

FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	XT2401-1
FCC ID	:	IHDT56AQ7
STANDARD	:	FCC Part 15 Subpart C §15.209
CLASSIFICATION	:	(DCD) Part 15 Low Power Transmitter Below 1705 kHz
TEST DATE(S)	:	Mar. 07, 2024 ~ Mar. 14, 2024

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

JasonJia

Approved by: Jason Jia



Sporton International Inc. (Kunshan) No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China



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History of this test report

Report No.	Version	Description	Issued Date
FR420701E	01	Initial issue of report	Mar. 22, 2024



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	2.1049	20dB Bandwidth	Reporting Only	-
3.1	2.1049	99% Occupied Bandwidth	Reporting Only	-
3.2	15.209	Radiated Emission	Pass	Under limit 16.16 dB at 32.910 MHz
3.3	15.207	AC Conducted Emission	Pass	Under limit 12.89 dB at 0.179 MHz
3.4	15.203	Antenna Requirements	Pass	-

Conformity Assessment Condition:

 The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.



1 General Description

1.1 Applicant

Motorola Mobility LLC

222 W, Merchandise Mart Plaza, Chicago IL 60654 USA

1.2 Manufacturer

Motorola Mobility LLC

222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature		
Equipment	Mobile Cellular Phone	
Brand Name	Motorola	
Model Name	XT2401-1	
FCC ID	IHDT56AQ7	
HW Version	DVT2	
SW Version	UUV34.71	
WPT Frequency Range	110 ~ 148kHz	
WPT Type of Modulation	ASK	
WPT Antenna Type	Loop Antenna	
EUT Stage	Identical Prototype	

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Modification of EUT

No modifications are made to the EUT during all test items.



1.5 Test Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)				
	No. 1098, Pengxi North Road, Kunshan Economic Development Zone				
Test Site Location	Jiangsu Province 215300 People's Republic of China				
	TEL : +86-512-579001	: +86-512-57900158			
	Sporton Sito No	FCC Designation No.	FCC Test Firm		
Test Site No.	Sporton Site No.	FCC Designation No.	Registration No.		
Test one NU.	CO01-KS 03CH02-KS TH01-KS	CN1257	314309		

1.6 Test Software

	ltem	Site	Manufacture	Name	Version
ſ	1.	03CH02-KS	AUDIX	E3	6.2009-8-24al
	2.	CO01-KS	AUDIX	E3	6.2009-8-24

1.7 Applied Standards

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

- FCC Part 15 Subpart C §15.209, §15.207
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.



1.8 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	Brand Name	Motorola(Chenyang)	Model Name	MC-1251
AC Adapter 1(EU)	Brand Name	Motorola(Chenyang)	Model Name	MC-1252
AC Adapter 1(UK)	Brand Name	Motorola(Chenyang)	Model Name	MC-1253
AC Adapter 1(AU)	Brand Name	Motorola(Chenyang)	Model Name	MC-1255
AC Adapter 1(AR)	Brand Name	Motorola(Chenyang)	Model Name	MC-1256
AC Adapter 1(BR)	Brand Name	Motorola(Chenyang)	Model Name	MC-1257
AC Adapter 2(US)	Brand Name	Motorola(AOHAI)	Model Name	MC-1251
AC Adapter 2(EU)	Brand Name	Motorola(AOHAI)	Model Name	MC-1252
AC Adapter 2(UK)	Brand Name	Motorola(AOHAI)	Model Name	MC-1253
AC Adapter 2(IN)	Brand Name	Motorola(AOHAI)	Model Name	MC-1254
AC Adapter 2(AU)	Brand Name	Motorola(AOHAI)	Model Name	MC-1255
AC Adapter 2(AR)	Brand Name	Motorola(AOHAI)	Model Name	MC-1256
AC Adapter 2(BR)	Brand Name	Motorola(AOHAI)	Model Name	MC-1257
AC Adapter 2(Chile)	Brand Name	Motorola(AOHAI)	Model Name	MC-1259
Battery	Brand Name	Motorola(ATL)	Model Name	QV45
USB Cable	Brand Name	Motorola(SAIBAO)	Model Name	SC18D71644
Wireless Earphone	Brand Name	Motorola	Model Name	XT2441-1
Wireless Charging dock	Marketing Name	Turbo Power 50W Wireless Charging Stand	Model Name	MW-02



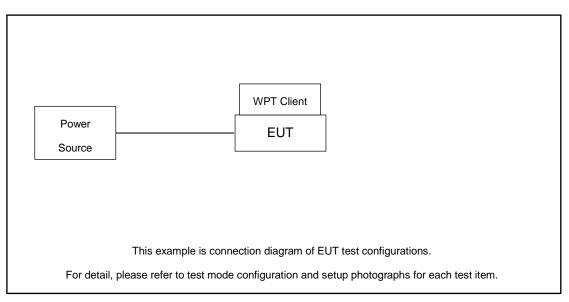
2 Test Configuration of Equipment Under Test

2.1 Test Mode

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 1000 MHz).
- b. AC power line Conducted Emission was tested under maximum output power.

Test Items	Function Type			
AC Conducted Emission	Mode 1: Wireless Charging (Reverse charge the other phone) + USB Cable (Charging from Adapter 1)			
Radiated Emission	Mode 1: Wireless Charging(Reverse charge the other phone) for 121KHz Mode 2: Wireless Charging(Reverse charge the other phone) for 145KHz			
Remark: The worst	Remark: The worst case of radiated emission is mode 2;			

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Mobile Phone (WPT Client)	N/A	N/A	N/A	N/A	N/A



3 Test Result

3.1 20dB and 99% Occupied Bandwidth Measurement

3.1.1 Limit of 20dB and 99% Occupied Bandwidth

Reporting only, 99% OBW shall not located within 15.205 restricted bands.

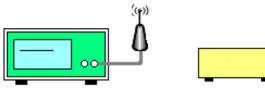
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

- 1. The 20dB bandwidth is measured with a spectrum analyzer connected via a receiver antenna placed near the EUT while wirelessly charging a charging board.
- 2. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
- 3. Measure and record the results in the test report.

3.1.4 Test Setup



Spectrum Analyzer

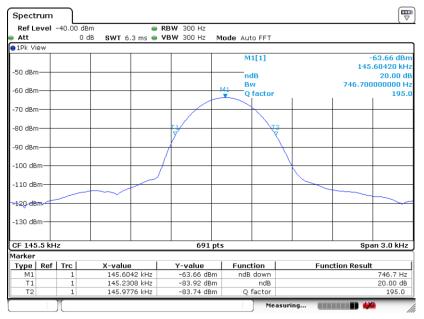
EUT



3.1.5 Test Result of 20dB and 99% Bandwidth

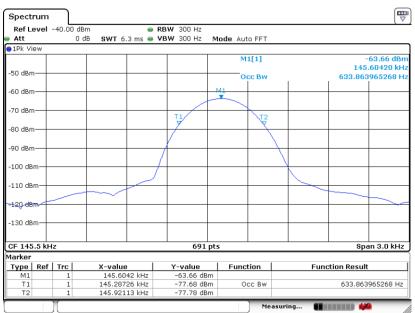
Reverse charge-145.6kHz

20 dB Bandwidth Plot



Date: 14.MAR.2024 12:36:52

99% Occupied Bandwidth Plot

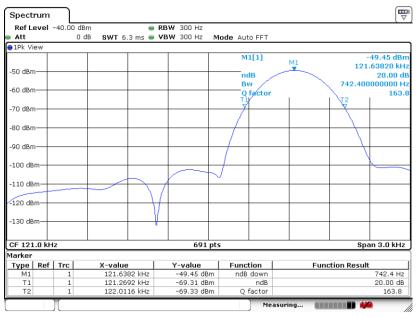


Date: 14.MAR.2024 12:37:11



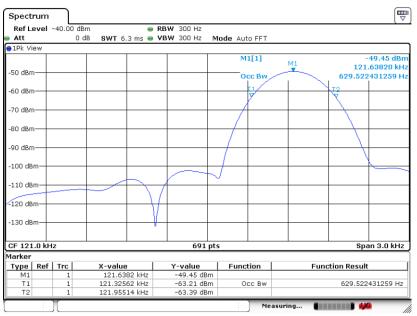
Reverse charge-121.6kHz

20 dB Bandwidth Plot



Date: 14.MAR.2024 12:42:48

99% Occupied Bandwidth Plot



Date: 14.MAR.2024 12:42:24



3.2 Radiated Emission Measurement

3.2.1 Limit of Radiated Emission

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Receiver Parameter	Setting
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For radiated emissions from 9kHz to 1GHz test distance is 3m

For 9kHz ~ 30MHz

- 1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
- 2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
- 3. specific line $(dB\mu V/m) = 20 \log Emission level (\mu V/m)$
- 4. Limit line = specific limits $(dB\mu V/m)$ + distance extrapolation factor.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

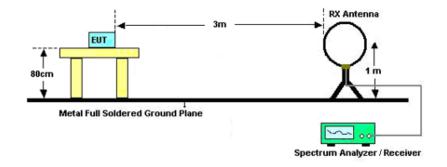
3.2.3 Measuring Instrument Setting

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.



3.2.4 Test Setup of Radiated Emission

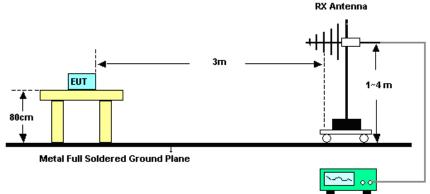
For radiated emissions below 30MHz



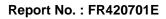
Note:

- 1. There is a comparison data of both open-field test site and alternative test site semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.
- Tested for radiated below 30 MHz using a loop antenna in accordance with C63.10, the antenna was positioned in three antenna orientations: horizontal, vertical, and ground-parallel three polarization's, the worst case is horizontal & vertical polarization, test data of two mode was reported.

For radiated emissions above 30MHz



Spectrum Analyzer / Receiver

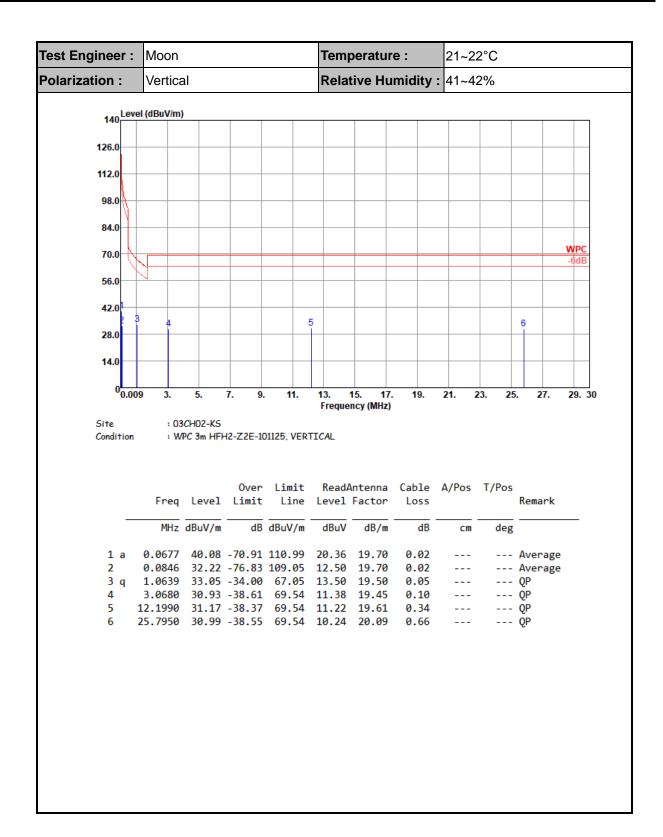




olarization : 140	-	Moon			Temp	Temperature :		21~	21~22°C		
140	Horizontal			Relat	Relative Humidity :		: 41~	41~42%			
	el (dBuV/m))									
126.0											
112.0									_		
98.0											
84.0											
70.0											WPC
10.0											-6dB
56.0	N										
42.0	3 4								_		
								5			6
28.0											
14.0											
0.00	09 3.	5.	7. 9.	11.		15. 17.		21.	23. 25	5. 27.	29. 30
Site Condition		ICHO2-KS PC 3m HFI	12-Z2E-10)1125, HOR		ncy (MHz) -					
					IZONTAL	-		A /Por	T /Pos		
	: W		0ver	Limit	IZONTAL ReadA	ntenna		A/Pos	; T/Pos	Remark	
	: W	PC 3m HFf	Over Limit	Limit Line	IZONTAL ReadA	ntenna Factor	Cable	A/Pos		Remark	
	: W Freq MHz	PC 3m HFP Level dBuV/m	Over Limit 	Limit Line	ReadA Level dBuV	ntenna Factor dB/m	Cable Loss	CI	deg	Remark	
Condition 1 a 2	: W Freq MHz 0.0648 0.0808	PC 3m HFP Level dBuV/m 40.52 38.22	Over Limit 	Limit Line dBuV/m 111.36 109.45	ReadA Level dBuV 20.80 18.50	- Factor 	Cable Loss dB 0.02 0.02	Cn 	deg	Average Average	
Condition 1 a 2 3 q	: W Freq MHz 0.0648 0.0808 1.0676	PC 3m HFF Level dBuV/m 40.52 38.22 38.12	Over Limit 	Limit Line dBuV/m 111.36 109.45 67.02	ReadA Level dBuV 20.80 18.50 18.57	ntenna Factor dB/m 19.70 19.70 19.50	Cable Loss dB 0.02 0.02 0.05	Cn 	deg	Average QP	
Condition 1 a 2	: W Freq MHz 0.0648 0.0808 1.0676	PC 3m HFF Level dBuV/m 40.52 38.22 38.12 39.11	Over Limit 	Limit Line dBuV/m 111.36 109.45 67.02 69.54	ReadA Level dBuV 20.80 18.50 18.57 19.57		Cable Loss dB 0.02 0.02	Cn 	deg	Average Average QP QP	

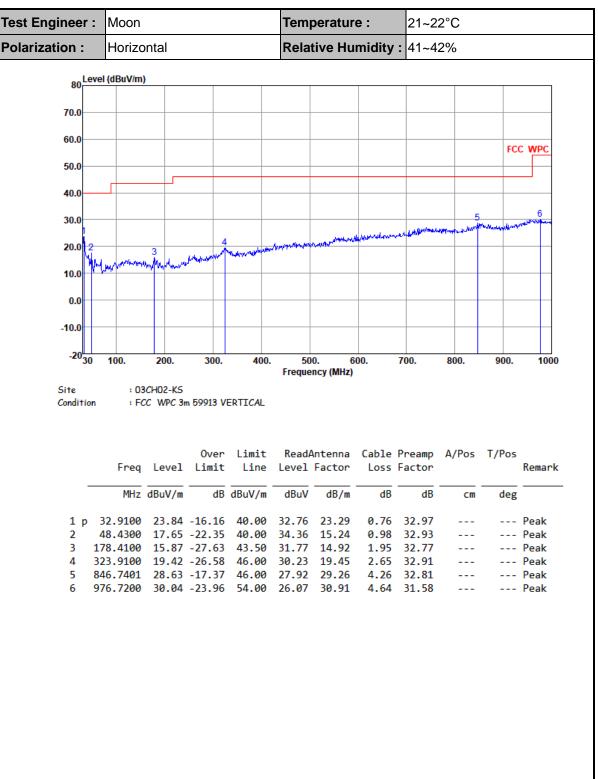
3.2.5 Test Result of Radiated Emission (9kHz ~ 30MHz)



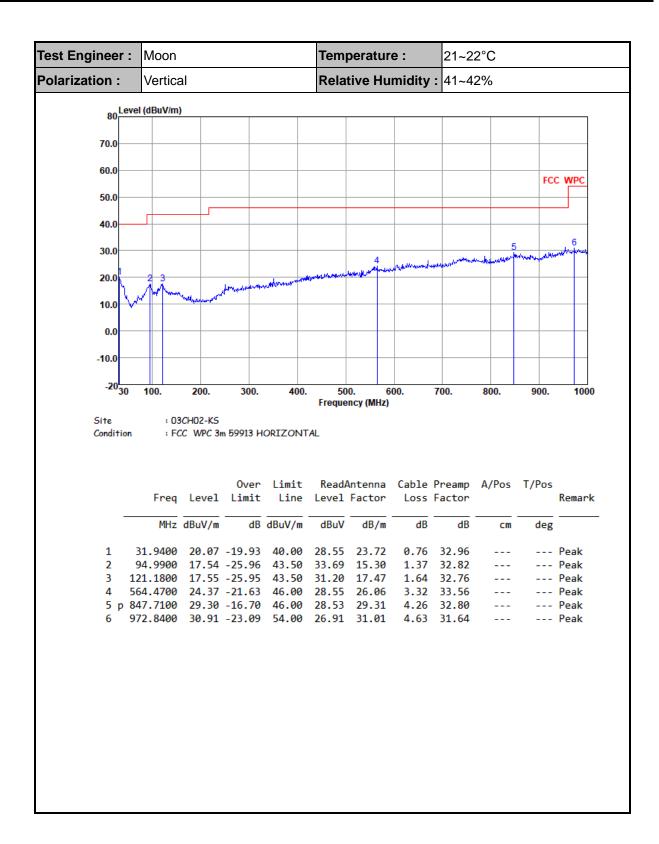




3.2.6 Test Result of Radiated Emission (30MHz ~ 1000MHz)









3.3 AC Conducted Emission Measurement

3.3.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission	Conducted Limit (dBµV)			
(MHz)	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.

3.3.2 Measuring Instruments

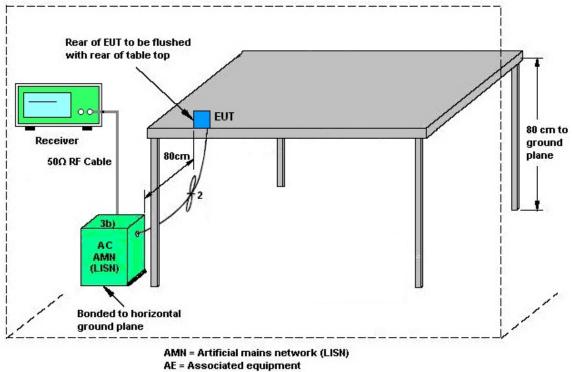
See list of measuring equipment of this test report.

3.3.3 Test Procedure

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.



3.3.4 Test Setup



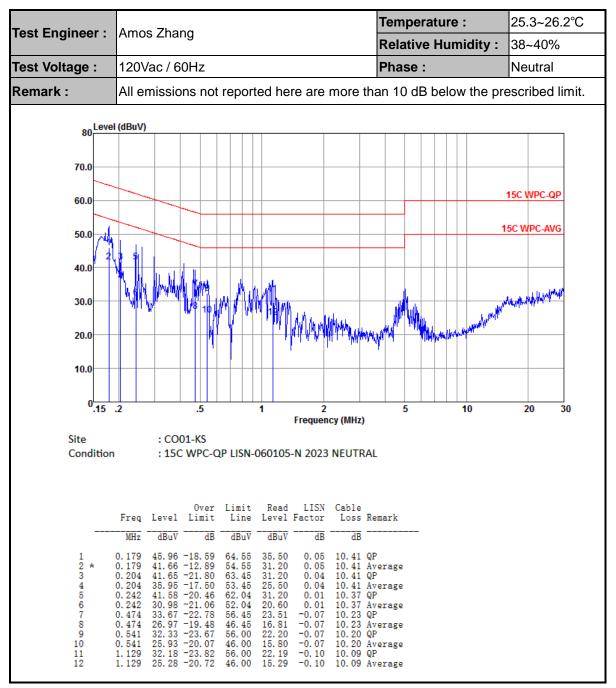
- EUT = Equipment under test
- ISN = Impedance stabilization network



Relative Humidity :38~40%Test Voltage :120Vac / 60HzPhase :Line	Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C	
Remark : All emissions not reported here are more than 10 dB below the prescribed limit add the image of th	rest Engineer :	Amos Zhang	Relative Humidity :	38~40%	
Image: the set of the se	Fest Voltage :	120Vac / 60Hz	Phase :	Line	
$\int_{1}^{1} \int_{1}^{1} \int_{1$	Remark :	All emissions not reported here are more t	han 10 dB below the pr	escribed limit.	
1 0.165 43.96 -21.25 65.21 33.50 0.04 10.42 QP 2 * 0.165 40.26 -14.95 55.21 29.80 0.04 10.42 Average 3 0.189 41.95 -22.11 64.06 31.51 0.03 10.41 QP 4 0.189 34.35 -19.71 54.06 23.91 0.03 10.41 Average 5 0.224 41.92 -20.74 62.66 31.50 0.03 10.39 QP	Remark : 80 70.0 60.0 50.0 40.0 20.0 10.0 0.15 Site Condition	All emissions not reported here are more t	han 10 dB below the pro-	escribed limit.	

3.3.5 Test Result of AC Conducted Emission





Note:

- 1. Level(dB μ V) = Read Level(dB μ V) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB μ V) Limit Line(dB μ V)



3.4 Antenna Requirements

3.4.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. 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.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.





4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz; Max 30dBm	Oct. 10, 2023	Mar. 07, 2024 ~Mar. 14, 2024	Oct. 09, 2024	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Oct. 10, 2023	Mar. 07, 2024 ~Mar. 14, 2024	Oct. 09, 2024	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 21, 2023	Mar. 07, 2024 ~Mar. 14, 2024	Dec. 20, 2024	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	380826	9KHz-1GHz	Jul 06, 2023	Mar. 07, 2024 ~Mar. 14, 2024	Jul 05, 2024	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	6160100024 73	N/A	NCR	Mar. 07, 2024 ~Mar. 14, 2024	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Mar. 07, 2024 ~Mar. 14, 2024	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Mar. 07, 2024 ~Mar. 14, 2024	NCR	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	May 16, 2023	Mar. 12, 2024	May 15, 2024	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2023	Mar. 12, 2024	Oct. 10, 2024	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	May 16, 2023	Mar. 12, 2024	May 15, 2024	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP0000008 11	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2023	Mar. 12, 2024	Oct. 10, 2024	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Mar. 14, 2024	Oct. 10, 2024	Conducted (TH01-KS)

NCR: No Calibration Required



5 Measurement Uncertainty

Uncertainty of Conducted Measurement

Occupied Channel Bandwidth	±0.1%
----------------------------	-------

Uncertainty of AC Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2.84dB
of 95% (U = 2Uc(y))	2.040B

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	3.30dB
of 95% (U = 2Uc(y))	3.300B

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence	6.04dB
of 95% (U = 2Uc(y))	6.04dB

----- THE END ------