

FCC Report

Product Name : RF Chrome System
Trade mark : 
Model No. : SD-110, SD-100
FCC ID : 2AXF9-SD-110
Report Number : BLA-EMC-202008-A0901
Date of sample receipt : 2020/8/6
Date of Test : 2020/8/6-2020/9/15
Date of Issue : 2020/9/15
Test standard : FCC CFR Title 47 Part 15 Subpart C Section 15.223
Test result : PASS

Prepared for:

Shenzhen Yixun Technology Co.,Ltd.
4th floor of west,Huo Li Baobuilding,NO.31,Gaoxin North 6
Rd,Nanshan,Shenzhen

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,
China
TEL: +86-755-28682673

Compiled by:



Approved by:



Review by:



Date: 2020/9/15



2 Version

Version No.	Date	Description
00	2020/9/15	Original

BlueAsia

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4 Test Summary

Test Item	Section in CFR 47	Result
AC Power Line Conducted Emission	15.207	Pass
Channel Bandwidth	15.223 (a)	Pass
Field Strength of the Fundamental Signal	15.223 (a)	Pass
Spurious Emission	15.209	Pass

Pass: The EUT complies with the essential requirements in the standard.

Remark: Test according to ANSI C63.10:2013.

Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz ~ 30MHz	$\pm 4.34\text{dB}$	(1)
Radiated Emission	30MHz ~ 1000MHz	$\pm 4.24\text{dB}$	(1)
Radiated Emission	1GHz ~ 26.5GHz	$\pm 4.68\text{dB}$	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	$\pm 3.45\text{dB}$	(1)

Note (1): The measurement uncertainty is for coverage factor of $k=2$ and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	RF Chrome System
Model No.:	SD-110, SD-100
Test Model No.:	SD-110
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are product appearance and model name for commercial purpose.	
Sample(s) Status	Engineer sample
Hardware:	V1.2
Software:	V1.2
Operation Frequency:	8.2MHz
Channel Numbers:	1
Modulation Type:	ASK
Antenna Type:	External Antenna
Antenna Gain:	0.0dBi
Power Supply:	Model:YDH-1802000 Input:AC220V,50Hz Output:AC18V 2A
Remark:The Antenna Gain is supplied by the customer	

5.2 Test mode

Transmitting mode:	Keep the EUT in continuously transmitting mode with modulation
Remark: All models have been pretest, only worse model SD-110 is reported	

5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
N/A	N/A	N/A	N/A

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC — Designation No.: CN1252**

BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Designation CN1252.

- **ISED — CAB identifier No.: CN0028**

BlueAsia of Technical Services(Shenzhen) Co., Ltd has been registered by Certification and Engineering Bureau of ISED for radio equipment testing with CAB identifier CN0028

5.5 Test Location

All tests were performed at:
All tests were performed at: BlueAsia of Technical Services(Shenzhen) Co., Ltd. IOT Test Centre of BlueAsia No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen, China Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673 No tests were sub-contracted.

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m SAC	SKET	9m*6 m*6m	966	06-10-2018	06-09-2023
2	Broadband Antenna	SCHWARZBECK	VULB9168	00836 P:00227	07-14-2019	07-13-2021
3	Horn Antenna	SCHWARZBECK	9120D	01892 P:00331	07-14-2019	07-13-2021
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Pre-amplifier	SKET	N/A	N/A	07-19-2020	07-18-2021
6	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2020	05-23-2021
7	EMI Test Receiver	Rohde & Schwarz	ESR7	101199	03-21-2020	03-20-2021
8	Controller	SKET	N/A	N/A	N/A	N/A
9	Vector Signal Generator	Agilent	E4438C	MY45092582	05-24-2020	05-23-2021
10	Signal Generator	Agilent	E8257D	MY44320250	05-24-2020	05-23-2021
11	Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
12	Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
13	Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	EMI Test Receiver	Rohde & Schwarz	ESPI3	101082	06-10-2020	06-09-2021
2	LISN	CHASE	MN2050D	1447	12-18-2019	12-17-2020
3	LISN	Rohde & Schwarz	ENV216	3560.6550.15	07-19-2020	07-18-2021
4	EMI Test Software	EZ	EZ	N/A	N/A	N/A
5	Temperature Humidity Chamber	Mingle	TH101B	N/A	07-19-2020	07-18-2021
6	Coaxial Cable	BlueAsia	BLA-XC-05	N/A	N/A	N/A

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Spectrum Analyzer	Agilent	N9030A	MY50510123	05-24-2020	05-23-2021
2	Spectrum analyzer	Rohde & Schwarz	FSP40	100817	05-24-2020	05-23-2021
3	Vector Signal Generator	Agilent	E4438C	MY45092582	05-24-2020	05-23-2021
4	Signal Generator	Agilent	E8257D	MY44320250	05-24-2020	05-23-2021
5	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO27	05-24-2020	05-23-2021
7	DC Power Supply	LODESTAR	LP305DE	N/A	07-19-2020	07-18-2021
8	Temperature Humidity Chamber	Mingle	TH101B	N/A	07-19-2020	07-18-2021

7 Test results and Measurement Data

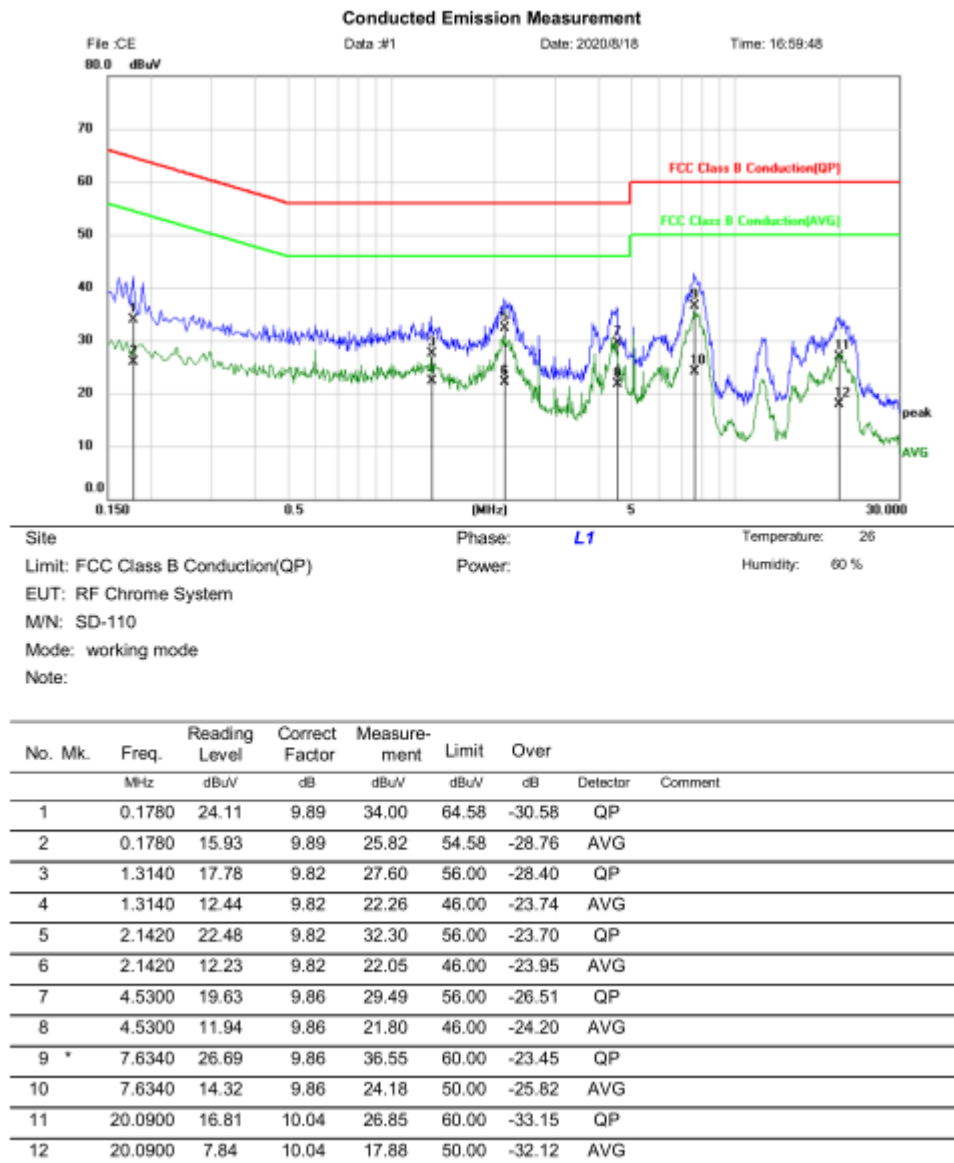
7.1 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207																
Test Method:	ANSI C63.10:2013																
Test Frequency Range:	150KHz to 30MHz																
Class / Severity:	Class B																
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto																
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> * Decreases with the logarithm of the frequency.			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
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															
Test setup:	Reference Plane Test table/Insulation plane <i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i>																
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.																
Test Instruments:	Refer to section 6.0 for details																
Test mode:	Refer to section 5.2 for details																
Test results:	Pass																

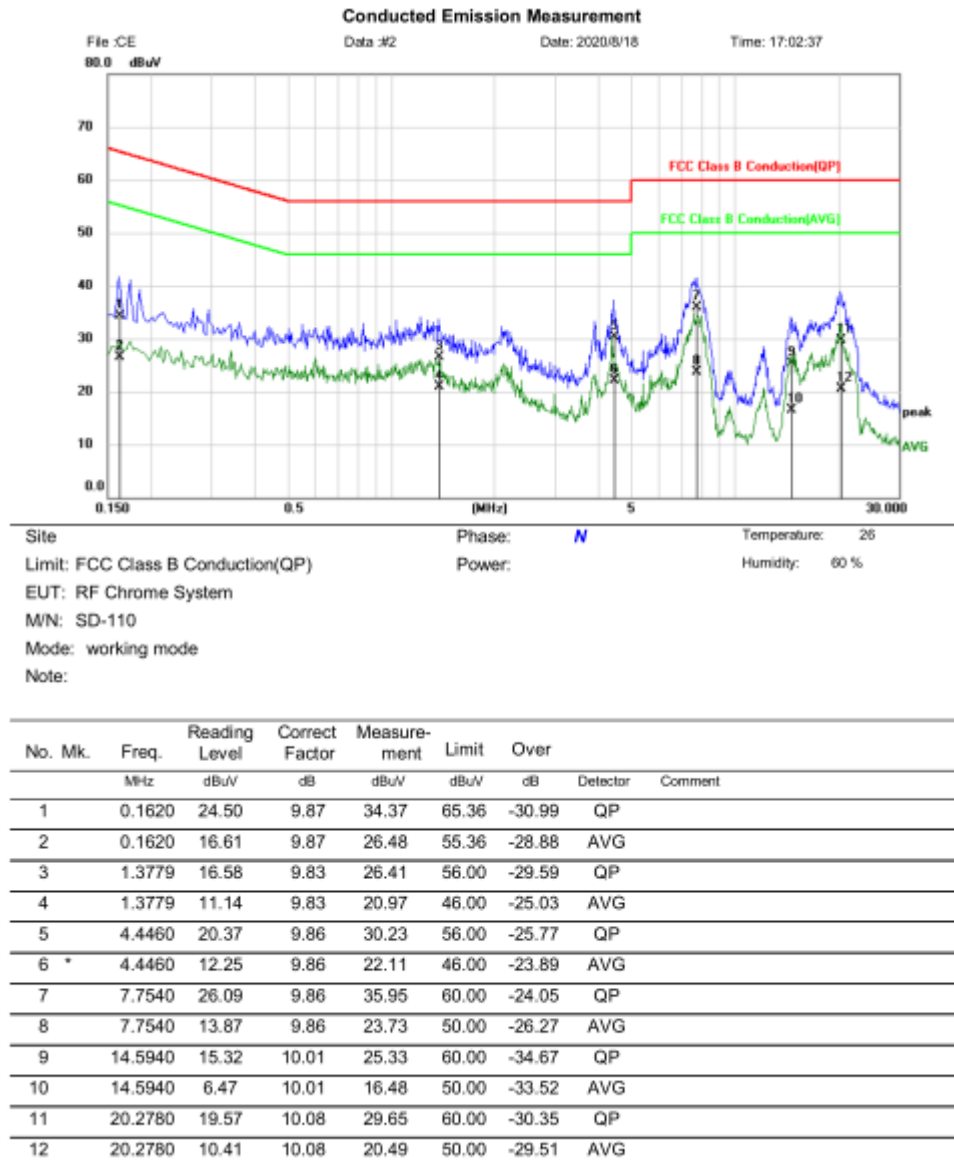
Measurement data

Line:

EUT:	RF Chrome System	Probe:	L1
Model:	SD-110	Power Source:	AC120V/60Hz
Mode:	TX mode	Test by:	Eason
Temp./Hum.(%RH):	26°C/60%RH		



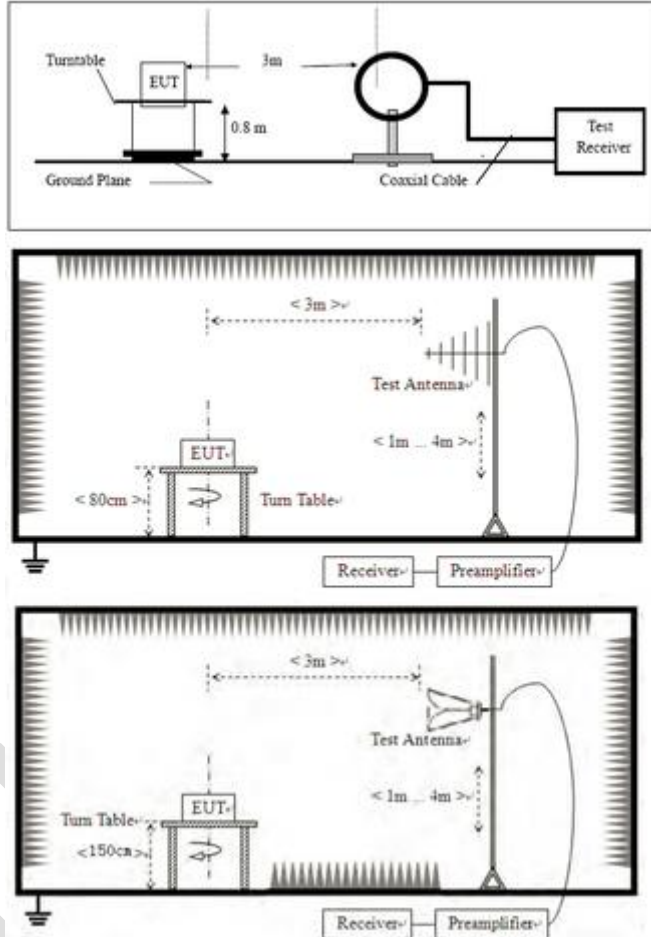
EUT:	RF Chrome System	Probe:	N
Model:	SD-110	Power Source:	AC120V/60Hz
Mode:	TX mode	Test by:	Eason
Temp./Hum.(%RH):	26°C/60%RH		



Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. *Final Level = Receiver Read level + Correct factor*
4. *Correct factor = LISN Factor + Cable Loss*
5. *If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.*

7.2 Field Strength of the Fundamental Signal

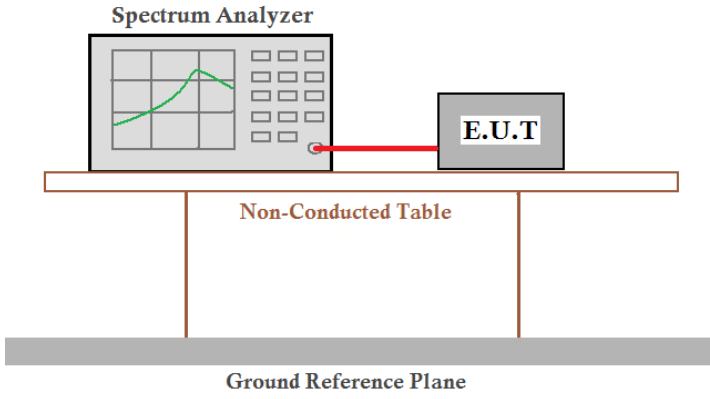
Test Requirement:	FCC Part15 C Section 15.223(a)
Test Method:	ANSI C63.10:2013
Limit:	(a) The field strength of any emission within the band 1.705-10.0 MHz shall not exceed 100 microvolts/meter at a distance of 30 meters.
Test setup:	 a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four 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. e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

	f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report. Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Peak value						
Frequency (MHz)	Read Level (dBuV)	Correct Facor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
8.2MHz	21.79	30.50	52.29	100	-47.71	Horizontoal (Worst case)
Average value						
8.2MHz	14.55	30.50	45.05	80	-34.95	Horizontoal (Worst case)

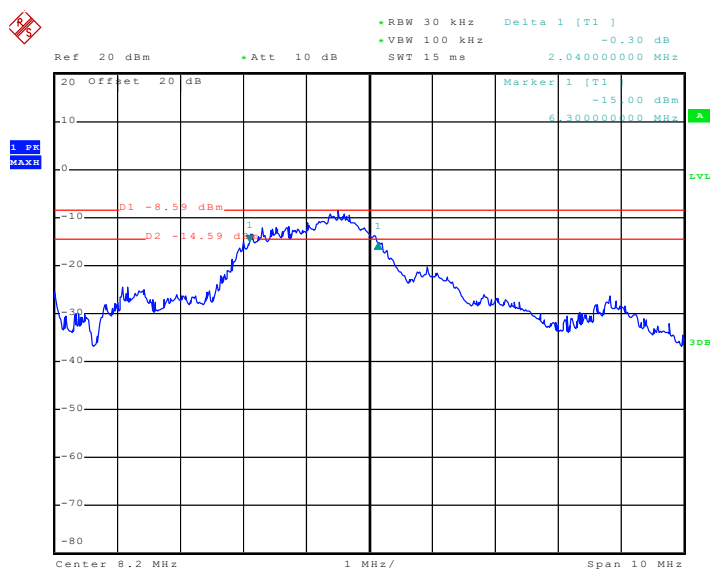
7.3 Channel Bandwidth

Test Requirement:	FCC Part15 C Section 15.223 (a)
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test channel	Channel Bandwidth (MHz)	Limit(KHz)	Result
8.2MHz	2.041	N/A	Pass

Test plot as follows:



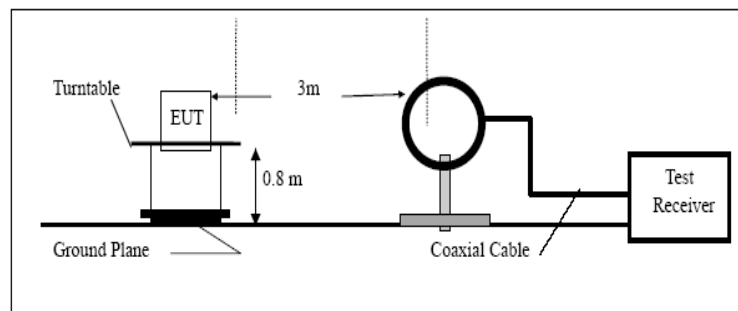
Date: 15.SEP.2020 10:11:31

7.3.1 Radiated Emission Method

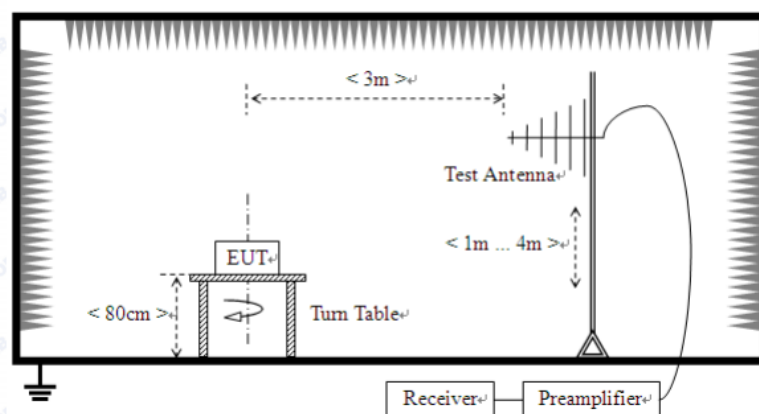
Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit: (Spurious Emissions)	Frequency	Limit (uV/m)	Value	Measurement Distance	
	0.009MHz-0.490MHz	2400/F(KHz)	QP	300m	
	0.490MHz-1.705MHz	24000/F(KHz)	QP	30m	
	1.705MHz-30MHz	30	QP	30m	
	30MHz-88MHz	100	QP	3m	
	88MHz-216MHz	150	QP		
	216MHz-960MHz	200	QP		
	960MHz-1GHz	500	QP		
	Above 1GHz	500	Average		
		5000	Peak		
Limit: (band edge)	Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.				

Test setup:

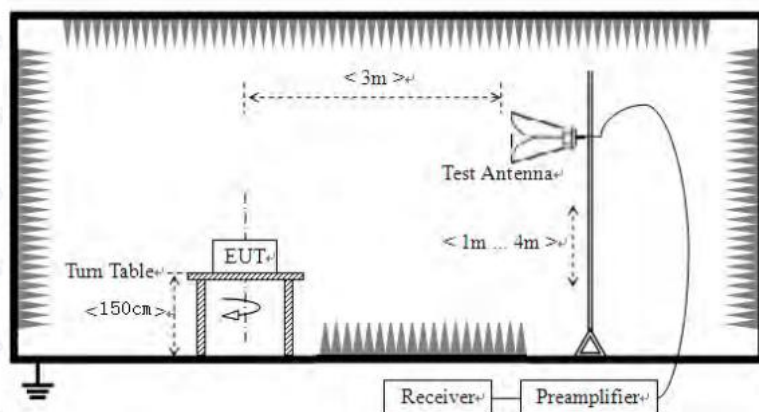
Below 30MHz



Below 1GHz



Above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8m for below 1G and 1.5m for above 1G) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four 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.
4. For each suspected emission, the EUT was arranged to its worst case

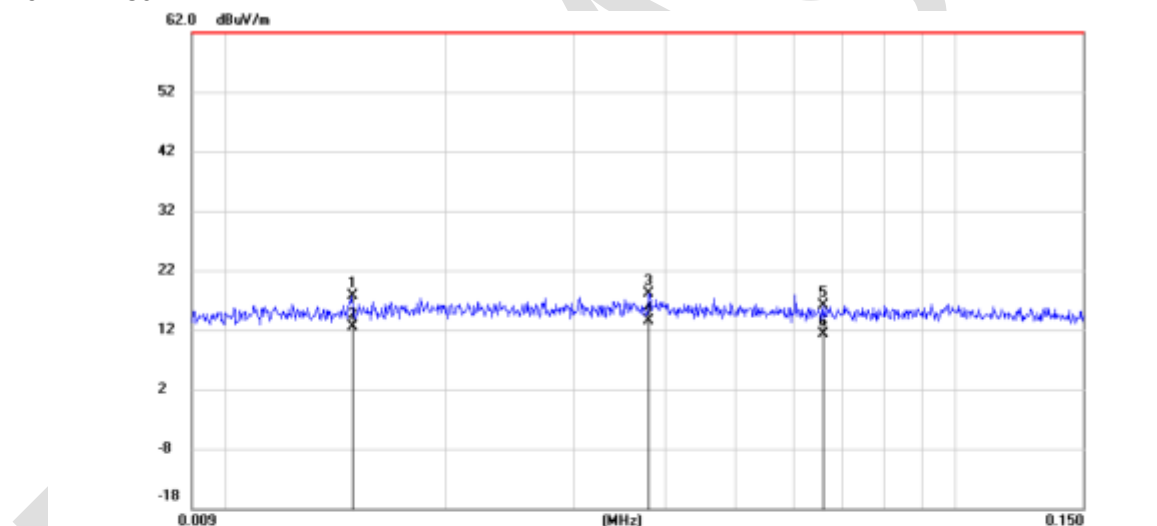
	and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

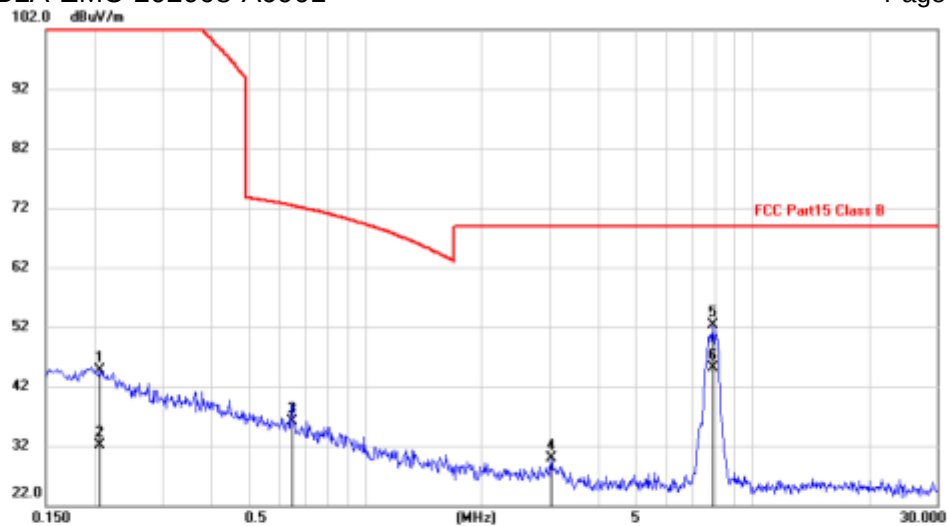
Measurement Data

■ 9 kHz ~ 30 MHz



Site	Polarization: Horizontal	Temperature:
Limit:	Power:	Humidity: %
EUT: RF Chrome System	Distance: 3m	
M/N: SD-110		
Mode: working mode		
Note:		

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		0.0149	-2.14	19.87	17.73	128.06	-110.33	peak		
2		0.0149	-7.29	19.87	12.58	128.06	-115.48	AVG		
3		0.0381	-1.74	19.80	18.06	126.40	-108.34	peak		
4		0.0381	-6.28	19.80	13.52	126.40	-112.88	AVG		
5	*	0.0660	-3.85	20.04	16.19	124.40	-108.21	peak		
6		0.0660	-8.81	20.04	11.23	124.40	-113.17	AVG		



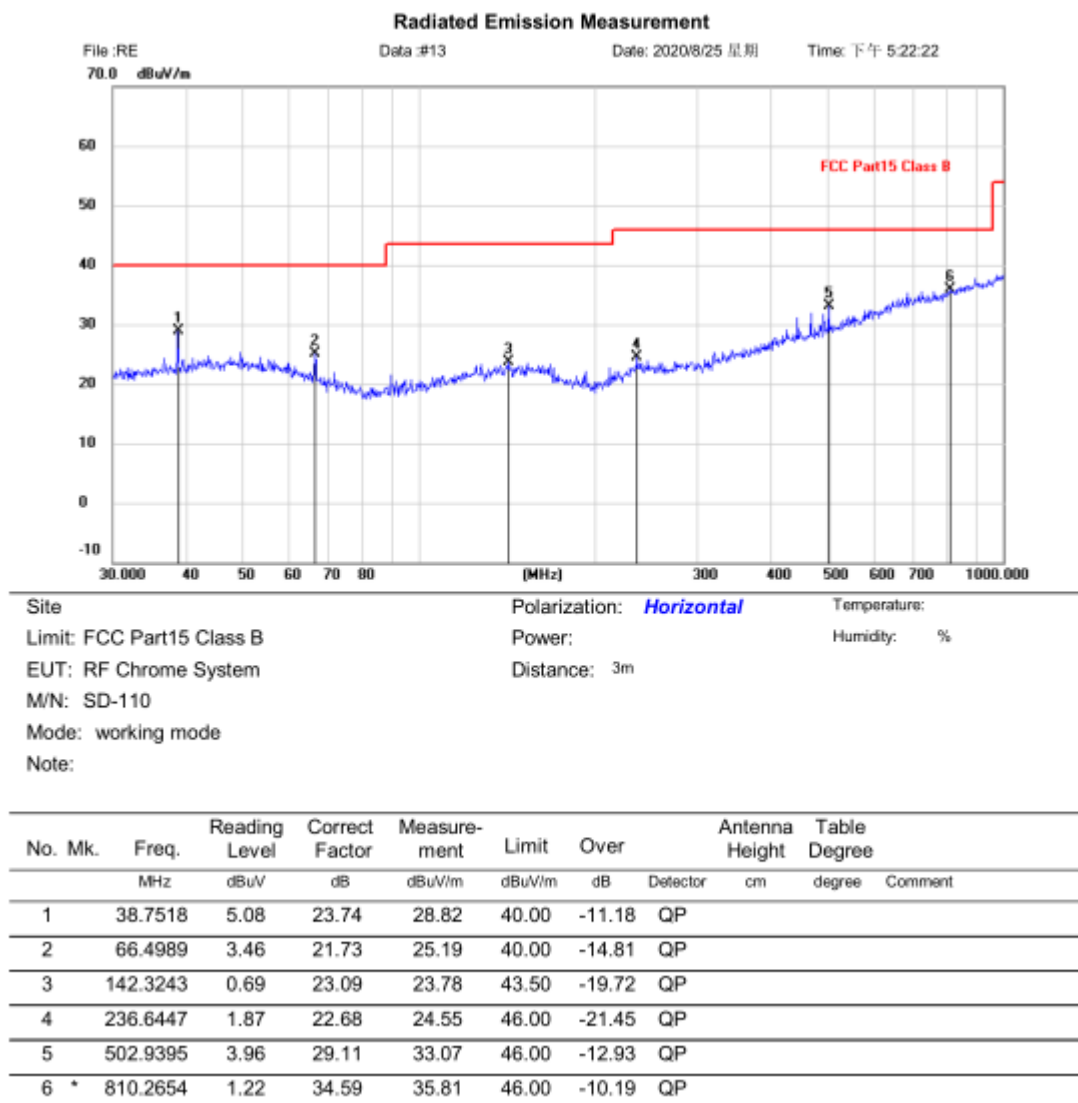
Site: Polarization: **Horizontal** Temperature:
 Limit: FCC Part15 Class B Power: Humidity: %
 EUT: RF Chrome System Distance: 3m
 M/N: SD-110
 Mode: working mode
 Note:

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	Comment
			dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		0.2071	14.39	30.34	44.73	114.28	-69.55	peak		
2		0.2071	1.83	30.34	32.17	114.28	-82.11	AVG		
3		0.6471	5.78	30.36	36.14	72.40	-36.26	QP		
4		3.0253	-0.82	30.78	29.96	69.00	-39.04	QP		
5	*	7.8932	21.79	30.50	52.29	69.00	-16.71	peak		
6		7.8932	14.55	30.50	45.05	69.00	-23.95	AVG		

Below 1GHz

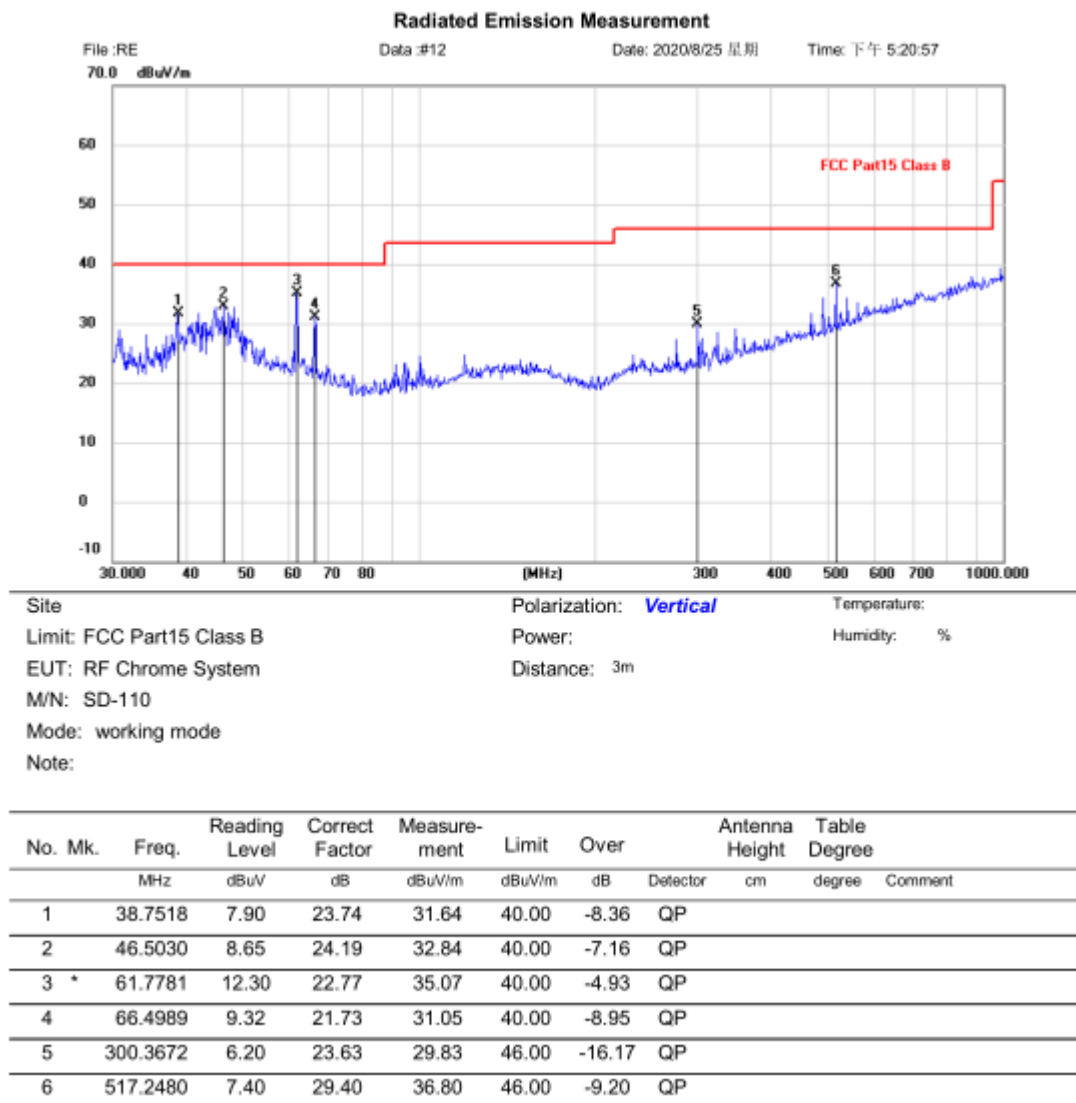
Horizontal:

EUT:	RF Chrome System	Polarization:	Horizontal
Model:	SD-110	Power Source:	AC120V/60Hz
Mode:	TX mode	Test by:	Eason
Temp./Hum.(%RH):	26°C/60%RH		



Vertical:

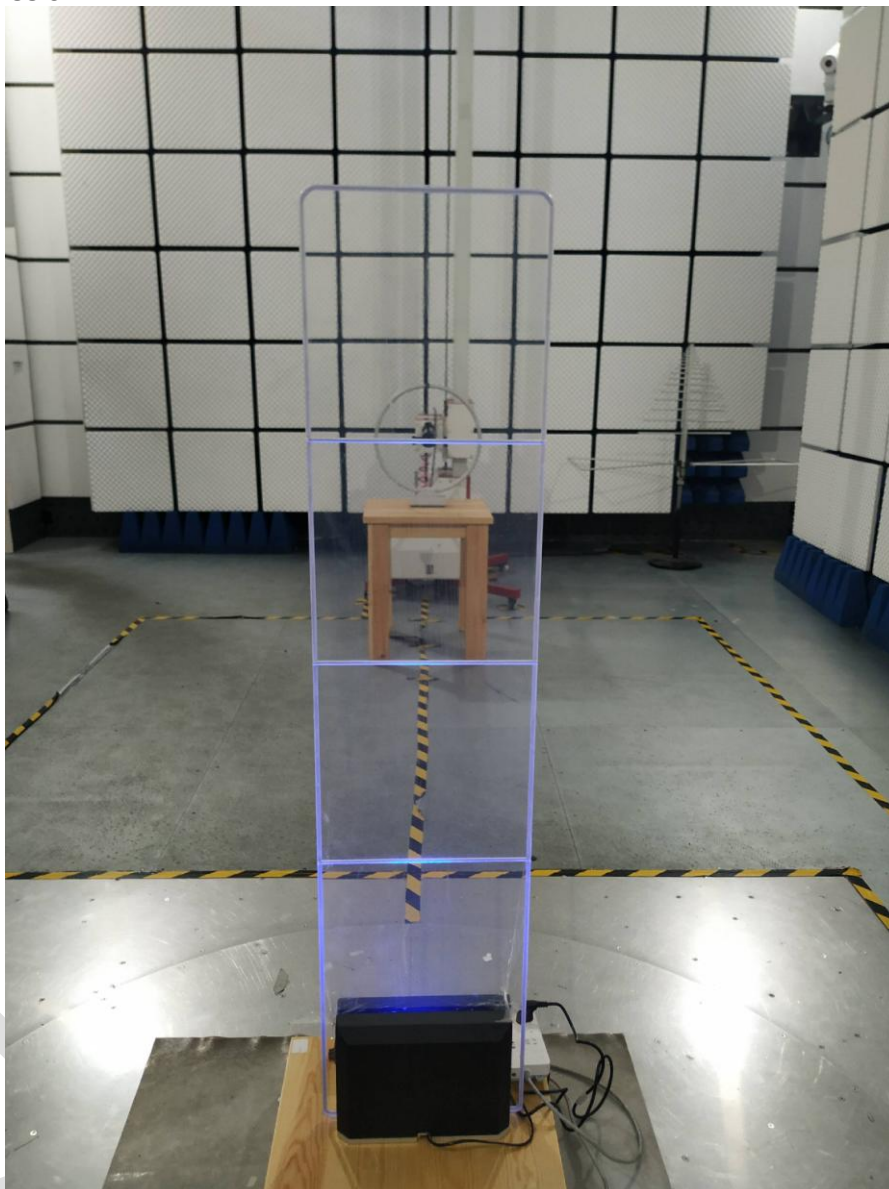
EUT:	RF Chrome System	Polarization:	Vertical
Model:	SD-110	Power Source:	AC120V/60Hz
Mode:	TX mode	Test by:	Eason
Temp./Hum.(%RH):	26℃/60%RH		
Note:			


Remark:

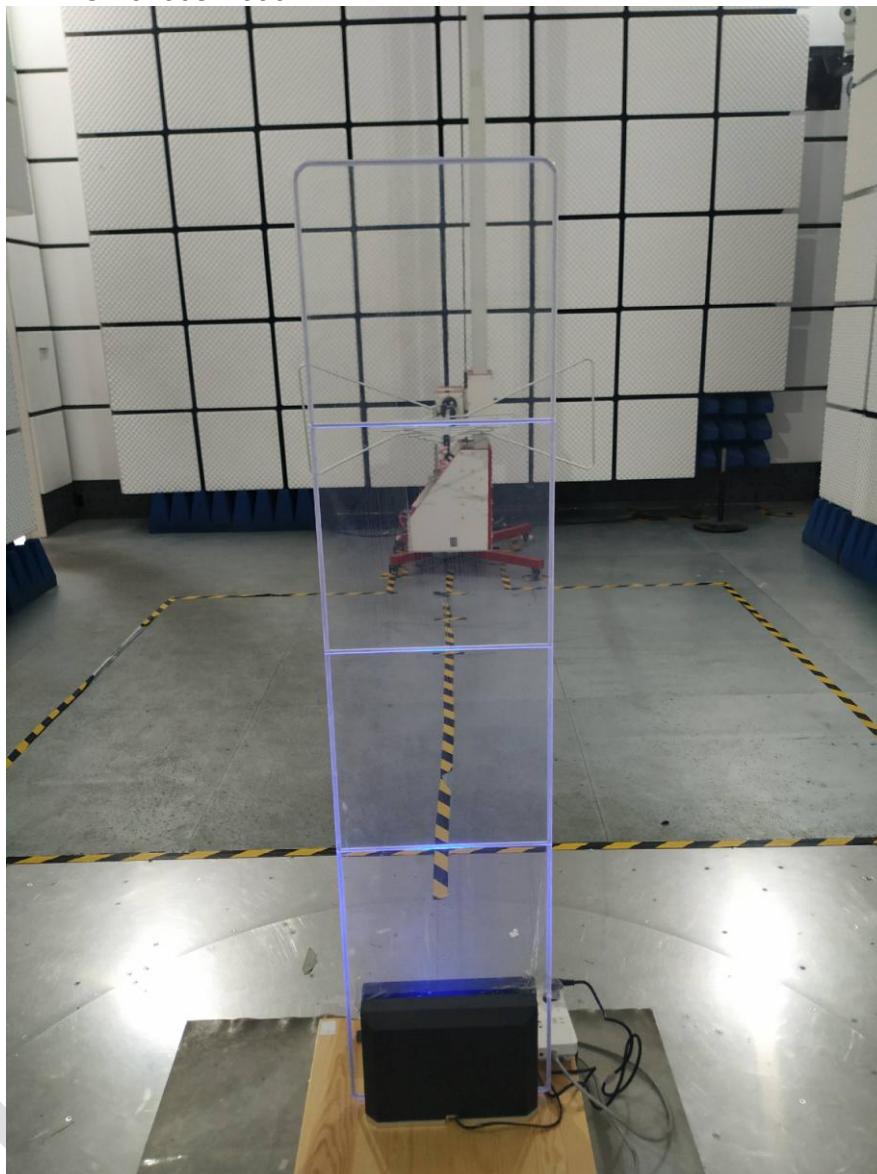
1. Final Level = Receiver Read level + Correct factor
2. "*", means this data is the too weak instrument of signal is unable to test.
3. Correct factor = Antenna Factor + Cable Loss – Preamplifier Factor

8 Test Setup Photo

Radiated Emission



9KHz-30MHz



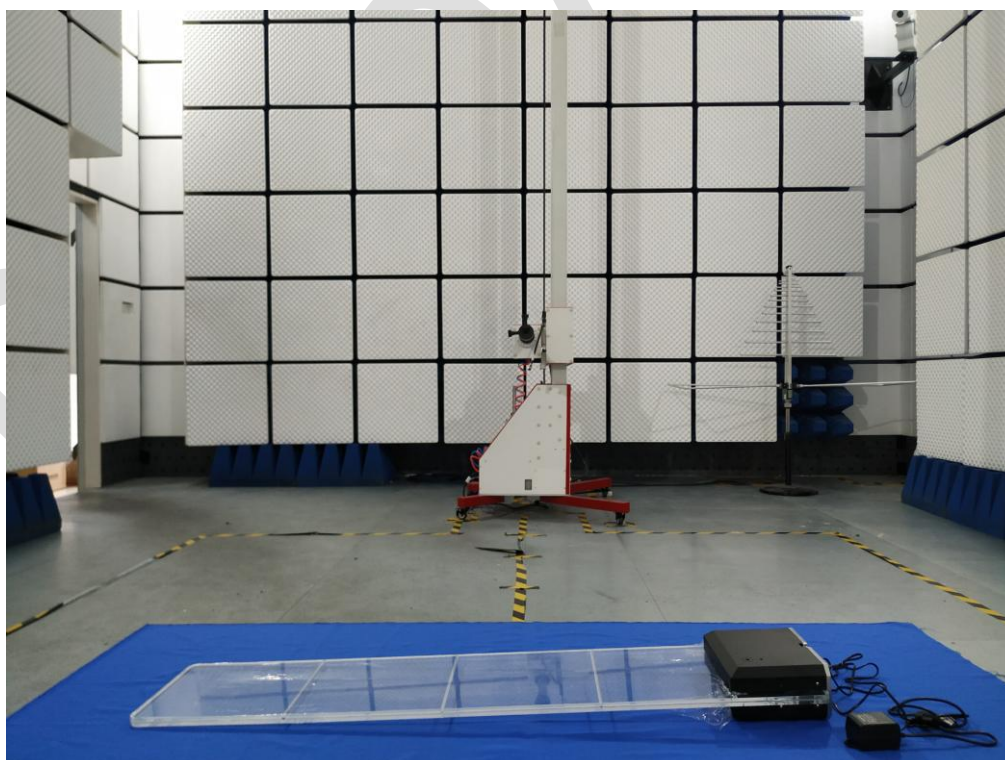
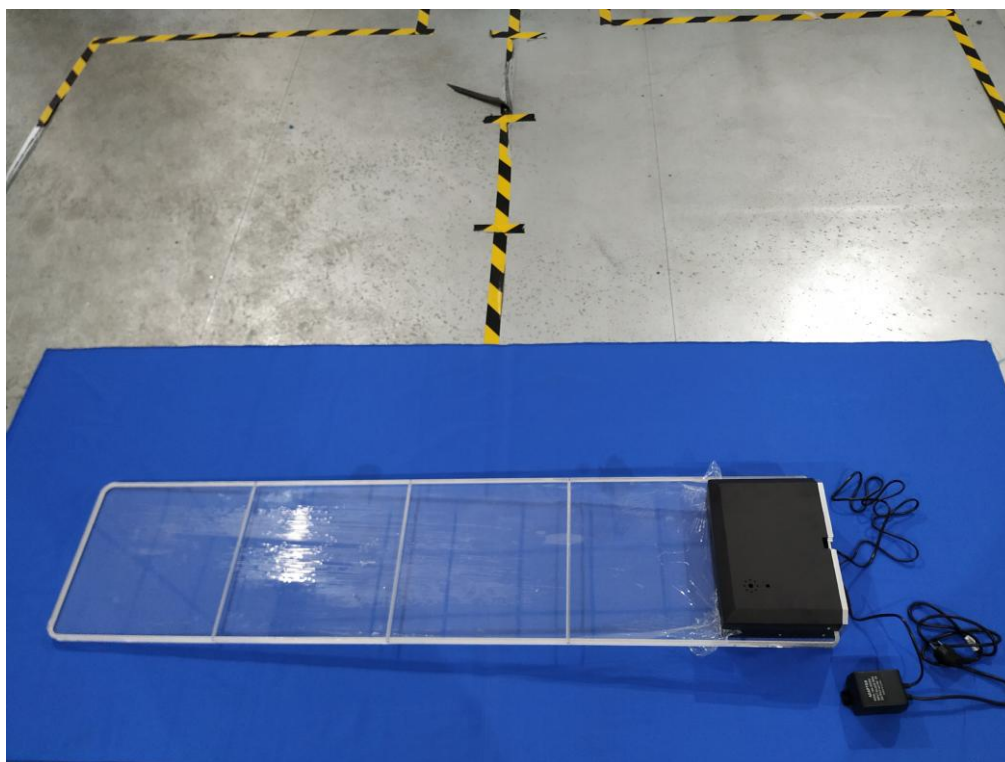
30MHz-1GHz

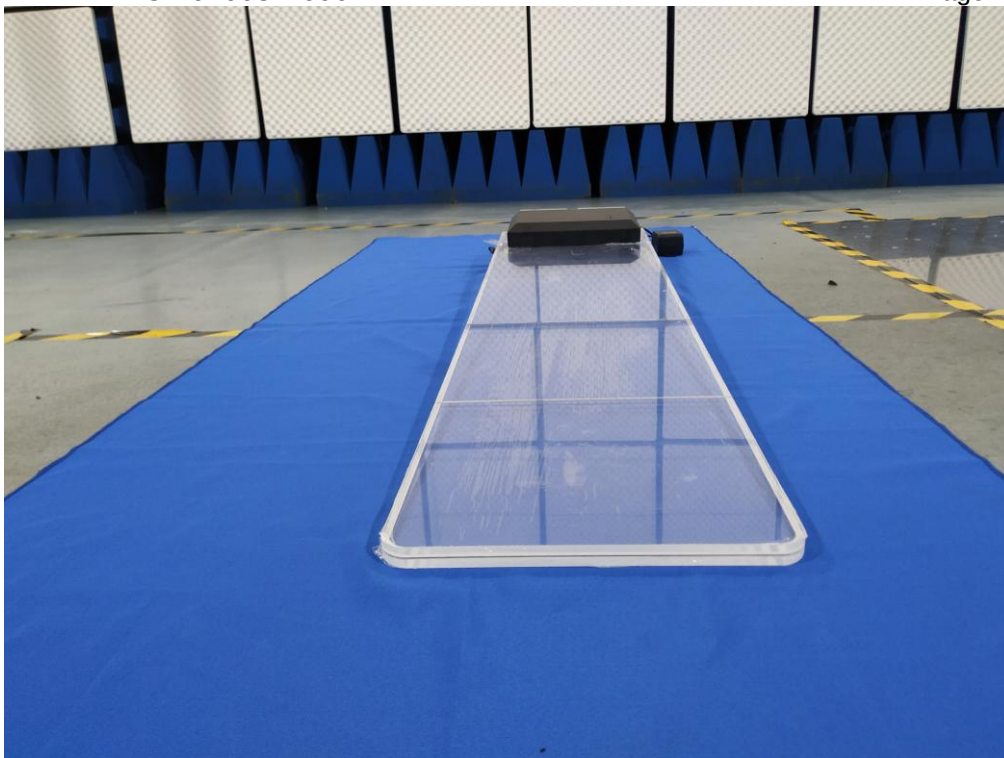
Conducted Emission

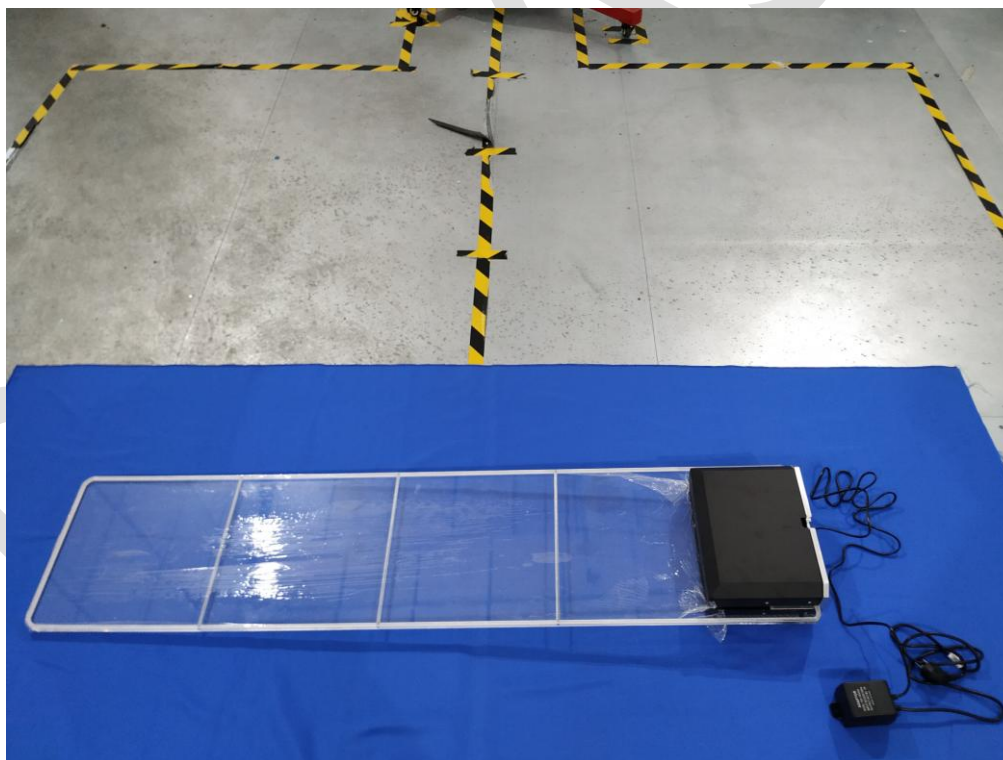
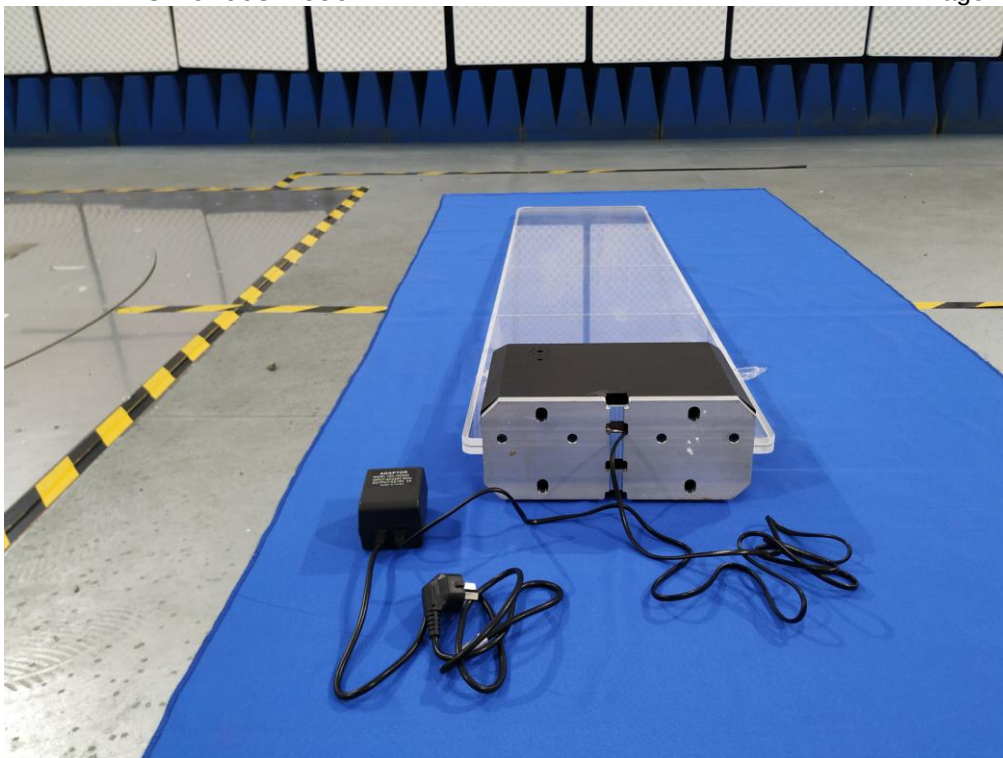


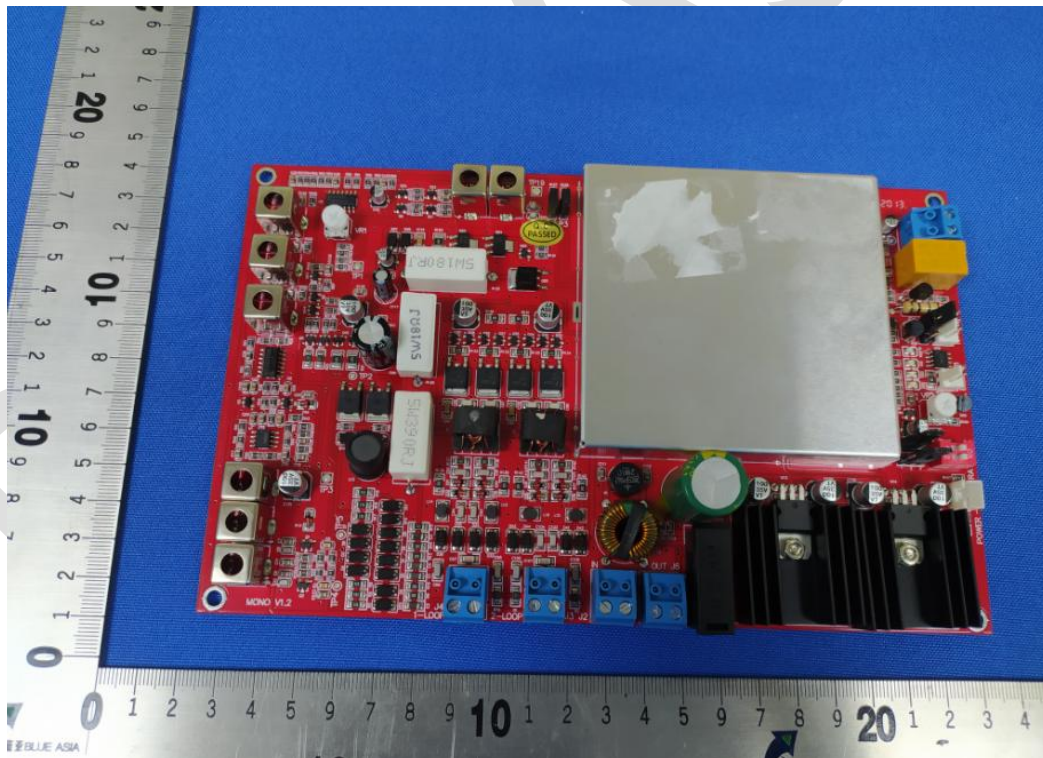
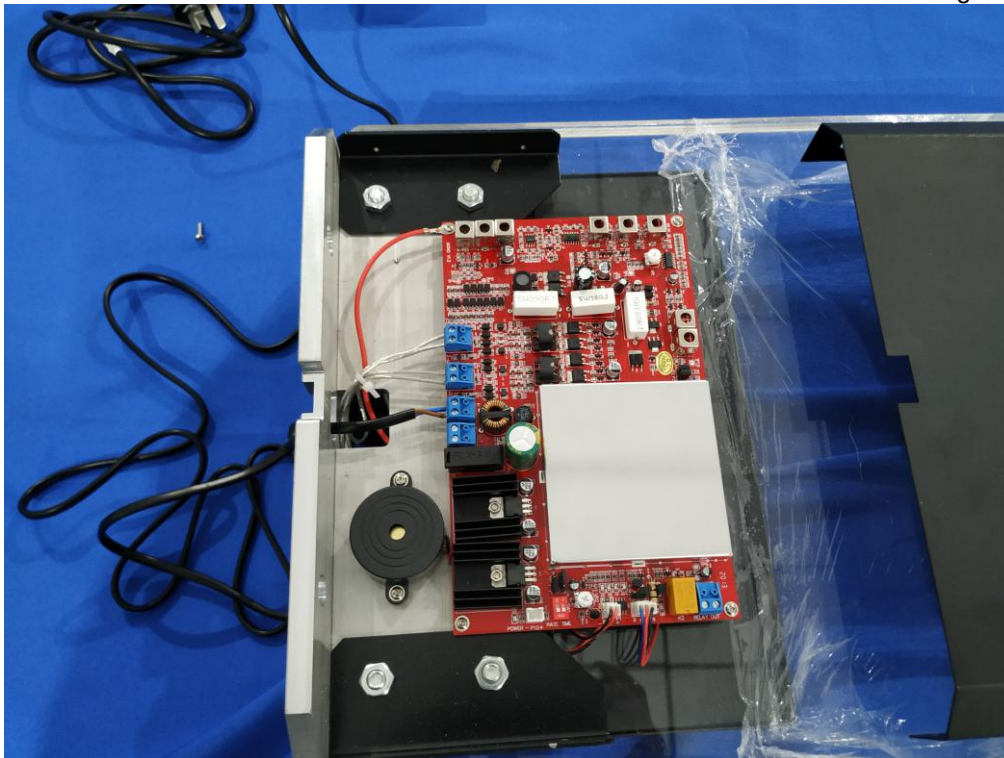
9 EUT Constructional Details

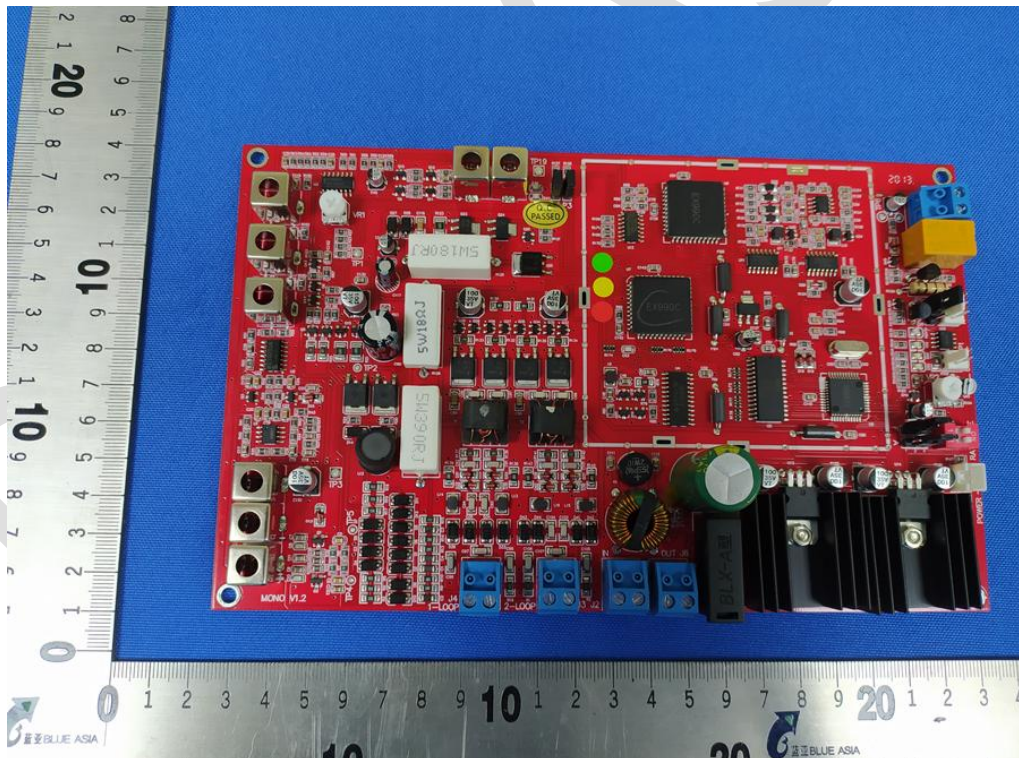
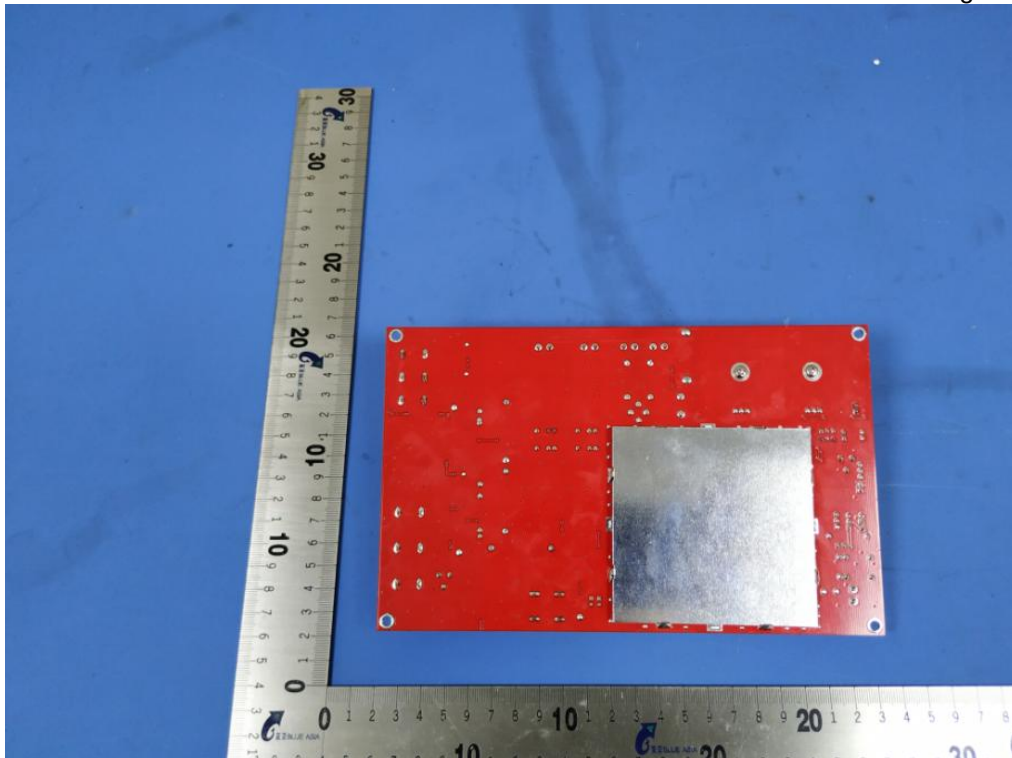
Model: SD-110

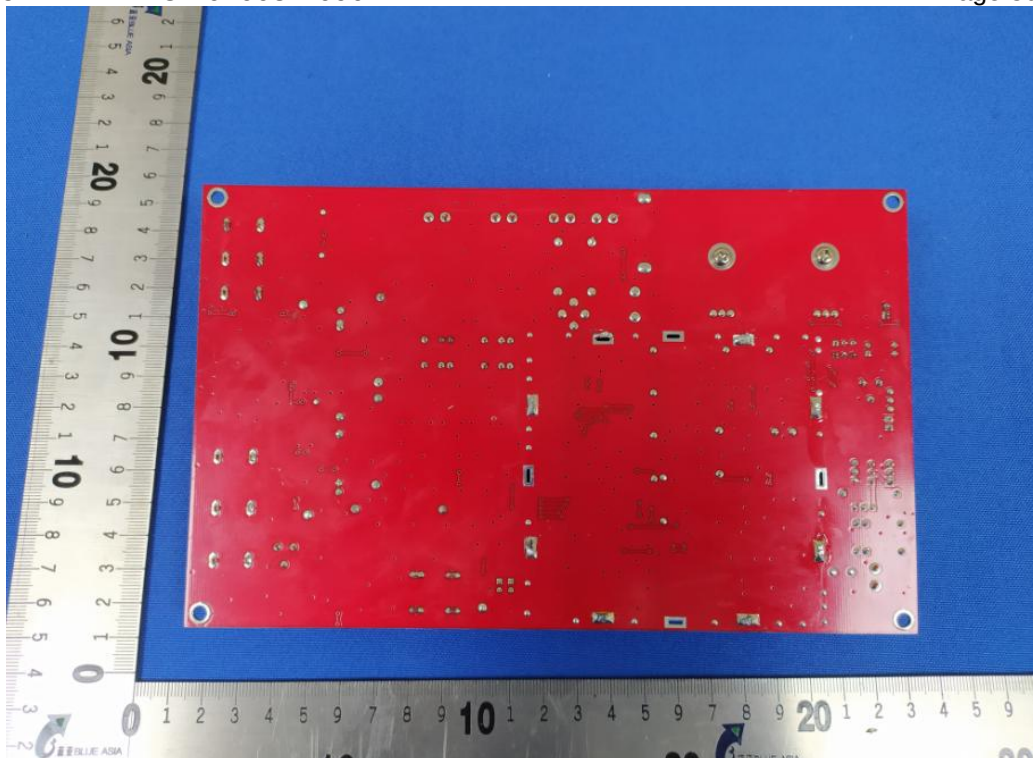












Extension Model : SD-100





*** End of Report ***

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