

TEST REPORT

Product Name : wireless remote
Brand Mark : N/A
Model No. : LDTR
FCC ID : 2AWOX-LDTR
Report Number : BLA-EMC-202006-A23-01
Date of Sample Receipt : 2020/6/11
Date of Test : 2020/6/11 to 2020/6/17
Date of Issue : 2020/7/1
Test Standard : 47 CFR Part 15, Subpart C 15.231
Test Result : Pass

Prepared for:

Keystone Automotive Operations, Inc.
44 Tunkhannock Avenue Exeter, PA 18643 ,United States

Prepared by:

BlueAsia of Technical Services(Shenzhen) Co.,Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China
TEL: +86-755-28682673
FAX: +86-755-28682673

Compiled by: *Jason*

Review by: *Sweet. Liang*

Approved by: *Jamen Li*

Date: 2020/7/1



REPORT REVISE RECORD

Version No.	Date	Description
00	2020/7/1	Original

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1 TEST SUMMARY

Test item	Test Requirement	Test Method	Class/Severity	Result
Radiated Emissions	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.4&6.5&6.6	47 CFR Part 15, Subpart C 15.231(b)	Pass
Field Strength of the Fundamental Signal (15.231(b))	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.5	47 CFR Part 15, Subpart C 15.231(b)	Pass
Dwell Time (15.231(a))	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 7.8.4	47 CFR Part 15, Subpart C 15.231(a)	Pass
20dB Bandwidth	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.231(c)	Pass
Conducted Emissions at AC Power Line (150kHz-30MHz)	47 CFR Part 15, Subpart C 15.231	ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	N/A
Antenna Requirement	47 CFR Part 15, Subpart C 15.231	N/A	47 CFR Part 15, Subpart C 15.203	Pass

2 GENERAL INFORMATION

Applicant	Keystone Automotive Operations, Inc.
Address	44 Tunkhannock Avenue Exeter, PA 18643 ,United States
Manufacturer	N/A
Address	N/A
Factory	N/A
Address	N/A

3 GENERAL DESCRIPTION OF E.U.T.

Hardware Version	PZYK31508 V1
Software Version	yaokong-24bit-TR V1
Product Name:	wireless remote
Model No.:	LDTR
Operation Frequency:	315MHz
Channel numbers:	1
Modulation type:	ASK
Antenna Type:	PCB antenna
Antenna gain:	3.0dBi
Power supply:	DC 3.0V

4 TEST ENVIRONMENT

Environment	Temperature	Voltage
Normal	25°C	DC3.0V

5 TEST MODE

TEST MODE	TEST MODE DESCRIPTION
Transmitting mode:	Keep the EUT in transmitting mode with modulation

Remark: Only the data of the worst mode would be recorded in this report. new battery is used during all test, X,Y,Z axes all have been tested, only worse case is reported.

6 MEASUREMENT UNCERTAINTY

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission	±4.34dB
Radiated Emission	±4.24dB
Radiated Emission	±4.68dB
AC Power Line Conducted Emission	±3.45dB

Parameter	Expanded Uncertainty (Confidence of 95%)
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1.5 dB
Power Spectral Density, conducted	±3.0 dB
Unwanted Emissions, conducted	±3.0 dB
Temperature	±3 °C
Supply voltages	±3 %
Time	±5 %
Radiated Emission (30MHz ~ 1000MHz)	±4.35 dB
Radiated Emission (1GHz ~ 18GHz)	±4.44 dB

7 DESCRIPTION OF SUPPORT UNIT

Device Type	Manufacturer	Model Name	Serial No.	Remark
--	--	--	--	--

Note:

"--" means no any support device during testing.

8 LABORATORY LOCATION

All tests were performed at:
BlueAsia of Technical Services(Shenzhen) Co., Ltd.
IOT Test Centre of BlueAsia
No. 448 Bulong Road, Bantian Street, Longgang District, Shenzhen,China
Telephone: TEL: +86-755-28682673 FAX: +86-755-28682673
No tests were sub-contracted.

9 TEST INSTRUMENTS LIST

Test Equipment Of Radiated Emissions					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2020
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2020
Amplifier	SKET	LNPA-0118-45	N/A	7/4/2019	7/3/2020
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2022
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Field Strength of the Fundamental Signal (15.231(b))					
Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Chamber	SKET	966	N/A	5/8/2018	5/7/2021
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Receiver	R&S	ESR7	101199	4/20/2020	4/19/2021
broadband Antenna	Schwarzbeck	VULB9168	00836 P:00227	7/14/2018	7/13/2020
Horn Antenna	Schwarzbeck	9120D	01892 P:00331	7/14/2018	7/13/2020

Amplifier	SKET	LNPA-0118-45	N/A	7/4/2019	7/3/2020
EMI software	EZ	EZ-EMC	N/A	N/A	N/A
Loop antenna	SCHNARZBECK	FMZB1519B	00102	2/14/2019	2/13/2022
Controller	SKET	N/A	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-02	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-03	N/A	N/A	N/A
Coaxial Cable	BlueAsia	BLA-XC-01	N/A	N/A	N/A

Test Equipment Of Dwell Time (15.231(a))

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

Test Equipment Of 20dB Bandwidth

Equipment	Manufacturer	Model	S/N	Cal.Date	Cal.Due
Spectrum	R&S	FSP40	100817	7/4/2019	7/3/2020
Spectrum	Agilent	N9020A	MY49100060	12/17/2019	12/16/2020
Signal Generator	Agilent	N5182A	MY49060650	12/17/2019	12/16/2020
Signal Generator	Agilent	E8257D	MY44320250	4/20/2020	4/19/2021

1 RADIATED EMISSIONS

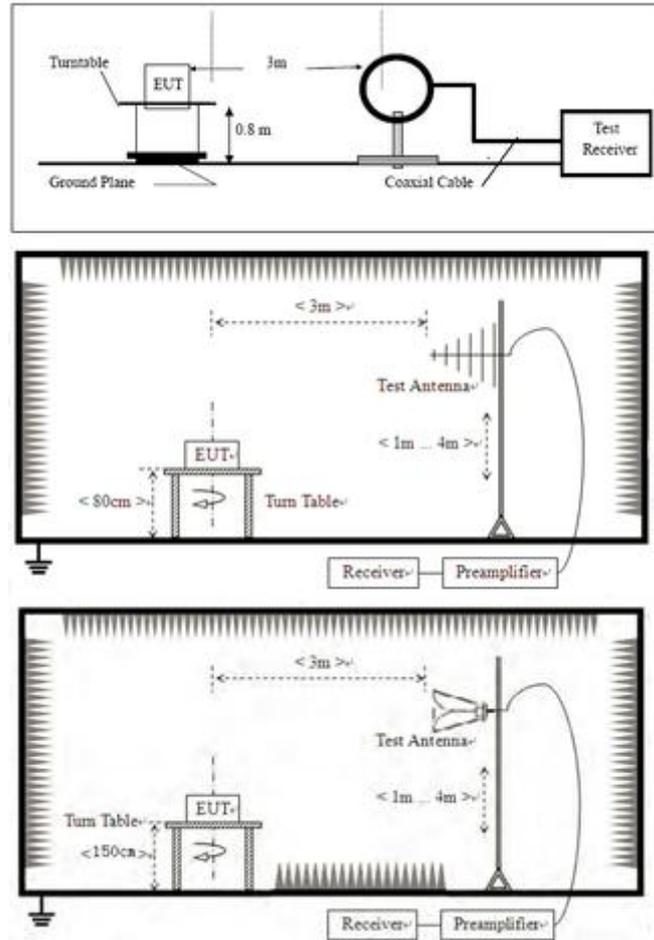
Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 6.4&6.5&6.6
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25°C
Humidity	55%

1.1 LIMITS

Frequency(MHz)	Field strength(microvolts/meter)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.

1.2 BLOCK DIAGRAM OF TEST SETUP

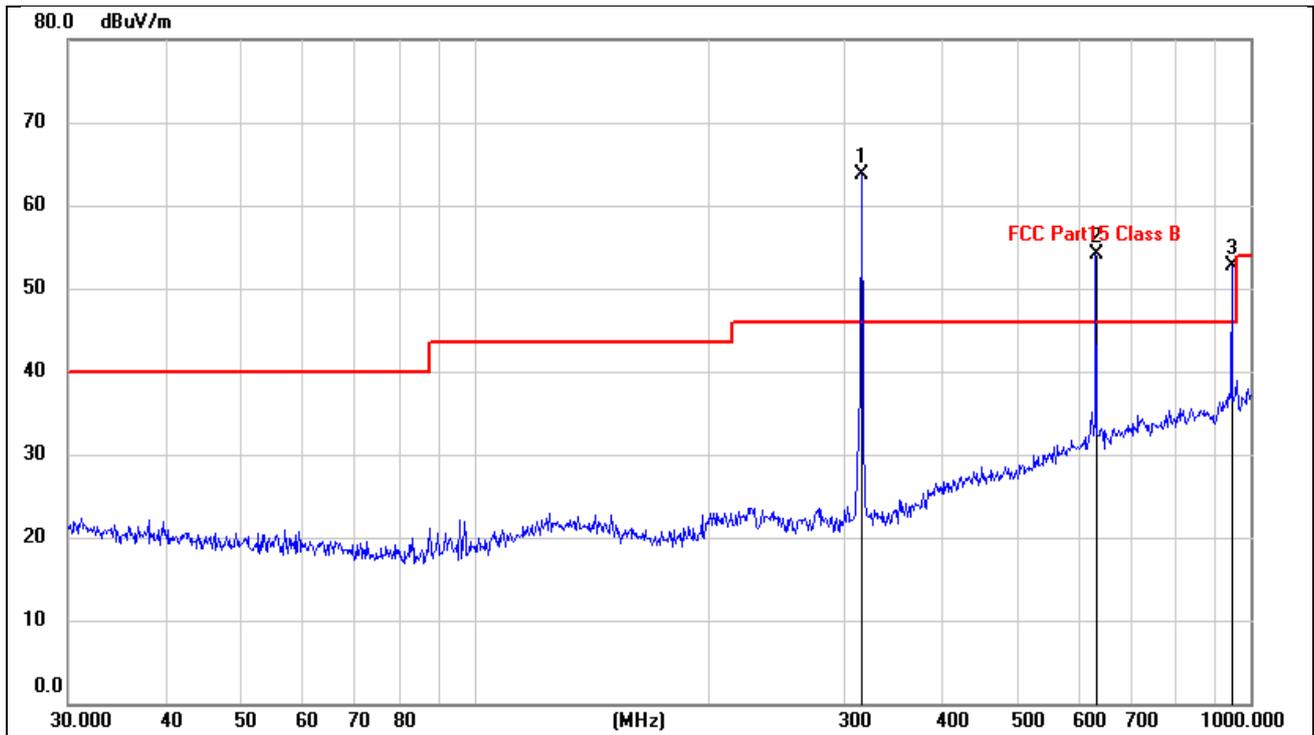


1.3 PROCEDURE

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane. Only the worst position of vertical was shown in the report.

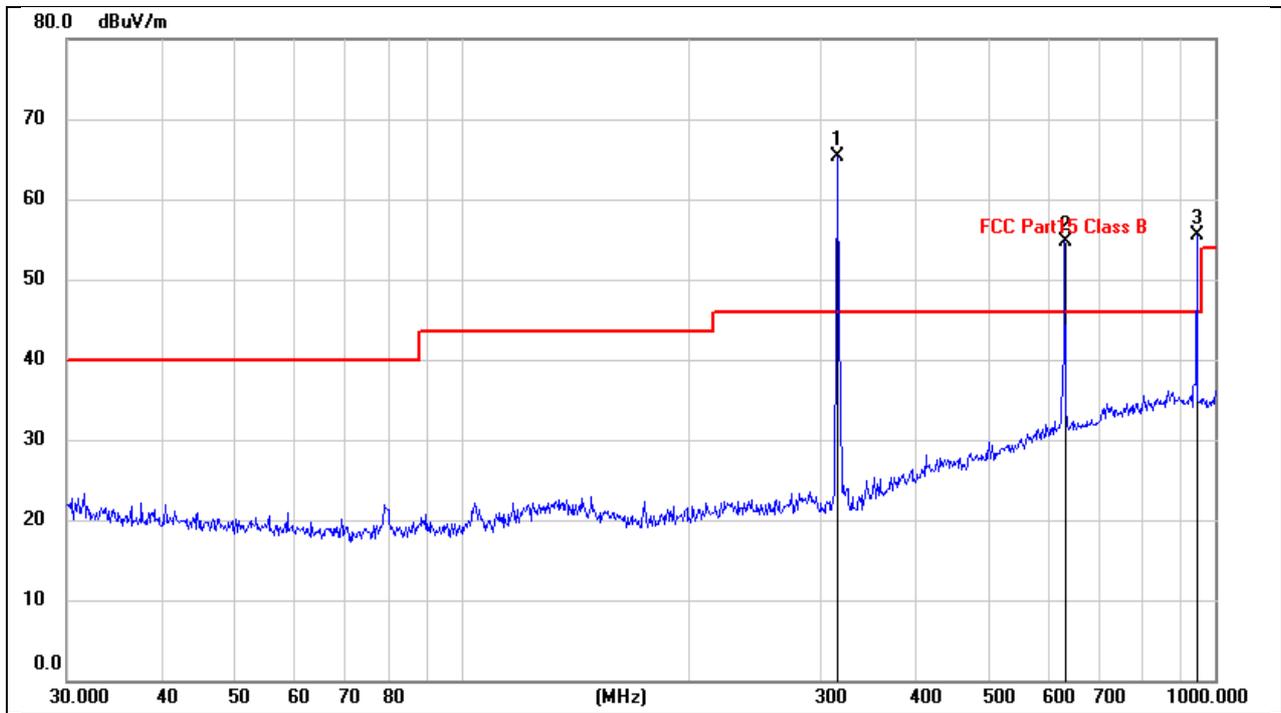
1.4 TEST DATA

Below 1G
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct dB/m	Dutycycle Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	315.4806	39.5	24.29	N/A	63.79	95.67	-31.88	peak
2	315.4806	/	/	-5.27	58.52	75.67	-17.15	Ave
3	631.6884	22.5	31.69	N/A	54.19	75.65	-21.46	peak
4	631.6884	/	/	-5.27	48.92	55.65	-6.73	Ave
5	945.4397	17.05	35.73	N/A	52.78	75.65	-22.87	peak
6	945.4397	/	/	-5.27	47.51	55.65	-8.14	Ave

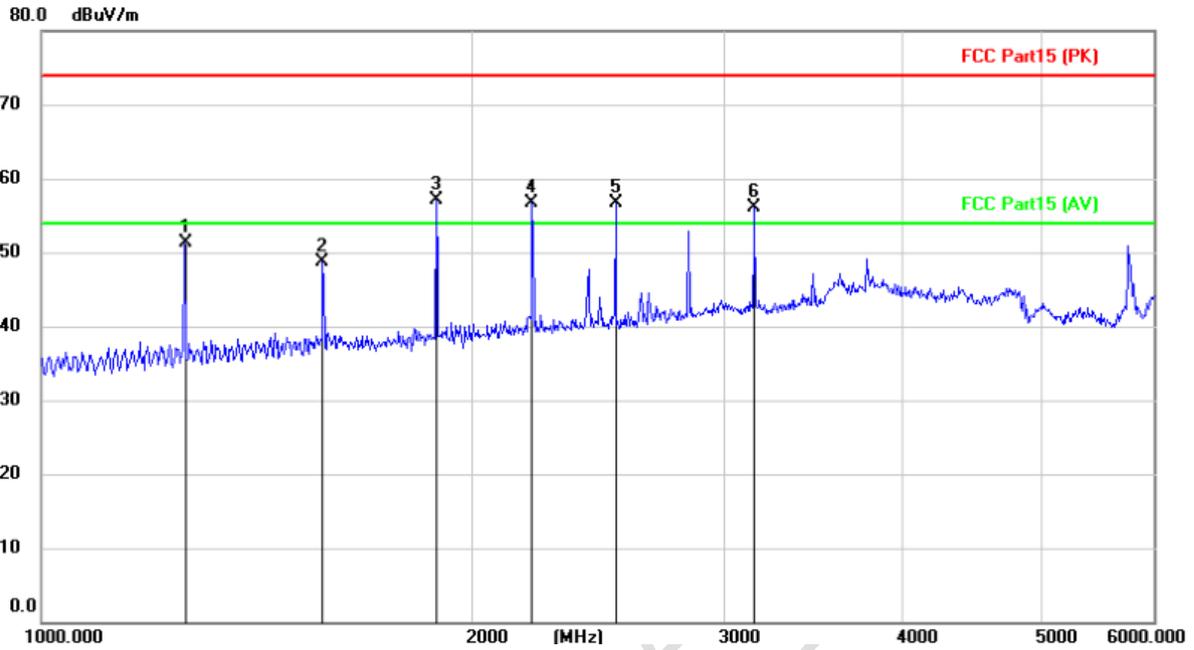
Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Dutycycle Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	315.4806	40.94	24.29	N/A	65.23	95.67	-30.44	peak
2	315.4806	/	/	-5.27	59.96	75.67	-15.71	Ave
3	631.6884	23.01	31.69	N/A	54.7	75.65	-20.95	peak
4	631.6884	/	/	-5.27	49.43	55.65	-6.22	Ave
5	945.4397	19.73	35.73	N/A	55.46	75.65	-20.19	peak
6	945.4397	/	/	-5.27	50.19	55.65	-5.46	Ave

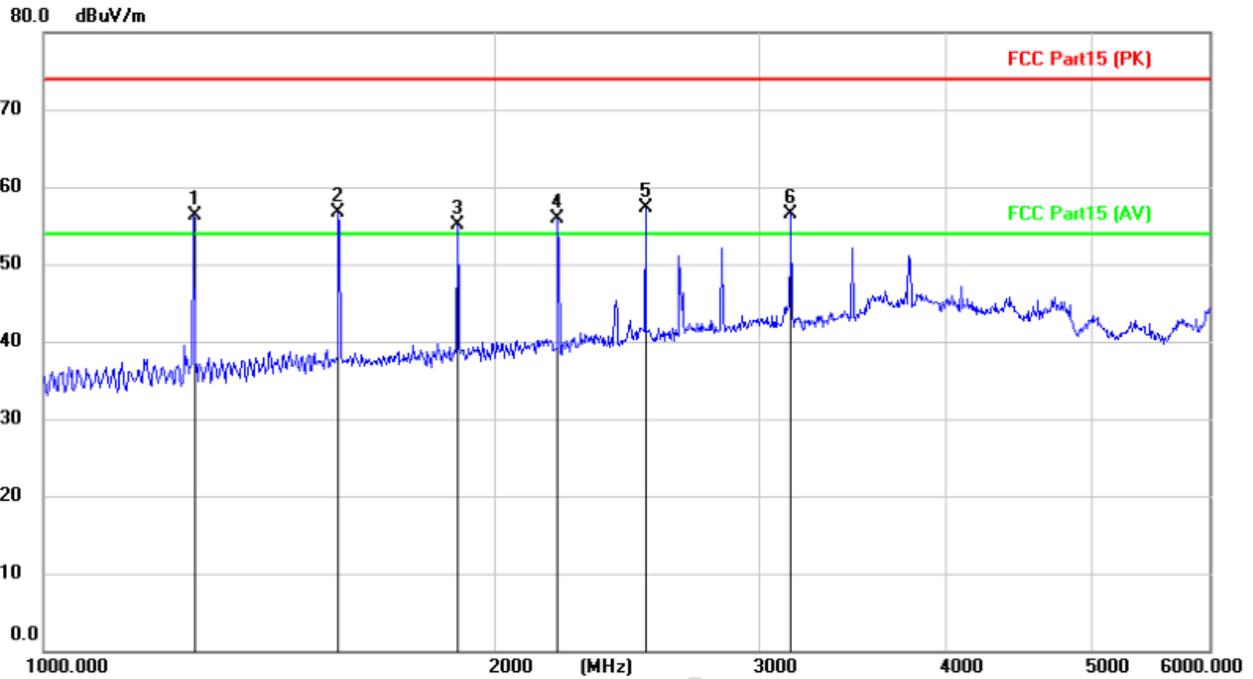
Above 1GHz

Peak value:
Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Dutycycle Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1260.032	60.8	-9.41	N/A	51.39	74	-22.61	peak
2	1260.032	/	/	-5.27	46.12	54	-7.88	AVG
3	1573.52	56.24	-7.55	N/A	48.69	74	-25.31	peak
4	1573.52	/	/	-5.27	43.42	54	-10.58	AVG
5	1889.051	63.32	-6.22	N/A	57.1	74	-16.9	peak
6	1889.051	/	/	-5.27	51.83	54	-2.17	AVG
7	2203.762	61.39	-4.77	N/A	56.62	74	-17.38	peak
8	2203.762	/	/	-5.27	51.35	54	-2.65	AVG
9	2520.728	59.87	-3.21	N/A	56.66	74	-17.34	peak
10	2520.728	/	/	-5.27	51.39	54	-2.61	AVG
11	3153.515	56.61	-0.54	N/A	56.07	74	-17.93	peak
12	3153.515	/	/	-5.27	50.8	54	-3.2	AVG

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Dutycycle Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1260.032	65.94	-9.71	N/A	56.23	74	-17.77	peak
2	1260.032	/	/	-5.27	50.96	54	-3.04	AVG
3	1573.52	64.54	-7.82	N/A	56.72	74	-17.28	peak
4	1573.52	/	/	-5.27	51.45	54	-2.55	AVG
5	1889.051	61.37	-6.36	N/A	55.01	74	-18.99	peak
6	1889.051	/	/	-5.27	49.74	54	-4.26	AVG
7	2203.762	60.88	-4.99	N/A	55.89	74	-18.11	peak
8	2203.762	/	/	-5.27	50.62	54	-3.38	AVG
9	2520.728	60.82	-3.59	N/A	57.23	74	-16.77	peak
10	2520.728	/	/	-5.27	51.96	54	-2.04	AVG
11	3153.515	57.02	-0.58	N/A	56.44	74	-17.56	peak
12	3153.515	/	/	-5.27	51.17	54	-8.11	AVG

2 FIELD STRENGTH OF THE FUNDAMENTAL SIGNAL

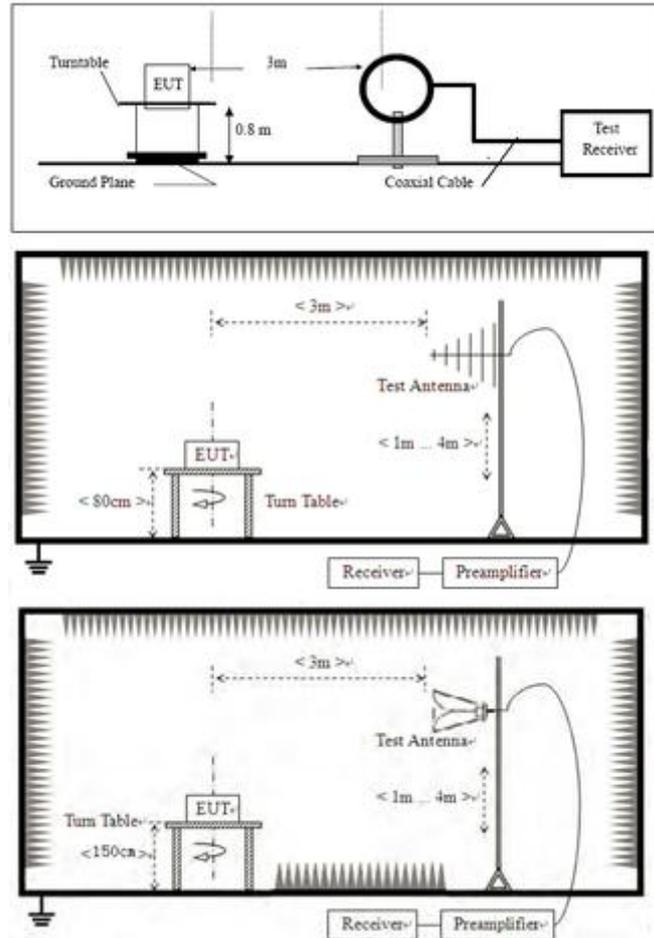
Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 6.5
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25°C
Humidity	55%

2.1 LIMITS

Fundamental frequency(MHz)	Field strength of fundamental(microvolts/meter)	Field strength of spurious emissions(microvolts/meter)
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

Remark: the emission limit is based on measurement instrumentation employing an average detector at a distance of 3 meters. The frequencies above 1000MHz 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.

2.2 BLOCK DIAGRAM OF TEST SETUP



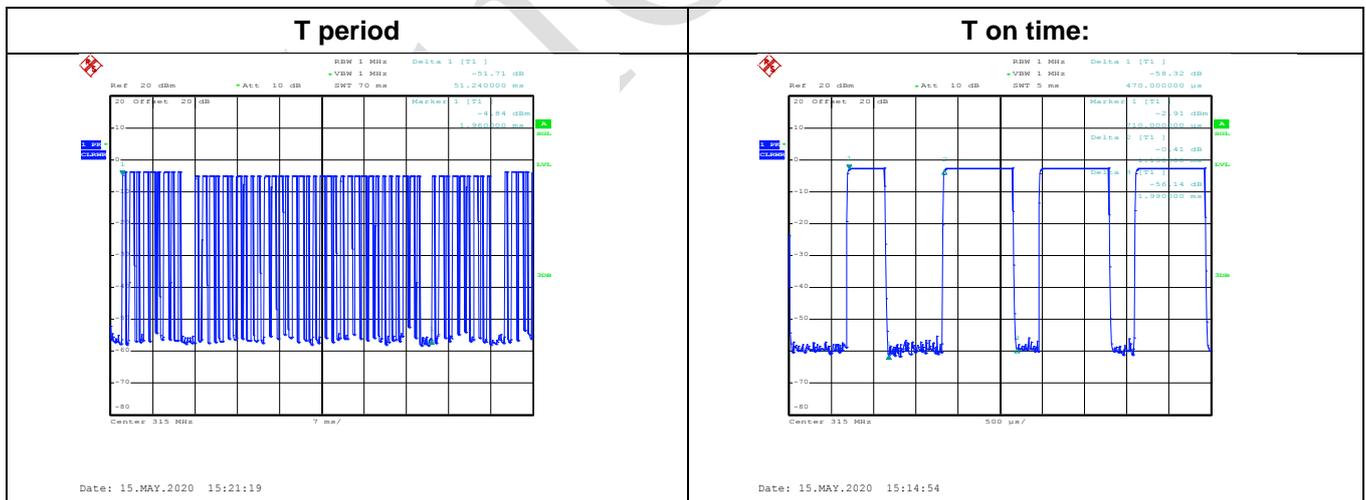
2.3 PROCEDURE

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- 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.
- 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.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- 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.

h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Remark: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

2.4 TEST DATA

Calculate Formula:	Average value = Peak value + Duty Cycle Factor
	Duty cycle factor = $20\log(\text{Duty cycle})$
	Duty cycle = on time/ period
Test data:	T on time = $0.47 \times 21(\text{ms}) + 0.86 \times 21(\text{ms}) = 27.93(\text{ms})$
	T period = $51.24(\text{ms})$
	Duty cycle = 54.51%
	Duty cycle factor = $20\log(\text{Duty cycle}) = -5.27$



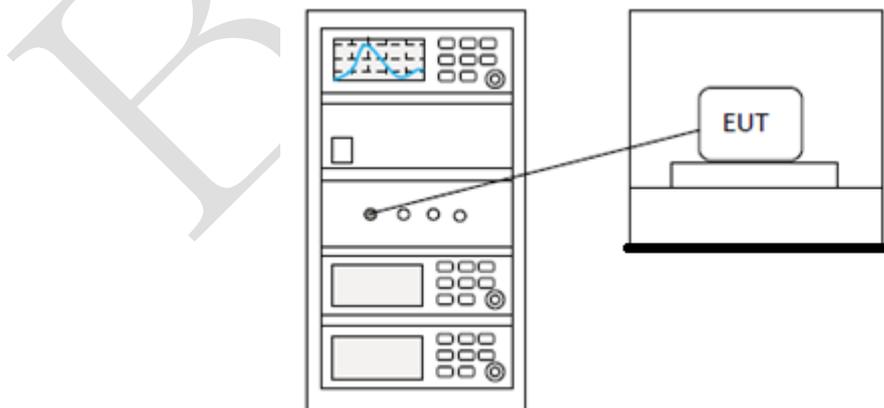
3 DWELL TIME

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 7.8.4
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25°C
Humidity	55%

3.1 LIMITS

Device type	Limit
Manually operated transmitter	The switch automatically deactivate the transmitter within not more than 5 seconds of being released
Automatically activated transmitter	Cease transmission within 5 seconds after activation
Periodic transmissions to determine system integrity of transmitters used in security or safety applications	The total transmission time does not exceed 2 seconds per hour

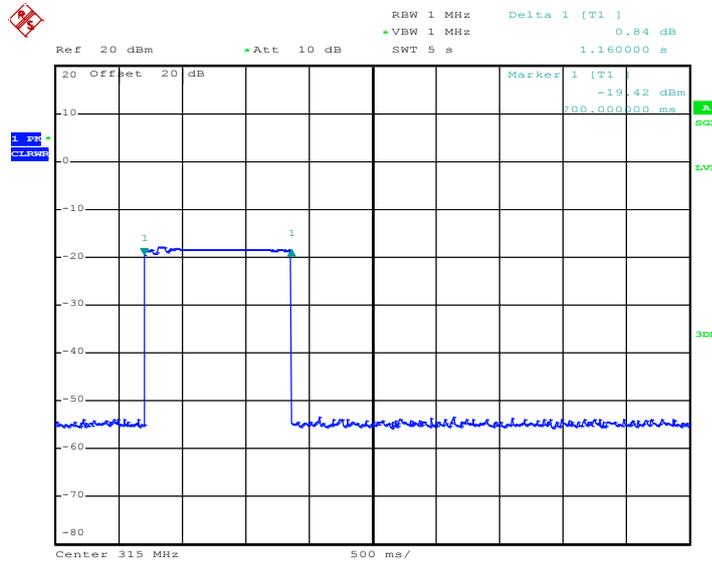
3.2 BLOCK DIAGRAM OF TEST SETUP



3.3 TEST DATA

Duration time (second)	Limit (second)	Result
1.16	<5.0	Pass

Test plot as follows:



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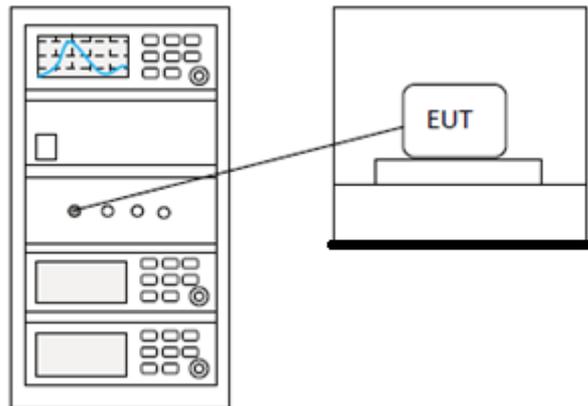
4 20DB BANDWIDTH

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	ANSI C63.10 (2013) Section 6.9
Test Mode (Pre-Scan)	TX
Test Mode (Final Test)	TX
Tester	Eason
Temperature	25°C
Humidity	55%

4.1 LIMITS

Frequency range(MHz)	Limit
70-900	No wider than 0.25% of the center frequency
Above 900	No wider than 0.5% of the center frequency

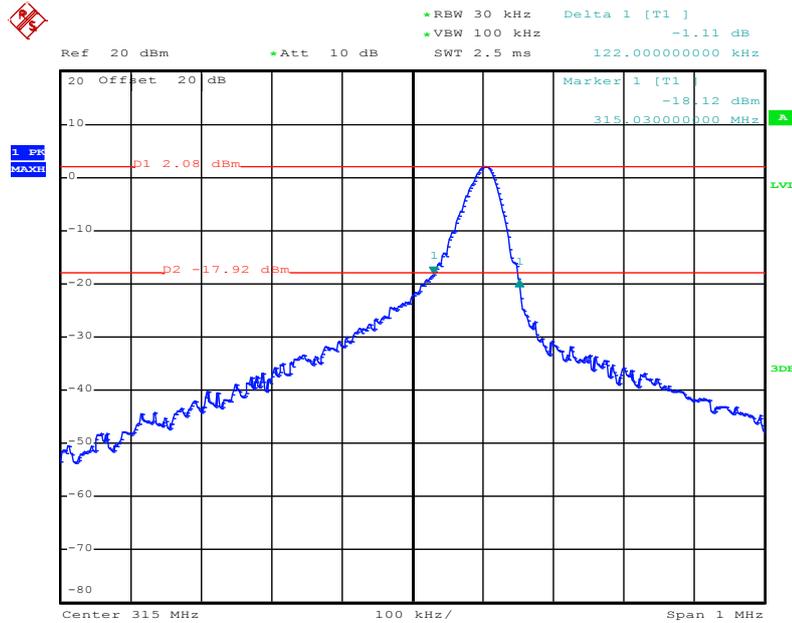
4.2 BLOCK DIAGRAM OF TEST SETUP



4.3 TEST DATA

20dB bandwidth (MHz)	Limit (MHz)	Results
0.122	0.7875	Passed

Note: Limit= Fundamental frequency×0.25%=315×0.25%=0.7875MHz



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5 ANTENNA REQUIREMENT

Test Standard	47 CFR Part 15, Subpart C 15.231
Test Method	N/A

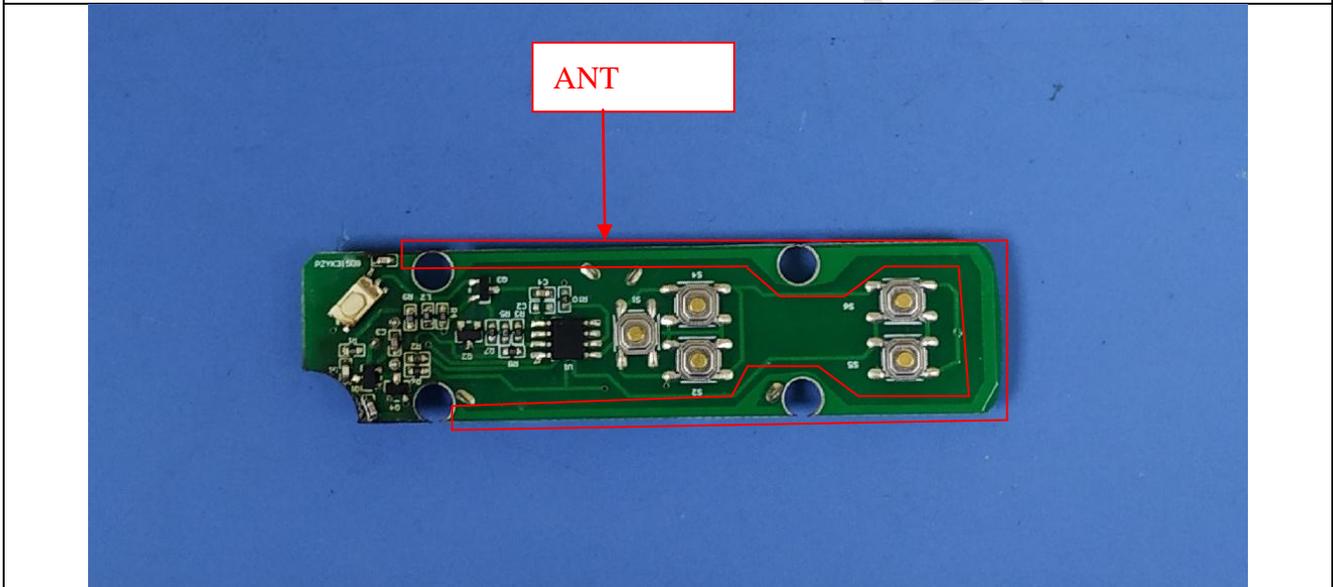
5.1 CONCLUSION

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.

E.U.T Antenna:

The EUT make use of an PCB antenna, The typical gain of the antenna is 3.0dBi.



APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Radiated Emission(below 1G)



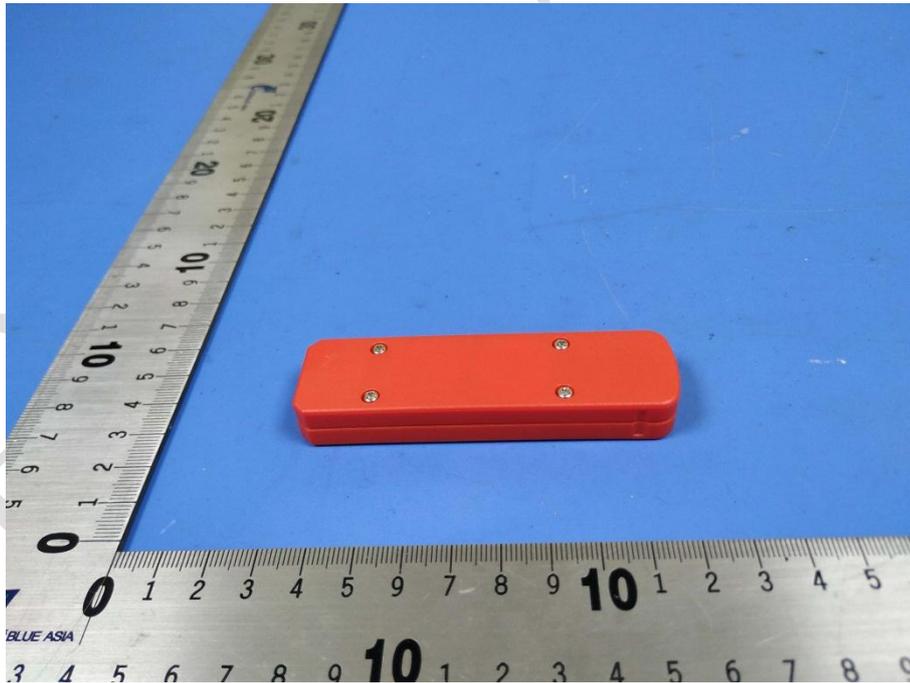
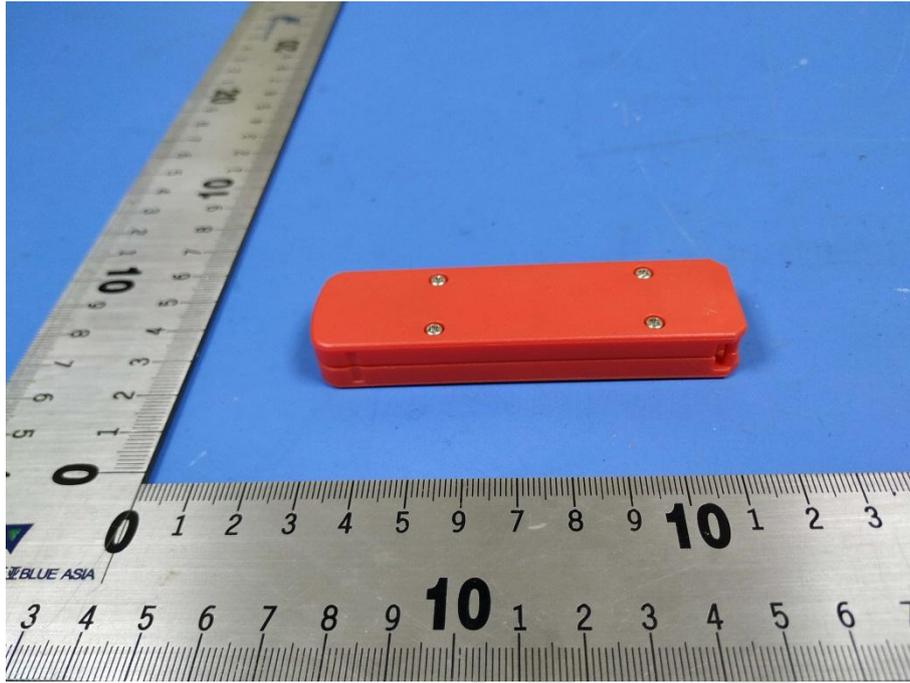
Radiated Emission(above 1G)

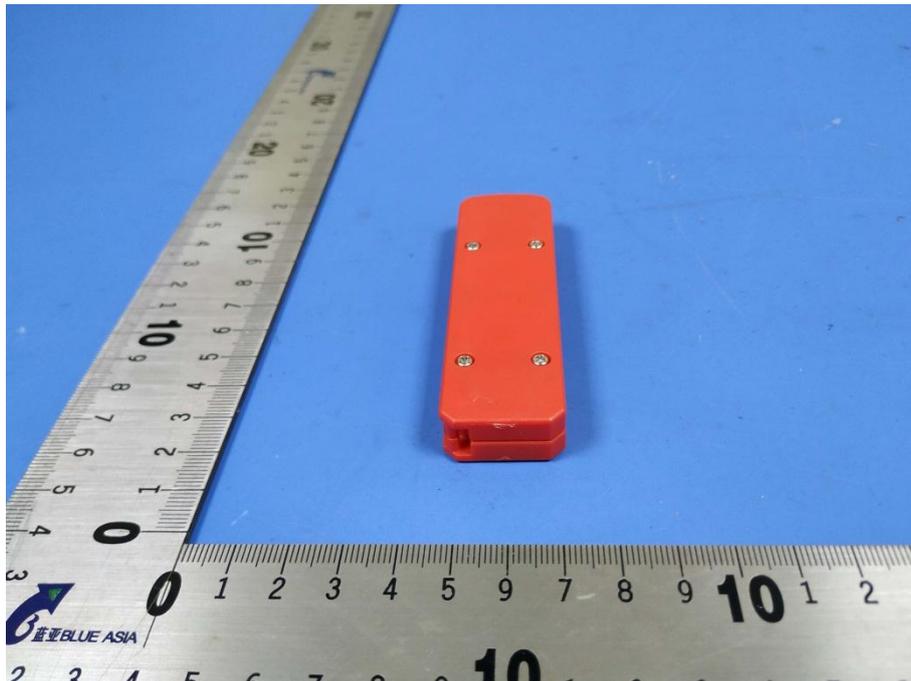


APPENDIX B: PHOTOGRAPHS OF EUT

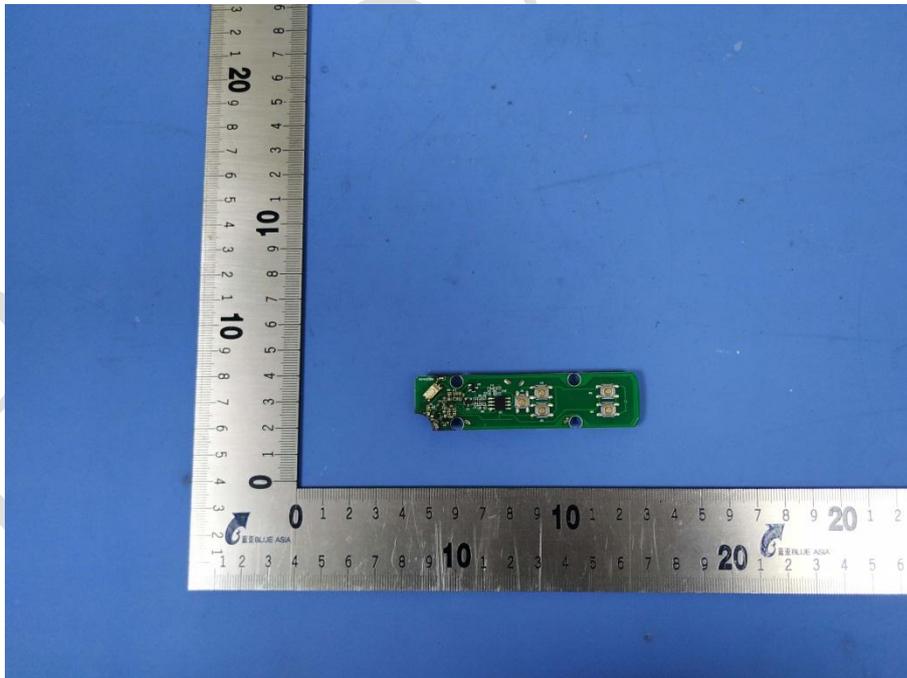
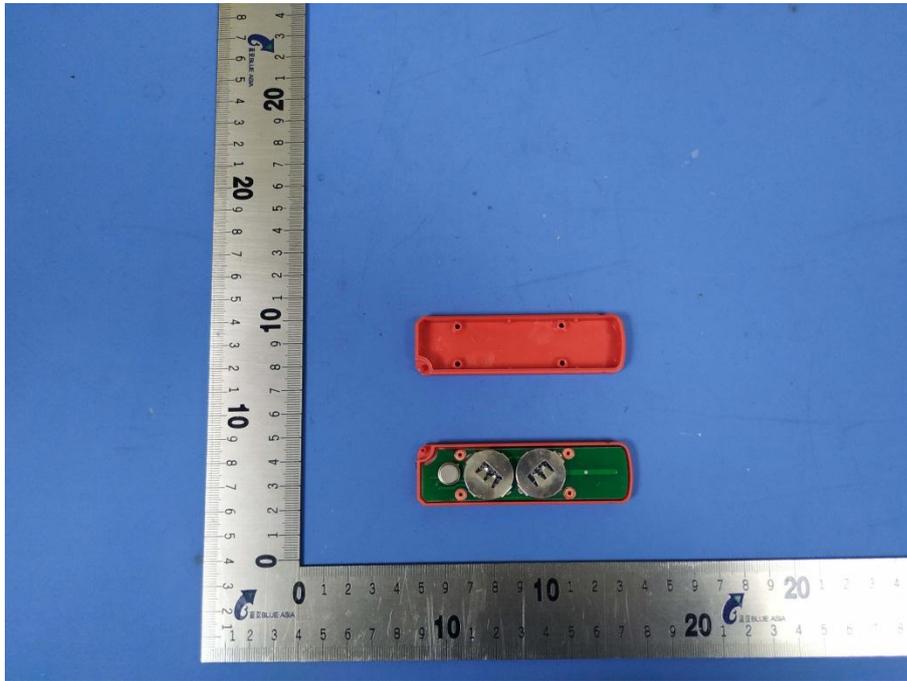
Exterior Photo

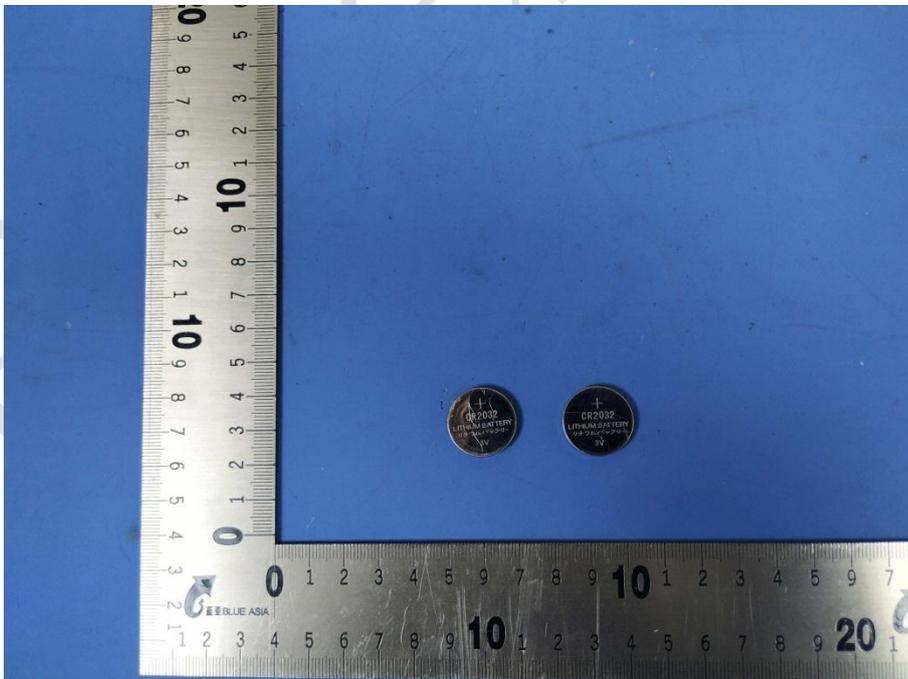
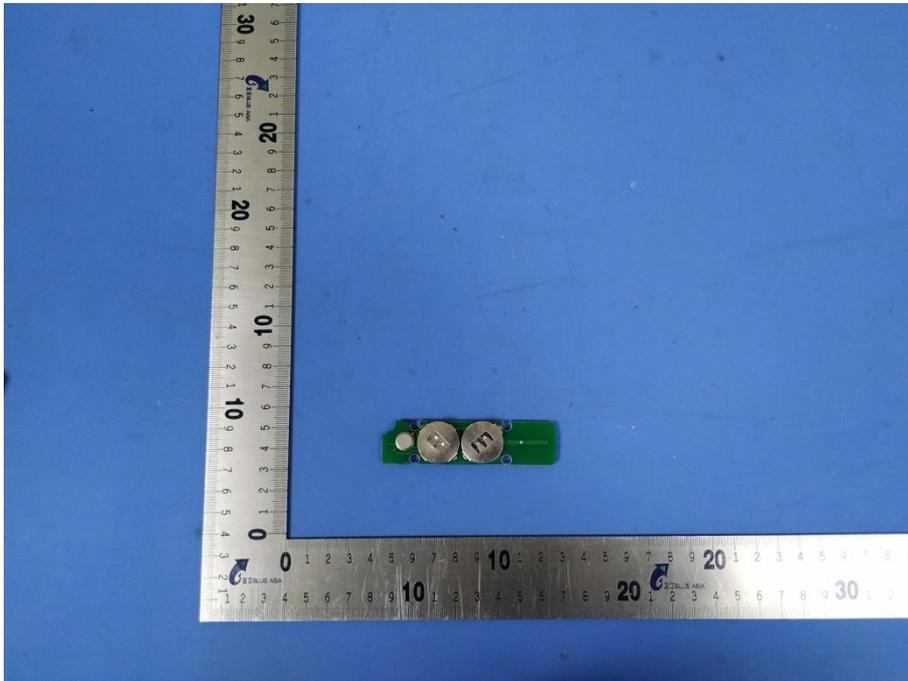


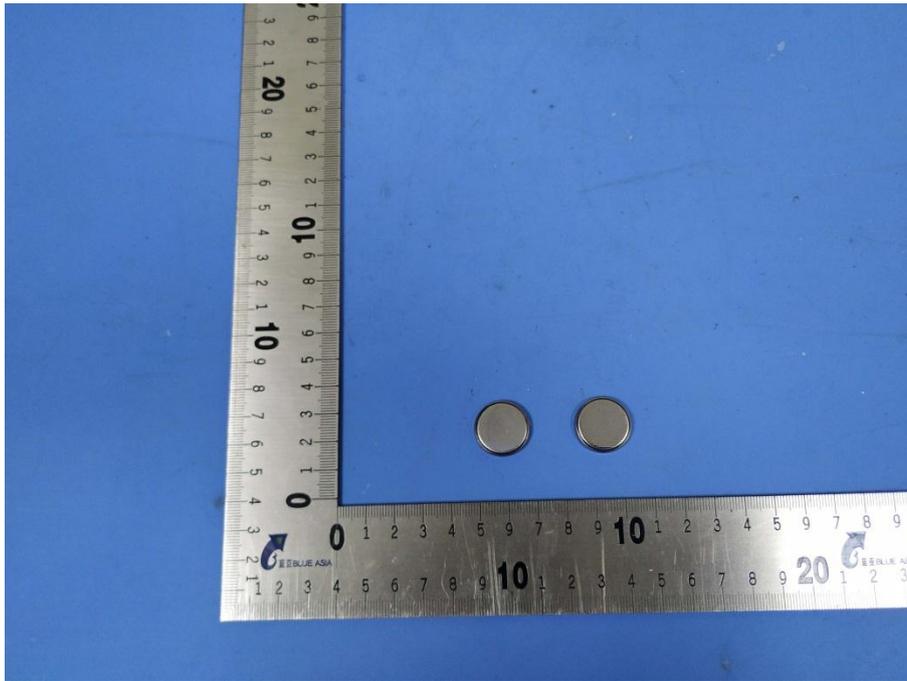




Interior photo







----END OF REPORT----

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