



# 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 2022-08-12  
**ISSUE DATE** : 2024-07-01



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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

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

## 1.2. Equipment Under Test (EUT) Description

<b>Product Name:</b>	KEY TOOL MAX PRO	
<b>Sample No.:</b>	2#	
<b>Hardware Version:</b>	V3.0	
<b>Software Version:</b>	V1.5.1	
<b>Operating Frequency:</b>	315.00 MHz	
<b>Modulation Type:</b>	ASK	
<b>Antenna Type:</b>	Loop Antenna	
<b>Accessory Information:</b>	Battery	
	<b>Brand Name:</b>	BAK
	<b>Model No.:</b>	G795260P
	<b>Serial No.:</b>	N/A
	<b>Capacity:</b>	3375 mAh
	<b>Rated Voltage:</b>	3.7 V
	<b>Charge Limit:</b>	4.2 V
	<b>Manufacturer:</b>	Zhengzhou BAK Battery Co., Ltd.



**Note 1:** This test report is variant from the original report (Report No.: SZ22070187W05, 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 <sub>Note1</sub>	No deviation
2	15.231(a)(1)	The Max Transmission Time	Aug. 09, 2022	Meng Shurui	PASS <sub>Note1</sub>	No deviation
3	15.231(c)	20dB Bandwidth	Aug. 09, 2022	Meng Shurui	PASS <sub>Note1</sub>	No deviation
4	15.207	Conducted Emission	Aug. 08, 2022	Wu Zhaoling	PASS <sub>Note1</sub>	No deviation
5	15.231(b) 15.209(a)	Radiated Emission	Aug. 12, 2022	Gao Jianrou	PASS <sub>Note1</sub>	No deviation

**Note 1:** The test results of these test items in this report refer to the test report (Report No.: SZ22070187W05).

**Note 2:** The tests were performed according to the method of measurements prescribed in ANSIC63.10-2013.

**Note 3:** Additions to, deviation, or exclusions from the method shall be judged in the “method determination” column of add, deviate or exclude from the specific method shall 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.

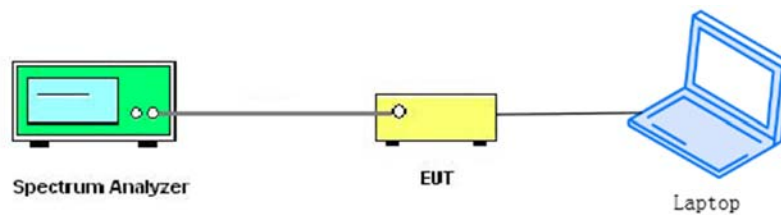
## 2.2. The Max Transmission Time

### 2.2.1. Requirement

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### 2.2.2. Test Description

#### Test Setup:



### 2.2.3. Test Procedure

Set the SPA Center Frequency = Fundamental frequency,  
Span = 0 Hz, change the sweep time until get the burst in the screen.  
Set EUT as normal operation and press Transmitter button.  
Set the SPA View. Delta Mark time.

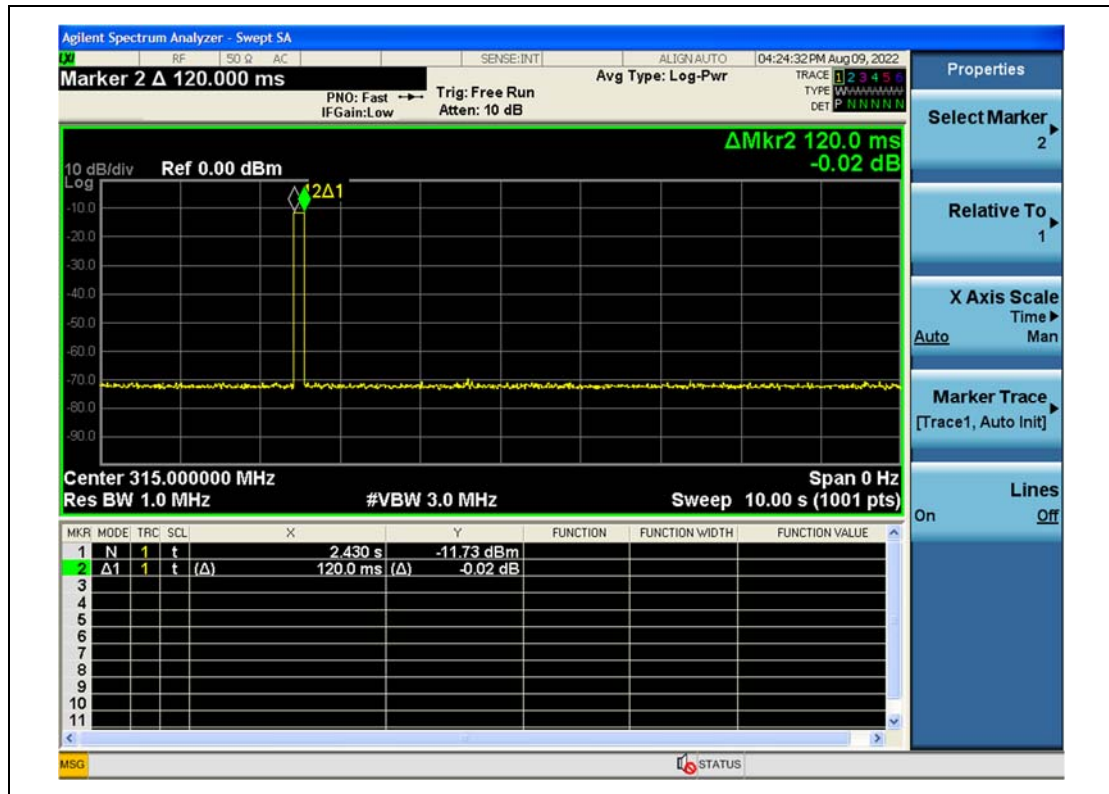


2.2.4. Test Result

A. Test Verdict:

Frequency (MHz)	The Max Transmission Time (s)	Limit (s)	Verdict
315.00	0.12	≤5	PASS

B. Test Plot:



(The max transmission time \_315.00 MHz)



## 2.3. 20 dB Bandwidth

### 2.3.1. Requirement

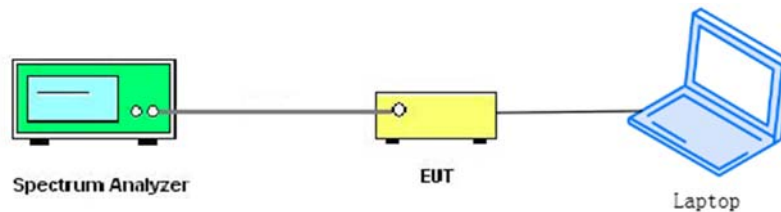
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

As the center frequency for the device operating is 315.00 MHz, thus, the 20 dB bandwidth limit is 787.50 kHz.

As the center frequency for the device operating is 433.92 MHz, thus, the 20 dB bandwidth limit is 1085 kHz.

### 2.3.2. Test Description

#### Test Setup:



### 2.3.3. Test Procedure

Set spectrum analyzer's Center Frequency = Fundamental frequency, RBW, VBW and span to applicable value with Peak in Max Hold, A PEAK output reading and 20 db Bandwidth function in spectrum analyzer were taken.

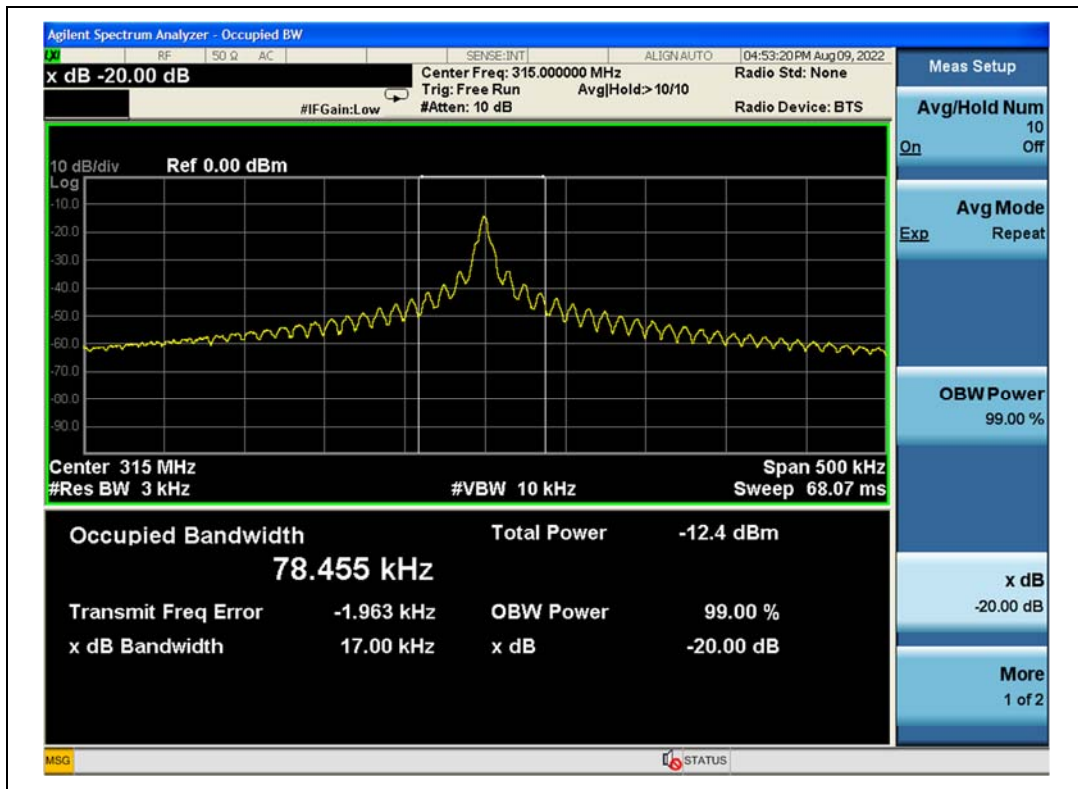


2.3.4. Test Result

A. Test Verdict:

Frequency (MHz)	20 dB Bandwidth (kHz)	Limits (kHz)	Verdict
315.00	17.00	≤787.5	PASS

B. Test Plot:



(Bandwidth\_315.00 MHz)

## 2.4. Conducted Emission

### 2.4.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, 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  $\mu$ H/50  $\Omega$  line impedance stabilization network (LISN).

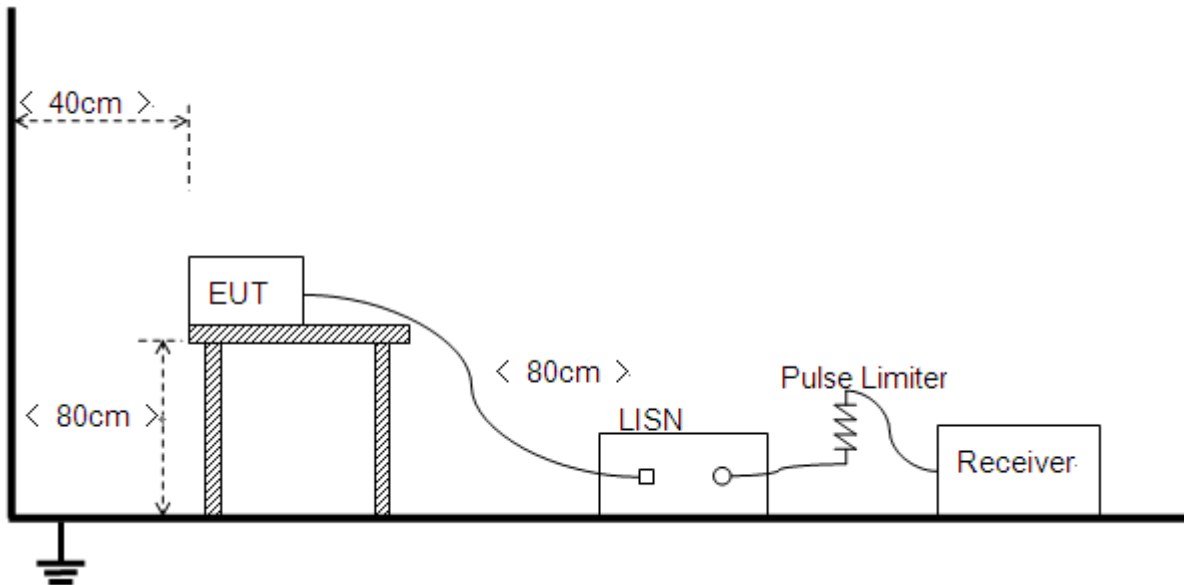
Frequency Range (MHz)	Conducted Limit (dB $\mu$ V)	
	Quai-peak	Average
0.15–0.50	66 to 56	56 to 46
0.50–5	56	46
5–30	60	50

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.

### 2.4.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80 cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.



### 2.4.3. 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 + 315 MHz TX

Test voltage: AC 120 V/60 Hz

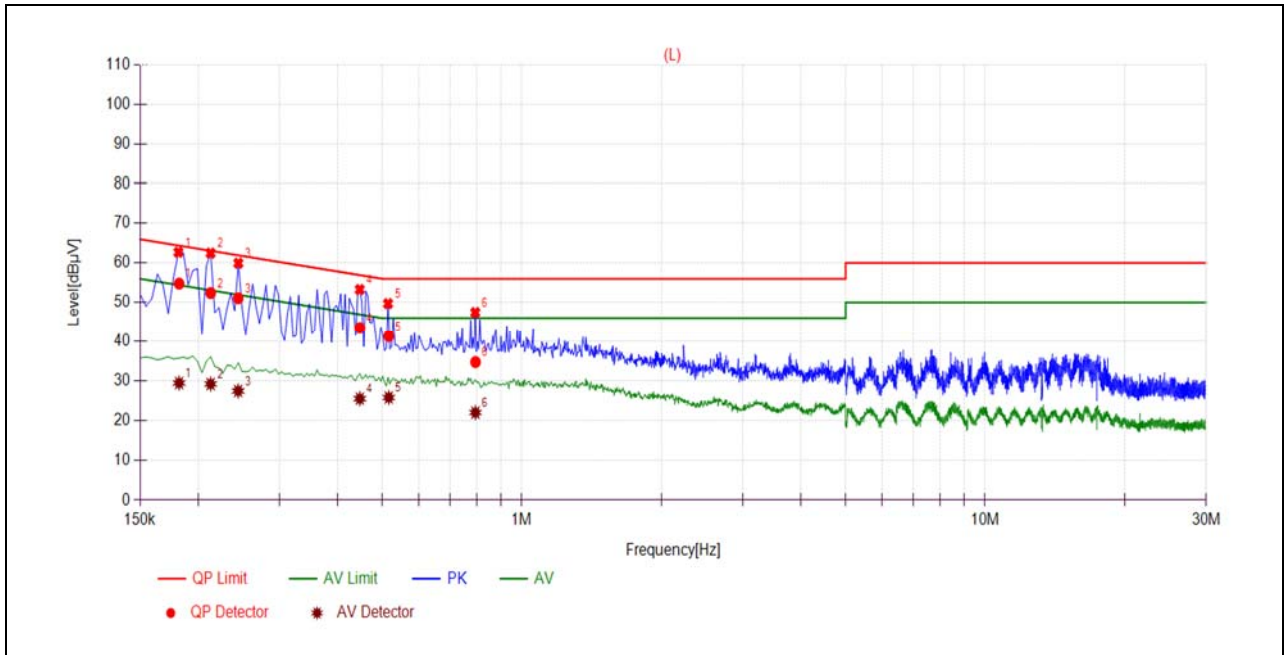
The measurement results are obtained as below:

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

$U_R$ : Receiver Reading

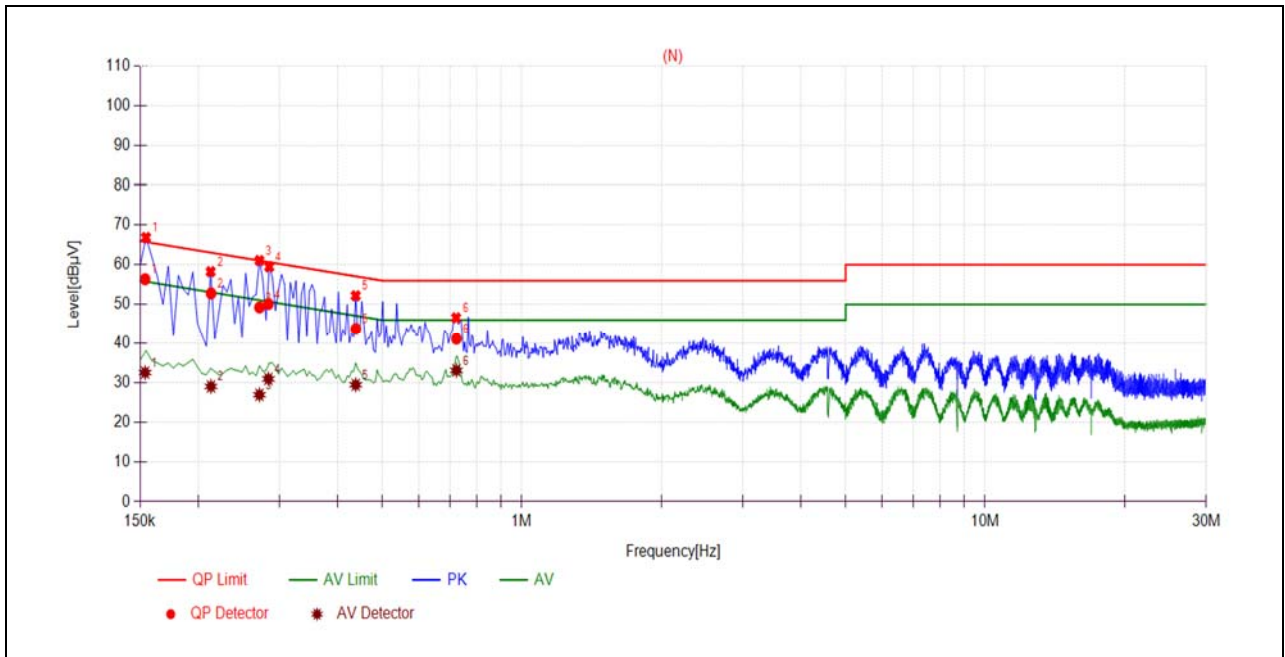
$A_{\text{Factor}}$ : Voltage division factor of LISN

**B.Test Plot:**



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1821	54.77	29.41	64.39	54.39	Line	PASS
2	0.2130	52.39	29.16	63.09	53.09		PASS
3	0.2442	51.08	27.41	61.95	51.95		PASS
4	0.4471	43.47	25.47	56.93	46.93		PASS
5	0.5162	41.32	25.75	56.00	46.00		PASS
6	0.7942	34.70	21.95	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	0.1538	56.36	32.53	65.79	55.79	Neutral	PASS
2	0.2134	52.80	29.02	63.07	53.07		PASS
3	0.2715	49.24	26.91	61.07	51.07		PASS
4	0.2838	50.10	30.93	60.70	50.70		PASS
5	0.4381	43.75	29.44	57.10	47.10		PASS
6	0.7225	41.16	33.09	56.00	46.00		PASS



## 2.5. Radiated Emission

### 2.5.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 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:

Frequency (MHz)	Field Strength ( $\mu\text{V}/\text{m}$ )	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

### FCC Part 15.231(b)

Fundamental Frequency(MHz)	Field Strength of Fundamental (Microvolts/Meter)	Field Strength of Spurious Emission (Microvolts/Meter)
40.66–40.70	2250	225
70–130	1250	125
130–174	1250 to 3750	125 to 375
174–260	3750	375
260–470	3750 to 12500	375 to 1250
Above 470	12500	1250

**Note 1:** For Above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

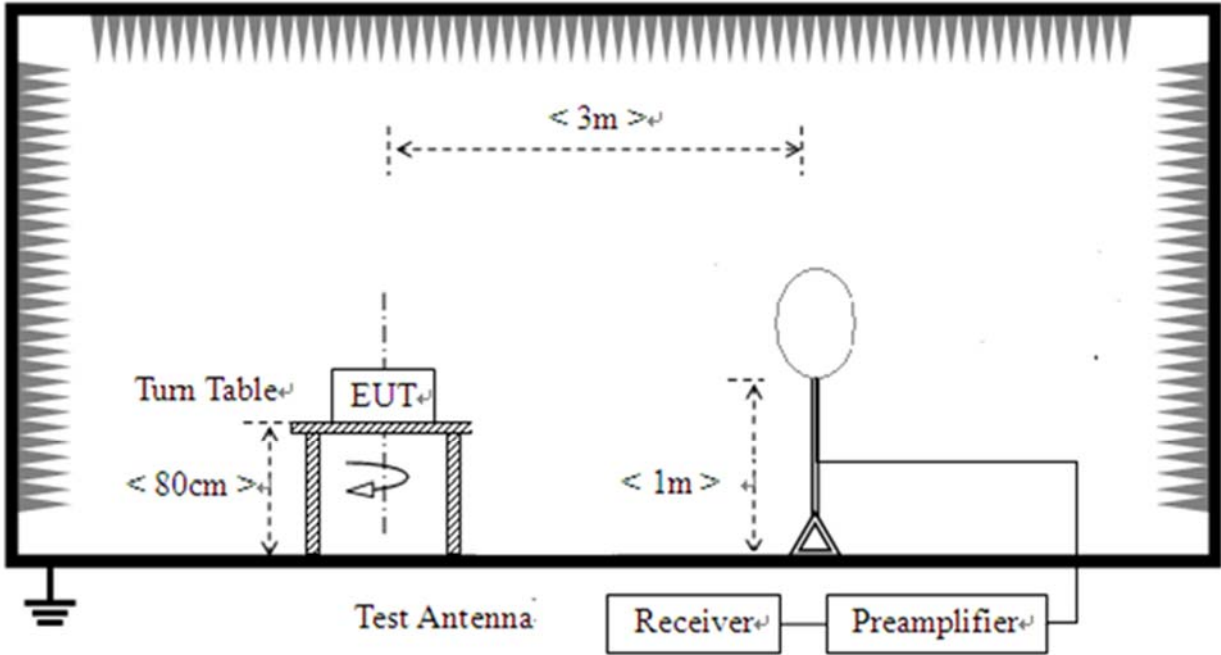
**Note 2:** For above 1000 MHz, limit field strength of harmonics: 54 dBuV/m@3 m (AV) and 74 dBuV/m@3 m (PK)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

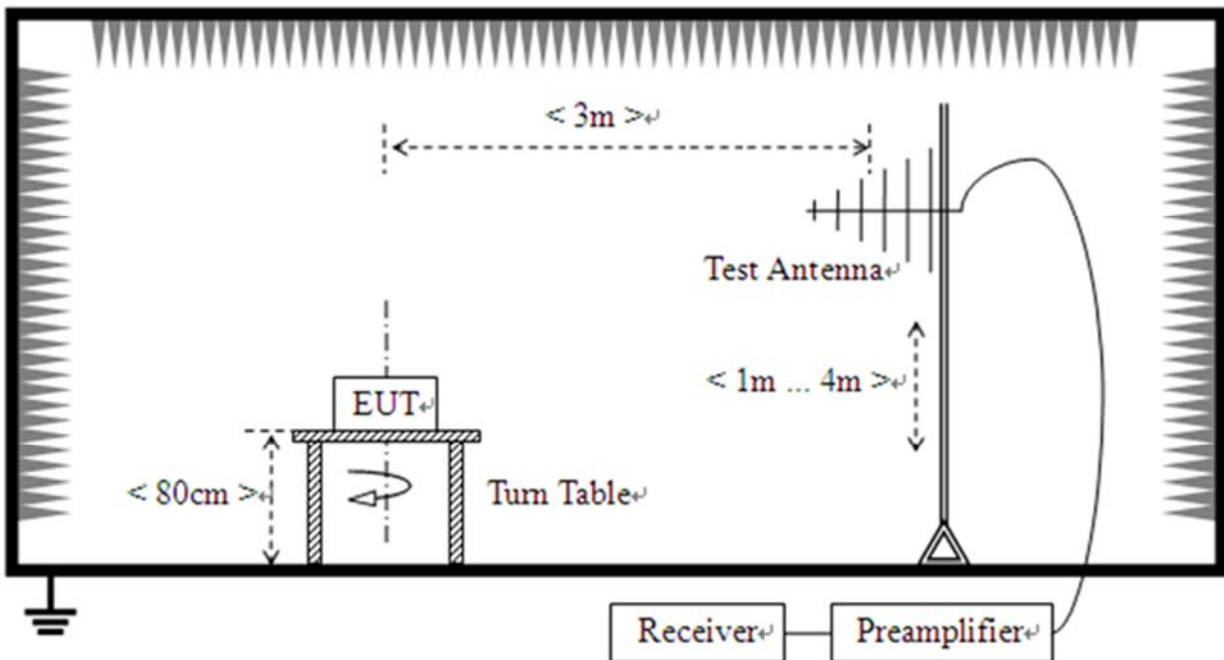
**2.5.2. Test Description**

**Test Setup:**

1) For radiated emissions from 9 kHz to 30 MHz

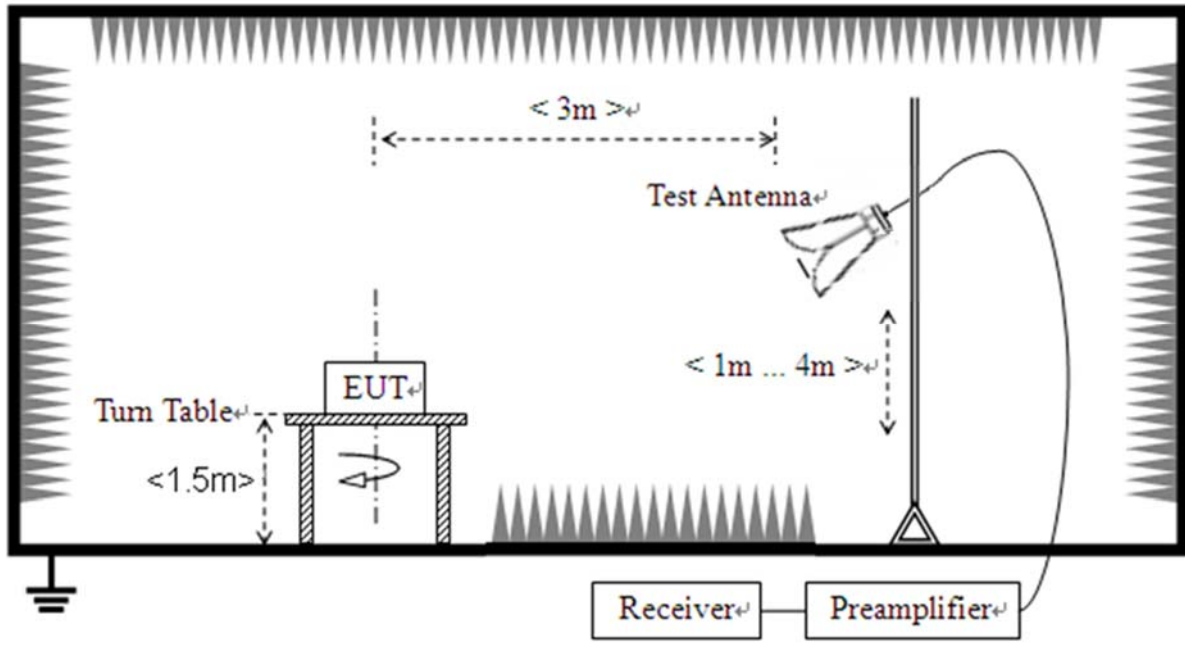


2) For radiated emissions from 30 MHz to 1 GHz





## 3) For radiated emissions above 1 GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1 GHz; 1.5 m above the ground plane for measurement above 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

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 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 band width is set to 3 MHz for peak measurements and as applicable for average measurements.

The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions. For measurements above 1 GHz, keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.



### 2.5.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna

$U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain

$A_{\text{Factor}}$ : Antenna Factor at 3 m

During the test, the total correction Factor  $A_T$  and  $A_{\text{Factor}}$  were built in test software.

**Note 1:** 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.

**Note 2:** For the frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit was not recorded.

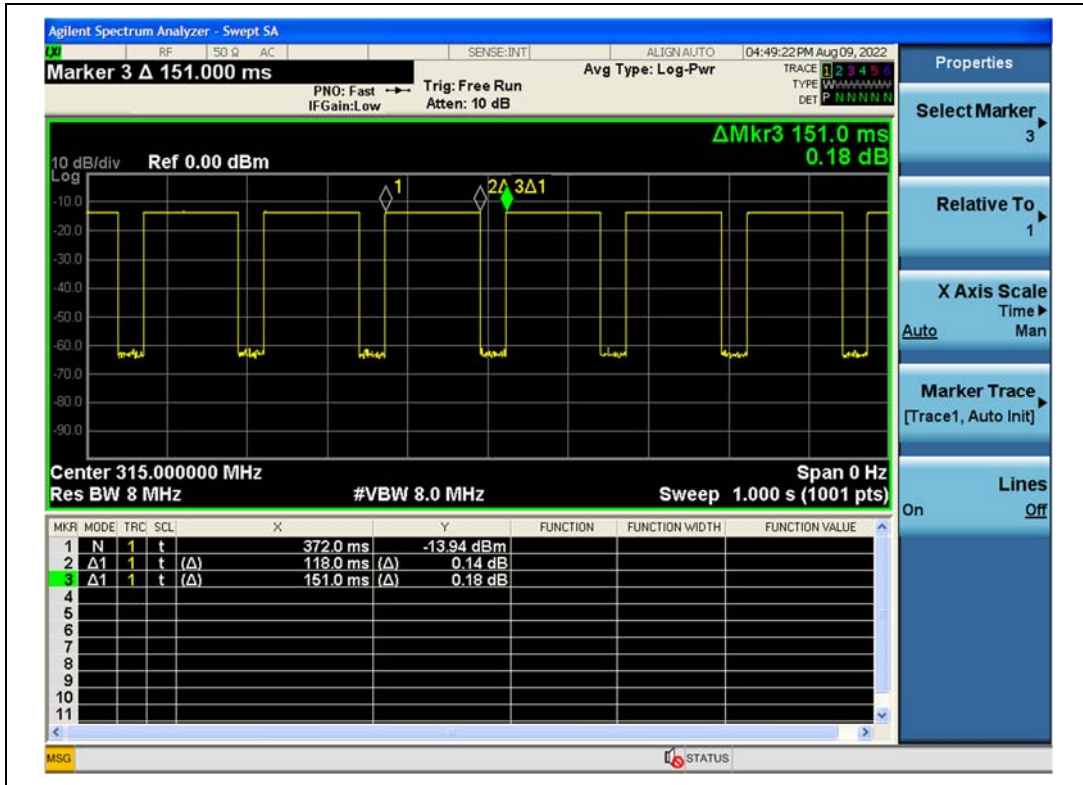


**315.00 MHz**

The duty cycle is simply the on-time divided by the period:

The Duration of One Cycle (ms):	118
Effective Period of the Cycle (ms):	151
Duty Cycle (%):	78.15

Therefore, the average factor is found by  $20\log(\text{Duty cycle}) = -11.98$

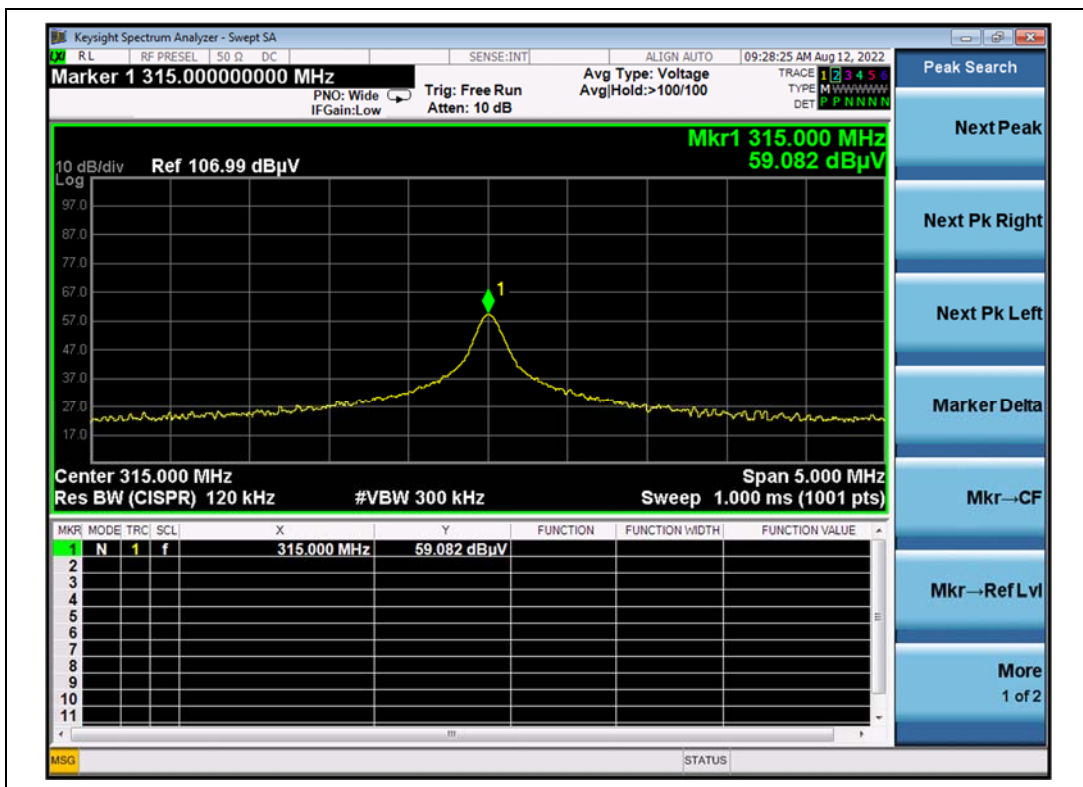


(Release Time)

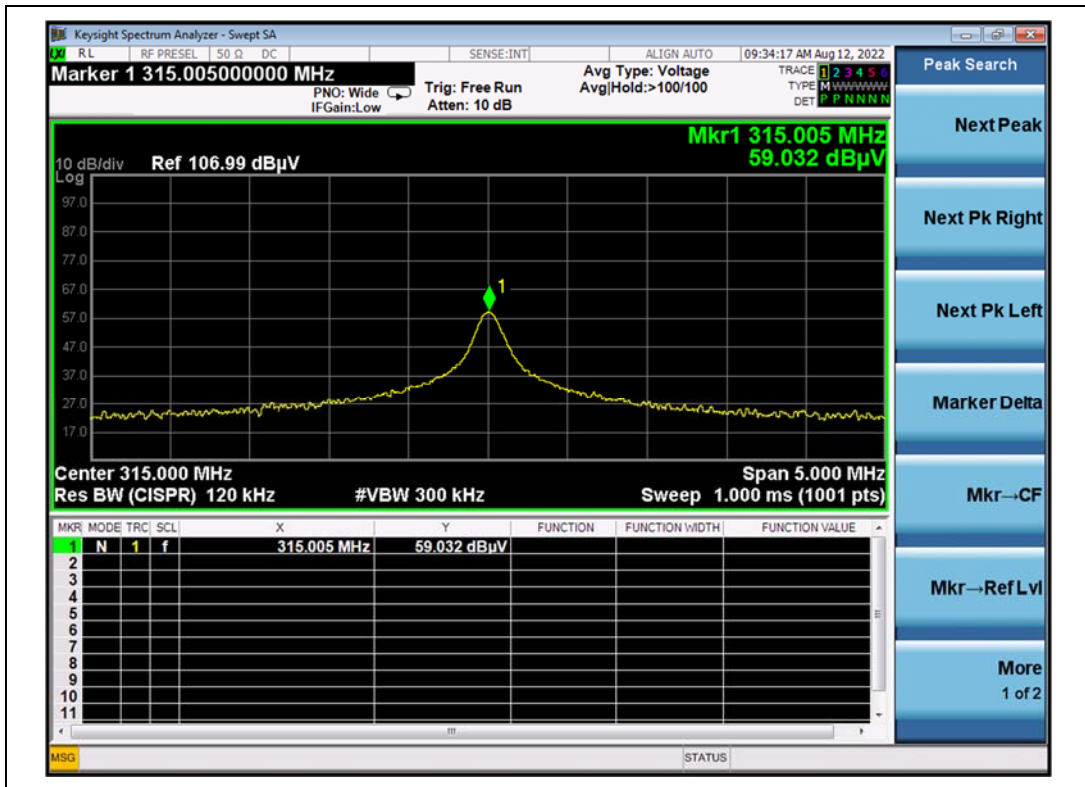
**A. Field strength of fundamental**

Fre. (MHz)	ANT	Receiver Reading $U_R(PK)$ (dBuV)	$A_T$ (dB)	$A_{Factor}$ (dB@ 3m)	Final Emission $_{PK}$ (dBuV/m)	Limit-PK (dBuV/m)	AV factor (dB)	Final Emission $_{AV}$ (dBuV/m)	Limit-AV (dBuV/m)	Verdict
315.00	H	59.082	3.94	13.69	76.712	95.62	-2.14	74.572	75.62	PASS
315.00	V	59.032	3.94	13.69	76.662	95.62	-2.14	74.522	75.62	PASS

**Test Plot:**

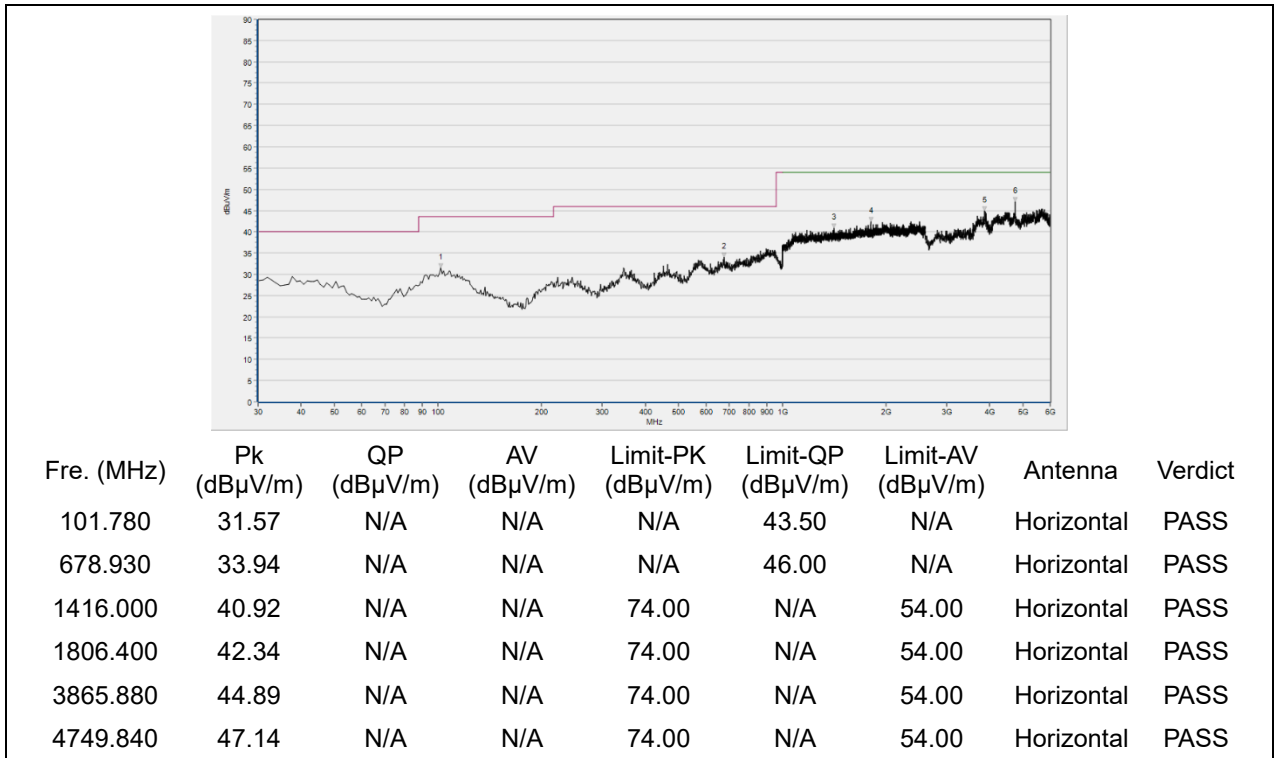


(315.00 MHz, Antenna Horizontal)

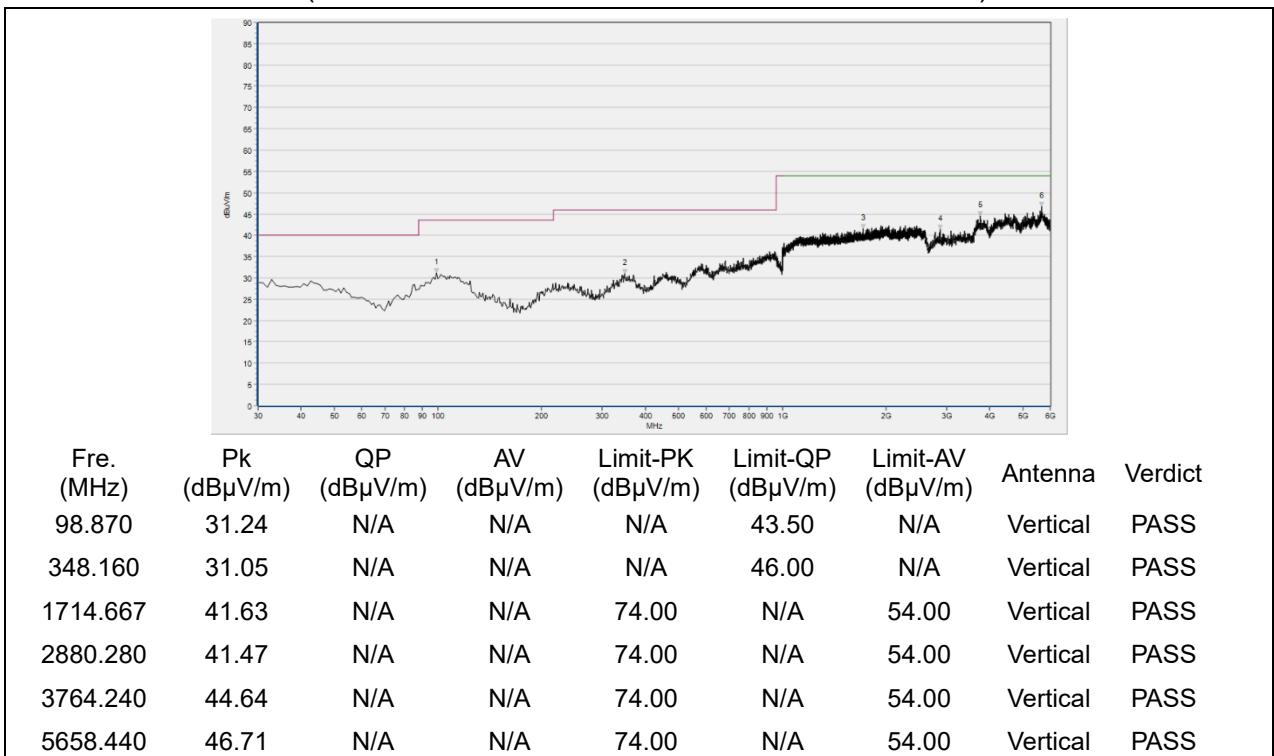


(315.00 MHz, Antenna Vertical)

**B. Radiated emission**



(315.00 MHz, Antenna Horizontal, 30 MHz to 5 GHz)



(315.00 MHz, Antenna Vertical, 30 MHz to 5 GHz)



## Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test Items	Uncertainty
20 dB Bandwidth	±5%
Transmission Time	±5%
Radiated Emission	±2.95 dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k = 2$ .



## Annex B Testing Laboratory Information

### 1. Identification of the Responsible Testing Laboratory

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

### 2. Identification of the Responsible Testing Location

<b>Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd.
<b>Address:</b>	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 Conducted Test Equipment

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2022.03.01	2023.02.28
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
USB Wideband Power Sensor	MY54180008	U202IXA	Agilent	2021.10.21	2022.10.20

##### 4.2 List of Software Used

Description	Manufacturer	Software Version
Test System	Tonscend	V2.5.77.0418
Morlab EMCR V1.2	Morlab	V1.0

**4.3 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	1519-022	FMZB1519	Schwarzbeck	2022.02.11	2025.02.10
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2022.07.13	2025.07.12
Test Antenna – Horn	BBHA9170 #774	BBHA 9170	Schwarzbeck	2022.07.14	2025.07.13
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L32 03	Tonscend	2022.07.08	2023.07.07
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

————— END OF REPORT —————