



FCC ID: 2AB3E-IT96
Report No.: T180917N02-RP1

Page: 1 / 97
Rev.: 00

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
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<http://www.ccsrf.com>**

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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Report No.: T180917N02-RP1

Page: 2 / 97
Rev.: 00

REVISION HISTORY

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	November 02, 2018	Initial Issue	ALL	Sunny Chang

TABLE OF CONTENTS

TITLE	PAGE NO.
1. TEST REPORT CERTIFICATION	4
2. TEST RESULT SUMMARY.....	5
3. EUT DESCRIPTION	6
3.1 DESCRIPTION OF EUT & POWER.....	6
4. DESCRIPTION OF TEST MODES	8
5. TEST METHODOLOGY	10
6. FACILITIES AND ACCREDITATIONS.....	11
6.1 FACILITIES	11
6.2 EQUIPMENT	11
6.3 LABORATORY ACCREDITATIONS LISTINGS.....	11
6.4 TABLE OF ACCREDITATIONS AND LISTINGS	12
6.5 MEASUREMENT EQUIPMENT USED	13
7. SETUP OF EQUIPMENT UNDER TEST.....	14
7.1 SETUP CONFIGURATION OF EUT	14
7.2 SUPPORT EQUIPMENT.....	15
8. APPLICABLE LIMITS AND TEST RESULTS.....	17
8.1 20DB BANDWIDTH FOR HOPPING.....	17
8.2 MAXIMUM PEAK OUTPUT POWER	23
8.3 HOPPING CHANNEL SEPARATION.....	34
8.4 NUMBER OF HOPPING FREQUENCY USED	39
8.5 DWELL TIME ON EACH CHANNEL	42
8.6 DUTY CYCLE	56
8.7 CONDUCTED SPURIOUS EMISSION	61
8.8 RADIATED EMISSIONS	68
8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS	68
8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHZ.....	72
8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHZ	75
8.8.4 RESTRICTED BAND EDGES.....	81
8.9 POWERLINE CONDUCTED EMISSIONS	89
APPENDIX I PHOTOGRPHS OF TEST SETUP	93

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.

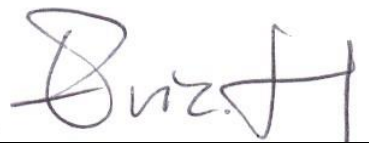
The test results of this report relate only to the tested sample EUT identified in this report.

Approved by:



Jeter Wu
Assistant Manager

Reviewed by:



Eric Huang
Section Manager



Report No.: T180917N02-RP1


Page: 5 / 97
Rev.: 00

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



Report No.: T180917N02-RP1

Page: 7 / 97
Rev.: 00

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



Report No.: T180917N02-RP1

Page: 10 / 97
Rev.: 00

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).



Report No.: T180917N02-RP1

Page: 12 / 97
Rev.: 00

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
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

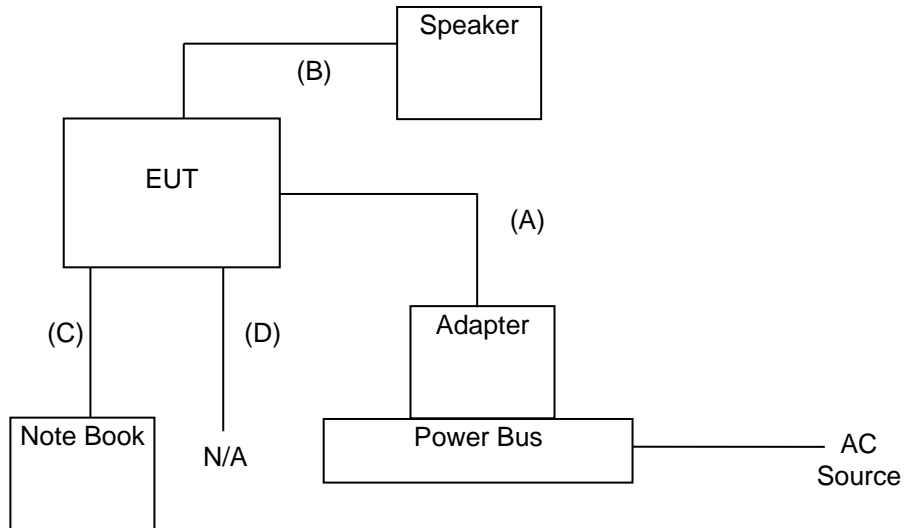
For §8.9

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)			

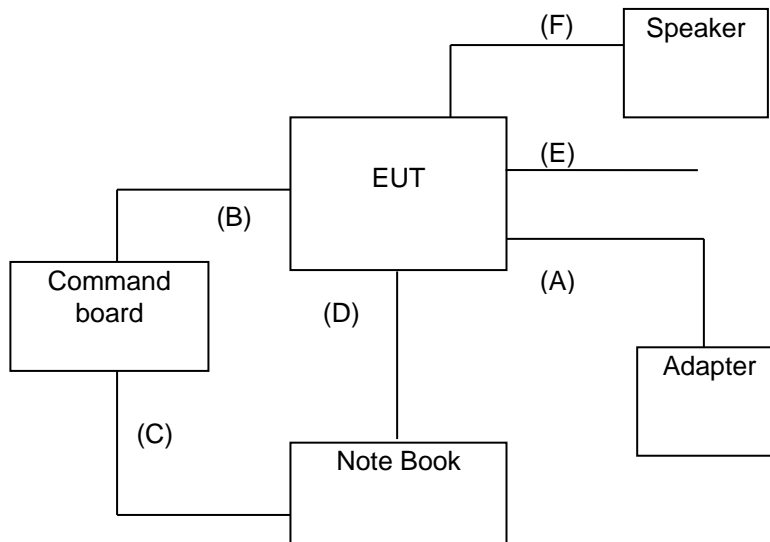
7. SETUP OF EQUIPMENT UNDER TEST

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.

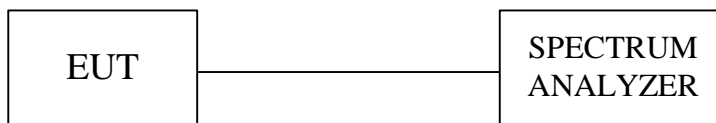
8. APPLICABLE LIMITS AND TEST RESULTS

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

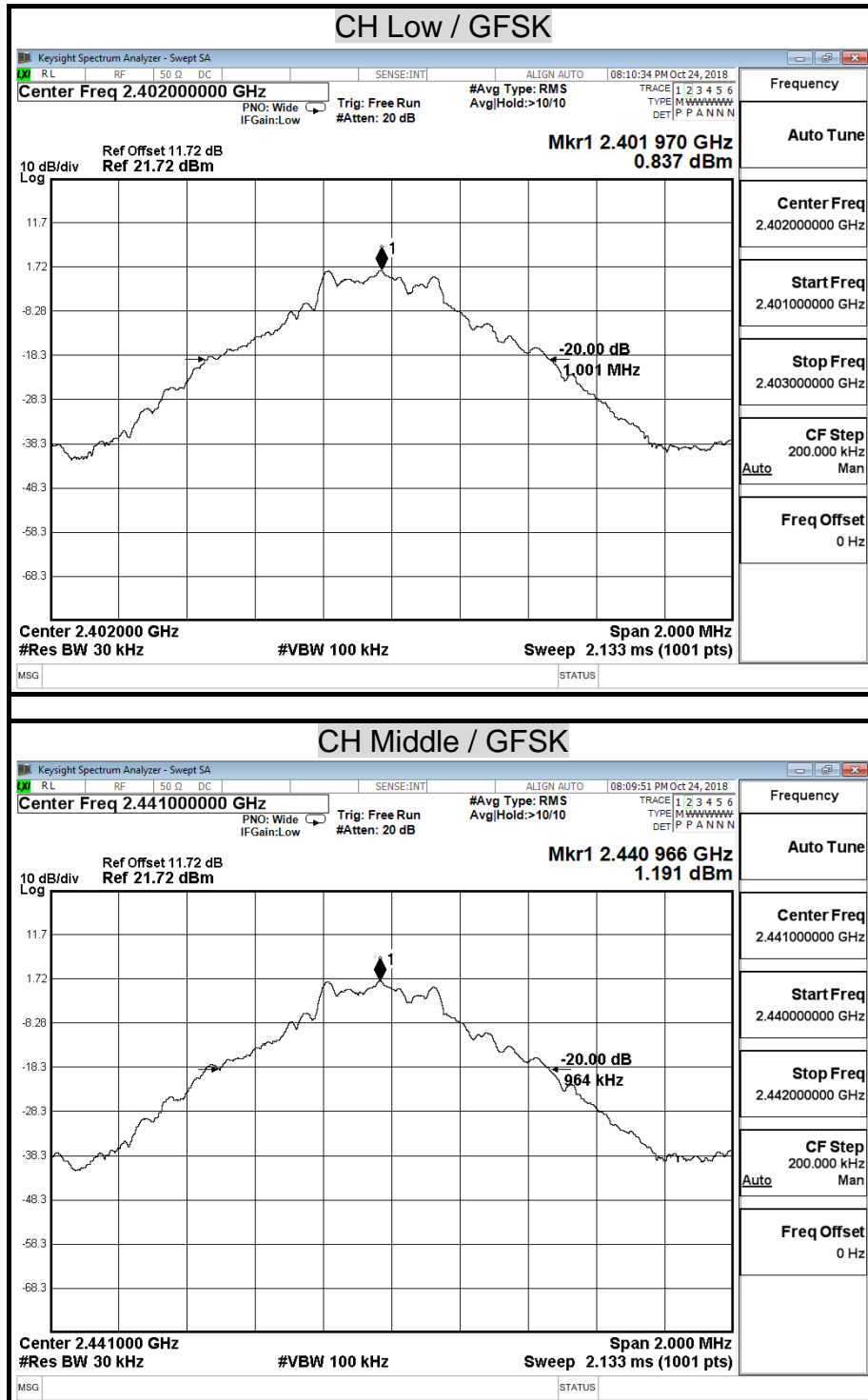
Model Name	PRO200BT	Test By	Ted Huang
Temp & Humidity	26.5°C, 54%	Test Date	2018/10/25

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

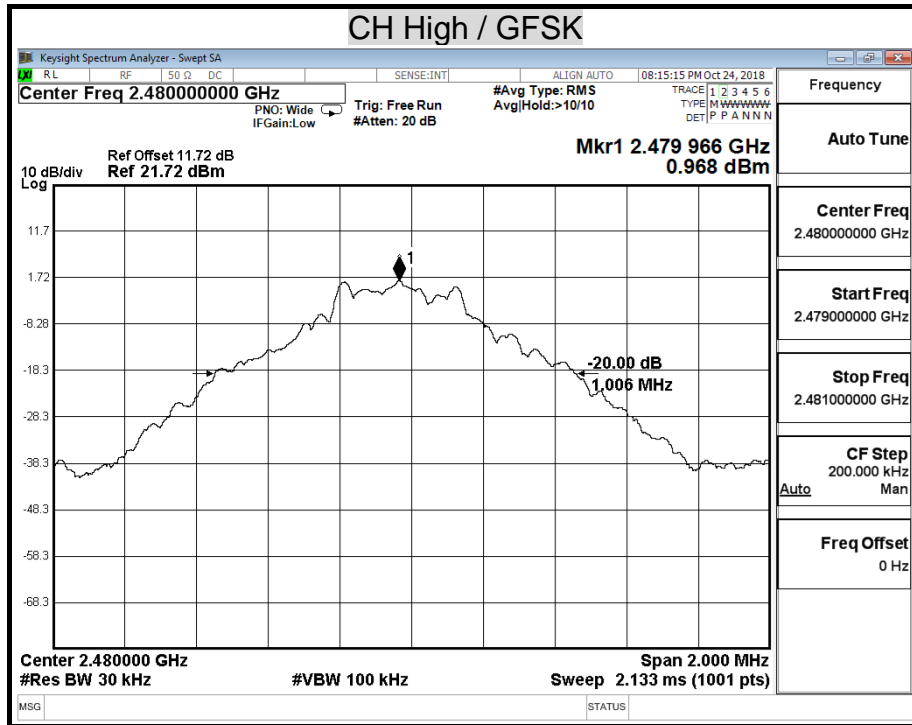
Modulation Type: 8-DPSK / 3-DH5

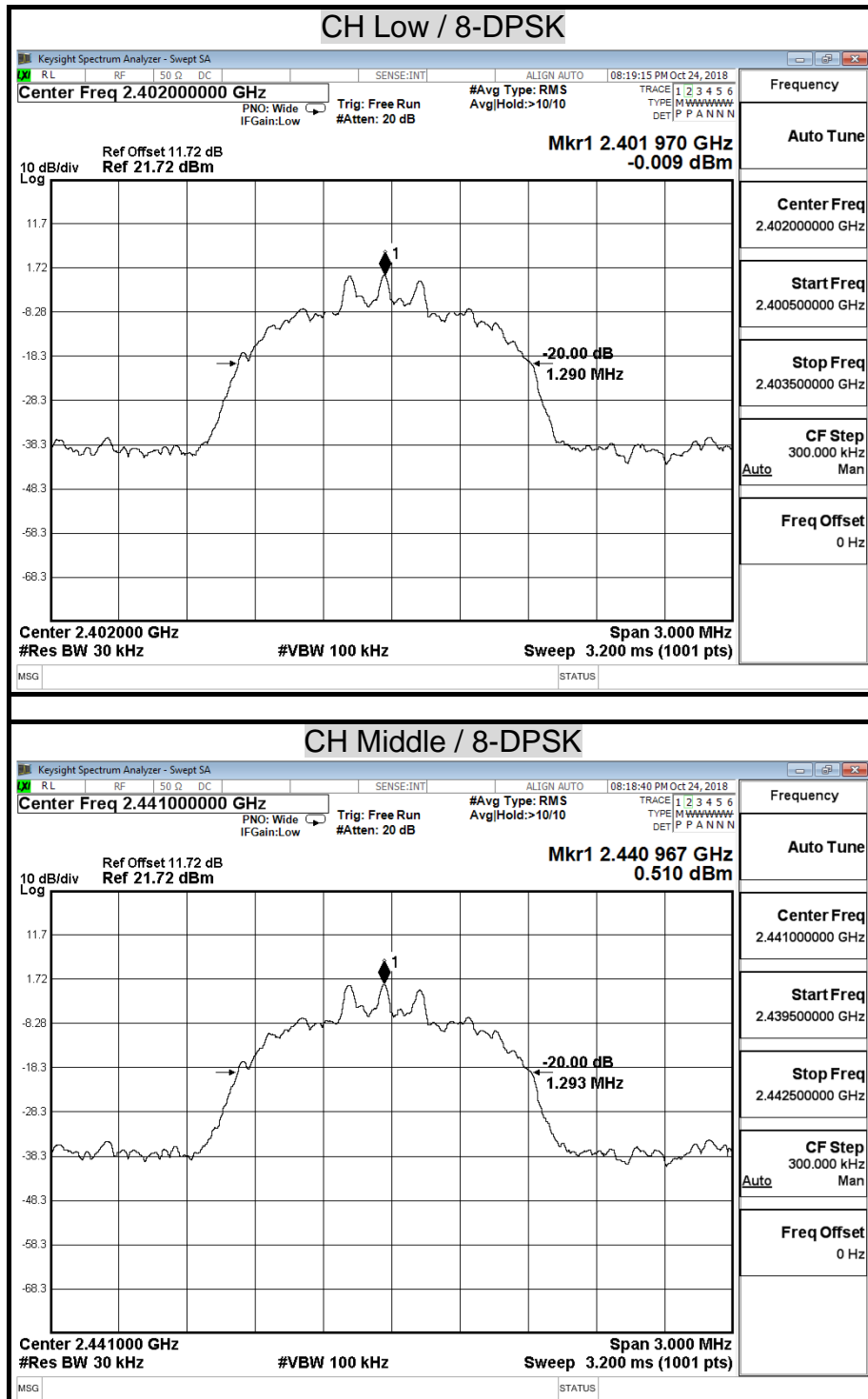
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Pass / Fail
Low	2402	1290.00	N/A
Middle	2441	1293.00	N/A
High	2480	1299.00	N/A

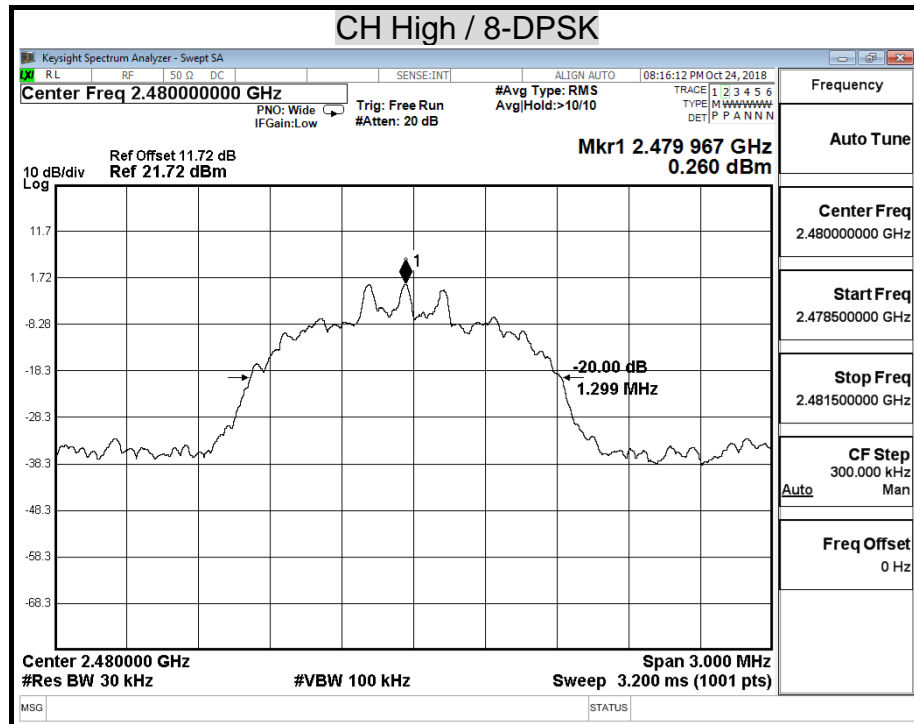
20dB BANDWIDTH

Report No.: T180917N02-RP1

Page: 20 / 97
Rev.: 00





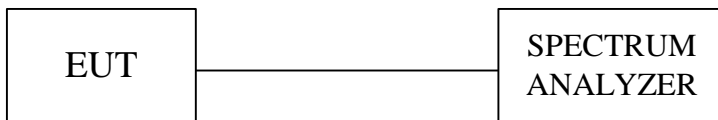


8.2 MAXIMUM PEAK OUTPUT POWER

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

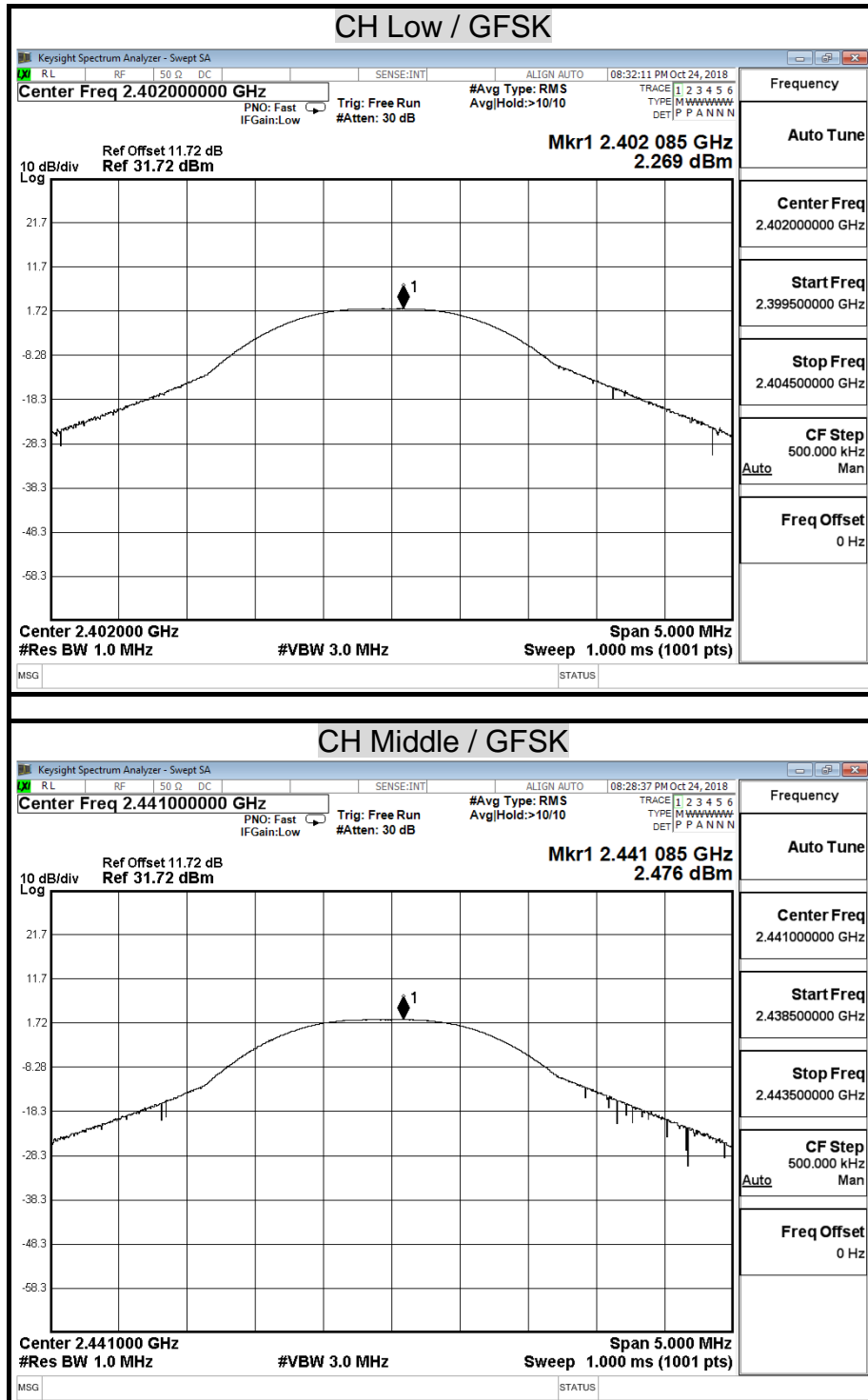
Average Power Data

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

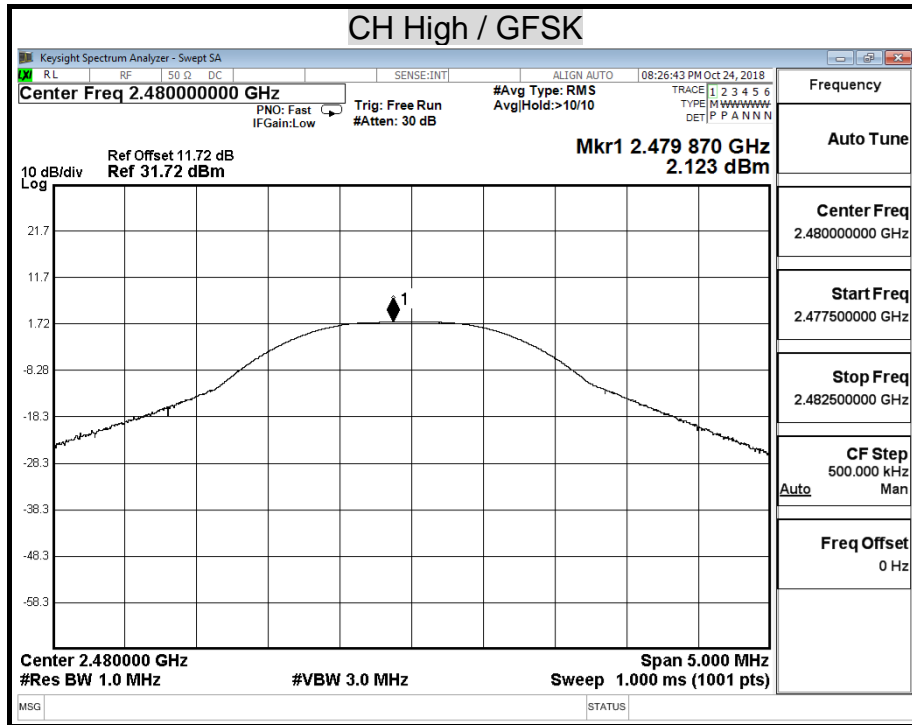
Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	-1.75
Middle	2441	-1.16
High	2480	-1.17

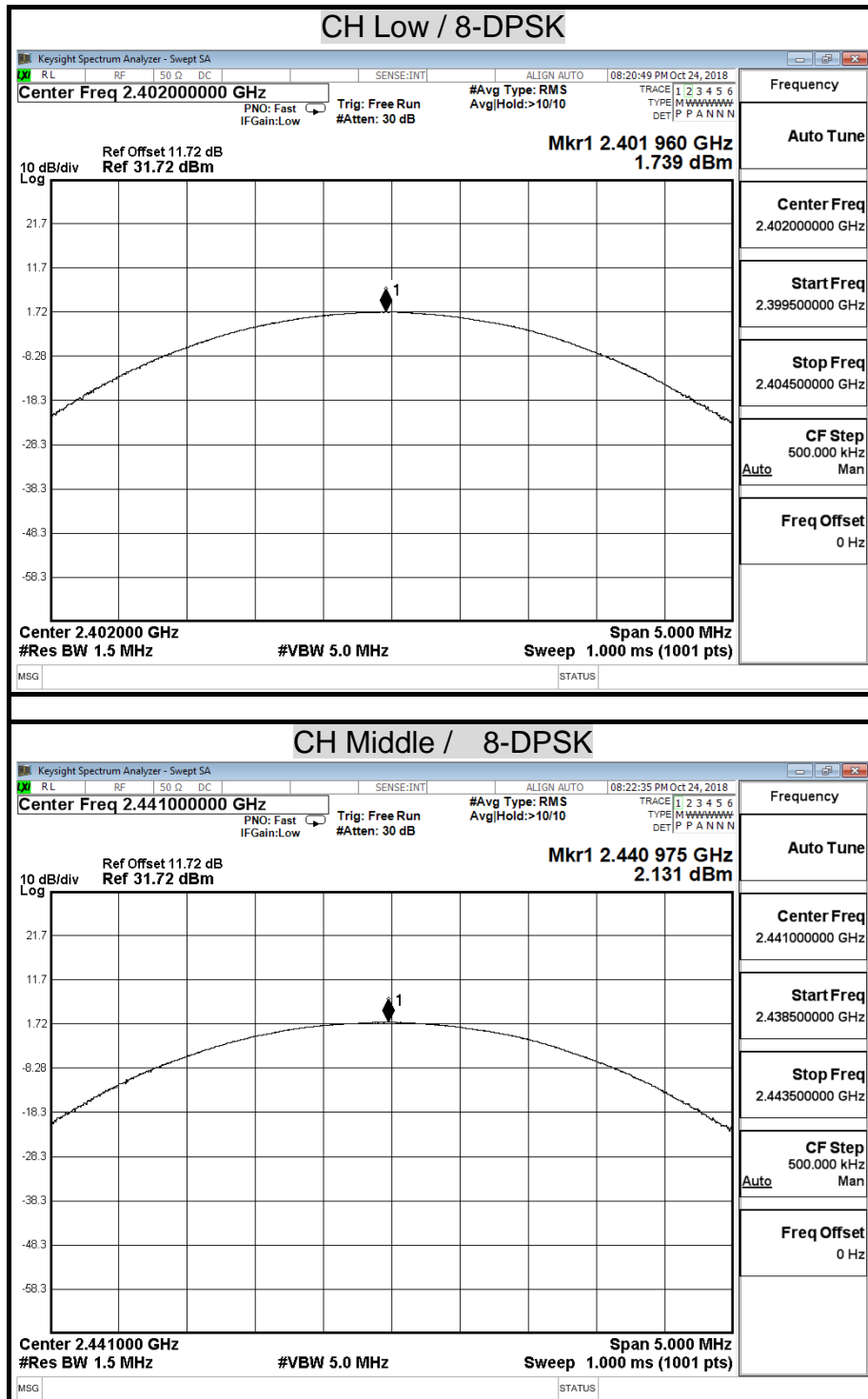
MAXIMUM PEAK OUTPUT POWER



Report No.: T180917N02-RP1

Page: 27 / 97
Rev.: 00

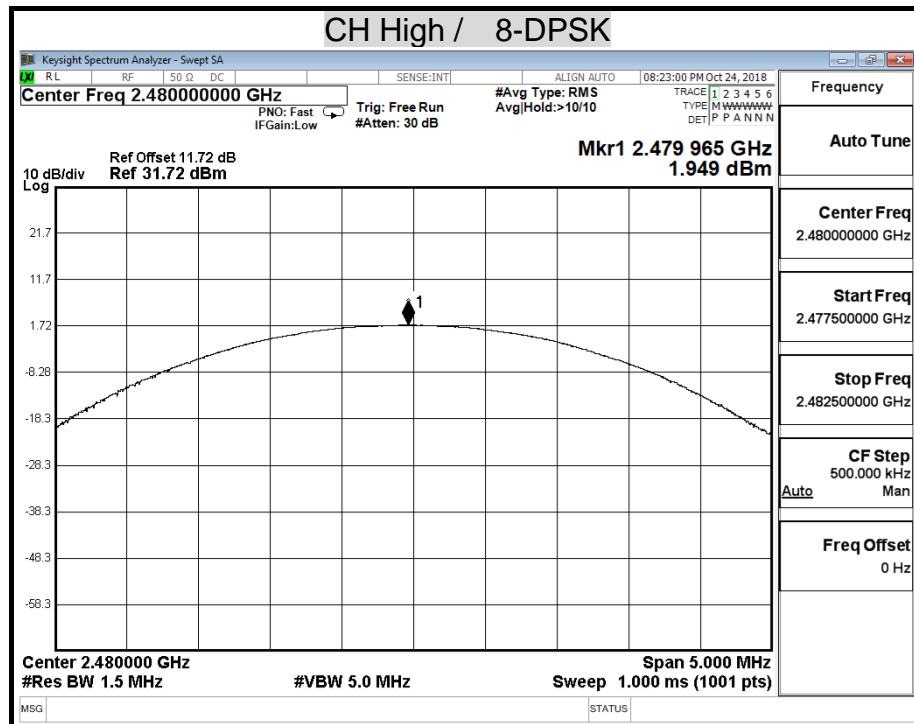


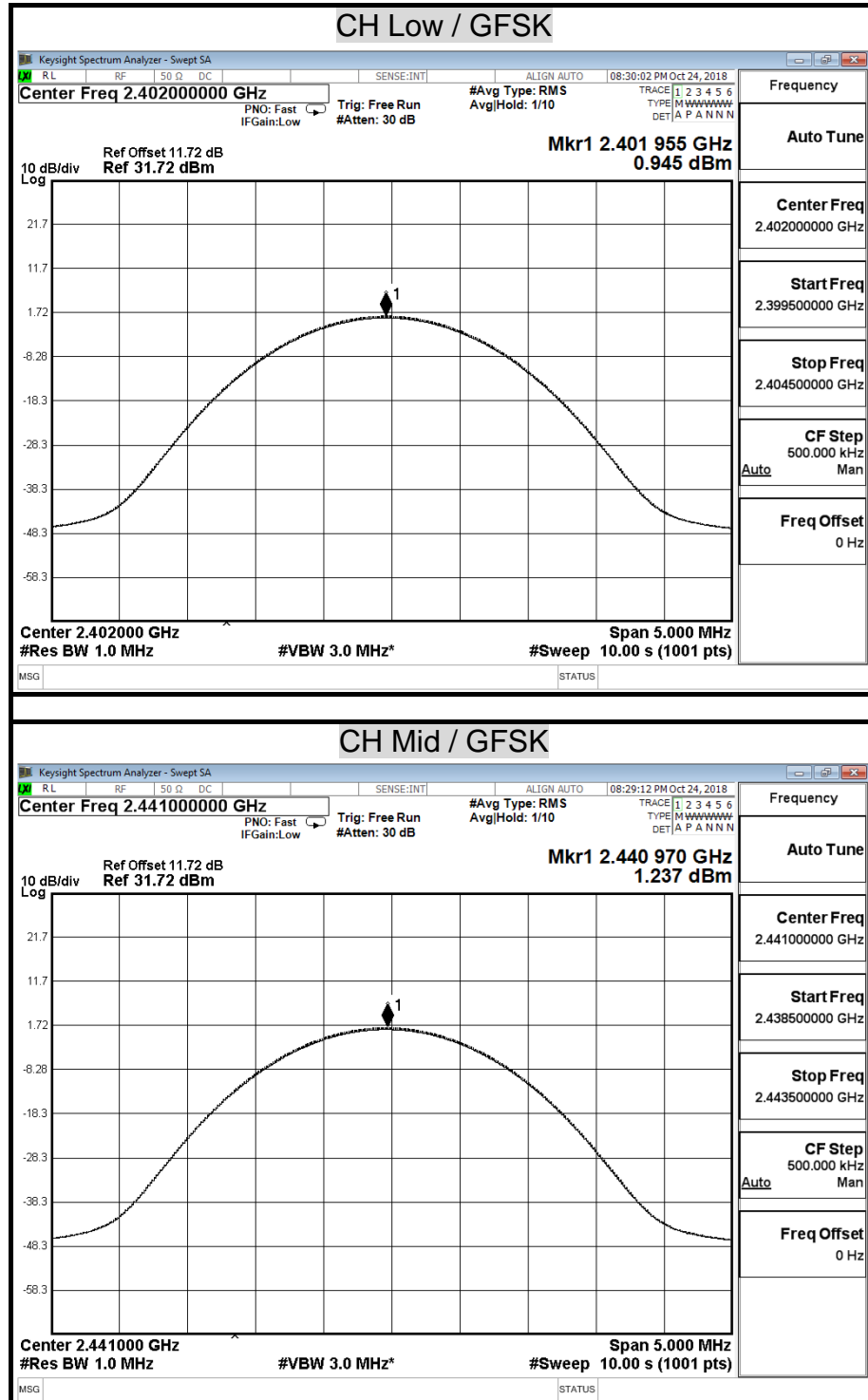


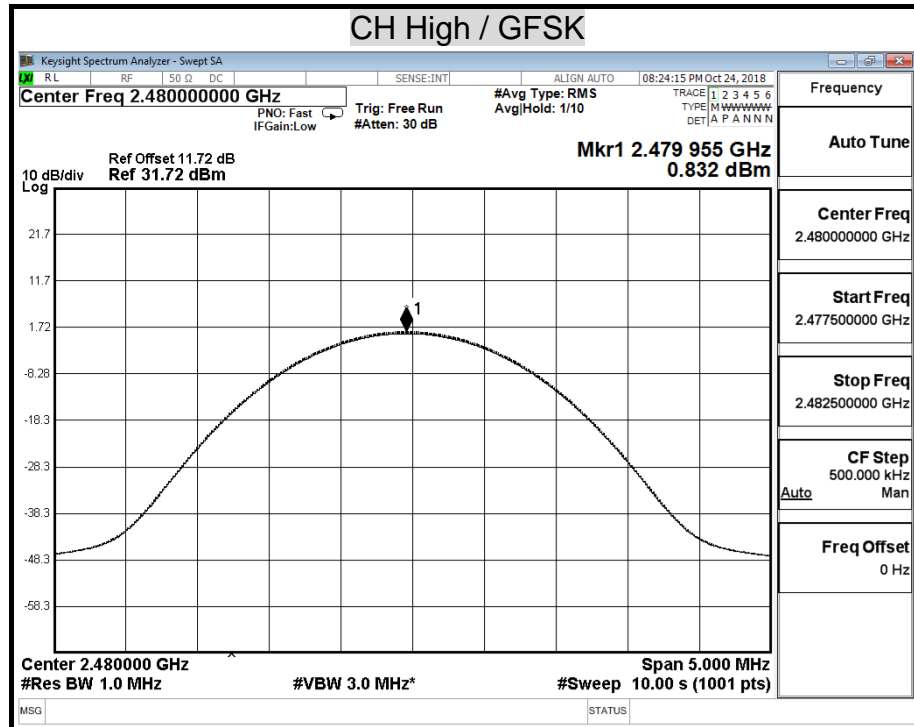


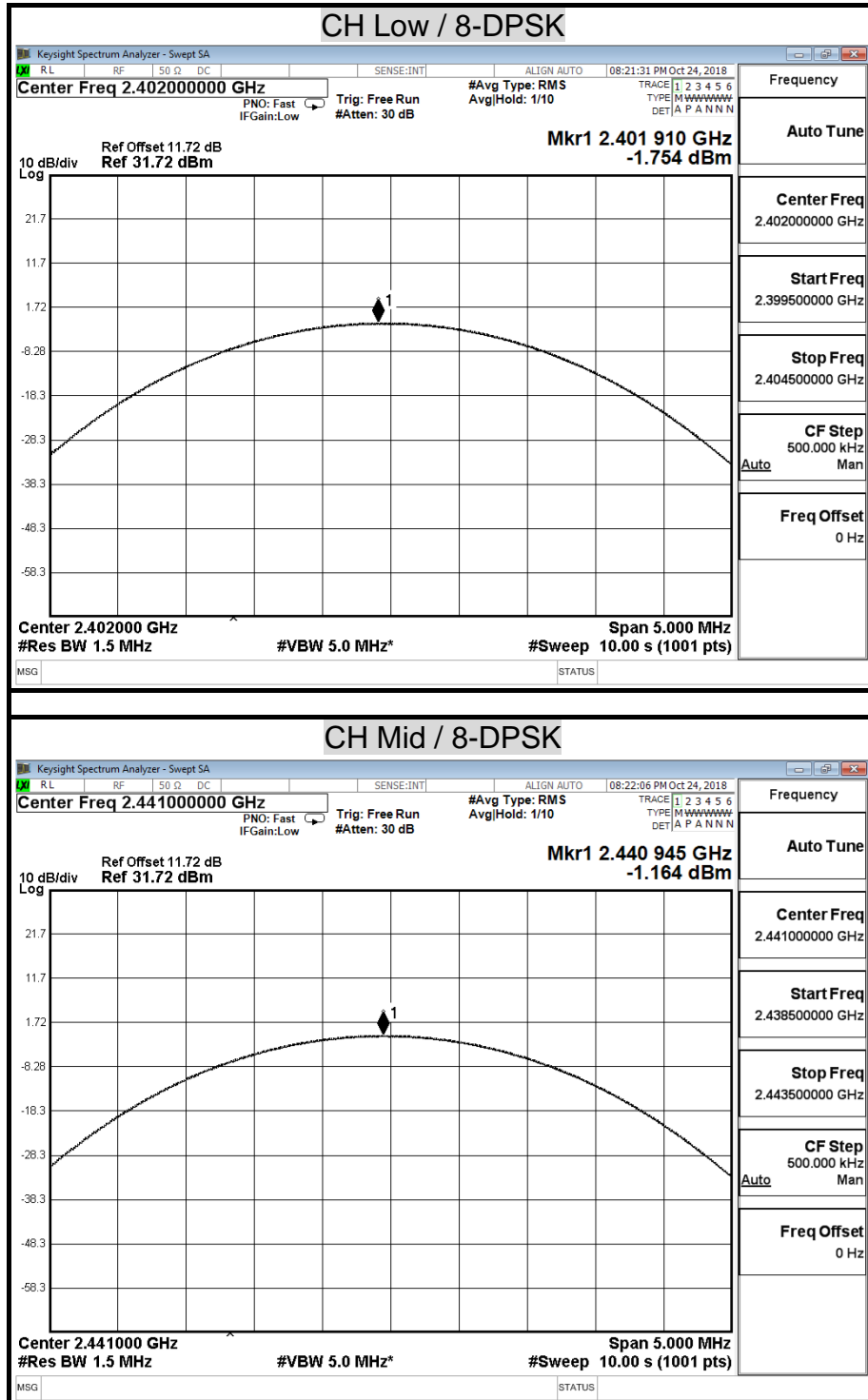
Report No.: T180917N02-RP1

Page: 29 / 97
Rev.: 00



AVERAGE POWER

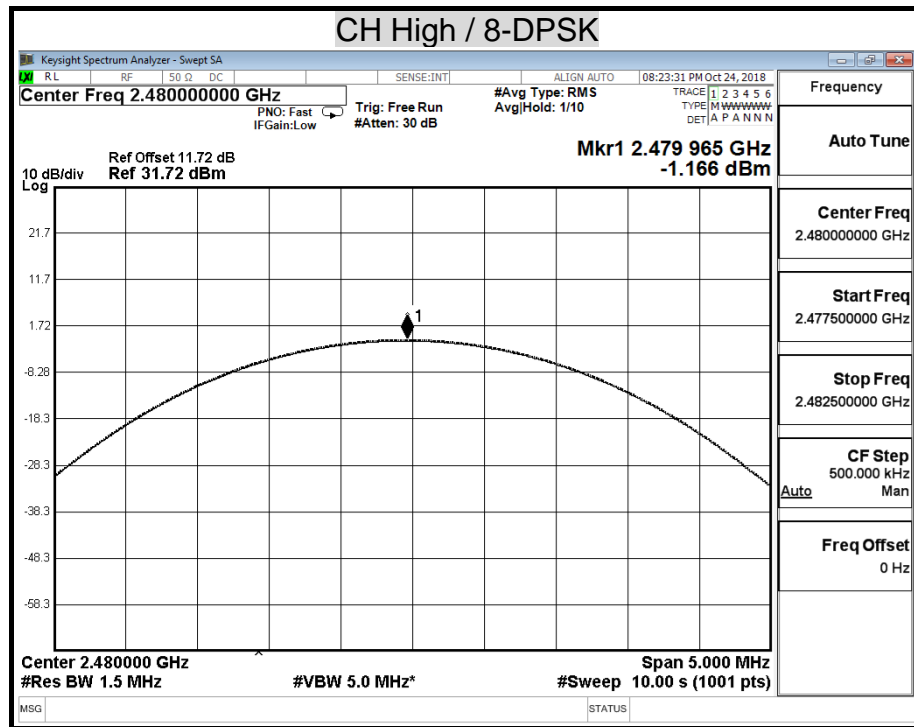






Report No.: T180917N02-RP1

Page: 33 / 97
Rev.: 00

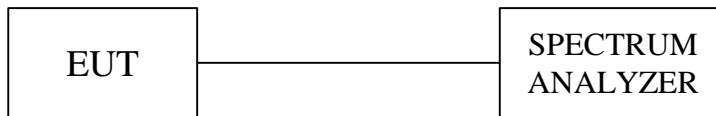


8.3 HOPPING CHANNEL SEPARATION

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.

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

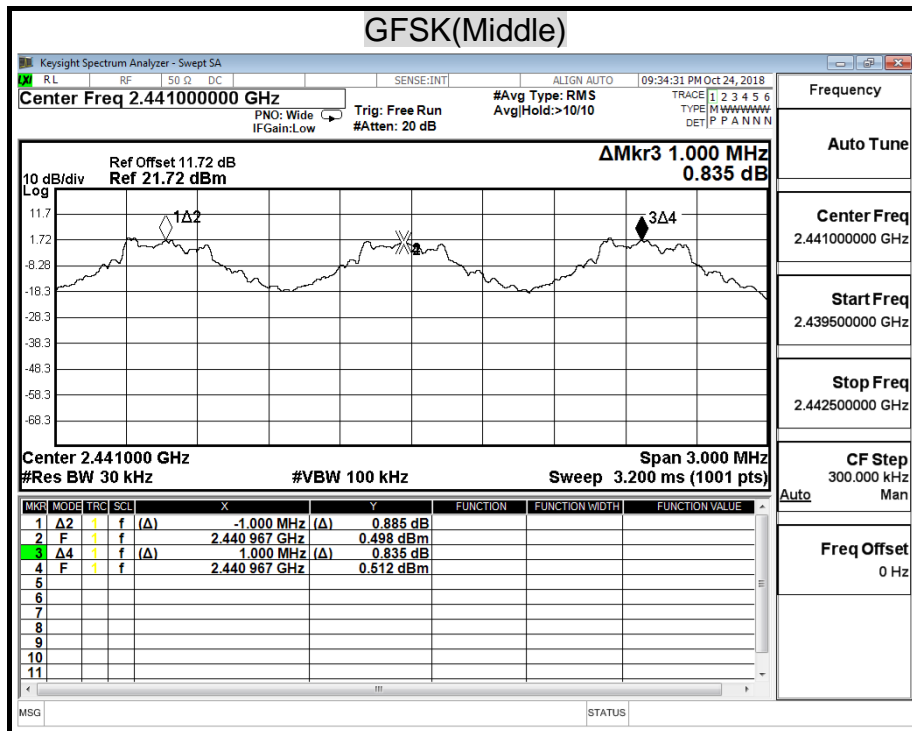
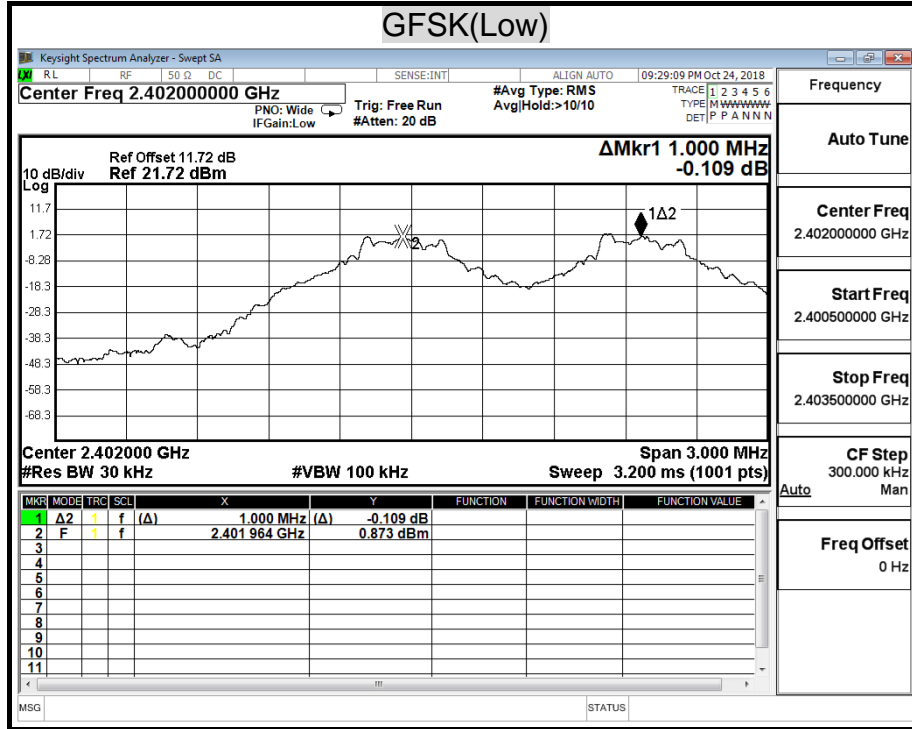
Modulation Type: GFSK / DH5

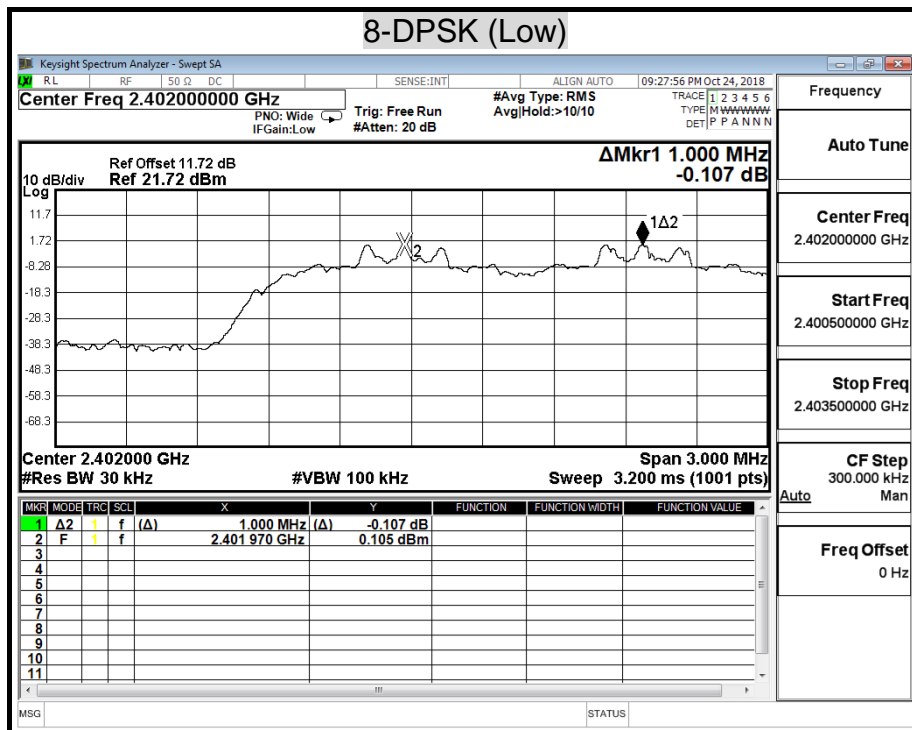
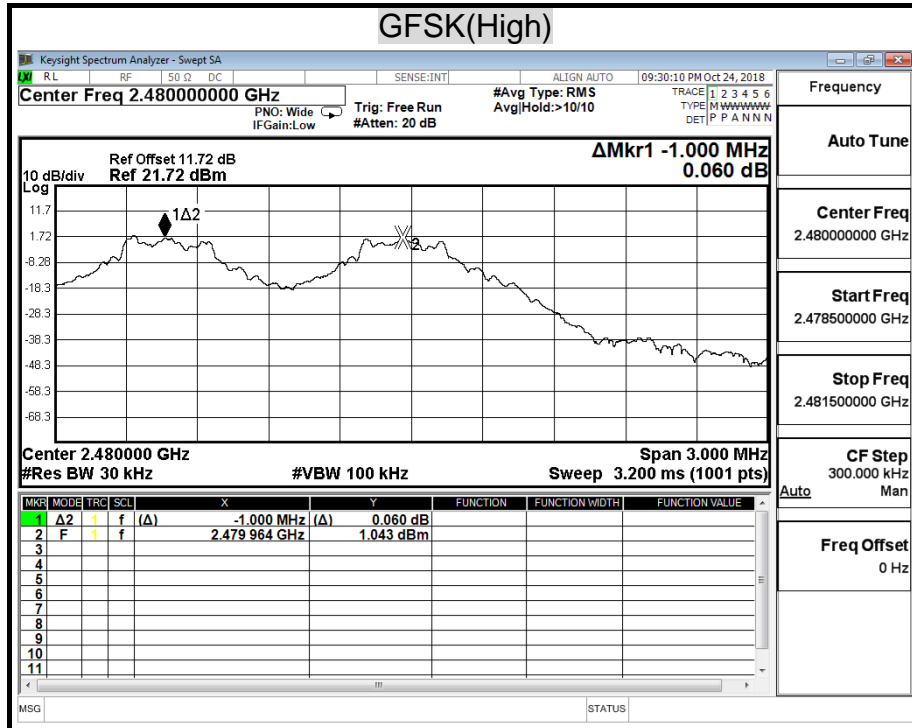
Channel	Adjacent Hopping Channel Separation (MHz)	Two -third of 20dB bandwidth (MHz)	Minimum Bandwidth (kHz)	Result
2402MHz	1.00	0.67	25 KHz	PASS
2441MHz	1.00	0.64	25 KHz	PASS
2480MHz	1.00	0.67	25 KHz	PASS

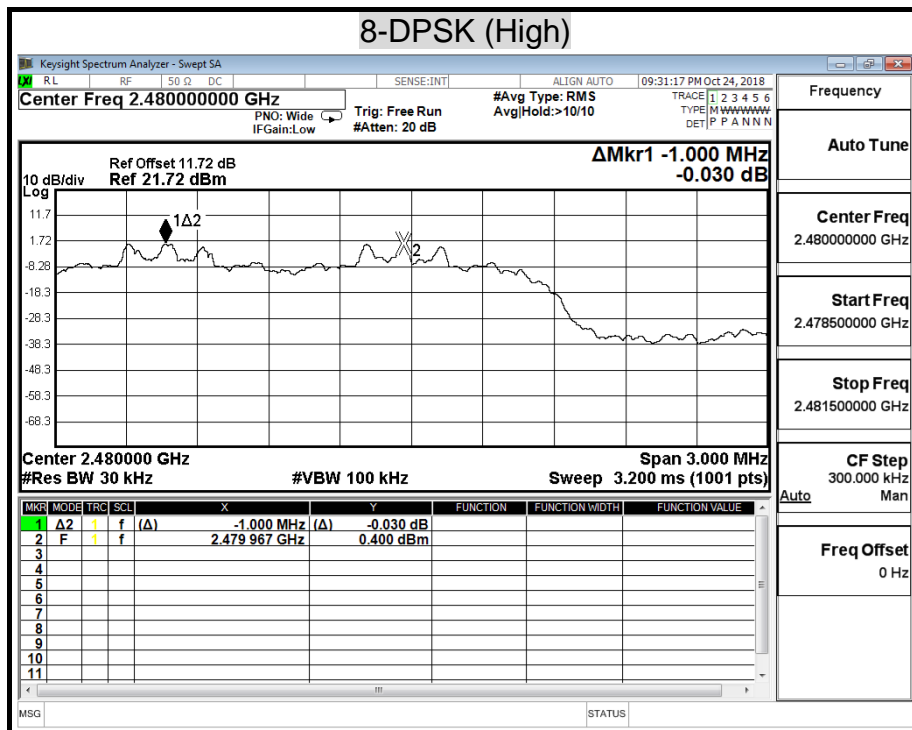
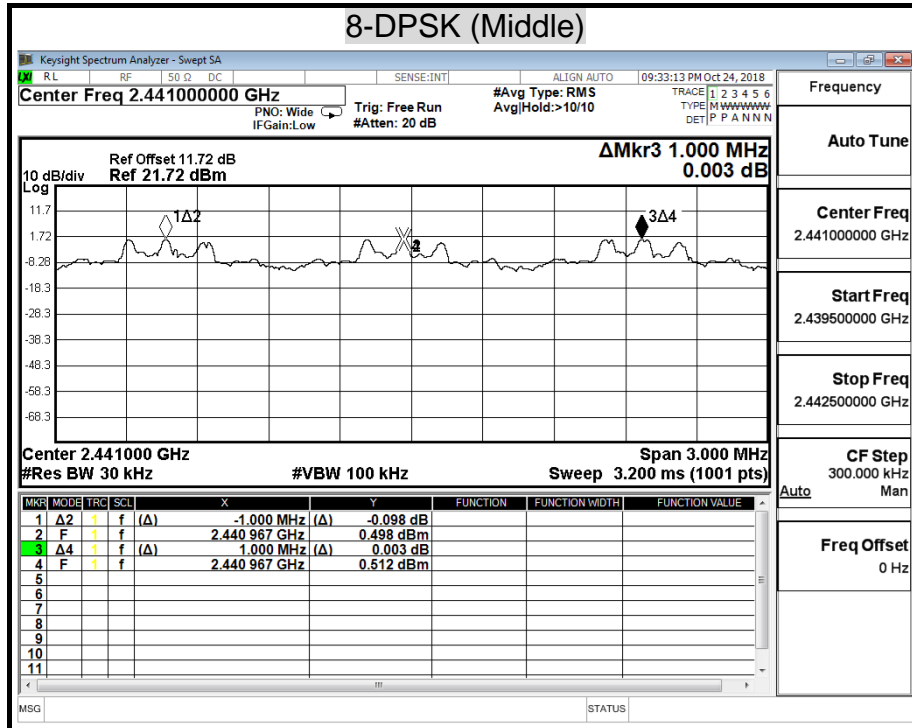
Modulation Type: 8-DPSK / 3-DH5

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





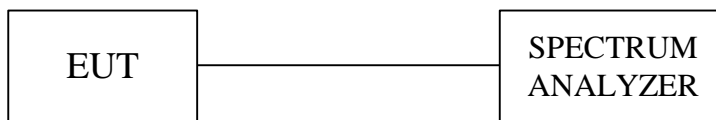


8.4 NUMBER OF HOPPING FREQUENCY USED

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.



Report No.: T180917N02-RP1

Page: 40 / 97
Rev.: 00

TEST RESULTS

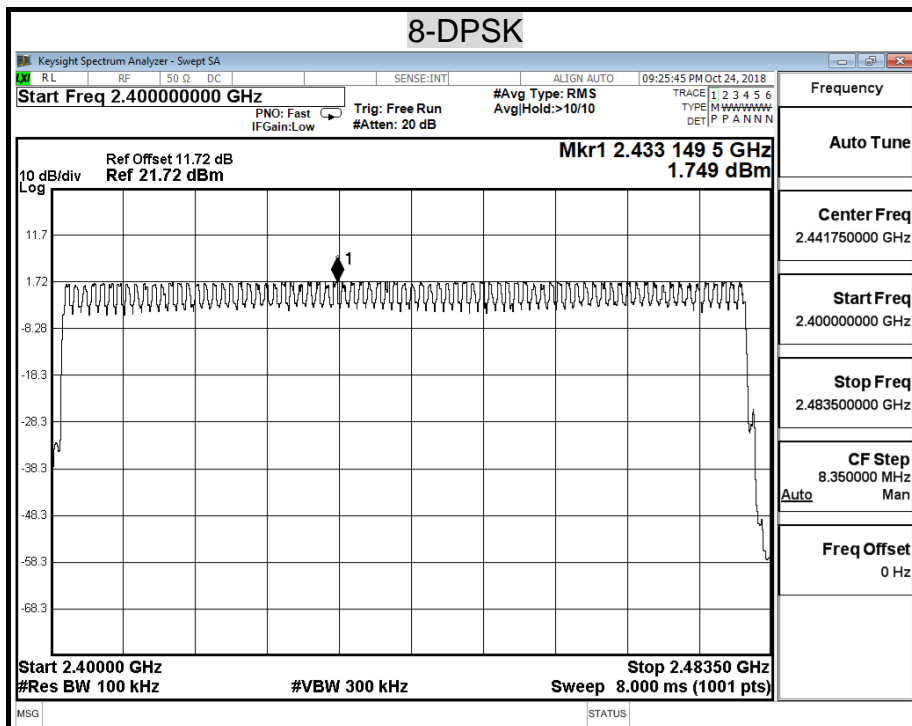
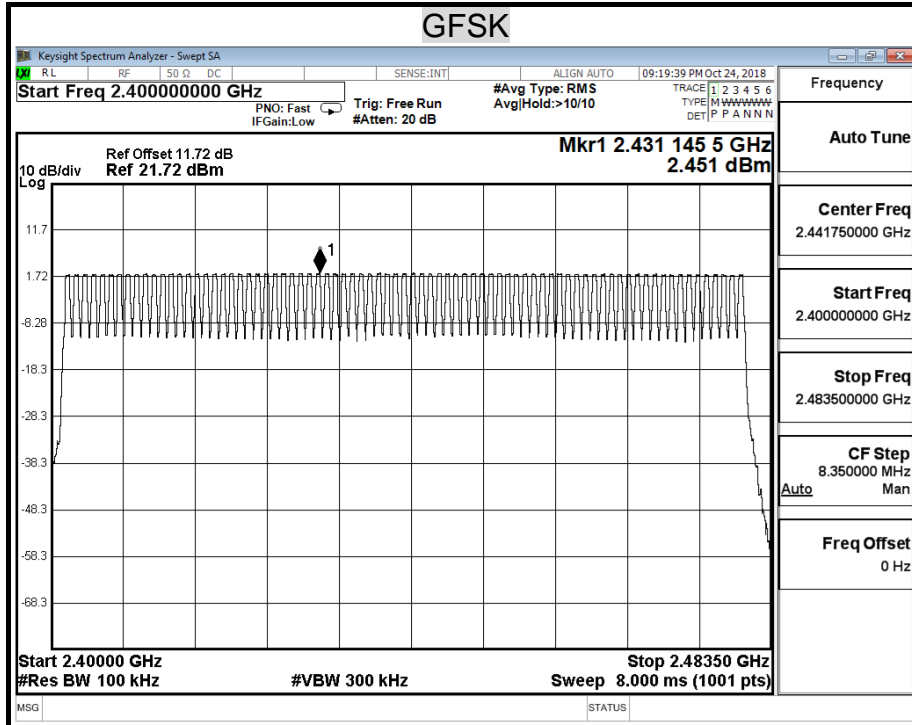
Model Name	PRO200BT	Test By	Ted Huang
Temp & Humidity	26.5°C, 54%	Test Date	2018/10/25

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

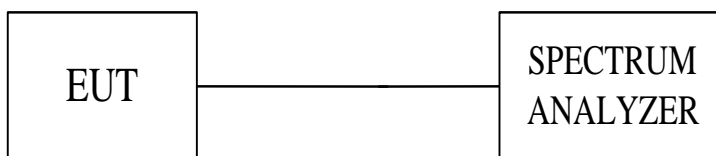
NUMBER OF HOPPING FREQUENCY USED

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.

Report No.: T180917N02-RP1

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

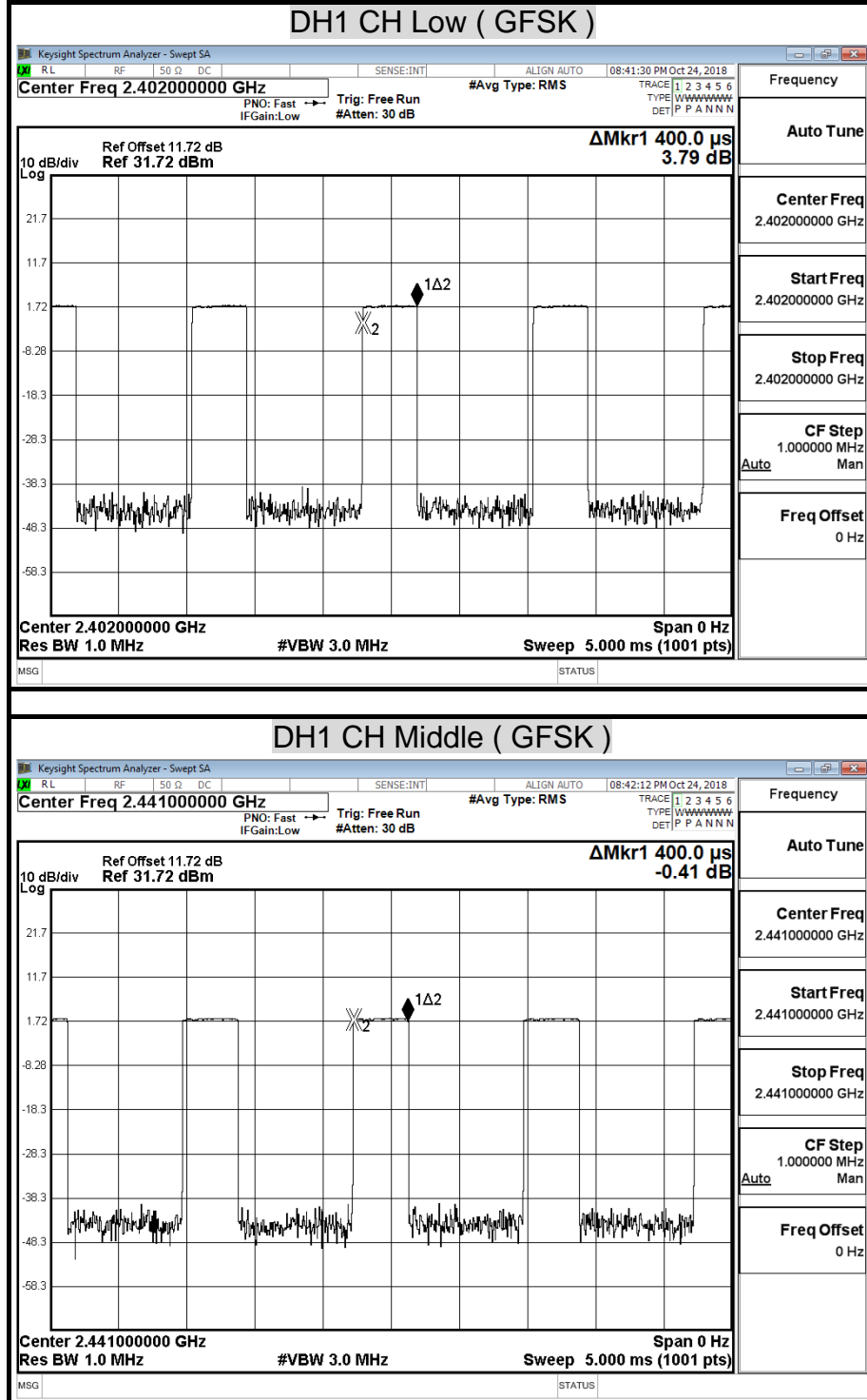
3DH1 Dwell time= 0.410 ms×(1600÷2)÷79×31.6= 131.20 (ms)

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)

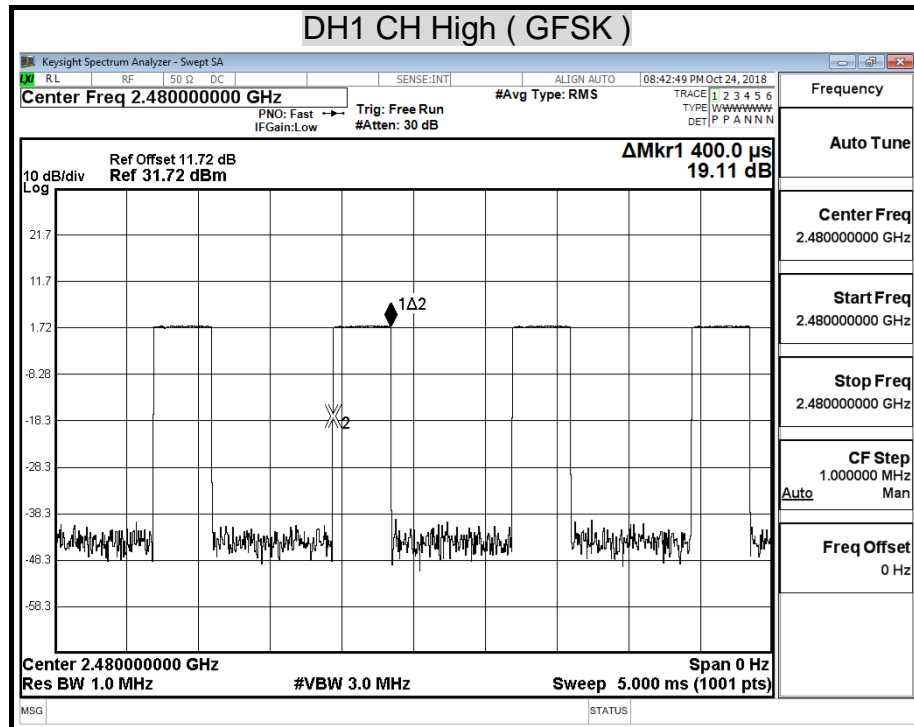
AFH Dwell time= 2.920 ms×(800÷6)÷20×8= 155.73 (ms)

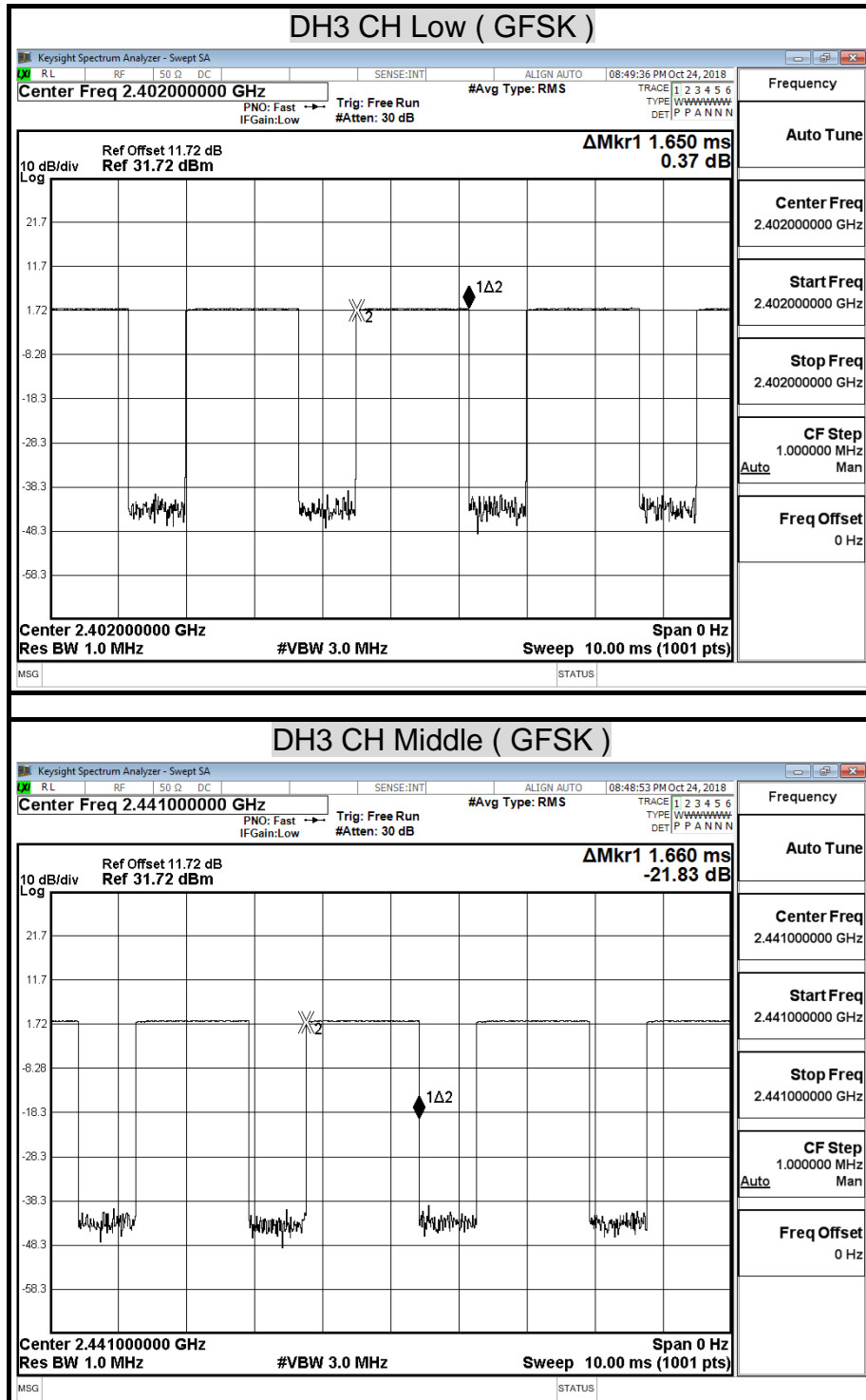
DWELL TIME ON EACH PAYLOAD



Report No.: T180917N02-RP1

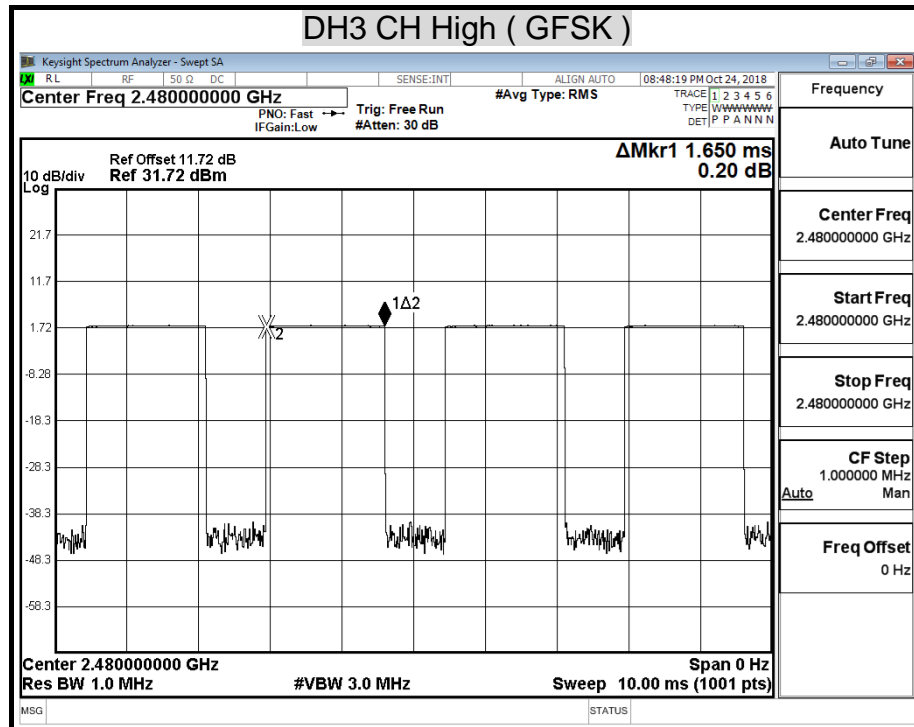
Page: 45 / 97
Rev.: 00

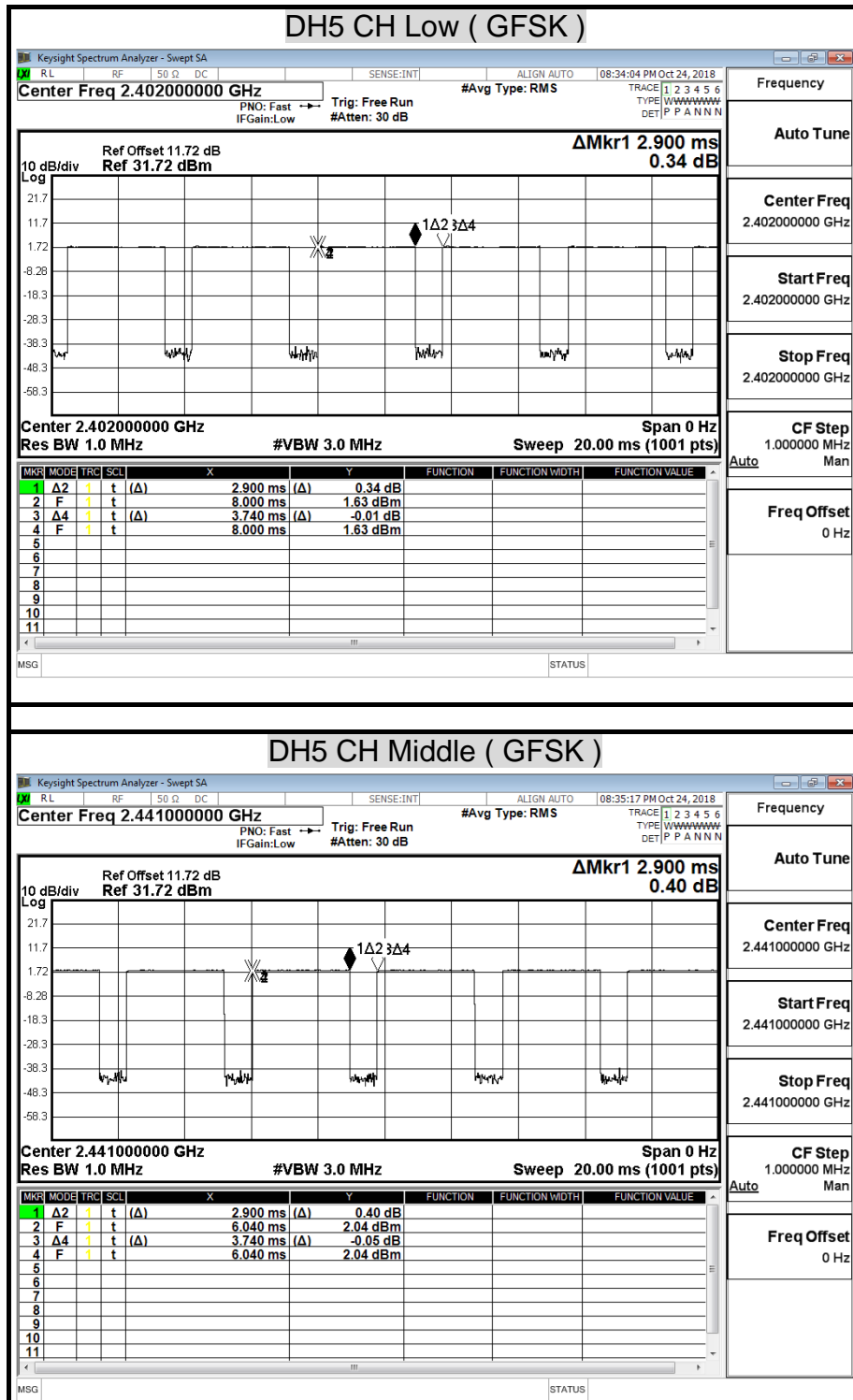




Report No.: T180917N02-RP1

Page: 47 / 97
Rev.: 00





Report No.: T180917N02-RP1

Page: 49 / 97
Rev.: 00

