

FCC TEST REPORT

For

Handheld Rugged Terminal

Model Number: HRT500i

FCC ID: SX3-HRT500I

Report Number : WT158002879

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TEST REPORT DECLARATION

Applicant : PRADOTEC CORPORATION SDN. BHD. (807780-P)
Address : IRIS Smart Technology Complex, Technology Park Malaysia,
Bukit Jalil, Kuala Lumpur, Malaysia
Manufacturer : OPTIMA KLASIK SDN.BHD.(807783-T)
Address : IRIS Smart Technology Complex, Technology Park Malaysia,
Bukit Jalil, Kuala Lumpur, Malaysia
EUT Description : Handheld Rugged Terminal
Model No : HRT500i
Trade mark : 
Serial Number : /
FCC ID : SX3-HRT500I

Test Standards:

FCC Part 15 15.207, 15.209, 15.225 (2014)

The EUT described above is tested by Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory to determine the maximum emissions from the EUT. Shenzhen Academy of Metrology and Quality Inspection EMC Laboratory is assumed full responsibility for the accuracy of the test results. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with FCC Rules Part 15.207, 15.209 and 15.225.

The test report is valid for above tested sample only and shall not be reproduced in part without written approval of the laboratory.

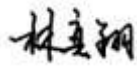
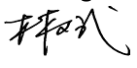
Project Engineer:	 (Chen Silin 陈司林)	Date:	<u>Jun.16.2015</u>
Checked by:	 (Lin Yixiang 林奕翔)	Date:	<u>Jun.16.2015</u>
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TABLE OF CONTENTS

TEST REPORT DECLARATION.....	2
1. TEST RESULTS SUMMARY.....	5
2. GENERAL INFORMATION.....	6
2.1. Report information.....	6
2.2. Laboratory Accreditation and Relationship to Customer	6
2.3. Measurement Uncertainty.....	7
3. PRODUCT DESCRIPTION.....	8
3.1. EUT Description	8
3.2. Related Submittal(s) / Grant (s)	8
3.3. Block Diagram of EUT Configuration	8
3.4. Operating Condition of EUT	9
3.5. Support Equipment List.....	9
3.6. Test Conditions.....	9
3.7. Special Accessories.....	9
3.8. Equipment Modifications	9
4. TEST EQUIPMENT USED.....	10
5. 20DB BANDWIDTH MEASUREMENT	11
5.1. Test Standard	11
5.2. TEST PROCEDURE.....	11
5.3. TEST SETUP	11
5.4. Test Data	11
6. RADIATED SPURIOUS EMISSION MEASUREMENTS	13
6.1. Test Standard	13
6.2. TEST PROCEDURE.....	14
6.3. TEST DATA.....	14
7. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT	17
7.1. Test Standard and Limit.....	17
7.2. Test Procedure	17
7.3. Test Arrangement	17
7.4. Test Data	17

8. ANTENNA REQUIREMENT21

1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
Occupied Bandwidth	2.1049	Pass
In-Band Emission	15.225(a)(b)(c)	Pass
Out-of-Band Emission	15.209 15.225(d)	Pass
Conducted emission test for AC power port	15.207	Pass
Frequency Stability Tolerance	15.225(e)	Pass
Antenna Requirement	15.203	Pass

Remark: "N/A" means "Not applicable."

2. GENERAL INFORMATION

2.1. Report information

- 2.1.1. This report is not a certificate of quality; it only applies to the sample of the specific product/equipment given at the time of its testing. The results are not used to indicate or imply that they are application to the similar items. In addition, such results must not be used to indicate or imply that SMQ approves recommends or endorses the manufacture, supplier or use of such product/equipment, or that SMQ in any way guarantees the later performance of the product/equipment.
- 2.1.2. The sample/s mentioned in this report is/are supplied by Applicant, SMQ therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture or any information supplied.
- 2.1.3. Additional copies of the report are available to the Applicant at an additional fee. No third part can obtain a copy of this report through SMQ, unless the applicant has authorized SMQ in writing to do so.

2.2. Laboratory Accreditation and Relationship to Customer

The testing report were performed by the Shenzhen Academy of Metrology and quality Inspection EMC Laboratory (Guangdong EMC compliance testing center), in their facilities located at Bldg. of Metrology & Quality Inspection, Longzhu Road, Nanshan District, Shenzhen, Guangdong, China. At the time of testing, Laboratory is accredited by the following organizations:

China National Accreditation Service for Conformity Assessment (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is CNAS L0579.

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number are 446246 806614 994606(semi anechoic chamber).

The Laboratory is listed in Voluntary Control Council for Interference by Information Technology Equipment (VCCI), and the registration number are R-1974(open area test site) , R-1966(semi anechoic chamber),C-2117(mains ports conducted interference measurement) and T-180(telecommunication ports conducted interference measurement).

The Laboratory is registered to perform emission tests with Industry Canada (IC), and the registration number is 11177A-1 11177A-2.

TUV Rhineland accredits the Laboratory for conformance to IEC and EN standards, the registration number is E2024086Z02.

2.3.Measurement Uncertainty

Conducted Emission

9kHz~30MHz 3.5dB

Radiated Emission

30MHz~1000MHz 4.5dB

1GHz~26.5GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1.EUT Description

Description	: Handheld Rugged Terminal
Manufacturer	: OPTIMA KLASIK SDN.BHD.(807783-T)
Model Number	: HRT500i
Operate Frequency	: 13.56MHz
Modulation	: ASK
Antenna Designation	: Integral antenna 0dBi

Remark: This is a derivative report based on original report WT158002173(FCC ID: SX3-HRT700).

HRT500i and HRT500, HRT700 differences are:

1. HRT700 has added on a printer board with different casing outlook
2. HRT500 and HRT500i don't have a printer
3. HRT500 and HRT500i have common casing outlook but HRT500i has added on HID module.

the rest are the same,

All the test data of HRT500i comes from the original test data of HRT500, HRT700.

3.2.Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **SX3-HRT500I**, filing to comply with Section 15.207, 15.209 and 15.225 of the FCC Part 15, Subpart C Rules.

3.3.Block Diagram of EUT Configuration



Figure 1 EUT setup

3.4. Operating Condition of EUT

The Radiated spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission (X plane).

3.5. Support Equipment List

Table 2 Support Equipment List

Name	Model No	S/N	Manufacturer
Adaptor for EUT	KSAS0250900300M2	--	Kuantech(Shenzhen)Co.,Ltd
Lithium polymer battery for EUT	N/A	--	SCUD (FUJIAN) Electronics Co., Ltd.

3.6. Test Conditions

Date of test : May.21, 2015- Jun.15, 2015

Date of EUT Receive : May.21, 2015

Temperature: (21-25) °C

Relative Humidity: (40-53)%

3.7. Special Accessories

Not available for this EUT intended for grant.

3.8. Equipment Modifications

Not available for this EUT intended for grant.

4. TEST EQUIPMENT USED

Table 3 Test Equipment

No.	Equipment	Manufacturer	Model No.	Last Cal.	Cal. Interval
SB2603	EMI Test Receiver	Rohde & Schwarz	ESCS30	Dec.19, 2014	1 Year
SB3321	AMN	Rohde & Schwarz	ESH2-Z5	Jan.18, 2015	1 Year
SB2604	AMN	Rohde & Schwarz	ESH3-Z5	Nov.18, 2015	1 Year
----	Radiated Emissions Cable set	HUBER+SUHN ER	---	Jan.19, 2015	1 Year
SB8501/09	EMI Test Receiver	Rohde & Schwarz	ESU40	Mar.19, 2015	1 Year
SB8501/04	Bilog Antenna	Schwarzbeck	VULB9163	Mar.19, 2015	1 Year
SB3435	Horn Antenna	Rohde & Schwarz	HF906	Jan.19, 2015	1 Year
SB5392/02	Horn Antenna	Amplifier Research	AT4560	May.15, 2015	1 Year
SB3345	Loop Antenna	Schwarzbeck	FMZB1516	Jan.20, 2015	2 Years
SB9721/02	Signal Analyzer	Agilent	N9020A	Jan.05, 2015	1 Year
----	Radiated Emissions Cable set	HUBER+SUHN ER	---	Jan.19, 2015	1 Year
---	Radiated Emissions Cable set	HUBER+SUHN ER	---	Jan.19, 2015	1 Year
SB8501/17	Preamplifier	Rohde & Schwarz	SCU-18	Mar.27, 2015	1 Year
SB8501/16	Preamplifier	Rohde & Schwarz	SCU-26	Mar.27, 2015	1 Year
SB9059	Preamplifier	Rohde & Schwarz	SCU-40	May.12, 2015	1 Year
SB9721/07	Mobile Communications DC Source	Agilent	66319D	Jan.05,2015	1year
SB2697	Temperature&Humi dity Test chamber	ESPEC	SB2697	Jun.30,2015	1year

5. 20DB BANDWIDTH MEASUREMENT

5.1.Test Standard

5.1.1.Test Standard

FCC part 2.1049

5.2.TEST PROCEDURE

The 20dB bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode

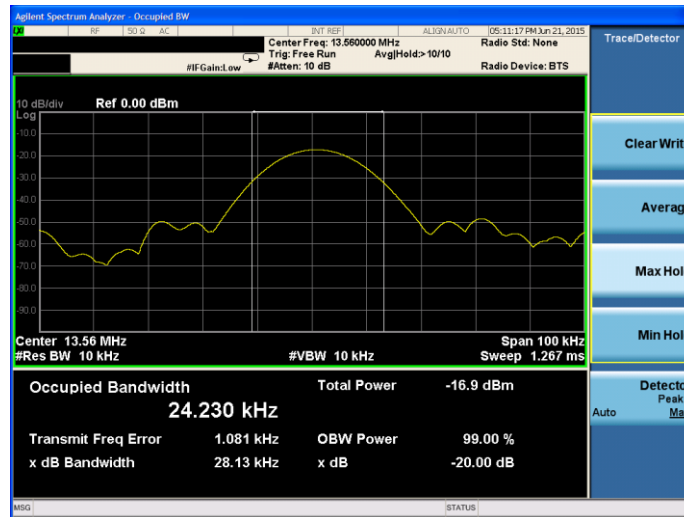
5.3.TEST SETUP



5.4.Test Data

Table 4 20dB Bandwidth Test Data

CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)	results
13.56	28.13	Pass



6. RADIATED SPURIOUS EMISSION MEASUREMENTS

6.1. Test Standard

6.1.1. Test Standard

FCC part 15.225(a)(b)(c)

6.1.2. Test Limit

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz, however, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241. §15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the field strength from µV/m to dBµV/m is:

Limit (dBµV/m) = 20 log limit (µV/m)

In addition:

§15.209 (d) The emission limits shown the above table is based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

6.2.TEST PROCEDURE

ANSI C63.4, 2009

The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

6.3.TEST DATA

Offset = $40 \cdot \log(3/30) + \text{Antenna Factor}$

Offset = -40 dB + 20 dB = -20 dB

Table 5 Radiated Disturbance Test Data

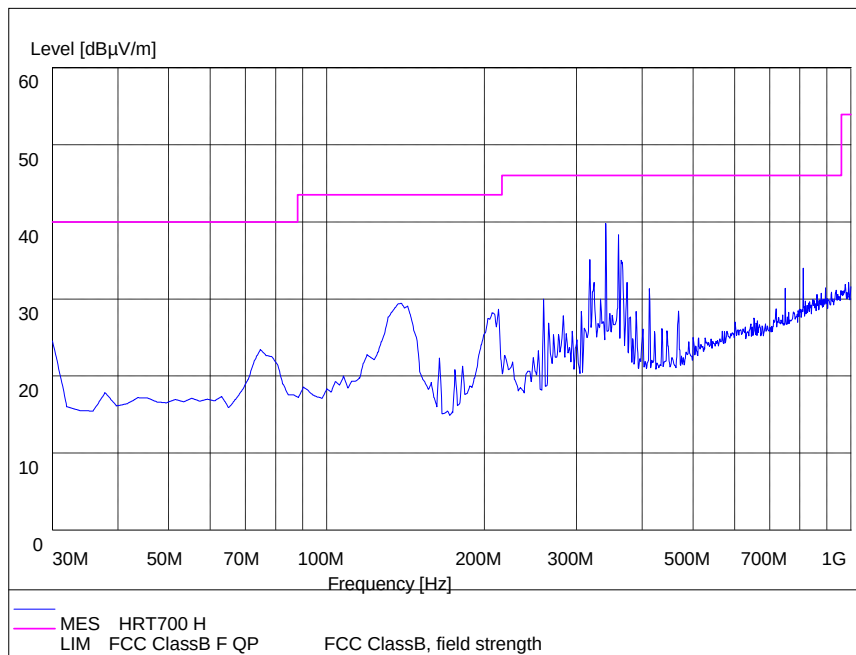
Frequency MHz	Cable Loss +pre amp(dB)	Antenna Factor(dB)	Readings(dBμV/m)	Level(dBμV/m)	Polarity(H/V)	Turntable Angle(deg)	Antenna Height(m)	Limits(dBμV/m)	Margin(dB)
30	0.6	12.3	9.6	22.5	H	66	1.0	40.0	17.5
74.709	1.0	8.7	11.6	21.3	H	159	1.0	40.0	18.7
138.858	1.3	8.9	16.7	26.9	H	178	1.0	43.5	16.6
212.725	1.6	10.6	13.2	25.4	H	6	1.0	43.5	18.1
341.022	2.2	14.1	22.3	38.6	H	290	1.0	46.0	7.4
360.461	2.3	14.3	20.7	37.3	H	264	1.0	46.0	8.7
30	0.6	12.3	19.4	32.3	V	151	1.0	40.0	7.7
66.934	0.8	10.7	14.1	25.6	V	23	1.0	40.0	14.4
80.541	0.9	8.5	16.7	26.1	V	0	1.0	40.0	13.9
140.802	1.3	8.2	21.3	30.8	V	90	1.0	43.5	12.7
208.838	1.7	10.6	14.0	26.3	V	328	1.0	43.5	17.2
360.461	2.3	14.3	8.8	25.4	V	70	1.0	46.0	20.6

1. Emission level(dBuV)=Read Value(dBuV/m) + Antenna Factor(dB)+ Cable Loss +pre amp(dB)

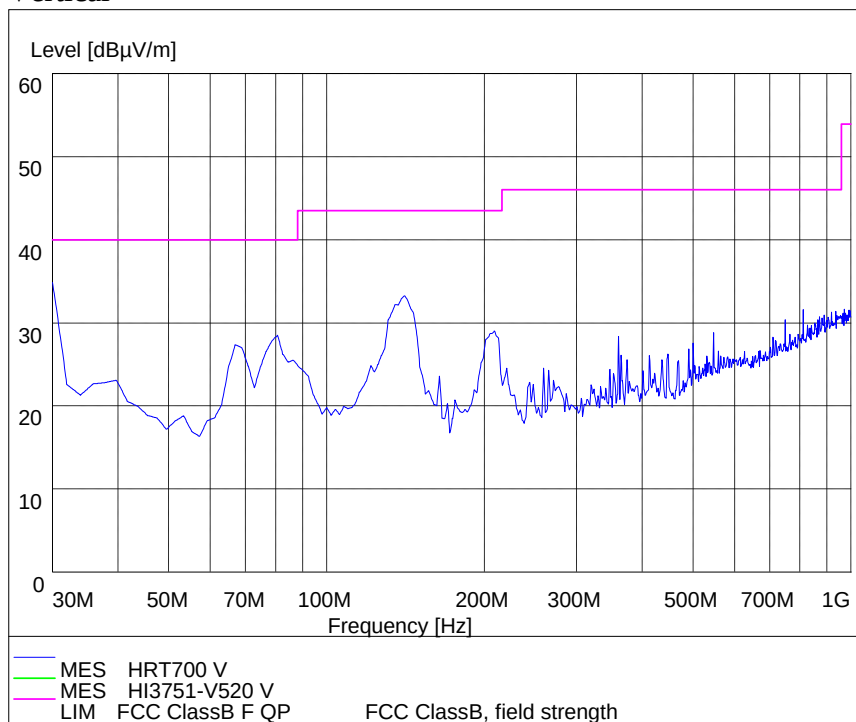
Radiated Emission

EUT Name: HRT500i
Operating Condition: Data transmitter with PC by USB Port
Test site: SMQ NETC EMC Lab.3m Chamber
Antenna Position: Vertical & Horizontal
Comment: AC 120V60Hz

Horizontal



Vertical



7. CONDUCTED EMISSION TEST FOR AC POWER PORT MEASUREMENT

7.1. Test Standard and Limit

7.1.1. Test Standard

FCC Part 15.207

7.1.2. Test Limit

Table 6 Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dB μ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

* Decreasing linearly with logarithm of the frequency

* The lower limit shall apply at the transition frequency.

7.2. Test Procedure

The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions form both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

The bandwidth of EMI test receiver is set at 9kHz.

7.3. Test Arrangement

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application. The detailed information refers to test picture.

7.4. Test Data

The emissions don't show in below are too low against the limits. Refer to the test curves.

Table 7 Conducted Disturbance Test Data

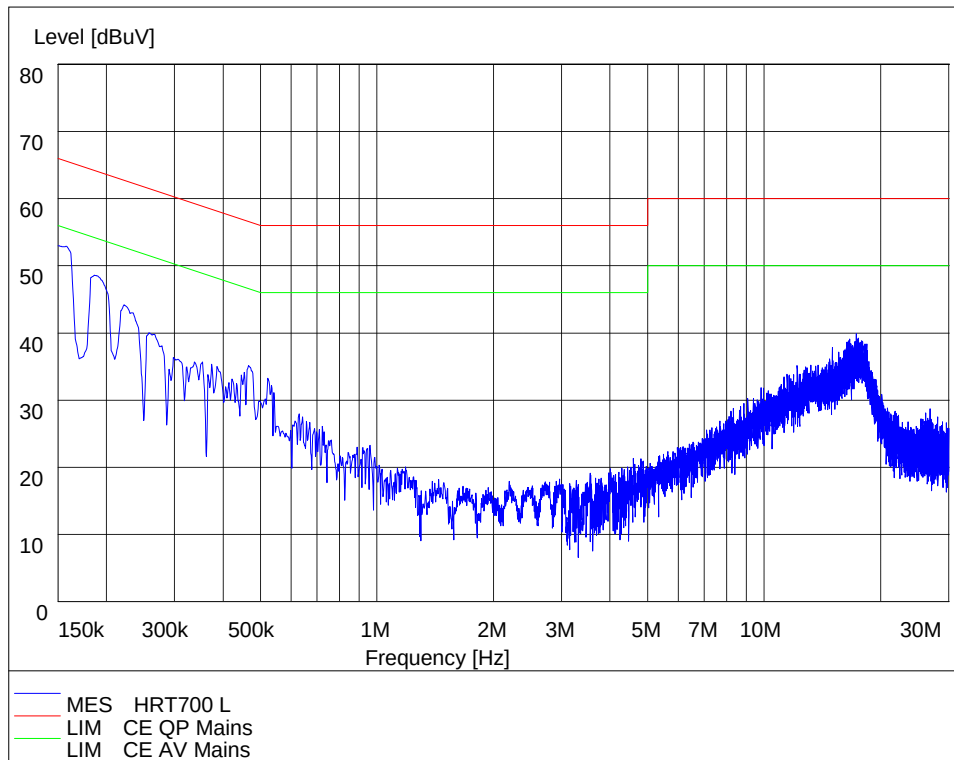
Model No.: HRT500i								
Test mode: Charging and transmitter								
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)	Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)
Line	0.156	9.7	40.0	49.7	65.7	24.8	34.5	55.7
	0.186	9.7	35.8	45.5	64.2	18.2	27.9	54.2
	0.222	9.7	31.2	40.9	62.7	14.1	23.8	52.7
	0.258	9.7	26.0	35.7	61.5	8.9	18.6	51.5
	0.466	9.7	20.1	29.8	56.6	7.0	16.7	46.6
	17.369	9.9	24.9	34.8	60	19.6	29.5	50
Neutral	0.158	9.7	39.5	49.2	65.6	25.9	35.6	55.6
	0.186	9.7	36.3	46	64.2	19.9	29.6	54.2
	0.218	9.7	33.8	43.5	62.9	18.2	27.9	52.9
	0.246	9.7	29.4	39.1	61.9	10.9	20.6	51.9
	0.282	9.7	28.1	37.8	60.8	12.2	21.9	50.8
	17.536	9.9	28.4	38.3	60	22.9	32.8	50

REMARKS: 1. Emission level(dBuV)=Read Value(dBuV) + Correction Factor(dB)

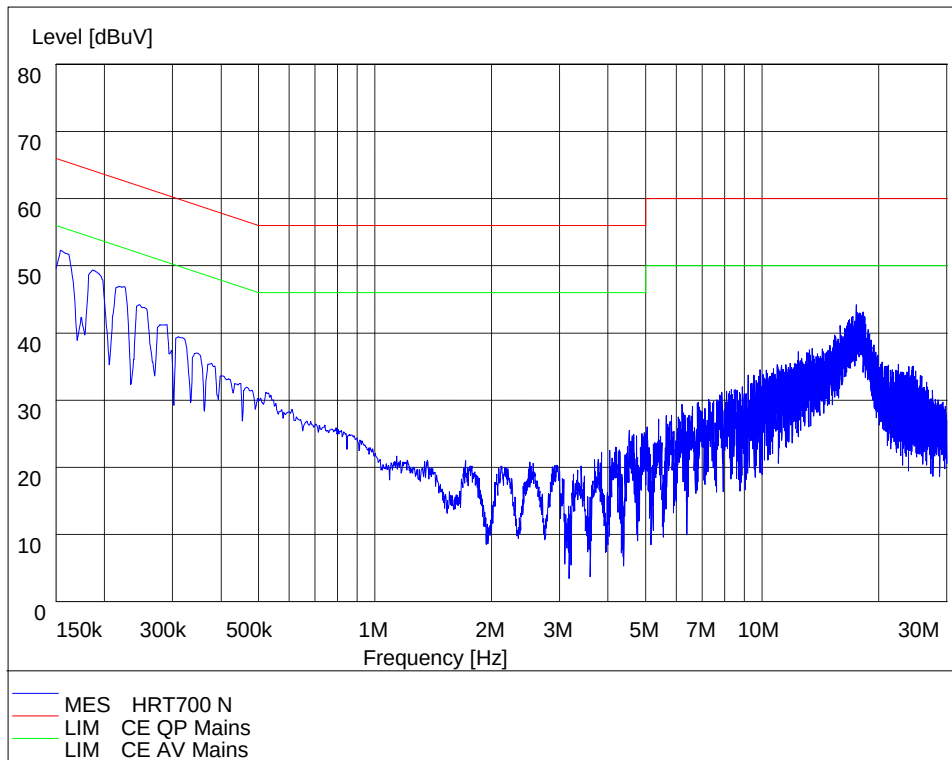
2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)

3. The other emission levels were very low against the limit.

EUT: HRT500i
Manufacturer:
Operating Condition: Charging and transmitter
Test Site:
Operator:
Test Specification: L
Comment: AC 120V/60Hz



EUT: HRT500i
Manufacturer:
Operating Condition: Charging and transmitter
Test Site:
Operator:
Test Specification: N
Comment: AC 120V/60Hz



8. ANTENNA REQUIREMENT

According to Section 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 EUT has a built in antenna which is integrated inside the enclosure, this is permanently attached antenna and meets the requirements of this section.