



ISO/IEC17025 Accredited Lab.

Report No: FCC/IC1401044
File reference No: 2014-04-10

Applicant: SHANGHAI BAOLONG AUTOMOTIVE CORPORATION

Product: Tyre Pressure Monitoring System

Model No: TPMS203

Trademark: Valor, Digitire

Test Standards: FCC Part 15 Subpart C, Paragraph 15.231 and RSS-210 Issue 8

Test result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4&FCC Part 15 Subpart C, Paragraph 15.231 and RSS-210 Issue 8 regulations for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung
Manager

Dated: April 10, 2014

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD

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Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 899988

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.:899988.

IC- Registration No.: IC5205A-02

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration No.: IC 5205A-02.

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Test Report Conclusion

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1.0 General Details

1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD
Address: 5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District,
Shenzhen,CHINA.
Telephone: (755) 83448688
Fax: (755) 83442996
Site on File with the Federal Communications Commission – United States
Registration Number: 899988
For 3m & 10 m OATS
Site Listed with Industry Canada of Ottawa, Canada
Registration Number: IC: 5205A-02
For 3m & 10 m OATS

1.2 Applicant Details

Applicant: SHANGHAI BAOLONG AUTOMOTIVE CORPORATION
Address: 5500, Shenzhuan Rd, Songjiang District, Shanghai 201619, China.
Telephone: --
Fax: --

1.3 Description of EUT

Product: Tyre Pressure Monitoring System
Manufacturer: Shanghai Qunying Auto Electronics Co., Ltd.
Address: 5500, Shenzhuan Rd, Songjiang District, Shanghai
Brand Name: Valor
Model Number: TPMS203
Additional Model Name N/A
Additional Trade Name Digitire
Rating: DC 3.6V (Battery)
Operation Frequency: 433.92MHz
Modulation Type: FSK
Emission Designation: 133KF1D
Antenna Designation Integral Antenna with Gain 0 dBi

1.4 Submitted Sample: 2 Samples

1.5 Test Duration

2014-01-10 to 2014-04-10

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1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer

Terry Tang

The sample tested by _____

Print Name: Terry Tang

2.0	Test Equipments				
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2013-08-23	2014-08-22
System Controller	CT	SC100	-	2013-08-23	2014-08-22
Power Amplifier	AR	150W1000	300999	2013-08-23	2014-08-22
ESPI Test Receiver	ROHDE&SCHWARZ	ESI26	838786/013	2013-08-23	2014-08-22
3m OATS	--	--	N/A	2013-08-23	2014-08-22
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2013-08-23	2014-08-22

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3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:				
Standard	Test Type	Result	Notes	
FCC Part 15, Paragraph 15.203 And RSS-210 Issue 8	Antenna requirements	PASS	Compliant	
FCC Part 15, Paragraph 15.207 And RSS-210 Issue 8	Conducted Emission Test	PASS	N/A	
FCC Part 15, Paragraph 15.209 And RSS-210 Issue 8	General Requirement	PASS	Compliant	
FCC Part 15, Paragraph 15.231 (e) And RSS-210 Issue 8	Radiated Emission Test	PASS	Compliant	
FCC Part 15, Paragraph 15.231 (c) And RSS-210 Issue 8	20dB Bandwidth Testing	PASS	Compliant	
FCC Part 15, Paragraph 15.231 (e) And RSS-210 Issue 8	Deactivate Testing	PASS	Compliant	

3.2 Test Standards

FCC Part 15 Subpart C, Paragraph 15.231 And RSS-210 Issue 8

4.0 EUT Modification

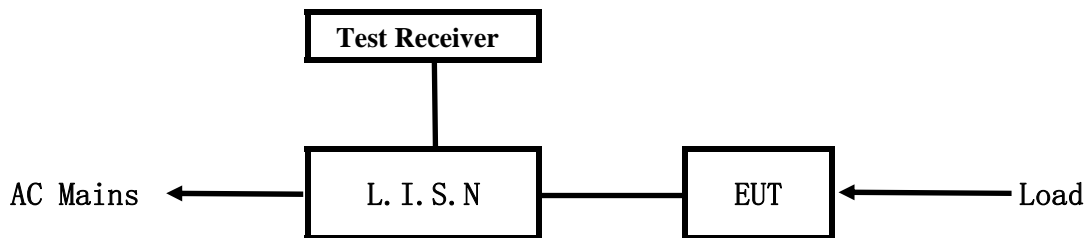
No modification by Shenzhen Timeway Technology Consulting Co.,Ltd

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5. Power Line Conducted Emission Test

5.1 Schematics of the test

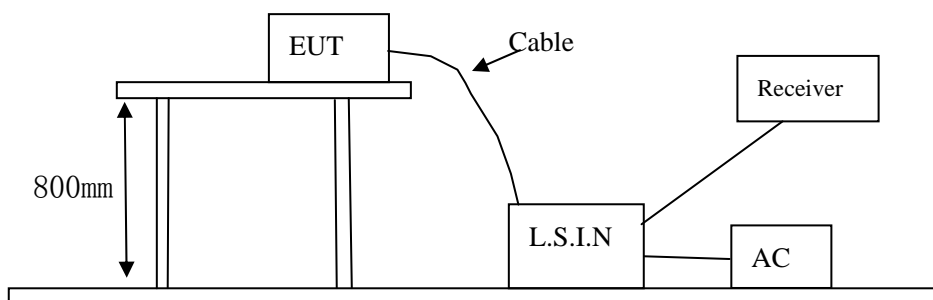


EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2003. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 –2003.

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2003. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model	FCC ID/IC
Tyre Pressure Monitoring System	Shanghai Qunying Auto Electronics Co., Ltd.	TPMS203	FCC ID:Z9F-TPMS203OTR IC:11852A-TPMS203OTR

B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
N/A				

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5.4 EUT Operating Condition

Operating condition is according to ANSI C63.4 -2003.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency (MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

- Notes:
1. *Decreasing linearly with logarithm of frequency.
 2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz. (The average detector is necessary when the Quasi-peak emission level beyond the average Limit.)

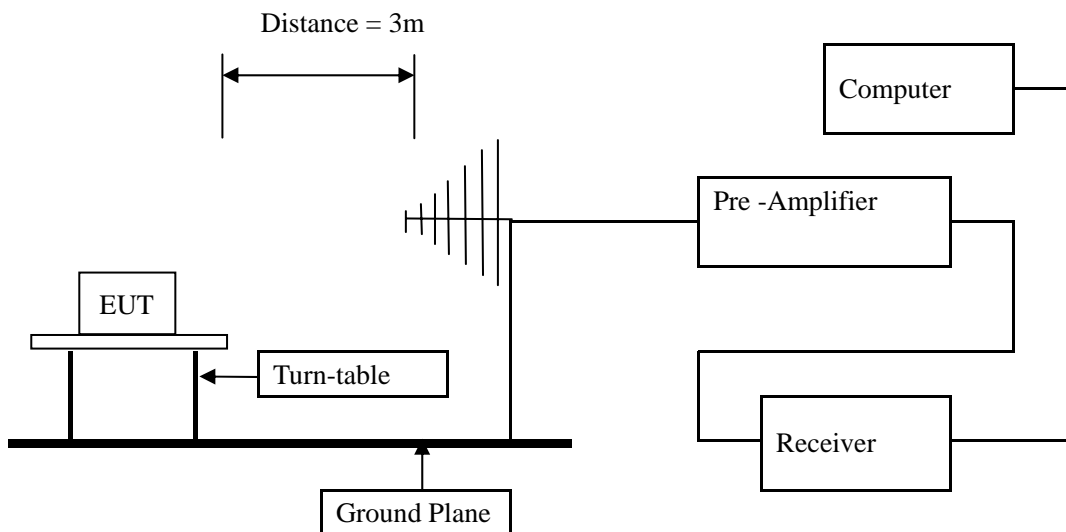
Note: Due to DC operation, this test item not applicable.

6 Radiated Emission Test

6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.4 –2003. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-2003.
- (3) The frequency spectrum from 30 MHz to 5 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "QP" in the data table.
- (6) The antenna polarization : Vertical polarization and Horizontal polarization.

Block diagram of Test setup



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

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6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

A FCC Part 15 Subpart C Paragraph 15.231(e) Limit AND RSS-210 A1.1 Table B

Fundamental Frequency (MHz)	Field Strength of Fundamental		Field Strength of Spurious Emission	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66-40.70	1000	60.00	100	40.00
70-130	500	53.98	50	33.98
130-174	500-1500	53.98-63.52	50-150	33.98-43.52
174-260	1500	63.52	150	43.52
260-470	1500-5000	63.52-73.98	150-500	43.52-53.98
Above 470	5000	73.98	500	53.98

- Note:
1. RF Field Strength (dBuV) = 20 log RF Voltage (uV)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.
 4. Linear interpolations for frequency ranges 130-174MHz and 260-470MHz
 5. the above field strength limits are specified at a distance of 3-meters and the tighter limits apply at the band edges
 6. New batteries were installed in the equipment under test for radiated emission testing.

B. Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
 4. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. As to 1G-5G, the final emission level got using PK detector. And Average = peak(dBuV/m) – duty cycle(dB)
 5. According to the user manual, this EUT was meant to be installed on metal tire rims and mounted using magnets. For radiated emissions, additional measurements were taken to verify the emissions. Only the worse case was recorded in the test report.

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6.5 Test result

A Fundamental Radiated Emission Data

Product:	Tyre Pressure Monitoring System	Test Mode:	Keep Transmitting	
Test Item:	Fundamental Radiated Emission and Spurious Emission Data	Temperature:	25°C	
Test Voltage:	DC 3.6V	Humidity:	56%	
Test Result:	Pass			
Frequency (MHz)	Emission PK/AV (dBuV/m)	Horiz / Vert	Limits PK/AV (dBuV/m)	Margin (dB)
433.92	75.20(PK)/35.74(AV)	H	92.87/72.87	-17.67/-37.13
433.92	76.60(PK)/37.14(AV)	V	92.87/72.87	16.27/-35.73
867.84	45.63(PK)	H	72.87/52.87	-7.24
867.84	48.61(PK)	V	72.87/52.87	-4.26
1301.76	44.91(PK)	H	74/54	-9.09
1301.76	48.93(PK)	V	74/54	-5.07
1735.68	45.51(PK)	H	72.87/52.87	-7.36
1735.68	48.22(PK)	V	72.87/52.87	-4.65
2169.6	47.91(PK)	V	72.87/52.87	-4.96
2169.6	44.92(PK)	H	72.87/52.87	-7.95
2603.52	--	H/V	72.87/52.87	--
3037.44	--	H/V	72.87/52.87	--
3471.36	--	H/V	72.87/52.87	--
3905.28	-	H/V	72.87/52.87	--
4339.2	--	H/V	72.87/52.87	--

Note: Average = peak(dBuV/m) – duty cycle(dB)= peak(dBuV/m)-20log(28.2/0.3)= peak(dBuV/m)-39.46

H=Horizontal, V=Vertical

Please see page 19 and 20. The data 28.2 and 0.3 were got from the two plots



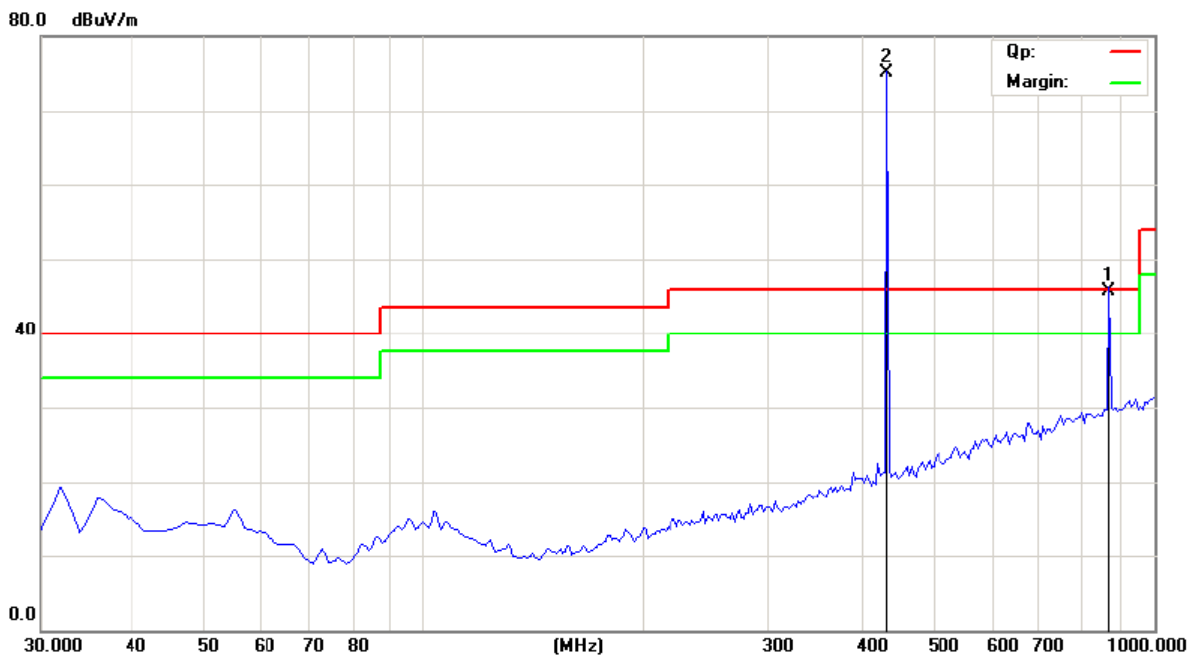
B. General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
--	--	H	--

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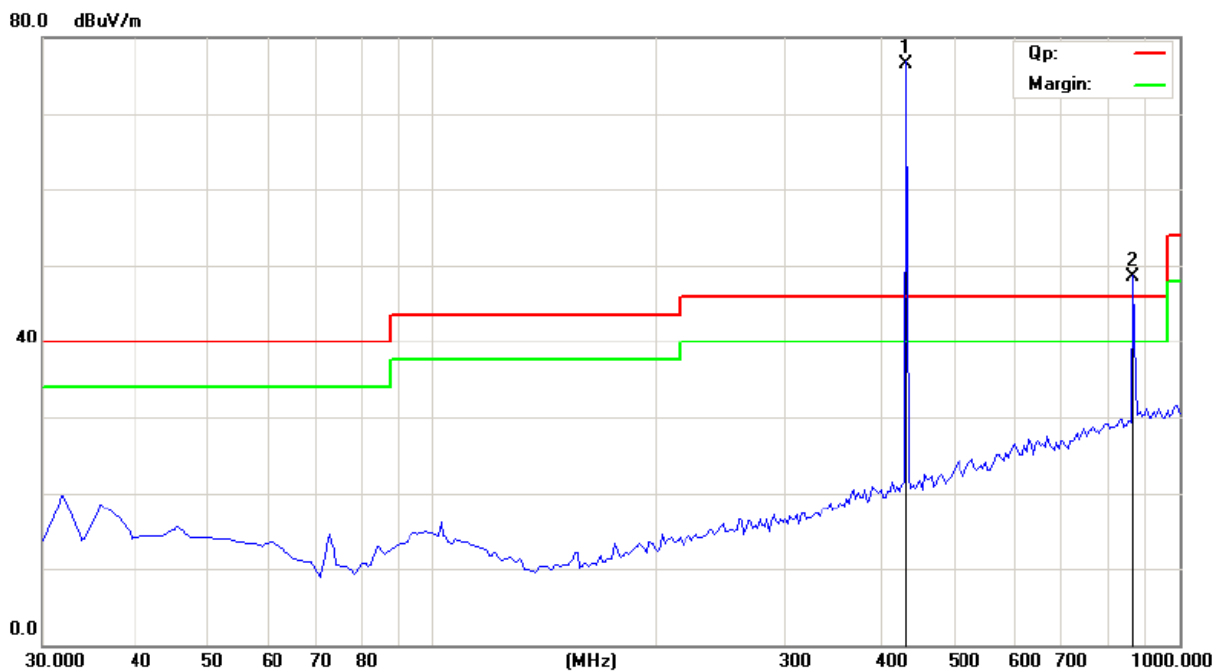
B. General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



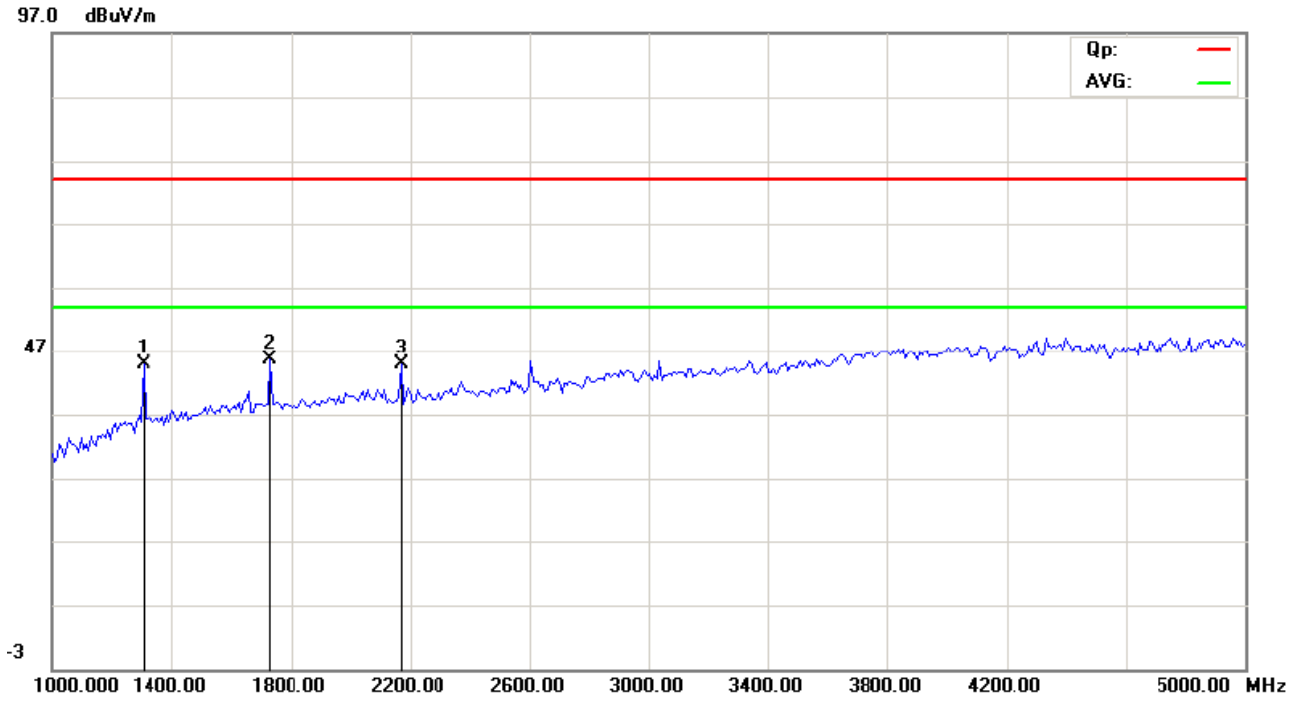
Frequency (MHz)	Level@3m (dB μ V/m)	Antenna Polarity	Limit@3m (dB μ V/m)
--	--	V	--

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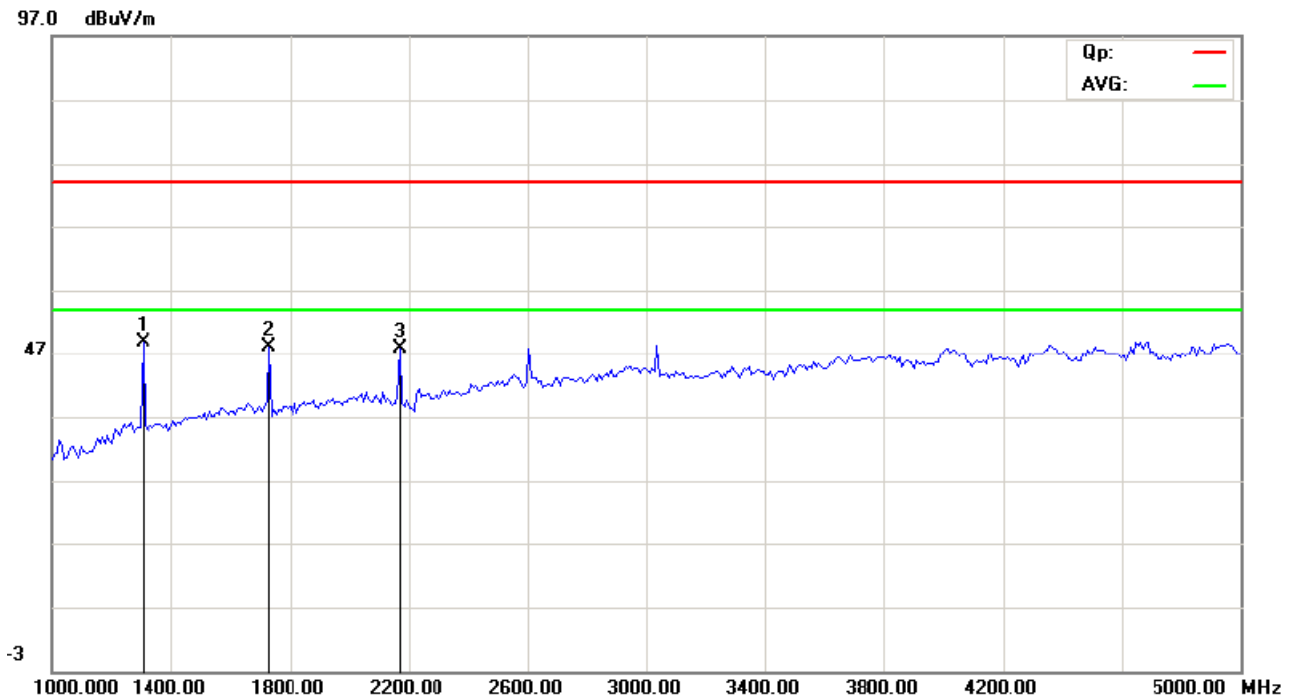


Test Plot above 1G

Horizontal



Vertical



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7.0 20dB and 99% Bandwidth Testing

7.1 Requirement

Per 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. Bandwidth is determined at the points 20 dB down from the modulated carrier.

7.2 Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna which was connected to the spectrum analyzer with the START and STOP frequencies set to the EUT's operation band.

7.3 Test Data

Frequency (MHz)	20dB Bandwidth Emission (kHz)	Limit (kHz)	Result
433.92	107	1084.80	Pass

Frequency (MHz)	99% Bandwidth Emission (kHz)	Limit (kHz)	Result
433.92	133	1084.80	Pass

$$\text{Limit} = \text{Frequency} \times 0.25\% = 433.92 \times 0.25\% = 1084.80\text{kHz}$$

Refer to attached plots:

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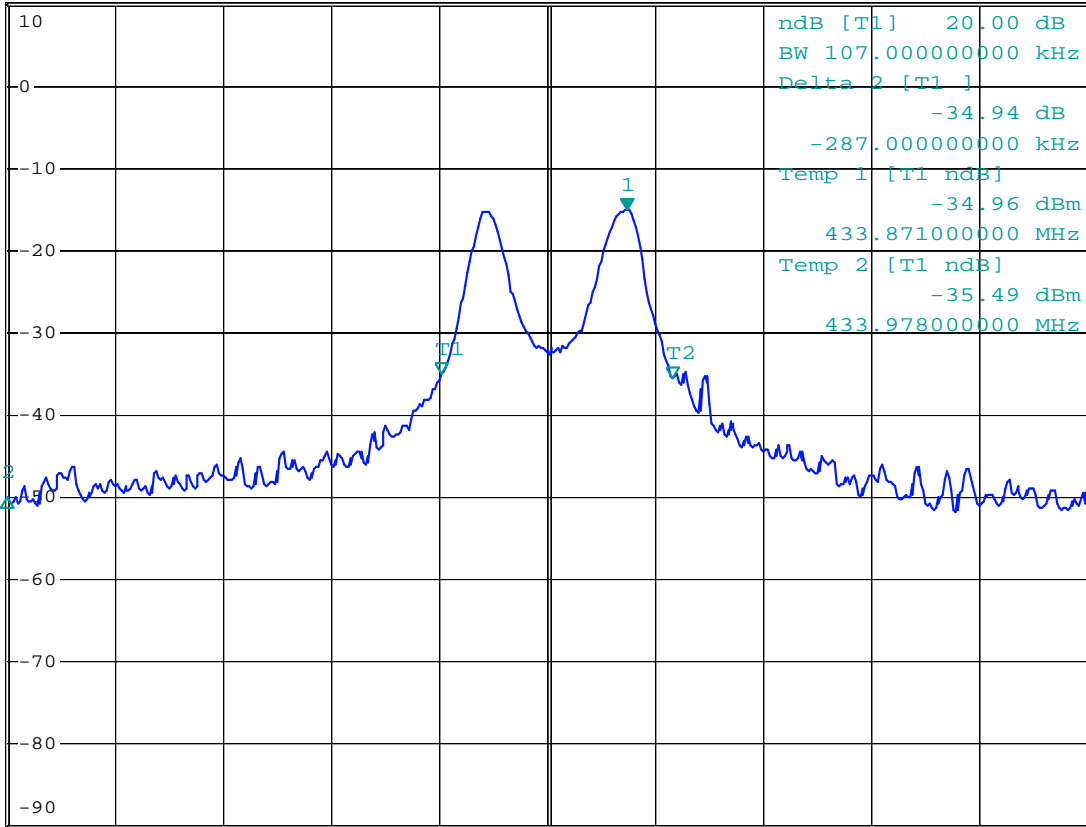
20dB Bandwidth



MARKER 1
 433.957 MHz
 Ref 10 dBm *Att 20 dB

RBW 10 kHz Marker 1 [T1]
 *VBW 30 kHz -14.99 dBm
 SWT 5 ms 433.957000000 MHz

1 PK
 MAXH



Center 433.92 MHz 50 kHz/ Span 500 kHz

Date: 2.APR.2014 15:55:38

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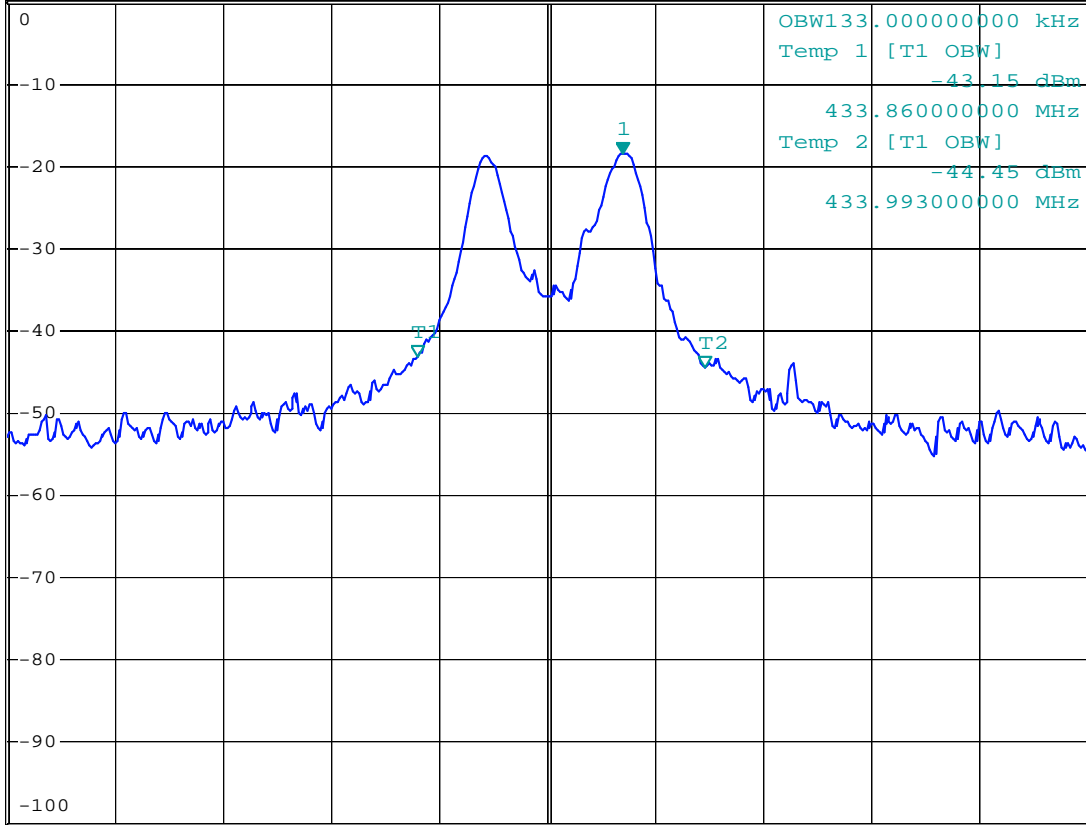
99% Bandwidth:



MARKER 1
 433.955 MHz
 Ref 0 dBm Att 20 dB

RBW 10 kHz Marker 1 [T1]
 VBW 30 kHz -18.39 dBm
 SWT 5 ms 433.955000000 MHz

1 PK
 MAXH



Center 433.92 MHz 50 kHz/ Span 500 kHz

Date: 10.APR.2014 12:55:47

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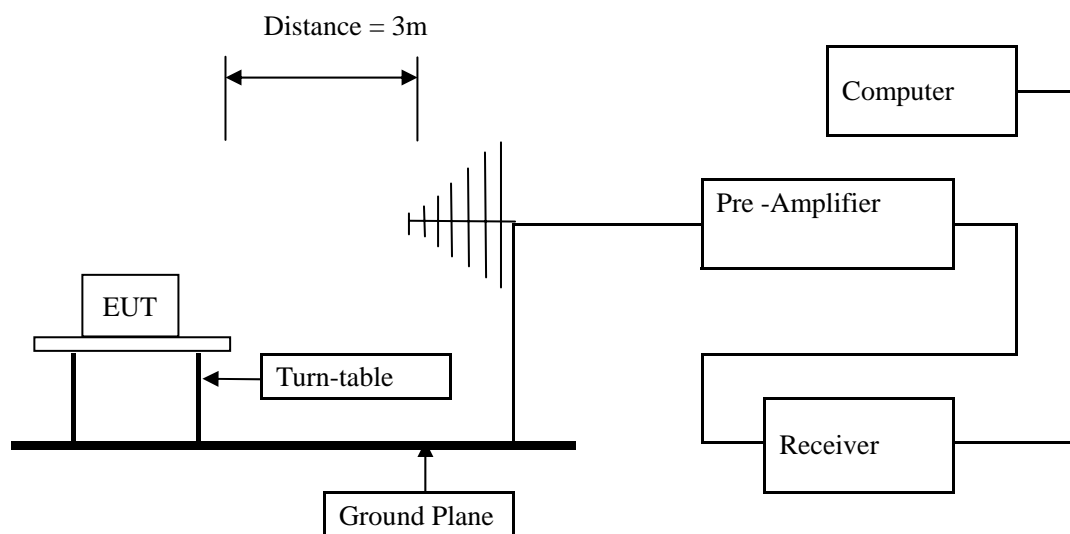
8.0 Deactivate Test

8.1 Requirement

Per 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.

8.2 Radiated Test Setup



For the actual test configuration , please refer to the related items – Photos of Testing

The deactivation test was performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4 - 2003. The specification used was the FCC 15.231(e) limits.

8.3 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

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8.4 Test Data

Refer to attached plots:

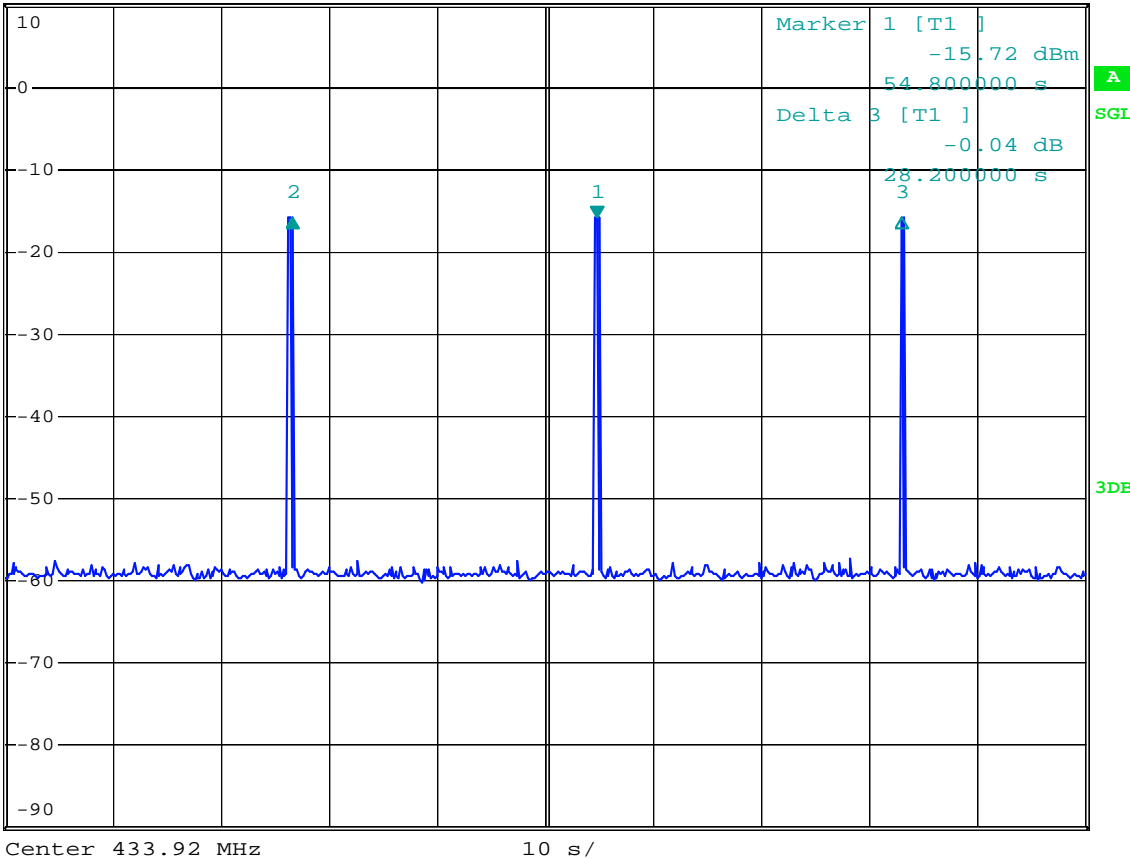
Periodic



DELTA MARKER 2
 -28.2 s
 Ref 10 dBm *Att 20 dB

RBW 100 kHz Delta 2 [T1]
 *VBW 300 kHz -0.05 dB
 SWT 100 s -28.200000 s

1 PK
 MAXH



Date: 2.APR.2014 15:52:58

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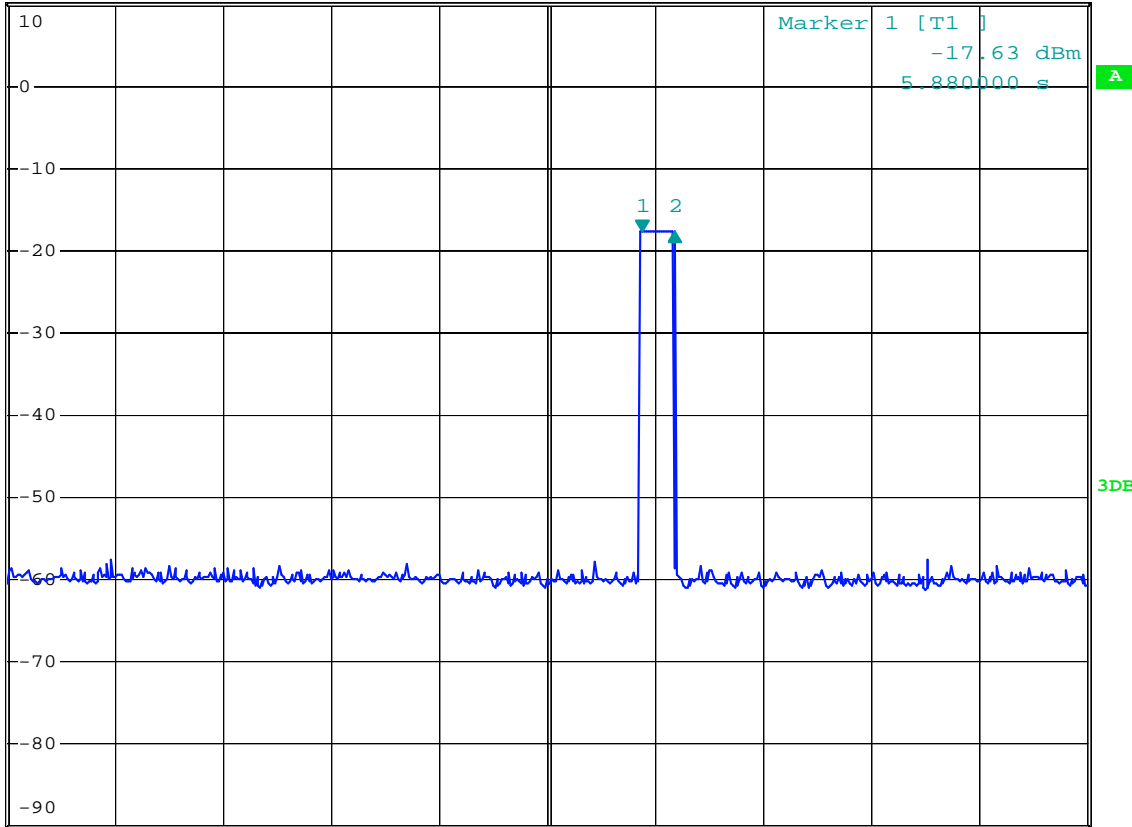
Single



DELTA MARKER 2
300 ms
Ref 10 dBm *Att 20 dB

RBW 100 kHz Delta 2 [T1]
*VBW 300 kHz -0.07 dB
SWT 10 s 300.000000 ms

1 PK
VIEW



Center 433.92 MHz 1 s/

Date: 2.APR.2014 15:53:54

8.5 Test result

Pass

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9.0 Antenna Requirement

9.1 Standard Applicable

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. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

9.2 Antenna Connected constructions

The antenna is integral antenna. So it meets the requirement of 15.203

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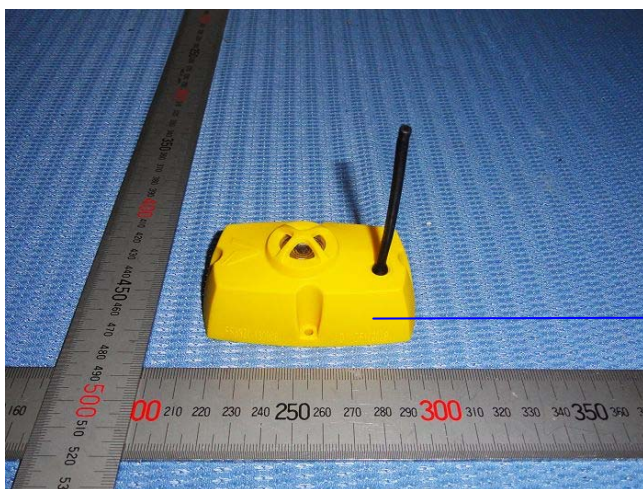
10.0 FCC ID/IC Label

FCC ID: Z9F-TPMS203OTR
IC:11852A-TPMS203OTR

This device complies with part 15 of the FCC rules and Industry Canada licence-exempt RSS standard(s). 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.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



FCC ID/IC Label Location

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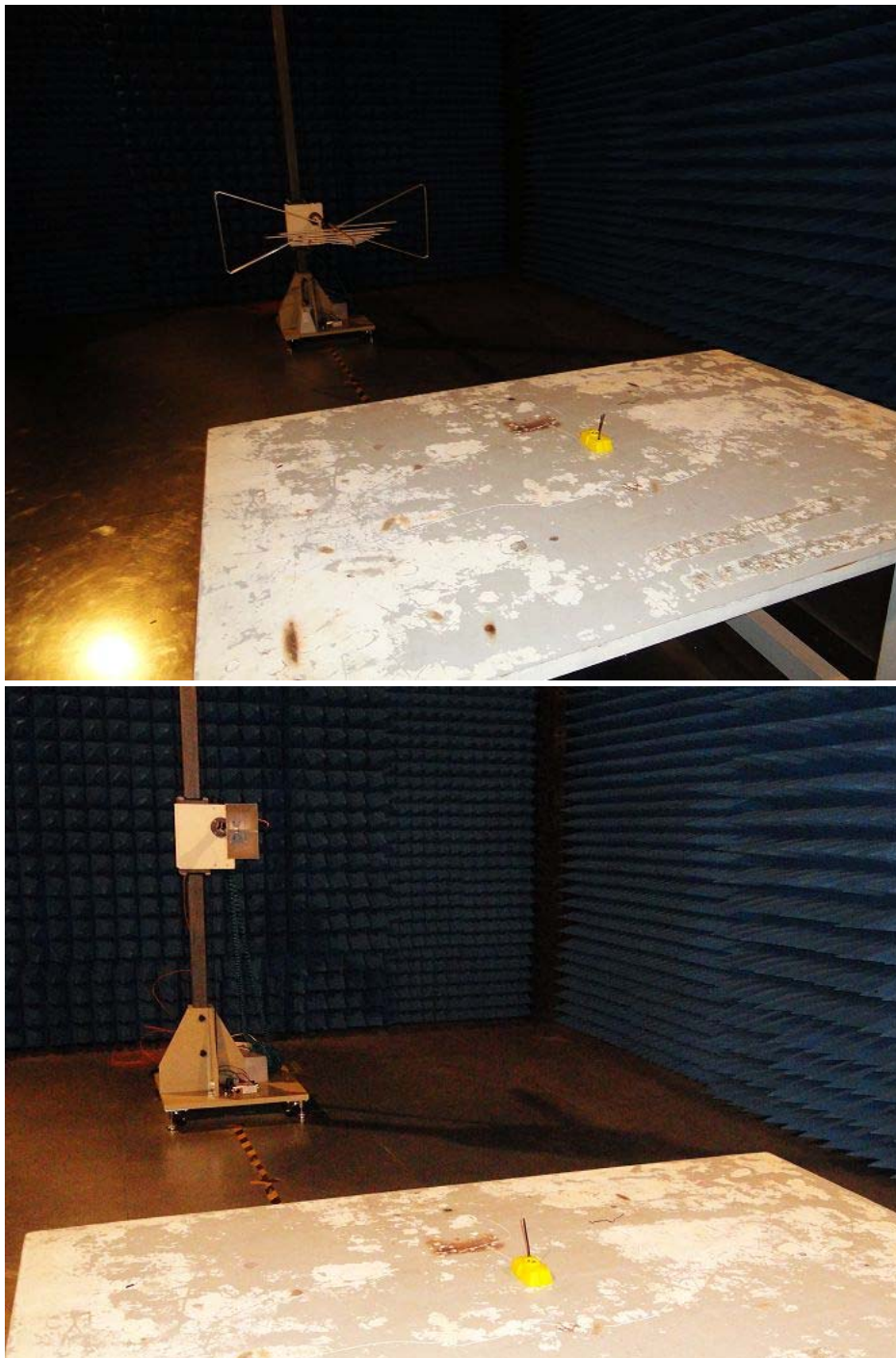
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11.0. Photo of testing

11.1 Conducted test View—N/A

11.2 Radiated emission test view

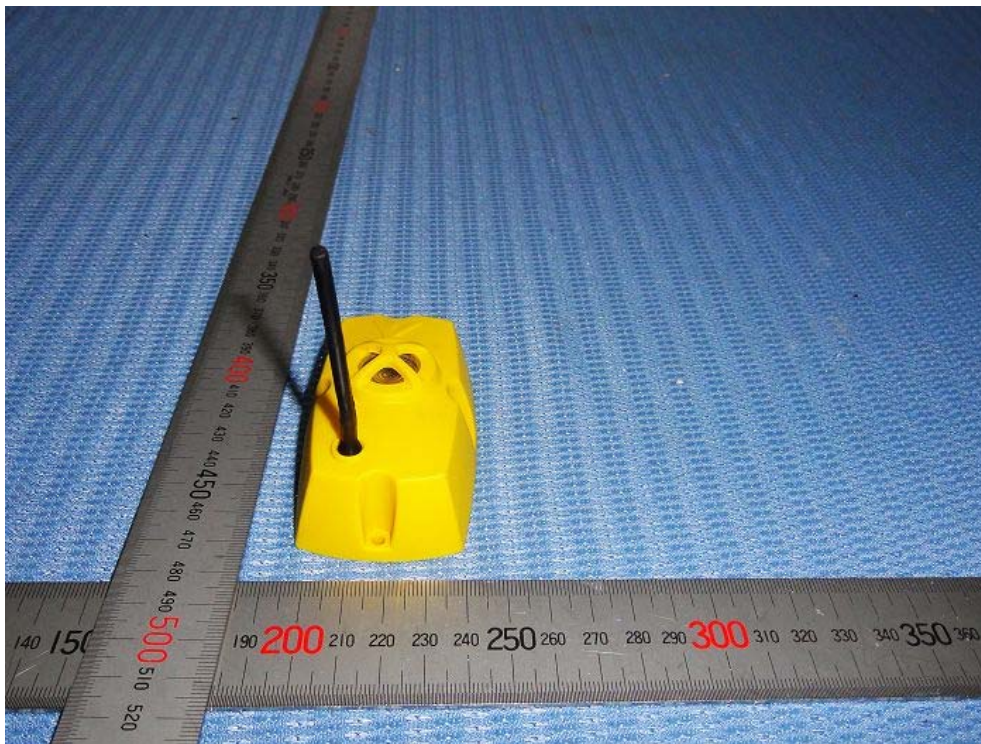
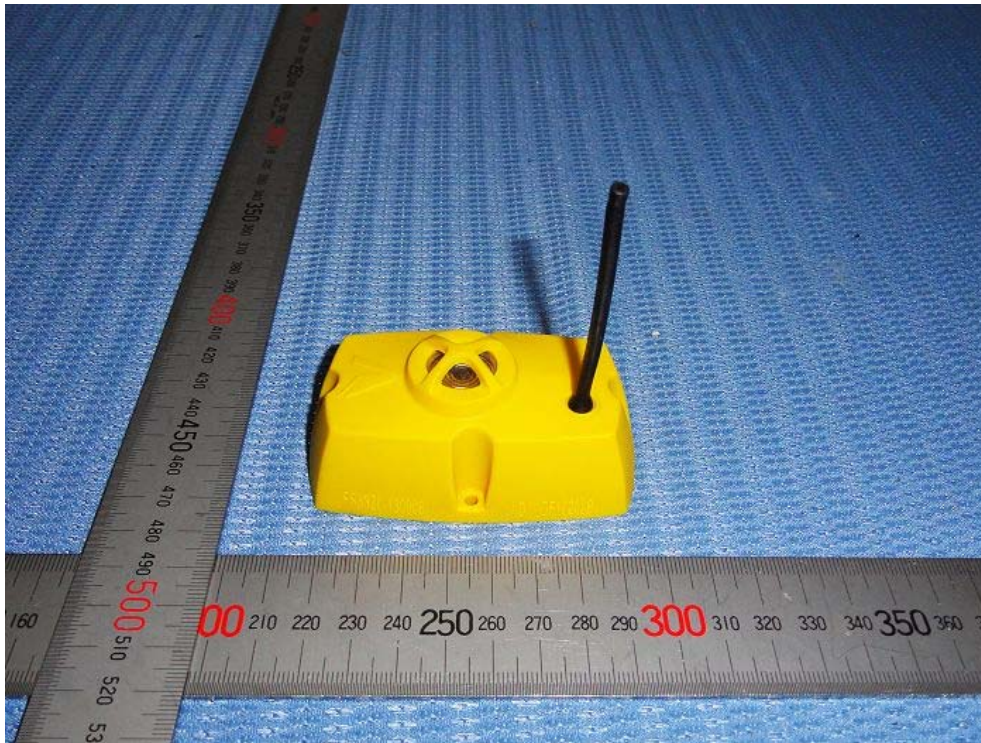


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11.3 Photo for the EUT



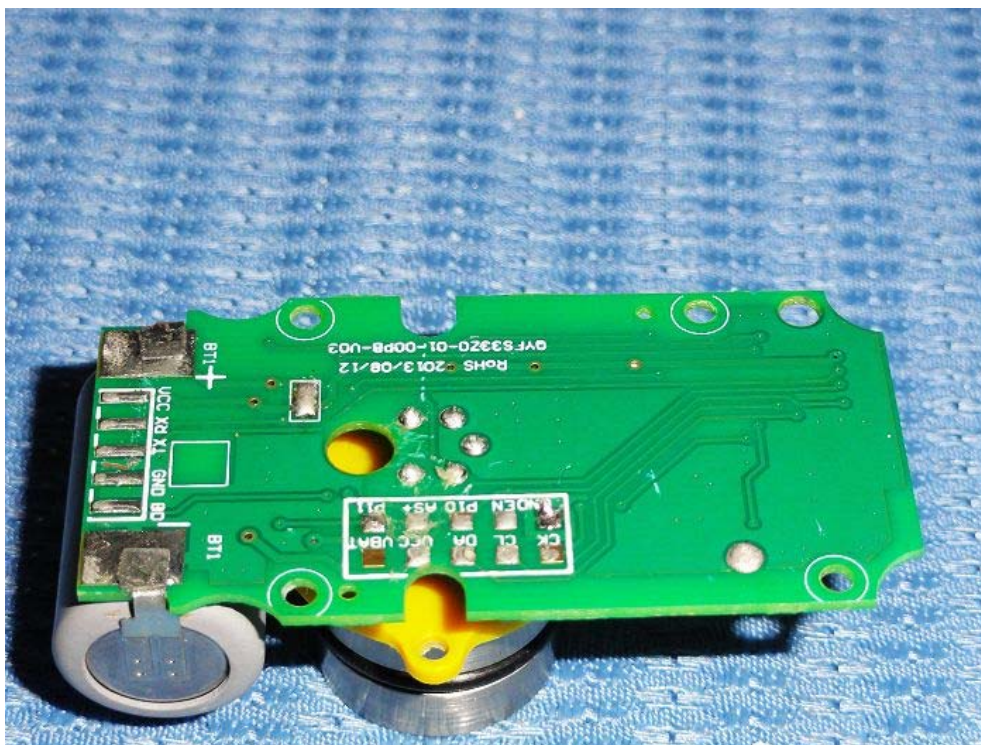
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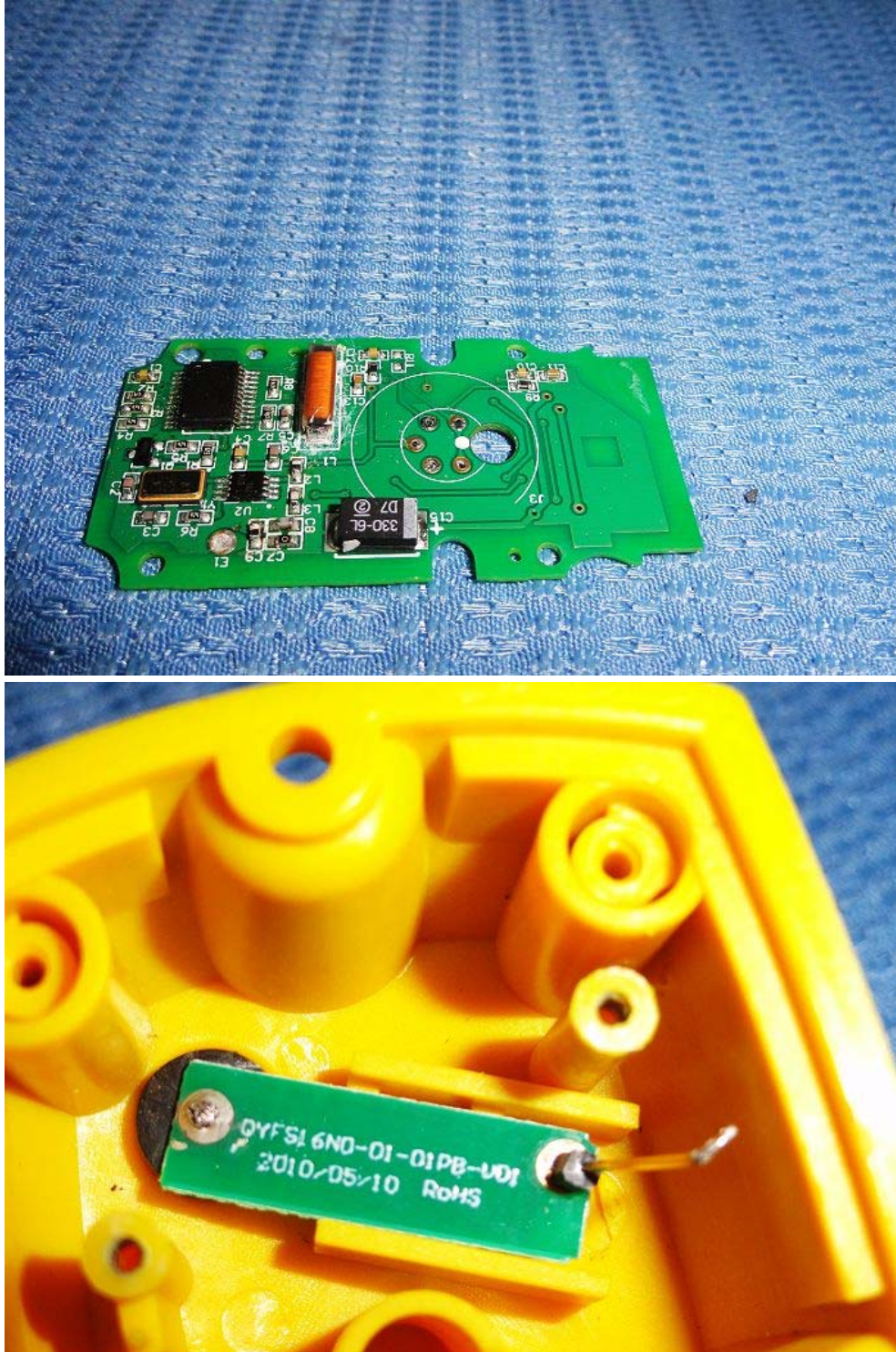
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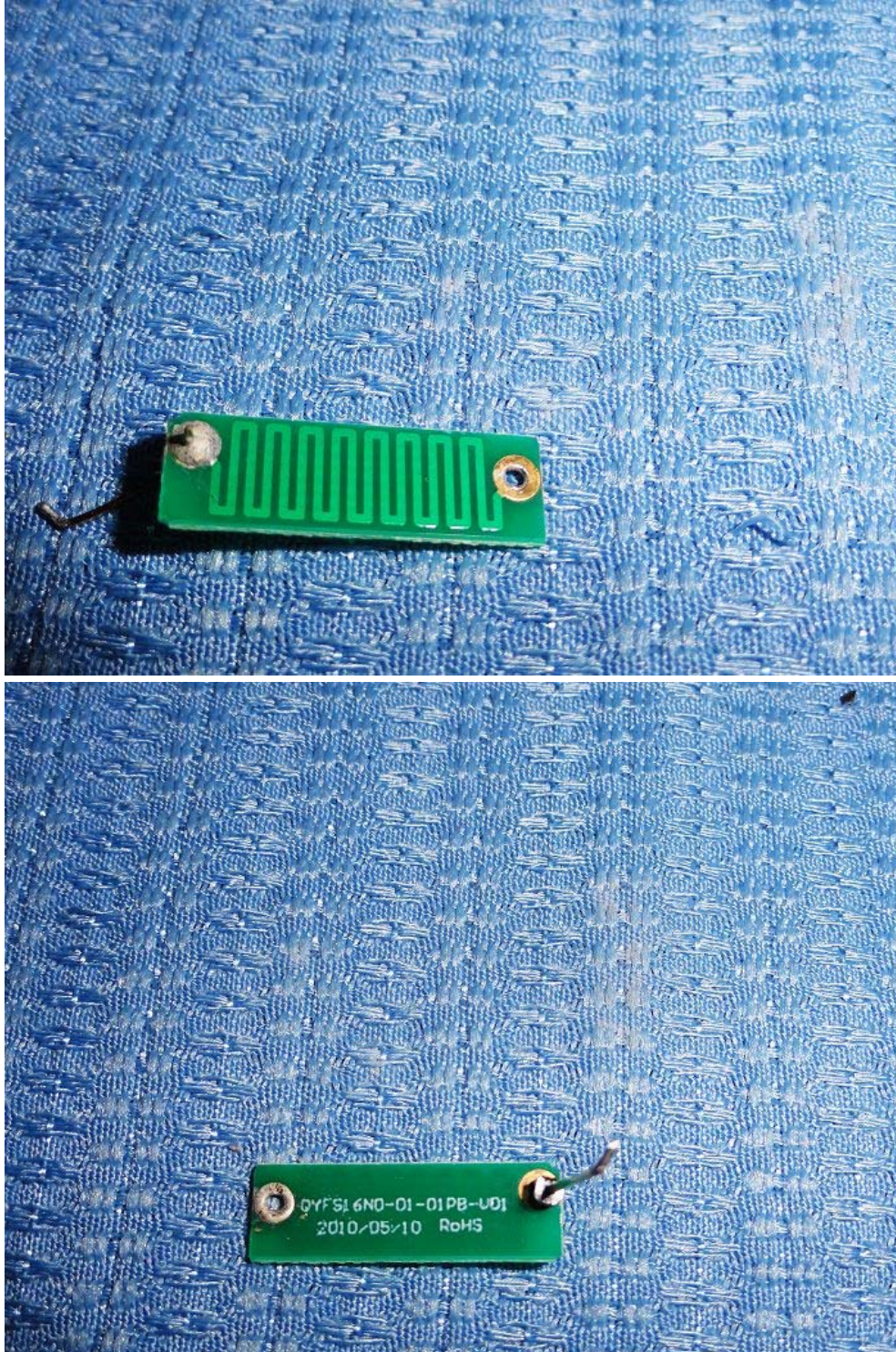
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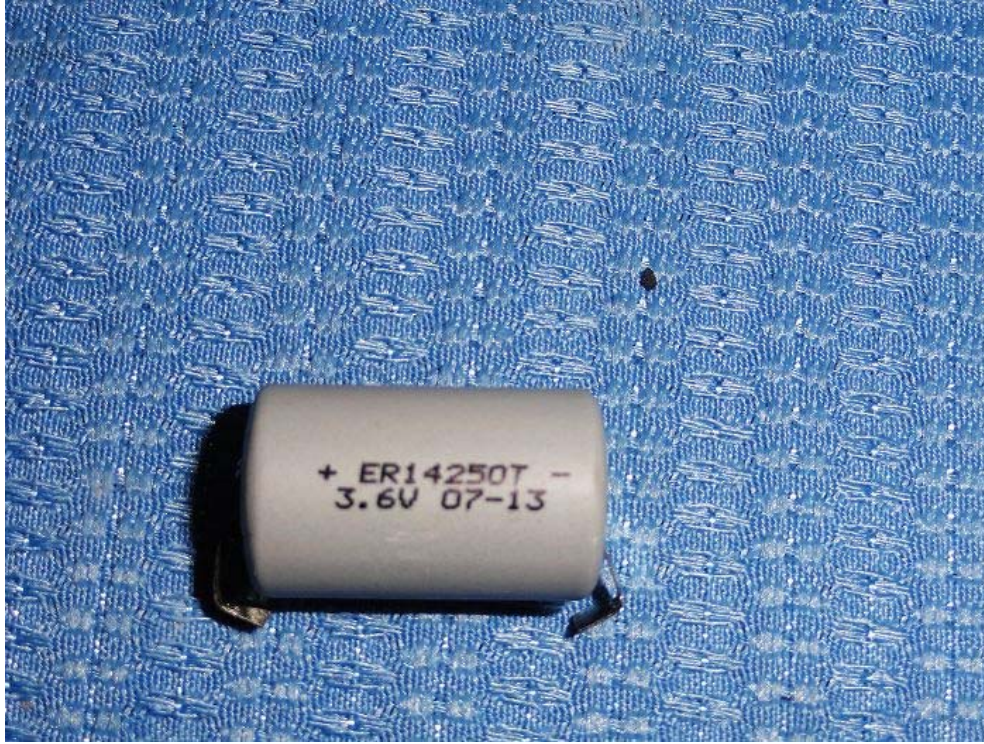
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--End of the report--