

6.7. Band-edge Compliance Measurement

6.7.1. Test Limit

The maximum permissible emission level is 20dBc. Any emissions were lying outside of the emission bandwidth and in authorized band edges to a field strength limit specified in Section 15.209 of the Title 47 CFR.

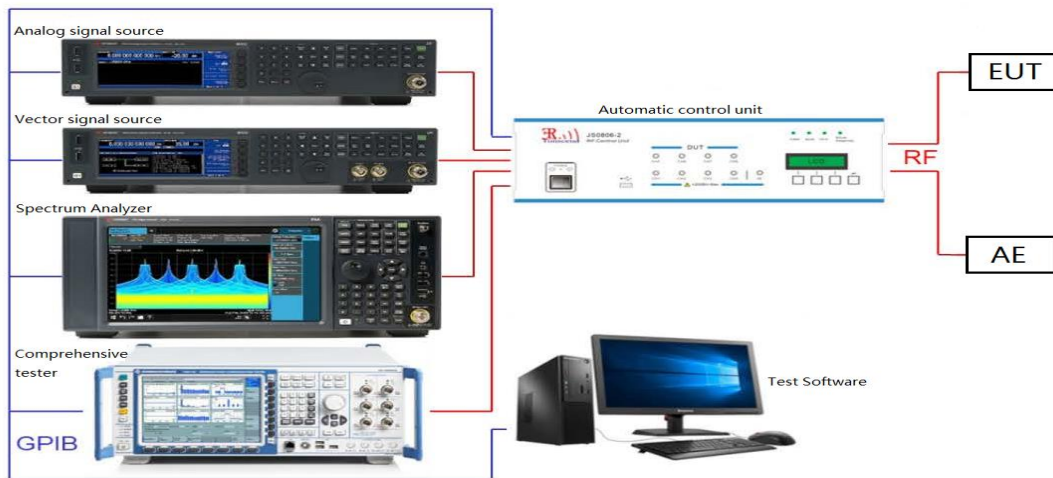
6.7.2. Test Procedure Used

ANSI C63.10-2013 - Section 6.10.4

6.7.3. Test Setting

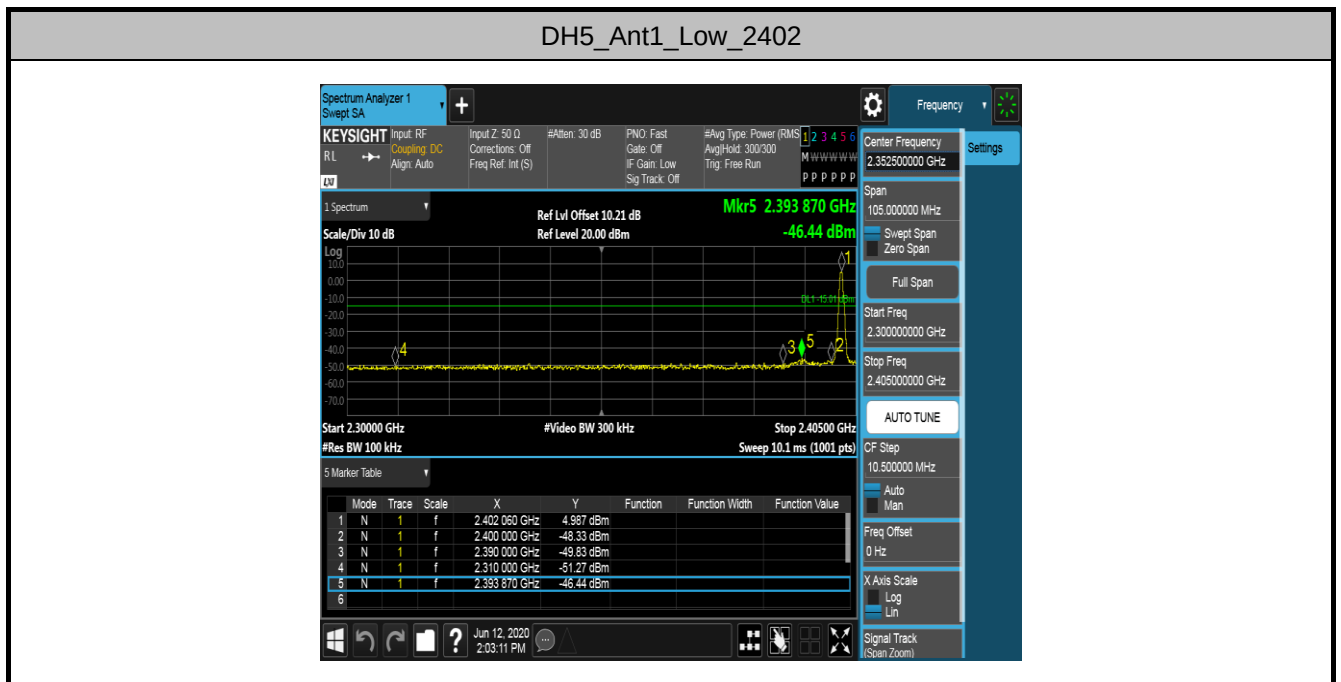
1. Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.

6.7.4. Test Setup

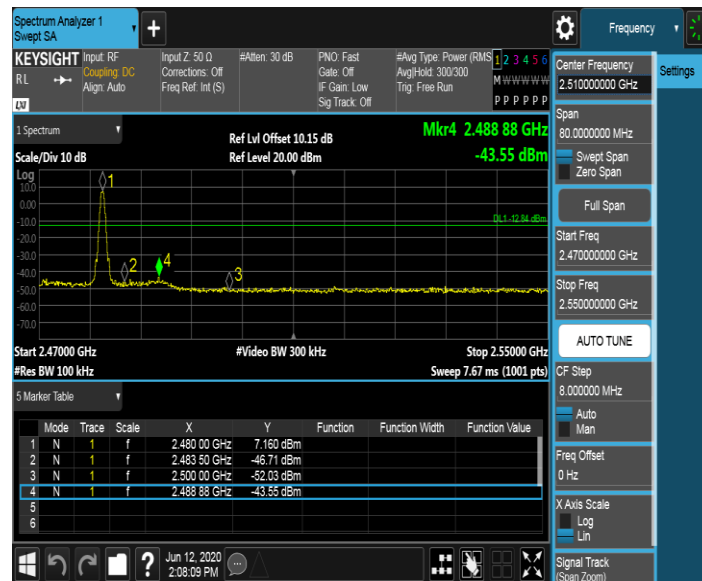


6.7.5.Test Result

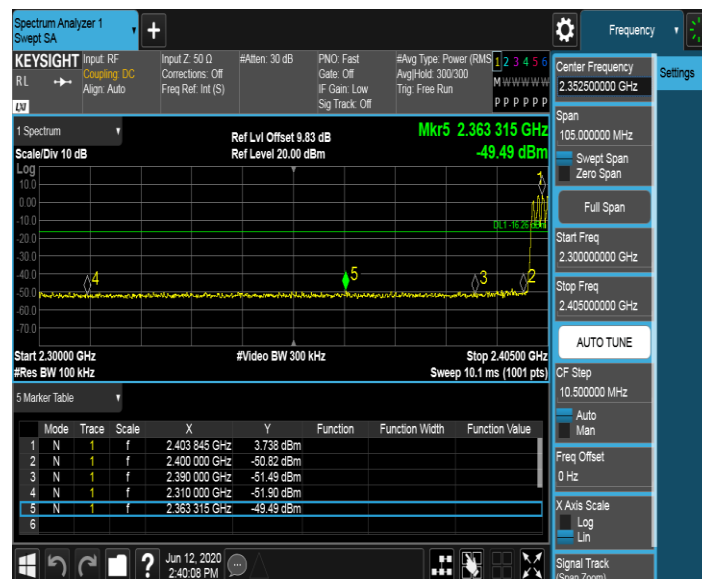
Test Mode	Antenna	Ch Name	Channel	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	4.99	-46.44	<=-15.01	PASS
		High	2480	7.16	-43.55	<=-12.84	PASS
		Low	Hop_2402	3.74	-49.49	-16.26	PASS
		High	Hop_2480	6.00	-47.96	-14	PASS
2DH5	Ant1	Low	2402	5.13	-45.88	<=-14.87	PASS
		High	2480	6.75	-45.27	<=-13.25	PASS
		Low	Hop_2402	2.91	-48.98	-17.09	PASS
		High	Hop_2480	3.94	-49.03	-16.06	PASS
3DH5	Ant1	Low	2402	4.65	-46.62	<=-15.35	PASS
		High	2480	6.35	-44.13	<=-13.65	PASS
		Low	Hop_2402	0.07	-49.48	-19.93	PASS
		High	Hop_2480	3.54	-48.44	-16.47	PASS



DH5_Ant1_High_2480



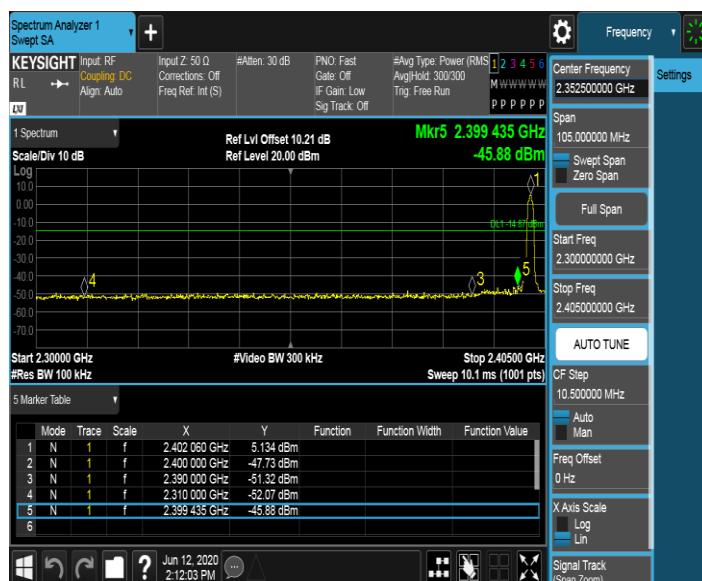
DH5_Ant1_Low_Hop_2402



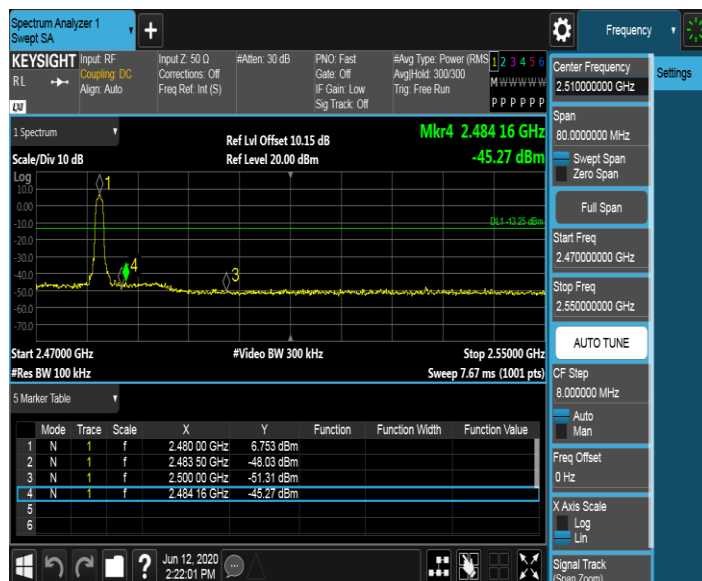
DH5_Ant1_High_Hop_2480



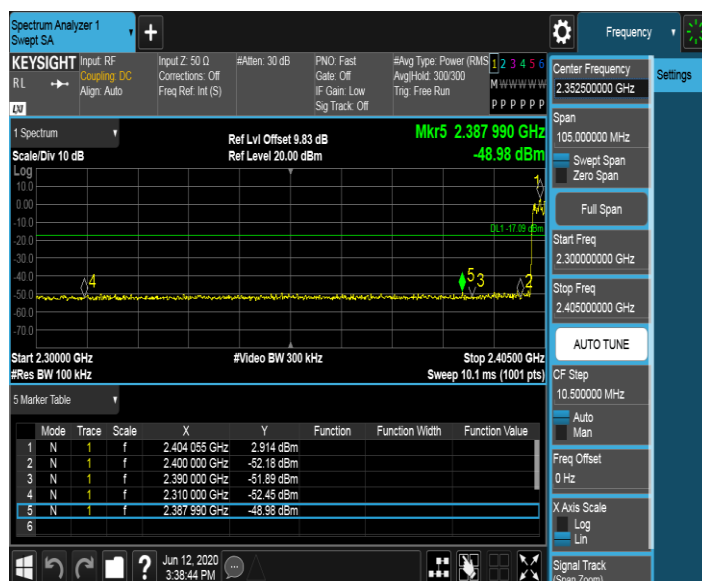
2DH5_Ant1_Low_2402



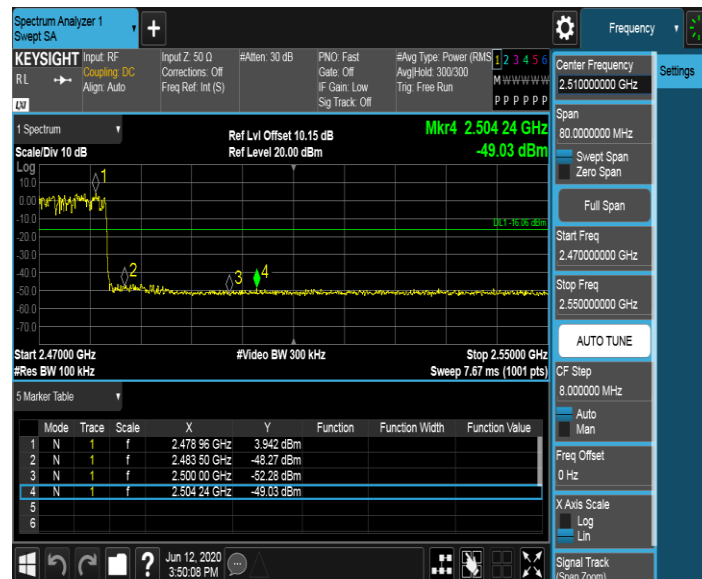
2DH5_Ant1_High_2480



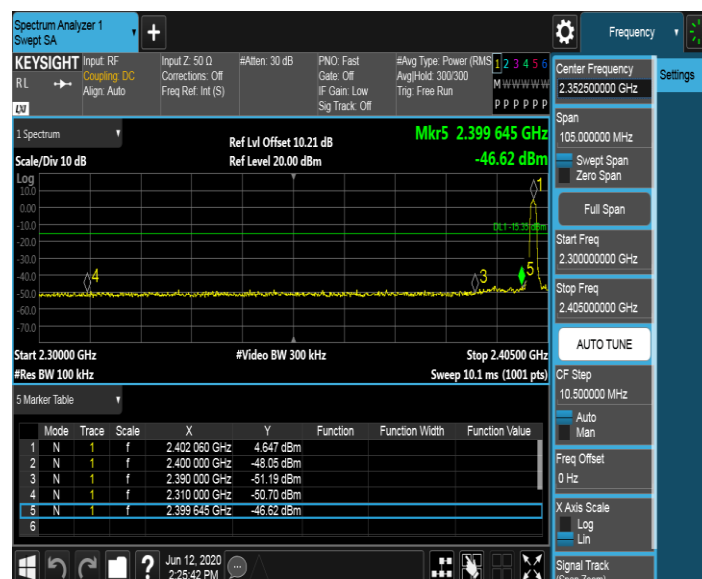
2DH5_Ant1_Low_Hop_2402



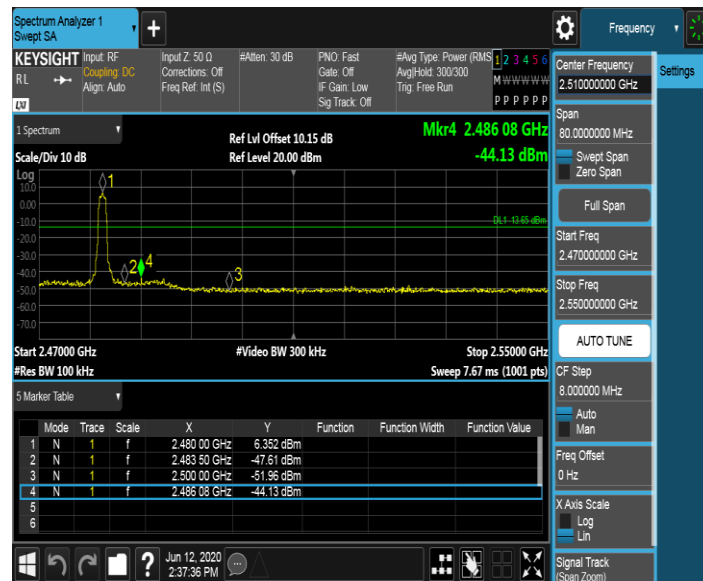
2DH5_Ant1_High_Hop_2480



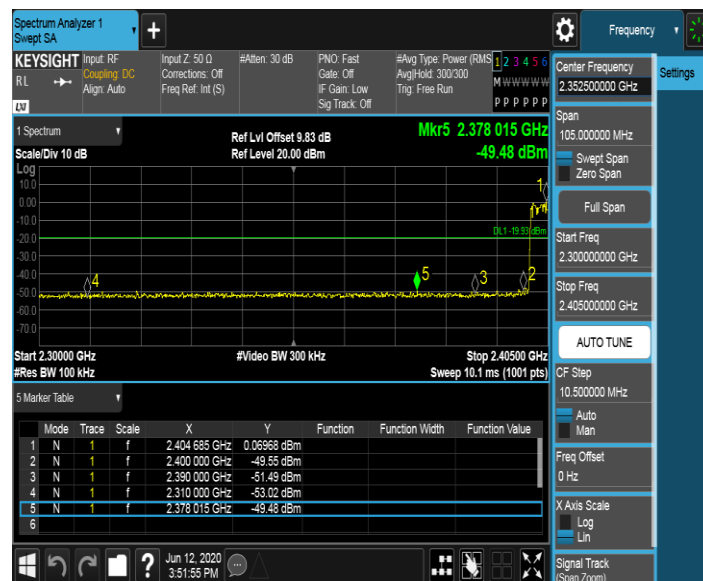
3DH5_Ant1_Low_2402



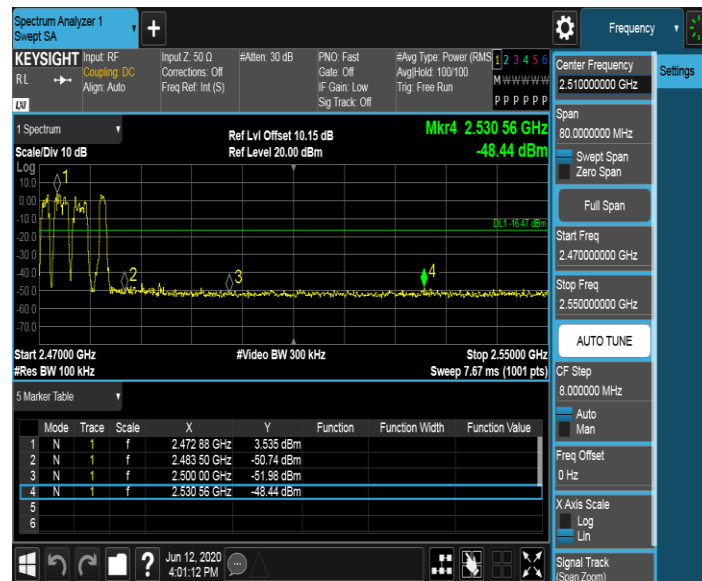
3DH5_Ant1_High_2480



3DH5_Ant1_Low_Hop_2402



3DH5_Ant1_High_Hop_2480



6.8. Conducted Spurious Emissions Measurement

6.8.1. Test Limit

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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

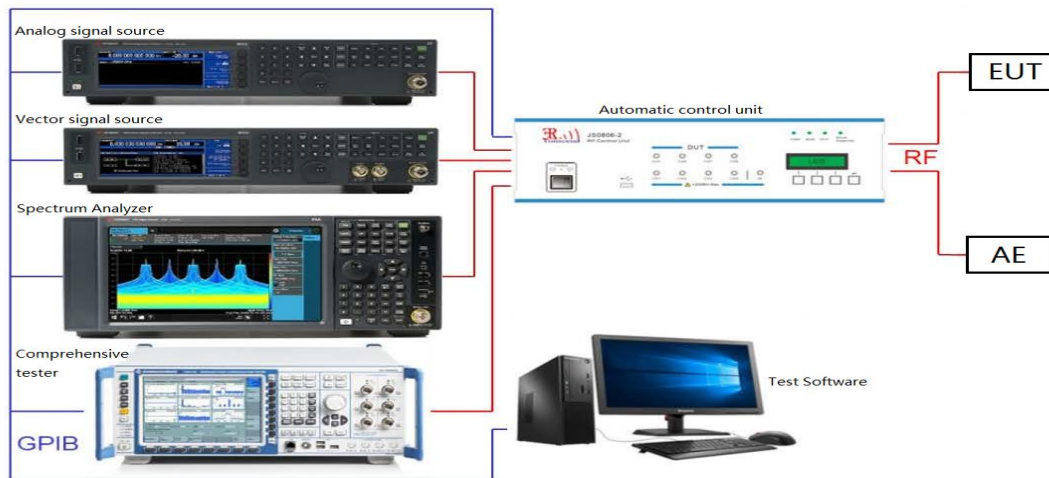
6.8.2. Test Procedure Used

ANSI C63.10-2013 - Section 7.8.8

6.8.3. Test Setting

1. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
2. RBW = 100 KHz
3. VBW $\geq$ RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

6.8.4. Test Setup



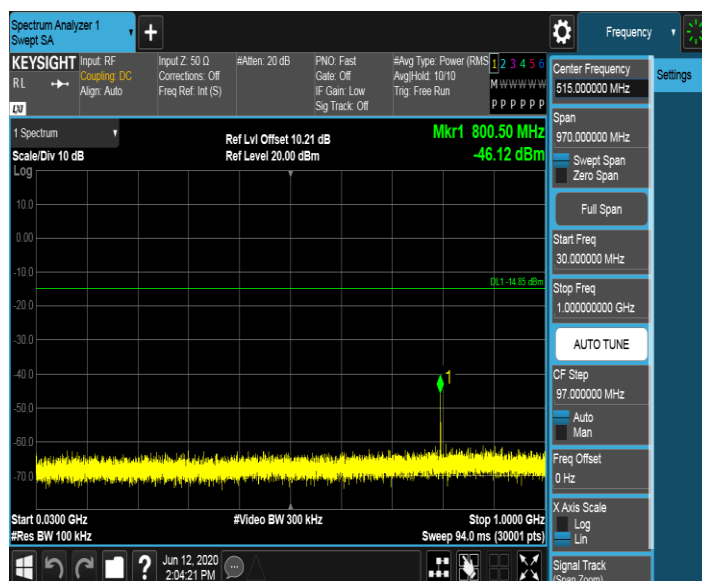
6.8.5.Test Result

Test Mode	Antenna	Channel	Freq Range [MHz]	Ref Level [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	Reference	5.15	5.15	---	PASS
			30~1000	30~1000	-46.125	<=-14.848	PASS
			1000~26500	1000~26500	-40.06	<=-14.848	PASS
		2441	Reference	5.18	5.18	---	PASS
			30~1000	30~1000	-46.19	<=-14.824	PASS
			1000~26500	1000~26500	-40.971	<=-14.824	PASS
		2480	Reference	6.54	6.54	---	PASS
			30~1000	30~1000	-45.574	<=-13.465	PASS
			1000~26500	1000~26500	-43.685	<=-13.465	PASS
2DH5	Ant1	2402	Reference	4.97	4.97	---	PASS
			30~1000	30~1000	-47.29	<=-15.029	PASS
			1000~26500	1000~26500	-39.741	<=-15.029	PASS
		2441	Reference	5.48	5.48	---	PASS
			30~1000	30~1000	-49.545	<=-14.516	PASS
			1000~26500	1000~26500	-40.999	<=-14.516	PASS
		2480	Reference	7.19	7.19	---	PASS
			30~1000	30~1000	-47.461	<=-12.813	PASS
			1000~26500	1000~26500	-43.94	<=-12.813	PASS
3DH5	Ant1	2402	Reference	4.28	4.28	---	PASS
			30~1000	30~1000	-51.124	<=-15.719	PASS
			1000~26500	1000~26500	-40.213	<=-15.719	PASS
		2441	Reference	5.49	5.49	---	PASS
			30~1000	30~1000	-47.828	<=-14.508	PASS
			1000~26500	1000~26500	-41.076	<=-14.508	PASS
		2480	Reference	5.99	5.99	---	PASS
			30~1000	30~1000	-47.923	<=-14.007	PASS
			1000~26500	1000~26500	-43.907	<=-14.007	PASS

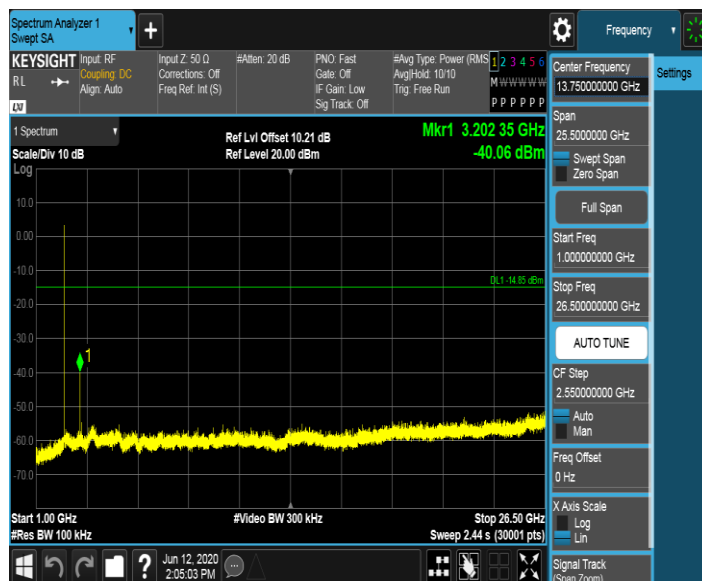
DH5_Ant1_2402_0~Reference



DH5_Ant1_2402_30~1000



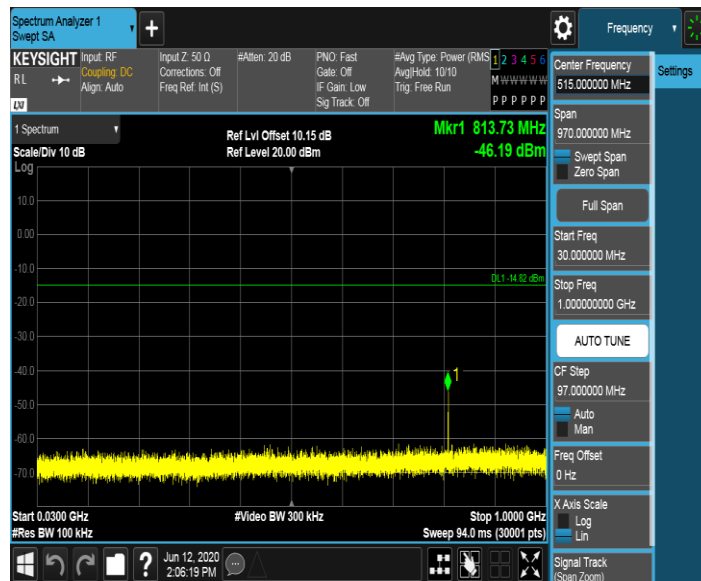
DH5_Ant1_2402_1000~26500



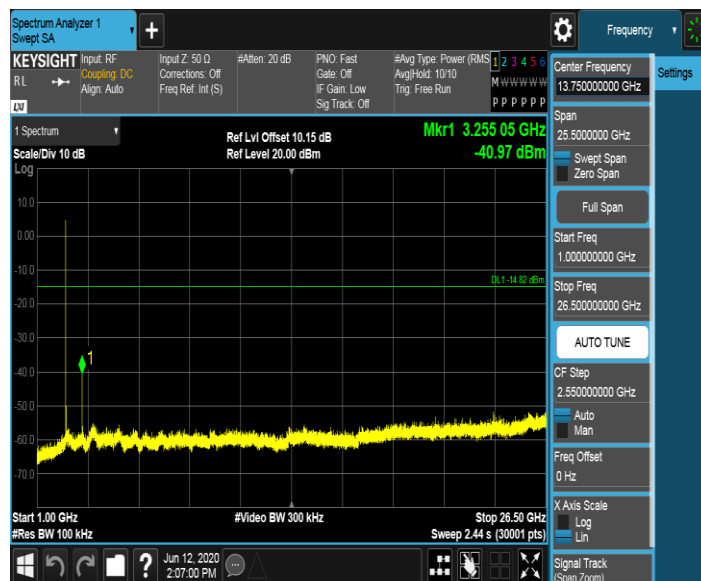
DH5_Ant1_2441_0~Reference



DH5_Ant1_2441_30~1000



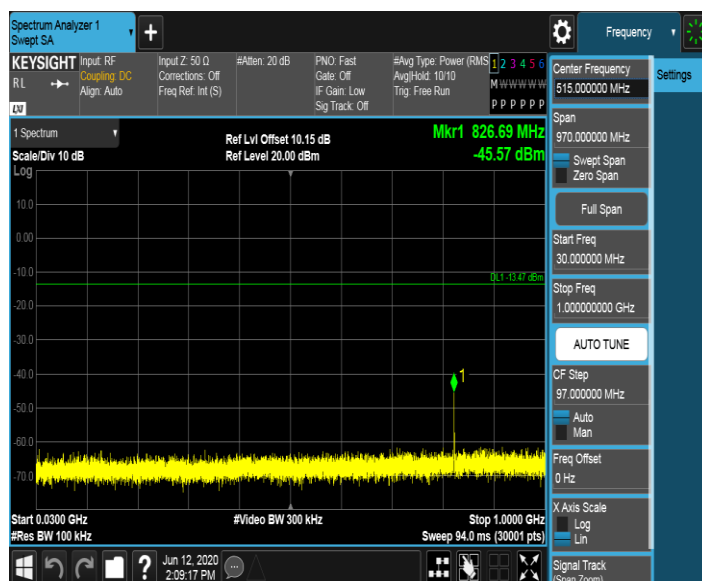
DH5_Ant1_2441_1000~26500



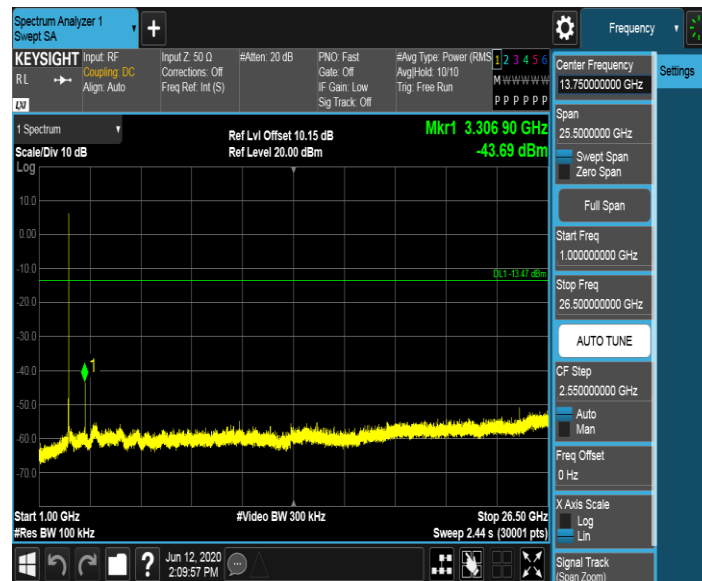
DH5_Ant1_2480_0~Reference



DH5_Ant1_2480_30~1000



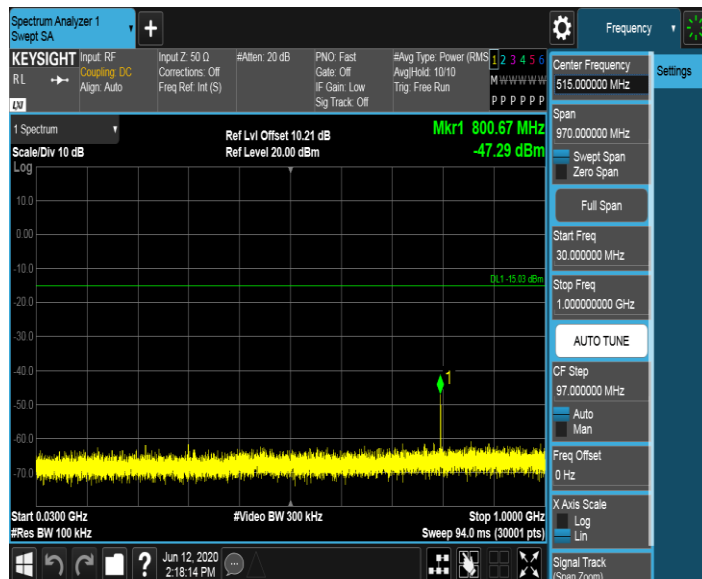
DH5_Ant1_2480_1000~26500



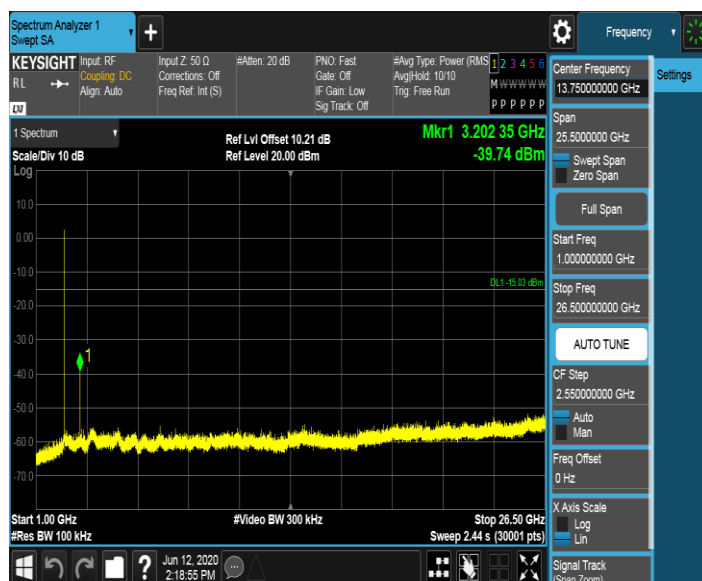
2DH5_Ant1_2402_0~Reference



2DH5_Ant1_2402_30~1000



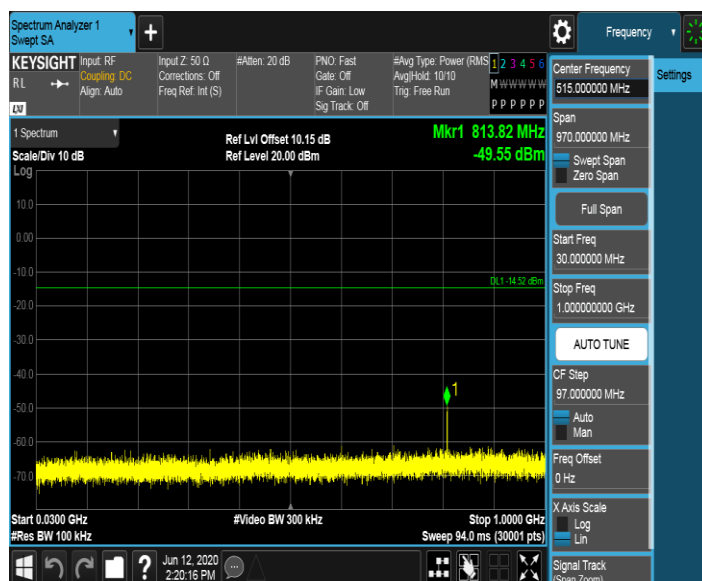
2DH5_Ant1_2402_1000~26500



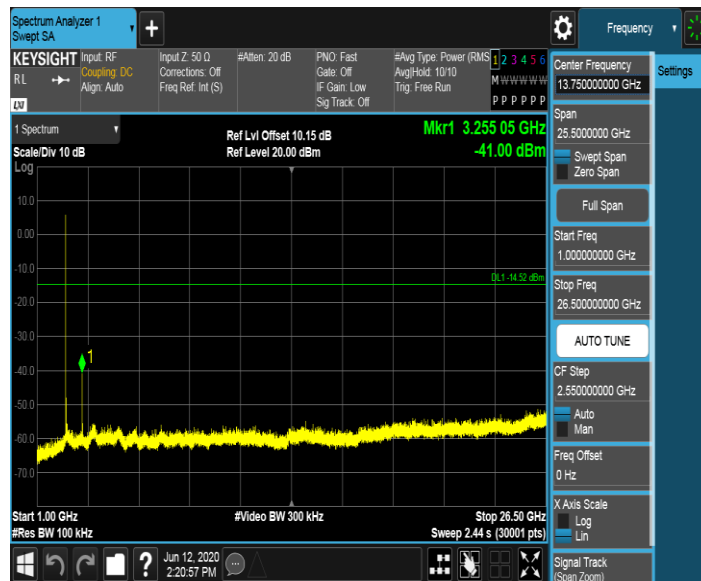
2DH5_Ant1_2441_0~Reference



2DH5_Ant1_2441_30~1000



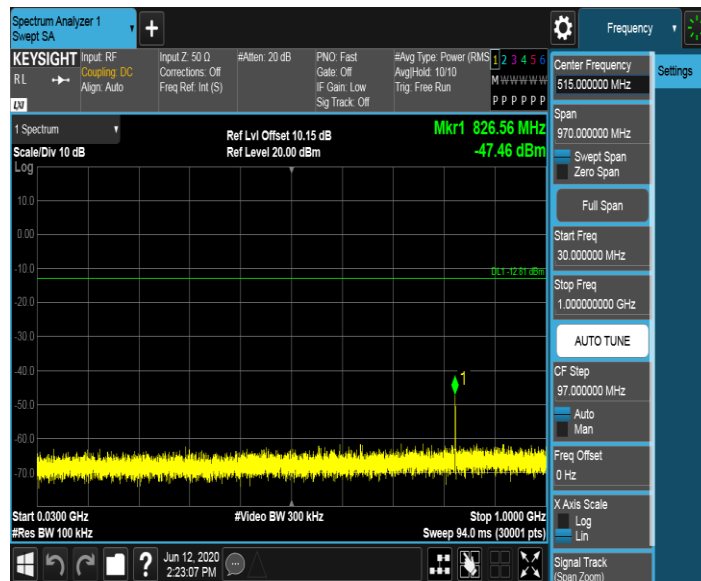
2DH5_Ant1_2441_1000~26500



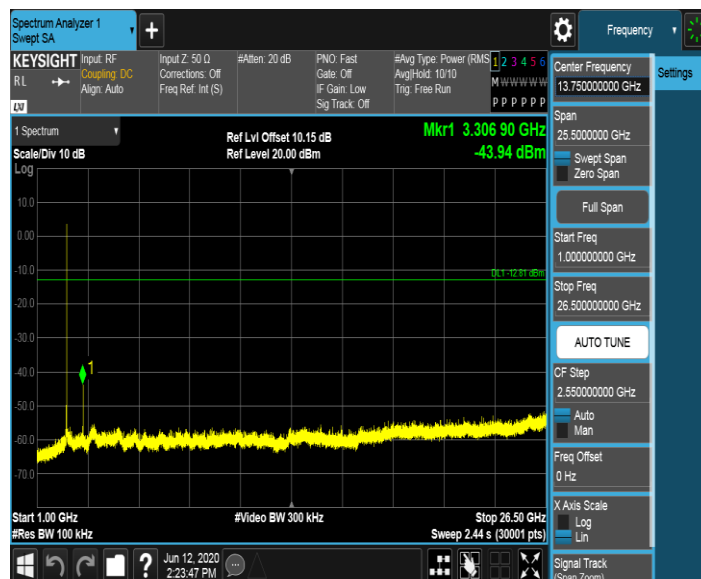
2DH5_Ant1_2480_0~Reference



2DH5_Ant1_2480_30~1000



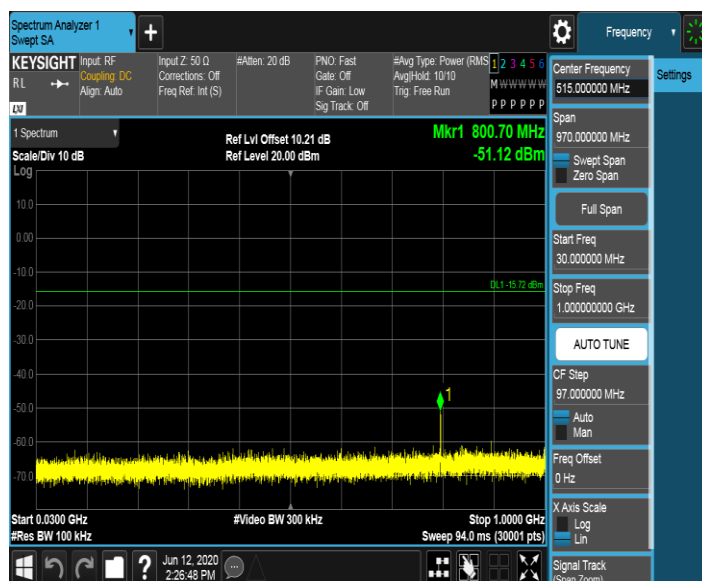
2DH5_Ant1_2480_1000~26500



3DH5_Ant1_2402_0~Reference



3DH5_Ant1_2402_30~1000



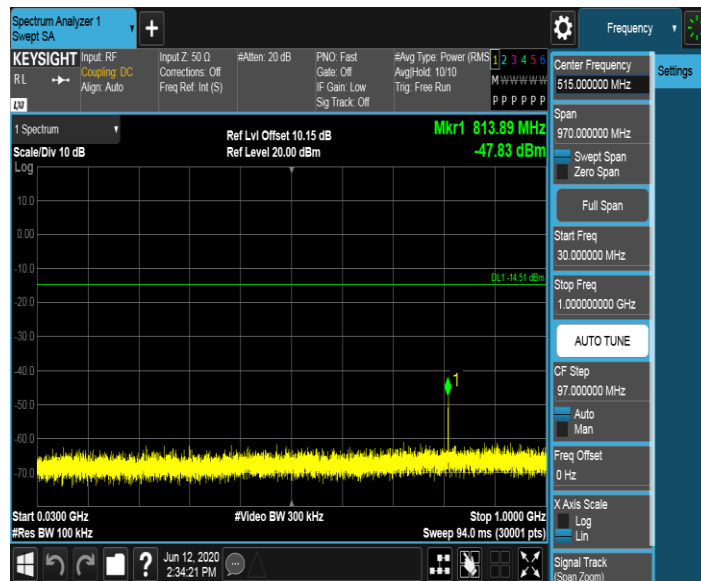
3DH5 Ant1 2402 1000~26500



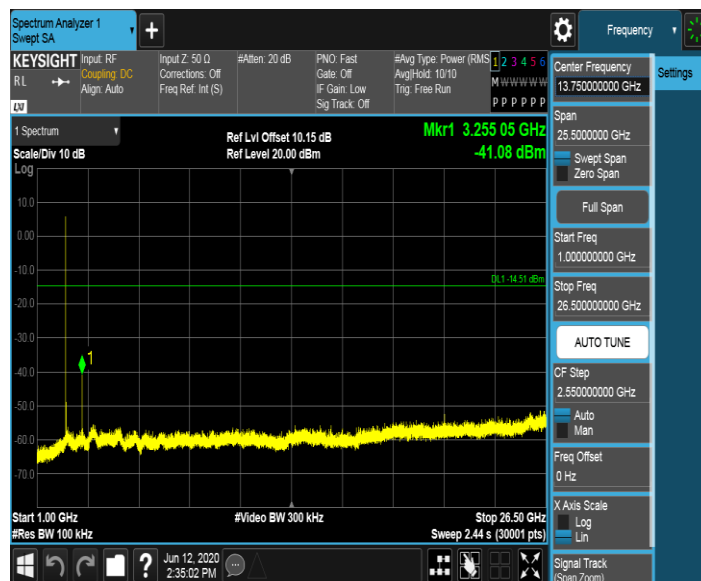
3DH5 Ant1 2441 0~Reference



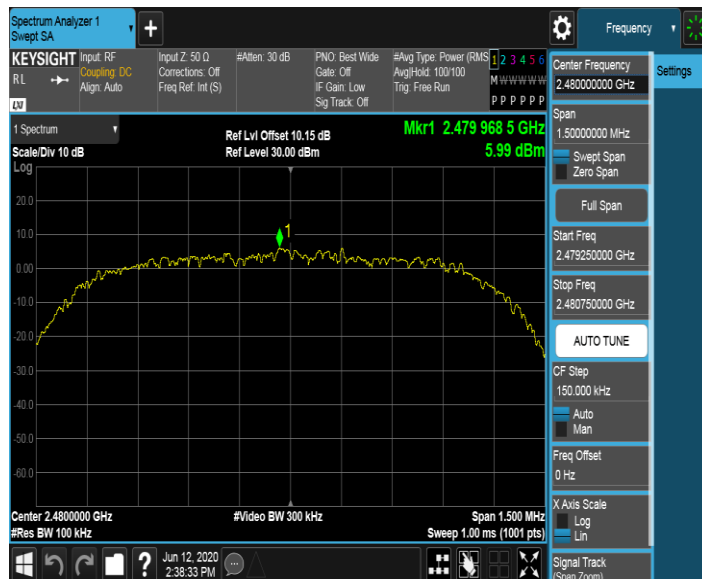
3DH5_Ant1_2441_30~1000



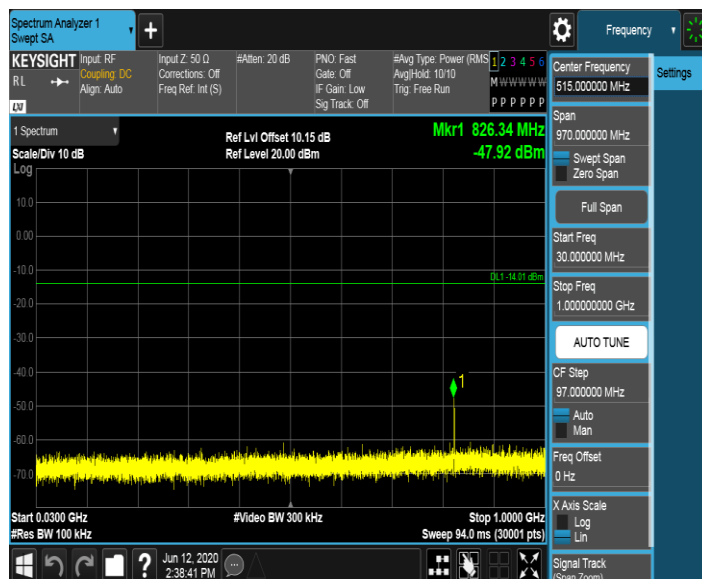
3DH5_Ant1_2441_1000~26500



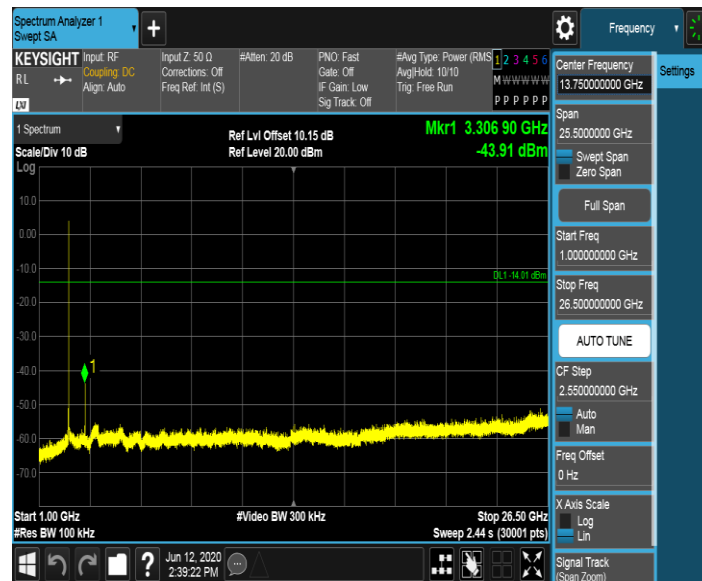
3DH5_Ant1_2480_0~Reference



3DH5_Ant1_2480_30~1000



3DH5_Ant1_2480_1000~26500



6.9. Radiated Spurious Emission Measurement

6.9.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.9.2. Test Procedure Used

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.4 (Standard test method below 30MHz)

ANSI C63.10 Section 6.5 (Standard test method above 30MHz to 1GHz)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

6.9.3. Test Setting

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as specified in Table 1
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Table 1 - RBW as a function of frequency

Frequency	RBW
9 ~ 150 kHz	200 ~ 300 Hz
0.15 ~ 30 MHz	9 ~ 10 kHz
30 ~ 1000 MHz	100 ~ 120 kHz
> 1000 MHz	1 MHz

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

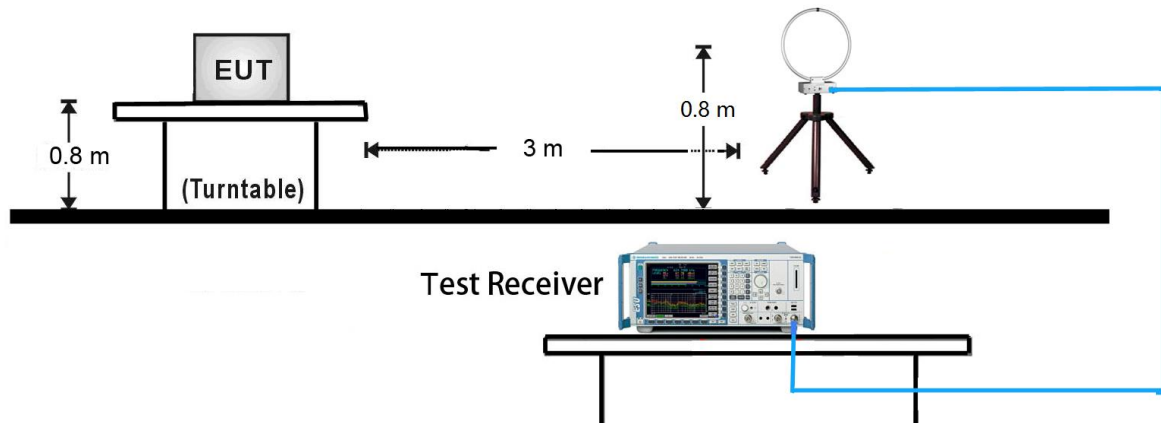
Average Measurements above 1GHz (Method VB)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
4. Detector = Peak
5. Sweep time = auto

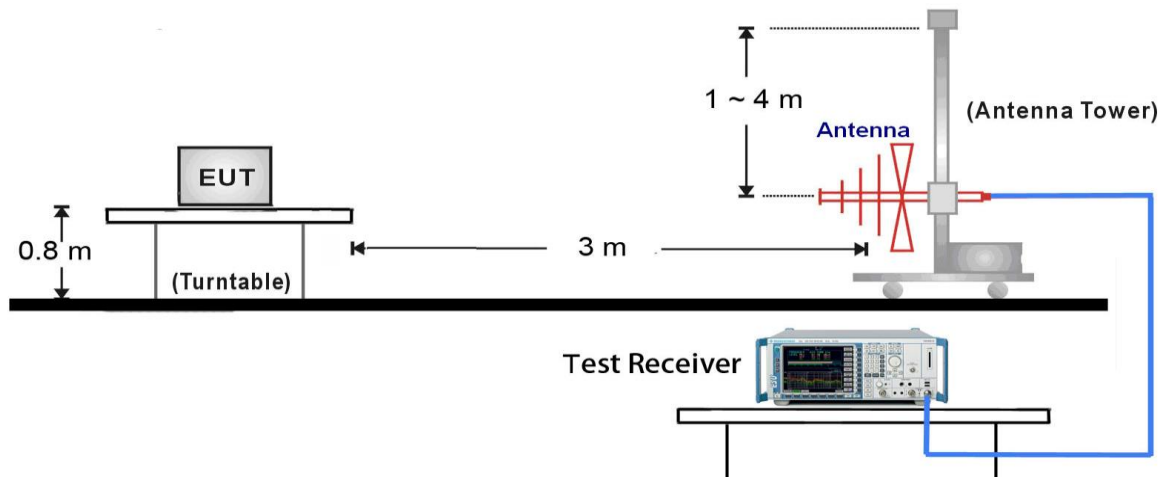
6. Trace mode = max hold
7. Trace was allowed to stabilize

6.9.4. Test Setup

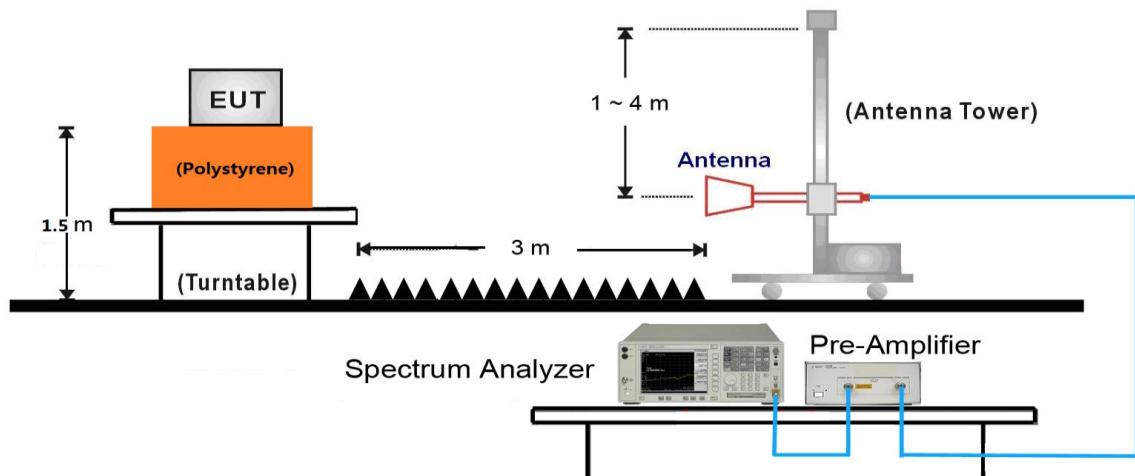
9kHz ~ 30MHz Test Setup:



30MHz ~ 1GHz Test Setup:



1GHz ~ 25GHz Test Setup:



6.9.5. Test Result

Test Mode:	DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	00	Test Engineer:	Line Chen
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4650.0000	43.25	7.15	74.00	30.75	Peak	Horizontal
	4875.0000	43.76	7.82	74.00	30.24	Peak	Horizontal
*	6360.0000	48.11	12.75	77.42	29.31	Peak	Horizontal
*	6615.0000	47.13	13.03	77.42	30.29	Peak	Horizontal
	4575.0000	42.72	7.15	74.00	31.28	Peak	Vertical
	4830.0000	43.70	7.64	74.00	30.30	Peak	Vertical
*	6300.0000	46.85	12.53	77.42	30.57	Peak	Vertical
*	6787.5000	46.67	13.03	77.42	30.75	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (97.42dBμV/m) or 15.209 which is higher.

Test Mode:	DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	39	Test Engineer:	Line Chen
Remark:	3. Average measurement was not performed if peak level lower than average limit. 4. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4567.5000	42.93	7.17	74.00	31.07	Peak	Horizontal
	4837.5000	43.61	7.65	74.00	30.39	Peak	Horizontal
*	6292.5000	47.72	12.49	80.41	32.69	Peak	Horizontal
*	6457.5000	46.85	12.62	80.41	33.56	Peak	Horizontal
	4695.0000	43.44	7.30	74.00	30.56	Peak	Vertical
	4897.5000	45.10	7.95	74.00	28.90	Peak	Vertical
*	6150.0000	47.45	12.24	80.41	32.96	Peak	Vertical
*	6847.5000	47.62	13.44	80.41	32.79	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (100.41dBμV/m) or 15.209 which is higher.

Test Mode:	DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	78	Test Engineer:	Line Chen
Remark:	5. Average measurement was not performed if peak level lower than average limit. 6. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4620.0000	42.97	7.10	74.00	31.03	Peak	Horizontal
	4807.5000	43.23	7.62	74.00	30.77	Peak	Horizontal
*	6315.0000	47.23	12.59	82.60	35.37	Peak	Horizontal
*	6855.0000	47.43	13.47	82.60	35.17	Peak	Horizontal
	4597.5000	43.49	7.08	74.00	30.51	Peak	Vertical
	4942.5000	44.52	8.01	74.00	29.48	Peak	Vertical
*	6307.5000	47.03	12.56	82.60	35.57	Peak	Vertical
*	6630.0000	47.57	13.06	82.60	35.03	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (102.60dBμV/m) or 15.209 which is higher.

Test Mode:	2DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	00	Test Engineer:	Line Chen
Remark:	7. Average measurement was not performed if peak level lower than average limit. 8. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4650.0000	43.25	7.15	74.00	30.75	Peak	Horizontal
	4875.0000	43.76	7.82	74.00	30.24	Peak	Horizontal
*	6045.0000	46.68	11.88	78.69	32.01	Peak	Horizontal
*	6360.0000	48.11	12.75	78.69	30.58	Peak	Horizontal
	4575.0000	42.72	7.15	74.00	31.28	Peak	Vertical
	4792.5000	43.08	7.58	74.00	30.92	Peak	Vertical
*	6015.0000	47.09	11.78	78.69	31.60	Peak	Vertical
*	6480.0000	47.83	12.66	78.69	30.86	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (98.69dBμV/m) or 15.209 which is higher.

Test Mode:	2DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	39	Test Engineer:	Line Chen
Remark:	9. Average measurement was not performed if peak level lower than average limit. 10. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4537.5000	43.54	7.17	74.00	30.46	Peak	Horizontal
	4837.5000	43.61	7.65	74.00	30.39	Peak	Horizontal
*	6292.5000	47.72	12.49	81.36	33.64	Peak	Horizontal
*	6457.5000	46.85	12.62	81.36	34.51	Peak	Horizontal
	4560.0000	42.67	7.19	74.00	31.33	Peak	Vertical
	4897.5000	45.10	7.95	74.00	28.90	Peak	Vertical
*	6150.0000	47.45	12.24	81.36	33.91	Peak	Vertical
*	6420.0000	46.81	12.76	81.36	34.55	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (101.36dBμV/m) or 15.209 which is higher.

Test Mode:	2DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	78	Test Engineer:	Line Chen
Remark:	11. Average measurement was not performed if peak level lower than average limit. 12. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4620.0000	42.97	7.10	74.00	31.03	Peak	Horizontal
	4807.5000	43.23	7.62	74.00	30.77	Peak	Horizontal
*	6000.0000	47.40	11.73	83.69	36.29	Peak	Horizontal
*	6315.0000	47.23	12.59	83.69	36.46	Peak	Horizontal
	4507.5000	42.97	7.06	74.00	31.03	Peak	Vertical
	4942.5000	44.52	8.01	74.00	29.48	Peak	Vertical
*	6307.5000	47.03	12.56	83.69	36.66	Peak	Vertical
*	6630.0000	47.57	13.06	83.69	36.12	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (103.69dBμV/m) or 15.209 which is higher.

Test Mode:	3DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	00	Test Engineer:	Line Chen
Remark:	13. Average measurement was not performed if peak level lower than average limit. 14. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4650.0000	43.25	7.15	74.00	30.75	Peak	Horizontal
	4792.5000	43.68	7.58	74.00	30.32	Peak	Horizontal
*	6360.0000	48.11	12.75	78.78	30.67	Peak	Horizontal
*	6615.0000	47.13	13.03	78.78	31.65	Peak	Horizontal
	4650.0000	43.25	7.15	74.00	30.75	Peak	Vertical
	4792.5000	43.68	7.58	74.00	30.32	Peak	Vertical
*	6360.0000	48.11	12.75	78.78	30.67	Peak	Vertical
*	6615.0000	47.13	13.03	78.78	31.65	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (98.78dBμV/m) or 15.209 which is higher.

Test Mode:	3DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	39	Test Engineer:	Line Chen
Remark:	15. Average measurement was not performed if peak level lower than average limit. 16. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4567.5000	42.93	7.17	74.00	31.07	Peak	Horizontal
	4837.5000	43.61	7.65	74.00	30.39	Peak	Horizontal
*	6292.5000	47.72	12.49	82.38	34.66	Peak	Horizontal
*	6457.5000	46.85	12.62	82.38	35.53	Peak	Horizontal
	4560.0000	42.67	7.19	74.00	31.33	Peak	Vertical
	4897.5000	45.10	7.95	74.00	28.90	Peak	Vertical
*	6150.0000	47.45	12.24	82.38	34.93	Peak	Vertical
*	6637.5000	46.90	13.08	82.38	35.48	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (102.38dBμV/m) or 15.209 which is higher.

Test Mode:	3DH5 - Ant 1	Test Date:	2020-06-18
Test Channel:	78	Test Engineer:	Line Chen
Remark:	17. Average measurement was not performed if peak level lower than average limit. 18. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

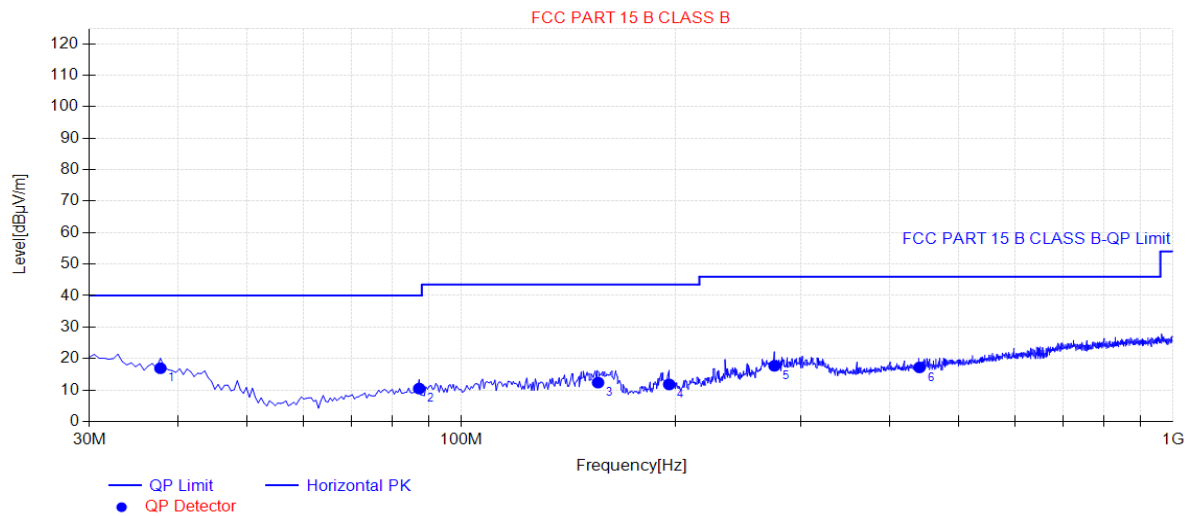
Mark	Frequency (MHz)	Level (dBμV)	Factor (dB)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
	4687.5000	42.99	7.28	74.00	31.01	Peak	Horizontal
	4912.5000	43.52	7.98	74.00	30.48	Peak	Horizontal
*	6315.0000	47.23	12.59	84.12	36.89	Peak	Horizontal
*	6465.0000	46.57	12.63	84.12	37.55	Peak	Horizontal
	4597.5000	43.49	7.08	74.00	30.51	Peak	Vertical
	4942.5000	44.52	8.01	74.00	29.48	Peak	Vertical
*	6097.5000	46.90	11.92	84.12	37.22	Peak	Vertical
*	6630.0000	47.57	13.06	84.12	36.55	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (104.12dBμV/m) or 15.209 which is higher.

The Worst Case of Radiated Emission below 1GHz:

EUT:	WYZE SPRINKLER CONTROLLER	Polarity:	Horizontal
Model:	WSPRK1	SN:	N/A
Mode:	Transmit by DH5 at Channel 2480MHz	Voltage:	120V/60Hz
Environment:	Temp: 25°C; Humi:60%	Engineer:	Line Chen

Test Graph



Final Data List

NO.	Freq. [MHz]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	37.7600	16.05	16.92	40.00	23.08	100	360	Horizontal
2	87.2300	10.48	10.46	40.00	29.54	200	328	Horizontal
3	155.615	10.22	12.36	43.50	31.14	100	237	Horizontal
4	195.870	9.09	11.77	43.50	31.73	200	0	Horizontal
5	275.410	12.41	17.68	46.00	28.32	100	258	Horizontal
6	440.310	17.34	17.18	46.00	28.82	100	37	Horizontal

Note 1: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.