TEST REPORT

Report No.	CISRR250228157
Project No.	CISR250228157
FCC ID	2BN37-TS34
Applicant	SHENZHEN STC TECHNOLOGY CO.LTD
Address	East Side, 3rd Floor, 2 Building, No 49 YueXing Road, FuCheng Street LongHua District, ShenZhen, China
Manufacturer	SHENZHEN STC TECHNOLOGY CO.LTD
Address	East Side, 3rd Floor, 2 Building, No 49 YueXing Road, FuCheng Street LongHua District, ShenZhen, China
Product Name	TPMS
Trade Mark	--
Model/Type reference	TS34
Listed Model(s)	TS35, TS36, TS37, TS38, TS39, TS40, TS41, TM5, TM9, TM10, TU05, TU06, TU08, TU09, TU10, TS600, TS610, TS620, TS630
Standard	Part 15 Subpart C Section 15.231
Test date	February 28, 2025 to March 6, 2025
Issue date	March 8, 2025
Test result	**Complied**

Prepared by: Rory Huang **Approved by: Genry Long**

The test results relate only to the tested samples.

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1. REPORT VERSION

Version No.	Issue date	Description
00	March 8, 2025	Original

2. SUMMARY OF TEST RESULT

Report clause	Test Item	Standard Requirement	Result
5.1	Antenna Requirement	15.203	PASS
5.2	AC Conducted Emission	15.207	PASS
5.3	20 dB Bandwidth	15.231(c)	PASS
5.4	Radiated Spurious Emission	15.231 (a)/15.205/15.209	PASS
5.5	Transmitter Deactivation Time	15.231	PASS
5.6	Duty cycle Factor	15.231	PASS

Note:

– The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Product Description

Main unit information:	
Product Name:	TPMS
Trade Mark:	--
Model No.:	TS34
Listed Model(s):	TS35, TS36, TS37, TS38, TS39, TS40, TS41, TM5, TM9, TM10, TU05, TU06, TU08, TU09, TU10, TS600, TS610, TS620, TS630
Power supply:	DC 3V
Hardware version:	N/A
Software version:	N/A

3.2. Radio Specification Description

Technology:	SRD
Modulation:	ASK
Operation frequency:	433.9MHz
Channel Number:	1
Antenna type:	Spring Antenna
Antenna gain:	0dBi

3.3. Modification of EUT

No modifications are made to the EUT during all test items.

3.4. Testing Site

Laboratory Name	Shenzhen Bangce Testing Technology Co., Ltd.
Laboratory Location	101, building 10, Yunli Intelligent Park, Shutianpu community, Matian Street, Guangming District, Shenzhen, Guangdong, China
FCC registration number	736346

3.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

3.6. DISTURBANCE Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

4. TEST CONFIGURATION

4.1. Test frequency list

Channel	Frequency (MHz)
CH1	433.9

4.2. Test mode

For RF test items:		
The engineering prototype is provided with key switching channel to realize EUT continuous transmission.Power setting Default.		
Test Item	Test Mode	Modulation
Conducted test item	TX-CH1	ASK
	Charging	--
Radiated test item	TX-CH1	ASK
	Normal link	--
Remark: – The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.		

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Item	Equipment name	Trade Name	Model No.
1	--	--	--

4.4. Test sample information

Type	sample no.
Engineer sample	CISR250228157-S01
Normal sample	CISR250228157-S02

4.5. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.6. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	1.63dB
2	Power Spectral Density	1.34dB
3	20dB Bandwidth	0.002%
4	Duty cycle	-
5	Conducted Band Edge and Spurious Emission	1.93dB
6	Radiated Band Edge Emission	3.76dB for 30MHz-1GHz 3.80dB for above 1GHz
7	Radiated Spurious Emission	3.76dB for 30MHz-1GHz 3.80dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.7. Equipment Used during the Test

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	MXG RF Signal Generator	Agilent	N5181A	MY50145362	2025-01-08	2026-01-07
2	Spectrum analyzer	R&S	FSV-40N	102130	2025-01-08	2026-01-07
3	Vector Signal Generator	Agilent	N5182A	MY50142364	2025-01-08	2026-01-07
4	Power Meter	WCS	WCS-PM	WCSPM230405A	2025-01-08	2026-01-07

Item	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	EMI Test Receiver	Rohde&schwarz	ESCI7	100853	2025-01-08	2026-01-07
2	Amplifier	Tonscend	TAP9K3G40	AP23A8060270	2025-01-08	2026-01-07
3	Prime amplifier	Tonscend	TAP01018050	AP23A8060280	2025-01-08	2026-01-07
4	9*6*6 anechoic chamber	SKET	9.3*6.3*6	N/A	2024-09-02	2027-09-01
5	Spectrum analyzer	Agilent	N9020A	MY50530263	2025-01-08	2026-01-07
6	Spectrum analyzer	R&S	FSV-40N	102130	2025-01-08	2026-01-07
7	Bilog Antenna	Schwarzbeck	VULB 9163	1463	2023-01-09	2026-01-08
8	Horn Antenna	SCHWARZBECK	BBHA 9120 D	2487	2023-01-09	2026-01-08
9	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	2023-01-09	2026-01-08
10	RF Cable	Tonscend	Cable 1	/	2025-01-08	2026-01-07
11	RF Cable	Tonscend	Cable 2	/	2025-01-08	2026-01-07
12	RF Cable	SKET	Cable 3	/	2025-01-08	2026-01-07
13	L.I.S.N.#1	Schwarzbeck	NSLK8127	/	2025-01-08	2026-01-07
14	L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	2025-01-08	2026-01-07
15	Horn Antenna	SCHWARZBECK	BBHA9170	1130	2023-01-09	2026-01-08
16	Preamplifier	Tonscend	TAP18040048	AP21C806126	2025-01-08	2026-01-07
17	Variable-frequency power source	Pinhong	PH1110	/	2025-01-08	2026-01-07
18	6dB Attenuator	SKET	DC-6G	/	2025-01-08	2026-01-07
19	Antenna tower	SKT	Bk-4AT-BS	AT2021040101-V1	2025-01-08	2026-01-07

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

Standard Applicable	**FCC CFR Title 47 Part 15 Subpart C Section 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the response-ble 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. **FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):** (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.
Description	The EUT antenna is Spring Antenna (0dBi), the directional gain of the antenna less than 6dBi. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.Antenna structure please refer to the EUT internal photographs antenna photo.

Remark: The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen Bangce Testing Technology Co., Ltd. does not assume any responsibility.

5.2. AC Conducted Emission

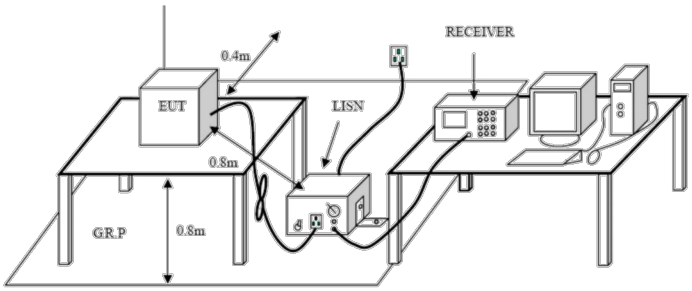
Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

Test configuration:



Test procedure:

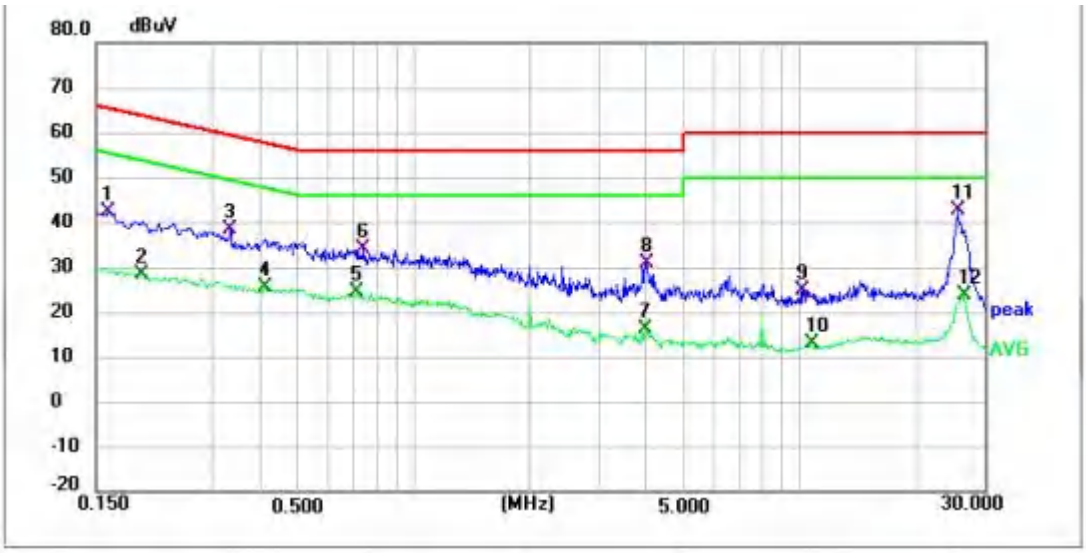
1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

Test mode: Refer to the clause 4.2

Result: **Passed**

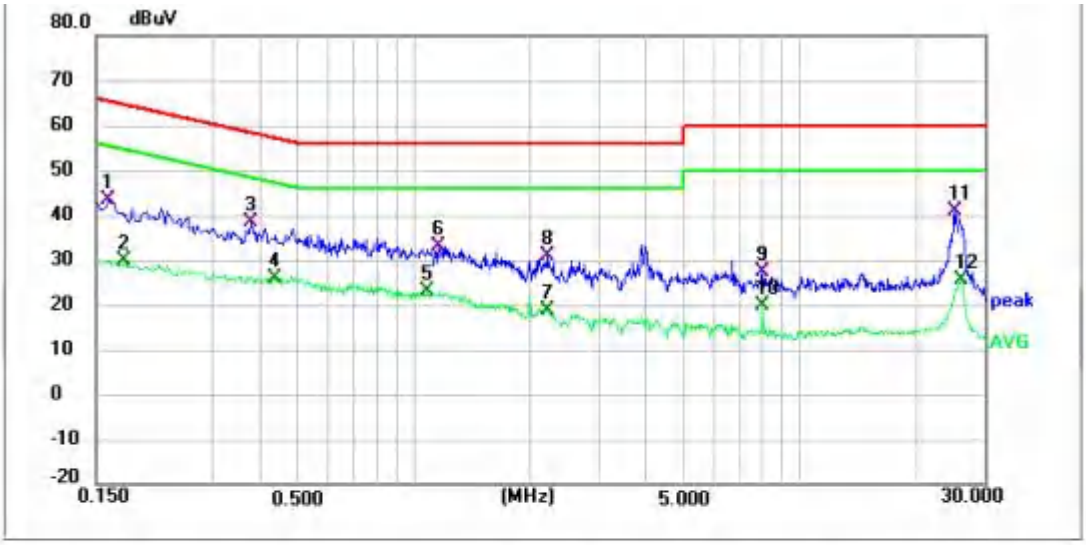
Note:
1. Factor = LISN Factor + Cable Factor
2. Level= Reading + Factor
3. Margin= Level – Limit

Test Line:	L



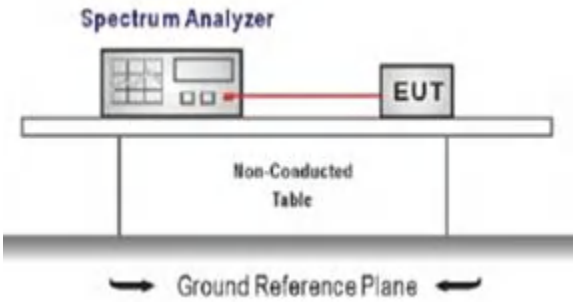
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.162	32.06	10.32	42.38	65.36	-22.98	QP
2	0.197	17.97	10.31	28.28	53.74	-25.46	AVG
3	0.334	28.04	10.33	38.37	59.35	-20.98	QP
4	0.410	15.06	10.32	25.38	47.65	-22.27	AVG
5	0.714	13.89	10.41	24.30	46.00	-21.70	AVG
6	0.742	23.86	10.41	34.27	56.00	-21.73	QP
7	3.982	4.88	11.36	16.24	46.00	-29.76	AVG
8	4.010	19.41	11.38	30.79	56.00	-25.21	QP
9	10.166	11.17	13.70	24.87	60.00	-35.13	QP
10	10.750	-0.86	14.00	13.14	50.00	-36.86	AVG
11 *	25.618	27.70	15.08	42.78	60.00	-17.22	QP
12	26.654	8.73	15.00	23.73	50.00	-26.27	AVG

Test Line:	N

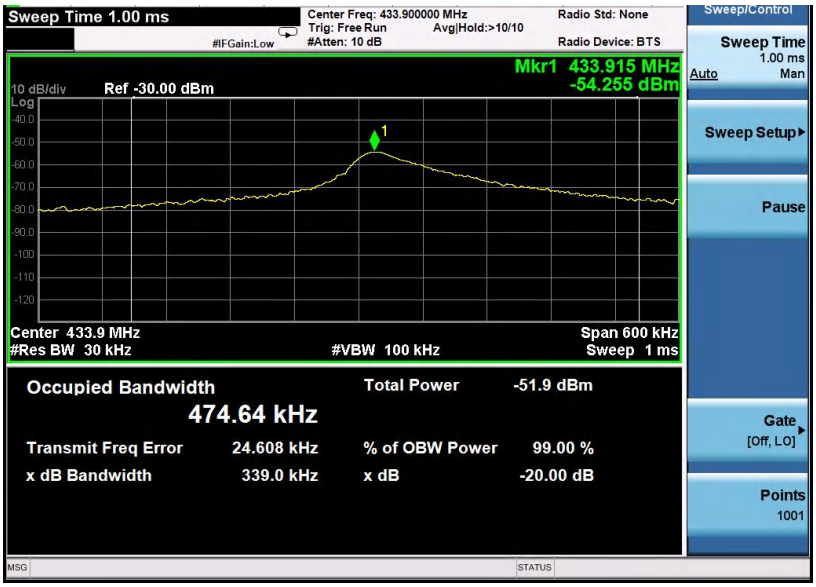


No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.162	33.18	10.33	43.51	65.36	-21.85	QP
2	0.178	19.48	10.32	29.80	54.58	-24.78	AVG
3	0.378	28.24	10.33	38.57	58.32	-19.75	QP
4	0.434	15.42	10.35	25.77	47.18	-21.41	AVG
5	1.082	12.64	10.45	23.09	46.00	-22.91	AVG
6	1.162	22.46	10.47	32.93	56.00	-23.07	QP
7	2.222	7.93	10.77	18.70	46.00	-27.30	AVG
8	2.234	19.98	10.77	30.75	56.00	-25.25	QP
9	8.002	14.12	13.06	27.18	60.00	-32.82	QP
10	8.002	6.82	13.06	19.88	50.00	-30.12	AVG
11 *	25.290	25.47	15.33	40.80	60.00	-19.20	QP
12	26.094	10.22	15.24	25.46	50.00	-24.54	AVG

5.3. 20 dB Bandwidth

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. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test configuration:	
Test procedure:	1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement. 2. Set to the maximum power setting and enable the EUT transmit continuously 3. Use the following spectrum analyzer settings: Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a Test channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold 4. Measure and record the results in the test report.
Test mode:	Refer to the clause 4.2
Result:	**Passed**

Center Frequency of operation(MHz)	Measured 20dB Bandwidth(kHz)	Limit(kHz)	Result
433.9	339.0	1084.75	PASS



5.4. Radiated Spurious Emission

Limit:

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

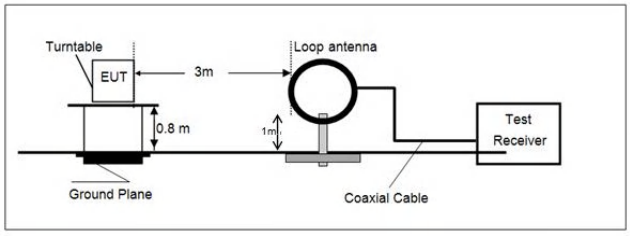
Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)

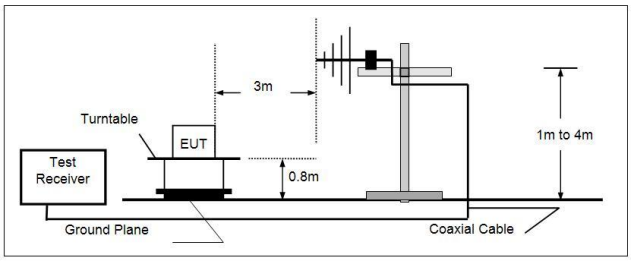
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

Test configuration:

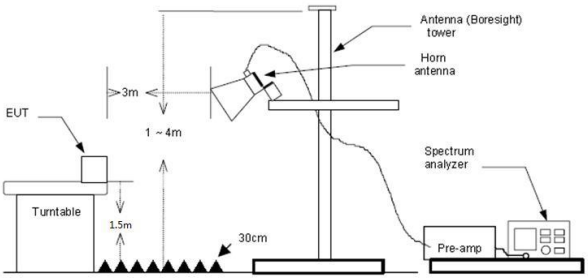
9kHz~30MHz



30 MHz ~ 1 GHz


3m
Turntable
EUT
Test Receiver
0.8m
1m to 4m
Ground Plane
Coaxial Cable

Above 1 GHz


Antenna (Boresight) tower
Horn antenna
>3m
EUT
1 ~ 4m
Spectrum analyzer
Turntable
1.5m
30cm
Pre-amp

Test procedure:	1. The EUT was setup and tested according to ANSI C63.10. 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level. 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower. 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines. 5. Set to the maximum power setting and enable the EUT transmit continuously. 6. Use the following spectrum analyzer settings a) Span shall wide enough to fully capture the emission being measured; b) Below 1 GHz: RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement d) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement
Test mode:	Refer to the clause 4.2
Result:	**Passed**

Note:

1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
2) Margin = Limit – Level
3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.
4) The other emission levels were very low against the limit.
5) This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in X position.

For 9 kHz ~ 30 MHz

The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

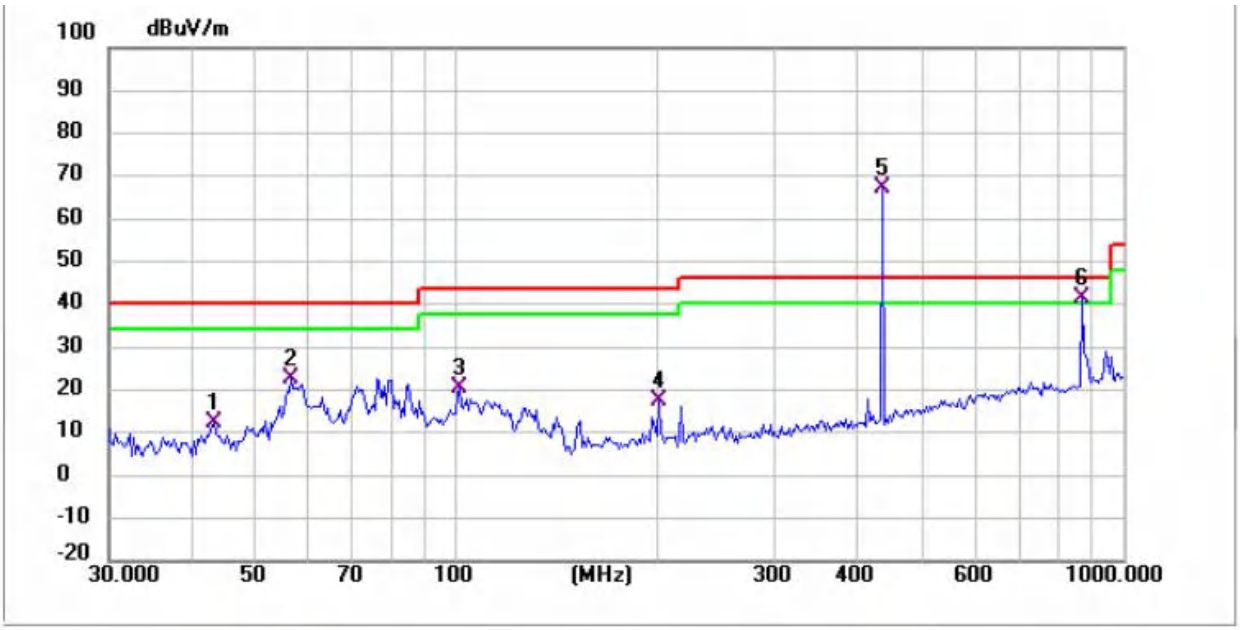
For 30 MHz ~ 1000 MHz

Polarization:	Horizontal

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	38.888	52.47	-31.00	21.47	40.00	-18.53	QP
2	55.221	56.06	-30.29	25.77	40.00	-14.23	QP
3	78.413	59.51	-34.65	24.86	40.00	-15.14	QP
4	200.688	45.23	-29.83	15.40	43.50	-28.10	QP
5 *	433.920	89.00	-23.88	65.12	46.00	19.12	QP
6 !	867.830	55.99	-15.25	40.74	46.00	-5.26	QP

Fundamental and Harmonics Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Limit(dBμV/m) (Peak)	Conclusion
433.9	89.00	-17.71	71.29	80.83	100.83	PASS
867.8	55.99	-17.71	38.28	60.83	80.83	PASS

Polarization:	Vertical



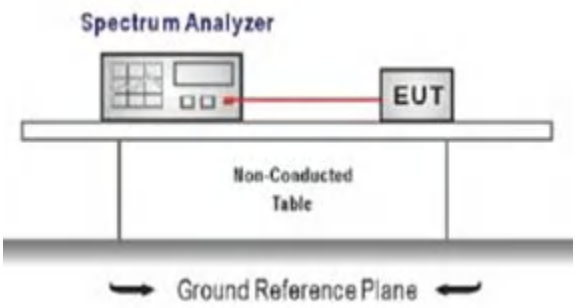
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	43.202	42.00	-29.84	12.16	40.00	-27.84	QP
2	56.395	52.96	-30.40	22.56	40.00	-17.44	QP
3	100.934	51.23	-30.84	20.39	43.50	-23.11	QP
4	200.688	47.37	-29.83	17.54	43.50	-25.96	QP
5 *	433.910	91.14	-23.88	67.26	46.00	21.26	QP
6 !	867.823	56.93	-15.25	41.68	46.00	-4.32	QP

Fundamental and Harmonics Result						
Frequency (MHz)	Peak Level (dBμV/m)	AV Factor(dBμV/m) (see Section 5.4)	Average Level (dBμV/m)	Limit(dBμV/m) (average)	Limit(dBμV/m) (Peak)	Conclusion
433.9	91.14	-17.71	73.43	80.83	100.83	PASS
867.8	56.93	-17.71	39.22	60.83	80.83	PASS

For 1 GHz ~ 4 GHz

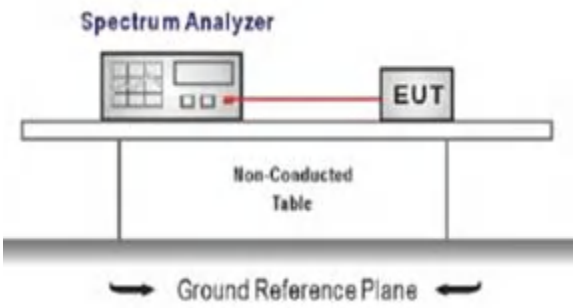
Test channel: 433.9MHz										
Freq. (MHz)	Reading (dBuv)	Ant. Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)	Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Remark	Polarity
1204.00	69.83	28.62	4.08	38.62	-5.92	63.91	74	10.09	Peak	Horizontal
1204.00	51.24	28.62	4.08	38.62	-5.92	45.32	54	8.68	Average	Horizontal
1204.00	69.49	28.62	4.08	38.62	-5.92	63.57	74	10.43	Peak	Vertical
1204.00	50.56	28.62	4.08	38.62	-5.92	44.64	54	9.36	Average	Vertical

5.5. Transmitter Deactivation Time

Limit:	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.
Test configuration:	
Test procedure:	Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.
Test mode:	Refer to the clause 4.2
Result:	**Passed**

Test Results			
Frequency (MHz)	Activation Time(s)	Limit: not more than 5 seconds of being released (s)	Conclusion
433.9	0.78	5	PASS

5.6. Duty cycle Factor

Limit:	No dedicated limit specified in the Rules.
Test configuration:	
Test procedure:	1. Place the EUT on the table and set it in transmitting mode. 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer. 3. Set centre frequency of spectrum analyzer=operating frequency. 4. Set the spectrum analyzer as RBW=100kHz, VBW=300kHz, Span=0Hz, Adjust Sweep=Auto. 5. Repeat above procedures until all frequency measured was complete.
Test mode:	Refer to the clause 4.2
Result:	**Passed**

Test Data

Ton = 0.120*21+1.150*4=7.12(ms)

Tp = 54.88(ms)

The duty cycle=7.14/54.88=13.01%

Average Correction Factory = 20log (Ton/Tp) =20log (0.1301) = -17.71dB

Test plot of Duty cycle

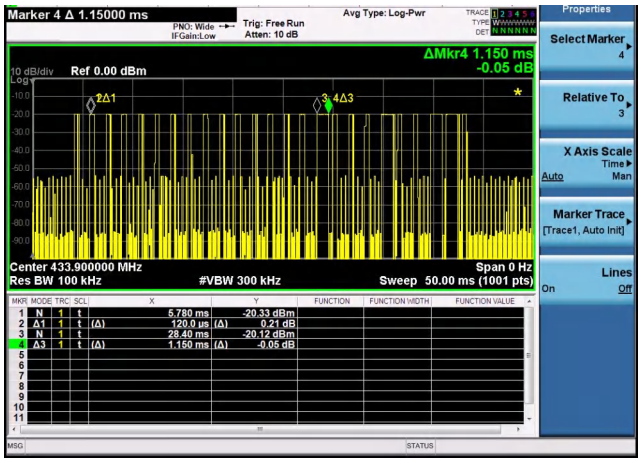


Fig.1

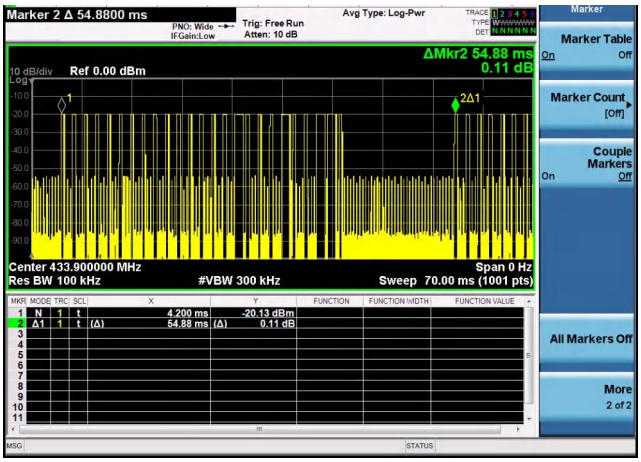
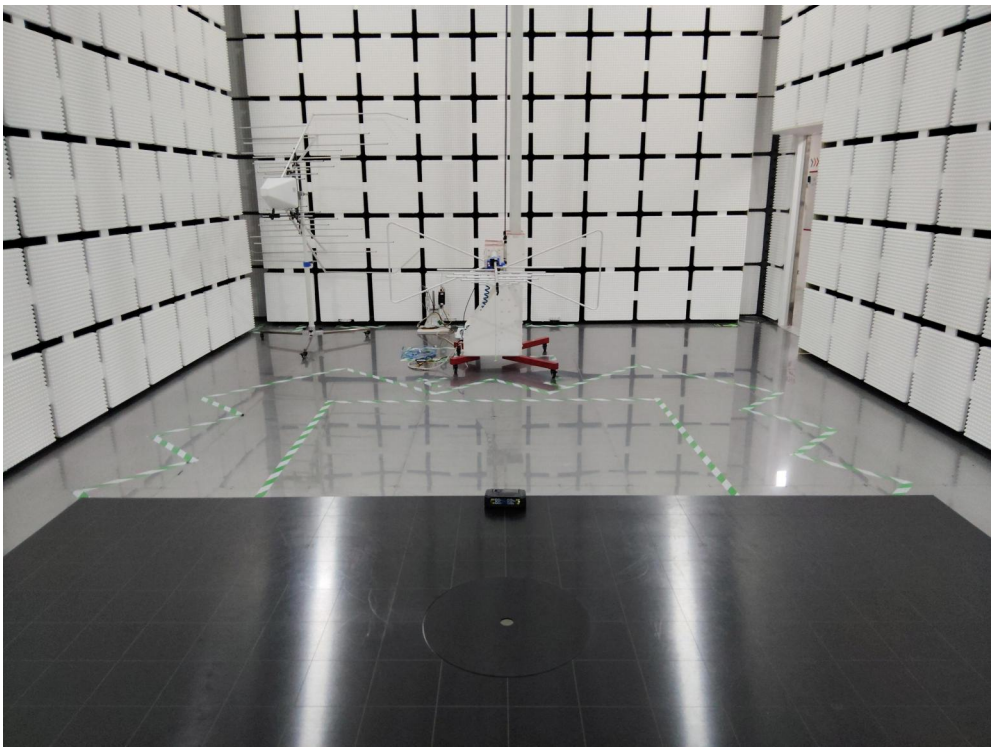


Fig.2

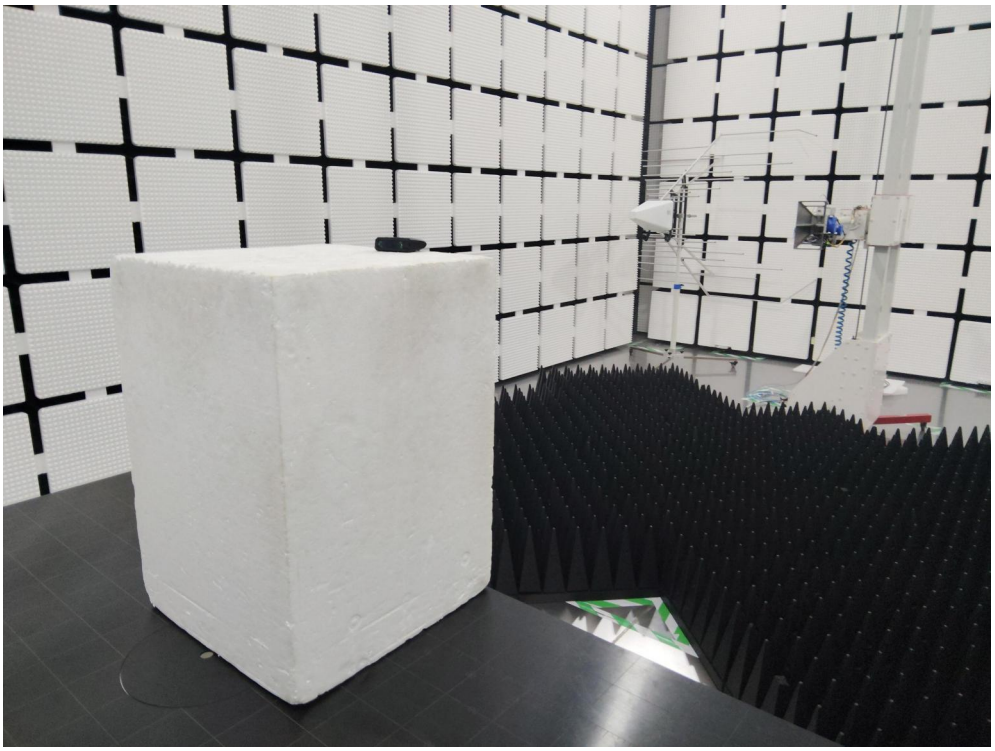
6. TEST SETUP PHOTOS

Radiated Emission

Below 1GHz:

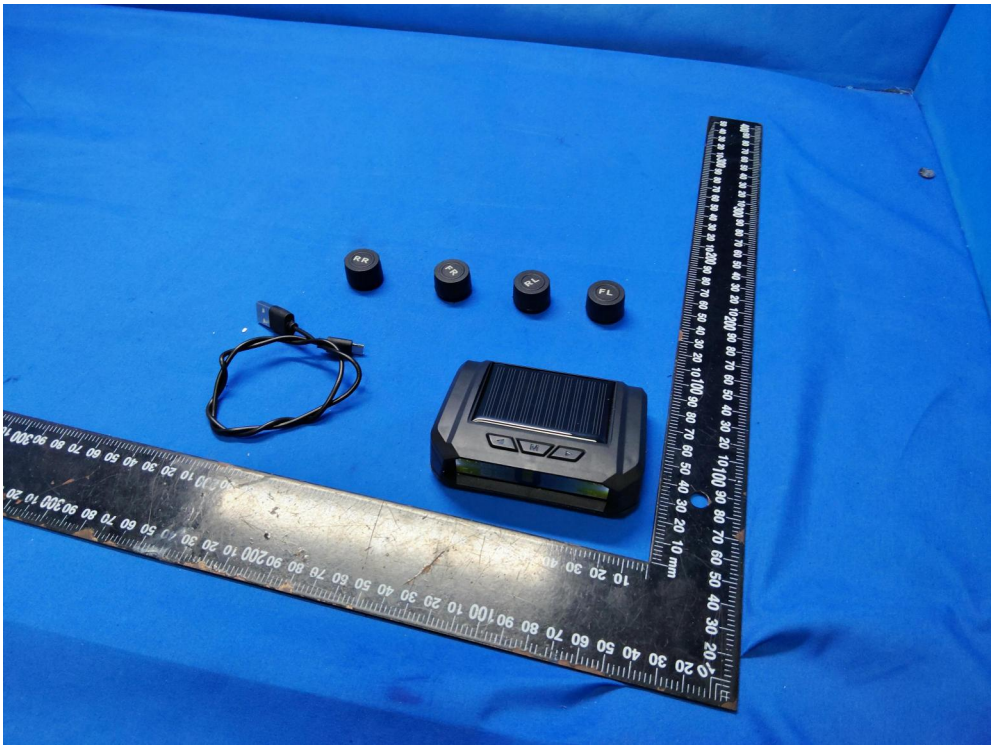


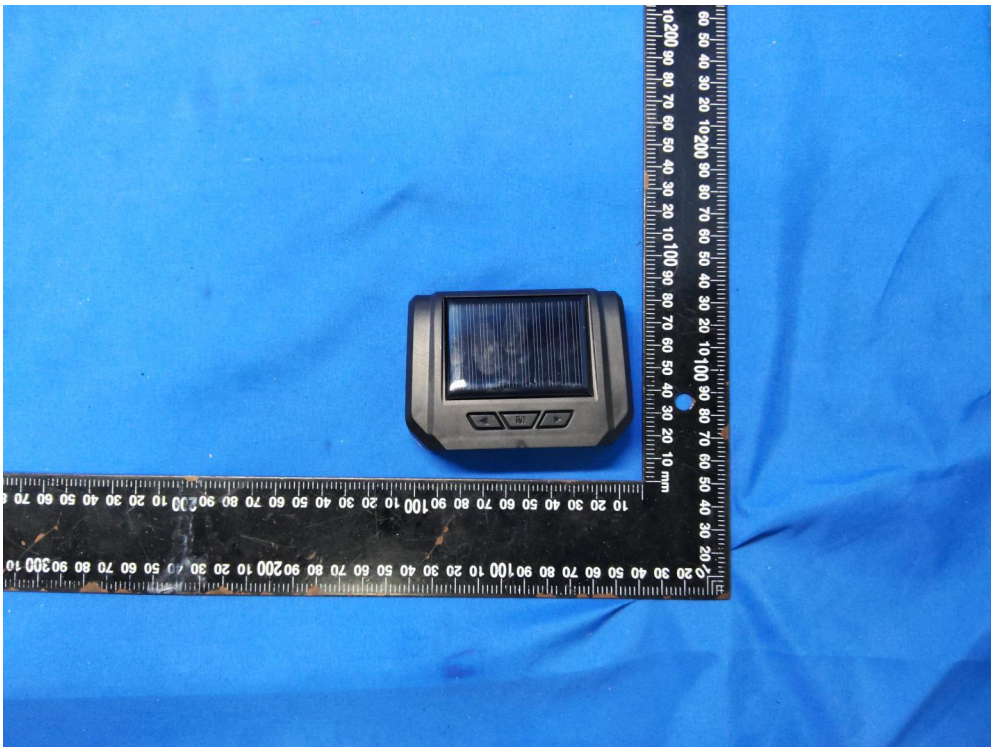
Above 1GHz:



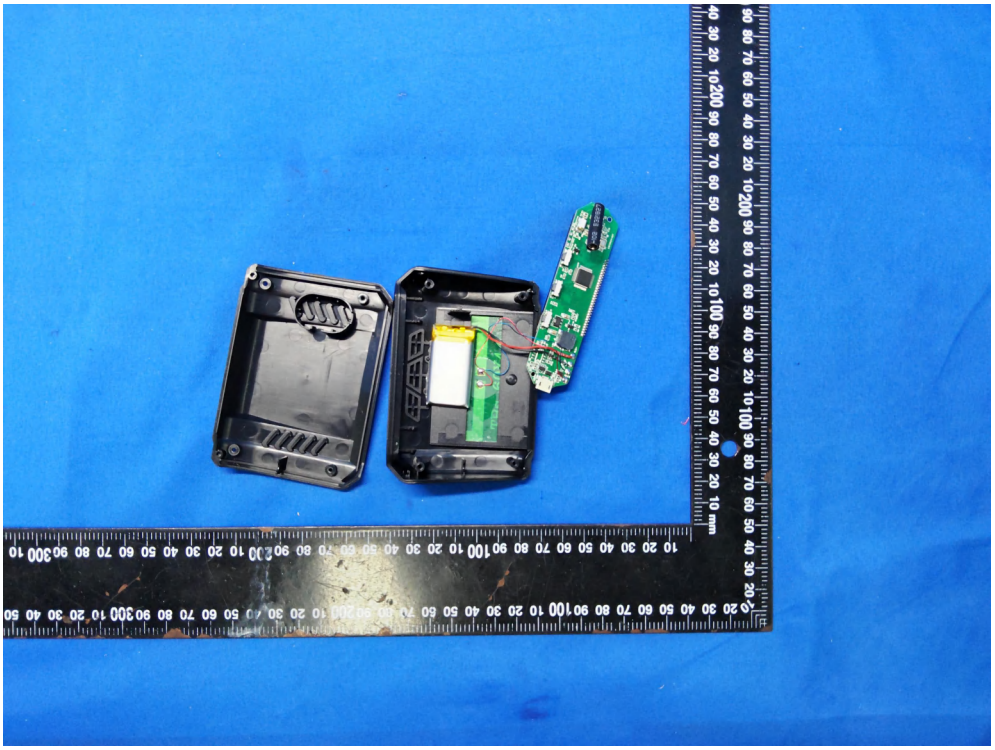
7. EXTERNAL AND INTERNAL PHOTOS

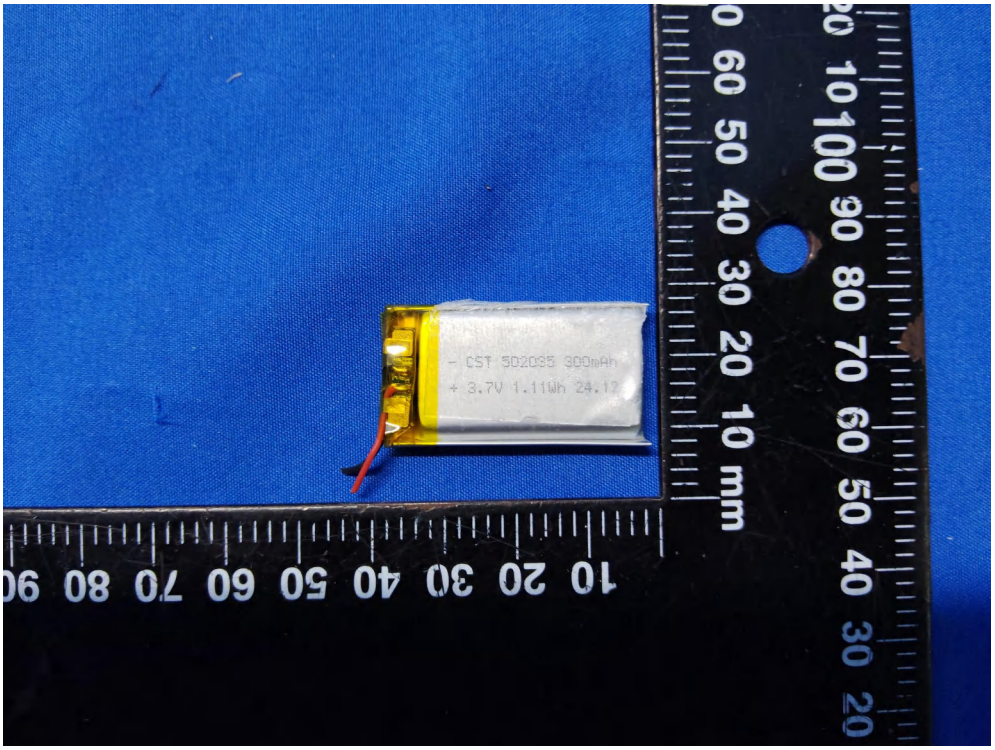
7.1 External photos

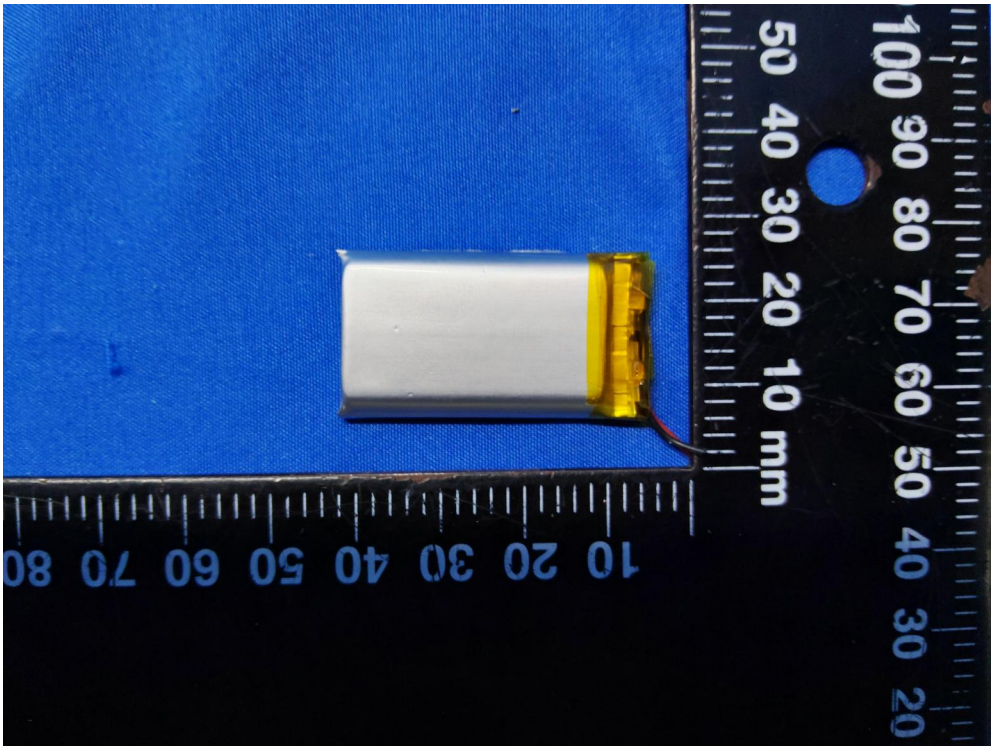


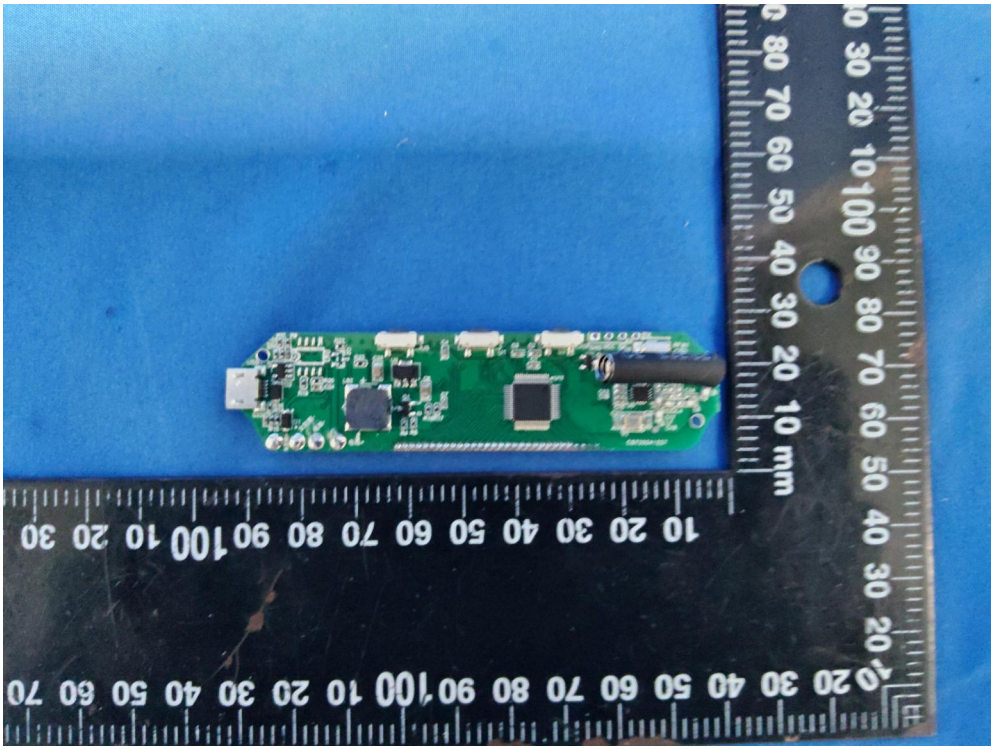


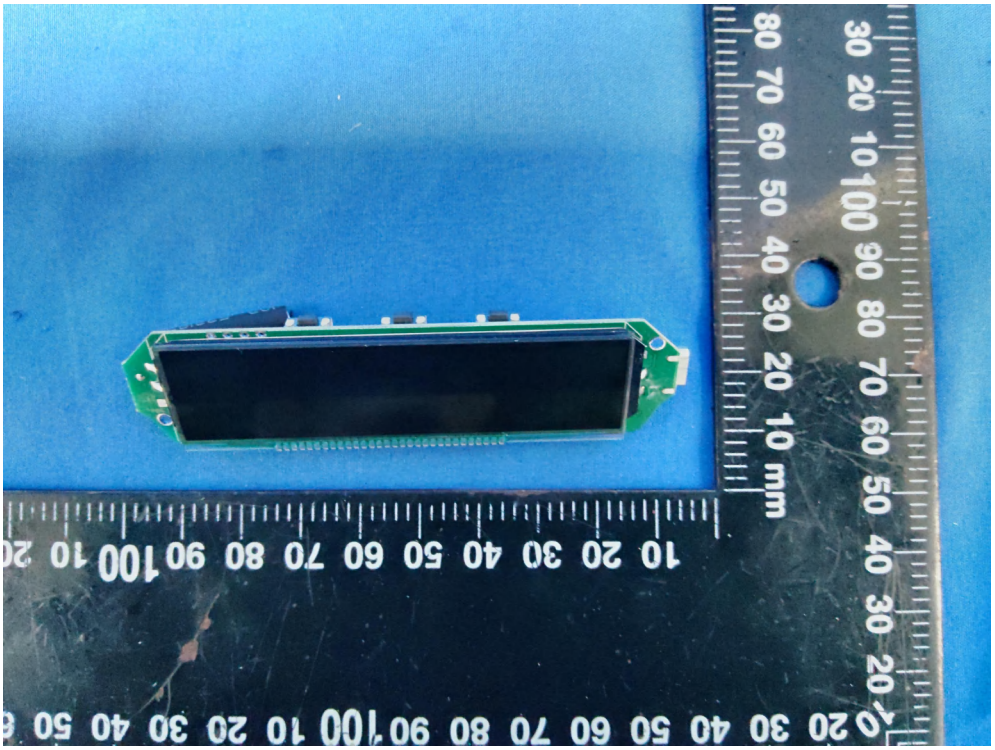
7.2 Internal photos

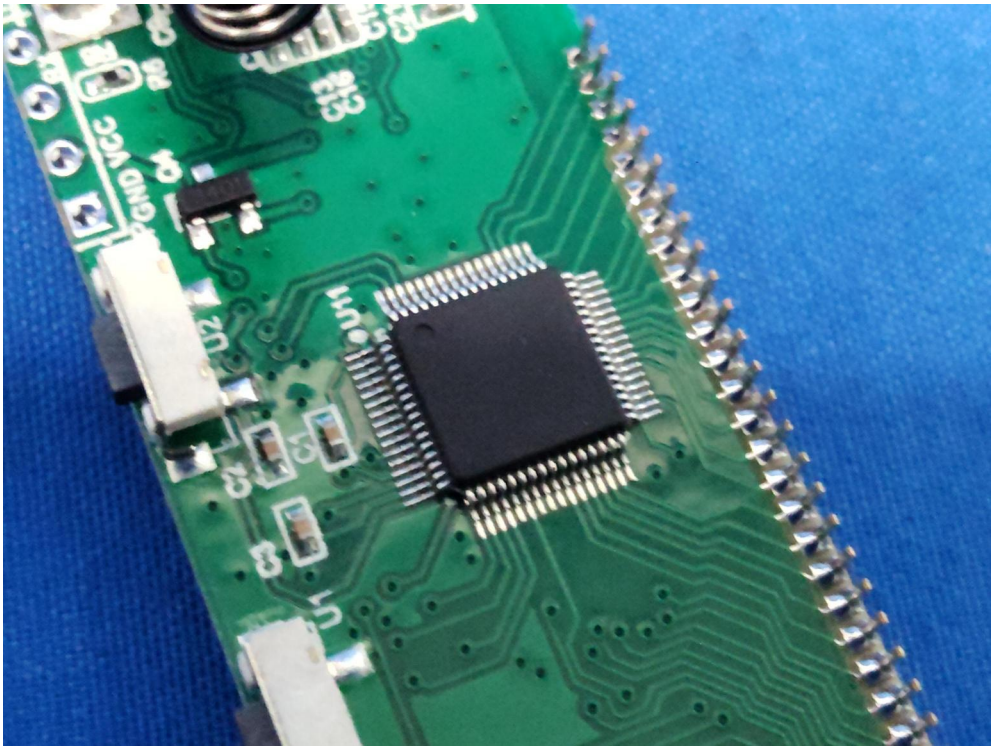


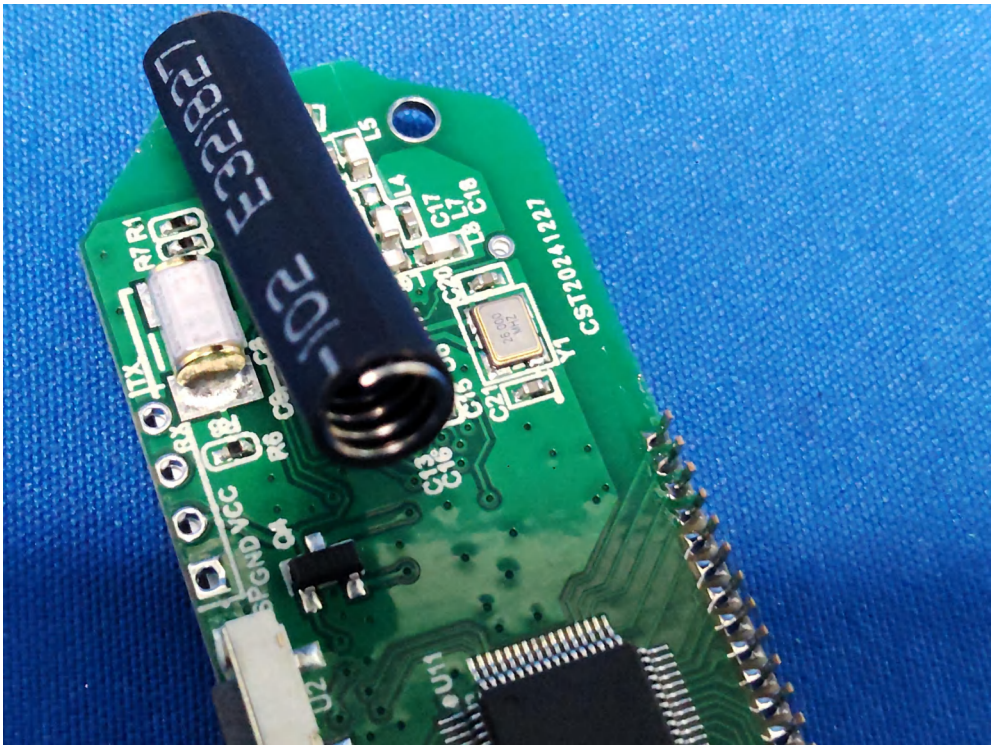








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U1
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R7 R1
R8
R6
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C16
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