



## FCC/ISED - TEST REPORT

Report Number : **68.950.22.0766.01** Date of Issue: October 25, 2022

Model : QS02

Product Type : BenQ HDMI Media Streaming

Applicant : Benq Corporation

Address : 16 Jihu Road, Neihu, Taipei 114, Taiwan

Manufacturers : Benq Corporation

Address : 16 Jihu Road, Neihu, Taipei 114, Taiwan

Test Result :  **Positive**       **Negative**

Total pages including Appendices : 67

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# 1 Table of Contents

1	Table of Contents .....	2
2	Details about the Test Laboratory.....	3
3	Description of the Equipment Under Test.....	4
4	Summary of Test Standards .....	5
5	Summary of Test Results .....	6
6	General Remarks .....	7
7	Test Setups.....	8
8	Systems test configuration .....	9
9	Technical Requirement .....	10
9.1	Conducted Emission.....	10
9.2	Conducted peak output power and e.i.r.p.....	13
9.3	20 dB bandwidth and 99% Occupied Bandwidth.....	20
9.4	Carrier Frequency Separation .....	30
9.5	Number of hopping frequencies.....	33
9.6	Dwell Time .....	35
9.7	Spurious RF conducted emissions.....	40
9.8	Band edge testing .....	51
9.9	Spurious radiated emissions for transmitter.....	56
10	Test Equipment List.....	66
11	System Measurement Uncertainty .....	67



## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

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

Telephone: 86 755 8828 6998  
Fax: 86 755 8288 5299

FCC Registration No.: 514049  
ISED test site number: 10320A

### 3 Description of the Equipment Under Test

Product/PMN:	BenQ HDMI Media Streaming
Model no/HVIN:	QS02
FVIN:	11.1.7
FCC ID	JVPQS02
IC:	6175A-QS02
Options and accessories:	HDMI Cable, USB Cable
Rating:	Input: 5.0VDC, 1.0A
RF Transmission Frequency:	Bluetooth BR+EDR: 2402-2480MHz Bluetooth LE: 2402-2480MHz Wi-Fi 2.4G: 2412-2462MHz Wi-Fi 5G: 5150MHz~5350MHz; Wi-Fi 5G: 5470MHz – 5725MHz Wi-Fi 5G: 5725MHz – 5850MHz. Note: until further notice, device subject to this section shall not be capable of transmitting in the band 5600-5650MHz. This restriction is for the protection of Environment Canada's weather radars operating in this band.
No. of Operated Channel:	79
Modulation:	GFSK, $\pi/4$ -DQPSK, 8-DPSK
Antenna Type:	PIFA antenna
Antenna Gain:	2.59dBi
Description of the EUT:	The Equipment Under Test (EUT) is a BenQ HDMI Media Streaming support Bluetooth function.

## 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
RSS-Gen Issue 5, Amendment 2, February 2021	General Requirements for the Certification of Radio Apparatus
RSS-247 Issue 2 February 2017	Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure, KDB558074 D01 v05r02 and ANSI C63.10-2013.



## 5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C/ RSS-247 Issue 2/RSS-Gen Issue 5				
Test Condition			Test Site	Test Result
§15.207	RSS-GEN 8.8	Conducted emission AC power port	Site 1	PASS
§15.247(b)(1)	RSS-247 Clause 5.4(b)	Conducted peak output power and e.i.r.p.	Site 1	PASS
§15.247(e)	RSS-247 Clause 5.2(b)	Power spectral density	--	N/A
§15.247(a)(2)	RSS-247 Clause 5.2(a)	6dB bandwidth	--	N/A
§15.247(a)(1)	RSS-247 Clause 5.1(a) & RSS-Gen 6.7	20dB bandwidth and 99% Occupied Bandwidth	Site 1	PASS
§15.247(a)(1)	RSS-247 Clause 5.1(b)	Carrier frequency separation	Site 1	PASS
§15.247(a)(1)(iii)	RSS-247 Clause 5.1(d)	Number of hopping frequencies	Site 1	PASS
§15.247(a)(1)(iii)	RSS-247 Clause 5.1(d)	Dwell Time	Site 1	PASS
§15.247(d)	RSS-247 Clause 5.5	Spurious RF conducted emissions	Site 1	PASS
§15.247(d)	RSS-247 Clause 5.5	Band edge	Site 1	PASS
§15.247(d) & §15.209 & §15.205	RSS-247 Clause 5.5 & RSS-GEN 6.13 RSS-GEN 8.9 RSS-GEN 8.10	Spurious radiated emissions for transmitter and receiver	Site 1	PASS
§15.203	RSS-GEN 6.8	Antenna requirement	See note 2	PASS

Note 1: N/A=Not Applicable.

Note 2: The EUT uses PIFA antenna, which gain is 2.59dBi. In accordance to §15.203 and RSS-GEN 6.8, it is considered sufficiently to comply with the provisions of this section.



## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: JVPQS02, IC: 6175A-QS02 complies with Section 15.205, 15.207, 15.209, 15.247 of the FCC Part 15, Subpart and RSS-247 issue 2 and RSS-Gen issue 5 rules.

Note: The report is for BDR+EDR only.

### SUMMARY:

All tests according to the regulations cited on page 6 were

n - Performed

o - **Not** Performed

The Equipment Under Test

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

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

Sample Received Date: July 22, 2022

Testing Start Date: July 22, 2022

Testing End Date: October 14, 2022

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:

John Zhi  
EMC Project Manager

Prepared by:

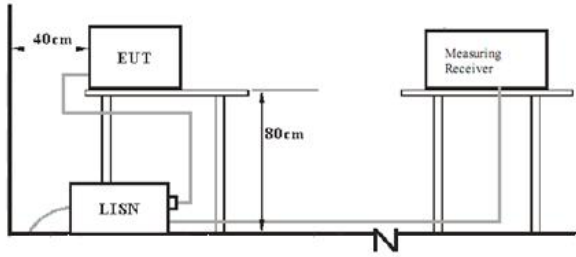
Mark Chen  
EMC Project Engineer

Tested by:

Carry Cai  
EMC Test Engineer

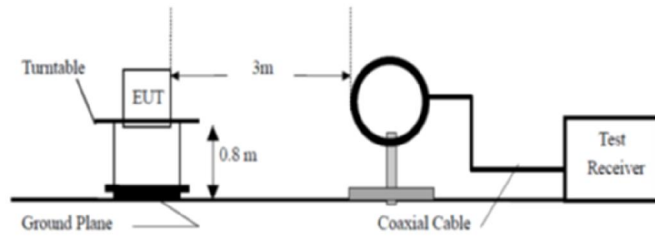
## 7 Test Setups

### 7.1 AC Power Line Conducted Emission test setups

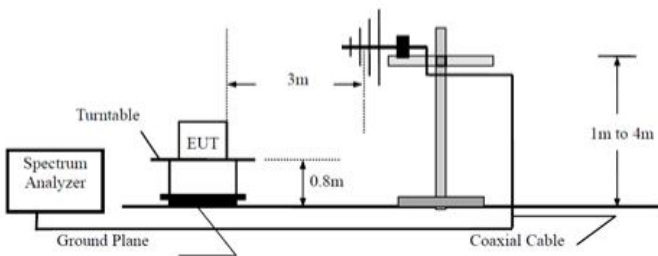


### 7.2 Radiated test setups

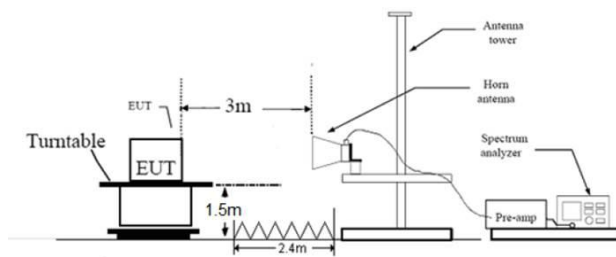
#### 9KHz-30MHz



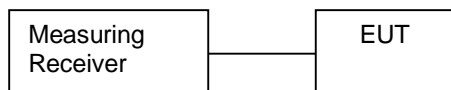
#### Below 1GHz



#### Above 1GHz



### 7.3 Conducted RF test setups





## 8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.	S/N
Notebook	Lenovo	X220	---
Display	DELL	---	---
Remote Control	---	---	---

Test software: APK Test Tool, which used to control the EUT in continues transmitting mode

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power.

## 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 a 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

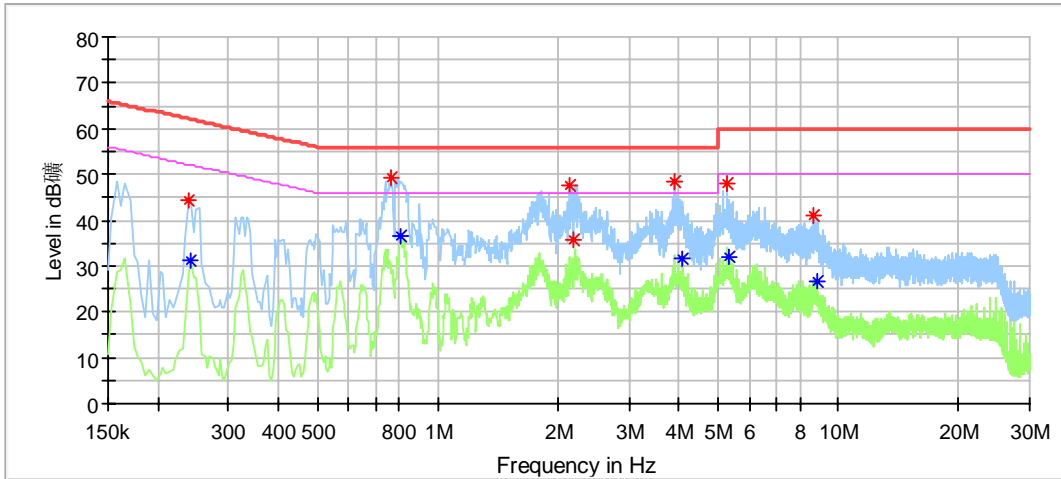
Frequency MHz	QP Limit dB $\mu$ V	AV Limit dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

\*Decreasing linearly with logarithm of the frequency.



## Conducted Emission

Product Type : BenQ HDMI Media Streaming  
 M/N : QS02  
 Operating Condition : Normal working with transmitting  
 Test specification : Live  
 Comment : AC 120V/60Hz



### Critical Freqs

Frequency (MHz)	MaxPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Corr. (dB/m)
0.238000	44.27	---	62.17	17.90	L1	9.23
0.242000	---	31.31	62.03	30.71	L1	9.23
0.766000	49.12	---	56.00	6.88	L1	9.20
0.806000	---	36.48	56.00	19.52	L1	9.20
2.134000	47.55	---	56.00	8.45	L1	9.23
2.178000	35.59	---	56.00	20.41	L1	9.23
3.902000	48.37	---	56.00	7.63	L1	9.28
4.094000	---	31.60	56.00	24.40	L1	9.28
5.266000	47.90	---	60.00	12.10	L1	9.31
5.362000	---	32.02	60.00	27.98	L1	9.32
8.674000	41.17	---	60.00	18.83	L1	9.38
8.870000	---	26.47	60.00	33.53	L1	9.38

Remark:

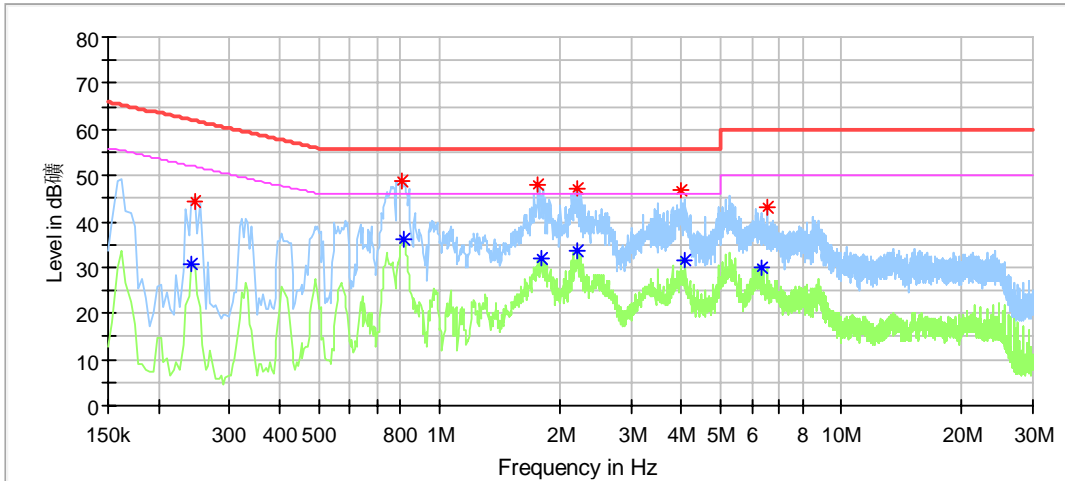
Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

## Conducted Emission

Product Type : BenQ HDMI Media Streaming  
 M/N : QS02  
 Operating Condition : Normal working with transmitting  
 Test specification : Neutral  
 Comment : AC 120V/60Hz



### Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB/m)
0.242000	---	30.68	62.03	31.35	N	9.39
0.246000	44.40	---	61.89	17.50	N	9.39
0.806000	48.88	---	56.00	7.12	N	9.39
0.818000	---	36.02	56.00	19.98	N	9.39
1.762000	47.83	---	56.00	8.17	N	9.41
1.798000	---	32.08	56.00	23.92	N	9.41
2.206000	---	33.53	56.00	22.47	N	9.42
2.210000	47.12	---	56.00	8.88	N	9.42
3.994000	46.85	---	56.00	9.15	N	9.47
4.090000	---	31.53	56.00	24.47	N	9.47
6.334000	---	30.06	60.00	29.94	N	9.54
6.530000	43.01	---	60.00	16.99	N	9.54

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)



## 9.2 Conducted peak output power and e.i.r.p.

### 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:

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

#### For e.i.r.p.:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤4	≤36

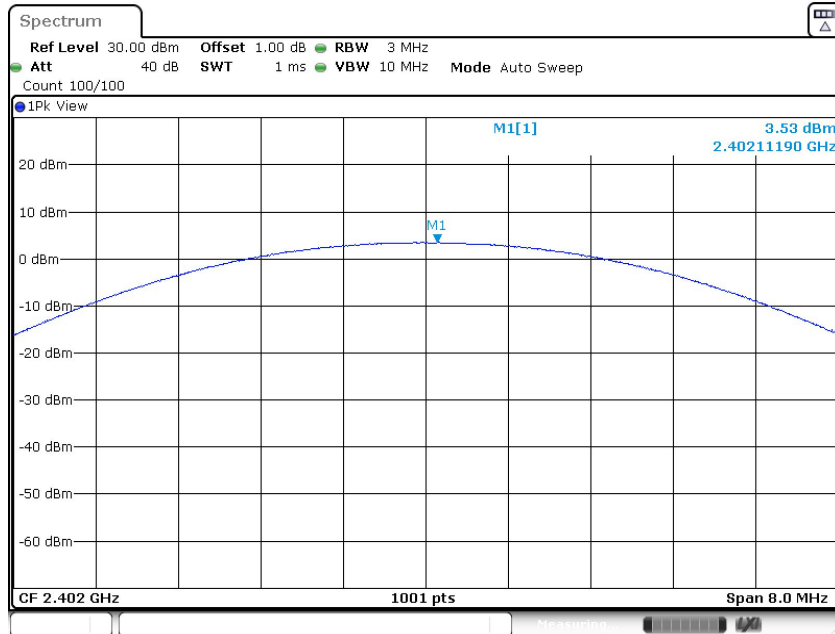
$EIRP(dBm) = \text{conducted output power (dBm)} + \text{antenna gain (dBi)}$

**Conducted peak output power**

Bluetooth Mode GFSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	e.i.r.p. dBm	Result
Low channel 2402MHz	3.53	6.12	Pass
Middle channel 2441MHz	2.32	4.91	Pass
High channel 2480MHz	3.07	5.66	Pass

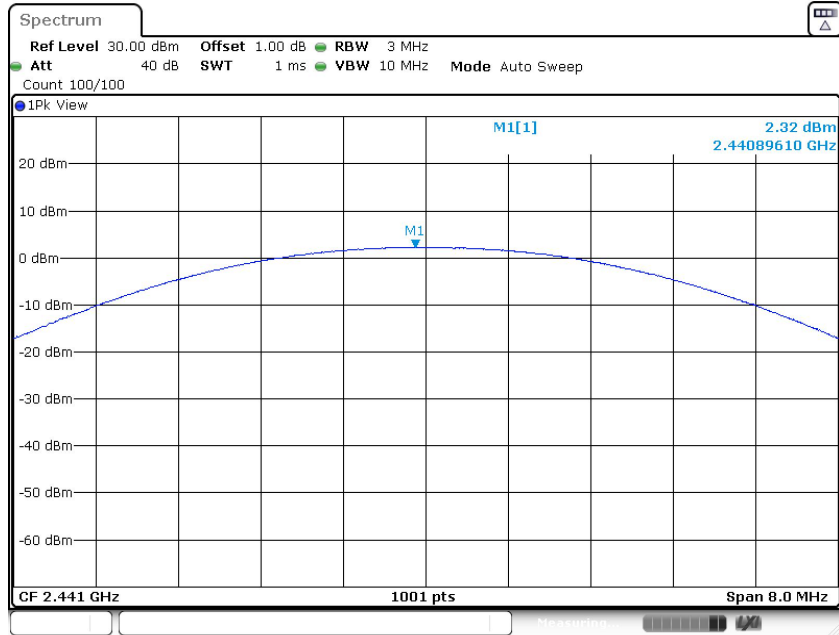
Low channel 2402MHz



Date: 2.AUG.2022 11:50:57

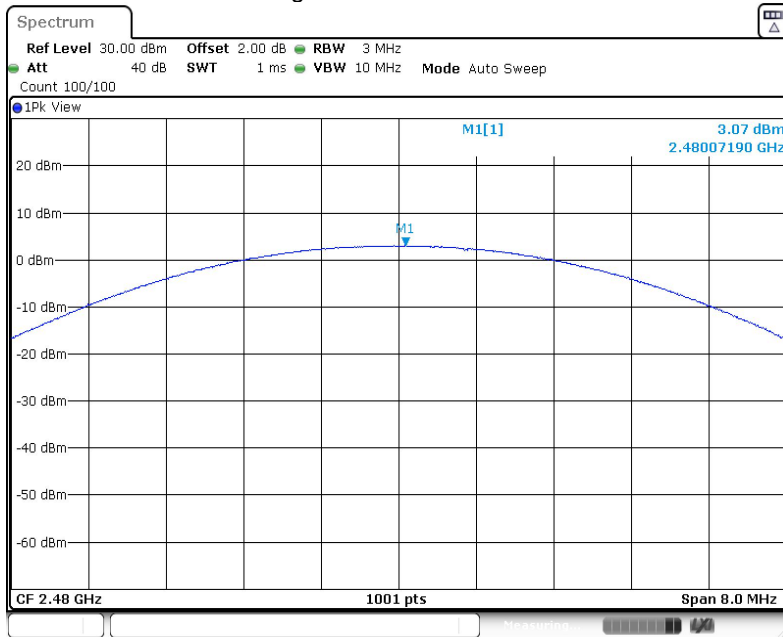


### Middle channel 2441MHz



Date: 2.AUG.2022 11:51:35

### High channel 2480MHz



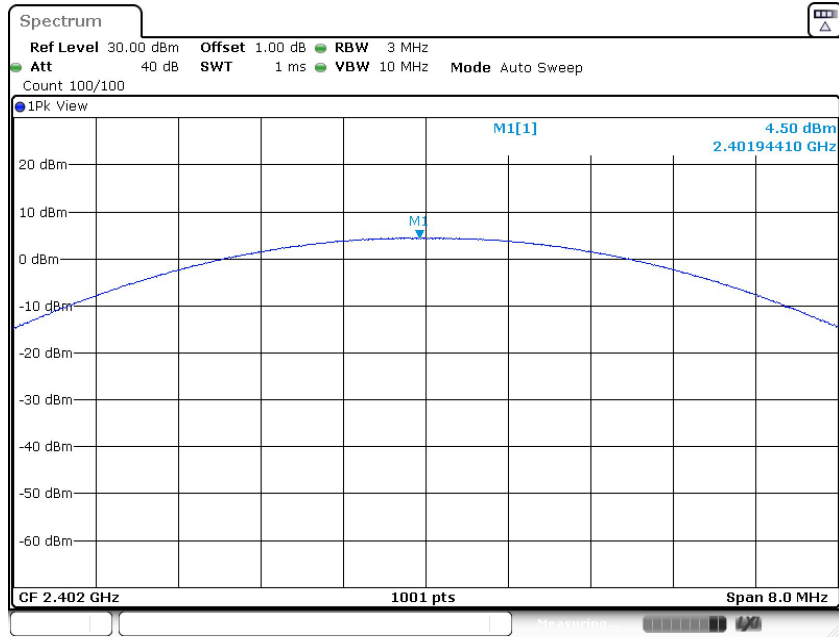
Date: 23.AUG.2022 12:07:22



Bluetooth Mode  $\pi/4$ -DQPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	e.i.r.p. dBm	Result
Low channel 2402MHz	4.5	7.09	Pass
Middle channel 2441MHz	3.27	5.86	Pass
High channel 2480MHz	4.34	6.93	Pass

Low channel 2402MHz

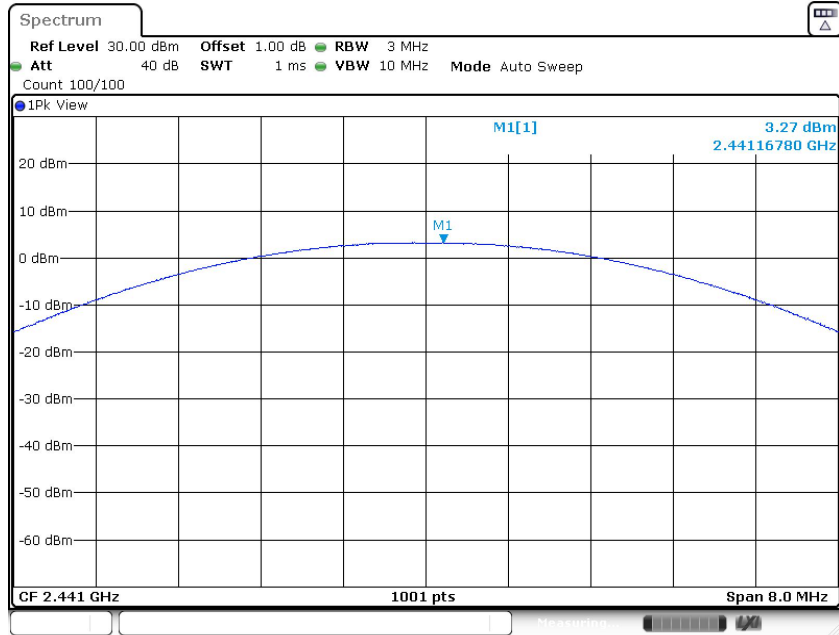


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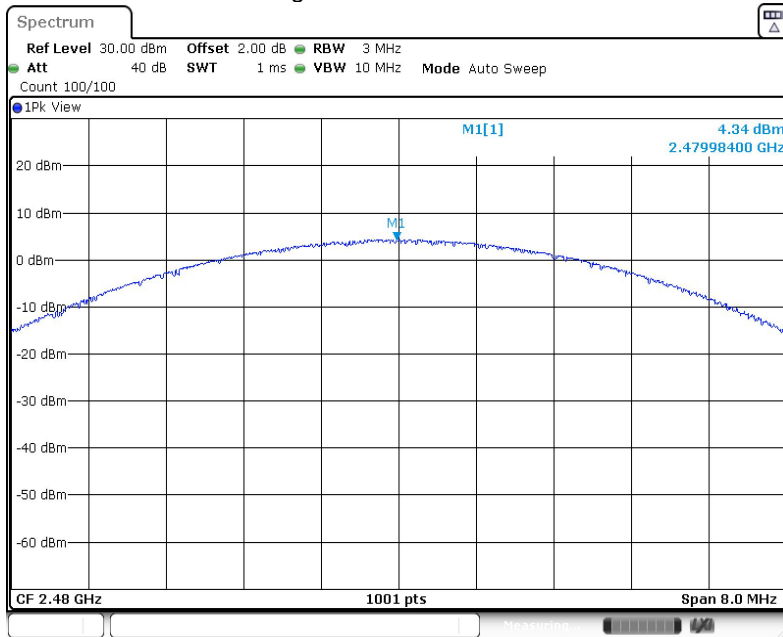


### Middle channel 2441MHz



Date: 2.AUG.2022 11:53:11

### High channel 2480MHz



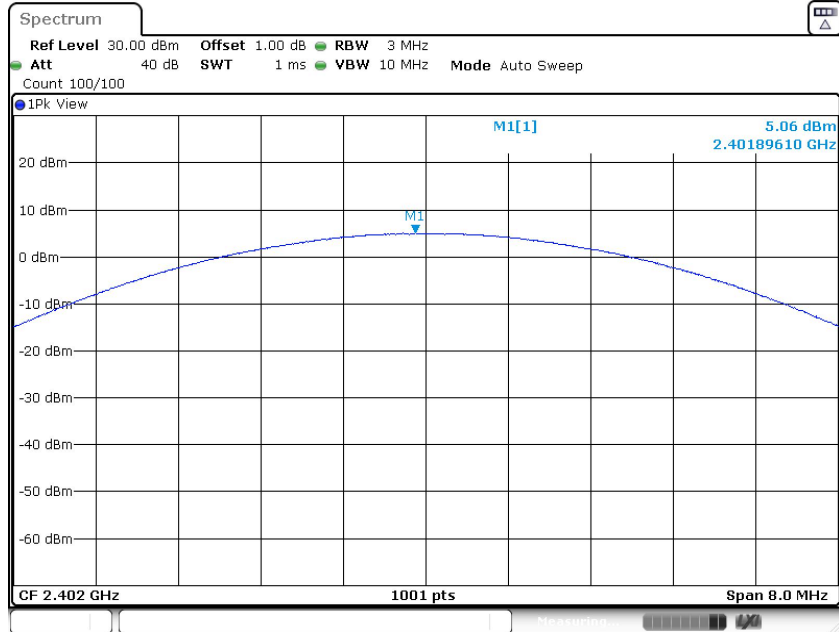
Date: 23.AUG.2022 12:08:41



### Bluetooth Mode 8DPSK modulation Test Result

Frequency MHz	Conducted Peak Output Power dBm	e.i.r.p. dBm	Result
Low channel 2402MHz	5.06	7.65	Pass
Middle channel 2441MHz	3.8	6.39	Pass
High channel 2480MHz	4.4	6.99	Pass

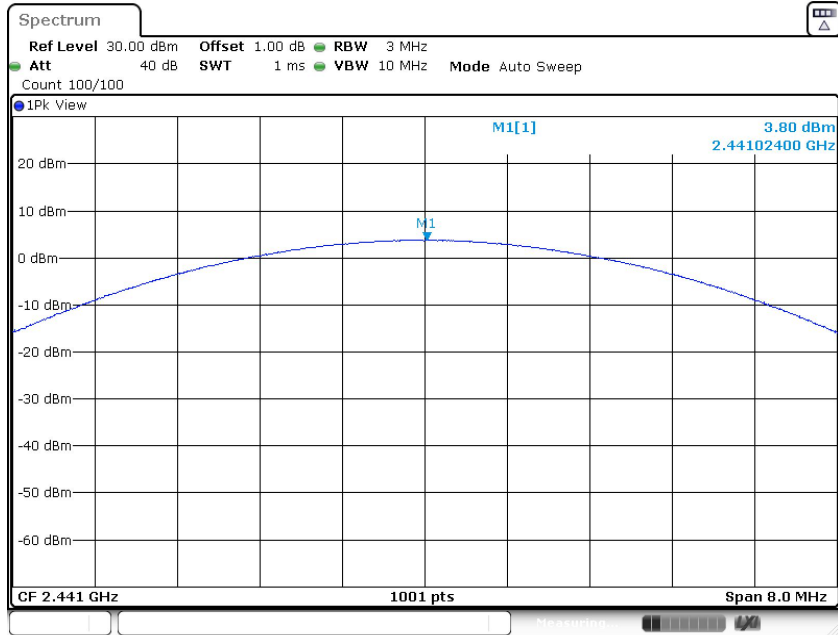
Low channel 2402MHz



Date: 2.AUG.2022 11:54:27

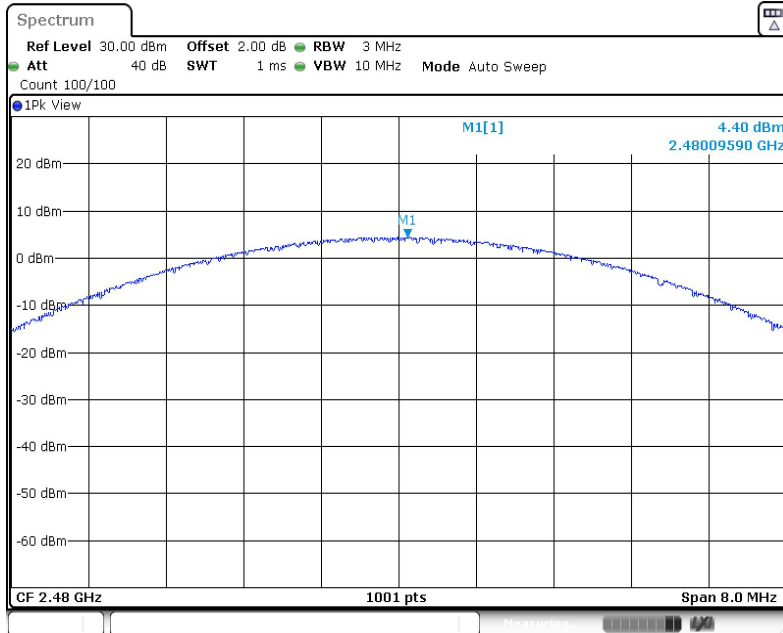


### Middle channel 2441MHz



Date: 2.AUG.2022 11:54:51

### High channel 2480MHz



Date: 23.AUG.2022 12:09:55



### 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]

---

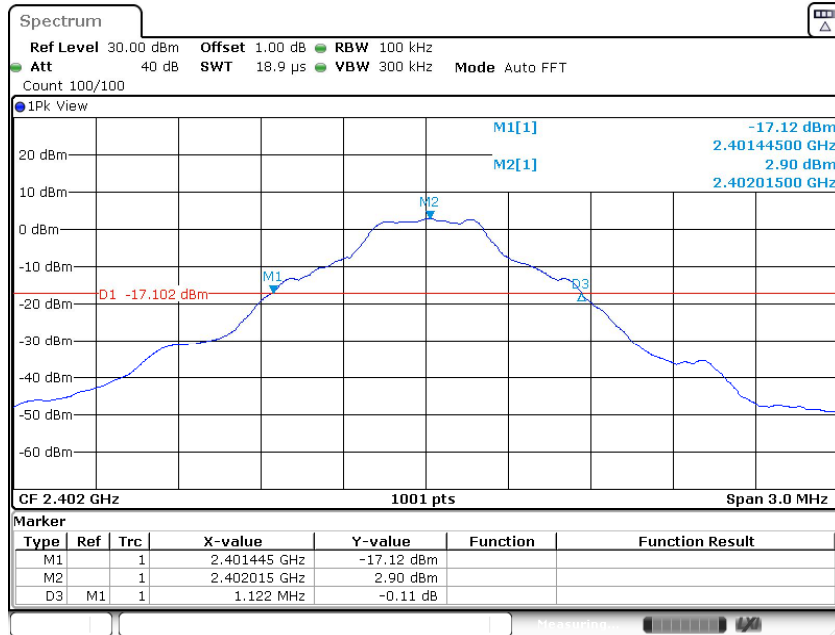
N/A

**20 dB bandwidth and 99% Occupied Bandwidth**

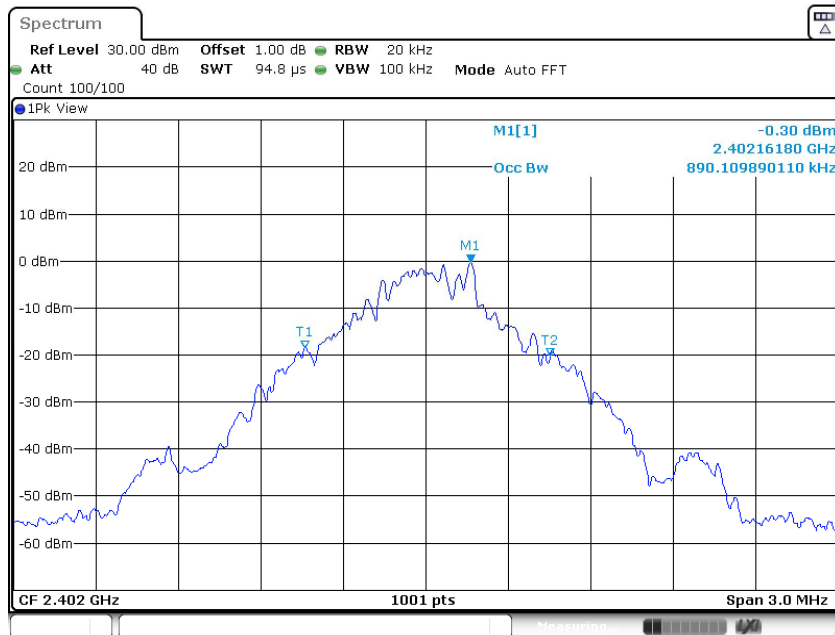
Bluetooth Mode GFSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1122	890	--	Pass
2441	1128	890	--	Pass
2480	1128	896	--	Pass

Low channel 2402MHz



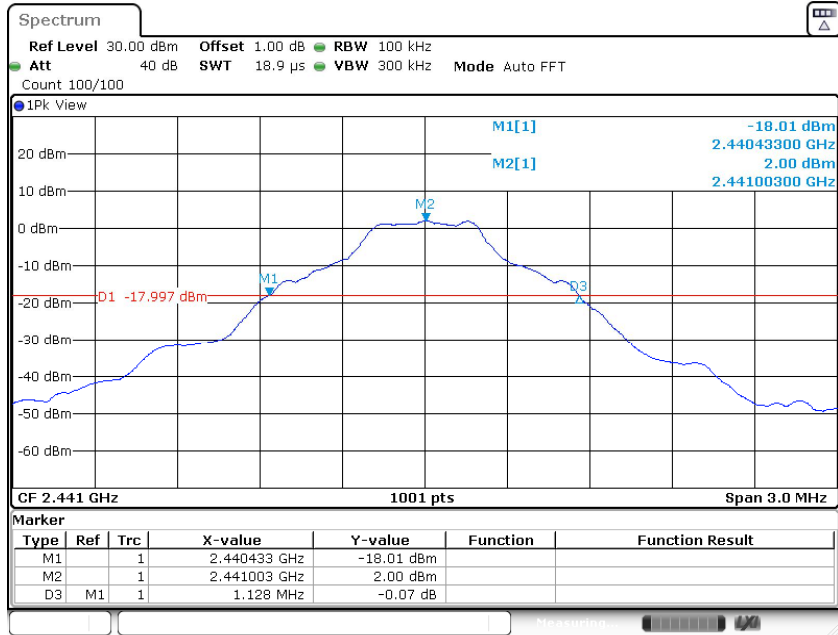
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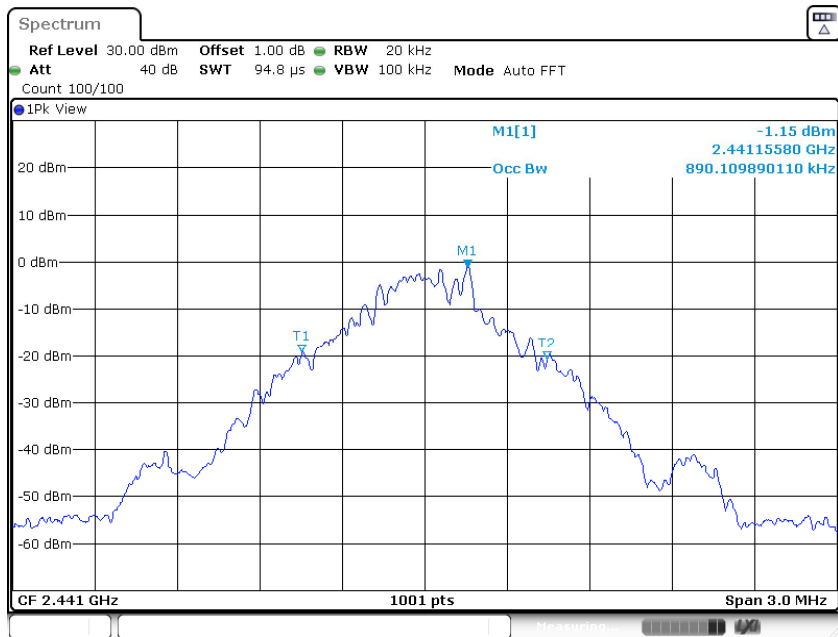
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Middle channel 2441MHz



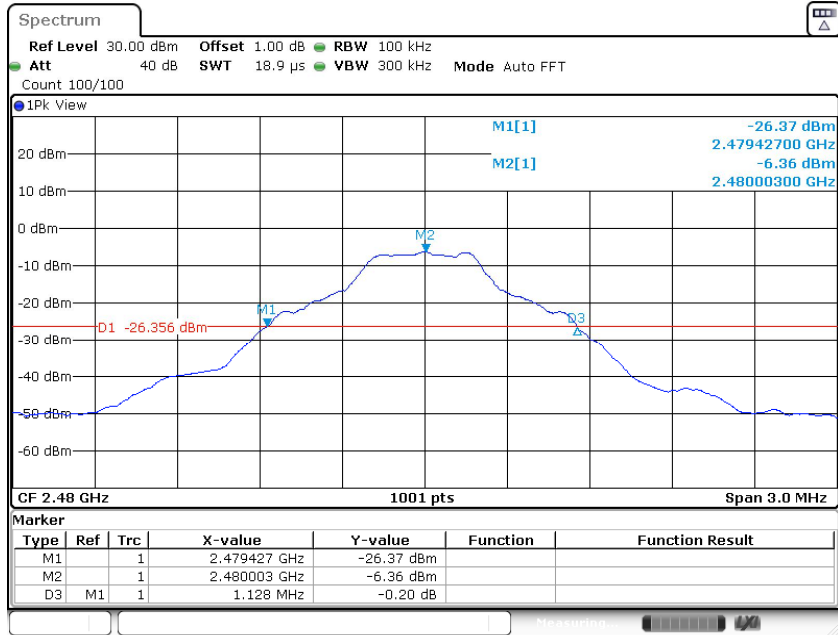
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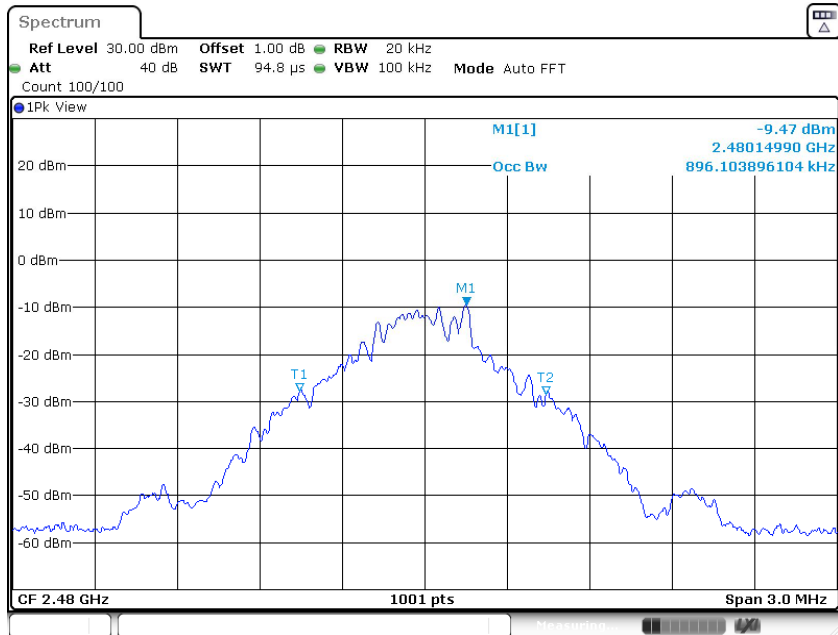
Date: 2.AUG.2022 11:17:55



### High channel 2480MHz



Date: 2.AUG.2022 11:19:19



Date: 2.AUG.2022 11:19:30

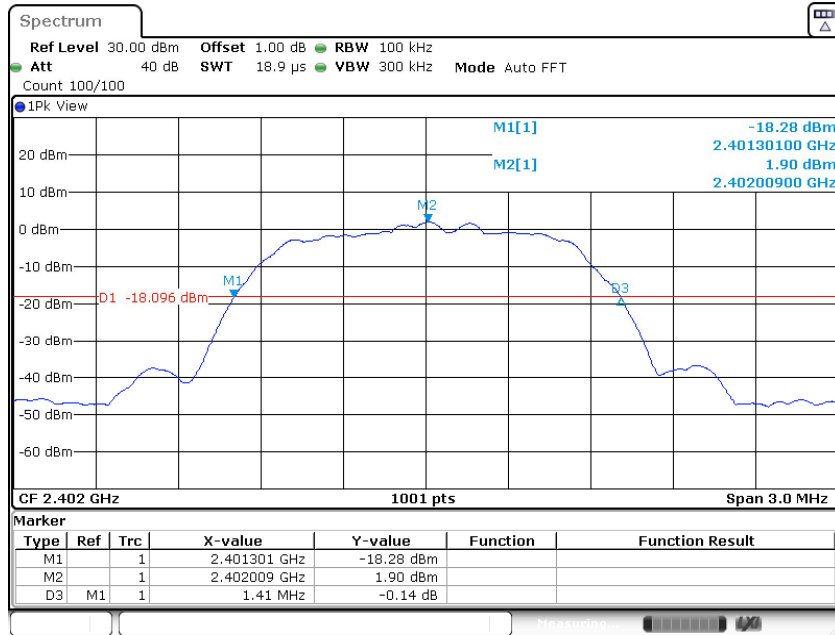


**20 dB bandwidth and 99% Occupied Bandwidth**

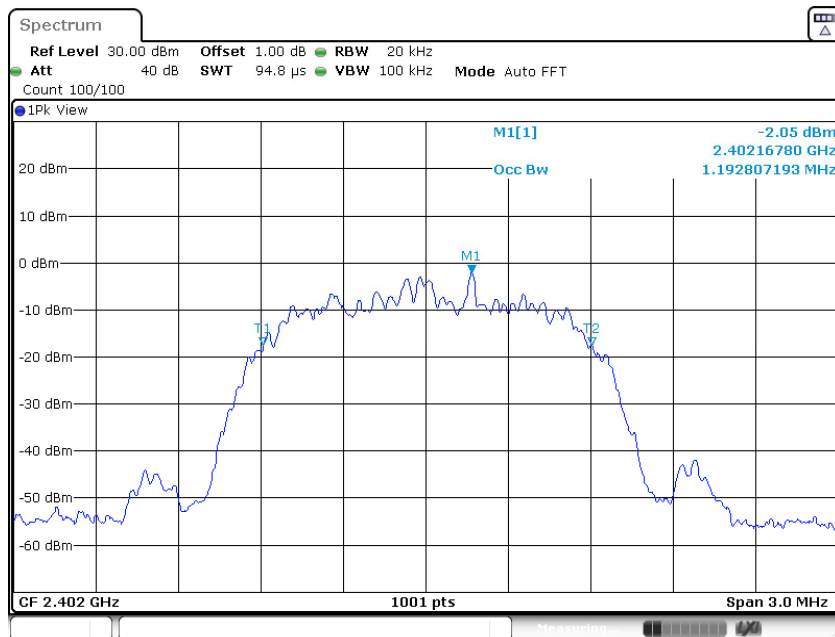
Bluetooth Mode  $\pi/4$ -DQPSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1410	1193	--	Pass
2441	1410	1193	--	Pass
2480	1410	1193	--	Pass

Low channel 2402MHz



Date: 2.AUG.2022 11:21:33

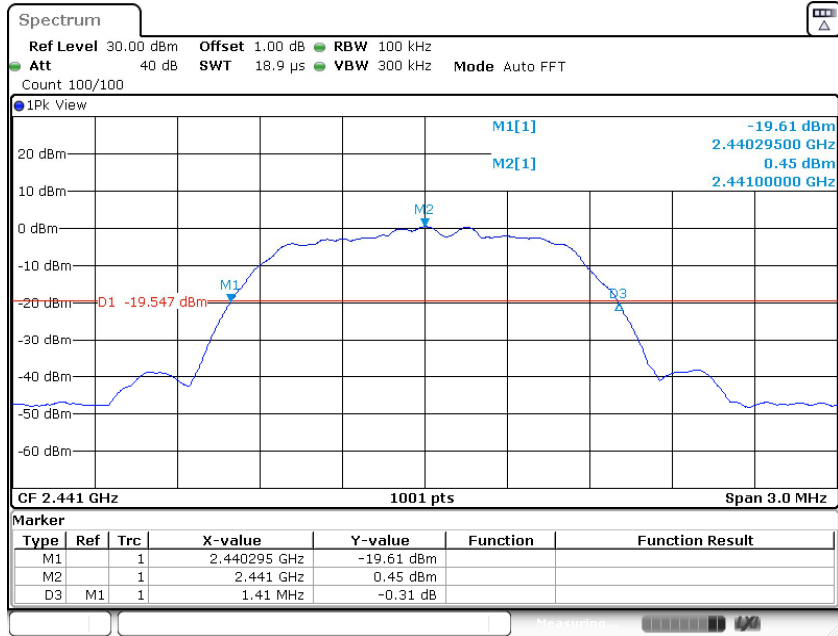


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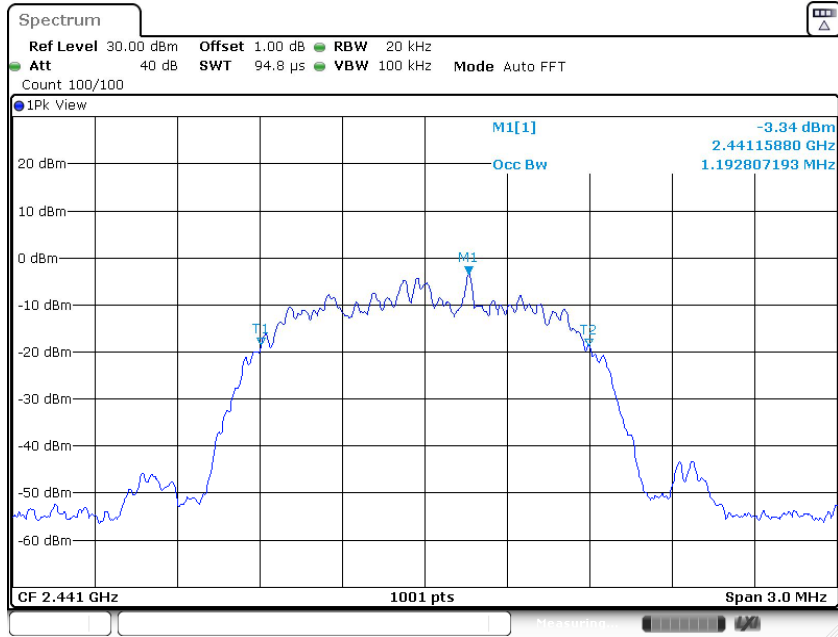




Middle channel 2441MHz



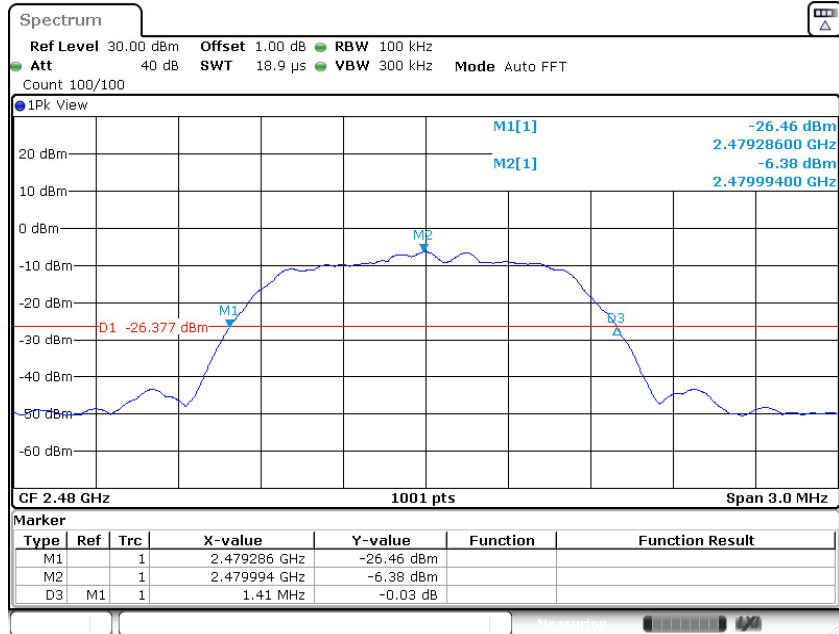
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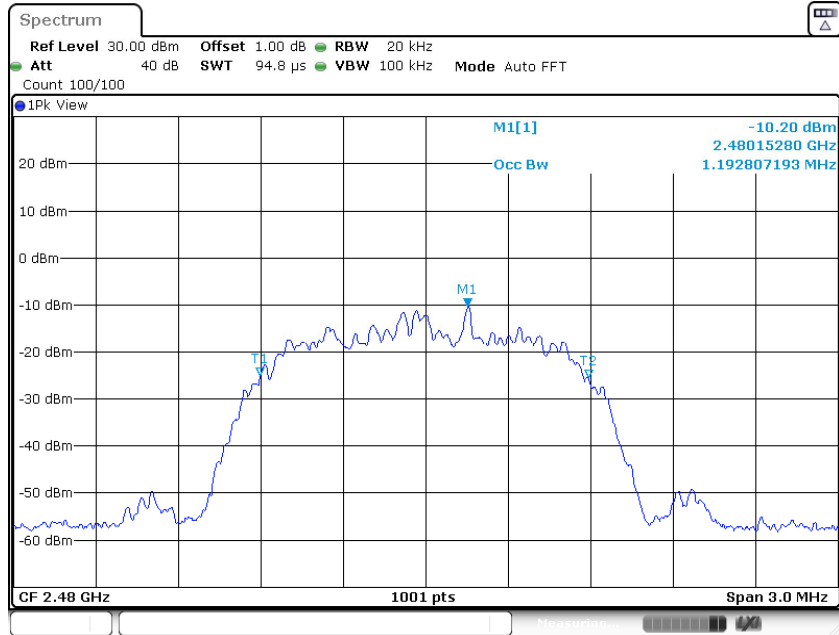
Date: 2.AUG.2022 11:23:28



High channel 2480MHz



Date: 2.AUG.2022 11:24:48



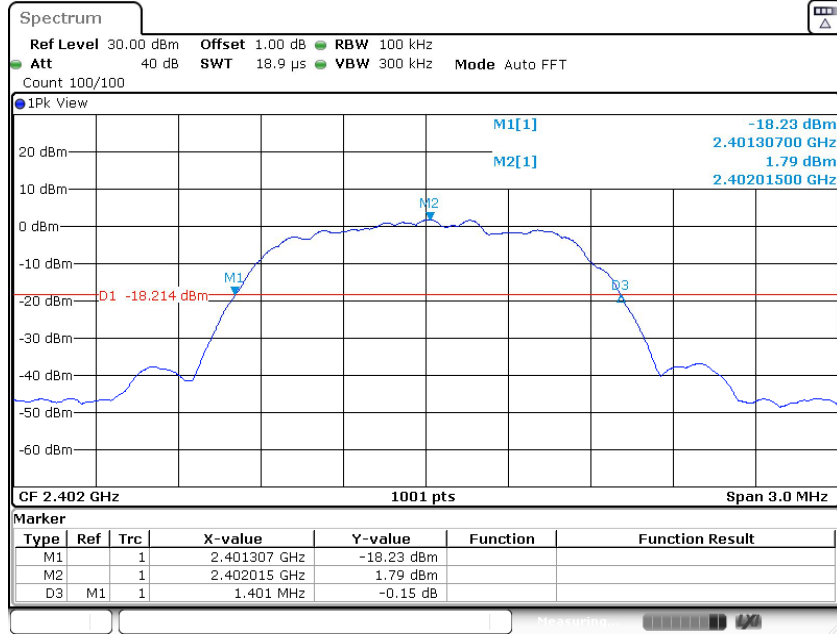
Date: 2.AUG.2022 11:24:59

## 20 dB bandwidth and 99% Occupied Bandwidth

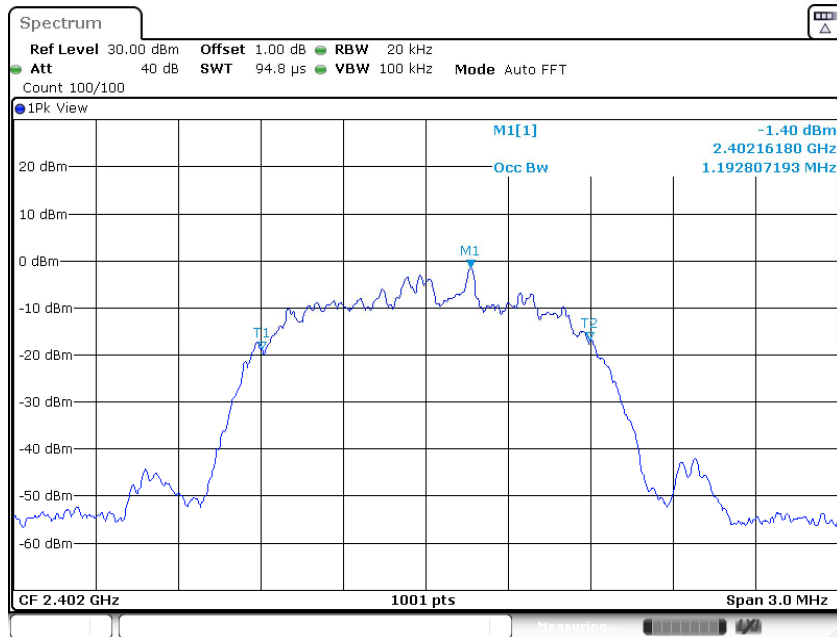
### Bluetooth Mode 8DPSK Modulation test result

Frequency MHz	20 dB Bandwidth kHz	99% Bandwidth kHz	Limit kHz	Result
2402	1401	1193	--	Pass
2441	1404	1193	--	Pass
2480	1407	1196	--	Pass

Low channel 2402MHz



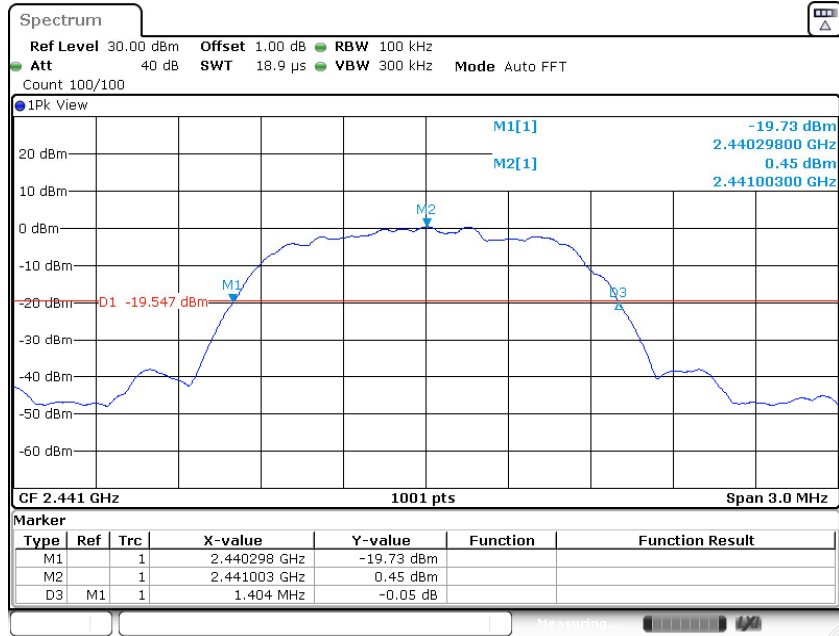
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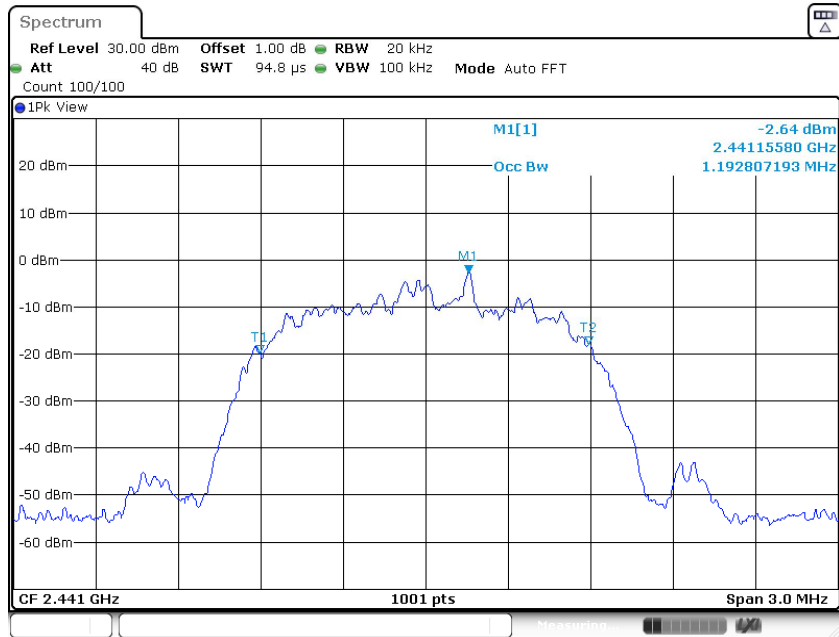
Date: 2.AUG.2022 11:30:05



Middle channel 2441MHz



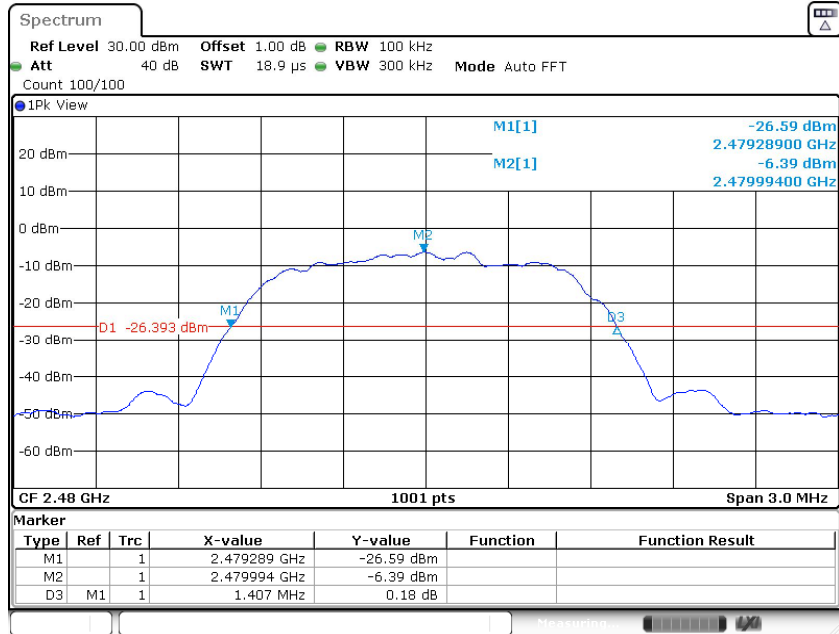
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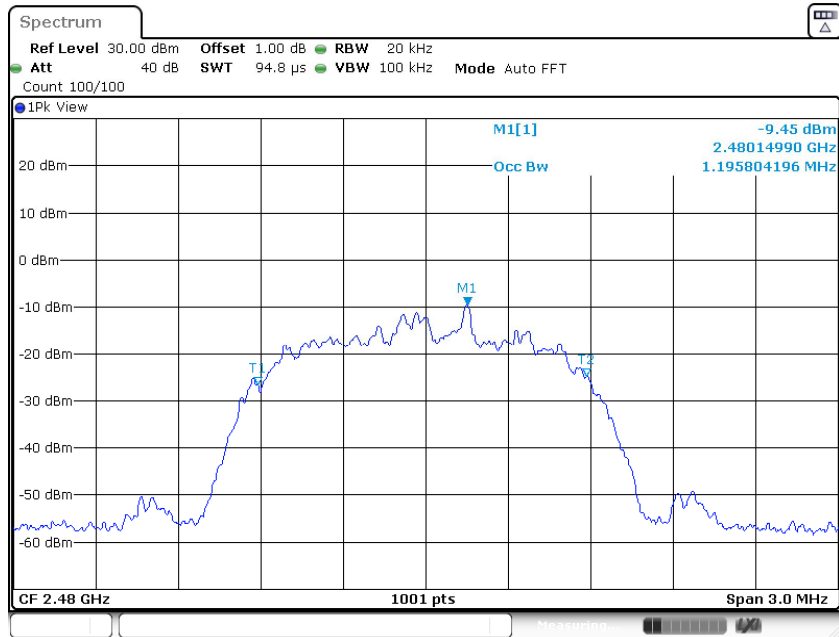
Date: 2.AUG.2022 11:31:48



High channel 2480MHz



Date: 2.AUG.2022 11:33:07



Date: 2.AUG.2022 11:33:17



## 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  $\geq$  1% of the span, VBW  $\geq$  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

GFSK Modulation Limit

Test Mode	2/3 of 20 dB Bandwidth kHz
DH5	853.33
2DH5	940
3DH5	938



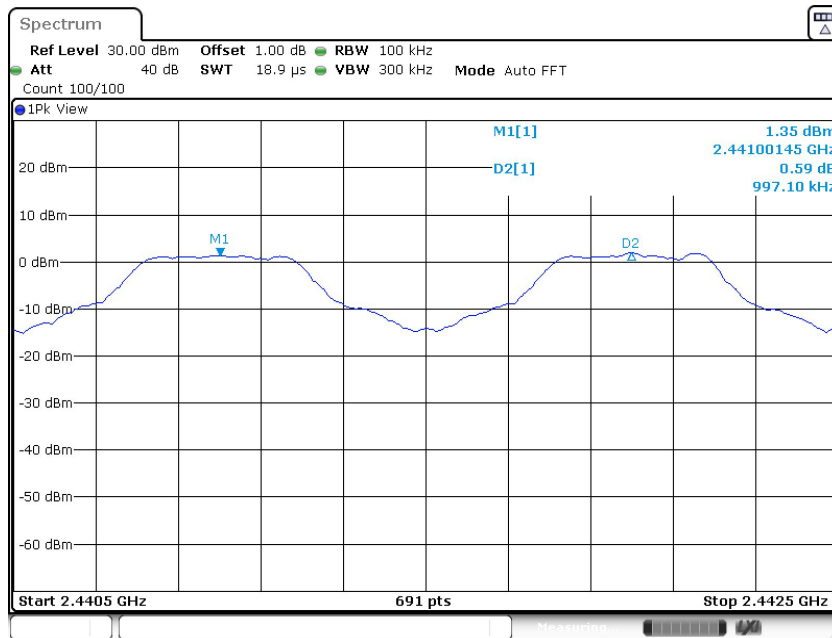
### Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here worst case mode was used to show compliance.

test result

Test Mode	Carrier Frequency Separation kHz	Result
DH5	997	Pass
2DH5	1006	Pass
3DH5	1157	Pass

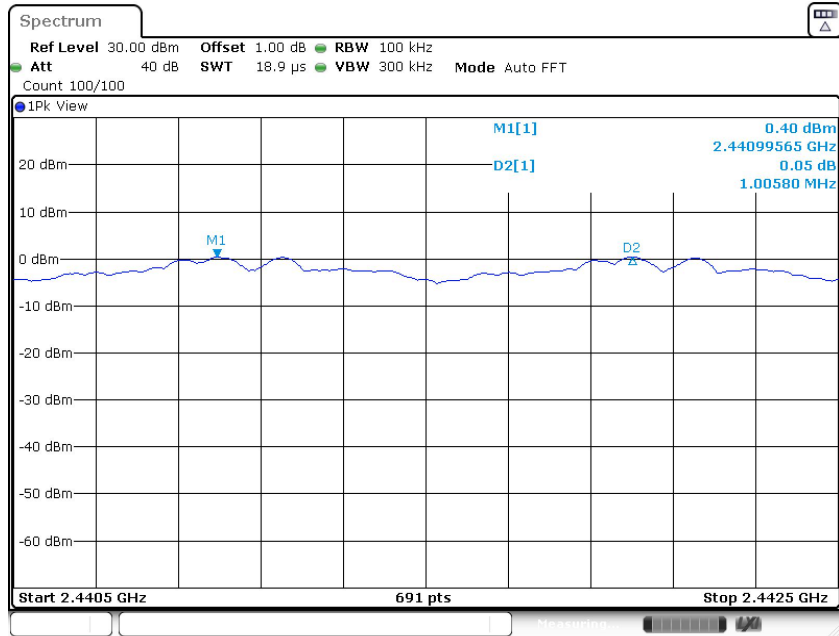
DH5



Date: 2.AUG.2022 11:35:41

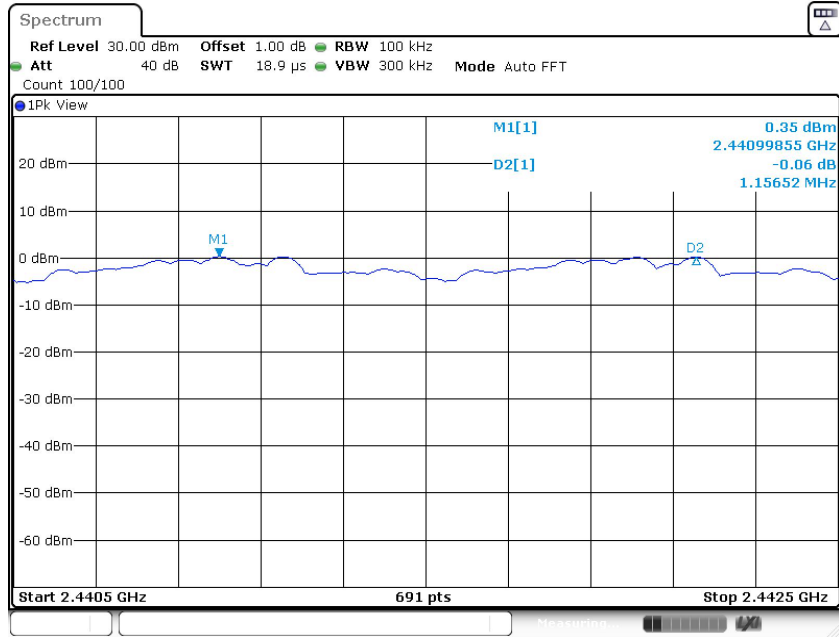


### 2DH5



Date: 2.AUG.2022 11:41:05

### 3DH5



Date: 2.AUG.2022 11:47:18





## 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,  $RBW \geq 1\%$  of the span,  $VBW \geq RBW$ , 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**

---

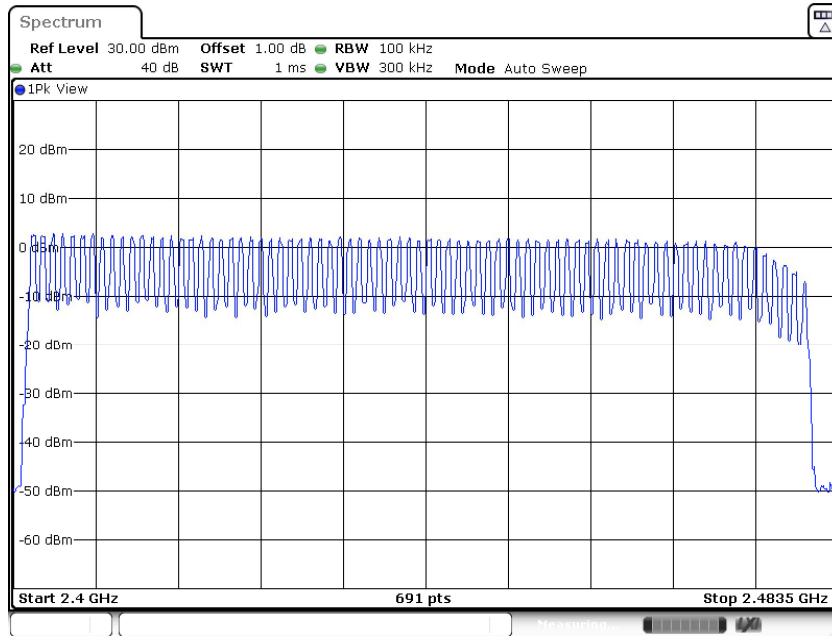
$\geq 15$



### 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. Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
79	Pass



Date: 2.AUG.2022 11:36:06

## 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.

## Dwell Time

### Dwell time

The maximum dwell time shall be 0.4 s.

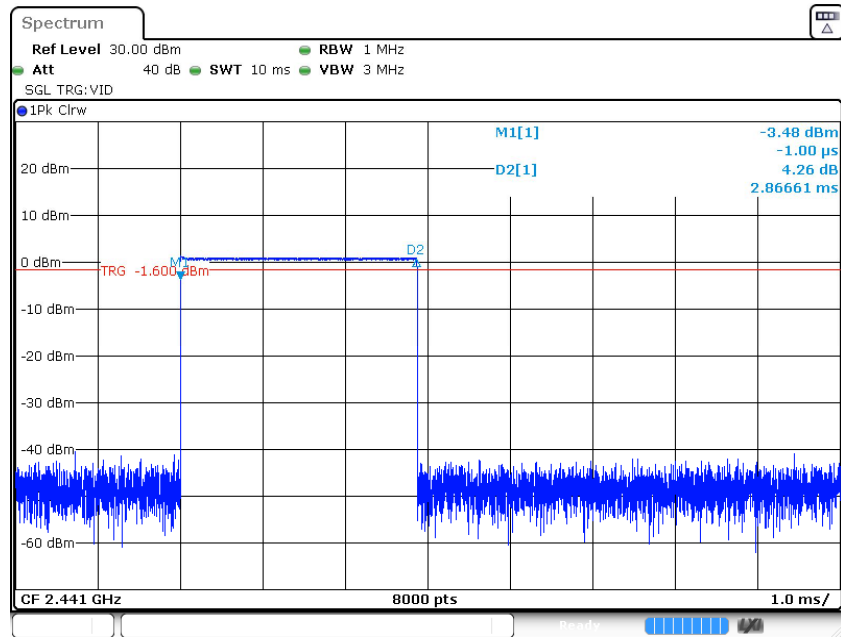
According to the Bluetooth Core Specification, the worse result (DH5, 2DH5, 3DH5 mode) was reported to show compliance.

The Dwell Time = Burst Width \* Total Hops. The detailed calculations are showed as follows:  
 The duration for dwell time calculations:  $0.4[s] \times \text{hopping number} = 0.4[s] \times 79 = 31.6[s \cdot \text{ch}]$

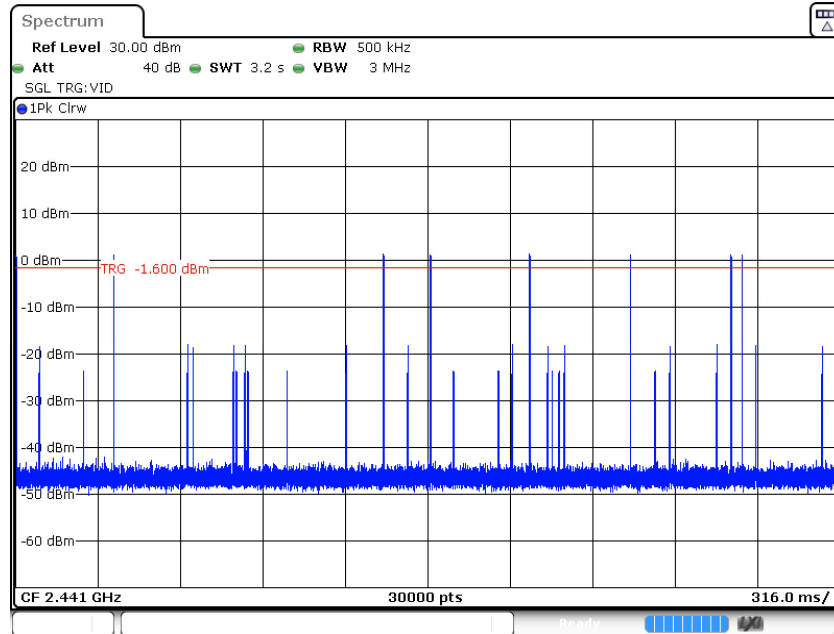
### Test Result

TestMode	Channel	Burst Width	Total Hops	Result(s)	Limit(s)	Verdict
DH5	Hop	2.87	80	0.229	$\leq 0.4$	PASS
2DH5	Hop	2.87	110	0.316	$\leq 0.4$	PASS
3DH5	Hop	2.87	120	0.344	$\leq 0.4$	PASS

### GFSK Modulation



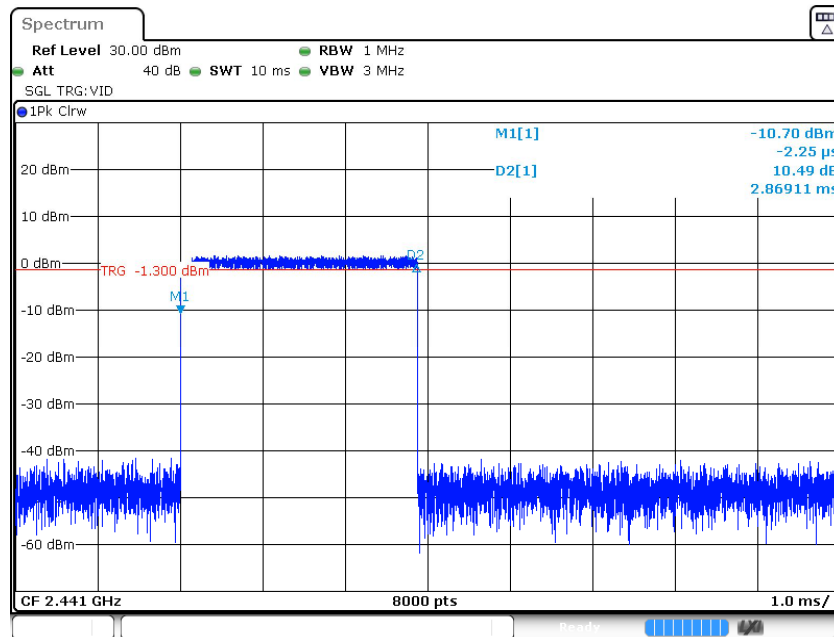
Date: 2.AUG.2022 11:36:18



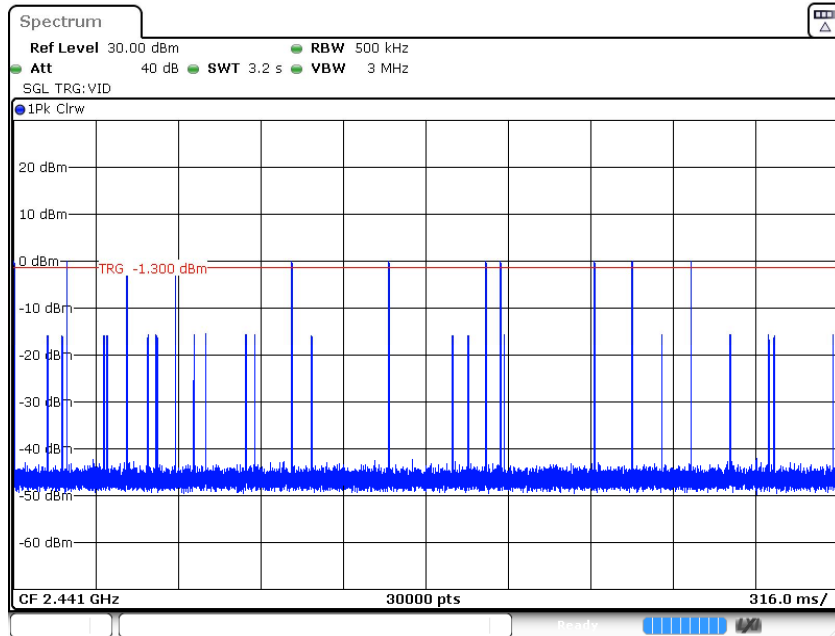
Date: 2.AUG.2022 11:36:23

DH5

$\pi/4$ -DQPSK Modulation



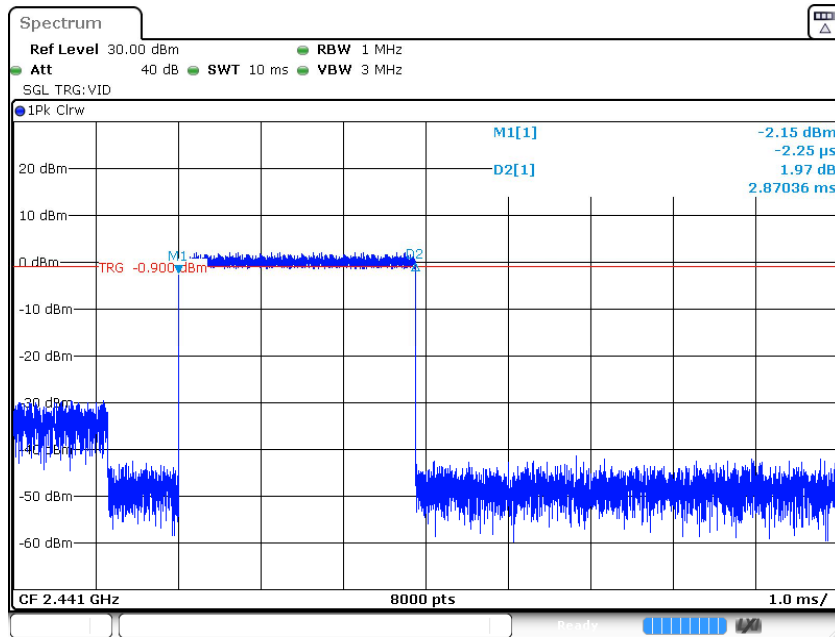
Date: 2.AUG.2022 11:41:42



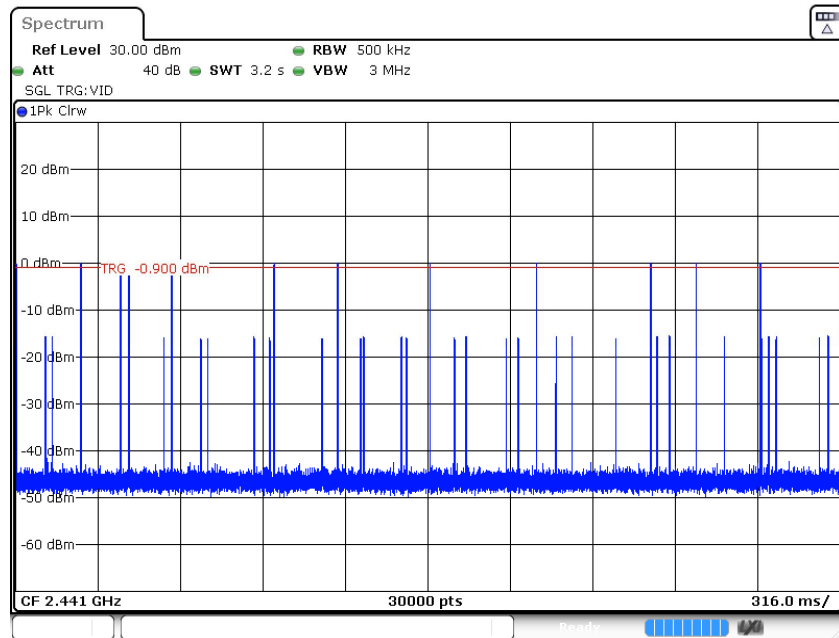
Date: 2.AUG.2022 11:41:48

### 2DH5

### 8-DPSK Modulation



Date: 2.AUG.2022 11:47:52



Date: 2.AUG.2022 11:47:57

3DH5



## 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 10<sup>th</sup> 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

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 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 that 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, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

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

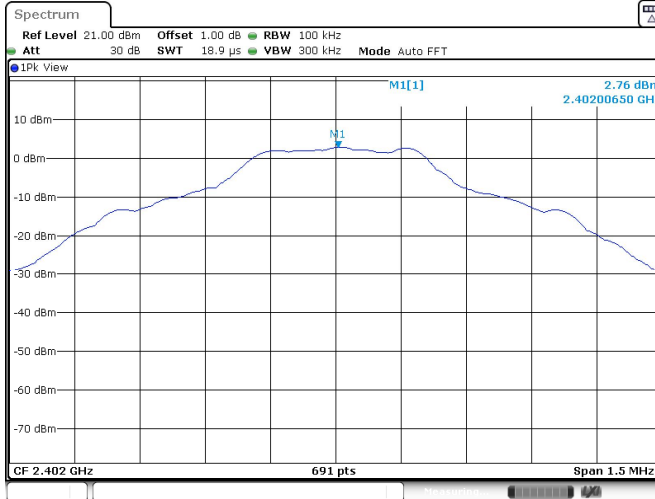




**Spurious RF conducted emissions**

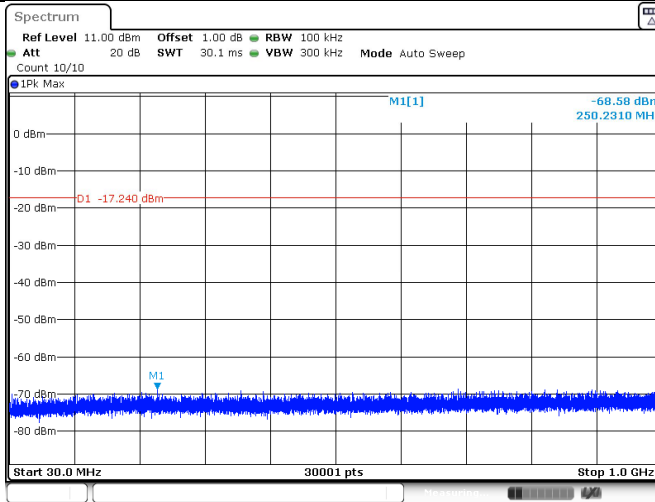
TestMode	Antenna	Channel (MHz)	FreqRange(MHz)	RefLevel	Result(dBm)	Limit(dBm)	Verdict
DH5	Ant1	2402	Reference	2.76	2.76	---	PASS
			30~1000	30~1000	-68.58	<=-17.24	PASS
			1000~26500	1000~26500	-47.23	<=-17.24	PASS
		2441	Reference	2.05	2.05	---	PASS
			30~1000	30~1000	-67.72	<=-17.95	PASS
			1000~26500	1000~26500	-49.55	<=-17.95	PASS
		2480	Reference	-6.34	-6.34	---	PASS
			30~1000	30~1000	-67.54	<=-26.34	PASS
			1000~26500	1000~26500	-51.9	<=-26.34	PASS
2DH5	Ant1	2402	Reference	1.79	1.79	---	PASS
			30~1000	30~1000	-66.93	<=-18.21	PASS
			1000~26500	1000~26500	-45.61	<=-18.21	PASS
		2441	Reference	0.51	0.51	---	PASS
			30~1000	30~1000	-68.11	<=-19.49	PASS
			1000~26500	1000~26500	-49.52	<=-19.49	PASS
		2480	Reference	-6.40	-6.40	---	PASS
			30~1000	30~1000	-62.69	<=-26.4	PASS
			1000~26500	1000~26500	-52.28	<=-26.4	PASS
3DH5	Ant1	2402	Reference	1.65	1.65	---	PASS
			30~1000	30~1000	-67.9	<=-18.35	PASS
			1000~26500	1000~26500	-45.66	<=-18.35	PASS
		2441	Reference	0.53	0.53	---	PASS
			30~1000	30~1000	-66.89	<=-19.47	PASS
			1000~26500	1000~26500	-50.34	<=-19.47	PASS
		2480	Reference	-6.43	-6.43	---	PASS
			30~1000	30~1000	-68.22	<=-26.43	PASS
			1000~26500	1000~26500	-52.37	<=-26.43	PASS

DH5\_Ant1\_2402\_0~Reference



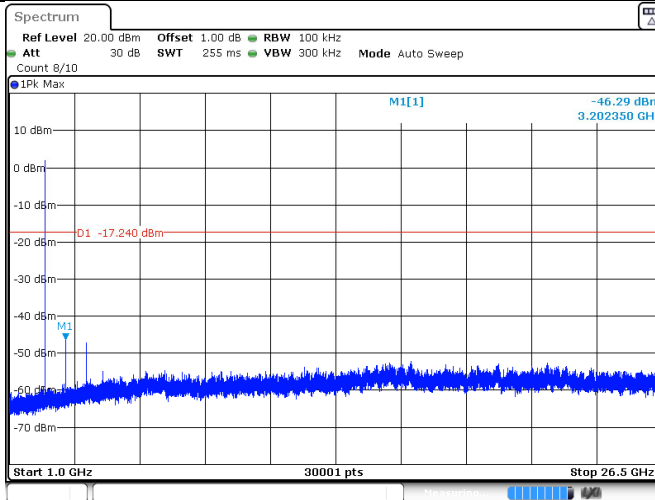
Date: 2 AUG.2022 11:16:18

DH5\_Ant1\_2402\_30~1000



Date: 2 AUG.2022 11:16:24

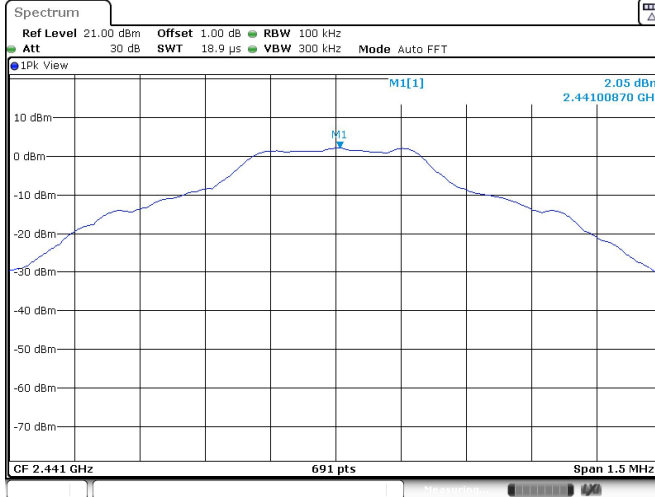
DH5\_Ant1\_2402\_1000~26500



Date: 2 AUG.2022 11:16:32

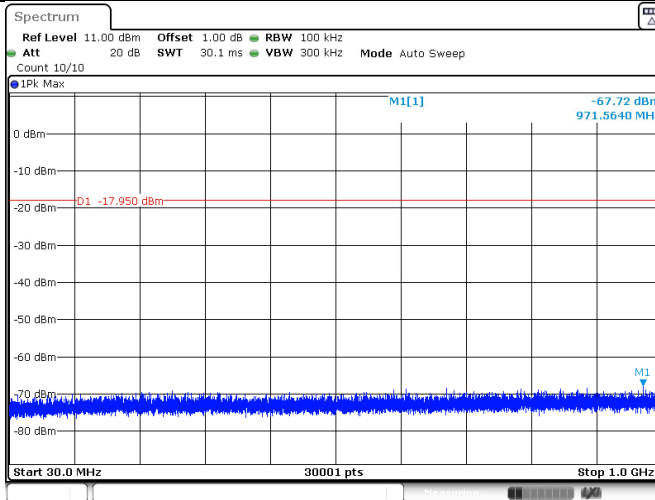


DH5\_Ant1\_2441\_0~Reference



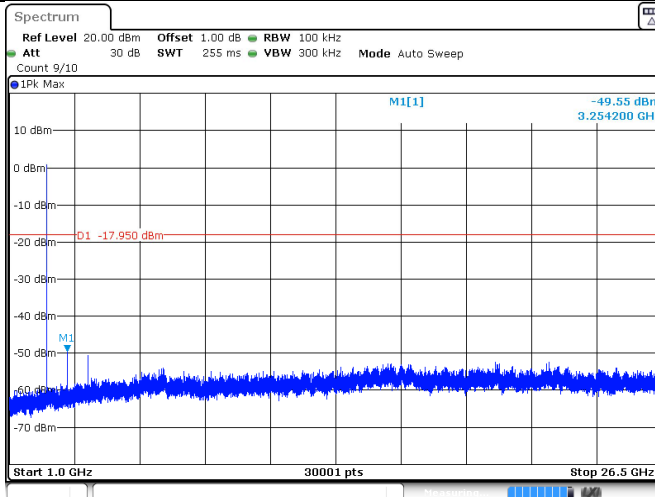
Date: 2 AUG.2022 11:18:01

DH5\_Ant1\_2441\_30~1000

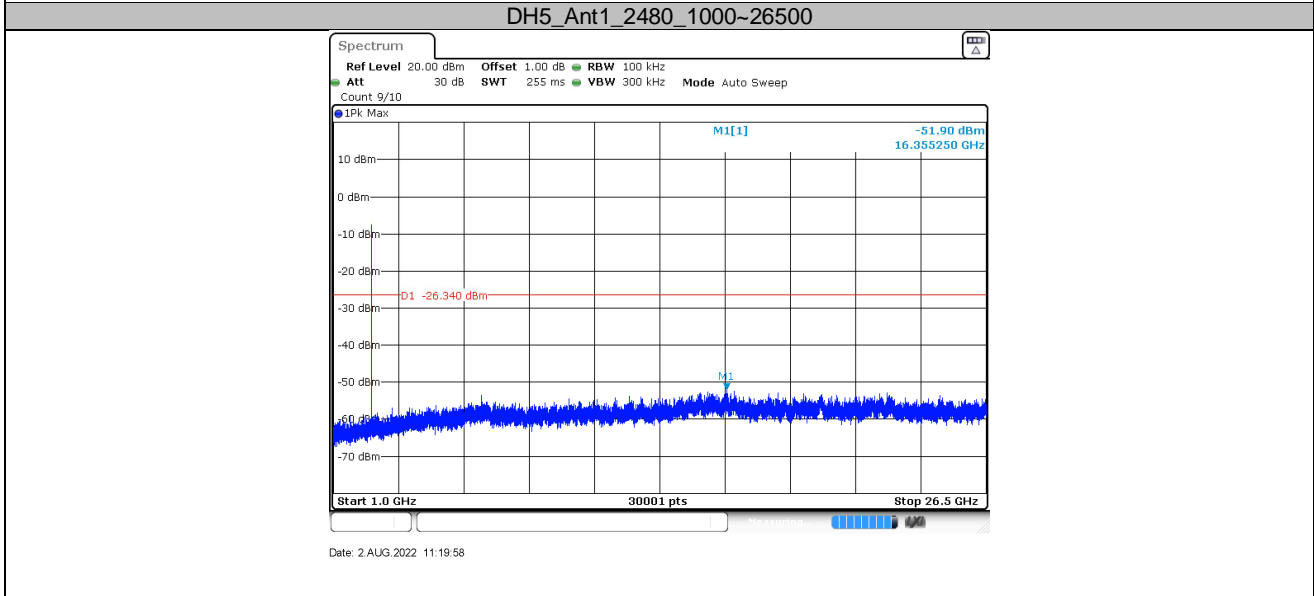
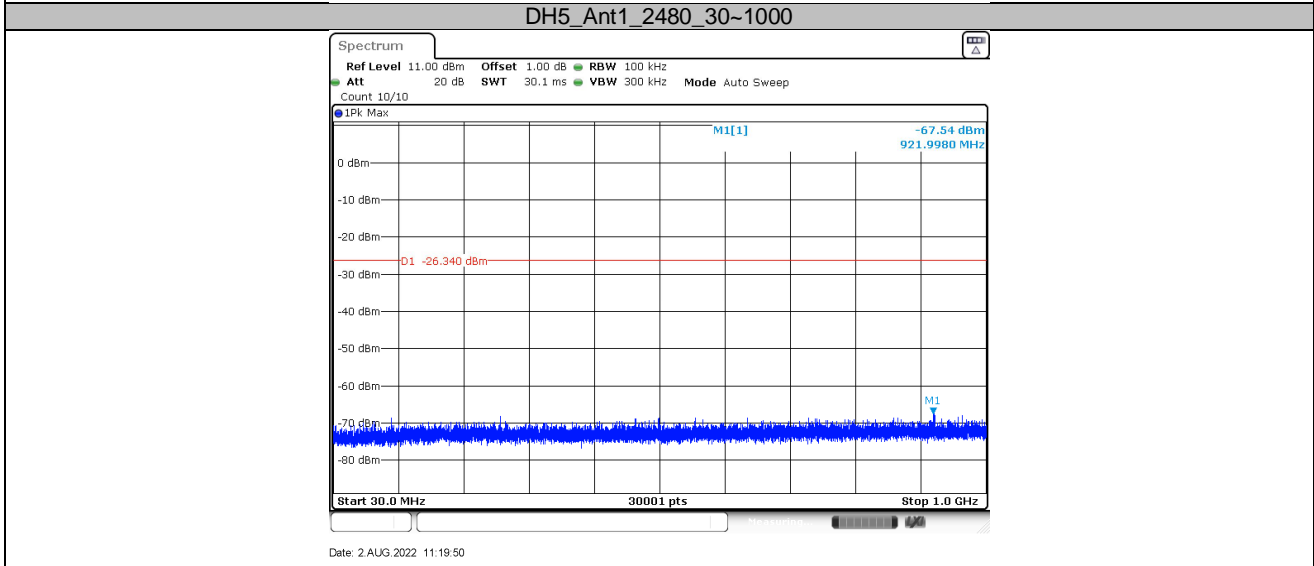
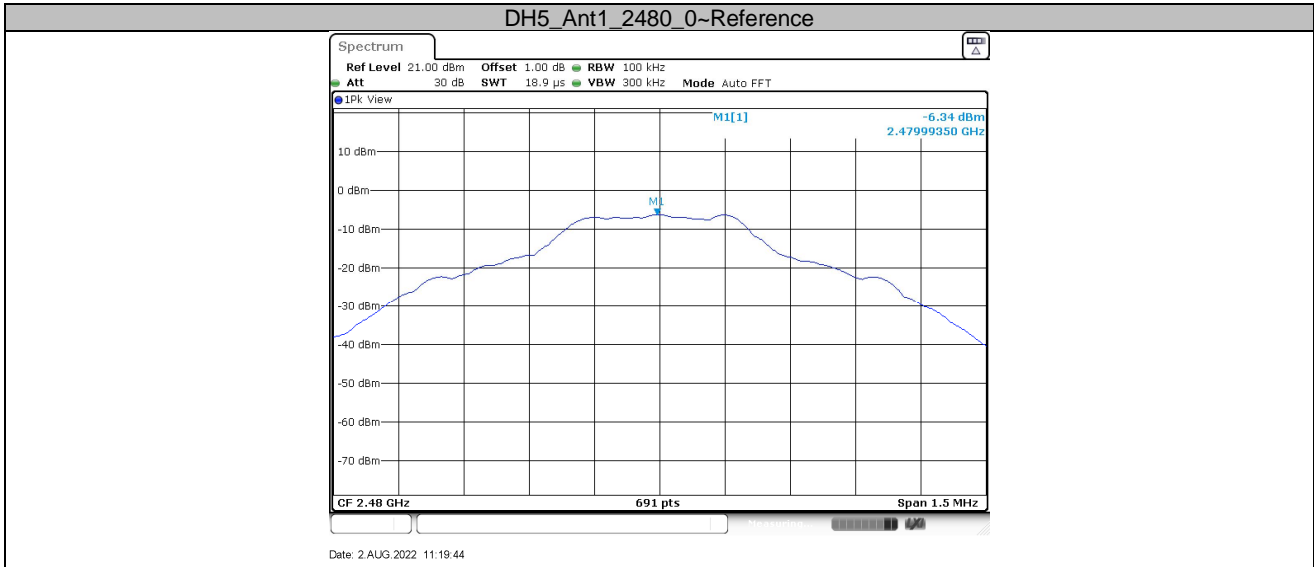


Date: 2 AUG.2022 11:18:07

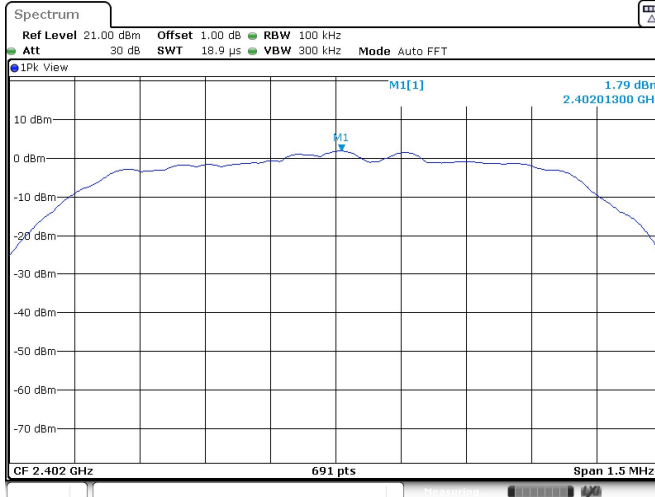
DH5\_Ant1\_2441\_1000~26500



Date: 2 AUG.2022 11:18:15

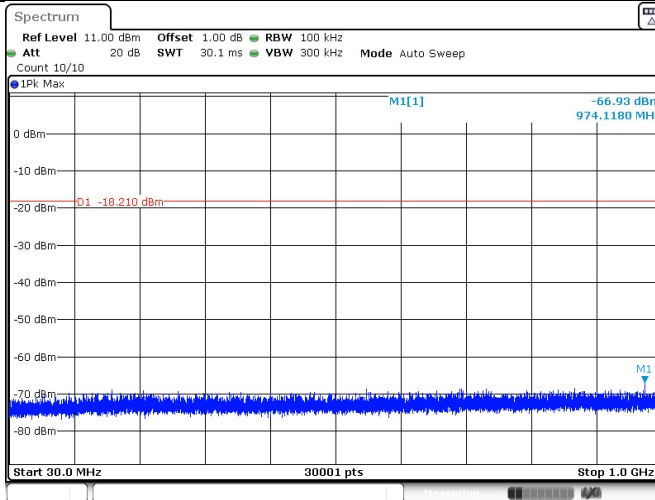


### 2DH5\_Ant1\_2402\_0-Reference



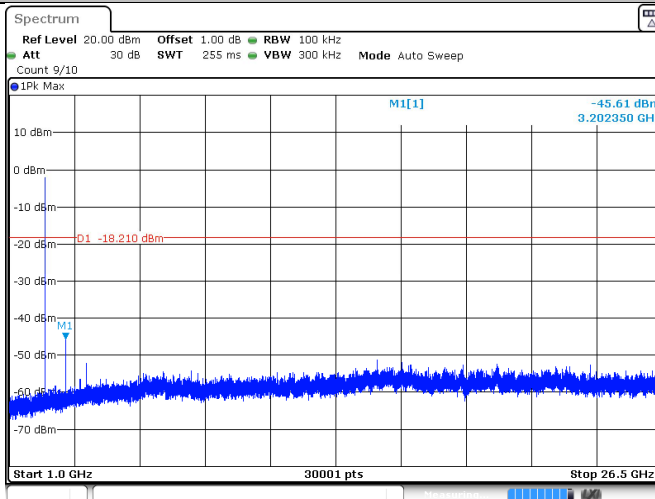
Date: 2 AUG.2022 11:21:58

### 2DH5\_Ant1\_2402\_30-1000



Date: 2 AUG.2022 11:22:05

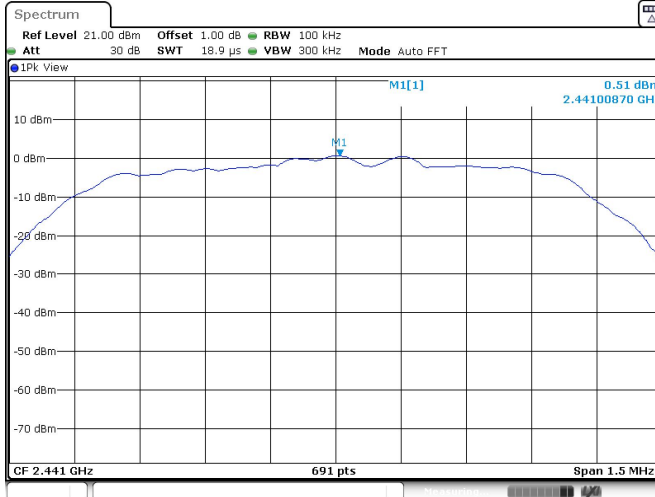
### 2DH5\_Ant1\_2402\_1000-26500



Date: 2 AUG.2022 11:22:12

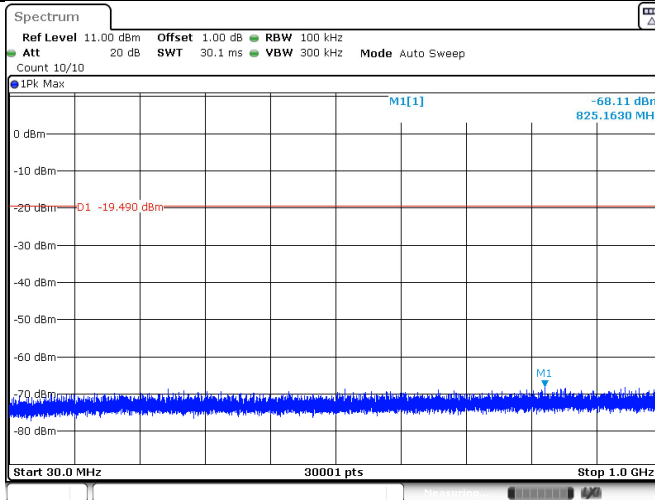


2DH5\_Ant1\_2441\_0~Reference



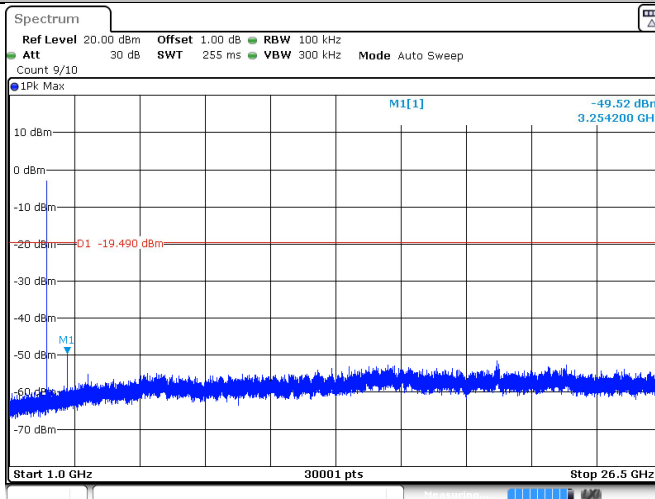
Date: 2 AUG.2022 11:23:34

2DH5\_Ant1\_2441\_30~1000

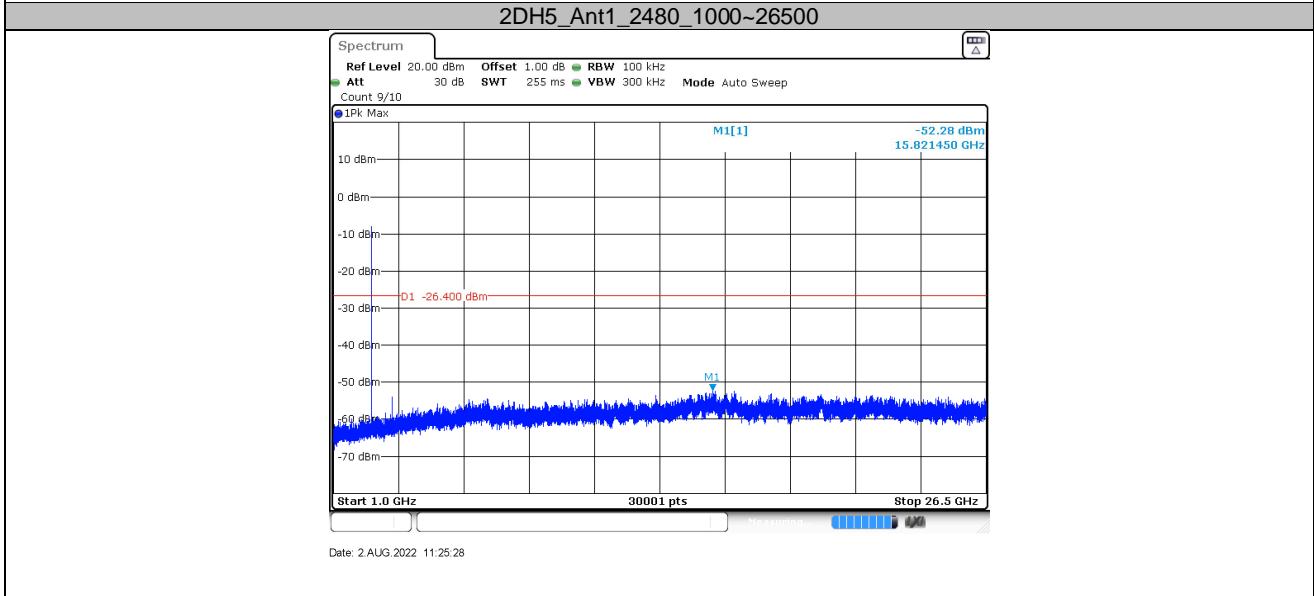
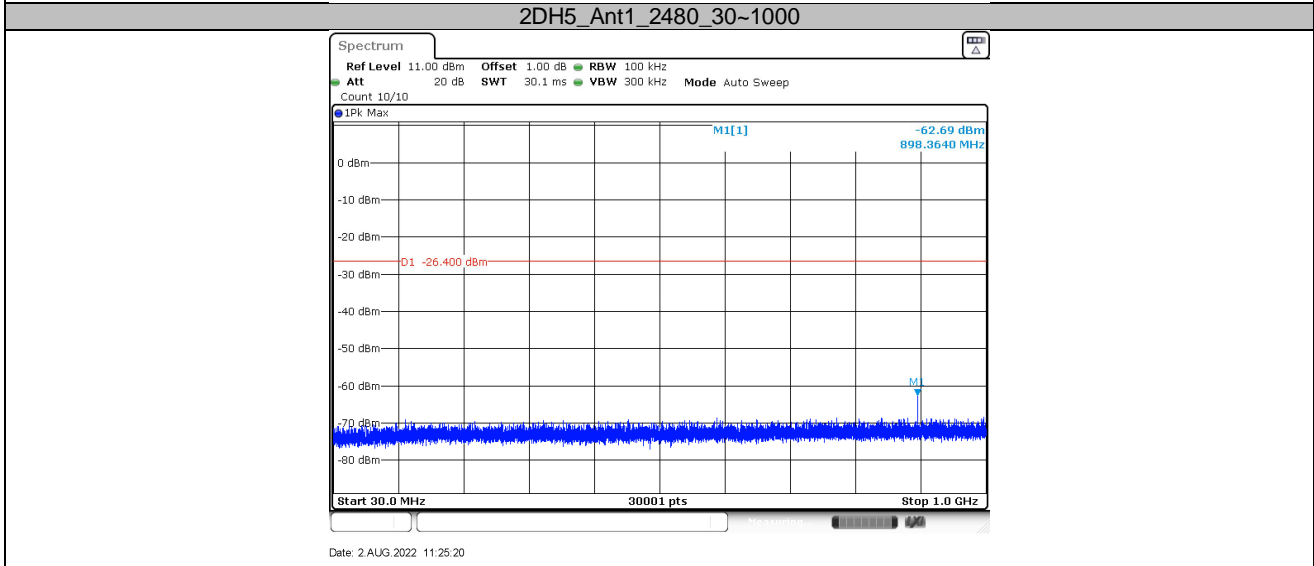
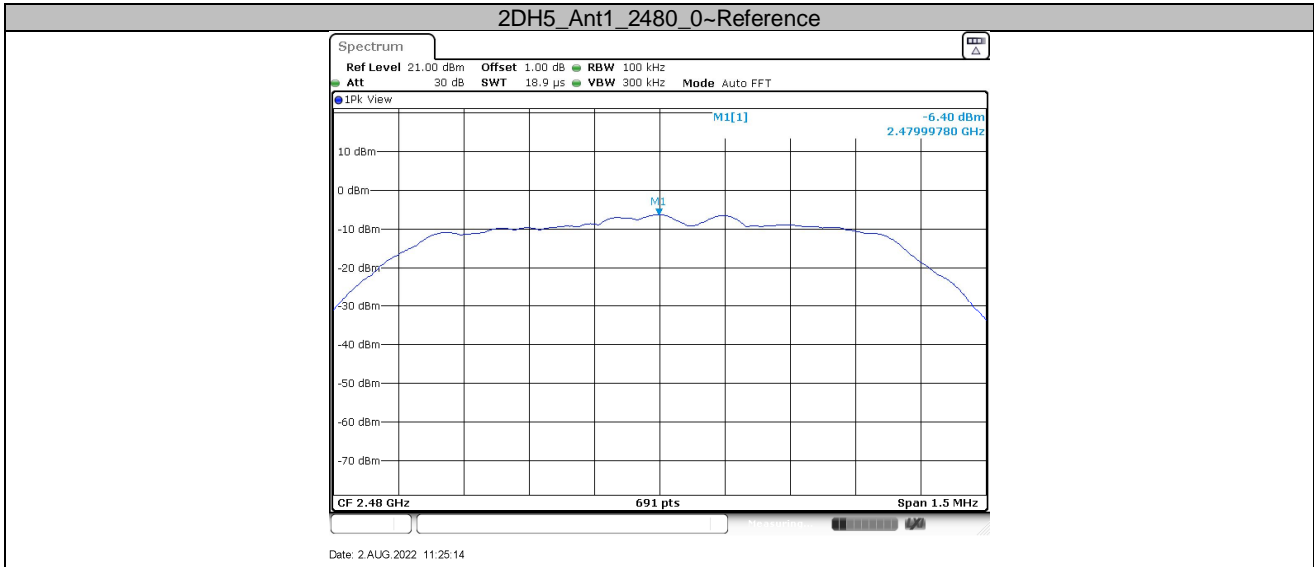


Date: 2 AUG.2022 11:23:40

2DH5\_Ant1\_2441\_1000~26500

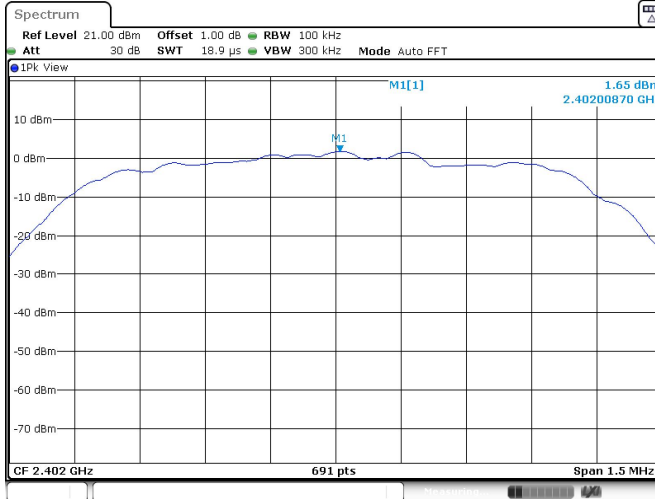


Date: 2 AUG.2022 11:23:48



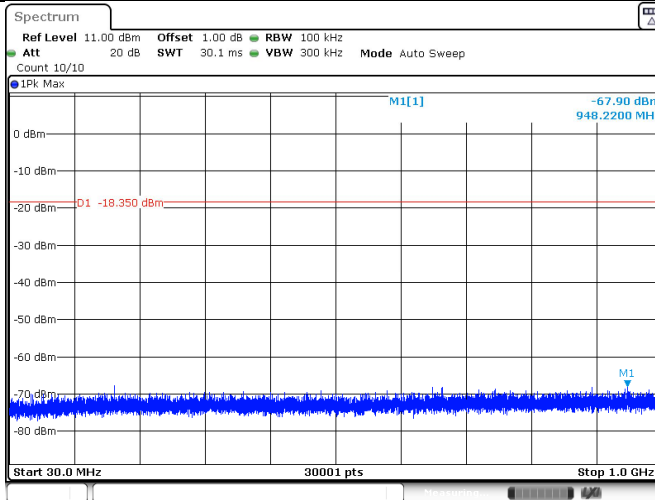


### 3DH5\_Ant1\_2402\_0-Reference



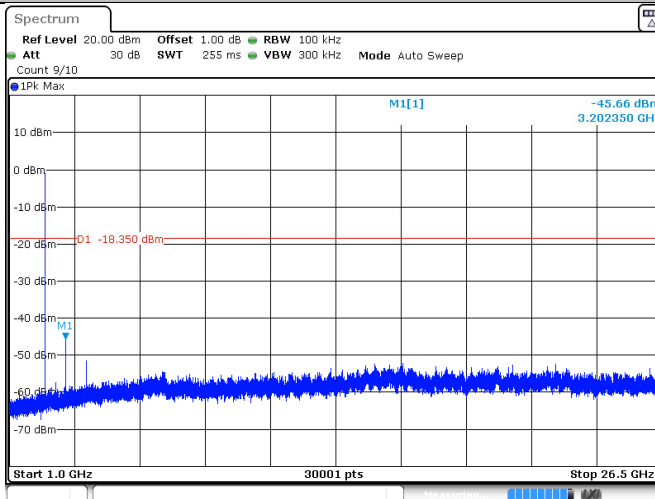
Date: 2 AUG.2022 11:30:19

### 3DH5\_Ant1\_2402\_30-1000



Date: 2 AUG.2022 11:30:26

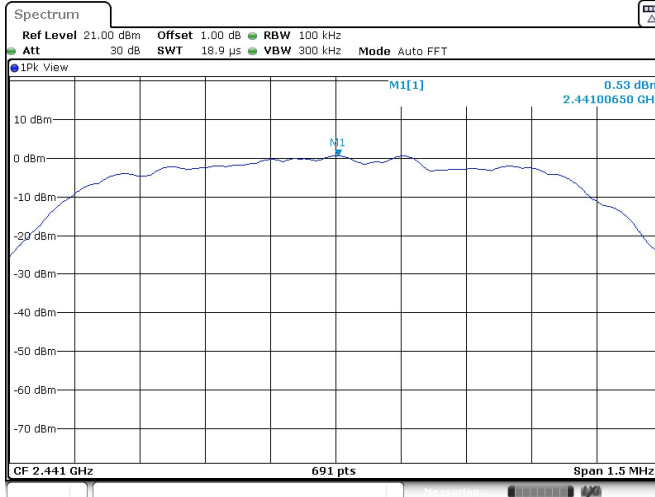
### 3DH5\_Ant1\_2402\_1000-26500



Date: 2 AUG.2022 11:30:33

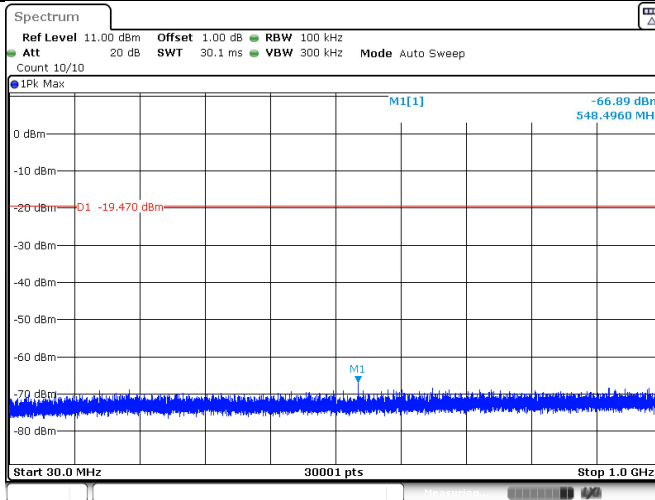


### 3DH5\_Ant1\_2441\_0-Reference



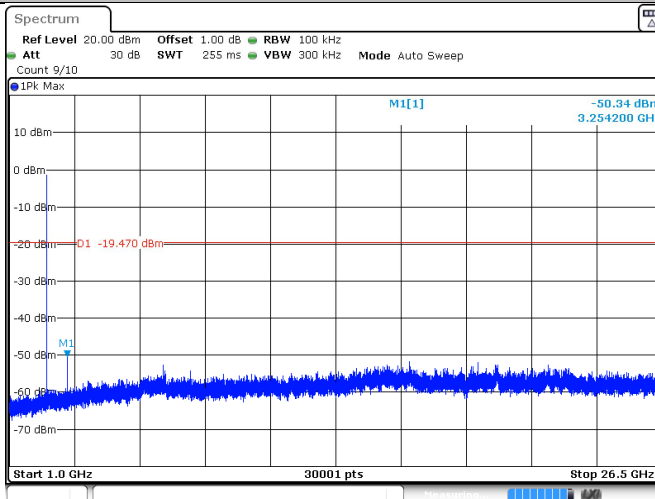
Date: 2 AUG.2022 11:31:53

### 3DH5\_Ant1\_2441\_30~1000

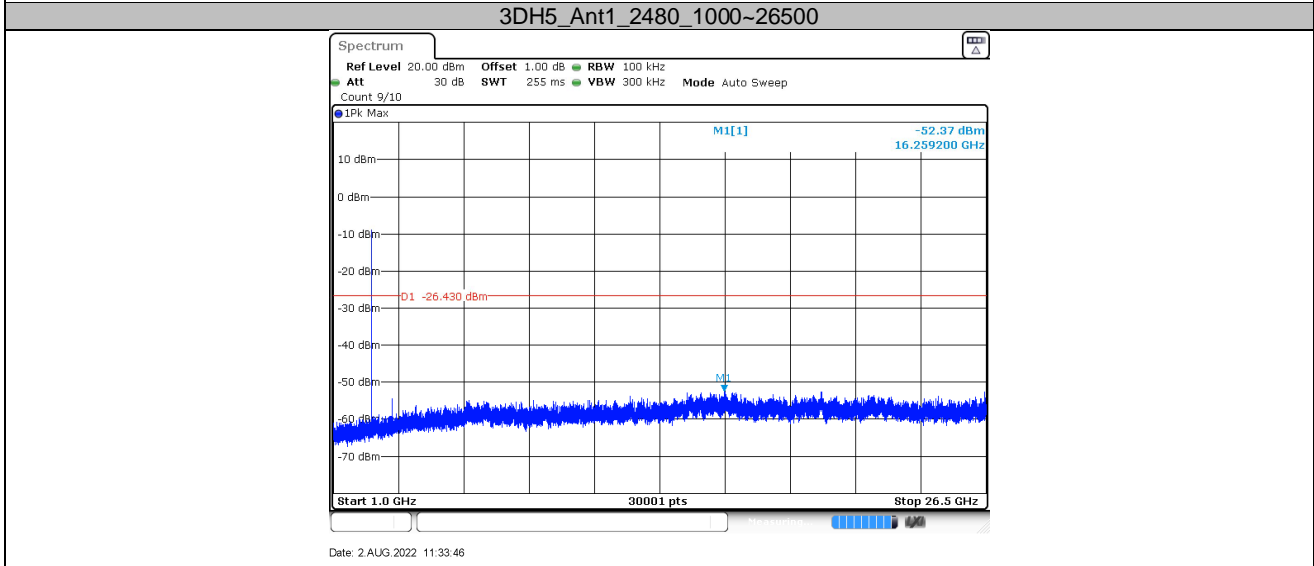
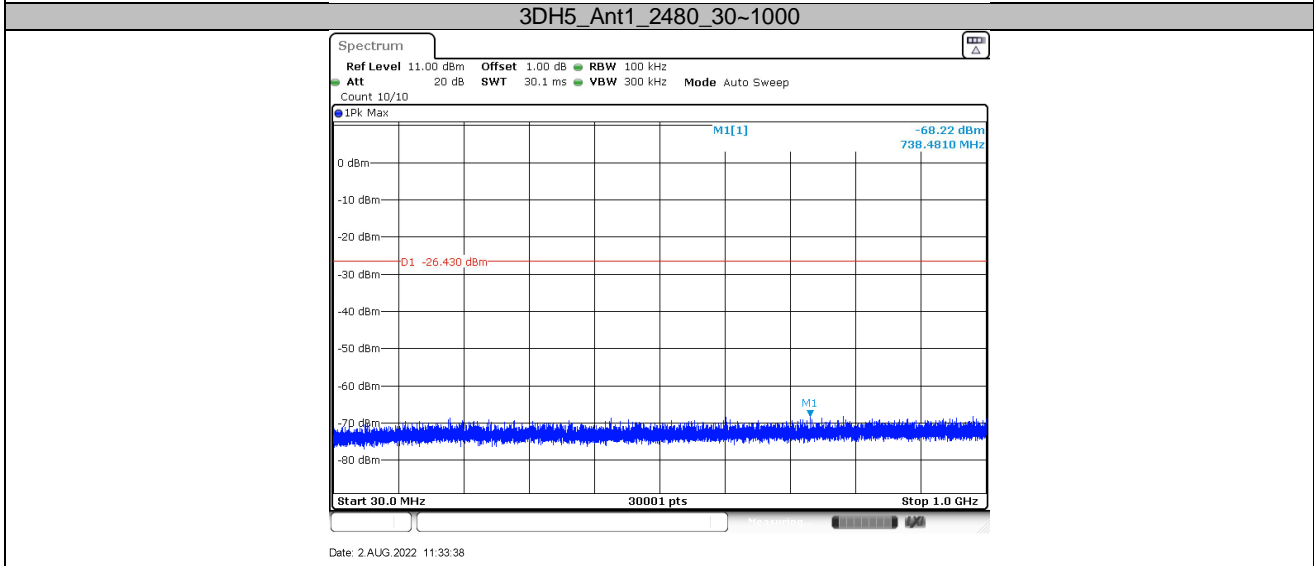
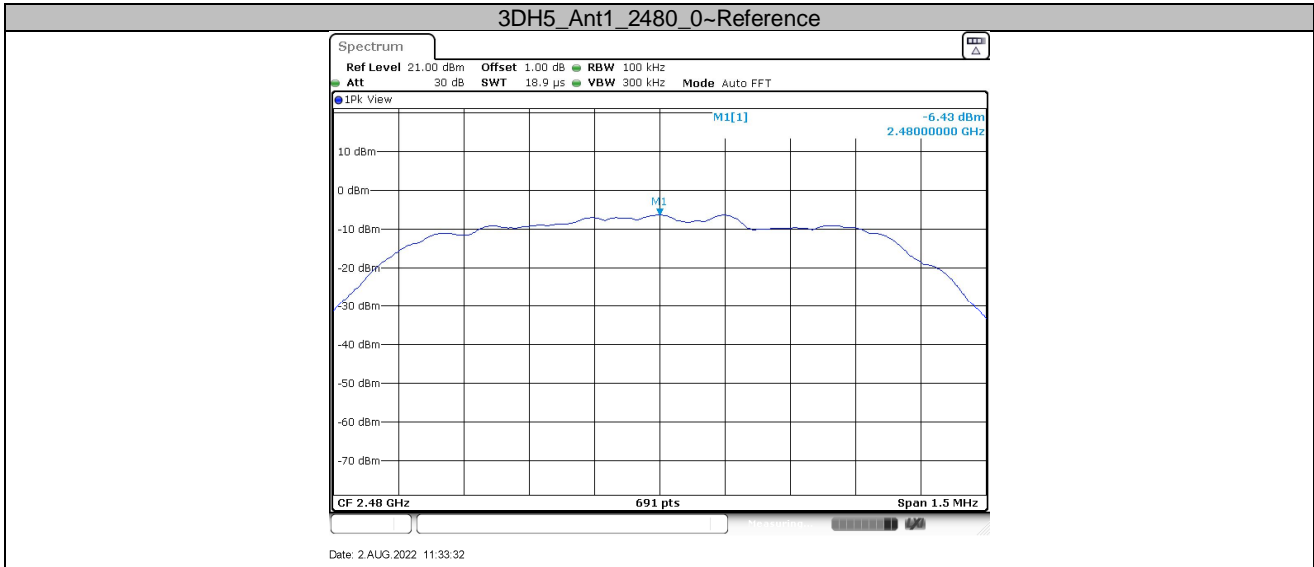


Date: 2 AUG.2022 11:31:59

### 3DH5\_Ant1\_2441\_1000~26500



Date: 2 AUG.2022 11:32:07





## 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.

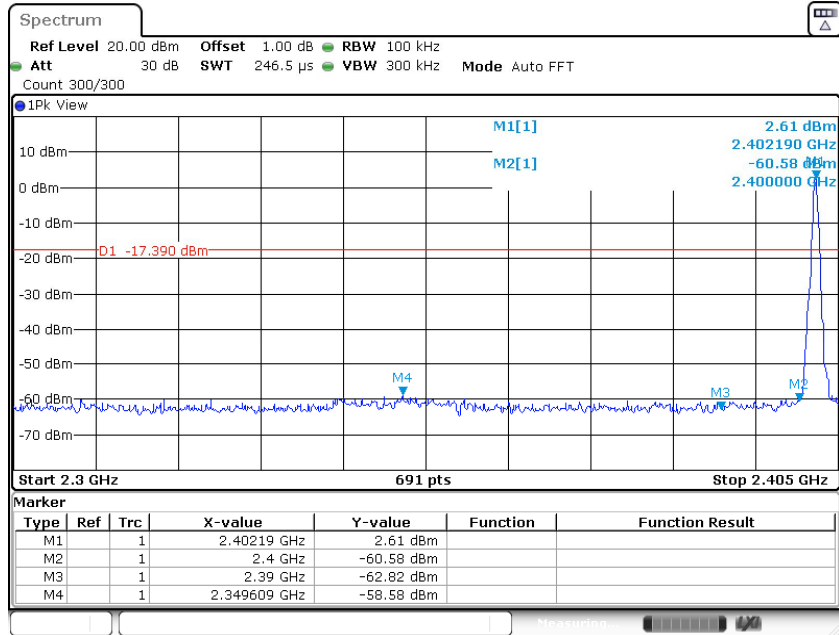
### Limit:

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 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 that 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, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB.

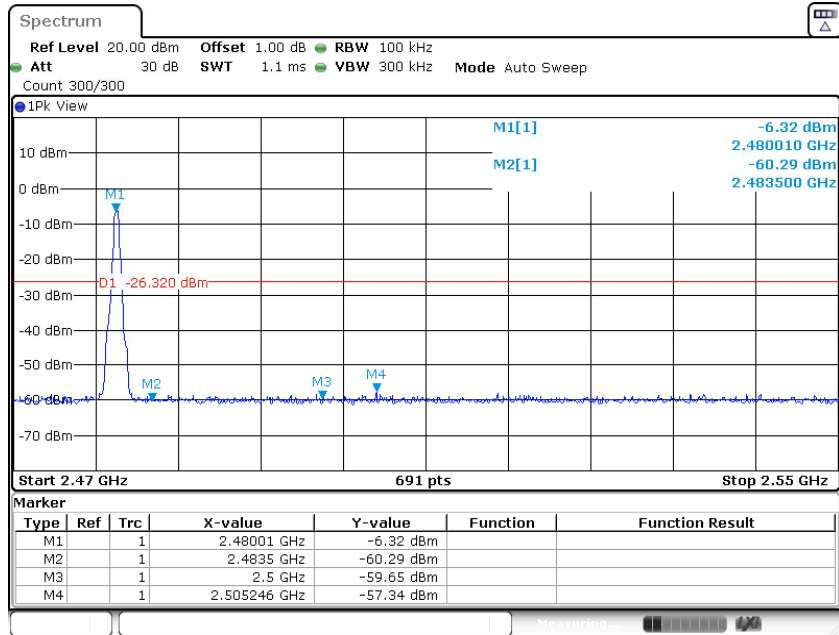
Frequency Range MHz	Limit (dBc)
30-25000	-20



GFSK mode: Hopping off

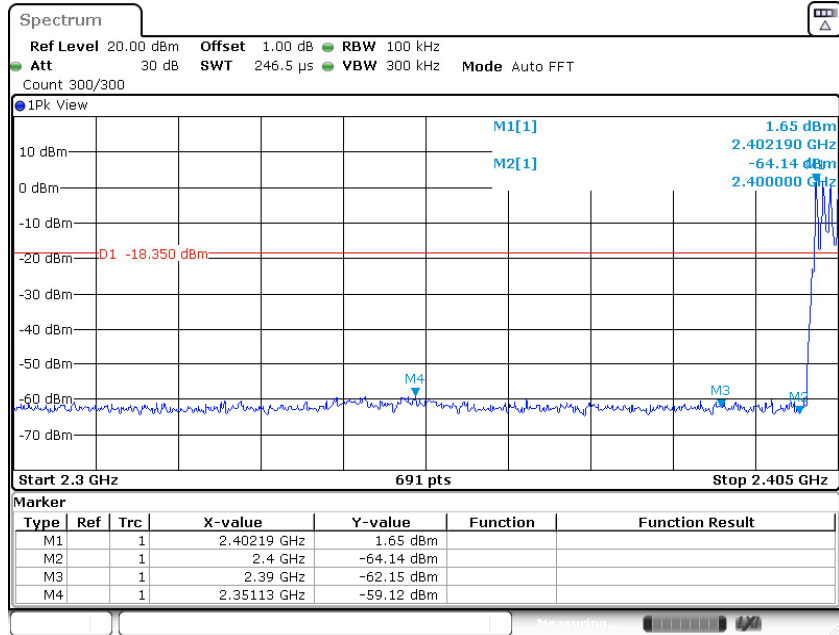


Date: 2.AUG.2022 11:16:12

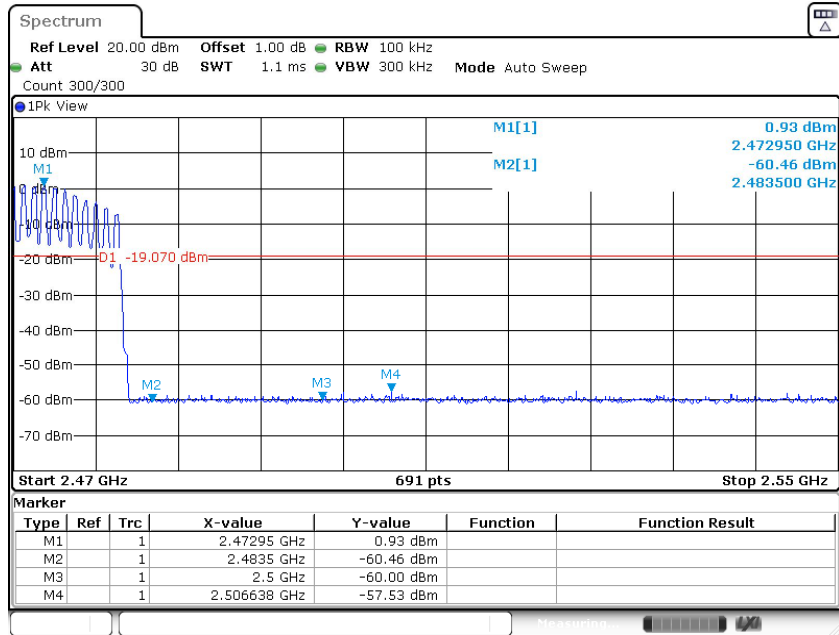


Date: 2.AUG.2022 11:19:39

GFSK mode: Hopping on

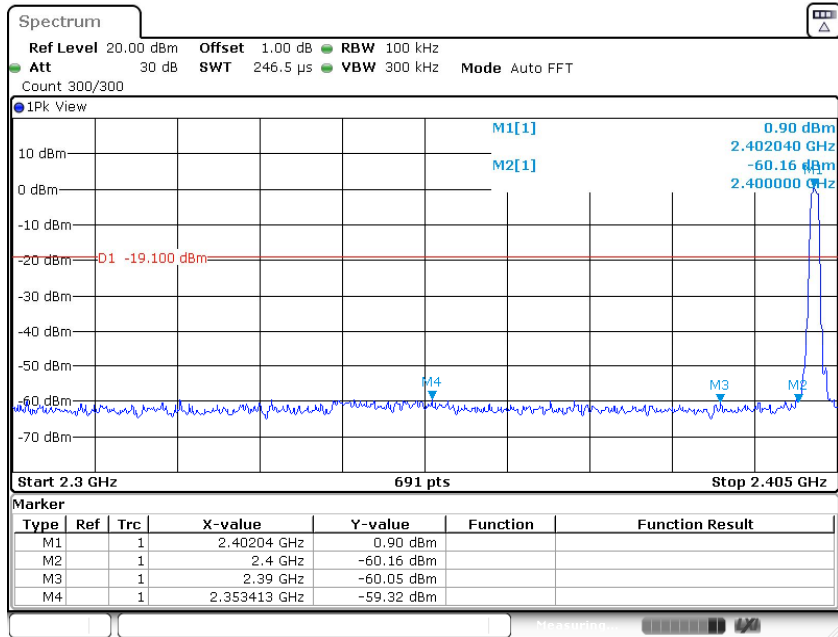


Date: 2.AUG.2022 11:34:45

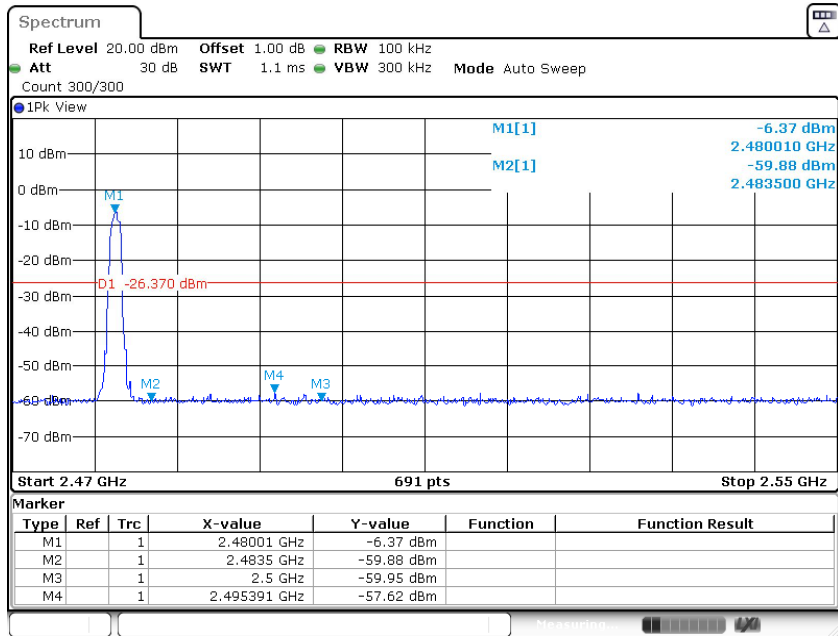


Date: 2.AUG.2022 11:39:10

8DPSK mode: Hopping off



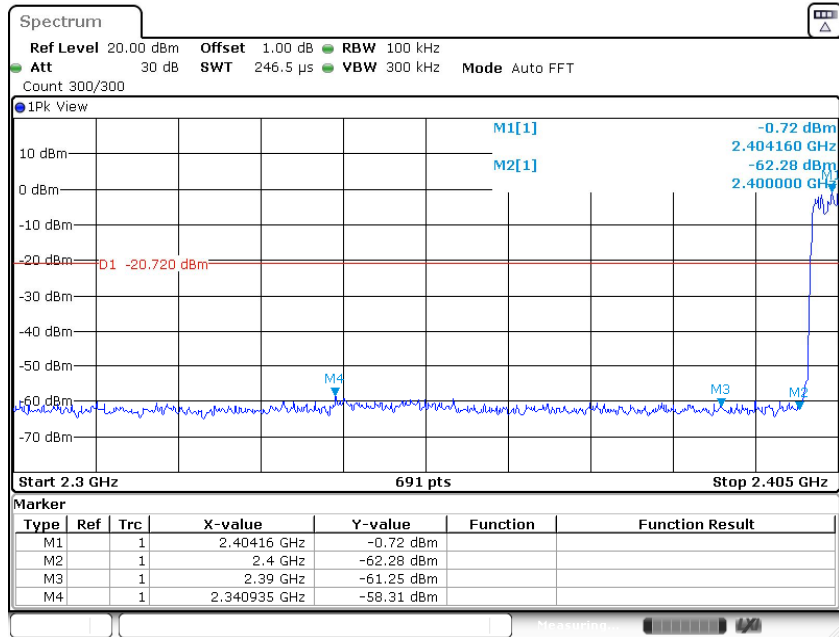
Date: 2.AUG.2022 11:30:14



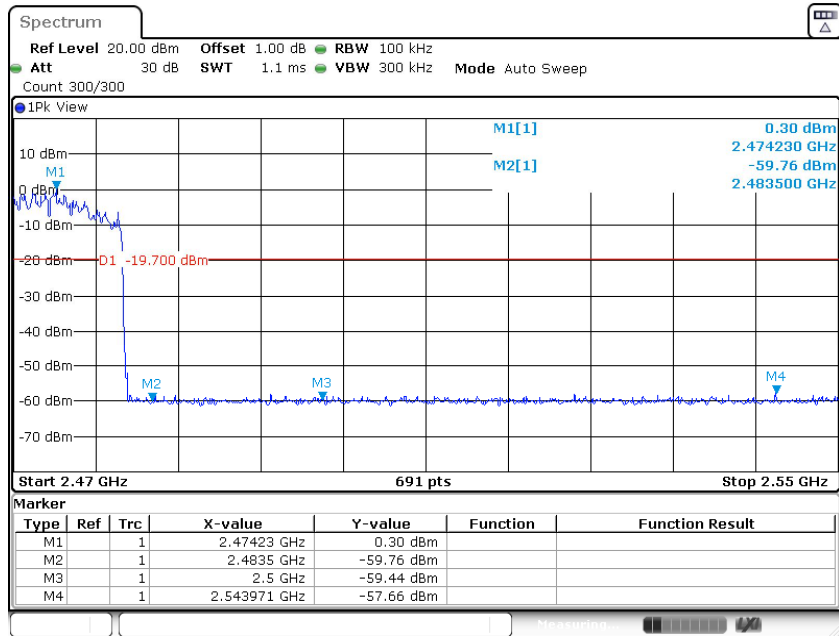
Date: 2.AUG.2022 11:33:26



8DPSK mode: Hopping on



Date: 2.AUG.2022 11:44:26



Date: 2.AUG.2022 11:50:06

## 9.9 Spurious radiated emissions for transmitter

### Test Method

- 1: The EUT was placed 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 $\geq$ 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 $\geq$ 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  $20\log(\text{dwell time}/100 \text{ ms})$ , 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 correction factor, derived from the appropriate duty cycle calculation.  
The setting method can refer to DA00-705.



## 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 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 that 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, as permitted under § 15.247(b)(3) and RSS 247 section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in § 15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a) and RSS-Gen section 8.9, must also comply with the radiated emission limits specified in § 15.209(a) and RSS-Gen section 8.10.

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



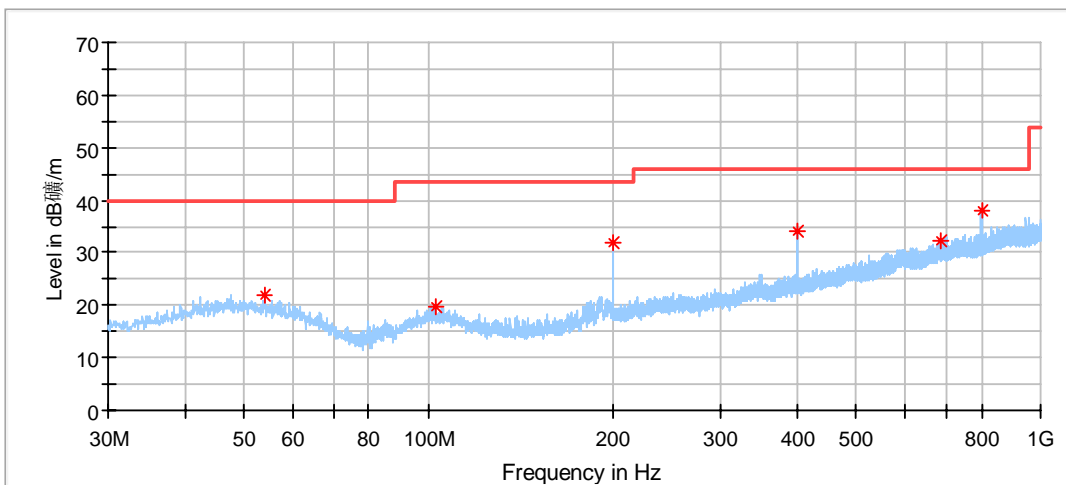
**Spurious radiated emissions for transmitter**

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.

The report only shows the worst test data.

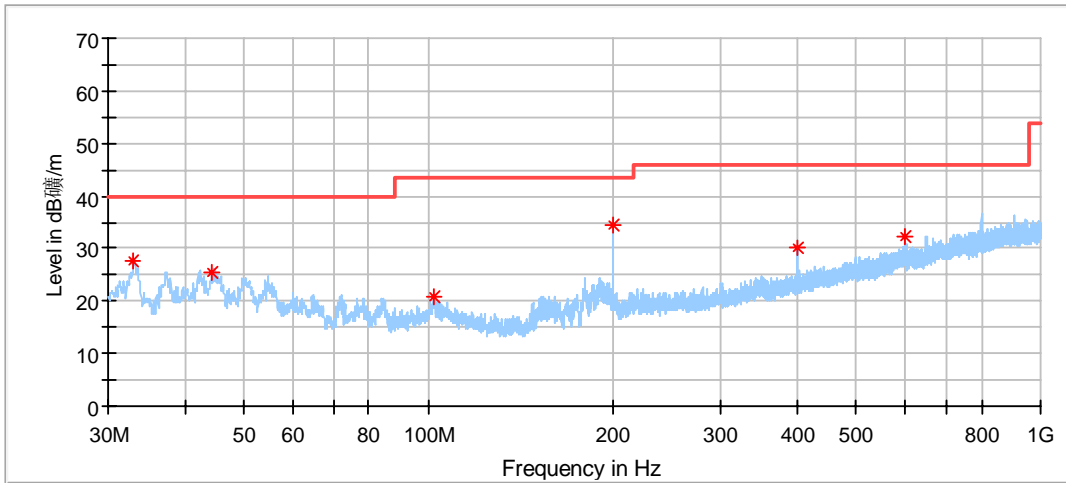
**Transmitting spurious emission test result as below:**

EUT: BenQ HDMI Media Streaming  
 M/N: QS02  
 Operating Condition: Tx 2402MHz, lowest Channel



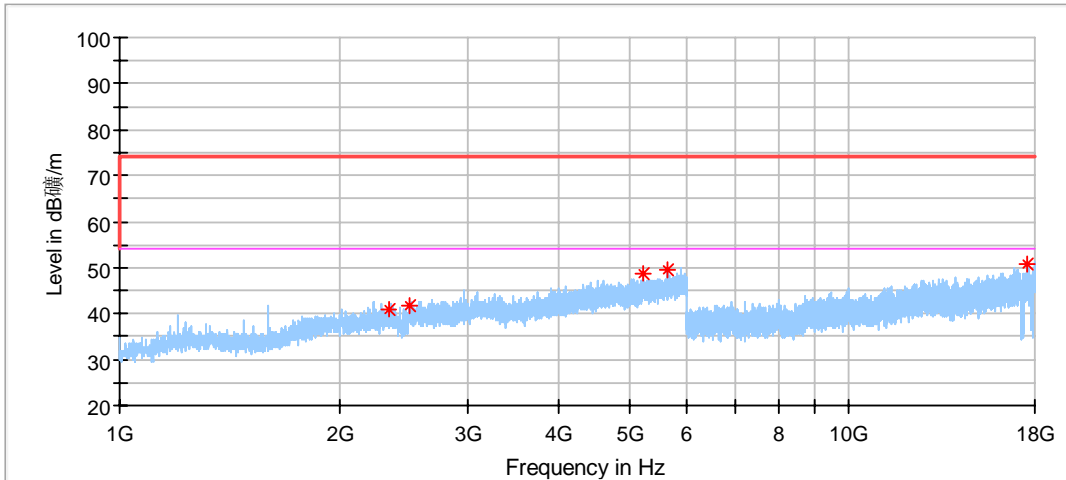
**Critical Freqs**

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
53.980556	21.85	40.00	18.15	100.0	H	221.0	20.64
102.588333	19.88	43.50	23.62	100.0	H	339.0	18.52
199.965556	31.93	43.50	11.57	100.0	H	93.0	18.46
400.001111*	34.12	46.00	11.89	100.0	H	129.0	23.56
688.252778	32.36	46.00	13.64	100.0	H	347.0	28.66
800.018333	37.97	46.00	8.03	100.0	H	301.0	30.12



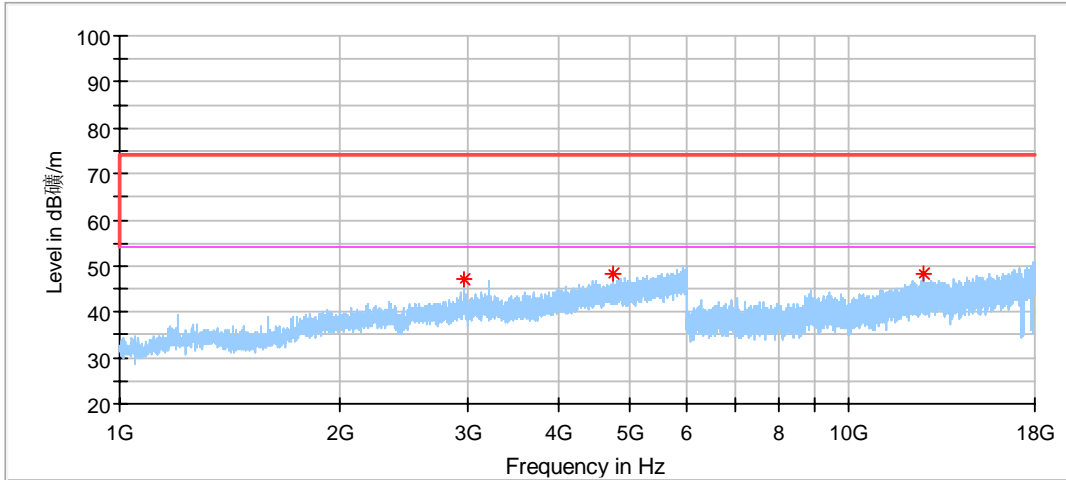
### Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
32.963889	27.78	40.00	12.22	100.0	V	7.0	16.86
44.388333	25.34	40.00	14.66	100.0	V	356.0	20.54
102.426667	20.65	43.50	22.85	100.0	V	123.0	18.52
199.965556	34.49	43.50	9.01	100.0	V	132.0	18.46
400.001111*	30.12	46.00	15.88	100.0	V	169.0	23.56
599.982778	32.48	46.00	13.52	100.0	V	240.0	27.55



### Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2341.000000*	41.12	74.00	32.88	150.0	H	67.0	-2.78
2497.000000*	41.63	74.00	32.37	150.0	H	15.0	-2.37
5226.000000	48.82	74.00	25.18	150.0	H	9.0	5.12
5646.500000	49.34	74.00	24.66	150.0	H	289.0	5.35
17626.000000	50.74	74.00	23.27	150.0	H	188.0	22.08

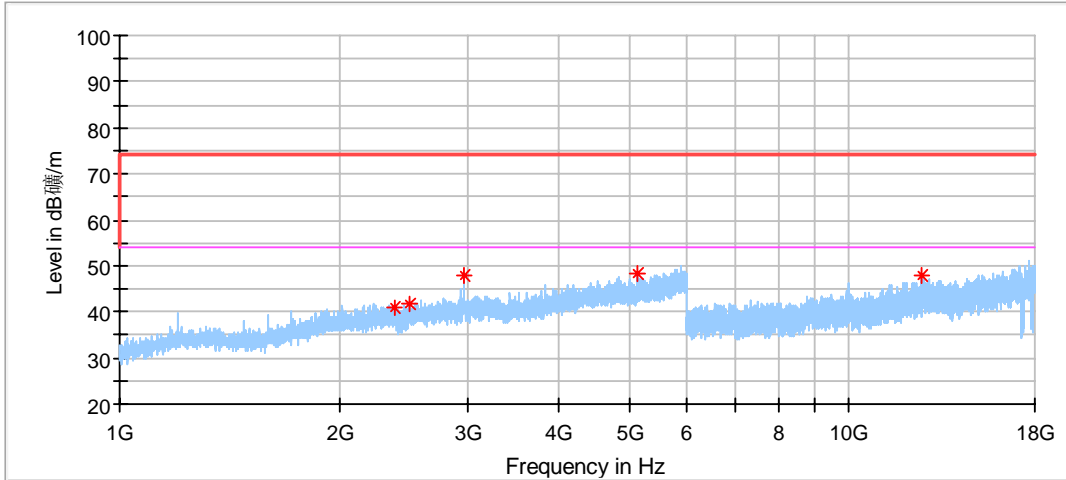


**Critical Freqs**

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2341.000000*	42.12	74.00	31.88	150.0	V	282.0	-2.78
2492.500000*	41.68	74.00	32.32	150.0	V	130.0	-2.36
2967.000000	47.21	74.00	26.79	150.0	V	166.0	-0.99
4743.500000*	48.16	74.00	25.84	150.0	V	76.0	3.70
12688.500000*	48.23	74.00	25.77	150.0	V	188.0	16.21

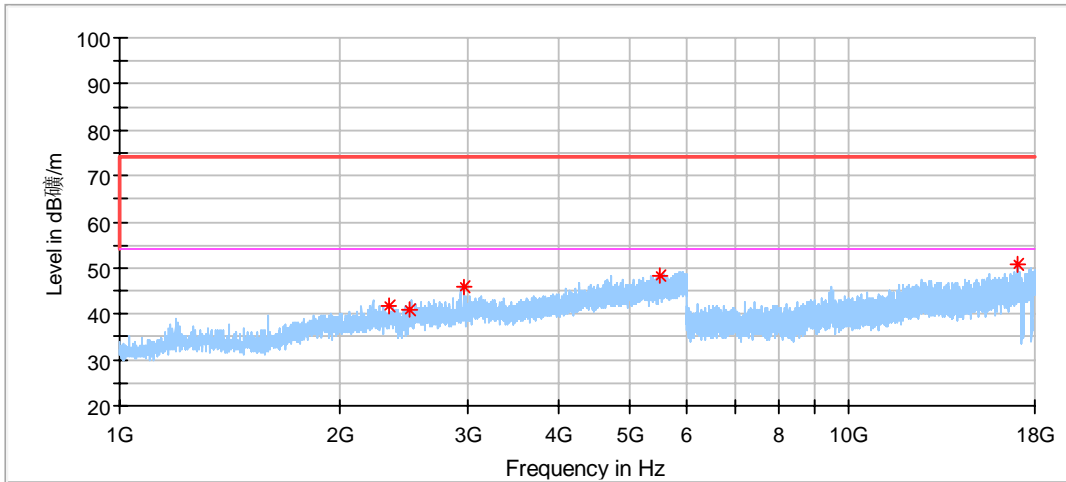


EUT: BenQ HDMI Media Streaming  
 M/N: QS02  
 Operating Condition: Tx 2441MHz, Middle Channel



**Critical\_Freqs**

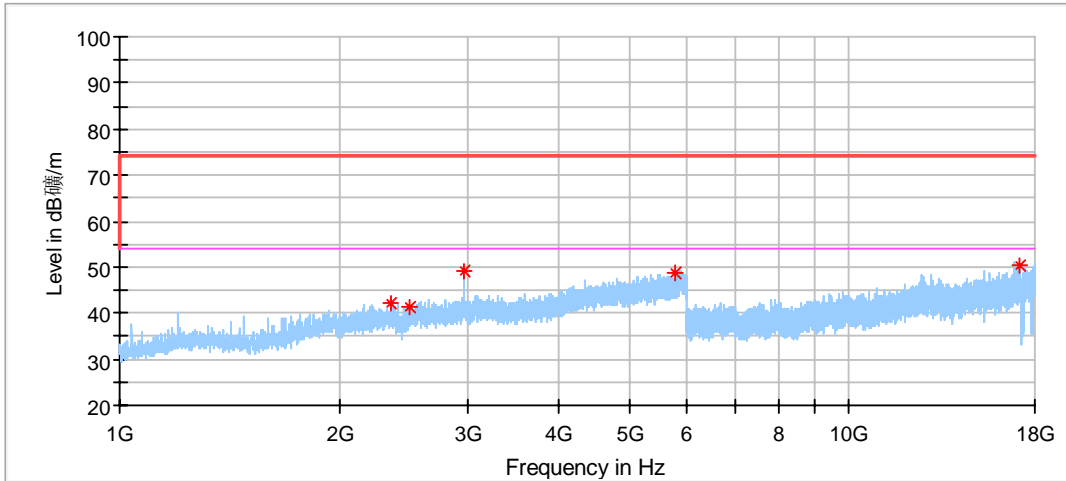
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2378.000000*	40.98	74.00	33.02	150.0	H	264.0	-2.82
2496.500000*	41.79	74.00	32.21	150.0	H	255.0	-2.37
2967.500000	47.86	74.00	26.14	150.0	H	317.0	-0.99
5141.500000*	48.46	74.00	25.54	150.0	H	0.0	4.79
12609.000000*	47.70	74.00	26.30	150.0	H	24.0	16.35



### Critical\_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2340.500000*	41.57	74.00	32.43	150.0	V	192.0	-2.78
2495.500000*	41.05	74.00	32.95	150.0	V	350.0	-2.37
2967.000000	45.91	74.00	28.09	150.0	V	50.0	-0.99
5519.000000	48.24	74.00	25.76	150.0	V	317.0	5.38
17109.500000	50.77	74.00	23.23	150.0	V	131.0	22.16

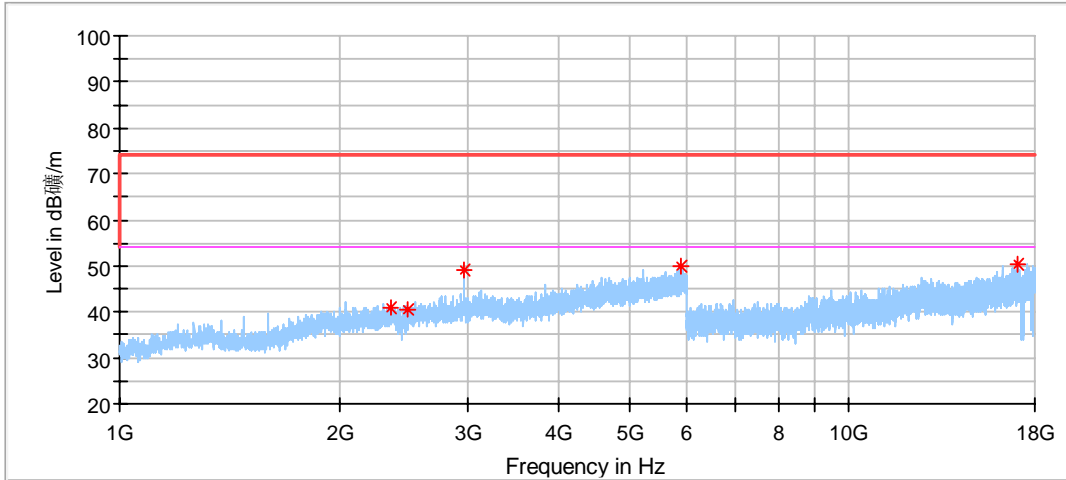
EUT: BenQ HDMI Media Streaming  
 M/N: QS02  
 Operating Condition: Tx 2480MHz, High Channel)



### Critical\_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2360.500000*	42.14	74.00	31.86	150.0	H	183.0	-2.82
2494.000000*	41.29	74.00	32.71	150.0	H	343.0	-2.36
2968.500000	49.07	74.00	24.94	150.0	H	67.0	-0.99
5767.000000	48.70	74.00	25.30	150.0	H	291.0	6.02
17133.500000	50.19	74.00	23.81	150.0	H	330.0	22.21





### Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2351.000000*	41.06	74.00	32.94	150.0	V	67.0	-2.81
2490.000000*	40.54	74.00	33.46	150.0	V	166.0	-2.36
2968.500000	49.16	74.00	24.84	150.0	V	23.0	-0.99
5872.500000	49.78	74.00	24.22	150.0	V	335.0	6.50
17101.500000	50.54	74.00	23.46	150.0	V	330.0	22.14

Remark:

- (1) "\*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within frequency range 9kHz-30MHz, 18-26GHz 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  
 (The Reading Level is recorded by software which is not shown in the sheet)

## 10 Test Equipment List

### List of Test Instruments

#### Conducted Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal interval (year)	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-19-002	102590	1	2023-5-27
LISN	Rohde & Schwarz	ENV216	68-4-87-19-001	102472	1	2023-5-27
ISN	Rohde & Schwarz	ENY81	68-4-87-14-003	100177	1	2023-5-27
ISN	Rohde & Schwarz	ENY81-CA6	68-4-87-14-004	101664	1	2023-5-27
High Voltage Probe	Schwarzbeck	TK9420(VT9420)	68-4-27-14-001	9420-584	1	2023-5-27
RF Current Probe	Rohde & Schwarz	EZ-17	68-4-27-14-002	100816	1	2023-5-31
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2023-5-27
Test software	Rohde & Schwarz	EMC32	68-4-90-19-005-A01	Version10.35.0 2	N/A	N/A
Shielding Room	TDK	CSR #2	68-4-90-19-005	----	3	2022-11-07

#### Radiated Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal interval (year)	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2023-5-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9162	68-4-80-19-003	284	1	2023-1-17
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	1	2023-5-9
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2023-5-28
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-002	100746	1	2023-5-28
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	1	2023-7-12
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	1	2023-7-27
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	1	2023-5-27
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2	2023-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.0 2	N/A	N/A

#### RF conducted test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal interval (year)	cal. due date
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	1	2023-5-27
RF Switch Module	Rohde & Schwarz	OSP120/OSP-B157	68-4-93-14-003	101226/100851	1	2023-5-27
Power Splitter	Weinschel	1580	68-4-85-14-001	SC319	1	2023-5-28
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.6.77.0518	N/A	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	3	2022-11-07



## 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 Radiated Emission in 3m chamber 9kHz-30MHz	4.70dB
Uncertainty for Conducted Emission in shielding room 150kHz-30MHz	3.33dB
Radiated Spurious Emission 30MHz-1000MHz	Horizontal: 4.59dB; Vertical: 4.75dB;
Radiated Spurious Emission 1000MHz-18000MHz	Horizontal: 5.08dB; Vertical: 5.09dB;
Conducted RF test with TS 8997	RF Power Conducted: 1.30dB Frequency test involved: 0.6×10 <sup>-8</sup> or 1%