FCC TEST REPORT

Product	:	Emitter
Trade mark	:	N/A
Model/Type reference	:	MTR019, MTR020, MTR021
Serial Number	:	N/A
Report Number	:	EED32L000795
FCC ID	:	2AS56MTR020
Date of Issue	:	May 22, 2019
Test Standards	:	47 CFR Part 15 Subpart C
Test result	:	PASS

Prepared for:

Ningbo Baiduode Electronics Co., Ltd.
1317 Wuxiang East Road, Yinzhou District, Ningbo, Zhejiang, China

Prepared by:

Centre Testing International Group Co., Ltd.
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Tested by: Tay zheng Compiled by: Kevin Lan

Reviewed by: Wave Xin Approved by: Kevin Tang

Date: May 22, 2019 Check No.:2448788466

2 Version

Version No.	Date	Description
00	May 22, 2019	Original

3 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Field Strength of the Fundamental Signal	47 CFR Part 15 Subpart C Section 15.231 (b)	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.231 (b)/15.209	ANSI C63.10-2013	PASS
20dB Bandwidth	47 CFR Part 15 Subpart C Section 15.231 (c)	ANSI C63.10-2013	PASS
Dwell Time	47 CFR Part 15 Subpart C Section 15.231 (a)(1)	ANSI C63.10-2013	PASS

Remark:
The tested sample(s) and the sample information are provided by the client.
Model No.: MTR019, MTR020, MTR021
Only the model MTR021 was tested, since MTR019 is a single button, MTR020 is two buttons, MTR021 is three buttons, other components and PCB is exactly the same.

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5 General Information

5.1 Client Information

Applicant:	Ningbo Baiduode Electronics Co., Ltd.
Address of Applicant:	1317 Wuxiang East Road, Yinzhou District, Ningbo, Zhejiang, China
Manufacturer:	Ningbo Baiduode Electronics Co., Ltd.
Address of Manufacturer:	1317 Wuxiang East Road, Yinzhou District, Ningbo, Zhejiang, China
Factory:	Ningbo Baiduode Electronics Co., Ltd.
Address of Factory:	1317 Wuxiang East Road, Yinzhou District, Ningbo, Zhejiang, China

5.2 General Description of EUT

Product Name:	Emitter
Model No.:	MTR019, MTR020, MTR021
Test Model No.:	MTR021
Trade Mark:	N/A
EUT Supports Radios application:	433.92MHz
Power Supply:	LITHIUM BATTERY CR2032 3V
Hardware Version:	V1.0 (manufacturer declare)
Firmware Version:	V2.2 (manufacturer declare)

5.3 Product Specification subjective to this standard

Frequency Range:	433.92MHz
Modulation Type:	ASK
Number of Channels:	1 (declared by the client)
Sample Type:	Portable production
Antenna type:	PCB antenna
Antenna gain:	6dBi
Test voltage:	LITHIUM BATTERY CR2032 3V
Sample Received Date:	Apr. 18, 2019
Sample tested Date:	Apr. 24, 2019 to Apr. 26, 2019

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	25 °C
Humidity:	52 % RH
Atmospheric Pressure:	1010mbar
Test mode:	
TX mode:	The EUT transmitted the continuous signal （new battery is used ）

5.5 Description of Support Units

The EUT has been tested independently.

5.6 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China 518101
Telephone: +86 (0) 755 3368 3668 Fax:+86 (0) 755 3368 3385
No tests were sub-contracted.
FCC Designation No.: CN1164

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

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

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

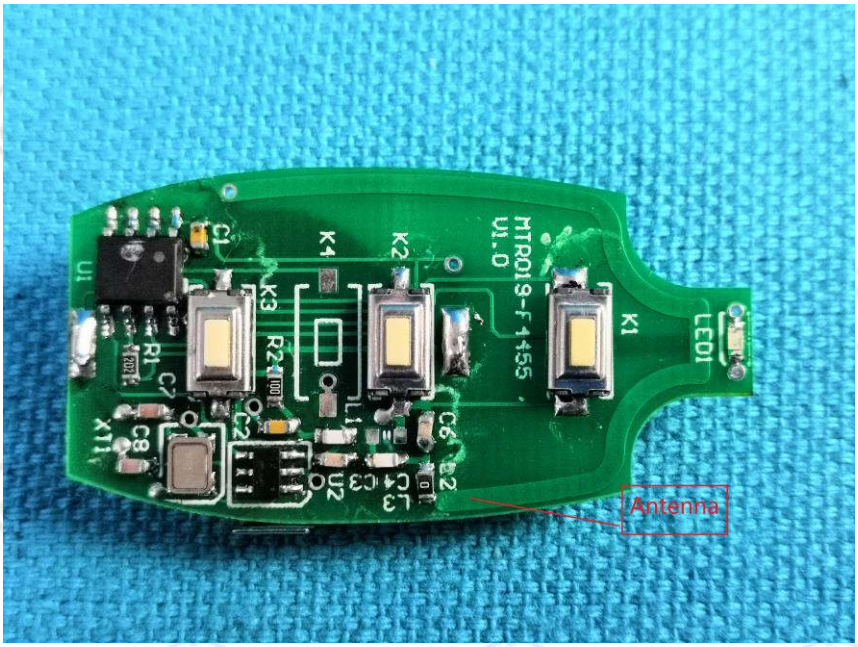
6 Equipment List

RF Conducted test					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
Spectrum Analyzer	R&S	FSP40	100416	04-28-2019	04-26-2020
Temperature/Humidity Indicator	----	HTC-1	N/A	04-30-2019	04-28-2020

3M Semi/full-anechoic Chamber					
Equipment	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm-dd-yyyy)**	**Cal. Due date (mm-dd-yyyy)**
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06-04-2016	06-03-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-401	12-21-2018	12-20-2019
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	07-30-2018	07-29-2019
Microwave Preamplifier	Agilent	8449B	3008A02425	08-21-2018	08-20-2019
Microwave Preamplifier	Tonscend	EMC051845SE	980380	01-16-2019	01-15-2020
Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1869	04-25-2018	04-23-2021
Horn Antenna	ETS-LINDGREN	3117	00057410	06-05-2018	06-03-2021
Double ridge horn antenna	A.H.SYSTEMS	SAS-574	374	06-05-2018	06-04-2021
Pre-amplifier	A.H.SYSTEMS	PAP-1840-60	6041.6041	08-08-2018	08-07-2019
Preamplifier	EMCI	EMC001330	980563	06-20-2018	06-19-2019
Loop Antenna	ETS	6502	00071730	06-22-2017	06-21-2019
Spectrum Analyzer	R&S	FSP40	100416	05-11-2018 04-28-2019	05-10-2019 04-26-2020
Receiver	R&S	ESCI	100435	05-25-2018	05-24-2019
Receiver	R&S	ESCI7	100938-003	11-23-2018	11-22-2019
Multi device Controller	maturo	NCD/070/10711112	---	01-09-2019	01-08-2020
Signal Generator	Agilent	E4438C	MY45095744	03-01-2019	02-28-2020
Signal Generator	Keysight	E8257D	MY53401106	03-01-2019	02-28-2020
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	10-12-2018	10-11-2019
Communication test set	Agilent	E5515C	GB47050534	03-01-2019	02-28-2020
Cable line	Fulai(7M)	SF106	5219/6A	01-09-2019	01-08-2020
Cable line	Fulai(6M)	SF106	5220/6A	01-09-2019	01-08-2020
Cable line	Fulai(3M)	SF106	5216/6A	01-09-2019	01-08-2020
Cable line	Fulai(3M)	SF106	5217/6A	01-09-2019	01-08-2020
Communication test set	R&S	CMW500	104466	01-18-2019	01-17-2020
High-pass filter	Sinoscite	FL3CX03WG18NM12-0398-002	---	01-09-2019	01-08-2020
High-pass filter	MICRO-TRONICS	SPA-F-63029-4	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA09CL12-0395-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08CL12-0393-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04CL12-0396-002	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03CL12-0394-001	---	01-09-2019	01-08-2020

7 Test results and Measurement Data

7.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203
15.203 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, 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.	
EUT Antenna:	
The antenna is PCB antenna and no consideration of replacement. The best case gain of the antenna is 6dBi.	

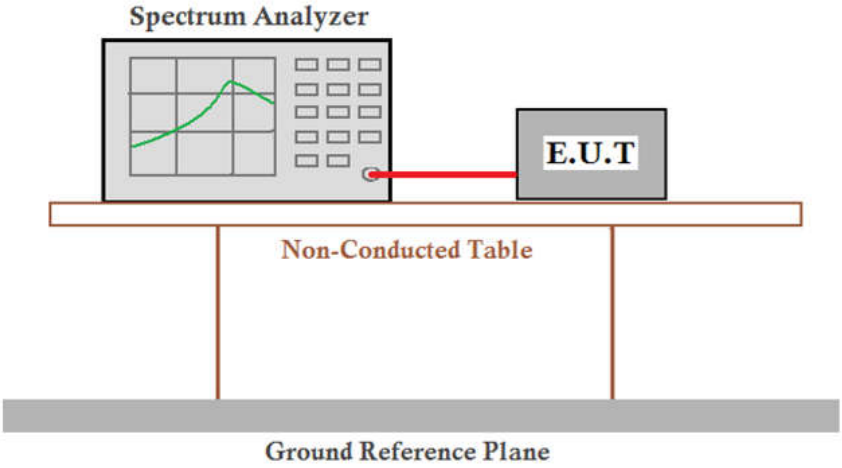
7.2 Spurious Emissions

7.2.1 Duty Cycle

Test Requirement: 47 CFR Part 15C Section 15.35 (c)

Test Method: ANSI C63.10

Test Setup:



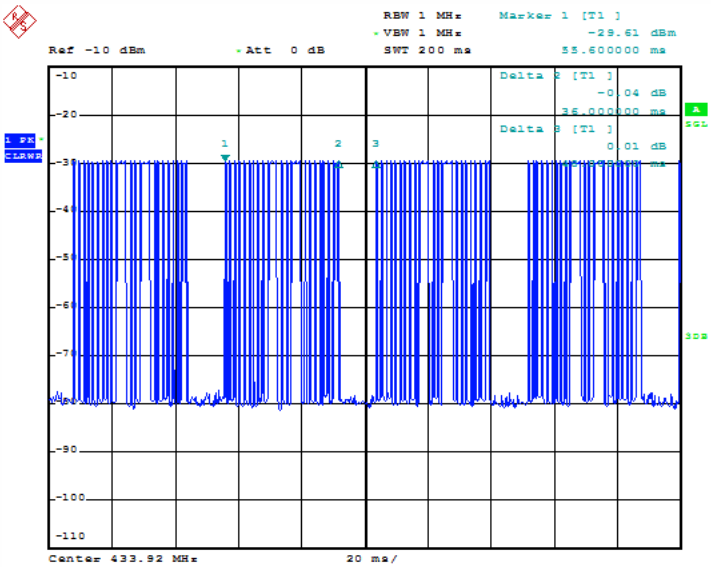
Limit: N/A

Test Mode: TX mode

Instruments Used: Refer to section 6 for details

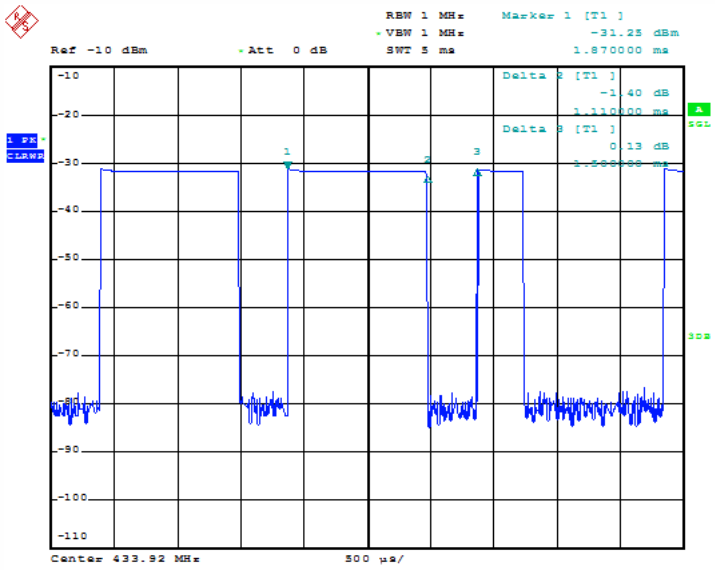
Test Results: Pass

Test plot as follows:

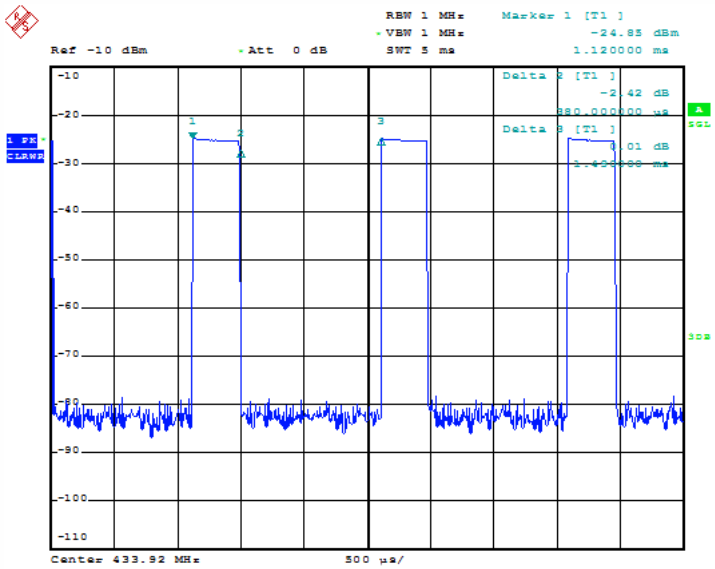


Date: 26.APR.2019 14:48:08

Time slot:



Date: 26.APR.2019 14:45:25



Date: 26.APR.2019 14:46:29

7.2.2 Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.231(b) and 15.209

Test Method: ANSI C63.10

Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Test Setup:

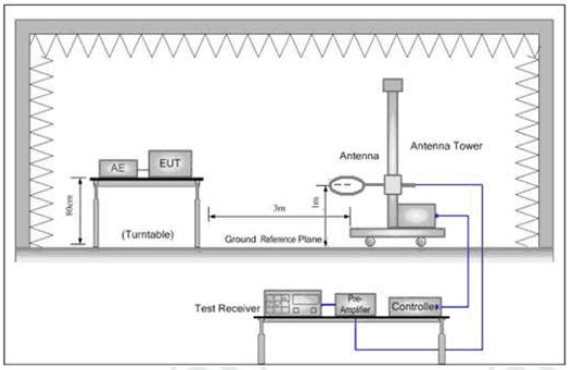


Figure 1. Below 30MHz

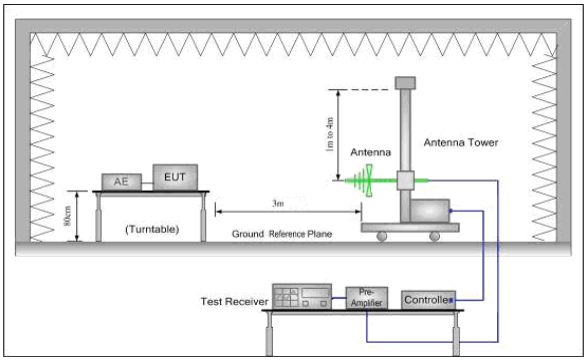


Figure 2. 30MHz to 1GHz

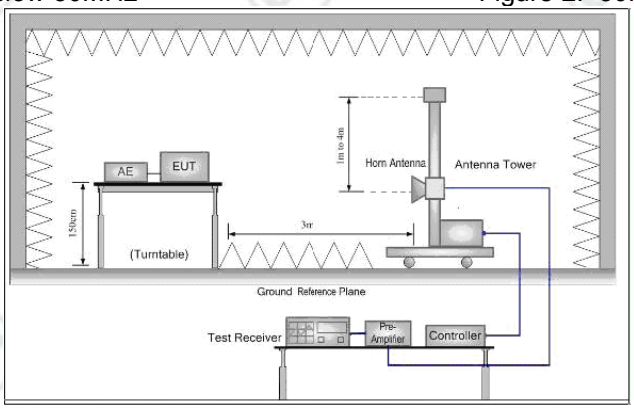


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
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.
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.
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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
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.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,middle channel, the Highest channel
i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.
j. Repeat above procedures until all frequencies measured was complete.

Limit: (Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBμV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Limit: (Field strength of the fundamental signal)

Frequency	Limit (dBμV/m @3m)	Remark
433.92MHz	80.8	Average Value
	100.8	Peak Value

Test Mode: TX mode

Instruments Used: Refer to section 6 for details

Test Results: Pass

Test data

Field Strength of the Fundamental Signal

Frequency (MHz)	Correct Factor (dB)	Read Level (dBuV)	Peak Value (dBμV/m)	PDCF (dB)	Average value (dBuV/m)	Average Limit (dBμV/m)	Over Limit (dB)	Polarization
433.920	17.00	64.10	81.10	-12.05	69.05	80.8	-11.75	H
433.920	17.00	61.52	78.52	-12.05	66.47	80.8	-14.33	V

Average value:	
Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =(1.11×3+0.38×22)ms=11.69ms
	T period =46.8ms
	PDCF= 20 log(Duty cycle)=20 log(11.69/46.8)= -12.05dB

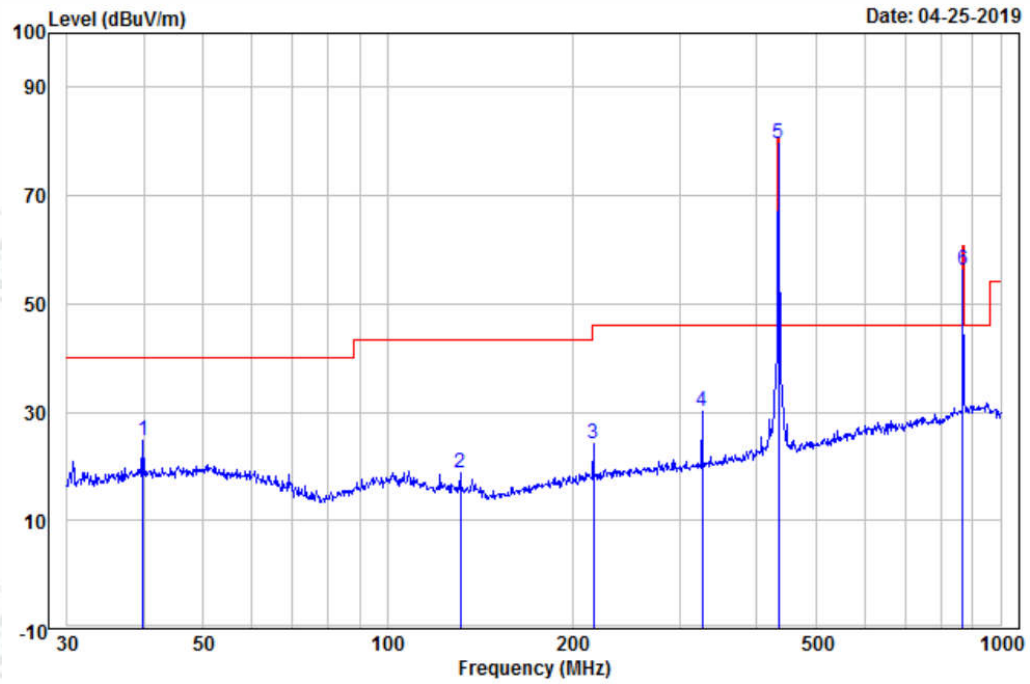
Test data

Spurious Emissions

30MHz-1GHz

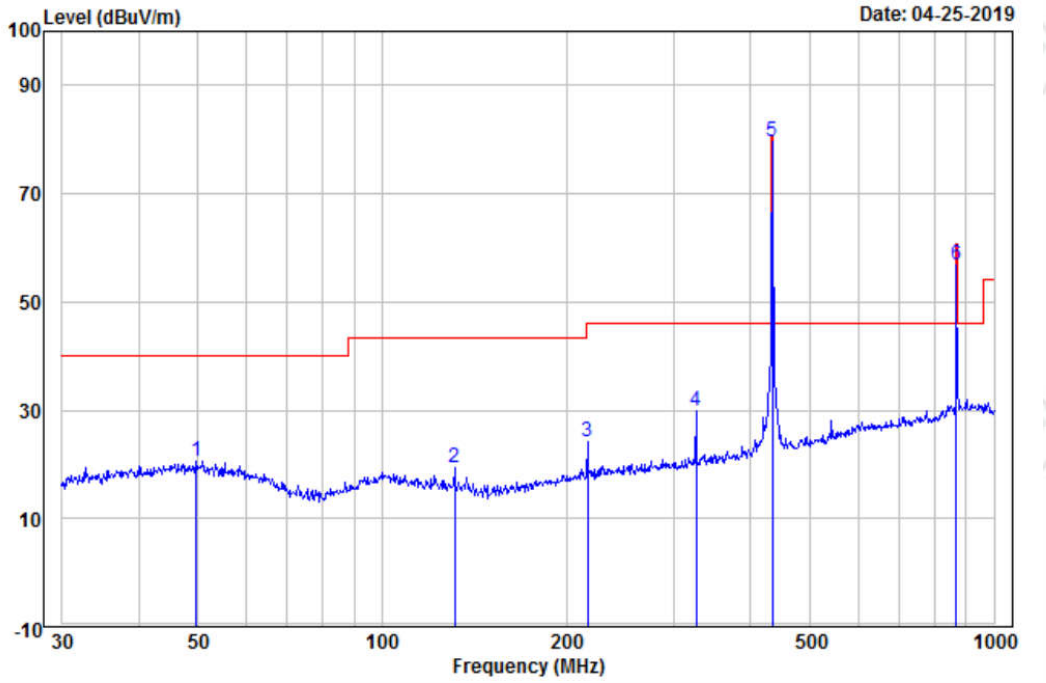
QP value:

Horizontal



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	39.854	13.78	0.05	11.00	24.83	40.00	-15.17	Horizontal	
2	131.297	10.02	0.60	8.12	18.74	43.50	-24.76	Horizontal	
3	216.783	11.90	1.19	11.11	24.20	46.00	-21.80	Horizontal	
4	325.596	13.93	1.20	14.91	30.04	46.00	-15.96	Horizontal	
5	434.065	15.89	1.42	62.35	79.66	80.80	-1.14	Horizontal	
6	869.130	21.61	2.47	32.11	56.19	60.80	-4.61	Horizontal	

Vertical



	Freq	Ant Factor	Cable Loss	Read Level	Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB		
1	49.707	14.58	0.11	5.93	20.62	40.00	-19.38	Vertical	
2	131.297	10.02	0.60	8.88	19.50	43.50	-24.00	Vertical	
3	216.783	11.90	1.19	11.11	24.20	46.00	-21.80	Vertical	
4	325.596	13.93	1.20	14.72	29.85	46.00	-16.15	Vertical	
5	434.065	15.89	1.42	62.17	79.48	80.80	-1.32	Vertical	
6	869.130	21.61	2.47	32.91	56.99	60.80	-3.81	Vertical	

Above 1GHz

Peak value:

Frequency (MHz)	Height (cm)	Azimuth (deg)	Correct Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Antenna Polaxis
1301.332	150	103	-7.63	45.33	80.80	-35.47	H
1733.375	150	256	-7.31	44.95	80.80	-35.85	H
2168.51	150	173	-3.72	43.19	80.80	-37.61	H
3037.063	150	263	-2.87	43.17	80.80	-37.63	H
3909.967	150	298	1.01	42.45	80.80	-38.35	H
4338.163	150	222	1.13	42.72	80.80	-38.08	H
1301.332	150	106	-7.81	47.16	80.80	-33.64	V
1736.483	150	251	-4.59	46.94	80.80	-33.86	V
2168.510	150	179	-3.96	45.52	80.80	-35.28	V
3037.063	150	265	-2.42	45.29	80.80	-35.51	V
4338.163	150	227	2.44	43.08	80.80	-37.72	V
4778.879	150	208	3.28	43.64	80.80	-37.16	V

Remark:

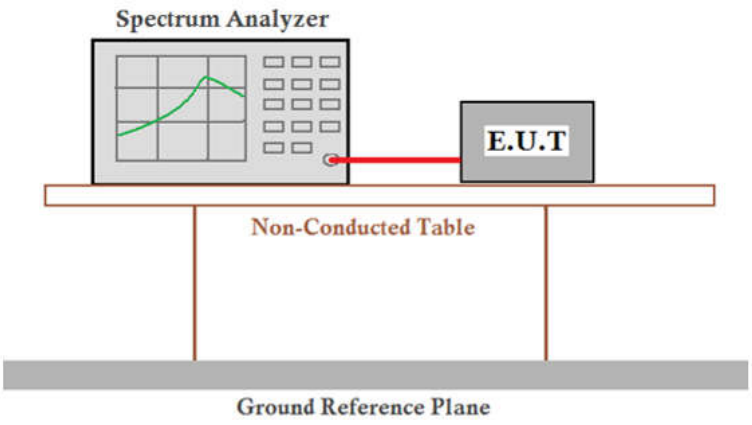
1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
   Final Test Level =Receiver Reading - Correct Factor
   Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor
2) Scan from 9kHz to 6GHz, the disturbance below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

7.3 20dB Bandwidth

Test Requirement: 47 CFR Part 15C Section 15.231 (c)

Test Method: ANSI C63.10

Test Setup:



Limit: 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.

Test Mode: TX mode

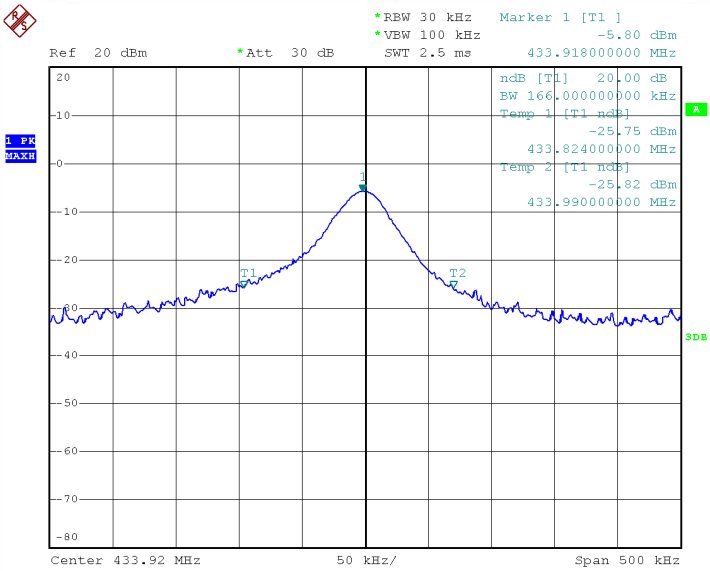
Instruments Used: Refer to section 6 for details

Test Results: Pass

Test data

20dB bandwidth (kHz)	Limit (kHz)	Results
166	1084.78	Pass

Test plot as follows:



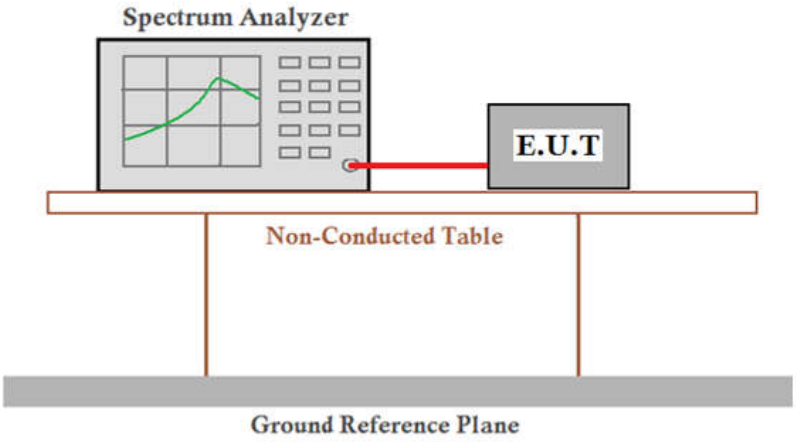
Date: 24.APR.2019 09:47:43

7.4 Dwell Time

Test Requirement: 47 CFR Part 15C Section 15.231 (a) (1)

Test Method: ANSI C63.10

Test Setup:



Limit: Not more than 5 seconds

Test Mode: TX mode

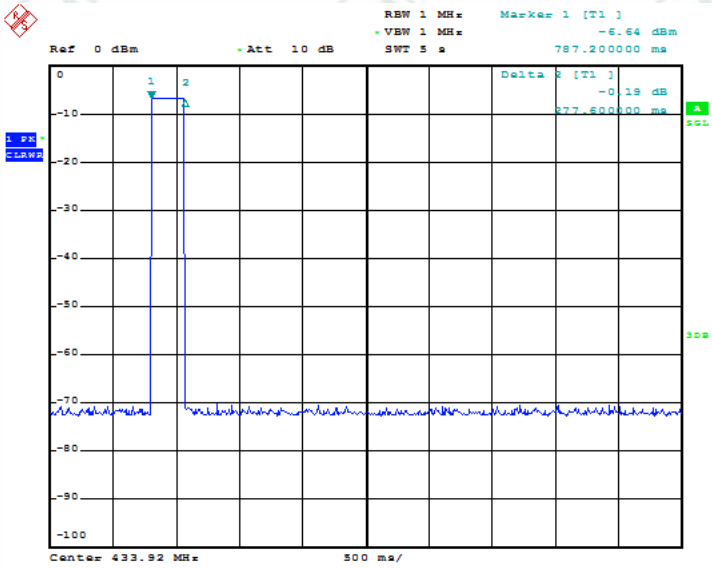
Instruments Used: Refer to section 6 for details

Test Results: Pass

Test data:

Test item	Test value	Limit (MHz)	Results
Transmitting time	0.2776s	≤5s	Pass

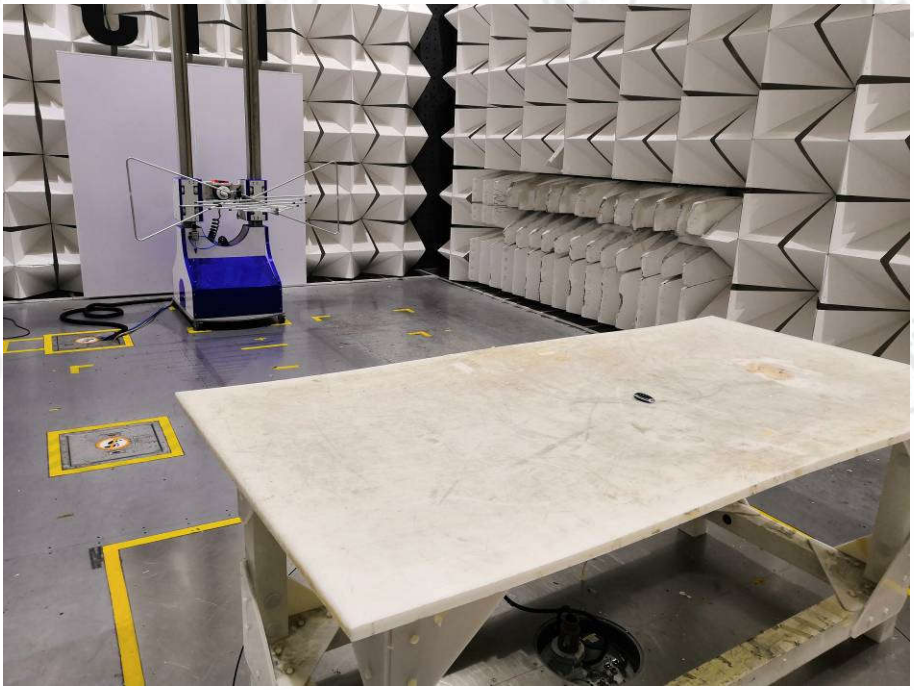
Test plot as follows:



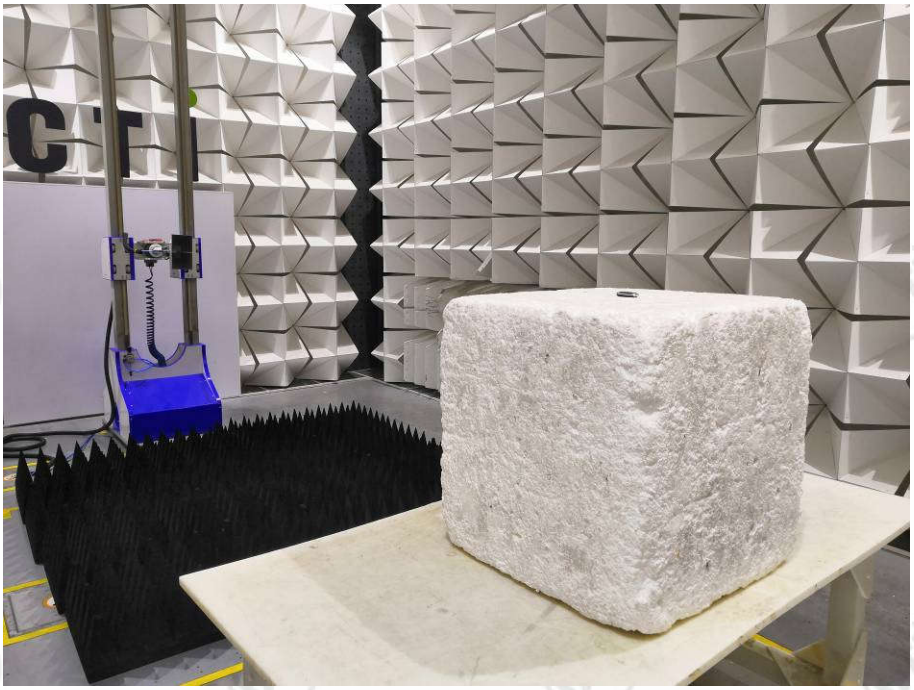
Date: 25.APR.2019 11:50:16

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test Model No.: MTR021



Radiated spurious emission Test Setup-1 (30MHz～1GHz)



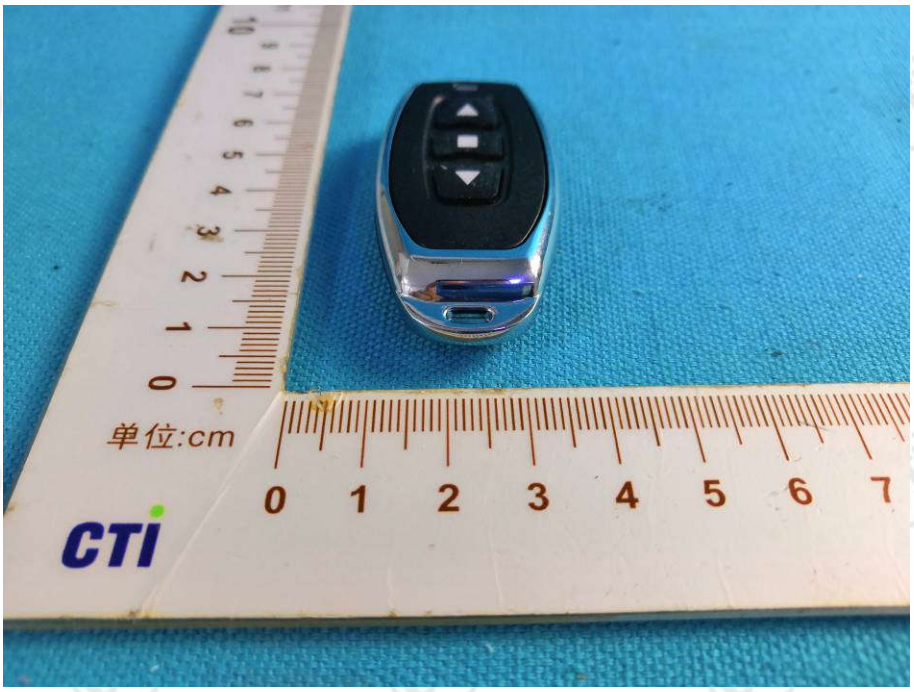
Radiated spurious emission Test Setup-2(Above 1GHz)

APPENDIX 2 PHOTOGRAPHS OF EUT

Test model No.: MTR021

View of Product-1

View of Product-2



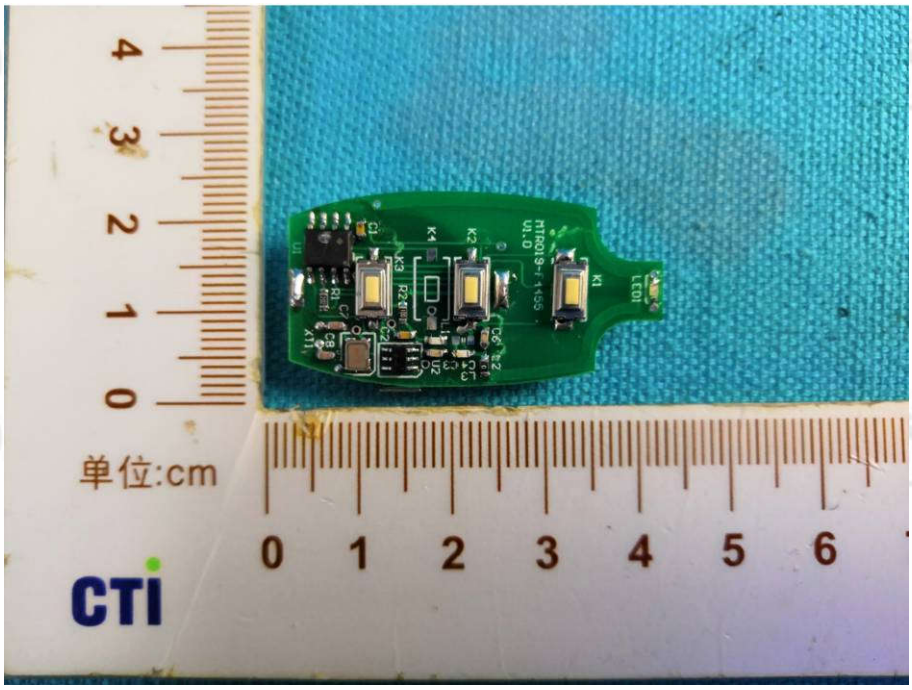
View of Product-3

View of Product-4

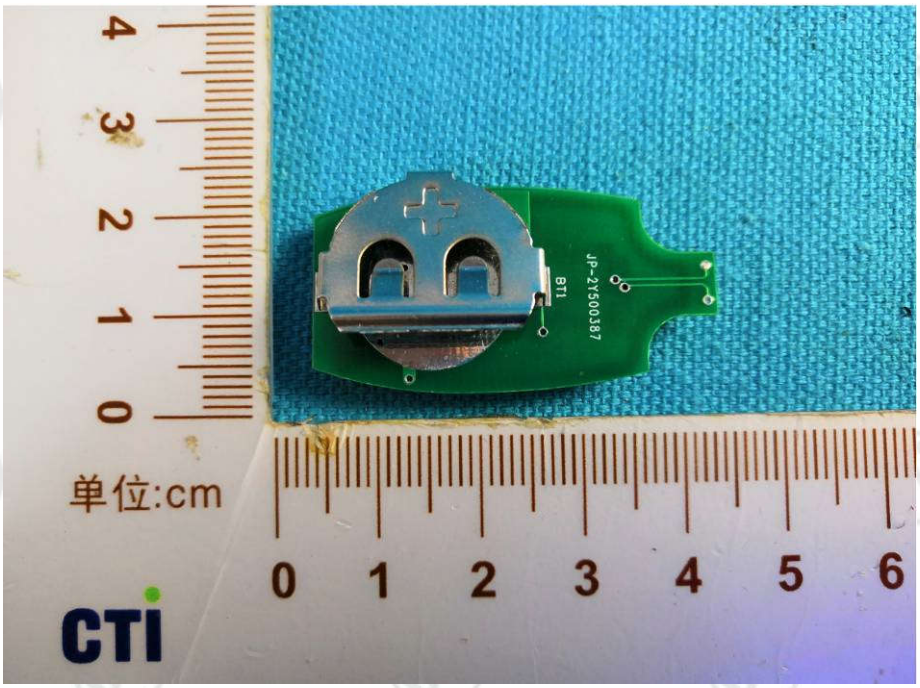
View of Product-5

View of Product-6

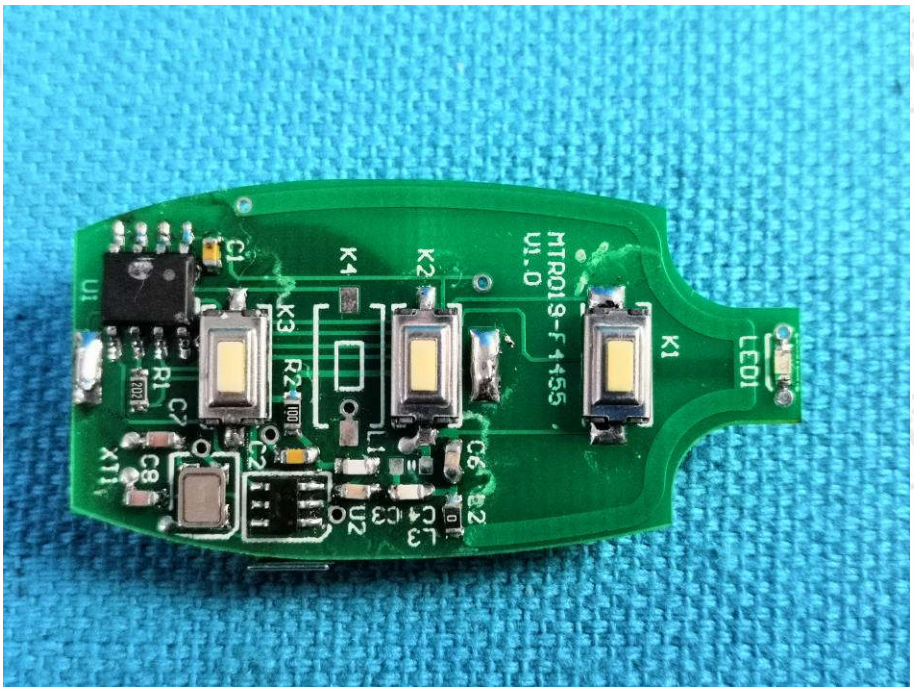
View of Product-7



View of Product-8



View of Product-9



View of Product-10

*** End of Report ***

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