



Project No.: TM-2606000400P
Report No.: TMTN2606000584NR

FCC ID: 2ACIA-TTBT021

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Rev.: 00

FCC 47 CFR PART 15 SUBPART C AND ANSI C63.10: 2020 TEST REPORT

For

40W Wall Plate Multi-Zone Bluetooth Audio Amplifier Kit

Model: A-1499WPT

Data Applies To: N/A

Brand Name: N/A

Issued for

Ten Tronics Co., Ltd

No. 33, Lane 347, Chung-San S.Road Young-Kang District, Tainan, Taiwan

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 20, 2026

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 20, 2026	Initial Issue	All Page	Polly Wang

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1. TEST REPORT CERTIFICATION

Applicant	: Ten Tronics Co., Ltd No. 33, Lane 347, Chung-San S.Road Young-Kang District, Tainan, Taiwan
Manufacturer	: Ten Tronics Co., Ltd No. 33, Lane 347, Chung-San S.Road Young-Kang District, Tainan, Taiwan
Equipment Under Test	: 40W Wall Plate Multi-Zone Bluetooth Audio Amplifier Kit
Model Number	: A-1499WPT
Data Applies To	: N/A
Brand Name	: N/A
Date of Test	: July 04, 2026 ~ July 15, 2026

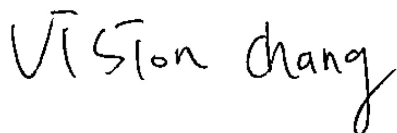
APPLICABLE STANDARD	
STANDARD	TEST RESULT
FCC Part 15 Subpart C AND ANSI C63.10: 2020	PASS
Statements of Conformity	
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

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: 2020** 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:



Vision Chang
Team Leader

2. TEST RESULT SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	3	ANTENNA REQUIREMENT	N/A
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
N/A	8.6	DUTY CYCLE	N/A
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	40W Wall Plate Multi-Zone Bluetooth Audio Amplifier Kit
Model Number	A-1499WPT
Data Applies To	N/A
Brand Name	N/A
Received Date	June 25, 2026
Reported Date	August 10, 2026
Frequency Range	2402MHz ~ 2480MHz
Transmit Peak Power	GFSK: 0.608 dBm / 1.15 mW 8DPSK: -1.217 dBm / 0.76 mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK Mode: 1 Mbps $\pi/4$ -DQPSK Mode: 2Mbps 8DPSK Mode: 3Mbps
Modulation Type	GFSK 、 $\pi/4$ -DQPSK 、8DPSK
Number of Channels	79 Channels
EUT Power Supply	24Vdc; 2.5A(Powered from Adapter)
Antenna Type	Manufacturer: Ten-Tronics Type: Printed Circuit Board Antenna Model: A-1499 Gain: 0.5 dBi
Firmware Version	V1.0
Software Version	V1.0

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: 2ACIA-TTBT021** 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. According to customer declaration 40W Wall Plate Multi-Zone Bluetooth Audio Amplifier Kit (**A-1499WPT** / **FCC ID: 2ACIA-TTBT021**) and 40W Wall Plate Multi-Zone Bluetooth Audio Amplifier Kit (**A-1499WPR** / **FCC ID: 2ACIA-TTBT022**) for sale.

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

Radiated Emission Test (Below 1 GHz):

- ☒ 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

Radiated Emission Test (Above 1 GHz):

- ☒ 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	$\pi/4$ -DQPSK	2-DH5
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, High	FHSS	GFSK	DH5
Low, Mid, High	FHSS	$\pi/4$ -DQPSK	2-DH5
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	$\pi/4$ -DQPSK	2-DH5
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 : 2020 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: TW0035).

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
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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	09/01/2025	08/31/2026
Attenuator	MCL	BW-S15W5	0535	01/13/2026	01/12/2027
Notch Filter	MICRO-TRONICS	BRM50702-01	018	01/13/2026	01/12/2027
Bilog Antenna with 6dB Attenuator	SUNOL SCIENCES & EMC	JB1 & N-6-06	A021306 & AT-N0682	10/08/2025	10/07/2026
Cable	EMCI	EM102-KMKM	CB1166-01	01/13/2026	01/12/2027
Double Ridged Guide Horn Antenna	ETS.LINDGREN	3117	00078733	04/24/2026	04/23/2027
EMI Test Receiver	R&S	ESCI 7	100856	06/29/2026	06/28/2027
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/24/2025	07/23/2026
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/26/2026	03/25/2027
Pre-Amplifier	EMEC	EM01G40GA	060919/S02-13041 7-307	04/29/2026	04/28/2027
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	01/13/2026	01/12/2027
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	01/13/2026	01/12/2027
EMI Test Receiver	R&S	ESCI	101203	10/20/2025	10/19/2026
LISN	R&S	ENV216	101495	07/23/2026	07/22/2027
LISN	SCHWARZBECK	NNLK 8130	8130124	01/17/2026	01/16/2027
Pulse Limiter	SCHWARZBECK	VTSD 9561-F	797	01/13/2026	01/12/2027
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:

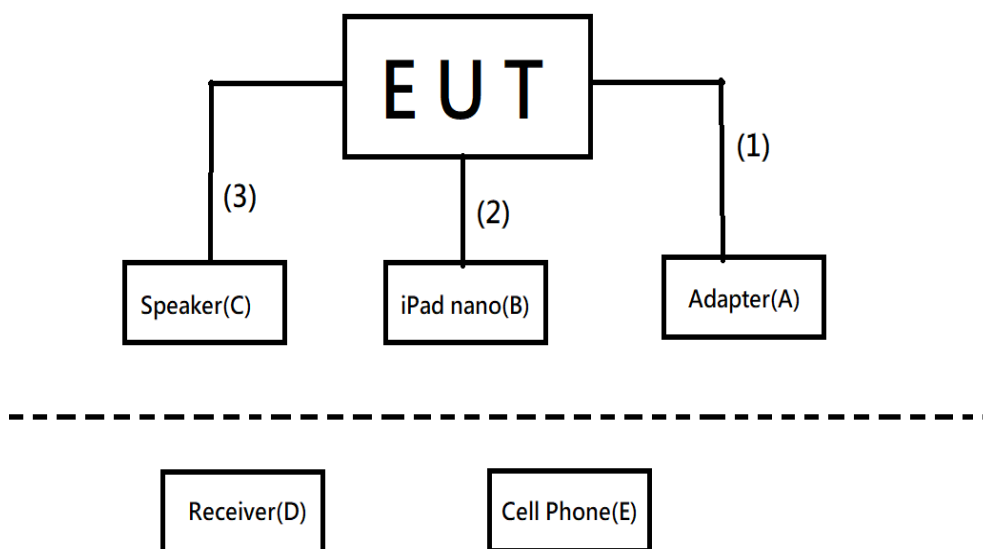
Measurement	Uncertainty
AC Powerline Conducted Emission	$\pm 2.21\text{dB}$
Channel Bandwidth	$\pm 2.87\%$
RF output power (Spectrum)	$\pm 2.88\text{dB}$
RF Output power (Power Meter & Power sensor)	$\pm 0.243\text{dB}$
Power Density	$\pm 2.87\text{dB}$
Conducted Badnedge	$\pm 2.87\text{dB}$
Conducted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

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

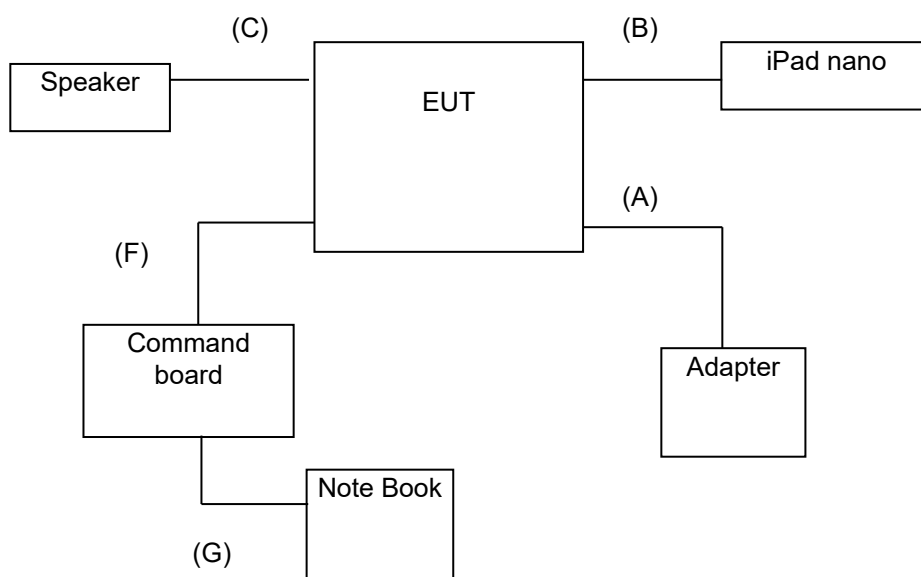
7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

EMI



RF



7.2 SUPPORT EQUIPMENT

For EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Adapter	Adapter	ATS060T-W240U	N/A	N/A
2	iPad nano	Apple	A1199	N/A	N/A
3	Speaker	logi	Z607	N/A	N/A
4	Multi-Zone BT Audio Amplifier Receiver	TEN-TRONICS	A-1499WPR	N/A	N/A
5	Cell Phone	SONY	XQ-DE72	N/A	N/A

No.	Signal cable description	
1	Power	Unshielded, 1.5m 1 pcs, with 1 core.
2	Audio	Shielded, 1.5m 1 pcs.
3	Audio	Unshielded, 2.35m 1 pcs.

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Power cable
1	Note Book	ASUS	X515J	DOC	N/A
2	Adapter	N/A	GQ4Z-240250-AU	DOC	N/A
3	iPad nano	Apple	A1199	N/A	N/A
4	Speaker	logi	Z607	N/A	N/A

No.	Signal cable description	
A	Power	Unshielded, 1.5m 1 pcs.
B	Audio	Shielded, 1.5m 1 pcs.
C	Audio	Unshielded, 2.35m 1 pcs.
D	Command	Unshielded, 0.25m 1 pcs.
E	USB	Shielded, 1.5m 1 pcs.
F	Command	Unshielded, 0.2m 1 pcs.
G	USB	Shielded, 0.8m 1 pcs.

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 “InstallBlueSuite_2_6_12_3289” software was used for testing
3. Choose Transport “SPI” and Port “USB SPI(1003538)”.

GFSK

TX Mode:

GFSK(DH1):

CFG PKT > Packet : 4 , Length : 27

TXDATA1 > LO Freq.(MHz) : 2402~2480

Power (Ext,Int) : 255,50

GFSK(DH3):

CFG PKT > Packet : 11 , Length : 183

TXDATA1 > LO Freq.(MHz) : 2402~2480

Power (Ext,Int) : 255,50

GFSK(DH5):

CFG PKT > Packet : 15 , Length : 339

TXDATA1 > LO Freq.(MHz) : 2402~2480

Power (Ext,Int) : 255,50

8DPSK

TX Mode:

8-DPSK(3DH1):

CFG PKT > Packet : 24 , Length : 83

TXDATA1 > LO Freq.(MHz) : 2402~2480

Power (Ext,Int) : 255,50

8-DPSK(3DH3):

CFG PKT > Packet : 27 , Length : 552

TXDATA1 > LO Freq.(MHz) : 2402~2480

Power (Ext,Int) : 255,50

8-DPSK(3DH5):

CFG PKT > Packet : 31 , Length : 1021

TXDATA1 > LO Freq.(MHz) : 2402~2480

Power (Ext,Int) : 255,50

RX Mode:

RXDATA1 > LO Freq.(MHz) : 2402~2480

BLE

TX Mode:

BLE TEST TX > Channel : 0~39

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Length : 37

BIT pattern : 0

RX Mode:

BLE TEST TX > Channel : 0~39

Report Int : 0

4. All of the function are under run.

5. Start test.

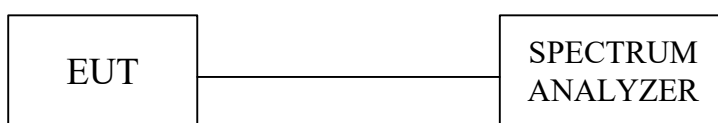
8. APPLICABLE LIMITS AND TEST RESULTS

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) $\geq 3 \times$ 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	A-1499WPT	Test By	Ted Huang
Temp & Humidity	24.8°C, 42%	Test Date	2026/07/14

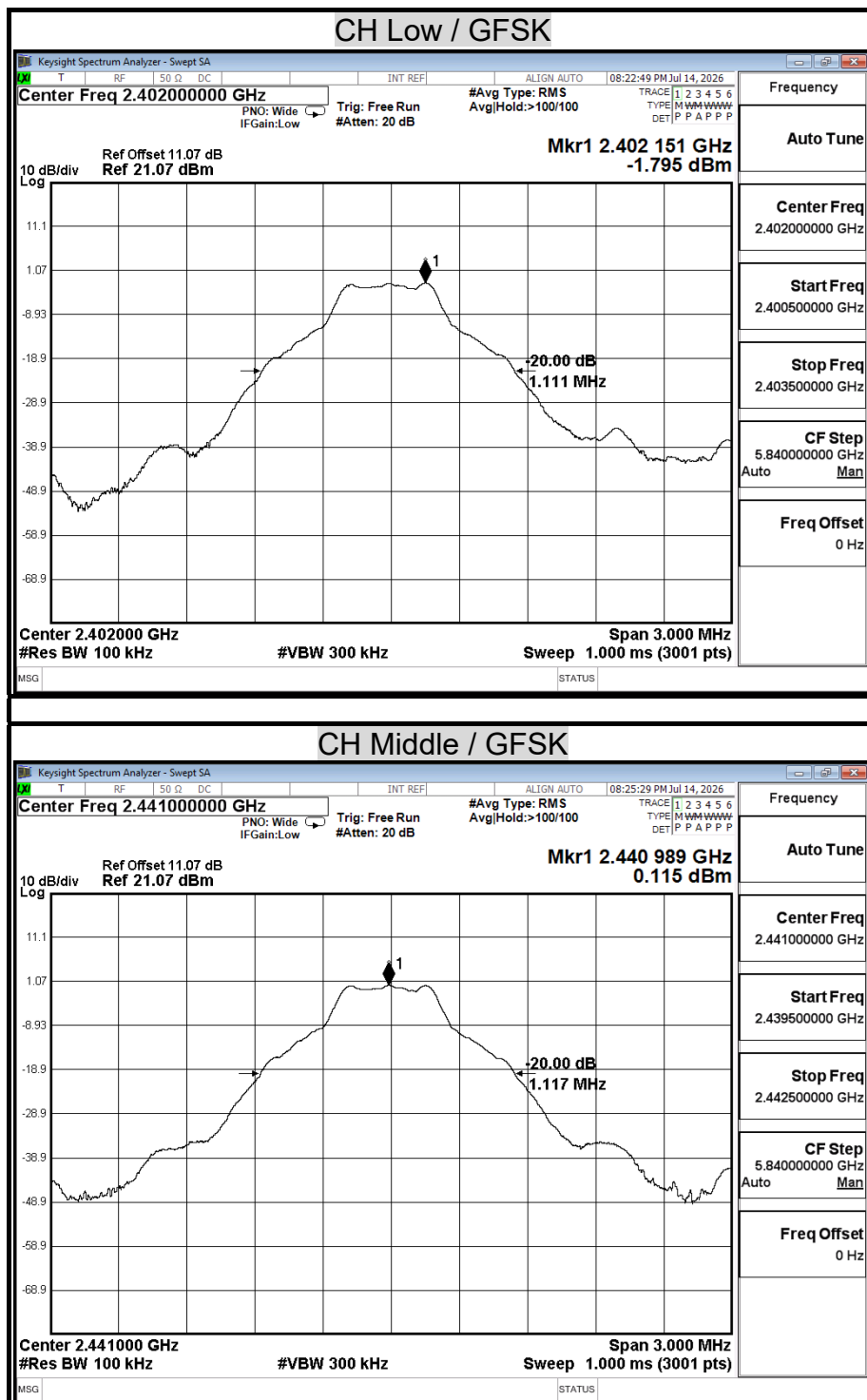
Modulation Type: GFSK / DH5

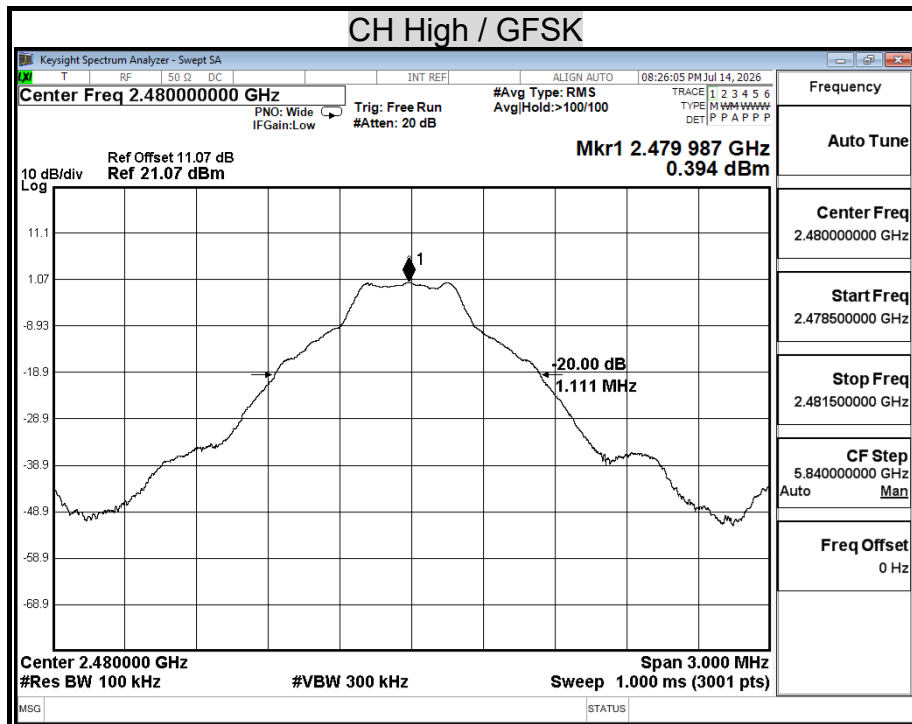
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)
Low	2402	1111.00	0.74
Middle	2441	1117.00	0.74
High	2480	1111.00	0.74

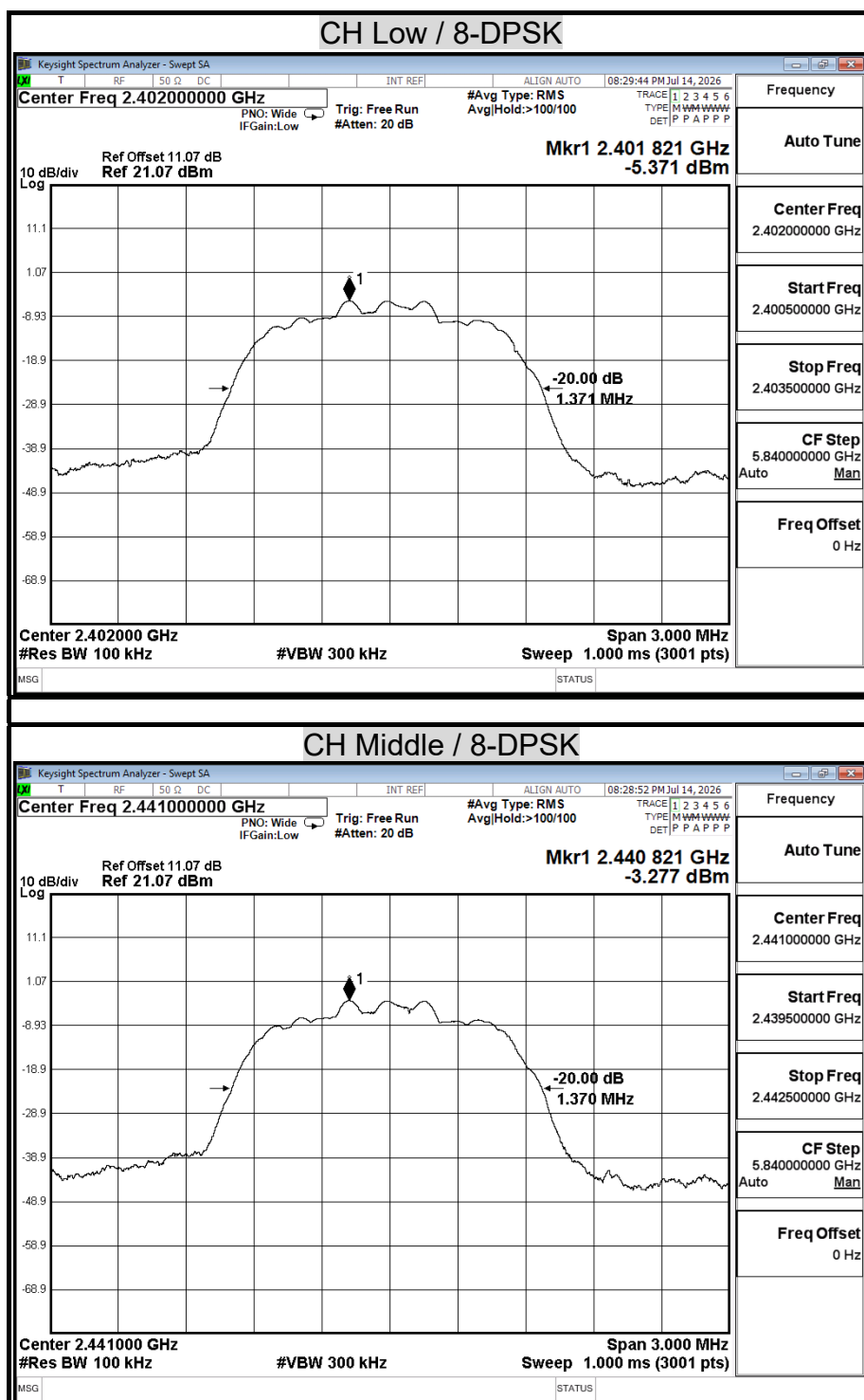
Modulation Type: 8-DPSK / 3-DH5

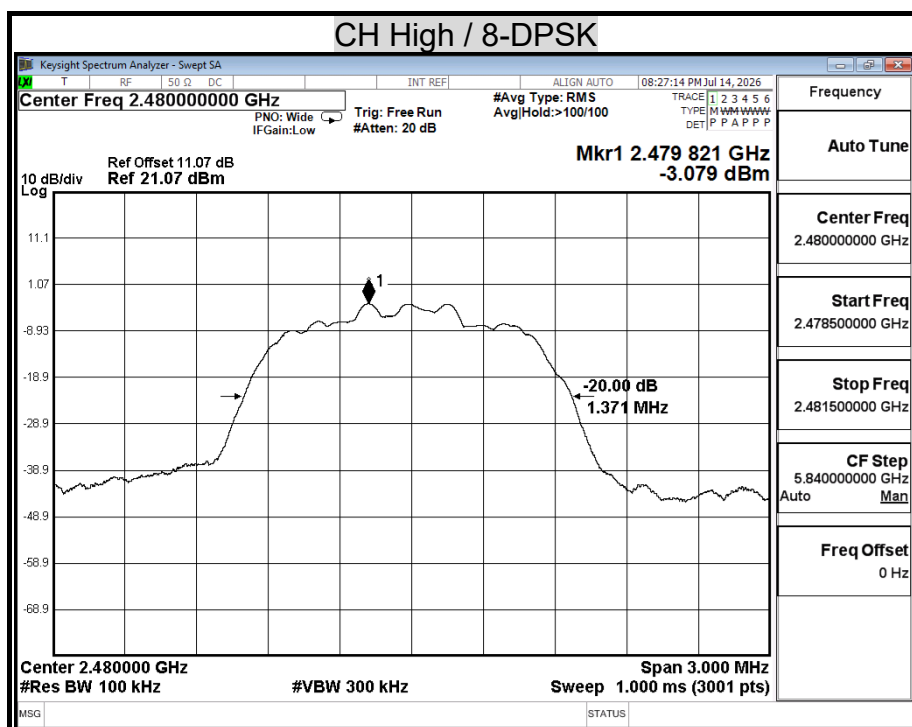
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)
Low	2402	1371.00	0.91
Middle	2441	1370.00	0.91
High	2480	1371.00	0.91

20dB BANDWIDTH









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 $\geq$ DTS bandwidth.
2. Set the VBW $\geq$ $[3 \times \text{RBW}]$.
3. Set the span $\geq$ $[1.5 \times \text{DTS bandwidth}]$.
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, $< 1\text{MHz}$.
4. Set VBW $\geq [3 \times \text{RBW}]$.
5. Number of points in sweep $\geq [2 \times \text{span} / \text{RBW}]$. (This gives bin-to-bin spacing $\leq \text{RBW} / 2$, so that narrowband signals are not lost between frequency bins.)
6. Manually set sweep time $\geq [10 \times (\text{number of points in sweep}) \times (\text{total ON/OFF period of the transmitted signal})]$.
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	A-1499WPT	Test By	Ted Huang
Temp & Humidity	24.8°C, 42%	Test Date	2026/07/14

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	-1.61	0.69	125	PASS
Mid	2441	0.35	1.08		PASS
High	2480	0.61	1.15		PASS

Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	-3.48	0.45	125	PASS
Mid	2441	-1.45	0.72		PASS
High	2480	-1.22	0.76		PASS

Average Power Data

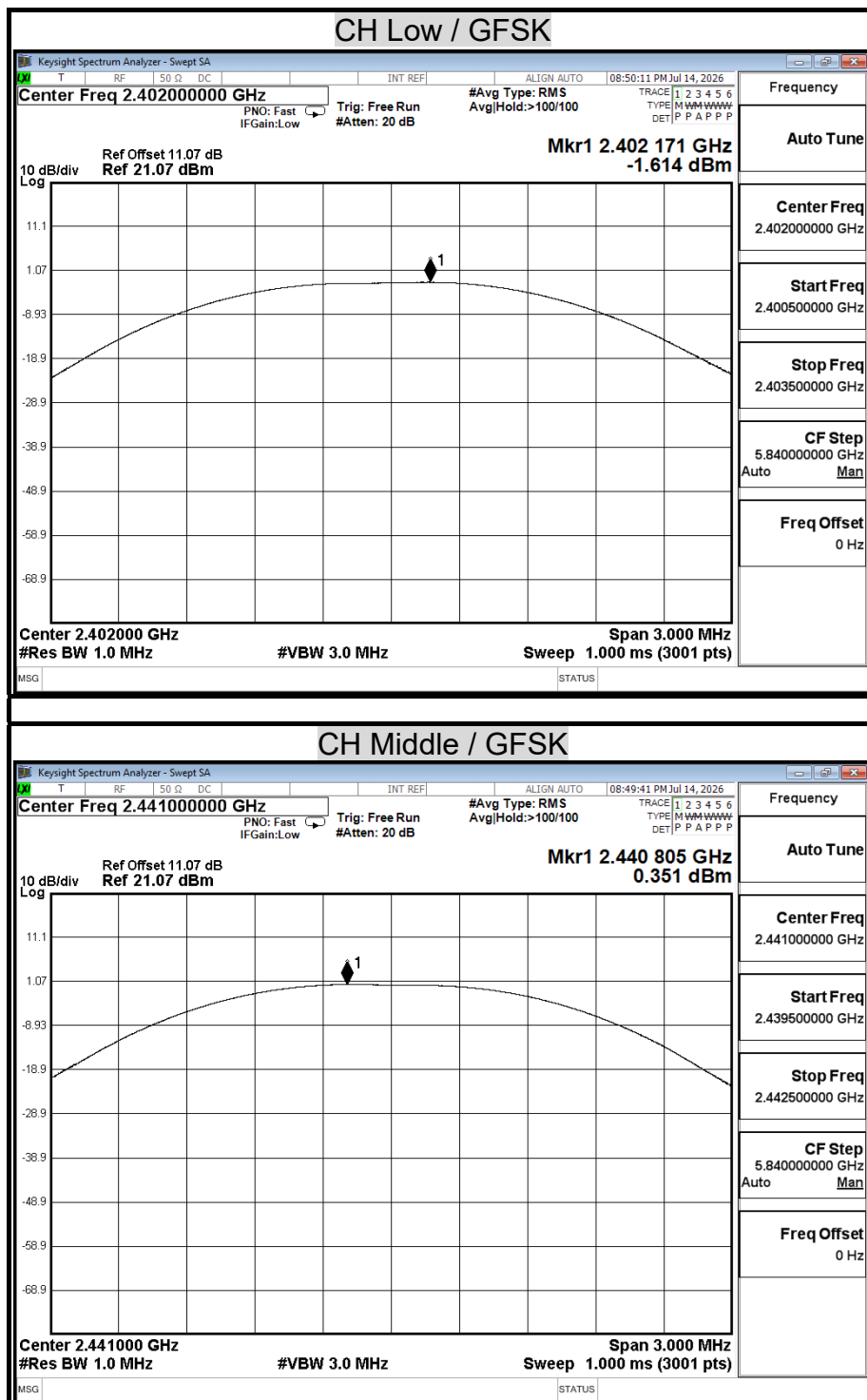
Modulation Type: GFSK / DH5

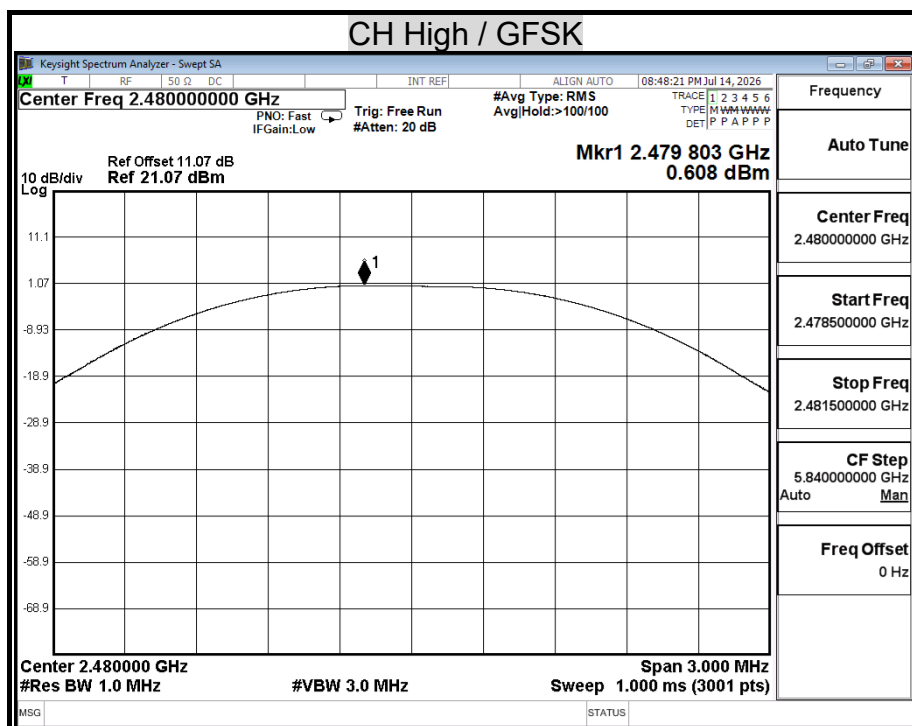
Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	-2.89	1.13	-1.76
Middle	2441	-1.14	1.13	-0.01
High	2480	-0.59	1.13	0.54

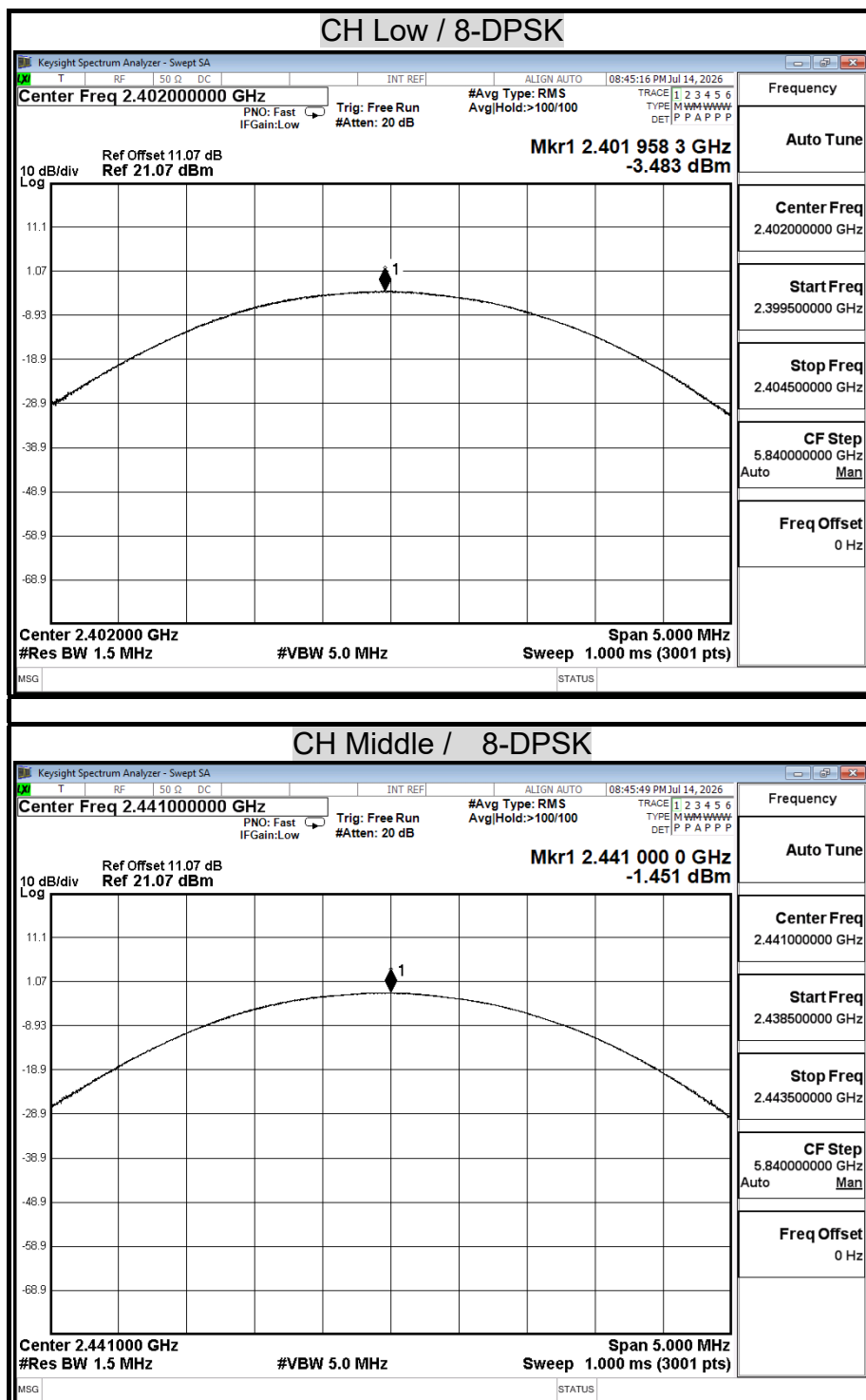
Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Measure Power (dBm)	10 log (1 / D)	Average Power (dBm)
Low	2402	-7.61	1.10	-6.51
Middle	2441	-5.51	1.10	-4.41
High	2480	-5.27	1.10	-4.17

MAXIMUM PEAK OUTPUT POWER



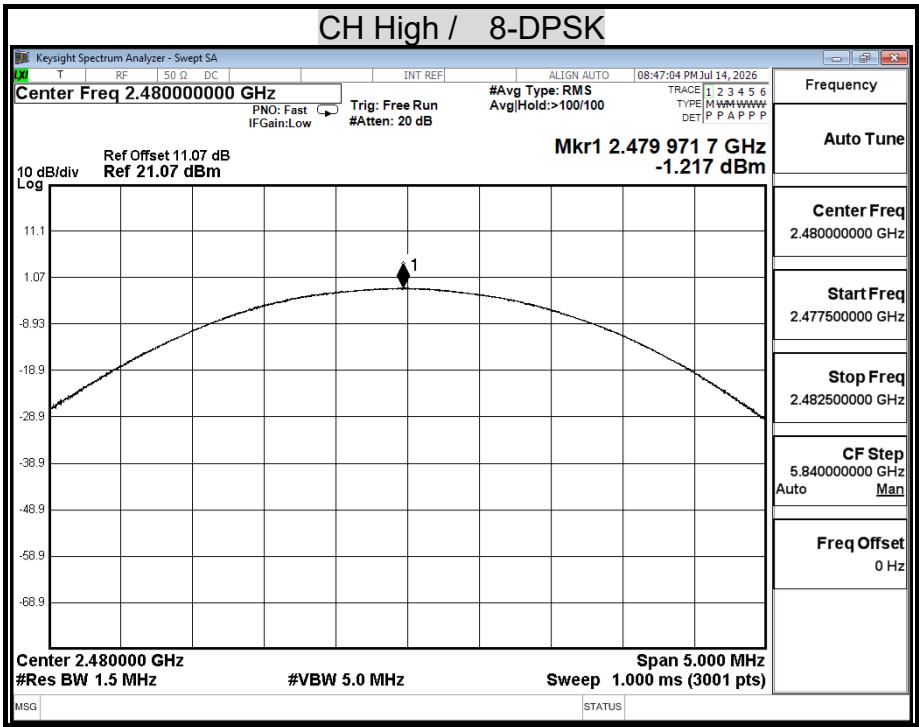




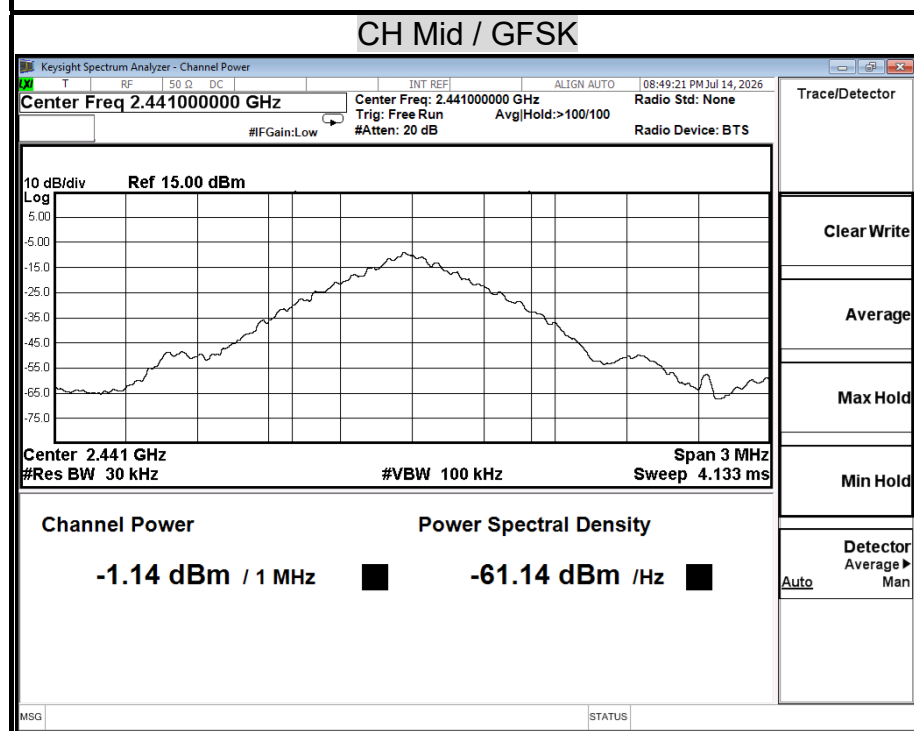
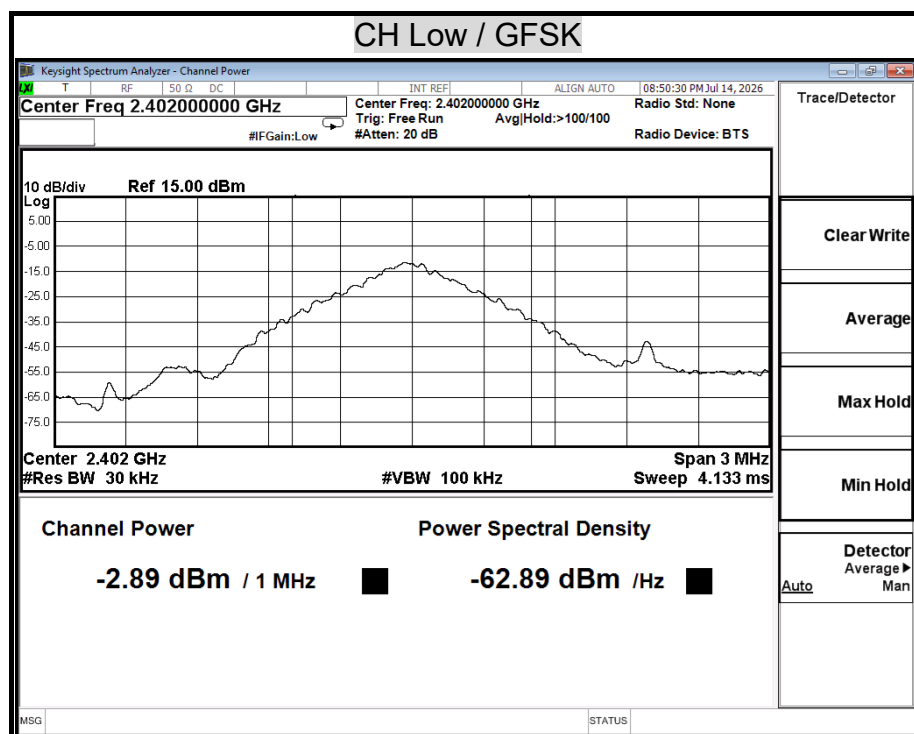


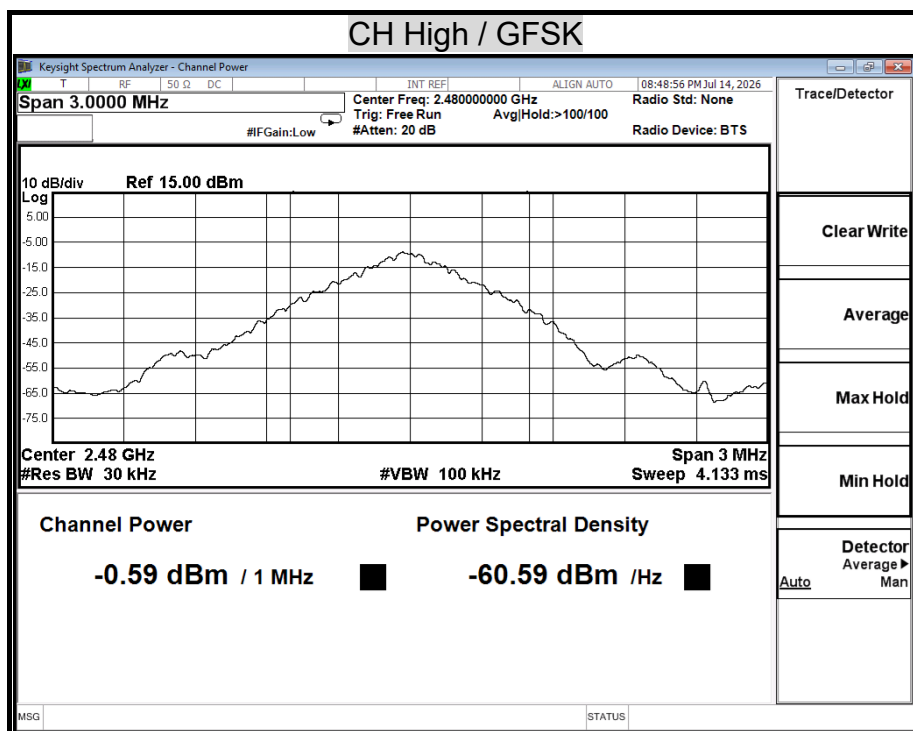
Report No.: TMTN2606000584NR

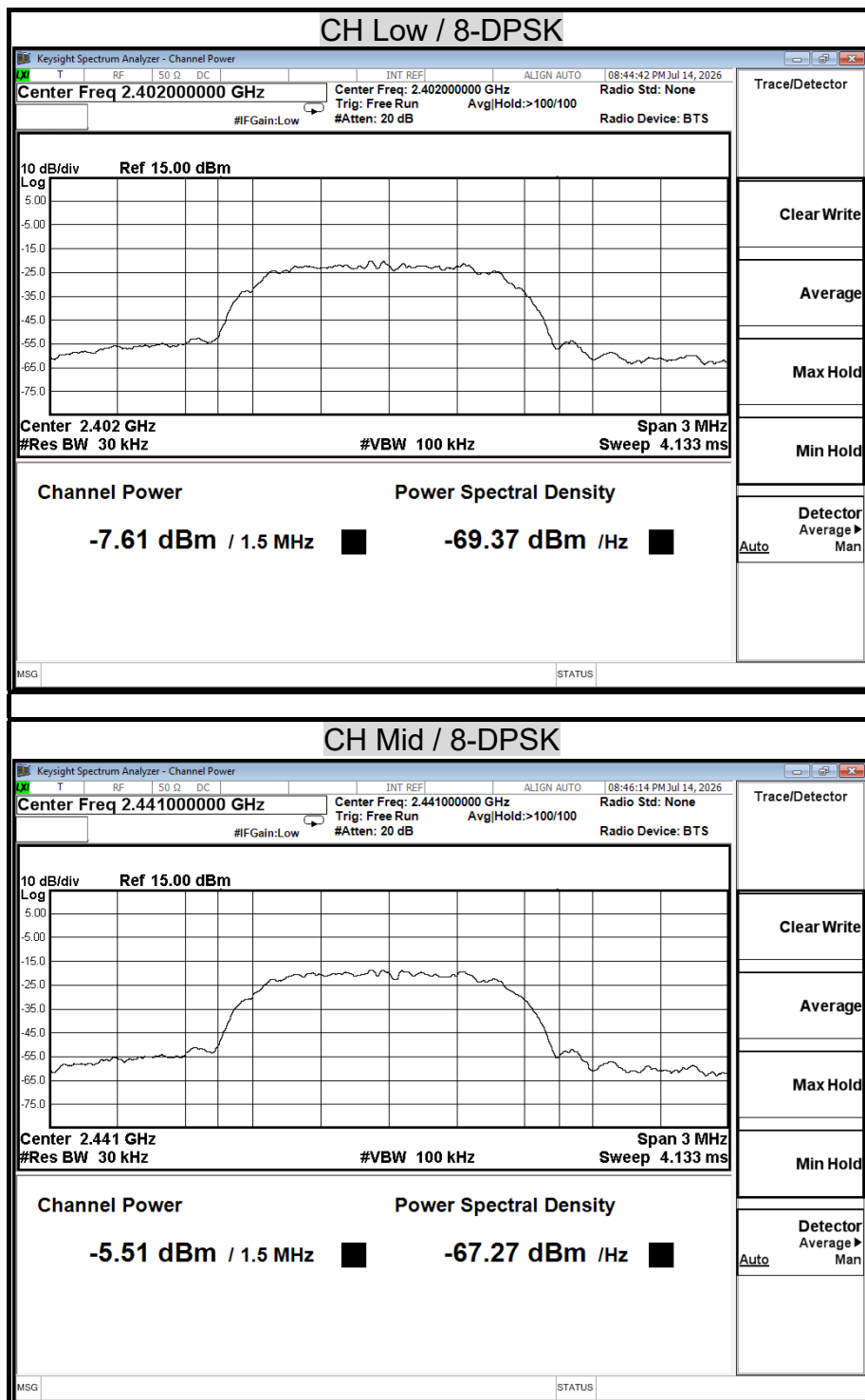
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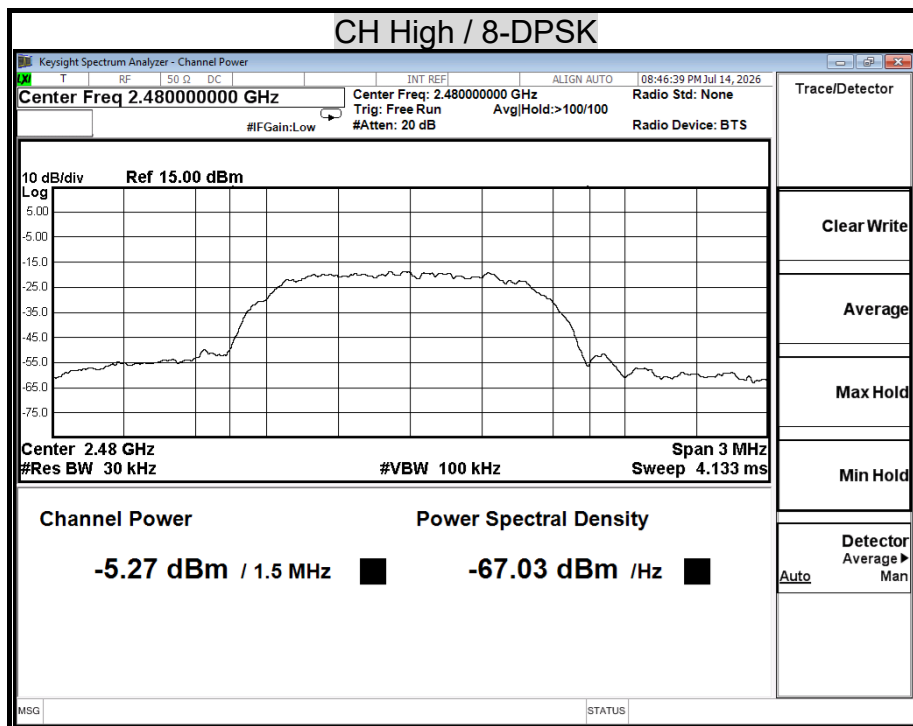


AVERAGE POWER







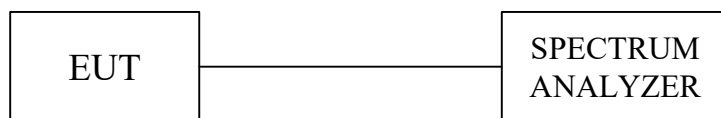


8.3 HOPPING CHANNEL SEPARATION

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.

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.

Report No.: TMTN2606000584NR

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	A-1499WPT	Test By	Ted Huang
Temp & Humidity	24.8°C, 42%	Test Date	2026/07/14

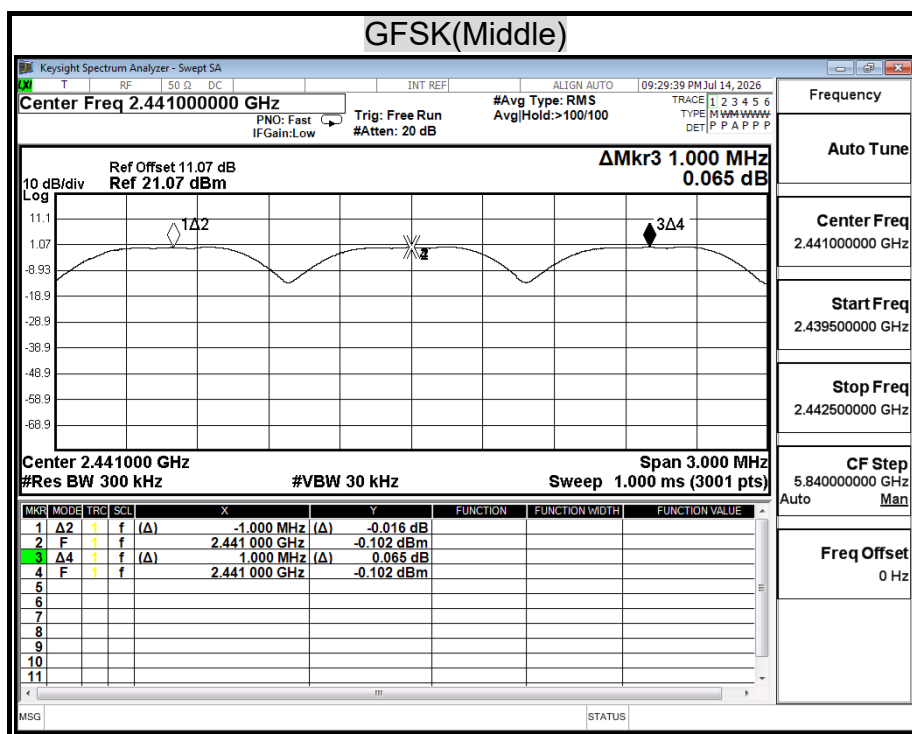
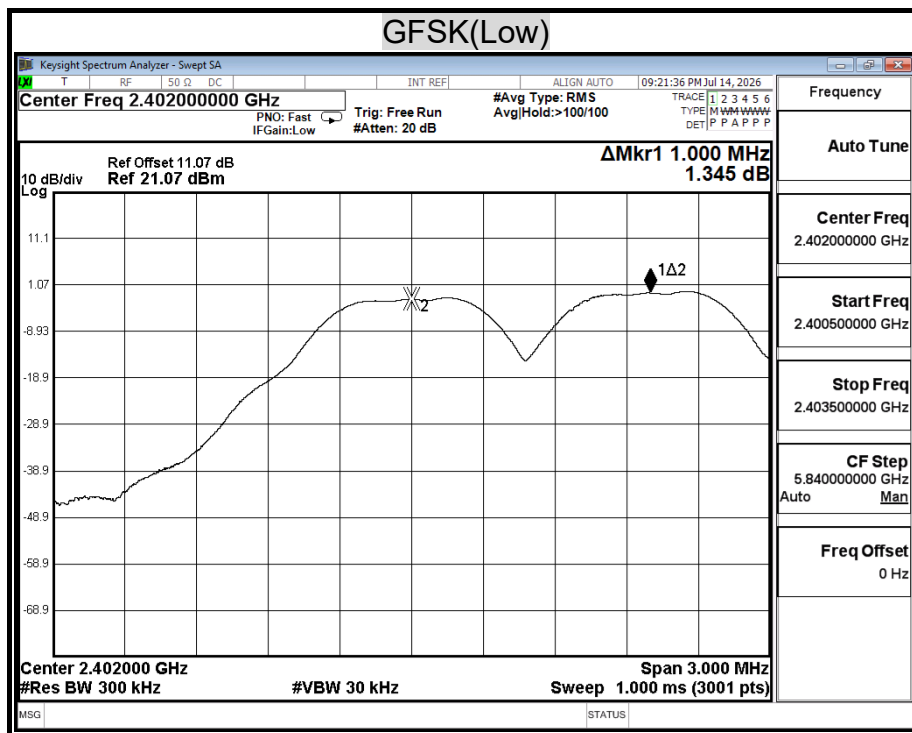
Modulation Type: GFSK / DH5

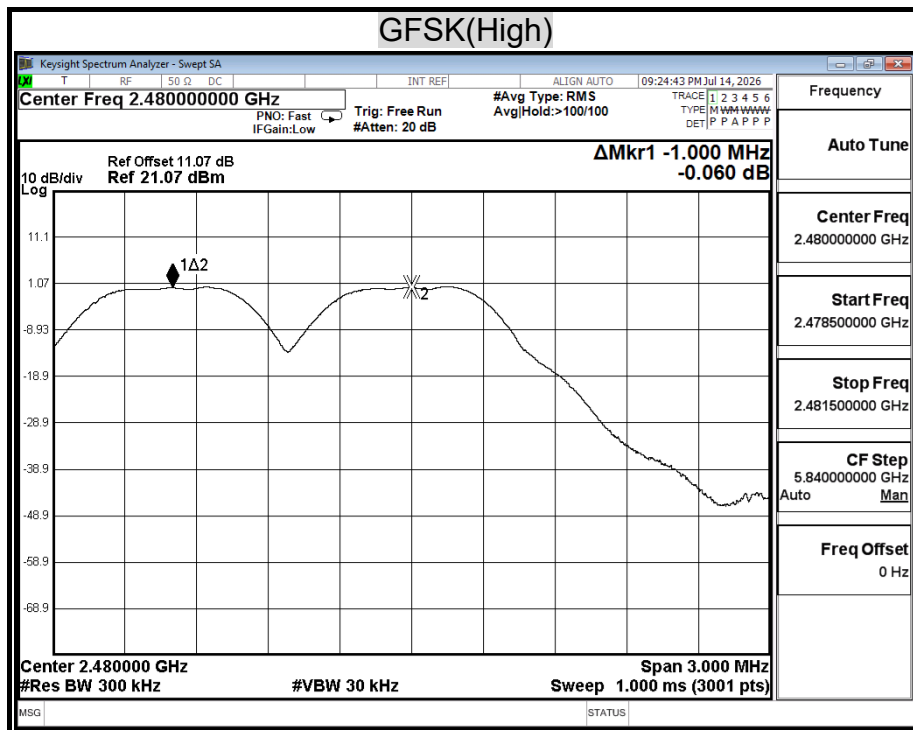
Channel	Adjacent Hopping Channel Separation (MHz)	Two -third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.74	25 KHz	PASS
2441MHz	1.00	0.74	25 KHz	PASS
2480MHz	1.00	0.74	25 KHz	PASS

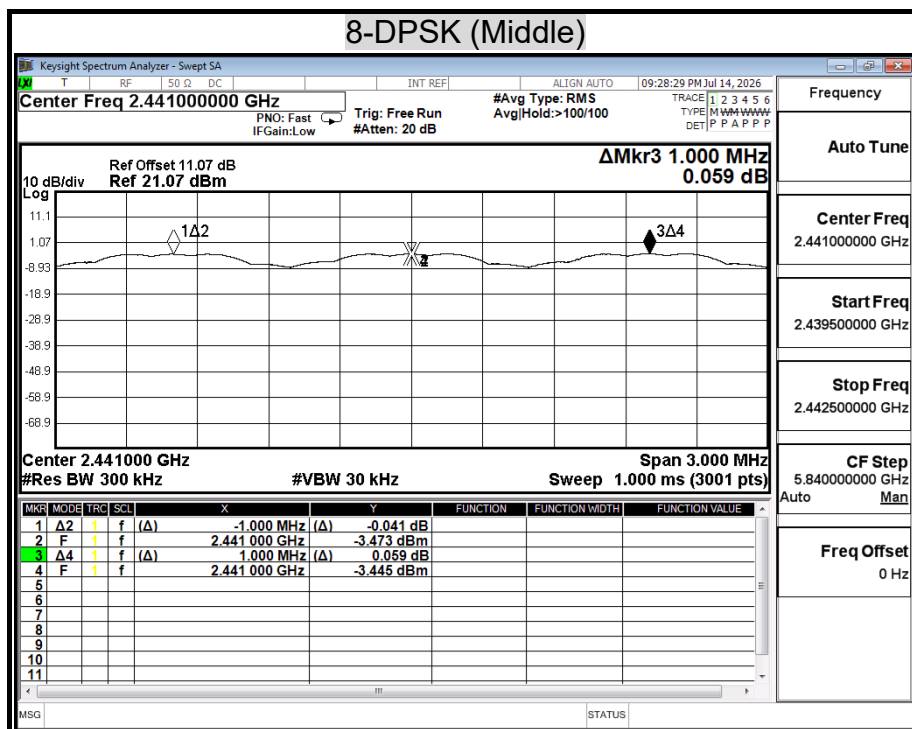
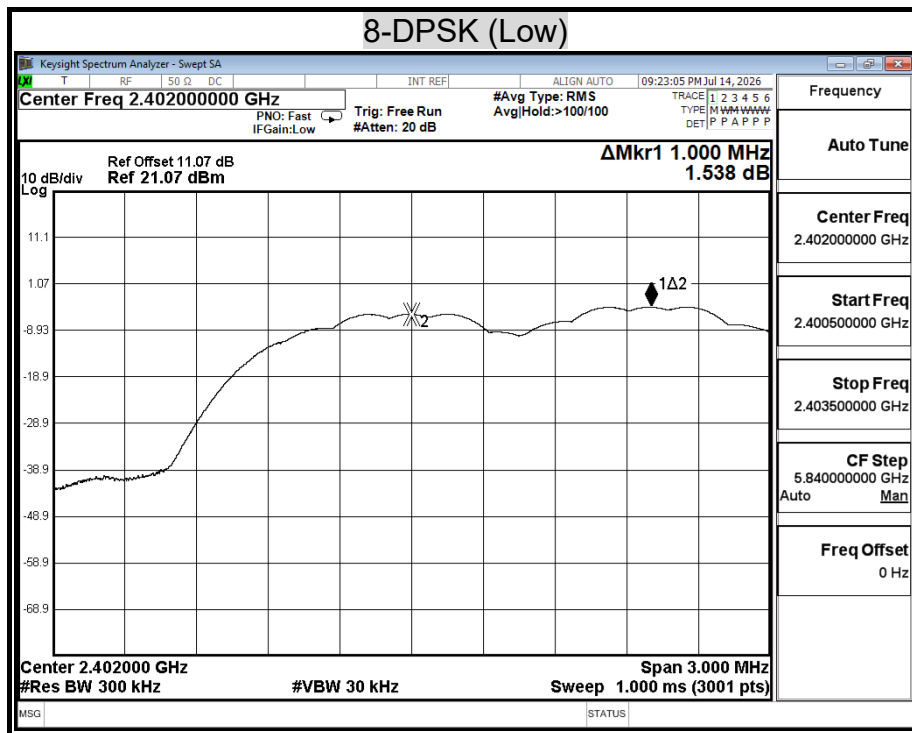
Modulation Type: 8-DPSK / 3-DH5

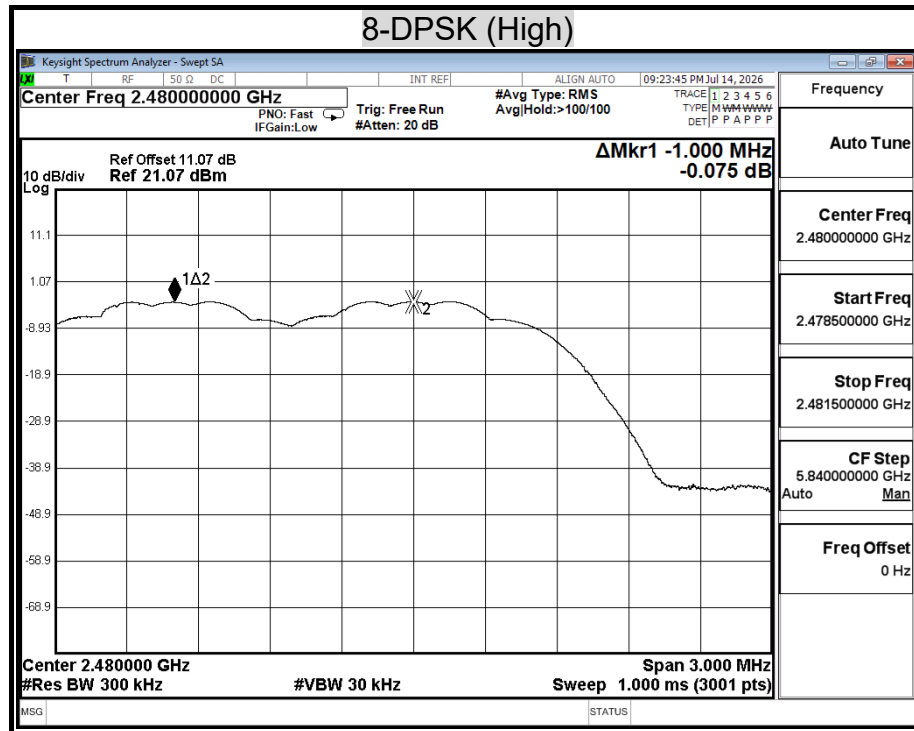
Channel	Adjacent Hopping Channel Separation (kHz)	Two -third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.91	25 KHz	PASS
2441MHz	1.00	0.91	25 KHz	PASS
2480MHz	1.00	0.91	25 KHz	PASS

HOPPING CHANNEL SEPARATION







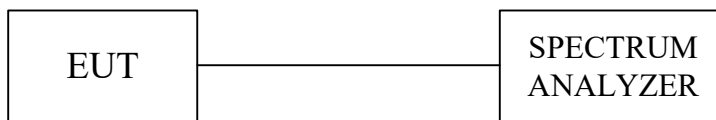


8.4 NUMBER OF HOPPING FREQUENCY USED

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	A-1499WPT	Test By	Ted Huang
Temp & Humidity	24.8°C, 42%	Test Date	2026/07/14

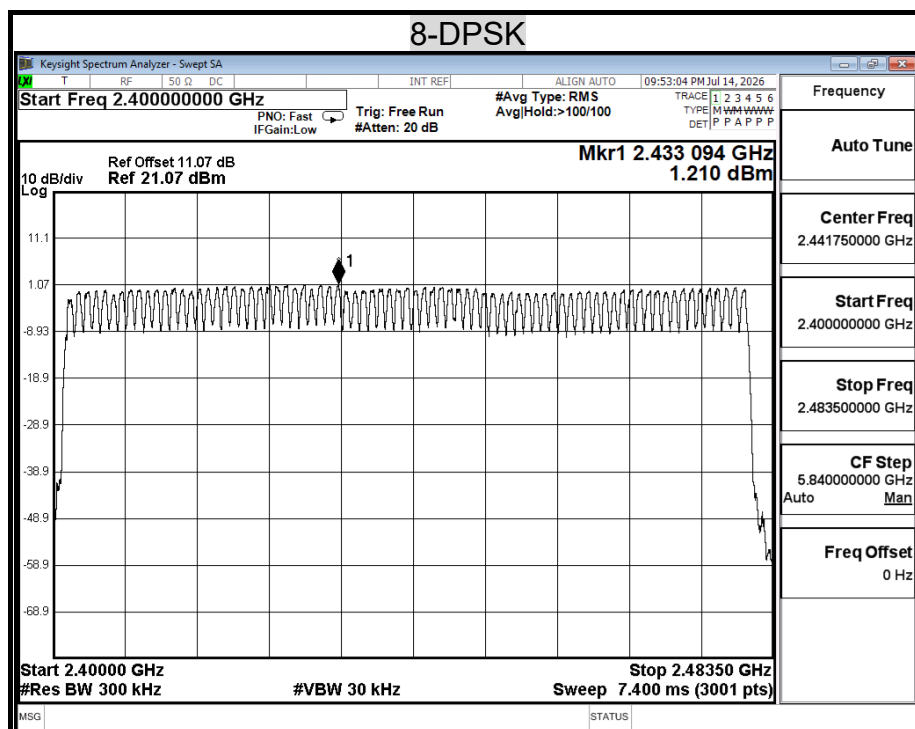
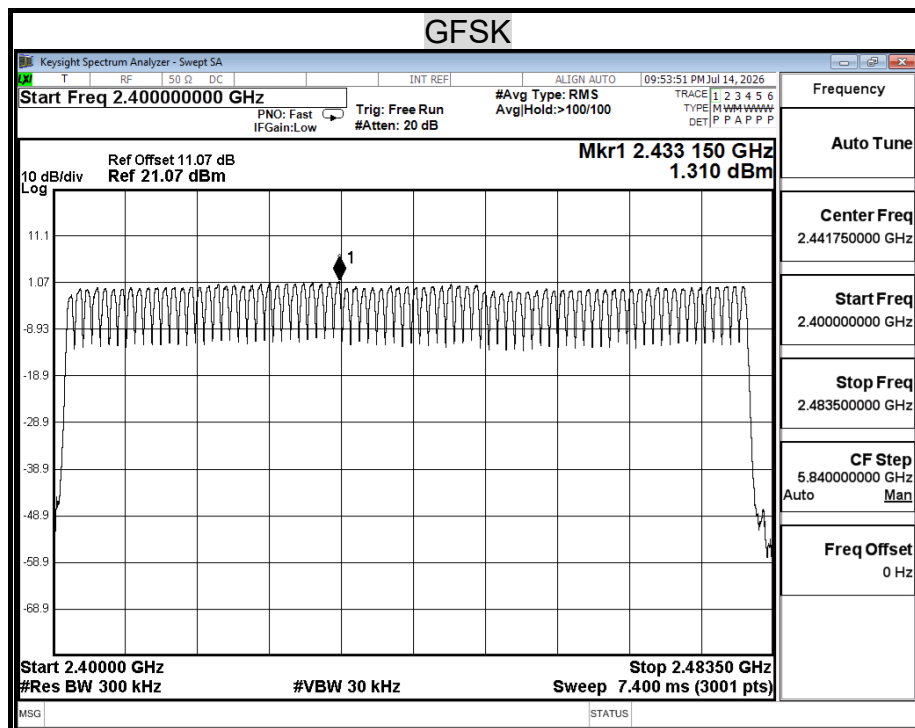
Modulation Type: GFSK / DH5

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

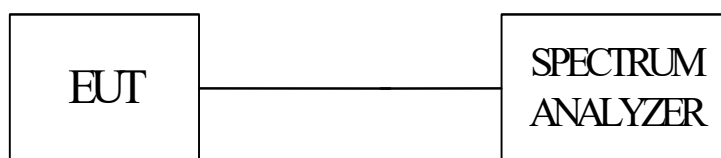


8.5 DWELL TIME ON EACH CHANNEL

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.

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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	A-1499WPT	Test By	Ted Huang
Temp & Humidity	24.8°C, 42%	Test Date	2026/07/14

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)	Results
2441MHz	DH1	0.405	129.60	400.00	PASS
2441MHz	DH3	1.660	265.60	400.00	PASS
2441MHz	DH5	2.900	309.33	400.00	PASS
2441MHz	AFH	2.900	154.67	400.00	PASS

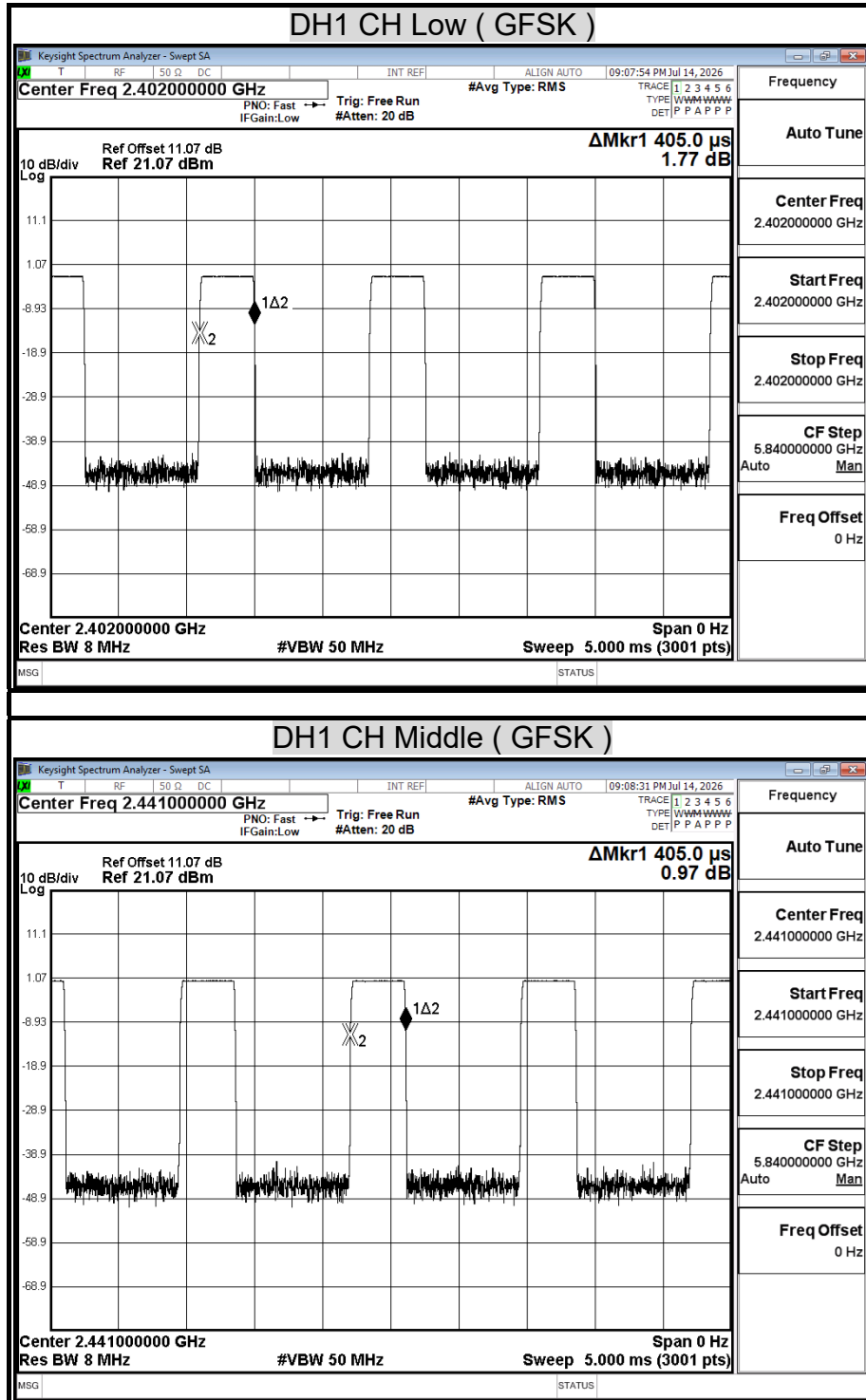
DH1 Dwell time= 0.405 ms×(1600÷2)÷79×31.6= 129.60 (ms)
DH3 Dwell time= 1.660 ms×(1600÷4)÷79×31.6= 265.60 (ms)
DH5 Dwell time= 2.900 ms×(1600÷6)÷79×31.6= 309.33 (ms)
AFH Dwell time= 2.900 ms×(800÷6)÷20×8= 154.67 (ms)

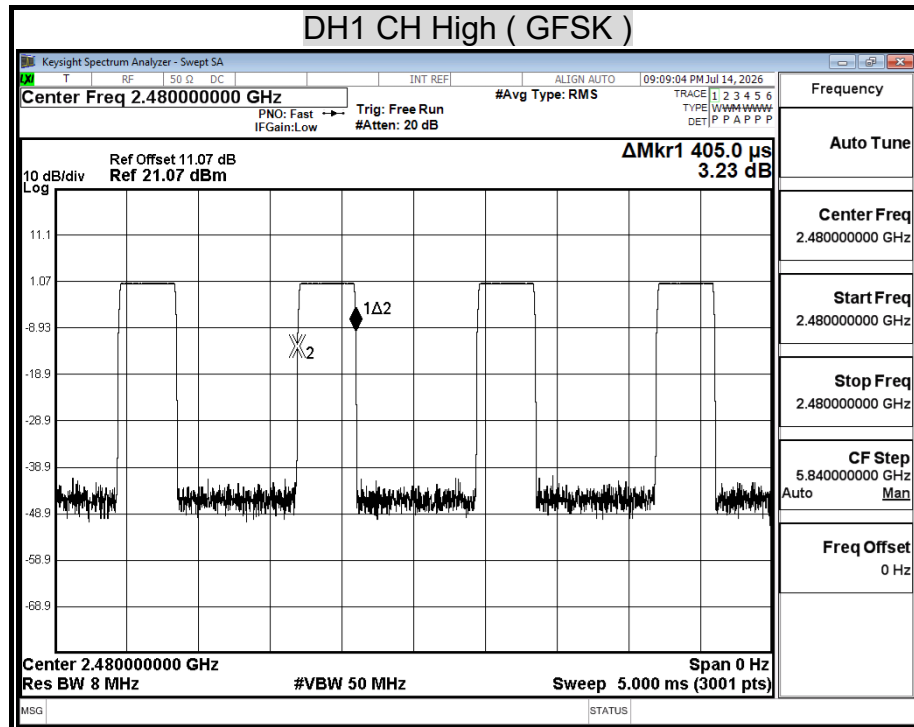
Modulation Type: 8-DPSK / 3-DH5

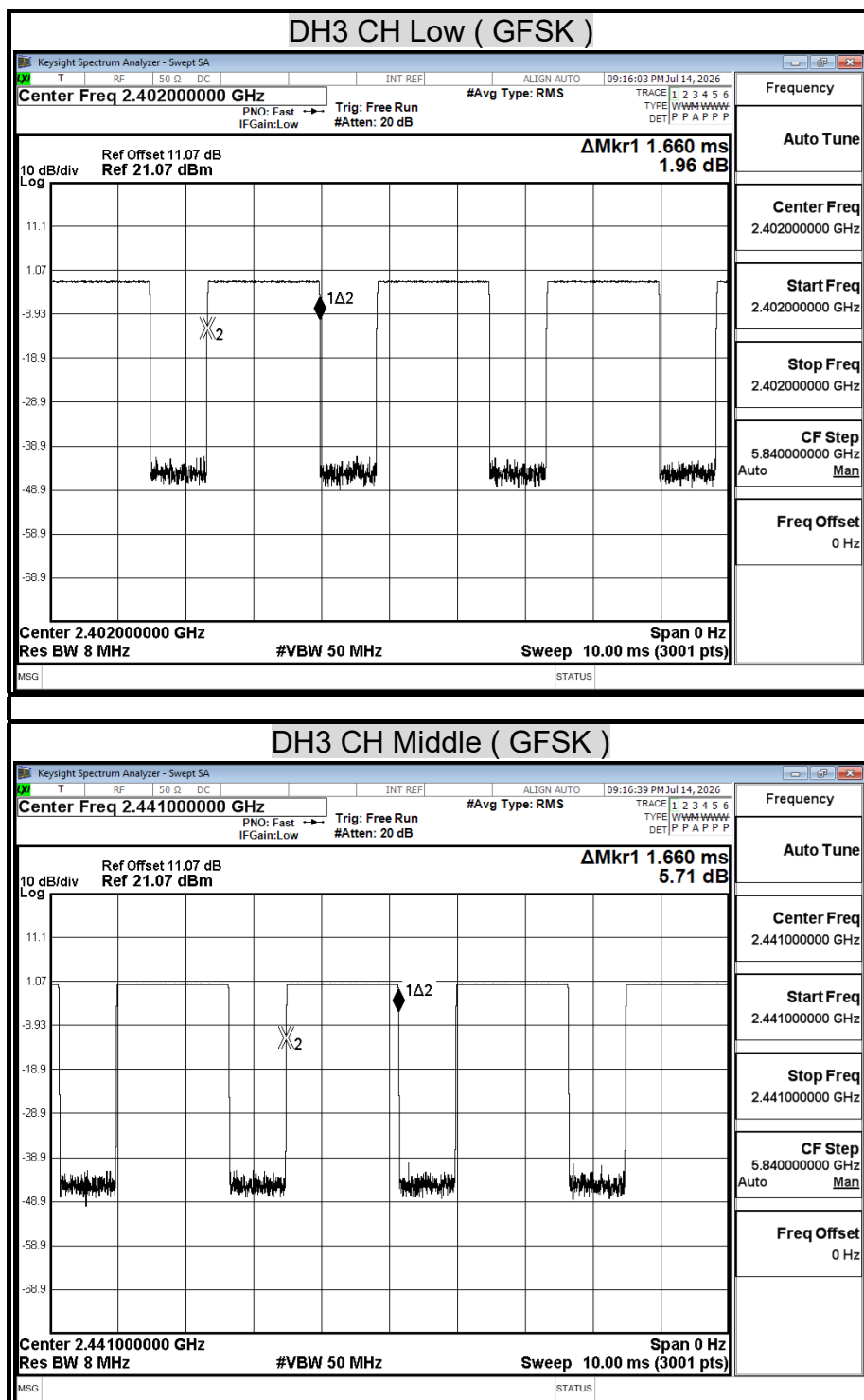
Transmitting Frequency	Packet type	Dwell time (ms)	Time of occupancy on the TX channel in 31.6sec (ms)	Limit for Time of occupancy on the TX channel in 31.6sec (ms)	Results
2441MHz	3DH1	0.420	134.40	400.00	PASS
2441MHz	3DH3	1.660	265.60	400.00	PASS
2441MHz	3DH5	2.920	311.47	400.00	PASS
2441MHz	AFH	2.920	155.73	400.00	PASS

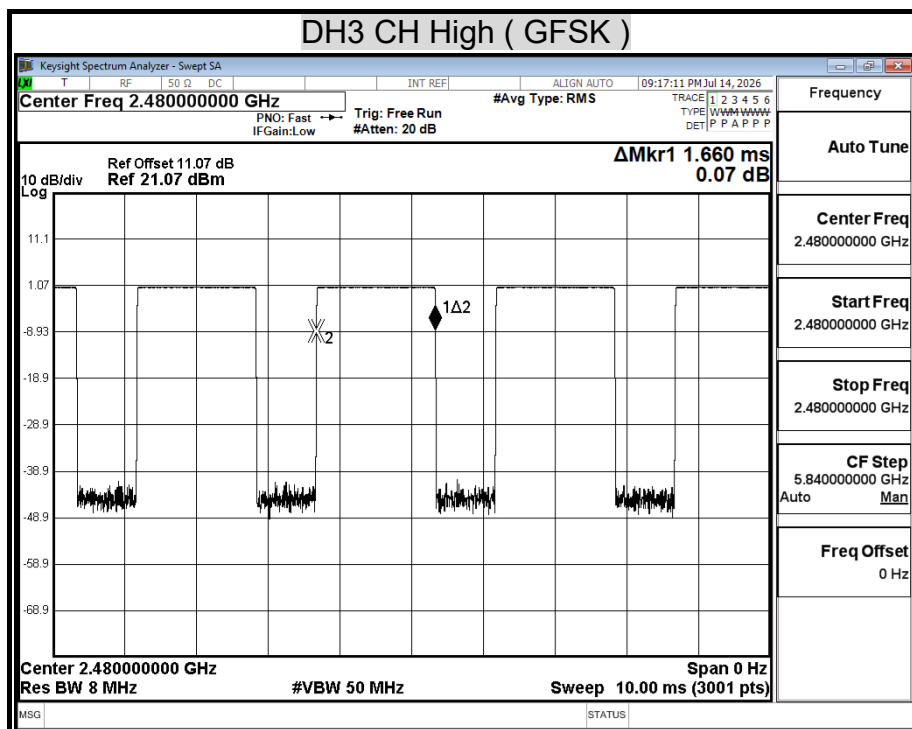
3DH1 Dwell time= 0.420 ms×(1600÷2)÷79×31.6= 134.40 (ms)
3DH3 Dwell time= 1.660 ms×(1600÷4)÷79×31.6= 265.60 (ms)
3DH5 Dwell time= 2.920 ms×(1600÷6)÷79×31.6= 311.47 (ms)
AFH Dwell time= 2.920 ms×(800÷6)÷20×8= 155.73 (ms)

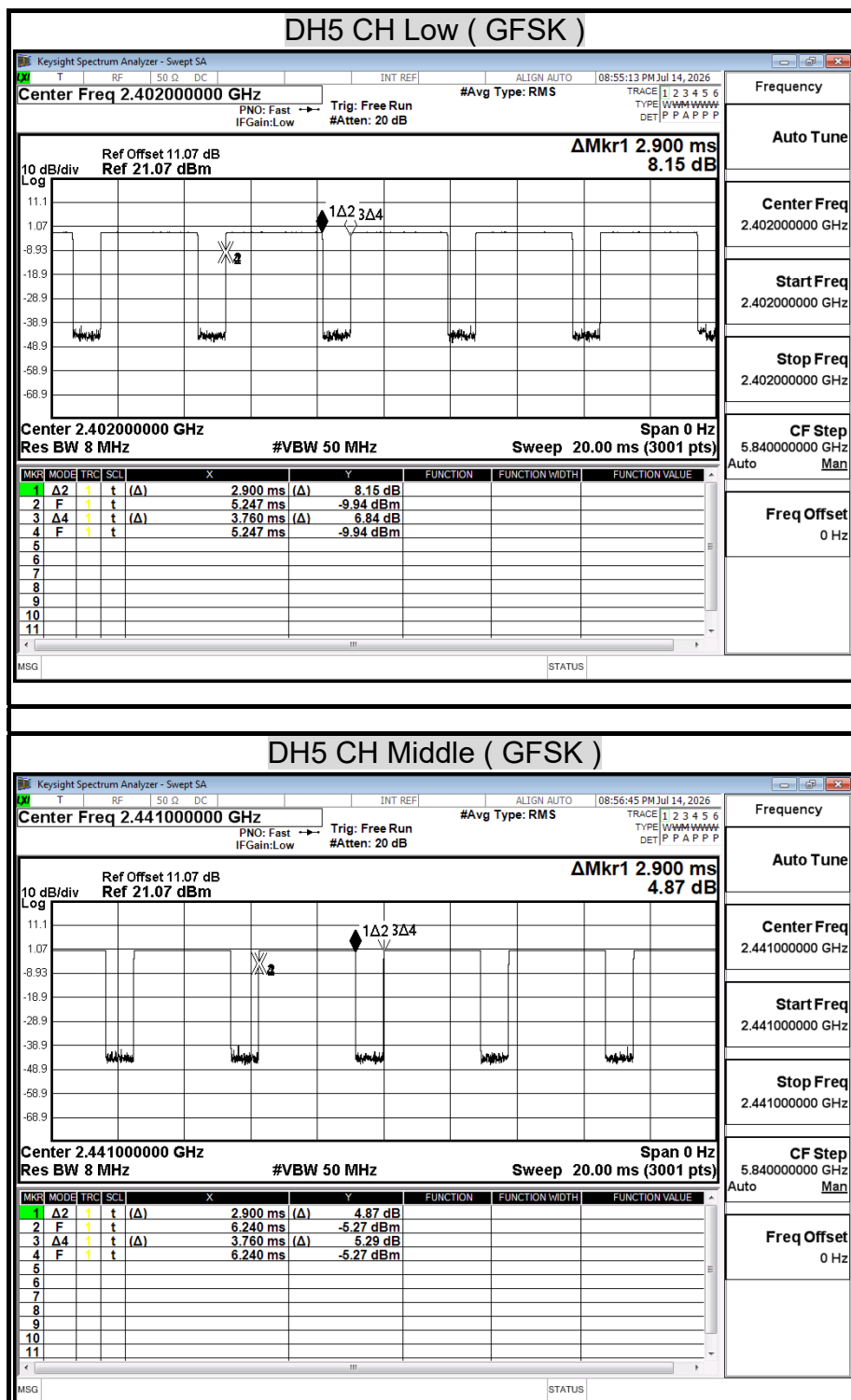
DWELL TIME ON EACH PAYLOAD

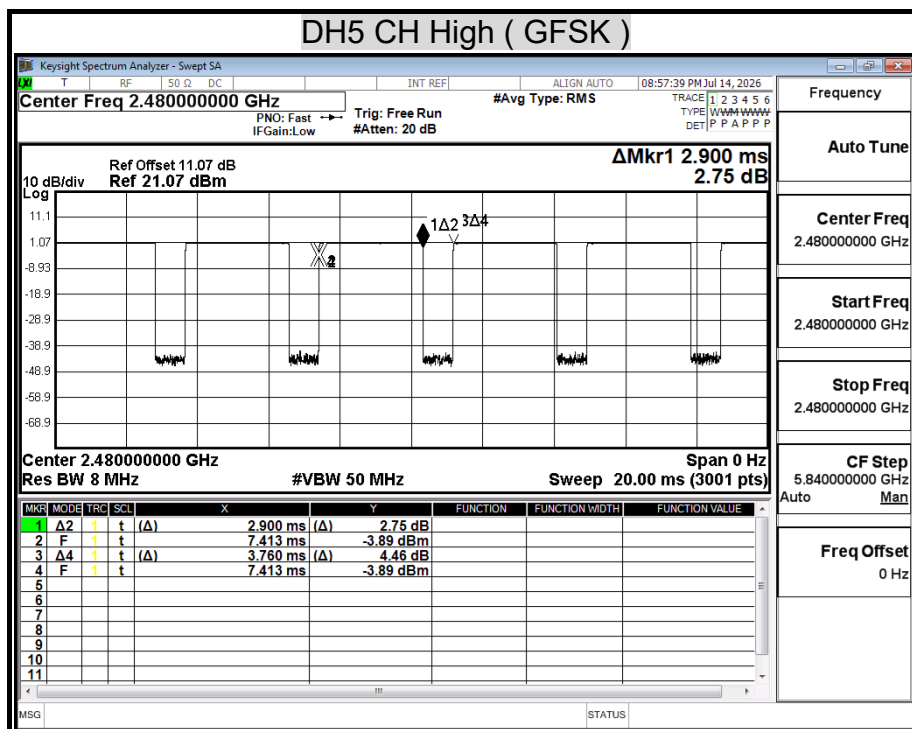


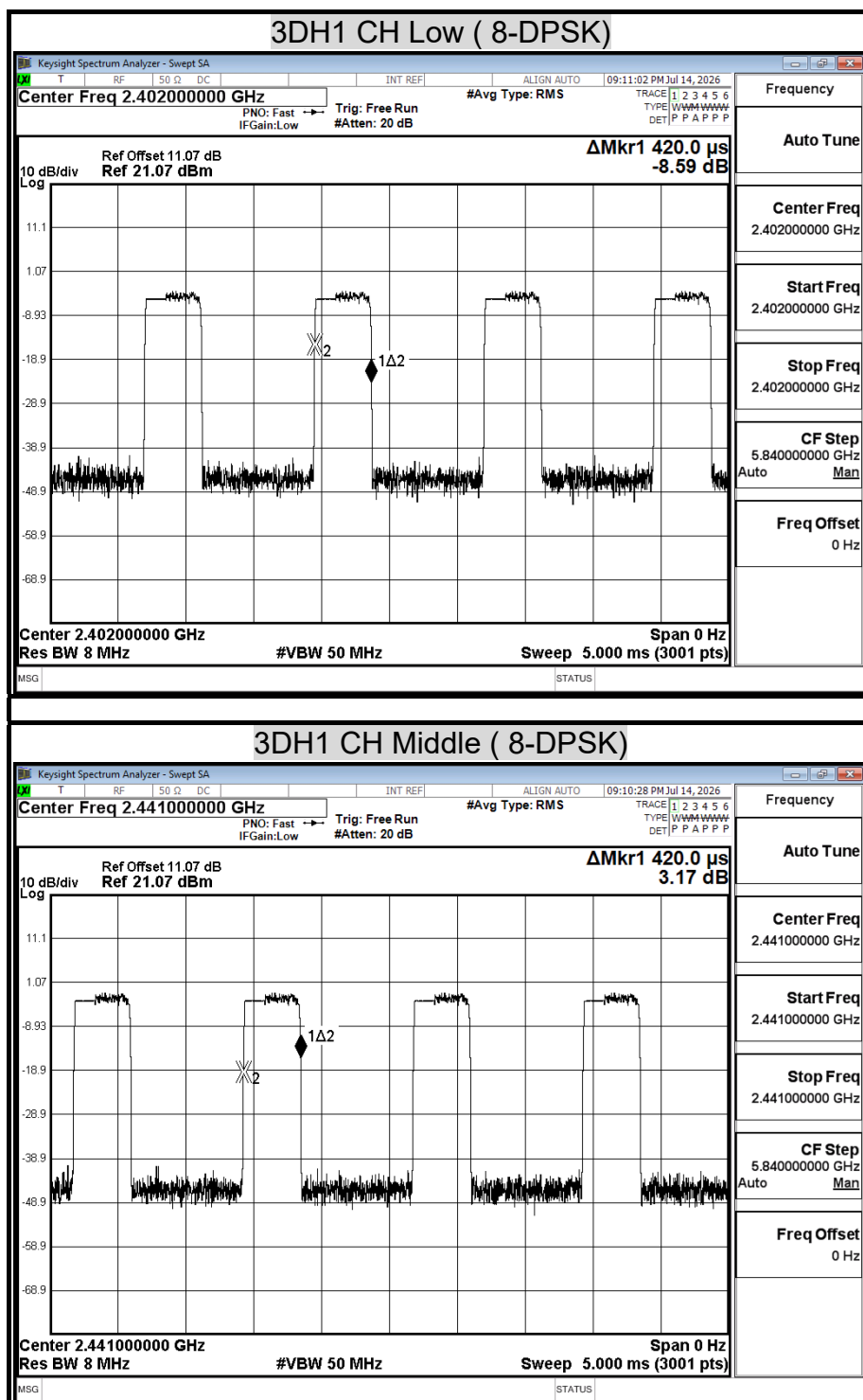


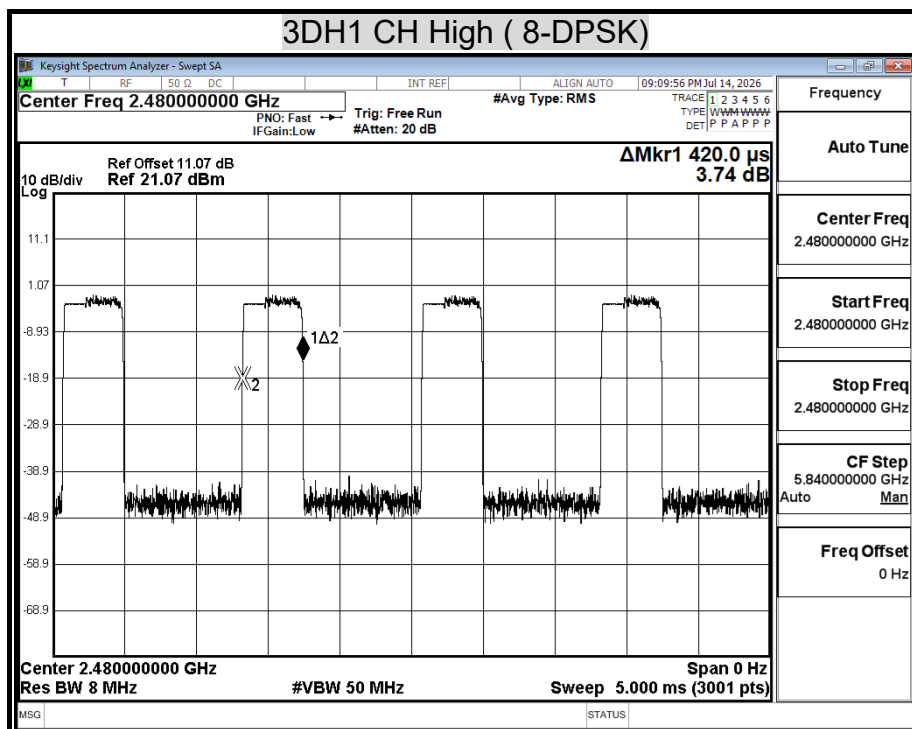


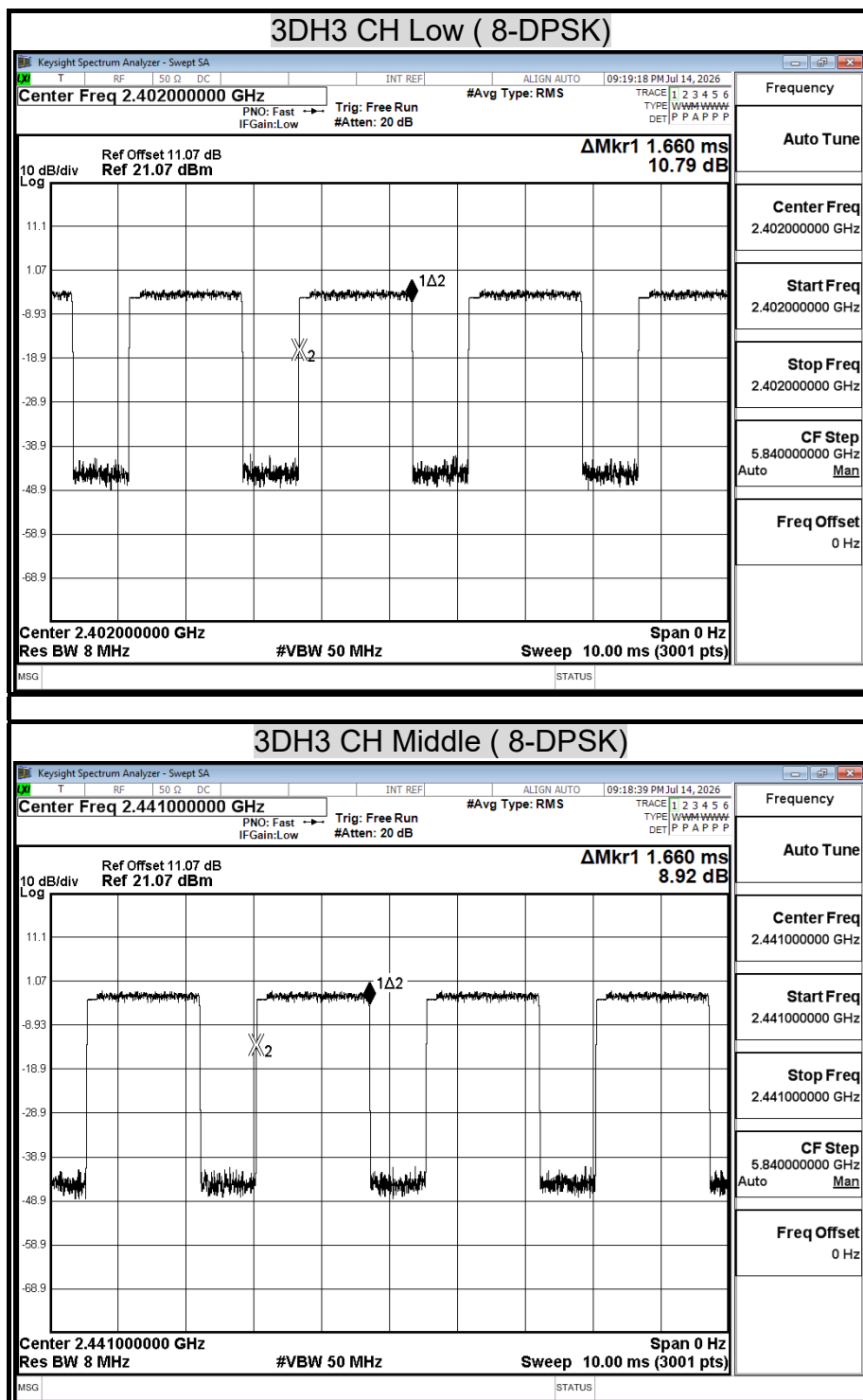


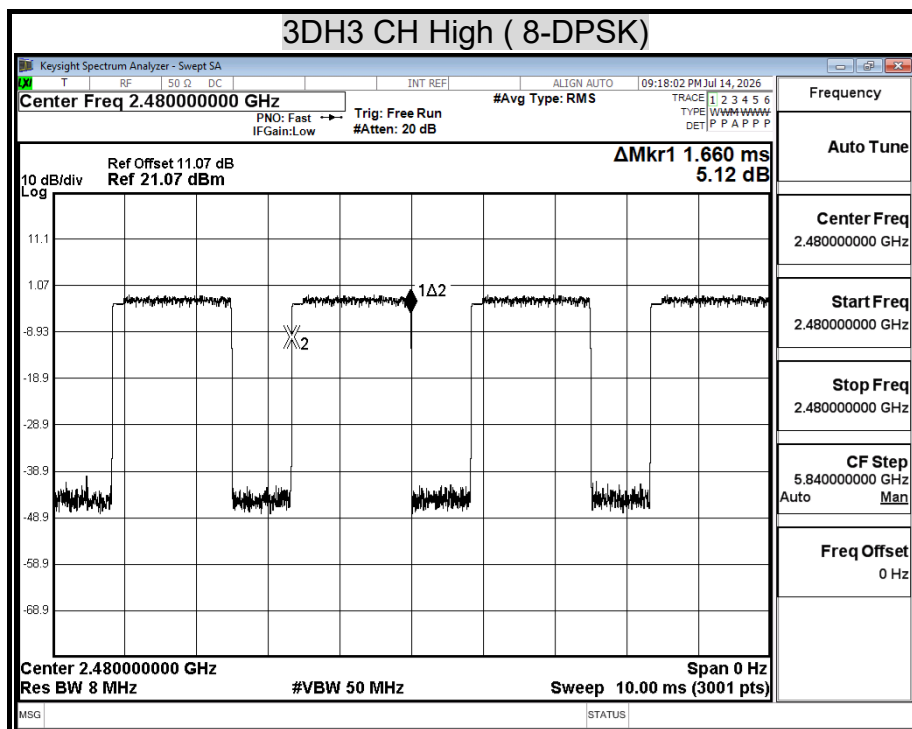


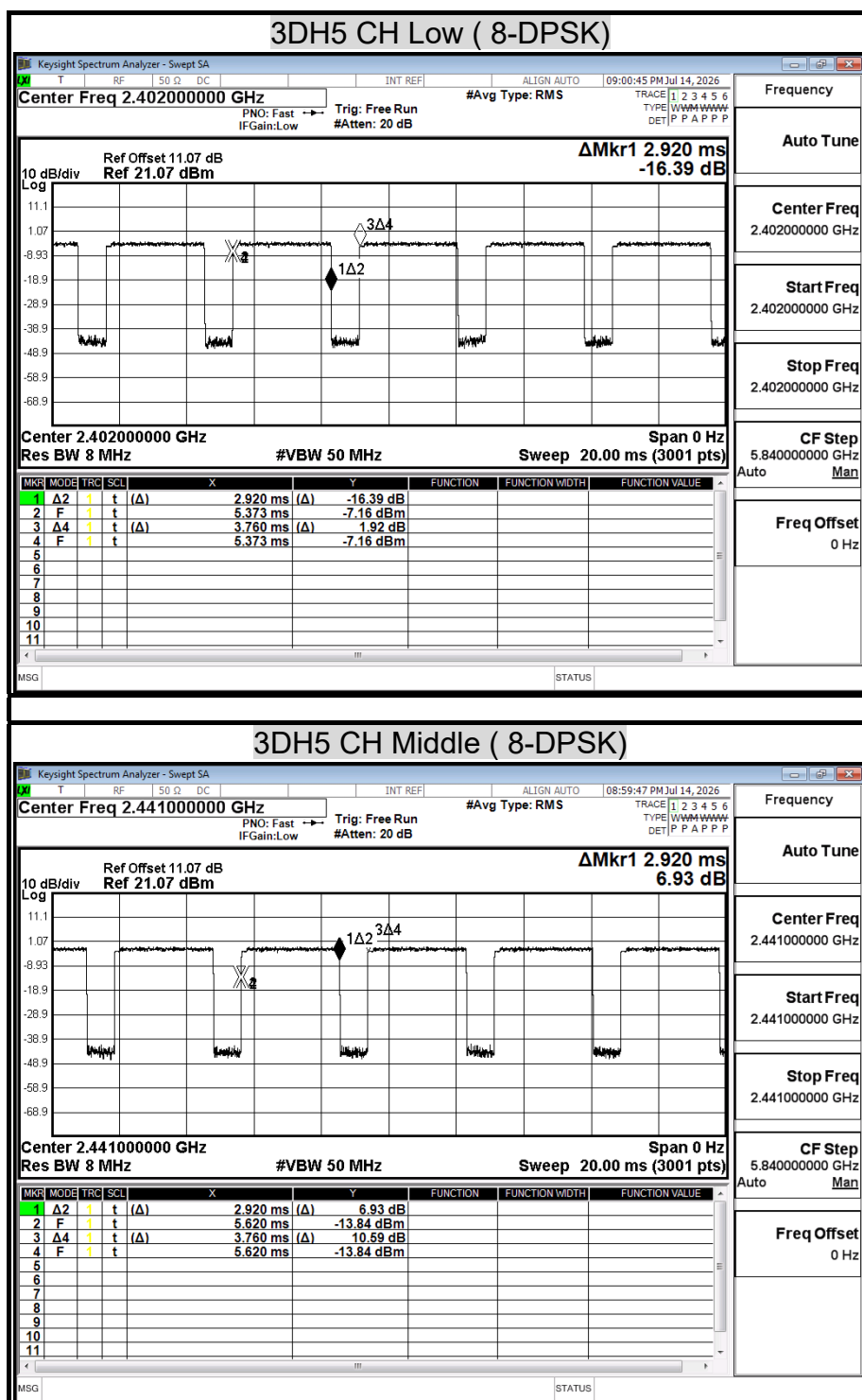


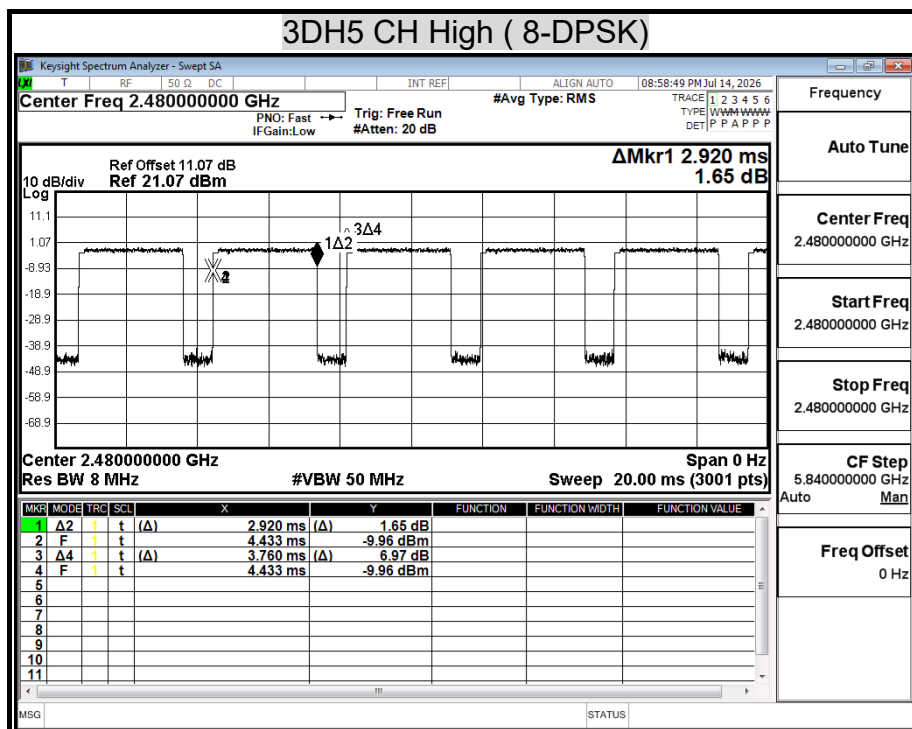












8.6 DUTY CYCLE

LIMIT

Nil (No dedicated limit specified in the Rules)

TEST SETUP



TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value. Set $VBW \geq RBW$. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.)

TEST RESULTS

No non-compliance noted.

TEST DATA

Model Name	A-1499WPT	Test By	Ted Huang
Temp & Humidity	24.8°C, 42%	Test Date	2026/07/14

Modulation Type: GFSK / DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2900.00	1	2900	
Ton2		0	0	
Ton3			0	2.9
Tp				3.76

Ton	2.90
Tp(Ton+Toff)	3.76
Duty Cycle	0.77
$10 * \log (1/x) =$	1.13

Modulation Type: 8-DPSK / 3-DH5

	us	Times	Ton	Total Ton time(ms)
Ton1	2920.00	1	2920	
Ton2		0	0	
Ton3			0	2.92
Tp				3.76

Ton	2.92
Tp(Ton+Toff)	3.76
Duty Cycle	0.78
$10 * \log (1/x) =$	1.10