FCC TEST REPORT

FOR

Suunto Sports Technology(Dongguan)Co., Ltd.

SUUNTO RACE

Test Model: OW224

Prepared for	:	Suunto Sports Technology(Dongguan)Co., Ltd.
Address	:	Room 108, No. 5, Longxi Road, Nancheng Street, Dongguan City, Guangdong Province China

Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	March 23, 2023
Number of tested samples	:	2
Sample No.	:	A032123039-1, A032123039-2
Serial number	:	Prototype
Date of Test	:	March 23, 2023 ~ April 07, 2023
Date of Report	:	April 10, 2023

FCC TEST REPORT
FCC CFR 47 PART 15 C (15.225)

Report Reference No.	:	**LCSA032123039EC**
Date of Issue.....	:	April 10, 2023
Testing Laboratory Name.....	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	:	**Suunto Sports Technology(Dongguan)Co., Ltd.**
Address.....	:	Room 108, No. 5, Longxi Road, Nancheng Street, Dongguan City, Guangdong Province China
Test Specification		
Standard.....	:	FCC CFR 47 PART 15 C(15.225)
Test Report Form No.....	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

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Test Item Description.....	:	**SUUNTO RACE**
Trade Mark.....	:	SUUNTO
Test Model.....	:	OW224
Ratings.....	:	Input: DC 5V, 500mA, Max 0.5W Output: DC 5V, 500mA, Max 0.5W DC 3.87V by Rechargeable Li-ion Battery, 515mAh
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Rory Huang	Cary Luo	Gavin Liang
Rory Huang/ Administrator	Cary Luo/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : **LCSA032123039EC**	April 10, 2023 Date of issue

Test Model.....	: OW224
EUT.....	: SUUNTO RACE
Applicant.....	**: Suunto Sports Technology(Dongguan)Co., Ltd.**
Address.....	: Room 108, No. 5, Longxi Road, Nancheng Street, Dongguan City, Guangdong Province China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Suunto Sports Technology(Dongguan)Co., Ltd.**
Address.....	: Room 108, No. 5, Longxi Road, Nancheng Street, Dongguan City, Guangdong Province China
Telephone.....	: /
Fax.....	: /
Factory.....	**: Suunto Sports Technology(Dongguan)Co., Ltd.**
Address.....	: Room 108, No. 5, Longxi Road, Nancheng Street, Dongguan City, Guangdong Province China
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Report Version	Issue Date	Revision Content	Revised By
000	April 10, 2023	Initial Issue	---

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1. GENERAL INFORMATION

1.1 Description of Device (EUT)

EUT	: SUUNTO RACE
Test Model	: OW224
Power Supply	: Input: DC 5V, 500mA, Max 0.5W Output: DC 5V, 500mA, Max 0.5W DC 3.87V by Rechargeable Li-ion Battery, 515mAh
Hardware Version	: 0732A2
Software Version	: 2.24.21
Bluetooth	:
Frequency Range	: 2402MHz~2480MHz
Channel Number	: 40 channels for Bluetooth V5.2 (DTS)
Channel Spacing	: 2MHz for Bluetooth V5.2 (DTS)
Modulation Type	: GFSK for Bluetooth V5.2 (DTS)
Bluetooth Version	: V5.2
Antenna Description	: Metal Frame Antenna, -4.54dBi(Max.)
WIFI(2.4G Band)	:
Frequency Range	: 2412MHz~2462MHz
Channel Spacing	: 5MHz
Channel Number	: 11 Channels for 20MHz bandwidth (2412~2462MHz)
Modulation Type	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Description	: Metal Frame Antenna, -4.54dBi(Max.)
NFC	:
Operating Frequency	: 13.56MHz
Modulation Type	: ASK
Antenna Description	: Internal Antenna, 0dBi(Max.)
GPS function	: Support and only RX

1.2 Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
SHENZHEN TIANYIN ELECTRONICS CO., LTD	Power Adapter	TPA-46050200UU	---	FCC

Note: The adapter is supplied by lab and only use tested.

1.3 External I/O

I/O Port Description	Quantity	Cable
---	---	---

1.4 Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5 Statement of The 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 LCS 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.

1.6 Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±3.80dB	(1)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)

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

1.7 Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in Y position.

AC conducted emission pre-test at both at AC 120V/60Hz and AC 240V/50Hz modes, recorded worst case.

Worst-case mode and channel used for 150 KHz-30 MHz power line conducted emissions was the mode and channel with the highest output power.

Worst-case mode and channel used for 9 KHz-1000 MHz radiated emissions was the mode and channel with the highest output power.

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.225 under the FCC Rules Part 15 Subpart C.

2.3 General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz and 1.5 m above gr ound plane above 1GHz. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10-2013.

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition and change test channels by software PhoenixTSW provided by applicant.

3.3. Special Accessories

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/ unshielded	Notes
/	/	/	/	/	/	/	/

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C		
Test Items	**FCC Rules**	**Result**
Line Conducted Emissions	§15.207(a)	PASS
Field Strength of Fundamental Emissions	§15.225(a)(b)(c)	PASS
Radiated Emissions	§15.225(d) & §15.209	PASS
20dB Bandwidth	§ 15.215	PASS
Frequency Stability	§15.225(e)	PASS
Antenna Requirement	§15.203	PASS

5. RADIATED MEASUREMENT

5.1. Radiated Emission

5.1.1. Standard Applicable

According to §15.209/ §15.205

15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
\1\ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293.	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(\2\)
13.36-13.41			

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

\2\ Above 38.6

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.1.2. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

5.1.3. Test Procedures

1) Sequence of testing 9 kHz to 30 MHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna height is 1.0 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) Sequence of testing 30 MHz to 1 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) Sequence of testing 1 GHz to 18 GHz

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

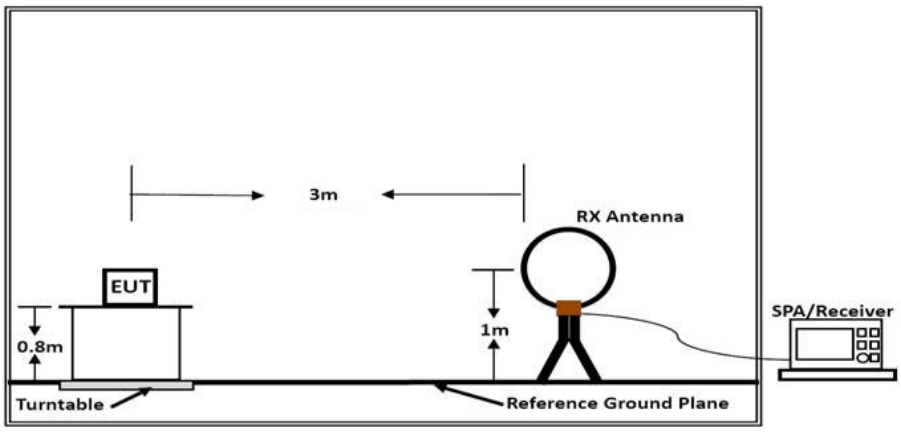
--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

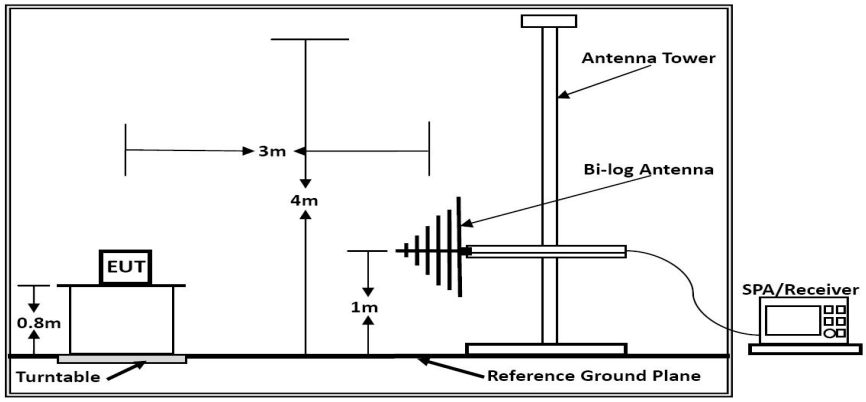
--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

5.1.4. Test Setup Layout



Below 30MHz



Below 1GHz

5.1.5. Test Results

Temperature	23.8℃	Humidity	52.5%
Test Engineer	Jack Cheng	Configurations	NFC

PASS.

The test data please refer to following page:

9 KHz~30MHz

X axis

Freq. MHz	Reading dBuA	Factor dB	Measured dBuA/m	Conversion factor dB (dBuA/m to dBuV/m)	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark
0.48	47.78	-30.85	16.93	51.50	68.43	113.91	-45.49	PK
2.36	30.36	-30.85	-0.49	51.50	51.01	69.54	-18.53	QP
6.74	31.05	-30.74	0.31	51.50	51.81	69.54	-17.73	QP
8.30	34.23	-30.72	3.51	51.50	55.01	69.54	-14.53	QP
13.56	48.87	-31.20	17.67	51.50	69.17	124.00	-54.83	QP
19.28	33.62	-30.72	2.90	51.50	54.40	69.54	-15.14	QP
21.70	29.96	-31.10	-1.14	51.50	50.36	69.54	-19.18	QP
23.35	28.66	-31.09	-2.43	51.50	49.07	69.54	-20.47	QP

Y axis

Freq. MHz	Reading dBuA	Factor dB	Measured dBuA/m	Conversion factor dB (dBuA/m to dBuV/m)	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark
0.54	47.51	-30.85	16.66	51.50	68.16	112.97	-44.81	PK
2.40	30.22	-30.85	-0.63	51.50	50.87	69.54	-18.67	QP
6.68	31.12	-30.74	0.38	51.50	51.88	69.54	-17.66	QP
8.40	34.18	-30.72	3.46	51.50	54.96	69.54	-14.58	QP
13.56	48.90	-31.20	17.70	51.50	69.20	124.00	-54.80	QP
19.24	33.81	-30.72	3.09	51.50	54.59	69.54	-14.95	QP
21.60	30.22	-31.10	-0.88	51.50	50.62	69.54	-18.92	QP
23.37	28.59	-31.09	-2.50	51.50	49.00	69.54	-20.54	QP

Z axis

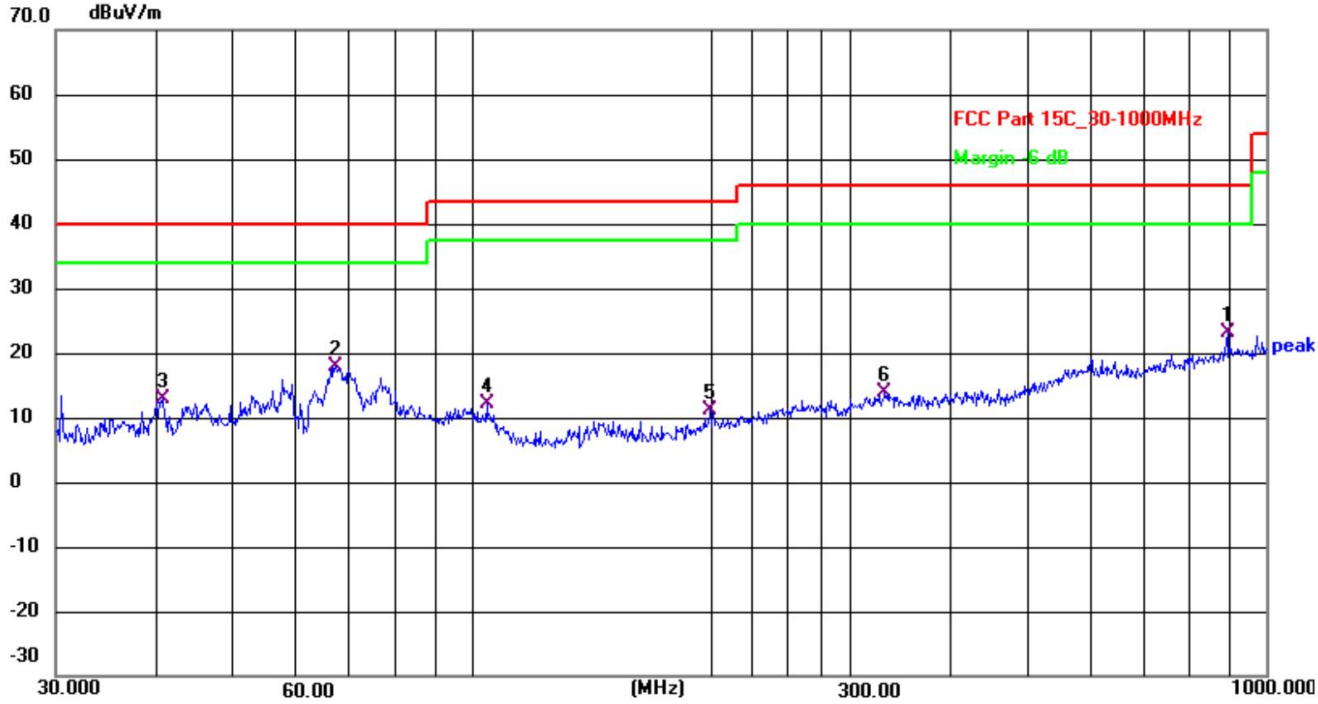
Freq. MHz	Reading dBuA	Factor dB	Measured dBuA/m	Conversion factor dB (dBuA/m to dBuV/m)	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark
0.37	47.66	-30.85	16.81	51.50	68.31	116.21	-47.90	PK
2.32	30.15	-30.85	-0.70	51.50	50.80	69.54	-18.74	QP
6.79	30.87	-30.74	0.13	51.50	51.63	69.54	-17.91	QP
8.36	34.13	-30.72	3.41	51.50	54.91	69.54	-14.63	QP
13.56	48.98	-31.20	17.78	51.50	69.28	124.00	-54.72	QP
19.23	33.77	-30.72	3.05	51.50	54.55	69.54	-14.99	QP
21.61	30.24	-31.10	-0.86	51.50	50.64	69.54	-18.90	QP
23.54	28.68	-31.09	-2.41	51.50	49.09	69.54	-20.45	QP

*Note: 1. Emission Level= Reading Level + Antenna Factor + Cable Loss
2. Margin = Emission Limit – Emission Values
3. Only recorded the worst test result.

30MHz ~ 1GHz

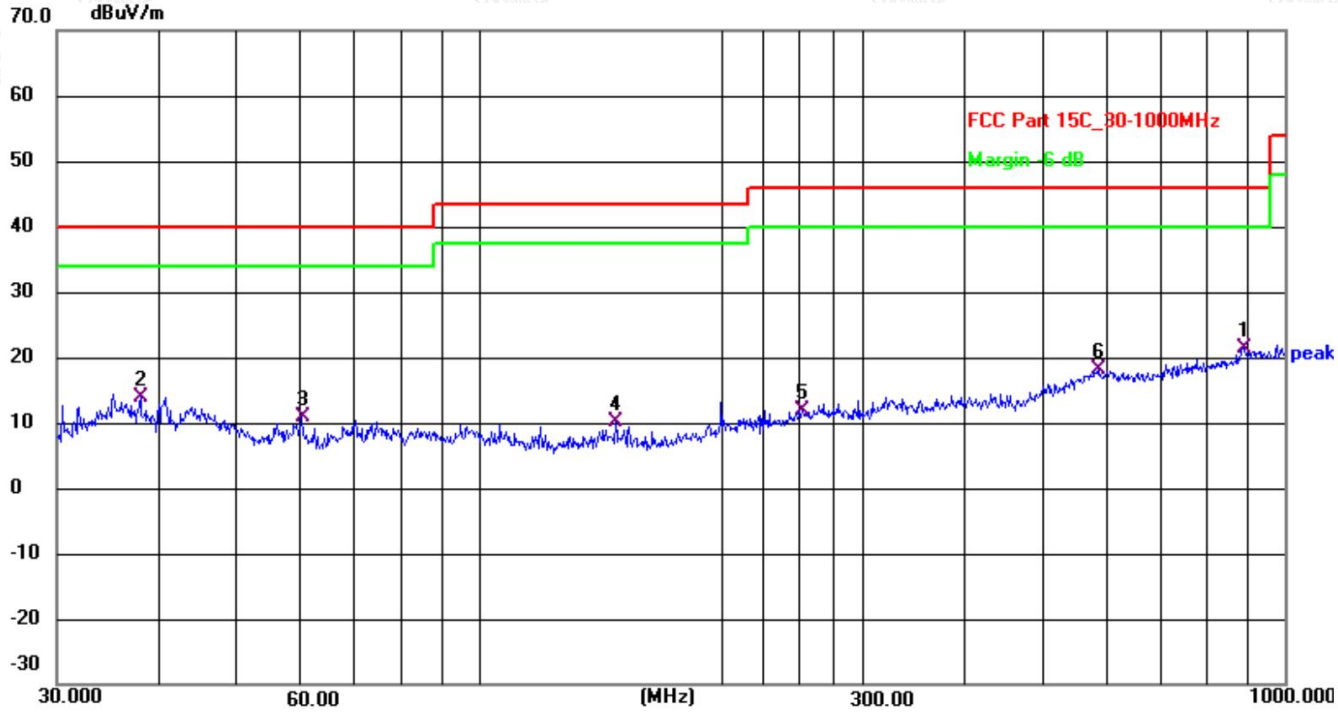
Temperature	23.8℃	Humidity	52.1%
Test Engineer	Jack Cheng	Configurations	NFC

Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	893.8565	31.65	-8.40	23.25	46.00	-22.75	QP
2	67.4381	37.29	-19.32	17.97	40.00	-22.03	QP
3	40.9879	30.25	-17.41	12.84	40.00	-27.16	QP
4	104.5360	30.67	-18.58	12.09	43.50	-31.41	QP
5	199.9855	28.53	-17.39	11.14	43.50	-32.36	QP
6	331.3546	28.21	-14.36	13.85	46.00	-32.15	QP

Vertical:

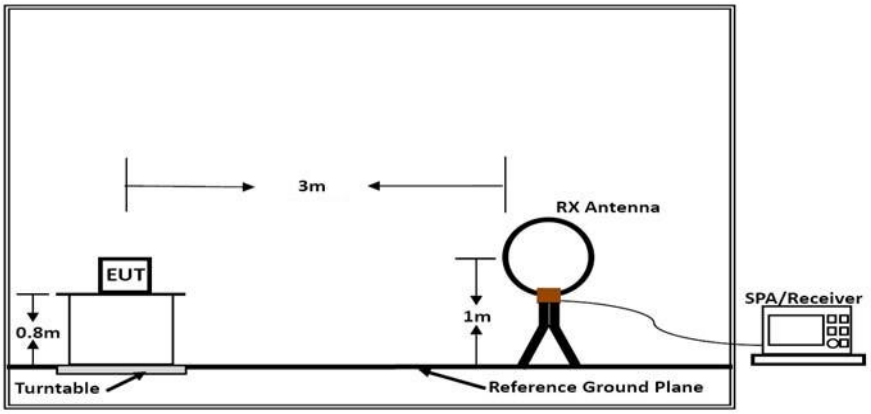


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	890.7277	29.95	-8.45	21.50	46.00	-24.50	QP
2	38.0782	31.53	-17.65	13.88	40.00	-26.12	QP
3	60.2801	29.81	-18.87	10.94	40.00	-29.06	QP
4	147.9214	30.07	-20.05	10.02	43.50	-33.48	QP
5	252.0627	27.51	-15.58	11.93	46.00	-34.07	QP
6	586.8436	28.89	-10.66	18.23	46.00	-27.77	QP

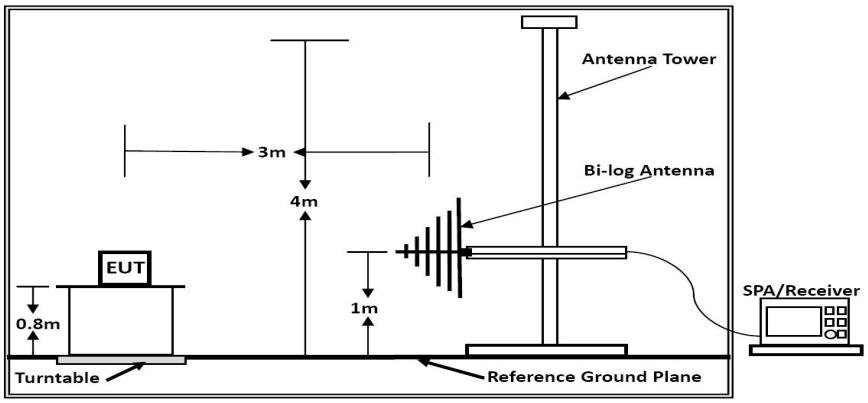
Note:
Pre-scan all modes and recorded the worst case results in this report.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Factor + Read Level = Level.
Margin=Level – Limit.

5.2. Field Strength of Fundamental Emissions and Mask Measurement

5.2.1. Block Diagram of Test Setup



Below 30MHz



Below 1GHz

5.2.2. Field strength of fundamental emissions limit and Mask limit

The field strength of fundamental emissions shall not exceed 15848 microvolts/meter at 30 meters. The emissions limit in this paragraph is based on measurement instrumentation employing a QP detector.

Frequencies (MHz)	Field Strength (microvolts/meter)	Field Strength (dBμV/m) at 10m	Field Strength (dBμV/m) at 3m
13.553 ~ 13.567MHz	15848 at 30m	103.08 (QP)	124 (QP)

Mask Limit:

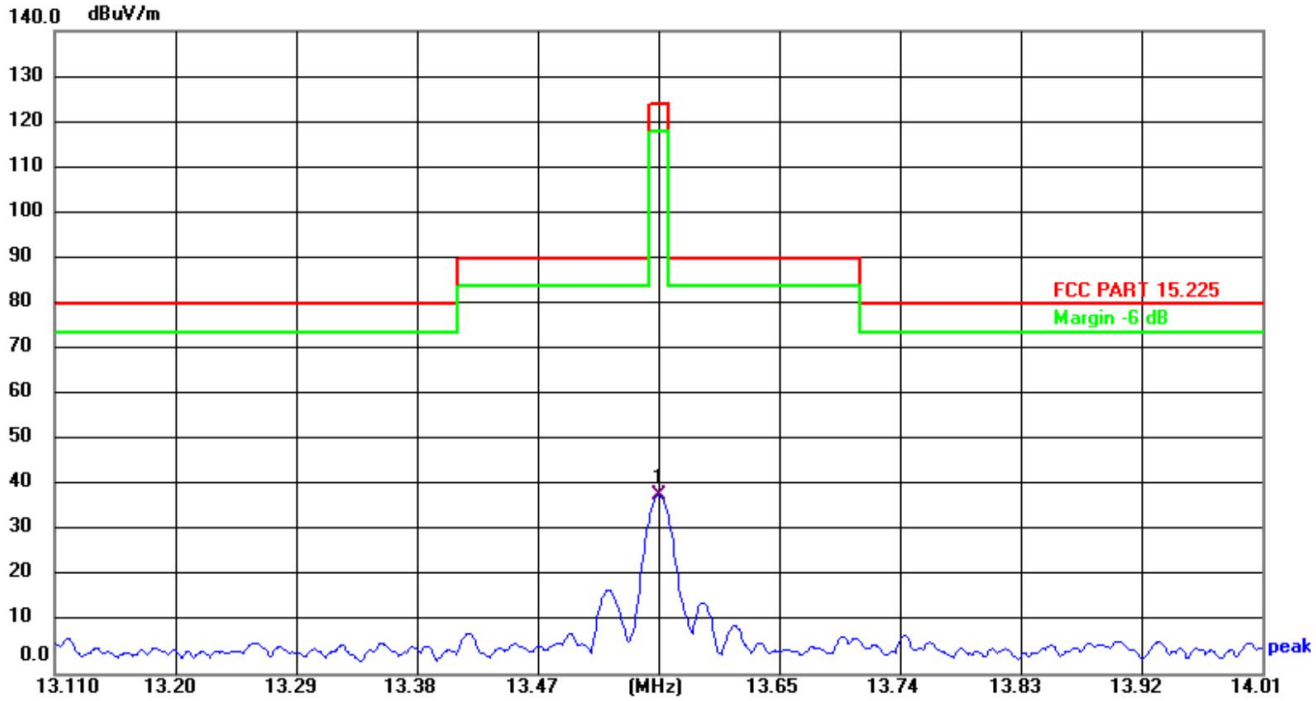
Frequency (MHz)	Limit (dBuV/m)	Distance (m)
1.705-13.110	69.5	3
13.110-13.410	80.5	3
13.410-13.553	90.5	3
13.553-13.567	124.0	3
13.567-13.710	90.5	3
13.710-14.010	80.5	3
14.010-30.000	69.5	3

5.2.3. Test Results

Temperature	23.7℃	Humidity	52.6%
Test Engineer	Jack Cheng	Configurations	NFC

PASS.
The test data please refer to following page:

X axis



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	13.5600	49.02	-10.01	39.01	124.00	-84.99	QP

**Note: Factor= Antenna Factor + Cable Loss*
Measured（dBμV/m）= Reading + Factor+51.5, Margin= Measured - Limit
Emission level (dBμV/m) = 20 log Emission level (μV/m).
Measured distance is 3m.
All emissions emit from non-NFC function of digital unintentional emissions. All NFC's spurious emissions are below 20dB of limits.
X axis / Y axis/ Z axis were tested,report only recorded the worst result of X axis.

6. BANDWIDTH OF THE OPERATING FREQUENCY

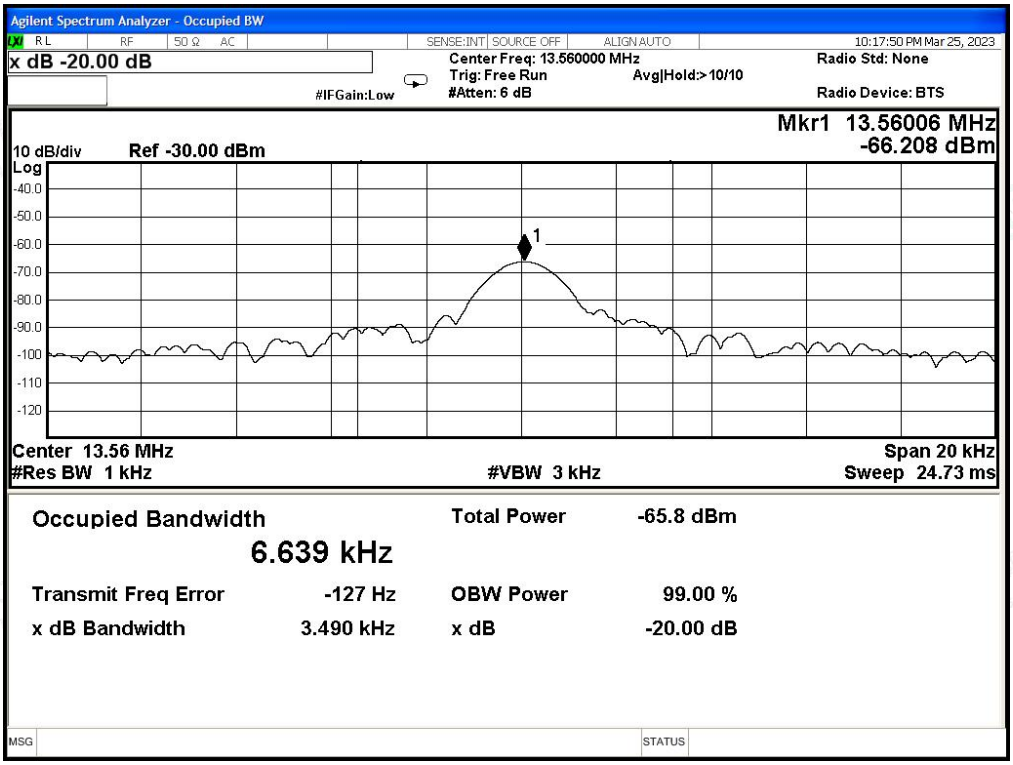
6.1. Standard Applicable

Intentional radiators must be designed to ensure that the 20 dB bandwidth of the emissions in the specific band (13.553 ~ 13.567MHz).

6.2. Test Result

EUT	SUUNTO RACE
RBW	1KHz
VBW	3KHz
SPAN	20KHz
Carrier Frequency (MHz)	20dB Bandwidth (KHz)
13.56	3.490

Please refer to the test plot:



7. FREQUENCY STABILITY MEASUREMENT

7.1 Standard Applicable

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a full charged battery.

7.2 Test Result

Voltage vs. Frequency Stability

Voltage(V)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
VN	13.56048	0.48	35.33	100
VL	13.56040	0.40	29.65	100
VH	13.56033	0.33	24.19	100

Temperature vs. Frequency Stability

Temperature (℃)	Measurement Frequency (MHz)	Deviation (KHz)	Deviation (ppm)	Limit (ppm)
-20	13.56035	0.35	26.03	100
-10	13.56019	0.19	13.87	100
0	13.56038	0.38	27.83	100
10	13.56041	0.41	30.27	100
20	13.56035	0.35	25.57	100
30	13.56035	0.35	25.98	100
40	13.56034	0.34	24.89	100
50	13.56028	0.28	20.34	100

8. LINE CONDUCTED EMISSIONS

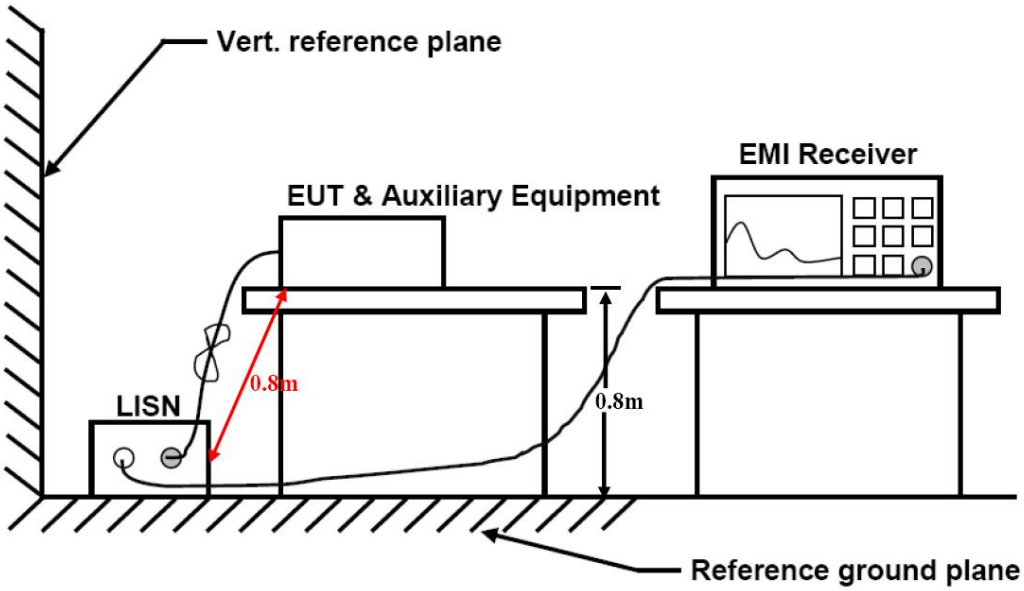
8.1. Standard Applicable

According to §15.207(a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

8.2. Block Diagram of Test Setup



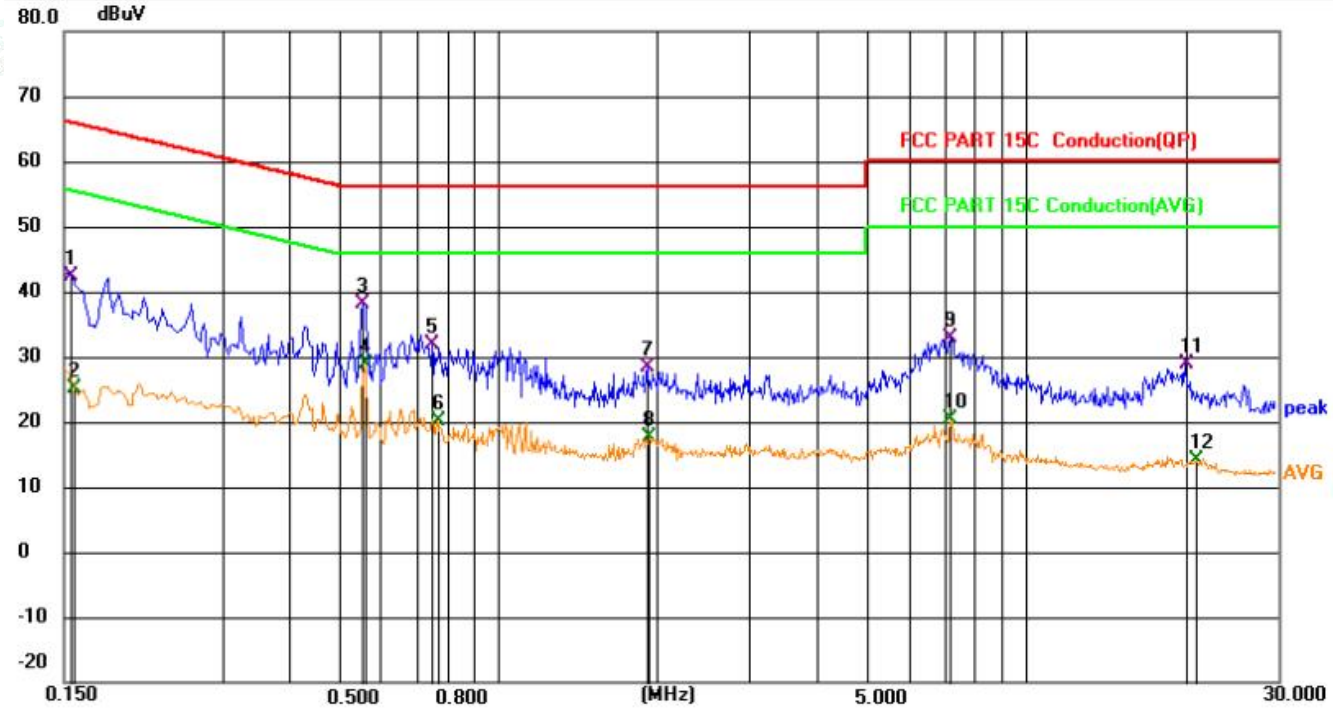
8.3. Test Results

PASS.

Temperature	24.3℃	Humidity	53.5%
Test Engineer	Jack Cheng	Configurations	NFC

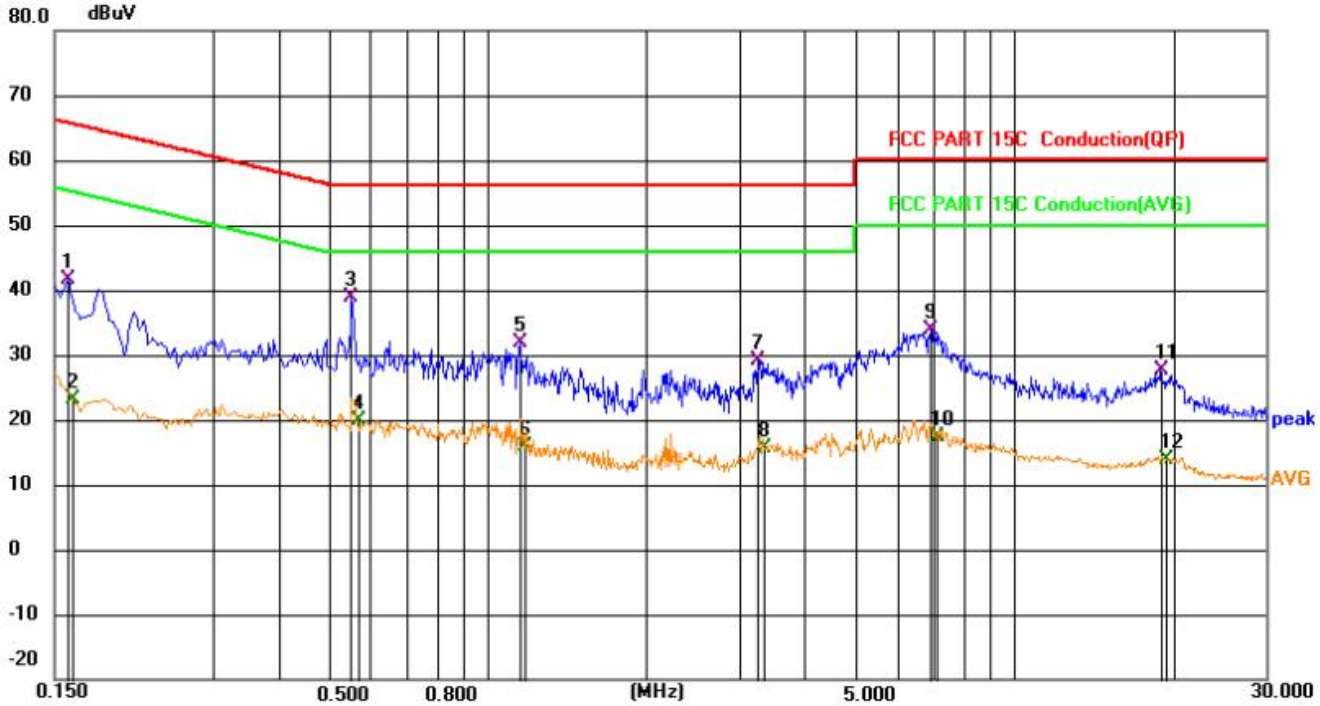
The test data please refer to following page.

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1547	22.82	19.63	42.45	65.74	-23.29	QP
2		0.1572	5.62	19.63	25.25	55.61	-30.36	AVG
3		0.5550	18.55	19.65	38.20	56.00	-17.80	QP
4	*	0.5594	9.11	19.65	28.76	46.00	-17.24	AVG
5		0.7485	12.33	19.65	31.98	56.00	-24.02	QP
6		0.7663	0.37	19.64	20.01	46.00	-25.99	AVG
7		1.9093	8.59	19.68	28.27	56.00	-27.73	QP
8		1.9365	-2.09	19.68	17.59	46.00	-28.41	AVG
9		7.2106	13.17	19.74	32.91	60.00	-27.09	QP
10		7.2106	0.56	19.74	20.30	50.00	-29.70	AVG
11		19.9544	8.62	20.21	28.83	60.00	-31.17	QP
12		21.1426	-6.10	20.14	14.04	50.00	-35.96	AVG

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1590	22.12	19.63	41.75	65.52	-23.77	QP
2		0.1621	3.49	19.63	23.12	55.36	-32.24	AVG
3	*	0.5503	19.24	19.65	38.89	56.00	-17.11	QP
4		0.5638	0.16	19.65	19.81	46.00	-26.19	AVG
5		1.1490	12.21	19.65	31.86	56.00	-24.14	QP
6		1.1758	-3.67	19.66	15.99	46.00	-30.01	AVG
7		3.2505	9.35	19.76	29.11	56.00	-26.89	QP
8		3.3496	-4.08	19.77	15.69	46.00	-30.31	AVG
9		6.9359	13.97	19.82	33.79	60.00	-26.21	QP
10		7.1341	-2.33	19.83	17.50	50.00	-32.50	AVG
11		19.0184	7.48	20.19	27.67	60.00	-32.33	QP
12		19.4461	-6.28	20.19	13.91	50.00	-36.09	AVG

Measurement =Reading + Correct, Margin = Measurement – Limit.
Correct Factor= Lisn Factor+Cable Factor

9. ANTENNA REQUIREMENTS

9.1 Standard Applicable

According to antenna requirement of §15.203.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

9.2 Antenna Connected Construction

9.2.1. Standard Applicable

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2.2. Antenna Connector Construction

The gains of antenna used for transmitting is 0dBi, and the antenna is Internal Antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

9.2.3. Results: Compliance.

10. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	Power Meter	R&S	NRVS	100444	2022-06-16	2023-06-15
2	Power Sensor	R&S	NRV-Z81	100458	2022-06-16	2023-06-15
3	Power Sensor	R&S	NRV-Z32	10057	2022-06-16	2023-06-15
4	Test Software	Tonscend	JS1120-2	/	N/A	N/A
5	RF Control Unit	Tonscend	JS0806-2	N/A	2022-10-29	2023-10-28
6	MXA Signal Analyzer	Agilent	N9020A	MY50510140	2022-10-29	2023-10-28
7	DC Power Supply	Agilent	E3642A	N/A	2022-10-29	2023-10-28
8	EMI Test Software	AUDIX	E3	/	N/A	N/A
9	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2022-06-16	2023-06-15
10	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
11	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2021-08-29	2024-08-28
12	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2021-09-12	2024-09-11
13	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2021-09-05	2024-09-04
14	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2021-08-29	2024-08-28
15	Broadband Preamplifier	SCHWARZBECK	BBV9719	9719-025	2022-06-16	2023-06-15
16	EMI Test Receiver	R&S	ESR 7	101181	2022-06-16	2023-06-15
17	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2022-10-29	2023-10-28
18	Broadband Preamplifier	/	BP-01M18G	P190501	2022-06-16	2023-06-15
19	6dB Attenuator	/	100W/6dB	1172040	2022-06-16	2023-06-15
20	3dB Attenuator	/	2N-3dB	/	2022-10-29	2023-10-28
21	EMI Test Receiver	R&S	ESPI	101940	2022-08-18	2023-08-17
22	Artificial Mains	R&S	ENV216	101288	2022-06-16	2023-06-15
23	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2022-06-16	2023-06-15
24	EMI Test Software	Farad	EZ	/	N/A	N/A

11. Test Setup Photographs of Eut

Please refer to separated files for Test Setup Photos of the EUT.

12. Exterior Photographs of the Eut

Please refer to separated files for Exterior Photos of the EUT.

13. Interior Photographs of the Eut

Please refer to separated files for Interior Photos of the EUT.

----------THE END OF REPORT----------