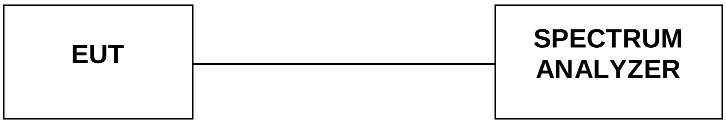
4.5. 6dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW=100 KHz and VBW=300KHz.
The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.
According to KDB558074 D01 for one of the following procedures may be used to determine the modulated DTS device signal bandwidth.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

LIMIT

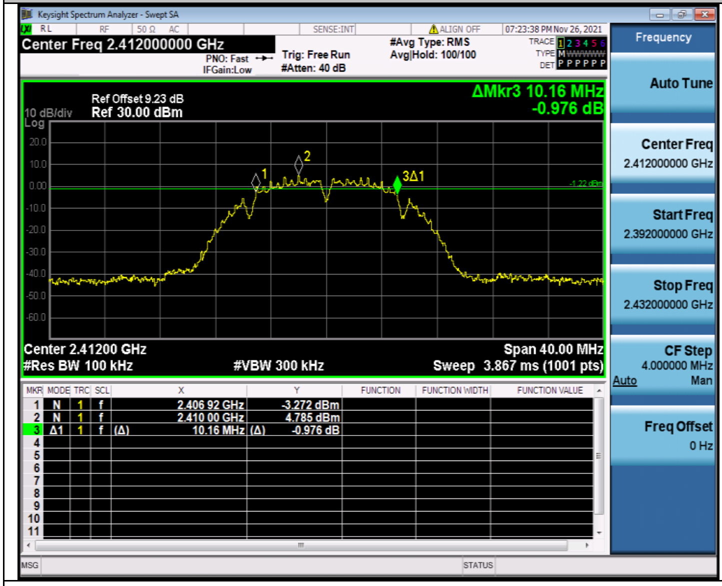
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

TEST RESULTS

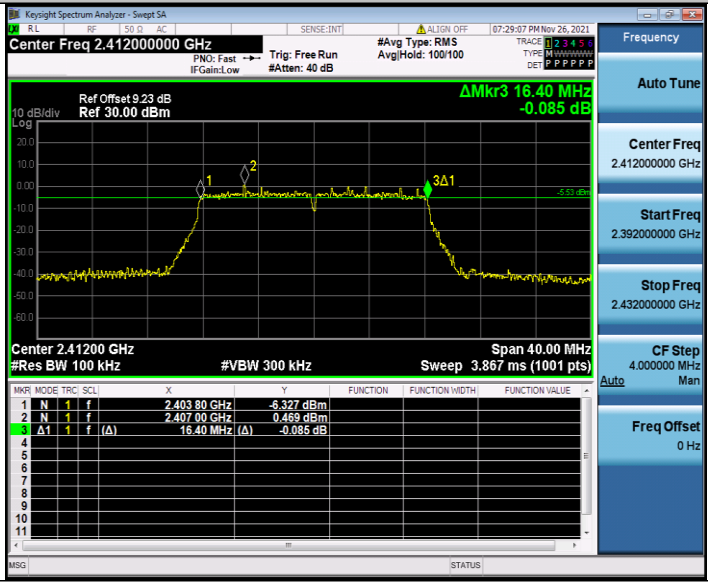
Temperature	23.4℃	Humidity	52.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11b/g/n

Type	Channel	6dB Bandwidth (MHz)	Limit (KHz)	Result
802.11b	01	10.160	≥500	Pass
	06	9.600		
	11	9.160		
802.11g	01	16.400	≥500	Pass
	06	16.400		
	11	16.480		
802.11nHT20	01	17.120	≥500	Pass
	06	17.120		
	11	17.040		

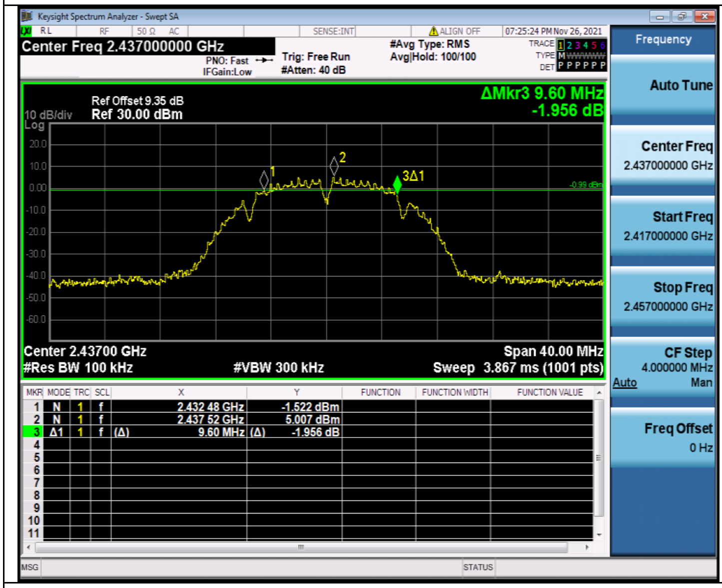
802.11b	802.11g



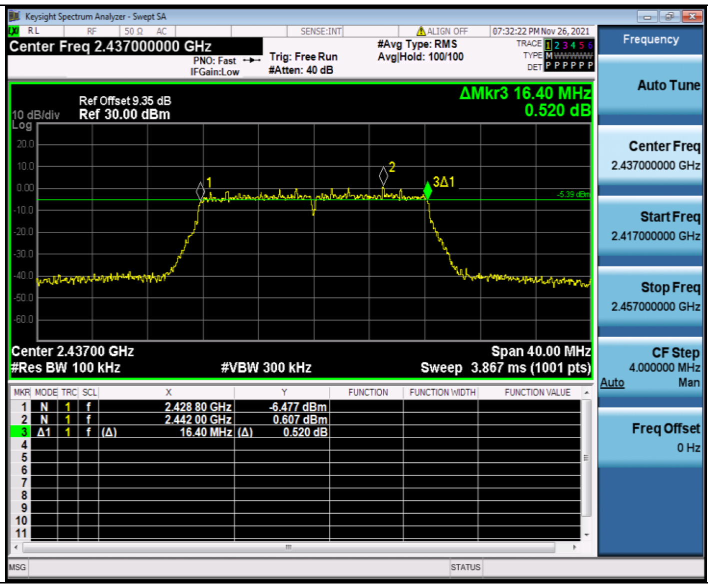
CH01



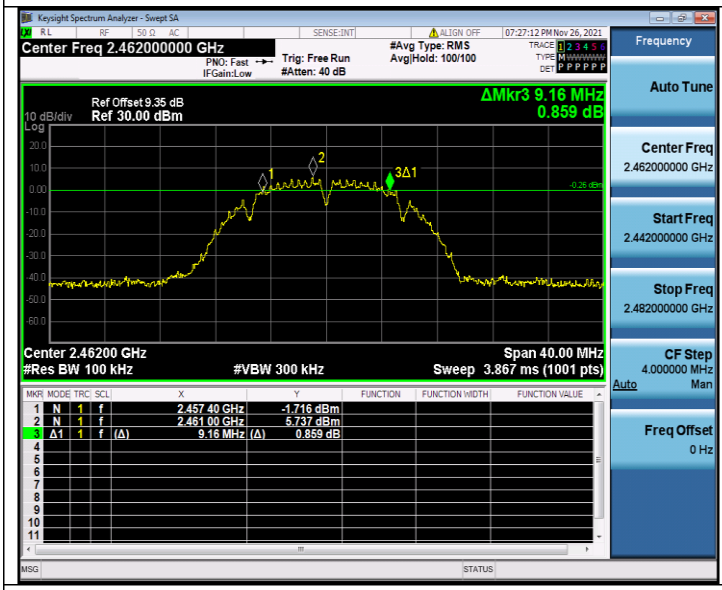
CH01



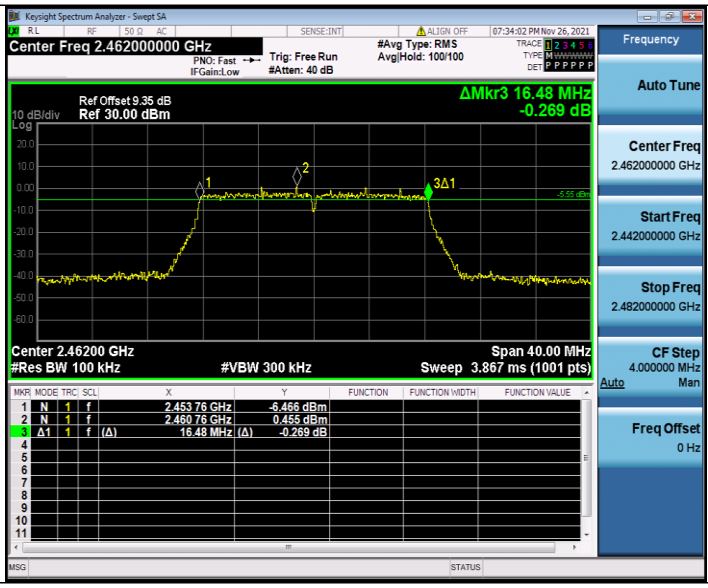
CH06



CH06

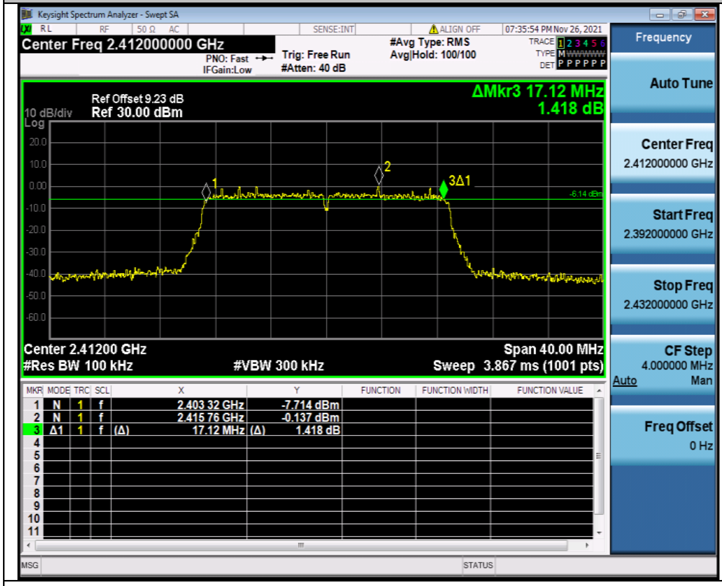


CH11

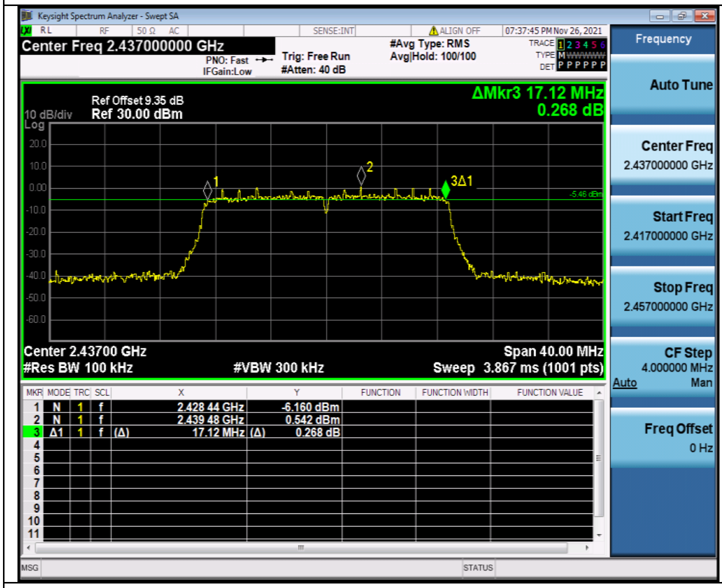


CH11

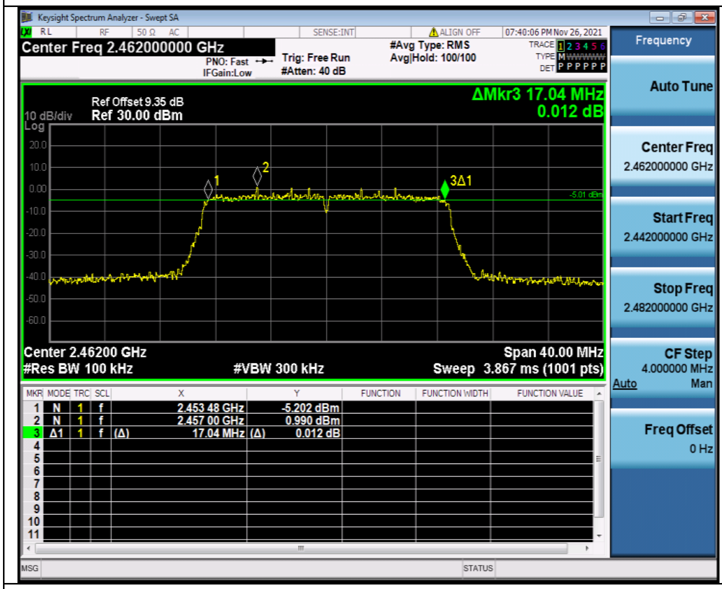
802.11n HT20	



CH01



CH06



CH11

4.6. Band Edge Compliance of RF Emission

TEST REQUIREMENT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

According to KDB 558074 D01 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies ≤ 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz).
9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
10. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:
    E = EIRP – 20log D + 104.8

where:
E = electric field strength in dBµV/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.

11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
12. Compare the resultant electric field strength level to the applicable regulatory limit.
13. Perform radiated spurious emission test dures until all measured frequencies were complete.

LIMIT

Below -20dB of the highest emission level in operating band.
Radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

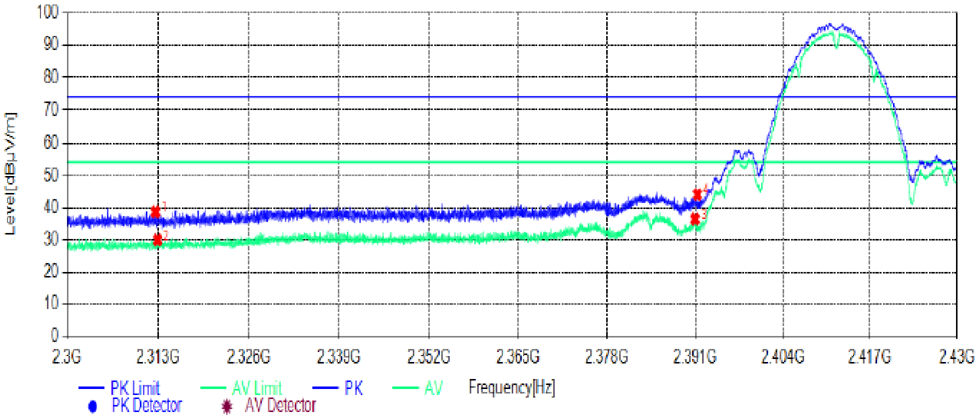
TEST RESULTS

4.6.1 For Radiated Bandedge Measurement

Temperature	23.8℃	Humidity	53.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11b/g/n

Horizontal (802.11b-2412MHz)

Test Graph



Suspected List

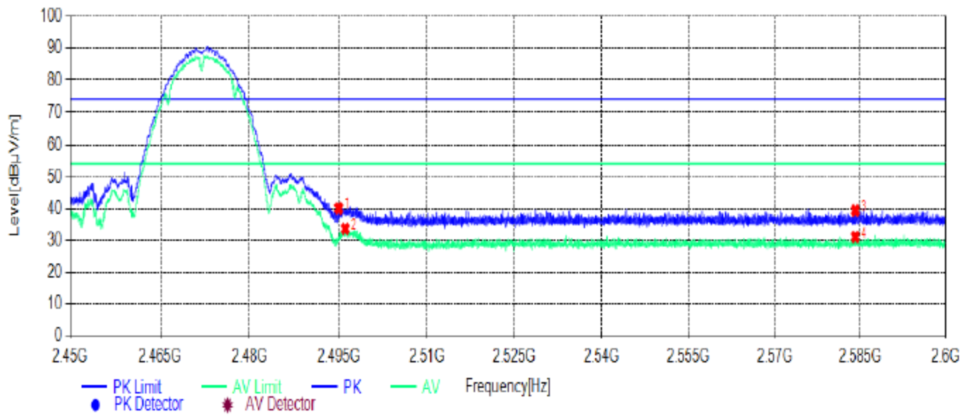
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	2312.5938	34.46	4.10	38.56	74.00	35.44	150	112	PK	Horizonta	PASS
2	2312.8863	25.78	4.10	29.88	54.00	24.12	150	302	AV	Horizonta	PASS
3	2391.0000	32.09	4.25	36.34	54.00	17.66	150	247	AV	Horizonta	PASS
4	2391.3413	39.84	4.26	44.10	74.00	29.90	150	205	PK	Horizonta	PASS

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Horizontal (802.11b-2462MHz)

Test Graph



Suspected List

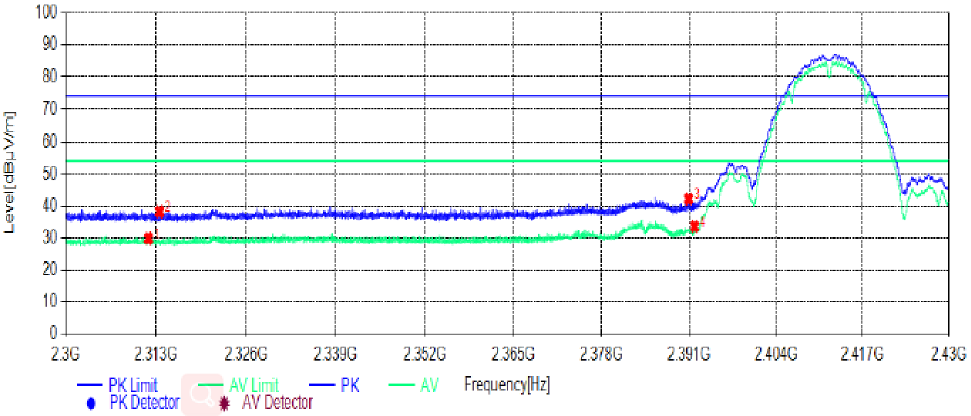
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	2495.0188	35.31	4.70	40.01	74.00	33.99	150	174	PK	Horizonta	PASS
2	2496.1250	28.88	4.71	33.59	54.00	20.41	150	123	AV	Horizonta	PASS
3	2584.0813	34.12	5.19	39.31	74.00	34.69	150	305	PK	Horizonta	PASS
4	2584.0813	25.82	5.19	31.01	54.00	22.99	150	226	AV	Horizonta	PASS

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Vertical(802.11b-2412MHz)

Test Graph



Suspected List

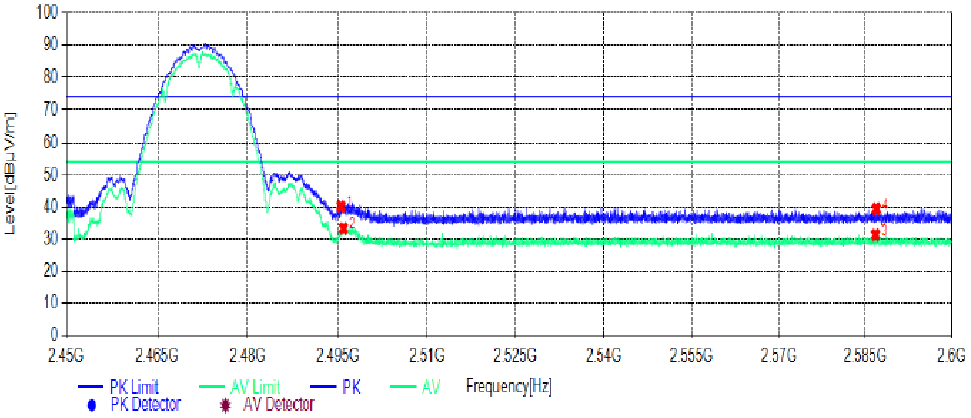
NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	2311.8625	25.70	4.09	29.79	54.00	24.21	150	204	AV	Vertical	PASS
2	2313.4713	34.05	4.10	38.15	74.00	35.85	150	110	PK	Vertical	PASS
3	2390.9675	37.92	4.25	42.17	74.00	31.83	150	162	PK	Vertical	PASS
4	2391.8288	29.28	4.26	33.54	54.00	20.46	150	230	AV	Vertical	PASS

Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

Vertical(802.11b-2462MHz)

Test Graph



Suspected List

NO.	Frequency [MHz]	Reading [dBµV/m]	Factor [dB]	Result [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Detector	Polarity	Remark
1	2495.5438	35.53	4.70	40.23	74.00	33.77	150	208	PK	Vertical	PASS
2	2495.9563	28.63	4.71	33.34	54.00	20.66	150	157	AV	Vertical	PASS
3	2586.7063	26.12	5.21	31.33	54.00	22.67	150	136	AV	Vertical	PASS
4	2586.8375	34.18	5.21	39.39	74.00	34.61	150	229	PK	Vertical	PASS

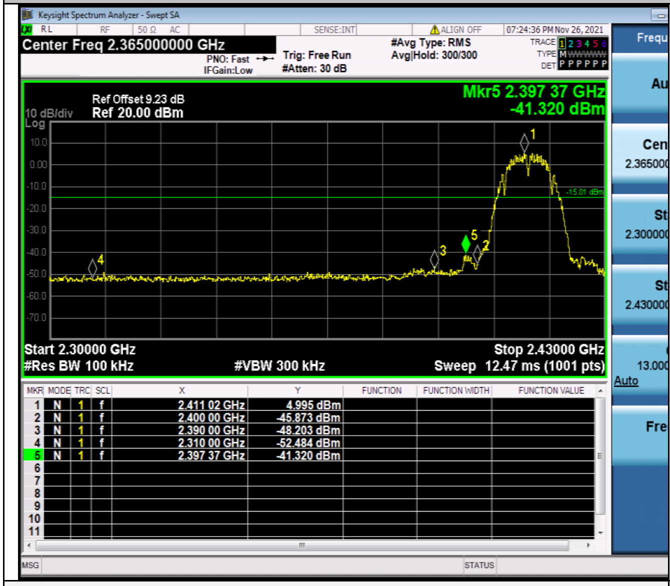
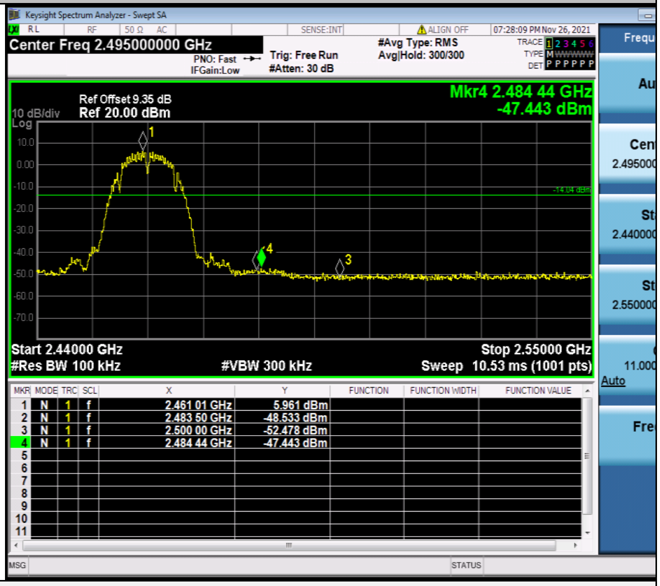
Note:1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

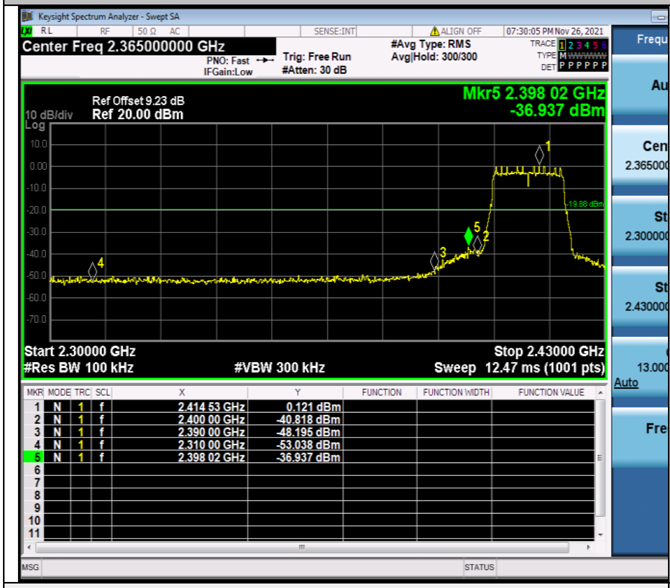
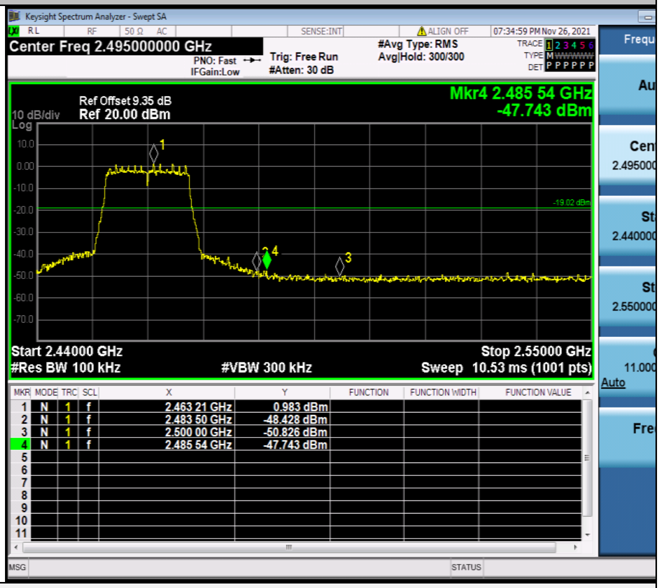
2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) - Pre Amplifier gain (dB).

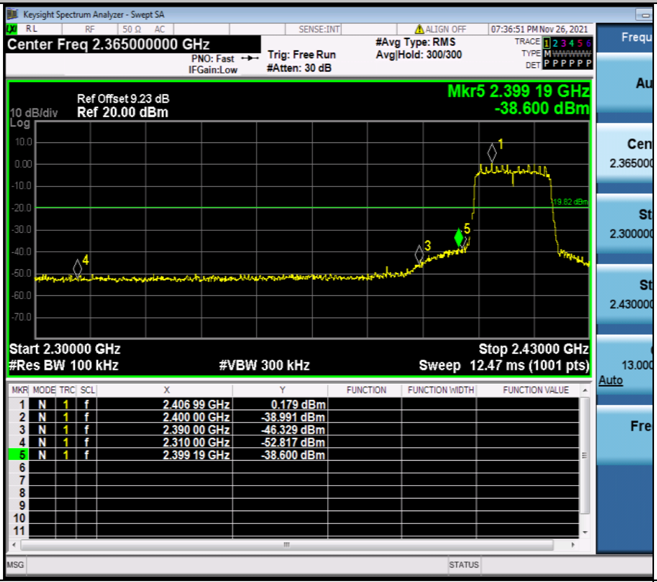
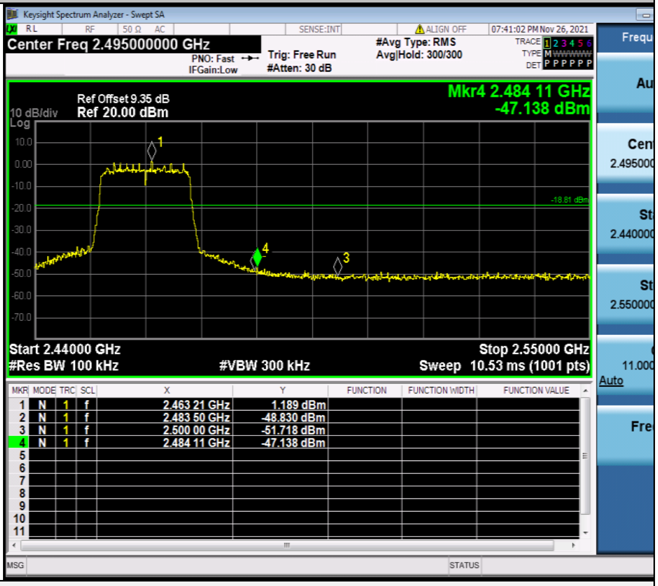
NOTE: All the modes have been tested and recorded worst mode in the report.

4.6.2 For Conducted Bandedge Measurement

Temperature	23.4℃	Humidity	52.7%
Test Engineer	Oliver Ou	Configurations	IEEE 802.11b/g/n

802.11b	
	
2412 MHz	2462 MHz

802.11g	
	
2412 MHz	2462 MHz

802.11n HT20	
	
2412 MHz	2462 MHz

4.7. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Antenna Information

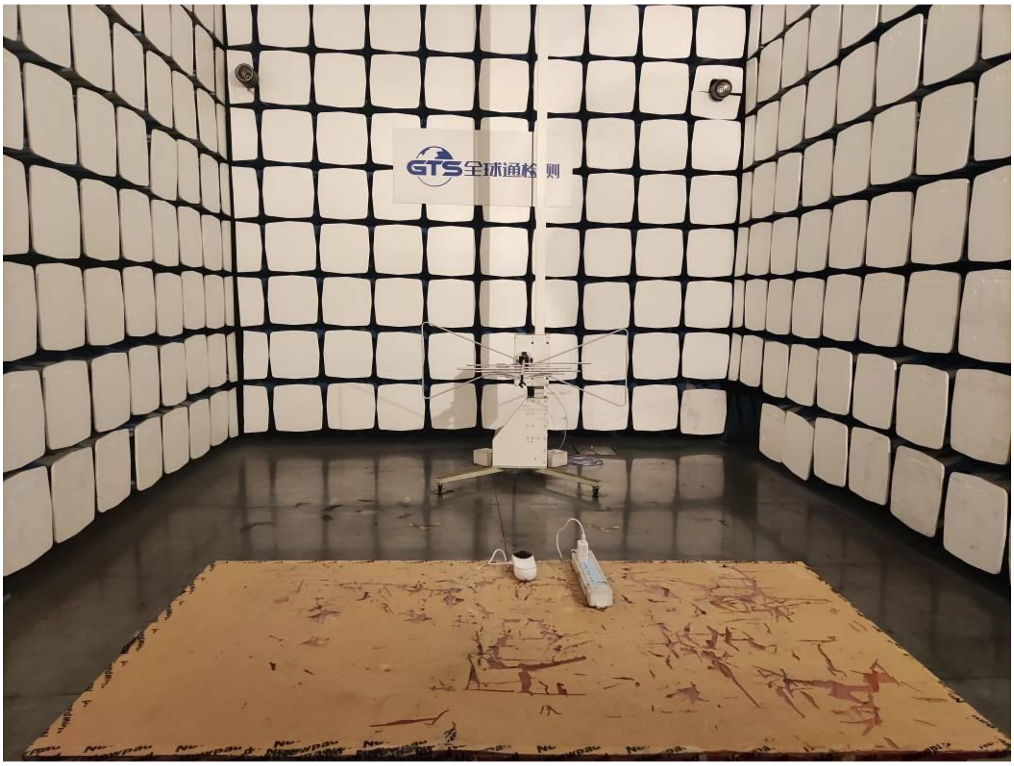
The antenna is FPC Aantenna, through the buckle stretched out, The directional gains of antenna used for transmitting is 3.64dBi.

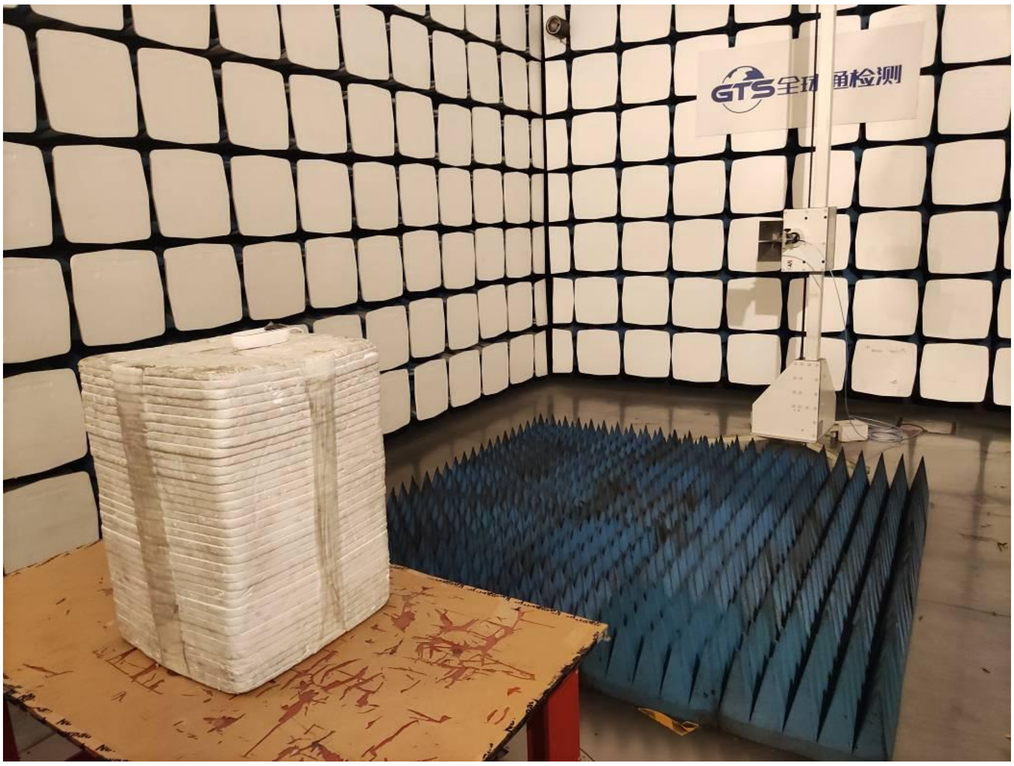
Reference to the **Internal photos**.

5. TEST SETUP PHOTOS OF THE EUT

Adapter: TPA-46B050100UU

Radiated Emission

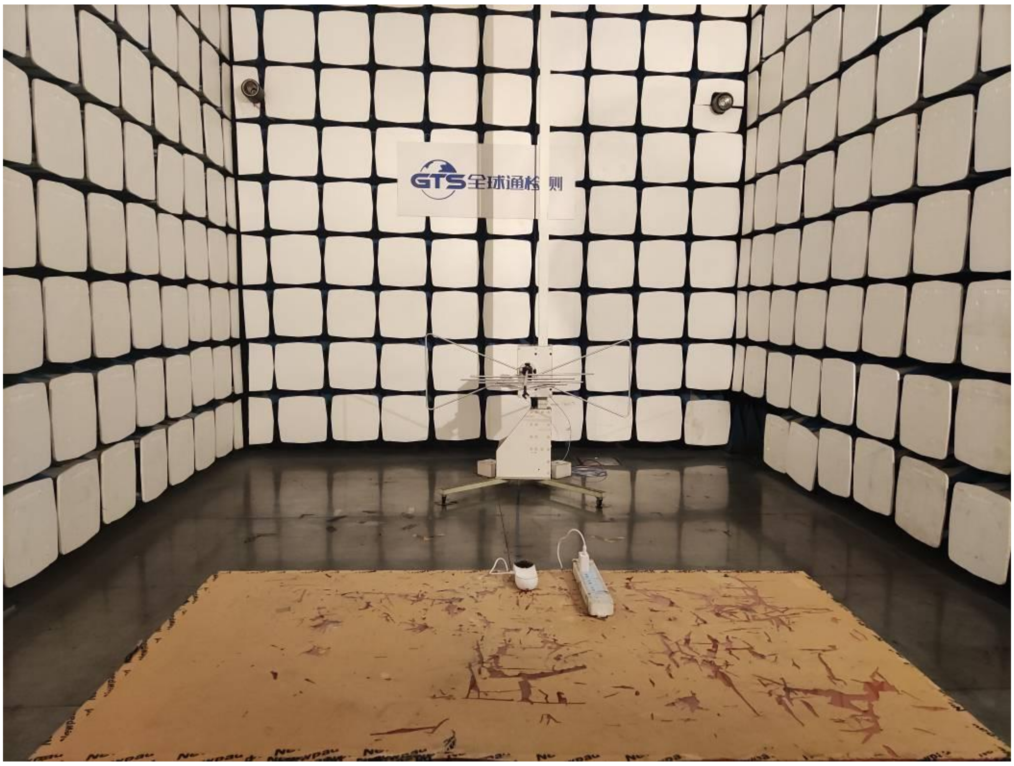


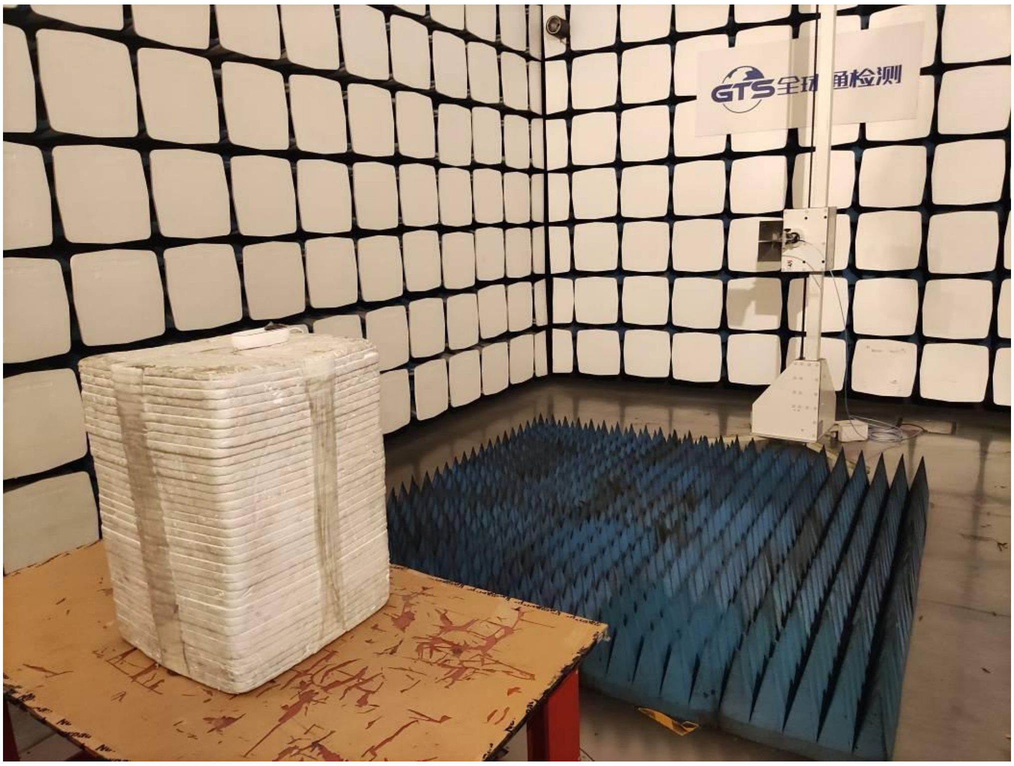


Conducted Emission

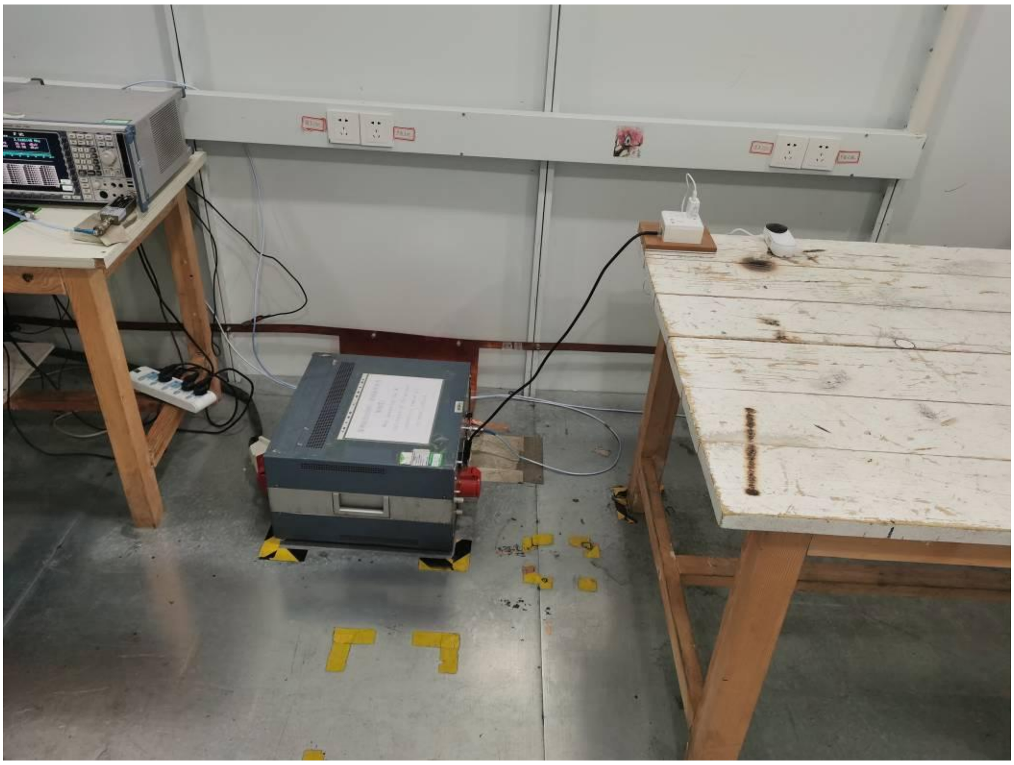
Adapter:GTA92-0501000US

Radiated Emission





Conducted Emission



6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

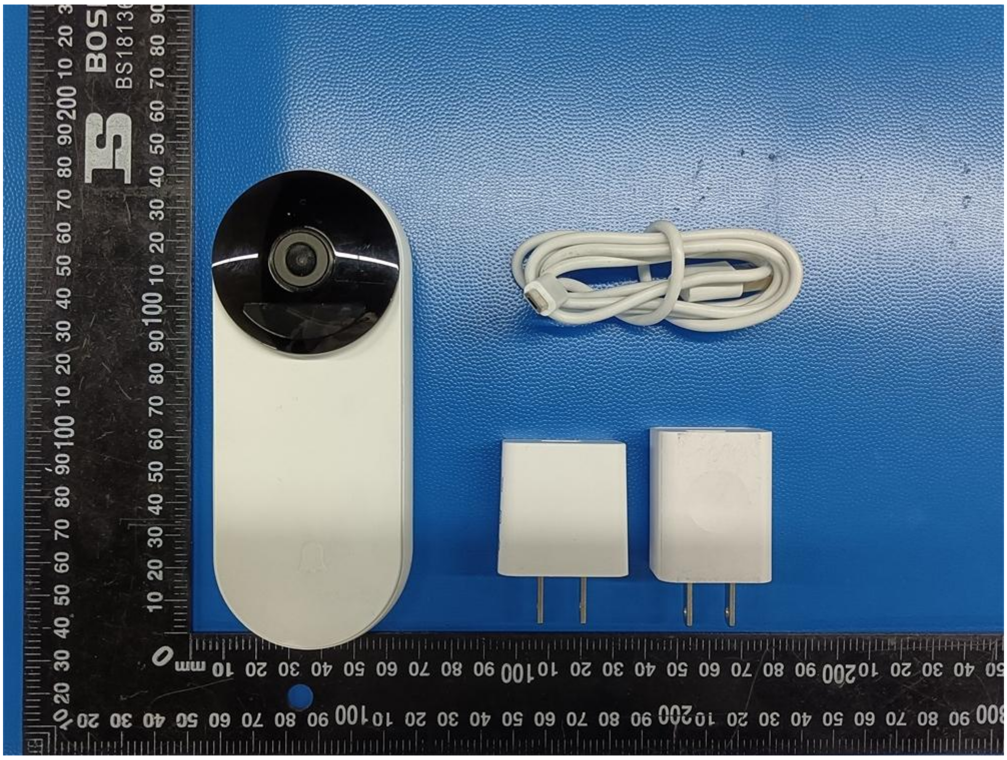


Fig. 1

Fig. 2


SZTY
Switching Adapter
Model:TPA-46B050100UU
Input:100-240V ~ 50/60Hz 0.2A
Output:5.0V ⎓ 1000mA
EFFICIENCY LEVEL: VI
LPS
LISTED
40AZ
E326703
I.T.E power supply
SHENZHEN TIANYIN ELECTRONICS CO., LTD.
Made in China

Fig. 3

Fig. 4

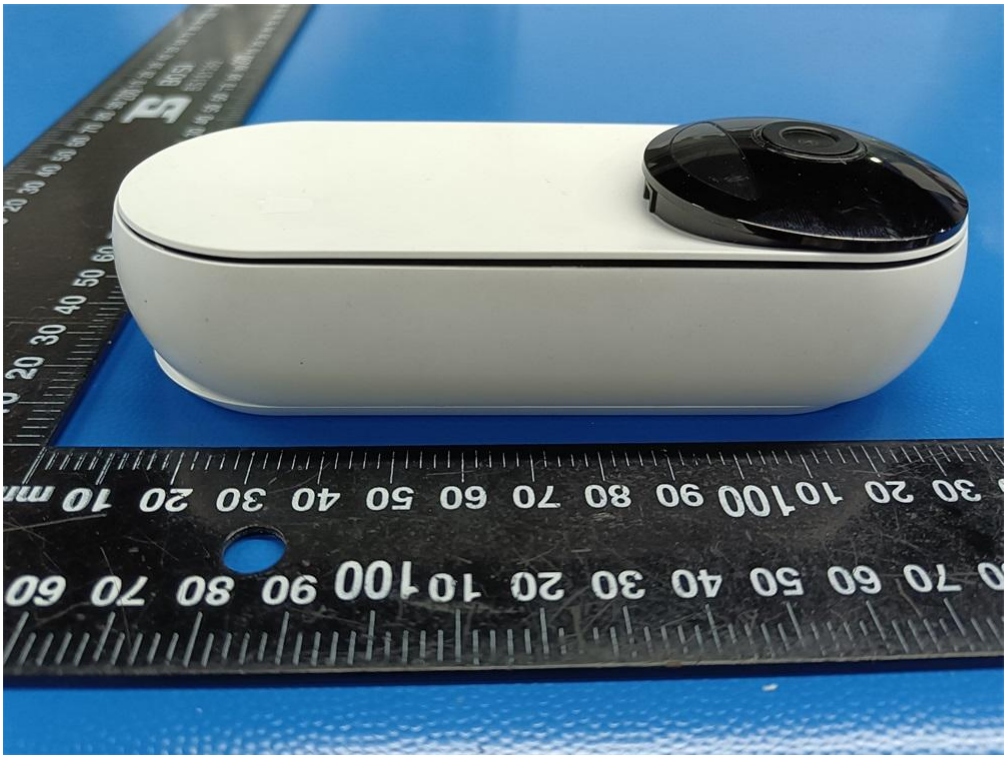


Fig. 5

Fig. 6

Fig. 7

Fig. 8

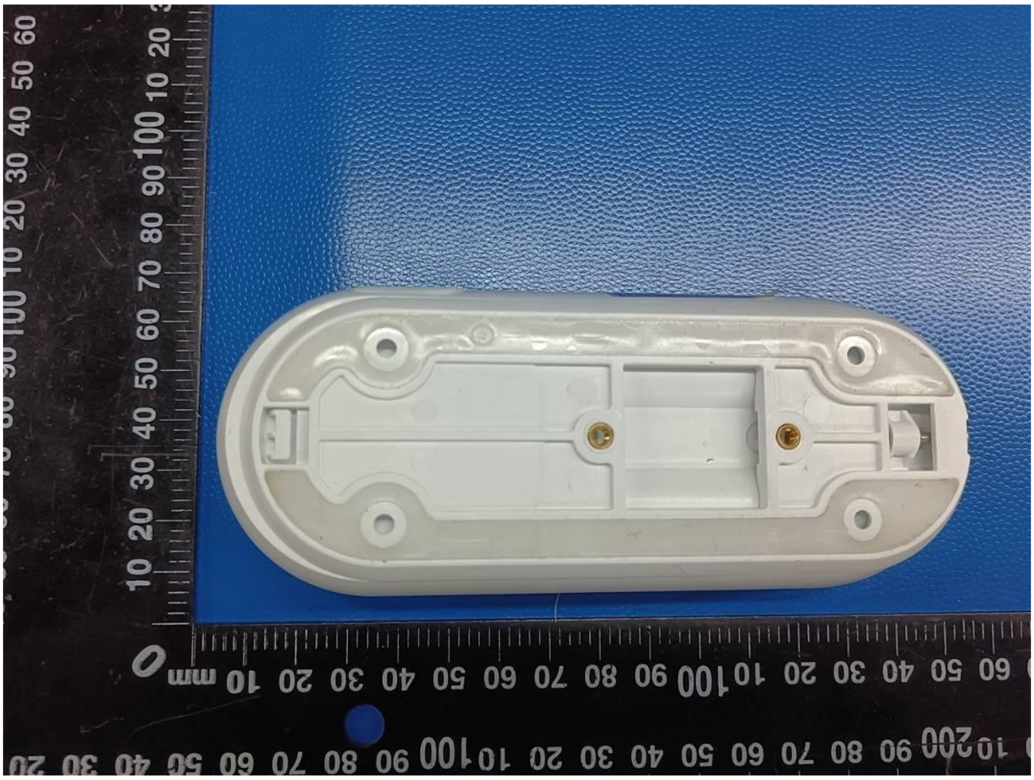


Fig. 9

Fig. 10

Fig. 11

Fig. 12

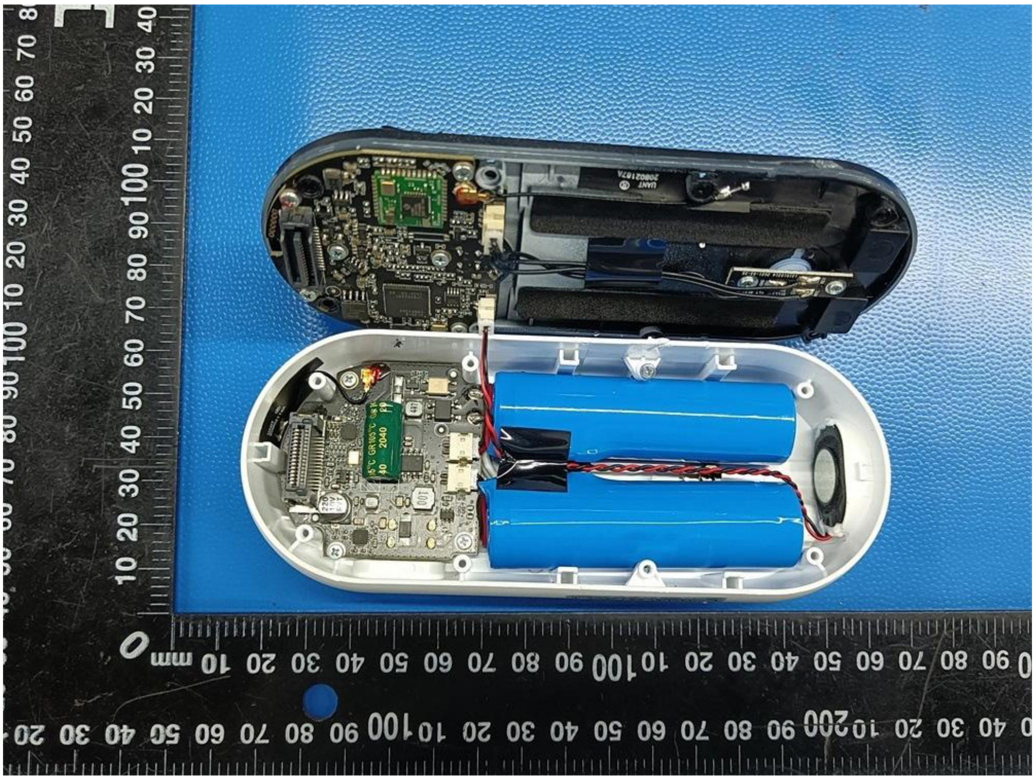


Fig. 13

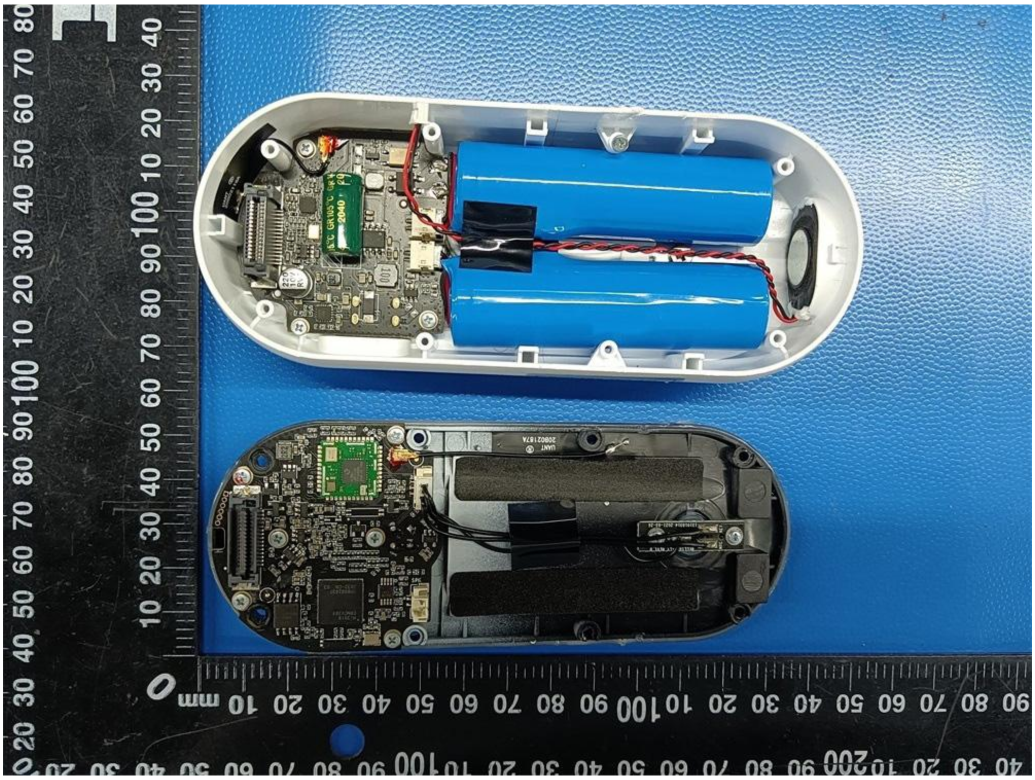


Fig. 14

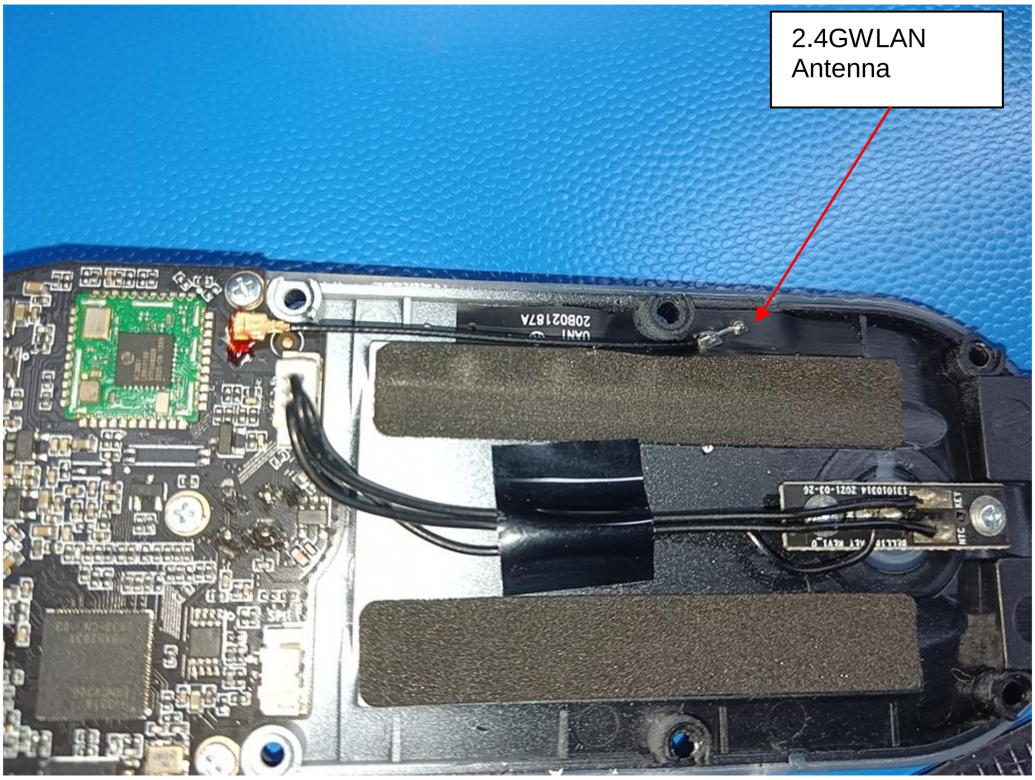


Fig. 15

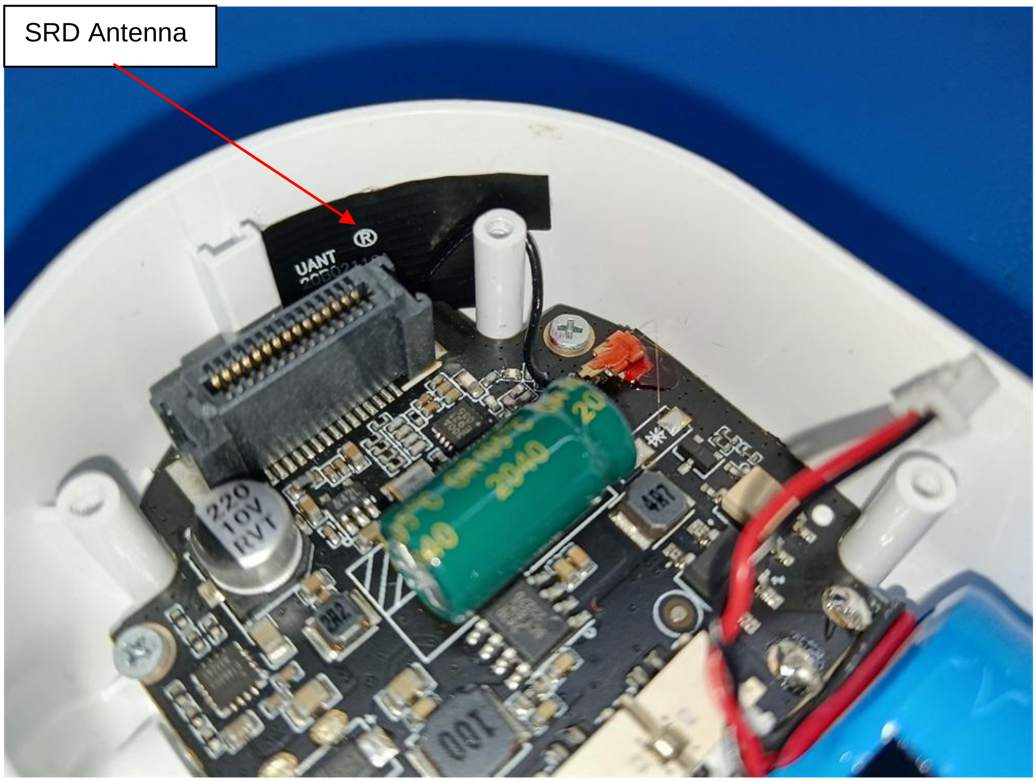


Fig. 16

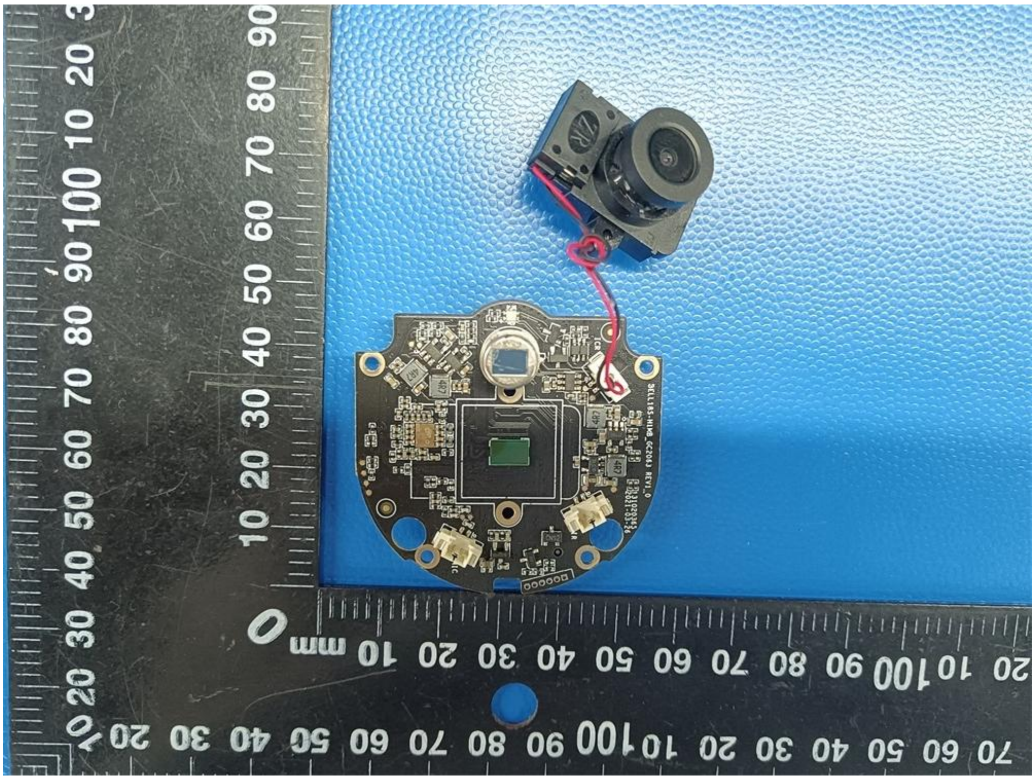


Fig. 17

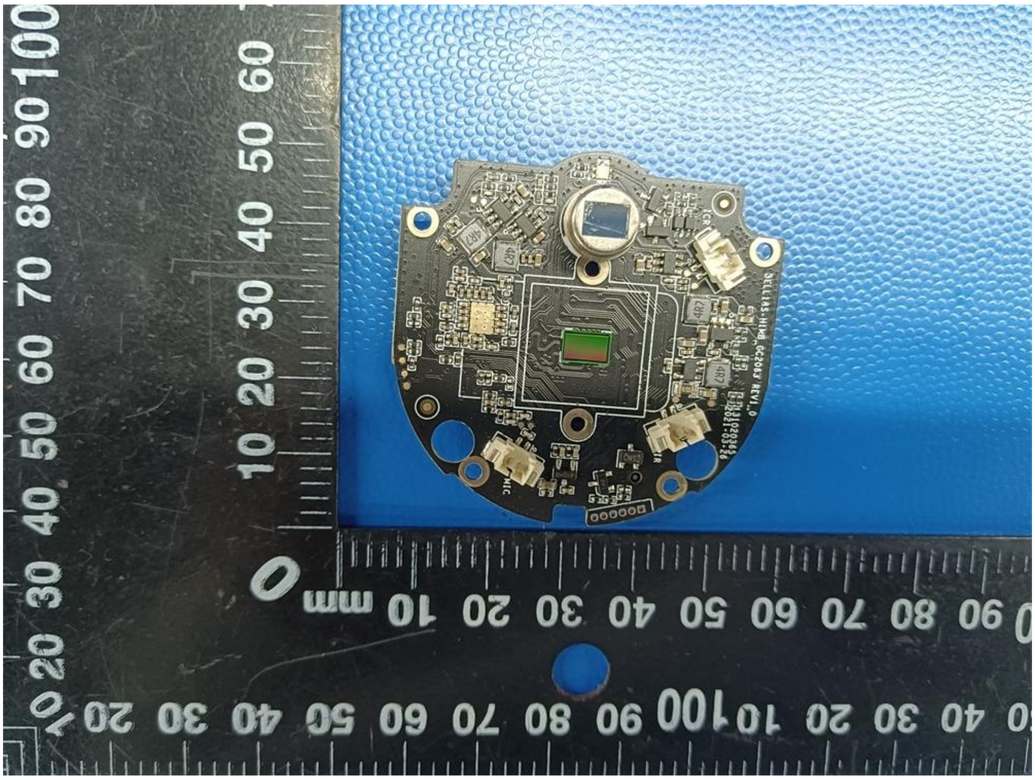


Fig. 18

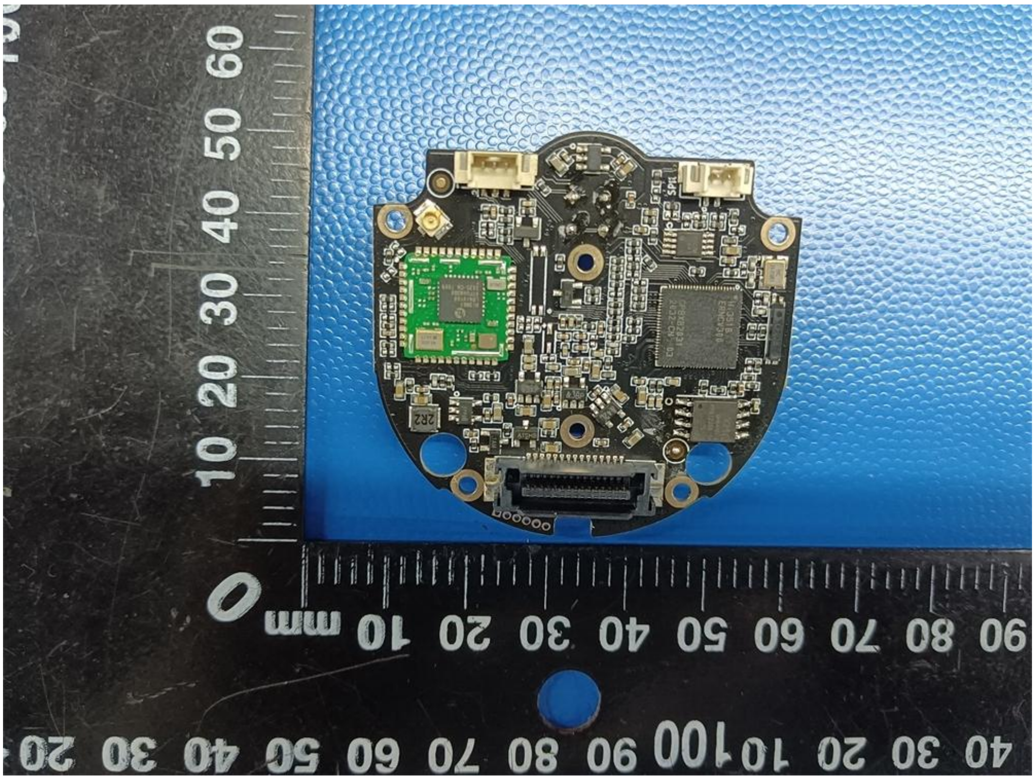


Fig. 19

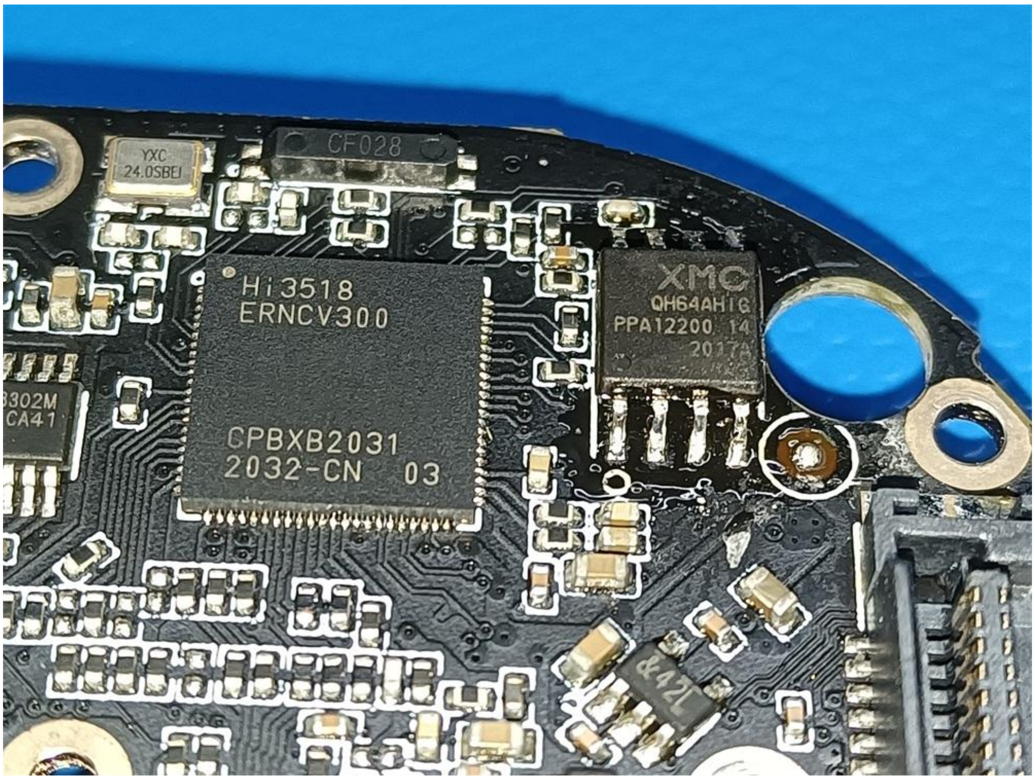

CF028
Hi3518
ERNCV300
CPBXB2031
2032-CN 03
XMC
QH64AHIG
PPA12200 14

Fig. 20

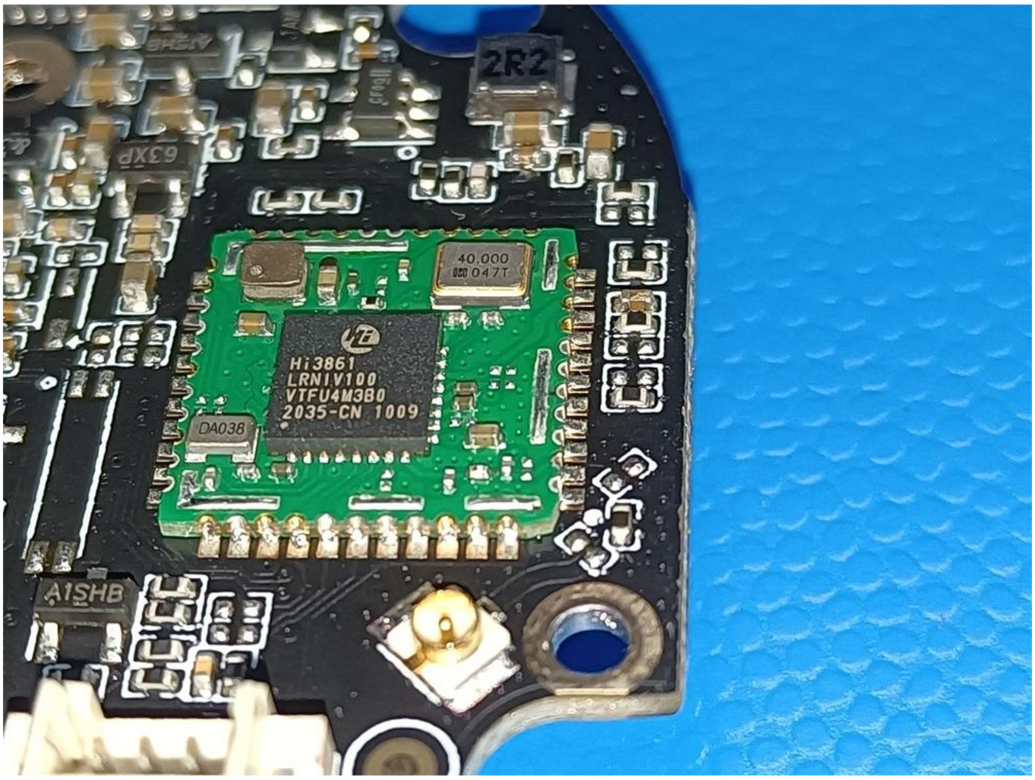

2R2
40.000
047T
Hi3861
LRNIV100
VTFU4M3B0
2035-CN 1009
DA038
A1SHB
63XP

Fig. 21

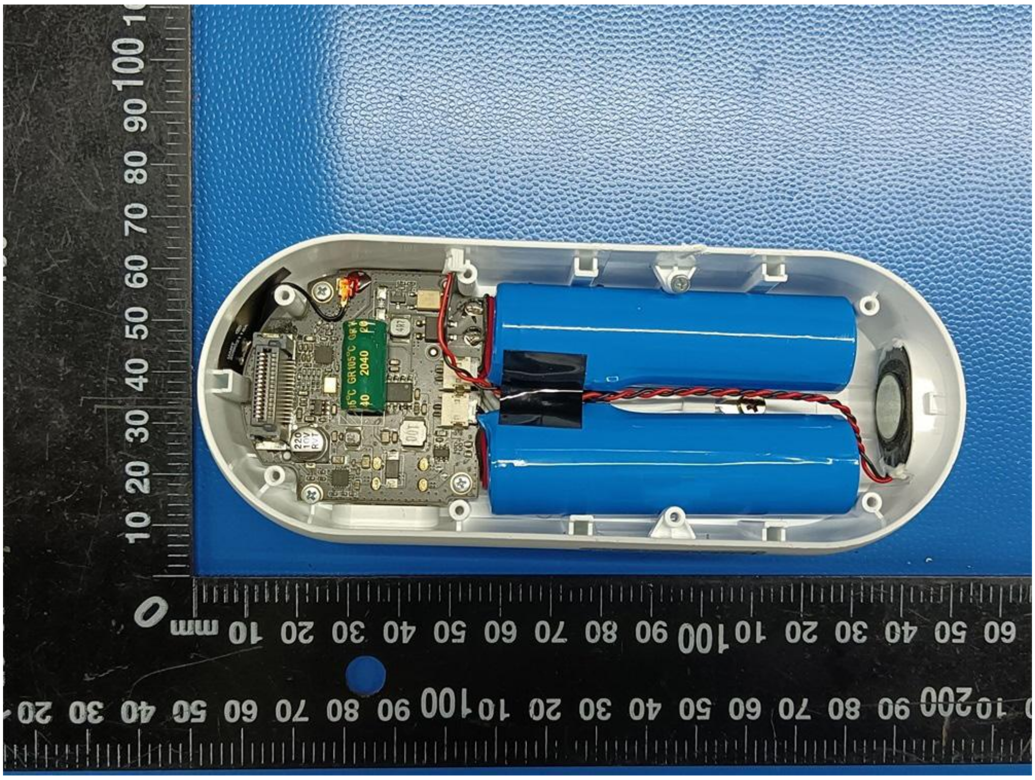


Fig. 22

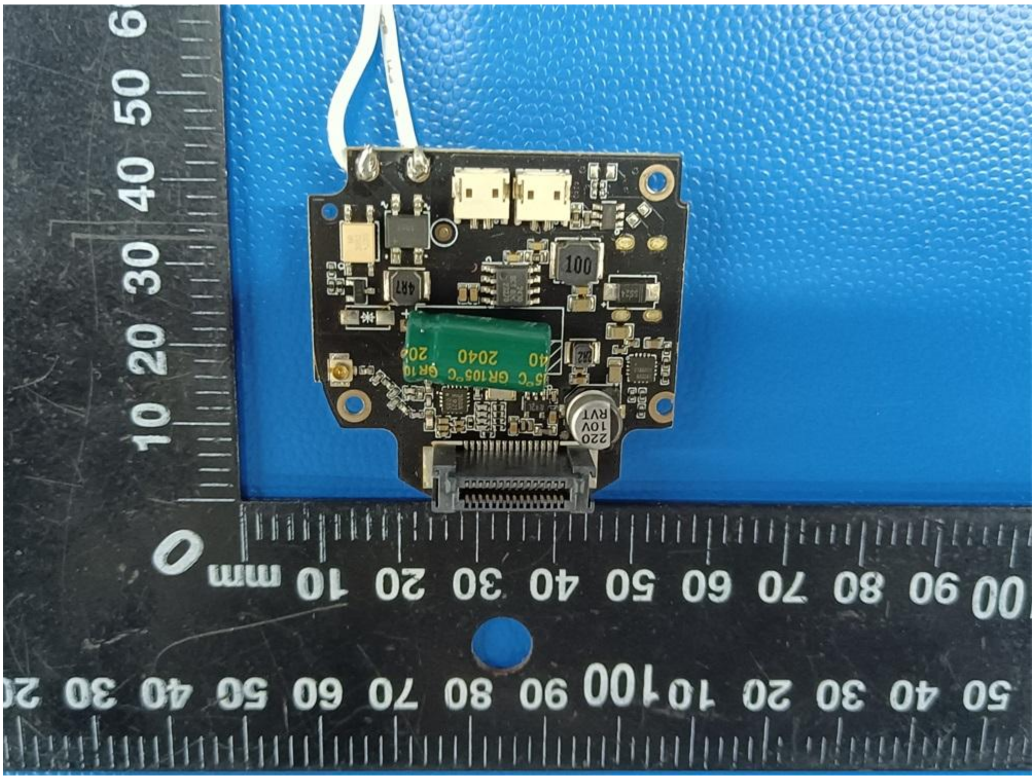


Fig. 23

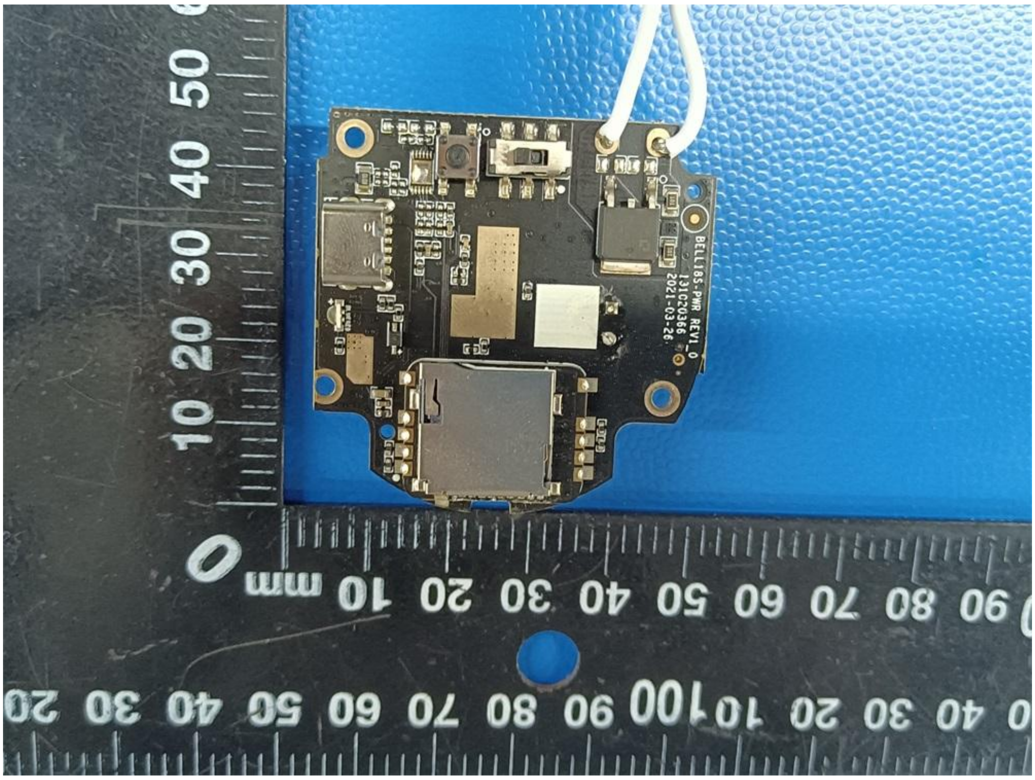


Fig. 24

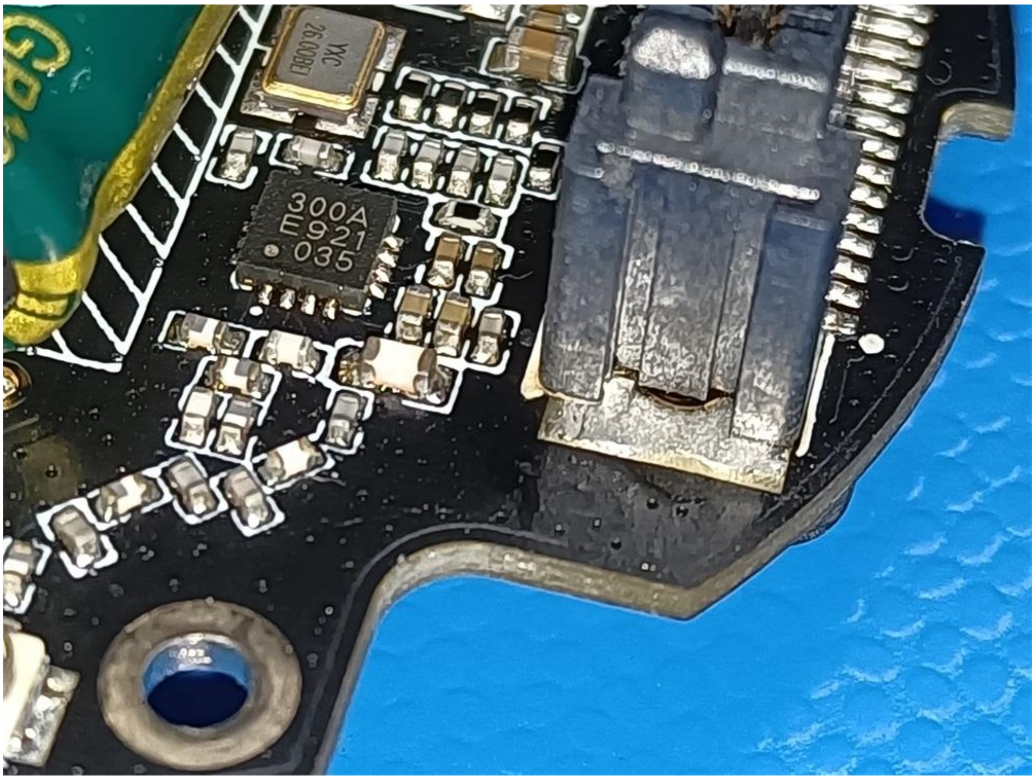


Fig. 25

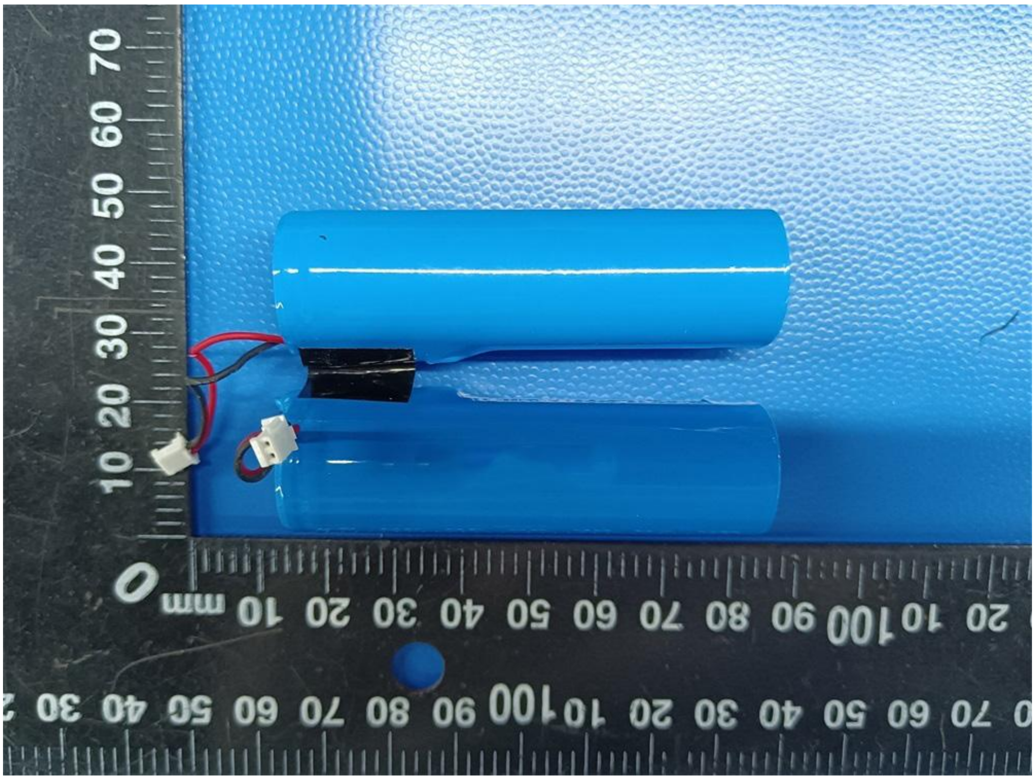


Fig. 26

......................End of Report.......................