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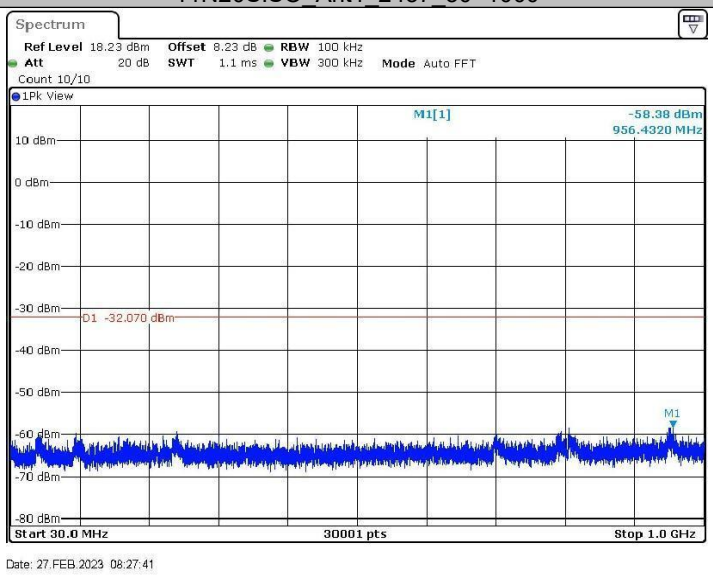
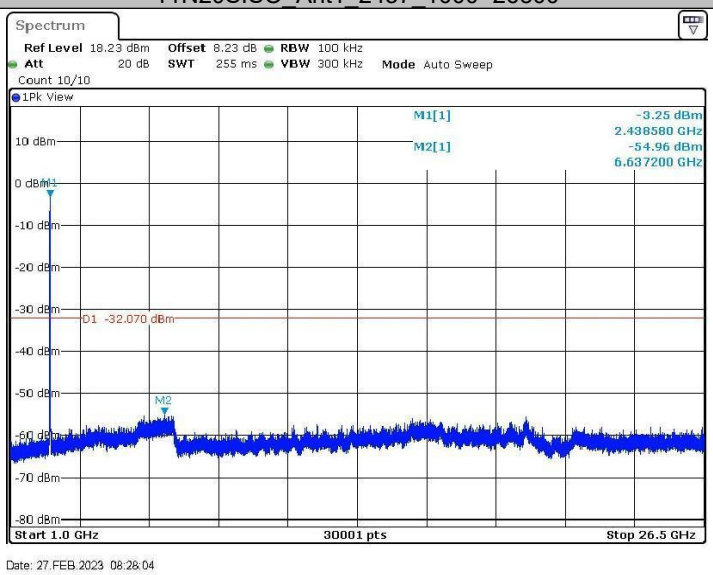


11N20SISO_Ant1_2437_1000~26500



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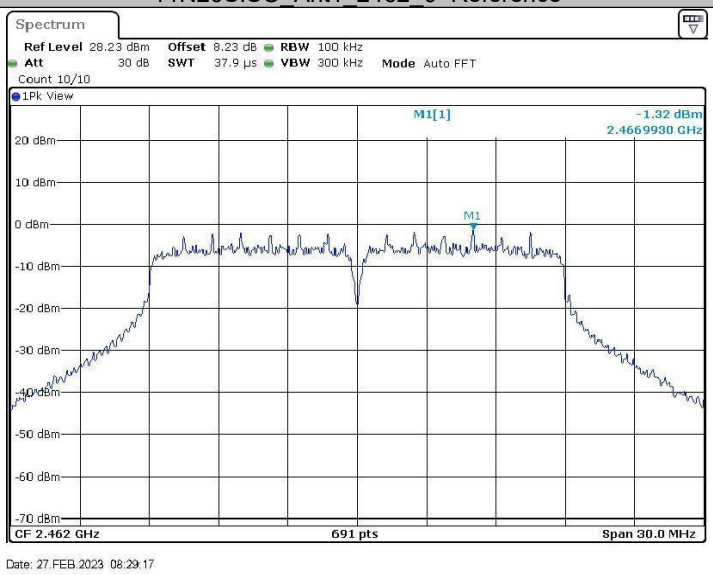

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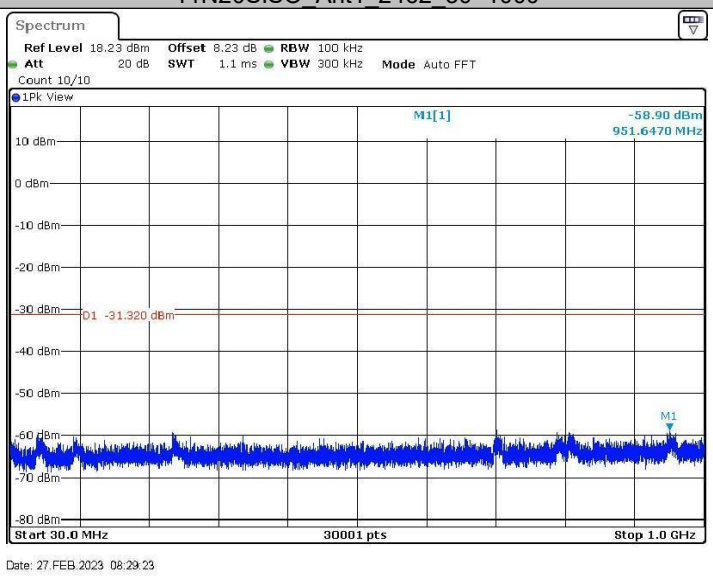

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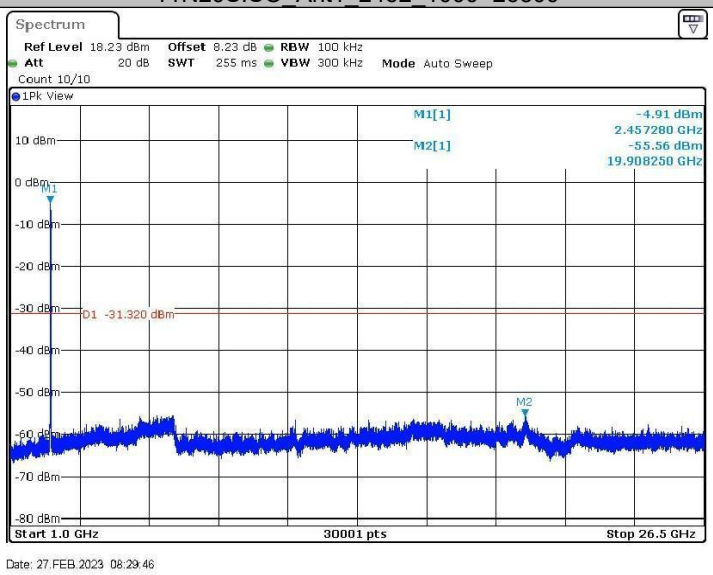
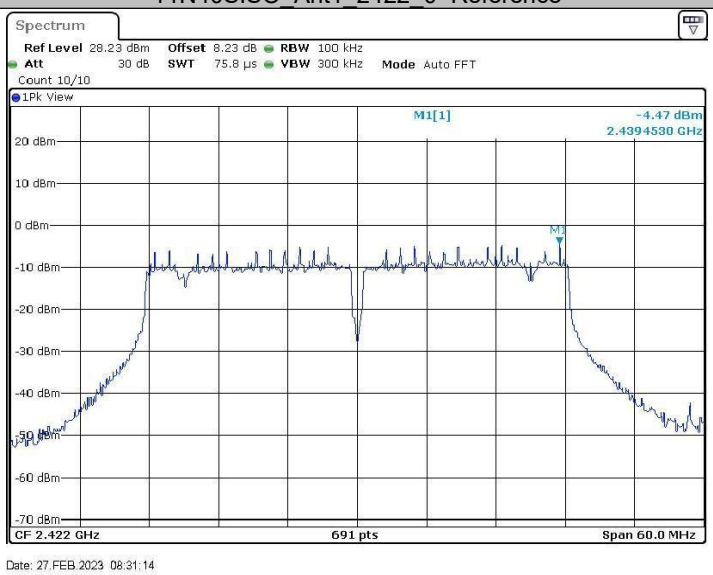


11N40SISO_Ant1_2422_0~Reference



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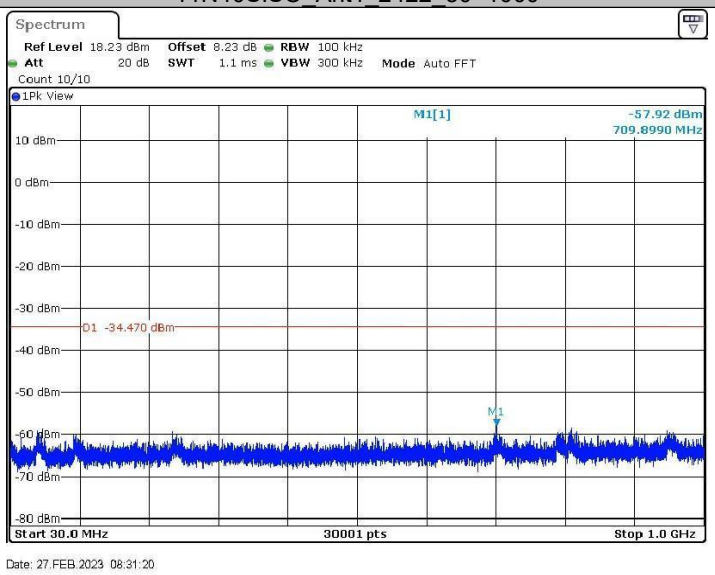
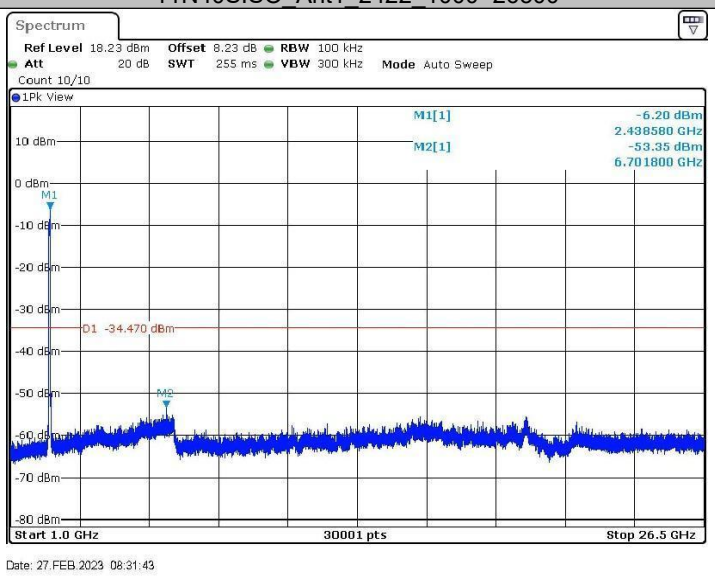
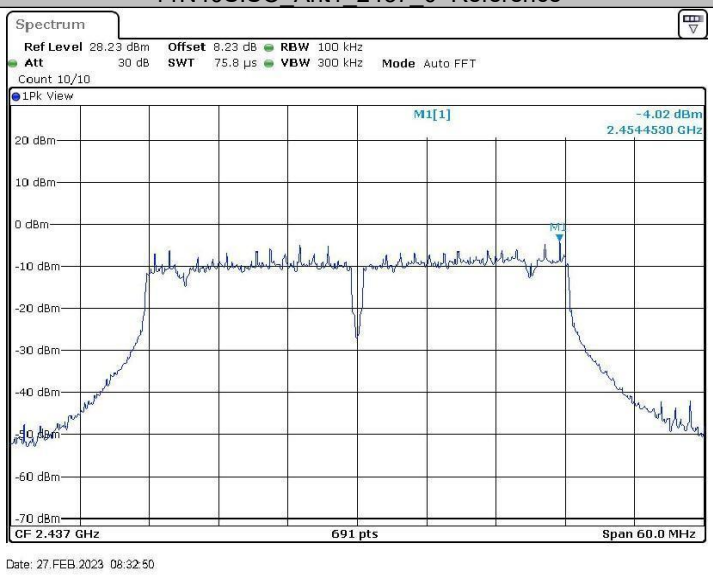


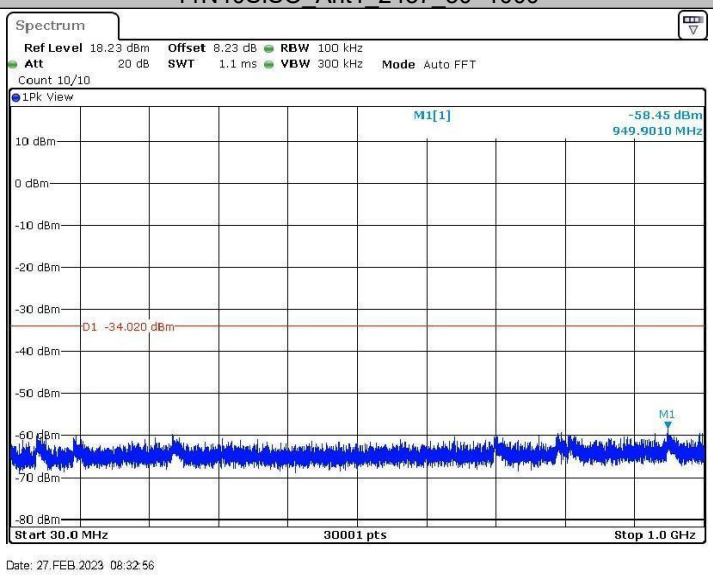
11N40SISO_Ant1_2422_1000~26500



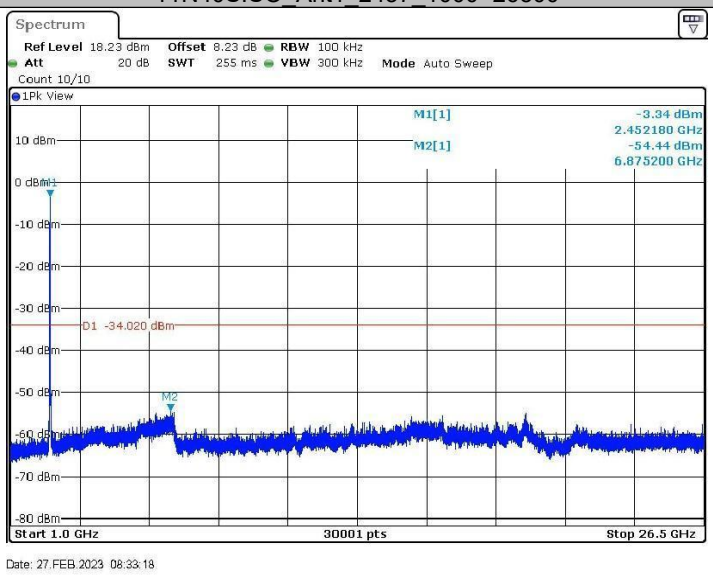
11N40SISO_Ant1_2437_0~Reference



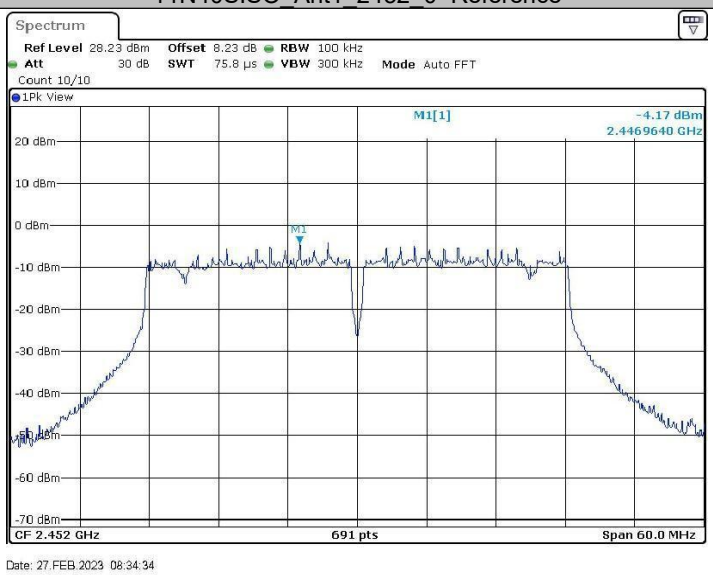
11N40SISO_Ant1_2437_30~1000



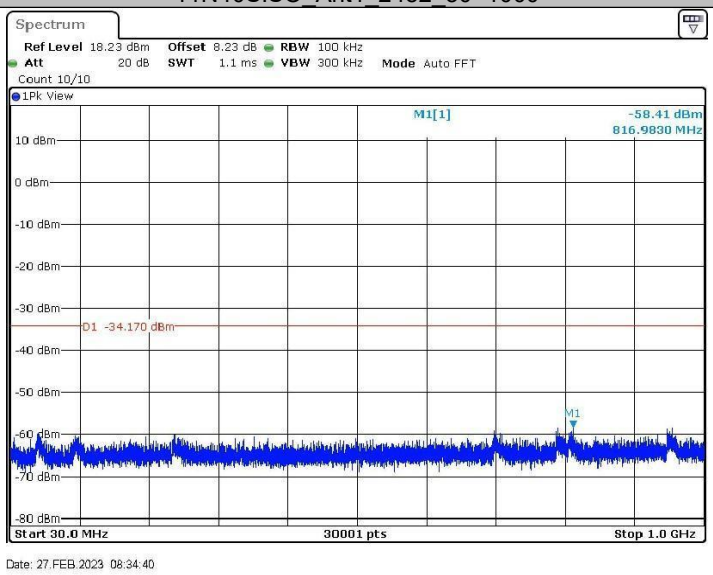
11N40SISO_Ant1_2437_1000~26500



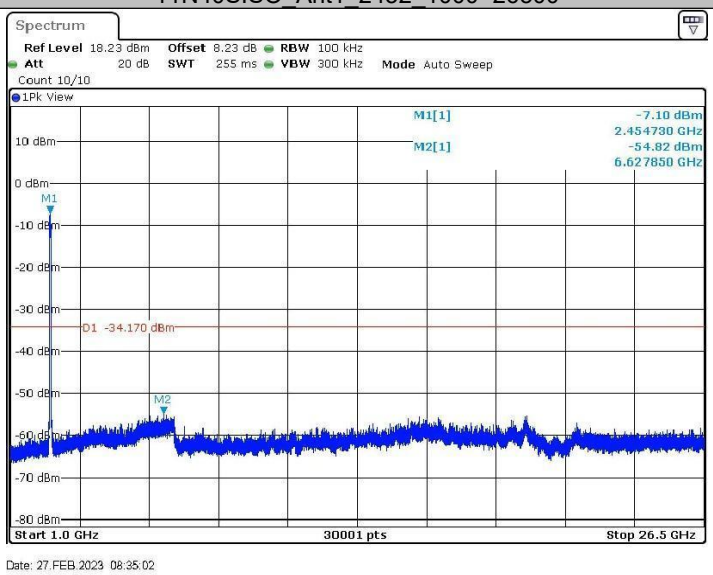
11N40SISO_Ant1_2452_0~Reference



11N40SISO_Ant1_2452_30~1000



11N40SISO_Ant1_2452_1000~26500



Remark:

Pretest 9kHz to 25GHz, find the highest point when testing, so only the worst data were shown in the test report. Per FCC Part 15.33 (a) and 15.31 (o) ,The amplitude of spurious emissions from intentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

5.8 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205
Test Method:	ANSI C63.10 2013
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	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/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.

Test Setup:	

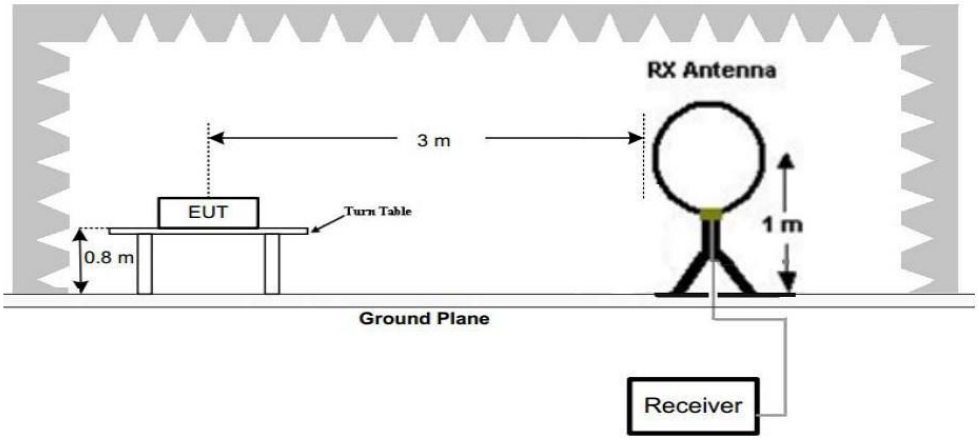


Figure 1. Below 30MHz

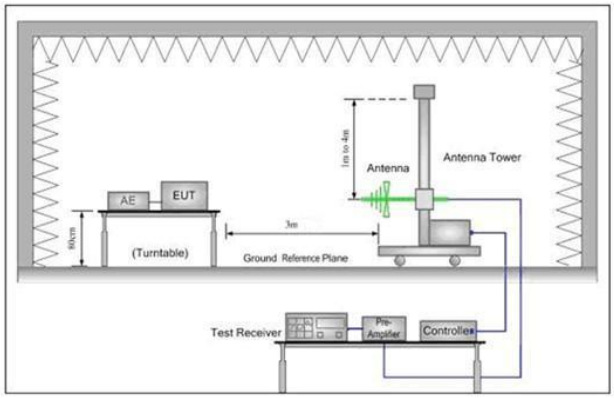


Figure 2. 30MHz to 1GHz

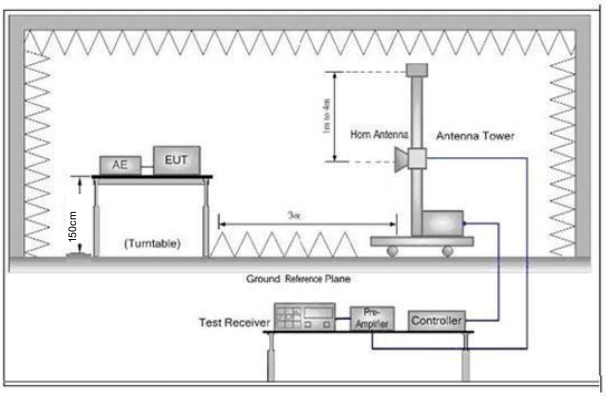


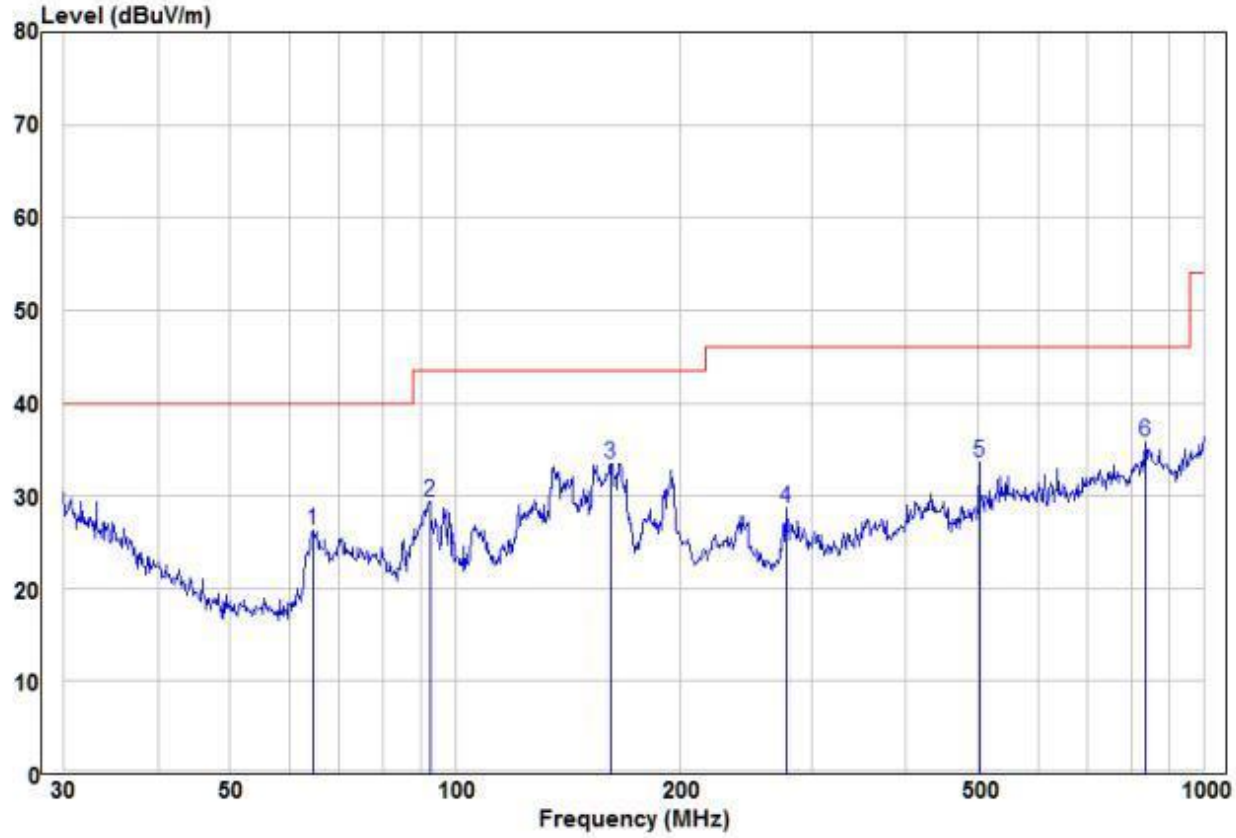
Figure 3. Above 1 GHz

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(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. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. 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. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. 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 . i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel.
Final Test Mode:	Pretest the EUT at Transmitting mode and Charge +Transmitting mode, found the Charge +Transmitting mode which it is worse case. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40). For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11b at middle channel is the worst case. Only the worst case is recorded in the report.
Test Results:	Pass

5.8.1 Radiated emission below 1GHz

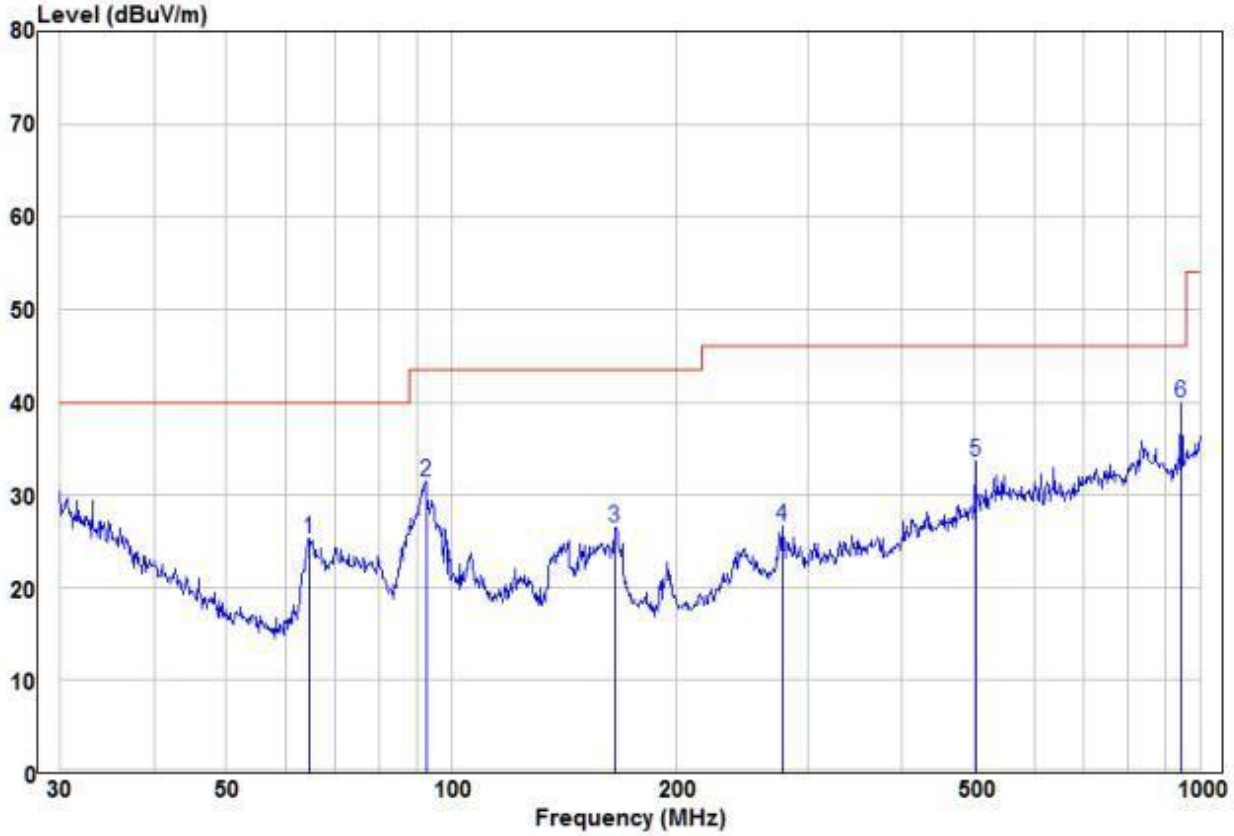
30MHz~1GHz
Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	64.66	19.72	6.48	26.20	40.00	-13.80	Peak	HORIZONTAL
2	92.46	19.16	10.18	29.34	43.50	-14.16	Peak	HORIZONTAL
3 pp	161.47	25.74	7.77	33.51	43.50	-9.99	Peak	HORIZONTAL
4	277.09	15.71	12.97	28.68	46.00	-17.32	Peak	HORIZONTAL
5	501.18	15.39	18.29	33.68	46.00	-12.32	Peak	HORIZONTAL
6	836.24	11.71	24.12	35.83	46.00	-10.17	Peak	HORIZONTAL

Remark:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Factor= Antenna Factor + Cable Factor – Preamplifier Factor,
Level = Read Level + Factor,
Over Limit=Level-Limit Line.

Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	64.66	18.72	6.48	25.20	40.00	-14.80	Peak	VERTICAL
2	92.46	21.16	10.18	31.34	43.50	-12.16	Peak	VERTICAL
3	165.49	18.77	7.70	26.47	43.50	-17.03	Peak	VERTICAL
4	277.09	13.71	12.97	26.68	46.00	-19.32	Peak	VERTICAL
5	501.18	15.39	18.29	33.68	46.00	-12.32	Peak	VERTICAL
6 pp	945.44	16.27	23.62	39.89	46.00	-6.11	Peak	VERTICAL

Remark:
The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Factor= Antenna Factor + Cable Factor – Preamplifier Factor,
Level = Read Level + Factor,
Over Limit=Level-Limit Line.

5.8.2 Transmitter emission above 1GHz

Test mode:		802.11b(1Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4824.000	52.97	-4.26	48.71	74	-25.29	peak	H
4824.000	36.39	-4.26	32.13	54	-21.87	AVG	H
7236.000	52.08	1.18	53.26	74	-20.74	peak	H
7236.000	37.94	1.18	39.12	54	-14.88	AVG	H
4824.000	55.83	-4.26	51.57	74	-22.43	peak	V
4824.000	39.78	-4.26	35.52	54	-18.48	AVG	V
7236.000	51.47	1.18	52.65	74	-21.35	peak	V
7236.000	36.07	1.18	37.25	54	-16.75	AVG	V

Test mode:		802.11b(1Mbps)		Test channel:		Middle	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4874.000	51.62	-4.12	47.50	74	-26.50	peak	H
4874.000	37.76	-4.12	33.64	54	-20.36	AVG	H
7311.000	48.67	1.46	50.13	74	-23.87	peak	H
7311.000	36.94	1.46	38.40	54	-15.60	AVG	H
4874.000	54.22	-4.12	50.10	74	-23.90	peak	V
4874.000	37.46	-4.12	33.34	54	-20.66	AVG	V
7311.000	50.15	1.46	51.61	74	-22.39	peak	V
7311.000	36.87	1.46	38.33	54	-15.67	AVG	V

Test mode:		802.11b(1Mbps)		Test channel:		Highest	
Frequency	Meter Reading	Factor	Emission Level	Limits	Over	Detector Type	Ant. Pol.
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)		H/V
4924.000	52.03	-4.03	48.00	74	-26.00	peak	H
4924.000	38.57	-4.03	34.54	54	-19.46	AVG	H
7386.000	50.79	1.66	52.45	74	-21.55	peak	H
7386.000	35.99	1.66	37.65	54	-16.35	AVG	H
4924.000	54.78	-4.03	50.75	74	-23.25	peak	V
4924.000	38.78	-4.03	34.75	54	-19.25	AVG	V
7386.000	49.26	1.66	50.92	74	-23.08	peak	V
7386.000	37.00	1.66	38.66	54	-15.34	AVG	V

Remark:

1) The 1Mbps of rate of 802.11b 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 25GHz,The disturbance above 13GHz 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.

5.9 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205
Test Method:	ANSI C63.10 2013
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	

Frequency	Limit (dBuV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Setup:

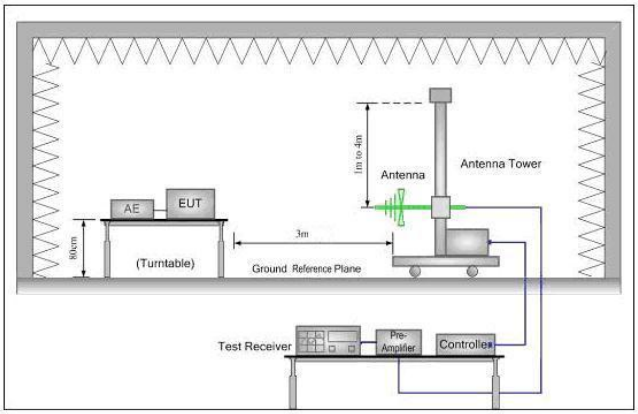


Figure 1. 30MHz to 1GHz

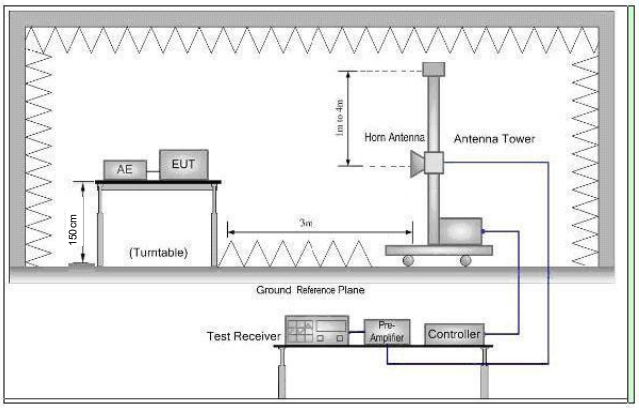


Figure 2. Above 1 GHz

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 middle channel, the Highest channel. h. 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 . i. 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 1Mbps of rate is the worst case of 802.11b; 6Mbps of rate is the worst case of 802.11g; 6.5Mbps of rate is the worst case of 802.11n(HT20); 13.5Mbps of rate is the worst case of 802.11n(HT40). Only the worst case is recorded in the report.
Test Results:	Pass

Test data:

Worse case mode:		802.11b(1Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	58.51	-9.2	49.31	74	-24.69	peak	H
2390.000	44.48	-9.2	35.28	54	-18.72	AVG	H
2400.000	59.98	-9.39	50.59	74	-23.41	peak	H
2400.000	46.23	-9.39	36.84	54	-17.16	AVG	H
2390.000	58.86	-9.2	49.66	74	-24.34	peak	V
2390.000	44.55	-9.2	35.35	54	-18.65	AVG	V
2400.000	59.26	-9.39	49.87	74	-24.13	peak	V
2400.000	46.78	-9.39	37.39	54	-16.61	AVG	V

Worse case mode:		802.11b(1Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	58.33	-9.29	49.04	74	-24.96	peak	H
2483.500	44.12	-9.29	34.83	54	-19.17	AVG	H
2483.500	57.85	-9.29	48.56	74	-25.44	peak	V
2483.500	45.56	-9.29	36.27	54	-17.73	AVG	V

Worse case mode:		802.11g(6Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	58.81	-9.2	49.61	74	-24.39	peak	H
2390.000	44.86	-9.2	35.66	54	-18.34	AVG	H
2400.000	59.99	-9.39	50.60	74	-23.40	peak	H
2400.000	46.00	-9.39	36.61	54	-17.39	AVG	H
2390.000	59.12	-9.2	49.92	74	-24.08	peak	V
2390.000	44.45	-9.2	35.25	54	-18.75	AVG	V
2400.000	59.56	-9.39	50.17	74	-23.83	peak	V
2400.000	46.33	-9.39	36.94	54	-17.06	AVG	V

Worse case mode:		802.11g(6Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	58.29	-9.29	49.00	74	-25.00	peak	H
2483.500	43.93	-9.29	34.64	54	-19.36	AVG	H
2483.500	57.58	-9.29	48.29	74	-25.71	peak	V
2483.500	45.48	-9.29	36.19	54	-17.81	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	58.29	-9.2	49.09	74	-24.91	peak	H
2390.000	44.59	-9.2	35.39	54	-18.61	AVG	H
2400.000	59.66	-9.39	50.27	74	-23.73	peak	H
2400.000	46.31	-9.39	36.92	54	-17.08	AVG	H
2390.000	58.37	-9.2	49.17	74	-24.83	peak	V
2390.000	44.94	-9.2	35.74	54	-18.26	AVG	V
2400.000	59.83	-9.39	50.44	74	-23.56	peak	V
2400.000	46.57	-9.39	37.18	54	-16.82	AVG	V

Worse case mode:		802.11n(HT20)(6.5Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	57.92	-9.29	48.63	74	-25.37	peak	H
2483.500	44.40	-9.29	35.11	54	-18.89	AVG	H
2483.500	57.59	-9.29	48.30	74	-25.70	peak	V
2483.500	45.96	-9.29	36.67	54	-17.33	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2390.000	58.48	-9.2	49.28	74	-24.72	peak	H
2390.000	44.92	-9.2	35.72	54	-18.28	AVG	H
2400.000	59.29	-9.39	49.90	74	-24.10	peak	H
2400.000	46.78	-9.39	37.39	54	-16.61	AVG	H
2390.000	58.80	-9.2	49.60	74	-24.40	peak	V
2390.000	44.30	-9.2	35.10	54	-18.90	AVG	V
2400.000	59.93	-9.39	50.54	74	-23.46	peak	V
2400.000	46.45	-9.39	37.06	54	-16.94	AVG	V

Worse case mode:		802.11n(HT40)(13.5Mbps)		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2483.500	57.53	-9.29	48.24	74	-25.76	peak	H
2483.500	43.61	-9.29	34.32	54	-19.68	AVG	H
2483.500	58.04	-9.29	48.75	74	-25.25	peak	V
2483.500	45.83	-9.29	36.54	54	-17.46	AVG	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:

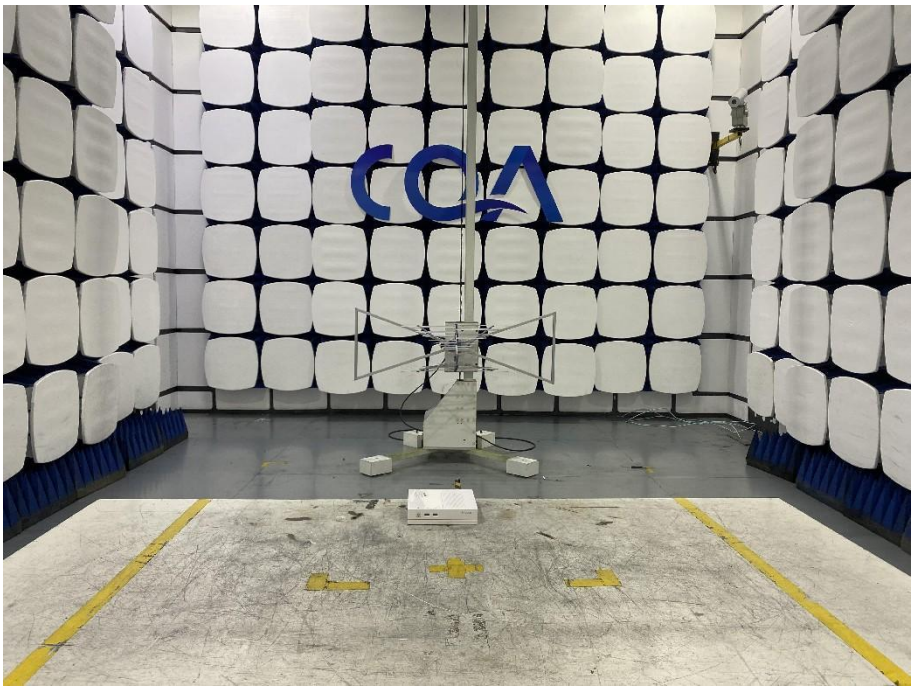
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

6 Photographs - EUT Test Setup

6.1 Radiated Spurious Emission

9kHz~30MHz:

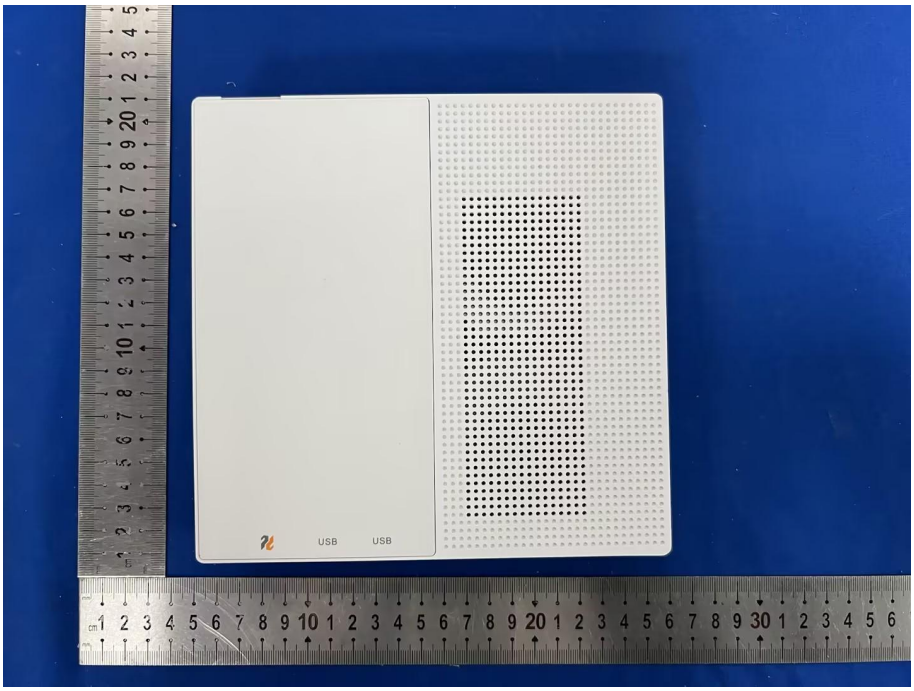
30MHz~1GHz:

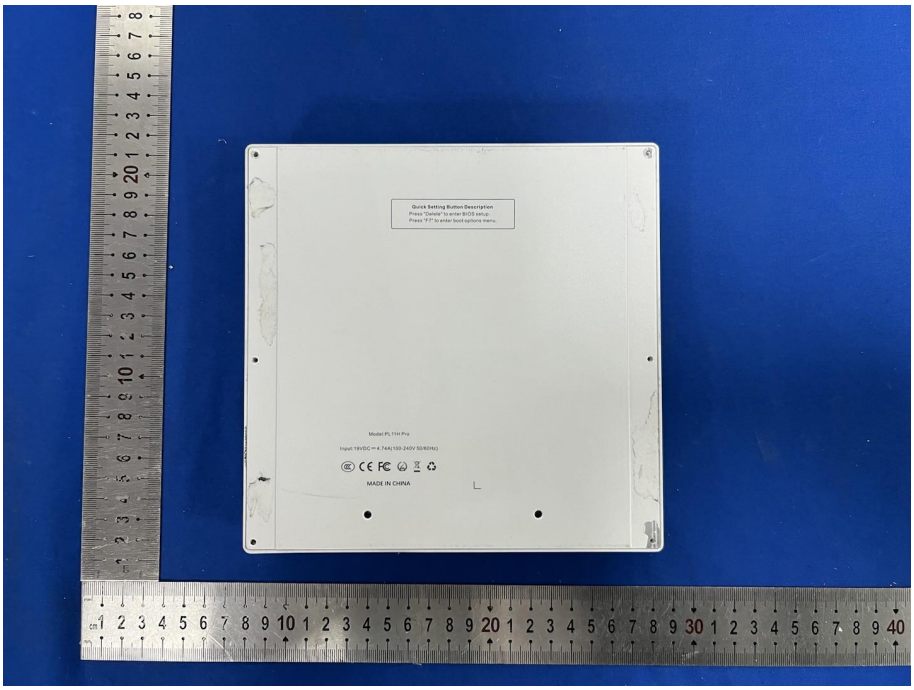


Above 1GHz:

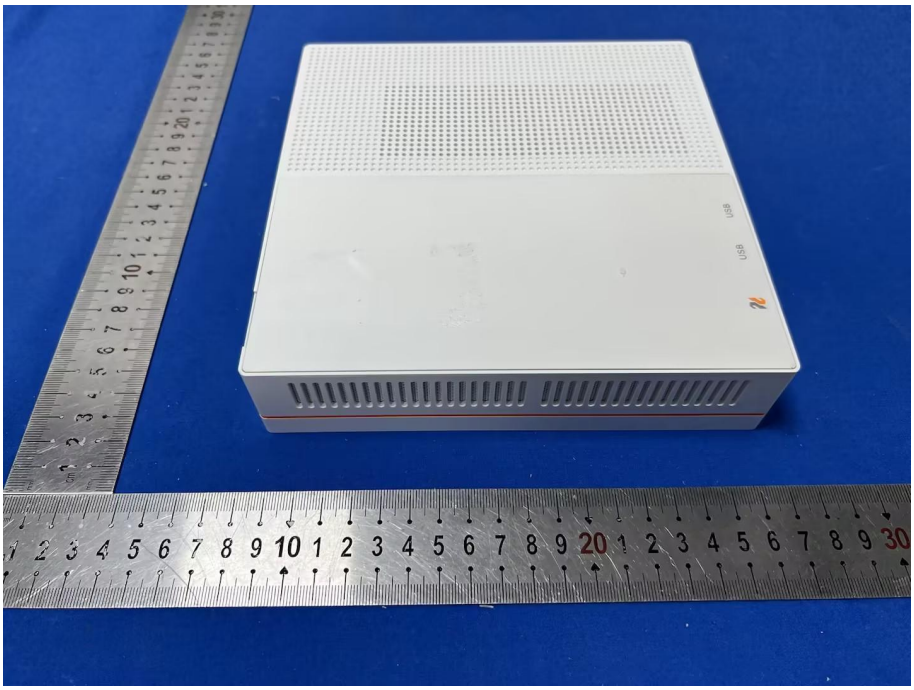
6.2 Conducted Emission

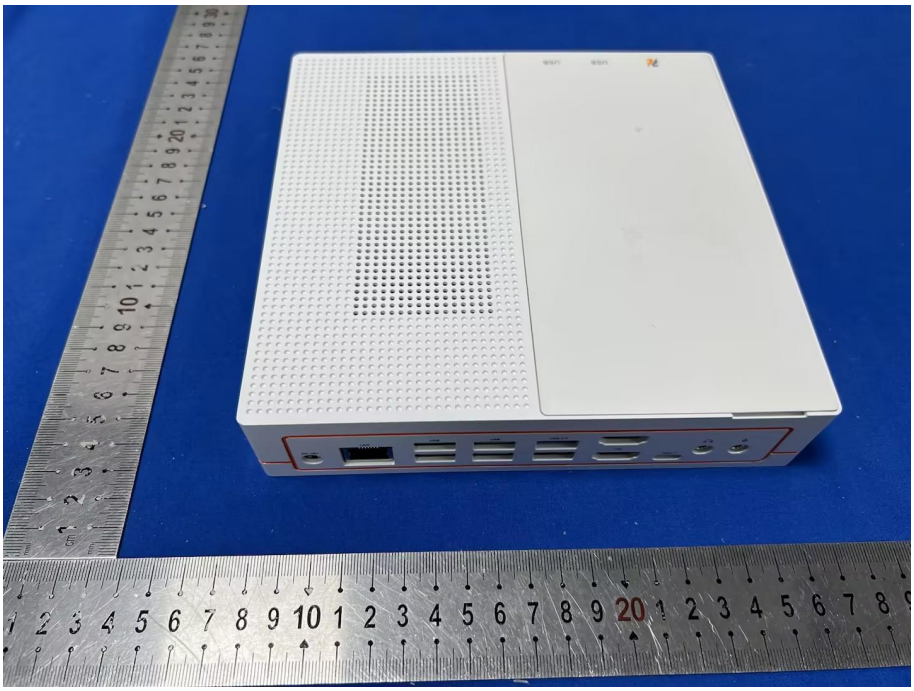
7 Photographs - EUT Constructional Details

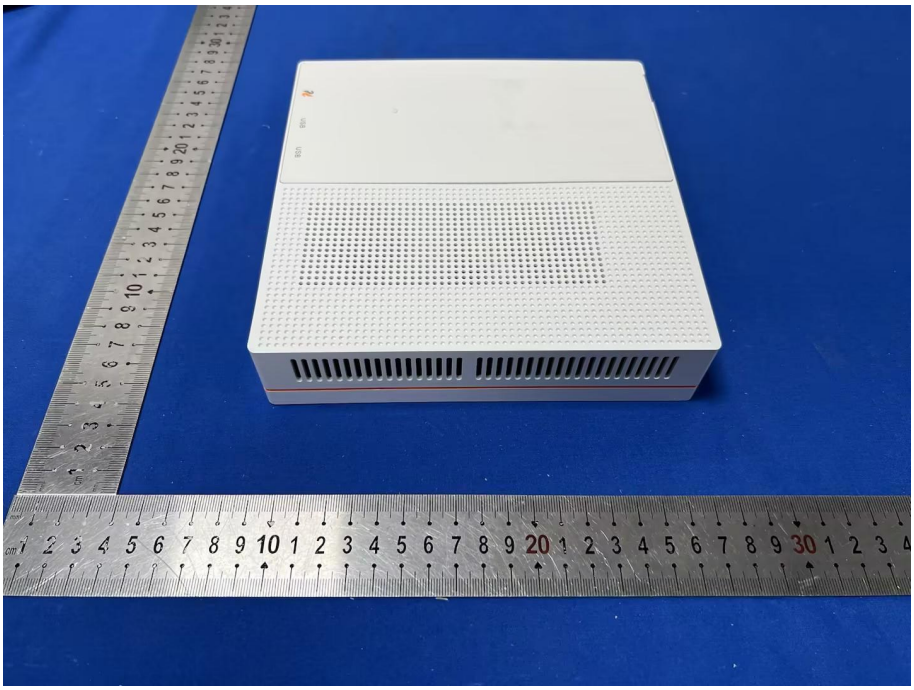


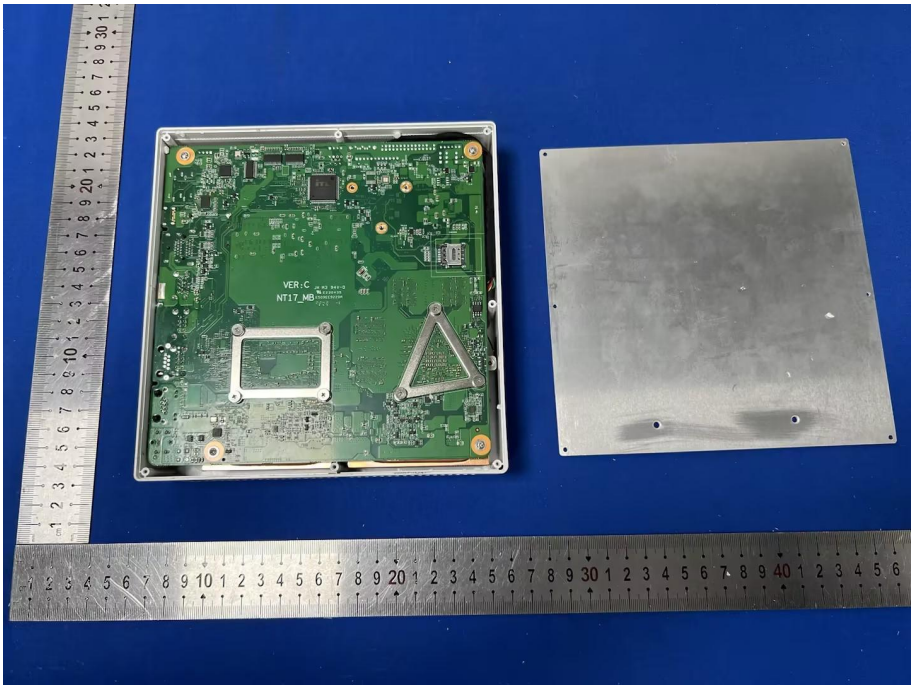

Quick Setting Button Description
Press "Delete" to enter BIOS setup.
Press "F7" to enter boot options menu.
Model: PL11H Pro
Input: 19VDC ⎓ 4.74A(100-240V 50/60Hz)
MADE IN CHINA

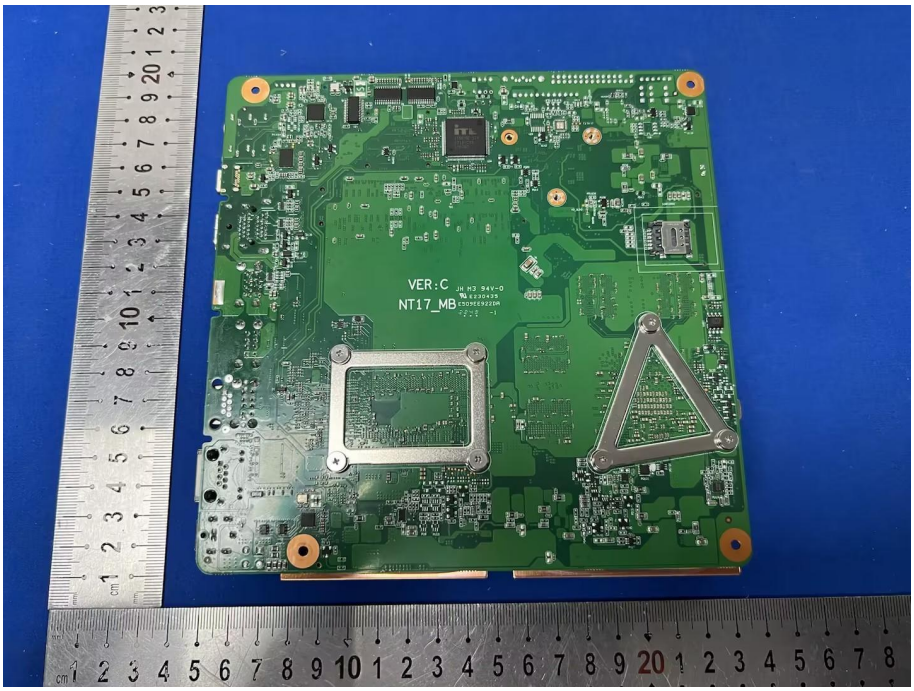
USB
USB
Tryco








VER:C
NT17_MB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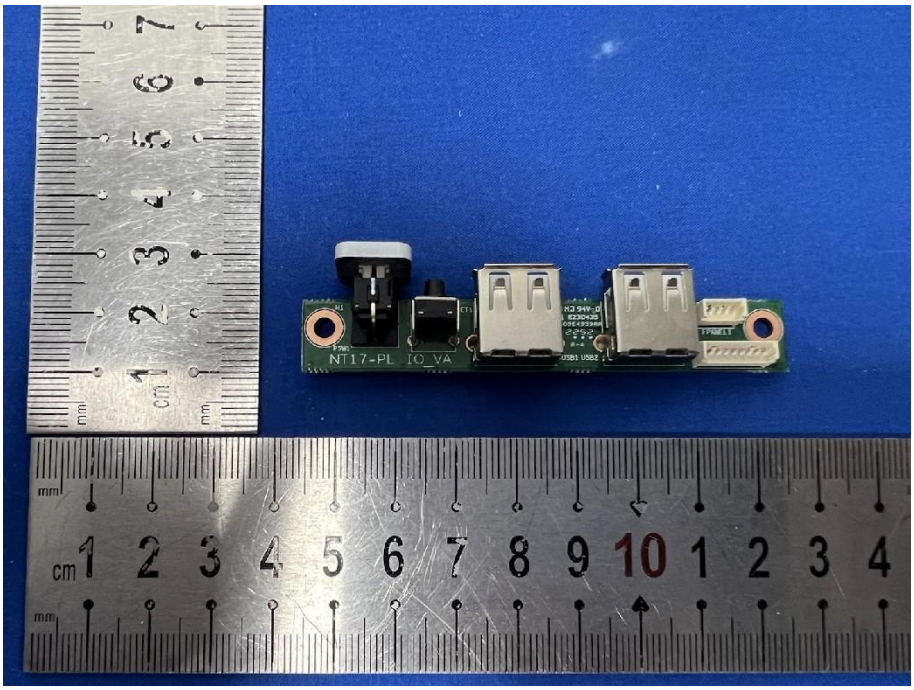
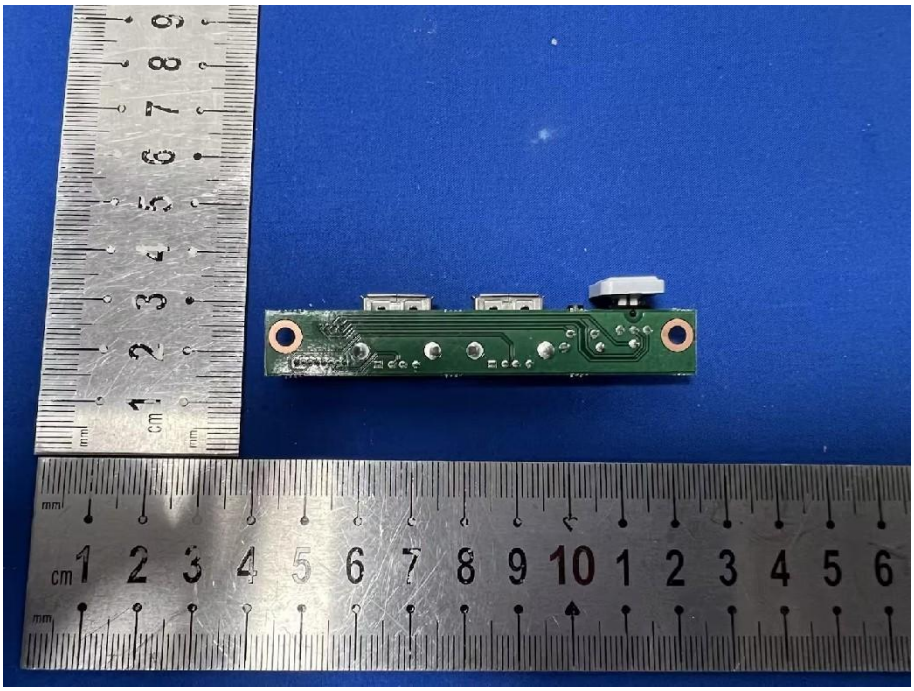
NT17_MB





*** END OF REPORT ***