

Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

EMC TEST REPORT

PRODUCT	Smart POS System
BRAND	SUNMI
MODEL	T6F10
APPLICANT	Shanghai Sunmi Technology Co.,Ltd.
FCC ID	2AH25T6F10LA
ISSUE DATE	February 26, 2024
STANDARD(S)	FCC Part 15, Subpart B, ANSI C63.4-2014

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Approved by: Zhang Min

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CONTENTS

1	SUMMARY OF TEST REPORT	3
1.1	TEST STANDARD (S)	3
1.2	SUMMARY OF TEST RESULTS	3
2	GENERAL INFORMATION OF THE LABORATORY	5
2.1	TESTING LABORATORY	5
2.2	LABORATORY ENVIRONMENTAL REQUIREMENTS	5
2.3	PROJECT INFORMATION	5
3	GENERAL INFORMATION OF THE CUSTOMER	6
3.1	APPLICANT	6
3.2	MANUFACTURER	6
3.3	FACTORY	6
4	GENERAL INFORMATION OF THE PRODUCT	7
4.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	7
4.2	DESCRIPTION FOR AUXILIARY EQUIPMENT (AE)	7
5	TEST CONFIGURATION INFORMATION	9
5.1	LABORATORY ENVIRONMENTAL CONDITIONS	9
5.2	DECISION OF FINAL TEST MODE	9
5.3	EUT SYSTEM OPERATION	10
5.4	EUT CONNECTION DIAGRAM OF TEST SYSTEM	11
5.5	TEST EQUIPMENT UTILIZED	12
5.6	MEASUREMENT UNCERTAINTY	12
6	TEST RESULTS	13
6.1	RADIATED EMISSION	13
6.2	CONDUCTED EMISSION	15
	ANNEX A: MEASUREMENT DATA	17
	ANNEX B: REVISED HISTORY	21
	ANNEX C: ACCREDITATION CERTIFICATE	22

1 Summary of Test Report

1.1 Test Standard (s)

No.	Test Standard(s)	Title
1	FCC Part 15, Subpart B	Radio frequency devices
2	ANSI C63.4	Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
NOTE: According to customer requirements, test and report using the latest version of the standard.		

1.2 Summary of Test Results

No.	Item(s)	Standard(s)	Verdicts for Single Item	Detailed Results
1	Radiated Emission	15.109(a)	Pass	See section 6.1
2	AC Conducted Emission	15.107(a)	Pass	See section 6.2

No.	Item(s)	Standard(s)	Verdicts for Single Item	Detaied Results		
NOTE: The T6F10 manufactured by Shanghai Sunmi Technology Co.,Ltd. is a variant product for testing. This project is a variant project based on original report 23T04I30131-EMC01-V01 with below changes: Software Modification: -Subtract EU bands Hardware Modification: -Band changes: YES WCDMA reduced by B6/B19 LTE reduced by B8/B18/B19/B20/B26/B34/B39/B40; B41(200M)->B41(120M) These changes do not affect the RF performance of other frequency bands. -Components on PCB changes: Yes -LCD changes: Please refer to the following difference chart -Camera changes: Please refer to the following difference chart						
Type of Service	Configuration type	Scanner	Front Camera	Rear Camera	Flash Lamp	LCD (Just different manufacturers)
Original	High Configuration	Yes	Yes	5M AF+flash	Yes	SHENZHEN DJN PHOTOELECTRIC TECHNOLOGY CO., LTD (DJN)
Original	Basic Configuration	NO	Yes	5M AF+flash	Yes	CPT Technology (Group) Co.,Ltd (Hua Ying)
Variant (Based on Original)	Low Configuration	NO	NO	2M FF	NO	CPT Technology (Group) Co.,Ltd (Hua Ying)
Other changes: PCBA Change According to the product change description, we retested it all, as shown in Section 5.2, and recorded the worst case of test data in the report. Industrial Internet Innovation Center (Shanghai) Co., Ltd. only performed test cases which identified with Pass/Fail/Inc result in section 1.3. Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 4 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 1 of this test report.						

2 General Information of The Laboratory

2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4, No. 766, Jingang Road, Pudong, Shanghai, China
Telephone	021-68866880
FCC Registration No.	708870
FCC Designation No.	CN1364

2.2 Laboratory Environmental Requirements

Temperature	15℃~35℃
Relative Humidity	25%RH~75%RH
Atmospheric Pressure	86kPa~106kPa
Supply Voltage	120V/60Hz

2.3 Project Information

Project Manager	Gao Hongning
Test Date	December 25, 2023 to January 18, 2024

3 General Information of The Customer

3.1 Applicant

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18826519551

3.2 Manufacturer

Company	Shanghai Sunmi Technology Co.,Ltd.
Address	Room 505, No.388,Song Hu Road, Yang Pu District, Shanghai, China
Telephone	18826519551

3.3 Factory

Company	N/A
Address	N/A

4 General Information of The Product

4.1 Product Description for Equipment under Test (EUT)

Product	Smart POS System
Model	T6F10
Date of Receipt	December 22, 2023
EUT ID*	S01aa
SN/IMEI	P303D3BM10026
Supported Radio Technology and Bands	GSM850/GSM900/GSM1800/GSM1900 WCDMA Band I/II/IV/V/VIII LTE Band 1/2/3/4/5/7/28/38/41 BT 5.0 BR/EDR/BLE WLAN 802.11b,g,n WLAN 802.11a,n,ac GPS/Galileo/GLONASS/BDS NFC
Hardware Version	V1.0(LA)
Software Version	V3.0.1
Power Rating	DC 7.7V form battery, DC 5V form adapter
NOTE1: EUT ID is the internal identification code of the laboratory. NOTE2: Photographs of EUT are shown in ANNEX A of this test report. NOTE3: Samples in the test report are provided by the customer. The test results are only applicable to the samples received by the laboratory.	

4.2 Description for Auxiliary Equipment (AE)

AE ID*	Description	Model	SN/Remark
CD02	Adapter	TPA-141A050200UU01	N/A
CH02	Adapter	UC13US	N/A
CI02	Adapter	TPA-23A050200UU01	N/A
UA09	USB Cable	N/A	N/A
BA12	Battery	HPPA	ICON ENERGY SYSTEM (SHENZHEN) CO., LTD.
BB07	Battery	HPPA	Guangdong Highpower New Energy Technology Co., Ltd.
AE1	Notebook PC	DELL Latitude E6510	N/A
AE2	Desktop PC	OptiPlex 790 DT	X8RP1 A01 APCC

AE3	LAN Cable	N/A	N/A
AE4	VGA Cable	N/A	N/A
AE5	RS232 Cable	N/A	N/A
AE6	Keyboard	KB212-B	CN-0Y88XT-65890-12I-005Q-A00
AE7	Mouse	MS111-P	CN-011D3V-71581-19J-1A64
AE8	Monitor	Dell E1709Wc	N/A
AE9	Micro SD card	Kingston SDC4/4GB 77	N/A
AE10	Earphone	N/A	N/A
NOTE: *AE ID is the internal identification code of the laboratory.			

5 Test Configuration Information

5.1 Laboratory Environmental Conditions

5.1.1 Permanent Facilities

Semi-anechoic chamber SAC3-1 (9 m*8m*6.2m) & SAC3-2 (9.8m*6.7m*6.7m)	
Shielding effectiveness	0.014MHz ~1MHz, >60dB; 1MHz~1000MHz, >90dB.
Electrical insulation	> 2MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (SVSWR)	Between 0 and 6 dB, from 1GHz to 18GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

Shielded room	
Shielding effectiveness	0.014MHz~1MHz, >60dB; 1MHz~1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω

5.2 Decision of final test mode

The EUT was tested in conjunction with the accessories in Section 4.2. We tested all of the following test modes and selected the worst mode from the test results and recorded them in the report.

The test configuration modes are as the following:

Test Item	Test setup and operating modes
Radiated emission	30MHz-18GHz frequency range: Mode 1: LTE Band 2 receiver mode+ Back Camera+ CD02+ UA09+ BA12 Mode 2: LTE Band 2 receiver mode+ Back Camera+ CH02+ UA09+ BA12 Mode 3: LTE Band 2 receiver mode+ Back Camera+ CI02+ UA09+ BA12 Mode 4: GSM 1900 receiver mode+ Back Camera+ CD02+ UA09+ BA12 Mode 6: WCDMA BAND V receiver mode+ Back Camera+ CD02+ UA09+ BA12

	Mode 8: Print mode+ CD02+ UA09+ BA12 Mode 10: GNSS mode+ CD02+ UA09+ BA12 Mode 12: Data Link mode+ UA09+ BA12 Mode 13: GSM 1900 receiver mode+ Back Camera+ CD02+ UA09+ BB07
AC Conducted emission	Mode 1: LTE Band 2 receiver mode+ Back Camera+ CD02+ UA09+ BA12 Mode 2: LTE Band 2 receiver mode+ Back Camera+ CH02+ UA09+ BA12 Mode 3: LTE Band 2 receiver mode+ Back Camera+ CI02+ UA09+ BA12 Mode 5: GSM 1900 receiver mode+ Back Camera+ CI02+ UA09+ BA12 Mode 7: WCDMA BAND V receiver mode+ Back Camera+ CI02+ UA09+ BA12 Mode 9: Print mode+ CI02+ UA09+ BA12 Mode 11: GNSS mode+ CI02+ UA09+ BA12 Mode 12: Data Link mode+ UA09+ BA12 Mode 14: LTE Band 2 receiver mode+ Back Camera+ CI02+ UA09+ BB07
Note: 1. All test modes are performed, only the worst cases test data are recorded in this report. 2. After laboratory verification, GSM 1900/WCDMA BAND V/LTE Band 2 is the worst mode among all receiving modes of 2G/3G/4G and is recorded in the report. 3. The worst case of radiated emission for 30MHz-1GHz is Mode 13 and for 1GHz -18GHz is Mode 12. 4. The worst case for conducted emission is mode 9.	

5.3 EUT System Operation

1. Connect the EUT with AE.
2. Setup the EUT according to the standard.
3. Start testing and monitoring the function.
4. Data Link mode means data application transferred mode between EUT and SD Card.
5. GNSS mode: EUT and GNSS simulator (SMBV100A) connection is established.

5.4 EUT Connection Diagram of Test System

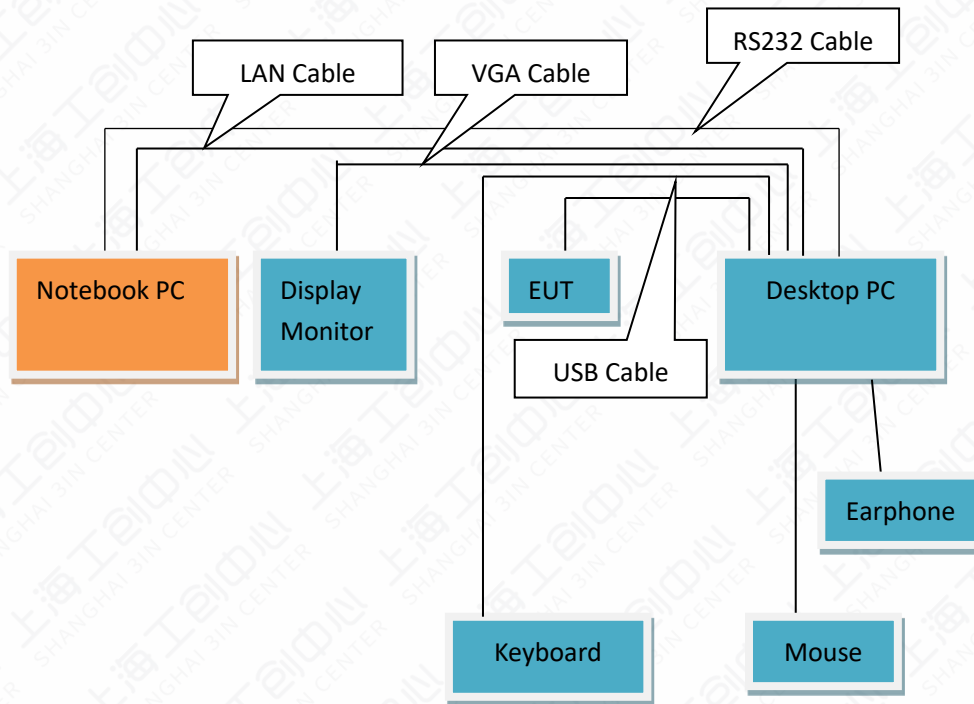


Figure 5.4-1 Mode 12

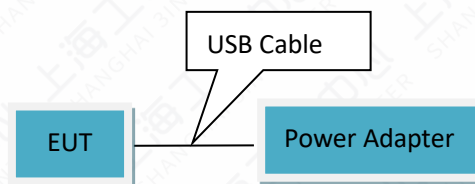


Figure 5.4-2 Mode 1-11,13,14

5.5 Test Equipment Utilized

No.	Name	Model	S/N	SW Version	HW Version	Manufacturer	Cal. Date	Cal. Interval
1	Test Receiver	ESCI	101235	V5.1-24-3	00	R&S	2023-12-19	1 year
2	Test Receiver	ESR7	102399	1.4	00	R&S	2023-06-23	1 year
3	Test Receiver	FSW43	101943	1.12	00	R&S	2023-08-31	1 year
4	Trilog Antenna	VULB9162	00426	N/A	N/A	Schwarzbeck	2023-07-18	1 year
5	Double Ridged Guide Antenna	ETS-3117	00135885	N/A	N/A	ETS	2023-03-23	2 years
6	2-Line V-Network	ENV216	101380	N/A	N/A	R&S	2023-12-19	1 year
7	EMI Test Software	EMC32 V10.35.02	N/A	N/A	N/A	R&S	N/A	N/A
8	EMI Test Software	EMC32 V10.60.20	N/A	N/A	N/A	R&S	N/A	N/A
9	Universal Radio Communication Tester	CMW500	104178	V3.7.20	1206.06 00.00	R&S	2023-10-17	1 year
10	Vector signal generator	SMBV100 A	257904	N/A	N/A	R&S	2023-12-19	1 year
11	Preamplifier	SCU08F1	8320024	N/A	N/A	R&S	2023-10-16	1 year
12	Preamplifier	SCU18	10155	N/A	N/A	R&S	2023-10-16	1 year

5.6 Measurement Uncertainty

Item (s)	Uncertainty
Radiated Emission 30MHz-1000MHz	4.86 dB
Radiated Emission 1000MHz-18000MHz	5.58 dB
Conducted Emission	3.30 dB

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

6 Test Results

6.1 Radiated Emission

6.1.1 Method of Measurement

- a. For 30MHz -1000MHz, the EUT was placed on the top of a rotating 0.8m table above the ground at a semi-anechoic chamber. The distance between the EUT and the received antenna was 3 meters. The table was rotated 360 degree and the received antenna mounted on a variable-height antenna tower was varied from 1m to 4m to find the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement.
- b. For 1000MHz -18000MHz, the EUT was placed on the top of a 0.8m table above the ground at a 3m fully anechoic chamber. The maximal emission value was acquired by adjusting the antenna height, The table was rotated 360 degrees to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna were set during the measurement

6.1.2 EUT Connection Diagram of Test System

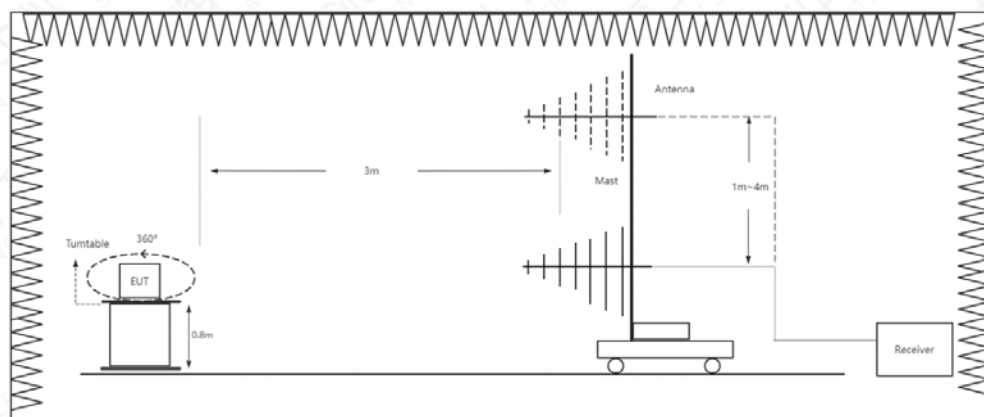


Figure 6.1.2-1 RE 30MHz-1GHz Connection Diagram

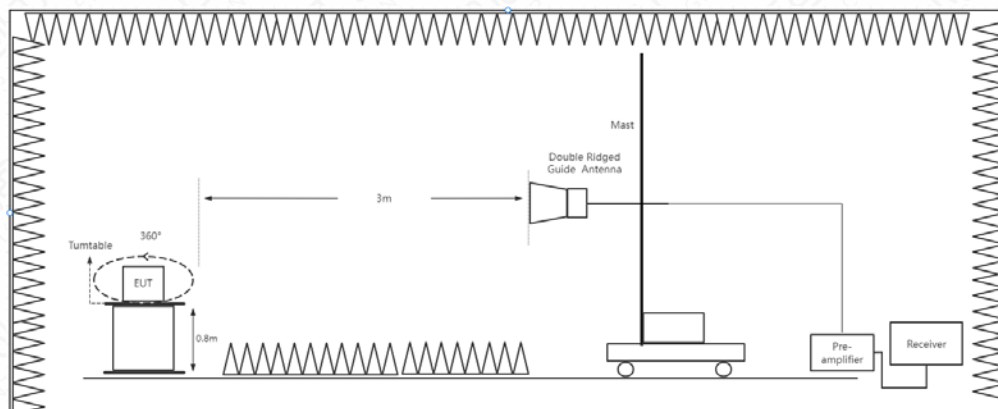


Figure 6.1.2-2 RE Above 1GHz Connection Diagram

6.1.3 Test Condition

Frequency Range (MHz)	RBW/VBW	Sweep Time (s)
30-1000	120kHz/300kHz	AUTO
1000-18000	1MHz/3MHz	AUTO

6.1.4 Limit/Criterion

Frequency Range (MHz)	Quasi-Peak (dBμV/m)	Peak (dBμV/m)	Average (dBμV/m)
30-88	40	N/A	N/A
88-216	43.5	N/A	N/A
216-960	46	N/A	N/A
Above 960	54	N/A	N/A
Above 1000	N/A	74	54

6.1.5 Test environmental conditions

Temperature	18.1℃
Relative Humidity	37.4%RH
Atmospheric Pressure	102.9 kPa

6.1.6 Test Results

Mode	Frequency (MHz)	Test Results	Verdicts
Mode 13: GSM 1900 receiver mode+ Back Camera+ CD02+ UA09+ BB07	30-1000	See Annex A.1-1	Pass
Mode 12: Data Link mode+ UA09+ BA12	1000-18000	See Annex A.1-2 & A.1-3	Pass
NOTE Abbreviations used in this clause: Pass—P; Fail—F; Not applicable—N/A			

6.2 Conducted Emission

6.2.1 Method of Measurement

The EUT was placed on a 0.8m height table with EUT being connected to the power mains through a line impedance stabilization network (LISN). Both lines of the power mains connected to the EUT were checked for maximum conducted interference. The frequency range from 150 kHz to 30 MHz was searched.

6.2.2 EUT Connection Diagram of Test System

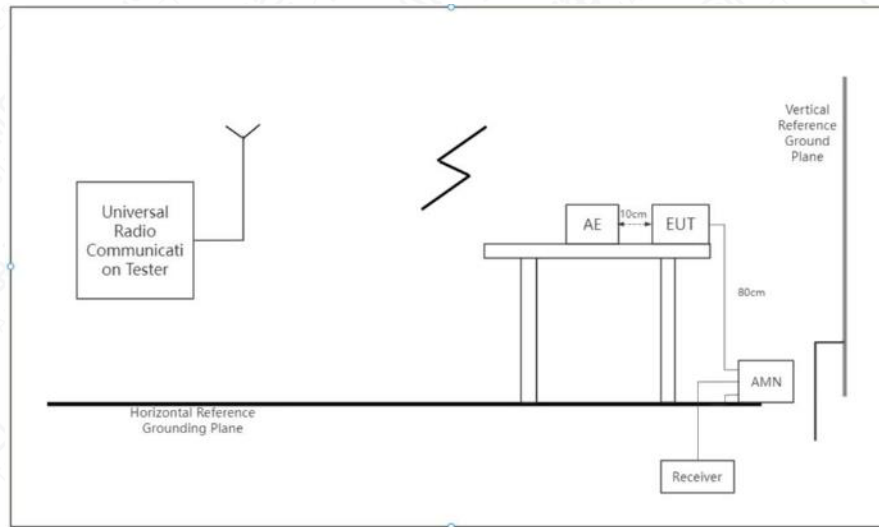


Figure 6.2.2-1 CE Connection Diagram

6.2.3 Test Condition

Test Condition in Charging Mode

Voltage (V)	Frequency (Hz)	RBW	Sweep Time (s)
120	60	9 kHz	AUTO

6.2.4 Limit

Frequency Range (MHz)	Conducted Limit (dBμV)	
	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		

6.2.5 Testing environmental conditions

Temperature	19.9°C
Relative Humidity	35.9%RH
Atmospheric Pressure	102.7kPa

6.2.6 Test Results

S01aa:

Mode	Frequency (MHz)	Test Results	Verdicts
Mode 9: Print mode+ CI02+ UA09+ BA12	0.15-30	See Annex A.2-1	Pass
NOTE Abbreviations used in this clause: Pass—P; Fail—F; Not applicable—N/A			

Annex A: Measurement Data

A.1 Radiated Emission

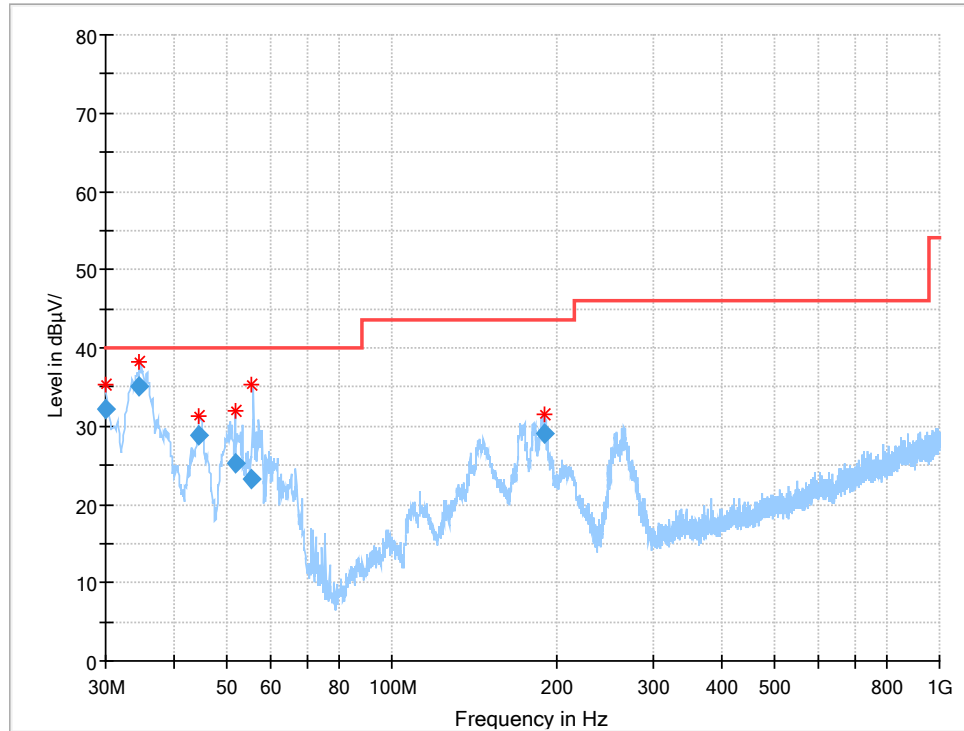


Figure A.1-1 Mode 13 (30M-1GHz)

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
30.008940	32.08	40.00	7.92	100.0	V	0.0	-16.2
34.537640	35.09	40.00	4.91	200.0	V	18.0	-15.1
44.354560	28.74	40.00	11.26	100.0	V	90.0	-11.7
51.845920	25.19	40.00	14.81	100.0	V	147.0	-11.6
55.527720	23.29	40.00	16.71	100.0	V	251.0	-11.9
189.861040	29.00	43.50	14.50	100.0	V	308.0	-13.0

Note:

1.Horizontal and vertical polarity is all have been tested, the result of them is synthesized in the above data diagram.

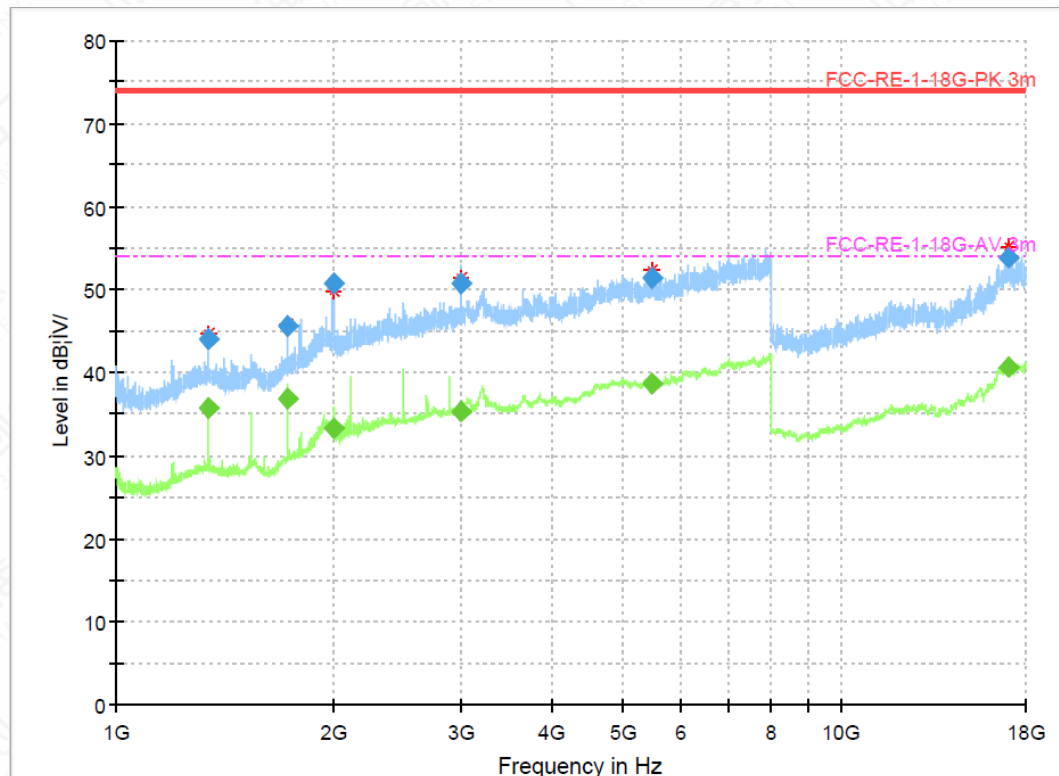


Figure A.1-2 Mode 12 (1GHz-18GHz)-H

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1344.007500	44.01	---	74.00	29.99	115.0	H	335.0	2.7
1344.007500	---	35.76	54.00	18.24	115.0	H	335.0	2.7
1728.196250	---	36.97	54.00	17.03	115.0	H	25.0	4.1
1728.196250	45.56	---	74.00	28.44	115.0	H	25.0	4.1
1998.040000	50.78	---	74.00	23.22	100.0	H	165.0	6.4
1998.040000	---	33.27	54.00	20.73	100.0	H	165.0	6.4
2999.659844	---	35.23	54.00	18.77	115.0	H	358.0	11.3
2999.659844	50.65	---	74.00	23.35	115.0	H	358.0	11.3
5481.152500	51.45	---	74.00	22.55	208.0	H	335.0	16.7
5481.152500	---	38.66	54.00	15.34	208.0	H	335.0	16.7
17042.542500	53.80	---	74.00	20.20	215.0	H	281.0	21.9
17042.542500	---	40.74	54.00	13.26	215.0	H	281.0	21.9

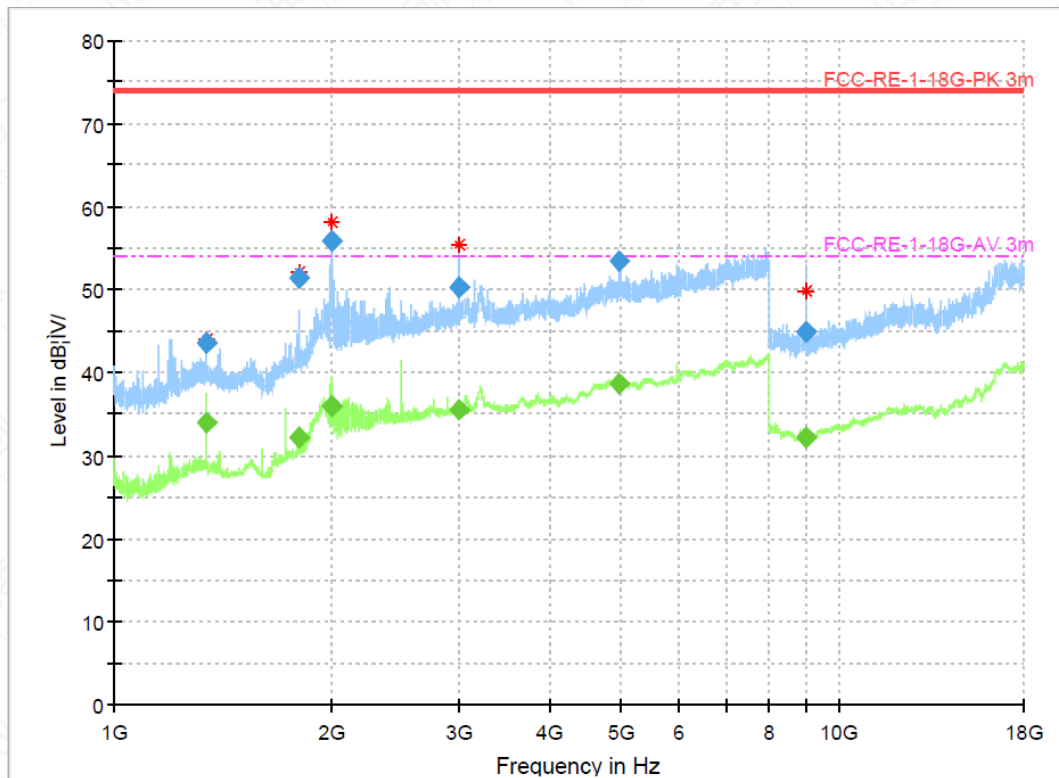


Figure A.1-3 Mode 12 (1GHz-18GHz)-V

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1343.665000	43.53	---	74.00	30.47	102.0	V	249.0	2.7
1343.665000	---	33.94	54.00	20.06	102.0	V	249.0	2.7
1794.791250	51.34	---	74.00	22.66	115.0	V	1.0	4.5
1794.791250	---	32.16	54.00	21.84	115.0	V	1.0	4.5
1993.121250	55.85	---	74.00	18.15	100.0	V	1.0	6.5
1993.121250	---	36.00	54.00	18.00	100.0	V	1.0	6.5
2990.626250	---	35.49	54.00	18.51	215.0	V	112.0	11.2
2990.626250	50.23	---	74.00	23.77	215.0	V	112.0	11.2
4980.888750	---	38.67	54.00	15.33	111.0	V	354.0	15.8
4980.888750	53.49	---	74.00	20.51	111.0	V	354.0	15.8
8997.578750	44.91	---	74.00	29.09	102.0	V	122.0	8.5
8997.578750	---	32.09	54.00	21.91	102.0	V	122.0	8.5

A.2 Conducted Emission

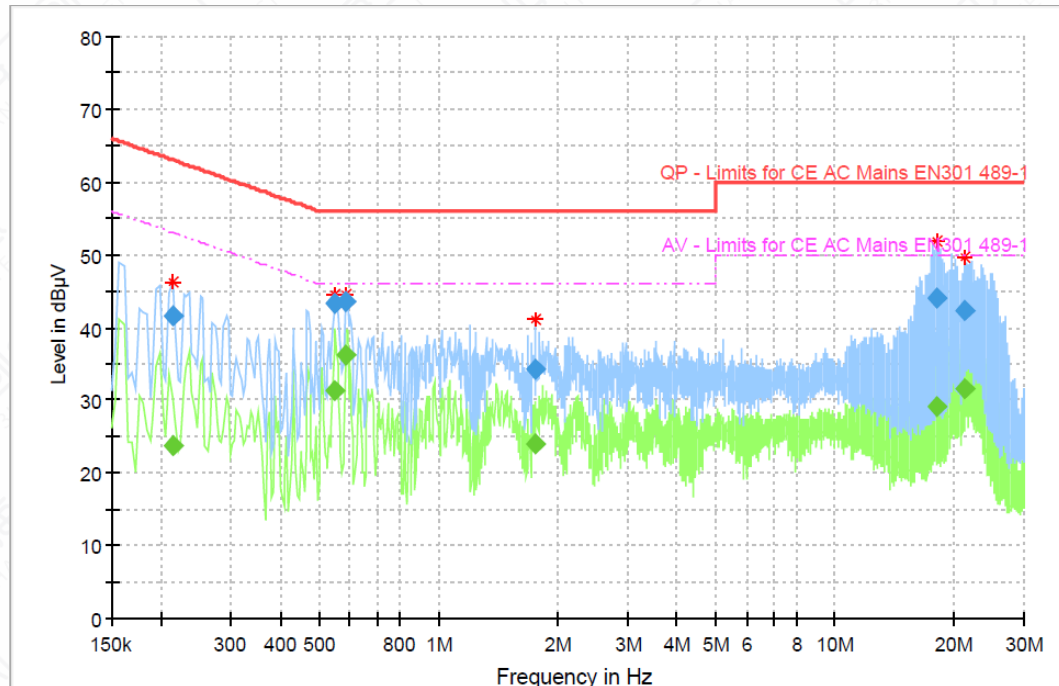


Figure A.2-1 Mode 9 (150kHz-30MHz)

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.213431	---	23.67	53.07	29.40	15000.0	9.000	L1	ON	9.8
0.213431	41.70	---	63.07	21.37	15000.0	9.000	L1	ON	9.8
0.549244	---	31.20	46.00	14.80	15000.0	9.000	L1	ON	9.8
0.549244	43.29	---	56.00	12.71	15000.0	9.000	L1	ON	9.8
0.586556	43.63	---	56.00	12.37	15000.0	9.000	N	ON	10.5
0.586556	---	36.12	46.00	9.88	15000.0	9.000	N	ON	10.5
1.758169	34.15	---	56.00	21.85	15000.0	9.000	L1	ON	9.9
1.758169	---	24.09	46.00	21.91	15000.0	9.000	L1	ON	9.9
18.160744	44.13	---	60.00	15.87	15000.0	9.000	L1	ON	13.4
18.160744	---	29.11	50.00	20.89	15000.0	9.000	L1	ON	13.4
21.339769	42.38	---	60.00	17.62	15000.0	9.000	L1	ON	14.0
21.339769	---	31.59	50.00	18.41	15000.0	9.000	L1	ON	14.0

Note: L1 and N line is all have been tested, the result of them is synthesized in the above data diagram.

Annex B: Revised History

Version	Revised Content
V00	Initial

Annex C: Accreditation Certificate