FCC - TEST REPORT

Report Number	:	**64.790.20.05500.01**	Date of Issue:	2021-11-05
Model	:	SLBP 5 A1, Swi-403612_2107		
Product Type	:	Bluetooth Speaker Pool		
Applicant	:	Lidl US, LLC		
Address	:	3500 S. Clark Street, Arlington, Virginia 22202, United States		
License Holder	:	Lidl US, LLC		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	46		

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2 Details about the Test Laboratory

Details about the Test Laboratory

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District Shenzhen 518052 P.R. China
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3 Description of the Equipment Under Test

Product:	Bluetooth Speaker Pool
Model no.:	SLBP 5 A1, Swi-403612_2107
Remark:	Two models are identical in circuit design, PCB layout and components used but only different in model name.
FCC ID:	2AJ9O-SLBP5A1
Options and accessories:	N/A
Input Rating:	DC 3.7V by internal battery, DC 5V by USB port
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, π/4-DQPSK
Antenna Type:	PCB antenna
Max Antenna Gain:	-0.58dBi
Description of the EUT:	EUT is a Bluetooth speaker.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 v05r02 and Public Notice DA 00-705 - Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and ANSI C63.10-2013.

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Pages	Test Result
§15.207	Conducted emission AC power port	10	Pass
§15.247(b)(1)	Conducted peak output power	13	Pass
§15.247(e)	Power spectral density*	--	N/A
§15.247(a)(2)	6dB bandwidth	--	N/A
§15.247(a)(1)	20dB bandwidth and 99% Occupied Bandwidth	17	Pass
§15.247(a)(1)	Min. of Hopping Channel Carrier Frequency Separation	23	Pass
§15.247(a)(1)(iii)	Min number of hopping frequencies	25	Pass
§15.247(a)(1)(iii)	Dwell Time - Average Time of Occupancy	27	Pass
§15.247(d)	Spurious RF conducted emissions	30	Pass
§15.247(d)	Band edge	38	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	42	Pass
§15.203	Antenna requirement	See note 2	Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses PCB antenna, which gain is -0.58dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID:2AJ9O-SLBP5A1 and complies with Section 15.209, 15.247 of the FCC Part 15, Subpart C rules.

This is report for Bluetooth BDR+EDR only.
Two models are identical in circuit design, PCB layout and components used but only different in model name. Tests were only performed on SLBP 5 A1.

SUMMARY:

All tests according to the regulations cited on page 6 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: October 14, 2021

Testing Start Date: October 18, 2021

Testing End Date: November 3, 2021

Reviewed by:	Prepared by:	Tested by:
Tony Liu	Kevin Ouyang	Louise Liu

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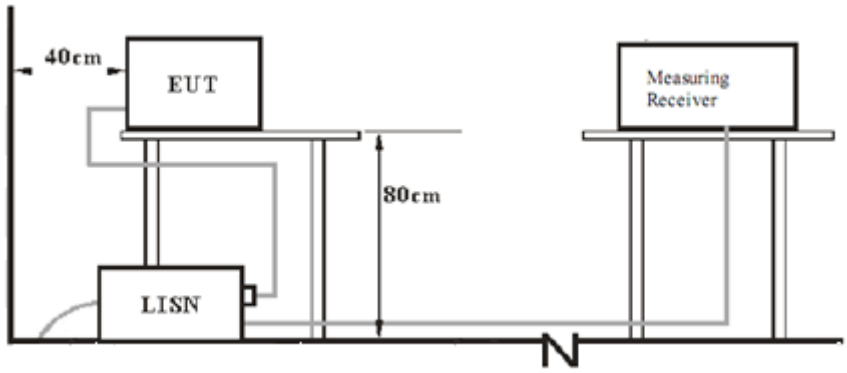
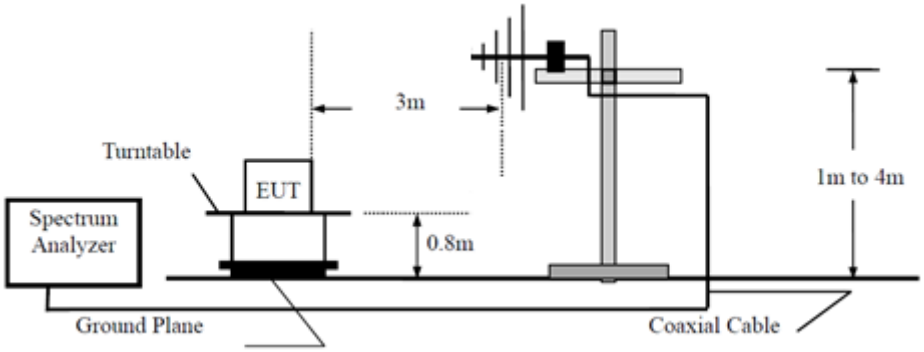
7 Test Setups

7.1 AC Power Line Conducted Emission test setups

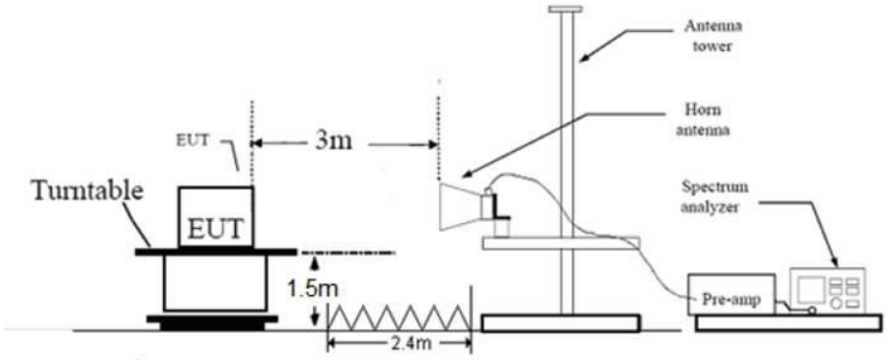


7.2 Radiated test setups

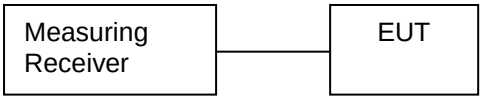
Below 1GHz



Above 1GHz



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Notebook	lenovo	X220	---
Adapter	Stiger	ACG-65W	---

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Remark: “*” Decreasing linearly with logarithm of the frequency

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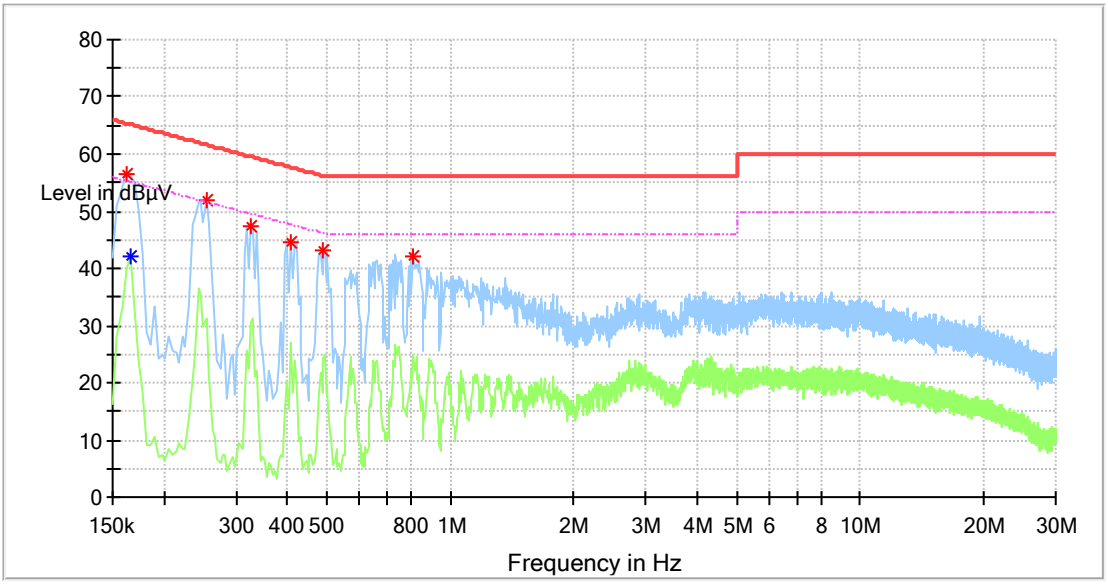
Conducted Emission Test 150kHz – 30MHz

Op Cond.: Charging and Bluetooth function on.
Test Spec.: Power Line, L

Temperature (°C): 22.5 Relative Humidity (%): 46.7 Atmospheric Pressure(mbar) : 1012



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.162000	56.56	---	65.36	8.81	L1	9.73
0.166000	---	42.06	55.16	13.10	L1	9.73
0.254000	51.95	---	61.63	9.68	L1	9.67
0.326000	47.47	---	59.55	12.09	L1	9.66
0.410000	44.53	---	57.65	13.12	L1	9.66
0.490000	43.00	---	56.17	13.17	L1	9.65
0.810000	42.03	---	56.00	13.97	L1	9.66

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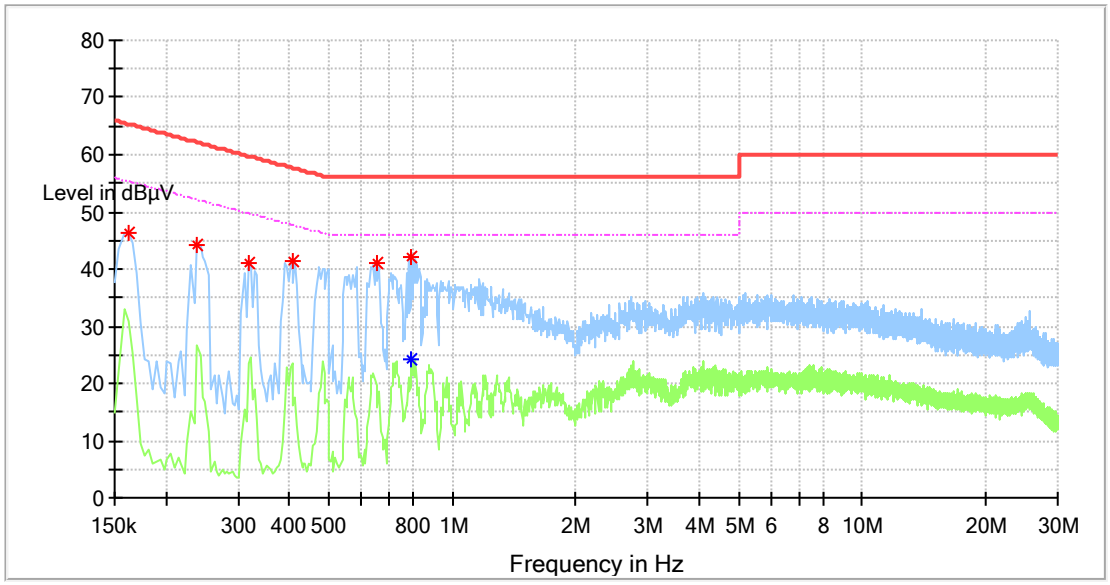
Op Cond.: Charging and Bluetooth function on.
Test Spec.: Power Line, N

Temperature (°C): 22.5 Relative Humidity (%): 46.7 Atmospheric Pressure(mbar) : 1012



Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.162000	46.43	---	65.36	18.94	N	9.77
0.238000	44.29	---	62.17	17.87	N	9.71
0.318000	41.09	---	59.76	18.67	N	9.69
0.406000	41.34	---	57.73	16.39	N	9.69
0.654000	41.12	---	56.00	14.88	N	9.68
0.794000	---	24.19	46.00	21.81	N	9.69
0.794000	42.20	---	56.00	13.80	N	9.69

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
   RBW > the 20dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

Limits

conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

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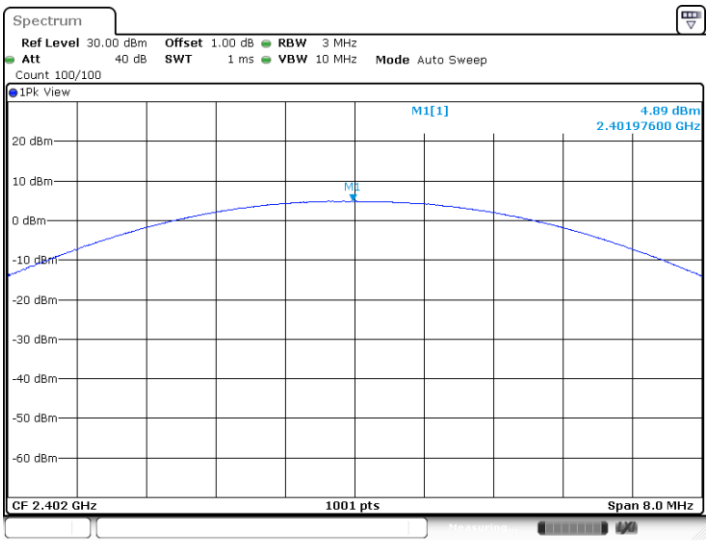
Conducted peak output power

Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	4.89	Pass
Middle channel 2441MHz	5.04	Pass
High channel 2480MHz	4.96	Pass

Low channel 2402MHz



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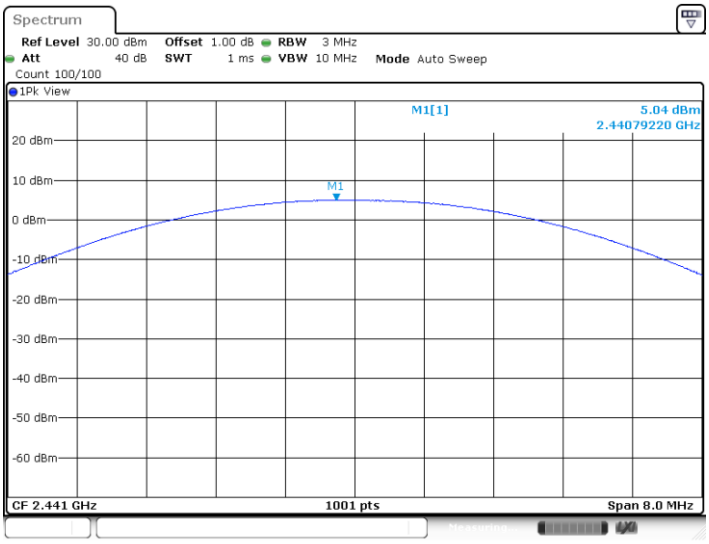
Middle channel 2441MHz



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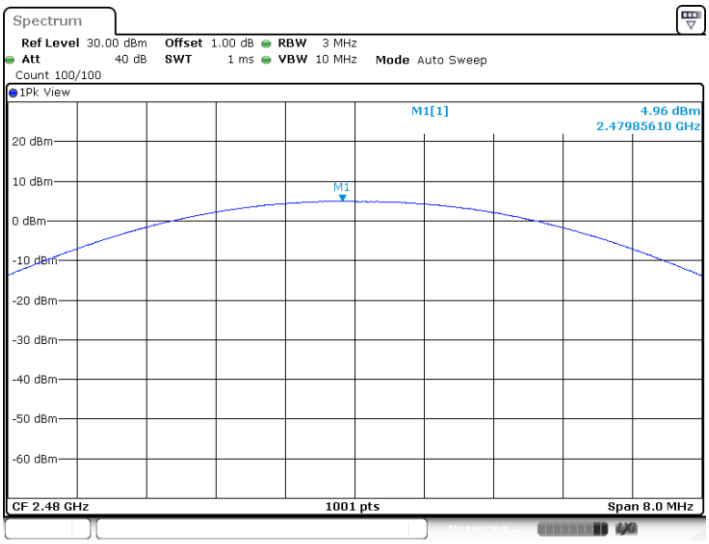
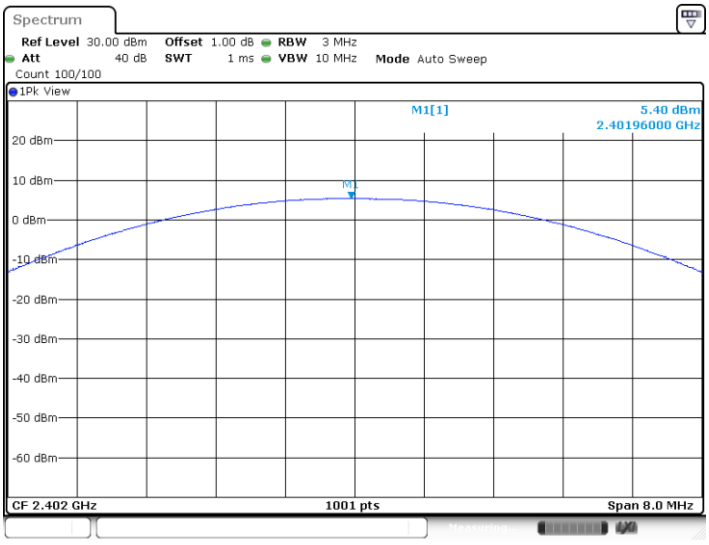
High channel 2480MHz



Bluetooth Mode π/4-DQPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	5.40	Pass
Middle channel 2441MHz	5.48	Pass
High channel 2480MHz	5.42	Pass

Low channel 2402MHz



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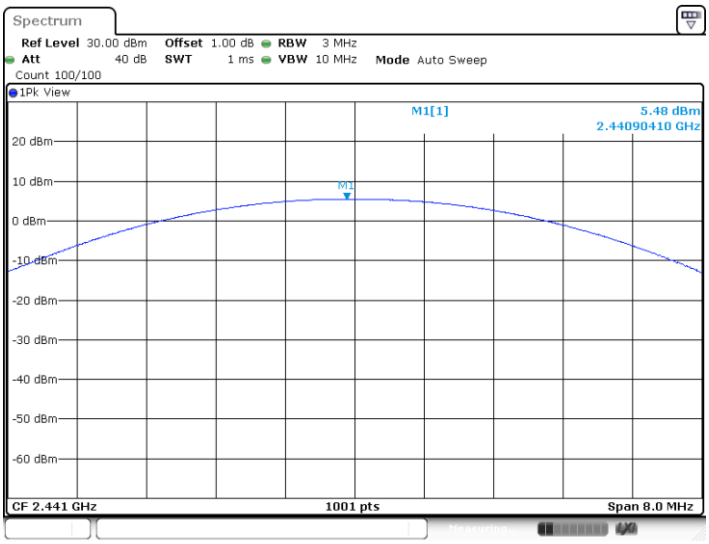
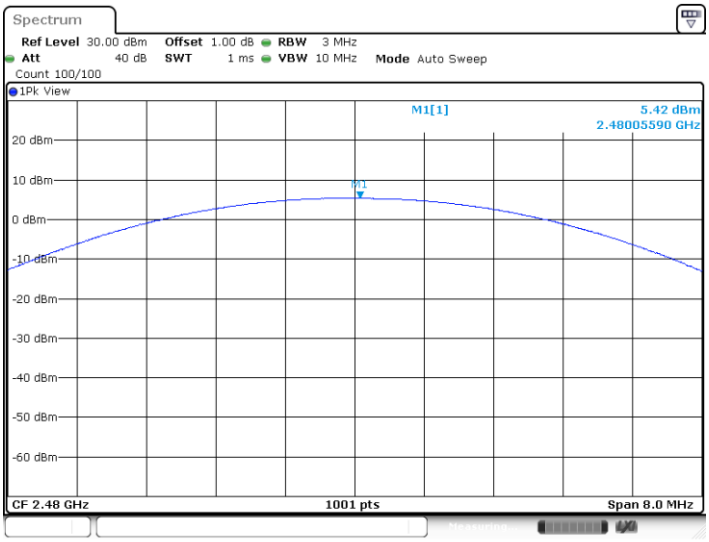
Middle channel 2441MHz



High channel 2480MHz



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9.3 20 dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]
N/A

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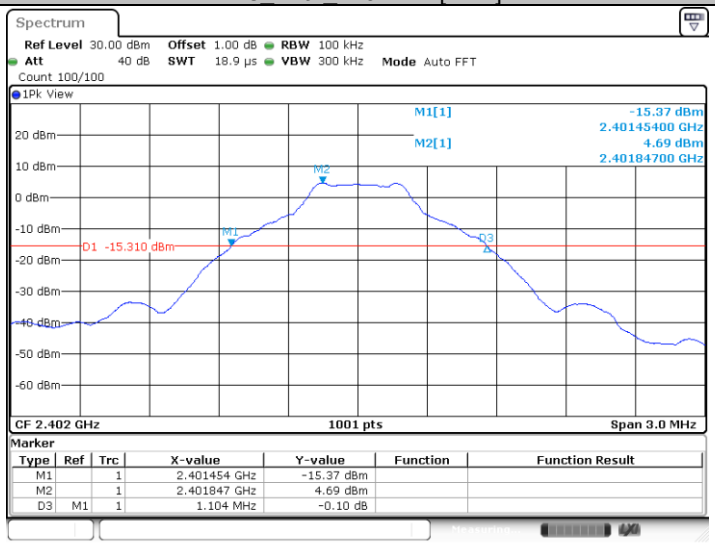
20 dB bandwidth and 99% Occupied Bandwidth

20 dB bandwidth
test result

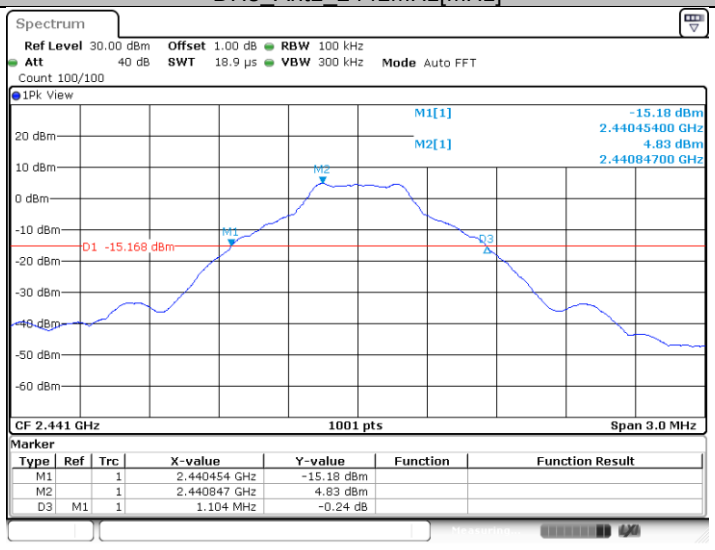
TestMode	Channel[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
GFSK	2402	1.104	2401.454	2402.558	---	PASS
	2441	1.104	2440.454	2441.558	---	PASS
	2480	1.104	2479.454	2480.558	---	PASS
π/4-DQPSK	2402	1.377	2401.310	2402.687	---	PASS
	2441	1.380	2440.310	2441.690	---	PASS
	2480	1.389	2479.310	2480.699	---	PASS

Test Graphs

DH5_Ant1_2402MHz[MHz]



DH5_Ant1_2441MHz[MHz]



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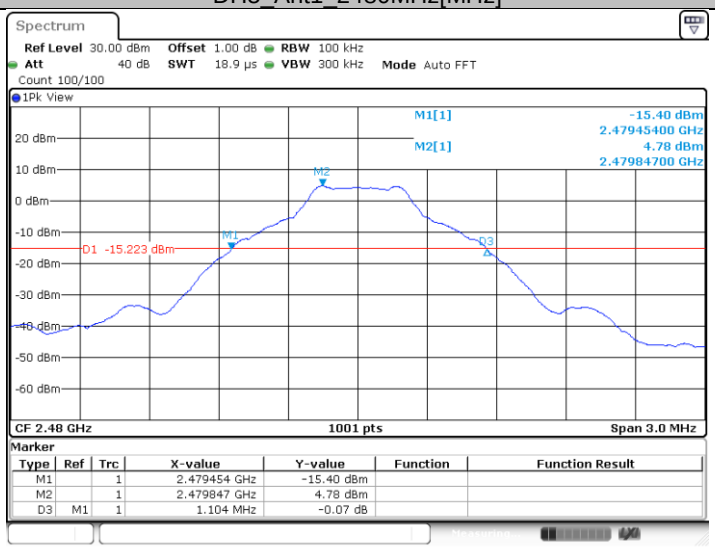
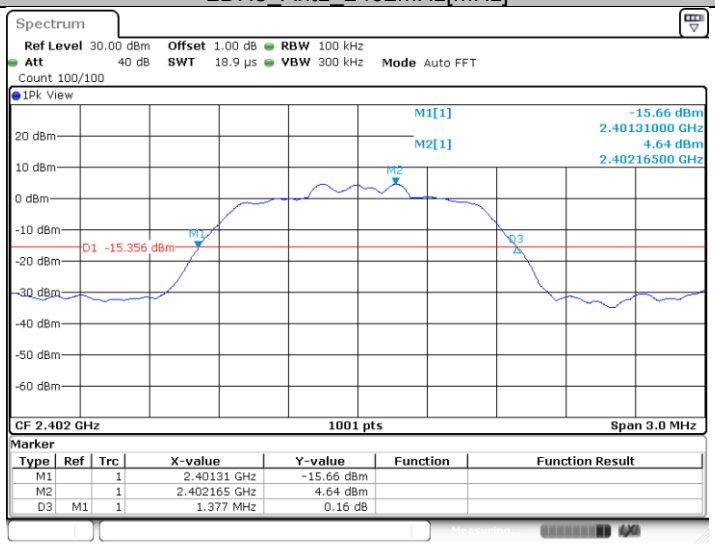
DH5_Ant1_2480MHz[MHz]



Date: 18.OCT.2021 16:37:35

2DH5_Ant1_2402MHz[MHz]



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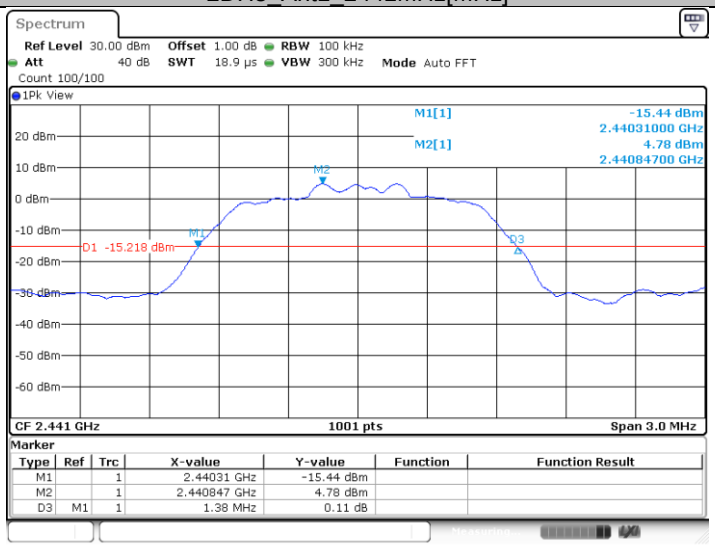
2DH5_Ant1_2441MHz[MHz]



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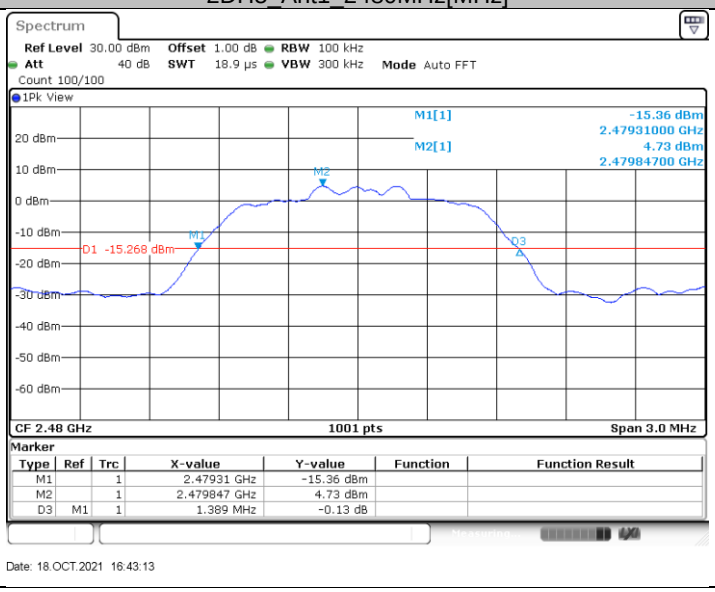
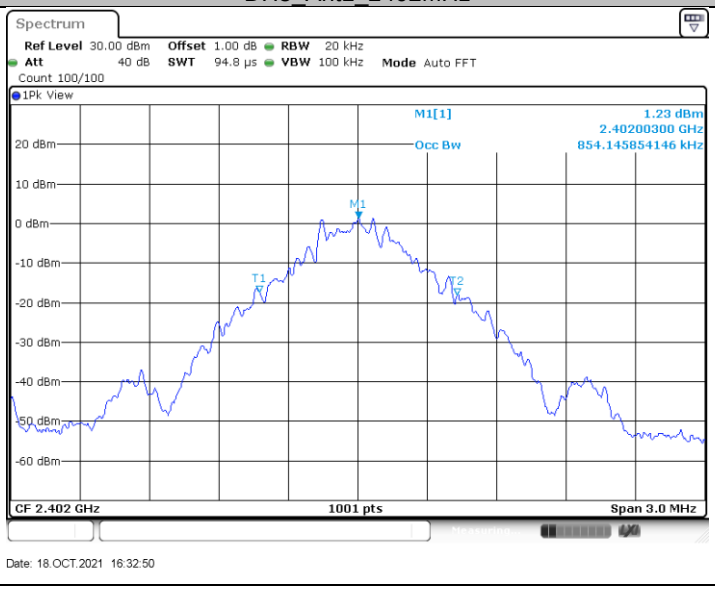
2DH5_Ant1_2480MHz[MHz]


99% Bandwidth
Test result

TestMode	Channel[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
GFSK	2402	0.854	2401.574	2402.429	---	PASS
	2441	0.854	2440.574	2441.429	---	PASS
	2480	0.854	2479.574	2480.429	---	PASS
π/4-DQPSK	2402	1.181	2401.413	2402.593	---	PASS
	2441	1.184	2440.410	2441.593	---	PASS
	2480	1.19	2479.410	2480.599	---	PASS

Test graph

DH5_Ant1_2402MHz


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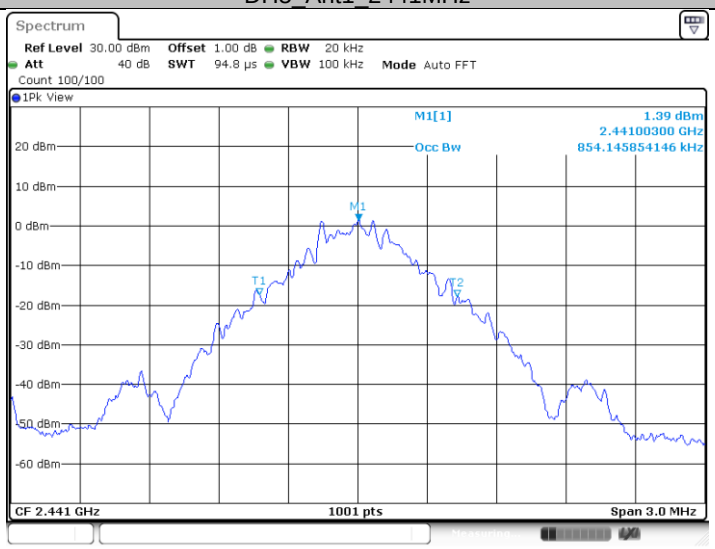
DH5_Ant1_2441MHz



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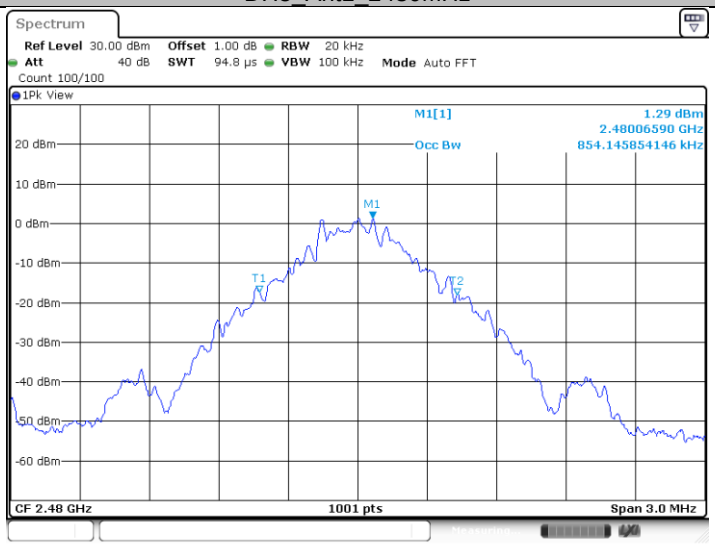
DH5_Ant1_2480MHz



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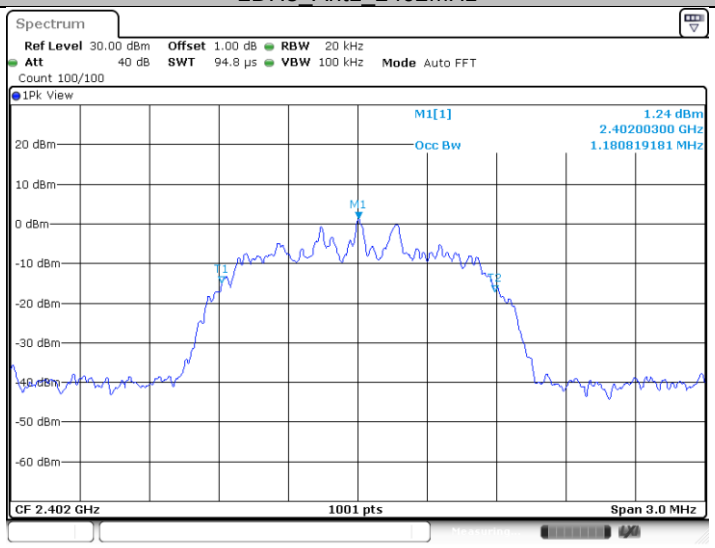
2DH5_Ant1_2402MHz



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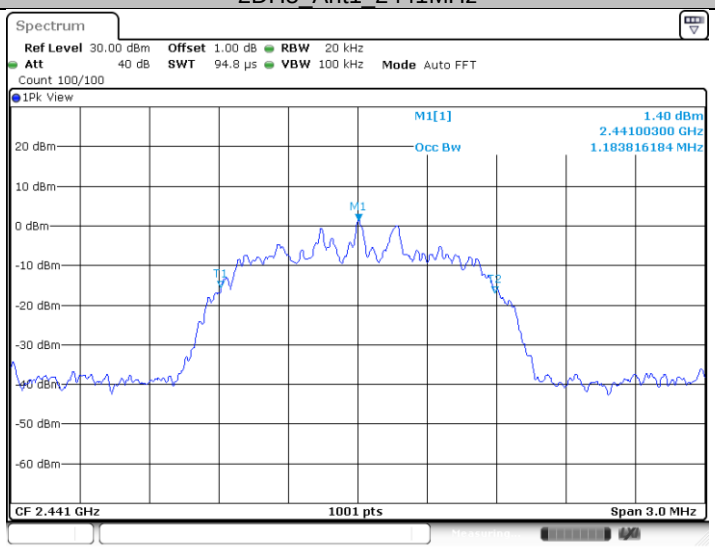
2DH5_Ant1_2441MHz

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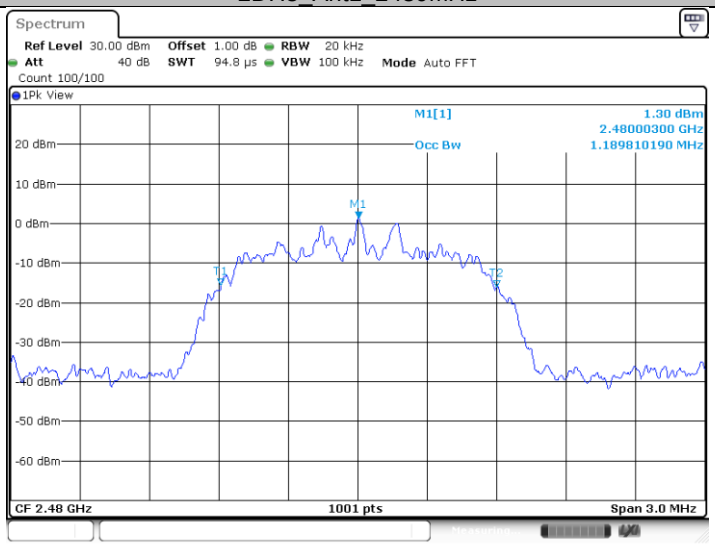

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9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
≥25KHz or 2/3 of the 20 dB bandwidth which is greater

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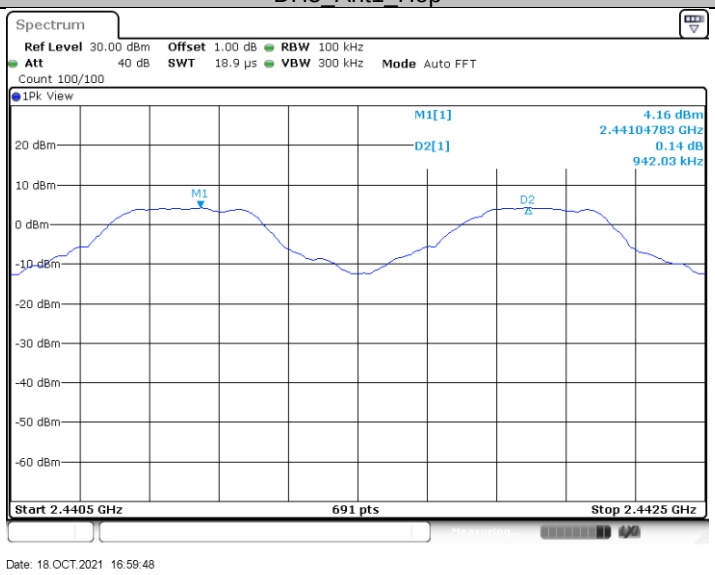
Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status).

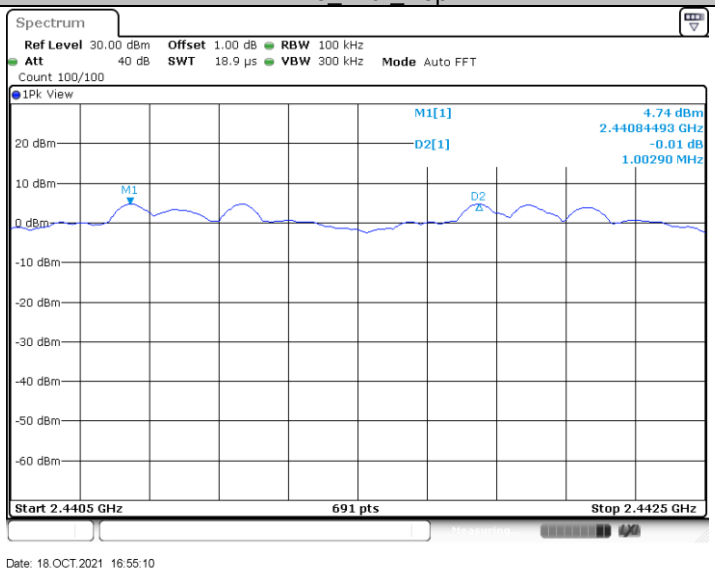
Test result

TestMode	Channel	Result[MHz]	Limit[MHz]	Verdict
GFSK	Hop	0.942	>=0.736	PASS
π/4 QDPSK	Hop	1.003	>=0.926	PASS

DH5_Ant1_Hop



2DH5_Ant1_Hop



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9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
≥ 15

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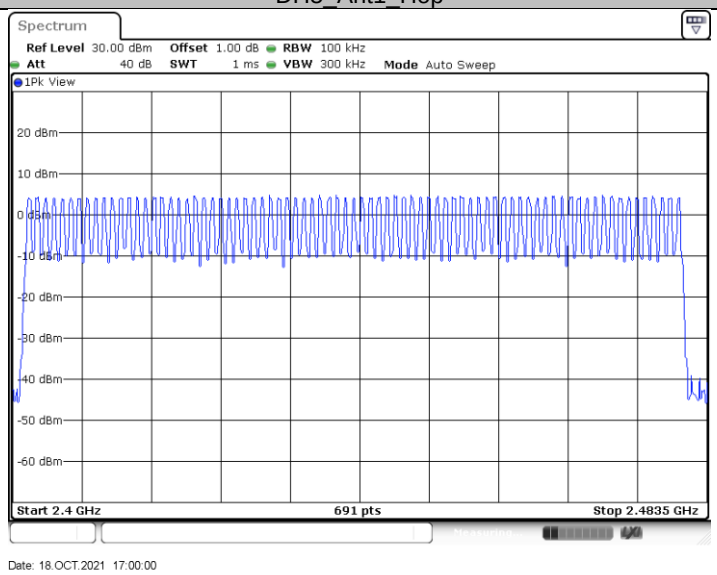
Number of hopping frequencies

Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification.

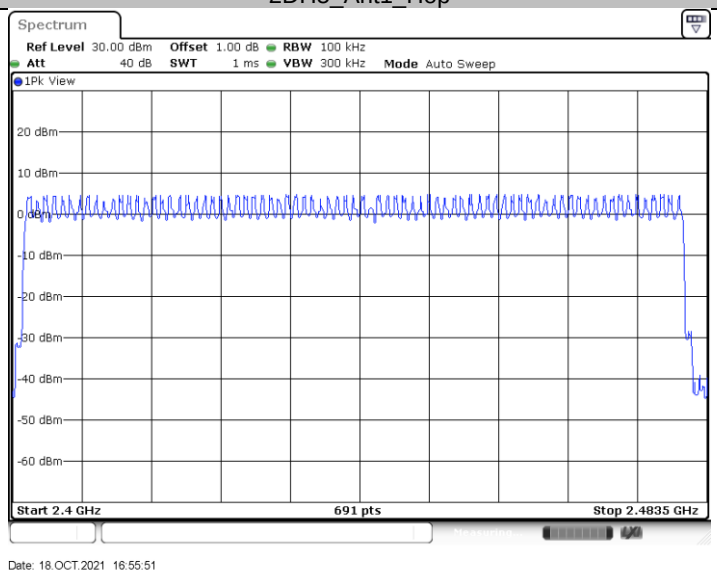
Number of hopping frequencies	Result
79	Pass

Test Graphs

DH5_Ant1_Hop



2DH5_Ant1_Hop



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9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable. Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

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Dwell Time

Dwell time

The maximum dwell time shall be 0.4 s.
According to the Bluetooth Core Specification, the worse result (DH5 mode) was reported to show compliance.

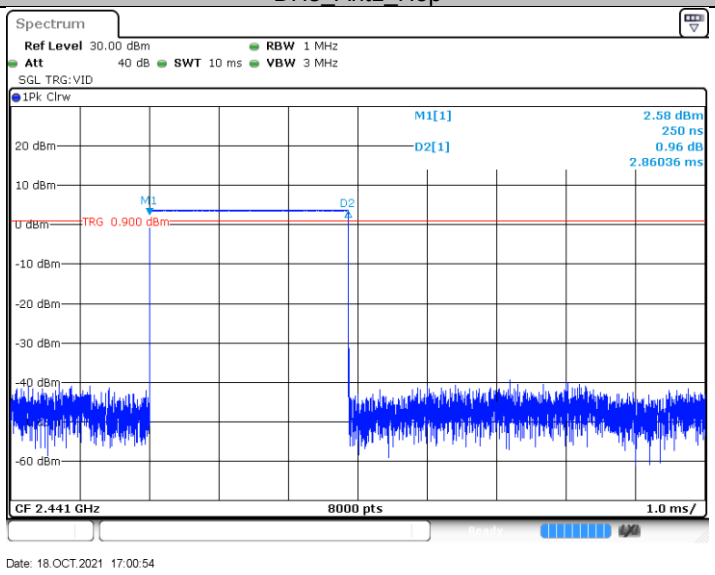
The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

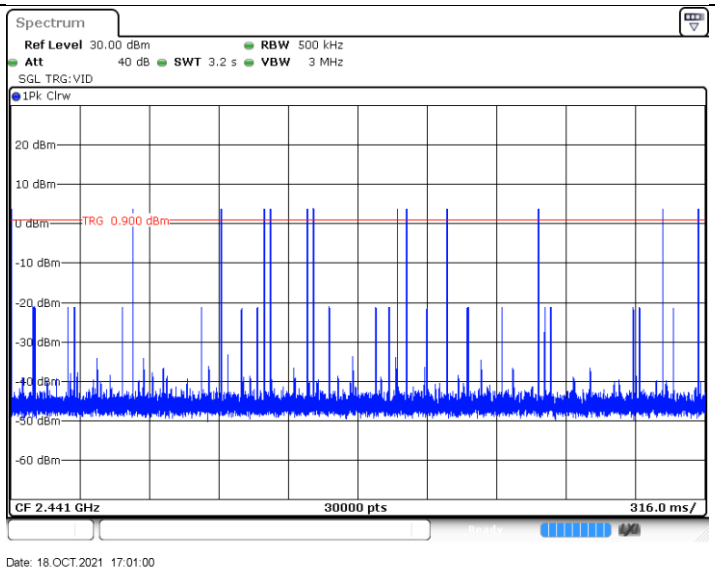
Test Result

TestMode	Channel	BurstWidth	TotalHops	Result[s]	Limit[s]	Verdict
GFSK	Hop	2.86	130	0.372	<=0.4	PASS
π/4 QDPSK	Hop	2.87	60	0.172	<=0.4	PASS

Test Graphs

DH5_Ant1_Hop





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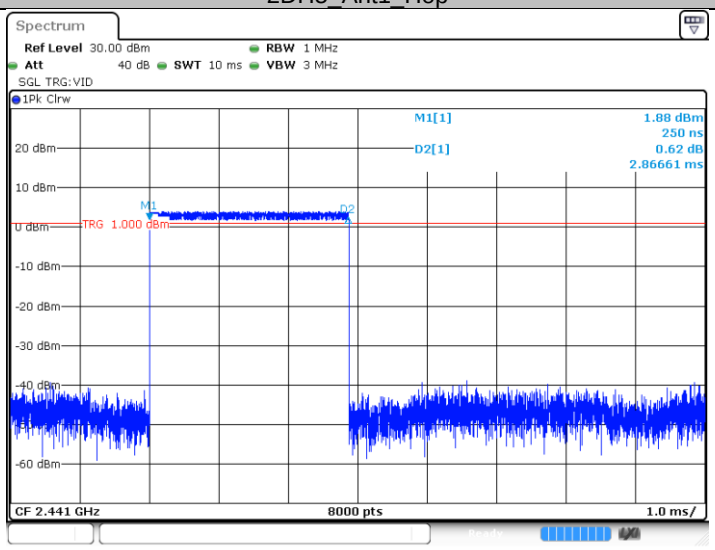
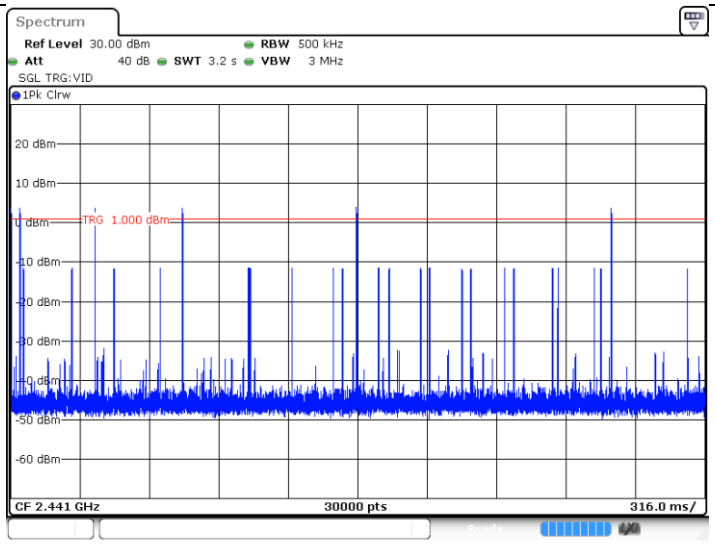
2DH5_Ant1_Hop



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9.7 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
   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.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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Spurious RF conducted emissions

Test Result

TestMode	Channel[MHz]	FreqRange [MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
DH5	2402	Reference	4.70	4.70	---	PASS
		30~1000	30~1000	-58.58	<=-15.3	PASS
		1000~26500	1000~26500	-43.5	<=-15.3	PASS
	2441	Reference	4.84	4.84	---	PASS
		30~1000	30~1000	-58.34	<=-15.16	PASS
		1000~26500	1000~26500	-41.01	<=-15.16	PASS
	2480	Reference	4.76	4.76	---	PASS
		30~1000	30~1000	-58.56	<=-15.24	PASS
		1000~26500	1000~26500	-37.53	<=-15.24	PASS
2DH5	2402	Reference	4.64	4.64	---	PASS
		30~1000	30~1000	-65.52	<=-15.36	PASS
		1000~26500	1000~26500	-33.83	<=-15.36	PASS
	2441	Reference	4.79	4.79	---	PASS
		30~1000	30~1000	-58.03	<=-15.21	PASS
		1000~26500	1000~26500	-44.62	<=-15.21	PASS
	2480	Reference	4.69	4.69	---	PASS
		30~1000	30~1000	-57.88	<=-15.31	PASS
		1000~26500	1000~26500	-44.06	<=-15.31	PASS
3DH5	2402	Reference	4.69	4.69	---	PASS
		30~1000	30~1000	-57.13	<=-15.31	PASS
		1000~26500	1000~26500	-34.44	<=-15.31	PASS
	2441	Reference	4.85	4.85	---	PASS
		30~1000	30~1000	-60.16	<=-15.15	PASS
		1000~26500	1000~26500	-39.04	<=-15.15	PASS
	2480	Reference	4.75	4.75	---	PASS
		30~1000	30~1000	-59.11	<=-15.25	PASS
		1000~26500	1000~26500	-32.08	<=-15.25	PASS

Test Graphs

DH5_Ant1_2402MHz_0~Reference

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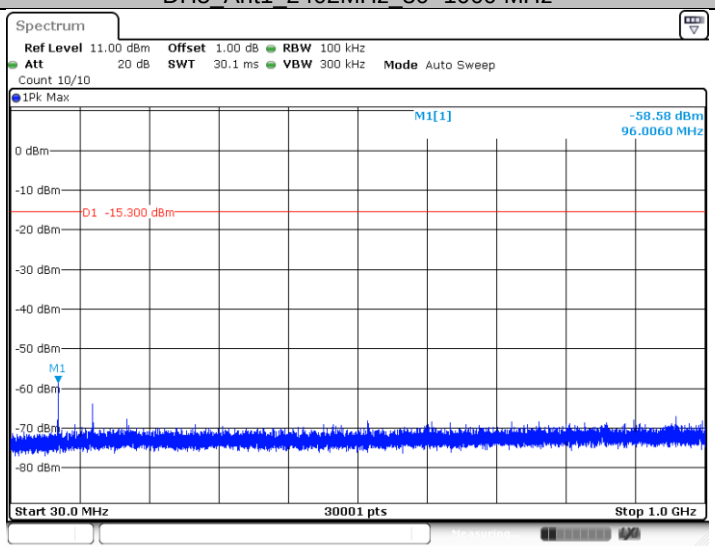
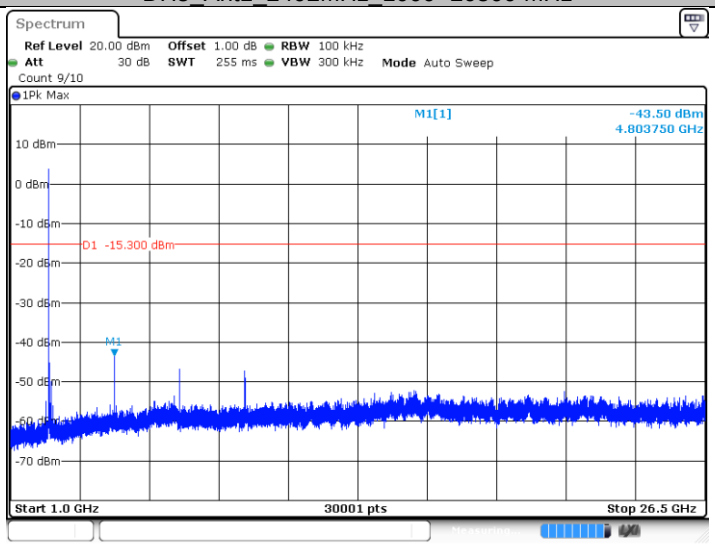
DH5_Ant1_2402MHz_30~1000 MHz



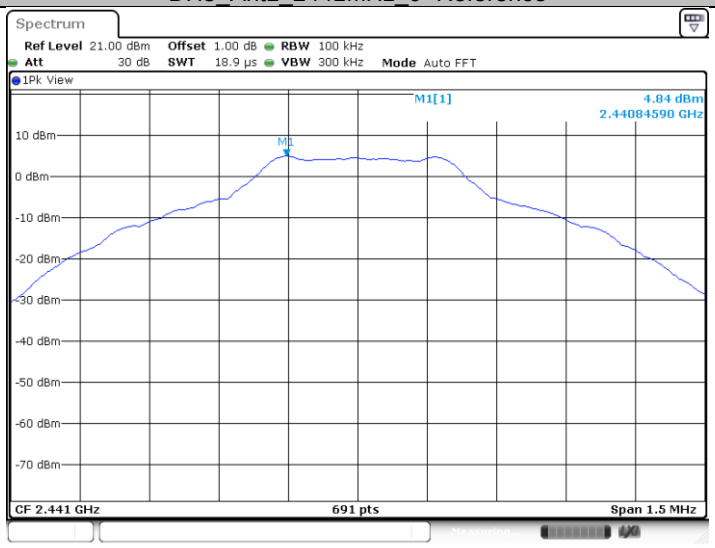
Date: 18.OCT.2021 16:33:12

DH5_Ant1_2402MHz_1000~26500 MHz



Date: 18.OCT.2021 16:33:20

DH5_Ant1_2441MHz_0~Reference



Date: 18.OCT.2021 16:36:14

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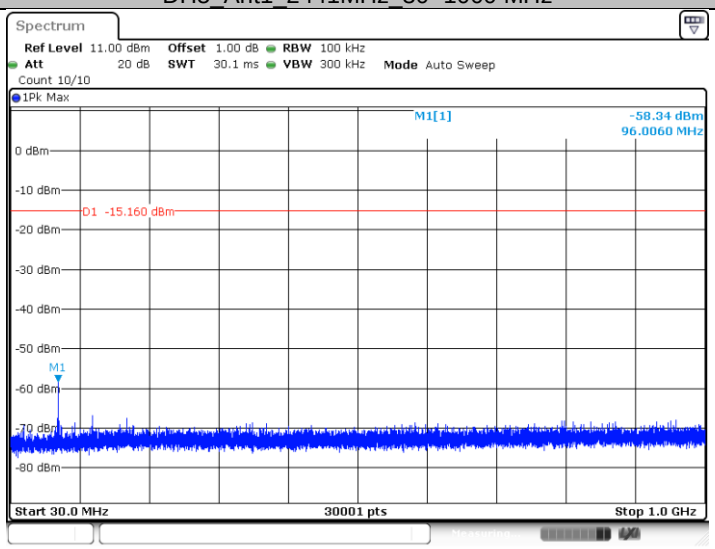
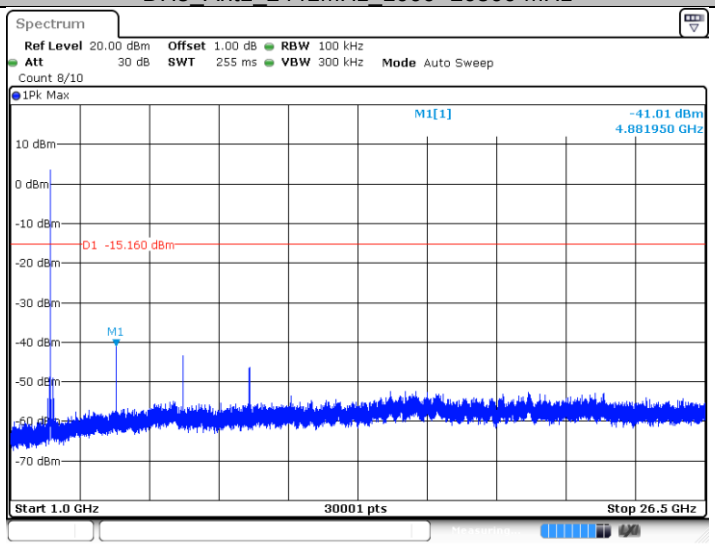
DH5_Ant1_2441MHz_30~1000 MHz



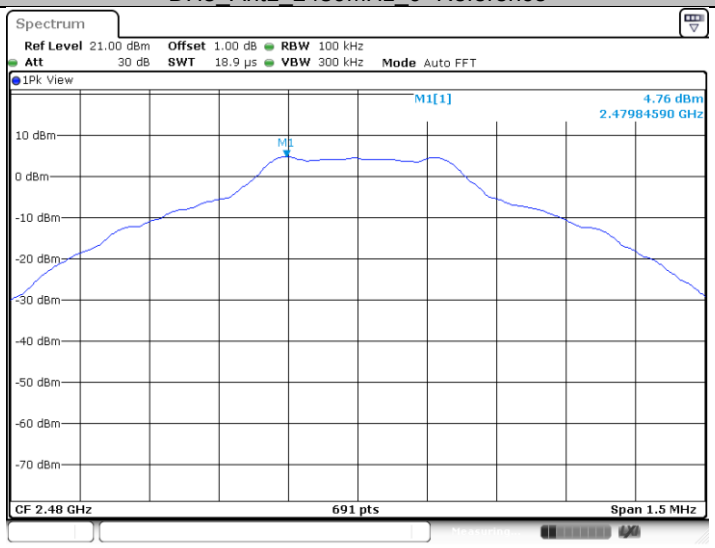
Date: 18.OCT.2021 16:36:20

DH5_Ant1_2441MHz_1000~26500 MHz



Date: 18.OCT.2021 16:36:28

DH5_Ant1_2480MHz_0~Reference



Date: 18.OCT.2021 16:38:00

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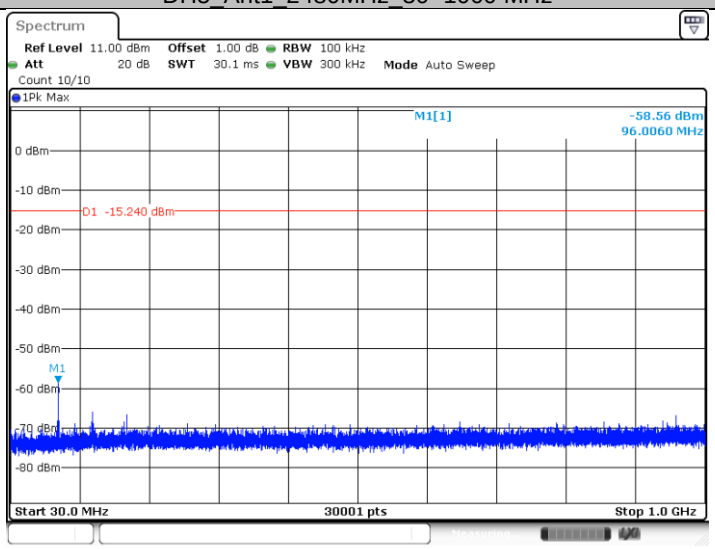
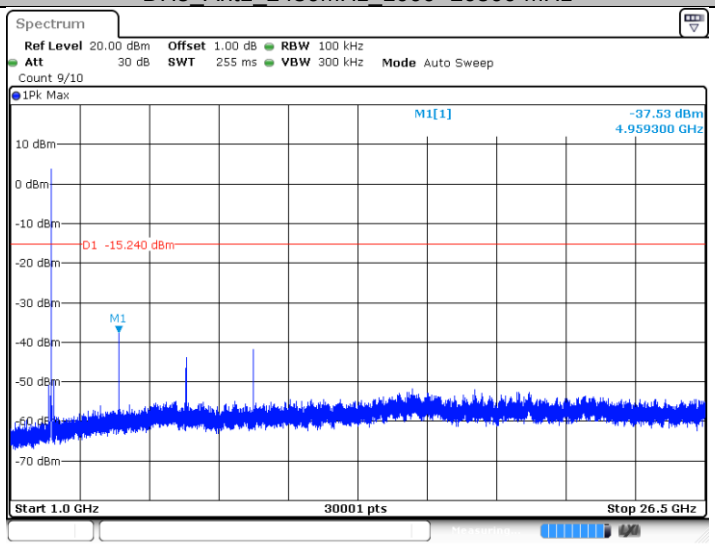
DH5_Ant1_2480MHz_30~1000 MHz



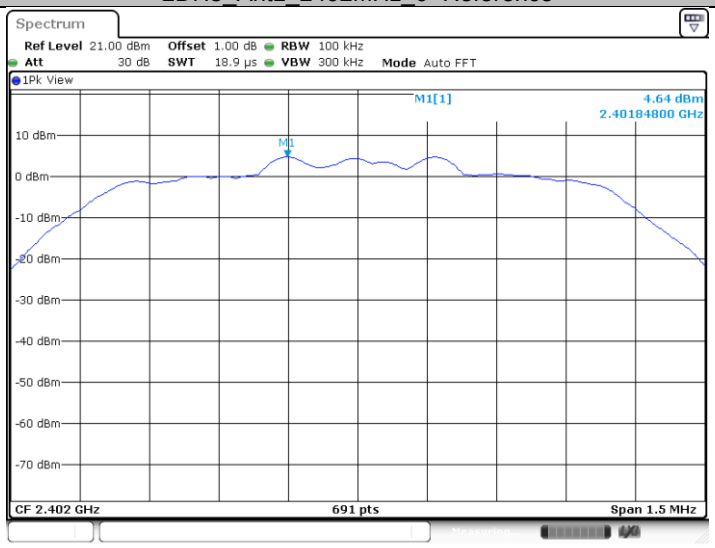
Date: 18.OCT.2021 16:38:06

DH5_Ant1_2480MHz_1000~26500 MHz



Date: 18.OCT.2021 16:38:14

2DH5_Ant1_2402MHz_0~Reference



Date: 18.OCT.2021 16:40:14

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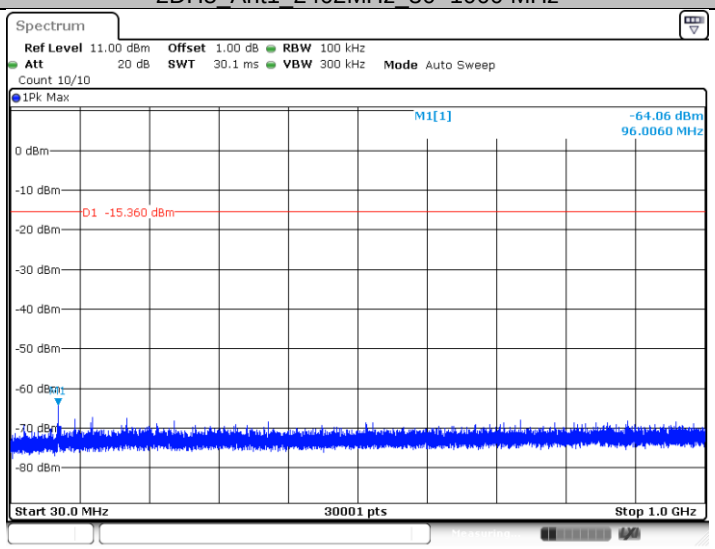
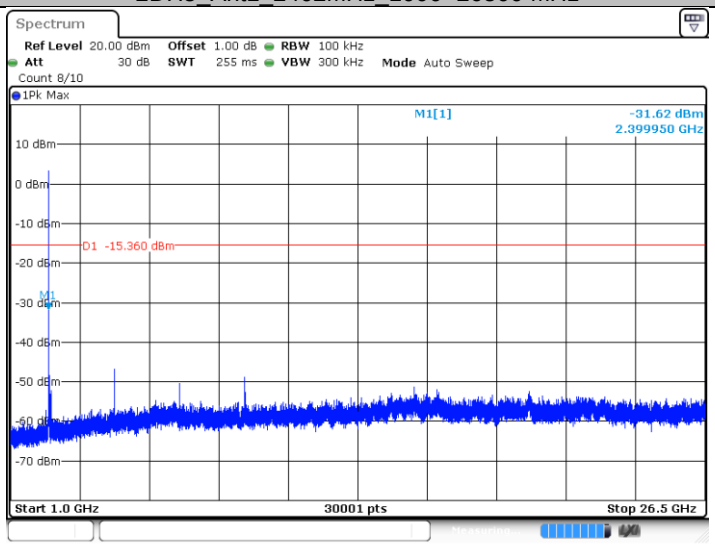
2DH5_Ant1_2402MHz_30~1000 MHz



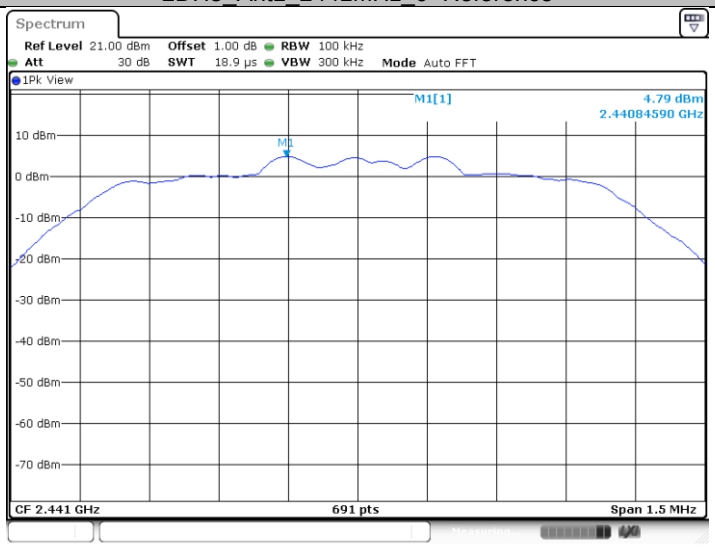
Date: 18.OCT.2021 16:40:20

2DH5_Ant1_2402MHz_1000~26500 MHz



Date: 18.OCT.2021 16:40:28

2DH5_Ant1_2441MHz_0~Reference



Date: 18.OCT.2021 16:41:51

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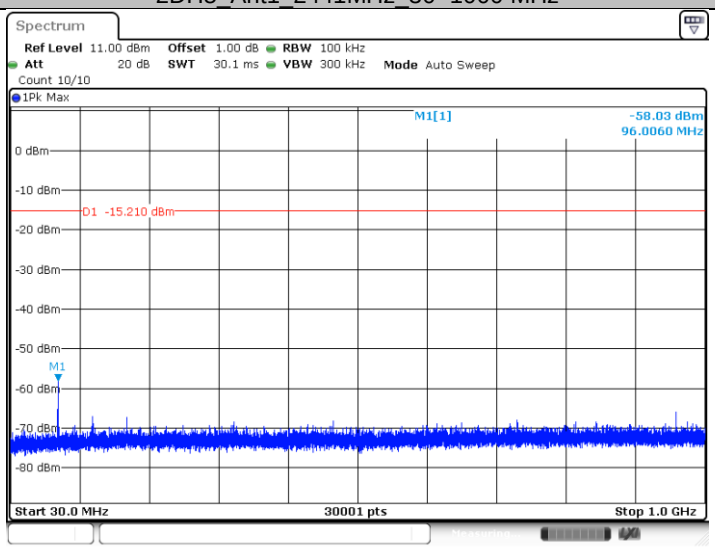
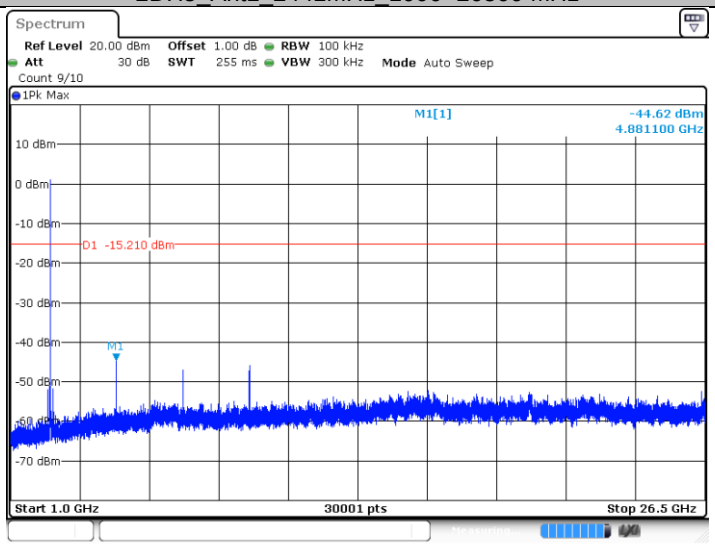
2DH5_Ant1_2441MHz_30~1000 MHz



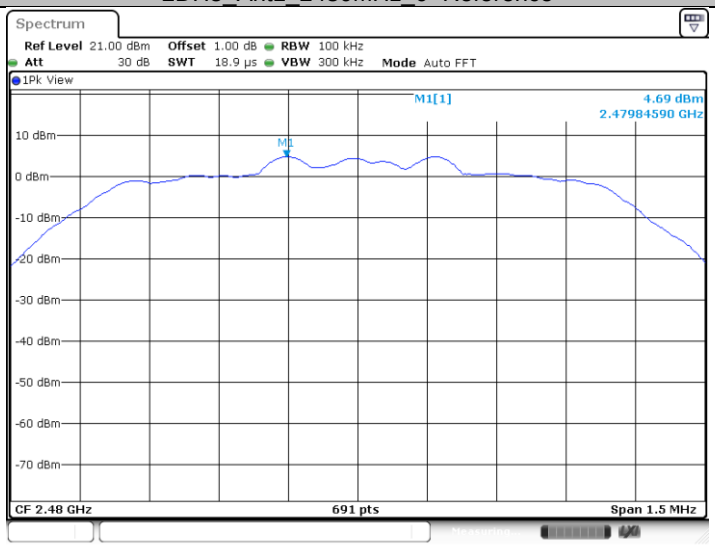
Date: 18.OCT.2021 16:41:57

2DH5_Ant1_2441MHz_1000~26500 MHz



Date: 18.OCT.2021 16:42:05

2DH5_Ant1_2480MHz_0~Reference



Date: 18.OCT.2021 16:43:38

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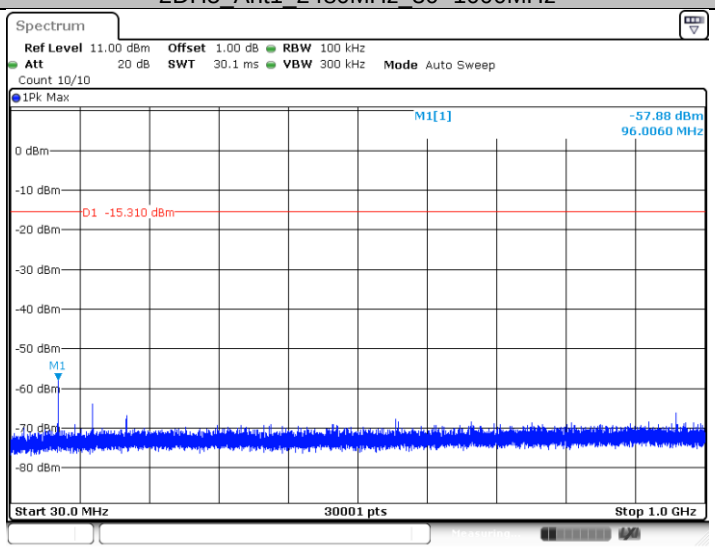
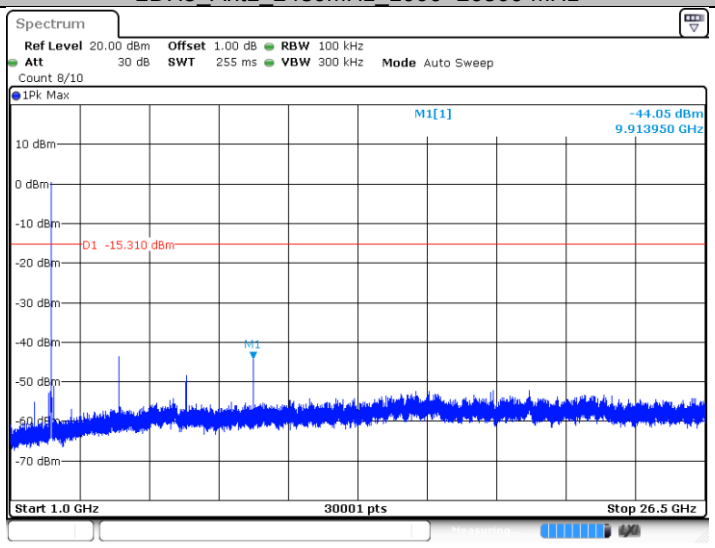
2DH5_Ant1_2480MHz_30~1000MHz

2DH5_Ant1_2480MHz_1000~26500 MHz


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9.8 Band edge testing

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section. .
4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the100 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 that the transmitter demonstrates compliance with the peak conducted power limits.

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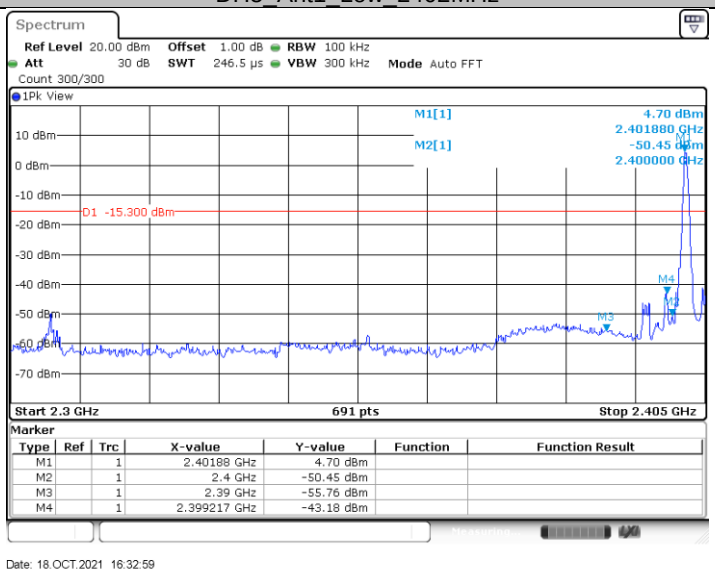
Test Result

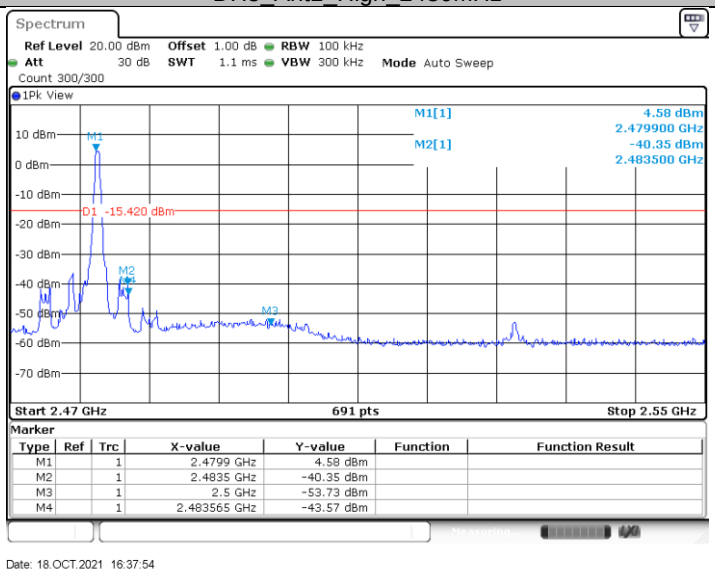
TestMode	ChName	Channel[MHz]	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
GFSK	Low	2402	4.70	-43.18	<=-15.3	PASS
	High	2480	4.58	-43.57	<=-15.42	PASS
	Low	Hop_2402	3.75	-47.82	-16.25	PASS
	High	Hop_2480	4.71	-44.41	-15.29	PASS
π/4 QDPSK	Low	2402	4.63	-44.65	<=-15.37	PASS
	High	2480	4.64	-43.46	<=-15.36	PASS
	Low	Hop_2402	0.77	-52.78	-19.23	PASS
	High	Hop_2480	4.72	-46.68	-15.28	PASS

Test Graphs

DH5_Ant1_Low_2402MHz



DH5_Ant1_High_2480MHz



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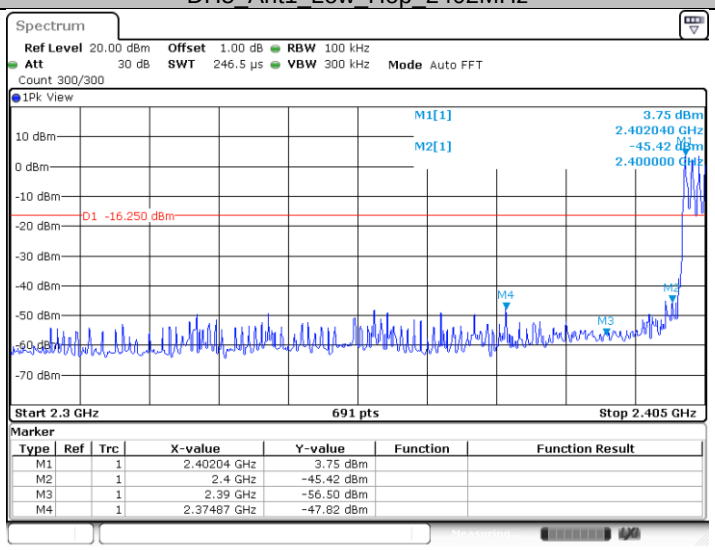
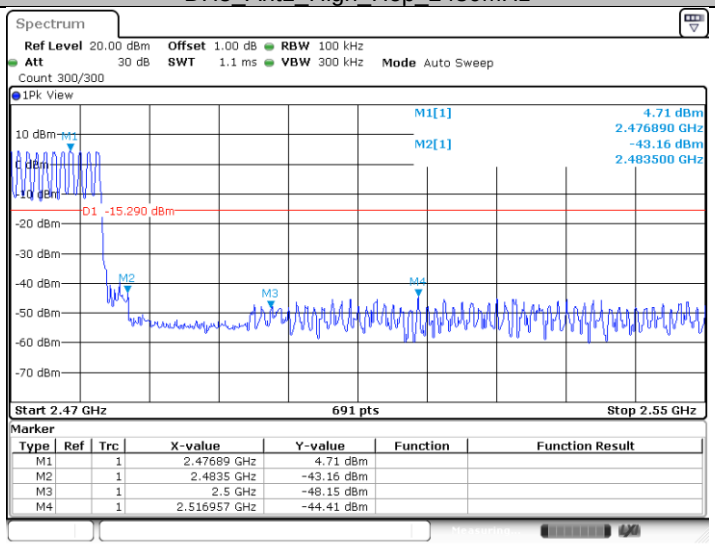
DH5_Ant1_Low_Hop_2402MHz



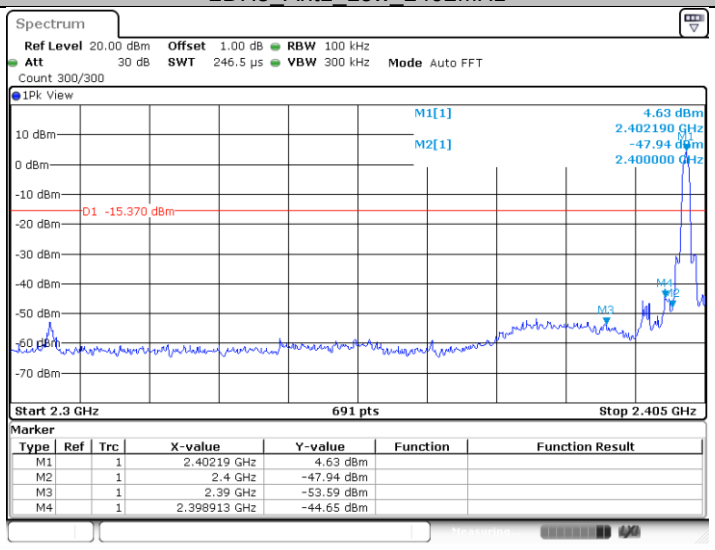
Date: 18.OCT.2021 16:59:33

DH5_Ant1_High_Hop_2480MHz



Date: 18.OCT.2021 17:00:31

2DH5_Ant1_Low_2402MHz



Date: 18.OCT.2021 16:40:09

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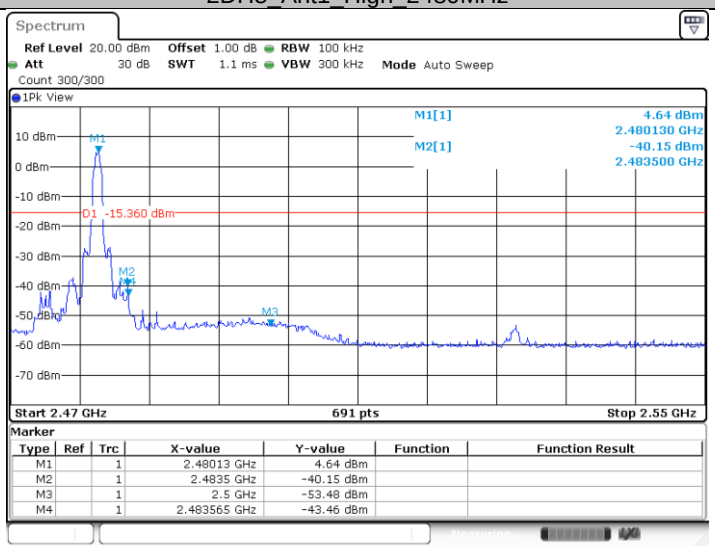
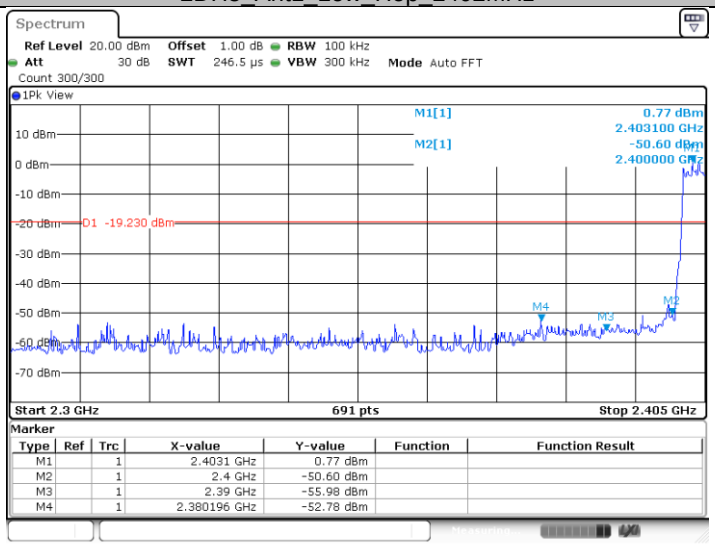
2DH5_Ant1_High_2480MHz



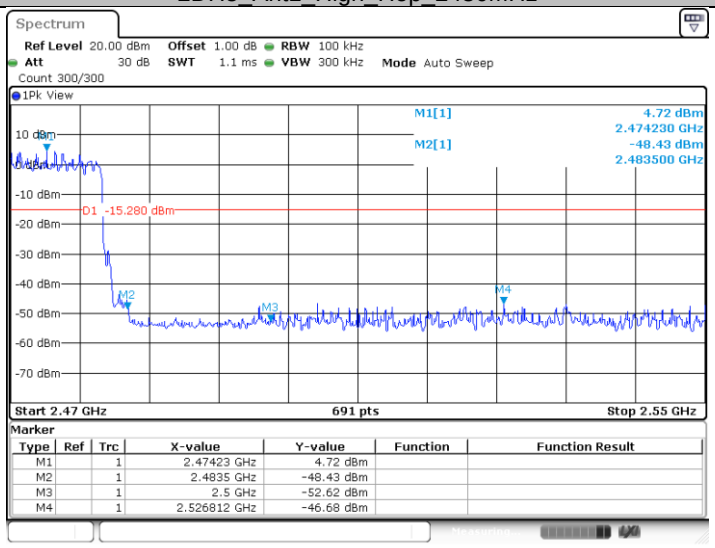
Date: 18.OCT.2021 16:43:33

2DH5_Ant1_Low_Hop_2402MHz



Date: 18.OCT.2021 16:52:49

2DH5_Ant1_High_Hop_2480MHz



Date: 18.OCT.2021 16:56:21

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9.9 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna 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.

4: 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.

5: Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW=10Hz, Sweep = auto, Detector function = peak, Trace = max hold.

If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit.

If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correct factor, derived from the appropriate the duty cycle calculation.

The setting method can refer to DA00-705.

Limit

The radio emission outside the operating frequency band 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. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

Below 1G:

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
49.400000	20.26	40.00	19.74	H	20.97
107.236250	17.95	43.50	25.55	H	19.07
191.990000	25.11	43.50	18.39	H	18.56
413.938125	24.51	46.00	21.49	H	24.65
584.718750	29.42	46.00	16.58	H	28.13
958.653750	34.11	46.00	11.89	H	32.61
32.243125	23.63	40.00	16.37	V	17.16
56.675000	18.85	40.00	21.15	V	20.44
96.990625	17.80	43.50	25.70	V	18.62
196.355000	19.55	43.50	23.95	V	19.37
335.974375	23.03	46.00	22.97	V	22.80
556.770625	28.39	46.00	17.61	V	27.06
915.731250	34.03	46.00	11.97	V	32.68

Above 1G:
GFSK Modulation 2402MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2306.190476	45.61	74.00	28.39	H	-2.46
2617.619048	45.98	74.00	28.02	H	-1.45
4800.500000	42.45	74.00	31.55	H	3.52
8336.000000	42.57	74.00	31.43	H	8.39
9602.000000	48.46	74.00	25.54	H	9.75
16843.000000	49.37	74.00	24.63	H	19.47
1803.333333	43.01	74.00	30.99	V	-5.25
2819.047619	46.33	74.00	27.67	V	-1.05
3511.500000	37.66	74.00	36.34	V	-0.27
4801.000000	44.63	74.00	29.37	V	3.52
7200.000000	42.09	74.00	31.91	V	7.31
9908.000000	44.19	74.00	29.81	V	11.00

GFSK Modulation 2441MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
2517.619048	46.07	74.00	27.93	V	-1.76
2845.238095	45.48	74.00	28.52	V	-1.05
4879.000000	47.54	74.00	26.46	V	3.69
7317.500000	41.71	74.00	32.29	V	7.48
8612.500000	41.76	74.00	32.24	V	8.73
10434.000000	45.53	74.00	28.47	V	10.79
2033.333333	42.87	74.00	31.13	H	-3.73
2679.047619	46.46	74.00	27.54	H	-1.36
4879.000000	41.42	74.00	32.58	H	3.69
6262.500000	39.88	74.00	34.12	H	7.03
7317.000000	42.42	74.00	31.58	H	7.48
9758.000000	46.84	74.00	27.16	H	10.06

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GFSK Modulation 2480MHz Test Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Corr. (dB/m)
1677.619048	39.28	74.00	34.72	H	-6.97
2383.809524	45.65	74.00	28.35	H	-2.25
2812.857143	46.19	74.00	27.81	H	-1.06
4957.000000	43.88	74.00	30.12	H	3.81
7434.500000	44.24	74.00	29.76	H	7.60
9914.500000	51.71	74.00	22.29	H	10.89
1000.000000	33.35	54.00	40.65	V	-11.04
2688.571429	46.69	74.00	27.31	V	-1.35
4590.500000	39.84	74.00	34.16	V	2.93
4957.000000	43.00	74.00	31.00	V	3.81
7434.500000	42.37	74.00	31.63	V	7.60
9914.500000	48.16	74.00	25.84	V	10.89

Remark:

(1) The report only shows the worst test case GSFK mode.

(2) Data of measurement within frequency range18-26GHz are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report;

(3) Level=Reading Level + Correction Factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

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10 Test Equipment List

List of Test Instruments

Radiated Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	102176	2022-6-4
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2022-7-23
Horn Antenna	Rohde & Schwarz	HF907	102294	2022-6-23
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2022-6-6
Attenuator	Mini-circuits	UNAT-6+	15542	2022-8-23
3m Semi-anechoic chamber	TDK	SAC-3 #1	----	2023-5-28
Test software	Rohde & Schwarz	EMC32	Version10.35.02	N/A

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2022-6-4
LISN	Rohde & Schwarz	ENV432	101318	2022-6-5
High Voltage Probe	Schwarzbeck	TK9420(VT9420)	9420-584	2022-6-5
RF Current Probe	Rohde & Schwarz	EZ-17	100816	2022-6-5
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2022-6-3
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A
Shielding Room	TDK	CSR #1	----	2022-11-07

TS8997 Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Generator	Rohde & Schwarz	SMB100A	108272	2022-6-3
Vector Signal Generator	Rohde & Schwarz	SMBV100A	262825	2022-6-3
Communication Synthetical Test Instrument	Rohde & Schwarz	CMW 270	101251	2022-6-3
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2022-6-3
Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2022-6-3
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	101226/100851	2022-6-3
Power Splitter	Weinschel	1580	SC319	2022-6-3
10dB Attenuator	Weinschel	4M-10	43152	2022-6-3
10dB Attenuator	R&S	DNF	DNF-001	2022-6-3
10dB Attenuator	R&S	DNF	DNF-002	2022-6-3
10dB Attenuator	R&S	DNF	DNF-003	2022-6-3
10dB Attenuator	R&S	DNF	DNF-004	2022-6-3
Test software	Rohde & Schwarz	EMC32	Version 10.60.10	N/A
Test software	Tonscend	System for BT/WIFI	Version 2.6.77.0518	N/A
Shielding Room	TDK	TS8997	----	2022-11-07

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.31dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.68dB; Vertical: 4.65dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.77dB; Vertical: 4.75dB;
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.28dB; Vertical: 4.36dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.26dB; Vertical: 4.25dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.51dB; Vertical: 4.50dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.27dB Frequency test involved: 0.6×10^{-7} or 1%

Remark:
Measurement Uncertainty Decision Rule
Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2007, clause 4.4.3 and 4.5.1.

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