REPORT No. : SZ20120300W06

TEST REPORT

APPLICANT	:	Shenzhen Xhorse Electronics Co., Ltd.
PRODUCT NAME	:	KEY TOOL PLUS
MODEL NAME	:	XDKP00
BRAND NAME	:	Xhorse
FCC ID	:	2AI4T-XDKP00
STANDARD(S)	:	47 CFR Part 15 Subpart C
RECEIPT DATE	:	2021-01-29
TEST DATE	:	2021-06-25 to 2021-06-29
ISSUE DATE	:	2021-07-26

Edited by: Peng Mi (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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MORLAB

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Change History		
Version	**Date**	**Reason for change**
1.0	2021-07-26	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, China
Manufacturer:	Shenzhen Xhorse Electronics Co., Ltd.
Manufacturer Address:	Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen, China

1.2. Equipment Under Test (EUT) Description

Product Name:	KEY TOOL PLUS	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	v1.2.6	
Software Version:	v1.2.0	
Operating Frequency:	125kHz	
Modulation Type:	ASK, FSK	
Antenna Type:	Loop Antenna	
Accessory Information:	Battery	
	Brand Name:	BAK
	Model No.:	6060100-2P
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	10000.00mAh
	Rated Voltage:	3.70V
	Charge Limit:	4.20V
	Manufacturer:	Zhengzhou BAK Battery Co., Ltd.

Accessory Information:	AC Adapter	
	Brand Name:	FOULLPOWER
	Model No.:	TYPE-C30IC
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	5.0V⎓3.0A, 9.0V⎓3.0A, 12.0V⎓2.5A, 15.0V⎓2.0A, 20.0V⎓1.5A
	Rated Input:	100-240V~50/60Hz, 0.80A
	Manufacturer:	SHENZHEN SHI YING YUAN ELECTRONICS CO LTD

Note1: 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	No deviation
2	15.207	Conducted Emission	Jun 29, 2021	Wu Runfeng	PASS	No deviation
3	15.209(a)	Radiated Emission	Jun 25, 2021	Gao Jianrou	PASS	No deviation
4	15.215(c)	20dB Bandwidth	Jun 28, 2021	Gao Jianrou	PASS	No deviation

Note 1: 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 2: 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 3: 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

Inside of the EUT has a FPC antenna coupled with the metal shrapnel. 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 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

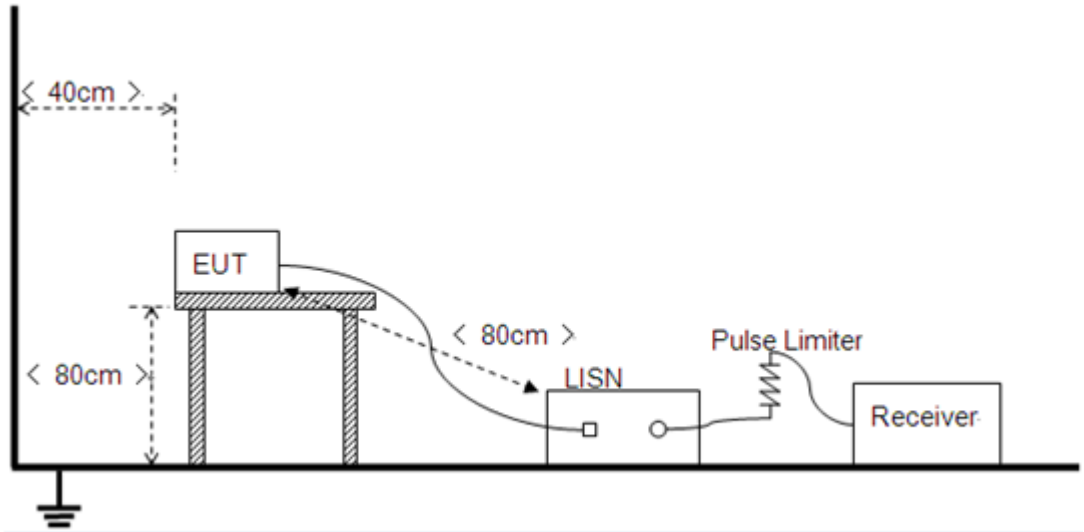
Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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 - 0.50MHz.

2.2.2. 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. 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=9kHz, VBW=30kHz. Refer to recorded points and plots below.

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

A.Test Setup:

Test Mode:EUT+Adapter+125kHz TX

Test Voltage:AC 120V/60Hz

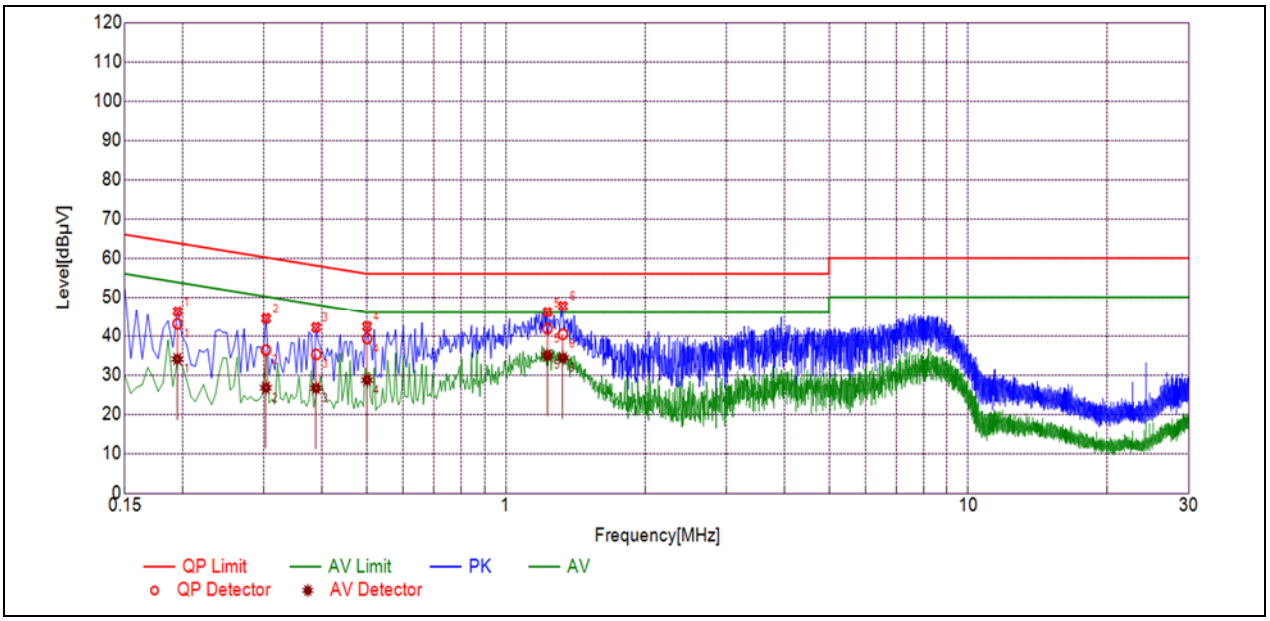
The measurement results are obtained as below:

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

U_R: Receiver Reading

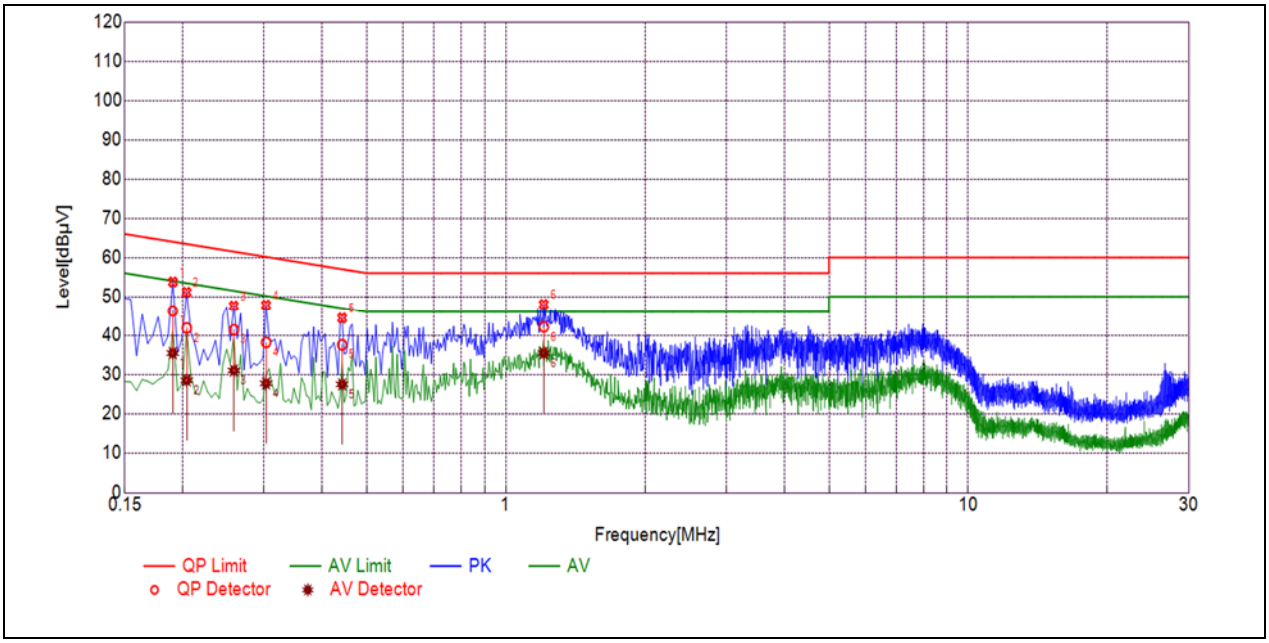
A_{Factor}: Voltage division factor of LISN

B.Test Plot:



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1948	43.05	34.06	63.83	53.83	Line	PASS
2	0.3027	36.33	26.74	60.17	50.17		PASS
3	0.3888	35.24	26.64	58.09	48.09		PASS
4	0.5011	39.29	28.71	56.00	46.00		PASS
5	1.2295	41.79	34.98	56.00	46.00		PASS
6	1.3283	40.38	34.32	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	0.1904	46.30	35.42	64.02	54.02	Neutral	PASS
2	0.2041	41.84	28.48	63.44	53.44		PASS
3	0.2582	41.40	30.98	61.49	51.49		PASS
4	0.3030	38.16	27.71	60.16	50.16		PASS
5	0.4425	37.55	27.46	57.02	47.02		PASS
6	1.2079	42.14	35.42	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 9-90kHz,110-490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Frequency Range (MHz)	Field Strength(μV/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:

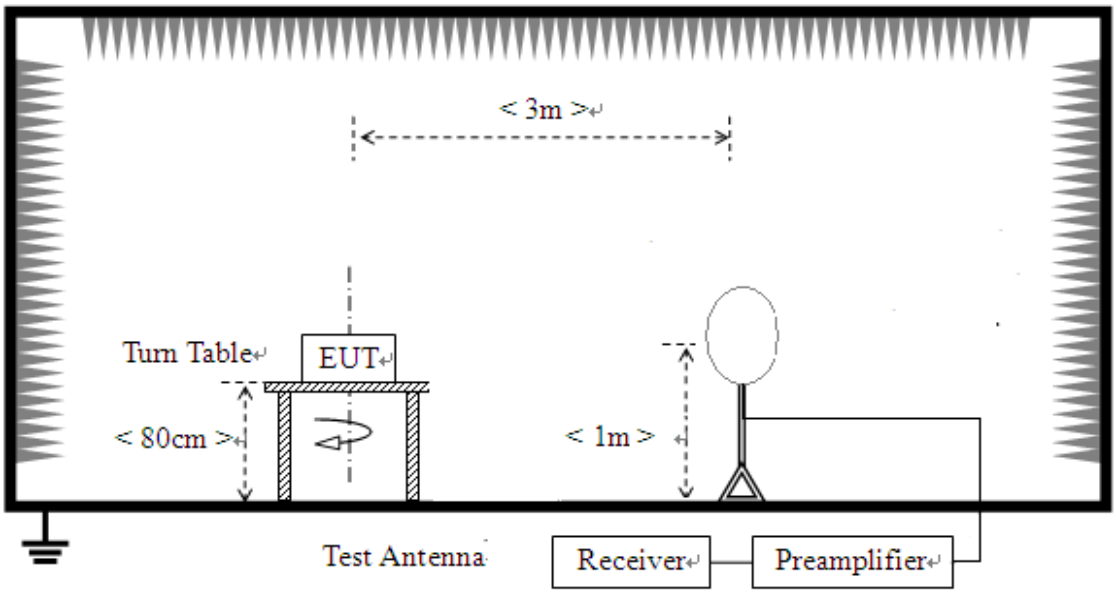
a) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)].

b) 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 = 30uV/m * $(10)^2$ = 100 * 30uV/m

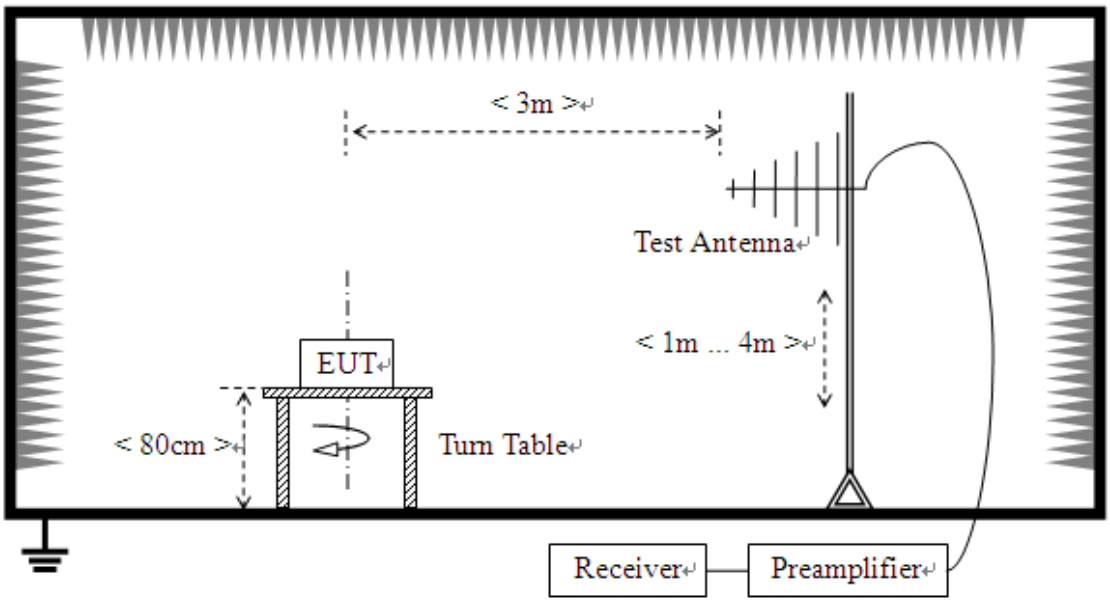
c) In the emission tables above, the tighter limit applies at the band edges.

2.3.2. Test Setup

1) For radiated emissions below 30MHz



2) For radiated emissions from 30MHz to1GHz



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:

In the frequency range of 9 kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m 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 30MHz, Bi-Log Test Antenna (30MHz to 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.

For measurements frequency range from 0.009MHz to 0.15MHz, the resolution bandwidth is set to 200kHz.

For measurements frequency range from 0.15MHz to 30MHz the resolution bandwidth is set to 9kHz.

The emission limits shown in the above are based on measurements employing a CISPR quasi-p eak detector except for the frequency bands 9-90 kHz and 110-490 kHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

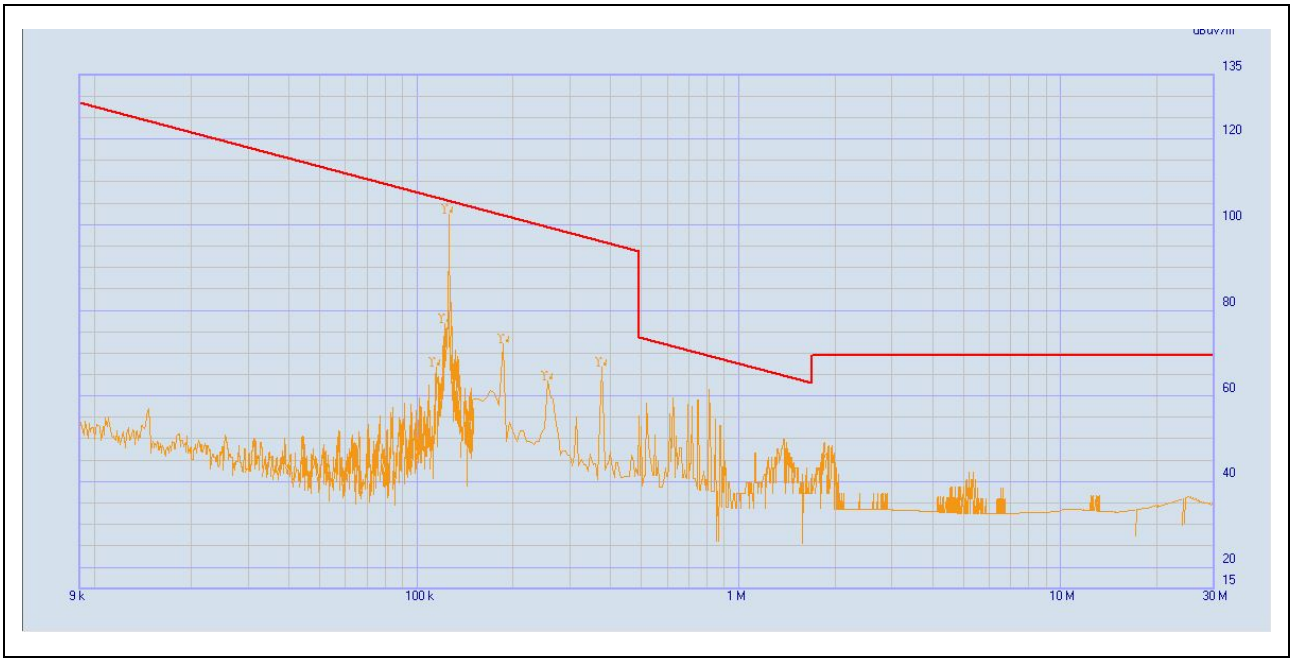
For measurements below 1GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Note1: All radiated emission tests were performed in three antenna orientations (parallel, perpendicular, and ground-parallel) only the worst orientation (parallel) was recorded in this test report.

2.3.3. Test Result

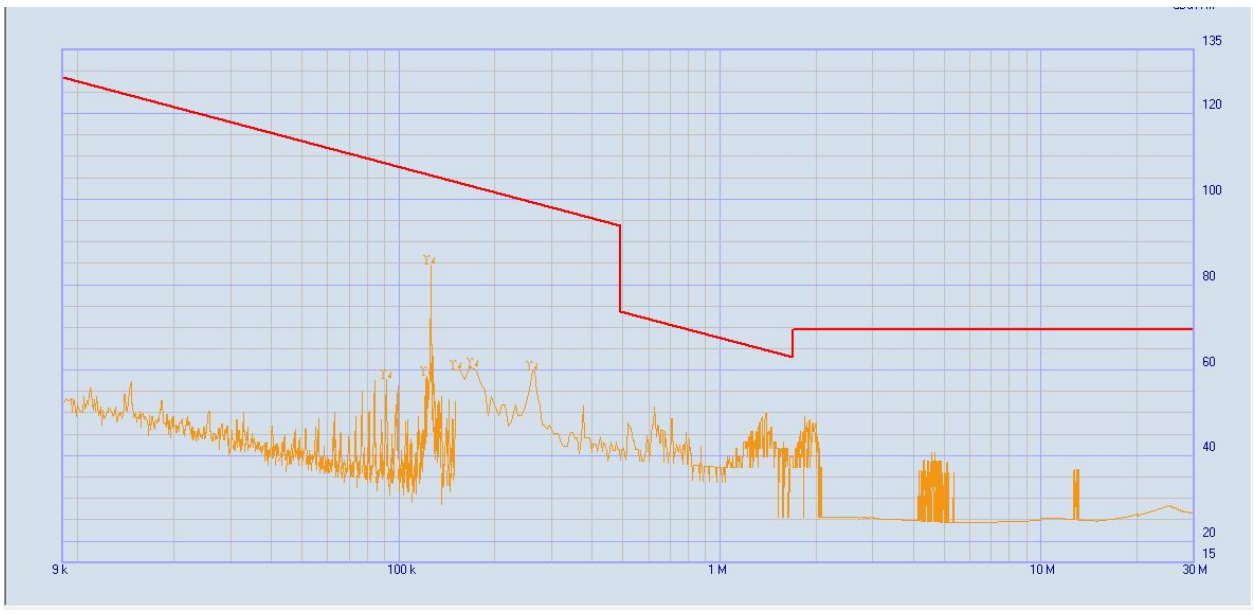
ASK

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



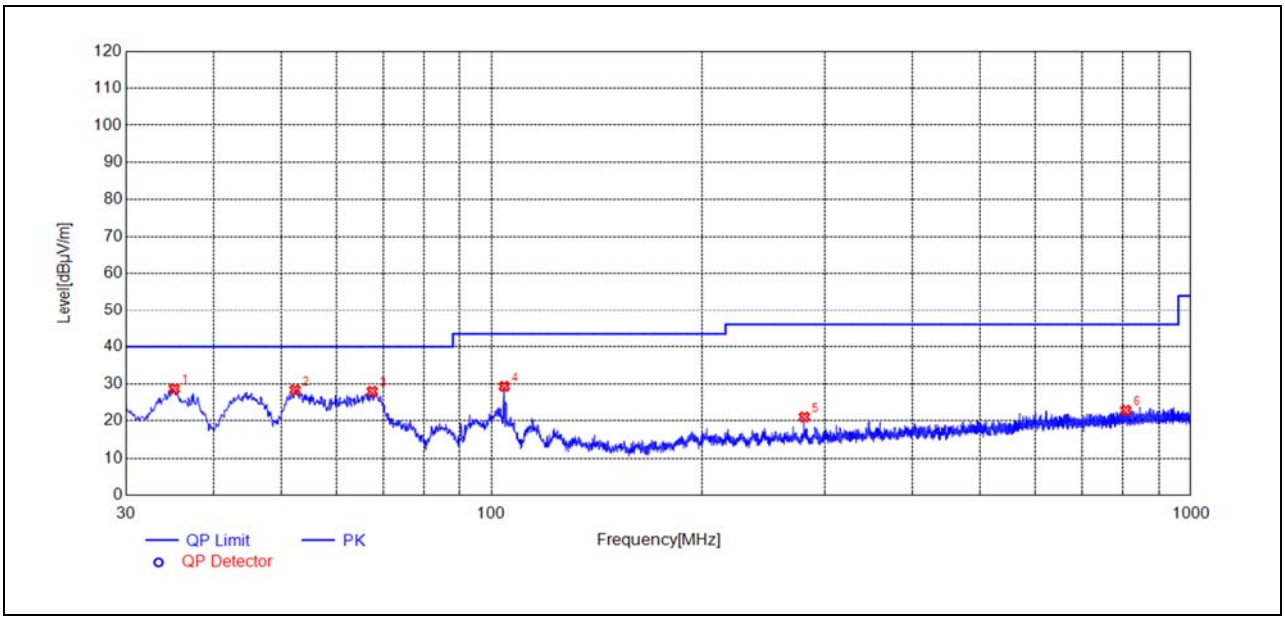
No.	Frequency (MHz)	Detector Type	Level at 3m(dBμV/m)	Limit at 3m(dBμV/m)	Verdict
1	0.1143	Quasi Peak	66.79	106.44	PASS
2	0.1217	Quasi Peak	76.97	105.90	PASS
3	0.1250	Quasi Peak	102.55	105.67	PASS
4	0.1850	Quasi Peak	72.08	102.26	PASS
5	0.2550	Quasi Peak	63.54	99.47	PASS
6	0.3750	Quasi Peak	66.66	96.12	PASS

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



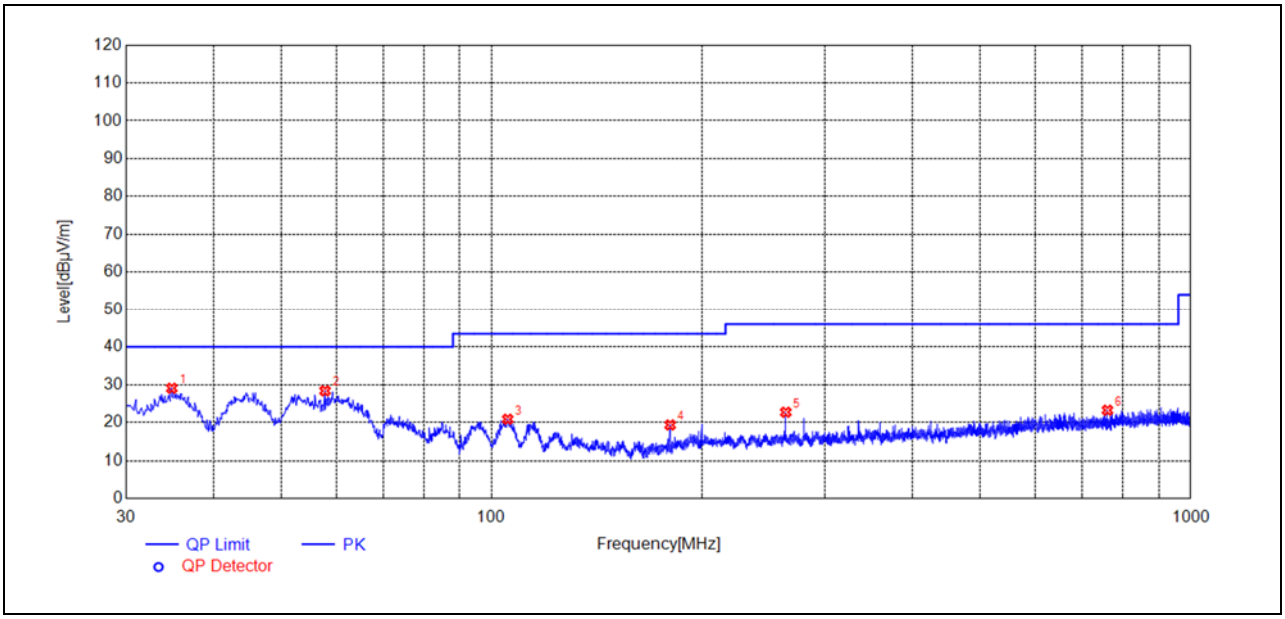
No.	Frequency(MHz)	Detector Type	Level at 3m(dBμV/m)	Limit at 3m(dBμV/m)	Verdict
1	0.0912	Quasi Peak	57.83	108.40	PASS
2	0.1216	Quasi Peak	58.62	105.91	PASS
3	0.1250	Quasi Peak	84.52	105.67	PASS
4	0.1500	Quasi Peak	60.05	104.08	PASS
5	0.1700	Quasi Peak	60.64	103.00	PASS
6	0.2600	Quasi Peak	59.90	99.30	PASS

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



(30MHz – 1GHz, 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	35.1415	28.61	N/A	N/A	N/A	40.00	N/A	H	PASS
2	52.3122	28.31	N/A	N/A	N/A	40.00	N/A	H	PASS
3	67.4457	27.93	N/A	N/A	N/A	40.00	N/A	H	PASS
4	104.2124	29.27	N/A	N/A	N/A	43.50	N/A	H	PASS
5	279.9940	21.00	N/A	N/A	N/A	46.00	N/A	H	PASS
6	807.3387	22.81	N/A	N/A	N/A	46.00	N/A	H	PASS



(30MHz – 1GHz, Test Antenna Vertical)

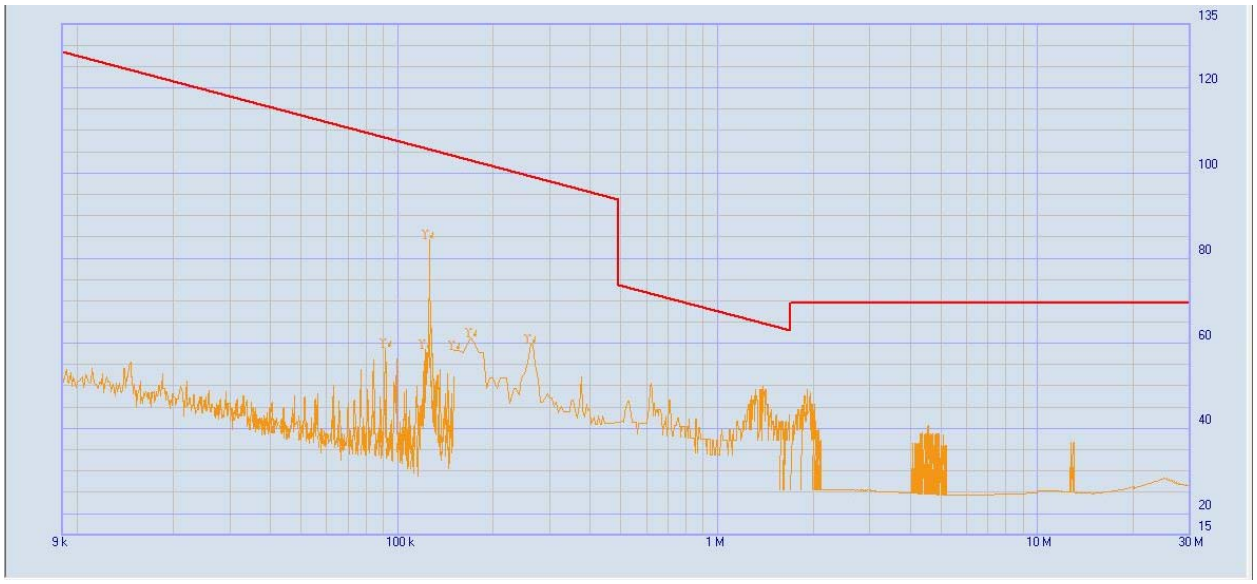
No.	Fre. MHz	Pk dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	34.8505	29.04	N/A	N/A	N/A	40.00	N/A	V	PASS
2	57.7448	28.35	N/A	N/A	N/A	40.00	N/A	V	PASS
3	105.3765	20.83	N/A	N/A	N/A	43.50	N/A	V	PASS
4	179.9770	19.31	N/A	N/A	N/A	43.50	N/A	V	PASS
5	263.4053	22.69	N/A	N/A	N/A	46.00	N/A	V	PASS
6	759.9980	23.22	N/A	N/A	N/A	46.00	N/A	V	PASS

FSK

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

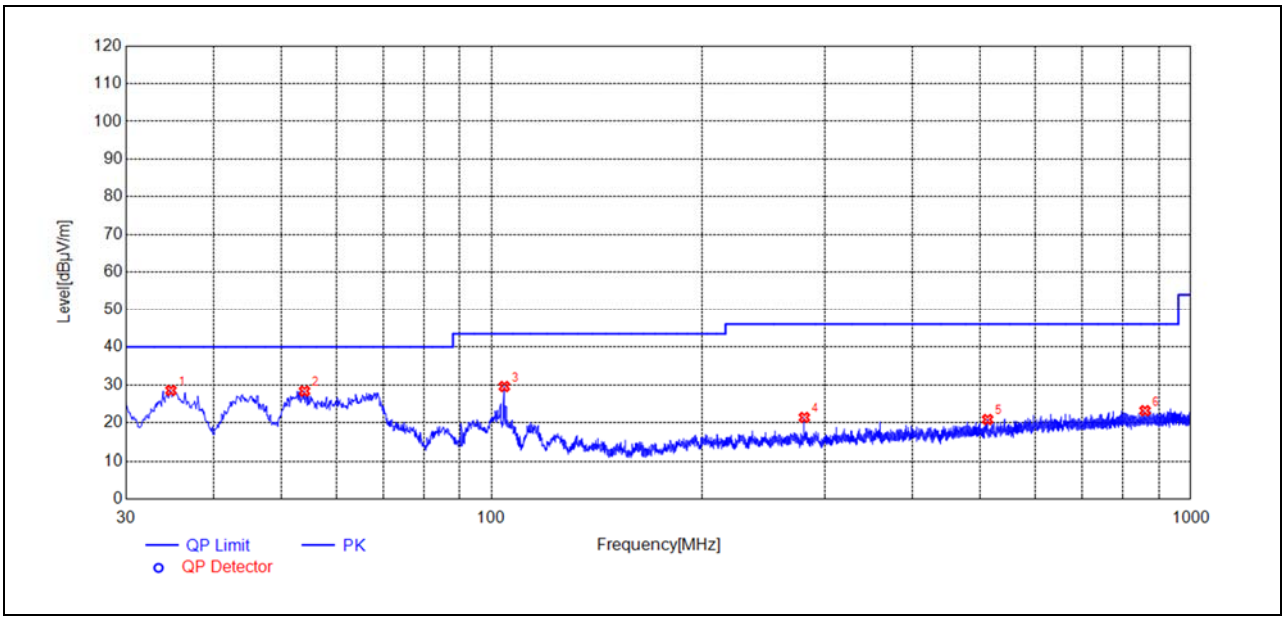
No.	Frequency(MHz)	Detector Type	Level at 3m(dBμV/m)	Limit at 3m(dBμV/m)	Verdict
1	0.1216	Quasi Peak	70.65	105.91	PASS
2	0.1250	Quasi Peak	96.49	105.67	PASS
3	0.1650	Quasi Peak	69.37	103.25	PASS
4	0.2050	Quasi Peak	63.36	101.37	PASS
5	0.5120	Quasi Peak	62.40	93.42	PASS
6	0.2600	Quasi Peak	61.38	99.30	PASS

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



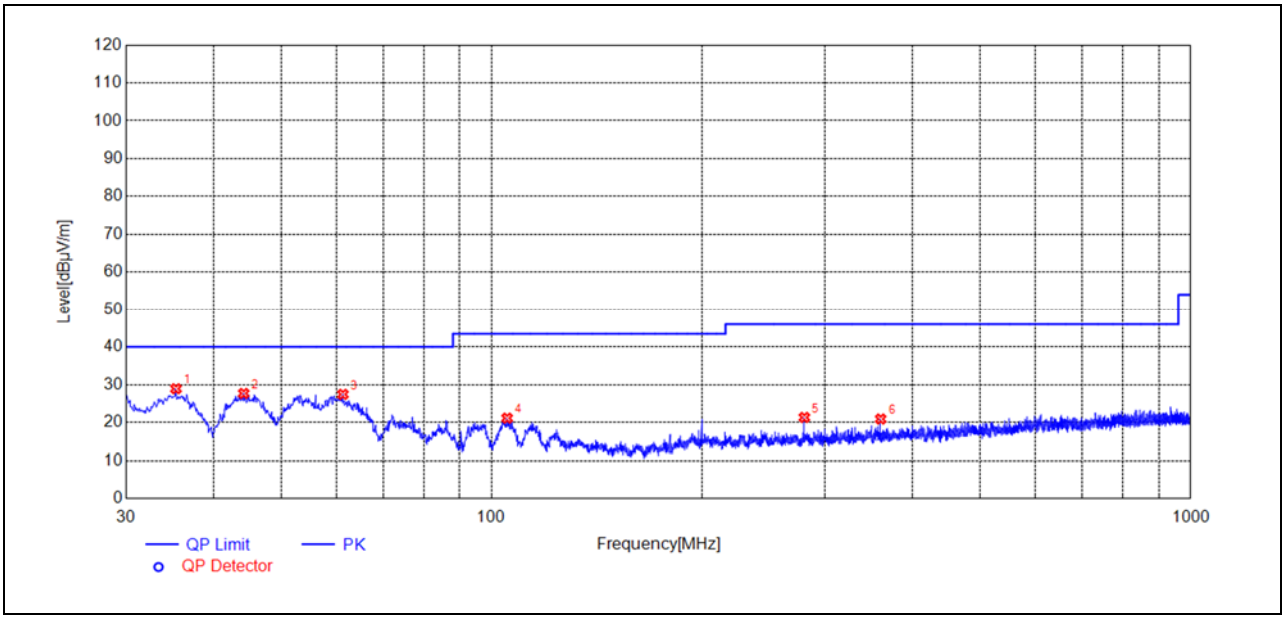
No.	Frequency (MHz)	Detector Type	Level at 3m(dBμV/m)	Limit at 3m(dBμV/m)	Verdict
1	0.0913	Quasi Peak	58.70	108.39	PASS
2	0.1214	Quasi Peak	58.47	105.92	PASS
3	0.1250	Quasi Peak	84.46	105.67	PASS
4	0.1500	Quasi Peak	58.30	104.08	PASS
5	0.1700	Quasi Peak	61.39	103.00	PASS
6	0.2600	Quasi Peak	59.90	99.30	PASS

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



(30MHz – 1GHz, 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	34.7535	28.52	N/A	N/A	N/A	40.00	N/A	H	PASS
2	53.9614	28.35	N/A	N/A	N/A	40.00	N/A	H	PASS
3	104.2124	29.55	N/A	N/A	N/A	43.50	N/A	H	PASS
4	279.9940	21.38	N/A	N/A	N/A	46.00	N/A	H	PASS
5	512.0412	20.84	N/A	N/A	N/A	46.00	N/A	H	PASS
6	860.1120	23.18	N/A	N/A	N/A	46.00	N/A	H	PASS



(30MHz – 1GHz, Test Antenna Vertical)

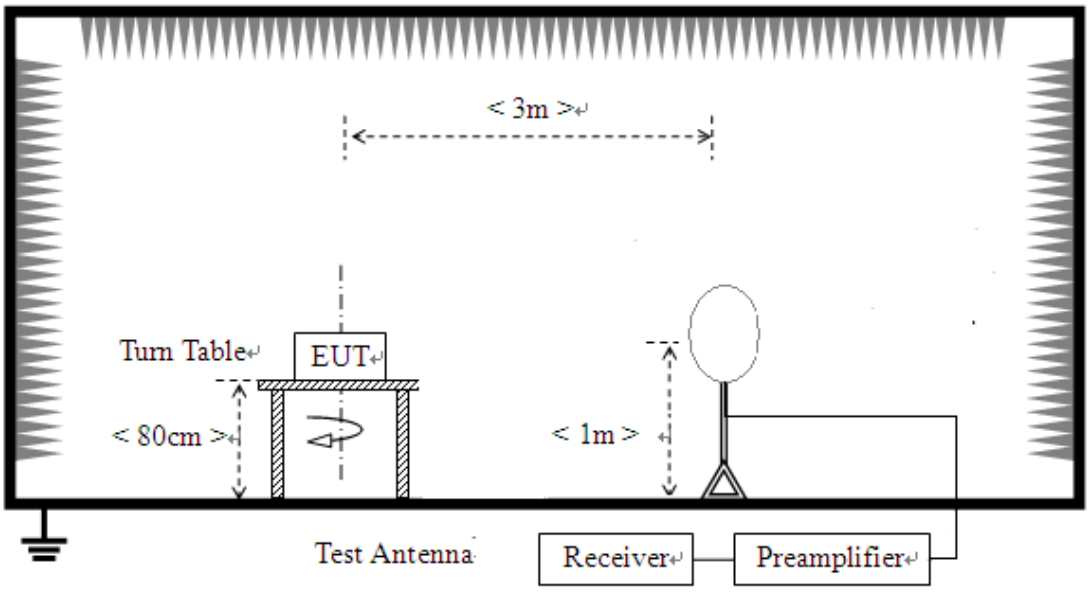
No.	Fre. MHz	Pk dBµV/m	QP dBµV/m	AV dBµV/m	Limit-PK dBµV/m	Limit-QP dBµV/m	Limit-AV dBµV/m	ANT	Verdict
1	35.3355	28.91	N/A	N/A	N/A	40.00	N/A	V	PASS
2	44.1634	27.67	N/A	N/A	N/A	40.00	N/A	V	PASS
3	61.2371	27.42	N/A	N/A	N/A	40.00	N/A	V	PASS
4	105.1825	21.11	N/A	N/A	N/A	43.50	N/A	V	PASS
5	279.9940	21.30	N/A	N/A	N/A	46.00	N/A	V	PASS
6	360.0270	20.88	N/A	N/A	N/A	46.00	N/A	V	PASS

2.4. 20dB Bandwidth

2.4.1. Standard Applicable

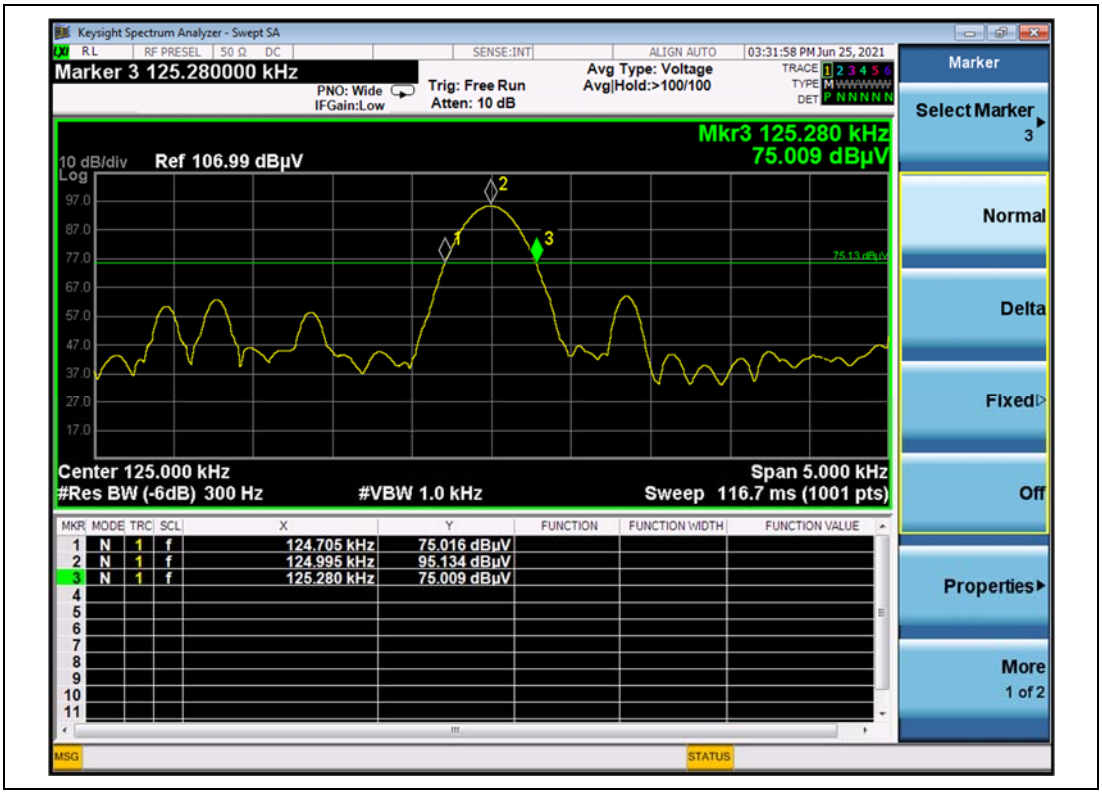
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific 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

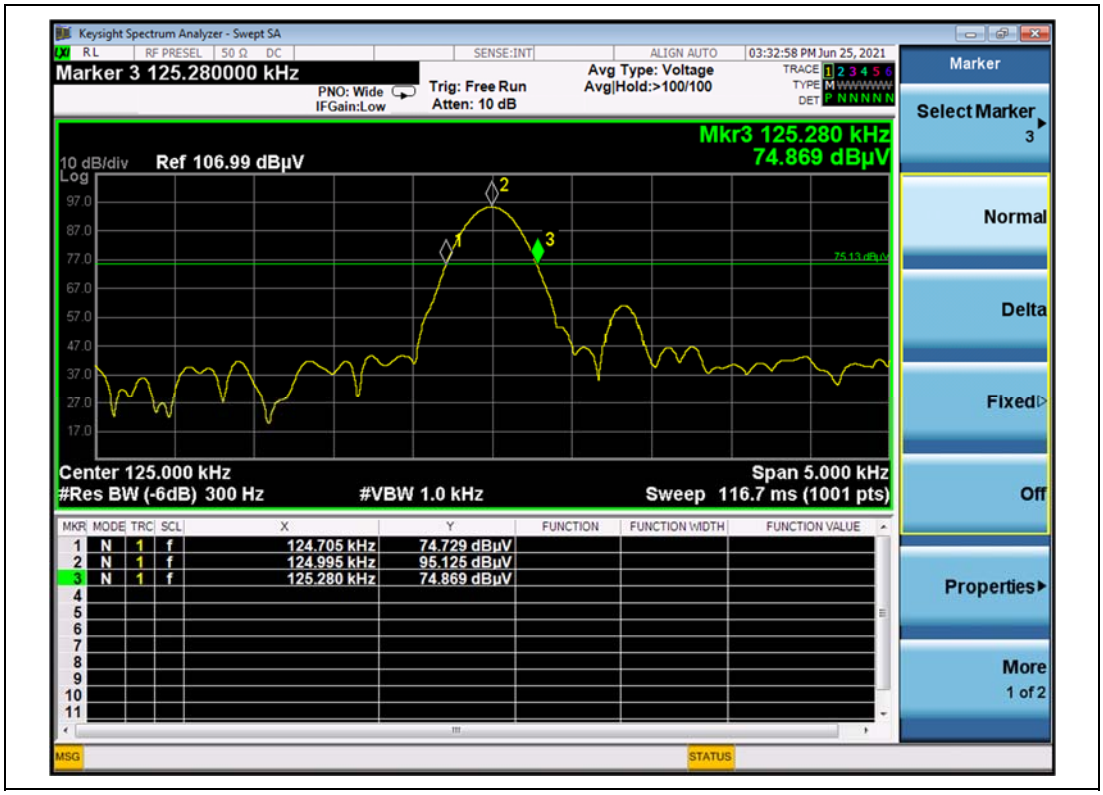


2.4.3. Test Result

Frequency(kHz)	Mode	20dB Bandwidth (kHz)	Verdict
125	ASK	0.575	PASS
	FSK	0.575	



(ASK)


Keysight Spectrum Analyzer - Swept SA
RL
RF PRESEL
50 Ω DC
SENSE:INT
ALIGN AUTO
03:32:58 PM Jun 25, 2021
Marker 3 125.280000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Voltage
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr3 125.280 kHz
74.869 dBµV
10 dB/div
Log
Ref 106.99 dBµV
97.0
87.0
77.0
67.0
57.0
47.0
37.0
27.0
17.0
75.13 dBµV
Center 125.000 kHz
#Res BW (-6dB) 300 Hz
#VBW 1.0 kHz
Span 5.000 kHz
Sweep 116.7 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N 1 f 124.705 kHz 74.729 dBµV
2 N 1 f 124.995 kHz 95.125 dBµV
3 N 1 f 125.280 kHz 74.869 dBµV
4
5
6
7
8
9
10
11
MSG
STATUS
Marker
Select Marker 3
Normal
Delta
Fixed
Off
Properties
More 1 of 2

(FSK)

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:	±3.1dB
Conducted Emission:	±1.8dB
Bandwidth	±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 C63.10-2013and CISPR Publication 22; the FCC designation number is CN1192,the test firm registration number is 226174.

4. Test Equipments Utilized

4.1 RadiatedTest Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2020.07.21	2021.07.20
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Loop	1520-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2021.03.09	2022.03.08
LISN	812744	NSLK 8127	Schwarzbeck	2021.03.09	2022.03.08
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2020.07.24	2021.07.23
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A
Dell Computer	N/A	Vostro 5370	Made in China	N/A	N/A
Dell adapter	N/A	LA45NM140	Lite-On Technology Co., Ltd.	N/A	N/A

4.3 Test Software Utilized

Model	Version Number	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

END OF REPORT