



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

Applicant : Fuzhou Emax Electronic Co., Ltd.

Address : Building #12-#16, CangShan Industrial Area, JuYuanZhou
JinShan District, FuZhou, China

Product Name : Mini Key Finder

Model Name : EM2516

Brand Name : N/A

FCC ID : WEC-1220

Report No. : MTE/EAH/D12111694

Date of Issue : Nov. 27, 2012

Issued by : Most Technology Service Co., Ltd.

Address : No.5, Langshan 2nd Road, North District, Hi-tech Industrial
Park, Nanshan, Shenzhen, Guangdong, China

Tel : 86-755-8617 0306

Fax : 86-755-8617 0310

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1. VERIFICATION OF CONFORMITY

Equipment Under Test: Mini Key Finder

Brand Name: N/A

Model Number: EM2516

FCC ID: WEC-1220

Applicant: Fuzhou Emax Electronic Co., Ltd.
Building #12-#16, CangShan Industrial Area, JuYuanZhou JinShan District,
FuZhou, China

Manufacturer: Fuzhou Emax Electronic Co., Ltd.
Building #12-#16, CangShan Industrial Area, JuYuanZhou JinShan District,
FuZhou, China

Technical Standards: 47 CFR Part 15 Subpart C

File Number: MTE/EAH/D12111694

Date of test: Nov. 13, 2012

Deviation: None

Condition of Test Sample: Normal

Test Result: PASS

The above equipment was tested by Most Technology Service Co., Ltd. for compliance with the requirements set forth in FCC rules and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Prepare by (+ signature):


Dona Liu

Nov. 24, 2012

Review by (+ signature):


Elva Wong

Nov. 26, 2012

Approved by (+ signature):


Yvette Zhou

Nov. 26, 2012



2. GENERAL INFORMATION

2.1 Product Information

Product	Mini Key Finder
Brand Name	N/A
Model Number	EM2516
Series Model Name:	N/A
Difference description:	N/A
Power Supply	TX:DC 3V by battery
Frequency Range	433.92 MHz
Channel Number:	1
Modulation Technique	ASK
Temperature Range	-10°C- 50°C

NOTE:

1. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 Objective

The objective of the report is to perform tests according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (10-1-05 Edition)	Radio Frequency Devices

2.3 Test Standards and Results

Test items and the results are as bellow:

No.	Section	Description	Result	Date of Test
1	15.231	Radiated Emission	PASS	2012-11-13
2	15.231	20dB Bandwidth	PASS	2012-11-13
3	15.231	Transmission Cease Time	PASS	2012-11-13
4	15.203	Antenna Requirement	PASS	2012-11-13

Note: 1. The test result judgment is decided by the limit of measurement standard
2. The information of measurement uncertainty is available upon the customer's request.

2.4 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

3. TEST METHODOLOGY

3.1 TEST FACILITY

Test Site:	Most Technology Service Co., Ltd.
Location:	No.5, Langshan 2nd Rd., North Hi-Tech Industrial park , Nanshan, Shenzhen, Guangdong ,China
Description:	<p>There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009 and CISPR 16 requirements.</p> <p>The FCC Registration Number is 490827.</p>
Site Filing:	The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
Instrument Tolerance:	All measuring equipment is in accord with ANSI C63.4:2009 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.
Ground Plane:	Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna.

3.2 GENERAL TEST PROCEDURES

EUT Function and Test Mode

The EUT has been tested under normal operating (TX) and standby (RX) condition.

The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The following data show only with the worst case setup.

The worst case of Y axis was reported.

Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report.

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4:2009, Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4:2009.

4 SETUP OF EQUIPMENT UNDER TEST

4.1 SETUP CONFIGURATION OF EUT

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

4.2 SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Audio Cable	Power Cord
N/A						

Remark:

All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.3 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at Most for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

No.	Equipment	Manufacturer	Model No.	S/N	Calibration due date
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2013/03/14
2	Spectrum Analyzer	Agilent	E7405A	US44210471	2013/03/14
3	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2013/03/14
4	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2013/03/14
5	Terminator	Hubersuhner	50_	No.1	2013/03/14
6	RF Cable	SchwarzBeck	N/A	No.1	2013/03/14
7	Test Receiver	Rohde & Schwarz	ESPI	101202	2013/03/14
8	Bilog Antenna	Sunol	JB3	A121206	2013/03/14
9	Horn Antenna	SCHWARZBECK	BBHA 9120D	MT-E172	2013/03/14
10	Horn Antenna	EM	EM-AH-10180	N/A	2013/03/14
10	Cable	Resenberger	N/A	NO.1	2013/03/14
11	Cable	SchwarzBeck	N/A	NO.2	2013/03/14
12	Cable	SchwarzBeck	N/A	NO.3	2013/03/14
13	DC Power Filter	DuoJi	DL2×30B	N/A	2013/03/14
14	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2013/03/14
15	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2013/03/14
16	Test Receiver	Rohde & Schwarz	ESCI	100492	2013/03/14
17	Absorbing Clamp	Luthi	MDS21	3635	2013/03/14
18	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2013/03/14
19	AC Power Source	Kikusui	AC40MA	LM003232	2013/03/14
20	Test Analyzer	Kikusui	KHA1000	LM003720	2013/03/14
21	Line Impedance Network	Kikusui	LIN40MA-PCR-L	LM002352	2013/03/14
22	ESD Tester	Kikusui	KES4021	LM003537	2013/03/14
23	EMC PRO System	EM Test	UCS-500-M4	V0648102026	2013/03/14
24	Signal Generator	IFR	2032	203002/100	2013/03/14
25	Amplifier	A&R	150W1000	301584	2013/03/14
26	CDN	FCC	FCC-801-M2-25	47	2013/03/14
27	CDN	FCC	FCC-801-M3-25	107	2013/03/14
28	EM Injection Clamp	FCC	F-203I-23mm	403	2013/03/14
29	RF Cable	MIYAZAKI	N/A	No.1/No.2	2013/03/14
30	Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	0304789	2013/03/14
31	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2013/03/14
32	8 Loop Antenna	ARA	PLA-1030/B	1029	2013/03/19

NOTE: Equipments listed above have been calibrated and are in the period of validation.

5. 47 CFR Part 15 C Requirements

5.1 Radiated Emission

5.1.1 Definition

The field strength of any emission within this band shall not exceed 10000 micro volts /meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

1. The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average limits shown in this table or to the general limits shown in 15.209, whichever limit permits a higher field strength.

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Remark: 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.

2. 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:

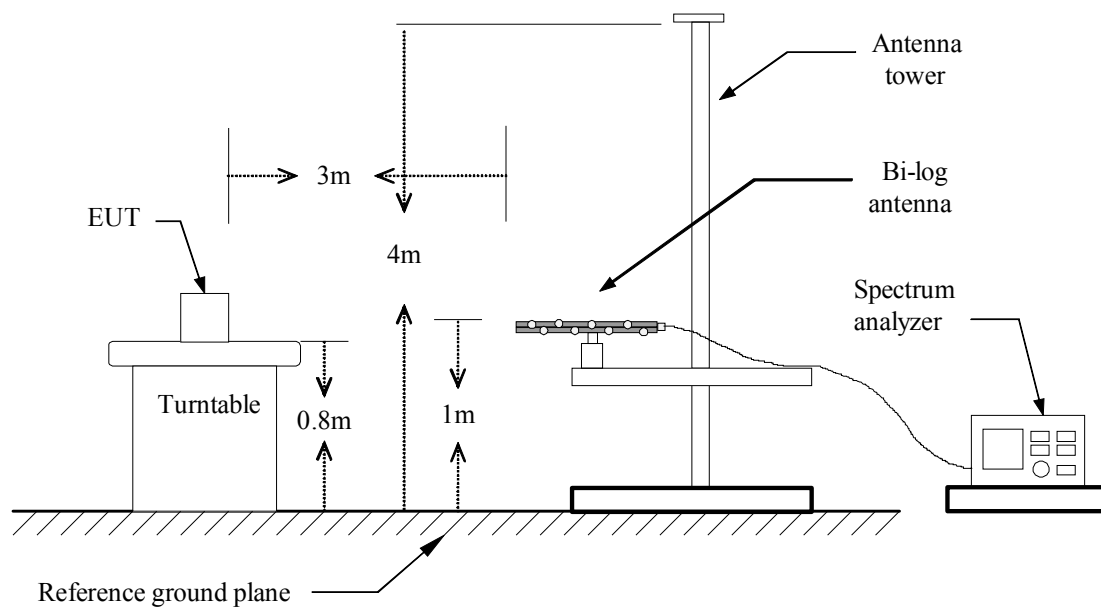
Fundamental Frequency (MHz)	Field Strength of fundamental(microvolts/m)	Field strength of spurious emissions(microvolts/m)
40.66-40.70	2250	225
70-130	1250	125
130-174	1250 to 3750	125 to 375
174-260	3750	375
260-470	3750 to 12500	375 to 1250
Above 470	12500	1250

The above field strength limits are specified at a distance of 3 meters, the tighter limit applies at the band edges.

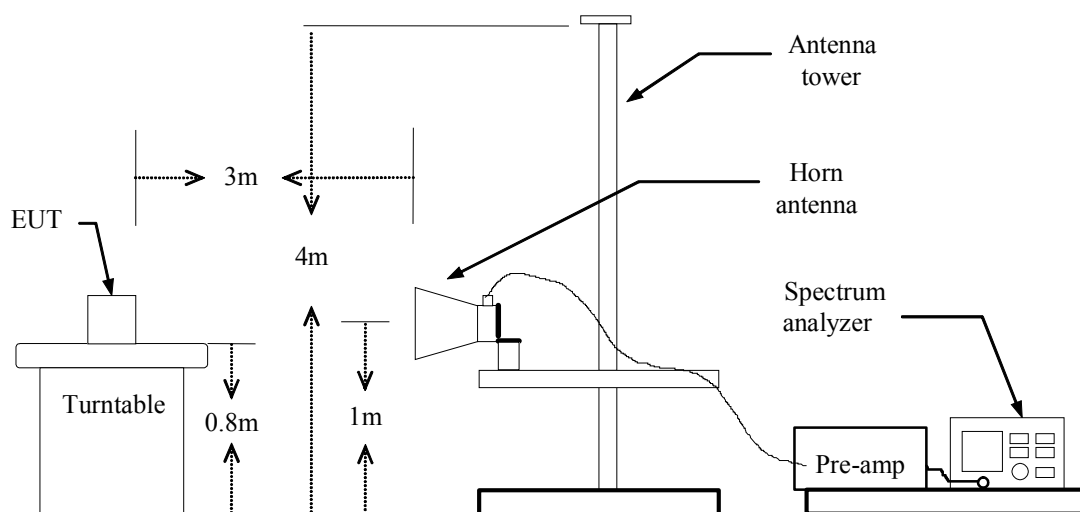
5.1.2 Test Configuration

Test Setup:

Below 1GHz:



Above 1GHz:



5.1.3 Test Description

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:
Below 1GHz: RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz : (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

5.1.4 Test Result

Operation Mode: TX mode

Test Date: 2012-11-13

Temperature: 24°C

Tested by: Habby Guo

Humidity: 68 % RH

Polarity: Ver. / Hor.

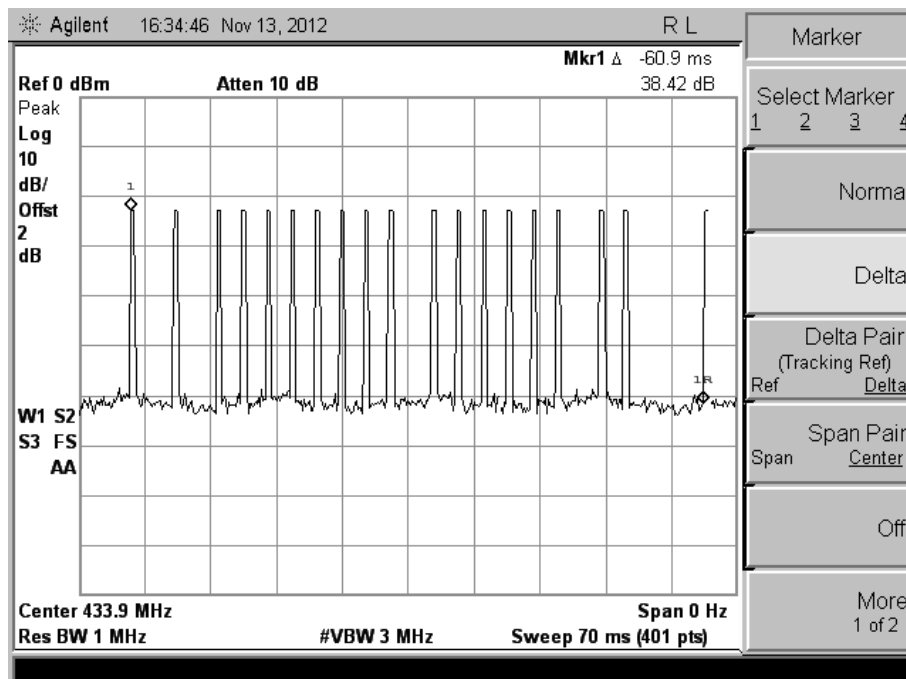
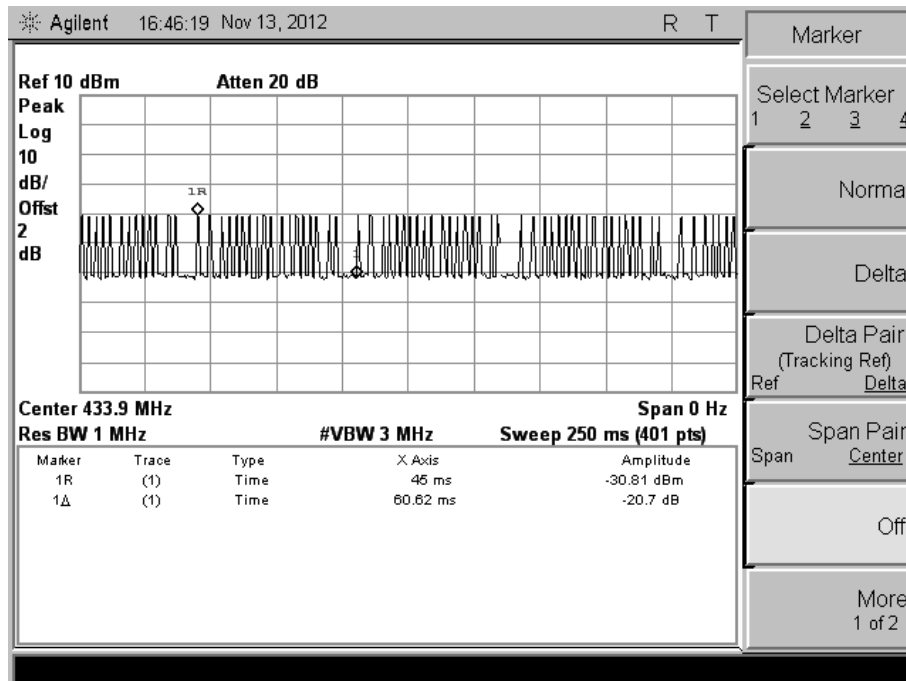
Form 9 KHz to 30MHz:

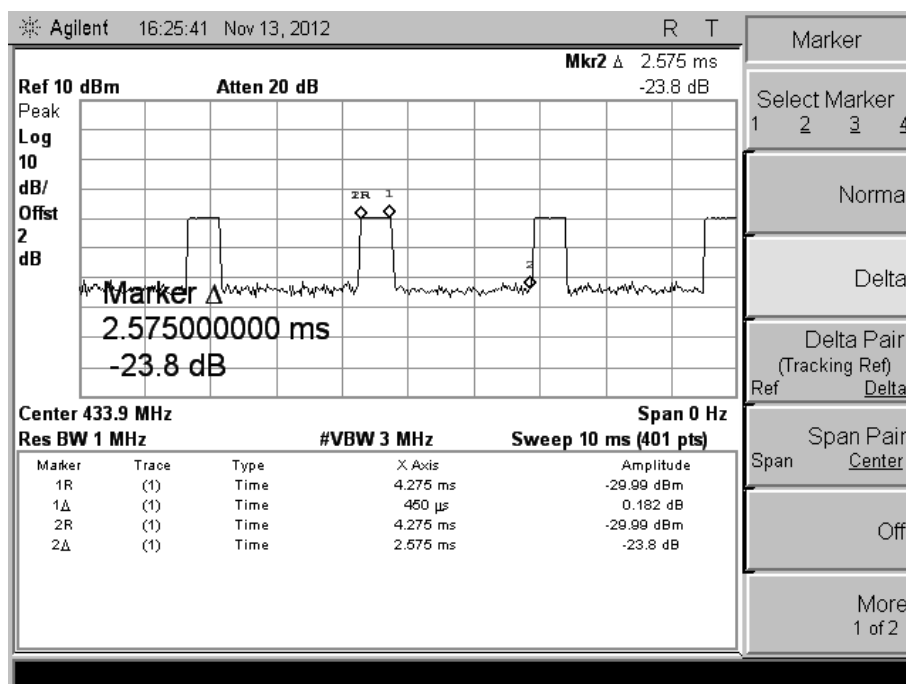
Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	AV Margin (dB)
					Peak (dBuV/m)	AV (dBuV/m)			
N/A	H								>20
N/A	V								>20

Notes:

Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

From 30MHz to 1000MHz:





Duty Cycle Correction Factor = $20 \cdot \log \left[\frac{(18 \times 0.45 \text{ ms})}{60.62 \text{ ms}} \right] = -17.48 \text{ dB}$

Freq. (MHz)	Ant. Pol. H/V	Reading (dBuV/m)		Factor (dB)	AV Factor (dB)	Actual FS (dBuV/m)		Limit 3m (dBuV/m)		Safe Margin (dB)
		Peak	Avg.			Peak	Avg.	Peak	Average	
433.92	H	49.26	--	20.34	-17.48	69.60	--	100.80	80.80	-10.40(Peak)
580.96	H	6.67	--	22.91	--	29.58	--	80.80	60.80	-31.22(Peak)
--								--		>20
433.92	V	39.55		20.34	--	59.89	--	100.80	80.80	-20.91(Peak)
532.46	V	4.07		22.17	--	26.24	--	80.80	60.80	-34.56(Peak)
--								--		>20

Note: Actual FS [AV] = actual FS [Peak] + Duty Cycle Correction Factor

Above 1 GHz

Freq. (MHz)	Ant. Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
1307.16	V	Peak	8.79	27.38	36.17	54.00	-17.83
--	--	--	--	--	--	--	>10
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
1307.15	H	Peak	9.48	27.38	36.86	54.00	-17.14
--	--	--	--	--	--	--	>10
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--

Notes:

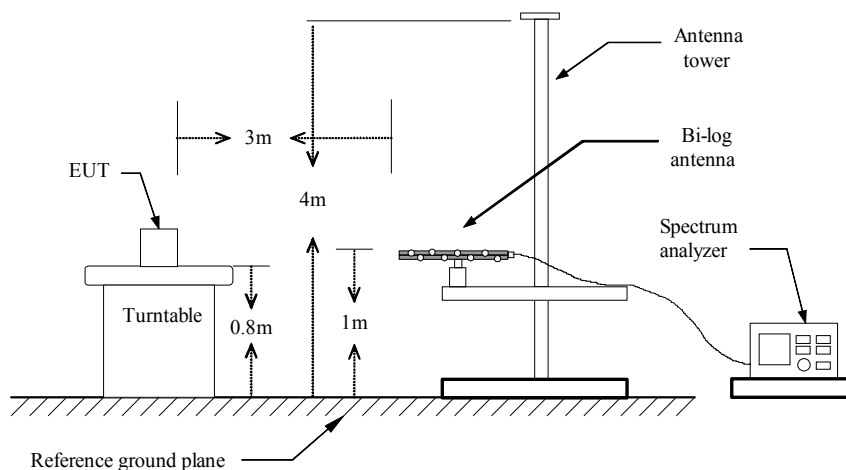
Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

5.2 20dB Bandwidth

5.2.1 Requirement

According to FCC section 15.231(c), 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 20 dB down from the modulated carrier.

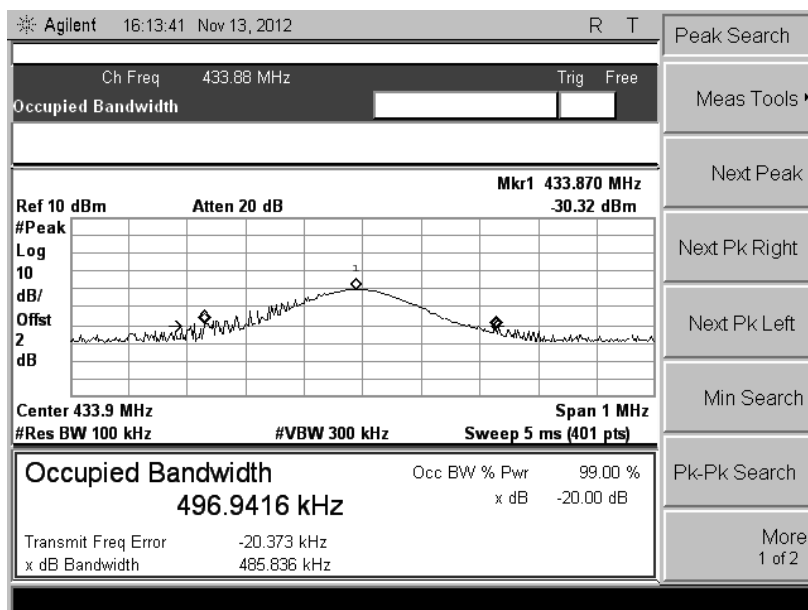
5.2.2 Test Description



5.2.3 Test Result

Frequency	Bandwidth	Limit	Result
433.92MHz	485.836kHz	1.0848MHz	PASS

Test Plot:



5.3 Transmission Cease Time

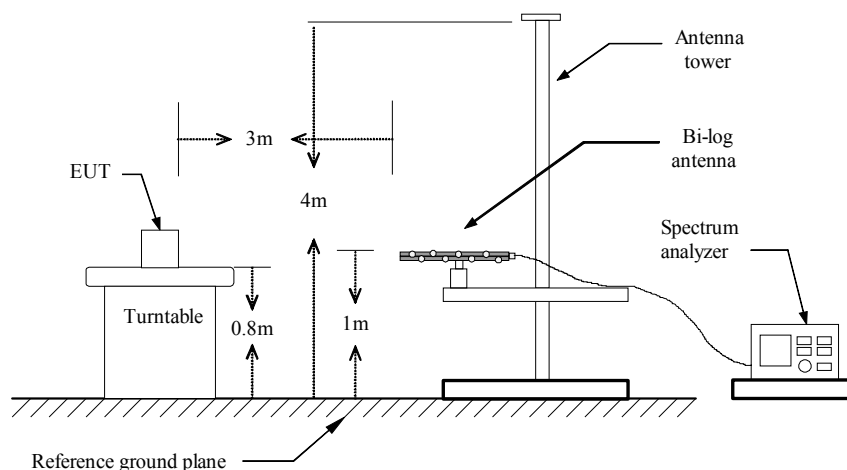
5.3.1 Requirement

According to FCC Part 15 Section 15.231(e), in addition, 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.

According to FCC section 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.
- (2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

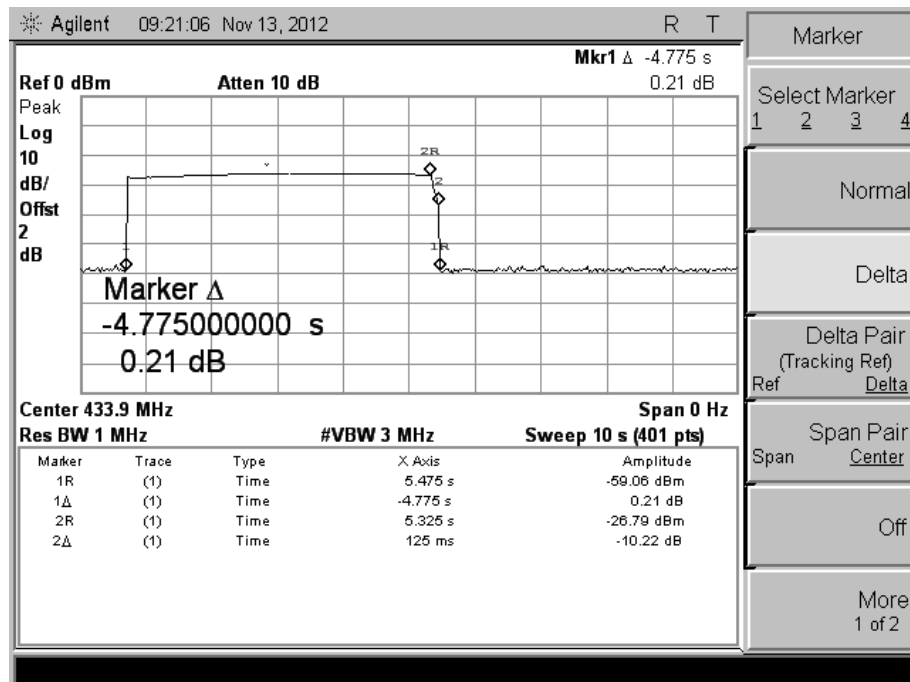
5.3.2 Test Description



5.3.3 Test Result

This time complies with the FCC requirement., the Stop Transmitting Time is 0.3 second., the limit of the the Stop Transmitting Time is 5 second, thus the time complies with the Stop Transmitting Time of limit.

Test Plot:



5.4 Antenna Requirement

5.4.1 Definition

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device, An analysis of the EUT was performed to determine compliance with FCC Section 15.203. This section requires specific handling and control of antennas used for devices subject to regulations.

5.4.2 Evaluation Criteria

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

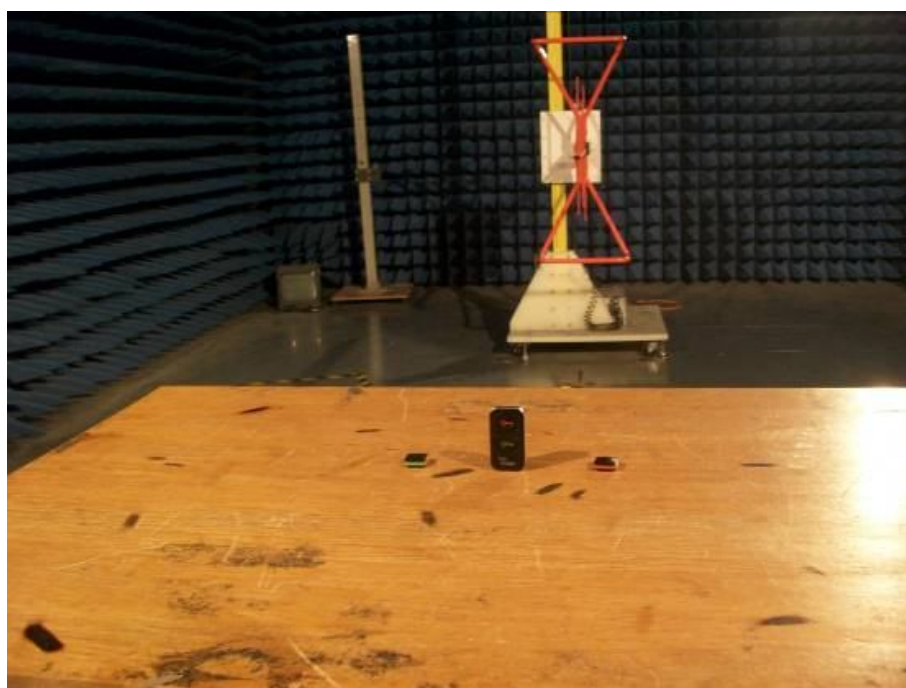
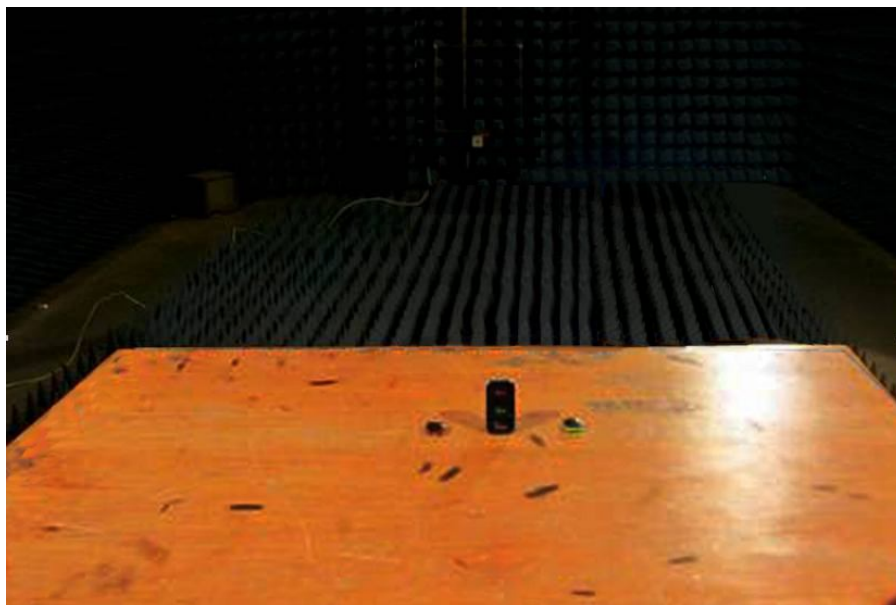
- (a) Antenna must be permanently attached to the unit.
- (b) Antenna must use a unique type of connector to attach to the EUT.
- (c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

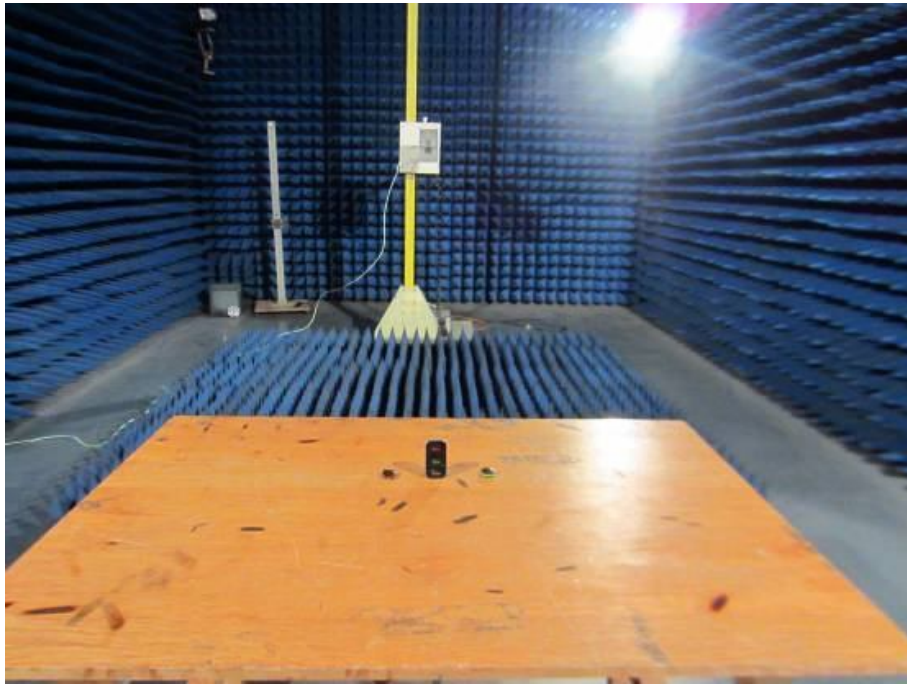
5.4.3 Evaluation Results

The Antenna is an Internal antenna, it is inaccessible to the user.
the EUT is therefor compliant with the regulation.

APPENDIX 1
PHOTOGRAPHS OF TEST SETUP

Radiated Emission Test Setup





-----END OF REPORT-----