FCC RADIO TEST REPORT
FCC 47 CFR PART 15 SUBPART C

Test Standard	**FCC Part 15.209**
Product name	**CUP HOLDER TRANSMITTER ASSEMBLY**
Model No.	**4361113**
Trade name	**VOXX Automotive**
Operation Freq.	**TX: 196 KHz**
Test Result	**Pass**
Statements of Conformity	**Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.**

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.
The test Report of full or partial shall not copy. Without written approval of SGS Compliance Certification Services Inc. (Wugu Laboratory)

Approved by:

Dally Hong
Sr. Engineer

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	May 16, 2024	Initial Issue	ALL	Doris Chu
01	May 29, 2024	See the following Note Rev. (01)	P.9, P.18-22, P.24	Doris Chu
02	May 30, 2024	See the following Note Rev. (02)	P.9	Doris Chu

Rev. (01):
1. Add test setup diagram in section 1.8.
2. Add remark 2 and 3 in page 18.
3. Revise Antenna Pol. in page 18 and 19.
4. Revise Factor and Actual FS to @300m in page 18.
5. Add remark 3 in page 20.
6. Add remark 1 in page 21-22.
7. Add remark 2 in page 24.

Rev. (02):
1. Revise test setup diagram in section 1.8.

Table of contents

1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	JET OPTOELECTRONICS CO.,LTD. 7F-2, No. 300, Yangguang St., Neihu Dist., Taipei City 11491,Taiwan
Manufacturer	JET OPTOELECTRONICS CO.,LTD. 7F-2, No. 300, Yangguang St., Neihu Dist., Taipei City 11491,Taiwan
Equipment	CUP HOLDER TRANSMITTER ASSEMBLY
Model Name	4361113
Model Discrepancy	N/A
Trade name	VOXX Automotive
Received Date	February 23, 2024
Date of Test	February 27 ~ 29, 2024
Power Operation	Power from power supply. (DC 12V)
Operation Frequency	TX: 196 KHz
H/W Version	R4
S/W Version	V2.3

Remark:

1. For more details, please refer to the User's manual of the EUT.

1.2 EUT CHANNEL INFORMATION

Frequency Range	TX: 196 KHz
Modulation Type	Inductance

Remark:
Refer as ANSI 63.10:2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	**Number of frequencies**	**Location in frequency range of operation**
☒ 1 MHz or less	1	Middle
☐ 1 MHz to 10 MHz	2	1 near top and 1 near bottom
☐ More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

1.3 ANTENNA INFORMATION

Antenna Type	core Antenna
Antenna Gain	0 dBi
Brand / Model	FULLSTAR / LAC2025-130Y

Remark:
1. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.213 dB
Channel Bandwidth	± 2.7 %
Radiated Emission_9KHz-30MHz	± 3.761 dB
Radiated Emission_30MHz-200MHz	± 3.473 dB
Radiated Emission_200MHz-1GHz	± 3.946 dB

Remark:
1.This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.

1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan

☐ No. 12, Ln. 116, Wugong 3rd Rd., Wugu Dist., New Taipei City, Taiwan

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	-	Not applicable, because EUT doesn't connect to AC Main Source direct.
Radiation	Tony Chao	-
Conducted	Jerry Chang	-

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6 INSTRUMENT CALIBRATION

966A_Radiated					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
PXA Signal Analyzer	Keysight Technologies	N9030B	MY62291089	2023-10-13	2024-10-12
Loop Antenna	COM-POWER	AL-130	121051	2023-05-23	2024-05-22
Thermo-Hygro Meter	WISEWIND	1206	D07	2023-12-07	2024-12-06
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2023-08-08	2024-08-07
Preamplifier	EMEC	EM330	060609	2024-02-21	2025-02-20
Cable	Huber+Suhner	104PEA	20995+21000+182330	2024-02-21	2025-02-20
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Software	e3 V9-210616c				

Conducted_FCC/IC/NCC (All)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Loop Probe	LANGER EMV-TECHNIK	RF-R 50-1	02-2644	2024-01-02	2025-01-01
DC Power Supply	GWINSTEK	SPS-3610	GPE880163	2023-11-16	2024-11-15
EXA Signal Analyzer	Keysight	N9010B	MY60242460	2024-01-18	2025-01-17
Software	N/A				

Remark:
1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.

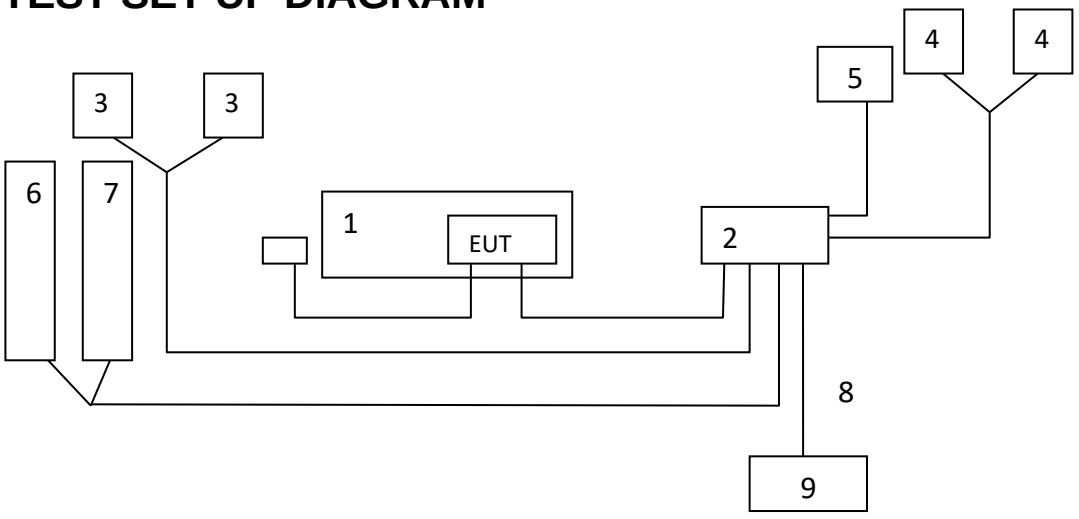
1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

There are no accessories and support equipment be used during the test.

EUT Accessories Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
	N/A				

Support Equipment					
No.	**Equipment**	**Brand**	**Model**	**Series No.**	**FCC ID**
1	CUP HOLDER LIGHT RECEIVER ASSEMBLY	NISSAN	4361112	N/A	N/A
2	Control module	NISSAN	4361101	N/A	N/A
3	Front footwell Light ASSEMBLY	NISSAN	4361108	N/A	N/A
4	Rear footwell Light ASSEMBLY	NISSAN	4361110	N/A	N/A
5	Switch	NISSAN	4361103	N/A	N/A
6	LIGHTING ASSEMBLY – LH	NISSAN	4361094	N/A	N/A
7	LIGHT ASSEMBLY – RH	NISSAN	4361095	N/A	N/A
8	POWER HARNESS	NISSAN	4120614	N/A	N/A
9	Power Supply	ABM	9603D	D011314	N/A

1.8 TEST SET UP DIAGRAM



1.9 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC 15.209.

2. TEST SUMMARY

FCC Standard Sec.	Chapter	Test Item	Result
15.215	4.1	20dB Bandwidth & 99% OBW	Pass
15.209	4.2	Transmitter Radiated Emission	Pass
15.207	4.3	AC Power-line Conducted Emission	Not applicable
15.203	4.4	Antenna Requirement	Pass

3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	TX: 196KHz
RF Field strength	Peak: -8.70 dBuV/m @300m

3.2 THE WORST MODE OF MEASUREMENT

Radiated Emission Measurement Below 1G	
Test Condition	**Radiated Emission Below 1G**
Power supply Mode	**Mode 1: EUT power by Power Supply**
Worst Mode	☒ **Mode 1** ☐ **Mode 2** ☐ **Mode 3** ☐ **Mode 4**

Remark:
1. The worst mode was record in this test report.
2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report

3.3 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

According to FCC 15.205,

(a) Except as shown in other rules, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	([2])
13.36 - 13.41	322 - 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided by other rules, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

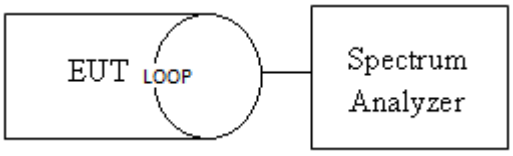
4. TEST RESULT

4.1 20DB BANDWIDTH

DEFINITION

According to FCC Part 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.

TEST CONFIGURATION



TEST PROCEDURE

The Loop antenna connected to the spectrum analyzer, was touching to the transmitter antenna. Set the RBW=1KHz, VBW ≥ 3 x RBW, Detector = Peak, Trace mode = Max hold, Sweep = Auto. Measure the maximum width of the emission that is constrained by the frequencies associated with the Occupied Bandwidth.

TEST RESULTS

Compliance

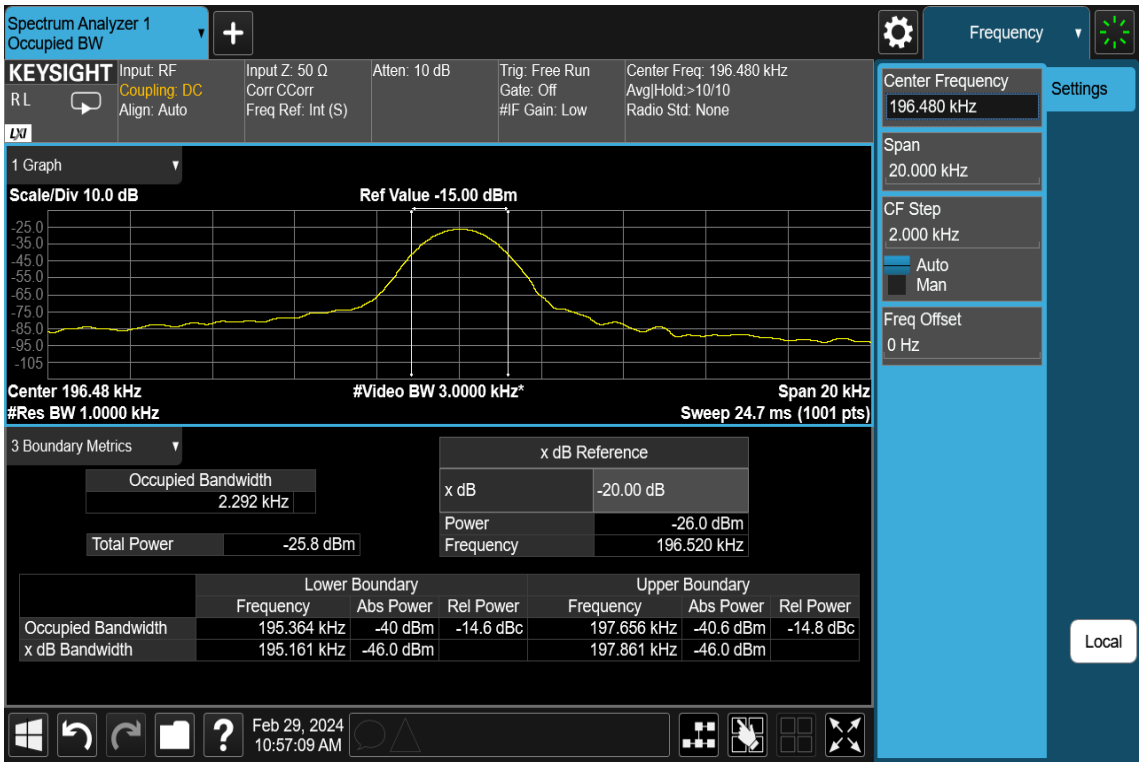
Test Data

Temperature: 19.2℃ **Test Date:** February 29, 2024

Humidity: 60% RH **Tested By:** Jerry Chang

20 dB Bandwidth (KHz)			99% Bandwidth (KHz)
FL	FH	Bandwidth	
195.161	197.861	2.7	2.292

Test Plots
20dB & 99%OBW



4.2 TRANSMITTER RADIATED EMISSION

LIMIT

1. According to FCC PART 15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
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

Remark: Except as provided in other rules, fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

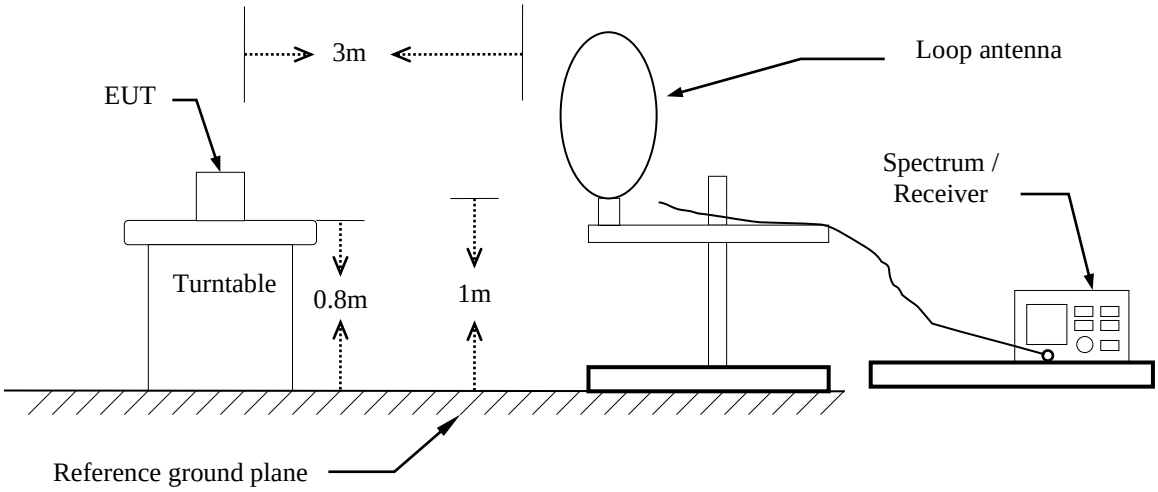
2. In the above emission table, the tighter limit applies at the band edges.

Above 30MHz

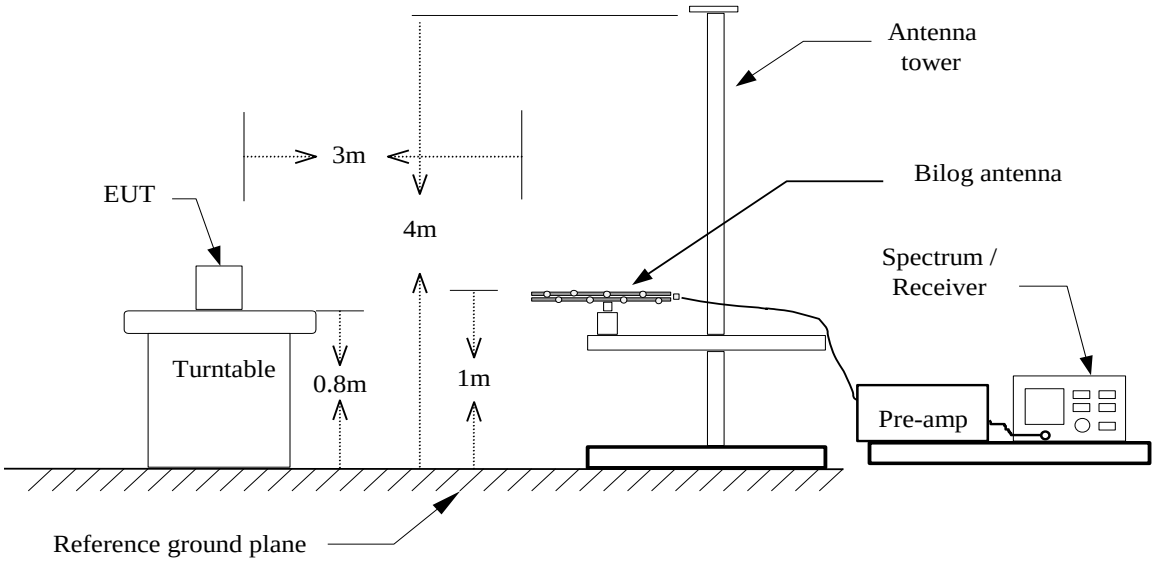
Frequency (MHz)	Field Strength		Measurement Distance (meter)
	(μV/m)	(dBμV/m)	
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Test Configuration

9KHz ~ 30MHz



30MHz ~ 1GHz



TEST PROCEDURE

For 9KHz ~ 30MHz

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
   Below 1GHz:
   RBW=200KHz / VBW=600KHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.
8. Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

For 30MHz ~ 1GHz

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
   RBW=100KHz / VBW=300KHz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

Fundamental Strength

Operation Mode: Main

Temperature: 24.3℃ **Test Date:** February 27, 2024

Humidity: 60% RH **Tested by:** Tony Chao

Antenna Pol.: Perpendicular

Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level @3m dBµV	Factor @3m dB	Actual FS @3m dBµV/m	Factor @300m dB	Actual FS @300m dBµV/m	Limit dBµV/m	Margin dB
0.196	Peak	53.27	14.35	67.62	-80.00	-12.38	21.76	-34.14

Antenna Pol.: Parallel

Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level @3m dBµV	Factor @3m dB	Actual FS @3m dBµV/m	Factor @300m dB	Actual FS @300m dBµV/m	Limit dBµV/m	Margin dB
0.196	Peak	56.94	14.35	71.30	-80.00	-8.70	21.76	-30.46

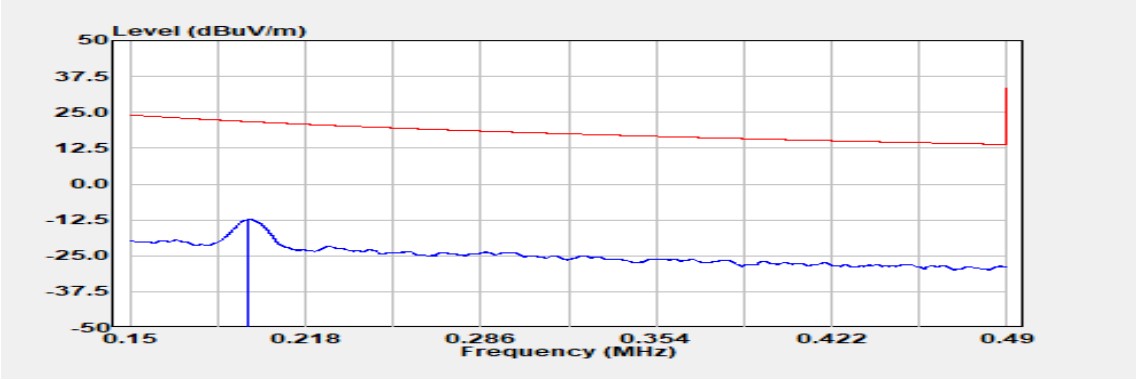
Antenna Pol.: Ground-parallel

Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level @3m dBµV	Factor @3m dB	Actual FS @3m dBµV/m	Factor @300m dB	Actual FS @300m dBµV/m	Limit dBµV/m	Margin dB
0.196	Peak	48.17	14.35	62.52	-80.00	-17.48	21.76	-39.24

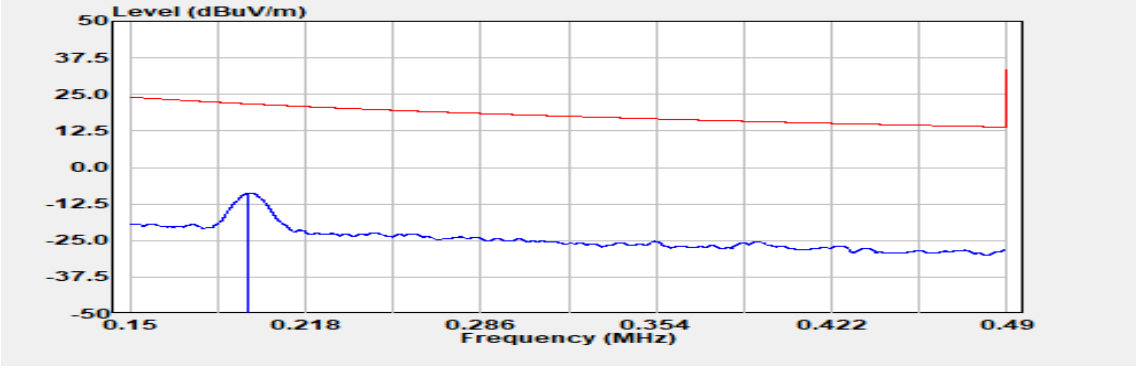
Remark:

1. Since the Factor included the distance conversion factor, the distance of Actual FS is 300m or 30m. (9KHz~490KHz is 300m, 490KHz~30MHz is 30m)
2. Limit: 20*log(2400/F(kHz))
   Actual FS = SA Read level+factor@3m+Distance Factor[ex: 20*LOG(3/300)@<490kHz]
3. For 9-90kHz, 110kHz-490kHz, the EUT peak value was under average limit, therefore the average value compliance with the average limit.

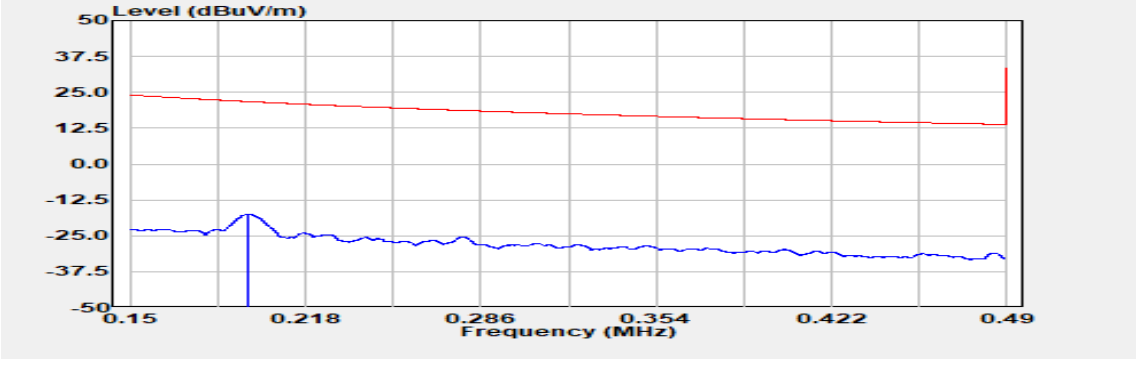
Antenna Pol.: Perpendicular



Antenna Pol.: Parallel

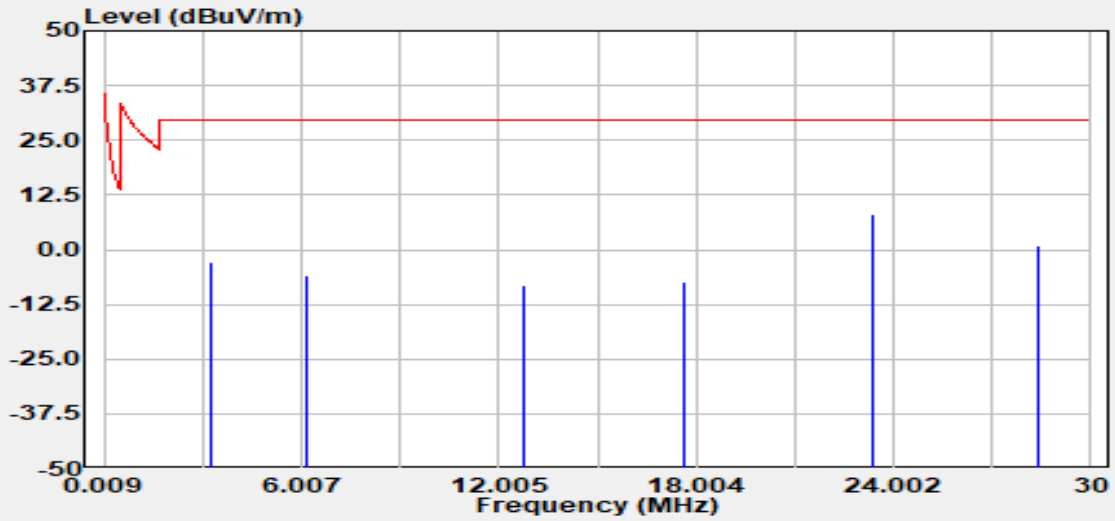


Antenna Pol.: Ground-parallel



9KHz – 30MHz

Operation Mode: TX 196KHz
Antenna Pol.: Horizontal
Temperature: 24.3℃
Test Date: February 27, 2024
Humidity: 60% RH
Tested by: Tony Chao



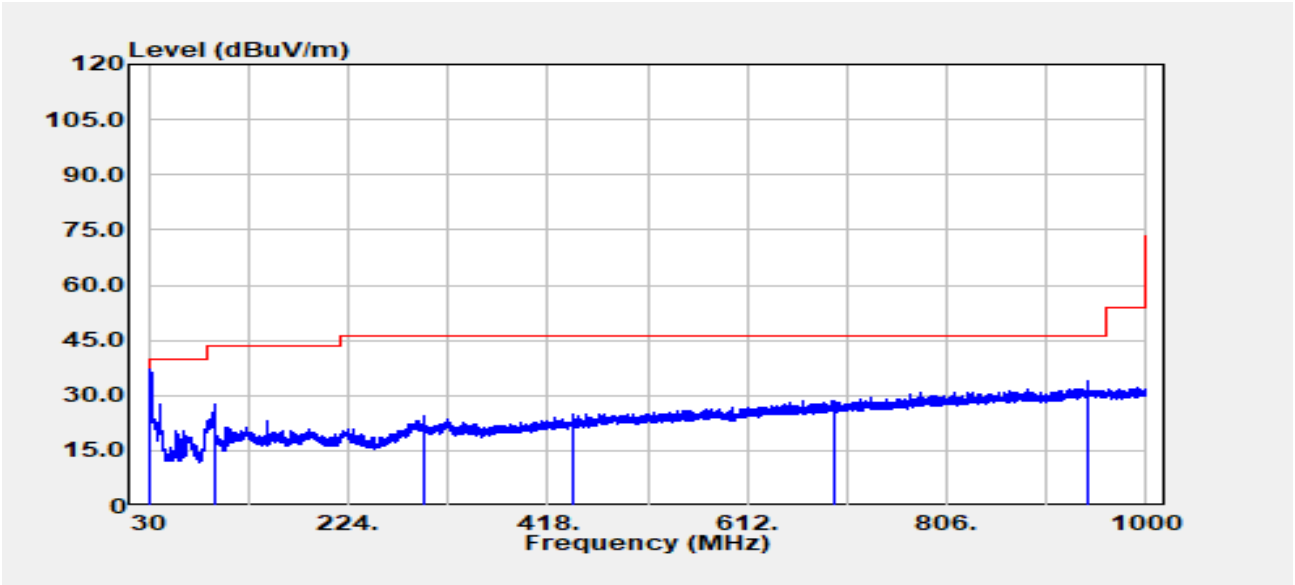
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level @3m dBµV	Factor @3m dB	Actual FS @3m dBµV/m	Factor @30m&300m dB	Actual FS @30m&300m dBµV/m	Limit dBµV/m	Margin dB
3.264	Peak	21.92	15.29	37.21	-40.00	-2.79	29.54	-32.33
6.159	Peak	17.55	16.65	34.19	-40.00	-5.81	29.54	-35.35
12.786	Peak	15.06	16.83	31.90	-40.00	-8.10	29.54	-37.64
17.671	Peak	14.87	17.59	32.47	-40.00	-7.53	29.54	-37.07
23.393	Peak	31.67	16.28	47.95	-40.00	7.95	29.54	-21.59
28.378	Peak	23.89	17.16	41.05	-40.00	1.05	29.54	-28.49

Remark:

1. the frequency bands 9-90 KHz, 110-490 KHz measurements employing an average detector and other below 1GHz measurements employing a CISPR quasi-peak detector.
2. Since the Factor included the distance conversion factor, the distance of Actual FS is 300m or 30m. (9KHz~490KHz is 300m, 490KHz~30MHz is 30m)
3. After pre-scanning three axes, only the worst polarity is recorded on the report.

Below 1 GHz

Operation Mode: TX 196KHz
Antenna Pol.: Vertical
Temperature: 24.3℃
Test Date: February 27, 2024
Humidity: 60% RH
Tested by: Tony Chao

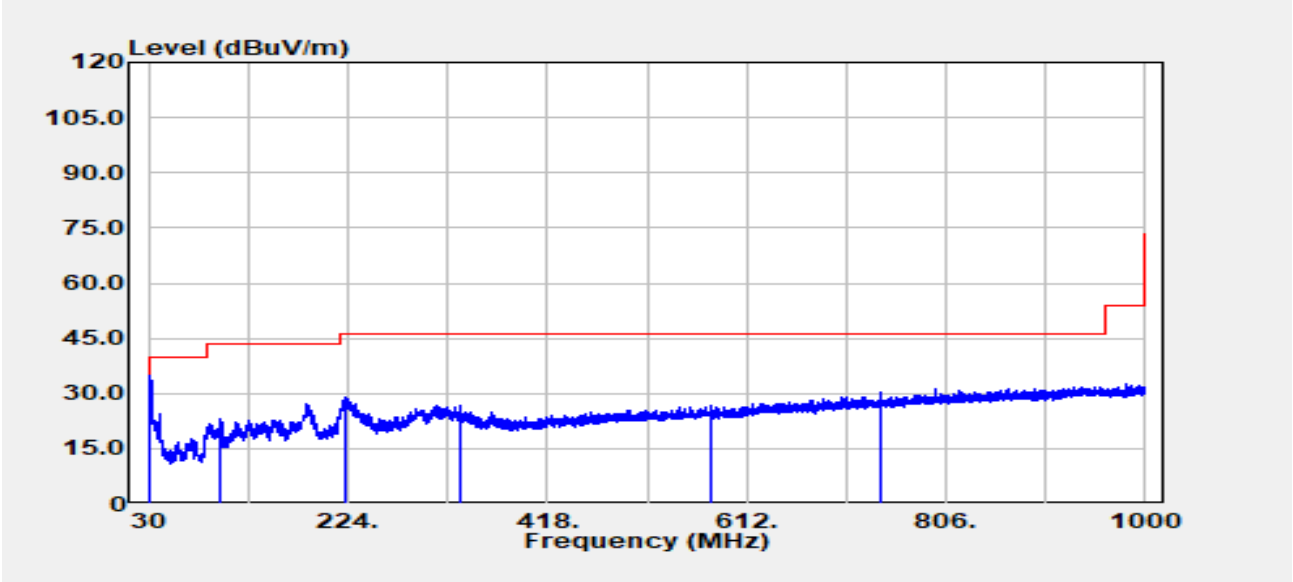


Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
32.18	Peak	40.93	-3.71	37.22	40.00	-2.78
94.38	Peak	41.91	-14.43	27.48	43.50	-16.02
297.48	Peak	33.12	-8.63	24.49	46.00	-21.51
442.98	Peak	29.55	-4.59	24.95	46.00	-21.05
697.00	Peak	28.83	-0.13	28.71	46.00	-17.29
942.89	Peak	30.12	3.85	33.97	46.00	-12.03

Remark:

1. Factor = Antenna factor + Cable loss – Amp gain

Operation Mode: TX 196KHz
Temperature: 24.3℃
Humidity: 60% RH
Antenna Pol.: Horizontal
Test Date: February 27, 2024
Tested by: Tony Chao



Freq. (MHz)	Detector Mode (PK/QP/AV)	Spectrum Reading Level (dBµV)	Factor (dB)	Actual FS (dBµV/m)	Limit @3m (dBµV/m)	Margin (dB)
32.18	Peak	38.47	-3.71	34.76	40.00	-5.24
100.69	Peak	35.46	-12.44	23.03	43.50	-20.47
220.97	Peak	40.45	-11.68	28.77	46.00	-17.23
332.64	Peak	34.73	-7.81	26.92	46.00	-19.08
576.60	Peak	28.63	-2.13	26.50	46.00	-19.50
743.44	Peak	29.63	0.58	30.21	46.00	-15.79

Remark:
1. Factor = Antenna factor + Cable loss – Amp gain

4.3 AC POWER LINE CONDUCTED EMISSION

4.3.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

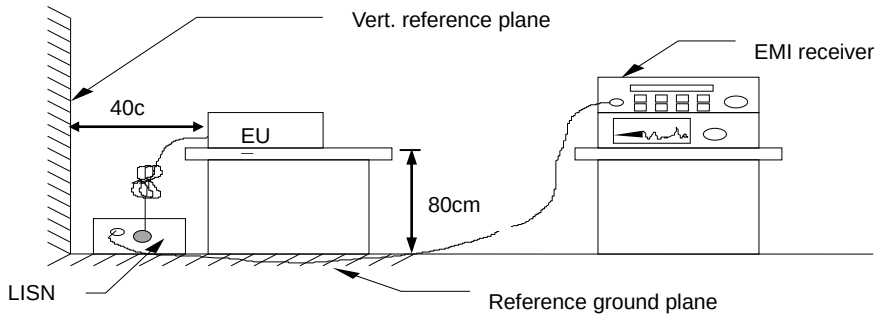
* Decreases with the logarithm of the frequency.

4.3.2 Test Procedure

Test method Refer as ANSI 63.10:2013 clause 6.2,

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete

4.3.3 Test Setup



4.3.4 Test Result

Not applicable, because EUT doesn’t connect to AC Main Source direct.

4.4 ANTENNA REQUIREMENT

§ 15.203 Antenna requirement.

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, or §15.221. 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.

Antenna Type	core Antenna
Antenna Gain	0 dBi
Brand / Model	FULLSTAR / LAC2025-130Y

Remark:
1.The antenna(s) of the EUT are permanently attached and there are no provisions for connection to an external antenna. So the EUT complies with the requirements of §15.203.
2. Only radiated measurements are used to show compliance with FCC limits for fundamental and spurious emissions.

- End of Test Report -