

Electromagnetic Compatibility Test Report

Applicable Requirements:

**FCC 47 CFR Part 15 Subpart C (§15.247) –
Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz**

Equipment Under Test: Universal Remote Control
Model Number: 9750BC0-XXX-R
Serial Number: N/A

Prepared for: Universal Electronics, Inc.
201 East Sandpointe Road, 8th Floor
Santa Ana, CA 92707

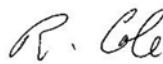
Tested by: Bob Cole

Prepared by: Amy Jones



Verified and Approved by: Bob Cole

Authorized Signatory: Bob Cole



EMCE Engineering, Inc.
44366 S. Grimmer Blvd.
Fremont, CA 94538



ACCREDITED BY THE NATIONAL VOLUNTARY LABORATORY
ACCREDITATION PROGRAM FOR THE SPECIFIC SCOPE
OF ACCREDITATION UNDER TESTING LAB CODE #: 200092-0

Note:

- This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.
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Test Report Revision History

Report Format	Report Version	Description	Issue Date
EMCE-TRF-FCC_B	1.0	Original Release	Feb. 18, 2016
EMCE-TRF-FCC_B	2.0	Updated Template (Obsolete)	Aug. 09, 2016
EMCE-TRF-FCC_B	3.0	Updated Template (Obsolete)	Jan. 13, 2017

ADMINISTRATIVE INFORMATION

Test Laboratory:	EMCE Engineering 44366 S. Grimmer Blvd. Fremont, CA 94538 USA Tel : 510-490-4307 Fax : 510-490-3441
Facility No. registered through NVLAP:	NVLAP Lab Code: 200092-0
Test Site:	FCC : US5291 IC : 3324A
Applicant Company Name :	Universal Electronics, Inc.
Applicant Contact Name :	Jesse Mendez
Application Purpose :	Original
EUT Description :	This product is a RF4CE Smart Controller.
Product Name :	Universal Remote Control
Model Number :	9750BC0-XXX-R
Serial Number :	N/A
Applied Requirements :	FCC 47 CFR Part 15 Subpart C (§15.247) – Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
Measurement Distance :	10 m up to 1 GHz, 3 m above 1 GHz
Classification of EUT :	Class B
RF Operating Frequencies :	2425 MHz, 2450 MHz, 2475 MHz : Per RF4CE protocol
Modulation :	O-QPSK (Offset-Quadrature Phase Shift Keying)
Type of Equipment :	Intentional Radiator
Testing Configuration :	The EUT was setup per applicable specifications during testing.
Operating Condition (Temp) :	Ambient
Supply Power to EUT : (If Battery supply details)	2x (AAA) Alkaline Batteries
Supply Voltage :	3V (2x 1.5V)
Receipt of EUT :	12-17-2016
Date of Testing :	12-18-2016
Tested By :	Bob Cole
Approved By (CTO) :	Bob Cole
Test Report Number :	4274
Test Report Issue Date :	1-23-2017
Test Report Prepared By:	Amy Jones
Test Report Reviewed By:	Bob Cole

Additional Items Provided

Spare Batteries	N/A
Battery Charging Device	N/A - Power to EUT is provided by 2x (AAA) Alkaline Batteries
External Power Supply or AC Adapter	N/A
Test Jig or Interface Box	N/A
RF Test Fixture (for integrated Antennas)	N/A
Host System	N/A
User Manual	Reviewed
Technical Documentation	Reviewed

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Accreditation

EMCE Engineering, has been placed on the Federal Communications Commission's list of recognized facilities for Parts 15 and 18 DoC approvals. Per the request of EMCE Engineering, the facility has been added to the list of those who perform Measurement Services for the public on a fee basis. This list is published periodically and is also available on the FCC Website. Additionally, EMCE Engineering has been accredited by the National Institute for Standards and Technology under the NVLAP program (Testing Lab Code 200092-0).

Disclaimer

EMCE Engineering, Inc., assumes no responsibility for the continuing validity of test data when the Equipment under Test is not under the continuous physical control of EMCE. The signature below attests to the fact that all measurements reported herein were performed by myself or were made under my supervision, and are correct to the best of my knowledge and belief as of the date specified. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Tests were conducted by qualified EMCE Engineering, Inc. personnel utilizing test equipment maintained in a "current" state of calibration with traceability to NIST.

- This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.
- This report or certificate shall not be reproduced except in full without the written approval of the issuer.

Modifications

There were no modifications installed by EMCE Engineering. The manufacturer may declare the EUT as complying with the CE Mark EMC Directive requirements.

Any modifications installed previous to testing by the Manufacturer will be incorporated into each production model, sold or leased.

Statement of Compliance

We, EMCE Engineering, declare under our sole responsibility that the product tested complies with the following listed standards:

Equipment Under Test:	Universal Remote Control
Model Number:	9750BC0-XXX-R
Serial Number:	N/A
Report Number:	4274
Test Date:	12-18-2016
Company:	Universal Electronics, Inc.
Street Address:	201 East Sandpointe Road, 8th Floor Santa Ana, CA 92707

This Statement of Compliance is based upon compliance of the product with the following FCC Rules:

FCC 47 CFR Part 15 SUBPART C (§15.247)	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.
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Issued by Test Laboratory:

Testing Lab Code: 200092-0

EMCE Engineering
44366 S. Grimmer Blvd.
Fremont, CA 94538



Verified By:



Bob Cole
Authorized Signatory

Test Location

Test Facility

All EMC Testing was performed at:

EMCE Engineering, Inc.
44366 S. Grimmer Blvd.
Fremont, CA 94538

This laboratory has one semi-anechoic chamber, one electromagnetic shielded enclosure, one conducted immunity test station and a 3-meter and 10-meter Open Area Test Site (OATS). A computer controlled spectrum analyzer with quasi-peak adapter, and printer were used for gathering and recording test data.

Description of Open Area Test Site (OATS)

The 3 and 10 meter site is located out-of-doors in an open field whose size is 95 feet long by 65 feet wide. The dimensions of the test area are 68 x 28 ft. The description of the 3 and 10-meter site is on file with the FCC and ISED according to the requirements of Part 2.948.

Site Attenuation

The site attenuation for radiated measurements has been determined for this test site using the method described in ANSI C63.4 Paragraph 5.4.6 and sub paragraphs. The site attenuation is measured annually.

Ground Plane (Ground Screen)

The site has a 1900 square foot floor area of poured reinforced concrete, 6 to 8 inches thick. A (68ft x 28ft) 24 gauge galvanized ¼ inch wire mesh ground plane is centered on the test area with its long dimension along the major axis of the test site. The antenna mast and turntable are located 3/10 meters apart on the centerline of the major axis. The ground plane is connected to a nine-foot long earth ground rod at each end of the ground plane.

Input Power for EUT

Electricity for the EUT is provided through buried power lines in metallic conduit with an outlet box placed near the EUT. Power for the EUT is taken from the outlet box of either of two "shielded enclosure" quality power line filters located on the ground plane near the EUT. The filters are electrically bonded to the ground plane.

Accessory Equipment Precautions

Care was taken that accessory equipment or adjacent equipment did not produce unacceptable interference so as to contaminate the final test data. The EMI receiver and its associated computer, printer and plotter were located greater than 15 meters away from the EUT during testing and were powered from a separately filtered power source.

Ambient Interference

Ambient interference from radio and television stations, vehicles, mobile radio, etc. was present at the open test site during testing. Therefore, preliminary radiated emissions testing was performed in the semi-anechoic chamber to identify all EUT related emissions. Care was taken to assure that ambient interference did not overload the measurement receiver or mask emissions from the EUT.

Personnel

All testing was performed by EMCE Engineering personnel who are properly trained for the instruments and procedures used.

Use of Interference Measurement Equipment

All of the emission measurements and field strength measurements were performed utilizing various EMC measurement equipment. The Emissions Measurement Lab utilizes the following basic instruments:

1. Toshiba Satellite Laptop Computer
2. EMI Test v4.1 measurement software
3. Rohde & Schwarz FSV40 Spectrum Analyzer
4. HP 8477F Pre Amp
5. HP 8449B Pre Amp
6. Sunol Sciences JB-6 Hybrid Antenna
7. EMCO 3110 Horn Antenna

Test results are recorded on tabular data sheets and show final corrected values compared to the specification limit. Sample calculations show how the antenna factors, cable losses, amplifier gain, etc. are combined in the automatic analyzer program to produce the final corrected values shown on the graphs and data sheets.

Calibration of Measuring Equipment

The EMI Receiver (spectrum analyzer) is calibrated by an ISO 17025 Accredited calibration laboratory on an annual basis. The laboratory provides certification accredited to ISO 17025. Antenna factors are measured on an annual basis by an ISO 17025 Accredited Antenna Calibration Facility. Cable losses as well as amplifier gains are swept at least every month to verify accurate values.

Equipment Calibration Data

Equipment	Serial Number	Last Calibration Date	Calibration Due Date
Omega-IBTHXBP	14490199	7/8/2016	7/8/2017
Schaffner-NSG435	5892	7/8/2016	7/8/2017
Fluke-87	64920001	6/28/2016	6/28/2017
Sunol Sciences-JB1	A061416	6/27/2016	6/27/2017
EMCO-3816-2	9809-1089	8/12/2016	8/12/2017
Rohde & Schwarz-FSV40	101424	6/20/2016	6/20/2017
Sunol Sciences-JB6	A042610	6/15/2016	6/15/2017
A. H. Systems-SAS-571	236	6/13/2016	6/13/2017
Com-Power-C50E	561034	2/22/2016	2/22/2017
Com-Power-M225E	511107	2/22/2016	2/22/2017
Com-Power-T8SE	511402	2/22/2016	2/22/2017

MEASUREMENT UNCERTAINTY

Measurement Uncertainty Budget Conducted Emissions 150 kHz – 30 MHz Per CISPR 16-4-2

Input Quantity	Uncertainty of x_i		$u(x_i)$ dB	c_i	$c_i u(x_i)$ dB
	dB	Probability Distribution Function			
Receiver Reading	+/- 0.1	$K = 1$	0.1	1	0.1
Attenuation: AMN – Receiver	+/- 0.1	$K = 2$	0.05	1	0.05
AMN Voltage Division Factor	+/- 0.2	$K = 2$	0.1	1	0.1
Receiver Corrections					
Sine Wave Voltage	+/- 1.0	$K = 2$	0.5	1	0.5
Pulse Amplitude Response	+/- 1.5	Rectangular	0.87	1	0.87
Pulse Rep Rate Response	+/- 1.5	Rectangular	0.87	1	0.87
Noise Floor Proximity	+/- 0.0		0.0	1	0.0
Mismatch: AMN – Receiver	+/- 0.75	U-shaped	0.53	1	0.53
AMN Impedance	+/- 2.65	Triangular	1.08	1	1.08
Total Measurement uncertainty – Conducted Emissions 150 kHz – 30 MHz $2u_c(P) = 4.45 \text{ dB}$					4.45 dB

Measurement Uncertainty Budget Radiated Emissions @ 10 Meters

Input Quantity	Uncertainty of x_i		$U(x)$ dB	C_i	$C_i u(x_i)$ dB
	dB	Probability Distribution Function			
Receiver Reading	+/- 0.1	$K = 1$	0.1	1	0.1
Attenuation, Antenna - receiver	+/- 0.1	$K = 2$	0.05	1	0.05
Antenna Factor	+/- 2.0	$K = 2$	1.0	1	1.0
<i>Receiver Corrections</i>					
Sine Wave Voltage	+/- 1.0	$K = 1$	0.5	1	0.5
Pulse Amplitude Response	+/- 1.5	Rectangular	0.87	1	0.87
Pulse Rep Rate Response	+/- 1.5	Rectangular	0.87	1	0.87
Noise Floor Proximity	+/- 0.5	$K = 2$	0.25	1	0.25
Mismatch Antenna – Receiver	+/- 0.9	U shaped	0.67	1	0.67
<i>Antenna Corrections</i>					
AF Freq Interpolation	+/- 0.3	Rectangular	0.17	1	0.17
AF Height Deviations	+/- 0.5	Rectangular	0.29	1	0.29
Balance	+/- 0.3	Rectangular	0.17	1	0.17
<i>Site Corrections</i>					
Site Imperfections	+/- 3.0	Rectangular	1.22	1	0.82
Separation distance	+/- 0.1	Rectangular	0.06	1	0.06
Table Height	+/- 0.1	$K = 2$	0.05	1	0.05
Total Measurement Uncertainty - Radiated Emissions @ 10 Meters					5.87

ANSI C63.4-2009, Section 10.2.8.2 states:

“For ITE unintentional radiators, the Frequency and Amplitude of the six highest radiated emissions relative to the limit and independent of antenna polarization shall be reported, unless such emissions are more than 20 dB below the limit. If less than the specified number (less than six) of emissions are within 20 dB of the limit, the noise level of the measuring instrument at representative frequencies shall be reported.

Sample Calculations

Conducted Spurious Emissions

Measurements are compared directly to the applicable limits. The calculation is as follows:

Where:

$$R_r - S = M$$

R_r = Measured value in dBm
 S = Specification Limit
 M = Margin

Radiated Spurious Emissions

Receiver readings are compared directly to a converted specification limit (dB form), the conversion uses the effective radiated power limit specified in the standard to calculate the expected field strength in free space using the following formula:

Where:

$$E = \sqrt{30 \cdot P \cdot G} / d$$

E = Field Strength in V/M
 P = Power in Watts
 G = Gain of antenna in dB
 D = Distance in meters

The field strength limit is then converted to decibel form (dBuV/M) and the margin of a given peak is calculated as follows:

Where:

$$M = R_c - L_s$$

M = Margin
 R_c = Corrected Reading in dBuV/M
 L_s = Calculated Specification Limit in dBuV/M

When substitution measurements are required (all signals with <6 dB margin relative to the Specification limit) the margin of the emission relative to the effective radiated power is calculated as follows:

Where:

$$P_s - S = M$$

P_s = ERP determined from antenna substitution (dBm)
 S = Specification limit in dBm
 M = Margin

PREPARATION OF EUT FOR TEST

Setup of EUT

Power to EUT: 2x (AAA) Alkaline Batteries
Grounding of EUT: N/A
Software: TeraTerm / TI Smart RF Flash Programmer 1.12.8

No Support Equipment was used.

Support Equipment				
Description	Model Number	Serial Number	Manufacturer	Power Cable Description
N/A				
Cable Description				
From	To	Length (Meters)	Shielded (Y/N)	Ferrite Loaded (Y/N)
N/A				

ATTACHMENT 1

NVLAP ISO 17025:2005

Accreditation Certificate

1.0 Certificate of Accreditation

United States Department of Commerce National Institute of Standards and Technology NVLAP[®] Certificate of Accreditation to ISO/IEC 17025:2005 NVLAP LAB CODE: 200092-0 Universal Compliance Labs dba EMCE Engineering Fremont, CA <i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i> Electromagnetic Compatibility & Telecommunications <i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).</i> <table><tr><td> 2016-12-28 through 2017-12-31 Effective Dates </td><td></td><td>  For the National Voluntary Laboratory Accreditation Program </td></tr></table>		2016-12-28 through 2017-12-31 Effective Dates		 For the National Voluntary Laboratory Accreditation Program
2016-12-28 through 2017-12-31 Effective Dates		 For the National Voluntary Laboratory Accreditation Program		

ATTACHMENT 2

Measurement Data

2.0 Summary of Test Results

The EUT has been tested according to the following specifications:

Test Standard		Description of Test	Result (Pass / Fail)
FCC 47 CFR Part 15	RSS 247 Issue 1, RSS-Gen, Issue 4		
15.205, 15.209 15.247	N/A	Radiated Spurious Emissions, Radiated Restricted Bandedge	Pass
15.247(a)(2)	N/A	6dB Bandwidth	Pass
15.247(6)(3)	N/A	Conducted Maximum Peak Output Power	Pass
15.247(e)	N/A	Power Spectral Density	Pass
15.247(d)	N/A	Conducted Bandedge (Out of Band Emissions)	Pass
15.207	N/A	AC Power Line Conducted Emissions	N/A
N/A	N/A	99% Bandwidth	N/A
ANSI C63.4: 2014 / FCC KDB 558074 D01 DTS Meas. Guidance v03r03 dated June 09, 2015			
PS: All measurement uncertainties are not taken into consideration for all presented test result.			

PASS - The EUT passed that particular test.
FAIL- The EUT failed that particular test.
N/A - Not Applicable – NO IC Application.

2.1 Test Results

2.1.1 Transmitter Radiated Spurious Emissions

LIMITS

§15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

§15.205 (b) Except as provided in paragraphs (d) and (e), 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 1000MHz, 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.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

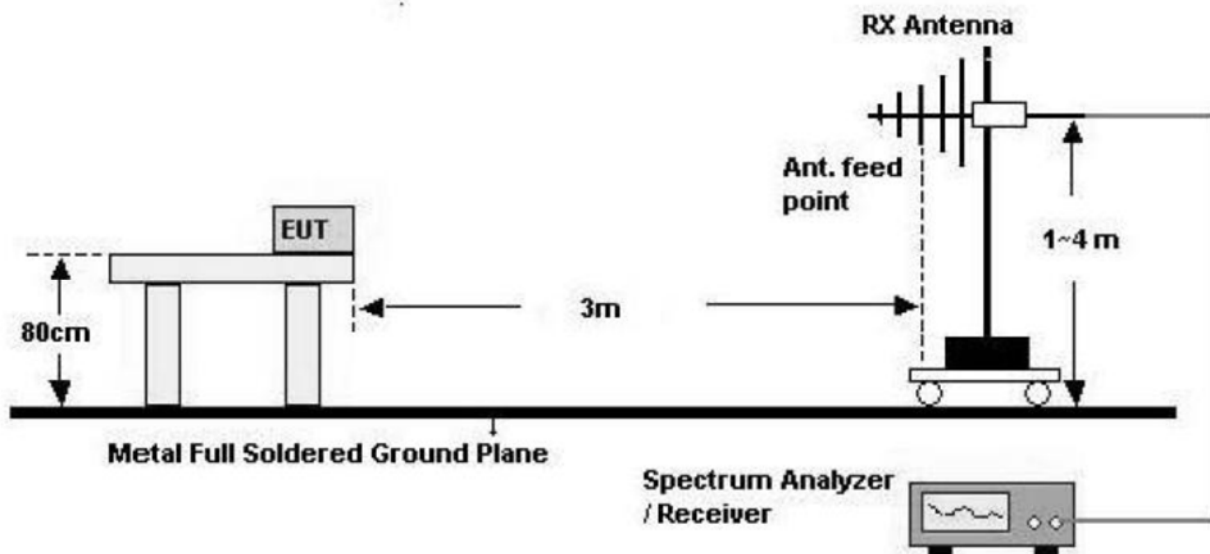
§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table;

<i>Frequency (MHz)</i>	<i>Field Strength (uV/m)</i>	<i>Field Strength (dBuV/m)</i>
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

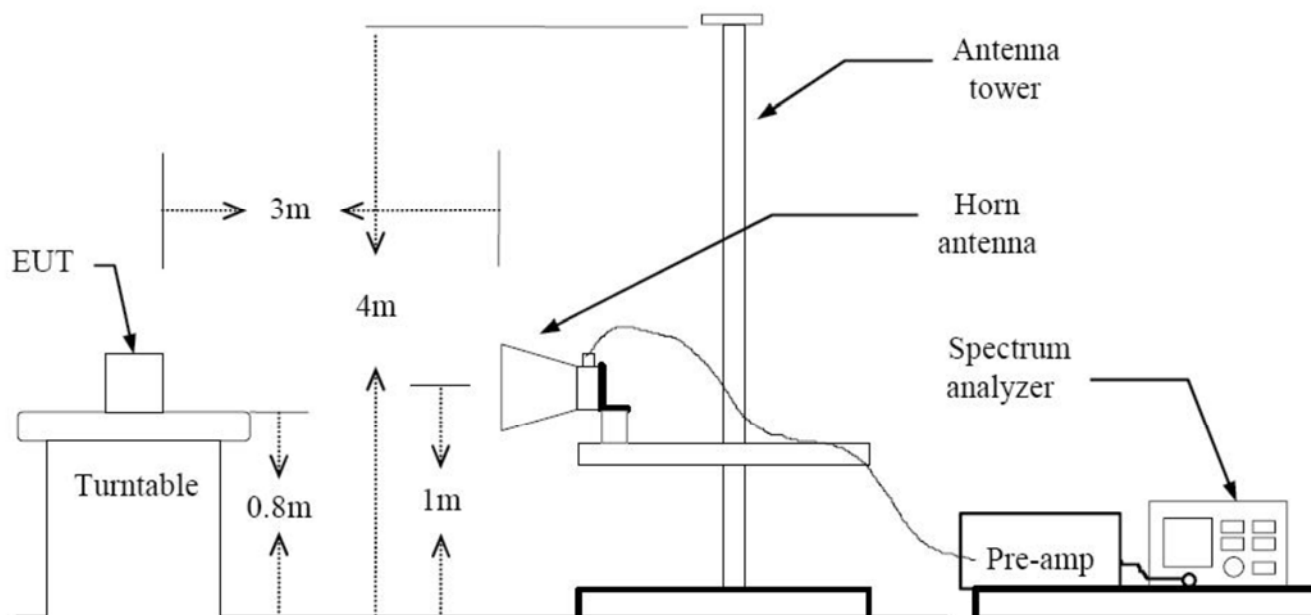
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

TEST CONFIGURATION

[30 MHz - 1 GHz]



[Above 1 GHz]



TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 10 meters. The EUT is configured in accordance with ANSI C63.4 The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 KHz for peak detection measurements or 120 KHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and VBW of 10 Hz for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

RESULTS:

NO non-compliance noted.

Note

1. The antenna is manipulated through typical positions, polarity and length during the testing
2. The frequency range was scanned from 30 MHz to 1 GHz and the worst-case emissions are reported.
3. There is detected level above reference noise floor spectrum analyzer.

FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

Assume a receiver reading of 21.5 dBuV is obtained. The Antenna Factor of 7.4 dB/m and a Cable Factor of 1.1 dB is added. The 30 dBuV/m value is mathematically converted to its corresponding level in uV/m.

$$FS = 21.5 + 7.4 + 1.1 = 30 \text{ dBuV/m}$$

Radiated Emissions < 1 GHz – EUT Receiver at 10 Meter Distance

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **UNIVERSAL ELECTRONICS, INC.**

Specification: **EN55022B RADIATED**

Work Order #: **4274**

Date: 1/10/2017

Test Type: **Radiated Scan**

Time: 11:58:47

Equipment: **Universal Remote Control**

Sequence#: 1

Manufacturer: **Universal Electronics, Inc.**

Tested By: Bob Cole

Model: **9750BC0-XXX-R**

S/N: **N/A**

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
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Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Remote Control*	Universal Electronics, Inc.	9750BC0-XXX-R	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
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Test Conditions / Notes:

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Transducer Legend:

T1=100' LMR 900 Rad Cable	T2=8447 Pre-Amp Asset 377
T3=Sunol JB6 S/N A42610 2016	

Ext Attn: 0 dB

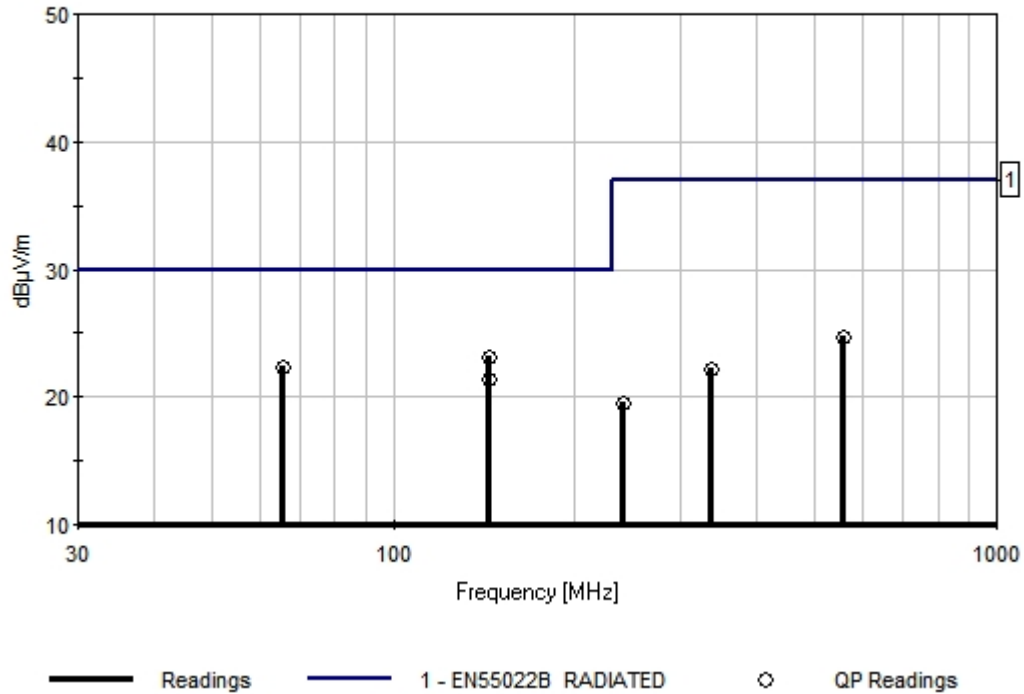
Measurement Data:

Reading listed by margin.

Test Distance: 10 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	144.017M	36.9	-0.1	+26.7	+13.0		+0.0	23.1	30.0	-6.9	Horiz
	QP						180				128
2	65.203M	41.6	-0.1	+26.9	+7.8		+0.0	22.4	30.0	-7.6	Horiz
	QP						180				120
3	336.112M	36.0	-0.1	+26.7	+13.0		+0.0	22.2	30.0	-7.8	Vert
	QP						94				122
4	144.028M	35.2	-0.1	+26.7	+13.0		+0.0	21.4	30.0	-8.6	Vert
	QP						177				122
5	239.996M	33.4	-0.1	+26.7	+13.0		+0.0	19.6	30.0	-10.4	Vert
	QP						88				125
6	554.212M	32.5	+1.1	+27.0	+18.2		+0.0	24.8	37.0	-12.2	Horiz
	QP						271				182

EMCE Engineering Date: 1/10/2017 Time: 11:58:47 UEIWO#: 4274
EN55022B RADIATED Test Distance: 10 Meters Sequence#: 1 Ext ATTN: 0 dB



Radiated Emissions > 1 GHz – EUT Receiver at 3 Meter Distance

Test Location: EMCE Engineering •44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **UNIVERSAL ELECTRONICS, INC.**

Specification: **FCC 15.209 Average Limits 1 - 25 G**

Work Order #: **4274**

Date: 1/11/2017

Test Type: **Radiated Scan**

Time: 14:34:26

Equipment: **Universal Remote Control**

Sequence#: 2

Manufacturer: Universal Electronics, Inc.

Tested By: Bob Cole

Model: 9750BC0-XXX-R

S/N: N/A

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
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Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Remote Control*	Universal Electronics, Inc.	9750BC0-XXX-R	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
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Test Conditions / Notes:

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Transducer Legend:

T1=25' LMR #001	T2=8449B Preamp
T3=A.H. SAS-200/571 Horn	

Ext Attn: 0 dB

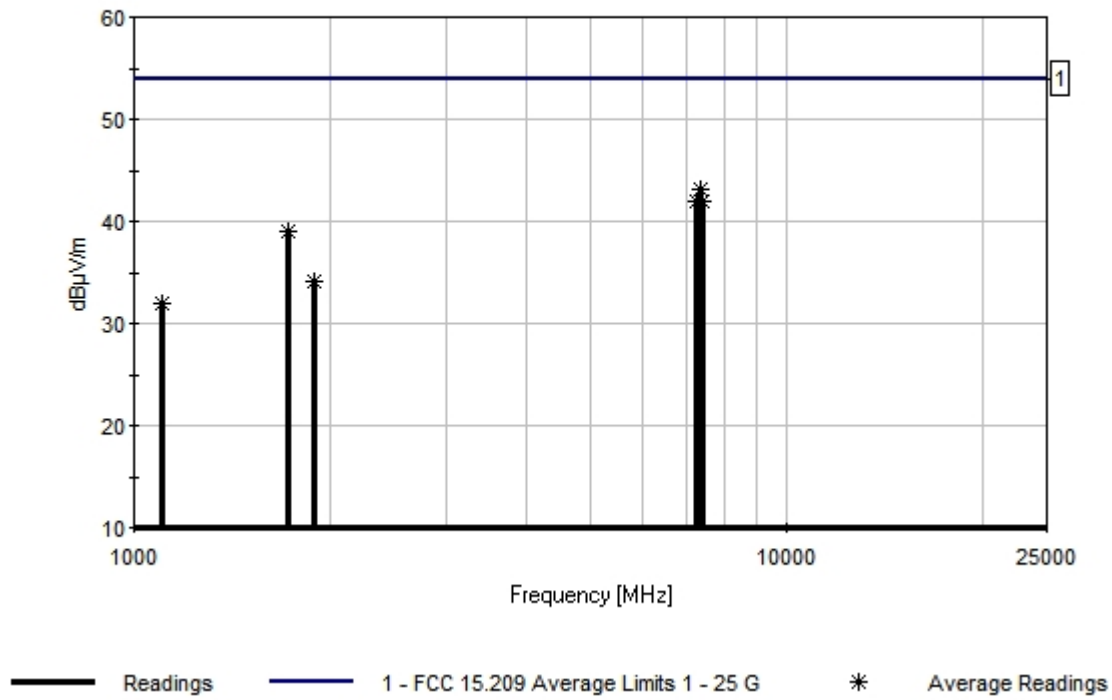
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB		Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	7350.117M	32.9	+4.2	+30.9	+36.9		+0.0	43.1	54.0	-10.9	Horiz
	Ave						89		2450 Xmit		255
2	7275.194M	31.8	+4.2	+30.9	+36.9		+0.0	42.0	54.0	-12.0	Vert
	Ave						281		2425 Xmit		175
3	7424.928M	31.7	+4.2	+30.9	+36.9		+0.0	41.9	54.0	-12.1	Horiz
	Ave						108		2475 Xmit		249
4	1722.104M	39.4	+1.2	+29.7	+28.2		+0.0	39.1	54.0	-14.9	Vert
	Ave						219		2450 Xmit		197
5	1881.483M	34.3	+1.3	+29.8	+28.4		+0.0	34.2	54.0	-19.8	Horiz
	Ave						171		2475 Xmit		254
6	1104.347M	32.8	+0.9	+29.4	+27.6		+0.0	31.9	54.0	-22.1	Horiz
	Ave						184		2425 Xmit		225

EMCE Engineering Date: 1/11/2017 Time: 14:34:26 UEI WO#: 4274
FCC 15.209 Average Limits 1 - 25 G Test Distance: 3 Meters Sequence#: 2 Ext ATTN: 0 dB



2.1.2 Radiated Spurious Emissions - Bandedge

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. **In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).**

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

Radiated Bandedge Data

2425 MHz

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **UNIVERSAL ELECTRONICS, INC.**
 Specification: **15.247 2390-2400 ave**
 Work Order #: **4274** Date: 1/12/2017
 Test Type: **Radiated Scan** Time: 13:20:56
 Equipment: **Universal Remote Control** Sequence#: 1
 Manufacturer: Universal Electronics, Inc. Tested By: Bob Cole
 Model: 9750BC0-XXX-R
 S/N: N/A

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
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Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Remote Control*	Universal Electronics, Inc.	9750BC0-XXX-R	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
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Test Conditions / Notes:

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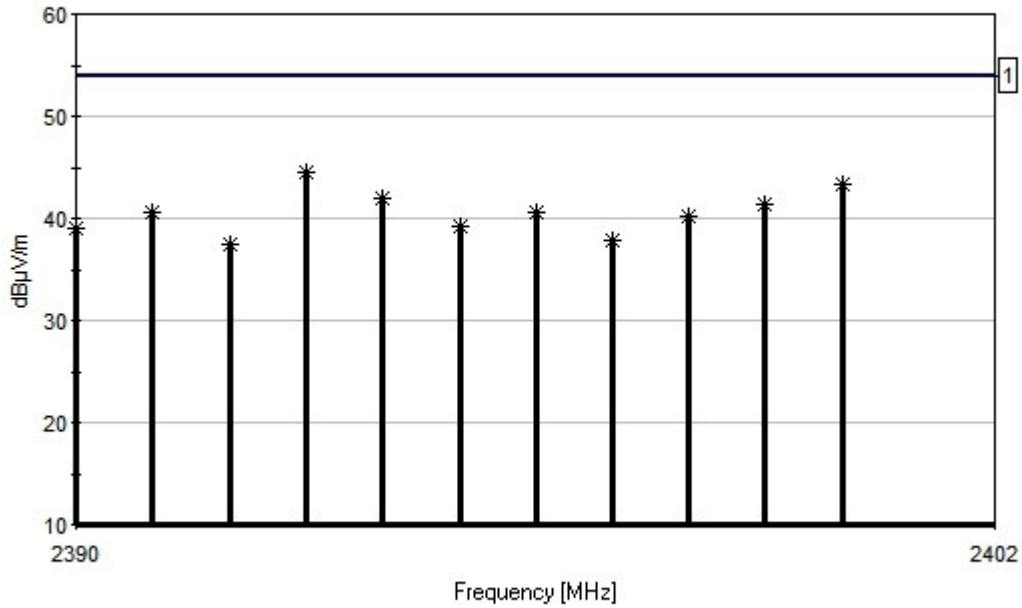
Transducer Legend:

T1=25' LMR #001	T2=8449B Preamp
T3=A.H. SAS-200/571 Horn	

Ext Attn: 0 dB

<u>Measurement Data:</u>		Reading listed by frequency.				Test Distance: 3 Meters					
#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2390.003M	38.8	+1.3	+30.1	+29.1		+0.0	39.1	54.0	-14.9	Horiz
	Ave						180		2425 Xmit		185
2	2391.000M	40.3	+1.3	+30.1	+29.1		+0.0	40.6	54.0	-13.4	Horiz
	Ave						180		2425 Xmit		185
3	2392.000M	37.2	+1.3	+30.1	+29.1		+0.0	37.5	54.0	-16.5	Horiz
	Ave						180		2425 Xmit		185
4	2393.000M	44.3	+1.3	+30.1	+29.1		+0.0	44.6	54.0	-9.4	Horiz
	Ave						180		2525 Xmit		185
5	2394.000M	41.6	+1.3	+30.1	+29.1		+0.0	41.9	54.0	-12.1	Horiz
	Ave						180		2425 Xmit		185
6	2395.000M	39.0	+1.3	+30.1	+29.1		+0.0	39.3	54.0	-14.7	Horiz
	Ave						180		2425 Xmit		185

EMCE Engineering Date: 1/12/2017 Time: 13:20:56 UEI WO#: 4274
15.247 2390-2400 ave Test Distance: 3 Meters Sequence#: 1 Ext ATTN: 0 dB



Readings 1 - 15.247 2390-2400 ave * Average Readings

2475 MHz

Test Location: EMCE Engineering • 44366 S. Grimmer Blvd • Fremont, CA 94538 •

Customer: **UNIVERSAL ELECTRONICS, INC.**

Specification: **15.247 2483.5 - 2500 Average**

Work Order #: **4274**

Date: 1/12/2017

Test Type: **Radiated Scan**

Time: 13:27:22

Equipment: **Universal Remote Control**

Sequence#: 2

Manufacturer: Universal Electronics, Inc.

Tested By: Bob Cole

Model: 9750BC0-XXX-R

S/N: N/A

Test Equipment:

Function	S/N	Calibration Date	Cal Due Date	Asset #
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Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Universal Remote Control*	Universal Electronics, Inc.	9750BC0-XXX-R	N/A

Support Devices:

Function	Manufacturer	Model #	S/N
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Test Conditions / Notes:

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Transducer Legend:

T1=25' LMR #001	T2=8449B Preamp
T3=A.H. SAS-200/571 Horn	

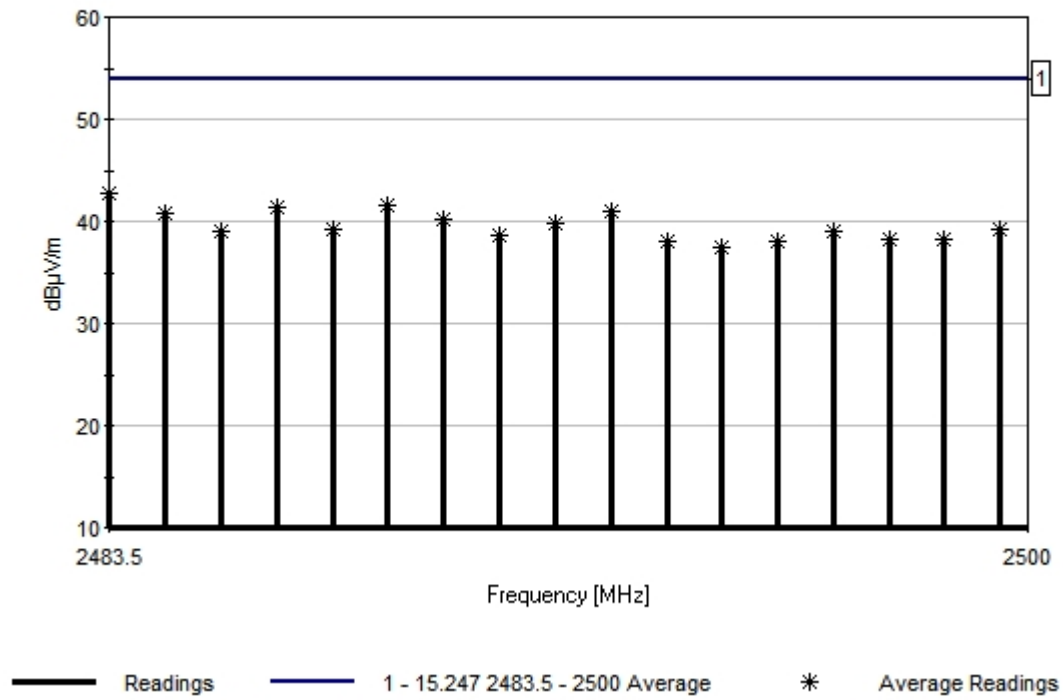
Ext Attn: 0 dB

Measurement Data: Reading listed by frequency.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	2483.500M Ave	42.2	+1.4	+30.2	+29.3	+0.0	180	42.7	54.0 2475 Xmit	-11.3	Horiz 185
2	2484.500M Ave	40.2	+1.4	+30.2	+29.3	+0.0	180	40.7	54.0 2475 Xmit	-13.3	Horiz 185
3	2485.500M Ave	38.6	+1.4	+30.2	+29.3	+0.0	180	39.1	54.0 2475 Xmit	-14.9	Horiz 185
4	2486.500M Ave	40.9	+1.4	+30.2	+29.3	+0.0	180	41.4	54.0 2475 Xmit	-12.6	Horiz 185
5	2487.500M Ave	38.7	+1.4	+30.2	+29.3	+0.0	189	39.2	54.0 2475 Xmit	-14.8	Horiz 185
6	2488.500M Ave	41.0	+1.4	+30.2	+29.3	+0.0	180	41.5	54.0 2475 Xmit	-12.5	Horiz 185

EMCE Engineering Date: 1/12/2017 Time: 13:27:22 UEI WO#: 4274
15.247 2483.5 - 2500 Average Test Distance: 3 Meters Sequence#: 2 Ext ATTN: 0 dB



2.1.3 6 dB BANDWIDTH

LIMIT:

FCC 47 CFR Part 15

§15.247(a) (2)

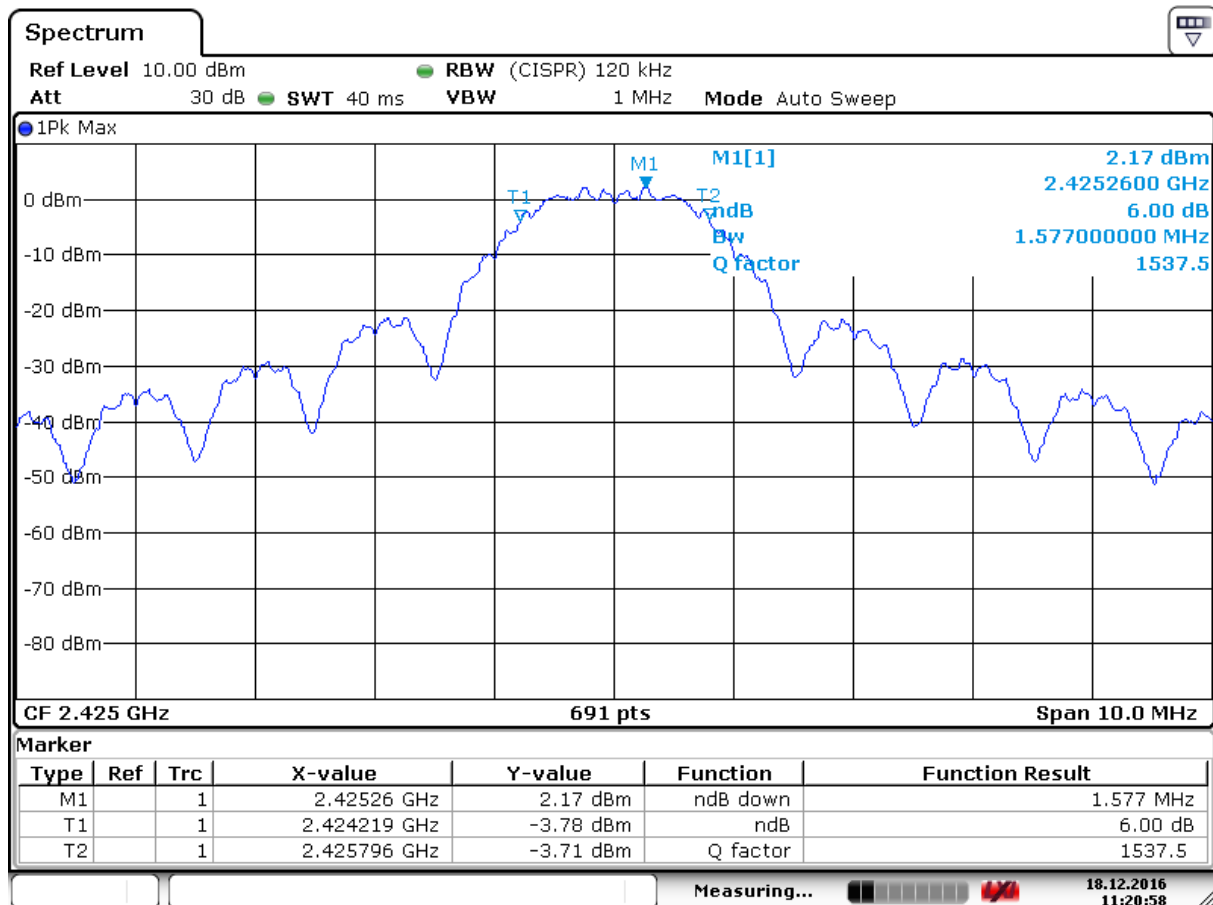
Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE:

- The transmitter output is connected to the spectrum analyzer
- The RBW is set to 100KHz. The VBW is set to 100KHz. The sweep time is coupled.
- Signal Peak is detected
- Bandwidth is determined at the points 6 dB down from the peak value of the modulated carrier.

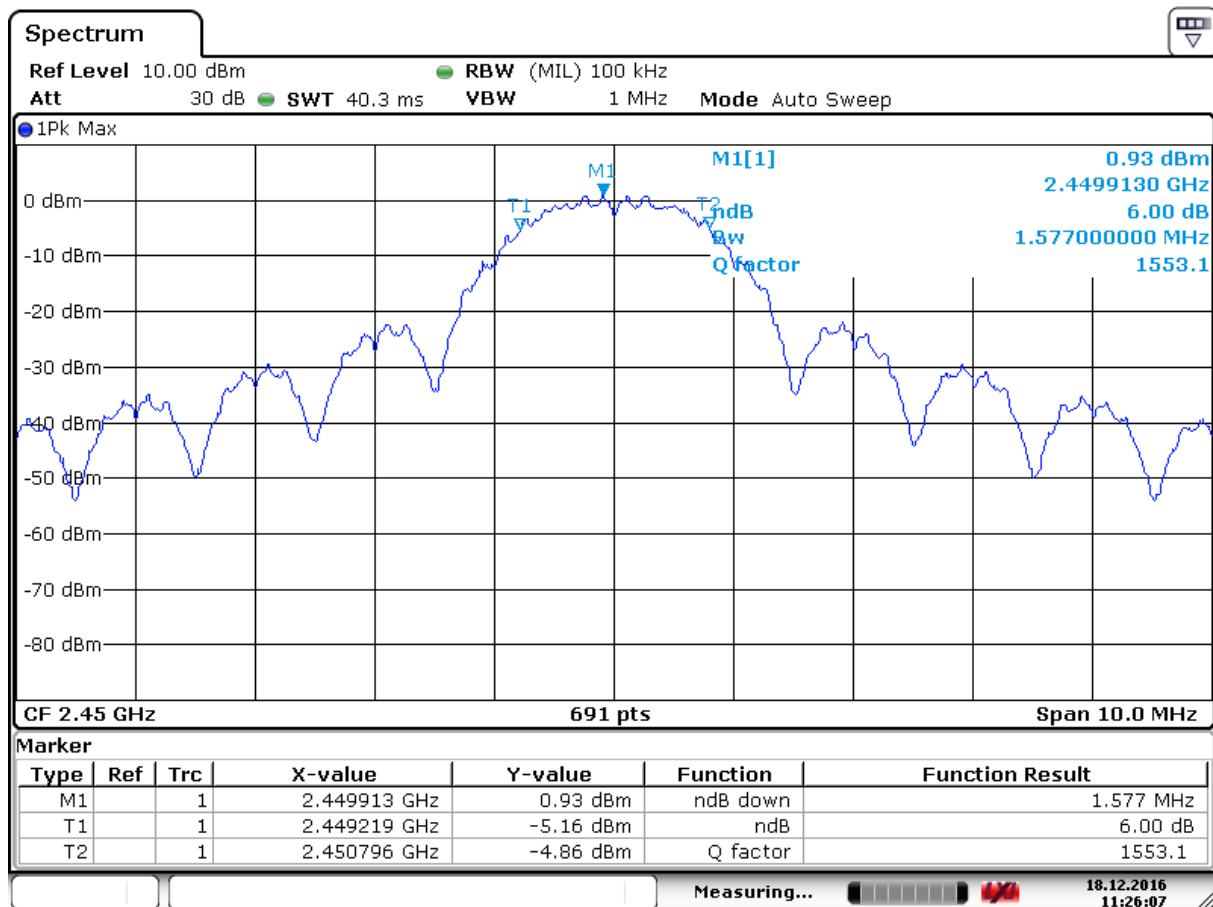
Operating Frequency (MHz)	6dB Bandwidth (KHz)	Limit (KHz)	Result
2425	1.58 MHz	>500	PASS
2450	1.58 MHz	>500	PASS
2475	1.69 MHz	>500	PASS

2425 MHz



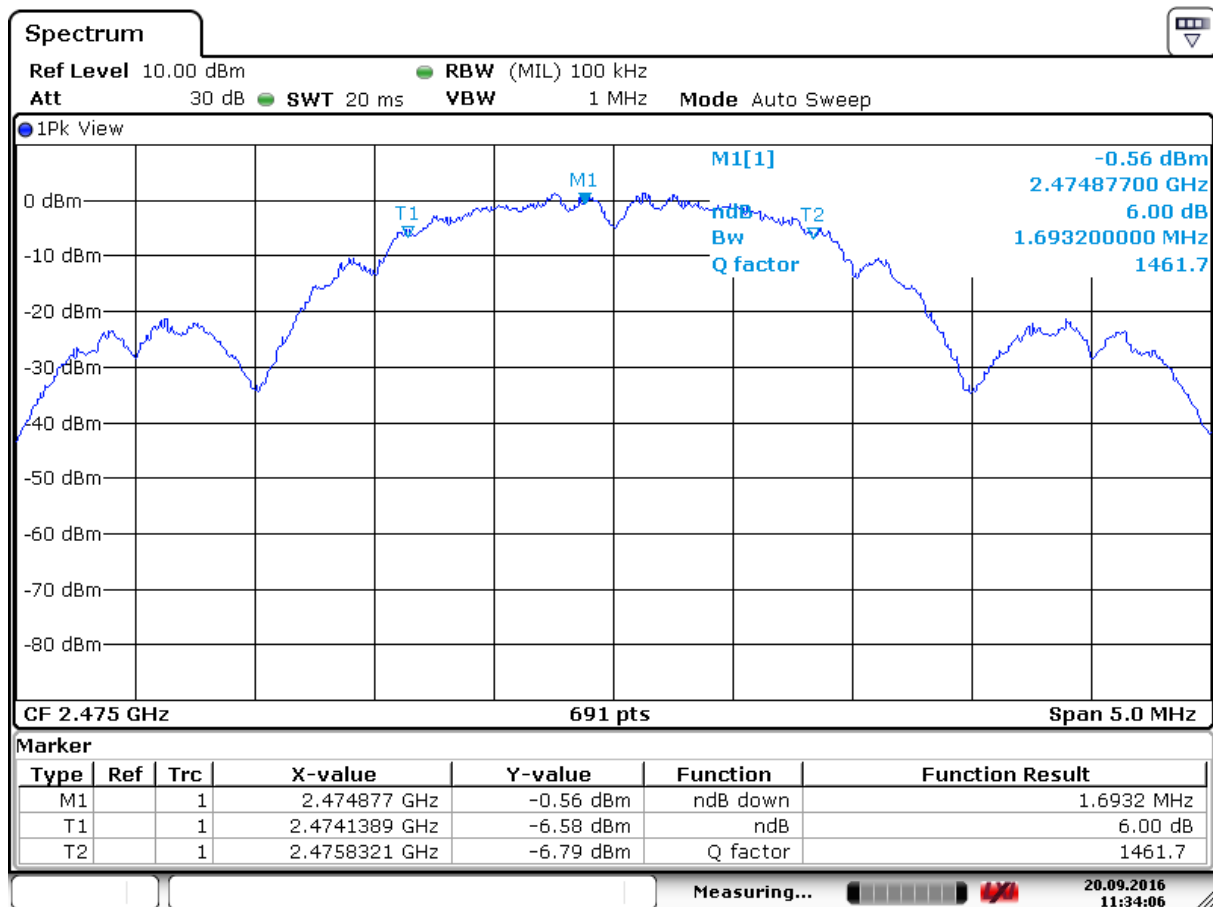
Date: 18 DEC 2016 11:20:58

2450 MHz



Date: 18 DEC 2016 11:26:08

2475 MHz



Date: 20.SEP.2016 11:34:06

2.1.4 Conducted Maximum Peak Output Power

LIMIT:

FCC 47 CFR Part 15

§15.247(d)

1 Watt / 30dBm / 137 dBuV (50 Ohms conversion)

TEST PROCEDURE:

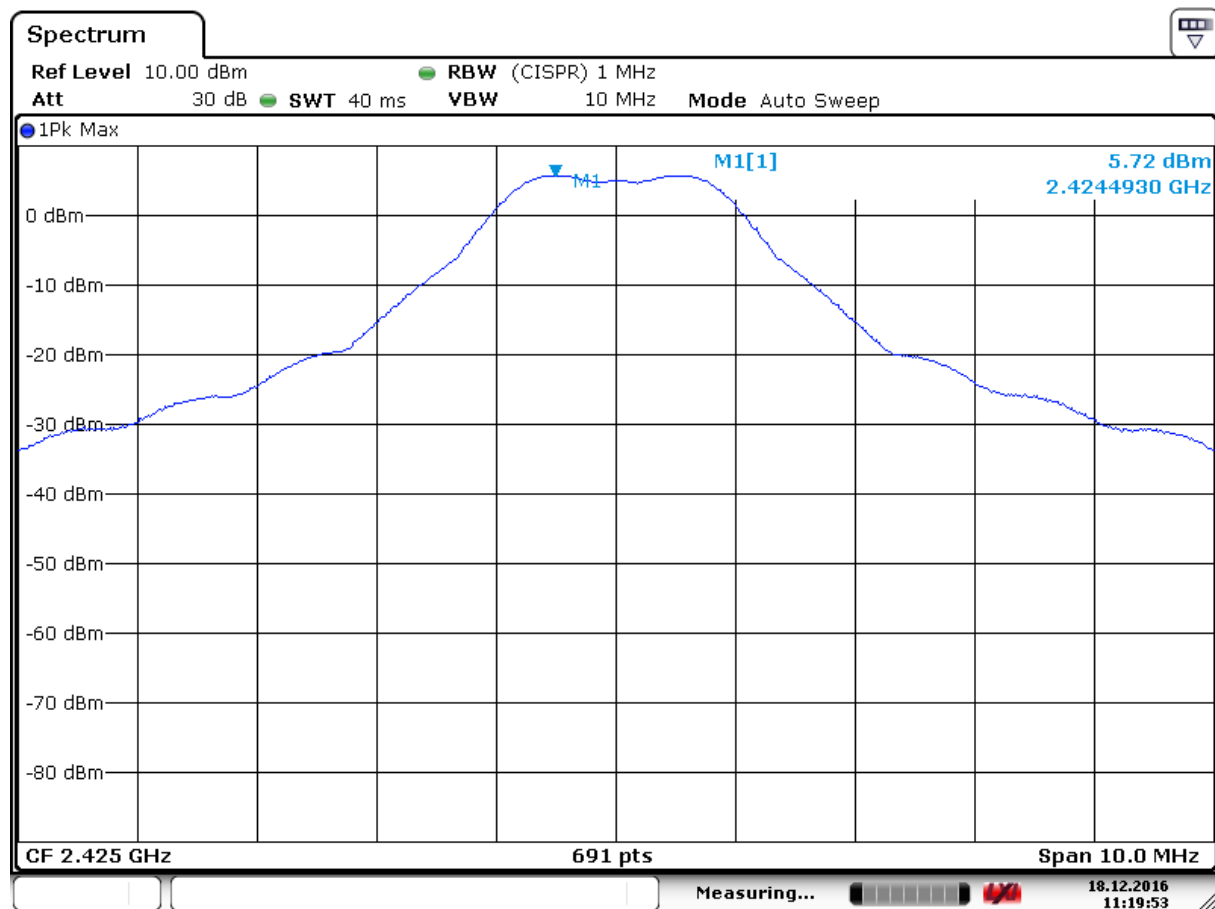
The transmitter output to the antenna is connected to a spectrum analyzer. The RBW / VBW is set to 1. The sweep time is coupled and the span is set to 5 MHz.

RESULTS:

Peak Output Power

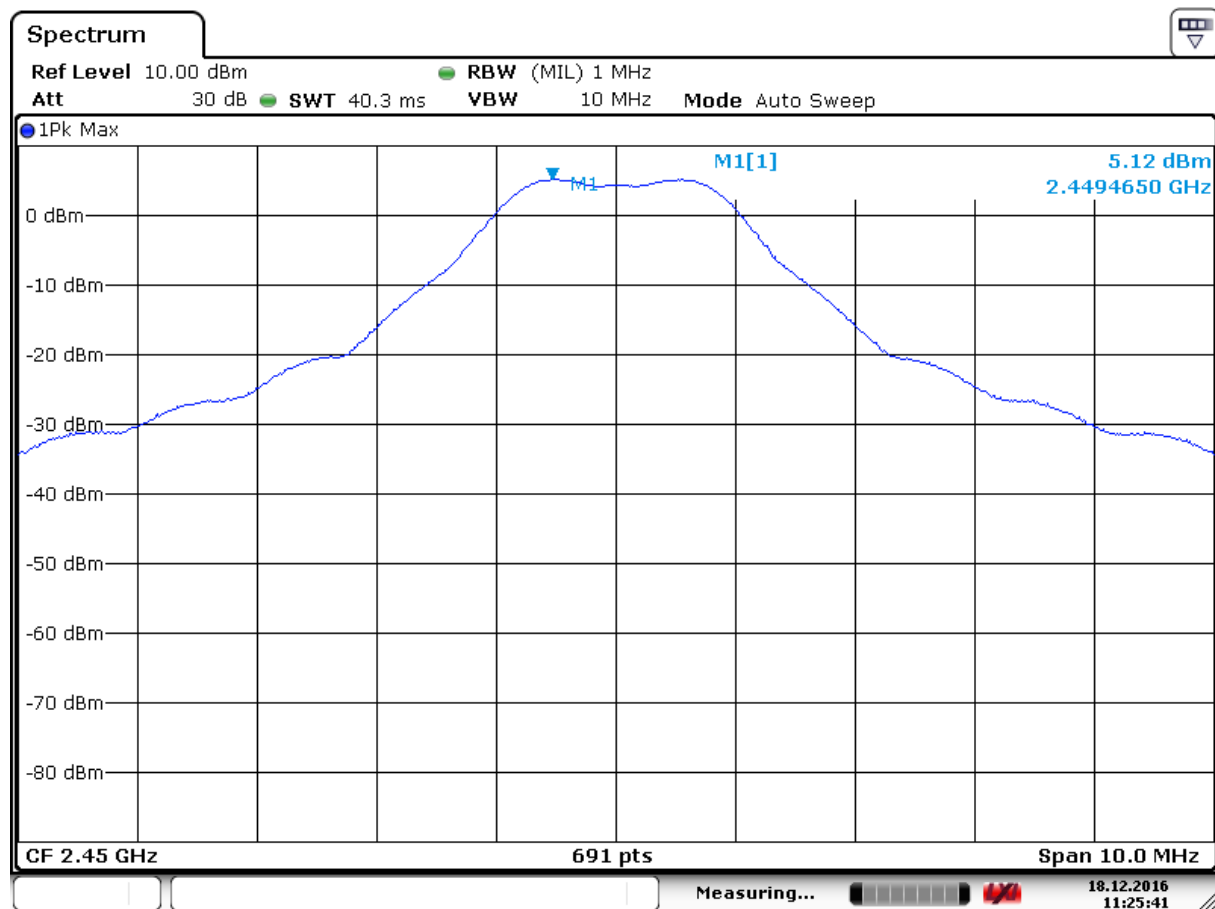
Frequency (MHz)	Peak Output Power(dBm)	Limit (dBm)	Results
2425	5.72	20	PASS
2450	5.12	20	PASS
2475	4.79	20	PASS

2425 MHz



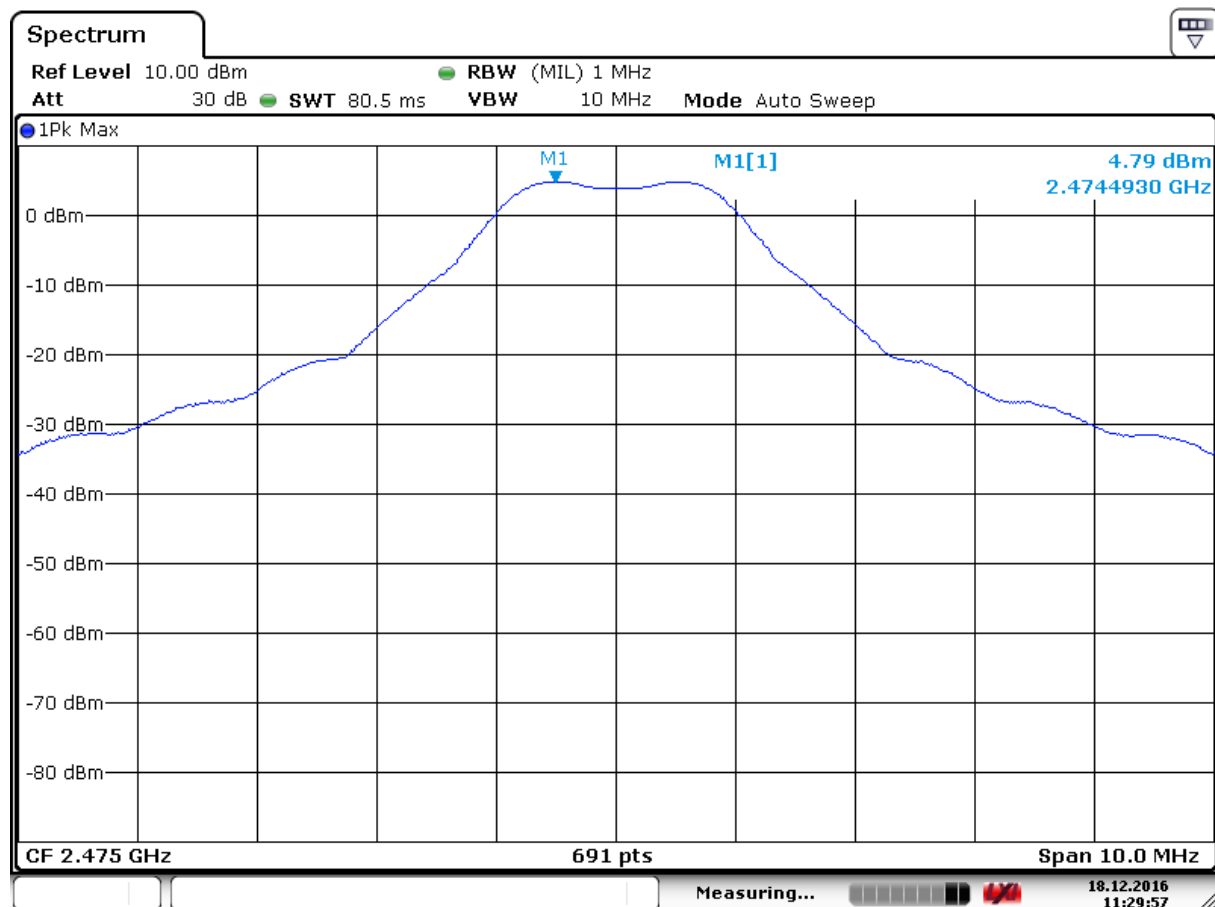
Date: 18 DEC 2016 11:19:54

2450 MHz



Date: 18 DEC 2016 11:25:41

2475 MHz



Date: 18 DEC 2016 11:29:57

2.1.5 Power Spectral Density

LIMIT:

FCC 47 CFR Part 15

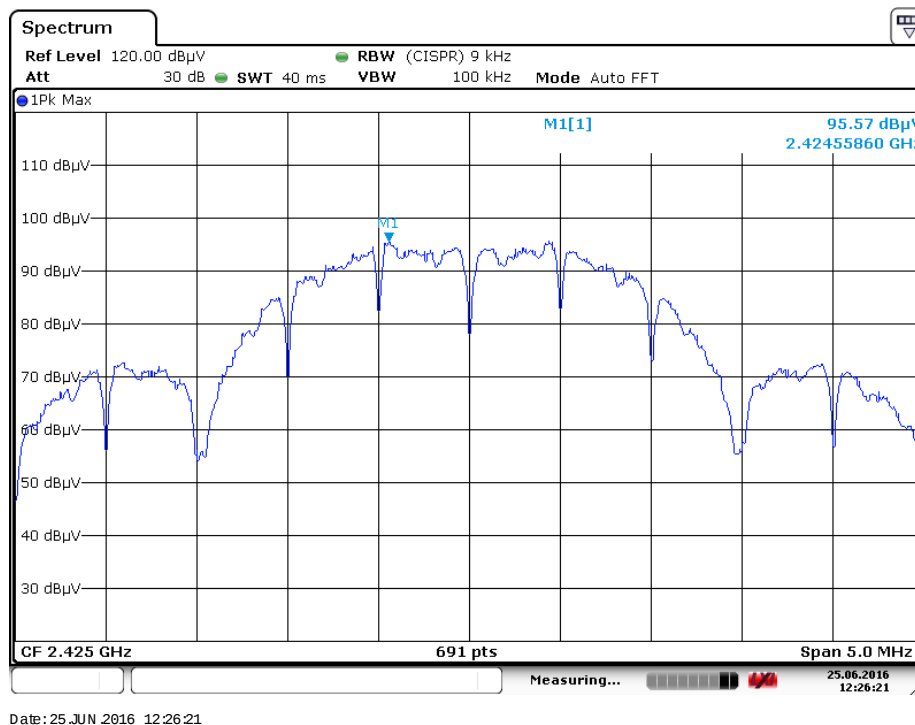
TEST PROCEDURE:

The transmitter antenna output is connected to a spectrum analyzer. The RBW is set to 3 KHz and the VBW is set to 10 KHz.

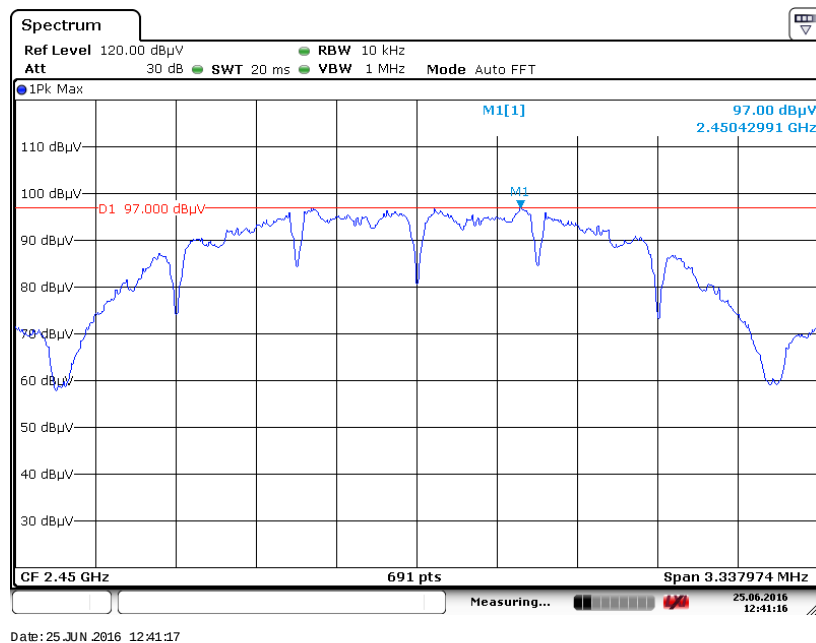
RESULTS:

Description	Channel	Measured Value	E.I.R.P.	Limit	Result
Power	2425	-11.43	-12.43	10 dBm	Complies
Spectral	2450	-10.00	-11.00		
Density	2475	-10.85	-11.85		

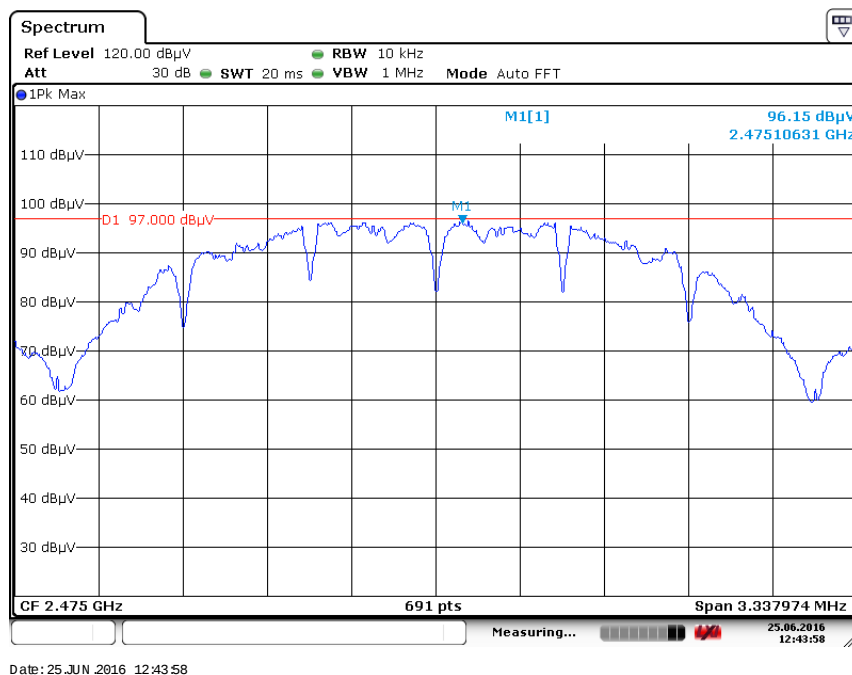
2425



2450

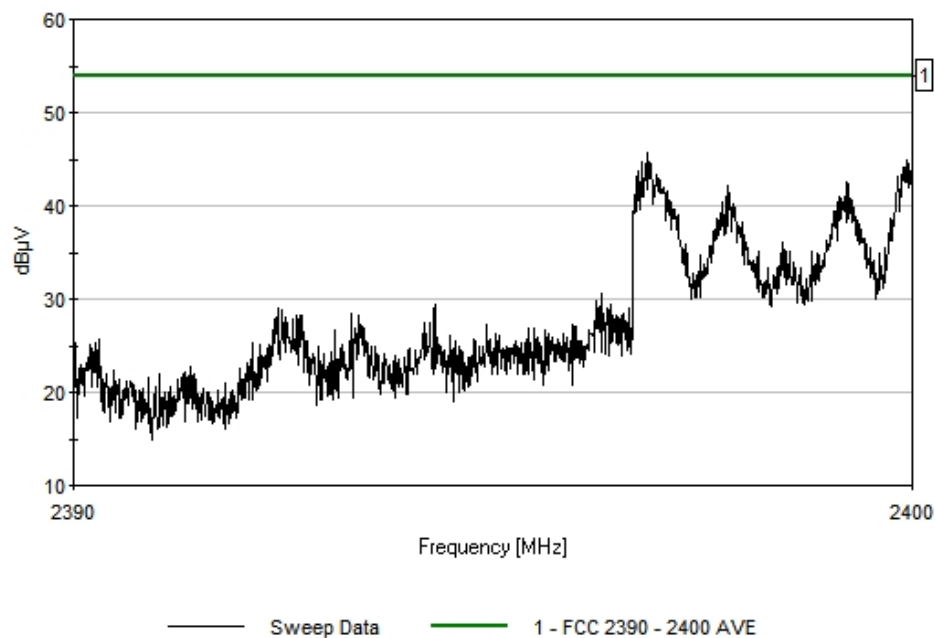


2475

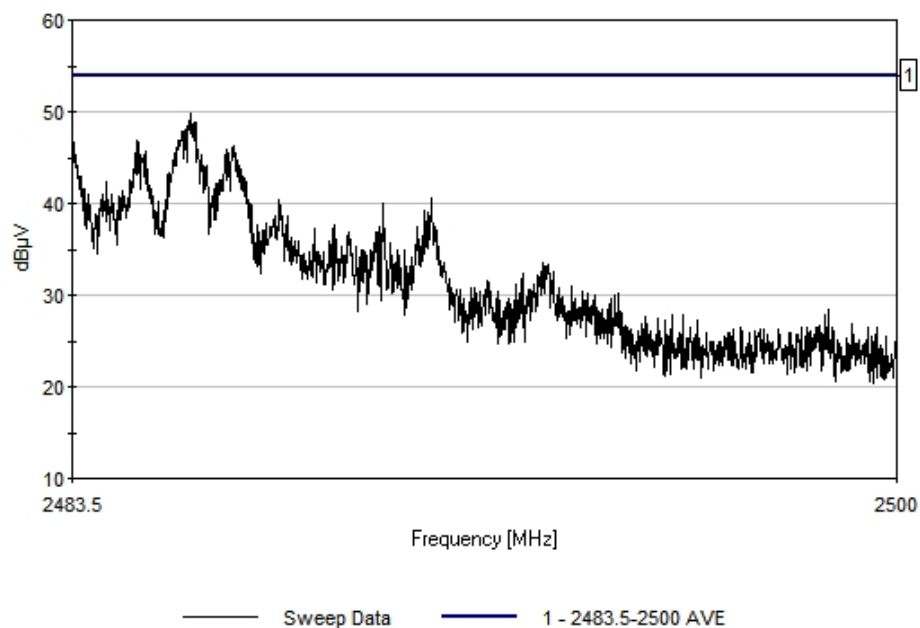


2.1.6 Conducted Bandedge

EMCE Engineering Date: 1/12/2017 Time: 12:17:43 PM UEI WO#: 4274
FCC 2390 - 2400 AVE Test Lead: Antenna Battery Sequence#: 8 Ext ATTN: 0 dB



EMCE Engineering Date: 1/12/2017 Time: 12:14:15 PM UEI WO#: 4274
2483.5-2500 AVE Test Lead: Antenna Battery Sequence#: 7 Ext ATTN: 0 dB



2.1.7 99% Bandwidth

LIMITS

None – For information purposes only

<i>Frequency (MHz)</i>	<i>99% BW (MHz)</i>	<i>Limit (MHz)</i>	<i>Result</i>
			N/A

END OF REPORT