



TEST REPORT

FCC ID: 2ADKU-02069

Applicant : National Entertainment Collectibles Association (NECA)
Address : 603 Sweetland Avenue Hillside, NJ 07205 USA

Equipment under Test (EUT):

Name : FM Transmitter with car charger-Hastings
Model : 02069

Standards : FCC PART 15, SUBPART C : 2014 (Section 15.239)

Report No. : A1850161 01

Date of Test: March 18- March 25, 2015

Date of Issue: March 25, 2015

Test Result :	PASS *
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*In the configuration tested, the EUT complied with the standards specified above

Authorized Signature

A handwritten signature in black ink, appearing to read "Mark Zhu".

(Mark Zhu)
General Manager

The manufacturer should ensure that all the products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of Shenzhen Alpha Product Testing Co., Ltd. Or test done by Shenzhen Alpha Product Testing Co., Ltd. Approvals in connection with, distribution or use of the product described in this report must be approved by Shenzhen Alpha Product Testing Co., Ltd. Approvals in writing.

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1 General Information

1.1 Description of Device (EUT)

EUT : FM Transmitter with car charger-Hastings

Trade Name : N/A

Model No. : 02069

Type of Antenna : Integrated Antenna, Max. Gain: 0dBi

Operation Frequency : 88.1-107.9MHz

Channel number : 199

Modulation type : FM

Power Supply : DC 5.0V From car charger for charge or DC 3.7V from battery

Applicant : National Entertainment Collectibles Association (NECA)

Address : 11-11 44 th Drive, Long Island, New York, United States

Manufacturer : C-STAR INDUSTRIAL LIMITED

Address : 4F, C11 block, Fuyuan Industrial Area, Jiuwei, Xixiang, Bao'an, Shenzhen, China

1.2 Description of Test Facility

Shenzhen Alpha Product Testing Co., Ltd.

Building B, East Area of Nanchang Second, Industrial Zone,
Gushu 2nd Road, Bao'an, Shenzhen, China

August 11, 2014 File on Federal Communication Commission
Registration Number: 203110

2 EMC Equipment List

Equipment	Manufacture	Model No.	Serial No.	Cal. Due day	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2016.01.19	1Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2016.01.19	1Year
Receiver	R&S	ESCI	1166.5950K03-1011	2016.01.19	1Year
Receiver	R&S	ESCI	101202	2016.01.19	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2017.01.21	2Year
Horn Antenna	EMCO	3115	640201028-06	2017.01.21	2Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2016.01.21	1Year
Cable	Resenberger	SUCOFLEX 104	MY6562/4	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	309972/4	2016.01.19	1Year
Cable	Resenberger	SUCOFLEX 104	329112/4	2016.01.19	1Year
Pre-amplifier	Schwarzbeck	BBV9743	9743-019	2016.01.19	1Year
Pre-amplifier	R&S	AFS33-18002 650-30-8P-44	SEL0080	2016.01.19	1Year

3 Test Procedure

POWER LINE CONDUCTED INTERFERENCE: The test procedure used was ANSI Standard C63.4-2009 using a 50 u H LISN. Both Lines were observed. The bandwidth of the receiver was 10kHz with an appropriate sweep speed. The ambient temperature of the EUT was 25°C with a humidity of 58%.

RADIATION INTERFERENCE: The test procedure used was ANSI Standard C63.4-2009 using a ANRITSU spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a micro volt at the output of the antenna. The resolution bandwidth was 100kHz and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3MHz above 1 GHz. The ambient temperature of the EUT was 25°C with a humidity of 58%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer and cable loss. The antenna correction factors and cable loss are stated in terms of dB. The gain of the Pre-selector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

$$\text{Freq (MHz) METER READING} + \text{ACF} + \text{CABLE} = \text{FS}$$
$$33.20 \text{ dBuV} + 10.36 \text{ dB} + 0.9 \text{ dB} = 44.46 \text{ dBuV/m @ 3m}$$

ANSI STANDARD C63.4-2009 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. The situation was similar for the conducted measurement except that the table did not rotate. The EUT was setup as described in ANSI Standard C63.4-2009 10.1.7 with the EUT 40 cm from the vertical ground wall.

4 Summary of Measurement

4.1 Summary of test result

Test Item	Test Requirement	Stanadard Paragraph	Result
Spurious Emission	FCC PART 15: 2014	Section 15.239(c)&15.209	Compliance
Conduction Emission	FCC PART 15: 2014	Section 15.207	N/A
20dB Occupied Bandwidth	FCC PART 15: 2014	Section 15.239(a)	Compliance
Radiated Emission of the Fundamental Signal	FCC PART 15: 2014	Section 15.239(b)	Compliance
Antenna Requirement	FCC PART 15: 2014	Section 15.203	Compliance

4.2 Test mode and Channel list

Tested mode, channel information		
Mode	Channel	Frequency (MHz)
FM	CH1	88.1
	CH101	98.1
	CH199	107.9

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channe 1	Frequency (MHz)
01	88.1	47	92.7	98	97.8	148	102.8
02	88.2	48	92.8	149	102.9
03	88.3	...	93.0	101	98.1	150	130.0
...	93.1	102	98.2
45	92.5	95	97.5	103	98.3	198	107.8
46	92.6	96	97.6	199	107.9

Remark: 88.1MHz, 98.1MHz & 107.9MHz were selected for test.

4.3 Block Diagram

For Radiated Emission:



4.4 Assistant equipment used for test

Description	:	IPod
Manufacturer	:	Apple
Model No.	:	A1136

Remark: FCC DOC approved

4.5 Test Conditions

Temperature range	21-25°C
Humidity range	40-75%
Pressure range	86-106kPa

4.6 Measurement Uncertainty (95% confidence levels, k=2)

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.50dB	
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB	Polarize: V
	2.57dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.04dB	Polarize: V
	3.02dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.84dB	Polarize: H
	3.56dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	3%	
Uncertainty for DC and low frequency voltages	0.06%	

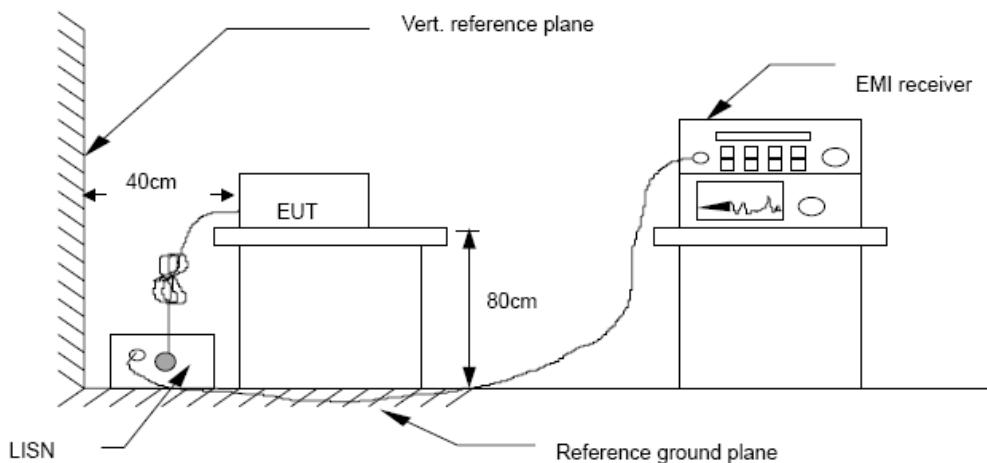
5 POWER LINE CONDUCTED EMISSION

5.1 Conducted Emission Limits(15.209&249)

Frequency MHz	Limits dB(μ V)	
	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

- Notes:
1. *Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.
 3. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.2 Test Setup



5.3 Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.4-2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

5.4 Test Results

N/A.

Not apply for products powered by Car DC systems.

6 Radiation Emission

6.1 Radiation Emission Limits(15.209&239 (a))

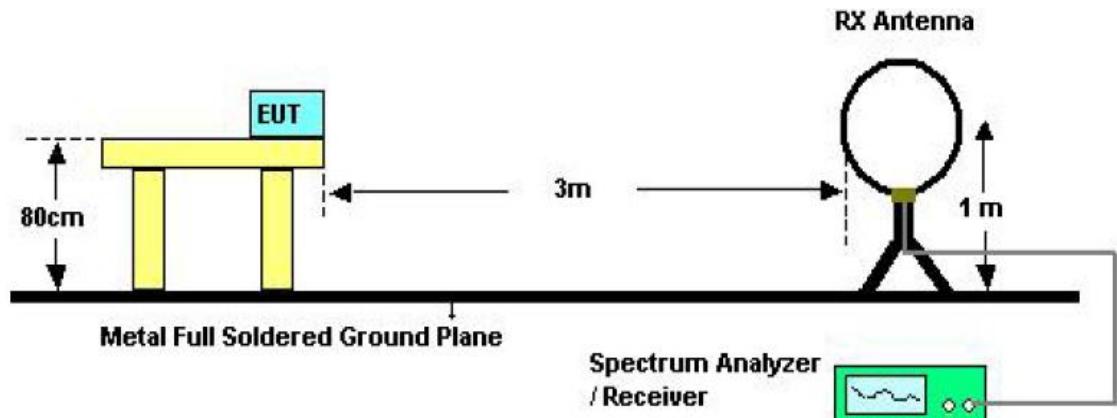
Frequency (MHz)	Field Strength Limits at 3 metres (watts,e.i.r.p.)		
	uV/m	dB uV/m	Measurement distance(m)
0.009-0.490	2400/F(kHz)	XX	300
0.490-1.705	24000/F(kHz)	XX	30
1.705-30	30	29.5	30
30~88	100(3nW)	40	3
88~216	150(6.8nW)	43.5	3
216~960	200(12nW)	46	3
Above960	500(75nW)	54	3
Carrier frequency		93.97(AV)	3
Carrier frequency		113.97(PK)	3

NOTE:

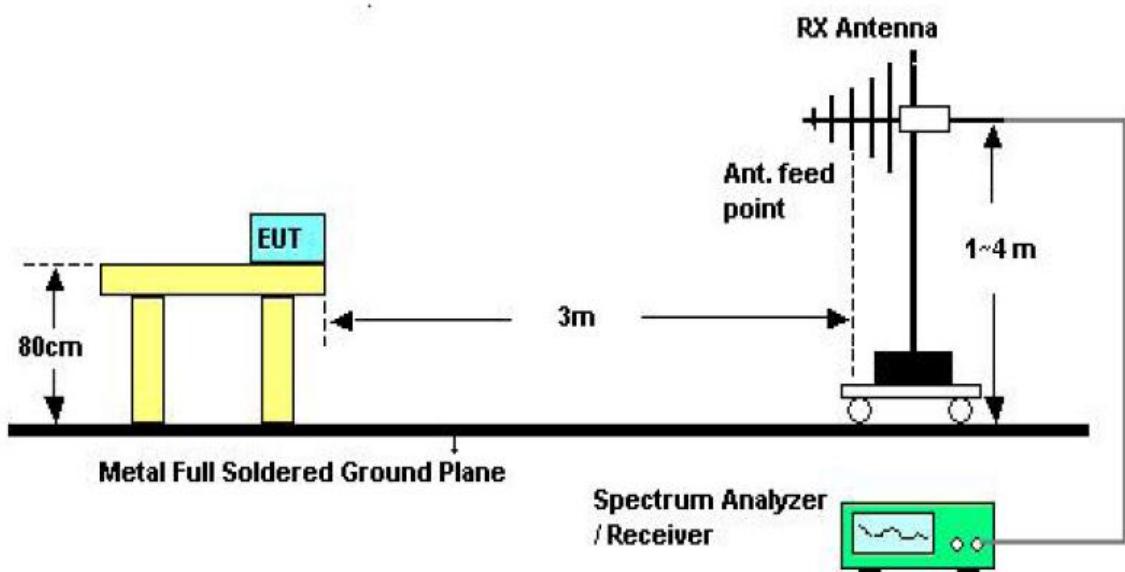
- a) The tighter limit applies at the band edges.
- b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

6.2 Test Setup

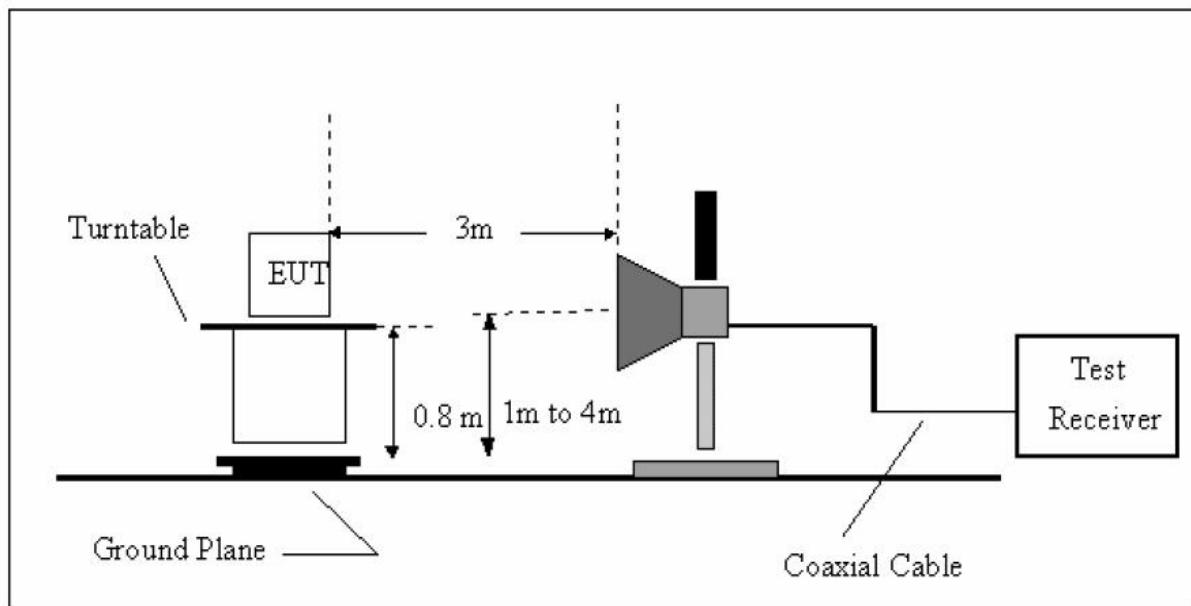
See the next page



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

6.3 Test Procedure

- The measuring distance of 3m shall be used for measurements at frequency up to 1GHz and above 1GHz. The EUT was placed on a rotating 0.8 m high above ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- The Test antenna shall vary between 1m and 4m. Both Horizontal and Vertical antenna are set to make measurement.
- The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked and then Qusia Peak Detector mode remeasured.
- If Peak value comply with QP limit Below 1GHz. The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.
- Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions.
- For the actual test configuration, please see the test setup photo.

6.4 Test Equipment Setting For emission test.

9KHz~150KHz	RBW 200Hz	VBW1KHz
150KHz~30MHz	RBW 9KHz	VBW 30KHz
30MHZ~1GHz	RBW 120KHz	VBW 300KHz
Above 1GHz	RBW 1MHz	VBW 3MHz

6.5 Test Condition

Continual Transmitting in maximum power.

6.6 Test Result

PASS.

We have scanned the 10th harmonic from 9KHz to the EUT.

Note: The Radiated emissions is showed the maximum power data of TX test mode and showed worst orthogonal axes with Y orthogonal axes.

Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: **PASS**

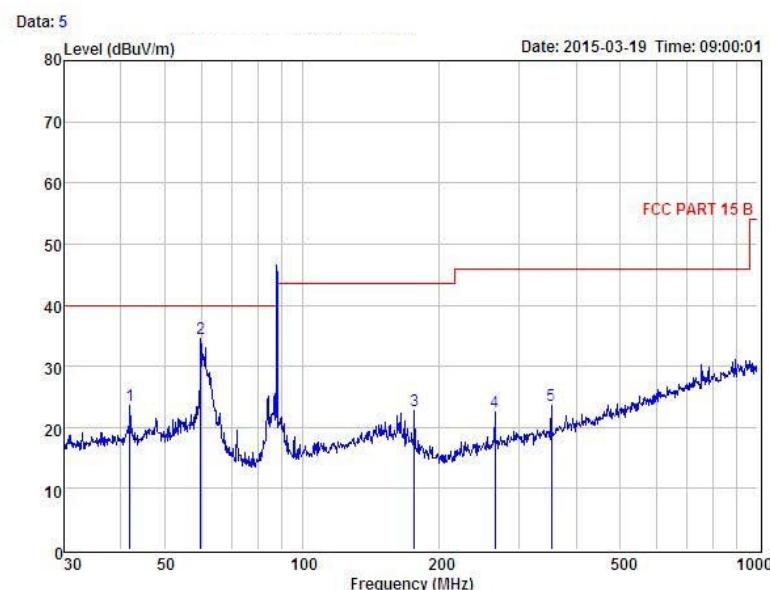
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value hasno need to be reported.

Below 1GHz test data

Note: This report only show the worst case mode TX 88.1MHz.



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Condition : FCC PART 15 B 3m POL: HORIZONTAL
 EUT : FM Transmitter with car charger-Hastings
 Model No : 02069
 Test Mode : TX 88.1MHz
 Power : DC 5V From Car Charger By 12V Battery
 Test Engineer : Store
 Remark :
 Temp : 25.2°C
 Hum : 56%

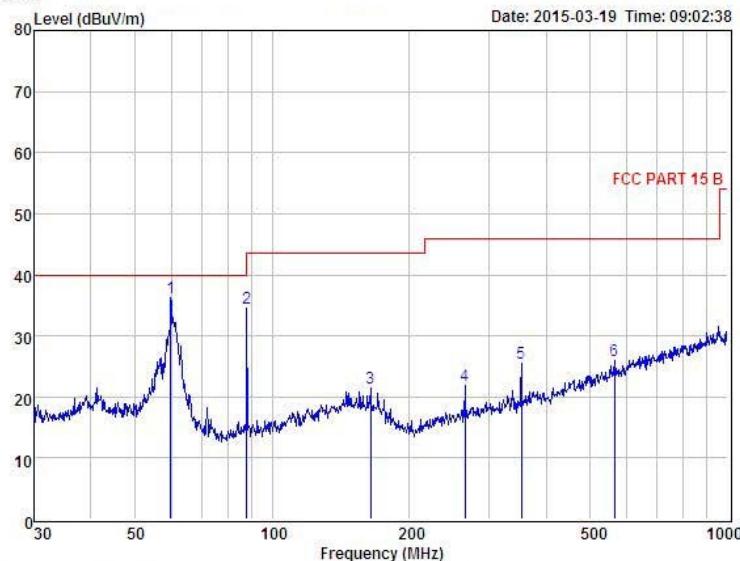
Item	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit	Margin	Remark
	MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	
1	41.86	41.32	13.93	31.87	0.19	23.57	40.00	-16.43	QP
2	59.86	53.29	12.75	31.75	0.24	34.53	40.00	-5.47	QP
3	176.27	40.84	12.28	31.05	0.59	22.66	43.50	-20.84	QP
4	264.75	40.60	11.96	30.68	0.57	22.45	46.00	-23.55	QP
5	352.94	39.44	13.87	30.47	0.65	23.49	46.00	-22.51	QP

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss



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Data: 6



Condition : FCC PART 15 B 3m POL: VERTICAL
 EUT : FM Transmitter with car charger-Hastings
 Model No : Q2069
 Test Mode : TX 88.1MHz
 Power : DC 5V From Car Charger By 12V Battery
 Test Engineer : Store
 Remark :
 Temp : 25.2°C
 Hum : 56%

Item	Freq MHz	Read Level dBuV	Antenna Factor dB	Preamp Factor dB	Cable Loss dB	Level dBuV	Limit dBuV	Margin dBuV	Remark
1	59.86	55.03	12.75	31.75	0.24	36.27	40.00	-3.73	QP
2	88.03	56.36	9.41	31.47	0.32	34.62	43.50	-8.88	QP
3	164.33	38.32	13.76	31.12	0.45	21.41	43.50	-22.09	QP
4	264.75	39.97	11.96	30.68	0.57	21.82	46.00	-24.18	QP
5	352.94	41.46	13.87	30.47	0.65	25.51	46.00	-20.49	QP
6	564.64	36.26	17.64	29.47	1.49	25.92	46.00	-20.08	QP

Remark: Level = Read Level + Antenna Factor - Preamp Factor + Cable Loss

Radiated Emission Test Data of Fundamental Signal

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Level
88.1	56.36	9.41	0.32	31.47	34.62	68	33.38	V	PEAK
88.1	68.28	9.41	0.32	31.47	46.54	68	21.46	H	PEAK
98.1	50.17	10.01	0.29	31.37	29.10	68	38.90	V	PEAK
98.1	60.92	10.01	0.29	31.37	39.85	68	28.15	H	PEAK
107.9	47.50	10.93	0.44	31.35	27.52	68	40.48	V	PEAK
107.9	58.72	10.93	0.44	31.35	38.74	68	29.26	H	PEAK
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.	Level
88.1	55.02	9.41	0.32	31.47	33.28	48	14.72	V	AVG
88.1	67.60	9.41	0.32	31.47	45.86	48	2.16	H	AVG
98.1	49.10	10.01	0.29	31.37	28.03	48	19.97	V	AVG
98.1	59.01	10.01	0.29	31.37	37.94	48	10.06	H	AVG
107.9	46.01	10.93	0.44	31.35	26.03	48	21.97	V	AVG
107.9	57.51	10.93	0.44	31.35	37.53	48	10.47	H	AVG

7 Occupied bandwidth

7.1 Test limit

Please refer section 15.249

7.2 Method of measurement

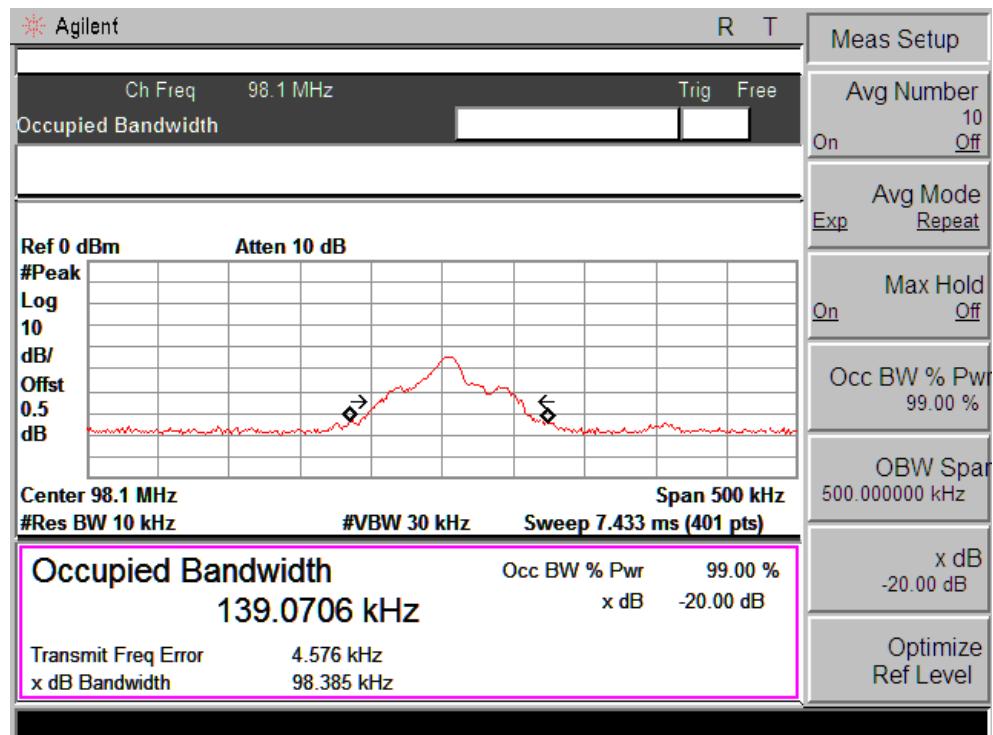
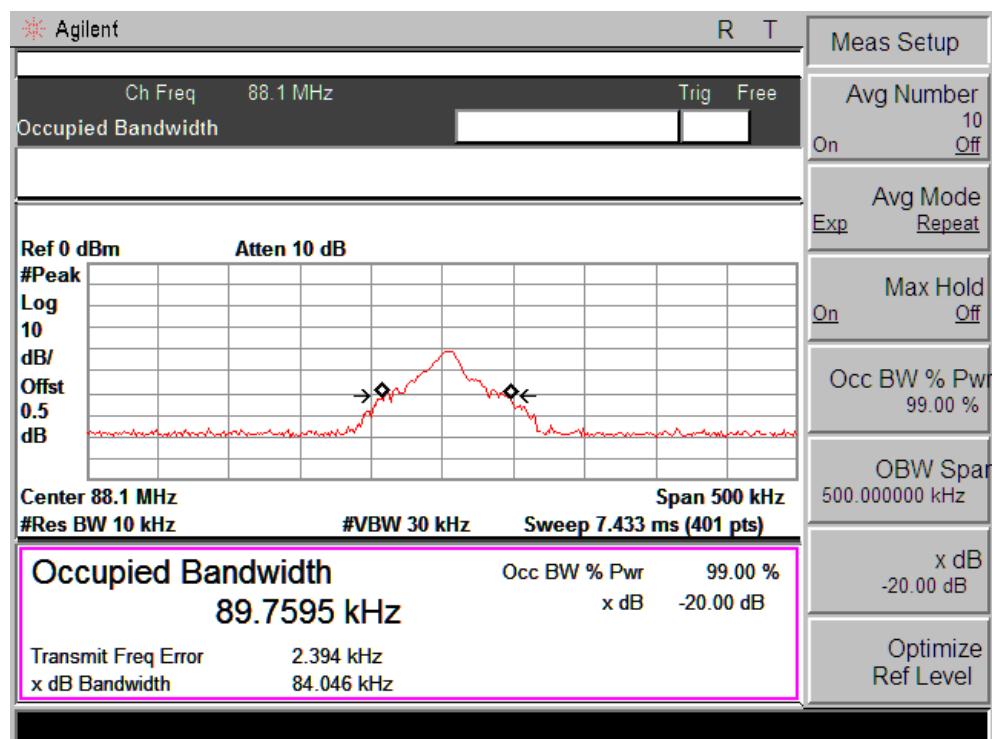
- a) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.
- b) The test receiver RBW set 10KHz, VBW set 30KHz, Sweep time set auto.

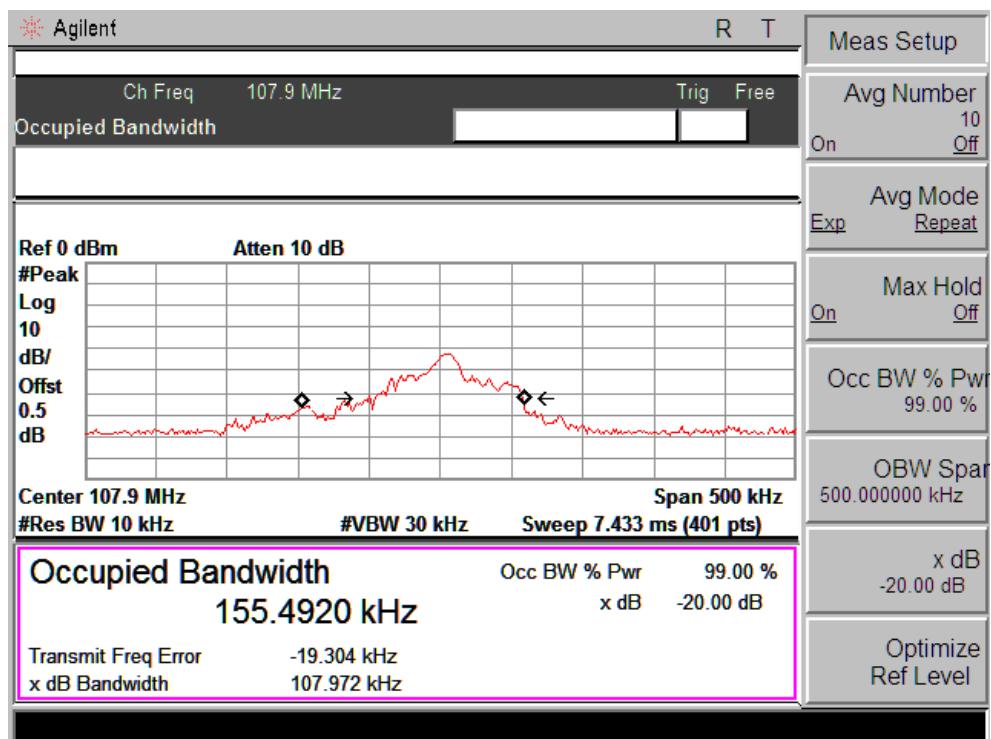
7.3 Test Setup



7.4 Test Results

Mode	Freq (MHz)	20dB Bandwidth (KHz)	Limit (kHz)	Conclusion
FM	88.1	84.046	/	PASS
	98.1	98.385	/	PASS
	107.9	107.97	/	PASS
Note: Detailed information please see the following page.				





8 Band Edge Check

8.1 Test limit

Please refer section 15.249 and section 15.205.

249(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 section 15.209, whichever is the lesser attenuation.

249(e) As shown in section 15.35(b), for frequencies above 1000MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. 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. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

8.2 Test Procedure

8.2.1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

8.2.2. Set spectrum analyzer please see the following test plot.

8.2.3. Set the spectrum analyzer as RBW, VBW=100 KHz,

8.2.4. Max hold, view and count how many channels in the band.

8.3 Test Setup

Please see the section 6.2.

8.4 Test Result

Pass.

Detailed information please see the following page.

9 Antenna Requirement

9.1 Standard Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2 Antenna Connected Construction

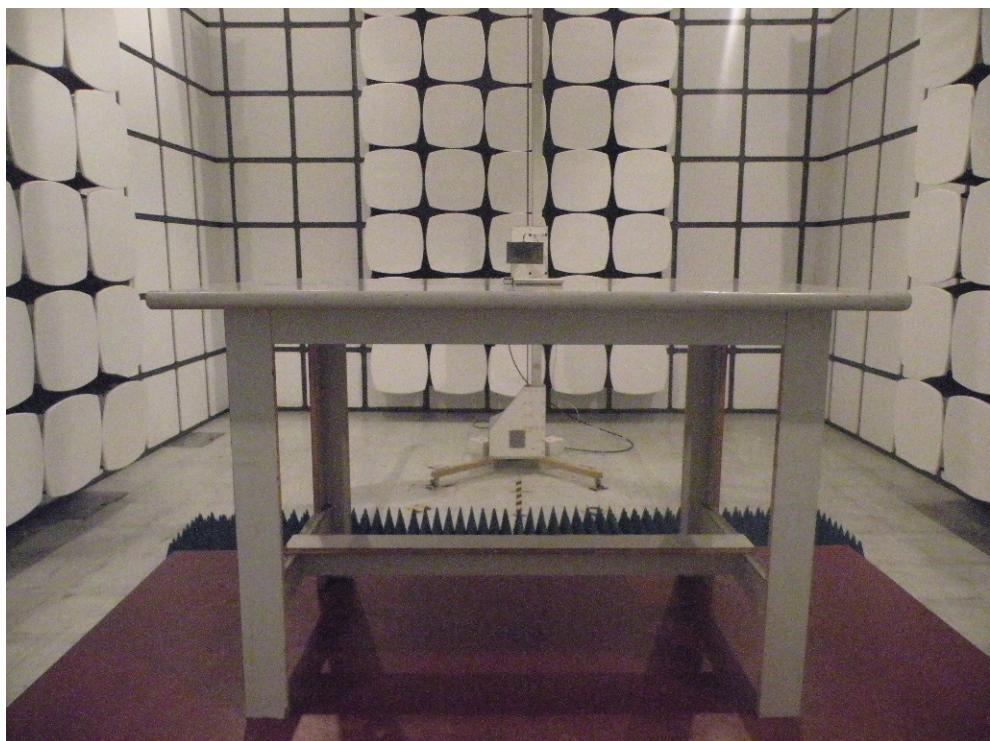
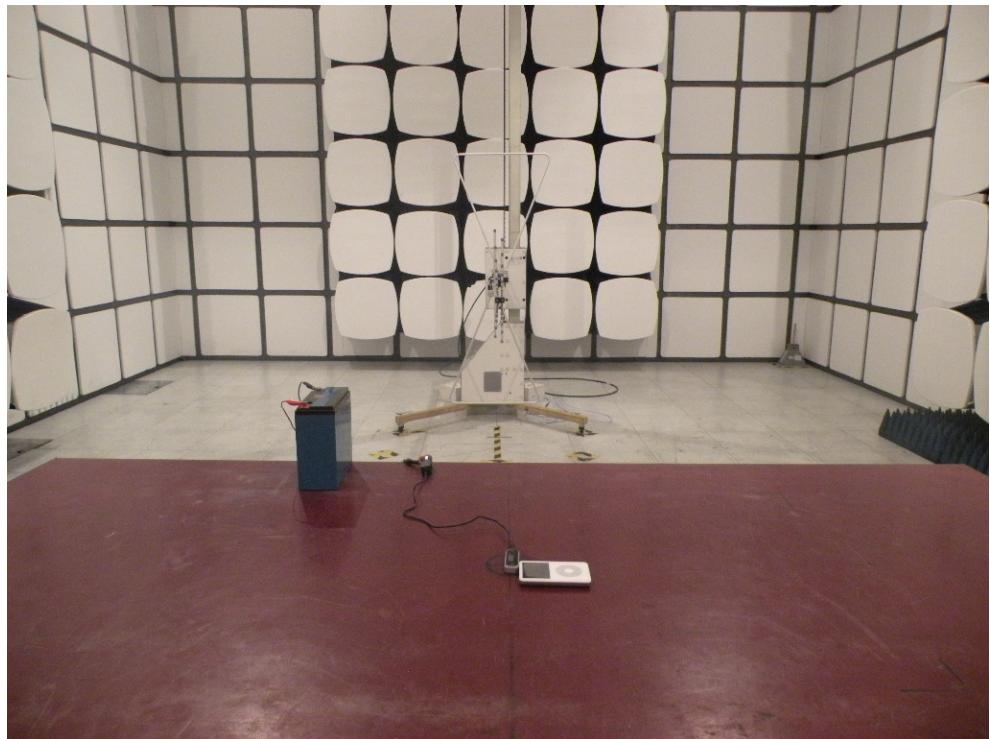
The directional gains of antenna used for transmitting is 0 dBi, and the antenna is integrated Antenna. Please see EUT photo for details.

9.3 Result

The EUT antenna is integrated Antenna. It complies with the standard requirement.

10 Photographs of Test Setup

Photographs-Radiated Emission Test Setup in Chamber



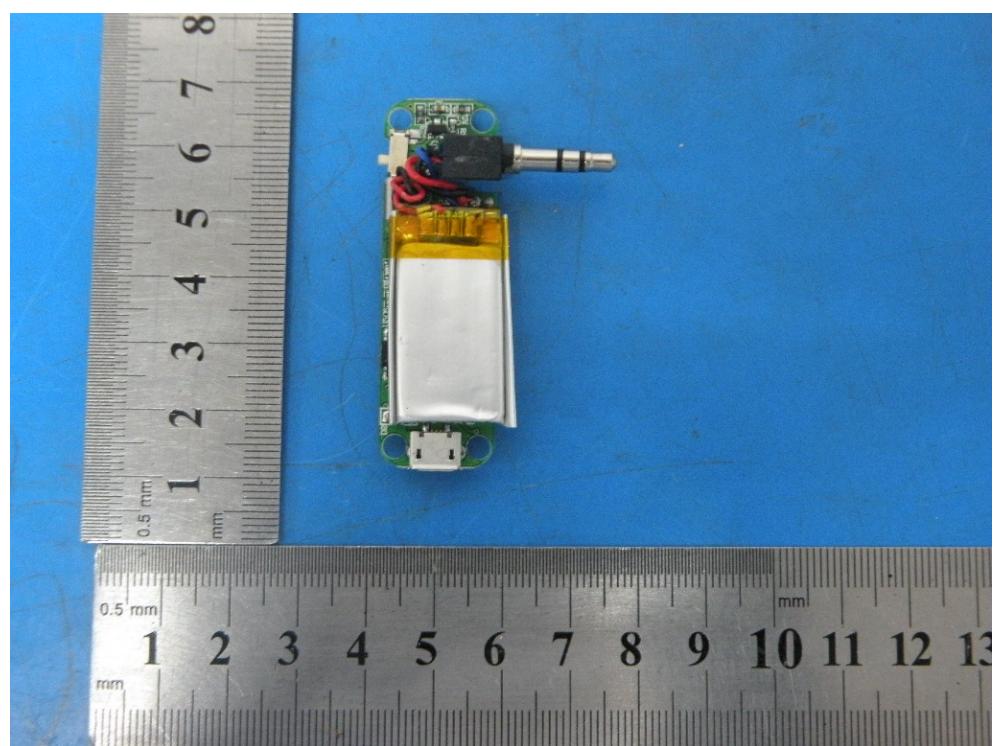
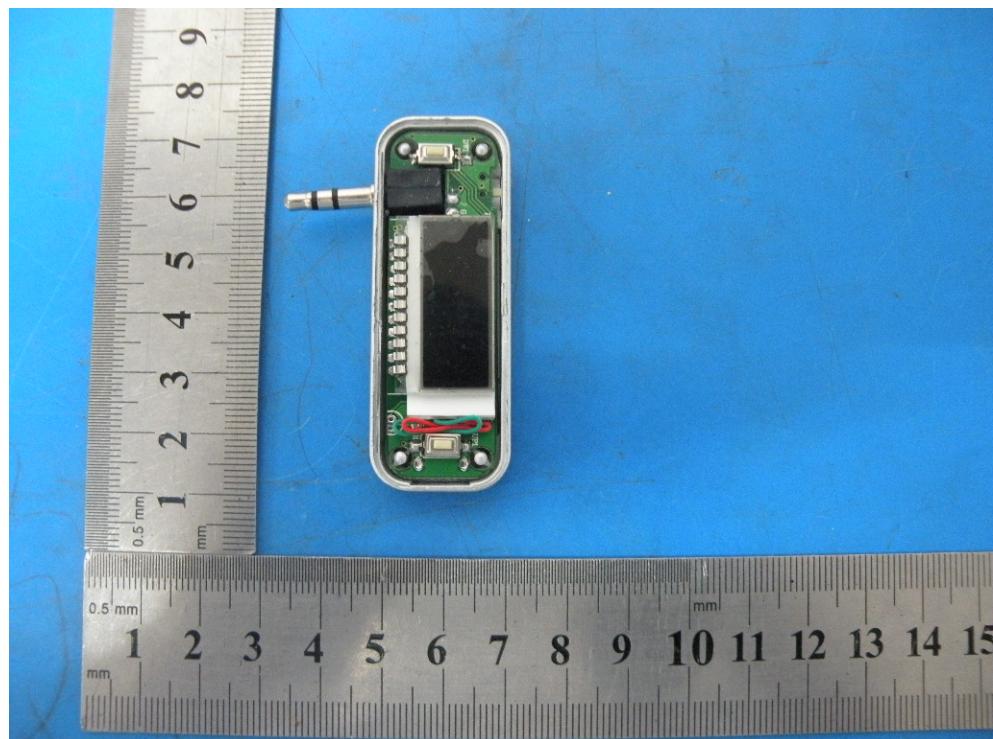
11 Photographs of EUT

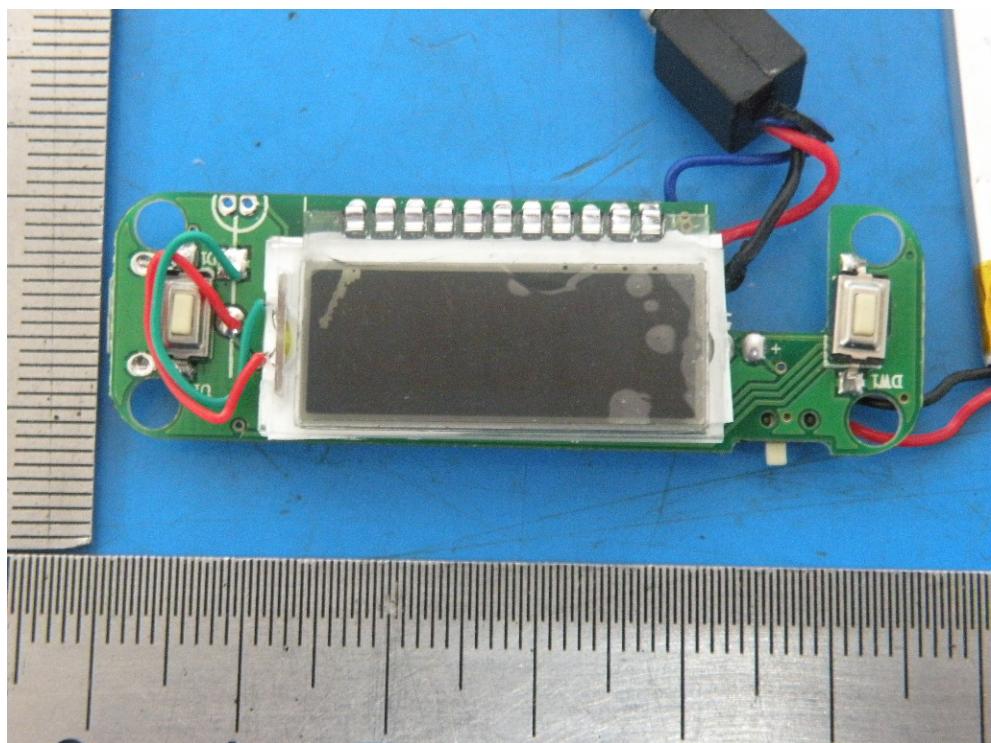
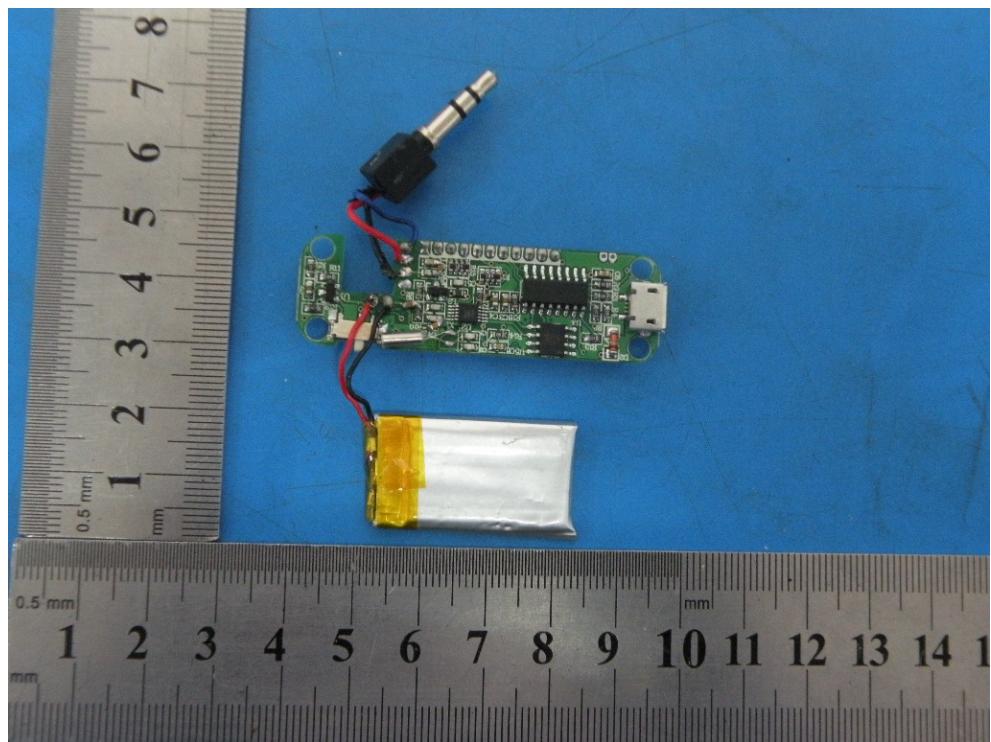


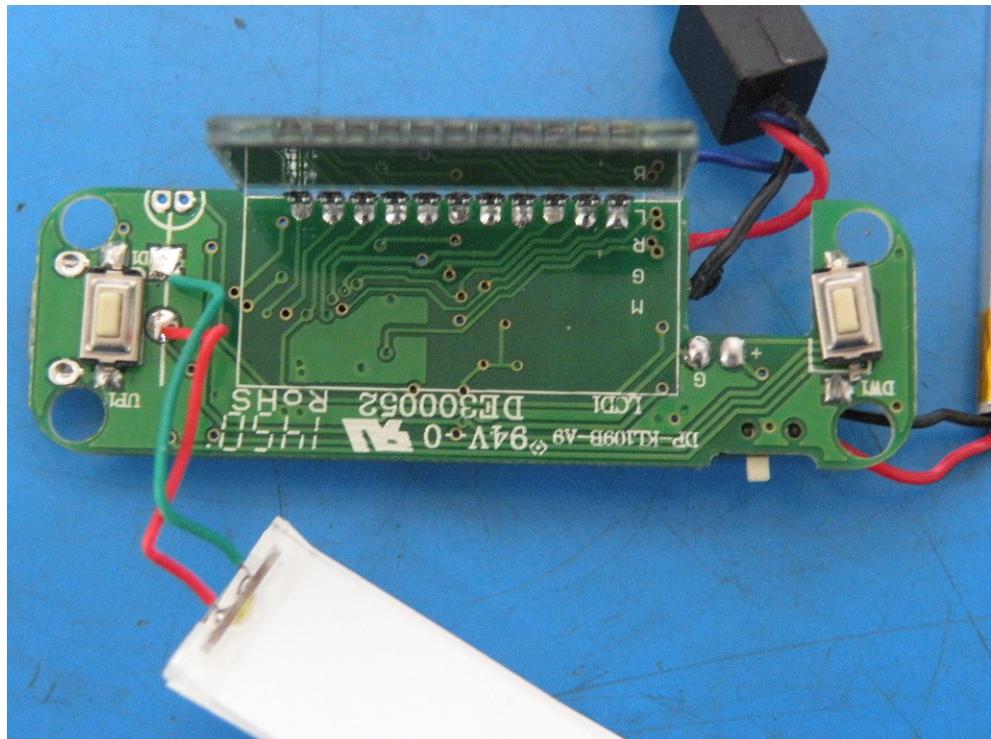












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