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

TEST REPORT

For

Musical keyboard with drum pads

Model: MPC Key 61

Brand:

Issued for

inMusic Brands, Inc.

200 Scenic View Drive, Cumberland, RI 02864, U.S.A.

Issued by

Compliance Certification Services Inc.
Tainan Lab.
No.8, Jiucengling, Xinhua Dist.,
Tainan City, Taiwan
Issued Date: October 05, 2021

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REVISION HISTORY

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

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TABLE OF CONTENTS

1. TEST REPORT CERTIFICATION 4

2. EUT DESCRIPTION 5

3. DESCRIPTION OF TEST MODES 6

4. TEST METHODOLOGY 7

5. FACILITIES AND ACCREDITATIONS 7

5.1 FACILITIES 7
5.2 EQUIPMENT 7
5.3 LABORATORY ACCREDITATIONS LISTINGS 7
5.4 TABLE OF ACCREDITATIONS AND LISTINGS 8

6. CALIBRATION AND UNCERTAINTY 9

6.1 MEASURING INSTRUMENT CALIBRATION 9
6.2 MEASUREMENT UNCERTAINTY 9

7. SETUP OF EQUIPMENT UNDER TEST 10

7.1 SETUP CONFIGURATION OF EUT 10
7.2 SUPPORT EQUIPMENT 11
7.3 EUT OPERATING CONDITION 13

8. APPLICABLE LIMITS AND TEST RESULTS 16

8.1 6dB BANDWIDTH 16
8.2 MAXIMUM PEAK OUTPUT POWER 28
8.3 DUTY CYCLE 41
8.4 POWER SPECTRAL DENSITY 53
8.5 CONDUCTED SPURIOUS EMISSION 65
8.6 RADIATED EMISSIONS 83
8.6.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS 83
8.6.2 WORST-CASE RADIATED EMISSION BELOW 1 GHZ 88
8.6.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHZ 90
8.6.4 RESTRICTED BAND EDGES 102
8.7 POWERLINE CONDUCTED EMISSIONS 118

9. ANTENNA REQUIREMENT 122

9.1 STANDARD APPLICABLE 122
9.2 ANTENNA CONNECTED CONSTRUCTION 122

APPENDIX I SETUP PHOTOS 123

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1. TEST REPORT CERTIFICATION

Applicant	:	**inMusic Brands, Inc.** 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.
Manufacturer	:	**inMusic Brands, Inc.** 200 Scenic View Drive, Cumberland, RI 02864, U.S.A.
Equipment Under Test	:	Musical keyboard with drum pads
Model	:	MPC Key 61
Brand	:	
Date of Test	:	June 22, 2021 ~ July 05, 2021

APPLICABLE STANDARD	
STANDARD	**TEST RESULT**
FCC Part 15 Subpart C AND ANSI C63.10: 2013	No non-compliance noted

Statements of Conformity
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

Approved by:

Eric Huang
Section Manager

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2. EUT DESCRIPTION

Product Name	Musical keyboard with drum pads
Model	MPC Key 61
Brand	AKAI PROFESSIONAL
Received Date	March 16, 2021
Frequency Range	IEEE 802.11b/g, 802.11n HT20: 2412MHz~2462MHz Bluetooth 5.0: 2402MHz~2480MHz
Transmit Power	IEEE 802.11b Mode: 15.91dBm (38.99mW) IEEE 802.11g Mode: 17.56dBm (57.02mW) IEEE 802.11n HT20 Mode: 16.49dBm (44.57mW) Bluetooth 5.0 Mode: 5.83dBm (3.826mW)
Channel Spacing	IEEE 802.11b/g, 802.11n HT20: 5MHz Bluetooth 5.0: 2MHz
Channel Number	IEEE 802.11b/g, 802.11n HT20: 11 Channels Bluetooth 5.0 : 40 Channels
Transmit Data Rate	IEEE 802.11b : 11, 5.5, 2, 1 Mbps IEEE 802.11g : 54, 48 ,36, 24, 18, 12, 9, 6 Mbps IEEE 802.11n HT20 : 130, 117 ,104, 78, 65, 58.5, 52, 39, 26, 19.5,13, 6.5 Mbps Bluetooth 5.0: 2 Mbps
Type of Modulation	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20: OFDM (64QAM, 16QAM, QPSK, BPSK) Bluetooth 5.0: GFSK
Antenna Type	Type: WLAN EMBEDDEN ANTENNA Model: WLA-EM-1707-0064-B Manufacturer: BRITO Gain: 4.6 dBi
Power Rating	AC 100V-240V, 65W, 50/60Hz
Hardware Version	GA-RCA1C REV:1.1
Software Version	N/A
Firmware Version	ACVM-acvs_trunk-0.0.0.613-2021-05-17-15-26-os_c0b1eda-acvs_1f3c54036-full
Temperature Range	0°C ~ +40°C
Reported Date	September 15, 2021

REMARK:

1. The sample **(MPC Key 61)** selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **Y4O-ACVM** 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.

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3. DESCRIPTION OF TEST MODES

The EUT is a Musical keyboard with drum pads. It has one transmitter chains and one receive chains (1x1 configurations) and BT5.0. The 1x1 configuration is implemented with one outside chains (Chain 0).

The RF chipset is manufactured by Broadcom.

The antenna peak gain 4.6dBi (highest gain) were chosen for full testing.

IEEE 802.11 b ,802.11g ,802.11n HT20 mode (DTS Band)

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode: 1Mbps long data rate (worst case) were chosen for full testing.

IEEE 802.11g mode: 6Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11n HT20 mode: 6.5Mbps data rate (worst case) were chosen for full testing.

GFSK mode

The EUT had been tested under operating condition.

There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2402
Middle	2442
High	2480

Bluetooth 5.0 (GFSK) mode: 1Mbps data rate (worst case) were chosen for full testing.

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4. TEST METHODOLOGY

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

5. FACILITIES AND ACCREDITATIONS

5.1 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.

5.2 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.”

5.3 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).

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5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Our laboratories are accredited and approved by the following accreditation body 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 (TW1109)
Germany	TUV NORD
Taiwan	BSMI
USA	FCC

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

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6. CALIBRATION AND UNCERTAINTY

6.1 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.

6.2 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 : OATS-6	±3.3456dB
Radiated Emission, 200 to 1000 MHz Test Site : OATS-6	±2.6828dB
Radiated Emission, 1 to 8 GHz	± 2.6485dB
Radiated Emission, 8 to 18 GHz	± 2.6852dB
Radiated Emission, 18 to 26.5 GHz	± 2.6485dB
Radiated Emission, 26 to 40 GHz	± 3.0295dB
Power Line Conducted Emission	±1.91dB
Band Width	136.49kHz
Peak Output Power MU	±1.904dB
Band Edge MU	±0.302dBuV
Channel Separation MU	361.69Hz
Duty Cycle MU	0.064ms
Frequency Stability MU	0.223kHz

Uncertainty figures are valid to a confidence level of 95%, K=2

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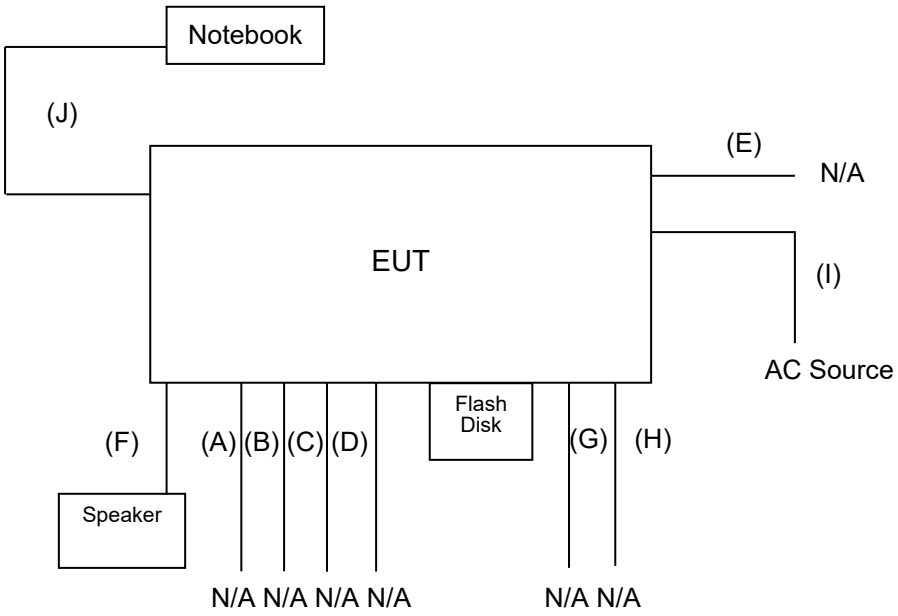
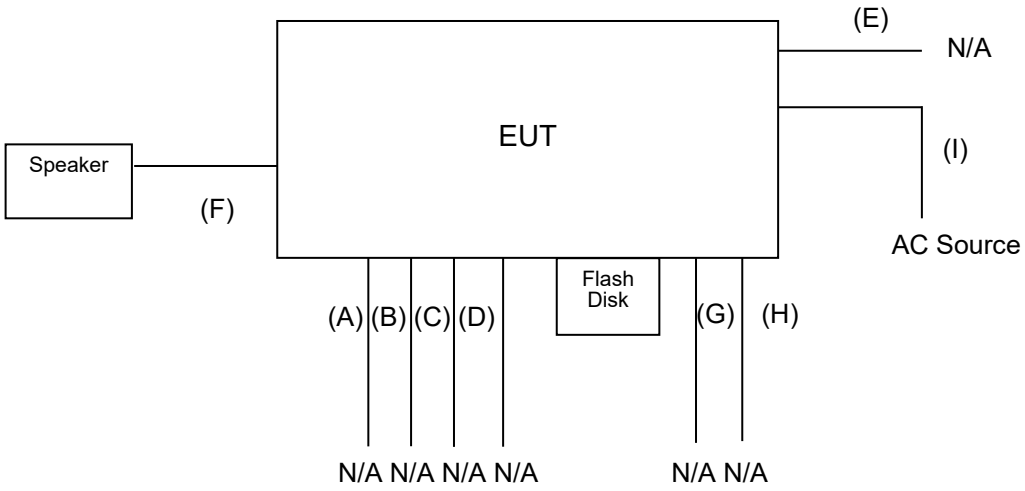
7. SETUP OF EQUIPMENT UNDER TEST

7.1 SETUP CONFIGURATION OF EUT

FOR RF TEST



FOR EMI TEST



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7.2 SUPPORT EQUIPMENT

RF test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Notebook	Acer	AS 3830TG	DOC	DC power, Unshielded, 1.2m, 1 core AC power, Unshielded, 1.4m
2	Speaker System	T.C.SATR	TCS2285	DOC	N/A
3	Flash Disk	Transcend	Jet Flash700	DOC	N/A

No.	Signal cable description	
A	Audio	Unshielded, 1.0m, 3pcs.
B	Audio	Unshielded, 0.2m, 3pcs.
C	Audio	Unshielded, 0.2m, 8pcs.
D	Audio	Unshielded, 0.5m, 2pcs.
E	Audio	Unshielded, 1.4m, 4pcs.
F	Speaker Audio	Unshielded, .1.3m, 1pcs.
G	USB	Shielded, 1.0m, 1pcs with one core.
H	RJ-45	Unshielded, 0.3m, 1pcs.
I	Power	Unshielded, 1.9m, 1pcs.
J	Command	Unshielded, 1.6m, 1pcs.

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EMI test

No.	Product	Manufacturer	Model No.	Certify No.	Signal cable
1	Speaker System	T.C.SATR	TCS2285	DOC	N/A
2	Flash Disk	Transcend	Jet Flash700	DOC	N/A

No.	Signal cable description	
A	Audio	Unshielded, 1.0m, 3pcs.
B	Audio	Unshielded, 0.2m, 3pcs.
C	Audio	Unshielded, 0.2m, 8pcs.
D	Audio	Unshielded, 0.5m, 2pcs.
E	Audio	Unshielded, 1.4m, 4pcs.
F	Speaker Audio	Unshielded, .1.3m, 1pcs.
G	USB	Shielded, 1.0m, 1pcs with one core.
H	RJ-45	Unshielded, 0.3m, 1pcs.
I	Power	Unshielded, 1.9m, 1pcs.

REMARK:

1. All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.
2. Grounding was established in accordance with the manufacturer’s requirements and conditions for the intended use.

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7.3 EUT OPERATING CONDITION

RF Setup

1. Set up a whole system as the setup diagram.
2. The “Tera Term” software was used for testing
3. Key in “root”，”connmanctl enable wifi”.

TX Mode Key in:

B Mode :

wl down
wl mpc 0
wl country ALL
wl band b
wl up
wl 2g_rate -r 01 -b 20
wl channel 01 (01,06,11)
wl phy_watchdog 0
wl scansuppress 1
wl phy_forcecal 1
wl phy_txpwrctrl 1
wl txpwr1 -1
wl pkteng_start 00:90:4c:14:43:19 tx 100 1000 0

G Mode :

wl down
wl mpc 0
wl country ALL
wl band b
wl up
wl 2g_rate -r 06 -b 20
wl channel 01 (01,06,11)
wl phy_watchdog 0
wl scansuppress 1
wl phy_forcecal 1
wl phy_txpwrctrl 1
wl txpwr1 -o -d 11
wl pkteng_start 00:90:4c:14:43:19 tx 100 1000 0

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HT20 Mode :

wl down
wl mpc 0
wl country ALL
wl band b
wl up
wl 2g_rate -h 0 -b 20
wl channel 01 (01,06,11)
wl phy_watchdog 0
wl scansuppress 1
wl phy_forcecal 1
wl phy_txpwrctrl 1
wl txpwr1 -o -d 09
wl pkteng_start 00:90:4c:14:43:19 tx 100 1000 0

RX Mode Key in:

wl down
wl band auto
wl mpc 0
wl country ALL
wl channel 01 (01,06,11)
wl bi 65535
wl up
wl phy_watchdog 0
wl scansuppress 1
wl phy_forcecal 1

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

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Bluetooth:

1. Set up a whole system as the setup diagram.
2. The “Tera Term” software was used for testing.
3. Key in :
   root
   cd /sys/class/bluetooth/hci0
   ls -al
   cd rfkill2/
   echo 1 >state
   echo 0 > /sys/class/rfkill/rfkill1/soft
   bluetoothctl
   power on
4. Press ”Ctrl + z”

   TX Mode Key in:
   hciconfig hci0 up
   hcitool cmd 0x03 0x0003
   hcitool cmd 0x08 0x0034 00(00,14,27) 25 00 02

   RX Mode Key in:
   hciconfig hci0 up
   hcitool cmd 0x03 0x0003
   hcitool cmd 0x08 0x0033 00(00,14,27) 02 00

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

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8. APPLICABLE LIMITS AND TEST RESULTS

8.1 6dB BANDWIDTH

LIMIT

§ 15.247(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

TEST EQUIPMENTS

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)				

TEST SETUP

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TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 1-5 % of the emission bandwidth (EBW).
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is 1-5 %.

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TEST RESULTS

No non-compliance noted.

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/06/29

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	9.05	500	PASS
Middle	2437	9.07	500	PASS
High	2462	9.05	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16.40	500	PASS
Middle	2437	16.38	500	PASS
High	2462	16.39	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	17.64	500	PASS
Middle	2437	17.63	500	PASS
High	2462	17.62	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/07/05

Bluetooth 5.0 (GFSK) mode

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2402	1122	500	PASS
Middle	2442	1118	500	PASS
High	2480	1122	500	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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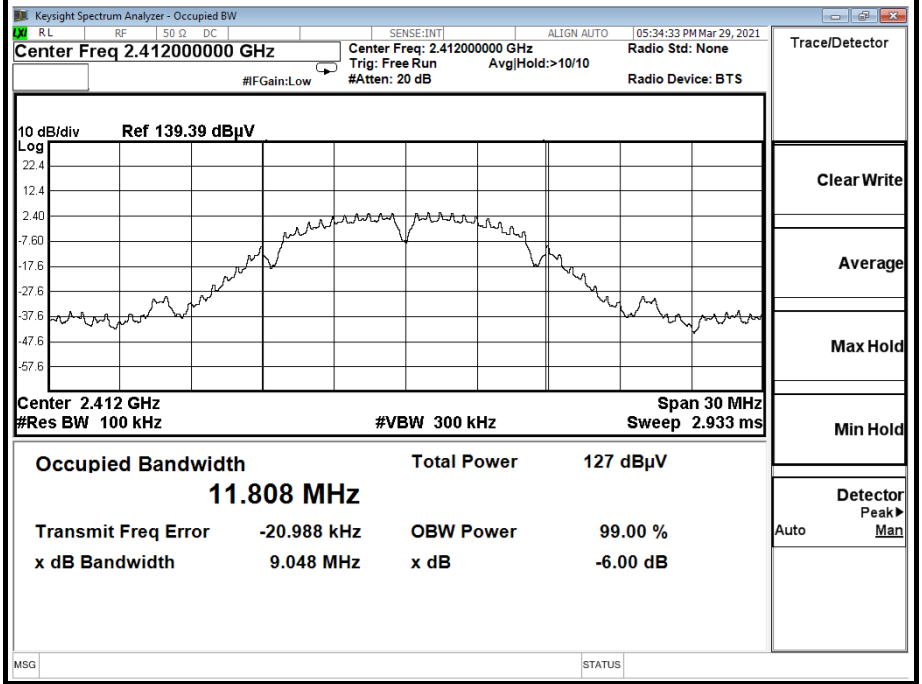
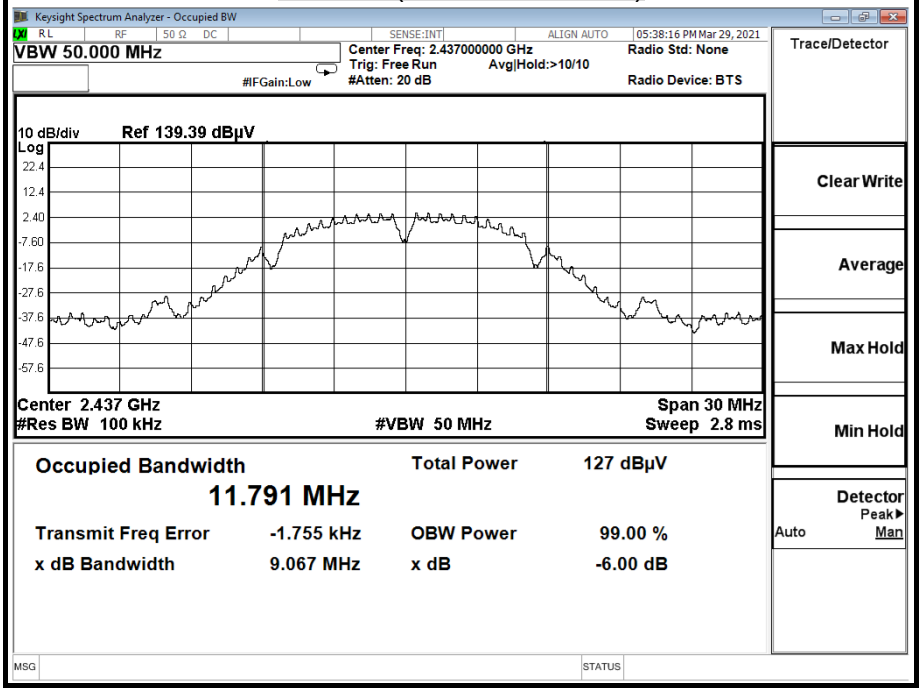
6dB BANDWIDTH (802.11b MODE)

CH Low (802.11b MODE)



CH Mid (802.11b MODE)



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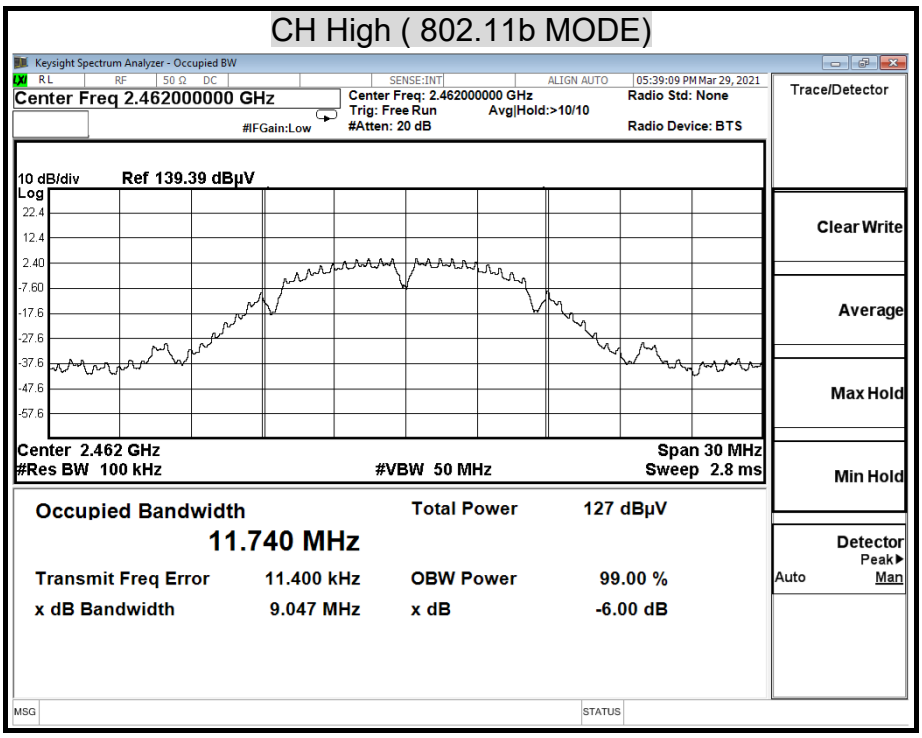
CH High (802.11b MODE)



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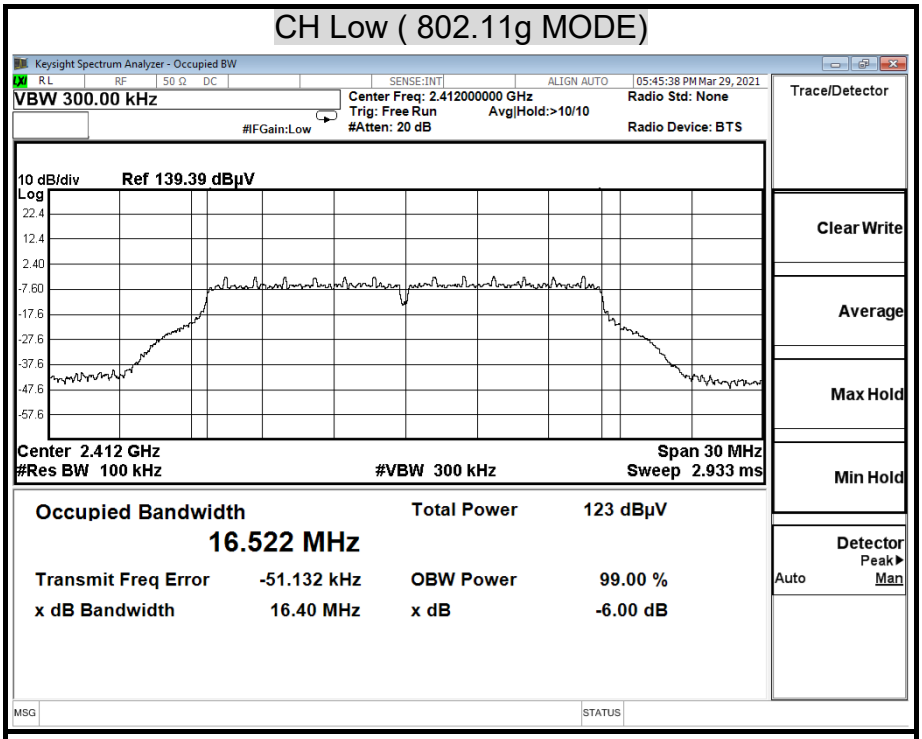
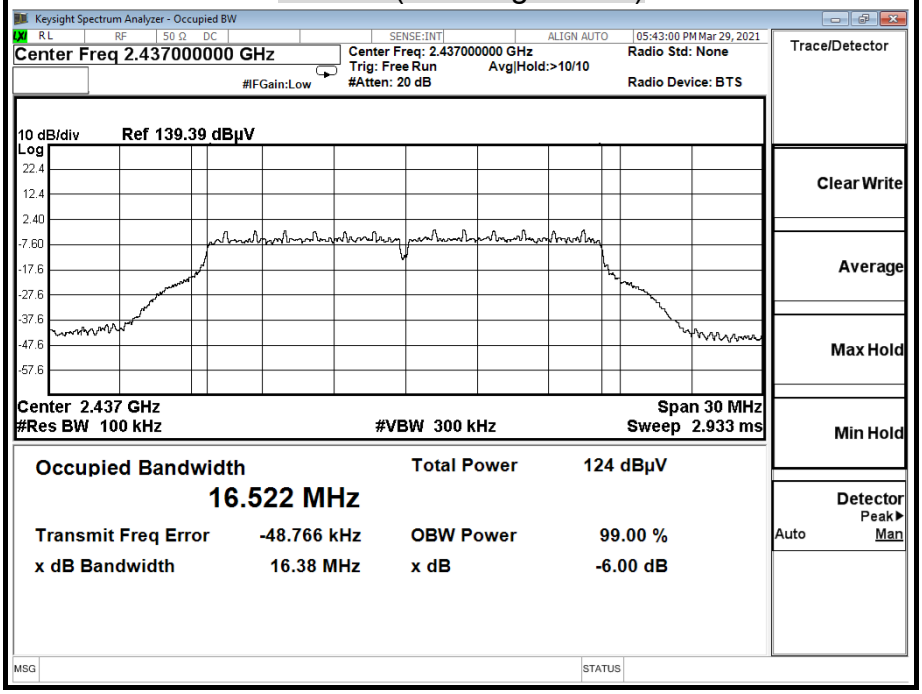
6dB BANDWIDTH (802.11g MODE)

CH Low (802.11g MODE)



CH Mid (802.11g MODE)



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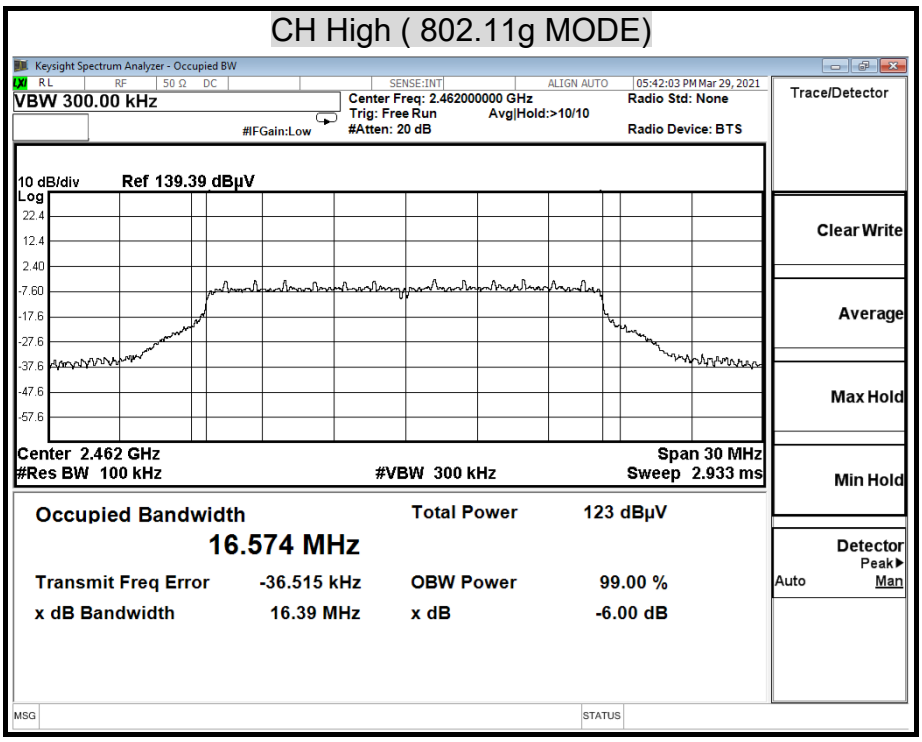
CH High (802.11g MODE)



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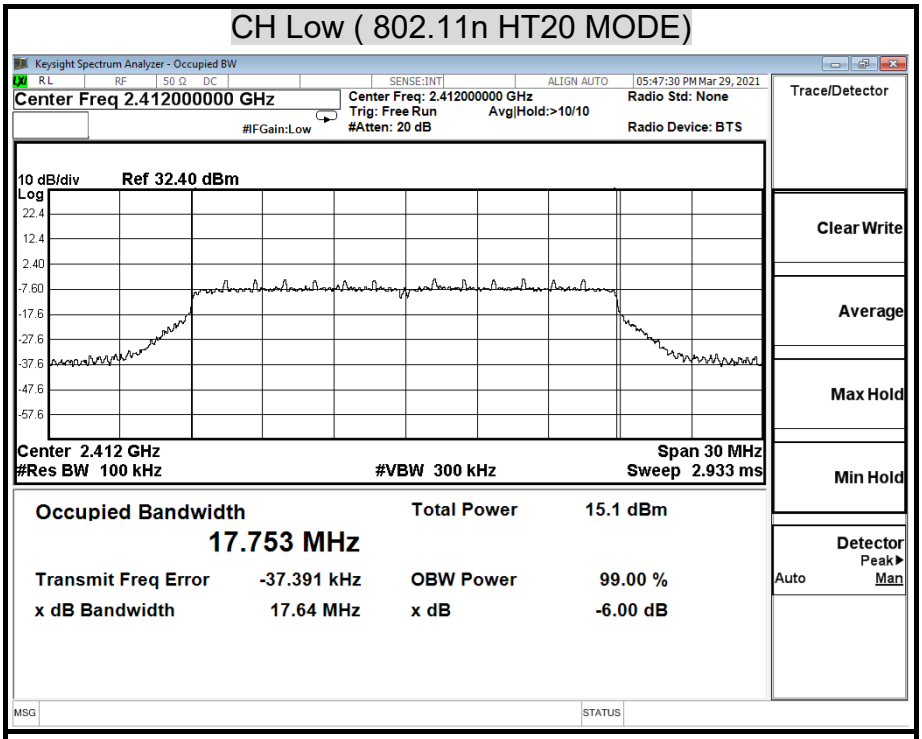
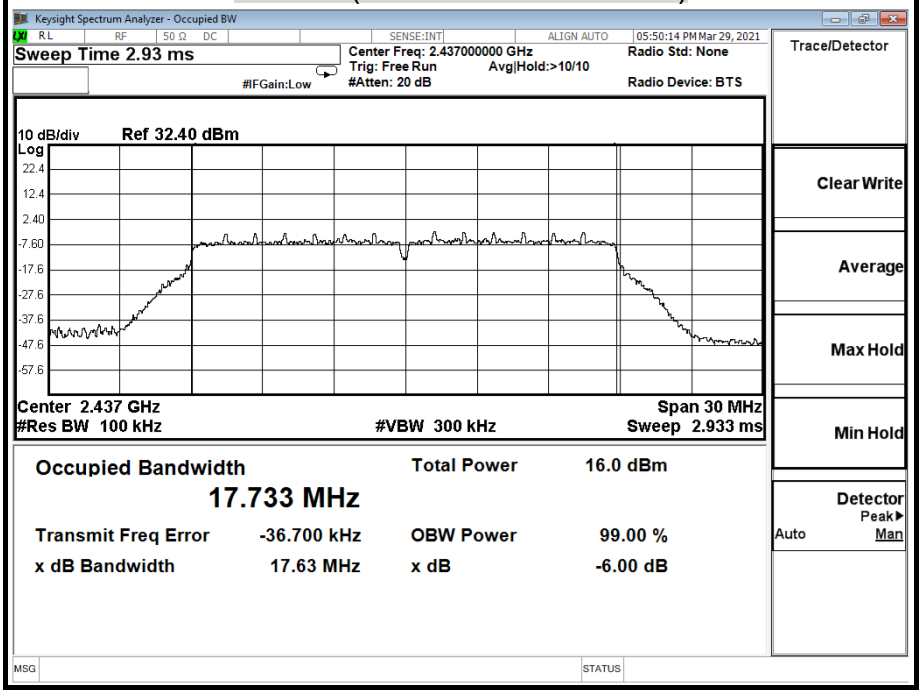
6dB BANDWIDTH (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE)



CH Mid (802.11n HT20 MODE)



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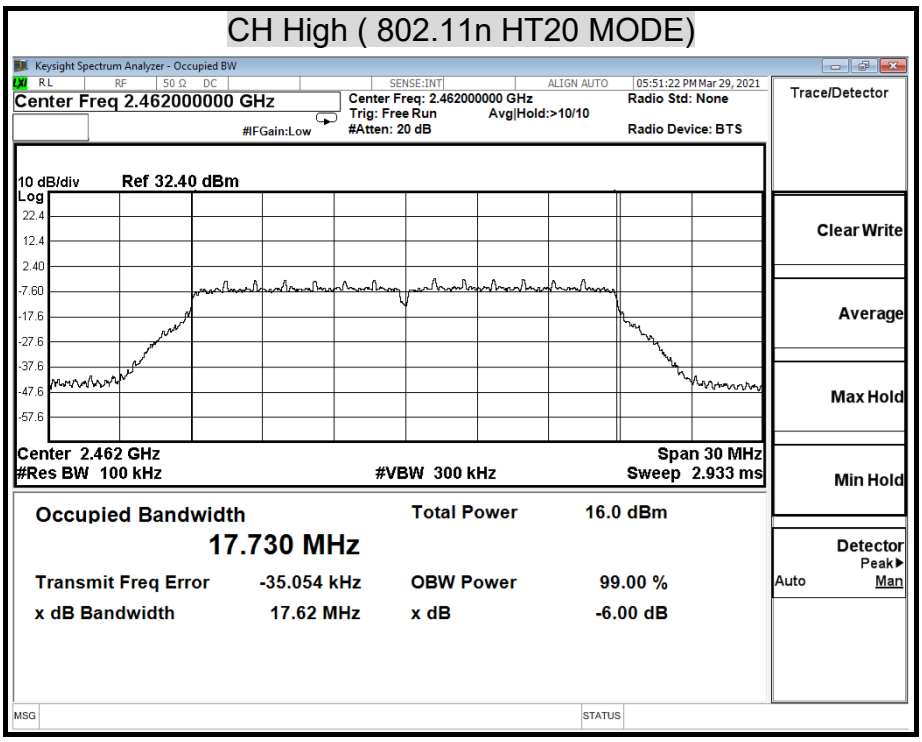
CH High (802.11n HT20 MODE)



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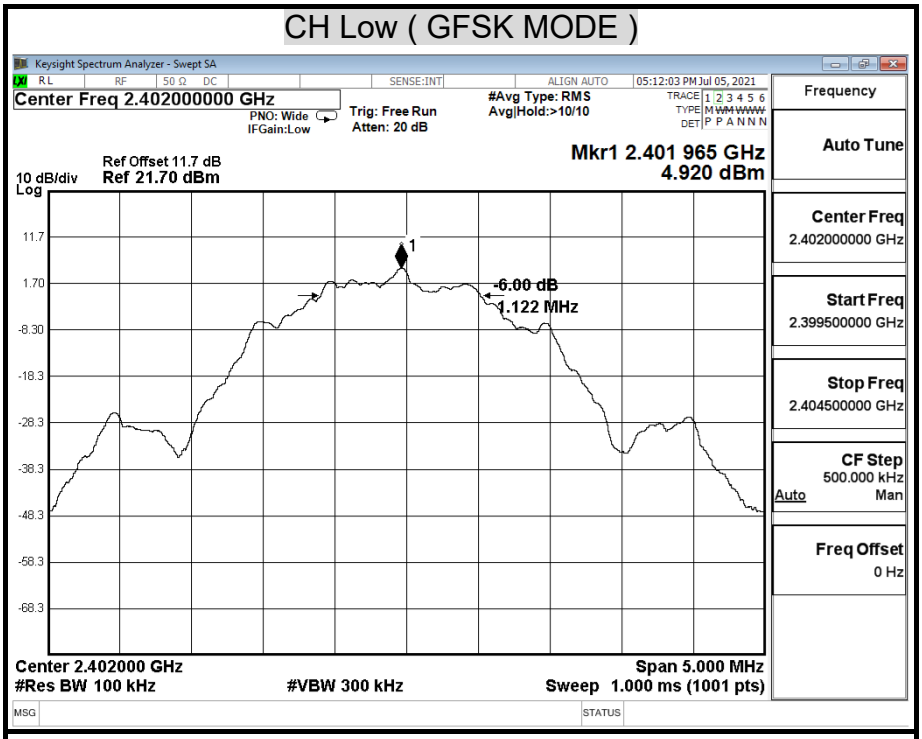
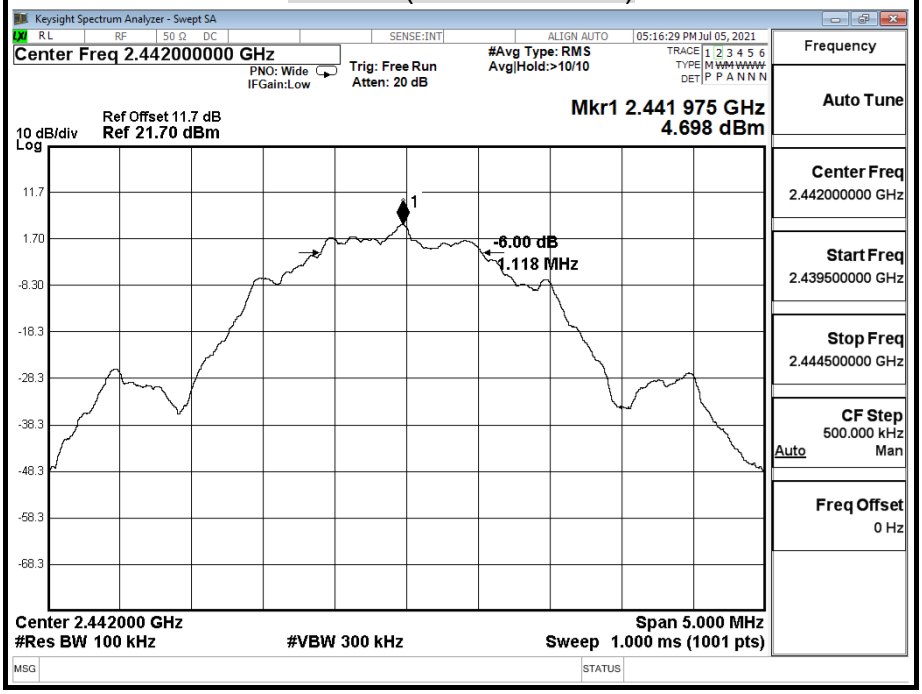
6dB BANDWIDTH (GFSK MODE)

CH Low (GFSK MODE)



CH Mid (GFSK MODE)



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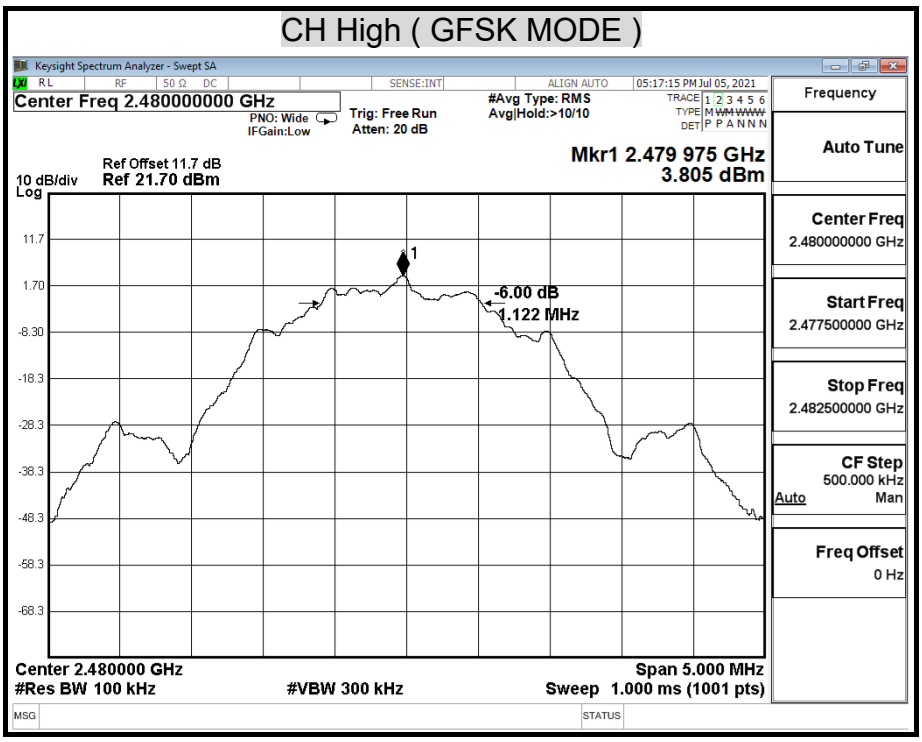
CH High (GFSK MODE)



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8.2 MAXIMUM PEAK OUTPUT POWER

LIMIT

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST EQUIPMENTS

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)				

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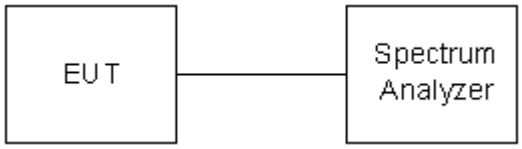
TEST SETUP



TEST PROCEDURE

The tests were performed in accordance with KDB 558074 5.2.1.2 and 5.2.2.1.

5.2.1.2 Measurement Procedure PK2:

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

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TEST RESULTS

No non-compliance noted

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/06/29

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	15.21	30.00	PASS
Middle	2437	15.72	30.00	PASS
High	2462	15.91	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	17.14	30.00	PASS
Middle	2437	17.43	30.00	PASS
High	2462	17.56	30.00	PASS

NOTE : 1.At finial test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	16.49	30.00	PASS
Middle	2437	16.48	30.00	PASS
High	2462	16.41	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/07/05

Bluetooth 5.0 (GFSK) mode

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2402	5.83	30.00	PASS
Middle	2442	5.59	30.00	PASS
High	2480	4.68	30.00	PASS

NOTE : 1. At finial test to get the worst-case emission at 1Mbps.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was entered as an offset in the spectrum analyzer to allow for direct reading of power.

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Average Power Data

IEEE 802.11b mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	12.29
Middle	2437	12.59
High	2462	12.95

IEEE 802.11g mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2412	8.87
Middle	2437	9.22
High	2462	9.32

IEEE 802.11n HT20 mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
		Chain 0
Low	2412	8.21
Middle	2437	8.34
High	2462	8.24

Bluetooth 5.0 (GFSK) mode

Channel	Channel Frequency (MHz)	Average Power (dBm)
Low	2402	5.13
Middle	2442	4.91
High	2480	3.99

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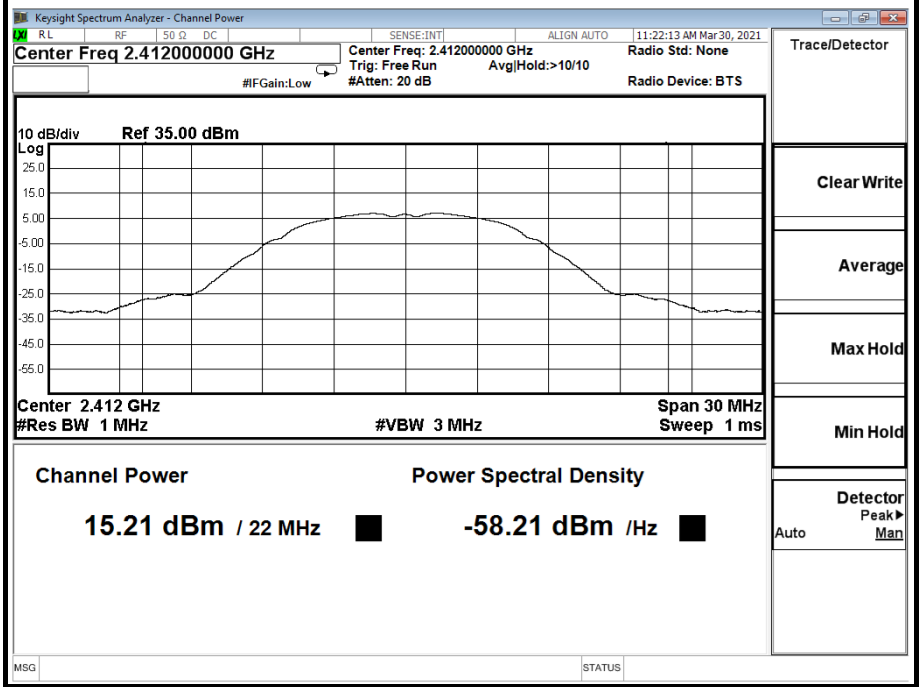
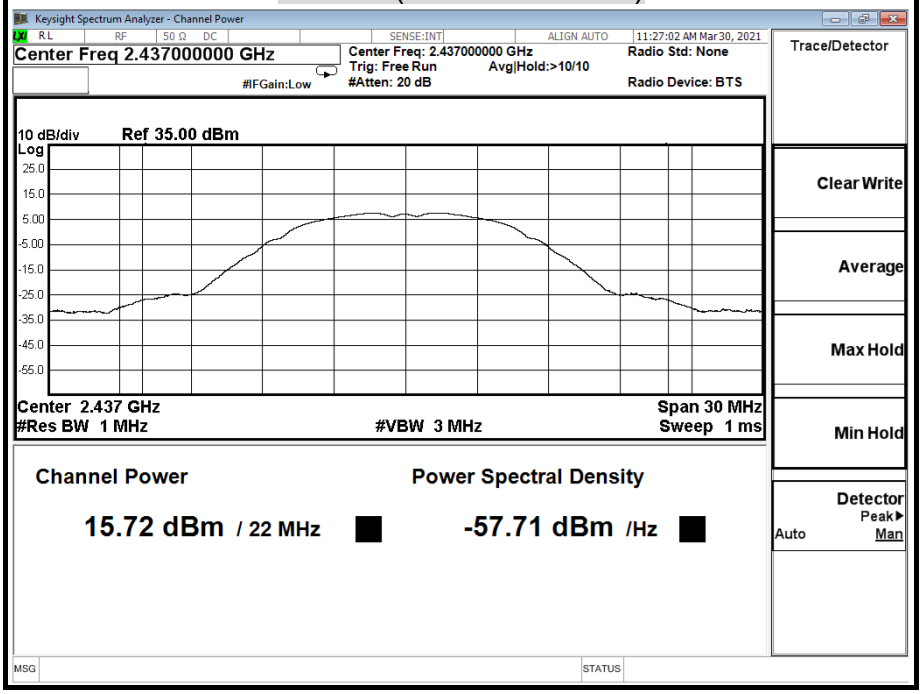
MAXIMUM PEAK OUTPUT POWER (802.11b MODE)

CH Low (802.11b MODE)



CH Mid (802.11b MODE)



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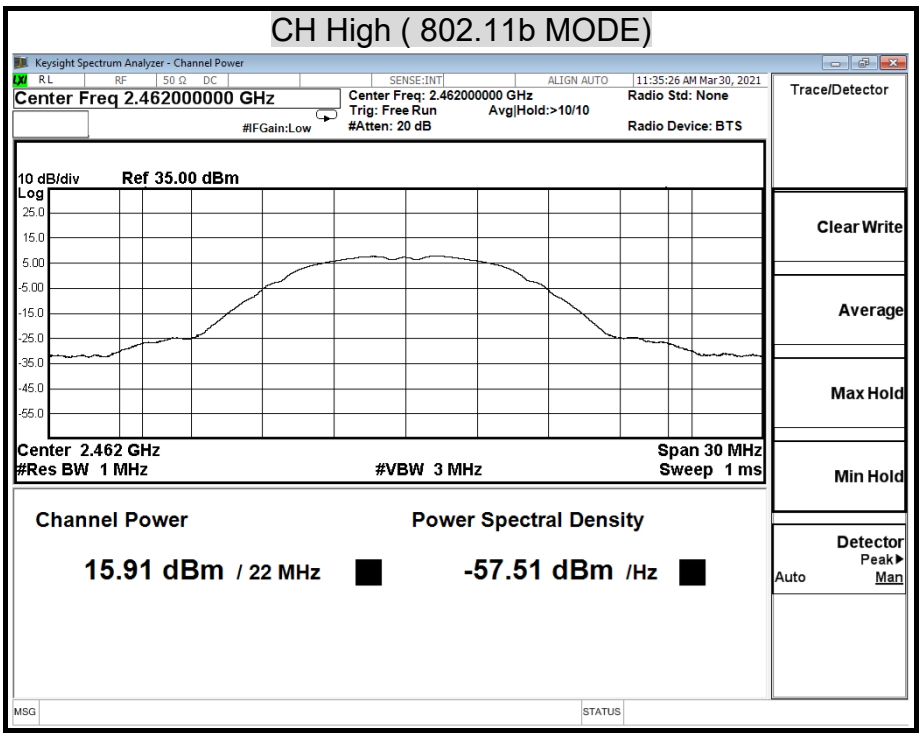
CH High (802.11b MODE)



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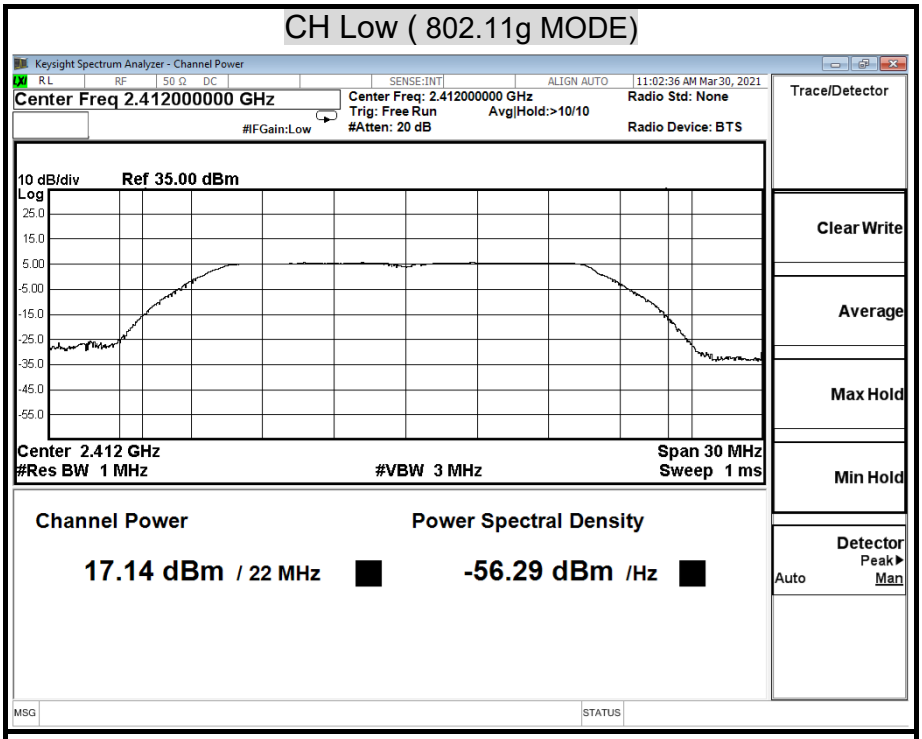
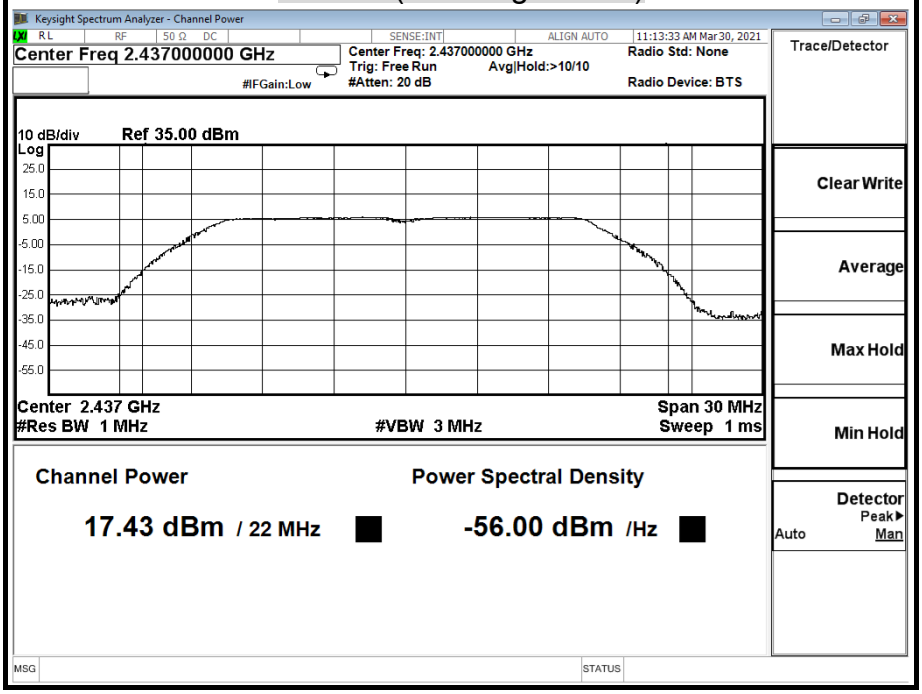
MAXIMUM PEAK OUTPUT POWER (802.11g MODE)

CH Low (802.11g MODE)



CH Mid (802.11g MODE)



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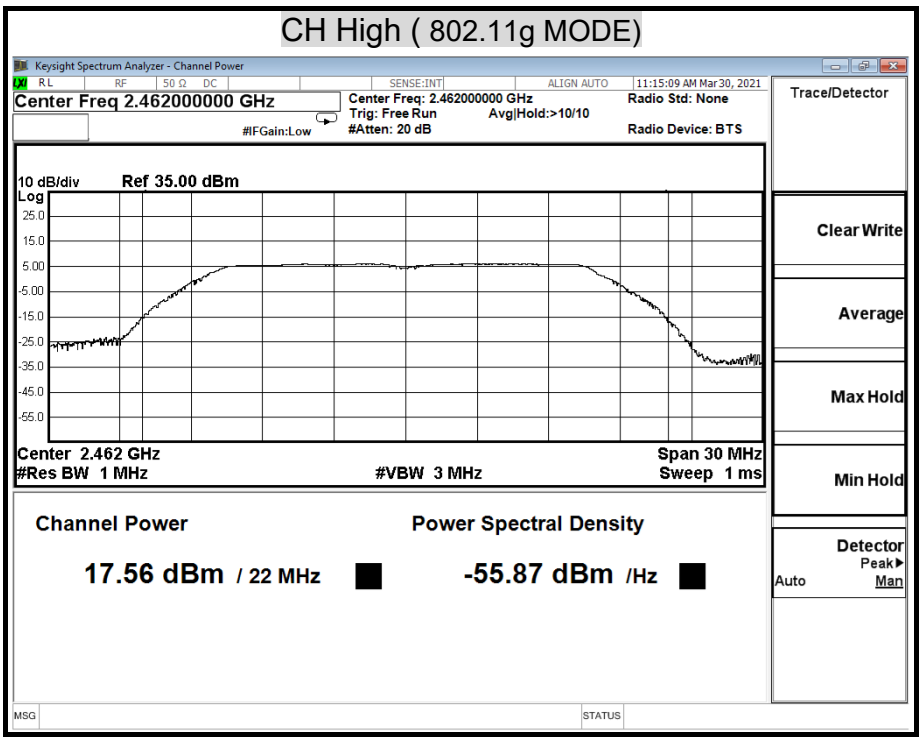
CH High (802.11g MODE)



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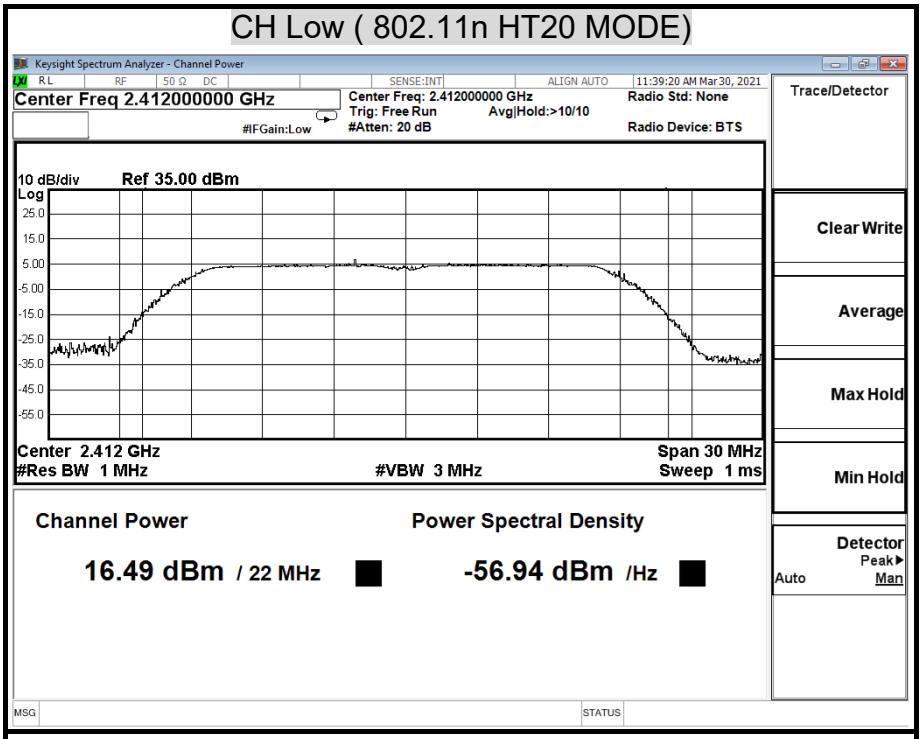
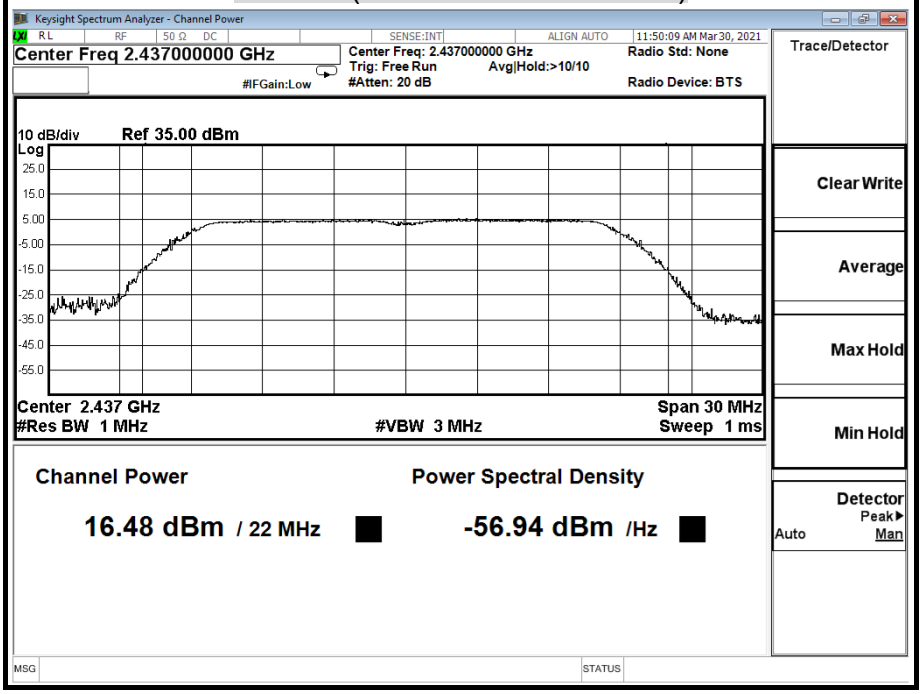
MAXIMUM PEAK OUTPUT POWER (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE)



CH Mid (802.11n HT20 MODE)



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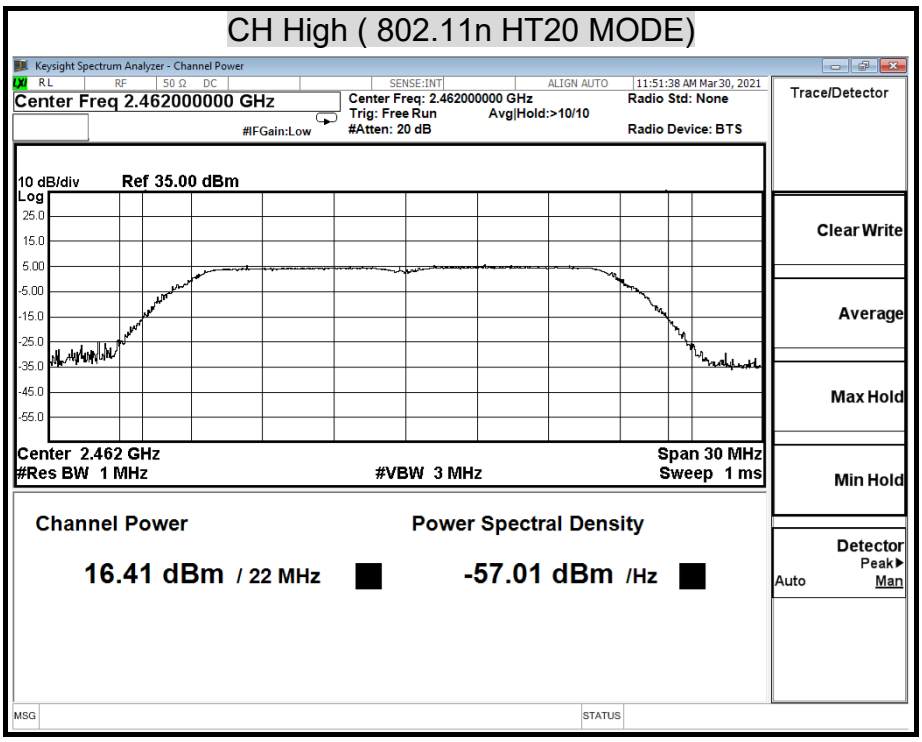
CH High (802.11n HT20 MODE)



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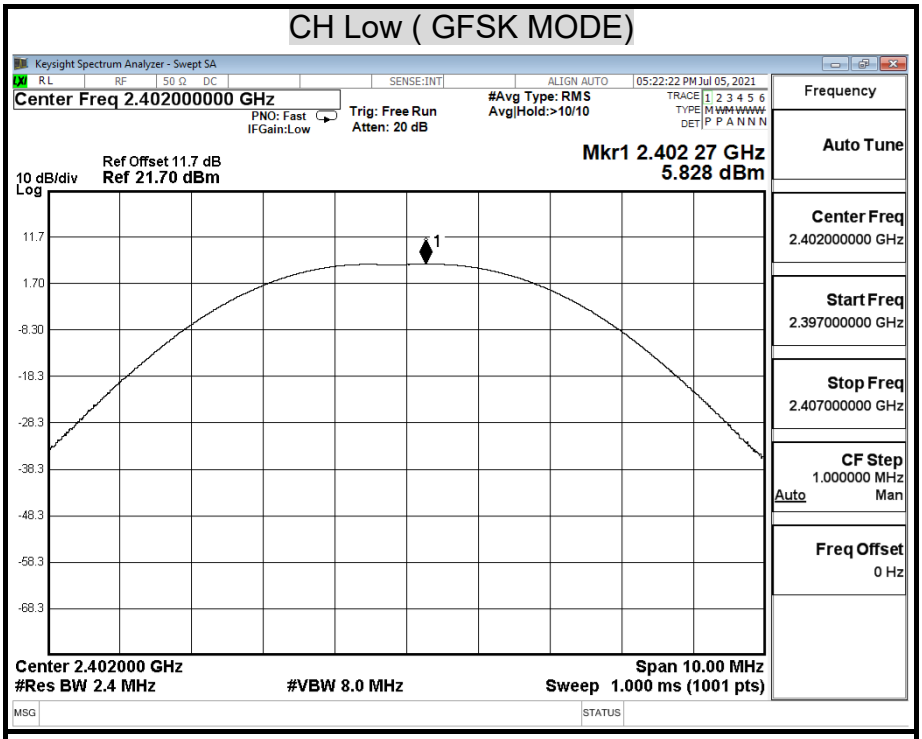
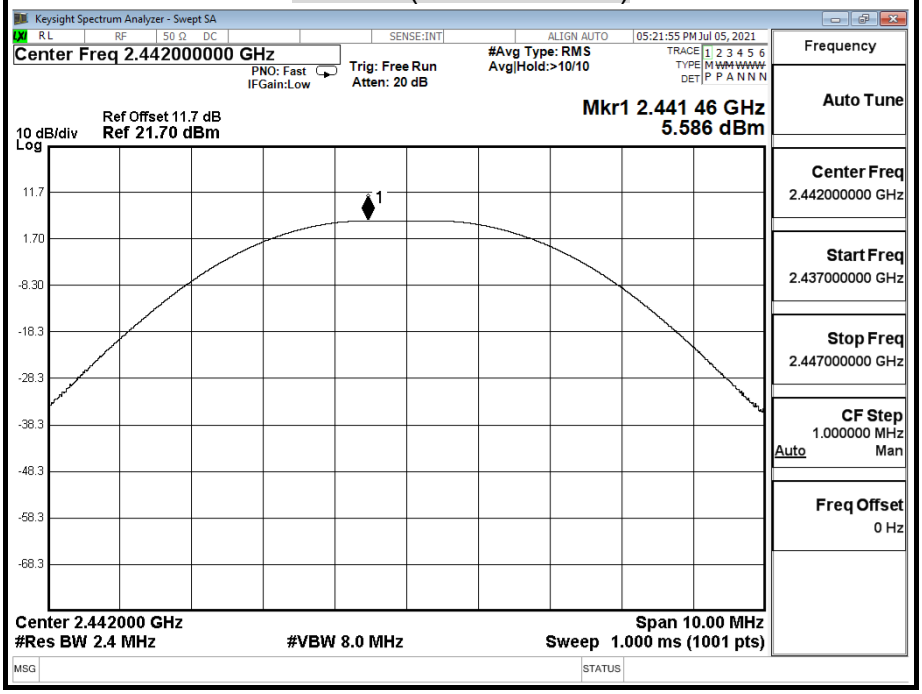
MAXIMUM PEAK OUTPUT POWER (GFSK MODE)

CH Low (GFSK MODE)



CH Mid (GFSK MODE)



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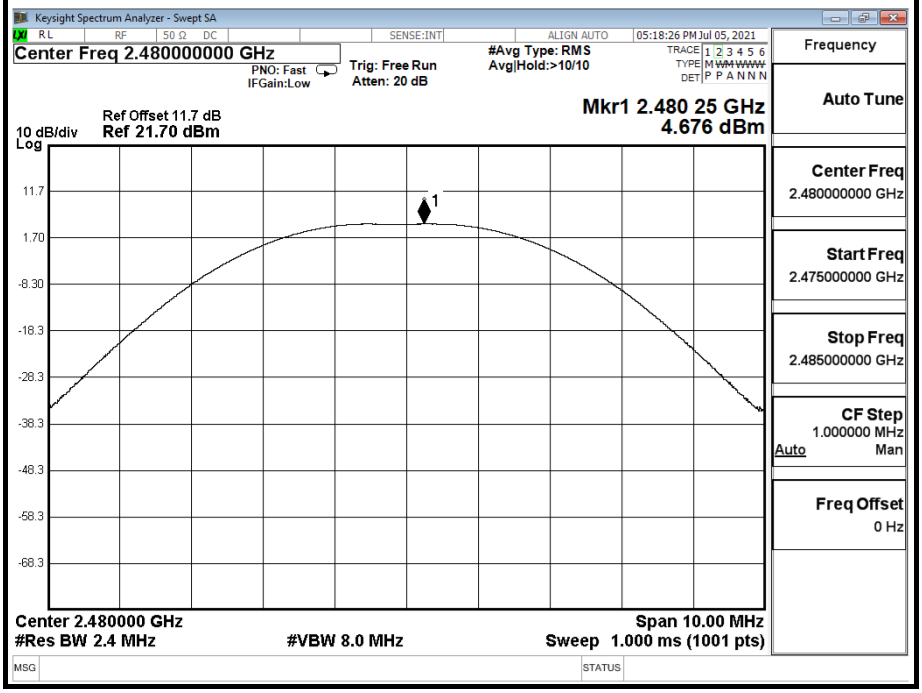
CH High (GFSK MODE)



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8.3 DUTY CYCLE

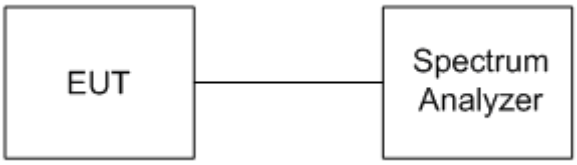
LIMIT

Nil (No dedicated limit specified in the Rules)

TEST EQUIPMENTS

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)				

TEST SETUP



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TEST PROCEDURE

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

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TEST RESULTS

No non-compliance noted.

TEST DATA

WIFI

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/06/29

	us	Times	Ton	Total Ton time(ms)
Ton1	100000.000	1	100000	
Ton2		0	0	
Ton3			0	100
Tp				100

Ton	100
Tp(Ton+Toff)	100
Duty Cycle	1
10 * log (1/x) =	0

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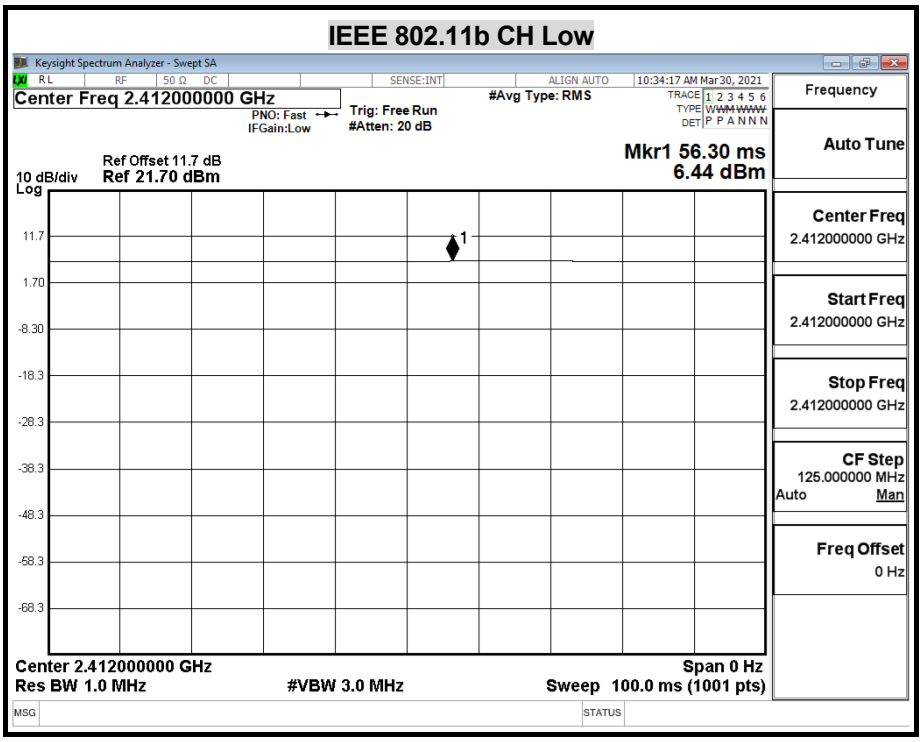
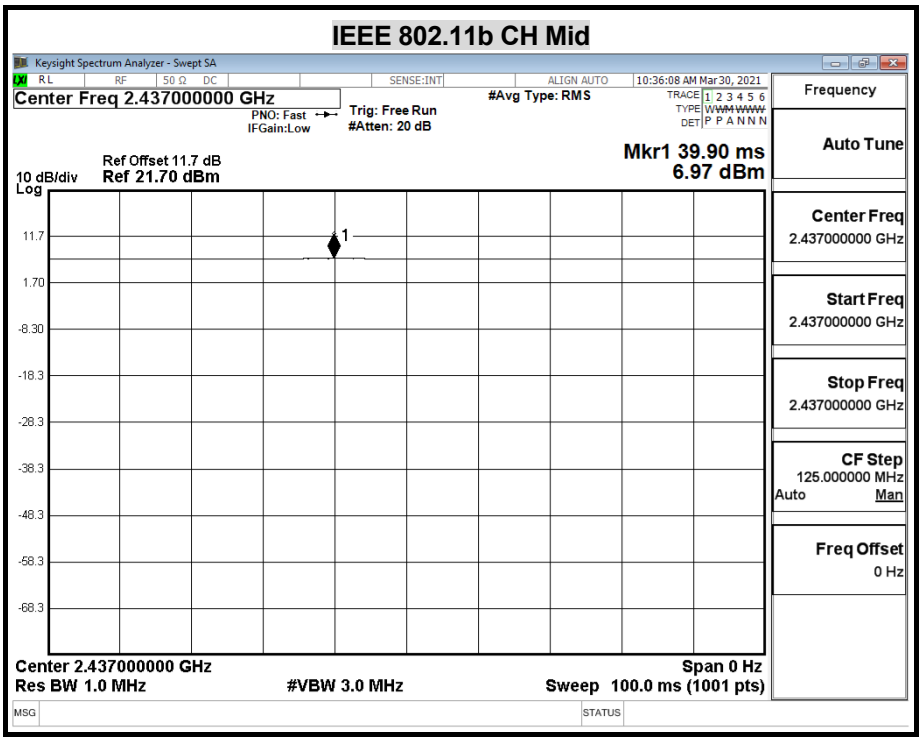
TEST PLOT

Plot





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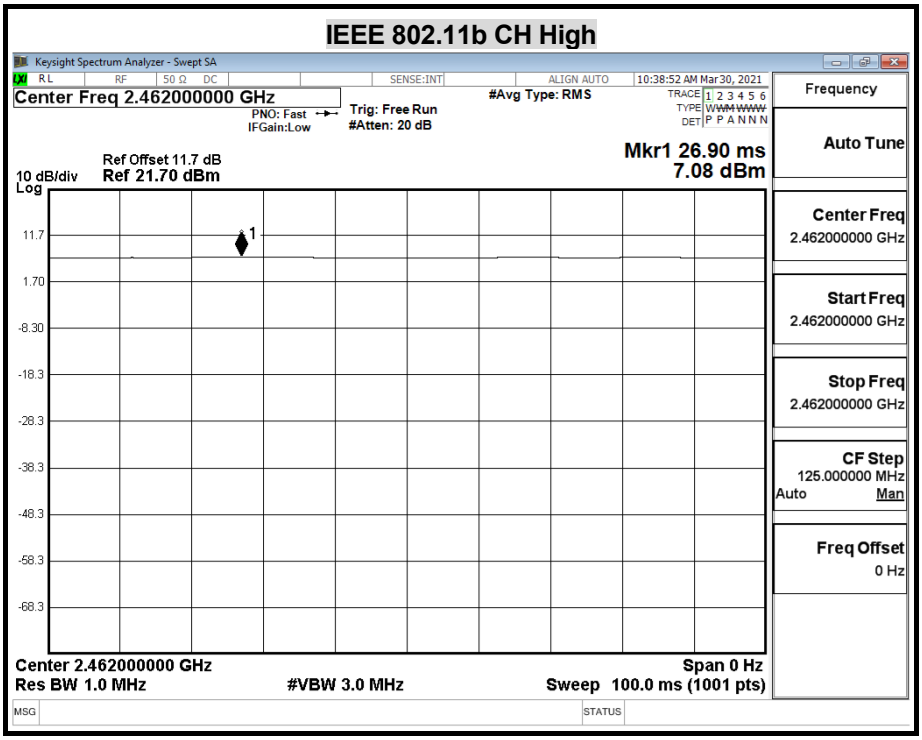

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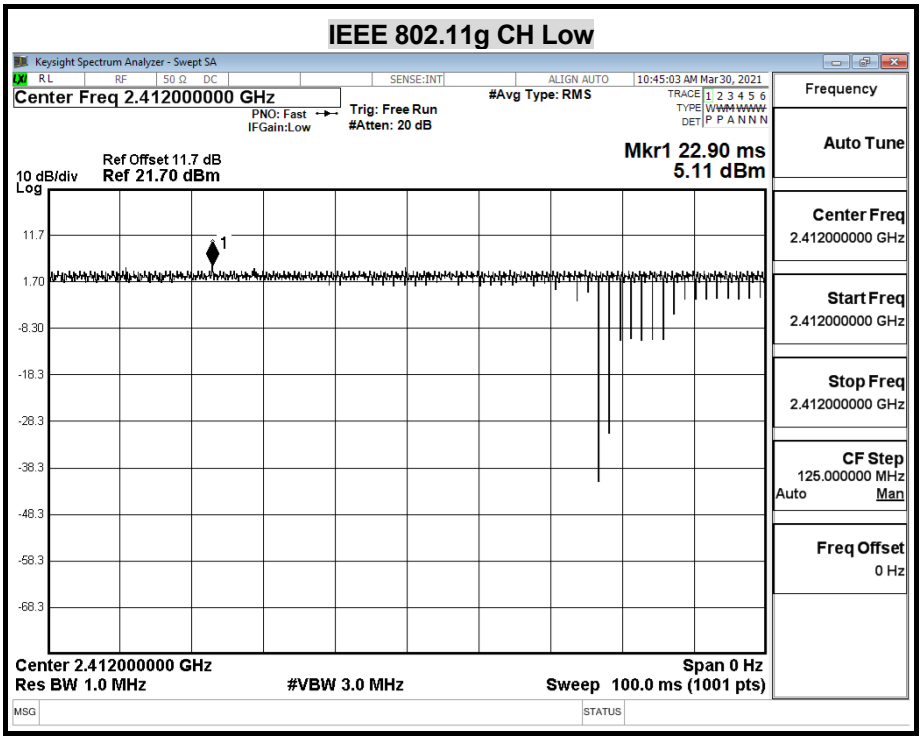
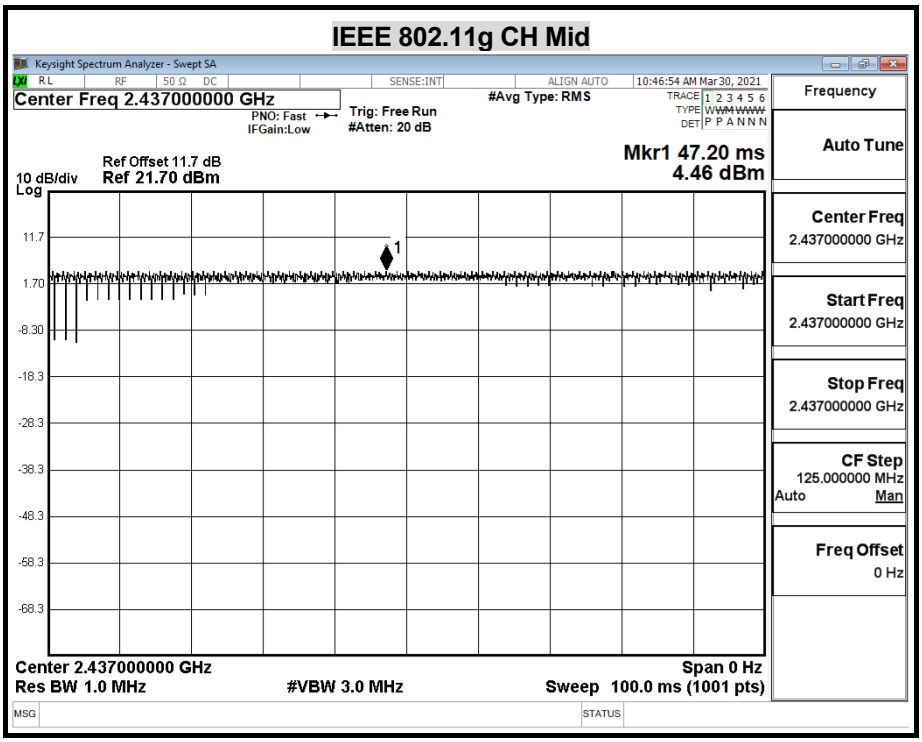
IEEE 802.11g CH Low



IEEE 802.11g CH Mid



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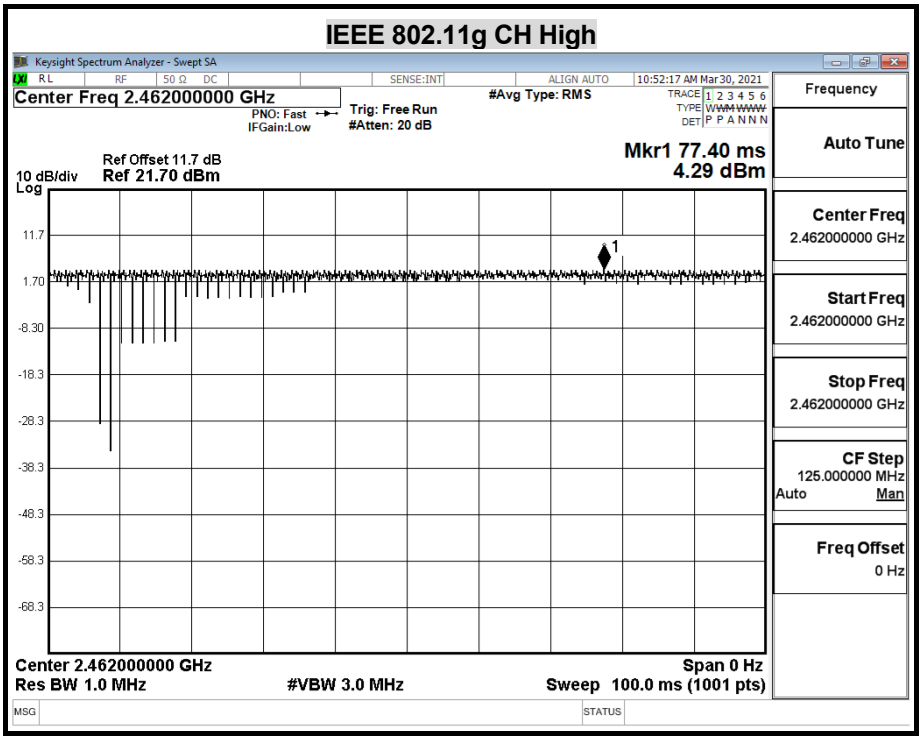

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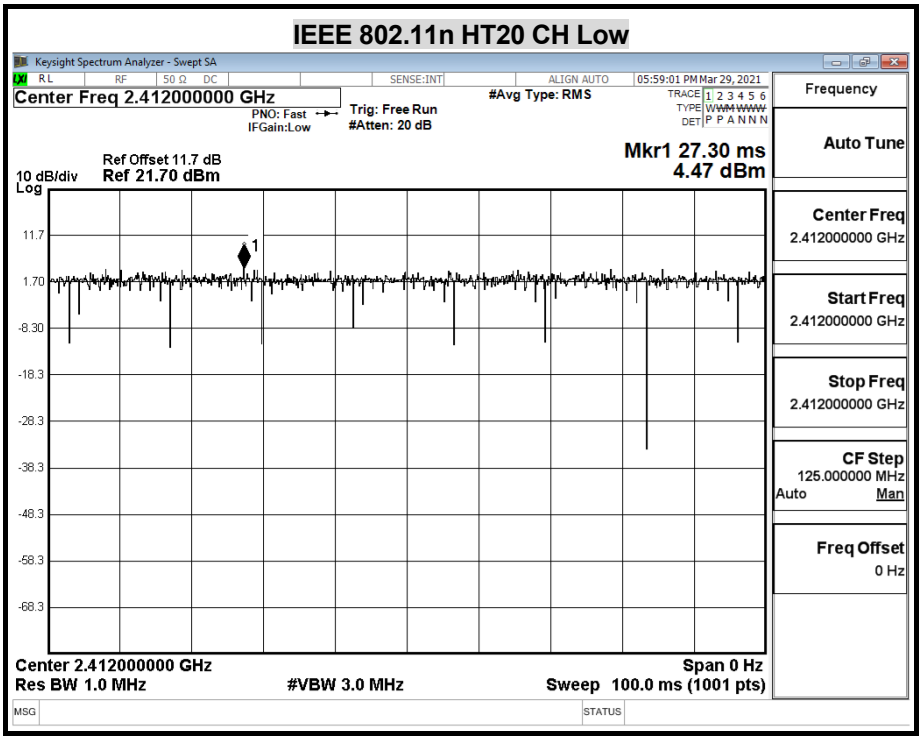
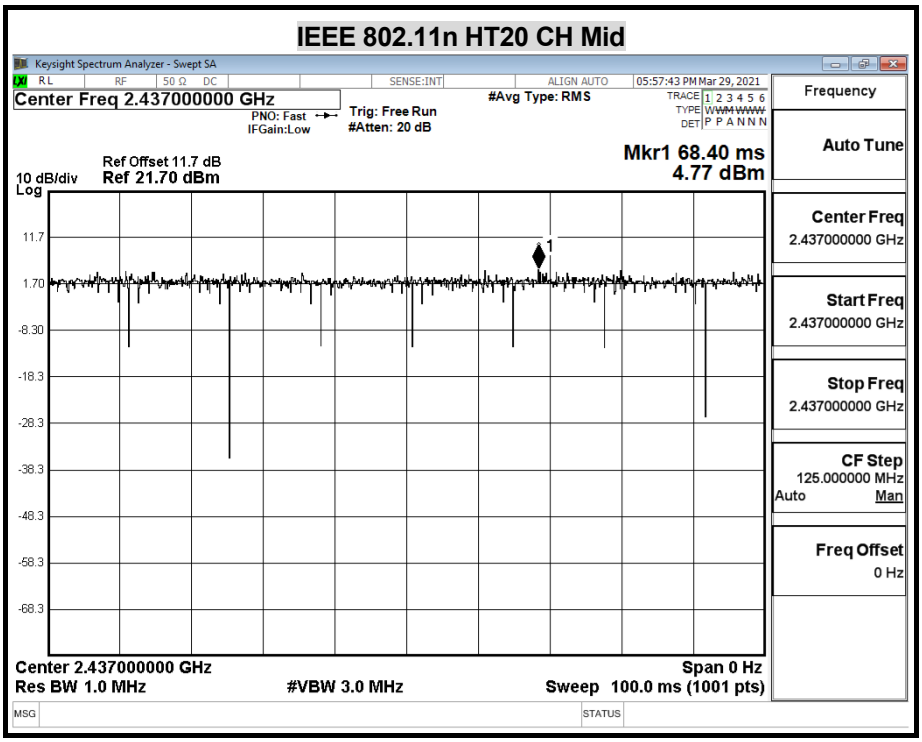
IEEE 802.11n HT20 CH Low



IEEE 802.11n HT20 CH Mid



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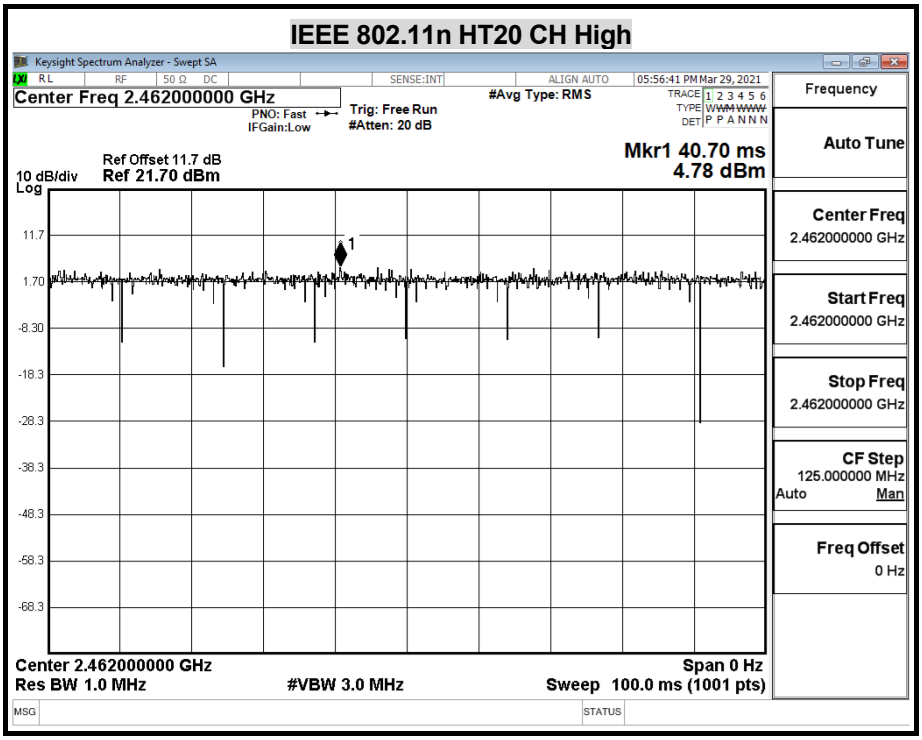

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Bluetooth 5.0:

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/07/05

	us	Times	Ton	Total Ton time(ms)
Ton1	215	1	215	
Ton2			0	
Ton3			0	0.215
Tp				0.625

Ton	0.215
Tp(Ton+Toff)	0.625
Duty Cycle	0.344
10 * log (1/x) =	4.63

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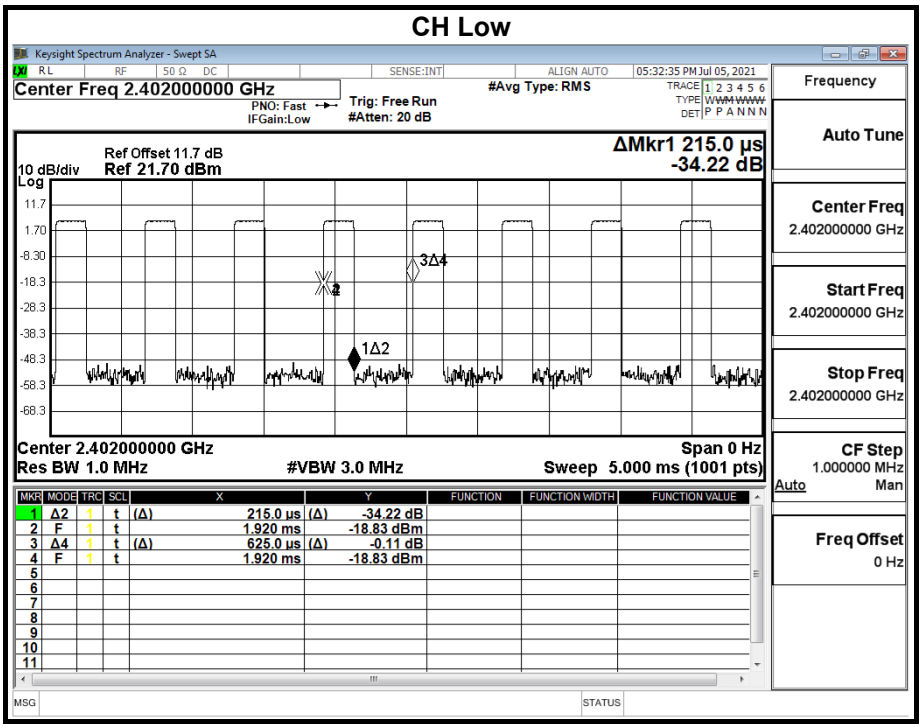
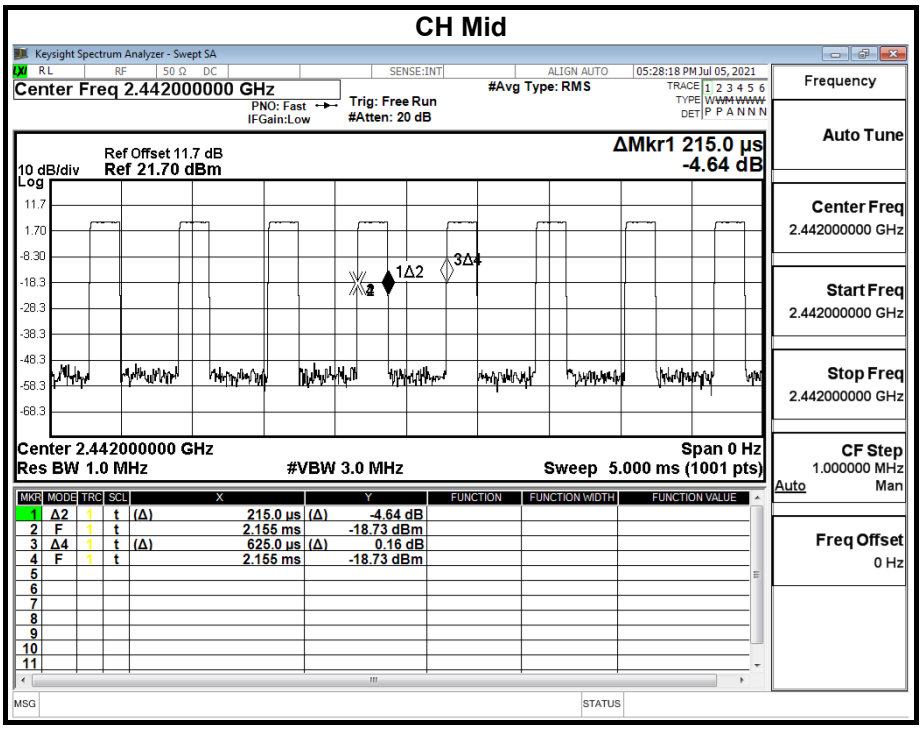
Plot

CH Low



CH Mid



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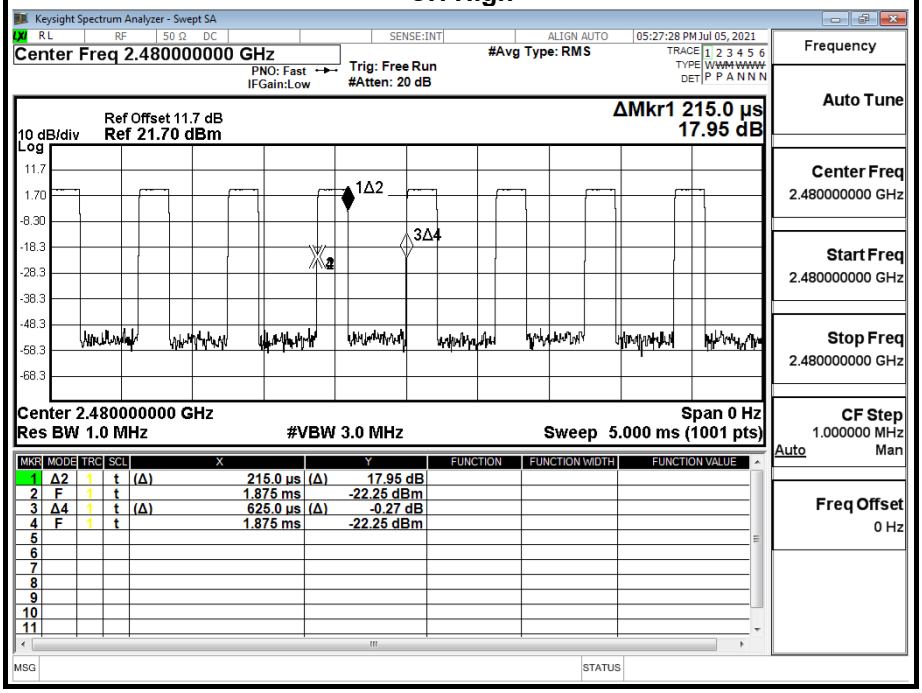
CH High



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8.4 POWER SPECTRAL DENSITY

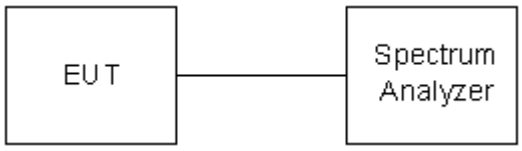
LIMIT

§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST EQUIPMENTS

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)				

TEST SETUP



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TEST PROCEDURE

The tests were performed in accordance with KDB 558074 5.3.1.

5.3.1 Measurement Procedure PKPSD:

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the *DTS bandwidth*.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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TEST RESULTS

Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/06/29

IEEE 802.11b mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-10.08	8.00	-18.08	PASS
Middle	2437	-9.47	8.00	-17.47	PASS
High	2462	-8.99	8.00	-16.99	PASS

NOTE : 1. At finial test to get the worst-case emission at 1long Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-16.11	8.00	-24.11	PASS
Middle	2437	-15.73	8.00	-23.73	PASS
High	2462	-15.80	8.00	-23.80	PASS

NOTE : 1. At finial test to get the worst-case emission at 6long Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

IEEE 802.11n HT20 mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2412	-16.35	8.00	-24.35	PASS
Middle	2437	-16.97	8.00	-24.97	PASS
High	2462	-16.08	8.00	-24.08	PASS

NOTE : 1. At finial test to get the worst-case emission at 6.5long Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

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Model Name	MPC Key 61	Test By	Ted Huang
Temp & Humidity	25.5℃, 46%	Test Date	2021/07/05

Bluetooth 5.0 (GFSK) mode

Channel	Frequency (MHz)	PPSD/3kHz (dBm)	Limit (dBm)	Margin (dB)	Pass / Fail
Low	2402	-11.24	8.00	-19.24	PASS
Middle	2442	-11.41	8.00	-19.41	PASS
High	2480	-12.28	8.00	-20.28	PASS

NOTE : 1. At finial test to get the worst-case emission at 1long Mbps long.
2. The cable assembly insertion loss of 11.1dB (including 10 dB pad and 1.1 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

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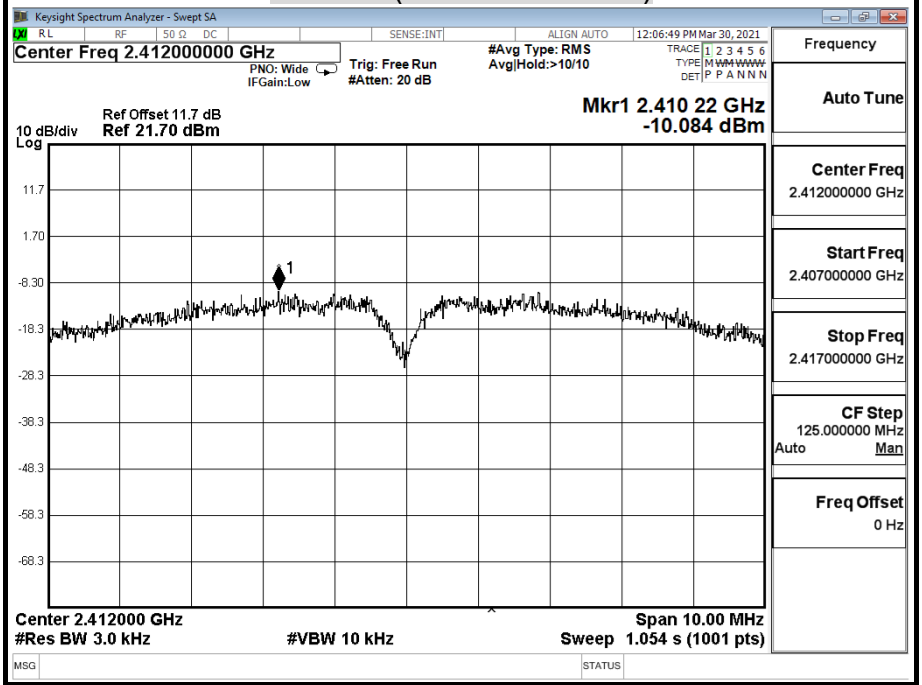
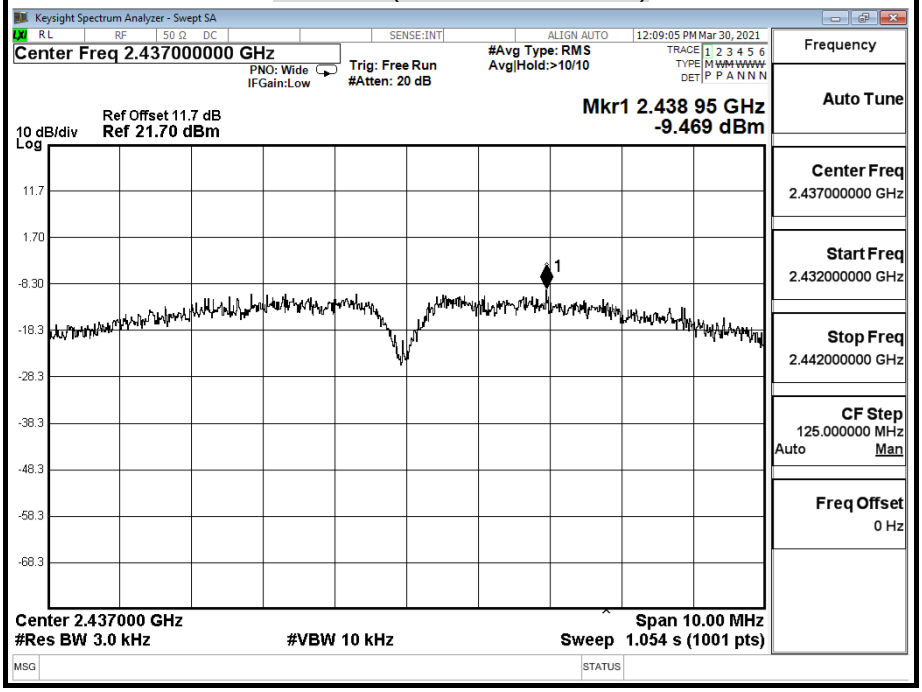
POWER SPECTRAL DENSITY (IEEE 802.11b MODE)

CH Low (802.11b MODE)



CH Mid (802.11b MODE)



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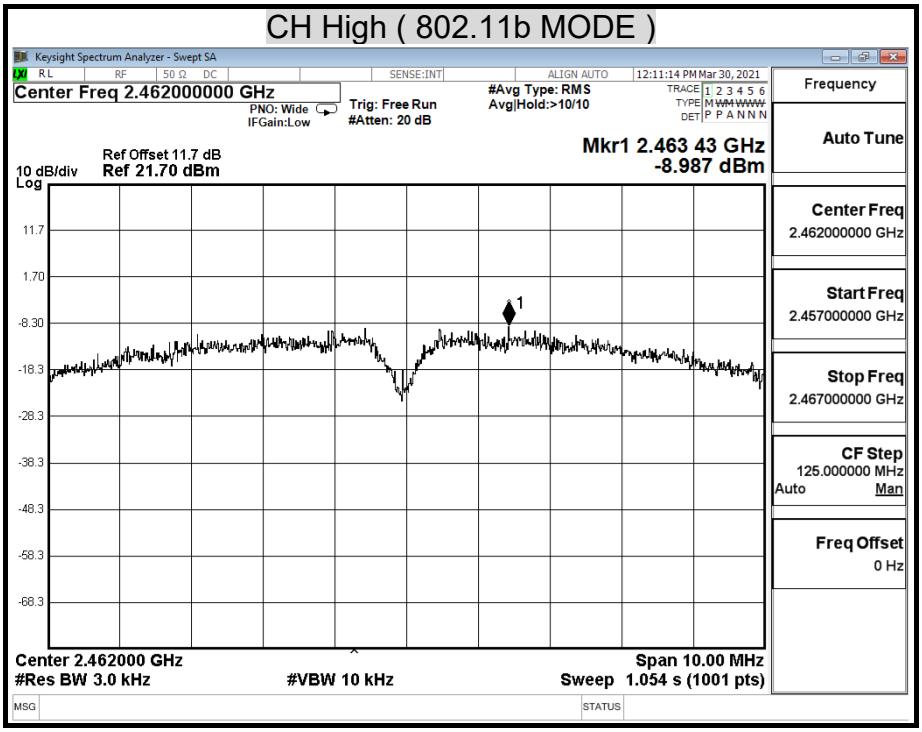
CH High (802.11b MODE)



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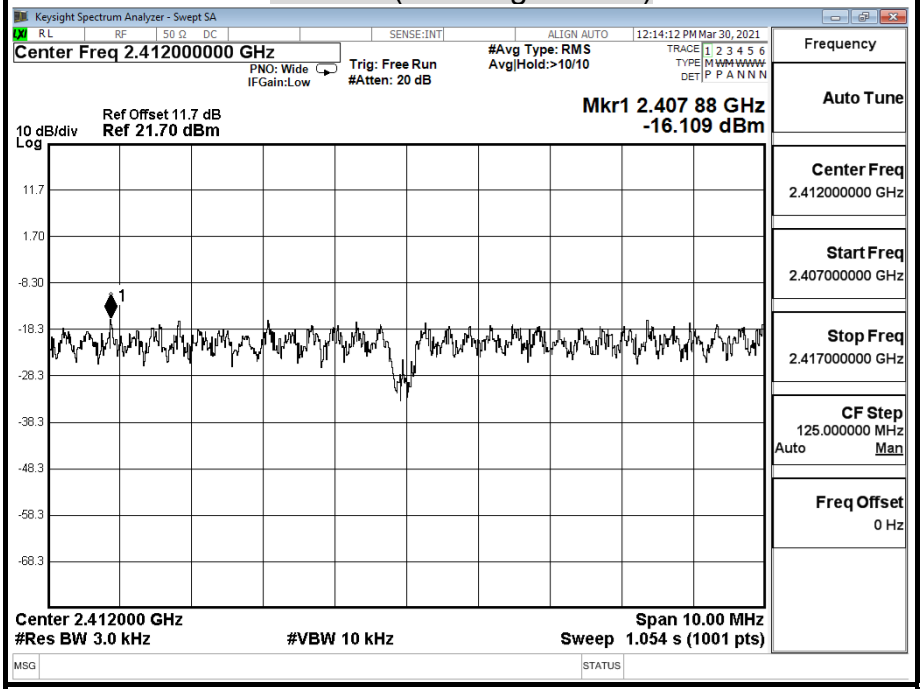
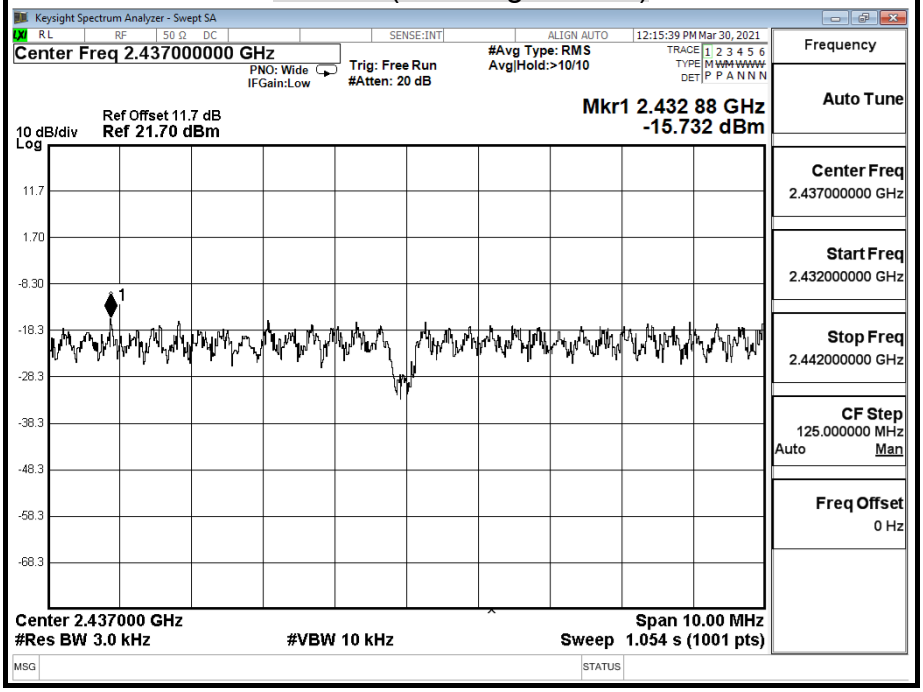
POWER SPECTRAL DENSITY (IEEE 802.11g MODE)

CH Low (802.11g MODE)



CH Mid (802.11g MODE)



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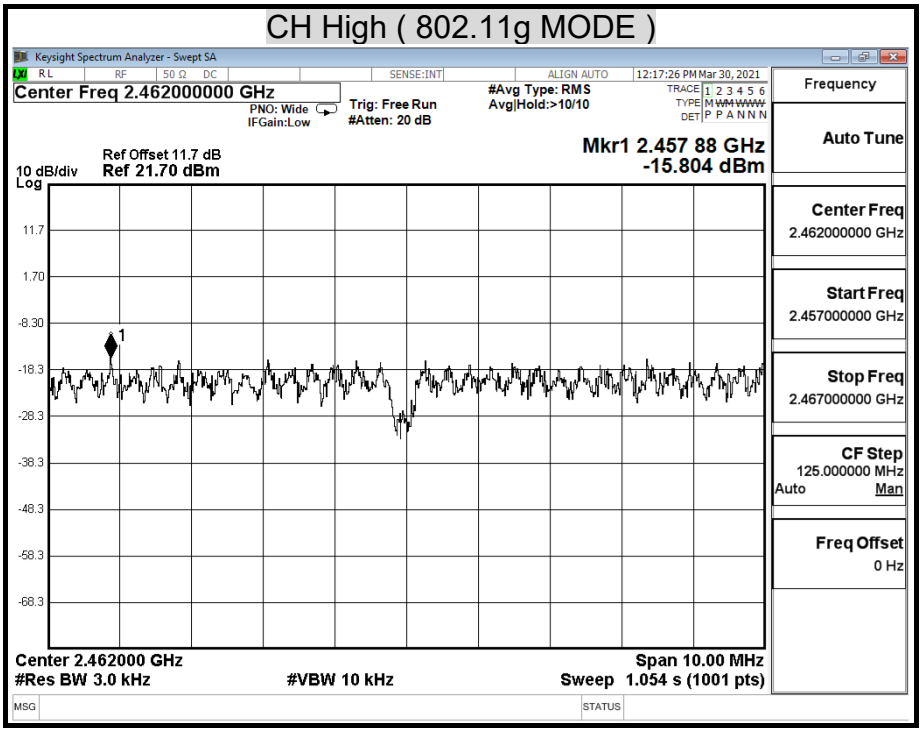
CH High (802.11g MODE)



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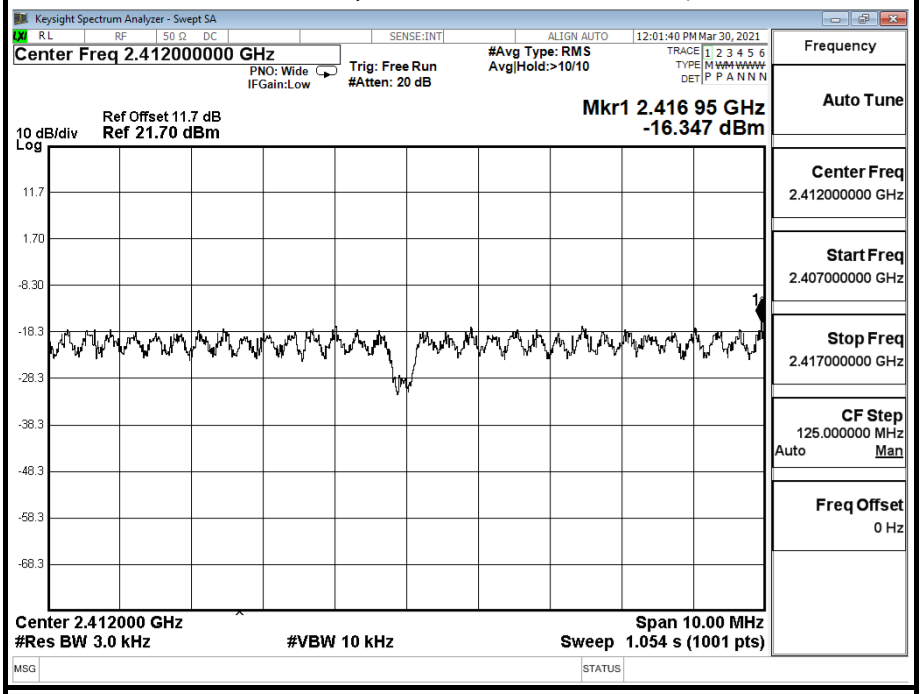
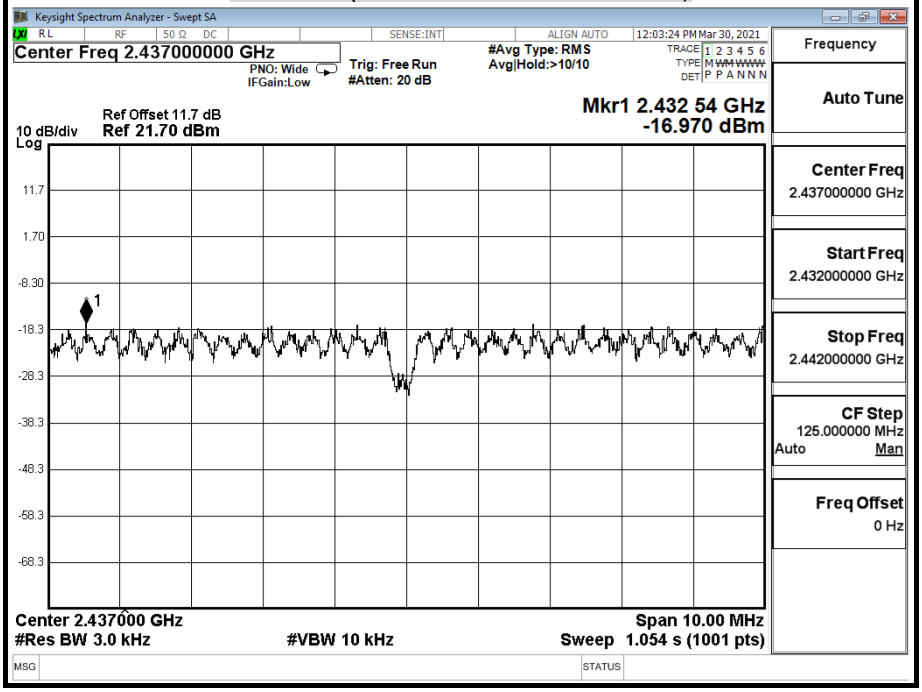
POWER SPECTRAL DENSITY (802.11n HT20 MODE)

CH Low (802.11n HT20 MODE)



CH Mid (802.11n HT20 MODE)



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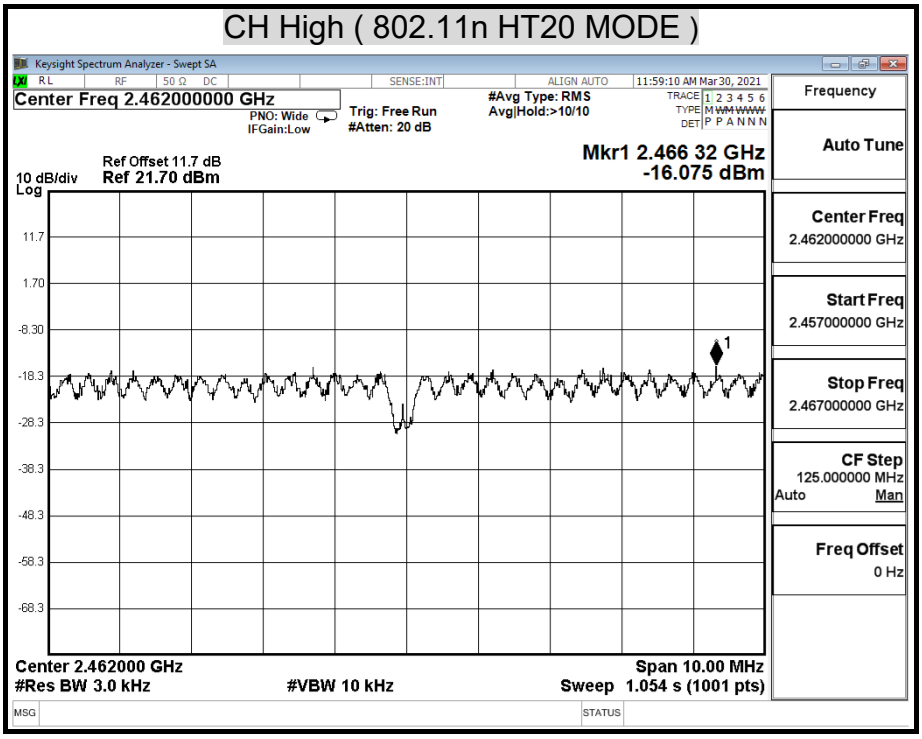
CH High (802.11n HT20 MODE)



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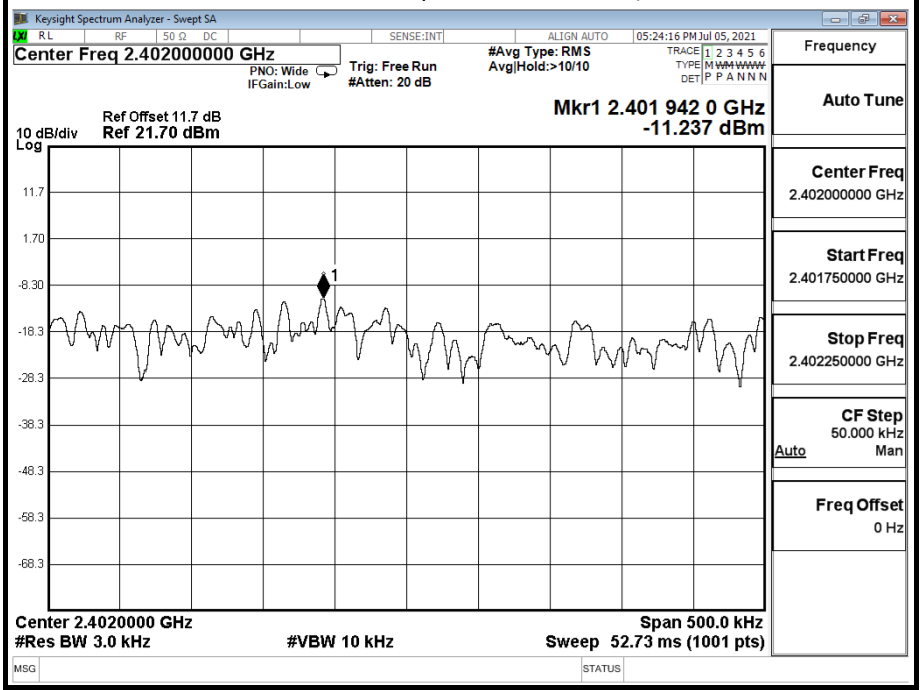
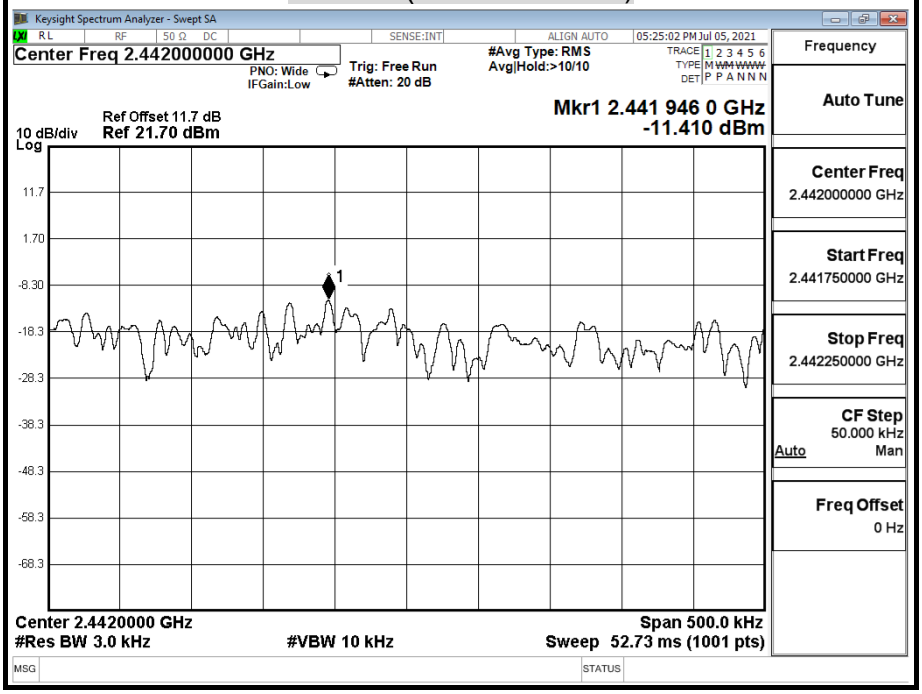
POWER SPECTRAL DENSITY (Bluetooth 5.0 (GFSK) MODE)

CH Low (GFSK MODE)



CH Mid (GFSK MODE)



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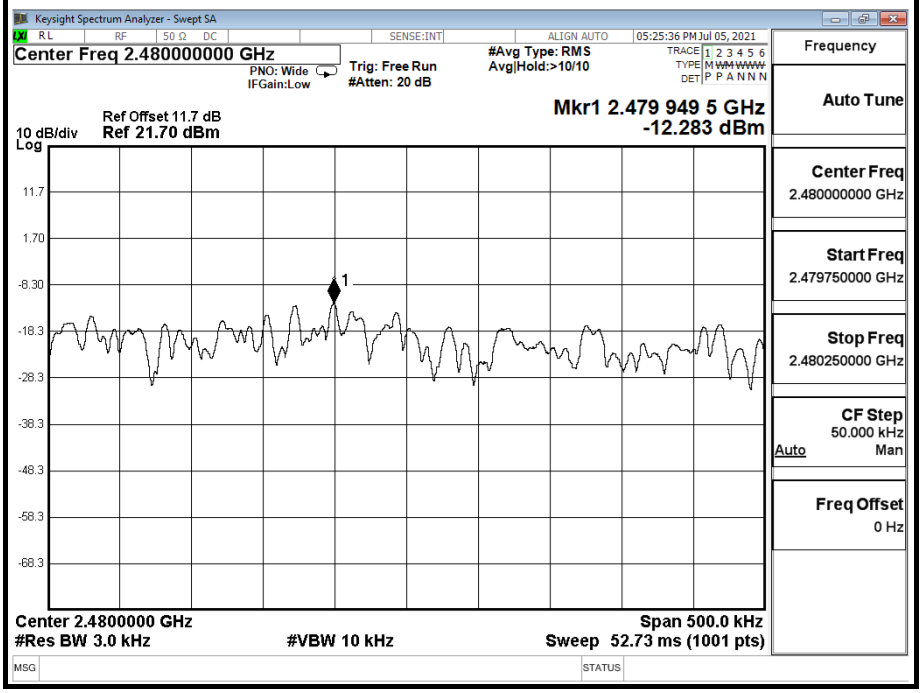
CH High (GFSK MODE)



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