



Shenzhen GTI Technology Co., Ltd.

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TEST REPORT

Product Name : KICKR HEADWIND

Trademark : N.A.

Model/Type reference : WF126US

Listed Model(s) : N.A.

FCC ID : PADWF126

Test Standards : FCC Part 15.249

Report No : GTI20182624E-2

Applicant : Wahoo Fitness L.L.C.

Address of applicant : 90 W WIEUCA RD NE STE 110 ATLANTA GA 30342

Date of Receipt : Aug. 11, 2018

Date of Test Date : Aug. 12, 2018 to Aug. 20, 2018

Data of issue. : Aug. 21, 2018

Test result	Pass *
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* In the configuration tested, the EUT complied with the standards specified above

Shenzhen General Testing & Inspection Technology Co., Ltd.

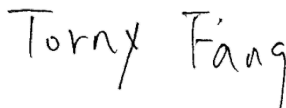
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GENERAL DESCRIPTION OF EUT	
Equipment:	KICKR HEADWIND
Model Name:	WF126US
Adding Model(s):	N.A.
Model difference:	N.A.
Manufacturer:	Wahoo Fitness L.L.C.
Manufacturer Address:	90 W WIEUCA RD NE STE 110 ATLANTA GA 30342
Factory:	East West Industries Vietnam LLC
Address:	NO.27, Street No.2, VSIP 2, Hoa Phu Ward, Thu Dau Mot City, Binh Duong Province, Vietnam 84, Viet Nam
Power Rating:	100-120V 50-60Hz 1.3A 65W
Note: This report based on previous report GTI20180934F-2, The circuit design of AC input was modified, and change X and Y capacitor. No other changes. This time it was retested for Conducted Emission Measurement, Radiated Emission (30M-1000M).	

Compiled By:



(Torny Fang)

Reviewed By:



(Cary Luo)

Approved By:



(Walter Chen)

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1. SUMMARY

1.1. Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.249: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices

1.2. Test Description

FCC PART 15 15.249		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.249 (a) (d) /15.209	Radiated Emissions	PASS

1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen General Testing & Inspection Technology Co., Ltd.

Add: 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

1.3.2 Laboratory accreditation

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

IC Registration No.: 9783A

The 3m alternate test site of Shenzhen GTI Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC-Registration No.: 951311

Shenzhen GTI Technology Co., Ltd. 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 951311, Aug 26, 2017

1.4.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 General Testing & Inspection 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 General Testing & Inspection laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	1.60 dB	(1)
Radiated spurious emission 9KHz-40 GHz	2.20 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	-----	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

2. GENERAL INFORMATION

2.1.Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~75 %
Air Pressure:	950~1050mba

2.2.General Description of EUT

Product Name:	KICKR HEADWIND
Model/Type reference:	WF126US
Power supply:	100-120V 50-60Hz 1.3A 65W
Hardware version:	V1.0
Software version:	V1.0
ANT+:	
Supported type:	ANT+
Modulation:	GFSK
Operation frequency:	2457MHz
Channel number:	1
Channel separation:	/
Antenna type:	Ceramic Antenna
Antenna gain:	5.46dBi

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.3. Description of Test Modes

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT						
No.	Equipment	Model	Serial No.	Manufacture	Trade name	Remark
1	iPhone	iPhone 6 plus	A1524	Apple	Apple	/

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test.

Operation Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) mode for testing.

ANT+

Channel	Frequency (MHz)
01	2457

2.4.Measurement Instruments List

Maximum Conducted Output Power					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2487B	110553	Jan. 04,2019
2	Power Sensor	Anritsu	MA2411B	100345	Jan. 04,2019
3	Spectrum Analyzer	R&S	FSU26	100105	Jan. 04,2019

1.

Power Spectral Density / 6dB Bandwidth / Band Edge Compliance of RF Emission / Spurious RF Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSU26	100105	Jan. 04,2019

2.

Conducted Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrate until
1	LISN	R&S	ENV216	101112	Jan. 04,2019
2	LISN	R&S	ENV216	101113	Jan. 04,2019
3	EMI Test Receiver	R&S	ESCI	100920	Jan. 04,2019
4	Cable	Schwarzbeck	AK9515E	33156	Jan. 04,2019

3.

Radiated Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100658	Jan. 04,2019
2	High pass filter	micro-tranics	HPM50111	34202	Jan. 04,2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Jan. 04,2019
4	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Jan. 04,2019
5	Loop Antenna	LAPLAC	RF300	9138	Jan. 04,2019
6	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Jan. 04,2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	647	Jan. 04,2019
8	Pre-Amplifier	HP	8447D	1937A03050	Jan. 04,2019
9	Pre-Amplifier	EMCI	EMC05183 5	980075	Jan. 04,2019
10	Antenna Mast	UC	UC3000	N/A	N/A
11	Turn Table	UC	UC3000	N/A	N/A
12	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Jan. 04,2019
13	Cable Above 1GHz	Hubersuhner	SUCOFLEX1 02	DA1580	Jan. 04,2019

Note: 1. The Cal.Interval was one year.

2. The cable loss has calculated in test result which connection between each test instruments.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emission Measurement

Limit

POWER LINE CONDUCTED EMISSION

(Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.5 - 5.0	73.00	60.00	56.00	46.00
5.0 - 30.0	73.00	60.00	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

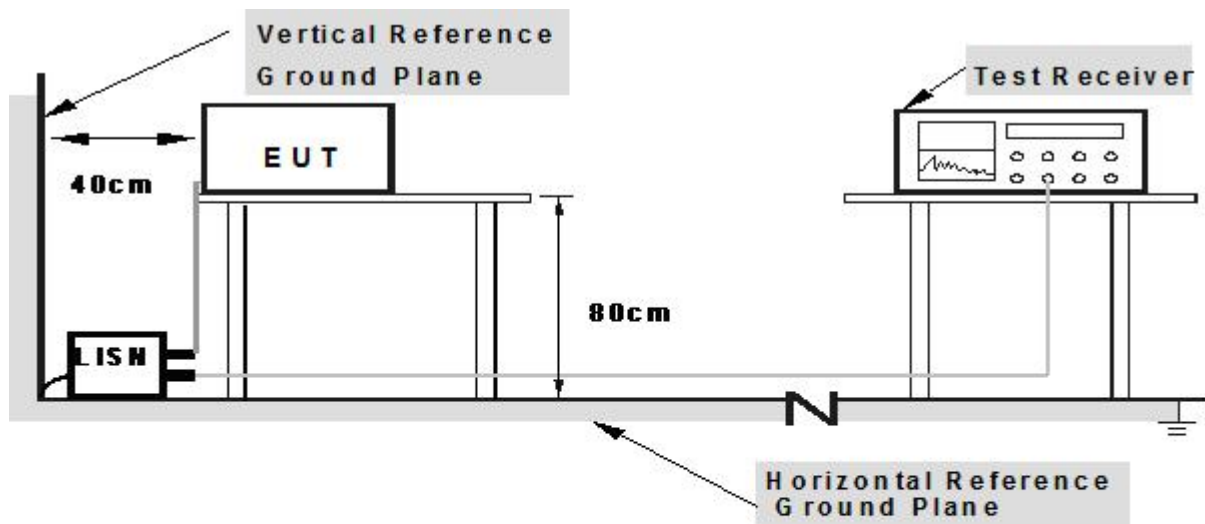
Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

Test Procedure

1. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
2. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
3. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m. Repeat above procedures until all frequency measurements have been completed.
4. LISN at least 80 cm from nearest part of EUT chassis.
5. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Test Configuration

For the actual test configuration, please refer to the related Item –EUT Test Photos.

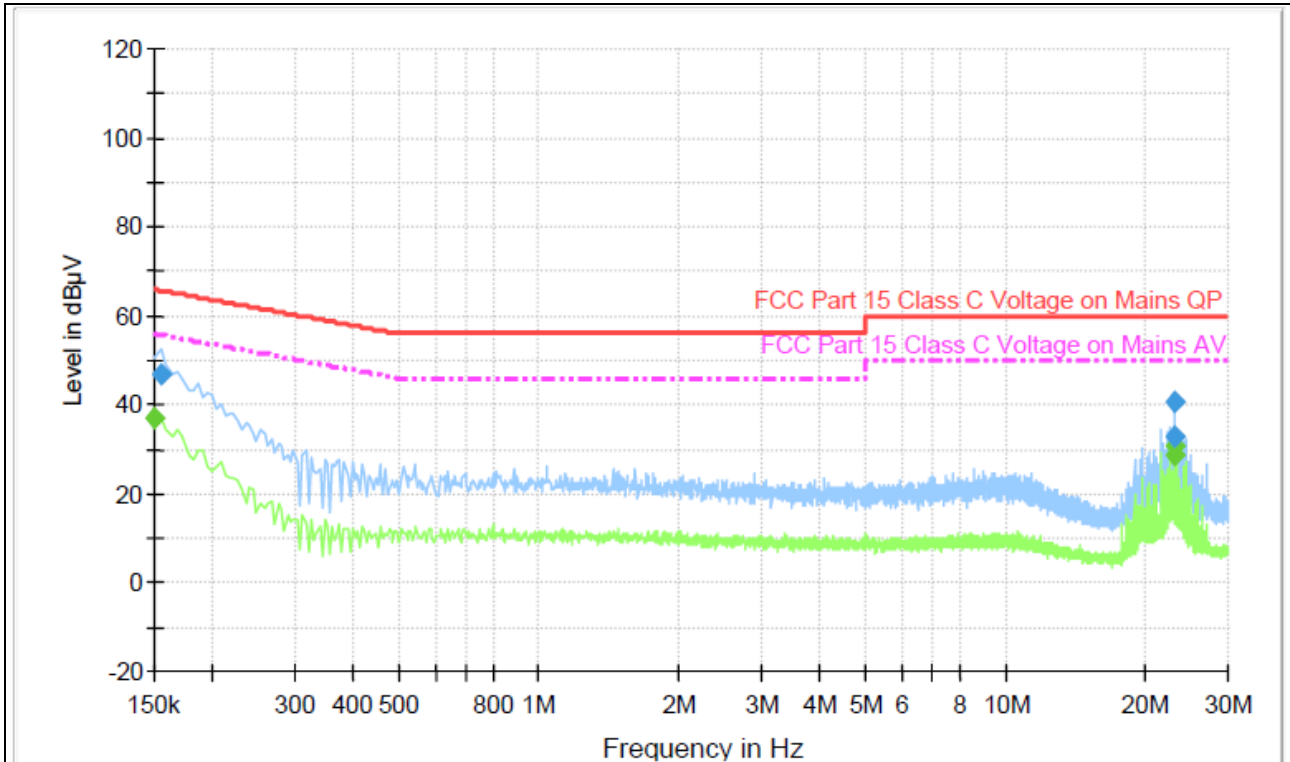


Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

TEST RESULTS

Temperature :	23.5 °C	Relative Humidity :	60%
Pressure :	101 Kpa	Test Date :	2018-08-20
Test Mode :	ANT+	Phase :	L
Test Voltage :	AC 120V/60Hz		



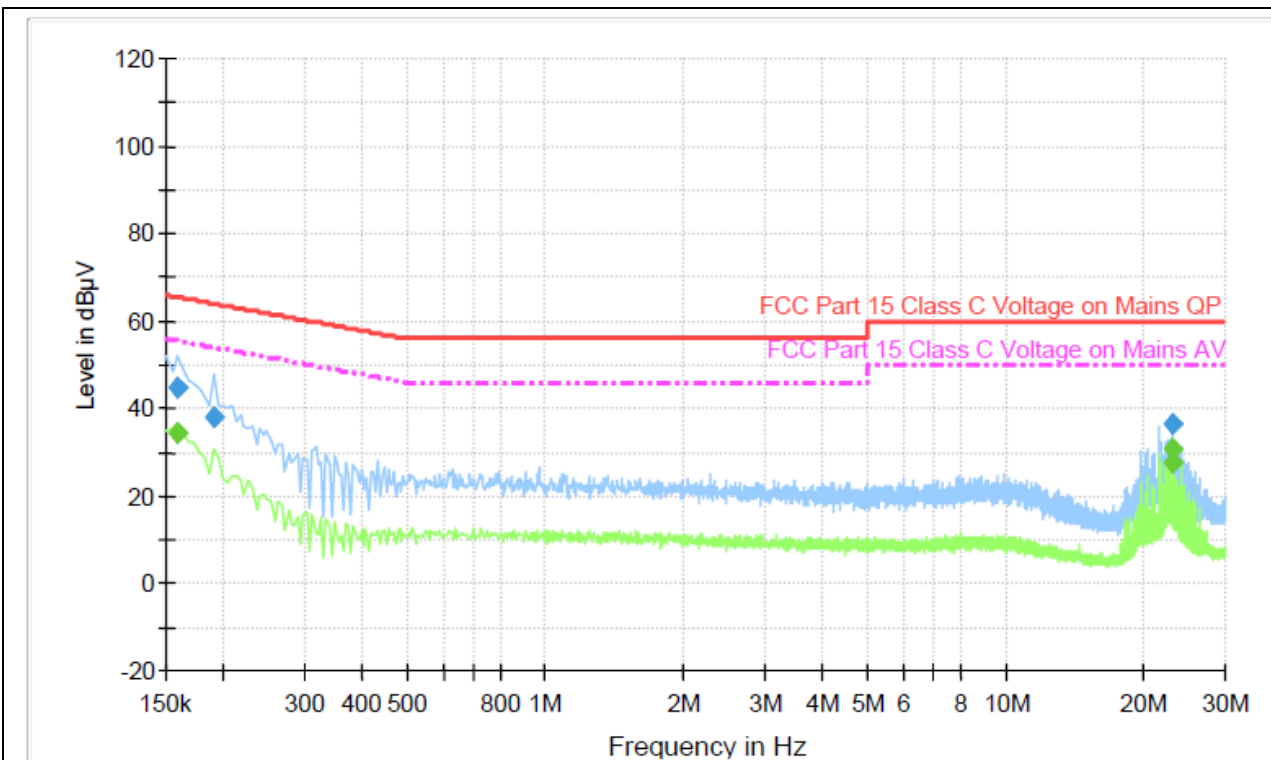
Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154500	46.8	1000.000	9.000	Off	L1	10.0	19.0	65.8	
23.068500	32.7	1000.000	9.000	Off	L1	10.0	27.3	60.0	
23.127000	40.4	1000.000	9.000	Off	L1	10.0	19.6	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.150000	37.2	1000.000	9.000	Off	L1	10.0	18.8	56.0	
23.068500	28.5	1000.000	9.000	Off	L1	10.0	21.5	50.0	
23.127000	30.7	1000.000	9.000	Off	L1	10.0	19.3	50.0	

Temperature :	23.5 °C	Relative Humidity :	60%
Pressure :	101 Kpa	Test Date :	2018-08-20
Test Mode :	ANT+	Phase :	N
Test Voltage :	AC 120V/60Hz		



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.159000	44.9	1000.000	9.000	Off	N	9.6	20.6	65.5	
0.190500	38.0	1000.000	9.000	Off	N	9.5	26.0	64.0	
23.127000	36.5	1000.000	9.000	Off	N	10.1	23.5	60.0	

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.159000	34.4	1000.000	9.000	Off	N	9.6	21.1	55.5	
23.068500	27.5	1000.000	9.000	Off	N	10.1	22.5	50.0	
23.127000	31.0	1000.000	9.000	Off	N	10.1	19.0	50.0	

4.2. Radiated Emission

Limit

For intentional device, according to § 15.209(a), § 15.249(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table.

The frequency spectrum above 1 GHz for Transmitter was investigated. All emission not reported are much lower than the prescribed limits. Set the RBW=1MHz, VBW=3MHz for Peak Detector while the RBW=1MHz, VBW=10Hz for Average Detector, Readings are both peak and average values. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos.

Frequency (MHz)	Distance (Meters)	Radiated (dBuV/m)	Radiated (μV/m)
0.009-0.49	3	$20\log(2400/F(\text{KHz}))+40\log(300/3)$	$2400/F(\text{KHz})$
0.49-1.705	3	$20\log(24000/F(\text{KHz}))+40\log(30/3)$	$24000/F(\text{KHz})$
1.705-30	3	$20\log(30)+40\log(30/3)$	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

Test Procedure

- The EUT was placed on a turn table which is 0.8m(below 1GHz)or1.5m(above 1GHz) above ground plane.
- Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- Repeat above procedures until all frequency measurements have been completed.

Field Strength Calculation

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

$$FS = RA + AF + CL - AG$$

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
150.00	40	58.1	12.2	1.6	31.90	-18.1

$$\text{Transd} = AF + CL - AG$$

Test Configuration

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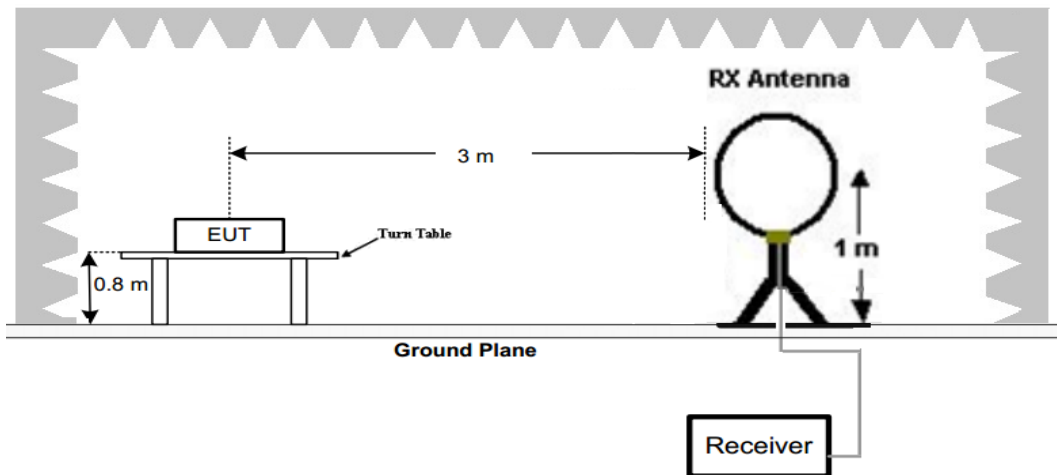
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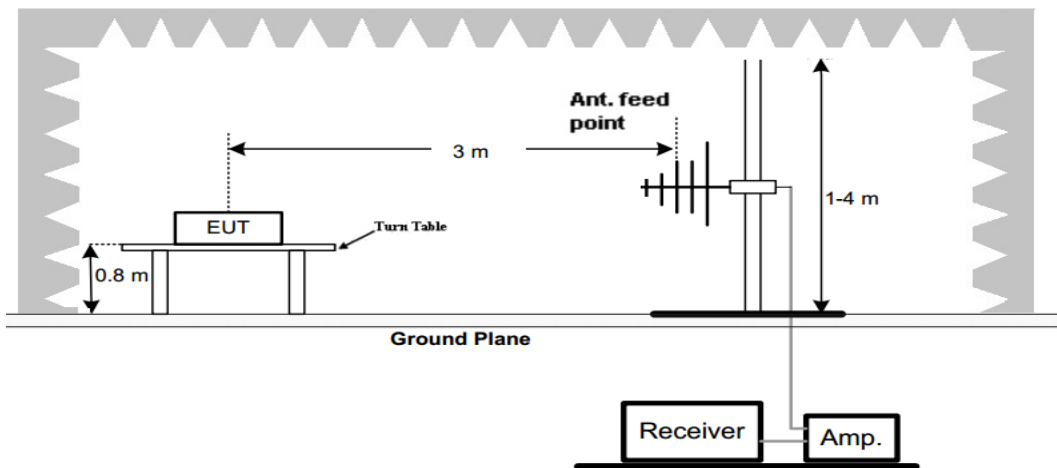
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For the actual test configuration, please refer to the related Item –EUT Test Photos.

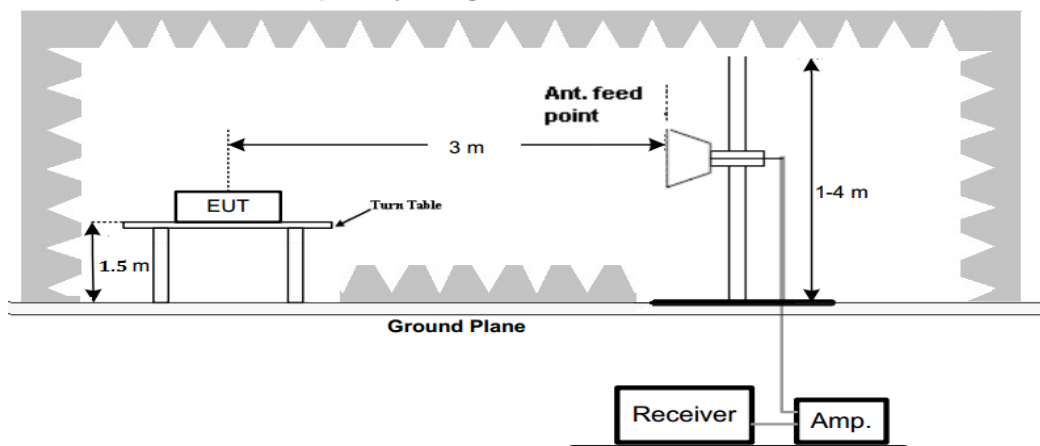
Frequency range 9 KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



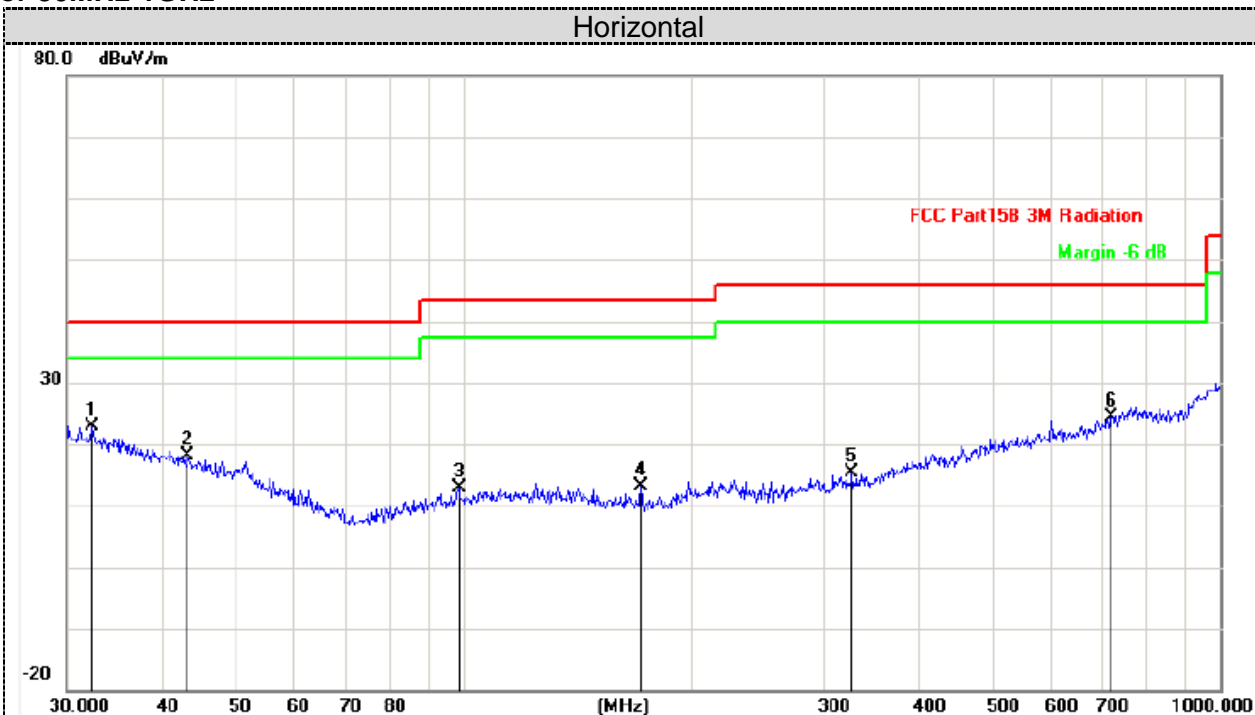
Test Results

Remark:

For 9 KHz-30MHz

The test results of 9kHz-30MHz is attenuated more than 20dB below the permissible limits, so the results don't record in the report.

For 30MHz-1GHz



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	32.4059	-4.69	27.55	22.86	40.00	-17.14	QP
2	43.3534	-8.41	26.56	18.15	40.00	-21.85	QP
3	98.8326	-14.09	27.06	12.97	43.50	-30.53	QP
4	171.9946	-15.25	28.36	13.11	43.50	-30.39	QP
5	326.7395	-10.89	26.37	15.48	46.00	-30.52	QP
6	719.1995	-2.60	26.97	24.37	46.00	-21.63	QP

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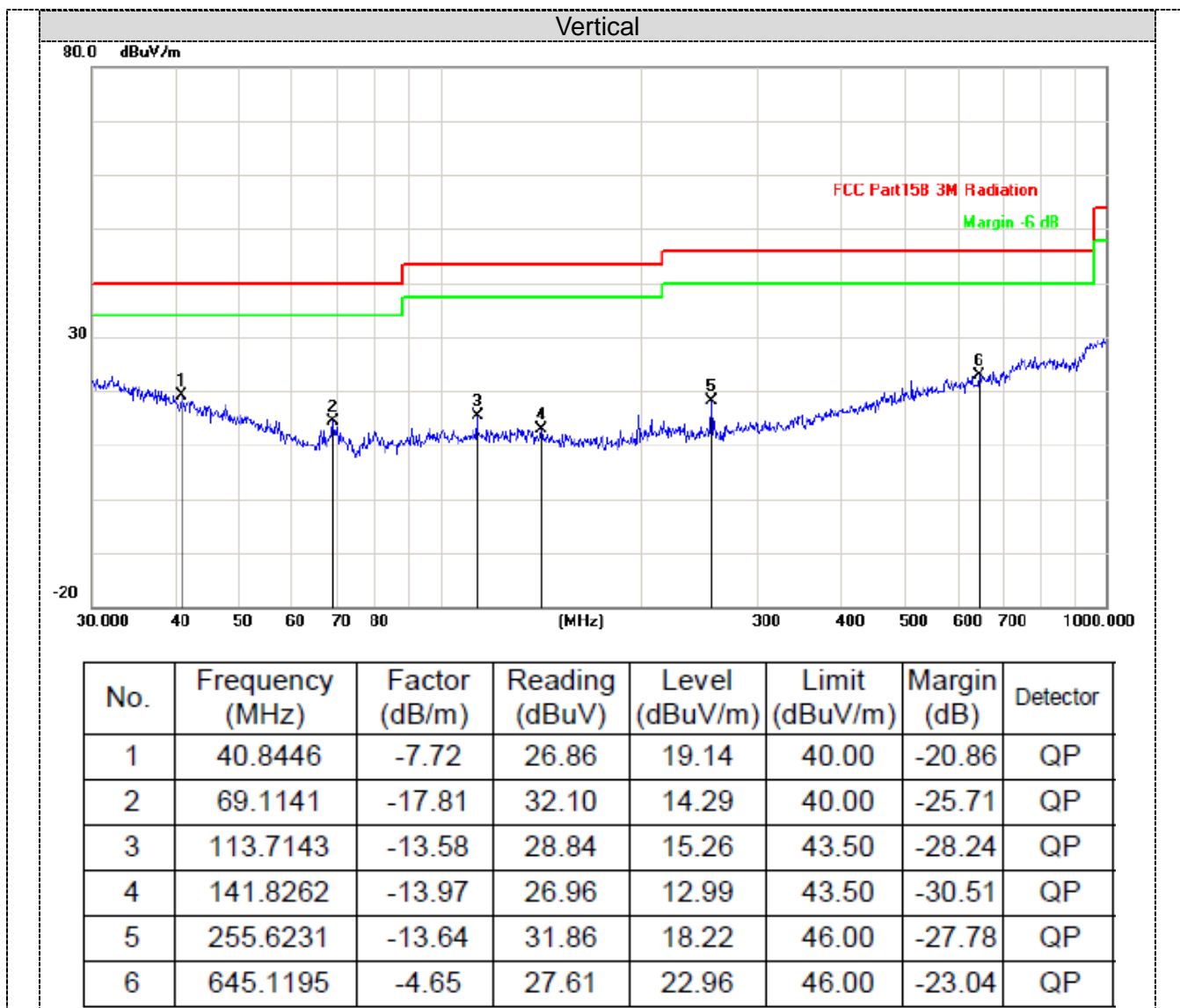
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Polar	Frequency	Meter Reading	Pre-amplifier	Cable Loss	Antenna Factor	Emission Level	Limits	Margin	Detector
(H/V)	(MHz)	(dBuV)	(dB)	(dB)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	Type
H	2457	87.56	36.2	4.25	30.1	85.71	114	-28.29	PK
H	2457	70.23	36.2	4.25	30.1	68.38	94	-25.62	AV
V	2457	88.22	36.2	4.25	30.1	86.37	114	-27.63	PK
V	2457	71.24	36.2	4.25	30.1	69.39	94	-24.61	AV

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Pre-amplifier Factor
3. Margin value = Limit value - Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Note: Above 1GHz emission please refer to C180620Z02-RP1

5. EUT TEST PHOTO

Please reference to the annex: Test Photo

6. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Please reference to the annex: External Photo and Internal Photo.

*****THE END*****