



FCC PART 15B, CLASS B

TEST REPORT

For

Vertex Standard LMR, Inc.

Tamachi First Bldg. 4-6-8 Shibaur, Minato-ku, Tokyo 108-0023 Japan

FCC ID: 2ADPVEVX-LRX

Report Type: Original Report	Product Type: Digital Radio receiving Equipment
Report Number: <u>RSZ170516010-00</u>	
Report Date: <u>2017-06-16</u>	
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Vertex Standard LMR, Inc.*'s product, model number: *EVX-LRX* (FCC ID: 2ADPVEVX-LRX) or the "EUT" in this report was a *Digital Radio receiving Equipment*, which was measured approximately: 50 mm (L) * 50 mm (W) * 50 mm (H), rated with input voltage: DC 3.7V. The highest operational frequency is 470 MHz.

**All measurement and test data in this report was gathered from production sample serial number: 1701037 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2017-05-16.*

Objective

This test report is prepared on behalf of *Vertex Standard LMR, Inc.* in accordance with Part 2-Subpart J, Part 15-Subparts A, B of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine the compliance of the EUT with FCC Part 15 B.

Related Submittal(s)/Grant(s)

No Related Submittal(s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item	Uncertainty
Radiated emission	30MHz~1GHz
	Above 1G

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in a manufacturer testing fashion.

EUT operation mode: Receiving

EUT Exercise Software

No exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

No modification was made to the EUT tested.

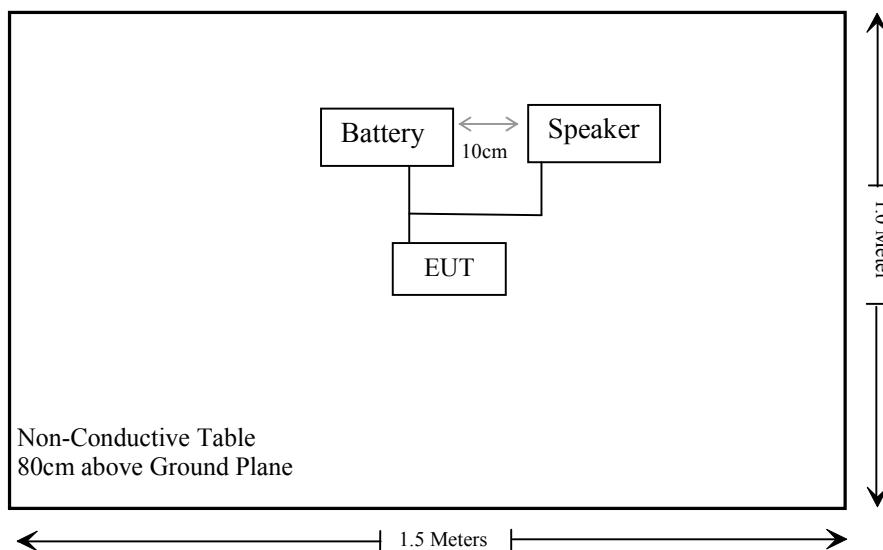
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
N/A	Speaker	N/A	N/A
N/A	Battery	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Un-shielding Detachable DC Cable	0.3	Battery	EUT
Un-shielding Detachable USB Cable	0.3	Speaker	EUT

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.107	AC Line Conducted Emissions	Not Applicable
§15.109	Radiated Spurious Emissions	Compliance
§15.121	Compliance for Scanning Receiver	Compliance

Not Applicable: EUT was supply by battery only.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sonoma Instrunent	Amplifier	330	171377	2016-10-21	2017-10-21
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
EMCO	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
ETS	Horn Antenna	3115	6229	2016-01-11	2019-01-10
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-12
RF Conducted test					
HP	Signal Generator	8341B	2624A00116	2016-08-29	2017-08-29
Yishite	Regulated DC Power Supply	MCH-303D-II	14070562	2016-10-10	2017-10-10
HP	RF Communications Test Set	8920B	N/A	2016-05-07	2018-05-07

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

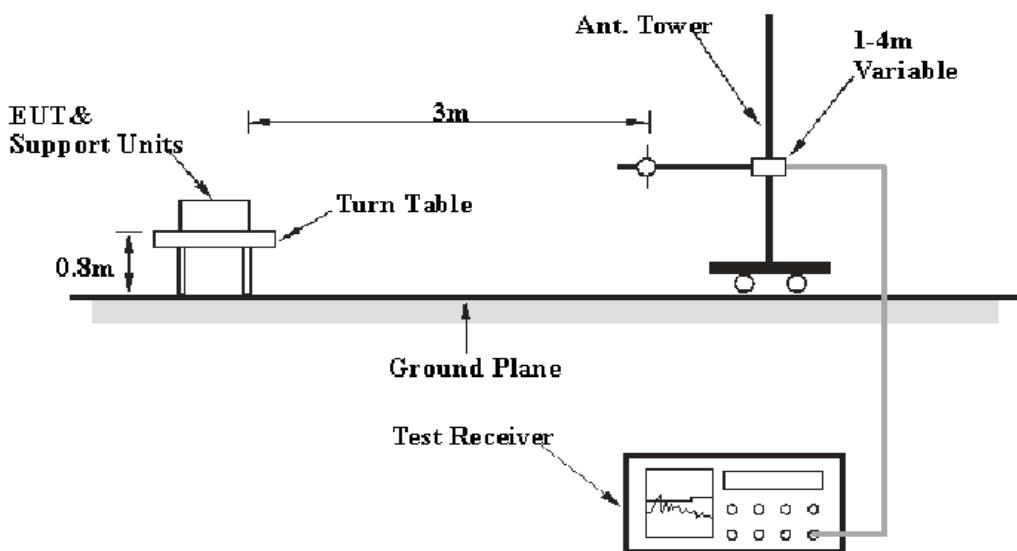
FCC §15.109 - RADIATED SPURIOUS EMISSIONS

Applicable Standard

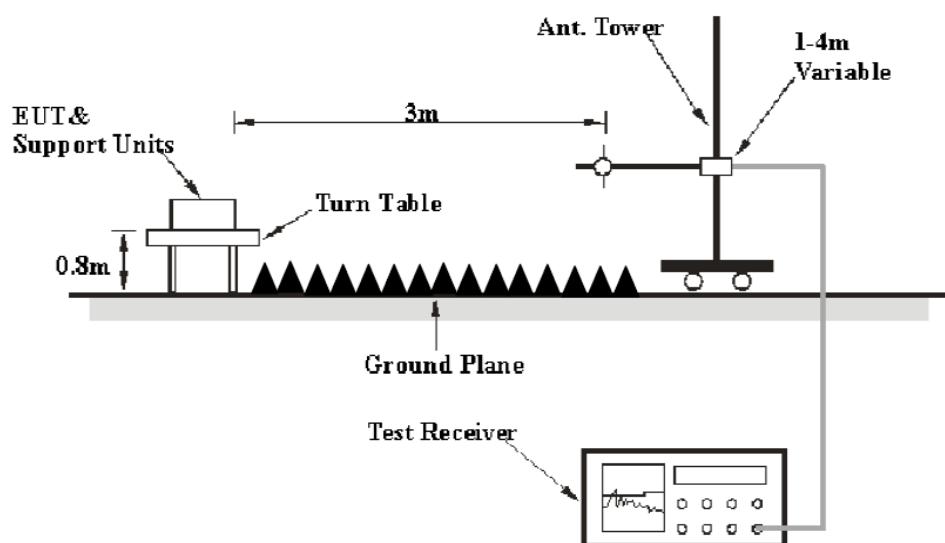
FCC §15.109

EUT Setup

Below 1GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2014. The specification used was the FCC Part 15.109 Class B limits.

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 system was investigated from 30 MHz to 2 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	Detector
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

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

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

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:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.109 Class B,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level is in compliance with the limit if

$$L_m + U_{(Lm)} \leq L_{\text{lim}} + U_{\text{cisp}}$$

In BACL, $U_{(Lm)}$ is less than U_{cisp} , if L_m is less than L_{lim} , it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-06-05

EUT Operation Mode: Receiving

30 MHz – 2GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB μ V/m)	FCC Part 15.109	
	Reading (dB μ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dB μ V/m)	Margin (dB)
Low (400.15MHz)									
30.80	21.86	QP	148	2.4	H	8.04	29.90	40	10.10
55.53	28.26	QP	35	1.8	H	-5.52	22.74	40	17.26
73.23	30.20	QP	241	1.9	H	-5.17	25.03	40	14.97
119.90	31.29	QP	96	1.2	H	-1.22	30.07	43.5	13.43
699.05	27.32	QP	297	2.0	H	7.33	34.65	46	11.35
850.96	27.57	QP	353	1.3	H	10.50	38.07	46	7.93
3201.10	54.73	PK	281	1.8	H	-2.72	52.01	74	21.99
3201.10	45.16	Ave.	281	1.8	H	-2.72	42.44	54	11.56
3201.10	55.62	PK	272	1.3	V	-2.72	52.90	74	21.10
3201.10	37.79	Ave.	272	1.3	V	-2.72	35.07	54	18.93
Middle (435.15MHz)									
30.72	17.93	QP	326	2.3	H	8.04	25.97	40	14.03
55.58	28.41	QP	86	1.5	H	-5.52	22.89	40	17.11
73.18	29.72	QP	106	2.4	H	-5.17	24.55	40	15.45
119.90	30.76	QP	110	1.3	H	-1.22	29.54	43.5	13.96
698.95	28.23	QP	2	1.6	H	7.33	35.56	46	10.44
851.08	28.27	QP	93	1.5	H	10.50	38.77	46	7.23
3481.20	47.32	PK	358	1.7	H	-1.94	45.38	74	28.62
3481.20	33.40	Ave.	358	1.7	H	-1.94	31.46	54	22.54
3481.15	47.11	PK	218	1.7	V	-1.94	45.17	74	28.83
3481.15	32.71	Ave.	218	1.7	V	-1.94	30.77	54	23.23

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB μ V/m)	FCC Part 15.109	
	Reading (dB μ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dB μ V/m)	Margin (dB)
High (469.15MHz)									
30.66	17.45	QP	196	1.2	H	8.04	25.49	40	14.51
55.60	27.32	QP	183	1.9	H	-5.52	21.80	40	18.20
73.18	31.33	QP	279	2.1	H	-5.17	26.16	40	13.84
119.88	30.82	QP	17	2.4	H	-1.22	29.60	43.5	13.90
698.94	27.34	QP	318	2.4	H	7.33	34.67	46	11.33
851.05	28.58	QP	232	1.6	H	10.50	39.08	46	6.92
3833.20	47.63	PK	38	1.3	H	-0.96	46.67	74	27.33
3833.20	33.14	Ave.	38	1.3	H	-0.96	32.18	54	21.82
3833.20	47.80	PK	269	1.6	V	-0.96	46.84	74	27.16
3833.20	33.15	Ave.	269	1.6	V	-0.96	32.19	54	21.81

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor(RX)+cable loss - amplifier factor

Margin = Limit- Corr. Amplitude

All signals exceeding 20 microvolts/meter at 3 meters have been recorded.

EUT Operation Mode: Scanning

30 MHz – 2GHz:

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dB μ V/m)	FCC Part 15.109	
	Reading (dB μ V)	Detector (PK/QP/Ave.)		Height (m)	Polar (H / V)			Limit (dB μ V/m)	Margin (dB)
(400MHz-470MHz)									
30.70	18.55	QP	36	1.2	H	8.04	26.59	40	13.41
55.52	28.74	QP	36	1.7	H	-5.52	23.22	40	16.78
73.15	31.00	QP	84	1.8	H	-5.17	25.83	40	14.17
119.83	30.86	QP	113	1.2	H	-1.22	29.64	43.5	13.86
698.98	27.44	QP	220	1.4	H	7.33	34.77	46	11.23
850.97	28.32	QP	306	1.4	H	10.50	38.82	46	7.18
3839.51	48.25	PK	91	1.6	H	-0.96	47.29	74	26.71
3839.51	33.24	Ave.	91	1.6	H	-0.96	32.28	54	21.72
3214.23	47.83	PK	31	2.0	V	-2.72	45.11	74	28.89
3214.23	33.30	Ave.	31	2.0	V	-2.72	30.58	54	23.42

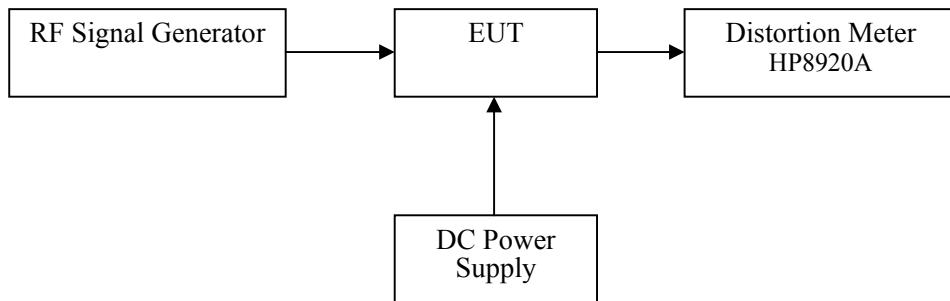
FCC §15.121 - COMPLIANCE FOR SCANNING RECEIVER

Applicable Standard

FCC §15.121

EUT Setup

For FCC §15.121(b) Scanning Receiver Cellular Band Rejection Test



Test Procedure

- 1) Connected the EUT as shown in the above block diagram.
- 2) Apply a RF signal to the receiver input port at lowest, middle and highest channel frequencies of receiver operation band.
- 3) Adjust the audio output level of the receiver to it's rated value with the distortion less than 10%.
- 4) Adjust the RF Signal Generator Output Power to produce 12 dB SINAD without the audio output power dropping by more than 3 dB. This output level of the RF SG at each channel frequency is the sensitivity of the receiver.
- 5) Select the lowest or worse-case sensitivity level for all of the bands as the reference sensitivity.
- 6) Adjust the RF Signal Generator output to a level of +60 dB above the reference sensitivity obtained in step 5) and its frequency to the frequency points in the cellular band.
- 7) Set the Receiver squelch to threshold, the signal required to open the squelch must be lower than the reference sensitivity level.
- 8) Set the receiver in a scanning mode and allow it to scan through it's complete receiving range.
- 9) If the receiver unsquelched or stopped on any frequency, receiving at this frequency, then adjust the signal generator output level until 12 dB SINAD is produced, this level is the spurious value and the difference between the reference sensitivity and the spurious value is the rejection ratio and must be at least 38dB.
- 10) Repeat above procedure at the frequencies 824.5, 836.0, and 848.5 MHz for the mobile band, and 869.1, 881.5, and 893.5MHz for the cellular base band.

Test Results Summary

Comply with FCC 121(a):

- Please refer to the technical informations or the attestation letter conforming compliance with this requirement.

Comply with FCC 121(b):

- Please refer to the following Scanning Receiver Cellular Band Rejection Test Result.

Comply with FCC 121(c):

- Not applicable.

Comply with FCC 121(d):

- Please refer to the User Manual.

Comply with FCC 121(e):

- This Scanning Receiver is not assembled from kits or marketed in kit form.

Comply with FCC 121(f):

- Please refer to the User Manual..

Test Data

For FCC §15.121(b) Scanning Receiver Cellular Band Rejection

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-06-14.

EUT Operation Mode: Scanning+Receiving Mode

Scanning Receiver Cellular Band Rejection Test Data:

EUT's Scanning Frequency Band (MHz)	Test Frequencies of Cellular Band (MHz)	Spurious Value of Cellular Frequencies for 12 dB SINAD (dBm)	Reference Sensitivity for 12 dB SINAD (dBm)	Rejection Ratio (dB)	Rejection Ratio Limit (dB)
400–470	824.5, 836.0, 848.5, 869.1, 881.5, 893.5	> -49.5	-106.1	< -56.6	< -38.0

Note: Rejection Ratio = Reference Sensitivity - Spurious Value

Result

Compliance with the requirements specified in Part 15.121 for scanning receiver.

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