



FCC PART 15.249

TEST REPORT

For

Kurt Manufacturing Company

5280 Main Street NE Minneapolis, MN 55421 United States

FCC ID: 2AO8MT2005

Report Type: Original Report	Product Type: Kinetic inRide 3.0
Report Producer: <u>Kaylee Chiang</u> 	
Report Number: <u>RXZ1803007-00B</u>	
Report Date: <u>2018-04-10</u>	
Reviewed By: <u>Jerry Chang</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. (Taiwan)

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
1.0	RXZ1803007	RXZ1803007-00B	2018.04.10	Original Report	Kaylee

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant : Kurt Manufacturing Company

5280 Main Street NE Minneapolis, MN 55421 United States

Manufacturer : ALATECH Technology Limited

39F., No.758,Jungming S.Rd. Taichung 40255, Taiwan, R.O.C.

Product : Kinetic inRide 3.0

Model : T-2005

Trade Name : KINETIC

Frequency Range : 2457 MHz

Antenna Specification : PCB Antenna/Gain: 1.98 dBi

Voltage Range: 3Vdc from Battery

Date of Test : Mar 19, 2018 ~ Mar 26, 2018

**All measurement and test data in this report was gathered from production sample serial number: 1803007*

(Assigned by BACL, Taiwan) The EUT supplied by the applicant was received on 2018-03-12.

Objective

This report is prepared on behalf of *Kurt Manufacturing Company* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communications Commission's rules.

The tests were performed in order to determine the ANT+ mode of EUT compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submission with FCC ID: 2AO8MT2005

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on
 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.
 68-3, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (Taiwan) Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3180) and the FCC designation No.TW3180 under the Mutual Recognition Agreement (MRA) in FCC Test. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.10.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 974454. 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 an engineering mode, which was provided by manufacturer. The engineering mode was configured the system transmitting with maximum power. For ANT+ mode, only 1 channel (2457MHz) was used.

EUT Exercise Software

No test software was used.

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Description	Manufacturer	Model Number	BSMI	FCC ID/DOC	S/N
Power supply	KIKUSUI	PMC35-2	N/A	N/A	MK002127

External Cable List and Details

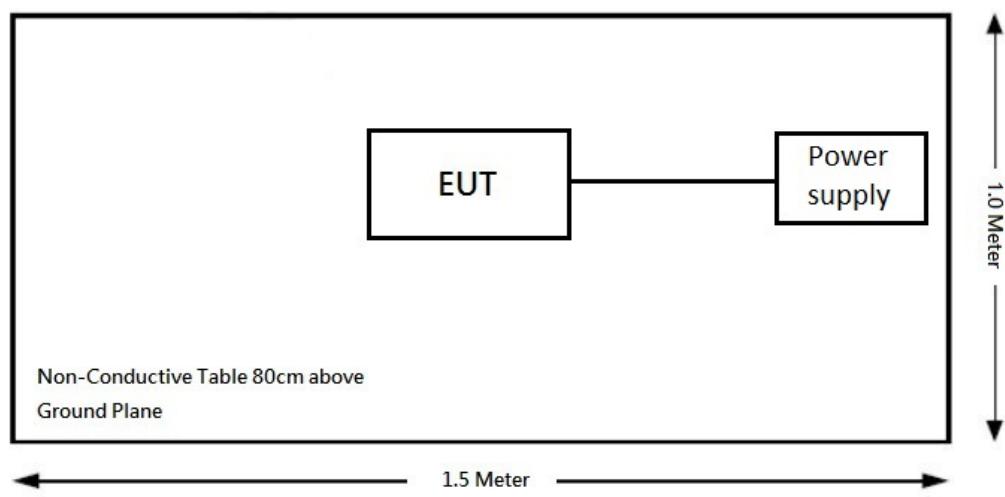
Cable Description	Length (m)	From	To
Alligator clamp	0.5	Power supply	EUT

Block Diagram of Test Setup

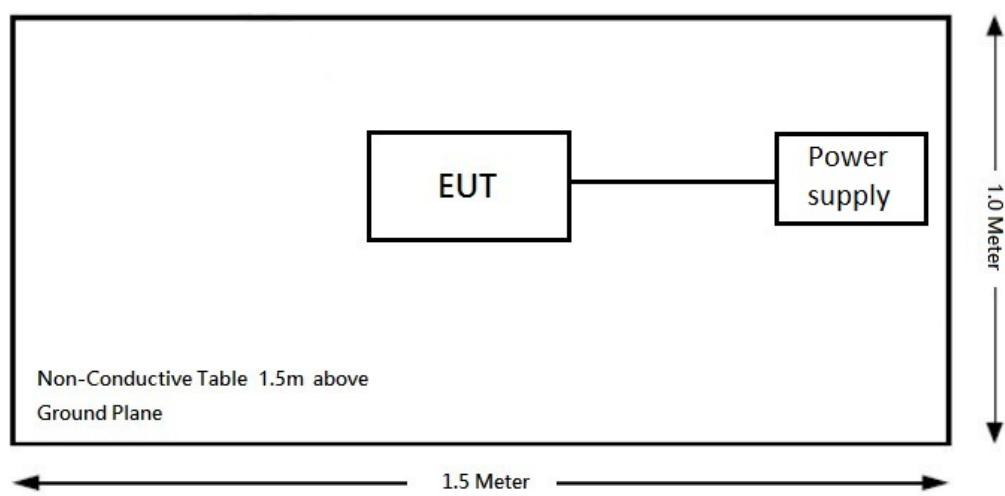
See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment

Radiation:

Below 1GHz:



Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Not applicable
§15.205, §15.209, §15.249	Radiated Emissions	Compliance
§15.215 (c)	20 dB Emission Bandwidth	Compliance

NOTE:

Not Applicable: The device is battery operated equipment.

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

Manufacturer	Type	Antenna Gain	Result
Alatech Technology Limited	PCB Antenna	1.98 dBi	Compliance

Result: Compliance.

FCC§15.209, §15.205 & §15.249 - RADIATED EMISSIONS

Applicable Standard

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

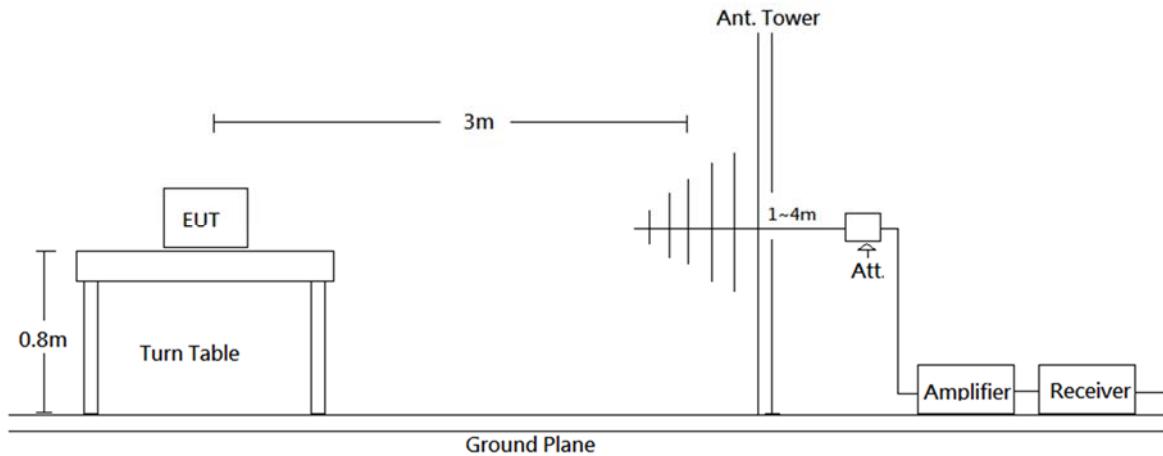
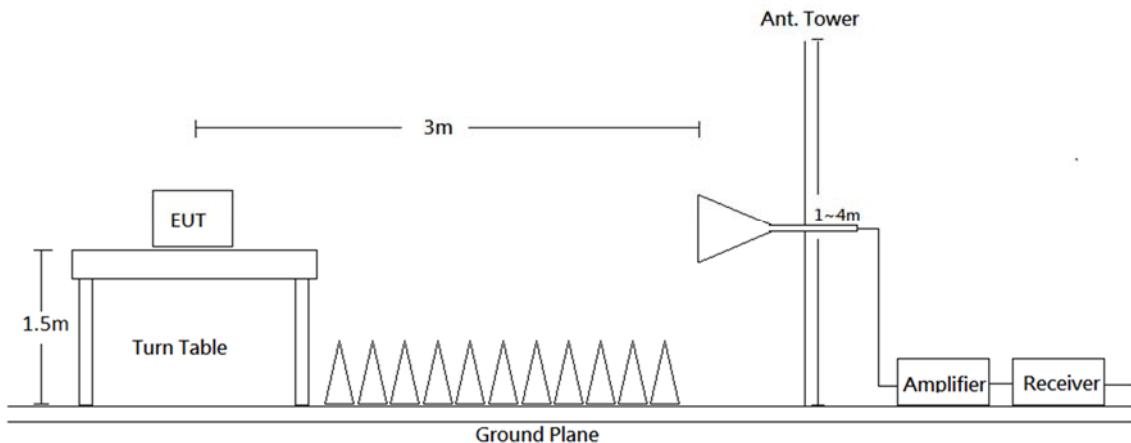
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Taiwan) is shown in below table. And the uncertainty will not be taken into consideration for the test data recorded in the report.

Frequency	Measurement uncertainty
30 MHz~200 MHz	3.76 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.12 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.84 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	5.16 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.84 dB (k=2, 95% level of confidence)
26 GHz~40 GHz	4.30 dB (k=2, 95% level of confidence)

EUT Setup**Below 1GHz:****Above 1GHz:**

The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.249 limits.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were 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.

Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
966A Room					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542 _01	2017/12/20	2018/12/19
Horn Antenna	EMCO	3115	9311-4158	2017/05/24	2018/05/23
Horn Antenna	ETS-Lindgren	3116	62638	2017/09/13	2018/09/12
Preamplifier	Sonoma	310N	130602	2017/07/03	2018/07/02
Preamplifier	EM Electronics Corp.	EM01G18G	060657	2017/12/14	2018/12/13
Microware Preamplifier	EM Electronics Corporatino	EM18G40G	060656	2018/01/15	2019/01/14
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2017/11/06	2018/11/05
Spectrum Analyzer	Rohde & Schwarz	FSV40	101203	2017/07/13	2018/07/12
Microflex Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2017/10/31	2018/10/30
Microflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2017/11/10	2018/11/09
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2018/03/05	2019/03/04
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-80CM	160309-2	2018/01/17	2019/01/16
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	60772	N.C.R	N.C.R
Software	Farad	EZ EMC	BACL-03A1	N.C.R	N.C.R

* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

Corrected Amplitude & Margin Calculation

The Correct Factor 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:

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain} + \text{Attenuator}$$

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:

$$\text{Margin} = \text{Result} - \text{Limit}$$

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, and section 15.205, 15.209 and 15.249.

Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

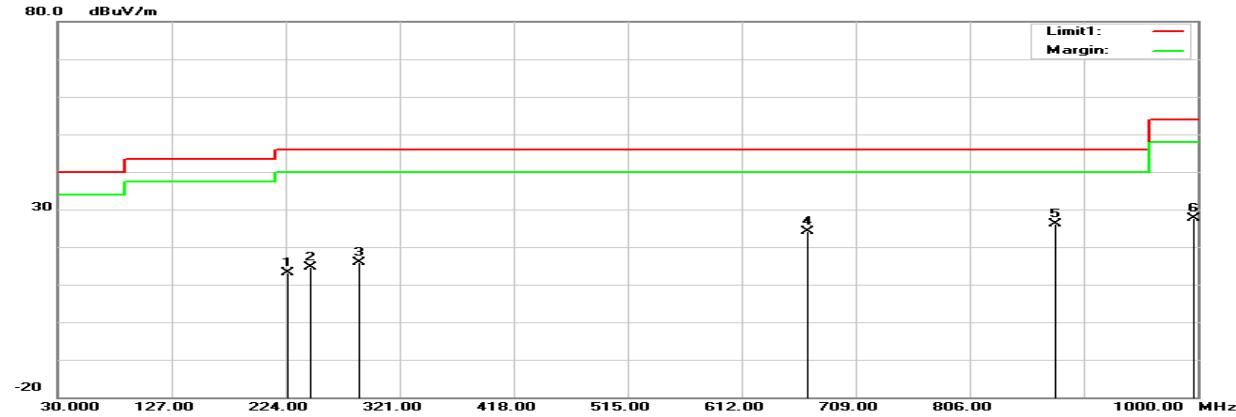
The testing was performed by Andy Shih on 2018-03-26.

Test Results

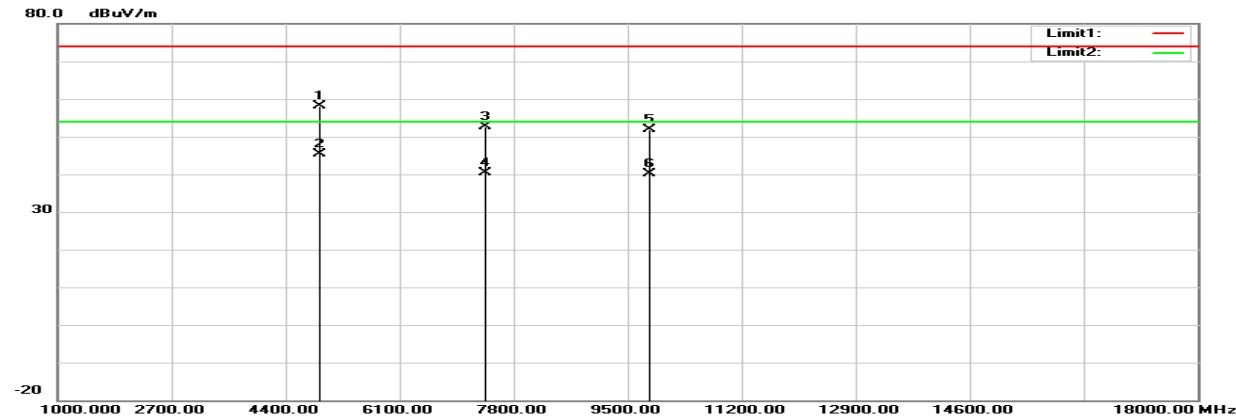
Mode: Transmitting

Horizontal

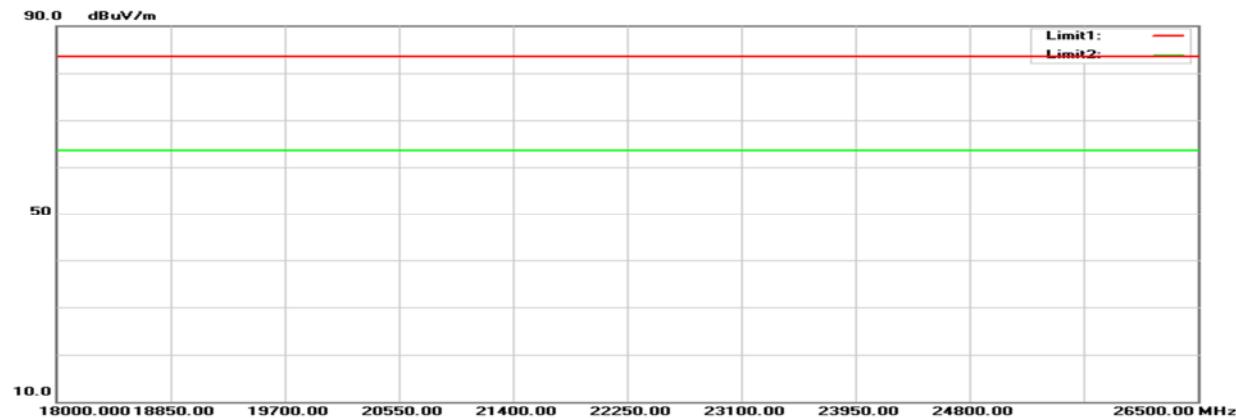
30MHz-1GHz:



1GHz-18GHz:

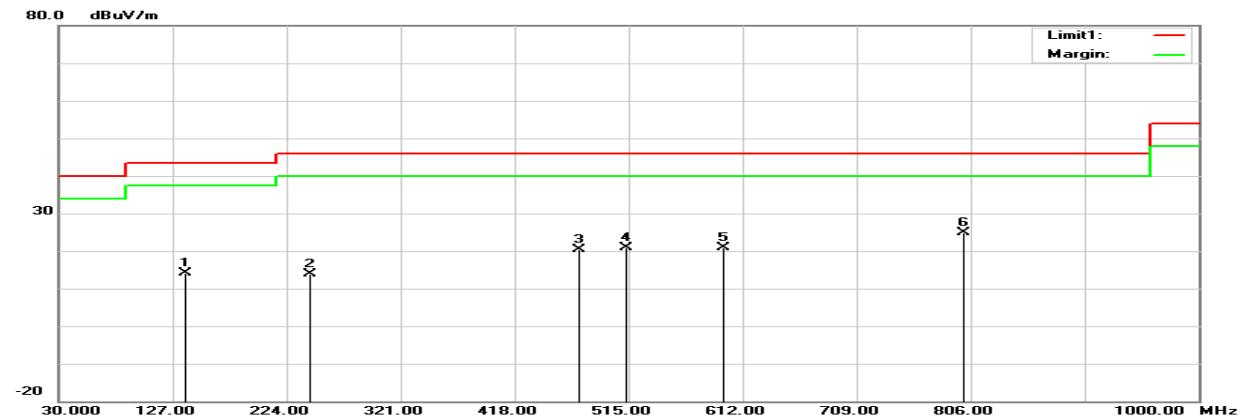


18GHz-26.5GHz:

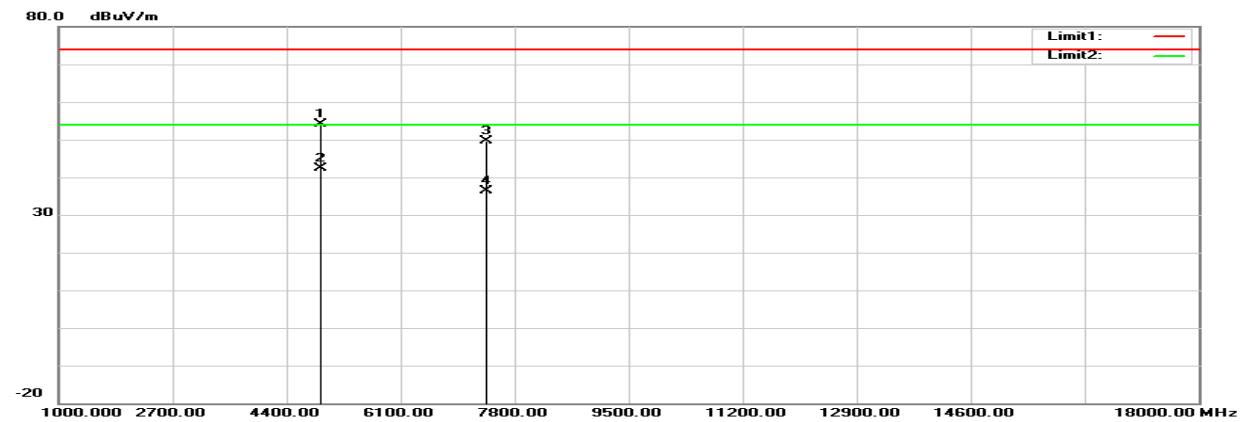


Vertical

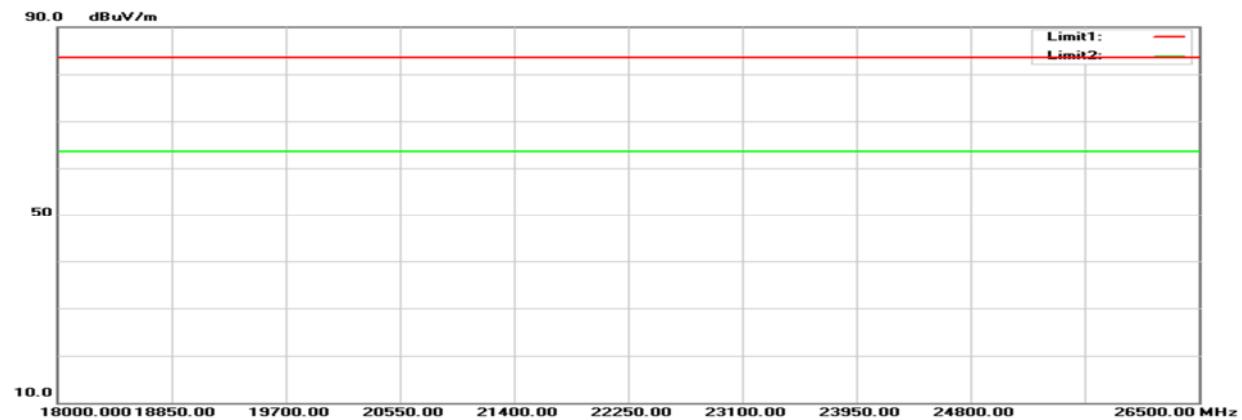
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



Horizontal

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree ($^{\circ}$)	Remark
225.9400	25.49	-12.38	13.11	46.00	-32.89	100	228	QP
245.3400	26.43	-11.83	14.60	46.00	-31.40	100	28	QP
287.0500	26.09	-10.21	15.88	46.00	-30.12	100	211	QP
668.2600	27.66	-3.45	24.21	46.00	-21.79	100	17	QP
878.7500	25.82	0.34	26.16	46.00	-19.84	100	120	QP
997.0900	23.99	3.56	27.55	54.00	-26.45	100	252	QP
2390.000	64.97	-7.52	57.45	74.00	-16.55	150	24	peak
2390.000	51.23	-7.52	43.71	54.00	-10.29	150	24	AVG
*2457.000	100.15	-7.22	92.93	114.00	-21.07	150	202	peak
*2457.000	83.28	-7.22	76.06	94.00	-17.94	150	202	AVG
2483.500	65.94	-7.11	58.83	74.00	-15.17	150	297	peak
2483.500	51.81	-7.11	44.70	54.00	-9.30	150	298	AVG
4914.000	56.49	1.58	58.07	74.00	-15.93	185	310	peak
4914.000	43.91	1.58	45.49	54.00	-8.51	185	310	AVG
7371.000	45.21	7.43	52.64	74.00	-21.36	100	360	peak
7371.000	33.00	7.43	40.43	54.00	-13.57	100	360	AVG
9828.000	42.65	9.27	51.92	74.00	-22.08	100	33	peak
9828.000	30.75	9.27	40.02	54.00	-13.98	100	33	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dB μ V)	Correct Factor(dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Degree ($^{\circ}$)	Remark
137.5800	24.58	-10.41	14.17	43.50	-29.33	100	350	QP
244.3700	25.84	-11.85	13.99	46.00	-32.01	100	240	QP
473.2900	26.65	-6.34	20.31	46.00	-25.69	100	102	QP
513.0600	26.56	-5.71	20.85	46.00	-25.15	100	355	QP
595.5100	25.65	-4.71	20.94	46.00	-25.06	100	309	QP
800.1800	26.30	-1.30	25.00	46.00	-21.00	100	115	QP
2390.000	65.87	-7.52	58.35	74.00	-15.65	150	299	peak
2390.000	51.81	-7.52	44.29	54.00	-9.71	150	299	AVG
*2457.000	93.76	-7.22	86.54	114.00	-27.46	150	211	peak
*2457.000	78.09	-7.22	70.87	94.00	-23.13	150	211	AVG
2483.500	65.90	-7.11	58.79	74.00	-15.21	150	205	peak
2483.500	51.61	-7.11	44.50	54.00	-9.50	150	205	AVG
4914.000	52.45	1.58	54.03	74.00	-19.97	164	91	peak
4914.000	40.68	1.58	42.26	54.00	-11.74	164	91	AVG
7371.000	42.19	7.43	49.62	74.00	-24.38	100	133	peak
7371.000	29.05	7.43	36.48	54.00	-17.52	100	133	AVG

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported.

FCC§15.215(c) – 20 dB BANDWIDTH TESTING

Applicable Standard

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 Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Spectrum Analyzer	Rohde & Schwarz	FSU26	200268	2017/05/08	2018/05/07
Cable	WOKEN	SFL402	S02-160323-07	2018/02/12	2019/02/11

* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed according to TAF requirements, traceable to the ETC.

Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

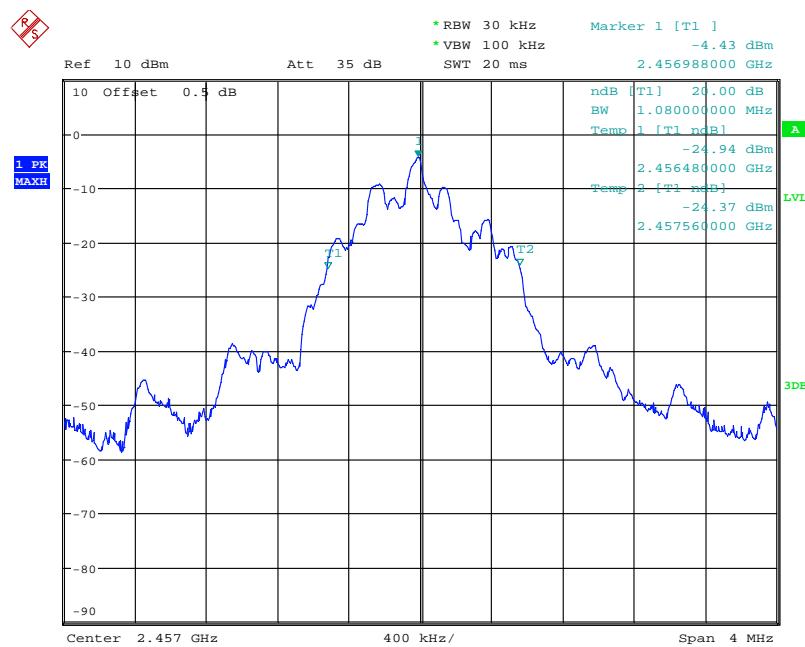
The testing was performed by Andy Shih on 2018-03-19.

Test Results

Test Mode: Transmitting

Frequency (MHz)	20 dB Emission Bandwidth (MHz)
2457	1.080

Please refer to the following tables and plots.



Date: 19.MAR.2018 12:08:00

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