FCC PART 15.249

TEST REPORT

For

Targus International LLC

1211 North Miller Street, Anaheim, CA 92806 United States

FCC ID: OXM000082

Report Type:	**Product Type:**
Original Report	Wireless Numeric Keypad

Report Producer:	Jane Lee
Report Number:	RTWL170824002-00
Report Date:	2017-09-13
Reviewed By:	Jerry Chang

Bay Area Compliance Laboratories Corp.(Taiwan)
70, Lane 169, Sec. 2, Datong Road,
Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.
Tel: +886 (2) 2647 6898
Fax: +886 (2) 2647 6895
www.bacl.com.tw

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
1.0	RTWL170824002	RTWL170824002-00	2017.09.13	Original Report	Jane

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant :	Targus International LLC 1211 North Miller Street, Anaheim, CA 92806 United States
Manufacturer :	ORtek Technology Inc. No 16, Xiang Pin HsiRoad, Xiang PingJieDao, DongAn Dist., Xiamen City, Xiamen, CHINA.
Product :	Wireless Numeric Keypad
Model :	AKP11A
Trade Name :	Targus
Frequency Range :	2408~2474MHz
Antenna Specification :	PCB Antenna/Gain:-0.28 dBi
Voltage Range: :	1.5Vdc from Battery
Date of Test :	August 24, 2017 ~Sep 11, 2017

**All measurement and test data in this report was gathered from production sample serial number: 170824002 (Assigned by BACL, Taiwan) The EUT supplied by the applicant was received on 2017-08-24*

Objective

This report is prepared on behalf of *Targus International LLC* 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 test 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 15.249 DXX submission with FCC ID: OXM000084

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 Engineering Mode, which was provided by the manufacturer, there are totally 3 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2408	3	2474
2	2440	-	-

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
N/A	N/A	N/A	N/A	N/A	N/A

External Cable List and Details

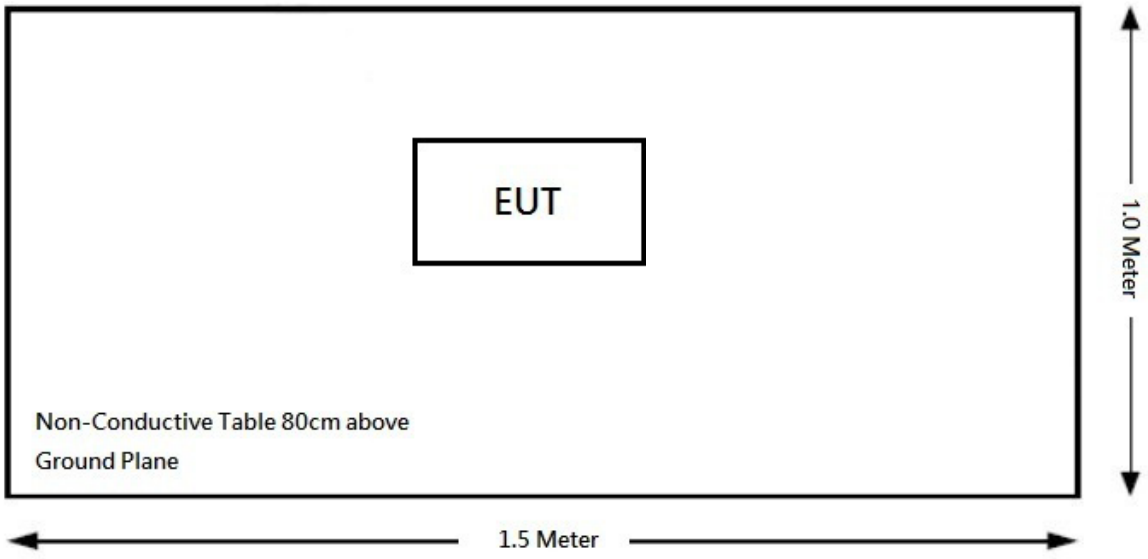
Cable Description	Length (m)	From	To
N/A	N/A	N/A	N/A

Block Diagram of Test Setup

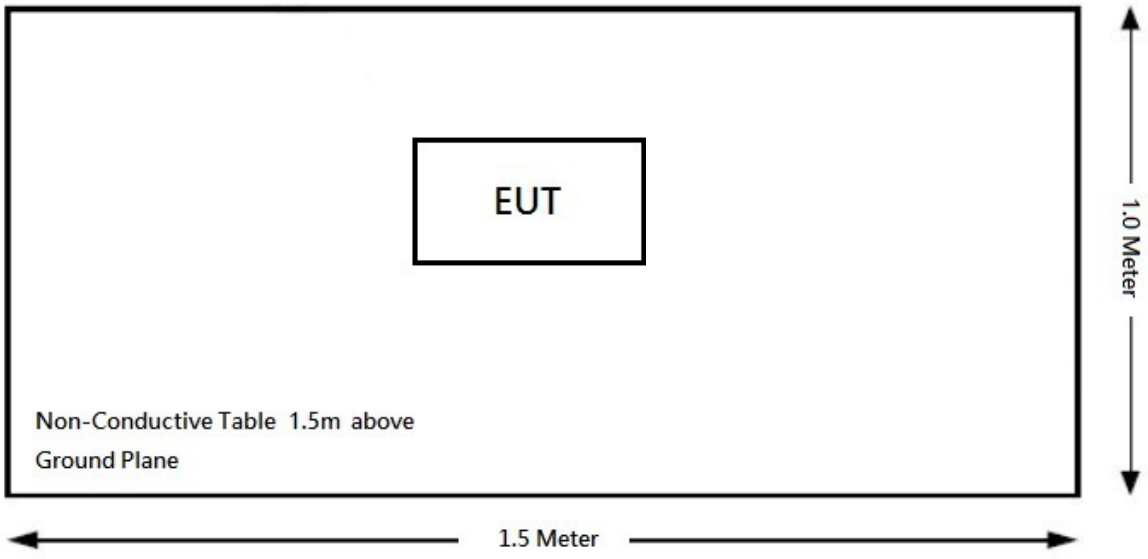
See the below setup block for the actual connections between EUT and support equipment.

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
ORtek Technology Inc.	PCB Antenna	- 0.28dBi	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

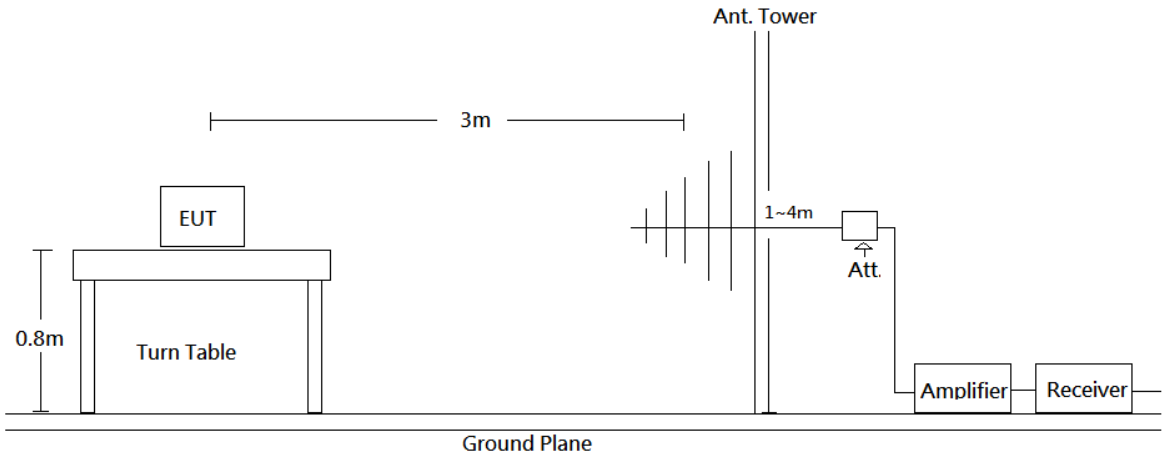
All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency 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.

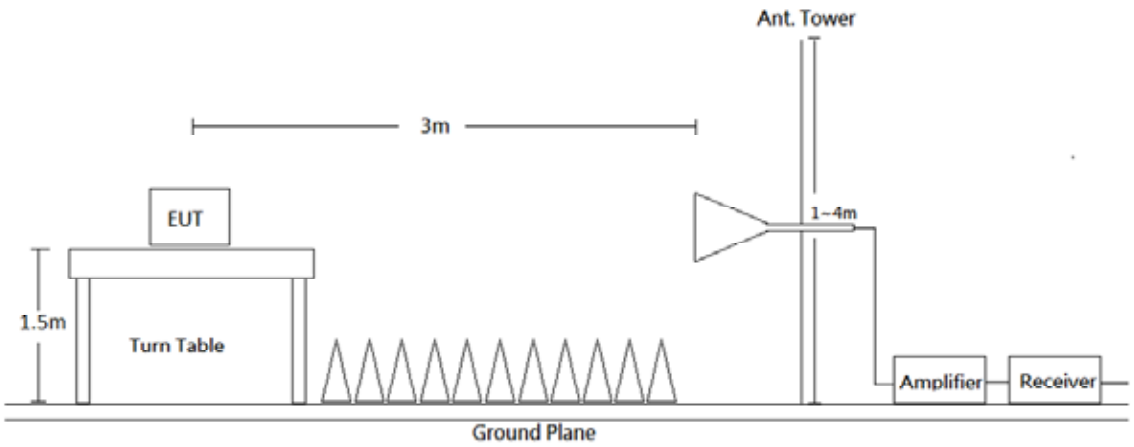
Frequency	Measurement uncertainty
30 MHz~200 MHz	3.76 dB (k=2, 95% level of confidence)
200 MHz~1 GHz	4.12 dB (k=2, 95% level of confidence)
1 GHz~6 GHz	4.84 dB (k=2, 95% level of confidence)
6 GHz~18 GHz	5.16 dB (k=2, 95% level of confidence)
18 GHz~26 GHz	4.84 dB (k=2, 95% level of confidence)
26 GHz~40 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 25 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	Sunol & Mini-Circuits	JB6/ UNAT-6+	A050115 / 15542_01	2016/11/16	2017/11/15
Horn Antenna	EMCO	3115	9311-4158	2017/05/31	2018/05/30
Horn Antenna	ETS-Lindgren	3116	00062638	2016/09/05	2017/09/04
Preamplifier	Sonoma	310N	130602	2017/07/03	2018/07/02
Preamplifier	EMEC	EM01G18G	060697	2017/04/14	2018/04/16
Preamplifier	EMEC	EM18G40G	060656	2016/12/13	2017/12/12
EMI Test Receiver	R & S	ESR7	101419	2016/11/03	2017/11/03
Spectrum Analyzer	Rohde & Schwarz	FSV40	101203	2017/07/13	2018/07/12
Microflex Cable	UTIFLEX	UFB311A-Q-1440 -300300	220490-006	2016/11/02	2017/11/01
Microflex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-001	2016/11/29	2017/11/28
Microflex Cable	ROSNOL	K1K50-UP0264-K 1K50-450CM	160309-1	2017/03/24	2018/03/23
Microflex Cable	ROSNOL	K1K50-UP0264-K 1K50-80CM	160309-2	2017/01/20	2018/01/19
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	060772	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:

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain + 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:

Margin = Result –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 ℃
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

The testing was performed by Ian Tu on 2017-08-25.

Test Results

Mode: Transmitting

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
Low Channel								
299.6600	39.57	-9.84	29.73	46.00	-16.27	100	266	QP
600.3600	30.06	-3.97	26.09	46.00	-19.91	100	65	QP
965.0800	26.34	3.04	29.38	54.00	-24.62	100	258	QP
2396.260	52.85	-4.88	47.97	74.00	-26.03	122	263	peak
2396.260	49.29	-4.88	44.41	54.00	-9.59	122	263	AVG
2400.000	60.66	-4.86	55.80	74.00	-18.20	150	100	peak
2400.000	52.12	-4.86	47.26	54.00	-6.74	150	100	AVG
2408.000	92.76	-4.69	88.07	114.00	-25.93	151	265	peak
2408.000	89.45	-4.69	84.76	94.00	-9.24	151	265	AVG
2498.480	41.91	-4.64	37.27	74.00	-36.73	133	161	peak
2498.480	29.33	-4.64	24.69	54.00	-29.31	133	161	AVG
4816.000	42.09	0.99	43.08	74.00	-30.92	156	360	peak
4816.000	37.86	0.99	38.85	54.00	-15.15	156	360	AVG
Middle Channel								
299.6600	39.76	-9.84	29.92	46.00	-16.08	100	235	QP
600.3600	30.01	-3.97	26.04	46.00	-19.96	100	223	QP
848.6800	28.41	0.39	28.80	46.00	-17.20	100	89	QP
2393.410	43.96	-4.88	39.08	74.00	-34.92	125	172	peak
2393.410	32.21	-4.88	27.33	54.00	-26.67	125	172	AVG
2440.000	90.31	-4.69	85.62	114.00	-28.38	155	264	peak
2440.000	87.73	-4.69	83.04	94.00	-10.96	155	264	AVG
2499.050	42.05	-4.64	37.41	74.00	-36.59	128	179	peak
2499.050	29.69	-4.64	25.05	54.00	-28.95	128	179	AVG
4880.000	46.10	1.23	47.33	74.00	-26.67	155	355	peak
4880.000	40.07	1.23	41.30	54.00	-12.70	155	355	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.

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
High Channel								
299.6600	40.06	-9.84	30.22	46.00	-15.78	100	79	QP
600.3600	33.12	-3.97	29.15	46.00	-16.85	100	57	QP
953.4400	26.17	2.75	28.92	46.00	-17.08	100	80	QP
2324.440	48.73	-5.03	43.70	74.00	-30.30	123	264	peak
2324.440	44.02	-5.03	38.99	54.00	-15.01	123	264	AVG
2474.000	88.66	-4.69	83.97	114.00	-30.03	157	256	peak
2474.000	85.55	-4.69	80.86	94.00	-13.14	157	256	AVG
2485.180	44.76	-4.67	40.09	74.00	-33.91	131	263	peak
2485.180	31.22	-4.67	26.55	54.00	-27.45	131	263	AVG
4948.000	45.36	1.47	46.83	74.00	-27.17	153	355	peak
4948.000	39.87	1.47	41.34	54.00	-12.66	153	355	AVG

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
Low Channel								
299.6600	37.01	-9.84	27.17	46.00	-18.83	100	137	QP
600.3600	29.69	-3.97	25.72	46.00	-20.28	100	156	QP
957.3200	27.50	2.85	30.35	46.00	-15.65	100	238	QP
2396.260	45.71	-4.88	40.83	74.00	-33.17	166	208	peak
2396.260	39.86	-4.88	34.98	54.00	-19.02	166	208	AVG
2400.000	54.24	-4.86	49.38	74.00	-24.62	150	204	peak
2400.000	45.32	-4.86	40.46	54.00	-13.54	150	204	AVG
2408.000	88.73	-4.85	84.04	114.00	-29.96	126	212	peak
2408.000	85.94	-4.85	81.25	94.00	-12.75	126	212	AVG
2497.910	42.29	-4.64	37.65	74.00	-36.35	178	142	peak
2497.910	29.36	-4.64	24.72	54.00	-29.28	178	142	AVG
4816.000	43.64	0.99	44.63	74.00	-29.37	113	186	peak
4816.000	39.29	0.99	40.28	54.00	-13.72	113	186	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.

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBuV)	Factor(dB/m)	(dBμV/m)	(dBμV/m)	(dB)	(cm)	(°)	
Middle Channel								
299.6600	36.72	-9.84	26.88	46.00	-19.12	100	100	QP
600.3600	29.76	-3.97	25.79	46.00	-20.21	100	111	QP
959.2600	26.75	2.89	29.64	46.00	-16.36	100	351	QP
2393.600	42.57	-4.88	37.69	74.00	-36.31	157	359	peak
2393.600	29.52	-4.88	24.64	54.00	-29.36	157	359	AVG
2440.000	88.36	-4.78	83.67	114.00	-30.33	124	217	peak
2440.000	85.27	-4.78	80.58	94.00	-13.42	124	217	AVG
2488.600	41.90	-4.67	37.23	74.00	-36.77	172	8	peak
2488.600	29.27	-4.67	24.60	54.00	-29.40	172	8	AVG
4880.000	43.69	1.23	44.92	74.00	-29.08	117	3	peak
4880.000	36.06	1.23	37.29	54.00	-16.71	117	3	AVG
High Channel								
299.6600	37.07	-9.84	27.23	46.00	-18.77	100	117	QP
600.3600	32.53	-3.97	28.56	46.00	-17.44	100	147	QP
984.4800	26.20	3.54	29.74	54.00	-24.26	100	78	QP
2324.630	45.32	-5.03	40.29	74.00	-33.71	155	118	peak
2324.630	37.87	-5.03	32.84	54.00	-21.16	155	118	AVG
2474.000	85.97	-4.69	81.28	114	-32.72	128	287	peak
2474.000	82.34	-4.69	77.65	94	-16.35	128	287	AVG
2493.730	42.18	-4.66	37.52	74.00	-36.48	166	17	peak
2493.730	29.25	-4.66	24.59	54.00	-29.41	166	17	AVG
4948.000	41.90	1.49	43.39	74.00	-30.61	124	250	peak
4948.000	36.81	1.49	38.30	54.00	-15.70	124	250	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	FSEK30	825084/006	2016/12/15	2017/12/14
Cable	WOKEN	SFL402	S02-160323-07	2017/02/22	2018/02/21

**** 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 ℃
Relative Humidity:	55 %
ATM Pressure:	1010 hPa

The testing was performed by Ian Tu on 2017-08-18.

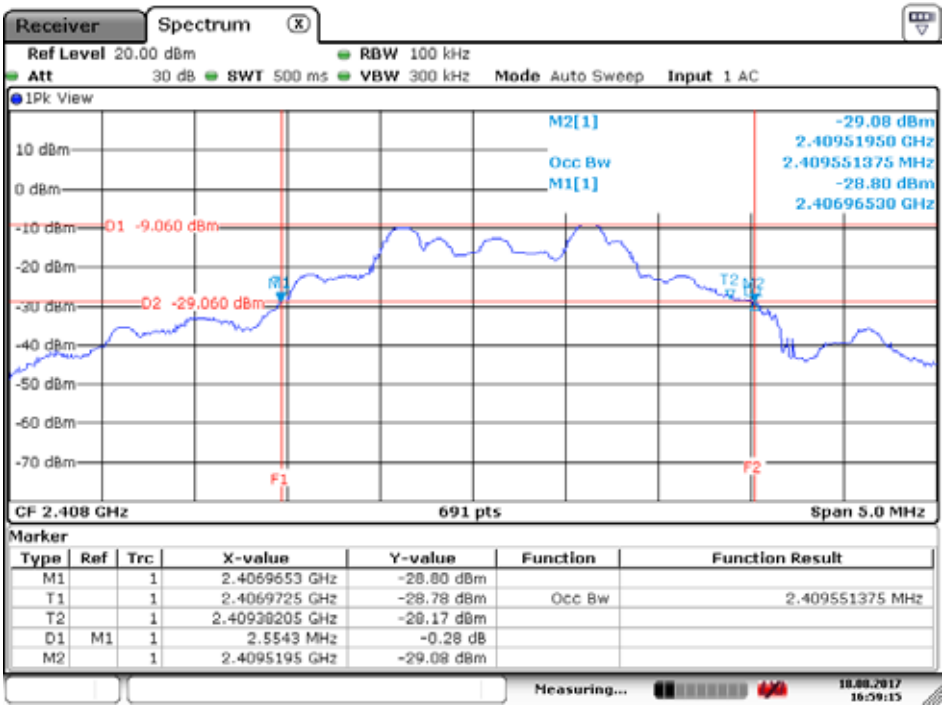
Test Results

Test Mode: Transmitting

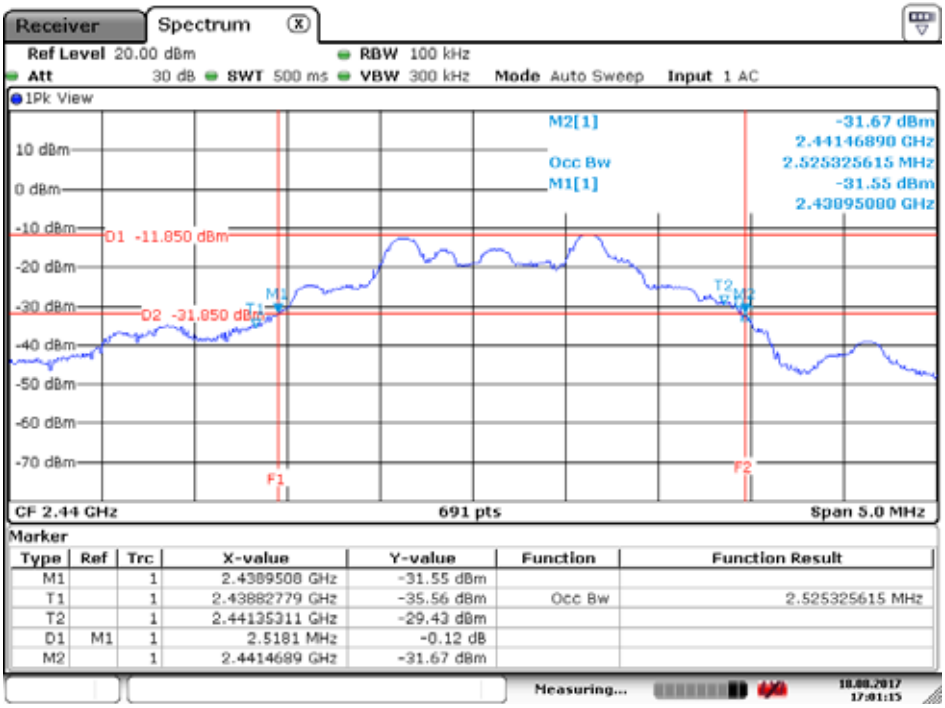
Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
Low	2408	2.5543
Middle	2440	2.5181
High	2474	2.7569

Please refer to the following tables and plots.

Low Channel



Middle Channel



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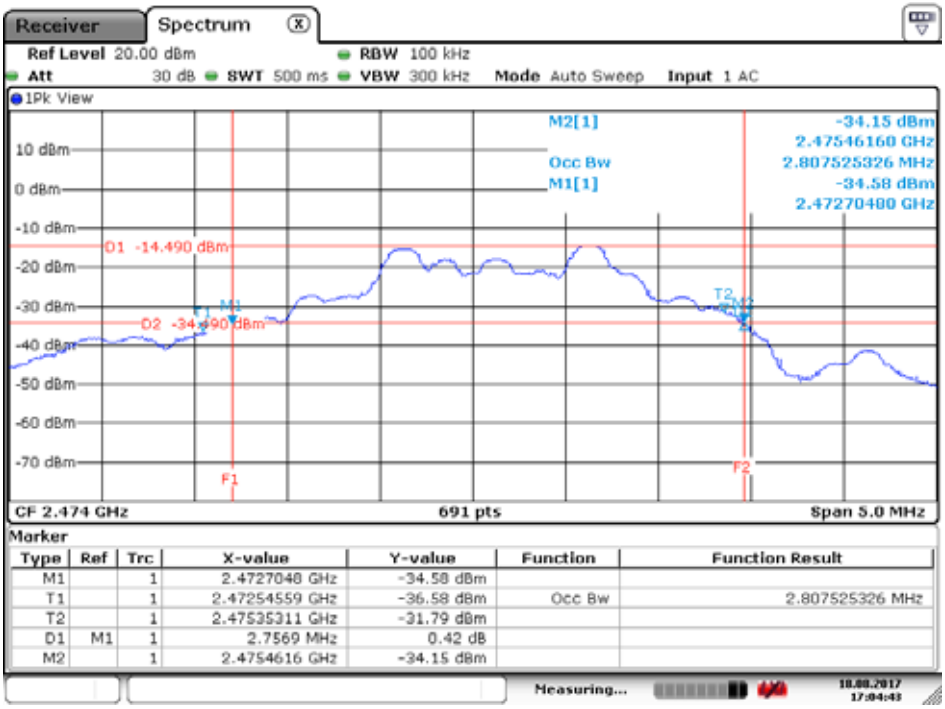
High Channel



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