



TEST REPORT

APPLICANT : Shenzhen Xhorse Electronics Co., Ltd.
PRODUCT NAME : KEY TOOL MAX PRO
MODEL NAME : XDKMP0
BRAND NAME : Xhorse
FCC ID : 2A14T-XDKMP0
STANDARD(S) : 47 CFR Part 15 Subpart C
RECEIPT DATE : 2022-07-20
TEST DATE : 2022-07-26 to 2022-08-11
ISSUE DATE : 2024-07-01



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Shen Junsheng (Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2024-07-01	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Shenzhen Xhorse Electronics Co., Ltd.
Applicant Address:	Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen
Manufacturer:	Shenzhen Xhorse Electronics Co., Ltd.
Manufacturer Address:	Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen

1.2. Equipment Under Test (EUT) Description

Product Name:	KEY TOOL MAX PRO	
Sample No.:	2#	
Hardware Version:	V3.0	
Software Version:	V1.5.1	
Operating Frequency:	125 kHz	
Modulation Type:	AM	
Antenna Type:	ANT1: Loop Antenna ANT2: Loop Antenna	
Accessory Information:	Battery	
	Brand Name:	BAK
	Model No.:	G795260P
	Serial No.:	N/A
	Capacity:	3375 mAh
	Rated Voltage:	3.7 V
	Charge Limit:	4.2 V
	Manufacturer:	Zhengzhou BAK Battery Co., Ltd.



Note 1: This test report is variant from the original report (Report No.: SZ22070187W06, Model: XDKMP0), based on the similarity between before, the differences with before as below:

1. Some optocoupler devices are reduced, their position is U803, U806, U810, U804, U808, U809, and added 0 ohm resistance. Their modifications are only related to OBD-related functionality, it has nothing to do with wireless functions.
2. Modified the logic device U704 is added in the 125 kHz acquisition and receiving part, and some devices are not welded (U701, C724, C725), and the corresponding principle is modified.
3. Update the software version and hardware version.

There is no other change. The appearance, all RF parameters and circuits remain the same as before.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-15 Edition)	Radio Frequency Devices

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

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS _{Note1}	No deviation
2	15.207	Conducted Emission	Aug. 01, 2022	Wu Zhaoling	PASS _{Note1}	No deviation
3	15.209(a)	Radiated Emission	Aug. 04, 2022	Gao Jianrou	PASS _{Note1}	No deviation
4	15.215(c)	20dB Bandwidth	Aug. 09, 2022	Gao Jianrou	PASS _{Note1}	No deviation

Note 1: The test results of these test items in this report refer to the test report (Report No.: SZ22070187W06).

Note 2: The tests were performed according to the method of measurements prescribed in ANSI C63.10-2013. The EUT has been tested under continuous operating condition.

Note 3: Additions to, deviation, or exclusions from the method should be judged in the “method determination” column of add, deviate or exclude from the specific method should be explained in the “Remark” of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.4. Environmental Conditions

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

Temperature (°C):	15–35
Relative Humidity (%):	30–60
Atmospheric Pressure (kPa):	86–106



2. 47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According to FCC 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.

2.1.2. Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

2.2. Conducted Emission

2.2.1. Test Requirement

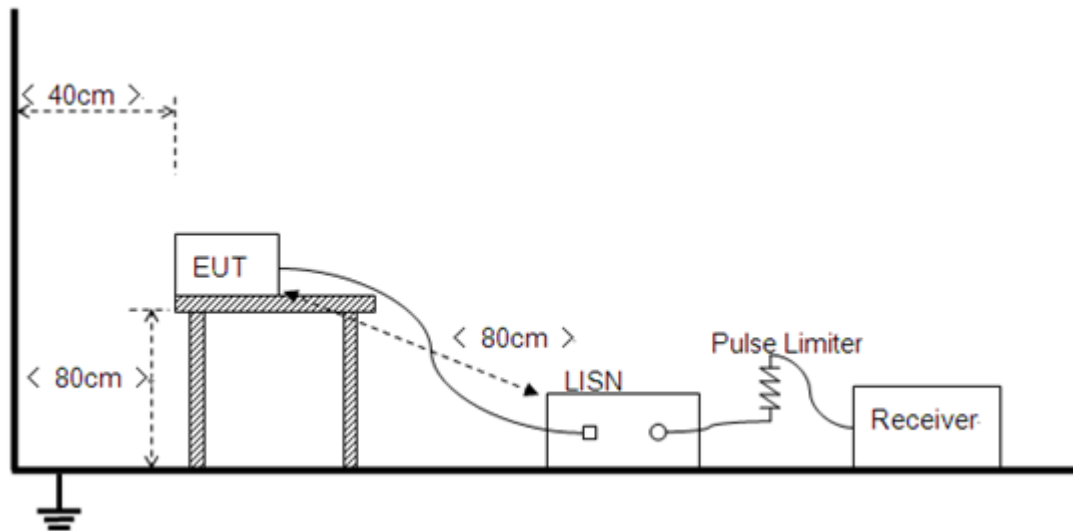
According to FCC section 15.207, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15–0.50	66 to 56	56 to 46
0.50–5	56	46
5–30	60	50

Note:

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15–0.50 MHz.

2.2.2. Test Setup



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



2.2.3. Test Result

The maximum conducted interference is searched using Peak (PK), if 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. Set RBW = 9 kHz, VBW = 30 kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120 V/60 Hz and AC 230 V/50 Hz were considered and tested respectively, only the results of the worst case AC 120 V/60 Hz were recorded in this report.

A. Test Setup:

Test Mode: EUT + Adapter + 125 kHz TX

Test Voltage: AC 120 V/60 Hz

The measurement results are obtained as below:

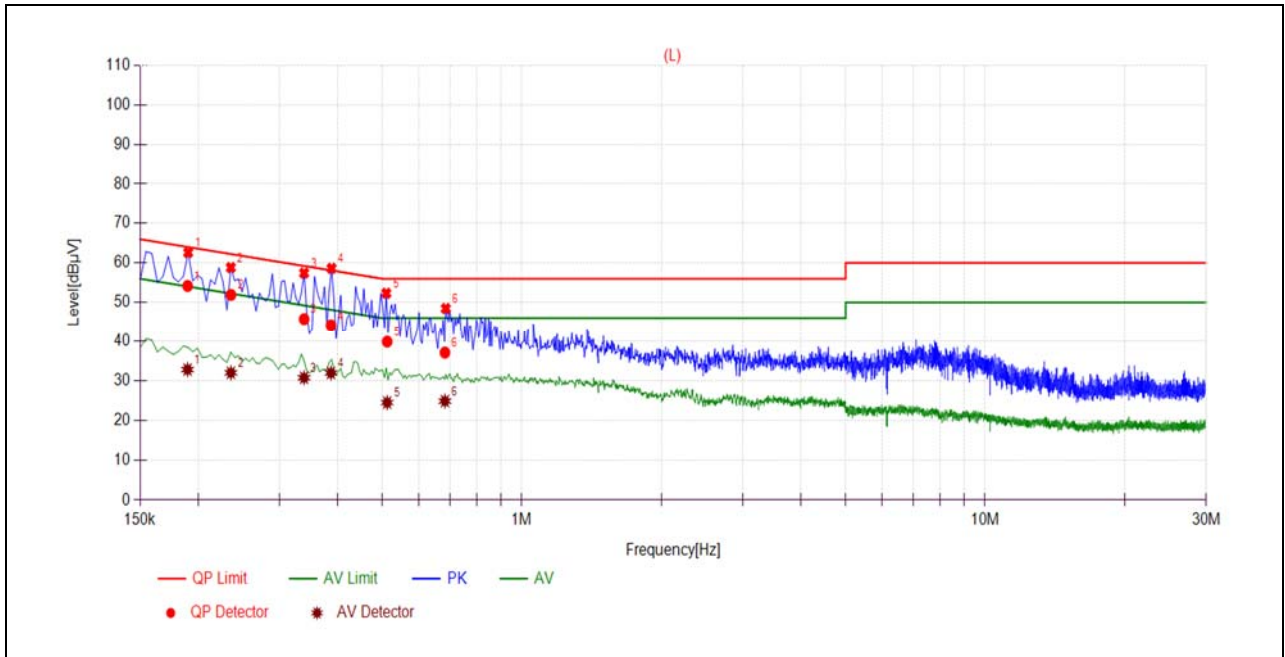
$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

U_R : Receiver Reading

A_{Factor} : Voltage division factor of LISN

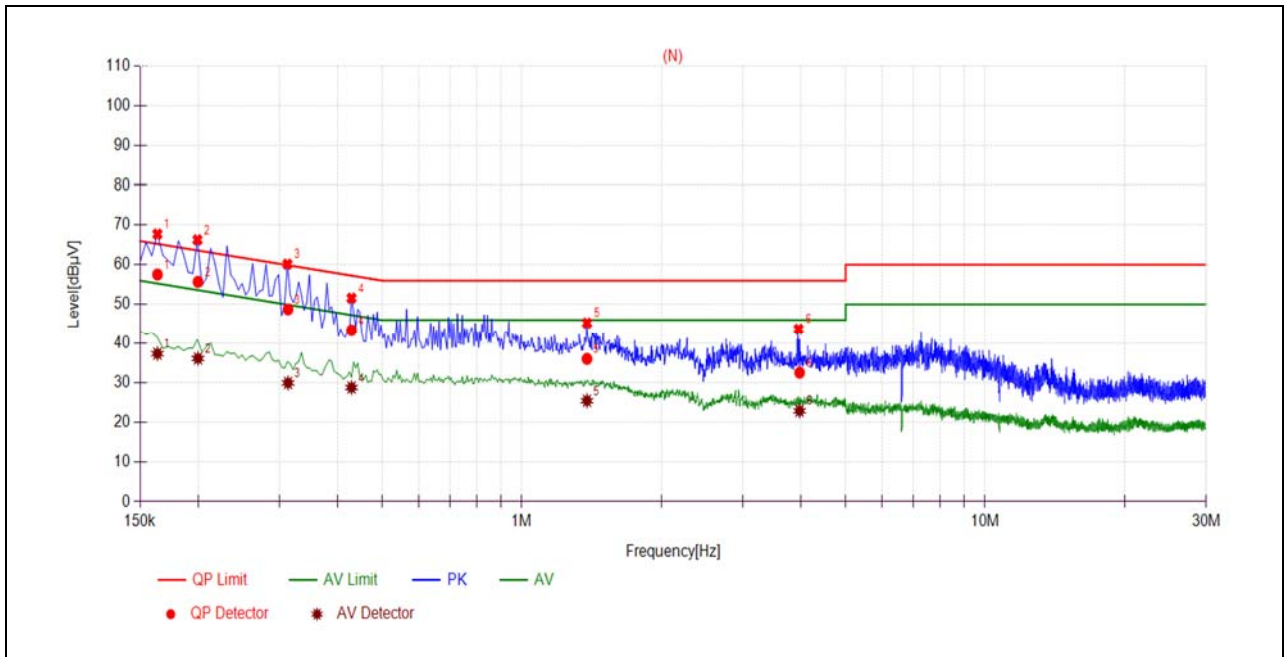
B.Test Plot:

ANT1



(L Phase)

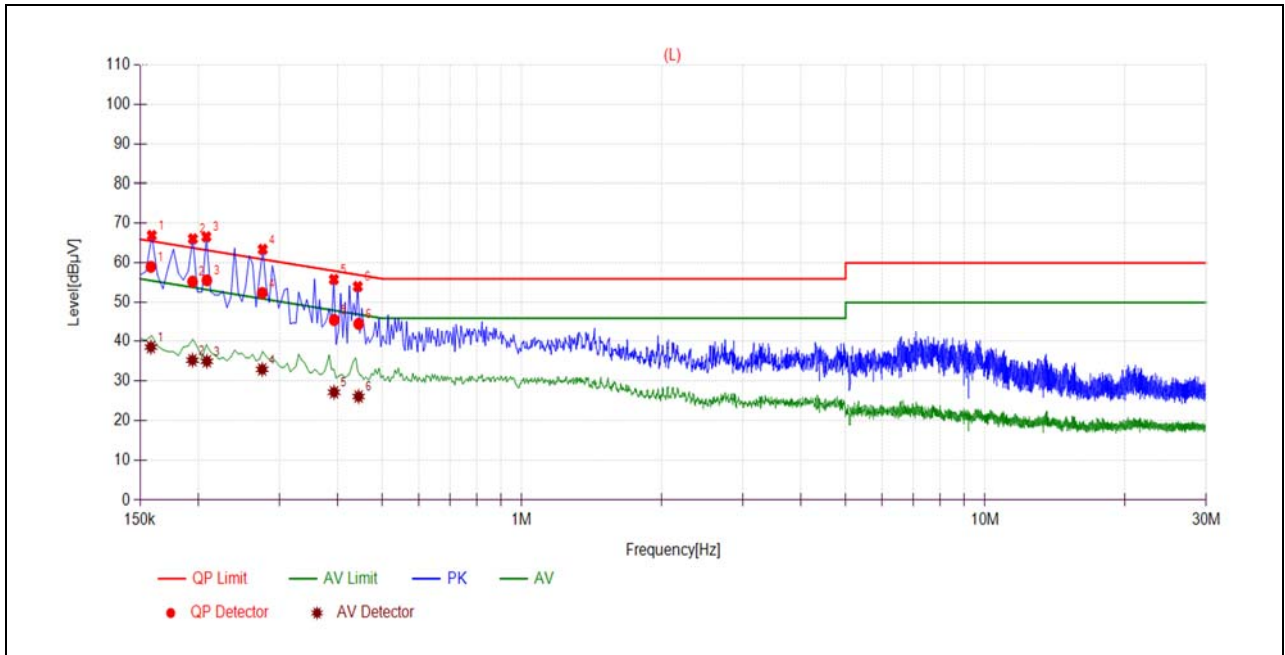
No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1899	54.18	32.79	64.04	54.04	Line	PASS
2	0.2356	51.92	31.98	62.25	52.25		PASS
3	0.3389	45.75	30.72	59.23	49.23		PASS
4	0.3874	44.18	31.93	58.12	48.12		PASS
5	0.5121	39.87	24.46	56.00	46.00		PASS
6	0.6824	37.08	24.83	56.00	46.00		PASS



(N Phase)

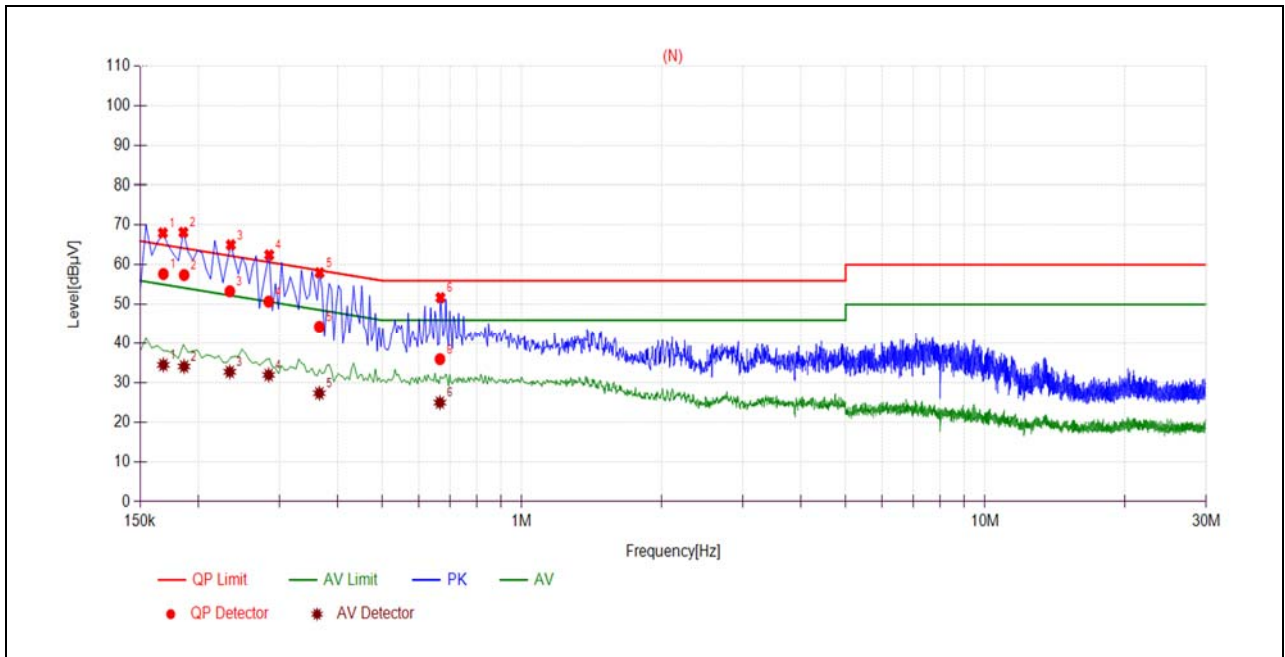
No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1635	57.56	37.34	65.28	55.28	Neutral	PASS
2	0.2000	55.71	36.13	63.61	53.61		PASS
3	0.3129	48.74	29.91	59.89	49.89		PASS
4	0.4290	43.38	28.75	57.27	47.27		PASS
5	1.3825	36.03	25.41	56.00	46.00		PASS
6	3.9765	32.52	22.84	56.00	46.00		PASS

ANT2



(L Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1583	59.03	38.48	65.55	55.55	Line	PASS
2	0.1946	55.29	35.18	63.84	53.84		PASS
3	0.2090	55.63	34.89	63.25	53.25		PASS
4	0.2752	52.41	32.85	60.96	50.96		PASS
5	0.3934	45.58	27.08	57.99	47.99		PASS
6	0.4444	44.59	26.01	56.98	46.98		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBμV)		Limit (dBμV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1684	57.69	34.48	65.04	55.04	Neutral	PASS
2	0.1867	57.43	34.07	64.18	54.18		PASS
3	0.2343	53.33	32.72	62.29	52.29		PASS
4	0.2842	50.71	31.93	60.69	50.69		PASS
5	0.3656	44.33	27.30	58.60	48.60		PASS
6	0.6657	35.93	24.94	56.00	46.00		PASS

2.3. Radiated Emission

2.3.1. Test Requirement

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.

The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other Sections within this Part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emission shall not exceed the level of the fundamental frequency.

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

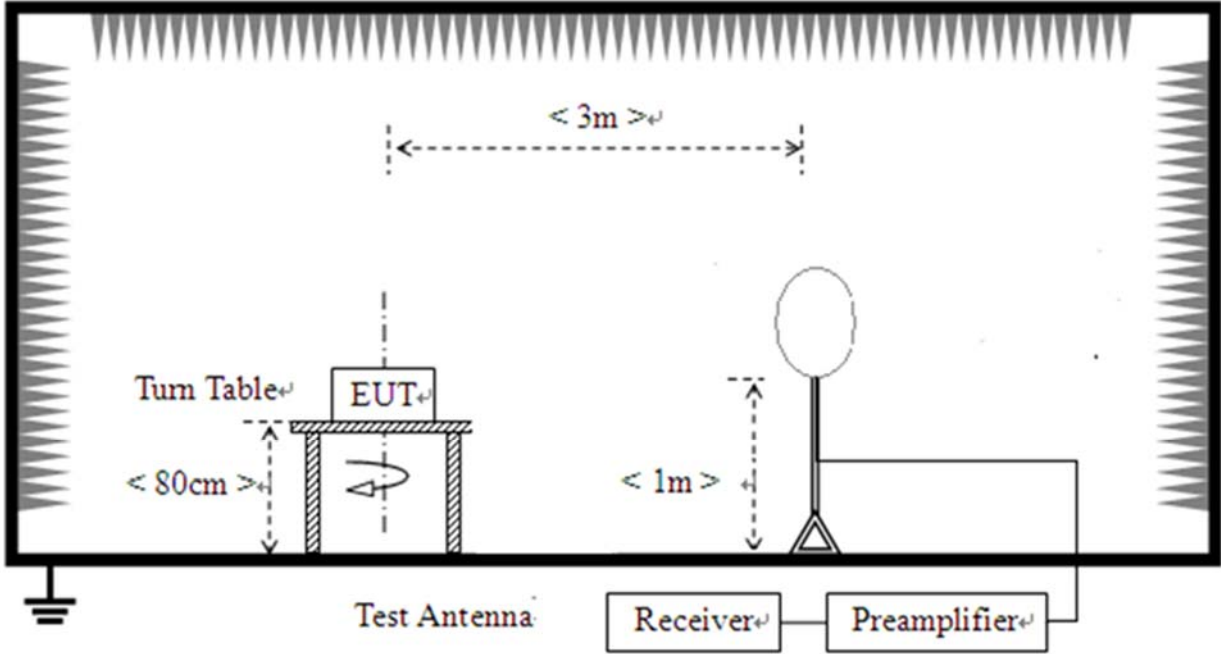
Frequency Range (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Distance (m)
0.009–0.490	2400/F (kHz)	300
0.490–1.705	24000/F (kHz)	30
1.705–30	30	30
30–88	100	3
88–216	150	3
216–960	200	3
Above 960	500	3

NOTE:

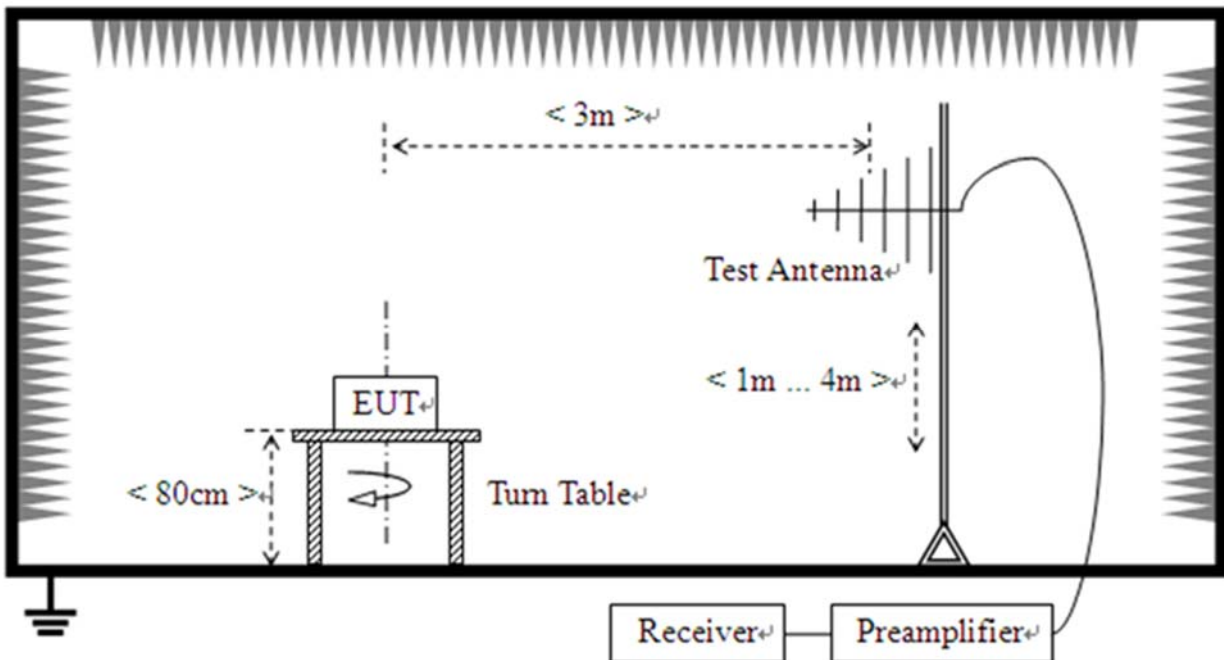
- Field Strength ($\text{dB}\mu\text{V}/\text{m}$) = $20 * \log[\text{Field Strength } (\mu\text{V}/\text{m})]$.
- If measurement is made at 3 m distance, then F.S Limitation at 3 m distance is adjusted by using the formula of $Ld1 = Ld2 * (d2/d1)^2$.
Example:
F.S Limit at 30 m distance is 30 $\mu\text{V}/\text{m}$, then F.S Limitation at 3 m distance is adjusted as
 $Ld1 = 30 \mu\text{V}/\text{m} * (10)^2 = 100 * 30 \mu\text{V}/\text{m}$
- In the emission tables above, the tighter limit applies at the band edges.

2.3.2. Test Setup

1) For radiated emissions below 30 MHz



2) For radiated emissions from 30 MHz to 1 GHz



The test is performed in a 3 m 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 0.8 m high



insulating Turn Table, and keeps 3 m away from the Test Antenna, which is mounted on a variable-height antenna master tower.

For the test Antenna:

In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1 m distance from the EUT. The center of the Loop Test Antenna is 1 m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

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

For measurements below 30 MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9 kHz–90 kHz, 110 kHz–490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector. For measurements frequency range from 0.009 MHz to 0.15 MHz, the resolution bandwidth is set to 200 Hz. For measurements frequency range from 0.15 MHz to 30 MHz the resolution bandwidth is set to 9 kHz.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

2.3.3. Test Result

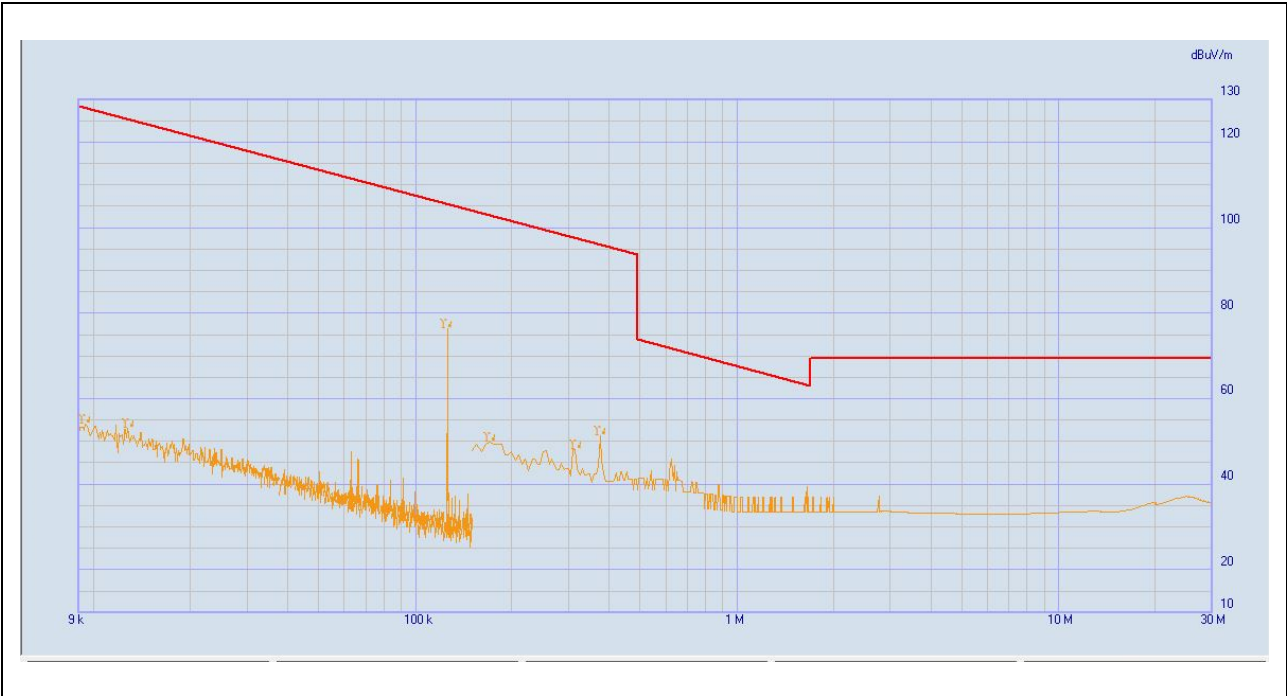
ANT 1

A.Radiated Emission <30 MHz (9 kHz–30 MHz, opened)



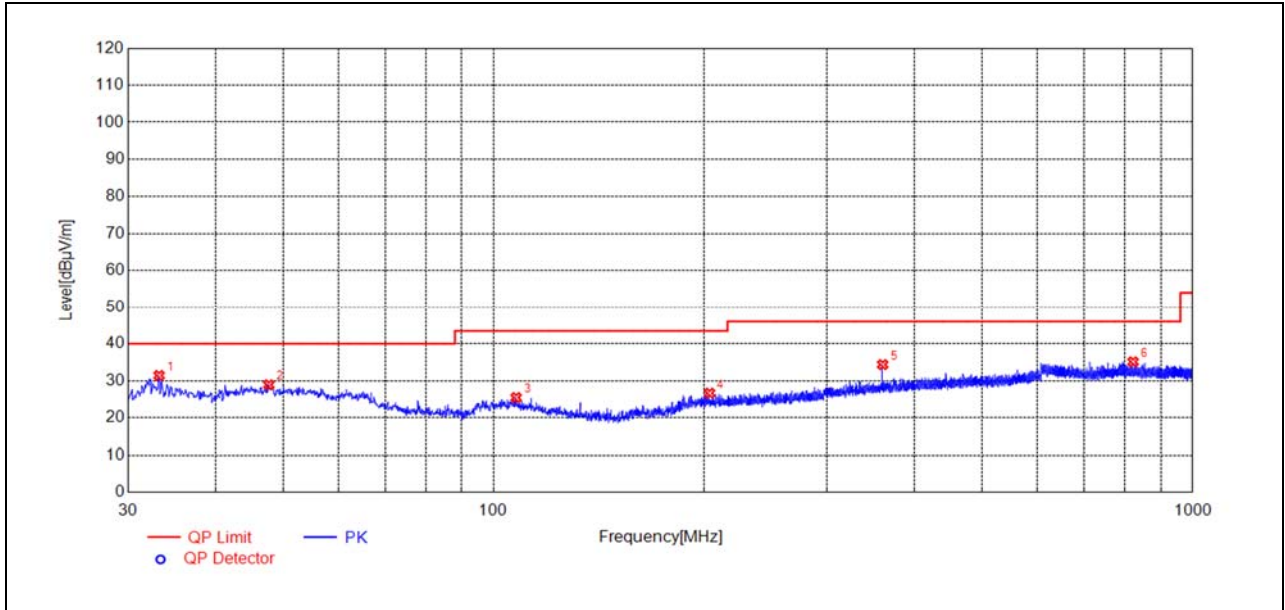
No.	Frequency (MHz)	Detector Type	Level at 3 m (dBμV/m)	Limit at 3 m (dBμV/m)
1	0.010	Quasi Peak	56.52	127.60
2	0.125	Quasi Peak	101.91	105.67
3	0.375	Quasi Peak	73.46	96.12
4	0.625	Quasi Peak	64.17	91.69
5	0.875	Quasi Peak	57.75	88.76
6	1.125	Quasi Peak	52.55	86.58

B.Radiated Emission <30 MHz (9 kHz–30 MHz, closed)



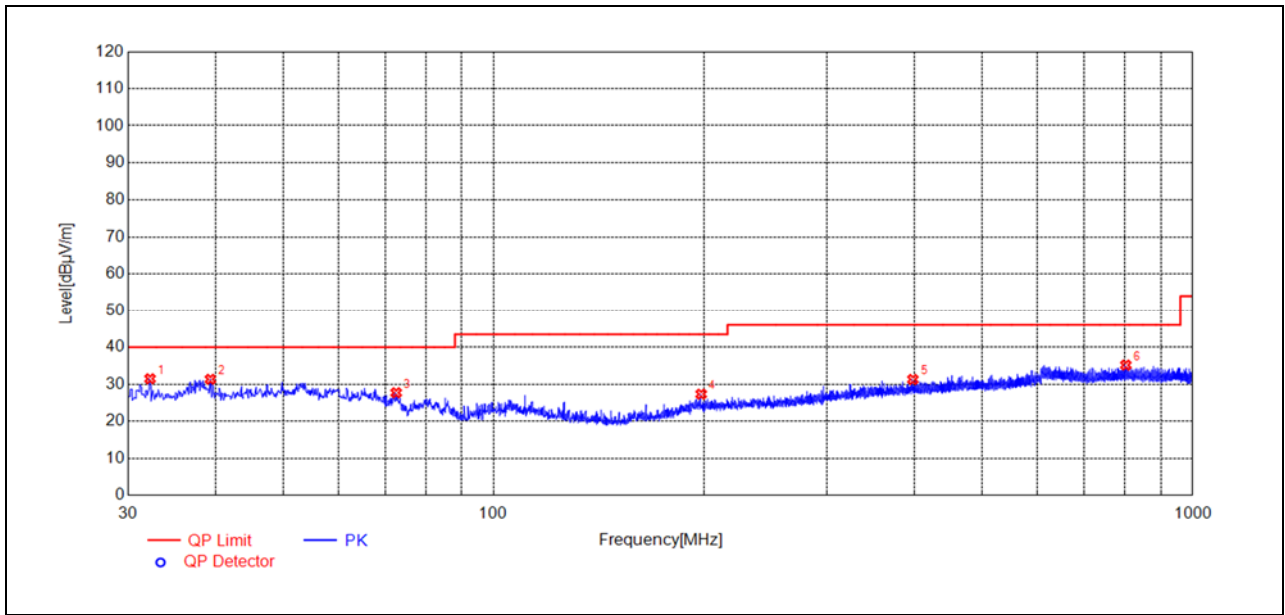
No.	Frequency (MHz)	Detector Type	Level at 3 m (dBμV/m)	Limit at 3 m (dBμV/m)
1	0.0094	Quasi Peak	54.15	128.14
2	0.0128	Quasi Peak	52.97	125.46
3	0.125	Quasi Peak	76.43	105.67
4	0.17	Quasi Peak	49.95	103.00
5	0.315	Quasi Peak	48.11	97.64
6	0.375	Quasi Peak	51.42	96.12

C.Radiated Emission >30 MHz (30 MHz–1 GHz)



(30 MHz–1 GHz, Test Antenna Horizontal)

No.	Fre. MHz	Pk dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	33.2013	31.41	N/A	N/A	N/A	40.00	N/A	H	PASS
2	47.6558	28.90	N/A	N/A	N/A	40.00	N/A	H	PASS
3	107.6078	25.43	N/A	N/A	N/A	43.50	N/A	H	PASS
4	203.5504	26.64	N/A	N/A	N/A	43.50	N/A	H	PASS
5	360.0270	34.35	N/A	N/A	N/A	46.00	N/A	H	PASS
6	821.4051	35.11	N/A	N/A	N/A	46.00	N/A	H	PASS

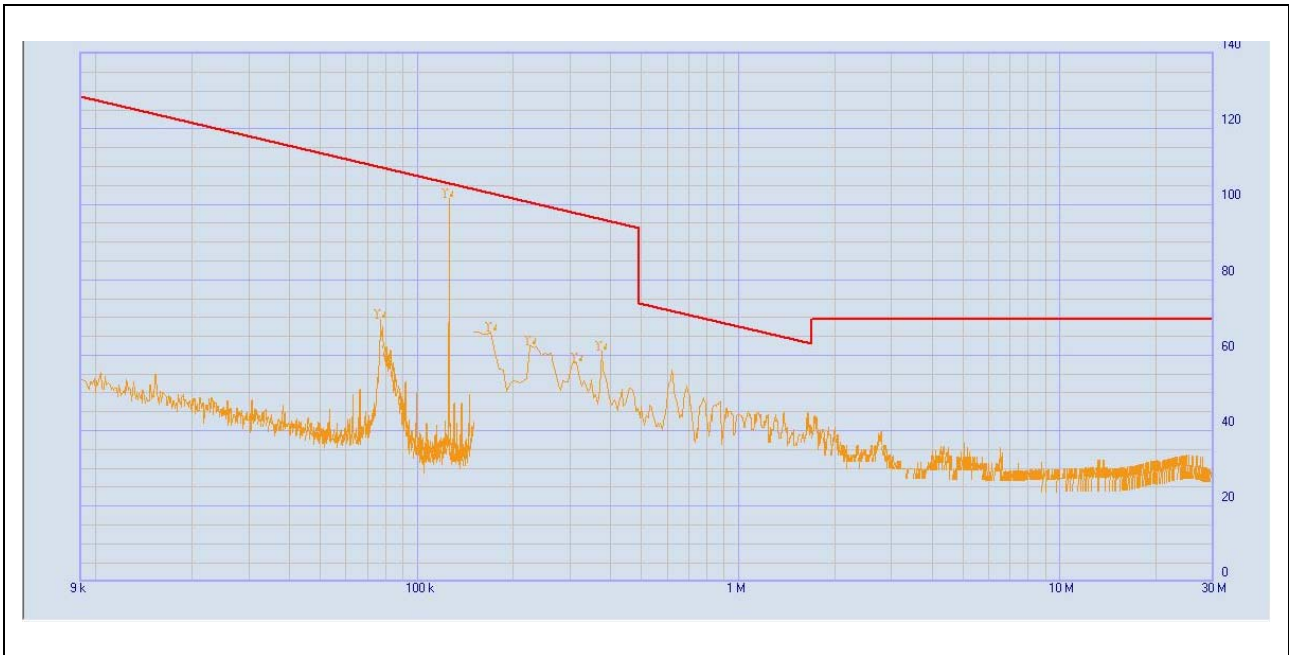


(30 MHz–1 GHz, Test Antenna Vertical)

No.	Fre. MHz	Pk dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	32.2312	31.46	N/A	N/A	N/A	40.00	N/A	V	PASS
2	39.3129	31.33	N/A	N/A	N/A	40.00	N/A	V	PASS
3	72.4902	27.69	N/A	N/A	N/A	40.00	N/A	V	PASS
4	198.0208	27.31	N/A	N/A	N/A	43.50	N/A	V	PASS
5	397.6668	31.28	N/A	N/A	N/A	46.00	N/A	V	PASS
6	802.1002	35.16	N/A	N/A	N/A	46.00	N/A	V	PASS

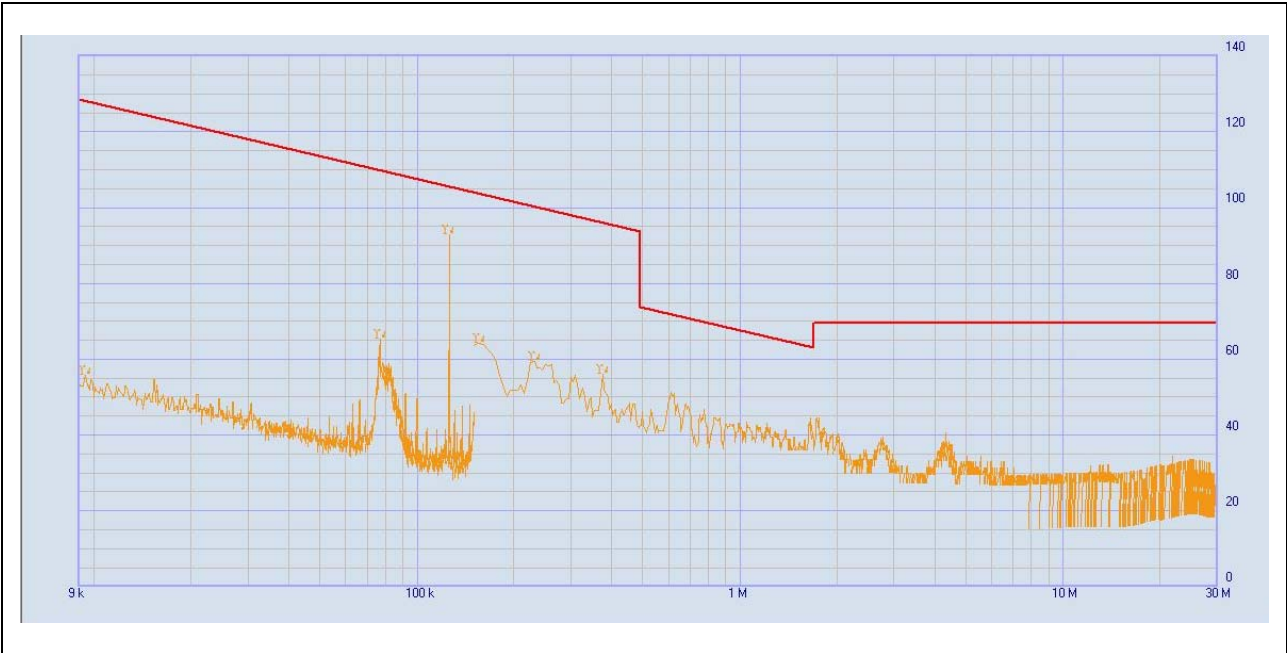
ANT 2

A. Radiated Emission <30 MHz (9 kHz–30 MHz, opened)



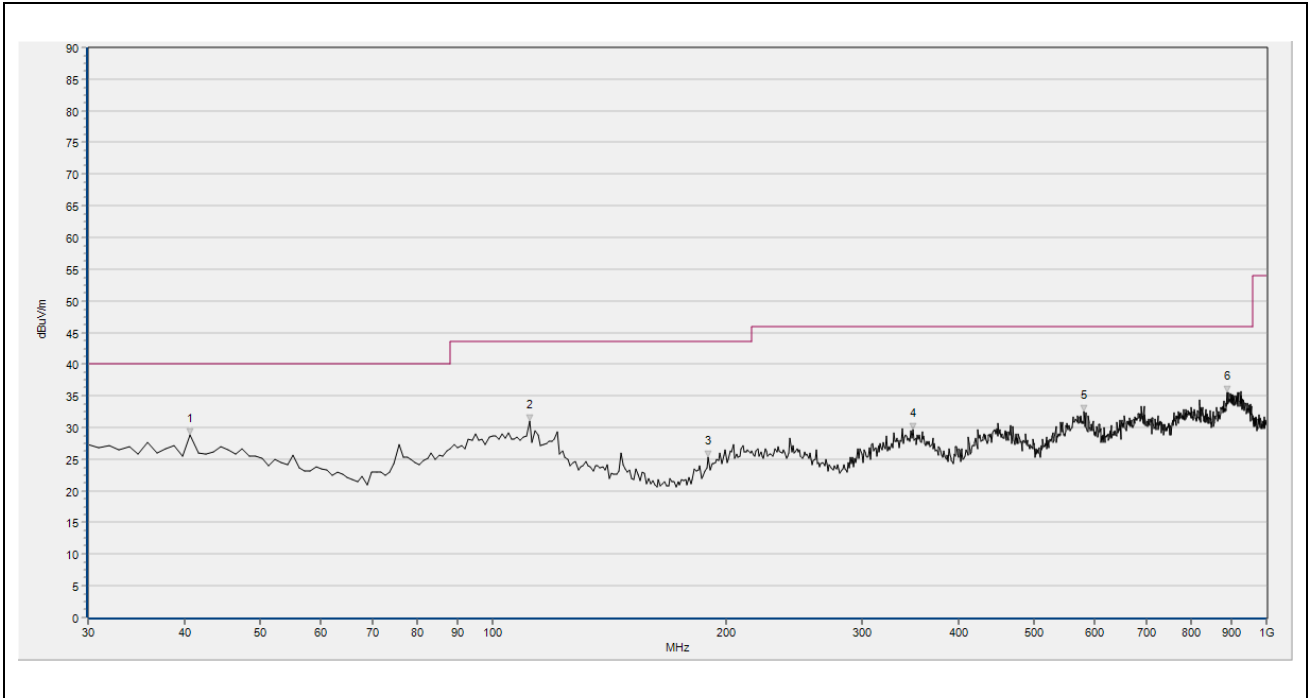
No.	Frequency (MHz)	Detector Type	Level at 3 m (dBμV/m)	Limit at 3 m (dBμV/m)
1	0.0769	Quasi Peak	69.50	109.89
2	0.125	Quasi Peak	101.54	105.67
3	0.17	Quasi Peak	66.21	103.00
4	0.225	Quasi Peak	62.59	100.56
5	0.315	Quasi Peak	58.10	97.64
6	0.375	Quasi Peak	60.98	96.12

B.Radiated Emission <30 MHz (9 kHz–30 MHz, closed)



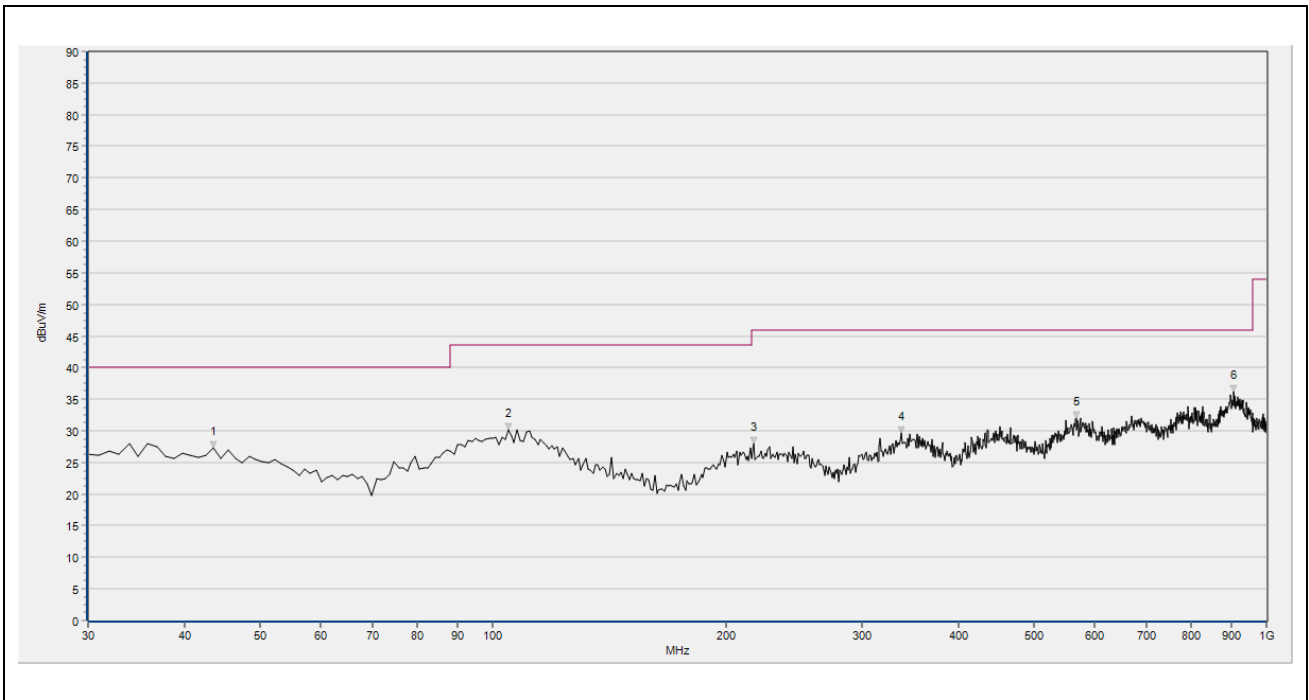
No.	Frequency (MHz)	Detector Type	Level at 3 m (dBμV/m)	Limit at 3 m (dBμV/m)
1	0.0094	Quasi Peak	55.73	128.14
2	0.0765	Quasi Peak	65.25	109.93
3	0.125	Quasi Peak	92.76	105.67
4	0.155	Quasi Peak	64.13	103.80
5	0.23	Quasi Peak	59.43	100.37
6	0.375	Quasi Peak	56.09	96.12

C.Radiated Emission >30 MHz (30 MHz–1 GHz)



(30 MHz–1 GHz, Test Antenna Horizontal)

No.	Fre. MHz	Pk dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	40.670	28.84	N/A	N/A	N/A	40.00	N/A	H	PASS
2	111.480	30.96	N/A	N/A	N/A	43.50	N/A	H	PASS
3	190.050	25.34	N/A	N/A	N/A	43.50	N/A	H	PASS
4	349.130	29.62	N/A	N/A	N/A	46.00	N/A	H	PASS
5	580.960	32.47	N/A	N/A	N/A	46.00	N/A	H	PASS
6	888.450	35.58	N/A	N/A	N/A	46.00	N/A	H	PASS



(30 MHz–1 GHz, Test Antenna Vertical)

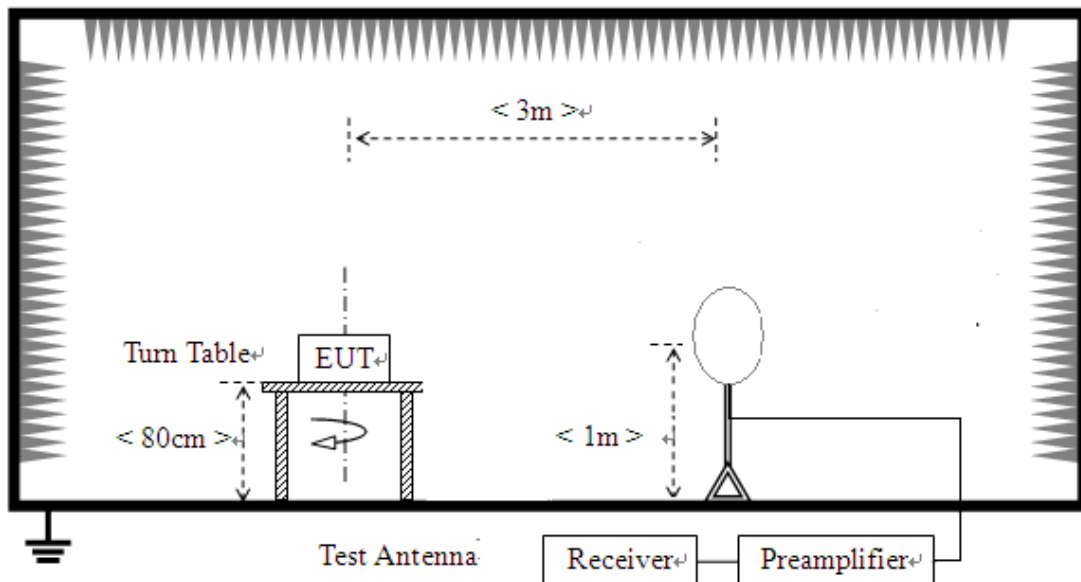
No.	Fre. MHz	Pk dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	43.580	27.33	N/A	N/A	N/A	40.00	N/A	V	PASS
2	104.690	30.24	N/A	N/A	N/A	43.50	N/A	V	PASS
3	217.210	28.05	N/A	N/A	N/A	46.00	N/A	V	PASS
4	337.490	29.75	N/A	N/A	N/A	46.00	N/A	V	PASS
5	567.380	31.97	N/A	N/A	N/A	46.00	N/A	V	PASS
6	907.850	36.14	N/A	N/A	N/A	46.00	N/A	V	PASS

2.4. 20 dB Bandwidth

2.4.1. Standard Applicable

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

2.4.2. Test Setup

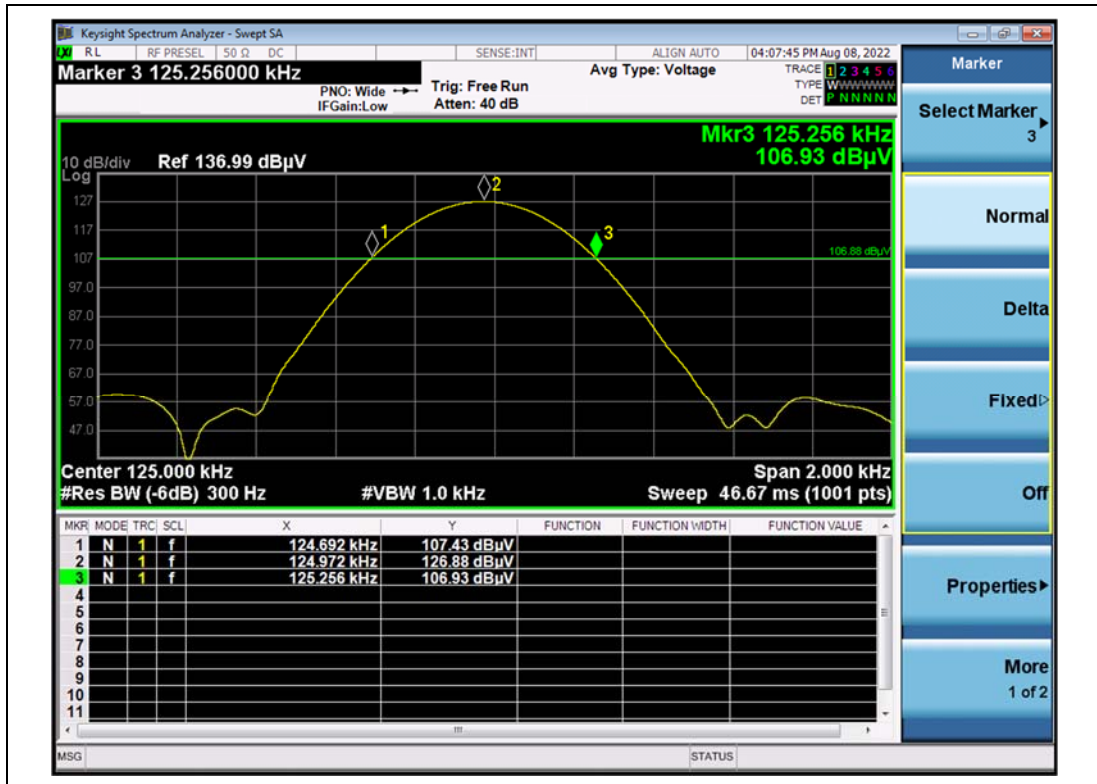




2.4.3. Test Result

ANT1

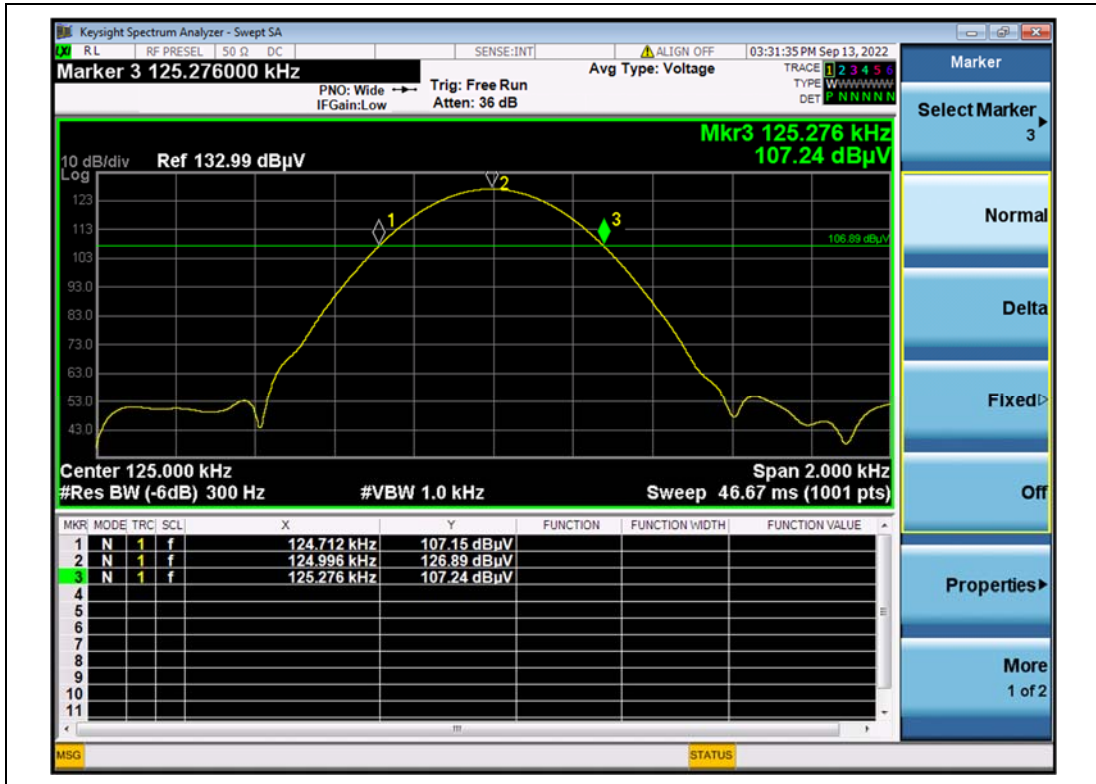
Frequency (kHz)	20 dB Bandwidth (kHz)	Verdict
125	0.28	PASS





ANT2

Frequency (kHz)	20 dB Bandwidth (kHz)	Verdict
125	0.284	PASS





Annex A Test Uncertainty

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

Radiated Emission:	± 3.1 dB
Conducted Emission:	± 1.8 dB
Bandwidth	$\pm 5\%$



Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.



4. Test Equipment Utilized

4.1 Radiated Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2022.07.06	2023.07.05
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2022.05.25	2025.05.24
Test Antenna - Loop	1520-022	FMZB1519	Schwarzbeck	2022.02.11	2025.02.10
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

4.2 Conducted Emission Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2022.03.03	2023.03.02
LISN	812744	NSLK 8127	Schwarzbeck	2022.03.03	2023.03.02
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2022.07.06	2023.07.05
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

4.3 Test Software Utilized

Model	Software Version	Manufacturer
TS+ -[JS32-RE]	Version 2.5.0.6	Tonscend
TS+ -[JS32-CE]	Version 2.5.0.0	Tonscend
PMM Emission Suite	Version 2.02	narda

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