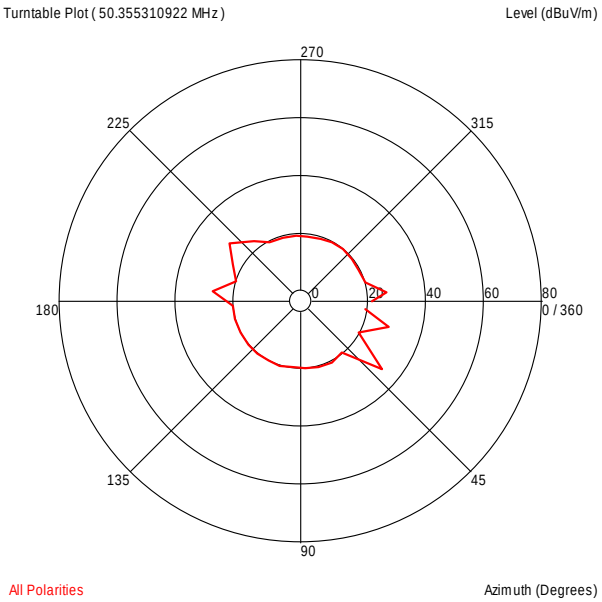
Emissions Test Data

Trace2: Measured Quasi Peak

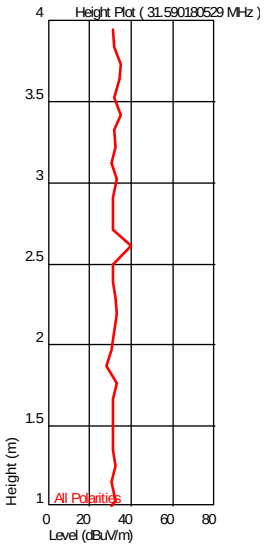
Frequency (Hz)	Level (dBuV/m)	AF	PA+CL	Limit (dBuV/m)	Margin (dBuV/m)	Hor (--), Ver (|)	Azimuth (deg)(Deg)	Mast Height(m)	RBW(Hz)	Comment
50.355310922 M	9.77	14.029	-27.382	30.000	-20.23	|	29	2.80	120 k	
113.985971707 M	16.17	19.397	-26.649	33.520	-17.35	|	213	2.41	120 k	
183.440280236 M	18.38	17.300	-25.899	33.520	-15.14	|	195	1.15	120 k	
964.29398788 M	29.46	29.814	-22.851	43.980	-14.52	|	195	1.78	120 k	
31.590180529 M	21.51	26.228	-27.743	30.000	-8.49	--	197	2.71	120 k	
710.729458475 M	31.88	26.729	-23.843	36.020	-4.14	|	360	2.88	120 k	

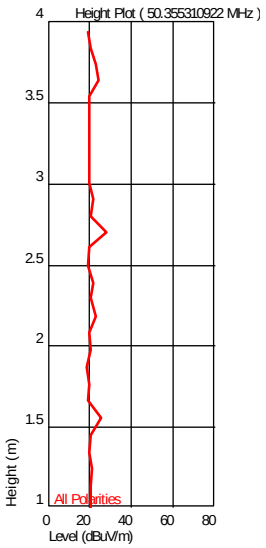
Azimuth Plots

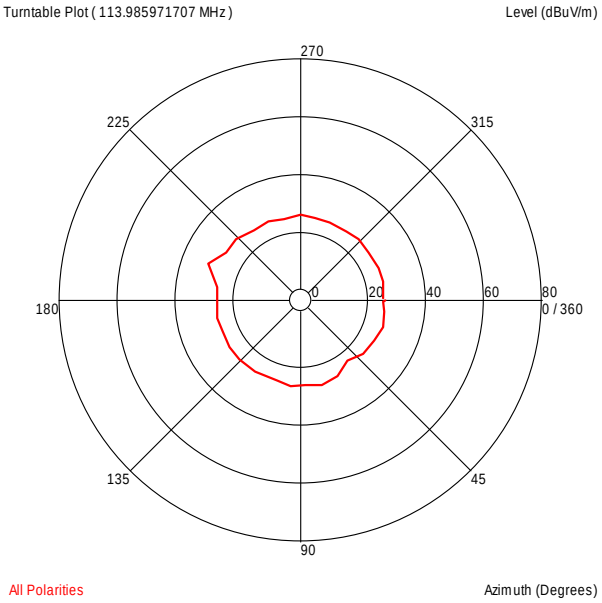


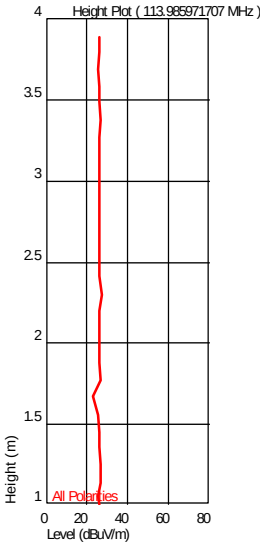


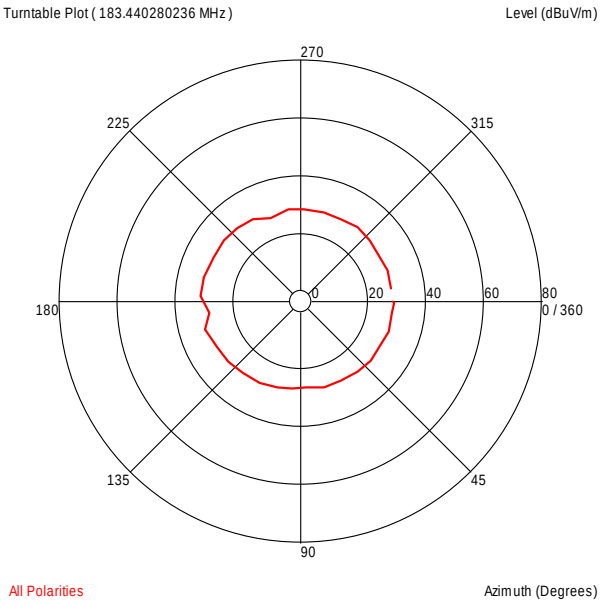
Turntable Plots

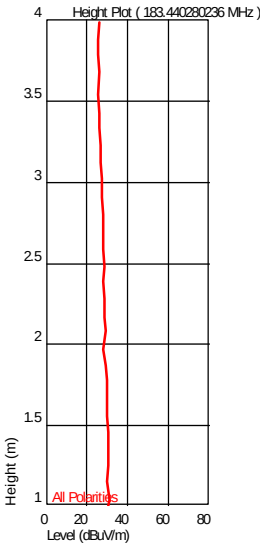


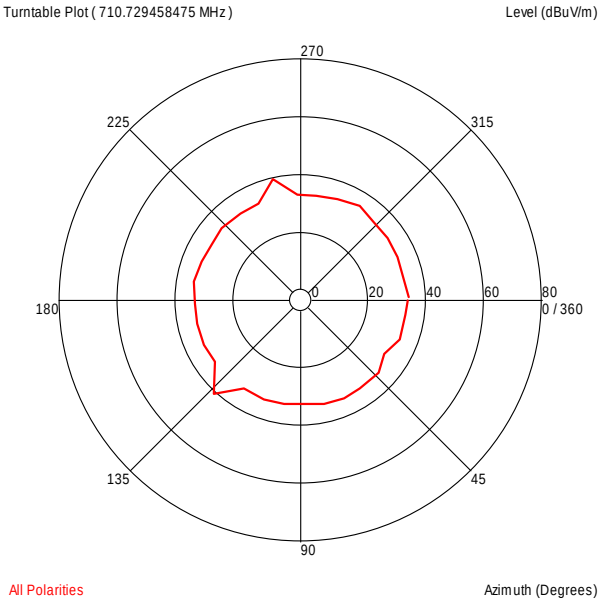


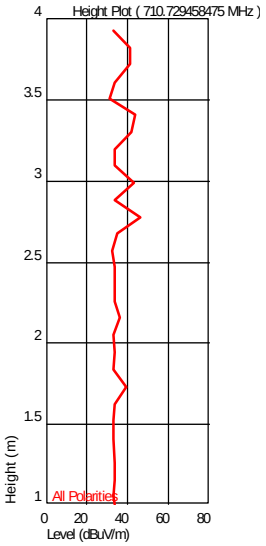

Turntable Plot (113.985971707 MHz)
Level (dBuV/m)
270
225
315
180
0
20
40
60
80
0 / 360
135
45
90
All Polarities
Azimuth (Degrees)

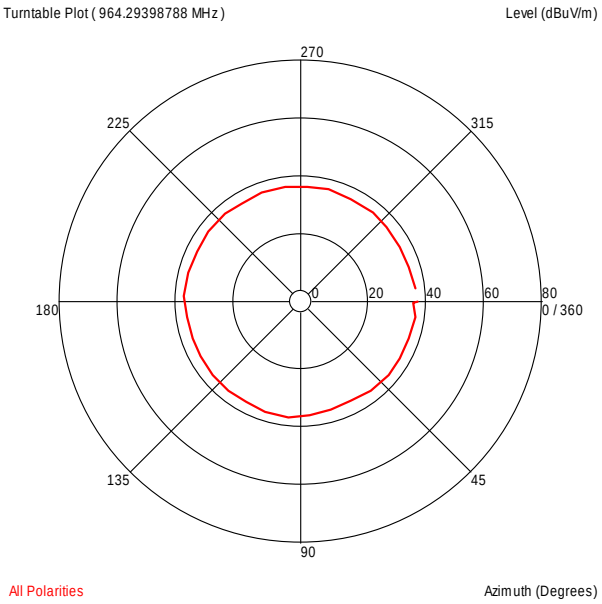

Height Plot (113.985971707 MHz)
4
3.5
3
2.5
2
1.5
1
Height (m)
All Polarities
0
20
40
60
80
Level (dBuV/m)

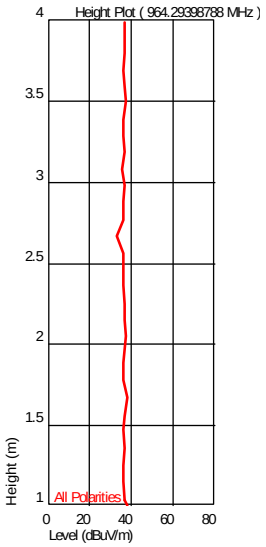

Turntable Plot (183.440280236 MHz)
Level (dBuV/m)
270
225
315
180
0
20
40
60
80
0 / 360
135
45
90
All Polarities
Azimuth (Degrees)


Height Plot (183.440280236 MHz)
4
3.5
3
2.5
2
1.5
1
Height (m)
All Polarities
0
20
40
60
80
Level (dBuV/m)









Test Personnel:	Vathana Ven VSV	Test Date:	12/23/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 15B, 15.247, ICES-003, RSS-247	Limit Applied:	Class B
Input Voltage:	120VAC/60Hz	Ambient Temperature:	19 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**Yes**	Relative Humidity:	21 %
		Atmospheric Pressure:	1015 mbars

Deviations, Additions, or Exclusions: None

9 AC Mains Conducted Emissions

9.1 Method

Tests are performed in accordance with FCC Part 15 Subpart B and ICES 003, FCC Part 15 Subpart C.

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.8dB	3.4dB
Telco Port Emissions	150 kHz - 30 MHz	3.2dB	5.0dB

As shown in the table above our conducted emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN or ISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV
NF = Net Reading in dBμV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

Alternately, when C5 Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. “TF” is the Transducer Factor; in this case LISN or ISN loss.

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV001'	Weather Station	Davis Instruments	7400	PE80519A61	11/28/2016	11/28/2017
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	07/29/2016	07/29/2017
CBLBNC 2012-4'	50 Ohm Coaxial Cable	Pomona	RG58C/U	CBLBCN2012-4	03/21/2016	03/21/2017
LISN31'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191957	03/14/2016	03/14/2017
DS23A'	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS23A	10/21/2016	10/21/2017

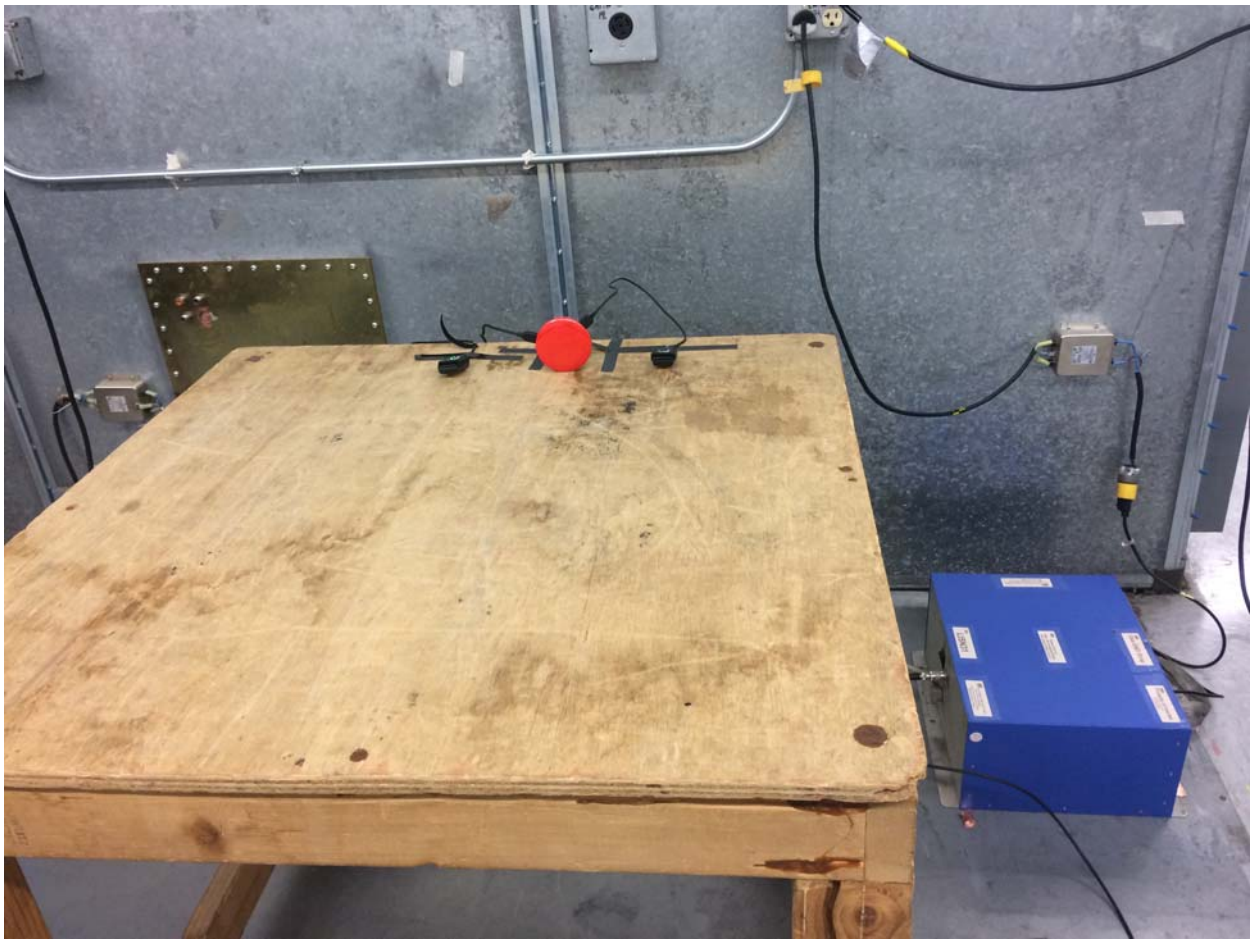
Software Utilized:

Name	Manufacturer	Version
Compliance5	Teseq	5.26.46.46

9.3 Results:

The sample tested was found to Comply.

9.4 Setup Photographs:



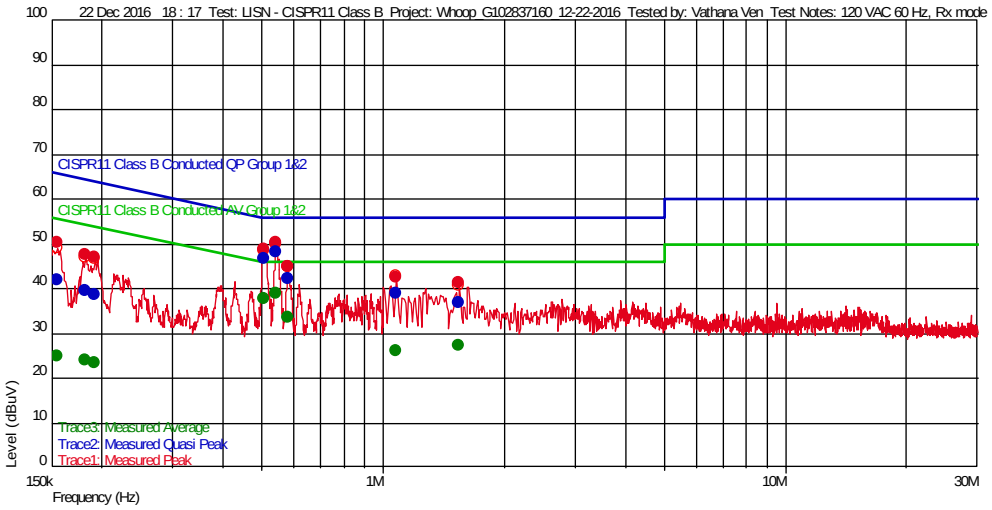
9.5 Plots/Data:

Operating @ 120VAC 60Hz Rx Mode

Test Information

Test Details	User Entry	Additional Information
Test:	LISN – FCC Part 15B Class B	
Project:	Whoop_G102837160_12-22-2016	
Test Notes:	120 VAC 60 Hz, Rx mode	
Temperature:	23 deg C	
Humidity:	18%, 1004 mB	
Tested by:	Vathana Ven	
Test Started:	22 Dec 2016 18 : 17	

Prescan Emission Graph



Measured Peak Value
Measured Quasi Peak Value
Measured Average Value
Maximum Value of Mast and Turntable
Swept Peak Data
Swept Quasi Peak Data
Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
192.5 k	38.57	0.046	20.592	63.928	-25.35	9 k		N
182.3 k	39.49	0.054	20.592	64.380	-24.89	9 k		N
155.1 k	41.86	0.076	20.594	65.722	-23.86	9 k		N
1.549 M	36.99	0.020	20.552	56.000	-19.01	9 k		L1
1.081 M	38.88	0.020	20.544	56.000	-17.12	9 k		L1
580.95 k	42.22	0.021	20.568	56.000	-13.78	9 k		L1
505.3 k	46.57	0.023	20.573	56.000	-9.43	9 k		L1
543.55 k	48.12	0.022	20.570	56.000	-7.88	9 k		L1

Trace3: Measured Average

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
155.1 k	24.98	0.076	20.594	55.722	-30.74	9 k		N
192.5 k	23.43	0.046	20.592	53.928	-30.49	9 k		N
182.3 k	23.91	0.054	20.592	54.380	-30.47	9 k		N
1.081 M	26.15	0.020	20.544	46.000	-19.85	9 k		L1
1.549 M	27.31	0.020	20.552	46.000	-18.69	9 k		L1
580.95 k	33.51	0.021	20.568	46.000	-12.49	9 k		L1
505.3 k	37.69	0.023	20.573	46.000	-8.31	9 k		L1
543.55 k	38.87	0.022	20.570	46.000	-7.13	9 k		L1

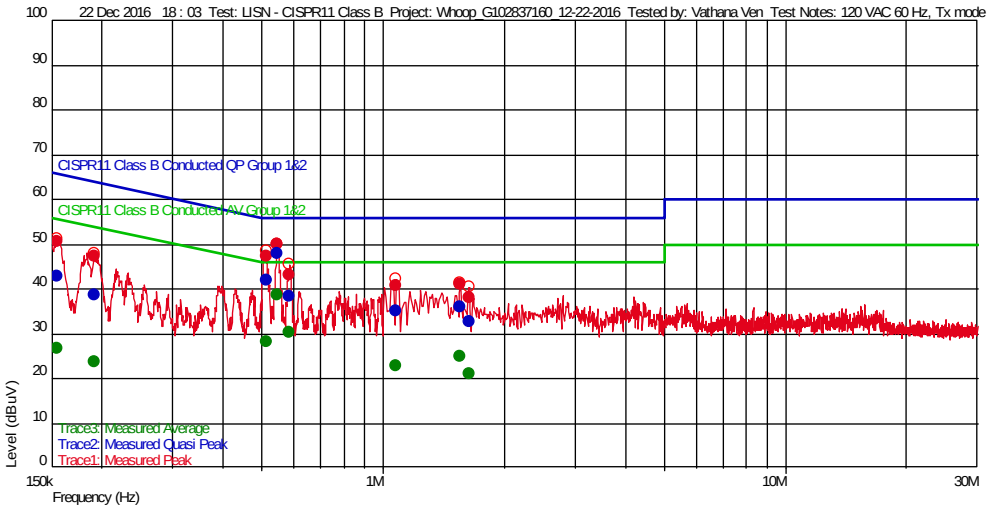
Limits for the FCC and CISPR 11 are the same.

Operating @ 120VAC 60Hz Tx Mode

Test Information

Test Details	User Entry	Additional Information
Test:	LISN – FCC Part 15B Class B	
Project:	Whoop_G102837160_12-22-2016	
Test Notes:	120 VAC 60 Hz, Tx mode	
Temperature:	23 deg C	
Humidity:	18%, 1004 mB	
Tested by:	Vathana Ven	
Test Started:	22 Dec 2016 18 : 03	

Prescan Emission Graph



Measured Peak Value
Measured Quasi Peak Value
Measured Average Value
Maximum Value of Mast and Turntable
Swept Peak Data
Swept Quasi Peak Data
Swept Average Data

Emissions Test Data

Trace2: Measured Quasi Peak

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
192.5 k	38.70	0.046	20.592	63.928	-25.22	9 k		N
1.639 M	32.75	0.020	20.554	56.000	-23.25	9 k		L1
155.1 k	42.81	0.076	20.594	65.722	-22.91	9 k		L1
1.081 M	34.94	0.020	20.544	56.000	-21.06	9 k		L1
1.558 M	35.90	0.020	20.553	56.000	-20.10	9 k		L1
585.2 k	38.24	0.020	20.568	56.000	-17.76	9 k		L1
513.8 k	41.99	0.023	20.572	56.000	-14.01	9 k		N
545.25 k	47.84	0.022	20.570	56.000	-8.16	9 k		L1

Trace3: Measured Average

Frequency(Hz)	Level(dBuV)	TF	PA+CL	Limit(dBuV)	Margin(dBuV)	RBW(Hz)	Comment	LINE
192.5 k	23.63	0.046	20.592	53.928	-30.30	9 k		N
155.1 k	26.63	0.076	20.594	55.722	-29.09	9 k		L1
1.639 M	21.19	0.020	20.554	46.000	-24.81	9 k		L1
1.081 M	22.74	0.020	20.544	46.000	-23.26	9 k		L1
1.558 M	25.07	0.020	20.553	46.000	-20.93	9 k		L1
513.8 k	28.13	0.023	20.572	46.000	-17.87	9 k		N
585.2 k	30.33	0.020	20.568	46.000	-15.67	9 k		L1
545.25 k	38.75	0.022	20.570	46.000	-7.25	9 k		L1

Limits for the FCC and CISPR 11 are the same.

Test Personnel:	Vathana Ven VSV	Test Date:	12/22/2016
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part15 Subpart B ICES 003	Limit Applied:	Class B
Input Voltage:	120VAC 60Hz		
Pretest Verification w/ Ambient Signals or BB Source:	BB Source	Ambient Temperature:	23 ºC
		Relative Humidity:	18 %
		Atmospheric Pressure:	1004 mbars

Deviations, Additions, or Exclusions: None

10 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	12/23/2016	102837160BOX-001	VFV	MFM	Original Issue
1	01/31/2017	102837160BOX-001a	VFV	MFM	Corrected typo on page 3, 5, 36
2	02/06/2017	102837160BOX-001b	VFV	MFM	Re-measured and added output power