

TEST REPORT

Report No.: BCTC2204435896-2E

Applicant: TOPLINKST TECHNOLOGY COMPANY LIMITED

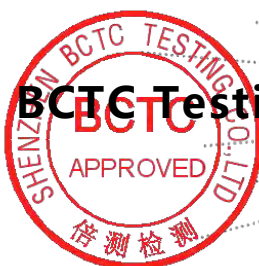
Product Name: 600Mbps wireless usb adapter

Model/Type Ref.: TOP-4512AC

Tested Date: 2022-04-16 to 2022-04-25

Issued Date: 2022-04-25

Shenzhen BCTC Testing Co., Ltd.



FCC ID: ZLJTOP-4512AC

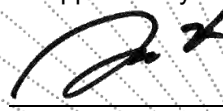
Product Name: 600Mbps wireless usb adapter
Trademark: N/A
Model/Type Ref.: TOP-4512AC
4512AC
Prepared For: TOPLINKST TECHNOLOGY COMPANY LIMITED
Address: UNIT 04,7F,BRIGHT WAY TOWER, NO,33 MONG KOK ROAD, KOWLOON,
HONGKONG
Manufacturer: TOPLINKST TECHNOLOGY COMPANY LIMITED
Address: UNIT 04,7F,BRIGHT WAY TOWER, NO,33 MONG KOK ROAD, KOWLOON,
HONGKONG
Prepared By: Shenzhen BCTC Testing Co., Ltd.
Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road,
Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date: 2022-04-16
Sample tested Date: 2022-04-16 to 2022-04-25
Issue Date: 2022-04-25
Report No.: BCTC2204435896-2E
Test Standards: FCC Part15 15.407
ANSI C63.10-2013
KDB 662911 D01 v02r01
KDB 789033 D02 v02r01
Test Results: PASS

Tested by:



Lei Chen/Project Handler

Approved by:



Zero Zhou/Reviewer

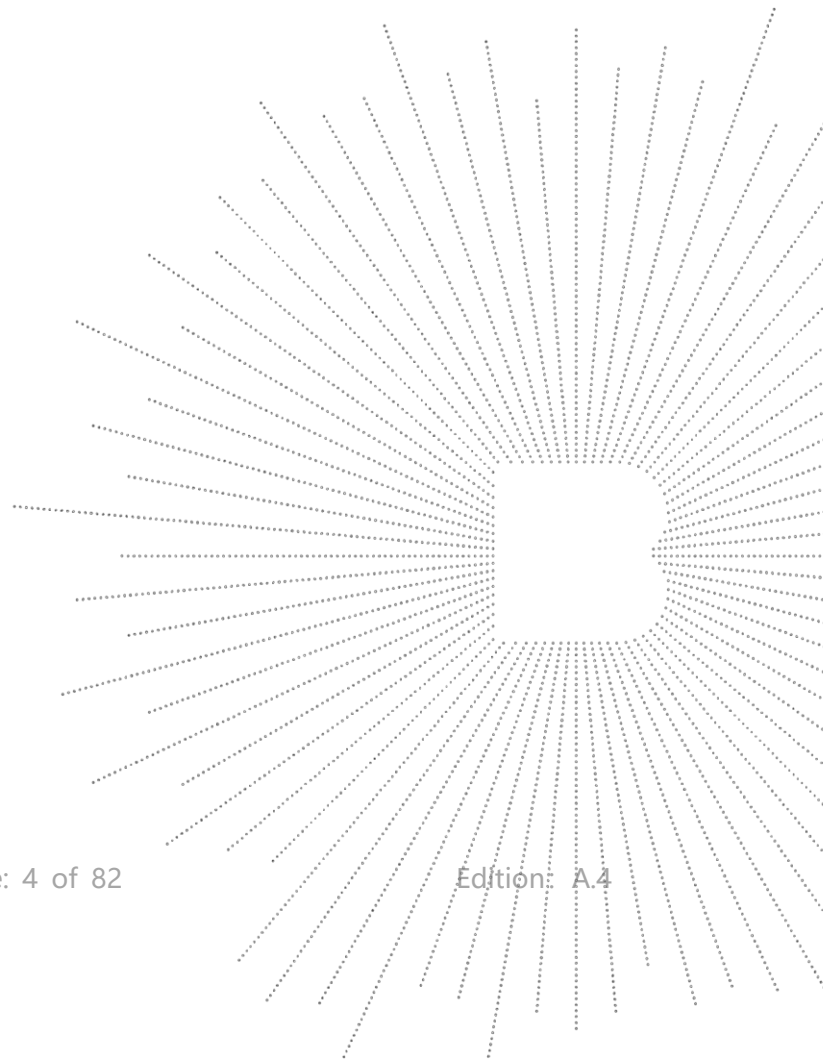
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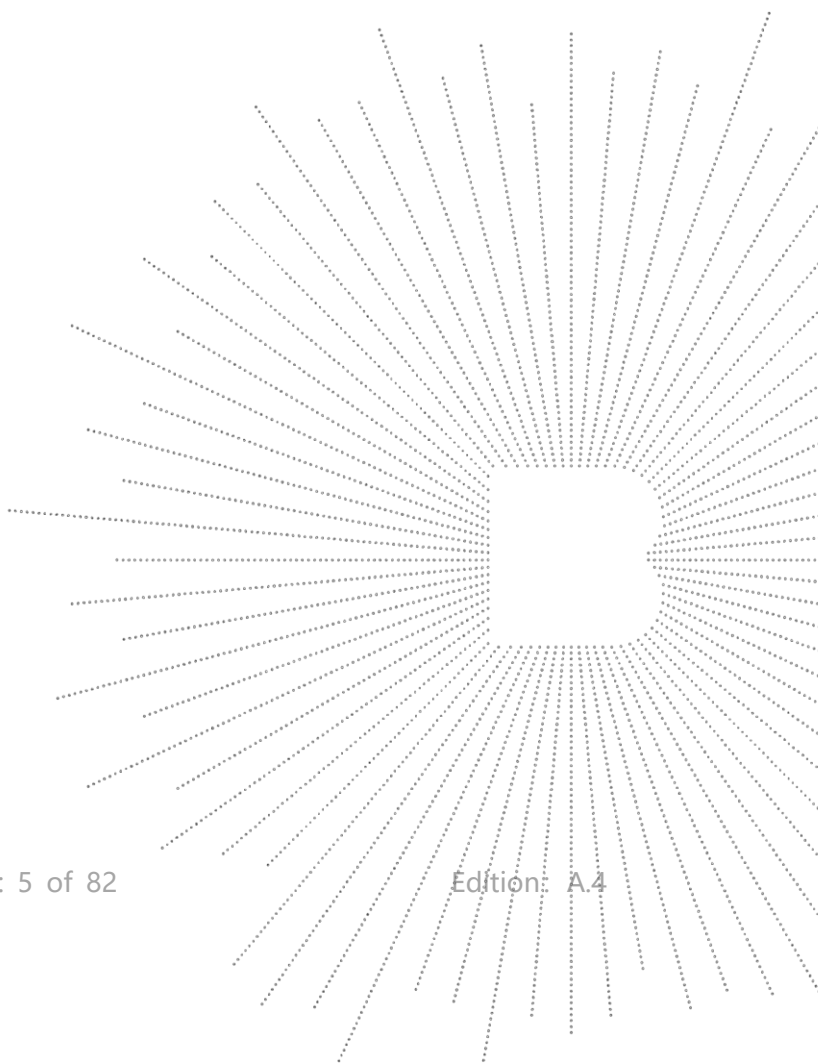
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(Note: N/A Means Not Applicable)



1. Version

Report No.	Issue Date	Description	Approved
BCTC2204435896-2E	2022-04-25	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)(4) 15.407 (b)(8)	PASS
2	Conducted Emission	15.207	PASS
3	26 dB and 99% Emission Bandwidth	15.407 (a)(12) 15.1049	PASS
4	Minimum 6 dB bandwidth	15.407(e)	PASS
5	Maximum Conducted Output Power	15.407 (a)(1) 15.407 (a)(3)	PASS
6	Band Edge	2.1051, 15.407(b)(1) 15.407(b)(4)	PASS
7	Power Spectral Density	15.407 (a)(1) 15.407 (a)(3)	PASS
8	Spurious Emissions at Antenna Terminals	2.1051, 15.407(b)	PASS
9	Antenna Requirement	15.203	PASS
10	Frequency Stability	15.407(g)	PASS

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°C

4. Product Information And Test Setup

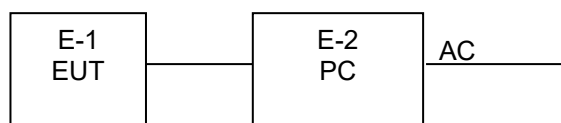
4.1 Product Information

Model/Type Ref.:	TOP-4512AC 4512AC
Model differences:	All the model are the same circuit and RF module, except model names.
Hardware Version:	N/A
Software Version:	N/A
IEEE 802.11 WLAN	802.11a/n/ac(20MHz channel bandwidth) 802.11n/ac(40MHz channel bandwidth) 802.11ac(80MHz channel bandwidth)
Mode Supported	5745-5825 MHz for 802.11a/n/ac(HT20); 5755-5795 MHz for 802.11a/n/ac(HT40); 5775MHz for 802.11 ac80
Operation Frequency:	802.11a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20/HT40):MCS0-MCS15; 802.11ac(VHT20): NSS1, MCS0-MCS8 802.11ac(VHT40/VHT80):NSS1, MCS0-MCS
Data Rate	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;
Type of Modulation:	5 channels for 802.11a/n20 in the 5745-5825MHz band ; 2 channels for 802.11 n40 in the 5755-5795MHz band ; 1 channels for 802.11 ac80 in the 5775MHz band
Number Of Channel	Internal antenna
Antenna installation:	2.05 dBi
Antenna Gain:	DC 5V
Ratings:	

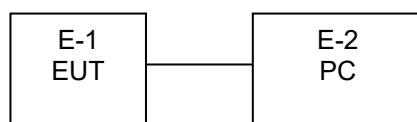
4.2 Test Setup Configuration

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

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	600Mbps wireless usb adapter	N/A	TOP-4512AC	N/A	EUT
E-2	PC	Lenovo	Thinkpad S2	N/A	Auxiliary

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

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

802.11n/ac (80MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775			-	-	-	-

4.5 Test Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly 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/ ac 20 CH149/ CH157/ CH 165
Mode 2	802.11n/ ac40 CH 151 / CH 159
Mode 3	802.11 ac 80 CH155
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a /n/ ac 20 CH149/ CH157/ CH 165
Mode 2	802.11n/ ac40 CH 151 / CH 159
Mode 3	802.11 ac 80 CH155
Note:	
(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.	

4.6 Table Of Parameters Of Test 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	RTL11ac_8811CU_USB		
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, Tangwei, 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
IC Registered No.: 23583

5.2 Test Instrument Used

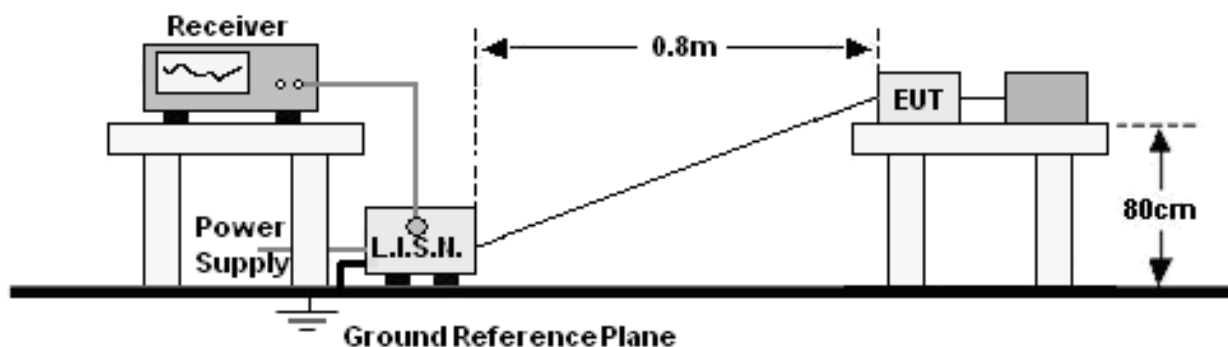
Conducted emissions Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022
LISN	R&S	ENV216	101375	May 28, 2021	May 27, 2022
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Attenuator	\	10dB DC-6GHz	1650	May 28, 2021	May 27, 2022

RF Conducted Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Power Metter	Keysight	E4419	\	May 28, 2021	May 27, 2022
Power Sensor (AV)	Keysight	E9300A	\	May 28, 2021	May 27, 2022
Signal Analyzer 20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 28, 2021	May 27, 2022
Spectrum Analyzer 9kHz-40GHz	R&S	FSP40	\	May 28, 2021	May 27, 2022

Radiated emissions Test (966 chamber)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023
Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022
Receiver	R&S	ESRP	101154	May 28, 2021	May 27, 2022
Amplifier	SKET	LAPA_01G18 G-45dB	\	May 28, 2021	May 27, 2022
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 28, 2021	May 27, 2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	Jun. 01, 2021	May 31, 2022
Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 02, 2021	Jun. 01, 2022
Horn Antenn(18GHz -40GHz)	Schwarzbeck	BBHA9170	00822	Jun. 15, 2021	Jun. 14, 2022
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35- HG	2034381	May 28, 2021	May 27, 2022
Loop Antenna(9kHz -30MHz)	Schwarzbeck	FMZB1519B	00014	Jun. 02, 2021	Jun. 01, 2022
RF cables1(9kHz- 30MHz)	Huber+Suhner	9kHz-30MHz	B1702988-00 08	May 28, 2021	May 27, 2022
RF cables2(30MH z-1GHz)	Huber+Suhner	30MHz-1GH z	1486150	May 28, 2021	May 27, 2022
RF cables3(1GHz- 40GHz)	Huber+Suhner	1GHz-40GHz	1607106	May 28, 2021	May 27, 2022
Power Metter	Keysight	E4419	\	May 28, 2021	May 27, 2022
Power Sensor (AV)	Keysight	E9300A	\	May 28, 2021	May 27, 2022
Signal Analyzer20kHz -26.5GHz	Keysight	N9020A	MY49100060	May 28, 2021	May 27, 2022
Spectrum Analyzer9kHz- 40GHz	R&S	FSP40	\	May 28, 2021	May 27, 2022
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:

- *Decreasing linearly with logarithm of frequency.
- The lower limit shall apply at the transition frequencies.

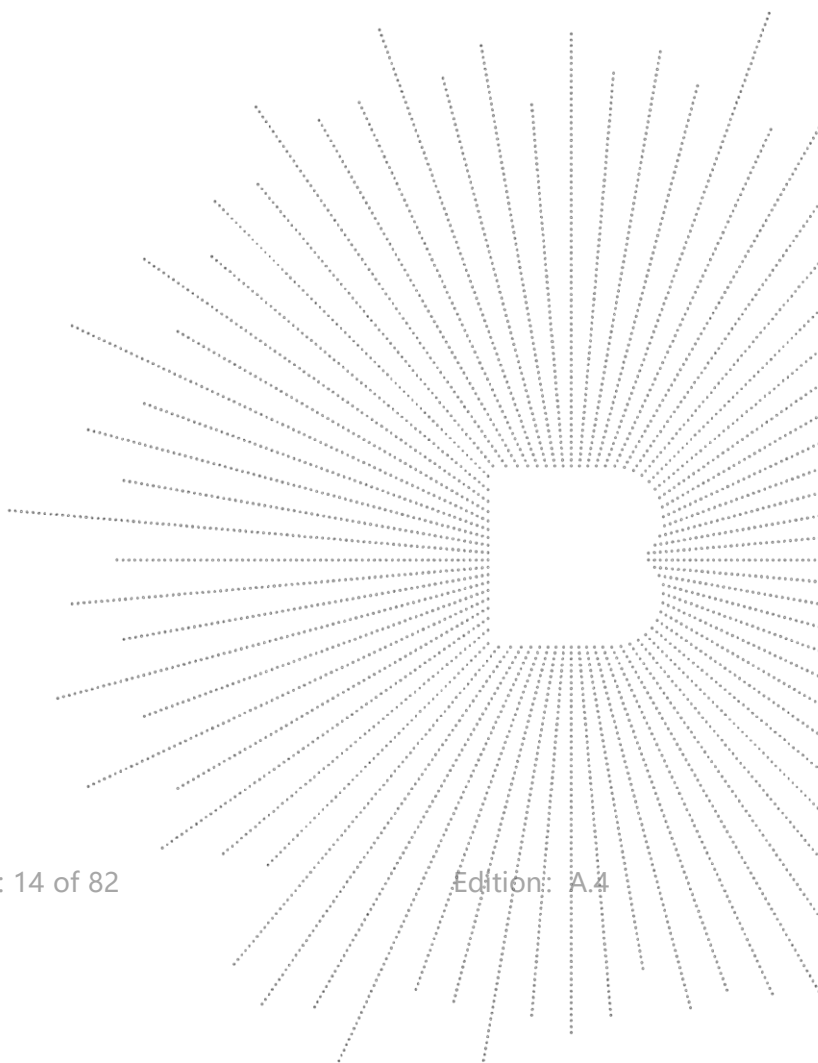
6.3 Test Procedure

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

- 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).
- 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.
- For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

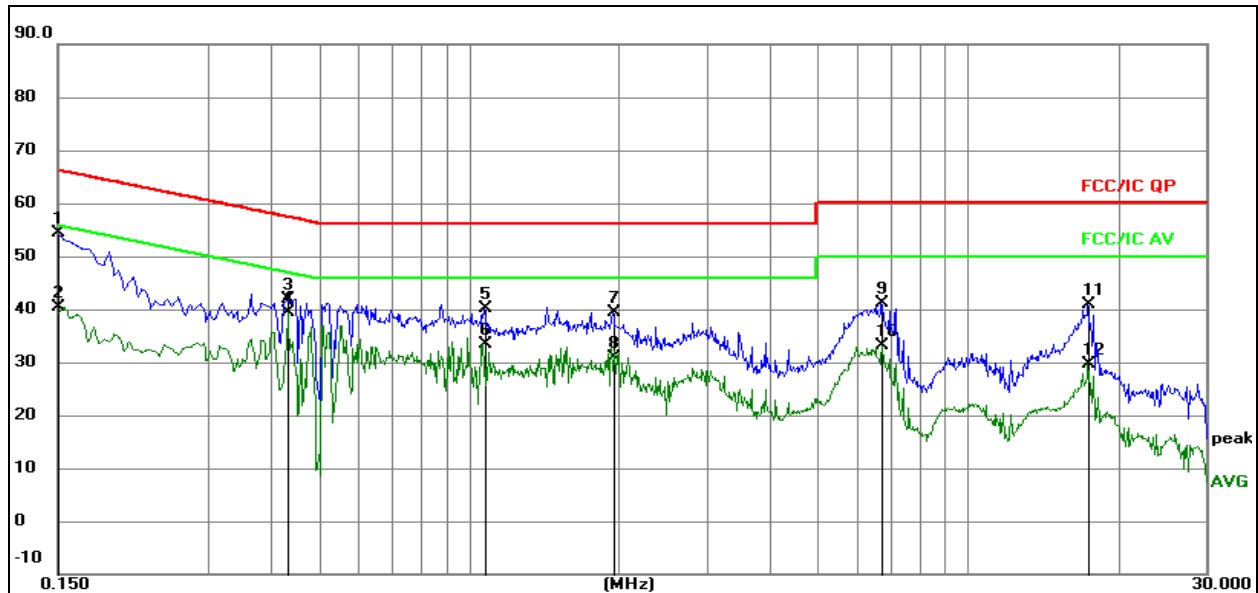
6.4 EUT Operating Conditions

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 °C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Line
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4

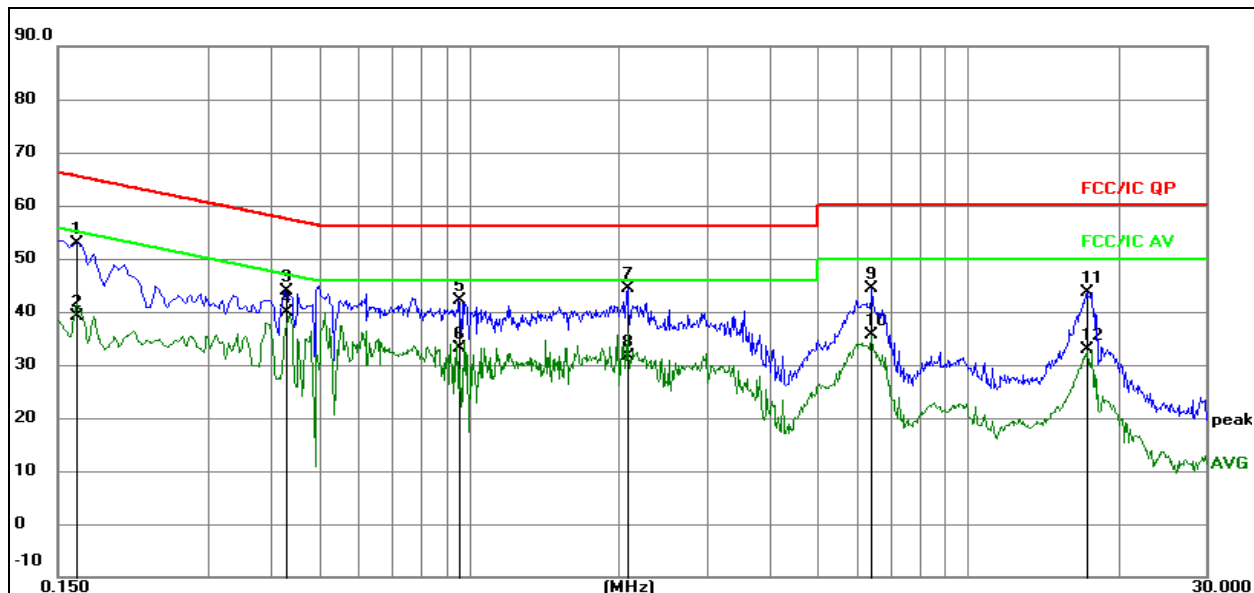


Remark:

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. MHz	Reading Level	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	0.1500	34.77	19.60	54.37	66.00	-11.63	QP
2	0.1500	20.89	19.60	40.49	56.00	-15.51	AVG
3	0.4335	22.32	19.61	41.93	57.19	-15.26	QP
4 *	0.4335	19.67	19.61	39.28	47.19	-7.91	AVG
5	1.0725	20.41	19.62	40.03	56.00	-15.97	QP
6	1.0725	13.87	19.62	33.49	46.00	-12.51	AVG
7	1.9455	19.88	19.62	39.50	56.00	-16.50	QP
8	1.9455	11.34	19.62	30.96	46.00	-15.04	AVG
9	6.7290	21.42	19.73	41.15	60.00	-18.85	QP
10	6.7290	13.42	19.73	33.15	50.00	-16.85	AVG
11	17.4570	21.08	19.76	40.84	60.00	-19.16	QP
12	17.4570	9.82	19.76	29.58	50.00	-20.42	AVG

Temperature:	26 °C	Relative Humidity:	54%
Pressure:	101kPa	Phase :	Neutral
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 4



Remark:

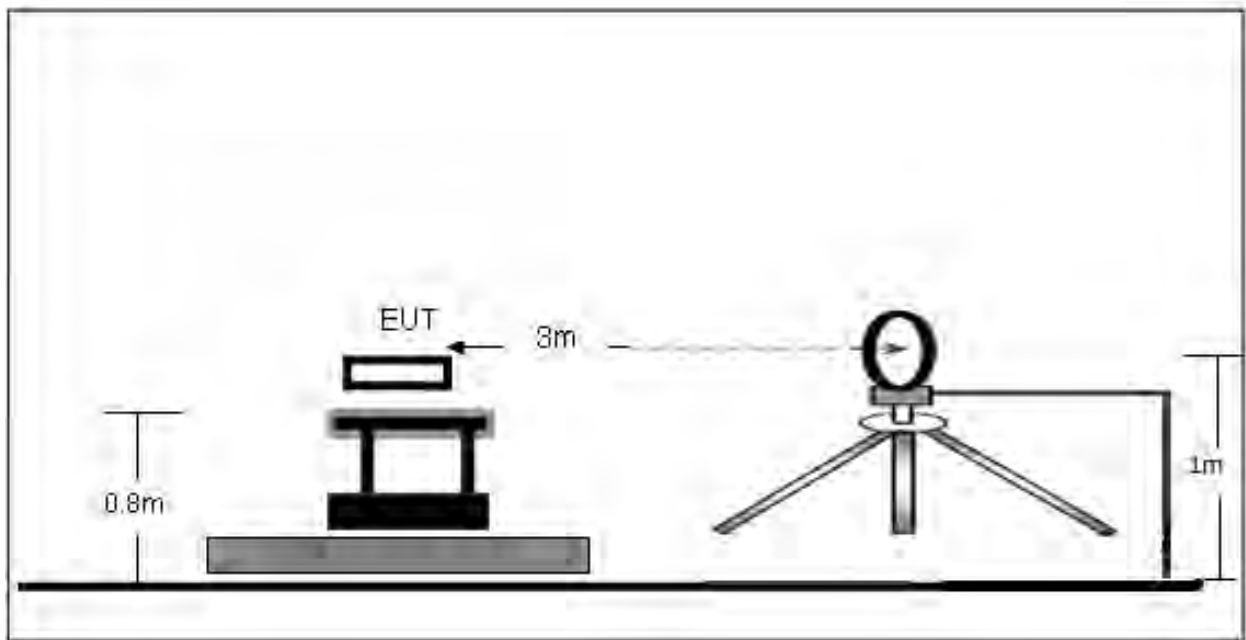
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement=Reading Level+ Correct Factor
4. Over=Measurement-Limit

No.	Mk.	Freq. MHz	Reading Level	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1635	33.29	19.60	52.89	65.28	-12.39	QP
2		0.1635	19.59	19.60	39.19	55.28	-16.09	AVG
3		0.4290	24.36	19.61	43.97	57.27	-13.30	QP
4	*	0.4290	20.28	19.61	39.89	47.27	-7.38	AVG
5		0.9555	22.62	19.62	42.24	56.00	-13.76	QP
6		0.9555	13.61	19.62	33.23	46.00	-12.77	AVG
7		2.0805	24.77	19.62	44.39	56.00	-11.61	QP
8		2.0805	12.07	19.62	31.69	46.00	-14.31	AVG
9		6.4185	24.55	19.72	44.27	60.00	-15.73	QP
10		6.4185	15.95	19.72	35.67	50.00	-14.33	AVG
11		17.3130	23.91	19.76	43.67	60.00	-16.33	QP
12		17.3130	13.08	19.76	32.84	50.00	-17.16	AVG

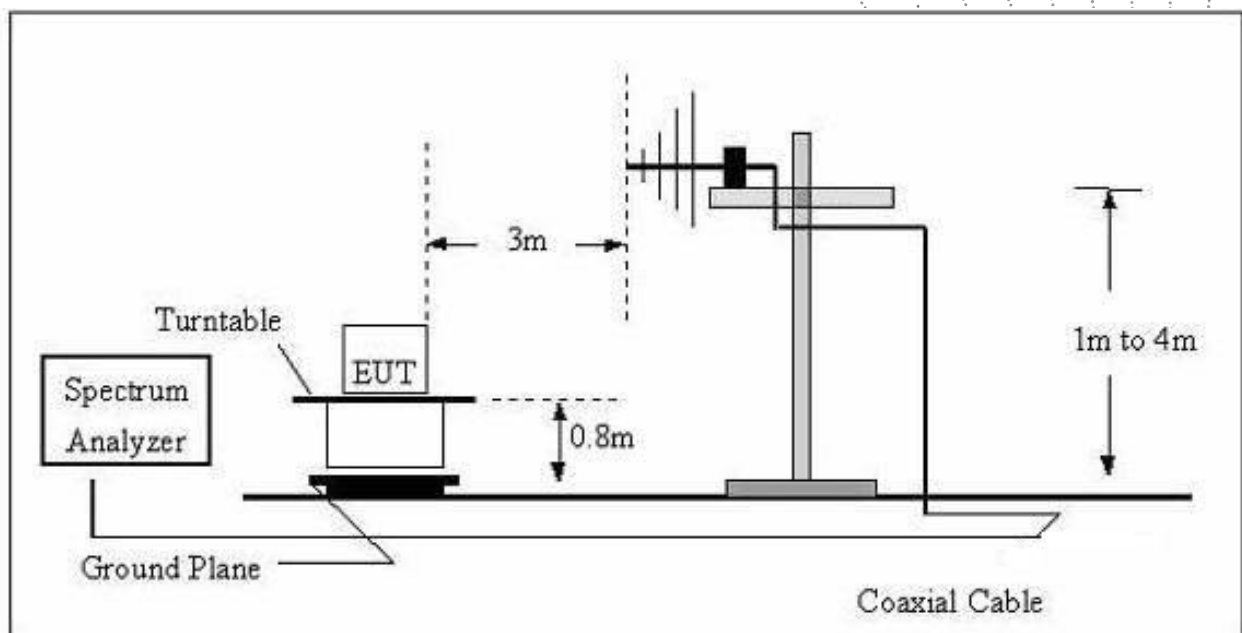
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

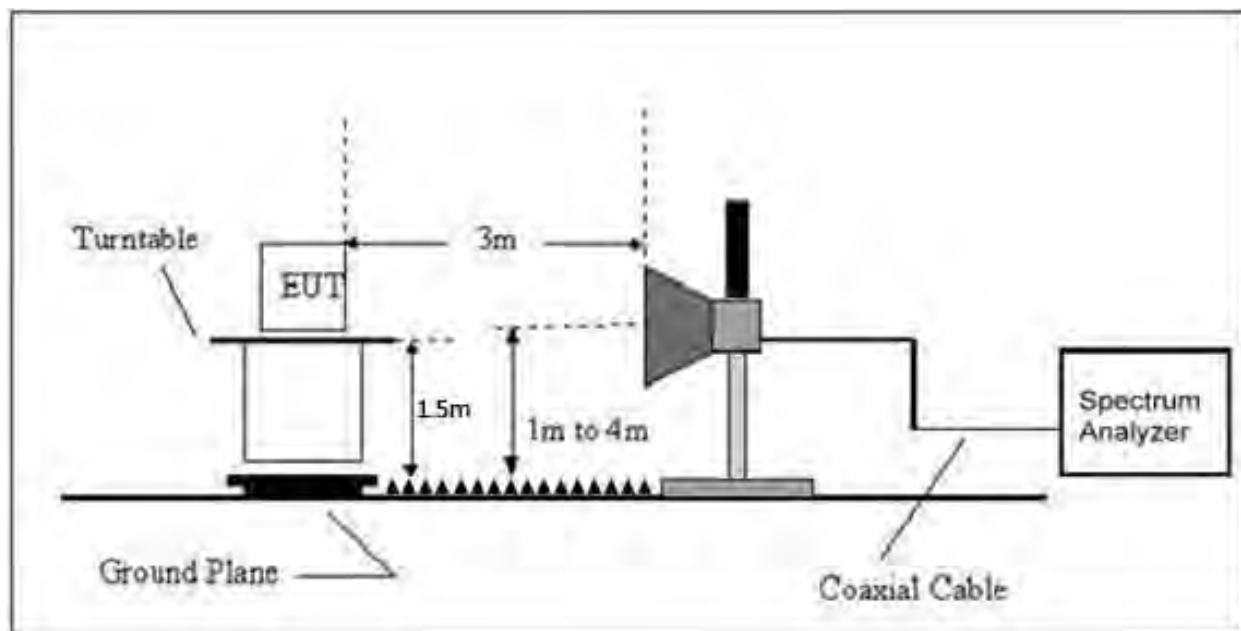
(A) Radiated Emission Test-Up Frequency Below 30MHz



(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 (MHz)	Field Strength uV/m	Distance (m)	Field Strength Limit at 3m Distance	
			uV/m	dBuV/m
0.009 ~ 0.490	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
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 $RBWCF [dB] = 10 \cdot \lg(100 [kHz]/\text{narrower RBW [kHz]})$. , 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°C	Relative Humidity:	24%
Pressure:	101 kPa	Test Voltage :	DC 5V
Test Mode :	Mode 4	Polarization :	--

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

Note:

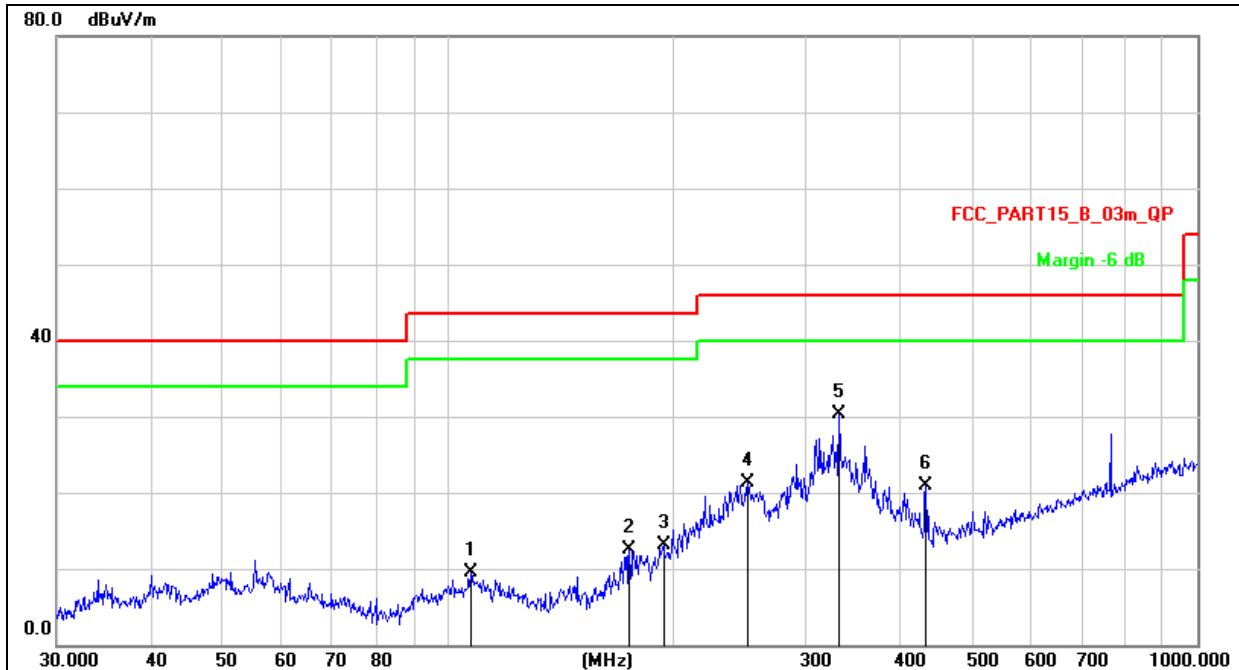
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})(dB)$;

Limit line = specific limits(dBuV) + distance extrapolation factor.

Between 30MHz – 1GHz

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kPa	Test Voltage :	DC 5V
Test Mode :	Mode 4	Polarization :	Horizontal

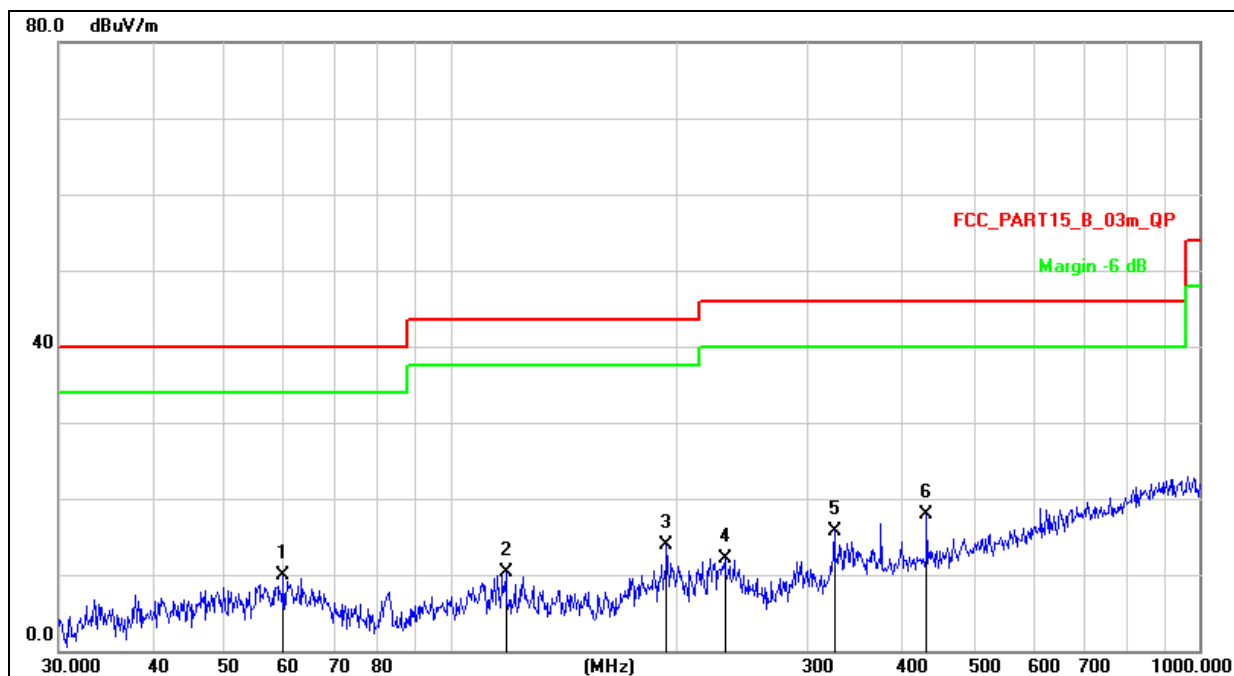


Remark:

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

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		107.1337	26.11	-16.61	9.50	43.50	-34.00	QP
2		174.4241	30.09	-17.52	12.57	43.50	-30.93	QP
3		193.7728	28.99	-15.95	13.04	43.50	-30.46	QP
4		251.1804	35.98	-14.63	21.35	46.00	-24.65	QP
5	*	332.5187	43.04	-12.81	30.23	46.00	-15.77	QP
6		434.0651	30.87	-9.98	20.89	46.00	-25.11	QP

Temperature:	26°C	Relative Humidity:	54%
Pressure:	101 kpa	Test Voltage :	DC 5V
Test Mode :	Mode 4	Polarization :	Vertical



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	Measurement	Limit	Over	Detector
	MHz	dBuV	dB	dBuV/m	dB/m	dB	
1	59.8588	25.86	-15.99	9.87	40.00	-30.13	QP
2	118.6013	27.73	-17.38	10.35	43.50	-33.15	QP
3	194.4533	29.71	-15.90	13.81	43.50	-29.69	QP
4	232.5318	27.11	-14.93	12.18	46.00	-33.82	QP
5	325.5957	28.81	-13.01	15.80	46.00	-30.20	QP
6 *	432.5457	27.83	-10.02	17.81	46.00	-28.19	QP

Test Mode :	TX (5.8G) -- 802.11a
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Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5745 MHz)-Above 1G									
V	4679.094	59.96	5.94	35.40	44.00	57.30	74	-16.70	PK
V	4679.094	43.44	5.94	35.40	44.00	40.78	54	-13.22	AV
V	11490.103	54.25	8.46	39.75	44.50	57.96	68.2	-10.24	PK
V	11490.103	43.52	8.46	39.75	44.50	47.23	54	-6.77	AV
V	17235.182	60.67	10.12	38.80	44.10	65.49	68.2	-2.71	PK
V	17235.182	43.85	10.12	38.80	42.70	50.07	54	-3.93	AV
H	4679.144	58.68	5.94	35.18	44.00	55.80	74	-18.20	PK
H	4679.144	43.70	5.94	35.18	44.00	40.82	54	-13.18	AV
H	11490.032	53.06	8.46	38.71	44.50	55.73	68.2	-12.47	PK
H	11490.032	43.35	8.46	38.71	44.50	46.02	54	-7.98	AV
H	17235.159	54.79	10.12	38.38	44.10	59.19	68.2	-9.01	PK
H	17235.159	42.58	10.12	38.38	44.10	46.98	54	-7.02	AV
middle Channel (5785 MHz)-Above 1G									
V	4592.153	56.62	6.48	36.35	44.05	55.40	74	-18.60	PK
V	4592.153	43.26	6.48	36.35	44.05	42.04	54	-11.96	AV
V	11570.022	56.67	8.47	37.88	44.51	58.51	68.2	-9.69	PK
V	11570.022	43.27	8.47	37.88	44.51	45.11	54	-8.89	AV
V	17355.153	60.44	10.12	38.80	44.10	65.26	68.2	-2.94	PK
V	17355.153	39.12	10.12	38.80	42.70	45.34	54	-8.66	AV
H	4592.189	59.60	6.48	36.37	44.05	58.40	74	-15.60	PK
H	4592.189	43.32	6.48	36.37	44.05	42.12	54	-11.88	AV
H	11570.128	52.18	8.47	38.64	44.50	54.79	68.2	-13.41	PK
H	11570.128	40.55	8.47	38.64	44.50	43.16	54	-10.84	AV
H	17355.109	54.49	10.12	38.38	44.10	58.89	68.2	-9.31	PK
H	17355.109	40.22	10.12	38.38	44.10	44.62	54	-9.38	AV
High Channel (5825 MHz)-Above 1G									
V	6039.050	56.36	7.10	37.24	43.50	57.20	68.2	-11.00	PK
V	6039.050	43.48	7.10	37.24	43.50	44.32	54	-9.68	AV
V	11650.080	58.10	8.46	37.68	44.50	59.74	74	-14.26	PK
V	11650.080	43.68	8.46	37.68	44.50	45.32	54	-8.68	AV
V	17475.108	53.51	10.12	38.80	44.10	58.33	68.2	-9.87	PK
V	17475.108	43.17	10.12	38.80	42.70	49.39	54	-4.61	AV
H	6039.106	58.15	7.10	37.24	43.50	58.99	68.2	-9.21	PK
H	6039.106	43.50	7.10	37.24	43.50	44.34	54	-9.66	AV
H	11650.198	52.48	8.46	38.57	44.50	55.01	74	-18.99	PK
H	11650.198	44.29	8.46	38.57	44.50	46.82	54	-7.18	AV
H	17475.095	52.28	10.12	38.38	44.10	56.68	68.2	-11.52	PK
H	17475.095	40.16	10.12	38.38	44.10	44.56	54	-9.44	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
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Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5745 MHz)-Above 1G									
V	4679.140	58.66	5.94	35.40	44.00	56.00	74	-18.00	PK
V	4679.140	43.54	5.94	35.40	44.00	40.88	54	-13.12	AV
V	11490.012	55.88	8.46	39.75	44.50	59.59	68.2	-8.61	PK
V	11490.012	43.27	8.46	39.75	44.50	46.98	54	-7.02	AV
V	17235.126	61.14	10.12	38.80	44.10	65.96	68.2	-2.24	PK
V	17235.126	43.20	10.12	38.80	42.70	49.42	54	-4.58	AV
H	4679.026	57.41	5.94	35.18	44.00	54.53	74	-19.47	PK
H	4679.026	43.99	5.94	35.18	44.00	41.11	54	-12.89	AV
H	11490.036	48.24	8.46	38.71	44.50	50.91	68.2	-17.29	PK
H	11490.036	44.37	8.46	38.71	44.50	47.04	54	-6.96	AV
H	17235.071	52.44	10.12	38.38	44.10	56.84	68.2	-11.36	PK
H	17235.071	43.00	10.12	38.38	44.10	47.40	54	-6.60	AV
middle Channel (5785 MHz)-Above 1G									
V	4592.158	60.11	6.48	36.35	44.05	58.89	74	-15.11	PK
V	4592.158	43.76	6.48	36.35	44.05	42.54	54	-11.46	AV
V	11570.122	55.60	8.47	37.88	44.51	57.44	68.2	-10.76	PK
V	11570.122	43.38	8.47	37.88	44.51	45.22	54	-8.78	AV
V	17355.151	59.90	10.12	38.80	44.10	64.72	68.2	-3.48	PK
V	17355.151	43.93	10.12	38.80	42.70	50.15	54	-3.85	AV
H	4592.057	60.39	6.48	36.37	44.05	59.19	74	-14.81	PK
H	4592.057	43.22	6.48	36.37	44.05	42.02	54	-11.98	AV
H	11570.165	51.47	8.47	38.64	44.50	54.08	68.2	-14.12	PK
H	11570.165	41.63	8.47	38.64	44.50	44.24	54	-9.76	AV
H	17355.013	51.37	10.12	38.38	44.10	55.77	68.2	-12.43	PK
H	17355.013	42.42	10.12	38.38	44.10	46.82	54	-7.18	AV
High Channel (5825 MHz)-Above 1G									
V	6039.195	55.35	7.10	37.24	43.50	56.19	68.2	-12.01	PK
V	6039.195	43.19	7.10	37.24	43.50	44.03	54	-9.97	AV
V	11650.049	59.10	8.46	37.68	44.50	60.74	74	-13.26	PK
V	11650.049	43.74	8.46	37.68	44.50	45.38	54	-8.62	AV
V	17475.150	57.76	10.12	38.80	44.10	62.58	68.2	-5.62	PK
V	17475.150	43.79	10.12	38.80	42.70	50.01	54	-3.99	AV
H	6039.111	55.72	7.10	37.24	43.50	56.56	68.2	-11.64	PK
H	6039.111	43.58	7.10	37.24	43.50	44.42	54	-9.58	AV
H	11650.052	52.72	8.46	38.57	44.50	55.25	74	-18.75	PK
H	11650.052	42.97	8.46	38.57	44.50	45.50	54	-8.50	AV
H	17475.054	52.19	10.12	38.38	44.10	56.59	68.2	-11.61	PK
H	17475.054	41.99	10.12	38.38	44.10	46.39	54	-7.61	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
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Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5755 MHz)-Above 1G									
V	4679.122	59.18	5.94	35.40	44.00	56.52	74	-17.48	PK
V	4679.122	43.81	5.94	35.40	44.00	41.15	54	-12.85	AV
V	11510.108	55.16	8.46	39.75	44.50	58.87	74	-15.13	PK
V	11510.108	43.15	8.46	39.75	44.50	46.86	54	-7.14	AV
V	17265.005	58.40	10.12	38.80	44.10	63.22	68.2	-4.98	PK
V	17265.005	2.00	10.12	38.80	42.70	8.22	54	-45.78	AV
H	4679.108	60.05	5.94	35.18	44.00	57.17	74	-16.83	PK
H	4679.108	43.33	5.94	35.18	44.00	40.45	54	-13.55	AV
H	11510.142	52.45	8.46	38.71	44.50	55.12	74	-18.88	PK
H	11510.142	43.45	8.46	38.71	44.50	46.12	54	-7.88	AV
H	17265.095	52.90	10.12	38.38	44.10	57.30	68.2	-10.90	PK
H	17265.095	42.89	10.12	38.38	44.10	47.29	54	-6.71	AV
middle Channel (5795 MHz)-Above 1G									
V	6039.177	57.36	6.48	36.35	44.05	56.14	68.2	-12.06	PK
V	6039.177	43.24	6.48	36.35	44.05	42.02	54	-11.98	AV
V	11590.044	58.66	8.47	37.88	44.51	60.50	74	-13.50	PK
V	11590.044	43.17	8.47	37.88	44.51	45.01	54	-8.99	AV
V	17385.118	55.66	10.12	38.80	44.10	60.48	68.2	-7.72	PK
V	17385.118	41.29	10.12	38.80	42.70	47.51	54	-6.49	AV
H	6039.155	58.19	6.48	36.37	44.05	56.99	68.2	-11.21	PK
H	6039.155	43.89	6.48	36.37	44.05	42.69	54	-11.31	AV
H	11590.076	51.10	8.47	38.64	44.50	53.71	74	-20.29	PK
H	11590.076	44.25	8.47	38.64	44.50	46.86	54	-7.14	AV
H	17385.104	54.79	10.12	38.38	44.10	59.19	68.2	-9.01	PK
H	17385.104	44.00	10.12	38.38	44.10	48.40	54	-5.60	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) --802.11AC20
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Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5745 MHz)-Above 1G									
V	4679.008	60.28	5.94	35.40	44.00	57.62	74	-16.38	PK
V	4679.008	43.34	5.94	35.40	44.00	40.68	54	-13.32	AV
V	11490.156	55.54	8.46	39.75	44.50	59.25	68.2	-8.95	PK
V	11490.156	43.32	8.46	39.75	44.50	47.03	54	-6.97	AV
V	17235.037	60.76	10.12	38.80	44.10	65.58	68.2	-2.62	PK
V	17235.037	43.50	10.12	38.80	42.70	49.72	54	-4.28	AV
H	4679.177	60.81	5.94	35.18	44.00	57.93	74	-16.07	PK
H	4679.177	43.83	5.94	35.18	44.00	40.95	54	-13.05	AV
H	11490.137	50.70	8.46	38.71	44.50	53.37	68.2	-14.83	PK
H	11490.137	42.78	8.46	38.71	44.50	45.45	54	-8.55	AV
H	17235.078	53.04	10.12	38.38	44.10	57.44	68.2	-10.76	PK
H	17235.078	41.20	10.12	38.38	44.10	45.60	54	-8.40	AV
middle Channel (5785 MHz)-Above 1G									
V	4592.104	61.97	6.48	36.35	44.05	60.75	74	-13.25	PK
V	4592.104	43.01	6.48	36.35	44.05	41.79	54	-12.21	AV
V	11570.082	54.55	8.47	37.88	44.51	56.39	68.2	-11.81	PK
V	11570.082	43.70	8.47	37.88	44.51	45.54	54	-8.46	AV
V	17355.023	58.84	10.12	38.80	44.10	63.66	68.2	-4.54	PK
V	17355.023	43.05	10.12	38.80	42.70	49.27	54	-4.73	AV
H	4592.160	59.37	6.48	36.37	44.05	58.17	74	-15.83	PK
H	4592.160	43.72	6.48	36.37	44.05	42.52	54	-11.48	AV
H	11570.108	52.55	8.47	38.64	44.50	55.16	68.2	-13.04	PK
H	11570.108	41.40	8.47	38.64	44.50	44.01	54	-9.99	AV
H	17355.018	54.40	10.12	38.38	44.10	58.80	68.2	-9.40	PK
H	17355.018	43.41	10.12	38.38	44.10	47.81	54	-6.19	AV
High Channel (5825 MHz)-Above 1G									
V	6039.104	55.53	7.10	37.24	43.50	56.37	68.2	-11.83	PK
V	6039.104	43.81	7.10	37.24	43.50	44.65	54	-9.35	AV
V	11650.083	60.01	8.46	37.68	44.50	61.65	74	-12.35	PK
V	11650.083	43.83	8.46	37.68	44.50	45.47	54	-8.53	AV
V	17475.042	55.34	10.12	38.80	44.10	60.16	68.2	-8.04	PK
V	17475.042	43.59	10.12	38.80	42.70	49.81	54	-4.19	AV
H	6039.177	56.26	7.10	37.24	43.50	57.10	68.2	-11.10	PK
H	6039.177	43.09	7.10	37.24	43.50	43.93	54	-10.07	AV
H	11650.151	54.22	8.46	38.57	44.50	56.75	74	-17.25	PK
H	11650.151	40.66	8.46	38.57	44.50	43.19	54	-10.81	AV
H	17475.125	54.23	10.12	38.38	44.10	58.63	68.2	-9.57	PK
H	17475.125	40.46	10.12	38.38	44.10	44.86	54	-9.14	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) -- 802.11AC40
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Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
Low Channel (5755 MHz)-Above 1G									
V	4679.013	56.41	5.94	35.40	44.00	53.75	74	-20.25	PK
V	4679.013	43.57	5.94	35.40	44.00	40.91	54	-13.09	AV
V	11510.061	55.05	8.46	39.75	44.50	58.76	74	-15.24	PK
V	11510.061	43.03	8.46	39.75	44.50	46.74	54	-7.26	AV
V	17265.144	57.19	10.12	38.80	44.10	62.01	68.2	-6.19	PK
V	17265.144	2.00	10.12	38.80	42.70	8.22	54	-45.78	AV
H	4679.010	60.94	5.94	35.18	44.00	58.06	74	-15.94	PK
H	4679.010	43.90	5.94	35.18	44.00	41.02	54	-12.98	AV
H	11510.006	52.63	8.46	38.71	44.50	55.30	74	-18.70	PK
H	11510.006	40.50	8.46	38.71	44.50	43.17	54	-10.83	AV
H	17265.179	50.26	10.12	38.38	44.10	54.66	68.2	-13.54	PK
H	17265.179	40.33	10.12	38.38	44.10	44.73	54	-9.27	AV
middle Channel (5795 MHz)-Above 1G									
V	6039.155	57.16	6.48	36.35	44.05	55.94	68.2	-12.26	PK
V	6039.155	43.16	6.48	36.35	44.05	41.94	54	-12.06	AV
V	11590.153	55.01	8.47	37.88	44.51	56.85	74	-17.15	PK
V	11590.153	43.94	8.47	37.88	44.51	45.78	54	-8.22	AV
V	17385.158	55.73	10.12	38.80	44.10	60.55	68.2	-7.65	PK
V	17385.158	41.97	10.12	38.80	42.70	48.19	54	-5.81	AV
H	6039.047	58.23	6.48	36.37	44.05	57.03	68.2	-11.17	PK
H	6039.047	43.57	6.48	36.37	44.05	42.37	54	-11.63	AV
H	11590.038	52.49	8.47	38.64	44.50	55.10	74	-18.90	PK
H	11590.038	40.66	8.47	38.64	44.50	43.27	54	-10.73	AV
H	17385.017	52.80	10.12	38.38	44.10	57.20	68.2	-11.00	PK
H	17385.017	44.46	10.12	38.38	44.10	48.86	54	-5.14	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) -- 802.11AC80
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Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Cable loss (dB)	Antenna Factor dB/m	Preamp Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/ m)	Margin (dB)	Detector Type
Low Channel (5775 MHz)-Above 1G									
V	4679.006	55.82	5.94	35.40	44.00	53.16	74	-20.84	PK
V	4679.006	43.46	5.94	35.40	44.00	40.80	54	-13.20	AV
V	11550.114	57.33	8.46	39.75	44.50	61.04	74	-12.96	PK
V	11550.114	43.44	8.46	39.75	44.50	47.15	54	-6.85	AV
V	17325.078	56.37	10.12	38.80	44.10	61.19	68.2	-7.01	PK
V	17325.078	41.63	10.12	38.80	42.70	47.85	54	-6.15	AV
H	4679.152	55.11	5.94	35.18	44.00	52.23	74	-21.77	PK
H	4679.152	43.82	5.94	35.18	44.00	40.94	54	-13.06	AV
H	11550.075	53.86	8.46	38.71	44.50	56.53	74	-17.47	PK
H	11550.075	43.95	8.46	38.71	44.50	46.62	54	-7.38	AV
H	17325.095	53.84	10.12	38.38	44.10	58.24	68.2	-9.96	PK
H	17325.095	42.54	10.12	38.38	44.10	46.94	54	-7.06	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

(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

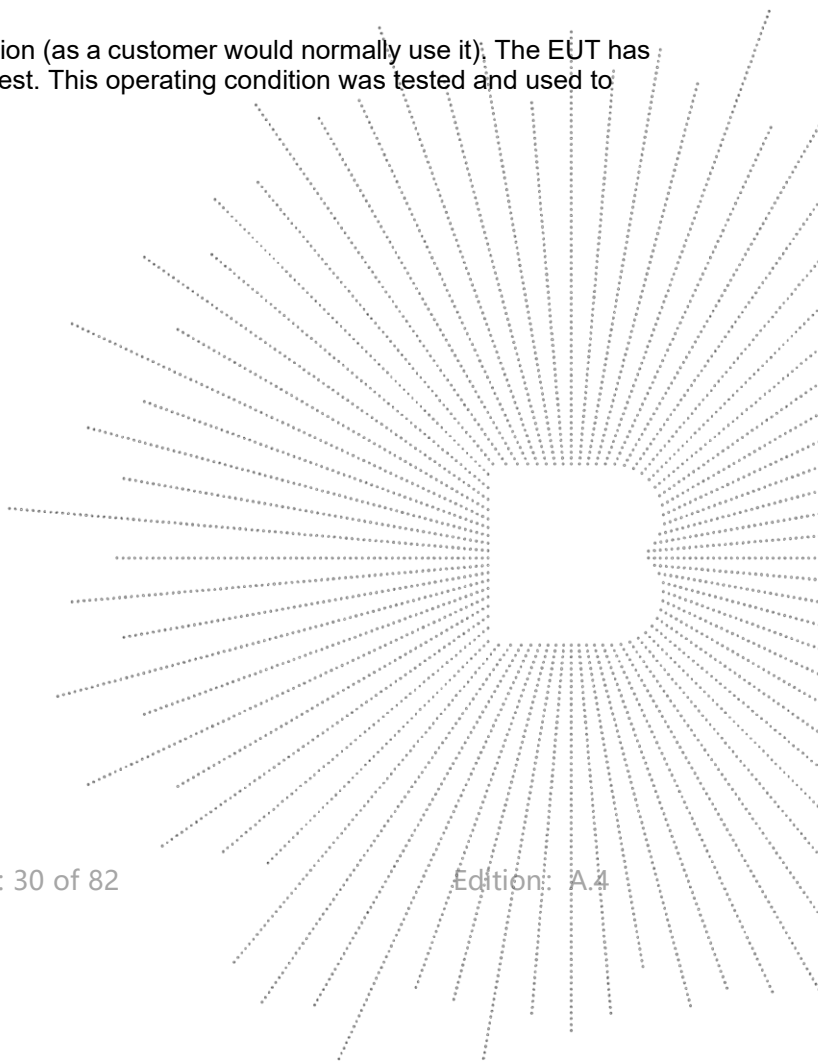
For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 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 $RBW \geq 1/T$, where T is defined in section II.B.I.a).
- b) Set $VBW \geq 3 RBW$.
- c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ 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 $10\log(1\text{MHz}/RBW)$ 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

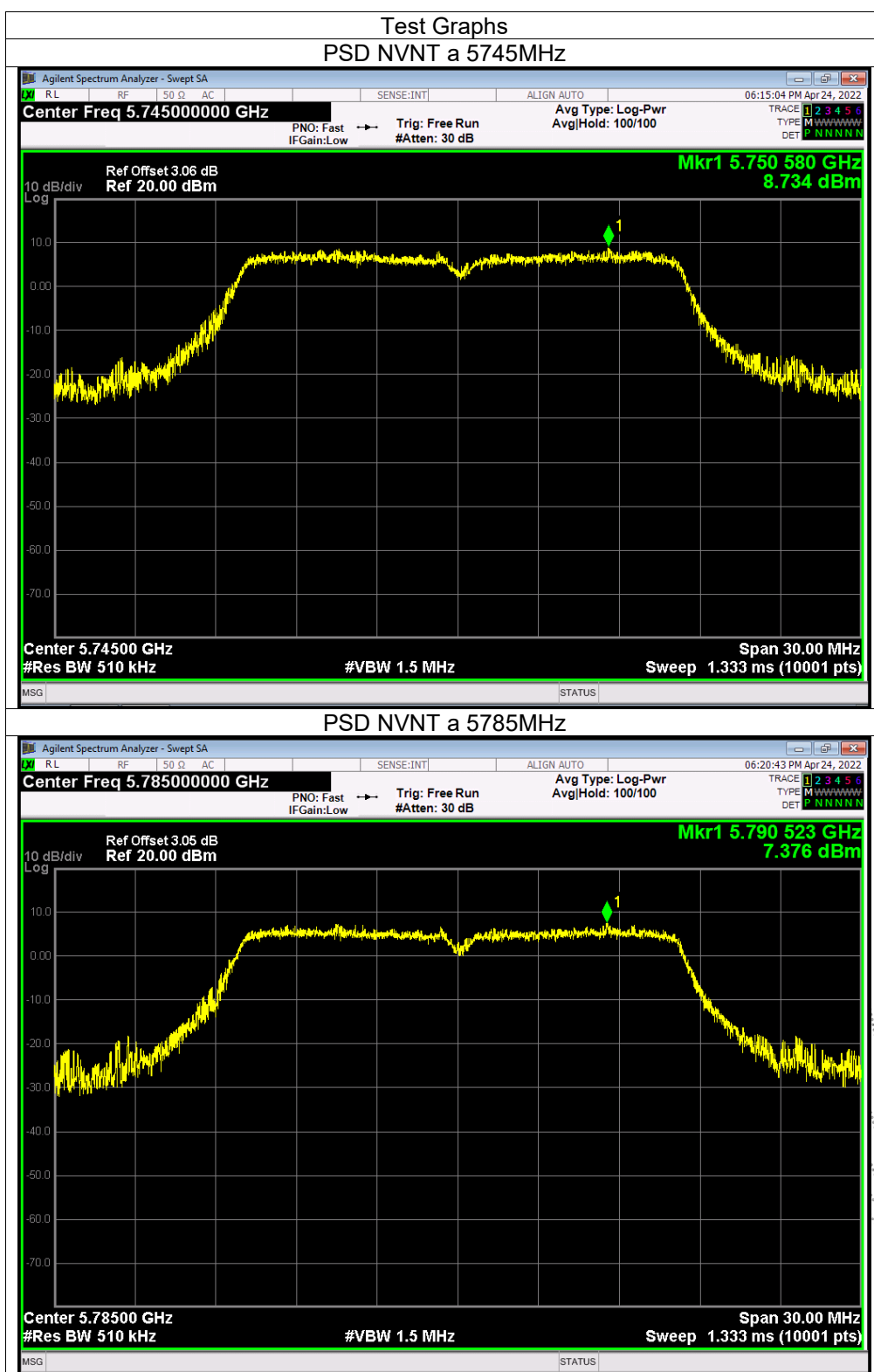
The EUT was configured for testing in a typical fashion (as a customer would normally use it); The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

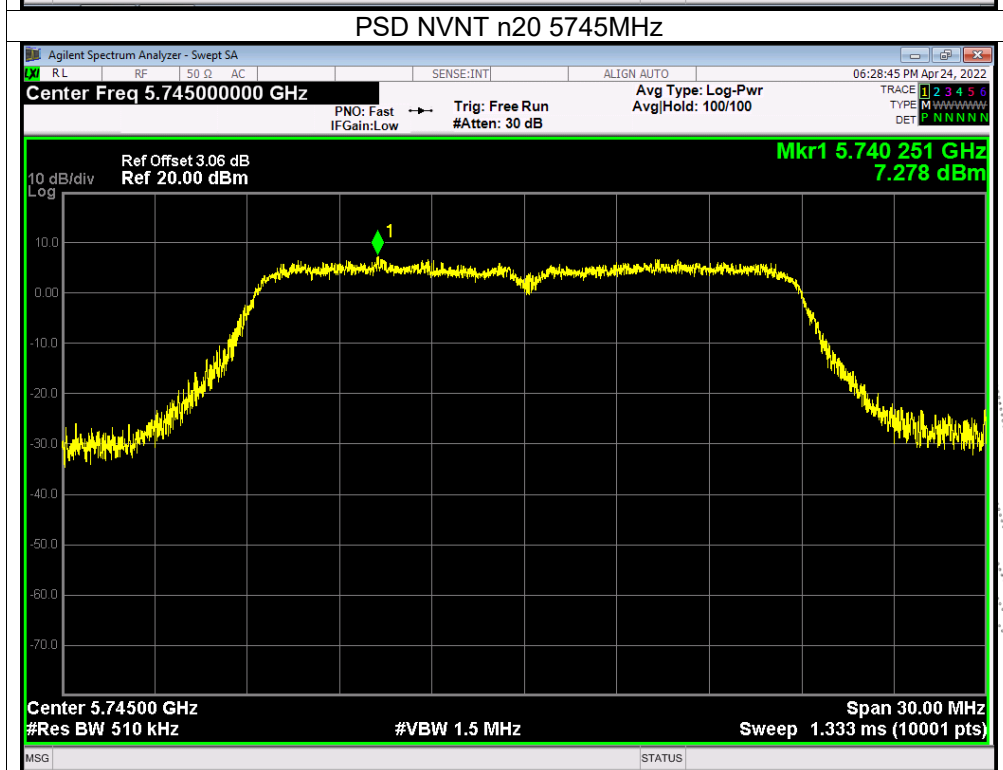
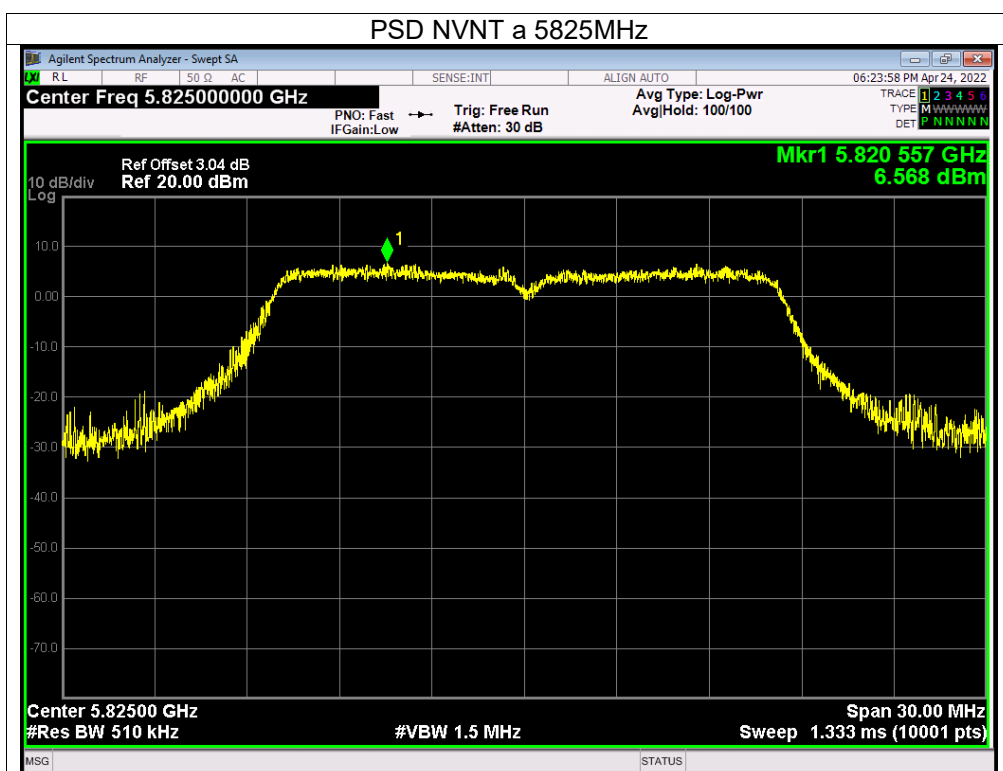


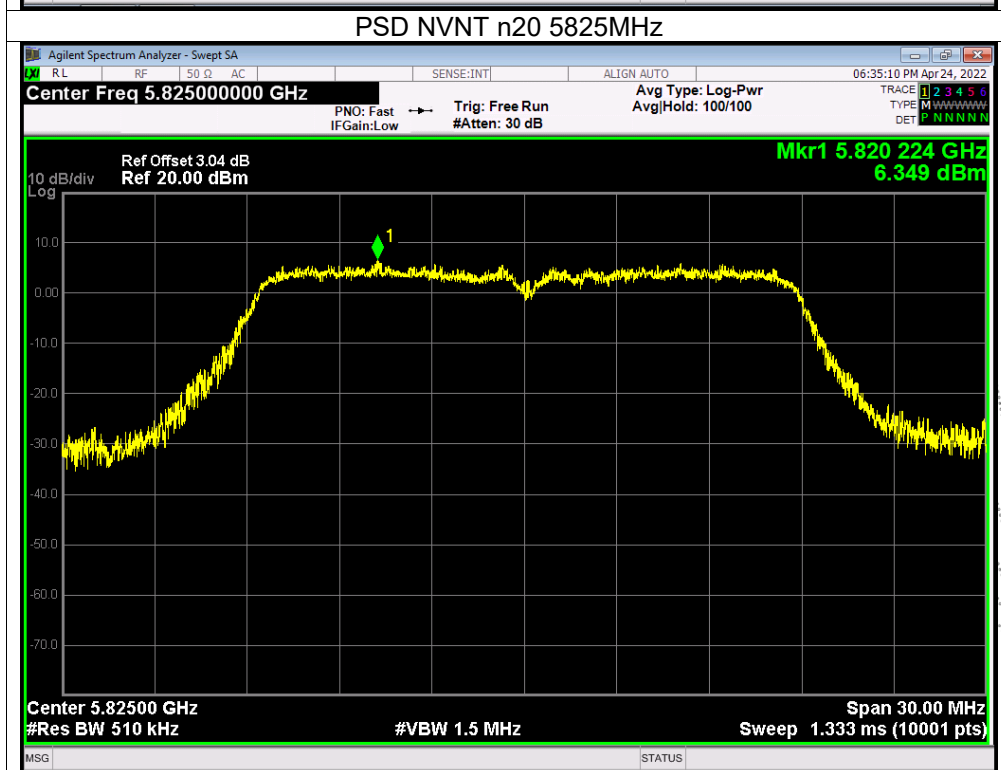
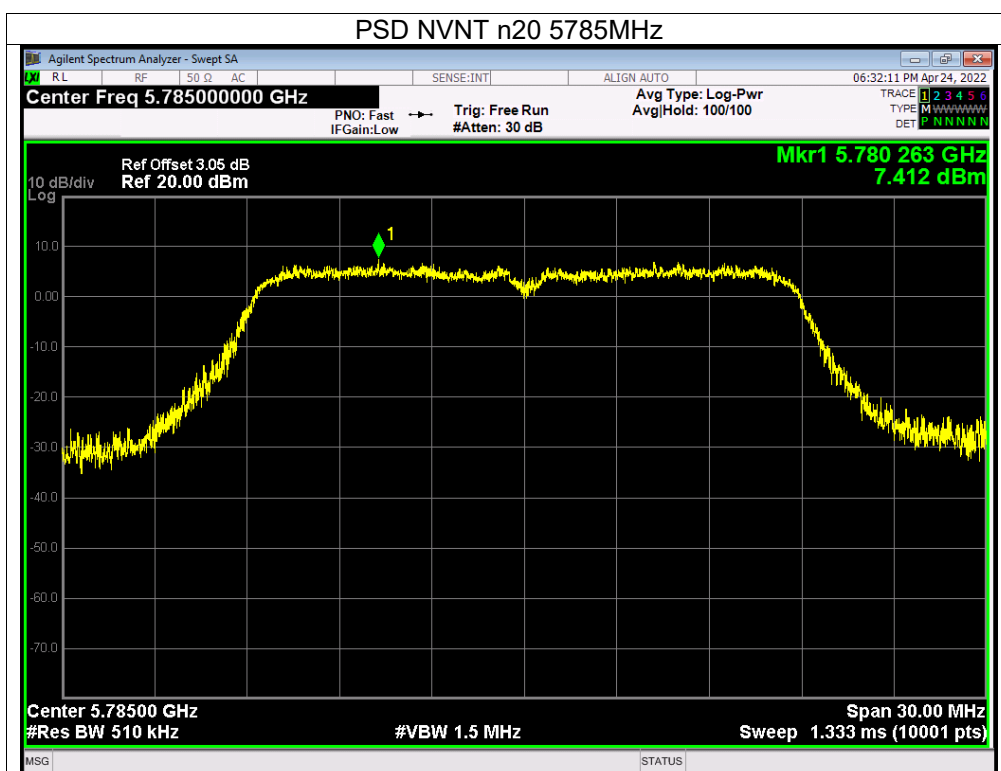
8.5 Test Result

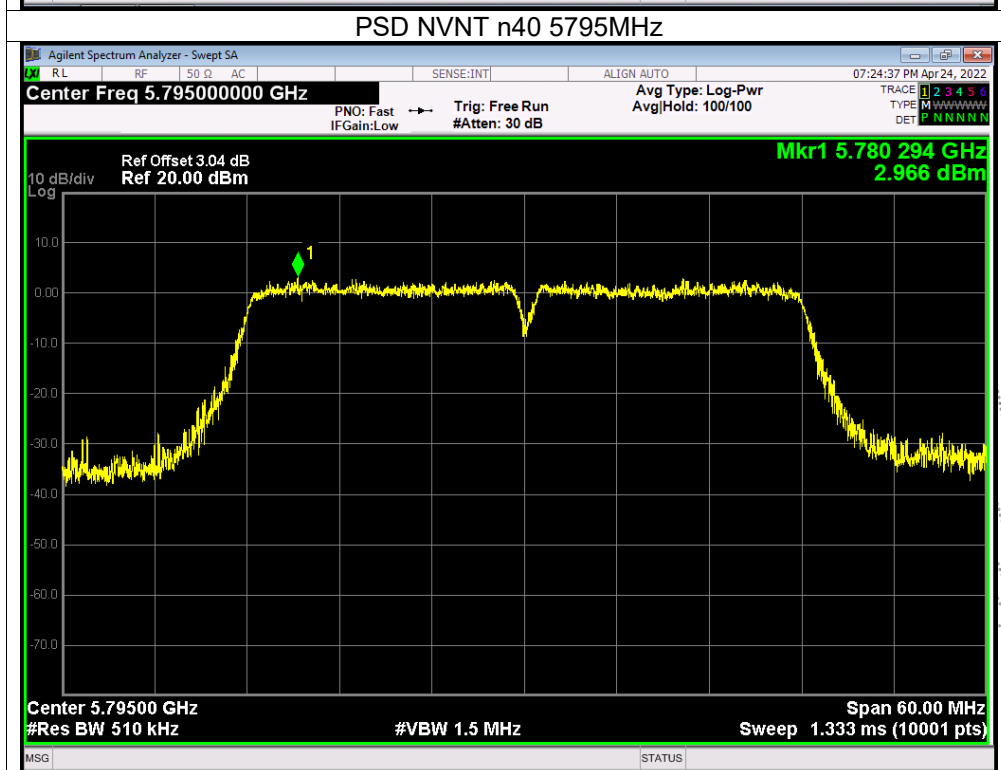
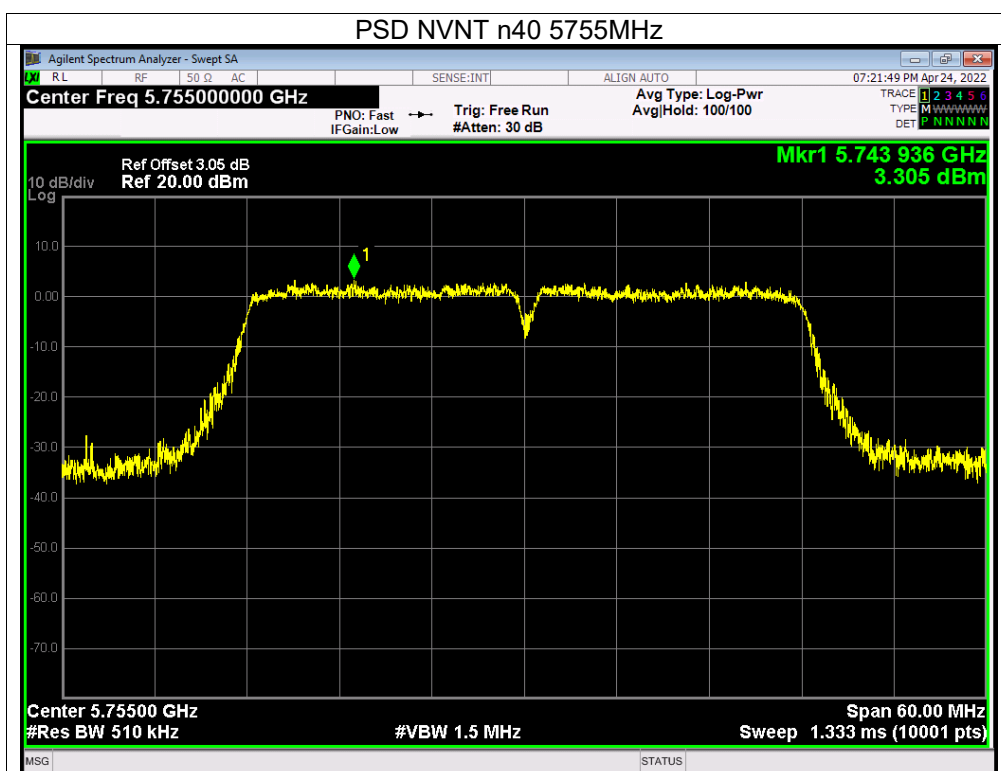
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 5V
Test Mode :	TX Frequency U-NII-3 (5745-5825MHz)		

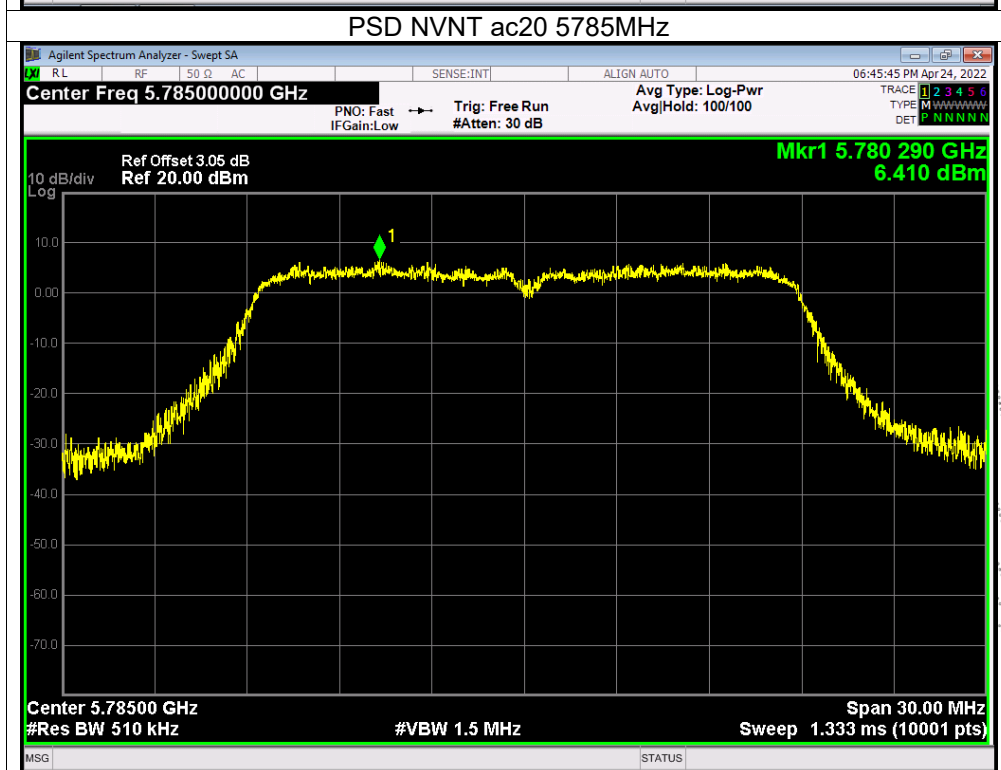
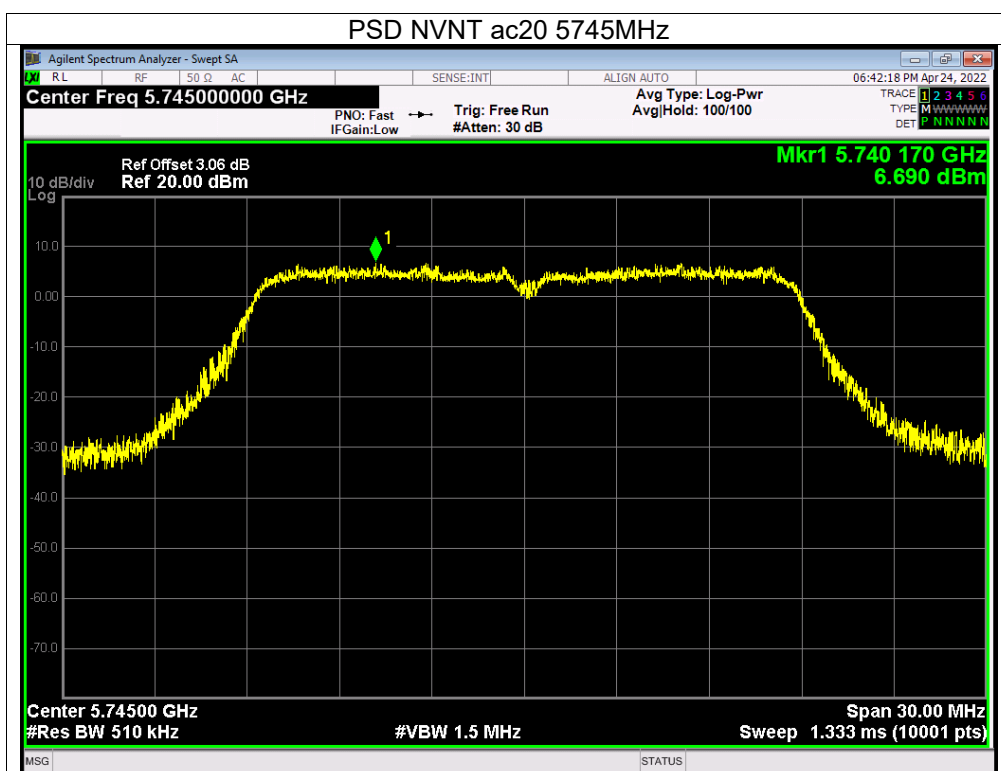
Mode	Frequency	Measured Power Density (dBm/500kHz)	Limit (dBm/500kHz)	Result
802.11 a	5745 MHz	8.73	30	PASS
	5785 MHz	7.38	30	PASS
	5825 MHz	6.57	30	PASS
802.11 n20	5745 MHz	7.28	30	PASS
	5785 MHz	7.41	30	PASS
	5825 MHz	6.35	30	PASS
802.11 n40	5755 MHz	3.31	30	PASS
	5795 MHz	2.97	30	PASS
802.11 AC20	5745 MHz	6.69	30	PASS
	5785 MHz	6.41	30	PASS
	5825 MHz	6.26	30	PASS
802.11 AC40	5755 MHz	3.69	30	PASS
	5795 MHz	3.54	30	PASS
802.11 AC80	5775 MHz	1.38	30	PASS

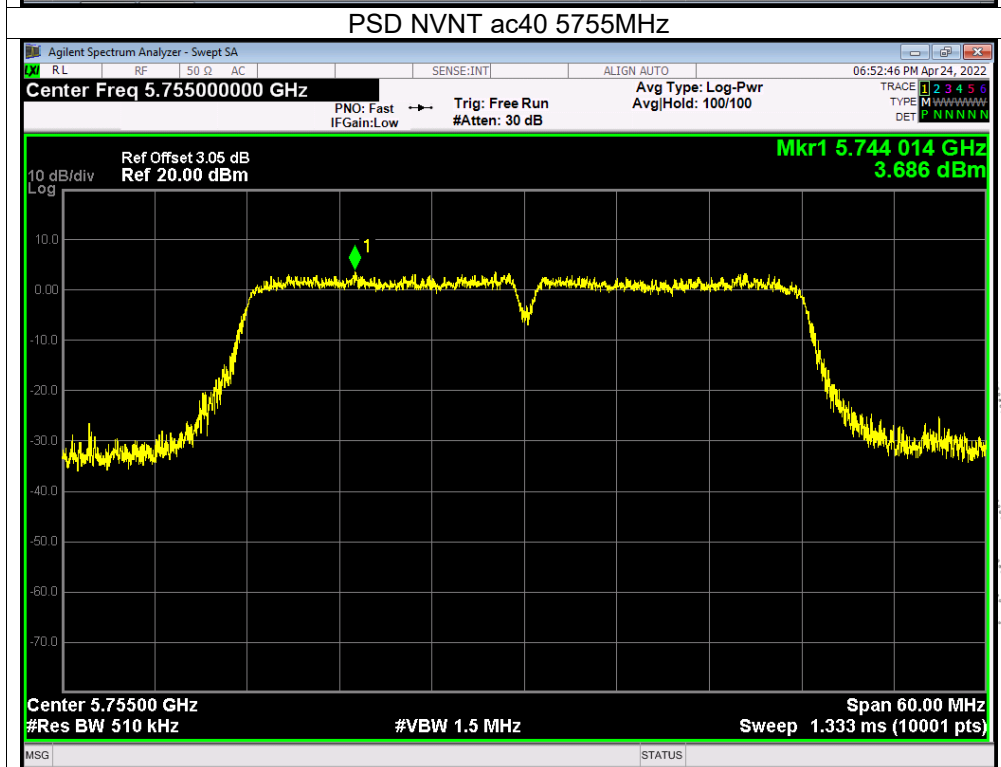
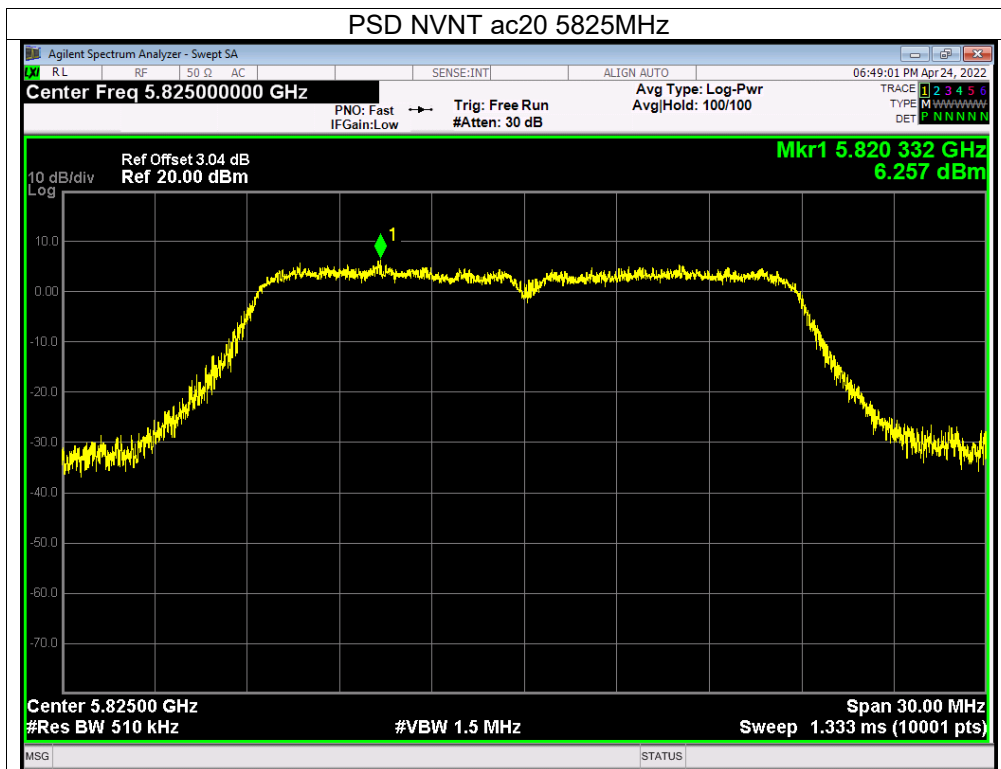


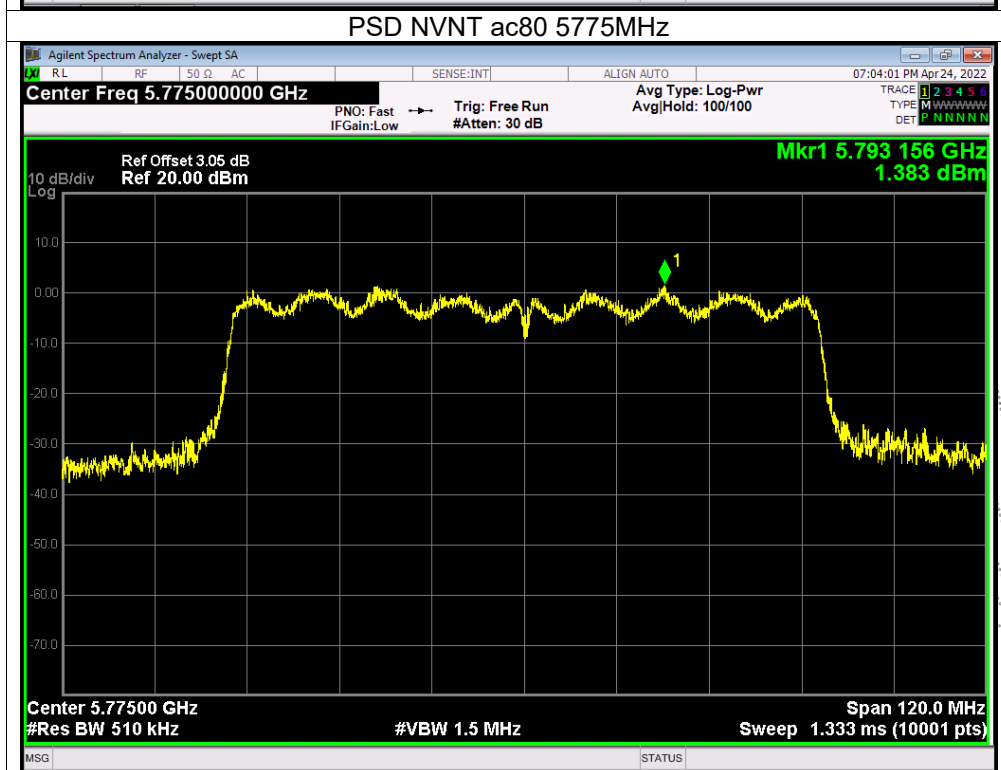
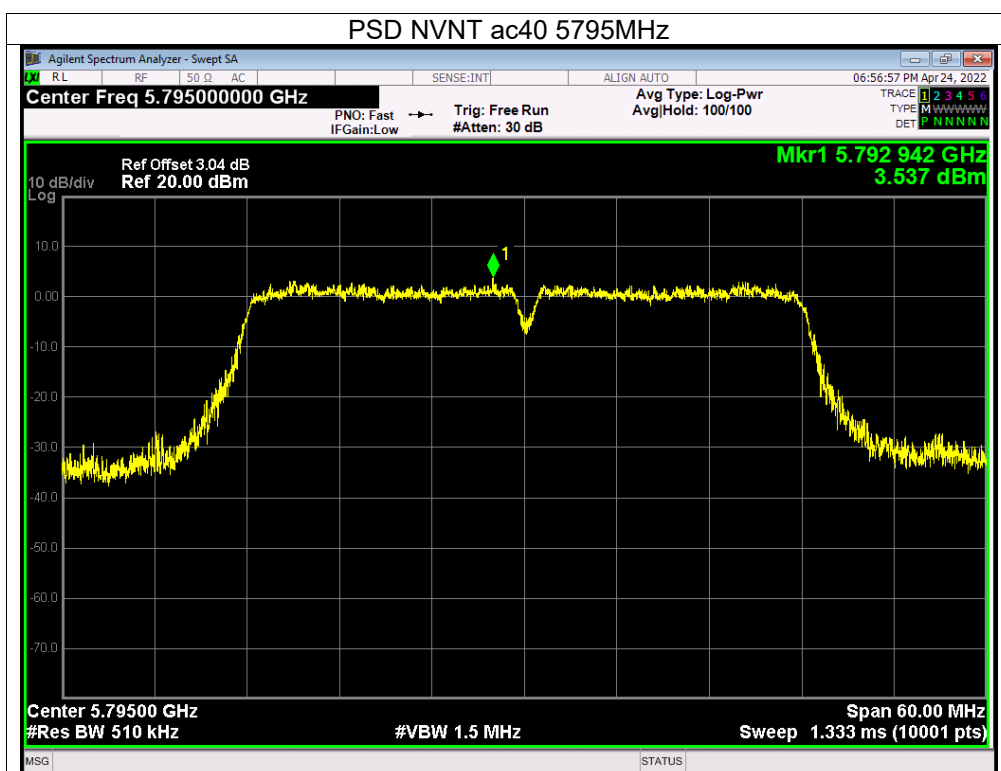






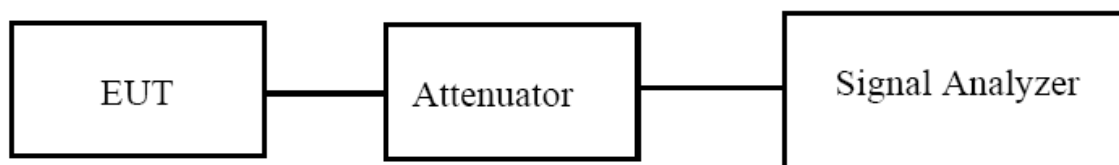






9. 6dB & 99% Emission Bandwidth

9.1 Block Diagram Of Test Setup



9.2 Limit

The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

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 $\geq 3 \cdot$ 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

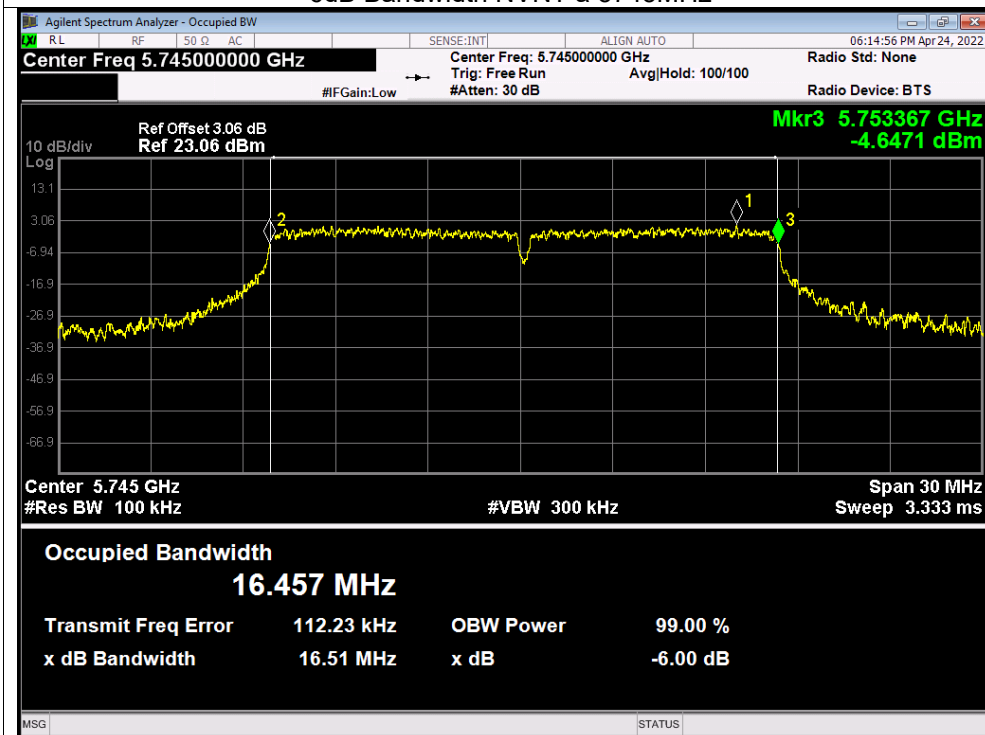
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 5V
Test Mode :	TX Frequency U-NII-3(5745-5825MHz)		

Mode	Channel	Frequency (MHz)	99% bandwidth(M Hz)	6dB bandwidth (MHz)	Limit kHz	Result
802.11a	CH149	5745	16.574	16.509	≥500	Pass
	CH157	5785	16.508	16.534	≥500	Pass
	CH165	5825	16.529	16.522	≥500	Pass
802.11 n20	CH149	5745	17.628	17.666	≥500	Pass
	CH157	5785	17.63	17.651	≥500	Pass
	CH165	5825	17.633	17.666	≥500	Pass
802.11 n40	CH151	5755	36.055	36.379	≥500	Pass
	CH159	5795	36.048	36.374	≥500	Pass
802.11 AC20	CH149	5745	17.656	17.62	≥500	Pass
	CH157	5785	17.646	17.626	≥500	Pass
	CH165	5825	17.653	17.642	≥500	Pass
802.11 AC40	CH151	5755	36.079	36.353	≥500	Pass
	CH159	5795	36.078	36.372	≥500	Pass
802.11 AC80	CH151	5755	75.392	76.057	≥500	Pass

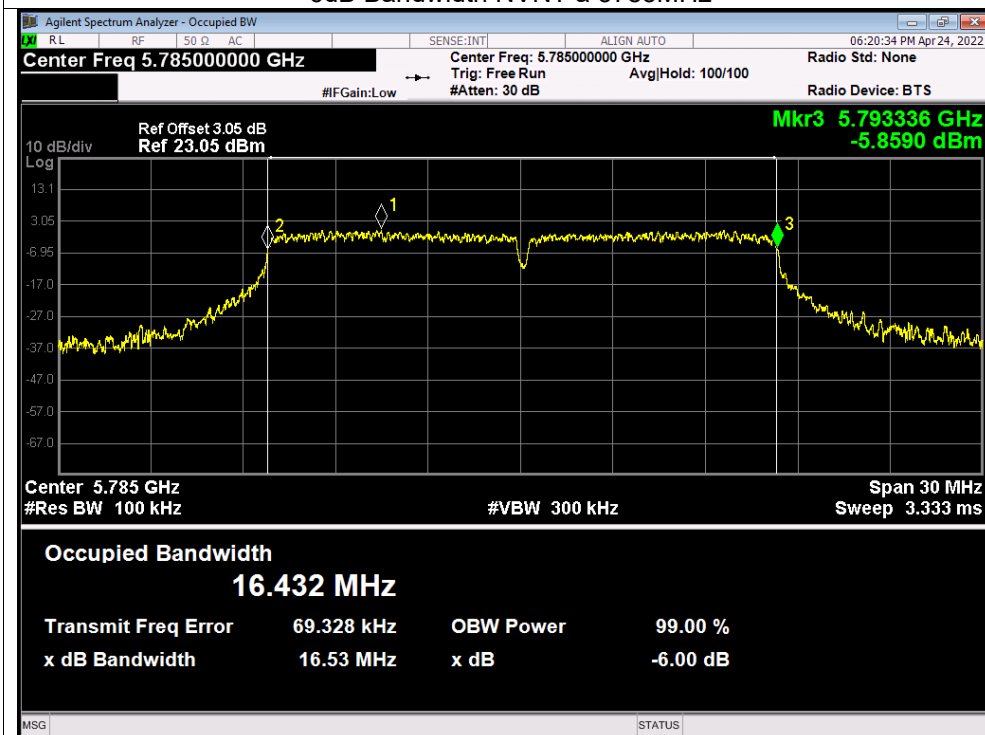
-6dB Bandwidth

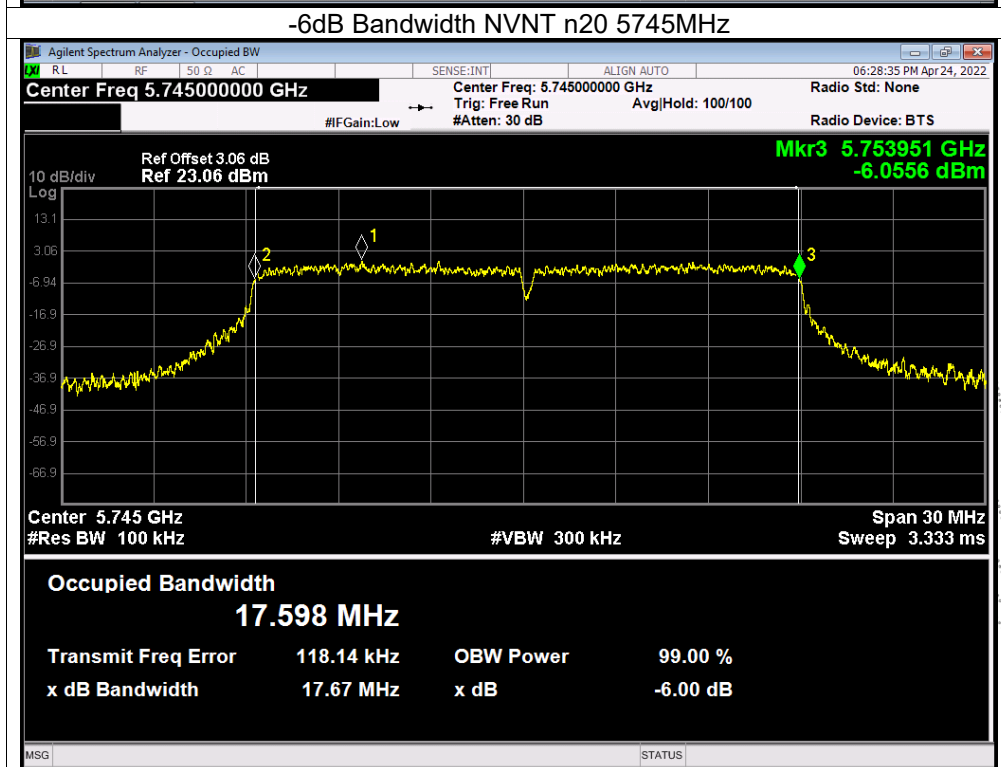
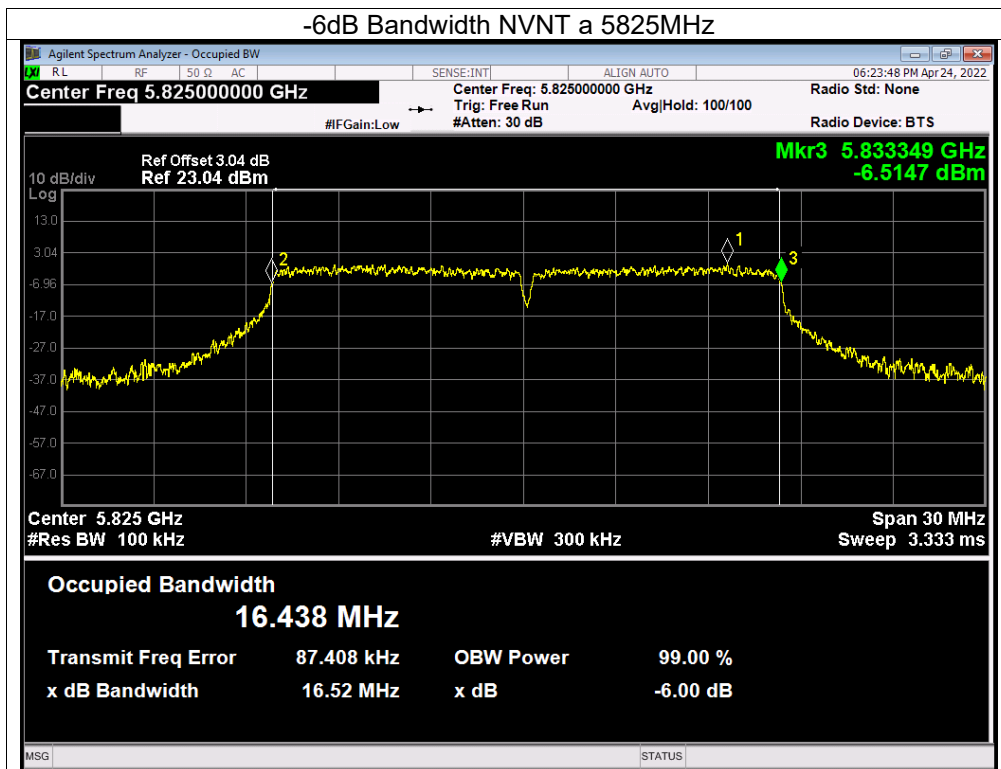
Test Graphs

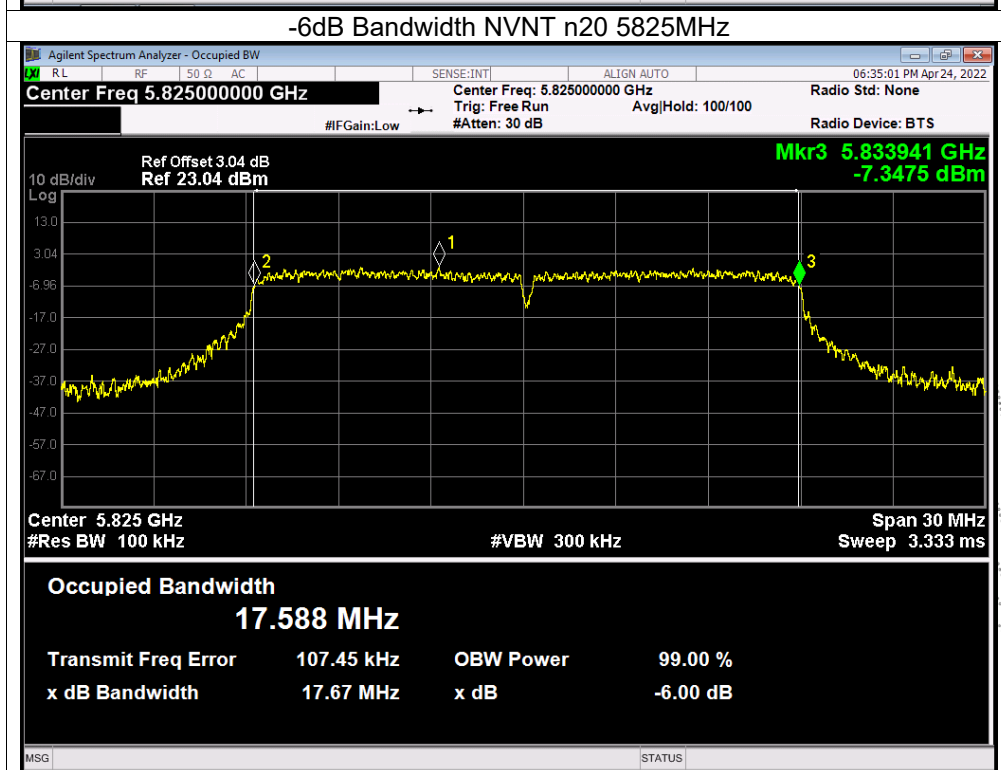
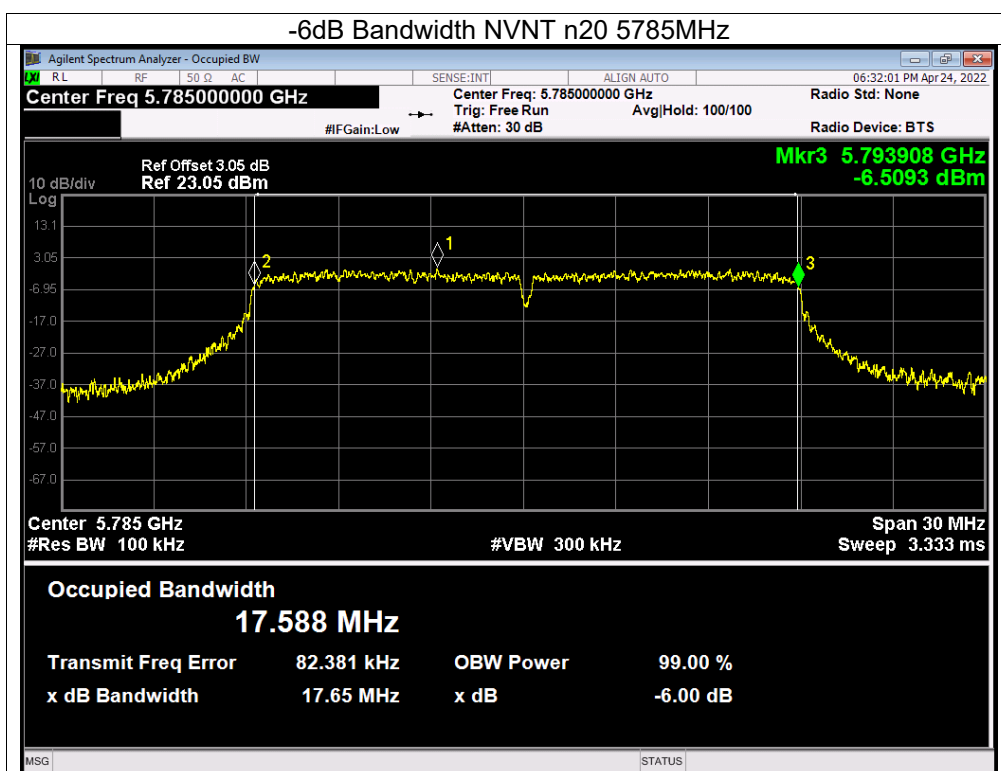
-6dB Bandwidth NVNT a 5745MHz

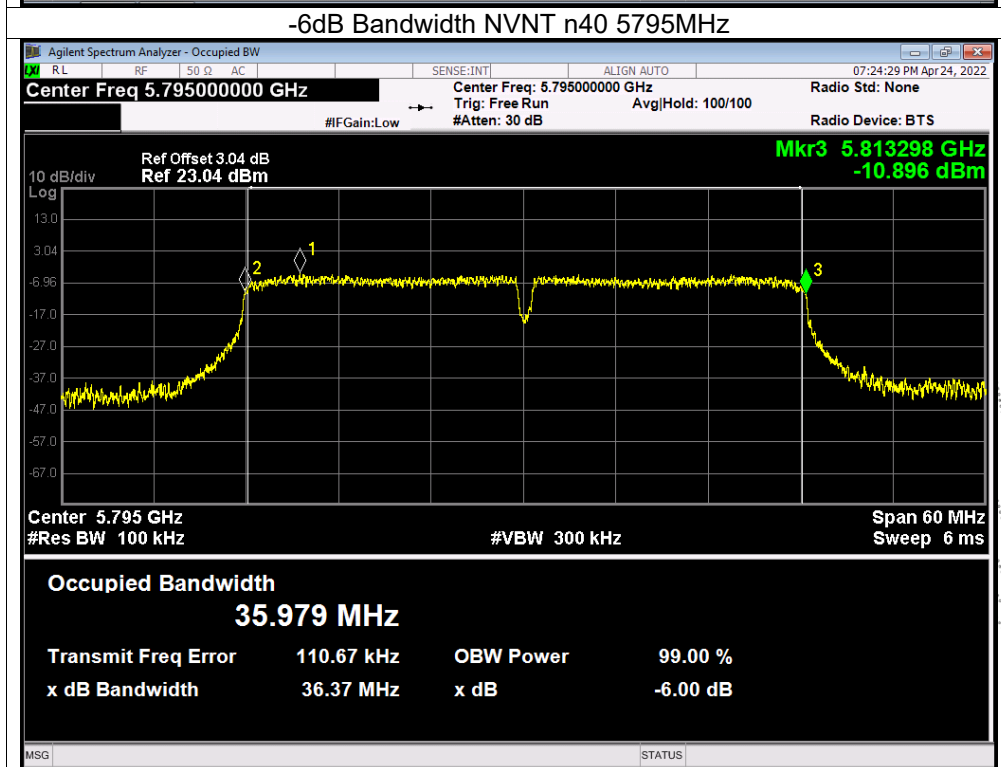
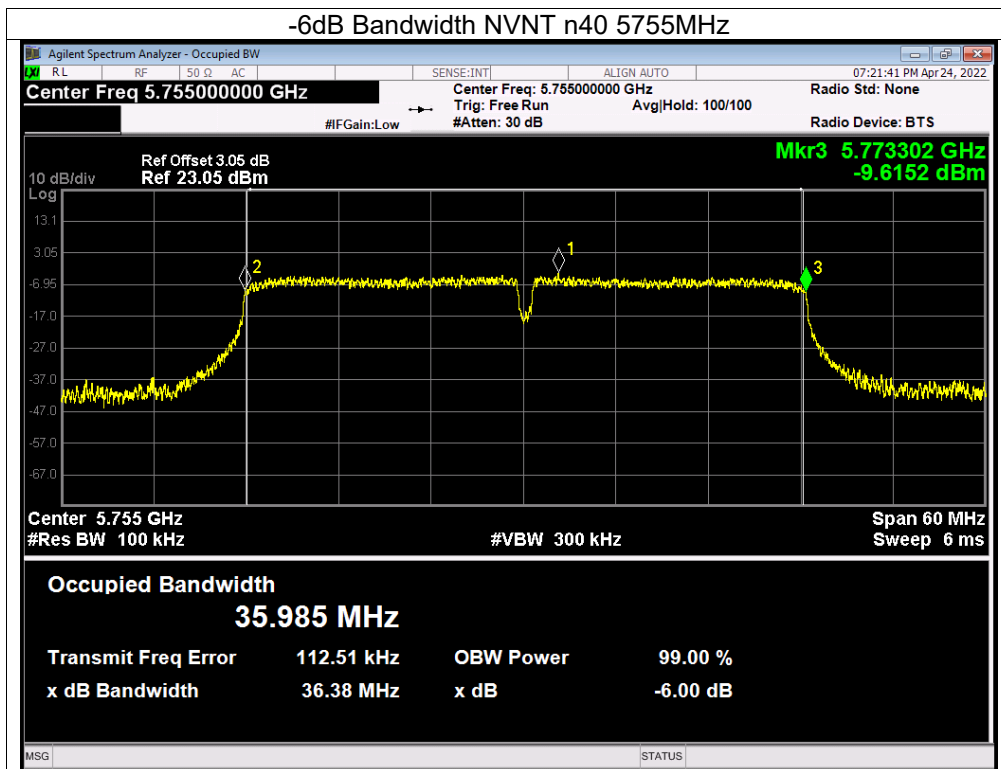


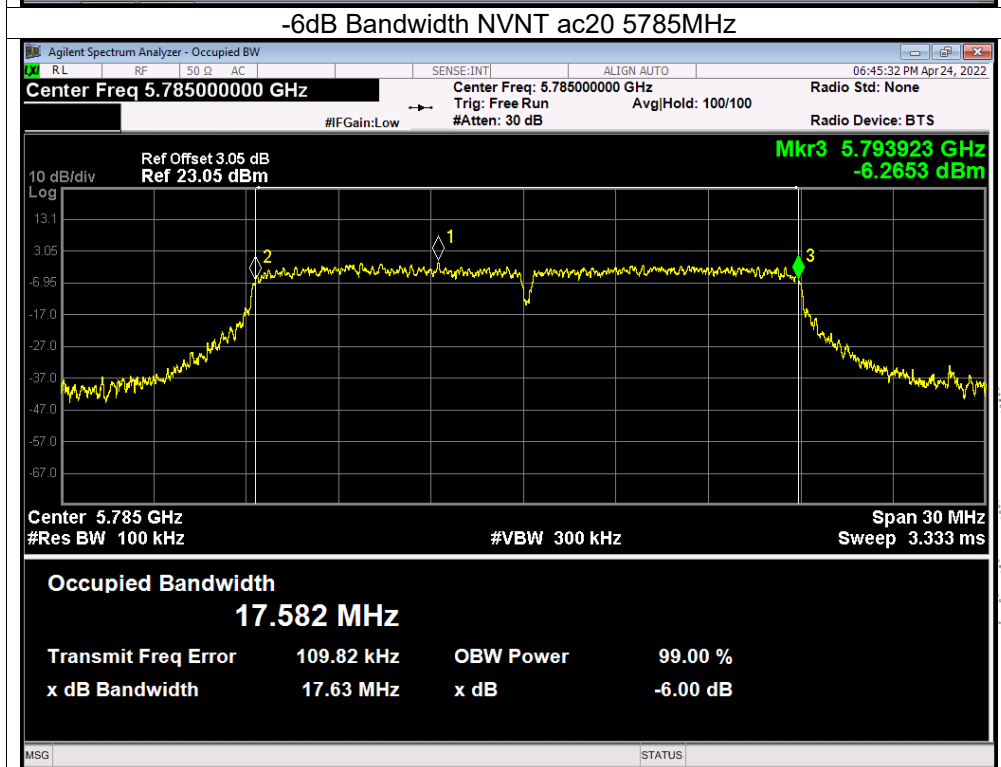
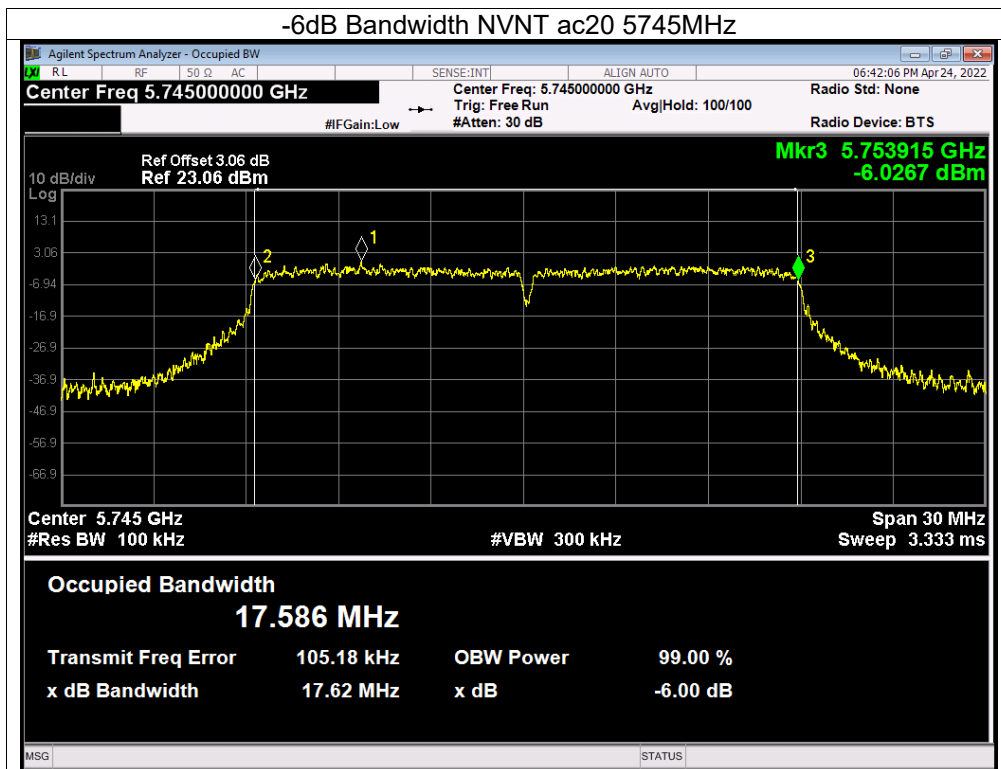
-6dB Bandwidth NVNT a 5785MHz

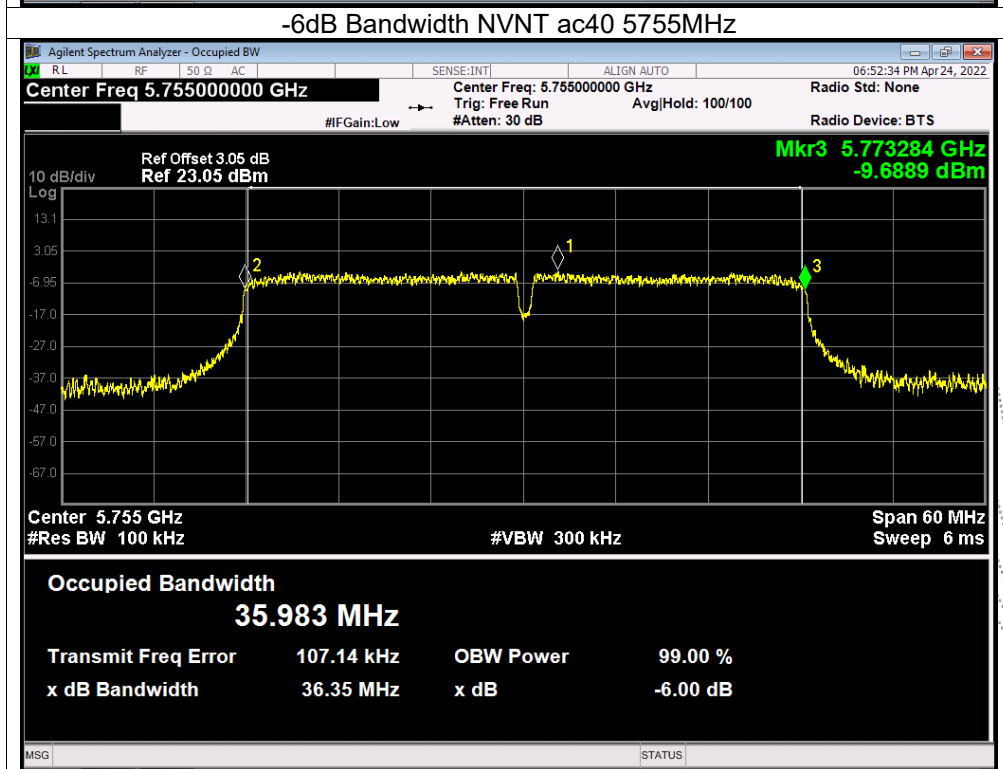
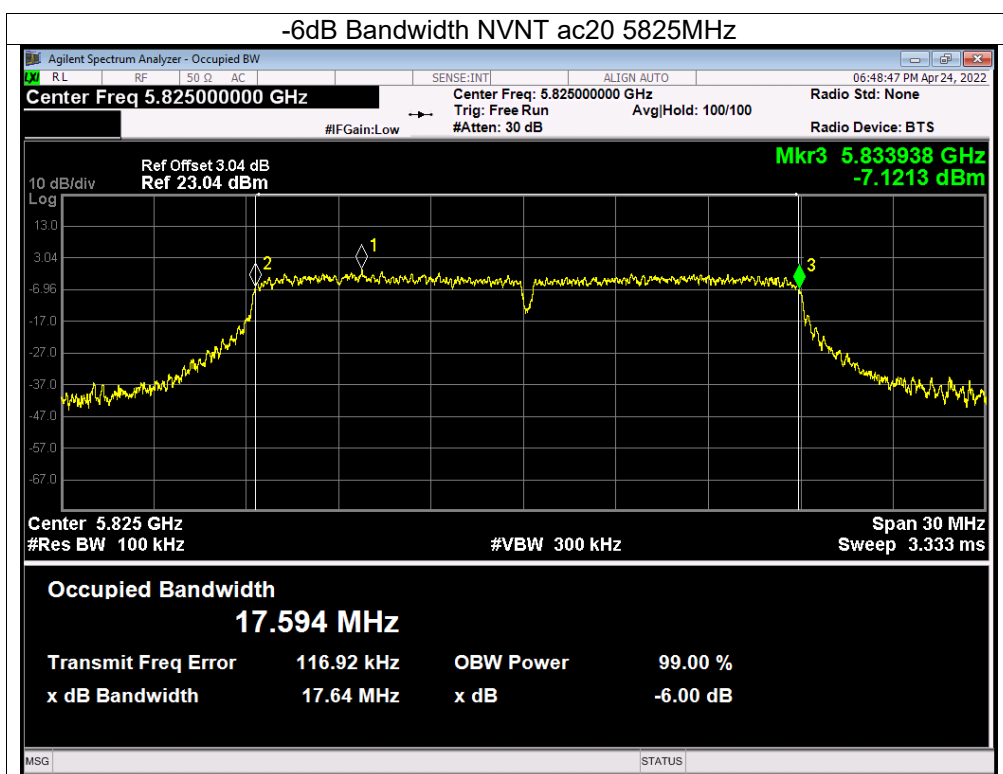


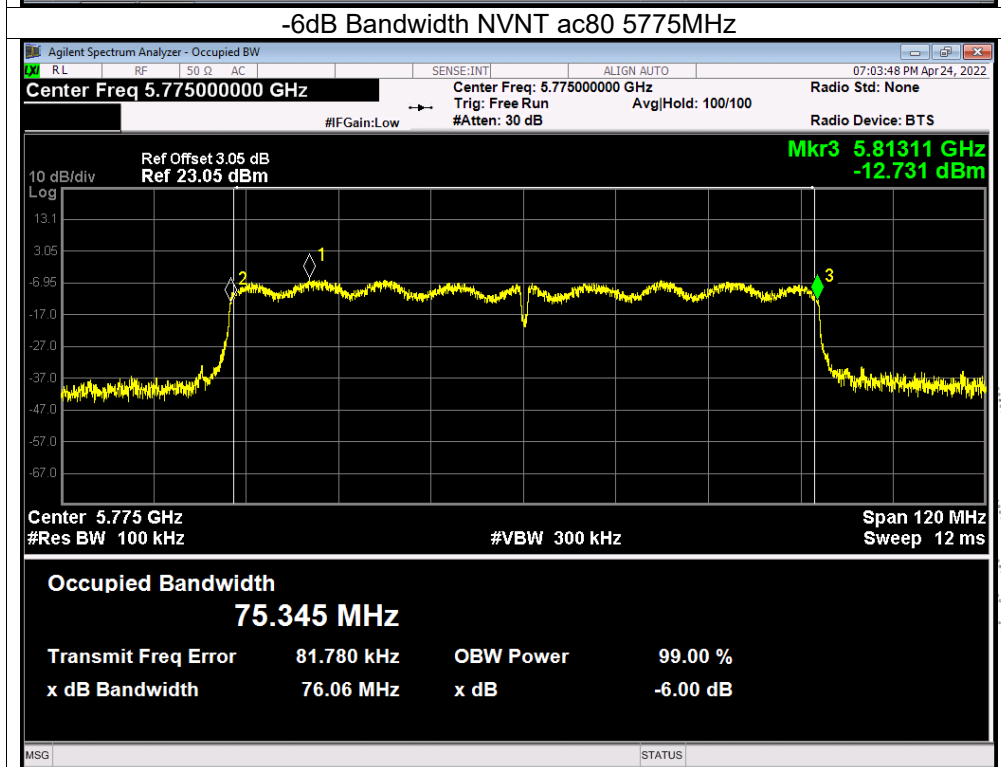
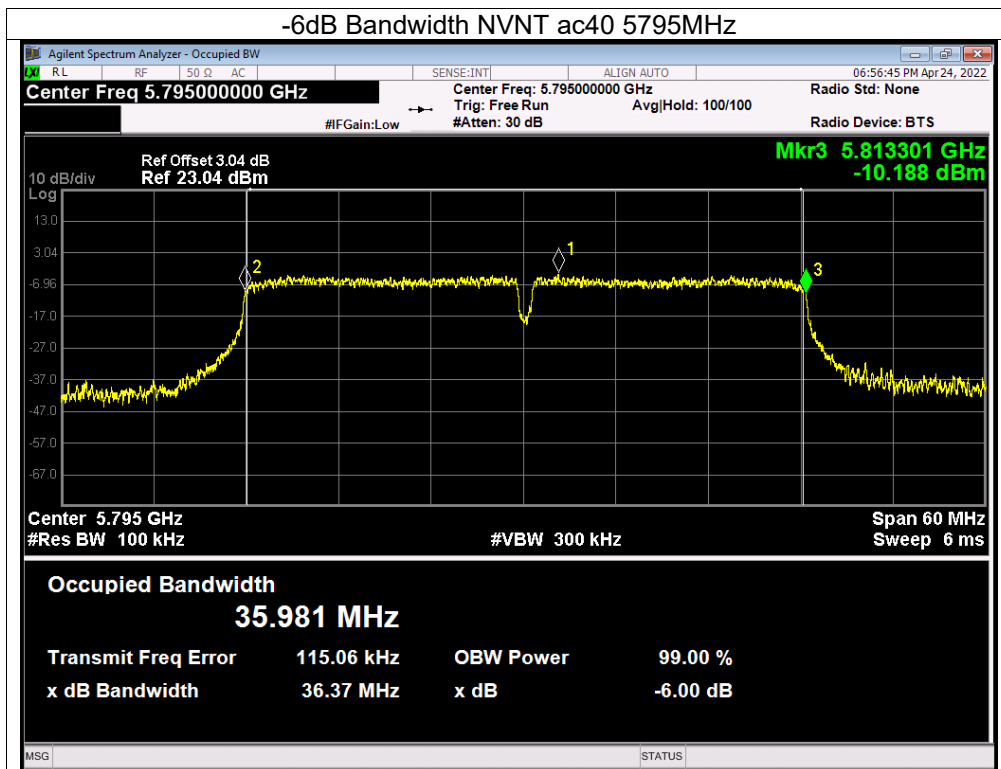


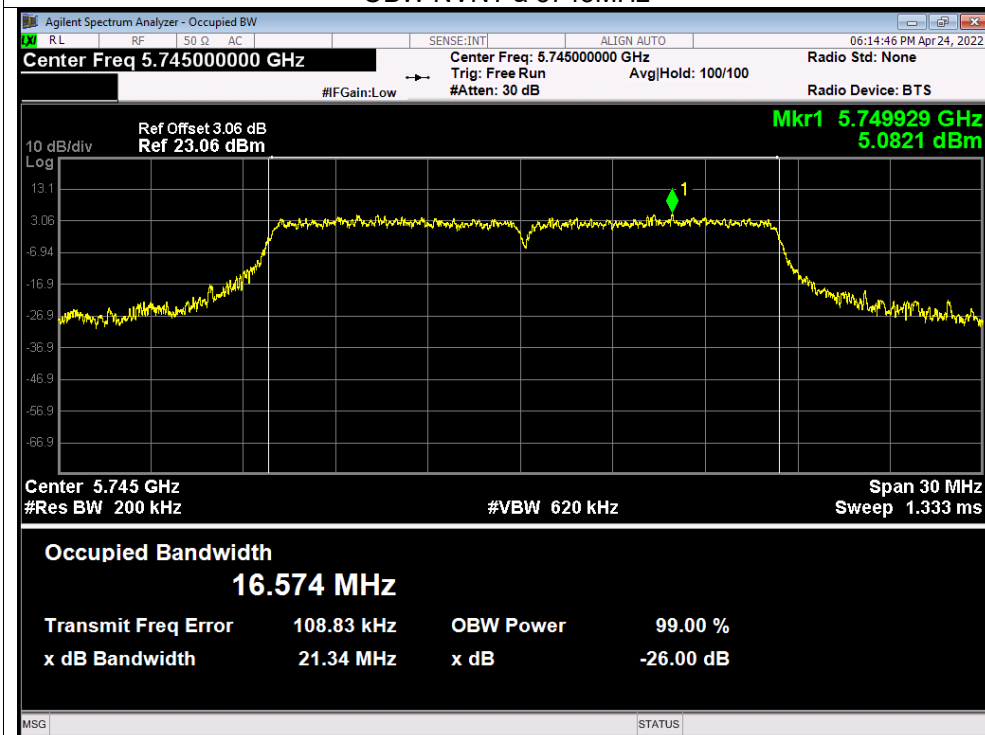
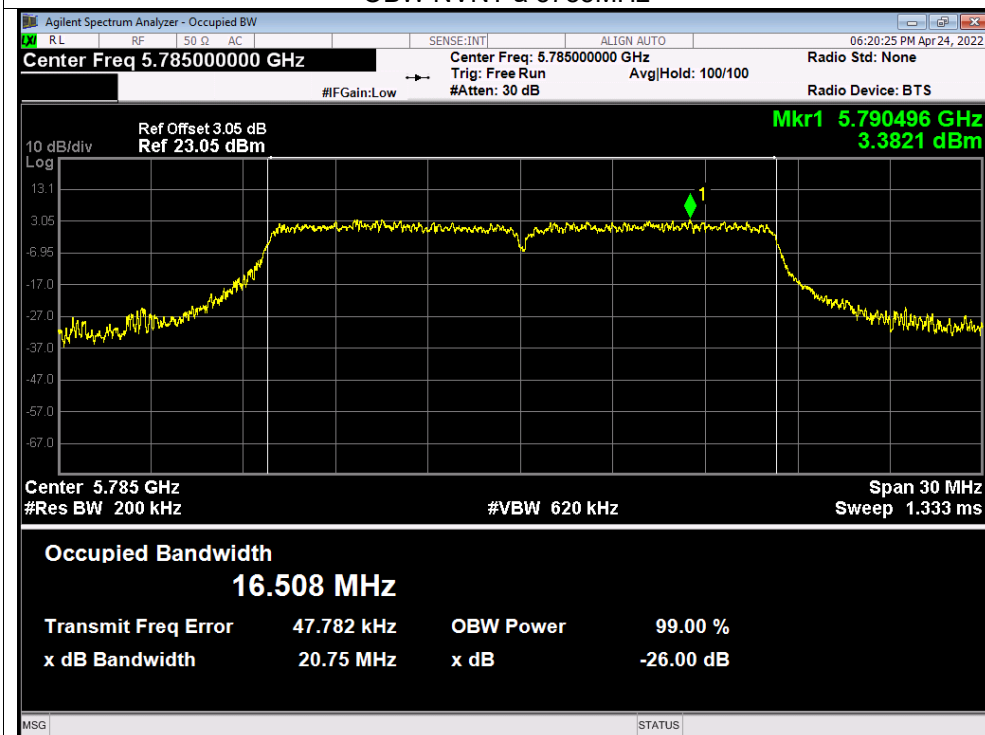


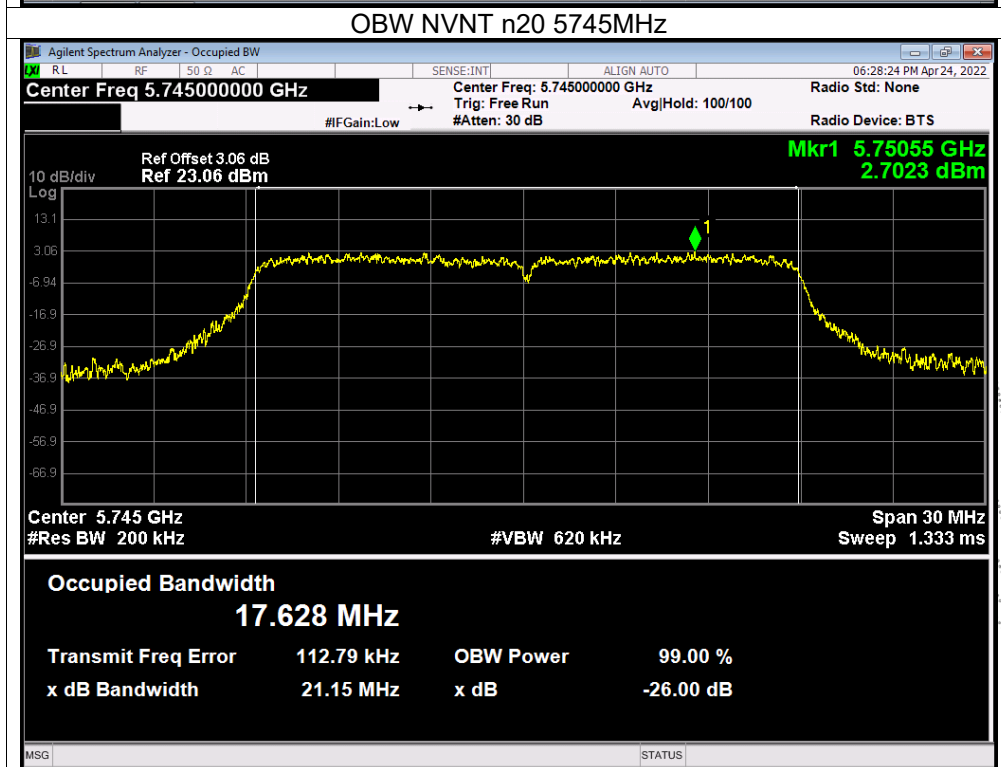
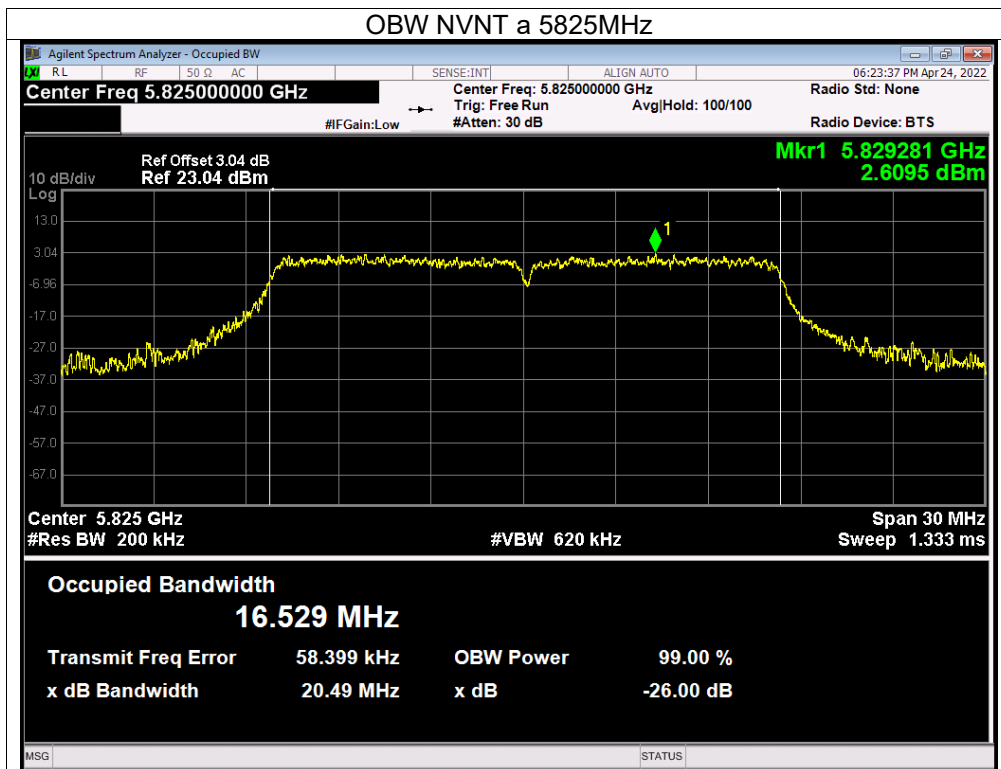


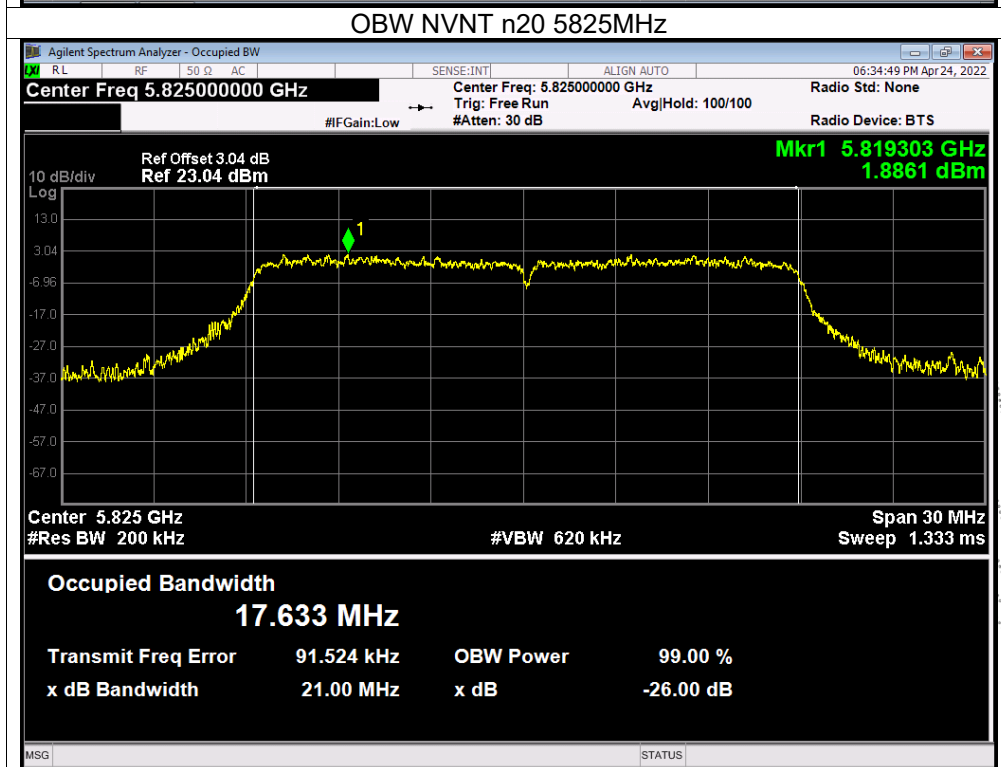
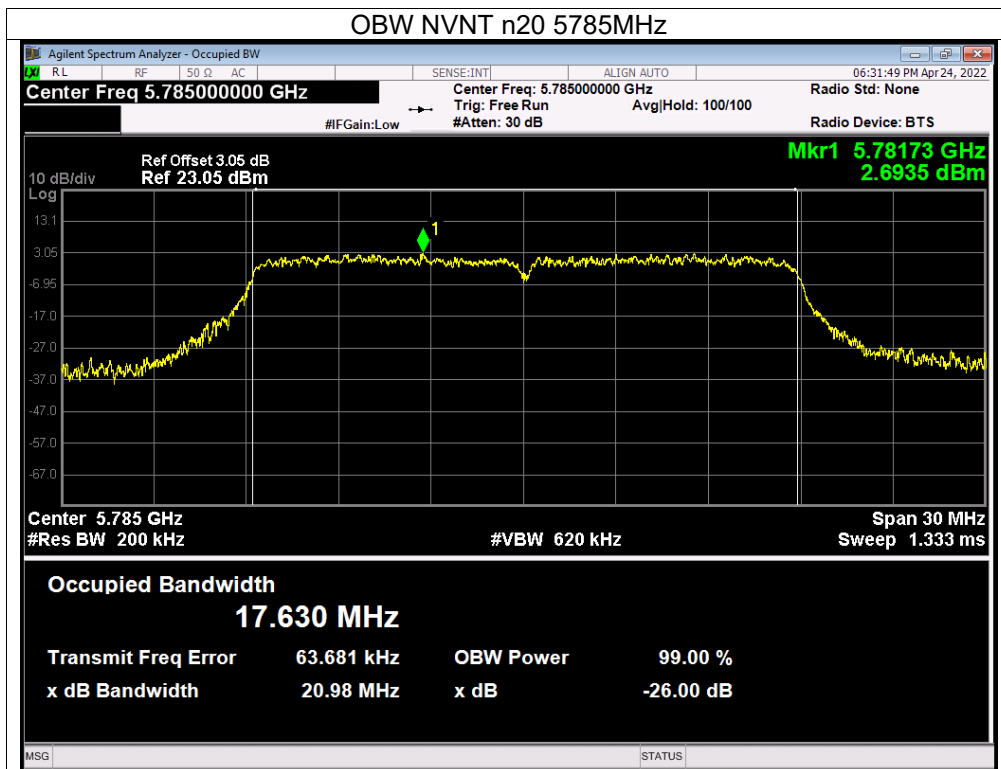


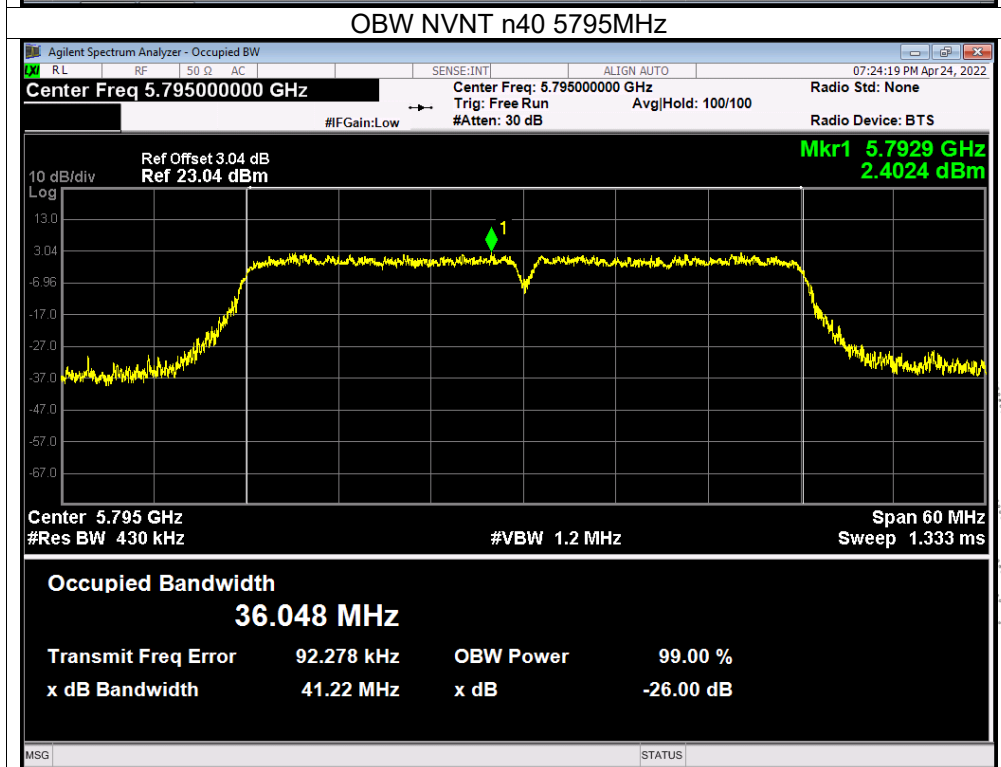
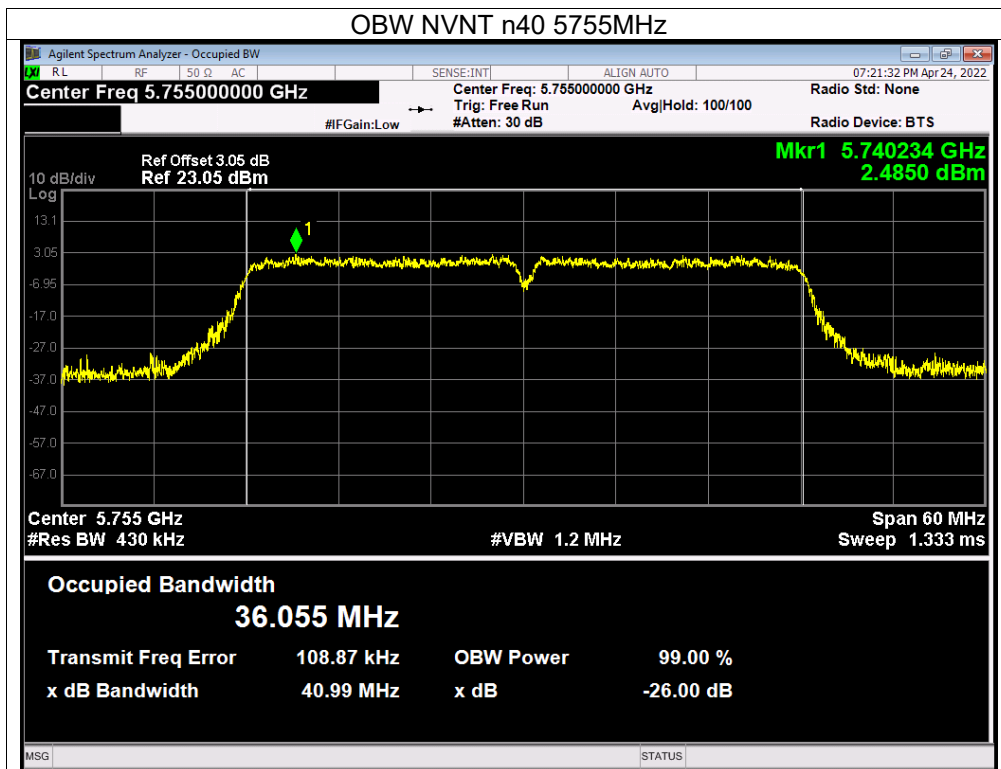


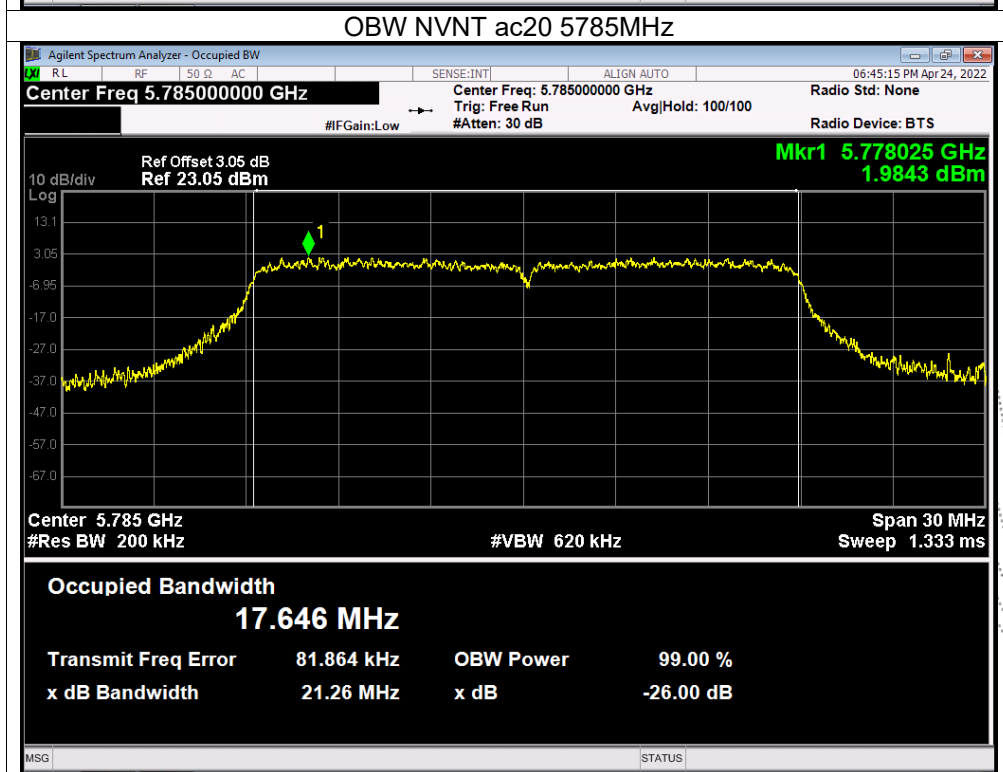
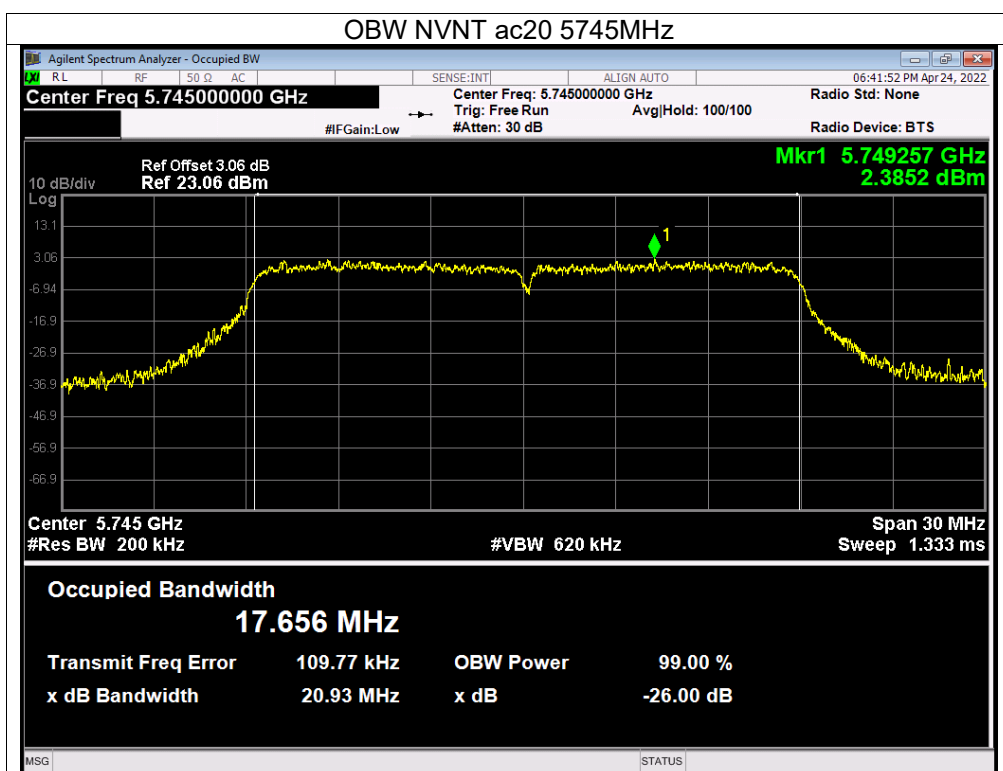


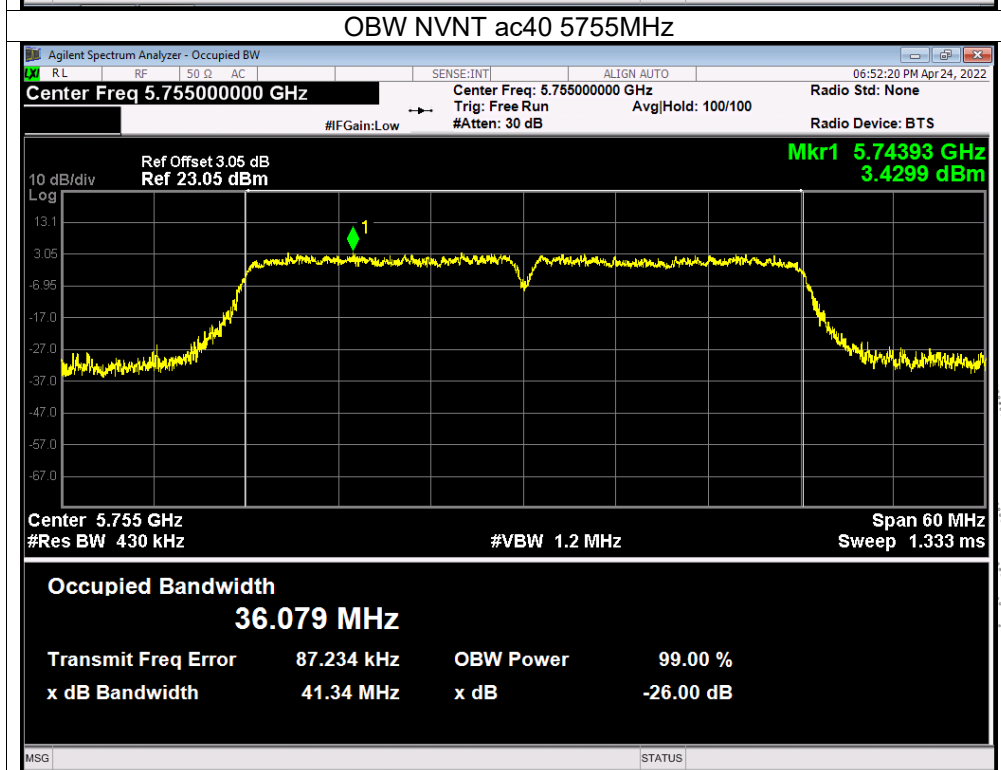
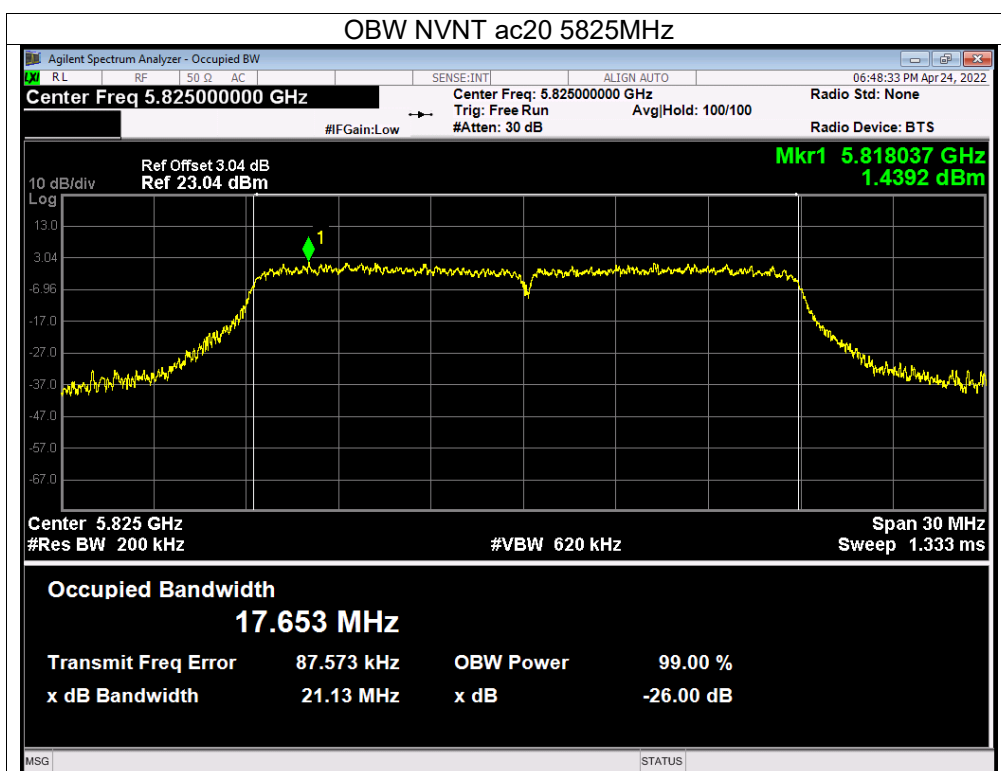
99% OBW
Test Graphs
OBW NVNT a 5745MHz

OBW NVNT a 5785MHz


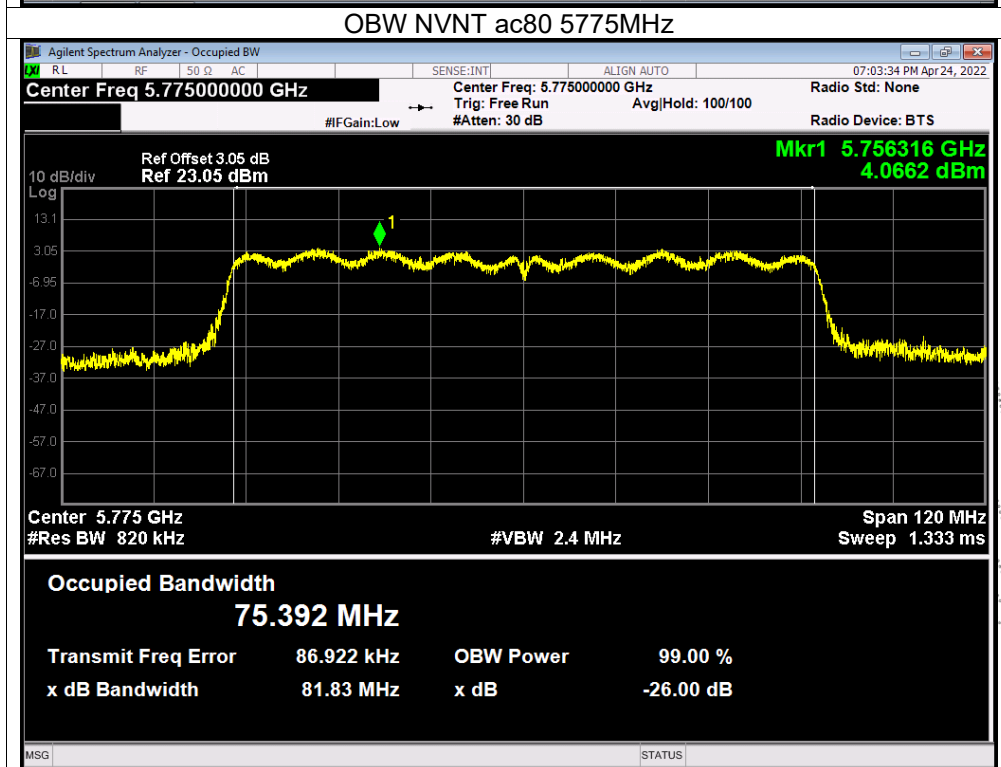
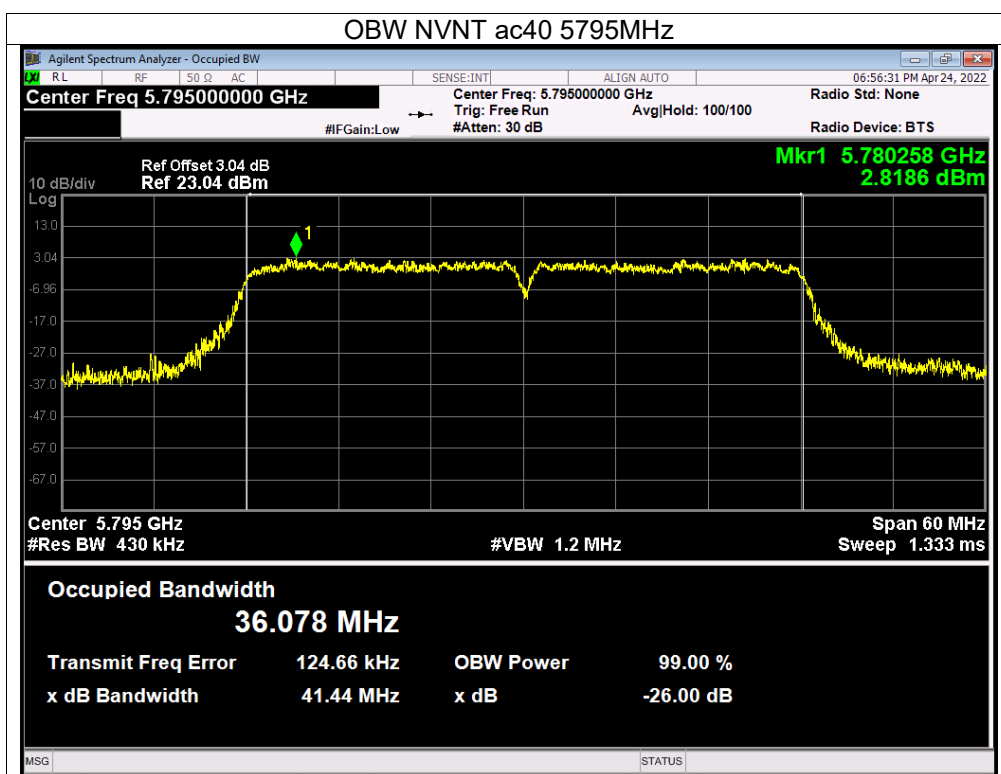












10. Maximum Conducted Output Power

10.1 Block Diagram Of Test Setup



10.2 Limit

According to FCC §15.407

The maximum conducted output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	1W
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. 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 $\geq$ 3 MHz.

(iv) Number of points in sweep $\geq$ 2 Span / RBW. (This ensures that bin-to-bin spacing is $\leq$ 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.

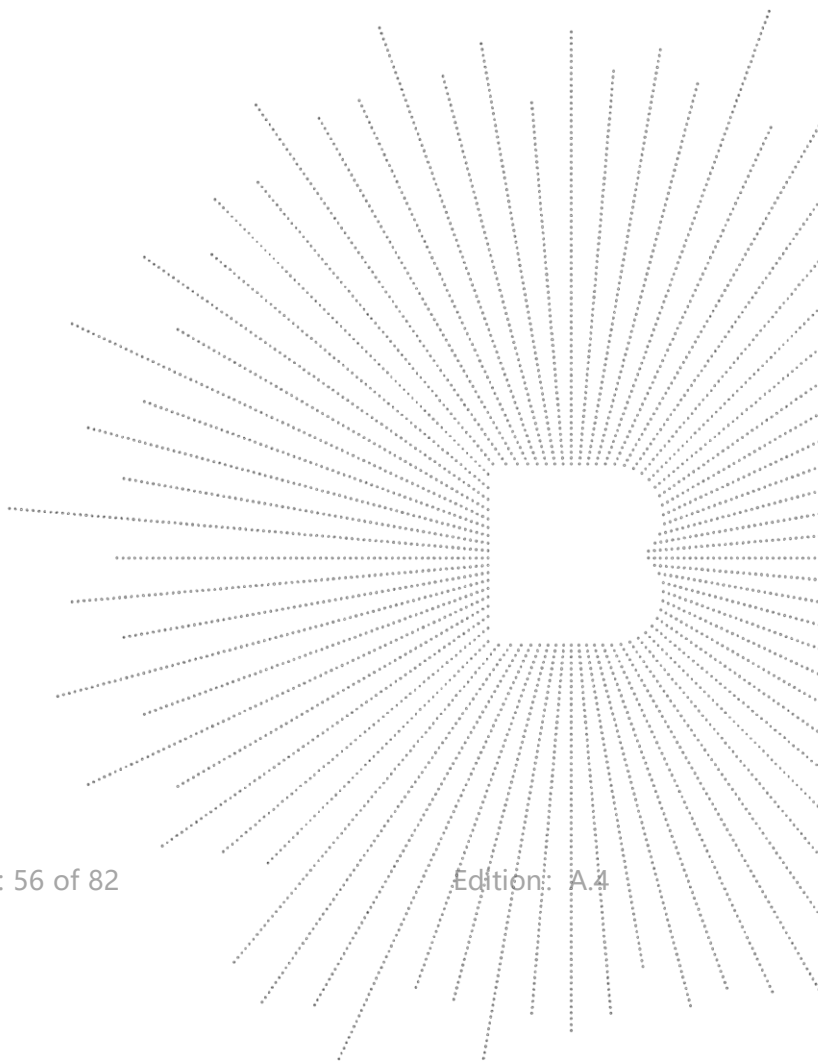
(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle $\geq$ 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

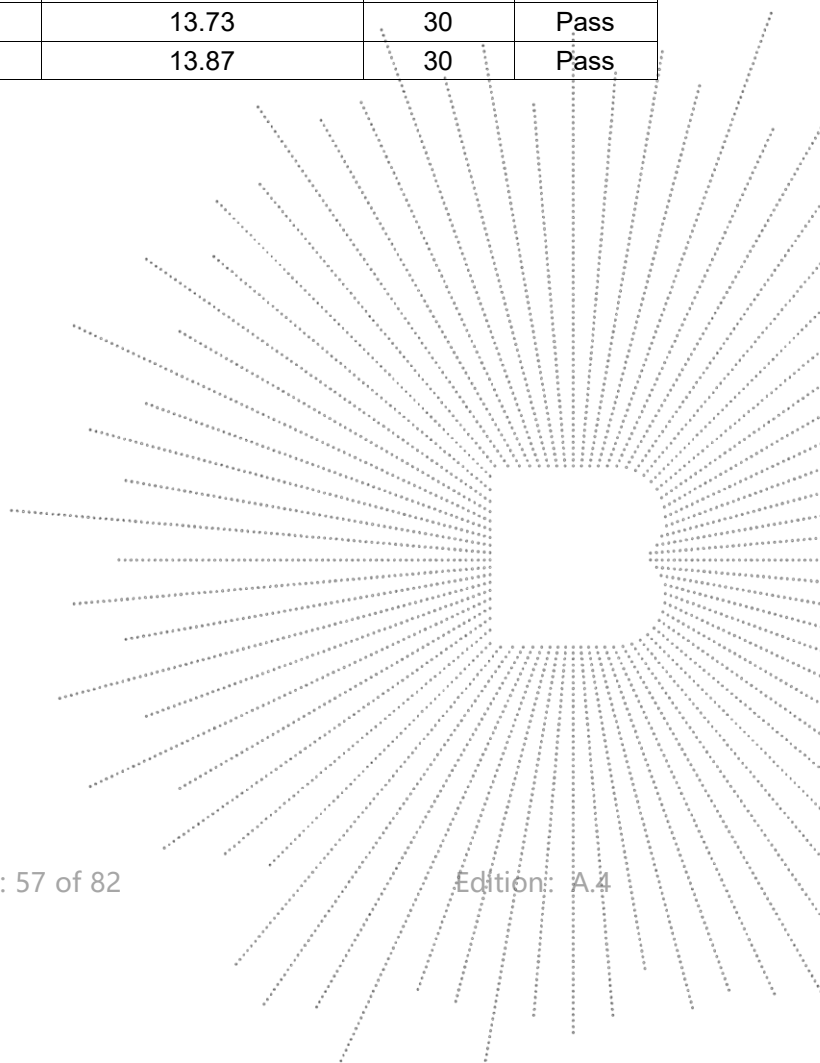
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.



10.5 Test Result

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 5V
Test Mode :	TX (5.8G) Mode Frequency U-NII-3 (5745-5825MHz)		

Mode	Test Channel	Frequency	Maximum output power. Antenna port (AV)	LIMIT	Result
		(MHz)	(dBm)	dBm	
TX 802.11a Mode	CH 149	5745	15.13	30	Pass
	CH 157	5785	14.75	30	Pass
	CH 165	5825	13.81	30	Pass
TX 802.11 n20M Mode	CH 149	5745	14.23	30	Pass
	CH 157	5785	14.83	30	Pass
	CH 165	5825	13.3	30	Pass
TX 802.11 n40M Mode	CH 151	5755	13.35	30	Pass
	CH 159	5795	13.39	30	Pass
TX 802.11 AC20M Mode	CH 149	5745	13.92	30	Pass
	CH 157	5785	13.63	30	Pass
	CH 165	5825	12.99	30	Pass
TX 802.11 AC40M Mode	CH 151	5755	14.55	30	Pass
	CH 159	5795	13.73	30	Pass
TX 802.11 AC80M Mode	CH 151	5775	13.87	30	Pass



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.

11.3 Test Procedure

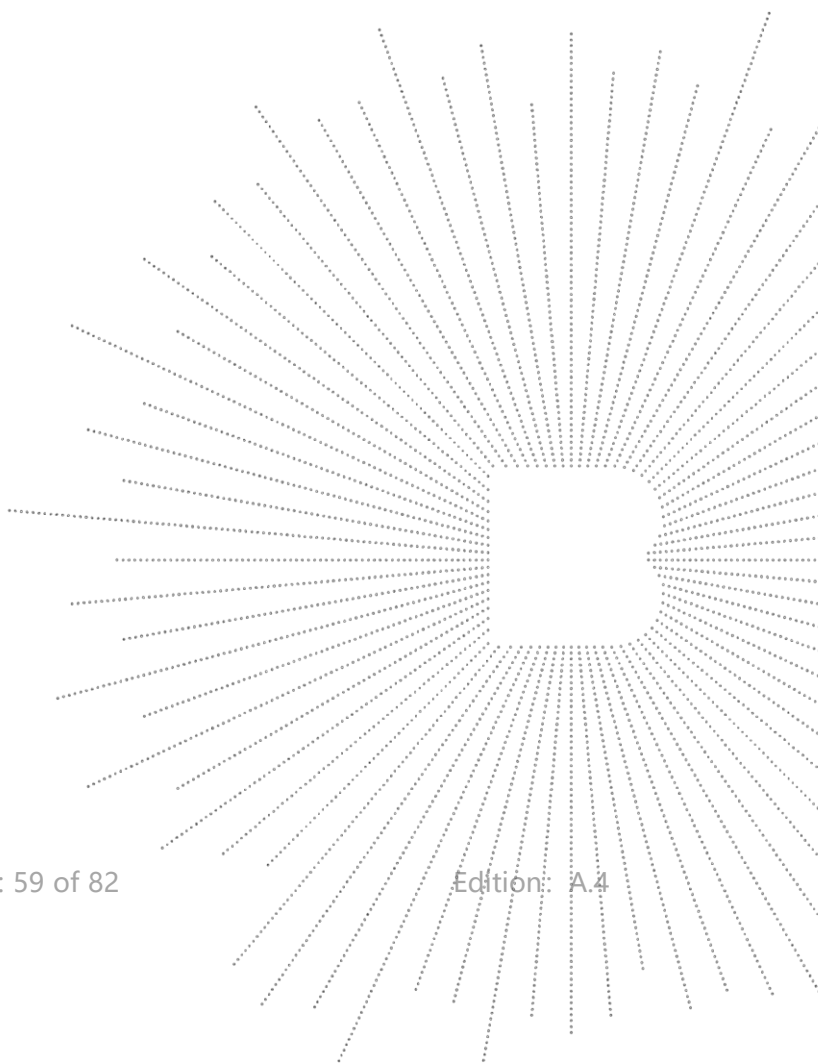
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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.

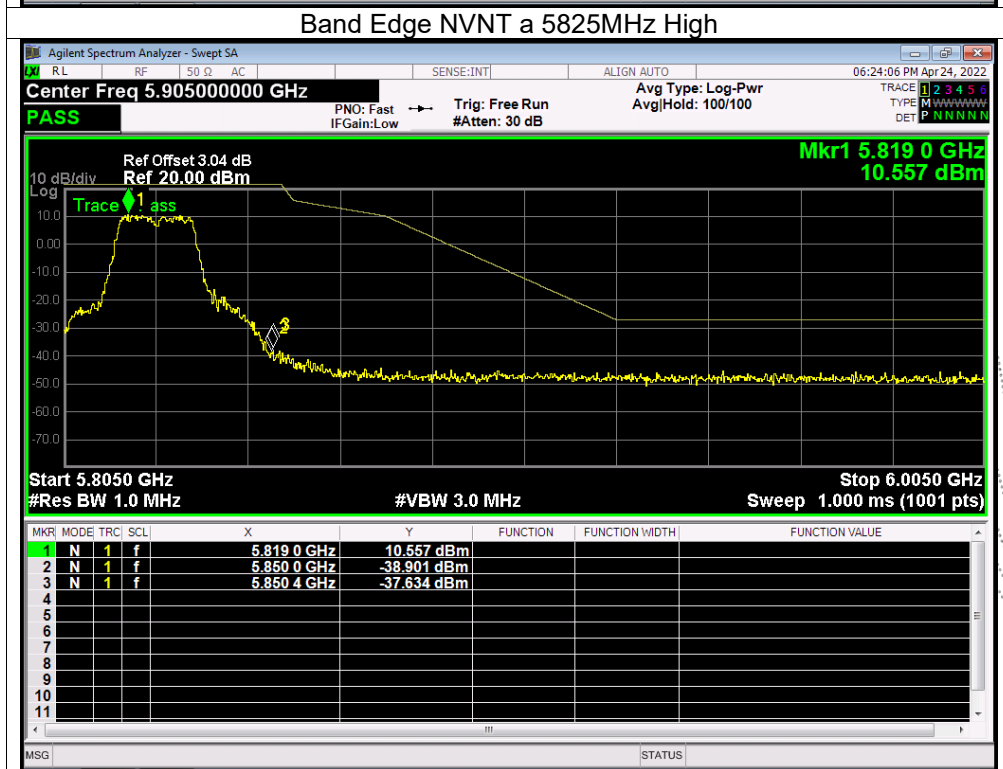
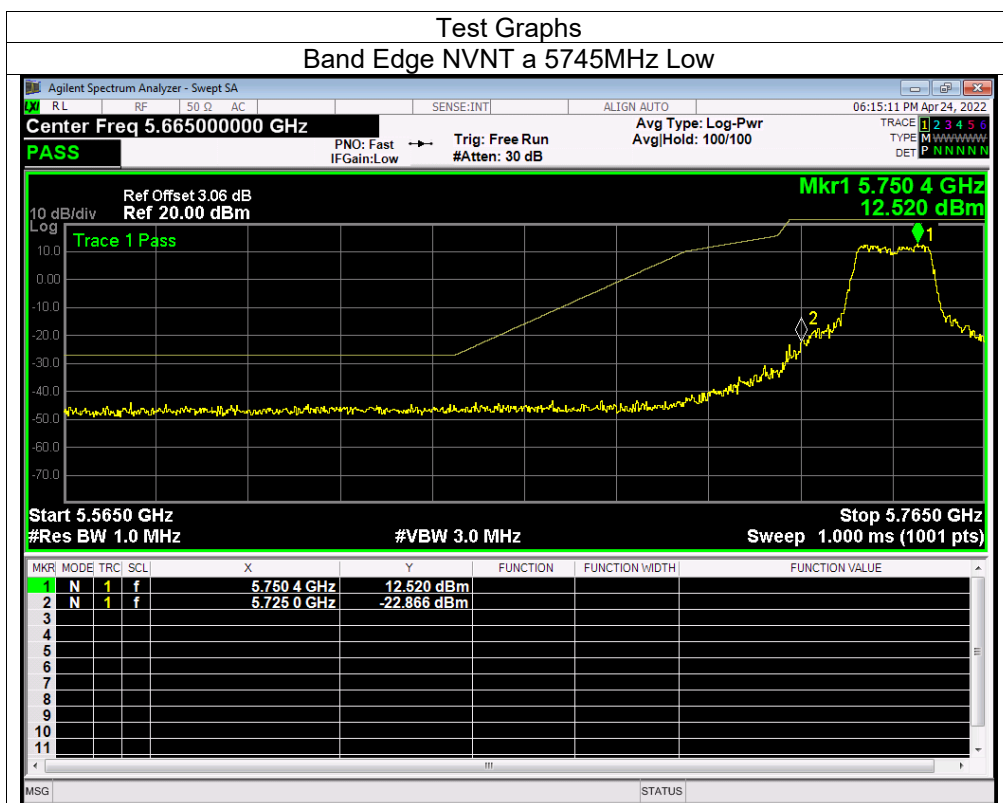
11.4 EUT Operating Conditions

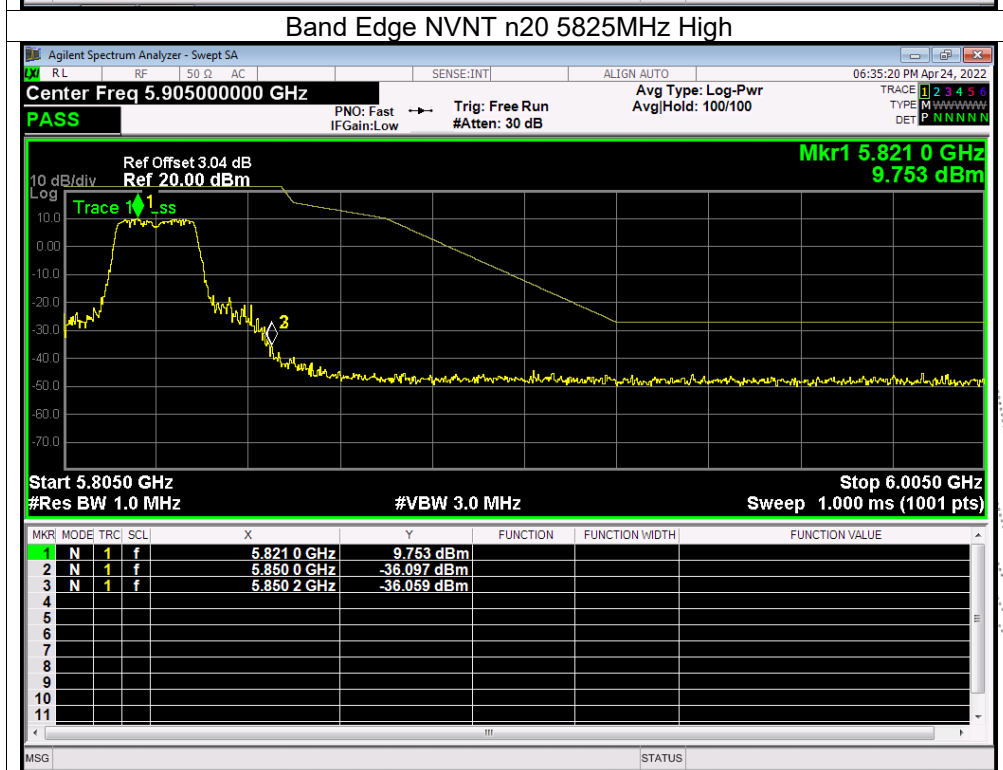
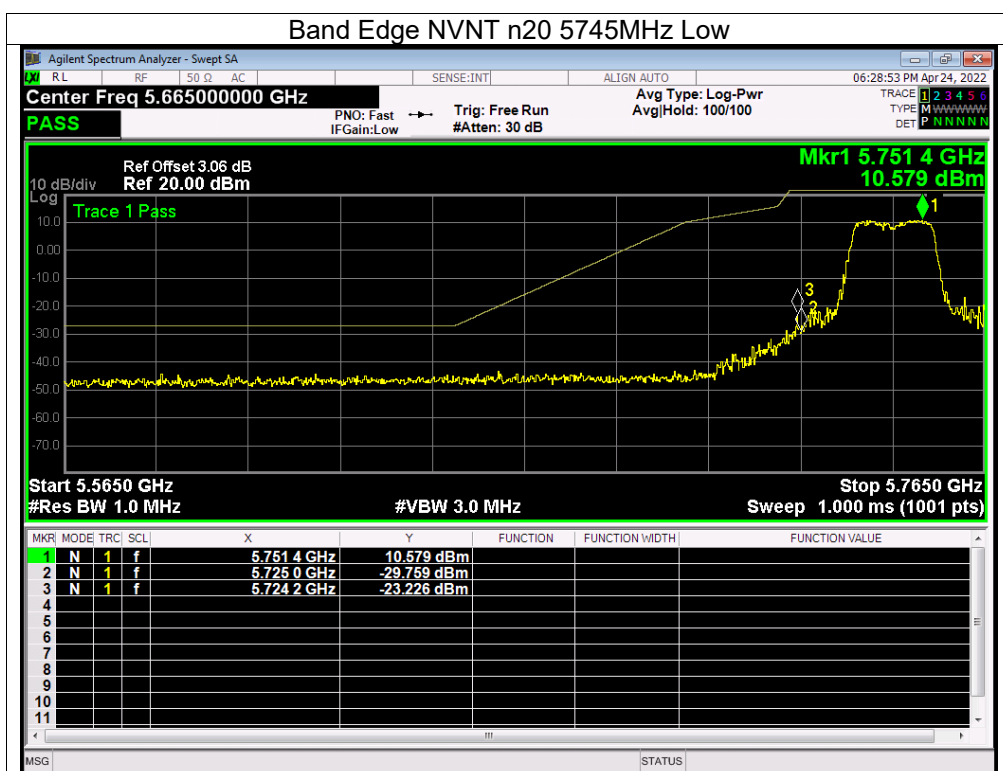
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data

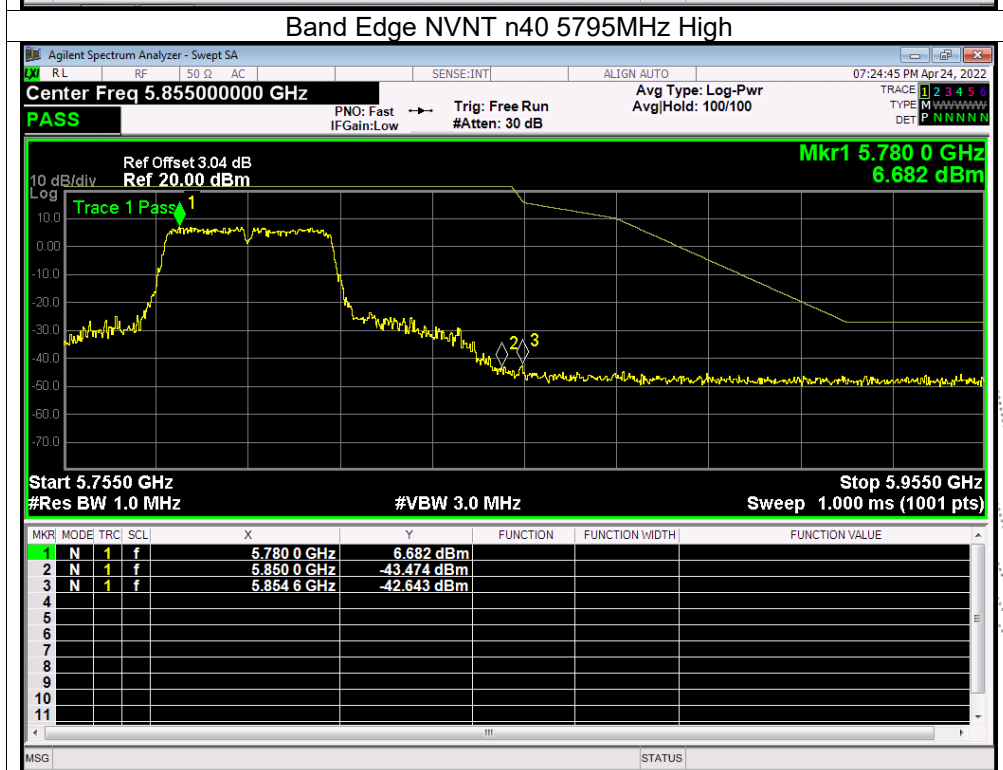
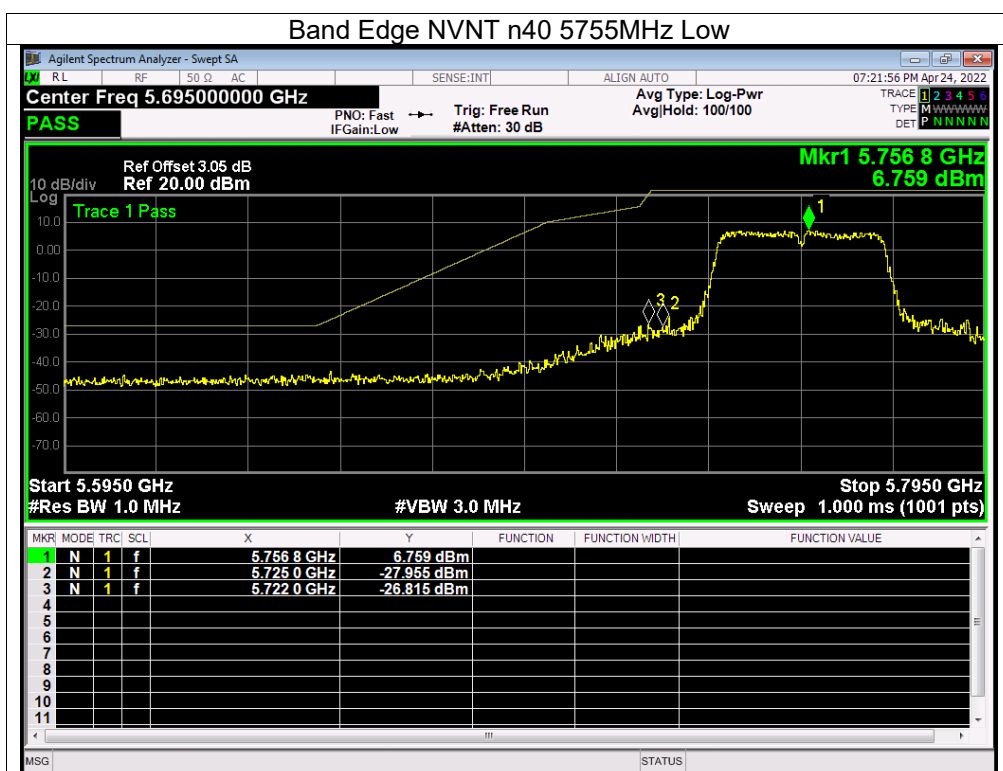
11.5 Test Result

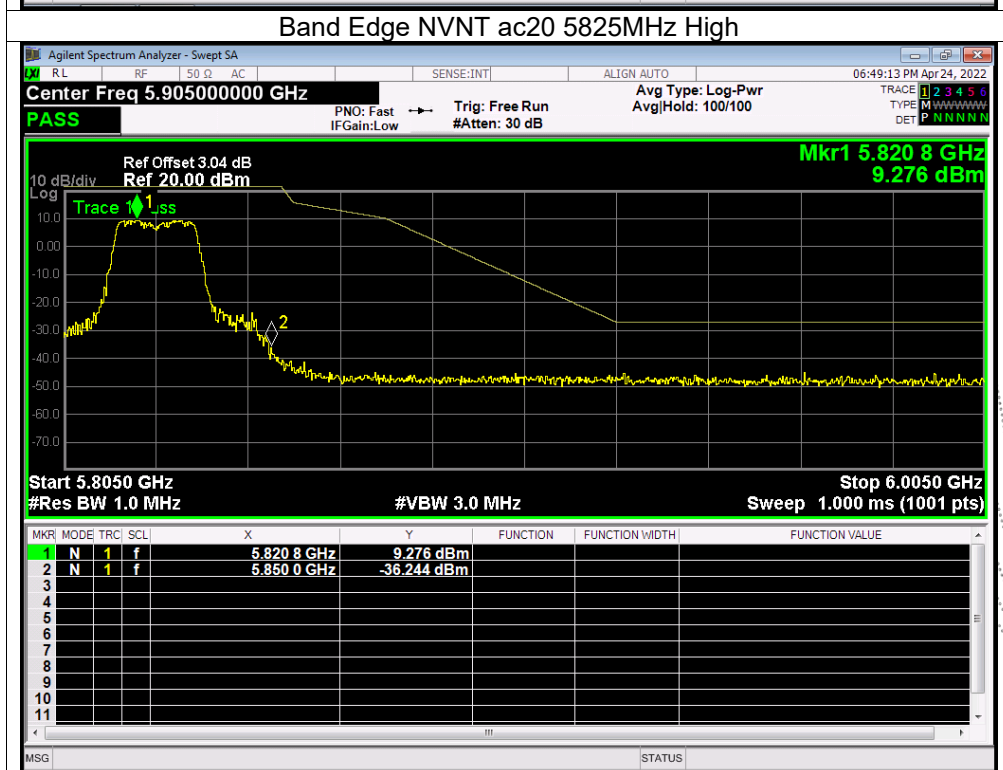
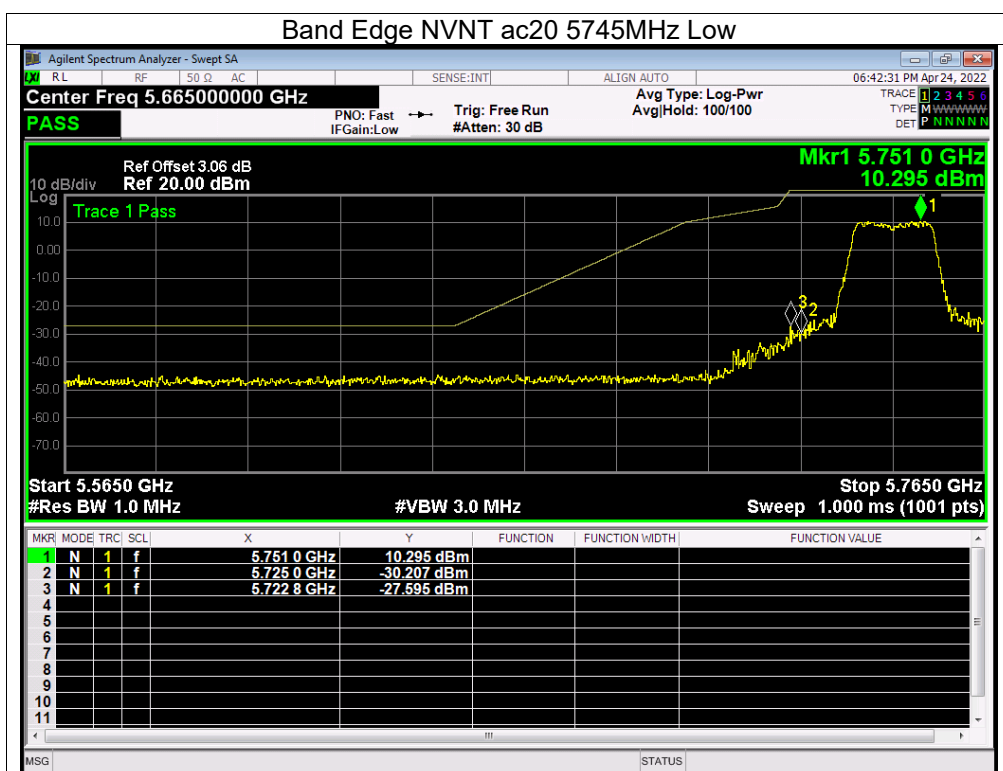
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 5V
Test Mode :	TX (5.8G) Mode Frequency U-NII-3 (5745-5825MHz)		

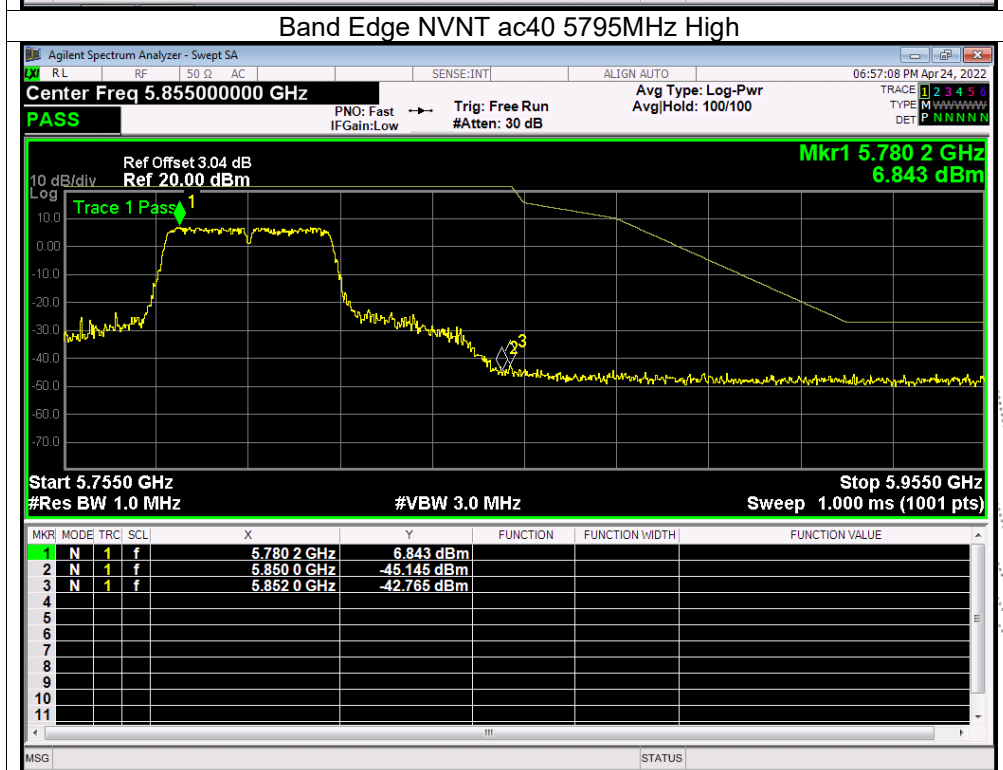
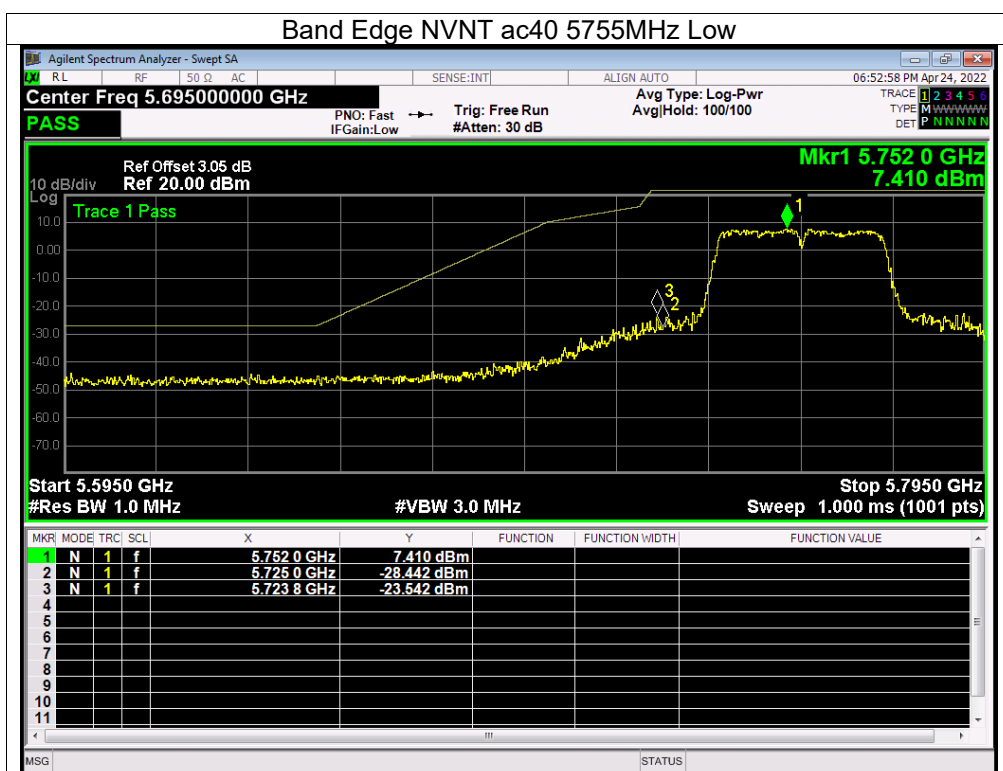


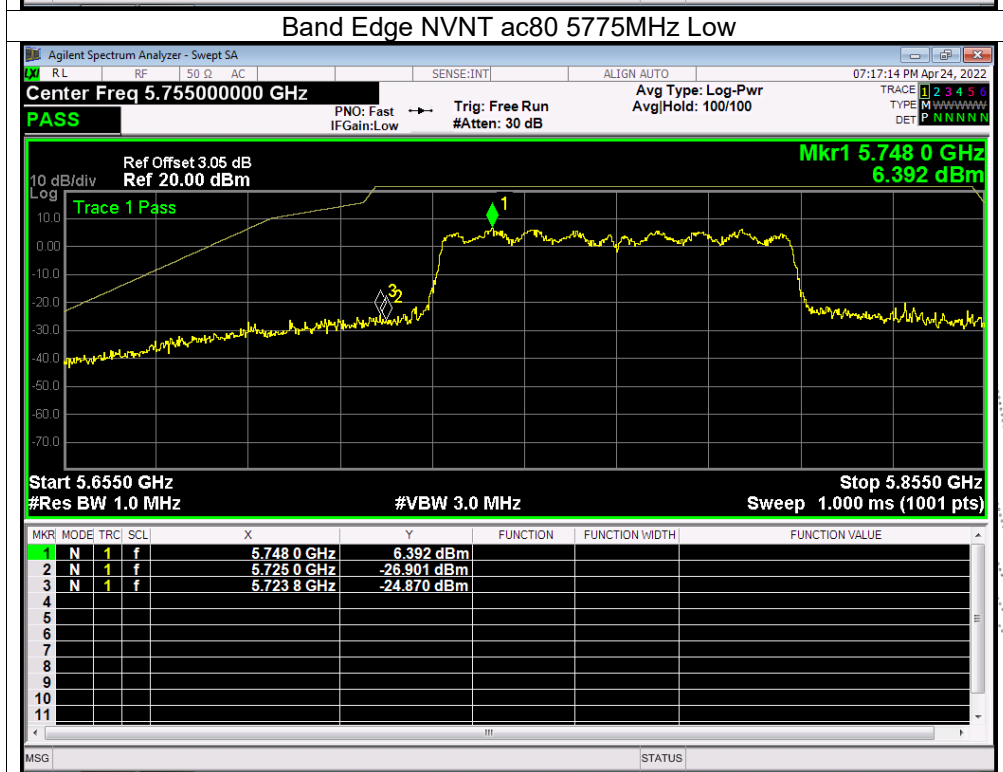
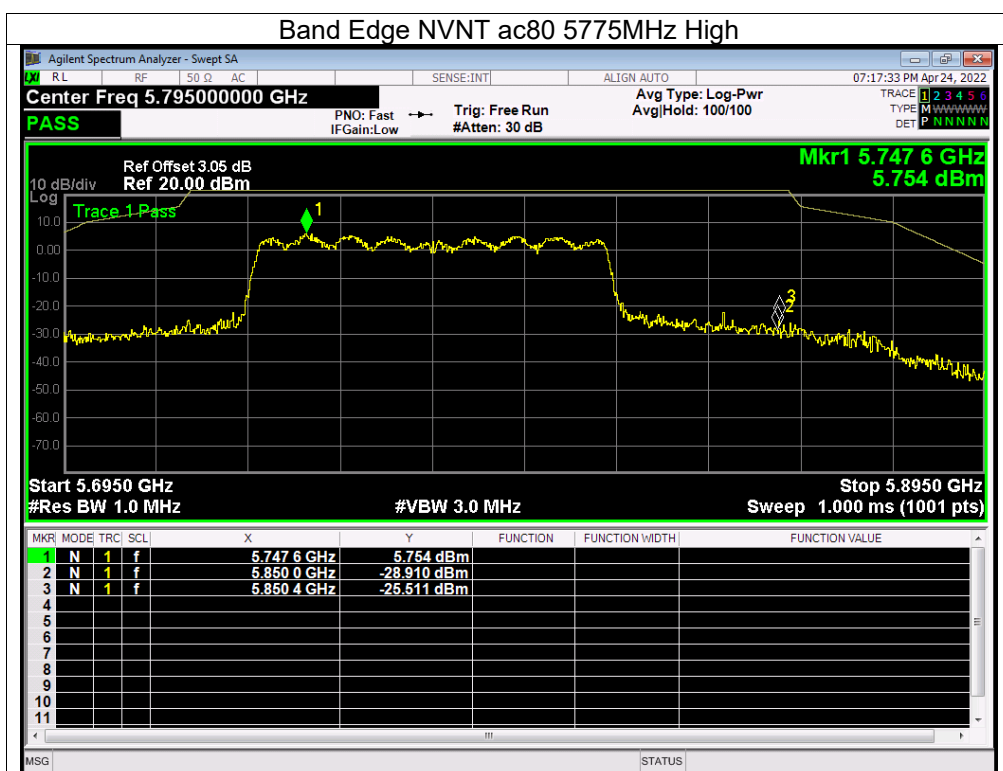






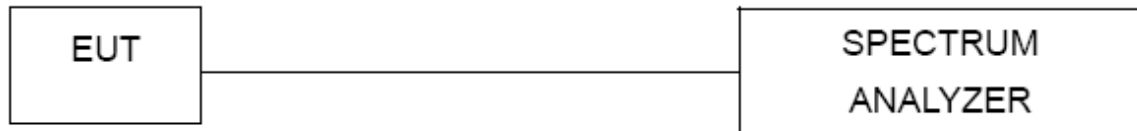






12. Spurious RF Conducted Emissions

12.1 Block Diagram Of Test Setup



12.2 Limit

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) 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 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..

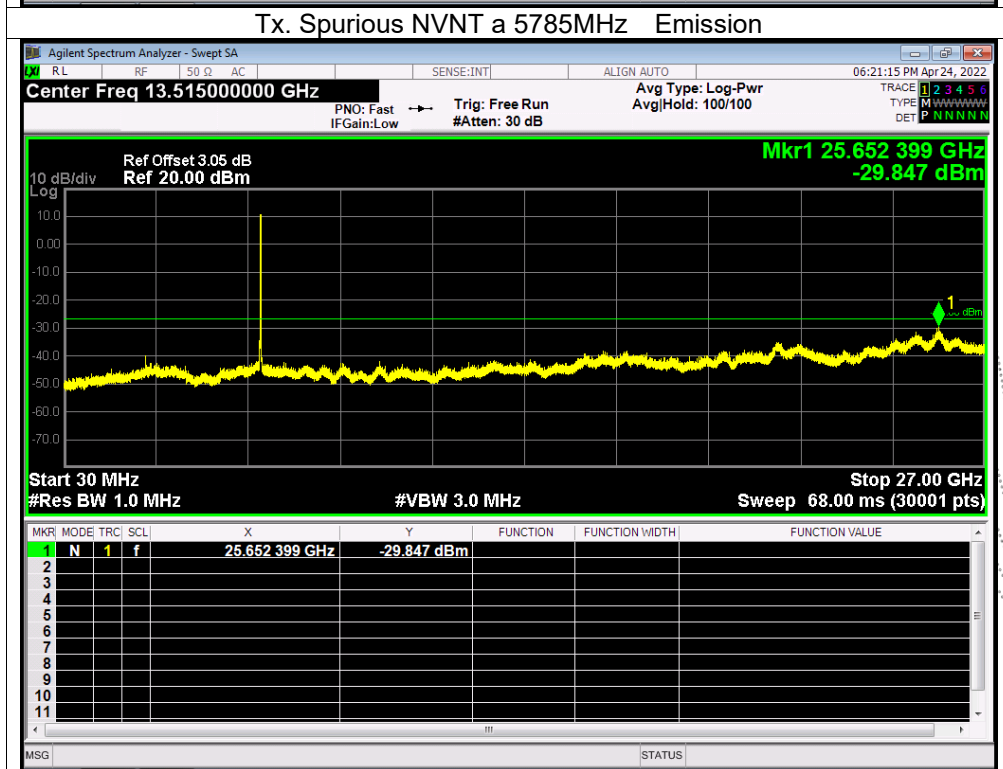
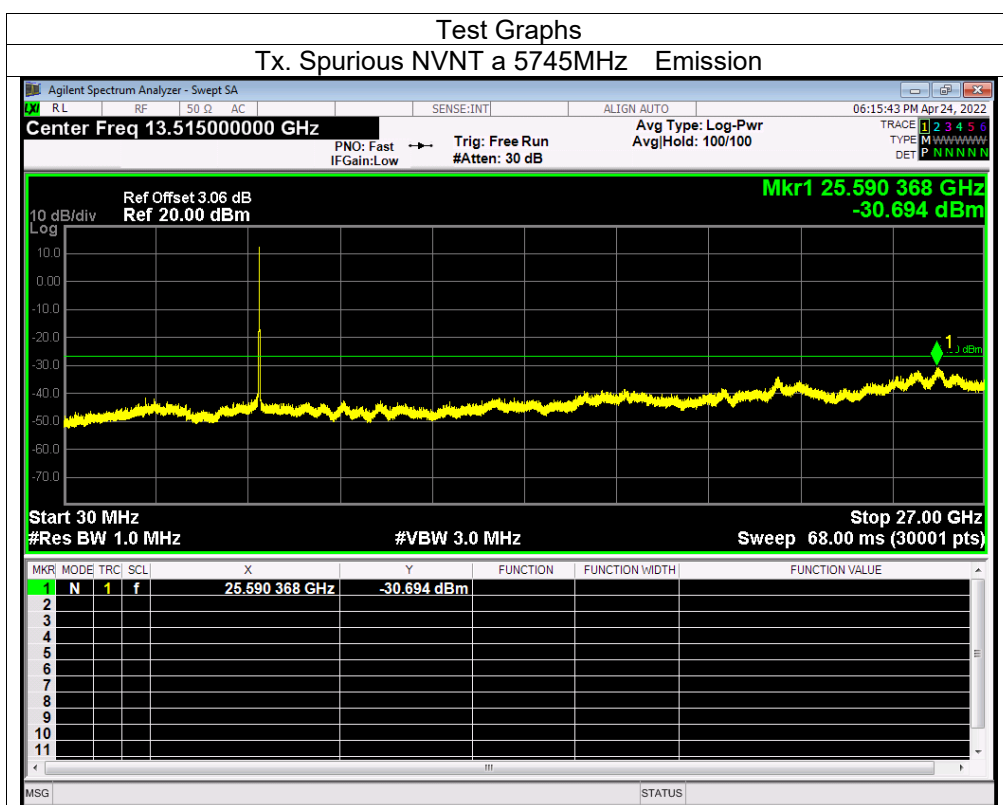
12.3 Test Procedure

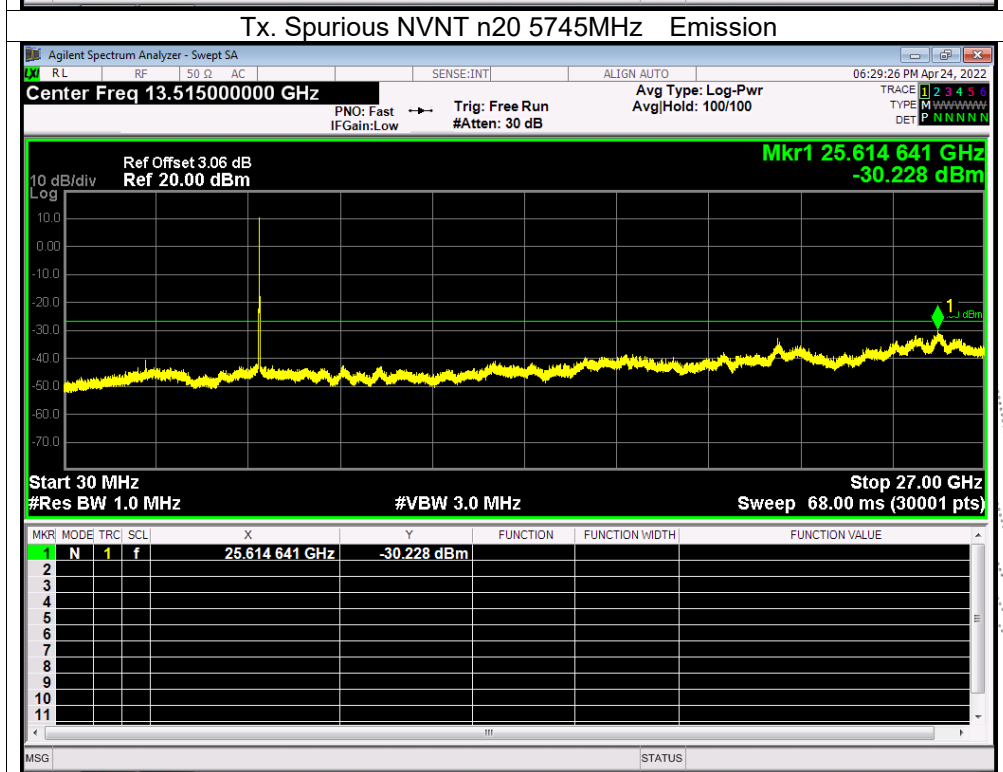
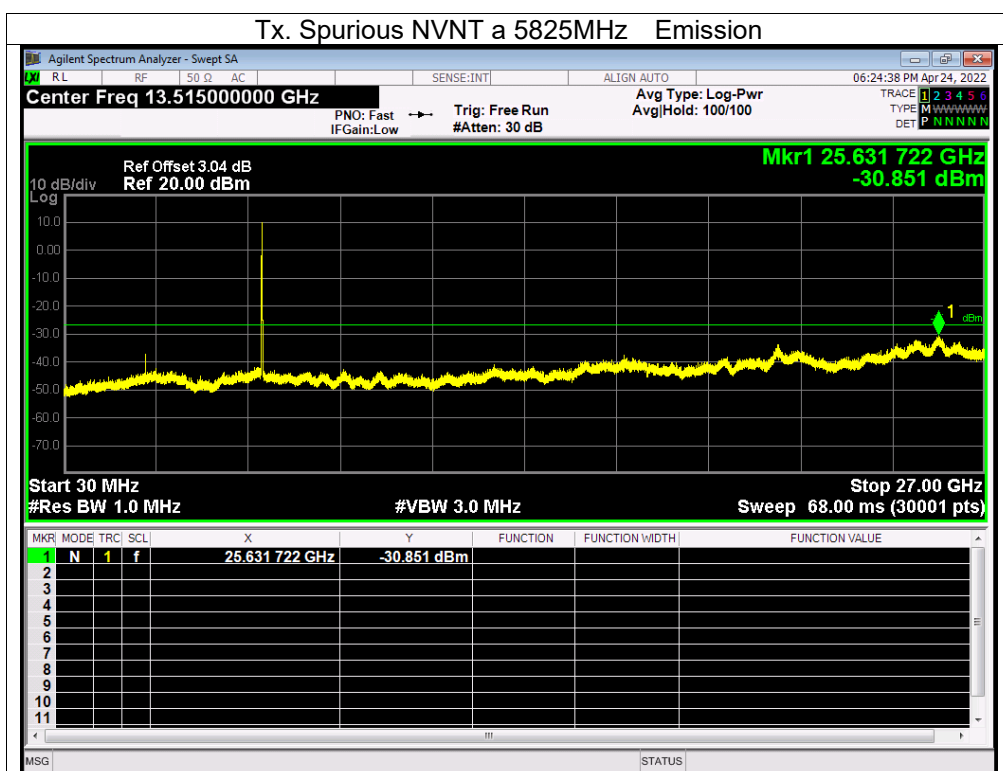
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then 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.

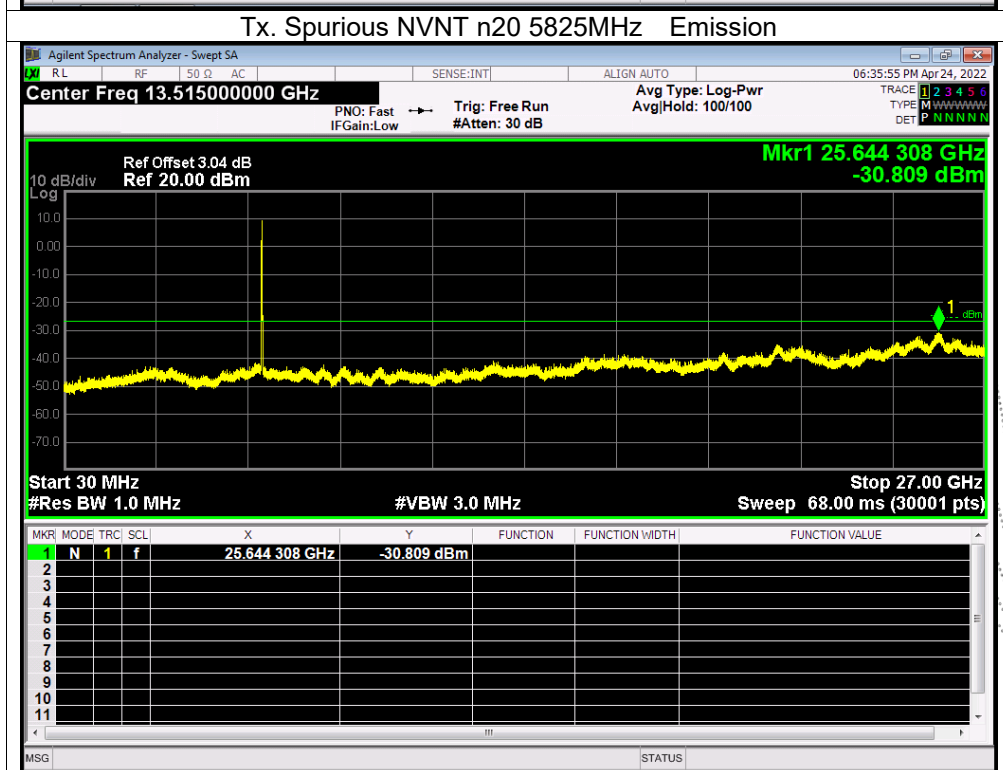
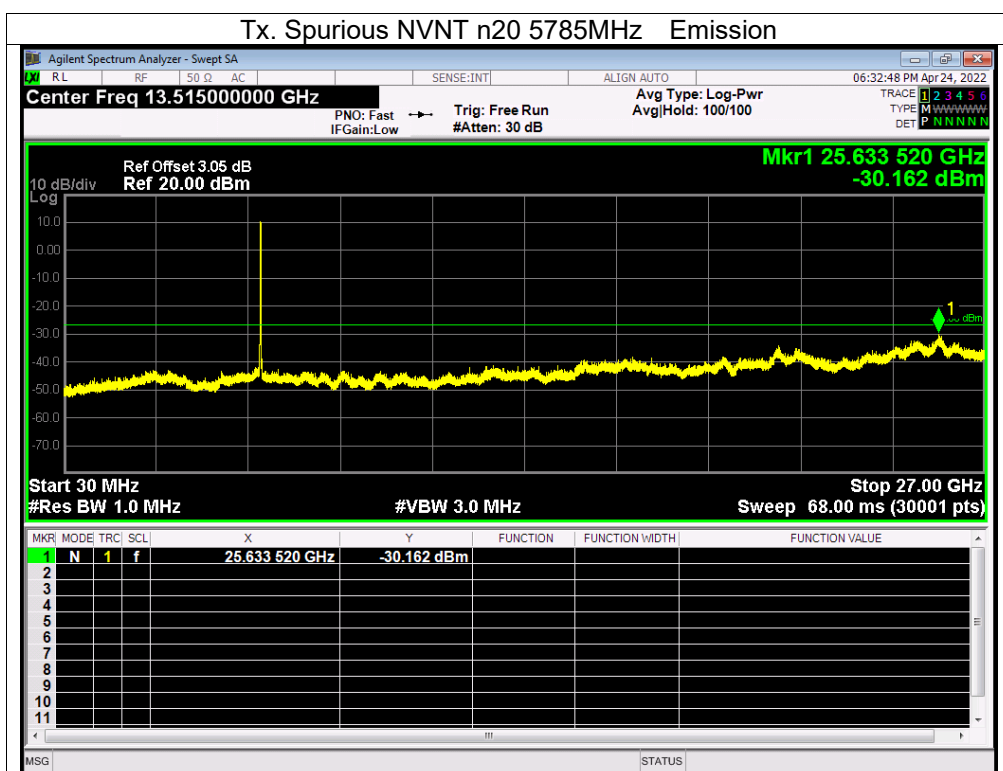
12.4 Test Result

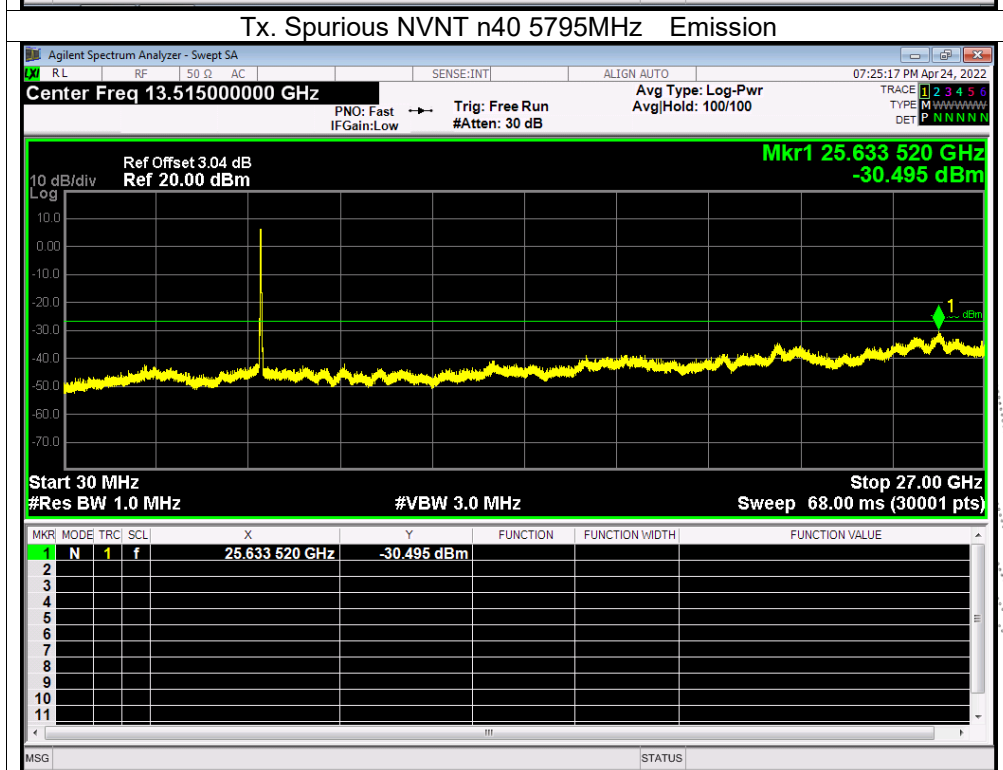
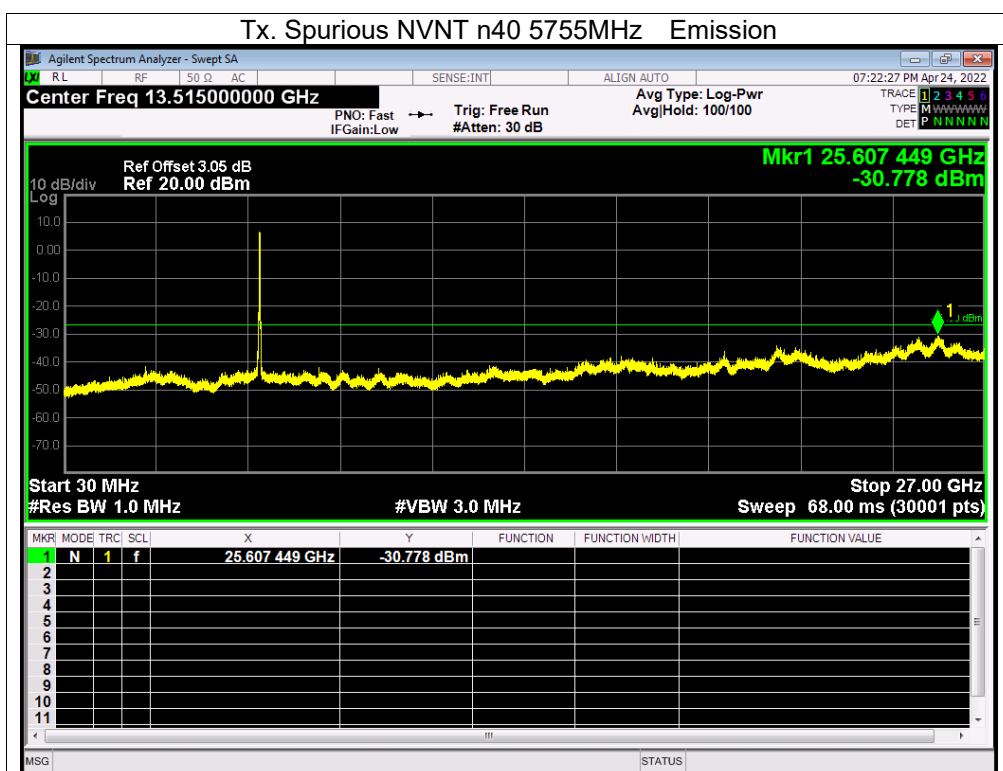
Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

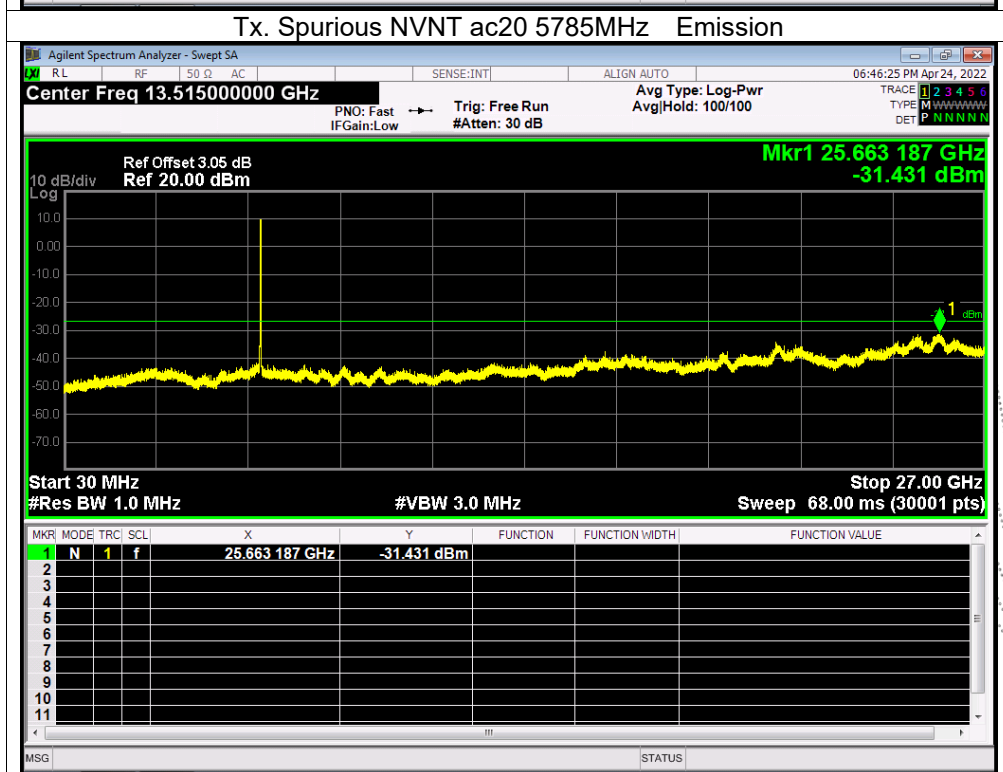
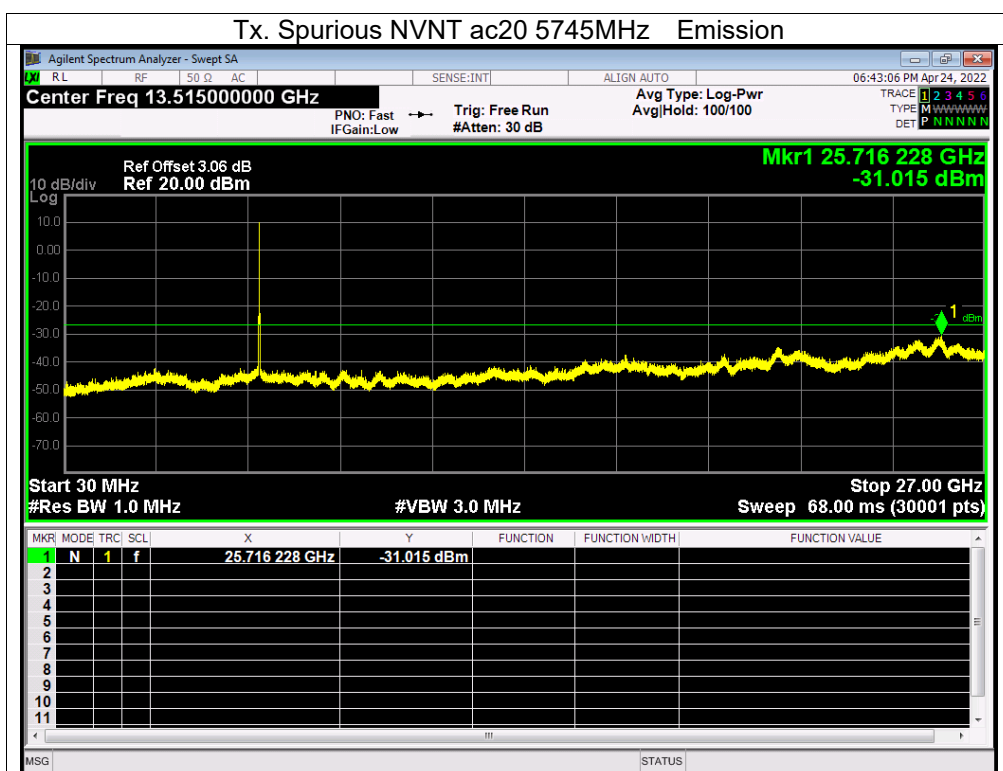
About: 26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

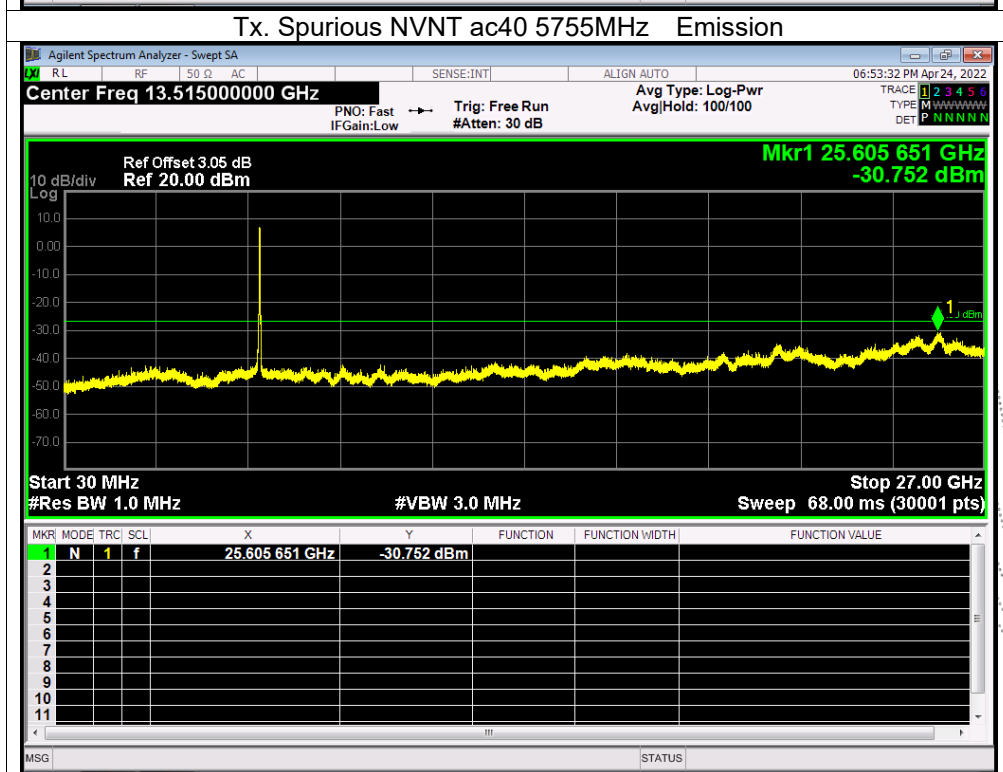
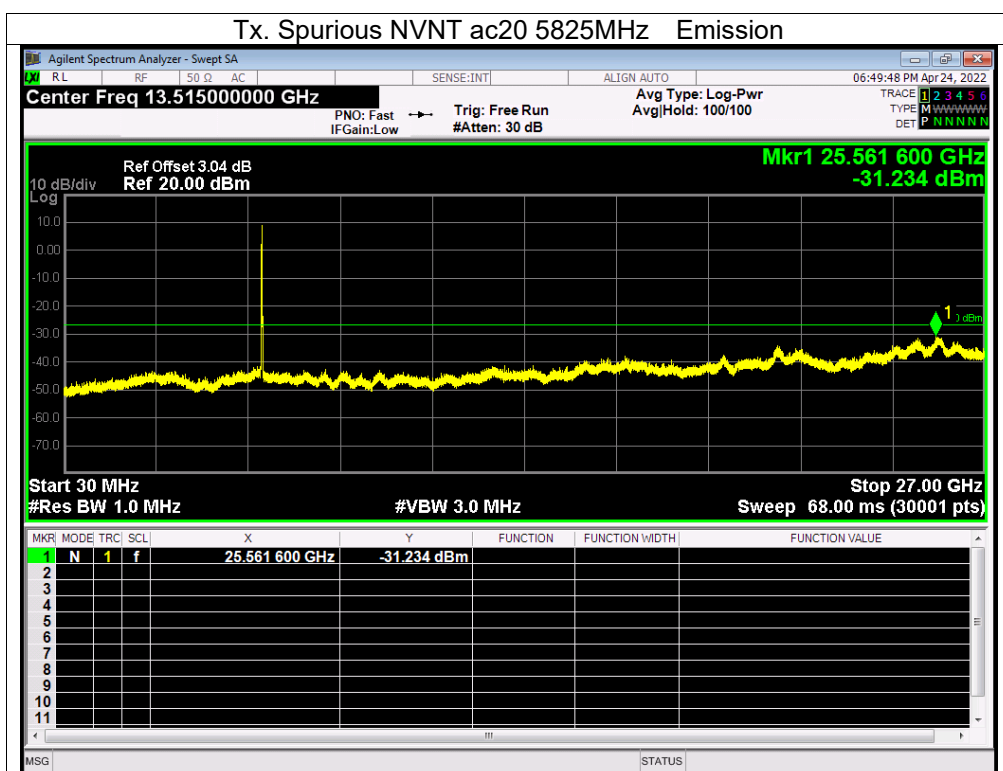


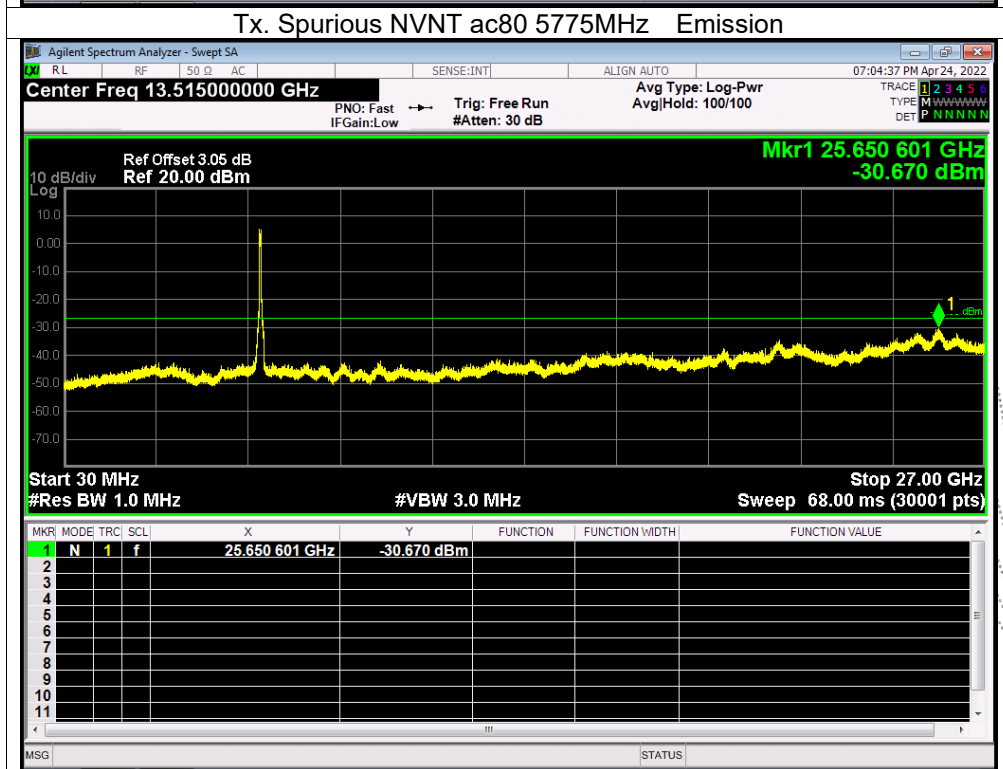
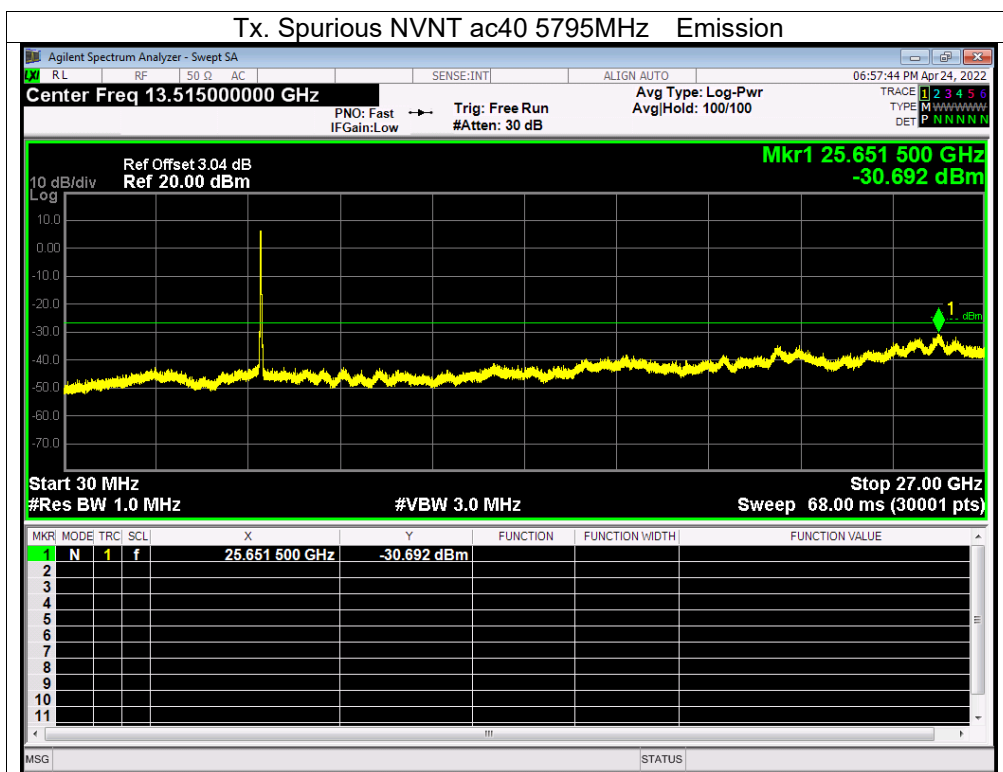












13. Frequency Stability Measurement

13.1 Block Diagram Of Test Setup



13.2 Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification)..

13.3 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and he limit is less than ± 20 ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is $-20^\circ\text{C} \sim 70^\circ\text{C}$.

13.4 Test Result

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 5V
Hrst Mode :	TX Frequency(5745-5825MHz)		

Voltage vs. Frequency Stabilit

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5745.00177	5745	0.00177	0.3084
		V max (V)	5.75	5745.00917	5745	0.00917	1.5965
		V min (V)	4.25	5745.00655	5745	0.00655	1.1408
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	DC 5V	T (°C)	-20	5745.01112	5745	0.01112	1.9353
		T (°C)	-10	5745.01079	5745	0.01079	1.8780
		T (°C)	0	5745.00740	5745	0.00740	1.2874
		T (°C)	10	5745.01294	5745	0.01294	2.2529
		T (°C)	20	5745.00370	5745	0.00370	0.6432
		T (°C)	30	5745.00734	5745	0.00734	1.2780
		T (°C)	40	5745.00078	5745	0.00078	0.1354
		T (°C)	50	5745.00204	5745	0.00204	0.3548
		T (°C)	60	5745.00226	5745	0.00226	0.3939
		T (°C)	70	5745.00880	5745	0.00880	1.5320
Limits				5725-5850 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5785.01141	5785	0.01141	1.9722
		V max (V)	5.75	5785.00262	5785	0.00262	0.4529
		V min (V)	4.25	5785.00454	5785	0.00454	0.7851
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	DC 5V	T (°C)	-20	5785.01276	5785	0.01276	2.2049
		T (°C)	-10	5785.01163	5785	0.01163	2.0107
		T (°C)	0	5785.00516	5785	0.00516	0.8918
		T (°C)	10	5785.00476	5785	0.00476	0.8226
		T (°C)	20	5785.00558	5785	0.00558	0.9638
		T (°C)	30	5785.00937	5785	0.00937	1.6189
		T (°C)	40	5785.00651	5785	0.00651	1.1257
		T (°C)	50	5785.00154	5785	0.00154	0.2657
		T (°C)	60	5785.00133	5785	0.00133	0.2300
		T (°C)	70	5785.01311	5785	0.01311	2.2656
Limits				5725-5850 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5825.00185	5825	0.00185	0.3172
		V max (V)	5.75	5825.00404	5825	0.00404	0.6934
		V min (V)	4.25	5825.00317	5825	0.00317	0.5434
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency: 5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	DC 5V	T (°C)	-20	5825.00813	5825	0.00813	1.3961
		T (°C)	-10	5825.00340	5825	0.00340	0.5838
		T (°C)	0	5825.00718	5825	0.00718	1.2322
		T (°C)	10	5825.00717	5825	0.00717	1.2305
		T (°C)	20	5825.00820	5825	0.00820	1.4077
		T (°C)	30	5825.00038	5825	0.00038	0.0652
		T (°C)	40	5825.00789	5825	0.00789	1.3549
		T (°C)	50	5825.00080	5825	0.00080	0.1371
		T (°C)	60	5825.01075	5825	0.01075	1.8453
		T (°C)	70	5825.01237	5825	0.01237	2.1241
Limits				5725-5850 MHz			
Result				Complies			

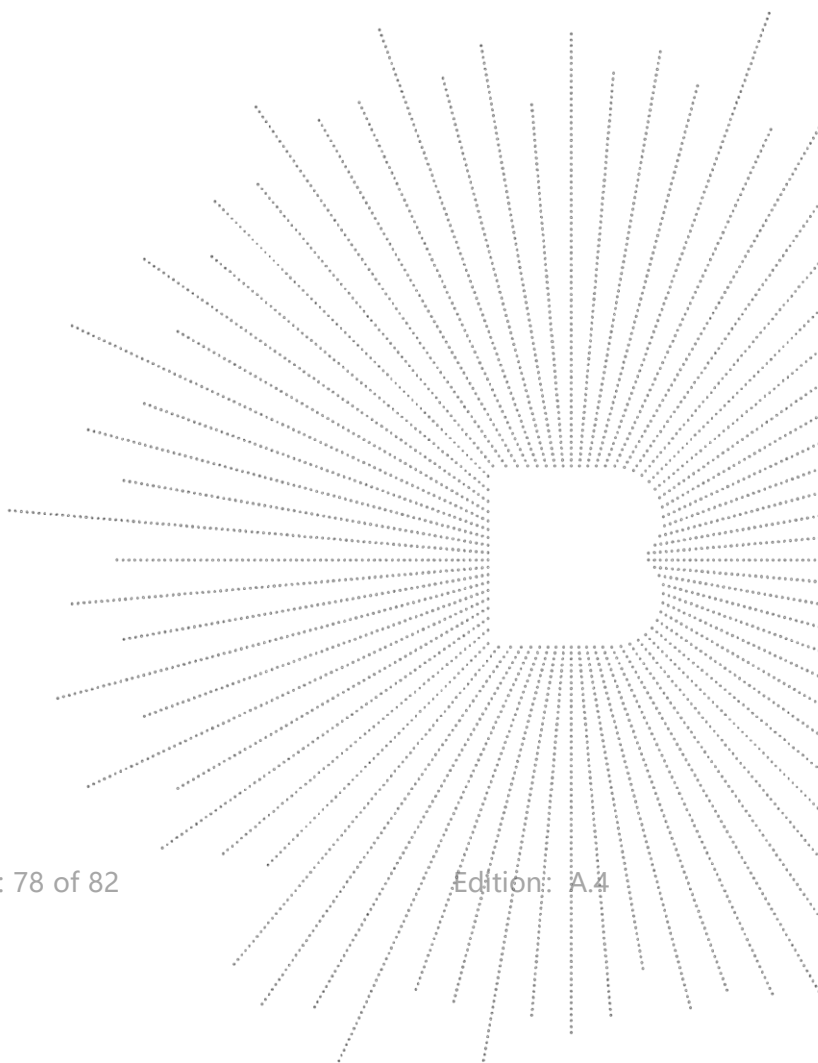
14. Antenna Requirement

14.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

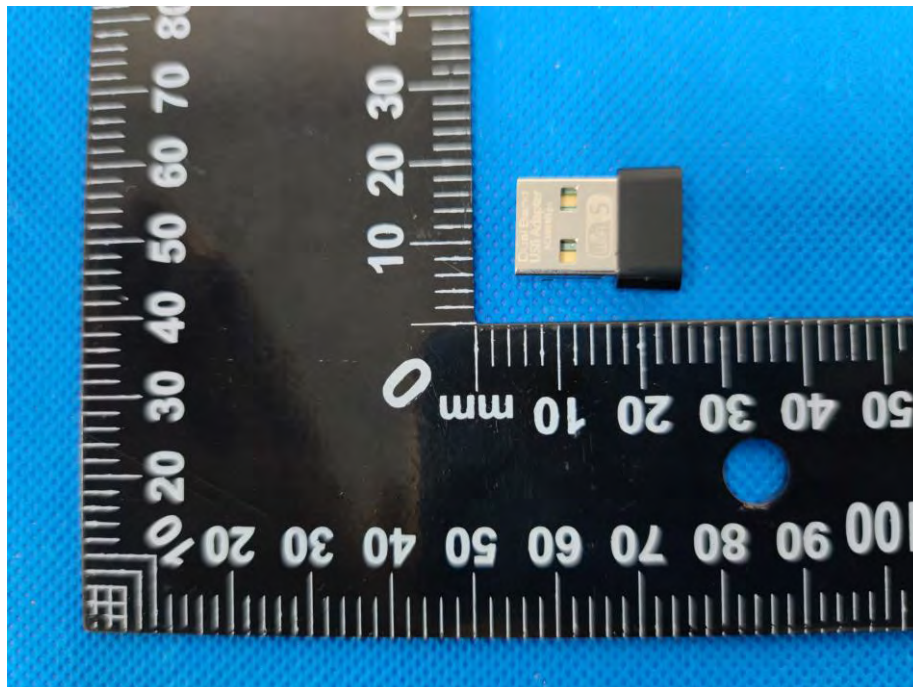
14.2 Test Result

The EUT antenna is Internal Antenna. It comply with the standard requirement.

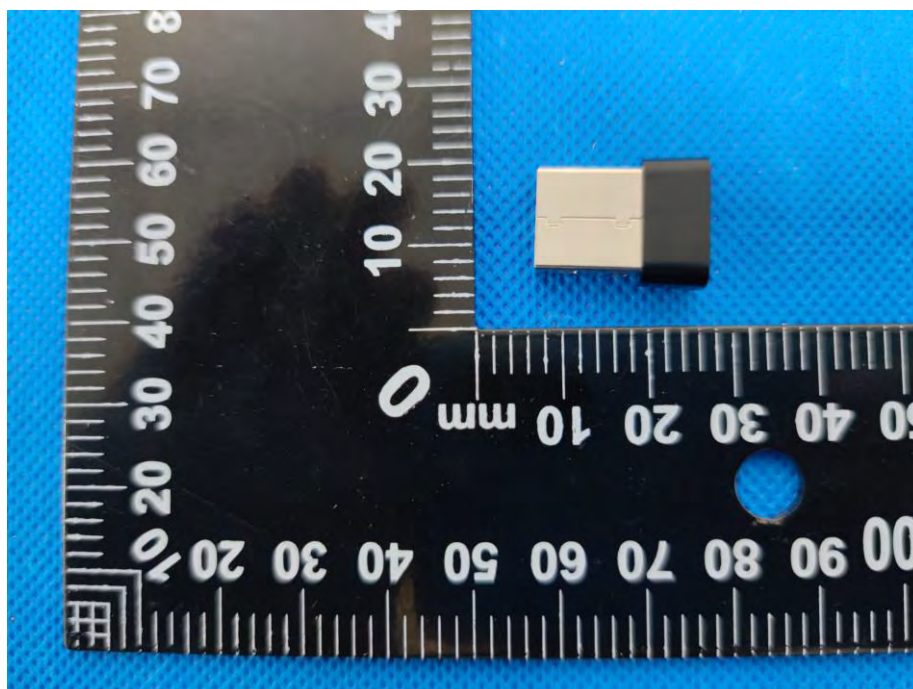


15. EUT Photographs

EUT Photo 1



EUT Photo 2

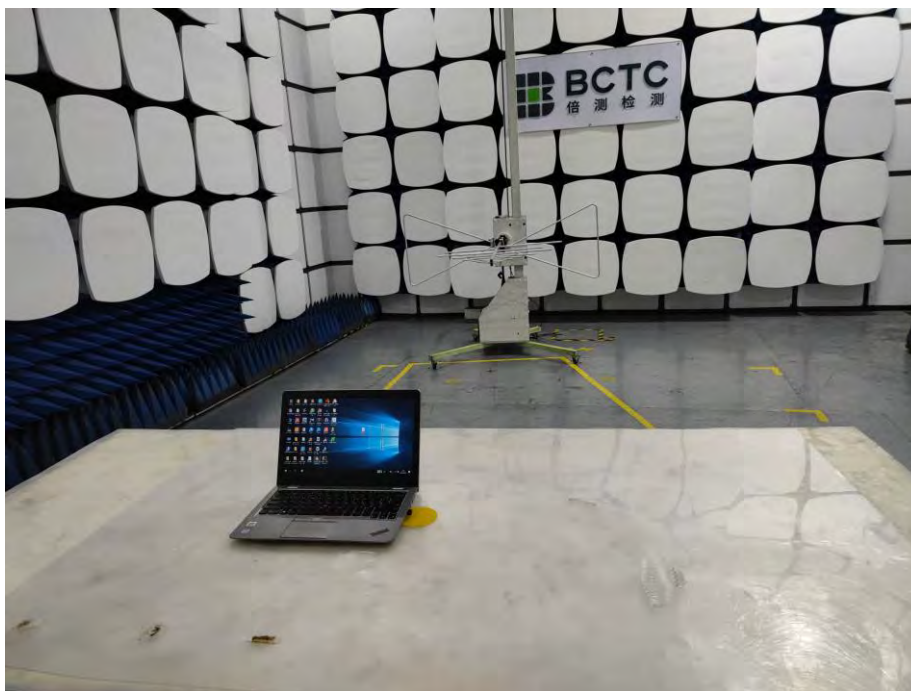


16. EUT Test Setup Photographs

Conducted Measurement Photo



Radiated Measurement Photos





STATEMENT

- 1.The equipment lists are traceable to the national reference standards.
- 2.The test report can not be partially copied unless prior written approval is issued from our lab.
- 3.The test report is invalid without stamp of laboratory.
- 4.The test report is invalid without signature of person(s) testing and authorizing.
- 5.The test process and test result is only related to the Unit Under Test.
- 6.The quality system of our laboratory is in accordance with ISO/IEC17025.
- 7.If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:

1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: 400-788-9558

P.C.: 518103

FAX: 0755-33229357

Website: <http://www.chnbctc.com>

E-Mail: bctc@bctc-lab.com.cn

***** END *****