FCC Test Report

Report No: WD-RF-R-190342-D0

Product Name	:	Time Clock
Model Name	:	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
Series Model Name	:	NT8000Y-YY(Y can be 0~9 or a~z or A~Z or blank)
FCC ID	:	2ASPANOVATIME-OEM
Applicant	:	NOVAtime Technology, Inc.
Received Date	:	Feb. 18, 2019
Tested Date	:	May. 09, 2019 ~ Jun. 26, 2019
Applicable Standard	:	47 CFR FCC Part 15, Subpart E (Section 15.407) 789033 D02 General U-NII Test Procedures New Rules v02r01 ANSI C63.10 : 2013

Wendell Industrial Co., Ltd
Wendell Electrical Testing Lab.

Test Report

Issued Date: June 26, 2019
Project No.: 19Q021808

Product Name	Time Clock
Trade Name	NOVAtime Technology, Inc.
Model Name	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
Series Model Name	NT8000Y-YY(Y can be 0~9 or a~z or A~Z or blank)
FCC ID	2ASPANOVATIME-OEM
Applicant	NOVAtime Technology, Inc.
Manufacturer	unitech electronics co., ltd.
EUT Rated Voltage	AC 100 ~ 240V / 50 or 60Hz、PoE
EUT Test Voltage	AC 120V / 60Hz
EUT Supports Radios Application	WLAN 802.11a/b/g、WLAN 802.11n (HT20/HT40) Bluetooth BR/EDR/LE、RFID
Applicable Standard	47 CFR FCC Part 15, Subpart E (Section 15.407) 789033 D02 General U-NII Test Procedures New Rules v02r01 ANSI C63.10 : 2013
Output Power	5.18 ~ 5.24 GHz: 16.79 dBm 5.26 ~ 5.32 GHz: 16.13 dBm 5.50 ~ 5.72 GHz: 16.93 dBm 5.745 ~ 5.825 GHz: 16.76 dBm
Test Result	Complied

Documented : Emma Lu
(Specialist / Emma Lu)

Technical Engineer : Jack Chang
(Deputy Section Manager / Jack Chang)

Approved : Gary Wu
(Project Manager / Gary Wu)

Table of Contents

Document Revision History

Report No.	Issue date	Description
WD-RF-R-190342-D0	June 26, 2019	Initial report

Summary of Test Result

Ref. Std. Clause	Test Items	Result
15.407(a)	26dB Bandwidth	Pass
15.407(e)	6dB Bandwidth	Pass
--	99% Occupied Bandwidth	Pass
15.407(a)	Maximum Conducted Output Power	Pass
15.407(a)	Power Spectral Density	Pass
15.407(b) 15.209	Unwanted Emissions	Pass
15.407(g)	Frequency Stability	Pass
15.207	AC Conducted Emission	Pass
15.203 15.407(a)	Antenna Requirement	Pass

1 Generation Information

1.1 Applicant

NOVAtime Technology, Inc.
9680 Haven Avenue, Suite #200, Rancho Cucamonga, CA 91730

1.2 Manufacturer

unitech electronics co., ltd.
5FI., No.136, Lane 235, Pao-Chiao Rd., Hsin-Tien Dist, New Taipei City, Taiwan 231, R.O.C.

1.3 Description of Equipment under Test

Product Name	Time Clock
Model No.	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
Series Model No.	NT8000Y-YY(Y can be 0~9 or a~z or A~Z or blank)
FCC ID	2ASPANOVATIME-OEM
Frequency Range	802.11a/n-20MHz: 5180-5320MHz, 5500-5700MHz, 5745-5825MHz 802.11n-40MHz: 5190-5310, 5510-5670MHz, 5755-5795MHz
Number of Channels	802.11a/n-20MHz: 24; 802.11n-40MHz: 11
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 150Mbps
Type of Modulation	802.11a/n: OFDM, BPSK, QPSK, 16QAM, 64QAM
Antenna Information	Refer to the table “Antenna List”
EUT Supports Radios Application	WLAN 802.11a/b/g WLAN 802.11n (HT20/HT40) Bluetooth BR/EDR/LE RFID
EUT Rated Voltage	AC 100 ~ 240V / 50 or 60Hz、PoE
EUT Test Voltage	AC 120V / 60Hz

The EUT uses following adapter.

Trade Name	ENG Electric co., Ltd.
Model No.	6A-601DB12
Input Power	AC 100 ~ 240V / 50 or 60Hz、PoE
Output Power	DC 12V/5.0A
Power Line	Non-shielded, 1 Core, 1.5m

Antenna List

No.	Manufacturer	Model No.	Antenna Type	Peak Gain
1	JOYMAX	TBF-UT01MPXX-752	Dipole	6 dBi for 5.15 ~ 5.25 GHz 6 dBi for 5.25 ~ 5.35 GHz 6 dBi for 5.47 ~ 5.725 GHz 6 dBi for 5.725 ~ 5.85 GHz

Remark: The antenna of EUT is conforming to FCC 15.203

Channel List

802.11a/n HT20		802.11n HT40	
Channel	**Frequency(MHz)**	**Channel**	**Frequency(MHz)**
36	5180	38	5190
40	5200	46	5230
44	5220	54	5270
48	5240	62	5310
52	5260	102	5510
56	5280	110	5550
60	5300	118	5590
64	5320	126	5630
100	5500	134	5670
104	5520	151	5755
108	5540	159	5795
112	5560	--	--
116	5580	--	--
120	5600	--	--
124	5620	--	--
128	5640	--	--
132	5660	--	--
136	5680	--	--
140	5700	--	--
149	5745	--	--
153	5765	--	--
157	5785	--	--
161	5805	--	--
165	5825	--	--

Test Frequencies in each operating band

Frequency range over which the device operates in each operating band (Note 1)	Number of test frequencies required	Location of test frequencies inside the operating frequency range (Note 1,2)
≤ 1 MHz	1	near centre
> 1 MHz and ≤ 10 MHz	2	1 near high end, 1 near low end
> 10 MHz	3	1 near high end, 1 near centre, and 1 near low end

Note 1: The frequency range over which the device operates in a given operating band is the difference between the highest and lowest frequencies on which the device can be tuned within that given operating band. The frequency range can be smaller than or equal to the operating band, but cannot be greater than the operating band.

Note 2: In the third column of table 1, "near" means as close as possible to or at the centre / low end / high end of the frequency range over which the device operates.

Firmware / Software Version

1	**Product Name**	Time Clock
2	**Model No.**	NT8000X-XX(X can be 0~9 or a~z or A~Z or blank)
3	**Test SW Version**	QRCT_ver.3.0.268.0
4	**RF power setting in TEST SW**	☐ RF power setting was not able to alter during testing. ☒ RF power setting was able to alter during testing. (See the following table)

Parameters of test software setting

Frequency (MHz)	Set Value		
	802.11a	802.11n HT20	802.11n HT40
5180	20	20	--
5190	--	--	17
5220	22	20	--
5230	--	--	21
5240	22	21	--
5260	22	21	--
5270	--	--	21
5300	22	21	--
5310	--	--	17
5320	20	20	--
5500	19	17	--
5510	--	--	14
5550	--	--	18
5580	20	18	--
5670	--	--	17
5700	18	17	--
5745	20	19	--
5755	--	--	18
5785	20	18	--
5795	--	--	19
5825	19	17	--

1.4 Test Mode Applicability And Tested Channel Detail

1. This device is a Time Clock with a built-in Wi-Fi、Bluetooth and RFID transceiver.
2. Main model: NT8000X-XX (X can be 0~9 or a~z or A~Z or blank), series model: NT8000Y-YY (Y can be 0~9 or a~z or A~Z or blank). The difference lies in the fingerprint recognizer function.
3. The EUT supports "Power over Ethernet" and "Adapter", the worst case is the adapter power supply. The final test mode selects the adapter power and records it in the report.
4. FCC ID: 2ASPANOVATIME-EM, 2ASPANOVATIME-HID and 2ASPANOVATIME-OEM use the same WIFI and Bluetooth modules, be used platform Time Clock, the platform is used identical internal printed circuit board layouts, have a common design and components, differ only in the 125kHz and 13.56MHz modular.
5. These tests were performed on a sample of equipment to demonstrate compliance with 47 CFR FCC Part 15, Subpart E (Section 15.407).
6. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports.
7. The worst case was found when positioned on X axis for radiated emission. Following test modes were selected for the final test, and the final worst case is recorded in the report:

EUT Configure Mode	RE < 1G	RE ≥ 1G	ACM	ACP	Description
--	☒	☒	☒	☐	Transmit WIFI
--	☐	☐	☐	☒	Normal Link

Note : RE<1G: Radiated Emission below 1GHz RE≥1G: Radiated Emission above 1GHz
ACM: Antenna Port Conducted Measurement ACP: AC Power Line Conducted Emission

Following channel(s) was (were) selected for the final test as listed below:

Radiated Spurious Emission Measurement(Below 1GHz):

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11a	36 ~ 165	44	OFDM	6

Radiated Spurious Emission Measurement(Above 1GHz):

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11a	5180 ~ 5240	36 ~ 48	36, 44, 48	OFDM	6
802.11n HT20		36 ~ 48	36, 44, 48	OFDM	6.5
802.11n HT40		38 ~ 46	38, 46	OFDM	13.5
802.11a	5260 ~ 5320	52 ~ 64	52, 60, 64	OFDM	6
802.11n HT20		52 ~ 64	52, 60, 64	OFDM	6.5
802.11n HT40		54 ~ 62	54, 62	OFDM	13.5
802.11a	5500 ~ 5700	100 ~ 140	100, 116, 140	OFDM	6
802.11n HT20		100 ~ 140	100, 116, 140	OFDM	6.5
802.11n HT40		102 ~ 134	102, 110, 134	OFDM	13.5
802.11a	5745 ~ 5825	149 ~ 165	149, 157, 165	OFDM	6
802.11n HT20		149 ~ 165	149, 157, 165	OFDM	6.5
802.11n HT40		151 ~ 159	151, 159	OFDM	13.5

Radiated Band Edge Emission Measurement(Above 1GHz):

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11a	5180 ~ 5240	36 ~ 48	36, 48	OFDM	6
802.11n HT20		36 ~ 48	36, 48	OFDM	6.5
802.11n HT40		38 ~ 46	38, 46	OFDM	13.5
802.11a	5260 ~ 5320	52 ~ 64	52, 64	OFDM	6
802.11n HT20		52 ~ 64	52, 64	OFDM	6.5
802.11n HT40		54 ~ 62	54, 62	OFDM	13.5
802.11a	5500 ~ 5700	100 ~ 140	100, 140	OFDM	6
802.11n HT20		100 ~ 140	100, 140	OFDM	6.5
802.11n HT40		102 ~ 134	102, 134	OFDM	13.5
802.11a	5745 ~ 5825	149 ~ 165	149, 165	OFDM	6
802.11n HT20		149 ~ 165	149, 165	OFDM	6.5
802.11n HT40		151 ~ 159	151, 159	OFDM	13.5

Output Power, Power Spectral Density,

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11a	5180 ~ 5240	36 ~ 48	36, 44, 48	OFDM	6
802.11n HT20		36 ~ 48	36, 44, 48	OFDM	6.5
802.11n HT40		38 ~ 46	38, 46	OFDM	13.5
802.11a	5260 ~ 5320	52 ~ 64	52, 60, 64	OFDM	6
802.11n HT20		52 ~ 64	52, 60, 64	OFDM	6.5
802.11n HT40		54 ~ 62	54, 62	OFDM	13.5
802.11a	5500 ~ 5700	100 ~ 140	100, 116, 140	OFDM	6
802.11n HT20		100 ~ 140	100, 116, 140	OFDM	6.5
802.11n HT40		102 ~ 134	102, 110, 134	OFDM	13.5
802.11a	5745 ~ 5825	149 ~ 165	149, 157, 165	OFDM	6
802.11n HT20		149 ~ 165	149, 157, 165	OFDM	6.5
802.11n HT40		151 ~ 159	151, 159	OFDM	13.5

6dB Bandwidth:

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11a	5745 ~ 5825	149 ~ 165	149, 157, 165	OFDM	6
802.11n HT20		149 ~ 165	149, 157, 165	OFDM	6.5
802.11n HT40		151 ~ 159	151, 159	OFDM	13.5

26dB Bandwidth, 99% Occupied Bandwidth:

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11a	5180 ~ 5240	36 ~ 48	36, 44, 48	OFDM	6
802.11n HT20		36 ~ 48	36, 44, 48	OFDM	6.5
802.11n HT40		38 ~ 46	38, 46	OFDM	13.5
802.11a	5260 ~ 5320	52 ~ 64	52, 60, 64	OFDM	6
802.11n HT20		52 ~ 64	52, 60, 64	OFDM	6.5
802.11n HT40		54 ~ 62	54, 62	OFDM	13.5
802.11a	5500 ~ 5700	100 ~ 140	100, 116, 140	OFDM	6
802.11n HT20		100 ~ 140	100, 116, 140	OFDM	6.5
802.11n HT40		102 ~ 134	102, 110, 134	OFDM	13.5

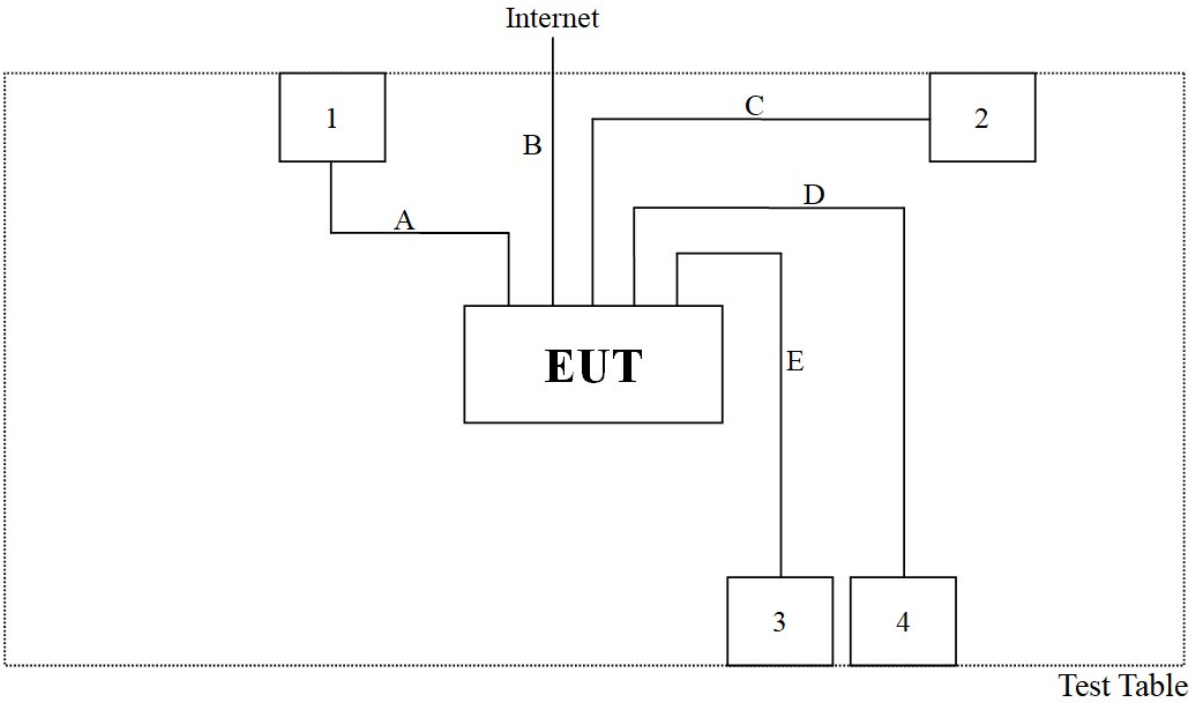
Frequency Stability:

Mode	Frequency (MHz)	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
802.11a	5180 ~ 5240	36 ~ 48	44	OFDM	6
802.11a	5260 ~ 5320	52 ~ 64	56	OFDM	6
802.11a	5500 ~ 5700	100 ~ 140	112	OFDM	6
802.11a	5745 ~ 5825	149 ~ 165	157	OFDM	6

AC Conducted Emission:

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Type	Data Rate (Mbps)
--	802.11a	36 ~ 165	44	OFDM	6

1.5 Configuration of Tested System



1.6 EUT Exercise Software

1. Setup the EUT as shown in Section 1.5
2. Execute software “QRCT_ver.3.0.268.0”.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous transmit.
5. Verify that the EUT works properly.

1.7 Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

No.	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Adapter	ENG Electric co., Ltd.	6A-601DB12	N/A	Non-shielded, 1 Core, 1.5m
2	Notebook PC	acer	N16Q1	NXVF4TA023742254147600	Non-shielded, 1 Core, 0.8m
3	USB Keyboard	Lemel	5105U	G6450015686	Non-shielded, Non-Core, 1.5m
4	USB Mouse	Lemel	M83	201707K31002387	Non-shielded, Non-Core, 1.5m

No.	Signal Cable Type	Signal cable Description
A	Power Cable	Non-shielded, 1 Core, 1.5m
B	LAN Cable	Non-shielded, Non-Core, 10m
C	USB Cable	Shielded, Non-Core, 1m
D	USB Mouse	Non-shielded, Non-Core, 1.5m
E	USB Keyboard	Non-shielded, Non-Core, 1.5m

1.8 Test Facility

Items	Required (IEC 60068-1)	Actual
Temperature (°C)	15-35	25
Humidity (% RH)	25-75	65
Barometric pressure (mbar)	860-1060	1001

Description: Accredited by TAF
Accredited Number: 2965

Issued by: Wendell Industrial Co., Ltd

Lab Address: 6F/6F-1, No.188, Baoqiao Rd., Xindian Dist.,
New Taipei City 23145, Taiwan R.O.C

Test Lab: Wendell Electrical Testing Lab.

Test Location: No.67-9, Shimen Rd., Tucheng Dist.,
New Taipei City 236, Taiwan R.O.C

FCC Accreditation Number: TW2965

FCC Designation Number: TW1118

1.9 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence (level based on a coverage factor K=2)

Measurement Project	Measuring Range	Expended Uncertainty
AC Conducted Emission	0.150 ~ 30 MHz	2.9 dB
Radiated Emission	0.009 ~ 30 MHz	3.8 dB
	30 ~ 1000 MHz	3.5 dB
	1000 ~ 18000 MHz	3.7 dB
	18000 ~ 40000 MHz	3.8 dB
RF Power, Conducted	1000 ~ 6000 MHz	1.3 dB
Occupied Bandwidth	1000 ~ 6000 MHz	3 %
Power Density	1000 ~ 6000 MHz	1.4 dB
Duty Cycle	1000 ~ 6000 MHz	1.1 %
DC Power Supply	0.5 ~ 30 V	1.7 %
Temperature	15 ~ 30 ℃	0.8 ℃
Humidity	40 ~ 80 %	3.8 %
Frequency Stability	1000 ~ 6000 MHz	5.1 ppm

Note: Please note that the measurement uncertainty are provided for informational purpose only and are not used in determining the Pass/Fail results.

1.10 List of Test Equipment

For Conducted measurements / RF Conducted Measurement Room

Equipment		Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓	Spectrum analyzer	Keysight	N9010A	MY54200737	2018/10/24	2019/10/23
✓	Wideband Peak Power Meter	Anritsu	ML2495A	1733007	2018/10/25	2019/10/24
✓	Pulse Power Sensor + Precision Adaptor	Anritsu	MA2411B	1726022	2018/10/25	2019/10/24
✓	Temperature Chamber	TAICHY	MHK-225LK	1061121	2019/4/29	2020/4/28
	Wireless Connectivity Tester	R&S	CMW270	101307	2019/4/24	2020/4/23
✓	Attenuator	MVE	MVE2211-10	CT-9-056	2018/8/6	2019/8/5
	Attenuator	MVE	MVE2211-20	CT-9-057	2018/8/6	2019/8/5
	Attenuator	MVE	MVE2211-30	CT-9-058	2018/8/6	2019/8/5
	Power Divider	MVE	MVE8546	170826003	2018/8/9	2019/8/8
	Power Splitter	MVE	MVE8547	170302047	2018/8/9	2019/8/8
	DC Power Supply	GW INSTEK	GPC-3060D	GER817636	2018/8/9	2019/8/8

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with "✓" are used to measure the final test results.

For AC Conduction measurements / Conducted Room

Equipment		Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓	EMI Test Receiver	R&S	ESR3	102309	2019/5/16	2020/5/15
✓	2-Line V-Network LISN	R&S	ENV216	101185	2019/5/20	2020/5/19
✓	LISN	SCHWARZBECK	NSLK 8127RC	05028	2019/5/20	2020/5/19
✓	Transient Limiter	EM Electronics Corporation	EM-7600	857	2019/5/16	2020/5/15
✓	50ohm Cable	EMCI	EMCCFD300-BM-BM-5000	170613	2019/5/16	2020/5/15
✓	50 ohm terminal impedance	HUBER+SUHNER	50 ohm terminal impedance	CT-1-109-1	2019/5/13	2020/5/12

Remark:

1. All equipments are calibrated every one year.
2. The test instruments marked with "✓" are used to measure the final test results.
3. Test Software version: FARAD EZ-EMC Ver.EMC-CON 3A1

For Radiated measurements / 9x6x6 Semi Anechoic Room

Equipment		Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
✓	Spectrum Analyzer	Keysight	N9010A	MY52220228	2019/4/25	2020/4/24
✓	EMI Receiver	Keysight	N9038A	MY51210173	2018/12/5	2019/12/4
✓	Pre-Amplifier	EMEC	EMC330	060668	2018/10/16	2019/10/15
✓	Pre-Amplifier	EMCI	EMC051845SE	980525	2018/10/11	2019/10/10
✓	Pre-Amplifier	EMCI	EMC184045SE	980515	2018/10/10	2019/10/9
✓	Pre-Amplifier	EMEC	EM01G18G	060648	2018/10/11	2019/10/10
✓	Cable	EMEC	EM-CB400	105060103	2018/10/18	2019/10/17
✓	Cable	EMEC	EM-CB400	105060102	2018/10/18	2019/10/17
✓	Cable	EMEC	EM-CB400	105060101	2018/10/18	2019/10/17
✓	Cable	EMCI	EMC102-KM-KM-600	170637	2018/10/10	2019/10/9
✓	Cable	HUBER+SUHNER	SF102	MY2751/2	2018/10/10	2019/10/9
✓	Cable	EMCI	EMC102-KM-KM-3000	170635	2018/10/10	2019/10/9
✓	Loop Antenna	EMCI	LPA600	277	2018/4/19	2020/4/18
✓	TRILOG super broad Antenna	Schwarzbeck	VULB 9168	VULB 9168-700 & 1421	2018/10/19	2019/10/18
✓	Horn Antenna	Schwarzbeck	BBHA 9120D	01557	2018/10/9	2019/10/8
✓	Horn Antenna	Schwarzbeck	BBHA 9170	703	2018/10/11	2019/10/10
	RF Filter	EMEC	BRF-2400-2500	002	2018/10/10	2019/10/9
✓	RF Filter	EMEC	BRF-5150-5350	104	2018/10/10	2019/10/9
✓	RF Filter	EMEC	BRF-5470-5725	092	2018/10/10	2019/10/9
✓	RF Filter	EMEC	BRF-5725-5875	091	2018/10/10	2019/10/9
	RF Filter	EMEC	HPF-2800	002	2018/10/10	2019/10/9
✓	RF Filter	EMEC	HPF-5850	059	2018/10/10	2019/10/9

Remark:

1. The test instruments marked with "✓" are used to measure the final test results.
2. Test Software version: FARAD EZ-EMC Ver.WD-03A1-1

2 Test Result

2.1 Output Power Measurement and Transmit Power Control

2.1.1 Limit

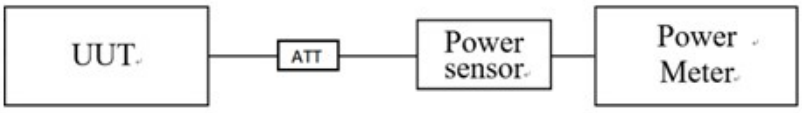
1. For frequency Band 5150~5250MHz:
   (1) Outdoor access point : 1W (30 dBm)
   (2) Indoor access point : 1W (30 dBm)
   (3) Fixed point-to-point access point : 1W (30 dBm)
   (4) Client device : 250mW (24 dBm)
   (5) If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

2. For frequency Band 5250~5350MHz and 5470~5725MHz:
   (1) 250mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth (MHz), whichever is lesser.
   (2) If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3. For frequency Band 5725~5850MHz:
   (1) The maximum conducted output power over the frequency band of operation shall not exceed 1 W(30 dBm).
   (2) If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Transmit power control (TPC). U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.

2.1.2 Test Setup



2.1.3 Test Procedure

1. Enable the EUT transmit continuously.
2. Let EUT be connected to the power meter, and record the max. reading.
3. Measurement using a gated RF average power meter, since this measurement is made only during the ON time of the transmitter, no duty cycle correction is required.

2.1.4 Test Result

802.11a

Frequency (MHz)	Average power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
5180	15.37	--	--	≤ 24	Pass
5220	16.79	--	--	≤ 24	Pass
5240	16.42	--	--	≤ 24	Pass
5260	16.05	--	--	≤ 24	Pass
5300	16.13	--	--	≤ 24	Pass
5320	15.67	--	--	≤ 24	Pass
5500	15.81	--	--	≤ 24	Pass
5580	16.93	--	--	≤ 24	Pass
5700	16.47	--	--	≤ 24	Pass
5745	16.68	--	--	≤ 30	Pass
5785	16.74	--	--	≤ 30	Pass
5825	16.76	--	--	≤ 30	Pass

Remark:

1. Average Power = Reading value on power meter + cable loss
2. 10 Log(X/mW) = dBm, X=1 watt (Limit)
   1 watt = 30 dBm

802.11n HT20

Frequency (MHz)	Average power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
5180	15.31	--	--	≤ 24	Pass
5220	15.54	--	--	≤ 24	Pass
5240	15.94	--	--	≤ 24	Pass
5260	15.49	--	--	≤ 24	Pass
5300	15.62	--	--	≤ 24	Pass
5320	15.64	--	--	≤ 24	Pass
5500	14.38	--	--	≤ 24	Pass
5580	15.75	--	--	≤ 24	Pass
5700	15.81	--	--	≤ 24	Pass
5745	15.91	--	--	≤ 30	Pass
5785	15.29	--	--	≤ 30	Pass
5825	15.31	--	--	≤ 30	Pass

Remark:

1. Average Power = Reading value on power meter + cable loss
2. 10 Log(X/mW) = dBm, X=1 watt (Limit)
   1 watt = 30 dBm

802.11n HT40

Frequency (MHz)	Average power (dBm)			Limit (dBm)	Result
	Chain A	Chain B	Total		
5190	12.84	--	--	≤ 24	Pass
5230	15.81	--	--	≤ 24	Pass
5270	15.39	--	--	≤ 24	Pass
5310	12.91	--	--	≤ 24	Pass
5510	11.34	--	--	≤ 24	Pass
5550	15.05	--	--	≤ 24	Pass
5670	15.39	--	--	≤ 24	Pass
5755	15.22	--	--	≤ 30	Pass
5795	15.23	--	--	≤ 30	Pass

Remark:

1. Average Power = Reading value on power meter + cable loss
2. 10 Log(X/mW) = dBm, X=1 watt (Limit)
   1 watt = 30 dBm

2.1.5 Transmit Power Control

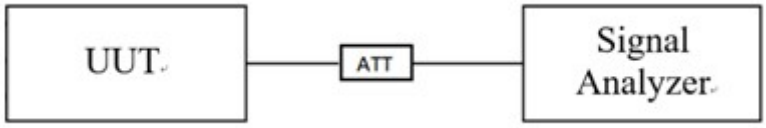
EUT doesn’t support TPC function.

2.2 26dB Bandwidth, 6dB Bandwidth and 99% Occupied Bandwidth Measurement

2.2.1 Limit

Within 5725~5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz.

2.2.2 Test Setup



2.2.3 Test Procedure

1. The following procedure shall be used for measuring 6dB bandwidth:
   (1) Enable the EUT transmit continuously.
   (2) Set RBW = 100 kHz, VBW ≥ 3 RBW, Sweep = auto couple.
   (3) Detector = Peak, Trace mode = max hold.
   (4) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
2. The following procedure shall be used for measuring 26 dB bandwidth:
   (1) Set RBW = approximately 1% of the emission bandwidth.
   (2) Set the VBW > RBW, Detector = Peak, Trace mode = max hold
   (3) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
3. The following procedure shall be used for measuring 99% power bandwidth:
   (1) Set center frequency to the nominal EUT channel center frequency.
   (2) Set span = 1.5 times to 5.0 times the OBW.
   (3) Set RBW = 1% to 5% of the OBW.
   (4) Set the VBW ≥ 3 RBW.
   (5) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
   (6) Use the 99% power bandwidth function of the instrument.

(7) If the instrument does not have a 99% power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

2.2.4 Test Result

2.2.4.1 6dB Bandwidth

802.11a

Frequency (MHz)	6dB BW (MHz)		Limit (kHz)	Result
	Chain A	Chain B		
5745	16.41	--	> 500	Pass
5785	16.38	--	> 500	Pass
5825	16.41	--	> 500	Pass

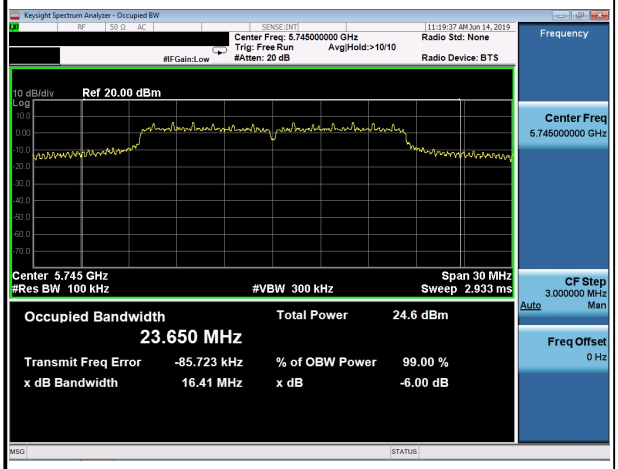
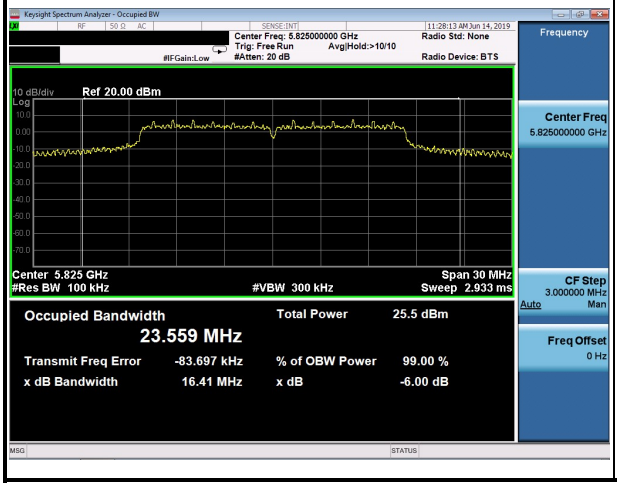
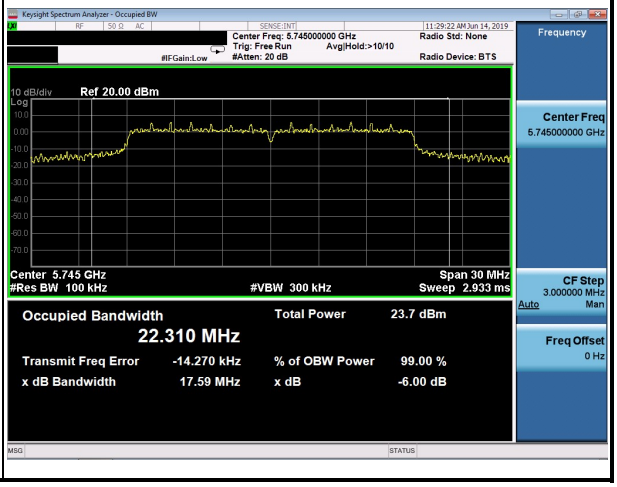
802.11n HT20

Frequency (MHz)	6dB BW (MHz)		Limit (kHz)	Result
	Chain A	Chain B		
5745	17.59	--	> 500	Pass
5785	17.62	--	> 500	Pass
5825	17.58	--	> 500	Pass

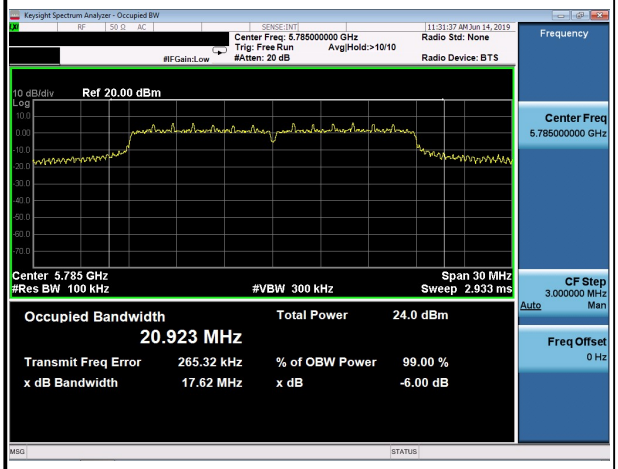
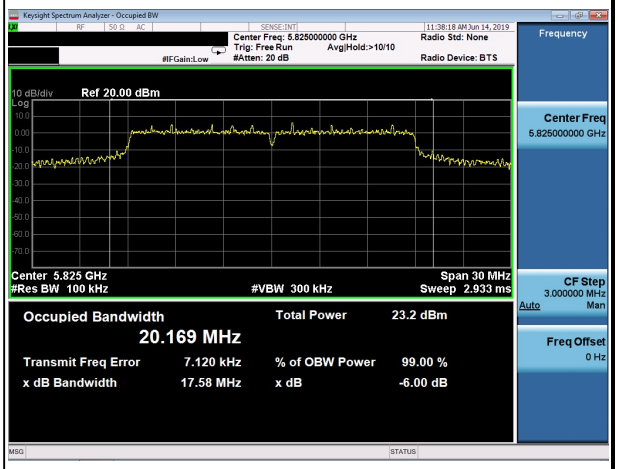
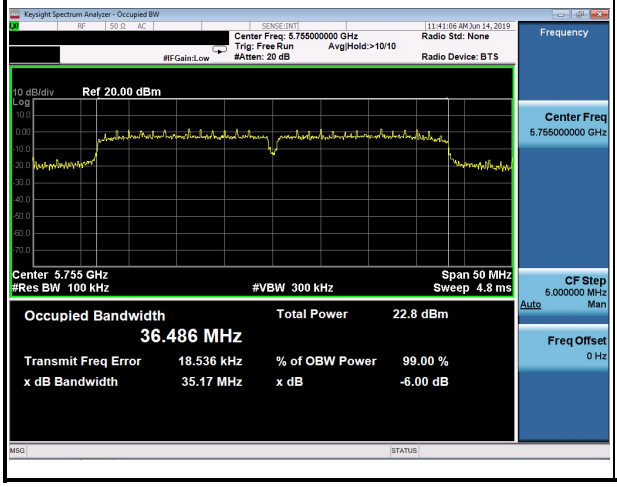
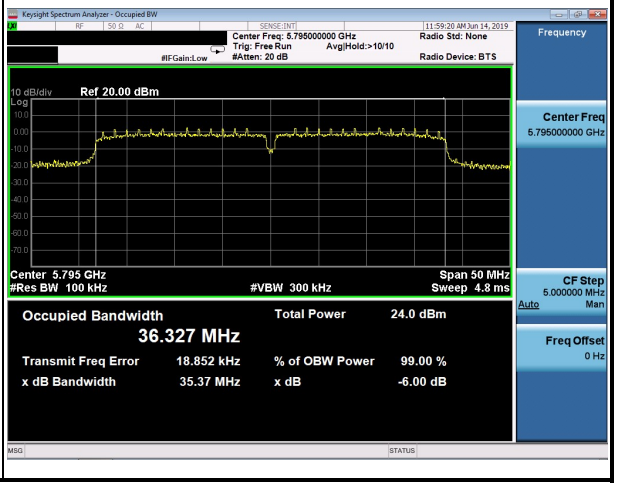
802.11n HT40

Frequency (MHz)	6dB BW (MHz)		Limit (kHz)	Result
	Chain A	Chain B		
5755	35.17	--	> 500	Pass
5795	35.37	--	> 500	Pass

6dB spectrum plot of value:

802.11a 5745MHz	802.11a 5785MHz
	
802.11a 5825MHz	**802.11n HT20 5745MHz**
	

6dB spectrum plot of value:

802.11n HT20 5785MHz	802.11n HT20 5825MHz
	
802.11n HT40 5755MHz	**802.11n HT40 5795MHz**
	

2.2.4.1 26dB Bandwidth

802.11a

Frequency (MHz)	26dB BW (MHz)		99% OBW (MHz)		Limit (kHz)	Result
	Chain A	Chain B	Chain A	Chain B		
5180	39.040	--	--	--	--	--
5220	44.260	--	--	--	--	--
5240	43.620	--	--	--	--	--
5260	43.740	--	--	--	--	--
5300	43.380	--	--	--	--	--
5320	43.490	--	--	--	--	--
5500	48.670	--	--	--	--	--
5580	47.010	--	--	--	--	--
5700	44.240	--	--	--	--	--

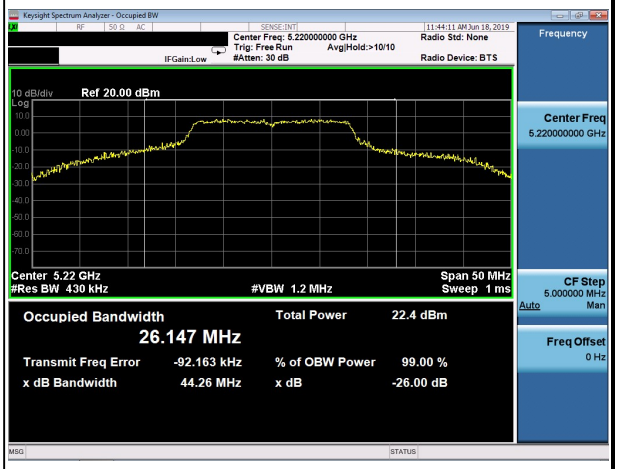
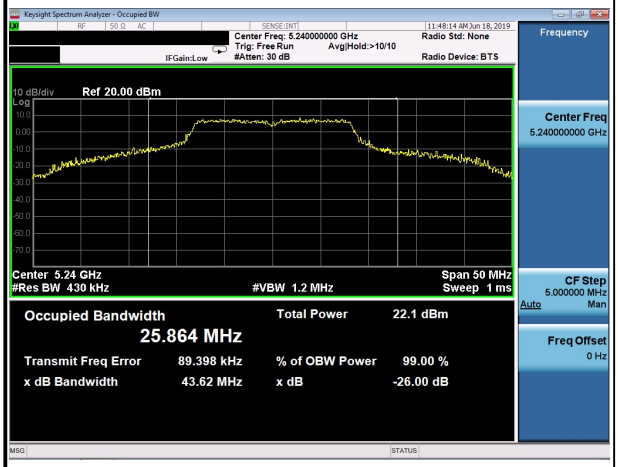
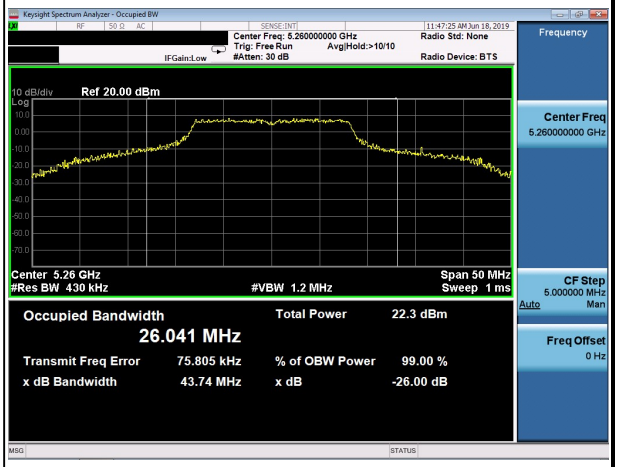
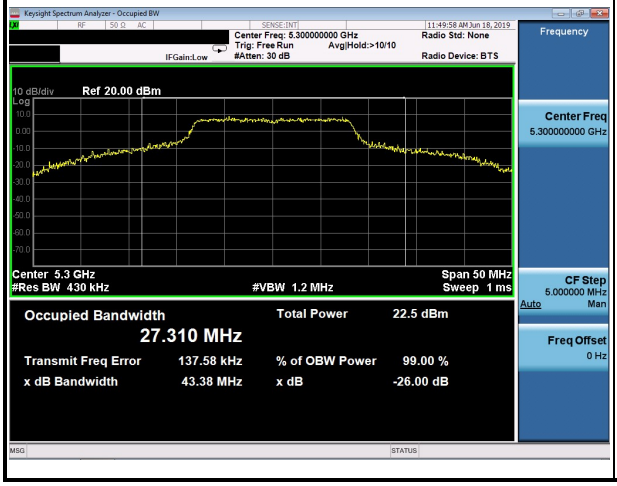
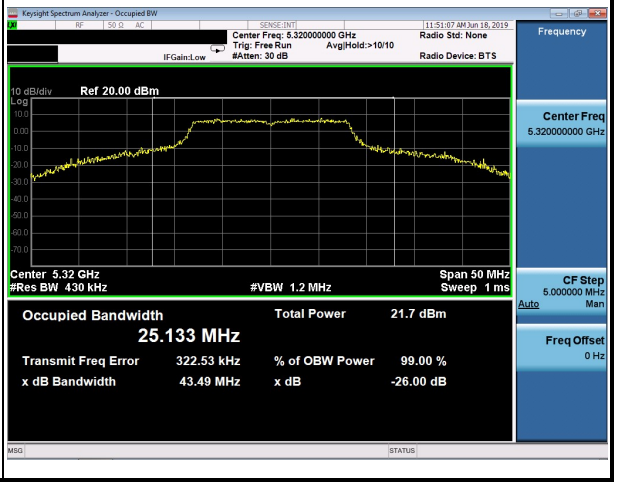
802.11n HT20

Frequency (MHz)	26dB BW (MHz)		99% OBW (MHz)		Limit (kHz)	Result
	Chain A	Chain B	Chain A	Chain B		
5180	45.660	--	--	--	--	--
5220	46.160	--	--	--	--	--
5240	46.470	--	--	--	--	--
5260	43.400	--	--	--	--	--
5300	44.310	--	--	--	--	--
5320	47.770	--	--	--	--	--
5500	46.910	--	--	--	--	--
5580	47.190	--	--	--	--	--
5700	47.940	--	--	--	--	--

802.11n HT40

Frequency (MHz)	26dB BW (MHz)		99% OBW (MHz)		Limit (kHz)	Result
	Chain A	Chain B	Chain A	Chain B		
5190	69.940	--	--	--	--	--
5230	89.250	--	--	--	--	--
5270	91.490	--	--	--	--	--
5310	74.060	--	--	--	--	--
5510	76.220	--	--	--	--	--
5550	95.770	--	--	--	--	--
5670	92.800	--	--	--	--	--

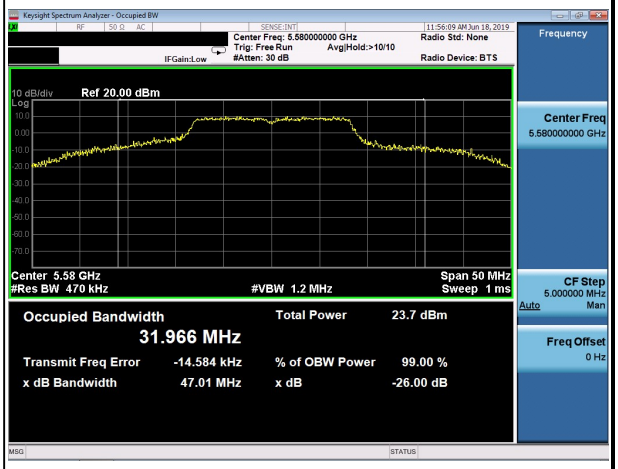
26dB & 99% Occupied Bandwidth spectrum plot of value:

802.11a 5180MHz	802.11a 5220MHz
	
802.11a 5240MHz	**802.11a 5260MHz**
	
802.11n a 5300MHz	**802.11n a 5320MHz**
	

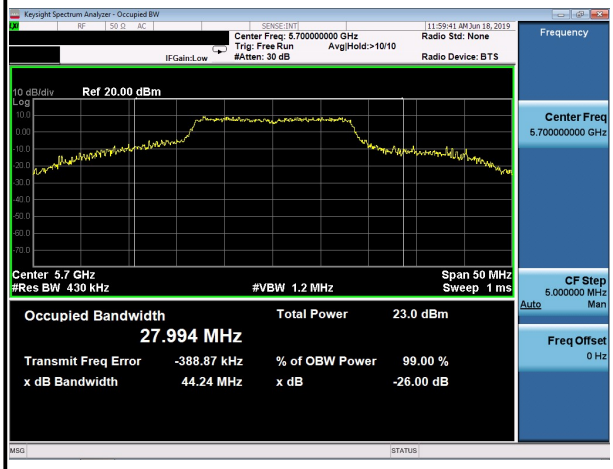
26dB & 99% Occupied Bandwidth spectrum plot of value:

802.11a 5500MHz

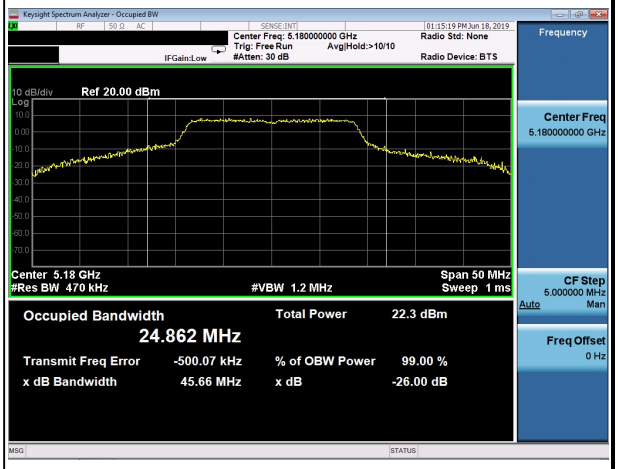
802.11a 5580MHz



802.11a 5700MHz



802.11n HT20 5180MHz



802.11n HT20 5220MHz

802.11n HT20 5240MHz