FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10: 2013 TEST REPORT

For

STEREO TURNTABLE SYSTEM

Model: YY2097C

Data Applies To: N/A

Brand Name: SONY

Issued for

Sony Group Corporation
1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan

Issued By

Compliance Certification Services Inc.

Tainan Lab.

No. 168, Ln. 523, Sec. 3, Zhongzheng Rd.,
Rende Dist., Tainan City, 717017, Taiwan

Issued Date: August 27, 2025

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REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 27, 2025	Initial Issue	All Page	Polly Wang

TABLE OF CONTENTS

TITLE PAGE NO.

1. TEST REPORT CERTIFICATION

Applicant	:	**Sony Group Corporation** 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Manufacturer	:	**Sony Group Corporation** 1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan
Equipment Under Test	:	STEREO TURNTABLE SYSTEM
Model Number	:	YY2097C
Data Applies To	:	N/A
Brand Name	:	SONY
Date of Test	:	July 01, 2025 ~ August 23, 2025

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.10: 2013	PASS
Statements of Conformity	
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.10: 2013** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:

John Chen
Supervisor

2. TEST RESULT SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	3	ANTENNA REQUIREMENT	Pass
15.247(a)(1)	8.1	20dB BANDWIDTH	Pass
15.247(b)(1)	8.2	MAXIMUM PEAK OUTPUT POWER	Pass
15.247(a)(1)	8.3	HOPPING CHANNEL SEPARATION	Pass
15.247(a)(1)(iii)	8.4	NUMBER OF HOPPING FREQUENCY USED	Pass
15.247(a)(1)(iii)	8.5	DWELL TIME	Pass
-	8.6	DUTY CYCLE	-
15.247(d)	8.7	CONDUCTED SPURIOUS EMISSION	Pass
15.247(d)	8.8	RADIATED EMISSIONS	Pass
15.207(a)	8.9	POWERLINE CONDUCTED EMISSIONS	Pass

3. EUT DESCRIPTION

3.1 DESCRIPTION OF EUT & POWER

Product	STEREO TURNTABLE SYSTEM
Model Number	YY2097C
Data Applies To	N/A
Brand Name	SONY
Received Date	June 30, 2025
Reported Date	August 25, 2025
Frequency Range	2402MHz ~ 2480MHz
Transmit Peak Power	GFSK Mode：3.34dBm / 2.16mW π /4-DQPSK Mode : 2.62dBm / 1.83mW 8DPSK: 3.18dBm / 2.08mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK Mode：1 Mbps π /4-DQPSK Mode : 2Mbps 8DPSK Mode : 3Mbps
Modulation Type	Frequency Hopping Spread Spectrum GFSK, π /4-DQPSK, 8-DPSK
Number of Channels	79 Channels for BT1.0~3.0
EUT Power Supply	AC 100-240V
Antenna Type	Manufacturer: Sunitec Type: Layout Antenna Model: TL/TH Gain: 3.0 dBi
Firmware Version	V1.0
Software Version	V1.0

Power Adapter :

Manufacturer	Model No.	Power Input	Power Output
SONY	FJ-SW7260502000DU	100-240V~ 50/60Hz 0.4A Max	DC5V 2.0A

Remark:
1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for **FCC ID: AK8YY2097C** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the User's manual of the EUT.

4. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2402
Middle	2441
High	2480

<u>Radiated Emission Test (Below 1 GHz)</u>:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Normal Operation

<u>Radiated Emission Test (Above 1 GHz)</u>:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	π/4-DQPSK	2DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

Bandedge Measurement :

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	π /4-DQPSK	2DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

Antenna Port Conducted Measurement :

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

Tested Channel	Modulation Technology	Modulation Type	Packet Type
Low, Mid, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	π /4-DQPSK	2DH5
Low, Mid, High	FHSS	8-DPSK	3-DH5

5. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10 : 2013 and FCC CFR 47 15.207, 15.209 and 15.247.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

☐ No.8, Jiucengling, Xinhua Dist., Tainan City 712, Taiwan (R.O.C.)

☒ No. 168, Ln. 523, Sec. 3, Zhongzheng Rd., Rende Dist., Tainan City 717, Taiwan

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.
Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6.3 LABORATORY ACCREDITATIONS LISTINGS

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by TAF or any agency of the Government. In addition, the test facilities are listed with Federal Communications Commission (registration no: TW1109).

6.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

Taiwan	TAF

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada	Industry Canada (ISED#: 2324H)
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

6.5 MEASUREMENT EQUIPMENT USED

For §8.8.2~8.8.3

Chamber 1166 Room (Radiation Test)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	08/29/2024	08/28/2025
Attenuator	MCL	BW-S10W5	0605	01/15/2025	01/14/2026
Notch Filter	MICRO-TRONICS	BRM50702-01	018	01/15/2025	01/14/2026
Bilog Antenna with 6dB Attenuator	SUNOL SCIENCES & EMCI	JB1 & N-6-06	A021306 & AT-N0682	09/27/2024	09/26/2025
Cable	EMCI	EM102-KMKM	CB1166-01	01/15/2025	01/14/2026
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/27/2025	03/26/2026
EMI Test Receiver	R&S	ESCI	101203	10/23/2024	10/22/2025
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/24/2025	07/23/2026
Double Ridged Guide Horn Antenna	ETS.LINDGREN	3117	00078733	04/28/2025	04/27/2026
Pre-Amplifier	EMEC	EM01G40GA	060919/S02-130417-307	05/06/2025	05/05/2026
Software	Excel(ccs-o6-2020 v1.1)，e3(v6.101222)				

For §8.1~8.7 8.8.4

Chamber 1166 Room (Conducted Test)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/24/2025	07/23/2026
SMA Cable+10dB Attenuator	CCS	SMA+10dB ATT	SMA/10dB	01/15/2025	01/14/2026
Software	Excel(ccs-o6-2020 v1.1)				

For §8.9

Conducted Emission room #1					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
BNC Coaxial Cable	CCS	BNC50	11	01/14/2025	01/13/2026
EMI Test Receiver	R&S	ESCI	100782	05/27/2025	05/26/2026
LISN	R&S	ENV216	101495	07/14/2024	07/13/2025
LISN	R&S	NNLK 8130	8130124	01/20/2025	01/19/2026
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	797	01/14/2025	01/13/2026
Test S/W	e3(v6.101222)				

6.6 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

6.7 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

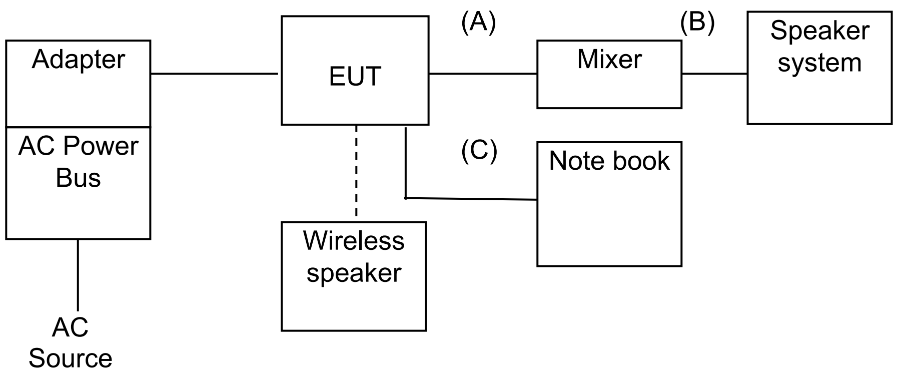
Measurement	Uncertainty
AC Powerline Conducted Emission	±2.21dB
Channel Bandwidth	±2.87 %
RF output power (Spectrum)	±2.88dB
RF Output power (Power Meter & Power sensor)	±0.243dB
Power Density	±2.87dB
Conducted Badnedge	±2.87dB
Conducted Spurious Emission	±2.88dB
Channel Separation	±2.87dB
In-Band Emission (Channel Mask)	±2.88dB
Frequency Stability	±0.03 ppm

This measurement uncertainty is confidence of approximately 95%, k=2

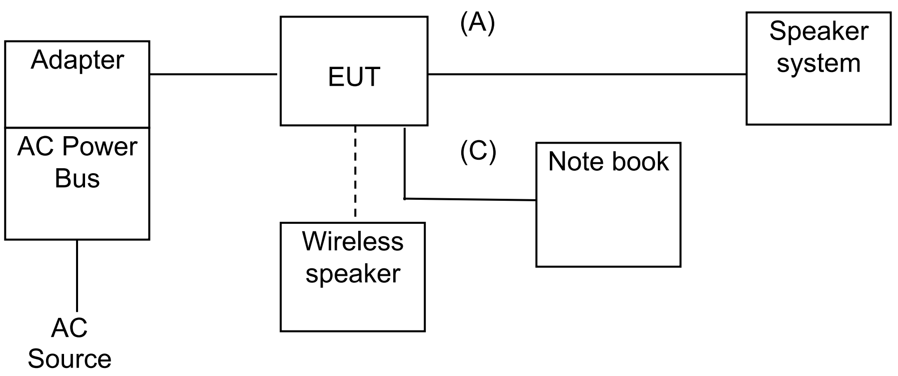
7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

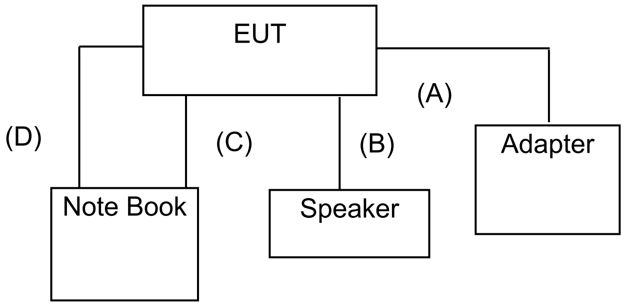
EMI
Phono Mode



Line Mode



RF



7.2 SUPPORT EQUIPMENT

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Speaker System	infotec	SP-102	DOC	Unshielded, 2.0m
2	Wireless Speaker	PHILIPS	TAS1505	DOC	N/A
3	Note Book	ASUS	X515J	DOC	N/A
4	Mixer	akiyama	S2P PHPMU1B17	N/A	N/A

No.	Signal cable description	
A	Audio	Shielded, 1.3m 1 pcs.
B	Audio	Shielded, 1.0m 1 pcs
C	USB	Shielded, 1.5m 1 pcs

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	Speaker System	infotec	SP-102	DOC	Power: Unshielded, 2.0m Audio: Shielded, 1.0m
2	Note Book	ASUS	X515J	DOC	N/A

No.	Signal cable description	
A	Power	Unshielded, 1.5m 1 pcs.
B	Audio	Shielded, 1.3m 1 pcs.
C	USB	Shielded, 1.5m 1 pcs
D	USB	Shielded, 2.9m 1 pcs with 1 core.

Note:
1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2) Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.
3) shd. = shielded; unshd. = unshielded

EUT OPERATING CONDITION

RF Setup

1. Set up all computers like the setup diagram.
2. The “Blue Test 3 V3.3.10.1199” software was used for testing
3.Choose Transport “DEBUG” and Device “USB DBG(100)”

GFSK

TX Mode:

PACKET TX
Channel 1~5 (0-78) > 0,39,78
Payload : Pseudo - random
GFSK(DH1)
Packet Type : DH1 > Packet Length 27
Power(0-11) : 6
GFSK (D3)
Packet Type : DH3 > Packet Length 183
Power(0-11) : 6
GFSK (DH5)
Packet Type : DH5 > Packet Length 339
Power(0-11) : 6

π /4-DQPSK

TX Mode:

PACKET TX
Channel 1~5 (0-78) > 0,39,78
Payload : Pseudo - random
π /4-DQPSK(2DH1)
Packet Type : 2DH1 > Packet Length 54
Power(0-11) : 6
π /4-DQPSK(2DH3)
Packet Type : 2DH3 > Packet Length 367
Power(0-11) : 6
π /4-DQPSK(2DH5)
Packet Type : 2DH5 > Packet Length 679
Power(0-11) : 6

8-DPSK

TX Mode:

PACKET TX

Channel 1~5 (0-78) > 0,39,78

Payload : Pseudo - random

8-DPSK(3DH1)

Packet Type : 3DH1 > Packet Length 83

Power(0-11) : 6

8-DPSK(3DH3)

Packet Type : 3DH3 > Packet Length 552

Power(0-11) : 6

8-DPSK(3DH5)

Packet Type : 3DH5 > Packet Length 1021

Power(0-11) : 6

RX Mode:

PACKET RX

4. All of the function are under run.
5. Start test.

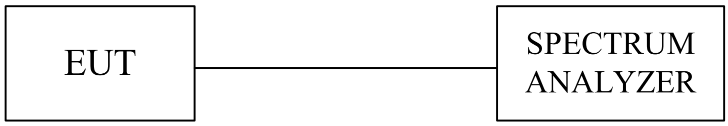
8. APPLICABLE LIMITS AND TEST RESULTS

8.1 20dB BANDWIDTH FOR HOPPING

LIMIT

None; for reporting purposes only.

TEST SETUP



TEST PROCEDURE

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 x RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

TEST RESULTS

Model Name	YY2097C	Test By	Ted Huang
Temp & Humidity	25.8°C, 44%	Test Date	2025/08/22

Modulation Type: GFSK / 3-DH5

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)
Low	2402	1112.37	0.74
Middle	2441	1109.89	0.74
High	2480	1106.13	0.74

Modulation Type: π/4-DQPSK / 2DH5

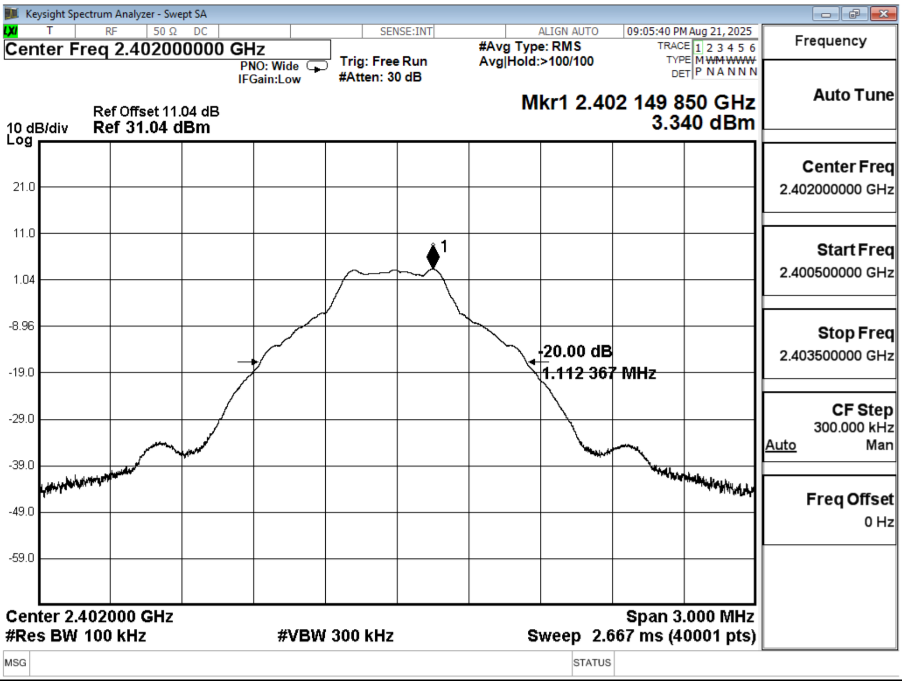
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)
Low	2402	1388.61	0.93
Middle	2441	1390.76	0.93
High	2480	1392.14	0.93

Modulation Type: 8-DPSK / 3-DH5

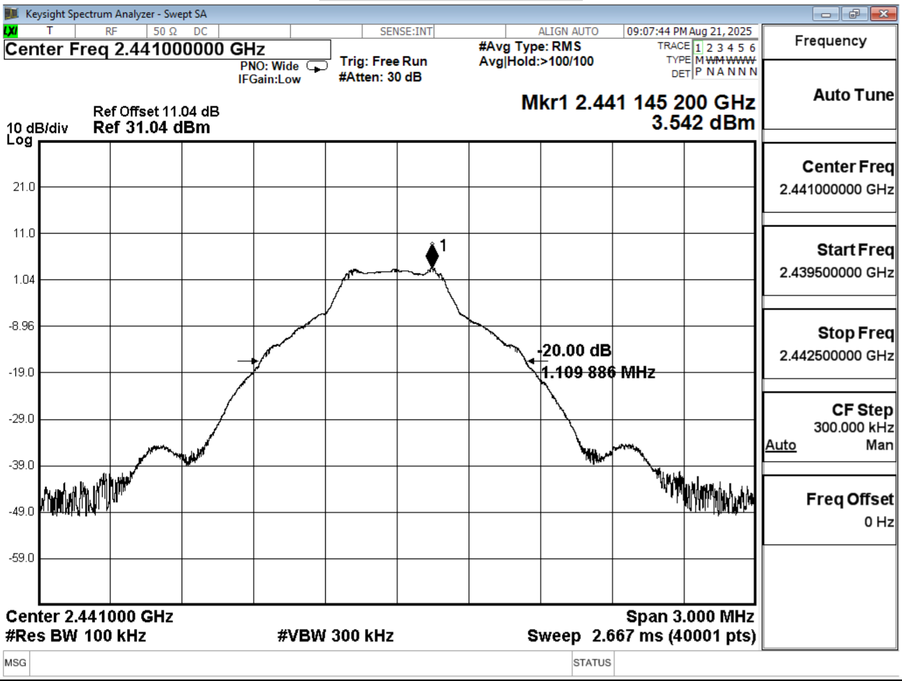
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)
Low	2402	1386.95	0.92
Middle	2441	1387.49	0.92
High	2480	1386.53	0.92

20dB BANDWIDTH

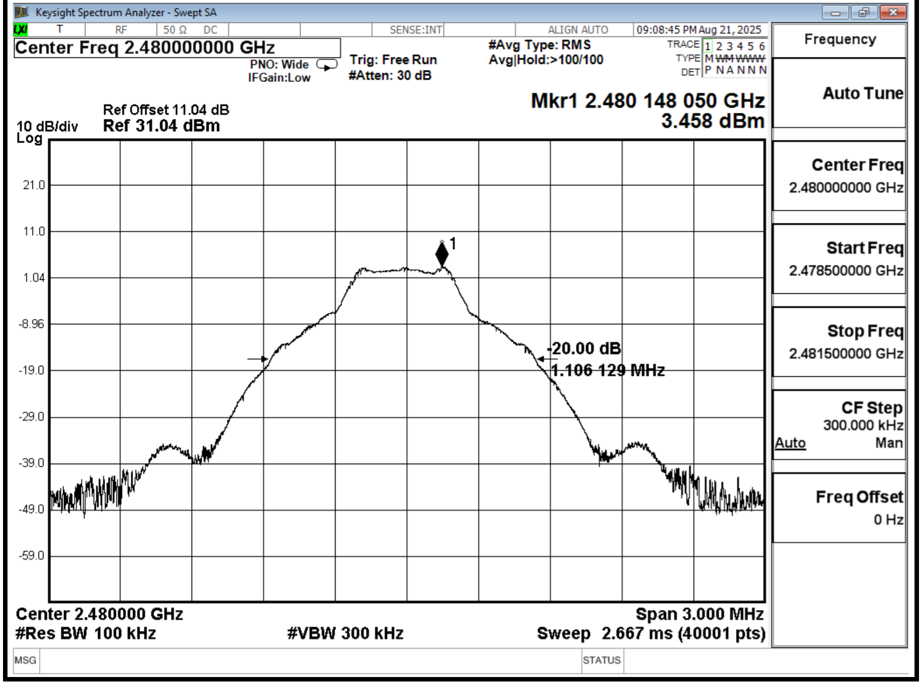
CH Low / GFSK



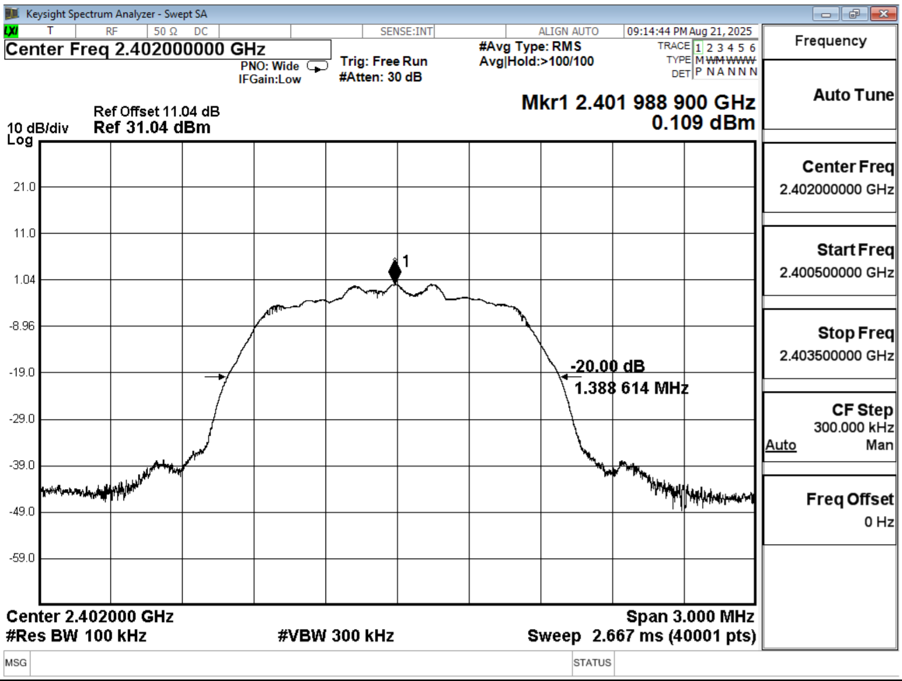
CH Middle / GFSK



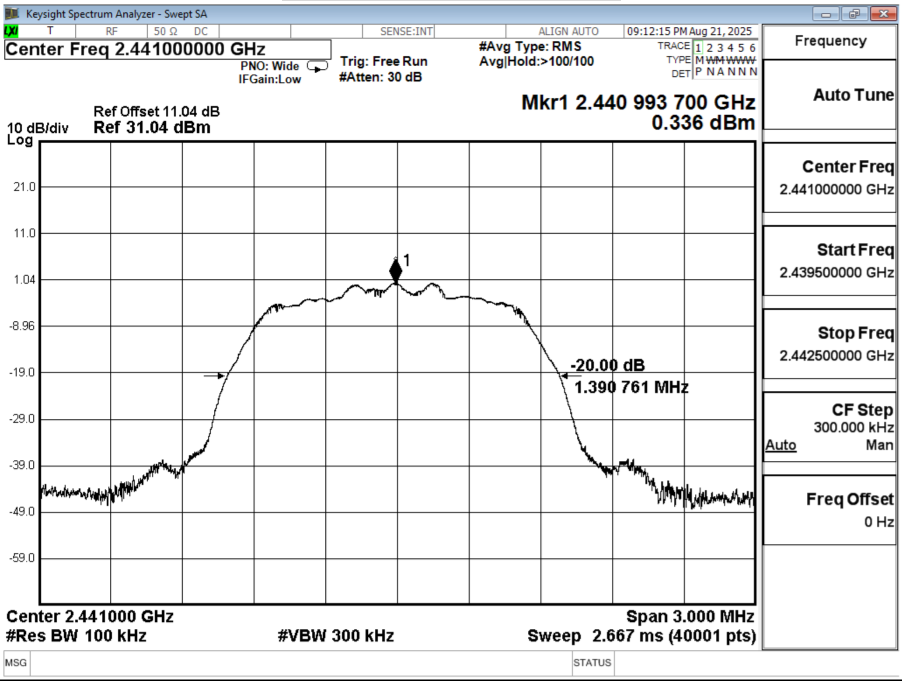
CH High / GFSK


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
09:08:45 PM Aug 21, 2025
Ref Offset 11.04 dB
10 dB/div Ref 31.04 dBm
Log
Mkr1 2.480 148 050 GHz
3.458 dBm
-20.00 dB
1.106 129 MHz
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 2.667 ms (40001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz

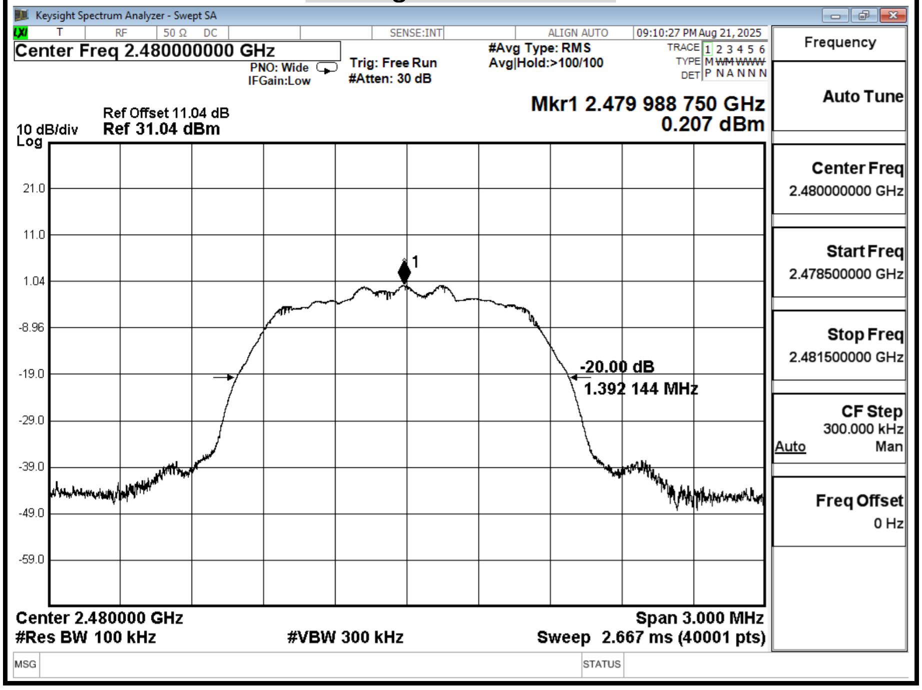
CH Low /π/4-DQPSK



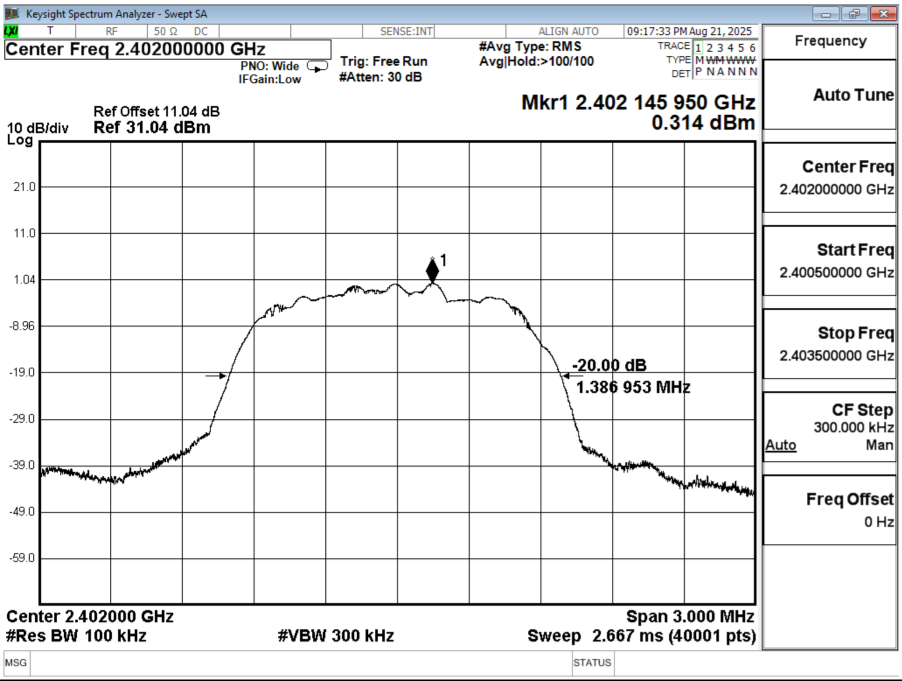
CH Middle /π/4-DQPSK



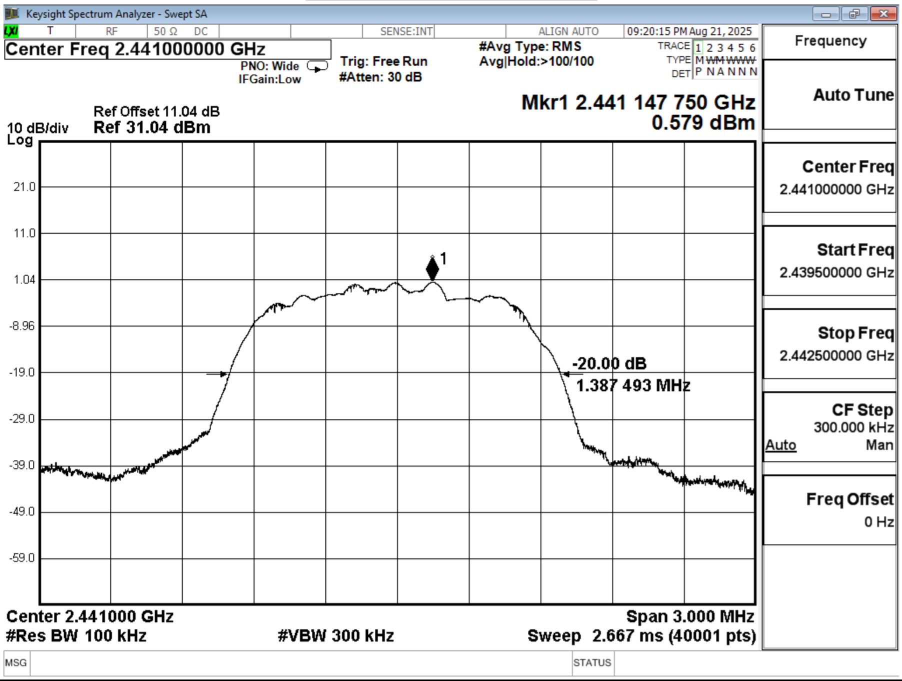
CH High /π/4-DQPSK



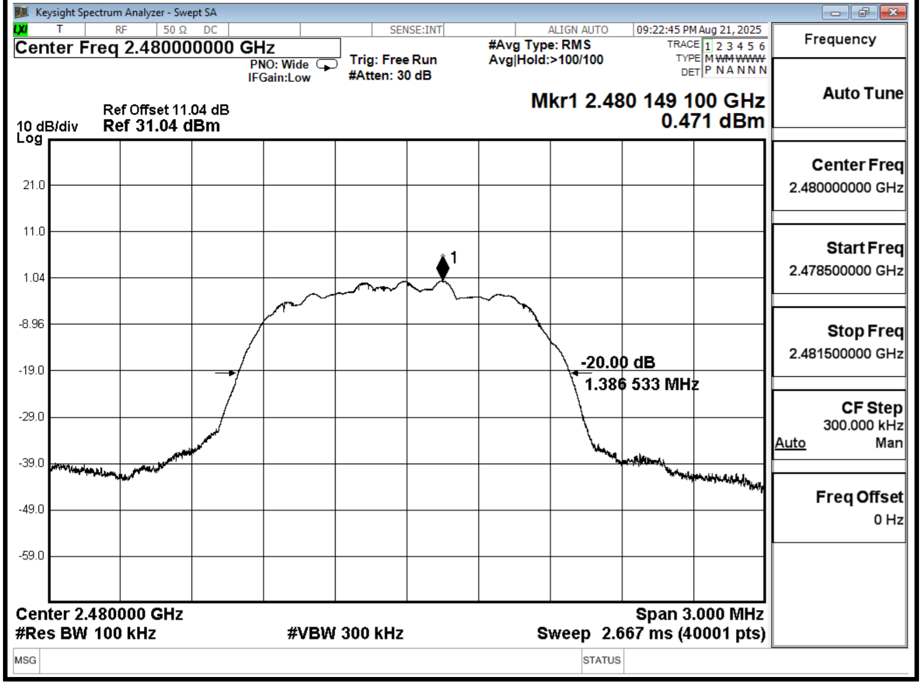
CH Low / 8-DPSK



CH Middle / 8-DPSK



CH High / 8-DPSK

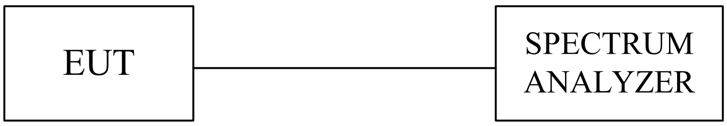


8.2 MAXIMUM PEAK OUTPUT POWER

LIMIT

§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

The RF power output was measured with a Spectrum Analyzer connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency.

Peak Power set:
1. Set the RBW = ≥ DTS bandwidth.
2. Set the VBW ≥ [3 × RBW].
3. Set the span ≥ [1.5 × DTS bandwidth].
4. Detector = peak.
5. Sweep time = auto couple.
6.Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

Average power set:

1. Measure the duty cycle D of the transmitter output signal
2. Set span > 1.5 times the OBW.
3. Set the RBW = 1% ~5% OBW,<1MHz.
4. Set VBW ≥ [3 × RBW].
5. Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
6. Manually set sweep time ≥ [10 × (number of points in sweep) × (total ON/OFF period of the transmitted signal)].
7. Set detector = power averaging(rms).
8. Trace average st least 100 traces.
9. Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW.
10. Add [10 log (1 / D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times.

TEST RESULTS

Model Name	YY2097C	Test By	Ted Huang
Temp & Humidity	25.8°C, 44%	Test Date	2025/08/22

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	3.05	2.02	125	PASS
Mid	2441	3.34	2.16		PASS
High	2480	3.31	2.14		PASS

Modulation Type: π/4-DQPSK / 2DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	2.41	1.74	125	PASS
Mid	2441	2.62	1.83		PASS
High	2480	2.59	1.82		PASS

Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	2.97	1.98	125	PASS
Mid	2441	3.17	2.07		PASS
High	2480	3.18	2.08		PASS

Average Power Data

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	1.86	1.10	2.96
Middle	2441	2.09	1.10	3.19
High	2480	2.08	1.10	3.18

Modulation Type: π/4-DQPSK / 2DH5

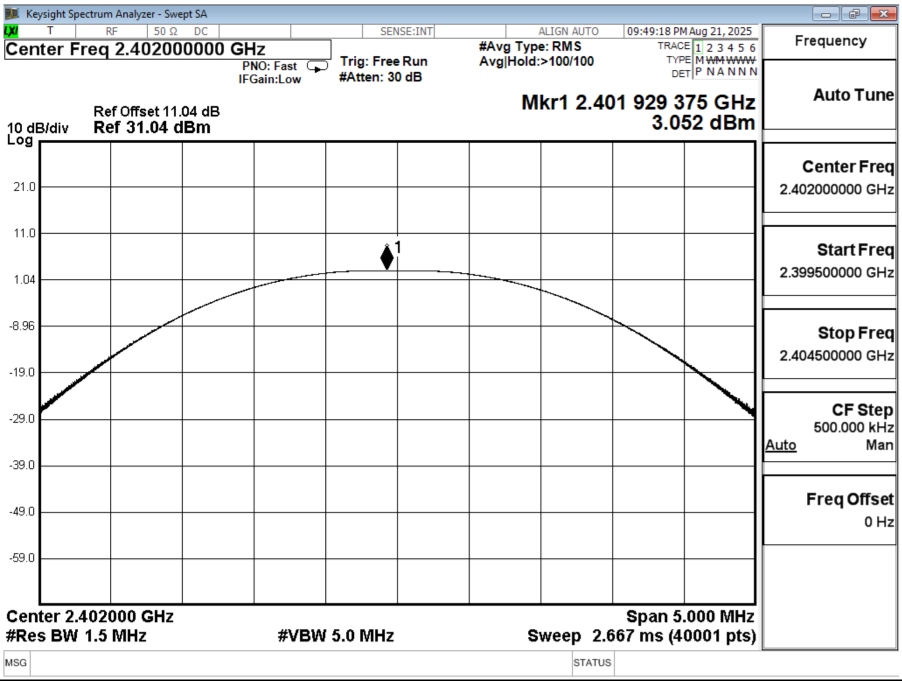
Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	-1.06	1.10	0.04
Middle	2441	-1.09	1.10	0.01
High	2480	-0.99	1.10	0.11

Modulation Type: 8-DPSK / 3-DH5

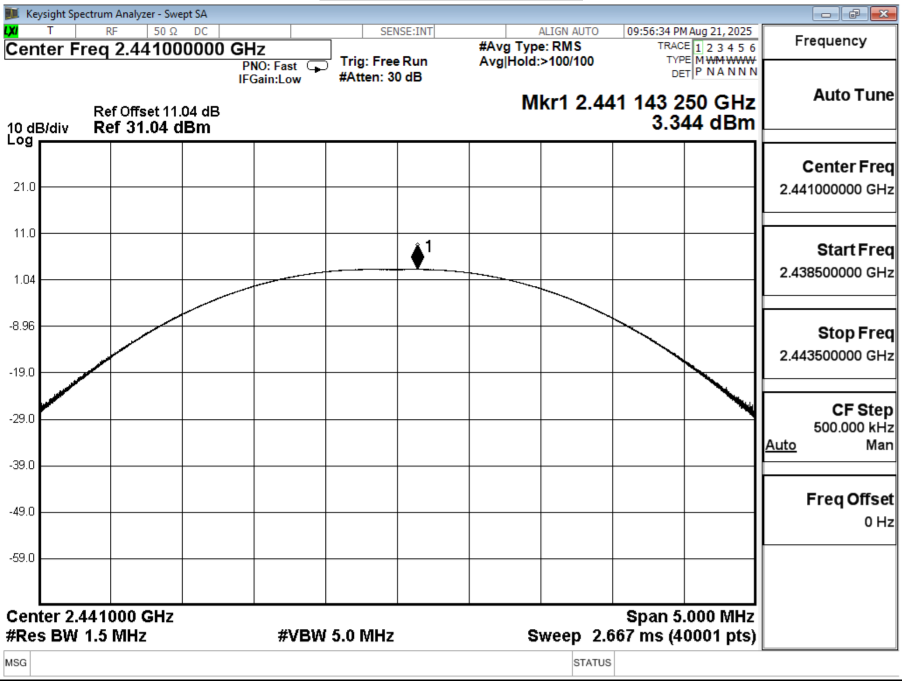
Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	-1.18	1.10	-0.08
Middle	2441	-0.95	1.10	0.15
High	2480	-0.98	1.10	0.12

MAXIMUM PEAK OUTPUT POWER

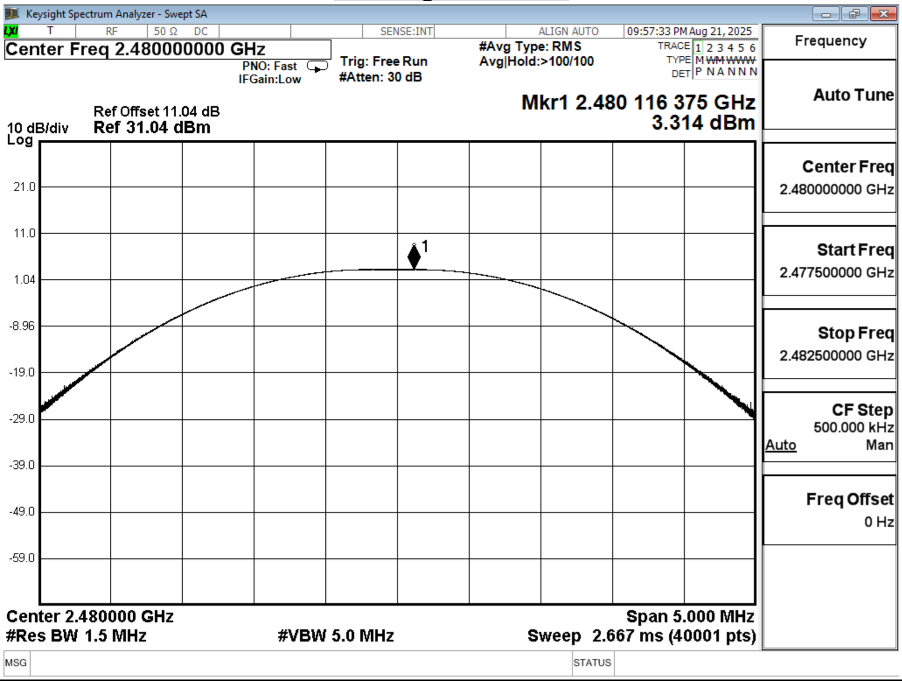
CH Low / GFSK



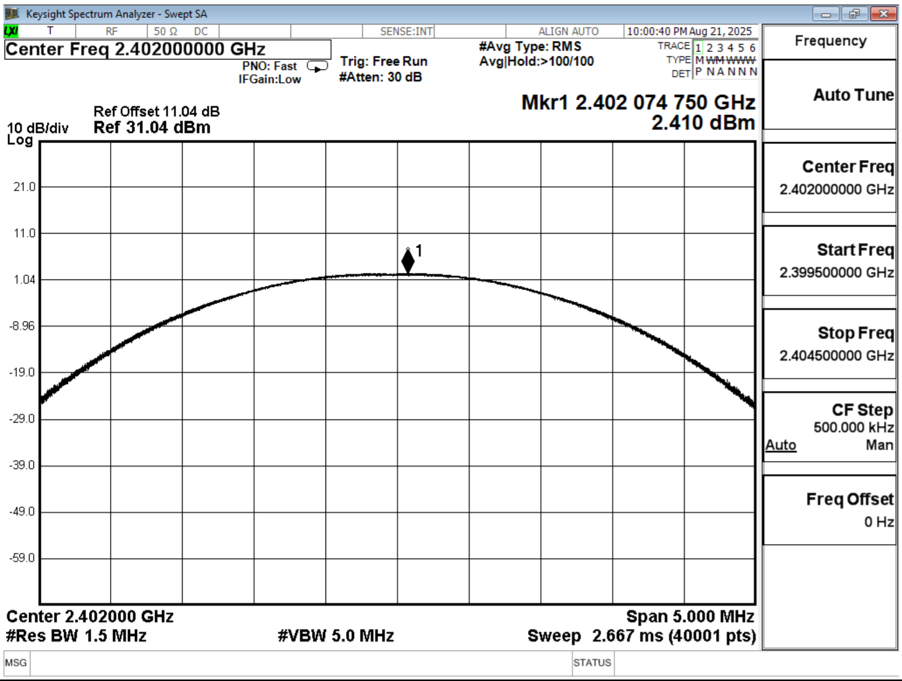
CH Middle / GFSK



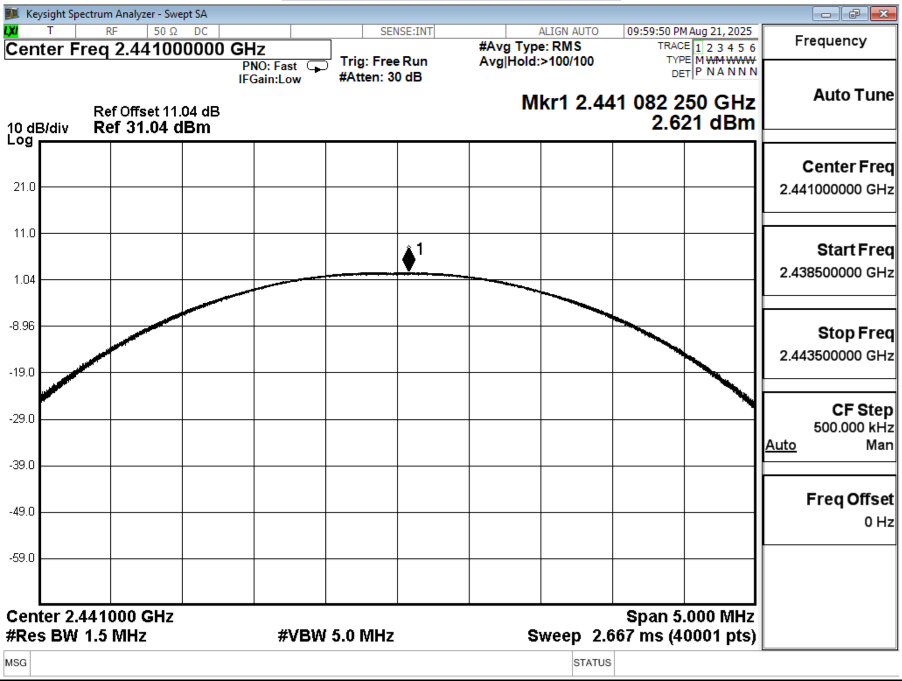
CH High / GFSK

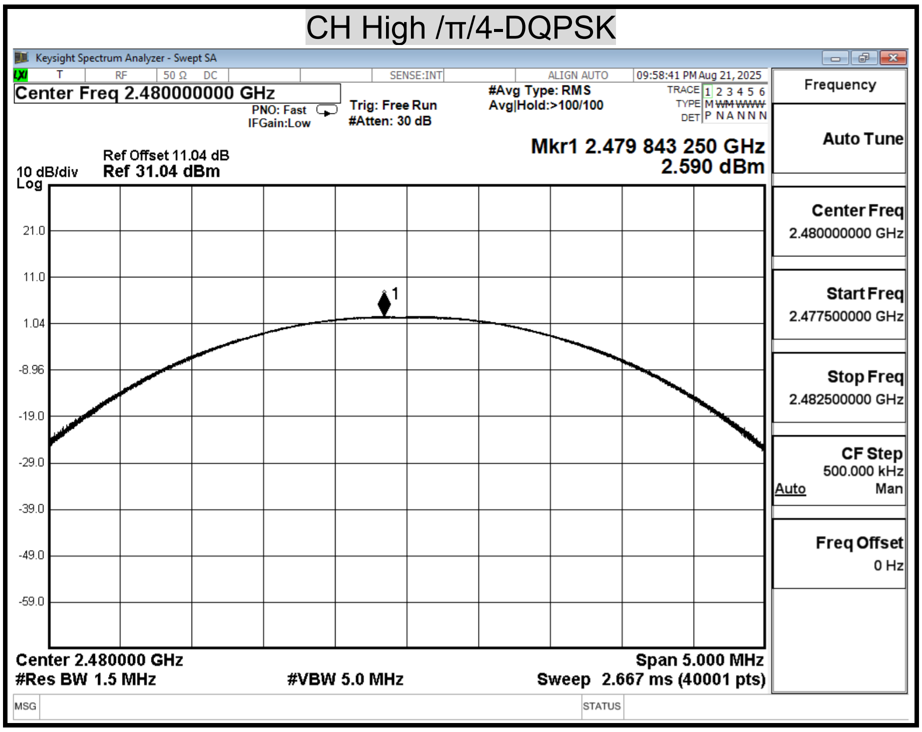

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
09:57:33 PM Aug 21, 2025
Ref Offset 11.04 dB
10 dB/div Ref 31.04 dBm
Log
Mkr1 2.480 116 375 GHz
3.314 dBm
21.0
11.0
1.04
-8.96
-19.0
-29.0
-39.0
-49.0
-59.0
Center 2.480000 GHz
#Res BW 1.5 MHz
#VBW 5.0 MHz
Span 5.000 MHz
Sweep 2.667 ms (40001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

CH Low /π/4-DQPSK

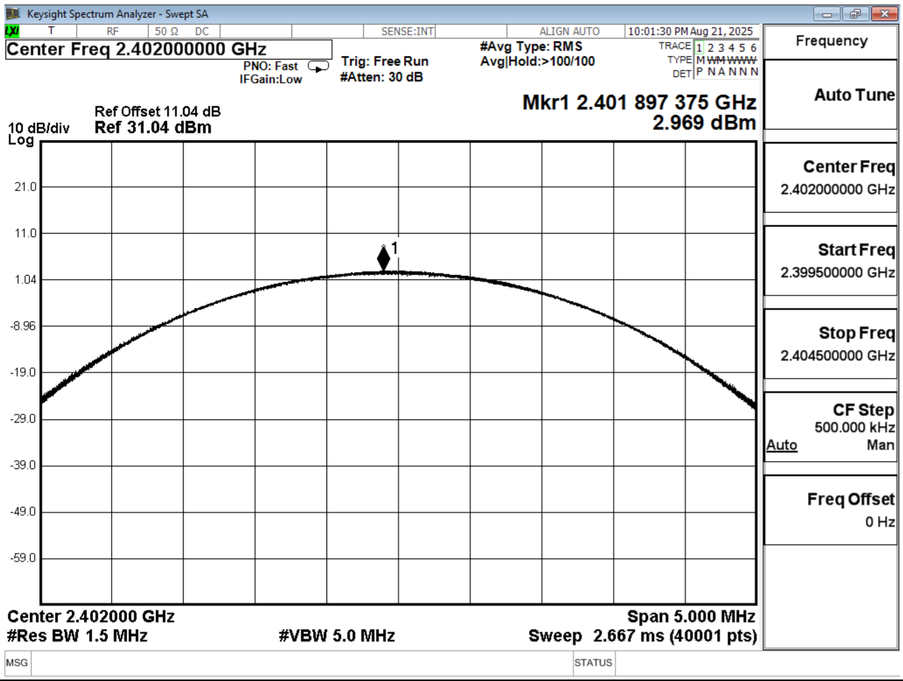


CH Middle /π/4-DQPSK

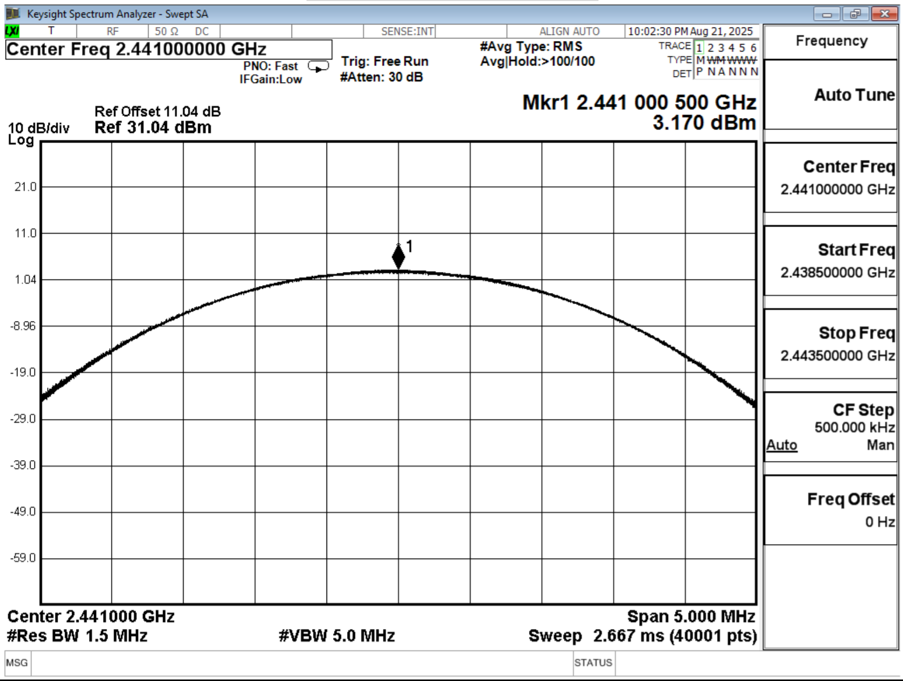



CH High /π/4-DQPSK
Keysight Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
09:58:41 PM Aug 21, 2025
Ref Offset 11.04 dB
10 dB/div Ref 31.04 dBm
Log
Mkr1 2.479 843 250 GHz
2.590 dBm
21.0
11.0
1.04
-8.96
-19.0
-29.0
-39.0
-49.0
-59.0
Center 2.480000 GHz
#Res BW 1.5 MHz
#VBW 5.0 MHz
Span 5.000 MHz
Sweep 2.667 ms (40001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS

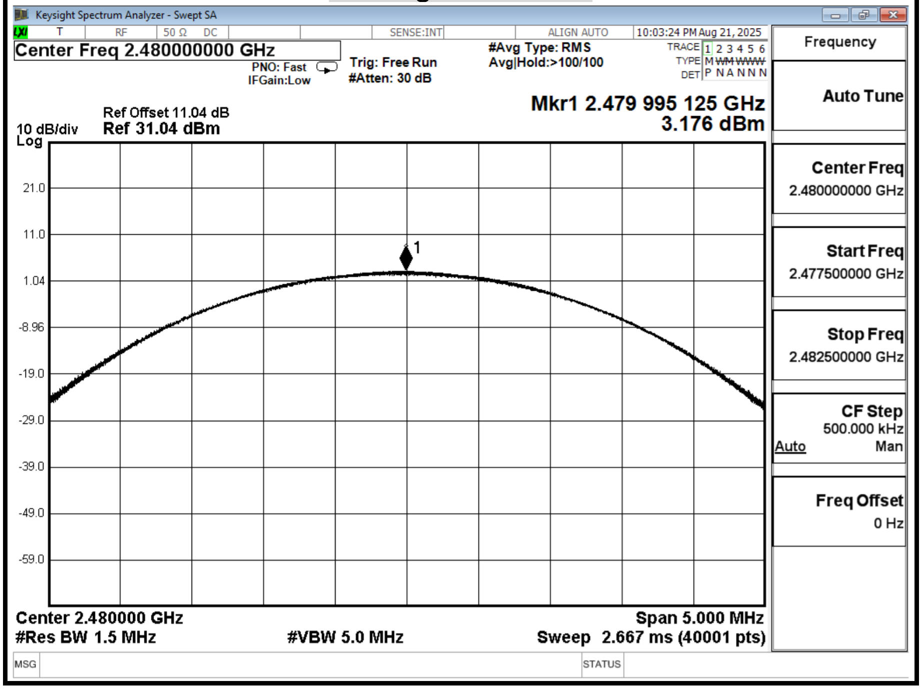
CH Low / 8-DPSK



CH Middle / 8-DPSK

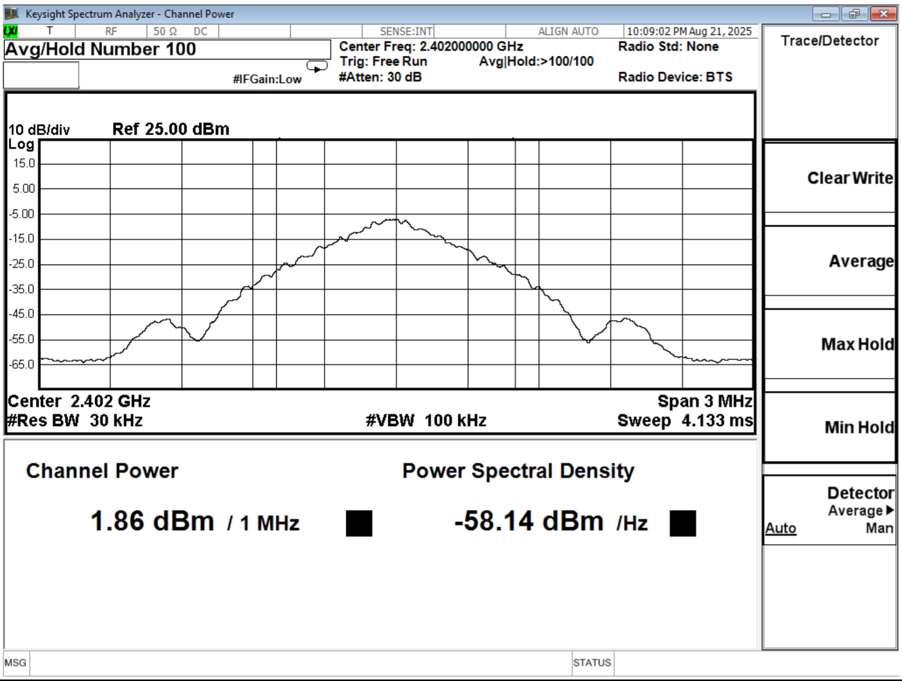


CH High / 8-DPSK

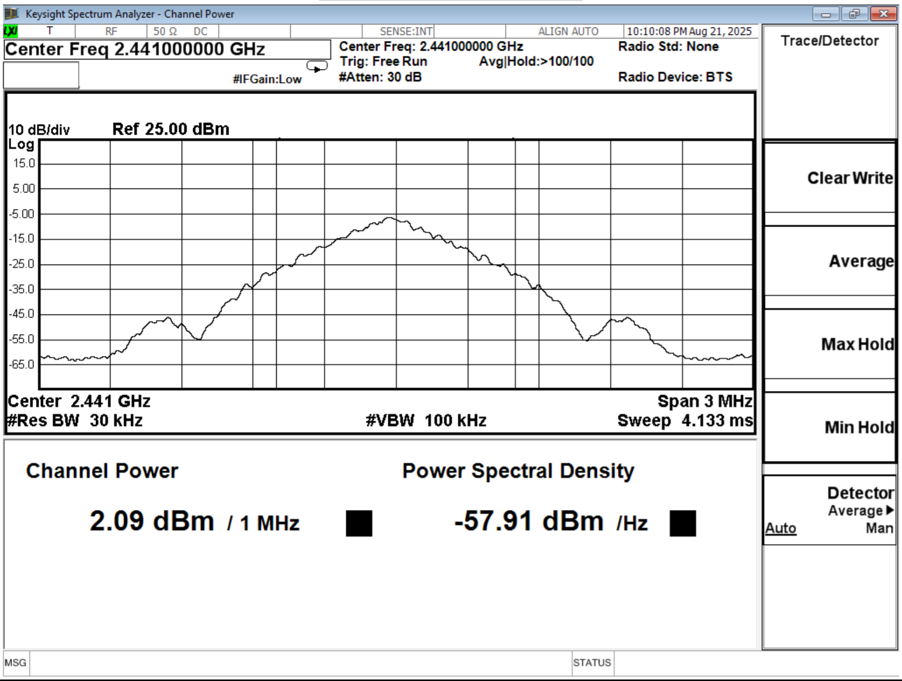


AVERAGE POWER

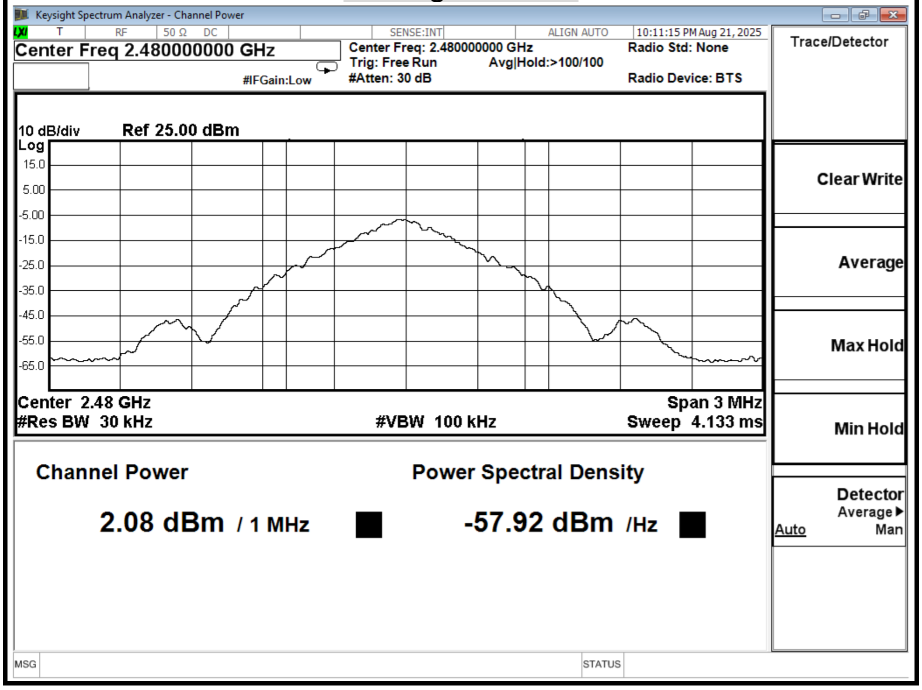
CH Low / GFSK



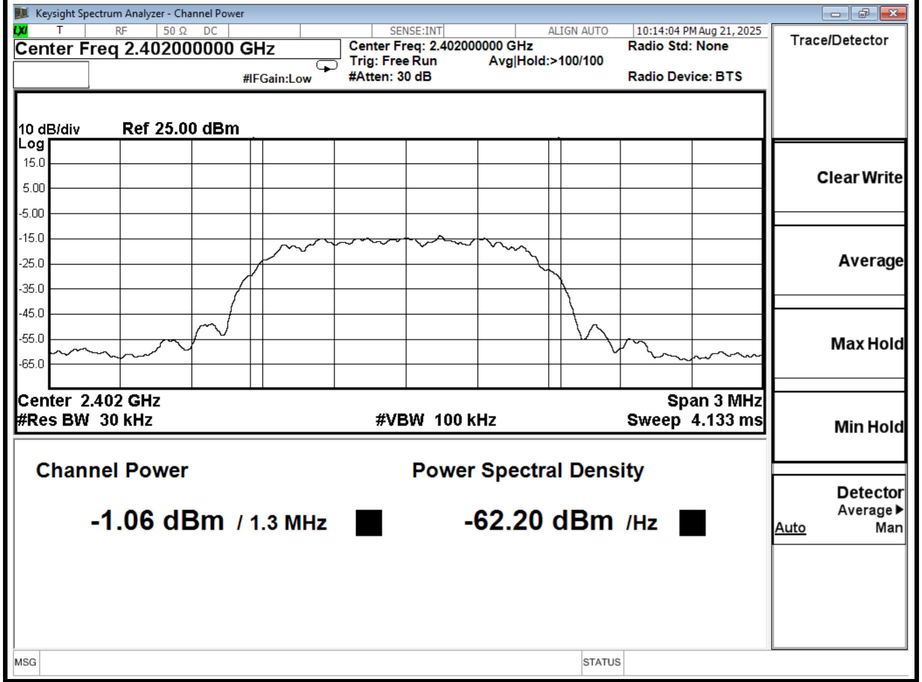
CH Middle / GFSK



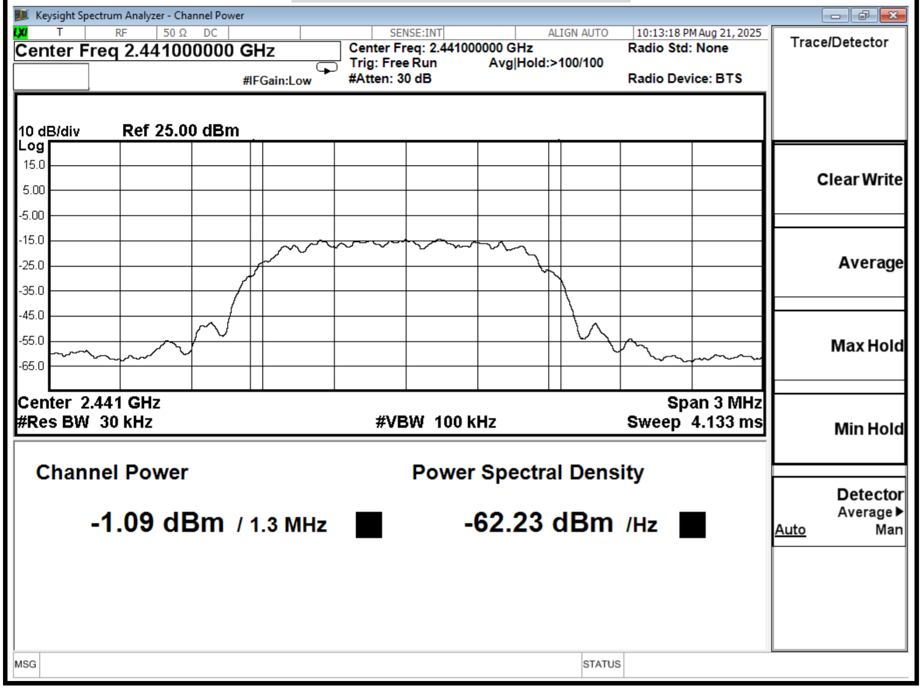
CH High / GFSK


Keysight Spectrum Analyzer - Channel Power
SENSE:INT
ALIGN AUTO
10:11:15 PM Aug 21, 2025
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>100/100
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Trace/Detector
10 dB/div
Log
Ref 25.00 dBm
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 4.133 ms
Clear Write
Average
Max Hold
Min Hold
Detector
Average
Auto
Man
Channel Power
2.08 dBm / 1 MHz
Power Spectral Density
-57.92 dBm /Hz
MSG
STATUS

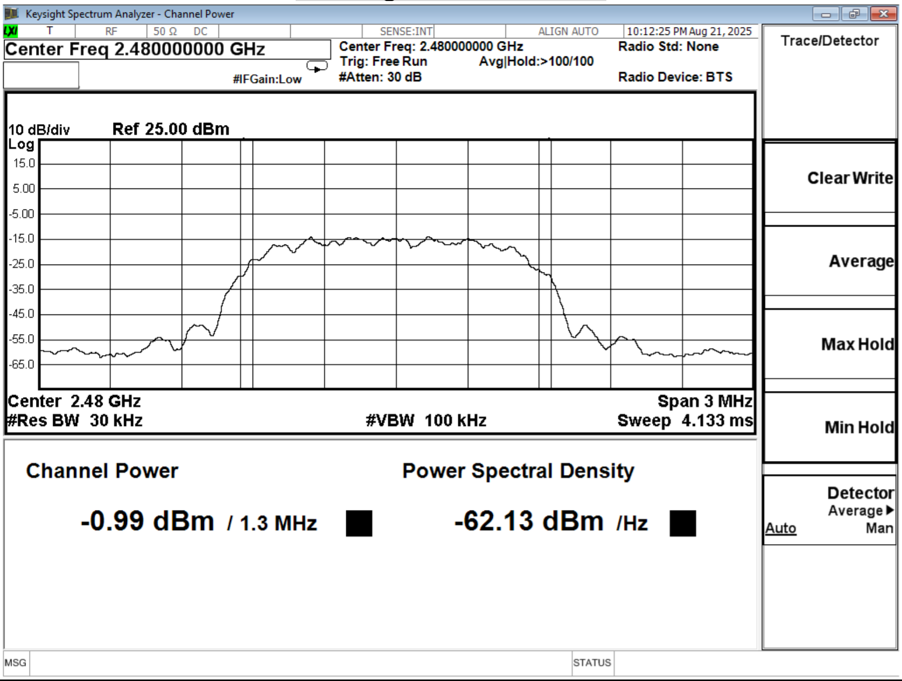
CH Low /π/4-DQPSK



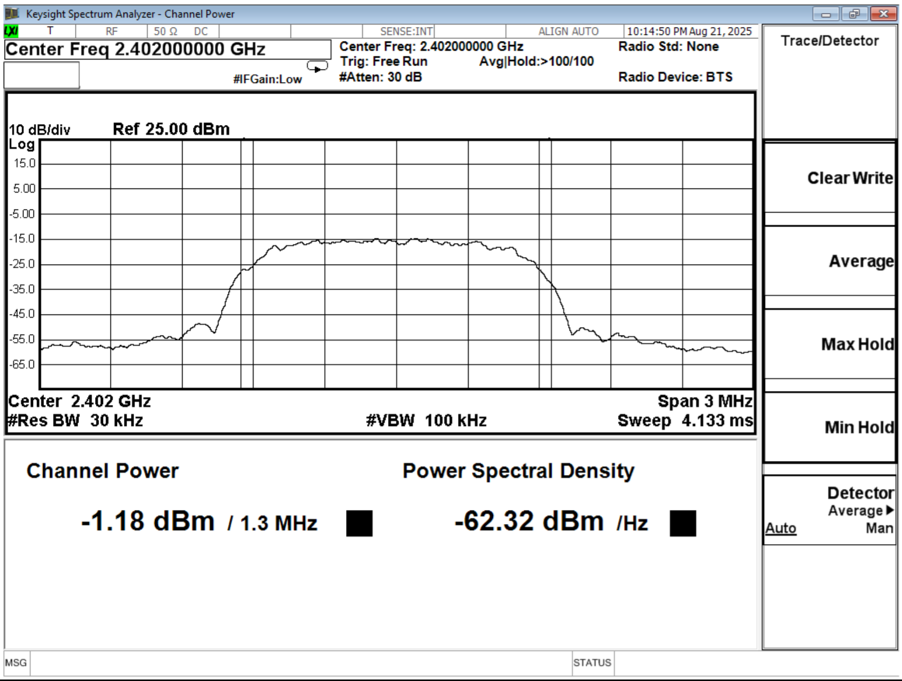
CH Middle /π/4-DQPSK



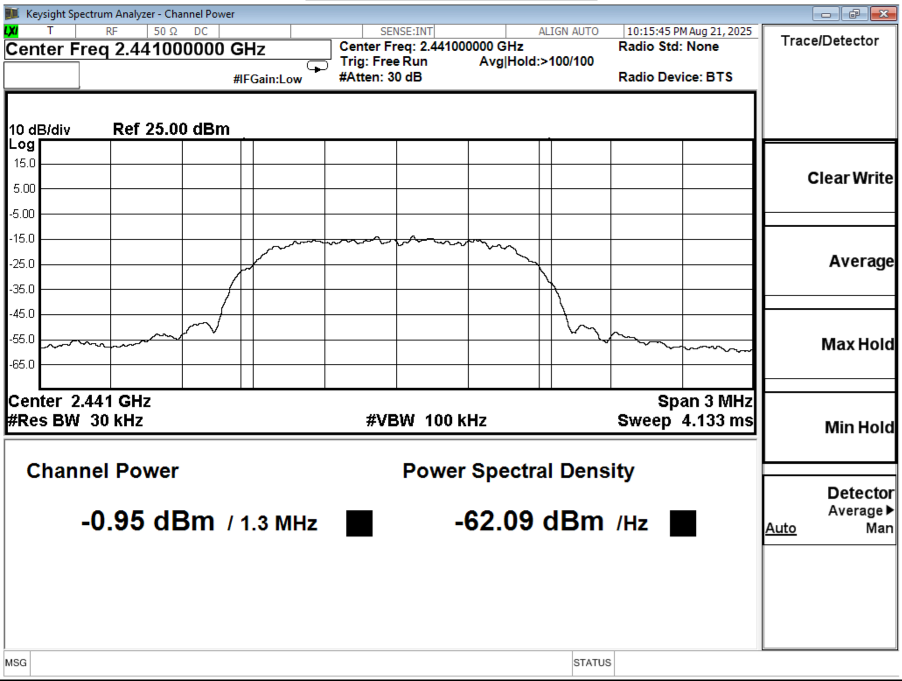
CH High /π/4-DQPSK



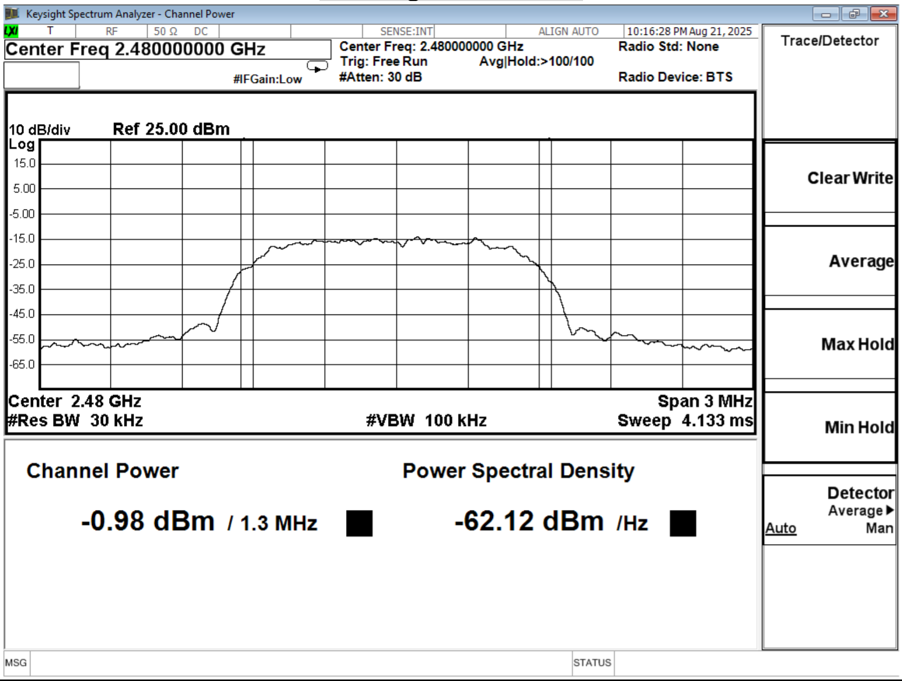
CH Low / 8-DPSK



CH Middle / 8-DPSK



CH High / 8-DPSK



8.3 HOPPING CHANNEL SEPARATION

LIMIT

§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.

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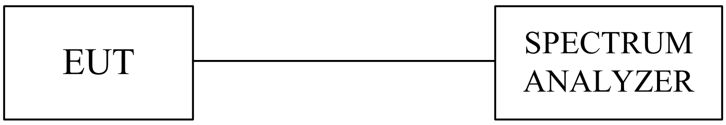
TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of adjacent channels.
4. Measure the frequency difference of these two adjacent channels by spectrum analyzer MARK function. And then plot the result on spectrum analyzer screen.
5. Repeat above procedures until all frequencies measured were complete.

TEST RESULTS

Refer to section 8.1, 20dB bandwidth measurement, the measured channel separation should be greater than two-third of 20dB bandwidth or Minimum bandwidth.

Model Name	YY2097C	Test By	Ted Huang
Temp & Humidity	25.8°C, 44%	Test Date	2025/08/22

Modulation Type: GFSK / DH5

Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.74	25	PASS
2441MHz	1.00	0.74	25	PASS
2480MHz	1.00	0.74	25	PASS

Modulation Type: π/4-DQPSK / 2DH5

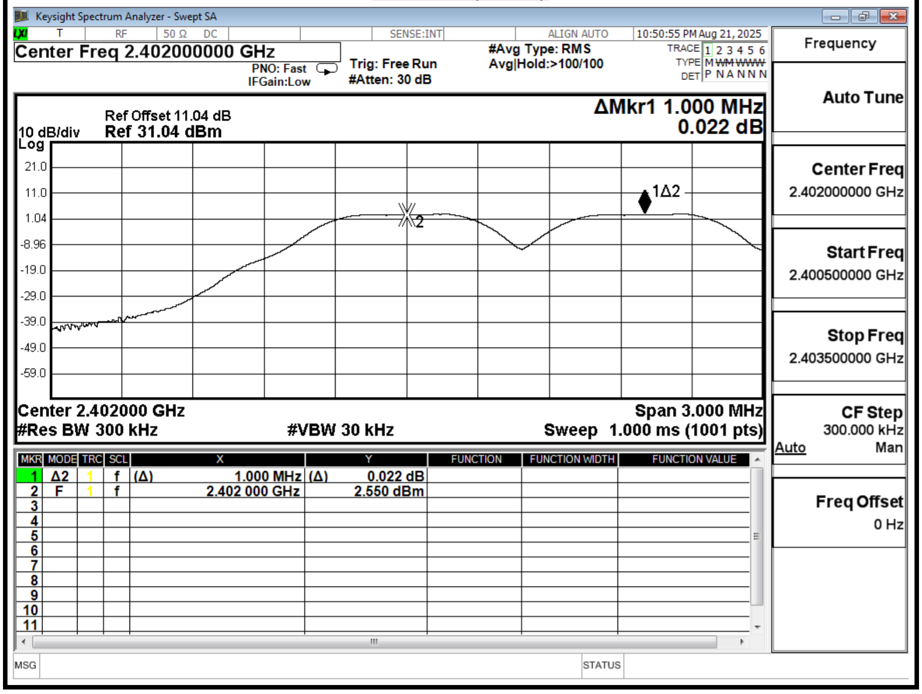
Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.93	25	PASS
2441MHz	1.00	0.93	25	PASS
2480MHz	1.00	0.93	25	PASS

Modulation Type: 8-DPSK / 3-DH5

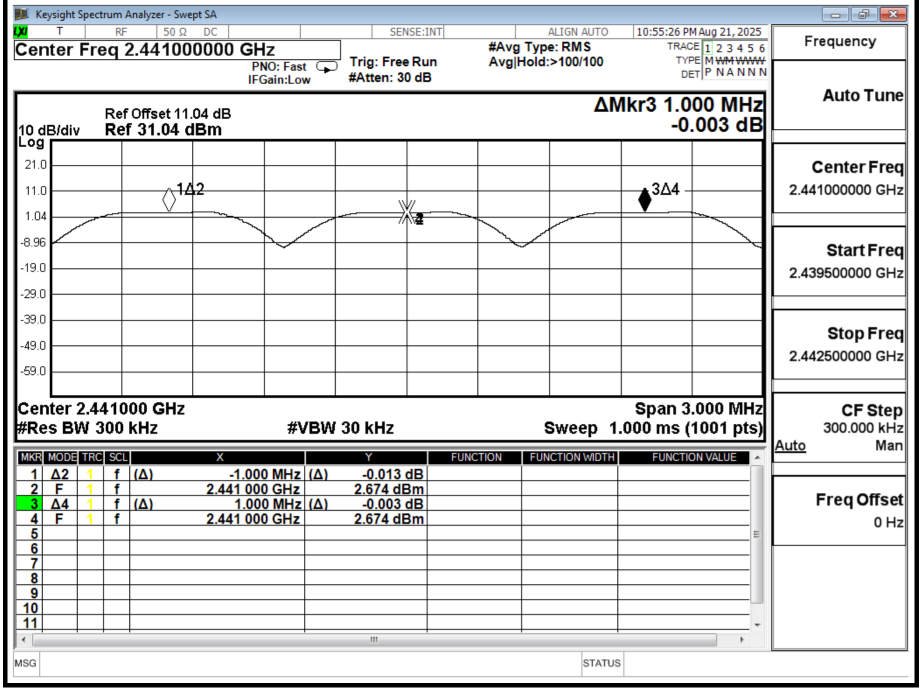
Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.92	25	PASS
2441MHz	1.00	0.92	25	PASS
2480MHz	1.00	0.92	25	PASS

HOPPING CHANNEL SEPARATION

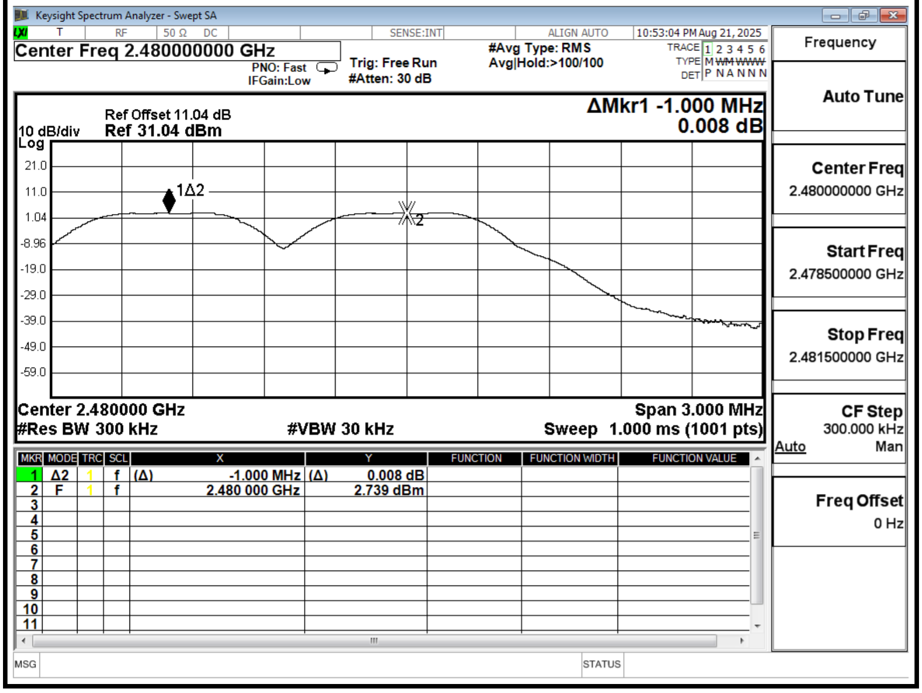
GFSK (Low)



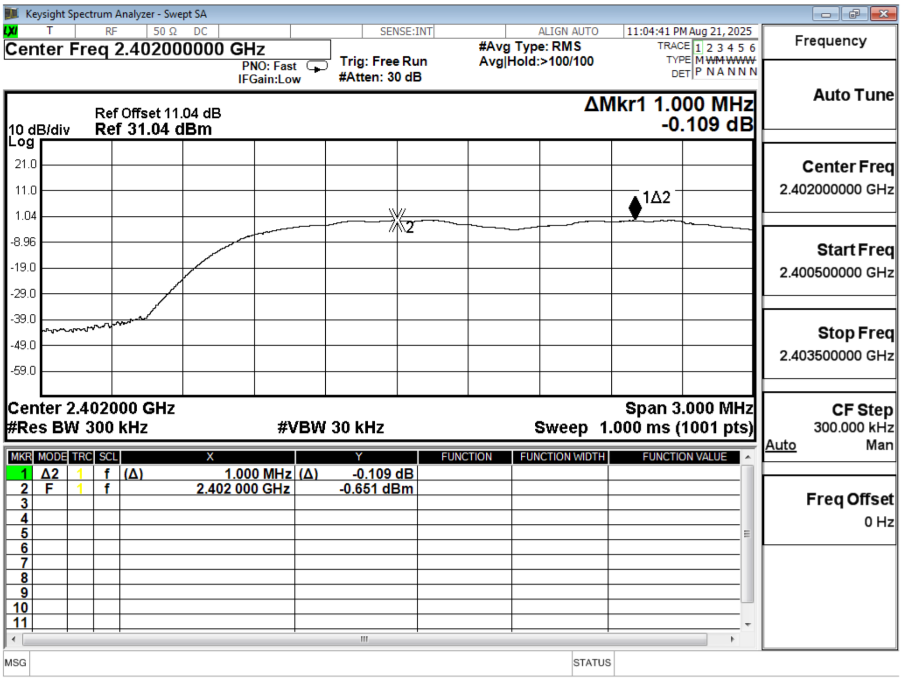
GFSK (Middle)



GFSK (High)

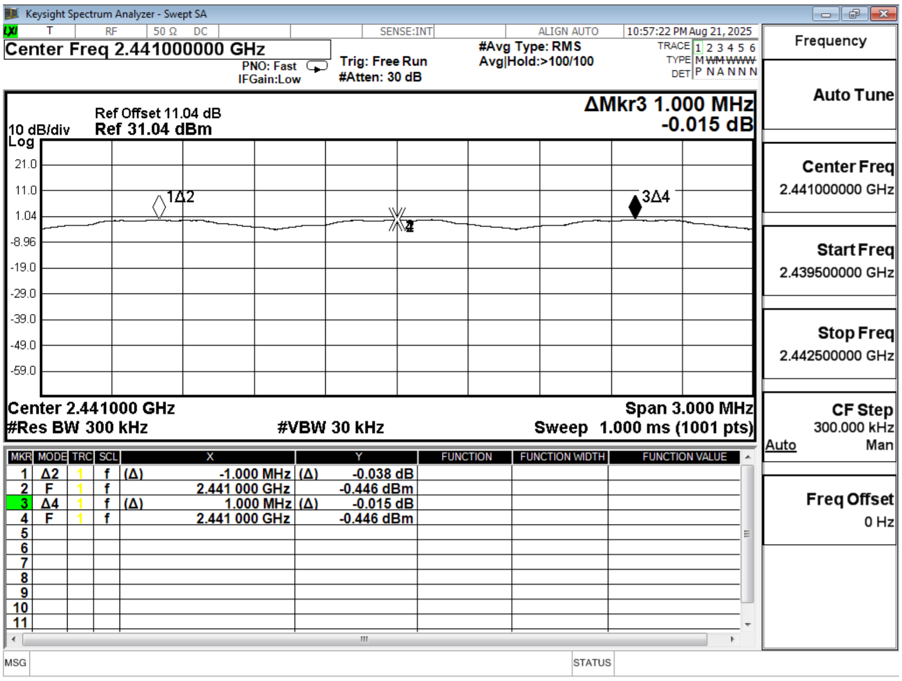


π/4-DQPSK (Low)

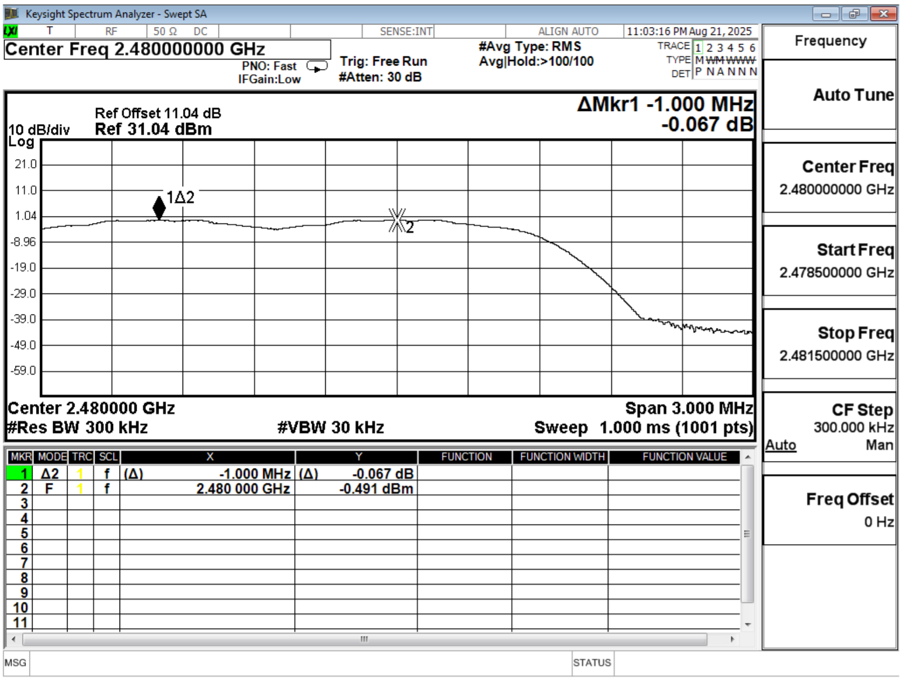

Keysight Spectrum Analyzer - Swept SA
Center Freq 2.402000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
11:04:41 PM Aug 21, 2025
Ref Offset 11.04 dB
10 dB/div
Ref 31.04 dBm
ΔMkr1 1.000 MHz
-0.109 dB
Center 2.402000 GHz
#Res BW 300 kHz
#VBW 30 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 Δ2 1 f (Δ) 1.000 MHz (Δ) -0.109 dB
2 F 1 f 2.402 000 GHz -0.651 dBm
Frequency
Auto Tune
Center Freq 2.402000000 GHz
Start Freq 2.400500000 GHz
Stop Freq 2.403500000 GHz
CF Step 300.000 kHz
Freq Offset 0 Hz

Report No.: TMTN2506000667NR

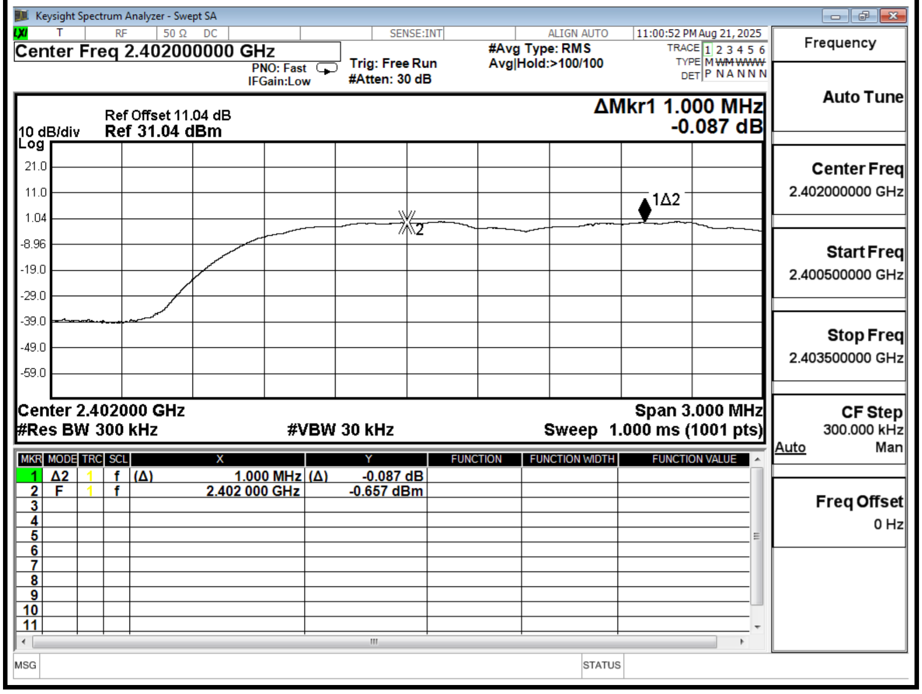
π/4-DQPSK (Middle)



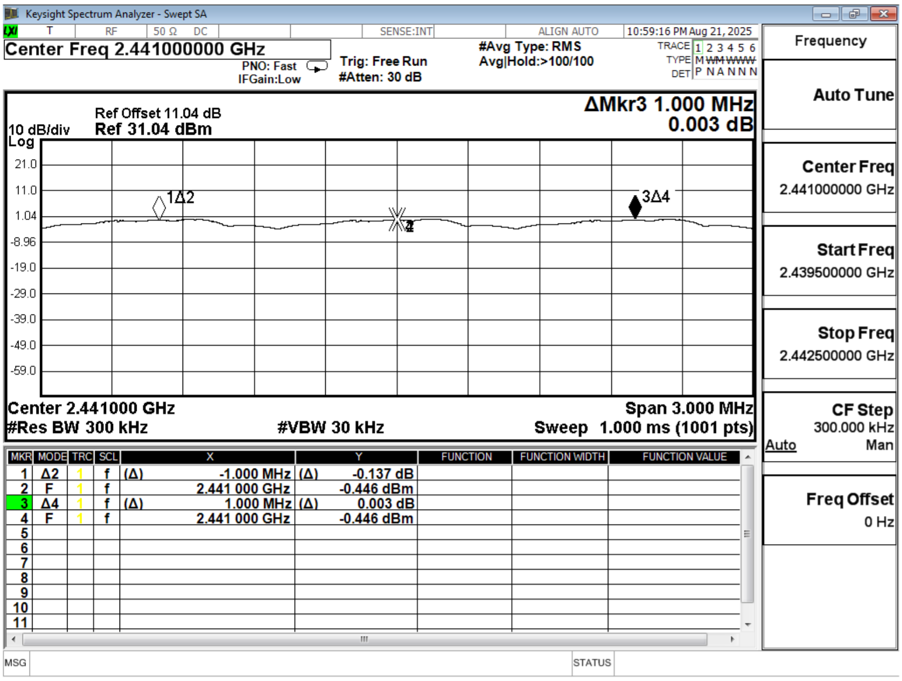
π/4-DQPSK (High)



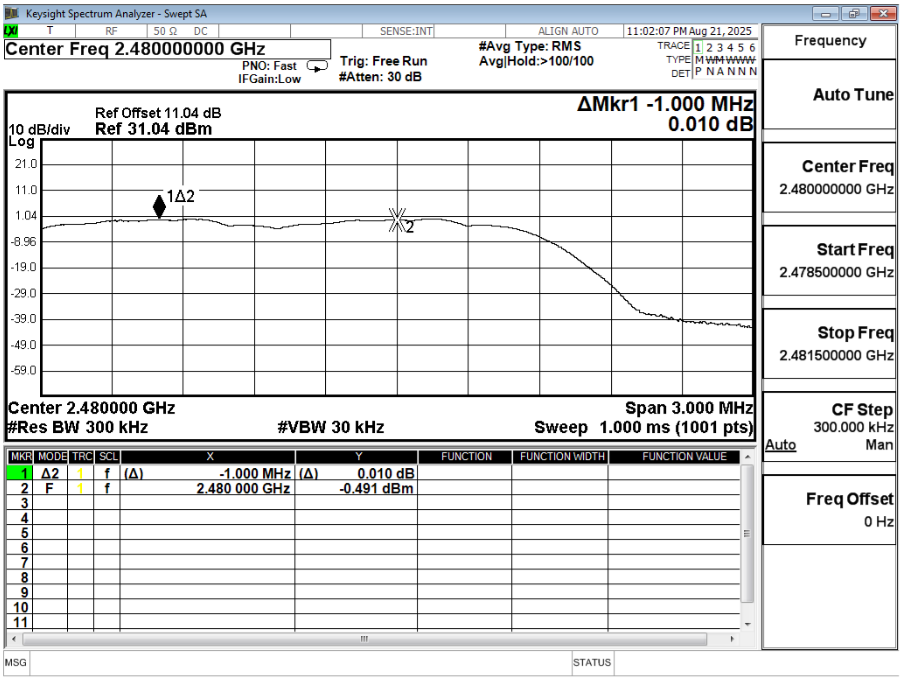
8-DPSK (Low)


Keysight Spectrum Analyzer - Swept SA
Center Freq 2.402000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
11:00:52 PM Aug 21, 2025
Ref Offset 11.04 dB
10 dB/div
Ref 31.04 dBm
ΔMkr1 1.000 MHz
-0.087 dB
Center 2.402000 GHz
#Res BW 300 kHz
#VBW 30 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 Δ2 1 f (Δ) 1.000 MHz (Δ) -0.087 dB
2 F 1 f 2.402 000 GHz -0.657 dBm
Frequency
Auto Tune
Center Freq 2.402000000 GHz
Start Freq 2.400500000 GHz
Stop Freq 2.403500000 GHz
CF Step 300.000 kHz
Freq Offset 0 Hz

8-DPSK (Middle)



8-DPSK (High)

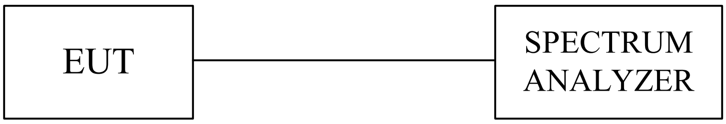


8.4 NUMBER OF HOPPING FREQUENCY USED

LIMIT

§15.247(a)(1)(iii) For frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

TEST SETUP



TEST PROCEDURE

1 Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2 Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3 Set the spectrum analyzer on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4 Set the spectrum analyzer on View mode and then plot the result on spectrum analyzer screen.
5 Repeat above procedures until all frequencies measured were complete.

TEST RESULTS

Model Name	YY2097C	Test By	Ted Huang
Temp & Humidity	25.8°C, 44%	Test Date	2025/08/22

Modulation Type: GFSK / DH5

Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

Modulation Type: π/4-DQPSK / 2DH5

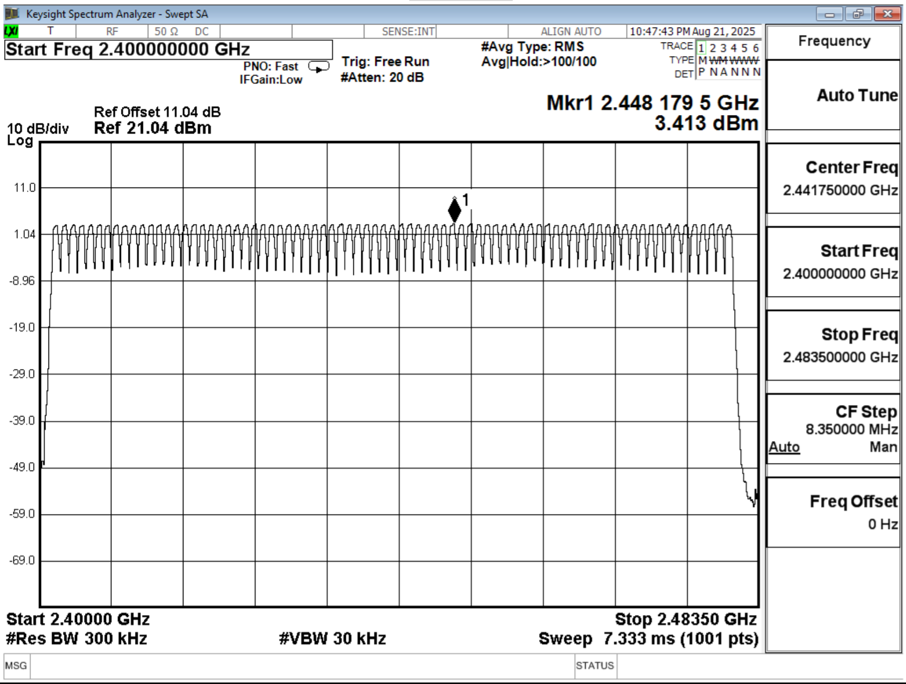
Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

Modulation Type: 8-DPSK / 3-DH5

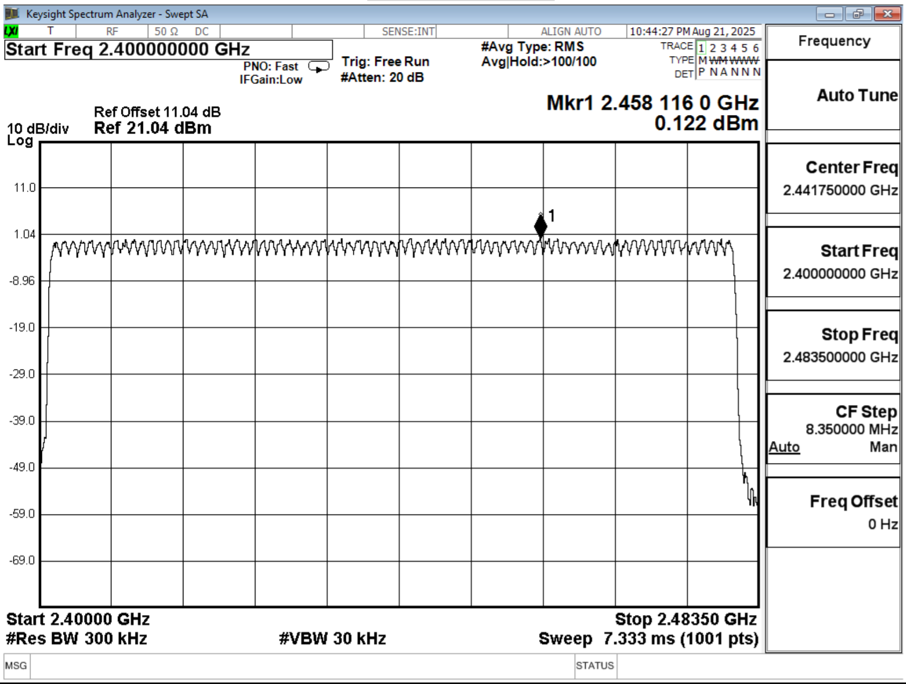
Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

NUMBER OF HOPPING FREQUENCY USED

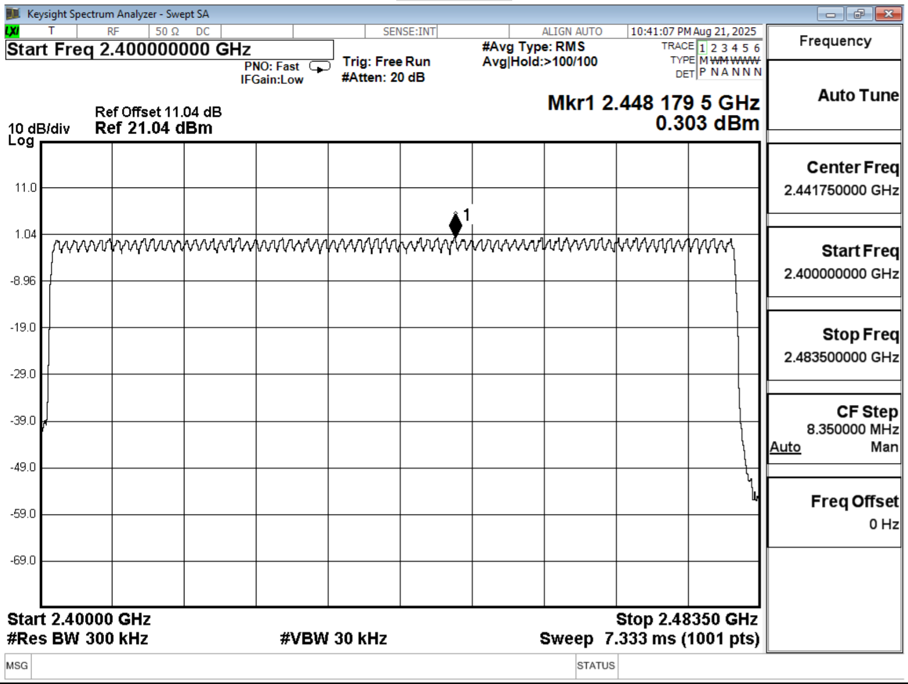
GFSK



π/4-DQPSK



8-DPSK

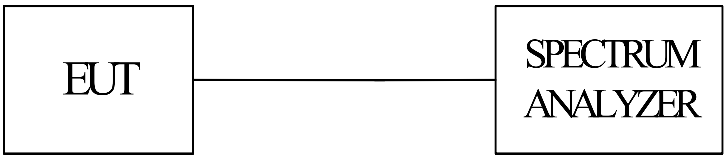

Keysight Spectrum Analyzer - Swept SA
Start Freq 2.400000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold:>100/100
10:41:07 PM Aug 21, 2025
Ref Offset 11.04 dB
10 dB/div
Log
Ref 21.04 dBm
Mkr1 2.448 179 5 GHz
0.303 dBm
11.0
1.04
-8.96
-19.0
-29.0
-39.0
-49.0
-59.0
-69.0
Start 2.40000 GHz
#Res BW 300 kHz
#VBW 30 kHz
Stop 2.48350 GHz
Sweep 7.333 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

8.5 DWELL TIME ON EACH CHANNEL

LIMIT

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 second within a 31.6 second period.

TEST SETUP



TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The Bluetooth Headset has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second. The longer the payload is, the slower the hopping rate is.

TEST RESULTS

Time of occupancy on the TX channel in 31.6sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6
Refer to the attached graph.
The hopping rates of Bluetooth devices change with different types of payload. The longer the payload is, the slower the hopping rate. The hopping rate scenario is defined in Bluetooth core specification.

Model Name	YY2097C	Test By	Ted Huang
Temp & Humidity	25.8°C, 44%	Test Date	2025/08/22

Modulation Type: GFSK / DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441MHz	DH1	0.400	128.00	400.00	PASS
2441MHz	DH3	1.660	265.60	400.00	PASS
2441MHz	DH5	2.910	310.40	400.00	PASS
2441MHz	AFH	2.910	155.20	400.00	PASS

CH1 Dwell time= 0.400 ms×(1600÷2)÷79×31.6= 128.00 (ms)
CH1 Dwell time= 1.660 ms×(1600÷4)÷79×31.6= 265.60 (ms)
CH1 Dwell time= 2.910 ms×(1600÷6)÷79×31.6= 310.40 (ms)
CH1 Dwell time= 2.910 ms×(800÷6)÷20×8= 155.20 (ms)

Modulation Type: π/4-DQPSK / 2DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441MHz	2DH1	0.400	128.00	400.00	PASS
2441MHz	2DH3	1.660	265.60	400.00	PASS
2441MHz	2DH5	2.910	310.40	400.00	PASS
2441MHz	AFH	2.910	155.20	400.00	PASS

CH1 Dwell time= 0.400 ms×(1600÷2)÷79×31.6= 128.00 (ms)
CH1 Dwell time= 1.660 ms×(1600÷4)÷79×31.6= 265.60 (ms)
CH1 Dwell time= 2.910 ms×(1600÷6)÷79×31.6= 310.40 (ms)
CH1 Dwell time= 2.910 ms×(800÷6)÷20×8= 155.20 (ms)

Modulation Type: 8-DPSK / 3-DH5

Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441MHz	3DH1	0.400	128.00	400.00	PASS
2441MHz	3DH3	1.660	265.60	400.00	PASS
2441MHz	3DH5	2.910	310.40	400.00	PASS
2441MHz	AFH	2.910	155.20	400.00	PASS

CH1 Dwell time= 0.400 ms×(1600÷2)÷79×31.6= 128.00 (ms)
CH1 Dwell time= 1.660 ms×(1600÷4)÷79×31.6= 265.60 (ms)
CH1 Dwell time= 2.910 ms×(1600÷6)÷79×31.6= 310.40 (ms)
CH1 Dwell time= 2.910 ms×(800÷6)÷20×8= 155.20 (ms)