

FCC REPORT

Applicant: DEI Headquarters, Inc.

Address of Applicant: 1 Viper Way, Vista, CA 92081, United States

Equipment Under Test (EUT)

Product Name: 7121V

Model No.: 7121V

FCC ID: EZSDEI7121

IC : 1513A-7121

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.231
RSS-210 Issue 9 August 2016 Annex A

Date of sample receipt: 25 Dec., 2017

Date of Test: 25 Dec., 2017 to 29 Jan., 2018

Date of report issue: 29 Jan., 2018

Test Result: PASS*

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Bruce Zhang
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. 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.

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2 Version

Version No.	Date	Description
00	30 Jan., 2018	Original

Prepared By: Zora Lee **Date:** 30 Jan., 2018
Test Engineer

Check By: Wimer Zhang **Date:** 30 Jan., 2018
Project Engineer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	FCC Part 15.203 RSS GEN ISSUE 4 8.3	Pass
Field strength of the fundamental signal	FCC Part 15.231 (b) RSS-210 Annex A Section A.1.2 (b)	Pass
Spurious emissions	FCC Part 15.231 (b)/15.209 RSS-210 Annex A Section A.1.2 (b)	Pass
20dB Bandwidth 99% Occupy Bandwidth	FCC Part 15.231 (c) RSS-210 Annex A Section A.1.3	Pass
Duration time	FCC Part 15.231 (a) RSS-210 Annex A Section A.1.1 (a)	Pass
Conducted Emission	FCC Part 15.207 RSS-GEN ISSUE 4 Section 8.8	N/A
<p><i>Remark:</i> <i>Pass: The EUT complies with the essential requirements in the standard.</i> <i>N/A: The EUT not applicable of the test item.</i></p>		

5 General Information

5.1 Client Information

Applicant:	DEI Headquarters, Inc.
Address of Applicant:	1 Viper Way, Vista, CA 92081, United States
Manufacturer :	Directed Electronics
Manufacturer Address:	1 Viper Way, Vista, CA 92081
Factory:	DONGGUAN PORTMAN ELECTRONIC SCIENCE AND TECHNOLOGY CO., LTD
Factory Address:	NO.10, LUYI 2 ROAD, TANGXIA TOWN, DONGGUAN CITY, GUANGDONG PROVINCE CHINA

5.2 General Description of E.U.T.

Product Name:	7121V
Model No.:	7121V
Operation Frequency:	433.92MHz
Channel numbers:	1
Modulation type:	AM
Antenna Type:	PCB antenna
Antenna gain:	-10.0 dBi
Power supply:	DC 3V (CR2032 battery)

5.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation (new battery)		
Pre-Test Mode:			
CCIS has verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	85.77	80.39	84.78
Final Test Mode:			
According to ANSI C63.4:2014 standards, the test results are both the “worst case” and “worst setup”: X axis (see the test setup photo)			

5.4 Measurement Uncertainty

Items	Expanded Uncertainty (Confidence of 95%)
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.5 Description of Support Units

N/A

5.6 Laboratory Facility

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

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/4346-01.pdf>

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
 Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
 Bao'an District, Shenzhen, Guangdong, China
 Tel: +86-755-23118282, Fax: +86-755-23116366
 Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

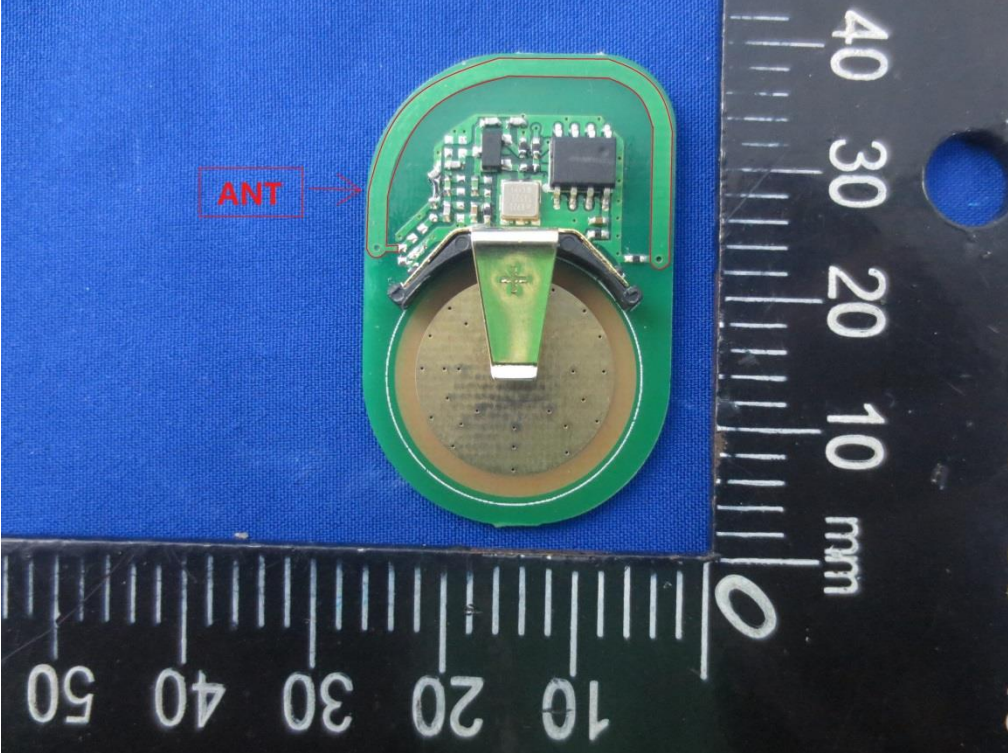
5.8 Test Instruments list

Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	02-25-2017	02-24-2018
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	02-25-2017	02-24-2018
Horn Antenna	SCHWARZBECK	BBHA9120D	916	02-25-2017	02-24-2018
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A
Pre-amplifier	HP	8447D	2944A09358	02-25-2017	02-24-2018
Pre-amplifier	CD	PAP-1G18	11804	02-25-2017	02-24-2018
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	02-25-2017	02-24-2018
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	02-25-2017	02-24-2018
Cable	ZDECL	Z108-NJ-NJ-81	1608458	02-25-2017	02-24-2018
Cable	MICRO-COAX	MFR64639	K10742-5	02-25-2017	02-24-2018
Cable	SUHNER	SUCOFLEX100	58193/4PE	02-25-2017	02-24-2018

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	02-25-2017	02-24-2018
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	02-25-2017	02-24-2018
LISN	CHASE	MN2050D	1447	02-25-2017	02-24-2018
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2018
Cable	HP	10503A	N/A	02-25-2017	02-24-2018
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A

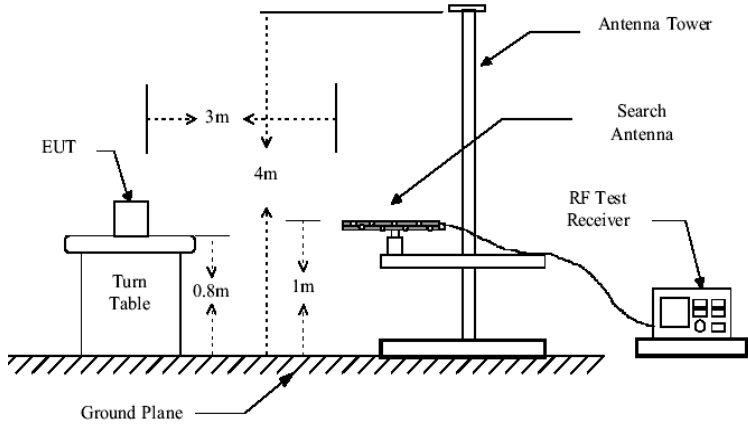
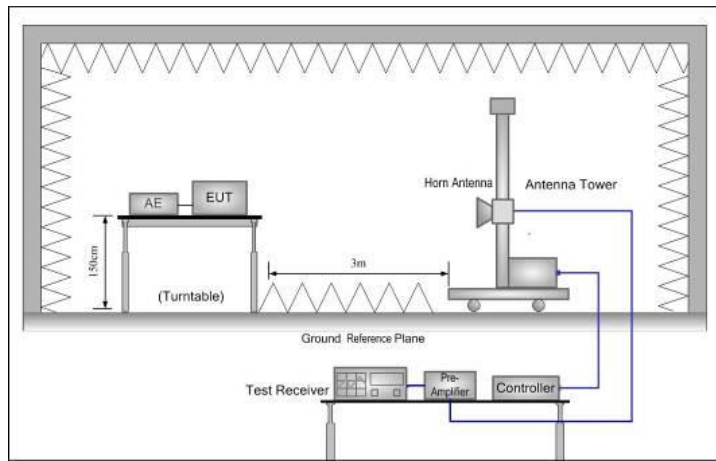
6 Test results and Measurement Data

6.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
<p><i>15.203 requirement:</i> <i>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, 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.</i></p>	
E.U.T Antenna:	
<p>The EUT make use of an PCB antenna, The typical gain of the antenna is -10.0dBi.</p>	
	

6.2 Radiated Emission

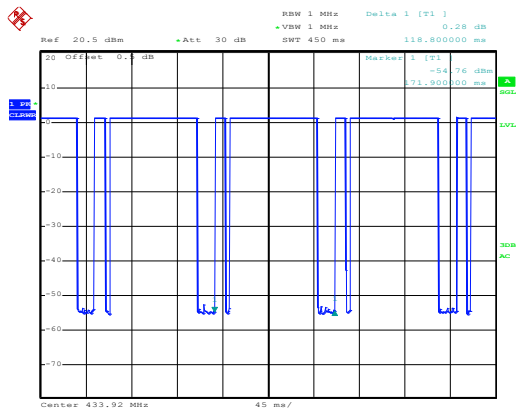
Test Requirement:	FCC Part15 C Section 15.231(a) and 15.209, RSS-210 Annex A Section A.1.2				
Test Method:	ANSI C63.4:2014; ANSI C63.10:2013				
Test Frequency Range:	30MHz to 5000MHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	433.92 MHz	80.8		Average Value	
		100.8		Peak Value	
Limit: (Spurious Emissions)	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
		74.0		Peak Value	
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.					
Test Procedure:	<p>a. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p>				

<p>Test setup:</p>	<p>Below 1GHz</p>  <p>Above 1GHz</p> 
<p>Test Instruments:</p>	<p>Refer to section 5.8 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Pass</p>

6.2.1 Field Strength Of The Fundamental Signal

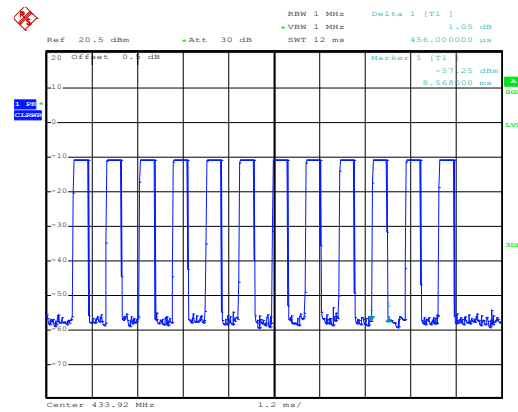
Peak value							
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	57.96	15.6	3.16	76.72	100.80	-24.08	Vertical
433.92	67.01	15.6	3.16	85.77	100.80	-15.03	Horizontal
Average value							
Frequency (MHz)	Level (dBuV/m)	Duty Cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization	
433.92	76.72	-5.45	71.27	80.80	-9.53	Vertical	
433.92	85.77	-5.45	80.32	80.80	-0.48	Horizontal	
Calculate Formula:	Average value = Peak value + Duty Cycle Factor						
	Duty cycle factor = 20log(Duty cycle)						
	Duty cycle = on time/100 milliseconds or period, whichever is less						
Test data:	T on time =(0.456(ms)*12)+(0.936(ms)*34)+(0.504(ms)*32)=53.424(ms)						
	T period = 118.8(ms)						
	Duty cycle = 53.424%						
	Duty cycle factor = 20log(Duty cycle) = -5.45						

T period:



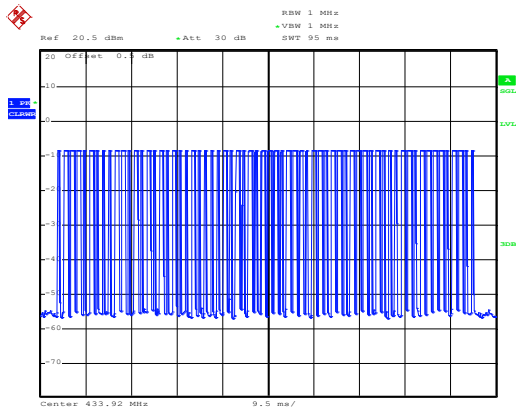
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T on time slot-1:



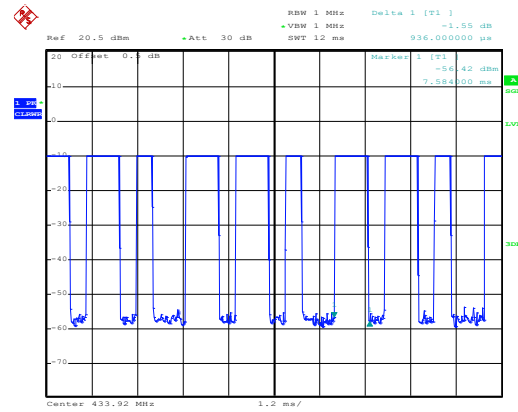
Date: 16.JAN.2018 16:05:48

T on time slot-2:



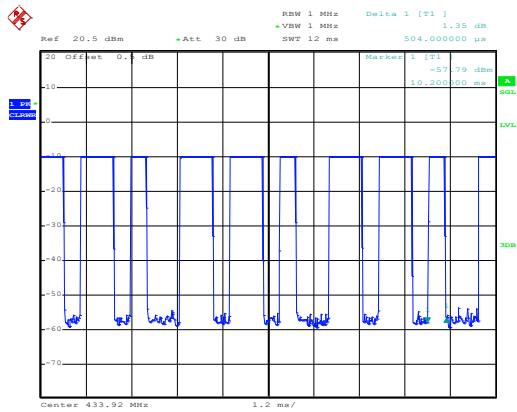
Date: 10.JAN.2017 15:07:11

T on time slot-2-1:



Date: 16.JAN.2018 16:12:09

T on time slot-2-2:



Date: 16.JAN.2018 16:13:55

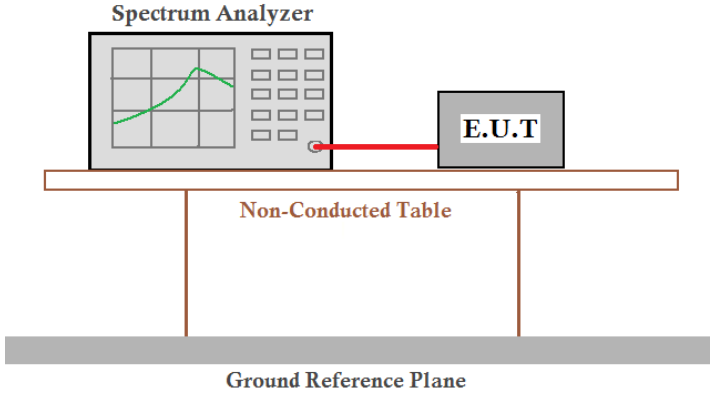
6.2.2 Spurious Emissions

Below 1GHz (30MHz-1000MHz)									
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	polarization
49.19	17.41	14.40	1.26	0.00	33.07	40.00	-6.93	QP	Vertical
938.83	16.54	21.32	4.10	0.00	41.96	46.00	-4.04	QP	Vertical
867.84	18.54	20.60	4.01	0.00	43.15	80.80	-37.65	PK	Vertical
48.33	16.02	14.40	1.27	0.00	31.69	40.00	-8.31	QP	Horizontal
719.20	18.25	19.52	4.25	0.00	42.02	46.00	-3.98	QP	Horizontal
867.84	23.45	20.60	4.01	0.00	48.06	80.80	-32.74	PK	Horizontal
Average value									
Frequency (MHz)	Level (dBuV/m)	Duty Cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization			
867.84	43.15	-5.45	37.70	60.80	-23.10	Vertical			
867.84	48.06	-5.45	42.61	60.80	-18.19	Horizontal			

Above 1GHz									
Peak value									
Frequency (MHz)	Read Level (dBuV/m)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization	
1301.76	49.72	24.30	3.51	41.04	38.89	74.00	-35.11	Vertical	
1735.68	62.20	25.02	4.05	41.16	52.44	80.80	-28.36	Vertical	
2169.60	46.87	24.91	4.48	41.68	37.26	74.00	-36.74	Vertical	
2603.52	47.63	26.05	4.96	41.87	39.63	80.80	-41.17	Vertical	
3037.44	45.96	27.22	5.36	41.49	39.96	80.80	-40.84	Vertical	
3471.36	46.42	27.48	5.71	41.42	41.15	80.80	-39.65	Vertical	
3905.28	46.66	28.24	6.10	41.80	42.20	74.00	-31.80	Vertical	
4339.20	46.66	29.00	6.62	41.92	43.81	80.80	-36.99	Vertical	
1301.76	47.38	24.30	3.51	41.04	36.55	74.00	-37.45	Horizontal	
1735.68	53.87	25.02	4.05	41.16	44.11	80.80	-36.69	Horizontal	
2169.60	45.51	24.91	4.48	41.68	35.90	74.00	-38.10	Horizontal	
2603.52	48.60	26.05	4.96	41.87	40.60	80.80	-40.20	Horizontal	
3037.44	45.31	27.22	5.36	41.49	39.31	80.80	-41.49	Horizontal	
3471.36	58.37	27.48	5.71	41.42	53.10	80.80	-27.70	Horizontal	
3905.28	46.37	28.24	6.10	41.80	41.91	74.00	-32.09	Horizontal	
4339.20	45.88	29.00	6.62	41.92	43.03	80.80	-37.77	Horizontal	

Average value						
Frequency (MHz)	Level (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
1301.76	38.89	-5.45	33.44	54.00	-20.56	Vertical
1735.68	52.44	-5.45	46.99	60.80	-13.81	Vertical
2169.60	37.26	-5.45	31.81	54.00	-22.19	Vertical
2603.52	39.63	-5.45	34.18	60.80	-26.62	Vertical
3037.44	39.96	-5.45	34.51	60.80	-26.29	Vertical
3471.36	41.15	-5.45	35.70	60.80	-25.10	Vertical
3905.28	42.20	-5.45	36.75	54.00	-17.25	Vertical
4339.20	43.81	-5.45	38.36	60.80	-22.44	Vertical
1301.76	36.55	-5.45	31.10	54.00	-22.90	Horizontal
1735.68	44.11	-5.45	38.66	60.80	-22.14	Horizontal
2169.60	35.90	-5.45	30.45	54.00	-23.55	Horizontal
2603.52	40.60	-5.45	35.15	60.80	-25.65	Horizontal
3037.44	39.31	-5.45	33.86	60.80	-26.94	Horizontal
3471.36	53.10	-5.45	47.65	60.80	-13.15	Horizontal
3905.28	41.91	-5.45	36.46	54.00	-17.54	Horizontal
4339.20	43.03	-5.45	37.58	60.80	-23.22	Horizontal

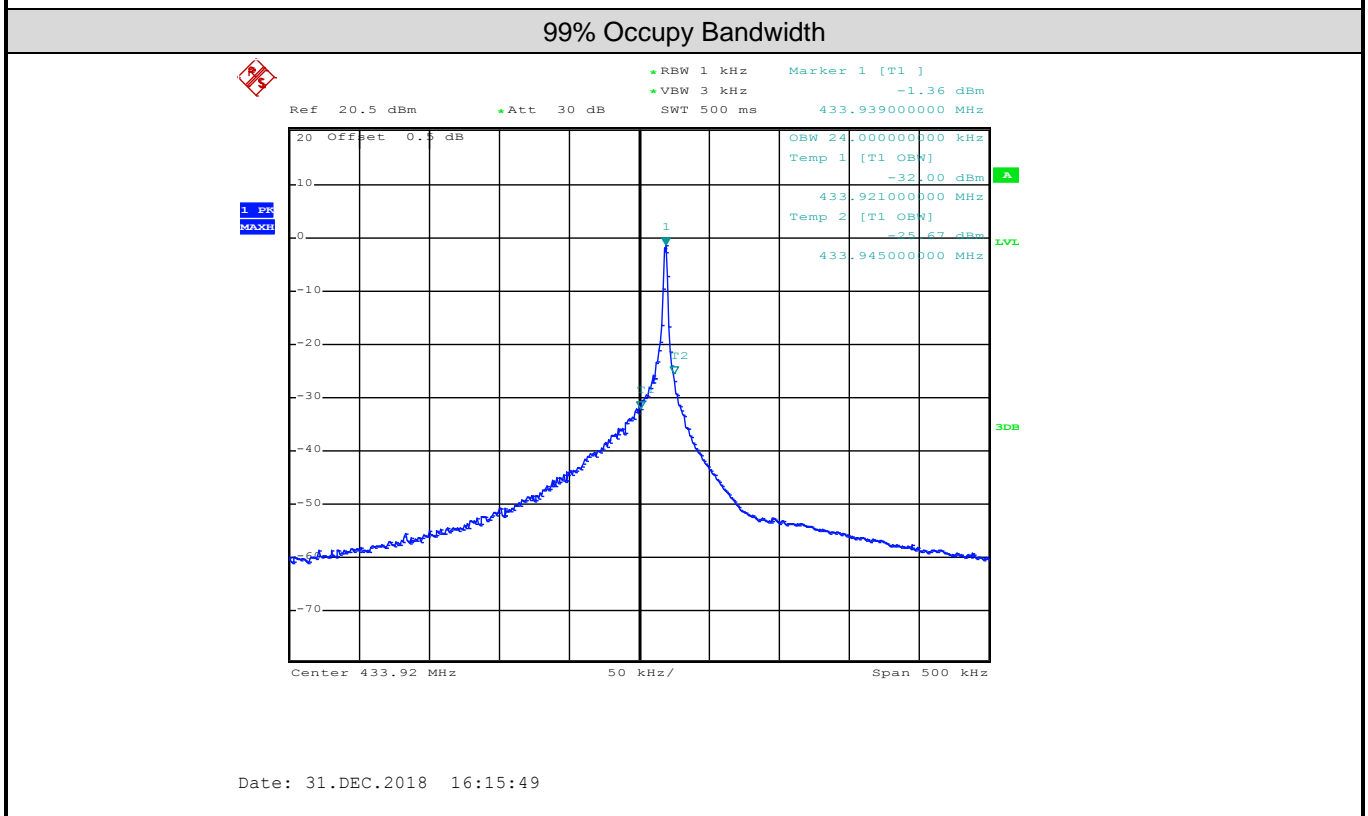
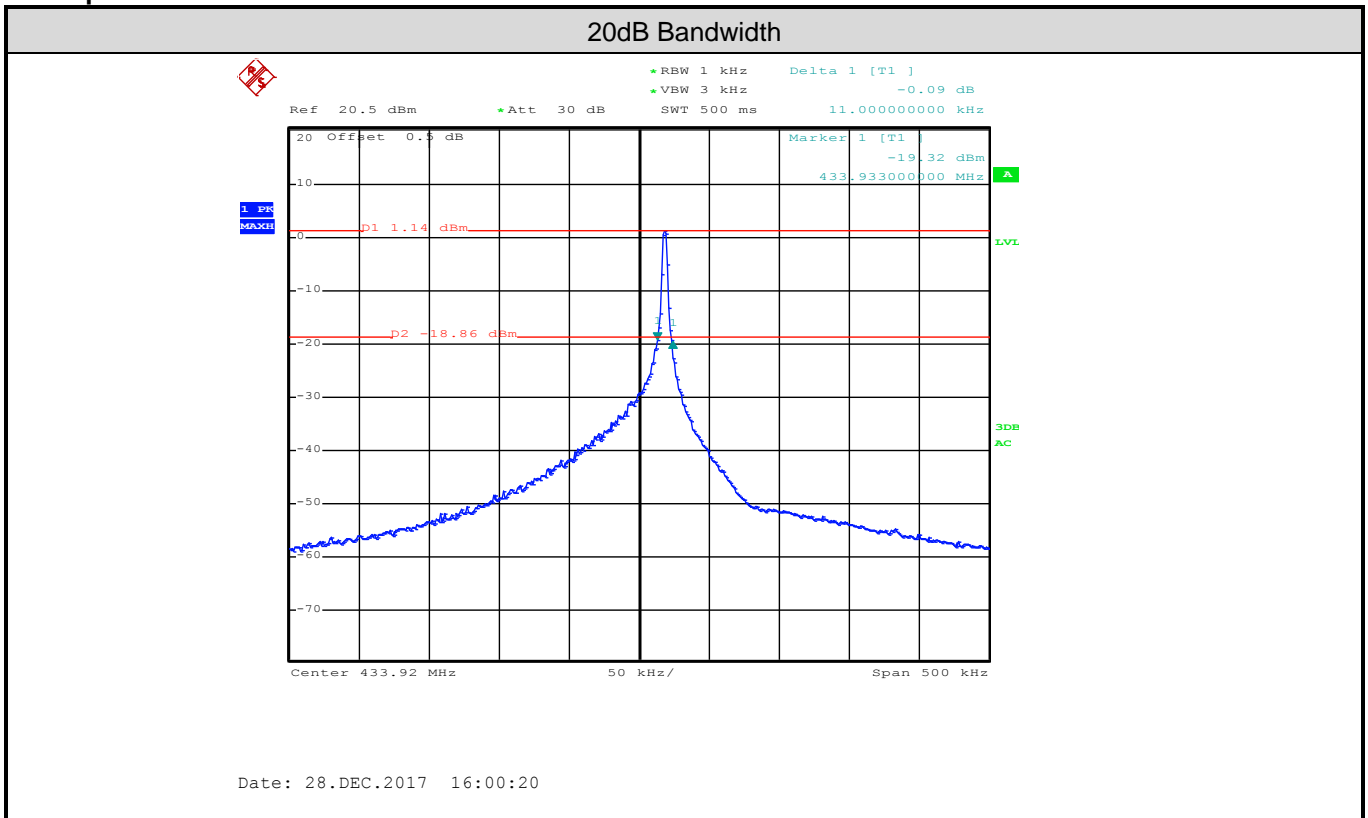
6.3 Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.231 (c), RSS-210 Annex A Section A.1.3
Test Method:	ANSI C63.4:2014
Receiver setup:	RBW=1kHz, VBW=3kHz, detector: Peak
Limit:	<p>FCC: 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.</p> <p>IC: The 99% bandwidth of momentarily operated devices shall be less or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz. For devices operating above 900 MHz, the 99% bandwidth shall be less or equal to 0.5% of the centre frequency.</p>
Test Procedure:	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

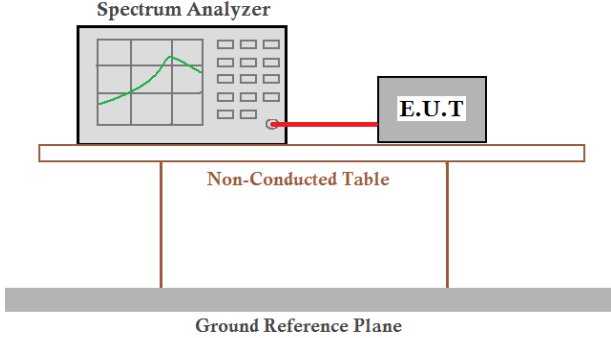
Measurement Data

20dB Bandwidth (MHz)	99% Occupy Bandwidth (MHz)	Limit (MHz)	Results
0.011	0.024	1.0848	Pass
<p>Note: 1. Limit= Fundamental frequency×0.25%=433.92×0.25%=1.0848MHz2.</p>			

Test plot as follows:



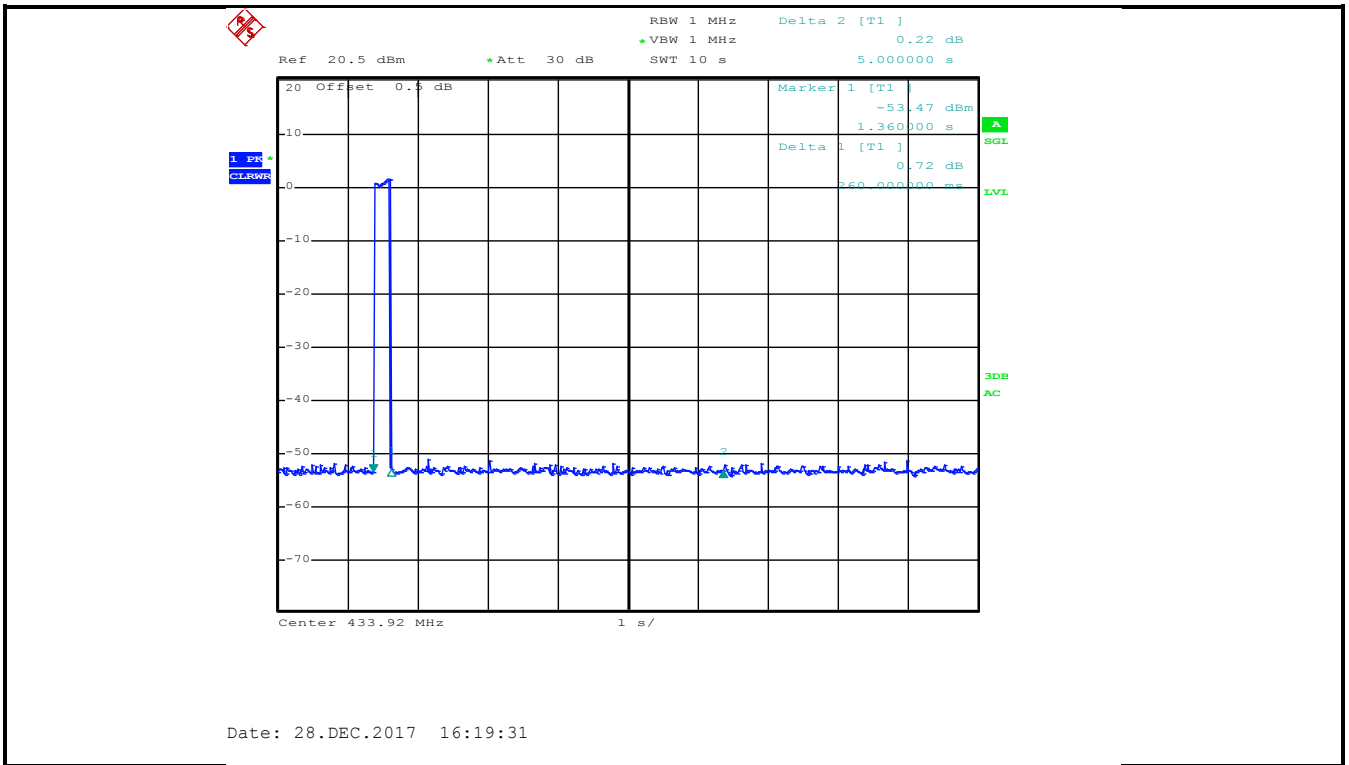
6.4 Duration Time

Test Requirement:	FCC Part15 C Section 15.231 (a) (1), RSS-210 Annex A Section A.1.1 (a)
Test Method:	ANSI C63.4:2014
Receiver setup:	RBW=100kHz, VBW=300kHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test mode:	Transmitting mode
Test Procedure:	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Single scan the transmission, and read the transmission time.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Measurement Data

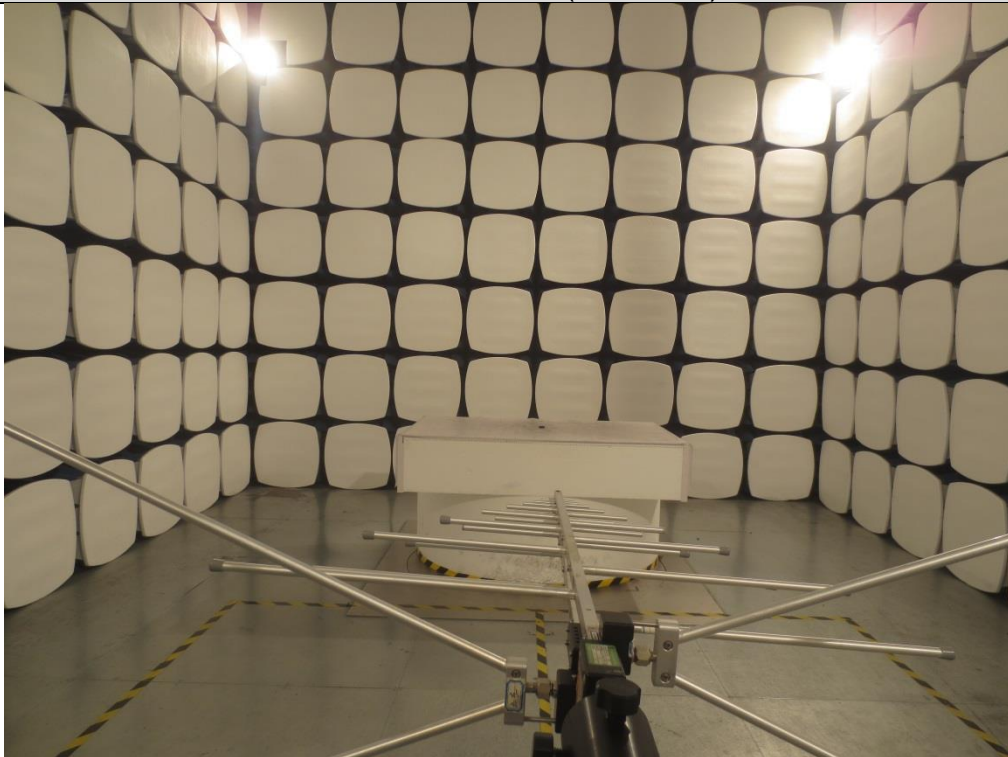
Duration time (second)	Limit (second)	Result
0.26	<5.0	Pass

Test plot as follows:

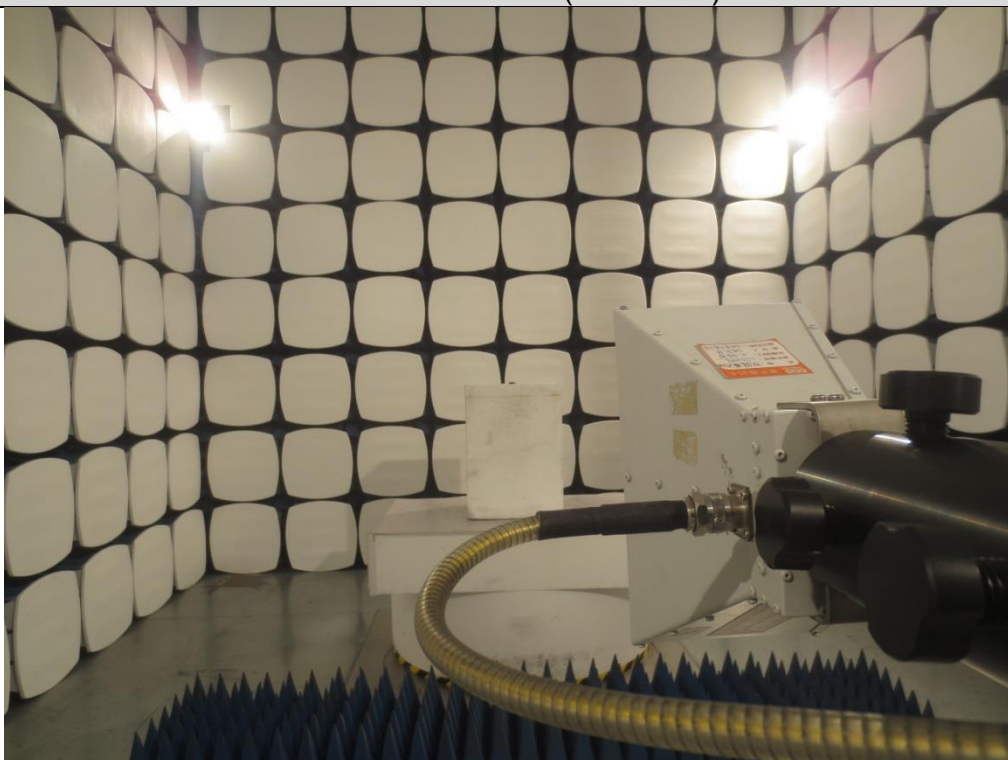


7 Test Setup Photos

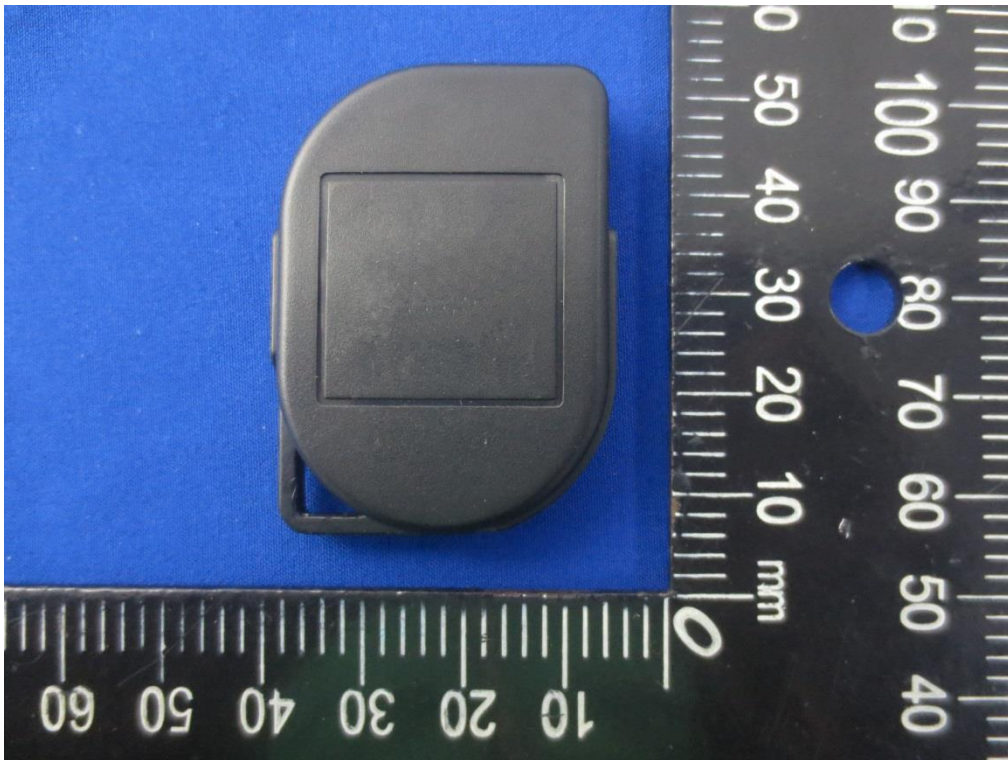
Radiated Emission(below 1G)



Radiated Emission(above 1G)

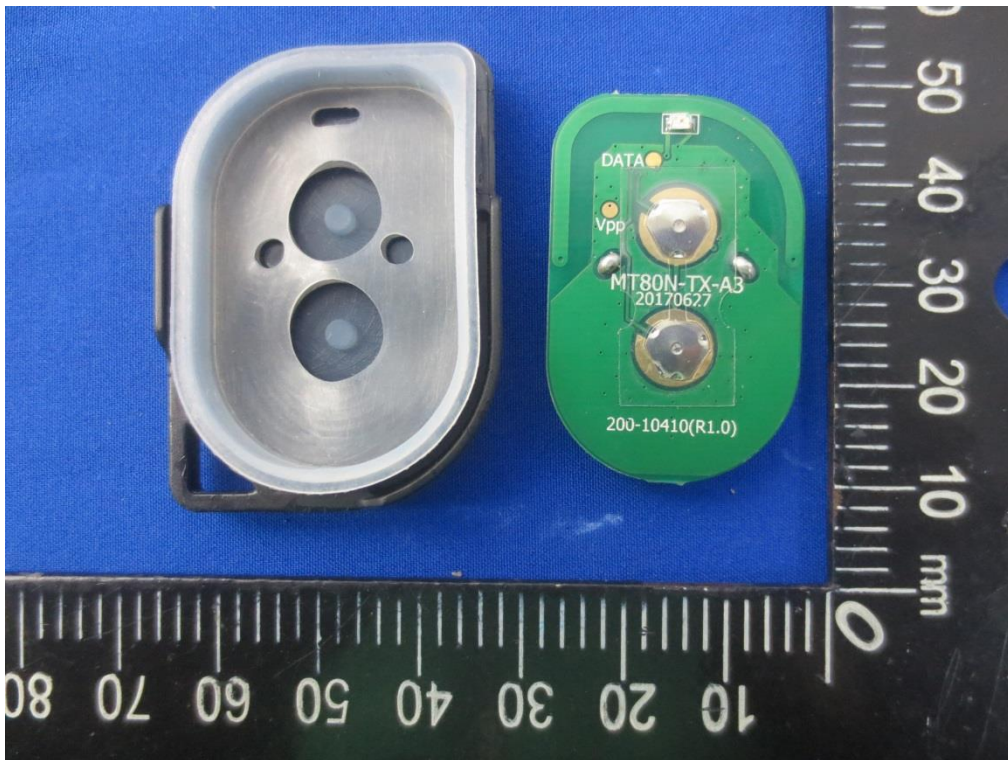
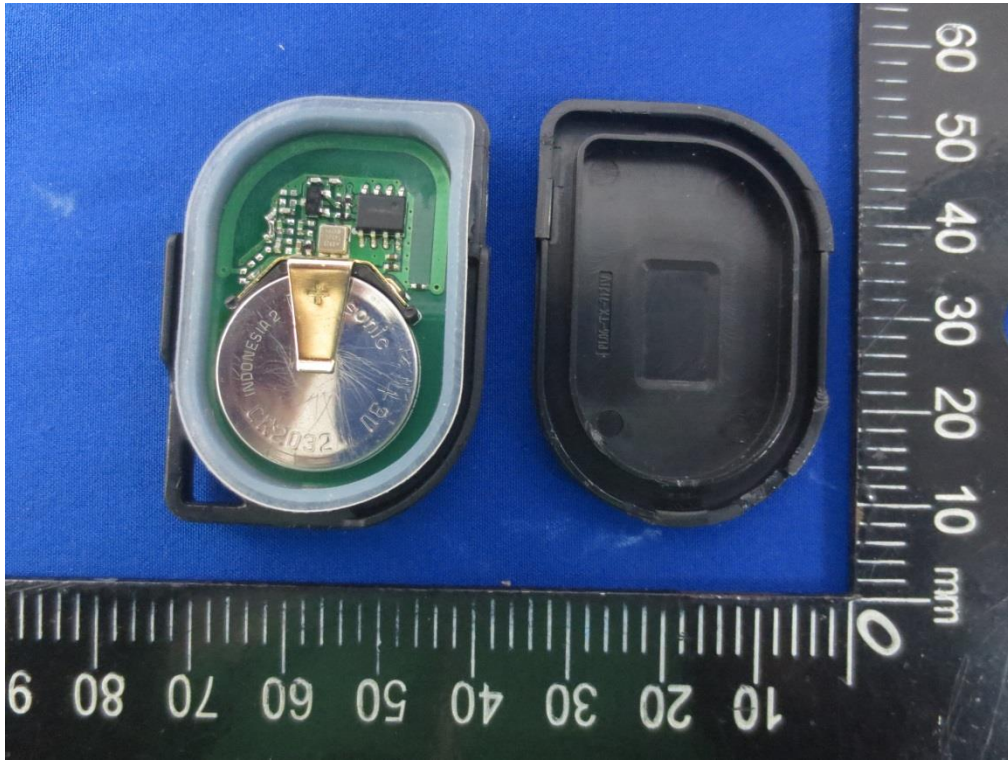


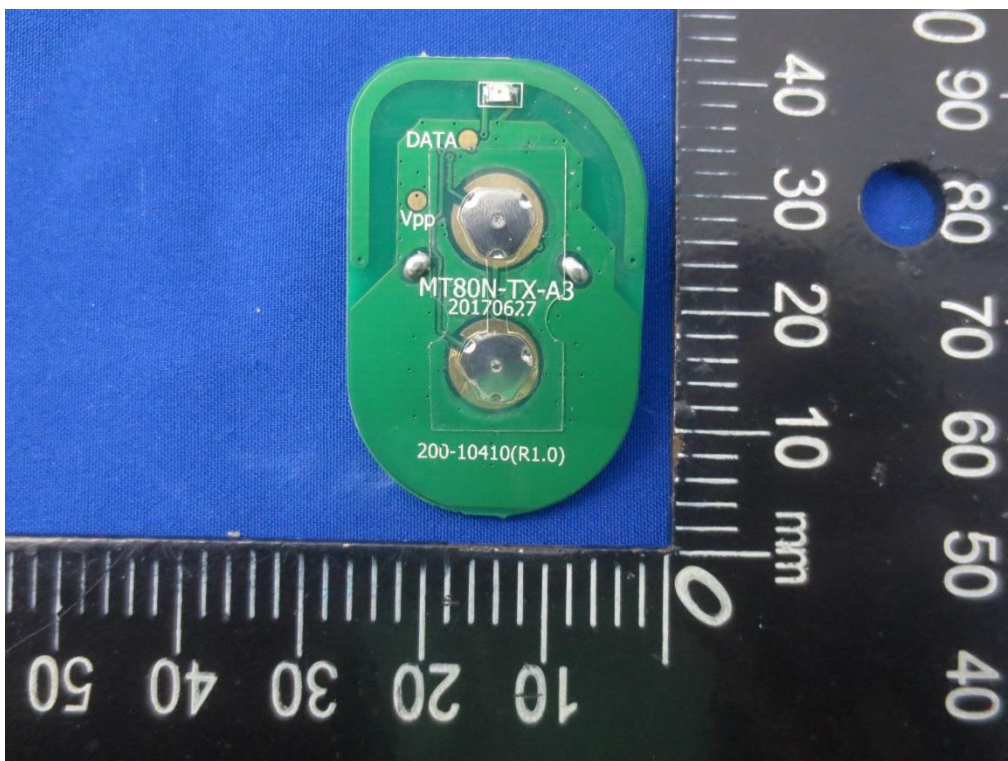
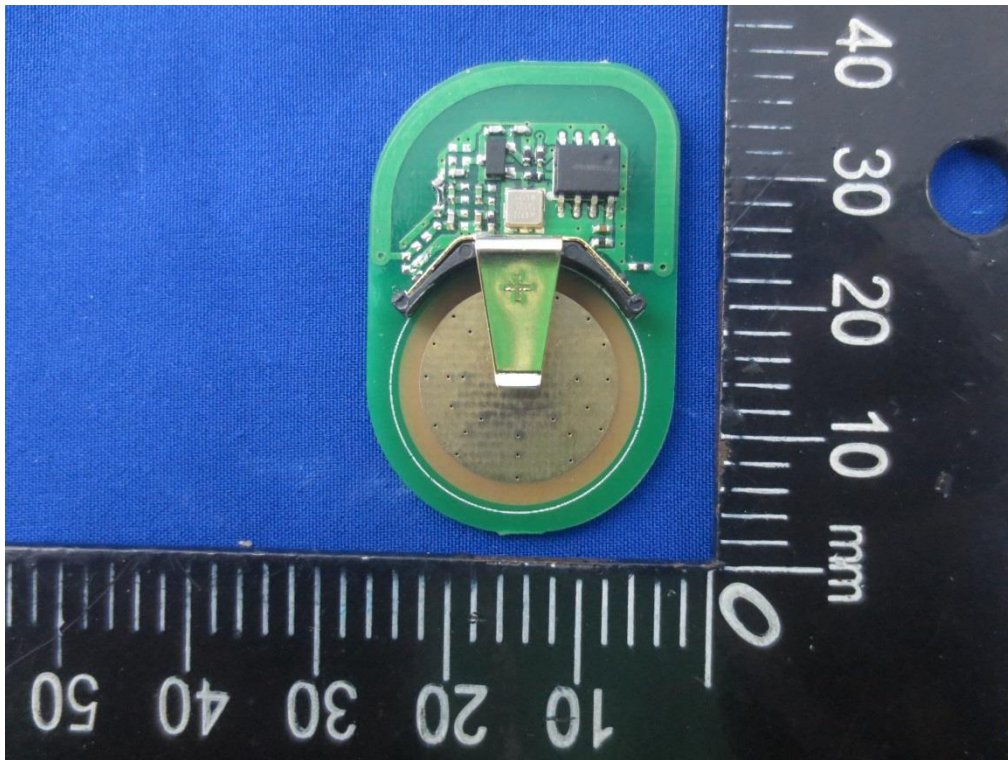
8 EUT Constructional Photos

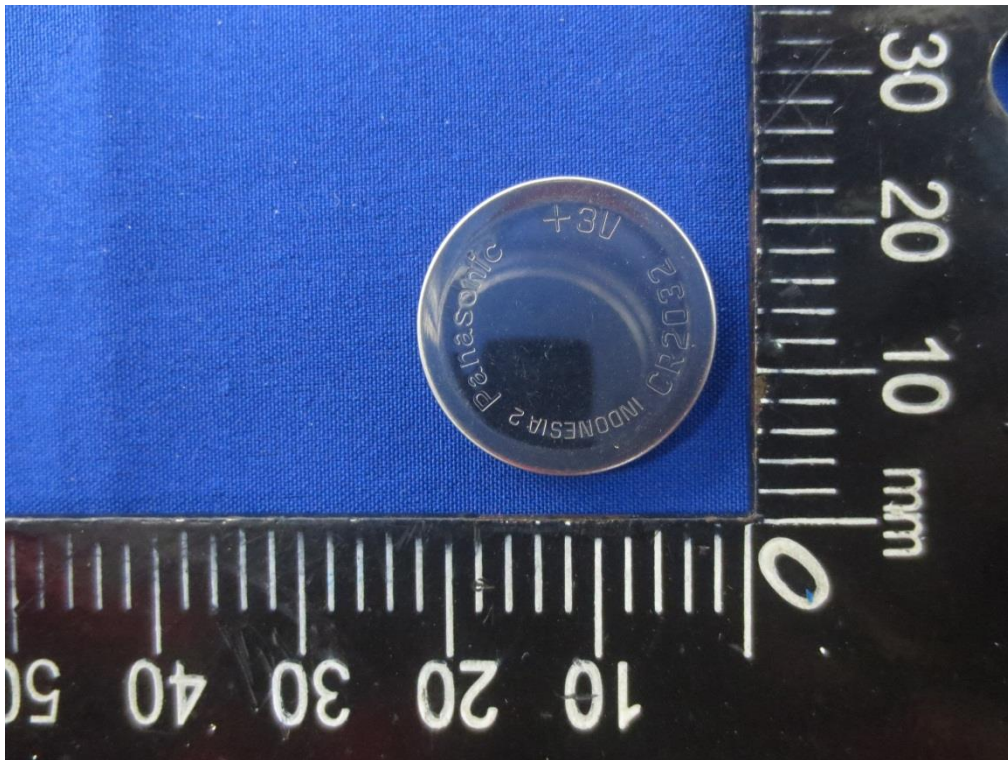
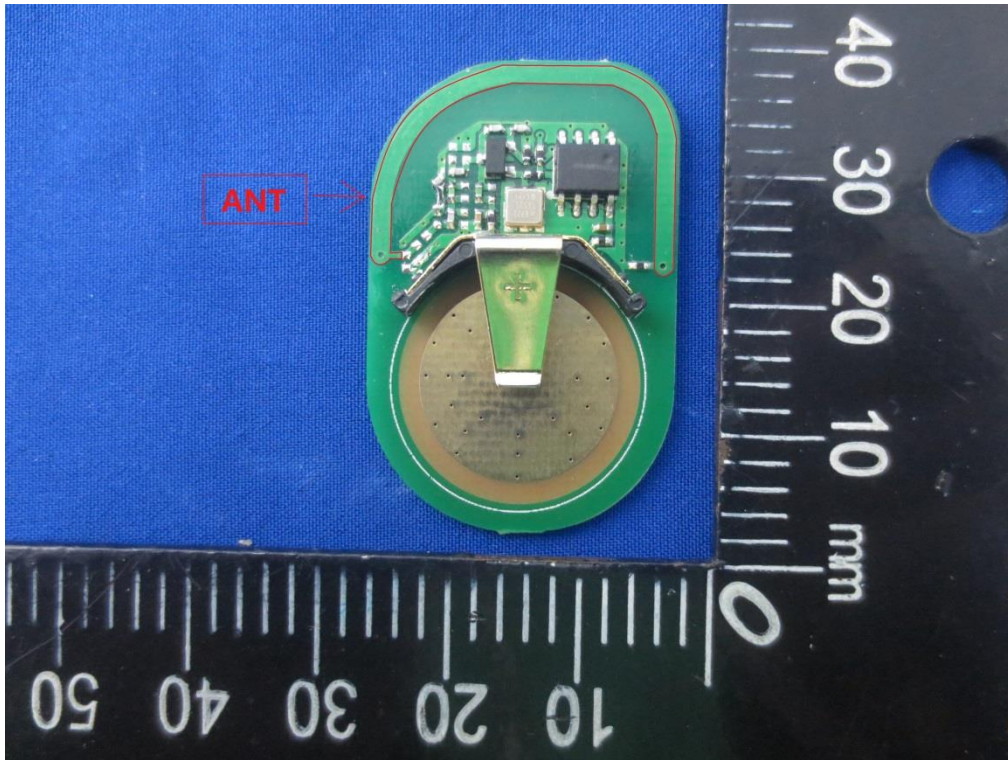


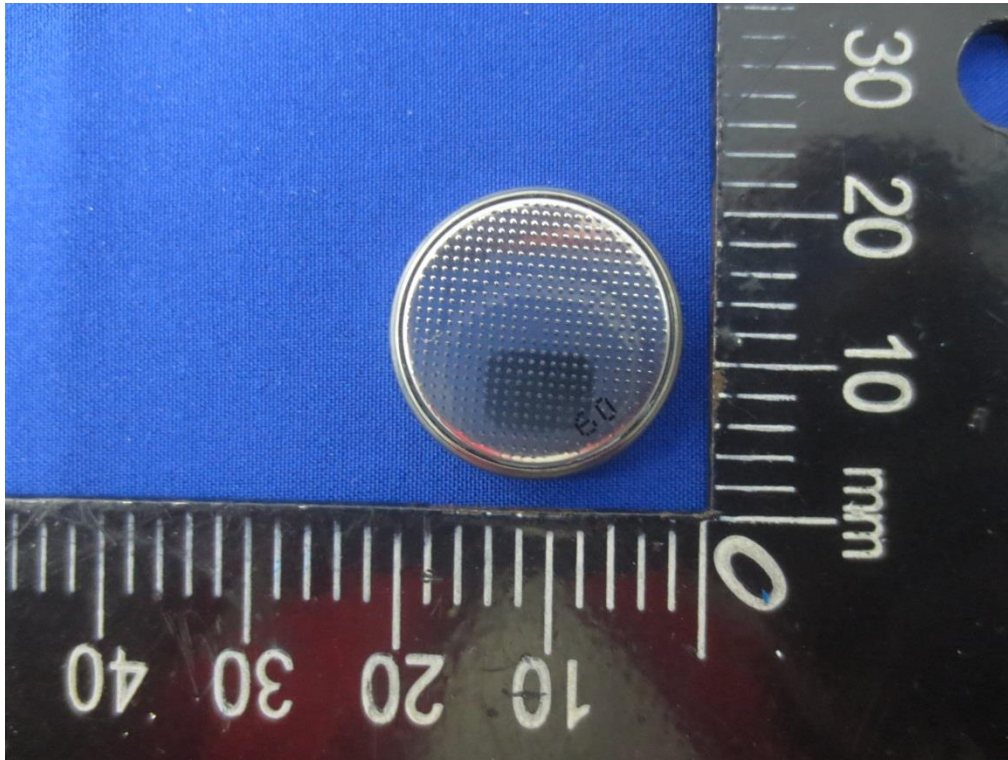












-----End of report-----