EMC TEST REPORT

Report No.:	SET2020-14159
Product Name:	Handheld Data Terminal
FCC ID:	SWSRFDT50
Model No. :	RFDT50
Applicant:	UROVO TECHNOLOGY CO., LTD.
Address:	36F,High-Tech Zone Union Tower,No.63,Xuefu Road, Nanshan
Received Date:	2020.10.28
Dates of Testing:	2020.10.28 —2020.11.19
Issued by:	CCIC Southern Testing Co., Ltd.
Lab Location:	Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China. **Tel:** 86 755 26627338 **Fax:** 86 755 26627238

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Test Report

Product Name.....	Handheld Data Terminal
Model No.	RFDT50
Trade name……..	UROVO
Trade name……..	UROVO
Applicant.....	UROVO TECHNOLOGY CO., LTD.
Applicant Address.....	36F,High-Tech Zone Union Tower,No.63,Xuefu Road, Nanshan District, Shenzhen, Guangdong, China
Manufacturer	UROVO TECHNOLOGY CO., LTD.
Manufacturer Address	36F,High-Tech Zone Union Tower,No.63,Xuefu Road, Nanshan District, Shenzhen, Guangdong, China
Test Standards.....	47 CFR Part 15 Subpart B
Test Result.....	PASS

Tested by ..... Zhang Pei Sen

PeiSen Zhang Test Engineer 2020.11.19

Reviewed by ..... Chris You

Chris You Senior Engineer 2020.11.19

Approved by ..... Shuangwen Zhang

2020.11.19

Shuangwen Zhang, Manager

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Change History		
Issue	Date	Reason for change
1.0	2020.11.19	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Name ..... .:	Handheld Data Terminal
Trade Name……:	UROVO
Brand Name……:	UROVO
Hardware Version……..… :	N/A
Software Version ..... :	N/A
Power supply……..……:	Battery Model No: NBLRFDT50 Capacitance: 3000mAh Rated Voltage: 3.7V Charge Limit: 4.2V Manufacturer: Shenzhen Cholipower Technology Co.,LTD
Ancillary Equipment…...……:	AC Adapter Model No.: KP10D-050200UU I/p: 100-240V～50/60Hz ,500mA O/p: 5.0V⎓2000mA Manufacturer: Strong Power Electronics Technology Co., Ltd.

Note 1:The EUT is a Handheld Data Terminal.

Note 2: All the patterns have been tested and only the worst results are recorded in the report.

Note 3: Please refer to ANNEX I for the photographs of the EUT. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacture

1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart B:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart B	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.107	Conducted Emission	PASS
2	15.109	Radiated Emission	PASS

NOTE:

(1) The EUT has been tested according to 47 CFR Part 15 Subpart B,Class B.The test procedure is according to ANSI C63.4:2014.

1.3 Facilities and Accreditations

1.3.1 Facilities

FCC-Registration No.: CN5031

CCIC Southern Testing 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. Designation Number: CN5031, valid time is until December 31, 2020.

ISED Registration: 11185A-1

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until December 31, 2020.

NVLAP Lab Code: 201008

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008

1.3.2 Test Environment Conditions

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

Temperature (°C):	15°C - 35°C
Relative Humidity (%):	25% -75%
Atmospheric Pressure (kPa):	86kPa-106kPa

1.3.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission:	Uc = 3.6 dB (k=2)
Uncertainty of Radiated Emission:	Uc = 4.5 dB (k=2)

2. TEST CONDITIONS SETTING

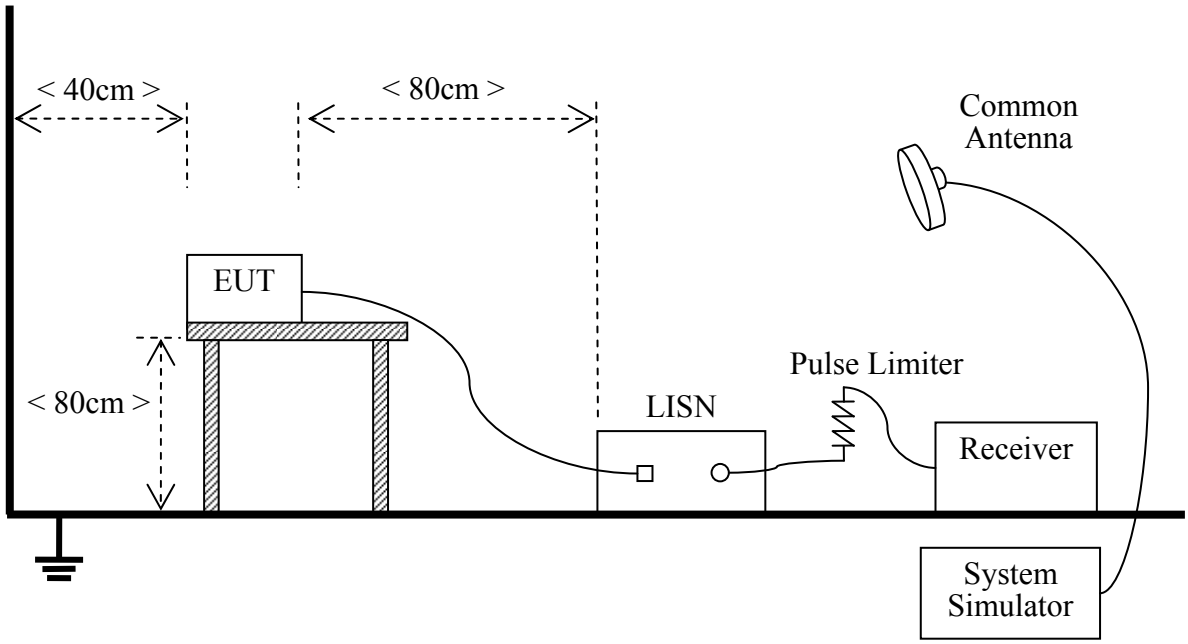
2.1 Test Mode

The EUT have the following typical setups during the test:
Setup1: EUT RFID+ Display+charge)
Setup2: EUT(Standby + charge)
Note: only worst-case mode setup 1 mode data provide at the report

2.2 Test Setup and Equipments List

2.2.1 Conducted Emission

A.Test Setup:



The EUT is placed on a 0.8m high insulating table, which stands on the grounded conducting floor, and keeps 0.4m away from the grounded conducting wall. The EUT is connected to the power mains through a LISN which provides 50Ω/50μH of coupling impedance for the measuring instrument. The Common Antenna is used for the call between the EUT and the System Simulator (SS). A Pulse Limiter is used to protect the measuring instrument. The factors of the whole test system are calibrated to correct the reading.

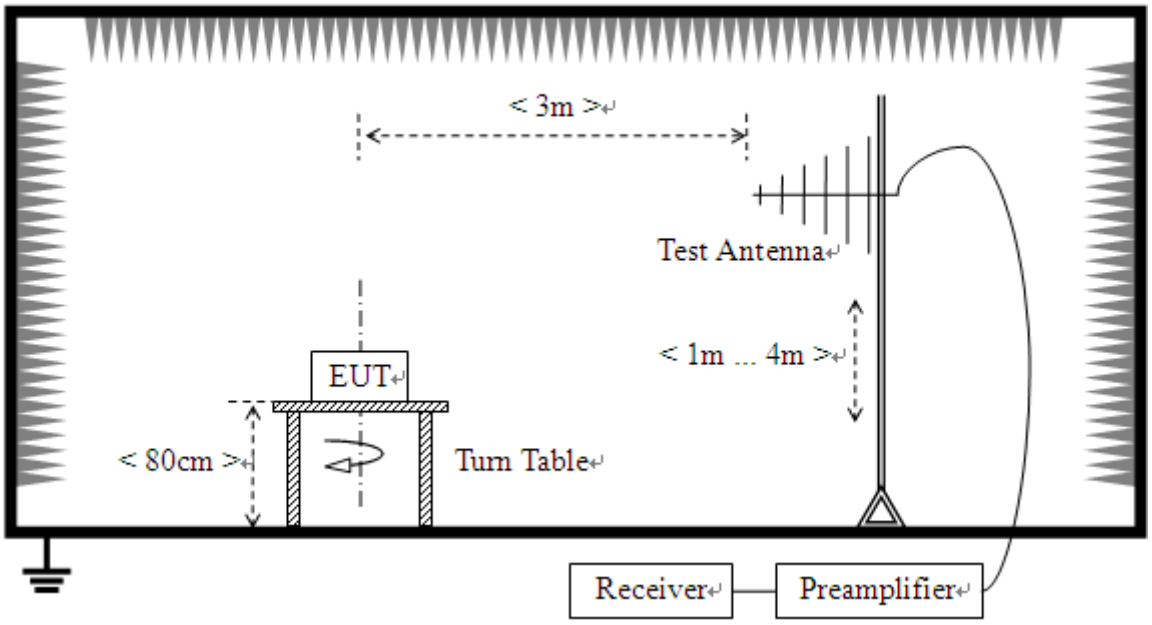
B.Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2019.11.21	2020.11.21
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2019.11.21	2020.11.21
Cable	MATCHING PAD	W7	/	2020.08.02	2021.08.01

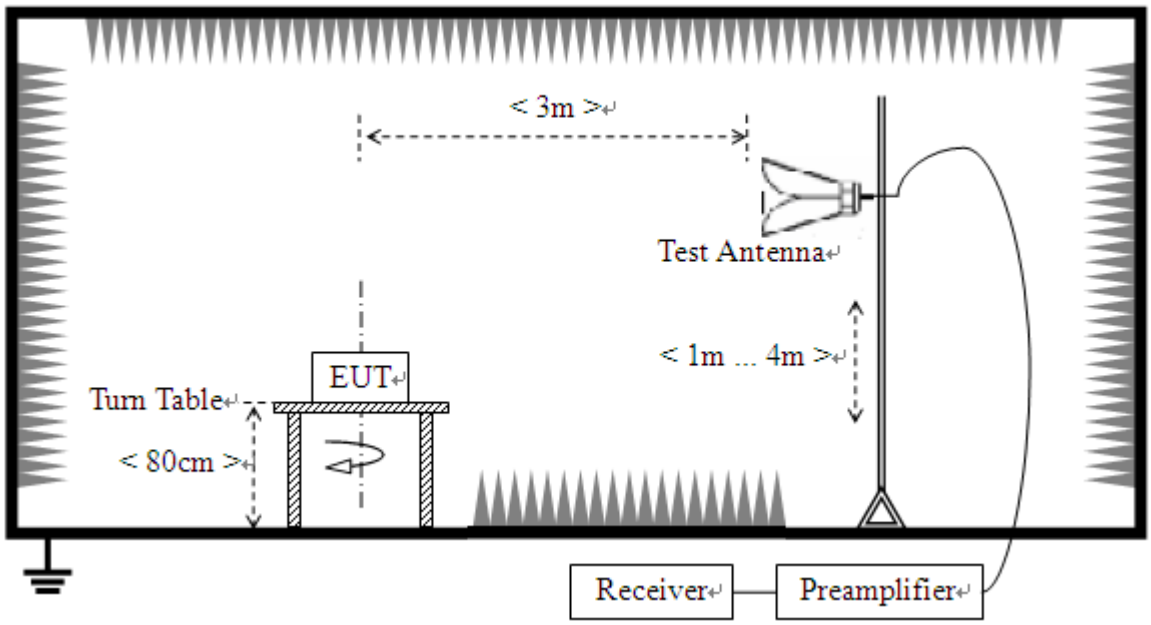
2.2.2 Radiated Emission

A. Test Setup:

1) For radiated emissions from 30MHz to1GHz



2) For radiated emissions above 1GHz



B. Test Procedure

The test is performed in a 3m Semi-Anechoic Chamber; the antenna factor, cable loss and so on of the site (factors) is calculated to correct the reading. The EUT is placed on a 0.8m high insulating Turn Table, and keeps 3m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

1) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Calibration Date	Calibration Due. Date
Test Receiver	KEYSIGHT	N9038A	A141202036	2019.11.21	2020.11.21
LISN	ROHDE&SCHWARZ	ENV216	A140701847	2019.11.21	2020.11.21
Shield Room	Xinju Electronics	L7300*W4500 *H3100	A181003226	2018.09.06	2021.09.05
EMI Test Receiver	ROHDE&SCHWARZ	ESCI	A0902601	2020.06.23	2021.06.23
Broadband Ant.	2786	ETC	A150402239	2018.09.17	2021.09.16
3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2019.03.26	2023.03.25
EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2020.09.23	2021.08.12
System Simulator	ROHDE&SCHWARZ	CMW500	A150802214	2019.07.30	2021.07.29
5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2019.03.25	2023.03.24
EMI Horn Ant.	ROHDE&SCHWARZ	HF906	A0304225	2019.04.17	2022.04.17

3. 47 CFR PART 15B REQUIREMENTS

3.1 Conducted Emission

3.1.1 Requirement

According to FCC section 15.107, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

Note:

a) The limit subjects to the Class B digital device.

b) The lower limit shall apply at the band edges.

c) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

3.1.2 Test Description

See section 2.2.1 of this report.

3.1.3 Test Result

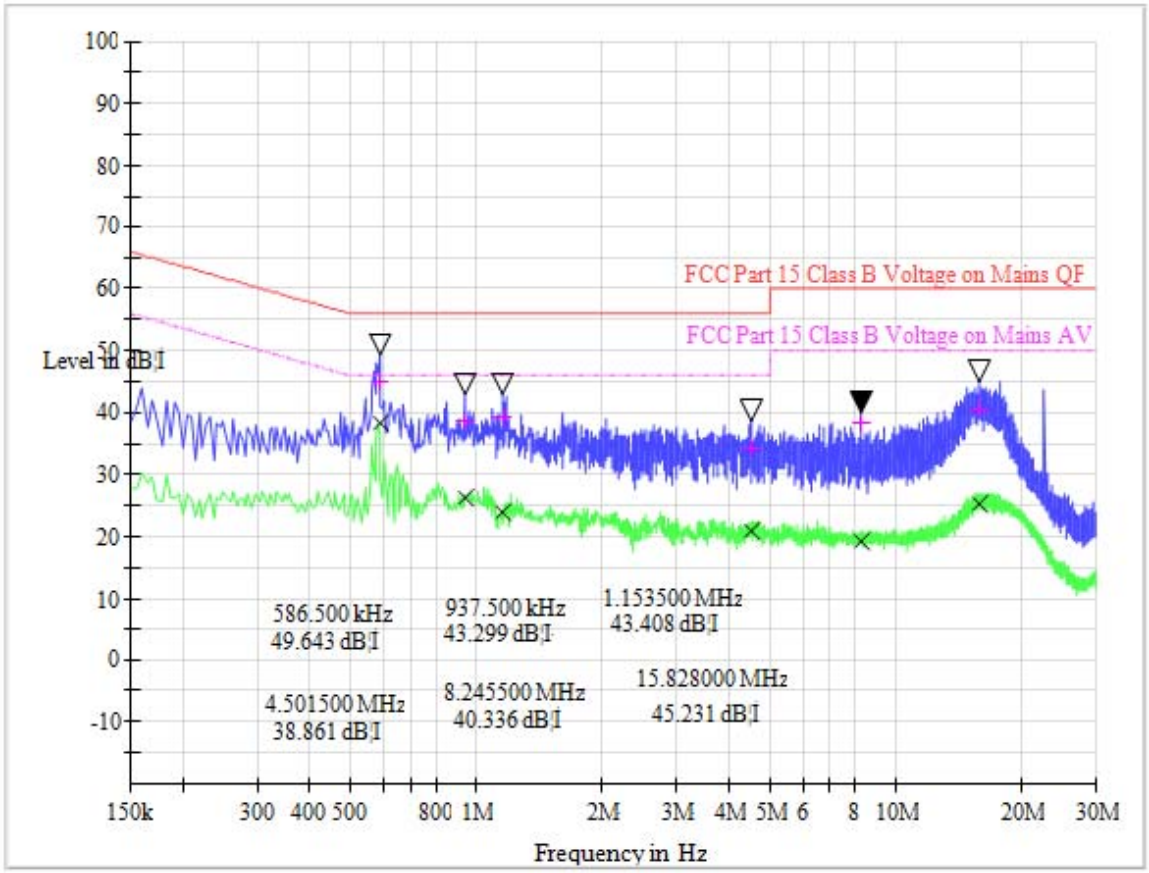
The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. All test modes are considered, refer to recorded points and plots below.

Note:

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a Nominal 120V AC,50/60Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

Test voltage and frequency

A.Mains terminal disturbance voltage, L phase

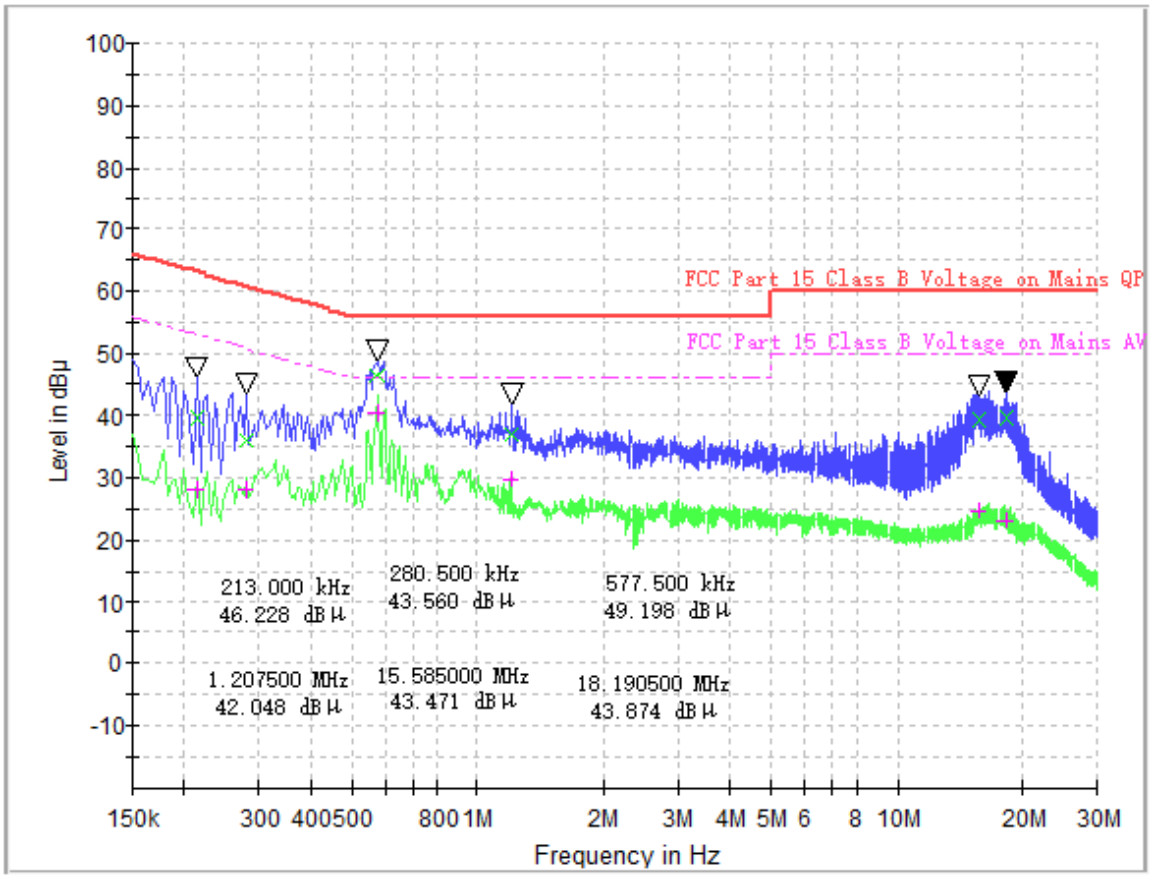


(Plot A: L Phase)

Frequency (MHz)	QuasiPeak	CAverage (dBµV)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.586500	44.90	38.40	0.1	20.1	11.10	56.0	7.60	46.0
0.937500	38.80	26.24	0.1	20.2	17.20	56.0	19.76	46.0
1.153500	39.22	23.85	0.1	20.2	16.78	56.0	22.15	46.0
4.501500	34.45	20.88	0.1	20.2	21.55	56.0	25.12	46.0
8.245500	38.47	19.08	0.1	20.3	21.53	60.0	30.92	50.0
15.828000	40.53	25.36	0.2	20.5	19.47	60.0	24.64	50.0

Note: Correction factor=Cabel loss+ attenuation factor
attenuation factor=10dB

B.Mains terminal disturbance voltage, N phase



(Plot B: N Phase)

Frequency (MHz)	QuasiPeak	CAverage (dBµV)	Cabel Loss (dB)	Corr. (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.213000	39.62	27.81	0.1	20.0	23.47	63.1	25.28	53.1
0.280500	36.11	27.77	0.1	20.0	24.69	60.8	23.03	50.8
0.577500	46.45	40.50	0.1	20.1	9.55	56.0	5.50	46.0
1.207500	36.84	29.66	0.1	20.2	19.16	56.0	16.34	46.0
15.585000	39.22	24.55	0.1	20.5	20.78	60.0	25.45	50.0
18.190500	39.52	23.01	0.2	20.6	20.48	60.0	26.99	50.0

3.2 Radiated Emission

3.2.1 Requirement

According to FCC section 15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency range (MHz)	Field Strength		Field Strength Limitation at 3m Measurement Dist	
	μV/m	Dist	(uV/m)	(dBuV/m)
30.0 - 88.0	100	3m	100	20log 100
88.0 - 216.0	150	3m	150	20log 150
216.0 - 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500

a) As shown in FCC section 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector. When average radiated emission measurements are specified in this part, including emission measurements below 1000MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

b) Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

c) For below 1G :QP detector RBW 120kHz ,VBW 300kHz.

d) For Above 1G: PK detector RBW 1MHz,VBW 3MHz for PK value ;AV detector RBW 1MHz, VBW 10Hz for AV value.

Note:

1) The tighter limit shall apply at the boundary between two frequency range.
2) Limitation expressed in dBuV/m is calculated by 20log Emission Level(uV/m).
3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^{2.}$
   Example:
   F.S Limit at 30m distance is 30uV/m, then F.S Limitation at 3m distance is adjusted as
   $Ld1 = L1 = 30uV/m * (10)^2 = 100 * 30uV/m.$

3.2.2 Test Description

See section 2.3.2 of this report.

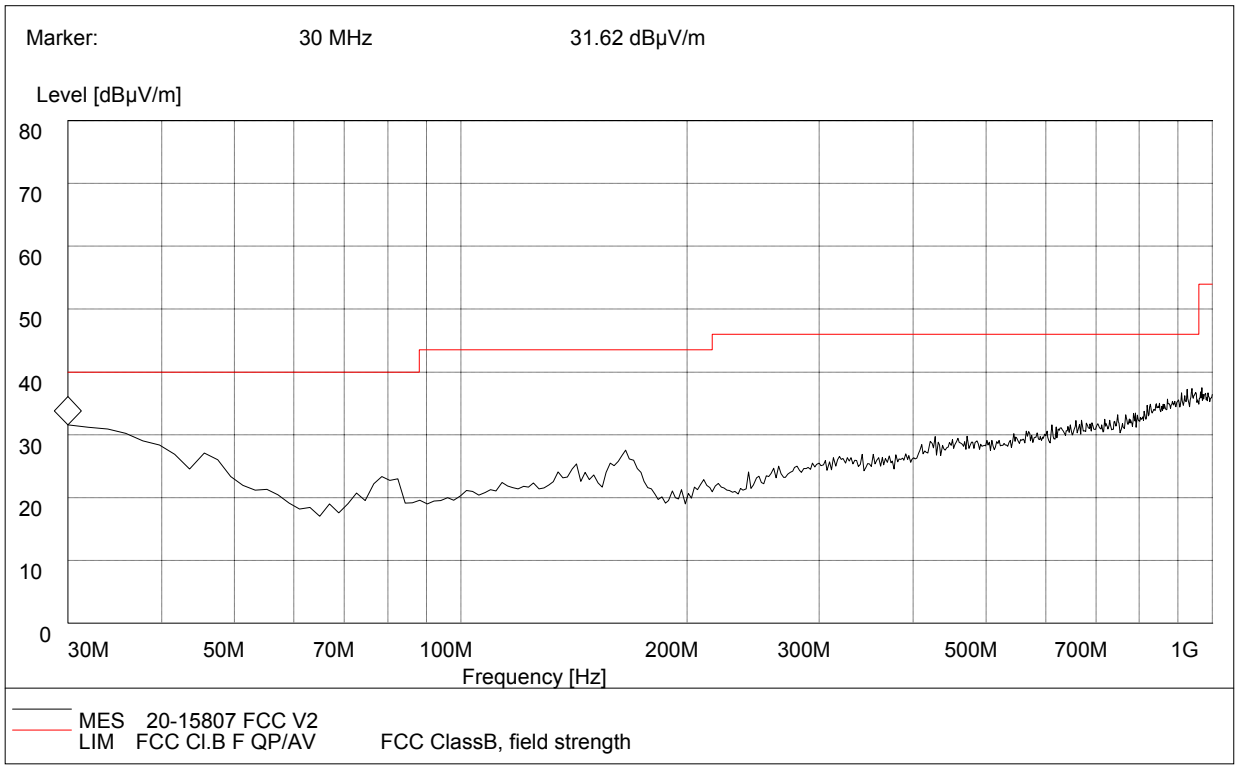
3.2.3 Test Result

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors. Both the vertical and the horizontal polarizations of the Test Antenna are considered to perform the tests. All test modes are considered, refer to recorded points and plots below.

The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

Note: All radiated emission tests were performed in X, Y, Z axis direction, and only the worst axis test condition was recorded in this test report.

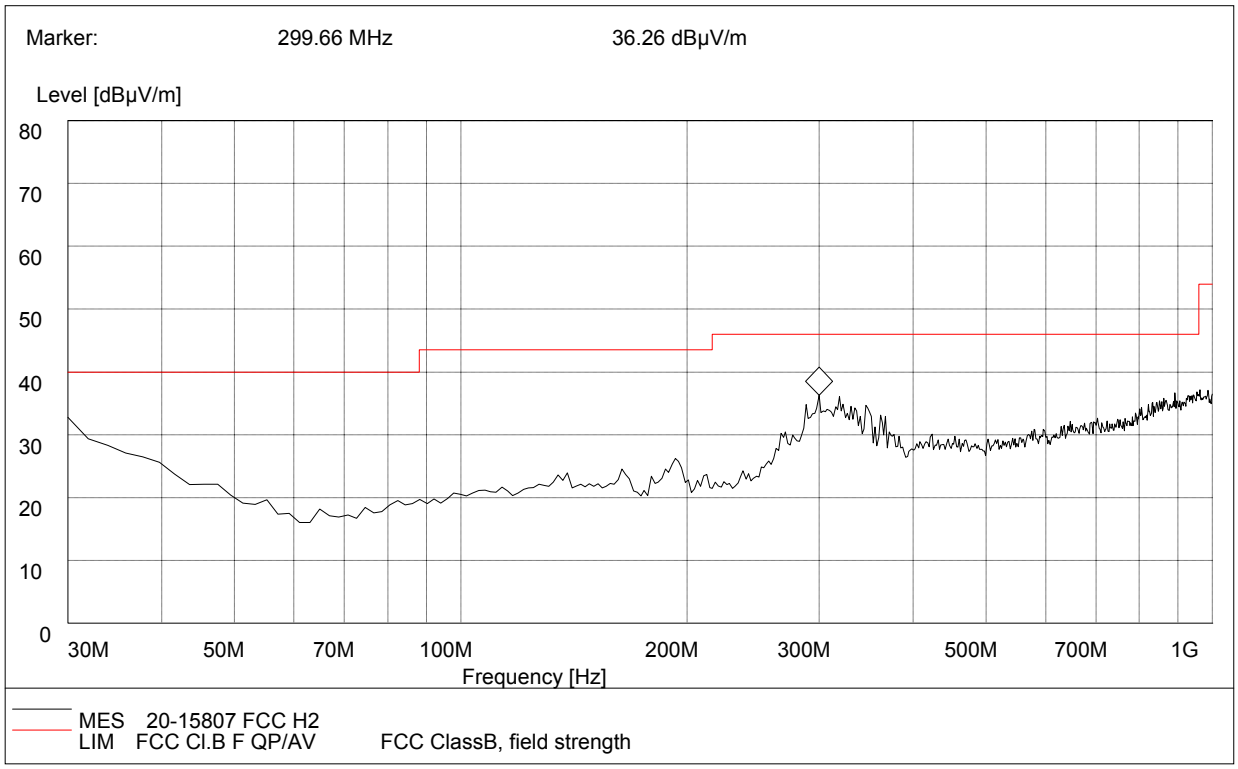
A.Radiation disturbances, antenna polarization:Vertical



(Plot C: Test Antenna Vertical 30M - 1G)

Frequency (MHz)	QuasiPeak (dB µ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB µ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	30.10	120.000	160.0	40.0	9.90	Vertical	0.4	26.3	Pass
45.52	26.37	120.000	177.0	40.0	13.63	Vertical	0.6	26.3	Pass
78.50	23.21	120.000	184.0	40.0	16.79	Vertical	0.5	26.3	Pass
142.52	24.36	120.000	179.0	43.5	19.14	Vertical	0.7	29.0	Pass
158.04	24.51	120.000	100.0	43.5	18.99	Vertical	0.5	29.0	Pass
165.80	26.18	120.000	110.0	43.5	17.32	Vertical	1.1	28.9	Pass

B.Radiation disturbances, antenna polarization: Horizontal

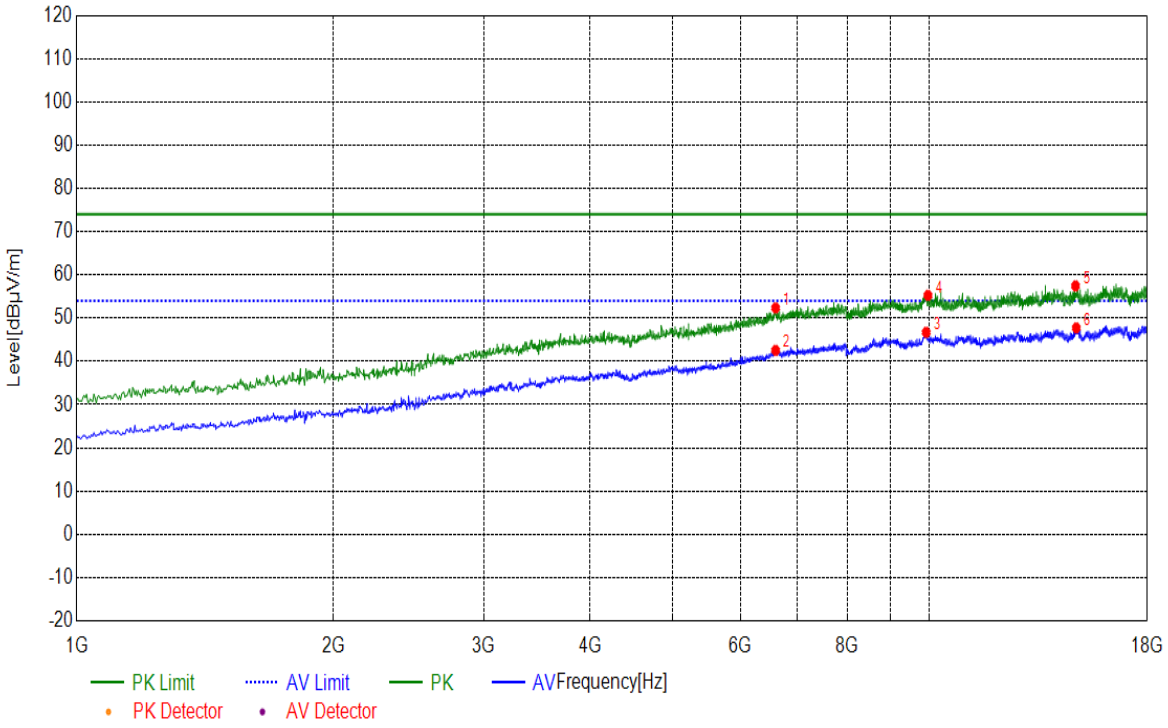


(Plot D: Test Antenna Horizontal 30M - 1G)

Frequency (MHz)	QuasiPeak (dB µ V/m)	Bandwidth (kHz)	Antenna height (cm)	Limit (dB µ V/m)	Margin (dB)	Antenna	Cable Loss(dB)	ANT. Factor(dB)	Verdict
30.00	31.13	120.000	100	40.0	8.87	Horizontal	0.5	26.3	Pass
138.64	22.82	120.000	130	43.5	20.68	Horizontal	0.5	26.3	Pass
163.86	23.54	120.000	185	43.5	19.96	Horizontal	0.6	29.0	Pass
192.96	24.19	120.000	200	43.5	19.31	Horizontal	0.6	29.0	Pass
299.66	34.26	120.000	100	46.0	11.74	Horizontal	0.6	29.0	Pass
319.06	34.05	120.000	100	46.0	11.95	Horizontal	1.2	28.9	Pass

Test Result: PASS

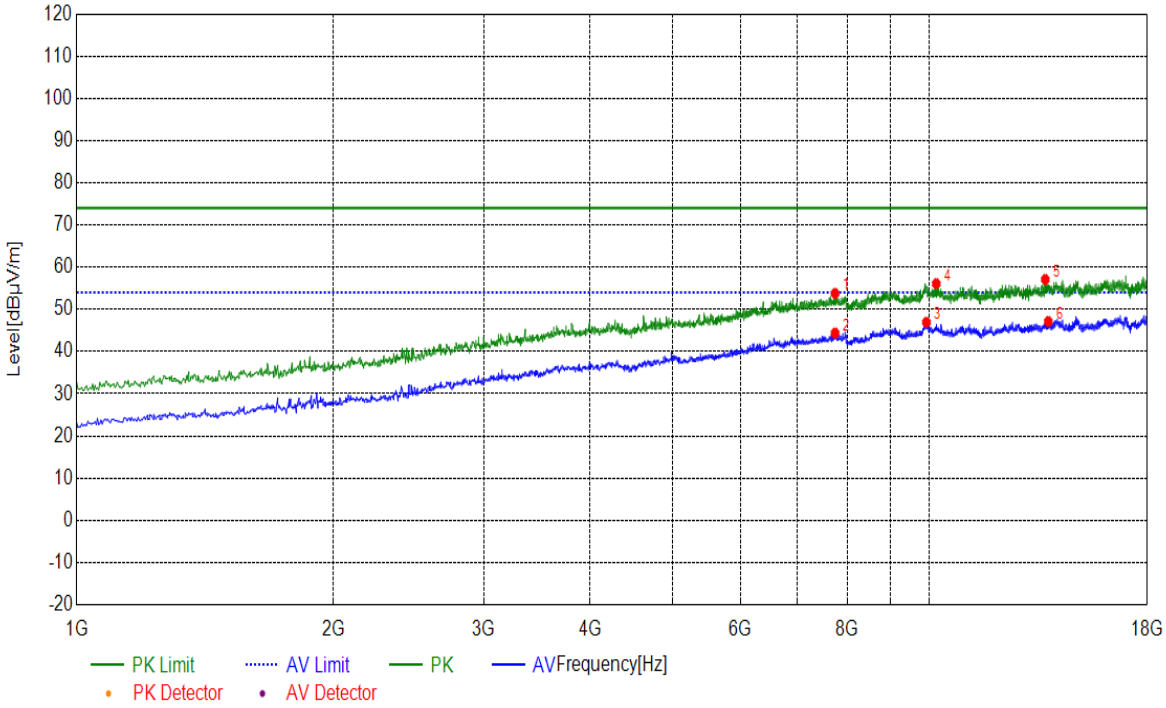
A.Radiation disturbances, antenna polarization: Horizontal



(Plot E: Test Antenna Horizontal 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	6597.51	52.36	6.20	74.00	21.64	PK	100	260	Horizontal
2	6597.51	42.54	6.20	54.00	11.46	AV	100	220	Horizontal
3	9906.38	46.71	11.83	54.00	7.29	AV	100	40	Horizontal
4	9953.99	55.25	11.41	74.00	18.75	PK	100	160	Horizontal
5	14823.7	57.45	14.51	74.00	16.55	PK	100	40	Horizontal
6	14854.3	47.75	14.71	54.00	6.25	AV	100	310	Horizontal

B.Radiation disturbances, antenna polarization: Vertical



(Plot F: Test Antenna Vertical 1G – 18G)

NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Trace	Height [cm]	Angle [°]	Polarity
1	7746.94	53.78	7.77	74.00	20.22	PK	100	310	Vertical
2	7746.94	44.38	7.77	54.00	9.62	AV	100	280	Vertical
3	9913.18	46.94	11.77	54.00	7.06	AV	100	60	Vertical
4	10178.4	56.09	11.11	74.00	17.91	PK	100	130	Vertical
5	13660.7	57.09	13.78	74.00	16.91	PK	100	170	Vertical
6	13772.9	47.13	13.49	54.00	6.87	AV	100	230	Vertical

-----End of Report-----