

FCC ID: MG3-4031
IC : 2575A-4031

Test Report # : 4087-1B
Date : 1/14/2015

TEST REPORT

OF

FCC Part 15 Subpart C (§15.209, §15.231)
Industry Canada RSS-210, Issue 8, RSS-Gen Issue 3

Prepared For:
Universal Electronics, Inc.
201 East Sandpointe Ave, 8th Floor
Santa Ana CA 92707 US

Product Name :
Entone Nova MR IR+433MHz Remote

Model Name :
URC-4031

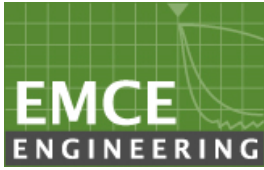
FCC ID : MG3-4031
IC : 2575A-4031

Application Purpose :
Class II Permissive Change

Prepared by:

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

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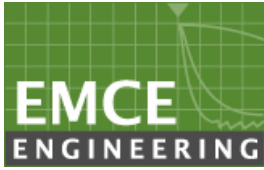


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Revision History

Rev.	Issue Date	Description
1	1/14/2015	Initial Issue

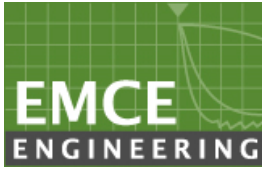


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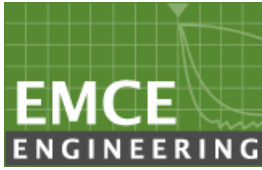
1.0 GENERAL INFORMATION

Test Laboratory:	EMCE Engineering 44366 S. Grimmer Blvd. Fremont, CA 94538 USA Tel: 510-490-4307, Fax: 510-490-3441 bob@universalcompliance.com FCC registration number : 743299 Test Site : FCC : US5291, IC : 3324A
Applicant Name :	Universal Electronics, Inc. 201 East Sandpointe Ave, 8 th Floor Santa Ana CA 92707 US Tel: +1-714-918-9500 Ext 9701 Contact Person: Jesse Mendez
Application Purpose :	Class II Permissive Change
EUT Description	Remote Controller
Product Name	Entone Nova MR IR+433MHz Remote
Model Name :	URC-4031
Applied Standards :	FCC 47 CFR §15.209, §15.231 & Canadian Standards RSS-GEN Issue 3, RSS-210 Issue 8
FCC ID :	MG3-4031
IC :	2575A-4031
RF Operating Frequency (ies)	433.92MHz
Modulation	FSK
Emission Designator	325K6K1D
Receipt of EUT :	12/22/14
Date of Testing :	12/30/14 – 1/14/15
Date of Report :	1/14/15

The tests listed in this report have been completed to demonstrated compliance to the CFR 47 Section 15.231, as well as Industry Canada Radio Standard RSS-210, Issue 8.

Contents approved:


Name: Bob Cole Title: President

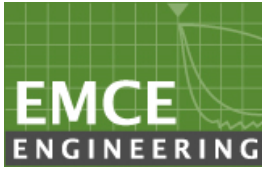


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2.0 EUT AND ACCESSORY INFORMATION

EUT				
Kind of Product	Remote Controller			
Product Name	Entone Nova MR IR+433MHz Remote			
Model name	URC-4031			
Frequency Range	433.92MHz			
Modulation Type	FSK			
Number of Channels	1			
Manufacturer	Universal Electronics, Inc.			
Power Source	DC 3V (Lithium Battery)			
Antenna Type	PCB Pattern Antenna			
Support Equipment				
Description	Model Number	Serial Number	Manufacturer	Power Cable Description
NONE				
Cable Description				
From	To	Length (Meters)	Shielded (Y/N)	Ferrite Loaded (Y/N)
NONE				



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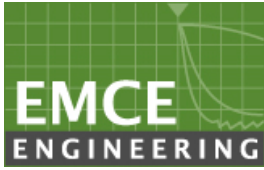
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3.0 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

Test Standard		Description	Result (Pass / Fail)
FCC 47 CFR Part 15	RSS 210, RSS-Gen		
15.209(a) 15.231(b)	RSS-210, Issue 8, A1.1.2	Radiated Emissions, Spurious Emissions and Field Strength of Fundamental	Pass
15.231(c)	RSS-210, Issue 8, A1.1.3	20dB Bandwidth of Operation Frequency	Pass
15.231(a)	RSS-210, Issue 8, A1.1.1	Transmission Time	Pass
-	RSS-Gen, Issue 3, 4.6.1	99% Occupied Bandwidth	Pass
§15.35 (c)	RSS-Gen Issue 3 §4.3	Maximum Modulation Percentage	-
ANSI C63.4: 2009/ RSS-Gen Issue 3			
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 due to product type.

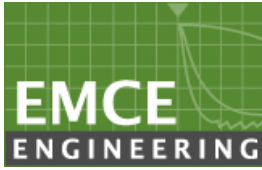


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4.0 MODIFICATIONS

There were no modifications.



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5.0 TEST RESULTS

5.1 TRANSMITTER RADIATED EMISSIONS

(Spurious Emissions and & Field Strength of Fundamental)

LIMITS

§15.231 (b) In addition to the provisions of §15.205, the field strength of emissions from Intentional radiators operated under this section shall not exceed the following.

Fundamental Frequency (MHz)	Field Strength of fundamental (uV/m)	Field Strength of Spurious Emissions (uV/m)
40.66 ~ 40.70	22.50	225
70 ~ 130	1250	125
130 ~ 174	1250 to 3750 **	125 to 375 **
174 ~ 260	3750	375
60 ~ 470	3750 to 12500 **	375 to 1250 **
Above 470	12500	1250

§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.

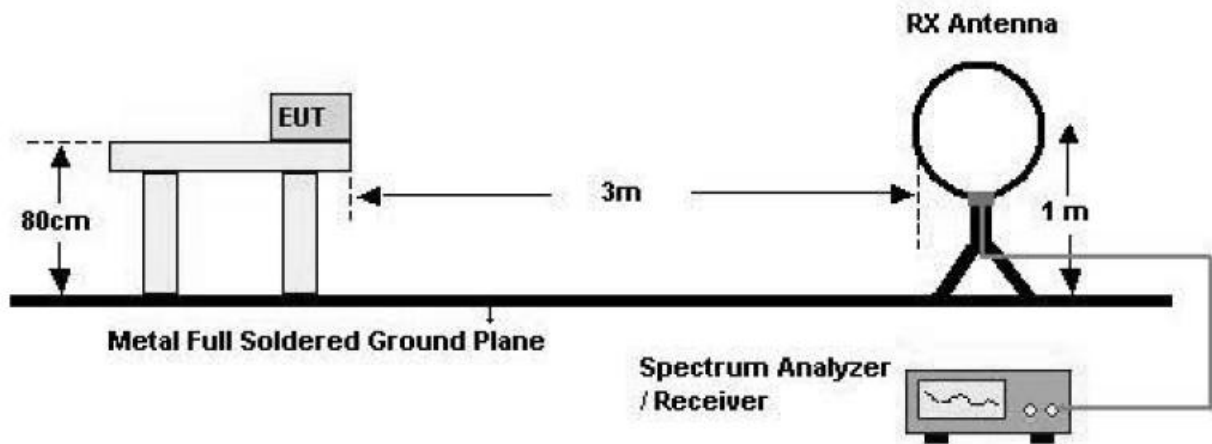
§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table ;

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

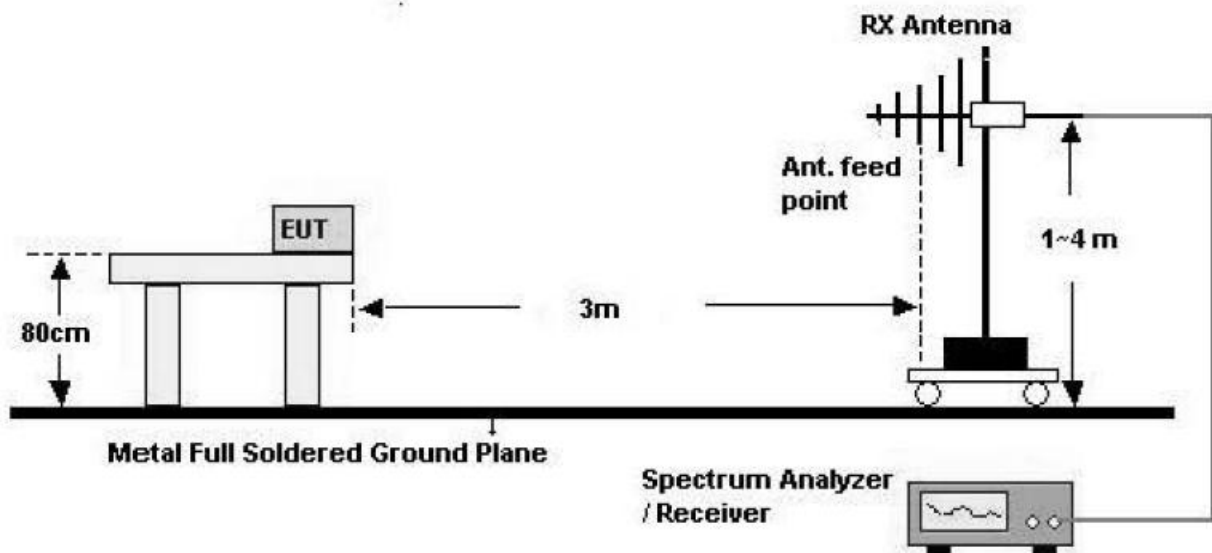
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

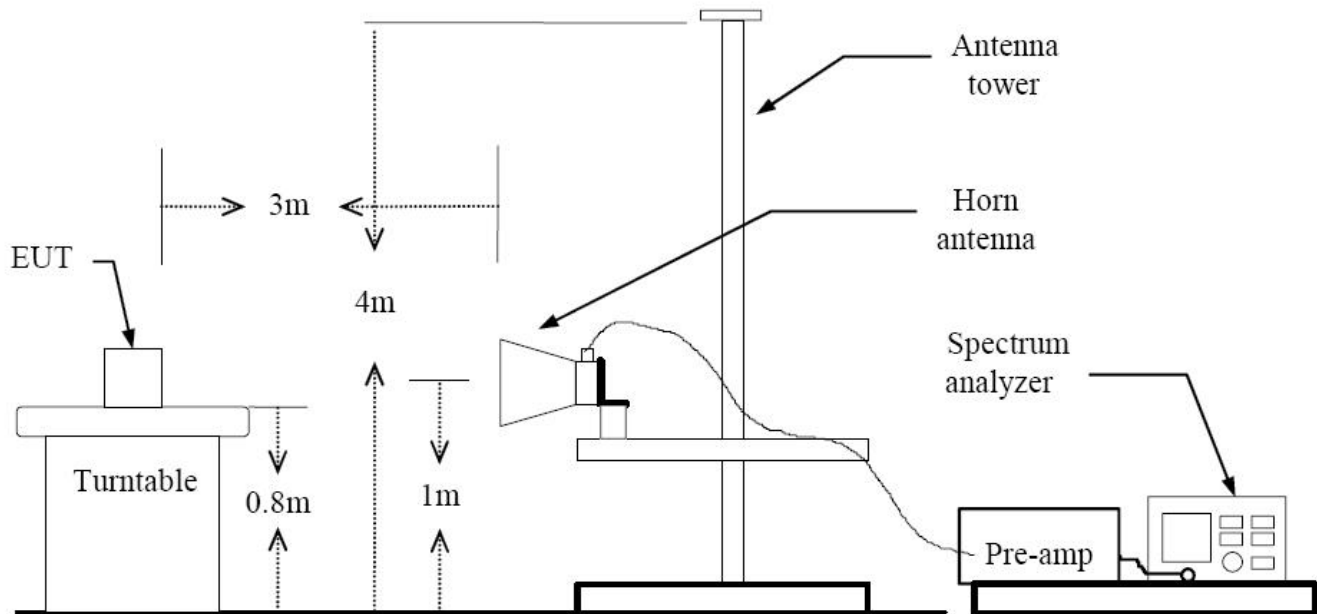
TEST CONFIGURATION

[Below 30 MHz]



[30 MHz - 1 GHz]



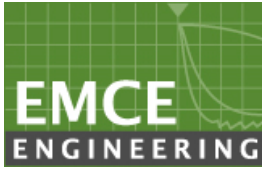
[Above 1 GHz]**TEST PROCEDURE**

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 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 or 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 -6.02 duty cycle for a 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.



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TEST RESULTS

Below 1 GHz

Table 1: Measured values of the Field strength

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

Customer: **UEI**
Specification: **15.231 260-470 MHz QP Limit**
Work Order #: **4087** Date: 12/30/2014
Test Type: **Radiated Scan** Time: 15:33:26
Equipment: **Remote Control** Sequence#: 1
Manufacturer: Universal Electronics, Inc. Tested By: Bob Cole
Model: Entone
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
Remote Control*	Universal Electronics, Inc.	Entone	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 12-2013	T2=8447 Pre-Amp Asset 377
T3=Sunol JB6 S/N A42610 2012	T4=Entone Duty Cycle Factor

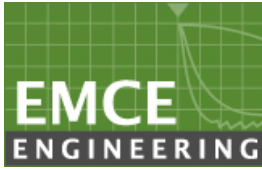
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	433.876M QP	86.9	+0.8	+26.9	+16.9	+8.3	+0.0 180	69.4	80.1	-10.7	Vert 214
2	433.881M QP	86.7	+0.8	+26.9	+16.9	+8.3	+0.0 96	69.2	80.1	-10.9	Horiz 300

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. Except above frequency



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Above 1 GHz

Table 1: Measured values of the Field strength

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

Customer: **UEI**
Specification: **EN55022B 1 - 6 GHz AVE**
Work Order #: **4087B** Date: 12/30/2014
Test Type: **Radiated Scan** Time: 11:34:30
Equipment: **Remote Control** Sequence#: 2
Manufacturer: Universal Electronics, Inc. Tested By: Bob Cole
Model: Entone
S/N: 7100

Test Equipment:

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

Function	Manufacturer	Model #	S/N
Remote Control*	Universal Electronics, Inc.	Entone	7100

Support Devices:

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

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Transducer Legend:

T1=Sunol JB6 S/N A42610	T2=8449B Preamp
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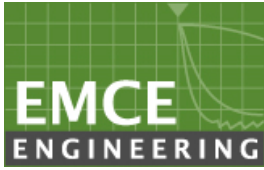
Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	3036.590M	32.1	+32.8	+23.5			+0.0 99	41.4	54.0	-12.6	Vert 205
2	2168.870M Ave	33.5	+29.6	+23.5			+0.0 180	39.6	54.0	-14.4	Horiz 140

Note

1. The antenna is manipulated through typical positions, polarity and length during the testing
2. The frequency range was scanned from 1 GHz to 4.4 GHz and the worst-case emissions are reported.
3. There is detected level above reference noise floor spectrum analyzer. Except above frequency



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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

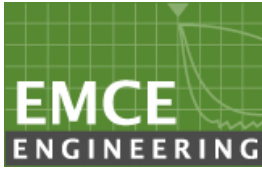
RA = Receiver Amplitude

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.

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



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5.2 20 dB BANDWIDTH OF OPERATION FREQUENCY

LIMIT

§15.231 (c) & IC RSS-210 A1.1.3

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

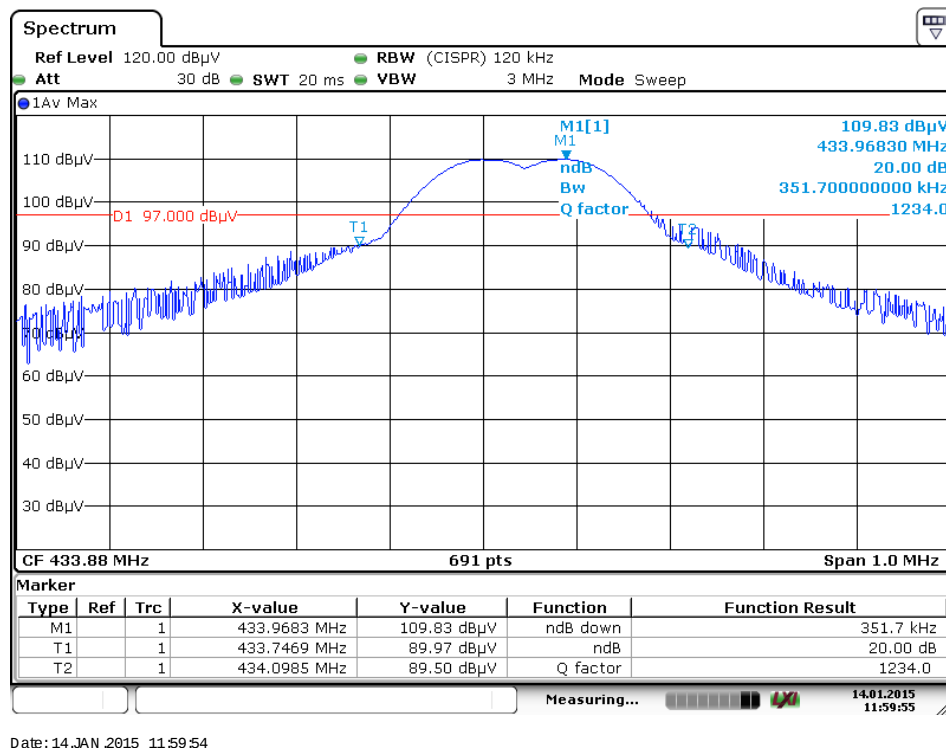
TEST PROCEDURE

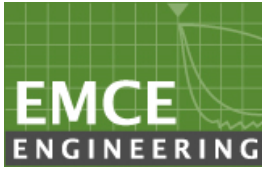
The transmitter output is connected to the spectrum analyzer.
20dB Bandwidth The RBW is set to 100KHz. The VBW is set to 100KHz. The sweep time is coupled. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RESULTS

NO non-compliance noted.

Operating Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Margin (KHz)
433.94	351.70	1000	832.17





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5.3 MAXIMUM MODULATION PERCENTAGE (M%)

LIMIT

§15.35 (c) & IC RSS-Gen §4.3

The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 seconds interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 100 KHz and the VBW is set to 100 KHz. The sweep time is coupled and the span is set to 0 Hz. The number of pulses is measured and calculated in a 100 ms scan.

CALCULATION

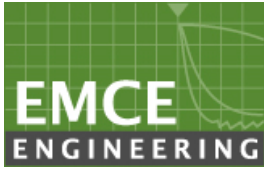
Average Reading = Peak Reading(dBuV/m)+20log (Duty Cycle), Where Duty Cycle is (# of pulses *pulse width)/100 or T

RESULTS

No non-compliance noted:

MAXIMUM MODULATION PERCENTAGE

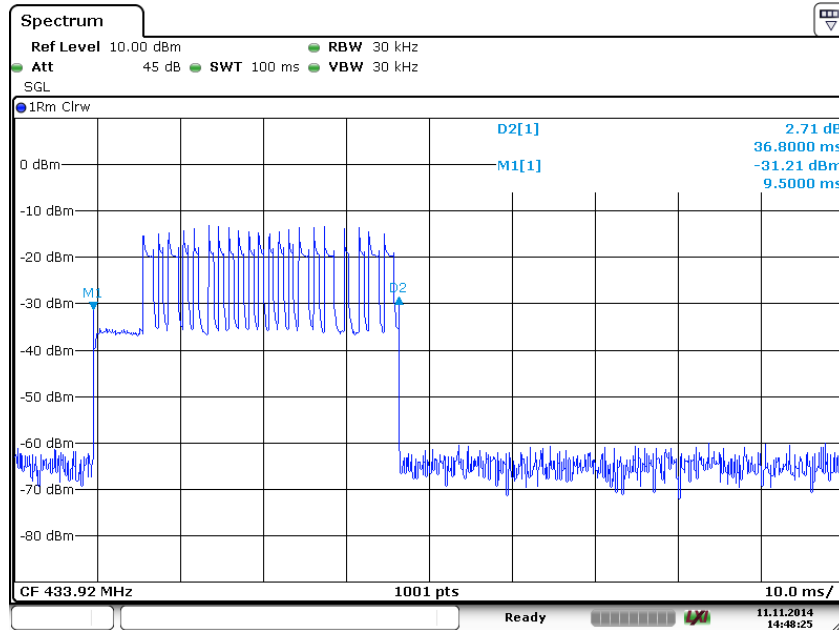
One Period (ms)	Pulse Width (ms)	# of Pulses	Duty Cycle	% Duty Cycle
100	36.8	1	0.368	36.8



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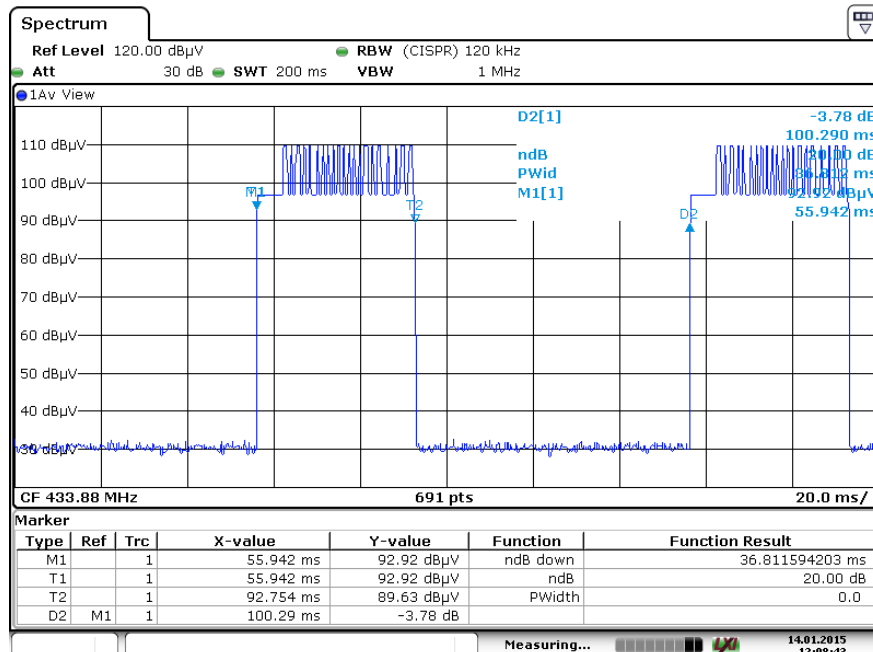
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Single Pulsewidth

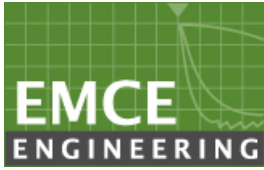


Date: 11 NOV 2014 14:48:25

Pulse Period



Date: 14 JAN 2015 12:08:42



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5.4 TRANSMISSION TIME

LIMIT

§15.231 (a) (1) & RSS210 A1.1.1 (1)

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. (See Declarative Statement Exhibit)

TEST PROCEDURE

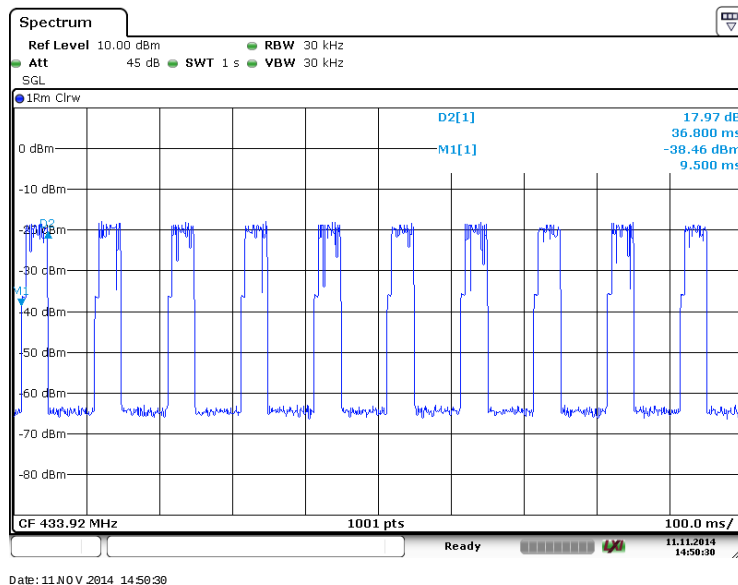
The transmitter output is connected to a spectrum analyzer or radiated field strength. The RBW is set to 100 KHz and the VBW is set to 100 KHz . The sweep time is set to 1 seconds and the span is set to 0 Hz.

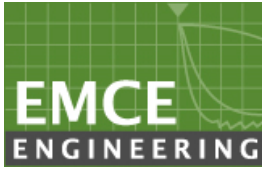
RESULTS

NO non-compliance noted.

Frequency (MHz)	Transmission time (ms)	Limit (Second)	Result
433.4	0	Less than 5	COMPLIES

Pulses per Second = 10





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5.5 99% Occupied Bandwidth

LIMIT

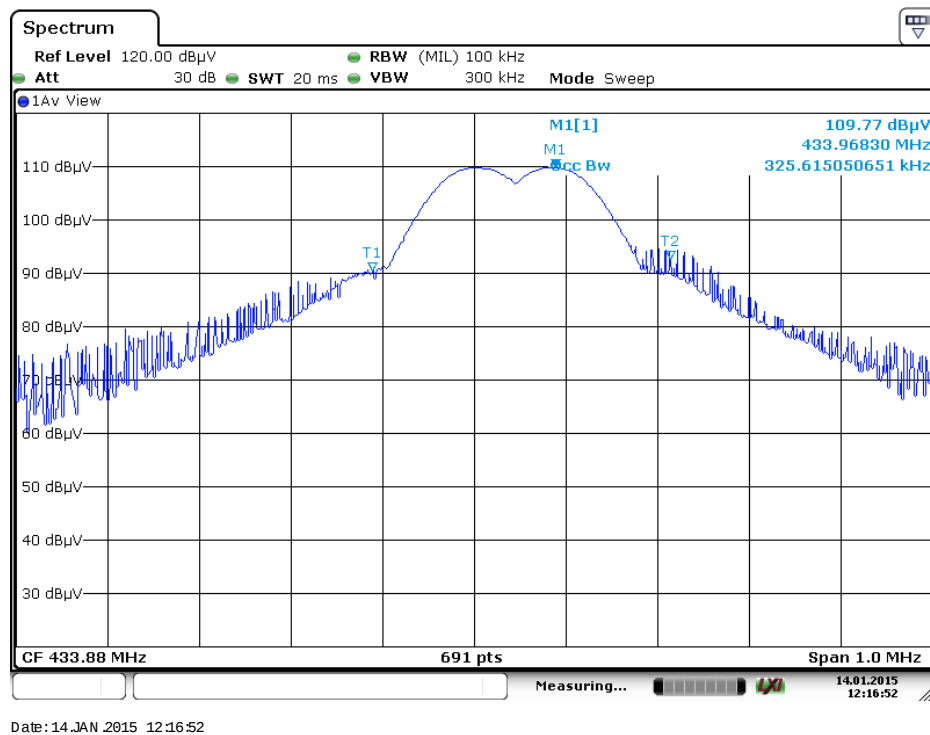
RSS-Gen

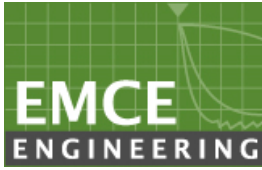
TEST PROCEDURE

Occupied Bandwidth was measured according to RSS-Gen Measurement was taken with spectrum analyzer. The spectrum analyzer bandwidth and span was set to read in hertz.

RESULTS

99% Occupied Bandwidth(KHz)	Result
325.61	COMPLIES





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6.0 TEST EQUIPMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
Spectrum Analyzer Hewlett-Packard	8566B	3014A06947	5/2/12	5/2/15
Quasi-Peak Adapter Hewlett-Packard	85650A	3145A01673	5/2/13	5/2/15
EMI Analyzer System Hewlett-Packard	8593EM	3497A5703	5/17/12	5/17/15
Signal Analyzer Rohde-Schwarz	FSV7	1321.3008K7	3/10/14	3/10/16
HP 84125 EMI Measurement System	84125B	US36432003	5/1 /13	5/1/15
Pre-Amplifier(100KHz-1.3GHz) Hewlett-Packard	8447D	2443A03587	5/1/13	5/1/15
LISN(9KHz-30MHz) EMCO	3810-2	9807-1988	5/17/12	5/17/15
LISN(9KHz-30MHz) EMCO	3810-2	4576	5/17/12	5/17/15
BiConiLog Antenna Sunol Sciences	JB6	1090	8/14/12	8/14/15
Loop Antenna Empire Devices	LP105	000114	1/15/14	1/15/16
Webber Temperature Chamber	WE4-100- 200	3-60-32	8/15/13	8/15/15
RF Signal Cable Murata	25' LMR	N/A	5/10 /13	5/10 /15
RF Signal Cable EMCE	100' LMR	N/A	5/1 /13	5/1 /15