


TEST REPORT


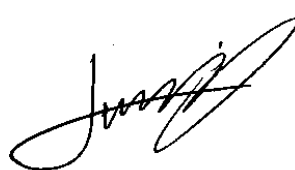
Applicant	Zhiwei Robotics Corp.
Address	Room 603, 2 Boyun Road, Pudong, Shanghai P.R. China

Manufacturer or Supplier	Zhiwei Robotics Corp.	
Address	Room 603, 2 Boyun Road, Pudong, Shanghai P.R. China	
Product	UNIHAKER	
Brand Name	N/A	
Model	DFR0706	
Additional Model & Model Difference	N/A	
Date of tests	Nov. 29, 2022 ~ Feb. 02, 2023	

The submitted sample of the above equipment has been tested according to the requirements of the following standards:

- ☒ EN 55032:2015+A1:2020, Class B
- ☒ EN 55035:2017+A11:2020
- ☒ EN 301 489-1 V2.2.3 (2019-11)
- ☒ EN 301 489-17 V3.2.4 (2020-09)

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Andy Zhu Supervisor / EMC Department	Approved by Madison Luo Assistant Manager / EMC Department
	 Date: Mar. 08, 2023

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.



TABLE OF CONTENTS

1 SUMMARY OF TEST RESULTS.....	4
1.1 MEASUREMENT UNCERTAINTY	5
2 GENERAL INFORMATION	6
2.1 GENERAL DESCRIPTION OF EUT	6
2.2 DESCRIPTION OF TEST MODES	7
2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS.....	8
2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS	8
2.5 DESCRIPTION OF SUPPORT UNITS	9
3 CONDUCTED EMISSION FROM THE AC MAINS POWER PORT	10
3.1 LIMITS	10
3.2 TEST INSTRUMENT	10
3.3 TEST ARRANGEMENT	10
3.4 TEST SETUP.....	11
3.5 SUPPLEMENTARY INFORMATION	11
3.6 TEST RESULTS	12
4 RADIATED EMISSION MEASUREMENT.....	14
4.1 LIMITS OF RADIATED EMISSION MEASUREMENT	14
4.2 TEST INSTRUMENTS	16
4.3 TEST PROCEDURE	17
4.4 TEST SETUP.....	19
4.5 SUPPLEMENTARY INFORMATION	19
4.6 TEST RESULTS (BELOW 1GHZ)	20
4.7 TEST RESULTS (ABOVE 1GHZ)	22
5 IMMUNITY TEST	23
5.1 GENERAL DESCRIPTION	23
5.1.1 GENERAL DESCRIPTION	23
5.1.2 PERFORMANCE CRITERIA	24
5.1.3 EUT OPERATING CONDITION.....	25
5.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN55035, EN301 489).....	26
5.2.1 TEST SPECIFICATION.....	26
5.2.2 TEST INSTRUMENTS.....	26
5.2.3 TEST PROCEDURE	27
5.2.4 DEVIATION FROM TEST STANDARD	28
5.2.5 TEST SETUP	28
5.2.6 TEST RESULTS.....	29
5.3 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN55035).....	31
5.3.1 TEST SPECIFICATION.....	31
5.3.2 TEST INSTRUMENTS.....	31
5.3.3 TEST PROCEDURE	32
5.3.4 DEVIATION FROM TEST STANDARD	32
5.3.5 TEST SETUP	33
5.3.6 TEST RESULTS.....	35
5.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN301 489).....	36
5.4.1 TEST SPECIFICATION	36
5.4.2 TEST INSTRUMENT	36
5.4.3 TEST PROCEDURE	37
5.4.4 DEVIATION FROM TEST STANDARD	37
5.4.5 TEST SETUP.....	37
5.4.6 TEST RESULTS	38
6 PHOTOGRAPHS OF THE TEST CONFIGURATION.....	39
7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	43



RELEASE CONTROL RECORD

Issue No.	Description	Date Issued
CE2211WDG0121	Original release	Mar. 08, 2023



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Item	Result	Remarks
EN 55032:2015+A1:2020, Class B	Conducted emission from the AC mains power port	PASS	Minimum passing margin is -12.39dB at 0.42577MHz
	Radiated emission 30MHz-1000MHz	PASS	Minimum passing margin is -1.50dB at 192.00MHz
	Radiated emission 1GHz -6GHz	PASS	Minimum passing margin is -17.20dB at 3566.14MHz.

IMMUNITY (EN 55035:2017+A11:2020)			
Standard	Test Type	Result	Remarks
IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion B
IEC 61000-4-3:2020 ED. 4.0	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements

IMMUNITY (EN 301 489-1 V2.2.3, EN 301489-17 V3.2.4)			
Standard	Test Type	Result	Remarks
EN 61000-4-2:2009	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion A
EN IEC 61000-4-3: 2020	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-6000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A



1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

MEASUREMENT	FREQUENCY	UNCERTAINTY
Mains Terminal Disturbance Voltage Test	0.15MHz ~ 30MHz	+/-2.67 dB
Radiated Disturbance Test	30MHz ~ 1000MHz	+/-4.34 dB
	1GHz ~ 6GHz	+/-4.84 dB



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	UNIIKER	
BRAND	N/A	
TEST MODEL	DFR0706	
ADDITIONAL MODEL	N/A	
POWER SUPPLY	DC 5V from USB host unit	
CABLE SUPPLIED	USB Line: Unshielded, detachable, 1.0m	
OPERATING FREQUENCY	BT	2402 ~ 2480MHz
	WIFI	2412 ~ 2472MHz

Notes:

1. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. Please refer to the EUT photo document (Reference No.: 2211WDG0121) for detailed product photo.



2.2 DESCRIPTION OF TEST MODES

The EUT was tested under the following modes. And the final worst mode was marked in boldface and recorded in this report.

FOR CONDUCTED EMISSION TEST AT AC MAINS POWER PORT

Description of Test Mode	Test Voltage
Normal working	DC 5V from Notebook
Network link	
USB Playing	
TF Card Playing	
Memory playing	
BT link	
WIFI link	
WIFI host link	

RADIATED EMISSIONS TEST: (BELOW 1GHz)

Description of Test Mode	Test Voltage
Normal working	DC 5V from Notebook
Network link	
USB Playing	
TF Card Playing	
Memory playing	
BT link	
WIFI link	
WIFI host link	

RADIATED EMISSIONS TEST: (ABOVE 1GHz)

Description of Test Mode	Test Voltage
Normal working	DC 5V from Notebook
Network link	
USB Playing	
TF Card Playing	
Memory playing	
BT link	
WIFI link	
WIFI host link	

**IMMUNITY TESTS:**

Description of Test Mode	Test Voltage
Normal working	DC 5V from Notebook
Network link	
USB Playing	
TF Card Playing	
Memory playing	
BT link	
WIFI link	
WIFI host link	

2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS

- Turned on the power of all equipment.
- EUT was operated according to the type described in manufacturer's specifications or the user's manual.

2.4 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturers, the EUT must comply with the requirements of the following standards:

EN 55032:2015+A1:2020, CLASS B

EN 55035:2017+A11:2020

IEC 61000-4-2:2008 ED. 2.0

IEC 61000-4-3:2020 ED. 4.0

EN 301 489-1 V2.2.3 (2019-11)

EN 301 489-17 V3.2.4 (2020-09)

EN 61000-4-2:2009

EN IEC 61000-4-3:2020

All applicable tests have been performed and recorded as per the above standards.

The EUT haven't any components susceptible to magnetic fields, so don't test power-frequency magnetic field item.

The EUT is without AC input function and therefore the test items harmonic, flicker, ETF, Surge, C/S and DIPS test items to be carried out to the EUT.



2.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	Latitude 5420	127710614	N/A
2	Notebook	DELL	Latitude 3420	127764357/7	N/A
3	Print	HP	VCVRA-1003	CN36M19JWX	N/A
4	Print	Lenovo	LJ2200L	N/A	N/A
5	Wireless router	Tenda	W311R	N/A	N/A
6	Wireless router	ASUS	RT-AX86U	M9IG3800G773JZN	N/A
7	TF Card(8G)	Kingston	SDC4/8GB	J4L8F-9P6T27-8XBD6	N/A
8	USB Driver 3.0(16G)	Kingston	DTSE9G2/16GB	YVLP9-B8HTAQ-XXAYB	N/A
9	USB Driver 3.0(16G)	Kingston	DTSE9G2/16GB	AQLJC-M8CTFB-UXTNB	N/A
10	IO Extender	N/A	N/A	N/A	N/A
11	BT SPK	N/A	BT-01	N/A	N/A
12	LED Module *5	N/A	N/A	N/A	N/A
13	Rotation Sensor	N/A	N/A	N/A	N/A
14	Digital Push Button	N/A	N/A	N/A	N/A
15	IR Ther mometer	N/A	N/A	N/A	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.0m;DC Line: Unshielded, Detachable 2.0m.
2	AC Line: Unshielded, Detachable 0.8m;DC Line: Unshielded, Detachable 1.8m.
3	AC Line:Unshielded, Detachable 1.2m;DC Line: Unshielded, Undetachable 1.5m. USB Line: Shielded, Detachable 2.8m,with one core.
4	AC Line:Unshielded, Detachable 1.2m; USB Line: Shielded, Detachable 1.6m.
5	AC Line: Unshielded, Detachable 1.5m;DC Line: Unshielded, Detachable 1.2m.
6	AC Line: Unshielded, Detachable 0.8m;DC Line: Unshielded, Detachable 1.2m.
7-10	N/A
11	USB Line: Unshielded,Detachable 0.8m
12-15	Input/Output Line: Unshielded,Detachable 0.2m



3 CONDUCTED EMISSION FROM THE AC MAINS POWER PORT

3.1 LIMITS

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

NOTES: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

3.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCI	100666	Jun. 14, 23
Artificial Mains Network	Rohde&Schwarz	ENV216	102477	Jun. 19, 23
Artificial Mains Network	SCHWARZBECK	NSLK 8127	8127713	Apr. 18, 23
Capacitive Voltage Probe	Rohde&Schwarz	CVP 9222	9222-044	Aug. 29, 23
Voltage Probe	SCHWARZBECK	TK 9421	9421-0332	Jun. 23, 23
Current Probe	Rohde&Schwarz	EZ-17	0816.2063.02	Apr. 19, 23
ISN	Rohde&Schwarz	ENY81-CA6	101928	Jun. 14, 23
ISN	TESEQ	ISN T800	34373	Feb. 16, 23
Coaxial RF Cable	COMMATE	CFD300-NL	5D-001	Oct. 24, 23
Shielding Room	Burgeon	5m*4m*3m	D3040008DG-1	Jul. 22, 24
Test software	ADT	ADT_Conc_V7.3.7	N/A	N/A

NOTES: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

2. The test was performed at Shielded Room 543.

3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.

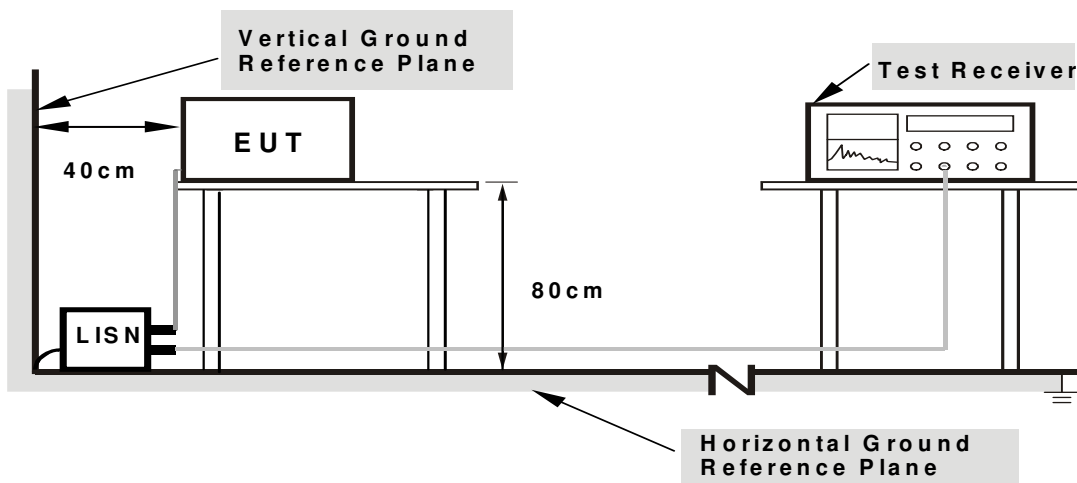
3.3 TEST ARRANGEMENT

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.



3.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

3.5 SUPPLEMENTARY INFORMATION

N/A

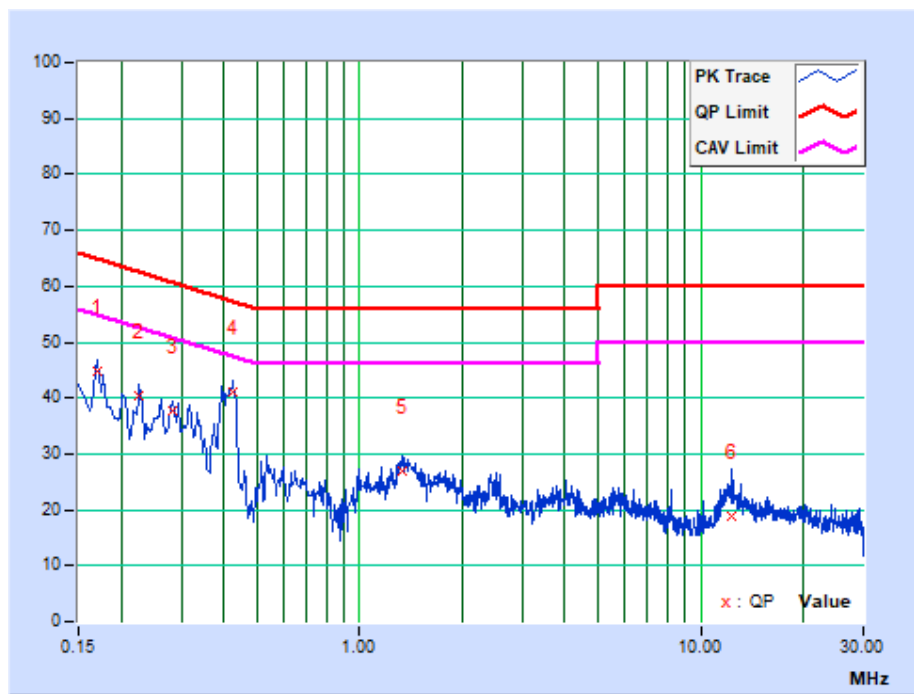


3.6 TEST RESULTS

TEST MODE	See section 2.2	6DB BANDWIDTH	9 kHz
TEST VOLTAGE	See section 2.2	PHASE	Line (L)
ENVIRONMENTAL CONDITIONS	25deg. C, 75% RH	TESTED BY	Bob

No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17000	9.77	35.01	23.79	44.78	33.56	64.96	54.96	-20.18	-21.40
2	0.22600	9.80	30.54	20.02	40.34	29.82	62.60	52.60	-22.26	-22.78
3	0.28228	9.79	27.96	19.12	37.75	28.91	60.75	50.75	-23.00	-21.84
4	0.42577	9.80	31.12	25.14	40.92	34.94	57.33	47.33	-16.41	-12.39
5	1.34200	9.81	17.23	10.92	27.04	20.73	56.00	46.00	-28.96	-25.27
6	12.28600	9.91	9.05	3.34	18.96	13.25	60.00	50.00	-41.04	-36.75

REMARKS: The emission levels of other frequencies were very low against the limit.

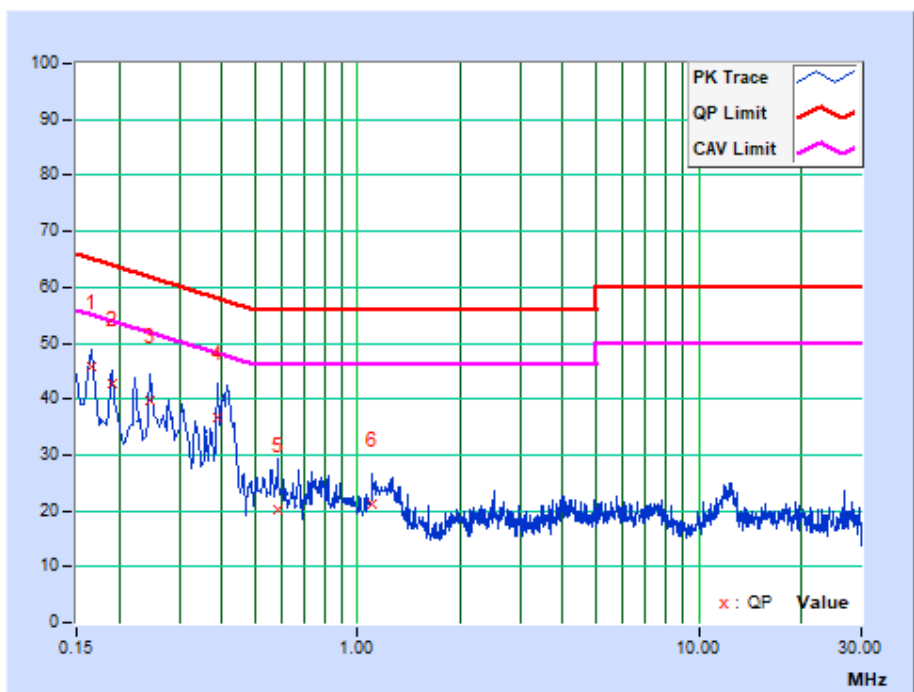




TEST MODE	See section 2.2	6DB BANDWIDTH	9 kHz
TEST VOLTAGE	See section 2.2	PHASE	Neutral (N)
ENVIRONMENTAL CONDITIONS	25deg. C, 75% RH	TESTED BY	Bob

No.	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16600	9.74	36.10	22.45	45.84	32.19	65.16	55.16	-19.32	-22.97
2	0.19000	9.77	32.97	20.39	42.74	30.16	64.04	54.04	-21.30	-23.88
3	0.24600	9.78	29.84	20.21	39.62	29.99	61.89	51.89	-22.28	-21.91
4	0.39000	9.78	27.05	17.36	36.83	27.14	58.06	48.06	-21.23	-20.92
5	0.58200	9.77	10.51	4.04	20.28	13.81	56.00	46.00	-35.72	-32.19
6	1.10211	9.79	11.51	5.02	21.30	14.81	56.00	46.00	-34.70	-31.19

REMARKS: The emission levels of other frequencies were very low against the limit.



**4 RADIATED EMISSION MEASUREMENT****4.1 LIMITS OF RADIATED EMISSION MEASUREMENT****FOR FREQUENCY BELOW 1000 MHz**

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	Quasi-Peak dBuV/m	Quasi-Peak dBuV/m
30 – 230	40	30
230 – 1000	47	37

FREQUENCY (MHz)	Class A (at 3m)	Class B (at 3m)
	Quasi-Peak dBuV/m	Quasi-Peak dBuV/m
30 – 230	50	40
230 – 1000	57	47

For FM receivers

Distance (m)	Source	Frequency Range (MHz)	Limits dB (uV/m)	
			Quasi-peak	
10	Local oscillator	≤1000	Fundamental	50
		30 to 300	Harmonics	42
		300 to 1000	Harmonics	46
	Other	30 to 230		30
		230 to 1000		37
3	Local oscillator	≤1000	Fundamental	60
		30 to 300	Harmonics	52
		300 to 1000	Harmonics	56
	Other	30 to 230		40
		230 to 1000		47



FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 6	80	60	74	54

- NOTES:**
1. The lower limit shall apply at the transition frequencies.
 2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
 3. All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



4.2 TEST INSTRUMENTS

FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU8	100372	Jun. 14, 23
Bilog Antenna	Sunol Sciences	JB1	A112107	July. 05, 24
Pre-Amplifier	HP	8447E	2727A02430	Mar. 07, 23
3m Semi-anechoic Chamber	Burgeon	9m*6m*6m	D3040001DG-1	July 22, 24
Coaxial RF Cable	TIMES	SFT205-NMNM-9.00M	532735-0001	July 11, 23
Coaxial RF Cable	TIMES	SFT205-NMNM-2.50M	532735-0001	July 11, 23
Coaxial RF Cable	ZDECL	Z302S-NJ-NJ-1.2M	18095226	July 11, 23
Test software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A

- NOTES:** 1. The test was performed at 966 Chamber-1 (a 3m Semi-anechoic chamber).
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.

FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Horn Antenna	COM-POWER	AH-118	071283	Jun. 19, 23
Horn Antenna	SCHWARZBECK	BBHA 9170	01023	Oct. 16, 23
Spectrum Analyzer	Agilent	E4407B	MY45108319	Feb. 16, 23
Broadband Preamplifier	EME	EM01G26G	60613	Mar. 14, 23
3m Semi-anechoic Chamber	Burgeon	9m*6m*6m	D3040001DG-1	July 22, 24
Coaxial RF Cable	TIMES	SFT205-NMNM-9.00M	532735-0001	July 11, 23
Coaxial RF Cable	TIMES	SFT205-NMNM-2.50M	532735-0001	July 11, 23
Coaxial RF Cable	ZDECL	Z302S-SMAJ-SMAJ-1.5M	18095240	July 11, 23
Coaxial RF Cable	TIMES	HF160-KMKM-2.00M	533245-0001	July 11, 23
Coaxial RF Cable	TIMES	HF160-KMKM-5.00M	533247-0001	July 11, 23
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A

- NOTES:** 1. The test was performed at 966 Chamber-1 (a 3m Semi-anechoic chamber).
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.



4.3 TEST PROCEDURE

<Frequency Range below 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.

NOTES:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
5. Margin value = Emission level – Limit value.

<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

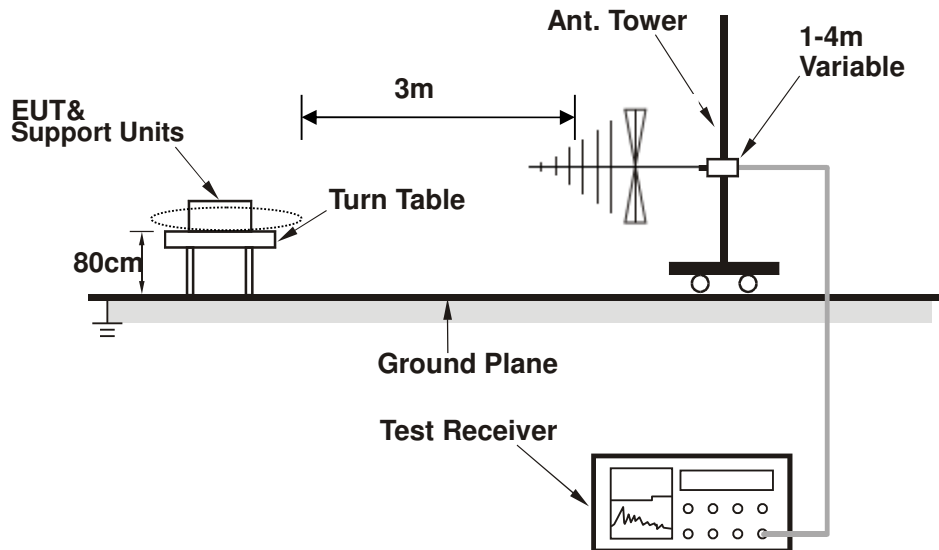
NOTES:

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
4. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier);
5. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier).
6. Margin value = Emission level – Limit value.

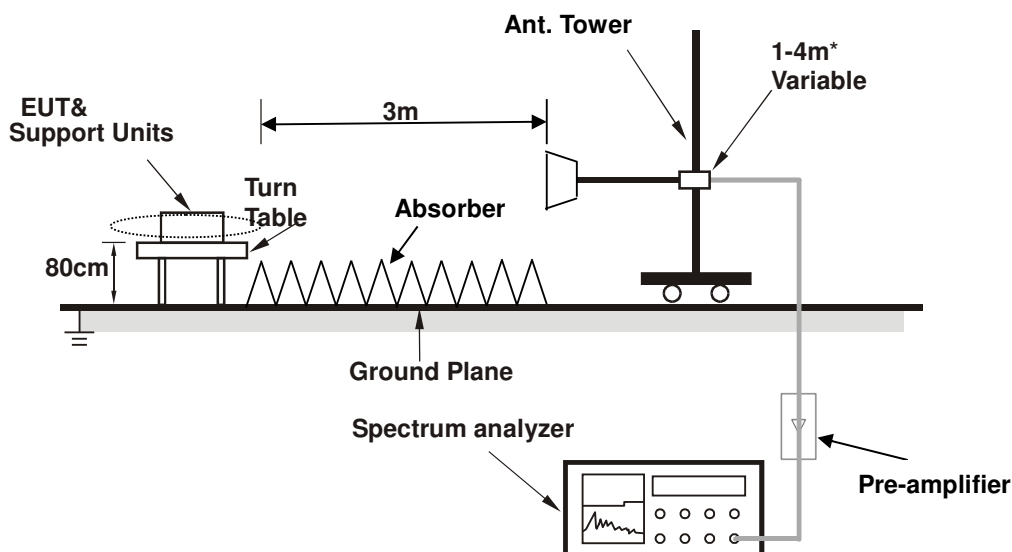


4.4 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3

4.5 SUPPLEMENTARY INFORMATION

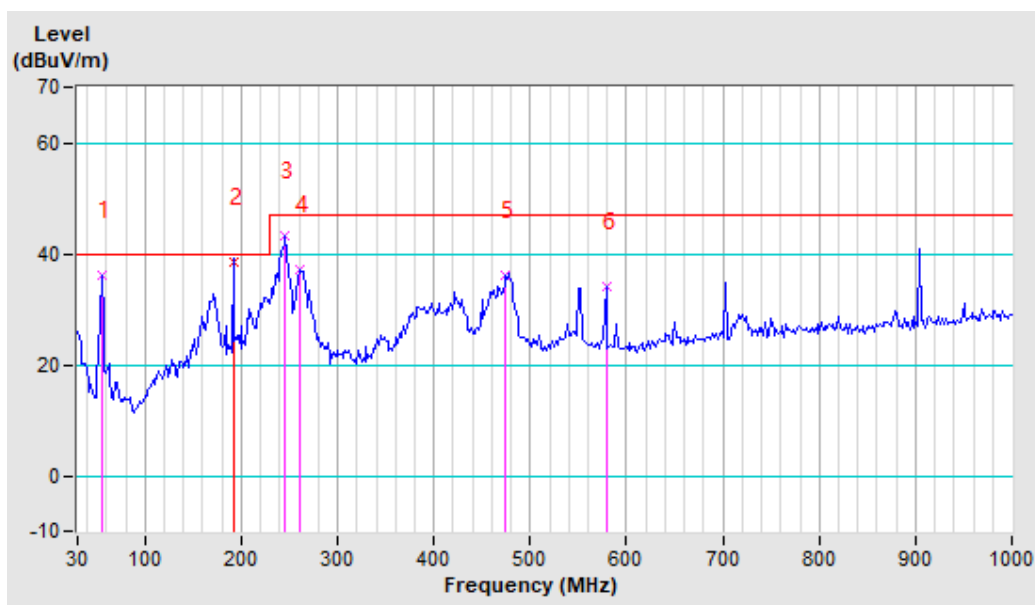
N/A.

**4.6 TEST RESULTS (BELOW 1GHz)**

TEST MODE	See section 2.2	FREQUENCY RANGE	30-1000MHz
TEST VOLTAGE	See section 2.2	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 55% RH	TESTED BY:	Durant

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	54.87	-12.98	49.08	36.10	40.00	-3.90	128	207
2	192.00	-8.59	47.09	38.50	40.00	-1.50	257	164
3	246.07	-8.41	51.59	43.18	47.00	-3.82	292	322
4	261.62	-8.07	45.14	37.07	47.00	-9.93	208	32
5	474.58	-2.43	38.51	36.08	47.00	-10.92	151	167
6	578.73	-1.13	35.17	34.04	47.00	-12.96	194	278

REMARKS: The emission levels of other frequencies were very low against the limit.



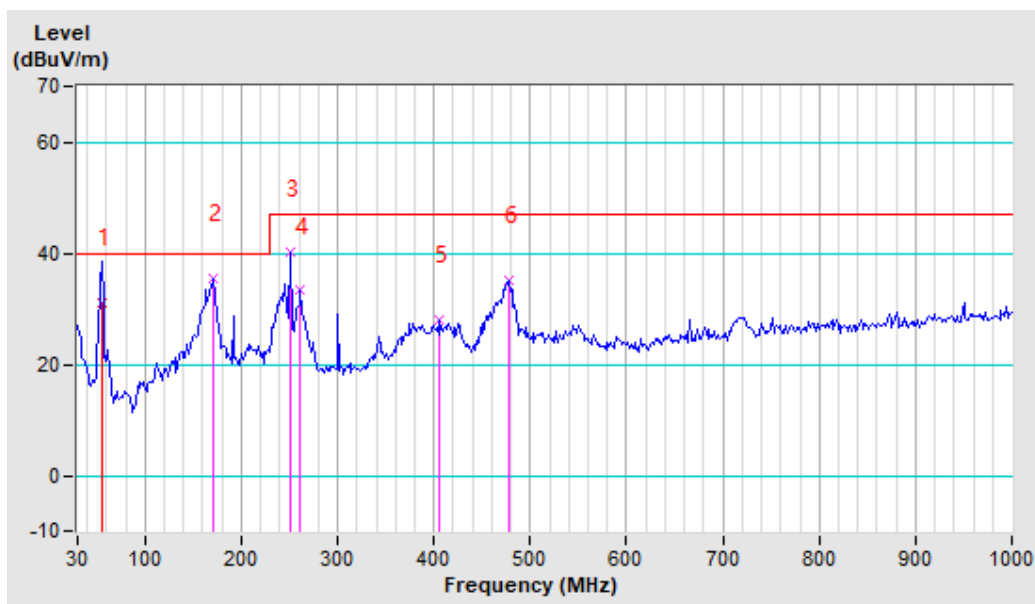


TEST MODE	See section 2.2	FREQUENCY RANGE	30-1000MHz
TEST VOLTAGE	See section 2.2	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120kHz
ENVIRONMENTAL CONDITIONS	25deg. C, 55% RH	TESTED BY: Durant	

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	55.70	-13.00	44.00	31.00	40.00	-9.00	249	256
2	171.46	-8.71	44.19	35.48	40.00	-4.52	187	87
3	250.74	-8.47	48.49	40.02	47.00	-6.98	110	60
4	261.62	-8.07	41.29	33.22	47.00	-13.78	252	73
5	406.19	-4.39	32.31	27.92	47.00	-19.08	215	60
6	477.69	-2.37	37.59	35.22	47.00	-11.78	148	56

REMARKS: The emission levels of other frequencies were very low against the limit.



**4.7 TEST RESULTS (ABOVE 1GHz)**

TEST MODE	See section 2.2		
TEST VOLTAGE	See section 2.2	FREQUENCY RANGE	1-6 GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 55% RH	TESTED BY: Durant	

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	1633.28PK	-14.97	69.57	54.60	74.00	-19.40	200	190
2	1633.28AV	-14.97	51.07	36.10	54.00	-17.90	200	190
3	3044.68PK	-10.81	67.01	56.20	74.00	-17.80	200	190
4	3044.68AV	-10.81	47.01	36.20	54.00	-17.80	200	190
5	3566.14PK	-10.10	66.90	56.80	74.00	-17.20	200	190
6	3566.14AV	-10.10	46.50	36.40	54.00	-17.60	200	190
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	Freq. (MHz)	Correction Factor (dB/m)	Raw Value (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)
1	1499.35PK	-16.02	70.32	54.30	74.00	-19.70	100	190
2	1499.35AV	-16.02	48.92	32.90	54.00	-21.10	100	190
3	2177.23PK	-11.89	68.19	56.30	74.00	-17.70	100	190
4	2177.23AV	-11.89	46.69	34.80	54.00	-19.20	100	190
5	3644.25PK	-9.84	65.94	56.10	74.00	-17.90	100	190
6	3644.25AV	-9.84	44.94	35.10	54.00	-18.90	100	190

- REMARKS:**
1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
 2. Negative sign (-) in the margin column signify levels below the limit.
 3. Frequency range scanned: 1GHz to 6GHz.
 4. Only emissions significantly above equipment noise floor are reported.



5 IMMUNITY TEST

8.1 GENERAL DESCRIPTION

5.1.1 GENERAL DESCRIPTION

Product Standard	EN 55035:2017+A11:2020	
Basic Standard, specification requirement, and Performance Criteria:	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), 1800 MHz, 3V/m, 80% AM (1kHz), 2600 MHz, 3V/m, 80% AM (1kHz), 3500 MHz, 3V/m, 80% AM (1kHz), 5000 MHz, 3V/m, 80% AM (1kHz)

Product Standard	EN 301 489-1 V2.2.3 (2019-11) EN 301 489-17 V3.2.4 (2020-09)	
Basic Standard, Specification, and Performance Criterion required	EN 61000-4-2	Electrostatic Discharge – ESD: 8 kV air discharge, 4 kV contact discharge, Performance Criterion B
	EN IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 6000 MHz, 3 V/m, 80% AM (1 kHz), Performance Criterion A



5.1.2 PERFORMANCE CRITERIA

According to Clause 8.2, 8.3, 8.4 of EN 55035:2017+A11:2020 standard, the following describes the general performance criteria.

CRITERION A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
	For audio output device: The measured acoustic interference ratio and/or the measured electrical interference during the test shall be -20dB or better(see note1)
CRITERION B	<p>During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.</p> <p>After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
CRITERION C	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.</p> <p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

Note 1: This performance criterion only using for Continuous induced RF disturbances and Continuous RF electromagnetic field disturbances item.



For EN 301 489-17

The performance criteria		
Performance criteria A for immunity tests with phenomena of a continuous nature	continuous phenomena	1. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test. 2. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test
Performance criteria B for immunity tests with phenomena of a transient nature	Transient phenomena	1. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test 2. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test
Performance criteria C for immunity tests with power interruptions exceeding a certain time	Transient phenomena	Voltage dips greater than or equal to 100 ms and voltage interruptions of 5000 ms duration, for which performance criteria C shall apply

The phenomena allowed during and after test in each criterion are clearly stated in the following table.

Performance criteria		
Criteria	During test	After test
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of stored data.
B	May show loss of function	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
NOTE: Operate as intended during the test allows a level of degradation in accordance with a and b. (a) For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %. (b) For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.		

5.1.3 EUT OPERATING CONDITION

Same as item 2.3

**5.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN55035, EN301 489)****5.2.1 TEST SPECIFICATION**

Basic Standard:	IEC 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Discharge Voltage:	Contact Discharge : 4 kV (Direct & Indirect) Air Discharge: 8kV (Direct)
Polarity:	Positive / Negative
Number of Discharge:	20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1-second

5.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
ESD Generator	TESEQ	NSG 437	603	Mar. 24, 23
Test Software	TESEQ	V03.03	N/A	N/A

- NOTES:**
1. The test was performed in ESD Room.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.



5.2.3 TEST PROCEDURE

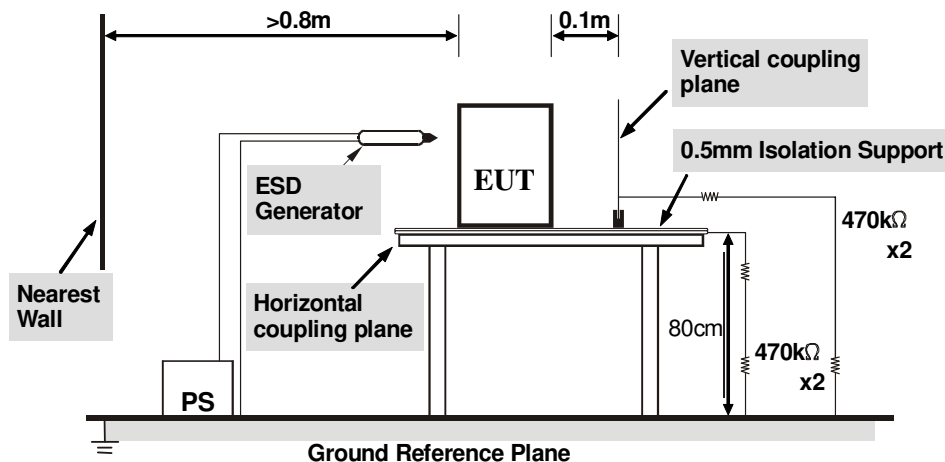
The basic test procedure was in accordance with IEC 61000-4-2:

- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. The discharge return cable of the generator shall be kept at a distance of at least 0.2 m from the EUT whilst the discharge is being applied and should not be held by the operator.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.
- g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation.

5.2.5 TEST SETUP



NOTE:

TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the **Ground Reference Plane**. The **GRP** consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A **Horizontal Coupling Plane** (1.6m x 0.8m) was placed on the table and attached to the **GRP** by means of a cable with 940k Ω total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the **HCP** and isolated by an insulating support of 0.5mm thickness. A distance of 0.8-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.

**5.2.6 TEST RESULTS**

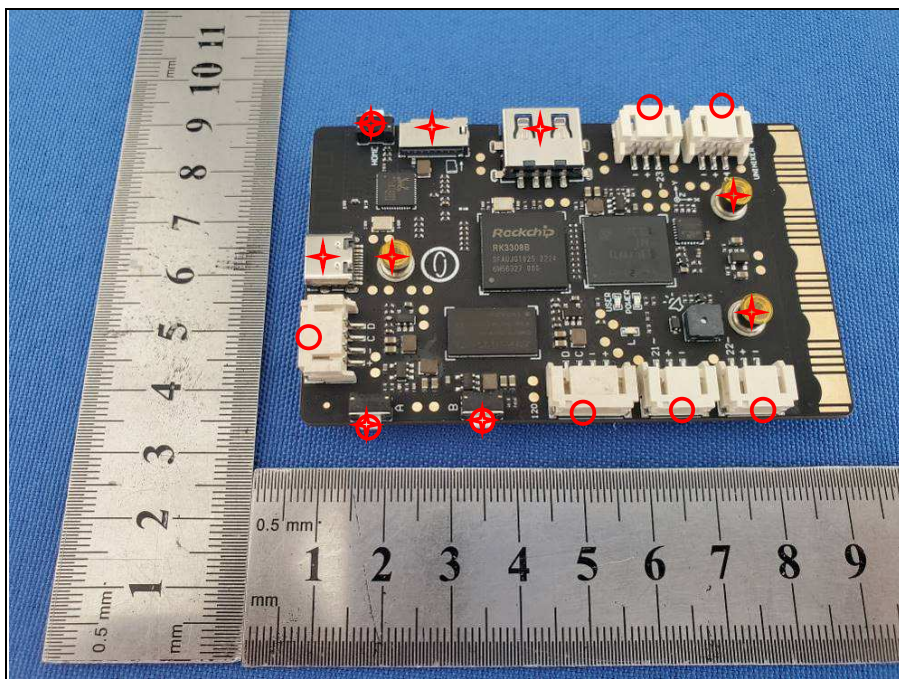
TEST VOLTAGE	See section 2.2	ENVIRONMENTAL CONDITIONS	22.1deg. C, 51.6% RH, 101.2kPa
TESTED BY	Ming Bai		

Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
4	+ /-	All metal part	A	N/A
8	+ /-	All non-metal part	N/A	A

Indirect Discharge Application				
Discharge Level (kV)	Polarity	Test Point	Test Result of HCP	Test Result of VCP
4	+ /-	HCP	A	N/A
4	+ /-	VCP	N/A	A

NOTES: A: There was no change compared with initial operation during the test.

ESD TEST POINT
(○ - Direct Contact Discharge; ✦ - Air Discharge)





5.3 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN55035)

5.3.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-3
Frequency Range:	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5m
Dwell Time:	at least 3 seconds

5.3.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Signal Generator	Rohde&Schwarz	SMB 100A	107636	Jun. 19, 23
Antenna Log-Periodic (80MHz~6GHz)	AR	ATR80M6G	0357505	N/A
Switch Controller	Tonscend	JS0806S	21G8060447	N/A
RF Power Meter	Rohde&Schwarz	NRP2	106419	Oct. 18, 23
Power Sensor	Rohde&Schwarz	NRP6A	103355	Jun. 19, 23
Power Sensor	Rohde&Schwarz	NRP6A	103357	Jun. 19, 23
E-Field probe	Narda	NBM-520	D-1702	Jun. 16, 23
Power Amplifier (80MHz~1GHz)	AR	500W1000CM33	0357919	N/A
Power Amplifier (1~6GHz)	AR	125S1G6M1	0358094	N/A
Dual Directional Coupler (80MHz~1GHz)	AR	DC6180A	0357475	Oct. 16, 23
Dual Directional Coupler (1~6GHz)	AR	DC7200A	0358250	Jun. 19, 23
Audio analyzer	Rohde&Schwarz	UPV	100508	Apr. 27, 23
Conditioning Amplifier	B&K	2690-W-013	3009832	Feb. 27, 23
EAR SIMULATOR	B&K	4192-L-001	3192610	Jan. 24, 23
RS Chamber	ETS-Lindgren	7m*4m*4m	D3040005DG-1	Aug. 05, 24
Test Software	Tonscend	TS+	3.0.0.5	N/A

- NOTES:**
1. The test was performed in RS chamber-2.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.



5.3.3 TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-3

- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
- d. The field strength levels were 3V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

For Broadcast reception function:

- f. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.
- g. **Group 2:** Broadcast reception equipment which is not included in Group 1.
- h. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.
- i. The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

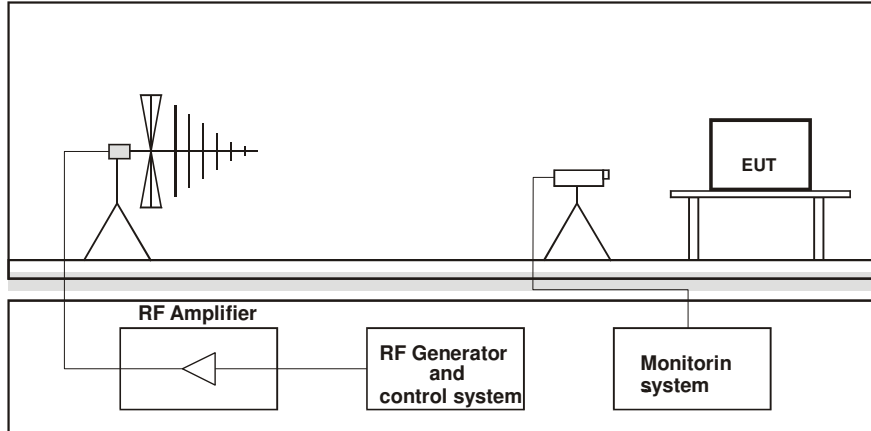
5.3.4 DEVIATION FROM TEST STANDARD

No deviation.

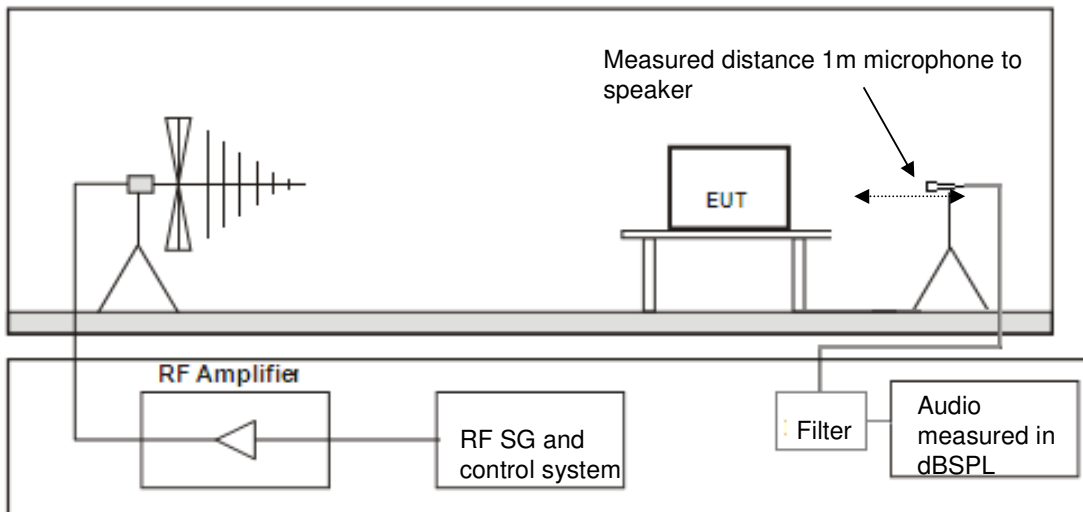


5.3.5 TEST SETUP

For Picture monitoring:

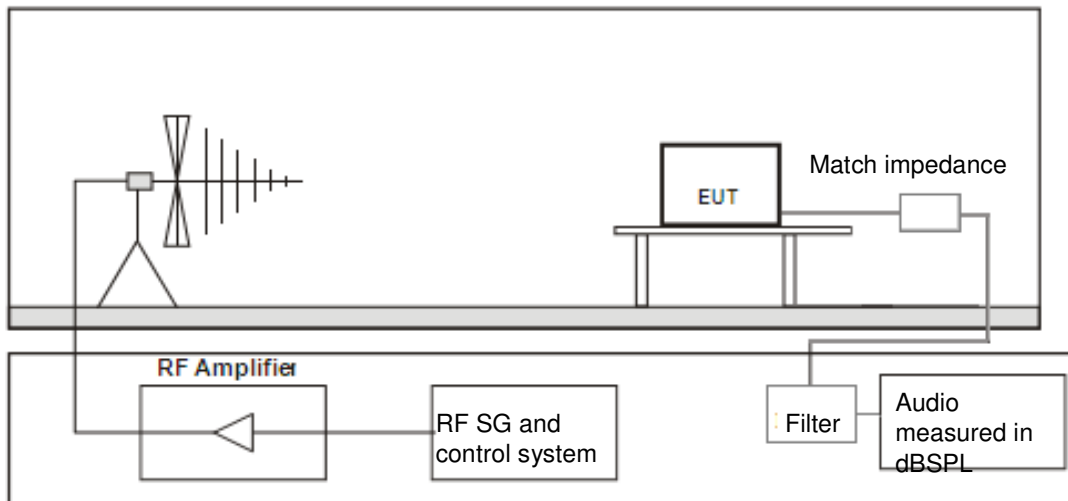


For Acoustic mode:





For Electrical mode:



NOTES:

1. The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.
2. Filter: 1kHz 3dB band pass filter.
3. The measurement distance: EUT to interference antenna was 3m.

**5.3.6 TEST RESULTS**

TEST MODE	See section 2.2	TEST VOLTAGE	See section 2.2
ENVIRONMENTAL CONDITIONS	23.6deg.C, 50.6% RH	TESTED BY: Ming Bai	

Field Strength (V/m)	Test Frequency (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz	H&V	3	A	Pass

NOTE: A: There was no change compared with initial operation during the test.



5.4 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS) (EN301 489)

5.4.1 TEST SPECIFICATION

Basic Standard:	EN IEC 61000-4-3
Frequency Range:	80 MHz ~ 6000 MHz
Field Strength:	3 V/m
Modulation:	1 kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1% of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Antenna Height:	1.5 m
Dwell Time:	3 seconds

5.4.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Signal Generator	Rohde&Schwarz	SMB 100A	107636	Jun. 19, 23
Antenna Log-Periodic (80MHz~6GHz)	AR	ATR80M6G	0357505	N/A
Switch Controller	Tonscend	JS0806S	21G8060447	N/A
RF Power Meter	Rohde&Schwarz	NRP2	106419	Oct.18, 23
Power Sensor	Rohde&Schwarz	NRP6A	103355	Jun. 19, 23
Power Sensor	Rohde&Schwarz	NRP6A	103357	Jun. 19, 23
E-Field probe	Narda	NBM-520	D-1702	Jun. 16, 23
Power Amplifier (80MHz~1GHz)	AR	500W1000CM33	0357919	N/A
Power Amplifier (1~6GHz)	AR	125S1G6M1	0358094	N/A
Dual Directional Coupler (80MHz~1GHz)	AR	DC6180A	0357475	Oct. 16, 23
Dual Directional Coupler(1~6GHz)	AR	DC7200A	0358250	Jun. 19, 23
Audio analyzer	Rohde&Schwarz	UPV	100508	Apr. 27, 23
Conditioning Amplifier	B&K	2690-W-013	3009832	Feb. 27, 23
EAR SIMULATOR	B&K	4192-L-001	3192610	Jan. 24, 23
RS Chamber	ETS-Lindgren	7m*4m*4m	D3040005DG-1	Aug. 05, 24
Test Software	Tonscend	TS+	3.0.0.5	N/A

NOTES: 1. The test was performed in RS chamber.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

3. Test site: No. 122, Houjie Avenue West Houjie Town, Dongguan City Guangdong Province, 523960, People's Republic of China.



5.4.3 TEST PROCEDURE

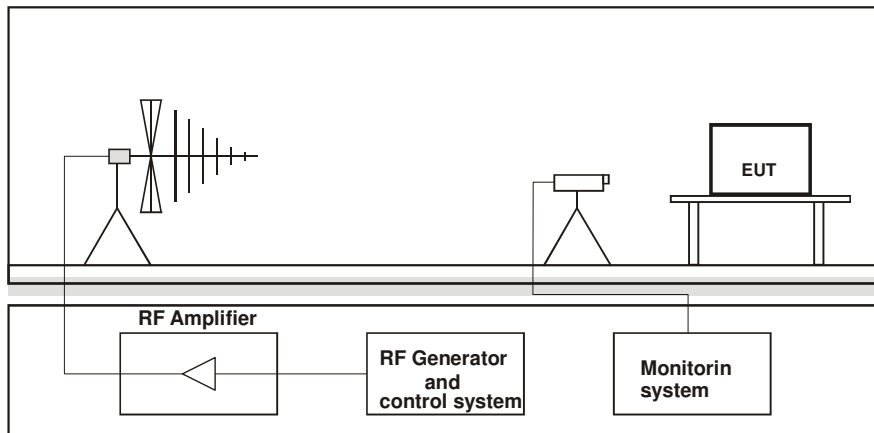
The test procedure was in accordance with EN IEC 61000-4-3.

- The testing was performed in a fully-anechoic chamber.
- The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1 kHz sine wave.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0.5s.
- The field strength level was 3 V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

5.4.4 DEVIATION FROM TEST STANDARD

No deviation.

5.4.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

NOTE:

TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.



5.4.6 TEST RESULTS

TEST MODE	See section 2.2	TEST VOLTAGE	See section 2.2
ENVIRONMENTAL CONDITIONS	23.6deg., 50.6% RH	TESTED BY: Ming Bai	

Field Strength (V/m)	Test Frequency Note#1 (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80 - 6000	H / V	3	A	Note 1

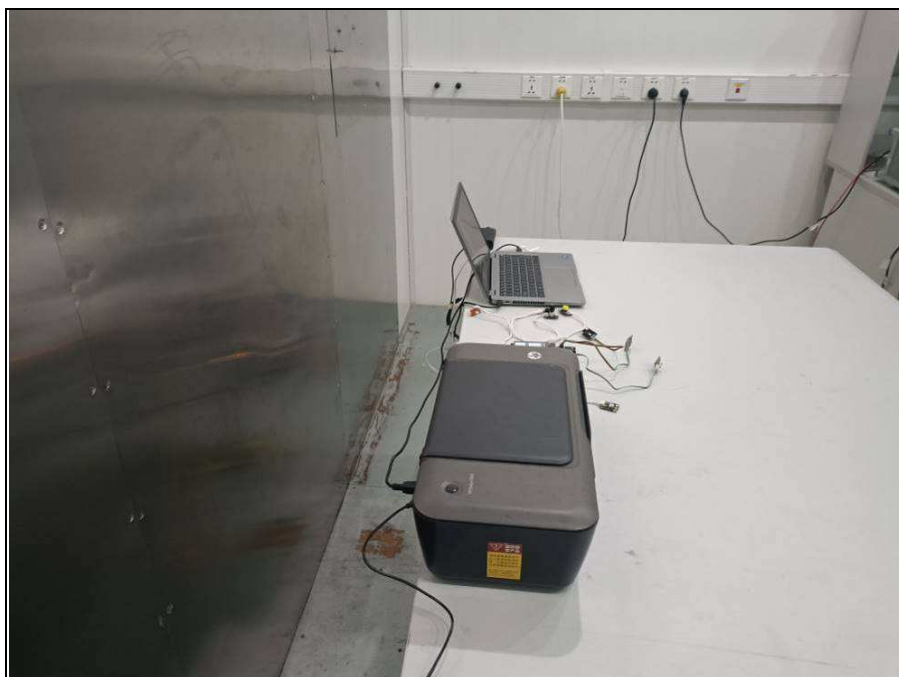
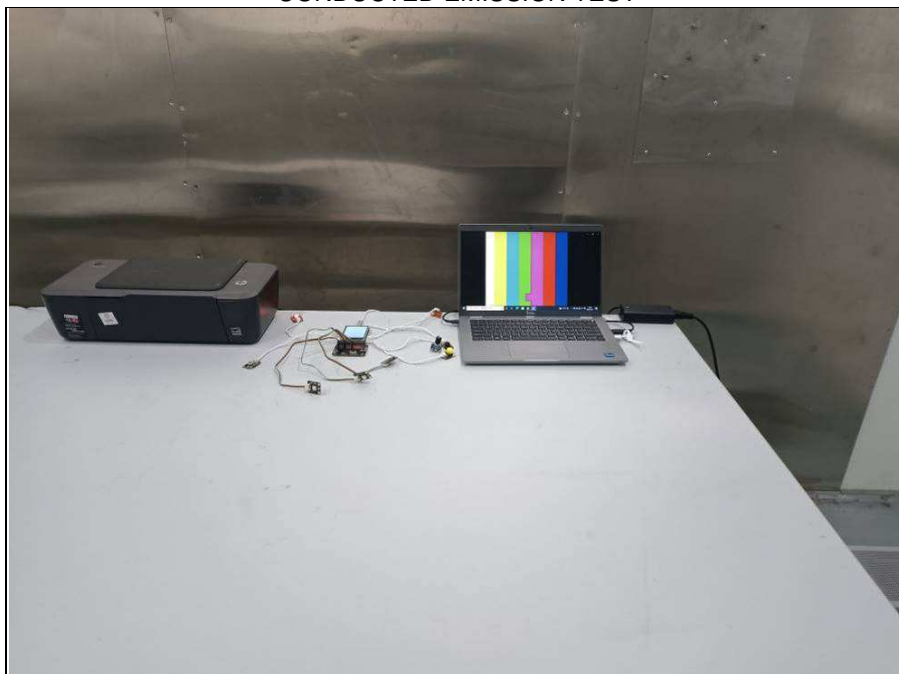
Note#1: Tested Israel SII Frequencies 89,100,107,144,163,196,244,315,434,460,600,825,845,880 MHz

Note 1: A: There was no change compared with initial operation during the test.

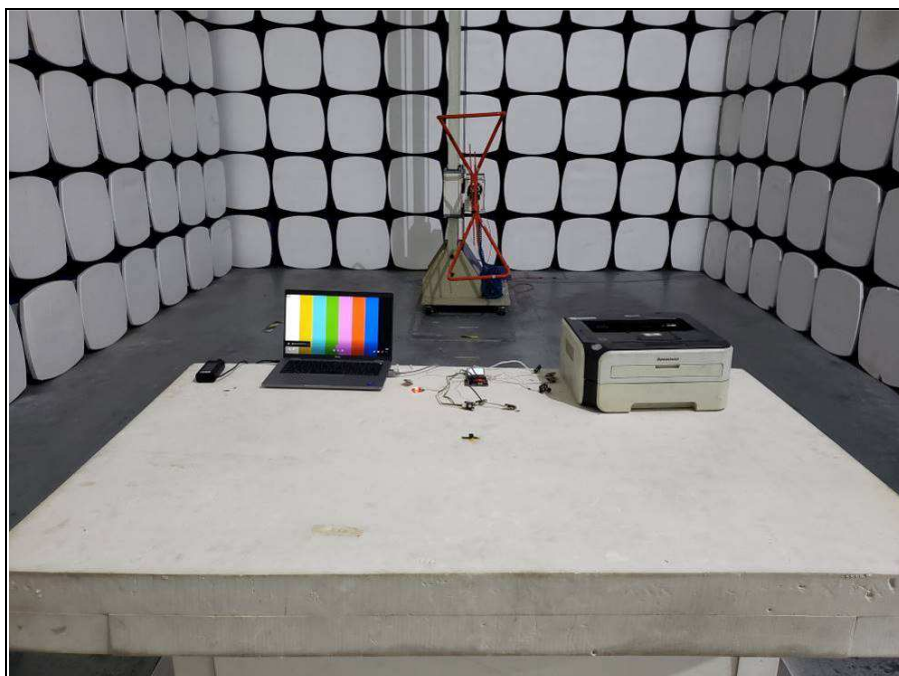
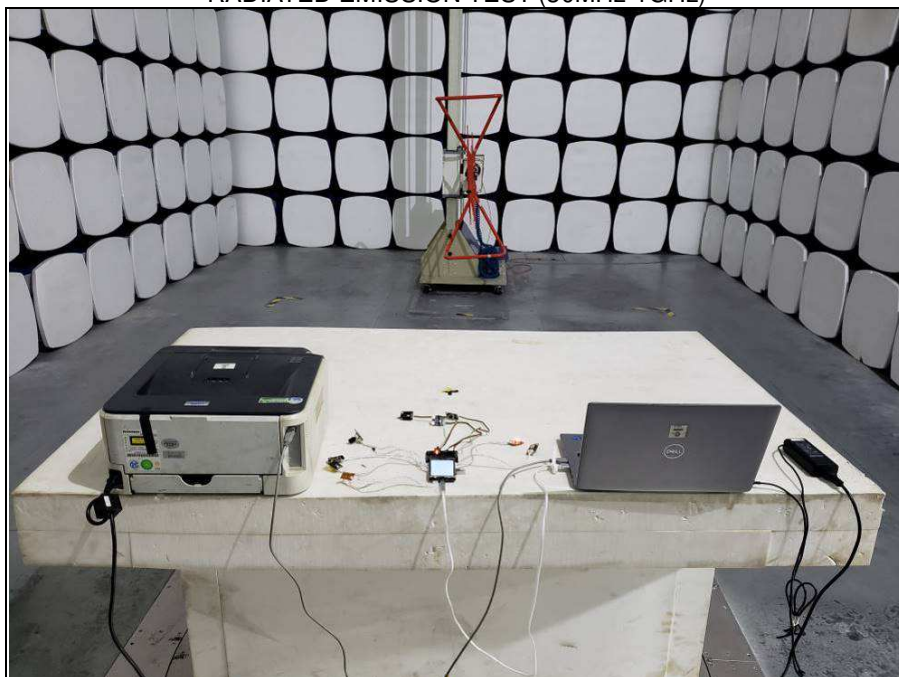


6 PHOTOGRAPHS OF THE TEST CONFIGURATION

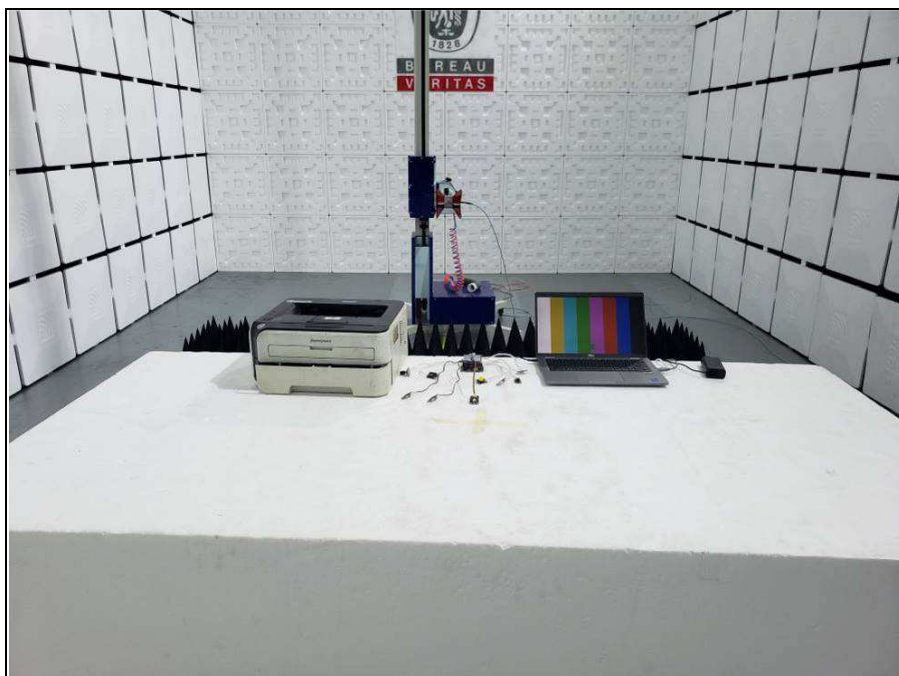
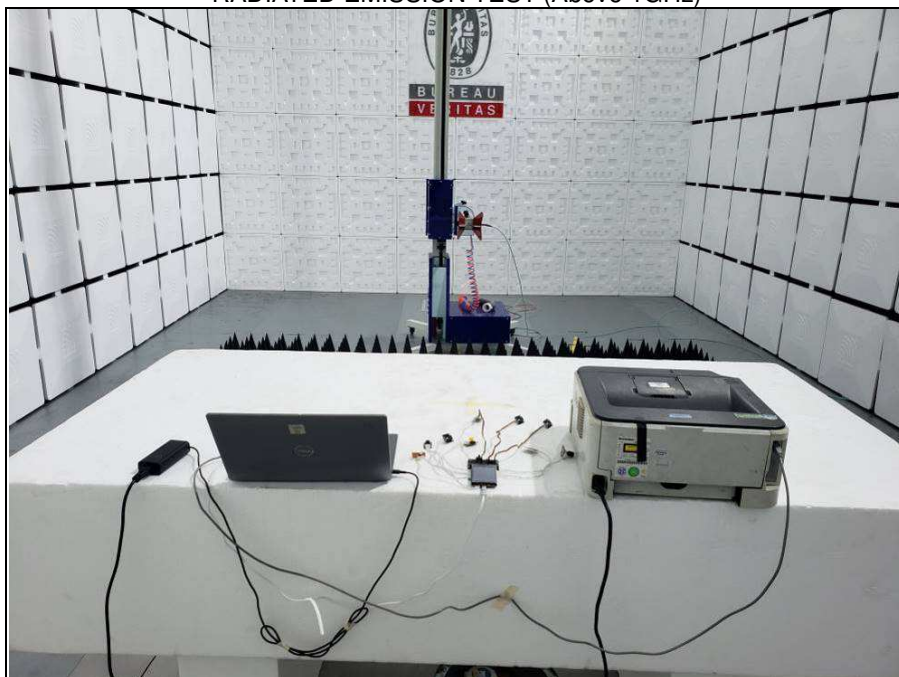
CONDUCTED EMISSION TEST



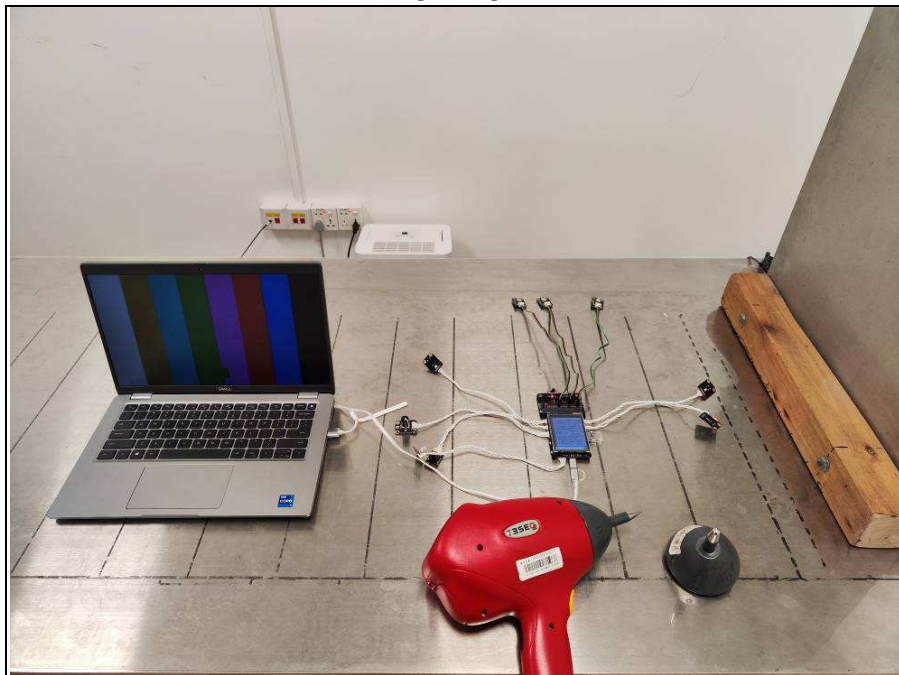
RADIATED EMISSION TEST (30MHz-1GHz)



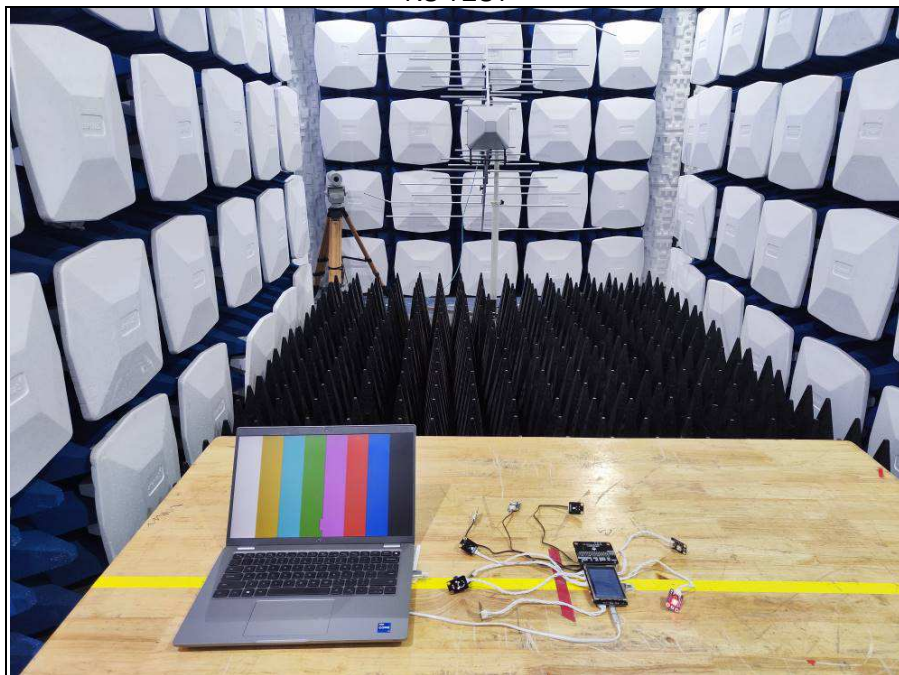
RADIATED EMISSION TEST (Above 1GHz)



ESD TEST



RS TEST





Test Report No.: CE2211WDG0121

7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications were made to the EUT by the lab during the test.

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