

FCC TEST REPORT

For

Handheld Rugged Terminal

Model Number: HRT500i

FCC ID: SX3-HRT500I

Report Number : WT158002876

Test Laboratory : Shenzhen Academy of Metrology and Quality Inspection
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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 : /

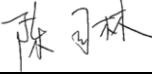
FCC ID : SX3-HRT500I

Test Standards:

FCC Part 15 Subpart B 15.107, 15.109 (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).

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:  Date: Jun.19, 2015
(Chen Sulin 陈司林)

Checked by:  Date: Jun.19, 2015
(Lin Yixiang 林奕翔)

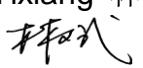
Approved by:  Date: Jun.19, 2015
(Lin Bin 林斌)

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1. TEST RESULTS SUMMARY

Table 1 Test Results Summary

Test Items	FCC Rules	Test Results
Conducted Disturbance	15.107	Pass
Radiation Emission	15.109	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 Committee for Laboratories (CNAS) accredits the Laboratory for conformance to FCC standards, EMC international standards and EN standards. The Registration Number is 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 registered to perform emission tests with Industry Canada (IC), and the registration number is IC4174.

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

Measurement Uncertainty

2.3. Measurement Uncertainty

Conducted Emission
9kHz~30MHz 3.5dB

Radiated Emission
30MHz~1000MHz 4.5dB
1GHz~18GHz 4.6dB

3. PRODUCT DESCRIPTION

3.1. EUT Description

Table 2 Specification of the Equipment under Test

Product Type:	Handheld Rugged Terminal
Hardware Version:	V1.0
Software Version :	Windows CE 6.0
FCC-ID:	SX3-HRT500I
Frequency:	GSM850/PCS1900MHz/WCDMA850MHz Wifi:2412MHz-2462MHz; Bluetooth: 2402MHz-2480MHz
Type(s) of Modulation:	GSM850/PCS1900MHz :GMSK 8PSK WCDMA850MHz:QPSK 802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11g: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth: GFSK, pi/4DQPSK, 8DPSK
Antenna Type:	RFID:Integrated Antenna 0dBi BT:Chip Antenna 0dBi WiFi:PCB Antenna 0dBi GPS:Patch Antenna 0dBi 2G/3G:PCB Antenna 0dBi
Operating voltage:	Internal battery, 120V AC Adapter; 6.5V (Low)/7.4V (Nominal)/ 8.4V (Max)

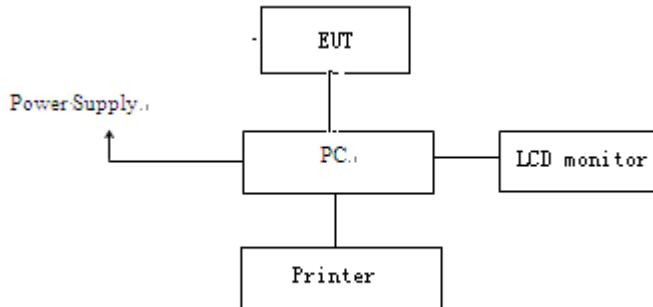
Remark: This is a derivative report based on original report WT158002170(FCC ID: SX3-HRT700).

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. Block Diagram of EUT Configuration



Test mode 1

3.3. Operating Condition of EUT

Test mode 1: data transmitter with PC by USB port

Prescan for other test mode: The test mode mentioned above is identified as worst case for this EUT and the test results for this mode is recorded in this report.

The Radiated 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).

3.4. Support Equipment List

Name	Model No	S/N	Manufacturer	FCC
Computer	9439	L3BDF2K	Lenovo	DOC
Keyboard (USB)	SK-8825 (L)	02553778	Lenovo	DOC
Mouse (USB)	MO28UOL	4418011108	Lenovo	DOC
Monitor	9227-AE1	V1TDB38	Lenovo	DOC
Printer	BJC-265SP	EVX81604	CANON	DOC
Adaptor for Printer	AD-300	---	CANON	DOC

3.5. 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)%

3.6. Modifications

No modification was made.

4. TEST EQUIPMENT USED

4.1. Test Equipment Used to Measure Conducted Disturbance

Table 3 Conducted Disturbance Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB3319	EMI Test Receiver	R&S	ESCS30	Dec.20,2014	1 Year
SB4357	AMN	R&S	ENV216	Oct.14,2014	1 Year
SB3321	AMN	R&S	ESH2-Z5	Jan.19,2015	1 Year
---	Conducted Emissions Cable set	HUBER+SUHNER	FAC X3/AP1	Dec.20,2014	1 Year

4.2. Test Equipment Used to Measure Radiated Disturbance

Table 4 Radiated Disturbance Test Equipment

No.	Equipment	Manufacturer	Model No.	LAST CALIB	Period
SB3436	EMI Test Receiver	Rohde & Schwarz	ESI26	Dec.29,2014	1 Year
SB5472/02	Bilog Antenna	SCHWARZBECK	VULB9163	Jan.18,2015	1 Year
SB9422/16	Horn Antenna	Rohde & Schwarz	HF907	May.19.2015	1 Year
----	Radiated Emissions Cable set	HUBER+SUHNER	---	Jan.19, 2015	1 Year
---	Radiated Emissions Cable set	HUBER+SUHNER	---	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

5. CONDUCTED DISTURBANCE TEST

5.1. Test Standard and Limit

5.1.1. Test Standard

FCC Part 15: Section 15.107

5.1.2. Test Limit

Table 5 Conducted Disturbance Test Limit (Class B)

Frequency	Power Port limits (dB μ V)	
	Quasi-peak	Average
0.15MHz ~ 0.5MHz	66~56*	56~46*
0.5MHz ~ 5 MHz	56	46
5 MHz ~ 30MHz	60	50

* Decreasing linearly with logarithm of the frequency

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

5.3. 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.

5.4. Test Data

The emissions don't show in following result tables are more than 20dB below the limits, the test curves are shown in the next page.

Table 6 Conducted Disturbance Test Data at mains Port

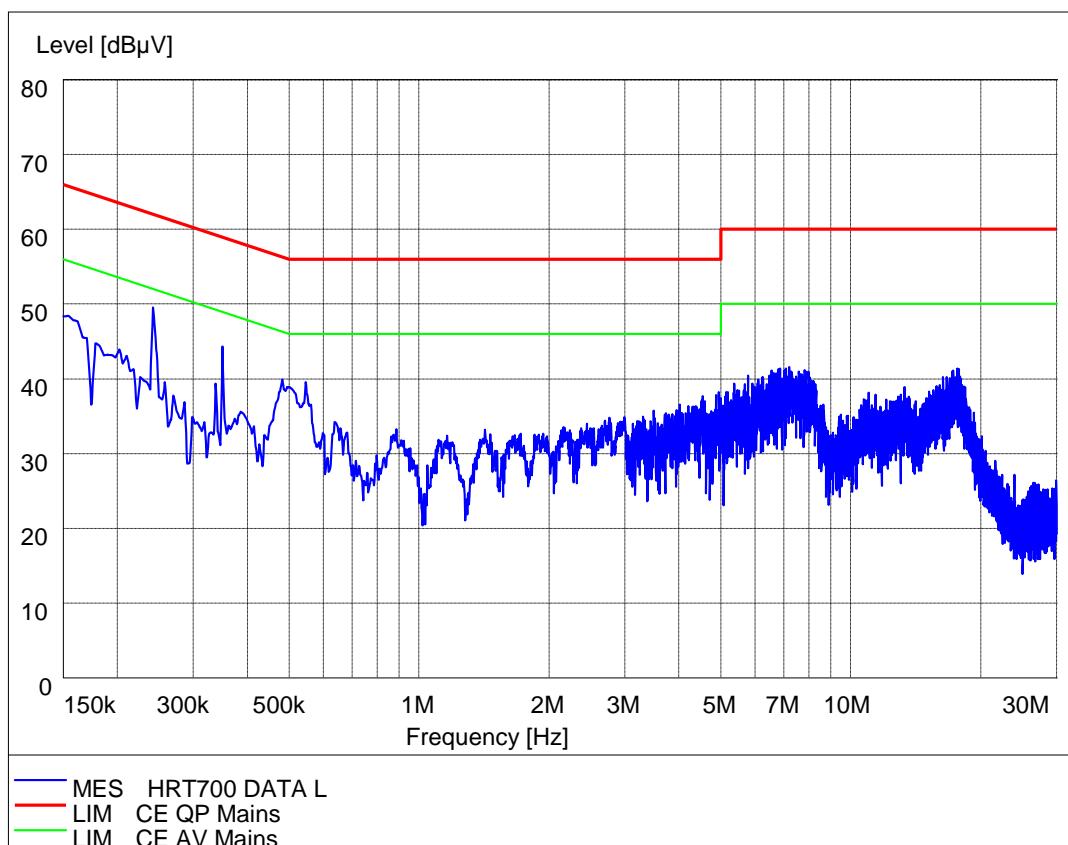
Model No.: HRT500i								
Test mode: data transmitter with PC by USB port								
	Frequency (MHz)	Correction Factor (dB)	Quasi-Peak			Average		
			Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)	Reading (dB μ V)	Emission Level (dB μ V)	Limits (dB μ V)
Line	0.15	9.7	32.5	42.2	66	12.7	22.4	56
	0.242	9.7	26.3	36	62.0	12.2	21.9	52.0
	0.35	9.7	32.5	42.2	59.0	9.6	19.3	49.0
	0.482	9.7	26.8	36.5	56.3	18.9	28.6	46.3
	0.546	9.8	26.2	36	56	15.5	25.3	46
	7.088	10.0	26.7	36.7	60	20.5	30.5	50
Neutral	0.154	9.7	34.6	44.3	65.8	17.5	27.2	55.8
	0.162	9.7	34.8	44.5	65.4	20.8	30.5	55.4
	0.178	9.7	27.1	36.8	64.6	10.6	20.3	54.6
	0.474	9.7	24.0	33.7	56.4	15.0	24.7	46.4
	6.932	10.0	26.9	36.9	60	20.5	30.5	50
	17.58	9.9	25.9	35.8	60	19.9	29.8	50

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

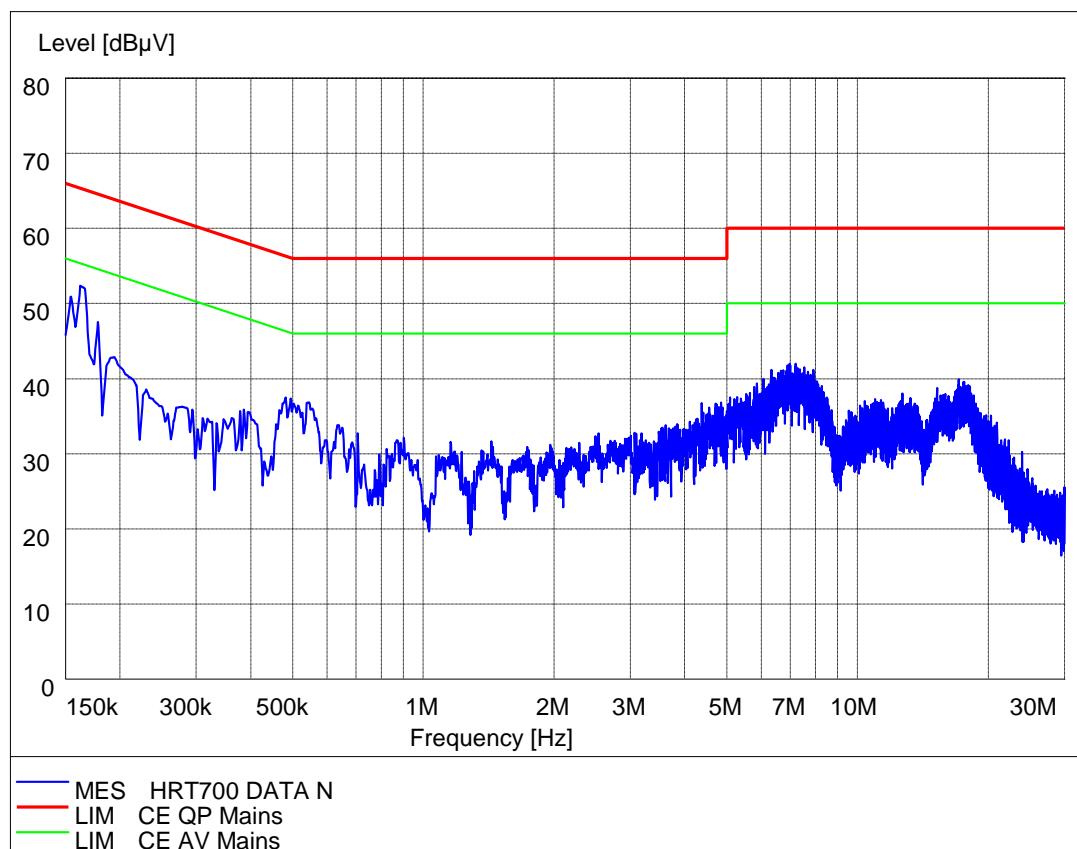
2. Correction Factor(dB) =LISN Factor (dB) + Cable Factor (dB)+Limiter Factor(dB)

3. The other emission levels were are more than 20dB below the limits.

EUT: HRT500i
Manufacturer:
Operating Condition: data transmitter with PC by USB port
Test Site:
Operator:
Test Specification: L
Comment: AC 120V/60Hz



EUT: HRT500i
Manufacturer:
Operating Condition: data transmitter with PC by USB port
Test Site:
Operator:
Test Specification: N
Comment: AC 120V/60Hz



6. RADIATION DISTURBANCE TEST

6.1. Test Standard and Limit

6.1.1. Test Standard

FCC Part 15: Section 15.109

6.1.2. Test Limit

Table 7 Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

Frequency (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
960~1000	500	3

Table 8 Radiation Disturbance Test Limit for FCC (Class B)(Above 1G)

Frequency (MHz)	(dBuV/m) (at 3 meters)	
	PEAK	AVERAGE
Above 1000	74	54

* The lower limit shall apply at the transition frequency.

* The test distance is 3m.

6.2. Test Procedure

The EUT is placed on a turntable, which is 0.8 meter above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set **3 meters** away from the receiving antenna, which is mounted on an antenna tower. The antenna can move up and down between 1 to 4 meters to find out the maximum emission level. Broadband antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna is set on test. Set RBW=100 kHz for $f < 1$ GHz; VBW \geq RBW; Detector function = peak; Set RBW = 1 MHz, VBW= 3MHz for $f > 1$ GHz for peak measurement.

6.3. 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.

6.4. Test Data

The emissions don't show in following result tables are more than 20dB below the limits, the test curves are shown in the next page.

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

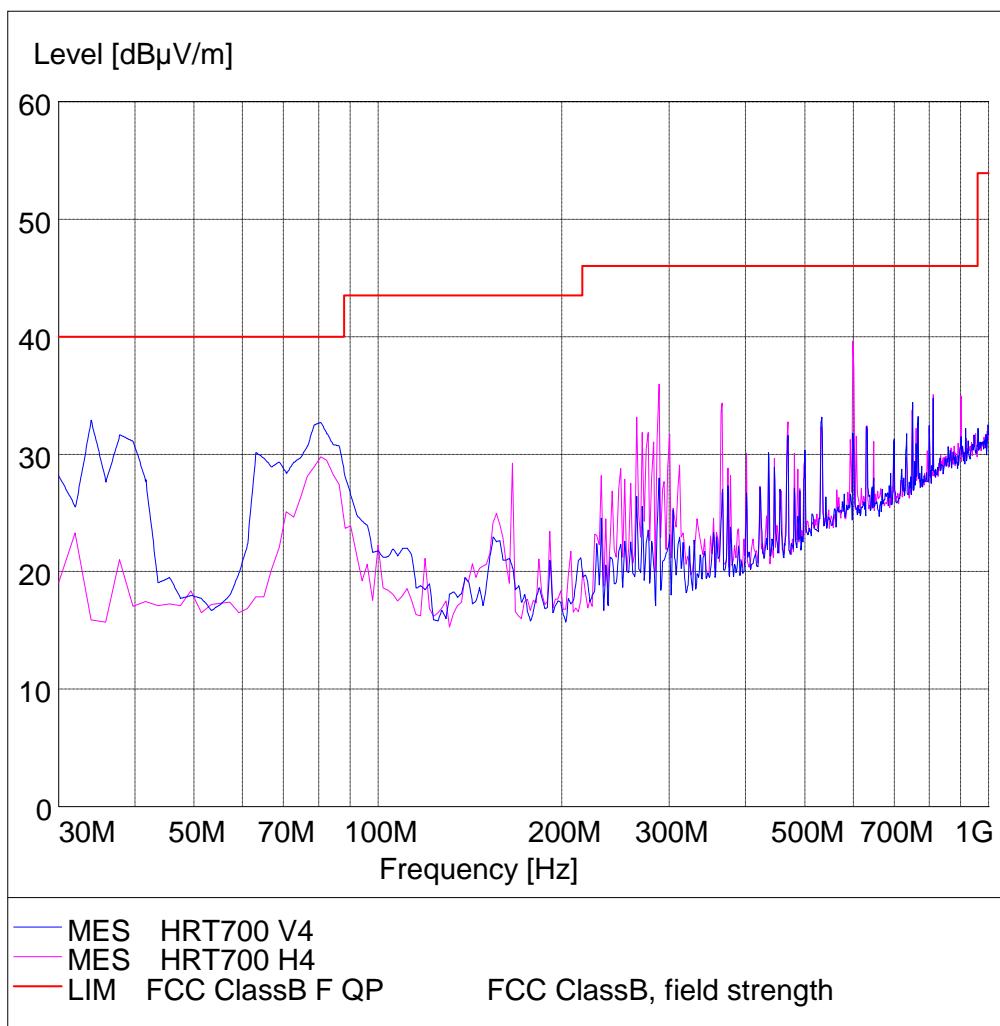
Table 9 Radiated Disturbance Test Data

Frequency MHz	Cable Loss +pre amp(dB)	Antenna Factor(dB)	Readings(d B μ V/m)	Level(dB μ V/m)	Polarity(H/V)	Turntable Angle(de g)	Antenna Height(m)	Limits(d B μ V/m)	Margin(d B)
80.541	0.9	8.5	17.3	26.7	H	5	1.0	40.0	13.3
166.072	1.5	8.7	19.0	29.2	H	15	1.0	43.5	14.3
265.21	1.9	12.1	19.1	33.1	H	346	1.0	46.0	12.9
288.537	2.0	12.7	21.2	35.9	H	355	1.0	46.0	10.1
366.292	2.2	14.3	17.8	34.3	H	35	1.0	46.0	11.7
599.559	3.1	16.6	19.8	39.5	H	350	1.0	46.0	6.5
33.887	0.7	12.3	16.8	29.8	V	350	1.0	40	10.2
37.775	0.7	12.3	15.6	28.6	V	45	1.0	40	11.4
80.541	0.9	8.5	20.3	29.7	V	330	1.0	40	10.3
469.318	2.7	15.6	13.3	31.6	V	51	1.0	46	14.4
553.466	2.9	16.6	13.6	33.1	V	58	1.0	46	12.9
751.182	3.5	18.8	11.8	34.1	V	17	1.0	46	11.9
PK									
1190.38	-41.0	24.4	64.8	48.2	H	345	1.0	74	25.8
1340.68	-40.7	24.3	64.2	47.8	H	360	1.0	74	26.2
1651.301	-40.6	26.7	59.7	45.8	H	15	1.0	74	28.2
1791.583	-40.5	26.7	60.3	46.5	H	45	1.0	74	27.5
1991.983	-40.4	26.9	58.9	45.4	H	13	1.0	74	28.6
2092.184	-40.4	28.6	60.3	48.5	H	90	1.0	74	25.5
1190.38	-41.0	24.4	66.7	50.1	V	78	1.0	74	23.9
1330.661	-40.8	24.3	63.4	46.9	V	65	1.0	74	27.1
1651.302	-40.6	26.7	65.5	51.6	V	43	1.0	74	22.4
1791.581	-40.5	26.7	70.4	56.6	V	15	1.0	74	17.4
2092.184	-40.4	28.6	59.6	47.8	V	330	1.0	74	26.2
2392.785	-40.2	28.3	66.2	54.3	V	84	1.0	74	19.7
AV									
1190.38	-41.0	24.4	45.1	28.5	H	345	1.0	54	25.5
1340.68	-40.7	24.3	47.0	30.6	H	360	1.0	54	23.4
1651.301	-40.6	26.7	43.4	29.5	H	15	1.0	54	24.5
1791.583	-40.5	26.7	44.5	30.7	H	45	1.0	54	23.3
1991.983	-40.4	26.9	41.7	28.2	H	13	1.0	54	25.8
2092.184	-40.4	28.6	44.5	32.7	H	90	1.0	54	21.3
1190.38	-41.0	24.4	48.6	32.0	V	78	1.0	54	22.0
1330.661	-40.8	24.3	48.1	31.6	V	65	1.0	54	22.4
1651.302	-40.6	26.7	51.0	37.1	V	43	1.0	54	16.9
1791.581	-40.5	26.7	54.2	40.4	V	15	1.0	54	13.6
2092.184	-40.4	28.6	44.9	33.1	V	330	1.0	54	20.9
2392.785	-40.2	28.3	43.0	31.1	V	84	1.0	54	22.9

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

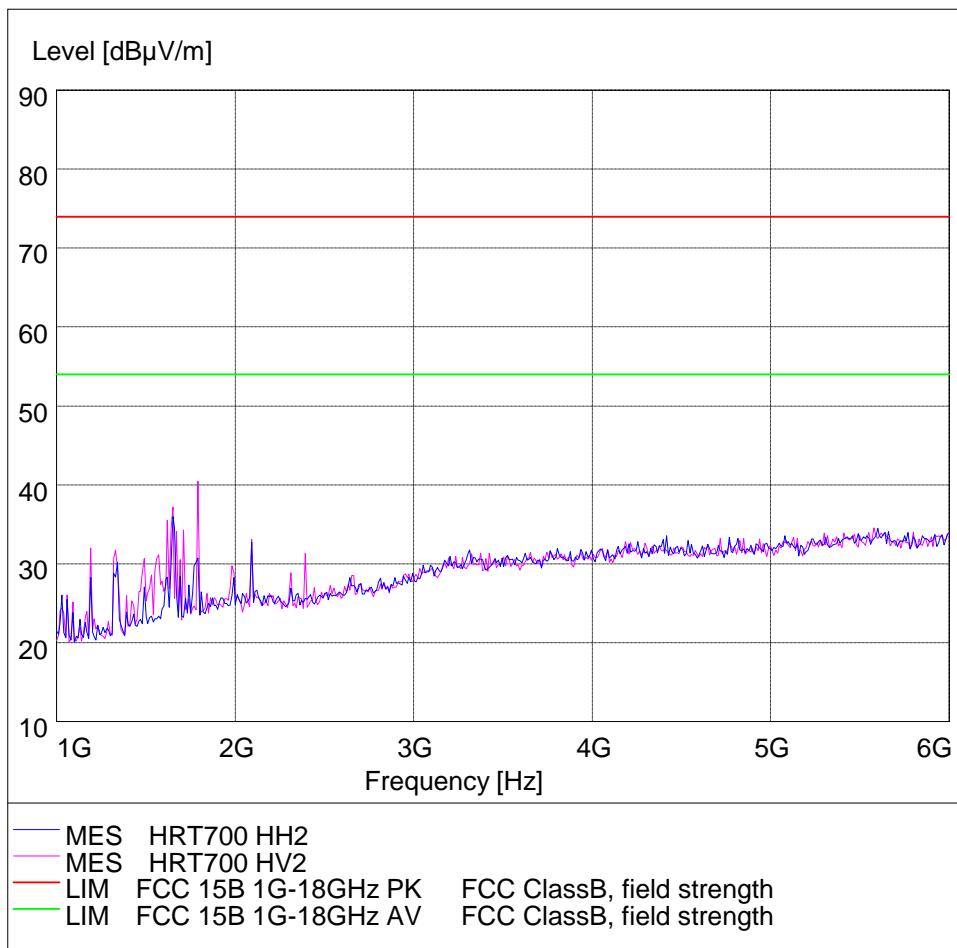
Radiated Emission

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



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



Radiated Emission

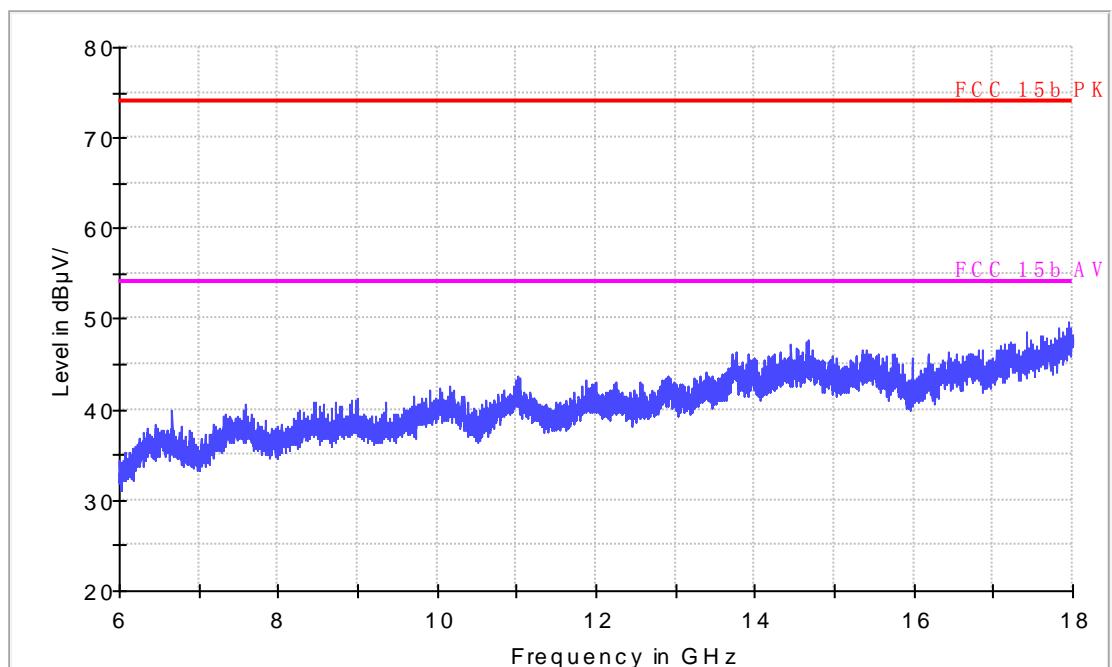
EUT Information

EUT Model name: HRT500i
Operater Mode: Data transmitter with PC by USB port
Comment:

Common Information

Test Description: SMQ NETC EMC Lab.3m Chamber
Customer
Antenna Position: Horizontal
Operator Name:
Comment1: AC 120V/60Hz
Comment2:

Copy (2) of FCC Electric Field Strength 1-18GHz operate on 2.4GHz



Radiated Emission

EUT Information

EUT Model name: HRT500i
Operator Mode: Data transmitter with PC by USB port
Comment:

Common Information

Test Description: SMQ NETC EMC Lab.3m Chamber
Customer
Antenna Position: Vertical
Operator Name:
Comment1: AC 120V/60Hz
Comment2:

Copy (2) of FCC Electric Field Strength 1-18GHz operate on 2.4GHz

