Prüfbericht-Nr.: *Test report no.*:	**CN247SOL 001**	**Auftrags-Nr.:** *Order no.*:	168486983	**Page 1 of 24** *Seite 1 von 24*
Kunden-Referenz-Nr.: *Client reference no.*:	N/A	**Auftragsdatum:** *Order date:*	2024-05-29	
Auftraggeber: *Client*:	**Harman International Industries, Inc** 8500 Balboa Blvd, Northridge, California, 91329, United States			
Prüfgegenstand: *Test item*:	BLUETOOTH HEADSET			
Bezeichnung / Typ-Nr.: *Identification / Type no.*:	TUNE BEAM 2 (Trademark: JBL)			
Auftrags-Inhalt: *Order content*:	Type test			
Prüfgrundlage: *Test specification*:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.207 CFR47 FCC Part 15: Subpart C Section 15.209		RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 March 2019	

Wareneingangsdatum: *Date of sample receipt*:	2024-05-30	Refer to photos document
Prüfmuster-Nr.: *Test sample no:*	A003731935	
Prüfzeitraum: *Testing period*:	2024-05-30 – 2024-06-12	
Ort der Prüfung: *Place of testing*:	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (Shenzhen) Co., Ltd.	
Prüfergebnis*: *Test result**:	Pass	

geprüft von: tested by:	X Signed by: Harry W. C. Wu	**genehmigt von:** *authorized by*:	X Signed by: Alex Lan
Datum: *Date: 2024-07-19*		**Ausstellungsdatum:** *Issue date: 2024-07-19*	
Stellung / Position:	Project Manager	**Stellung** / Position:	Department Manager

Sonstiges / *Other*:	FCC ID: APITUNEBEAM2 IC: 6132A-TUNEBEAM2 HVIN: TUNE BEAM 2

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery*:	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*P(ass) = passed a.m. test specification(s)*	*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Remarks
Anmerkungen

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request. *Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.* *Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.*
2	As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. *Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.*
3	Test clauses with remark of * are subcontracted to qualified subcontractors and descripted under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report. *Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.*
4	The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the “Zero Guard Band Rule” and “Simple Acceptance” in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019. *Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019.*

Test Summary

5.1.1 ANTENNA REQUIREMENT
RESULT: Pass

5.1.2 MAXIMUM CONDUCTED OUTPUT POWER
RESULT: Pass

5.1.3 99% BANDWIDTH
RESULT: Pass

5.1.4 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH
RESULT: Pass

5.1.5 RADIATED SPURIOUS EMISSION
RESULT: Pass

5.1.6 20DB BANDWIDTH
RESULT: Pass

5.1.7 CARRIER FREQUENCY SEPARATION
RESULT: Pass

5.1.8 FREQUENCY STABILITY
RESULT: Pass

5.1.9 NUMBER OF HOPPING FREQUENCY
RESULT: Pass

5.1.10 TIME OF OCCUPANCY
RESULT: Pass

Contents

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Photographs of the Test Set-up

Appendix B: Test Results of left earbud.

Appendix C: Test Results of right earbud.

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.
No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China/518110

FCC Registration No.: 694916

IC Registration No.: 25069 and the CAB identifier is CN0078.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (TS8997)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
Wireless Connectivity Tester	R&S	CMW270	101375	25.07.2024
Signal Analyzer	R&S	FSV 40	101441	25.07.2024
Vector Signal Generator	R&S	SMBV100A	263301	25.07.2024
Signal Generator	R&S	SMB100A	115186	25.07.2024
OSP	R&S	OSP 150	101017	13.11.2024
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	13.11.2024
Power Sensor	R&S	NRP-Z81	105677	25.07.2024
Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	28.02.2025
Shielding Room 8#	Albatross	SR8	APC17151-SR8	22.06.2024
Unwanted Emission Testing (TS9975)				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Cal. until**
EMI Test Receiver	R&S	ESR 7	102021	25.07.2024
Signal Analyzer	R&S	FSV 40	101439	25.07.2024
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	25.07.2024
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	25.07.2024
Amplifier	R&S	SCU-18F	180070	25.07.2024
Amplifier	R&S	SCU40A	100475	25.07.2024
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	06.08.2024
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	06.08.2024
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	27.08.2024
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	06.08.2024
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	22.06.2024

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table

Parameter	Uncertainty (k=2)
Occupied Channel Bandwidth	± 2.08 %
RF output power, conducted	± 0.99 dB
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
All emissions, radiated	± 4.17 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No.362, Huanguan Middle Road, Songyuansha Community, Guanhu Subdistrict, Longhua District, Shenzhen, Guangdong, China/518110 is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is Bluetooth Headset, which supports Bluetooth dual mode technology.

This product has two different version: Solid version and Ghost version.
For Solid Version: The left & right earbuds are identical in schematic except the PCB layout different.
For Ghost Version: The left & right earbuds are identical in schematic except the PCB layout different
For Solid Version and Ghost Version: all in identical except the charging case and enclosure are different.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment	BLUETOOTH HEADSET
Type Designation	TUNE BEAM 2
Trademark	JBL
FCC ID	APITUNEBEAM2
IC	6132A-TUNEBEAM2
HVIN	TUNE BEAM 2
Extreme Temperature Range	0ºC to +45ºC
Operating Voltage	For charging case: Input: DC 5V, 1A via Type C interface or DC 3.8V, 590mAh via built-in Li-ion battery Output: DC 5V, 200mA * 2 For left & right earbuds: DC 3.85V, 65mAh via built-in lithium-ion battery DC 5V, 0.2A*2 via charging case
Technical Specification of Classical Bluetooth	
Bluetooth Core Version	Bluetooth 5.3
Operating Frequency band	2402 ~ 2480 MHz
Channel Number	79 channels
Channel separation	1MHz
Modulation	GFSK, π/4DQPSK, 8DPSK
Antenna Type	PIFA antenna
Antenna Gain	-1.36 dBi for left earbud -2.16 dBi for right earbud

Technical Specification of Bluetooth Low Energy	
Bluetooth Core Version	Bluetooth 5.3
Operating Frequency band	2402 – 2480 MHz for data rate 1Mbps 2404 – 2478 MHz for data rate 2Mbps
Channel Number	40 channels for data rate 1Mbps 37 channels for data rate 2Mbps Note: 2402MHz/2426MHz/2480MHz will be disable via software for date rate 2Mbps.
Channel separation	2MHz
Data rate	1Mbps, 2Mbps
Modulation	GFSK
Antenna Type	PIFA antenna
Antenna Gain	-1.36 dBi for left earbud -2.16 dBi for right earbud

Table 3: RF Channel and Frequency of Classic Bluetooth

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	**2402.00**	20	2422.00	40	2442.00	60	2462.00
01	2403.00	21	2423.00	41	2443.00	61	2463.00
02	2404.00	22	2424.00	42	2444.00	62	2464.00
03	2405.00	23	2425.00	43	2445.00	63	2465.00
04	2406.00	24	2426.00	44	2446.00	64	2466.00
05	2407.00	25	2427.00	45	2447.00	65	2467.00
06	2408.00	26	2428.00	46	2448.00	66	2468.00
07	2409.00	27	2429.00	47	2449.00	67	2469.00
08	2410.00	28	2430.00	48	2450.00	68	2470.00
09	2411.00	29	2431.00	49	2451.00	69	2471.00
10	2412.00	30	2432.00	50	2452.00	70	2472.00
11	2413.00	31	2433.00	51	2453.00	71	2473.00
12	2414.00	32	2434.00	52	2454.00	72	2474.00
13	2415.00	33	2435.00	53	2455.00	73	2475.00
14	2416.00	34	2436.00	54	2456.00	74	2476.00
15	2417.00	35	2437.00	55	2457.00	75	2477.00
16	2418.00	36	2438.00	56	2458.00	76	2478.00
17	2419.00	37	2439.00	57	2459.00	77	2479.00
18	2420.00	38	2440.00	58	2460.00	**78**	**2480.00**
19	2421.00	**39**	**2441.00**	59	2461.00	--	--

Table 4: RF Channel and Frequency of Bluetooth Low Energy

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
00	**2402.00**	10	2422.00	20	2442.00	30	2462.00
01	2404.00	11	2424.00	21	2444.00	31	2464.00
02	2406.00	12	2426.00	22	2446.00	32	2466.00
03	2408.00	13	2428.00	23	2448.00	33	2468.00
04	2410.00	14	2430.00	24	2450.00	34	2470.00
05	2412.00	15	2432.00	25	2452.00	35	2472.00
06	2414.00	16	2434.00	26	2454.00	36	2474.00
07	2416.00	17	2436.00	27	2456.00	37	2476.00
08	2418.00	18	2438.00	28	2458.00	38	2478.00
09	2420.00	**19**	**2440.00**	29	2460.00	**39**	**2480.00**

3.3 Independent Operation Modes

The basic operation modes are:

A. On
   1. Bluetooth transmitting mode (BR & EDR mode)
      a) Low Channel
      b) Middle Channel
      c) High Channel

B. On, Transmitting on Hopping channel

C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- Block Diagram
- Schematics
- Technical Description
- FCC/IC Label and Location Info
- Photo Document
- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10: 2013.
According to clause 3.1, all test items were applied on model TUNE BEAM (Solid version) with left & right earbuds.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N or Rating
Laptop	Lenovo	T480	PF-16A6N8
USB cable	Shen zhen Daytone Electronics Co., Ltd	CE-2196N	28AWG；length：0.2M

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 30MHz)

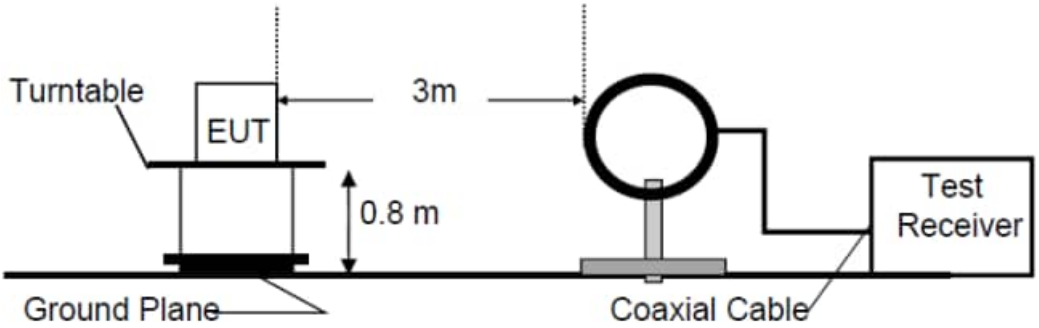


Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

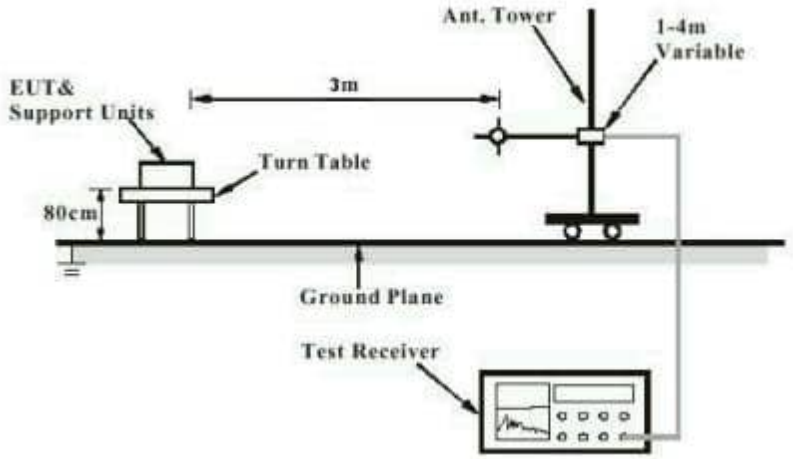


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

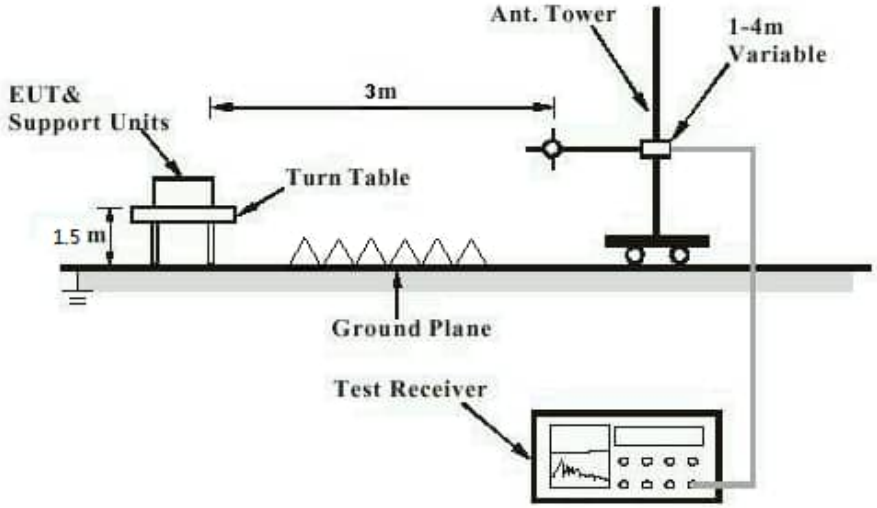
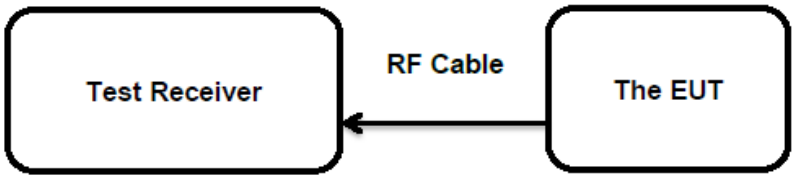


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Pass**

Test Specification

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 8.3

According to the manufacturer declared, the EUT has one PIFA antenna, the directional gain of antennas are -1.36 dBi for left earbud & -2.16 dBi for right earbud , and the antenna connector is designed with permanent attachment and no consideration of replacement. Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Conducted Output Power

RESULT: **Pass**

Test Specification

Test standard	FCC Part 15.247(b)(1) RSS-247 Clause 5.4(b)
Basic standard	ANSI C63.10: 2013
Limits	FHSS<0.125W(Maximum peak conducted output power) < 4 W (e.i.r.p.)
Kind of test site	Shielded Room

Test Setup

Date of testing	2024-05-30 to 2024-06-12
Input voltage	DC 3.85V for left and right earbud
Operation mode	A.1
Test channel	Low / Middle / High
Ambient temperature	23.5 ℃
Relative humidity	54 %
Atmospheric pressure	101 kPa

Table 6: Test Result of Maximum Conducted Output Power, left earbud

Test Mode	Channel Frequency (MHz)	Measured Peak Output Power		Limit (W)
		(dBm)	(W)	
BR	2402	11.4	0.01380	< 0.125
	2441	11.6	0.01445	
	2480	11.3	0.01349	
EDR	2402	8.4	0.00692	
	2441	8.8	0.00759	
	2480	8.3	0.00676	
Maximum Measured Value		11.6	0.01445	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 10.24dBm less than 4W(36dBm).

Table 7: Test Result of Maximum Conducted Output Power, right earbud

Test Mode	Channel Frequency (MHz)	Measured Peak Output Power		Limit (W)
		(dBm)	(W)	
BR	2402	11.5	0.01413	< 0.125
	2441	11.6	0.01445	
	2480	11.5	0.01413	
EDR	2402	8.8	0.00759	
	2441	9.1	0.00813	
	2480	8.5	0.00708	
Maximum Measured Value		11.6	0.01445	

Note: The cable loss is taken into account in results and the maximum e.i.r.p. is 9.44 dBm less than 4W(36dBm).

5.1.3 99% Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	RSS-Gen Clause 6.7
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C

Table 8: Test Result of 99% Bandwidth, left earbud

Test Mode	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)	Limit
BR	2402	0.870	/
	2441	0.870	
	2480	0.880	
EDR	2402	1.165	/
	2441	1.170	
	2480	1.175	

Table 9: Test Result of 99% Bandwidth, right earbud

Test Mode	Channel Frequency (MHz)	Measured 99% Bandwidth (MHz)	Limit
BR	2402	0.860	/
	2441	0.875	
	2480	0.875	
EDR	2402	1.170	/
	2441	1.180	
	2480	1.175	

Note: The fundamental emissions stay within the allocated band 2400-2483.5MHz.

5.1.4 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	:	ANSI C63.10: 2013
Limits	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to following test plot, and compliance is achieved as well.

For the measurement records, refer to the appendix B & C

5.1.5 Radiated Spurious Emission

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3
Basic standard	:	ANSI C63.10: 2013
Limits	:	Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Table 6 & Table 7
Kind of test site	:	3m Semi-anechoic Chamber

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	Refer to test result
Relative humidity	:	Refer to test result
Atmospheric pressure	:	101 kPa

Remark:
During the pretest the EUT was rotated through three orthogonal axes to determine the attitude that maximizes the emissions. After that the EUT was manually handled to find the orientation that has the maximum emission, which is the orientation shown in the test set-up photos.

Testing was carried out within frequency range 9kHz to the tenth harmonics.

For the measurement records, refer to the appendix B & C

5.1.6 20dB Bandwidth

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(1) RSS-247 Clause 5.1(a)
Basic standard	:	ANSI C63.10: 2013
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	A.1
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C

Table 10: Test Result of -20dB Bandwidth, Left earbud

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (MHz)	2/3 of 20dB Bandwidth (MHz)	Limit (MHz)
BR	2402	0.970	0.647	/
	2441	0.965	0.643	
	2480	0.985	0.657	
EDR	2402	1.240	0.827	/
	2441	1.245	0.830	
	2480	1.240	0.827	

Table 11: Test Result of -20dB Bandwidth, Right earbud

Test Mode	Channel Frequency (MHz)	20dB Bandwidth (MHz)	2/3 of 20dB Bandwidth (MHz)	Limit (MHz)
BR	2402	0.940	0.627	/
	2441	0.960	0.640	
	2480	1.010	0.673	
EDR	2402	1.250	0.833	/
	2441	1.240	0.827	
	2480	1.290	0.860	

5.1.7 Carrier Frequency Separation

RESULT: **Pass**

Test Specification

Test standard	:	FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)
Basic standard	:	ANSI C63.10: 2013
Limits	:	≥ 25kHz or 2/3 of 20dB bandwidth, whichever is greater
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C

Table 12: Test Result of Carrier Frequency Separation, Left earbud

Test Mode	Channel (MHz)	Result[MHz]	Limit[MHz]	Verdict
BR-DH5	2402	1.0036	≥0.647	PASS
	2441	1.0036	≥0.643	PASS
	2480	1.0036	≥0.657	PASS
EDR-3DH5	2402	1.0036	≥0.827	PASS
	2441	1.0036	≥0.830	PASS
	2480	1.0036	≥0.827	PASS

Table 13: Test Result of Carrier Frequency Separation, Right earbud

Test Mode	Channel	Result[MHz]	Limit[MHz]	Verdict
BR-DH5	2402	1.0035	≥0.627	PASS
	2441	1.0011	≥0.640	PASS
	2480	1.0025	≥0.673	PASS
EDR-3DH5	2402	1.0003	≥0.833	PASS
	2441	1.0030	≥0.827	PASS
	2480	1.0025	≥0.860	PASS

5.1.8 Frequency stability

RESULT: **Pass**

Test Specification

Test standard	:	RSS-247 Clause 8.11
Basic standard	:	ANSI C63.10: 2013
Limits	:	within at least the central 80% of its permitted operating frequency band (2400-2483.5MHz)
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	B
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C

5.1.9 Number of Hopping Frequency

RESULT: **Pass**

Test Specification

Test standard	:	FCC part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	≥ 15 non-overlapping channels
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	B
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C.

Table 14: Test Result of Number of Hopping Frequency, Left earbud

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2402 to 2480 MHz	79	≥15	Pass

Table 15: Test Result of Number of Hopping Frequency, Right earbud

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2402 to 2480 MHz	79	≥15	Pass

5.1.10 Time of Occupancy

RESULT: **Pass**

Test Specification

Test standard	:	FCC part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)
Basic standard	:	ANSI C63.10: 2013
Limits	:	< 0.4s
Kind of test site	:	Shielded Room

Test Setup

Date of testing	:	2024-05-30 to 2024-06-12
Input voltage	:	DC 3.85V for left and right earbud
Operation mode	:	B
Test channel	:	Low / Middle / High
Ambient temperature	:	23.5 ℃
Relative humidity	:	54 %
Atmospheric pressure	:	101 kPa

For the measurement records, refer to the appendix B & C.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix A.

7 List of Tables

Appendix B: Test Results of Left earbud

Appendix B.1: Test Results of 99% Bandwidth

BR mode (GFSK)

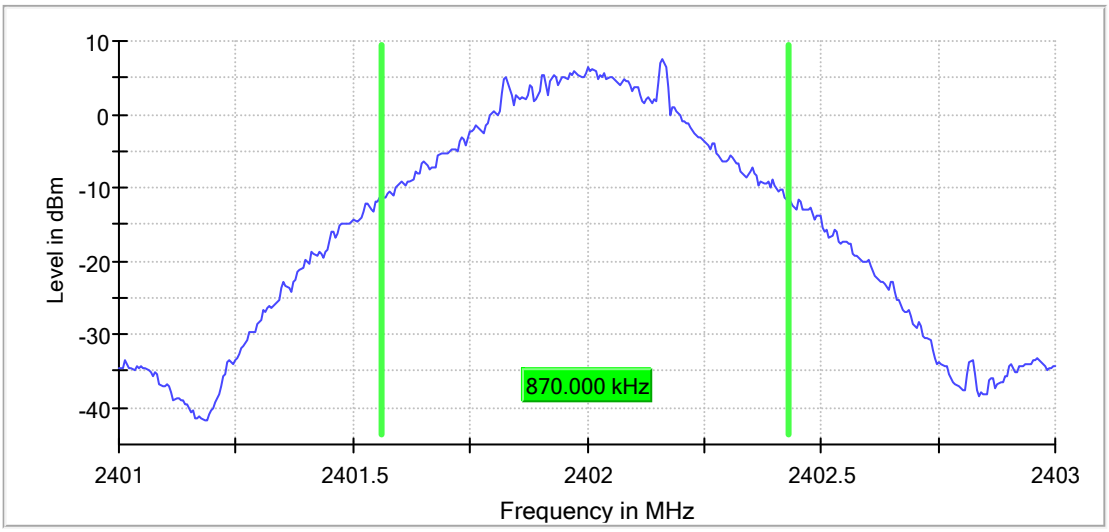
99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.870000	---	---	2401.562500	2402.432500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2402.000000	PASS

RBW=30kHz, VBW=100kHz



99 % Bandwidth

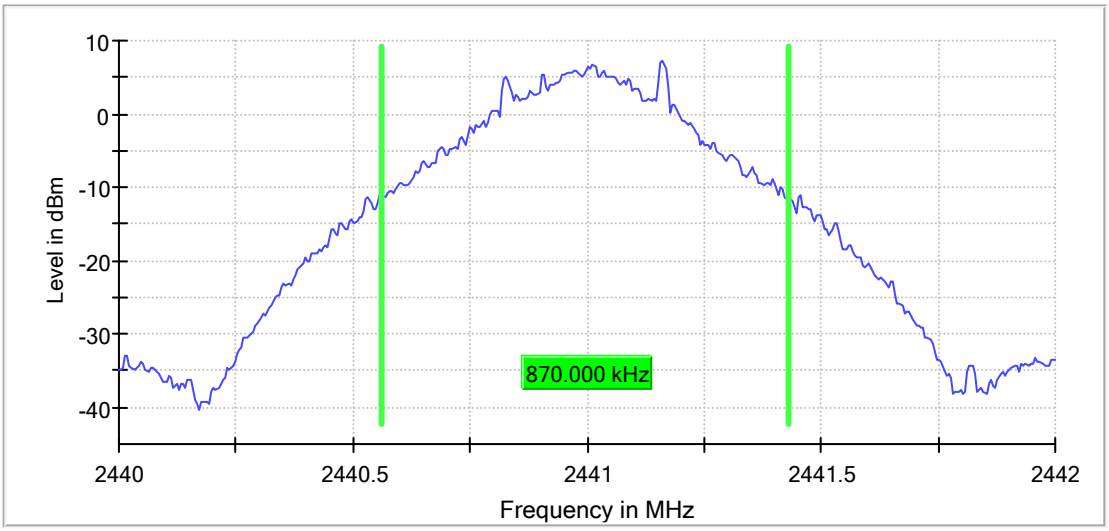
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.870000	---	---	2440.562500	2441.432500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2441.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



99 % Bandwidth

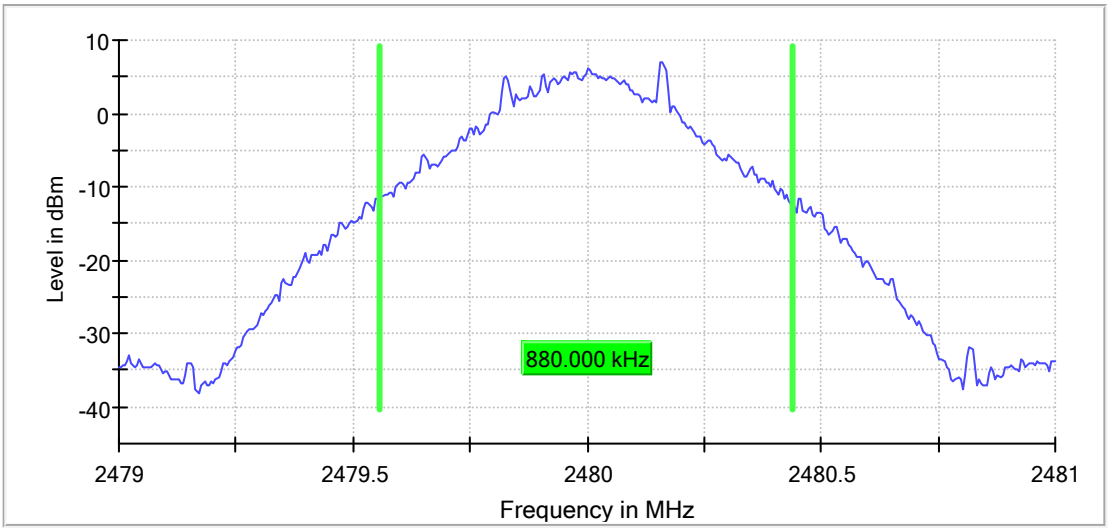
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.880000	---	---	2479.557500	2480.437500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2480.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



EDR mode (8DPSK)

99 % Bandwidth

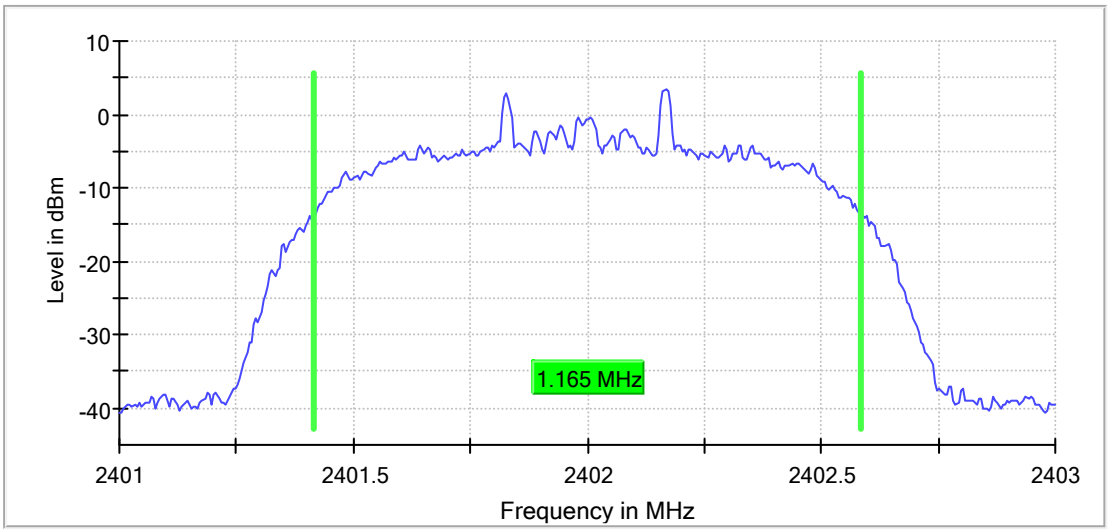
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.165000	---	---	2401.417500	2402.582500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2402.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



99 % Bandwidth

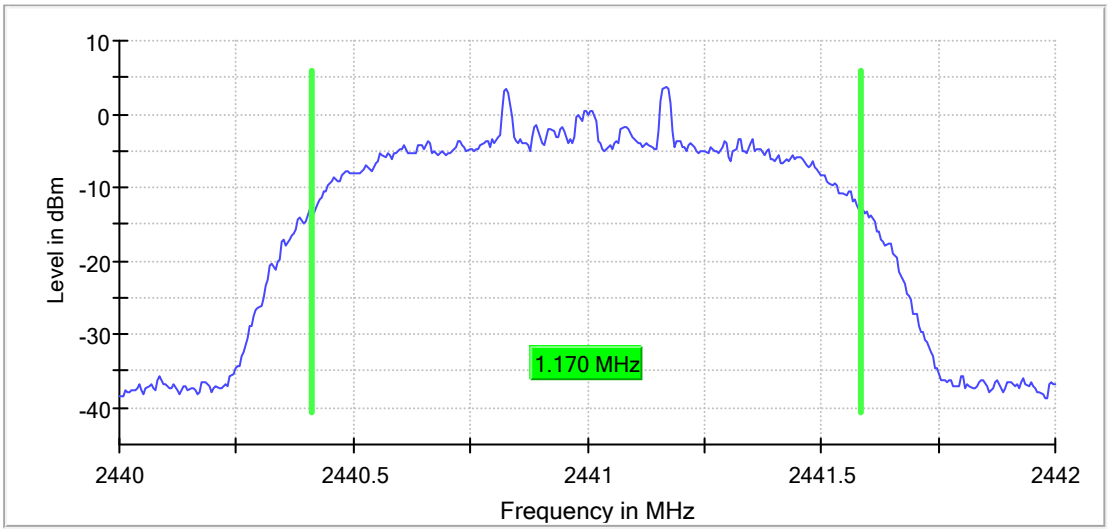
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.170000	---	---	2440.412500	2441.582500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2441.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



99 % Bandwidth

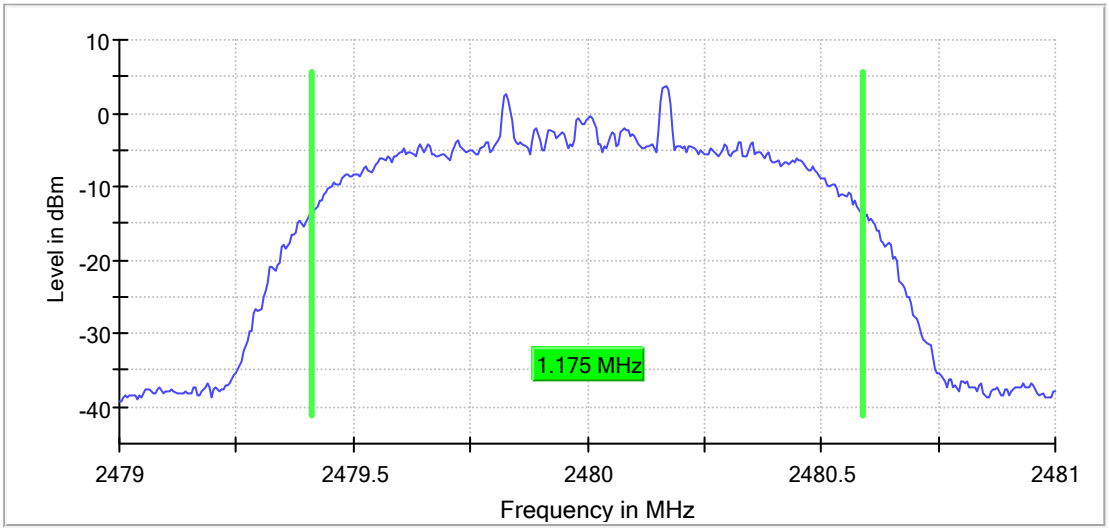
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.175000	---	---	2479.412500	2480.587500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2480.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



Appendix B.2: Test Results of 20dB Bandwidth

BR mode (GFSK)

20 dB Bandwidth

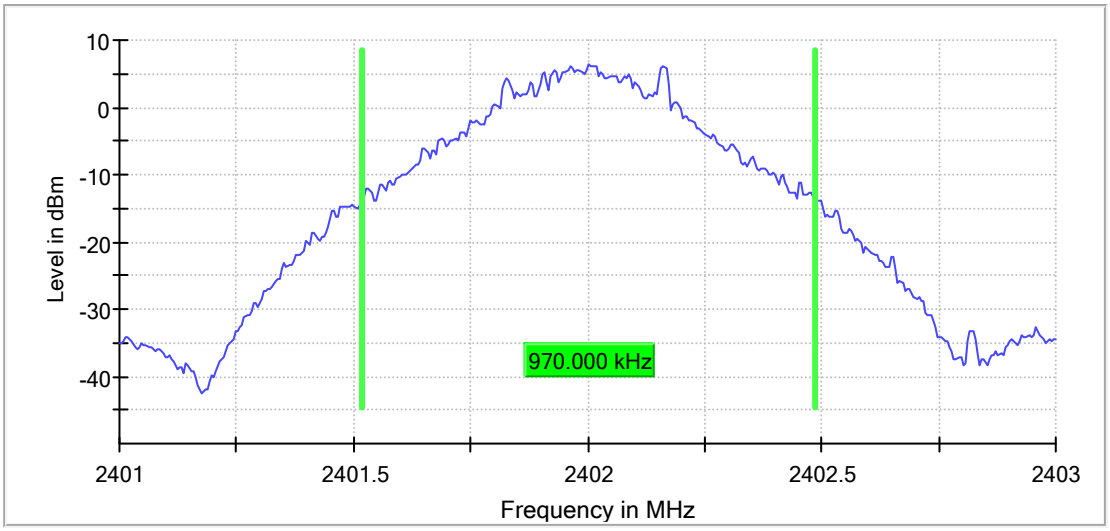
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.970000	---	---	2401.517500	2402.487500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	6.4	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

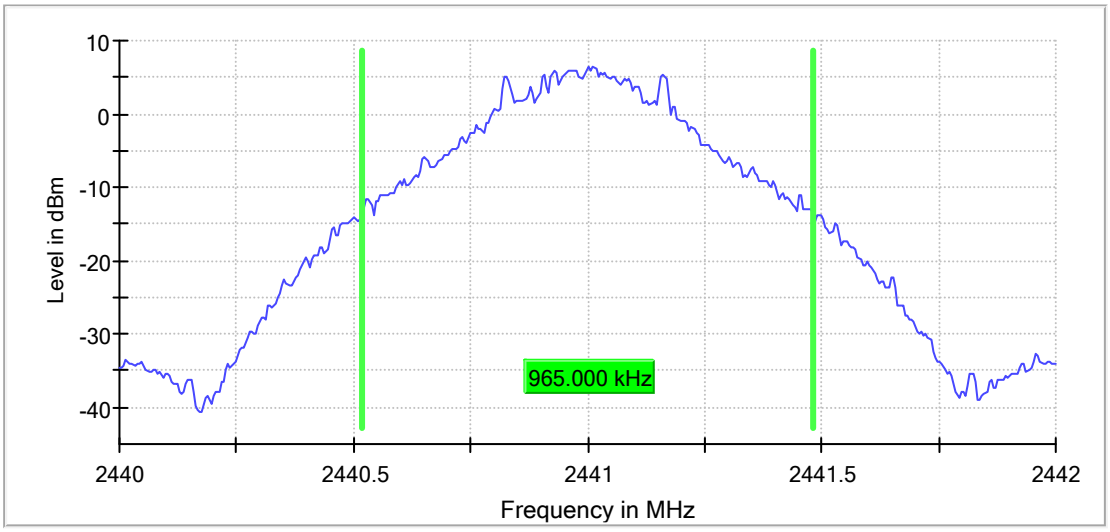
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.965000	---	---	2440.517500	2441.482500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2441.000000	6.6	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

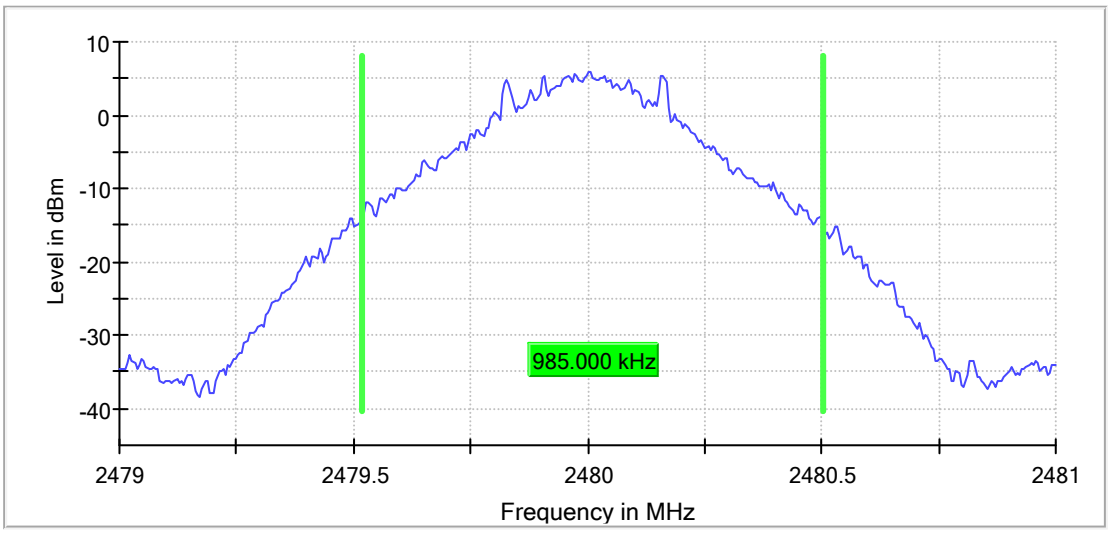
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.985000	---	---	2479.517500	2480.502500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	6.0	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



EDR mode (8DPSK)

20 dB Bandwidth

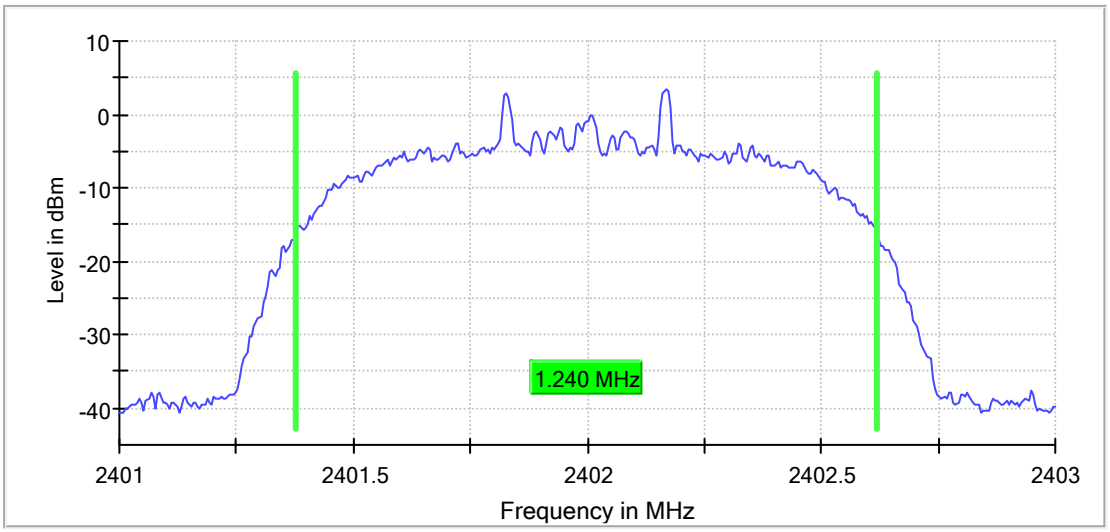
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.240000	---	---	2401.377500	2402.617500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	3.5	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

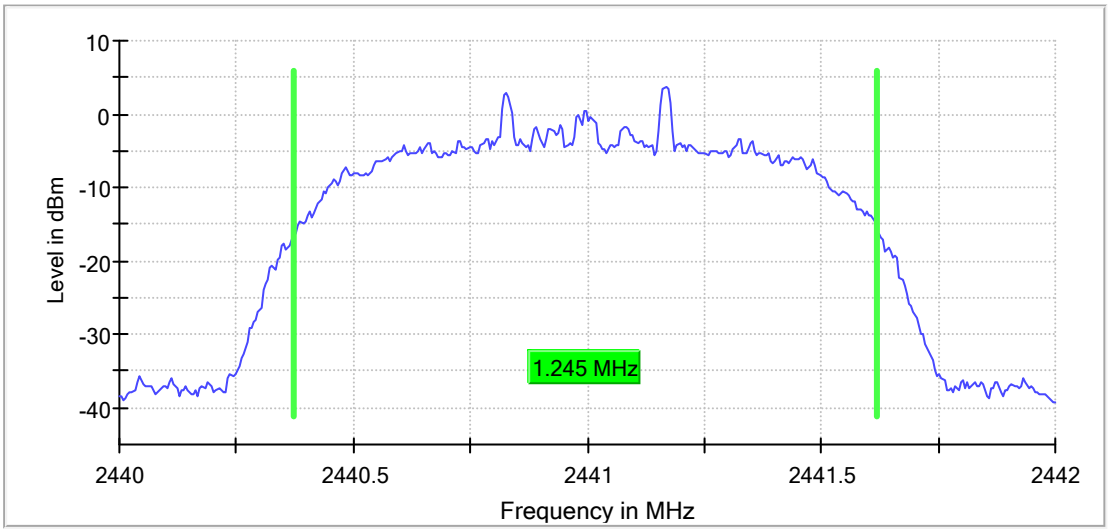
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.245000	---	---	2440.372500	2441.617500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2441.000000	3.8	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

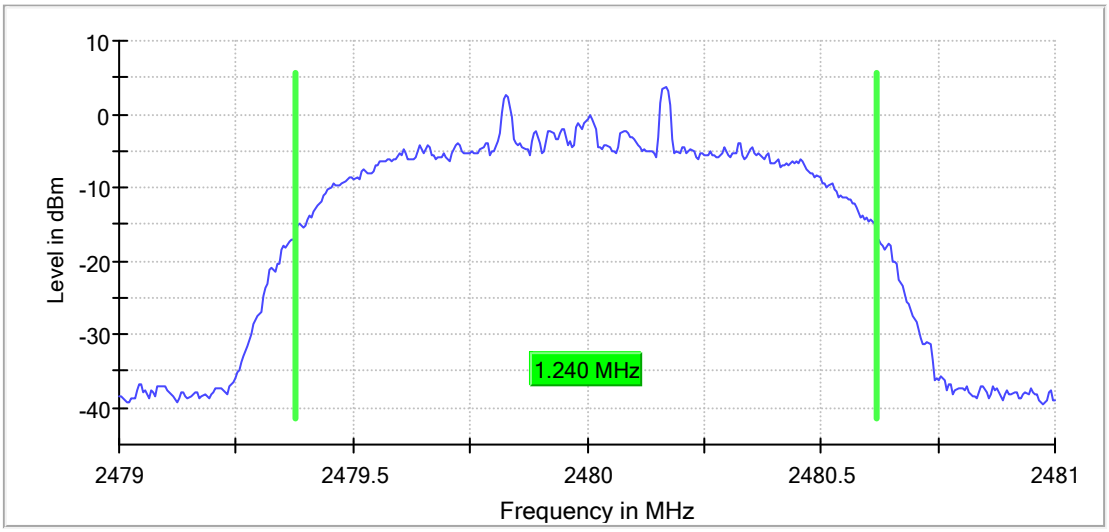
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.240000	---	---	2479.377500	2480.617500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	3.6	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



Appendix B.3: Test Results of Frequency stability

Test Channel (MHz)	2402

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.465V	2401.992	-8	-3.33	10
DC 3.85V	2401.996	-4	-1.67	
DC 4.235V	2401.991	-9	-3.75	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2401.986	-14	-5.83	10
-20	2401.985	-15	-6.24	
-10	2401.986	-14	-5.83	
0	2401.989	-11	-4.58	
10	2401.990	-10	-4.16	
20	2401.988	-12	-5.00	
30	2401.988	-12	-5.00	
40	2401.987	-13	-5.41	
50	2401.985	-15	-6.24	
55	2401.983	-17	-7.08	

Test Channel (MHz)	2441

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.465V	2440.995	-5	-2.05	10
DC 3.85V	2440.993	-7	-2.87	
DC 4.235V	2440.992	-8	-3.28	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2440.993	-7	-2.87	10
-20	2440.994	-6	-2.46	
-10	2440.995	-5	-2.05	
0	2440.992	-8	-3.28	
10	2440.994	-6	-2.46	
20	2440.996	-4	-1.64	
30	2440.996	-4	-1.64	
40	2440.997	-3	-1.23	
50	2440.991	-9	-3.69	
55	2440.997	-3	-1.23	

Test Channel (MHz)	2480

Test result of frequency tolerance of voltage variation

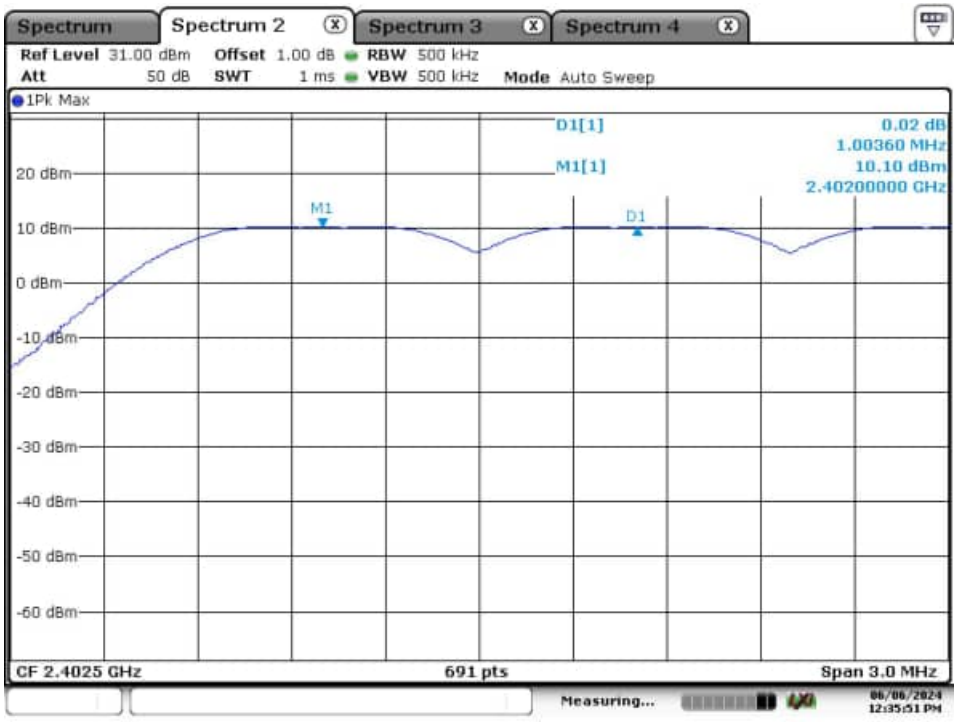
Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.465V	2479.997	-3	-1.21	10
DC 3.85V	2479.995	-5	-2.02	
DC 4.235V	2479.996	-4	-1.61	

Test result of frequency tolerance of temperature variation

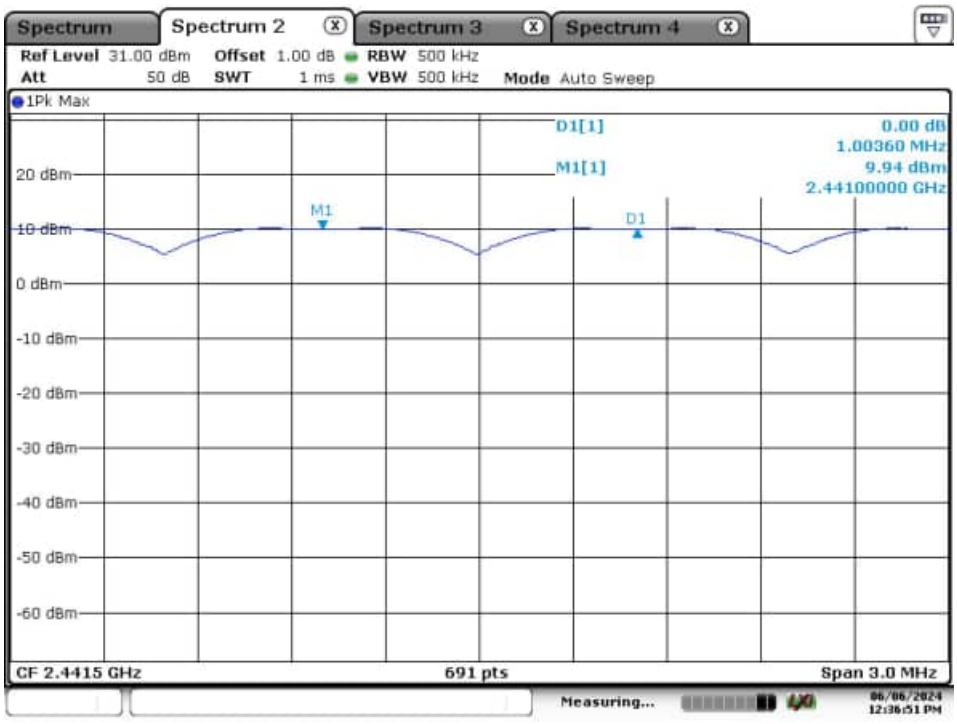
Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2479.995	-5	-2.02	10
-20	2479.995	-5	-2.02	
-10	2479.993	-7	-2.82	
0	2479.994	-6	-2.42	
10	2479.993	-7	-2.82	
20	2479.995	-5	-2.02	
30	2479.996	-4	-1.61	
40	2479.996	-4	-1.61	
50	2479.993	-7	-2.82	
55	2479.995	-5	-2.02	

Appendix B.4: Test Results of Carrier Frequency Separation

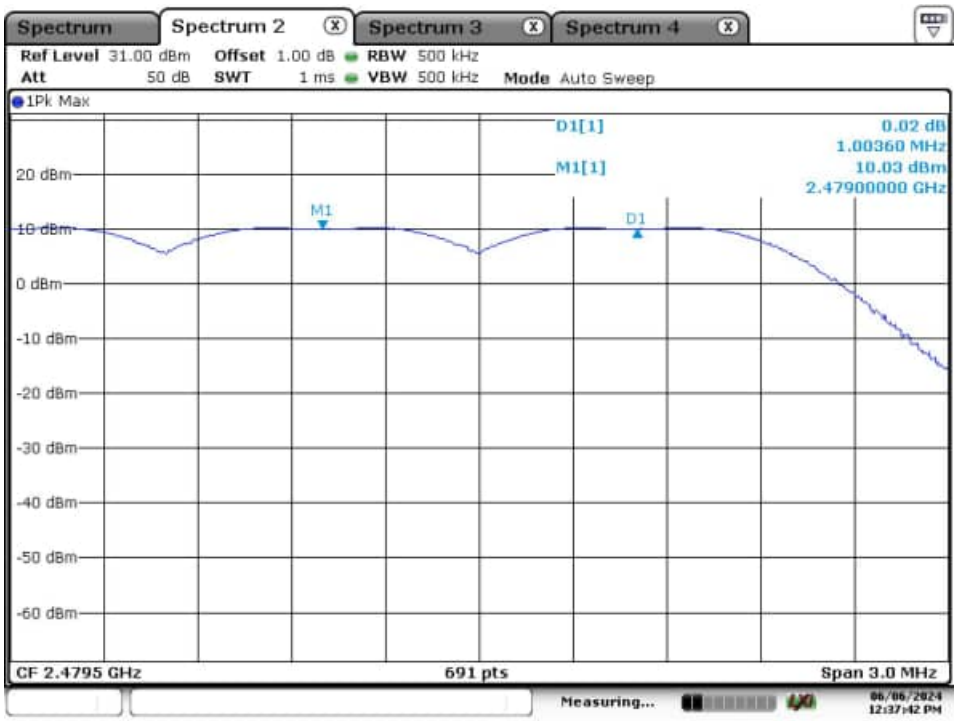
BR mode (GFSK)



Date: 6.JUN.2024 12:35:52

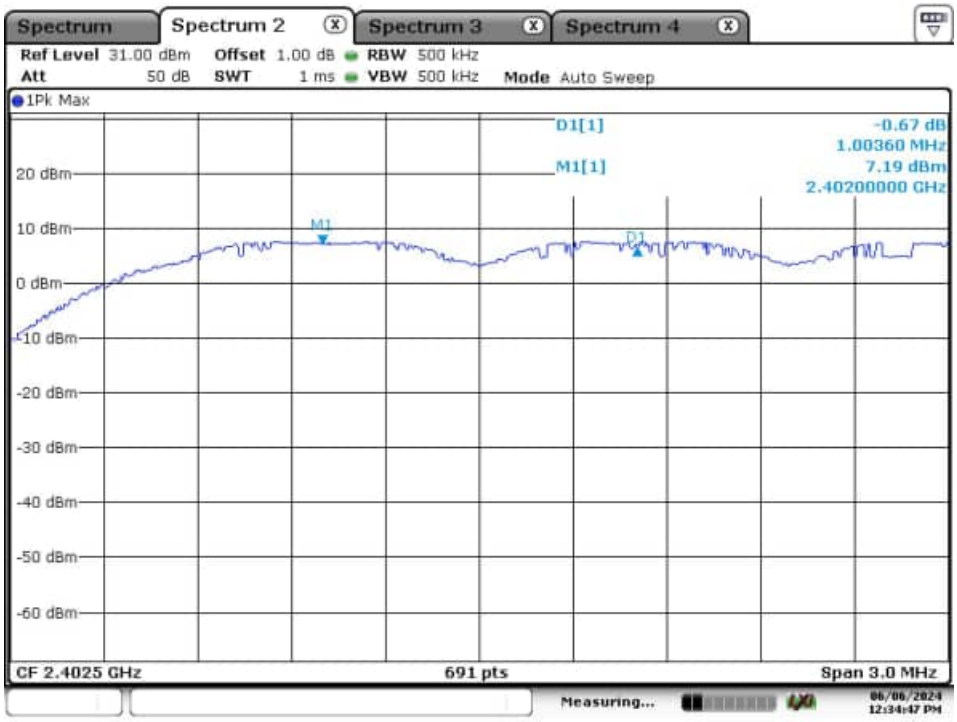


Date: 6.JUN.2024 12:36:51

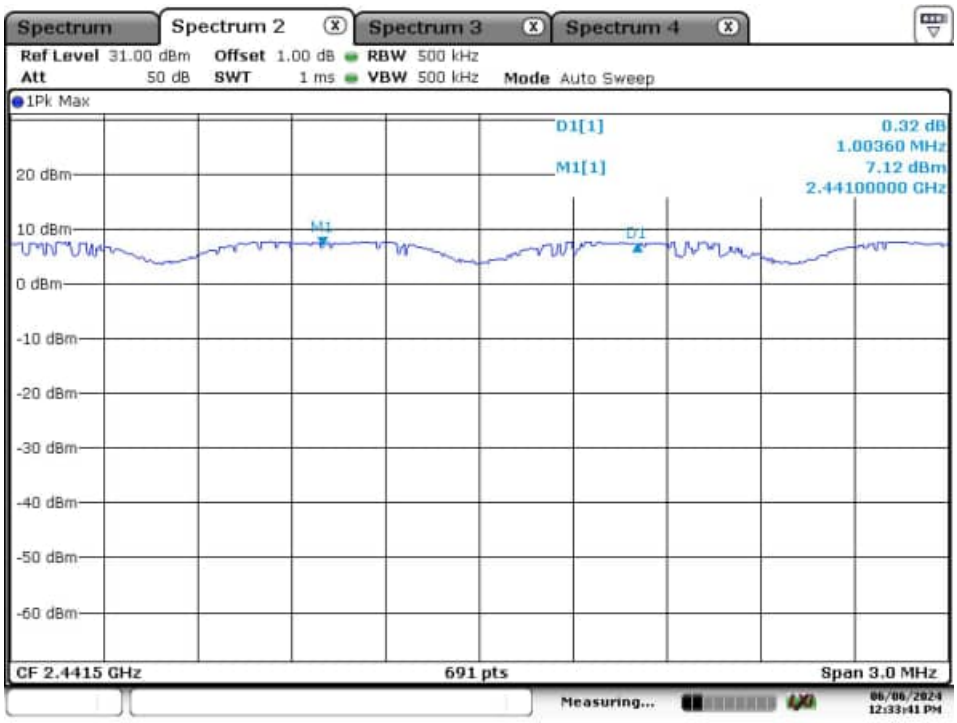


Date: 6.JUN.2024 12:37:43

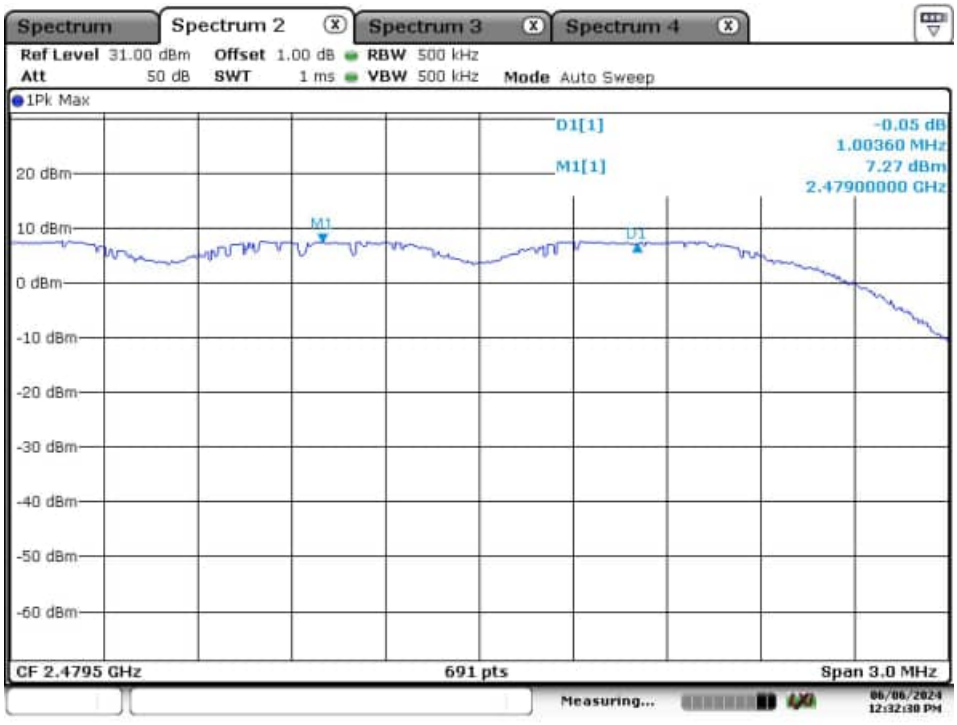
EDR mode (8DPSK)



Date: 6.JUN.2024 12:34:48



Date: 6.JUN.2024 12:33:42



Date: 6.JUN.2024 12:32:30

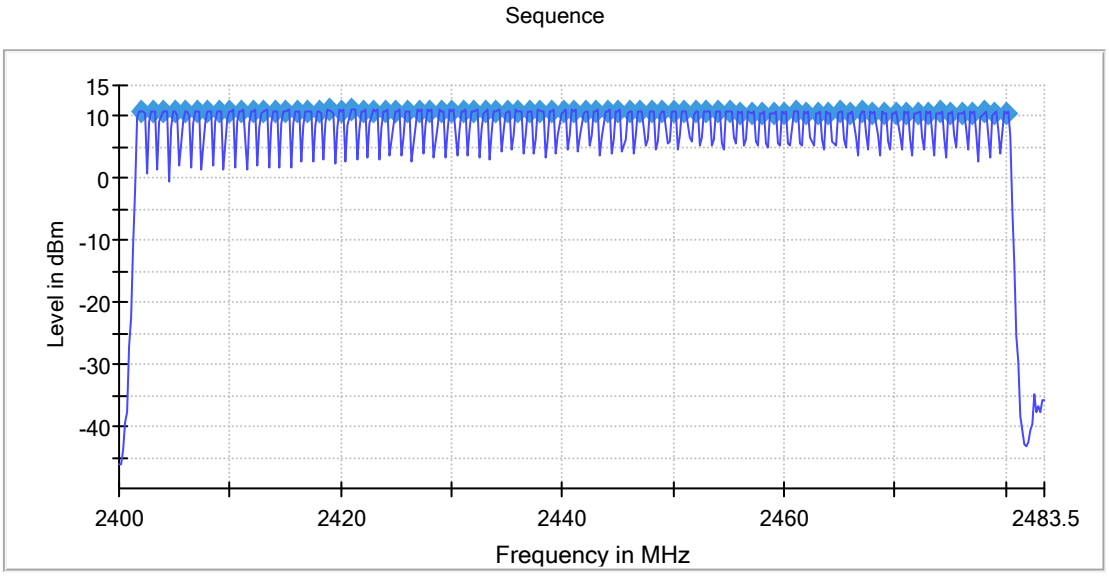
Appendix B.5: Test Results of Number of Hopping Frequency

BR mode (GFSK)

Channels

Channels	Limit Min	Limit Max	Result
79	15	---	PASS

RBW=200kHz, VBW=200kHz

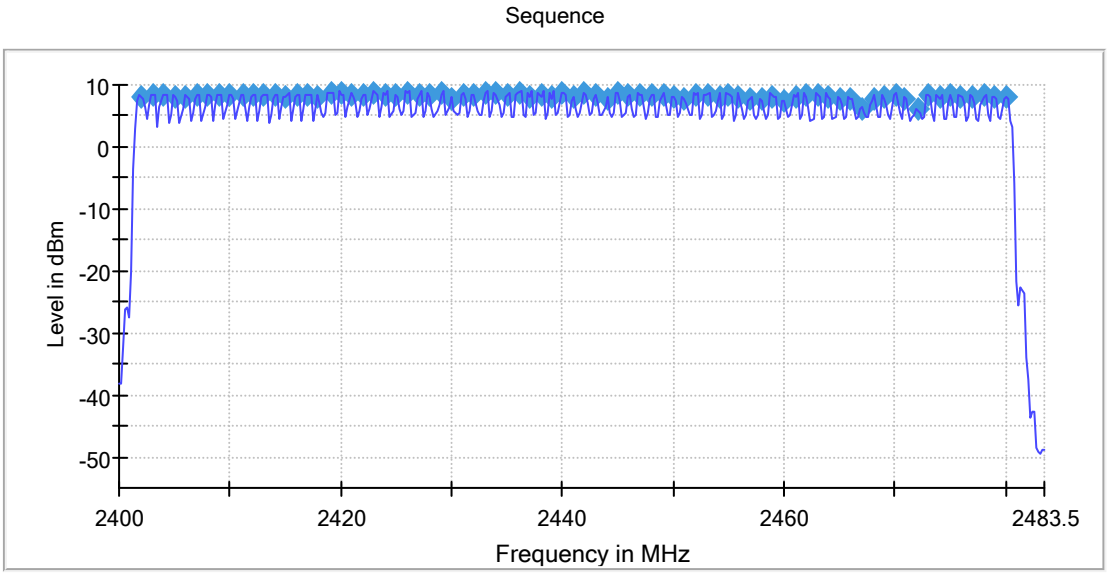


EDR mode (8DPSK)

Channels

Channels	Limit Min	Limit Max	Result
81	15	---	PASS

RBW=200kHz, VBW=200kHz



Appendix B.6: Test Results of Time of Occupancy

BR mode (GFSK)

1DH1

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	319	127.340	-10.0

Periode

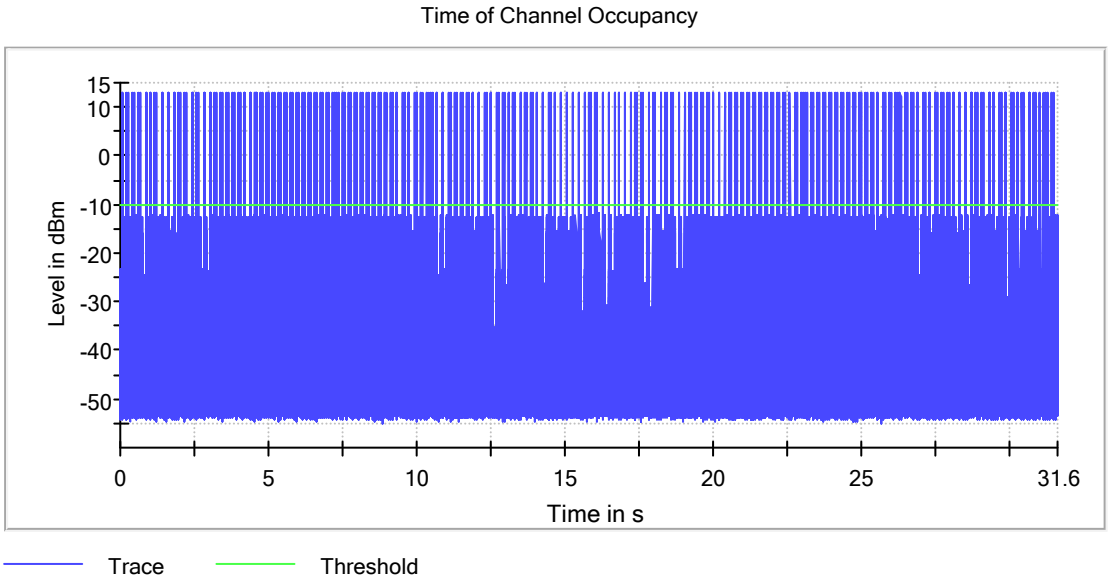
Min (ms)	Max (ms)	Mean (ms)
8.750	195.000	98.677

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
0.39	0.40	400.000	0.000	0.398

DwellTime

Min (ms)	Max (ms)	Mean (ms)
0.39	0.40	0.398



RBW=500kHz, VBW=1MHz

1DH3

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	157	261.290	-10.0

Periode

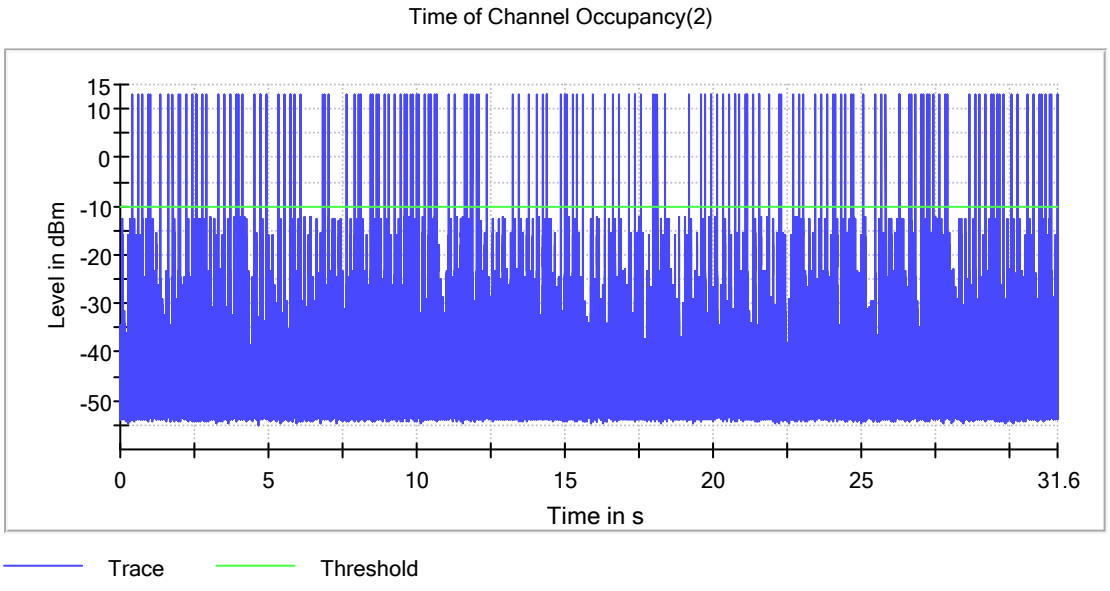
Min (ms)	Max (ms)	Mean (ms)
17.490	824.980	198.568

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
1.650	1.660	400.000	0.000	1.654

DwellTime

Min (ms)	Max (ms)	Mean (ms)
1.650	1.660	1.654



RBW=500kHz, VBW=1MHz

1DH5

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	117	342.400	-10.0

Periode

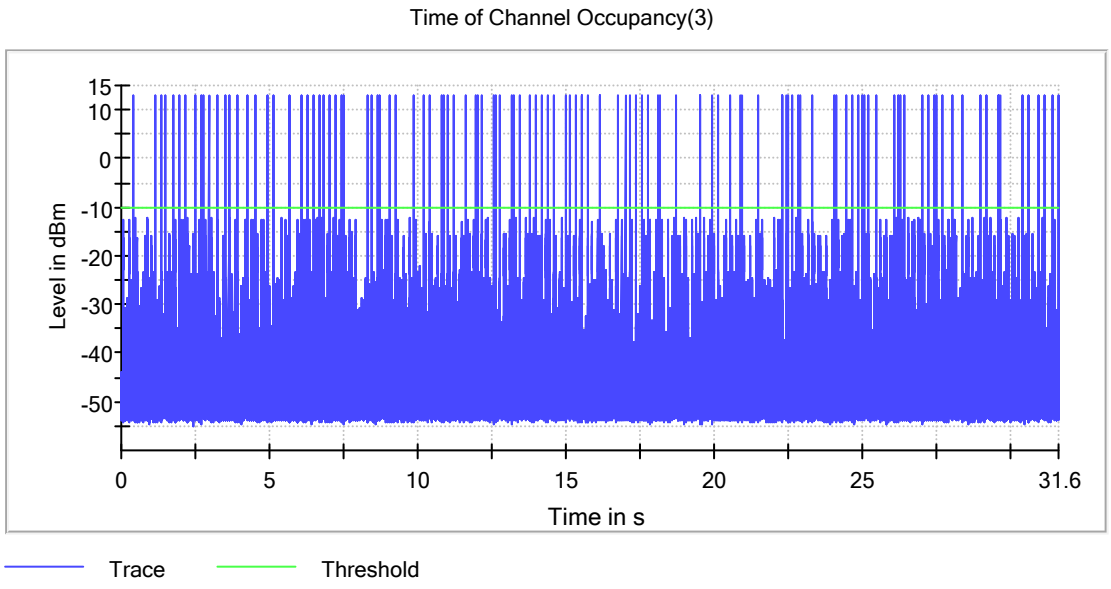
Min (ms)	Max (ms)	Mean (ms)
26.250	802.480	267.277

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
2.900	2.910	400.000	0.000	2.902

DwellTime

Min (ms)	Max (ms)	Mean (ms)
2.900	2.910	2.902



RBW=500kHz, VBW=1MHz

EDR mode (8DPSK)

3DH1

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	319	129.230	-10.0

Periode

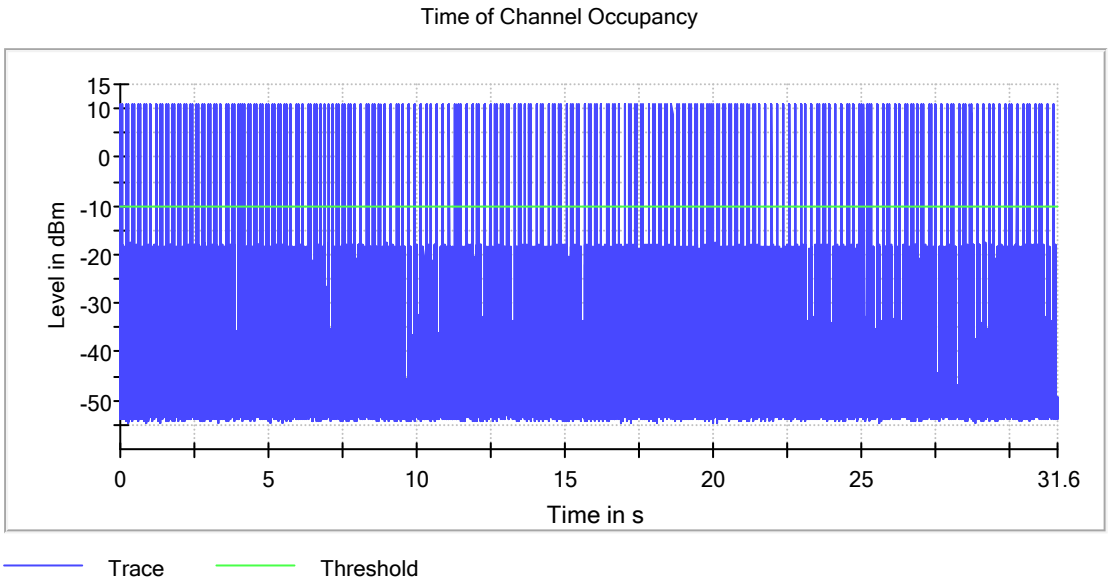
Min (ms)	Max (ms)	Mean (ms)
3.750	196.240	98.838

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
0.40	0.41	400.000	0.000	0.404

DwellTime

Min (ms)	Max (ms)	Mean (ms)
0.40	0.41	0.404



RBW=500kHz, VBW=1MHz

3DH3

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	154	256.380	-10.0

Periode

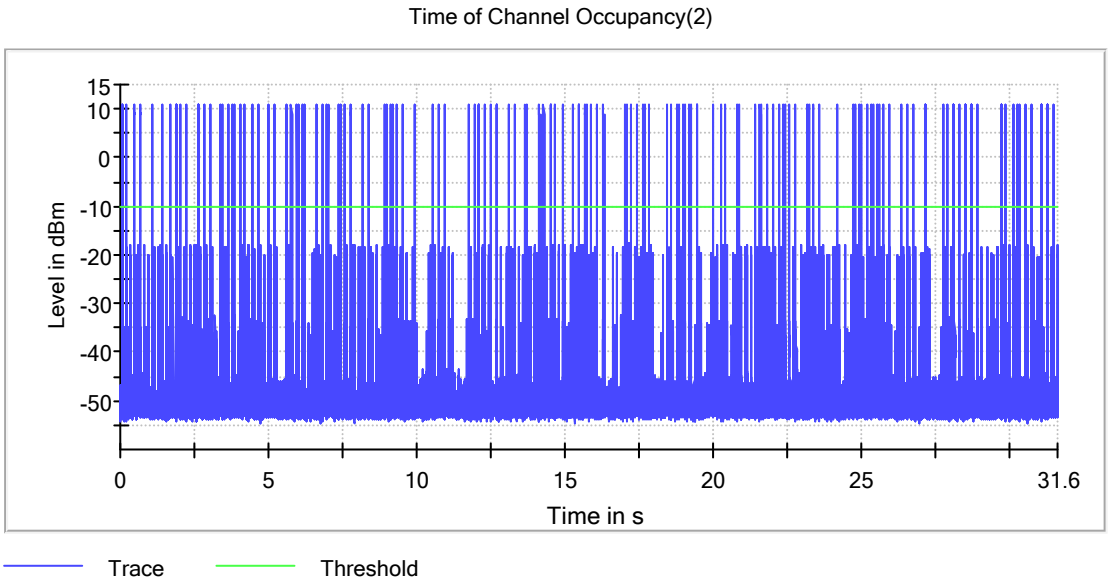
Min (ms)	Max (ms)	Mean (ms)
7.500	809.980	204.177

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
1.650	1.660	400.000	0.000	1.654

DwellTime

Min (ms)	Max (ms)	Mean (ms)
1.650	1.660	1.654



RBW=500kHz, VBW=1MHz

3DH5

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	92	270.230	-10.0

Periode

Min (ms)	Max (ms)	Mean (ms)
22.500	1923.700	337.903

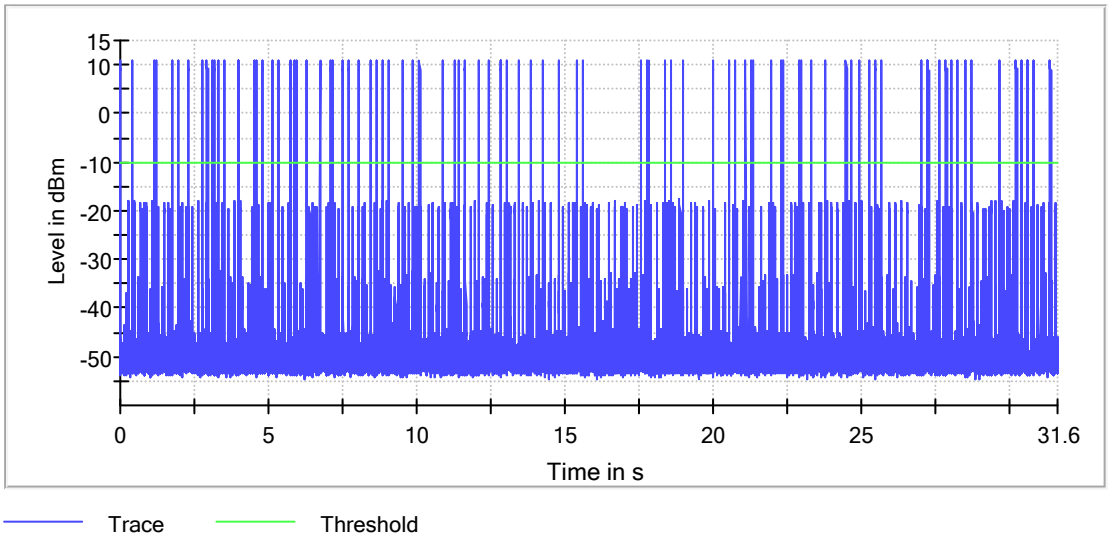
Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
2.900	2.910	400.000	0.000	2.906

DwellTime

Min (ms)	Max (ms)	Mean (ms)
2.900	2.910	2.906

Time of Channel Occupancy(3)

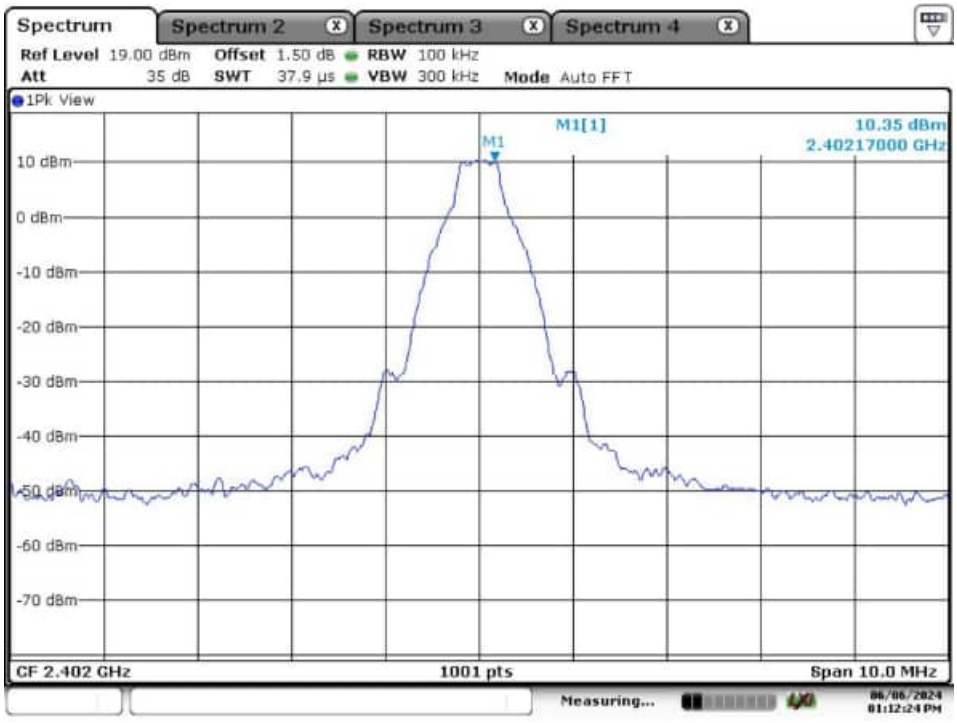


RBW=500kHz, VBW=1MHz

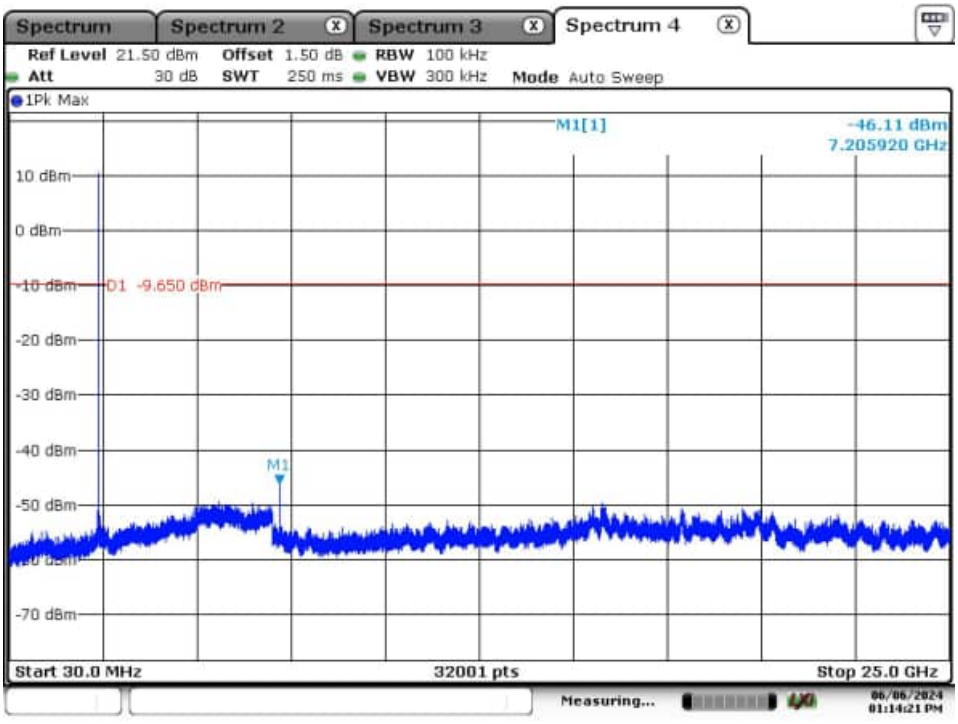
Appendix B.7: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

BR mode (GFSK)

Low Channel

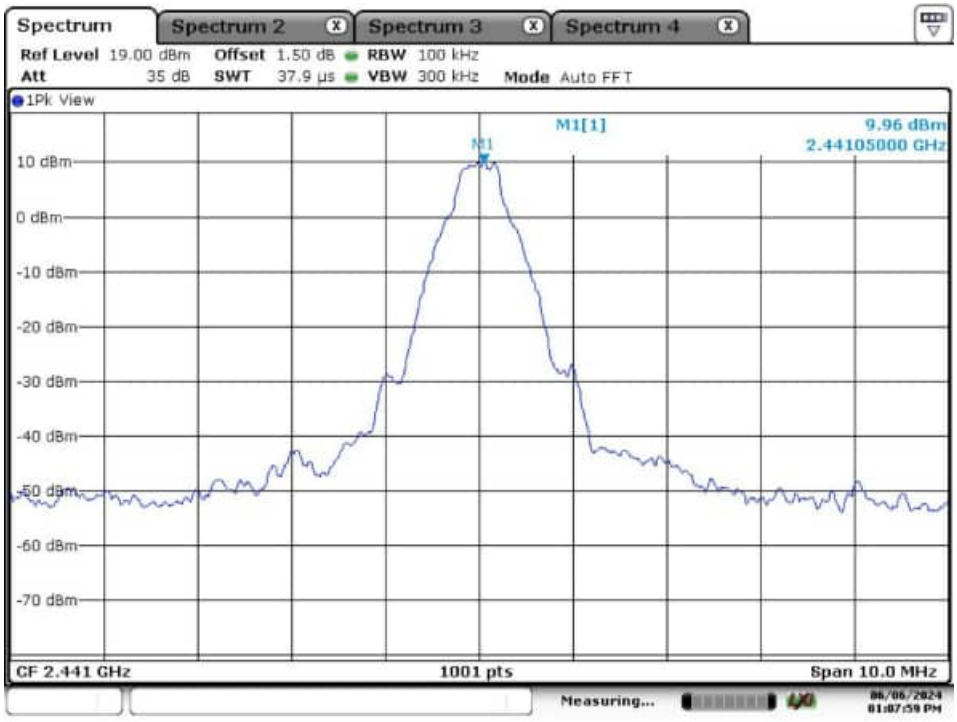


Date: 6.JUN.2024 13:12:24

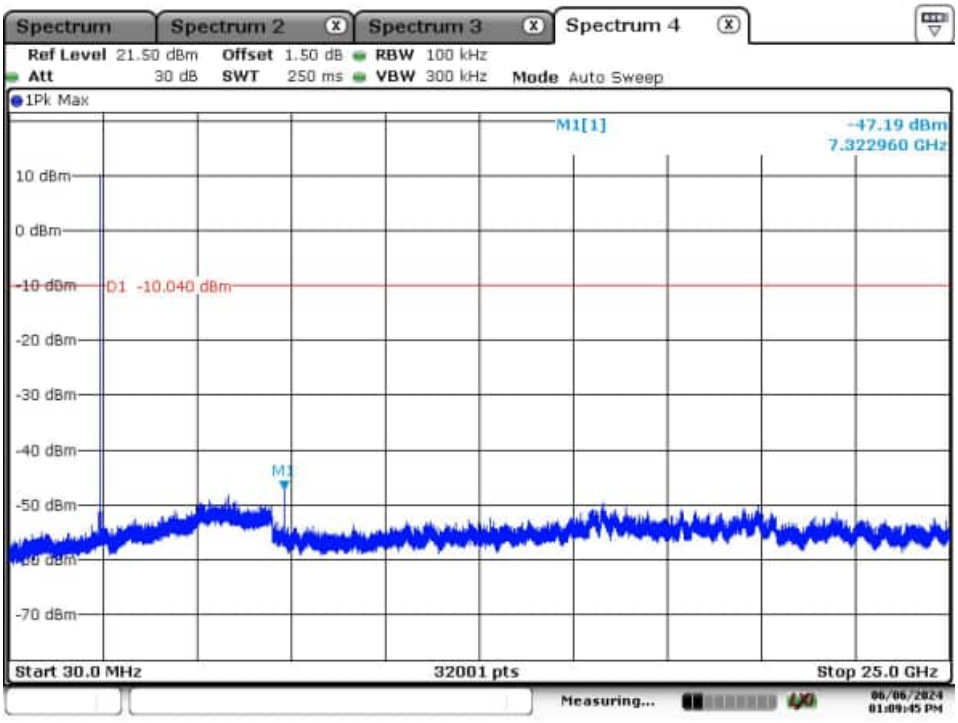


Date: 6.JUN.2024 13:14:21

Middle Channel

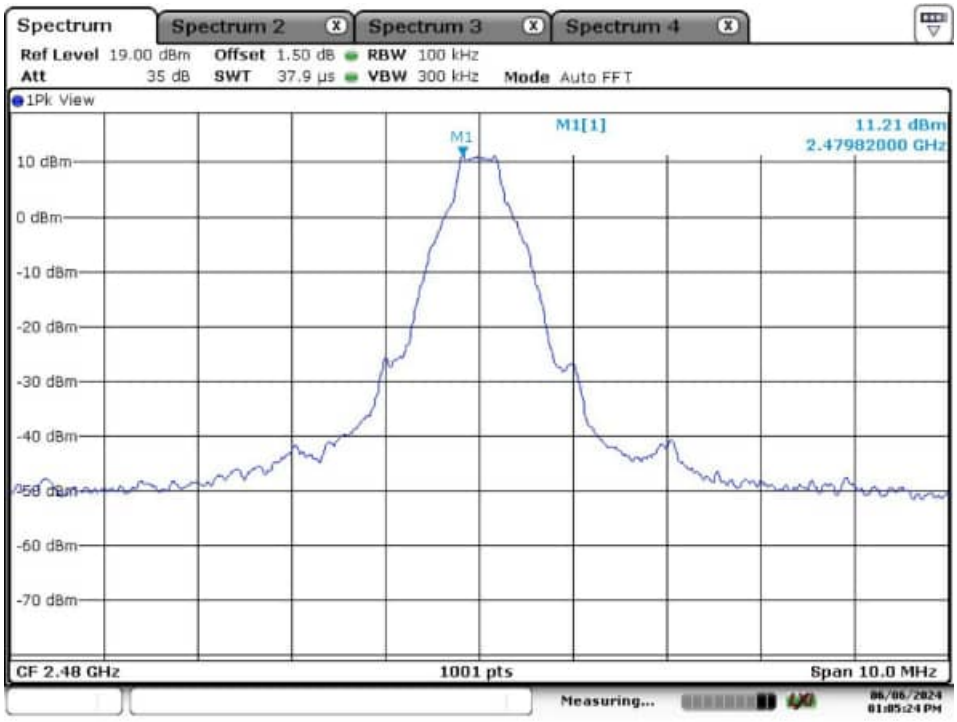


Date: 6.JUN.2024 13:07:59

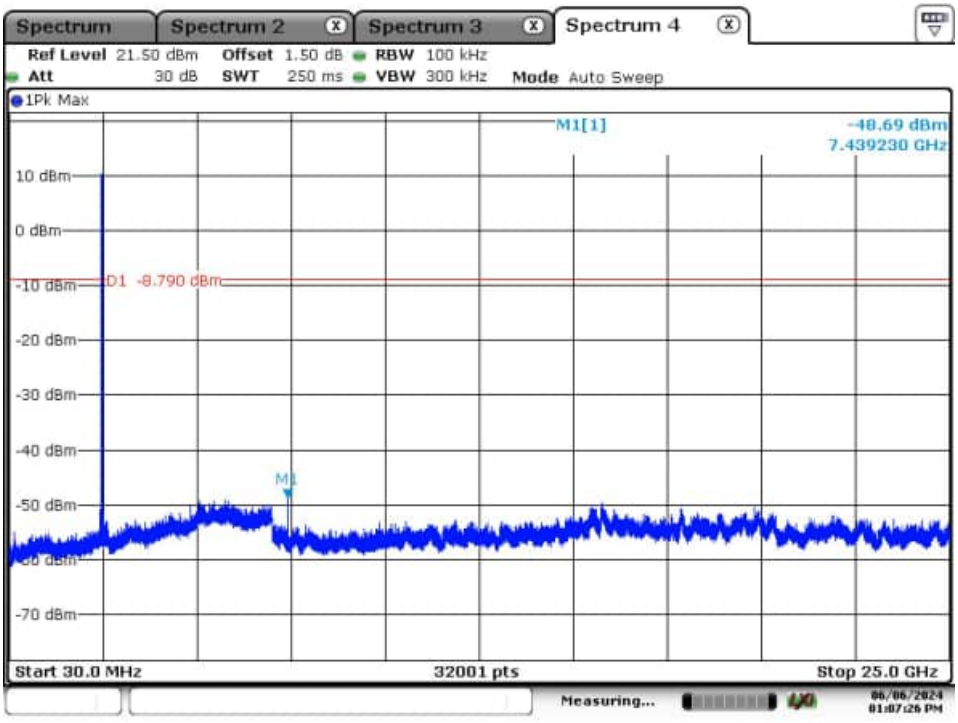


Date: 6.JUN.2024 13:09:45

High Channel

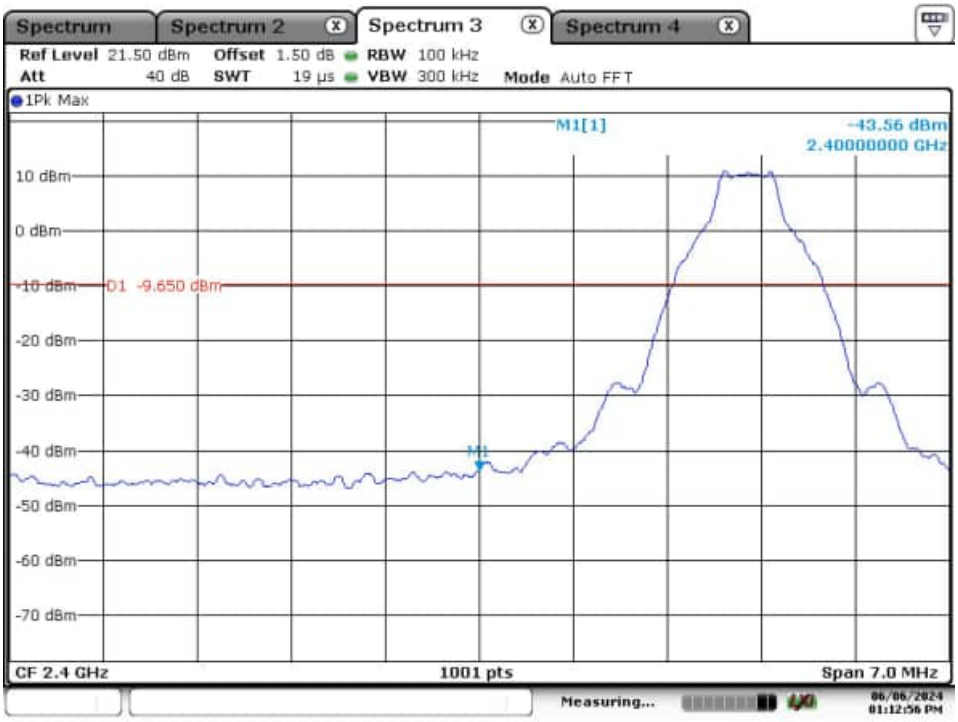


Date: 6.JUN.2024 13:05:24



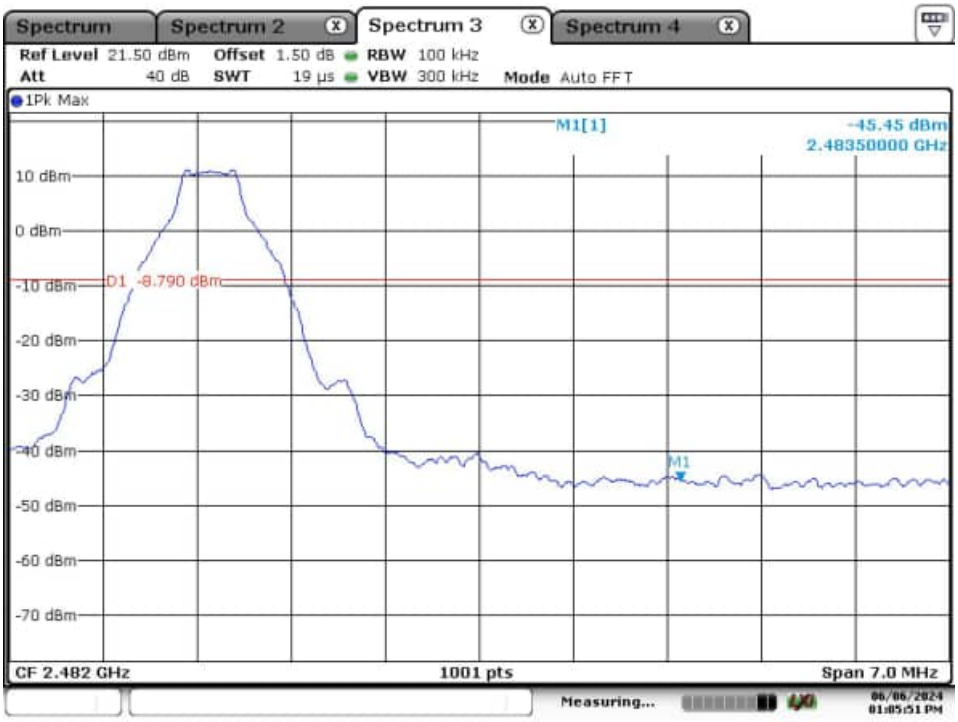
Date: 6.JUN.2024 13:07:26

Band Edge, Low Channel



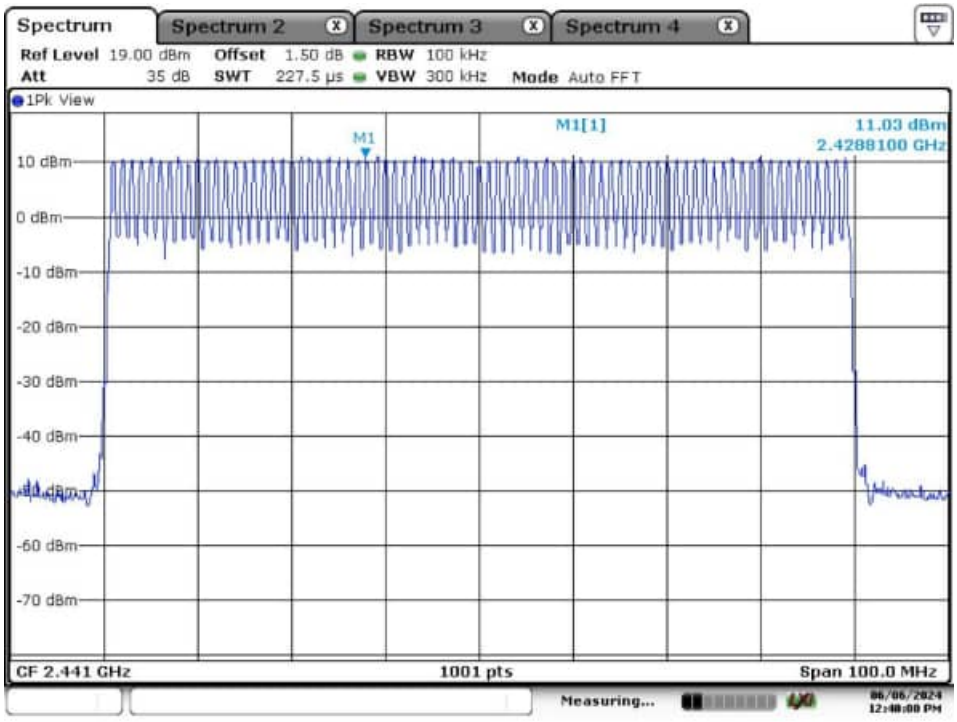
Date: 6.JUN.2024 13:12:56

Band Edge, High Channel

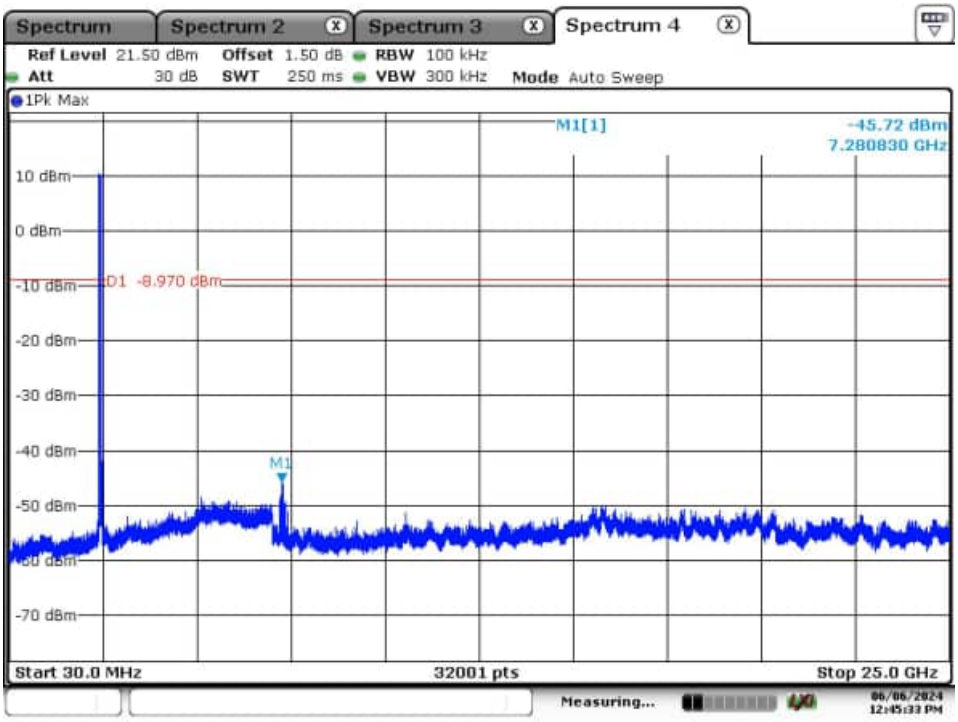


Date: 6.JUN.2024 13:05:52

Hopping Mode

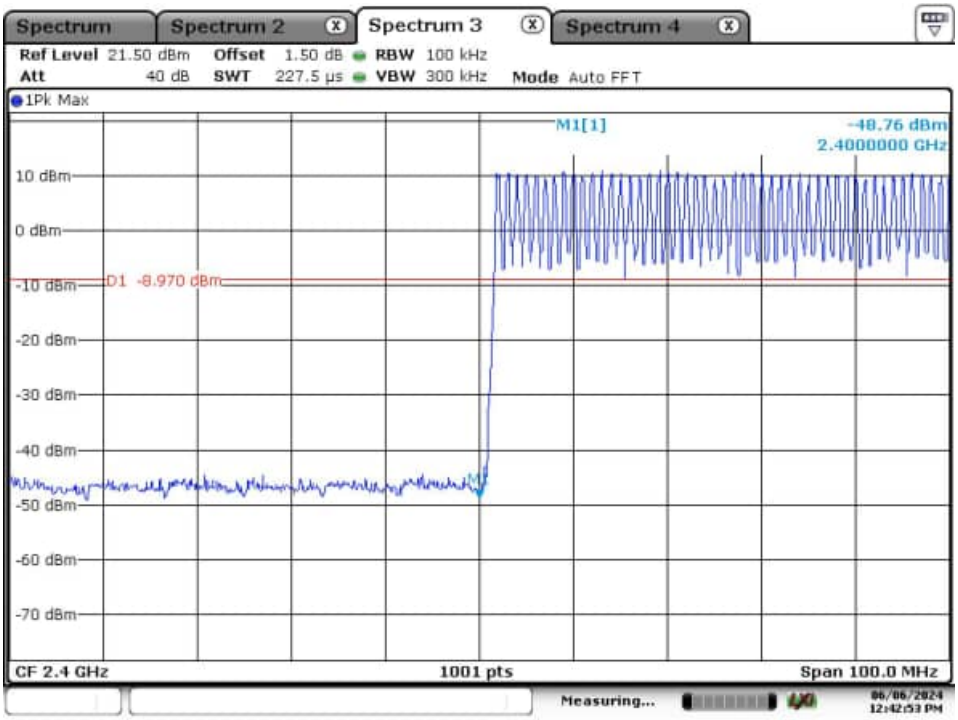


Date: 6.JUN.2024 12:40:00



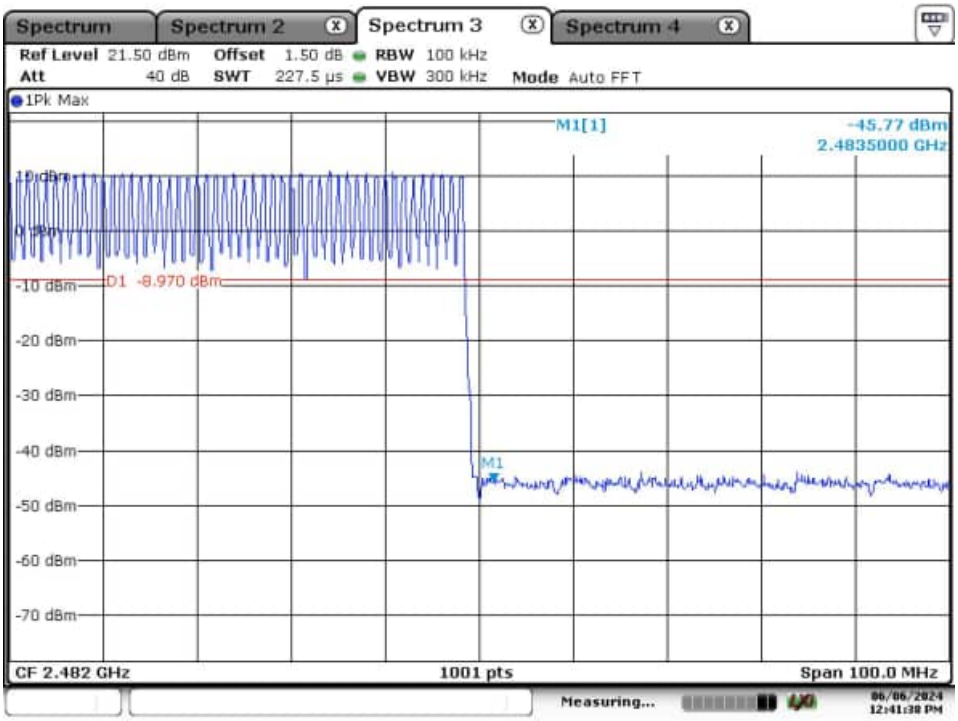
Date: 6.JUN.2024 12:45:33

Band Edge, Hopping Mode, Low Channel



Date: 6.JUN.2024 12:42:53

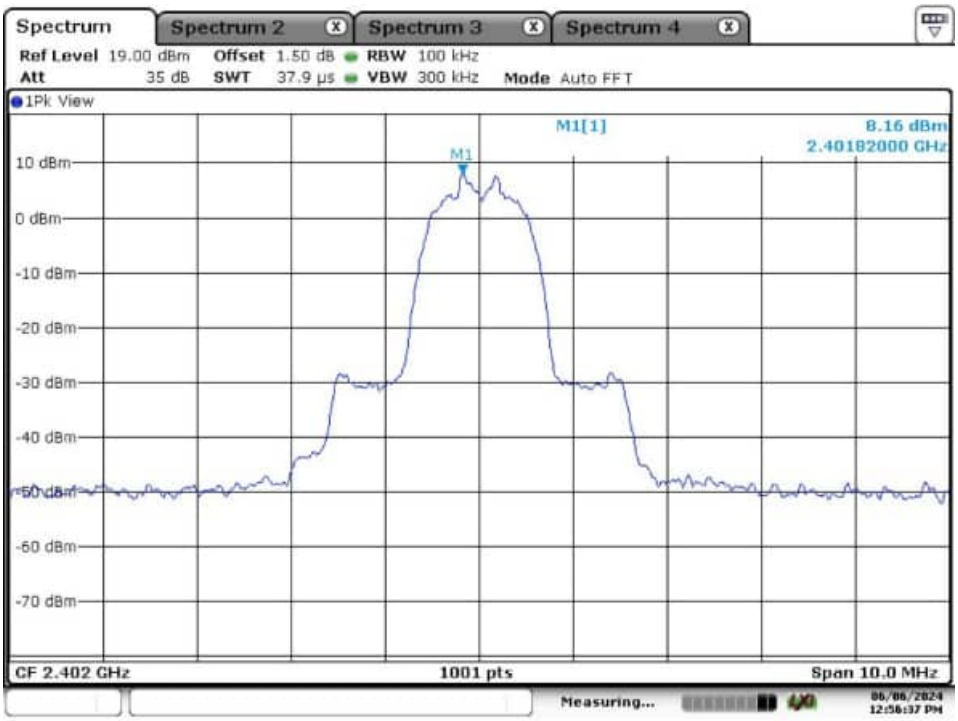
Band Edge, Hopping Mode, High Channle



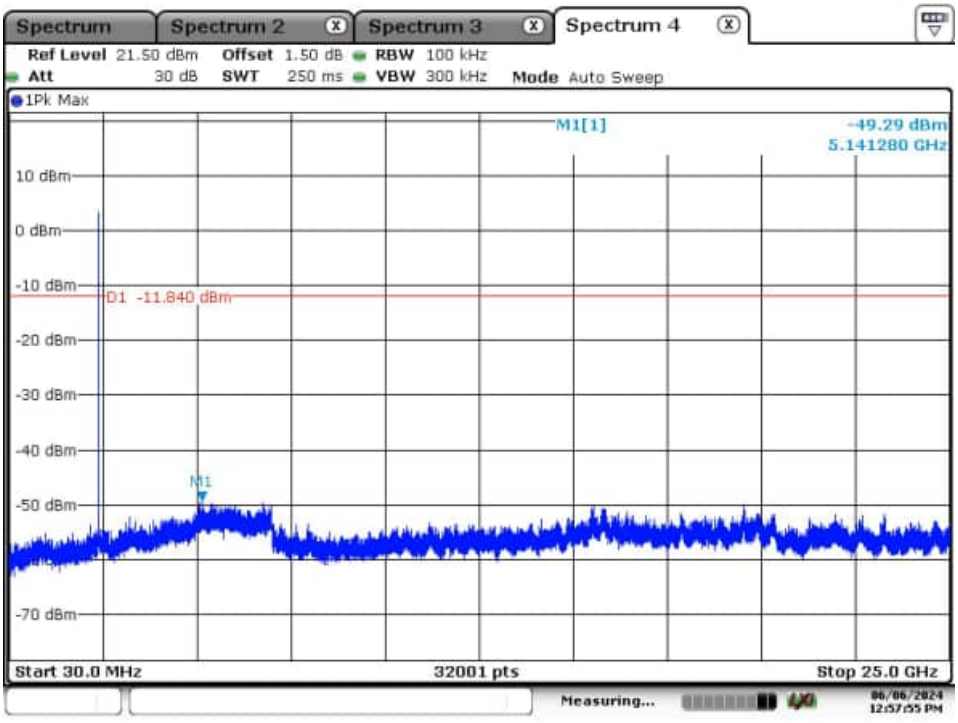
Date: 6.JUN.2024 12:41:38

EDR mode (8DPSK)

Low Channel

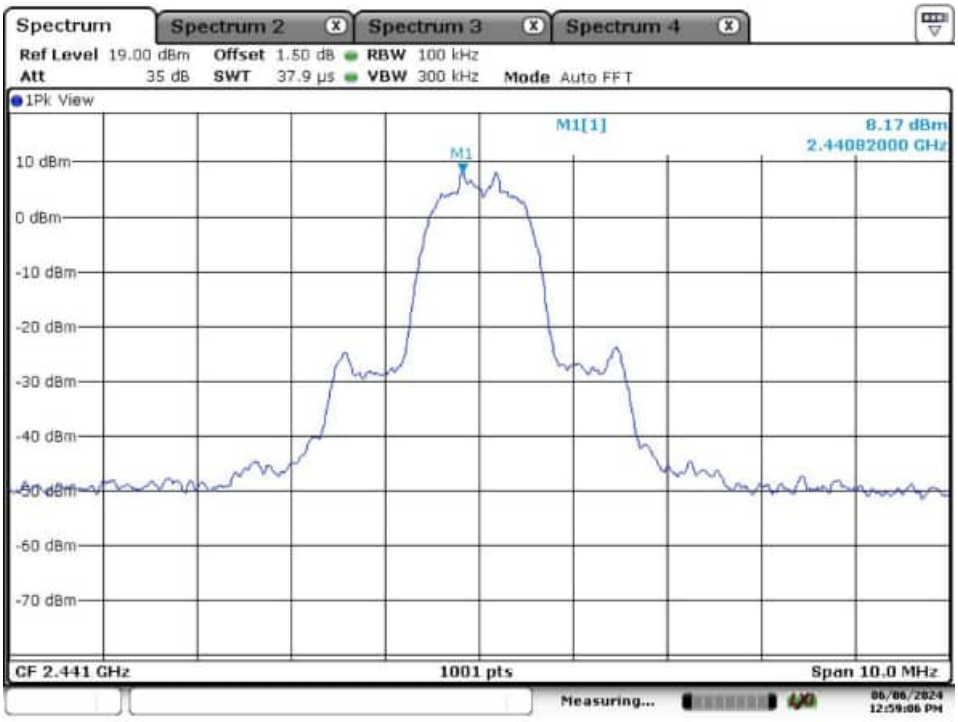


Date: 6.JUN.2024 12:56:37

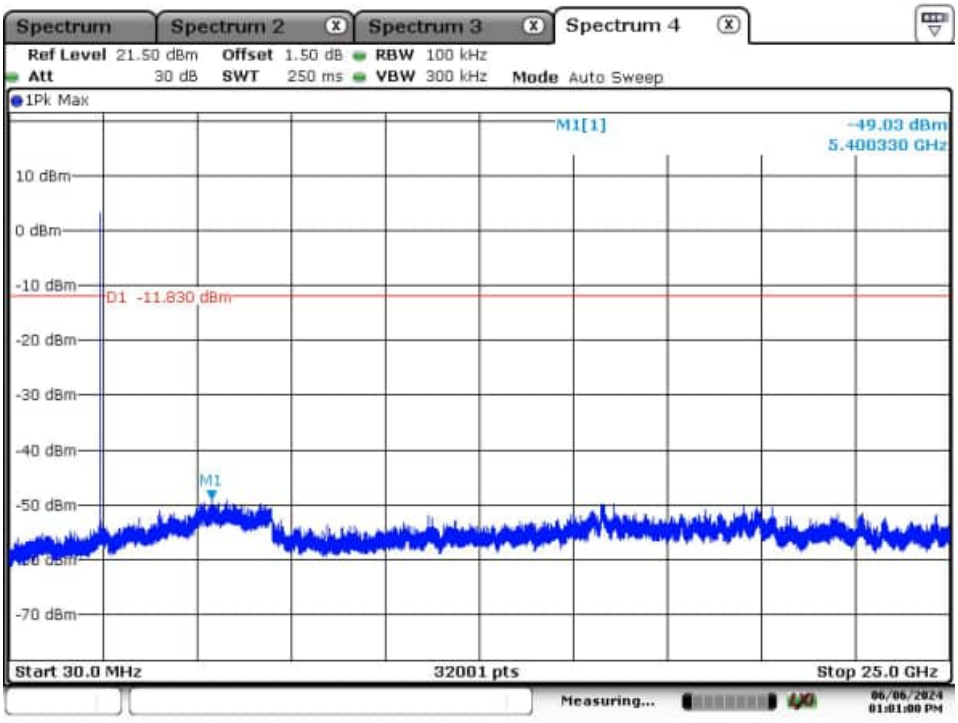


Date: 6.JUN.2024 12:57:55

Middle Channel

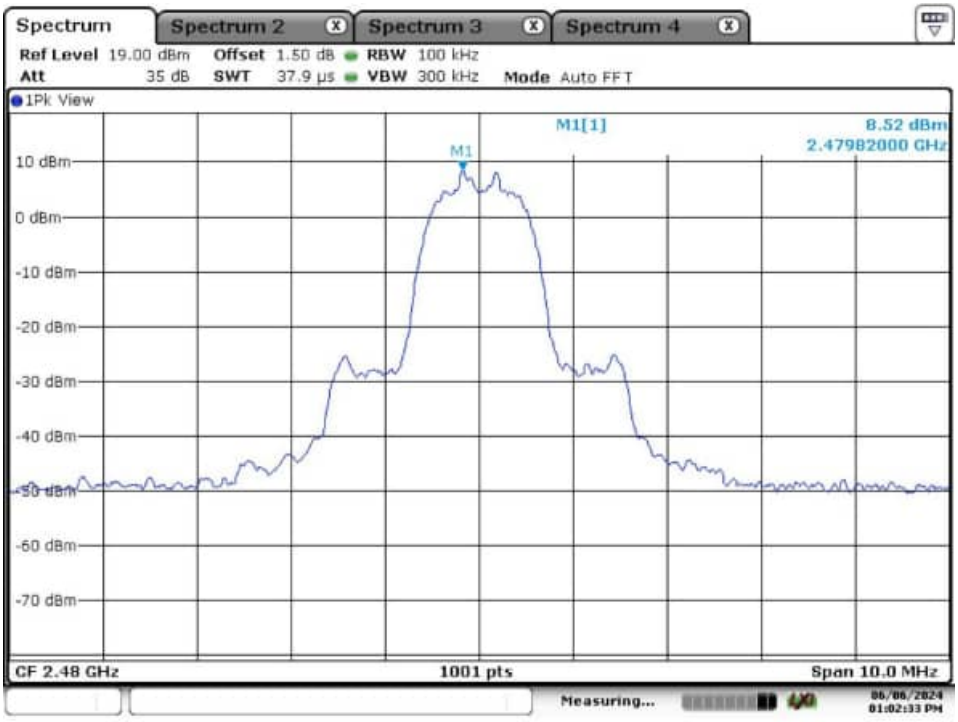


Date: 6.JUN.2024 12:59:06

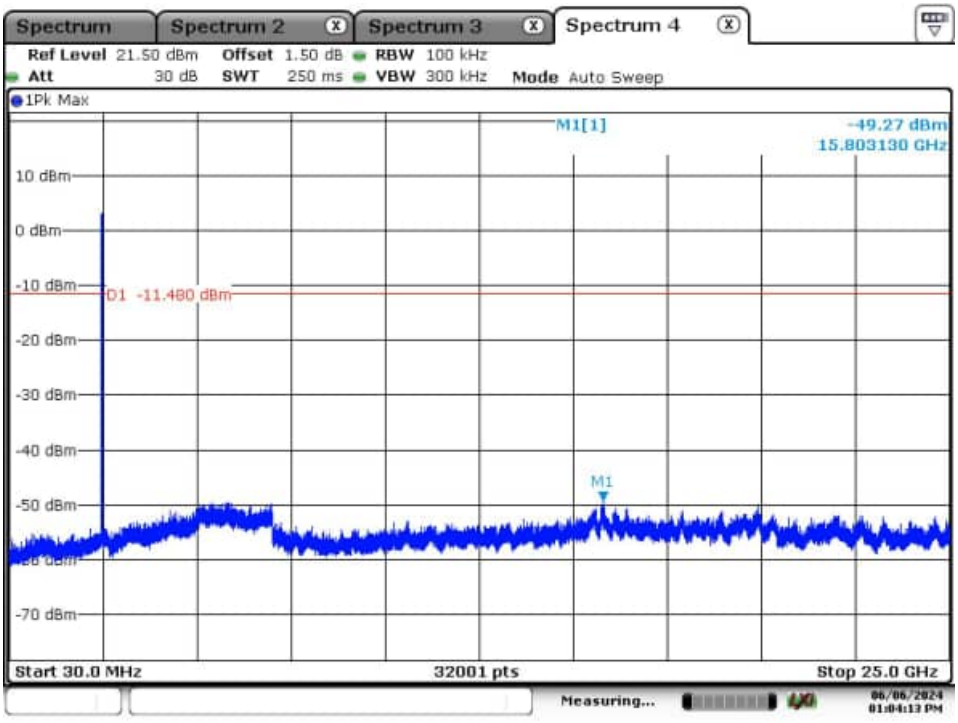


Date: 6.JUN.2024 13:01:00

High Channel

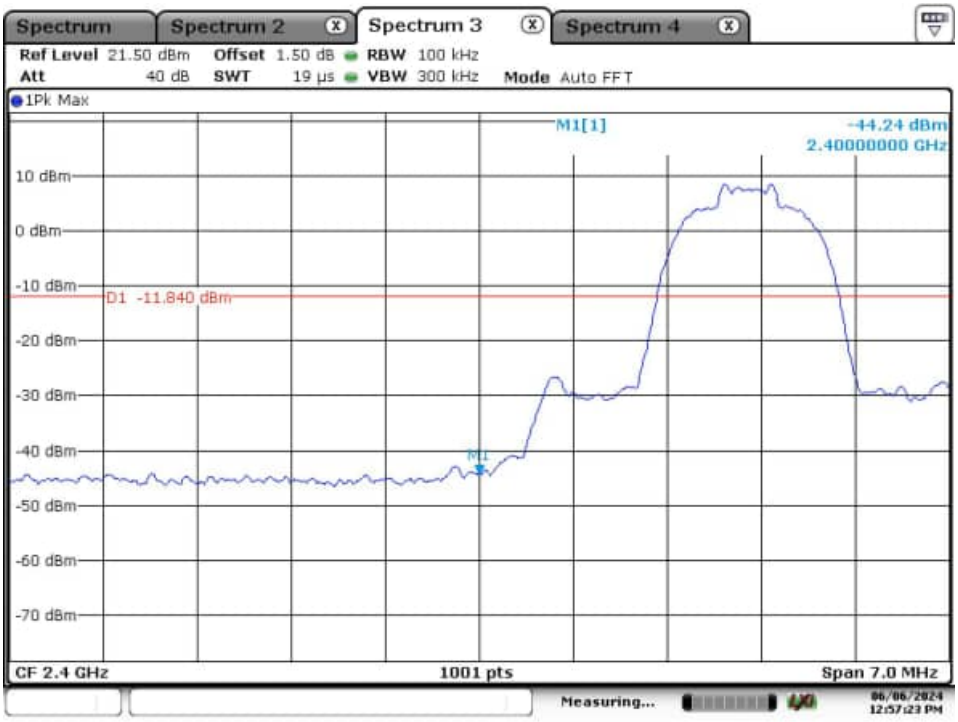


Date: 6.JUN.2024 13:02:33



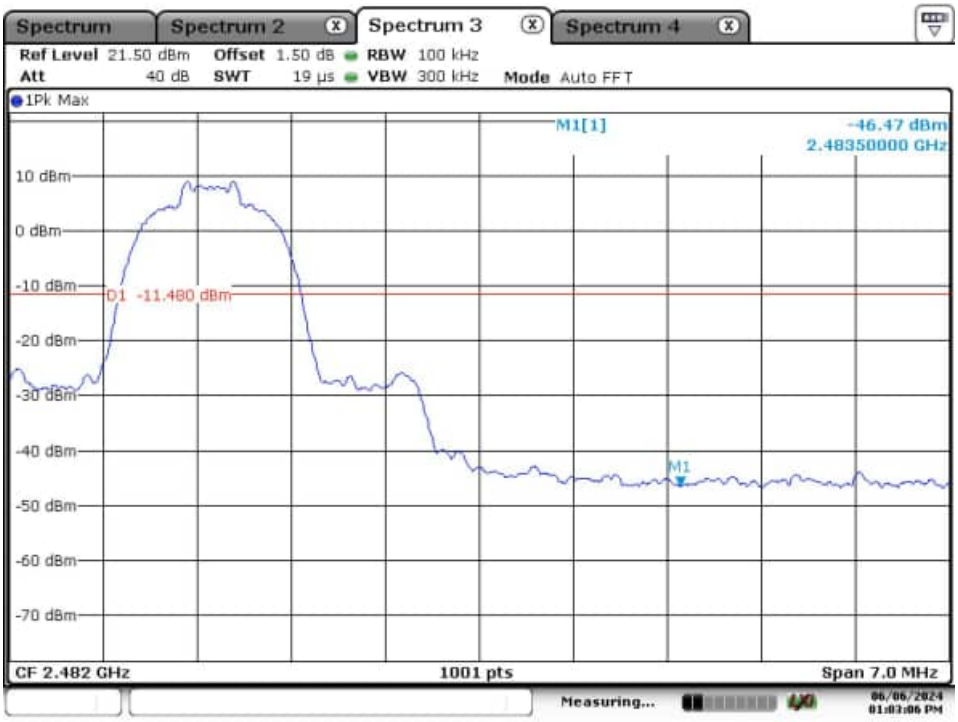
Date: 6.JUN.2024 13:04:14

Band Edge, Low Channel



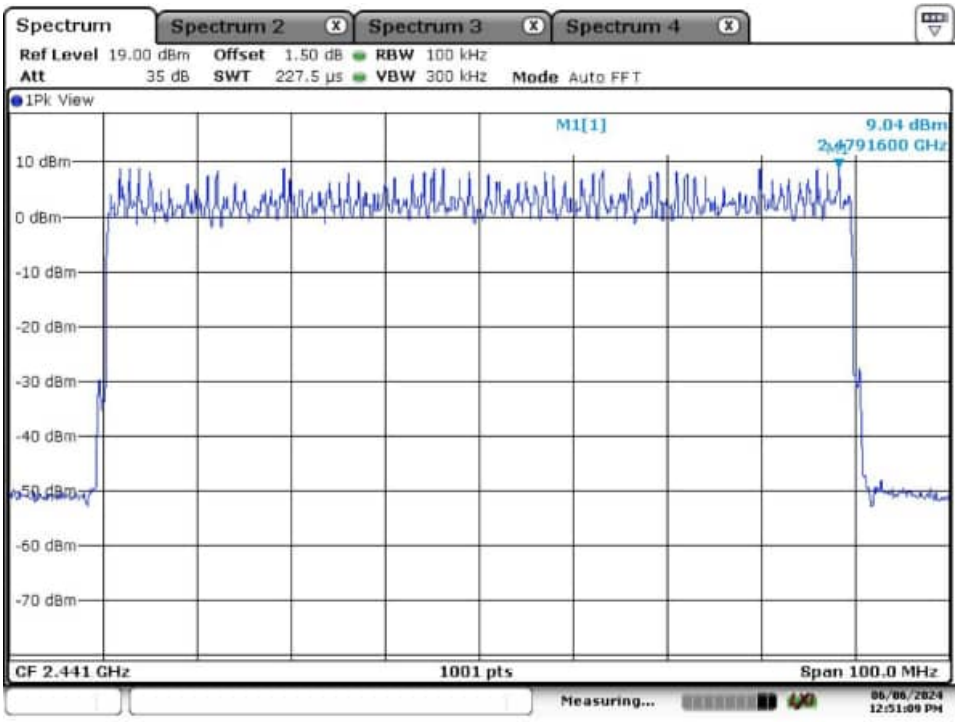
Date: 6.JUN.2024 12:57:23

Band Edge, High Channel

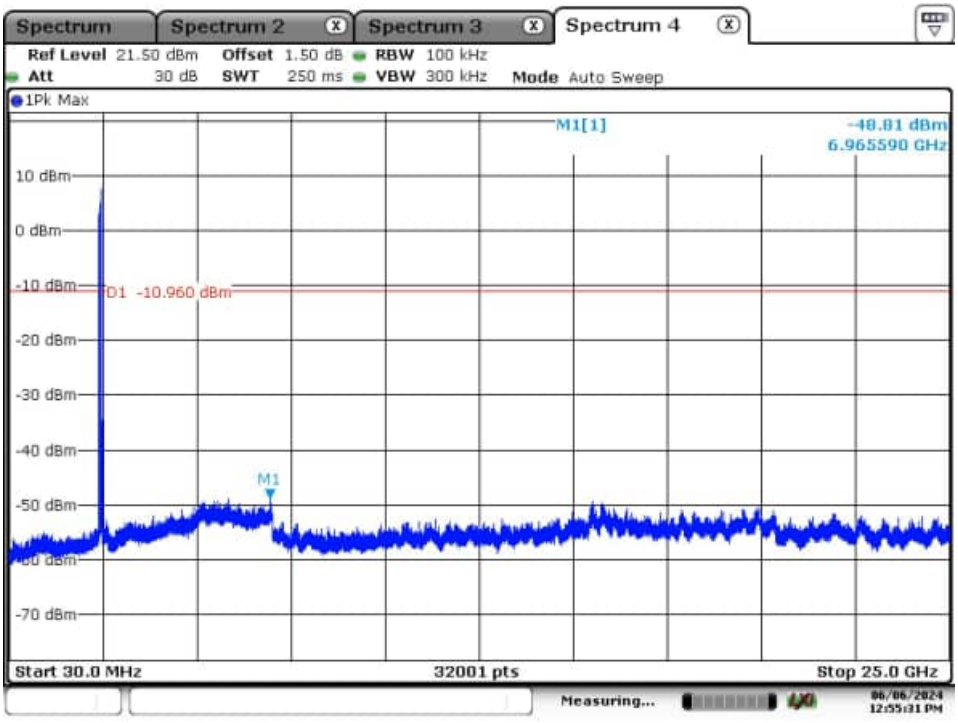


Date: 6.JUN.2024 13:03:06

Hopping Mode

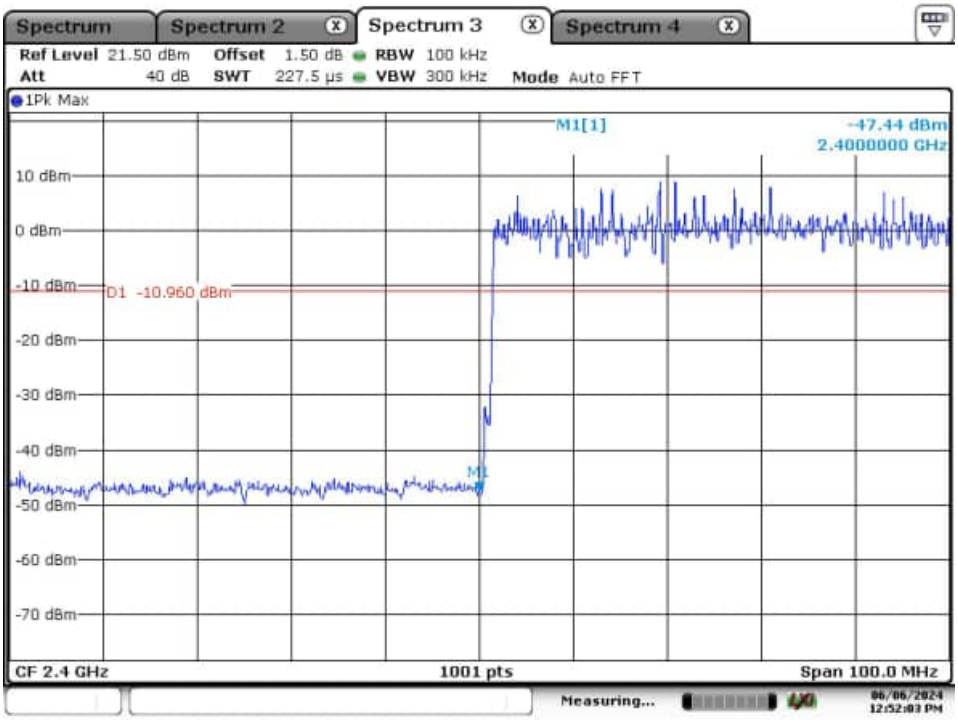


Date: 6.JUN.2024 12:51:09



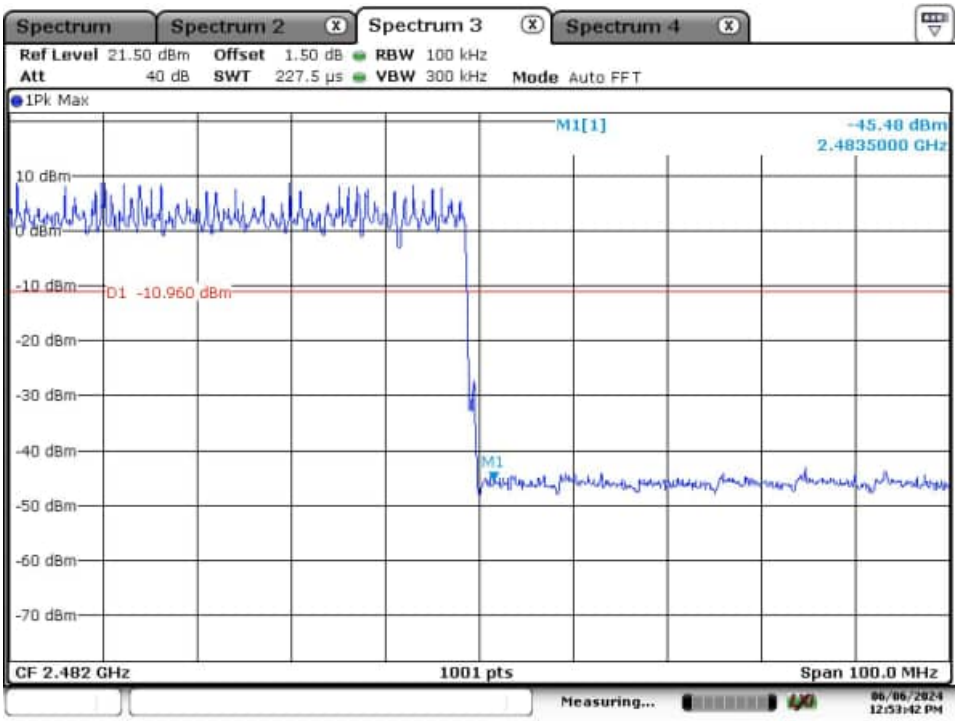
Date: 6.JUN.2024 12:55:31

Band Edge, Hopping Mode, Low Channel



Date: 6.JUN.2024 12:52:03

Band Edge, Hopping Mode, High Channle



Date: 6.JUN.2024 12:53:42

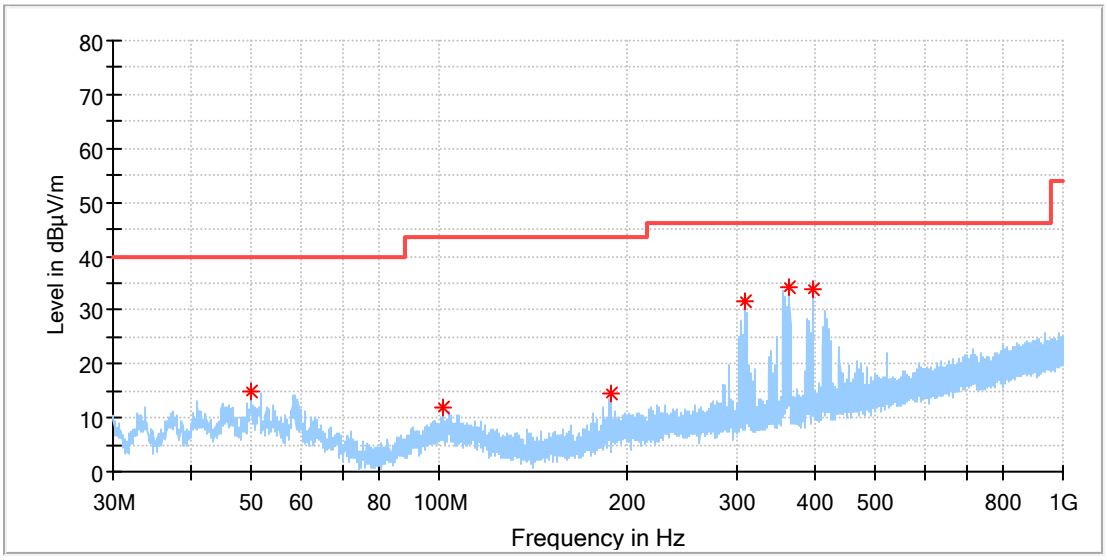
Appendix B.8: Test Results of Radiated Spurious Emissions

Note: 1. Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported. 2. This testing was carried out on different modulations, but only the worst case (GFSK) was presented in this report.

30MHz - 1GHz

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

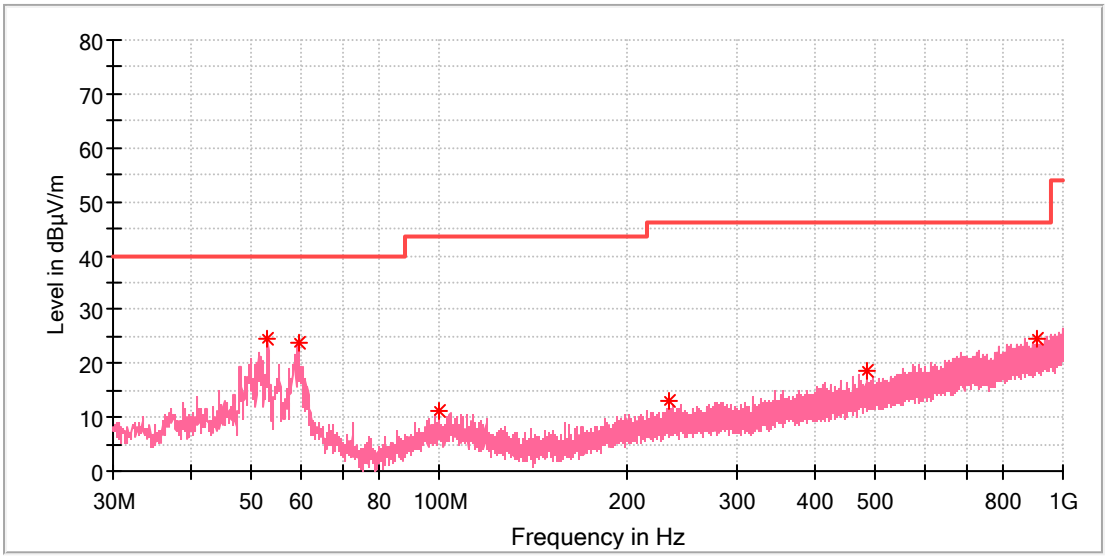


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.996923	14.89	40.00	25.11	100.0	H	0.0	-18.6
101.668077	11.83	43.50	31.67	100.0	H	239.0	-19.2
188.706923	14.42	43.50	29.08	100.0	H	273.0	-20.0
309.024231	31.57	46.00	14.43	100.0	H	283.0	-16.4
364.985769	34.26	46.00	11.74	100.0	H	283.0	-14.9
396.995769	34.03	46.00	11.97	100.0	H	172.0	-14.2

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



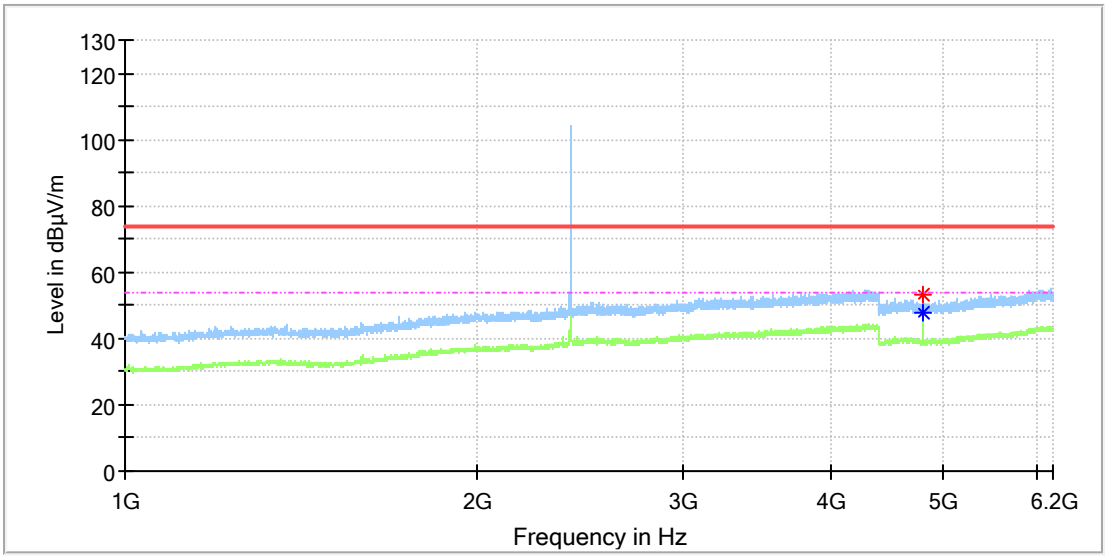
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
53.093462	24.58	40.00	15.42	100.0	V	119.0	-18.7
59.435769	23.97	40.00	16.03	100.0	V	315.0	-19.2
99.951923	11.33	43.50	32.17	100.0	V	55.0	-19.3
233.588077	12.91	46.00	33.09	100.0	V	14.0	-18.3
485.377692	18.54	46.00	27.46	100.0	V	315.0	-12.4
908.260385	24.65	46.00	21.35	100.0	V	250.0	-5.3

1GHz - 18GHz
Note: The highest waveform in the figure is Bluetooth Fundamental.

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

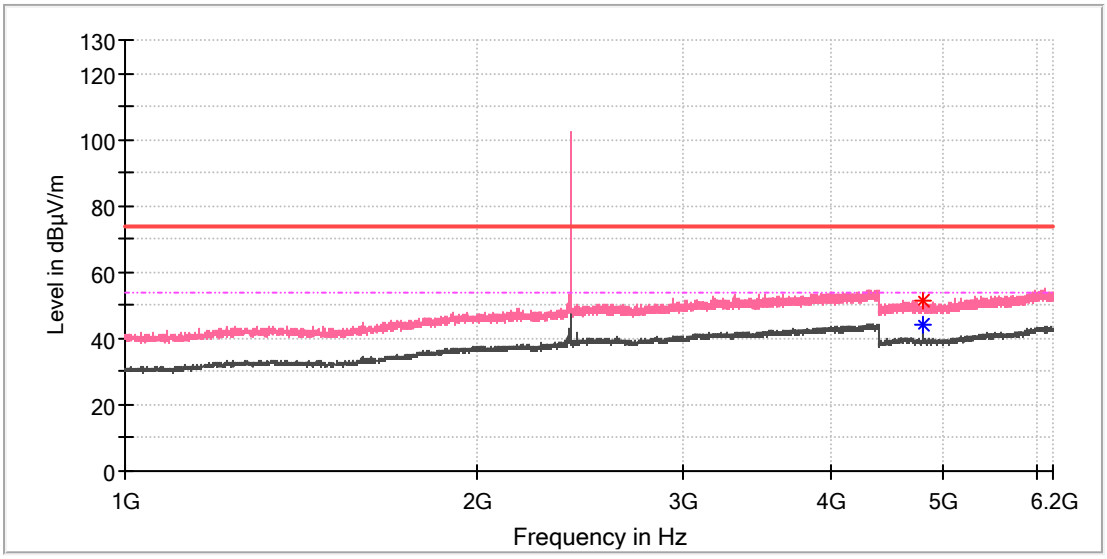


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	53.47	---	74.00	20.53	150.0	H	285.0	11.8
4804.000000	---	47.55	54.00	6.45	150.0	H	3.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

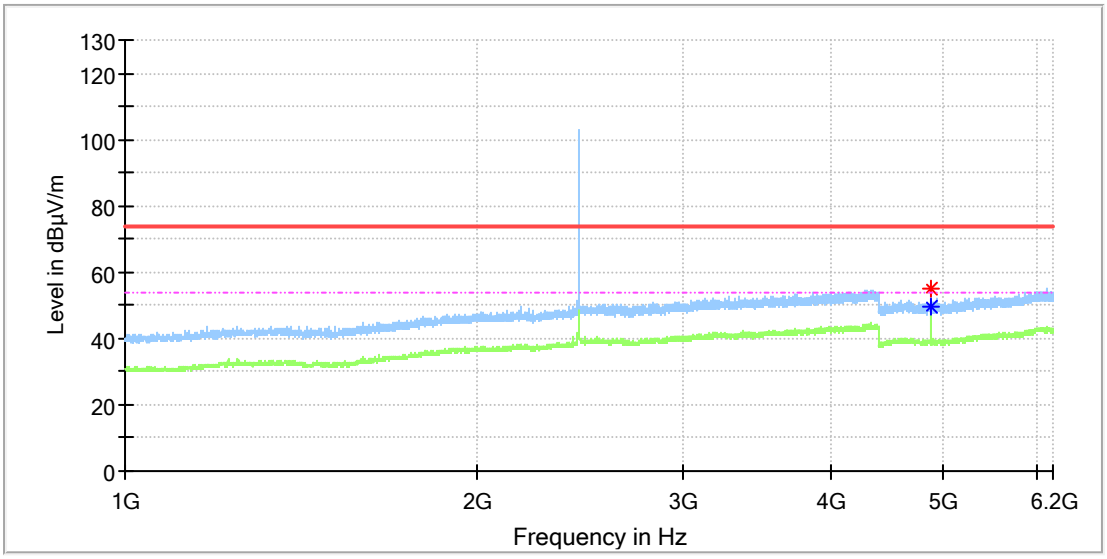


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	51.47	---	74.00	22.53	150.0	V	108.0	11.8
4804.000000	---	43.97	54.00	10.03	150.0	V	71.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

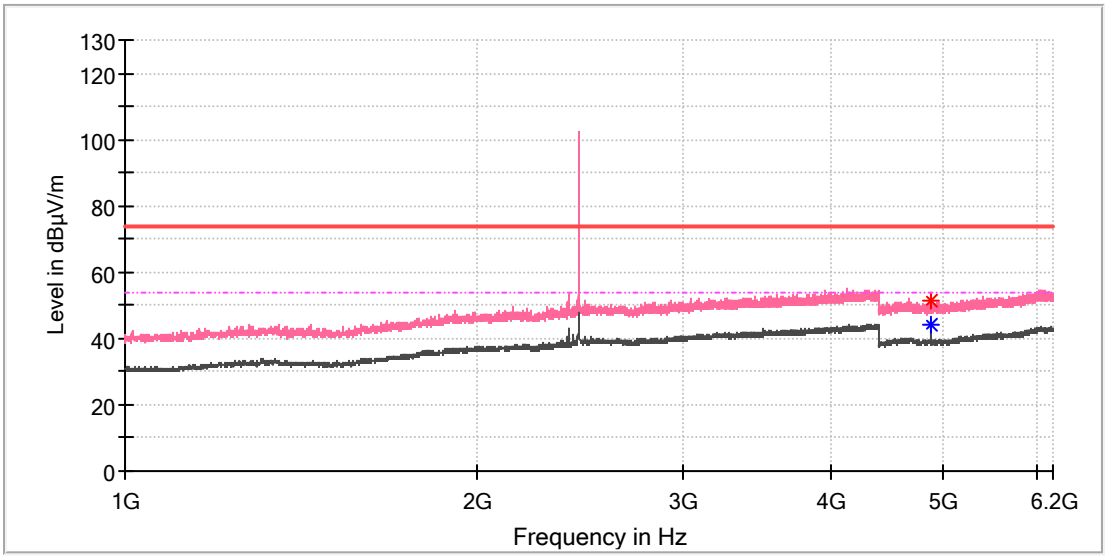


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4881.500000	---	49.30	54.00	4.70	150.0	H	356.0	11.8
4882.000000	54.93	---	74.00	19.07	150.0	H	356.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

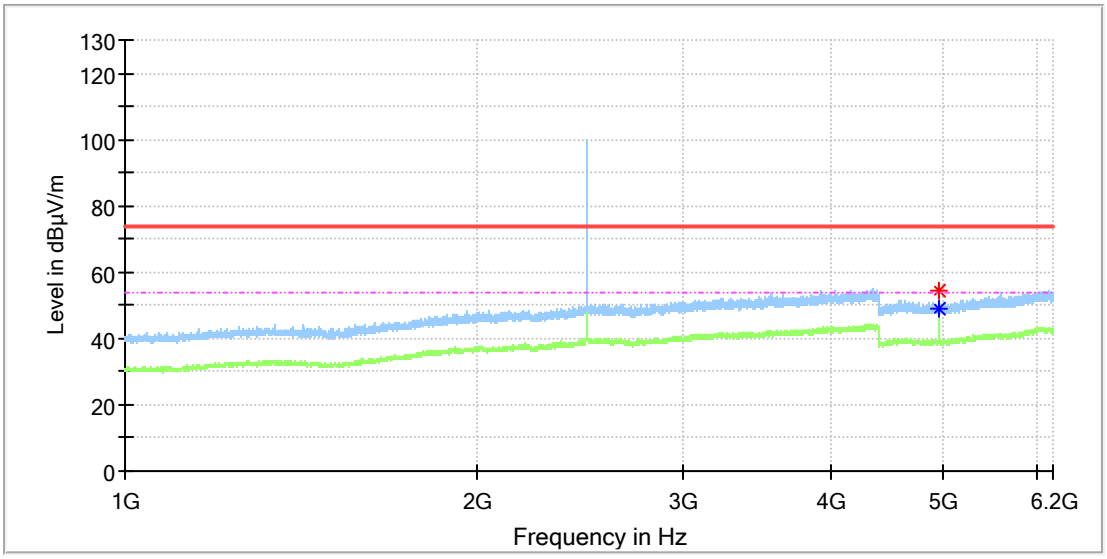


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4882.000000	51.65	---	74.00	22.35	150.0	V	181.0	11.8
4882.000000	---	44.38	54.00	9.62	150.0	V	181.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

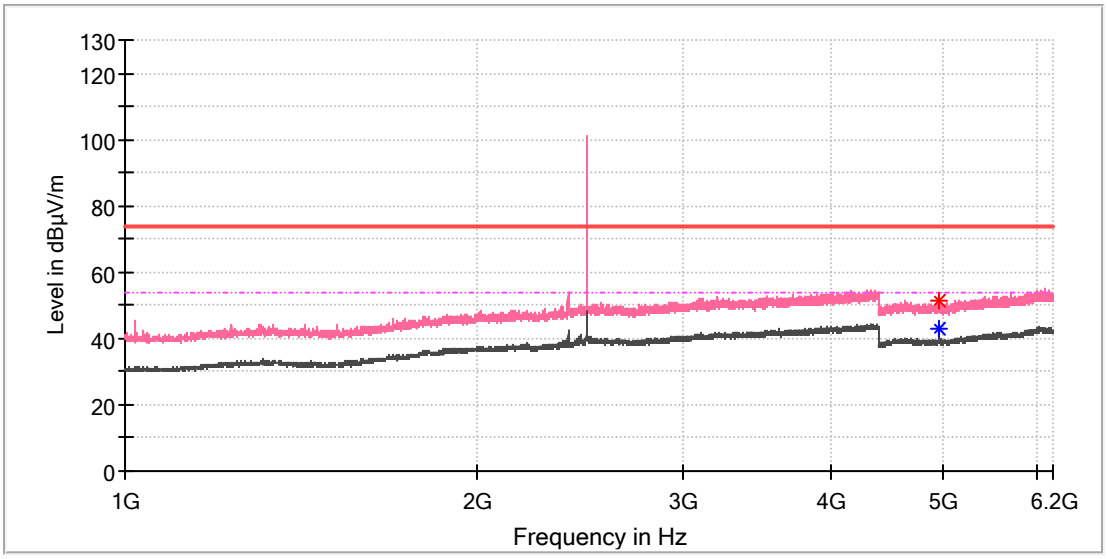


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.500000	54.57	---	74.00	19.43	150.0	H	31.0	11.8
4960.000000	---	48.92	54.00	5.08	150.0	H	31.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

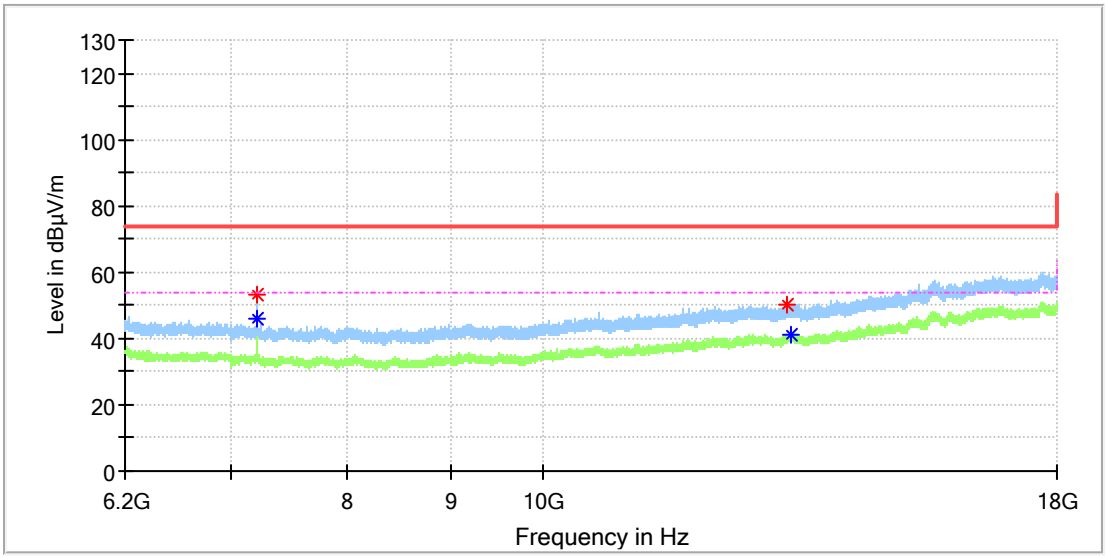


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4960.000000	51.46	---	74.00	22.54	150.0	V	80.0	11.8
4960.000000	---	43.11	54.00	10.89	150.0	V	80.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

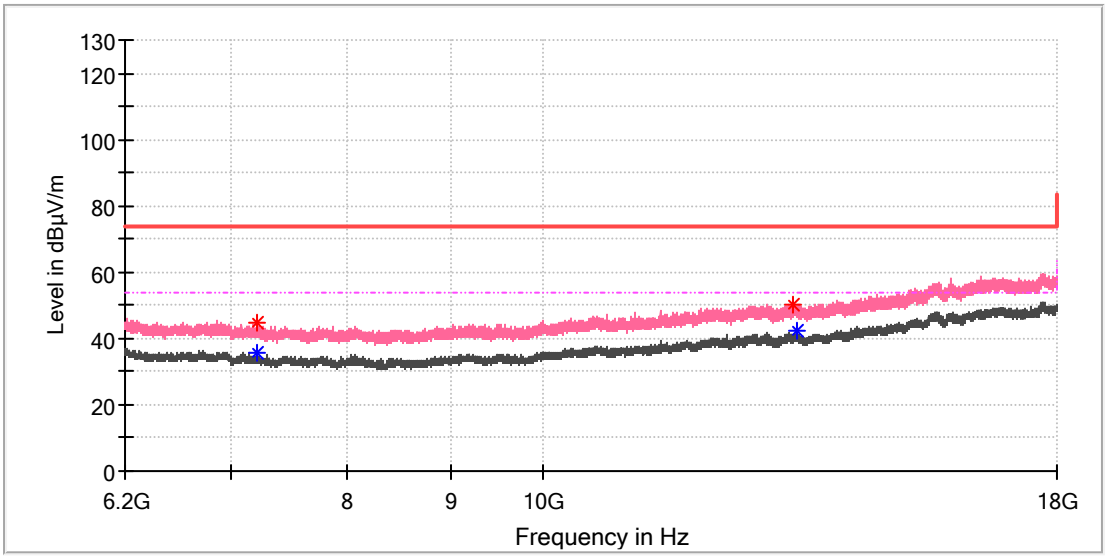


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7204.966667	---	45.92	54.00	8.08	150.0	H	209.0	8.8
7205.458333	53.22	---	74.00	20.78	150.0	H	209.0	8.8
13219.525000	50.22	---	74.00	23.78	150.0	H	209.0	15.5
13286.391667	---	41.42	54.00	12.58	150.0	H	336.0	15.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

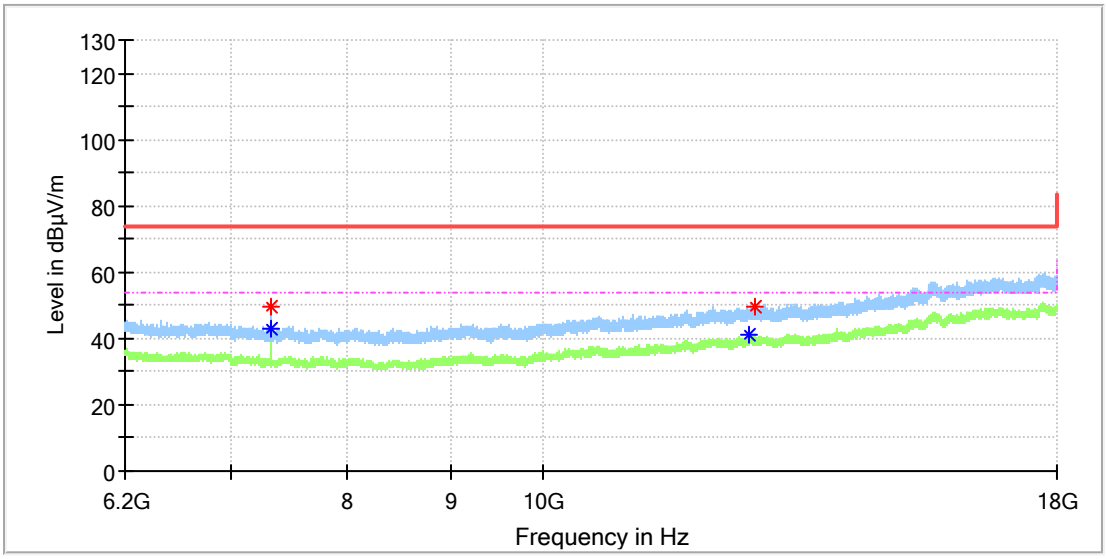


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.458333	44.72	---	74.00	29.28	150.0	V	0.0	8.8
7206.441667	---	35.87	54.00	18.13	150.0	V	82.0	8.8
13320.316667	50.24	---	74.00	23.76	150.0	V	326.0	15.5
13356.700000	---	42.08	54.00	11.92	150.0	V	22.0	15.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 24 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

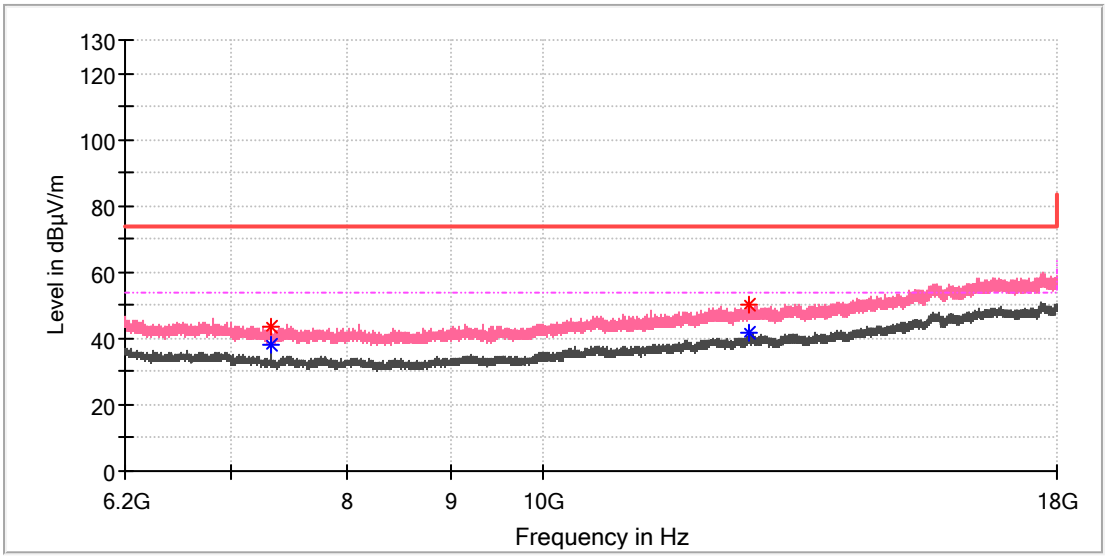


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7322.475000	49.85	---	74.00	24.15	150.0	H	294.0	8.2
7323.458333	---	43.09	54.00	10.91	150.0	H	97.0	8.2
12665.416667	---	40.91	54.00	13.09	150.0	H	359.0	15.1
12745.558333	49.54	---	74.00	24.46	150.0	H	0.0	15.2

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 24 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

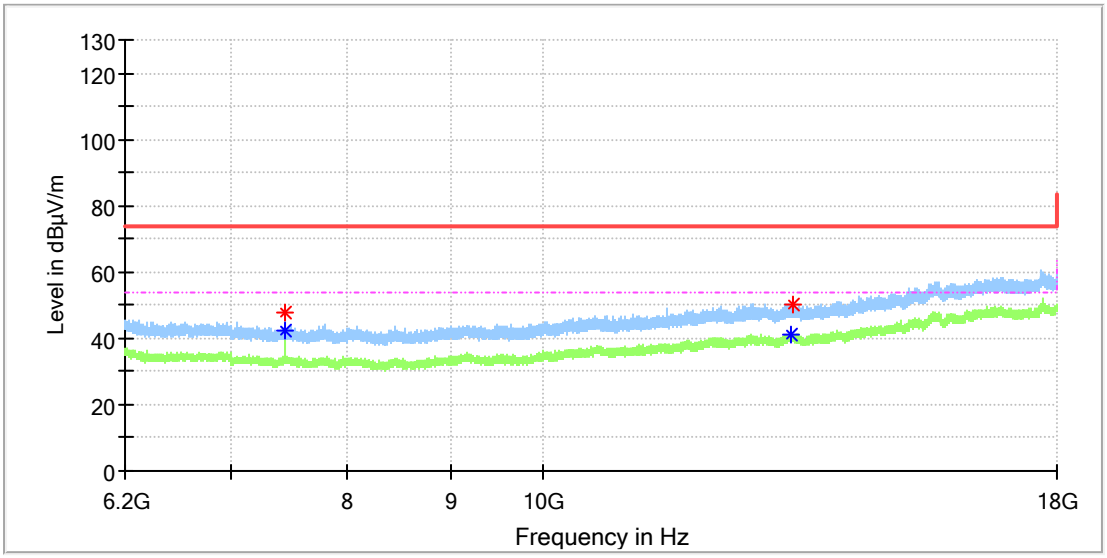


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7322.966667	43.77	---	74.00	30.23	150.0	V	130.0	8.2
7322.966667	---	38.24	54.00	15.76	150.0	V	130.0	8.2
12644.275000	50.07	---	74.00	23.93	150.0	V	355.0	15.0
12650.666667	---	41.71	54.00	12.29	150.0	V	42.0	15.0

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 24 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

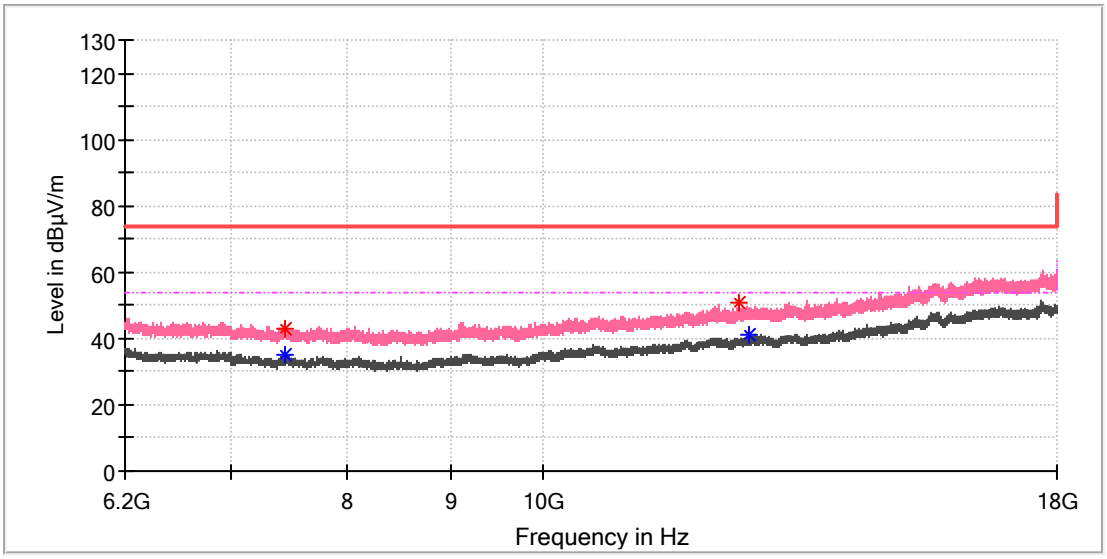


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.491667	---	42.49	54.00	11.51	150.0	H	107.0	8.4
7439.983333	47.93	---	74.00	26.07	150.0	H	57.0	8.4
13278.525000	---	41.31	54.00	12.69	150.0	H	156.0	15.5
13307.041667	50.20	---	74.00	23.80	150.0	H	45.0	15.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 24 Humi:50%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



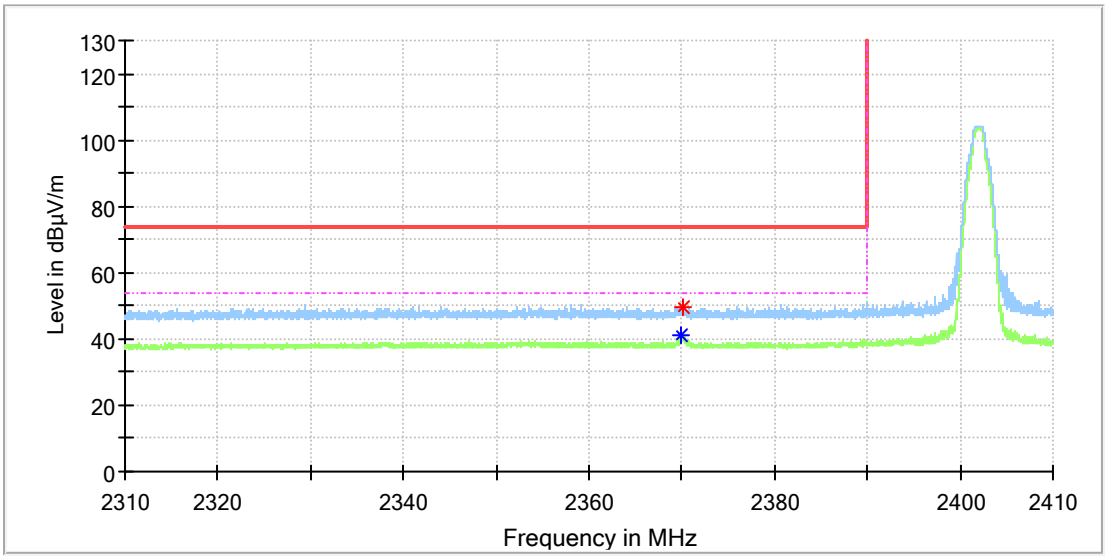
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.983333	---	35.09	54.00	18.91	150.0	V	108.0	8.4
7451.783333	42.93	---	74.00	31.07	150.0	V	275.0	8.5
12517.916667	50.89	---	74.00	23.11	150.0	V	300.0	14.7
12670.333333	---	40.97	54.00	13.03	150.0	V	60.0	15.1

Appendix B.9: Test Results of Radiated Emissions in Restricted Bands

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

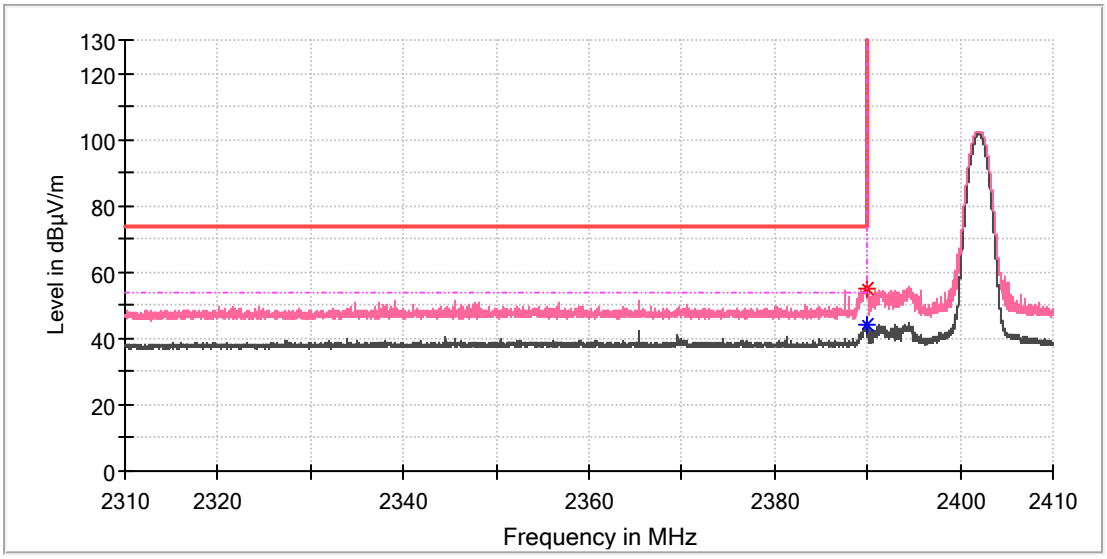


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2369.882353	---	40.96	54.00	13.04	150.0	H	212.0	6.9
2370.102941	49.83	---	74.00	24.17	150.0	H	212.0	6.9

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

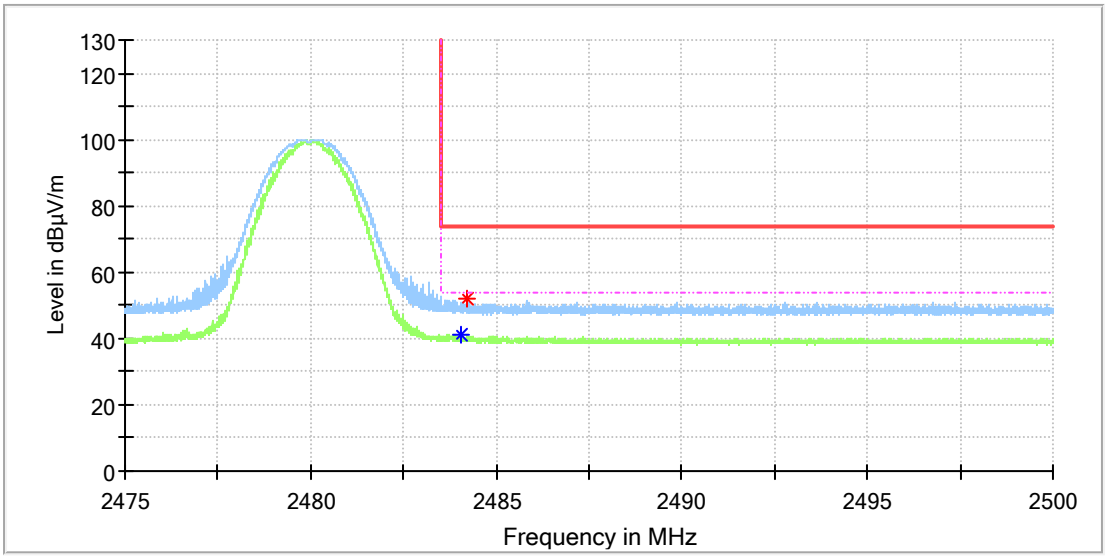


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.882353	55.15	---	74.00	18.85	150.0	V	264.0	7.0
2389.926471	---	44.41	54.00	9.59	150.0	V	264.0	7.0

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

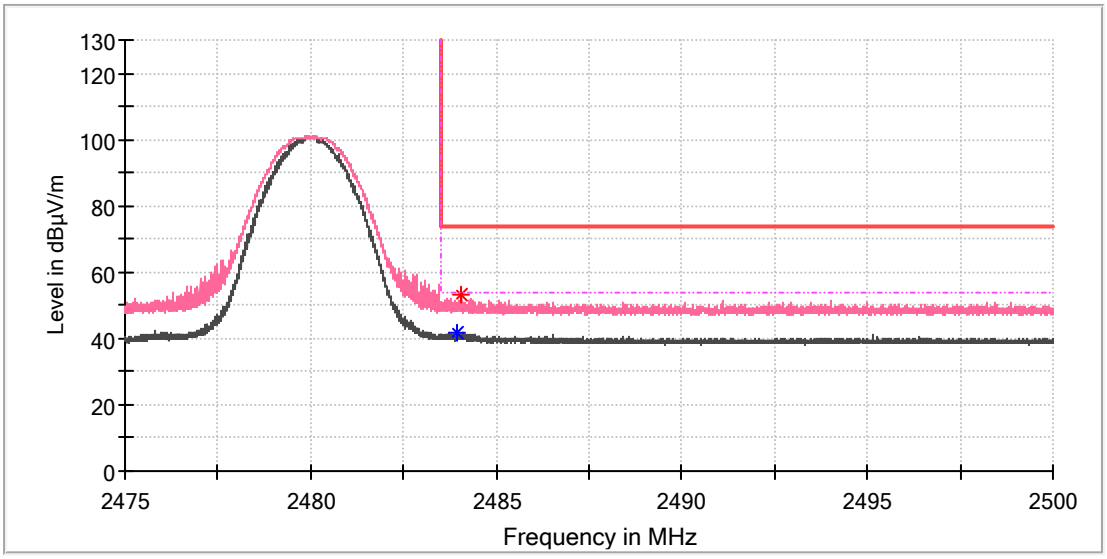


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2484.073530	---	41.30	54.00	12.70	150.0	H	256.0	7.4
2484.205882	51.83	---	74.00	22.17	150.0	H	358.0	7.4

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-035
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.966912	---	41.98	54.00	12.02	150.0	V	110.0	7.4
2484.077206	53.27	---	74.00	20.73	150.0	V	110.0	7.4

Appendix C: Test Results of Right earbud

Appendix C.1: Test Results of 99% Bandwidth

BR mode (GFSK)

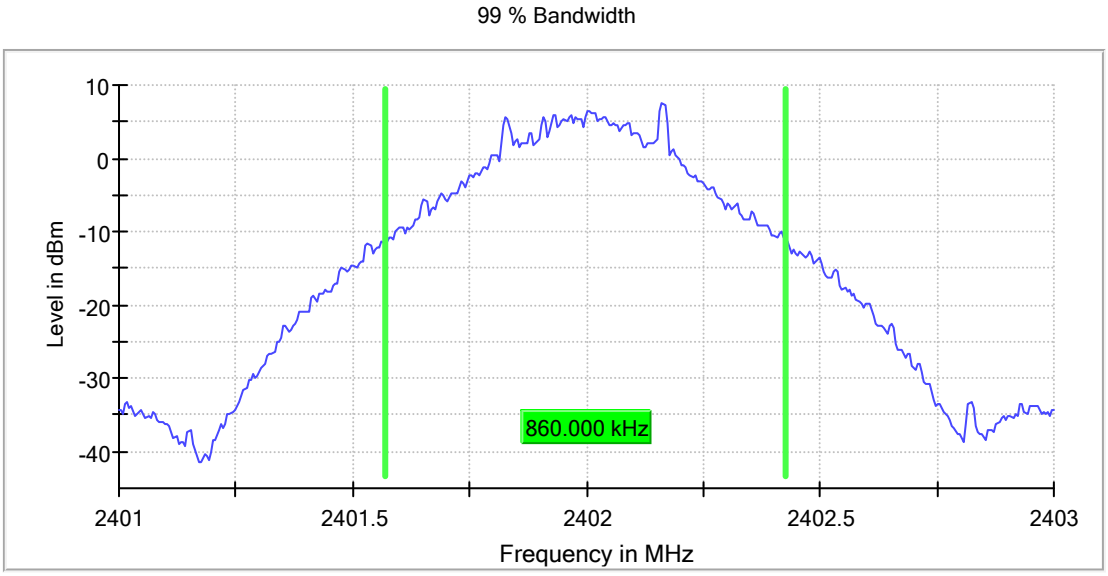
99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.860000	---	---	2401.567500	2402.427500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2402.000000	PASS

RBW=30kHz, VBW=100kHz



99 % Bandwidth

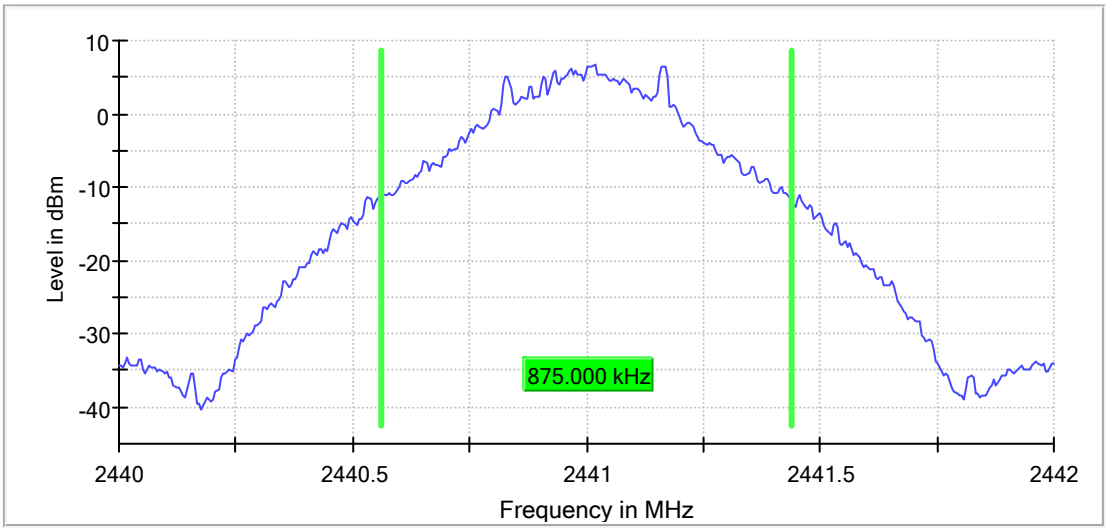
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.875000	---	---	2440.562500	2441.437500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2441.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



99 % Bandwidth

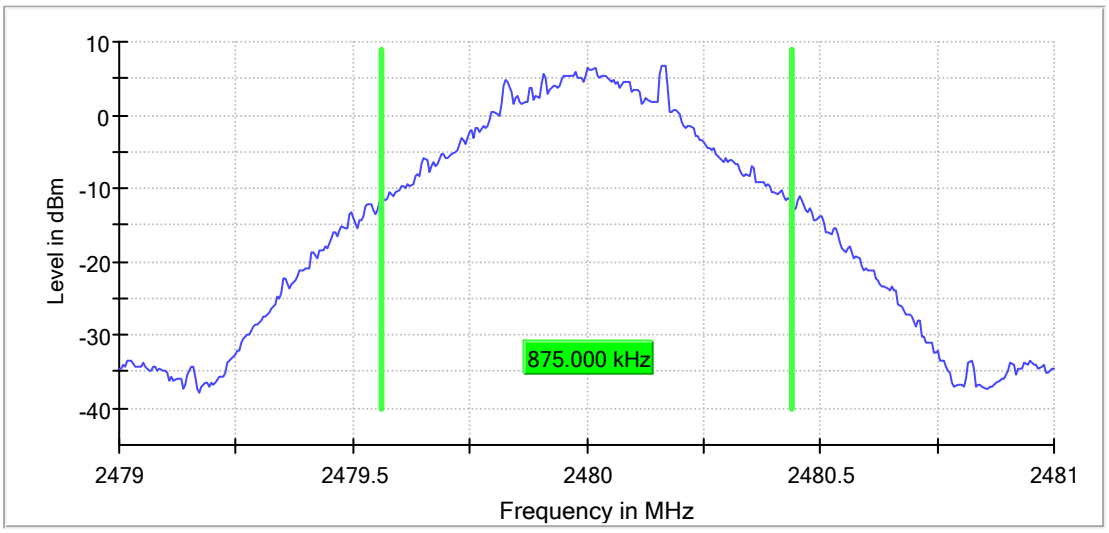
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	0.875000	---	---	2479.562500	2480.437500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2480.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



EDR mode (8DPSK)

99 % Bandwidth

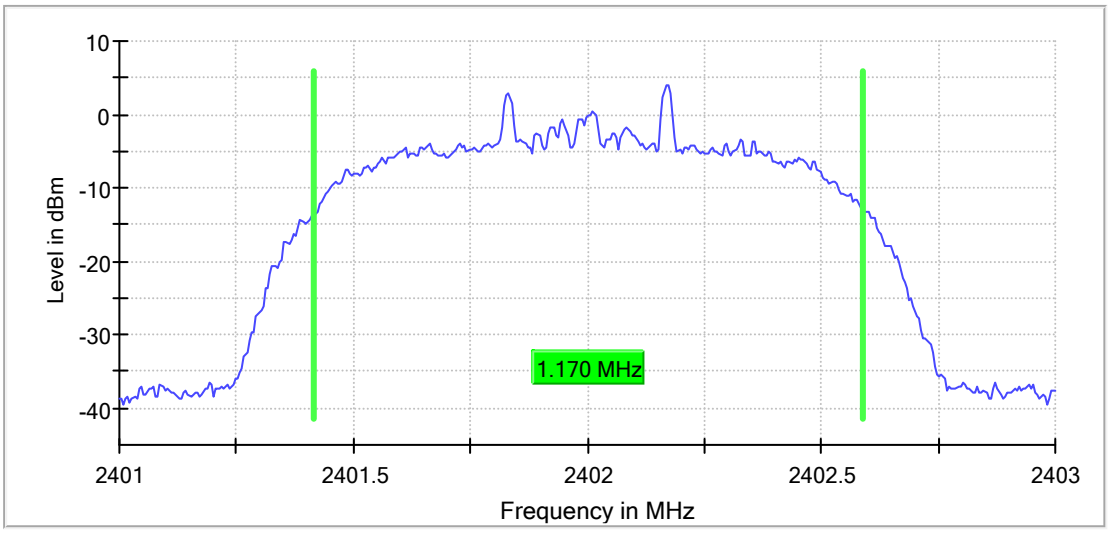
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.170000	---	---	2401.417500	2402.587500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2402.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



99 % Bandwidth

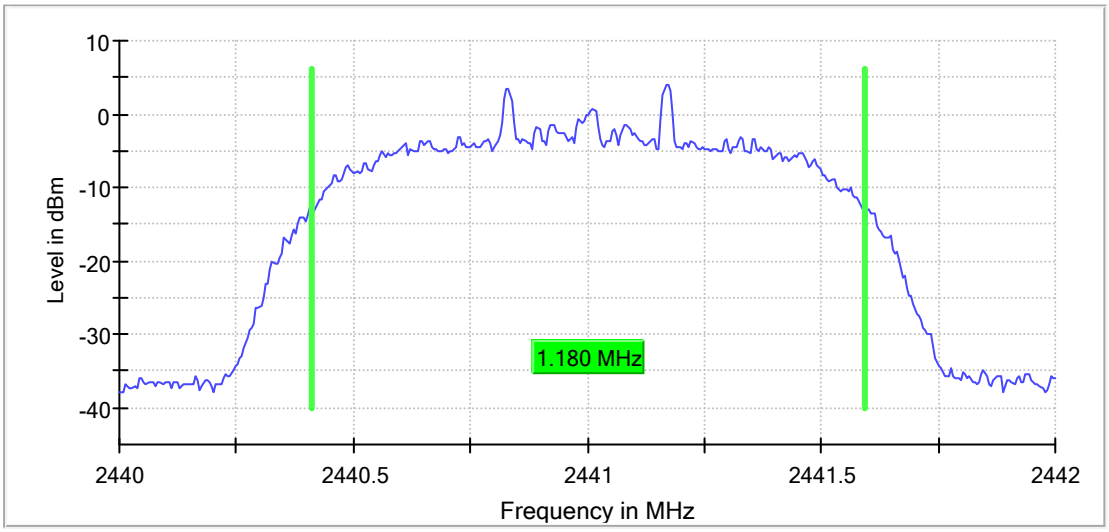
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.180000	---	---	2440.412500	2441.592500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2441.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



99 % Bandwidth

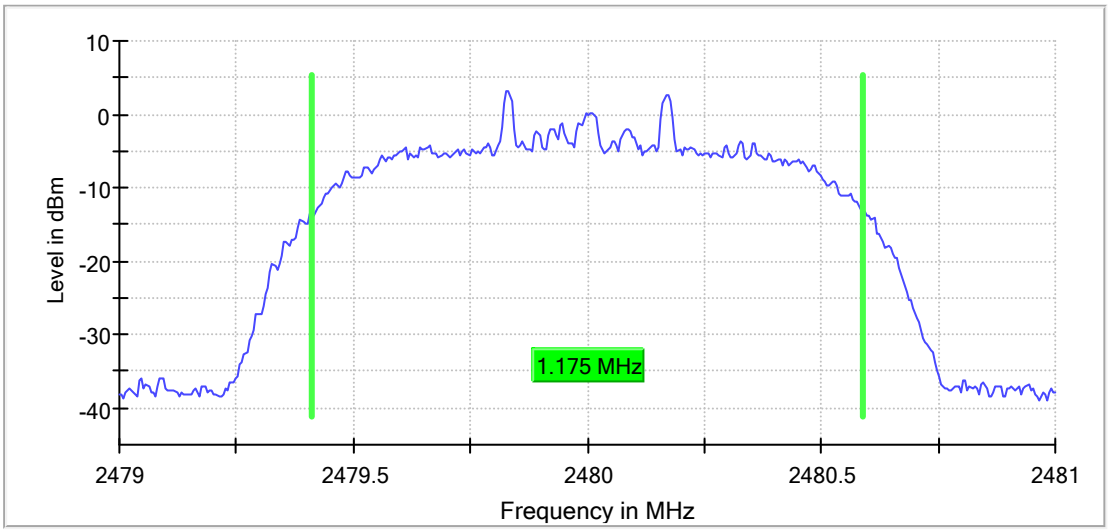
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.175000	---	---	2479.412500	2480.587500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2480.000000	PASS

RBW=30kHz, VBW=100kHz

99 % Bandwidth



Appendix C.2: Test Results of 20dB Bandwidth

BR mode (GFSK)

20 dB Bandwidth

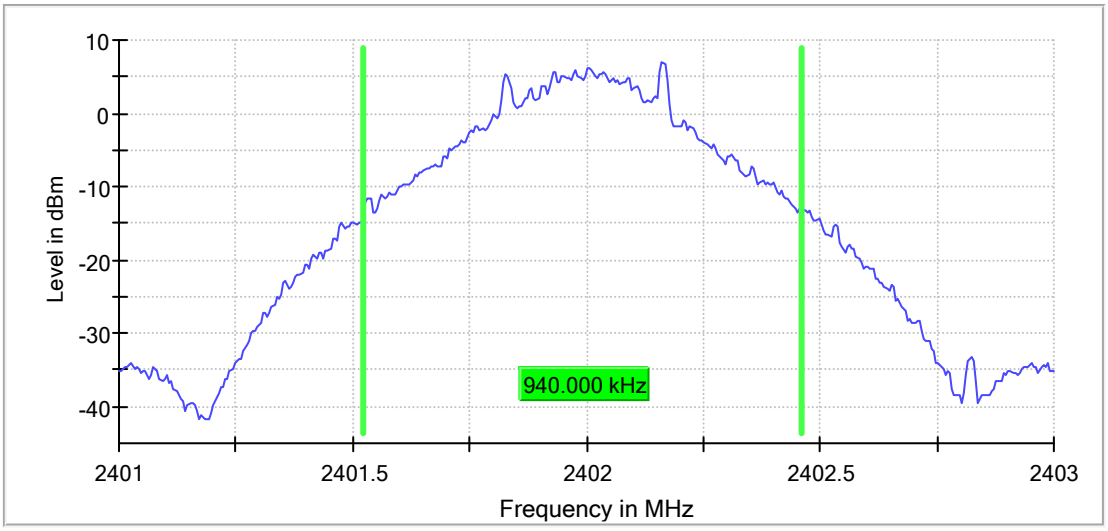
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	0.940000	---	---	2401.522500	2402.462500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	6.9	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

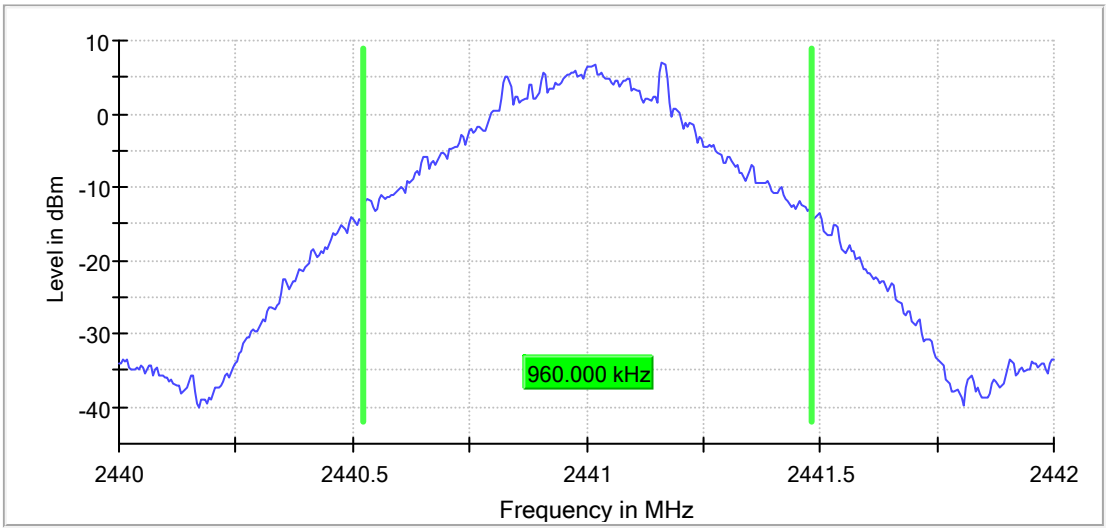
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	0.960000	---	---	2440.522500	2441.482500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2441.000000	6.9	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

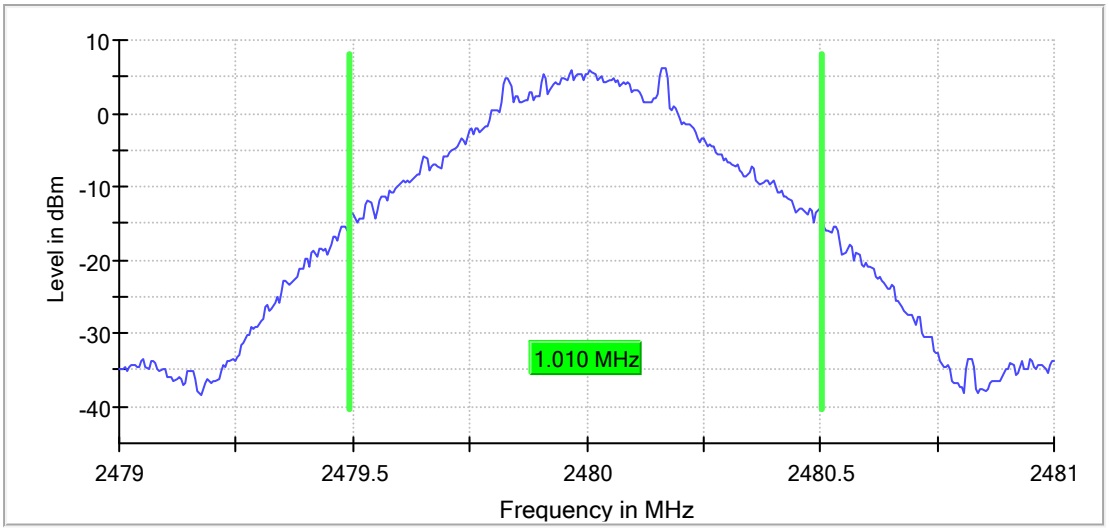
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.010000	---	---	2479.492500	2480.502500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	6.2	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



EDR mode (8DPSK)

20 dB Bandwidth

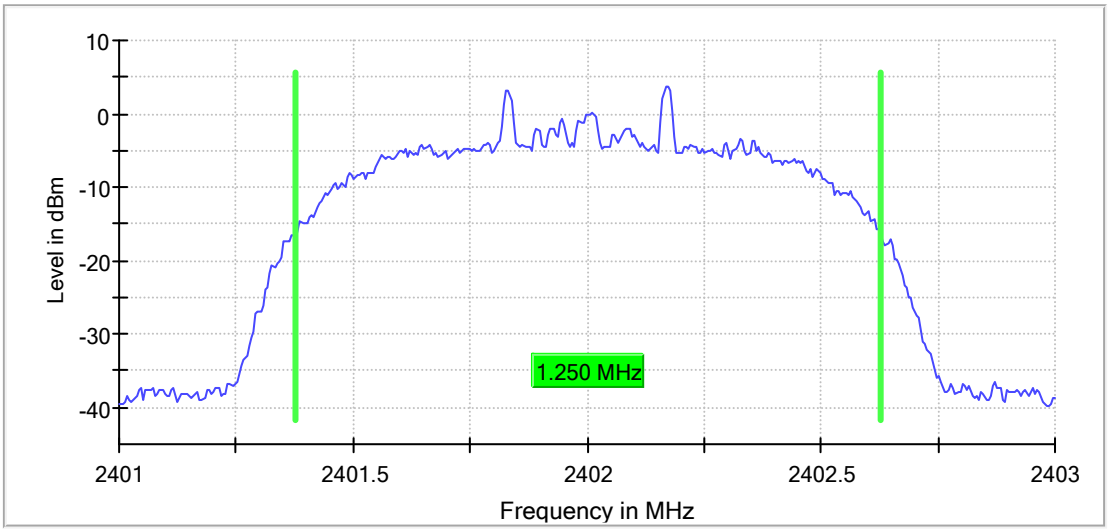
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2402.000000	1.250000	---	---	2401.377500	2402.627500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2402.000000	3.7	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

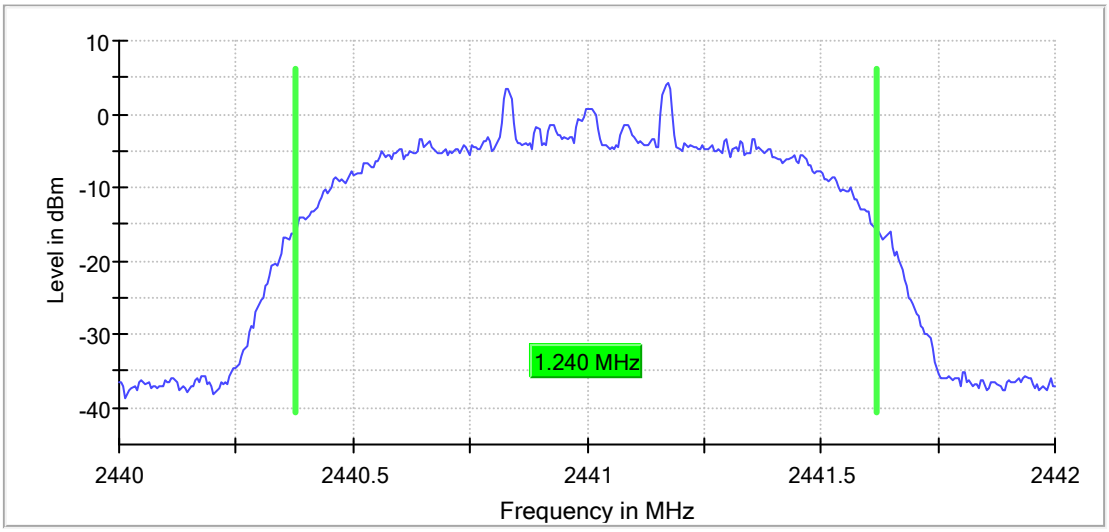
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2441.000000	1.240000	---	---	2440.377500	2441.617500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2441.000000	4.2	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



20 dB Bandwidth

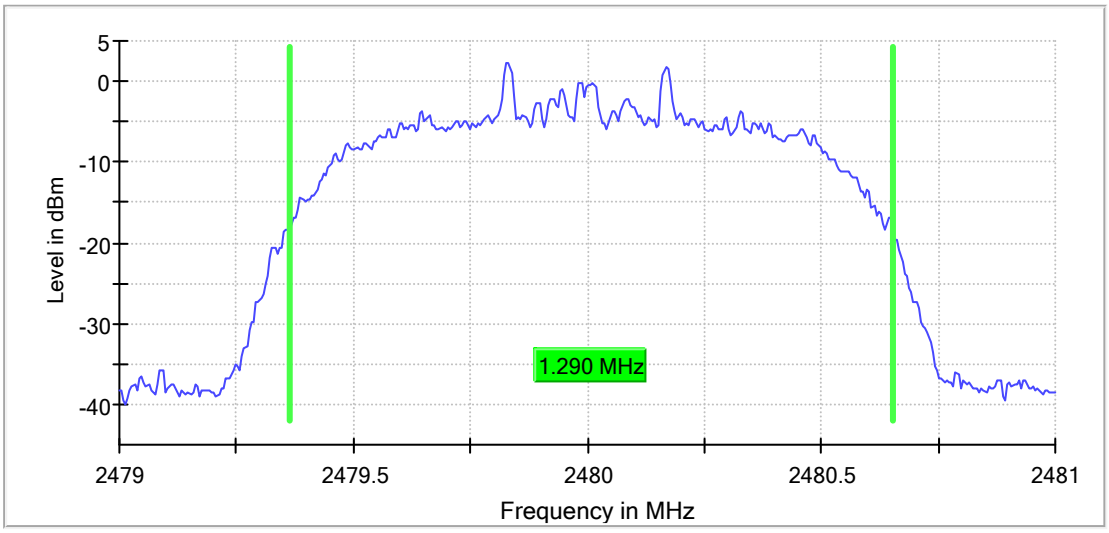
DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2480.000000	1.290000	---	---	2479.362500	2480.652500

(continuation of the "20 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2480.000000	2.4	PASS

RBW=30kHz, VBW=100kHz

20 dB Bandwidth



Appendix C.3: Test Results of Frequency stability

Test Channel (MHz)	2402

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.465V	2401.991	-9	-3.75	10
DC 3.85V	2401.989	-11	-4.58	
DC 4.235V	2401.993	-7	-2.91	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2401.988	-12	-5.00	10
-20	2401.986	-14	-5.83	
-10	2401.984	-16	-6.66	
0	2401.988	-12	-5.00	
10	2401.987	-13	-5.41	
20	2401.986	-14	-5.83	
30	2401.988	-12	-5.00	
40	2401.984	-16	-6.66	
50	2401.985	-15	-6.24	
55	2401.983	-17	-7.08	

Test Channel (MHz)	2441

Test result of frequency tolerance of voltage variation

Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.465V	2440.992	-8	-3.28	10
DC 3.85V	2440.991	-9	-3.69	
DC 4.235V	2440.993	-7	-2.87	

Test result of frequency tolerance of temperature variation

Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2440.991	-9	-3.69	10
-20	2440.988	-12	-4.92	
-10	2440.995	-5	-2.05	
0	2440.990	-10	-4.10	
10	2440.989	-11	-4.51	
20	2440.986	-14	-5.74	
30	2440.985	-15	-6.15	
40	2440.987	-13	-5.33	
50	2440.991	-9	-3.69	
55	2440.988	-12	-4.92	

Test Channel (MHz)	2480

Test result of frequency tolerance of voltage variation

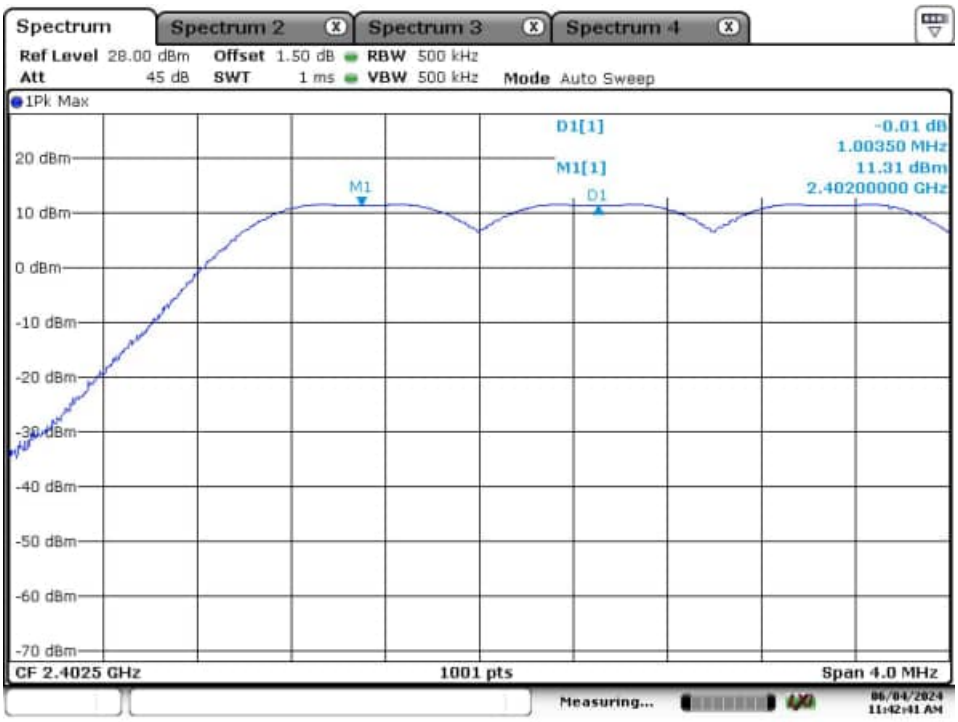
Voltage	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
DC 3.465V	2479.995	-5	-2.02	10
DC 3.85V	2479.992	-8	-3.23	
DC 4.235V	2479.994	-6	-2.42	

Test result of frequency tolerance of temperature variation

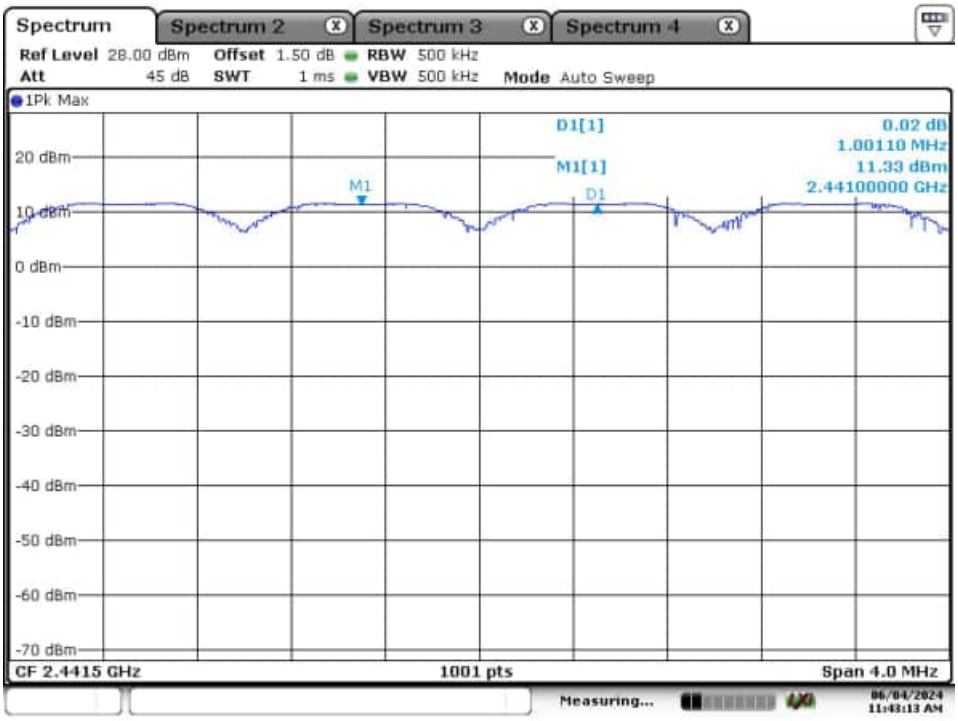
Temperature (℃)	Test result (MHz)	Deviation Frequency (KHz)	Test result (ppm)	Limit (ppm)
-30	2479.991	-9	-3.63	10
-20	2479.992	-8	-3.23	
-10	2479.989	-11	-4.44	
0	2479.991	-9	-3.63	
10	2479.990	-10	-4.03	
20	2479.988	-12	-4.84	
30	2479.985	-15	-6.05	
40	2479.986	-14	-5.65	
50	2479.988	-12	-4.84	
55	2479.985	-15	-6.05	

Appendix C.4: Test Results of Carrier Frequency Separation

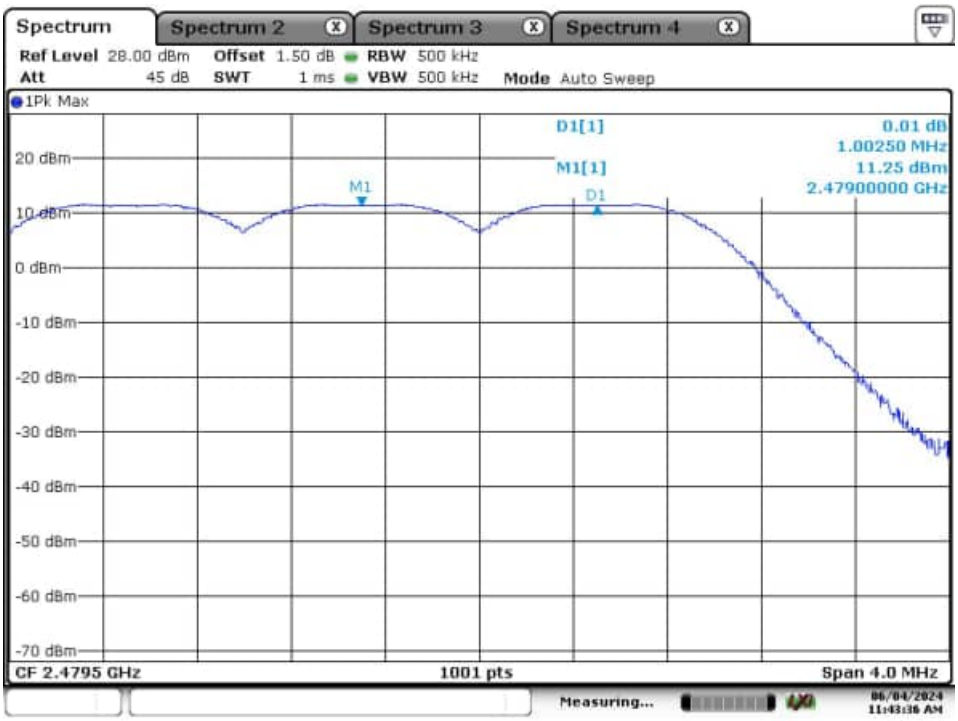
BR mode (GFSK)



Date: 4.JUN.2024 11:42:41

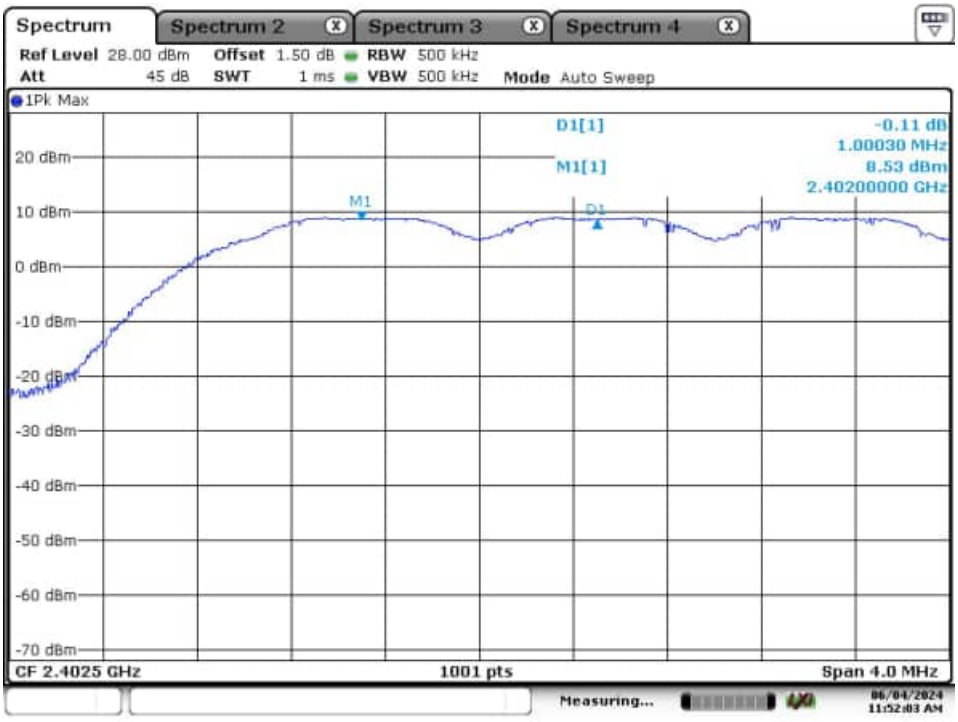


Date: 4.JUN.2024 11:43:12

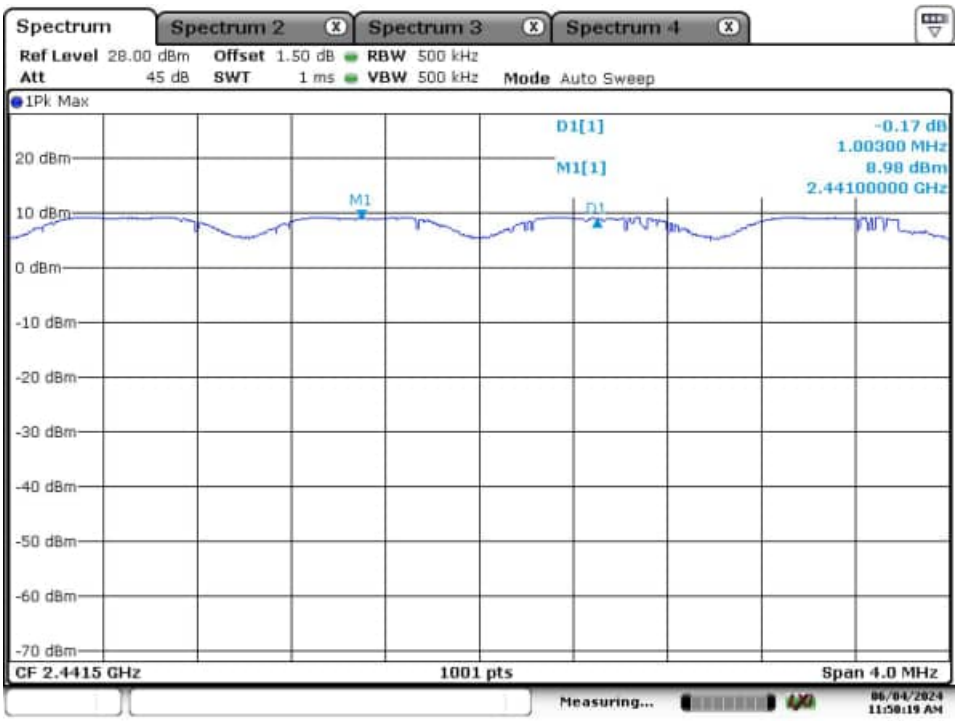


Date: 4.JUN.2024 11:43:35

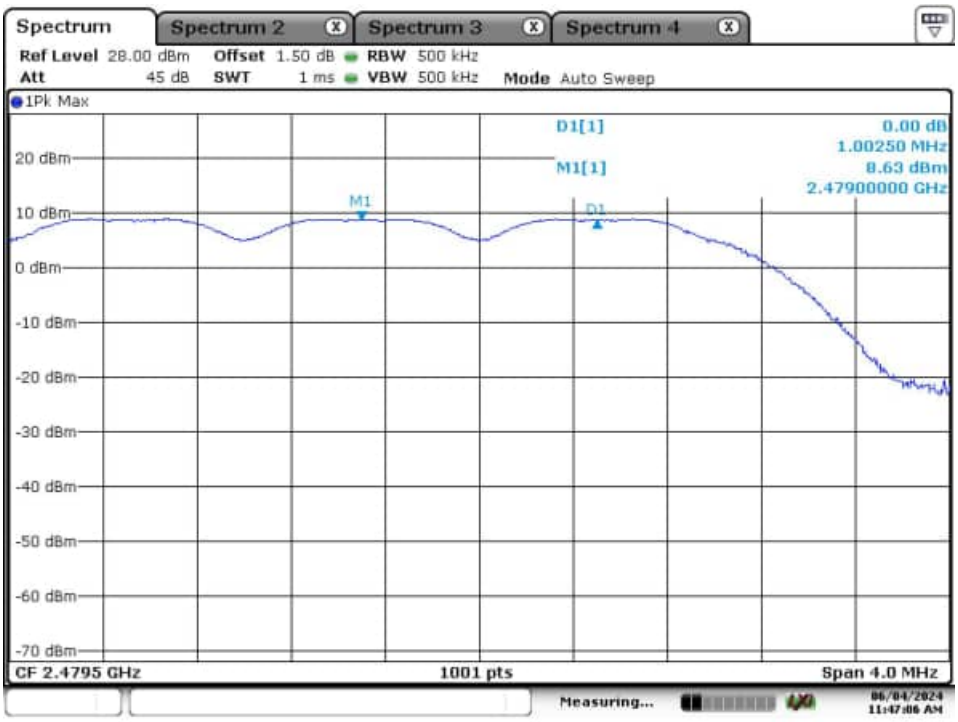
EDR mode (8DPSK)



Date: 4.JUN.2024 11:52:03



Date: 4.JUN.2024 11:50:19



Date: 4.JUN.2024 11:47:06

Appendix C.5: Test Results of Number of Hopping Frequency

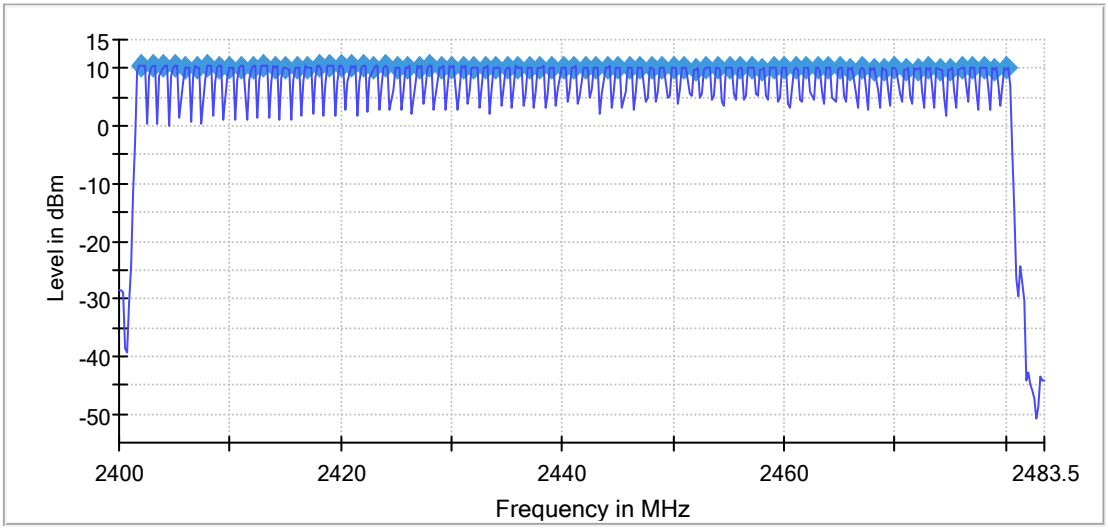
BR mode (GFSK)

Channels

Channels	Limit Min	Limit Max	Result
79	15	---	PASS

RBW=200kHz, VBW=200kHz

Sequence



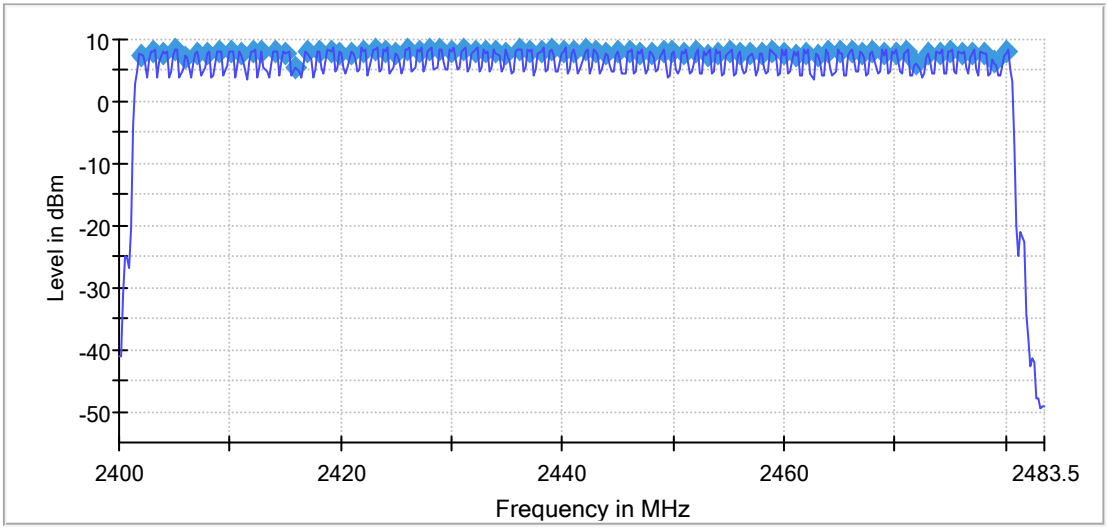
EDR mode (8DPSK)

Channels

Channels	Limit Min	Limit Max	Result
84	15	---	PASS

RBW=200kHz, VBW=200kHz

Sequence



Appendix C.6: Test Results of Time of Occupancy

BR mode (GFSK)

1DH1

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	318	126.800	-10.0

Periode

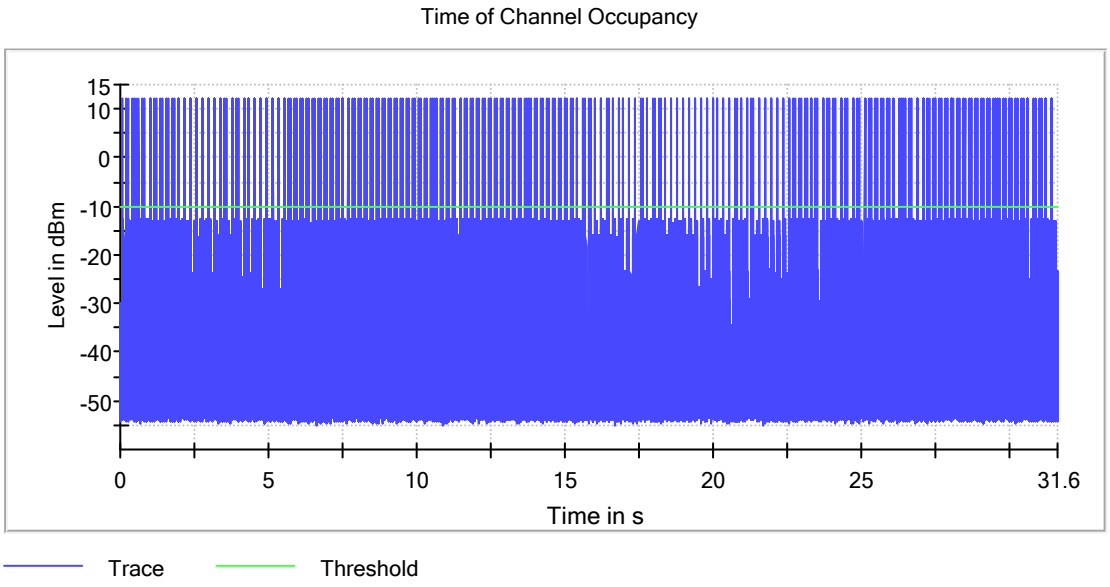
Min (ms)	Max (ms)	Mean (ms)
5.000	194.990	98.850

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
0.39	0.40	400.000	0.000	0.398

DwellTime

Min (ms)	Max (ms)	Mean (ms)
0.39	0.40	0.398



RBW=500kHz, VBW=1MHz

1DH3

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	164	272.820	-10.0

Periode

Min (ms)	Max (ms)	Mean (ms)
5.000	762.480	191.728

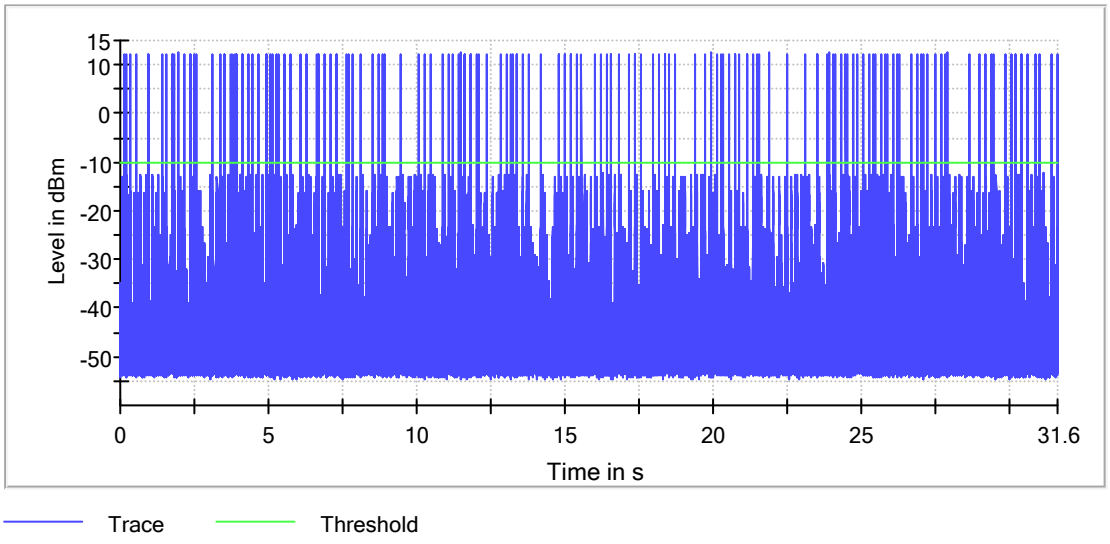
Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
1.650	1.660	400.000	0.000	1.653

DwellTime

Min (ms)	Max (ms)	Mean (ms)
1.650	1.660	1.653

Time of Channel Occupancy(2)



RBW=500kHz, VBW=1MHz

1DH5

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	107	319.230	-10.0

Periode

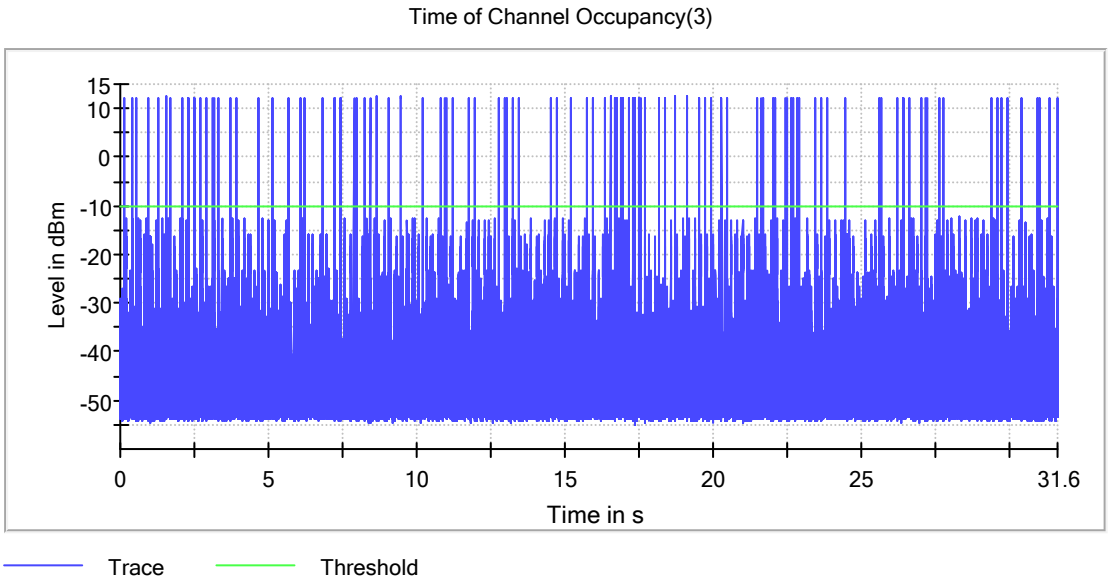
Min (ms)	Max (ms)	Mean (ms)
7.500	1589.950	294.296

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
2.900	5.800	400.000	0.000	2.956

DwellTime

Min (ms)	Max (ms)	Mean (ms)
2.900	6.650	2.972



RBW=500kHz, VBW=1MHz

EDR mode (8DPSK)

3DH1

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	319	129.340	-10.0

Periode

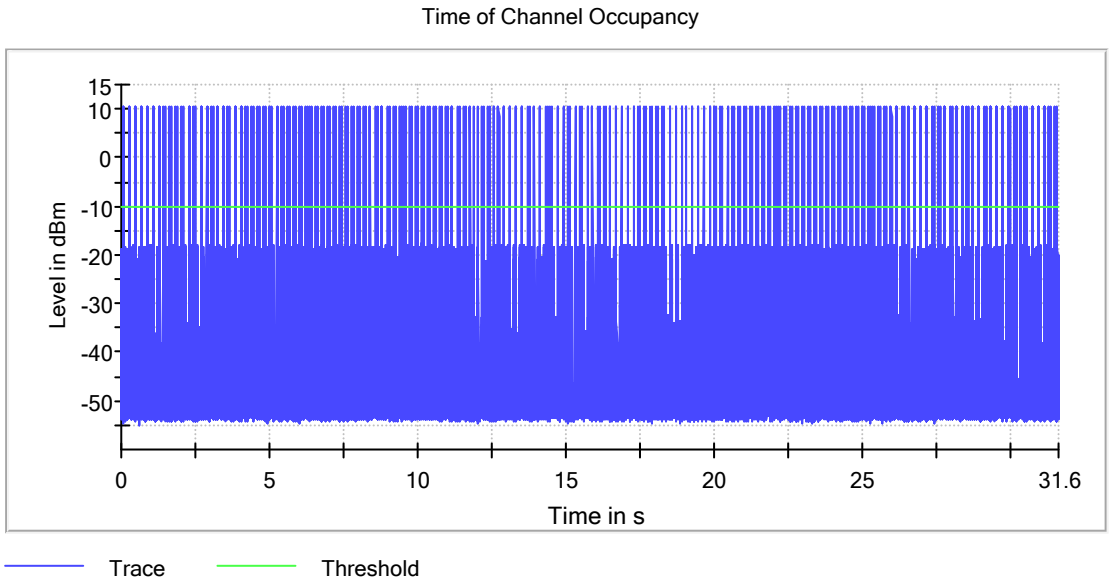
Min (ms)	Max (ms)	Mean (ms)
13.750	191.250	98.822

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
0.40	0.41	400.000	0.000	0.404

DwellTime

Min (ms)	Max (ms)	Mean (ms)
0.40	0.41	0.404



RBW=500kHz, VBW=1MHz

3DH3

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	171	284.440	-10.0

Periode

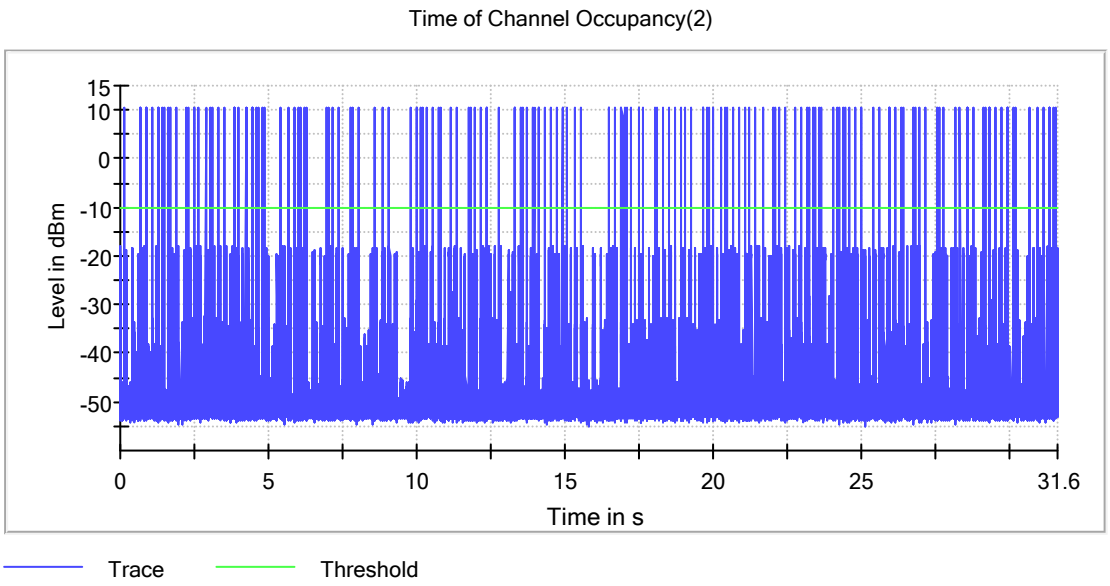
Min (ms)	Max (ms)	Mean (ms)
20.000	912.470	184.333

Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
1.650	1.660	400.000	0.000	1.654

DwellTime

Min (ms)	Max (ms)	Mean (ms)
1.650	1.660	1.654



RBW=500kHz, VBW=1MHz

3DH5

Result

DUT Frequency (MHz)	Result	Number of Hops	Average time of occupancy (ms)	Threshold (dBm)
2441.000000	PASS	108	316.580	-10.0

Periode

Min (ms)	Max (ms)	Mean (ms)
26.250	1162.470	282.469

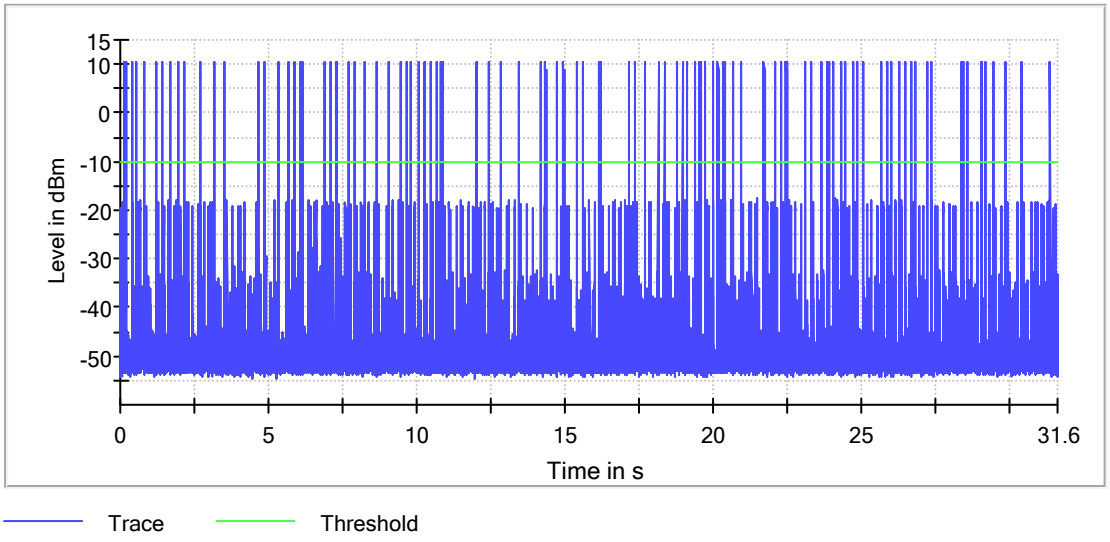
Transmit Time per Hop

Min (ms)	Max (ms)	Limit Max for Max (ms)	Limit Min for Max (ms)	Mean (ms)
2.900	2.910	400.000	0.000	2.904

DwellTime

Min (ms)	Max (ms)	Mean (ms)
2.900	2.910	2.904

Time of Channel Occupancy(3)

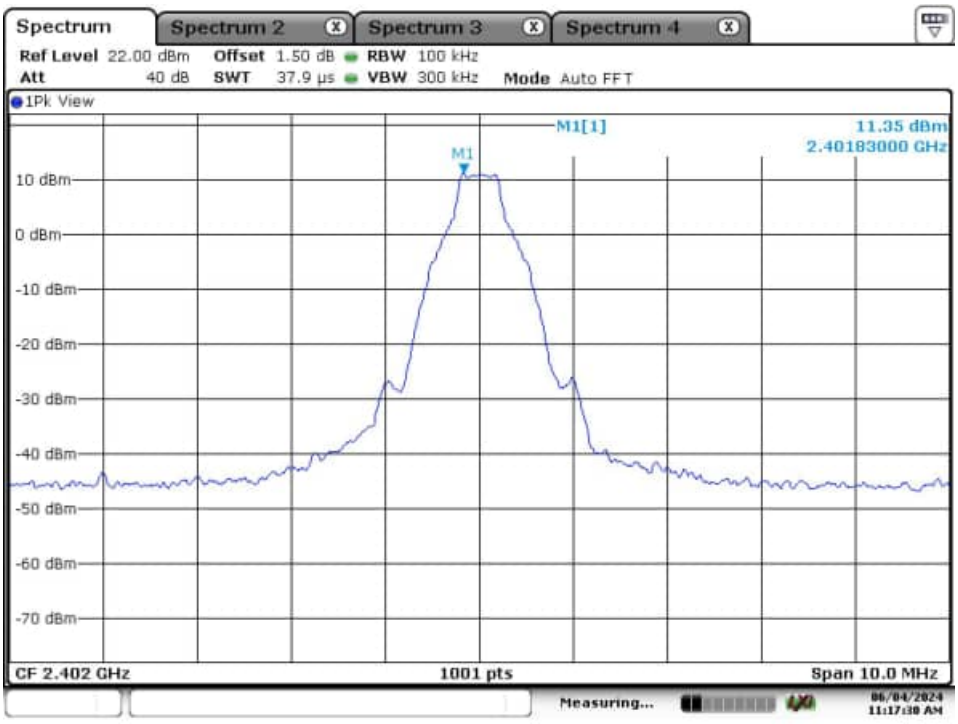


RBW=500kHz, VBW=1MHz

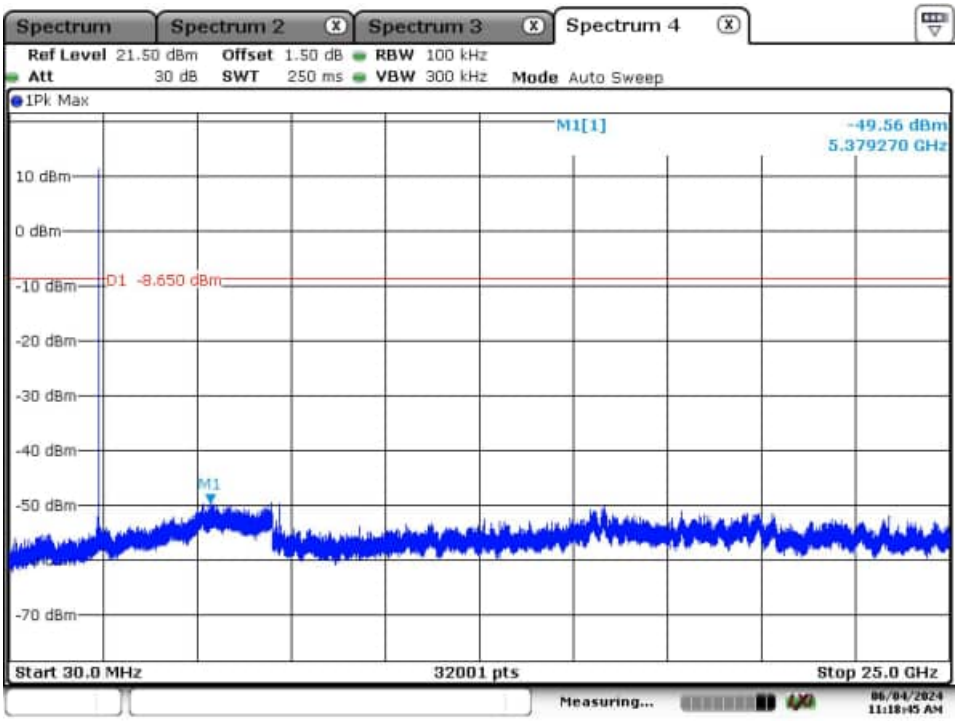
Appendix C.7: Test Results of Conducted Spurious Emissions Measured in 100 kHz Bandwidth

BR mode (GFSK)

Low Channel

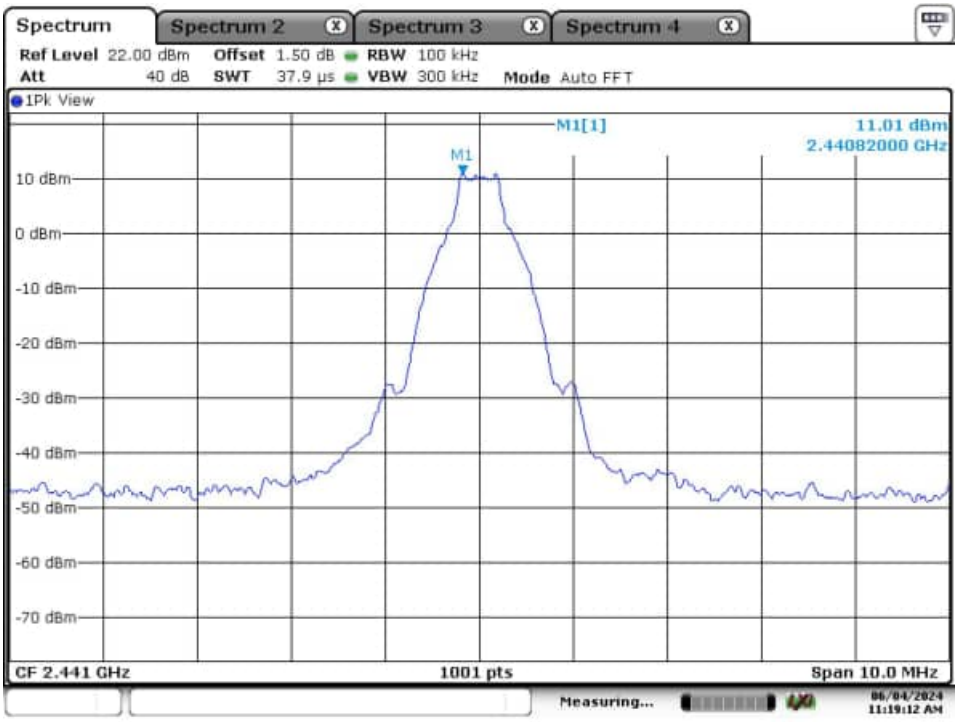


Date: 4.JUN.2024 11:17:30

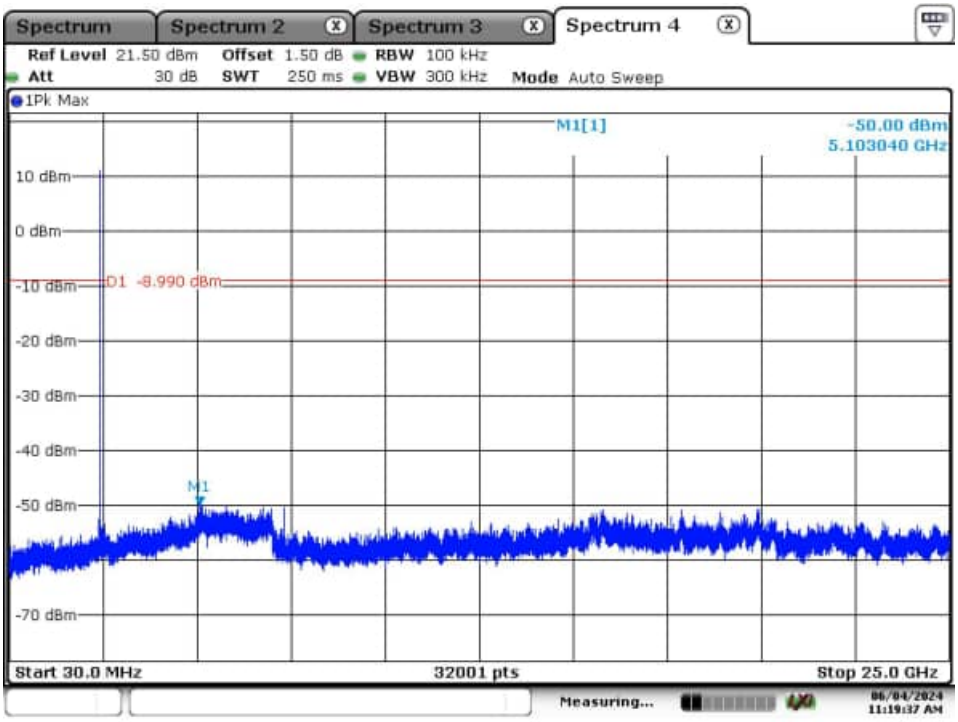


Date: 4.JUN.2024 11:18:44

Middle Channel

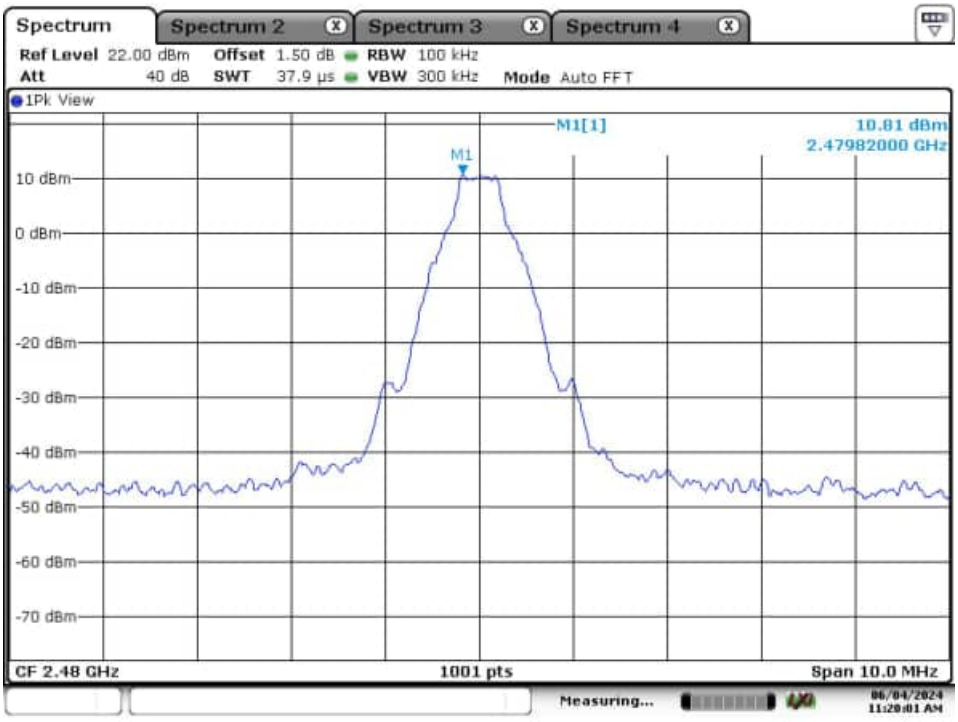


Date: 4.JUN.2024 11:19:12

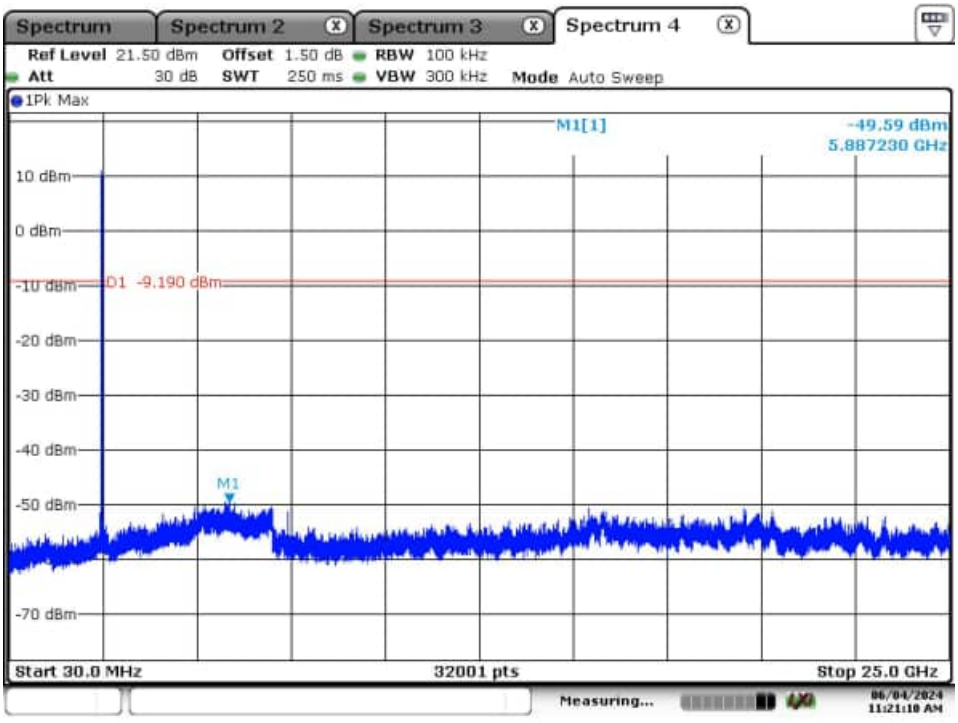


Date: 4.JUN.2024 11:19:37

High Channel

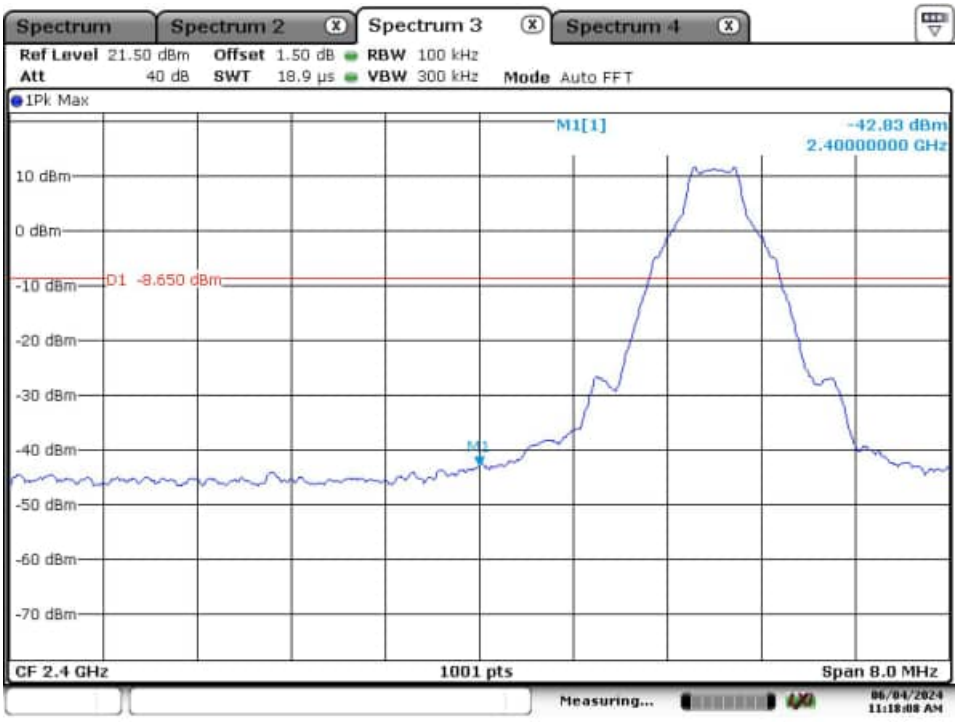


Date: 4.JUN.2024 11:20:01



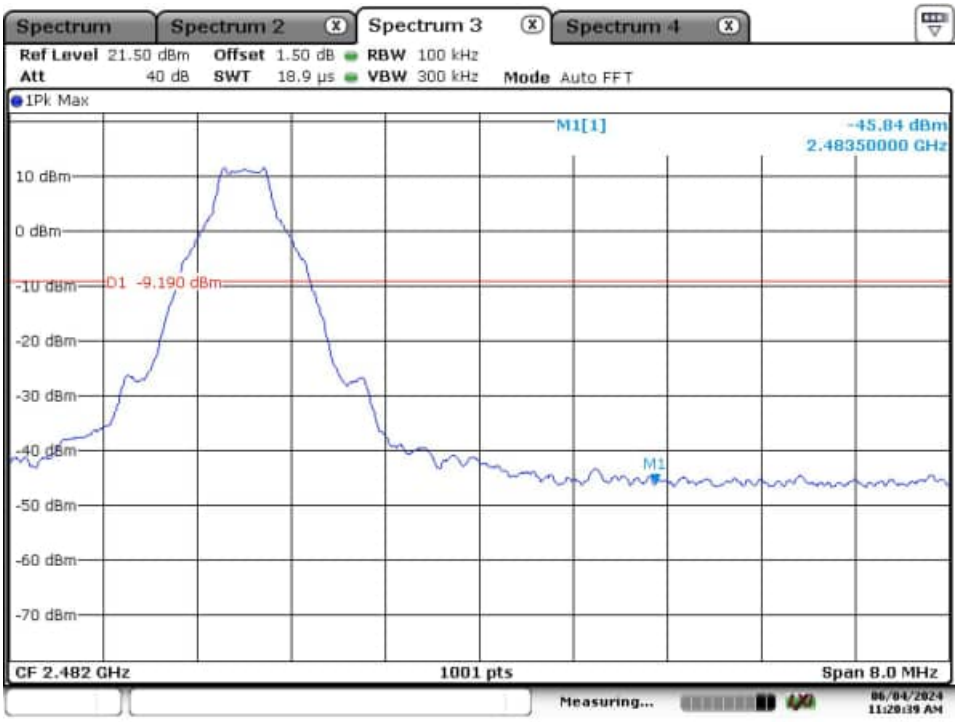
Date: 4.JUN.2024 11:21:09

Band Edge, Low Channel



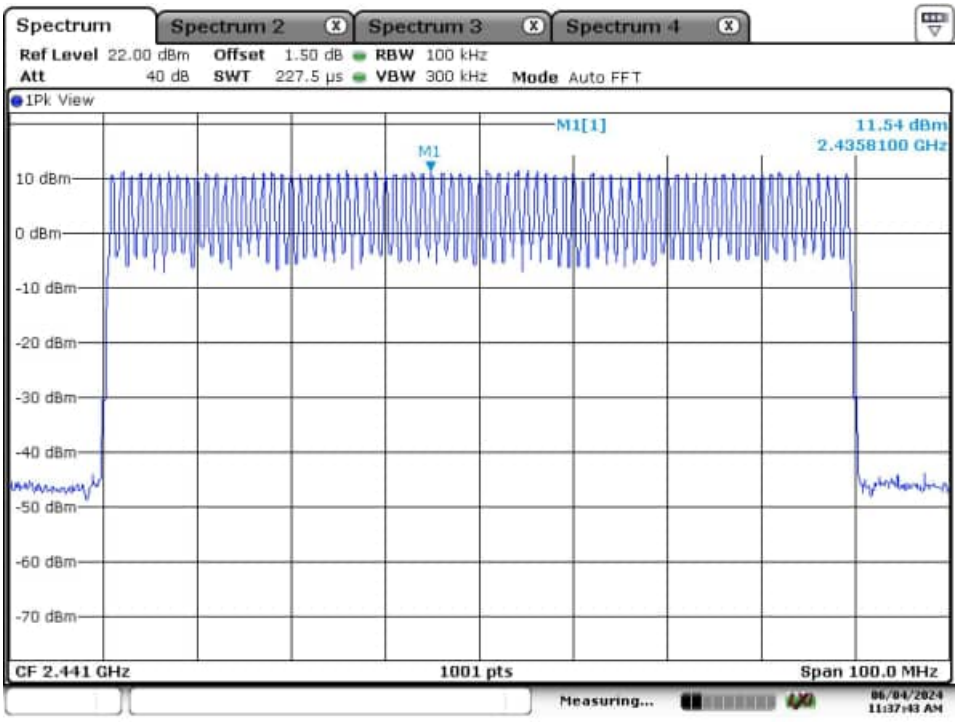
Date: 4.JUN.2024 11:18:08

Band Edge, High Channel

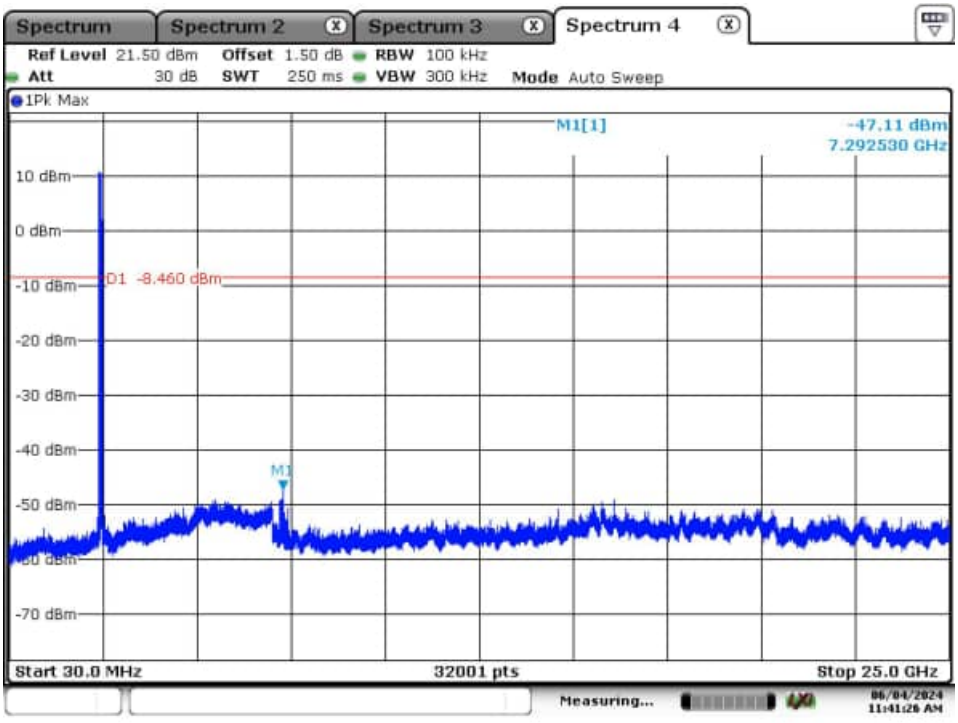


Date: 4.JUN.2024 11:20:39

Hopping Mode

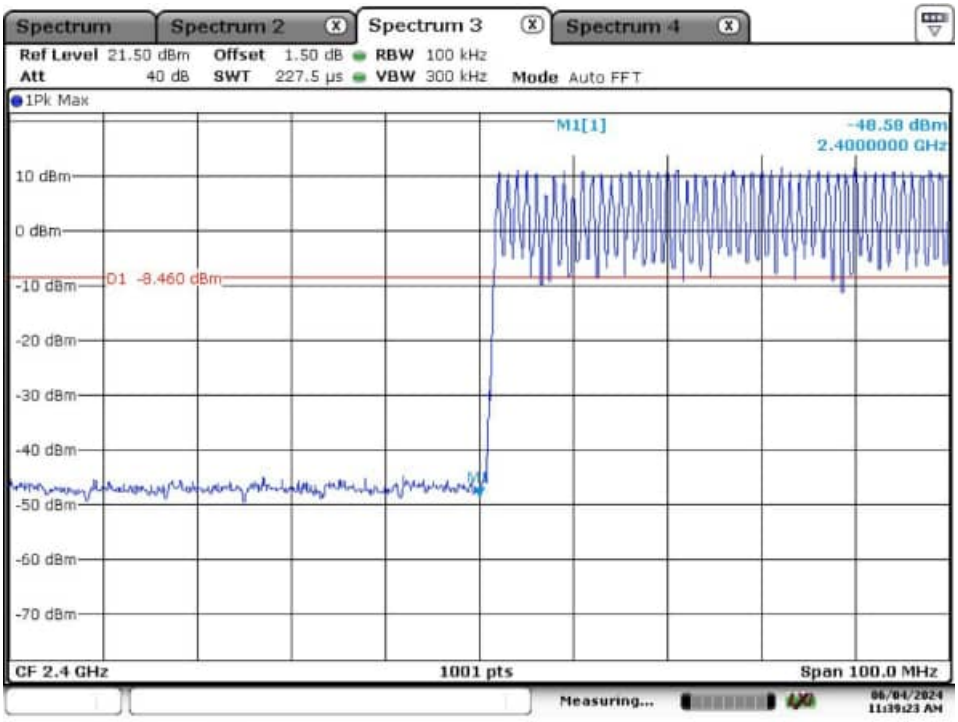


Date: 4.JUN.2024 11:37:43



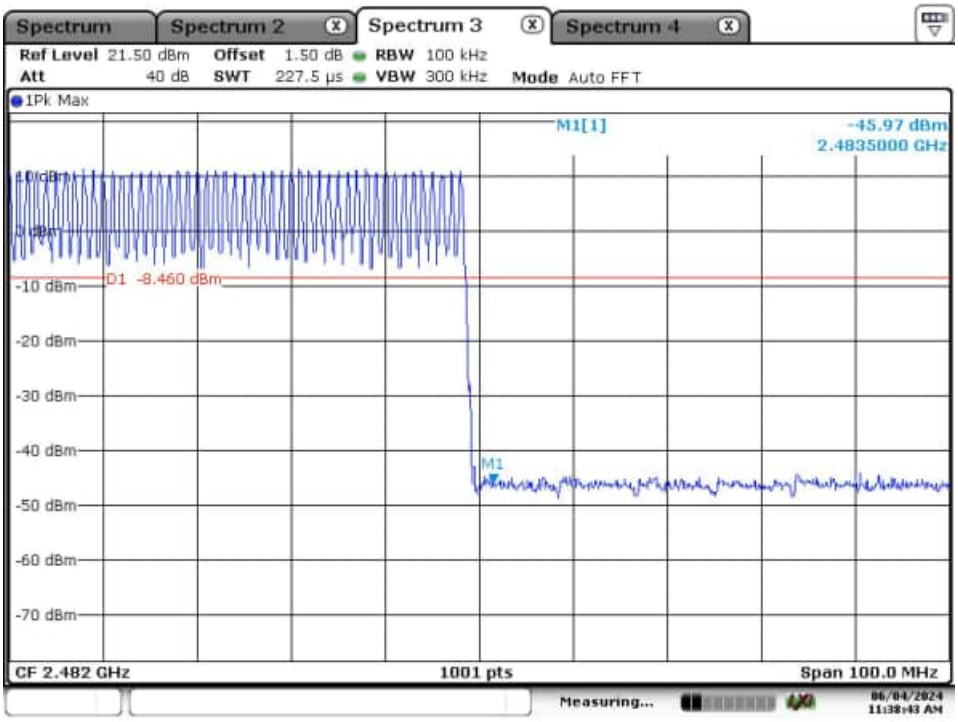
Date: 4.JUN.2024 11:41:26

Band Edge, Hopping Mode, Low Channel



Date: 4.JUN.2024 11:39:23

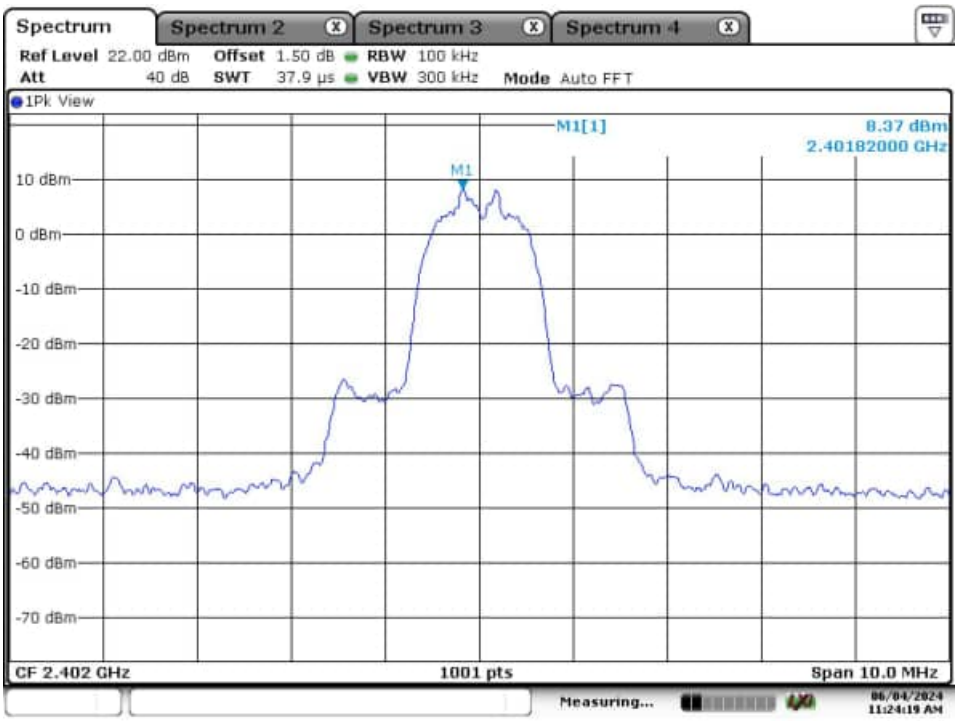
Band Edge, Hopping Mode, High Channle



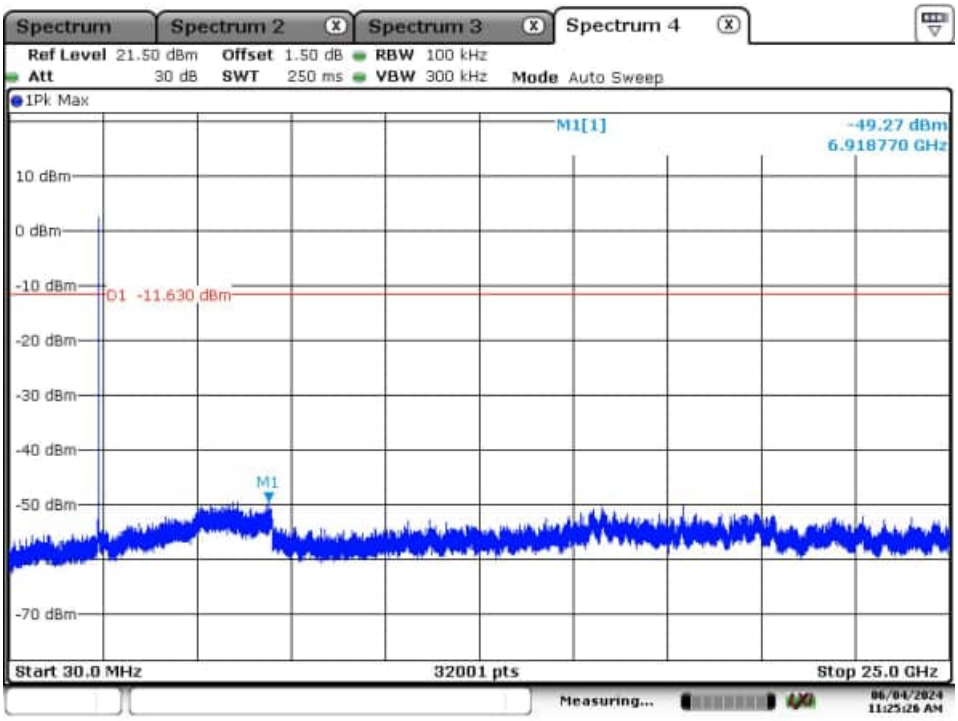
Date: 4.JUN.2024 11:38:43

EDR mode (8DPSK)

Low Channel

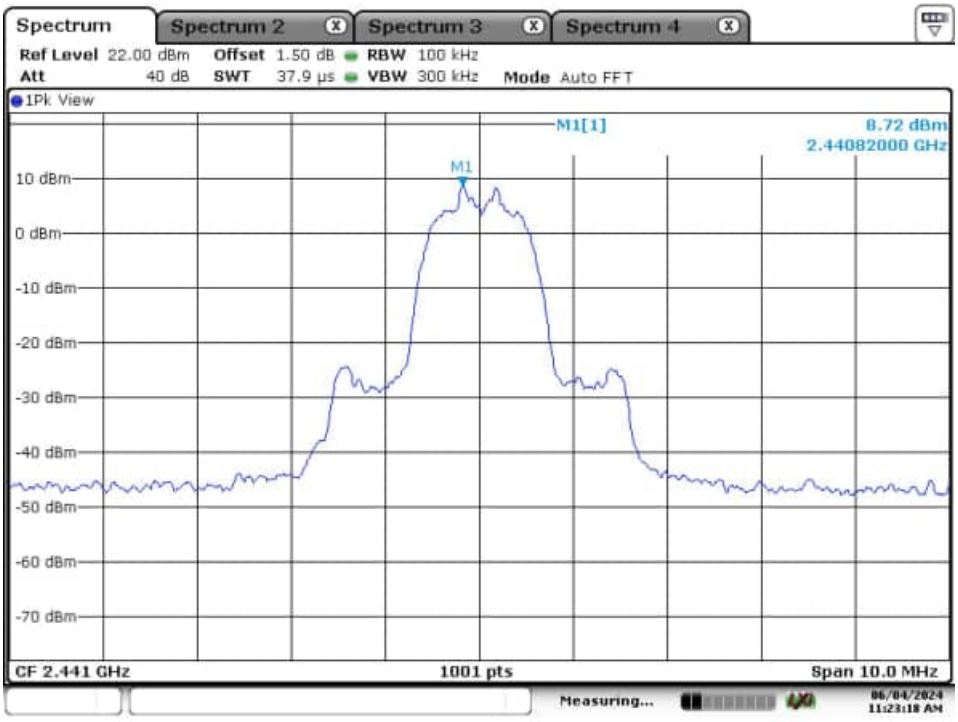


Date: 4.JUN.2024 11:24:19

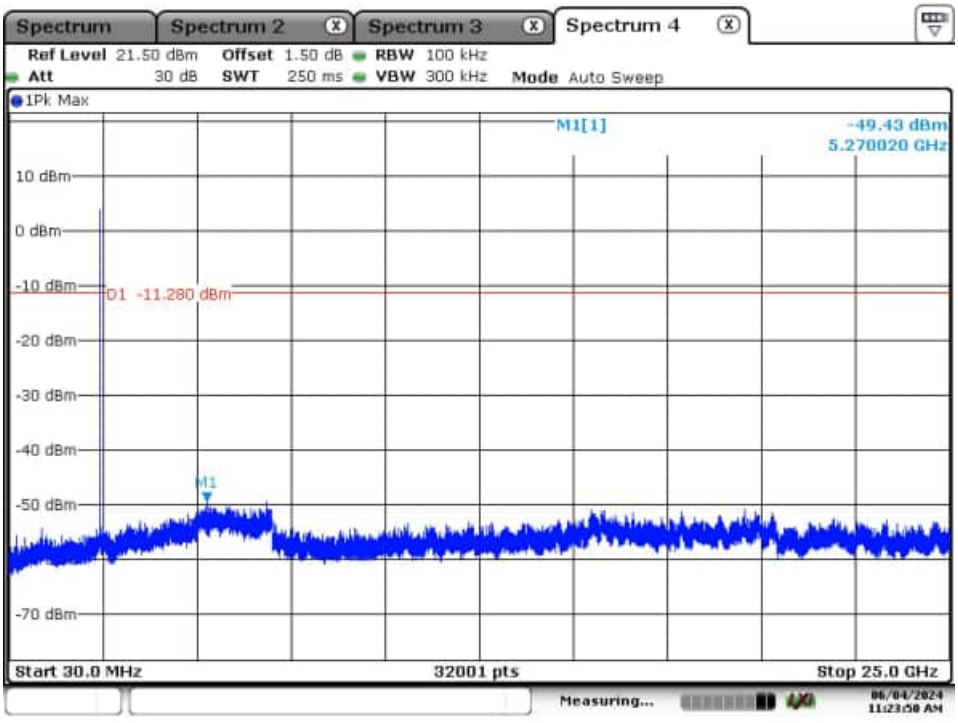


Date: 4.JUN.2024 11:25:25

Middle Channel

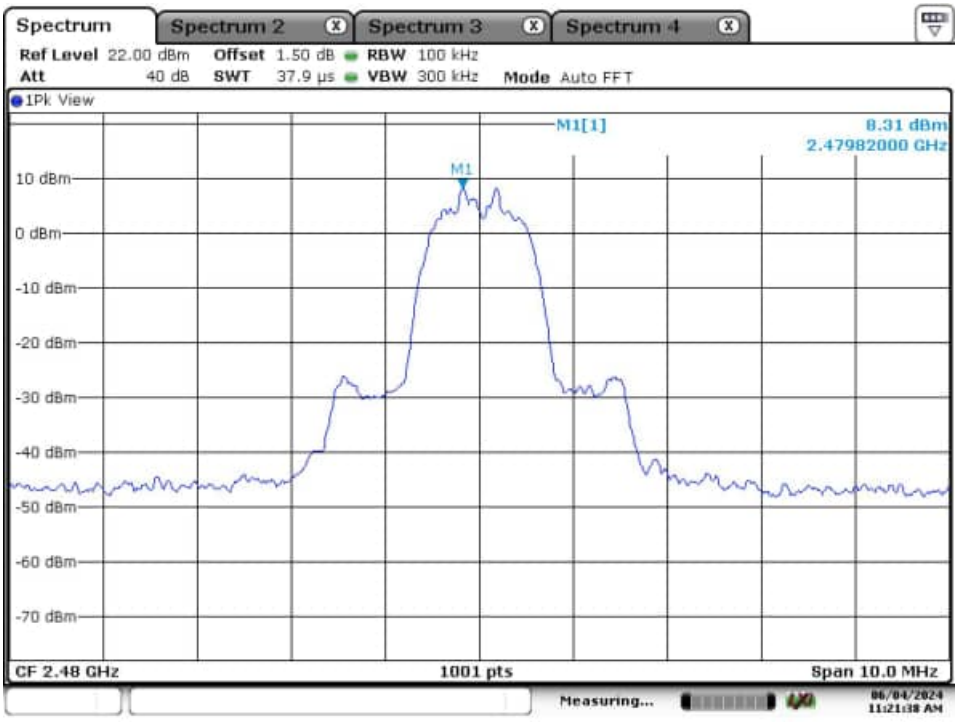


Date: 4.JUN.2024 11:23:18

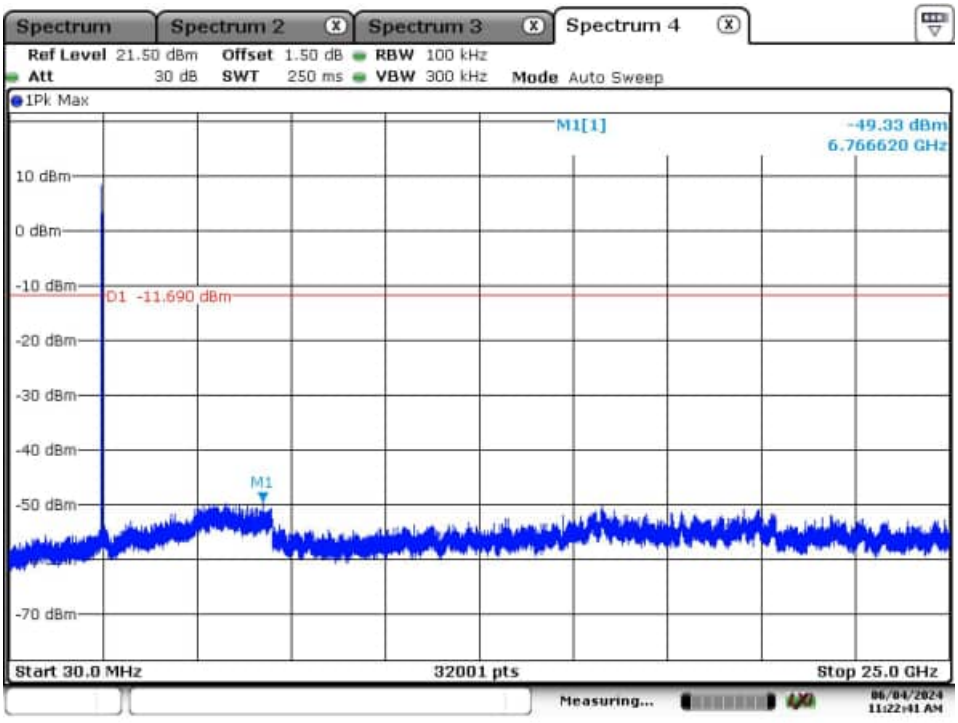


Date: 4.JUN.2024 11:23:50

High Channel

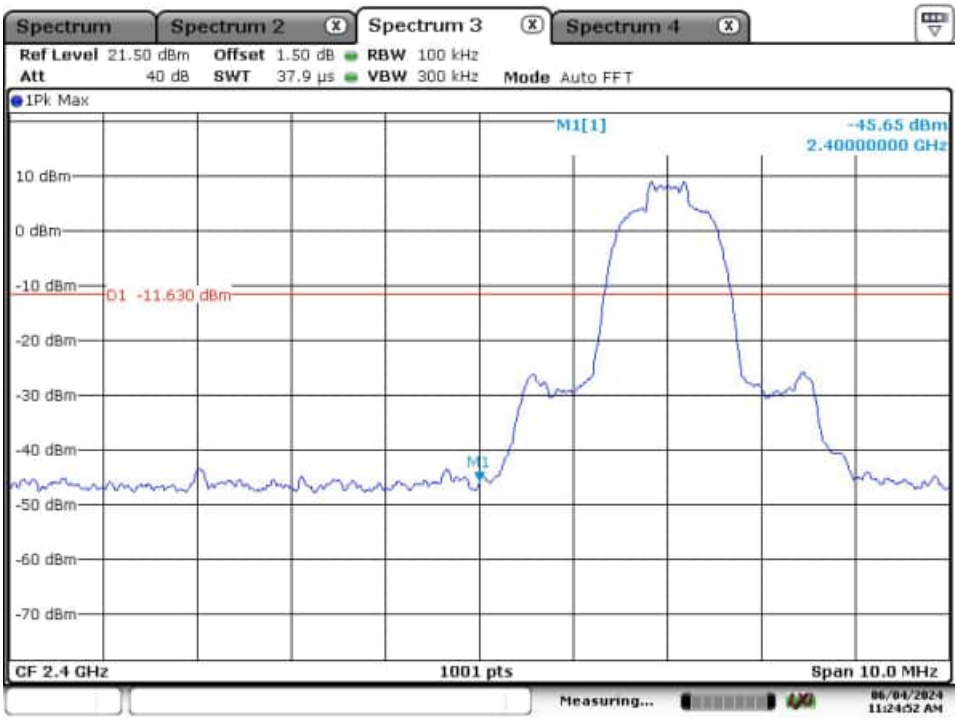


Date: 4.JUN.2024 11:21:38



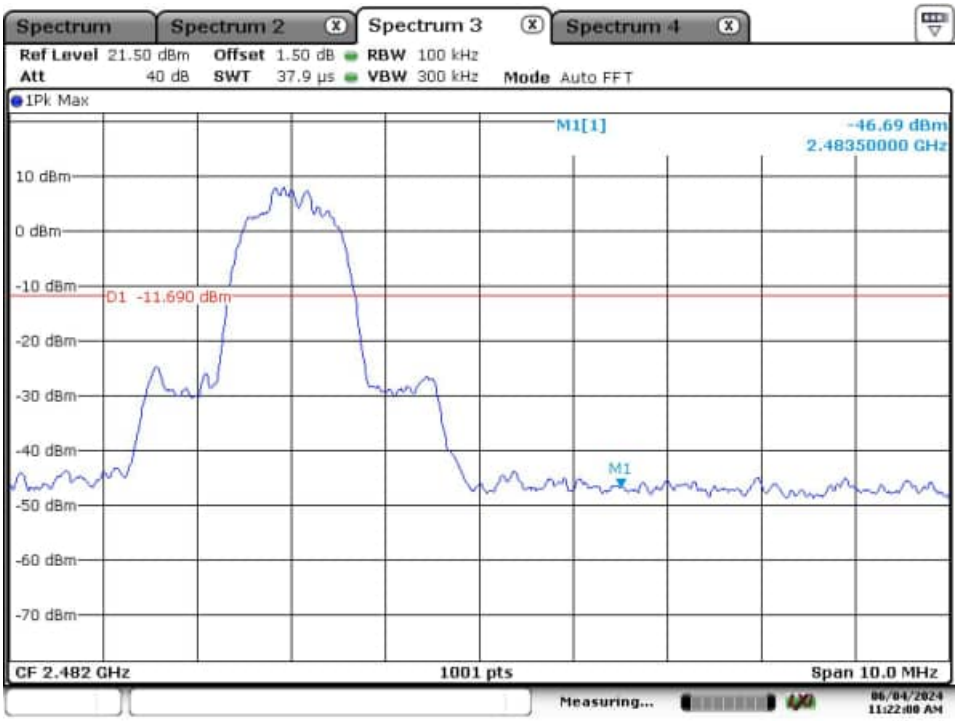
Date: 4.JUN.2024 11:22:41

Band Edge, Low Channel



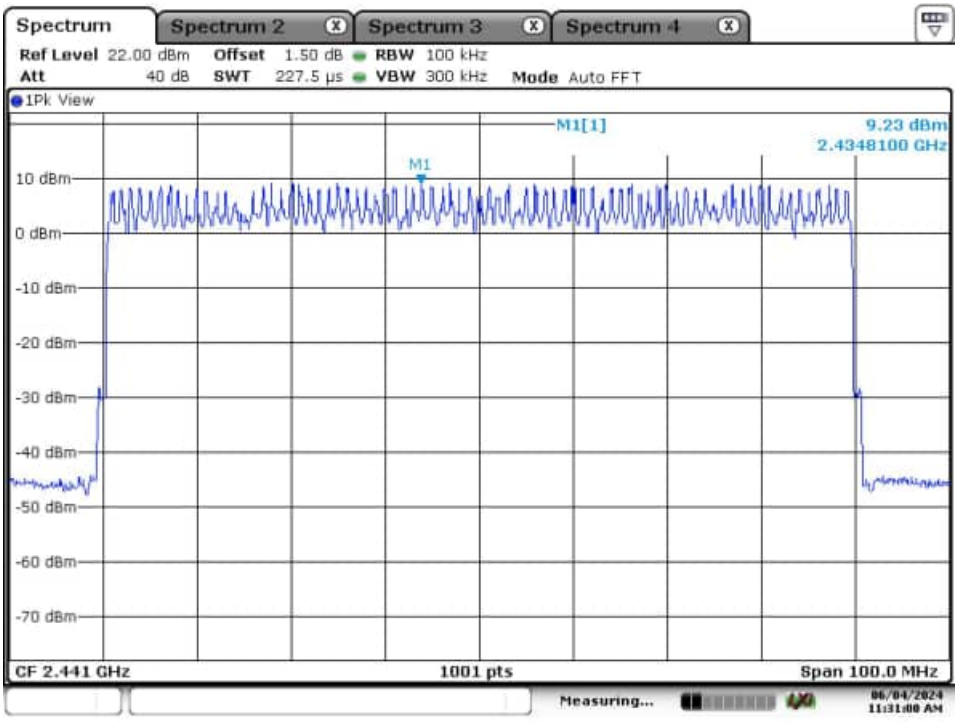
Date: 4.JUN.2024 11:24:51

Band Edge, High Channel

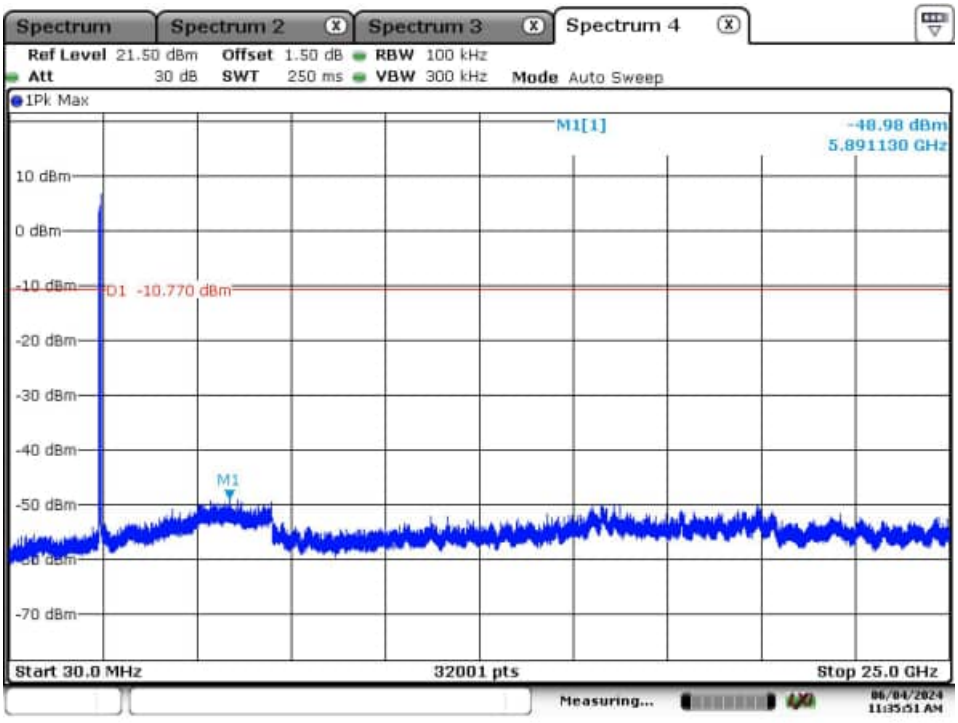


Date: 4.JUN.2024 11:22:00

Hopping Mode

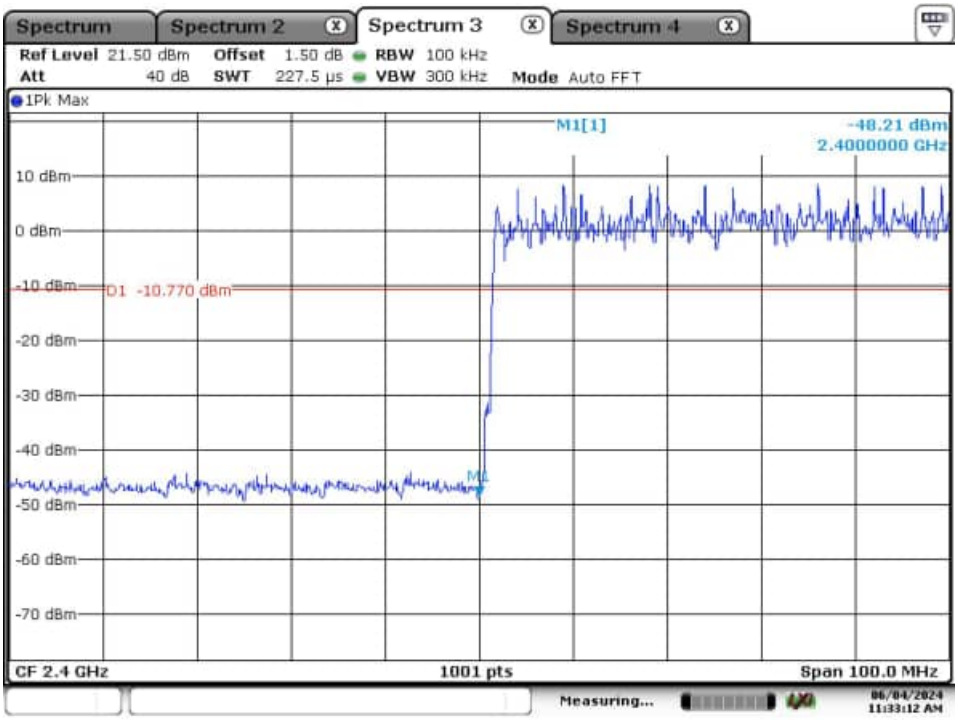


Date: 4.JUN.2024 11:30:59



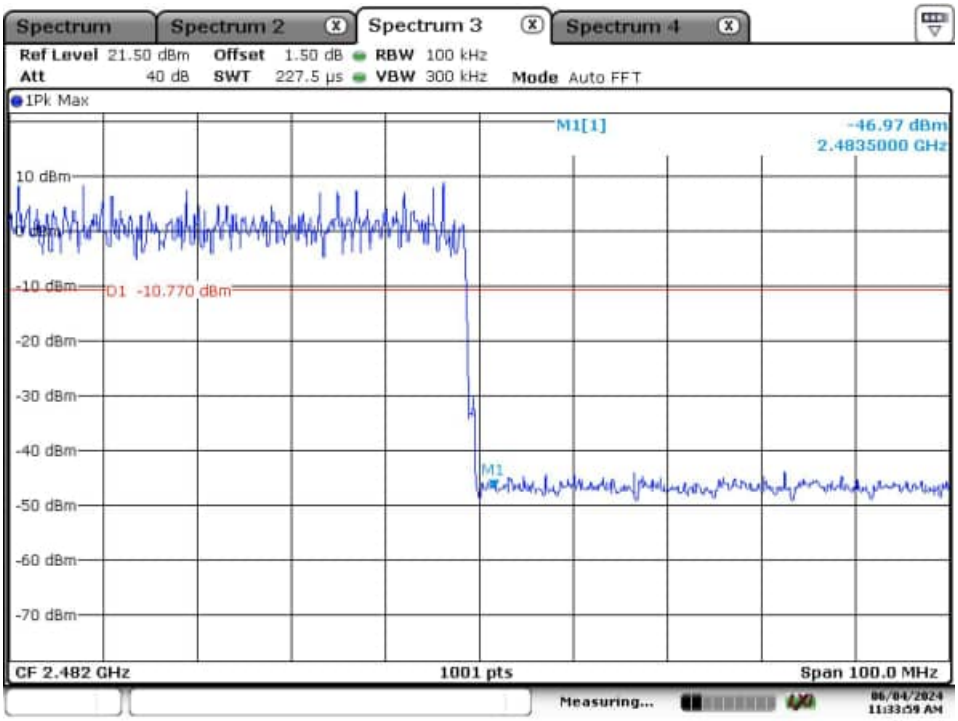
Date: 4.JUN.2024 11:35:50

Band Edge, Hopping Mode, Low Channel



Date: 4.JUN.2024 11:33:12

Band Edge, Hopping Mode, High Channle



Date: 4.JUN.2024 11:33:59

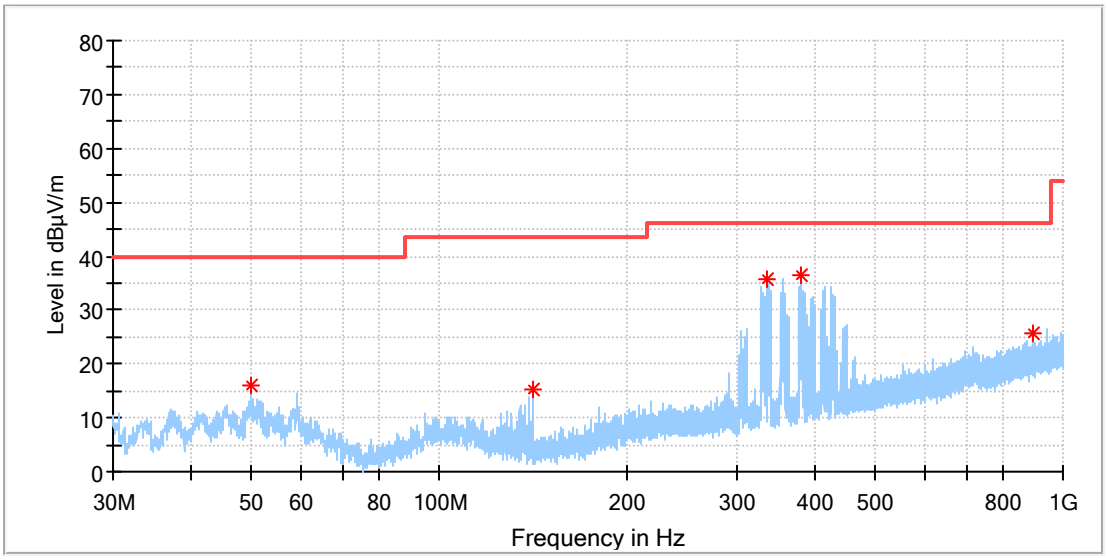
Appendix C.8: Test Results of Radiated Spurious Emissions

Note: 1. Testing was carried out within frequency range 9kHz to the tenth harmonics. The measurement results below 30MHz and 18GHz - 26.5GHz were greater than 20dB below the limit, so only the radiated spurious emissions from 30MHz to 18GHz were reported. 2. This testing was carried out on different modulations, but only the worst case (GFSK) was presented in this report.

30MHz - 1GHz

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

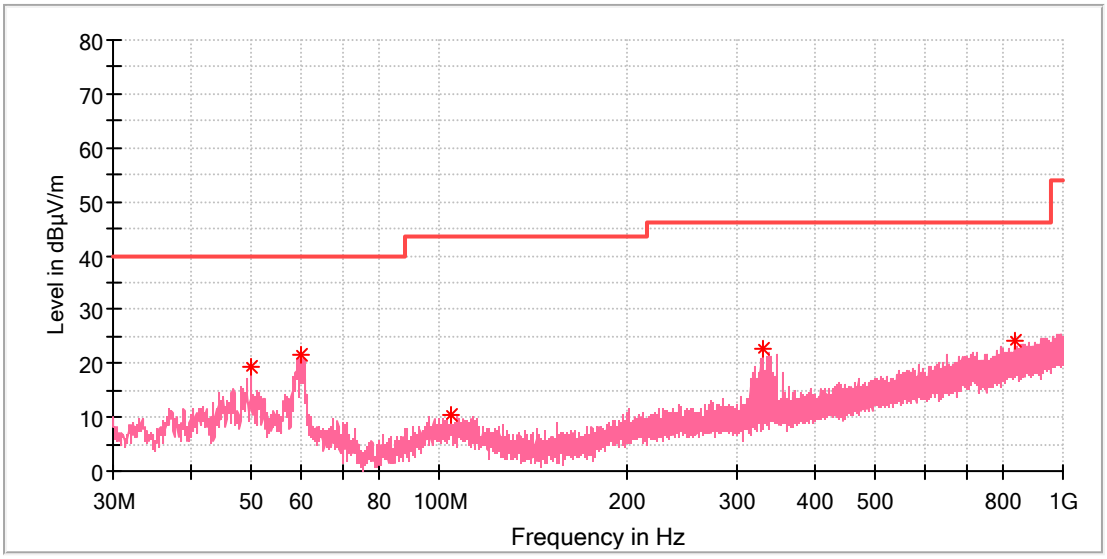


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.996923	16.13	40.00	23.87	100.0	H	165.0	-18.6
140.990385	15.17	43.50	28.33	100.0	H	66.0	-22.6
334.990385	35.89	46.00	10.11	100.0	H	225.0	-15.5
379.237308	36.42	46.00	9.58	100.0	H	225.0	-14.6
891.956923	25.86	46.00	20.14	100.0	H	297.0	-5.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



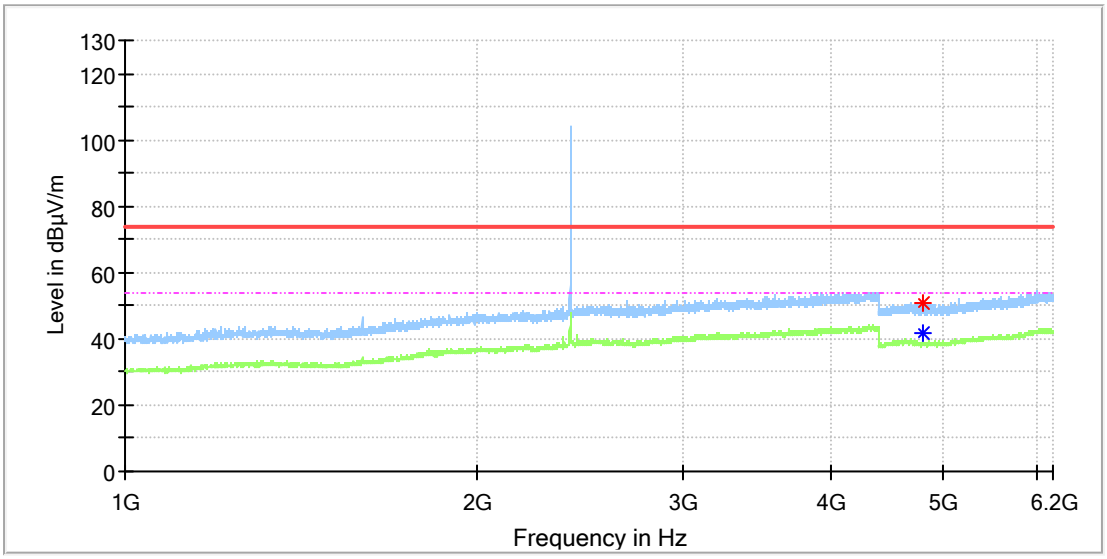
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
49.996923	19.18	40.00	20.82	100.0	V	98.0	-18.6
60.070000	21.69	40.00	18.31	100.0	V	264.0	-19.3
104.428846	10.60	43.50	32.90	100.0	V	82.0	-19.1
330.811923	22.67	46.00	23.33	100.0	V	206.0	-15.7
840.435000	24.27	46.00	21.73	100.0	V	50.0	-6.1

1GHz - 18GHz
Note: The highest waveform in the figure is Bluetooth Fundamental.

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

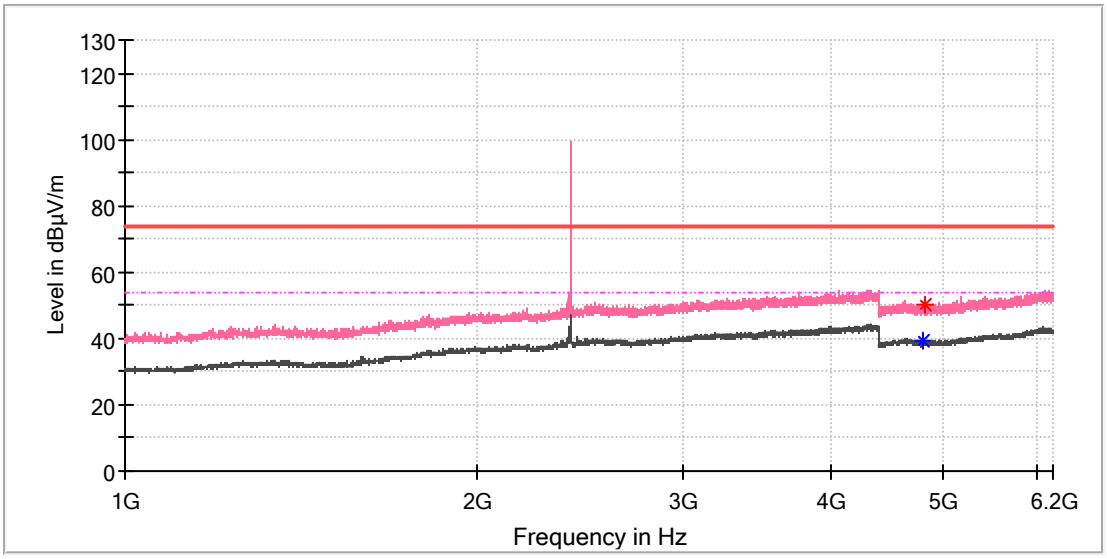


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4804.000000	50.62	---	74.00	23.38	150.0	H	280.0	11.8
4804.000000	---	41.63	54.00	12.37	150.0	H	280.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

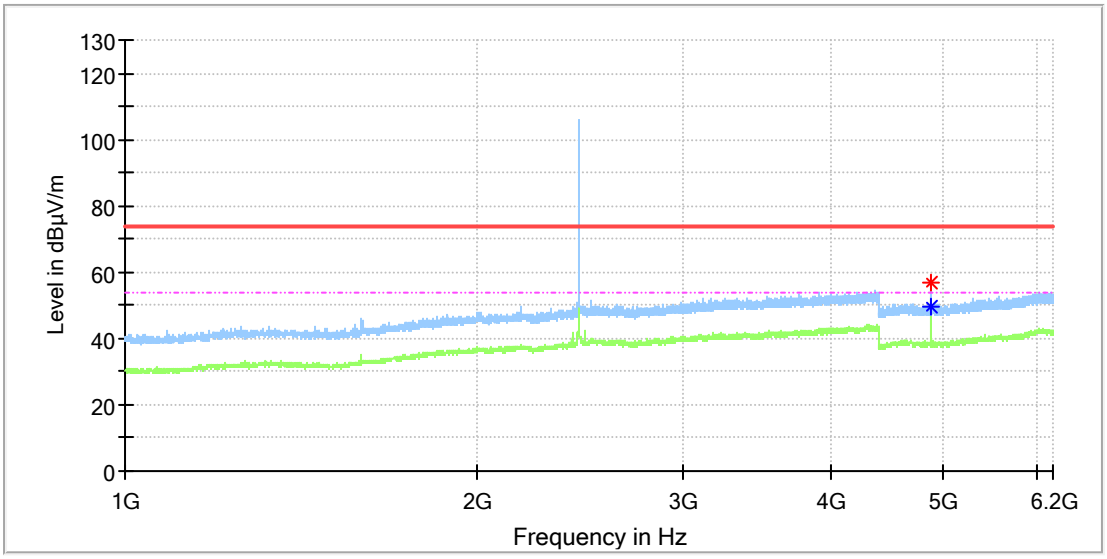


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4803.500000	---	39.21	54.00	14.79	150.0	V	303.0	11.8
4817.500000	50.12	---	74.00	23.88	150.0	V	254.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

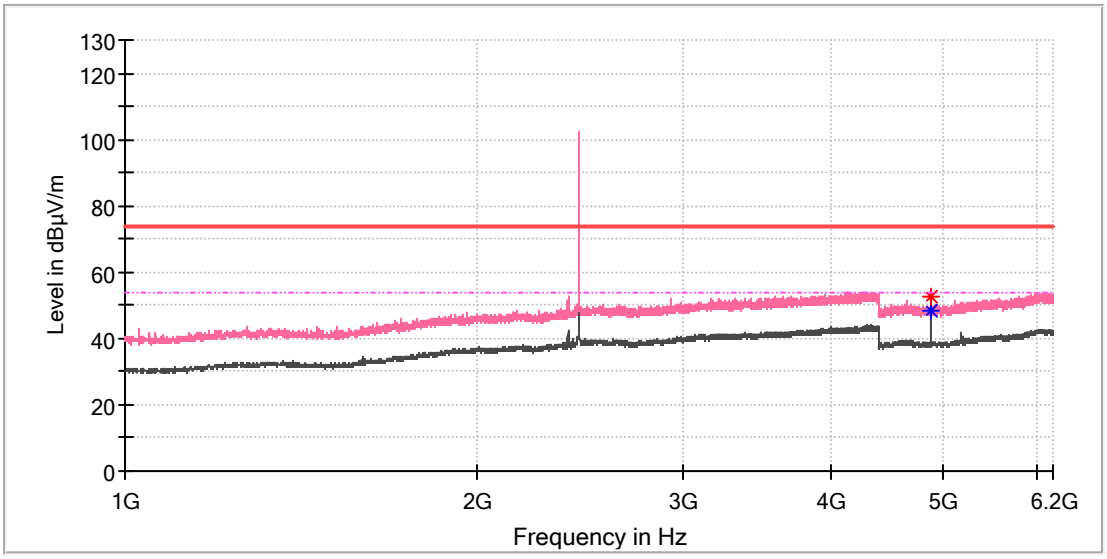


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4882.000000	56.97	---	74.00	17.03	150.0	H	290.0	11.8
4882.500000	---	49.49	54.00	4.51	150.0	H	290.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

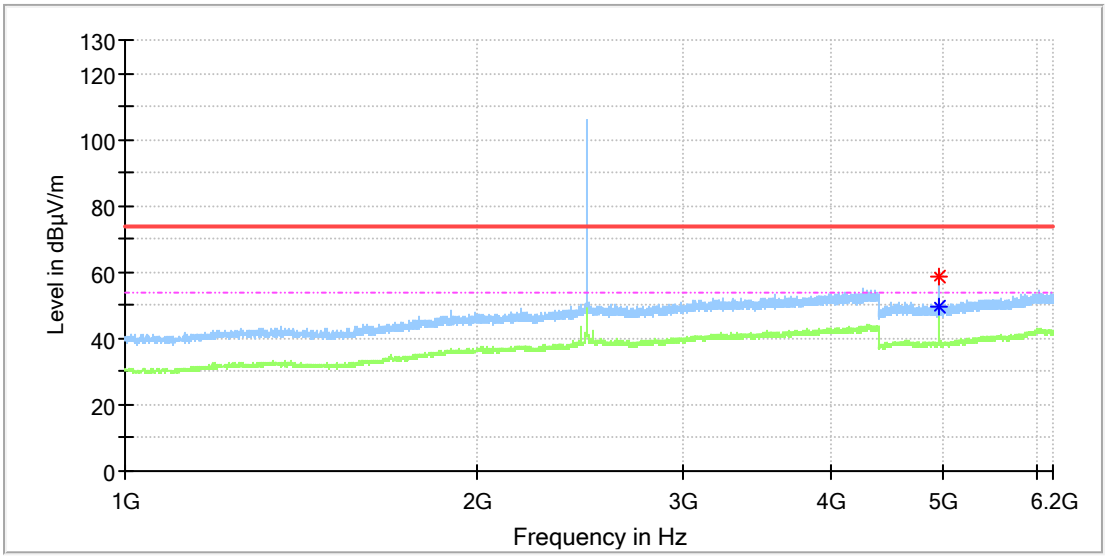


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4881.500000	52.62	---	74.00	21.38	150.0	V	248.0	11.8
4882.000000	---	48.15	54.00	5.85	150.0	V	248.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

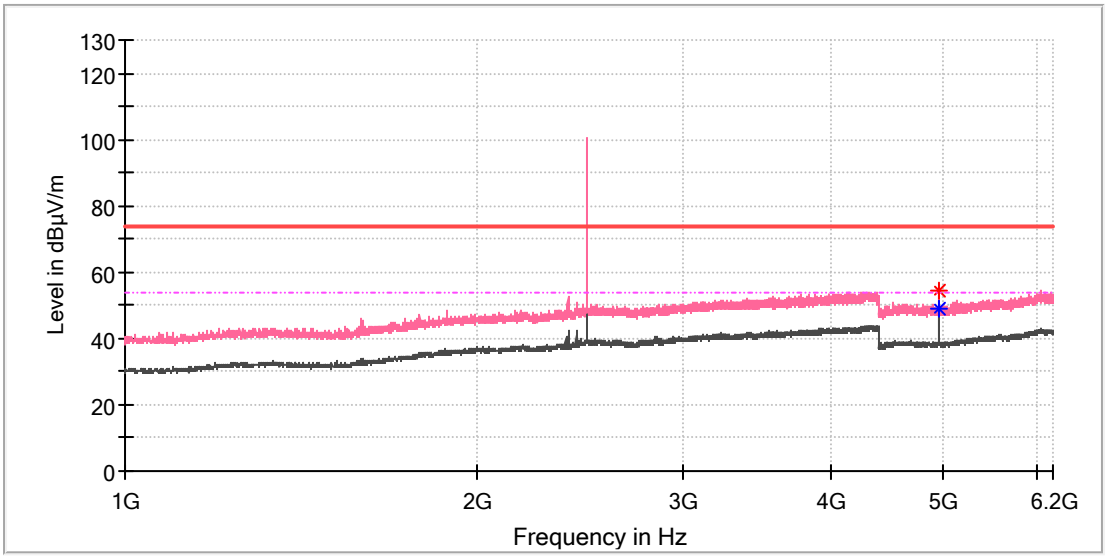


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.000000	---	49.36	54.00	4.64	150.0	H	129.0	11.8
4960.000000	58.42	---	74.00	15.58	150.0	H	265.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

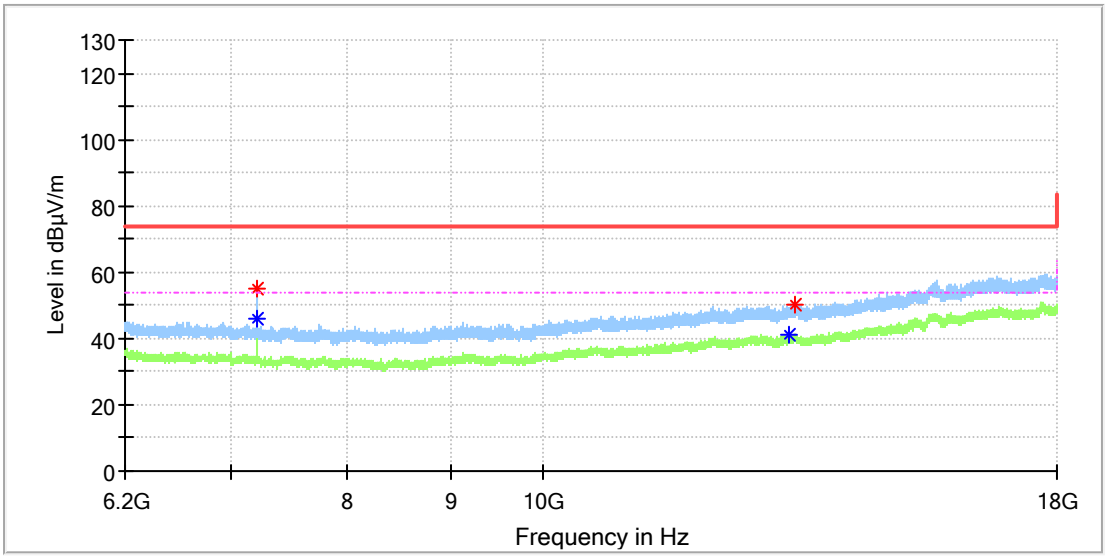


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
4959.500000	---	48.77	54.00	5.23	150.0	V	259.0	11.8
4960.500000	54.45	---	74.00	19.55	150.0	V	259.0	11.8

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

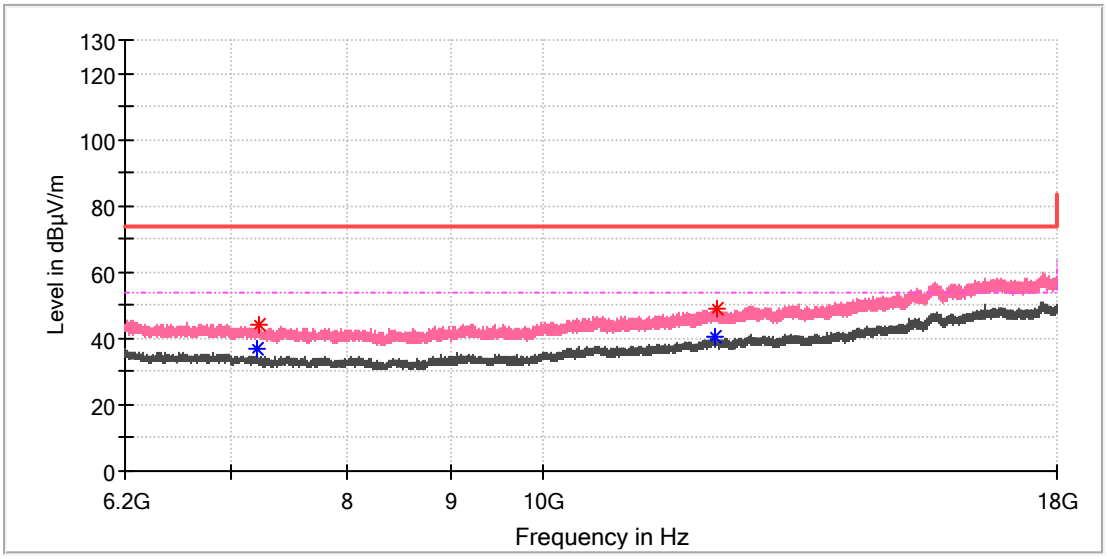


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.950000	55.11	---	74.00	18.89	150.0	H	57.0	8.8
7206.933333	---	45.79	54.00	8.21	150.0	H	44.0	8.8
13241.650000	---	41.03	54.00	12.97	150.0	H	334.0	15.5
13349.816667	50.09	---	74.00	23.91	150.0	H	167.0	15.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

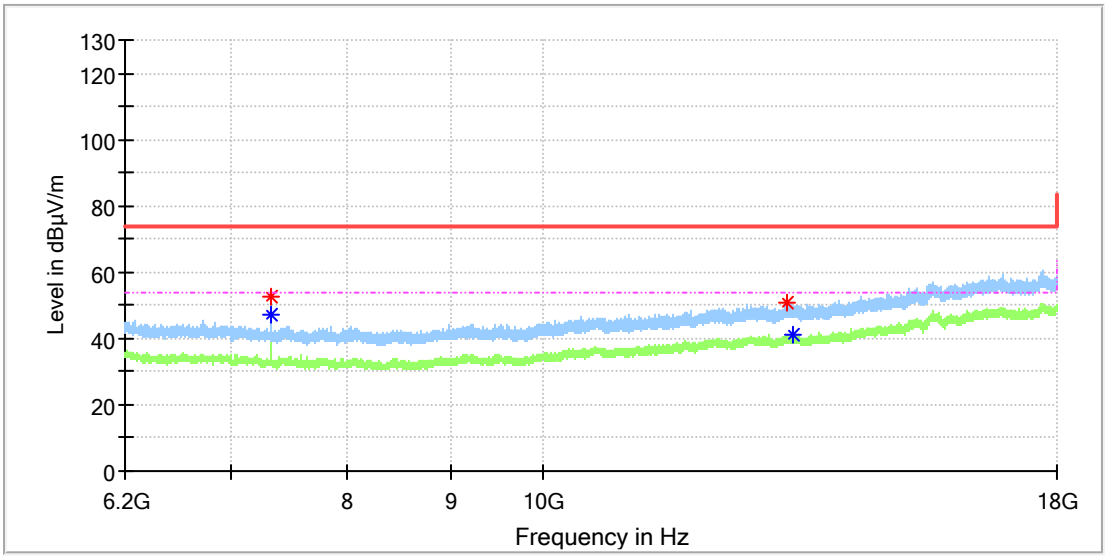


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7205.950000	---	36.87	54.00	17.13	150.0	V	342.0	8.8
7231.516667	43.91	---	74.00	30.09	150.0	V	100.0	8.6
12173.750000	---	40.43	54.00	13.57	150.0	V	210.0	14.5
12188.991667	49.04	---	74.00	24.96	150.0	V	4.0	14.6

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

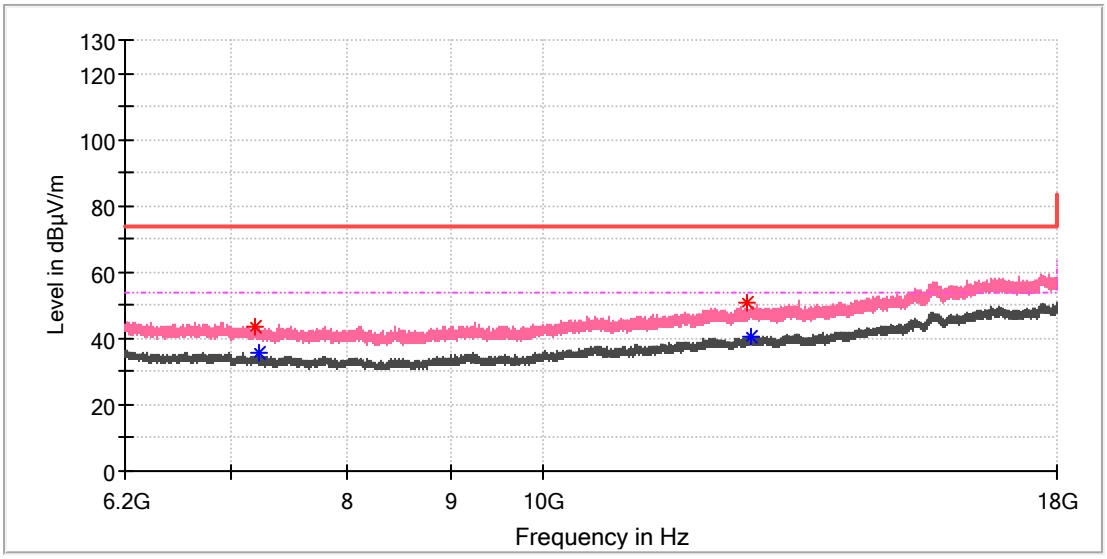


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7321.983333	---	47.24	54.00	6.76	150.0	H	35.0	8.2
7322.475000	52.74	---	74.00	21.26	150.0	H	35.0	8.2
13231.816667	50.76	---	74.00	23.24	150.0	H	105.0	15.5
13317.366667	---	41.16	54.00	12.84	150.0	H	70.0	15.5

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Mid channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

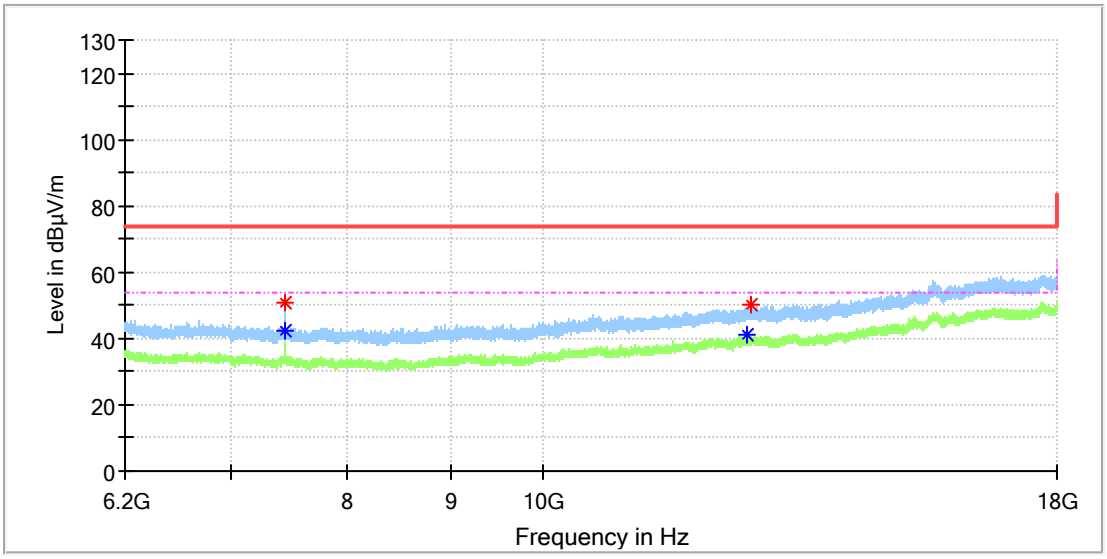


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7186.775000	43.42	---	74.00	30.58	150.0	V	359.0	8.8
7224.633333	---	35.53	54.00	18.47	150.0	V	160.0	8.7
12627.558333	50.63	---	74.00	23.37	150.0	V	327.0	14.9
12681.641667	---	40.51	54.00	13.49	150.0	V	359.0	15.1

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

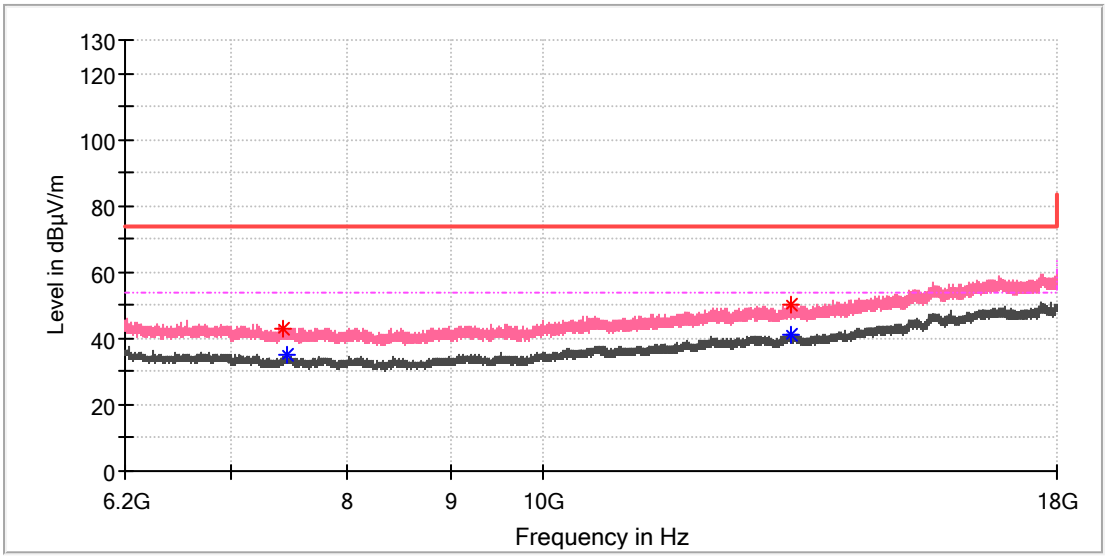


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7439.491667	50.49	---	74.00	23.51	150.0	H	33.0	8.4
7440.966667	---	42.14	54.00	11.86	150.0	H	33.0	8.4
12632.966667	---	40.97	54.00	13.03	150.0	H	87.0	15.0
12696.883333	49.90	---	74.00	24.10	150.0	H	185.0	15.1

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



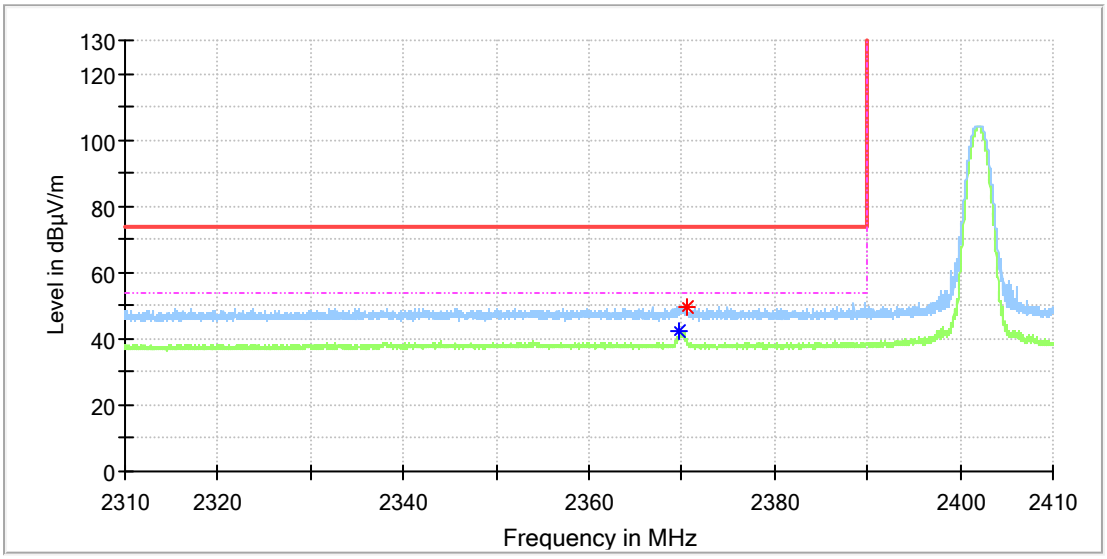
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
7420.808333	43.11	---	74.00	30.89	150.0	V	62.0	8.4
7457.191667	---	34.86	54.00	19.14	150.0	V	98.0	8.5
13266.725000	49.95	---	74.00	24.05	150.0	V	156.0	15.5
13286.883333	---	40.94	54.00	13.06	150.0	V	192.0	15.5

Appendix C.9: Test Results of Radiated Emissions in Restricted Bands

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

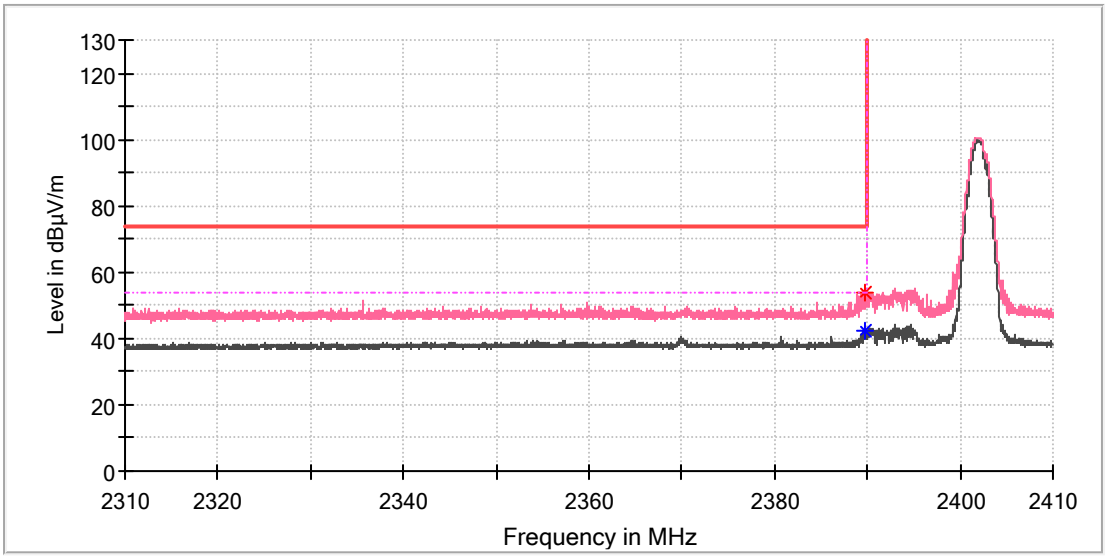


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2369.735294	---	42.07	54.00	11.93	150.0	H	141.0	6.9
2370.558824	49.81	---	74.00	24.19	150.0	H	91.0	6.9

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_Low channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

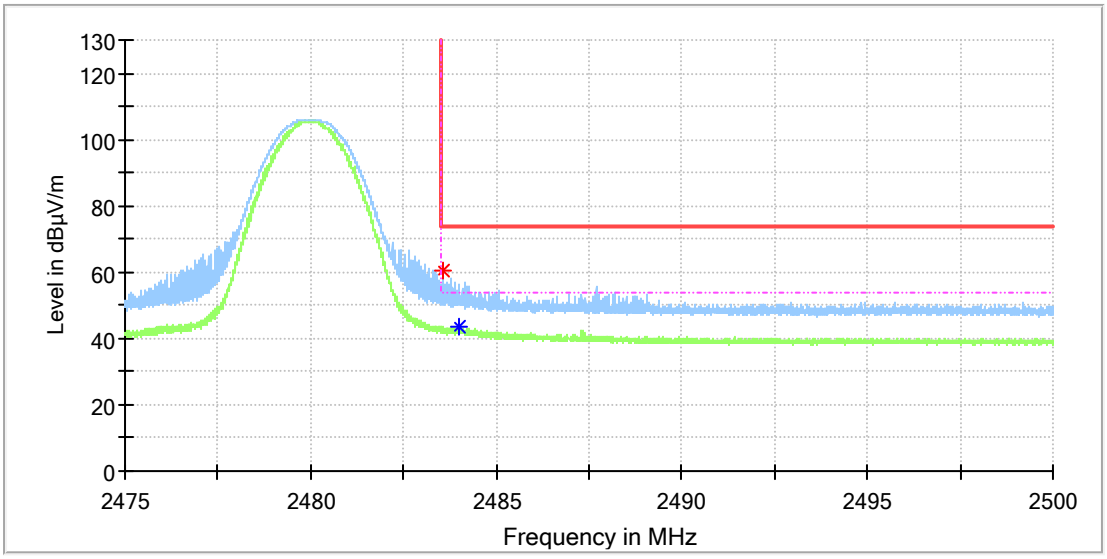


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.647059	53.87	---	74.00	20.13	150.0	V	265.0	7.0
2389.691177	---	42.62	54.00	11.38	150.0	V	252.0	7.0

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin

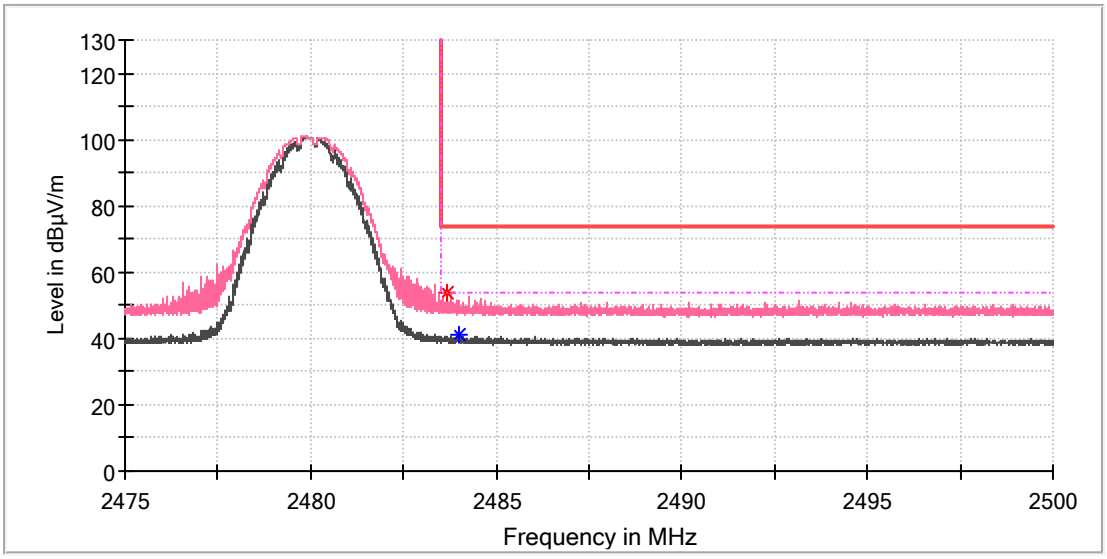


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.555147	60.50	---	74.00	13.50	150.0	H	52.0	7.4
2483.992647	---	43.74	54.00	10.26	150.0	H	74.0	7.4

EUT Information

EUT Name:	BLUETOOTH HEADSET
Model:	TUNE BEAM 2
Test Mode:	BR_DH5_High channel
Order No/Sample No:	A003731935-034
Test Voltage::	Battery
Remark:	Temp 22 Humi:52%
Test Standard:	FCC 15.247
Tested By:	Kei Zhang
Reviewed By:	Terry Yin



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.669118	53.88	---	74.00	20.12	150.0	V	353.0	7.4
2483.974265	---	40.83	54.00	13.17	150.0	V	59.0	7.4