TEST REPORT

Report No.:	BCTC2405064824-3E
Applicant:	Vine Connected Corp.
Product Name:	Thermostat
Test Model:	ST300
Tested Date:	2024-05-08 to 2024-05-14
Issued Date:	2024-05-15

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2AVCM-ST3XX

Product Name:	Thermostat
Trademark:	vine®
Model/Type reference:	ST300 ST3XX
Prepared For:	Vine Connected Corp.
Address:	2596 Nicholson St San Leandro, CA 94577
Manufacturer:	Guangzhou Video-Star Electronics Co., Ltd
Address:	6th Floor, Building 6, No.9, 4th Lanyu St., Huangpu District, Guangzhou, China
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2024-05-08
Sample tested Date:	2024-05-08 to 2024-05-14
Issue Date:	2024-05-15
Report No.:	BCTC2405064824-3E
Test Standards:	FCC Part15 15.407 ANSI C63.10-2013 KDB 662911 D01 v02r01 KDB 789033 D02 v02r01
Test Results:	PASS

Tested by:

Brave Zeng

Brave Zeng/ Project Handler

Approved by:

Zero Zhou/Reviewer

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(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2405064824-3E	2024-05-15	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No.	Results
1	Spurious Radiated Emissions	15.209(a) 15.407 (b)	PASS
2	Conducted Emission	15.207	PASS
3	26 dB and 99% Emission Bandwidth	15.407 a 15.1049	PASS
4	Minimum 6 dB bandwidth	15.407(e)	PASS
5	Maximum Conducted Output Power	15.407 a	PASS
6	Band Edge	15.407 b	PASS
7	Power Spectral Density	15.407 a	PASS
8	Spurious Emissions at Antenna Terminals	15.407 b	PASS
9	Antenna Requirement	15.203	PASS

Note：The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure.

3. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(9kHz-30MHz)	U=3.7dB
2	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission(150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59℃

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	ST300 ST3XX
Model differences:	All the model are the same circuit and RF module, except model names.
Hardware Version:	2.1
Software Version:	1.1.0
IEEE 802.11 WLAN Mode Supported	802.11a/n (20MHz channel bandwidth) 802.11n (40MHz channel bandwidth)
Operation Frequency:	5180-5240MHz for 802.11a/n(HT20); 5190-5230MHz for 802.11n(HT40); 5745-5825 MHz for 802.11a/n(HT20); 5755-5795 MHz for 802.11n(HT40)
Data Rate	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15
Type of Modulation:	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n;
Antenna installation:	Internal antenna
Antenna Gain:	5.1 dBi Remark: ☒ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.
Ratings:	AC 24V from adapter

4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	Thermostat	vine®	ST300	N/A	EUT
E-2	Adapter	N/A	N/A	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	0.5M	DC cable unshielded

Notes:
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.

4.4 Channel List

Frequency and Channel list for 802.11a/n (5180-5240MHz):

802.11a/n (20MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220	40	5200	48	5240

802.11n (40MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230	-	-	-	-

Frequency and Channel list for 802.11a/n (5745-5825MHz):

802.11a/n (20MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

802.11n (40MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	-	-	-	-

4.5 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11a / n 20 CH36/ CH40/ CH 48 802.11a /n 20 CH149/ CH157/ CH 165
Mode 2	802.11n40 CH38/ CH 46 802.11n40 CH 151 / CH 159
Mode 3	WIFI Link+TF (Conducted emission & Radiated emission)

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

4.6 Table Of Parameters Of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Test software Version	CMD		
Parameters	DEF	DEF	DEF

5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.
FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017

5.2 Test Instrument Used

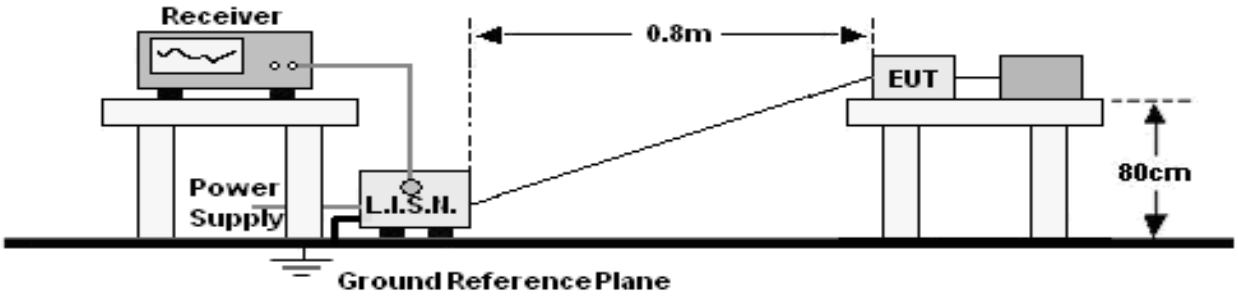
Conducted Emissions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
LISN	R&S	ENV216	101375	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Pulse limiter	Schwarzbeck	VTSD9561-F	01323	Sept. 22, 2023	Sept. 21, 2024

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power meter	Keysight	E4419	\	May 15, 2023	May 14, 2024
Power Sensor (AV)	Keysight	E9300A	\	May 15, 2023	May 14, 2024
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Radio frequency control box	MAIWEI	MW100-RFCB	\	\	\
Software	MAIWEI	MTS 8310	\	\	\

Radiated Emissions Test (966 Chamber01)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 29, 2023	May 28, 2024
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 31, 2023	May 30, 2024
Amplifier	SKET	LAPA_01G18G-45dB	SK2021040901	May 15, 2023	May 14, 2024
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 31, 2023	May 30, 2024
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
Horn Antenna(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 31, 2023	May 30, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

6. Conducted Emissions

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Limit (dBuV)	
	Quas-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00
Notes: 1. *Decreasing linearly with logarithm of frequency. 2. The lower limit shall apply at the transition frequencies.		

6.3 Test Procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

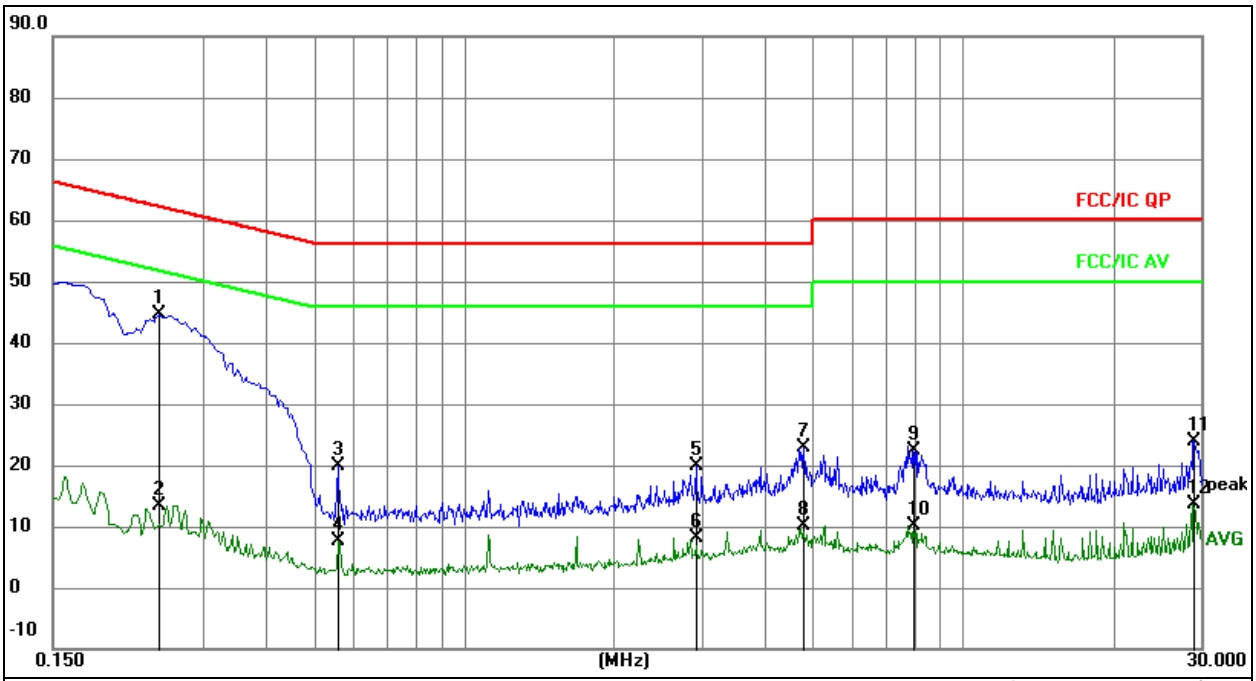
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

6.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

6.5 Test Result

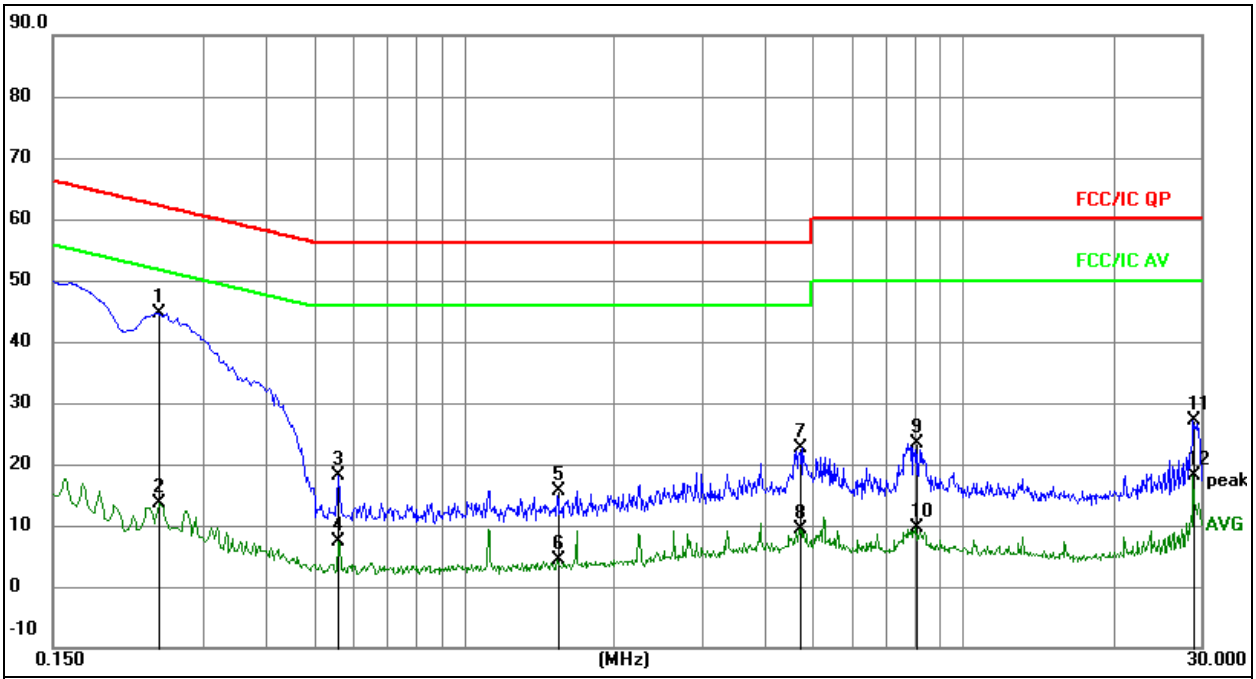
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Line
Test Voltage :	AC 24V/60Hz	Test Mode:	Mode 3



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1	*	0.2442	24.77	19.83	44.60	61.95	-17.35	QP
2		0.2442	-6.40	19.83	13.43	51.95	-38.52	AVG
3		0.5581	-0.06	19.84	19.78	56.00	-36.22	QP
4		0.5581	-12.11	19.84	7.73	46.00	-38.27	AVG
5		2.9152	-0.46	20.27	19.81	56.00	-36.19	QP
6		2.9152	-12.03	20.27	8.24	46.00	-37.76	AVG
7		4.7969	2.32	20.47	22.79	56.00	-33.21	QP
8		4.7969	-10.28	20.47	10.19	46.00	-35.81	AVG
9		7.9353	2.45	19.94	22.39	60.00	-37.61	QP
10		7.9353	-9.76	19.94	10.18	50.00	-39.82	AVG
11		29.0613	3.91	19.99	23.90	60.00	-36.10	QP
12		29.0613	-6.37	19.99	13.62	50.00	-36.38	AVG

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Neutral
Test Voltage :	AC 24V/60Hz	Test Mode:	Mode 3



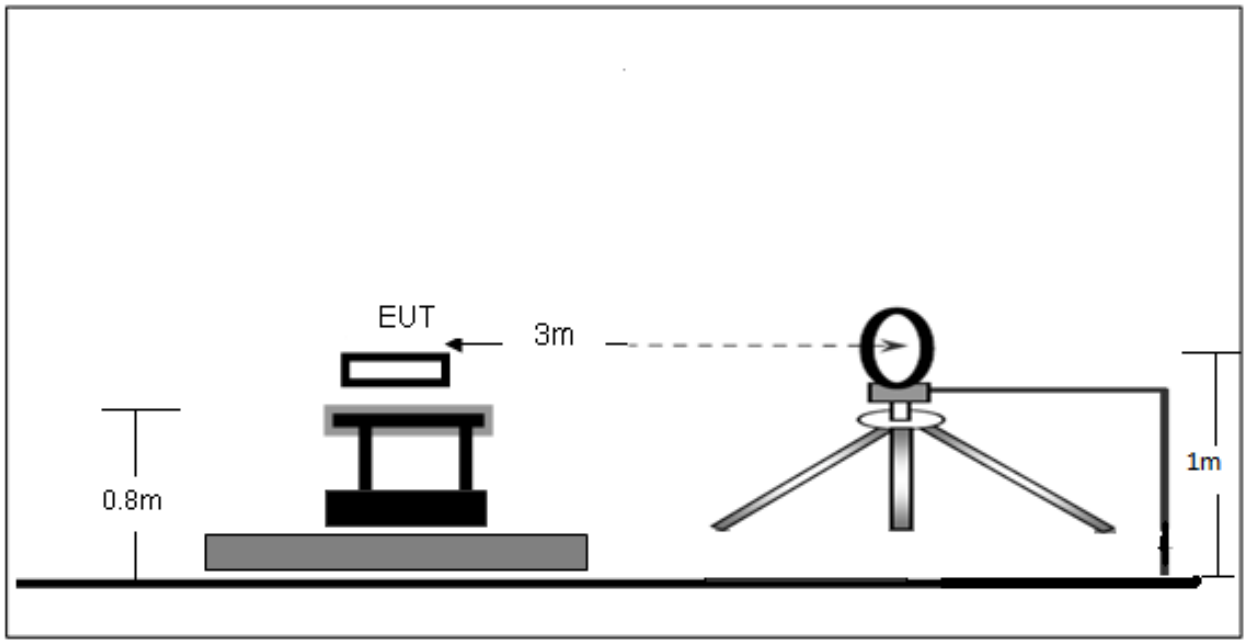
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1	*	0.2445	24.85	19.83	44.68	61.94	-17.26	QP
2		0.2445	-6.20	19.83	13.63	51.94	-38.31	AVG
3		0.5594	-1.74	19.84	18.10	56.00	-37.90	QP
4		0.5594	-12.39	19.84	7.45	46.00	-38.55	AVG
5		1.5404	-4.29	19.95	15.66	56.00	-40.34	QP
6		1.5404	-15.68	19.95	4.27	46.00	-41.73	AVG
7		4.7175	2.03	20.49	22.52	56.00	-33.48	QP
8		4.7175	-11.17	20.49	9.32	46.00	-36.68	AVG
9		8.0340	3.53	19.93	23.46	60.00	-36.54	QP
10		8.0340	-10.31	19.93	9.62	50.00	-40.38	AVG
11		29.0490	7.17	19.99	27.16	60.00	-32.84	QP
12		29.0490	-1.81	19.99	18.18	50.00	-31.82	AVG

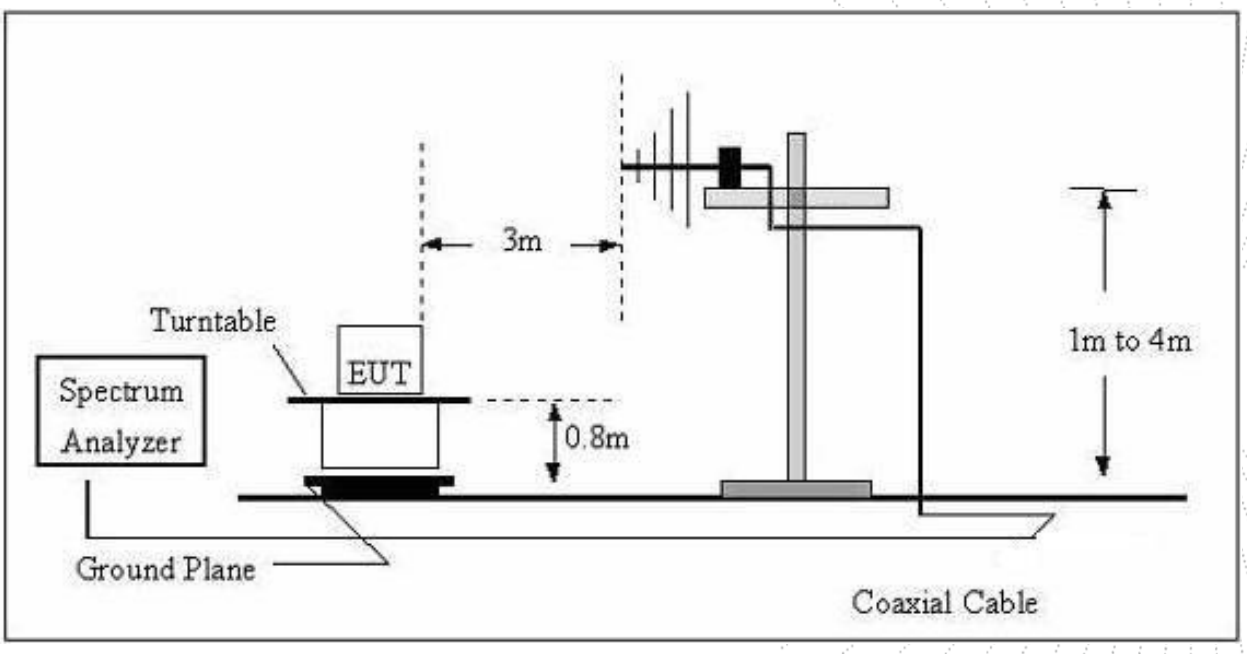
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

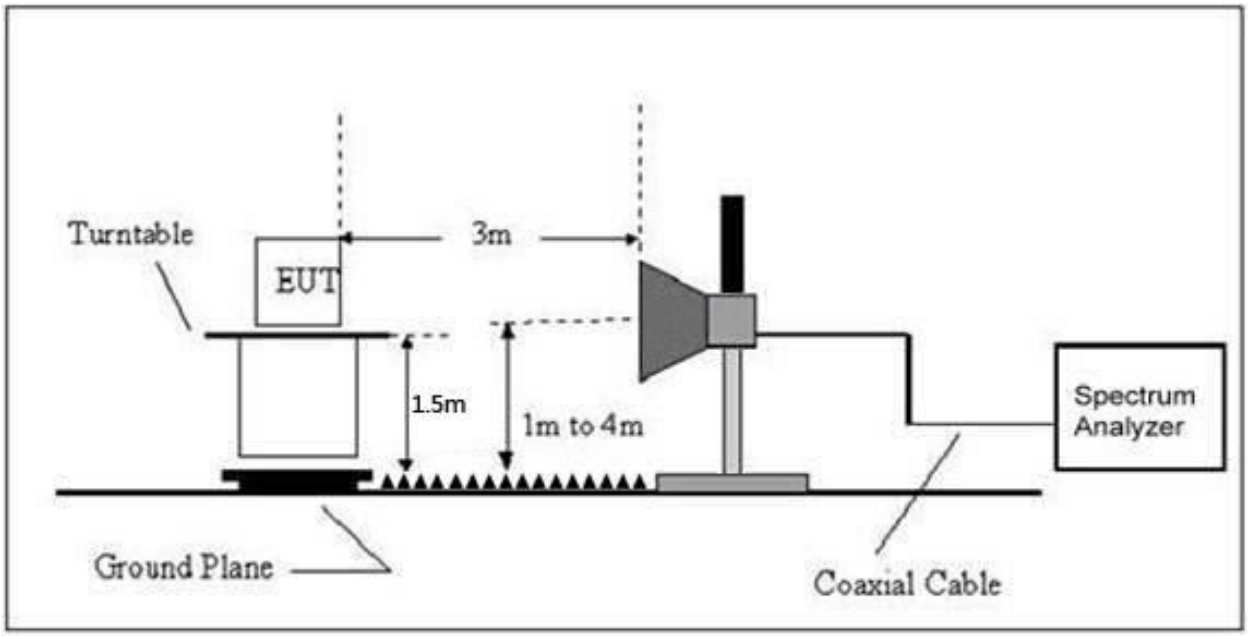
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency	Field Strength	Distance	Field Strength Limit at 3m Distance	
(MHz)	uV/m	(m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Limits Of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit (dBuV/m) (at 3M)	
	Peak	Average
Above 1000	74	54

Notes:
(1)The limit for radiated test was performed according to FCC PART 15C.
(2)The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).

7.3 Test Procedure

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

7.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

7.5 Test Result

Below 30MHz

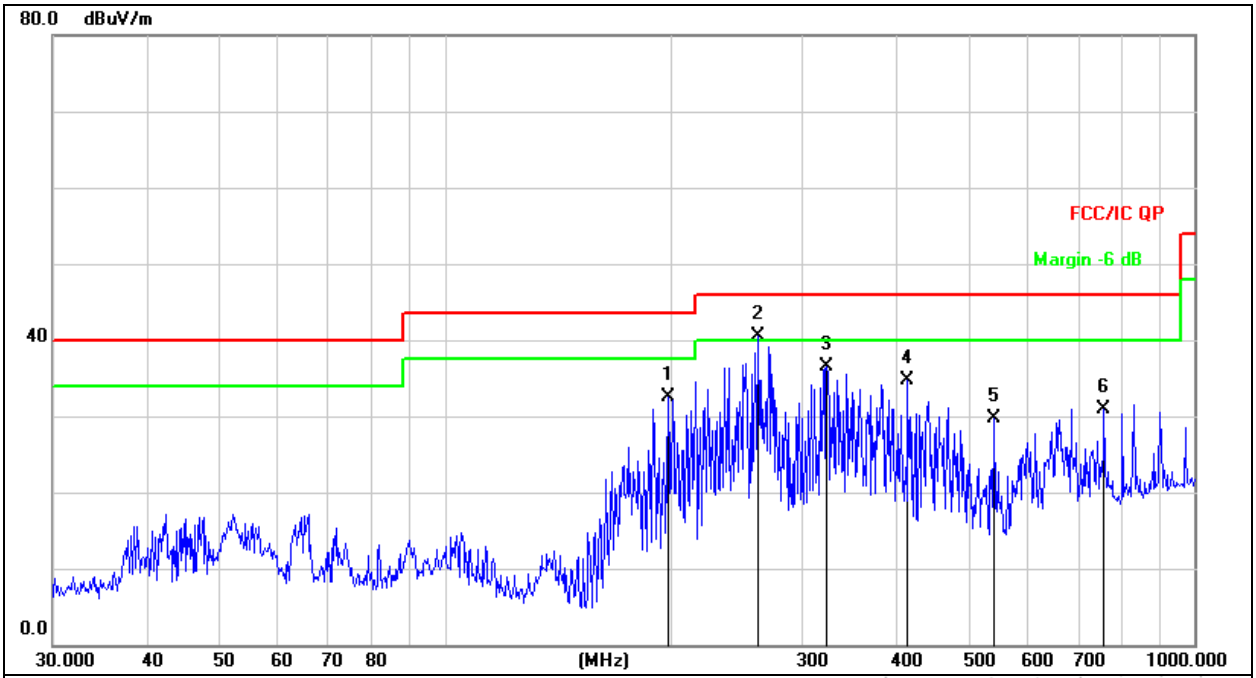
Temperature:	26℃	Relative Humidity:	24%
Pressure:	101 kPa	Test Voltage :	AC 24V/60Hz
Test Mode:	Mode 3	Polarization:	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30MHz – 1GHz

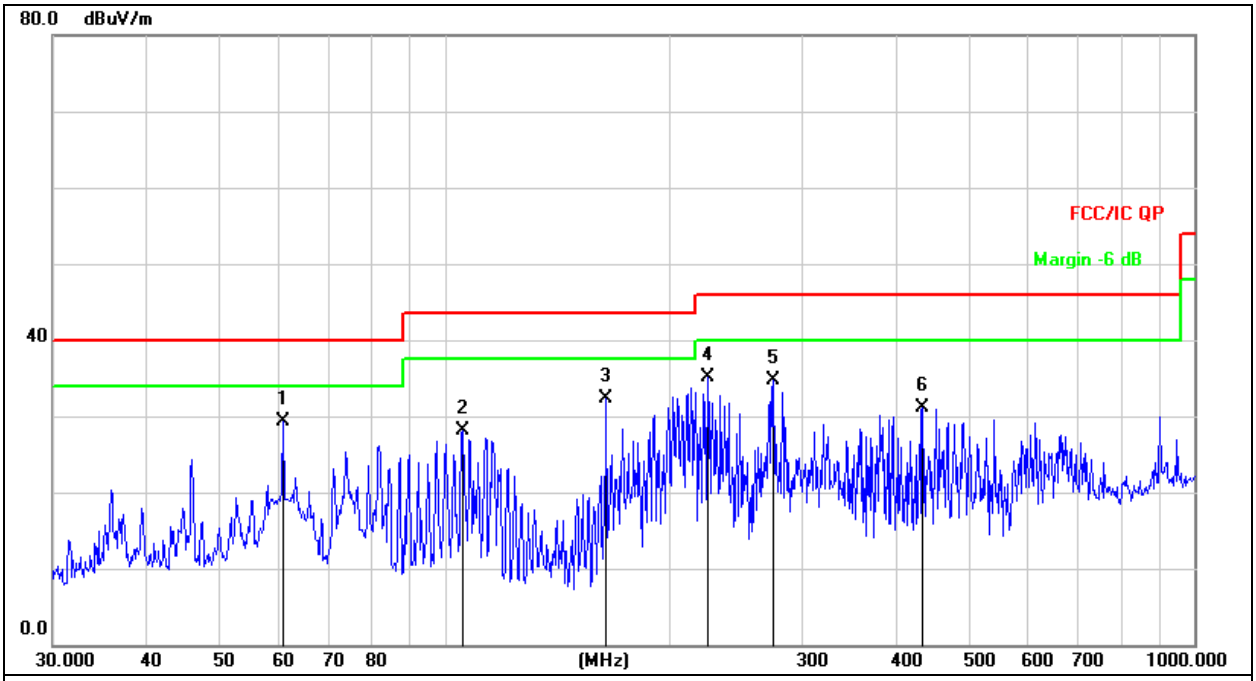
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 3	Test Voltage :	AC 24V/60Hz



Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement = Reading Level + Correct Factor
3. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		198.5880	48.34	-15.82	32.52	43.50	-10.98	QP
2	*	261.9753	54.53	-14.04	40.49	46.00	-5.51	QP
3		323.3204	49.00	-12.42	36.58	46.00	-9.42	QP
4		414.7223	45.20	-10.55	34.65	46.00	-11.35	QP
5		541.3725	39.76	-10.07	29.69	46.00	-16.31	QP
6		758.0408	35.79	-4.90	30.89	46.00	-15.11	QP

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 3	Test Voltage :	AC 24V/60Hz



Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement = Reading Level + Correct Factor
3. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	60.9176	44.71	-15.50	29.21	40.00	-10.79	QP
2		105.6415	44.39	-16.32	28.07	43.50	-15.43	QP
3		164.3301	50.60	-18.37	32.23	43.50	-11.27	QP
4		224.5193	50.17	-15.02	35.15	46.00	-10.85	QP
5		274.1939	48.53	-13.78	34.75	46.00	-11.25	QP
6		434.0651	41.26	-10.17	31.09	46.00	-14.91	QP

Between 1GHz – 40GHz

Test Mode:	TX(5.1G) - 802.11a

Polar	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5180 MHz)-Above 1G							
Vertical	4434.06	70.24	-20.73	49.51	68.20	-18.69	PK
Vertical	4434.06	59.43	-20.73	38.69	54.00	-15.31	AV
Vertical	10360.13	64.67	-9.36	55.31	68.20	-12.89	PK
Vertical	10360.13	49.33	-9.36	39.97	54.00	-14.03	AV
Vertical	15540.05	62.05	-7.84	54.21	74.00	-19.79	PK
Vertical	15540.05	49.23	-7.84	41.39	54.00	-12.61	AV
Horizontal	4434.15	70.78	-20.73	50.05	68.20	-18.15	PK
Horizontal	4434.15	59.20	-20.73	38.47	54.00	-15.53	AV
Horizontal	10360.16	62.62	-9.36	53.26	68.20	-14.94	PK
Horizontal	10360.16	49.76	-9.36	40.40	54.00	-13.60	AV
Horizontal	15540.06	62.69	-7.84	54.85	74.00	-19.15	PK
Horizontal	15540.06	49.23	-7.84	41.39	54.00	-12.61	AV
Middle Channel (5200 MHz)-Above 1G							
Vertical	4592.00	74.55	-20.42	54.13	74.00	-19.87	PK
Vertical	4592.00	59.10	-20.42	38.68	54.00	-15.32	AV
Vertical	10400.09	61.18	-9.30	51.88	68.20	-16.32	PK
Vertical	10400.09	49.46	-9.30	40.16	54.00	-13.84	AV
Vertical	15600.10	60.80	-7.82	52.98	74.00	-21.02	PK
Vertical	15600.10	49.37	-7.82	41.55	54.00	-12.45	AV
Horizontal	4592.07	70.89	-20.42	50.47	74.00	-23.53	PK
Horizontal	4592.07	59.68	-20.42	39.26	54.00	-14.74	AV
Horizontal	10400.03	62.45	-9.30	53.15	68.20	-15.05	PK
Horizontal	10400.03	49.72	-9.30	40.42	54.00	-13.58	AV
Horizontal	15600.10	62.58	-7.82	54.76	74.00	-19.24	PK
Horizontal	15600.10	49.47	-7.82	41.65	54.00	-12.35	AV
High Channel (5240 MHz)-Above 1G							
Vertical	4739.13	71.01	-20.12	50.89	74.00	-23.11	PK
Vertical	4739.13	59.15	-20.12	39.03	54.00	-14.97	AV
Vertical	10480.09	61.28	-9.18	52.10	68.20	-16.10	PK
Vertical	10480.09	49.05	-9.18	39.87	54.00	-14.13	AV
Vertical	15720.17	60.27	-7.78	52.49	74.00	-21.51	PK
Vertical	15720.17	49.01	-7.78	41.23	54.00	-12.77	AV
Horizontal	4739.02	74.72	-20.12	54.59	74.00	-19.41	PK
Horizontal	4739.02	59.43	-20.12	39.31	54.00	-14.69	AV
Horizontal	10480.19	61.13	-9.18	51.95	68.20	-16.25	PK
Horizontal	10480.19	49.94	-9.18	40.76	54.00	-13.24	AV
Horizontal	15720.17	61.98	-7.78	54.20	74.00	-19.80	PK
Horizontal	15720.17	49.23	-7.78	41.45	54.00	-12.55	AV

Note: PK value is lower than the Average value limit, So average didn't record.
The 26.5-40G amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Test Mode:	TX(5.1G) - 802.11n-HT20

Polar	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5180 MHz)-Above 1G							
Vertical	4434.01	71.01	-20.73	50.28	68.20	-17.92	PK
Vertical	4434.01	59.60	-20.73	38.86	54.00	-15.14	AV
Vertical	10360.15	63.64	-9.36	54.28	68.20	-13.92	PK
Vertical	10360.15	49.79	-9.36	40.43	54.00	-13.57	AV
Vertical	15540.19	60.17	-7.84	52.33	74.00	-21.67	PK
Vertical	15540.19	49.61	-7.84	41.77	54.00	-12.23	AV
Horizontal	4434.14	72.01	-20.73	51.28	68.20	-16.92	PK
Horizontal	4434.14	59.79	-20.73	39.06	54.00	-14.94	AV
Horizontal	10360.10	63.35	-9.36	53.99	68.20	-14.21	PK
Horizontal	10360.10	49.19	-9.36	39.83	54.00	-14.17	AV
Horizontal	15540.06	62.78	-7.84	54.94	74.00	-19.06	PK
Horizontal	15540.06	49.94	-7.84	42.10	54.00	-11.90	AV
Middle Channel (5200 MHz)-Above 1G							
Vertical	4592.12	73.22	-20.42	52.80	74.00	-21.20	PK
Vertical	4592.12	59.76	-20.42	39.34	54.00	-14.66	AV
Vertical	10400.12	62.52	-9.30	53.22	68.20	-14.98	PK
Vertical	10400.12	49.27	-9.30	39.97	54.00	-14.03	AV
Vertical	15600.18	60.14	-7.82	52.32	74.00	-21.68	PK
Vertical	15600.18	49.79	-7.82	41.97	54.00	-12.03	AV
Horizontal	4592.02	71.51	-20.42	51.10	74.00	-22.90	PK
Horizontal	4592.02	59.12	-20.42	38.70	54.00	-15.30	AV
Horizontal	10400.06	63.50	-9.30	54.20	68.20	-14.00	PK
Horizontal	10400.06	49.47	-9.30	40.17	54.00	-13.83	AV
Horizontal	15600.16	61.95	-7.82	54.13	74.00	-19.87	PK
Horizontal	15600.16	49.13	-7.82	41.31	54.00	-12.69	AV
High Channel (5240 MHz)-Above 1G							
Vertical	4739.10	70.09	-20.12	49.97	74.00	-24.03	PK
Vertical	4739.10	59.32	-20.12	39.20	54.00	-14.80	AV
Vertical	10480.10	61.95	-9.18	52.77	68.20	-15.43	PK
Vertical	10480.10	49.14	-9.18	39.96	54.00	-14.04	AV
Vertical	15720.12	64.33	-7.78	56.55	74.00	-17.45	PK
Vertical	15720.12	49.35	-7.78	41.57	54.00	-12.43	AV
Horizontal	4739.14	70.45	-20.12	50.33	74.00	-23.67	PK
Horizontal	4739.14	59.15	-20.12	39.03	54.00	-14.97	AV
Horizontal	10480.17	63.16	-9.18	53.98	68.20	-14.22	PK
Horizontal	10480.17	49.32	-9.18	40.14	54.00	-13.86	AV
Horizontal	15720.03	60.28	-7.78	52.50	74.00	-21.50	PK
Horizontal	15720.03	49.20	-7.78	41.42	54.00	-12.58	AV

Note: PK value is lower than the Average value limit, So average didn't record.
The 26.5-40G amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Test Mode:	TX(5.1G) - 802.11n-HT40

Polar	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5190 MHz)-Above 1G							
Vertical	4434.07	73.85	-20.73	53.12	68.20	-15.08	PK
Vertical	4434.07	59.38	-20.73	38.65	54.00	-15.35	AV
Vertical	10380.12	62.23	-9.33	52.90	68.20	-15.30	PK
Vertical	10380.12	49.71	-9.33	40.38	54.00	-13.62	AV
Vertical	15570.04	64.47	-7.83	56.64	74.00	-17.36	PK
Vertical	15570.04	49.20	-7.83	41.37	54.00	-12.63	AV
Horizontal	4434.05	72.56	-20.73	51.83	74.00	-22.17	PK
Horizontal	4434.05	59.42	-20.73	38.69	54.00	-15.31	AV
Horizontal	10380.03	61.68	-9.33	52.35	68.20	-15.85	PK
Horizontal	10380.03	49.13	-9.33	39.80	54.00	-14.20	AV
Horizontal	15570.09	62.07	-7.83	54.24	74.00	-19.76	PK
Horizontal	15570.09	49.21	-7.83	41.38	54.00	-12.62	AV
Middle Channel (5230 MHz)-Above 1G							
Vertical	4739.09	73.58	-20.12	53.46	68.20	-14.74	PK
Vertical	4739.09	59.63	-20.12	39.51	54.00	-14.49	AV
Vertical	10460.15	62.84	-9.21	53.63	68.20	-14.57	PK
Vertical	10460.15	49.79	-9.21	40.58	54.00	-13.42	AV
Vertical	15690.03	63.27	-7.79	55.48	74.00	-18.52	PK
Vertical	15690.03	49.30	-7.79	41.51	54.00	-12.49	AV
Horizontal	4739.02	72.59	-20.12	52.47	68.20	-15.73	PK
Horizontal	4739.02	59.10	-20.12	38.98	54.00	-15.02	AV
Horizontal	10460.11	61.91	-9.21	52.70	68.20	-15.50	PK
Horizontal	10460.11	49.46	-9.21	40.25	54.00	-13.75	AV
Horizontal	15690.02	64.12	-7.79	56.33	74.00	-17.67	PK
Horizontal	15690.02	49.86	-7.79	42.07	54.00	-11.93	AV

Note: PK value is lower than the Average value limit, So average didn't record.
The 26.5-40G amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Test Mode:	TX (5.8G) -- 802.11a

Polar	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G							
Vertical	4679.01	70.10	-20.24	49.86	74.00	-24.14	PK
Vertical	4679.01	59.30	-20.24	39.06	54.00	-14.94	AV
Vertical	11490.14	61.65	-8.79	52.86	68.20	-15.34	PK
Vertical	11490.14	49.74	-8.79	40.95	54.00	-13.05	AV
Vertical	17235.07	56.32	-3.18	53.14	68.20	-15.06	PK
Vertical	17235.07	44.08	-3.18	40.90	54.00	-13.10	AV
Horizontal	4679.02	70.01	-20.73	49.28	74.00	-24.72	PK
Horizontal	4679.02	60.00	-20.73	39.27	54.00	-14.73	AV
Horizontal	11490.03	61.65	-8.79	52.86	68.20	-15.34	PK
Horizontal	11490.03	49.84	-8.79	41.05	54.00	-12.95	AV
Horizontal	17235.18	55.50	-3.18	52.32	68.20	-15.88	PK
Horizontal	17235.18	44.55	-3.18	41.37	54.00	-12.63	AV
Middle Channel (5785 MHz)-Above 1G							
Vertical	4592.01	74.84	-20.42	54.42	74.00	-19.58	PK
Vertical	4592.01	59.40	-20.42	38.98	54.00	-15.02	AV
Vertical	11570.01	64.91	-8.86	56.05	68.20	-12.15	PK
Vertical	11570.01	49.71	-8.86	40.85	54.00	-13.15	AV
Vertical	17355.05	59.50	-2.52	56.98	68.20	-11.22	PK
Vertical	17355.05	44.03	-2.52	41.51	54.00	-12.49	AV
Horizontal	4592.12	74.70	-20.42	54.28	74.00	-19.72	PK
Horizontal	4592.12	59.41	-20.42	38.99	54.00	-15.01	AV
Horizontal	11570.18	60.99	-8.86	52.13	68.20	-16.07	PK
Horizontal	11570.18	49.03	-8.86	40.17	54.00	-13.83	AV
Horizontal	17355.02	56.86	-2.52	54.34	68.20	-13.86	PK
Horizontal	17355.02	44.88	-2.52	42.36	54.00	-11.64	AV
High Channel (5825 MHz)-Above 1G							
Vertical	6039.05	70.13	-18.93	51.19	68.20	-17.01	PK
Vertical	6039.05	59.72	-18.93	40.79	54.00	-13.21	AV
Vertical	11650.06	61.85	-8.92	52.93	74.00	-21.07	PK
Vertical	11650.06	49.54	-8.92	40.62	54.00	-13.38	AV
Vertical	17475.05	55.86	-1.86	54.00	68.20	-14.20	PK
Vertical	17475.05	44.46	-1.86	42.60	54.00	-11.40	AV
Horizontal	6039.19	72.39	-18.93	53.46	68.20	-14.74	PK
Horizontal	6039.19	59.08	-18.93	40.15	54.00	-13.85	AV
Horizontal	11650.00	61.68	-8.92	52.76	74.00	-21.24	PK
Horizontal	11650.00	49.50	-8.92	40.58	54.00	-13.42	AV
Horizontal	17475.00	57.37	-1.86	55.51	68.20	-12.69	PK
Horizontal	17475.00	44.53	-1.86	42.67	54.00	-11.33	AV

Note: PK value is lower than the Average value limit, So average didn't record.
The 26.5-40G amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

Test Mode:	TX (5.8G) --802.11n-HT20

Polar	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G							
Vertical	4679.17	73.52	-20.24	53.28	74.00	-20.72	PK
Vertical	4679.17	59.30	-20.24	39.06	54.00	-14.94	AV
Vertical	11490.14	62.44	-8.79	53.65	68.20	-14.55	PK
Vertical	11490.14	49.99	-8.79	41.20	54.00	-12.80	AV
Vertical	17235.00	56.71	-3.18	53.53	68.20	-14.67	PK
Vertical	17235.00	44.86	-3.18	41.68	54.00	-12.32	AV
Horizontal	4679.10	73.72	-20.24	53.48	74.00	-20.52	PK
Horizontal	4679.10	59.77	-20.24	39.53	54.00	-14.47	AV
Horizontal	11490.18	60.84	-8.79	52.05	68.20	-16.15	PK
Horizontal	11490.18	49.90	-8.79	41.11	54.00	-12.89	AV
Horizontal	17235.04	58.53	-3.18	55.35	68.20	-12.85	PK
Horizontal	17235.04	44.05	-3.18	40.87	54.00	-13.13	AV
Middle Channel (5785 MHz)-Above 1G							
Vertical	4592.11	73.17	-20.42	52.75	74.00	-21.25	PK
Vertical	4592.11	59.08	-20.42	38.67	54.00	-15.33	AV
Vertical	11570.09	63.03	-8.86	54.17	68.20	-14.03	PK
Vertical	11570.09	49.64	-8.86	40.78	54.00	-13.22	AV
Vertical	17355.13	57.09	-2.52	54.57	68.20	-13.63	PK
Vertical	17355.13	44.36	-2.52	41.84	54.00	-12.16	AV
Horizontal	4592.19	71.24	-20.42	50.82	74.00	-23.18	PK
Horizontal	4592.19	59.53	-20.42	39.11	54.00	-14.89	AV
Horizontal	11570.18	64.92	-8.86	56.06	68.20	-12.14	PK
Horizontal	11570.18	49.28	-8.86	40.42	54.00	-13.58	AV
Horizontal	17355.07	57.25	-2.52	54.73	68.20	-13.47	PK
Horizontal	17355.07	44.18	-2.52	41.66	54.00	-12.34	AV
High Channel (5825 MHz)-Above 1G							
Vertical	6039.16	72.34	-18.93	53.41	68.20	-14.79	PK
Vertical	6039.16	59.23	-18.93	40.30	54.00	-13.70	AV
Vertical	11650.07	63.17	-8.92	54.25	74.00	-19.75	PK
Vertical	11650.07	49.93	-8.92	41.01	54.00	-12.99	AV
Vertical	17475.02	57.49	-1.86	55.63	68.20	-12.57	PK
Vertical	17475.02	44.60	-1.86	42.74	54.00	-11.26	AV
Horizontal	6039.01	72.84	-18.93	53.91	68.20	-14.29	PK
Horizontal	6039.01	59.82	-18.93	40.88	54.00	-13.12	AV
Horizontal	11650.09	64.69	-8.92	55.77	74.00	-18.23	PK
Horizontal	11650.09	49.94	-8.92	41.02	54.00	-12.98	AV
Horizontal	17475.02	55.62	-1.86	53.76	68.20	-14.44	PK
Horizontal	17475.02	44.45	-1.86	42.59	54.00	-11.41	AV

Note: PK value is lower than the Average value limit, So average didn't record.
The 26.5-40G amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

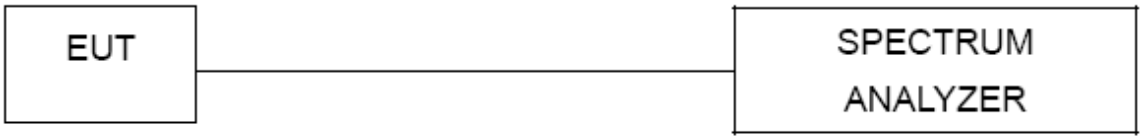
Test Mode:	TX (5.8G) -- 802.11n-HT40

Polar	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
(H/V)	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5755 MHz)-Above 1G							
Vertical	4679.16	74.90	-20.24	54.66	74.00	-19.34	PK
Vertical	4679.16	59.93	-20.24	39.69	54.00	-14.31	AV
Vertical	11510.05	60.47	-8.81	51.66	74.00	-22.34	PK
Vertical	11510.05	49.61	-8.81	40.80	54.00	-13.20	AV
Vertical	17265.06	59.50	-3.01	56.49	68.20	-11.71	PK
Vertical	17265.06	44.04	-3.01	41.03	54.00	-12.97	AV
Horizontal	4679.13	74.07	-20.24	53.83	74.00	-20.17	PK
Horizontal	4679.13	59.89	-20.24	39.65	54.00	-14.35	AV
Horizontal	11510.18	62.56	-8.81	53.75	74.00	-20.25	PK
Horizontal	11510.18	49.25	-8.81	40.44	54.00	-13.56	AV
Horizontal	17265.18	57.85	-3.01	54.84	68.20	-13.36	PK
Horizontal	17265.18	44.46	-3.01	41.45	54.00	-12.55	AV
Middle Channel (5795 MHz)-Above 1G							
Vertical	6039.14	70.52	-18.93	51.59	68.20	-16.61	PK
Vertical	6039.14	59.04	-18.93	40.11	54.00	-13.89	AV
Vertical	11590.04	61.68	-8.87	52.81	74.00	-21.19	PK
Vertical	11590.04	49.29	-8.87	40.42	54.00	-13.58	AV
Vertical	17385.09	57.93	-2.35	55.58	68.20	-12.62	PK
Vertical	17385.09	44.13	-2.35	41.78	54.00	-12.22	AV
Horizontal	6039.08	72.17	-18.93	53.24	68.20	-14.96	PK
Horizontal	6039.08	59.47	-18.93	40.54	54.00	-13.46	AV
Horizontal	11590.15	62.07	-8.87	53.20	74.00	-20.80	PK
Horizontal	11590.15	49.13	-8.87	40.26	54.00	-13.74	AV
Horizontal	17385.06	56.77	-2.35	54.42	68.20	-13.78	PK
Horizontal	17385.06	44.63	-2.35	42.28	54.00	-11.72	AV

Note: PK value is lower than the Average value limit, So average didn't record.
The 26.5-40G amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.
Emission level (dBuV/m) = 20 log Emission level (uV/m).
Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

8. Power Spectral Density Test

8.1 Block Diagram Of Test Setup



8.2 Limit

For the band 5.15-5.25 GHz,
(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. 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.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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.
For the band 5.725-5.85 GHz

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands
(b) (2) The maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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 the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. 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.

8.3 Test Procedure

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:
a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

8.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

8.5 Test Result

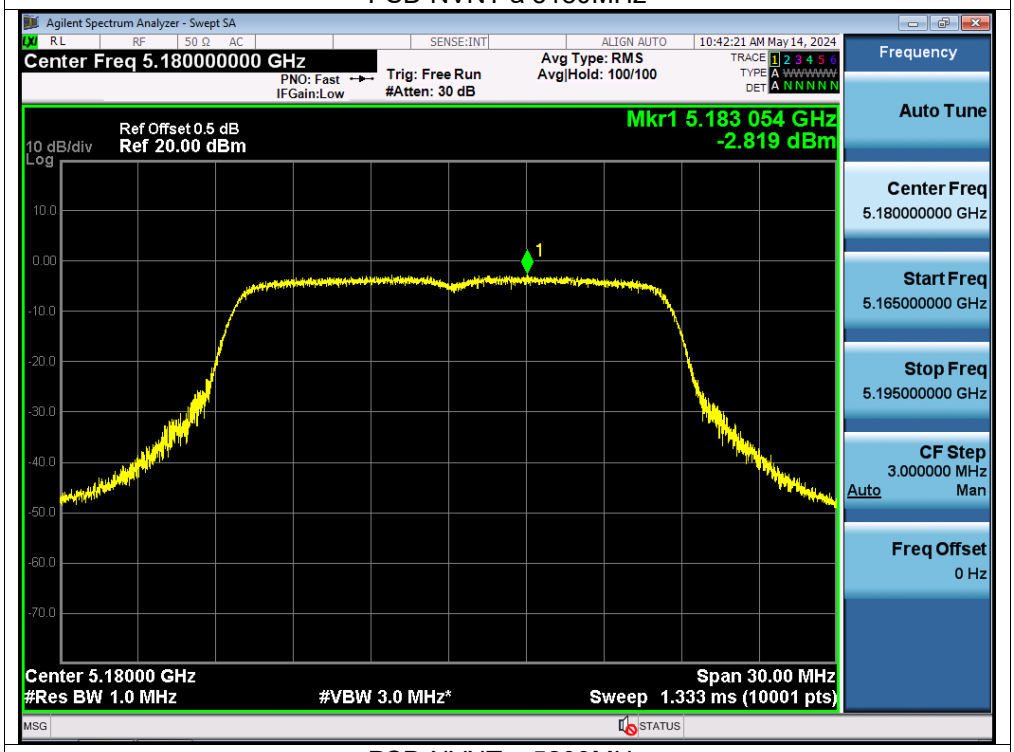
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC 24V/60Hz
Test Mode:	(5180-5240MHz); (5745-5825MHz)		

Condition	Mode	Frequency (MHz)	Conducted PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	-2.82	10	Pass
NVNT	a	5200	-1.47	10	Pass
NVNT	a	5240	-0.74	10	Pass
NVNT	n20	5180	-2.45	10	Pass
NVNT	n20	5200	-2.87	10	Pass
NVNT	n20	5240	-2.63	10	Pass
NVNT	n40	5190	-5.64	10	Pass
NVNT	n40	5230	-4.89	10	Pass

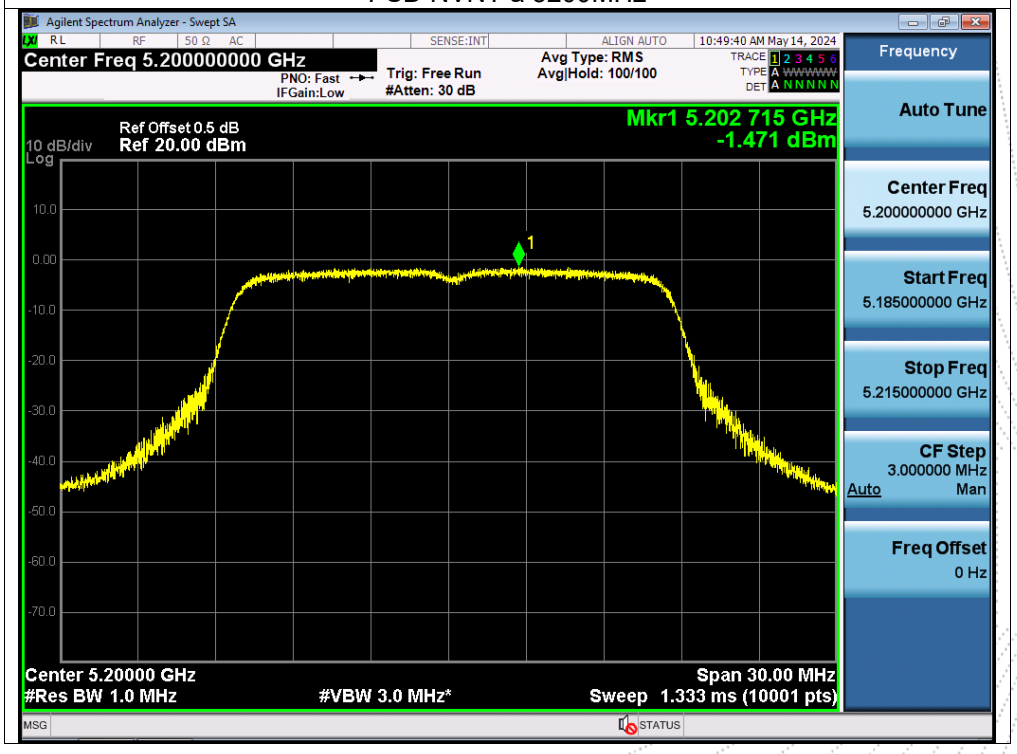
Condition	Mode	Frequency (MHz)	Conducted PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	-5.14	30	Pass
NVNT	a	5785	-6.17	30	Pass
NVNT	a	5825	-6.86	30	Pass
NVNT	n20	5745	-5.52	30	Pass
NVNT	n20	5785	-6.52	30	Pass
NVNT	n20	5825	-6.99	30	Pass
NVNT	n40	5755	-11.54	30	Pass
NVNT	n40	5795	-12.35	30	Pass

Test Graphs

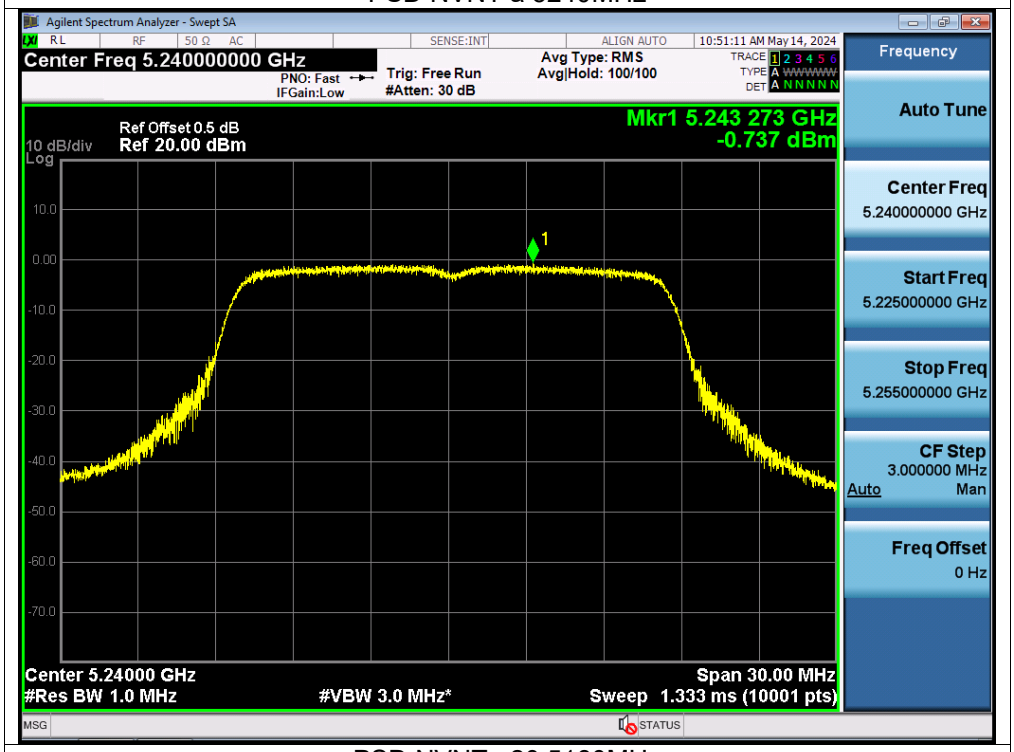
PSD NVNT a 5180MHz



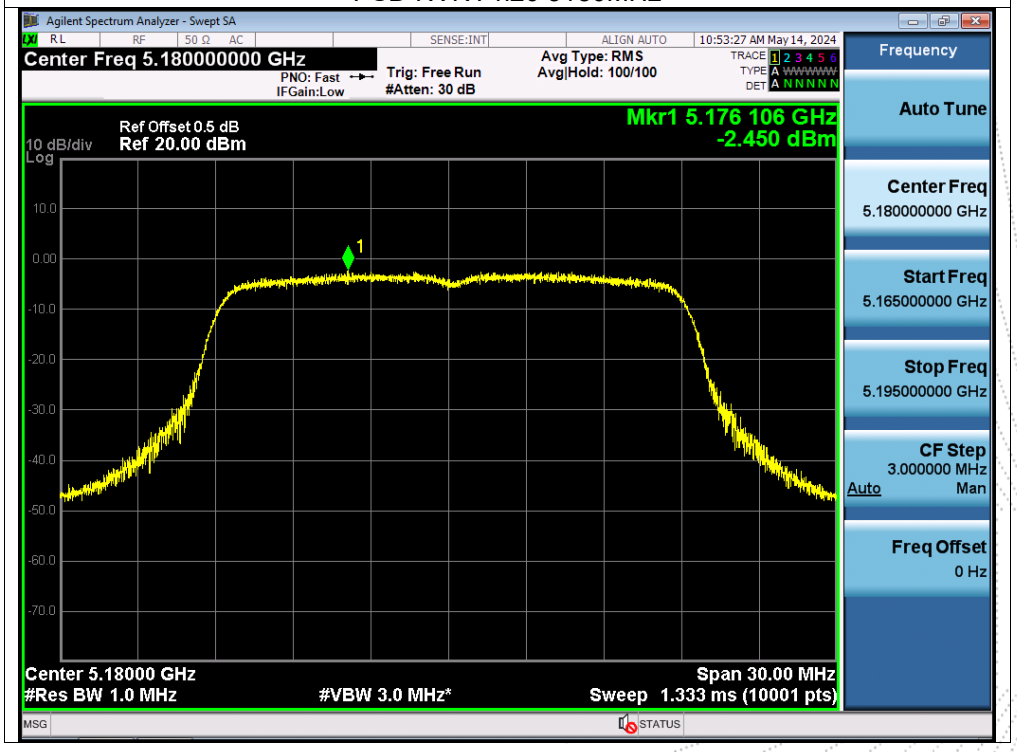
PSD NVNT a 5200MHz



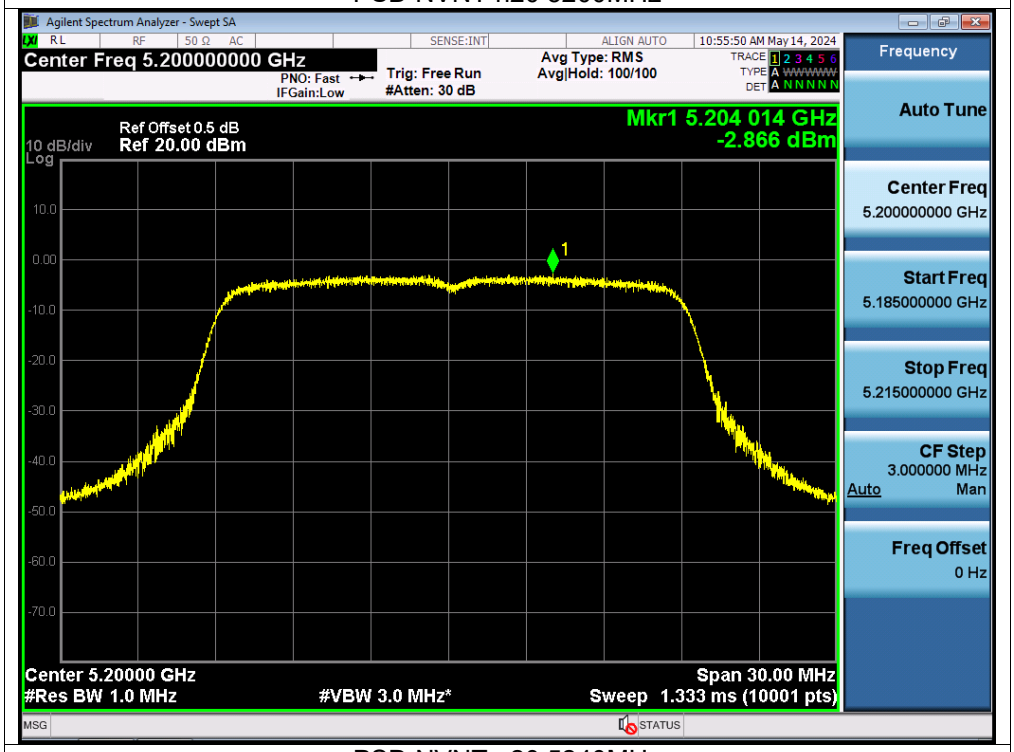
PSD NVNT a 5240MHz



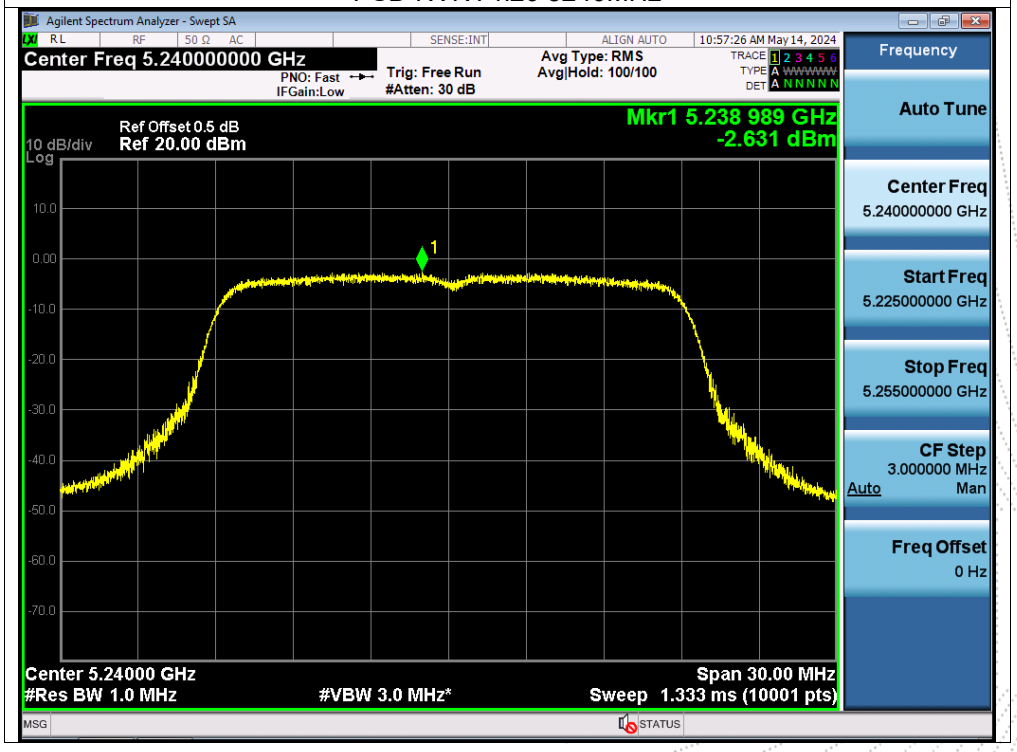
PSD NVNT n20 5180MHz



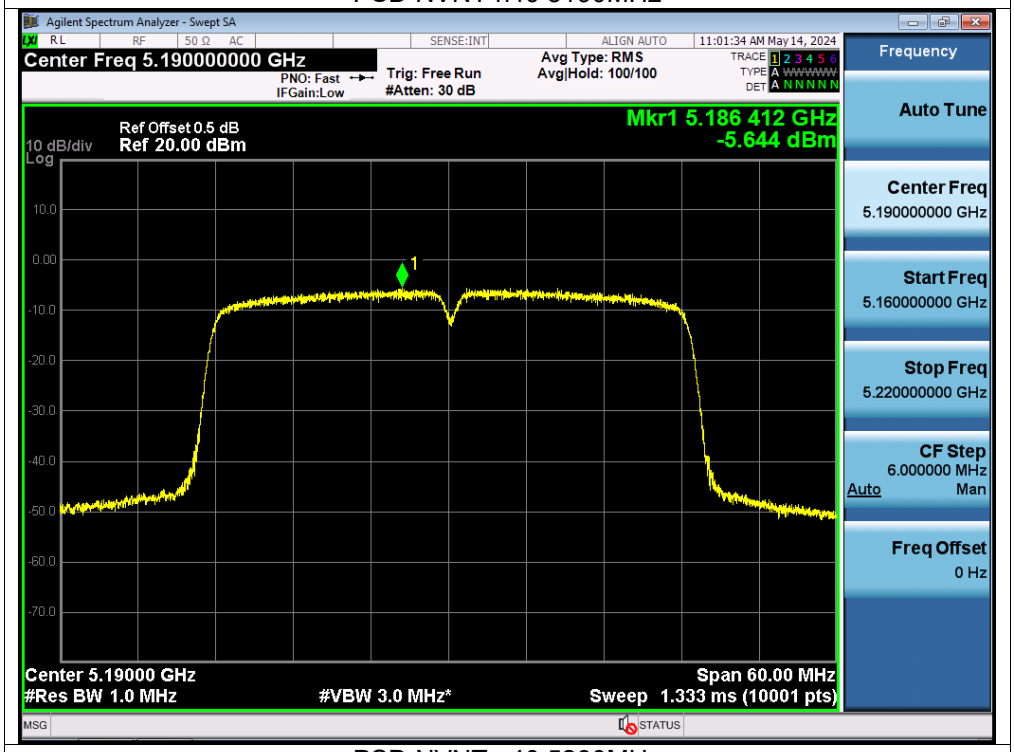
PSD NVNT n20 5200MHz



PSD NVNT n20 5240MHz



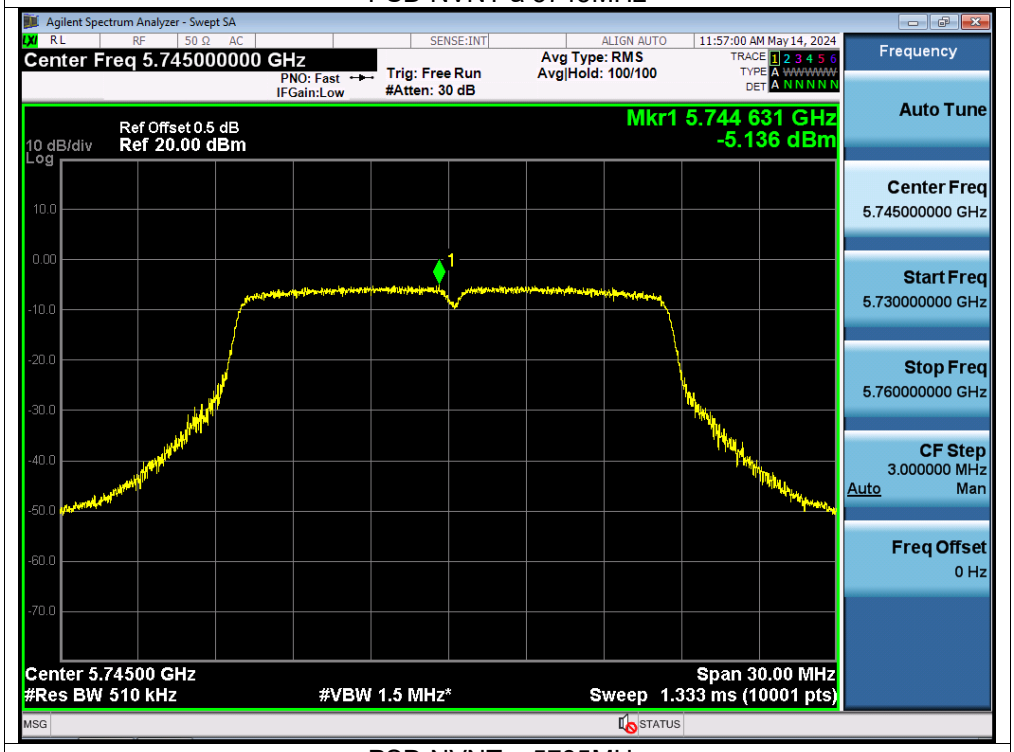
PSD NVNT n40 5190MHz



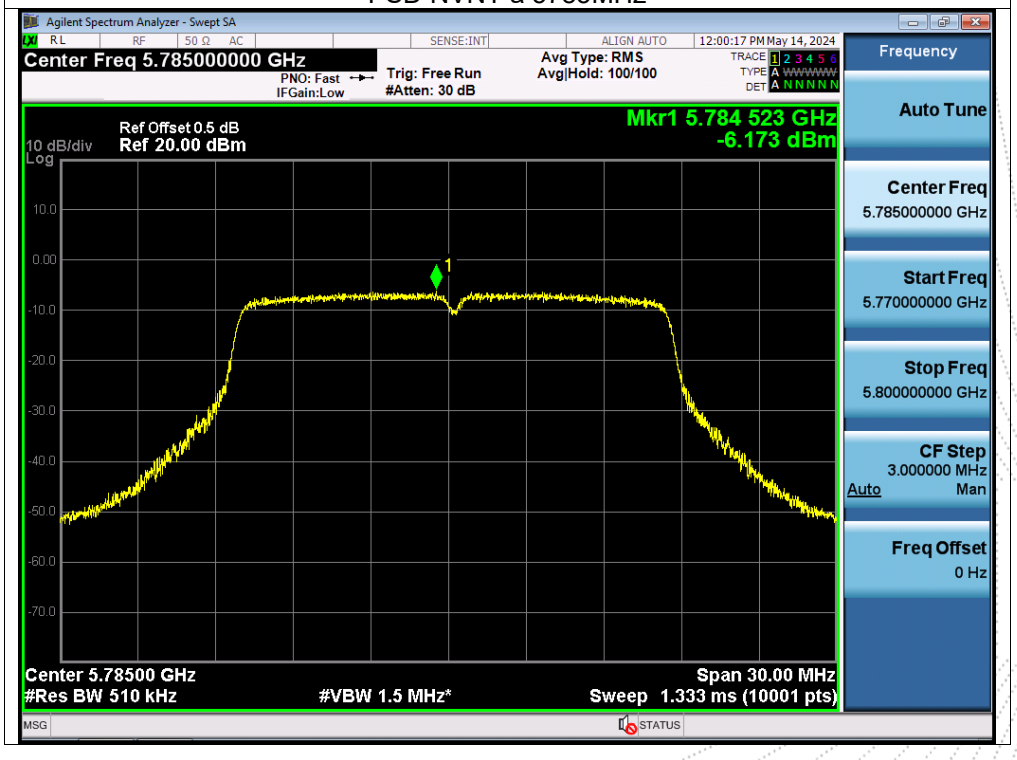
PSD NVNT n40 5230MHz

Test Graphs

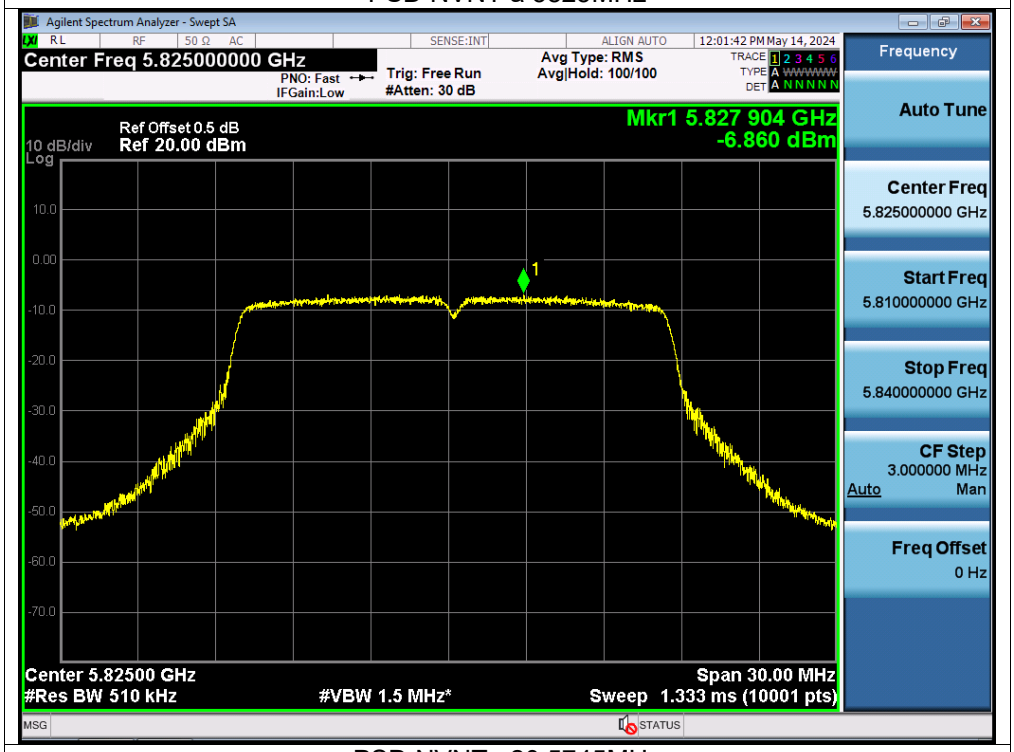
PSD NVNT a 5745MHz



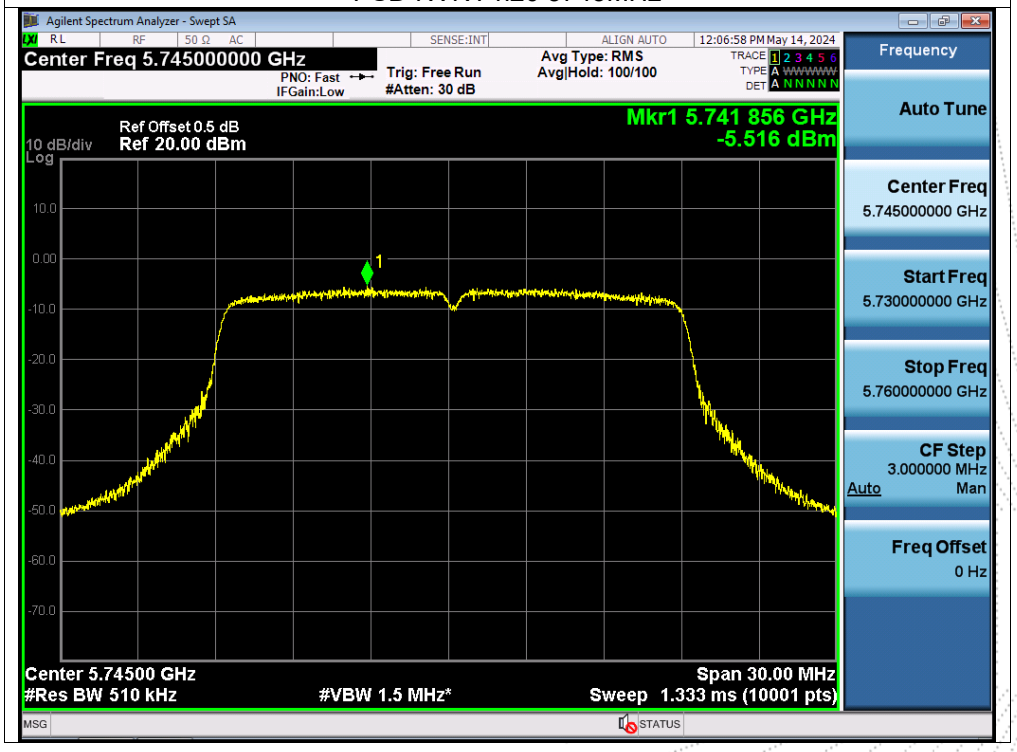
PSD NVNT a 5785MHz



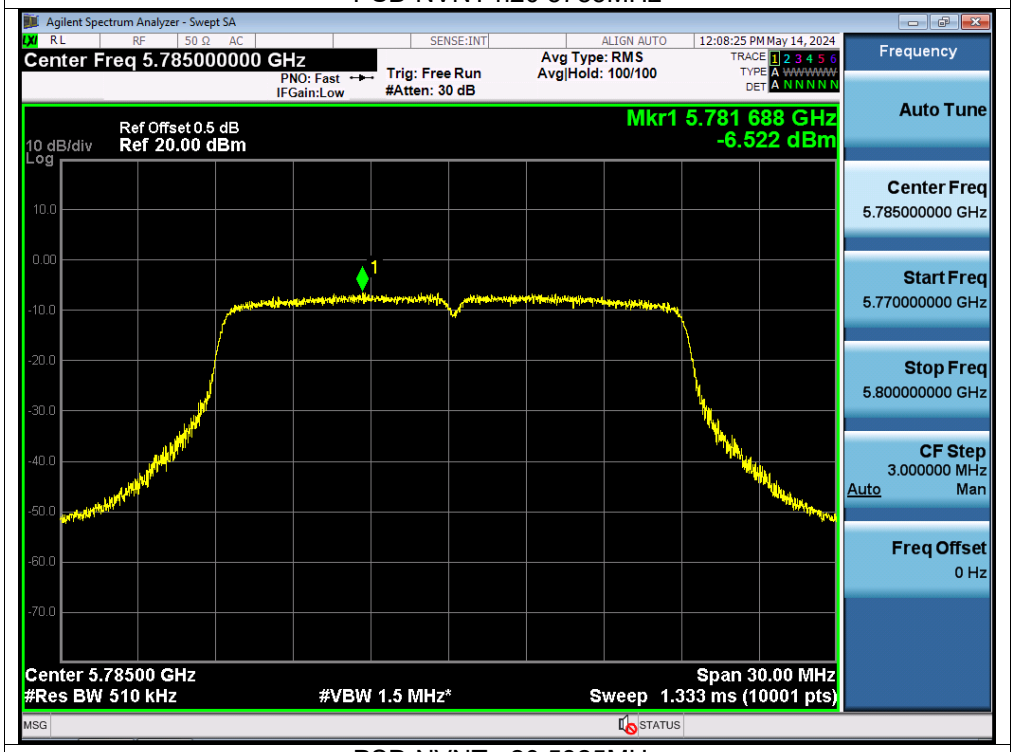
PSD NVNT a 5825MHz



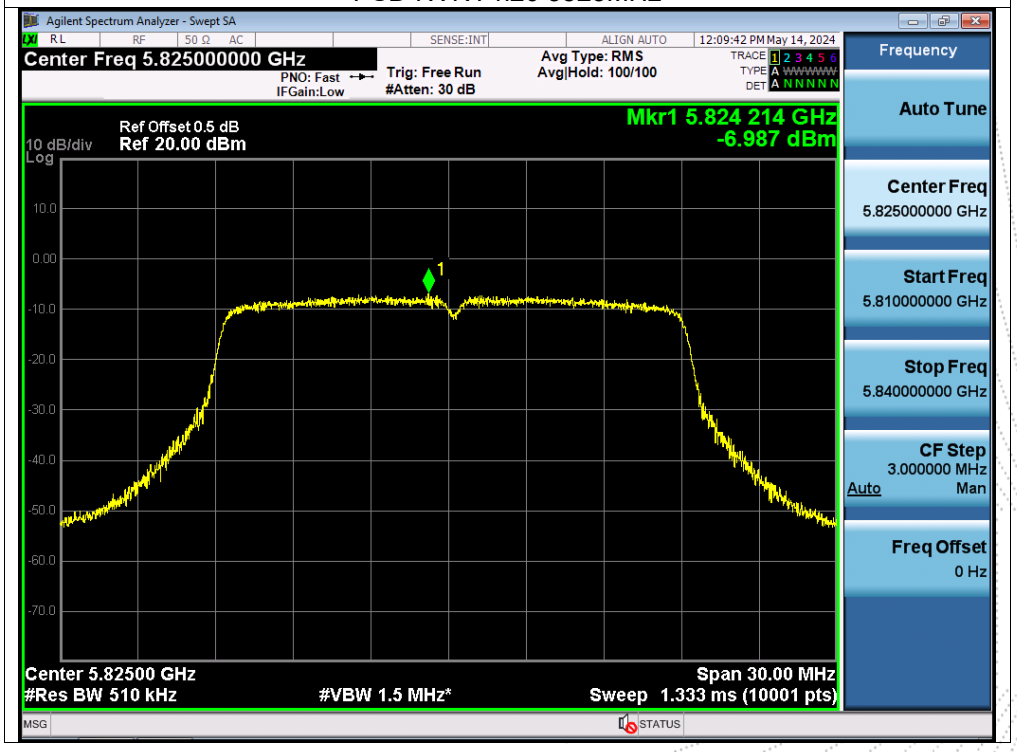
PSD NVNT n20 5745MHz



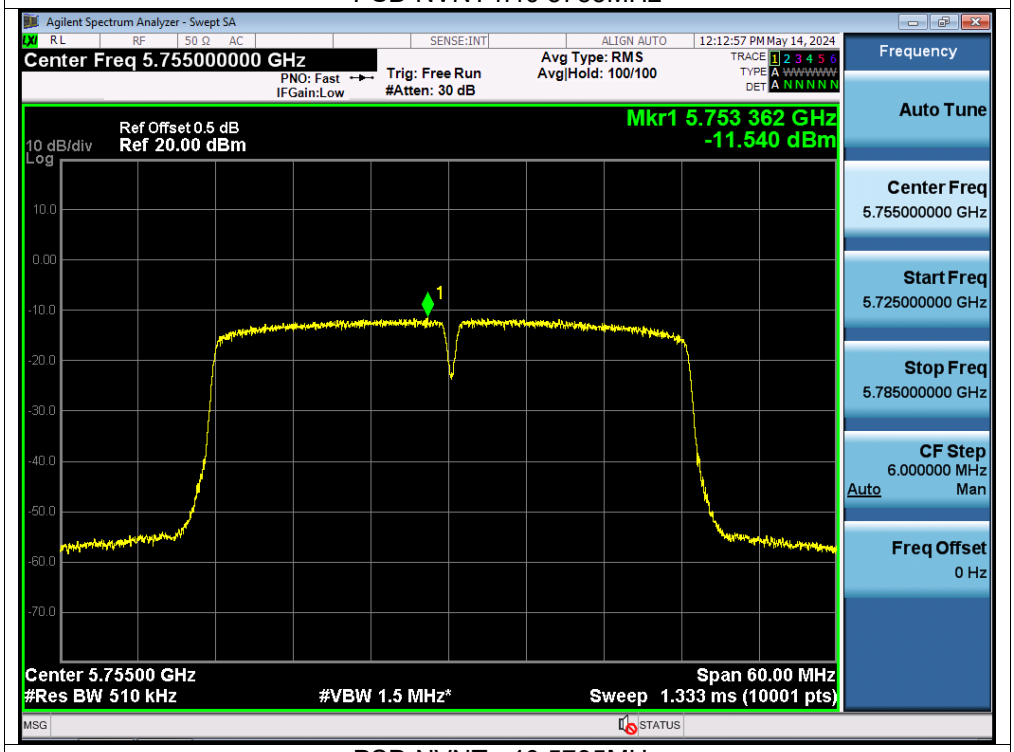
PSD NVNT n20 5785MHz



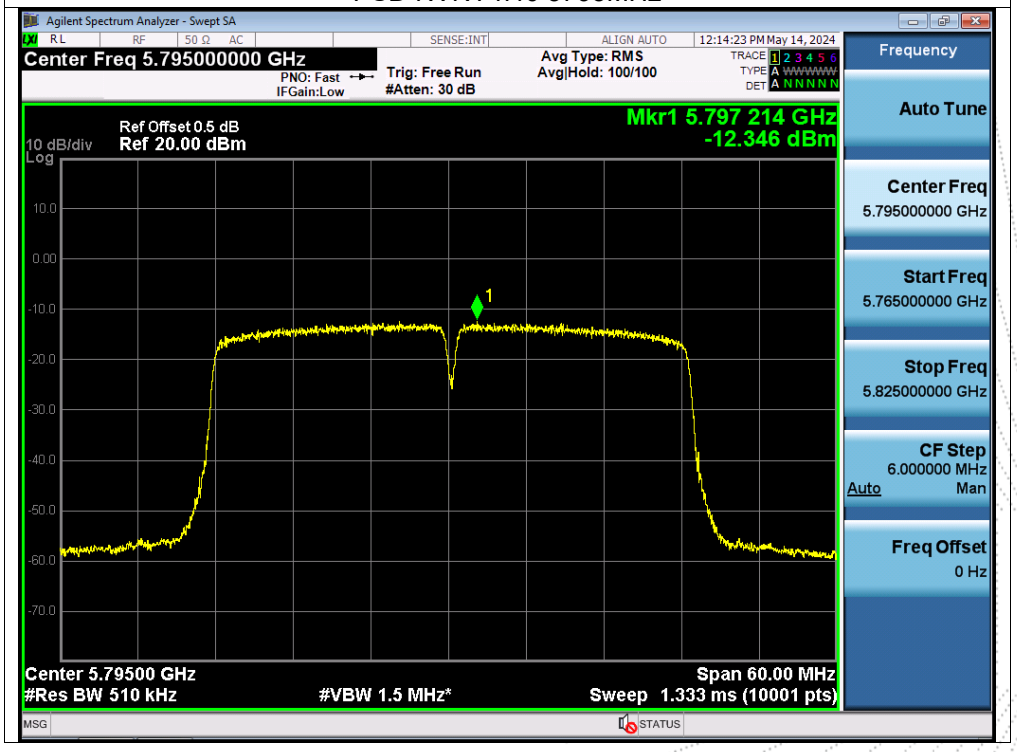
PSD NVNT n20 5825MHz



PSD NVNT n40 5755MHz

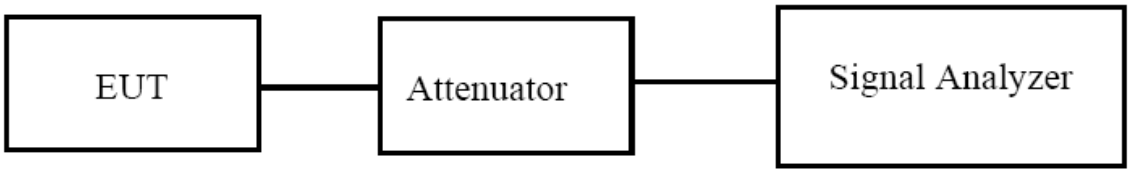


PSD NVNT n40 5795MHz



9. 26dB & 6dB & 99% Emission Bandwidth

9.1 Block Diagram Of Test Setup



9.2 Limit

(1) For the band 5.15-5.25 GHz.
(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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 the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. 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 the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

9.3 Test Procedure

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum 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%.

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 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 (if available).
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.

9.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

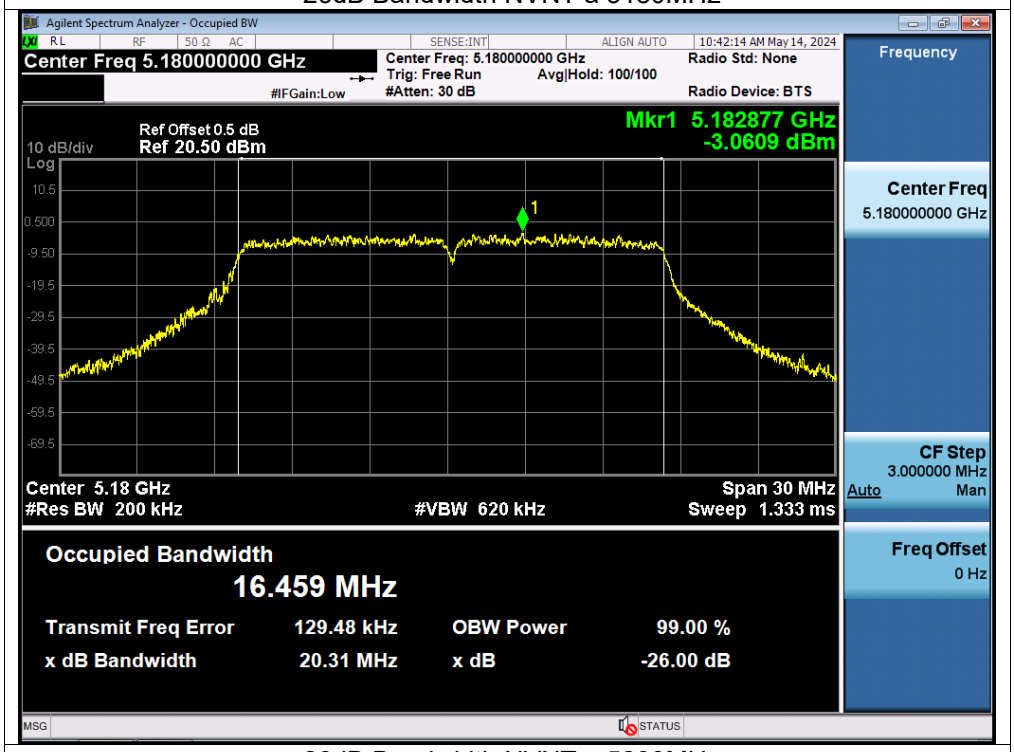
9.5 Test Result

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC 24V/60Hz
Test Mode:	(5180-5240MHz)		

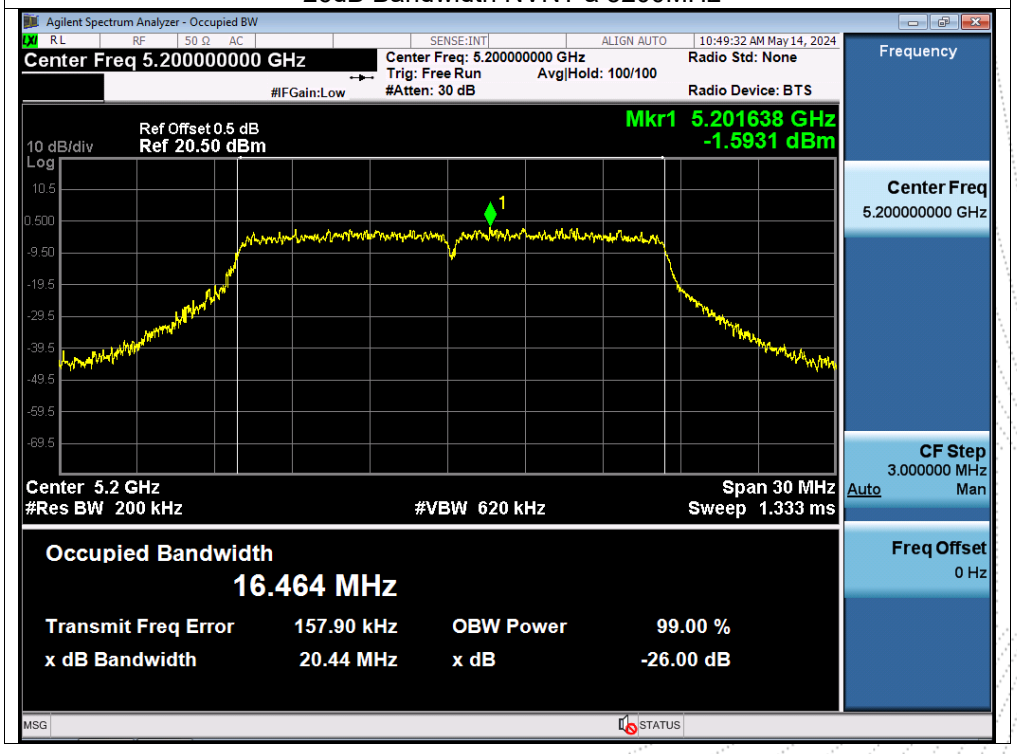
Condition	Mode	Frequency (MHz)	99% bandwidth (MHz)	26dB bandwidth (MHz)	Result
NVNT	a	5180	16.449	20.309	Pass
NVNT	a	5200	16.459	20.439	Pass
NVNT	a	5240	16.454	20.156	Pass
NVNT	n20	5180	17.607	20.934	Pass
NVNT	n20	5200	17.604	20.994	Pass
NVNT	n20	5240	17.616	21.159	Pass
NVNT	n40	5190	35.714	38.44	Pass
NVNT	n40	5230	35.655	38.361	Pass

Test Graphs

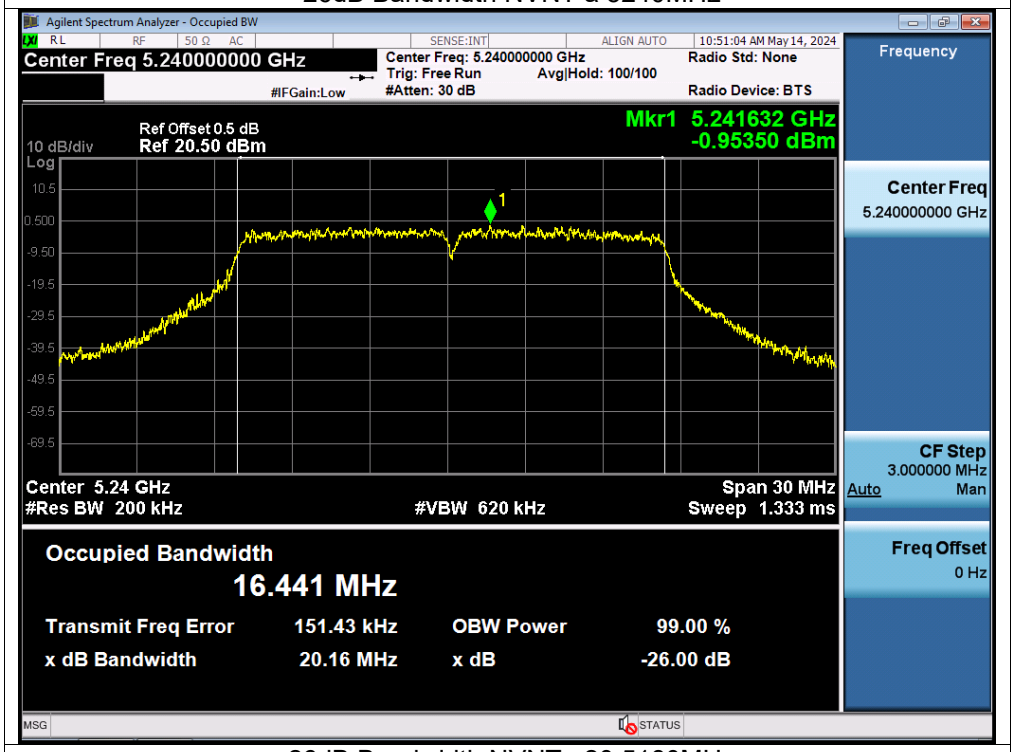
-26dB Bandwidth NVNT a 5180MHz



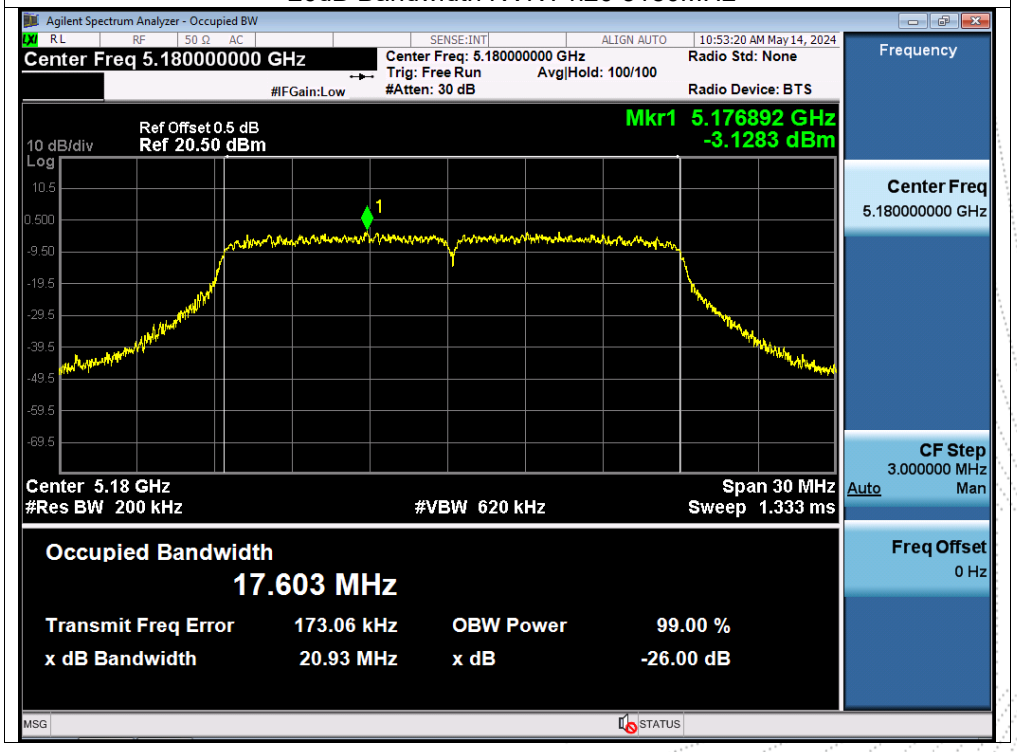
-26dB Bandwidth NVNT a 5200MHz



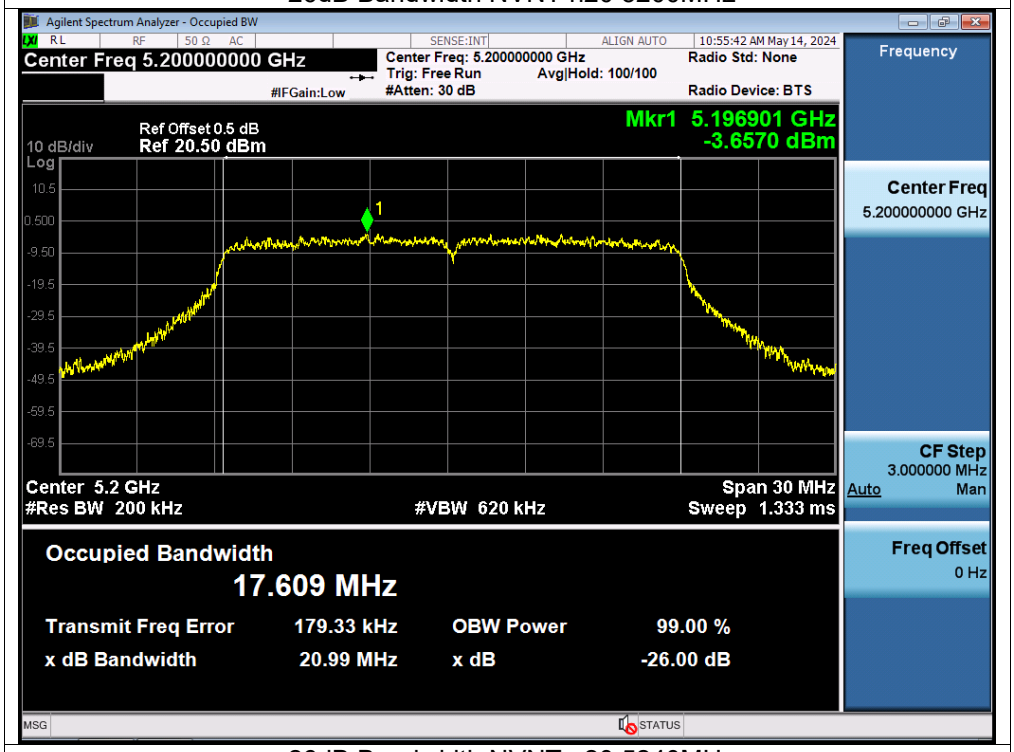
-26dB Bandwidth NVNT a 5240MHz



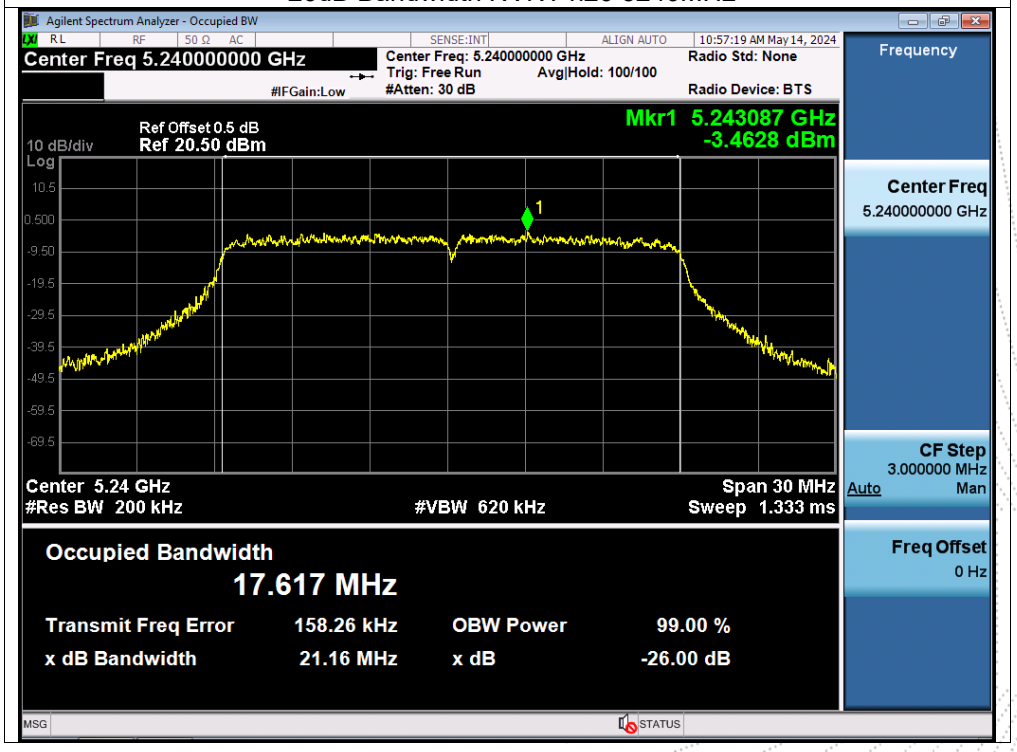
-26dB Bandwidth NVNT n20 5180MHz



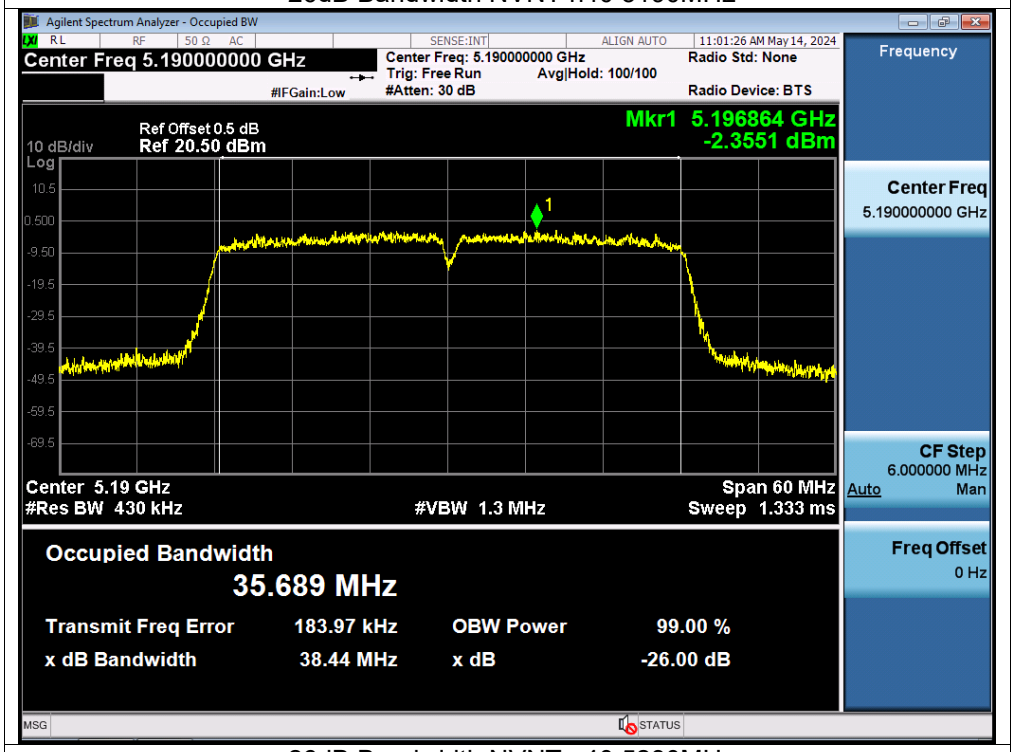
-26dB Bandwidth NVNT n20 5200MHz



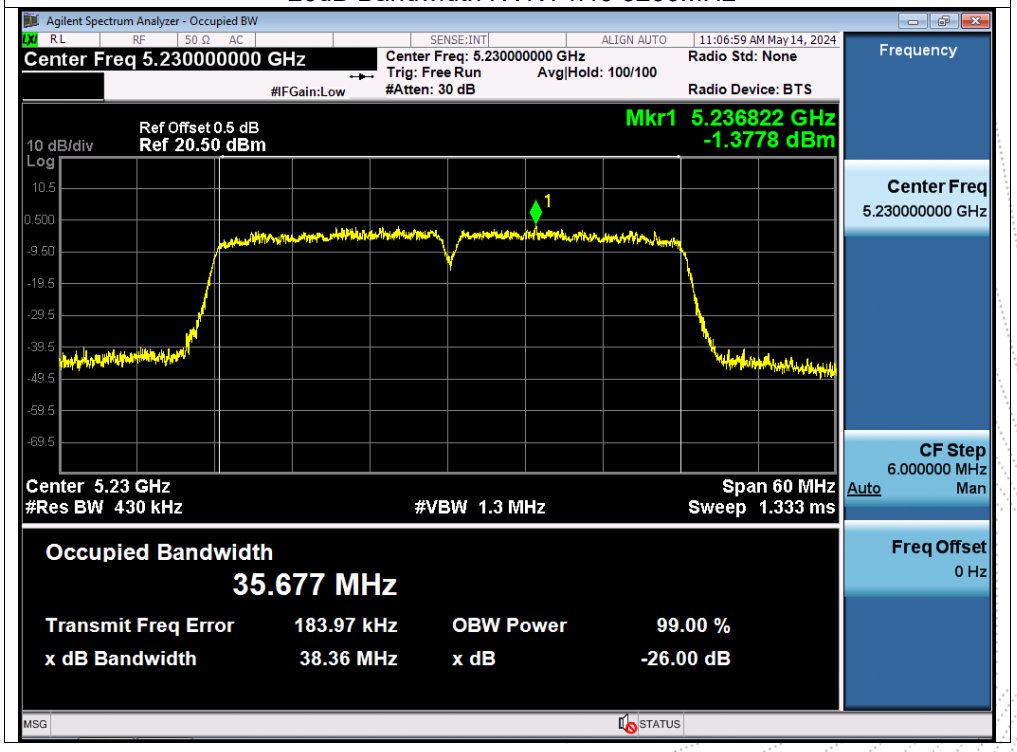
-26dB Bandwidth NVNT n20 5240MHz



-26dB Bandwidth NVNT n40 5190MHz

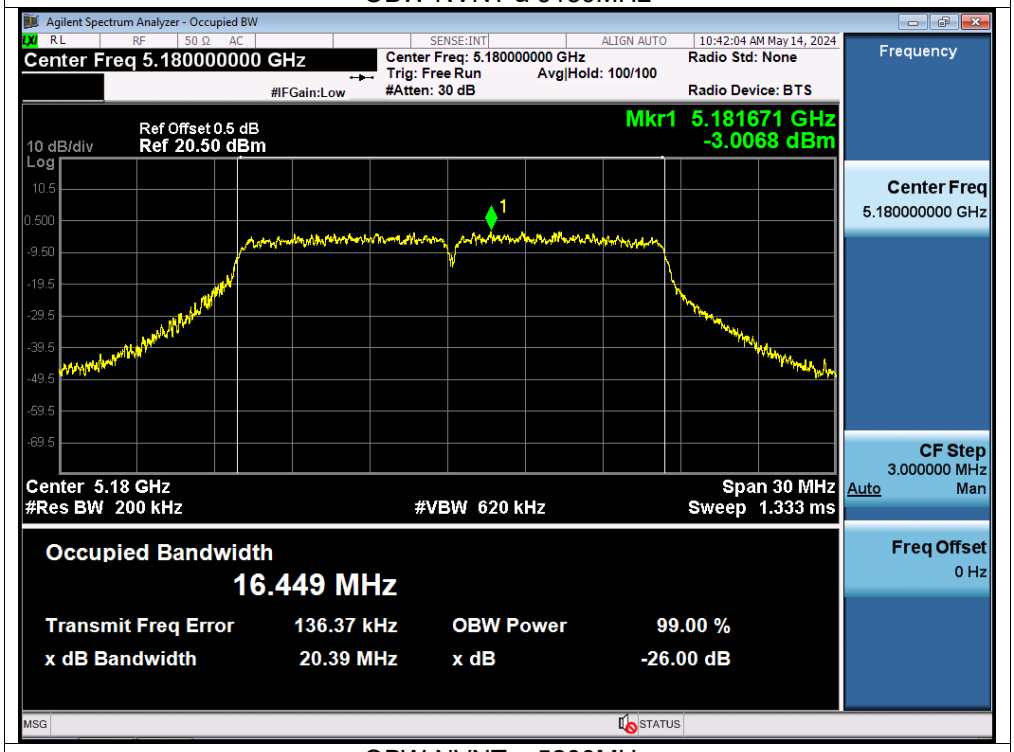


-26dB Bandwidth NVNT n40 5230MHz

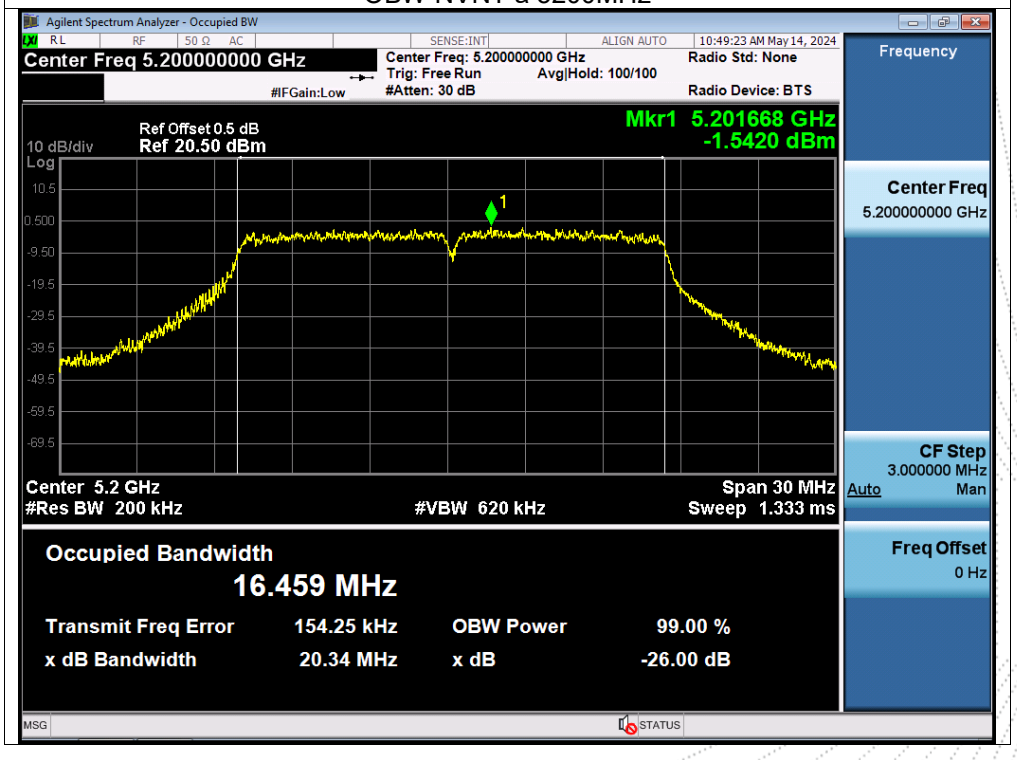


Test Graphs

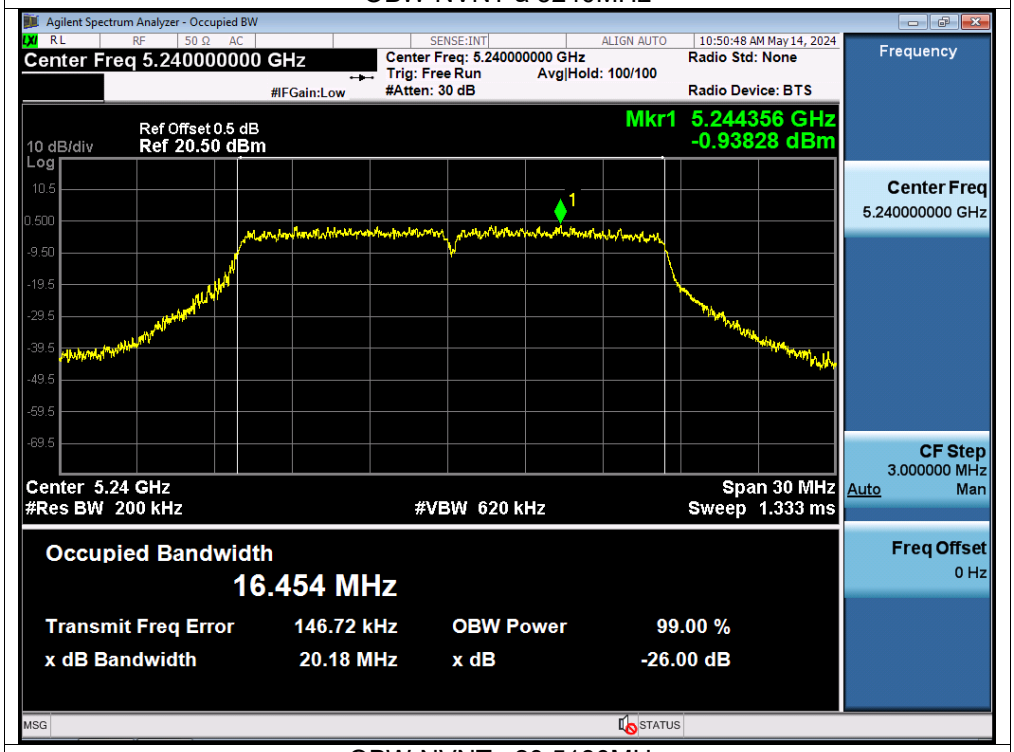
OBW NVNT a 5180MHz



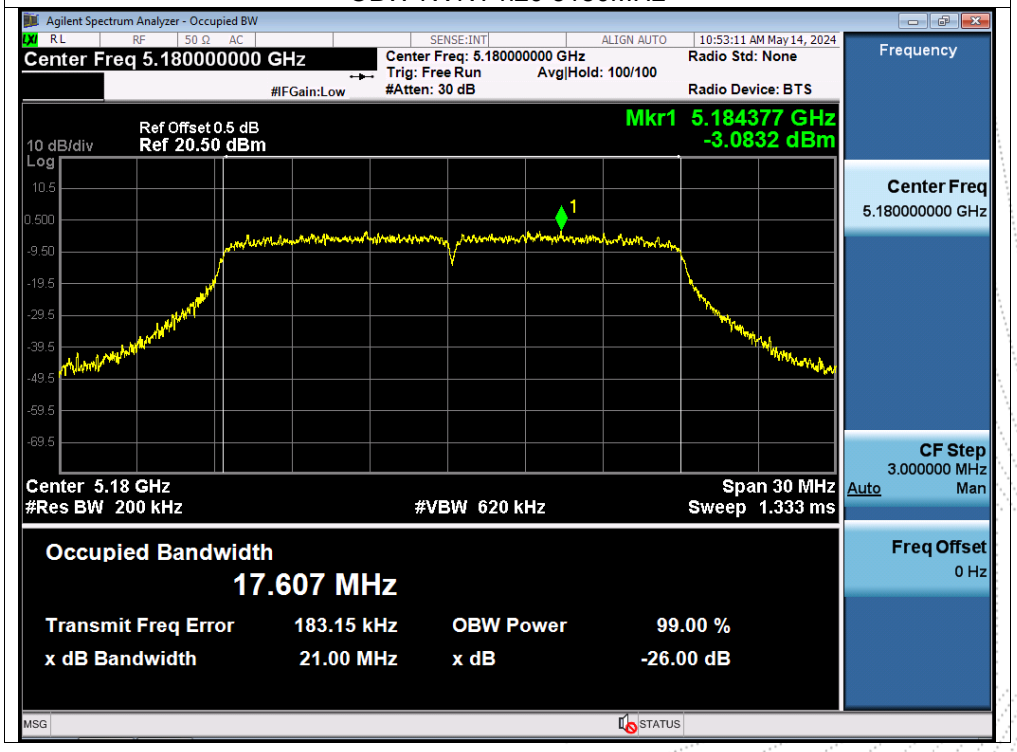
OBW NVNT a 5200MHz



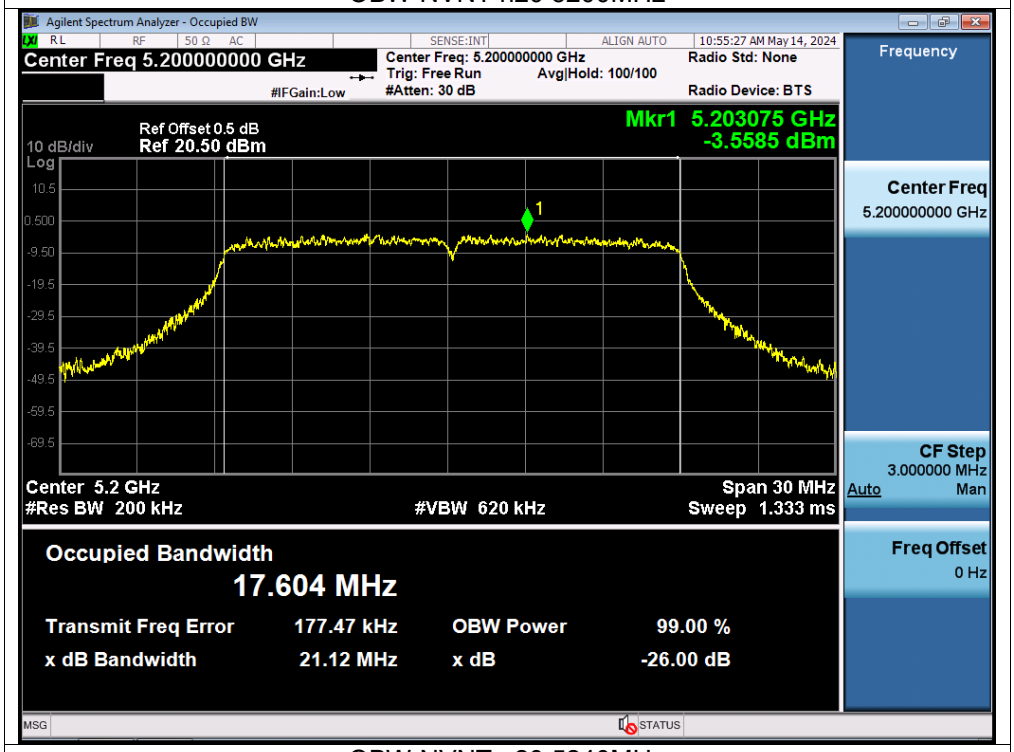
OBW NVNT a 5240MHz



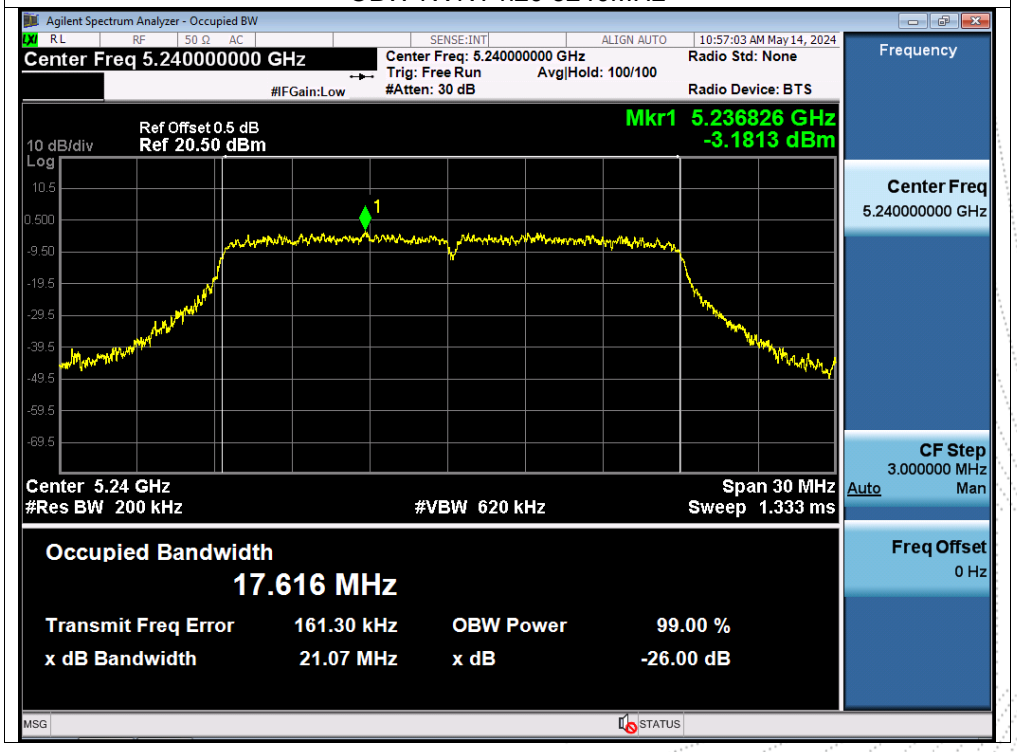
OBW NVNT n20 5180MHz



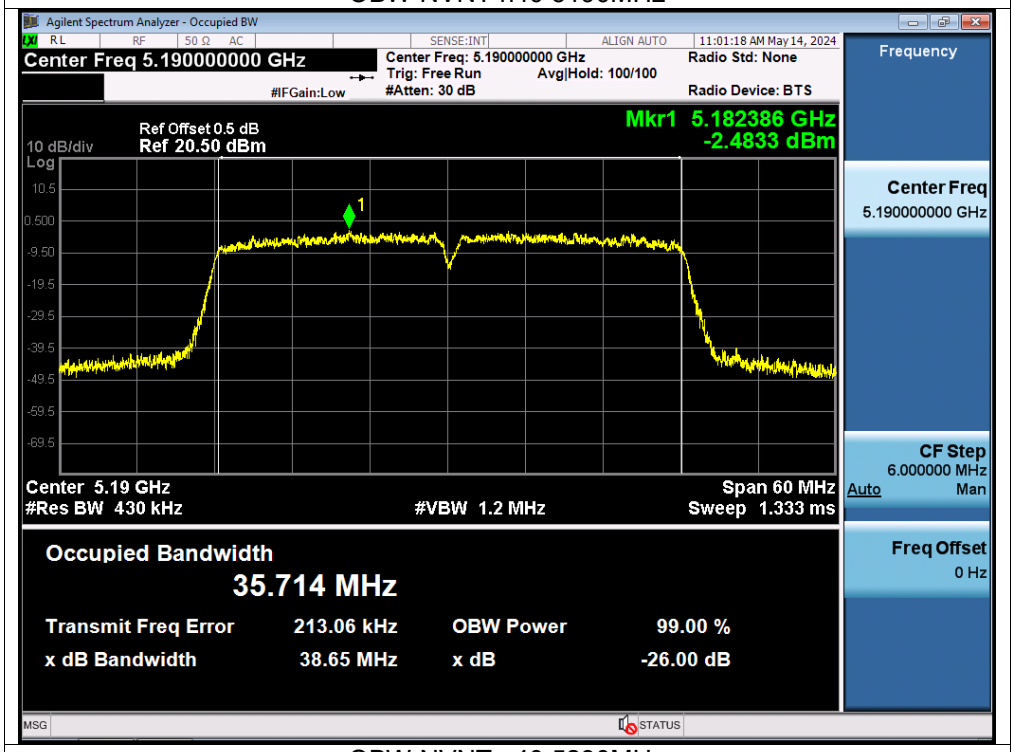
OBW NVNT n20 5200MHz



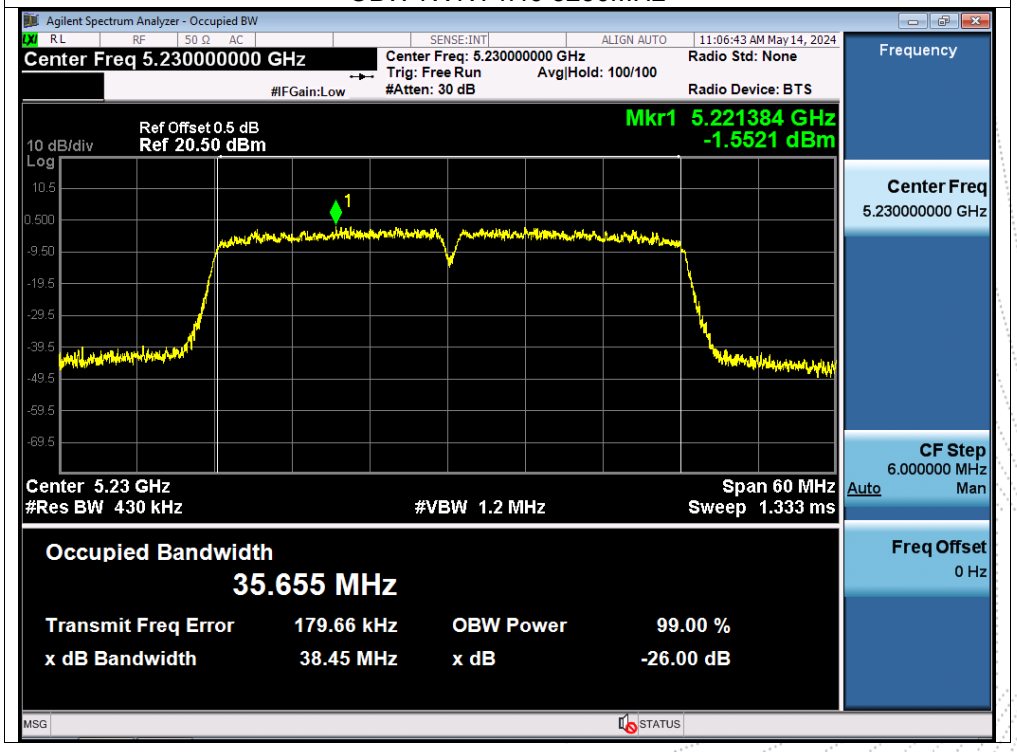
OBW NVNT n20 5240MHz



OBW NVNT n40 5190MHz



OBW NVNT n40 5230MHz

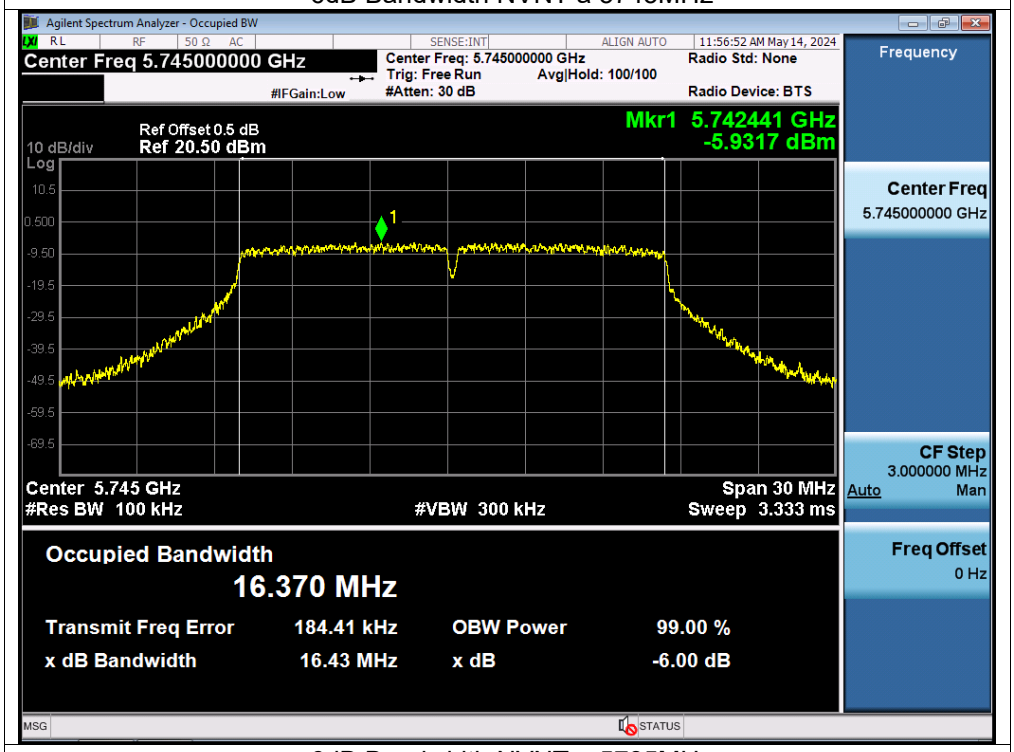


Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC 24V/60Hz
Test Mode:	(5745-5825MHz)		

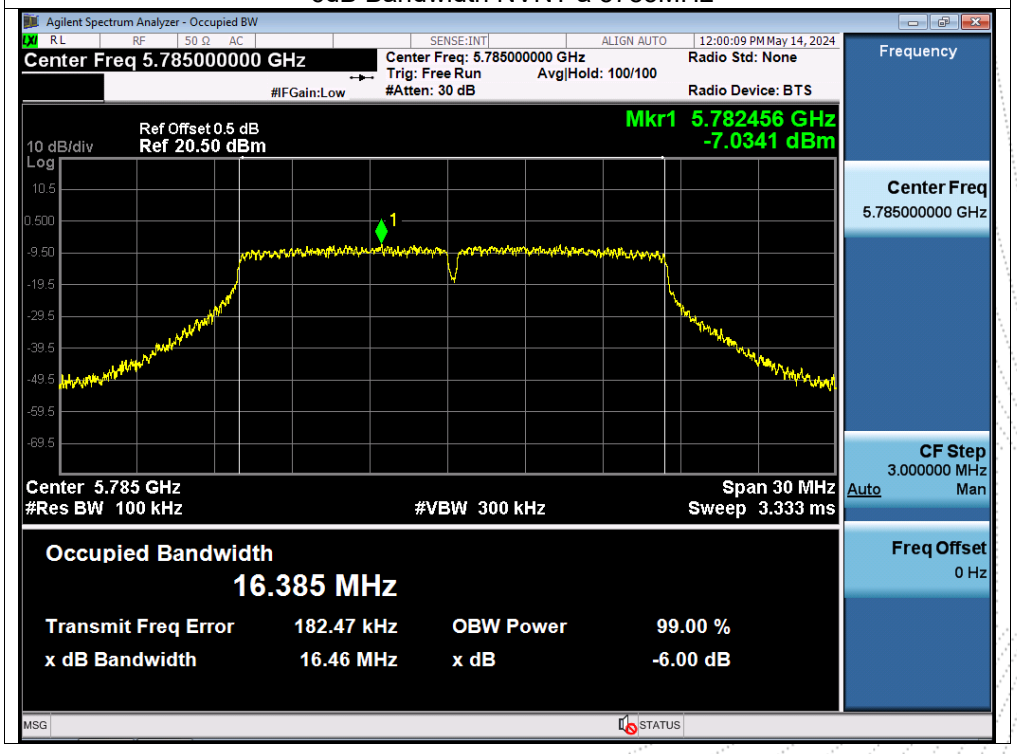
Condition	Mode	Frequency (MHz)	99% bandwidth (MHz)	-6dB bandwidth (MHz)	Limit -6dB bandwidth (MHz)	Result
NVNT	a	5745	16.463	16.429	0.5	Pass
NVNT	a	5785	16.467	16.462	0.5	Pass
NVNT	a	5825	16.456	16.431	0.5	Pass
NVNT	n20	5745	17.598	17.642	0.5	Pass
NVNT	n20	5785	17.607	17.602	0.5	Pass
NVNT	n20	5825	17.618	17.636	0.5	Pass
NVNT	n40	5755	35.679	36.314	0.5	Pass
NVNT	n40	5795	35.706	36.314	0.5	Pass

Test Graphs

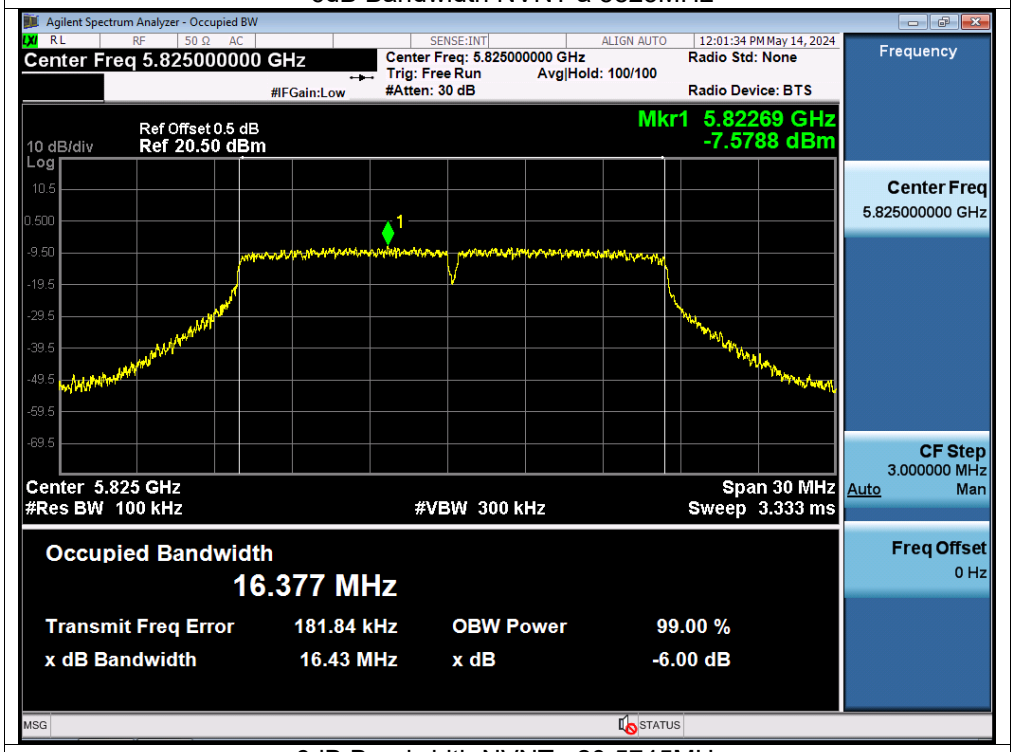
-6dB Bandwidth NVNT a 5745MHz



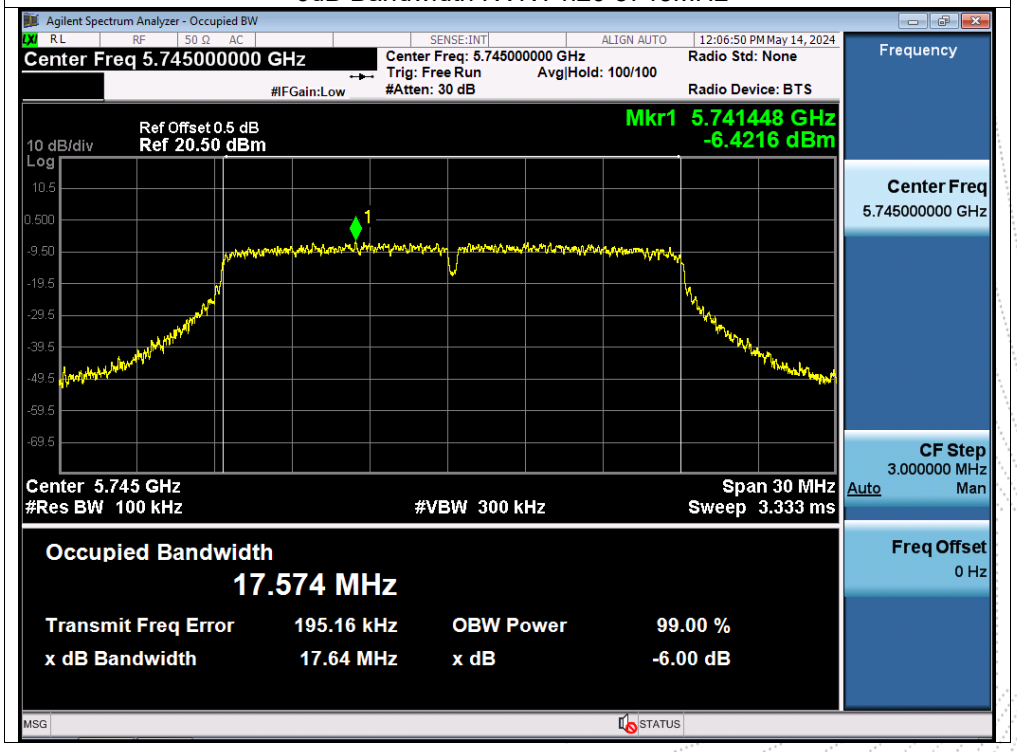
-6dB Bandwidth NVNT a 5785MHz



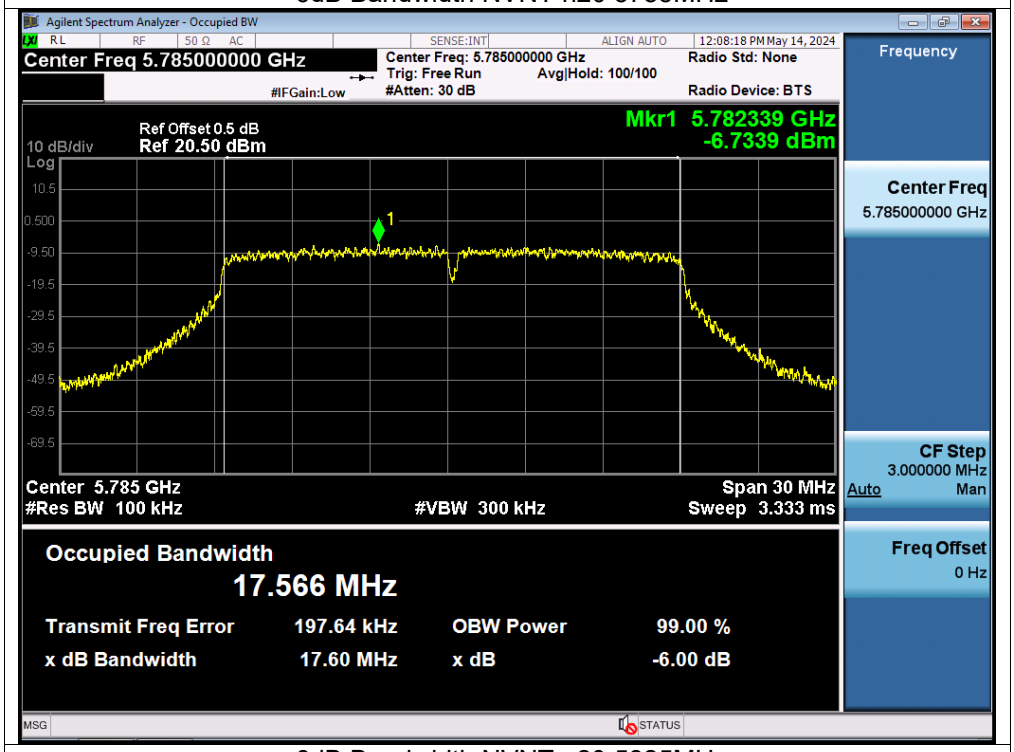
-6dB Bandwidth NVNT a 5825MHz



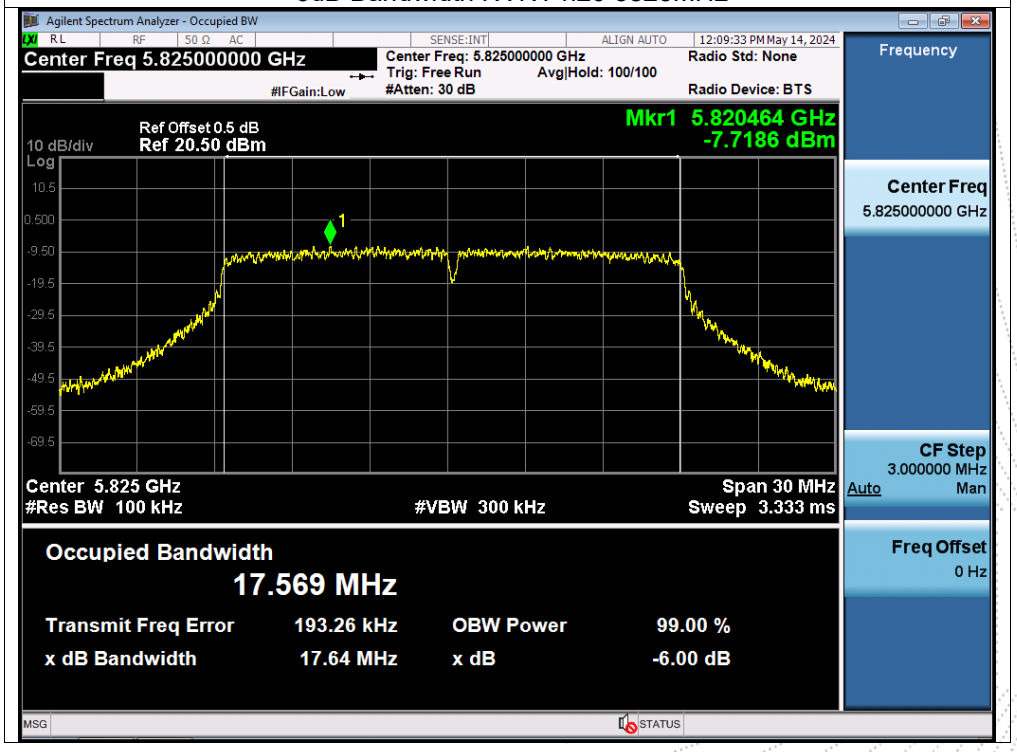
-6dB Bandwidth NVNT n20 5745MHz



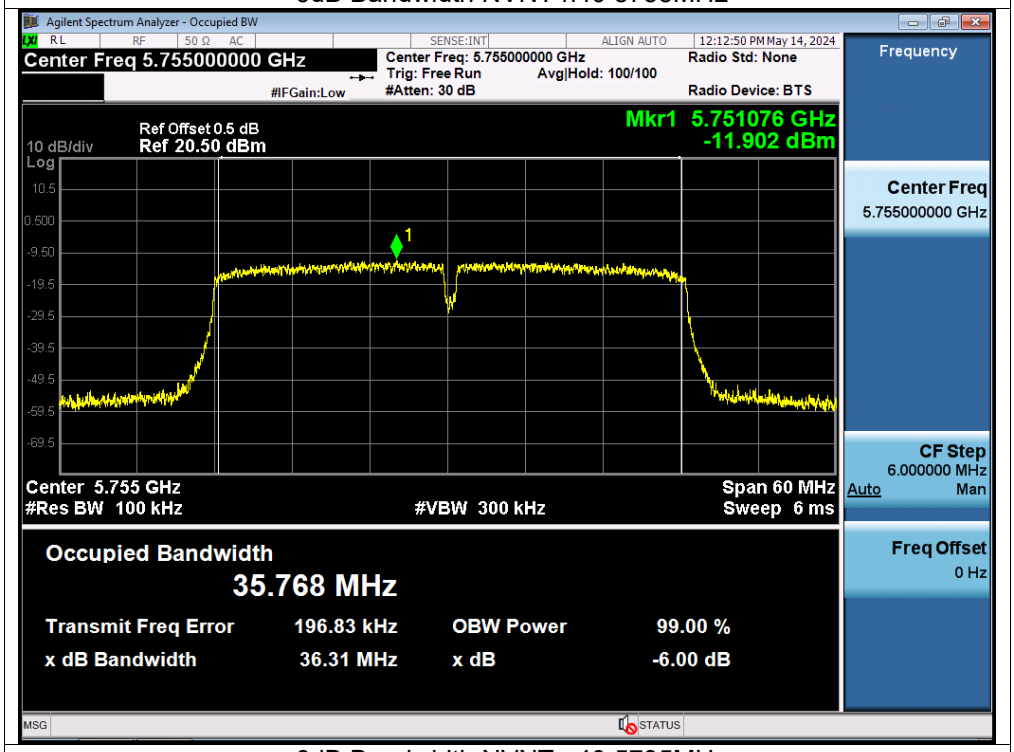
-6dB Bandwidth NVNT n20 5785MHz



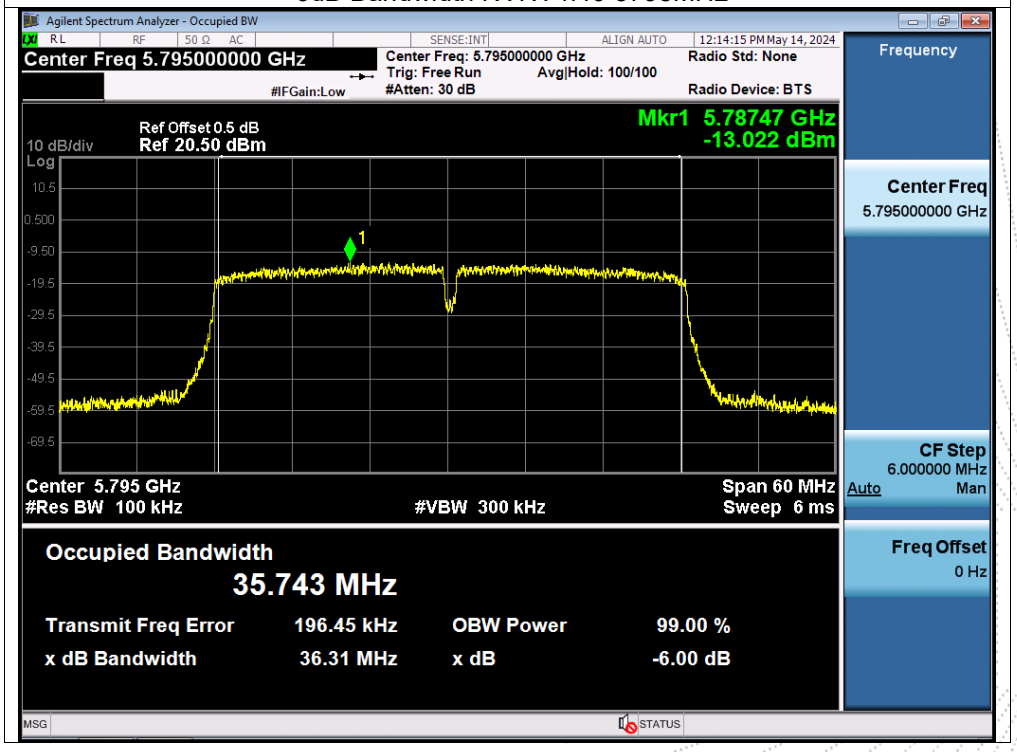
-6dB Bandwidth NVNT n20 5825MHz



-6dB Bandwidth NVNT n40 5755MHz

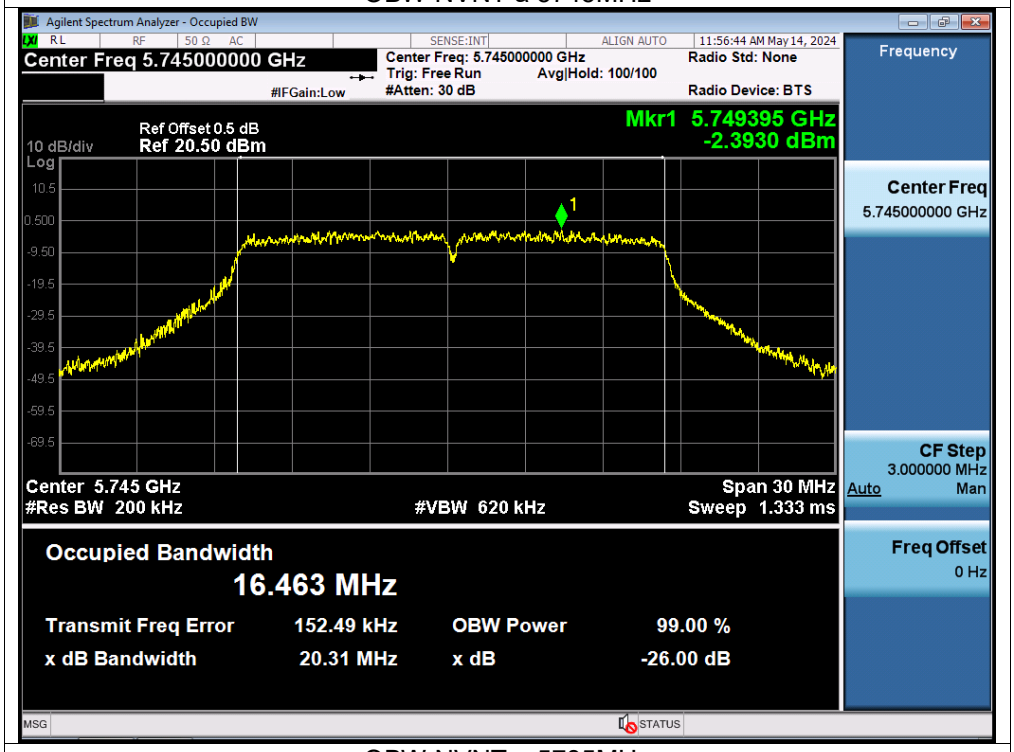


-6dB Bandwidth NVNT n40 5795MHz

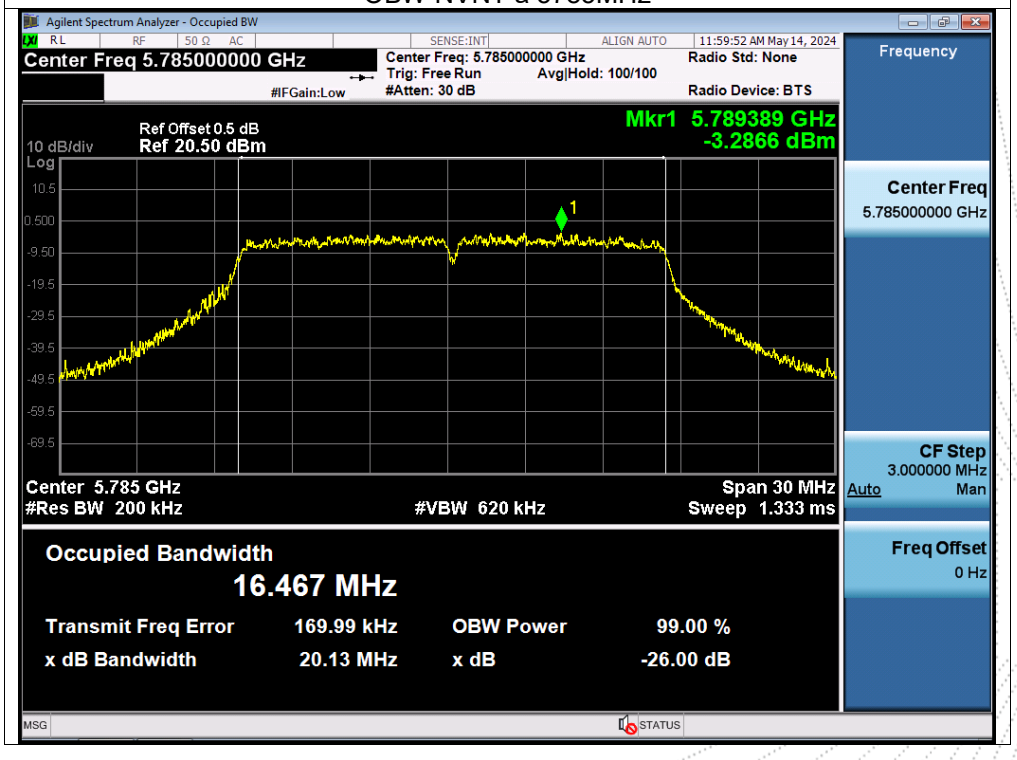


Test Graphs

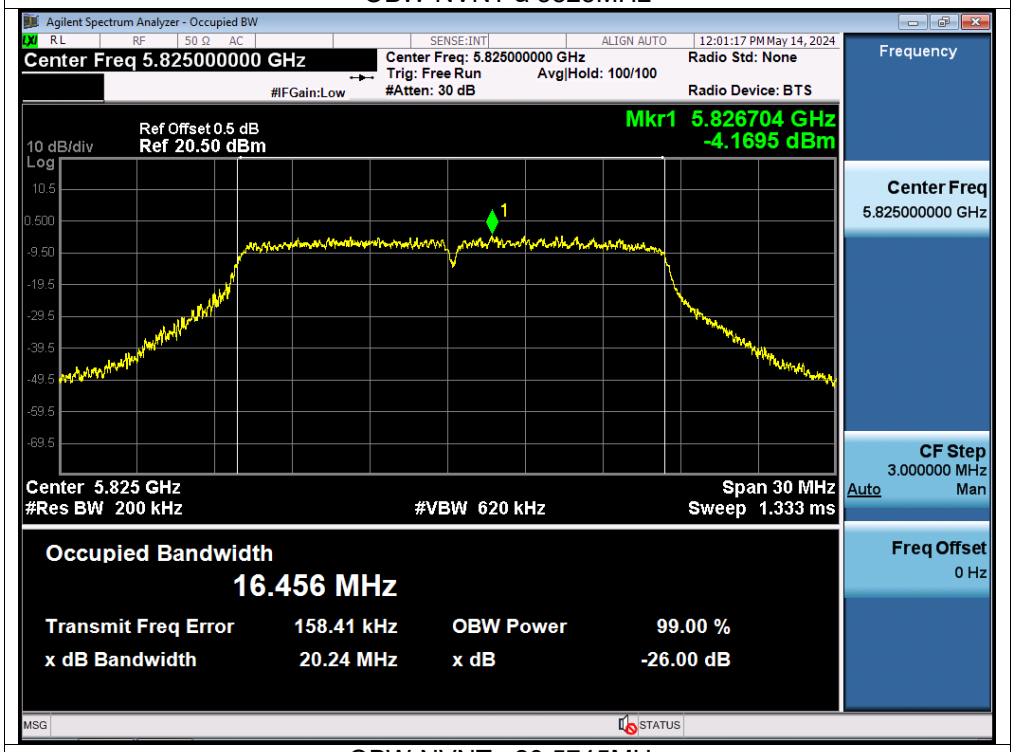
OBW NVNT a 5745MHz



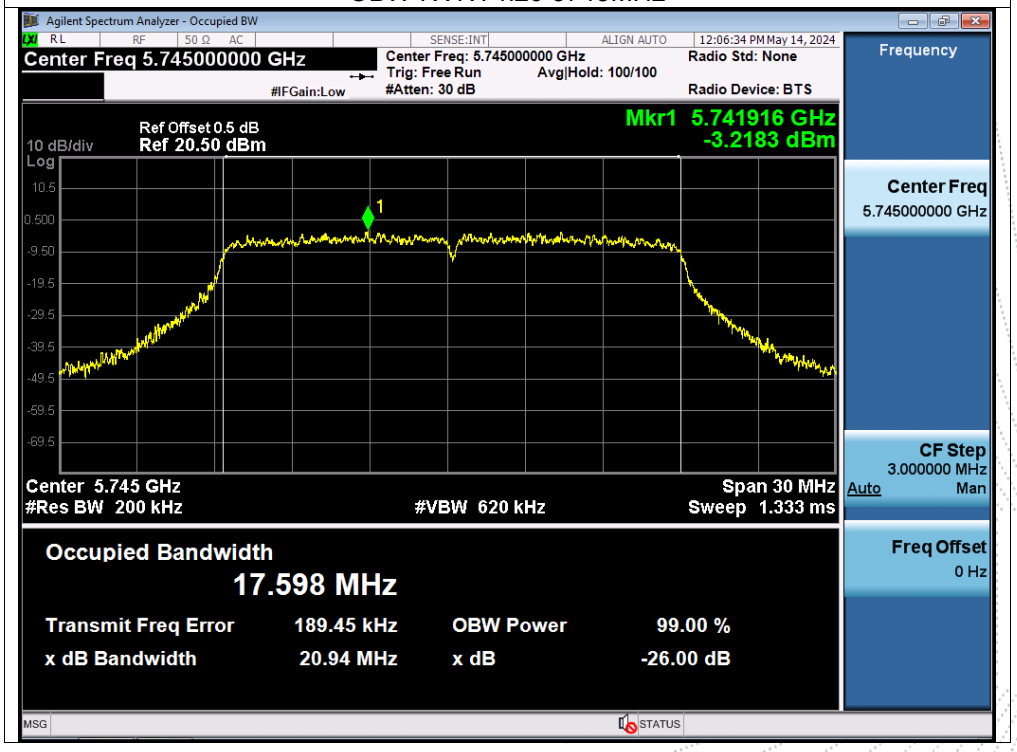
OBW NVNT a 5785MHz



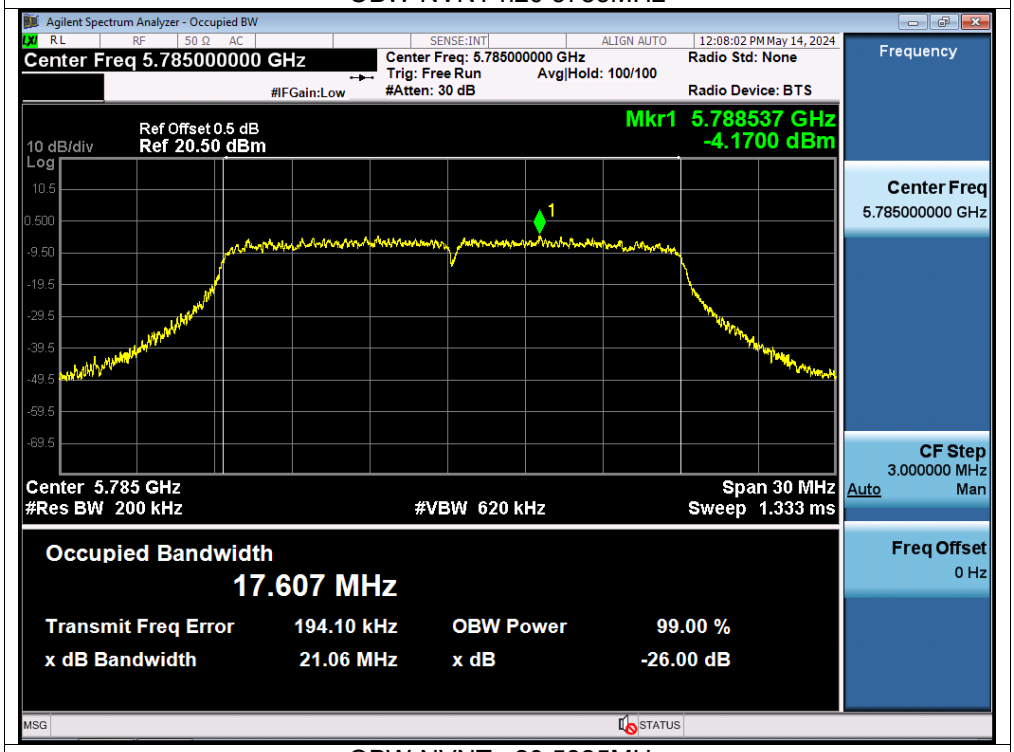
OBW NVNT a 5825MHz



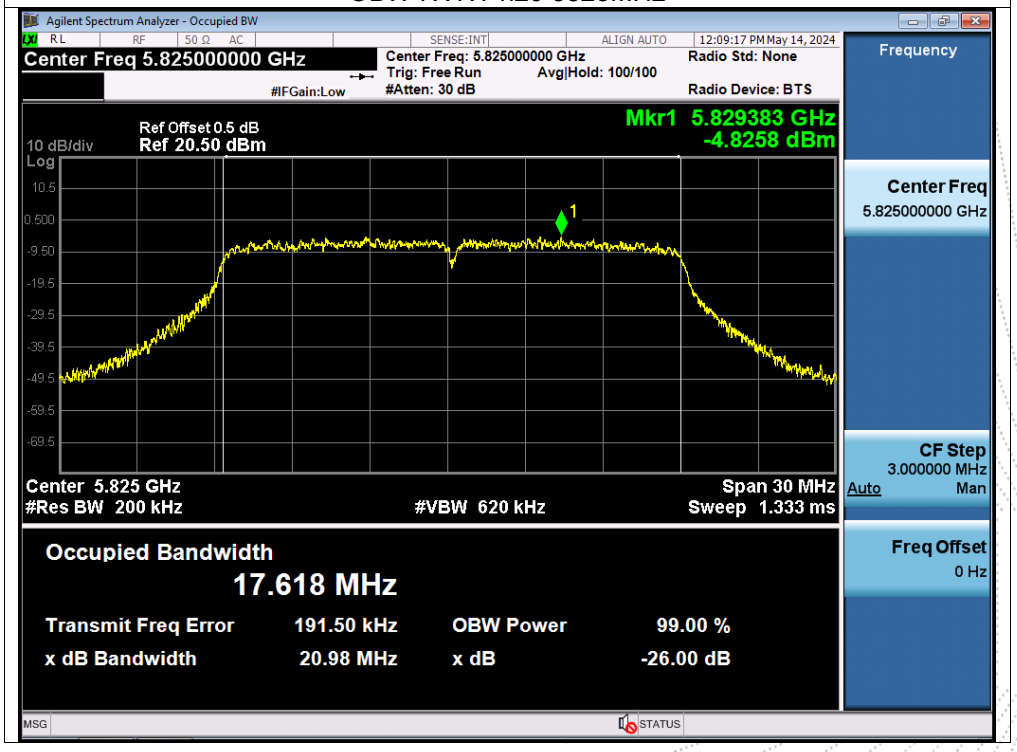
OBW NVNT n20 5745MHz



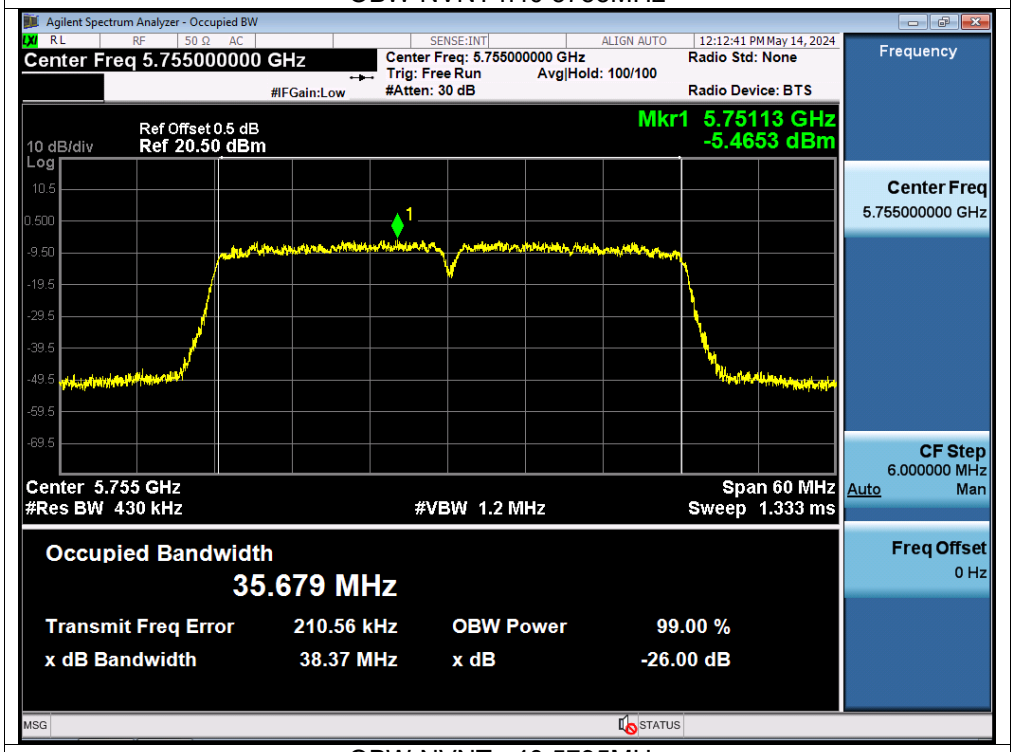
OBW NVNT n20 5785MHz



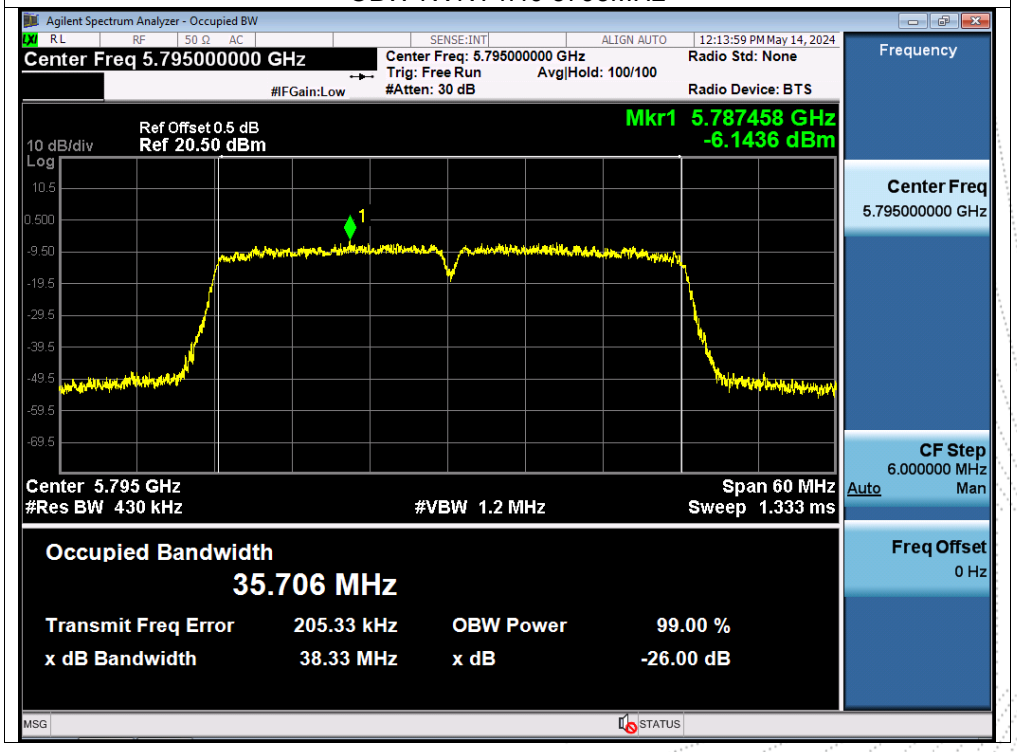
OBW NVNT n20 5825MHz



OBW NVNT n40 5755MHz

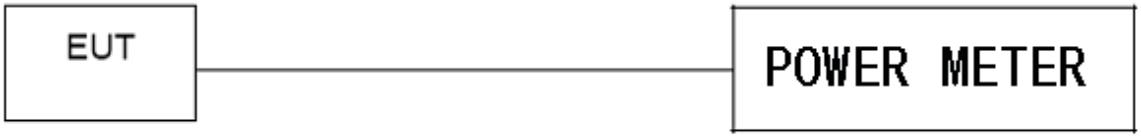


OBW NVNT n40 5795MHz



10. Maximum Conducted Output Power

10.1 Block Diagram Of Test Setup



10.2 Limit

According to FCC §15.407
The maximum conduced output power should not exceed**:**

Frequency Band(MHz)	Limit
5150~5250	0.25W
5250~5350	0.25W
5500~5700	0.25W
5725~5850	1W

10.3 Test Procedure

Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration
If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).
a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.
b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)
Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).
a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:
• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).
• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

10.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

10.5 Test Result

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC 24V/60Hz
Test Mode:	5180-5240MHz		

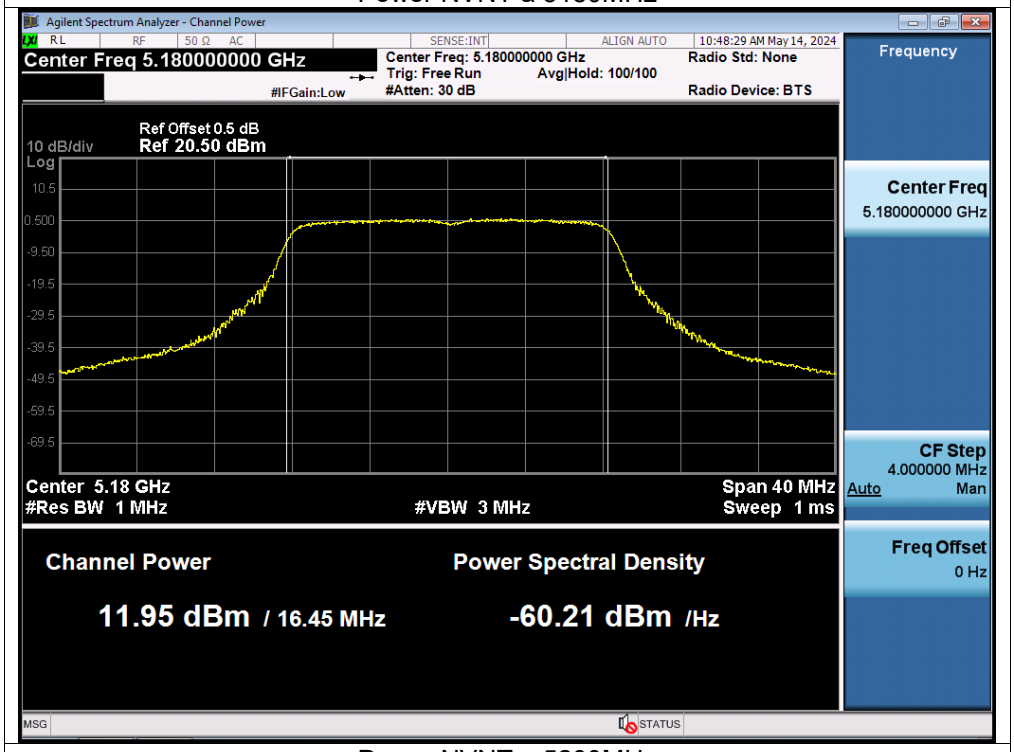
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	11.95	24	Pass
NVNT	a	5200	11.97	24	Pass
NVNT	a	5240	12.42	24	Pass
NVNT	n20	5180	11.07	24	Pass
NVNT	n20	5200	10.44	24	Pass
NVNT	n20	5240	10.64	24	Pass
NVNT	n40	5190	10.7	24	Pass
NVNT	n40	5230	10.98	24	Pass

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage:	AC 24V/60Hz
Test Mode:	5745-5825MHz		

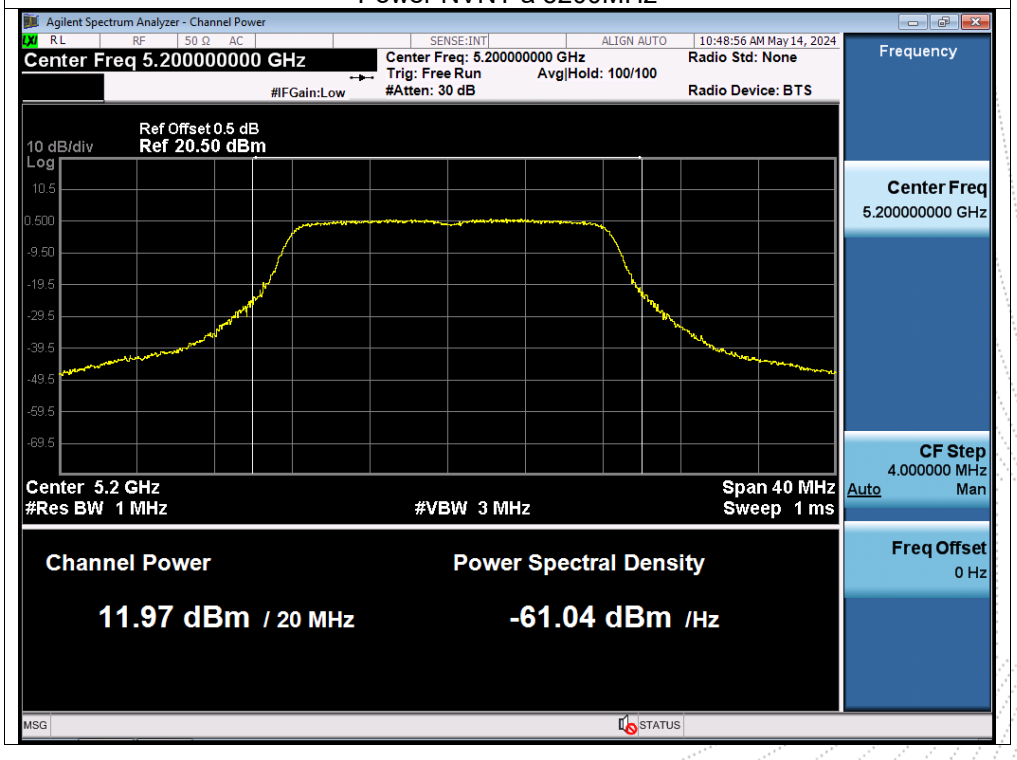
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	11.25	30	Pass
NVNT	a	5785	9.97	30	Pass
NVNT	a	5825	9.22	30	Pass
NVNT	n20	5745	10.61	30	Pass
NVNT	n20	5785	9.64	30	Pass
NVNT	n20	5825	9.1	30	Pass
NVNT	n40	5755	8.08	30	Pass
NVNT	n40	5795	6.62	30	Pass

Test Graphs

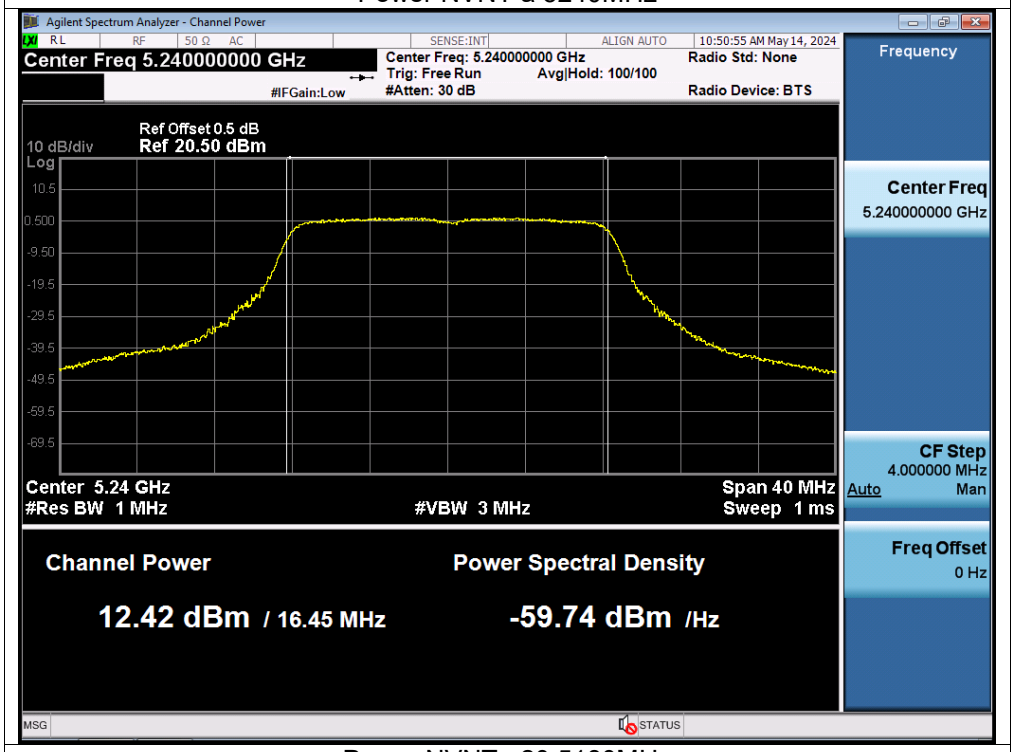
Power NVNT a 5180MHz



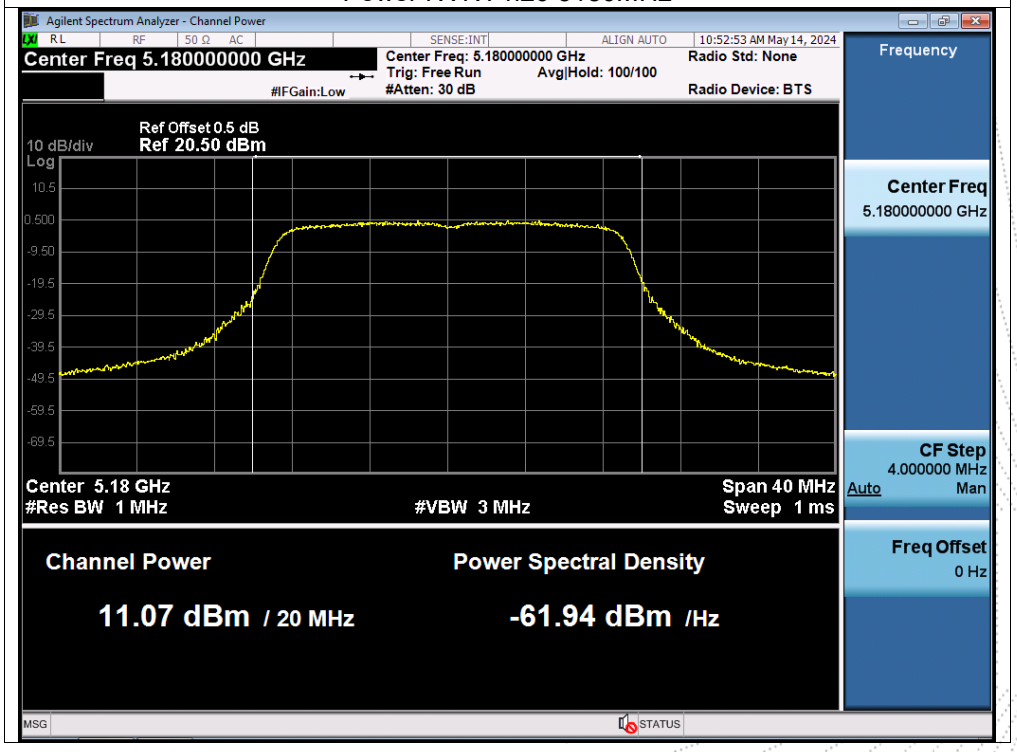
Power NVNT a 5200MHz



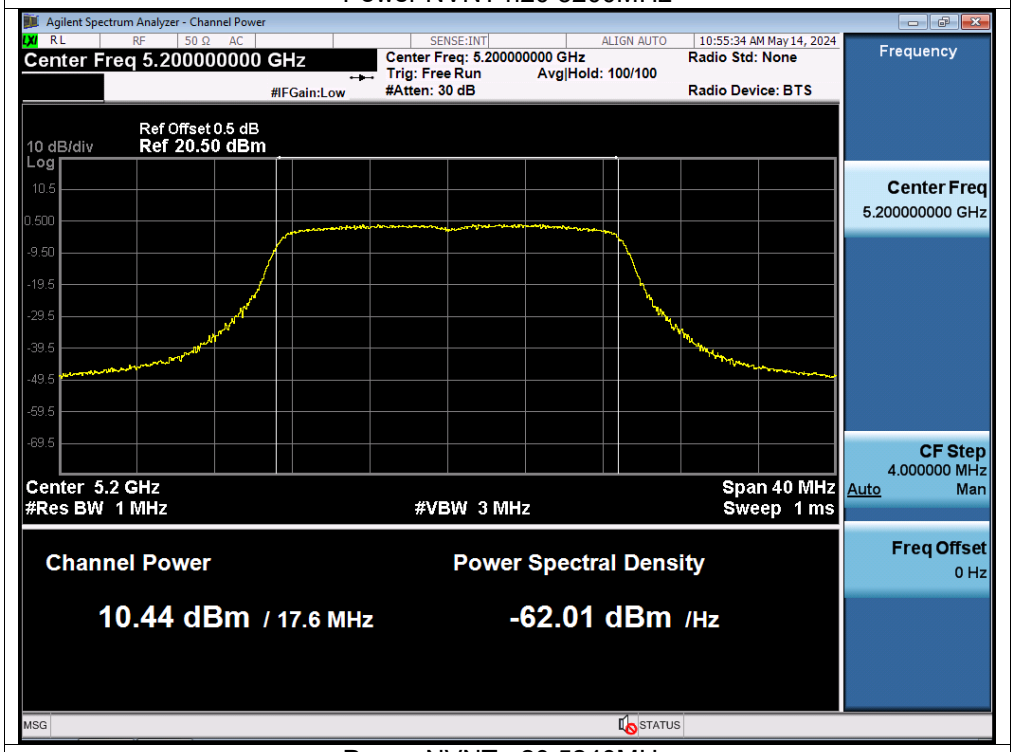
Power NVNT a 5240MHz



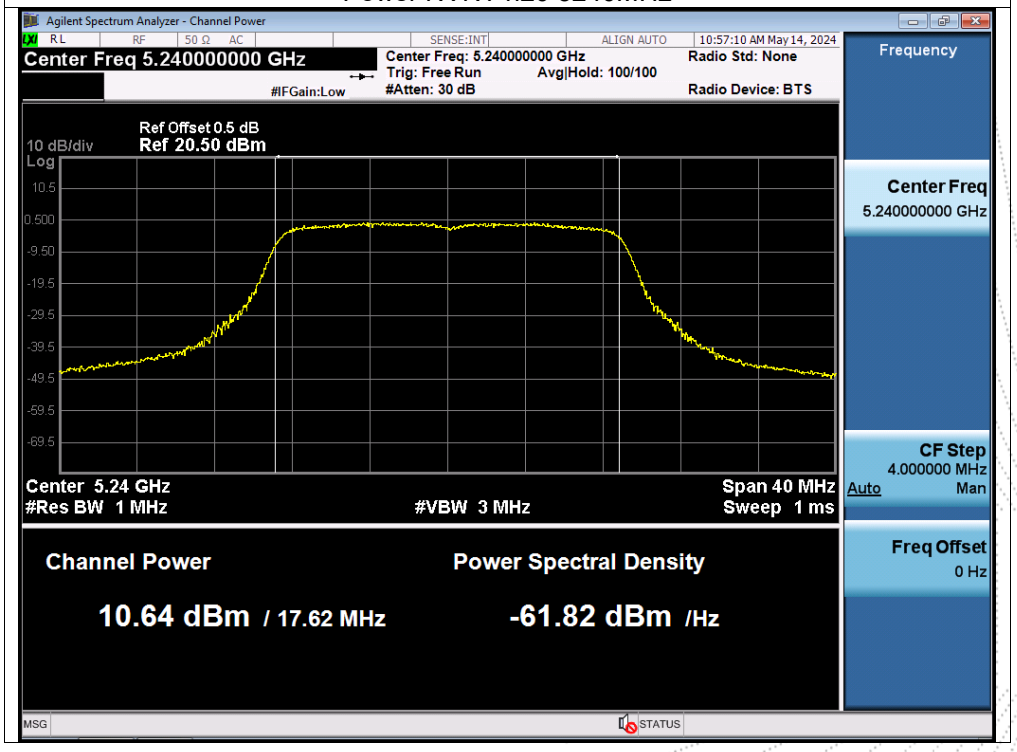
Power NVNT n20 5180MHz



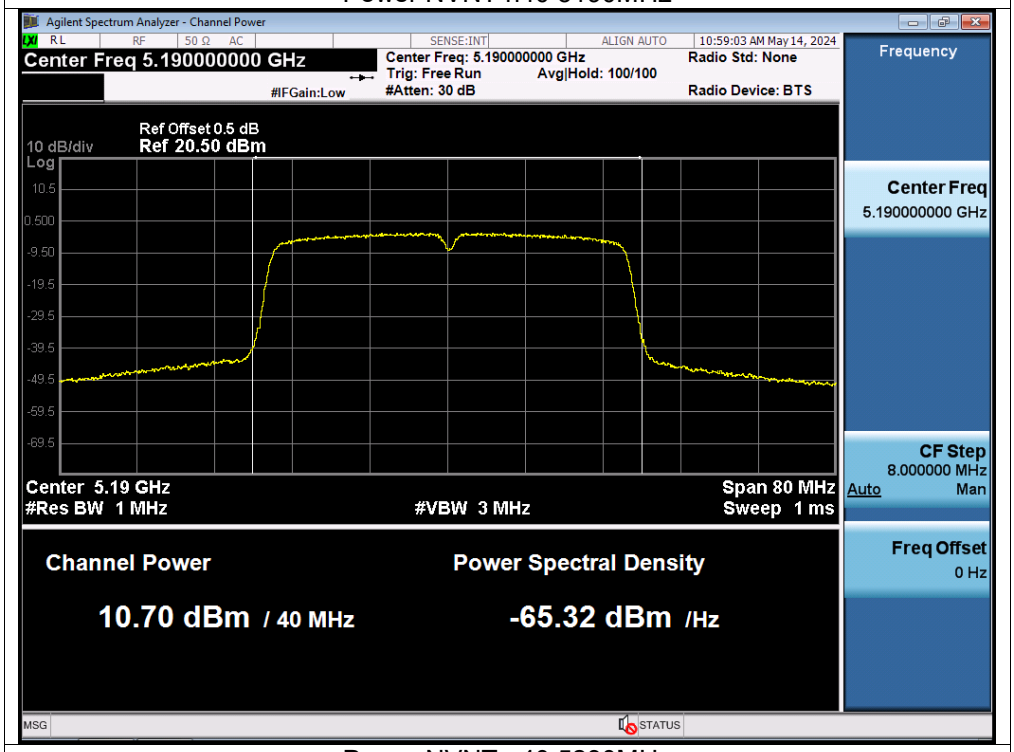
Power NVNT n20 5200MHz



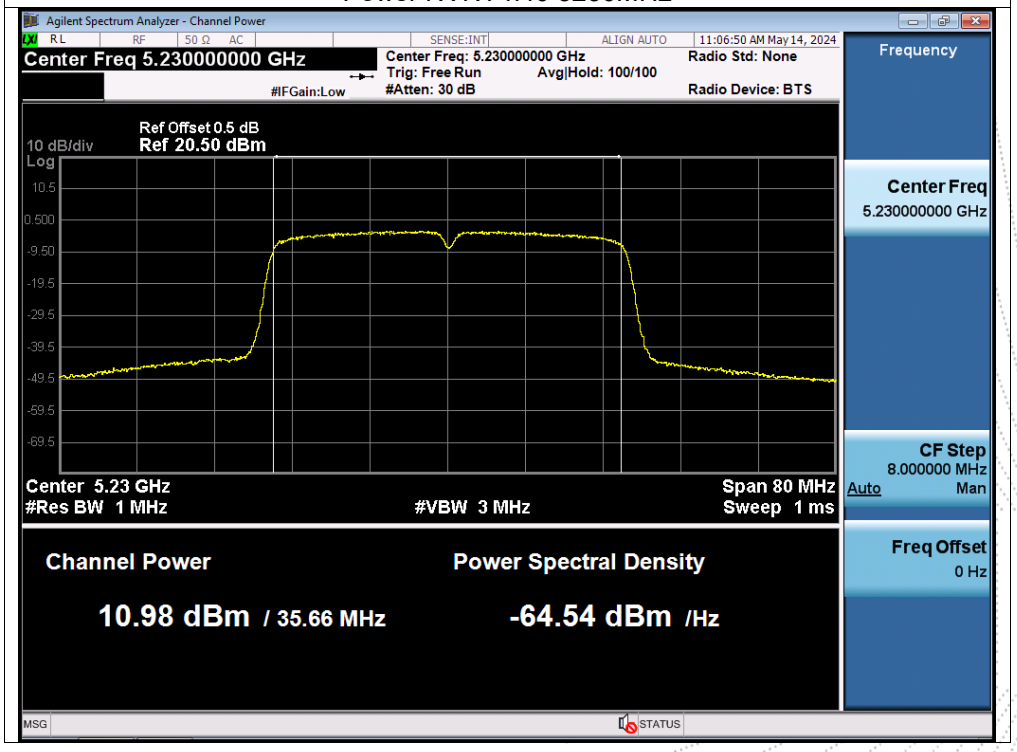
Power NVNT n20 5240MHz



Power NVNT n40 5190MHz

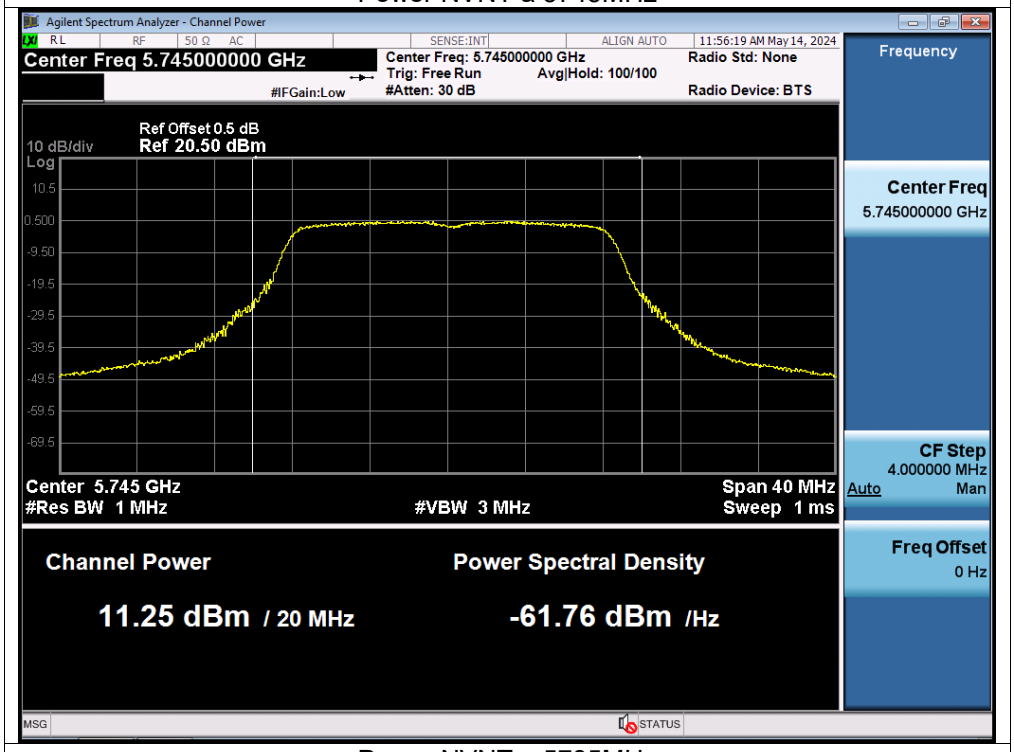


Power NVNT n40 5230MHz

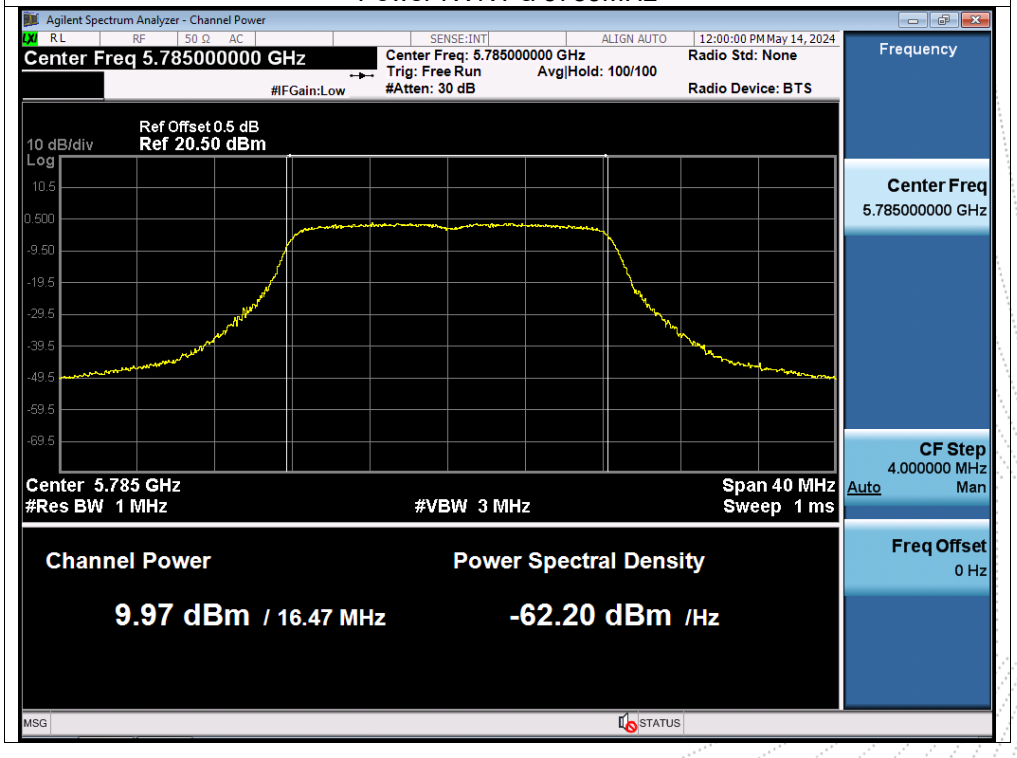


Test Graphs

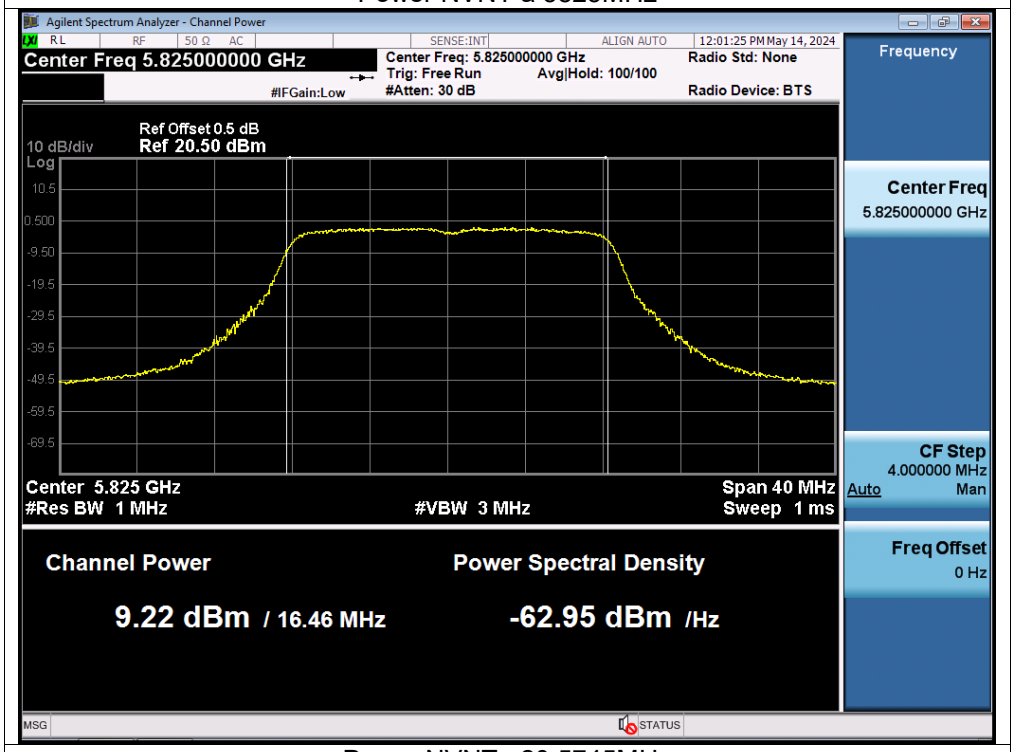
Power NVNT a 5745MHz



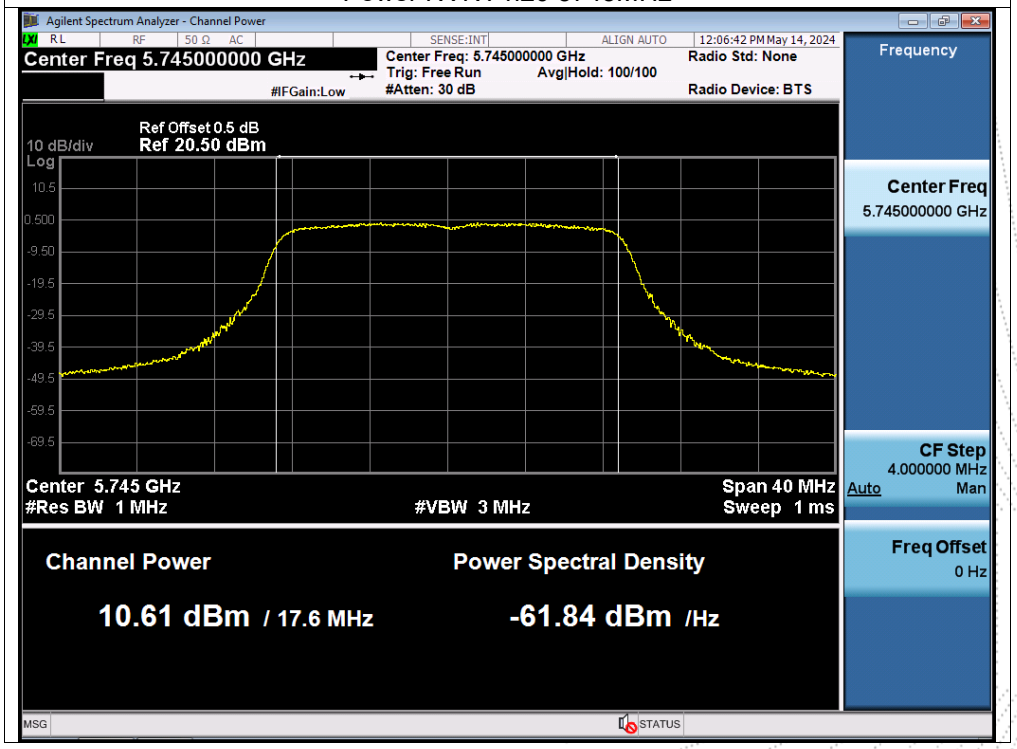
Power NVNT a 5785MHz



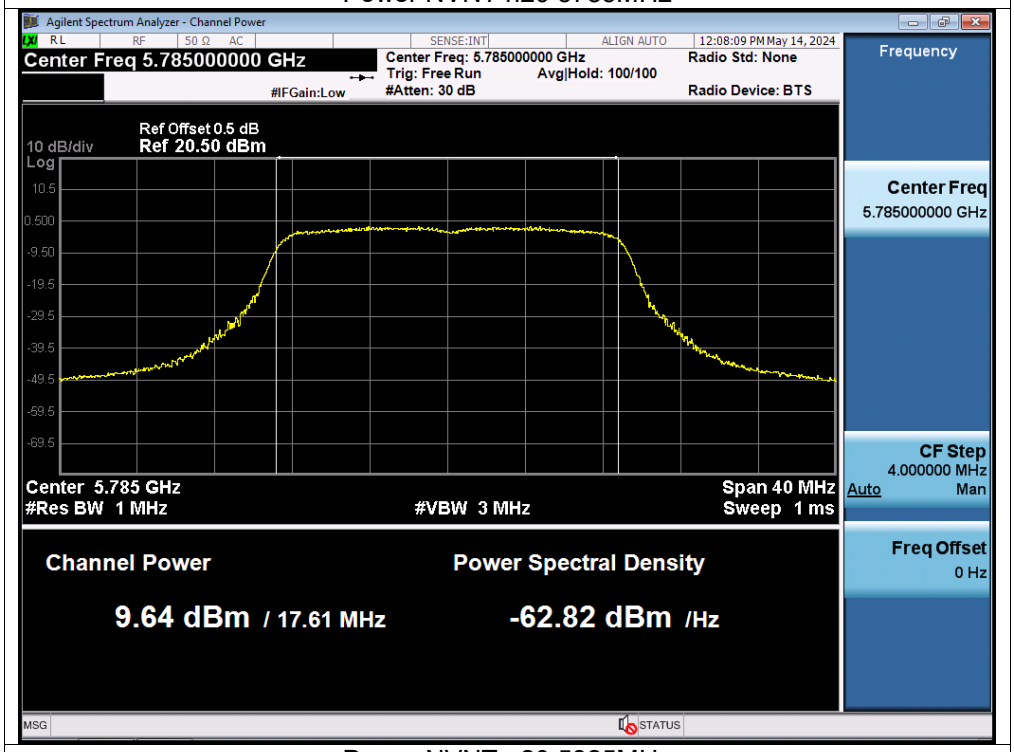
Power NVNT a 5825MHz



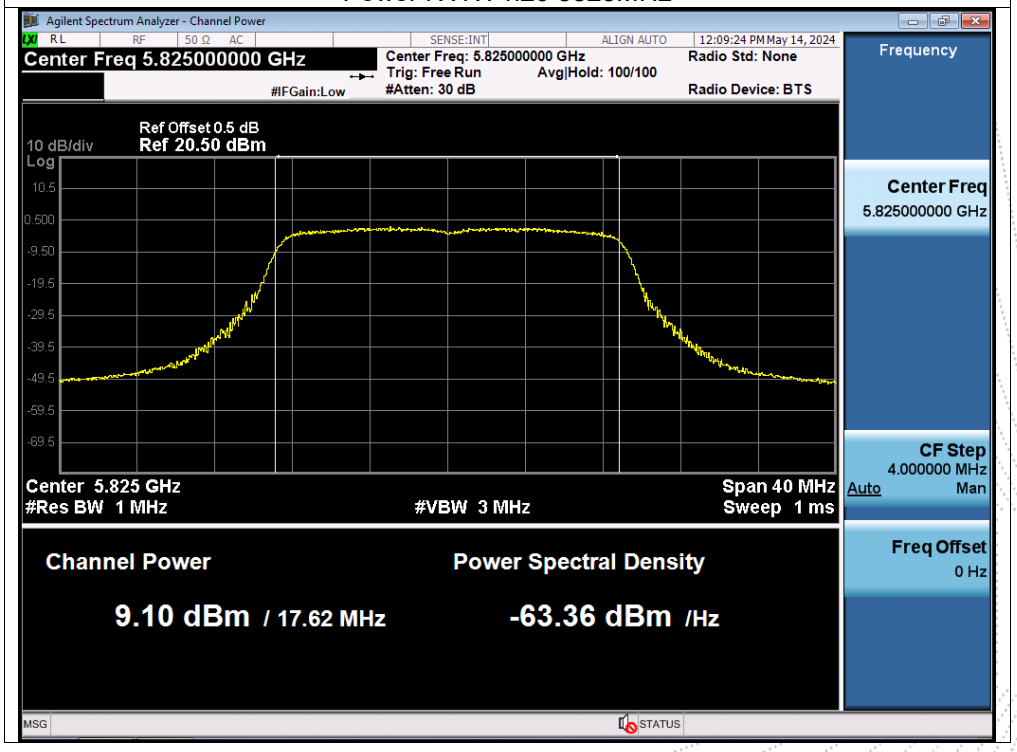
Power NVNT n20 5745MHz



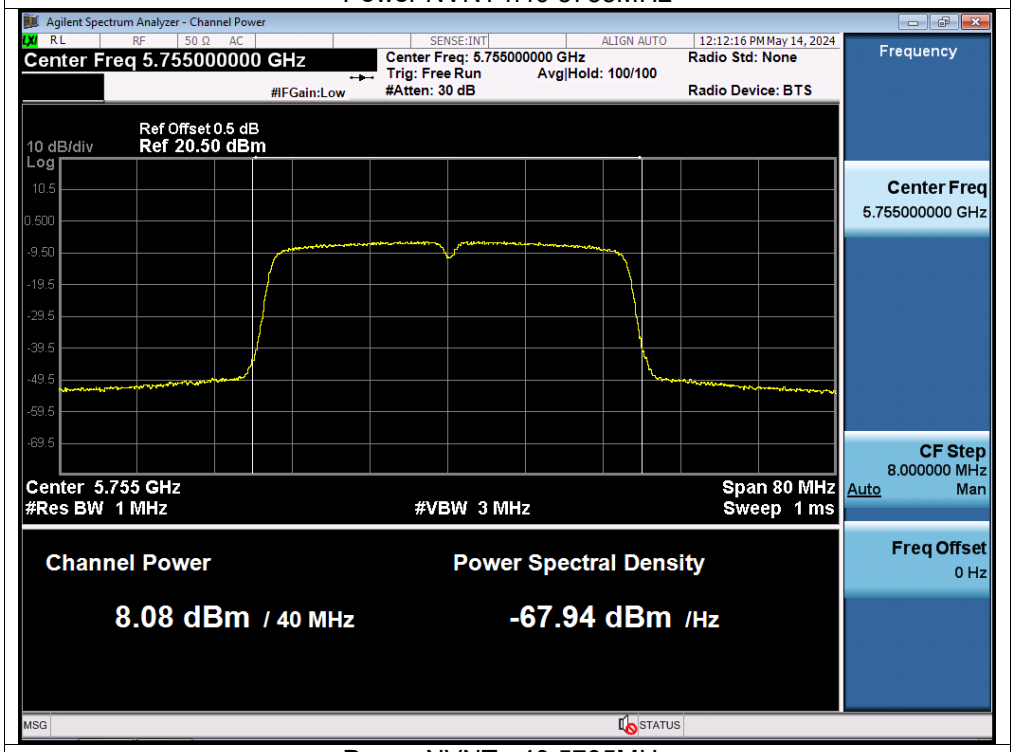
Power NVNT n20 5785MHz



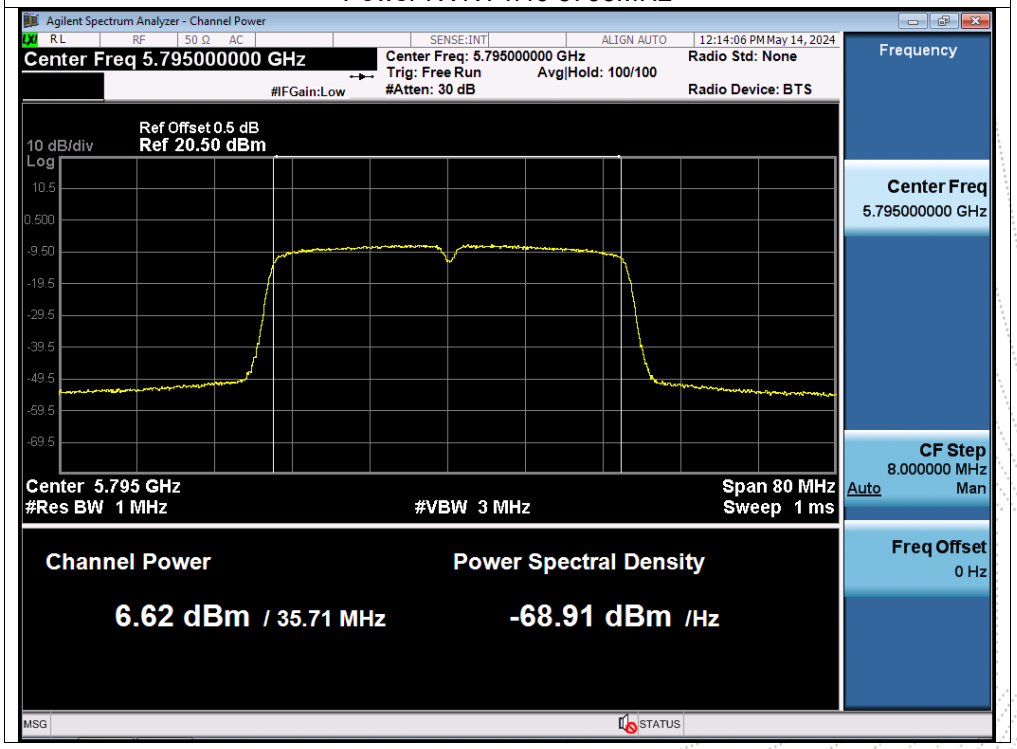
Power NVNT n20 5825MHz



Power NVNT n40 5755MHz

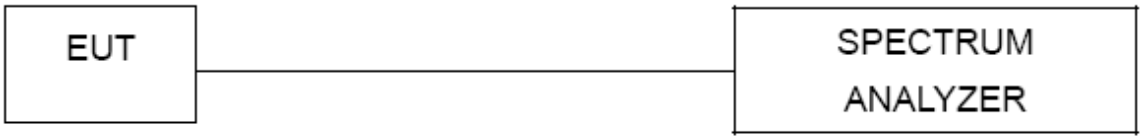


Power NVNT n40 5795MHz



11. Out Of Band Emissions

11.1 Block Diagram Of Test Setup



11.2 Limit

According to FCC §15.407(b)
Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(2) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
(3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
(4) For transmitters operating in the 5.725-5.85 GHz band(i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing

11.3 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 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 RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

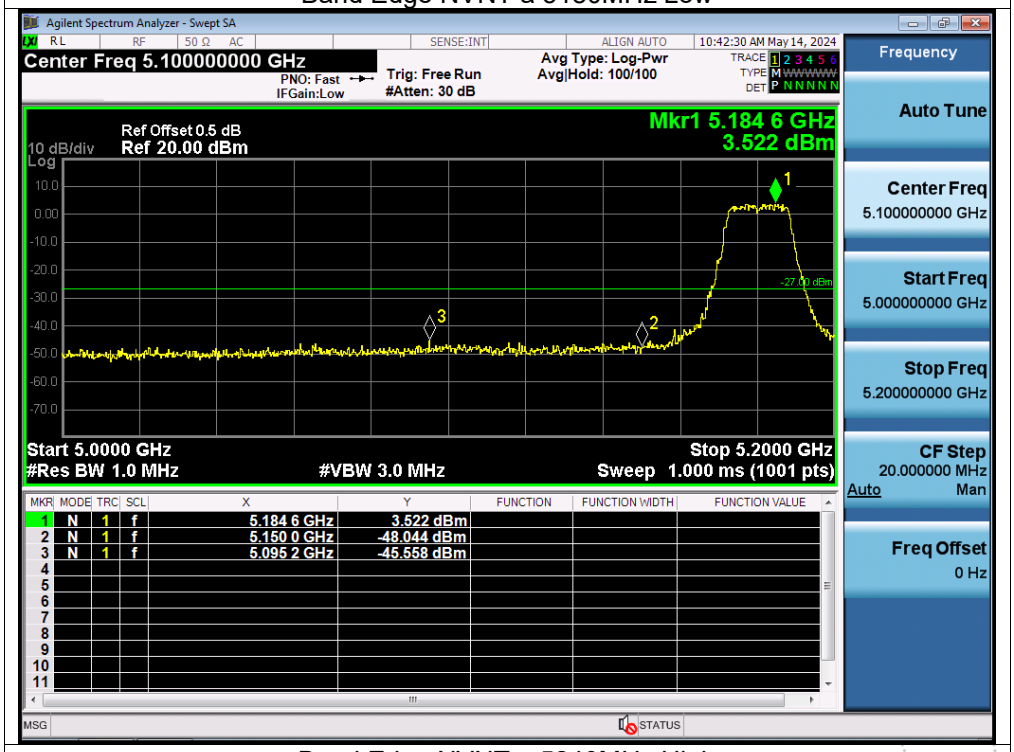
11.4 EUT Operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data

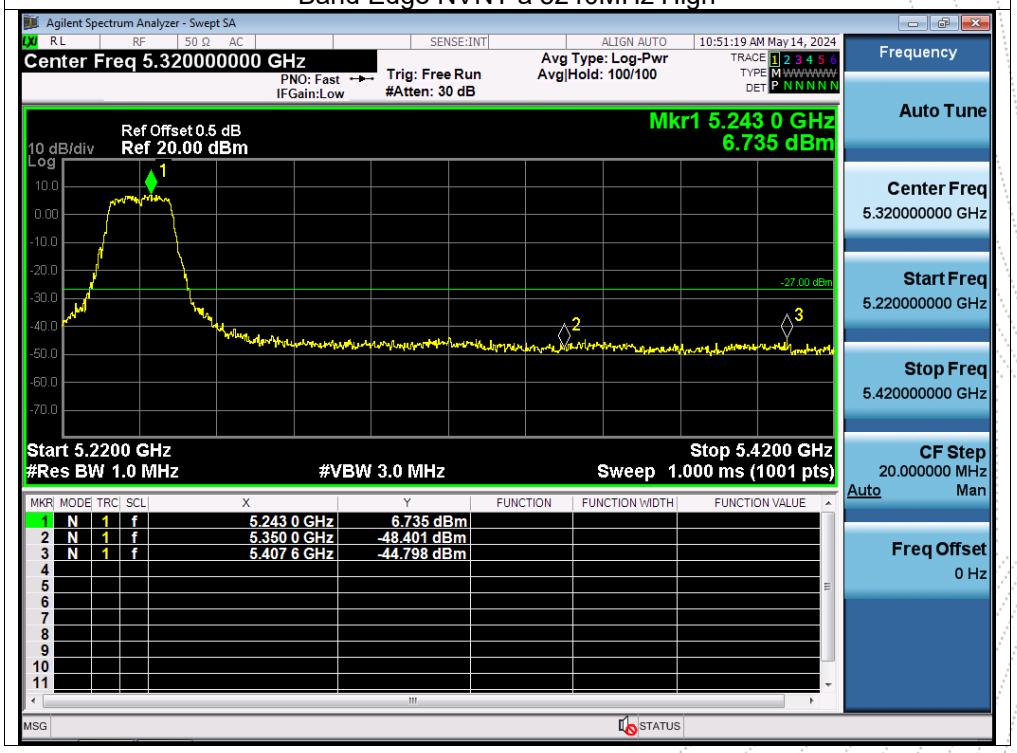
11.5 Test Result

Test Graphs

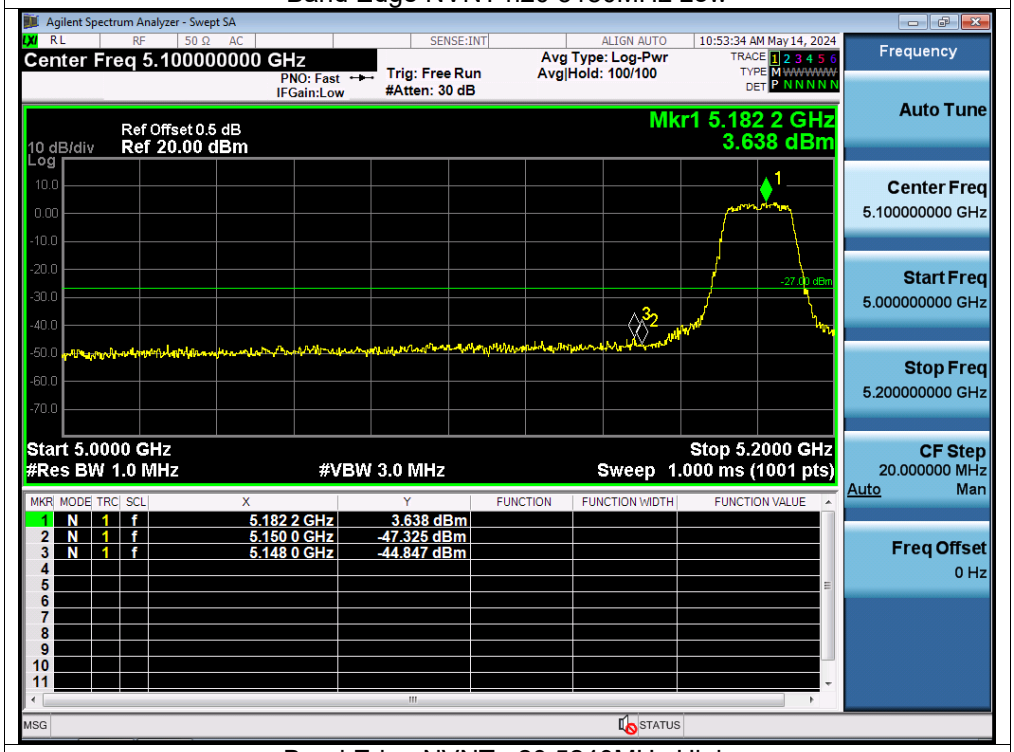
Band Edge NVNT a 5180MHz Low



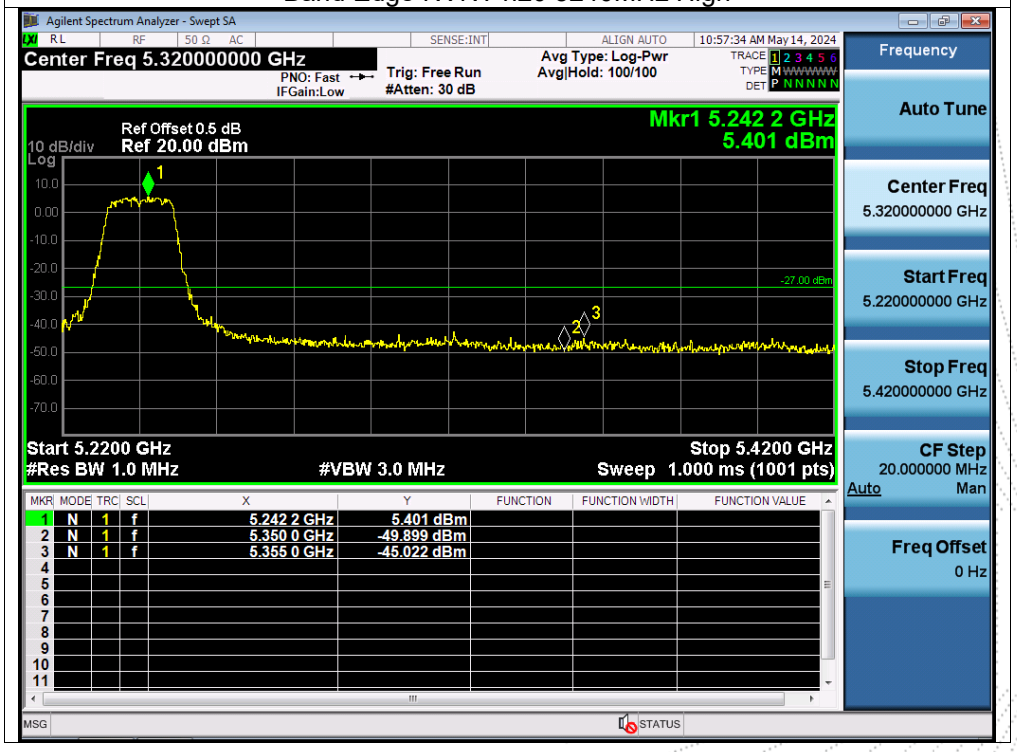
Band Edge NVNT a 5240MHz High



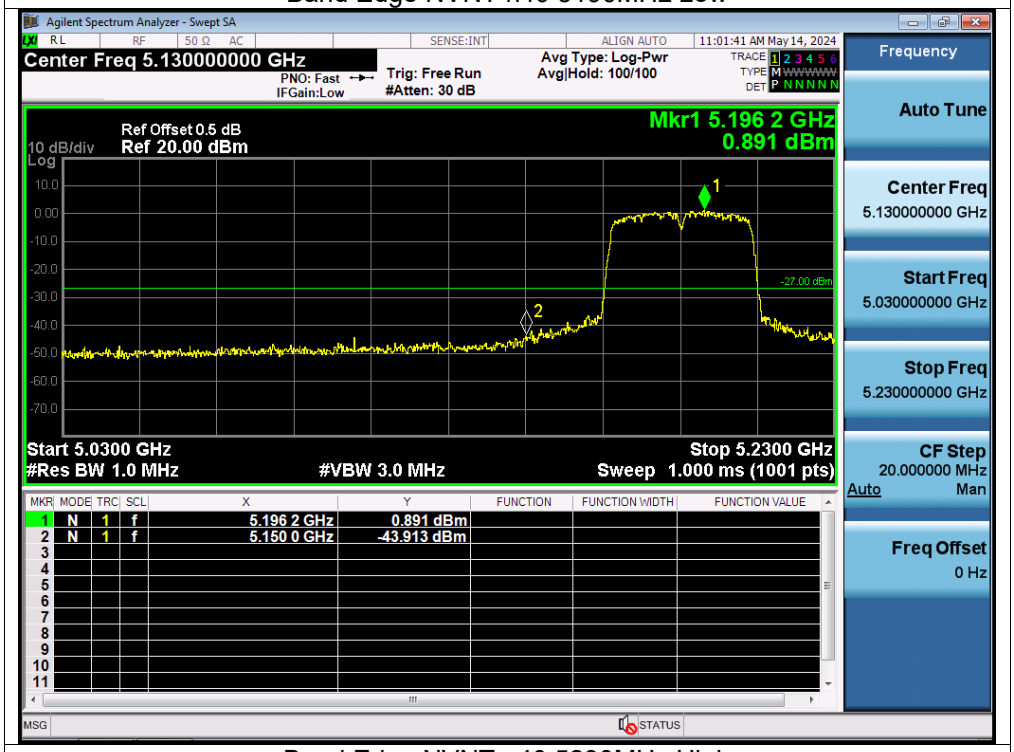
Band Edge NVNT n20 5180MHz Low



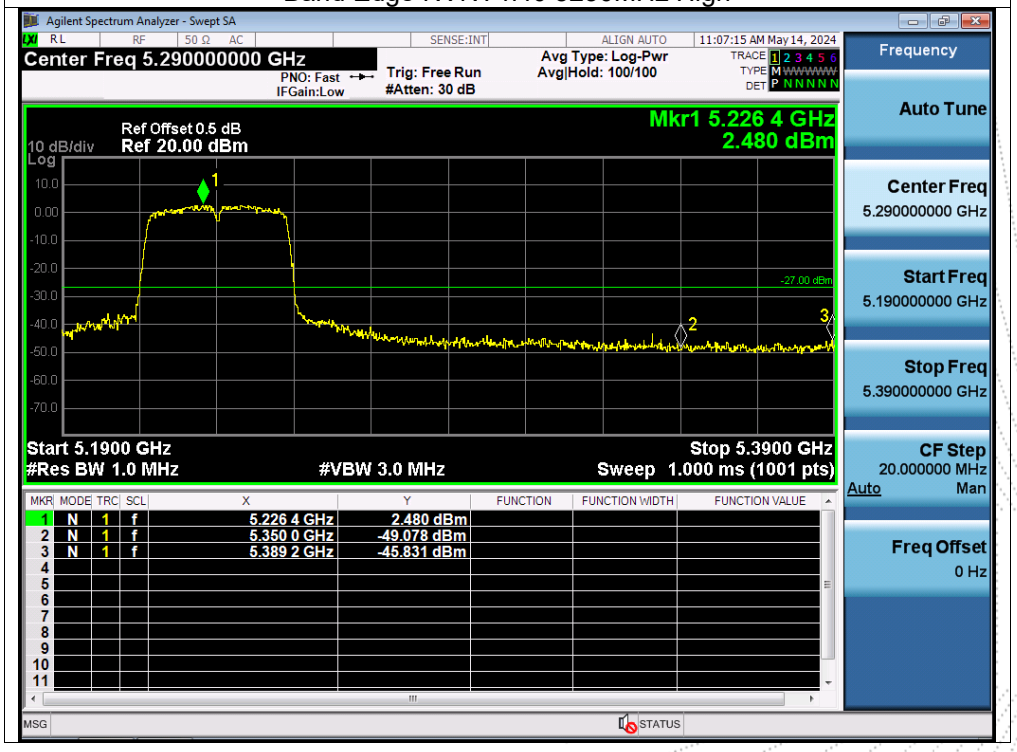
Band Edge NVNT n20 5240MHz High



Band Edge NVNT n40 5190MHz Low

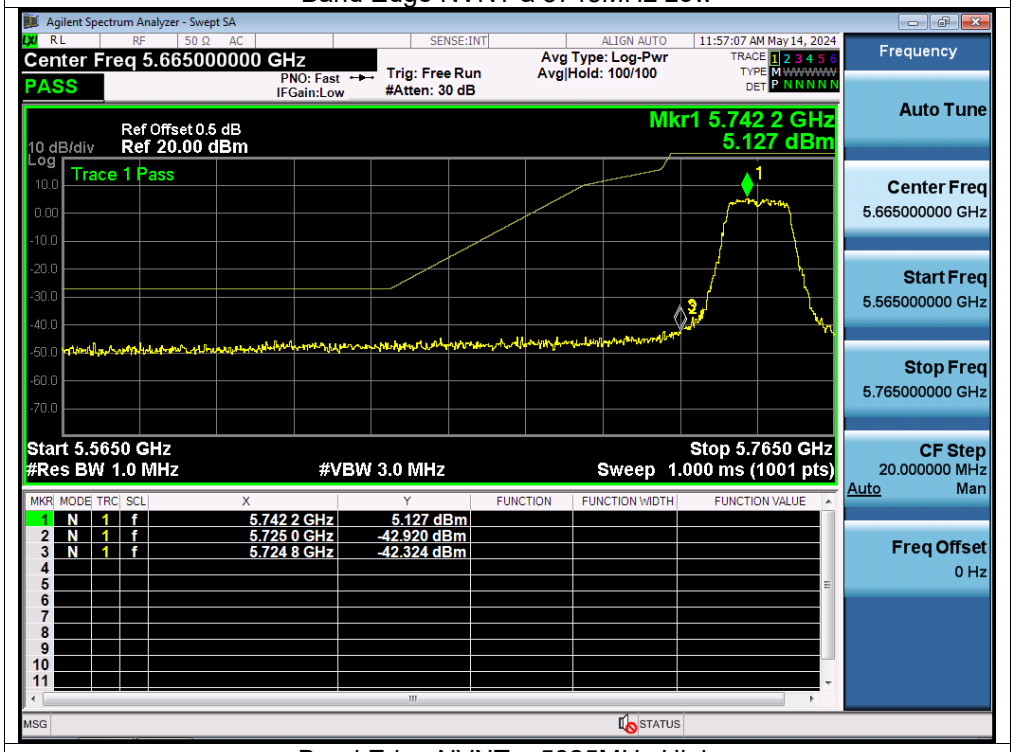
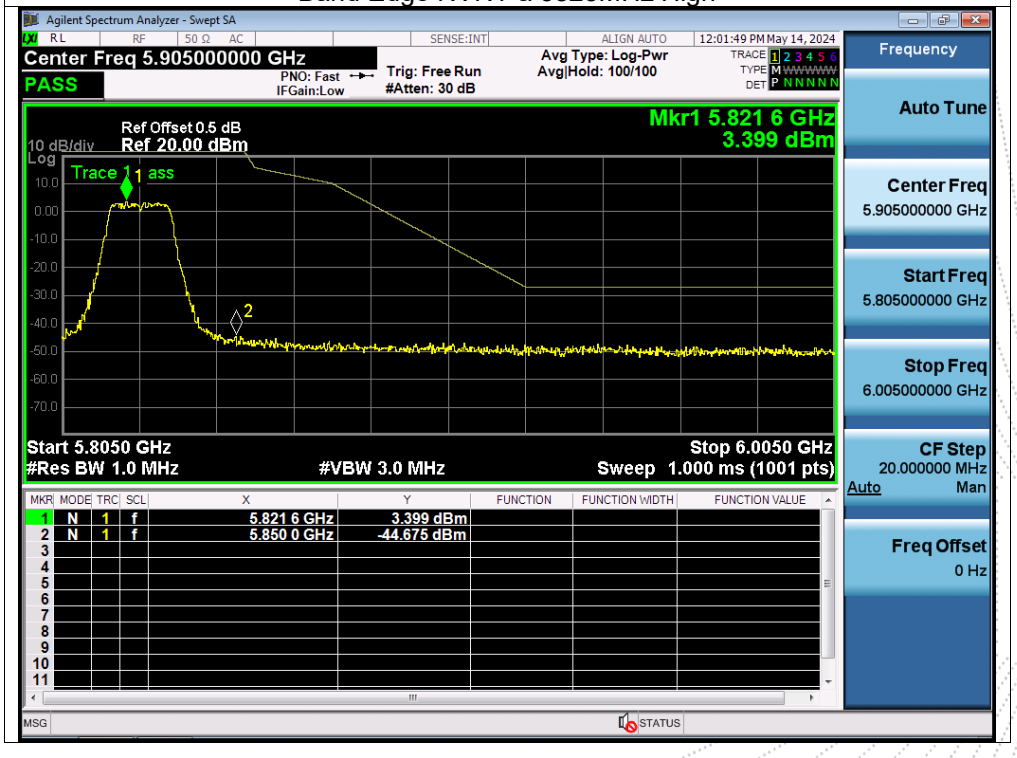


Band Edge NVNT n40 5230MHz High



Test Graphs

Band Edge NVNT a 5745MHz Low



Band Edge NVNT a 5825MHz High