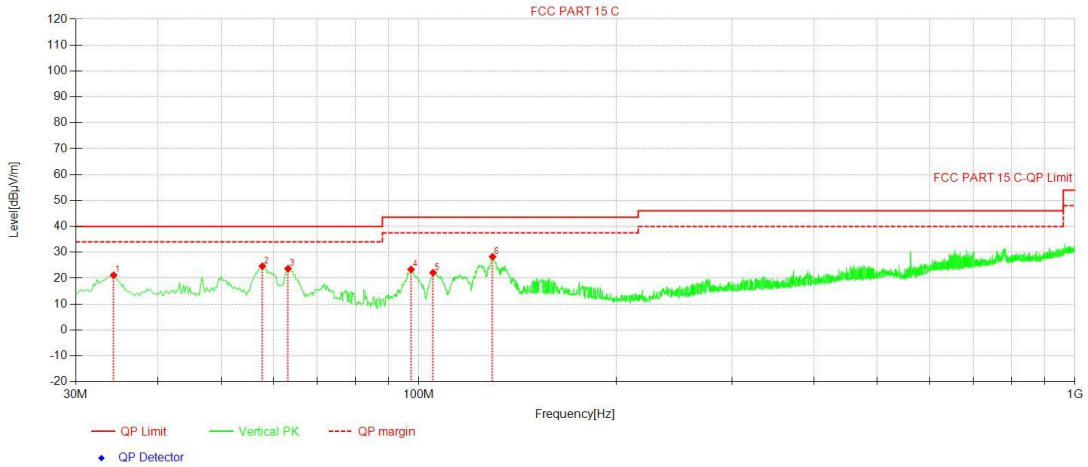
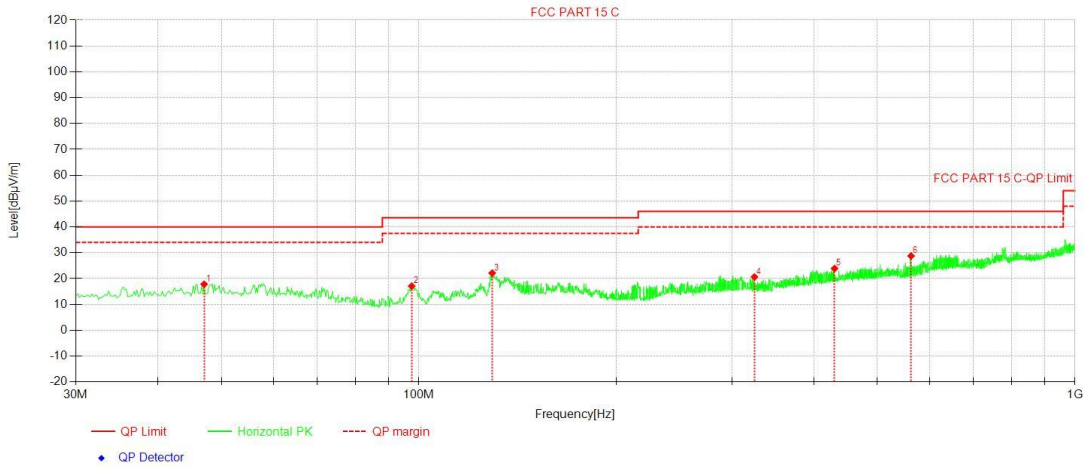
Test data

For 30-1000MHz



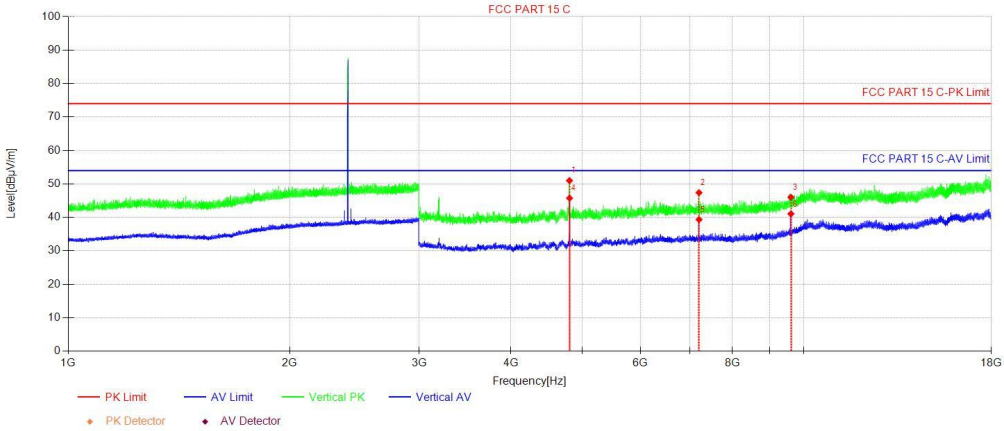
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	34.27	30.55	-9.39	21.16	40.00	18.84	100	334	PK	Vertical
2	57.75	33.15	-8.53	24.62	40.00	15.38	100	358	PK	Vertical
3	63.18	32.80	-9.12	23.68	40.00	16.32	100	346	PK	Vertical
4	97.33	36.35	-13.01	23.34	43.50	20.66	100	270	PK	Vertical
5	105.09	33.96	-11.82	22.14	43.50	21.36	100	30	PK	Vertical
6	129.54	37.73	-9.46	28.27	43.50	15.23	100	1	PK	Vertical



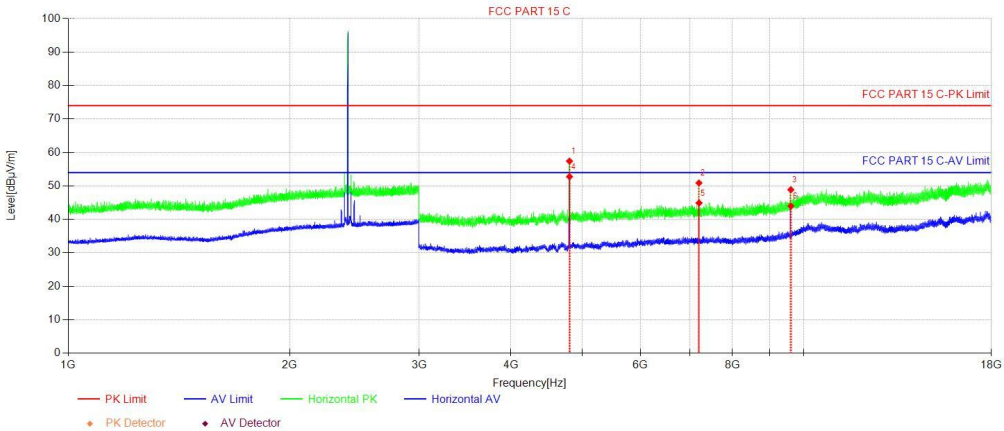
NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	47.08	25.93	-8.11	17.82	40.00	22.18	100	183	PK	Horizontal
2	97.53	30.08	-12.99	17.09	43.50	26.41	200	337	PK	Horizontal
3	129.35	31.61	-9.48	22.13	43.50	21.37	200	178	PK	Horizontal
4	324.74	26.77	-6.14	20.63	46.00	25.37	100	272	PK	Horizontal
5	430.11	27.25	-3.35	23.90	46.00	22.10	200	251	PK	Horizontal
6	562.64	30.32	-1.55	28.77	46.00	17.23	200	233	PK	Horizontal

For above 1GHz

DH5 2402MHz

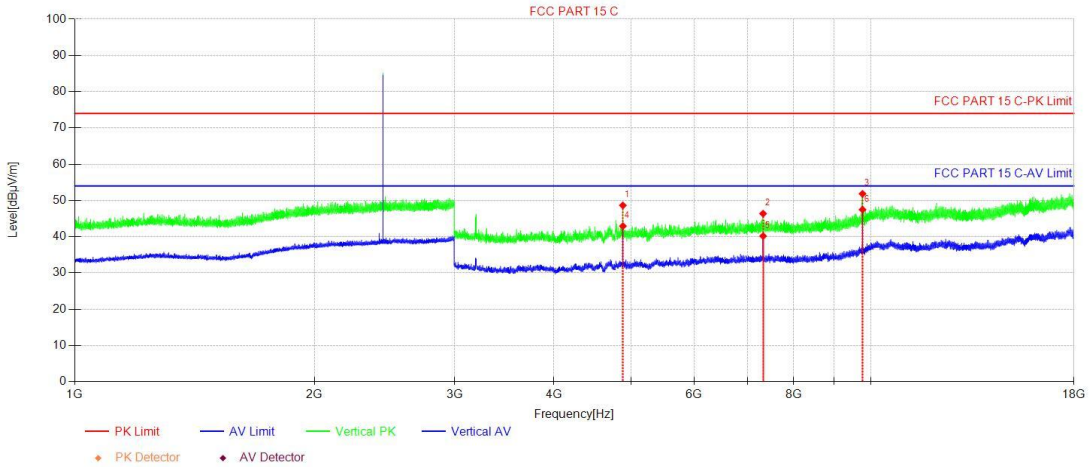


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4803.84	55.62	-4.61	51.01	74.00	22.99	150	145	Peak	Vertical
2	7206.21	49.15	-1.76	47.39	74.00	26.61	150	309	Peak	Vertical
3	9608.58	45.14	0.88	46.02	74.00	27.98	150	360	Peak	Vertical
4	4804.59	50.36	-4.61	45.75	54.00	8.25	150	127	AV	Vertical
5	7206.96	41.12	-1.76	39.36	54.00	14.64	150	198	AV	Vertical
6	9608.58	40.18	0.88	41.06	54.00	12.94	150	360	AV	Vertical

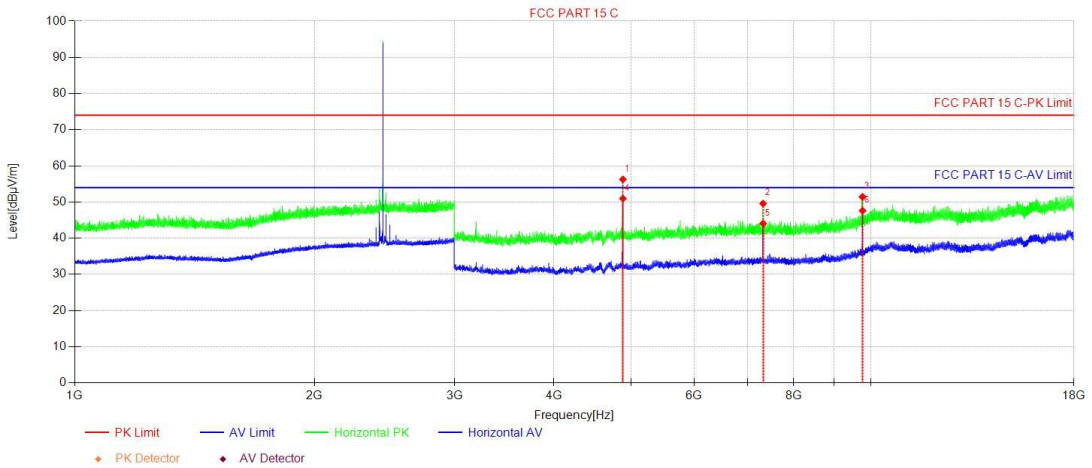


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4803.84	62.03	-4.61	57.42	74.00	16.58	150	321	PK	Horizon
2	7206.21	52.65	-1.76	50.89	74.00	23.11	150	338	PK	Horizon
3	9607.83	48.01	0.87	48.88	74.00	25.12	150	360	PK	Horizon
4	4804.59	57.39	-4.61	52.78	54.00	1.22	150	321	AV	Horizon
5	7206.96	46.66	-1.76	44.90	54.00	9.10	150	338	AV	Horizon
6	9608.58	43.13	0.88	44.01	54.00	9.99	150	360	AV	Horizon

DH5 2441MHz

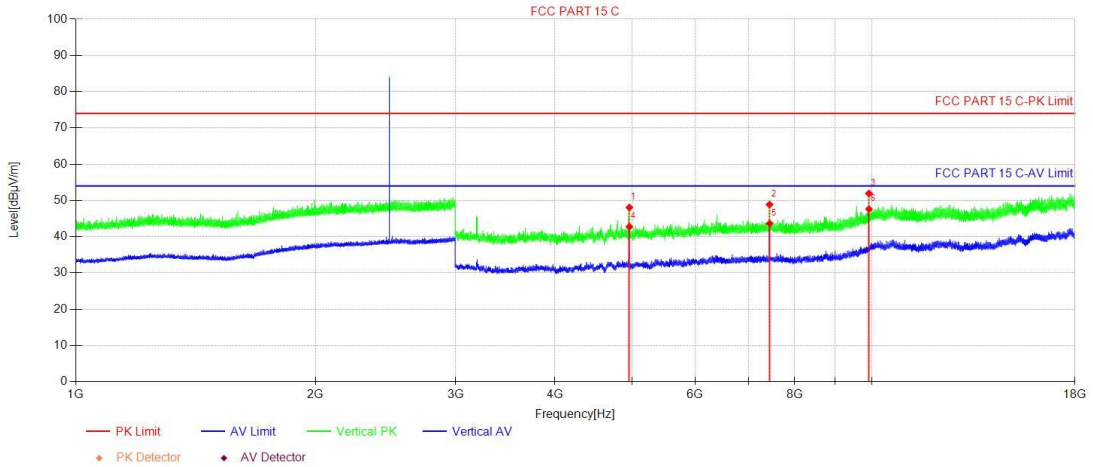


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4881.84	53.37	-4.72	48.65	74.00	25.35	150	128	Peak	Vertical
2	7323.22	47.87	-1.49	46.38	74.00	27.62	150	326	Peak	Vertical
3	9763.84	50.21	1.64	51.85	74.00	22.15	150	360	Peak	Vertical
4	4882.59	47.65	-4.72	42.93	54.00	11.07	150	128	AV	Vertical
5	7323.97	41.68	-1.49	40.19	54.00	13.81	150	216	AV	Vertical
6	9764.59	45.84	1.64	47.48	54.00	6.52	150	360	AV	Vertical

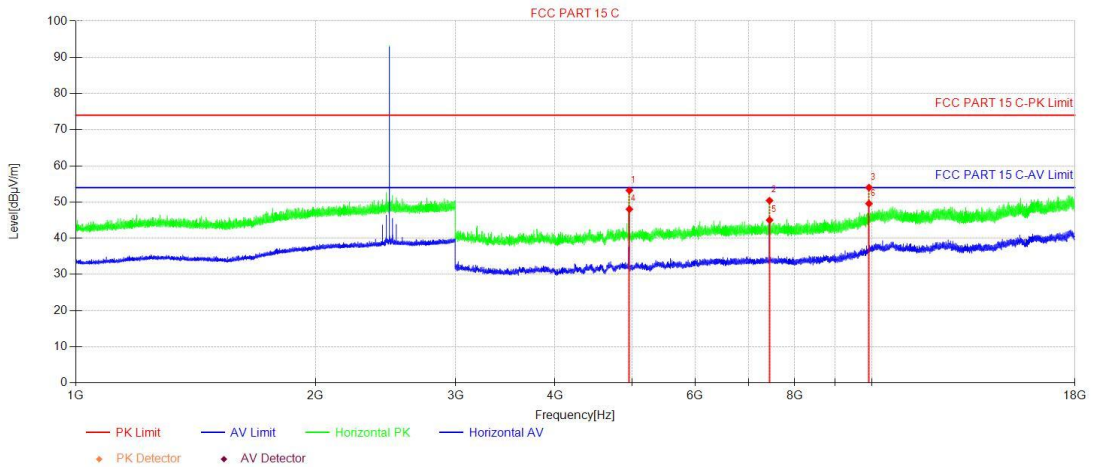


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4881.84	61.00	-4.72	56.28	74.00	17.72	150	323	Peak	Horizon
2	7323.22	51.08	-1.49	49.59	74.00	24.41	150	305	Peak	Horizon
3	9763.84	49.81	1.64	51.45	74.00	22.55	150	360	Peak	Horizon
4	4882.59	55.67	-4.72	50.95	54.00	3.05	150	323	AV	Horizon
5	7323.97	45.56	-1.49	44.07	54.00	9.93	150	341	AV	Horizon
6	9764.59	45.96	1.64	47.60	54.00	6.40	150	360	AV	Horizon

DH5 2480MHz



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4959.85	52.93	-4.86	48.07	74.00	25.93	150	129	Peak	Vertical
2	7440.22	50.22	-1.34	48.88	74.00	25.12	150	165	Peak	Vertical
3	9919.85	49.69	2.26	51.95	74.00	22.05	150	292	Peak	Vertical
4	4960.60	47.63	-4.86	42.77	54.00	11.23	150	129	AV	Vertical
5	7440.97	44.97	-1.34	43.63	54.00	10.37	150	165	AV	Vertical
6	9920.60	45.34	2.27	47.61	54.00	6.39	150	292	AV	Vertical



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	4959.85	58.08	-4.86	53.22	74.00	20.78	150	325	Peak	Horizon
2	7439.47	51.74	-1.34	50.40	74.00	23.60	150	344	Peak	Horizon
3	9919.85	51.74	2.26	54.00	74.00	20.00	150	306	Peak	Horizon
4	4960.60	52.88	-4.86	48.02	54.00	5.98	150	325	AV	Horizon
5	7440.97	46.35	-1.34	45.01	54.00	8.99	150	325	AV	Horizon
6	9920.60	47.30	2.27	49.57	54.00	4.43	150	306	AV	Horizon

Note:

1. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:

   Result Level= Reading Level + Correct Factor(including Ant.Factor, Cable Factor etc.)

2. The amplitude of 9KHz to 30MHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

3. The amplitude of 18GHz to 25GHz spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be report.

4. All channels had been pre-test,DH5 is the worst case, only the worst case was reported.

3.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m)	Remark
	30MHz-88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1GHz	54.0	Quasi-peak
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			

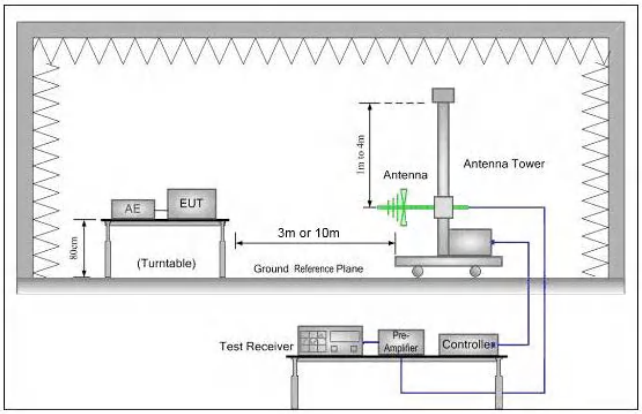


Figure 1. 30MHz to 1GHz

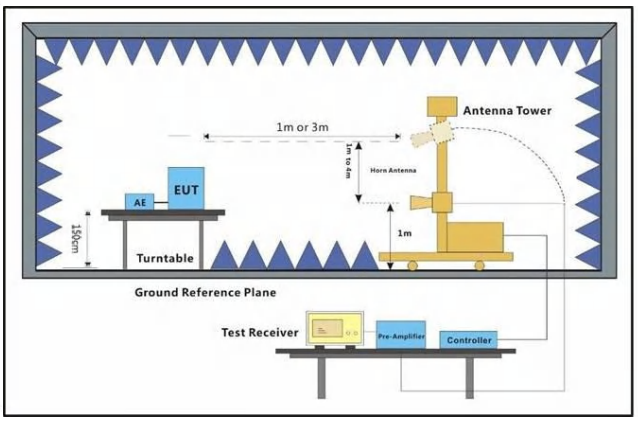


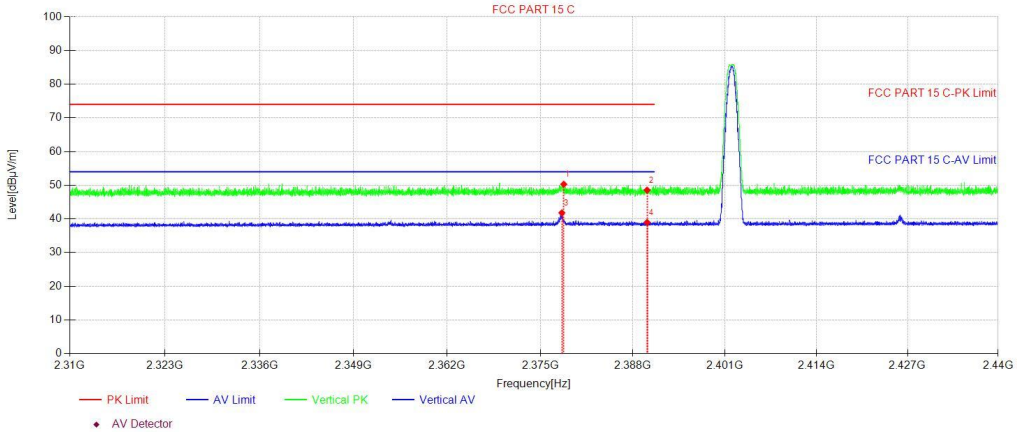
Figure 2. Above 1 GHz

Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, 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. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. 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. e. 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. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. 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 h. Test the EUT in the lowest channel , the Highest channel i. 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. j. Repeat above procedures until all frequencies measured was complete.
Test Configuration:	Measurements Below 1000MHz

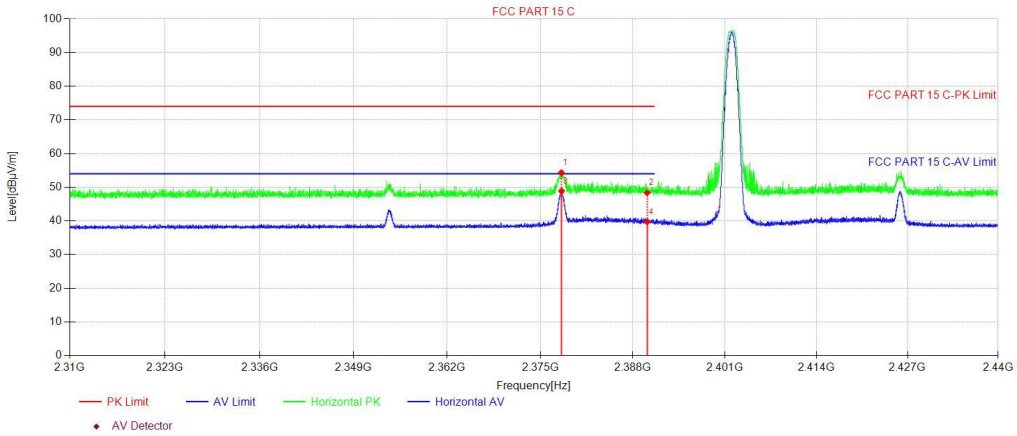
	• RBW = 120 kHz • VBW = 300 kHz • Detector = Peak • Trace mode = max hold Peak Measurements Above 1000 MHz • RBW = 1 MHz • VBW ⩾ 3 MHz • Detector = Peak • Sweep time = auto • Trace mode = max hold Average Measurements Above 1000MHz • RBW = 1 MHz • VBW = 10 Hz, when duty cycle is no less than 98 percent. • VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Transmitting mode.
Final Test Mode:	Pretest the EUT Transmitting mode. Through Pre-scan, find the DH5 of data type is the worst case of all modulation type. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 2.9 for details
Test Results:	Pass

Test Date

DH5 2402MHz

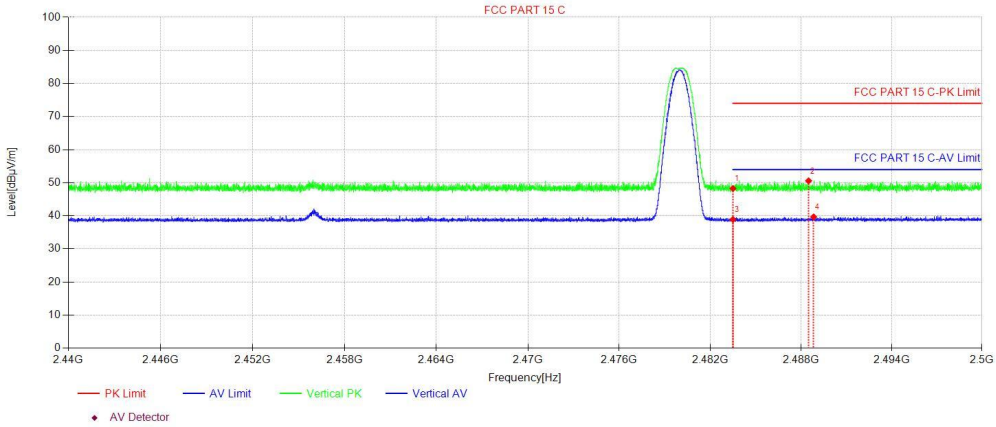


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	AV Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	2378.30	51.13	-0.84	50.29	74.00	23.71	150	146	Peak	Vertical
2	2390.01	49.36	-0.80	48.56	74.00	25.44	150	326	Peak	Vertical
3	2378.02	42.66	-0.84	41.82	54.00	12.18	150	135	AV	Vertical
4	2390.01	39.77	-0.80	38.97	54.00	15.03	150	146	AV	Vertical

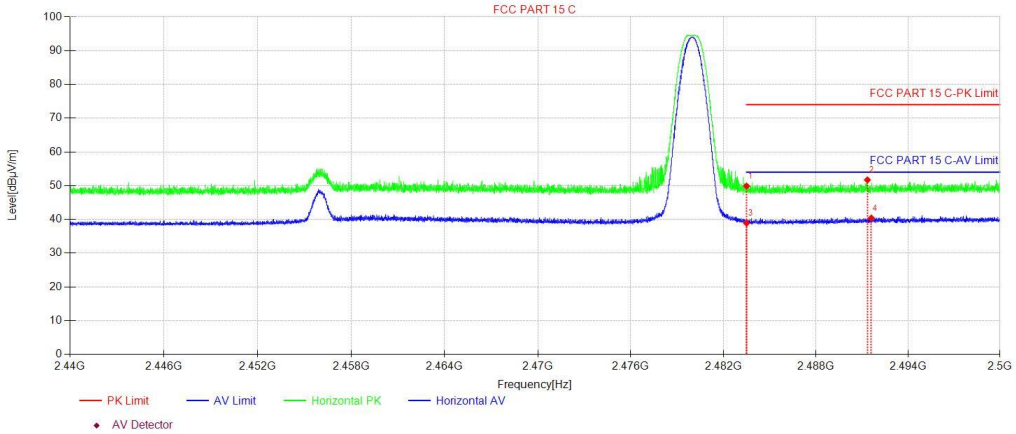


NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	AV Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	2377.96	55.16	-0.84	54.32	74.00	19.68	150	294	Peak	Horizon
2	2390.01	49.17	-0.80	48.37	74.00	25.63	150	272	Peak	Horizon
3	2377.98	49.73	-0.84	48.89	54.00	5.11	150	294	AV	Horizon
4	2390.01	40.55	-0.80	39.75	54.00	14.25	150	305	AV	Horizon

DH5 2480MHz



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	2483.50	48.56	-0.29	48.27	74.00	25.73	150	78	Peak	Vertical
2	2488.50	50.84	-0.25	50.59	74.00	23.41	150	296	Peak	Vertical
3	2483.50	39.20	-0.29	38.91	54.00	15.09	150	16	AV	Vertical
4	2488.84	39.92	-0.24	39.68	54.00	14.32	150	341	AV	Vertical



NO.	Freq. [MHz]	Reading Level [dBμV]	Correct Factor [dB/m]	Result Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark	Polarity
1	2483.50	50.19	-0.29	49.90	74.00	24.10	150	256	Peak	Horizon
2	2491.36	51.94	-0.23	51.71	74.00	22.29	150	291	Peak	Horizon
3	2483.50	39.20	-0.29	38.91	54.00	15.09	150	280	AV	Horizon
4	2491.61	40.63	-0.23	40.40	54.00	13.60	150	335	AV	Horizon

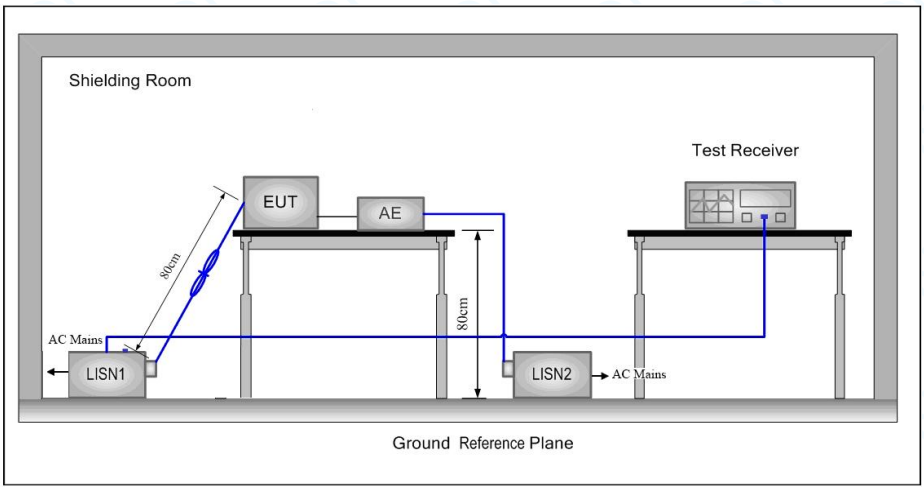
Note:

1. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including Ant.Factor and the Cable Factor etc.), The basic equation is as follows:

Result Level= Reading Level + Correct Factor(including Ant.Factor ,Cable Factor etc.

2.All channels had been pre-test, DH5 is the worst case, only the worst case was reported.

3.11 AC Power Line Conducted Emissions

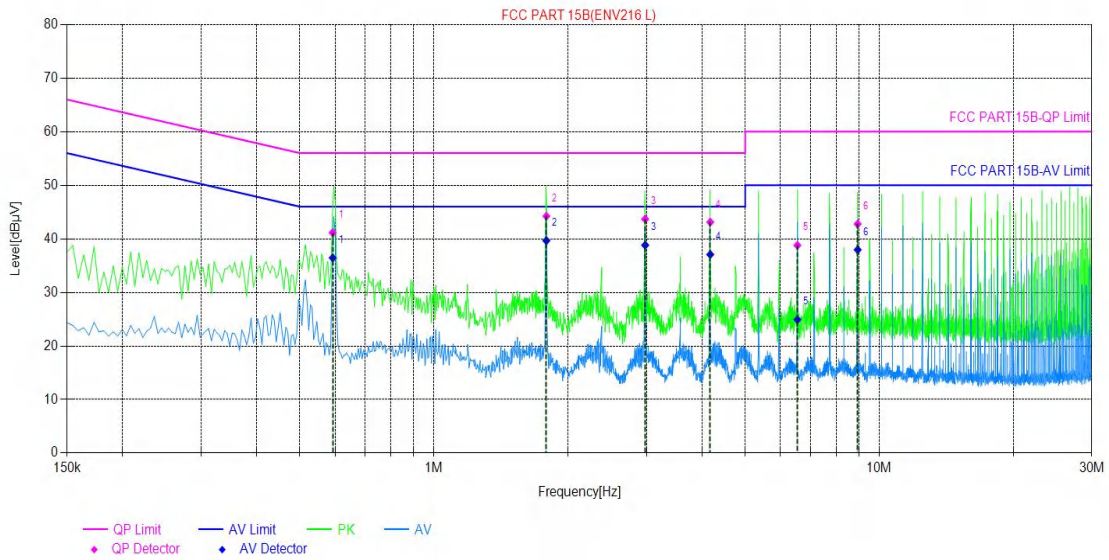
Test Requirement:	47 CFR Part 15C Section 15.207		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150kHz to 30MHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test Procedure:	1) The mains terminal disturbance voltage test was conducted in a shielded room. 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded. 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 2013 on conducted measurement.		
Test Setup:			
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates at lowest, middle and highest channel. Charge + Transmitting mode.		

Final Test Mode:	Through Pre-scan, find the the worst case.
Instruments Used:	Refer to section 2.9 for details
Test Results:	PASS

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.
Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

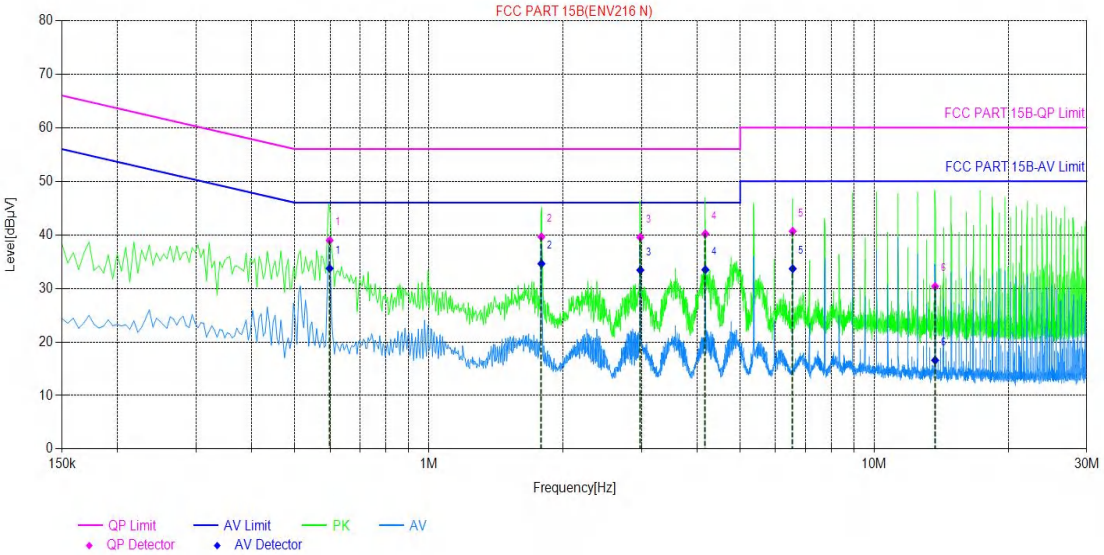
Live Line:



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.5925	9.82	41.14	56.00	14.86	36.45	46.00	9.55	PASS
2	1.7886	9.73	44.23	56.00	11.77	39.66	46.00	6.34	PASS
3	2.9807	9.74	43.69	56.00	12.31	38.81	46.00	7.19	PASS
4	4.1741	9.75	43.12	56.00	12.88	37.07	46.00	8.93	PASS
5	6.5489	9.86	38.79	60.00	21.21	24.91	50.00	25.09	PASS
6	8.9427	9.87	42.76	60.00	17.24	37.95	50.00	12.05	PASS

Neutral Line:



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	Verdict
1	0.5985	9.78	38.95	56.00	17.05	33.73	46.00	12.27	PASS
2	1.7891	9.75	39.62	56.00	16.38	34.60	46.00	11.40	PASS
3	2.9831	9.87	39.53	56.00	16.47	33.42	46.00	12.58	PASS
4	4.1756	9.96	40.18	56.00	15.82	33.48	46.00	12.52	PASS
5	6.5598	9.99	40.66	60.00	19.34	33.67	50.00	16.33	PASS
6	13.6983	9.90	30.38	60.00	29.62	16.59	50.00	33.41	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. The Measurement (Result Level) is calculated by Reading Level adding the Correct Factor(maybe including LISN Factor and the Cable Factor etc.), The basic equation is as follows:

Result Level= Reading Level + Correct Factor(including LISN Factor, Cable Factor etc

4 Appendix

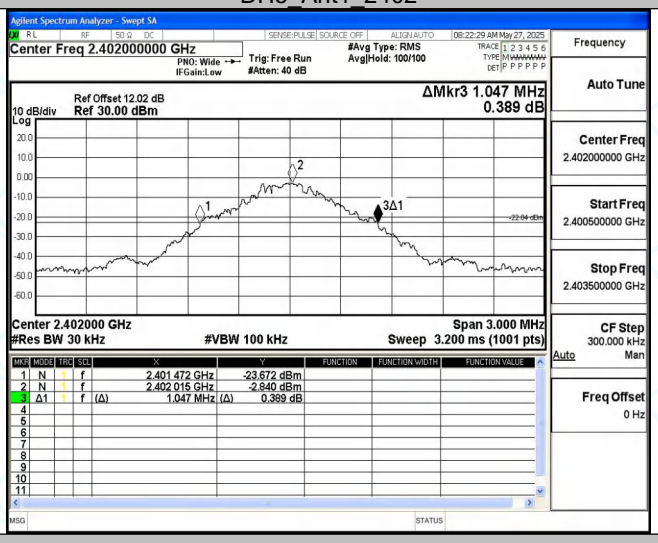
Appendix A: 20dB Emission Bandwidth

Test Result

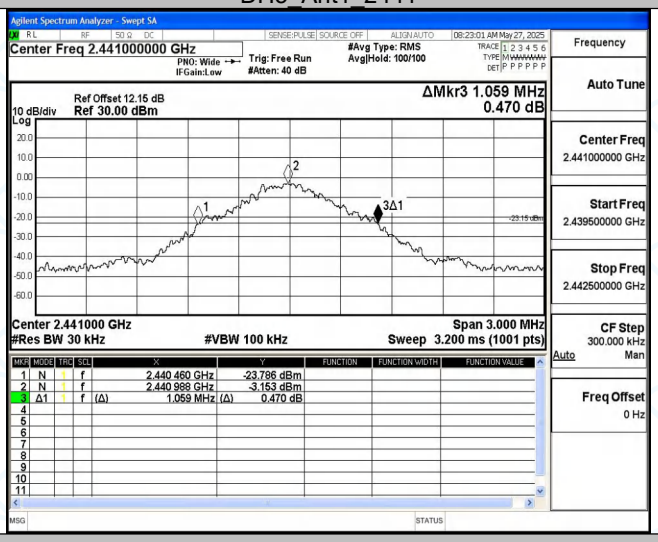
TestMode	Antenna	Freq(MHz)	20dB EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	1.047	2401.472	2402.519	---	---
		2441	1.059	2440.460	2441.519	---	---
		2480	1.056	2479.463	2480.519	---	---
2DH5	Ant1	2402	1.329	2401.334	2402.663	---	---
		2441	1.362	2440.322	2441.684	---	---
		2480	1.374	2479.322	2480.696	---	---
3DH5	Ant1	2402	1.311	2401.346	2402.657	---	---
		2441	1.326	2440.334	2441.660	---	---
		2480	1.323	2479.337	2480.660	---	---

Test Graphs

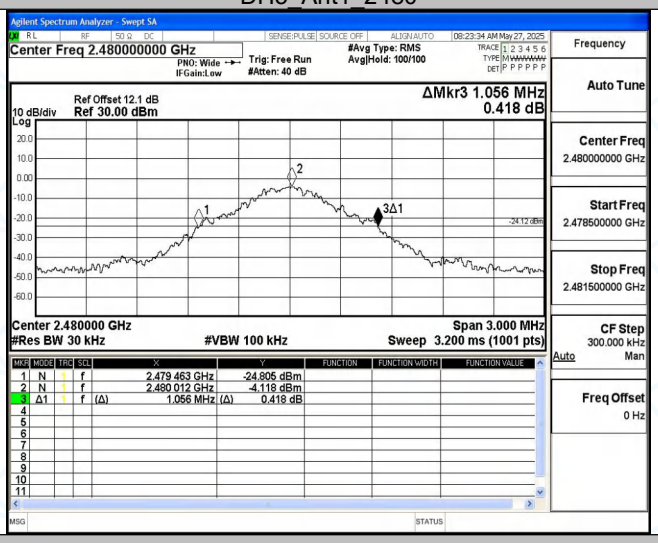
DH5_Ant1_2402



DH5_Ant1_2441



DH5_Ant1_2480



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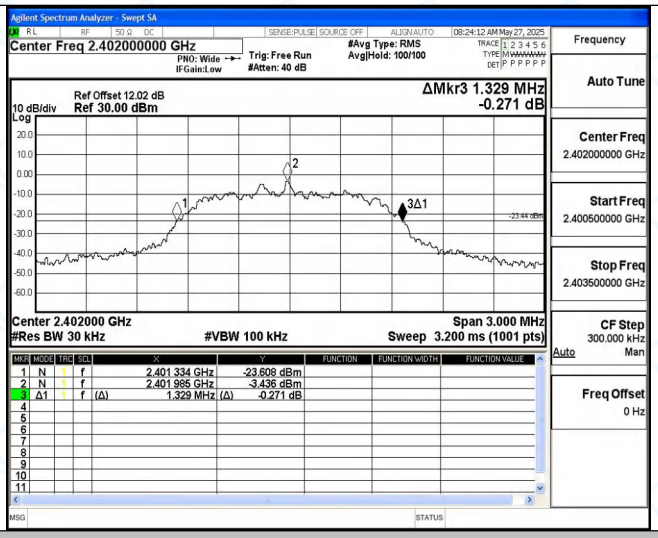
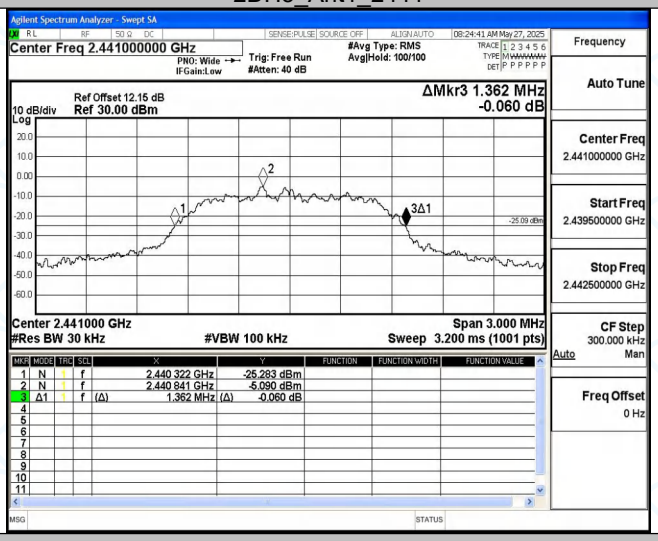


2DH5_Ant1_2441



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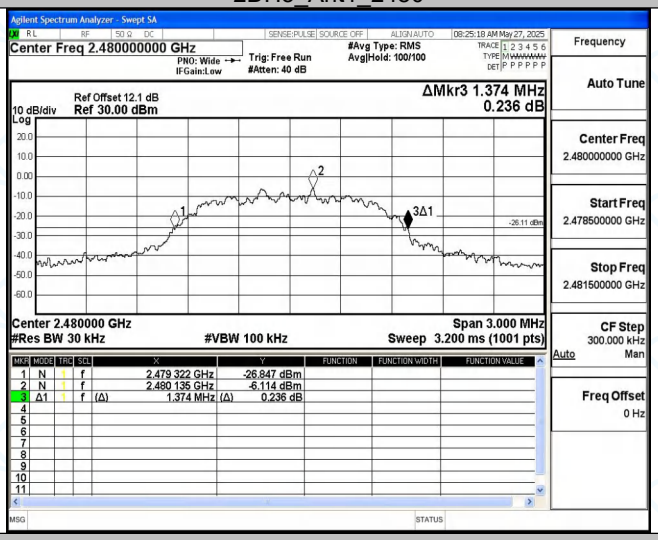

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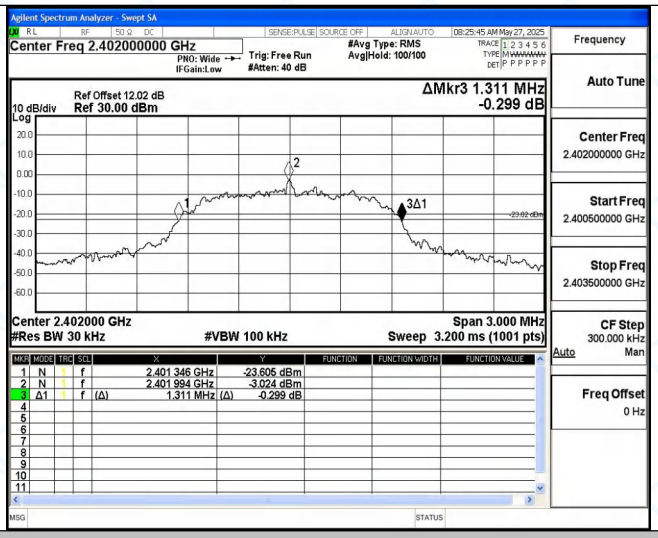
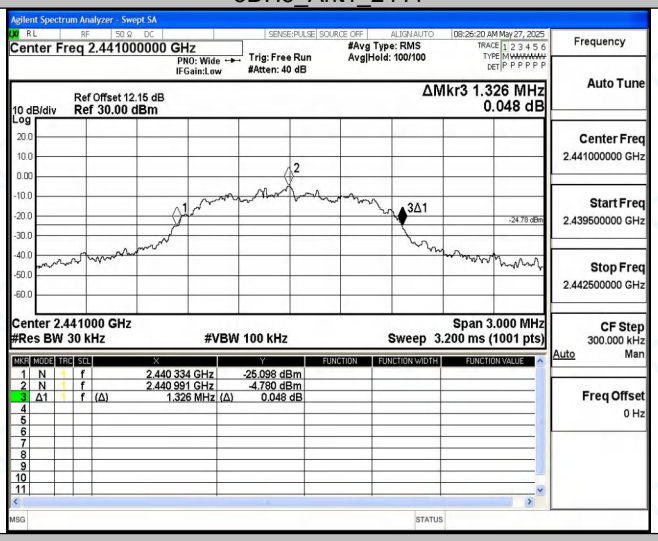


3DH5_Ant1_2441



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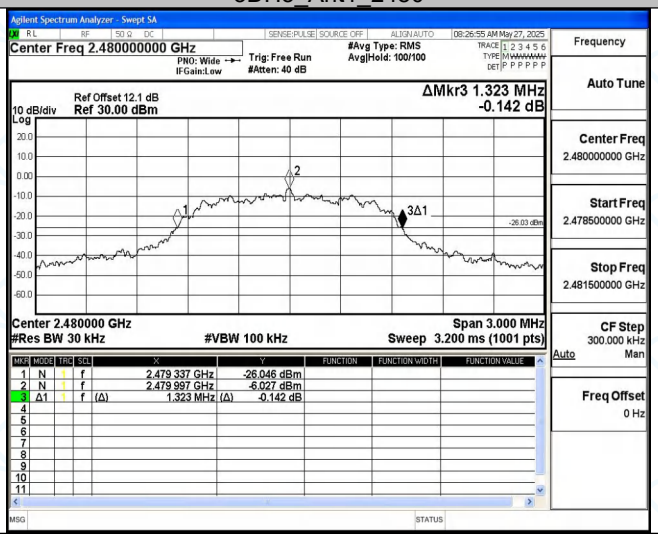


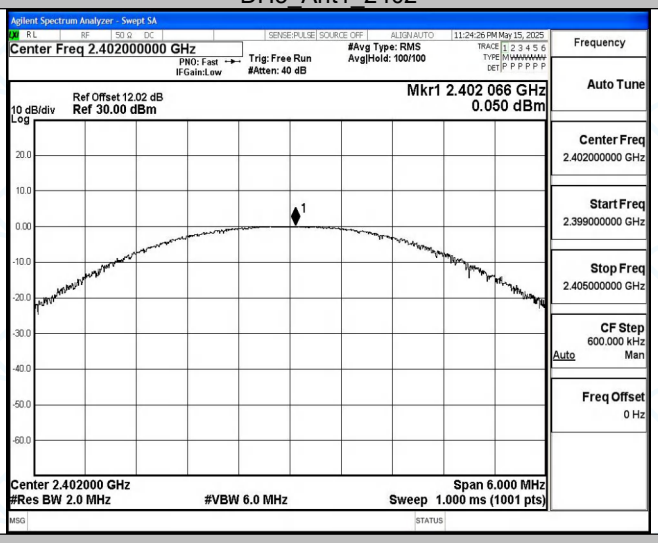
Appendix B: Maximum conducted output power

Test Result

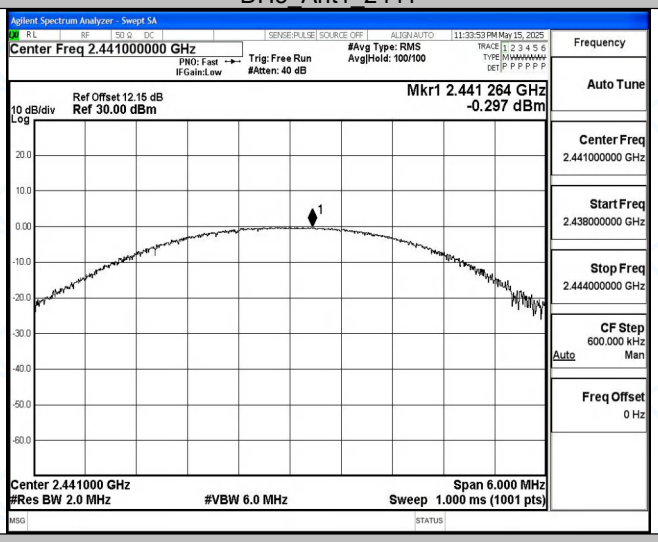
Test Mode	Antenna	Freq(MHz)	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	0.05	≤20.97	PASS
		2441	-0.30	≤20.97	PASS
		2480	-1.16	≤20.97	PASS
2DH5	Ant1	2402	0.35	≤20.97	PASS
		2441	-0.15	≤20.97	PASS
		2480	-0.86	≤20.97	PASS
3DH5	Ant1	2402	0.46	≤20.97	PASS
		2441	0.03	≤20.97	PASS
		2480	-0.81	≤20.97	PASS

Test Graphs

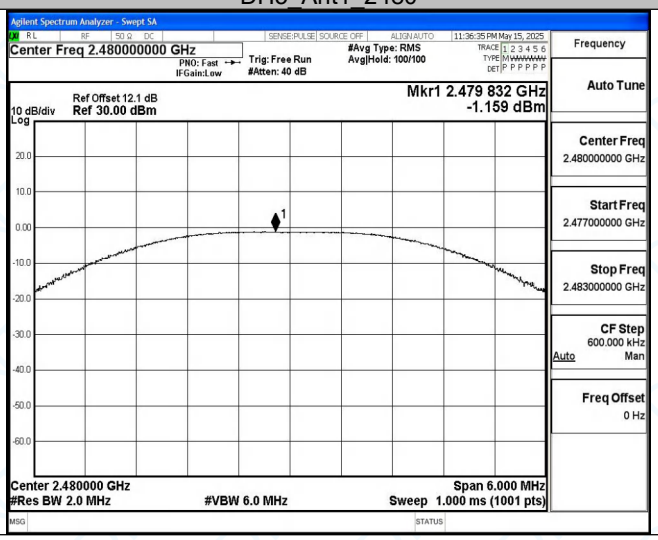
DH5_Ant1_2402



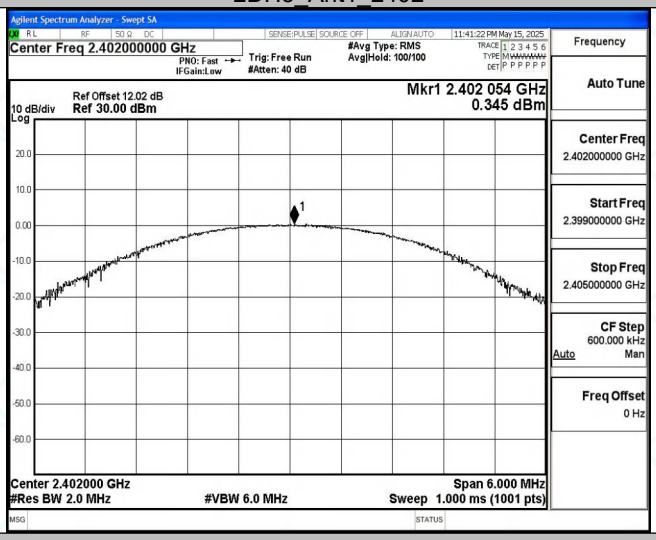
DH5_Ant1_2441



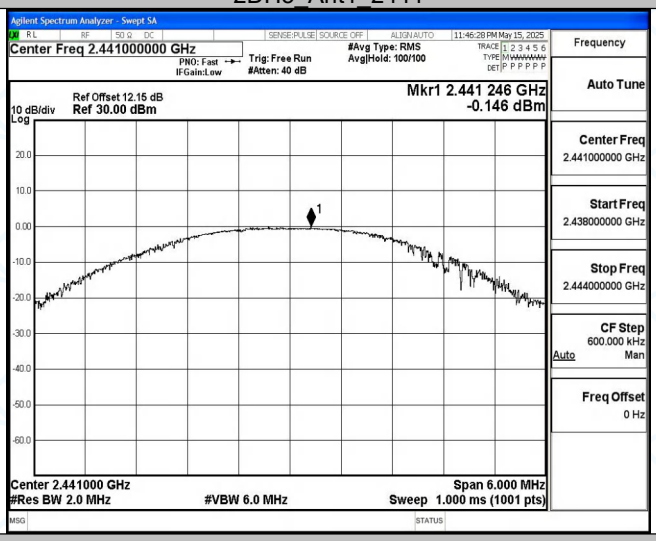
DH5_Ant1_2480



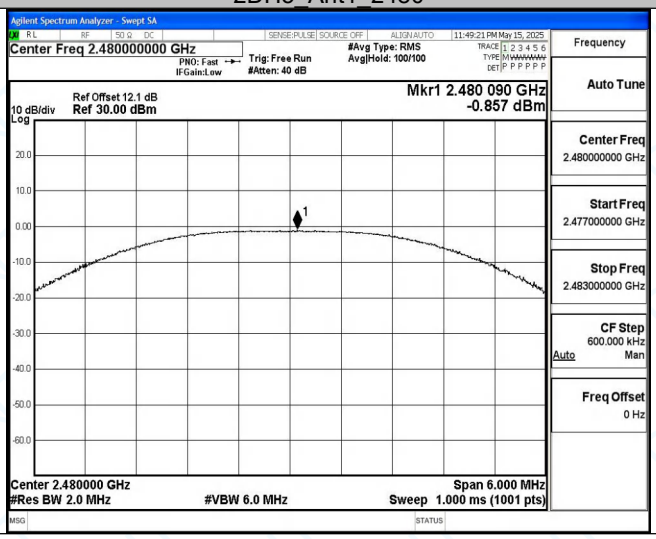
2DH5_Ant1_2402



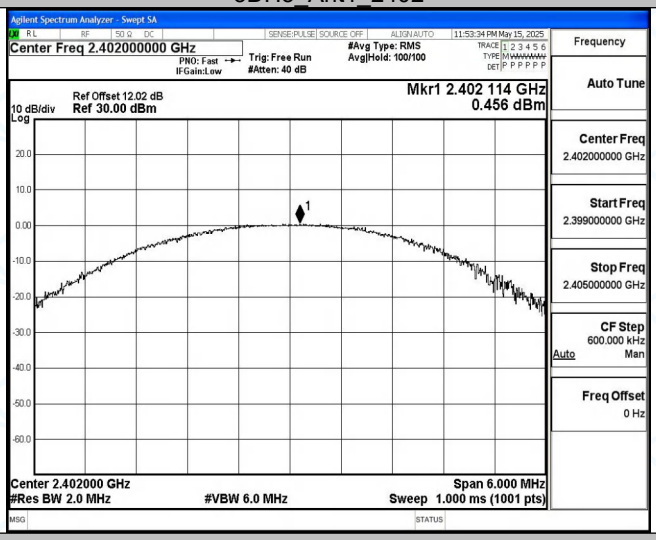
2DH5_Ant1_2441



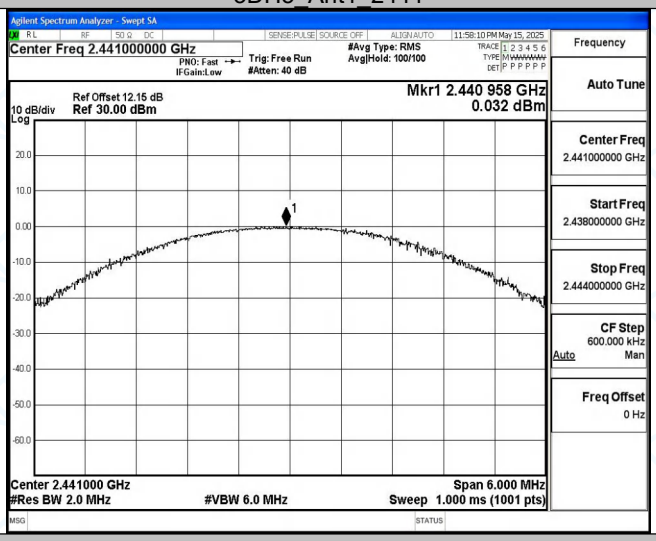
2DH5_Ant1_2480



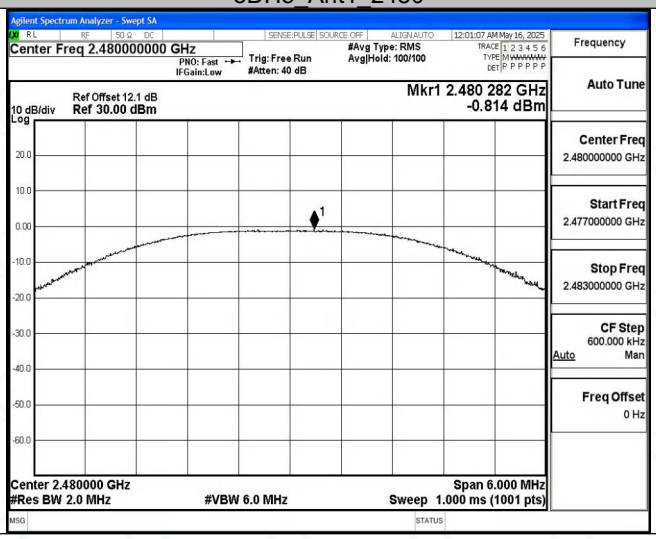
3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



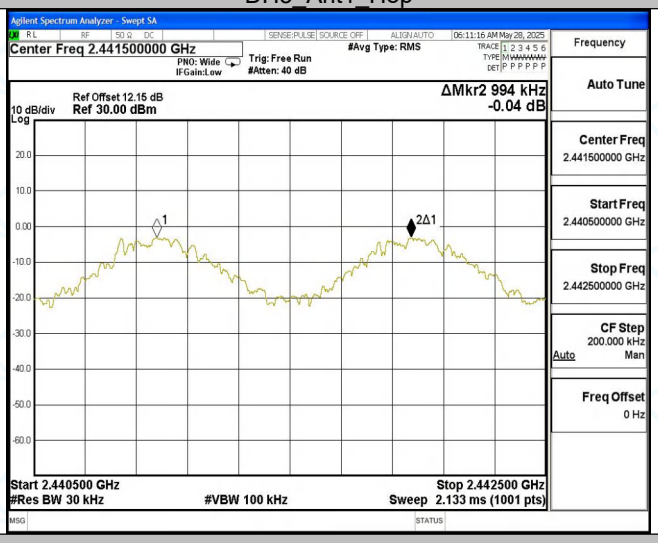
Appendix C: Carrier frequency separation

Test Result

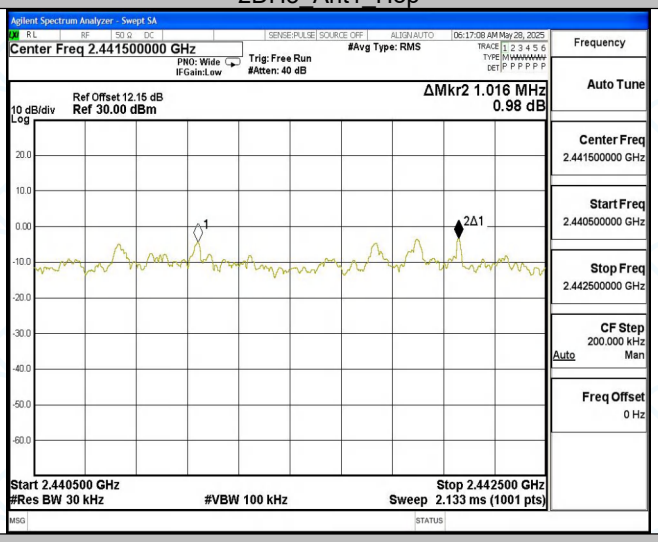
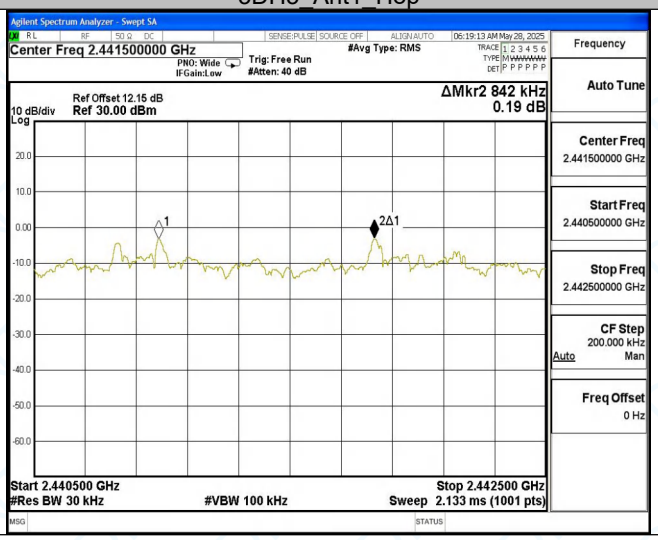
TestMode	Antenna	Freq(MHz)	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop	0.994	≥0.706	PASS
2DH5	Ant1	Hop	1.016	≥0.916	PASS
3DH5	Ant1	Hop	0.892	≥0.884	PASS

Test Graphs

DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop