



# TEST REPORT

Report No. .... : **CHTEW20100070** Report Verification: 

Project No..... : **SHT2009085401EW**

FCC ID..... : **2AJ9T-KR500**

Applicant's name..... : **ZKTECO CO.,LTD.**

Address..... : No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

Manufacturer..... : ZKTECO CO.,LTD.

Address..... : No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

Test item description ..... : **RFID Weigand Reader**

Trade Mark ..... : -

Model/Type reference..... : KR500

Listed Model(s) ..... : KR501, KR502, KR503

Standard ..... : **FCC CFR Title 47 Part 15 Subpart C**

Date of receipt of test sample..... : Sep. 23, 2020

Date of testing..... : Sep. 24, 2020- Oct. 19, 2020

Date of issue..... : Oct. 20, 2020

Result..... : **PASS**

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Testing Laboratory Name ..... : **Shenzhen Huatongwei International Inspection Co., Ltd.**

Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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The test report merely correspond to the test sample.

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## 1. TEST STANDARDS AND REPORT VERSION

### 1.1. Test Standards

The tests were performed according to following standards:

[FCC Rules Part 15C](#): Intentional Radiators

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices.

### 1.2. Report version information

Revision No.	Date of issue	Description
N/A	2020-10-20	Original

## 2. TEST DESCRIPTION

Report clause	Test Item	Section in CFR 47	Result	Test Engineer
5.1	Antenna requirement	15.203	PASS	Jiongsheng Feng
5.2	AC Power Line Conducted Emissions	15.207	PASS	Pan Xie
5.3	20dB Occupied Bandwidth	2.1049	PASS	Jiongsheng Feng
5.4	Spurious Emissions	15.209	PASS	Pan Xie

Remark: The measurement uncertainty is not included in the test result.

### 3. SUMMARY

#### 3.1. Client Information

Applicant:	ZKTECO CO.,LTD.
Address:	No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728
Manufacturer:	ZKTECO CO.,LTD.
Address:	No.26,Pingshan 188 Industry zone,Tangxia Town,Dongguan City,Guangdong Province,China 523728

#### 3.2. Product Description

Name of EUT:	RFID Weigand Reader
Trade Mark:	-
Model No.:	KR500
Listed Model(s):	KR501, KR502, KR503
Adapter Information:	MODEL:ADS-40SI-12-3 12036E INPUT:100-240V 50/60Hz 1.0A max OUTPUT:12V,3.0A MANUFACTURER:SHENZHEN HONOR ELECTRONIC CO.,LTD
Power supply:	DC 12V
Hardware version:	V1.0
Software version:	V1.0

#### 3.3. Radio Specification Description

Operation frequency:	125KHz
Modulation Type:	ASK
Antenna type:	induction coil antenna
Antenna gain:	0dBi

#### 3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Qualifications	Type	Accreditation Number
	CNAS	L1225
	A2LA	3902.01
	FCC	762235
	Canada	5377A

## 4. TEST CONFIGURATION

### 4.1. Test frequency list

Channel	Frequency (KHz)
00	125

### 4.2. EUT operation mode

#### TEST MODE

For RF test items
The EUT was programmed to be in continuously transmitting mode
For AC power line conducted emissions:
The EUT was programmed to be in continuously transmitting mode
For Radiated suprious emissions test item:
The EUT was programmed to be in continuously transmitting mode

### 4.3. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
  - - supplied by the lab
- NA

### 4.4. Environmental conditions

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

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

#### 4.5. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics;Part 2” and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system according to ISO/IEC 17025. Further more, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei is reported:

Test Items	Measurement Uncertainty	Notes
Conducted Disturbance 9KHz-30MHz	3.02 dB	(1)
Radiated emissions below 1GHz	4.90 dB	(1)
Radiated emissions above 1GHz	4.96 dB	(1)
Occupied Bandwidth	15 Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=1.96$ .

#### 4.6. Modifications

No modifications were implemented to meet testing criteria.

## 4.7. Equipments Used during the Test

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	HTWE0114	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2019/10/26	2020/10/25
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2019/10/23	2020/10/22
●	Pulse Limiter	R&S	HTWE0033	ESH3-Z2	100499	2019/10/23	2020/10/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0113-02	ENVIROFLE X_142	N/A	2019/10/23	2020/10/22
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-6th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	N/A	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	HTWE0099	ESCI	100900	2019/10/26	2020/10/25
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2018/04/02	2021/04/01
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0123	VULB9163	546	2020/04/28	2023/04/27
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	N/A	2019/11/14	2020/11/13
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-01	N/A	N/A	2020/05/27	2021/05/26
●	RF Connection Cable	HUBER+SUHNER	HTWE0062-02	SUCOFLEX 104	501184/4	2020/05/27	2021/05/26
●	Test Software	R&S	N/A	ES-K1	N/A	N/A	N/A

● Radiated emission-7th test site							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2019/10/26	2020/10/25
●	Horn Antenna	SCHWARZBECK	HTWE0126	9120D	1011	2020/04/01	2023/03/31
●	Broadband Horn Antenna	SCHWARZBECK	HTWE0103	BBHA9170	BBHA9170472	2018/10/11	2021/10/11
●	Pre-amplifier	CD	HTWE0071	PAP-0102	12004	2019/11/14	2020/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2020/05/23	2021/05/22
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-01	6m 18GHz S Serisa	N/A	2020/05/10	2021/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-02	6m 3GHz RG Serisa	N/A	2020/05/10	2021/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-03	6m 3GHz RG Serisa	N/A	2020/05/10	2021/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0120-04	6m 3GHz RG Serisa	N/A	2020/05/10	2021/05/09
●	RF Connection Cable	HUBER+SUHNER	HTWE0121-01	6m 18GHz S Serisa	N/A	2020/05/10	2021/05/09
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A



● RF Conducted Method						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2019/10/26	2020/10/25
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2019/10/26	2020/10/25
●	Power Meter	Anritsu	ML249A	N/A	2019/10/26	2020/10/25
○	Radio communication tester	R&S	CMW500	137688-Lv	2019/10/26	2020/10/25

## 5. TEST CONDITIONS AND RESULTS

### 5.1. Antenna requirement

#### Requirement

##### **FCC CFR Title 47 Part 15 Subpart C Section 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

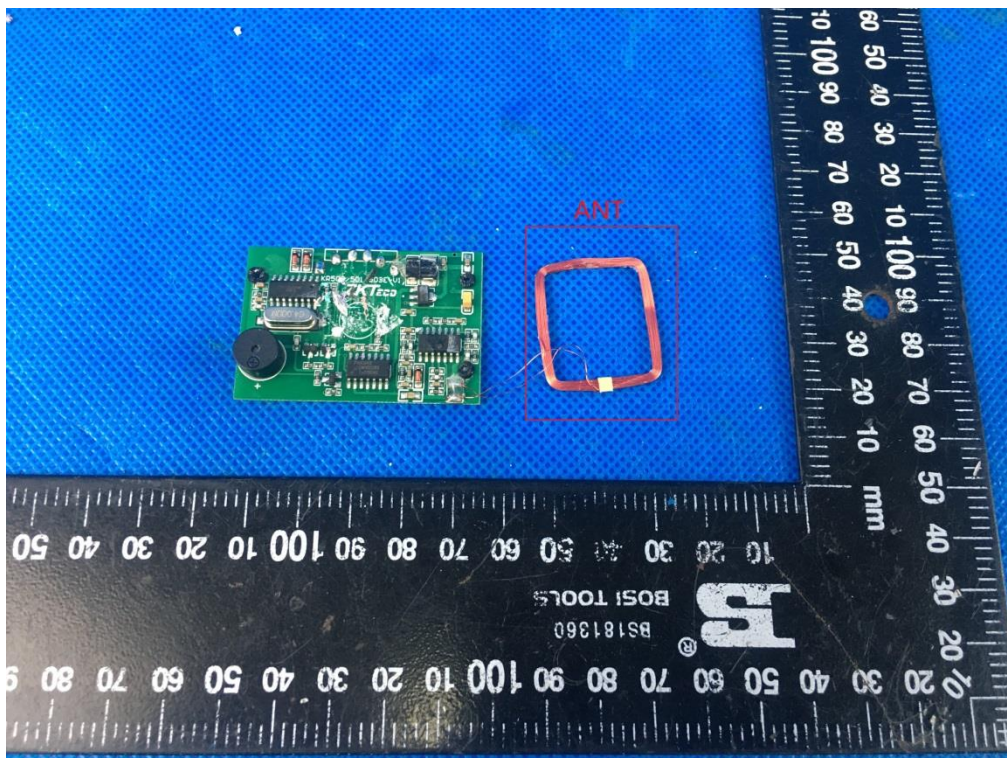
#### **Refer to statement below for compliance.**

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### TEST RESULTS

**Passed**       **Not Applicable**

The antenna type is an induction coil antenna, Please refer to the below antenna photo.



## 5.2. AC Power Conducted Emissions

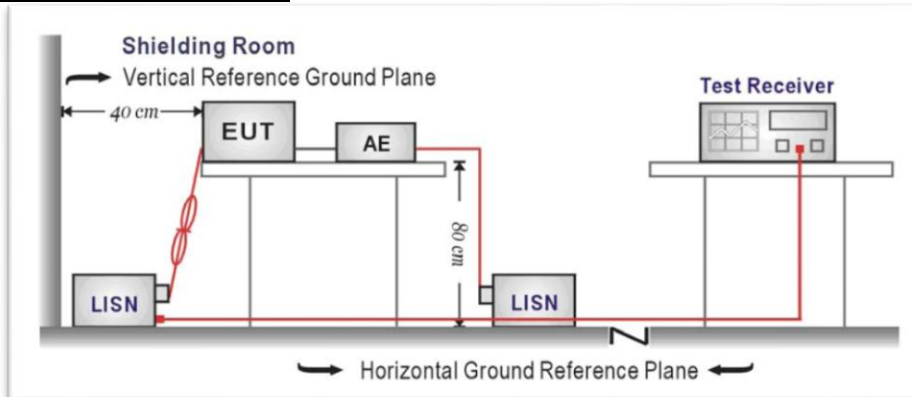
### LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.

### TEST CONFIGURATION



### TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013
2. The EUT was placed on a plat form of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50ohm / 50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

### TEST MODE:

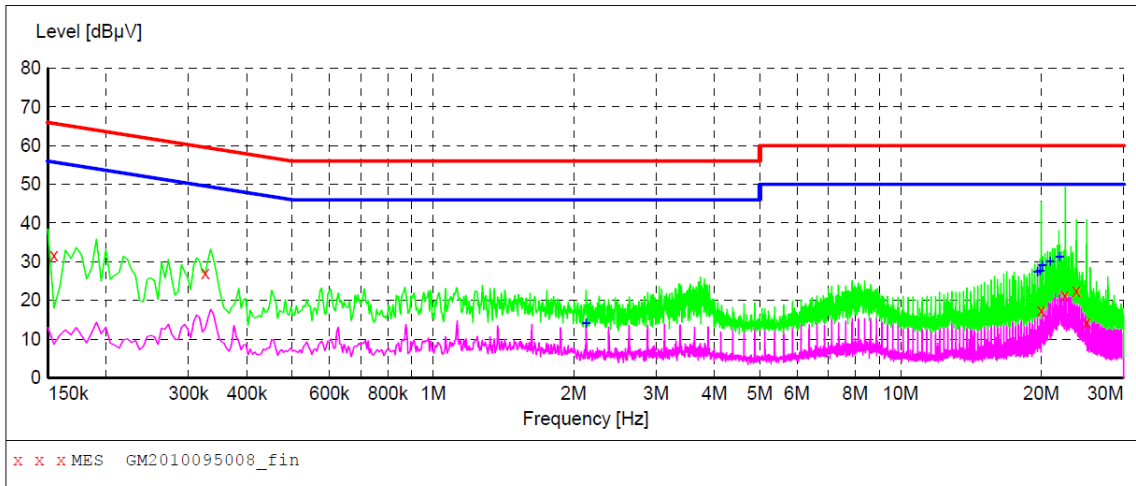
Please refer to the clause 3.3

### TEST RESULTS

Passed       Not Applicable

Test Line:

L



**MEASUREMENT RESULT: "GM2010095008\_fin"**

10/9/2020 9:50AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	31.70	10.0	66	34.1	QP	L1	GND
0.325500	27.10	10.1	60	32.5	QP	L1	GND
19.986000	17.40	10.5	60	42.6	QP	L1	GND
22.474500	21.40	10.5	60	38.6	QP	L1	GND
23.761500	22.50	10.5	60	37.5	QP	L1	GND
24.994500	14.20	10.6	60	45.8	QP	L1	GND

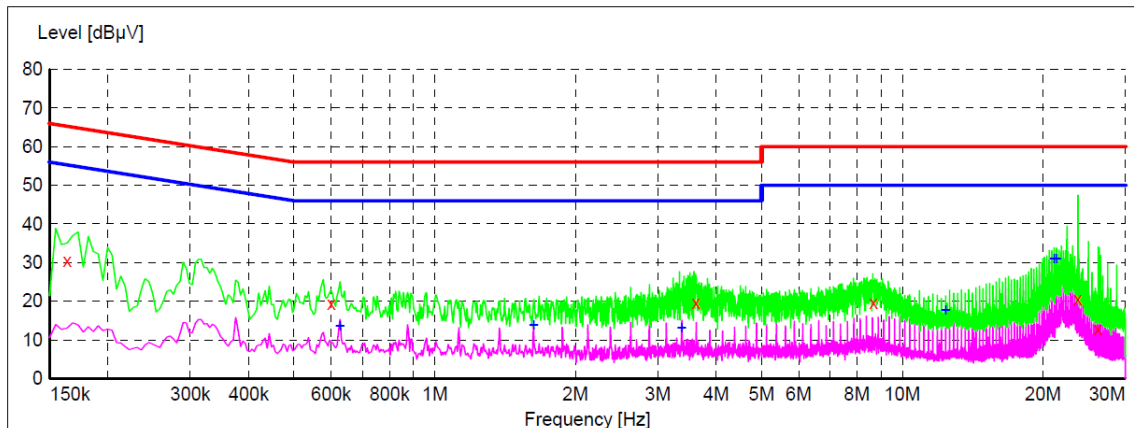
**MEASUREMENT RESULT: "GM2010095008\_fin2"**

10/9/2020 9:50AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
2.125500	14.00	10.1	46	32.0	AV	L1	GND
19.626000	27.40	10.5	50	22.6	AV	L1	GND
19.873500	27.50	10.5	50	22.5	AV	L1	GND
20.125500	28.90	10.5	50	21.1	AV	L1	GND
20.877000	30.00	10.5	50	20.0	AV	L1	GND
21.876000	31.20	10.5	50	18.8	AV	L1	GND

Test Line:

N



x x x MES GM2010095007\_fin

**MEASUREMENT RESULT: "GM2010095007\_fin"**

10/9/2020 9:47AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	30.50	10.0	65	34.8	QP	N	GND
0.600000	19.40	10.1	56	36.6	QP	N	GND
3.615000	19.50	10.2	56	36.5	QP	N	GND
8.682000	19.70	10.3	60	40.3	QP	N	GND
23.743500	20.60	10.5	60	39.4	QP	N	GND
26.241000	12.80	10.6	60	47.2	QP	N	GND

**MEASUREMENT RESULT: "GM2010095007\_fin2"**

10/9/2020 9:47AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.627000	13.60	10.1	46	32.4	AV	N	GND
1.626000	13.80	10.1	46	32.2	AV	N	GND
3.372000	13.20	10.2	46	32.8	AV	N	GND
12.376500	17.70	10.4	50	32.3	AV	N	GND
21.124500	31.00	10.5	50	19.0	AV	N	GND
21.376500	31.00	10.5	50	19.0	AV	N	GND

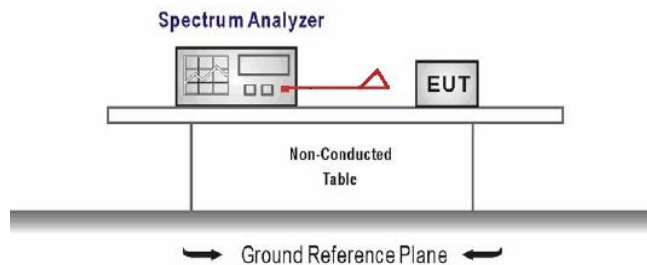
### 5.3. 20dB Bandwidth

#### Limit

#### **FCC CFR Title 47 Part 15 Subpart C Section 15.215**

Intentional radiators must be designed to ensure that the 20dB emission bandwidth in the specific band.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:  
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel  
RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW  
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

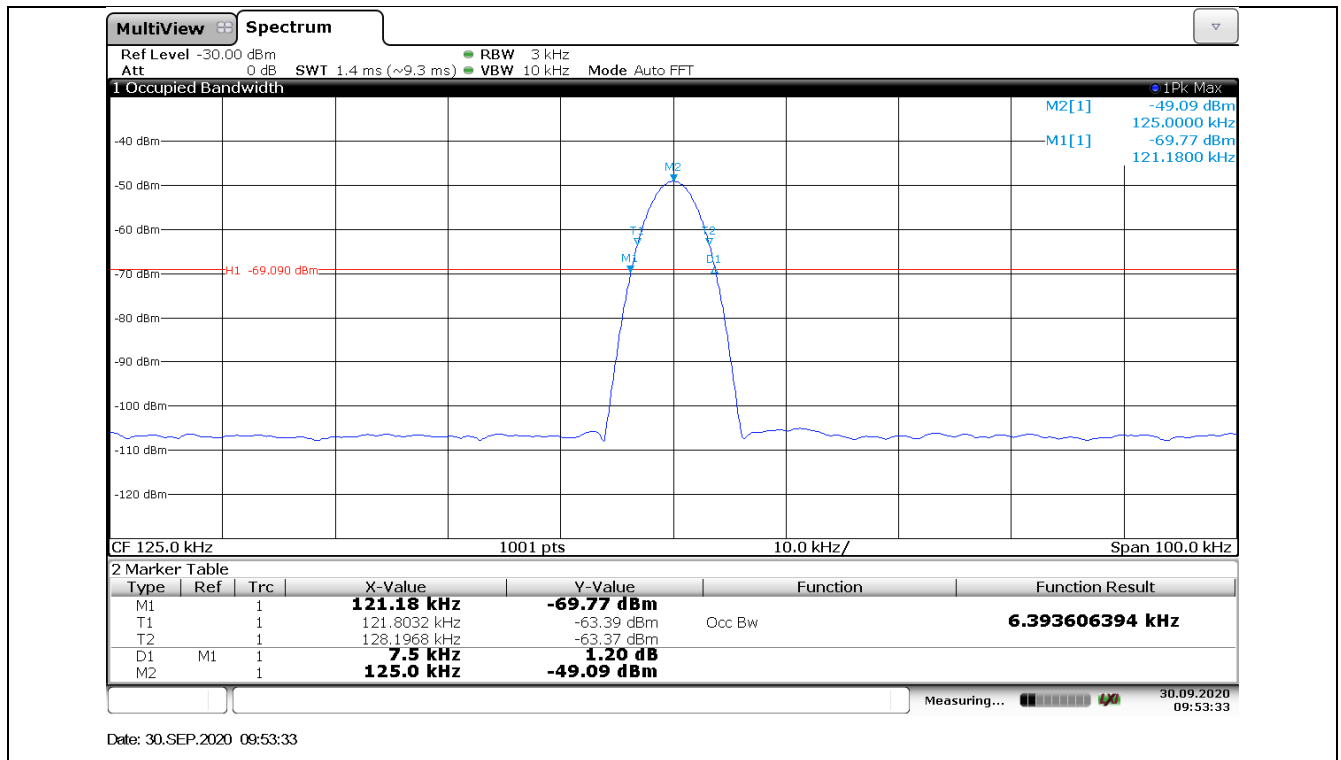
#### **TEST MODE:**

Please refer to the clause 3.3

#### **TEST RESULTS**

Passed       Not Applicable

Test Channel	20dB Bandwidth (KHz)	Limit (KHz)	Result
00	7.5	-	Pass



### 5.4. Radiated Emission

#### LIMIT

#### FCC CFR Title 47 Part 15 Subpart C Section 15.209

Limit for frequency below 30MHz:

Frequency	Limit (uV/m)	Measurement Distance(m)	Remark
0.009~0.490	2400/F(kHz)	300	Quasi-peak
0.490~1.705	24000/F(kHz)	30	Quasi-peak
1.705~30.0	30	30	Quasi-peak

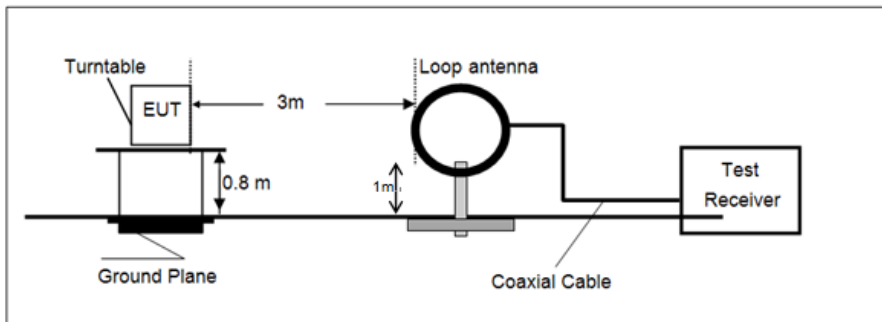
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40\*log(300/3)= Limit dBuV/m @300m +80,  
 Limit dBuV/m @3m = Limit dBuV/m @30m +40\*log(30/3)= Limit dBuV/m @30m + 40.

Limit for frequency above 30MHz:

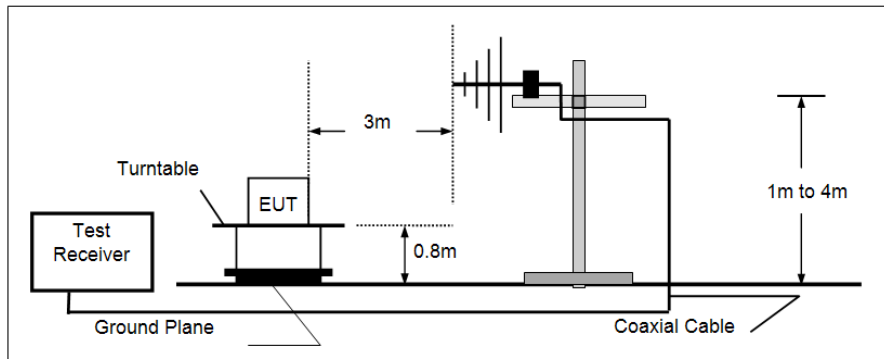
Frequency	Limit (dBuV/m@3m)	Remark
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak

#### TEST CONFIGURATION

- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz





**TEST PROCEDURE**

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Below 30MHz:  
RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
  - (3) 30MHz to 1 GHz:  
RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;  
If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
  - (4) From 1 GHz to 10<sup>th</sup> harmonic:  
RBW=1MHz, VBW=3MHz Peak detector for Peak value.  
RBW=1MHz, VBW=3MHz RMS detector for Average value.

**TEST MODE:**

Please refer to the clause 3.3

**TEST RESULTS**

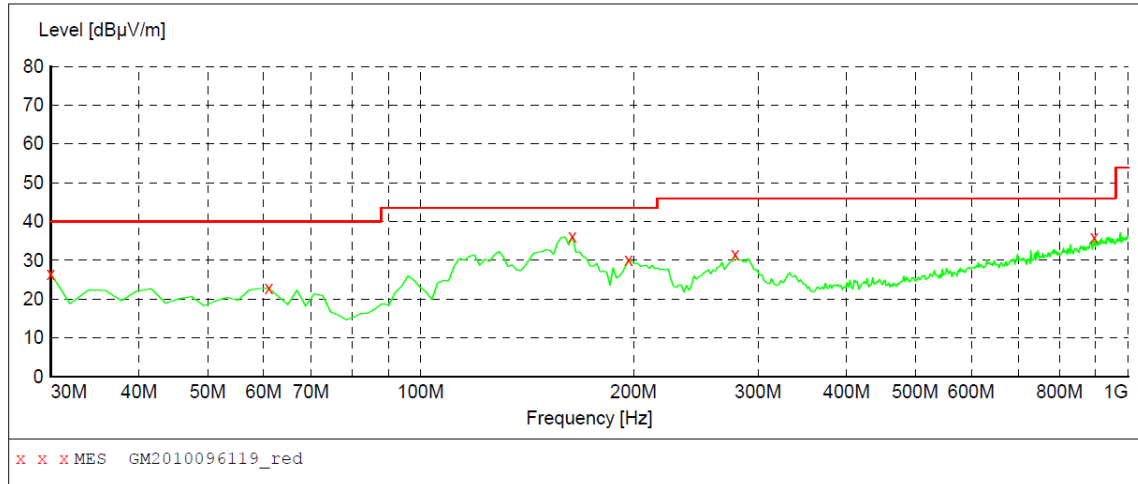
**Passed**                       **Not Applicable**

**Below 30MHz:**

Frequency (MHz)	Reading (dBuA)	Antenna (dB)	Cable (dB)	Preamp (dB)	Level (dBuA/m)	Limit (dBuA/m)	Over Limit	Remark
0.03	21.13	22.36	0.20	0.00	43.69	118.06	-74.37	Peak
0.05	22.22	22.34	0.21	0.00	44.77	113.62	-68.85	Peak
0.13	48.66	22.27	0.23	0.00	71.16	105.33	-34.17	Peak
0.37	25.34	22.20	0.23	0.00	47.77	96.24	-48.47	Peak
1.17	21.34	22.20	0.28	0.00	43.72	66.24	-22.52	Peak
15.72	13.49	19.52	0.57	0.00	33.58	69.54	-35.96	Peak

**Above 30MHz:**

Polarization: Vertical

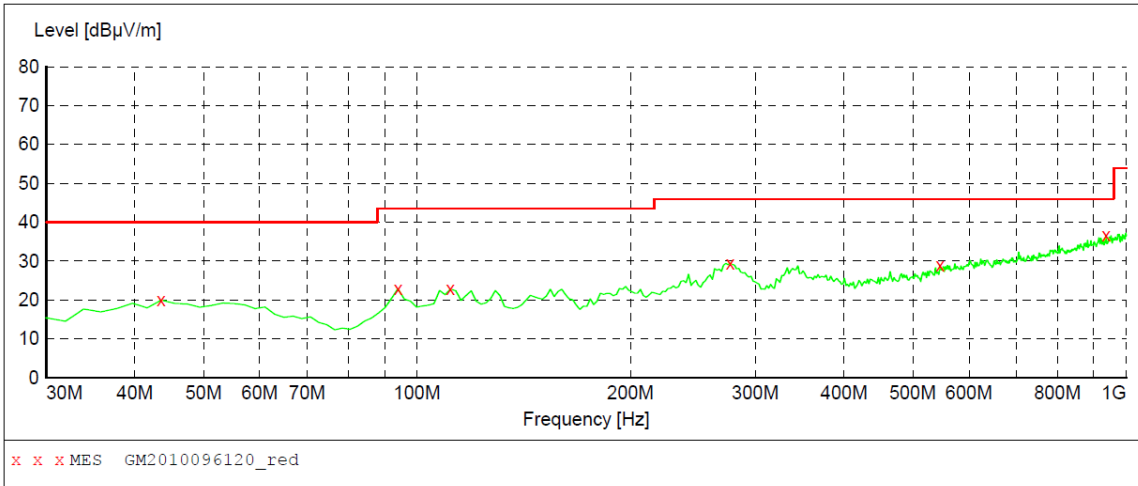


**MEASUREMENT RESULT: "GM2010096119\_red"**

10/9/2020 10:49PM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	26.60	-11.8	40.0	13.4	QP	100.0	13.00	VERTICAL
61.040000	22.80	-9.4	40.0	17.2	QP	100.0	303.00	VERTICAL
163.860000	36.20	-12.3	43.5	7.3	QP	100.0	303.00	VERTICAL
196.840000	30.10	-9.1	43.5	13.4	QP	100.0	317.00	VERTICAL
278.320000	31.50	-7.1	46.0	14.5	QP	100.0	291.00	VERTICAL
895.240000	36.00	7.5	46.0	10.0	QP	100.0	354.00	VERTICAL

Polarization: Horizontal



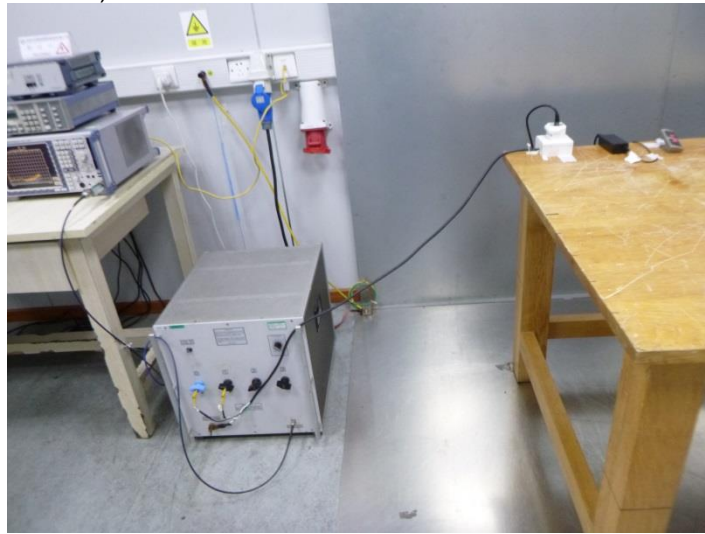
**MEASUREMENT RESULT: "GM2010096120\_red"**

10/9/2020 10:55PM

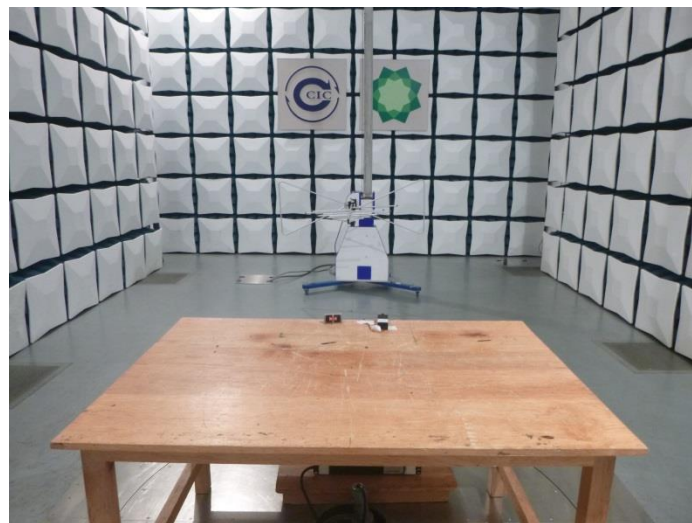
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
43.580000	19.90	-8.6	40.0	20.1	QP	100.0	56.00	HORIZONTAL
94.020000	22.90	-10.9	43.5	20.6	QP	300.0	228.00	HORIZONTAL
111.480000	22.80	-10.7	43.5	20.7	QP	300.0	190.00	HORIZONTAL
276.380000	29.50	-7.1	46.0	16.5	QP	100.0	87.00	HORIZONTAL
546.040000	28.80	0.3	46.0	17.2	QP	100.0	22.00	HORIZONTAL
935.980000	36.60	8.4	46.0	9.4	QP	300.0	276.00	HORIZONTAL

## 6. TEST SETUP PHOTOS OF THE EUT

### Conducted Emissions (AC Mains)



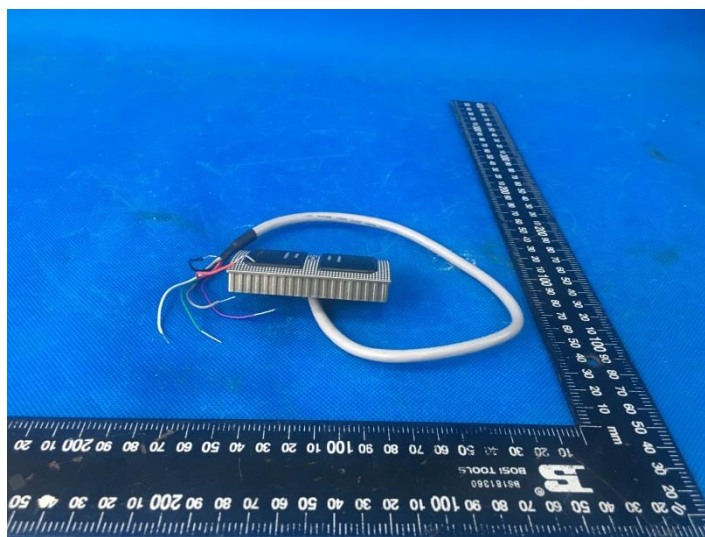
### Radiated Emissions

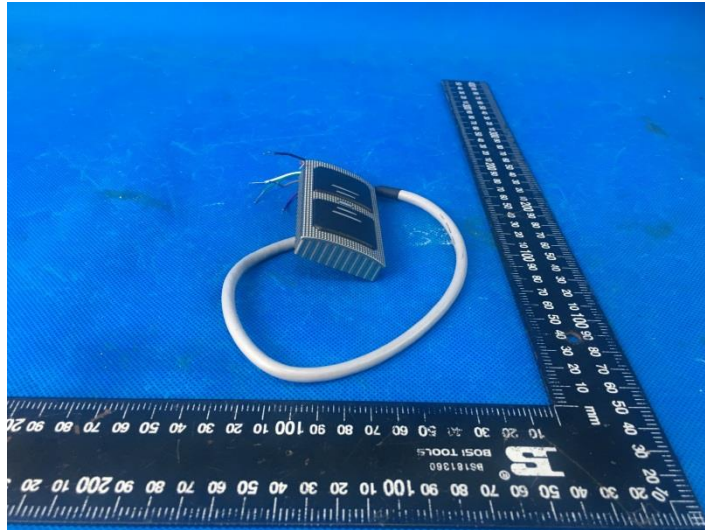


## 7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

### External photos of EUT



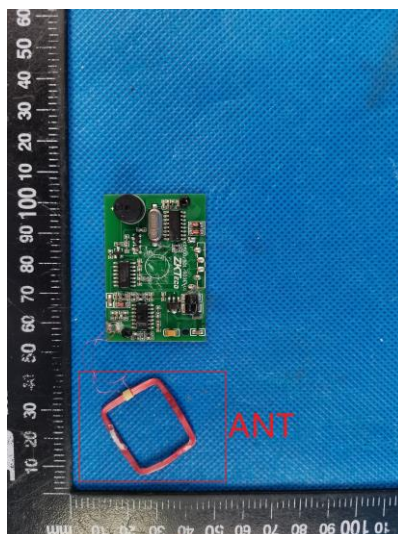
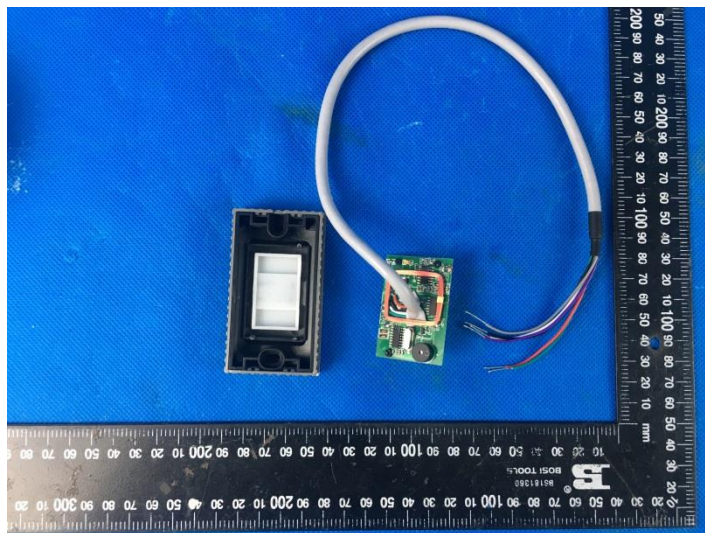








**Internal photos of EUT**





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