5.6.2 Transmitter emission above 1GHz

Only show ANT1 test date:

Test mode:		802.11a20(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10360.000	51.66	2.13	53.79	74	-20.21	peak	H
10360.000	38.16	2.13	40.29	54	-13.71	AVG	H
15540.000	48.76	3.62	52.38	74	-21.62	peak	H
15540.000	33.93	3.62	37.55	54	-16.45	AVG	H
10360.000	52.46	2.13	54.59	74	-19.41	peak	V
10360.000	38.23	2.13	40.36	54	-13.64	AVG	V
15540.000	49.06	3.62	52.68	74	-21.32	peak	V
15540.000	33.38	3.62	37.00	54	-17.00	AVG	V

Test mode:		802.11a20(6Mbps)		Test channel:		40	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10440.000	52.11	2.23	54.34	74	-19.66	peak	H
10440.000	37.32	2.23	39.55	54	-14.45	AVG	H
15660.000	48.41	3.75	52.16	74	-21.84	peak	H
15660.000	33.20	3.75	36.95	54	-17.05	AVG	H
10440.000	49.84	2.23	52.07	74	-21.93	peak	V
10440.000	38.16	2.23	40.39	54	-13.61	AVG	V
15660.000	48.07	3.75	51.82	74	-22.18	peak	V
15660.000	33.14	3.75	36.89	54	-17.11	AVG	V

Test mode:		802.11a20(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10480.000	48.93	2.31	51.24	74	-22.76	peak	H
10480.000	38.66	2.31	40.97	54	-13.03	AVG	H
15720.000	49.39	3.82	53.21	74	-20.79	peak	H
15720.000	34.87	3.82	38.69	54	-15.31	AVG	H
10480.000	49.53	2.31	51.84	74	-22.16	peak	V
10480.000	38.77	2.31	41.08	54	-12.92	AVG	V
15720.000	49.08	3.82	52.90	74	-21.10	peak	V
15720.000	33.28	3.82	37.10	54	-16.90	AVG	V

Test mode:		802.11n20(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10360.000	50.53	2.42	52.95	74	-21.05	peak	H
10360.000	40.25	2.42	42.67	54	-11.33	AVG	H
15540.000	48.44	3.92	52.36	74	-21.64	peak	H
15540.000	40.74	3.92	44.66	54	-9.34	AVG	H
10360.000	51.47	2.42	53.89	74	-20.11	peak	V
10360.000	39.84	2.42	42.26	54	-11.74	AVG	V
15540.000	48.31	3.92	52.23	74	-21.77	peak	V
15540.000	39.03	3.92	42.95	54	-11.05	AVG	V

Test mode:		802.11n20(6.5Mbps)		Test channel:		40	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10440.000	51.72	2.23	53.95	74	-20.05	peak	H
10440.000	39.38	2.23	41.61	54	-12.39	AVG	H
15660.000	48.82	3.75	52.57	74	-21.43	peak	H
15660.000	40.06	3.75	43.81	54	-10.19	AVG	H
10440.000	52.95	2.23	55.18	74	-18.82	peak	V
10440.000	39.85	2.23	42.08	54	-11.92	AVG	V
15660.000	49.13	3.75	52.88	74	-21.12	peak	V
15660.000	39.21	3.75	42.96	54	-11.04	AVG	V

Test mode:		802.11n20(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10480.000	50.33	2.31	52.64	74	-21.36	peak	H
10480.000	40.19	2.31	42.50	54	-11.50	AVG	H
15720.000	49.49	3.82	53.31	74	-20.69	peak	H
15720.000	39.42	3.82	43.24	54	-10.76	AVG	H
10480.000	52.83	2.31	55.14	74	-18.86	peak	V
10480.000	40.93	2.31	43.24	54	-10.76	AVG	V
15720.000	49.57	3.82	53.39	74	-20.61	peak	V
15720.000	40.52	3.82	44.34	54	-9.66	AVG	V

Test mode:		802.11ac20(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10360.000	49.33	2.13	51.46	74	-22.54	peak	H
10360.000	39.00	2.13	41.13	54	-12.87	AVG	H
15540.000	48.57	3.62	52.19	74	-21.81	peak	H
15540.000	40.06	3.62	43.68	54	-10.32	AVG	H
10360.000	49.45	2.13	51.58	74	-22.42	peak	V
10360.000	39.42	2.13	41.55	54	-12.45	AVG	V
15540.000	48.71	3.62	52.33	74	-21.67	peak	V
15540.000	39.82	3.62	43.44	54	-10.56	AVG	V

Test mode:		802.11ac20(6.5Mbps)		Test channel:		40	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10440.000	49.39	2.23	51.62	74	-22.38	peak	H
10440.000	39.28	2.23	41.51	54	-12.49	AVG	H
15660.000	49.36	3.75	53.11	74	-20.89	peak	H
15660.000	40.05	3.75	43.80	54	-10.20	AVG	H
10440.000	52.81	2.23	55.04	74	-18.96	peak	V
10440.000	40.60	2.23	42.83	54	-11.17	AVG	V
15660.000	48.16	3.75	51.91	74	-22.09	peak	V
15660.000	39.48	3.75	43.23	54	-10.77	AVG	V

Test mode:		802.11ac20(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
10480.000	48.97	2.31	51.28	74	-22.72	peak	H
10480.000	40.82	2.31	43.13	54	-10.87	AVG	H
15720.000	48.32	3.82	52.14	74	-21.86	peak	H
15720.000	39.79	3.82	43.61	54	-10.39	AVG	H
10480.000	50.68	2.31	52.99	74	-21.01	peak	V
10480.000	39.11	2.31	41.42	54	-12.58	AVG	V
15720.000	48.57	3.82	52.39	74	-21.61	peak	V
15720.000	40.08	3.82	43.90	54	-10.10	AVG	V

Remark:

1) The 6Mbps of rate of 802.11a is the worst case.

2) 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 + Antenna Factor + Cable Factor – Preamplifier Factor

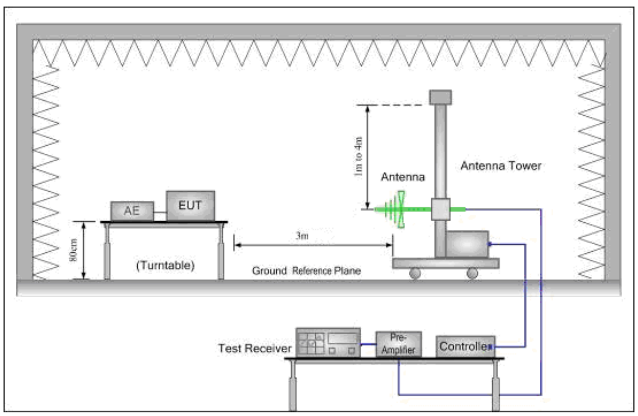
3) Scan from 9kHz to 40GHz,The disturbance above 18GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

5.7 Restricted bands around fundamental frequency

Test Requirement:	FCC 47 CFR Part 15 Subpart E Section 15.407 (b)(1)(2)(3)(4)(6) FCC 47 CFR Part 15 Subpart C Section 15.209/205
Test Method:	KDB 789033 D02 v02r01 Section G.3, G.4, G.5, and G.6
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	

Applicable To	Limit	
789033 D02 General U-NII Test Procedures New Rules v02r01	Field Strength at 3 m	
	PK: 74 (dBμV/m)	AV: 54 (dBμV/m)
Applicable To	EIRP Limit	Equivalent Field Strength at 3 m
Part 15 Subpart E Section 6.2.1.2	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
Part 15 Subpart E Section 6.2.2.2	PK: -27 (dBm/MHz)	PK: 74 (dBμV/m)
Part 15 Subpart E Section 6.2.3.2	PK: -27 (dBm/MHz)	PK: 68.2 (dBμV/m)
FCC 47 CFR Part 15 Subpart E Section 6.2.4.2	27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edges;	PK: 68.2 (dBμV/m)
	15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;	
	10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges;	
	-27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.	

Test Setup:



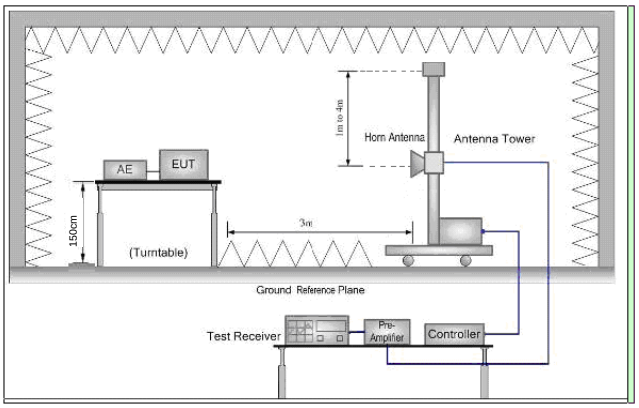


Figure 1. 30MHz to 1GHz	Figure 2. Above 1 GHz
Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 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. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 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 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. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel g. Test the EUT in the lowest channel , the Highest channel h. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT at Transmitting mode, found the Transmitting mode which it is worse case Through Pre-scan, find the 6Mbps of rate is the worst case of 802.11a ; 6.5Mbps of rate is the worst case of 802.11n(HT20) ; 13.5Mbps of rate is the worst case of 802.11n(HT40); 6.5Mbps of rate is the worst case of 802.11ac(VHT20) ; 13.5Mbps of rate is the worst case of 802.11ac(VHT40); Only the worst case is recorded in the report.
Test Results:	Pass

Test data:

Worse case mode:		802.11a(6Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	55.68	-3.63	52.05	74	-21.95	peak	H
5150.00	44.30	-3.63	40.67	54	-13.33	AVG	H
5150.00	54.22	-3.63	50.59	74	-23.41	peak	V
5150.00	42.23	-3.63	38.60	54	-15.40	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	56.20	-3.59	52.61	74	-21.39	peak	H
5350.00	44.63	-3.59	41.04	54	-12.96	AVG	H
5350.00	54.78	-3.59	51.19	74	-22.81	peak	V
5350.00	42.94	-3.59	39.35	54	-14.65	AVG	V

Worse case mode:		802.11a(6Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	57.12	-3.46	53.66	68.2	-14.54	peak	H
5742.15	91.82	-3.44	88.38	122.2	-33.82	peak	H
5650.00	56.39	-3.46	52.93	68.2	-15.27	peak	V
5742.37	90.40	-3.44	86.96	122.2	-35.24	peak	V

Worse case mode:		802.11a(6Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5824.77	90.98	-3.42	87.56	122.2	-34.64	peak	H
5925.00	57.43	-3.41	54.02	68.2	-14.18	peak	H
5818.71	90.65	-3.42	87.23	122.2	-34.97	peak	V
5925.00	57.43	-3.41	54.02	68.2	-14.18	peak	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.04	-3.63	52.41	74	-21.59	peak	H
5150.00	43.92	-3.63	40.29	54	-13.71	AVG	H
5150.00	54.69	-3.63	51.06	74	-22.94	peak	V
5150.00	42.31	-3.63	38.68	54	-15.32	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	59.77	-3.59	56.18	74	-17.82	peak	H
5350.00	43.56	-3.59	39.97	54	-14.03	AVG	H
5350.00	55.73	-3.59	52.14	74	-21.86	peak	V
5350.00	41.52	-3.59	37.93	54	-16.07	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	61.06	-3.46	57.60	68.2	-10.60	peak	H
5751.09	92.17	-3.44	88.73	122.2	-33.47	peak	H
5650.00	56.11	-3.46	52.65	68.2	-15.55	peak	V
5744.27	90.29	-3.44	86.85	122.2	-35.35	peak	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5823.41	91.41	-3.42	87.99	122.2	-34.21	peak	H
5925.00	59.94	-3.41	56.53	68.2	-11.67	peak	H
5824.65	90.08	-3.42	86.66	122.2	-35.54	peak	V
5925.00	56.60	-3.41	53.19	68.2	-15.01	peak	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		38	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	55.26	-3.63	51.63	74	-22.37	peak	H
5150.00	44.11	-3.63	40.48	54	-13.52	AVG	H
5150.00	55.24	-3.63	51.61	74	-22.39	peak	V
5150.00	42.35	-3.63	38.72	54	-15.28	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		46	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.46	-3.59	54.87	74	-19.13	peak	H
5350.00	43.53	-3.59	39.94	54	-14.06	AVG	H
5350.00	54.23	-3.59	50.64	74	-23.36	peak	V
5350.00	41.32	-3.59	37.73	54	-16.27	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		36	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.74	-3.63	53.11	74	-20.89	peak	H
5150.00	43.12	-3.63	39.49	54	-14.51	AVG	H
5150.00	54.44	-3.63	50.81	74	-23.19	peak	V
5150.00	41.71	-3.63	38.08	54	-15.92	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		48	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.95	-3.59	55.36	74	-18.64	peak	H
5350.00	44.22	-3.59	40.63	54	-13.37	AVG	H
5350.00	54.46	-3.59	50.87	74	-23.13	peak	V
5350.00	41.65	-3.59	38.06	54	-15.94	AVG	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		149	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	60.06	-3.46	56.60	68.2	-11.60	peak	H
5743.54	92.25	-3.44	88.81	122.2	-33.39	peak	H
5650.00	57.01	-3.46	53.55	68.2	-14.65	peak	V
5739.28	92.58	-3.44	89.14	122.2	-33.06	peak	V

Worse case mode:		802.11ac(HT20)(6.5Mbps)		Test channel:		165	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5831.03	92.59	-3.42	89.17	122.2	-33.03	peak	H
5925.00	61.78	-3.41	58.37	68.2	-9.83	peak	H
5825.11	91.94	-3.42	88.52	122.2	-33.68	peak	V
5925.00	58.28	-3.41	54.87	68.2	-13.33	peak	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		38	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5150.00	56.52	-3.63	52.89	74	-21.11	peak	H
5150.00	43.88	-3.63	40.25	54	-13.75	AVG	H
5150.00	54.55	-3.63	50.92	74	-23.08	peak	V
5150.00	41.56	-3.63	37.93	54	-16.07	AVG	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		46	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5350.00	58.50	-3.59	54.91	74	-19.09	peak	H
5350.00	43.58	-3.59	39.99	54	-14.01	AVG	H
5350.00	55.69	-3.59	52.10	74	-21.90	peak	V
5350.00	42.33	-3.59	38.74	54	-15.26	AVG	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		151	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5650.00	57.35	-3.46	53.89	68.2	-14.31	peak	H
5751.19	92.17	-3.44	88.73	122.2	-33.47	peak	H
5650.00	56.40	-3.46	52.94	68.2	-15.26	peak	V
5741.72	87.37	-3.44	83.93	122.2	-38.27	peak	V

Worse case mode:		802.11ac(VHT40)(13.5Mbps)		Test channel:		159	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
5771.12	91.64	-3.42	88.22	122.2	-33.98	peak	H
5925.00	58.81	-3.41	55.40	68.2	-12.80	peak	H
5806.53	90.32	-3.42	86.90	122.2	-35.30	peak	V
5925.00	56.26	-3.41	52.85	68.2	-15.35	peak	V

Note:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

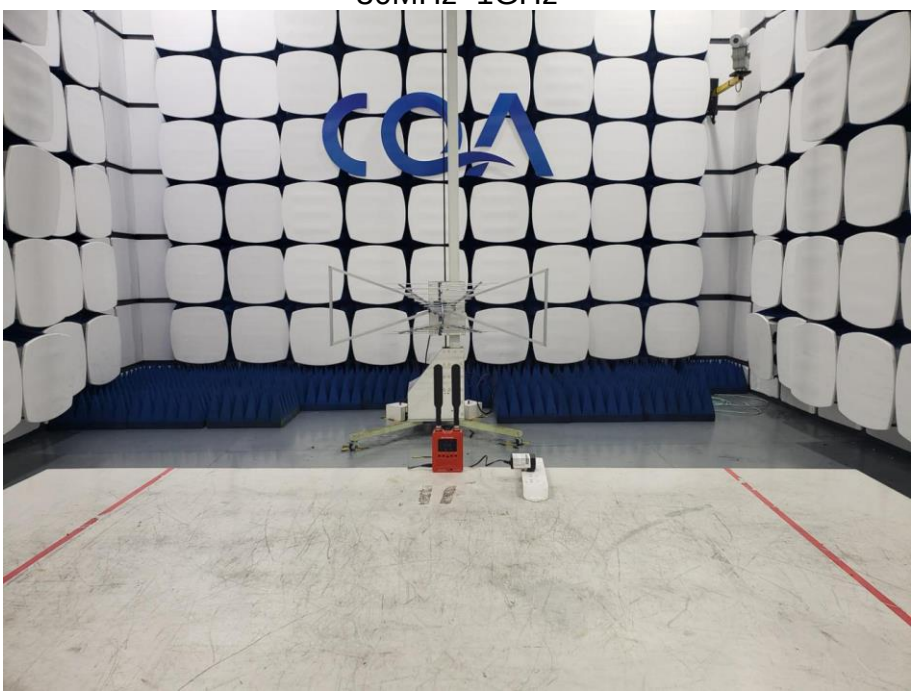
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

6 Photographs - EUT Test Setup

Please refer to test setup file

9kHz~30MHz

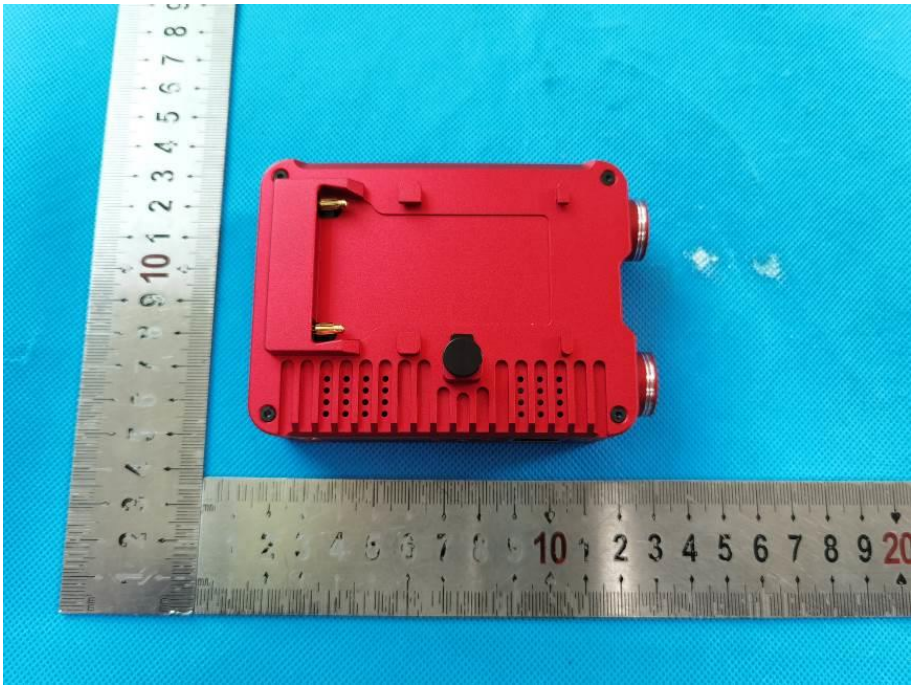
30MHz~1GHz

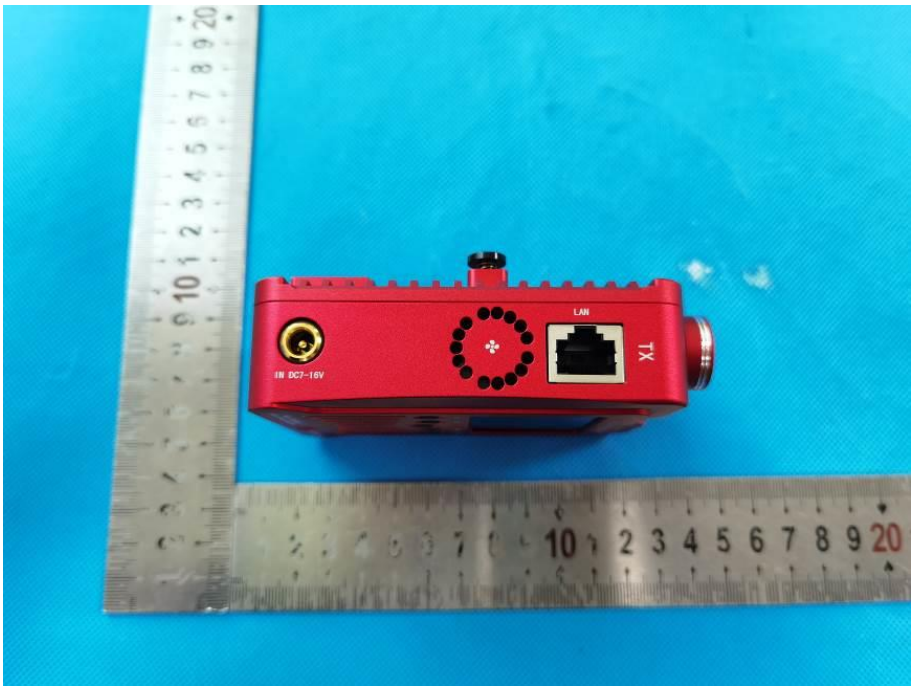


Above 1GHz

7 Photographs - EUT Constructional Details

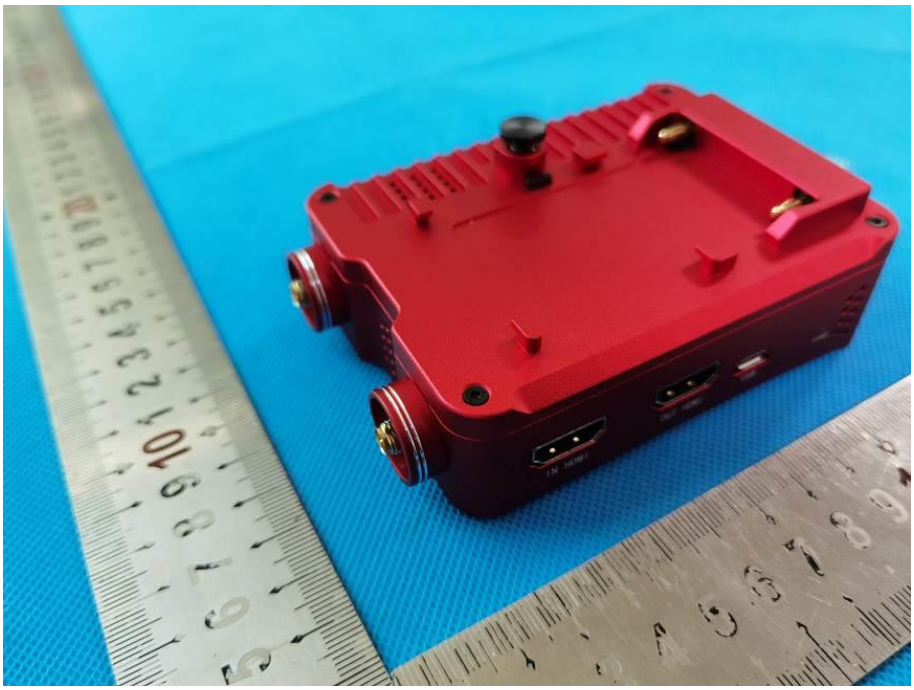
External photos



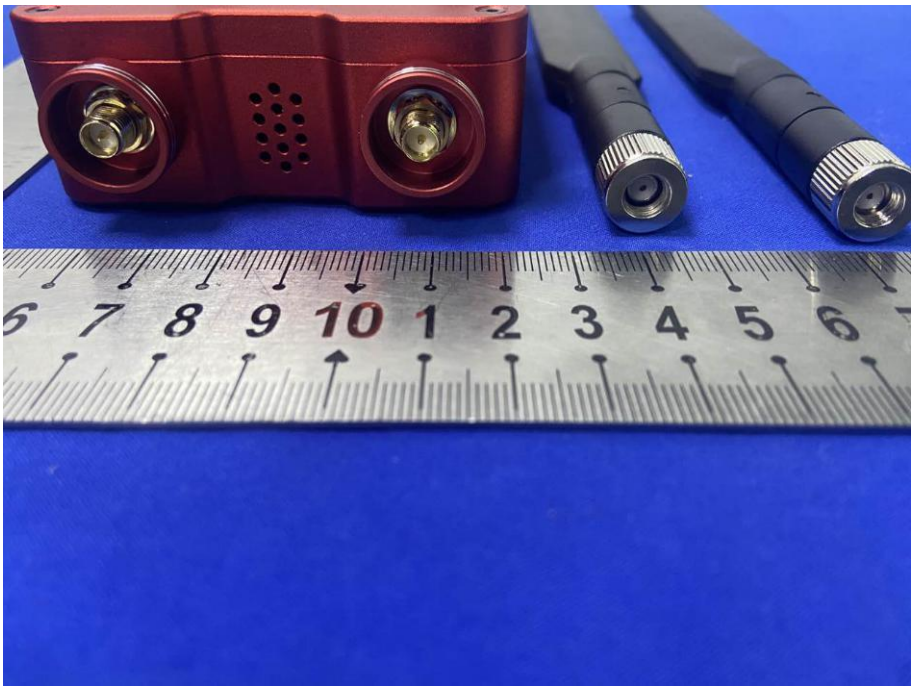

IN DC7-16V
LAN
TX

VIDEO
USB
OUT HDMI
IN HDMI

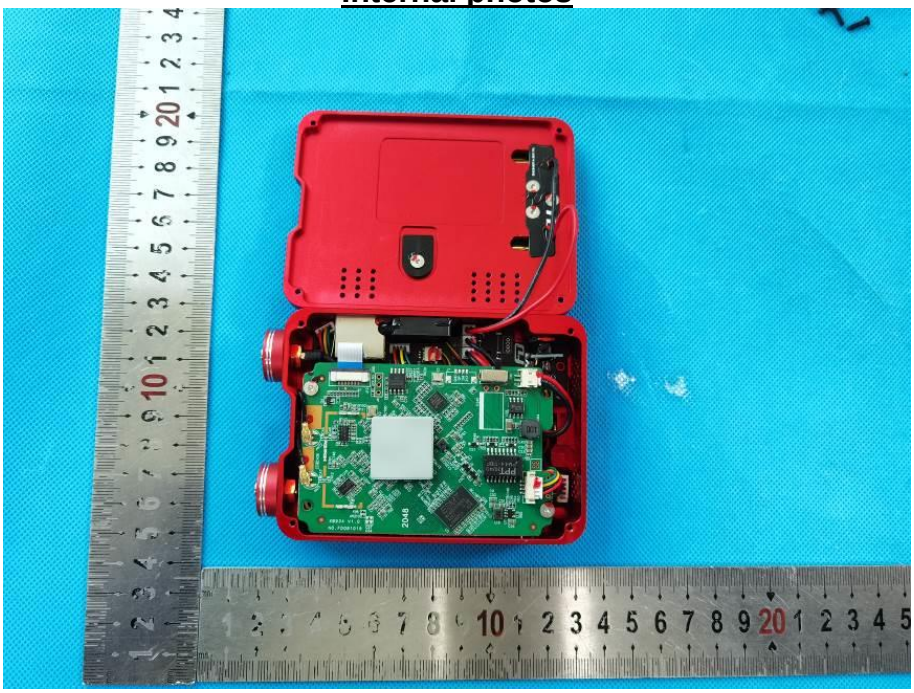
RollMaster
Mark-1000(4K)
1000ft 4k Video Transmitter

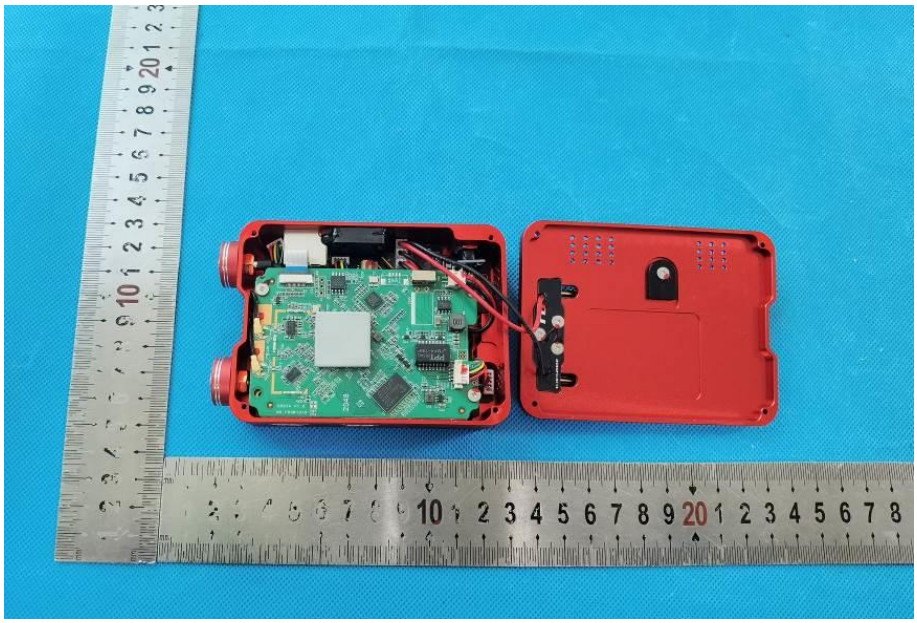


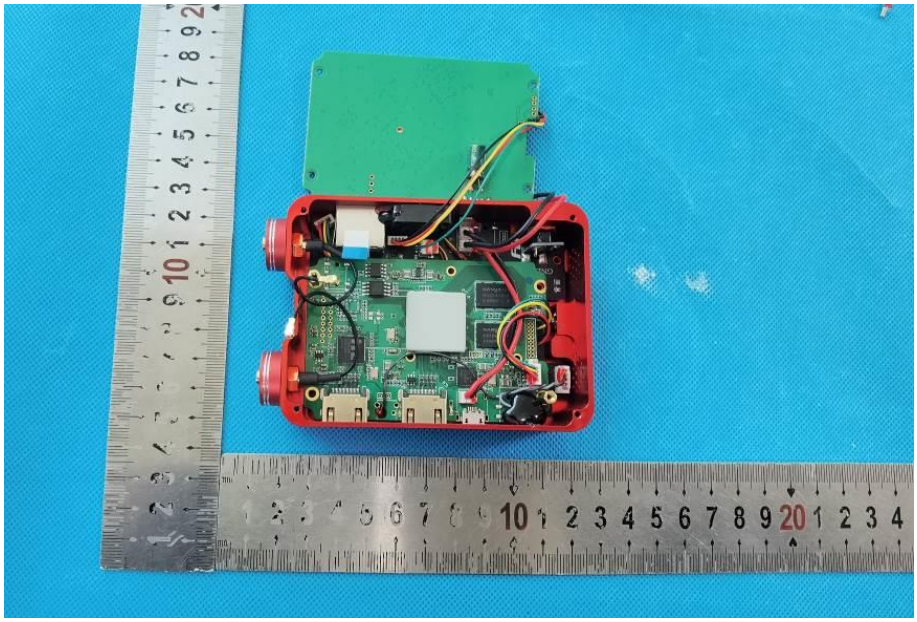
RollMaster

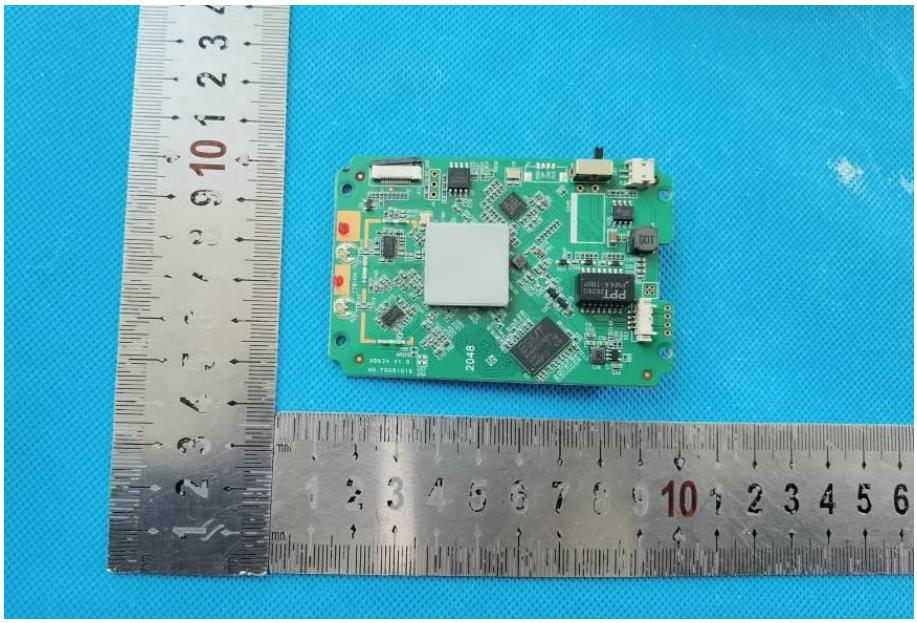


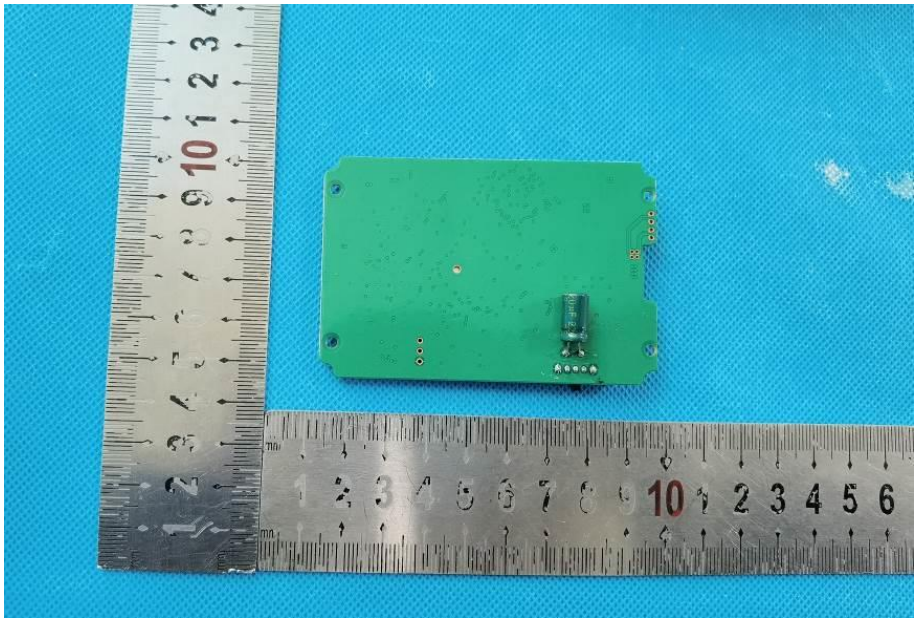
Internal photos

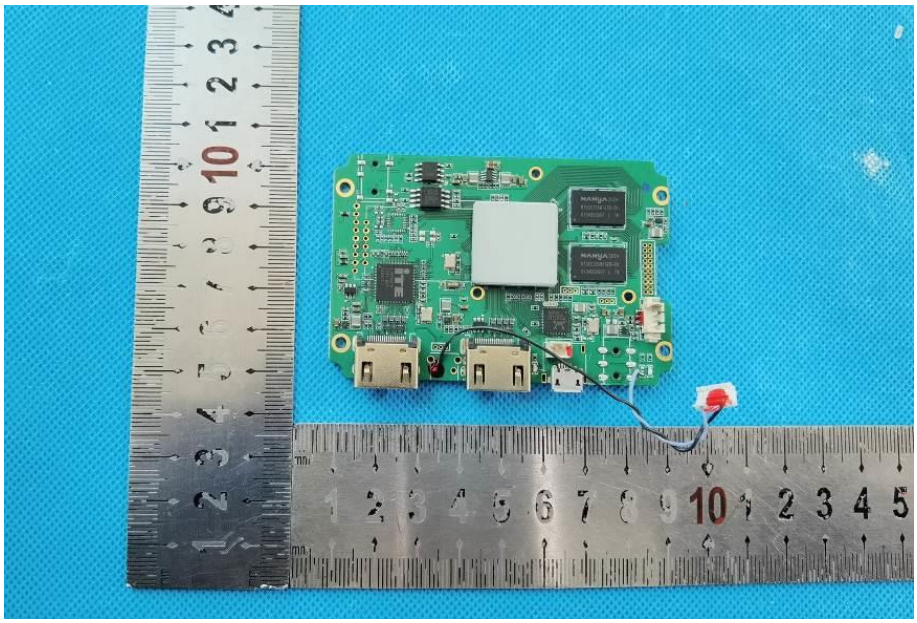


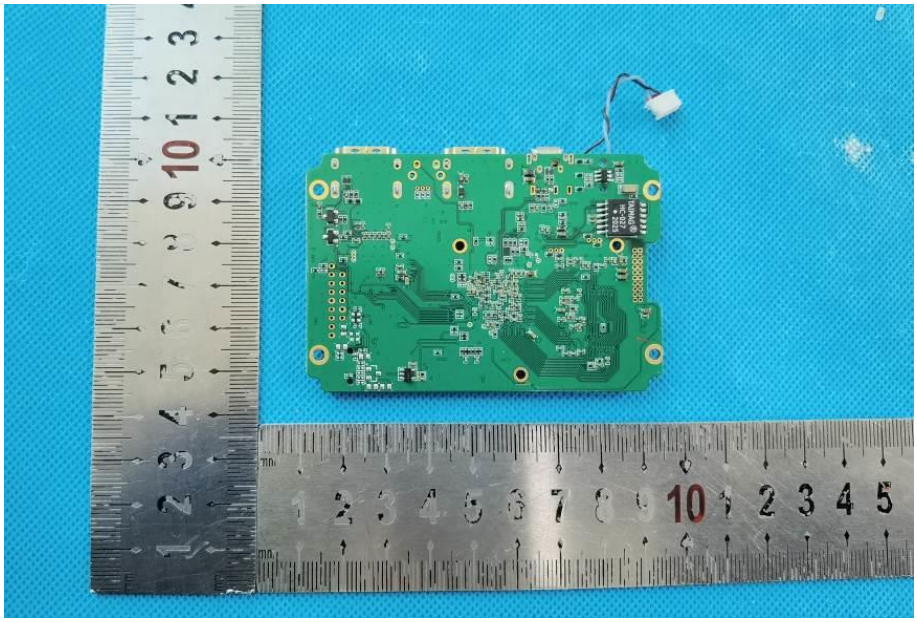


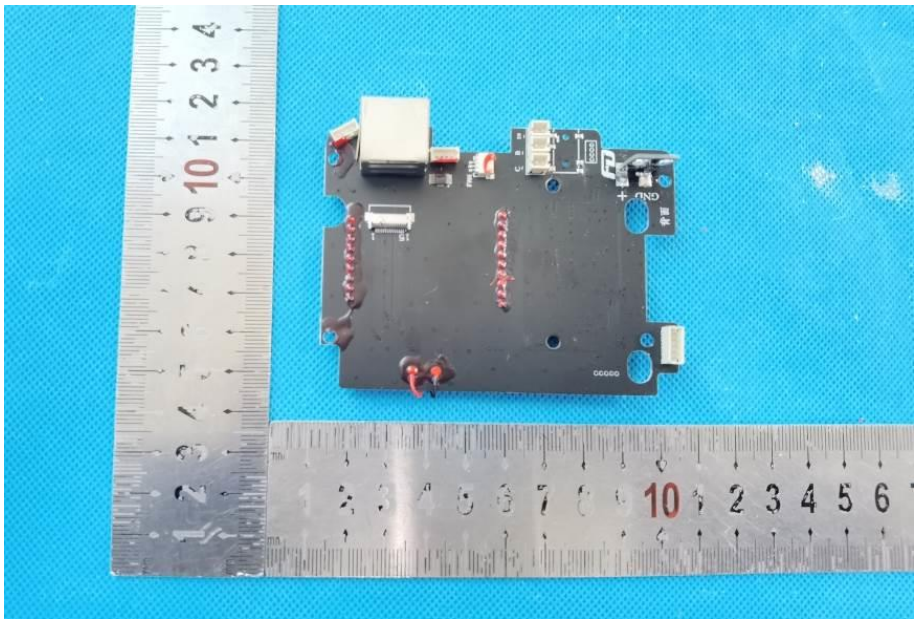


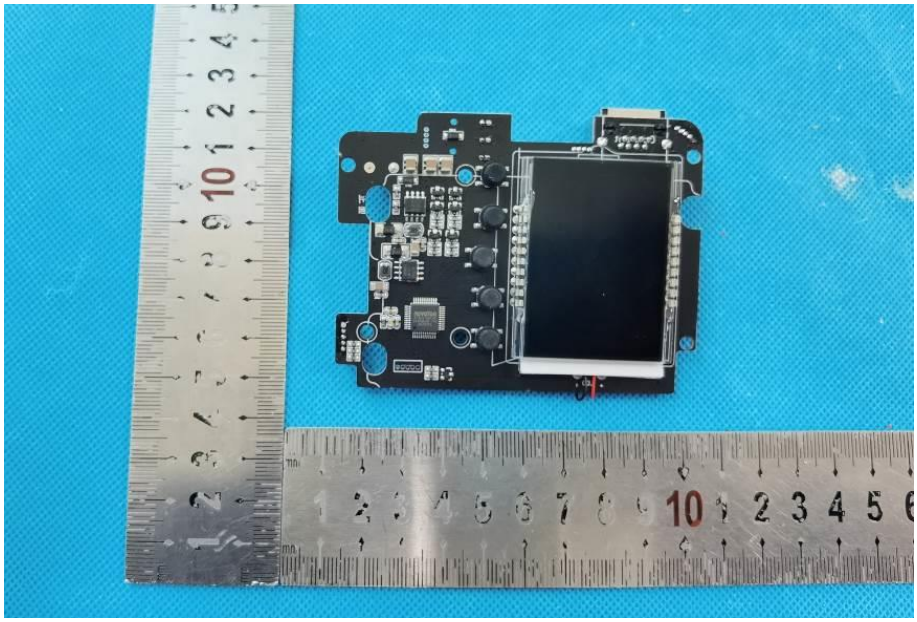












THE END