

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

For

Fully Automatic Belt-Drive Wireless Streaming Turntable

Model: PRO200BT, iT96

Data Applies To: N/A

Brand Name: ION

Issued for

**ION Audio, LLC
200 Scenic View Drive, Cumberland, RI 02864, U.S.A.**

Issued By

**Compliance Certification Services Inc.
Tainan Laboratory
No.8, Jiucengling, Xinhua Dist., Tainan City
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Issued Date: November 02, 2018

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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 | November 02, 2018 | Initial Issue | ALL | Sunny Chang |
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Report No.: T180917N02-RP1

1. TEST REPORT CERTIFICATION

| | | |
|-----------------------------|---|---|
| Applicant | : | ION Audio, LLC 200 Scenic View Drive, Cumberland, RI 02864, U.S.A. |
| Manufacturer | : | ION Audio, LLC 200 Scenic View Drive, Cumberland, RI 02864, U.S.A. |
| Equipment Under Test | : | Fully Automatic Belt-Drive Wireless Streaming Turntable |
| Model Number | : | PRO200BT, iT96 |
| Data Applies To | : | N/A |
| Brand Name | : |  |
| Date of Test | : | October 24, 2018 ~ October 25, 2018 |

| APPLICABLE STANDARD | |
|--|-------------|
| STANDARD | TEST RESULT |
| FCC Part 15 Subpart C AND ANSI C63.10: 2013 | PASS |

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.

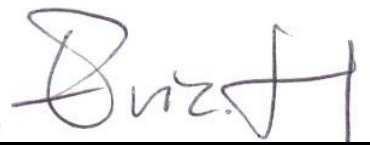
The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:



Jeter Wu
Assistant Manager

Reviewed 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 | Fully Automatic Belt-Drive Wireless Streaming Turntable |
| Model Number | PRO200BT, iT96 |
| Data Applies To | N/A |
| Brand Name |  |
| Identify Number | T180917N02 |
| Received Date | September 17, 2018 |
| Frequency Range | 2402 ~ 2480 MHz |
| Transmit Peak Power | GFSK : 2.476dBm / 1.76847938mW 8DPSK: 2.131dBm / 1.63342802mW |
| Channel Spacing | 1MHz |
| Transmit Data Rate | GFSK Mode : 1 Mbps 4/π DQPSK Mode : 3Mbps 8DPSK Mode : 24Mbps |
| Modulation Type | Frequency Hopping Spread Spectrum |
| Number of Channels | 79 Channels |
| EUT Power Supply | DC 12V, 500mA (Powered by Adapter) |
| Antenna Type | Manufacturer: BRITO TECHNOLOGY Type: PIFA Antenna Model: ANT-200 Gain: 2.04 dBi |
| Firmware Version | ICYH104P08 |
| Software Version | N/A |

Power Adapter :

| No. | Manufacturer | Model No. | Power Input | Power Output |
|-----|--------------|-----------------------|---------------------------|--------------|
| 1 | GPE | GPE053A-V12005 0-1 | 100-240Vac, 50/60Hz, 0.2A | 12Vdc, 0.5A |

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: 2AB3E-iT96** 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. To add model(iT96) all the same of the original model(PRO200BT), design, except for different models name and is just for the marketing purpose.

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 |
| Germany | TUV NORD |
| Taiwan | BSMI |
| USA | FCC |

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 Due |
| Active Loop Antenna | ETS-LINDREN | 6502 | 8905-2356 | 07/19/2019 |
| Amplifier | HP | 8447F | 2443A01671 | 01/21/2019 |
| Bi-Log Antenna | Sunol | JB1 | A070506-2 | 02/08/2019 |
| Cable | Rosnol+Suhner | SUCOFLEX 104PEA | SN25737 /4PEA | 01/26/2019 |
| Double Ridged Guide Horn Antenna | ETS-LINDGREN | 3116 | 00078900 | 03/19/2019 |
| EMI Test Receiver | R&S | ESCI | 100960 | 10/30/2018 |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 07/04/2019 |
| Hi-Pass Filter | MICRO-TRONIC S | BRM50702-01 | 018 | 01/21/2019 |
| Horn Antenna | Com-Power | AH-118 | 071032 | 04/18/2019 |
| Pre-Amplifier | EMCI | EMC012645 | 980098 | 01/21/2019 |

For §8.1~8.7 8.8.4

| Chamber 966 Room (Conducted Test) | | | | |
|-----------------------------------|--------------|----------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| EXA Spectrum Analyzer | KEYSIGHT | N9010A | MY54430216 | 07/04/2019 |
| Power Meter | Anritsu | ML2487A | 6K00003888 | 05/01/2019 |
| Power Sensor | Anritsu | MA2491A | 033265 | 05/01/2019 |
| SMA Cable + 10dB Attenuator | CCS | SMA + 10dB Att | O6 | 01/21/2019 |

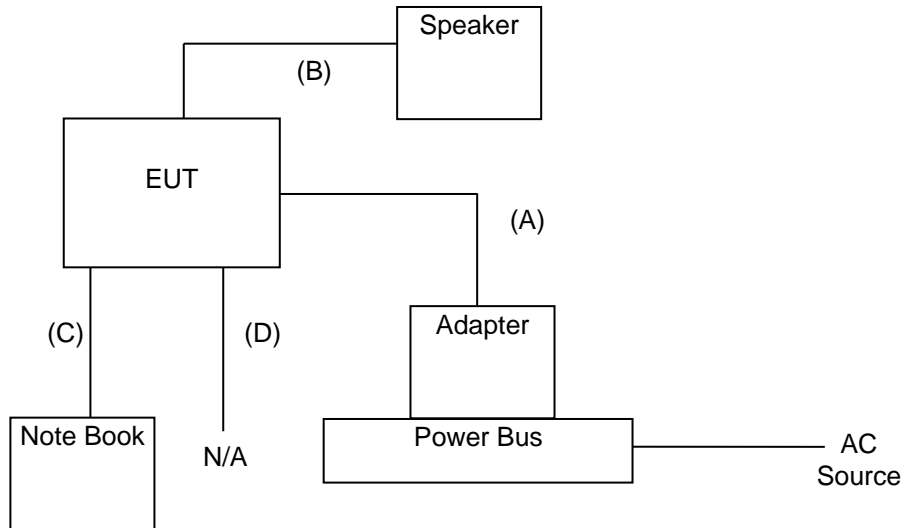
For §8.9

| Conducted Emission room #1 | | | | |
|----------------------------|----------------|----------------------|---------------|-----------------|
| Name of Equipment | Manufacturer | Model | Serial Number | Calibration Due |
| BNC Coaxial Cable | CCS | BNC50 | 11 | 01/23/2019 |
| EMI Test Receiver | R&S | ESCS 30 | 100348 | 01/30/2019 |
| LISN | SCHWARZBECK | NNLK8130 | 8130124 | 11/30/2018 |
| LISN | FCC | FCC-LISN-50-32- 2 | 08009 | 05/23/2019 |
| Pulse Limiter | R&S | ESH3-Z2 | 100116 | 01/23/2019 |
| Test S/W | e-3 (5.04211j) | | | |

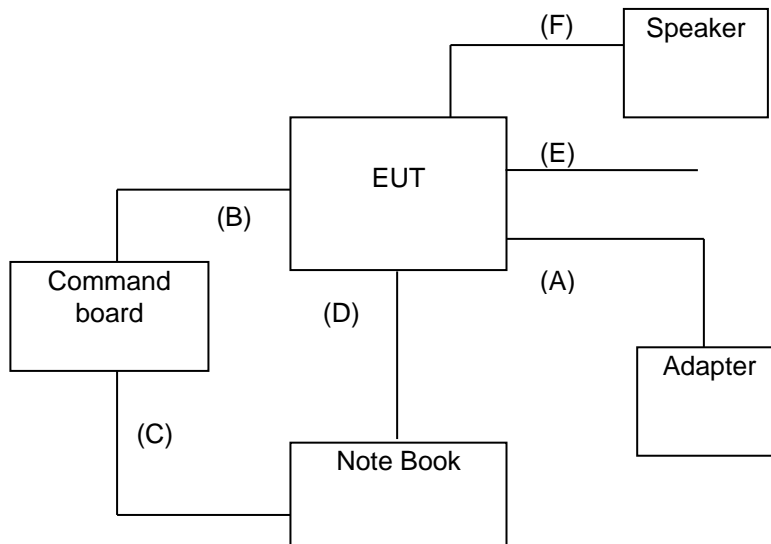
7. SETUP OF EQUIPMENT UNDER TEST

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 | Genius | SP-S110 | DCC | Audio cable, unshd, 1.6m |
| 2 | Note Book | TOSHIBA | PORTEGE R30-A | DCC | Power cable, unshd, 1.8m |

| No. | Signal cable description | |
|-----|--------------------------|-------------------------------------|
| A | DC In | Unshielded, 1.5m 1 pcs. |
| B | Audio | Unshielded, 1.4m 1 pcs. |
| C | USB | Shielded, 1.0m 1 pcs. with one core |
| D | Audio | Unshielded, 0.35m 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 | Speaker System | T.C.SATR | TCS2285 | DoC | Power cable, unshd, 1.8m |

| No. | Signal cable description | |
|-----|--------------------------|------------------------------------|
| A | Power | Unshielded, 1.5m 1 pcs. |
| B | Command | Unshielded, 0.15m 1 pcs. |
| C | USB | Shielded, 1.0m 1 pcs. with 1 core. |
| D | USB | Shielded, 1.0m 1 pcs. with 1 core. |
| E | Audio | Unshielded, 0.35m 1 pcs. |
| F | Audio | Unshielded, 1.4m 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 "ISRT_V1.0.37.2841" software was used for testing
3. Choose Chip Number "IS1621S_393_SRC_V3.1", COM "COM6" and BAUDRATE "115200".

TX Mode:

GFSK(DH1):

Packet Type > DH1

BDR MAX > 0x36

GFSK(DH3):

BDR MAX > 0x36

GFSK(DH5):

Packet Type > DH5

BDR MAX > 0x36

8-DPSK(3DH1):

Packet Type > 3DH1

BDR MAX > 0x2e

8-DPSK(3DH3):

Packet Type > 3DH3

EDR MAX > 0x2e

8-DPSK(3DH5):

Packet Type > 3DH5

EDR MAX > 0x2e

RX Mode:

RX

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

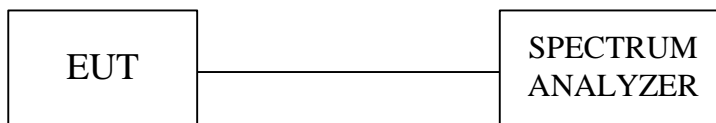
8. APPLICABLE LIMITS AND TEST RESULTS

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 | PRO200BT | Test By | Ted Huang |
| Temp & Humidity | 26.5°C, 54% | Test Date | 2018/10/25 |

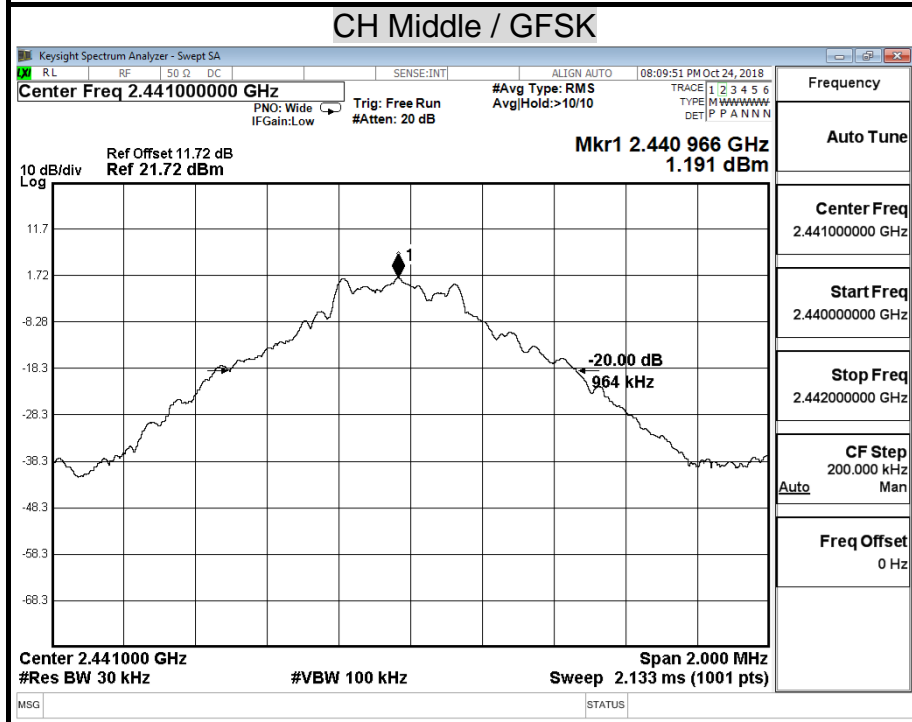
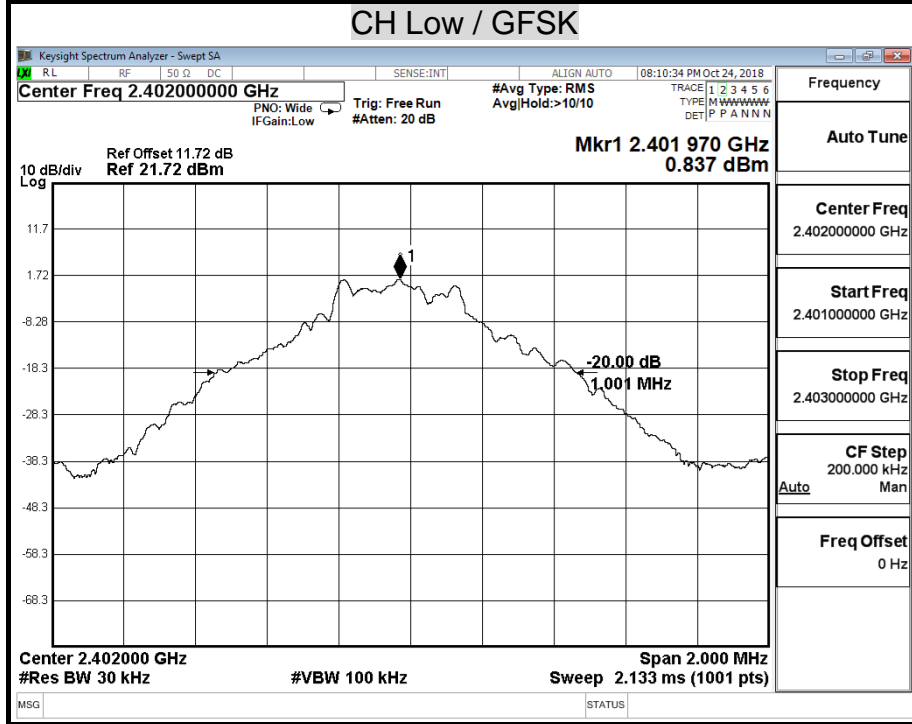
Modulation Type: GFSK / DH5

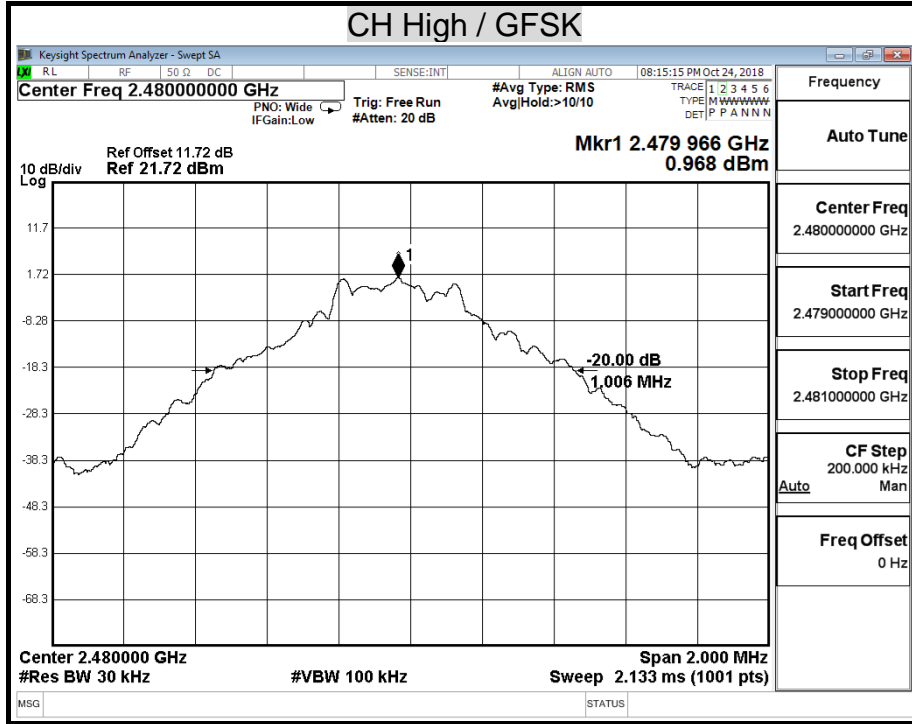
| Channel | Channel Frequency (MHz) | 20dB Bandwidth (kHz) | Pass / Fail |
|---------|-------------------------|----------------------|-------------|
| Low | 2402 | 1001.00 | N/A |
| Middle | 2441 | 964.00 | N/A |
| High | 2480 | 1006.00 | N/A |

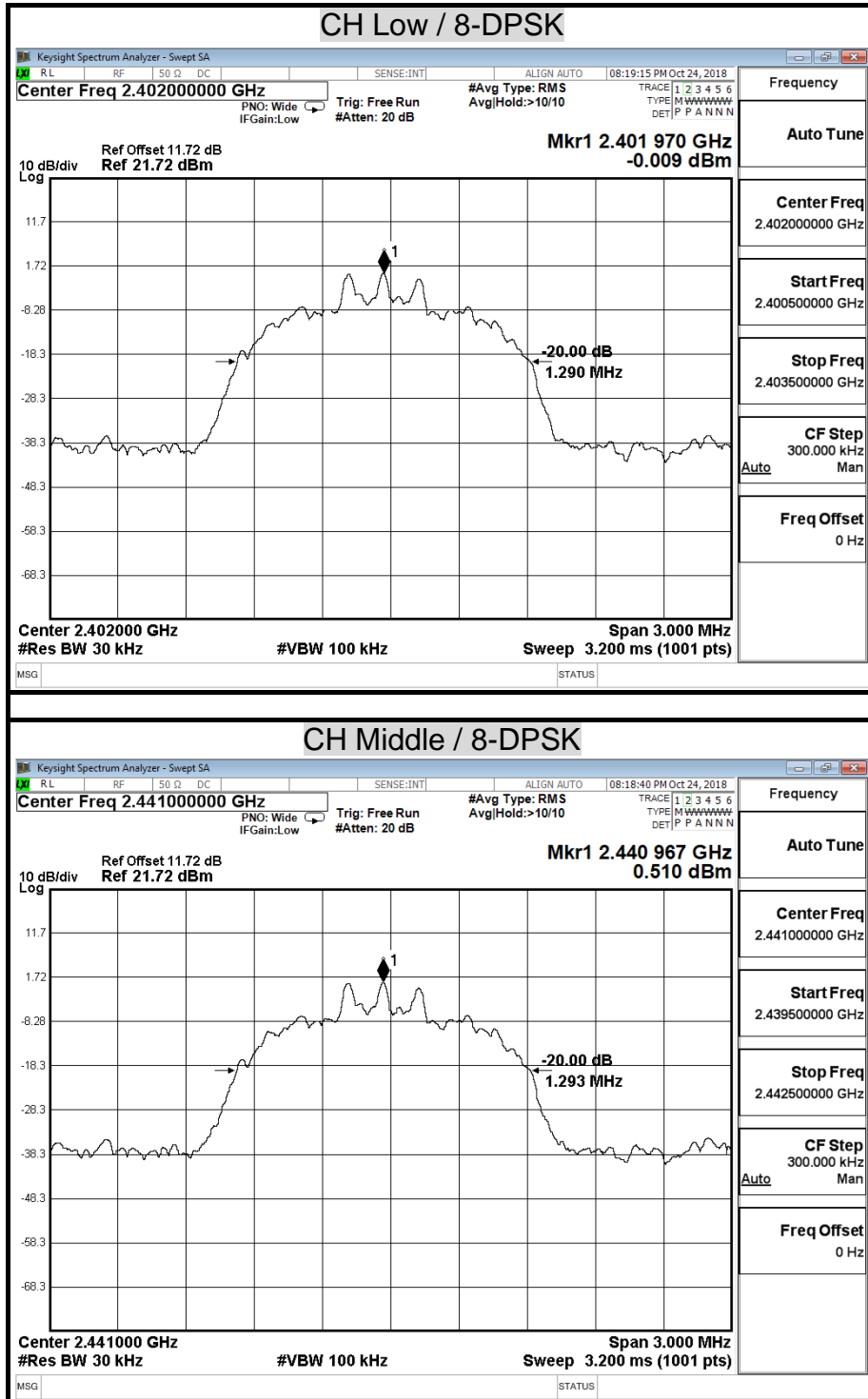
Modulation Type: 8-DPSK / 3-DH5

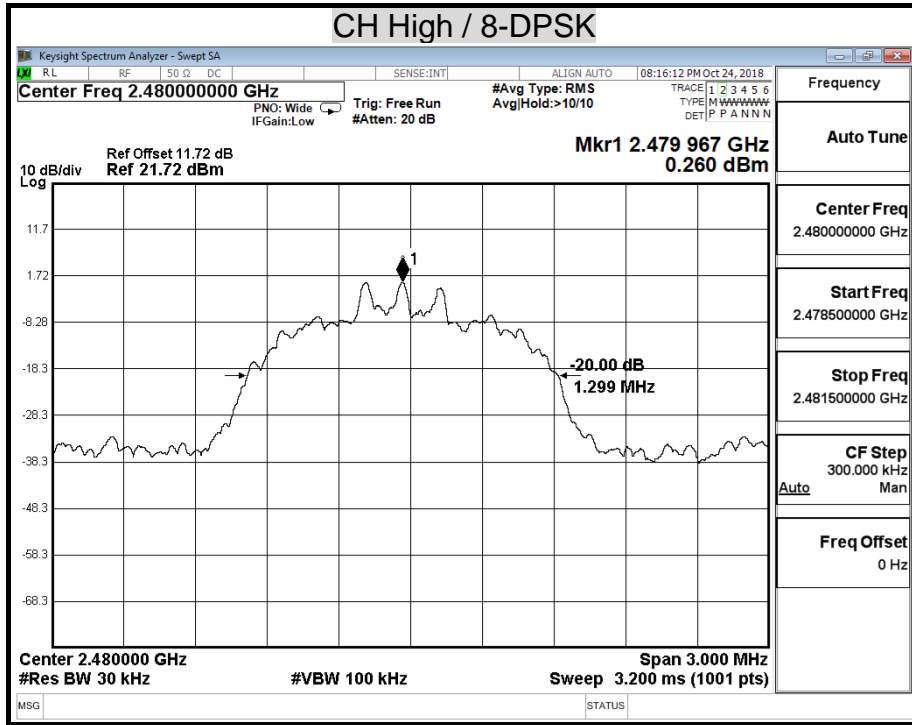
| Channel | Channel Frequency (MHz) | 20dB Bandwidth (kHz) | Pass / Fail |
|---------|-------------------------|----------------------|-------------|
| Low | 2402 | 1290.00 | N/A |
| Middle | 2441 | 1293.00 | N/A |
| High | 2480 | 1299.00 | N/A |

20dB BANDWIDTH







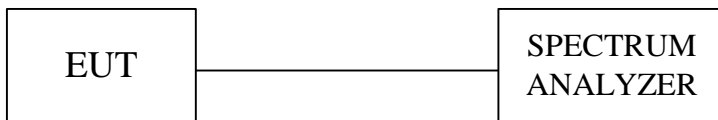


8.2 MAXIMUM PEAK OUTPUT POWER

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, 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 | PRO200BT | Test By | Ted Huang |
| Temp & Humidity | 26.5°C, 54% | Test Date | 2018/10/25 |

Modulation Type: GFSK / DH5

| Channel | Channel Frequency (MHz) | Peak Power Output (dBm) | Peak Power Output (mW) | Limit (mW) | Result |
|---------|-------------------------|-------------------------|------------------------|------------|--------|
| Low | 2402 | 2.27 | 1.68616 | 125 | PASS |
| Mid | 2441 | 2.48 | 1.76848 | | PASS |
| High | 2480 | 2.12 | 1.63042 | | PASS |

Modulation Type: 8-DPSK / 3-DH5

| Channel | Channel Frequency (MHz) | Peak Power Output (dBm) | Peak Power Output (mW) | Limit (mW) | Result |
|---------|-------------------------|-------------------------|------------------------|------------|--------|
| Low | 2402 | 1.74 | 1.49245 | 125 | PASS |
| Mid | 2441 | 2.13 | 1.63343 | | PASS |
| High | 2480 | 1.95 | 1.56531 | | PASS |

Average Power Data

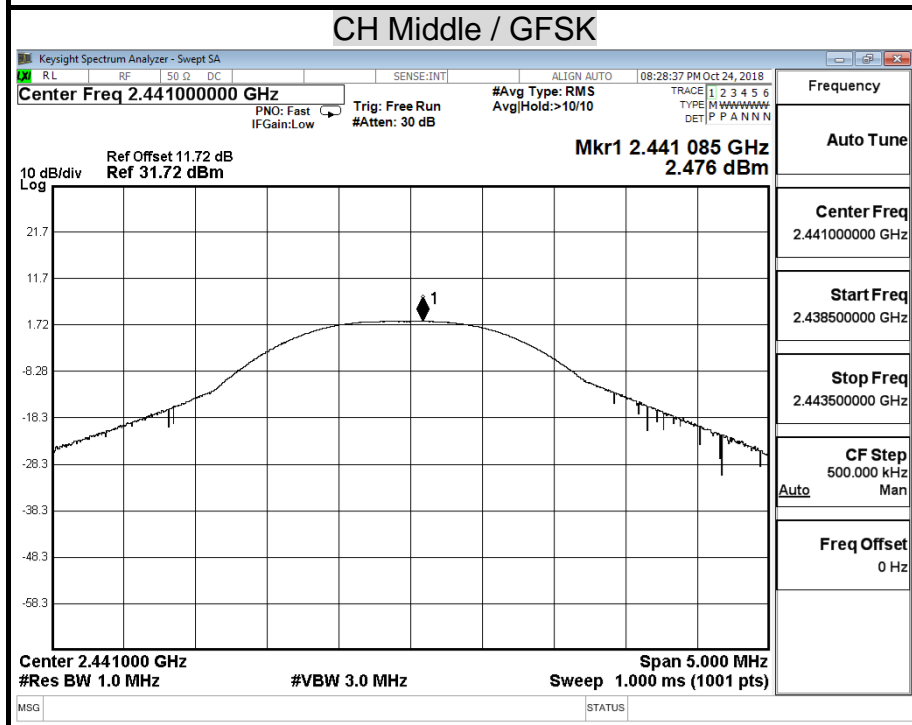
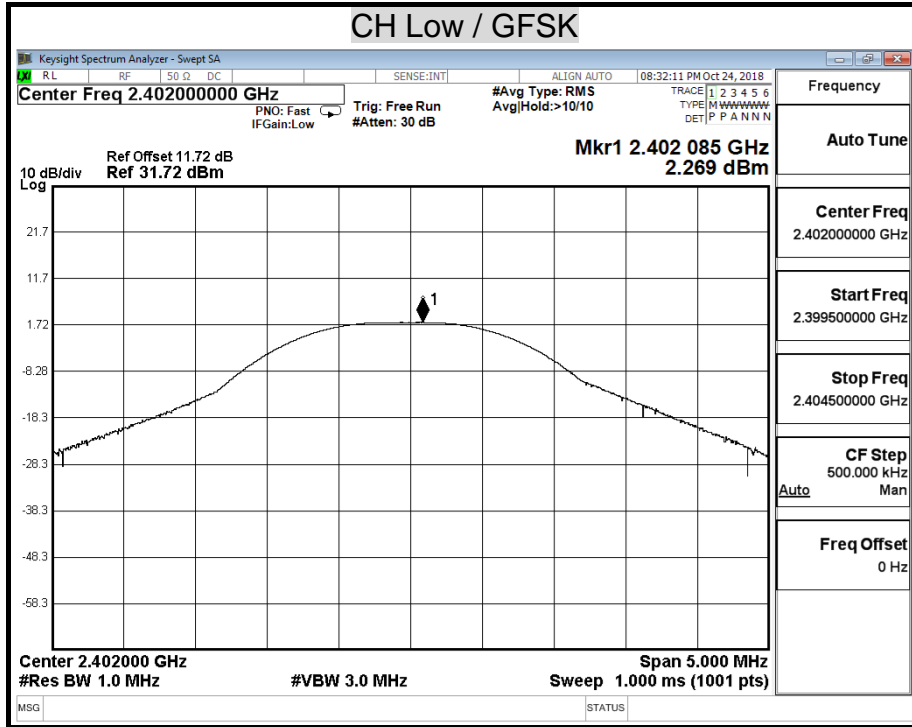
Modulation Type: GFSK / DH5

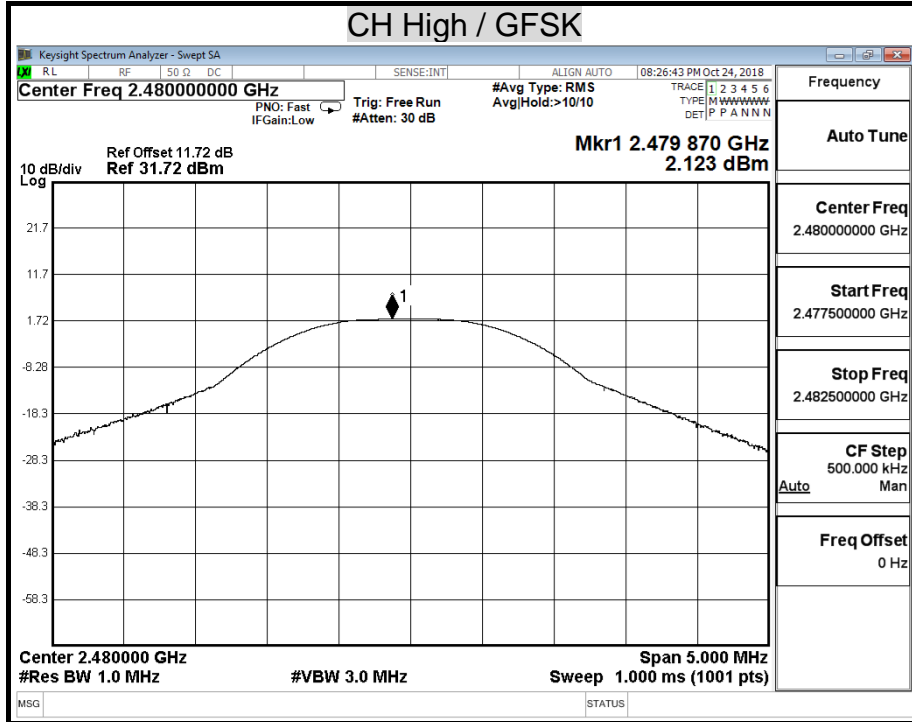
| Channel | Channel Frequency (MHz) | Average Power (dBm) |
|---------|-------------------------|---------------------|
| Low | 2402 | 0.95 |
| Middle | 2441 | 1.24 |
| High | 2480 | 0.83 |

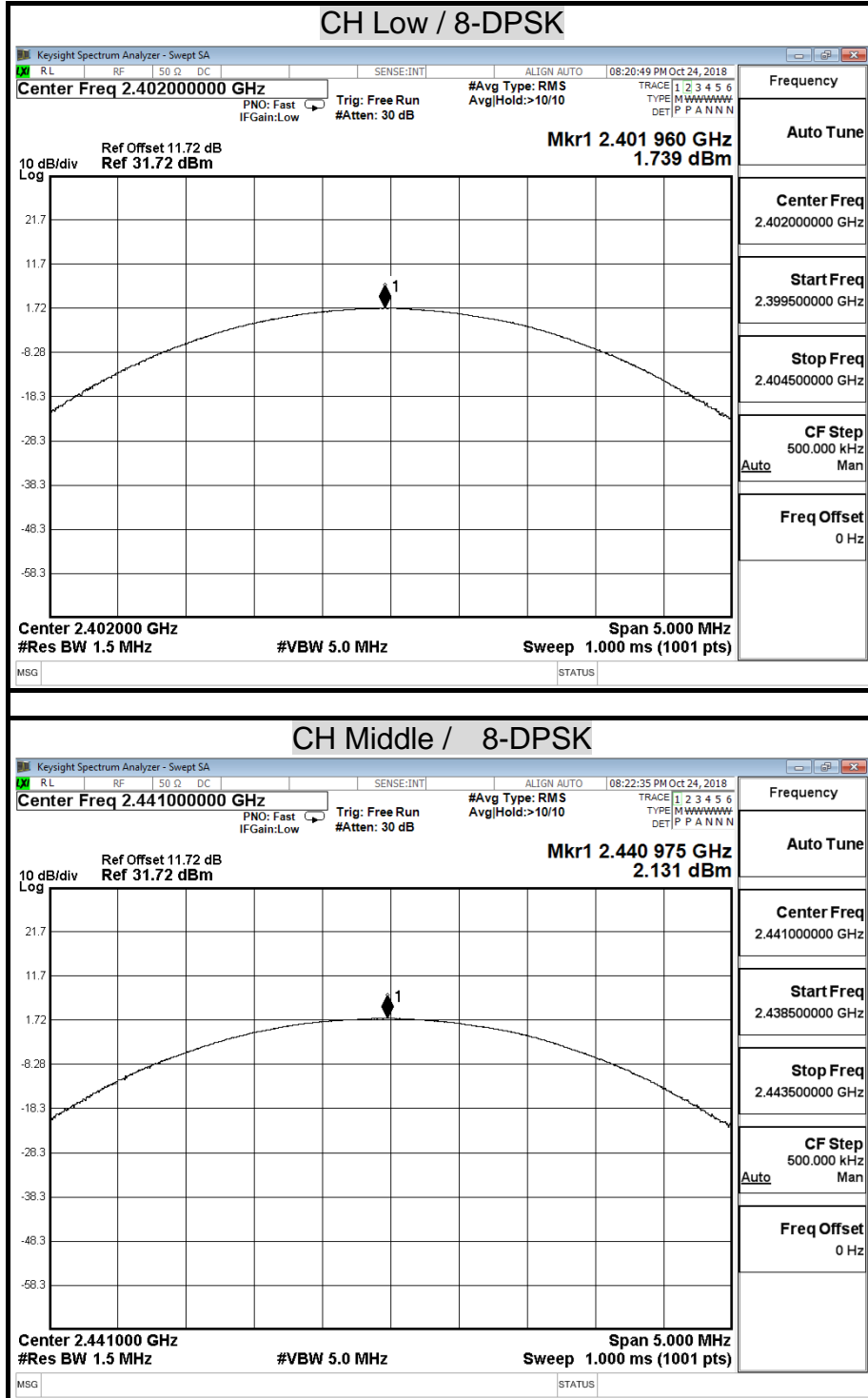
Modulation Type: 8-DPSK / 3-DH5

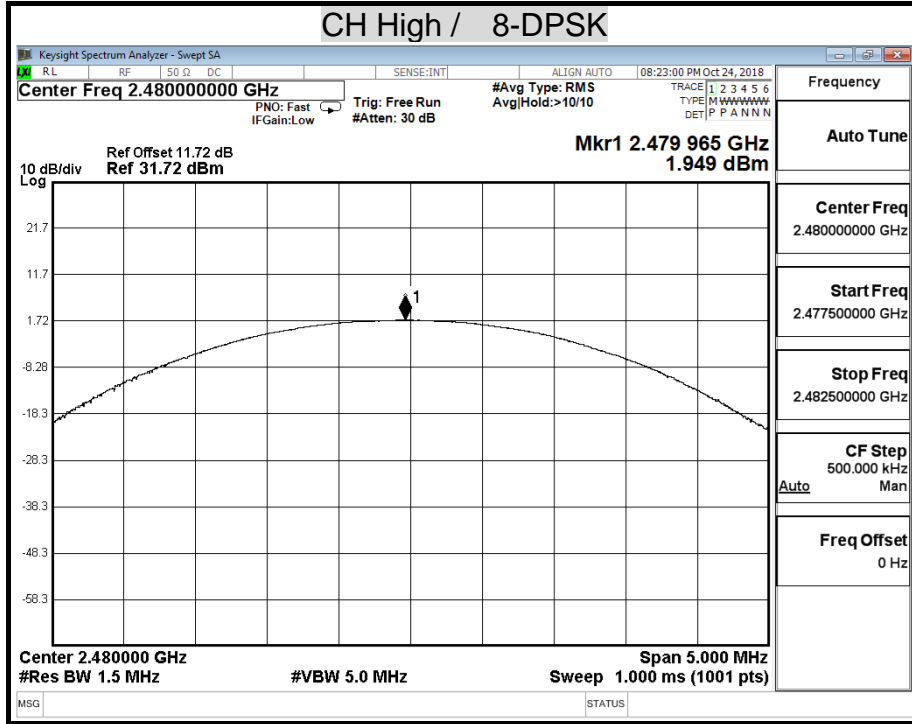
| Channel | Channel Frequency (MHz) | Average Power (dBm) |
|---------|-------------------------|---------------------|
| Low | 2402 | -1.75 |
| Middle | 2441 | -1.16 |
| High | 2480 | -1.17 |

MAXIMUM PEAK OUTPUT POWER

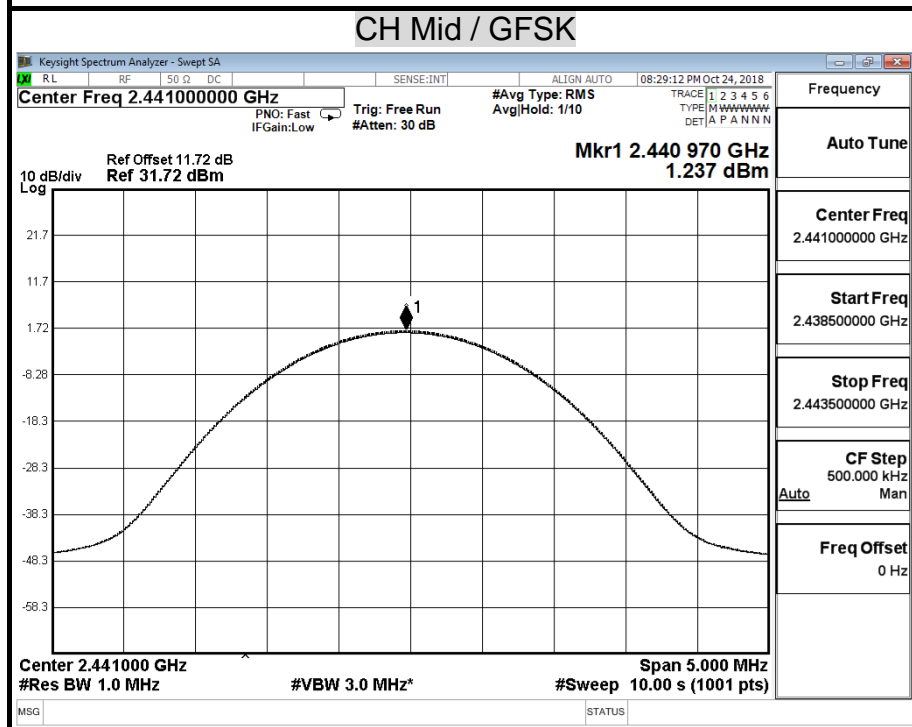
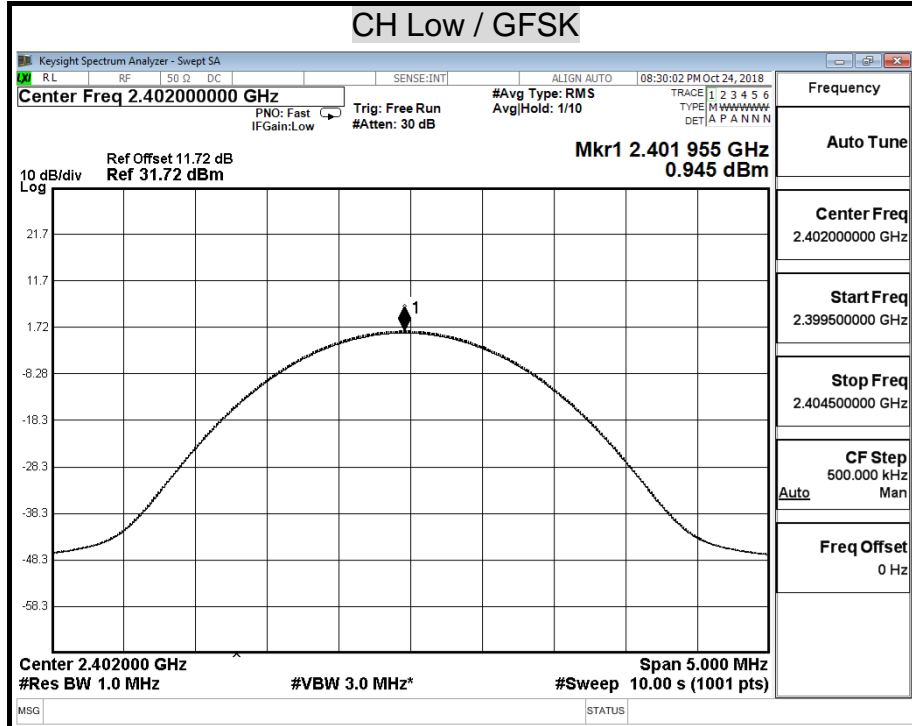


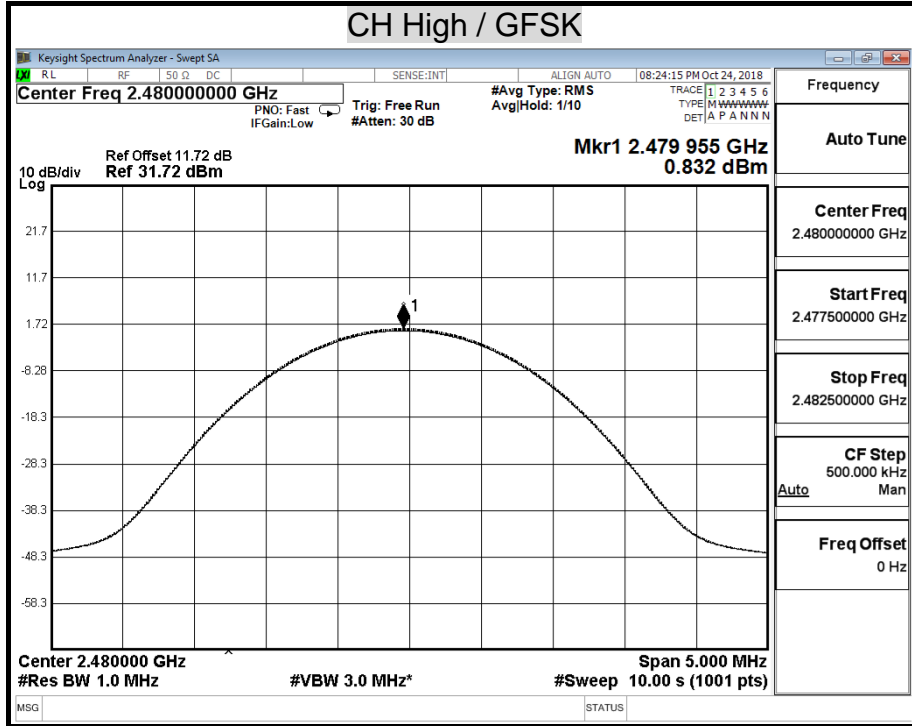


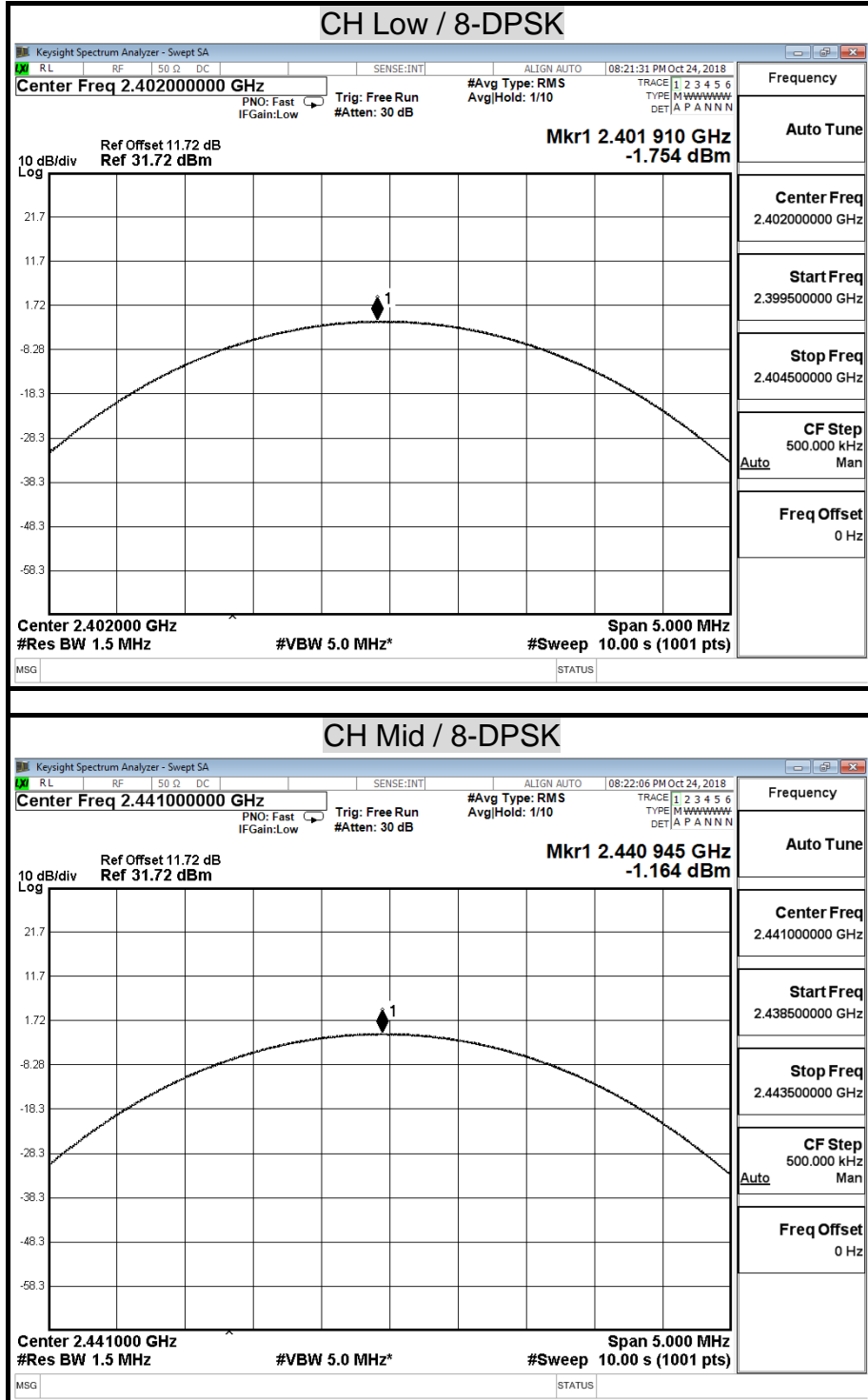


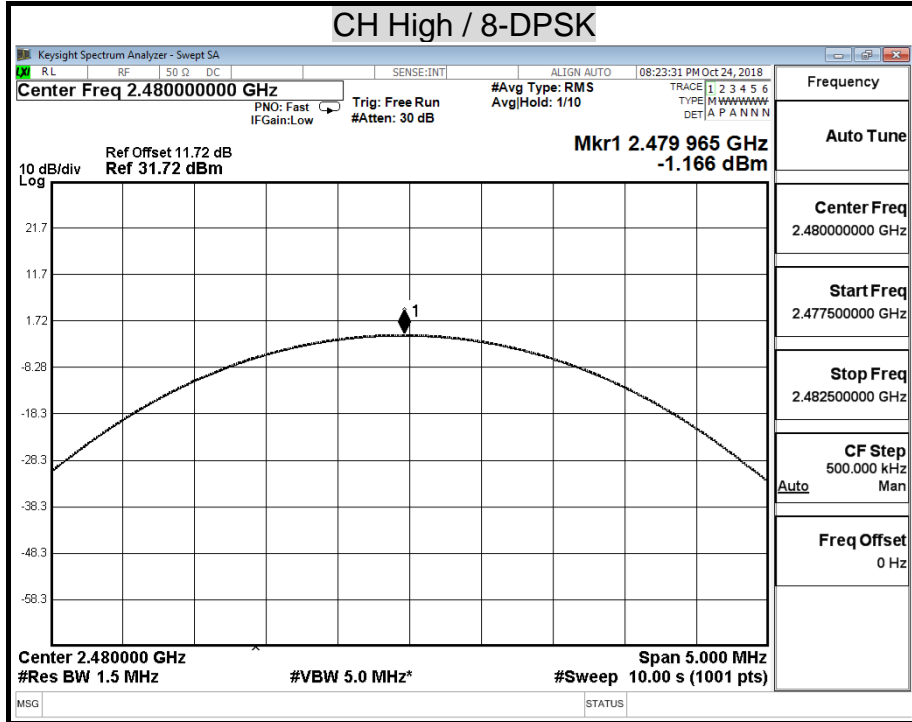


AVERAGE POWER







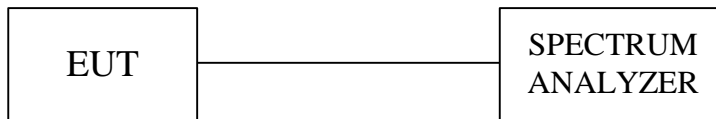


8.3 HOPPING CHANNEL SEPARATION

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.

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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 | PRO200BT | Test By | Ted Huang |
| Temp & Humidity | 26.5°C, 54% | Test Date | 2018/10/25 |

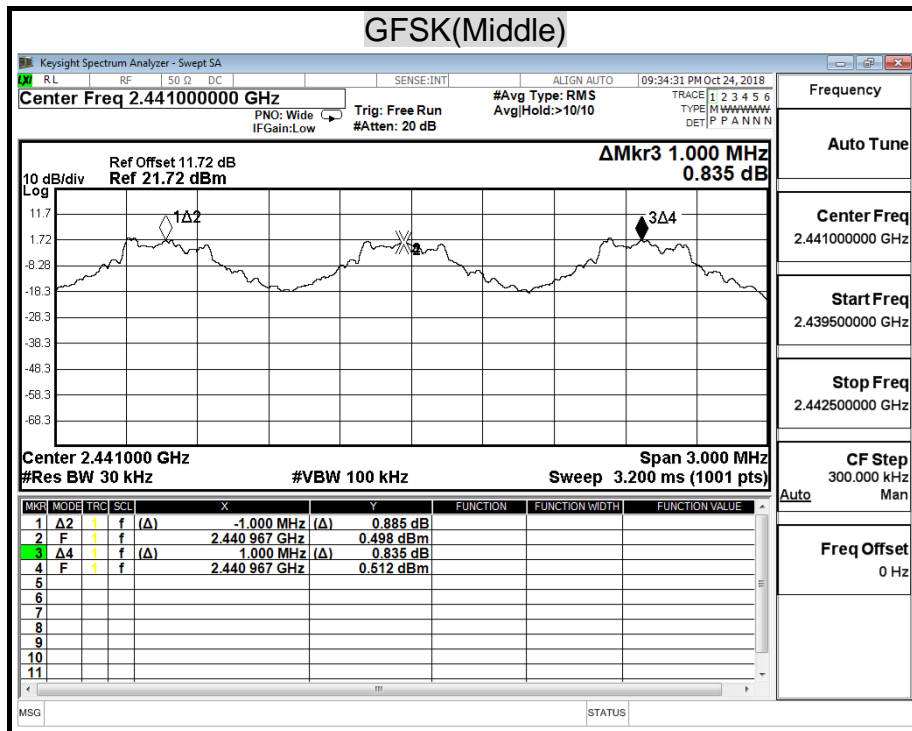
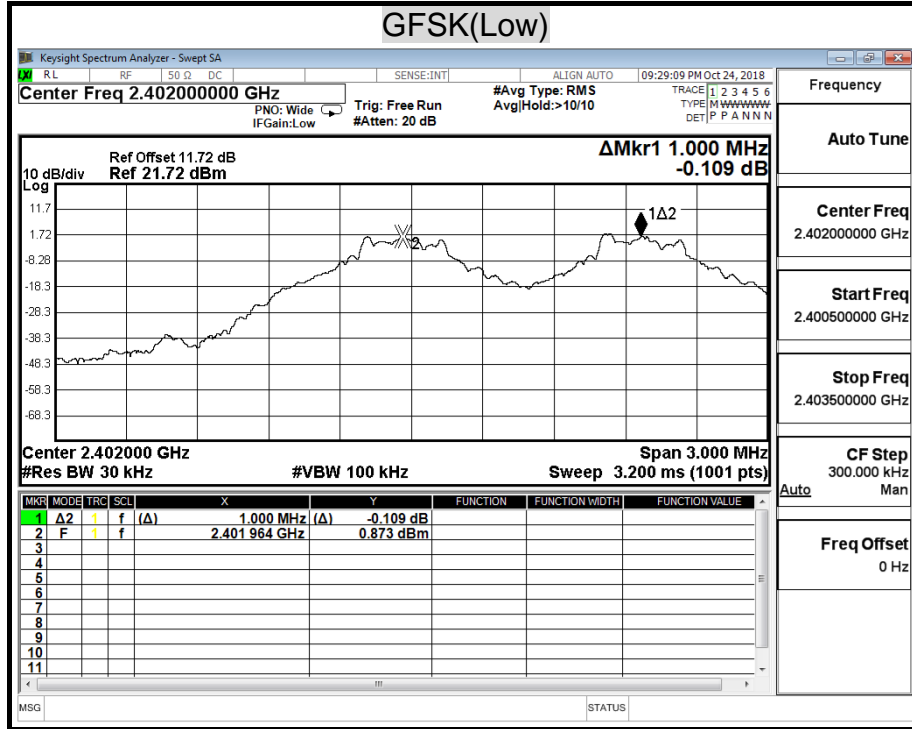
Modulation Type: GFSK / DH5

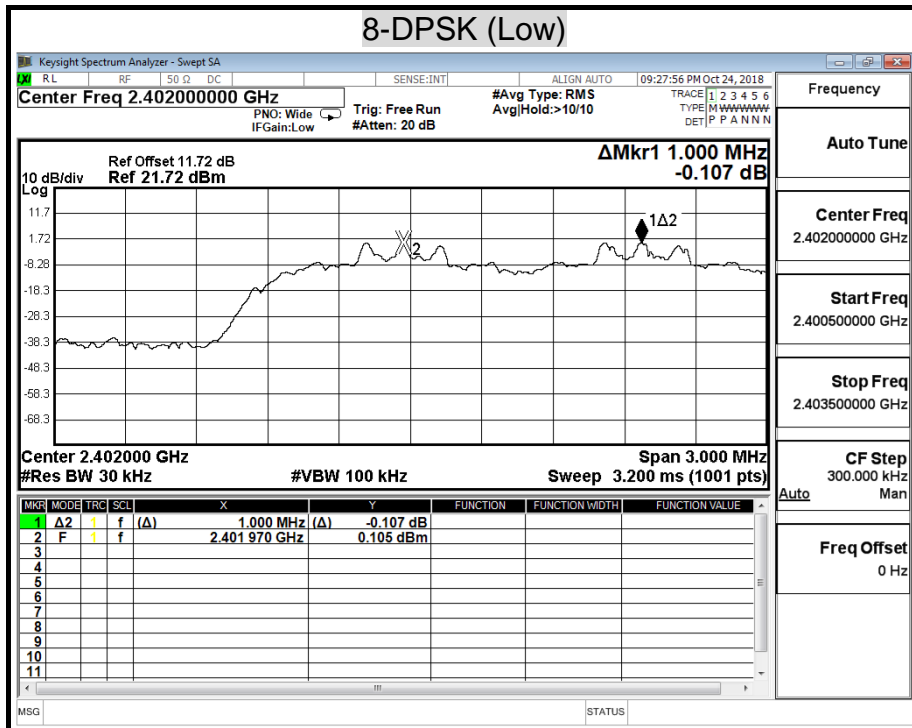
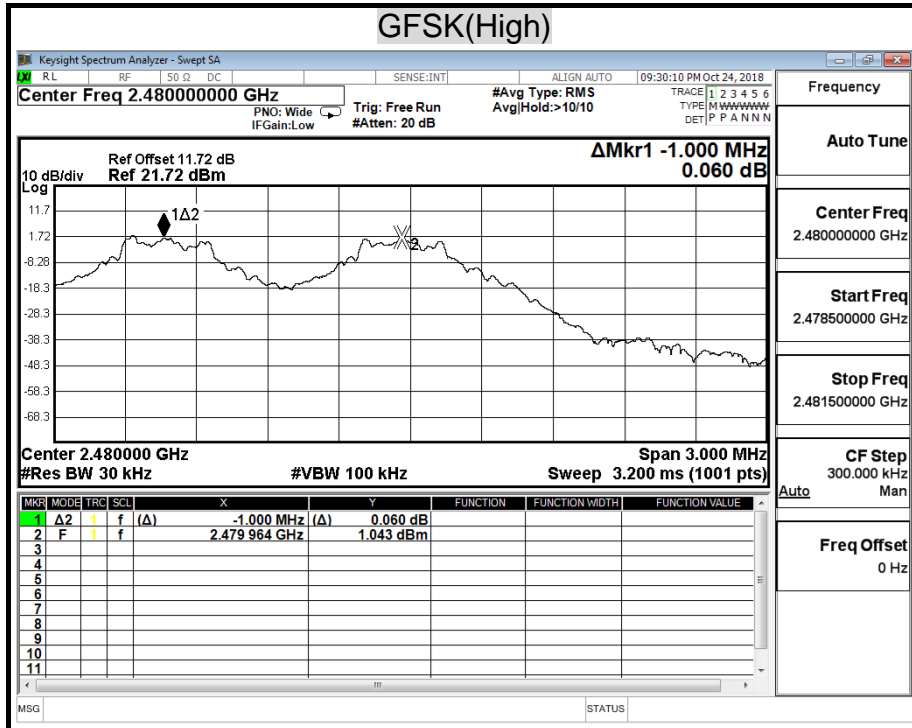
| Channel | Adjacent Hopping Channel Separation (MHz) | Two -third of 20dB bandwidth (MHz) | Minimum Bandwidth (kHz) | Result |
|---------|---|------------------------------------|-------------------------|--------|
| 2402MHz | 1.00 | 0.67 | 25 KHz | PASS |
| 2441MHz | 1.00 | 0.64 | 25 KHz | PASS |
| 2480MHz | 1.00 | 0.67 | 25 KHz | PASS |

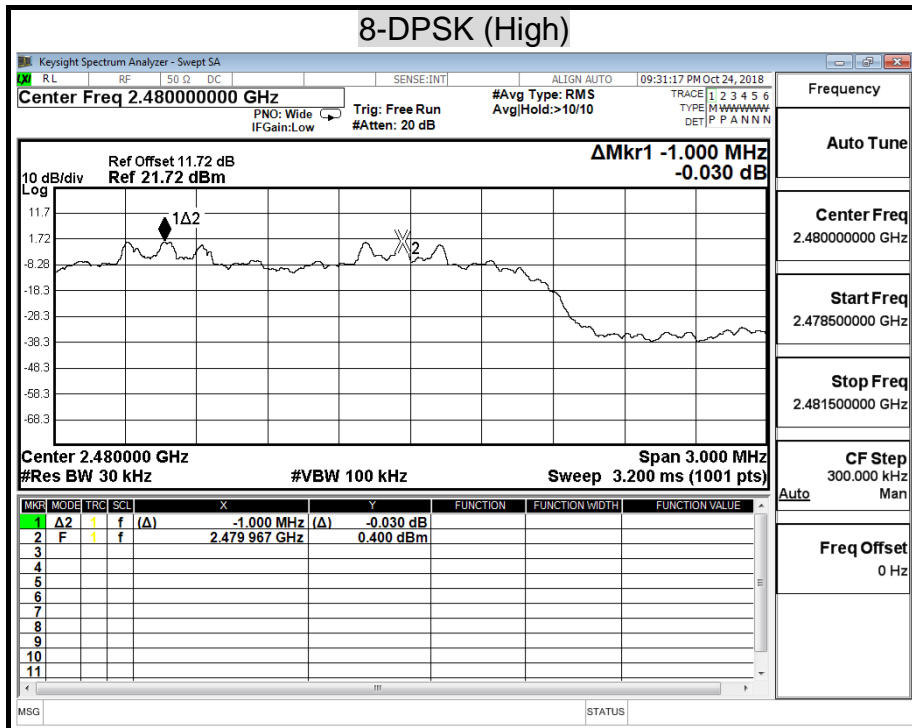
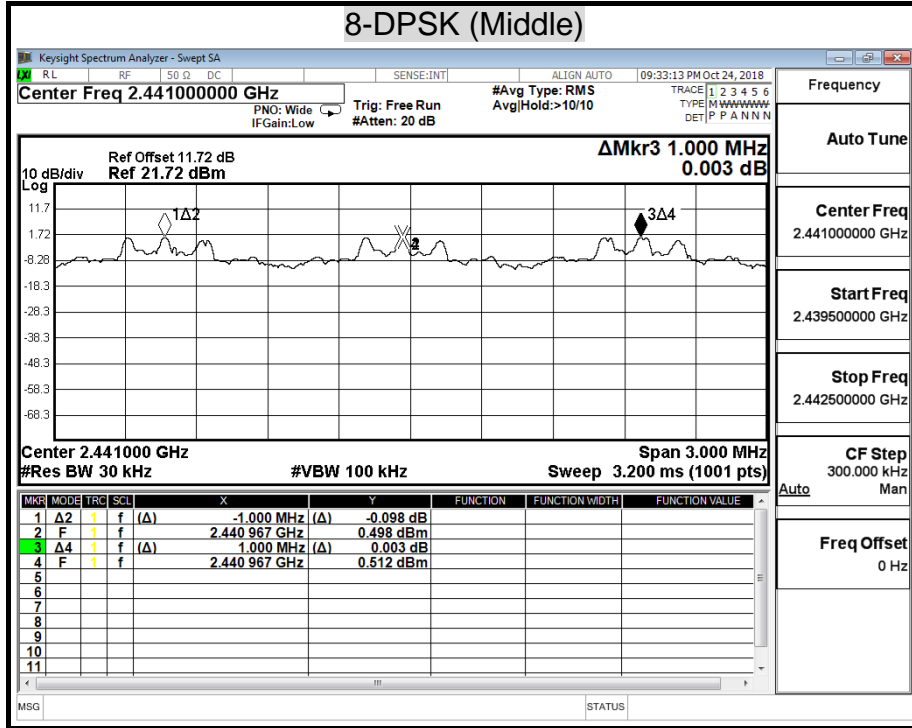
Modulation Type: 8-DPSK / 3-DH5

| Channel | Adjacent Hopping Channel Separation (kHz) | Two -third of 20dB bandwidth (kHz) | Minimum Bandwidth (kHz) | Result |
|---------|---|------------------------------------|-------------------------|--------|
| 2402MHz | 1.00 | 0.86 | 25 KHz | PASS |
| 2441MHz | 1.00 | 0.86 | 25 KHz | PASS |
| 2480MHz | 1.00 | 0.87 | 25 KHz | PASS |

HOPPING CHANNEL SEPARATION





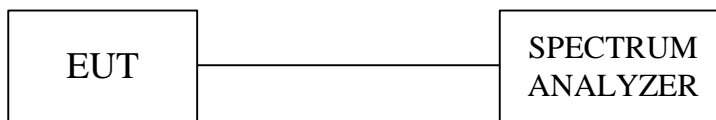


8.4 NUMBER OF HOPPING FREQUENCY USED

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 | PRO200BT | Test By | Ted Huang |
| Temp & Humidity | 26.5°C, 54% | Test Date | 2018/10/25 |

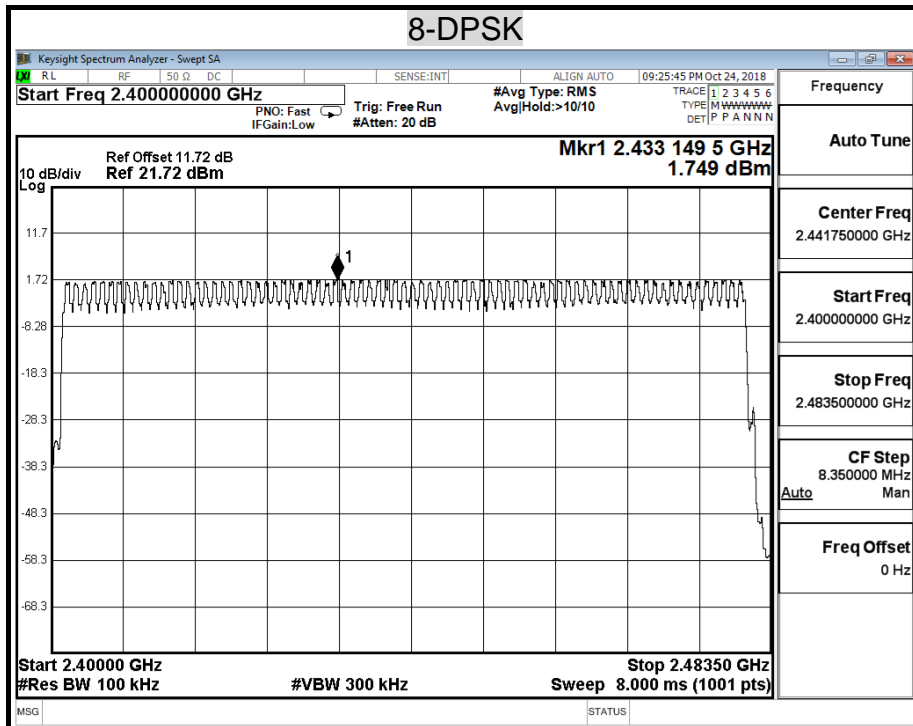
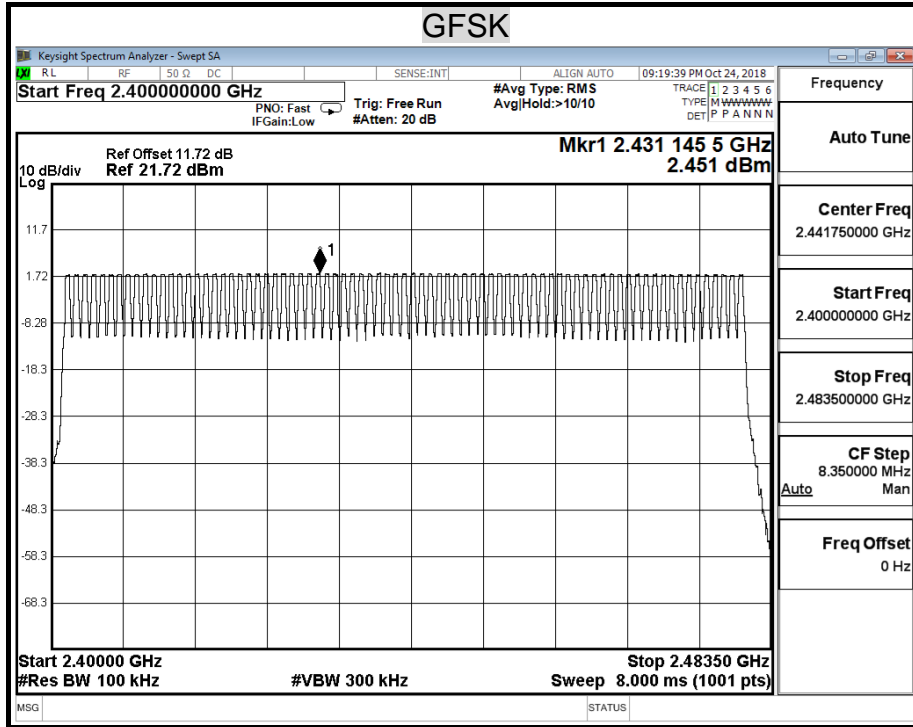
Modulation Type: GFSK / DH5

| Result(No.of CH) | Limit(No.of CH) | Result |
|------------------|-----------------|--------|
| 79 | >75 | PASS |

Modulation Type: 8-DPSK / 3-DH5

| Result(No.of CH) | Limit(No.of CH) | Result |
|------------------|-----------------|--------|
| 79 | >75 | PASS |

NUMBER OF HOPPING FREQUENCY USED

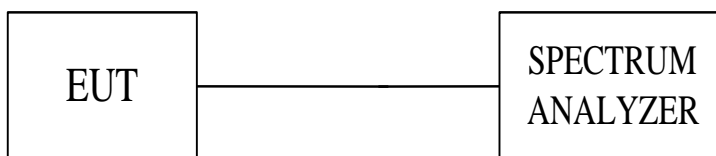


8.5 DWELL TIME ON EACH CHANNEL

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 | PRO200BT | Test By | Ted Huang |
| Temp & Humidity | 26.5°C, 54% | Test Date | 2018/10/25 |

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 | 2.900 | 309.33 | 400.00 | PASS |
| 2441MHz | AFH | 2.900 | 154.67 | 400.00 | PASS |

DH1 Dwell time= 0.400 ms×(1600÷2)÷79×31.6= 128.00 (ms)
 DH3 Dwell time= 1.650 ms×(1600÷4)÷79×31.6= 264.00 (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 | 0.410 | 131.20 | 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= 0.410 ms×(1600÷2)÷79×31.6= 131.20 (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

