



CONFORMANCE TEST REPORT FOR FCC 47 CFR, Part 15 Subpart C

Report No.: 11-06-MAS-216

Client: Micro Alarm System Inc
Product: transmitter
Model: TX-D4A235
FCC ID: JRMTX6813
Manufacturer/supplier: Micro Alarm System Inc

Date test item received: 2011/06/22
Date test campaign completed: 2011/09/13
Date of issue: 2011/09/20

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Total number of pages of this test report: 21 pages

Total number of pages of photos: External photos 1 pages

Internal photos 2 pages

Setup photos 2 pages

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Client : Micro Alarm System Inc
Address : 4825 South Soto street Vernon, CA 90058
Manufacturer : Micro Alarm System Inc
Address : 4825 South Soto street Vernon, CA 90058
EUT : transmitter
Trade name : MICRO
Model No. : TX-D4A235
Power Source : DC 6V (Lithium Battery)
Regulations applied : FCC 47 CFR, Part 15 Subpart C

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- ⑤ FCC Registration Number: 90588, 91094, 91095
- ⑥ Industry Canada Site Registration number: IC 2949A



NVLAP Lab Code 200133-0

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1. GENERAL INFORMATION

1.1 Product Description

- a) Type of EUT : transmitter
- b) Model No. : TX-D4A235
- c) Serial No. : ----
- d) FCC ID : JRMTX6813
- e) Working Frequency : 433.92 MHz

1.2 Characteristics of Device:

The EUT is a remote controller operates at 433.92 MHz.

The TX-D4A235 series is an indoor transmitter featuring dimming control on normal light with twin receptacles.

1.3 Test Methodology

Both Conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4 (2003).

The equipment under test was operated continuously in its normal operating mode for the purpose of the measurements. In order to secure the continuous operation of the device under test, the circuit rewired by the manufacturer to affect its intended operation. The receiving antenna was varied from 1 to 4 meters and the wooden turntable was rotated through 360 degrees to obtain the highest reading on the field strength meter or on the display of the spectrum analyzer. And also, each emission was to be maximized by changing the orientation of the equipment transmitter under test.

1.4 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.

This site has been accreditation as a FCC filing site.

2. DEFINITION AND LIMITS

2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 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	2655-2900	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	Above 38.6
13.36-13.41			

Remark "***" : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.3 Limitation

(1) Conducted Emission Limits :

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the conducted limit is the following:

Frequency MHz	Quasi Peak dB μ V	Average dB μ V
0.15 - 0.5	66-56	56-46
0.5 - 5.0	56	46
5.0 - 30.0	60	50

(2) Radiated Emission Limits :

According to 15.231 (b) , in addition to the provisions of section 15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	2250	225
70-130	1250	125
130-174	*1,250 to 3,750	*125 to 375
174-260	3750	375
260-470	*3,750 to 12,500	*375 to 1250
Above 470	12500	1250

* Linear interpolations.

According to 15.231(e) ,Periodic operation in the band 40.66-40.70 MHz and above 70 MHz, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Frequency Band (MHz)	Field strength of Fundamental (uV/m)	Field strength of Spurious (uV/m)
40.66-40.70	1000	100
70-130	500	50
130-174	*500-1500	*50-150
174-260	1500	150
260-470	*1500-5000	*150-500
Above 470	5000	500

* Linear interpolations.

According to 15.205 (b), the field strength of emissions appearing within the Restricted Bands shall not exceed. The general radiated limits in 15.209, as following table:

Frequency (MHz)	Field Strength		Measurement Distance (meters)
	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}$	
30 - 88	100	40.0	3
88 - 216	150	43.5	3
216 - 960	200	46.0	3
Above 960	500	54.0	3

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

(3) Limit of transmission time

According to 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

According to 15.231(e), devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirement, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

3. RADIATED EMISSION MEASUREMENT

3.1 Applicable Standard

For periodic operation intentional radiator, the radiated emission shall comply with § 15.231(b).

3.2 Measurement Procedure

A.Preliminary Measurement For Portable Devices.

For portable devices, the following procedure was performed to determine the maximum emission axis of EUT (X 、Y and Z axis):

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. The axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.
4. The position in which the maximum noise occurred was “Z axis”. (Please see the test setup photos)

B. Final Measurement

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively.
2. For emission frequencies measured below 1 GHz, it is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions. For emission frequencies measured above 1 GHz, a pre-scan be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 120 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

Note : A filter was used to avoid pre-amplifier saturated when measure TX operation mode.

5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.
7. Check the three frequencies of highest emission with varying the data rate, placement of ANT. cables associated with EUT to obtain the worse case and record the result.

Figure 1 : Frequencies measured below 1 GHz configuration

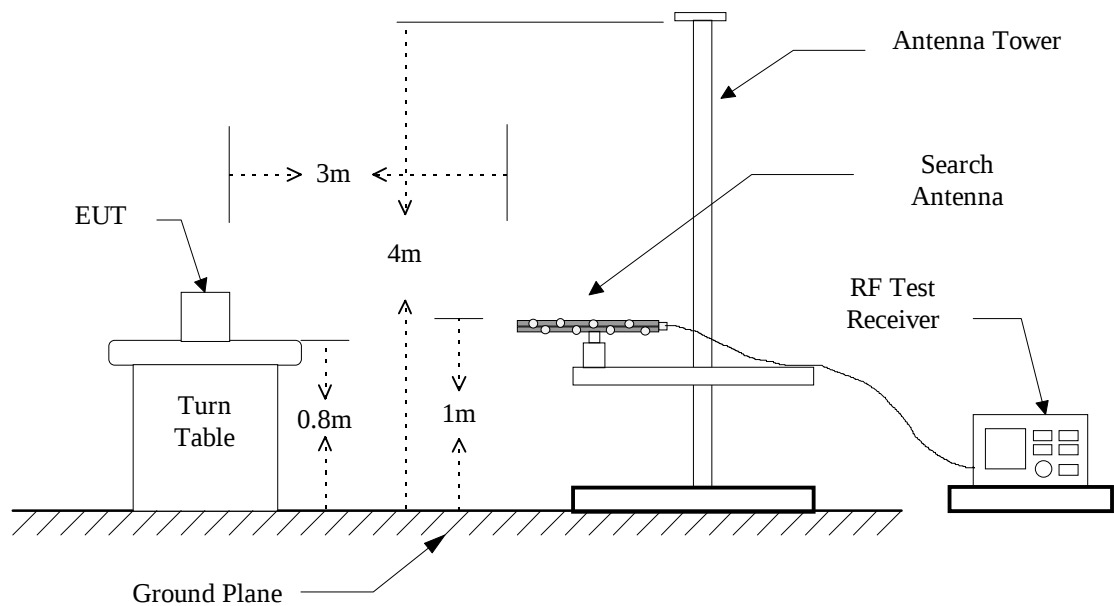
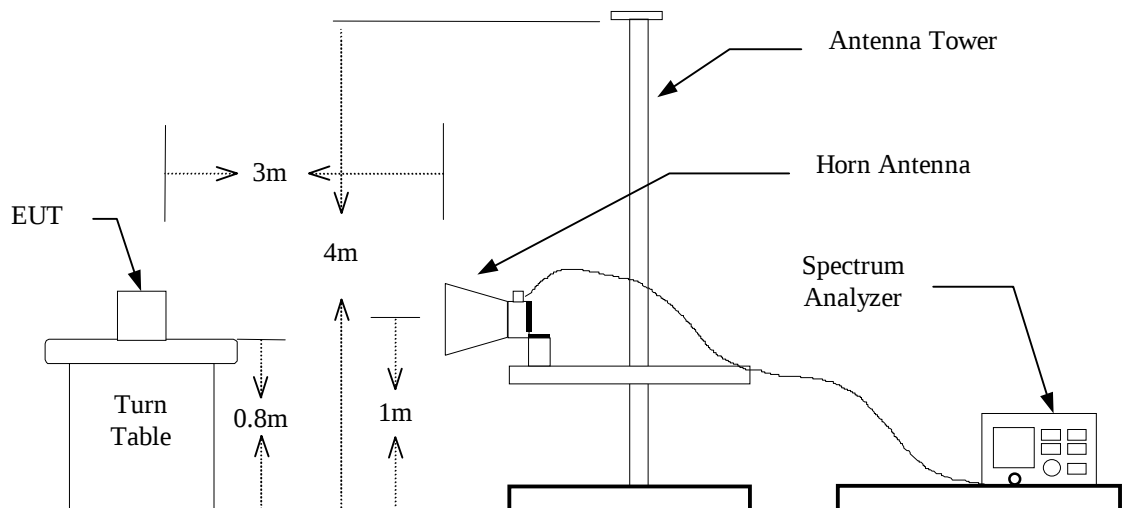


Figure 2 : Frequencies measured above 1 GHz configuration



3.3 Test Data

3.3.1 Fundamental and Harmonic of Transmitter

Operated mode : Transmitting

Frequency	Ant Pol	Reading (dBuV) @3m		Correct Factor	Duty Factor	Result (dBuV) @3m			Limit (dBuV/m) @3m			Margin
(MHz)	H/V	Peak	QP	(dB/m)	(dB)	Peak	QP	AVG	Peak	QP	AVG	(dB)
Fundamental												
433.5700	H	51.7	----	19.57	-8.75	71.3	----	62.6	100.8	----	80.8	-18.2
433.5700	V	38.8	----	19.57	-8.75	58.4	----	49.7	100.8	----	80.8	-31.1
Harmonic												
867.1400	H	33.9	----	25.28	-8.75	59.2	----	50.5	80.8	----	60.8	-10.3
867.1400	V	18.0	----	25.28	-8.75	43.3	----	34.6	80.8	----	60.8	-26.2
*1300.7100	H	----	----	-13.10	-8.75	----	----	----	74.0	----	54.0	----
*1300.7100	V	----	----	-13.10	-8.75	----	----	----	74.0	----	54.0	----
1734.2800	H	----	----	-10.93	-8.75	----	----	----	80.8	----	60.8	----
1734.2800	V	----	----	-10.93	-8.75	----	----	----	80.8	----	60.8	----
2167.8500	H	----	----	-9.10	-8.75	----	----	----	80.8	----	60.8	----
2167.8500	V	----	----	-9.10	-8.75	----	----	----	80.8	----	60.8	----
2601.4200	H	----	----	-7.76	-8.75	----	----	----	80.8	----	60.8	----
2601.4200	V	----	----	-7.76	-8.75	----	----	----	80.8	----	60.8	----
3034.9900	H	----	----	-6.30	-8.75	----	----	----	80.8	----	60.8	----
3034.9900	V	----	----	-6.30	-8.75	----	----	----	80.8	----	60.8	----
3468.5600	H	----	----	-5.09	-8.75	----	----	----	80.8	----	60.8	----
3468.5600	V	----	----	-5.09	-8.75	----	----	----	80.8	----	60.8	----
*3902.1300	H	----	----	-3.47	-8.75	----	----	----	74.0	----	54.0	----
*3902.1300	V	----	----	-3.47	-8.75	----	----	----	74.0	----	54.0	----
*4335.7000	H	----	----	-3.16	-8.75	----	----	----	74.0	----	54.0	----
*4335.7000	V	----	----	-3.16	-8.75	----	----	----	74.0	----	54.0	----

Note:

1. Peak Result = Peak Reading + Correct Factor
2. AVG Result = Peak Result + Duty Factor
3. If the result of peak value is under the limit of average, the average value doesn't need to be measured.
4. "*" means the frequency is in the Restricted Bands.

3.4 Field Strength Calculation

(a) Field Strength:

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\text{RESULT} = \text{READING} + \text{CORR. FACTOR}$$

where CORR. FACTOR = Antenna FACTOR + Cable FACTOR

(b) Duty Factor:

$$20\log \frac{13 \times 1.675(\text{ms}) + 26 \times 0.5667(\text{ms})}{100(\text{ms})} = -8.75 \text{ dB}$$

The plotted graph of Duty Factor please see page 13 ~ 15.

This Duty Factor is the worst case of the EUT and confirmed by the test engineer.

3.5 Radiated Test Equipment

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
EMI Receiver	R&S	ESIB7	13054414-001	06/25/2012
BiLog Antenna	ETC	MCTD2756	BL09D01004	12/06/2011
Horn Antenna	EMCO	3115	9107-3729	07/21/2012
PRE-Amplifier	Agilent	8449B	3008A01648	10/25/2011
Spectrum Analyzer	R&S	FSU46	13040904-001	11/25/2011
Spectrum Analyzer	Agilent	E4446A	MY48250073	09/26/2011

Note: The standards used to perform this calibration are traceable to NML/ROC, NIST/USA and NPL.

File: 235

Data: #99

Date: 2011/9/13

Temperature: 28 °C

Time: PM 03:12:55

Humidity: 55 %



Condition:

EUT: EUTY

RF Conducted

Sweep Time: 5ms Att.: 0dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: 300k-300k-200ms

No.	Sweep time(ms)	Level(dBm)
1	1.6417	8.50
2	3.3167	10.66
3	3.8500	9.28
4	4.4167	7.04

No.		Δ Time(ms)	Δ Level(dB)
1	mk2-mk1	1.675	2.16
2	mk4-mk3	0.5667	-2.24

File: 235

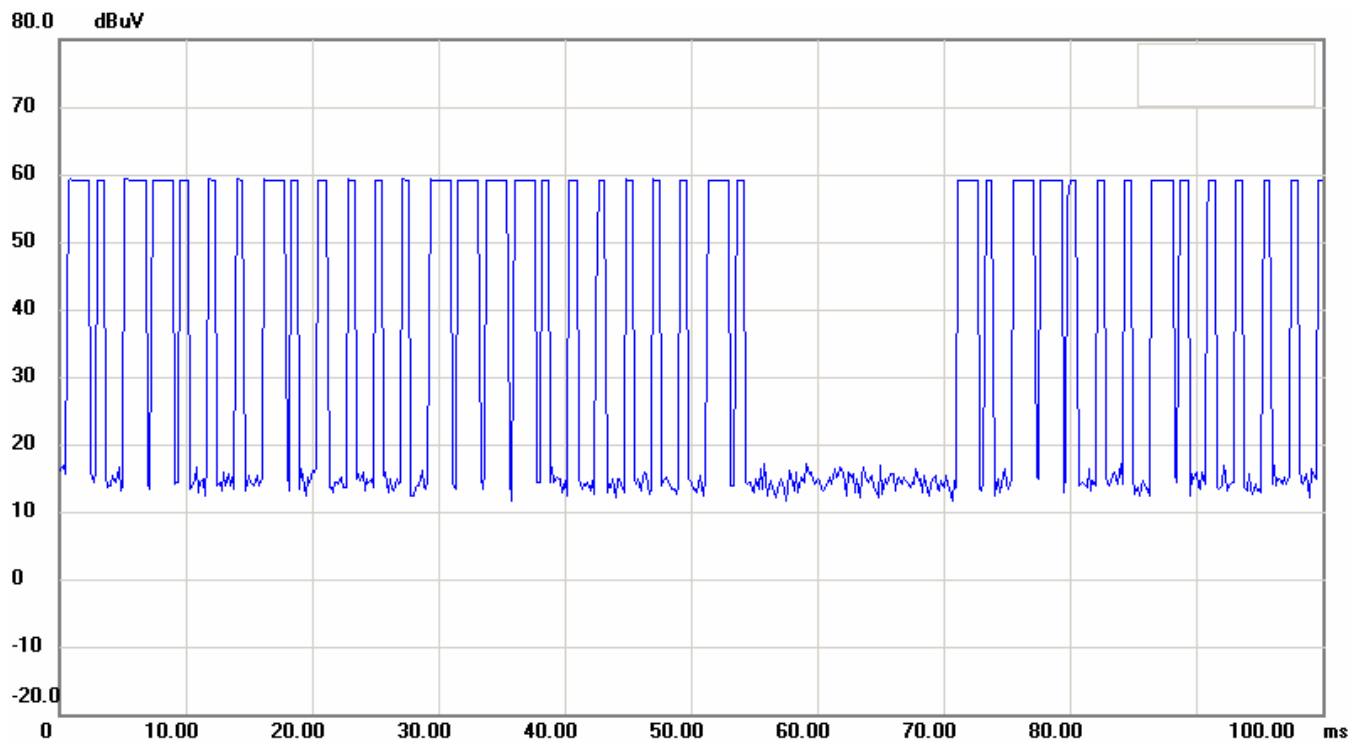
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Date: 2011/9/13

Temperature: 28 °C

Time: PM 03:10:12

Humidity: 55 %



Condition:

EUT: EUTY

Model:

Test Mode:

Note: 300k-300k-200ms

RF Conducted

Sweep Time: 100ms Att.: 0dB

RBW: 100 KHz VBW: 300 KHz

File: 235

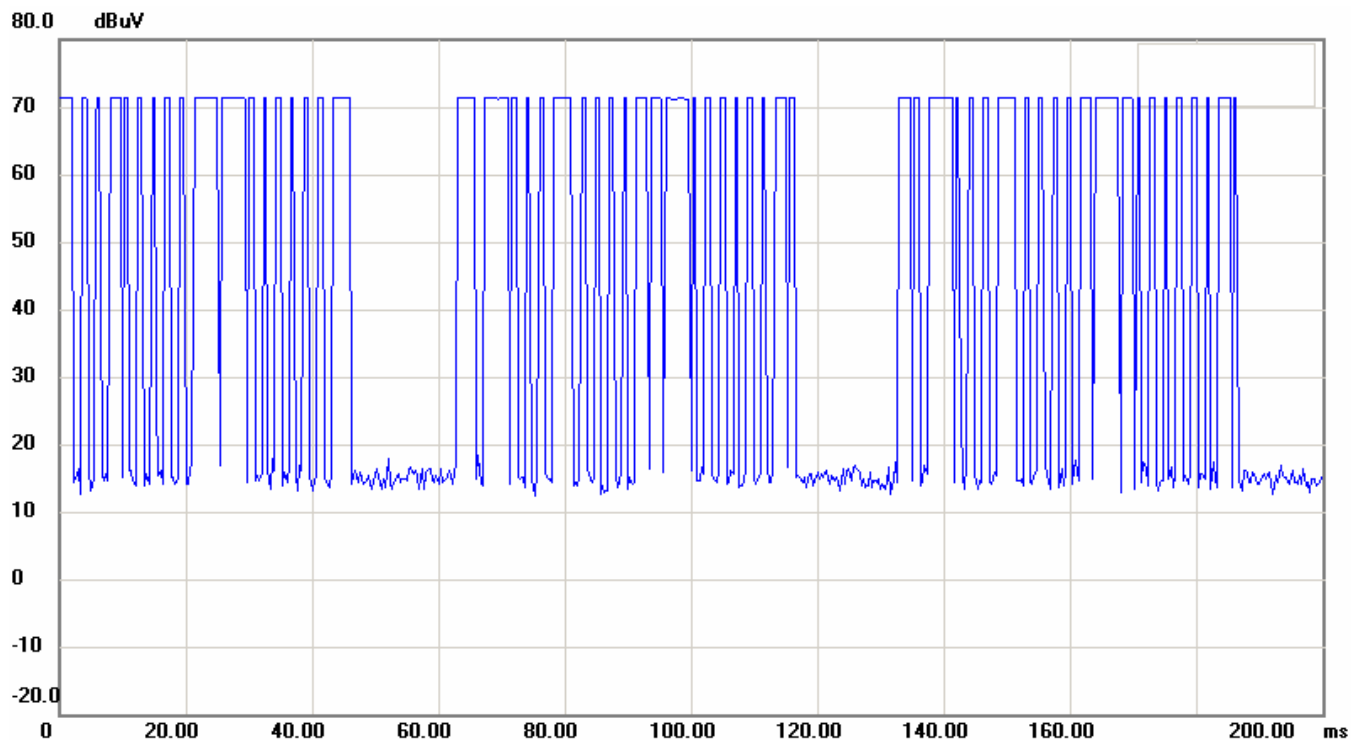
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Date: 2011/9/13

Temperature: 28 °C

Time: PM 03:08:03

Humidity: 55 %



Condition:

EUT: EUTY

Model:

Test Mode:

Note: 300k-300k-200ms

RF Conducted

Sweep Time: 200ms Att.: 0dB

RBW: 100 KHz VBW: 300 KHz

3.6 Measuring Instrument Setup

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	EMI Test Receiver	Peak	120 kHz	300 kHz
1000 to 4500	EMI Test Receiver	Peak	1 MHz	1 MHz

4. BANDWIDTH OF EMISSION

4.1 Applicable Standard Plot Graphic of Bandwidth

Per FCC rule §15.231(c), the permitted emission bandwidth is 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 centre frequency.

4.2 Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Agilent	E4446A	09/26/2011

4.3 Test Result

Test Date : Sep. 13, 2011 Temperature : 28°C Humidity : 55%

Center Frequency	433.5700 MHz
Limit	$433.5700 \text{ MHz} \times 0.25\% = 1083.9 \text{ kHz}$
20dB Bandwidth of Emission	461.7 kHz
Chart	Page 18
Result	PASS

File: 235

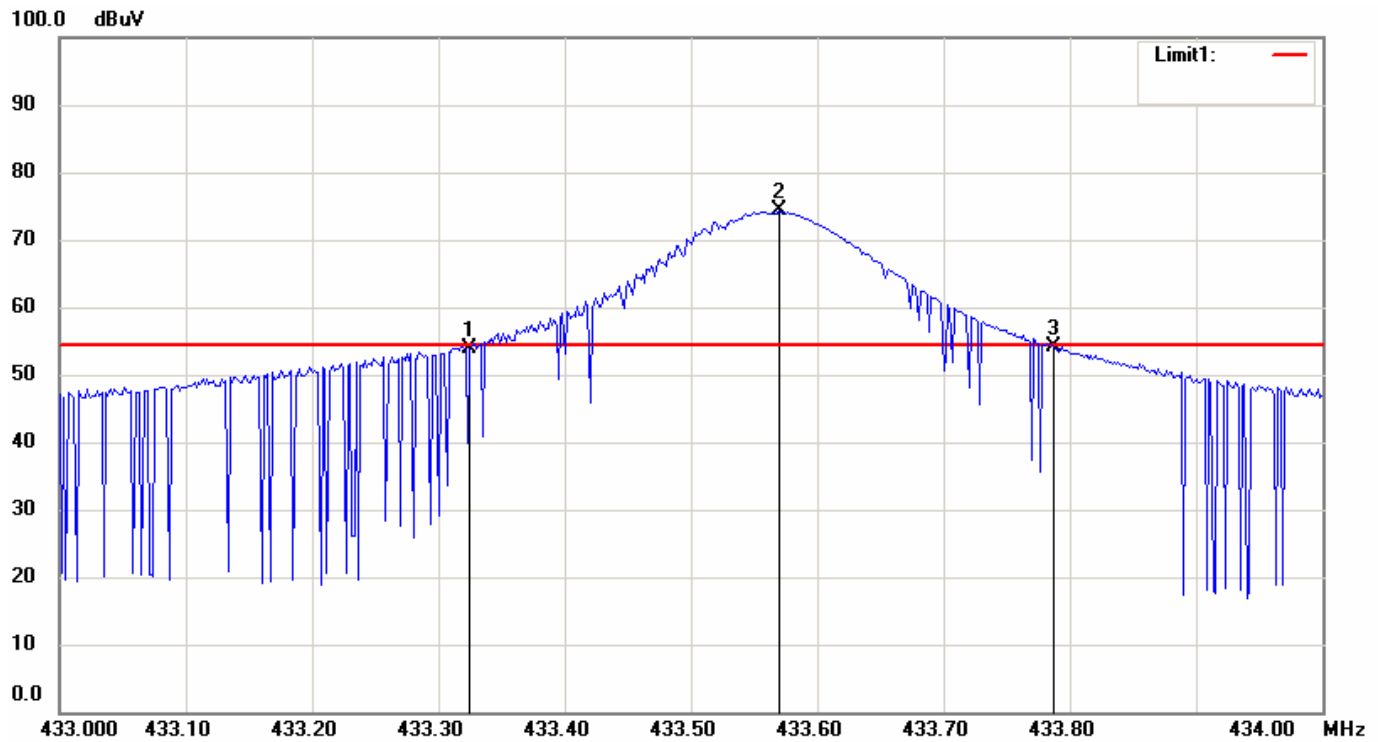
Data: #92

Date: 2011/9/13

Temperature: 28 °C

Time: PM 03:03:31

Humidity: 55 %



Condition:

EUT: EUTY

Model:

Test Mode:

Note: 300k-300k-200ms

RF Conducted

Sweep Time: 300ms Att.: 0dB

RBW: 100 KHz VBW: 300 KHz

No.	Frequency(MHz)	Level(dBm)
1	433.3250	53.99
2	433.5700	74.26
3	433.7867	54.10

No.		Δ Frequency(MHz)	Δ Level(dB)
1	mk3-mk1	0.4617	0.11

5. CONDUCTED EMISSION MEASUREMENT

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to §15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.
specification.

6. LIMIT OF TRANSMISSION TIME

6.1 Applicable Standard

According to 15.231(a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

6.2 Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Agilent	E4446A	09/26/2011

6.3 Test Result

Test Date : Sep. 13, 2011 Temperature : 28°C Humidity : 55%

This transmitter is operated by manual and active time is 0.34 second after being released.

Note : Please refer to page 21 for chart

File: 235

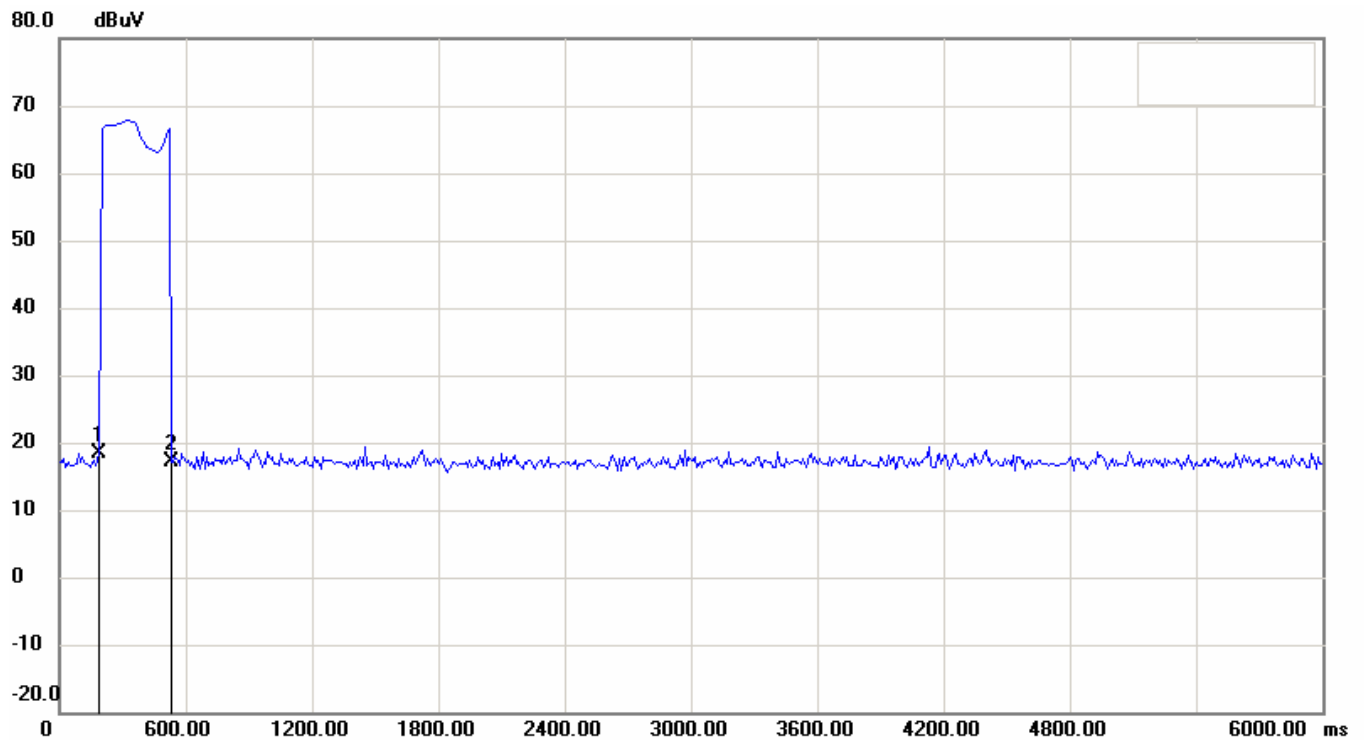
Data: #105

Date: 2011/9/13

Temperature: 28 °C

Time: PM 03:24:10

Humidity: 55 %



Condition:

EUT: EUTY

Model:

Test Mode:

Note: 300k-300k-200ms

RF Conducted

Sweep Time: 6000ms Att.: 0dB

RBW: 100 KHz VBW: 300 KHz

No.	Sweep time(ms)	Level(dBm)
1	190.0000	18.50
2	530.0000	17.17

No.		Δ Time(ms)	Δ Level(dB)
1	mk2-mk1	340	-1.33