Shenzhen Huaxia Testing Technology Co., Ltd

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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

Test Report

Report No. :	CQASZ20190300204E-03
Applicant:	WHOOP INC
Address of Applicant:	1325 Boylston St, Suite 401, Boston, MA USA 02215
Manufacturer:	Shenzhen Fenda Technology Co., Ltd.
Address of Manufacturer:	Fenda Technology Park, Shiyan Road, Bao'an District, Shenzhen, Guangdong, China
Equipment Under Test (EUT):	
Product:	WHOOP Strap 3.0
Model No.:	WS30
Brand Name:	WHOOP, Inc.
Standards:	47 CFR PART 15, Subpart B
	ICES-003 Issue 6
Date of Test:	2019-03-24 to 2019-04-26
Date of Issue:	2019-04-26
Test Result :	**PASS***

Tested By： Daisy Qin

(Daisy Qin)

Reviewed By: Aaron Ma

(Aaron Ma)

Approved By:

(Jack Ai)

* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190300204E-03	Rev.01	Initial report	2019-04-25

2 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (30MHz to 25GHz)	47 CFR PART 15,Subpart B ICES-003 Issue 6	ANSI C63.4:2014	Class B	PASS
Conducted Emission (150kHz to 30MHz)	47 CFR PART 15,Subpart B ICES-003 Issue 6	ANSI C63.4:2014	Class B	PASS

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	**Upper frequency of measurement Range (MHz)**
Below 1.705	30
1.705 to 108	1000
108 to 500	2000
500 to 1000	5000
Above 1000	5th harmonic of the highest frequency or 40GHz, whichever is lower

Note:

The highest frequency of the internal sources of the EUT is 2480MHz

3 Contents

4 General Information

4.1 Details of E.U.T.

Power Supply: lithium battery:DC3.8V

4.2 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450c	Provide by lab	ID
AC/DC Adapter	Lenovo	ADLX65NLC3A	Provide by lab	DOC
Mobile phone	Apple	Iphone 8 plus	Provide by lab	ID

4.3 Measurement Uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for **CQA** laboratory is reported:

Test	Range	Uncertainty	Notes
Radiated Emission	Below 1GHz	±5.12dB	(1)
Radiated Emission	Above 1GHz	±4.60dB	(1)
Conducted Disturbance	0.15~30MHz	±3.34dB	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.4 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• CNAS (No. CNAS L5785)

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

• ISED#: 22984

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

5 Equipment List

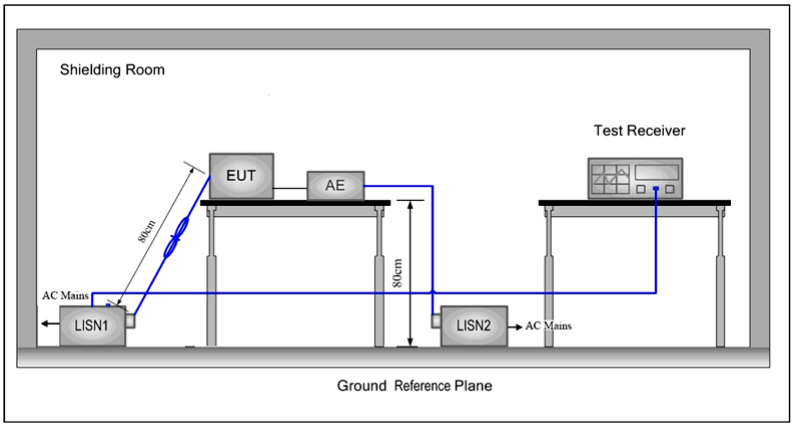
Radiated Emission					
Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Coaxial cable (1GHz~40GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial cable (9KHz~1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Instrument No.	Due Date
EMI Test Receiver	R&S	ESPI3	CQA-005	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable (9KHz~300MHz)	CQA	N/A	C009	2018/9/26	2019/9/25

6 Test Results

6.1 Conducted Emissions Mains Terminals, 150kHz to 30MHz

Test Requirement:	47 CFR PART 15,Subpart B ICES-003 Issue 6
Test Method:	ANSI C63.4
Frequency Range:	150kHz to 30MHz
Class / Severity:	Class B
Limit:	
0.15M-0.5MHz	66dB(dBμV)-56dB(dBμV) quasi-peak, 56dB(dBμV)-46dB(dBμV) average
0.5M-5MHz	56dB(dBμV) quasi-peak, 46dB(dBμV) average
5M-30MHz	60dB(dBμV) quasi-peak, 50dB(dBμV) average
Test Setup:	



Test Procedure:

1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.

Detector: Peak for pre-scan (9kHz Resolution Bandwidth)

Quasi-Peak if maximised peak within 6dB of Quasi-Peak limit

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.0 °C Humidity: 55 % RH Atmospheric Pressure: 1015 mbar

EUT Operation: Mode a: Charging

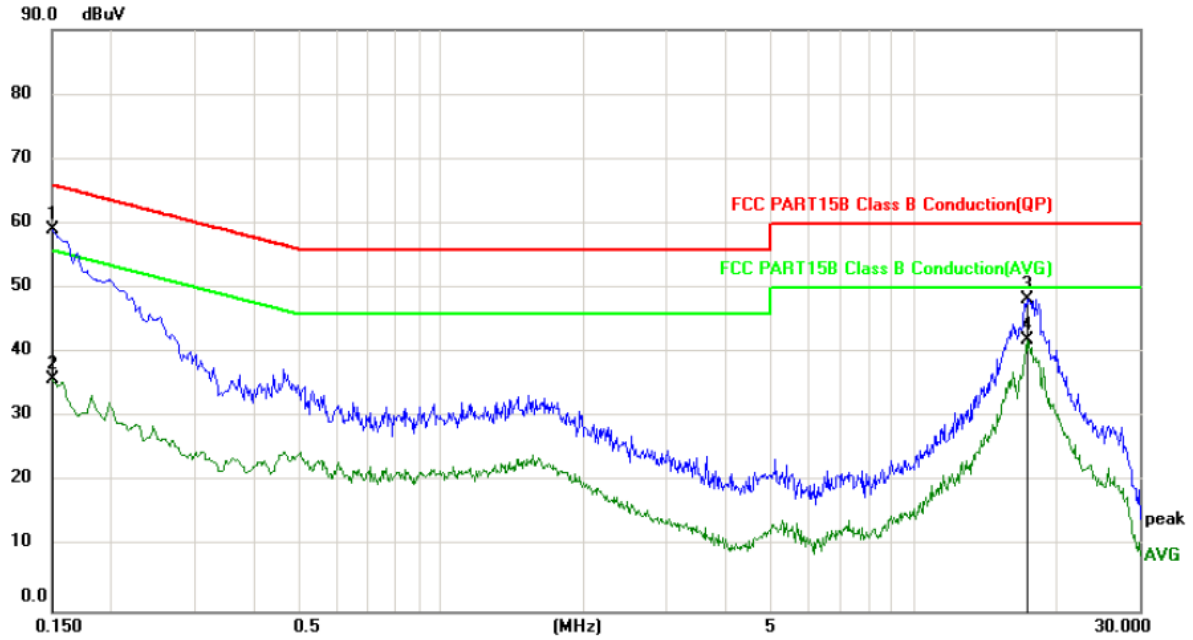
Test Status: Pretest the EUT at different test mode and found the Mode a which is worst case, the test worst case mode is recorded in the report.

Test voltage: 120V/60Hz

6.1.2 Measurement Data

Mode a:

Live line



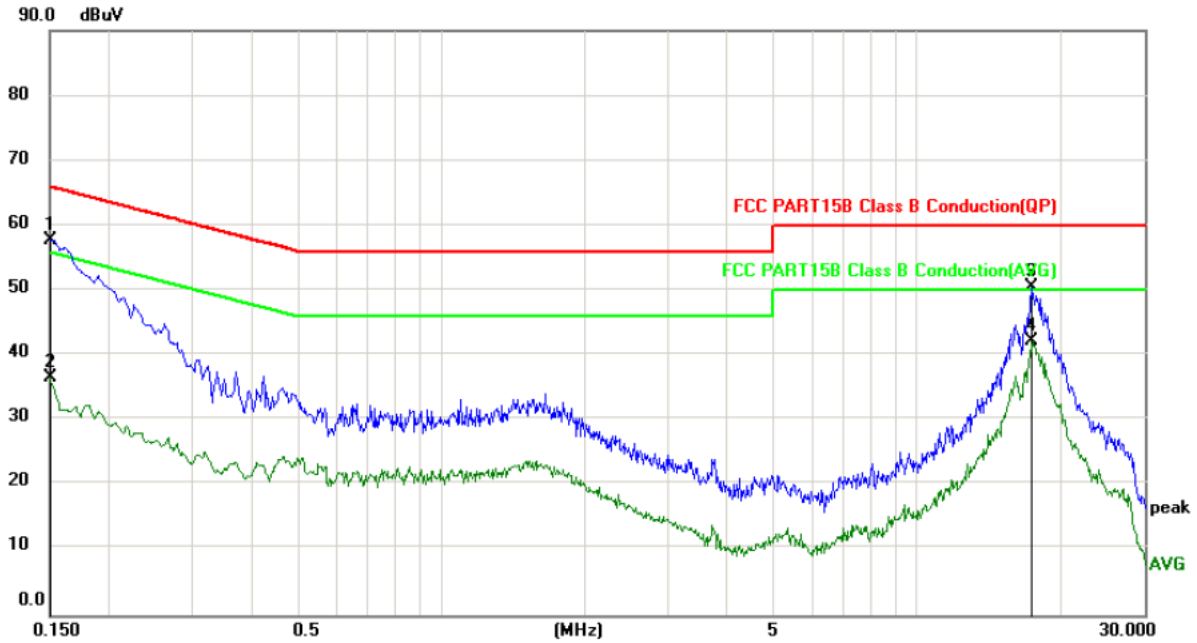
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	*	0.1500	49.39	9.73	59.12	66.00	-6.88	QP
2		0.1500	26.25	9.73	35.98	56.00	-20.02	AVG
3		17.3100	38.49	9.86	48.35	60.00	-11.65	QP
4		17.3100	31.99	9.86	41.85	50.00	-8.15	AVG

Remark:

1. The following Peak, Quasi-Peak and Average measurements were performed on the EUT:
2. Correct Factor= LISN Factor + Cable Loss
3. Final Test Level =Receiver Reading + Correct Factor.
4. Over Limit= Final Test Level - Limit

Mode b:

Neutral line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	48.01	9.79	57.80	66.00	-8.20	QP
2		0.1500	26.75	9.79	36.54	56.00	-19.46	AVG
3		17.3139	40.58	9.88	50.46	60.00	-9.54	QP
4	*	17.3139	32.23	9.88	42.11	50.00	-7.89	AVG

Remark:

1. The following Peak, Quasi-Peak and Average measurements were performed on the EUT:
2. Correct Factor= LISN Factor + Cable Loss
3. Final Test Level =Receiver Reading + Correct Factor.
4. Over Limit= Final Test Level - Limit

6.2 Radiated Emissions, 30MHz to 25GHz

Test Requirement:	47 CFR PART 15,Subpart B ICES-003 Issue 6
Test Method:	ANSI C63.4
Frequency Range:	30MHz to 6GHz
Measurement Distance:	3m
Class:	Class B
Limit:	40.0 dBμV/m between 30MHz & 88MHz 43.5 dBμV/m between 88MHz & 216MHz 46.0 dBμV/m between 216MHz & 960MHz /54.0 dBμV/m above 960MHz
The highest frequence:	74 dBμV/m above 960MHz for peak 54 dBμV/m above 960MHz for average

Test Setup:

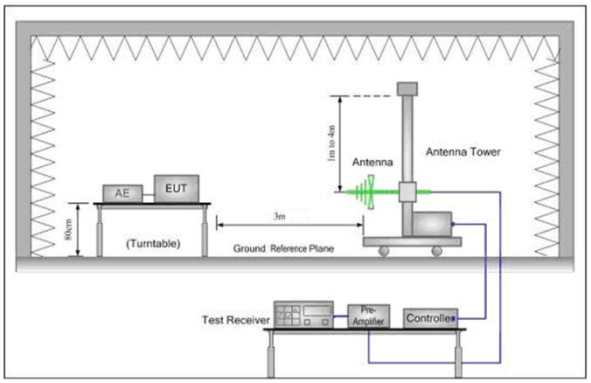


Figure 1. 30MHz to 1GHz

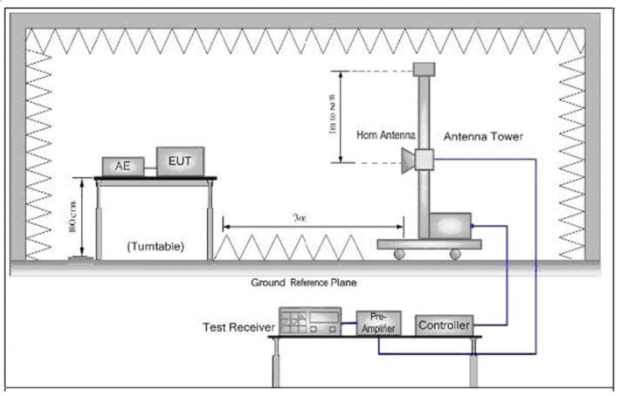


Figure 2. Above 1 GHz

Test Procedure:

1) The radiated emissions were tested in a semi-anechoic chamber.
2) The EUT is placed on a turntable, which is 0.8m above ground plane.
3) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4) EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
5) Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6) And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7) Repeat above procedures until the measurements for all frequencies are complete.

2. Above 1GHz test procedure as below:

1) Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and receiving antenna is moved from 1m to 4m.

Detector: Peak for pre-scan (120kHz resolution bandwidth)

Quasi-Peak if maximised peak within 6dB of limit

6.2.1 E.U.T. Operation

Operating Environment:

Temperature:	22.0 °C	Humidity:	54 % RH	Atmospheric Pressure:	1015	mbar	

EUT Operation: For below 1GHz:
Mode a: Charging
Mode b: Bluetooth Link
Mode c: NFC Link
For above 1GHz:
Mode b: Bluetooth Link

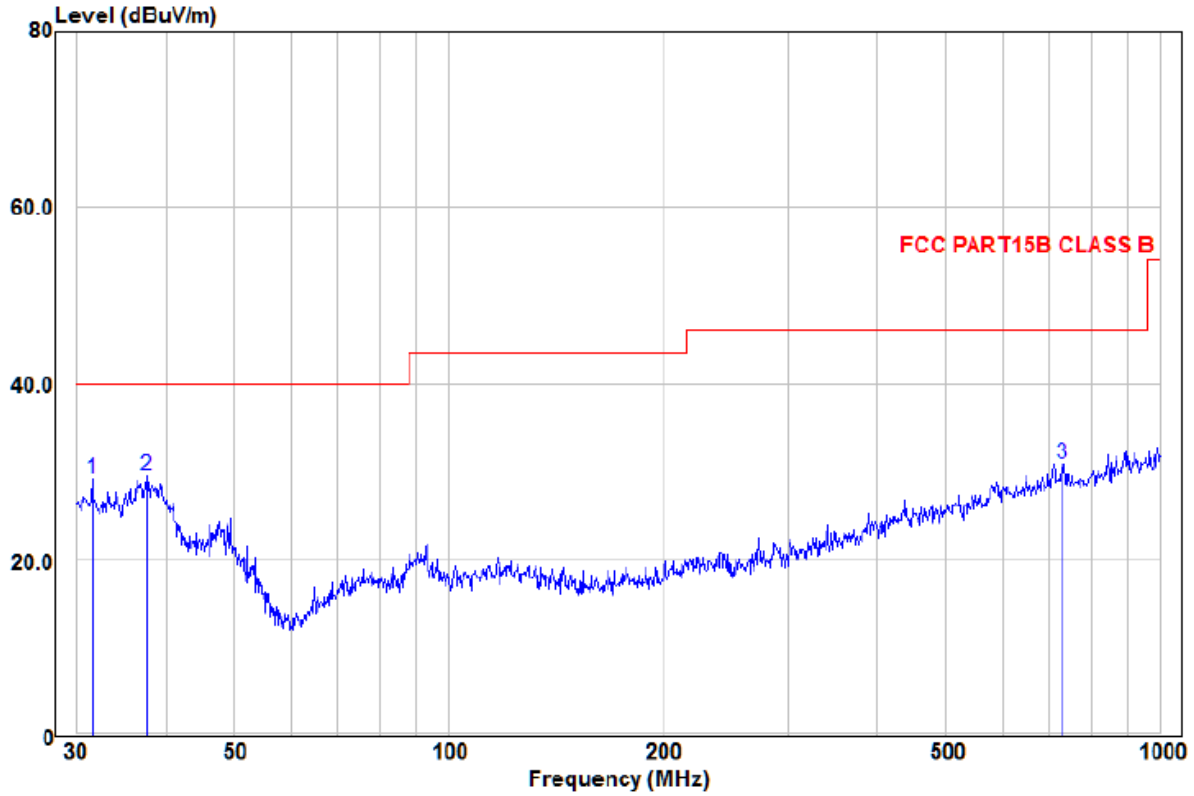
Test Status: Pretest the EUT at different test mode and found the Mode b which is worst case, the test worst case mode is recorded in the report.

6.2.2 Measurement Data

Below 1GHz:

Mode b

Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	31.51	11.79	17.35	29.14	40.00	-10.86	Peak	VERTICAL
2 pp	37.68	12.85	16.63	29.48	40.00	-10.52	Peak	VERTICAL
3	729.36	10.93	19.97	30.90	46.00	-15.10	Peak	VERTICAL

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic

equation with a sample calculation is as follows:

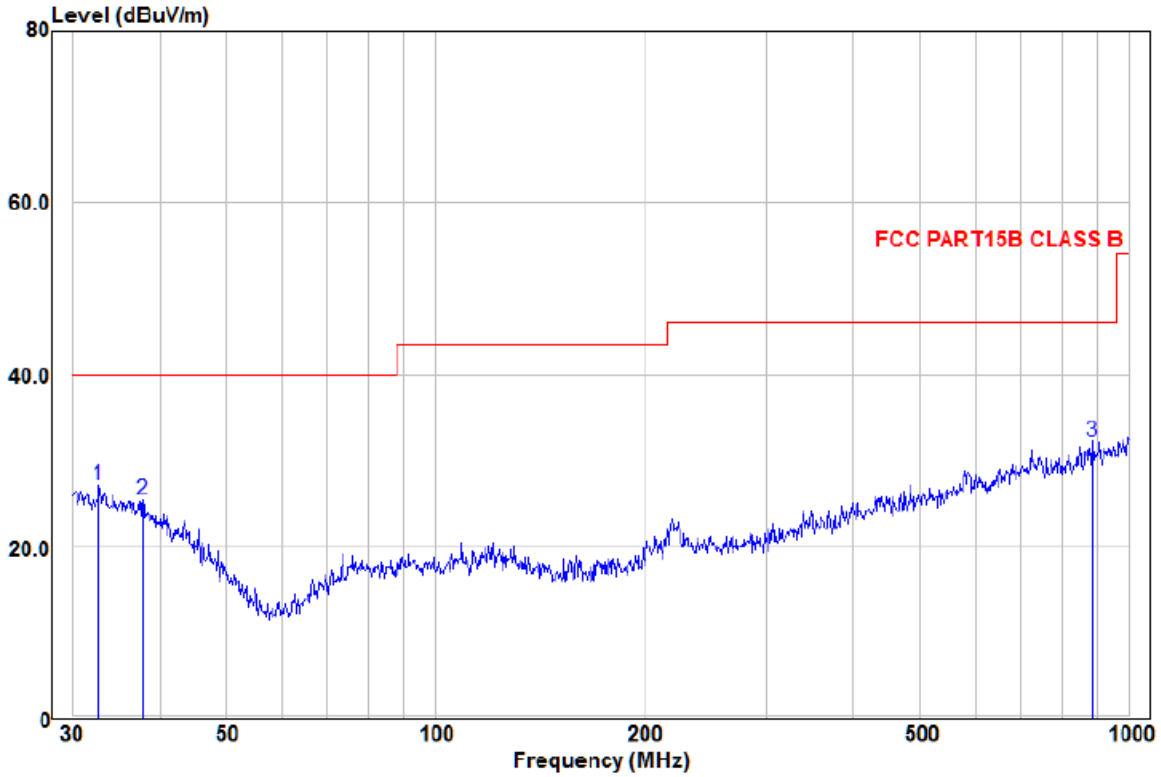
Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

Level = Read Level + Factor,

Over Limit=Level-Limit Line.

Mode b:

Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	32.75	9.96	17.19	27.15	40.00	-12.85	Peak	HORIZONTAL
2	37.81	8.81	16.62	25.43	40.00	-14.57	Peak	HORIZONTAL
3	887.61	10.88	21.40	32.28	46.00	-13.72	Peak	HORIZONTAL

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic

equation with a sample calculation is as follows:

Factor= Antenna Factor + Cable Factor – Preamplifier Factor,

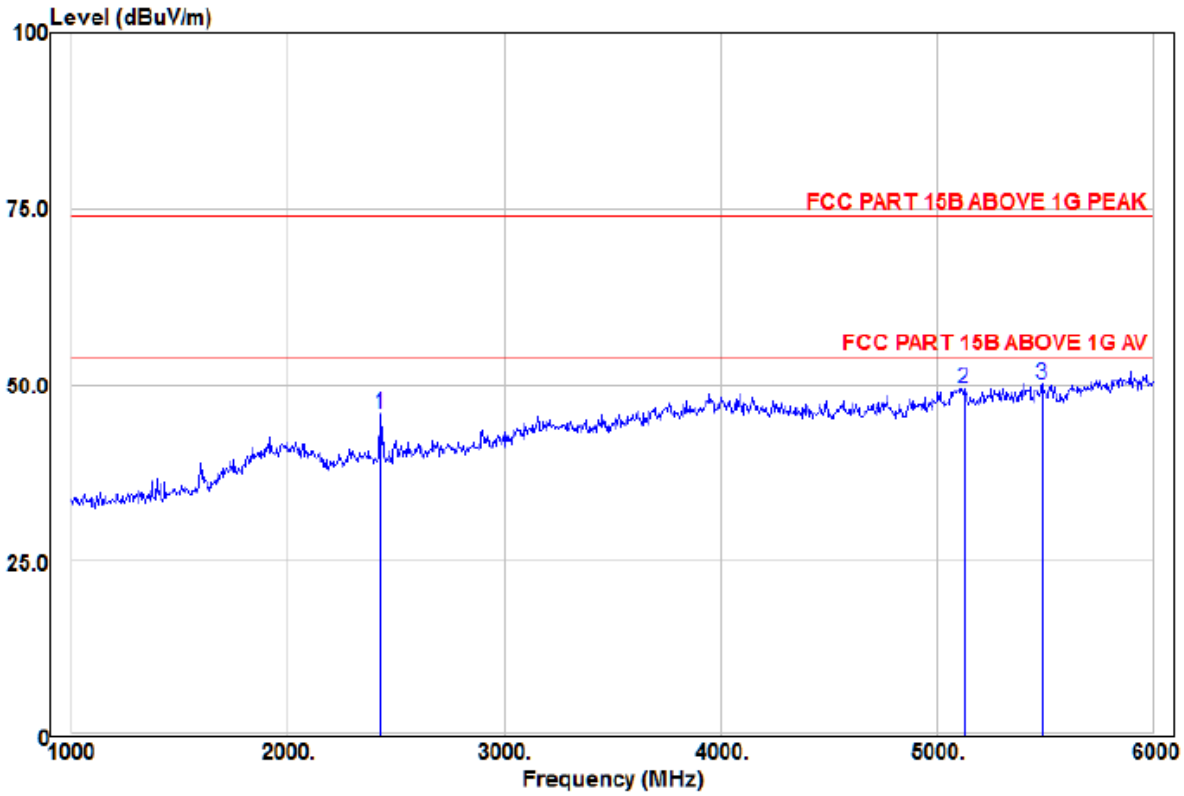
Level = Read Level + Factor,

Over Limit=Level-Limit Line.

Above 1GHz

Mode b:

Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	2425.00	54.61	-8.84	45.77	74.00	-28.23	Peak	HORIZONTAL
2	5125.00	48.96	0.61	49.57	74.00	-24.43	Peak	HORIZONTAL
3 pp	5490.00	48.40	1.73	50.13	74.00	-23.87	Peak	HORIZONTAL

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

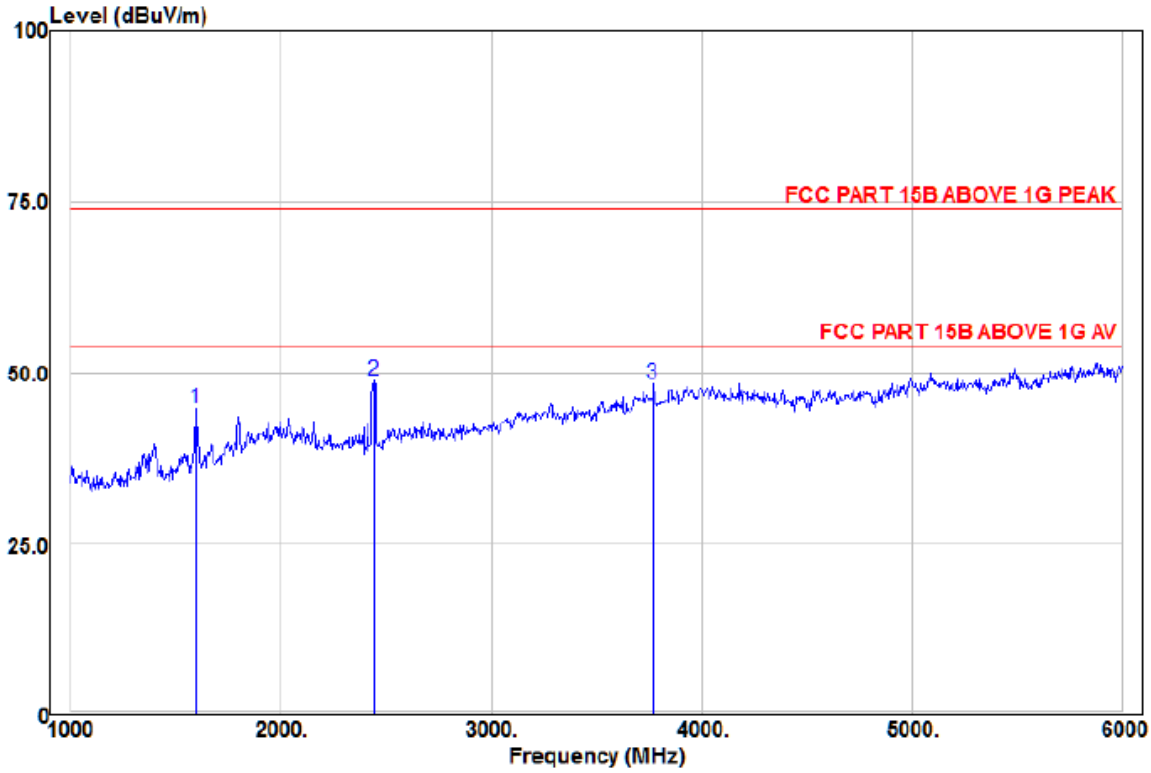
   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 30M to 25GHz, the disturbance above 6GHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

3) 2402~2480MHz was the fundamental frequency range

Mode b:

Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	1595.00	58.00	-13.26	44.74	74.00	-29.26	Peak	VERTICAL
2 pp	2440.00	57.85	-8.97	48.88	74.00	-25.12	Peak	VERTICAL
3	3770.00	51.04	-2.58	48.46	74.00	-25.54	Peak	VERTICAL

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

   Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 30M to 25GHz, the disturbance above 6GHz was very low. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

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