FCC PART 15.225

TEST REPORT

For

Vanstone Electronic (Beijing) Co., Ltd.

3F No.2 Building, Aisino Corporation Park 18A, Xingshikou Road, Haidian District, Beijing, China 100195

FCC ID: OWLV39

Report Type:	Product Type:
Original Report	Mobile POS

Report Number:	SZXX1210513-17047E-RF-00D
Report Date:	2021-07-27
Reviewed By:	Jacob Kong RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Mobile POS
Tested Model	V39
Frequency Range	13.56MHz
Field Strength	75.41dBuV/m@3m
Modulation Technique	ASK
Antenna Specification*	1dBi (It is provided by the applicant)
Voltage Range	DC3.8V from battery or DC 5V From Adapter
Date of Test	2021-06-05 to 2021-07-24
Sample number	SZXX1210513-17047E-RF-S_5RA (Assigned by BACL, Shenzhen)
Received date	2021-05-13
Sample/EUT Status	Good condition
Normal/Extreme Condition	N.V.: Nominal Voltage: 3.8V_{DC} L.V.: Low Voltage 3.5V_{DC}; L.T.: Low Temperature -10℃ N.V.: Normal Voltage 3.8V_{DC}; N.T.: Normal Temperature +20℃ H.V.: High Voltage 4.35V_{DC}; H.T.: High Temperature +50℃ Note: the extreme test condition was declared by applicant.
Adapter information	Model: SW-0018C Input: 100-240V~50/60Hz, 0.2A Output: 5.0V, 1.0A

Objective

This Type approval report is in accordance with Part 2- Subpart J, and Part 15-Subparts A and C of the Federal Communication Commissions rules.

The objective is to determine the compliance of the EUT with FCC rules, section 15.203, 15.205, 15.207, 15.209 and 15.225.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.
Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		±5%
AC Power Lines Conducted Emissions		±1.95dB
Radiated Emissions	Below 1GHz	±4.75dB
	Above 1GHz	±4.88dB
Temperature		±1℃
Humidity		±6%
Supply voltages		±0.4%

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 5F(B-West) , 6F, 7F, the 3rd Phase of Wan Li Industrial Building D, Shihua Rd, FuTian Free Trade Zone, Shenzhen, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0023.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

EUT Exercise Software

No Exercise Software was used.

Equipment Modifications

No modification on the EUT.

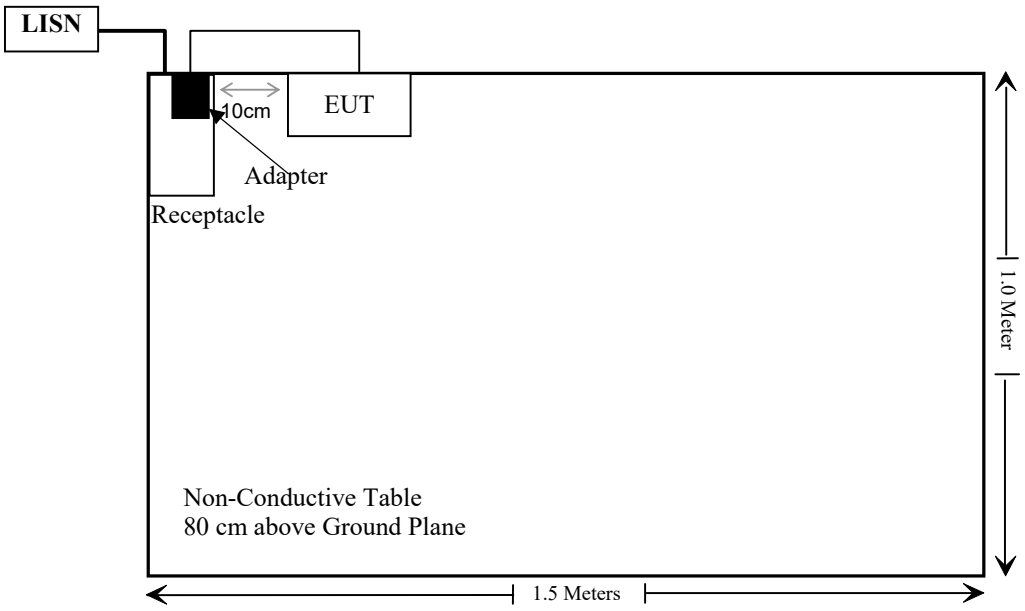
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
/	/	/	/

External I/O Cable

Cable Description	Length (m)	From Port	To
Un-shielding Detachable USB Cable	1.0	EUT	Adapter

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207	AC Line Conducted Emission	Compliant
§15.225 §15.209 §15.205	Radiated Emission Test	Compliant
§15.225(e)	Frequency Stability	Compliant
§15.215(c)	20dB Emission Bandwidth	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2020/08/04	2021/08/03
Rohde & Schwarz	LISN	ENV216	101613	2020/08/04	2021/08/03
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2020/11/29	2021/11/28
Unknown	CE Cable	CE Cable	UF A210B-1-0720-504504	2020/11/29	2021/11/28
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR
Radiated Emission Test					
R&S	EMI Test Receiver	ESR3	102455	2020/08/04	2021/08/03
Sonoma instrument	Pre-amplifier	310 N	186238	2020/08/04	2021/08/03
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2020/12/22	2023/12/21
ETS	Passive Loop Antenna	6512	29604	2018/07/14	2021/07/13
ETS	Passive Loop Antenna	6512	29604	2021/07/14	2024/07/13
Unknown	Cable 2	RF Cable 2	F-03-EM197	2020/11/29	2021/11/28
Unknown	Cable	Chamber Cable 1	F-03-EM236	2020/11/29	2021/11/28
Rohde & Schwarz	Auto test software	EMC 32	V9.10.00	NCR	NCR
CHIGO	Temperature & Humidity Meter	HTC-1S	T-03-EM451	2021/04/07	2022/04/06
RF Conducted Test					
Rohde & Schwarz	Signal and Spectrum Analyzer	FSV40	101473	2020/08/04	2021/08/03
instek	DC Power Supply	GPS-3030DD	EM832096	NCR	NCR
Fluke	Digital Multimeter	287	19000011	2021/02/22	2022/02/21
ESPEC	Temperature & Humidity Chamber	EL-10KA	9107726	2021/01/05	2022/01/05

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

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

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.

Antenna Connected Construction

The EUT has one internal antenna arrangement for NFC which was permanently attached, fulfill the requirement of this section. Please refer to the EUT photos.

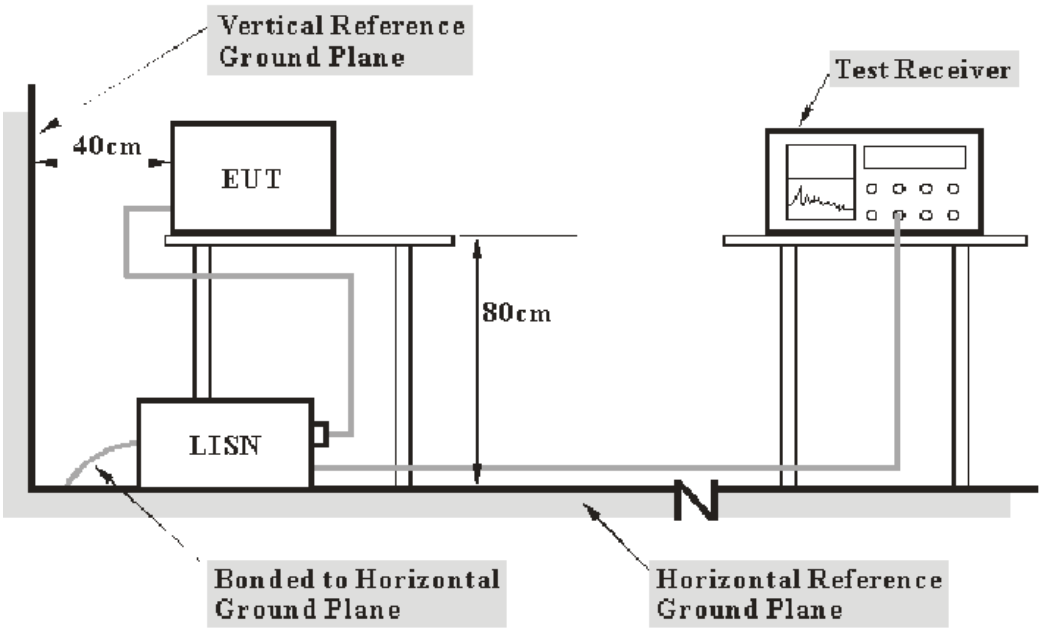
Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSION

Applicable Standard

FCC§15.207

EUT Setup



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

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.

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

Test Procedure

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

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

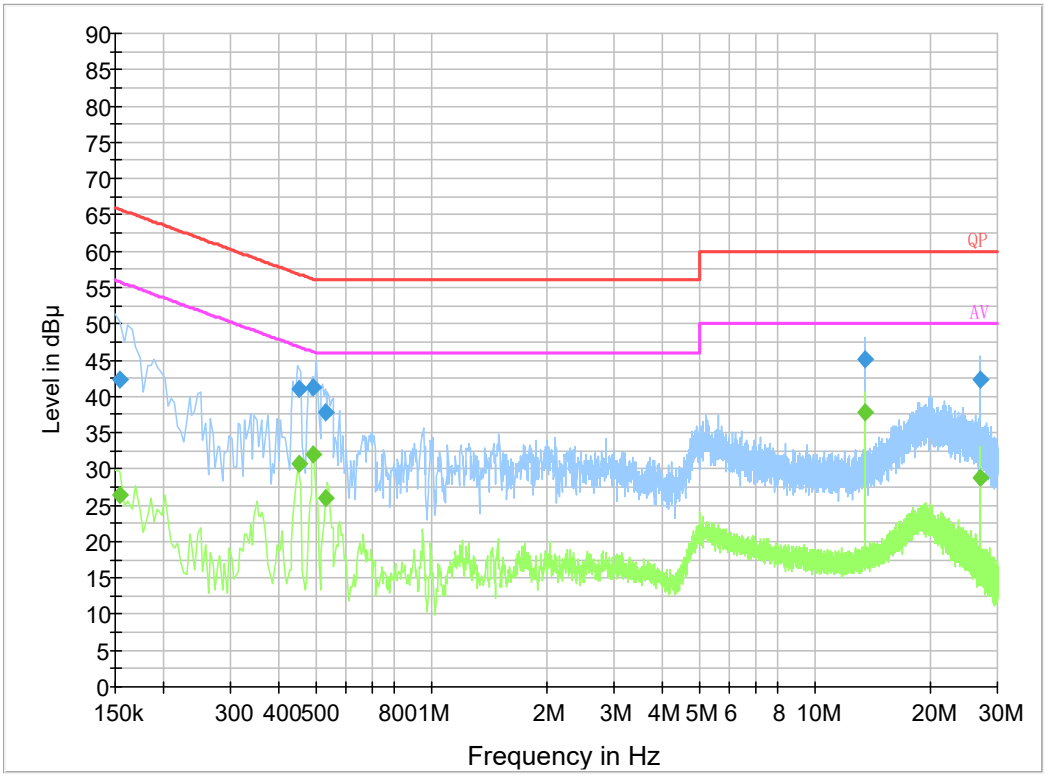
Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	59 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2021-06-07.

EUT Operation Mode: Transmitting

AC 120 V/60 Hz, Line:



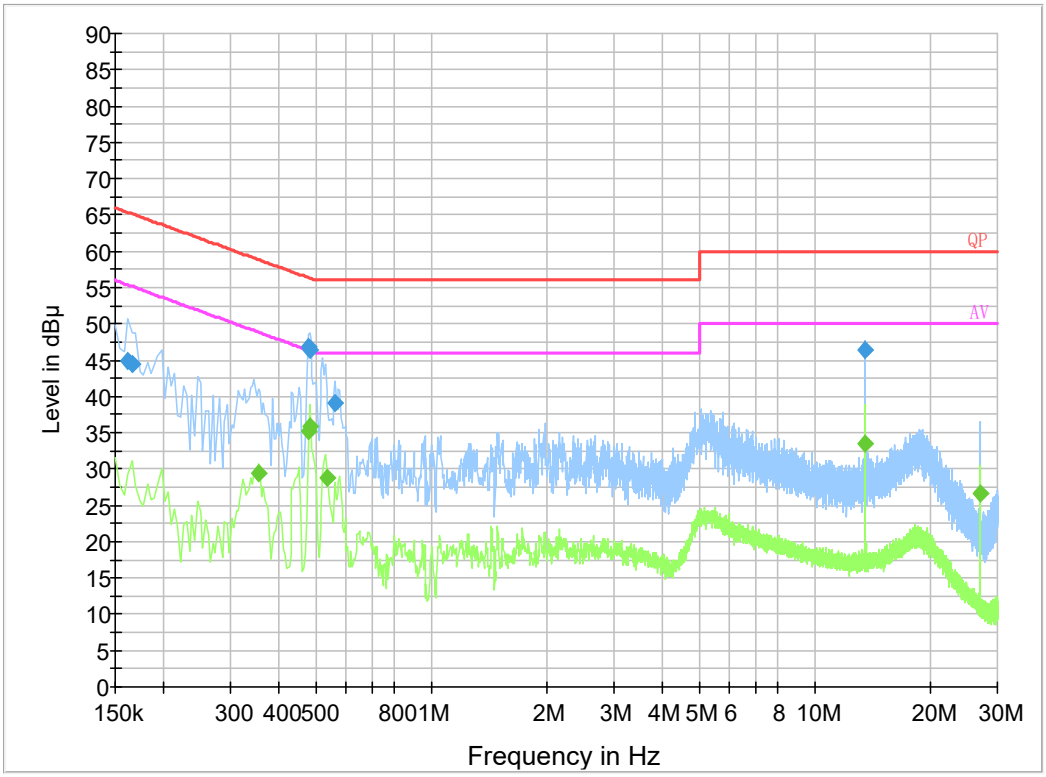
Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.154000	42.4	9.000	L1	19.8	23.4	65.8
0.451250	41.1	9.000	L1	19.8	15.8	56.9
0.494470	41.2	9.000	L1	19.8	14.9	56.1
0.529930	37.8	9.000	L1	19.8	18.2	56.0
13.562570	45.2	9.000	L1	20.0	14.8	60.0
27.123170	42.4	9.000	L1	20.2	17.6	60.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.154000	26.4	9.000	L1	19.8	29.4	55.8
0.451250	30.6	9.000	L1	19.8	16.3	46.9
0.494470	31.9	9.000	L1	19.8	14.2	46.1
0.529930	26.0	9.000	L1	19.8	20.0	46.0
13.562570	37.9	9.000	L1	20.0	12.1	50.0
27.123170	28.8	9.000	L1	20.2	21.2	50.0

AC 120V/60 Hz, Neutral:



Final Result 1

Frequency (MHz)	QuasiPeak (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.161500	44.9	9.000	N	19.8	20.5	65.4
0.165500	44.5	9.000	N	19.8	20.7	65.2
0.478770	46.9	9.000	N	19.8	9.5	56.4
0.482830	46.4	9.000	N	19.8	9.9	56.3
0.561570	39.0	9.000	N	19.8	17.0	56.0
13.558630	46.4	9.000	N	19.9	13.6	60.0

Final Result 2

Frequency (MHz)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.354000	29.5	9.000	N	19.9	19.4	48.9
0.478000	35.2	9.000	N	19.8	11.2	46.4
0.482000	35.8	9.000	N	19.8	10.5	46.3
0.538000	28.7	9.000	N	19.8	17.3	46.0
13.558000	33.5	9.000	N	19.9	16.5	50.0
27.122000	26.6	9.000	N	20.2	23.4	50.0

FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

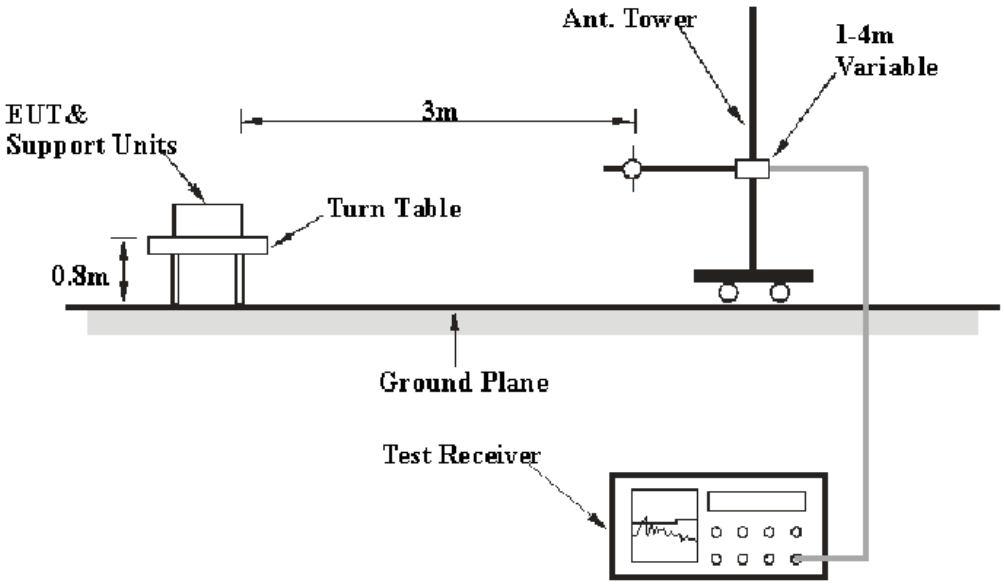
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(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.

EUT Setup



Note: Antenna is set up at 1m during test for below 30MHz.

The radiated emission tests were performed in the 3-meter chamber a test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated up to 1000 MHz.

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

Frequency Range	RBW	Video B/W	IF B/W	Detector
9 kHz – 150 kHz	300 Hz	1 kHz	/	QP
150 kHz –30 MHz	10 kHz	30 kHz	/	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	/	QP

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Factor = Antenna Factor + Cable Loss- Amplifier Gain
Corrected Amplitude = Meter Reading + Corrected Factor

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Data

Environmental Conditions

Temperature:	28 ℃
Relative Humidity:	57~58 %
ATM Pressure:	101.0 kPa

The testing was performed by Cloud Qiu and Zero Yan on 2021-06-05 and 2021-07-24.

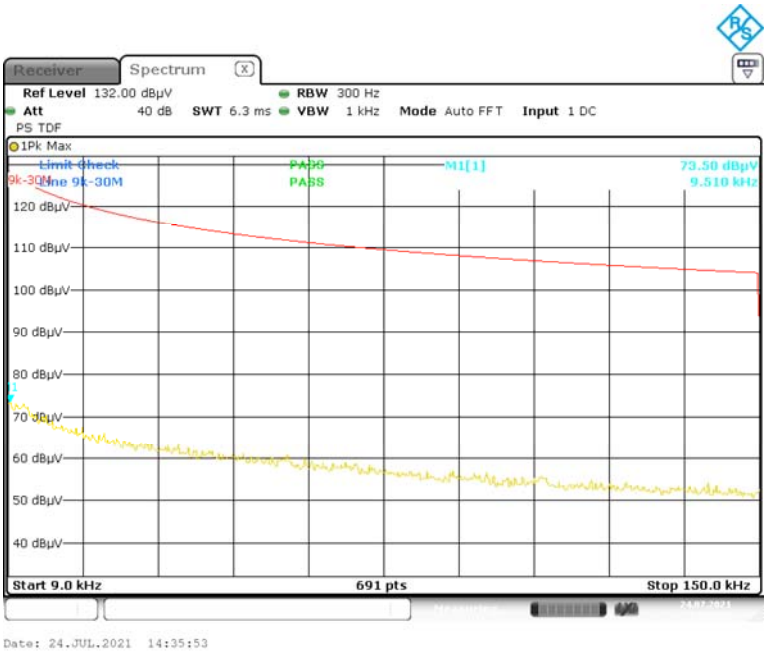
Test mode: Transmitting

1) Spurious Emissions (9 kHz~30 MHz):

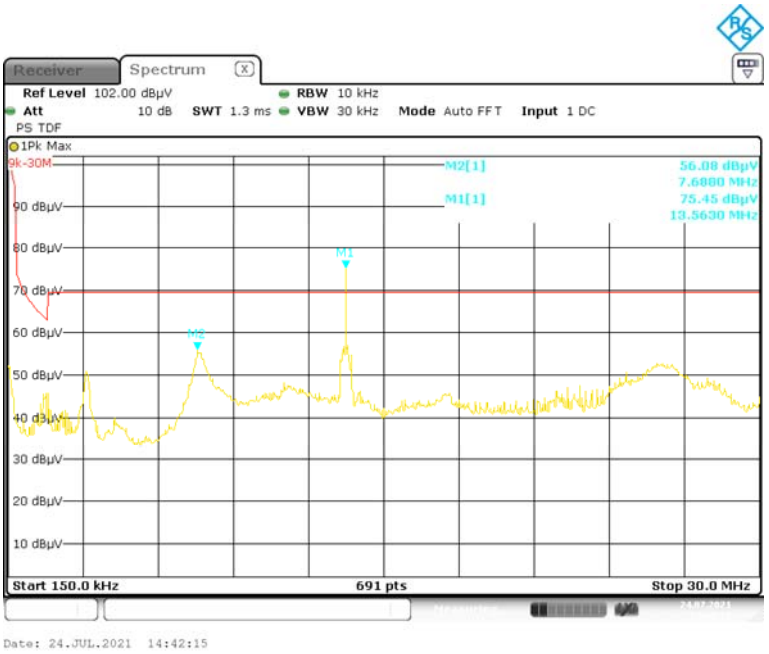
Freq. (MHz)	Corrected Amplitude (dBμV/m) @3m	Table Angle Degree	Antenna Height (m)	Detector	Correction Factor			FCC part 15.225	
					Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Limit (dBμV/m) @3m	Result
0.0095	73.50	0	1	PK	88.5	0.2	30.2	128.05	Pass
7.688	56.08	0	1	PK	34.3	0.3	30.2	69.54	Pass

Note: The Peak value can meet the QP limit.

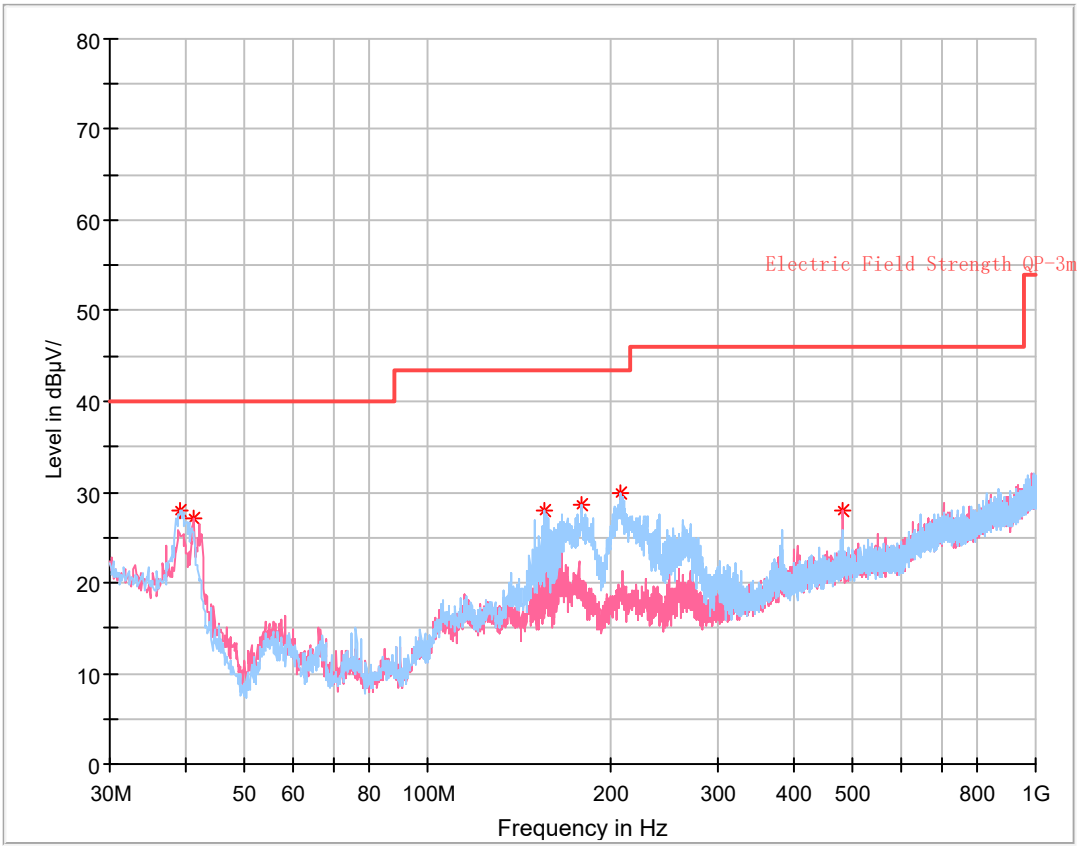
9 kHz~150 kHz



150 kHz~30 MHz



2) Spurious Emissions (30 MHz~1GHz):



Critical_Freqs

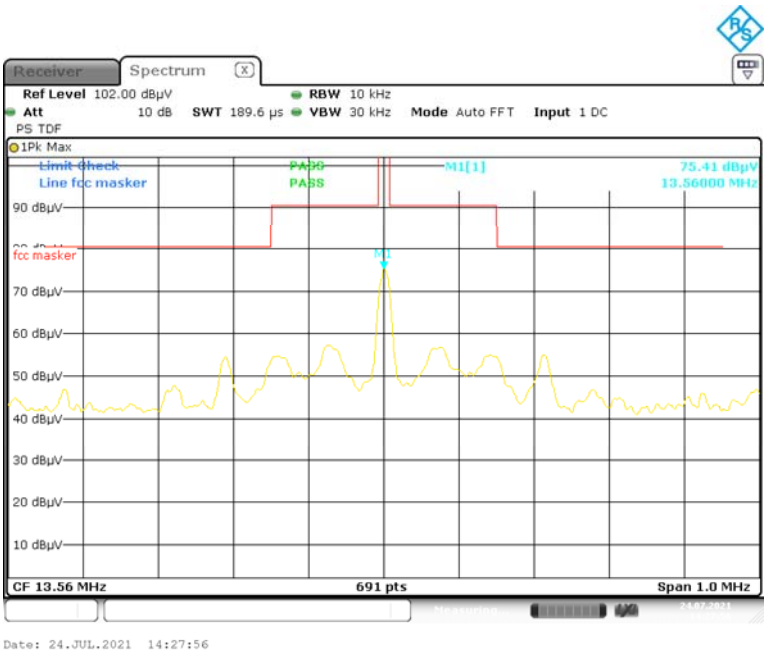
Frequency (MHz)	MaxPeak (dB µ V/m)	Limit (dB µ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
39.215000	27.92	40.00	12.08	100.0	H	168.0	-9.9
41.276250	27.11	40.00	12.89	200.0	V	249.0	-11.3
155.493750	27.87	43.50	15.63	300.0	H	80.0	-11.6
179.016250	28.52	43.50	14.98	200.0	H	252.0	-12.2
208.237500	29.96	43.50	13.54	100.0	H	74.0	-11.2
479.958750	27.88	46.00	18.12	100.0	V	48.0	-5.3

3) Emission Mask & Fundamental:

Frequency (MHz)	Corrected Amplitude (dBμV/m) @3m	Table Angle Degree	Antenna Height (m)	Detector	Correction Factor			FCC Part 15.225	
					Ant. Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Limit (dBμV/m) @3m	Result
13.56	75.41	0	1	PK	32.3	0.2	30.2	124	Pass

Note: The Peak value can meet the QP limit.

Emission Mask



FCC§15.225(e) - FREQUENCY STABILITY

Applicable Standard

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.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and inductive antenna was connected to a Spectrum Analyzer. The EUT was placed inside the temperature chamber.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external DC power supply Source. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

Test Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	57 %
ATM Pressure:	101.0 kPa

The testing was performed by Cloud Qiu on 2021-07-24.

Test Mode: Transmitting

Test Result: Pass

Voltage Supply (V_{AC})	Temperature (℃)	Measured Frequency (MHz)	Frequency Error (%)	Limit (%)
N.V.	-20	13.561051	0.00775	±0.01
	-10	13.561208	0.00891	±0.01
	0	13.561213	0.00895	±0.01
	10	13.561237	0.00912	±0.01
	20	13.561245	0.00918	±0.01
	30	13.561273	0.00939	±0.01
	40	13.561380	0.01018	±0.01
	50	13.561340	0.00988	±0.01
L.V.	20	13.561567	0.01155	±0.01
H.V.	20	13.561345	0.00992	±0.01

FCC§15.215(c) - 20dB EMISSION BANDWIDTH

Requirement

Per 15.215 (c) 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.

Test Procedure

Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.

Test Data

Environmental Conditions

Temperature:	28 °C
Relative Humidity:	57 %
ATM Pressure:	101.0 kPa

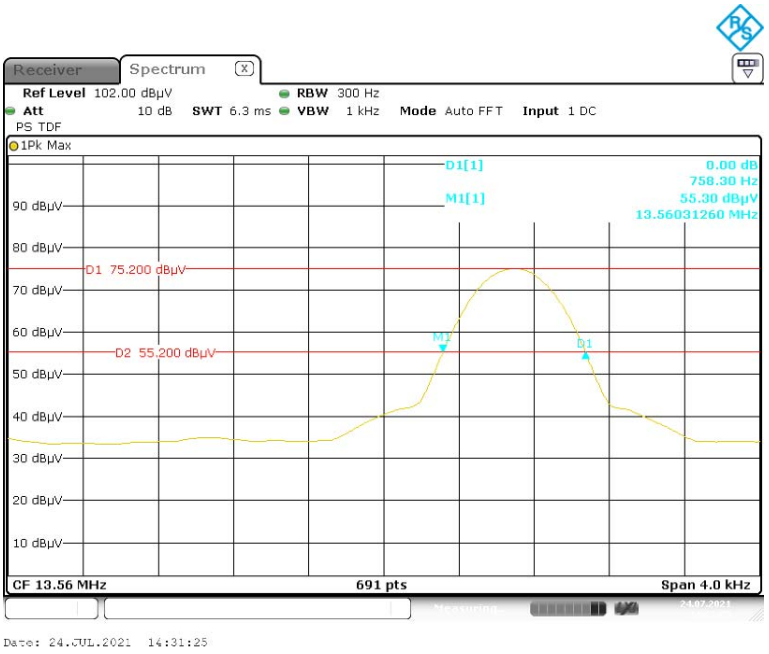
The testing was performed by Cloud Qiu on 2021-07-24.

Test Mode: Transmitting

Test Result: Pass

Test Frequency (MHz)	20dB Bandwidth (kHz)
13.56	0.758

20 dB Emission Bandwidth



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