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

For

Turntable

Model: ST

Data Applies To: N/A

Brand Name: CAMBRIDGE AUDIO

Issued for

Audio Partnership PLC
Gallery Court, Hankey Place, London, SE1 4BB, United Kingdom

Issued By

Compliance Certification Services Inc.
Tainan Lab.
No.8, Jiucengling, Xinhua Dist.,
Tainan City, Taiwan

Issued Date: August 05, 2021

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REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 05, 2021	Initial Issue	ALL	Gina Lin

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1. TEST REPORT CERTIFICATION

Applicant	:	**Audio Partnership PLC** Gallery Court, Hankey Place, London, SE1 4BB, United Kingdom
Manufacturer	:	**Hanchih Electronics (Shenzhen) Co., Ltd.** XINGYE FIRST ROAD 60#, FENGHUANG INDUSTRIAL DISTRICT, FUYONG TOWN,BAOAN COUNTY, SHENZHEN CITY, GUANG DONG PROVINCE, CHINA
Equipment Under Test	:	Turntable
Model Number	:	ST
Data Applies To	:	N/A
Brand Name	:	CAMBRIDGE AUDIO
Date of Test	:	June 01, 2021 ~ June 29, 2021

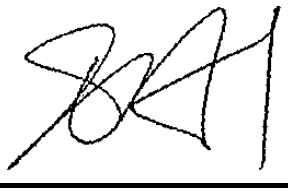
APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.10: 2013	PASS
Statements of Conformity	
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.	

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:



Eric Huang
Section Manager

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	Turntable
Model Number	ST
Data Applies To	N/A
Brand Name	CAMBRIDGE AUDIO
Identify Number	T210521N01
Received Date	May 21, 2021
Reported Date	July 13, 2021
Frequency Range	2402MHz ~ 2480MHz
Transmit Peak Power	GFSK : -0.695dBm / 0.852mW 8DPSK: 5.737dBm / 3.747mW
Channel Spacing	1MHz
Transmit Data Rate	GFSK Mode：1 Mbps 4/πDQPSK Mode : 2-3Mbps 8DPSK Mode : 24Mbps
Modulation Type	GFSK、π/4DQPSK、8DPSK
Number of Channels	79 Channels
EUT Power Supply	DC 12V (Powered by adapter)
Antenna Type	Manufacturer: Audio Partnership PLC Type: ANTENNA WIFI FOR FPC Model: 520122-0010-23R Gain: 1.24 dBi
Firmware Version	V1.0
Software Version	V1.0

Power Adapter :

Manufacturer	Model No.	Power Input	Power Output
SHENZHEN FUJIA APPLIANCE CO., LTD.	FJ-SW1202000N	AC 100-240V, 50/60Hz, 0.6A	DC 12V, 2A, 24W

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: YKBST-039** 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

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	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, 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	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.)

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
Japan	VCCI

Copies of granted accreditation certificates are available for downloading from our web site, http:///www.ccsrf.com

6.5 MEASUREMENT EQUIPMENT USED

For §8.8.2~8.8.3

Chamber 966 Room (Radiation Test)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Active Loop Antenna	ETS-LINDREN	6502	8905-2356	08/02/2019	08/01/2021
Bilog Antenna With 6dB Attenator	SUNOL SCIENCES & EMCI	JB1 & AT-N0681	A070506-1 & AT-N0681	09/14/2020	09/13/2021
Cable	Suhner	SUCOFLEX104PEA	20520/4PEA&O6	01/29/2021	01/28/2022
Double Ridged Guide Horn Antenna	ETS-LINDGREN	3116	00078900	03/30/2021	03/29/2022
EMI Test Receiver	R&S	ESCI	100960	02/05/2021	02/04/2022
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/20/2020	07/19/2021
Horn Antenna	Com-Power	AH-118	071032	05/04/2021	05/03/2022
Pre-Amplifier	EMCI	EMC012645	980098	01/29/2021	01/28/2022
Pre-Amplifier	HP	8447F	2443A01683	01/19/2021	01/18/2022
Pre-Amplifier	Com-Power	PAM-840A	461378	07/20/2020	07/19/2021
Type N coaxial cable	Suhner	CHA9513	6	01/19/2021	01/18/2022
Notch Filter	MICRO-TRONICS	BRM50702-01	018	N.C.R	N.C.R
Software	Excel(ccs-o6-2020 v1.1)，e3(v6.101222)				

For §8.1~8.7 8.8.4

Chamber 966 Room (Conducted Test)					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY54430216	07/20/2020	07/19/2021
Power Meter	Anritsu	ML2487A	6K00003888	05/18/2021	05/17/2023
Power Sensor	Anritsu	MA2491A	033265	05/18/2021	05/17/2023
SMA Cable + 10dB Attenuator	CCS	SMA+10dB ATT	SMA/10dB	01/29/2021	01/28/2022
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	01/21/2021	01/20/2022
EMI Test Receiver	R&S	ESCS 30	100348	02/25/2021	02/24/2022
LISN	FCC	FCC-LISN-50-32-2	08009	06/30/2020	06/29/2021
LISN	SCHWARZBECK	NNLK8130	8130124	01/15/2021	01/14/2022
Pulse Limiter	R&S	ESH3-Z2	100116	01/21/2021	01/20/2022
Test S/W	e3(6.101222)				

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:

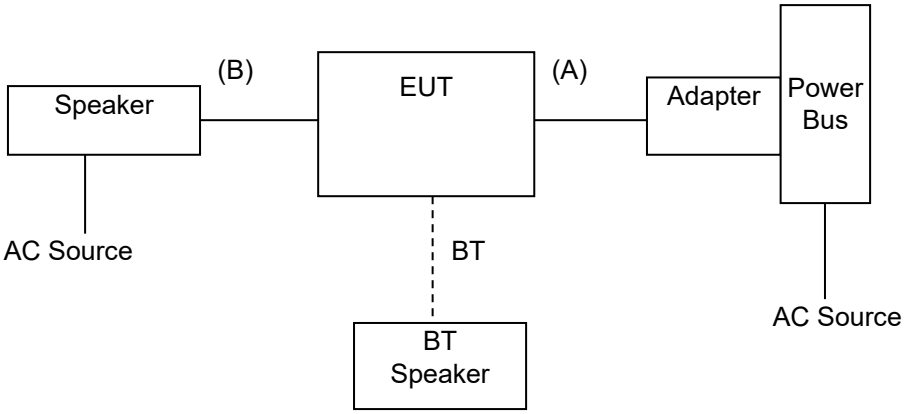
PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz Test Site : CB966	±3.1dB
Radiated Emission, 200 to 1000 MHz Test Site : CB966	±2.7dB
Radiated Emission, 1 to 6 GHz	± 2.7dB
Radiated Emission, 6 to 18 GHz	± 2.7dB
Radiated Emission, 18 to 26.5 GHz	± 2.7dB
Radiated Emission, 26 to 40 GHz	± 3.7dB
Power Line Conducted Emission	± 2.0dB

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

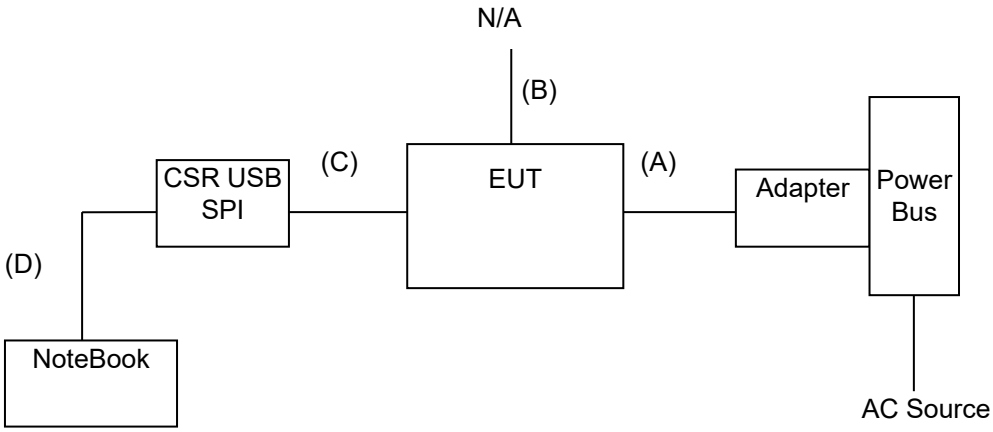
7. SETUP OF EQUIPMENT UNDER TEST

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	Speaker System	T.C.SATR	TCS2285	DOC	Audio cable, unshd, 1.4m
2	Bluetooth speaker	KINYO	BTS-672	DOC	N/A

No.	Signal cable description	
A	DC power cable	Unshielded, 1.5m 1 pcs, with 1 core.
B	Audio	Shielded, 1.0m 1 pcs.
C	Audio	Shielded, 1.0m 1 pcs.

For RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Note Book	Acer	AS 3830TG	DOC	Power cable, unshd, 1.6m
2	Flask Disk	Transcend	Jet Flash790	DOC	N/A

No.	Signal cable description	
A	DC power cable	Unshielded, 1.5m 1 pcs, with 1 core.
B	Audio	Shielded, 1.0m 1 pcs.
C	Command	Unshielded, 0.3m 1 pcs.
D	USB	Shielded, 0.7m 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 “CSR BlueSuite 2.6.4”,“Blue Test 3” software was used for testing.
3.Choose Transport “SPI” and Port “USB SPI (600373)”.

TX Mode:

GFSK(DH1):

CFG PKT > Packet Type : 4 , Packet Type : 27
TXDATA1 > LO Freq : 2402 (2402,2441,2480)，Power : 255,0 (255,0，175,0)

GFSK(DH3):

CFG PKT > Packet Type : 11 , Packet Type : 183
TXDATA1 > LO Freq : 2402 (2402,2441,2480)，Power : 255,0 (255,0，175,0)

GFSK(DH5):

CFG PKT > Packet Type : 15 , Packet Type : 339
TXDATA1 > LO Freq : 2402 (2402,2441,2480)，Power : 255,0 (255,0，175,0)

8-DPSK(3DH1):

CFG PKT > Packet Type : 24 , Packet Type : 83
TXDATA1 > LO Freq : 2402 (2402,2441,2480)，Power : 255,50 (255,50，255,40)

8-DPSK(3DH3):

CFG PKT > Packet Type : 27 , Packet Type : 552
TXDATA1 > LO Freq : 2402 (2402,2441,2480)，Power : 255,50 (255,50，255,40)

8-DPSK(3DH5):

CFG PKT > Packet Type : 31 , Packet Type : 1021
TXDATA1 > LO Freq : 2402 (2402,2441,2480)，Power : 255,50 (255,50，255,40)

DSSS:

BLE TEST TX > Channel :0 (0,20,39)
Length : 37
Bit pattern : 0

RX Mode:

GFSK，8-DPSK:

RXDATA1

DSSS:

BLE TEST RX

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

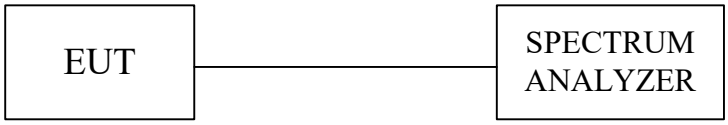
8. APPLICABLE LIMITS AND TEST RESULTS

8.1 20dB BANDWIDTH FOR HOPPING

LIMIT

None; for reporting purposes only.

TEST SETUP



TEST PROCEDURE

The 20dB band width was measured with a spectrum analyzer connected to RF antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency, using the analyzer. Display Line and Marker Delta functions, the 20dB band width of the emission was determined.

TEST RESULTS

Model Name	ST	Test By	Peter Chu
Temp & Humidity	26.8°C, 42%	Test Date	2021/06/25

Modulation Type: GFSK / DH5

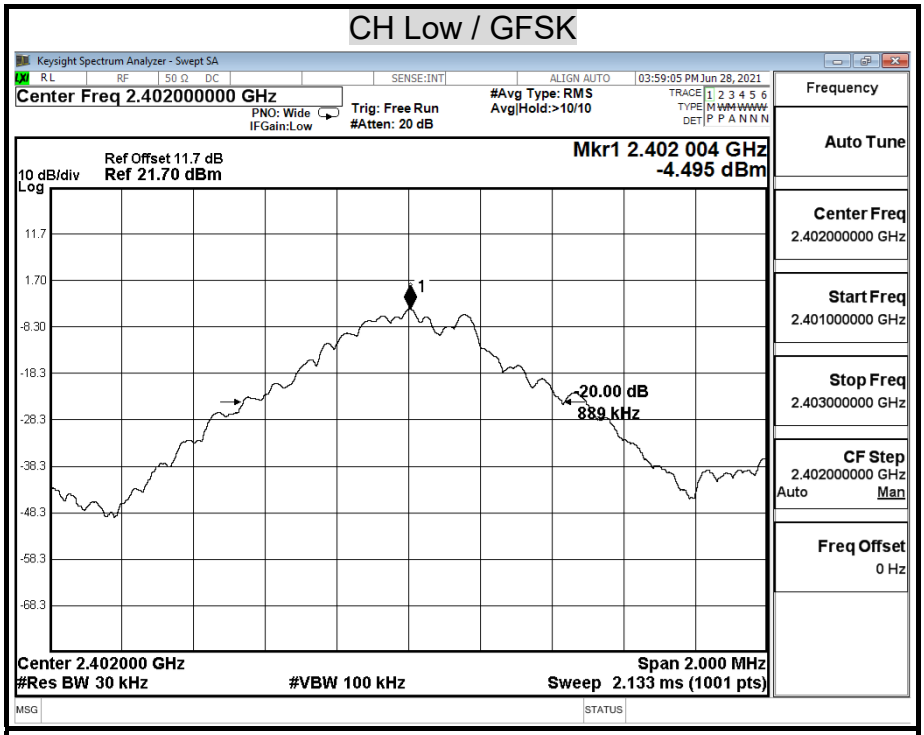
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	889.00	0.59	PASS
Middle	2441	885.00	0.59	PASS
High	2480	890.00	0.59	PASS

Modulation Type: 8-DPSK / 3-DH5

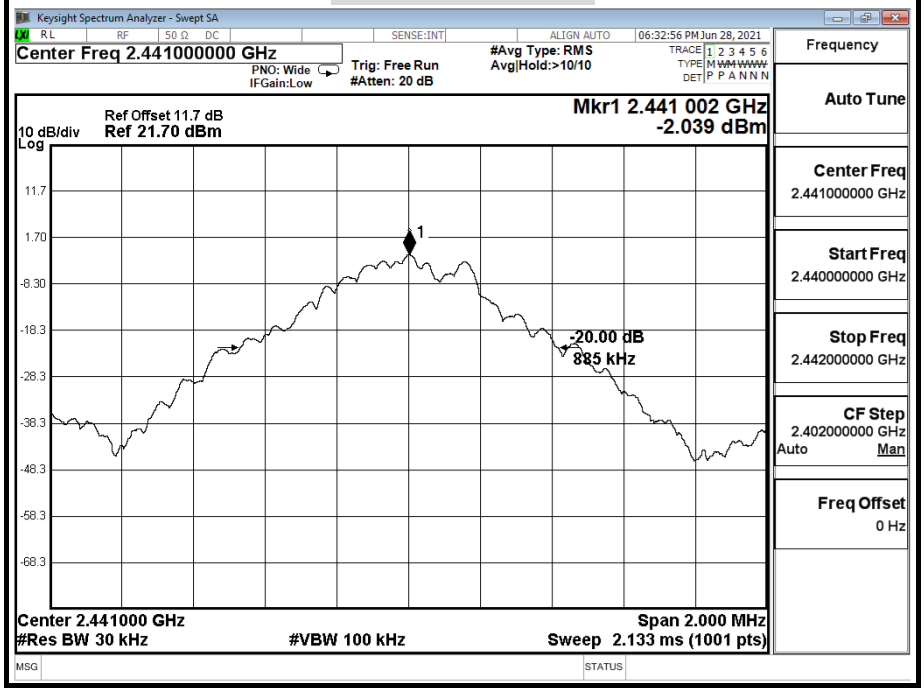
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Two-third of 20dB Bandwidth (MHz)	Pass / Fail
Low	2402	1265.00	0.84	PASS
Middle	2441	1261.00	0.84	PASS
High	2480	1262.00	0.84	PASS

20dB BANDWIDTH

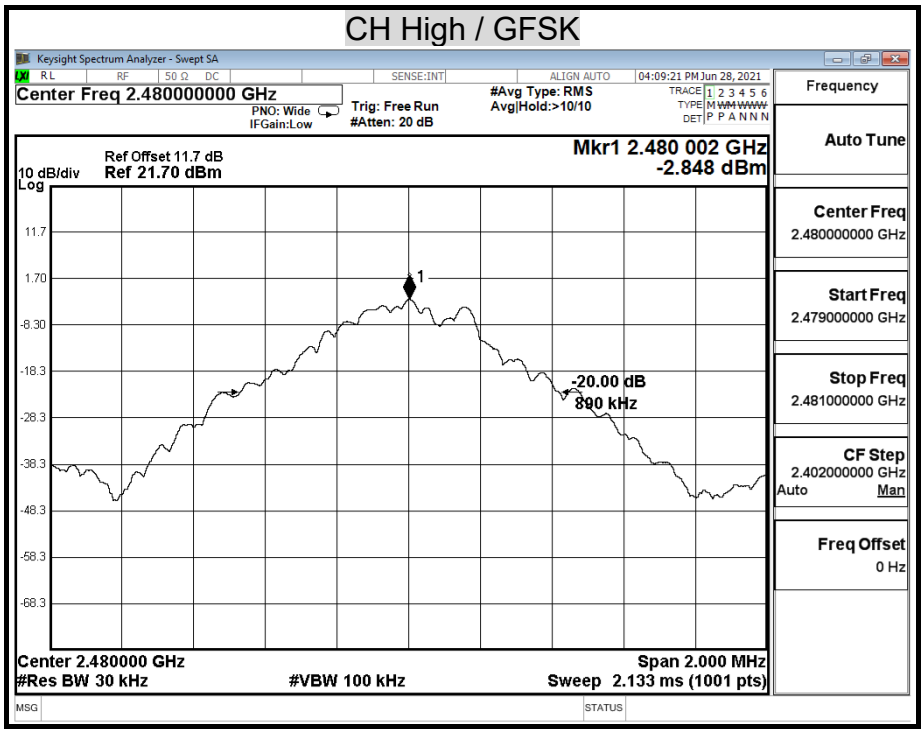
CH Low / GFSK



CH Middle / GFSK



CH High / GFSK



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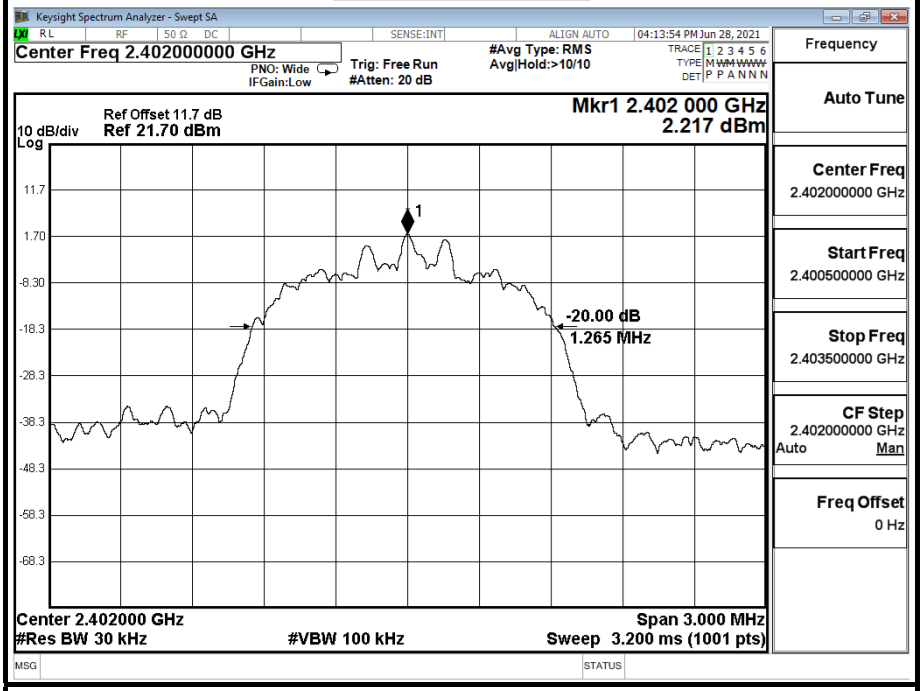
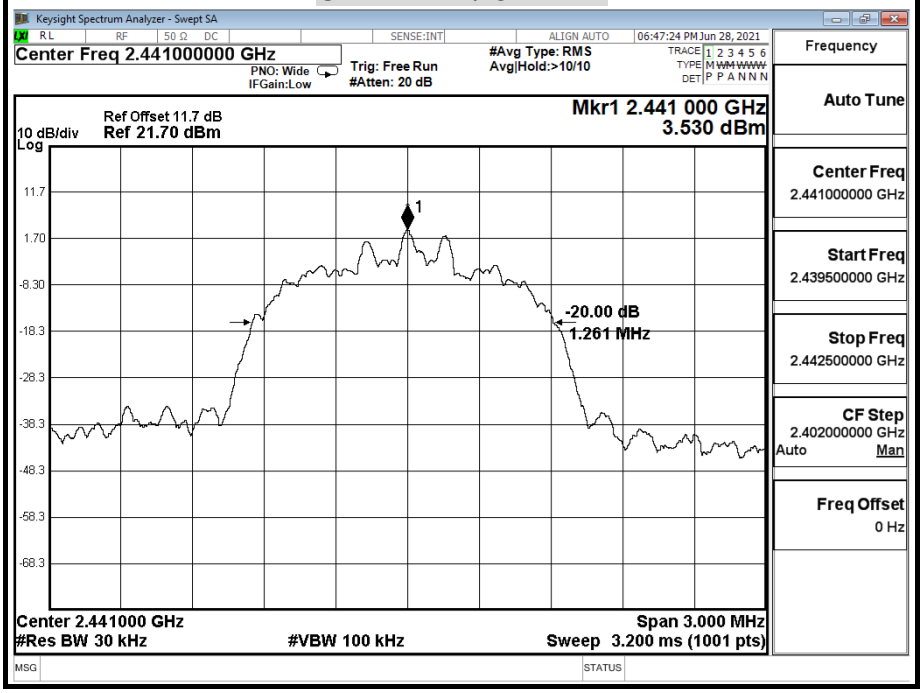
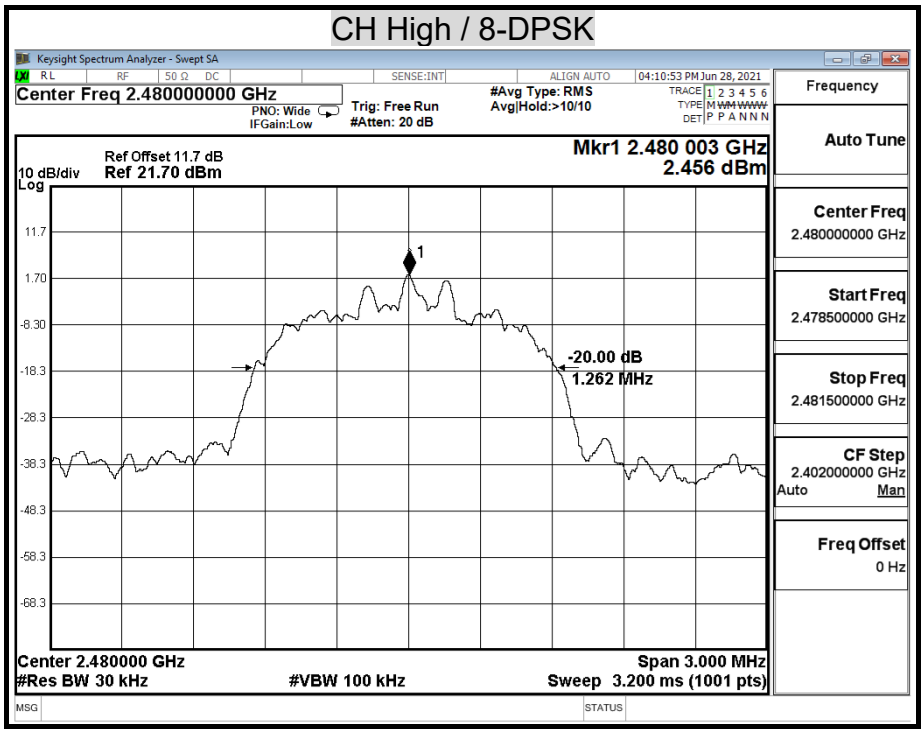


CH Middle / 8-DPSK



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, A power meter was used to record the shape of the transmit signal.

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
RBW > the 20 dB bandwidth of the emission being measured
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold

TEST RESULTS

Model Name	ST	Test By	Peter Chu
Temp & Humidity	26.8°C, 42%	Test Date	2021/06/25

Modulation Type: GFSK / DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	-3.10	0.49012	125	PASS
Mid	2441	-0.70	0.85212		PASS
High	2480	-1.50	0.70795		PASS

Modulation Type: 8-DPSK / 3-DH5

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)	Limit (mW)	Result
Low	2402	4.43	2.77141	125	PASS
Mid	2441	5.74	3.74714		PASS
High	2480	4.97	3.13979		PASS

Average Power Data

Modulation Type: GFSK / DH5

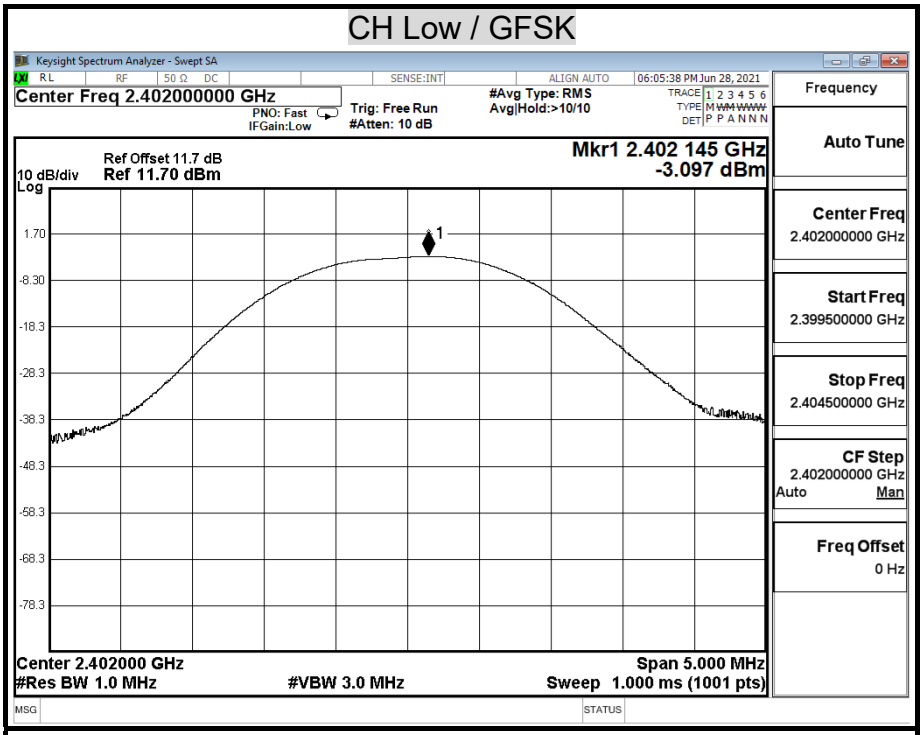
Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-3.50
Middle	2441	-1.07
High	2480	-1.87

Modulation Type: 8-DPSK / 3-DH5

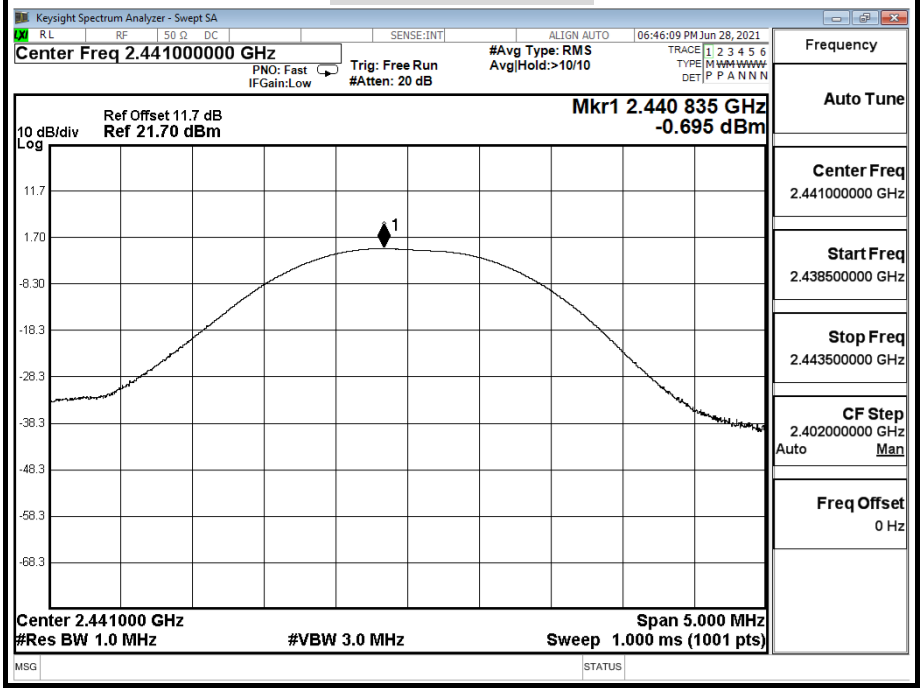
Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	1.35
Middle	2441	2.60
High	2480	1.57

MAXIMUM PEAK OUTPUT POWER

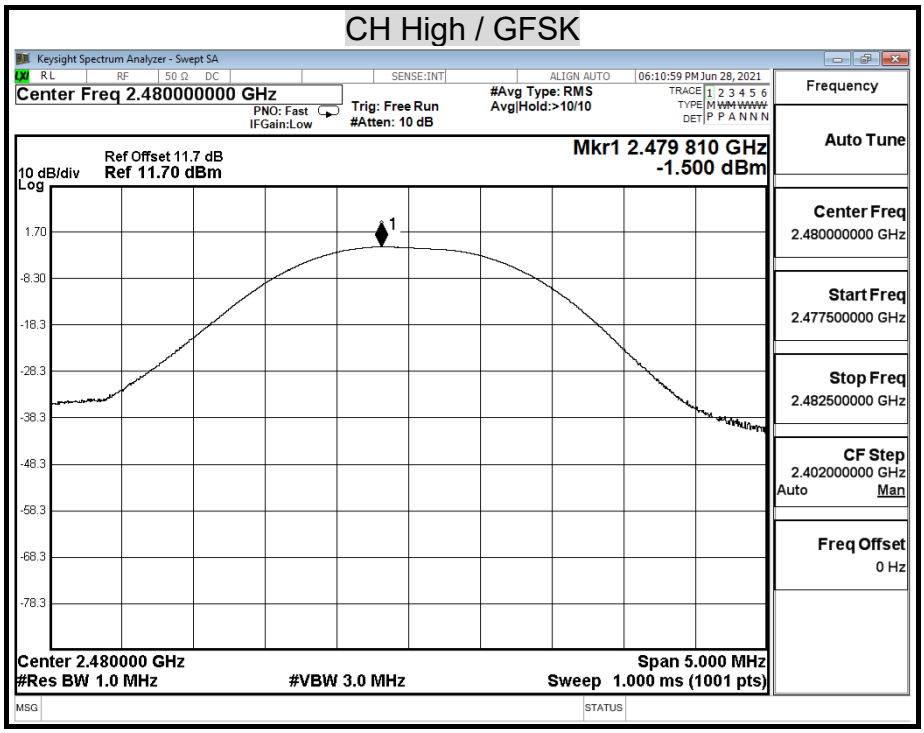
CH Low / GFSK



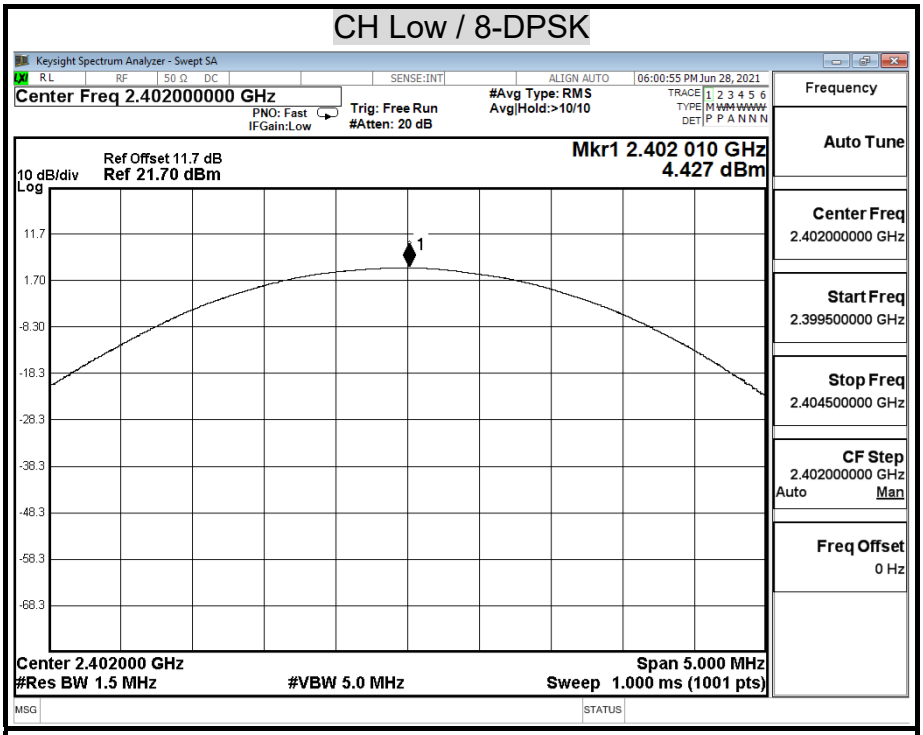
CH Middle / GFSK



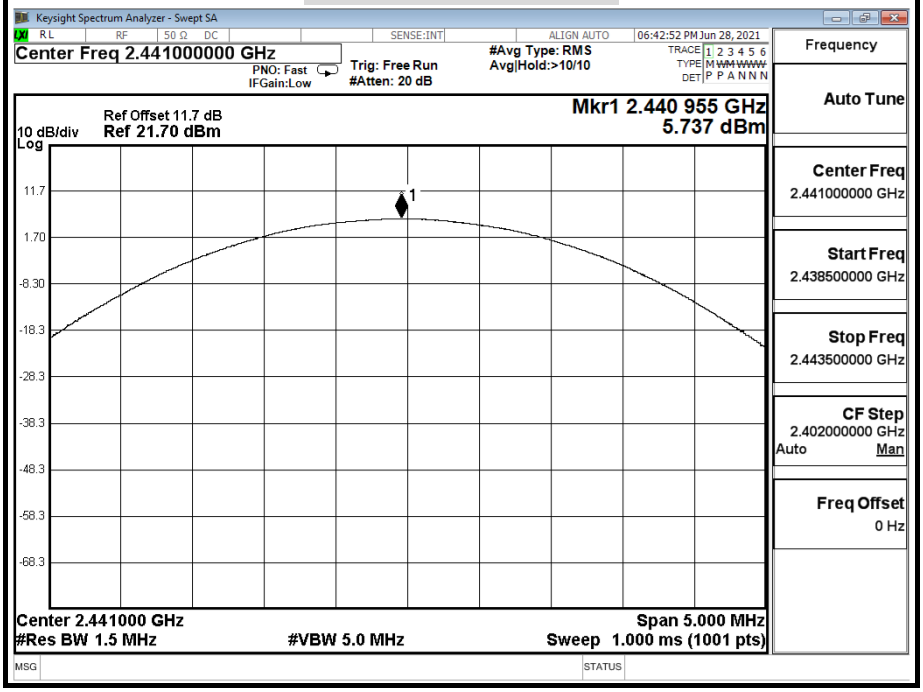
CH High / GFSK



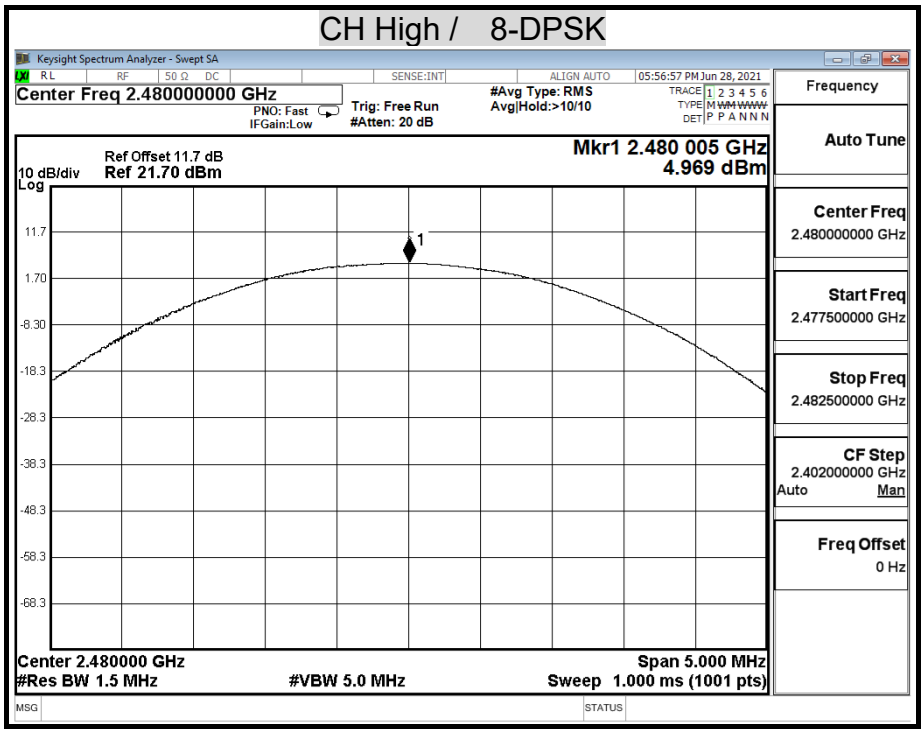
CH Low / 8-DPSK



CH Middle / 8-DPSK

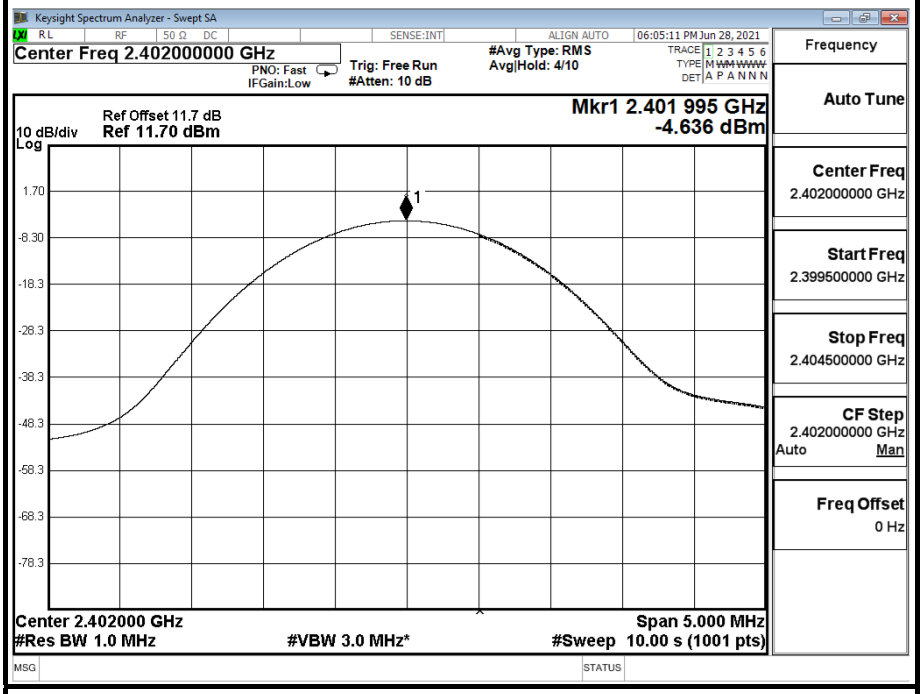


CH High / 8-DPSK

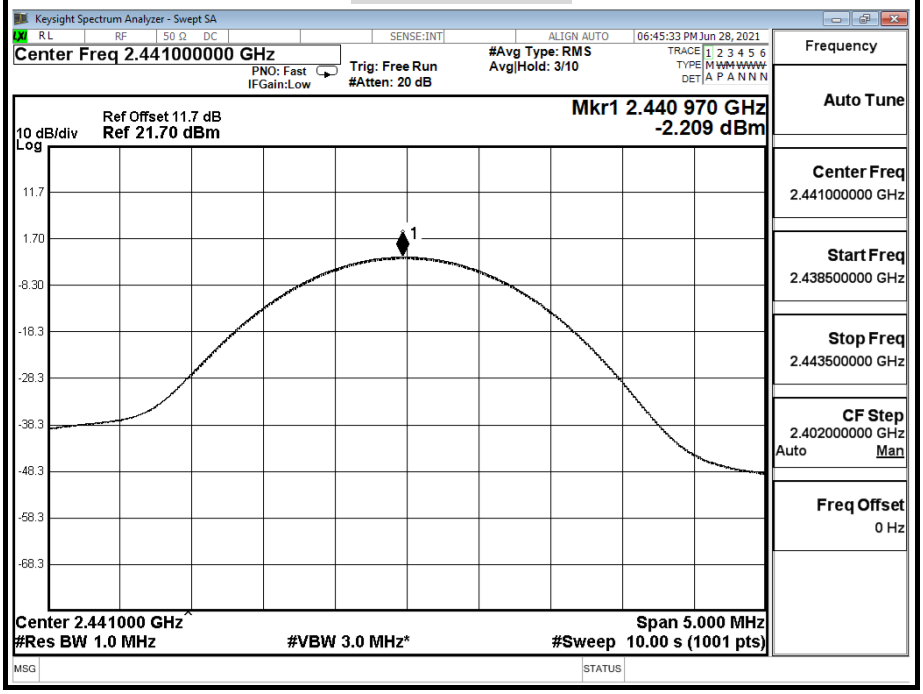


AVERAGE POWER

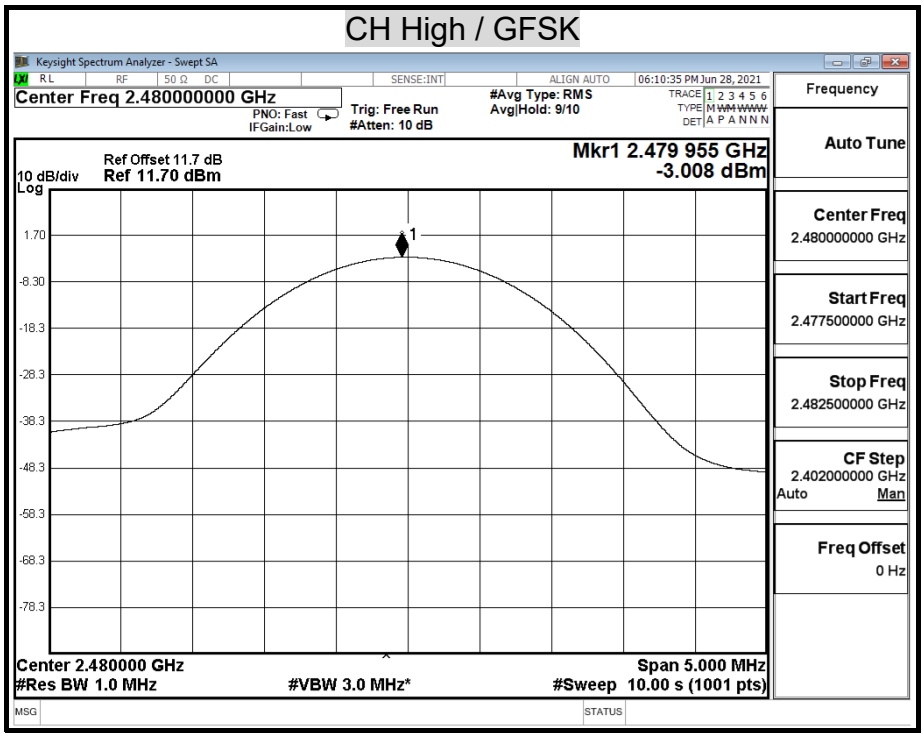
CH Low / GFSK



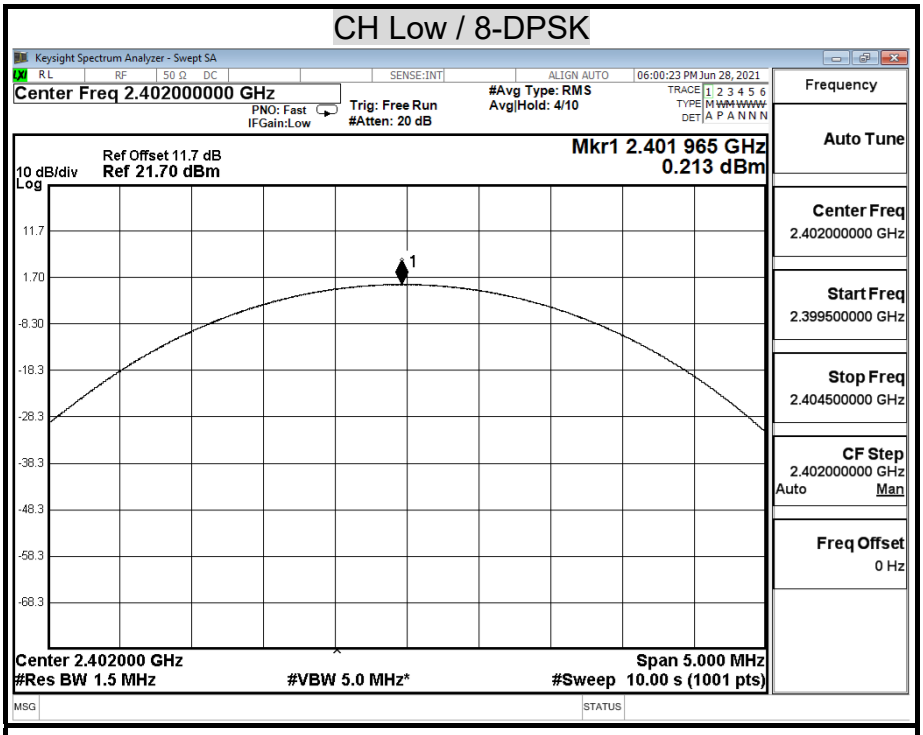
CH Mid / GFSK



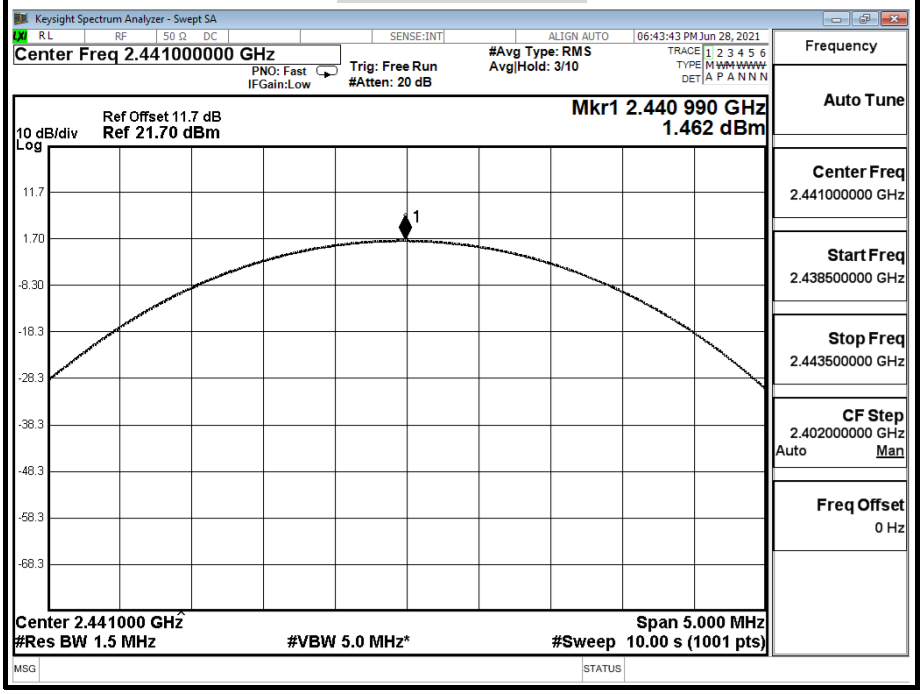
CH High / GFSK



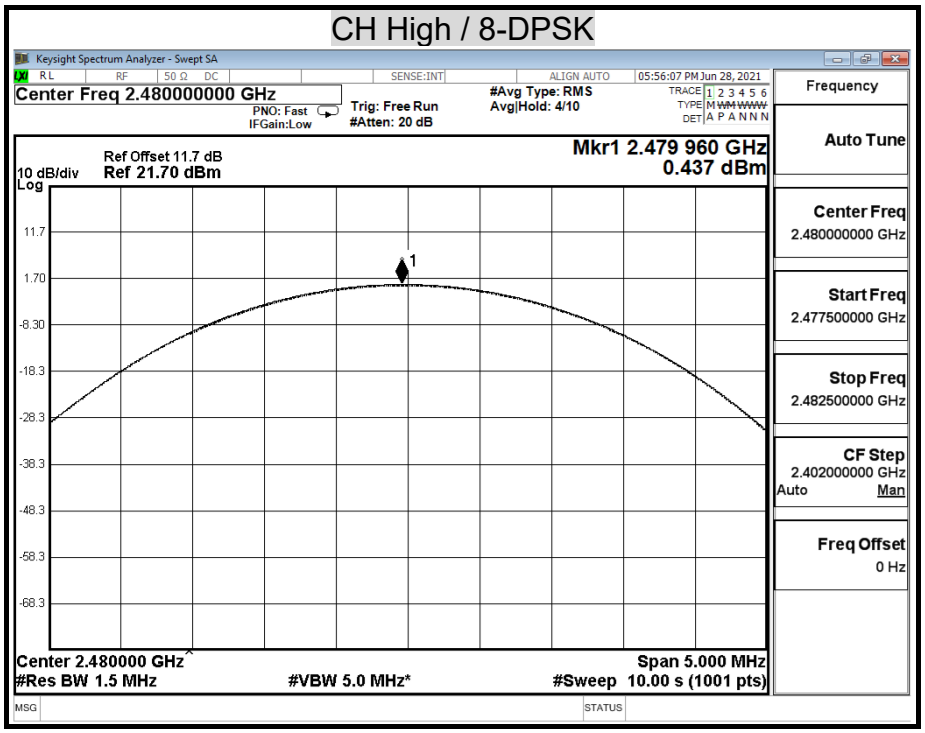
CH Low / 8-DPSK



CH Mid / 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 andomly 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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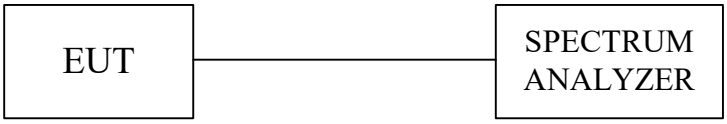
TEST SETUP



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	ST	Test By	Peter Chu
Temp & Humidity	26.8°C, 42%	Test Date	2021/06/25

Modulation Type: GFSK / DH5

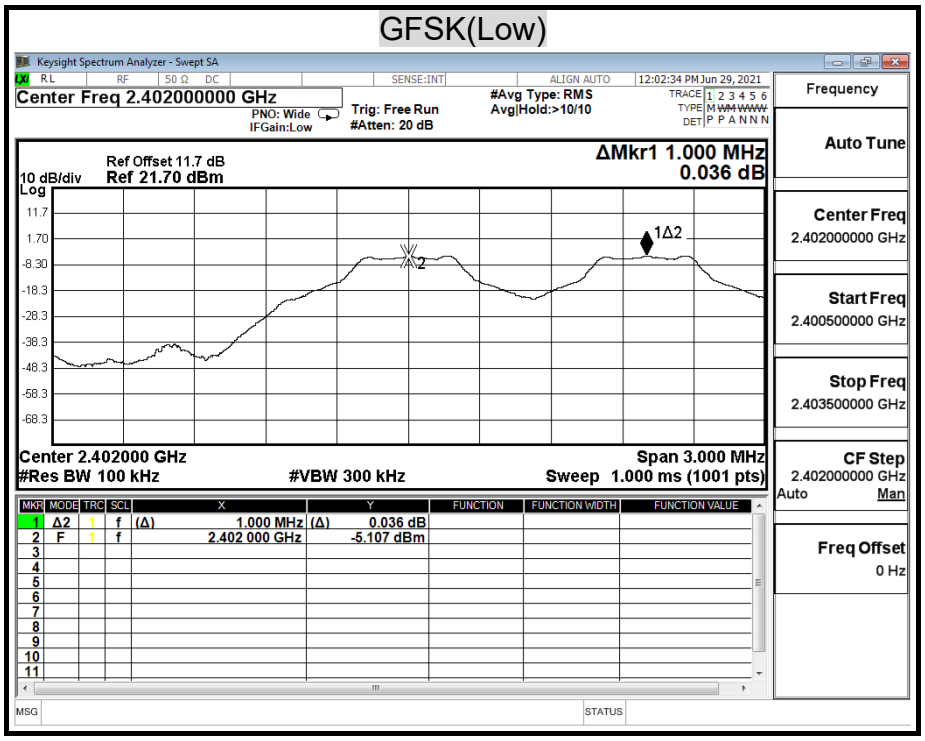
Channel	Adjacent Hopping Channel Separation (MHz)	Two –third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.59	25 KHz	PASS
2441MHz	1.00	0.59	25 KHz	PASS
2480MHz	1.00	0.59	25 KHz	PASS

Modulation Type: 8-DPSK / 3-DH5

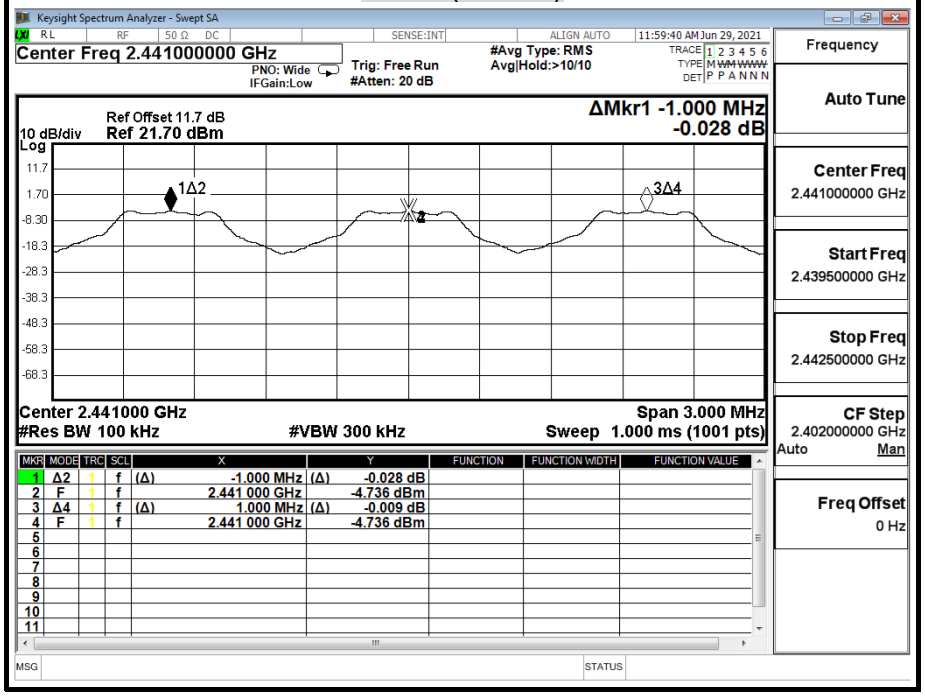
Channel	Adjacent Hopping Channel Separation (kHz)	Two –third of 20dB bandwidth (kHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.84	25 KHz	PASS
2441MHz	1.00	0.84	25 KHz	PASS
2480MHz	1.00	0.84	25 KHz	PASS

HOPPING CHANNEL SEPARATION

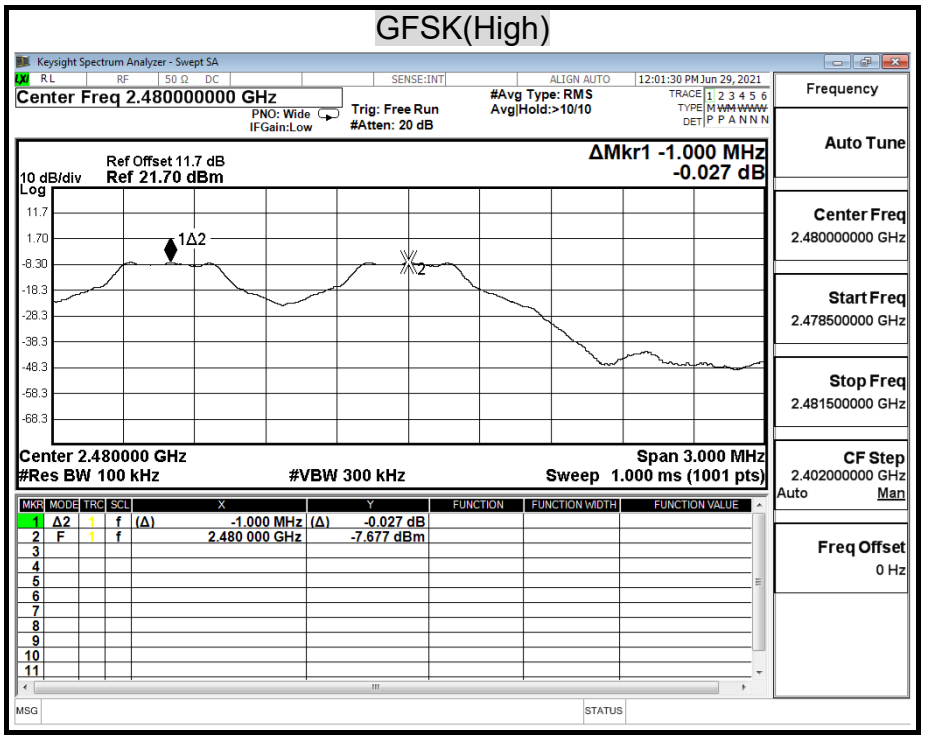
GFSK(Low)



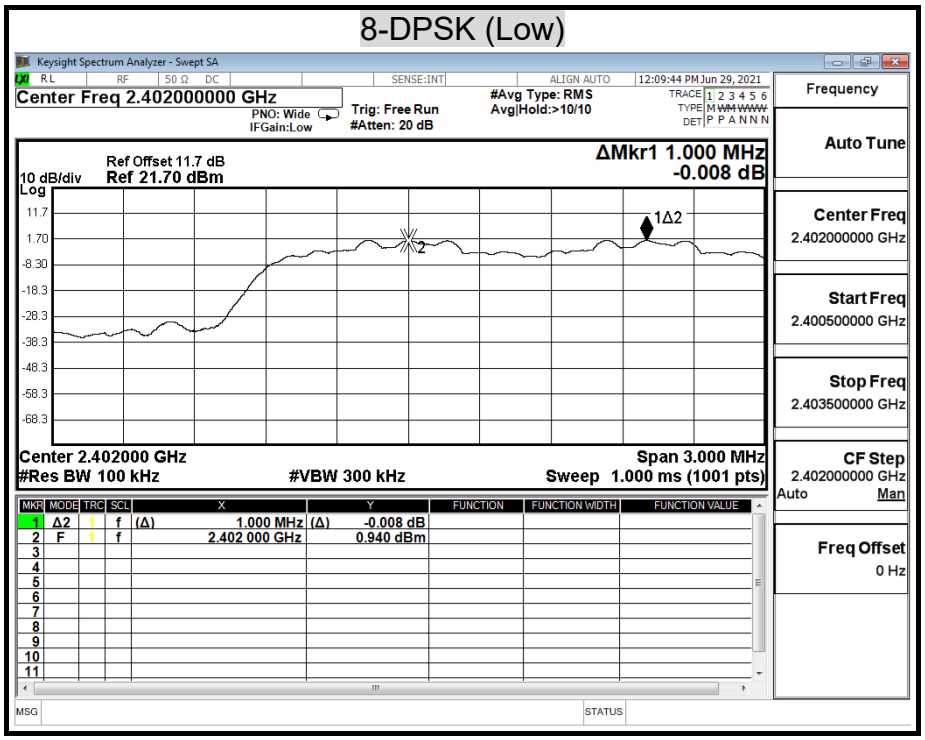
GFSK(Middle)



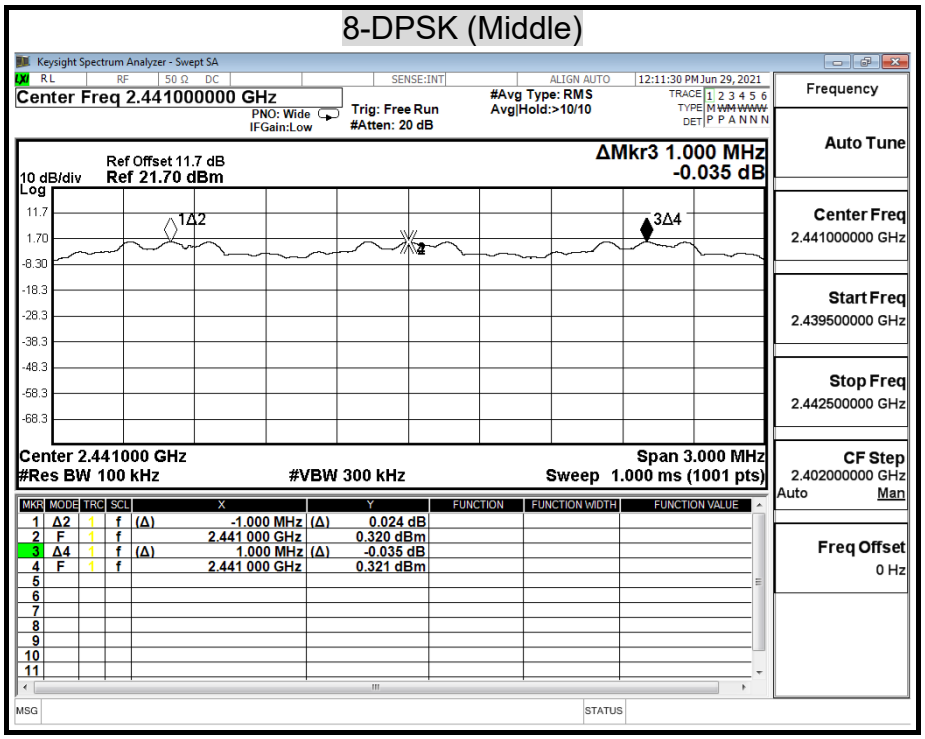
GFSK(High)



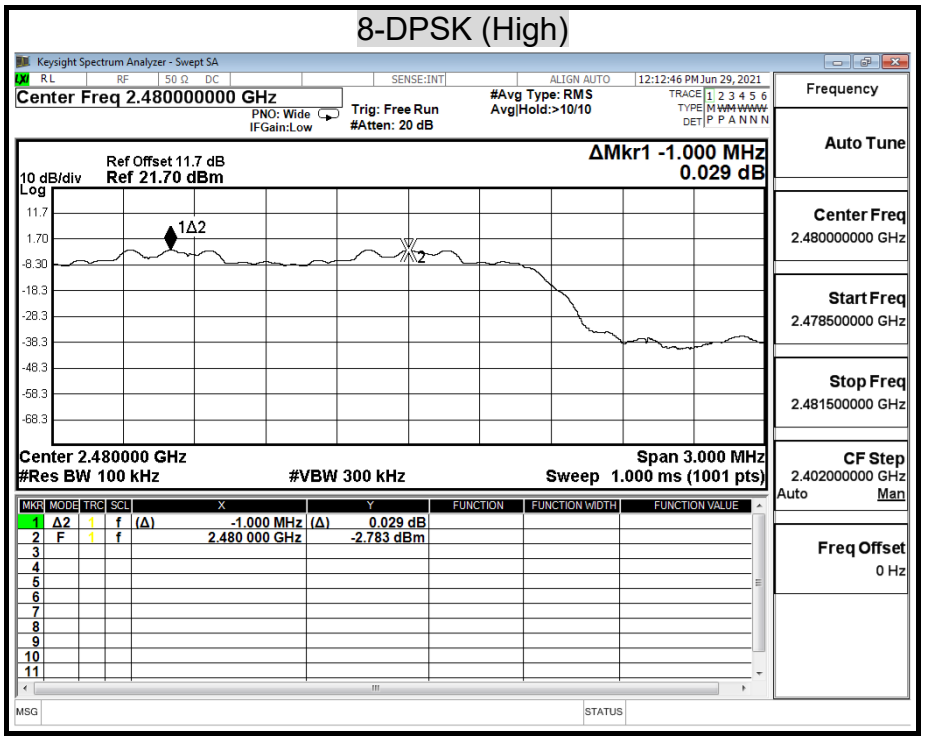
8-DPSK (Low)



8-DPSK (Middle)



8-DPSK (High)

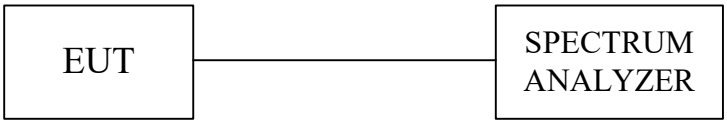


8.4 NUMBER OF HOPPING FREQUENCY USED

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	ST	Test By	Peter Chu
Temp & Humidity	26.8°C, 42%	Test Date	2021/06/25

Modulation Type: GFSK / DH5

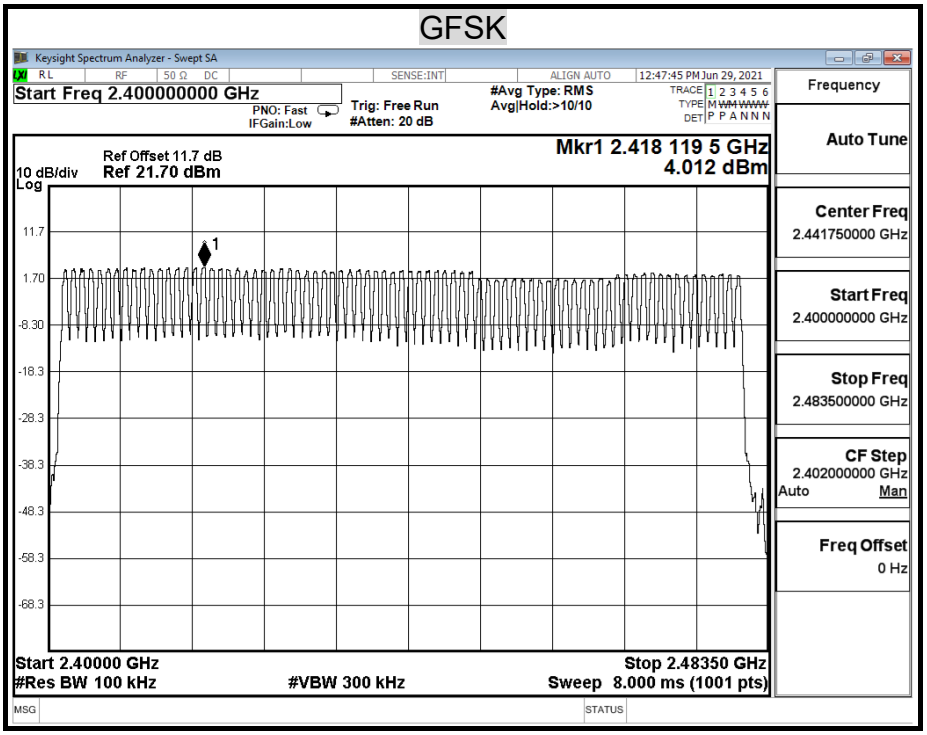
Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

Modulation Type: 8-DPSK / 3-DH5

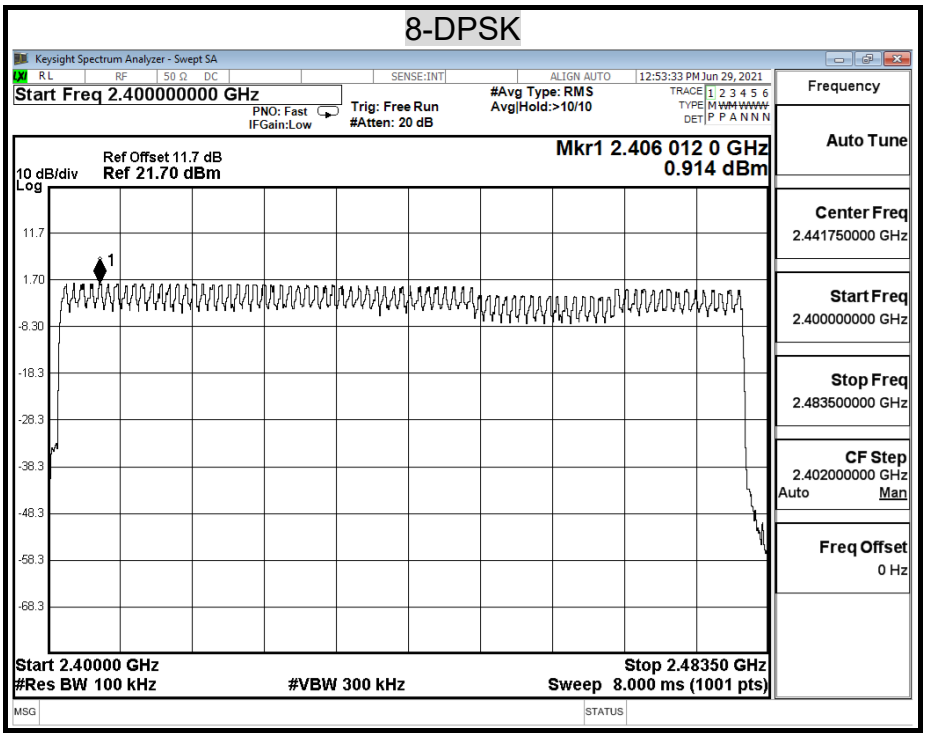
Result(No.of CH)	Limit(No.of CH)	Result
79	>15	PASS

NUMBER OF HOPPING FREQUENCY USED

GFSK



8-DPSK

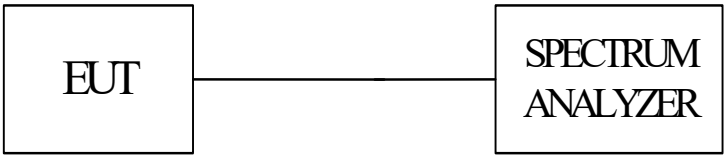


8.5 DWELL TIME ON EACH CHANNEL

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	ST	Test By	Peter Chu
Temp & Humidity	26.8°C, 42%	Test Date	2021/06/25

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	0.400	128.00	400.00	PASS
2441MHz	DH3	1.650	264.00	400.00	PASS
2441MHz	DH5	2.880	307.20	400.00	PASS
2441MHz	AFH	2.880	153.60	400.00	PASS

DH1 Dwell tine= 0.400 ms×(1600÷2)÷79×31.6= 128.00 (ms)
DH3 Dwell tine= 1.650 ms×(1600÷4)÷79×31.6= 264.00 (ms)
DH5 Dwell tine= 2.880 ms×(1600÷6)÷79×31.6= 307.20 (ms)
AFH Dwell tine= 2.880 ms×(800÷6)÷20×8= 153.60 (ms)

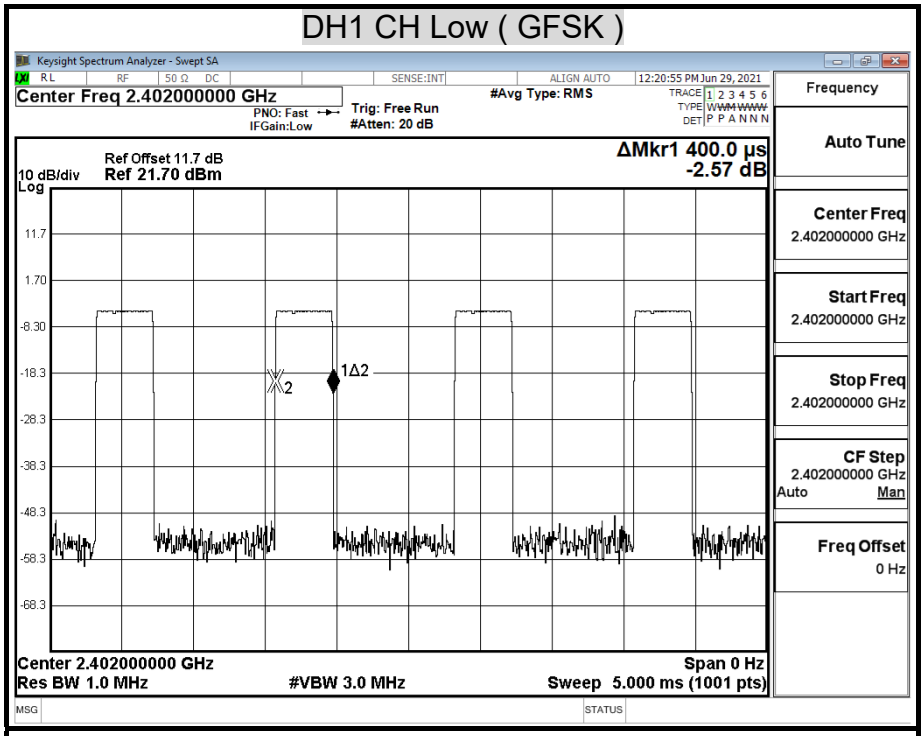
Modulation Type: 8-DPSK / 3-DH5

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	0.400	128.00	400.00	PASS
2441MHz	3DH3	1.650	264.00	400.00	PASS
2441MHz	3DH5	2.880	307.20	400.00	PASS
2441MHz	AFH	2.880	153.60	400.00	PASS

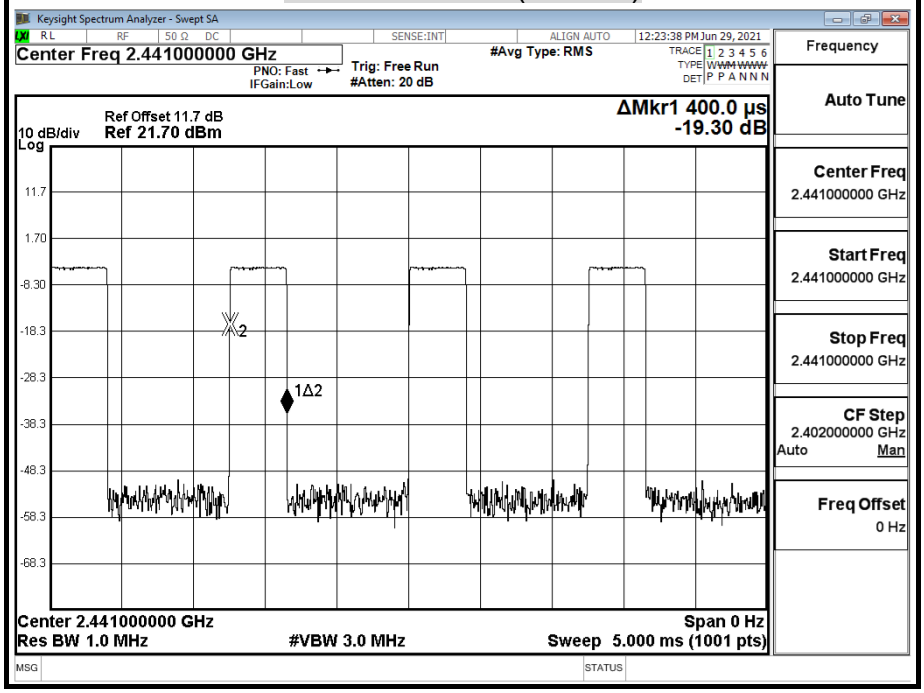
3DH1 Dwell tine= 0.400 ms×(1600÷2)÷79×31.6= 128.00 (ms)
3DH3 Dwell tine= 1.650 ms×(1600÷4)÷79×31.6= 264.00 (ms)
3DH5 Dwell tine= 2.880 ms×(1600÷6)÷79×31.6= 307.20 (ms)
AFH Dwell tine= 2.880 ms×(800÷6)÷20×8= 153.60 (ms)

DWELL TIME ON EACH PAYLOAD

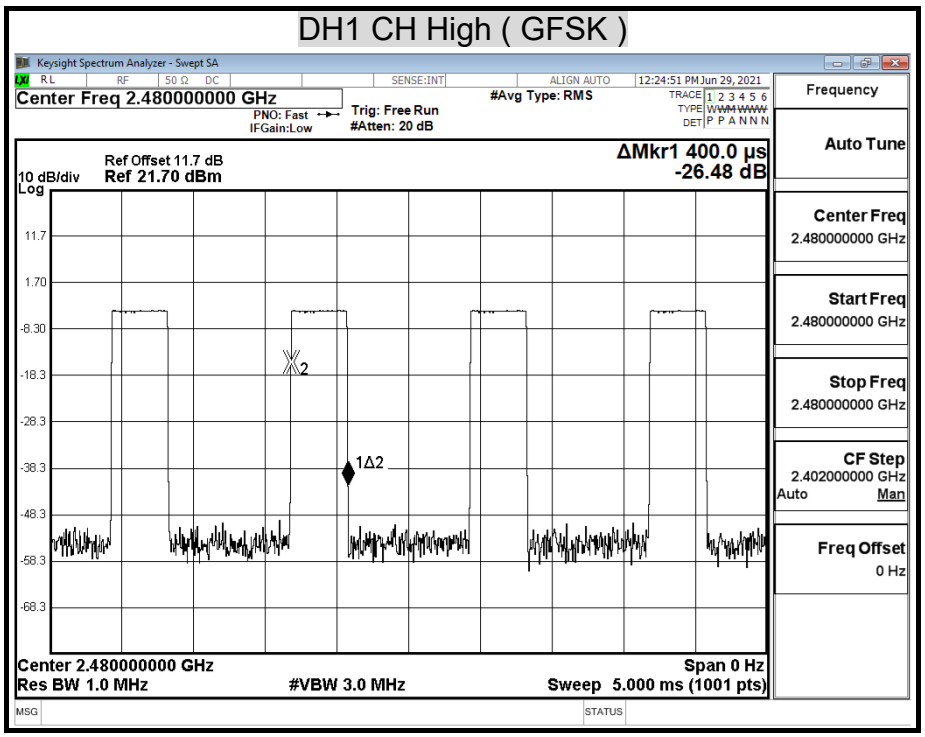
DH1 CH Low (GFSK)



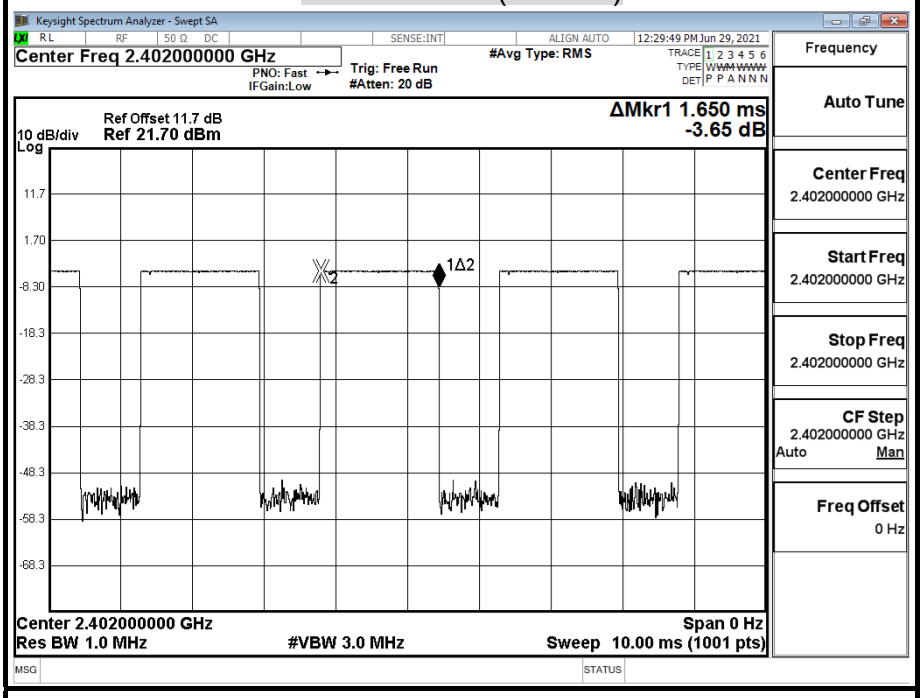
DH1 CH Middle (GFSK)



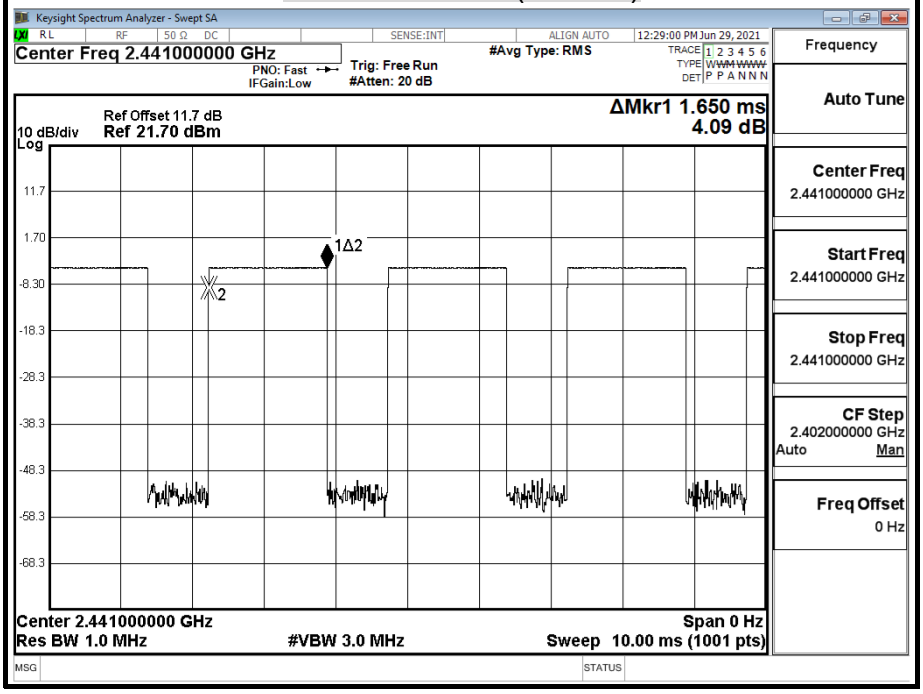
DH1 CH High (GFSK)



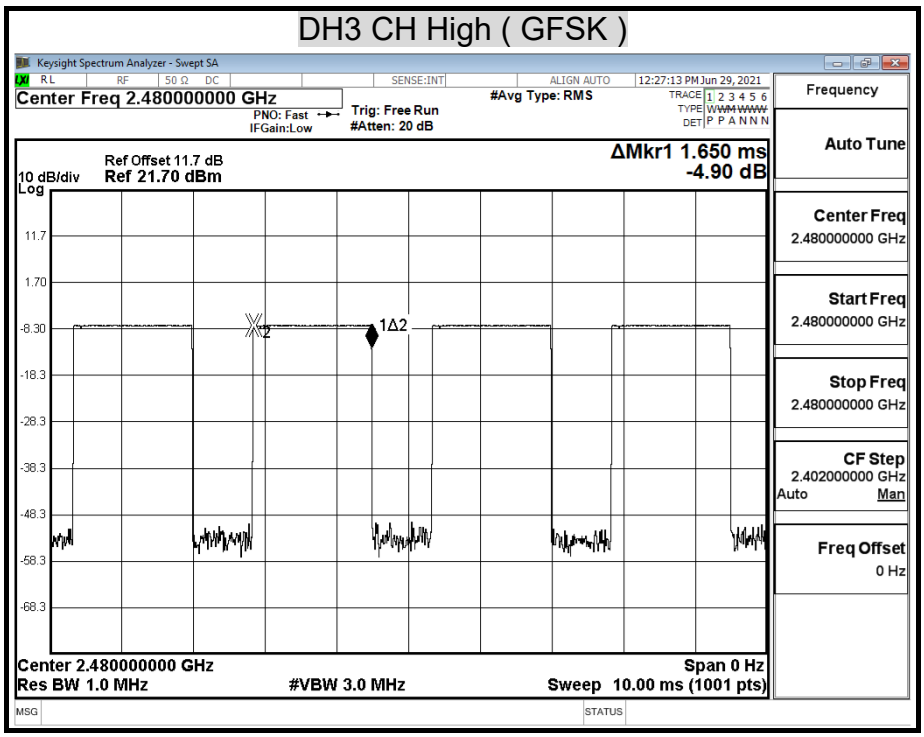
DH3 CH Low (GFSK)



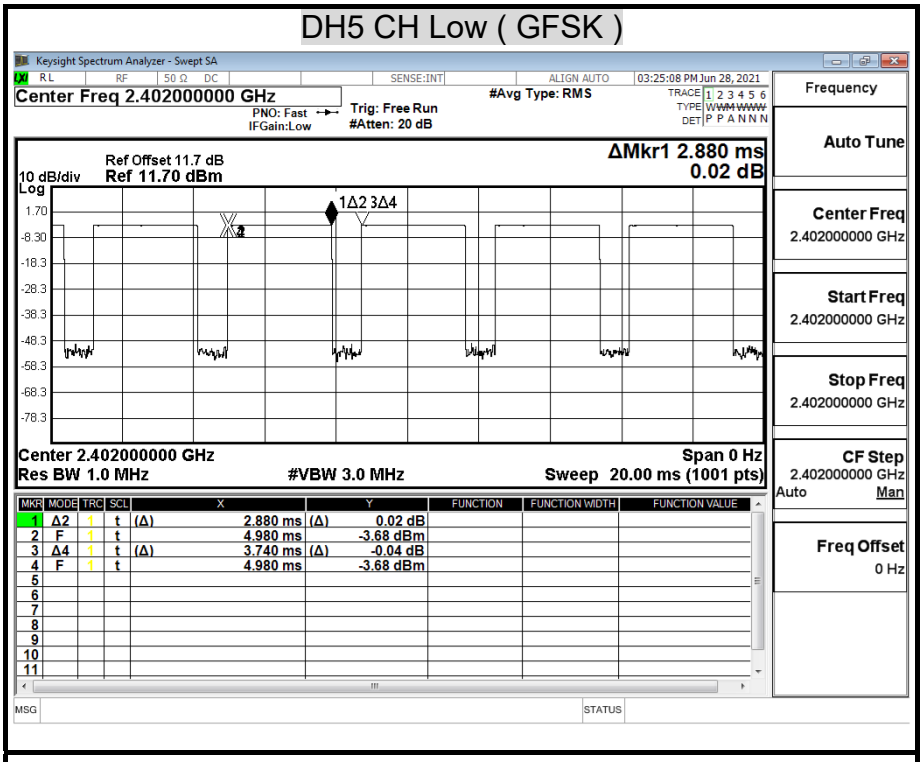
DH3 CH Middle (GFSK)



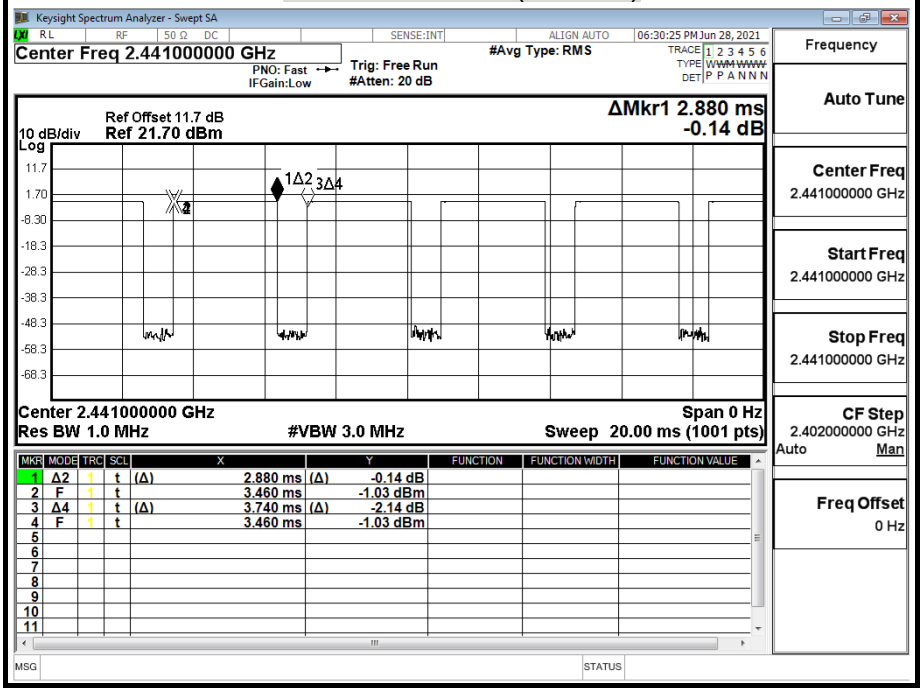
DH3 CH High (GFSK)



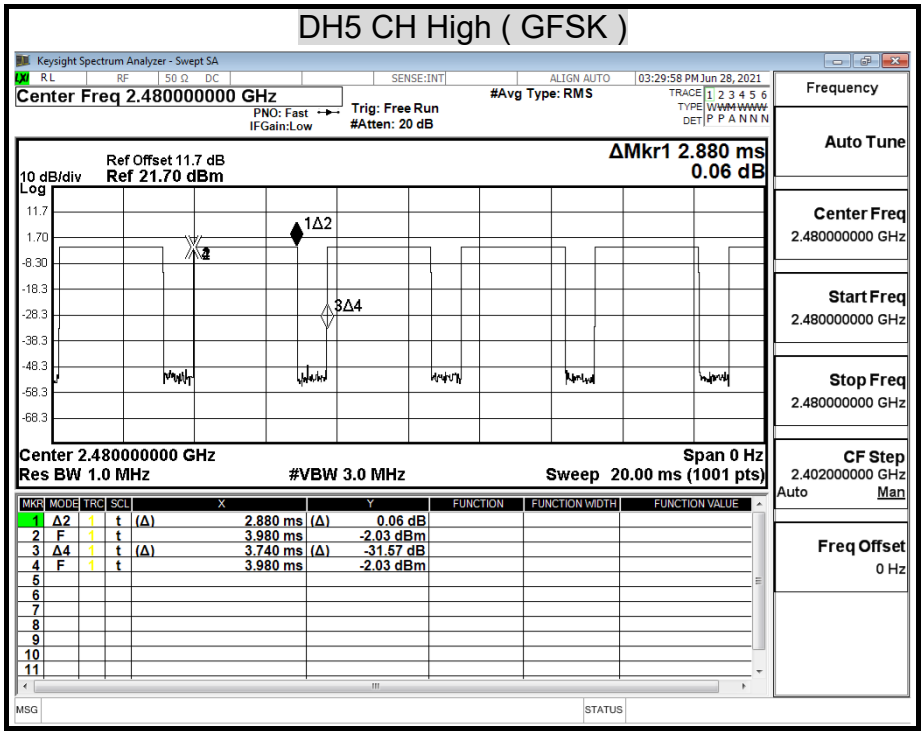
DH5 CH Low (GFSK)



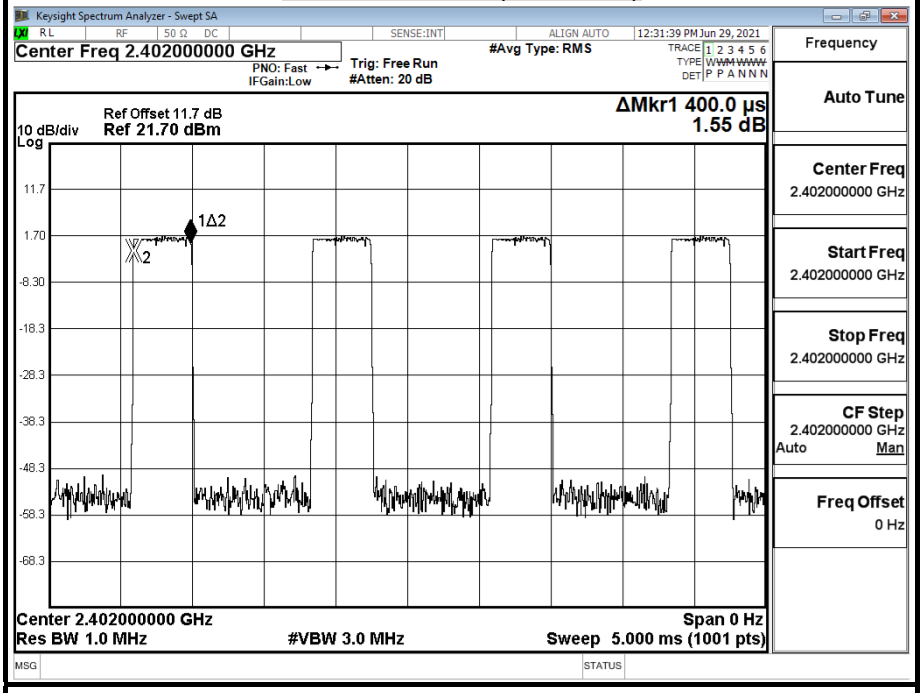
DH5 CH Middle (GFSK)



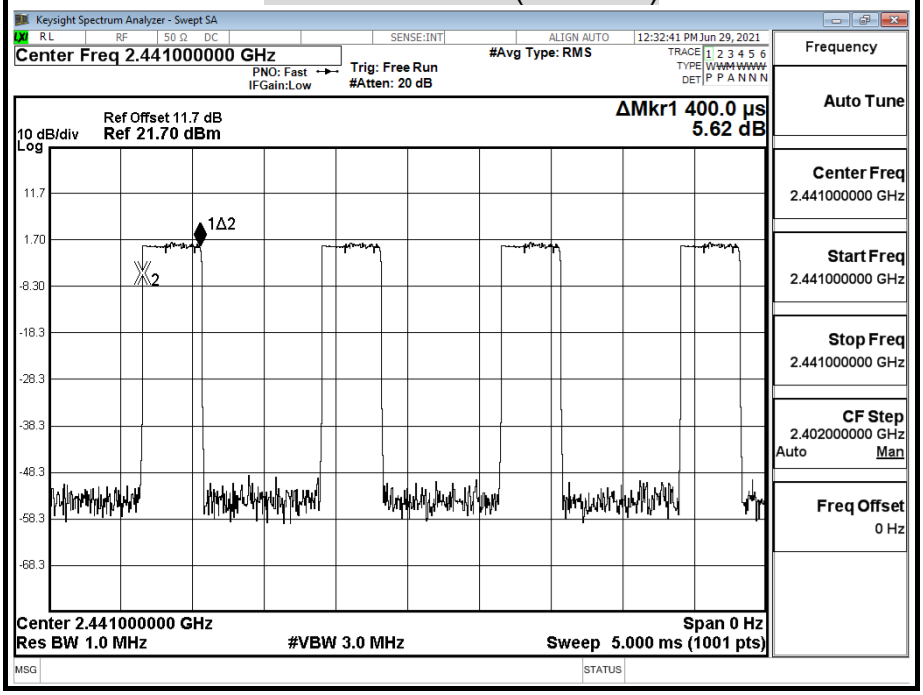
DH5 CH High (GFSK)



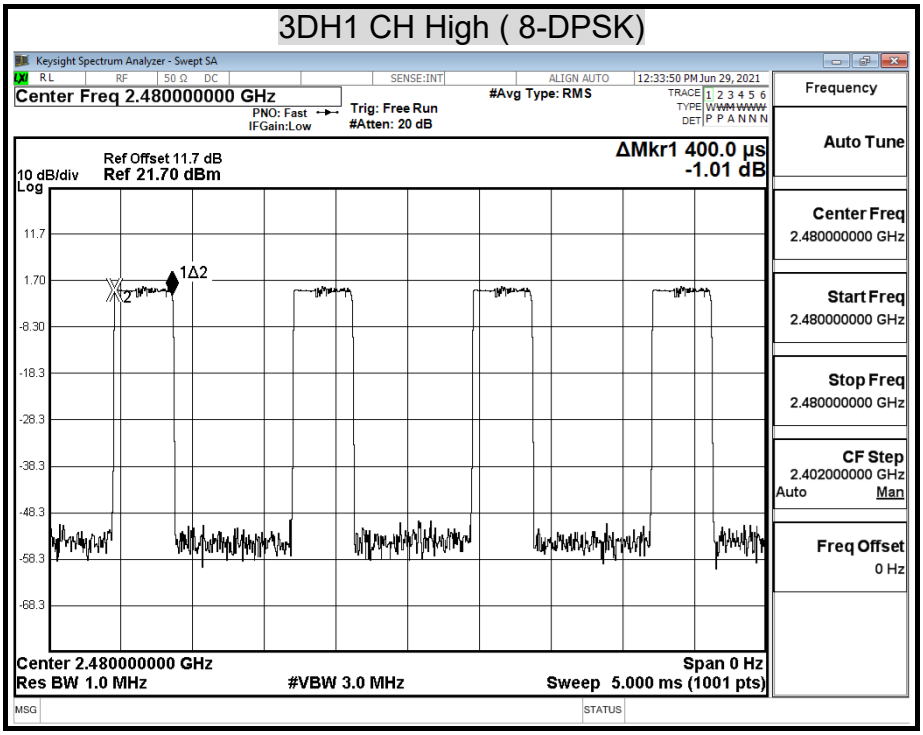
3DH1 CH Low (8-DPSK)



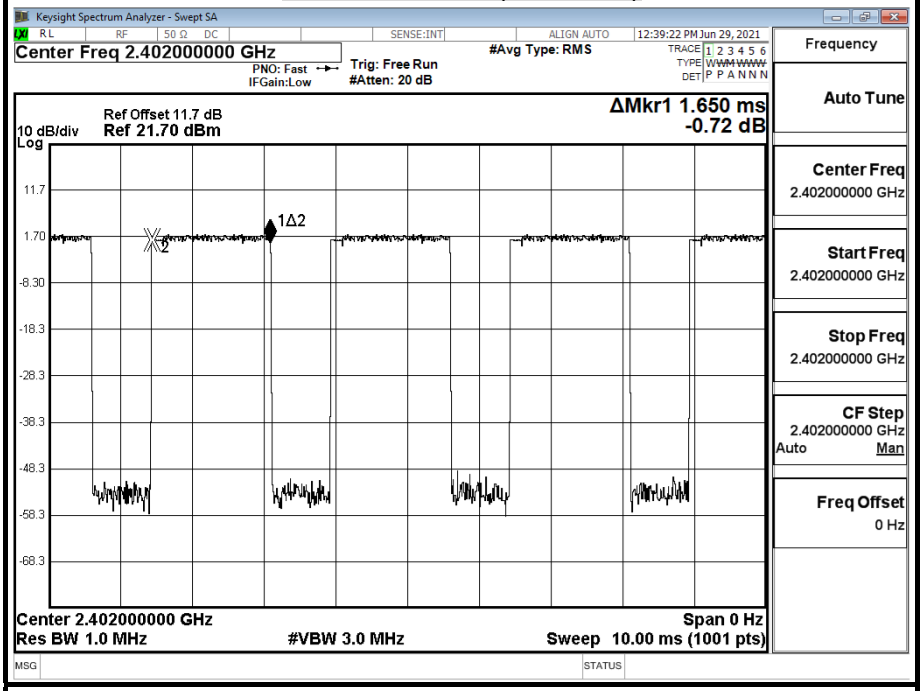
3DH1 CH Middle (8-DPSK)



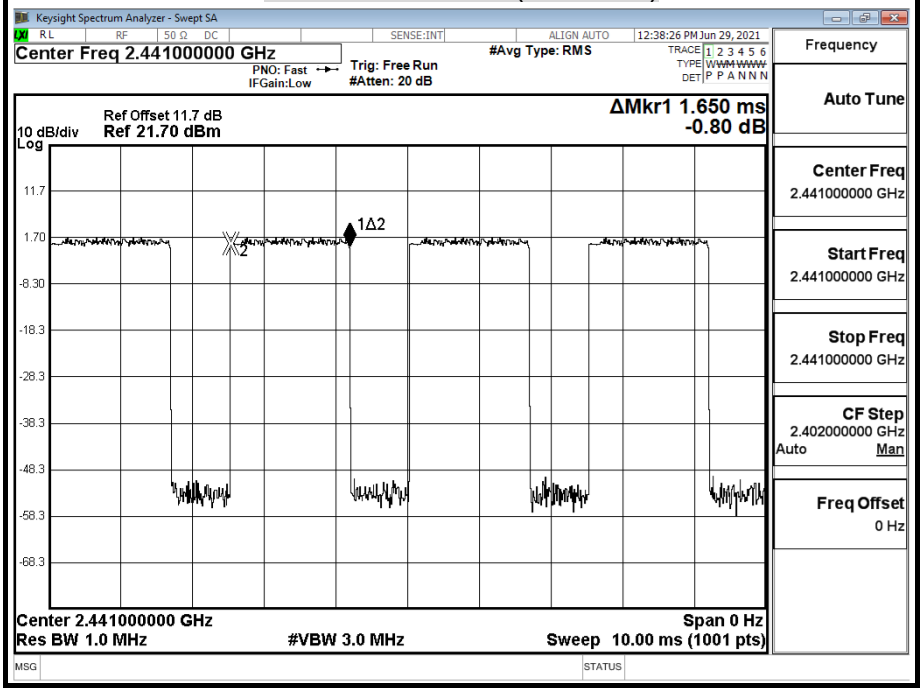
3DH1 CH High (8-DPSK)



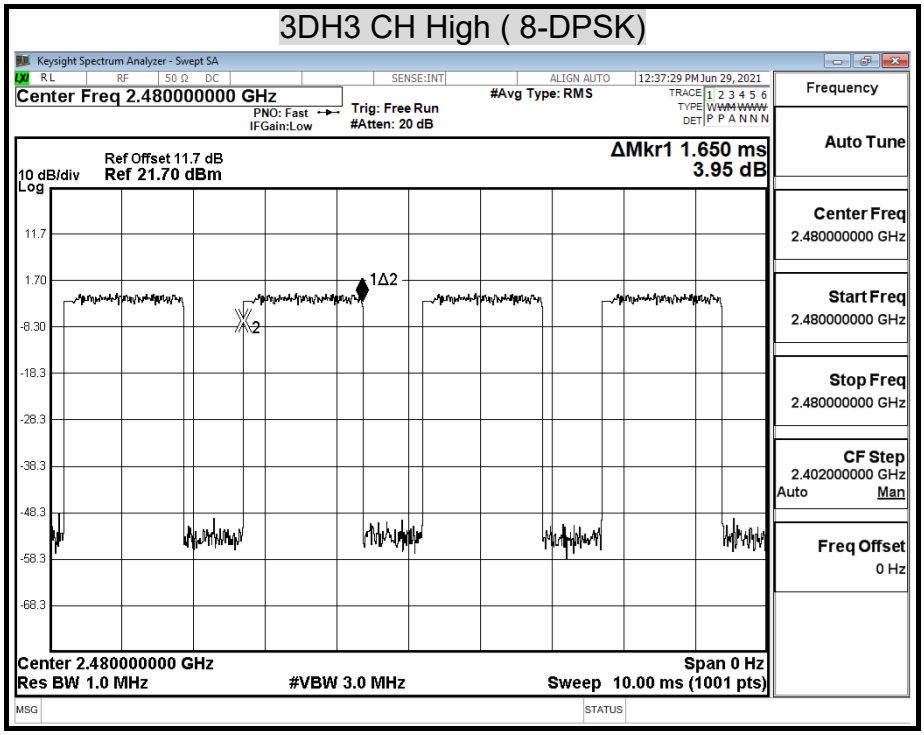
3DH3 CH Low (8-DPSK)



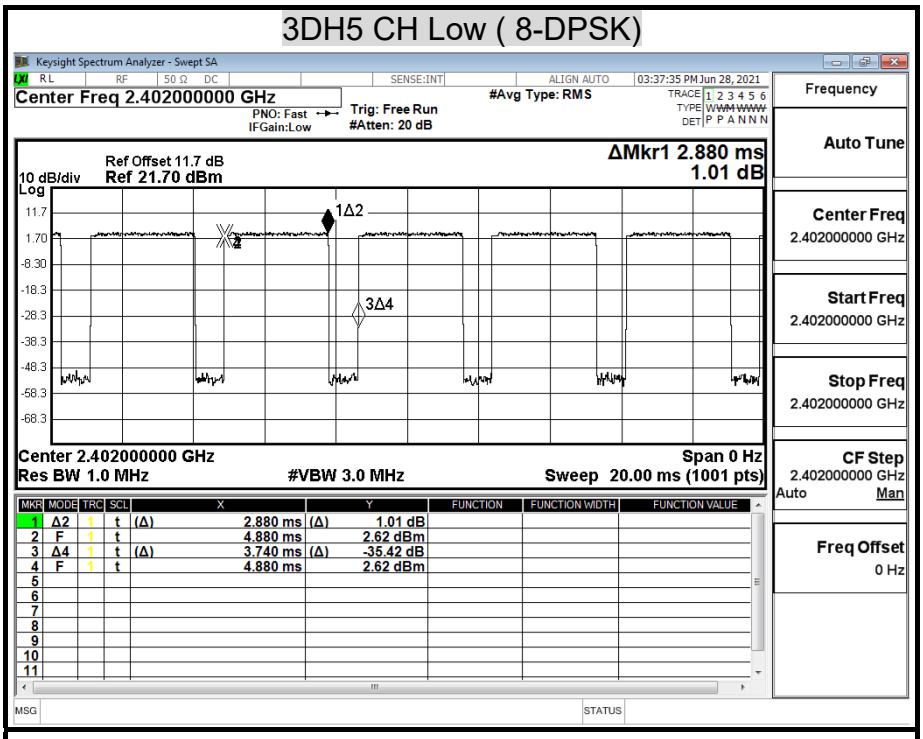
3DH3 CH Middle (8-DPSK)



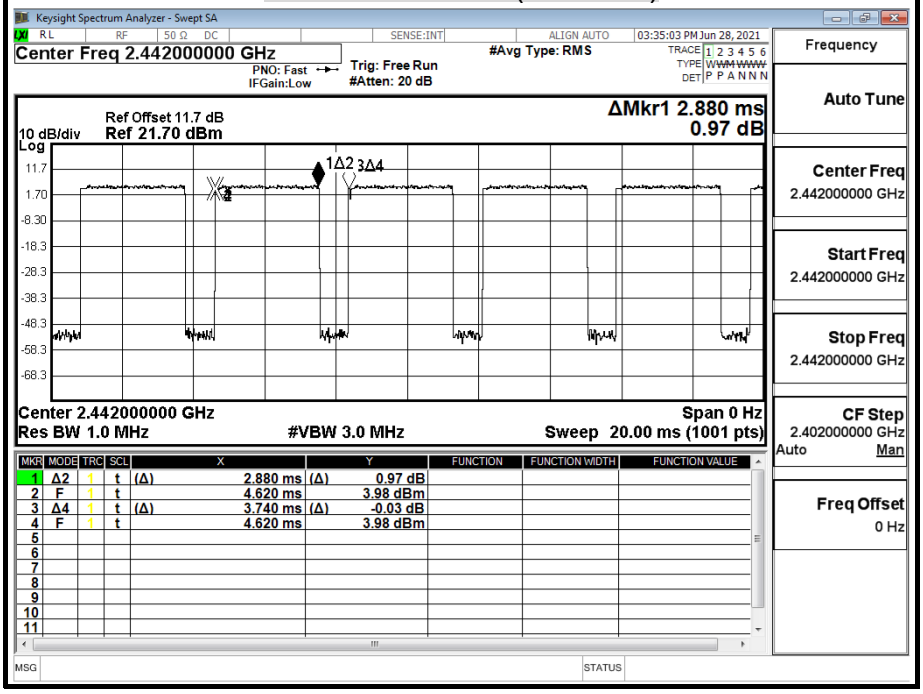
3DH3 CH High (8-DPSK)



3DH5 CH Low (8-DPSK)



3DH5 CH Middle (8-DPSK)



3DH5 CH High (8-DPSK)