NVLAP TESTING
NVLAP LAB CODE 600341-0

BACL Bay Area Compliance Labs Corp.

TEST REPORT

Applicant:	**Fujian LANDI Commercial Equipment Co.,Ltd.**
Address:	**FCC: Building 17, Section A, Software Park, No. 89 Software Road, Gulou District, Fuzhou Municipality, Fujian Province, China** **IC: Building 17, Section A, Software Park, No. 89 Software Road, Gulou District, Fuzhou Municipality, Fujian Province,P.R. 350003 China**
Product Name:	**Mobile Terminal**
FCC ID:	**2AG6N-M20**
IC:	**23725-M20**
HVIN:	**M20S1, M20S0, M20SES1, M20SES0**
Standard(s):	**47 CFR Part 15, Subpart C(15.225)** **ANSI C63.10-2013** **RSS-210 Issue 10, December 2019, Amendment (April 2020)** **RSS-Gen, Issue 5, February 2021 Amendment 2**
Report Number:	**XMDN240206-08120E-RF-00G**
Report Date:	**2024/6/14**

The above device has been tested and found compliant with the requirement of the relative standards by Bay Area Compliance Laboratories Corp. (Dongguan).

Reviewed By: Gavin Xu	**Approved By:** Ivan Cao
Title: RF Engineer	Title: EMC Manager

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	XMDN240206-08120E-RF-00G	Original Report	2024/6/14

1. GENERAL INFORMATION

1.1 General Description of Equipment under Test

EUT Name:	Mobile Terminal
EUT Model:	M20
Multiple Models:	M20SE
Operation Frequency:	13.56 MHz
Modulation Type:	ASK
Rated Input Voltage:	DC 7.7V from battery or DC 5V from Adapter or Charging Base
Serial Number:	Radiated spurious emission and AC line conducted emission tests: 2HPA-3(HVIN: M20S1) 2HPA-4(HVIN: M20S0) 2HPA-5(HVIN: M20SES1) 2HPA-6(HVIN: M20SES0) Bandwidth and frequency stability test: 2HPA-3(HVIN: M20S1)
EUT Received Date:	2024/2/7
EUT Received Status:	Good
Note : The Multiple models are electrically identical with the test model .Each model of device have two configurations, the difference see the below table and the declaration letter for more detail, which was provided by manufacturer.	

Configurations:

Configuration	HVIN	Model	Configuration Description
1	M20S1	M20	With Printer, with Scanning camera, wired loop NFC Antenna, M20 Housing and antennas
2	M20S0	M20	With Printer, without Scanning camera, wired loop NFC Antenna, M20 Housing and antennas
3	M20SES1	M20SE	Without Printer, with Scanning camera, FPC loop NFC Antenna, M20SE Housing and antennas
4	M20SES0	M20SE	Without Printer, without Scanning camera, FPC loop NFC Antenna, M20SE Housing and antennas

1.2 Accessory Information

Accessory Description	Manufacturer	Model	Parameters
Adapter 1	Something High Electric (Xiamen) Company Inc.	P12GUSB050200	Input: 100-240Vac~50/60Hz 0.3A Output: 5.0Vdc,2.0A
Adapter 2	SHENZHEN KEYU POWER SUPPLY TECHNOLOGY CO., LTD	KA1602-0502000DEU	Input: 100-240Vac~50/60Hz 0.35A Output: 5.0Vdc 2.0A,10W
Battery 1	HuiZhou Ganfeng LiEnergy Battery Technology Co.,LTD.	526265-2S (2ICP6/62/65)	DC 7.7V 3550mAh/27.34Wh
Battery 2	SCUD(Fujian)Electronics Co.,LTD	526266-2S (2ICP6/62/66)	DC 7.7V 3620mAh/27.87Wh

1.3 Antenna Information Detail▲

Model	Antenna Type	input impedance (Ohm)	Frequency Range	Antenna Gain
M20	Wired loop	50	13.56MHz	Unknown
M20SE	FPC Loop	50	13.56MHz	Unknown
The design of compliance with §15.203:				
☒ Unit uses a permanently attached antenna.				
☐ Unit uses a unique coupling to the intentional radiator.				
☐ Unit was professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.				

1.4 Equipment Modifications

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

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
FCC§15.207 (a) RSS-Gen Clause 8.8	AC Line Conducted Emissions	Compliant
§15.225 §15.209; §15.205 RSS-Gen Clause 8.9 RSS-210 Annex B.6 (a)	Radiated Spurious Emissions	Compliant
§15.225(e) RSS-210 Annex B.6 (b)	Frequency Stability	Compliant
§15.215(c)	20 dB Bandwidth	Compliant
RSS-Gen Clause 6.7	99% Occupied Bandwidth	Compliant
FCC§15.203 RSS-Gen Clause 6.8	Antenna Requirement	Compliant

3. DESCRIPTION OF TEST CONFIGURATION

3.1 EUT Operation Condition

The system was configured for testing in Engineering Mode, which was provided by the manufacturer.
The following summary table is showing all test modes to demonstrate in compliance with the standard:

Test Items	Test Modes
Radiated Spurious Emission:	M1: Transmitting (Configuration 1+Adapter 1+ Battery 1)
	M2: Transmitting (Configuration 1+Adapter 1+ Battery 2)
	M3: Transmitting (Configuration 1+Adapter 2+ Worst Battery)
	M4: Transmitting (Configuration 2+Worst Adapter above+ Worst Battery above)
	M5: Transmitting (Configuration 3+Worst Adapter above+ Worst Battery above)
	M6: Transmitting (Configuration 4+Worst Adapter above+ Worst Battery above)
	M7: Transmitting (Configuration 1/2+ M20 charger base+Worst Adapter above+ Worst Battery above)
	M8: Transmitting (Configuration 3/4+ M20SE charger base+Worst Adapter above+ Worst Battery above)
AC Line Conducted Emission:	M1: Transmitting (Configuration 1+Adapter 1+ Battery 1)
	M2: Transmitting (Configuration 1+Adapter 1+ Battery 2)
	M3: Transmitting (Configuration 1+Adapter 2+ Worst Battery)
	M4: Transmitting (Configuration 2+Worst Adapter above+ Worst Battery above)
	M5: Transmitting (Configuration 3+Worst Adapter above+ Worst Battery above)
	M6: Transmitting (Configuration 4+Worst Adapter above+ Worst Battery above)
	M7: Transmitting (Configuration 1/2+ M20 charger base+Worst Adapter above+ Worst Battery above)
	M8: Transmitting (Configuration 3/4+ M20SE charger base+Worst Adapter above+ Worst Battery above)

3.2 EUT Exercise Software

No software was used in test.

3.3 Support Equipment List and Details

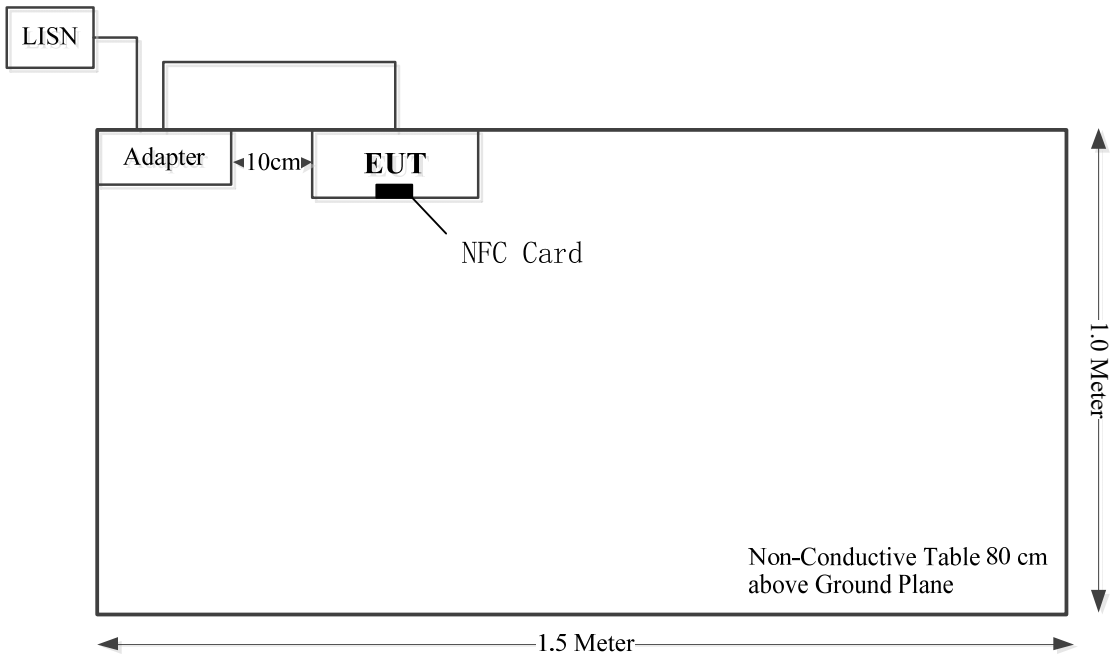
Manufacturer	Description	Model	Serial Number
LANDI	M20 Charging Base	BASEM20	BASEM20
LANDI	M20SE Charging Base	BASEM20SE	BASEM20SE
LANDI	NFC Card	EINOLDA	EMZBNC21103001

3.4 Support Cable List and Details

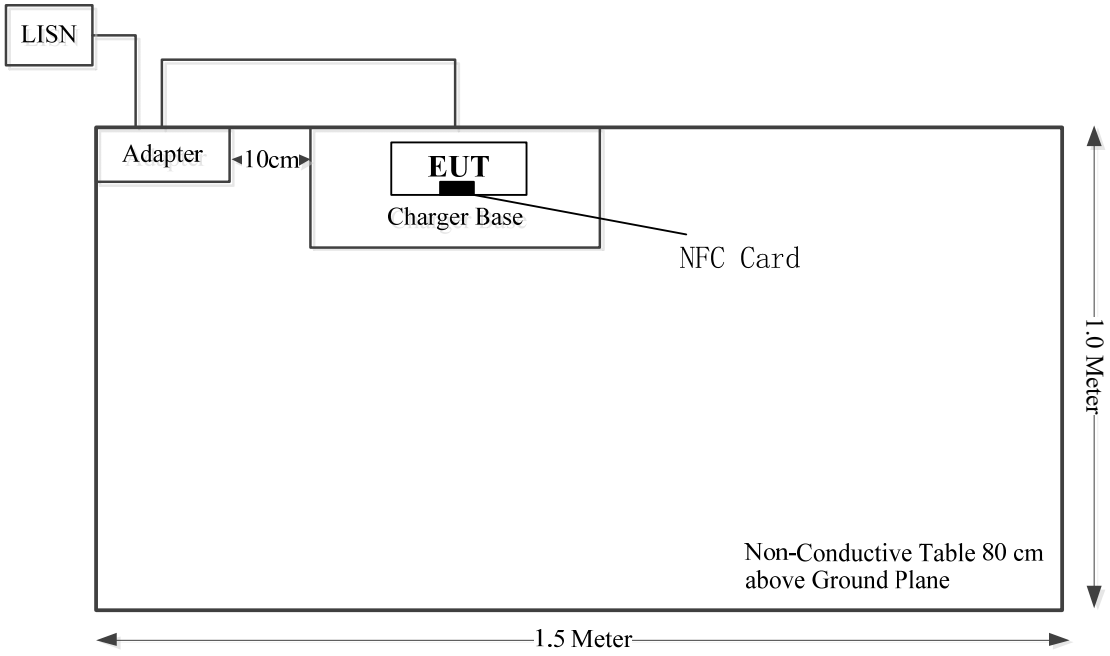
Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	No	No	1.0	Adapter	EUT/Charger Base

3.5 Block Diagram of Test Setup

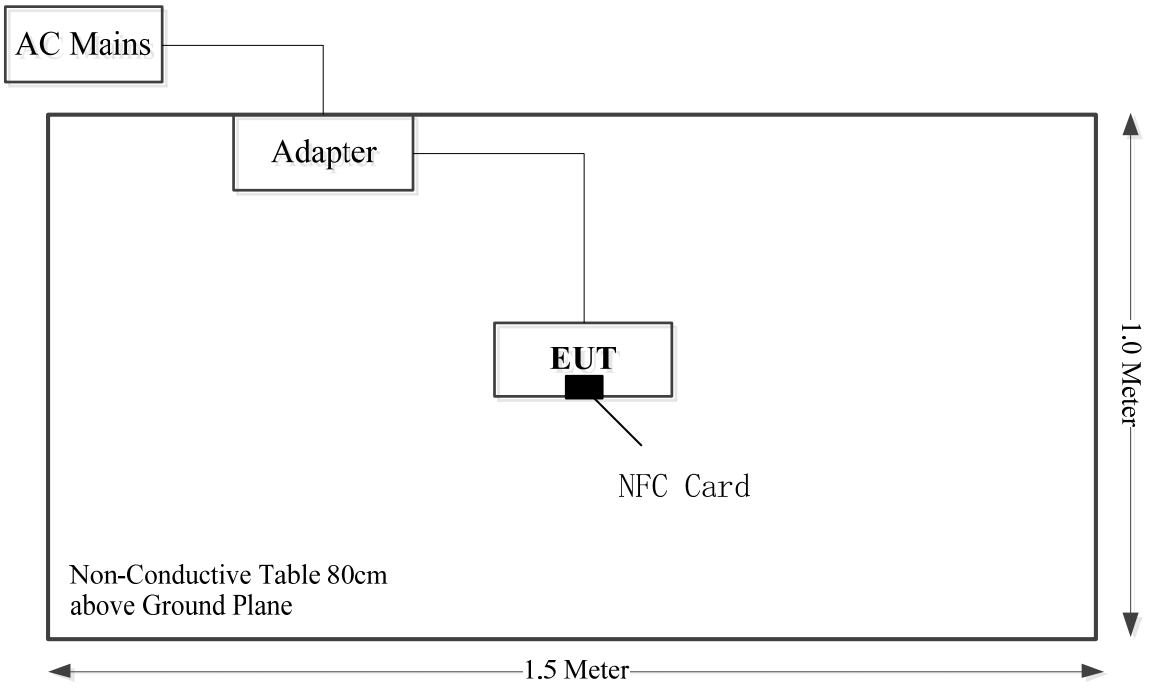
AC power line conducted emissions:
Charged by USB:



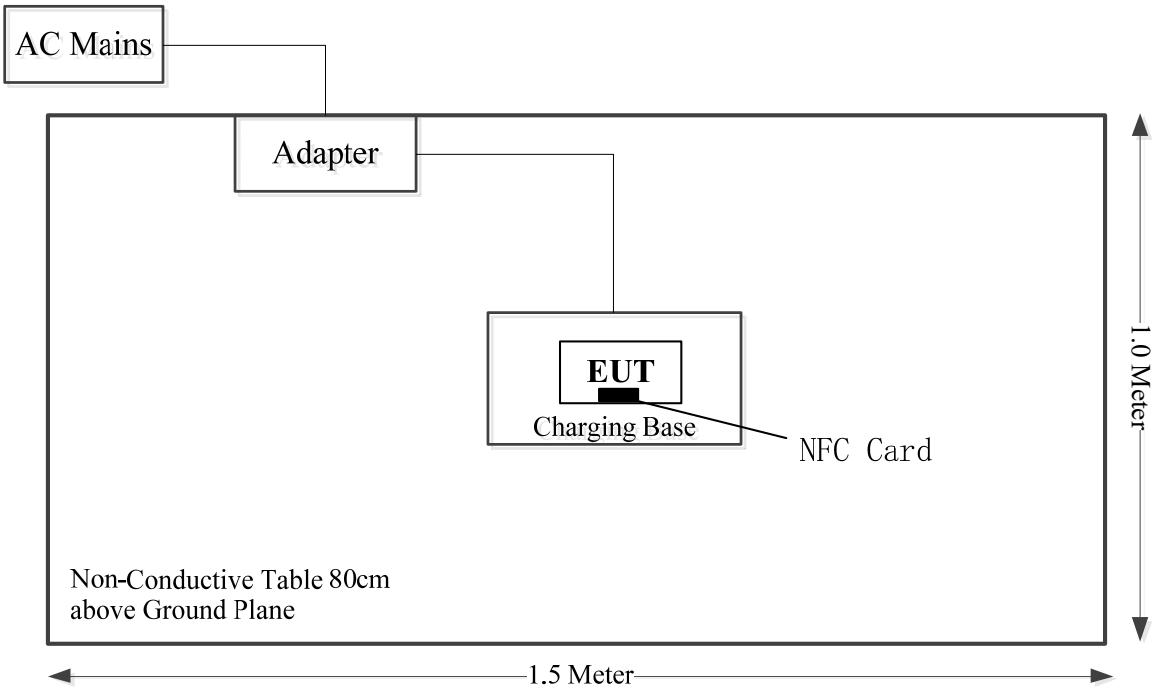
Charged by Charger Base:



Radiated Spurious Emissions:
Charged by USB:



Charged by Charger Base:



3.6 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1st Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 829273, the FCC Designation No. : CN5044.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

3.7 Measurement Uncertainty

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Power Spectral Density, conducted	±0.61 dB
Unwanted Emissions, radiated	9kHz~30MHz: 3.3dB, 30MHz~200MHz: 4.55 dB, 200MHz~1GHz: 5.92 dB, 1GHz~6GHz: 4.98 dB, 6GHz~18GHz: 5.89 dB, 18GHz~26.5GHz:5.47 dB, 26.5GHz~40GHz:5.63 dB
Unwanted Emissions, conducted	±2.47 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%
AC Power Lines Conducted Emission	3.11 dB (150 kHz to 30 MHz)

4. REQUIREMENTS AND TEST RESULTS

4.1 AC Line Conducted Emissions

4.1.1 Applicable Standard

FCC§15.207(a).

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

	Conducted limit (dBμV)	
Frequency of emission (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.

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

(1) For carrier current system containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.

(2) For all other carrier current systems: 1000 μV within the frequency band 535-1705 kHz, as measured using a 50 μH/50 ohms LISN.

(3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtainig their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

RSS-Gen Clause 8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 µH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.
For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 – AC power-line conducted emissions limits

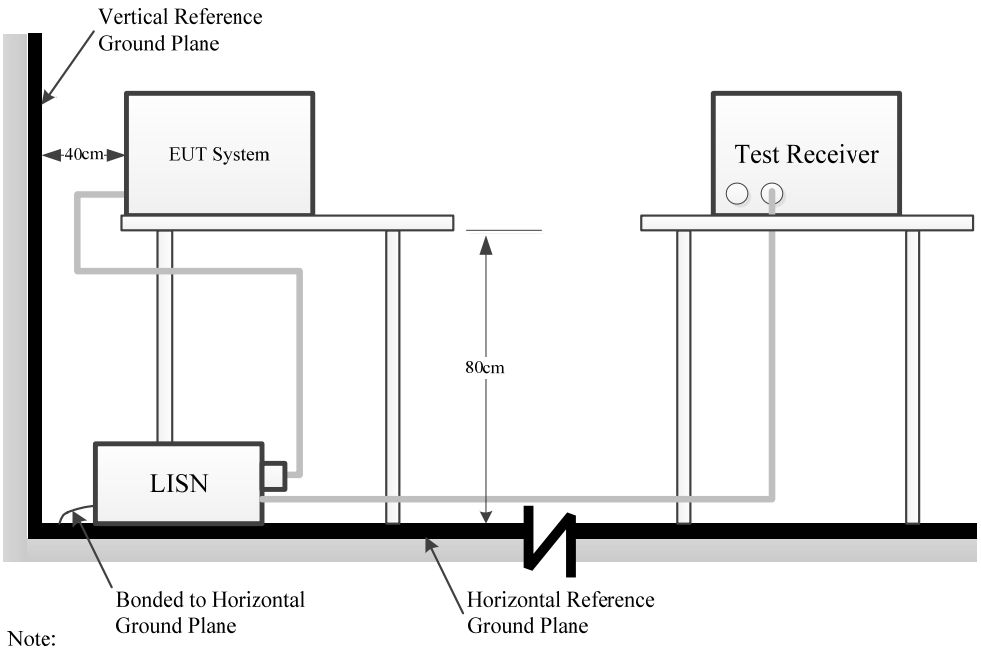
Frequency (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:
(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

4.1.2 EUT Setup



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

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207, RSS-Gen limits.

The spacing between the peripherals was 10 cm.

The adapter or EUT was connected to the main LISN with a 120 V/60 Hz AC power source.

4.1.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

4.1.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

The frequency and amplitude of the six highest ac power-line conducted emissions relative to the limit, measured over all the current-carrying conductors of the EUT power cords, and the operating frequency or frequency to which the EUT is tuned (if appropriate), should be reported, unless such emissions are more than 20 dB below the limit. AC power-line conducted emissions measurements are to be separately carried out only on each of the phase ("hot") line(s) and (if used) on the neutral line(s), but not on the ground [protective earth] line(s). If less than six emission frequencies are within 20 dB of the limit, then the noise level of the measuring instrument at representative frequencies should be reported. The specific conductor of the power-line cord for each of the reported emissions should be identified. Measure the six highest emissions with respect to the limit on each current-carrying conductor of each power cord associated with the EUT (but not the power cords of associated or peripheral equipment that are part of the test configuration). Then, report the six highest emissions with respect to the limit from among all the measurements identifying the frequency and specific current-carrying conductor identified with the emission. The six highest emissions should be reported for each of the current-carrying conductors, or the six highest emissions may be reported over all the current-carrying conductors.

According FCC publication number 174176,for a device with a permanent antenna operating at or below 30 MHz, the measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

4.1.5 Corrected Amplitude & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = attenuation caused by cable loss + voltage division factor of AMN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

4.1.6 Test Data

Serial Number:	2HPA-3, 2HPA-5	Test Date:	2024/3/15~2024/4/8
Test Site:	CE	Test Mode:	Transmitting
Tester:	Wright Lai	Test Result:	Pass

Environmental Conditions:

Temperature: (℃)	21.6~24.5	Relative Humidity: (%)	67~70	ATM Pressure: (kPa)	100.5~100.9

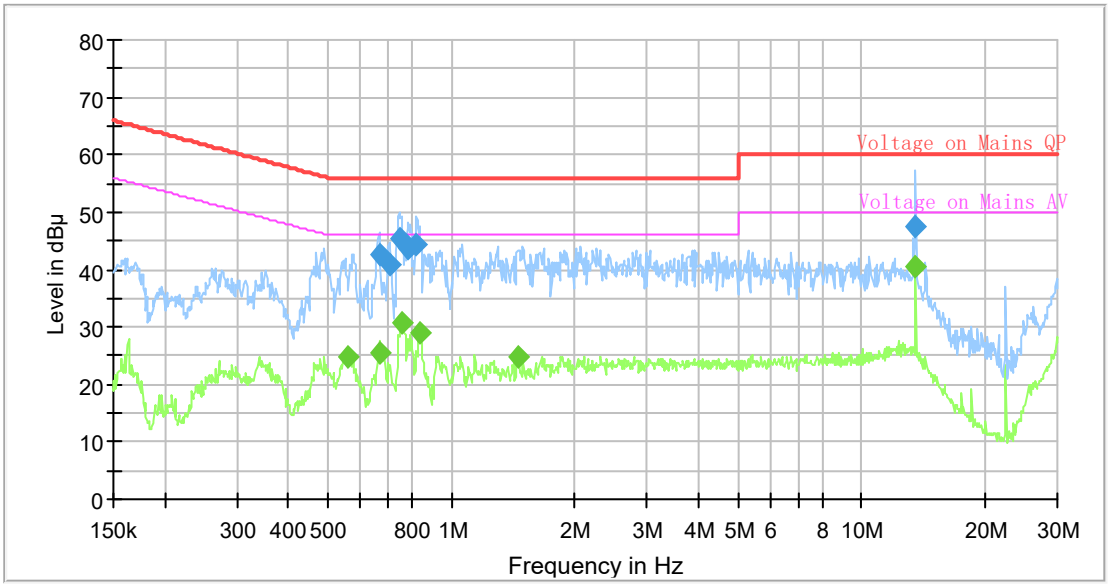
Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	LISN	ENV216	101614	2023/10/18	2024/10/17
MICRO-COAX	Coaxial Cable	C-NJNJ-50	C-0200-01	2023/9/5	2024/9/4
R&S	EMI Test Receiver	ESCI	100035	2023/8/18	2024/8/17
R&S	Test Software	EMC32	V9.10.00	N/A	N/A

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

(Mode 1 is the worst of model M20,and be reported):

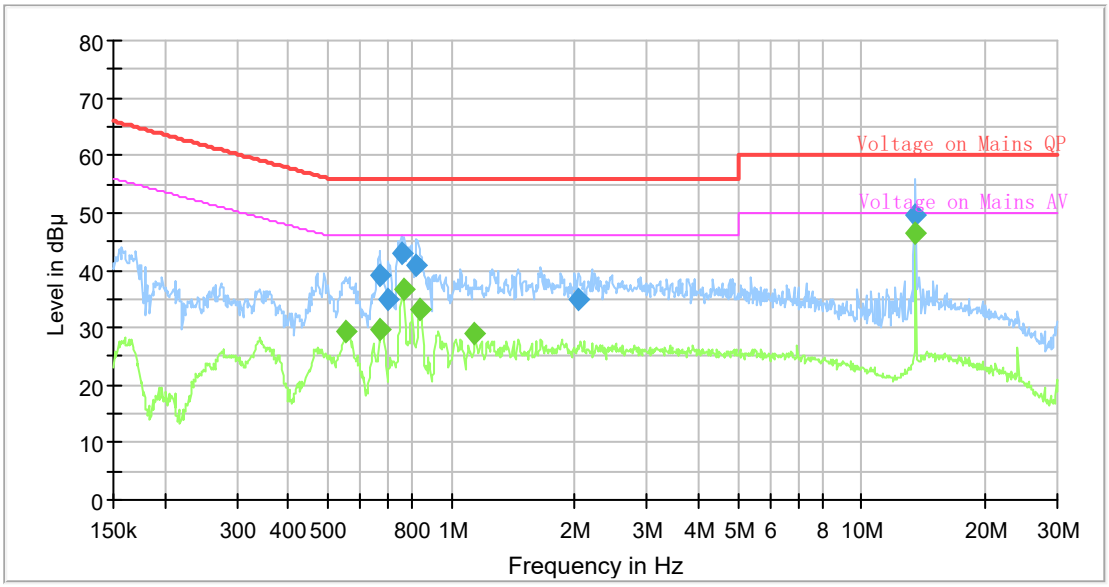
Project No:	XMDN240206-08120E-RF
Test Engineer:	Wright Lai
Test Date:	2024/3/15
Port:	L
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.556885	---	24.86	46.00	21.14	9.000	L1	10.8
0.666413	---	25.56	46.00	20.44	9.000	L1	10.8
0.666413	42.65	---	56.00	13.35	9.000	L1	10.8
0.707516	40.80	---	56.00	15.20	9.000	L1	10.9
0.747417	45.25	---	56.00	10.75	9.000	L1	10.9
0.758685	---	30.86	46.00	15.14	9.000	L1	10.9
0.785640	43.78	---	56.00	12.22	9.000	L1	10.9
0.821710	44.49	---	56.00	11.51	9.000	L1	10.9
0.838267	---	28.85	46.00	17.15	9.000	L1	10.9
1.458194	---	24.90	46.00	21.10	9.000	L1	10.8
13.555870	47.67	---	60.00	12.33	9.000	L1	10.8
13.555870	---	40.36	50.00	9.64	9.000	L1	10.8

Project No:	XMDN240206-08120E-RF
Test Engineer:	Wright Lai
Test Date:	2024/3/15
Port:	N
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz

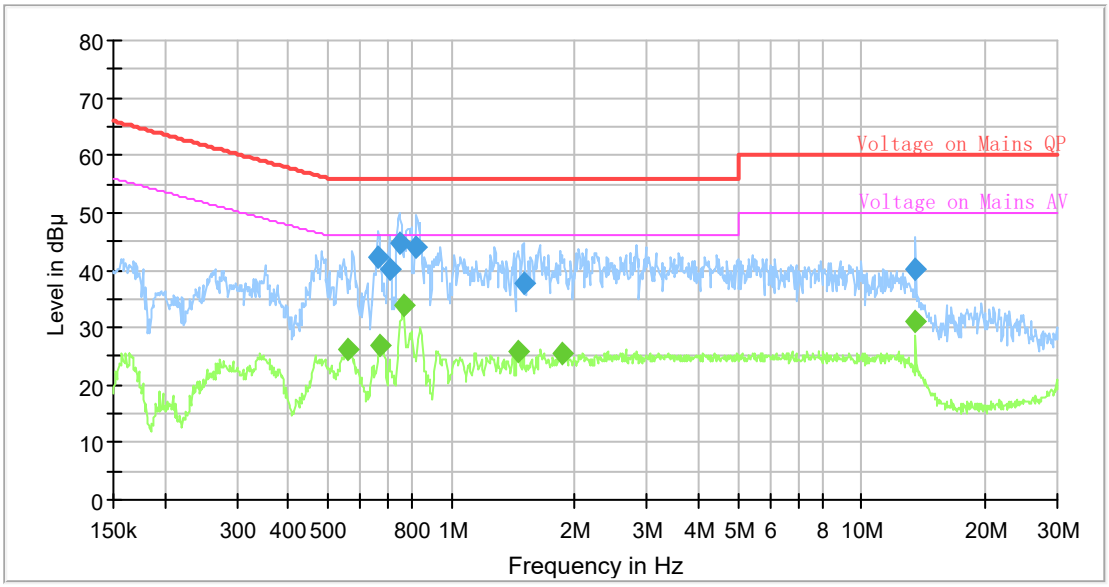


Final_Result

Frequency (MHz)	QuasiPeak (dB µV)	Average (dB µV)	Limit (dB µV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.554114	---	29.42	46.00	16.58	9.000	N	10.7
0.669745	39.09	---	56.00	16.91	9.000	N	10.7
0.673094	---	29.67	46.00	16.33	9.000	N	10.7
0.703996	34.81	---	56.00	21.19	9.000	N	10.8
0.754910	43.13	---	56.00	12.87	9.000	N	10.8
0.762478	---	36.76	46.00	9.24	9.000	N	10.8
0.821710	40.73	---	56.00	15.27	9.000	N	10.8
0.842459	---	33.16	46.00	12.84	9.000	N	10.8
1.142032	---	29.03	46.00	16.97	9.000	N	10.9
2.046952	34.76	---	56.00	21.24	9.000	N	10.9
13.553299	---	46.36	50.00	43.64	9.000	N	10.9
13.553299	49.76	---	60.00	10.24	9.000	N	10.9

(Mode 3 is the worst of model M20SE, and be reported):

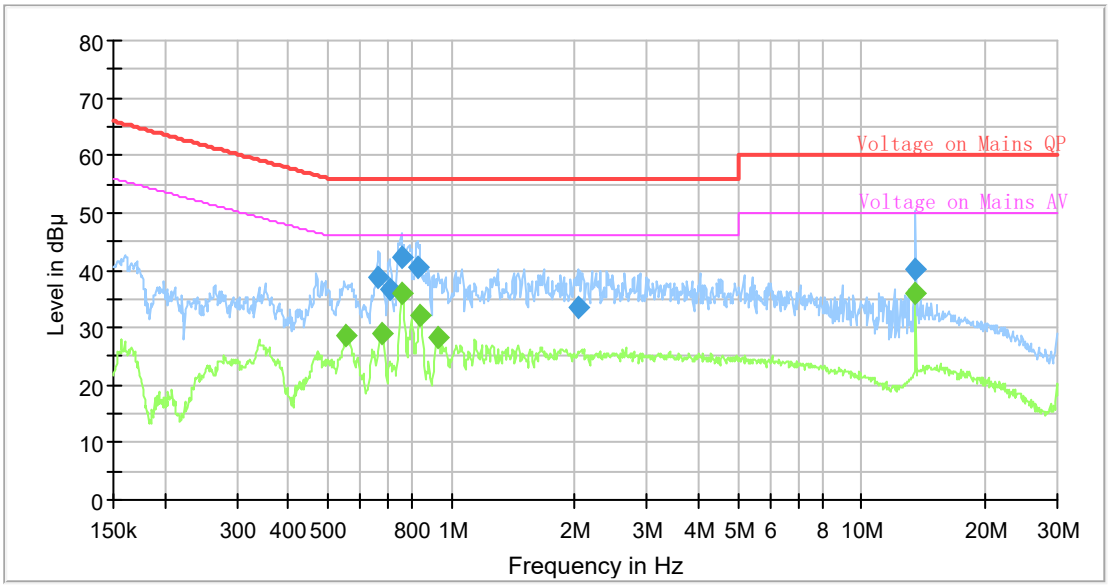
Project No:	XMDN240206-08120E-RF
Test Engineer:	Wright Lai
Test Date:	2024/3/15
Port:	L
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.556885	---	26.18	46.00	19.82	9.000	L1	10.8
0.663098	42.27	---	56.00	13.73	9.000	L1	10.8
0.669745	---	26.82	46.00	19.18	9.000	L1	10.8
0.707516	40.12	---	56.00	15.88	9.000	L1	10.9
0.747417	44.84	---	56.00	11.16	9.000	L1	10.9
0.762478	---	34.03	46.00	11.97	9.000	L1	10.9
0.821710	44.10	---	56.00	11.90	9.000	L1	10.9
1.450940	---	25.90	46.00	20.10	9.000	L1	10.8
1.502491	37.77	---	56.00	18.23	9.000	L1	10.8
1.861883	---	25.36	46.00	20.64	9.000	L1	10.8
13.553299	---	31.24	50.00	18.76	9.000	L1	10.8
13.553299	40.31	---	60.00	19.69	9.000	L1	10.8

Project No:	XMDN240206-08120E-RF
Test Engineer:	Wright Lai
Test Date:	2024/3/15
Port:	N
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



Final_Result

Frequency (MHz)	QuasiPeak (dB µ V)	Average (dB µ V)	Limit (dB µ V)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.554114	---	28.77	46.00	17.23	9.000	N	10.7
0.663098	38.89	---	56.00	17.11	9.000	N	10.7
0.676460	---	28.85	46.00	17.15	9.000	N	10.8
0.707516	36.57	---	56.00	19.43	9.000	N	10.8
0.754910	42.25	---	56.00	13.75	9.000	N	10.8
0.758685	---	35.91	46.00	10.09	9.000	N	10.8
0.825818	40.49	---	56.00	15.51	9.000	N	10.8
0.842459	---	32.15	46.00	13.85	9.000	N	10.8
0.926198	---	28.22	46.00	17.78	9.000	N	10.8
2.036768	33.44	---	56.00	22.56	9.000	N	10.9
13.553299	---	36.02	50.00	13.98	9.000	N	10.9
13.553299	40.05	---	60.00	19.95	9.000	N	10.9

4.2 Radiated Spurious Emissions

4.2.1 Applicable Standard

FCC Part 15.225

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

RSS-210 B.6(a)

(a) the field strength of any emission shall not exceed the following limits:

(i) 15.848 mV/m (84 dBµV/m) at 30 m, within the band 13.553-13.567 MHz

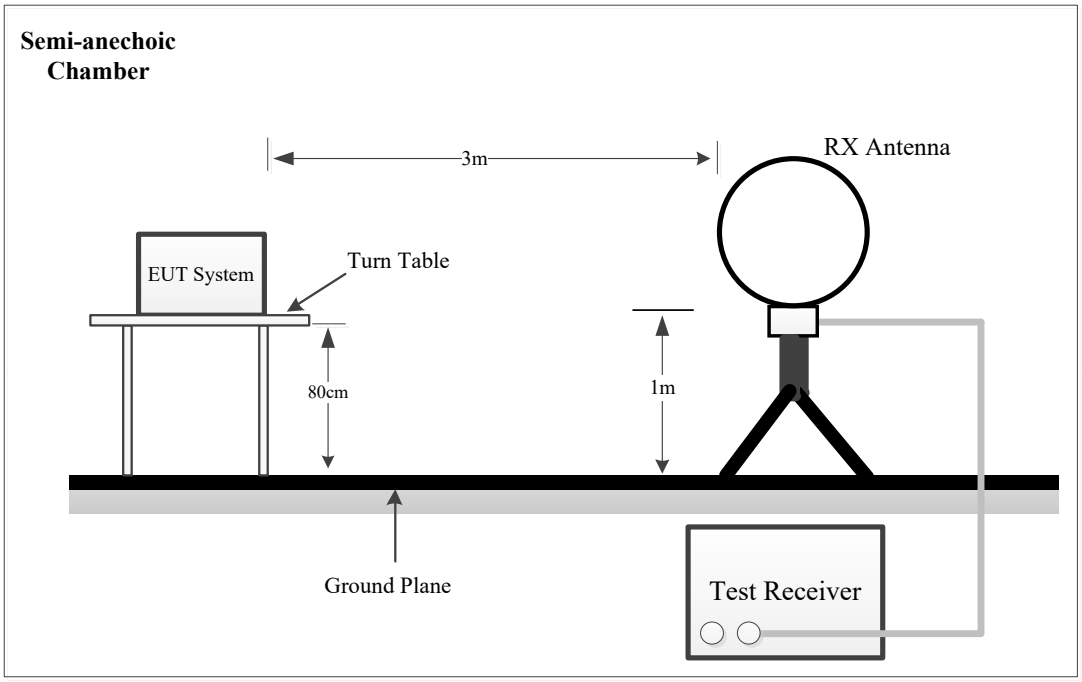
(ii) 334 µV/m (50.5 dBµV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz

(iii) 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz

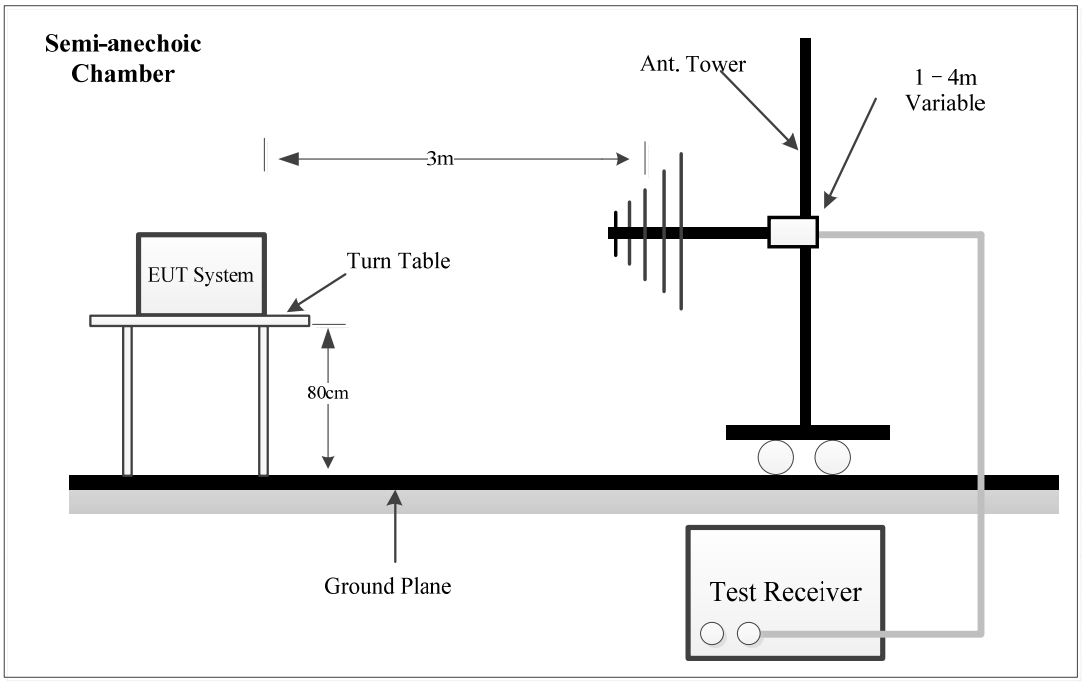
(iv) RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz

4.2.2 EUT Setup

9kHz~30MHz:



30MHz~1GHz:



The radiated emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.10-2013.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

For 9kHz-30MHz test, the lowest height of the magnetic antenna shall be 1 m above the ground and three antenna orientations (parallel, perpendicular, and ground-parallel) shall be measured.

4.2.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9 kHz to 1 GHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
9 kHz – 150 kHz	200 Hz	1 kHz	200 Hz	QP/AV
150 kHz – 30 MHz	9 kHz	30 kHz	9 kHz	QP/AV
30 MHz – 1000 MHz	100 kHz	300 kHz	/	PK
	/	/	120 kHz	QP

If the maximized peak measured value complies with the limit, then it is unnecessary to perform an QP measurement

4.2.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 9 kHz-1 GHz except 9-90 kHz, 110-490 kHz, employing an average detector.

All emissions under the average limit and under the noise floor have not recorded in the report.

4.2.5 Corrected Result & Margin Calculation

The basic equation is as follows:

Result = Reading + Factor
Factor = Antenna Factor + Cable Loss- Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. The equation for margin calculation is as follows:

Margin = Limit – Result

For measuring equipment calibrated in dBμV/m, the reading should be reduced by 51,5dB to be converted to dBμA/m.

4.2.6 Test Data

Serial Number:	2HPA-3, 2HPA-5,	Test Date:	2024/3/12~2024/6/11
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang, Zoo Zou	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	19.1~27.8	Relative Humidity: (%)	55~72	ATM Pressure: (kPa)	100.8~101.3

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/21	2026/10/20
Sunol Sciences	Hybrid Antenna	JB3	A060611-1	2023/9/6	2026/9/5
Narda	Attenuator	779-6dB	04269	2023/9/6	2024/9/5
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17
Farad	Test Software	EZ-EMC	V1.1.4.2	N/A	N/A

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

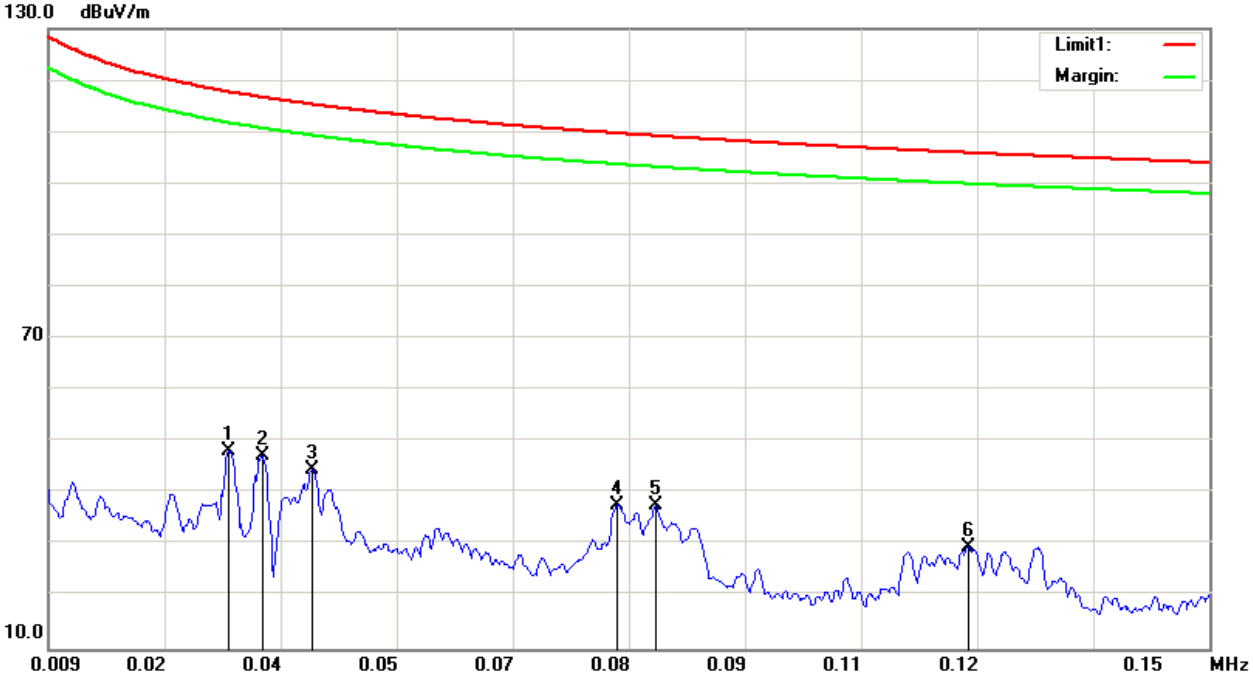
Test Data:

Please refer to the below table and plots.
After pre-scan in the X, Y and Z axes of orientation, the worst case is below:

1) 9kHz~30MHz

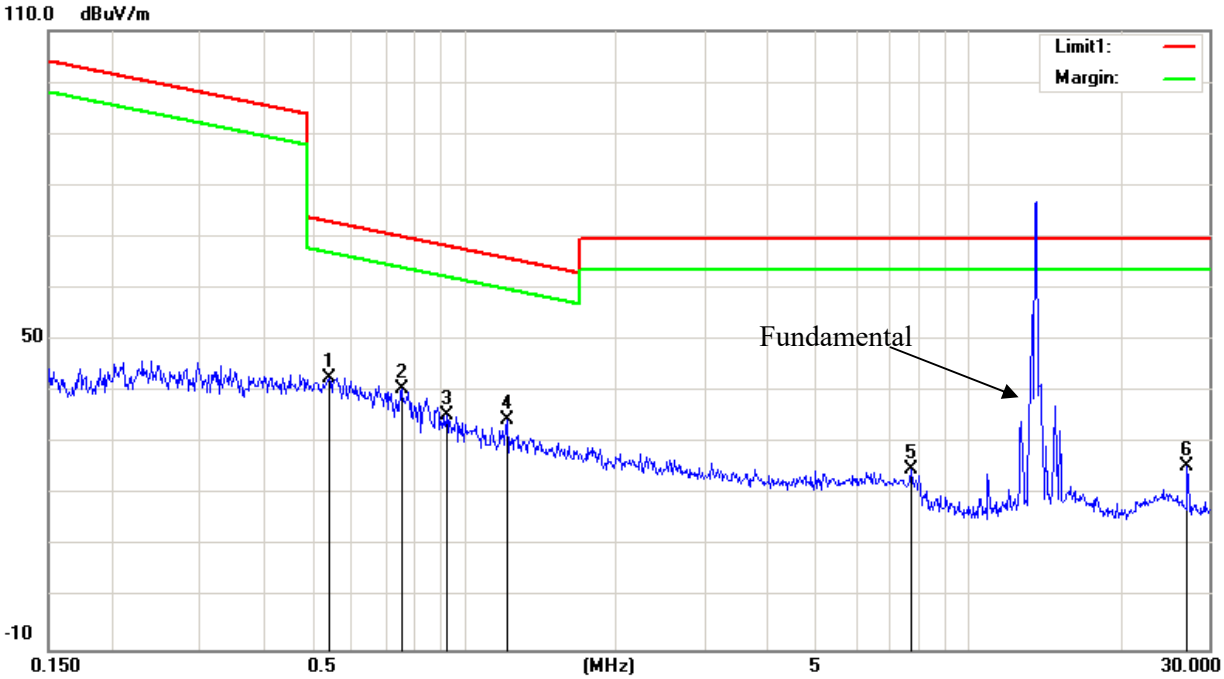
(Mode 1 is the worst of model M20,and be reported):

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



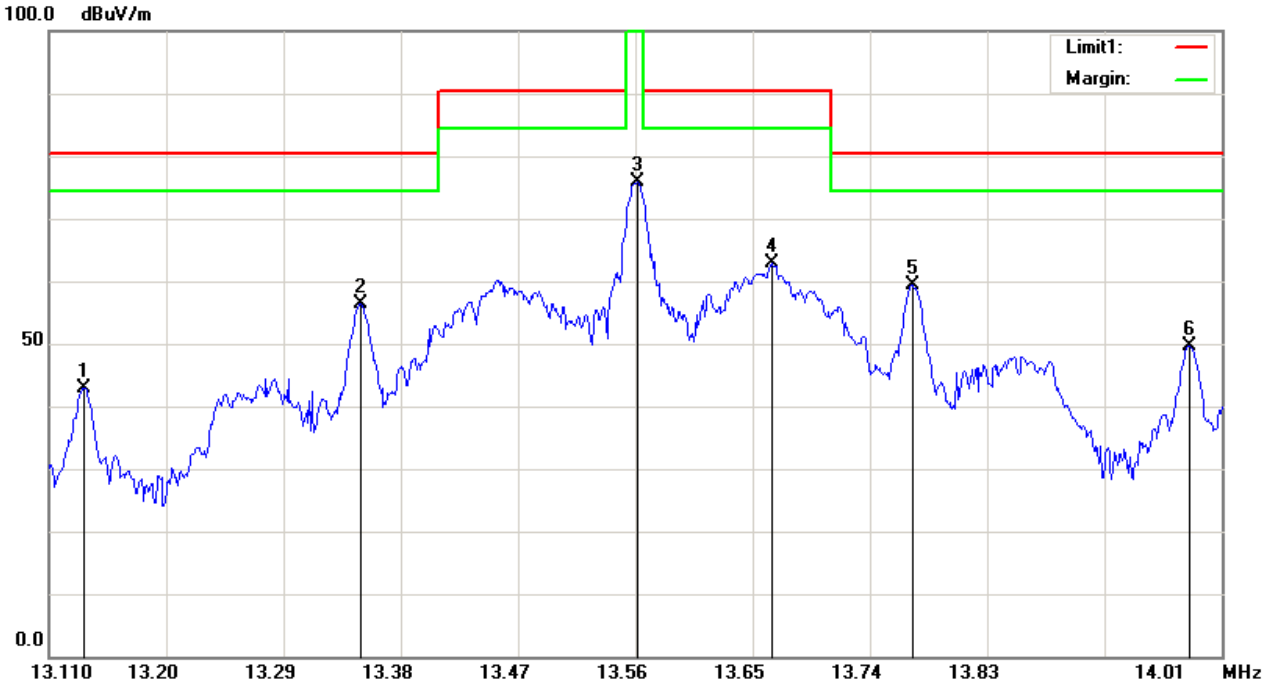
No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.0310	0.94	peak	47.37	48.31	117.78	69.47
2	0.0350	0.56	peak	46.66	47.22	116.72	69.50
3	0.0410	-0.80	peak	45.60	44.80	115.35	70.55
4	0.0781	-1.51	peak	39.24	37.73	109.75	72.02
5	0.0827	-0.78	peak	38.44	37.66	109.25	71.59
6	0.1207	-4.49	peak	34.26	29.77	105.97	76.20

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.5407	19.69	peak	23.10	42.79	72.94	30.15
2	0.7508	19.48	peak	21.01	40.49	70.08	29.59
3	0.9233	17.24	peak	18.09	35.33	68.27	32.94
4	1.2162	19.01	peak	15.60	34.61	65.87	31.26
5	7.6870	19.77	peak	5.21	24.98	69.54	44.56
6	27.1270	21.53	peak	4.16	25.69	69.54	43.85

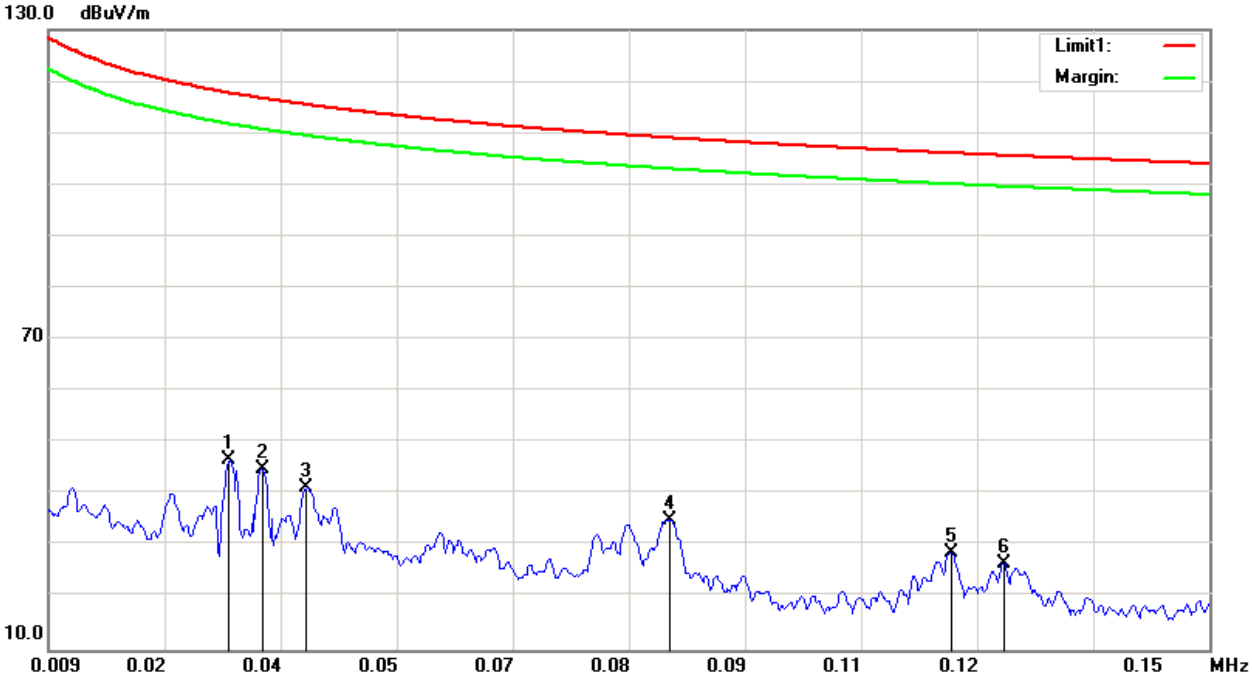
Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	13.1370	38.29	peak	4.59	42.88	80.50	37.62
2	13.3494	51.78	peak	4.57	56.35	80.50	24.15
3	13.5618*	71.24	peak	4.53	**75.77**	124.00	48.23
4	13.6653	58.34	peak	4.51	62.85	90.50	27.65
5	13.7724	54.93	peak	4.51	59.44	80.50	21.06
6	13.9848	45.23	peak	4.47	49.70	80.50	30.80

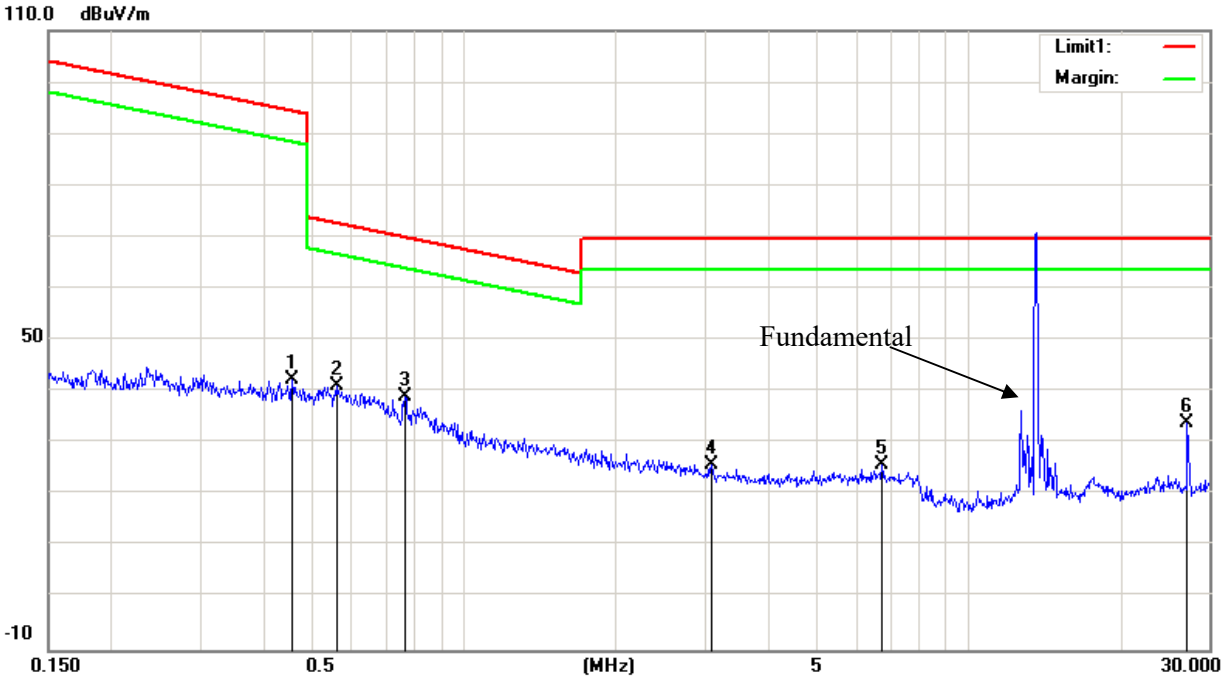
Note:* is fundamental

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Perpendicular
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



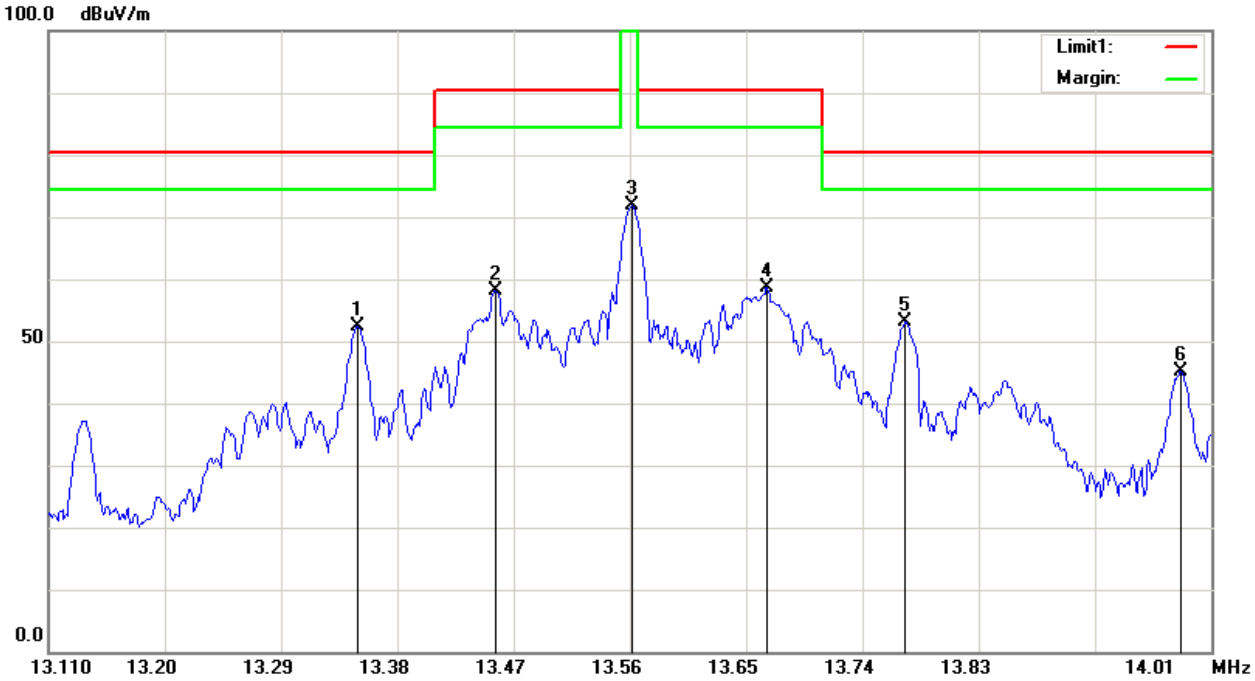
No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.0310	-0.59	peak	47.37	46.78	117.78	71.00
2	0.0350	-1.57	peak	46.66	45.09	116.72	71.63
3	0.0403	-4.32	peak	45.72	41.40	115.50	74.10
4	0.0844	-2.96	peak	38.14	35.18	109.08	73.90
5	0.1186	-5.53	peak	34.38	28.85	106.12	77.27
6	0.1250	-7.32	peak	34.02	26.70	105.66	78.96

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Perpendicular
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.4563	18.58	peak	23.64	42.22	94.42	52.20
2	0.5581	18.32	peak	22.91	41.23	72.66	31.43
3	0.7630	18.07	peak	20.89	38.96	69.94	30.98
4	3.0901	16.17	peak	9.64	25.81	69.54	43.73
5	6.7332	20.24	peak	5.60	25.84	69.54	43.70
6	27.1270	29.80	peak	4.16	33.96	69.54	35.58

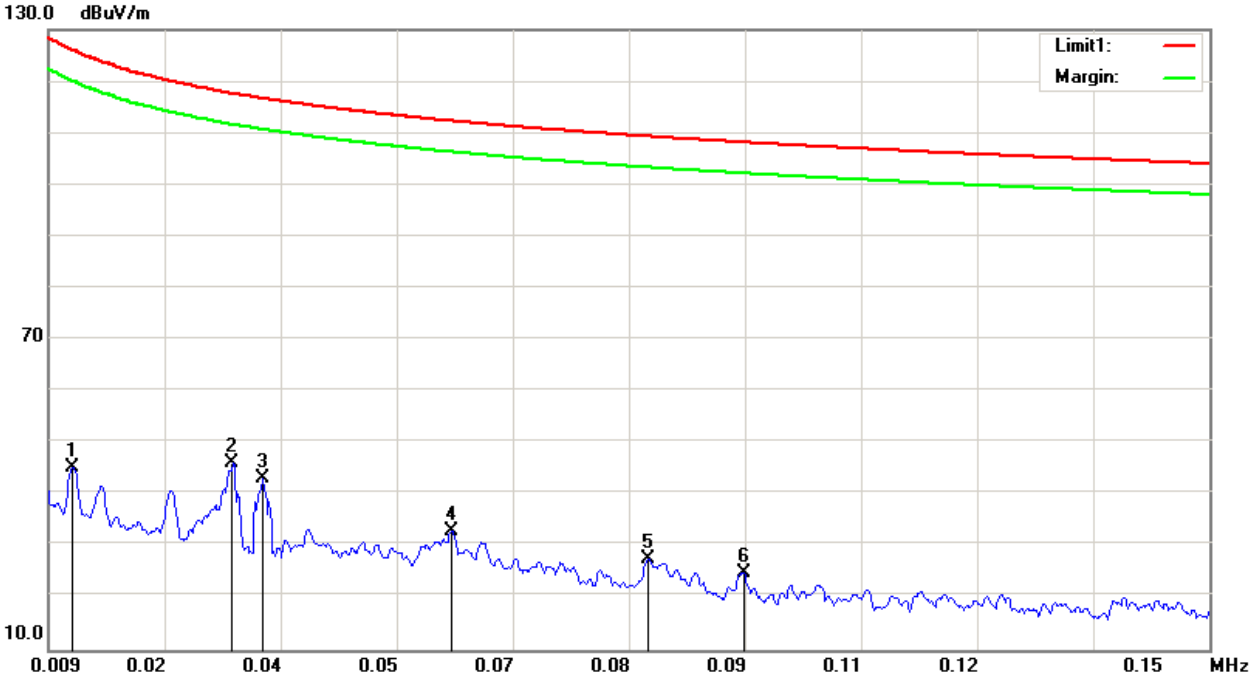
Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Perpendicular
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	13.3494	47.78	peak	4.57	52.35	80.50	28.15
2	13.4556	53.60	peak	4.55	58.15	90.50	32.35
3	13.5618*	67.25	peak	4.53	71.78	124.00	52.22
4	13.6662	54.19	peak	4.51	58.70	90.50	31.80
5	13.7733	48.60	peak	4.51	53.11	80.50	27.39
6	13.9866	40.58	peak	4.47	45.05	80.50	35.45

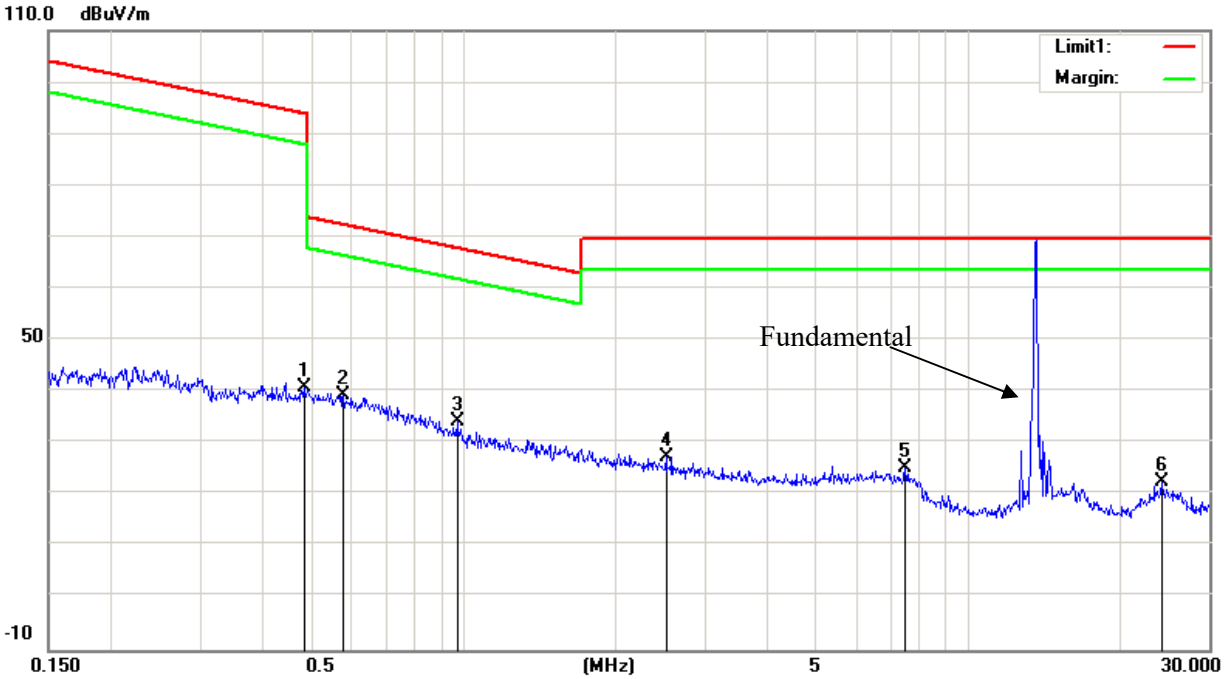
Note:*is fundamental.

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Ground-parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



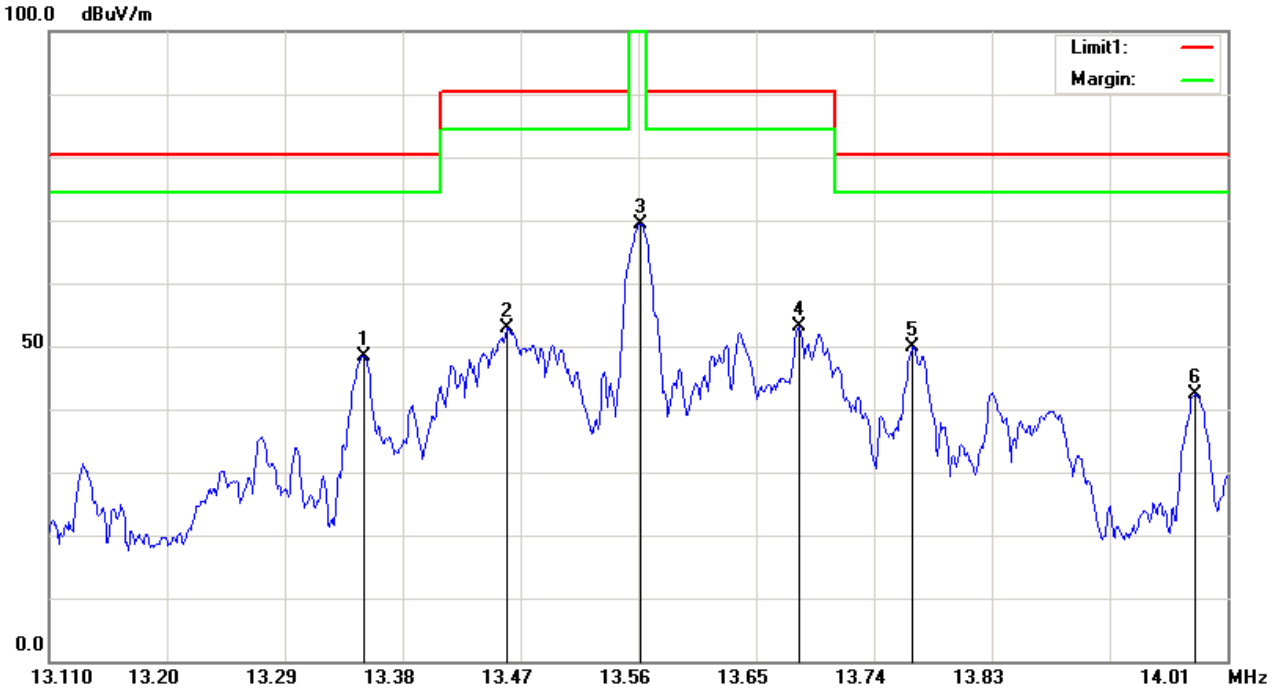
No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.0120	-6.95	peak	52.29	45.34	126.02	80.68
2	0.0313	-1.30	peak	47.32	46.02	117.69	71.67
3	0.0350	-3.39	peak	46.66	43.27	116.72	73.45
4	0.0580	-9.68	peak	42.68	33.00	112.33	79.33
5	0.0820	-10.90	peak	38.57	27.67	109.33	81.66
6	0.0933	-11.73	peak	36.56	24.83	108.20	83.37

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Ground-parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.4812	17.35	peak	23.58	40.93	93.96	53.03
2	0.5762	16.60	peak	22.71	39.31	72.39	33.08
3	0.9684	16.92	peak	17.19	34.11	67.86	33.75
4	2.5133	16.54	peak	10.95	27.49	69.54	42.05
5	7.4860	19.94	peak	5.30	25.24	69.54	44.30
6	24.1423	18.36	peak	4.18	22.54	69.54	47.00

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Ground-parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	13.3503	43.91	peak	4.57	48.48	80.50	32.02
2	13.4601	48.30	peak	4.55	52.85	90.50	37.65
3	13.5618*	64.94	peak	4.53	69.47	124.00	54.53
4	13.6824	48.53	peak	4.51	53.04	90.50	37.46
5	13.7697	45.36	peak	4.51	49.87	80.50	30.63
6	13.9848	38.02	peak	4.47	42.49	80.50	38.01

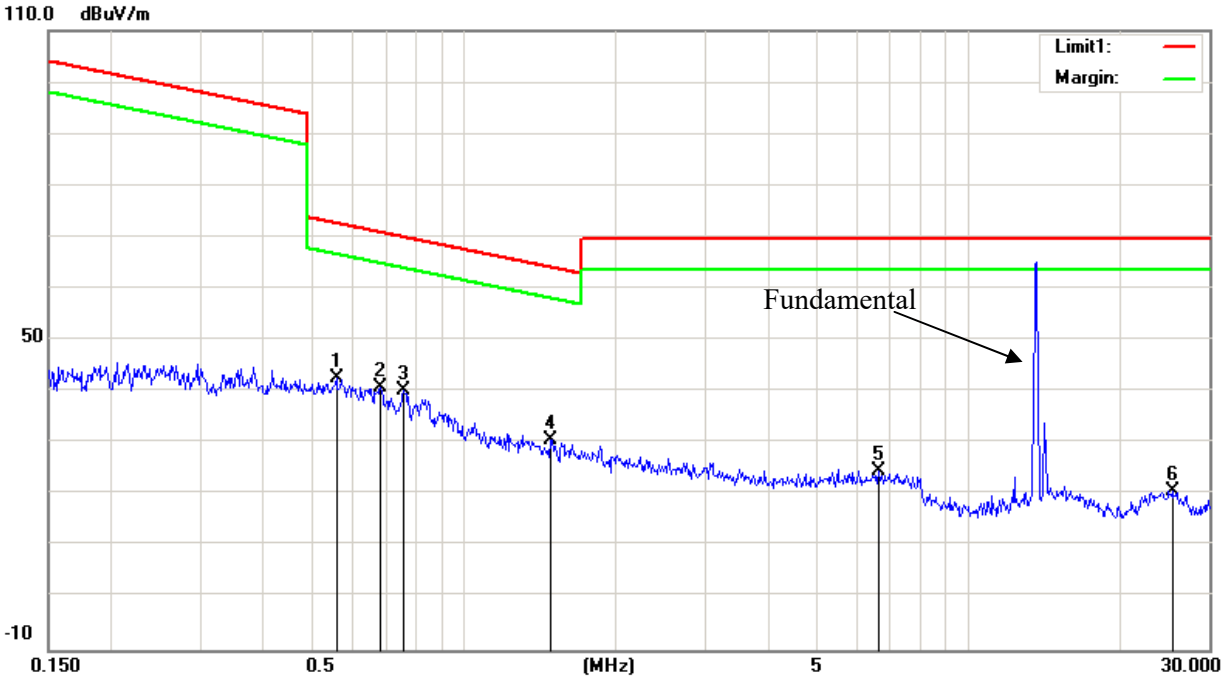
Note:*is fundamental.

(Mode 3 is the worst of model M20SE,and be reported):

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz

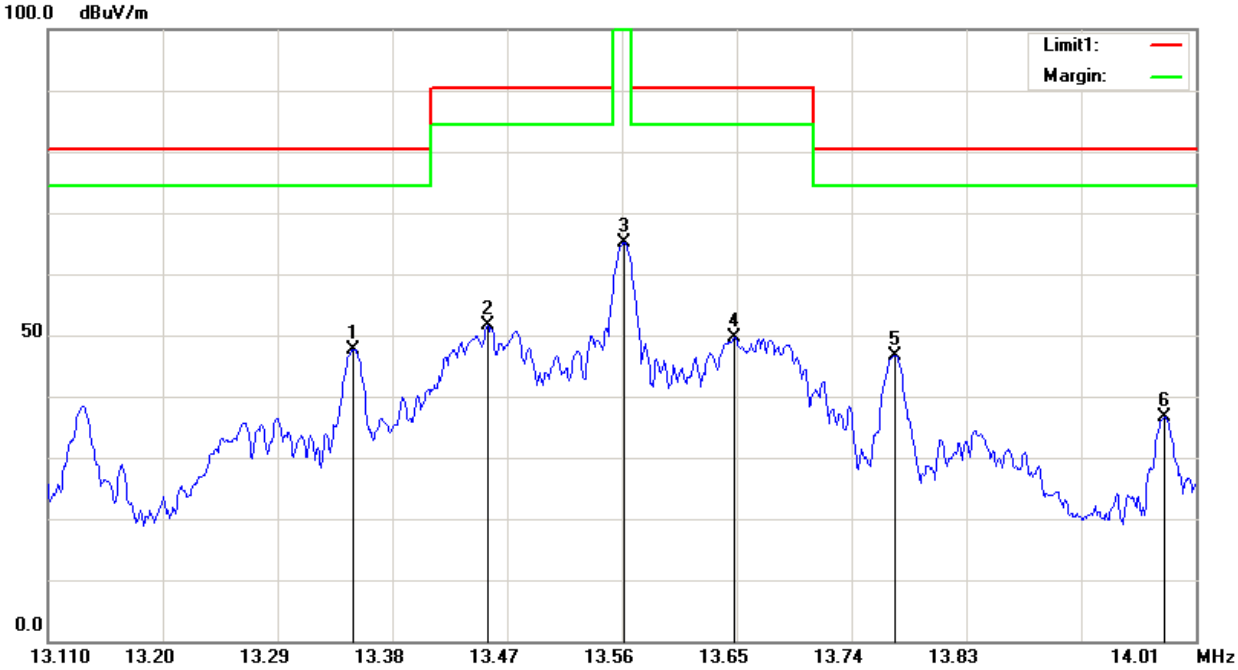
No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.0310	1.41	peak	47.37	48.78	117.78	69.00
2	0.0350	-1.67	peak	46.66	44.99	116.72	71.73
3	0.0398	-3.80	peak	45.80	42.00	115.61	73.61
4	0.0773	-0.20	peak	39.37	39.17	109.84	70.67
5	0.0826	-0.13	peak	38.45	38.32	109.26	70.94
6	0.1180	-1.97	peak	34.41	32.44	106.16	73.72

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.5581	19.74	peak	22.91	42.65	72.66	30.01
2	0.6826	19.16	peak	21.64	40.80	70.91	30.11
3	0.7590	19.39	peak	20.93	40.32	69.98	29.66
4	1.4796	16.33	peak	14.43	30.76	64.16	33.40
5	6.6272	19.15	peak	5.64	24.79	69.54	44.75
6	25.3214	16.52	peak	4.19	20.71	69.54	48.83

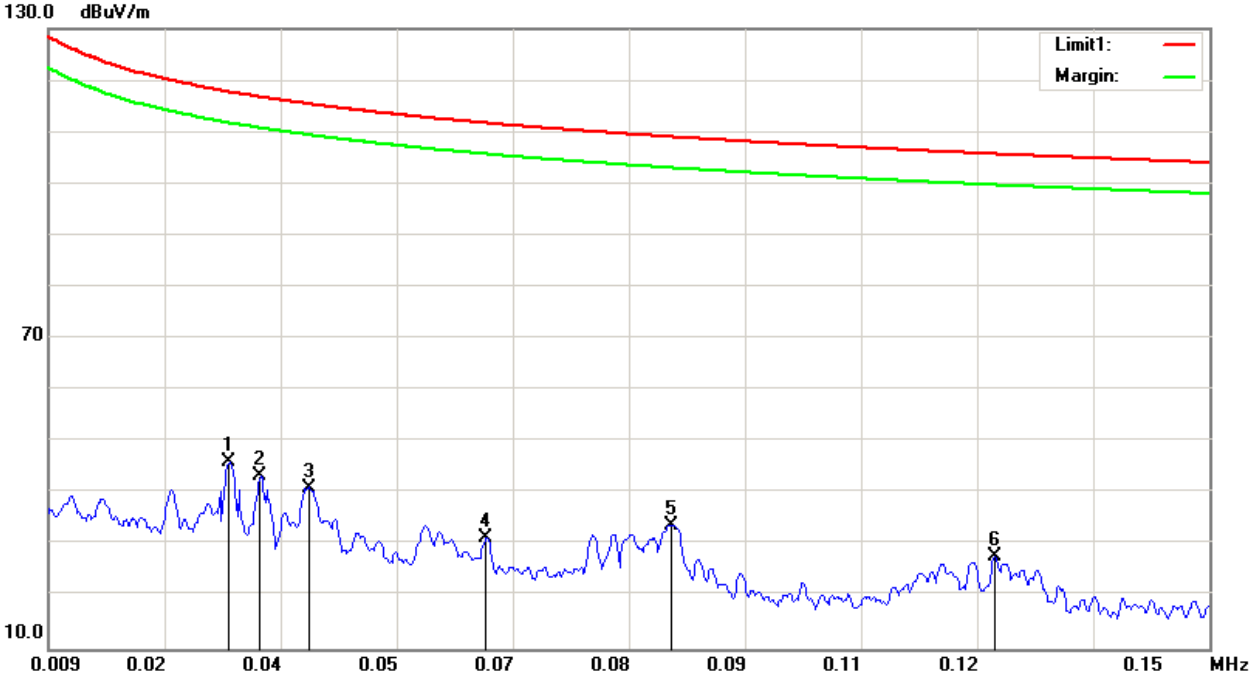
Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	13.3494	43.13	peak	4.57	47.70	80.50	32.80
2	13.4547	47.01	peak	4.55	51.56	90.50	38.94
3	13.5618*	60.69	peak	4.53	65.22	124.00	58.78
4	13.6482	45.02	peak	4.51	49.53	90.50	40.97
5	13.7742	42.19	peak	4.51	46.70	80.50	33.80
6	13.9857	32.20	peak	4.47	36.67	80.50	43.83

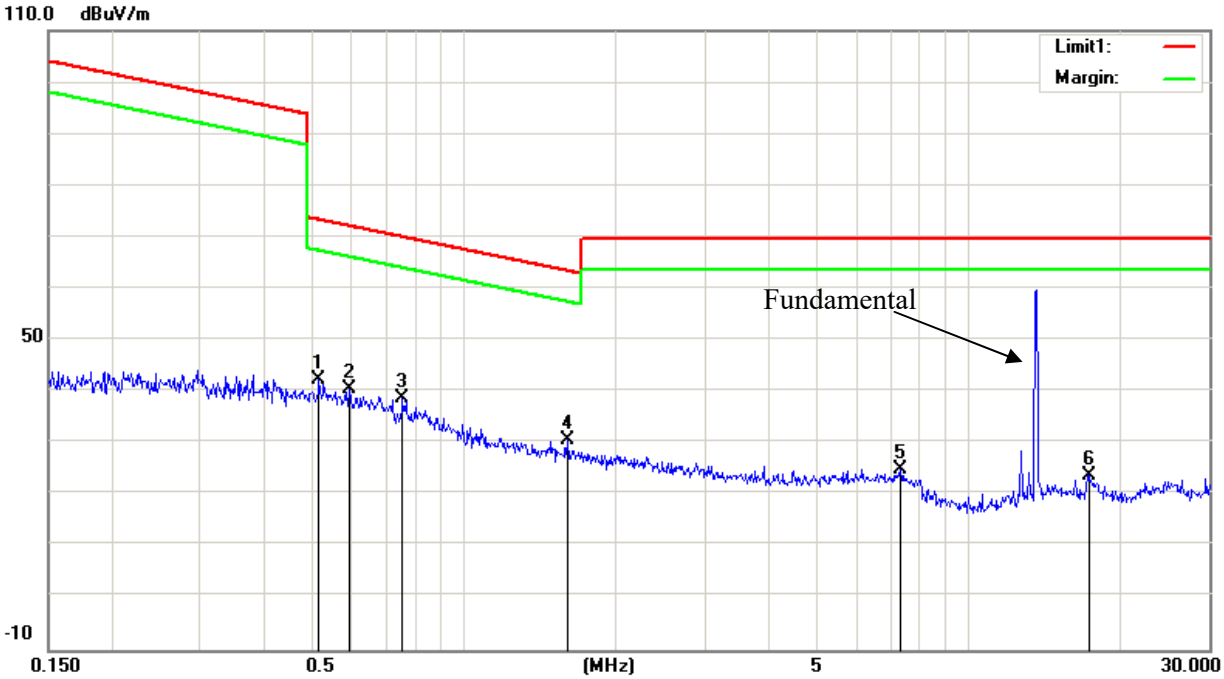
Note:*is fundamental

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Perpendicular
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



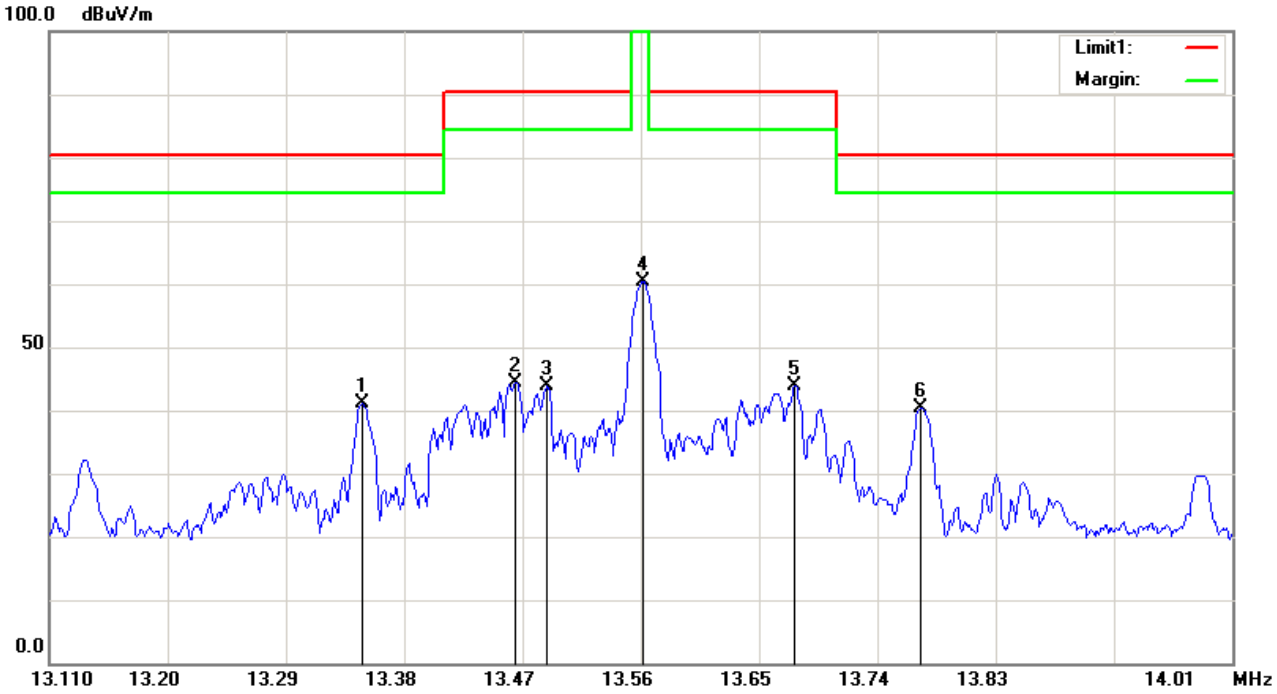
No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.0310	-1.29	peak	47.37	46.08	117.78	71.70
2	0.0347	-3.40	peak	46.71	43.31	116.80	73.49
3	0.0407	-4.47	peak	45.65	41.18	115.41	74.23
4	0.0622	-10.49	peak	41.96	31.47	111.73	80.26
5	0.0846	-4.12	peak	38.11	33.99	109.06	75.07
6	0.1240	-6.33	peak	34.07	27.74	105.73	77.99

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Perpendicular
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.5155	18.87	peak	23.36	42.23	73.36	31.13
2	0.5916	17.97	peak	22.55	40.52	72.16	31.64
3	0.7550	17.74	peak	20.97	38.71	70.03	31.32
4	1.6020	16.82	peak	13.89	30.71	63.46	32.75
5	7.3290	19.72	peak	5.36	25.08	69.54	44.46
6	17.3826	19.45	peak	4.32	23.77	69.54	45.77

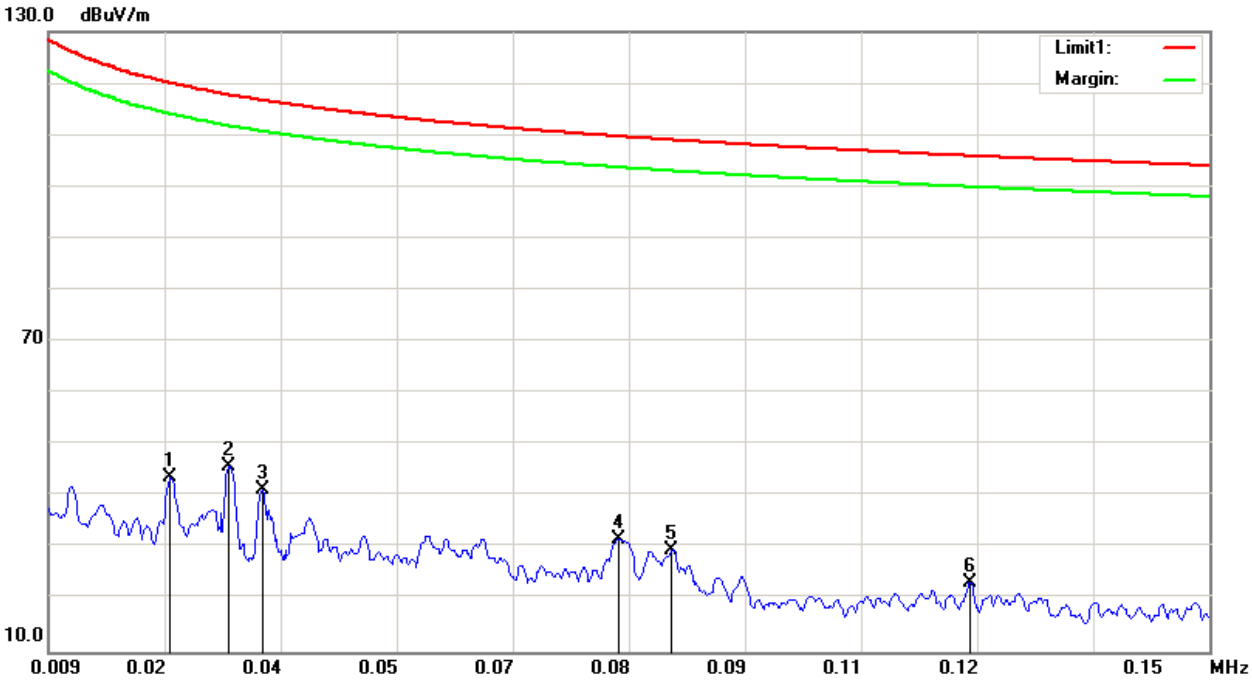
Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Perpendicular
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	13.3485	36.57	peak	4.57	41.14	80.50	39.36
2	13.4646	39.76	peak	4.55	44.31	90.50	46.19
3	13.4890	39.29	peak	4.55	43.84	90.50	46.66
4	13.5618*	55.89	peak	4.53	60.42	124.00	63.58
5	13.6770	39.40	peak	4.51	43.91	90.50	46.59
6	13.7733	35.84	peak	4.51	40.35	80.50	40.15

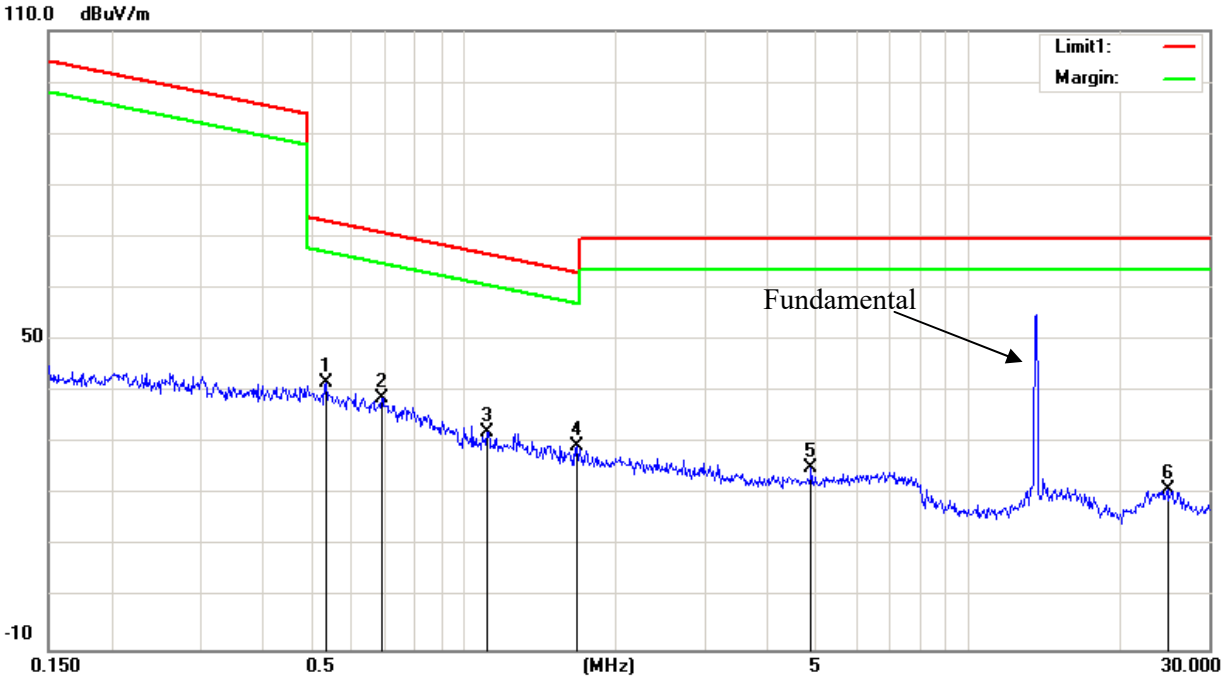
Note:*is fundamental.

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Ground-parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



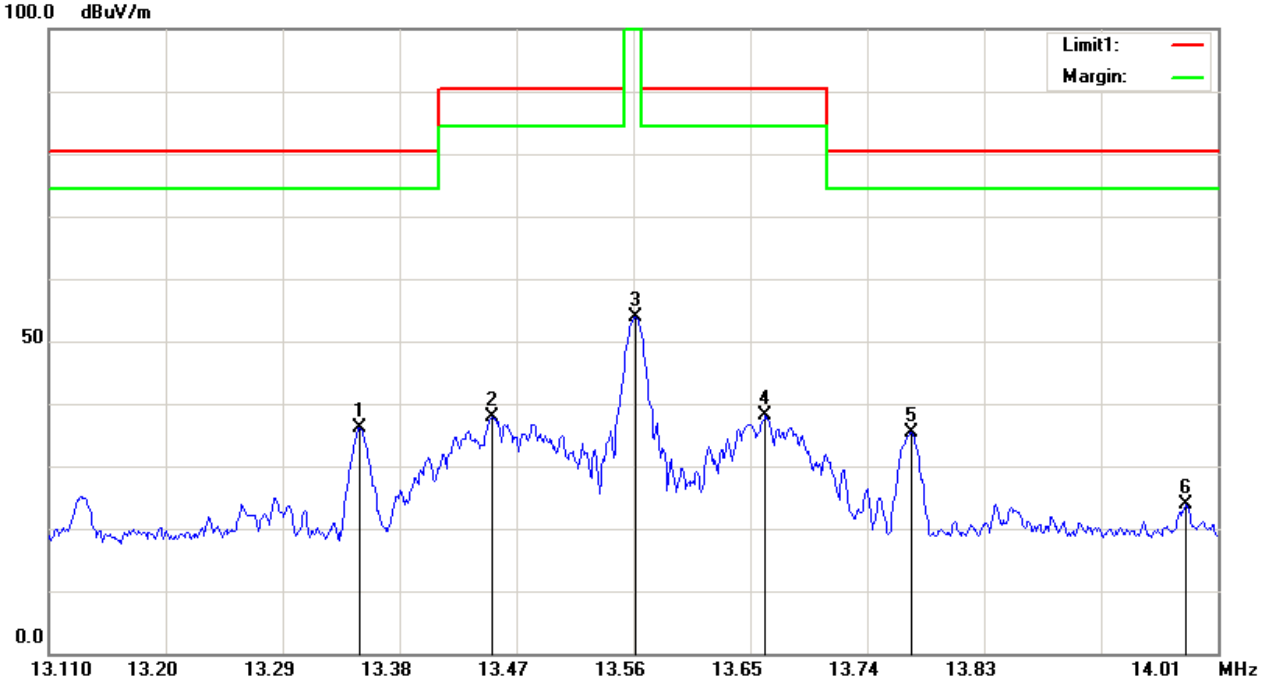
No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.0238	-5.48	peak	49.09	43.61	120.07	76.46
2	0.0310	-1.38	peak	47.37	45.99	117.78	71.79
3	0.0350	-5.21	peak	46.66	41.45	116.72	75.27
4	0.0782	-7.52	peak	39.23	31.71	109.74	78.03
5	0.0847	-8.40	peak	38.09	29.69	109.04	79.35
6	0.1210	-10.82	peak	34.24	23.42	105.95	82.53

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Ground-parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	0.5322	18.69	peak	23.19	41.88	73.08	31.20
2	0.6863	17.28	peak	21.61	38.89	70.86	31.97
3	1.1114	16.18	peak	16.07	32.25	66.65	34.40
4	1.6713	15.95	peak	13.58	29.53	63.09	33.56
5	4.8738	18.41	peak	6.74	25.15	69.54	44.39
6	24.7904	16.88	peak	4.19	21.07	69.54	48.47

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/14
Polarization:	Ground-parallel
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



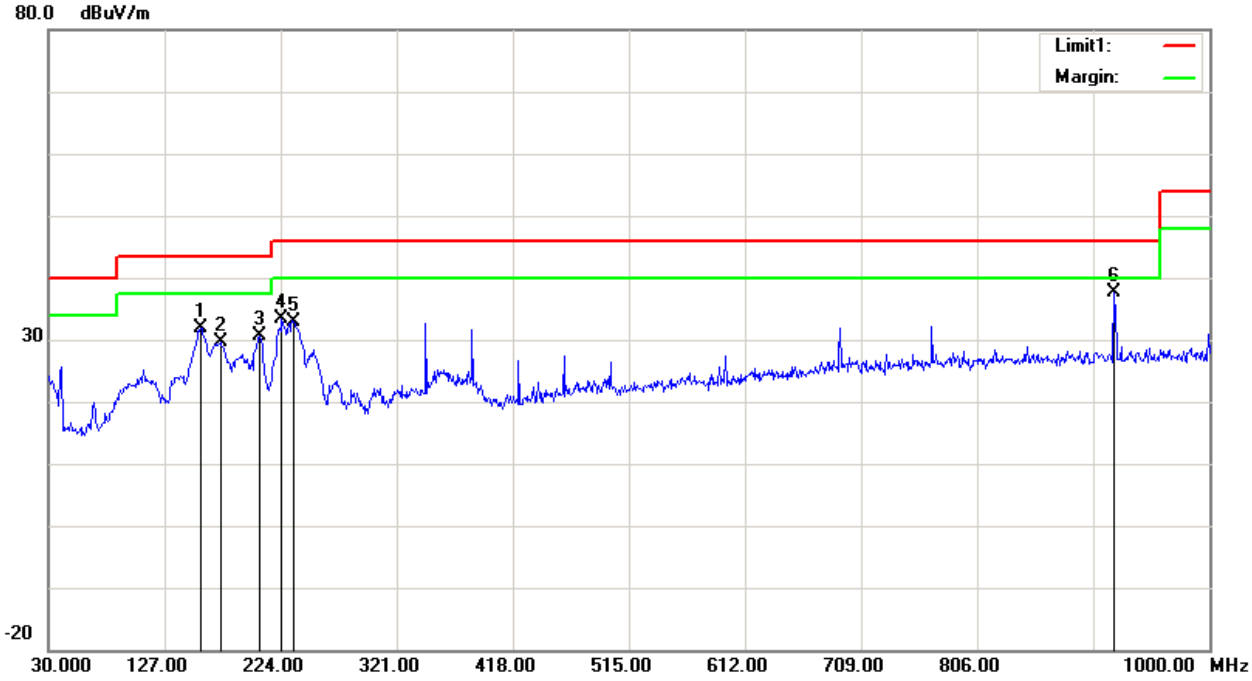
No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	13.3494	31.64	peak	4.57	36.21	80.50	44.29
2	13.4511	33.23	peak	4.55	37.78	90.50	52.72
3	13.5618*	49.32	peak	4.53	53.85	124.00	70.15
4	13.6617	33.63	peak	4.51	38.14	90.50	52.36
5	13.7742	30.98	peak	4.51	35.49	80.50	45.01
6	13.9857	19.52	peak	4.47	23.99	80.50	56.51

Note:*is fundamental.

2) 30MHz-1GHz

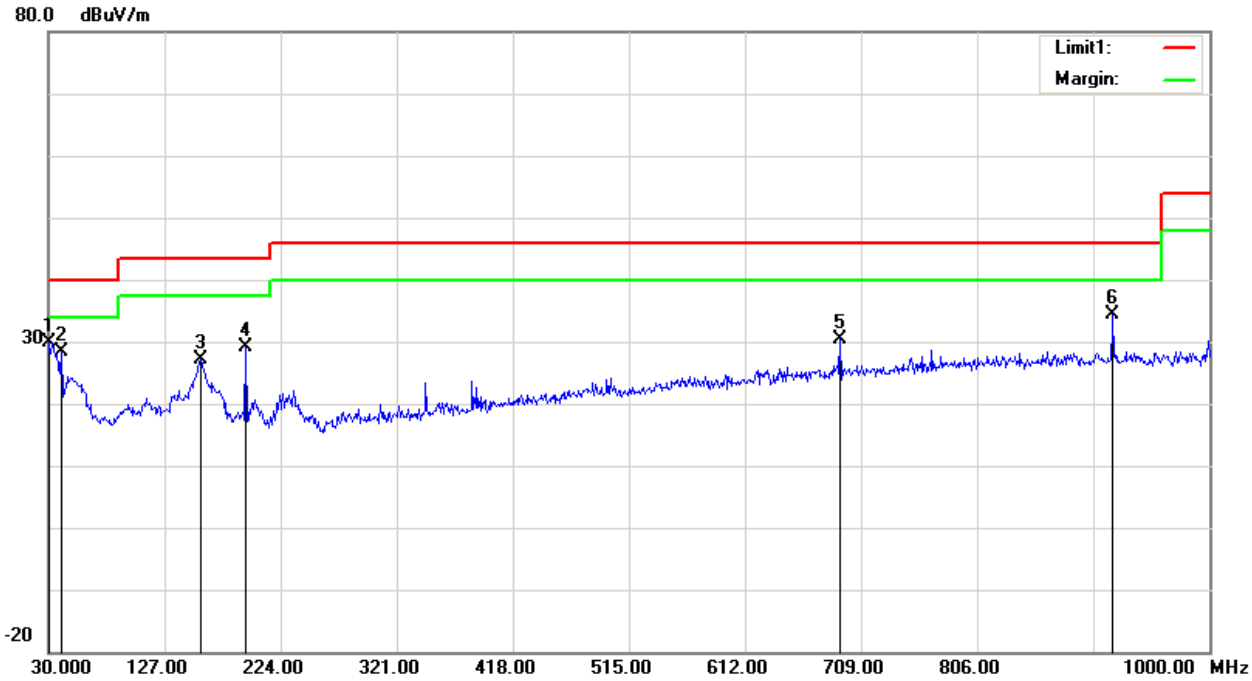
(Mode 1 is the worst of model M20,and be reported):

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/12
Polarization:	Horizontal
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	157.0700	43.07	peak	-11.12	31.95	43.50	11.55
2	173.5600	41.30	peak	-11.77	29.53	43.50	13.97
3	206.5400	42.83	peak	-12.17	30.66	43.50	12.84
4	224.9700	45.73	peak	-12.41	33.32	46.00	12.68
5	234.6700	45.03	peak	-12.05	32.98	46.00	13.02
6	920.4600	35.87	peak	1.70	37.57	46.00	8.43

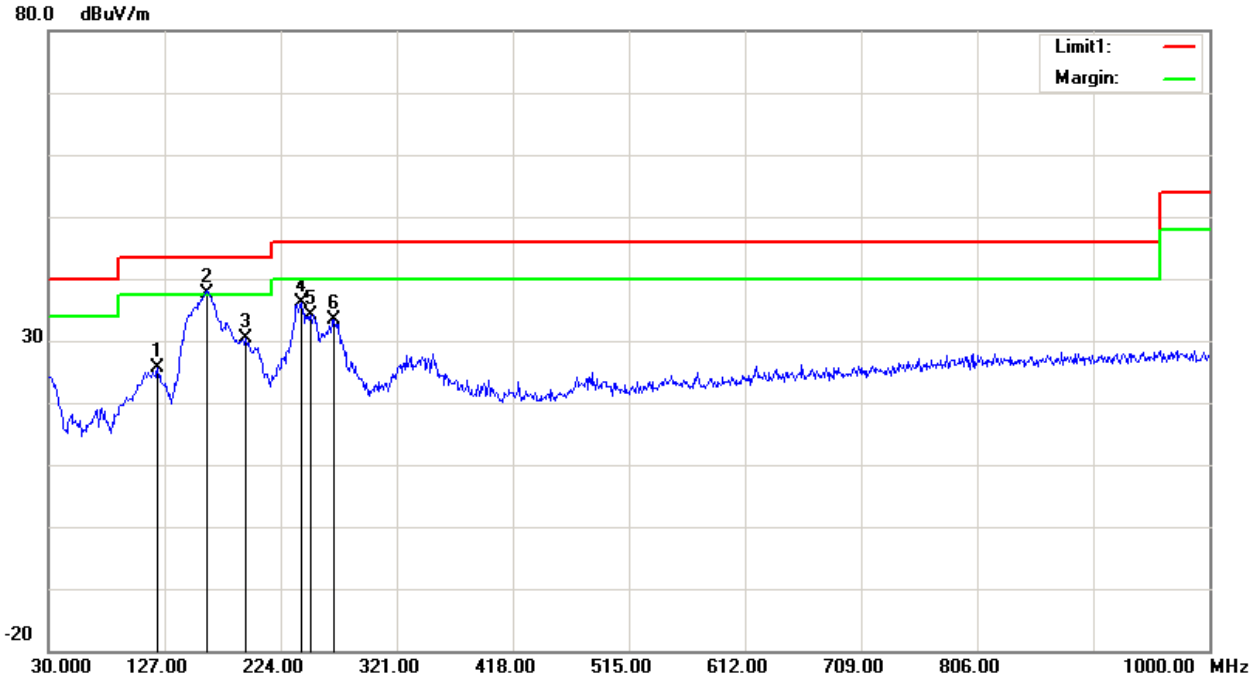
Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/12
Polarization:	Vertical
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	30.9700	34.20	peak	-4.31	29.89	40.00	10.11
2	40.6700	39.81	peak	-11.37	28.44	40.00	11.56
3	157.0700	38.31	peak	-11.12	27.19	43.50	16.31
4	194.9000	40.94	peak	-11.88	29.06	43.50	14.44
5	691.5400	31.68	peak	-1.38	30.30	46.00	15.70
6	919.4900	32.71	peak	1.69	34.40	46.00	11.60

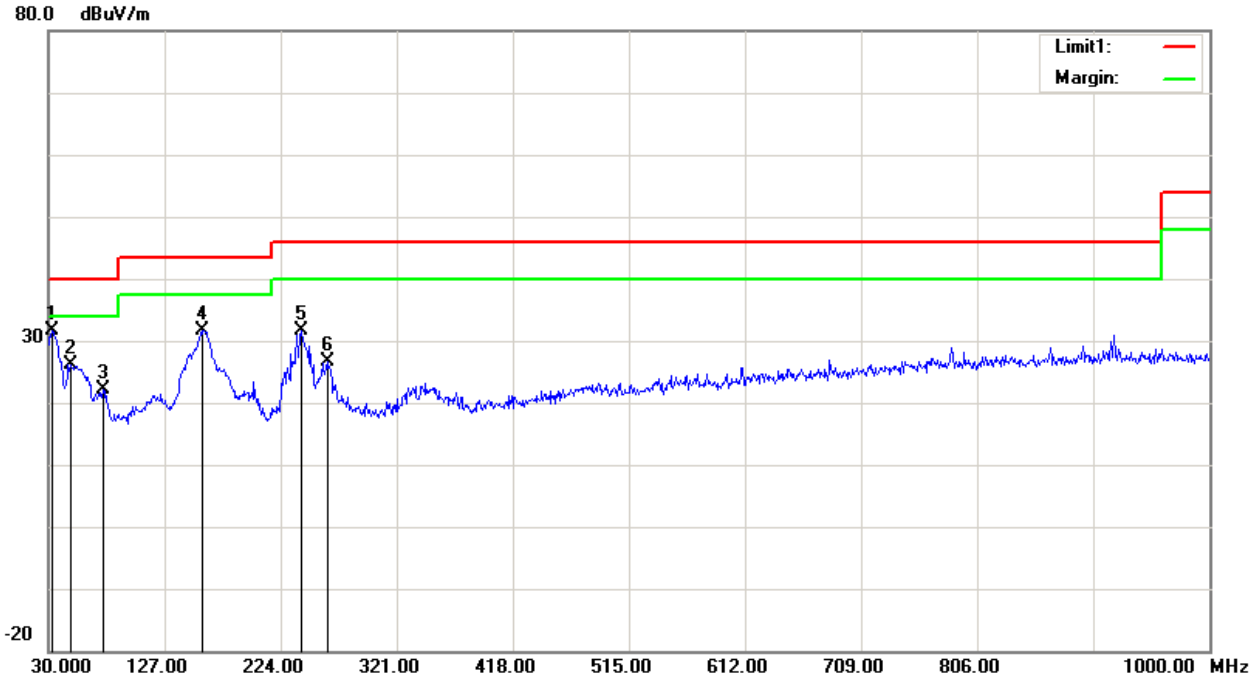
(Mode 3 is the worst of model M20SE,and be reported):

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/13
Polarization:	Horizontal
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Detector	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	121.1800	35.44	peak	-9.84	25.60	43.50	17.90
2	162.8900	48.85	QP	-11.25	37.60	43.50	5.90
3	194.9000	42.15	peak	-11.88	30.27	43.50	13.23
4	241.4600	47.94	peak	-11.71	36.23	46.00	9.77
5	249.2200	45.69	peak	-11.46	34.23	46.00	11.77
6	268.6200	43.58	peak	-10.18	33.40	46.00	12.60

Project No:	XMDN240206-08120E-RF
Test Engineer:	Leesin Xiang
Test Date:	2024/3/13
Polarization:	Vertical
Test Mode:	Transmitting
Power Source:	AC 120V/60Hz



No.	Frequency	Reading	Detector	Factor	Result	Limit	Margin
	(MHz)	(dBuV)		(dB/m)	(dBuV/m)	(dBuV/m)	(dB)
1	32.9100	37.18	peak	-5.47	31.71	40.00	8.29
2	48.4300	42.14	peak	-16.11	26.03	40.00	13.97
3	75.5900	38.40	peak	-16.20	22.20	40.00	17.80
4	159.0100	42.78	peak	-11.17	31.61	43.50	11.89
5	241.4600	43.30	peak	-11.71	31.59	46.00	14.41
6	262.8000	37.32	peak	-10.75	26.57	46.00	19.43

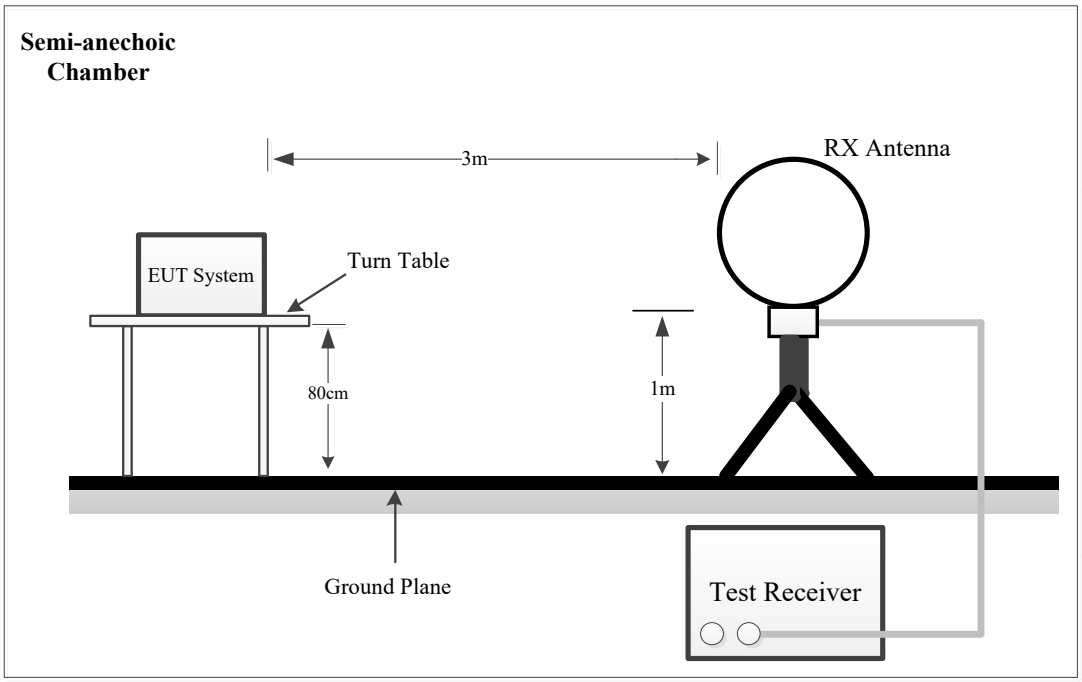
4.3 20 dB Emission Bandwidth

4.3.1 Applicable Standard

FCC §15.215

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through § 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of band operation.

4.3.2 EUT Setup



4.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.2

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2
d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target

"−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.3.4 Test Data

Serial Number:	2HPA-3	Test Date:	2024/3/14
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	21.6	Relative Humidity: (%)	57	ATM Pressure: (kPa)	101.1

Test Equipment List and Details:

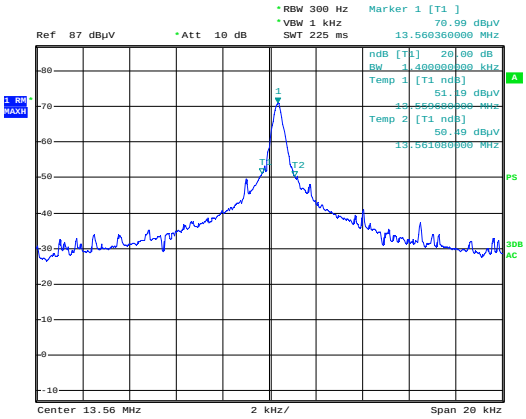
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/21	2026/10/20
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Frequency (MHz)	20 dB Emission Bandwidth (kHz)
13.56	1.4

20dB Emission Bandwidth Parallel



Project: XMDN240206-08120E-RF Tester:Leesin Xiang
Date: 14.MAR.2024 19:02:53

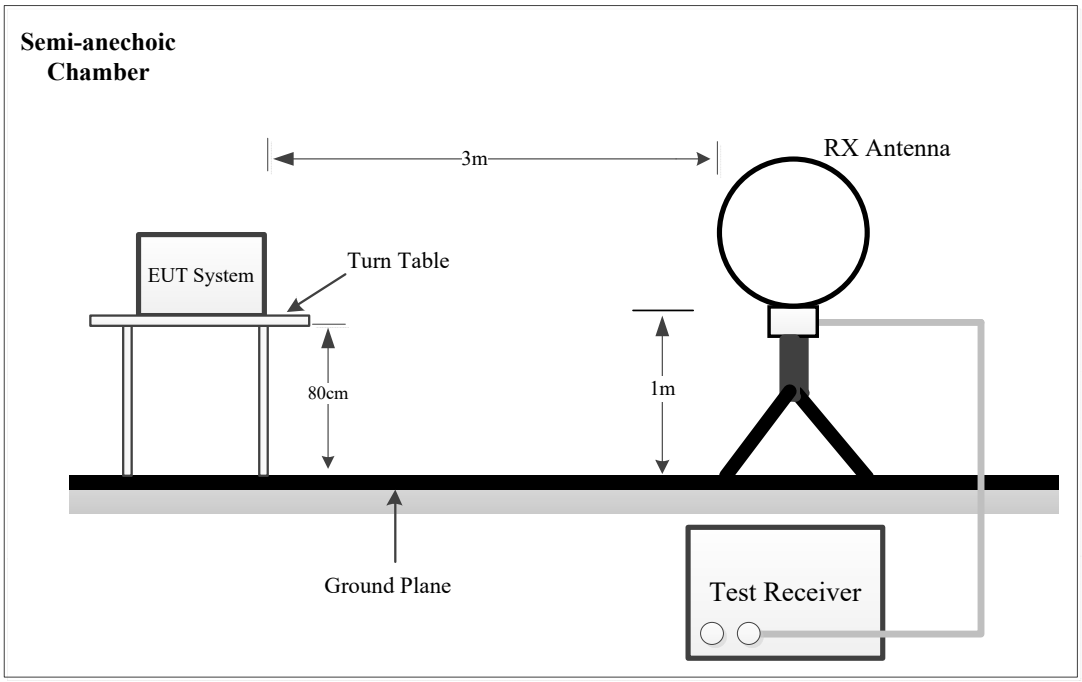
4.3 99% Occupied Bandwidth:

4.3.1 Applicable Standard

RSS-Gen Clause 6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.
In some cases, the "x dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated x dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.
The following conditions shall be observed for measuring the occupied bandwidth and x dB bandwidth:
The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.
The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / x dB bandwidth if the device is not transmitting continuously.
The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / x dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value.
Video averaging is not permitted.
Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.
For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

4.3.2 EUT Setup



4.3.3 Test Procedure

According to ANSI C63.10-2013 Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth:
a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.3.4 Test Data And Result

Serial Number:	2HPA-3	Test Date:	2024/3/14
Test Site:	Chamber 10m	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	21.6	Relative Humidity: (%)	57	ATM Pressure: (kPa)	101.1

Test Equipment List and Details:

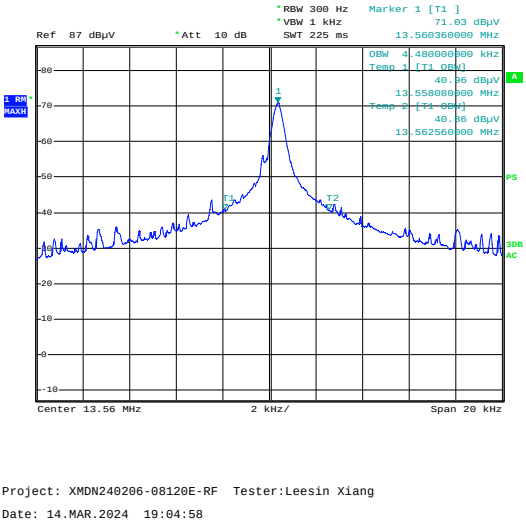
Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/21	2026/10/20
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-04	2023/8/1	2024/7/31
Unknown	Coaxial Cable	C-NJNJ-50	C-0530-01	2023/8/1	2024/7/31
Sonoma	Amplifier	310N	185914	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

Test Frequency (MHz)	99% Occupied Bandwidth (kHz)
13.56	4.48

99% Occupied Bandwidth Parallel



4.5 Frequency Stability

4.5.1 Applicable Standard

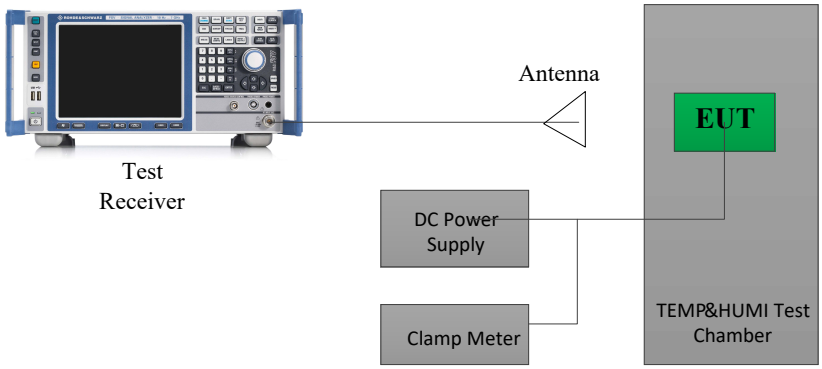
FCC Part 15.225:

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

RSS-210 B.6:

(b) the carrier frequency stability shall not exceed ±100 ppm

4.5.2 EUT Setup



4.5.3 Test Procedure

According to ANSI C63.10-2013 Section 6.8

Frequency stability with respect to ambient temperature

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies shown in 5.6.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument, through an attenuator if necessary.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that

have oscillator heaters, energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies specified in 5.6.

h) Switch OFF the EUT but do not switch OFF the oscillator heater.

i) Lower the chamber temperature by not more that 10 °C, and allow the temperature inside the chamber to stabilize.

j) Repeat step f) through step i) down to the lowest specified temperature.

Frequency stability when varying supply voltage

Unless otherwise specified, these tests shall be made at ambient room temperature (+15 °C to +25 °C). An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.

a) Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency-measuring instrument.

NOTE—An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

b) Tune the EUT to one of the number of frequencies required in 5.6. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

c) Measure the frequency at each of the frequencies specified in 5.6.

d) Repeat the above procedure at 85% and 115% of the nominal supply voltage as described in 5.13.

4.5.4 Test Result

Serial Number:	2HPA-3	Test Date:	2024/3/14
Test Site:	RF	Test Mode:	Transmitting
Tester:	Leesin Xiang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	21.6	Relative Humidity: (%)	57	ATM Pressure: (kPa)	101.1

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
EMCO	Passive Loop Antenna	6512	9706-1206	2023/10/21	2026/10/20
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2023/8/1	2024/7/31
R&S	EMI Test Receiver	ESCI	100224	2023/8/18	2024/8/17
All-sun	Clamp Meter	EM305A	8348897	2023/8/3	2024/8/2
TDK-Lambda	DC Power Supply	Z+60-14	F-08-EM038-1	N/A	N/A
BACL	TEMP&HUMI Test Chamber	BTH-150-40	30173	2023/10/18	2024/10/17

** Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

f_o = 13.56 MHz				
Temperature	**Voltage**	**Measured frequency**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**MHz**	**Hz**	**Hz**
-30	7.7	13.56034	340	±1356
-20		13.56037	370	±1356
-10		13.56039	390	±1356
0		13.56033	330	±1356
10		13.56035	350	±1356
20		13.56036	360	±1356
25		13.5604	400	±1356
30		13.56041	410	±1356
40		13.56031	310	±1356
50		13.56032	320	±1356
25	8.8	13.56051	510	±1356
25	6.8	13.56053	530	±1356

Note: the voltage range was declared by manufacturer.

4.6 Antenna Requirement

4.6.1 Applicable Standard

FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §§15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

RSS-Gen §6.8

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.
For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).
When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.
The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.6.2 Judgment

Please refer to the Antenna Information detail in Section 1.3.

APPENDIX A - EUT PHOTOGRAPHS

Please refer to the attachment XMDN240206-08120E-RF-EXP EUT external photographs and XMDN240206-08120E-RF-INP EUT internal photographs.

APPENDIX B - TEST SETUP PHOTOGRAPHS

Please refer to the attachment XMDN240206-08120E-RF-00G-TSP test setup photographs.

APPENDIX C - RF EXPOSURE EVALUATION

SAR test exclusion

Applicable Standard

According to KDB447498 D01 General RF Exposure Guidance v06: 4.3. General SAR test exclusion guidance

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

1) For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/$f_{(MHz)}$)]

2) For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

3) SAR measurement procedures are not established below 100 MHz

Measurement Result

For NFC, the power of EUT: E Field@3m is 75.77 dBuV/m =-19.43dBm (0.01 mW)
Note: E[dBμV/m] = EIRP[dBm] + 95.2 for d = 3 m.

SAR test exclusion threshold for NFC(13.56MHz) separation distance < 50mm

=[474*(1 + log(100/$f_{(MHz)}$))]/2

= 443mW

>0.01 mW

Result: Compliant.

Exemption Limits For Routine Evaluation

Applicable Standard

SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5.

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance[4,5]

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of 30 mm	At separation distance of 35 mm	At separation distance of 40 mm	At separation distance of 45 mm	At separation distance of ≥50 mm
≤300	223 mW	254 mW	284 mW	315 mW	345 mW
450	141 mW	159 mW	177 mW	195 mW	213 mW
835	80 mW	92 mW	105 mW	117 mW	130 mW
1900	99 mW	153 mW	225 mW	316 mW	431 mW
2450	83 mW	123 mW	173 mW	235 mW	309 mW
3500	86 mW	124 mW	170 mW	225 mW	290 mW
5800	56 mW	71 mW	85 mW	97 mW	106 mW

Measurement Result

For NFC, the power of EUT: E Field@3m is 75.77 dBuV/m =-19.43dBm (0.01 mW)
Note: E[dBμV/m] = EIRP[dBm] + 95.2 for d = 3 m.
SAR test exclusion threshold is 71 mW for NFC(13.56MHz) separation distance ⩽ 5mm
E.I.R.P = -19.43dBm (0.01 mW)<<71mW

Result: Compliance. So the stand-alone SAR evaluation can be exempted.

******* END OF REPORT *******