

KiwiCo Inc.

TEST REPORT

SCOPE OF WORK:

47 CFR FCC Part 15.247 – Radio Spectrum report

Model:

F2095-ESPK

REPORT NUMBER

210600213THC-001

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Radio Spectrum TEST REPORT

Applicant:	KiwiCo Inc. 140 E Dana St., Mountain View, CA, USA 94043
Product:	Eureka Laser Speaker
Model No.:	F2095-ESPK
Brand Name	KiwiCo Inc.
FCC ID:	2A2FL-ESPK
Test Method/ Standard:	47 CFR FCC Part 15.247 & ANSI C63.10 2013 KDB 558074 D01 v05r02
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan



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TEST REPORT**Revision History**

Report No.	Issue Date	Revision Summary
210600213THC-001	Jan. 11, 2022	Original report

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Summary of Test Data

Test Requirement	Applicable Rule (Section 15.247)	Result
20dB Bandwidth Test	15.247(a)(1)	Pass
Carrier Frequency Separation Test	15.247(a)(1)	Pass
Number of Hopping Frequencies Test	15.247(a)(1)	Pass
Time of Occupancy (Dwell Time) Test	15.247(a)(1)(iii)	Pass
Maximum Output Power Test	15.247(b)	Pass
RF Antenna Conducted Spurious Test	15.247(d)	Pass
Radiated Spurious Emission Test	15.205, 15.209	Pass
Emission on the Band Edge Test	15.247(d)	Pass
AC Power Line Conducted Emission Test	15.207	N/A
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Eureka Laser Speaker
Model No.:	F2095-ESPK
Operating Frequency:	2402 MHz ~ 2480 MHz
Channel Number:	79 channels
Frequency of Each Channel:	2402+1 k, k= 0 ~ 78
Rated Power:	DC 5V
Power Cord:	N/A
Sample receiving date:	2021/06/17
Sample condition:	Workable
Test Date(s):	2021/12/24 ~ 2021/12/27

1.2 Antenna description

Antenna Gain : -0.58 dBi
 Antenna Type : Printed Antenna
 Connector Type : Fixed

1.3 Operation mode

Connected to Notebook PC via USB Cable, executing “FCC assist V1.0.2.2” and select different frequency and modulation.

The signal is maximized through rotation and placement in the three orthogonal axes.



X axis



Y axis



Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at X axis. The final test data was executed under this configuration.

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Mode	Channel	Frequency (MHz)	Signal on time (ms)	Signal on & off time (ms)	Duty cycle	Duty Cycle factor (dB)
DH5	39	2441	2.88	3.75	0.768	1.146
2DH5	39	2441	2.89	3.75	0.771	1.131
3DH5	39	2441	2.89	3.75	0.771	1.131

1.4 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.	Data cable
Notebook PC	HP	HP ProBook 440 G3	5CD8021S9H	Mini USB cable 0.5m

2. 20dB Bandwidth Test

2.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The 20dB bandwidth per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set $\geq 1\%$ of 20dB Bandwidth, the video bandwidth $\geq$ RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

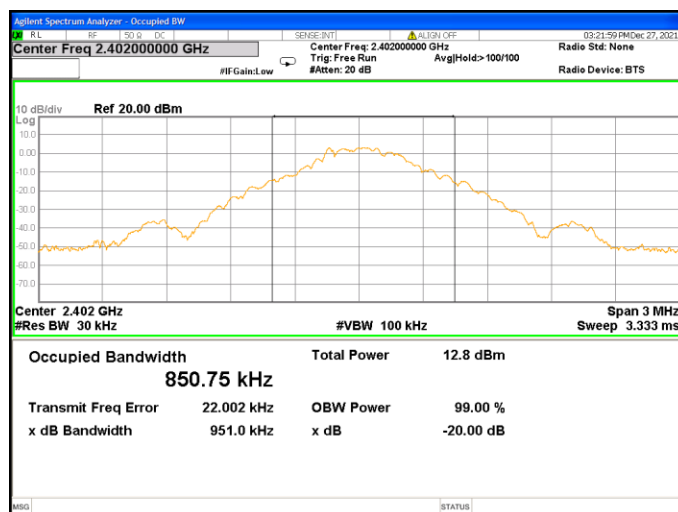
2.2 Operating Environment Condition

Temperature (°C):	20
Relative Humidity (%):	63
Test date:	2021/12/27

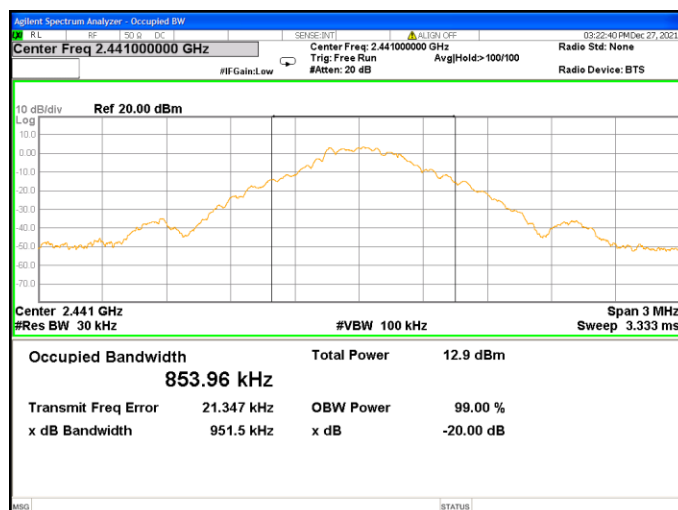
2.3 Test Results

Mode	Channel	Frequency (MHz)	20dB Bandwidth (MHz)
DH5	0	2402	0.951
	39	2441	0.952
	78	2480	0.955
2DH5	0	2402	1.324
	39	2441	1.319
	78	2480	1.324
3DH5	0	2402	1.310
	39	2441	1.306
	78	2480	1.307

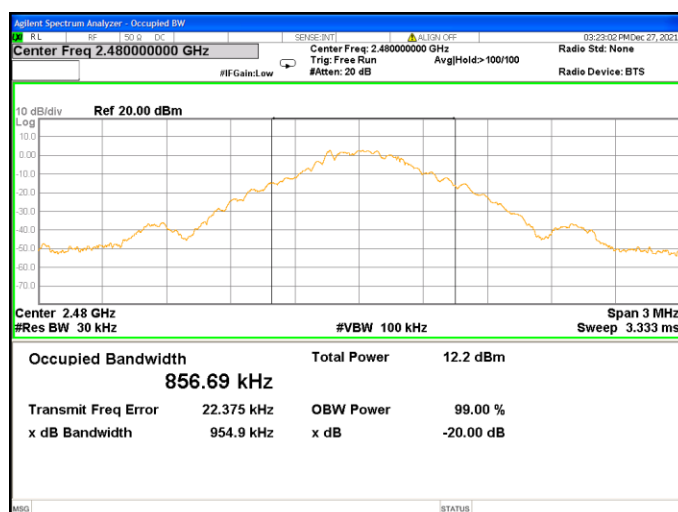
Chain 0: 20dB Occupied Bandwidth @ 1DH5 Mode CH0



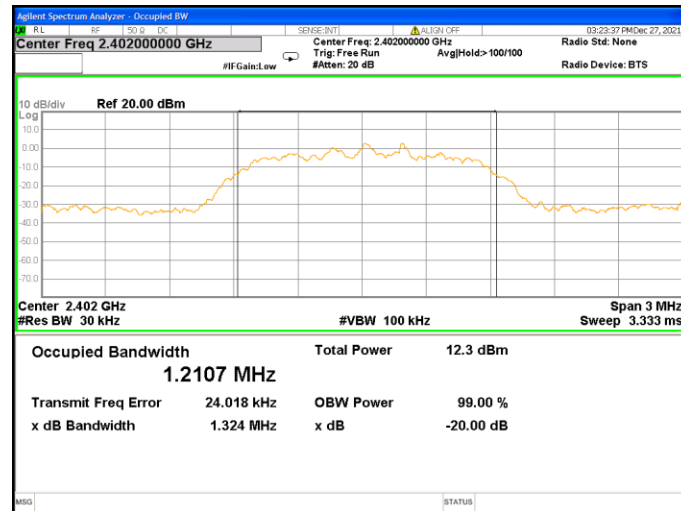
Chain 0: 20dB Occupied Bandwidth @ 1DH5 Mode CH39



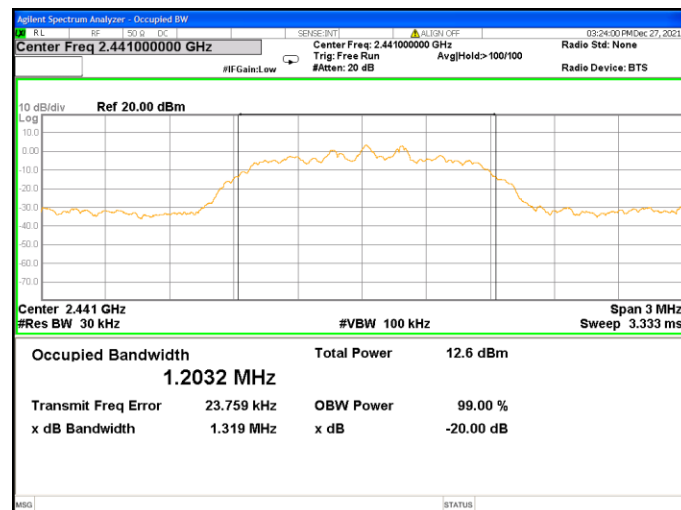
Chain 0: 20dB Occupied Bandwidth @ 1DH5 Mode CH78



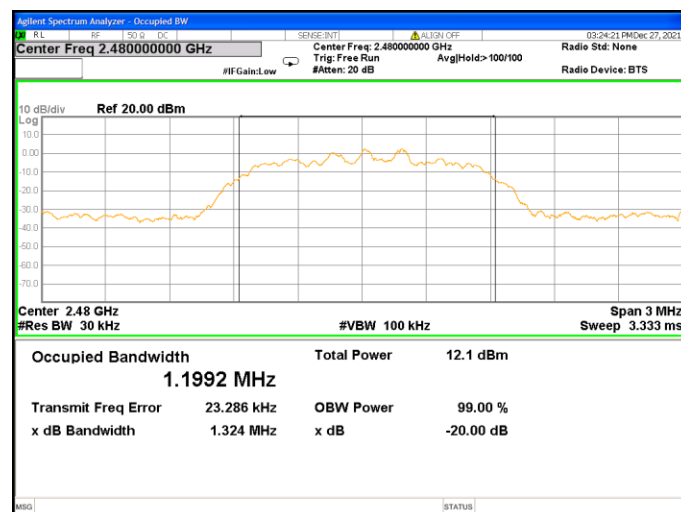
Chain 0: 20dB Occupied Bandwidth @ 2DH5 Mode CH0



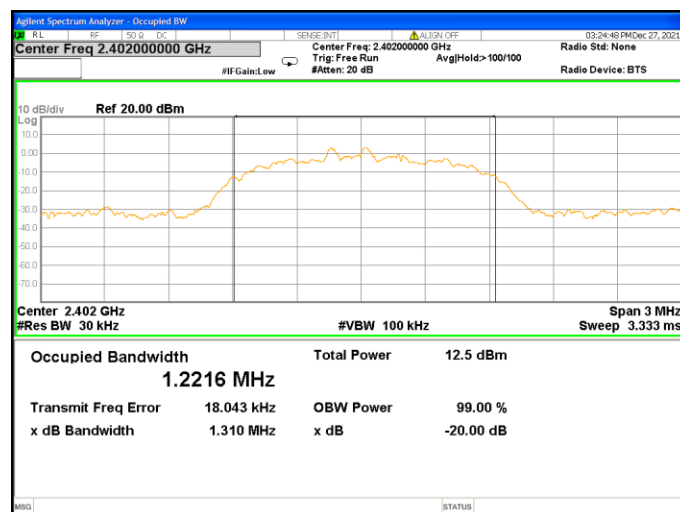
Chain 0: 20dB Occupied Bandwidth @ 2DH5 Mode CH39



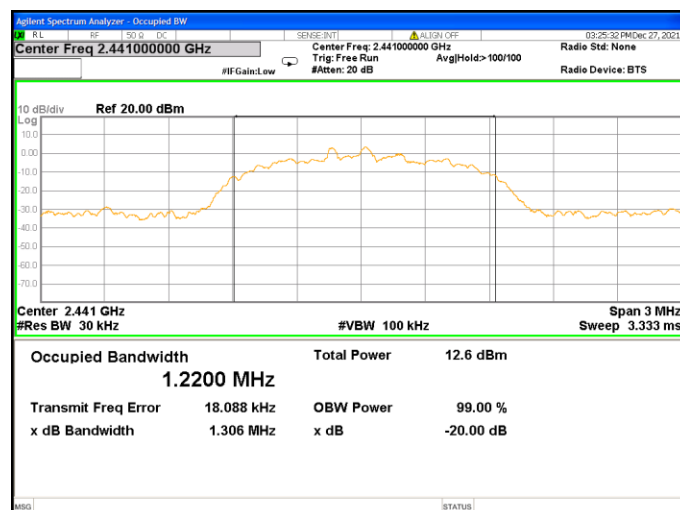
Chain 0: 20dB Occupied Bandwidth @ 2DH5 Mode CH78



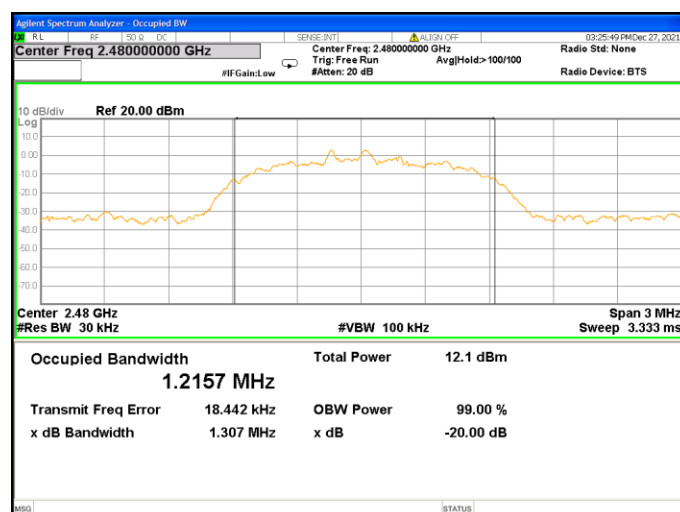
Chain 0: 20dB Occupied Bandwidth @ 3DH5 Mode CH0



Chain 0: 20dB Occupied Bandwidth @ 3DH5 Mode CH39



Chain 0: 20dB Occupied Bandwidth @ 3DH5 Mode CH78



3. Carrier Frequency Separation Test

3.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The carrier frequency separation per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at $\geq 1\%$ of the span, the video bandwidth $\geq$ RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels. The carrier frequency separation result is in the following Table.

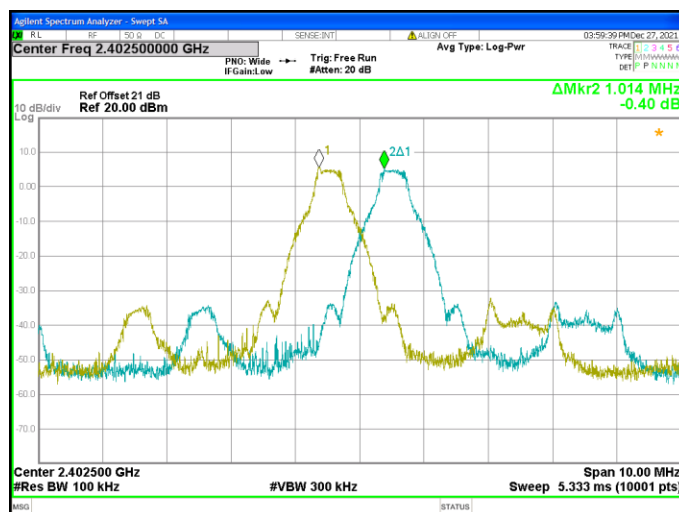
3.2 Operating Environment Condition

Temperature (°C):	20
Relative Humidity (%):	63
Test Date:	2021/12/27

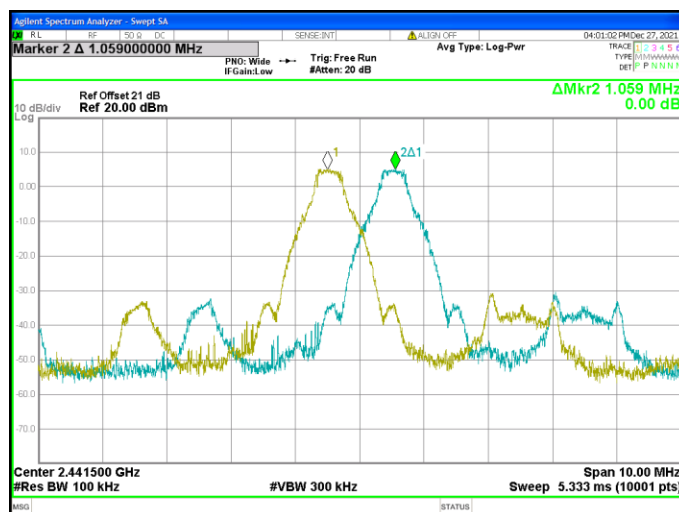
3.3 Test Results

Mode	Channel	Frequency (MHz)	Adjacent channel separation (MHz)	>Limit (MHz)	Results
DH5	0	2402	1.014	0.634	Pass
	39	2441	1.059	0.634	Pass
	78	2480	1.001	0.637	Pass
2DH5	0	2402	1.013	0.883	Pass
	39	2441	1.144	0.879	Pass
	78	2480	1.021	0.883	Pass
3DH5	0	2402	1.062	0.873	Pass
	39	2441	1.185	0.871	Pass
	78	2480	0.971	0.871	Pass

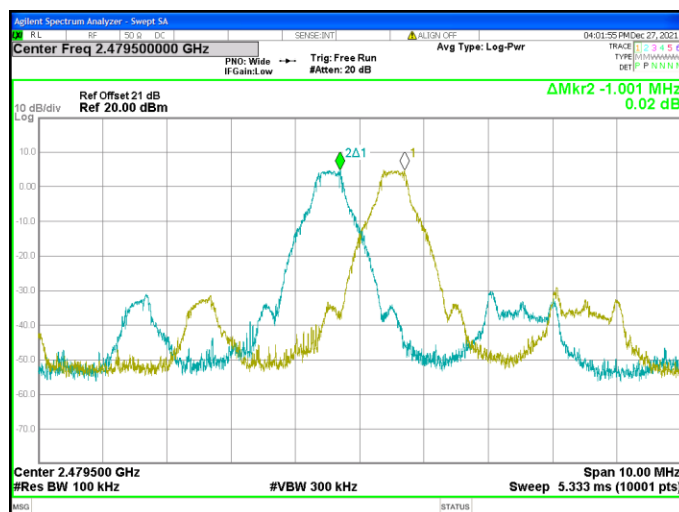
Chain 0: Frequency Separation @ 1DH5 Mode CH0



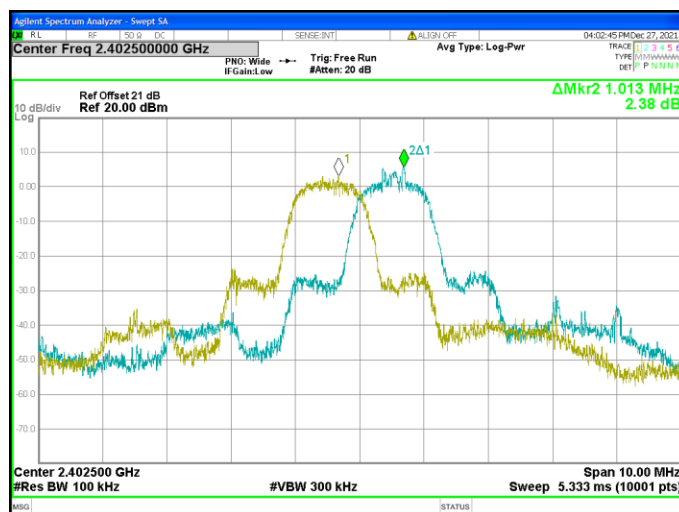
Chain 0: Frequency Separation @ 1DH5 Mode CH39



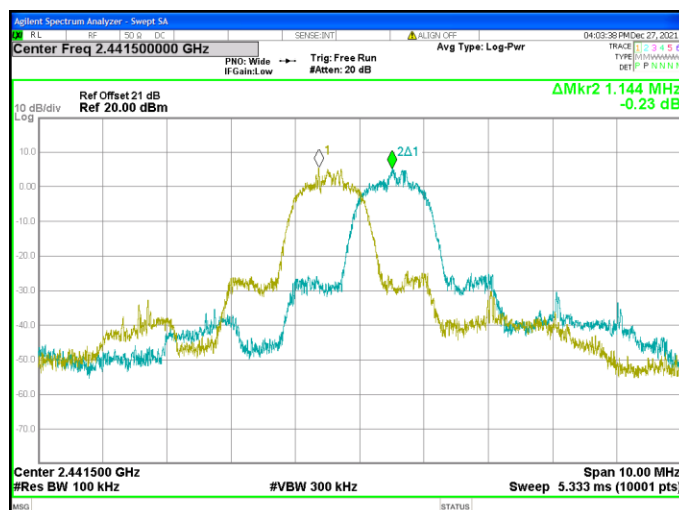
Chain 0: Frequency Separation @ 1DH5 Mode CH78



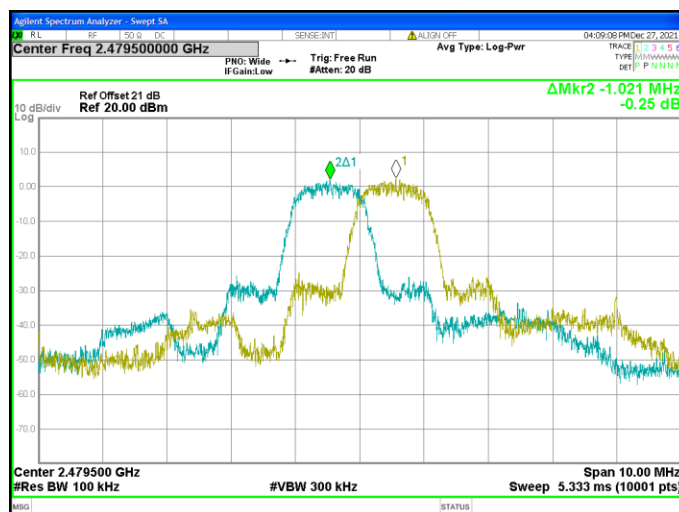
Chain 0: Frequency Separation @ 2DH5 Mode CH0



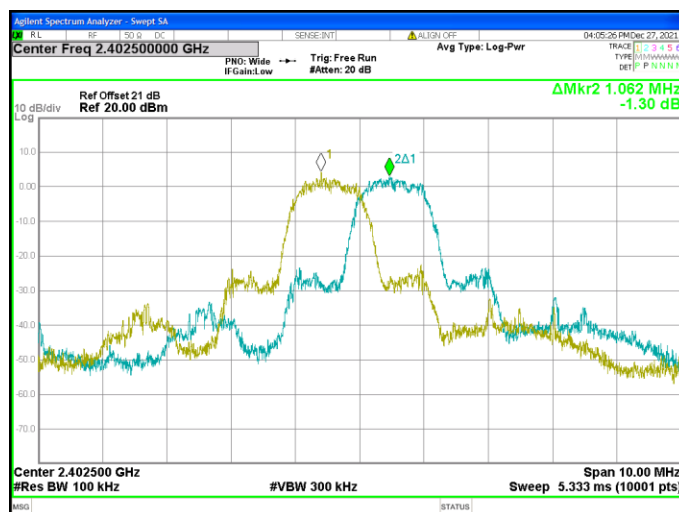
Chain 0: Frequency Separation @ 2DH5 Mode CH39



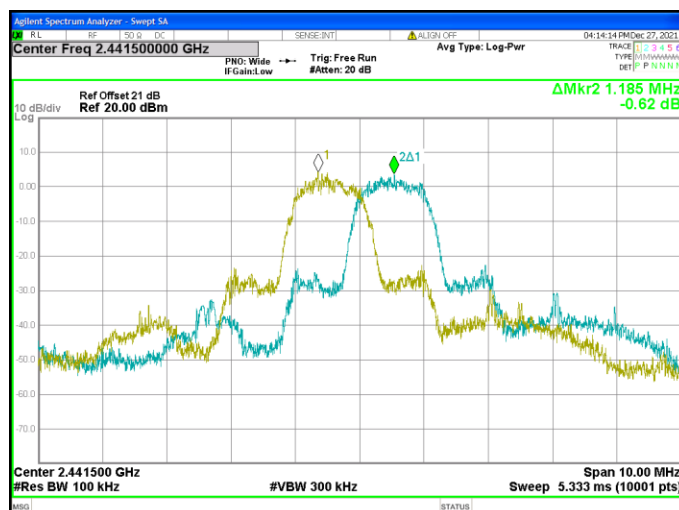
Chain 0: Frequency Separation @ 2DH5 Mode CH78



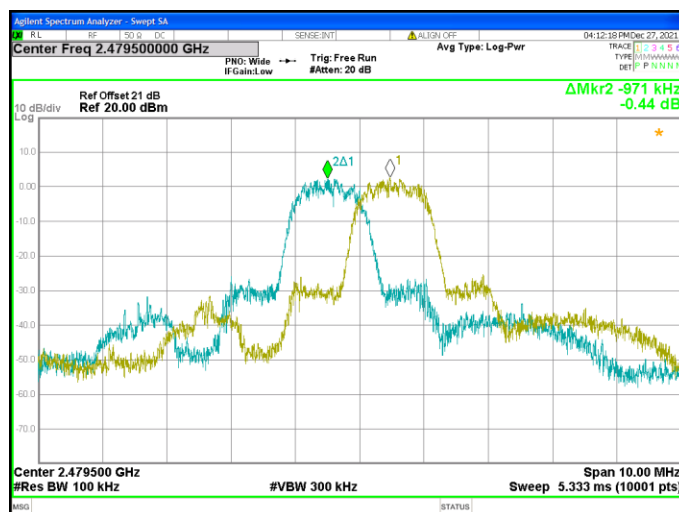
Chain 0: Frequency Separation @ 3DH5 Mode CH0



Chain 0: Frequency Separation @ 3DH5 Mode CH39



Chain 0: Frequency Separation @ 3DH5 Mode CH78



4. Number of Hopping Frequencies Test

4.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The number of hopping frequencies per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at $\geq 1\%$ of the span, the video bandwidth $\geq$ RBW, and the SPAN was the frequency band of operation. The carrier frequency separation result is in the following Table.

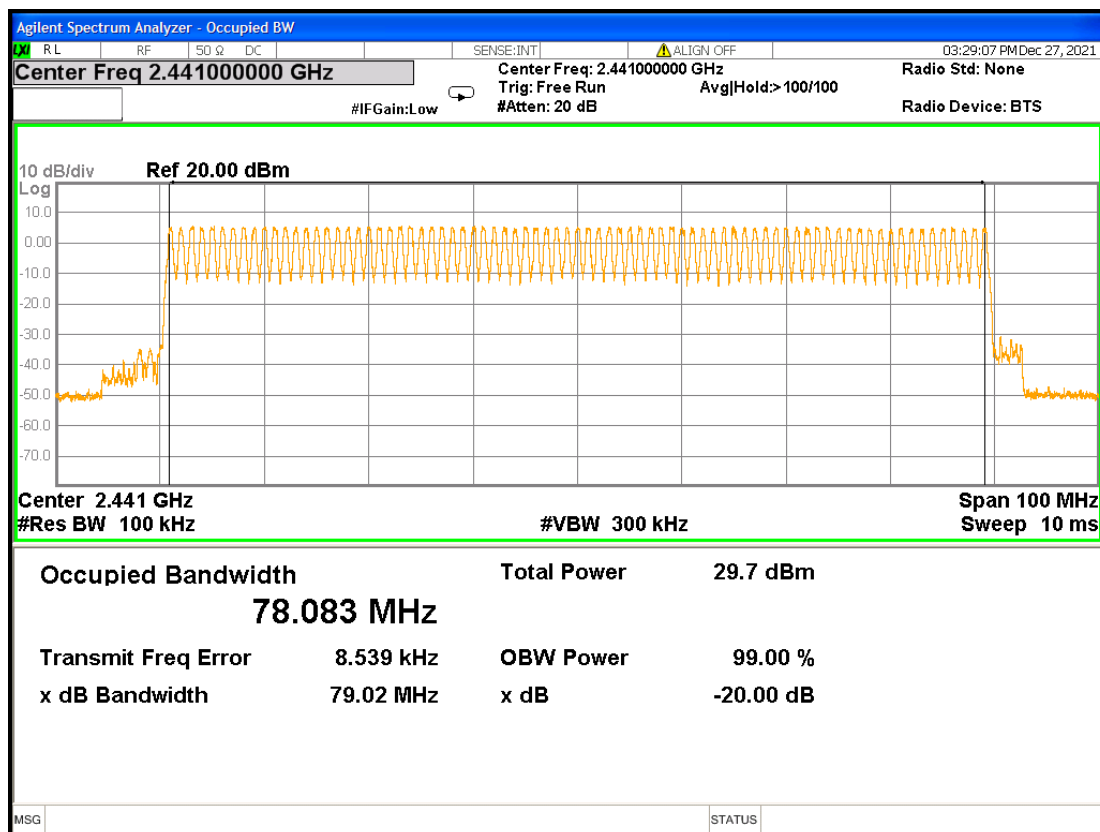
4.2 Operating Environment Condition

Temperature (°C):	20
Relative Humidity (%):	63
Test Date:	2021/12/27

4.3 Test Results

Frequency Range (MHz)	Hopping Channels
2402~2480	79

Number of Hopping Frequencies @ DH5 Hopping Mode



5. Time of Occupancy (Dwell Time)

5.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The time of occupancy (dwell time) per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth $\geq$ RBW, and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

5.2 Operating Environment Condition

Temperature (°C):	20
Relative Humidity (%):	63
Test Date:	2021/12/27

5.3 Test Results

The total sweep time is $0.4 \times 79 \text{ Channels} = 31.6 \text{ seconds}$

Due to the number of hops in the 31.6s sweep, we determined to reduce the sweep time to 5s, count the number of hops and multiply by 6.32. The total number of hops will be multiplied by the measured time of one pulse.

Mode	Packet type	Pulse duration (ms)	Measure time (s)	Dwell time (s)	Limit (s)	Test Results
GFSK	DH1	0.375	31.6	0.120	0.4	Pass
	DH3	1.630	31.6	0.261	0.4	Pass
	DH5	2.880	31.6	0.307	0.4	Pass
$\pi/4$ -DPSK	2DH1	0.385	31.6	0.123	0.4	Pass
	2DH3	1.637	31.6	0.262	0.4	Pass
	2DH5	2.876	31.6	0.307	0.4	Pass
8-DPSK	3DH1	0.386	31.6	0.123	0.4	Pass
	3DH3	1.628	31.6	0.260	0.4	Pass
	3DH5	2.883	31.6	0.308	0.4	Pass

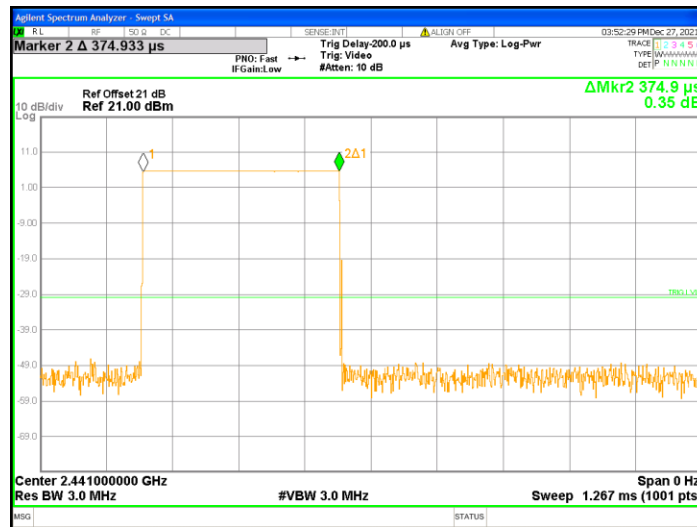
Note: (1) Dwell time = $1600 \div (79 \times N) \times \text{Pulse duration} \times \text{Measure time}$

(2) DH1, N=2

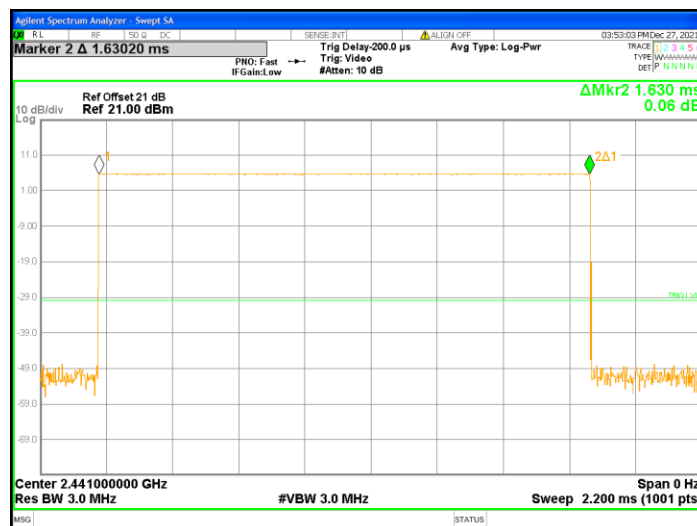
DH3, N=4

DH5, N=6

Dwell Time @ DH1 Ch 39



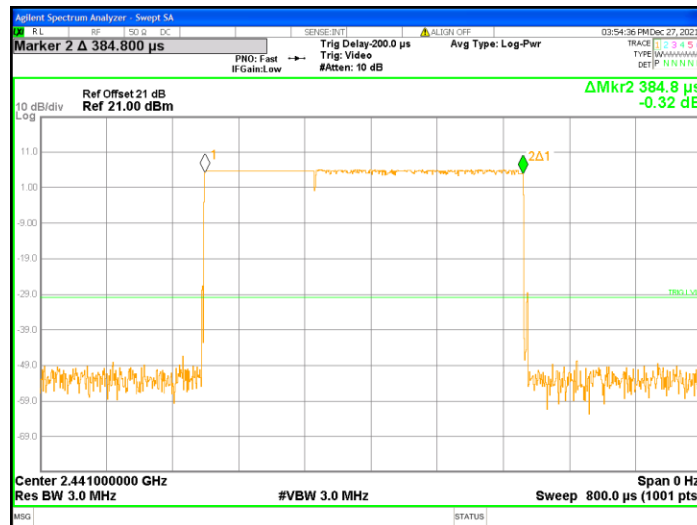
Dwell Time @ DH3 Ch 39



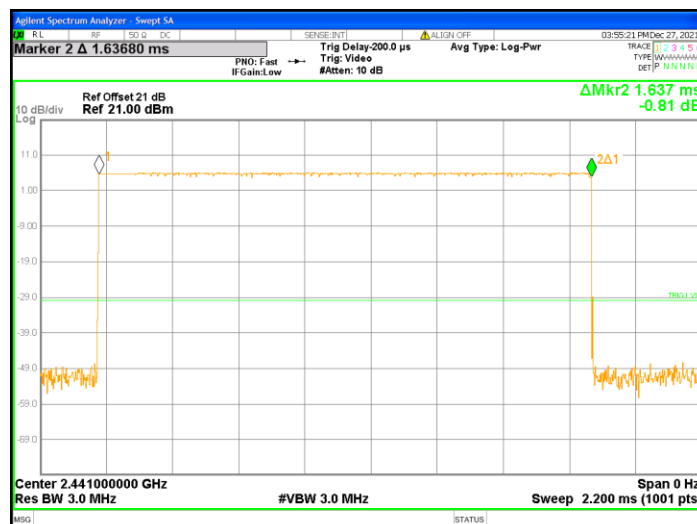
Dwell Time @ DH5 Ch 39



Dwell Time @ 2DH1 Ch 39



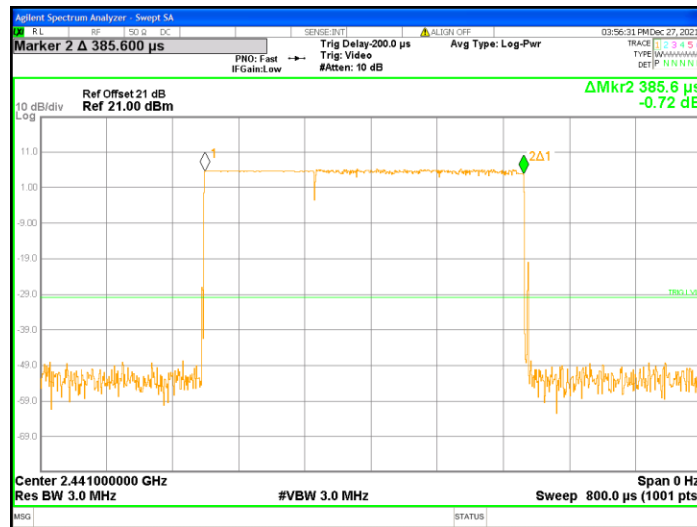
Dwell Time @ 2DH3 Ch 39



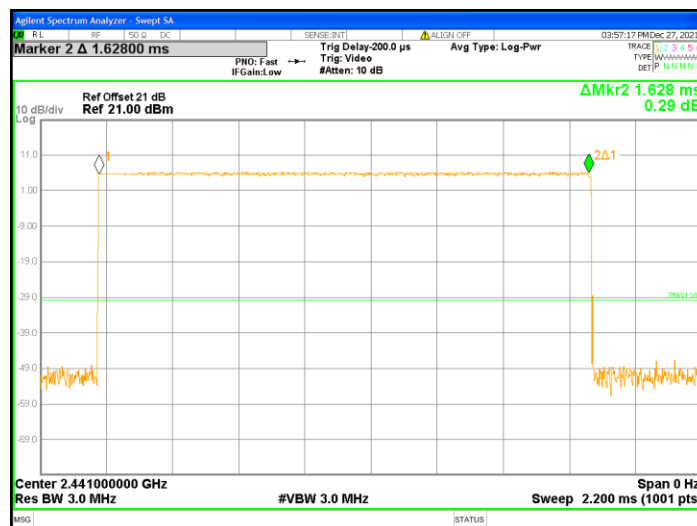
Dwell Time @ 2DH5 Ch 39



Dwell Time @ 3DH1 Ch 39



Dwell Time @ 3DH3 Ch 39



Dwell Time @ 3DH5 Ch 39



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6. Maximum Output Power Test

6.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

6.2 Operating Environment Condition

Temperature (°C):	20
Relative Humidity (%):	63
Test Date:	2021/12/27

6.3 Test Results

Mode	Channel	Frequency (MHz)	Output Power (AV) (dBm)	Total Power (AV) (mW)	Maximum power (PK) (dBm)	Maximum power (PK) (mW)	Limit (dBm)	Margin (dB)
1DH5	0	2402	5.60	3.63	6.11	4.08	30	-23.89
	39	2441	5.54	3.58	6.07	4.05	30	-23.93
	78	2480	5.27	3.37	5.74	3.75	30	-24.26
2DH5	0	2402	4.57	2.86	6.32	4.29	21	-14.68
	39	2441	4.50	2.82	6.23	4.20	21	-14.77
	78	2480	4.14	2.59	6.07	4.05	21	-14.93
3DH5	0	2402	4.60	2.88	6.40	4.37	21	-14.60
	39	2441	4.52	2.83	6.39	4.36	21	-14.61
	78	2480	4.51	2.82	6.26	4.23	21	-14.74

7. RF Antenna Conducted Spurious Test

7.1 Test Setup & Procedure

The test procedure was according to FCC measurement guidelines DA 00-705.

The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.

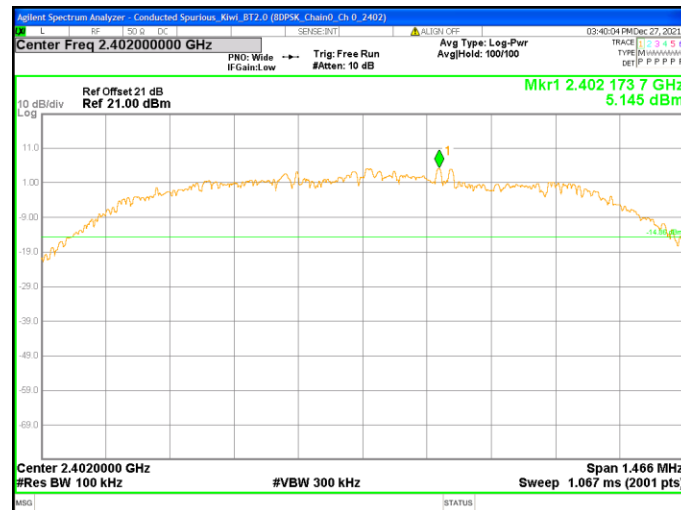
Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

7.2 Operating Environment Condition

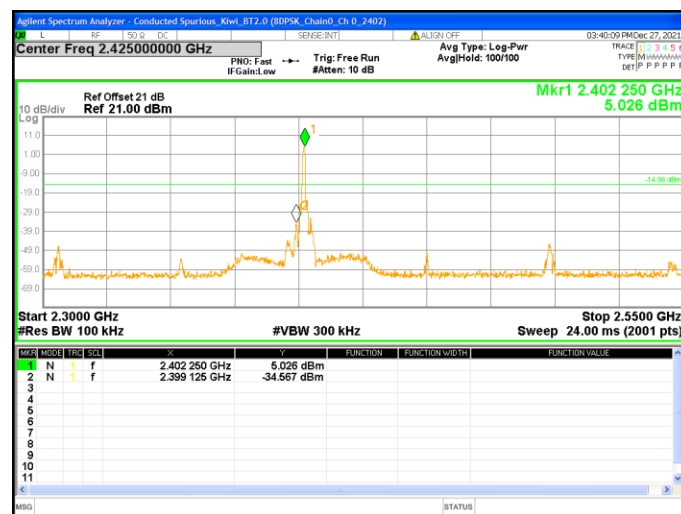
Temperature (°C):	20
Relative Humidity (%):	63
Test Date:	2021/12/27

7.3 Test Results

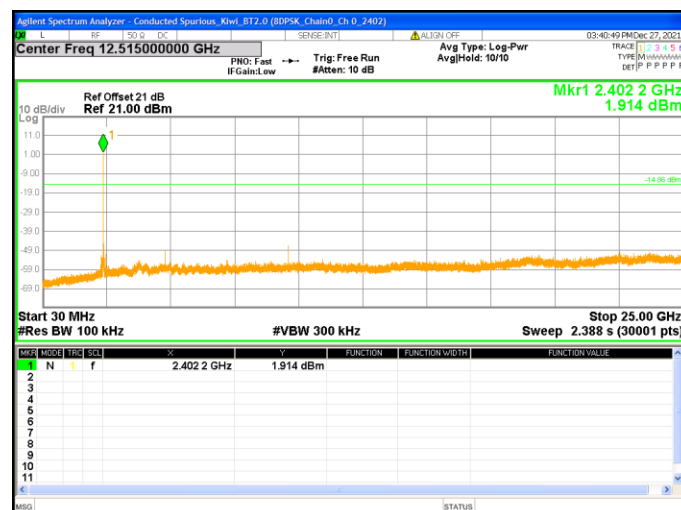
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 0



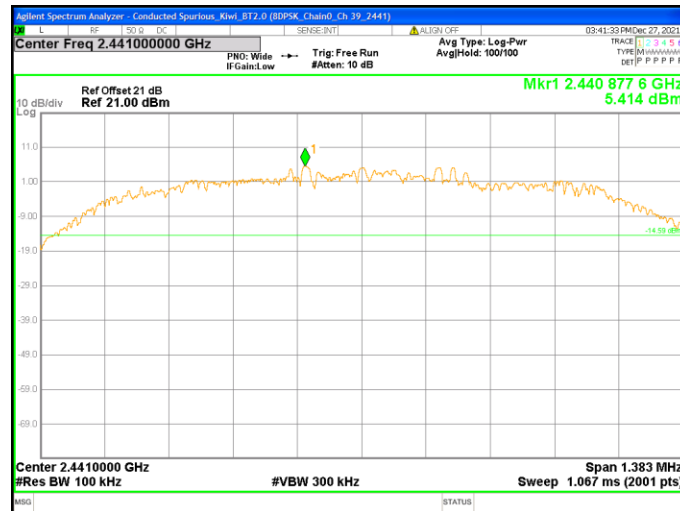
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 0



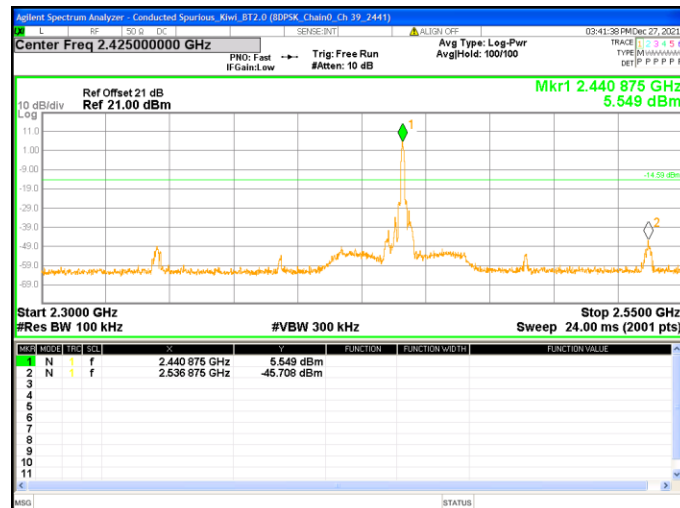
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 0



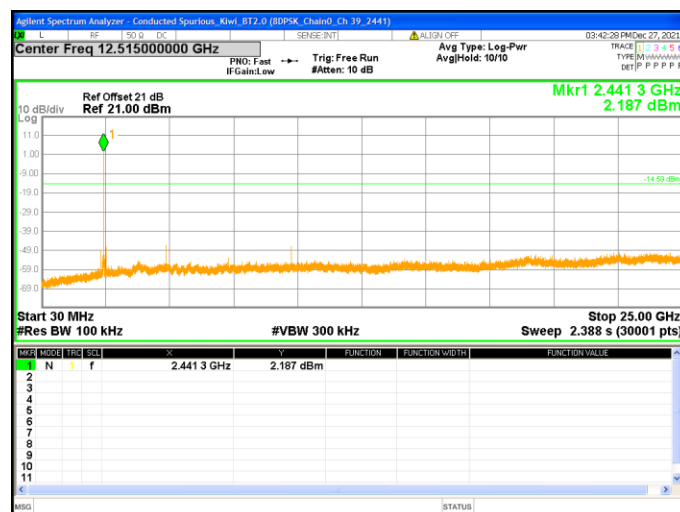
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 39



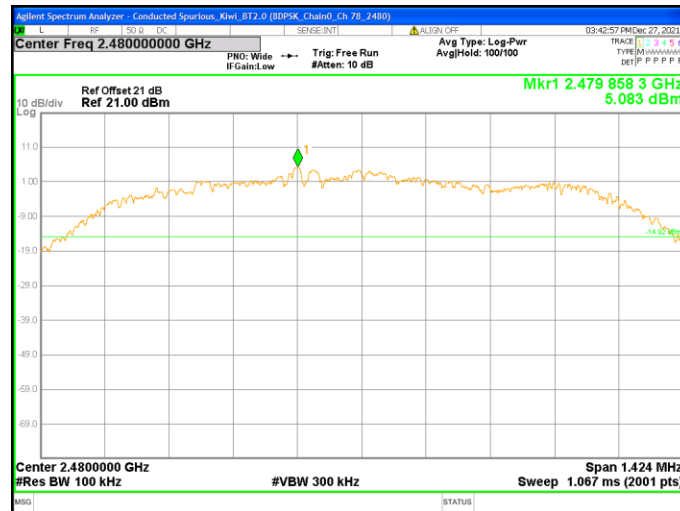
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 39



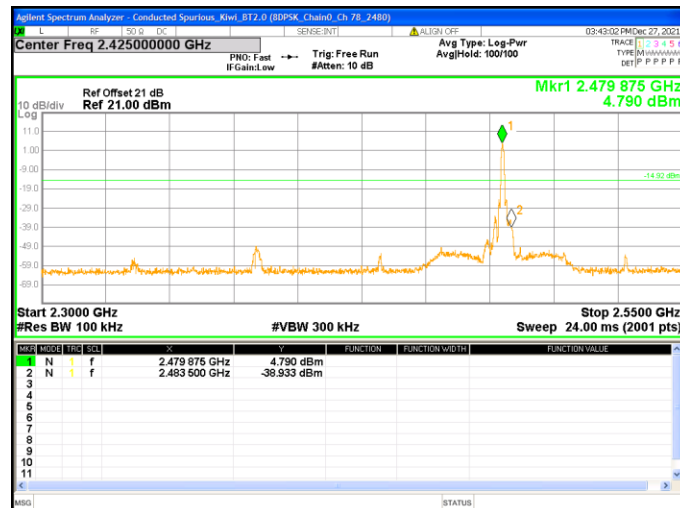
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 39



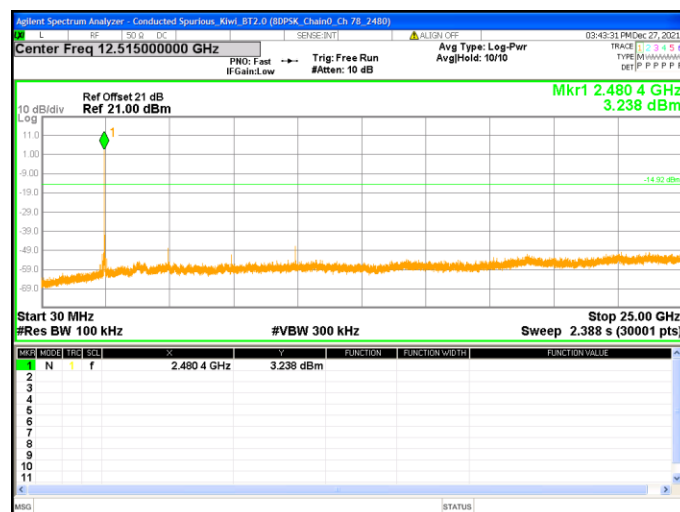
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 78



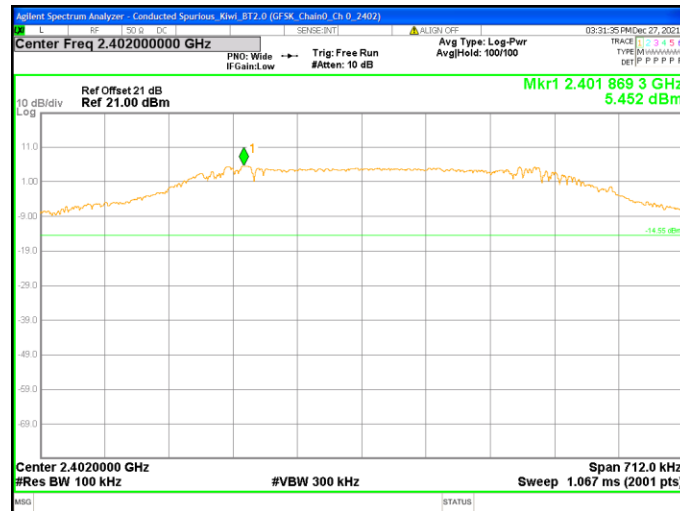
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 78



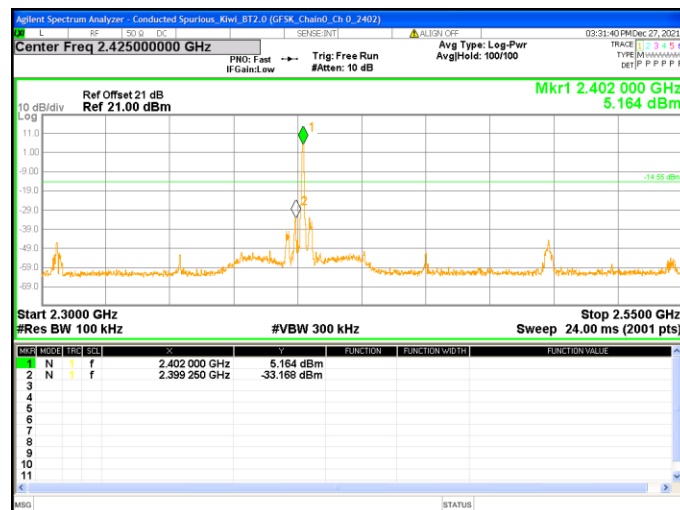
Chain 0: Conducted Spurious @ 1DH5 Mode Ch 78



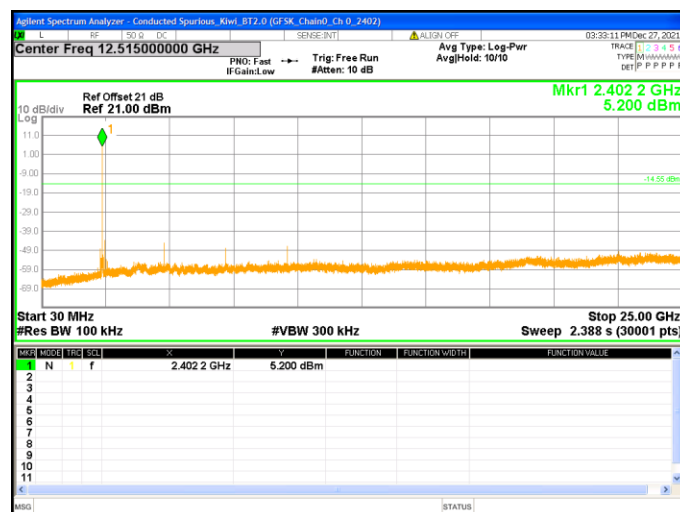
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 0



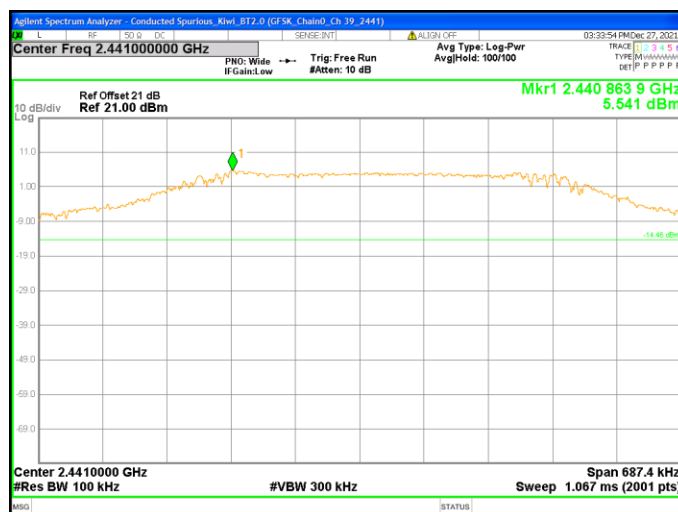
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 0



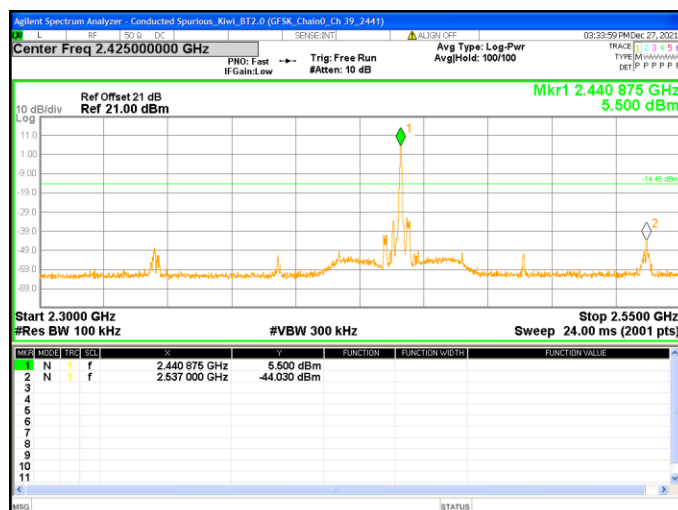
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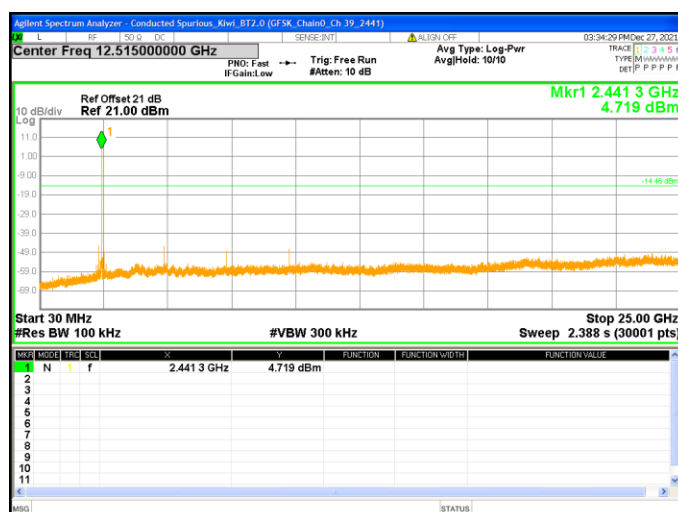
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 39



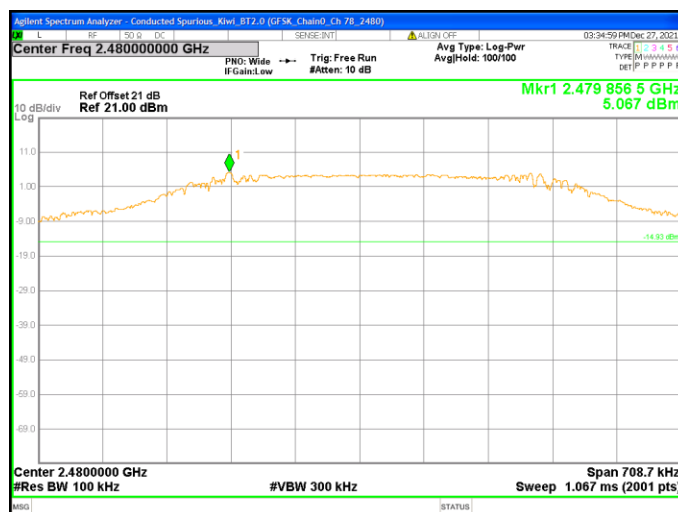
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 39



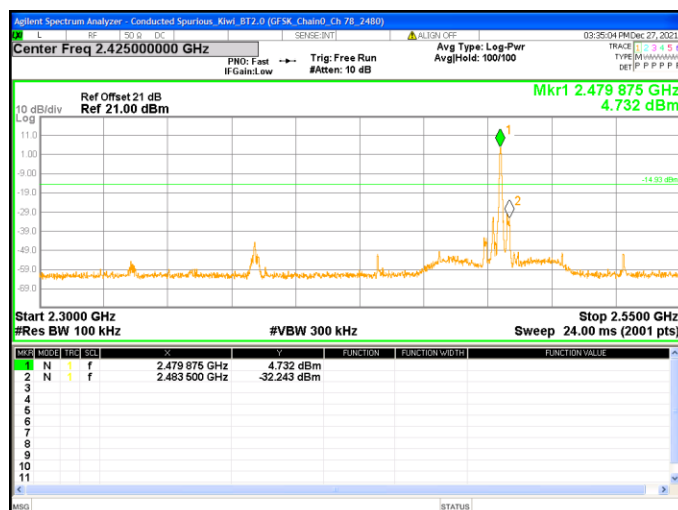
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 39



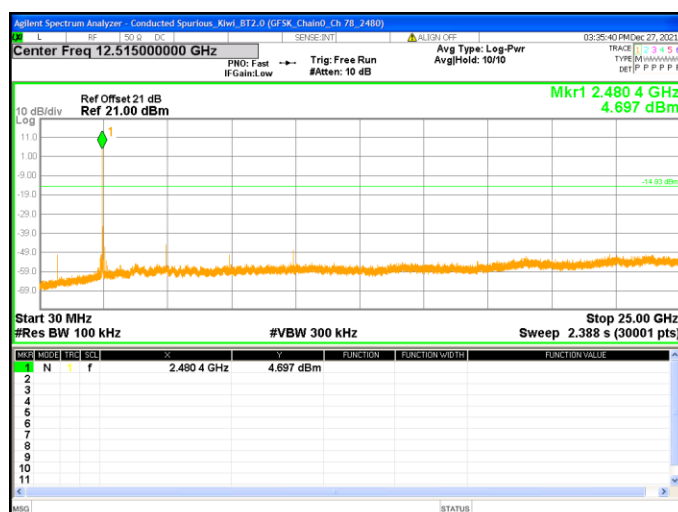
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 78



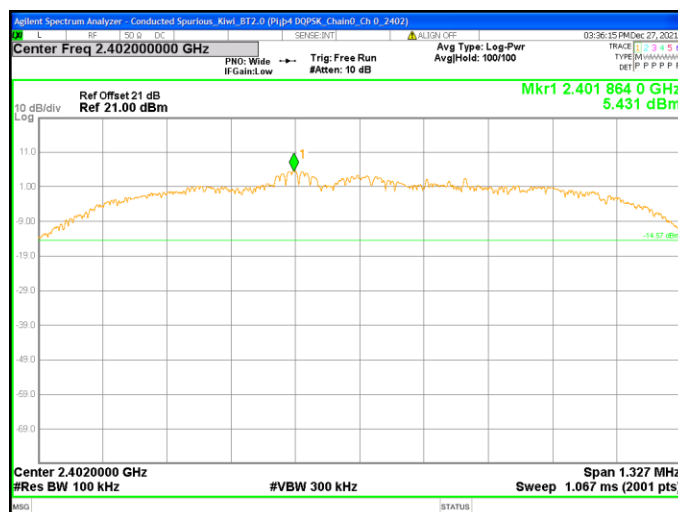
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 78



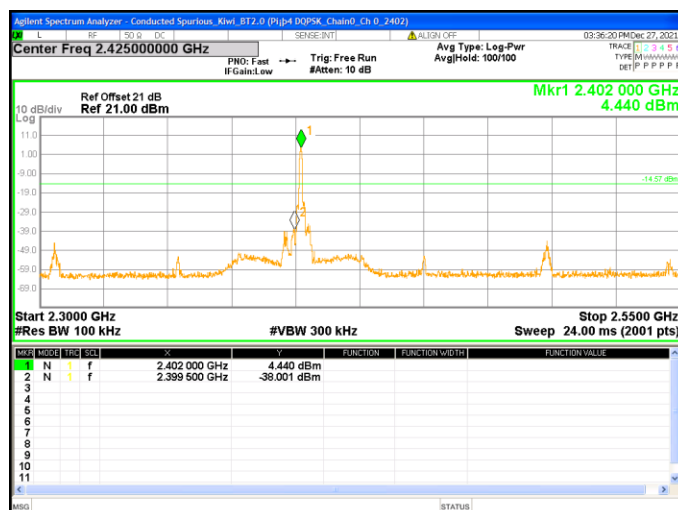
Chain 0: Conducted Spurious @ 2DH5 Mode Ch 78



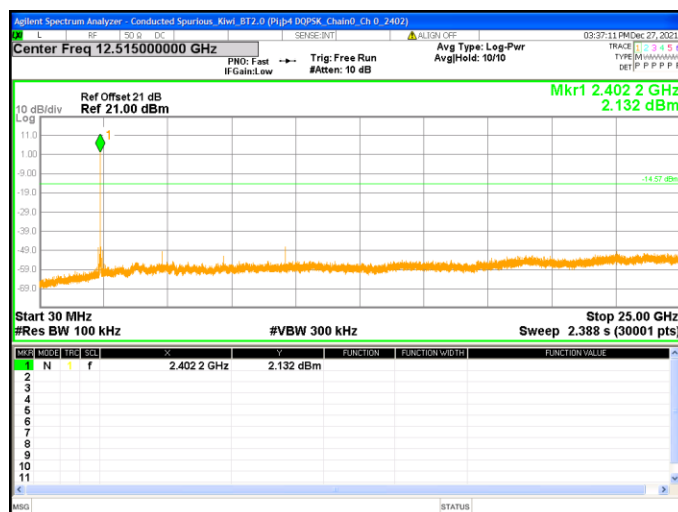
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 0



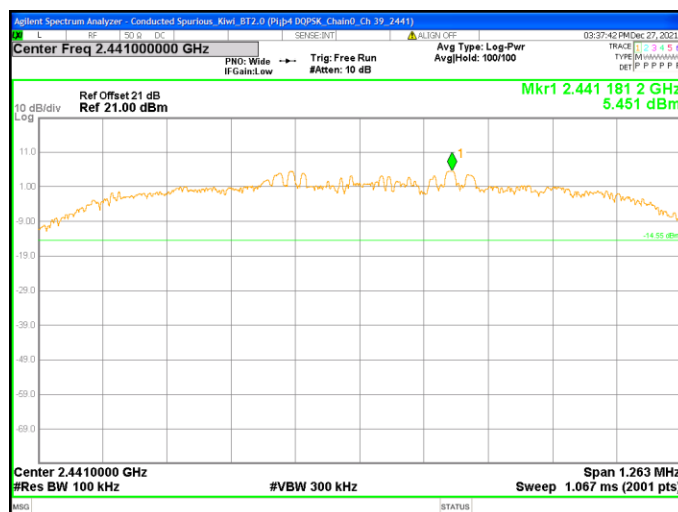
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 0



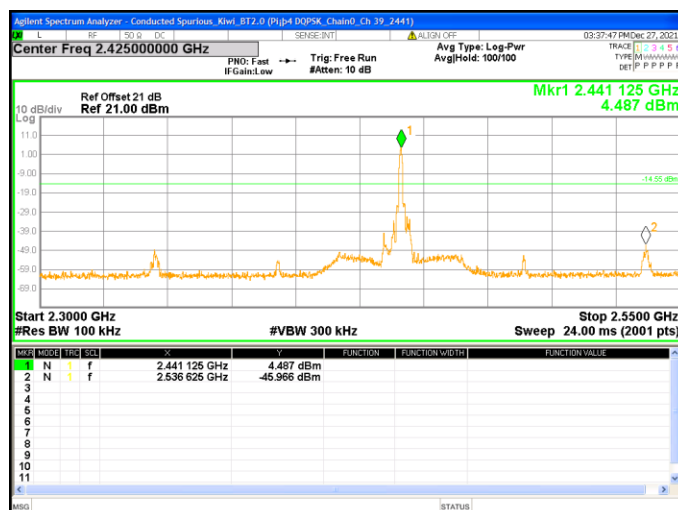
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 0



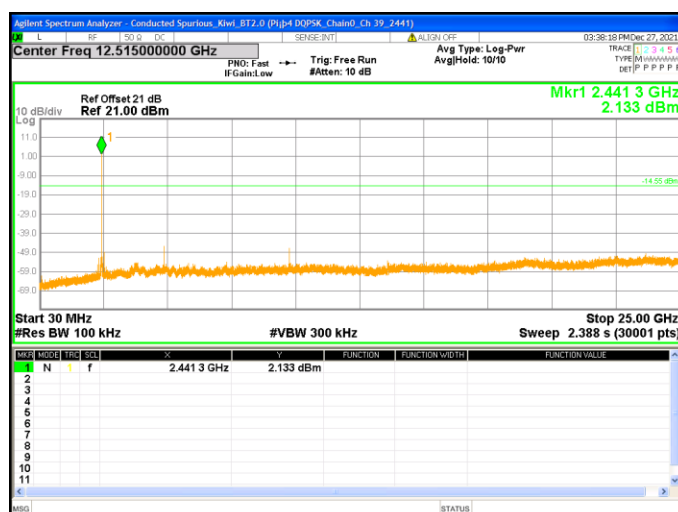
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 39



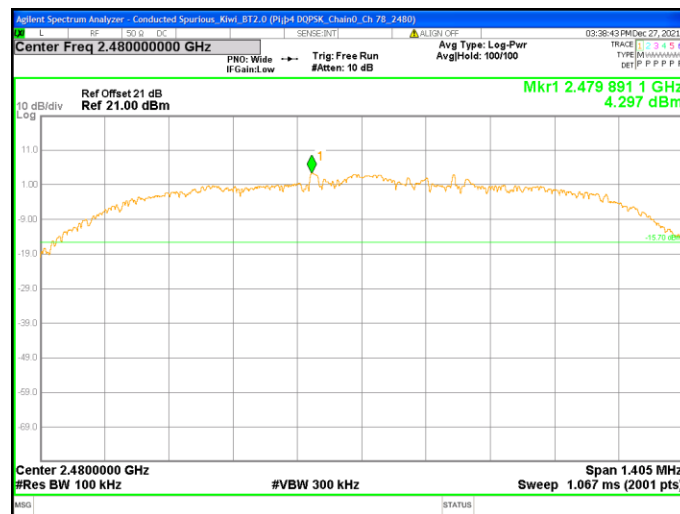
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 39



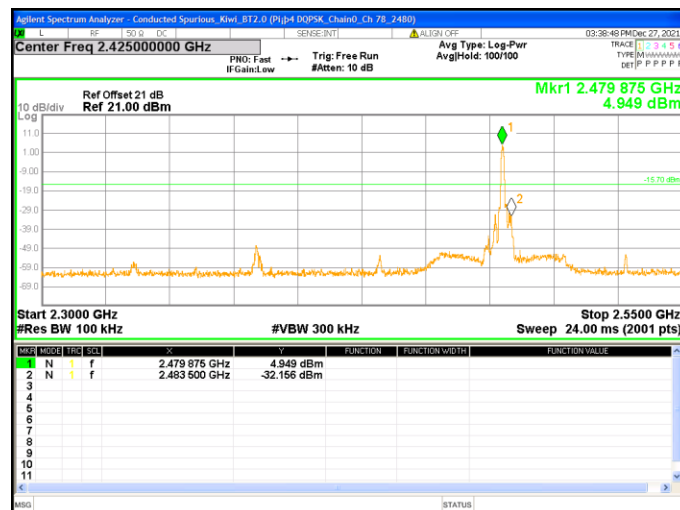
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 39



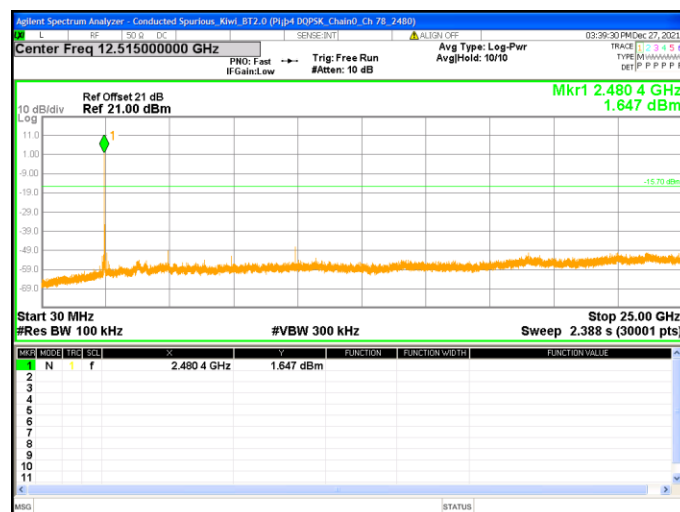
Chain 0: Conducted Spurious @ 3DH5 Mode Ch 78



Chain 0: Conducted Spurious @ 3DH5 Mode Ch 78



Chain 0: Conducted Spurious @ 3DH5 Mode Ch 78



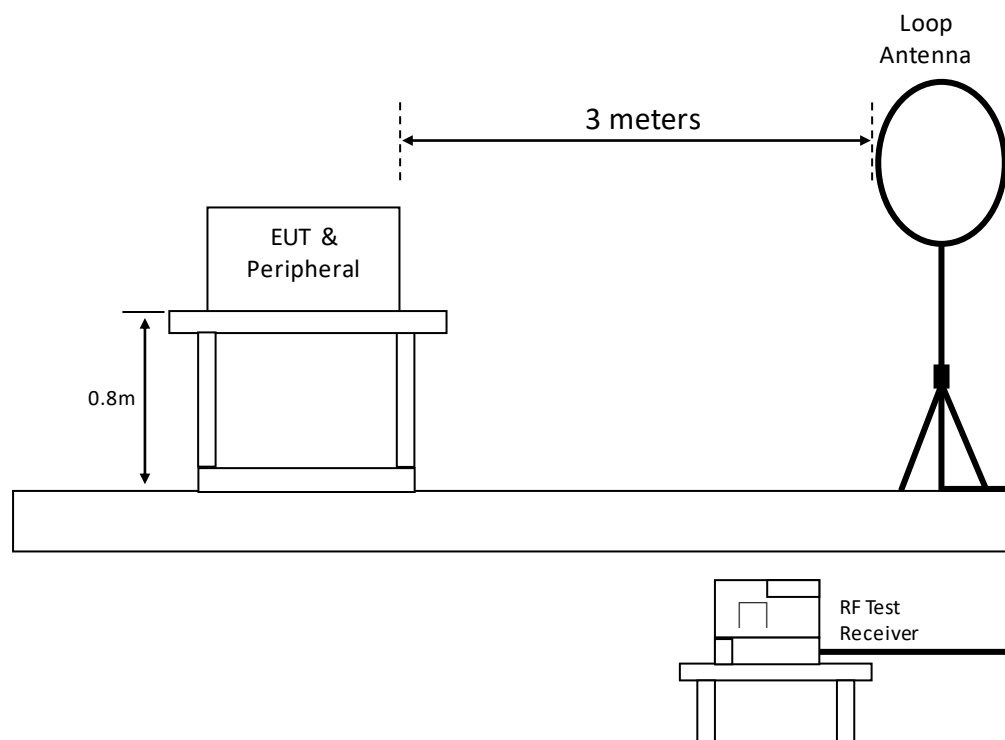
8. Emissions in Restricted Frequency Bands (Radiated emission measurements)

8.1 Instrument Setting

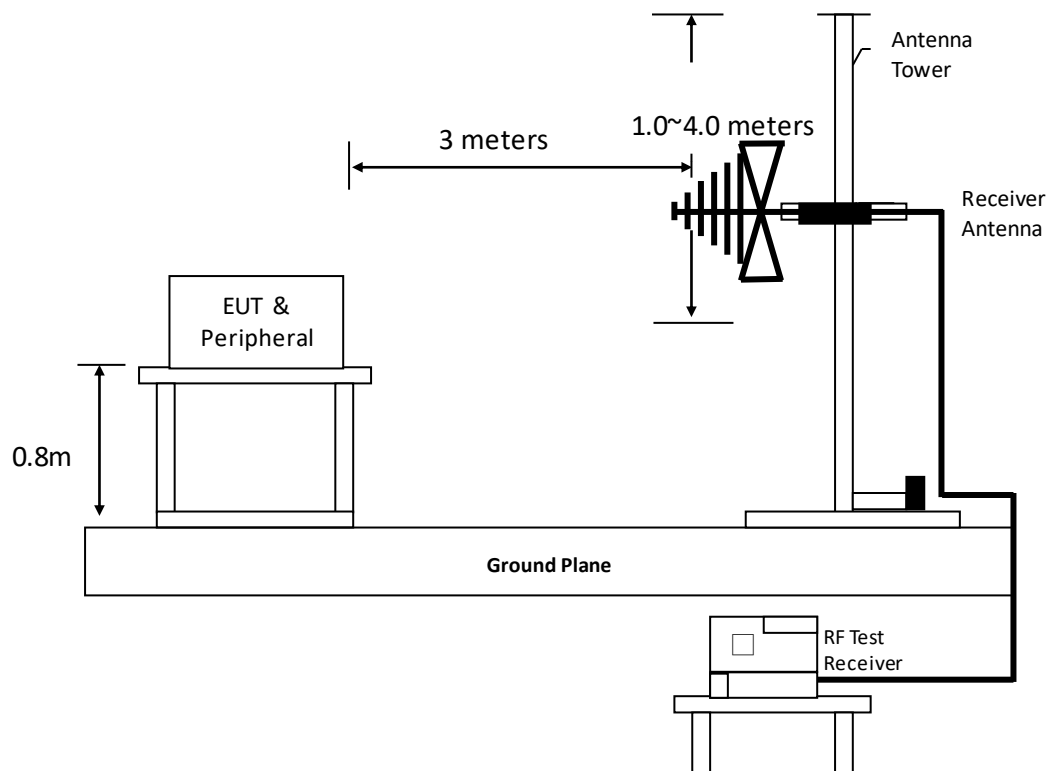
Receiver Function	Setting (Below 1GHz)	Setting (Above 1GHz)
Detector	QP	Peak and Average
RBW	9-150 kHz ; 200-300 Hz 0.15-30 MHz; 9-10 kHz 30-1000 MHz; 100-120 kHz	1MHz
VBW	$\geq 3 \times \text{RBW}$	3MHz & 1/T Minimum VBW
Sweep	Auto couple	Auto couple
Start Frequency	9 kHz	1GHz
Stop Frequency	1 GHz	Tenth harmonic
Attenuation	Auto	Auto

8.2 Test setup & procedure

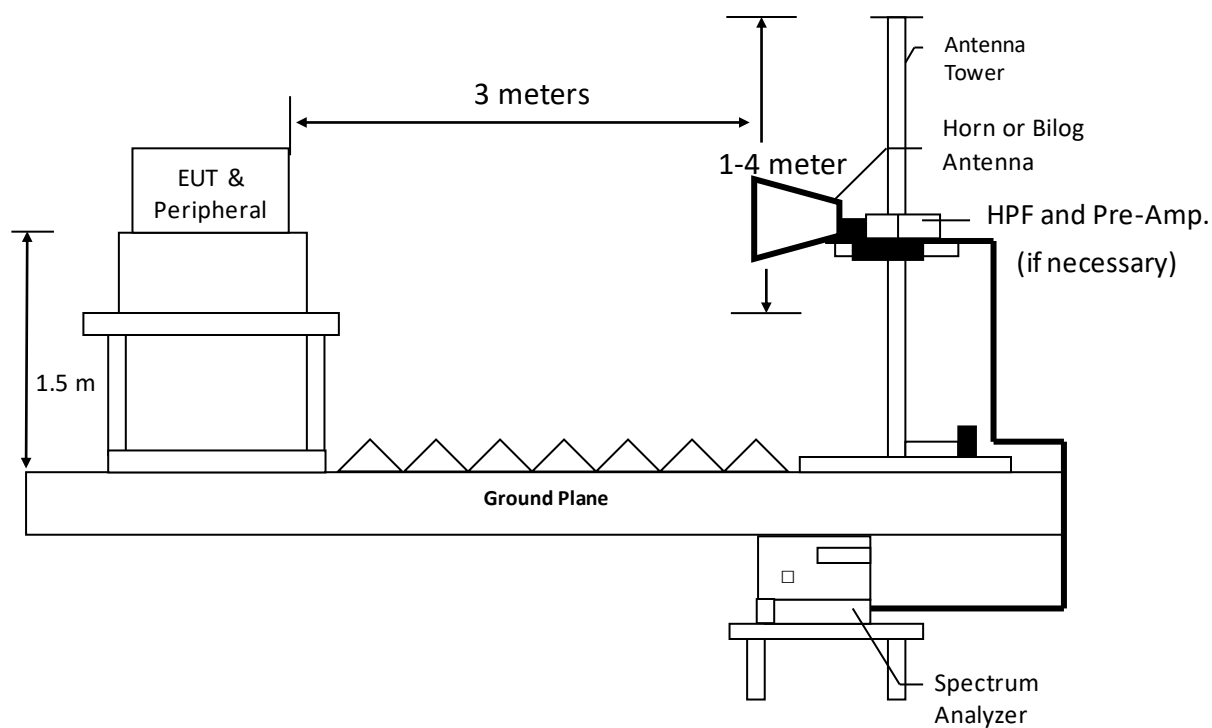
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



TEST REPORT

Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

8.3 Limit

Frequency(MHz)	Field Strength(uV/m)	Measurement distance(m)
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

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

TEST REPORT

8.4 Test Result

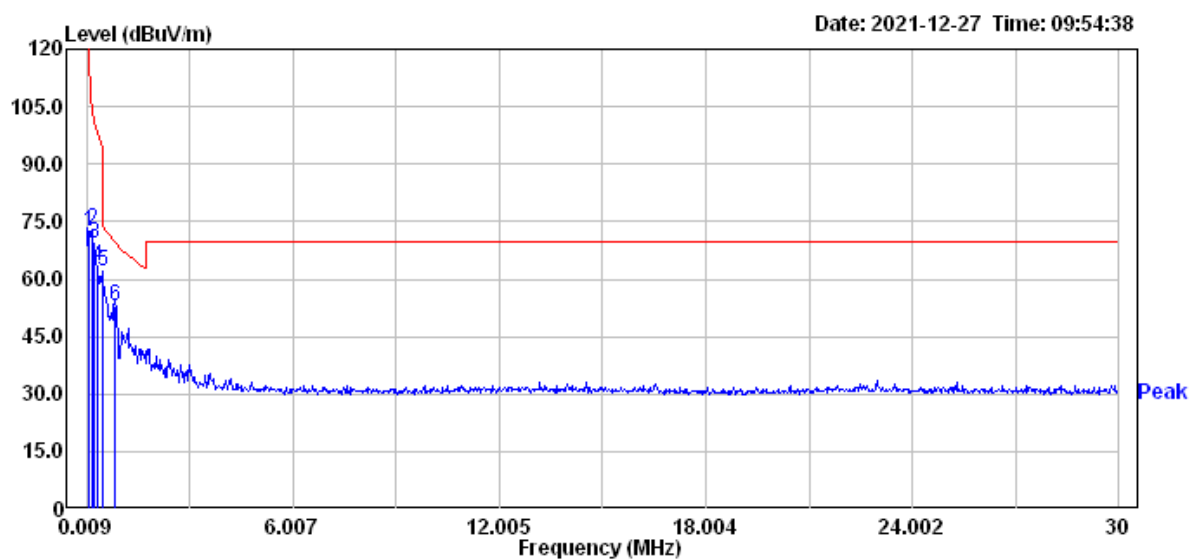
8.4.1 Measurement results: frequencies 9kHz to 30MHz

Temperature (°C):	12
Relative Humidity (%):	63
Test date:	2021/12/27

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 1DH5 Ch 0.

Ant Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)
Perpendicular	0.069	AV	19.08	53.24	72.32	114.73	-42.41
Perpendicular	0.159	AV	18.57	54.38	72.95	103.63	-30.68
Perpendicular	0.219	AV	18.75	50.73	69.48	100.85	-31.37
Perpendicular	0.309	AV	18.72	44.48	63.20	97.82	-34.62
Perpendicular	0.459	AV	19.17	42.71	61.88	94.38	-32.50
Perpendicular	0.819	QP	19.65	33.33	52.98	69.36	-16.38

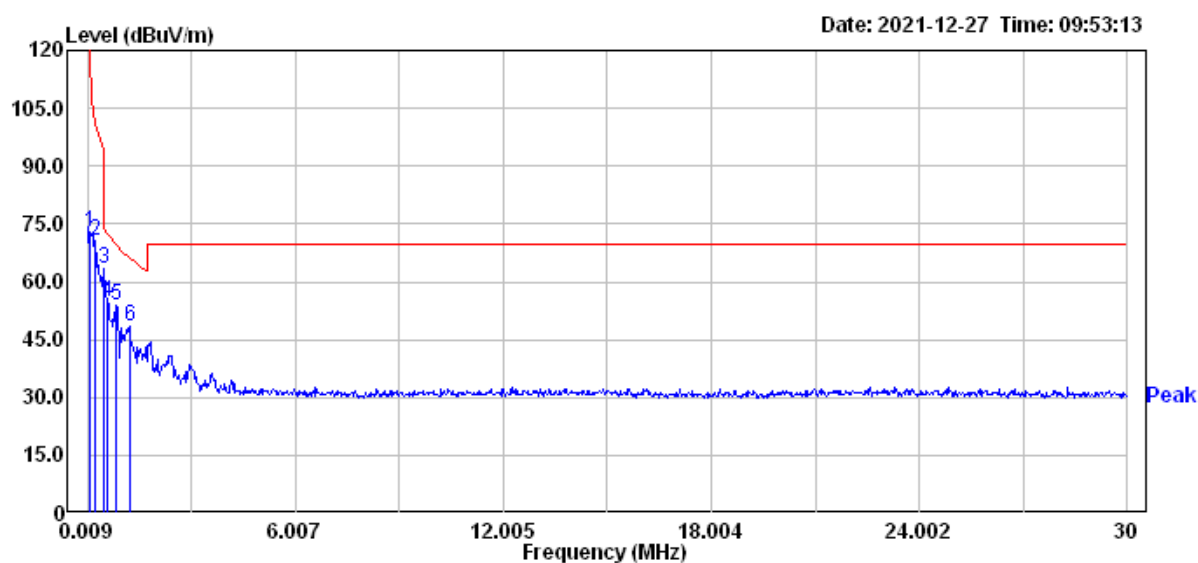
Remark: Corr. Factor = Antenna Factor + Cable Loss



TEST REPORT

Ant Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)
Parallel	0.069	AV	19.08	54.03	73.11	114.73	-41.62
Parallel	0.219	AV	18.75	51.75	70.50	100.85	-30.35
Parallel	0.459	AV	19.17	44.04	63.21	94.38	-31.17
Parallel	0.579	QP	19.33	35.34	54.67	72.38	-17.71
Parallel	0.819	QP	19.65	34.35	54.00	69.36	-15.36
Parallel	1.209	QP	19.49	28.87	48.36	65.96	-17.60

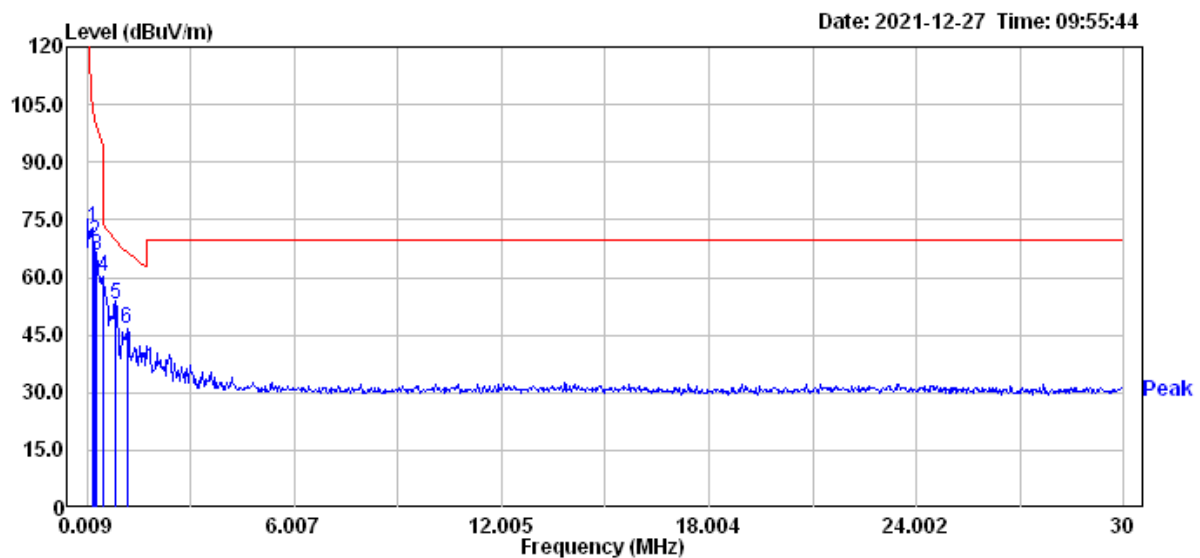
Remark: Corr. Factor = Antenna Factor + Cable Loss



TEST REPORT

Ant Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3m (dB μ V/m)	Margin (dB)
Ground-parallel	0.159	AV	18.57	54.47	73.04	103.63	-30.59
Ground-parallel	0.219	AV	18.75	50.63	69.38	100.85	-31.47
Ground-parallel	0.279	AV	18.72	46.85	65.57	98.73	-33.16
Ground-parallel	0.459	AV	19.17	41.05	60.22	94.38	-34.16
Ground-parallel	0.819	QP	19.65	33.16	52.81	69.36	-16.55
Ground-parallel	1.149	QP	19.50	27.10	46.60	66.43	-19.83

Remark: Corr. Factor = Antenna Factor + Cable Loss



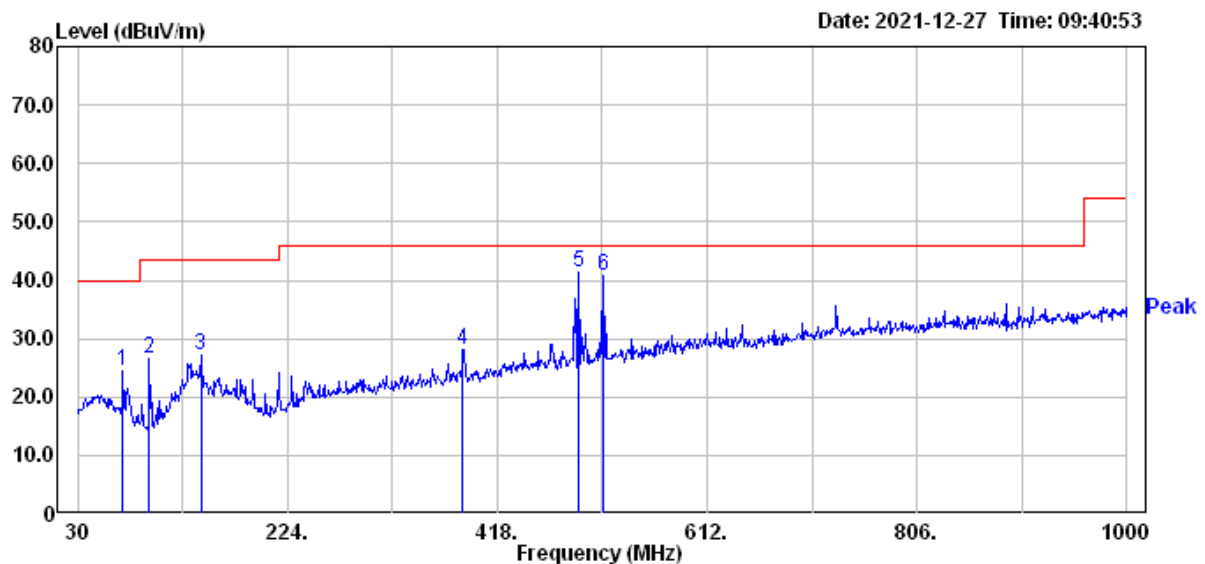
TEST REPORT

8.4.2 Measurement results: frequencies below 1 GHz

Temperature (°C):	12
Relative Humidity (%):	63
Test date:	2021/12/27

The test was performed on EUT under continuously transmitting mode. The worst case occurred at 1DH5 Ch 0.

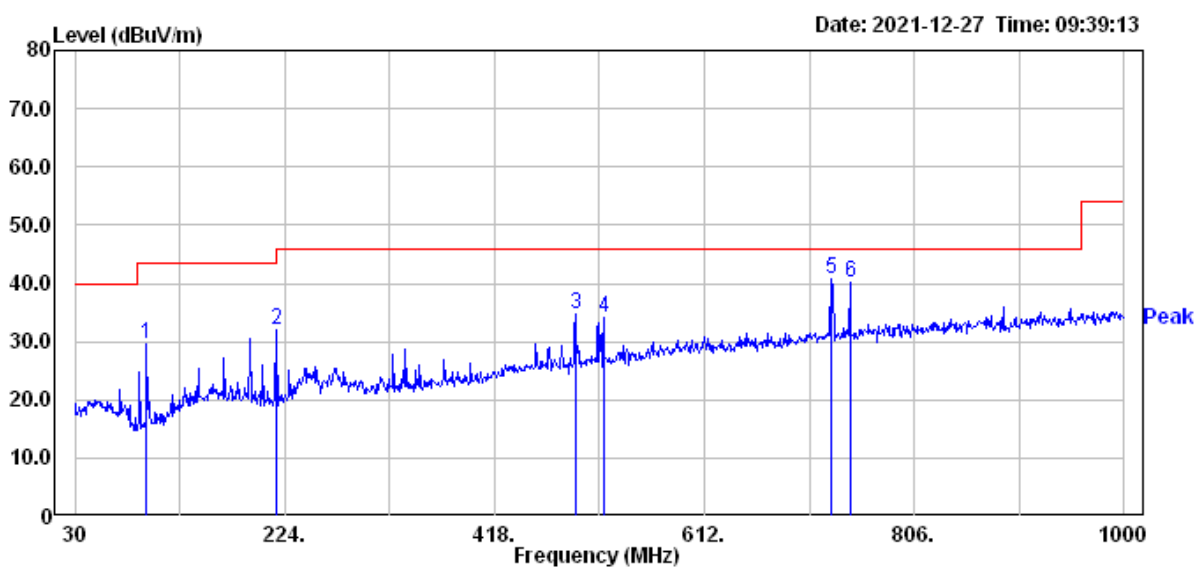
Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)
Vertical	71.71	QP	18.67	5.82	24.49	40.00	-15.51
Vertical	95.96	QP	15.65	10.92	26.57	43.50	-16.93
Vertical	143.49	QP	20.68	6.51	27.19	43.50	-16.31
Vertical	385.99	QP	24.06	4.11	28.17	46.00	-17.83
Vertical	493.66	QP	26.81	14.64	41.45	46.00	-4.55
Vertical	515.97	QP	27.45	13.30	40.75	46.00	-5.25



TEST REPORT

Ant Polarity	Frequency (MHz)	Detector	Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3m (dBμV/m)	Margin (dB)
Horizontal	95.96	QP	15.65	14.05	29.70	43.50	-13.80
Horizontal	215.27	QP	18.47	13.53	32.00	43.50	-11.50
Horizontal	492.69	QP	26.77	7.94	34.71	46.00	-11.29
Horizontal	518.88	QP	27.49	6.57	34.06	46.00	-11.94
Horizontal	729.37	QP	31.22	9.62	40.84	46.00	-5.16
Horizontal	746.83	QP	31.88	8.13	40.01	46.00	-5.99

Remark: Corr. Factor = Antenna Factor + Cable Loss



TEST REPORT

8.4.3 Measurement results: frequency above 1GHz to 25GHz

Temperature (°C):	17
Relative Humidity (%):	61
Test date:	2021/12/24

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
DH5_Ch0	4804	PK	H	17.77	24.21	41.98	74	-32.02
	4804	PK	V	17.77	25.60	43.37	74	-30.63
DH5_Ch39	4882	PK	H	17.89	22.22	40.11	74	-33.89
	4882	PK	V	17.89	26.39	44.28	74	-29.72
DH5_Ch78	4960	PK	H	18.15	21.43	39.58	74	-34.42
	4960	PK	V	18.15	21.60	39.75	74	-34.25
2DH5_Ch0	4804	PK	H	17.77	23.61	41.38	74	-32.62
	4804	PK	V	17.77	25.32	43.09	74	-30.91
2DH5_Ch39	4882	PK	H	17.89	22.13	40.02	74	-33.98
	4882	PK	V	17.89	25.10	42.99	74	-31.01
2DH5_Ch78	4960	PK	H	18.15	21.38	39.53	74	-34.47
	4960	PK	V	18.15	24.33	42.48	74	-31.52
3DH5_Ch0	4804	PK	H	17.77	24.29	42.06	74	-31.94
	4804	PK	V	17.77	25.61	43.38	74	-30.62
3DH5_Ch39	4882	PK	H	17.89	22.14	40.03	74	-33.97
	4882	PK	V	17.89	26.84	44.73	74	-29.27
3DH5_Ch78	4960	PK	H	18.15	22.77	40.92	74	-33.08
	4960	PK	V	18.15	24.50	42.65	74	-31.35

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

9. Emission on Band Edge

9.1 Instrument Setting

Spectrum Function	Setting
Detector	Peak and Average
RBW	1MHz
VBW	3MHz & 1/T Minimum VBW
Sweep	Auto couple
Restrict bands	2310 MHz ~ 2390 MHz 2483.5 MHz ~ 2500 MHz
Attenuation	Auto

9.2 Test Procedure

The test procedure is the same as Emissions in Restricted Frequency Bands (Radiated emission measurements).

9.3 Operating Environment Condition

Temperature (°C):	17
Relative Humidity (%):	61
Test Date:	2021/12/24

TEST REPORT

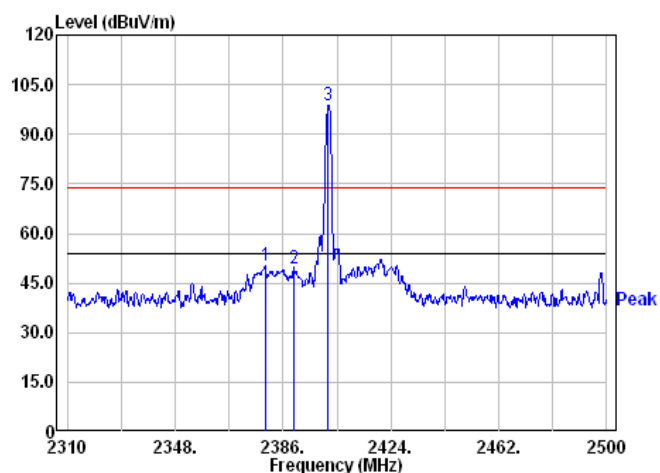
9.4 Test Results

Temperature (°C):	17
Relative Humidity (%):	61
Test Date:	2021/12/24

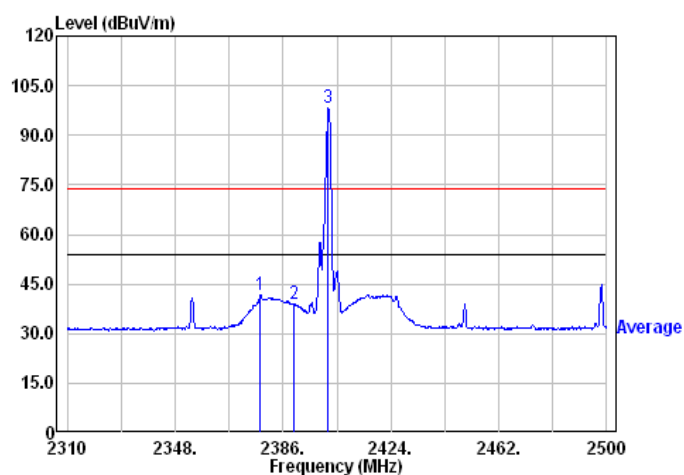
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
DH5	2379.73	PK	H	34.86	15.29	50.15	74	-23.85	2310~2390
	2378.02	AV	H	34.86	7.00	41.86	54	-12.14	
	2483.50	PK	H	34.80	20.17	54.97	74	-19.03	2483.5~2500
	2483.50	AV	H	34.80	13.90	48.70	54	-5.30	
2DH5	2377.83	PK	H	34.86	15.06	49.92	74	-24.08	2310~2390
	2378.02	AV	H	34.86	6.22	41.08	54	-12.92	
	2483.50	PK	H	34.80	19.03	53.83	74	-20.17	2483.5~2500
	2483.50	AV	H	34.80	11.95	46.75	54	-7.25	
3DH5	2382.01	PK	H	34.87	15.58	50.45	74	-23.55	2310~2390
	2378.21	AV	H	34.86	6.37	41.23	54	-12.77	
	2483.50	PK	H	34.80	19.39	54.19	74	-19.81	2483.5~2500
	2483.50	AV	H	34.80	11.09	45.89	54	-8.11	

Remark: Correction Factor = Antenna Factor + Cable Loss

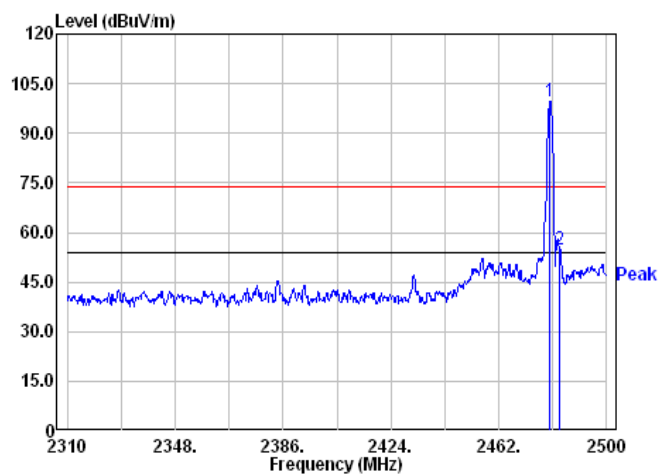
Chain 0: Restricted Band Bandedge @ DH5 Mode Ch0 PK



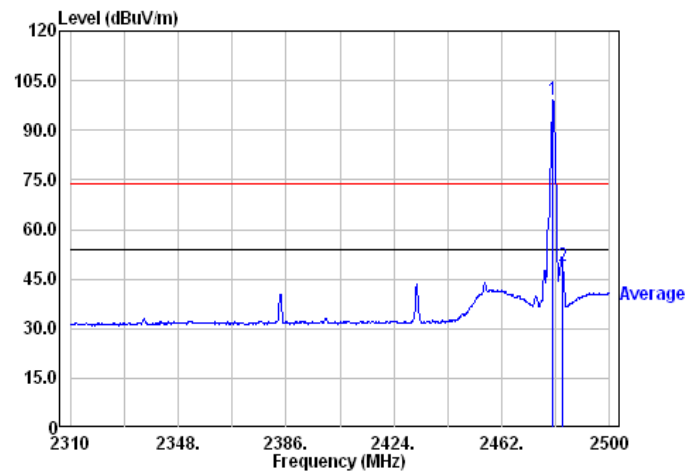
Chain 0: Restricted Band Bandedge @ DH5 Mode Ch0 AV



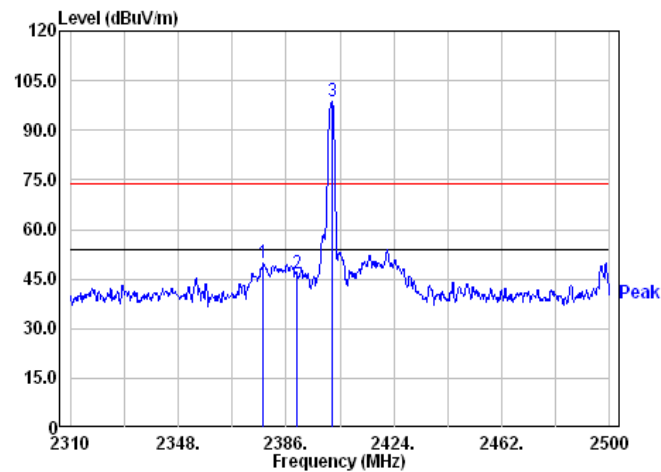
Chain 0: Restricted Band Bandedge @ DH5 Mode Ch78 PK



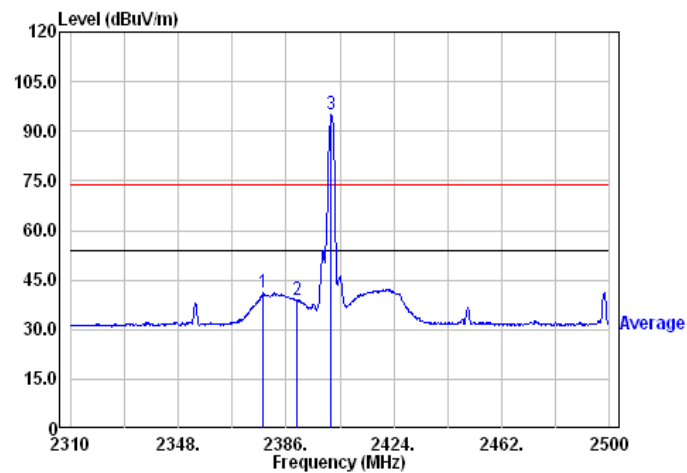
Chain 0: Restricted Band Bandedge @ DH5 Mode Ch78 AV



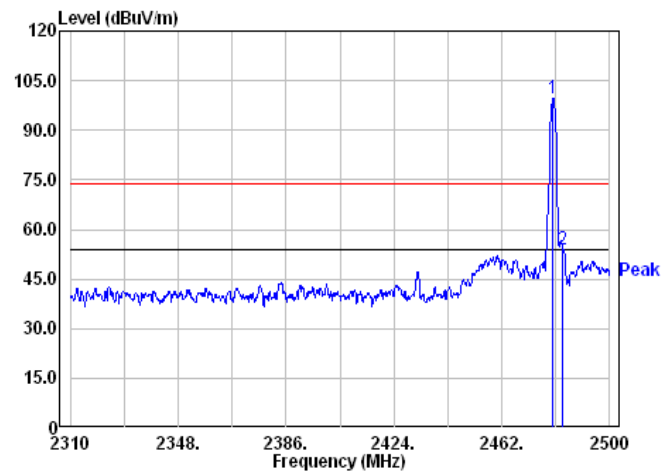
Chain 0: Restricted Band Bandedge @ 2DH5 Mode Ch0 PK



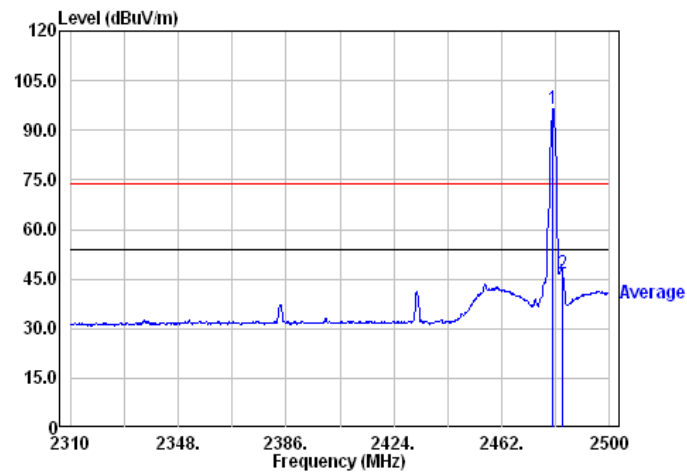
Chain 0: Restricted Band Bandedge @ 2DH5 Mode Ch0 AV



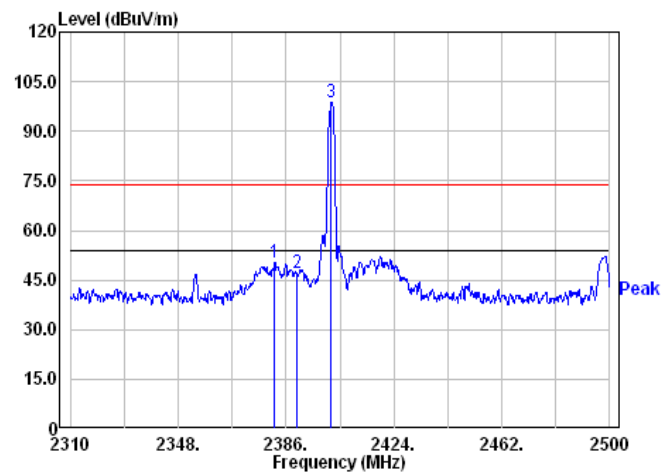
Chain 0: Restricted Band Bandedge @ 2DH5 Mode Ch78 PK



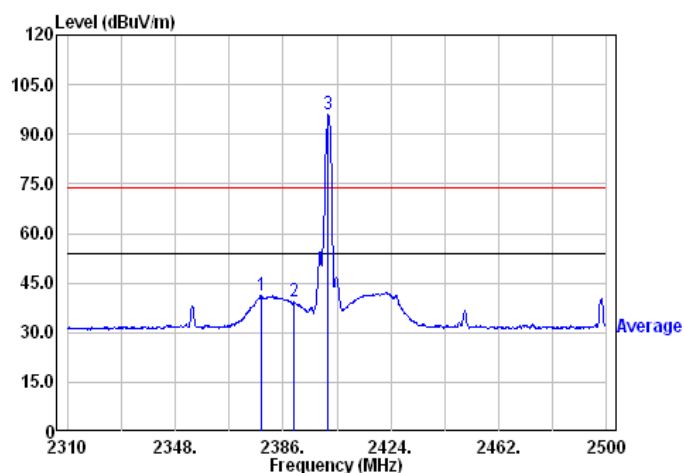
Chain 0: Restricted Band Bandedge @ 2DH5 Mode Ch78 AV



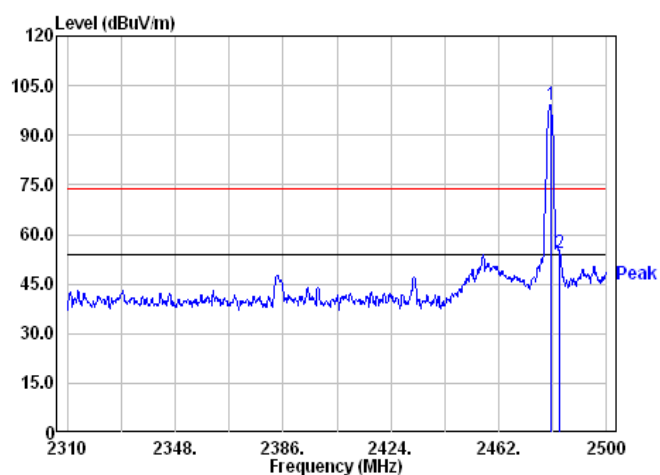
Chain 0: Restricted Band Bandedge @ 3DH5 Mode Ch0 PK



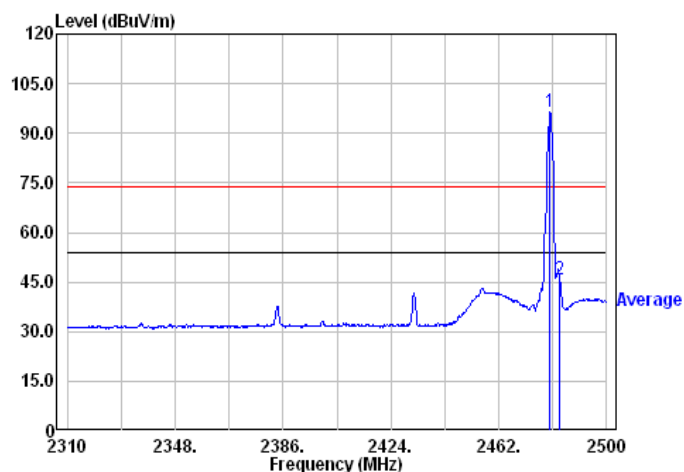
Chain 0: Restricted Band Bandedge @ 3DH5 Mode Ch0 AV



Chain 0: Restricted Band Bandedge @ 3DH5 Mode Ch78 PK



Chain 0: Restricted Band Bandedge @ 3DH5 Mode Ch78 AV



10. AC Power Line Conducted Emission

Since the EUT is not connected to AC source, therefore, the test can be waived.

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESR7	101822	2021/08/16	2022/08/15
Signal Analyzer	Agilent	N9030A	MY51380492	2021/08/17	2022/08/16
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2021/04/14	2022/04/13
Broadband Antenna	SHWARZBECK	VULB 9168	9168-172	2021/01/29	2022/01/28
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-456	2021/01/11	2022/01/10
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170159	2020/08/20	2023/08/19
Pre-Amplifier	AML	AML0120L3401	0419-114	2021/12/06	2022/12/05
Pre-amplifier	SGH	SGH184	20201124-1	2021/12/06	2022/12/05
Power Meter	Anritsu	ML2495A	0844001	2021/10/17	2022/10/16
Power Sensor	Anritsu	MA2411B	0738452	2021/10/17	2022/10/16
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2021/03/08	2022/03/07
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2021/03/08	2022/03/07
RF Cable	SUHNER	SUCOFLEX 104P	CB0006	2021/04/29	2022/04/28
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2021/01/15	2022/01/14
Hight Pass Filter	Reactel	7HS-3G/18G-S11	N/A	2021/05/26	2022/05/25
20dB Attenuator	Mini-Circuits	BW-S20W5+	N/A	2021/05/26	2022/05/25
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

TEST REPORT

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.16 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.02 dB
Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	5.17 dB
Vertically polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.39 dB
Horizontally polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.39 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.70 dB
Emission on the Band Edge Test	4.32 dB
RF Antenna Conducted Spurious Test	1.27 dB
Maximum Output Power Test	0.44 dB
Occupied Bandwidth Test	7.78 %
Carrier Frequency Separation Test	1.27 dB
Number of Hopping Frequencies Test	1.27 dB
Time of Occupancy (Dwell Time) Test	1.27 dB
AC Power Line Conducted Emission	3.08 dB