

FCC TEST REPORT

Product : TEMP-SENSOR
Trade mark : N/A
Model/Type reference : QY1026A0
Serial Number : N/A
Report Number : EED32K001537
FCC ID : Z9F-QY1026A0
Date of Issue : Jun. 14, 2019
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Shanghai Baolong Automotive Corporation
5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China

Prepared by:

Centre Testing International Group Co., Ltd.
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Date:

Jun. 14, 2019

Check No.: 3319565157



2 Version

Version No.	Date	Description
00	Jun. 14, 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)	ANSI C63.10-2013	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

N/A: The device is battery operated and not connected to AC mains, so the conducted emission is not applicable.

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5 General Information

5.1 Client Information

Applicant:	Shanghai Baolong Automotive Corporation
Address of Applicant:	5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China
Manufacturer:	Shanghai Baolong Automotive Corporation
Address of Manufacturer:	5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China
Factory:	Shanghai Baolong Automotive Corporation
Address of Factory:	5500, Shenzhuan Rd., Songjiang District, Shanghai 201619, China

5.2 General Description of EUT

Product Name:	TEMP-SENSOR
Model No.(EUT):	QY1026A0
Trade Mark:	N/A
EUT Supports Radios application:	433.92MHz
Power Supply:	Lithium battery EF702338 LTC-16PN 3.6V
Hardware Version:	V5.0(manufacturer declare)
Firmware Version:	V1.1(manufacturer declare)

5.3 Product Specification subjective to this standard

Frequency Range:	433.92MHz
Modulation Type:	FSK
Number of Channels:	1(declared by the client)
Antenna type:	Monopole antenna
Antenna gain:	1.90dBi
Test voltage:	Lithium battery EF702338 LTC-16PN 3.6V
Sample Received Date:	Jun. 20, 2018
Sample tested Date:	May 05, 2019 to May 17, 2019

5.4 Test Environment and Mode

Operating Environment for RF Conducted test:	
Temperature:	23°C
Humidity:	51%
Atmospheric Pressure:	101kPa
Test mode:	
TX mode:	The EUT transmitted the continuous signal at the specific channel(s).

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%

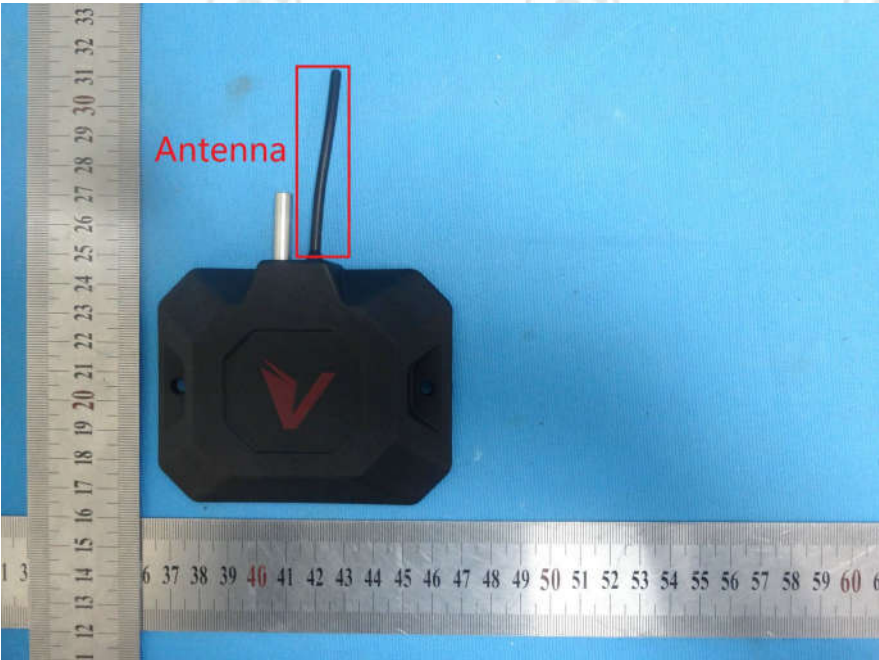
6 Equipment List

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	maturio	NCD/070/10711 112	---	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	FL3CX03WG18 NM12-0398-002	---	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	FL5CX01CA09C L12-0395-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	01-09-2019	01-08-2020
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	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 Monopole antenna and no consideration of replacement. The best case gain of the antenna is 1.90dBi.	
	

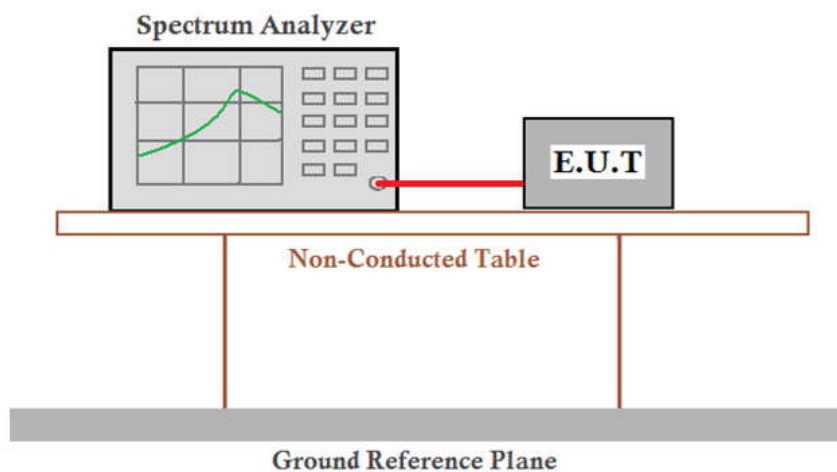
7.2 Spurious Emissions

7.2.1 Duty Cycle

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

Test Method: ANSI C63.10

Test Setup:



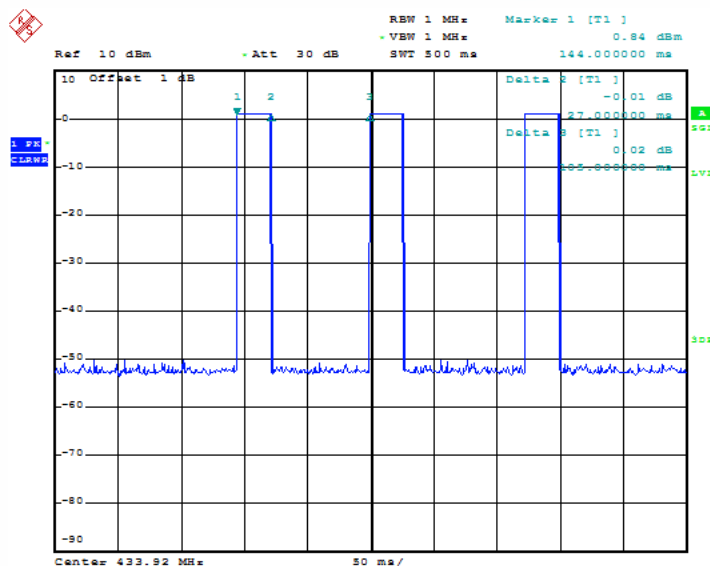
Limit: N/A

Test Mode: TX mode

Instruments Used: Refer to section 6 for details

Test Results: Pass

Test plot as follows:



Date: 10.MAY.2019 19:11:32

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:

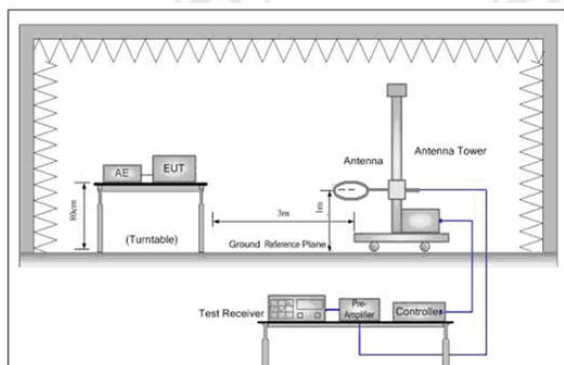


Figure 1. Below 30MHz

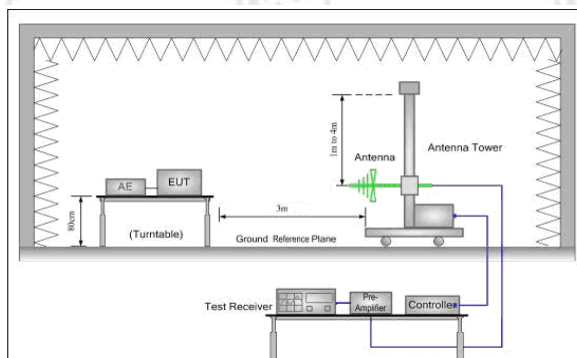


Figure 2. 30MHz to 1GHz

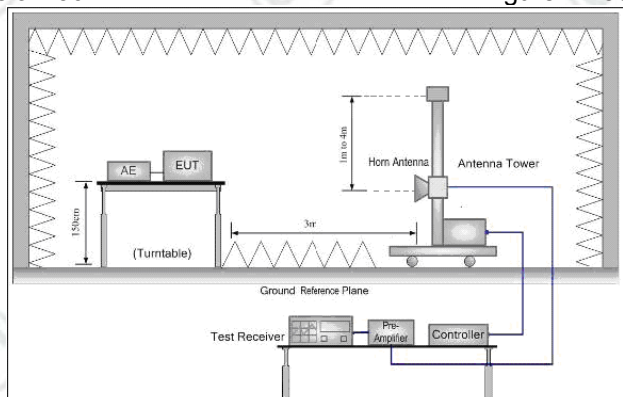


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 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.

Above 1GHz test procedure as below:

- 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).
- Test the EUT in the lowest channel ,middle channel, the Highest channel
- 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.
- Repeat above procedures until all frequencies measured was complete.

**Limit:
(Spurious
Emissions)**

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/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 (dB μ V/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 Ambient:

Temp.: 22°C

Humid.: 53%

Press.: 101kPa

Test data

Field Strength of the Fundamental Signal

Frequency (MHz)	Correct Factor (dB)	Read Level (dBuV)	Peak Value (dBuV/m)	Average value (dBuV/m)	Average Limit (dBuV/m)	Over Limit (dB)	Polarization
434.065	27.66	47.27	74.93	63.13	80.8	-17.67	Horizontal
433.943	27.66	33.79	61.45	49.65	80.8	-31.15	Vertical

Remark: As shown in this section, for field strength of the fundamental signal measurements, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above. So, only the peak value is measured.

Test data

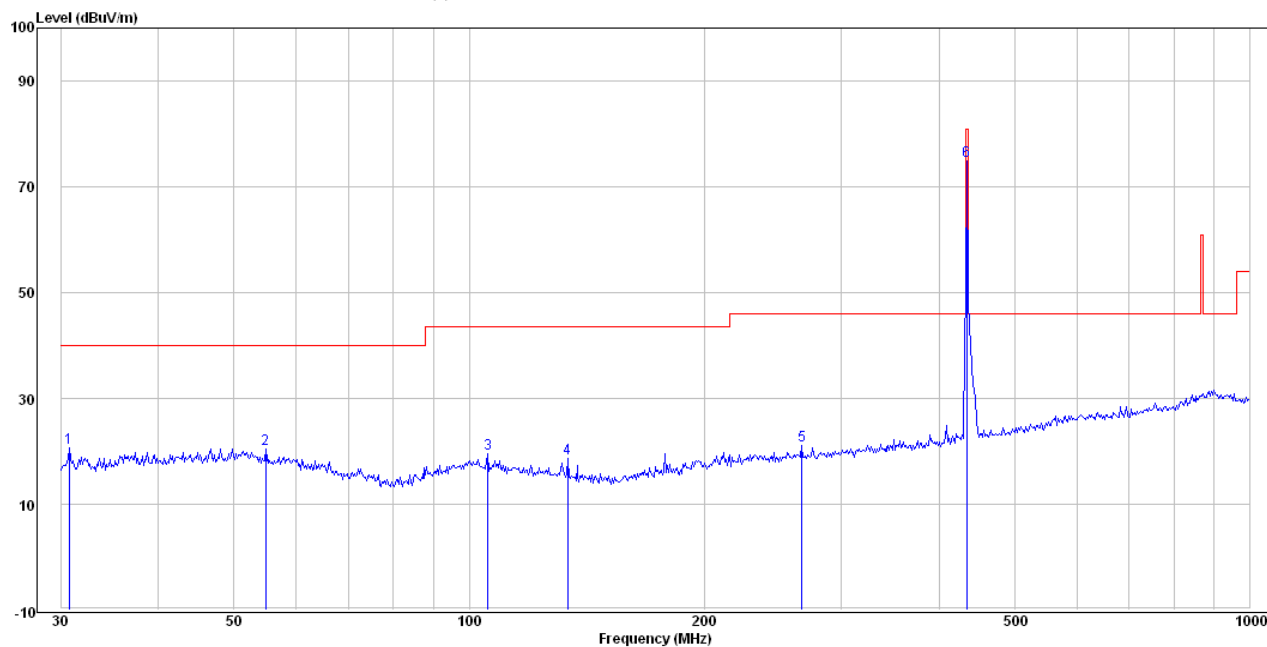
Spurious Emissions

30MHz-1GHz

QP value:

Horizontal

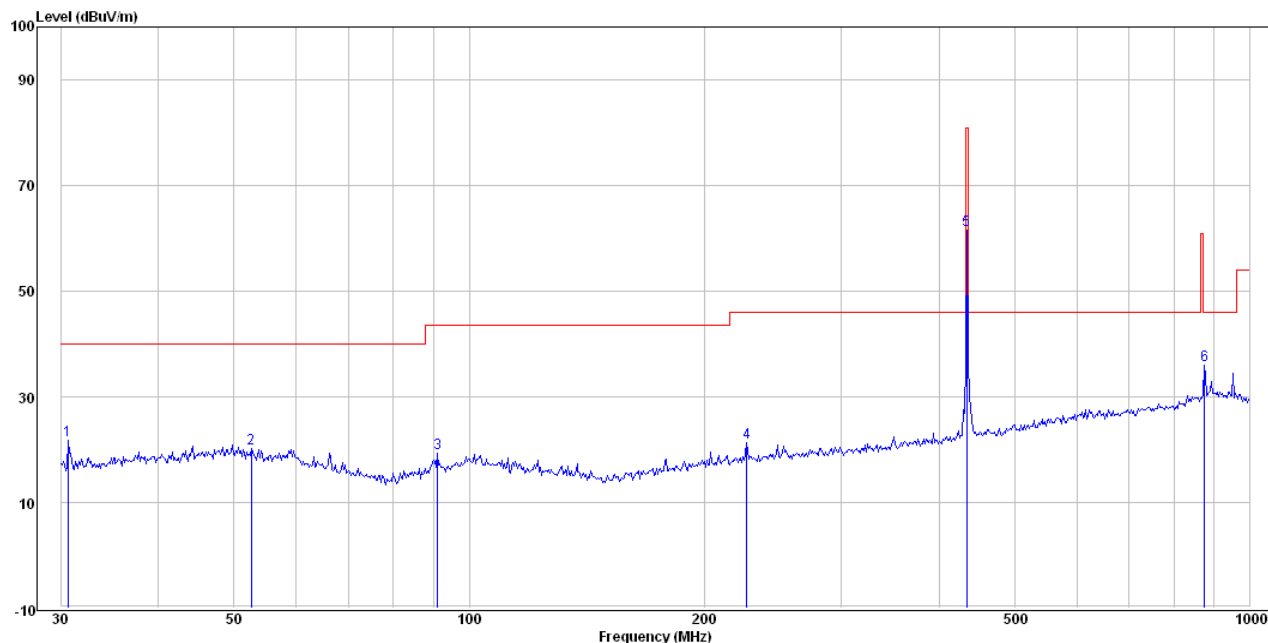
Data: 7 File: D:\e3 data\2019\AN JIAN\LI\1541\0514\EM8 (7)



Freq (MHz)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamplifier_Gain (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)	Pol/Phase
30.745	12.06	0.09	0	8.63	20.78	40	-19.22	Horizontal
54.835	13.84	0.16	0	6.54	20.54	40	-19.46	Horizontal
105.642	12	0.59	0	6.95	19.54	43.5	-23.96	Horizontal
133.619	9.86	0.6	0	8.11	18.57	43.5	-24.93	Horizontal
266.609	12.88	1.24	0	7.07	21.19	46	-24.81	Horizontal
434.065	15.89	1.42	0	57.62	74.93	80.8	-5.87	Horizontal

Vertical

Data: 6 File: D:\e3 data\2019\AN JIAN\LI\15410514.EM8 (7)

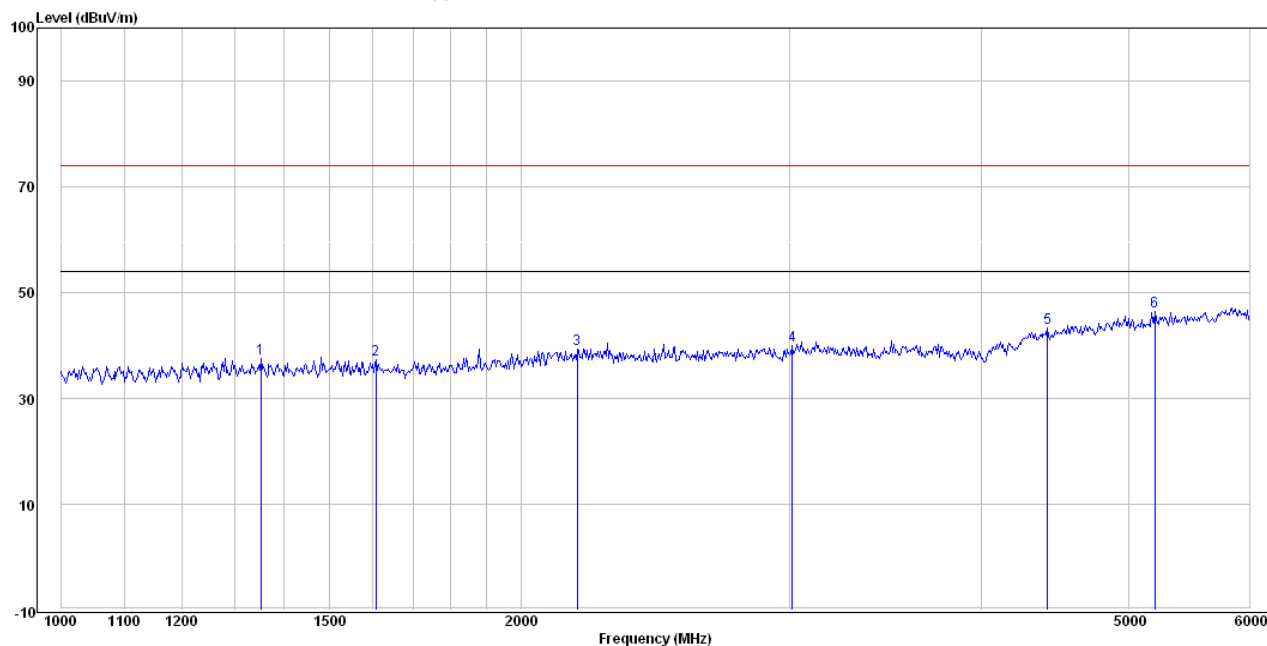


Freq (MHz)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)	Pol/Phase
30.638	12.04	0.09	0	9.64	21.77	40	-18.23	Vertical
52.575	14.19	0.14	0	5.94	20.27	40	-19.73	Vertical
91.175	11.1	0.42	0	7.9	19.42	43.5	-24.08	Vertical
226.894	12.12	1.24	0	7.96	21.32	46	-24.68	Vertical
434.065	15.89	1.42	0	44.14	61.45	80.8	-19.35	Vertical
875.247	21.71	2.47	0	11.73	35.91	46	-10.09	Vertical

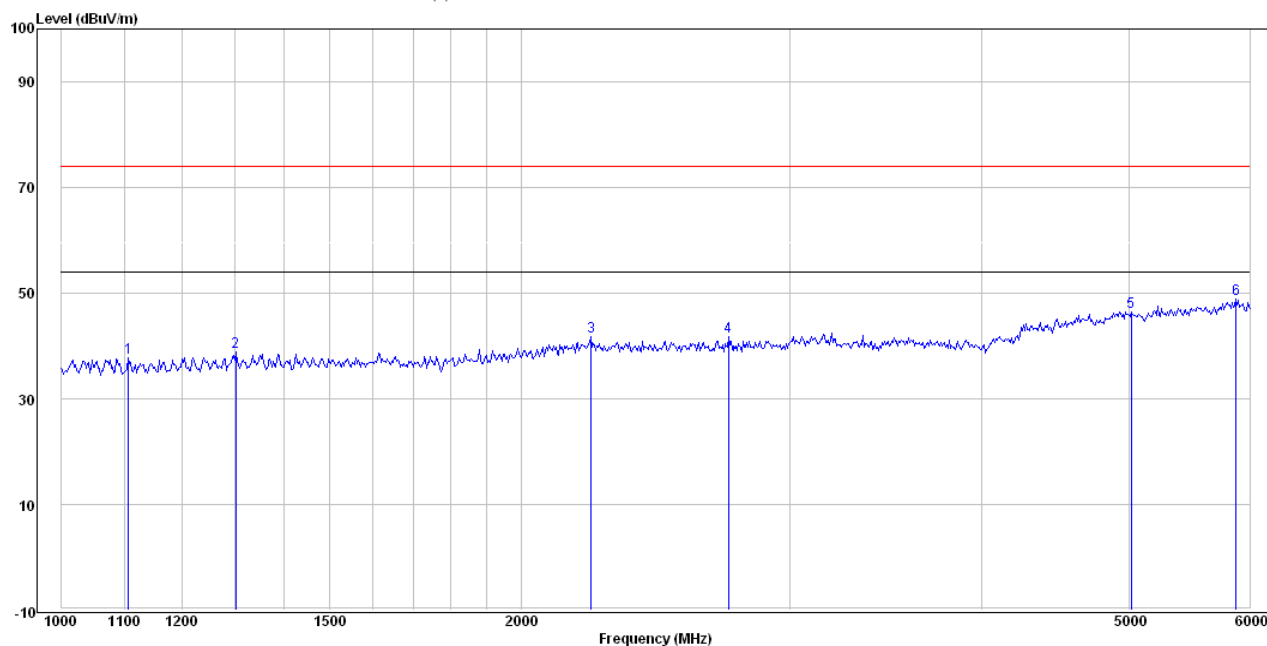
Above 1GHz

Peak value:

Data: 4 File: D:\e3 data\2019\AN JIAN\LI\1541\0517.EM8 (4)



Freq (MHz)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamplifier_Gain (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)	Pol/Phase
1351.23	25.09	2.09	34.81	45.12	37.49	74	-36.51	Horizontal
1607.719	24.85	2.42	34.58	44.74	37.43	74	-36.57	Horizontal
2176.294	27.67	2.95	34.34	42.98	39.26	74	-34.74	Horizontal
3009.976	28.26	3.37	34.5	42.96	40.09	74	-33.91	Horizontal
4424.514	30.44	5.18	34.46	42.24	43.4	74	-30.6	Horizontal
5198.752	31.68	6.6	34.3	42.51	46.49	74	-27.51	Horizontal



Freq (MHz)	Antenna_Factor (dB/m)	Cable_Loss (dB)	Preamp_Gain (dB)	Read_Level (dBuV)	Level (dBuV/m)	Limit_Line (dBuV/m)	Over_Limit (dB)	Pol/Phase
1107.528	24.17	1.71	35.07	46.95	37.76	74	-36.24	Vertical
1301.332	25.03	2.02	34.86	46.73	38.92	74	-35.08	Vertical
2223.594	27.82	2.98	34.35	45.31	41.76	74	-32.24	Vertical
2732.391	27.89	3.24	34.45	45.08	41.76	74	-32.24	Vertical
5015.753	31.56	6.39	34.3	42.87	46.52	74	-27.48	Vertical
5872.37	32.54	7.31	34.3	43.43	48.98	74	-25.02	Vertical

Remark:

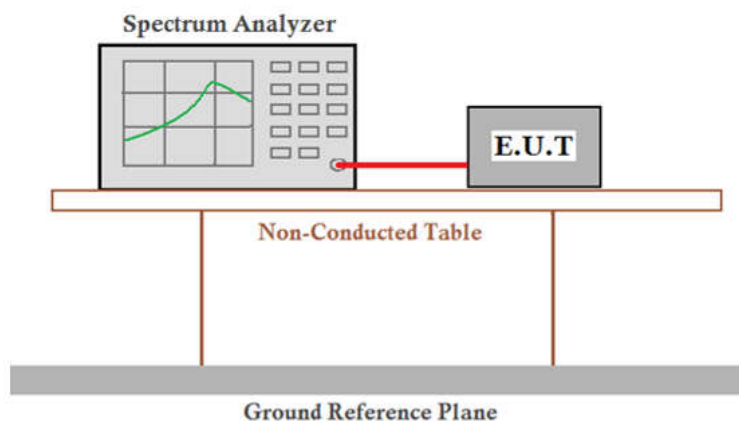
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading - Correct Factor
Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor
- 2) Scan from 9kHz to 6GHz, below 30MHz was very low, so 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

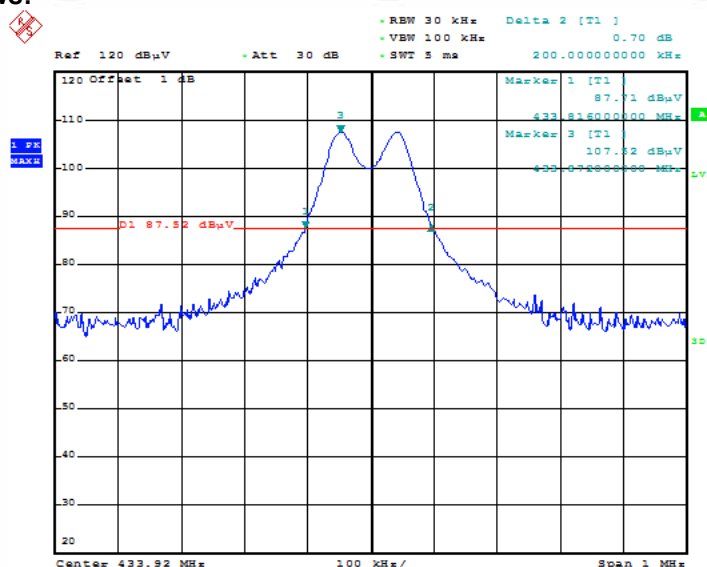
Instruments Used: Refer to section 6 for details

Test Results: Pass

Test data

20dB bandwidth (kHz)	Limit (kHz)	Results
200	1084.78	Pass

Test plot as follows:



Date: 10.MAY.2019 18:58:54

7.4 Dwell Time

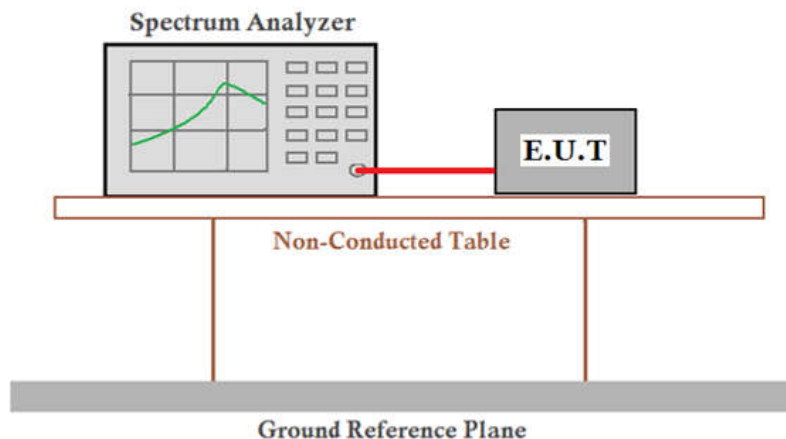
Test Requirement:

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

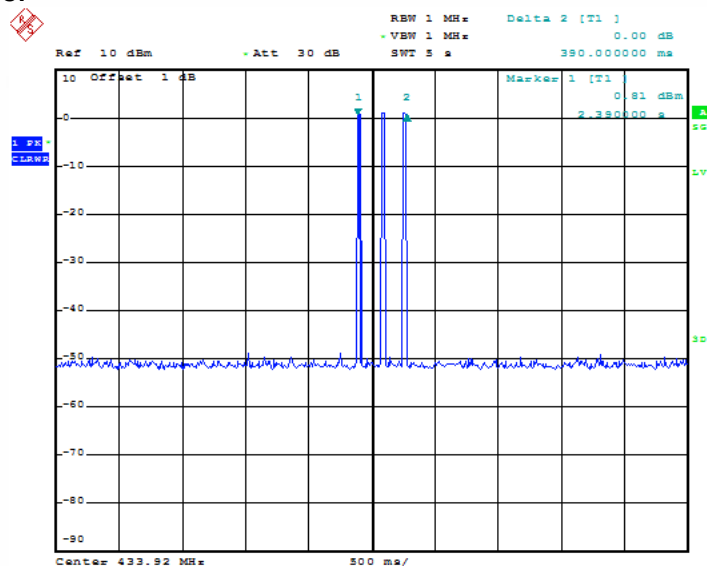
Test Results:

Pass

Test data:

Test item	Test value	Limit (MHz)	Results
Transmitting time	0.390s	≤5s	Pass

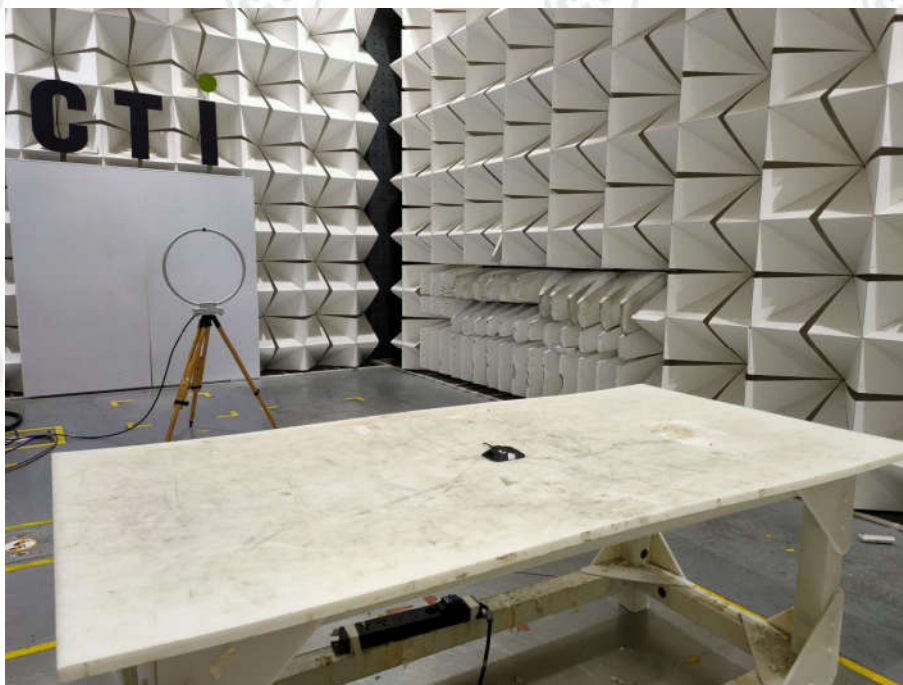
Test plot as follows:



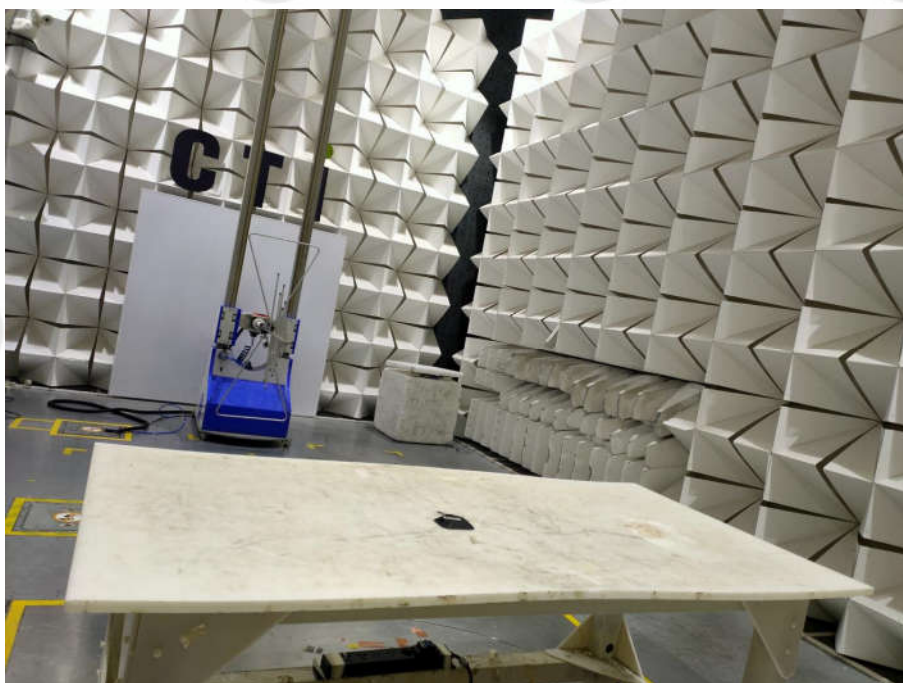
Date: 10.MAY.2019 19:06:08

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP

Test Model No.: QY1026A0



Radiated spurious emission Test Setup-1(Below 30MHz)



Radiated spurious emission Test Setup-2(30MHz-1GHz)



Radiated spurious emission Test Setup-3(Above 1GHz)



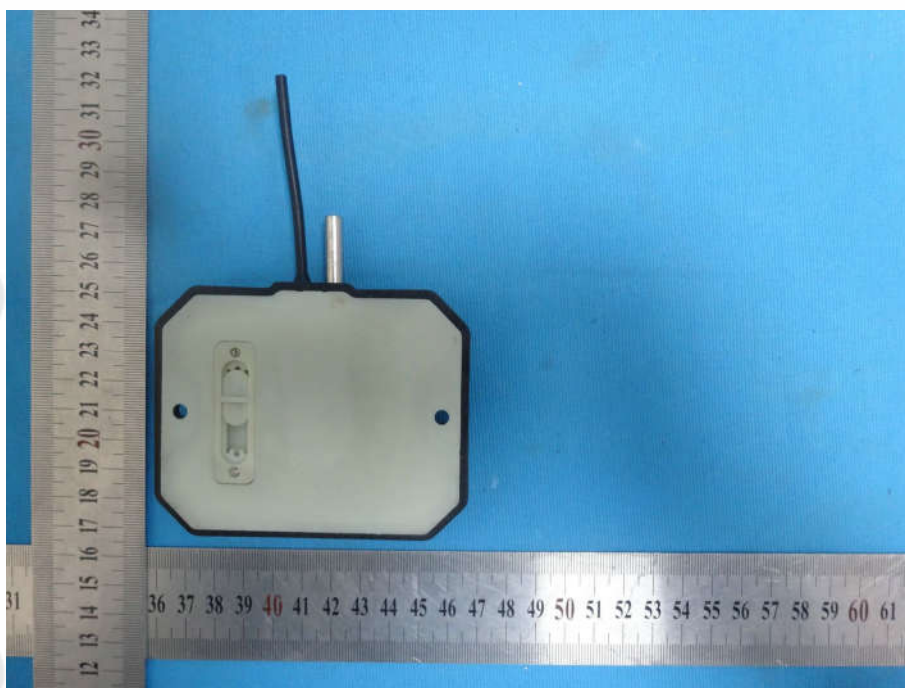
Radiated spurious emission Test Setup for Close-up

APPENDIX 2 PHOTOGRAPHS OF EUT

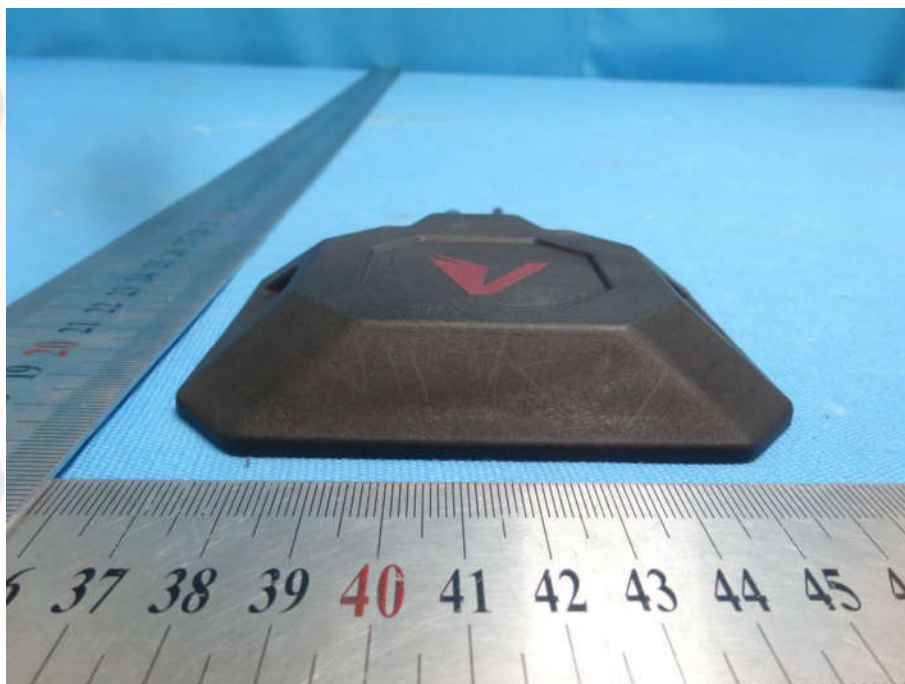
Test model No.: QY1026A0



View of Product-1



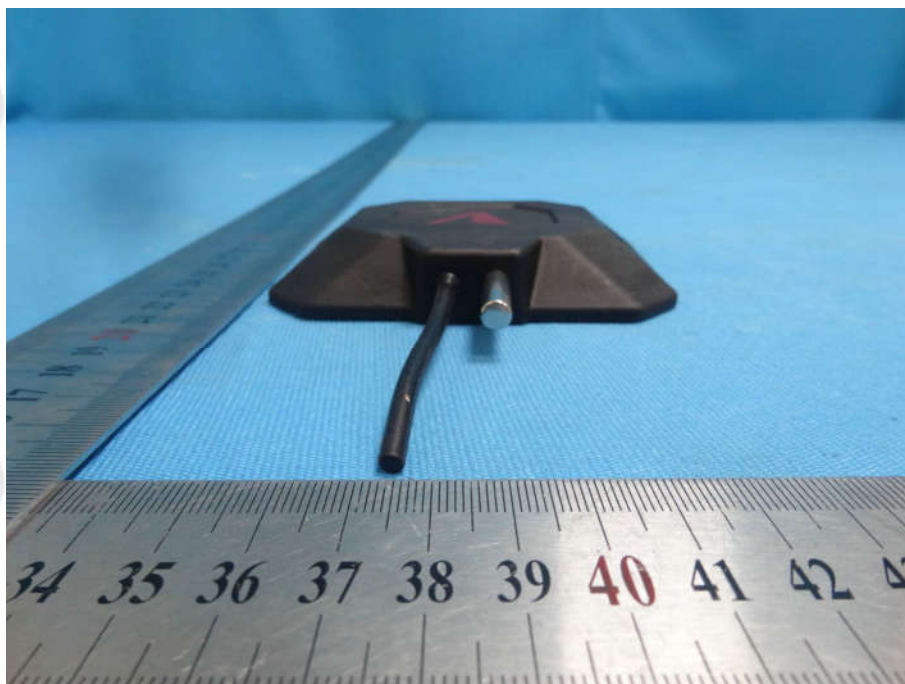
View of Product-2



View of Product-3



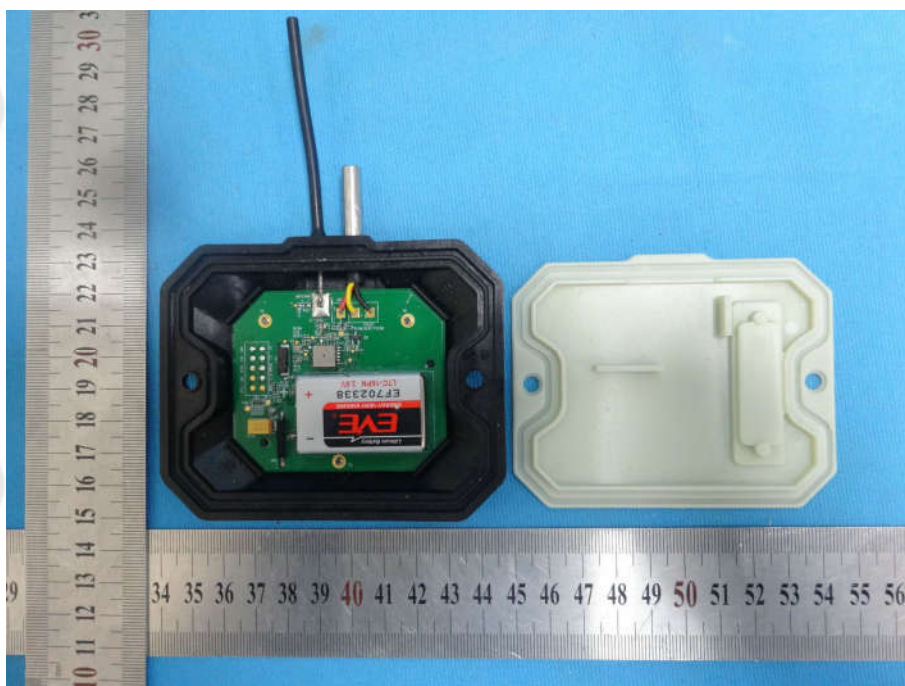
View of Product-4



View of Product-5



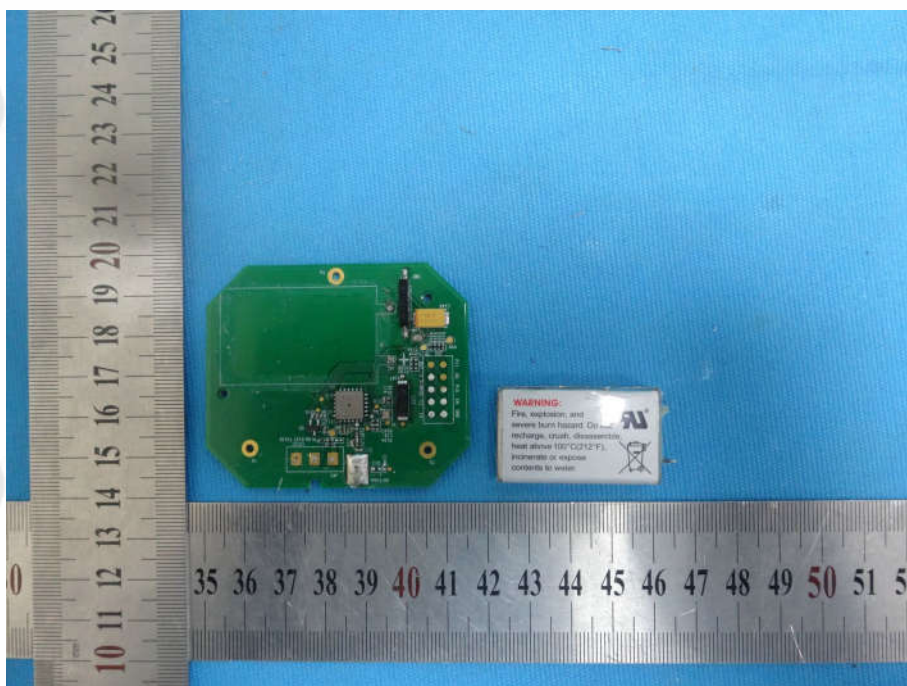
View of Product-6



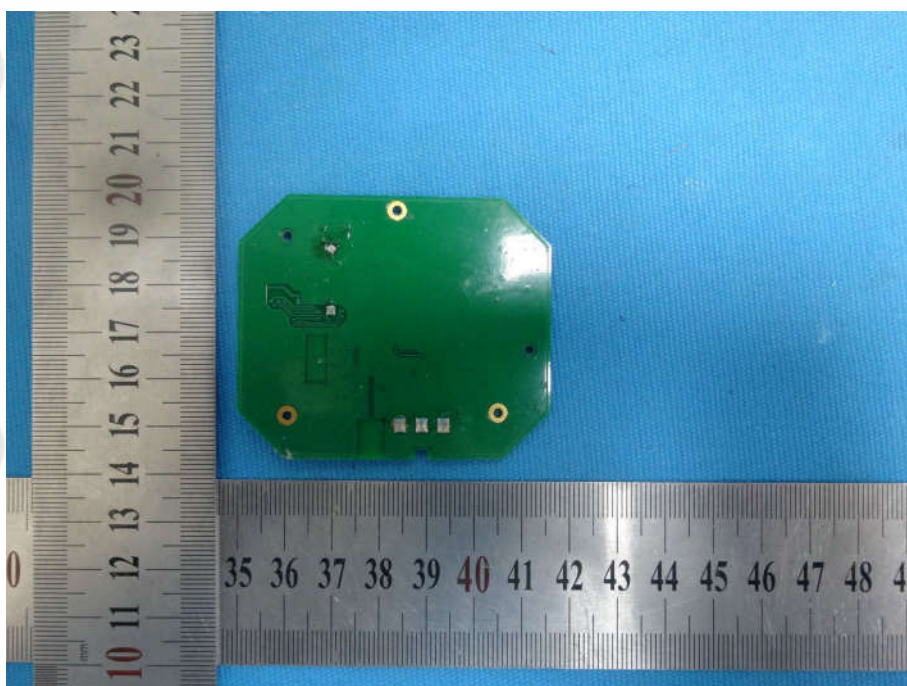
View of Product-7



View of Product-8



View of Product-9



View of Product-10

*** End of Report ***

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