

TEST REPORT

For Bluetooth-EDR



Report No. : CHTEW23120049 Report Verification:

Project No..... : SHT2310062301EW

FCC ID..... : 2ASWW-STAR10PRO

Applicant's name : XINCHUANGXIN INTERNATIONAL CO. LTD

Address..... : ROOM 605 6/F, FA YUEN COMMERCIAL BUILDING, 75-77 FA YUEN STREET MONGKOK KL

Product Name : Tablet

Trade Mark : CORN

Model No. : Star10 Pro

Listed Model(s) : -

Standard : FCC CFR Title 47 Part 15 Subpart C § 15.247

Date of receipt of test sample..... : Nov. 01, 2023

Date of testing..... : Nov. 02, 2023- Dec. 20, 2023

Date of issue..... : Dec. 21, 2023

Result..... : PASS

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1. TEST STANDARDS AND REPORT VERSION

1.1. Test Standards

The tests were performed according to following standards:

- [FCC CFR Title 47 Part 15 Subpart C § 15.247](#): Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
- [ANSI C63.10:2020](#): American National Standard for Testing Unlicensed Wireless Devices
- [KDB 558074 D01 15.247 Meas Guidance v05r02](#): Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating under Section 15.247 of The FCC Rules

1.2. Report version

Revision No.	Date of issue	Description
N/A	2023-12-21	Original

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	Test Engineer
5.1	Antenna Requirement	15.203/15.247 (c)	PASS	Xiaodong Zhao
5.2	AC Conducted Emission	15.207	PASS	Junman Wang
5.3	Peak Output Power	15.247 (b)(1)	PASS	Xiangyu Wei
5.4	20 dB Bandwidth	15.247 (a)(1)	PASS	Xiangyu Wei
5.5	99% Occupied Bandwidth	-	PASS ^{*1}	Xiangyu Wei
5.6	Carrier Frequency Separation	15.247 (a)(1)	PASS	Xiangyu Wei
5.7	Hopping Channel Number	15.247 (a)(1)	PASS	Xiangyu Wei
5.8	Dwell Time	15.247 (a)(1)	PASS	Xiangyu Wei
5.9	Duty Cycle Correction Factor	-	PASS ^{*1}	Xiangyu Wei
5.10	Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	PASS	Xiangyu Wei
5.11	Conducted Band Edge and Spurious Emission	15.247(d)/15.205	PASS	Xiangyu Wei
5.12	Radiated Band Edge Emission	15.205/15.209	PASS	Yifan Wang
5.13	Radiated Spurious Emission	15.247(d)/15.205/15.209	PASS	Yifan Wang

Note:

- The measurement uncertainty is not included in the test result.
- ^{*1}: No requirement on standard, only report these test data.

3. SUMMARY

3.1. Client Information

Applicant:	XINCHUANGXIN INTERNATIONAL CO. LTD
Address:	ROOM 605 6/F, FA YUEN COMMERCIAL BUILDING, 75-77 FA YUEN STREET MONGKOK KL
Manufacturer:	Shenzhen Chiteng Technology Co.,LTD
Address:	Second Floor,Area A, Building 4, Huiye Technology Workshop, Guangang Road, Tangjia Community, Gongming Street, Guangming New District, Shenzhen, Guangdong

3.2. Product Description

Main unit information:	
Product Name:	Tablet
Trade Mark:	CORN
Model No.:	Star10 Pro
Listed Model(s):	-
Power supply:	DC 3.8V from Battery
Hardware version:	T30-T616-V2.0-230725-LU
Software version:	CORN_Star10_Pro_V01
Accessory unit information:	
Battery information:	JJY 3092142/3.8V/24 6000mAh /22.8Wh /DI
Adapter information:	Model: ENGY Pro 24 INPUT: 100~240V-50/60Hz 0.35A OUTPUT: DC 5.0V 2A

3.3. Radio Specification Description

Bluetooth version:	V5.0
Support function:	EDR
Modulation:	GFSK, $\pi/4$ DQPSK, 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	PIFA
Antenna gain:	2.6dBi

3.4. Testing Laboratory Information

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China	
Contact information:	Tel: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications:	Type	Accreditation Number
	FCC Registration Number	762235
	FCC Designation Number	CN1181

4. TEST CONFIGURATION

4.1. Test frequency list

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channels which were tested. The Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the below blue front.

Channel	Frequency (MHz)
00	2402
01	2403
:	:
39	2441
:	:
77	2479
78	2480

4.2. Descriptions of Test mode

Preliminary tests were performed in different data rates and recorded the RF output power in the clause 5.3

Note:

- 1) The manufacturer declare that the maximum power value of the product is set as a default value in the enter test mode software.
- 2) All the test data for each data rate were verified, found 8DPSK Modulation which is worse case mode

4.3. Test mode

For RF test items:			
The engineering test program was provided and enabled to make EUT continuous transmitting.			
Test Item	Modulation / Data Rate		
	GFSK 1Mbps	π /4DQPSK 2Mbps	8DPSK 3Mbps
Conducted test item	✓	✓	✓
Radiated test item	-	-	✓
Remark:			
– For radiated test item, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests.			
– The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.			

4.4. Test sample information

Test item	HTW sample no.
RF Conducted test items	Refer to the description in the appendix report
RF Radiated test items	YPHT23100623001
EMI test items	YPHT23100623001

Note:

RF Conducted test items: Peak Output Power, 20 dB Bandwidth, 99% Occupied Bandwidth, Carrier Frequency Separation, Hopping Channel Number, Dwell Time, Duty Cycle Correction Factor, Pseudorandom Frequency Hopping Sequence, Conducted Band Edge and Spurious Emission

RF Radiated test items: Radiated Band Edge Emission, Radiated Spurious Emission

EMI test items: AC Conducted Emission

4.5. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether support unit is used?			
✓ No			
Item	Equipment	Trade Name	Model No.
1			
2			

4.6. Testing environmental condition

Type	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.7. Statement of the measurement uncertainty

No.	Test Items	Measurement Uncertainty
1	AC Conducted Emission	3.21dB
2	Peak Output Power	1.07
3	Power Spectral Density	1.07
4	6dB Bandwidth	0.002%
5	99% Occupied Bandwidth	0.002%
6	Duty cycle	-
7	Conducted Band Edge and Spurious Emission	1.68dB
8	Radiated Band Edge Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz
9	Radiated Spurious Emission	4.54dB for 30MHz-1GHz 5.10dB for above 1GHz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.8. Equipment Used during the Test

● Conducted Emission							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2023/8/22	2024/8/21
●	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2023/8/18	2024/8/17
●	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561FN	00899	2023/8/18	2024/8/17
●	ISN	FCC	HTWE0148	FCC-TLISN-T2-02	20371	2023/8/18	2024/8/17
●	ISN	FCC	HTWE0150	FCC-TLISN-T8-02	20375	2023/8/18	2024/8/17
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● RF Conducted test item							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	HTWE0242	FSV40	100048	2023/08/22	2024/08/21
●	Signal & Spectrum Analyzer	R&S	HTWE0262	FSW26	103440	2023/08/22	2024/08/21
●	Vector signal generator	R&S	HTWE0244	SMBV100A	260790	2023/05/23	2024/05/22
●	Test software	Tonscend	N/A	JS1120	N/A	N/A	N/A

● Radiated emission- 9kHz~30MHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2023/08/22	2024/08/21
●	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2021/4/6	2024/4/5
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated emission- 30MHz~1GHz							
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/4/6	2026/4/5
●	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2023/08/22	2024/08/21
●	Ultra-Broadband Antenna	SCHWARZBECK	HTWE0119	VULB9163	546	2023/2/22	2026/2/21
●	Pre-Amplifier	SCHWARZBECK	HTWE0295	BBV 9742	/	2023/5/25	2024/5/24
●	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A

● Radiated emission- Above 1GHz

Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	HTWE0122	SAC-3m-01	C11121	2023/4/17	2026/4/16
●	Spectrum Analyzer	R&S	HTWE0098	FSP40	100597	2023/08/22	2024/08/21
●	Spectrum Analyzer	R&S	HTWE0385	N9020A	MY54486658	2023/08/22	2024/08/21
●	Horn Antenna	SCHWARZBECK	HTWE0126	BBHA 9120D	1011	2023/2/14	2026/2/13
●	Pre-Amplifier	CD	HTWE0071	PAP-0102	12004	2023/5/25	2024/5/24
●	Broadband Pre-amplifier	SCHWARZBECK	HTWE0201	BBV 9718	9718-248	2023/5/25	2024/5/24
●	Test Software	Audix	N/A	E3	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna Requirement

REQUIREMENT

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

TEST RESULT

☒ Passed ☐ Not Applicable

The antenna type is a PIFA antenna, Refer to the below antenna photo.



5.2. AC Conducted Emission

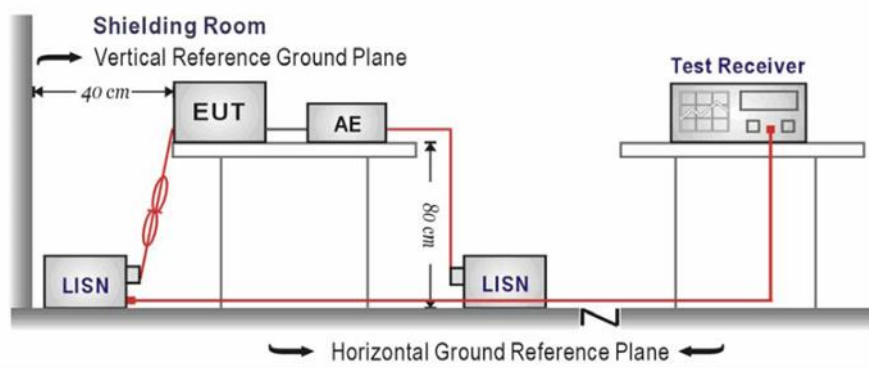
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE

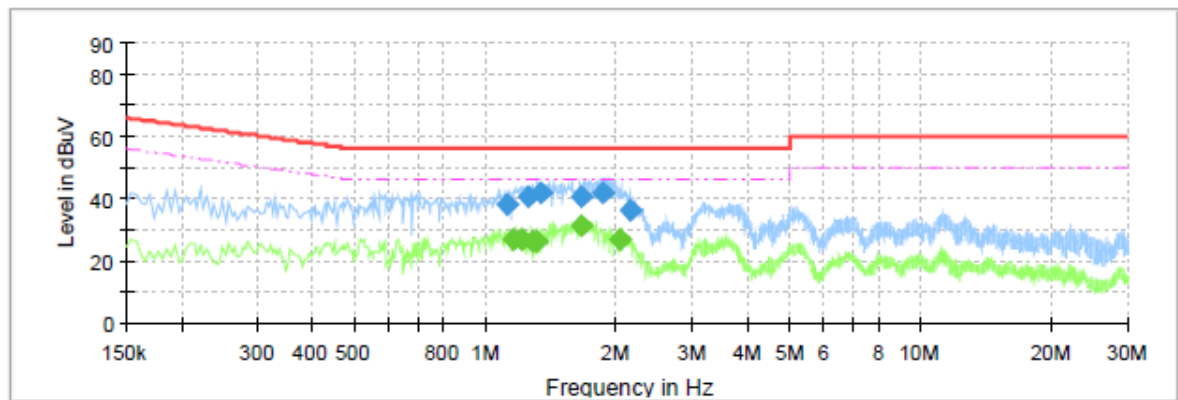
Refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

Test Line:

L

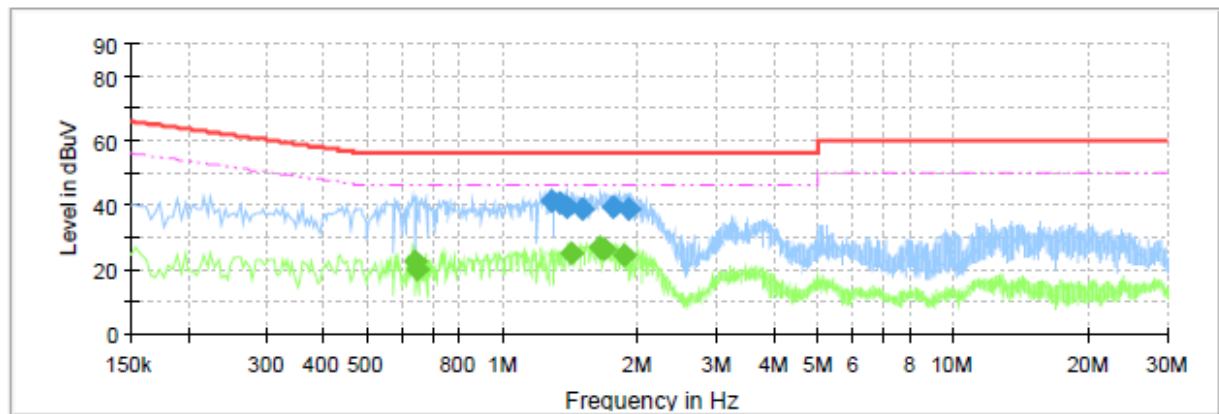


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
1.1275	38.28	---	56.00	17.72	L1	11.0
1.1635	---	27.01	46.00	18.99	L1	11.0
1.2115	---	27.05	46.00	18.95	L1	11.0
1.2565	40.62	---	56.00	15.38	L1	11.0
1.2795	---	26.01	46.00	19.99	L1	11.0
1.3115	---	26.36	46.00	19.64	L1	11.0
1.3435	41.72	---	56.00	14.28	L1	11.0
1.6645	---	31.02	46.00	14.98	L1	11.0
1.6675	40.36	---	56.00	15.64	L1	11.0
1.8595	41.61	---	56.00	14.39	L1	11.0
2.0475	---	27.14	46.00	18.86	L1	11.0
2.1475	36.49	---	56.00	19.51	L1	11.0

Test Line:

N



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr. (dB)
0.6395	---	22.62	46.00	23.38	N	10.8
0.6475	---	20.27	46.00	25.73	N	10.8
1.2795	41.30	---	56.00	14.70	N	10.8
1.3435	40.83	---	56.00	15.17	N	10.8
1.3875	39.37	---	56.00	16.63	N	10.8
1.4235	---	25.21	46.00	20.79	N	10.8
1.4995	38.74	---	56.00	17.26	N	10.8
1.6555	---	26.82	46.00	19.18	N	10.8
1.6835	---	26.48	46.00	19.52	N	10.8
1.7635	39.39	---	56.00	16.61	N	10.8
1.8595	---	24.16	46.00	21.84	N	10.8
1.9115	38.82	---	56.00	17.18	N	10.8

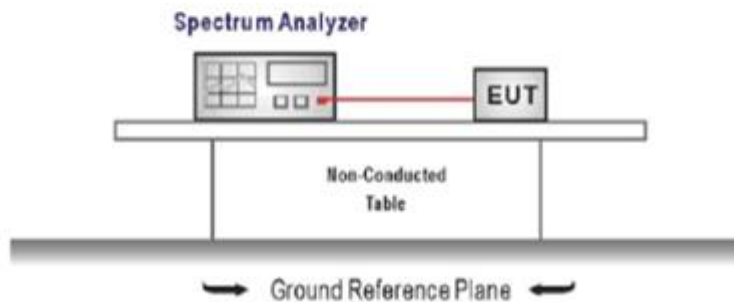
5.3. Peak Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (b)(1):

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.
For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the pathloss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ the 20 dB bandwidth of the emission being measured, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE

Refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

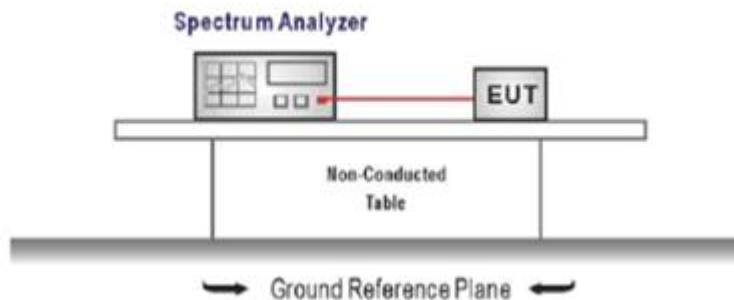
Refer to the appendix report

5.4. 20 dB Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW $\geq$ 1% of the 20 dB bandwidth, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE

Refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

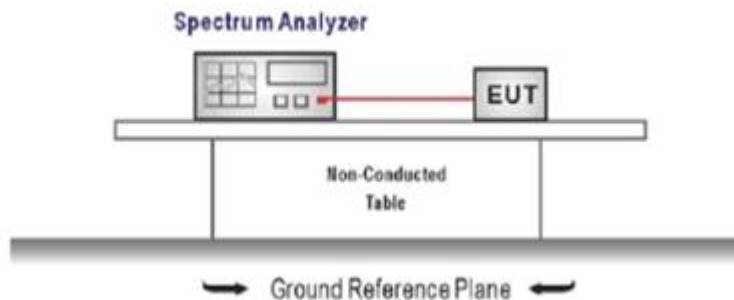
Refer to the appendix report

5.5. 99% Occupied Bandwidth

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
Center Frequency = channel center frequency
Span $\geq 1.5 \times \text{OBW}$
RBW = 1%~5%OBW
VBW $\geq 3 \times \text{RBW}$
Sweep time = auto couple
Detector = Peak
Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.

TEST MODE

Refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

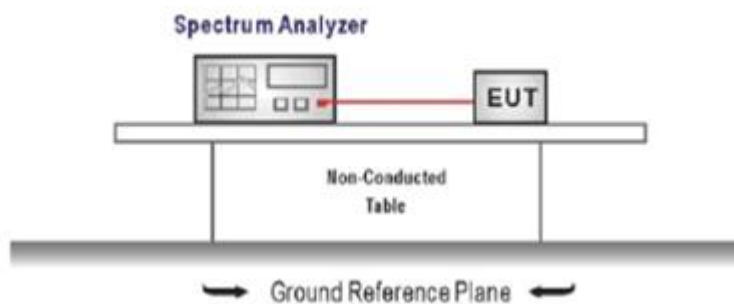
5.6. Carrier Frequencies Separation

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels
RBW $\geq$ 1% of the span, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE

Refer to the clause 4.3

TEST RESULTS

☒ Passed ☐ Not Applicable

TEST DATA

Refer to the appendix report

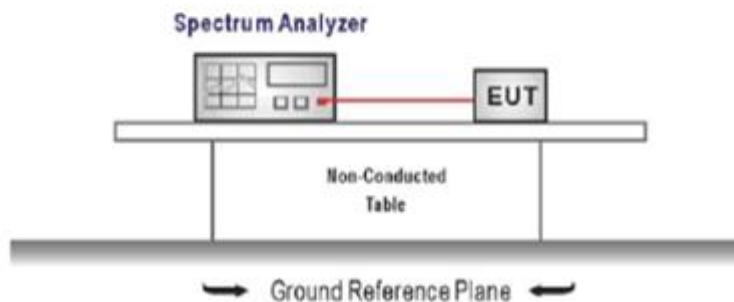
5.7. Hopping Channel Number

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1):

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least **15** channels.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = the frequency band of operation
RBW $\geq$ 1% of the span, VBW $\geq$ RBW
Sweep = auto, Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE

Refer to the clause 4.3

TEST RESULTS

☒ Passed ☐ Not Applicable

TEST DATA

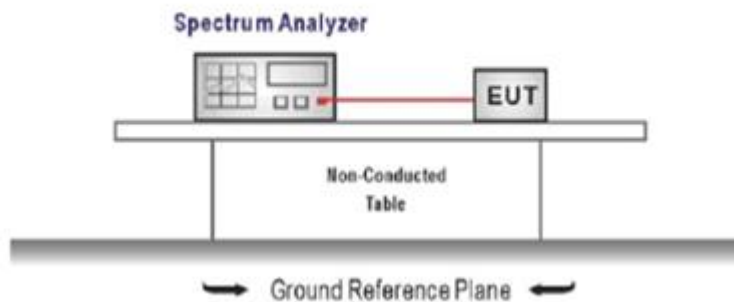
Refer to the appendix report

5.8. Dwell Time

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1): The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW $\geq$ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel,
Detector function = peak, Trace = max hold
4. Measure and record the results in the test report.

TEST MODE

Refer to the clause 4.3

TEST RESULTS

☒ Passed ☐ Not Applicable

TEST DATA

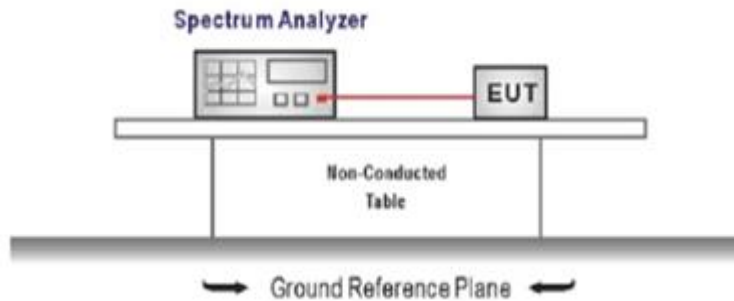
Refer to the appendix report

5.9. Duty Cycle Correction Factor (DCCF)

LIMIT

N/A

TEST CONFIGURATION



TEST PROCEDURE

1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously
3. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel, RBW= 1 MHz, VBW $\geq$ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel,
Detector function = peak, Trigger mode
4. Measure and record the duty cycle data

TEST MODE

Refer to the clause 4.3

TEST DATA

Refer to the appendix report

5.10. Pseudorandom Frequency Hopping Sequence

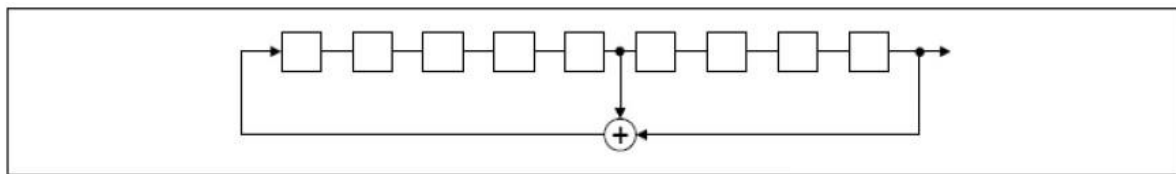
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo-randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

TEST RESULTS

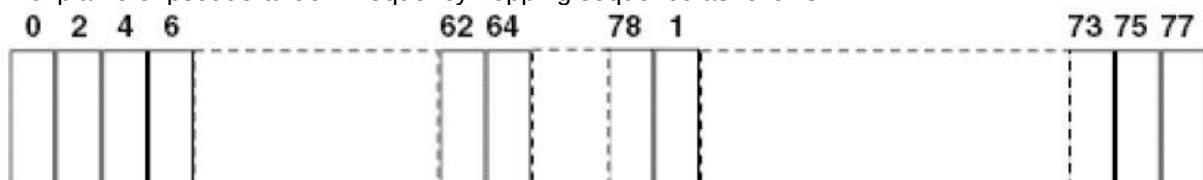
The pseudorandom frequency hopping sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first one of 9 consecutive ones, for example: the shift register is initialized with nine ones.

- Number of shift register stages: 9
- Length of pseudo-random sequence: $2^9 - 1 = 511$ bits
- Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of pseudorandom frequency hopping sequence as follows:



Each frequency used equally on the average by each transmitter.

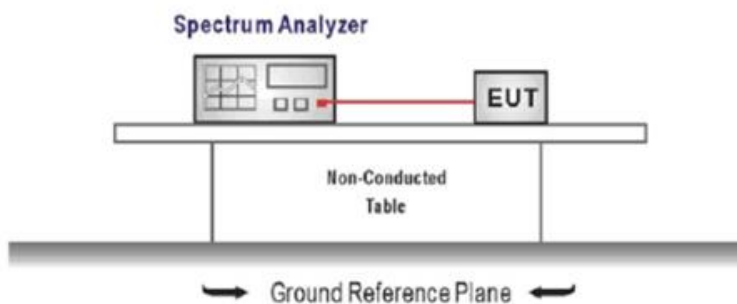
The system receiver has input bandwidths that match the hopping channel bandwidths of their corresponding transmitter and shifts frequencies in synchronization with the transmitted signals.

5.11. Conducted Band edge and Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Emission level measurement
Set the center frequency and span to encompass frequency range to be measured
RBW = 100 kHz, VBW $\geq 3 \times$ RBW
Detector = peak, Sweep time = auto couple, Trace mode = max hold
Allow trace to fully stabilize
Use the peak marker function to determine the maximum amplitude level.
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter waveform on the spectrum analyzer.
4. Ensure that the amplitude of all unwanted emission outside of the authorized frequency band excluding restricted frequency bands) are attenuated by at least the minimum requirements specified (at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz). Report the three highest emission relative to the limit.

TEST MODE

Refer to the clause 4.3

TEST RESULT

☒ **Passed** ☐ **Not Applicable**

TEST DATA

Refer to the appendix report

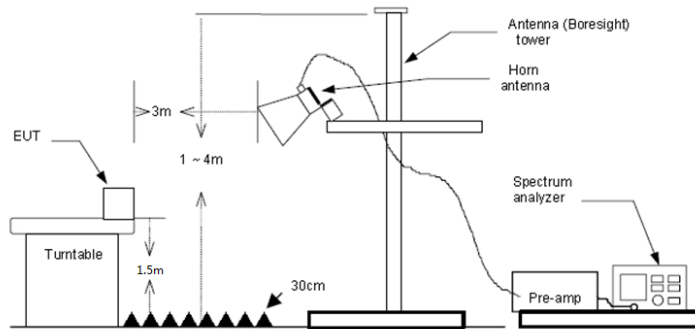
5.12. Radiated Band edge Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, Radiated Emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the Radiated Emissions limits specified in §15.209(a) (see §15.205(c)).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 .
2. The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.
5. Use the following spectrum analyzer settings:
 - a) Span shall wide enough to fully capture the emission being measured
 - b) Set RBW=100kHz for <1GHz, VBW=3*RBW, Sweep time=auto, Detector=peak, Trace=max hold
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurementFor average measurement: use duty cycle correction factor method (DCCF)
Averager level = Peak level + DCCF

TEST MODE

Refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

Note:

- 1) Level= Reading + Factor; Factor =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Over Limit = Level- Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m).

Test channel:		CH00		Polarity			Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	57.00	27.86	4.01	41.80	47.07	74.00	-26.93	Peak
2	2390.03	56.56	27.54	4.31	41.80	46.61	74.00	-27.39	Peak

Test channel:		CH00		Polarity			Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2310.00	55.65	27.86	4.01	41.80	45.72	74.00	-28.28	Peak
2	2390.03	56.51	27.54	4.31	41.80	46.56	74.00	-27.44	Peak

Test channel:		CH78		Polarity			Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	65.59	27.33	4.18	41.80	55.30	74.00	-18.70	Peak
2	2484.82	68.20	27.33	4.18	41.80	57.91	74.00	-16.09	Peak
3	2500.00	56.09	27.30	4.19	41.80	45.78	74.00	-28.22	Peak
Fundamental of Average									
No.	Freq. [MHz]	PK level [dBμV/m]	DCCF [dB]	Level [dBμV/m]	Limit [dBμV/m]	Over Limit [dB]	Polarity		
1	2483.50	55.30	-30.84	24.46	54.00	-29.54	Horizontal		
2	2484.82	57.91	-30.84	27.07	54.00	-26.93	Horizontal		

Test channel:		CH78		Polarity			Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2483.50	59.54	27.33	4.18	41.80	49.25	74.00	-24.75	Peak
2	2483.80	64.16	27.33	4.18	41.80	53.87	74.00	-20.13	Peak
3	2500.00	56.13	27.30	4.19	41.80	45.82	74.00	-28.18	Peak

5.13. Radiated Spurious Emission

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m)	Value
0.009 MHz ~0.49 MHz	2400/F(kHz) @300m	Quasi-peak
0.49 MHz ~ 1.705 MHz	24000/F(kHz) @30m	Quasi-peak
1.705 MHz ~30 MHz	30 @30m	Quasi-peak

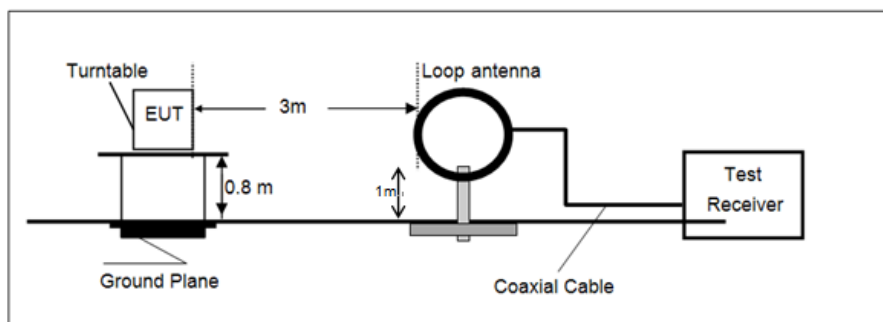
Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

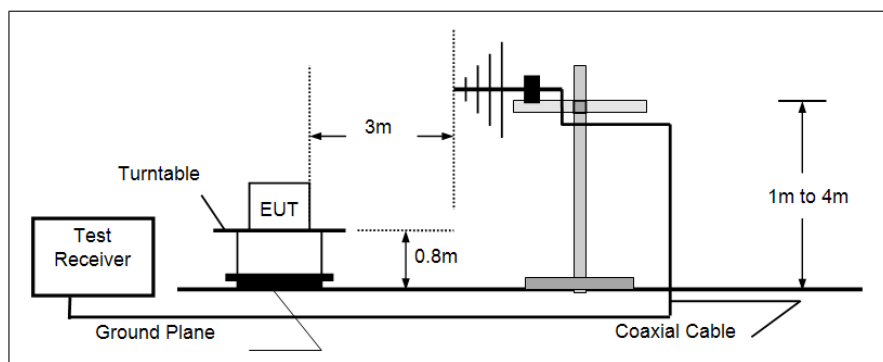
Frequency	Limit (dBuV/m @3m)	Value
30MHz~88MHz	40.00	Quasi-peak
88MHz~216MHz	43.50	Quasi-peak
216MHz~960MHz	46.00	Quasi-peak
960MHz~1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

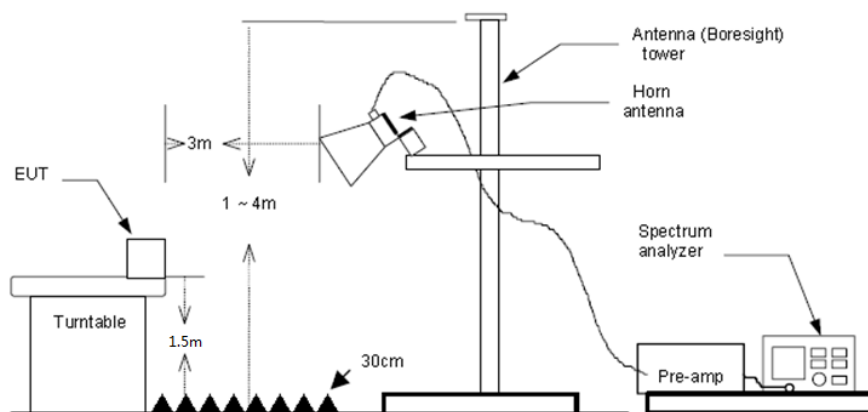
- 9 kHz ~ 30 MHz



- 30 MHz ~ 1 GHz



- Above 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10.
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
 - a) Span shall wide enough to fully capture the emission being measured;
 - b) Below 1 GHz:

RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;

If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
 - c) Set RBW=1MHz, VBW=3MHz for >1GHz, Sweep time=auto, Detector=peak, Trace=max hold for Peak measurement

For average measurement: use duty cycle correction factor method (DCCF)

Averager level = Peak level + DCCF

TEST MODE

Refer to the clause 4.3

TEST RESULT

☒ Passed ☐ Not Applicable

Note:

- 1) Level= Reading + Factor/Transd; Factor/Transd =Antenna Factor+ Cable Loss- Preamp Factor
- 2) Over Limit = Level- Limit
- 3) Average measurement was not performed if peak level is lower than average limit(54 dBuV/m) for above 1GHz.

For 9 kHz ~ 30 MHz

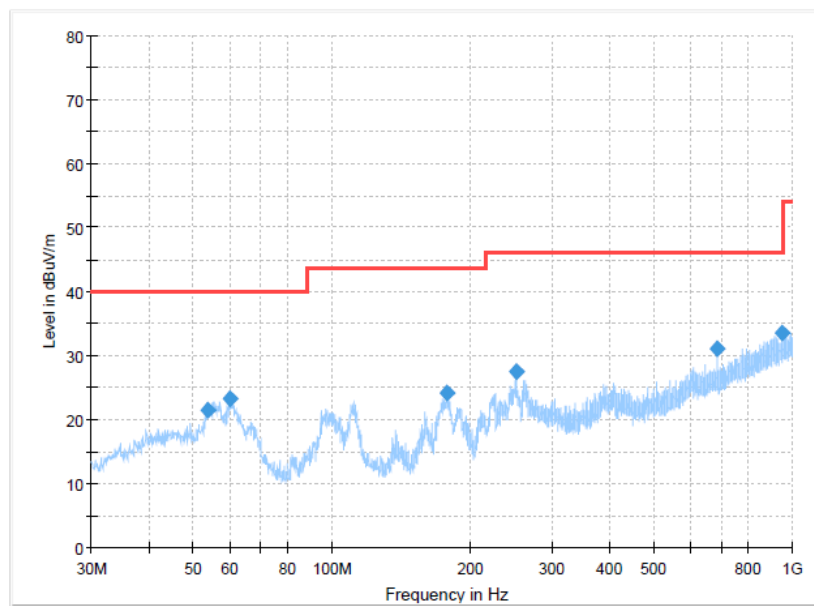
The EUT was pre-scanned this frequency band, found the radiated level 20dB lower than the limit, so don't show data on this report.

For 30 MHz ~ 1000 MHz

Have pre-scan all test channel, found **CH39** which it was worst case, so only show the worst case's data on this report.

Polarization:

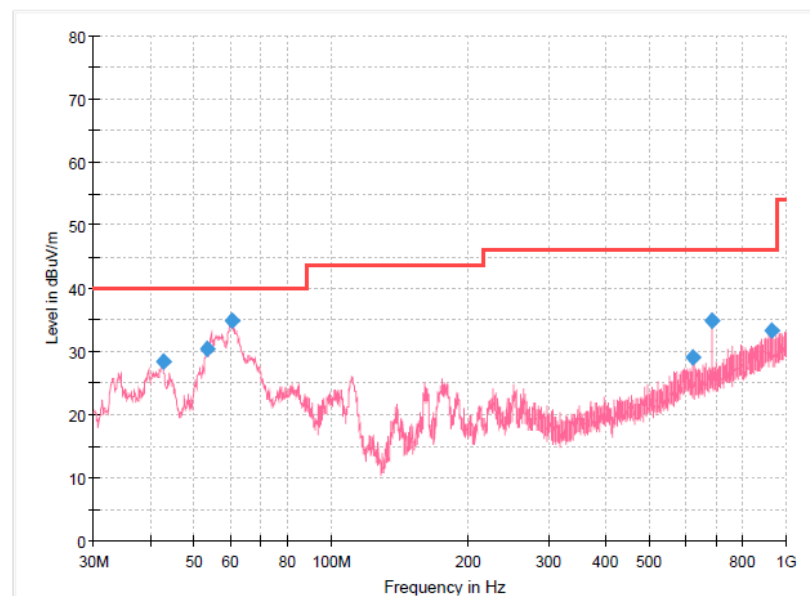
Horizontal

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
53.7650	21.46	40.00	18.54	300.0	H	4.0	-9.1
59.8275	23.31	40.00	16.69	300.0	H	0.0	-9.9
177.3188	24.17	43.50	19.33	100.0	H	247.0	-12.7
251.7663	27.51	46.00	18.49	100.0	H	215.0	-8.8
687.5388	31.05	46.00	14.95	100.0	H	207.0	2.1
948.5900	33.45	46.00	12.55	300.0	H	325.0	7.1

Polarization:

Vertical

**Final Result**

Frequency (MHz)	MaxPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
42.6100	28.30	40.00	11.70	100.0	V	161.0	-9.3
53.2800	30.40	40.00	9.60	100.0	V	130.0	-9.0
60.4338	34.87	40.00	5.13	100.0	V	98.0	-10.1
621.5788	29.09	46.00	16.91	100.0	V	0.0	1.3
687.5388	34.75	46.00	11.25	100.0	V	341.0	2.1
928.2200	33.30	46.00	12.70	100.0	V	0.0	7.0

For 1 GHz ~ 25 GHz

Test channel		CH00			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2935.15	43.96	28.50	4.62	41.69	35.39	74.00	-38.61	Peak
2	5546.36	40.61	31.71	6.49	40.79	38.02	74.00	-35.98	Peak
3	8022.46	41.07	37.00	8.07	40.76	45.38	74.00	-28.62	Peak
4	10374.42	39.45	39.82	9.69	40.65	48.31	74.00	-25.69	Peak

Test channel		CH00			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3041.64	44.63	28.58	4.65	41.62	36.24	74.00	-37.76	Peak
2	5448.41	40.78	31.79	6.59	40.85	38.31	74.00	-35.69	Peak
3	7981.72	40.68	36.96	7.99	40.85	44.78	74.00	-29.22	Peak
4	10507.31	39.55	40.00	9.76	40.95	48.36	74.00	-25.64	Peak

Test channel		CH39			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	2854.11	41.33	28.41	4.56	41.75	32.55	74.00	-41.45	Peak
2	5448.41	39.57	31.79	6.59	40.85	37.10	74.00	-36.90	Peak
3	9204.60	38.39	38.83	9.30	41.00	45.52	74.00	-28.48	Peak
4	12148.02	38.71	39.55	10.81	42.18	46.89	74.00	-27.11	Peak

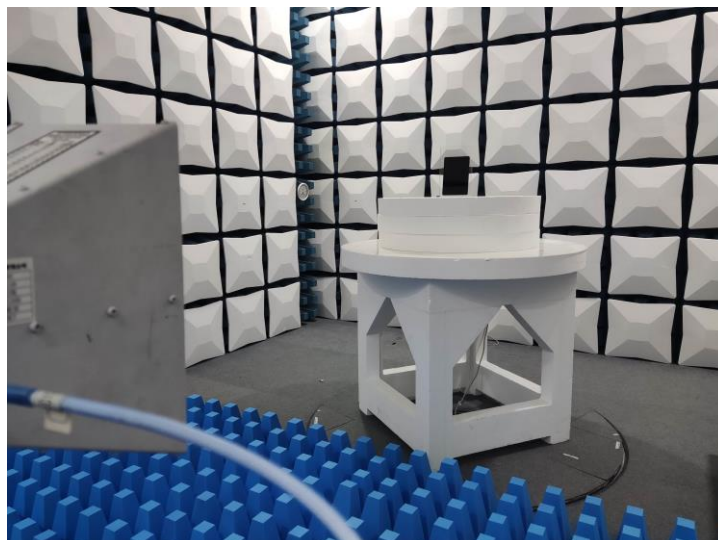
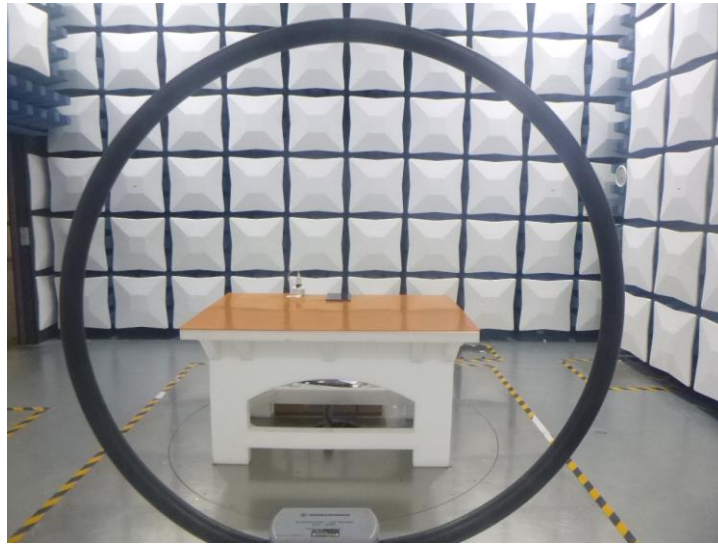
Test channel		CH39			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	4096.88	41.40	29.90	5.52	41.41	35.41	74.00	-38.59	Peak
2	5718.40	39.97	31.84	6.68	40.73	37.76	74.00	-36.24	Peak
3	9465.98	38.34	38.97	9.37	40.94	45.74	74.00	-28.26	Peak
4	11515.68	38.71	40.47	10.37	42.30	47.25	74.00	-26.75	Peak

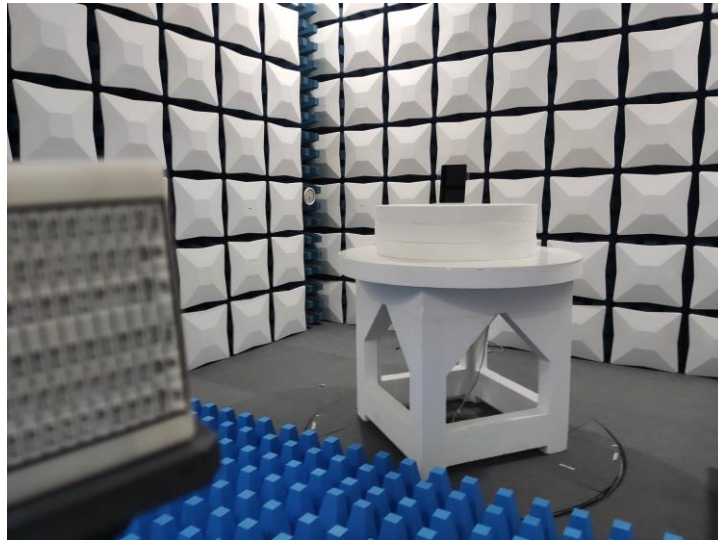
Test channel		CH78			Polarity		Horizontal		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3266.35	43.83	28.50	4.81	41.60	35.54	74.00	-38.46	Peak
2	5448.41	40.93	31.79	6.59	40.85	38.46	74.00	-35.54	Peak
3	8104.56	40.65	36.98	8.11	40.59	45.15	74.00	-28.85	Peak
4	10860.83	40.39	40.42	9.93	42.10	48.64	74.00	-25.36	Peak

Test channel		CH78			Polarity		Vertical		
Mark	Frequency MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	Level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3507.65	42.94	29.03	5.11	41.60	35.48	74.00	-38.52	Peak
2	5462.30	41.08	31.80	6.60	40.84	38.64	74.00	-35.36	Peak
3	8002.06	41.12	37.00	8.00	40.81	45.31	74.00	-28.69	Peak
4	10427.37	39.89	39.93	9.72	40.69	48.85	74.00	-25.15	Peak

6. TEST SETUP PHOTOS

Radiated Emission





AC Conducted Emission



7. EXTERNAL AND INTERNAL PHOTOS

Refer to the test report No.: CHTEW23120046

8. APPENDIX REPORT

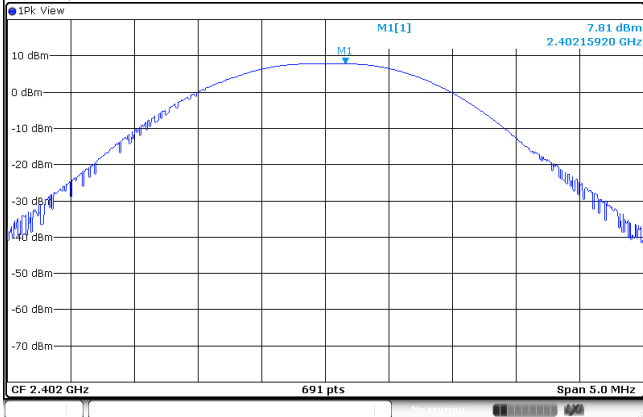
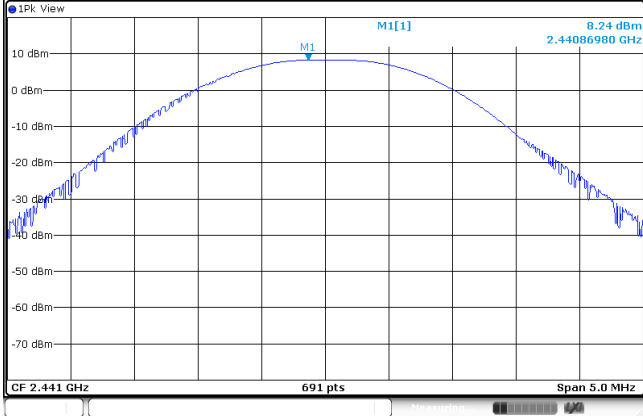
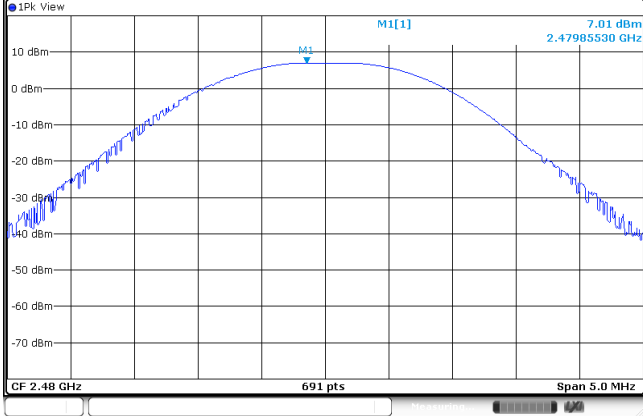
APPENDIX REPORT

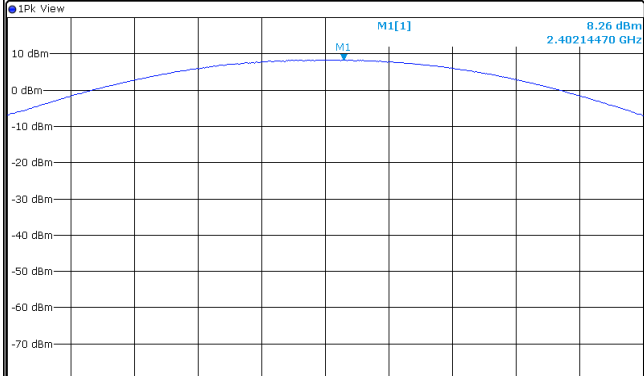
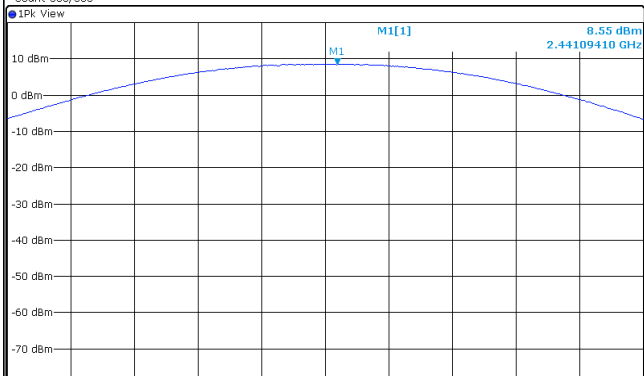
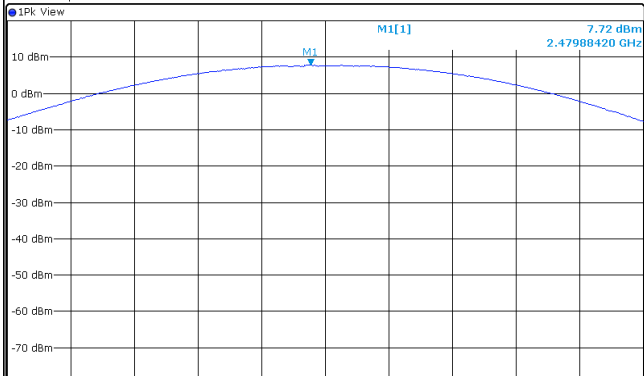
Project No.	SHT2310062301EW	Radio Specification	Bluetooth EDR
Test sample No.	YPHT23100623001	Model No.	Star10 Pro
Start test date	2023-11-3	Finish date	2023-12-20
Temperature	25℃	Humidity	49%
Test Engineer	Xiangyu Wei	Auditor	Xiaodong Zheo

Appendix clause	Test item	Result
A	Peak Output Power	PASS
B	20 dB Bandwidth	PASS
C	99% Occupied Bandwidth	PASS
D	Carrier Frequencies Separation	PASS
E	Hopping Channel Number	PASS
F	Dwell Time	PASS
G	Duty Cycle Correction Factor (DCCF)	PASS
H	Band edge and Spurious Emissions(coducted)	PASS

Appendix A: Peak Output Power

Modulation type	Channel	Peak Output power (dBm)	Average Output power (dBm)	Limit (dBm)	Result
GFSK	00	7.81	7.79	≤ 30.00	Pass
	39	8.24	8.22		
	78	7.01	6.98		
$\pi/4$ DQPSK	00	8.26	8.22	≤ 21.00	Pass
	39	8.55	8.5		
	78	7.72	7.70		
8DPSK	00	8.27	8.2	≤ 21.00	Pass
	39	8.58	8.5		
	78	7.72	7.68		

Modulation Type:		GFSK
CH00	Spectrum Ref Level 20.00 dBm Att 30 dB Count 300/300 Offset 0.50 dB SWT 1 ms RBW 1 MHz VBW 3 MHz Mode Auto Sweep 1Pk View M1 M1[1] 7.81 dBm 2.40215920 GHz  CF 2.402 GHz691 ptsSpan 5.0 MHz Date: 3 NOV 2023 08:48:17	
CH39	Spectrum Ref Level 20.00 dBm Att 30 dB Count 300/300 Offset 0.50 dB SWT 1 ms RBW 1 MHz VBW 3 MHz Mode Auto Sweep 1Pk View M1 M1[1] 8.24 dBm 2.44086980 GHz  CF 2.441 GHz691 ptsSpan 5.0 MHz Date: 3 NOV 2023 08:41:22	
CH78	Spectrum Ref Level 20.00 dBm Att 30 dB Count 300/300 Offset 0.50 dB SWT 1 ms RBW 1 MHz VBW 3 MHz Mode Auto Sweep 1Pk View M1 M1[1] 7.01 dBm 2.47985530 GHz  CF 2.48 GHz691 ptsSpan 5.0 MHz Date: 3 NOV 2023 08:43:11	

Modulation Type:		$\pi/4$ DQPSK
CH00	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep 1Pk View M1 M1[1] 8.26 dBm 2.40214470 GHz  CF 2.402 GHz 691 pts Span 5.0 MHz Date: 3 NOV 2023 08:45:41	
CH39	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep 1Pk View M1 M1[1] 8.55 dBm 2.44109410 GHz  CF 2.441 GHz 691 pts Span 5.0 MHz Date: 3 NOV 2023 08:47:08	
CH78	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep 1Pk View M1 M1[1] 7.72 dBm 2.47988420 GHz  CF 2.48 GHz 691 pts Span 5.0 MHz Date: 3 NOV 2023 08:48:50	

Modulation Type:		8DPSK
CH00	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep 1Pk View M1 M1[1] 8.27 dBm 2.40196380 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.402 GHz 691 pts Span 5.0 MHz Date: 3 NOV 2023 09:48:04	
CH39	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep 1Pk View M1 M1[1] 8.58 dBm 2.44094930 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.441 GHz 691 pts Span 5.0 MHz Date: 3 NOV 2023 08:49:33	
CH78	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1 ms RBW 2 MHz VBW 5 MHz Mode Auto Sweep 1Pk View M1 M1[1] 7.72 dBm 2.47995660 GHz 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm CF 2.48 GHz 691 pts Span 5.0 MHz Date: 3 NOV 2023 08:54:40	

Appendix B : 20 dB Bandwidth

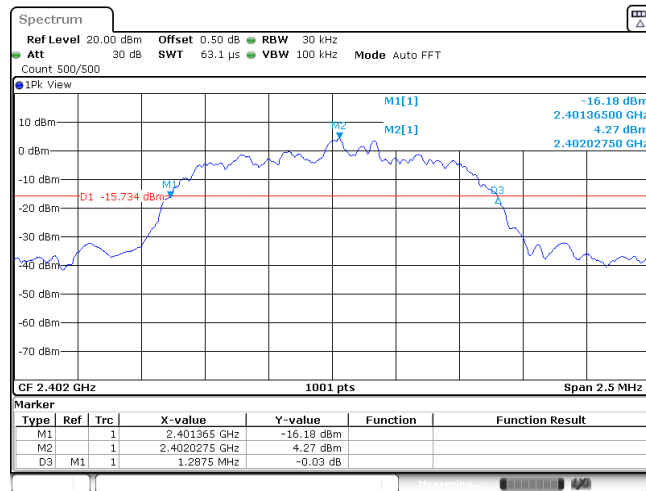
Modulation type	Channel	20 dB Bandwidth (kHz)	Limit (kHz)	Result
GFSK	00	925.00	-	Pass
	39	925.00		
	78	925.00		
$\pi/4$ DQPSK	00	1288.00	-	Pass
	39	1285.00		
	78	1285.00		
8DPSK	00	1295.00	-	Pass
	39	1295.00		
	78	1295.00		

Appendix report page: 7 of 41

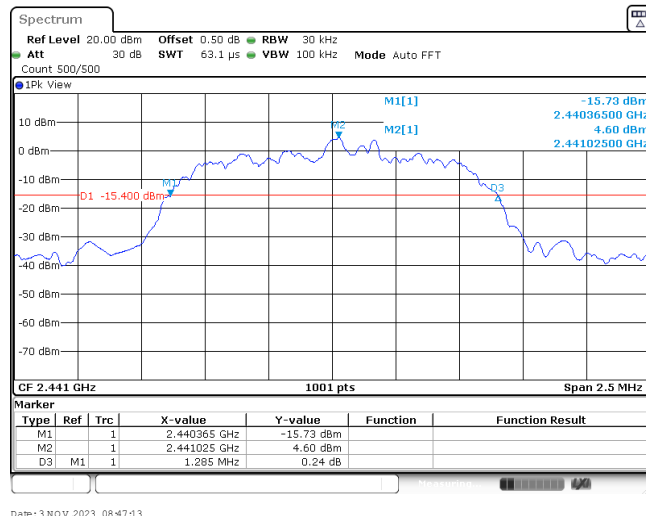
Modulation Type:

 $\pi/4$ DQPSK

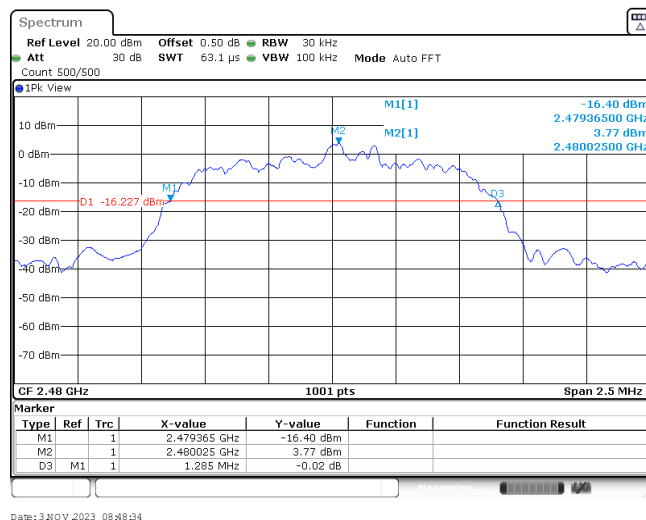
CH00



CH39



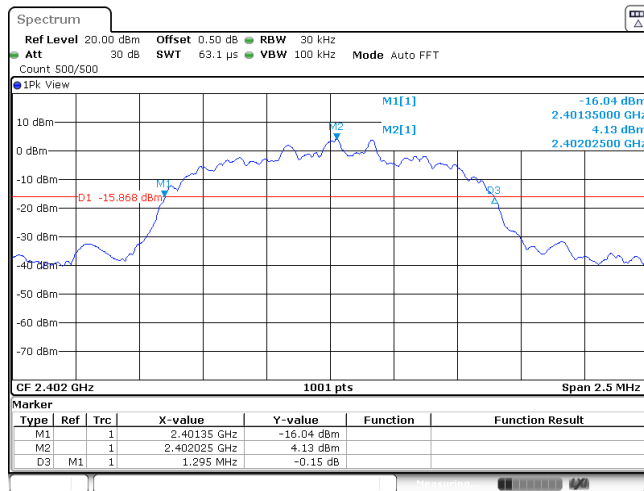
CH78



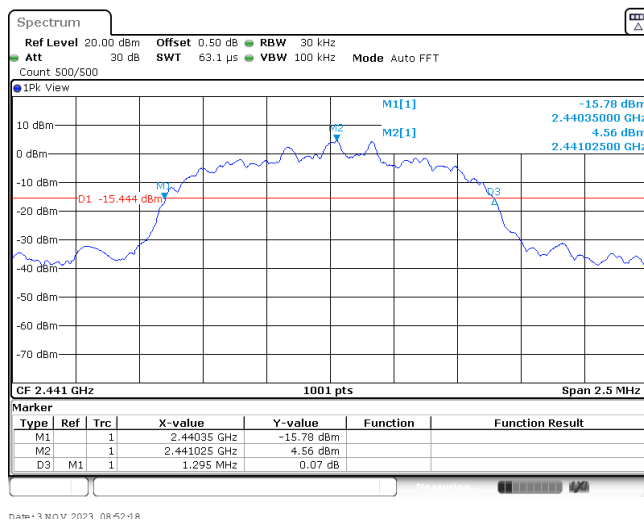
Modulation Type:

8DPSK

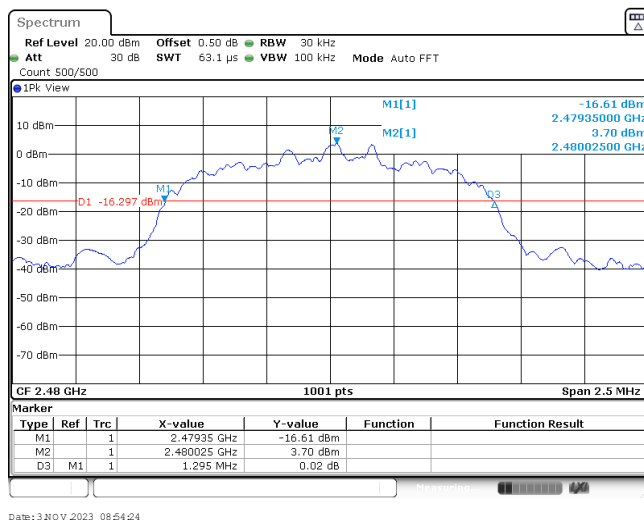
CH00



CH39

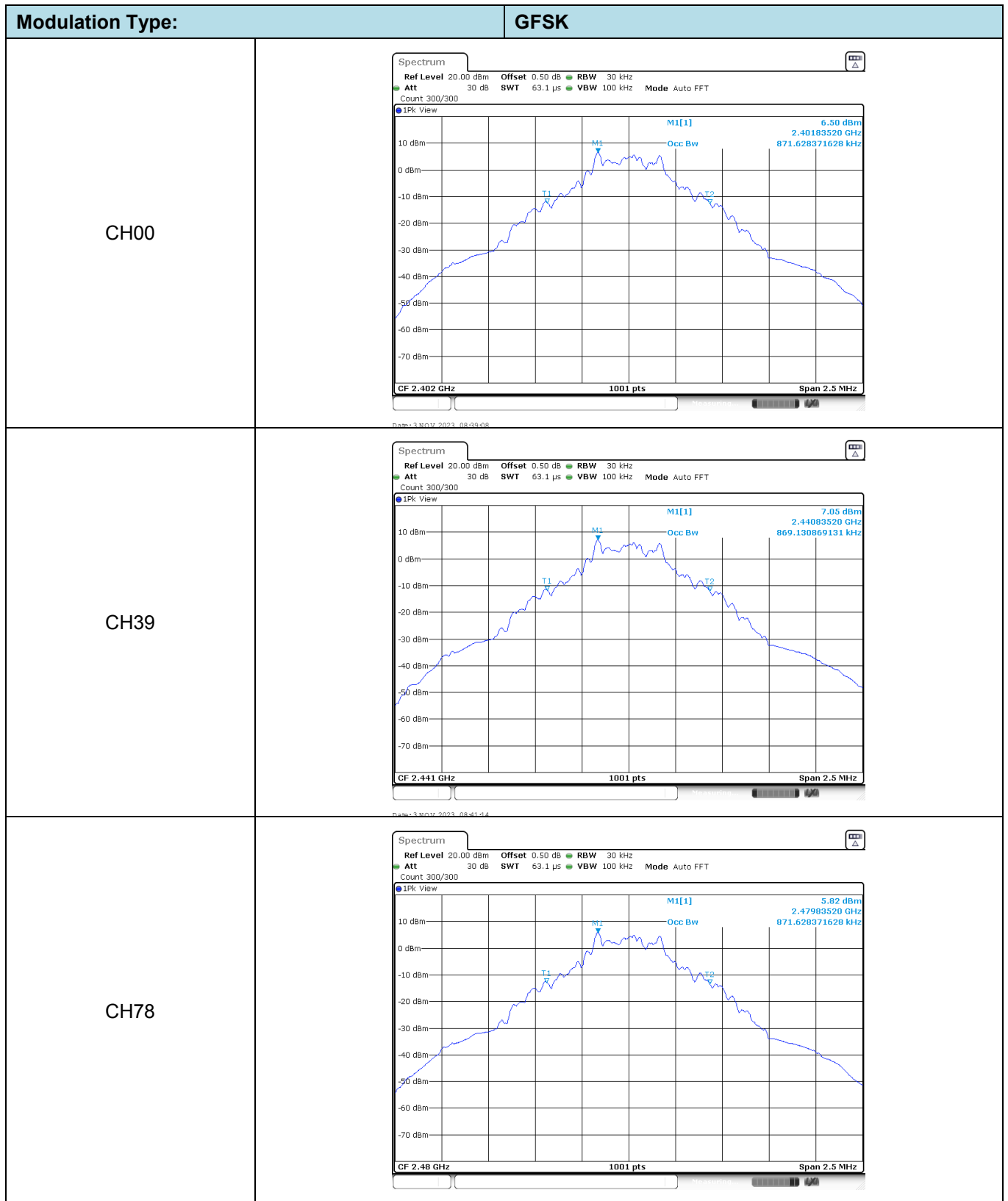


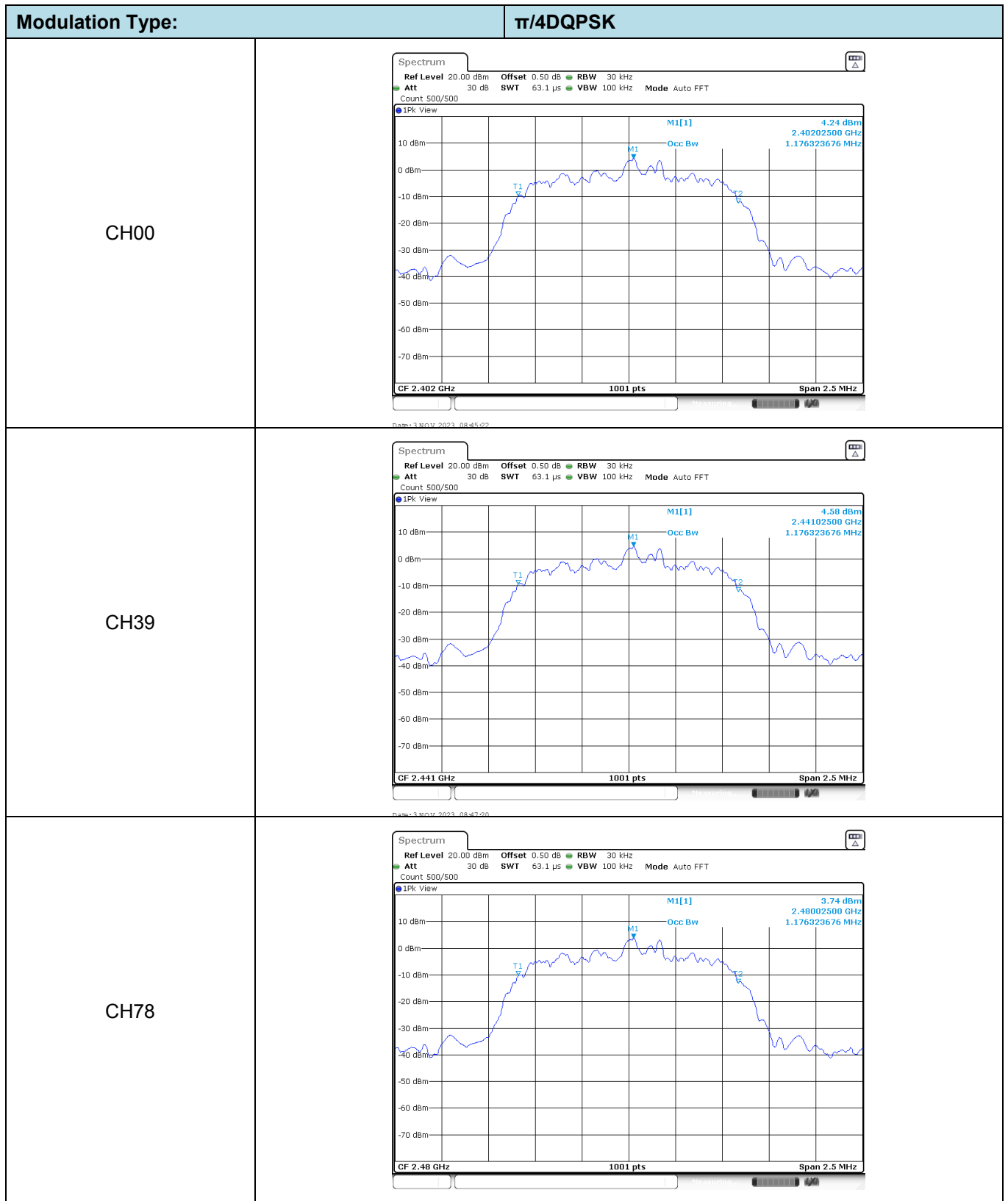
CH78



Appendix C: 99% Occupied Bandwidth

Modulation type	Channel	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
GFSK	00	0.87	-	Pass
	39	0.87		
	78	0.87		
$\pi/4$ DQPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		
8DPSK	00	1.18	-	Pass
	39	1.18		
	78	1.18		





Modulation Type:		8DPSK
CH00	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 4.17 dBm 2.40202500 GHz 1.176323676 MHz M1[1] Occ Bw T1 T2 CF 2.402 GHz 1001 pts Span 2.5 MHz Date: 3 NOV 2023_093816	
CH39	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 4.54 dBm 2.44102500 GHz 1.176323676 MHz M1[1] Occ Bw T1 T2 CF 2.441 GHz 1001 pts Span 2.5 MHz Date: 3 NOV 2023_085205	
CH78	Spectrum Ref Level 20.00 dBm Offset 0.50 dB RBW 30 kHz Att 30 dB SWT 63.1 μs VBW 100 kHz Mode Auto FFT Count 500/500 1Pk View 9.65 dBm 2.48002500 GHz 1.176323676 MHz M1[1] Occ Bw T1 T2 CF 2.48 GHz 1001 pts Span 2.5 MHz Date: 3 NOV 2023_085431	

Appendix D: Carrier Frequencies Separation

Modulation type	Channel	Carrier Frequencies Separation (MHz)	Limit (kHz) *	Result
GFSK	39	1.00	≥925	Pass
π/4DQPSK	39	1.00	≥818.67	Pass
8DPSK	39	1.14	≥863.33	Pass

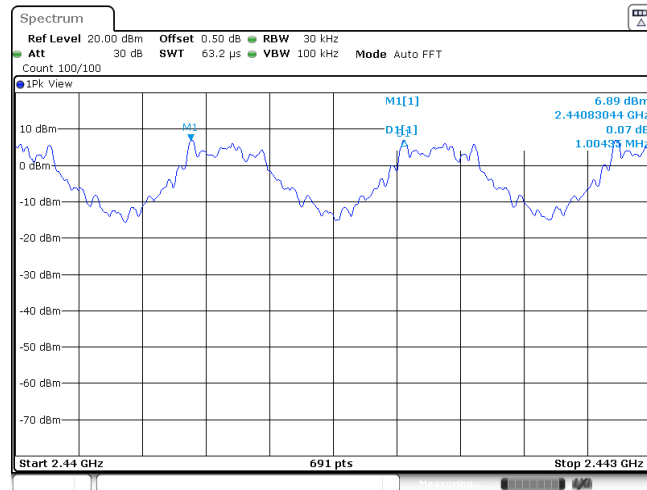
Note:

*: GFSK limit = The maximum 20 dB Bandwidth for GFSK modulation on the appendix B.

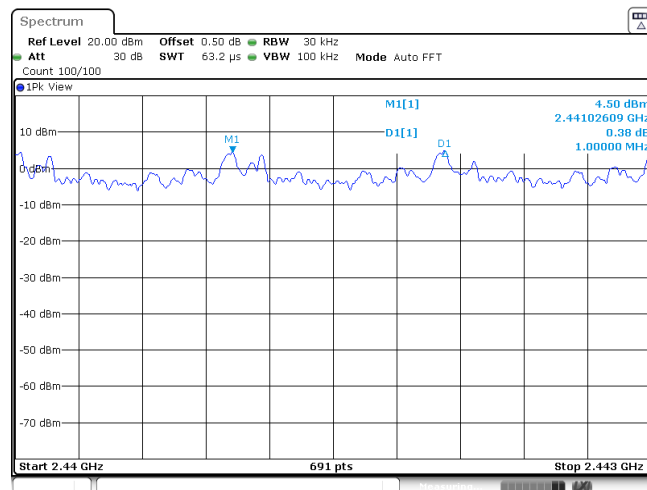
π/4DQPSK limit = 2/3 * The maximum 20 dB Bandwidth for π/4DQPSK modulation on the appendix B.

8DPSK limit = 2/3 * The maximum 20 dB Bandwidth for 8DPSK modulation on the appendix B

GFSK

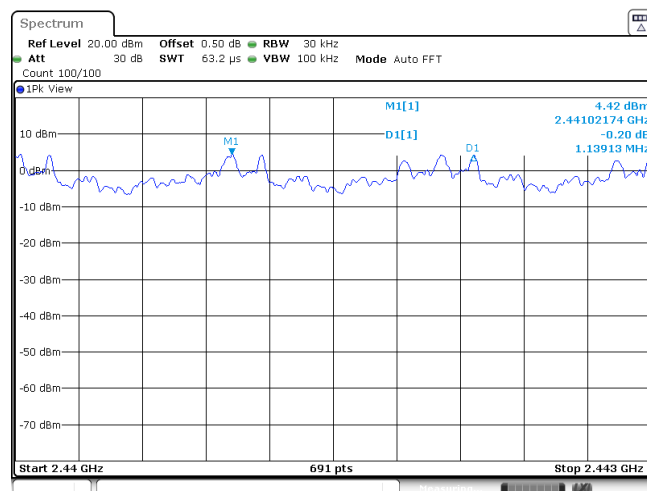


Date: 3 NOV 2023 09:40:18

 $\pi/4$ DQPSK

Date: 3 NOV 2023 09:45:49

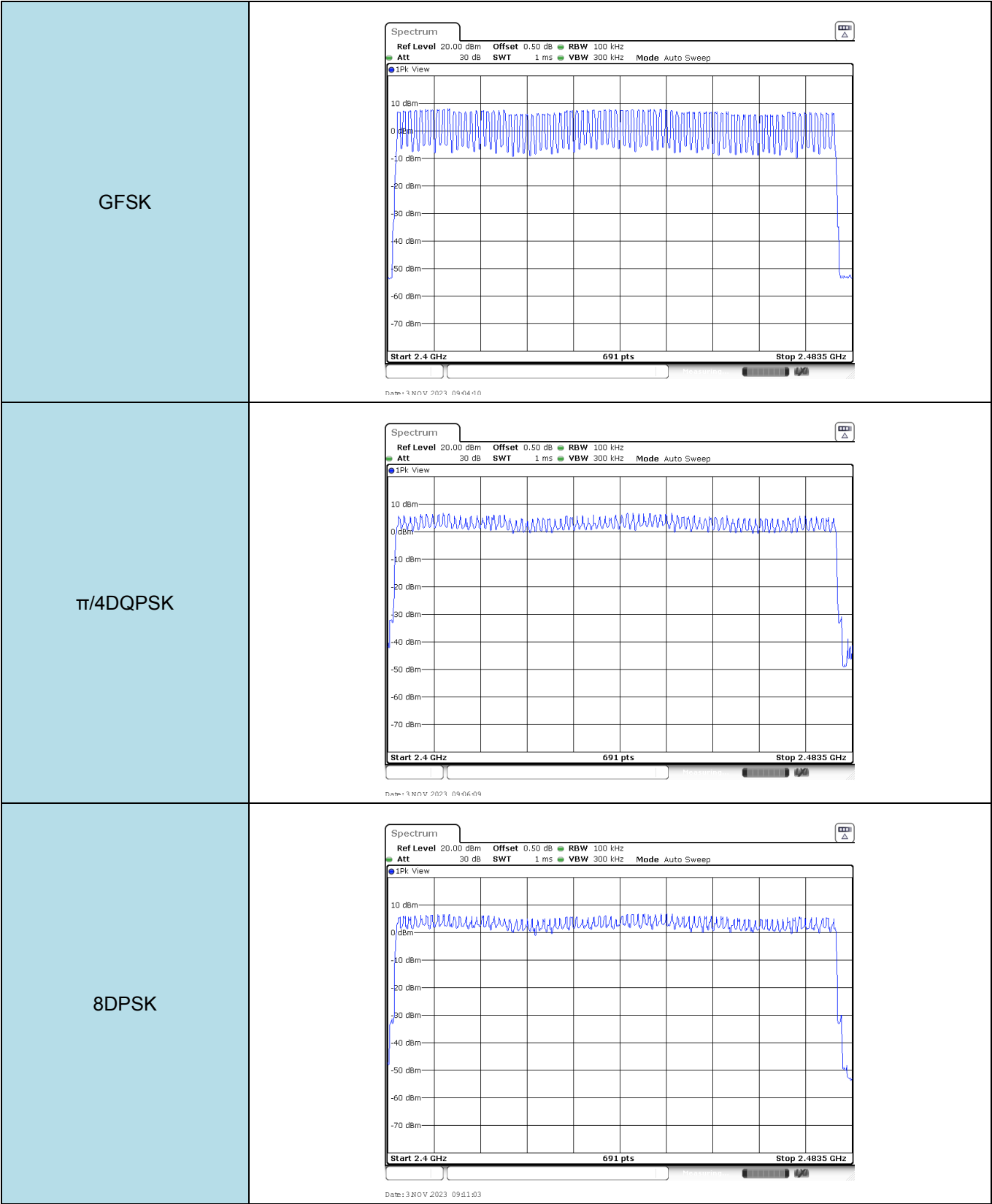
8DPSK



Date: 3 NOV 2023 09:40:52

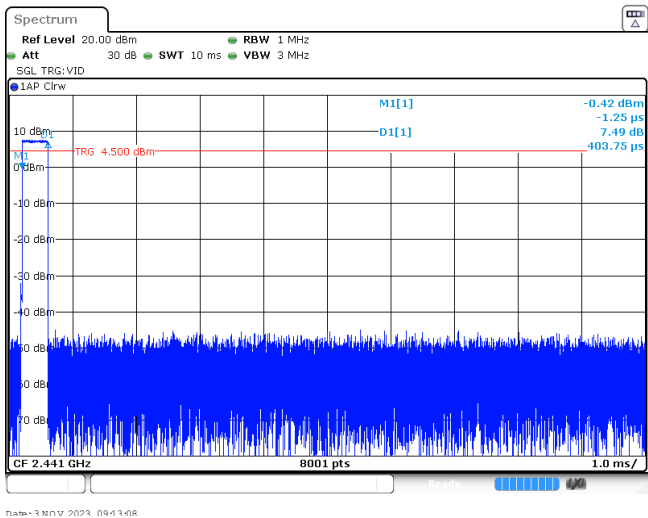
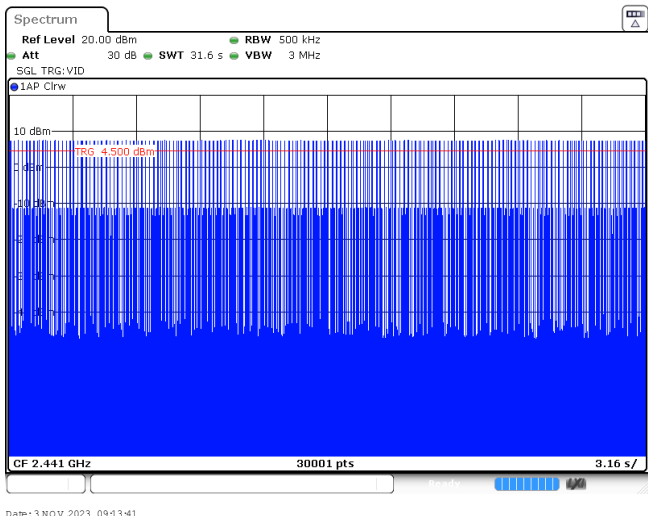
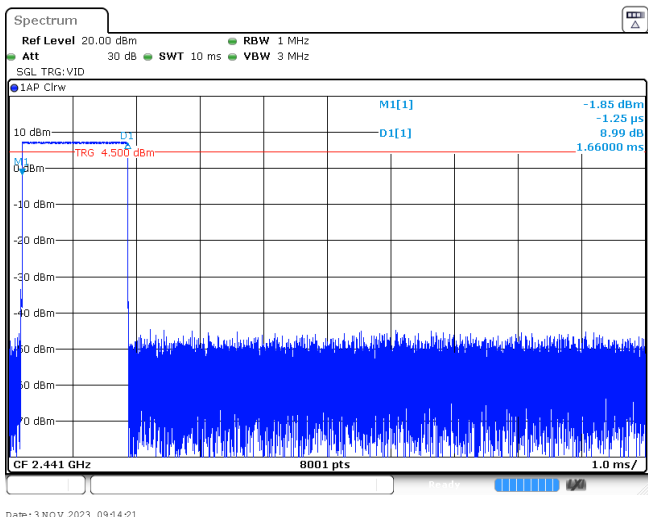
Appendix E: Hopping Channel Number

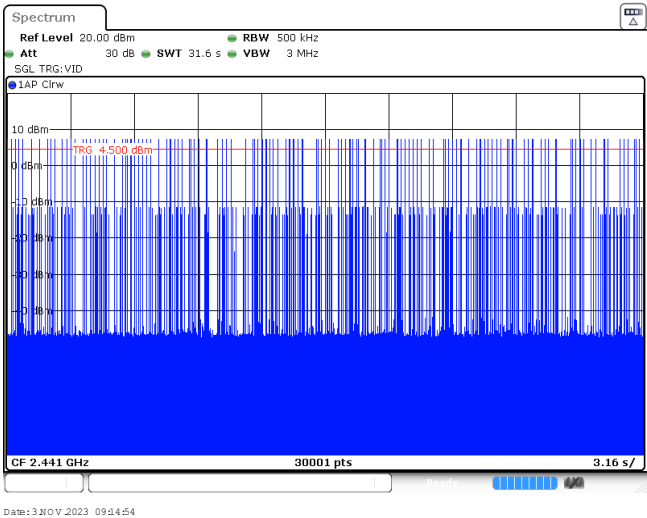
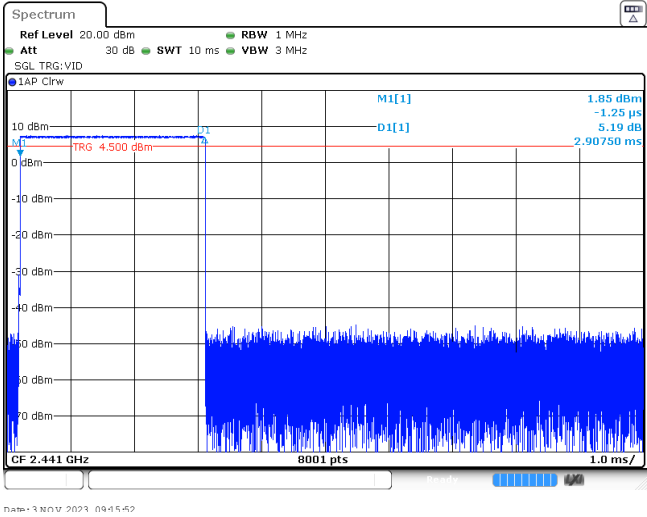
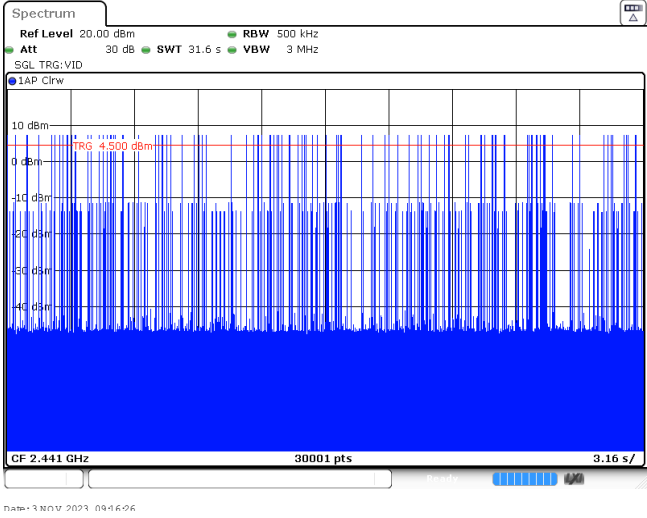
Modulation type	Channel number	Limit	Result
GFSK	79	≥15.00	Pass
π/4DQPSK	79		
8DPSK	79		



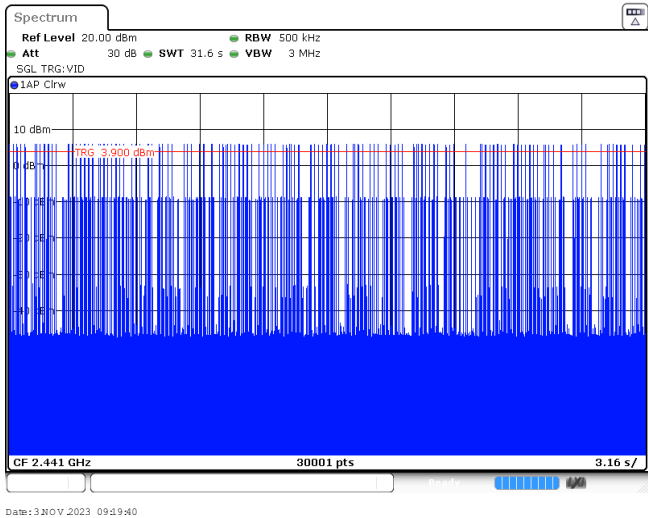
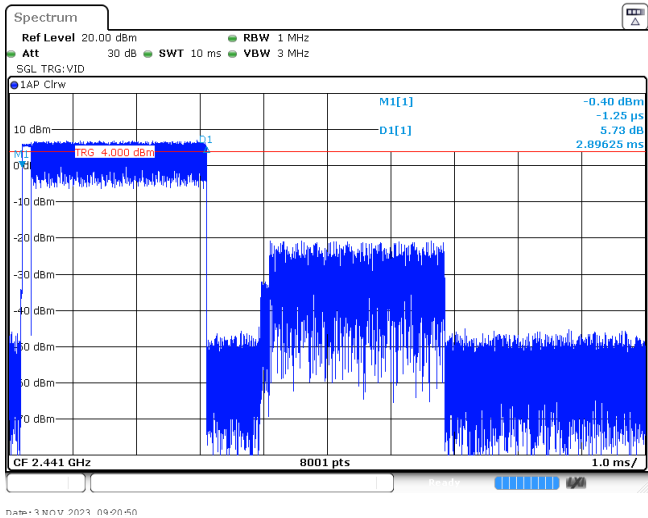
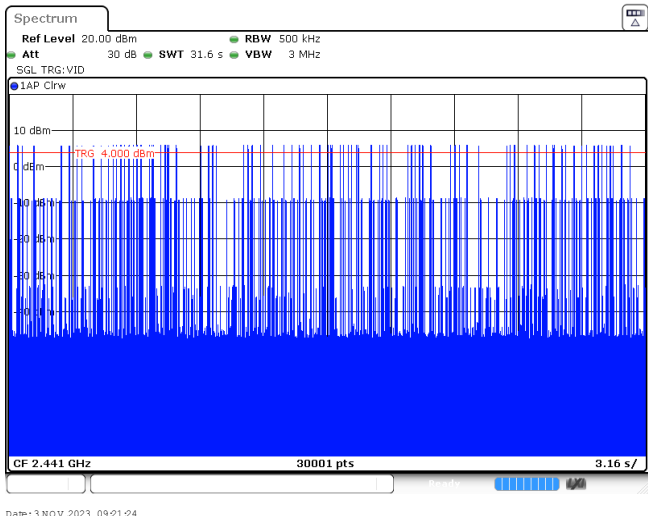
Appendix F: Dwell Time

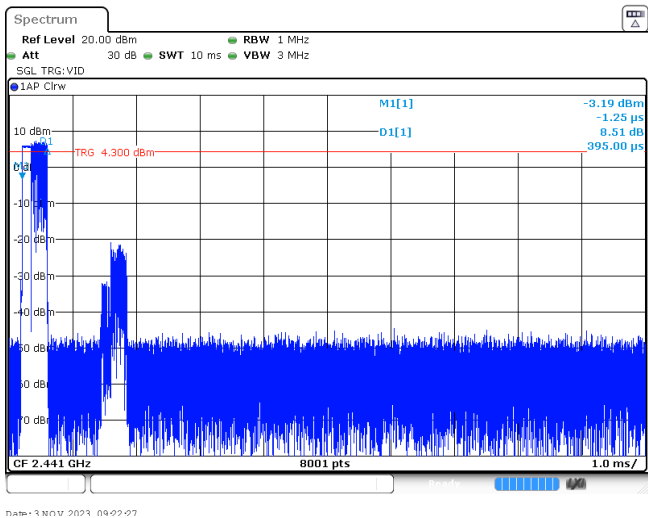
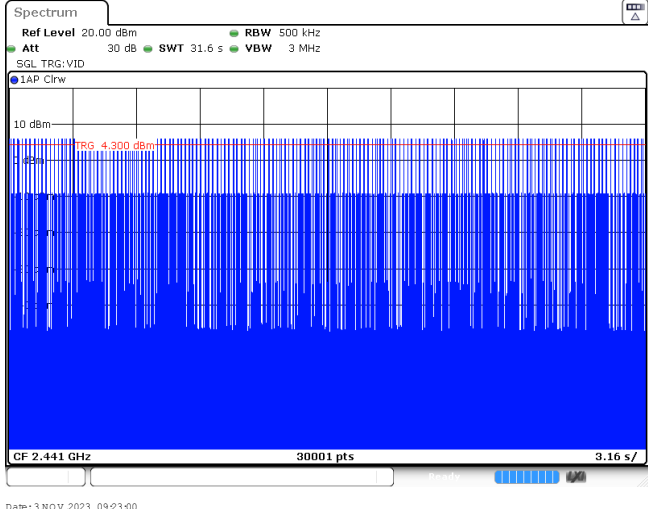
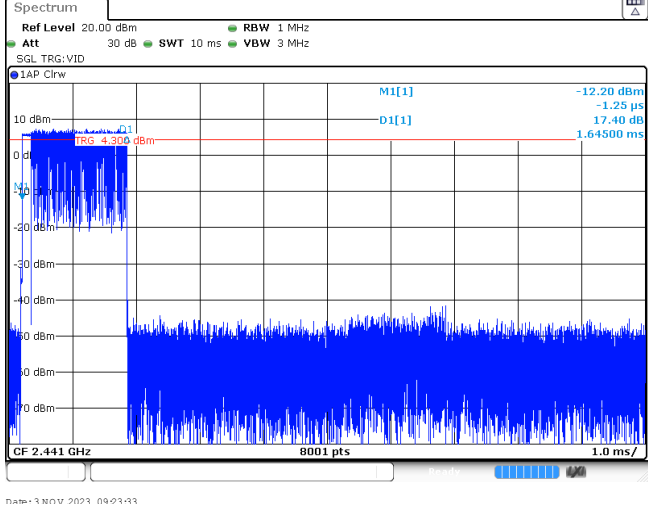
Modulation type	Packet	Burst Width [ms]	Total Hops[hop*ch]	Dwell time (Second)	Limit (Second)	Result
GFSK	DH1	0.40	319.00	0.13	≤ 0.40	Pass
	DH3	1.66	160.00	0.27		
	DH5	2.91	105.00	0.31		
$\pi/4$ DQPSK	2DH1	0.40	319.00	0.13	≤ 0.40	Pass
	2DH3	1.65	160.00	0.26		
	2DH5	2.90	118.00	0.34		
8DPSK	3DH1	0.39	320.00	0.13	≤ 0.40	Pass
	3DH3	1.65	163.00	0.27		
	3DH5	2.90	105.00	0.30		

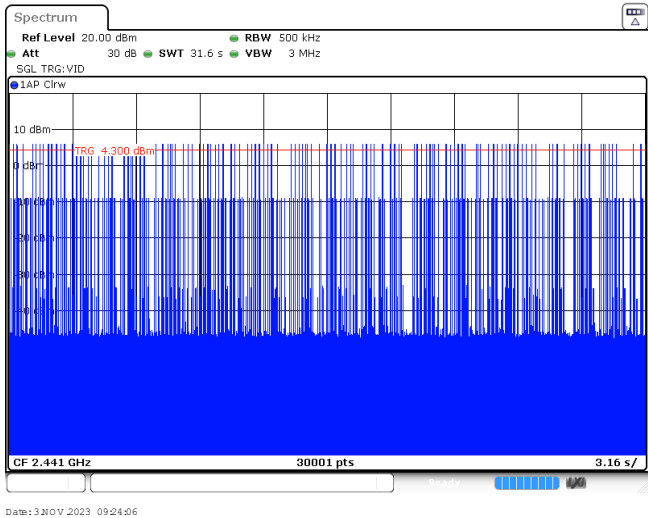
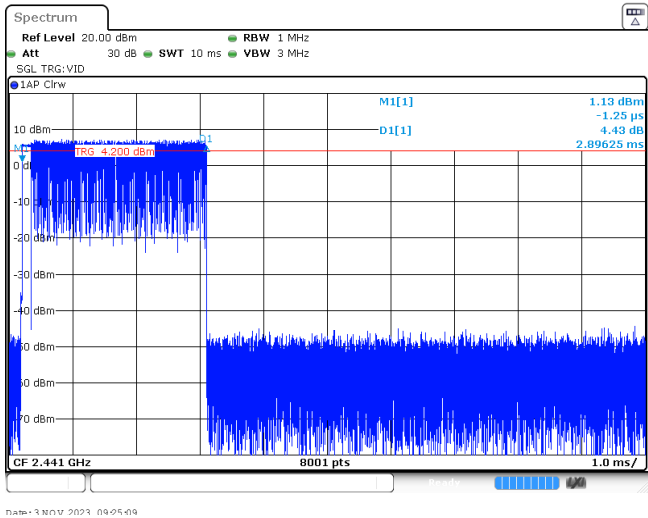
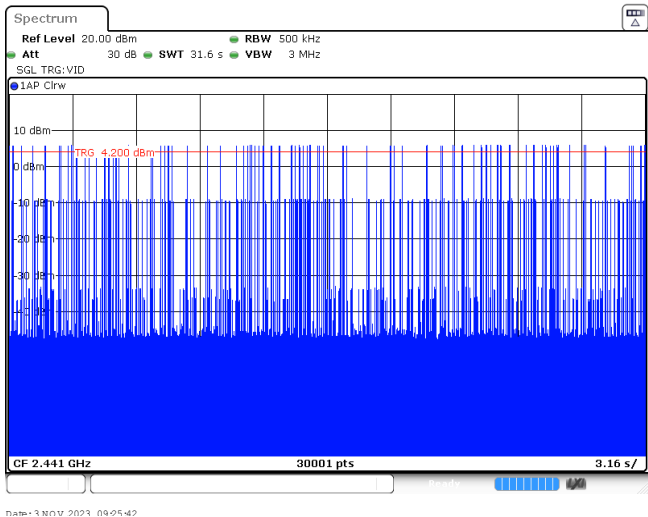
Modulation Type: GFSK	
DH1 Burst width	
DH1 Burst number	
DH3 Burst width	

DH3 Burst number	
DH5 Burst width	
DH5 Burst number	

Modulation Type: $\pi/4$ DQPSK	
2DH1 Burst width	
2DH1 Burst number	
2DH3 Burst width	

2DH3 Burst number	
2DH5 Burst width	
2DH5 Burst number	

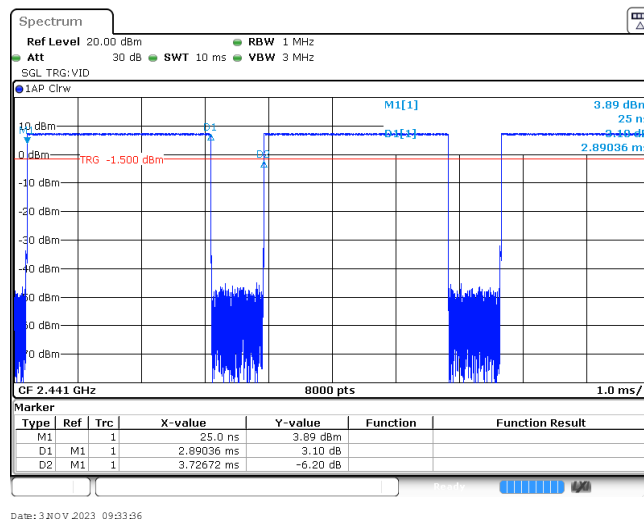
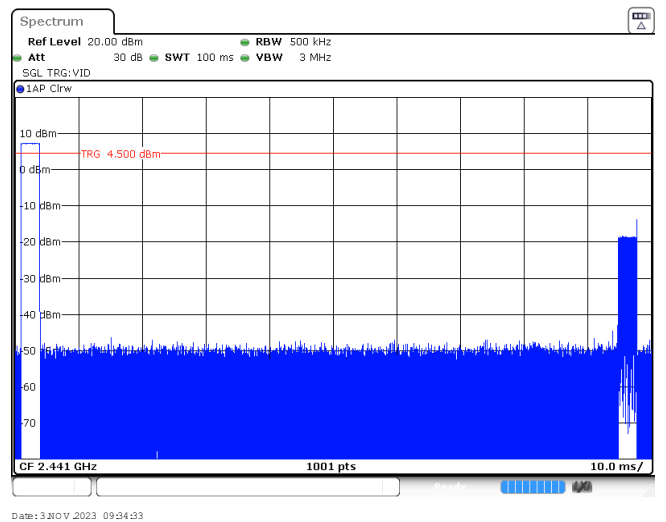
Modulation Type:		8DPSK
3DH1 Burst width		
3DH1 Burst number		
3DH3 Burst width		

3DH3 Burst number	 The spectrum plot shows a dense signal across the frequency range. The y-axis represents power in dBm, ranging from -40 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. The plot shows a continuous signal with a peak level around 0 dBm. The RBW is 500 kHz, and the VBW is 3 MHz. The SWT is 31.6 s. The Att is 30 dB. The SGL TRG:VID is 1AP Clrw. The TRG is 4.300 dBm. The CF is 2.441 GHz, and the scale is 30001 pts, 3.16 s/.
3DH5 Burst width	 The spectrum plot shows a signal burst. The y-axis represents power in dBm, ranging from -70 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. The plot shows a signal burst with a peak level around 0 dBm. The RBW is 1 MHz, and the VBW is 3 MHz. The SWT is 10 ms. The Att is 30 dB. The SGL TRG:VID is 1AP Clrw. The TRG is 4.200 dBm. The CF is 2.441 GHz, and the scale is 8001 pts, 1.0 ms/.
3DH5 Burst number	 The spectrum plot shows a dense signal across the frequency range. The y-axis represents power in dBm, ranging from -40 to 10. The x-axis represents frequency in GHz, centered at 2.441 GHz. The plot shows a continuous signal with a peak level around 0 dBm. The RBW is 500 kHz, and the VBW is 3 MHz. The SWT is 31.6 s. The Att is 30 dB. The SGL TRG:VID is 1AP Clrw. The TRG is 4.200 dBm. The CF is 2.441 GHz, and the scale is 30001 pts, 3.16 s/.

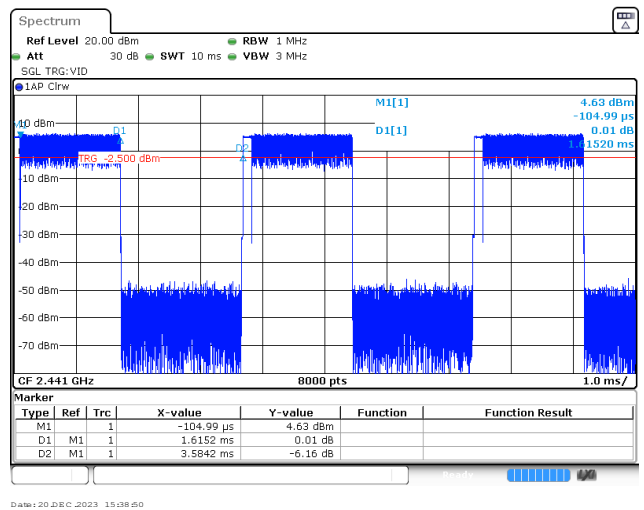
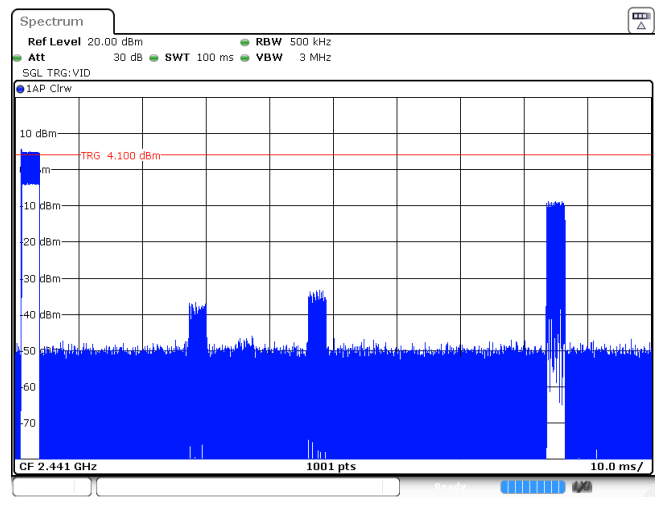
Appendix G: Duty Cycle Correction Factor (DCCF)

DCCF Calculate Formula					
DCCF=20 * Log(duty cycle) = 20 * Log($T_{\text{on time}} / T_{\text{period}}$)					
Modulation type	Test Frequency (MHz)	$T_{\text{on time}}$ for single burst [ms]	T_{period} [ms]	Burst Quantity	DCCF [dB]
GFSK	2441	2.89	100	1.00	-30.78
$\pi/4$ DQPSK	2441	1.62	100	1.00	-35.81
8DPSK	2441	2.87	100	1.00	-30.84

GFSK

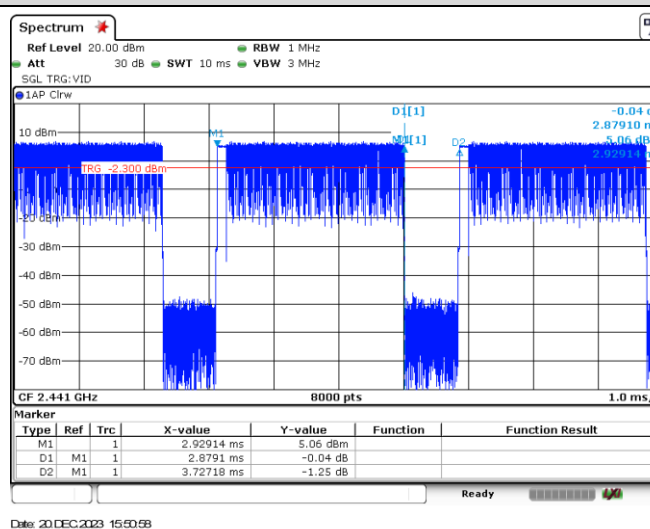
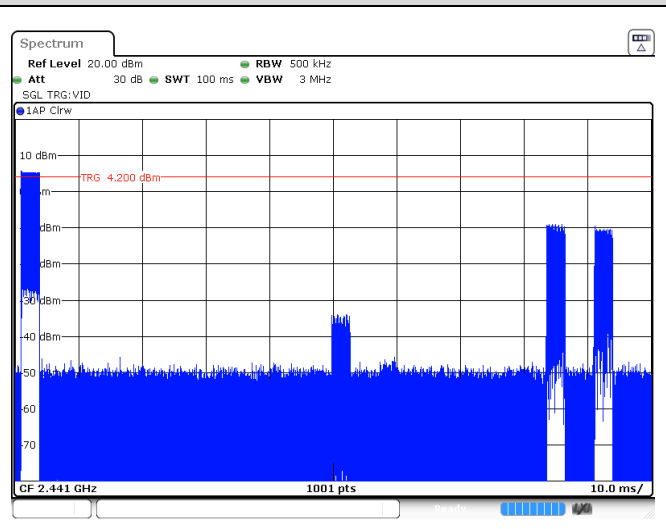
T_{on} time for single burst

Burst Quantity

 $\pi/4$ DQPSKT_{on} time for single burst

Burst Quantity

8DPSK

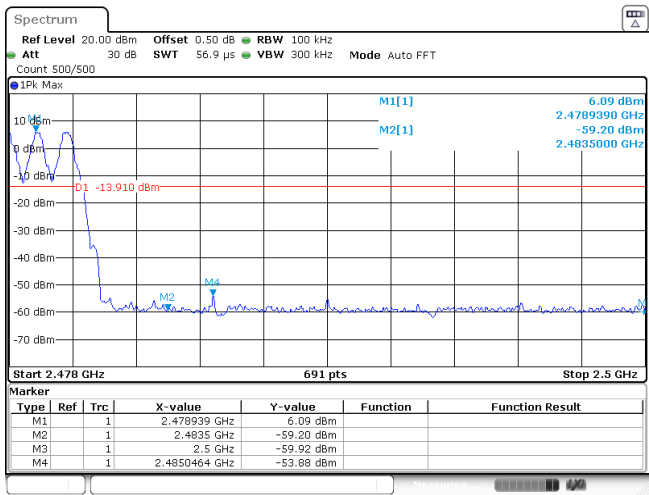
T_{on} time for single burst

Burst Quantity

Appendix H: Band edge and Spurious Emissions (conducted)

Test Item:	Band edge	Modulation type:	GFSK																																										
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 300/300 Offset 0.50 dB SWT 1.1 ms Mode Auto Sweep RBW 100 kHz VBW 300 kHz 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 7.20 dBm 2.402180 GHz M2[1] -54.12 dBm 2.400000 GHz D1 -12.800 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.40218 GHz</td><td>7.20 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-54.12 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-54.88 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.31 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399355 GHz</td><td>-52.55 dBm</td><td></td><td></td></tr></table> Date: 3 NOV 2023 08:39:30			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40218 GHz	7.20 dBm			M2	1		2.4 GHz	-54.12 dBm			M3	1		2.39 GHz	-54.88 dBm			M4	1		2.31 GHz	-54.31 dBm			M5	1		2.399355 GHz	-52.55 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40218 GHz	7.20 dBm																																									
M2	1		2.4 GHz	-54.12 dBm																																									
M3	1		2.39 GHz	-54.88 dBm																																									
M4	1		2.31 GHz	-54.31 dBm																																									
M5	1		2.399355 GHz	-52.55 dBm																																									
CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1.1 ms Mode Auto Sweep RBW 100 kHz VBW 300 kHz 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 7.29 dBm 2.403830 GHz M2[1] -54.77 dBm 2.400000 GHz D1 -12.710 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.40383 GHz</td><td>7.29 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-54.77 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-54.89 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.00 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.353783 GHz</td><td>-52.36 dBm</td><td></td><td></td></tr></table> Date: 3 NOV 2023 09:04:23			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40383 GHz	7.29 dBm			M2	1		2.4 GHz	-54.77 dBm			M3	1		2.39 GHz	-54.89 dBm			M4	1		2.31 GHz	-54.00 dBm			M5	1		2.353783 GHz	-52.36 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40383 GHz	7.29 dBm																																									
M2	1		2.4 GHz	-54.77 dBm																																									
M3	1		2.39 GHz	-54.89 dBm																																									
M4	1		2.31 GHz	-54.00 dBm																																									
M5	1		2.353783 GHz	-52.36 dBm																																									
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 300/300 Offset 0.50 dB SWT 56.9 µs Mode Auto FFT RBW 100 kHz VBW 300 kHz 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 6.93 dBm 2.4798310 GHz M2[1] -56.61 dBm 2.4835000 GHz D1 -13.070 dBm Start 2.478 GHz 691 pts Stop 2.5 GHz <table><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr><tr><td>M1</td><td>1</td><td></td><td>2.479831 GHz</td><td>6.93 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-56.61 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-59.17 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.4835159 GHz</td><td>-56.42 dBm</td><td></td><td></td></tr></table> Date: 3 NOV 2023 08:43:24			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.479831 GHz	6.93 dBm			M2	1		2.4835 GHz	-56.61 dBm			M3	1		2.5 GHz	-59.17 dBm			M4	1		2.4835159 GHz	-56.42 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.479831 GHz	6.93 dBm																																									
M2	1		2.4835 GHz	-56.61 dBm																																									
M3	1		2.5 GHz	-59.17 dBm																																									
M4	1		2.4835159 GHz	-56.42 dBm																																									

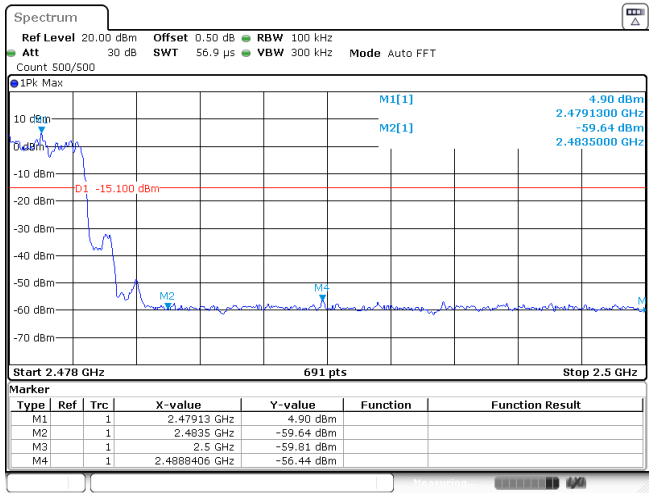
CH78
Hopping mode



Date: 3 NOV 2023 09:04:37

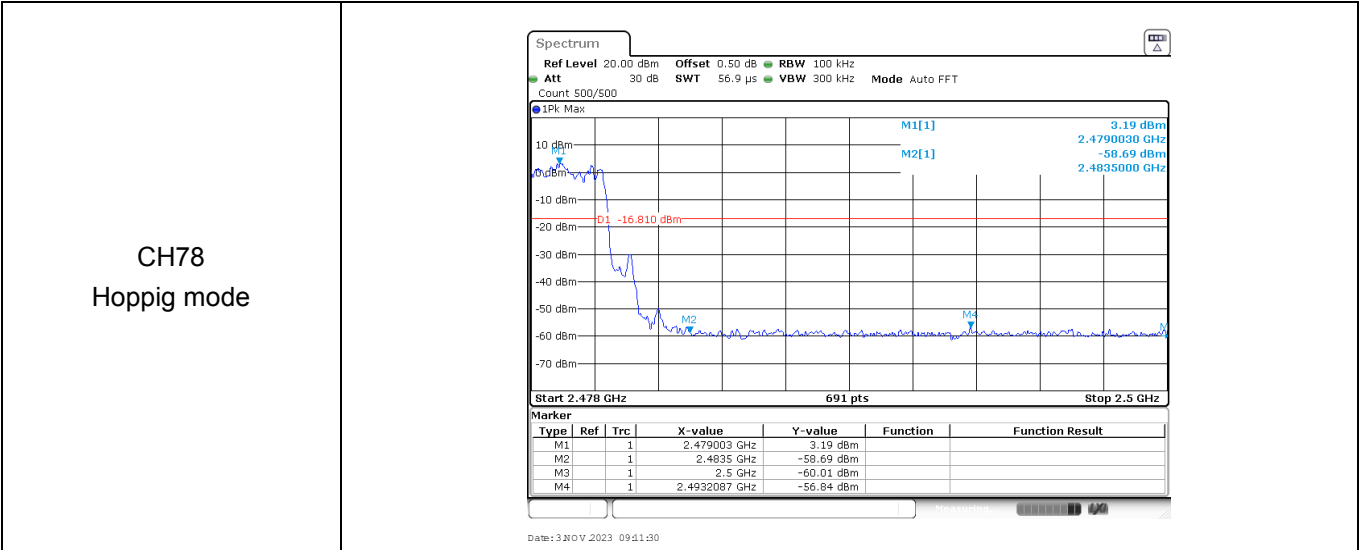
Test Item:	Band edge	Modulation type:	$\pi/4$ DQPSK																																										
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1.1 ms VBW 300 kHz RBW 100 kHz Mode Auto Sweep 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 5.73 dBm M2[1] -47.29 dBm D1 -14.270 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.40204 GHz</td><td>5.73 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-47.29 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-55.15 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.14 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.39963 GHz</td><td>-44.62 dBm</td><td></td><td></td></tr></tbody></table> Date: 3/30/2023 08:45:44			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40204 GHz	5.73 dBm			M2	1		2.4 GHz	-47.29 dBm			M3	1		2.39 GHz	-55.15 dBm			M4	1		2.31 GHz	-54.14 dBm			M5	1		2.39963 GHz	-44.62 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
M1	1		2.40204 GHz	5.73 dBm																																									
M2	1		2.4 GHz	-47.29 dBm																																									
M3	1		2.39 GHz	-55.15 dBm																																									
M4	1		2.31 GHz	-54.14 dBm																																									
M5	1		2.39963 GHz	-44.62 dBm																																									
CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1.1 ms VBW 300 kHz RBW 100 kHz Mode Auto Sweep 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 4.64 dBm M2[1] -49.16 dBm D1 -15.360 dBm Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.40314 GHz</td><td>4.64 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-49.16 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-54.79 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-53.78 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.399768 GHz</td><td>-47.51 dBm</td><td></td><td></td></tr></tbody></table> Date: 3/30/2023 09:06:22			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40314 GHz	4.64 dBm			M2	1		2.4 GHz	-49.16 dBm			M3	1		2.39 GHz	-54.79 dBm			M4	1		2.31 GHz	-53.78 dBm			M5	1		2.399768 GHz	-47.51 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
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M5	1		2.399768 GHz	-47.51 dBm																																									
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 56.9 μs VBW 300 kHz RBW 100 kHz Mode Auto FFT 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] 5.83 dBm M2[1] -56.78 dBm D1 -14.170 dBm Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.47999 GHz</td><td>5.83 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-56.78 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-59.25 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.484058 GHz</td><td>-55.82 dBm</td><td></td><td></td></tr></tbody></table> Date: 3/30/2023 08:49:02			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.47999 GHz	5.83 dBm			M2	1		2.4835 GHz	-56.78 dBm			M3	1		2.5 GHz	-59.25 dBm			M4	1		2.484058 GHz	-55.82 dBm									
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M4	1		2.484058 GHz	-55.82 dBm																																									

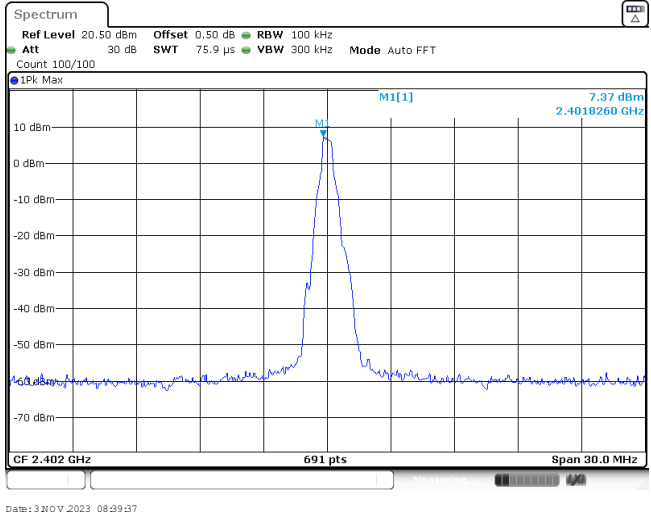
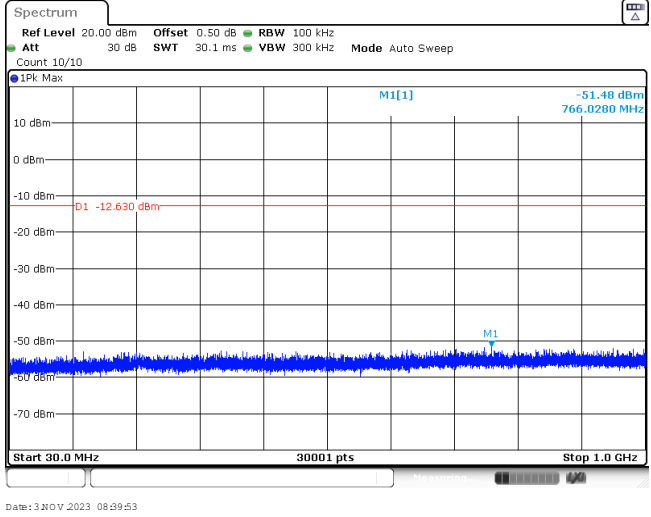
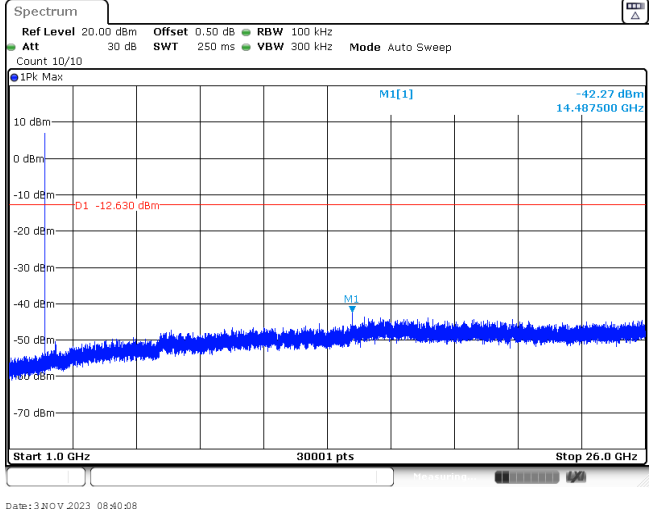
CH78
Hopping mode

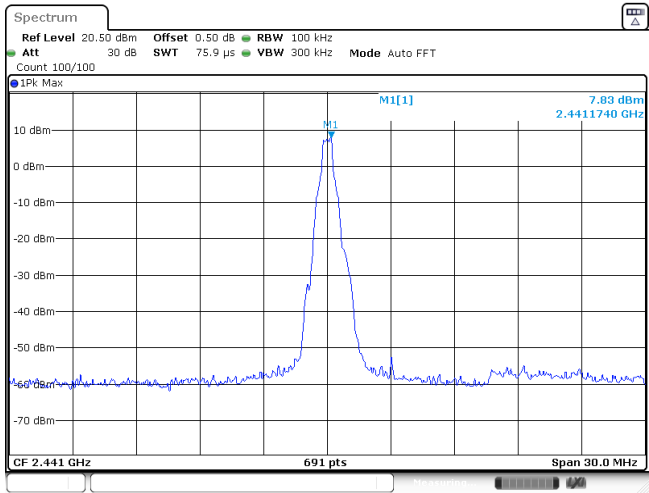
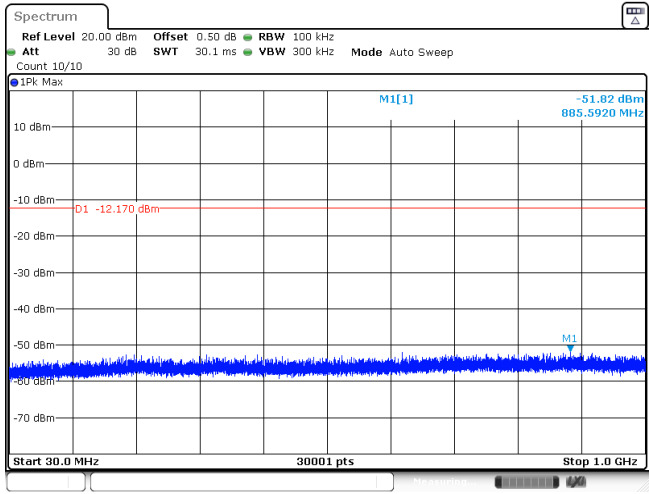
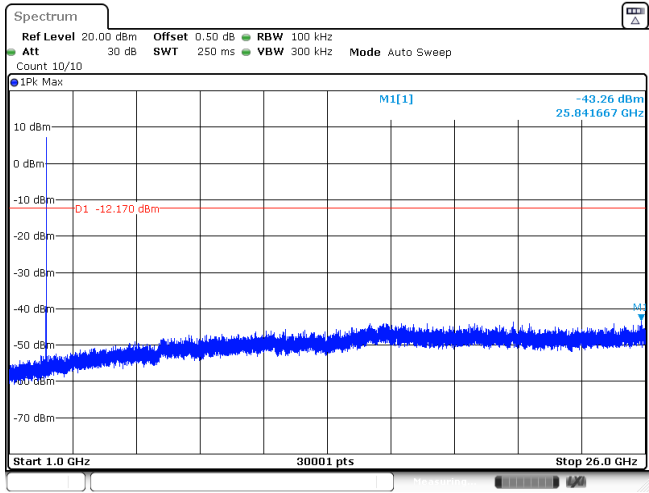


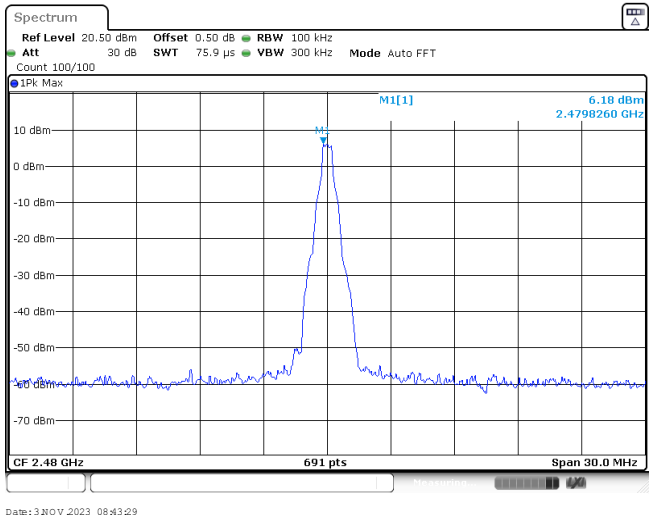
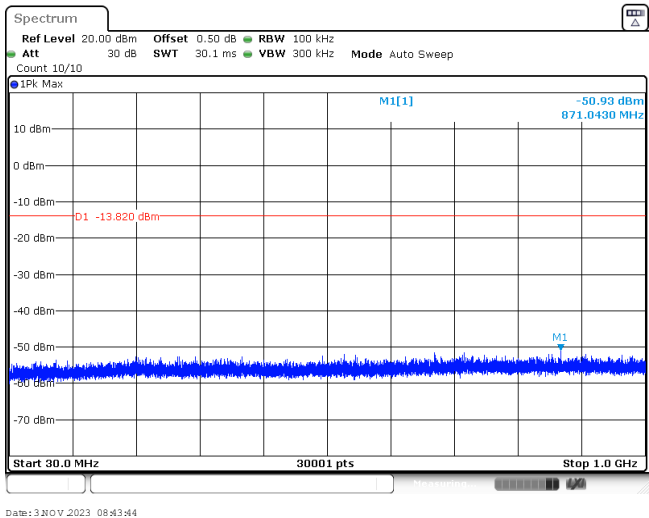
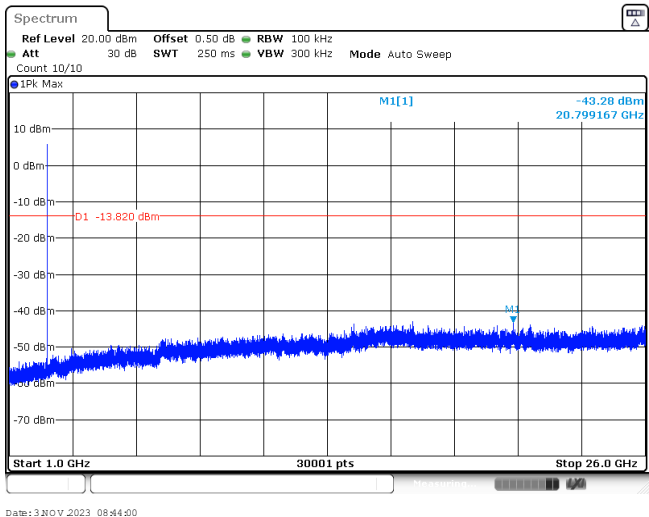
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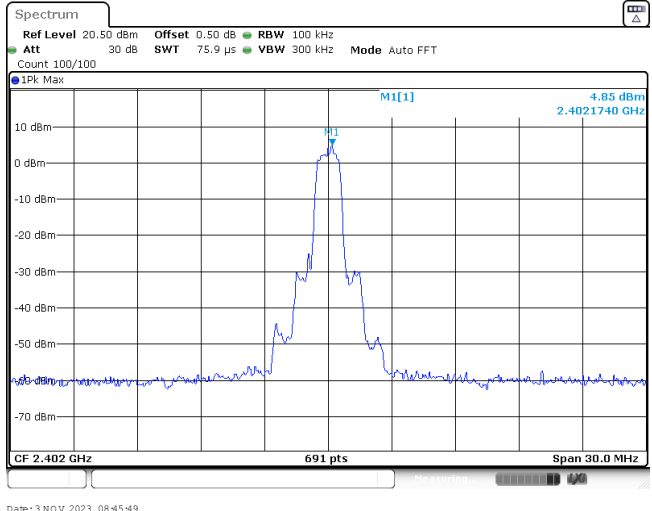
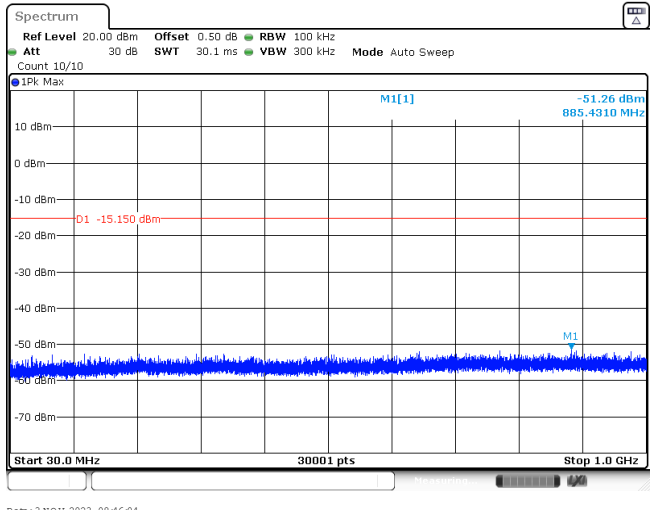
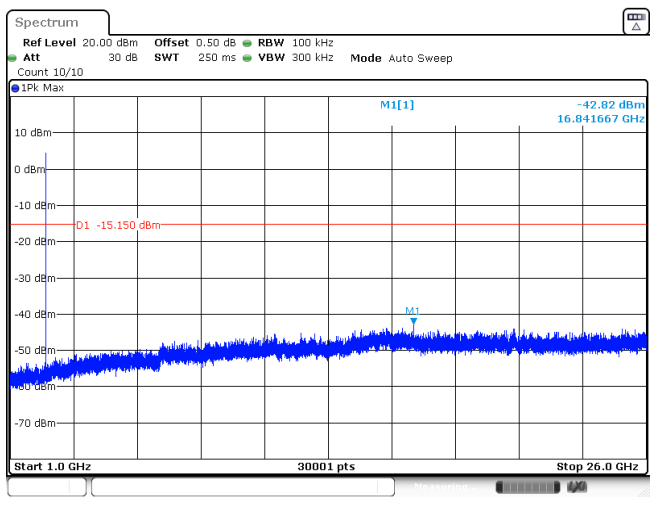
Test Item:	Band edge	Modulation type:	8DPSK																																										
CH00 No hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1.1 ms RBW 100 kHz VBW 300 kHz Mode Auto Sweep 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -14.420 dBm M3 M4 M5 5.58 dBm 2.401770 GHz -46.36 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.40177 GHz</td><td>5.58 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-46.36 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-54.58 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.29 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.39963 GHz</td><td>-44.11 dBm</td><td></td><td></td></tr></tbody></table> Date: 3 NOV 2023 08:48:17			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40177 GHz	5.58 dBm			M2	1		2.4 GHz	-46.36 dBm			M3	1		2.39 GHz	-54.58 dBm			M4	1		2.31 GHz	-54.29 dBm			M5	1		2.39963 GHz	-44.11 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
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CH00 Hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 1.1 ms RBW 100 kHz VBW 300 kHz Mode Auto Sweep 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -15.430 dBm M3 M4 M5 4.57 dBm 2.402040 GHz -49.63 dBm 2.400000 GHz Start 2.31 GHz 691 pts Stop 2.405 GHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.40204 GHz</td><td>4.57 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4 GHz</td><td>-49.63 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.39 GHz</td><td>-55.49 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.31 GHz</td><td>-54.71 dBm</td><td></td><td></td></tr><tr><td>M5</td><td>1</td><td></td><td>2.39963 GHz</td><td>-45.44 dBm</td><td></td><td></td></tr></tbody></table> Date: 3 NOV 2023 08:41:16			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.40204 GHz	4.57 dBm			M2	1		2.4 GHz	-49.63 dBm			M3	1		2.39 GHz	-55.49 dBm			M4	1		2.31 GHz	-54.71 dBm			M5	1		2.39963 GHz	-45.44 dBm		
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
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M3	1		2.39 GHz	-55.49 dBm																																									
M4	1		2.31 GHz	-54.71 dBm																																									
M5	1		2.39963 GHz	-45.44 dBm																																									
CH78 No hopping mode	Spectrum Ref Level 20.00 dBm Att 30 dB Count 500/500 Offset 0.50 dB SWT 56.9 µs RBW 100 kHz VBW 300 kHz Mode Auto FFT 1Pk Max 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm -50 dBm -60 dBm -70 dBm M1[1] M2[1] D1 -14.240 dBm M3 M4 5.76 dBm 2.4799900 GHz -57.47 dBm 2.4835000 GHz Start 2.478 GHz 691 pts Stop 2.5 GHz Marker <table><thead><tr><th>Type</th><th>Ref</th><th>Trc</th><th>X-value</th><th>Y-value</th><th>Function</th><th>Function Result</th></tr></thead><tbody><tr><td>M1</td><td>1</td><td></td><td>2.47999 GHz</td><td>5.76 dBm</td><td></td><td></td></tr><tr><td>M2</td><td>1</td><td></td><td>2.4835 GHz</td><td>-57.47 dBm</td><td></td><td></td></tr><tr><td>M3</td><td>1</td><td></td><td>2.5 GHz</td><td>-58.25 dBm</td><td></td><td></td></tr><tr><td>M4</td><td>1</td><td></td><td>2.4838667 GHz</td><td>-56.65 dBm</td><td></td><td></td></tr></tbody></table> Date: 3 NOV 2023 08:54:52			Type	Ref	Trc	X-value	Y-value	Function	Function Result	M1	1		2.47999 GHz	5.76 dBm			M2	1		2.4835 GHz	-57.47 dBm			M3	1		2.5 GHz	-58.25 dBm			M4	1		2.4838667 GHz	-56.65 dBm									
Type	Ref	Trc	X-value	Y-value	Function	Function Result																																							
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M4	1		2.4838667 GHz	-56.65 dBm																																									

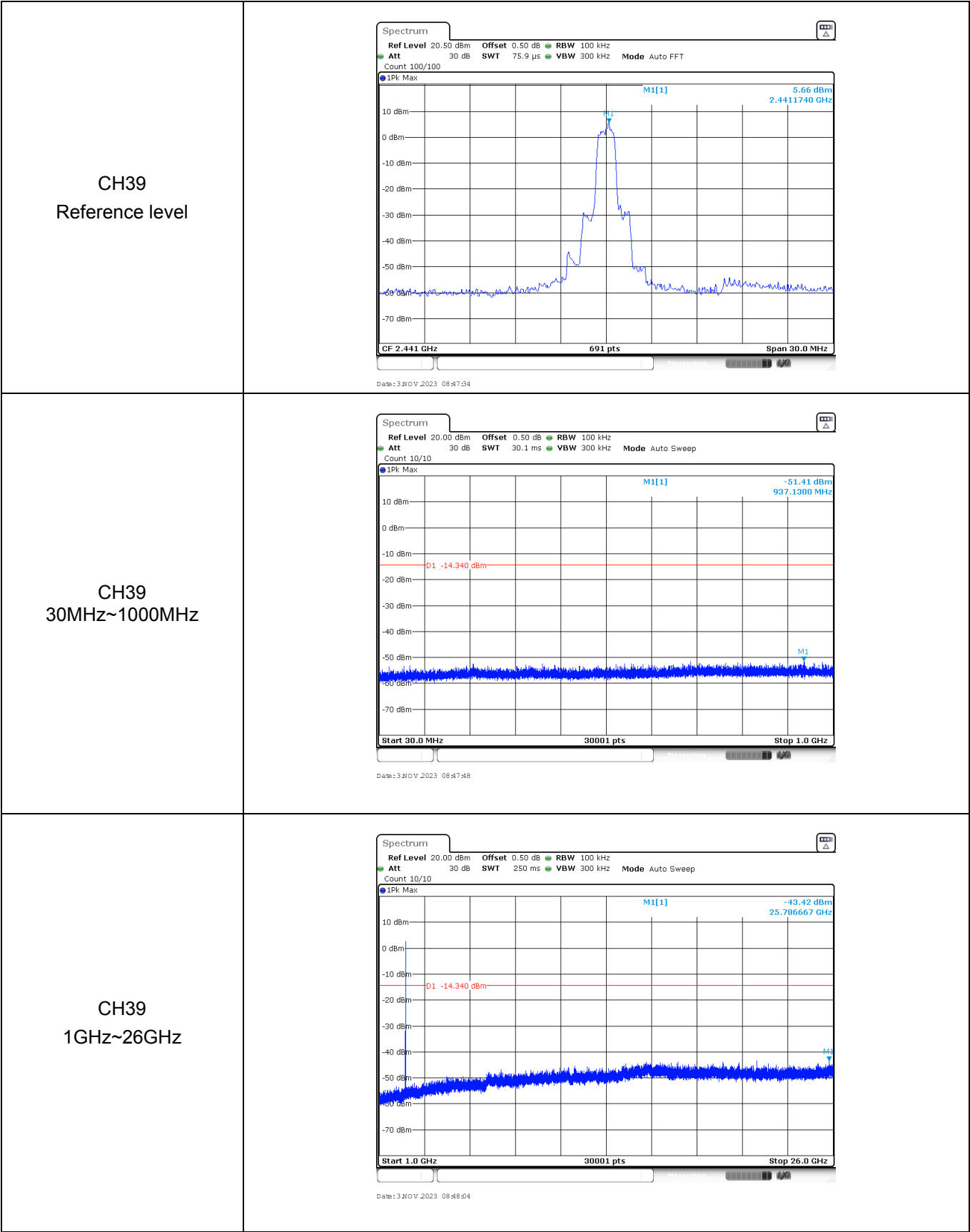


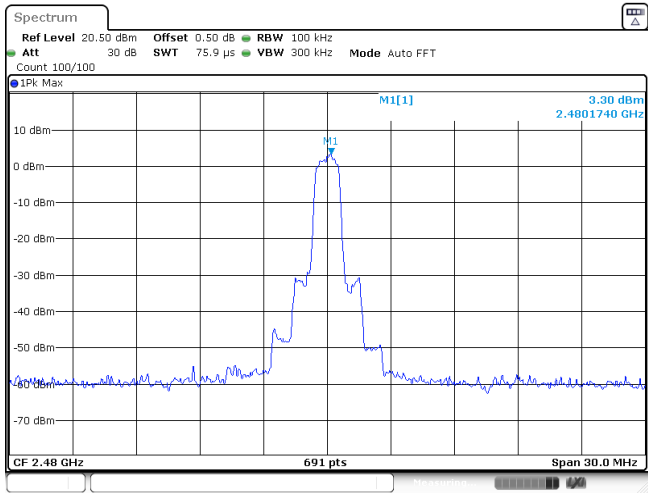
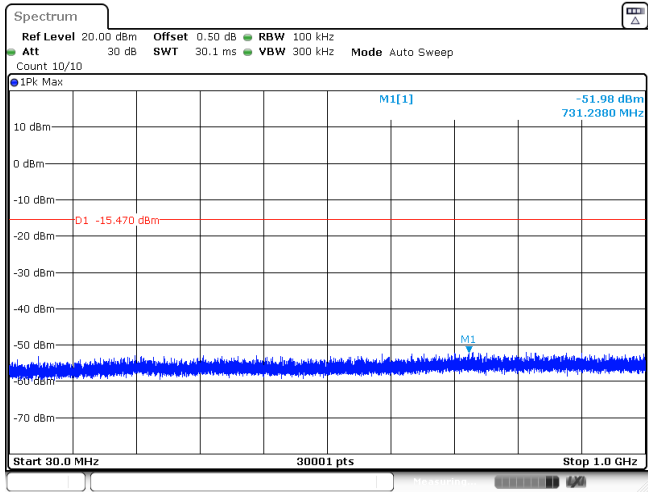
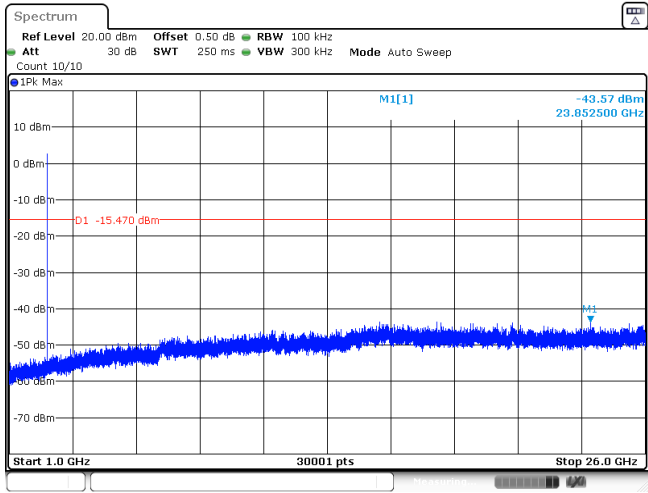
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CH00 1GHz~26GHz			

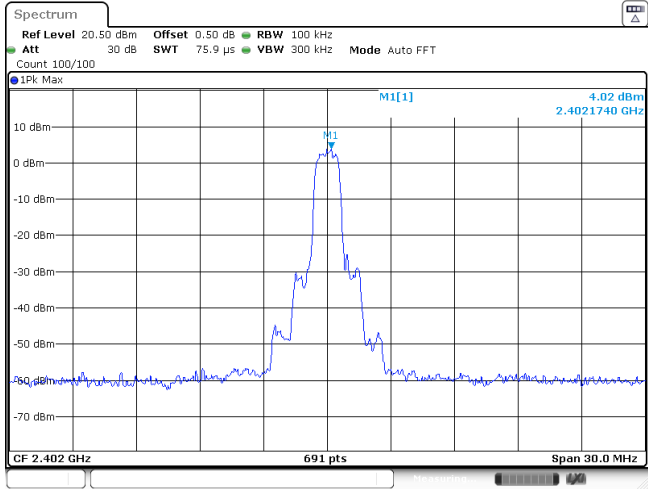
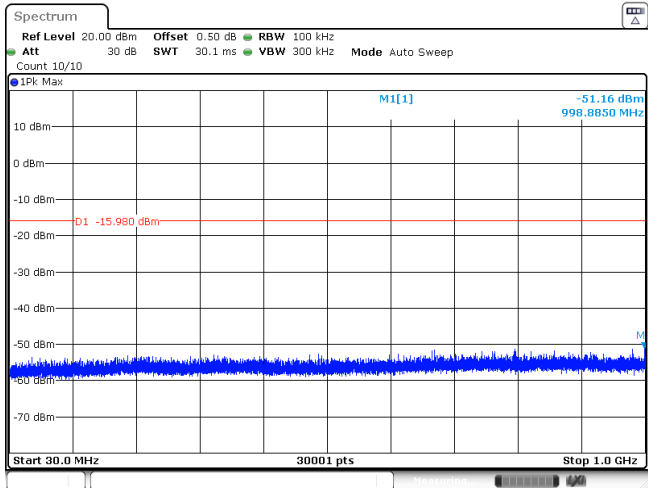
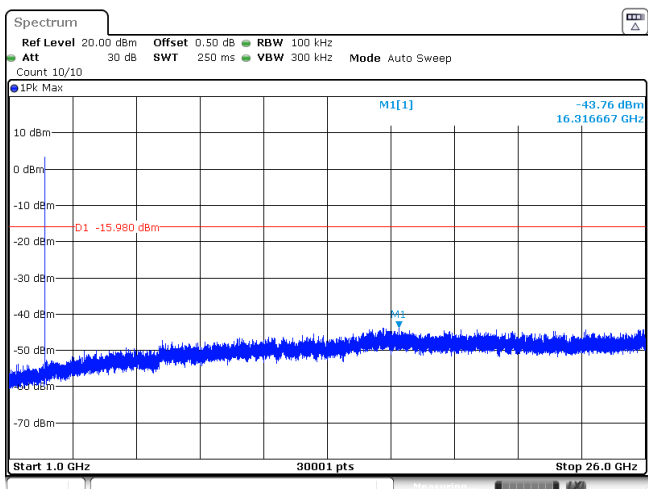
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CH39 30MHz~1000MHz	 -12.170 dBm -51.82 dBm 885.5920 MHz Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 3 NOV 2023 08:41:42
CH39 1GHz~26GHz	 -12.170 dBm -43.26 dBm 25.841667 GHz Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 3 NOV 2023 08:41:57

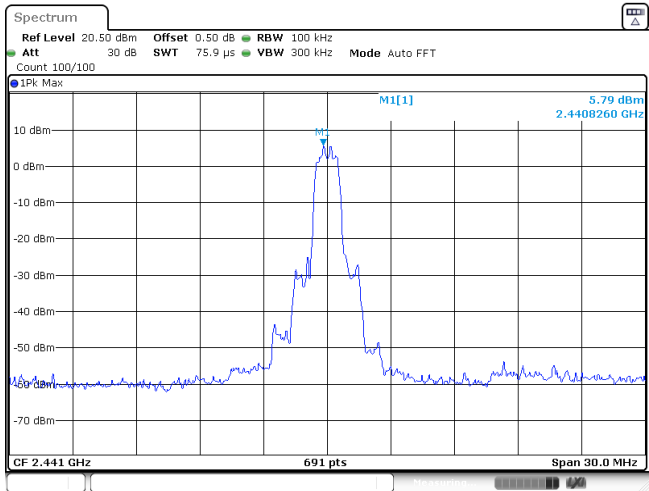
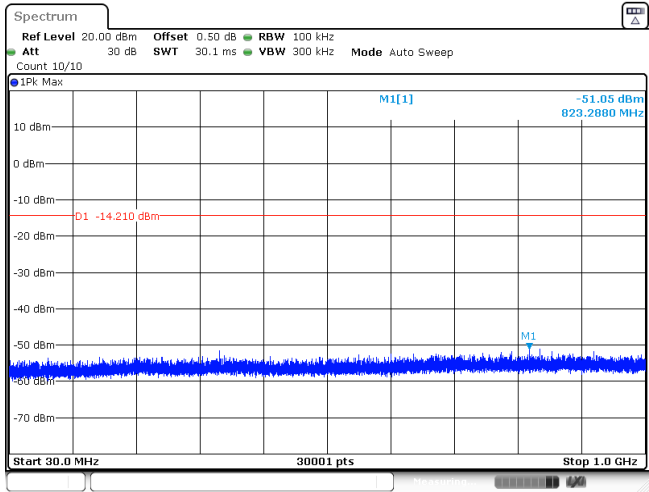
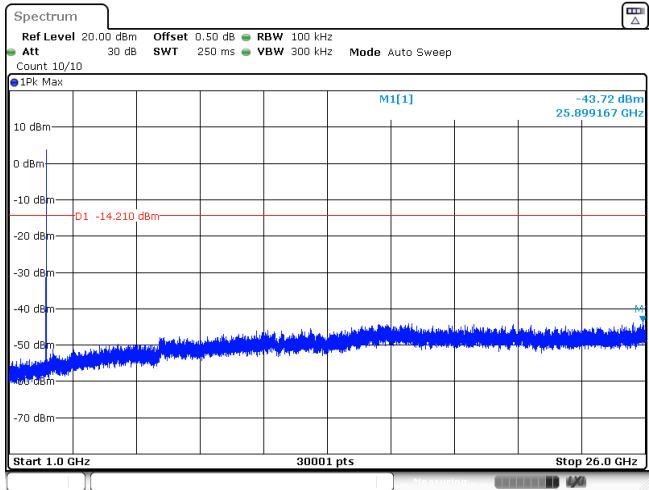
CH78 Reference level	
CH78 30MHz~1000MHz	
CH78 1GHz~26GHz	

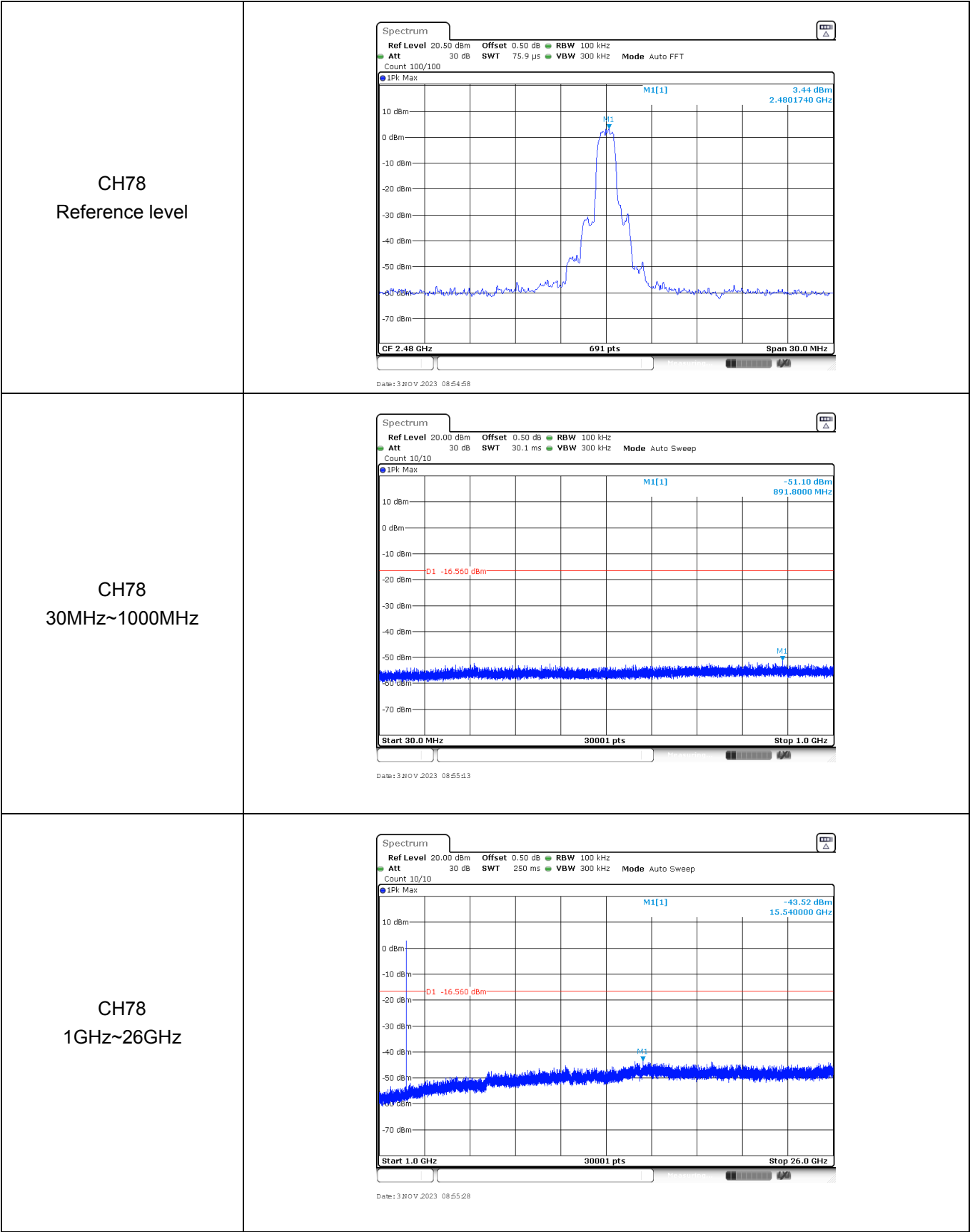
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CH00 30MHz~1000MHz	 Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 3 NOV 2023 08:46:04		
CH00 1GHz~26GHz	 Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 3 NOV 2023 08:46:20		



CH78 Reference level	 3.30 dBm 2.4001740 GHz CF 2.48 GHz 691 pts Span 30.0 MHz Date: 3 NOV 2023 08:49:08
CH78 30MHz~1000MHz	 -51.98 dBm 731.2380 MHz Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 3 NOV 2023 08:49:23
CH78 1GHz~26GHz	 -43.57 dBm 23.852500 GHz Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 3 NOV 2023 08:49:38

Test Item:	Spurious Emission	Modulation type:	8DPSK
CH00 Reference level			
CH00 30MHz~1000MHz			
CH00 1GHz~26GHz			

CH39 Reference level	 5.79 dBm 2.4408260 GHz CF 2.441 GHz 691 pts Span 30.0 MHz Date: 3 NOV 2023 08:52:38
CH39 30MHz~1000MHz	 -51.05 dBm 823.2880 MHz Start 30.0 MHz 30001 pts Stop 1.0 GHz Date: 3 NOV 2023 08:52:53
CH39 1GHz~26GHz	 -43.72 dBm 25.899167 GHz Start 1.0 GHz 30001 pts Stop 26.0 GHz Date: 3 NOV 2023 08:53:09



-----End of Report-----