TEST REPORT

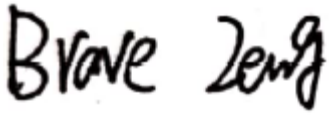
Report No.:	BCTC2206634854-3E
Applicant:	ROCKPI TRADING LIMITED
Product Name:	ROCK Pi 4/ROCK 4
Model/Type Ref.:	ROCK 4 SE
Tested Date:	2022-06-30 to 2022-07-05
Issued Date:	2022-07-05

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2A3PA-ROCK4SE

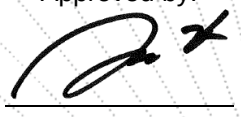
Product Name:	ROCK Pi 4
Trademark:	N/A
Model/Type Ref.:	ROCK 4 SE ROCK Pi 4 A, ROCK Pi 4 B, ROCK Pi 4 A+, ROCK Pi 4 B+, ROCK 4 SE, ROCK 4 A, ROCK 4 B, ROCK 4 A+, ROCK 4 B+
Prepared For:	ROCKPI TRADING LIMITED
Address:	Room 11, 27 / f, Ga wah international centre, 191 Javaroad, north point, Hong Kong
Manufacturer:	ROCKPI TRADING LIMITED
Address:	Room 11, 27 / f, Ga wah international centre, 191 Javaroad, north point, Hong Kong
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:	2022-06-30
Sample tested Date:	2022-06-30 to 2022-07-05
Issue Date:	2022-07-05
Report No.:	BCTC2206634854-3E
Test Standards:	FCC Part15.247 ANSI C63.10-2013
Test Results:	PASS
Remark:	This is WIFI-2.4GHz band radio test report.

Tested by:



Brave Zeng/ Project Handler

Approved by:



Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

Table Of Content

(Note: N/A means not applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2206634854-3E	2022-07-05	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Conducted Emission	15.207	PASS
2	6dB Bandwidth	15.247 (a)(2)	PASS
3	Peak Output Power	15.247 (b)	PASS
4	Radiated Spurious Emission	15.247 (d)	PASS
5	Power Spectral Density	15.247 (e)	PASS
6	Restricted Band of Operation	15.205	PASS
7	Band Edge (Out of Band Emissions)	15.247 (d)	PASS
8	Antenna Requirement	15.203	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℃

4. Product Information And Test Setup

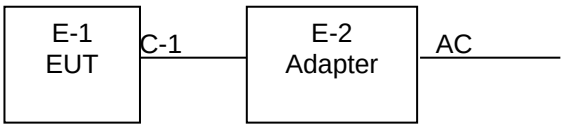
4.1 Product Information

Model/Type Ref.:	ROCK 4 SE ROCK Pi 4 A, ROCK Pi 4 B, ROCK Pi 4 A+, ROCK Pi 4 B+, ROCK 4 SE, ROCK 4 A, ROCK 4 B, ROCK 4 A+, ROCK 4 B+
Model differences:	All the model are the same circuit and RF module, except model names.
Operation Frequency:	802.11b/g/n20MHz:2412~2462 MHz
Bit Rate of Transmitter	802.11b:11/5.5/2/1 Mbps 802.11g:54/48/36/24/18/12/9/6Mbps 802.11n Up to 150Mbps
Type of Modulation:	OFDM/DSSS
Number Of Channel	802.11b/g/n20MHz:11 CH
Antenna Gain:	2 dBi
Ratings:	DC 5V From adapter

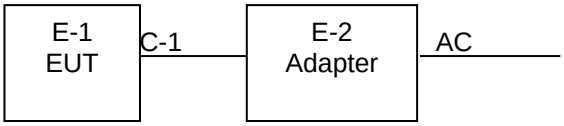
4.2 Test Setup Configuration

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

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	ROCK Pi 4/ROCK 4	N/A	ROCK 4 SE	N/A	EUT
E-2	Adapter	N/A	BCTC001	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	0.3M	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

Channel List for 802.11b/g/n(20)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	02	2417	03	2422
04	2427	05	2432	06	2437
07	2442	08	2447	09	2452
10	2457	11	2462		

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	802.11b CH1/ CH6/ CH11
Mode 2	802.11g CH1/ CH6/ CH11
Mode 3	802.11n20 CH1/ CH6/ CH11
Mode 4	Link Mode

Radiated Emission	
Final Test Mode	Description
Mode 4	Link Mode

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		
Frequency	2412 MHz	2437 MHz	2462 MHz
Parameters	DEF	DEF	DEF
Frequency	2422MHz	2437MHz	2452MHz
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

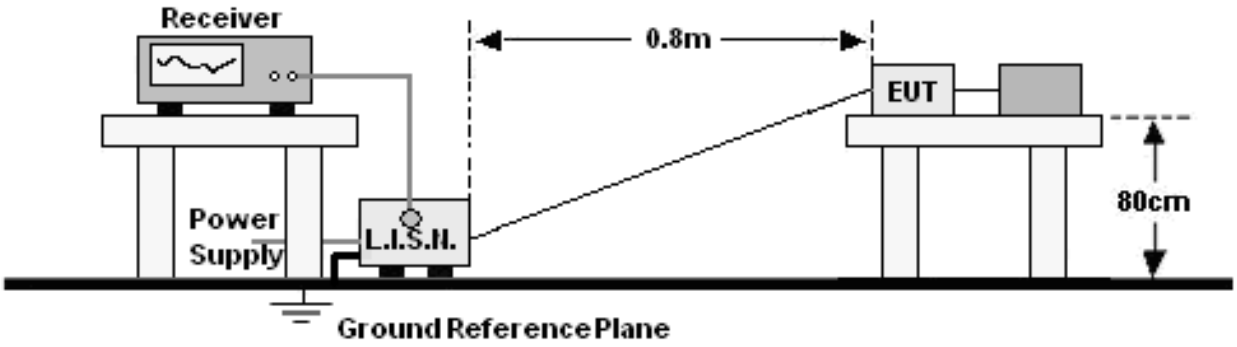
Conducted Emissions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR3	102075	May 24, 2022	May 23, 2023
LISN	R&S	ENV216	101375	May 24, 2022	May 23, 2023
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Attenuator	\	10dB DC-6GHz	1650	May 24, 2022	May 23, 2023

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power Metter	Keysight	E4419	\	May 24, 2022	May 23, 2023
Power Sensor (AV)	Keysight	E9300A	\	May 24, 2022	May 23, 2023
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 24, 2022	May 23, 2023
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	\	May 24, 2022	May 23, 2023

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 24, 2022	May 23, 2023
Receiver	R&S	ESRP	101154	May 24, 2022	May 23, 2023
Amplifier	SKET	LAPA_01G18G-45dB	\	May 24, 2022	May 23, 2023
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 24, 2022	May 23, 2023
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 26, 2022	May 25, 2023
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 24, 2022	May 23, 2023
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 24, 2022	May 23, 2023
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 24, 2022	May 23, 2023
Loop Antenna(9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	May 26, 2022	May 25, 2023
RF cables1(9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	May 26, 2022	May 25, 2023
RF cables2(30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	May 26, 2022	May 25, 2023
RF cables3(1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	May 24, 2022	May 23, 2023
Power Metter	Keysight	E4419	\	May 26, 2022	May 25, 2023
Power Sensor (AV)	Keysight	E9300A	\	May 26, 2022	May 25, 2023
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 26, 2022	May 25, 2023
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	\	May 26, 2022	May 25, 2023
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

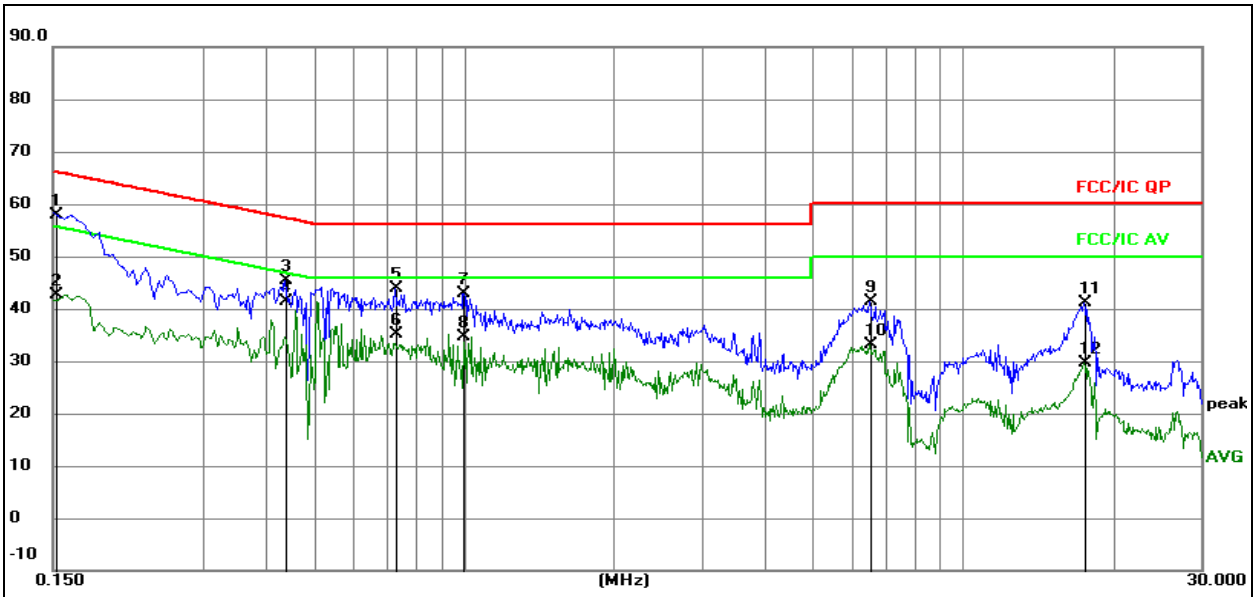
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak 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

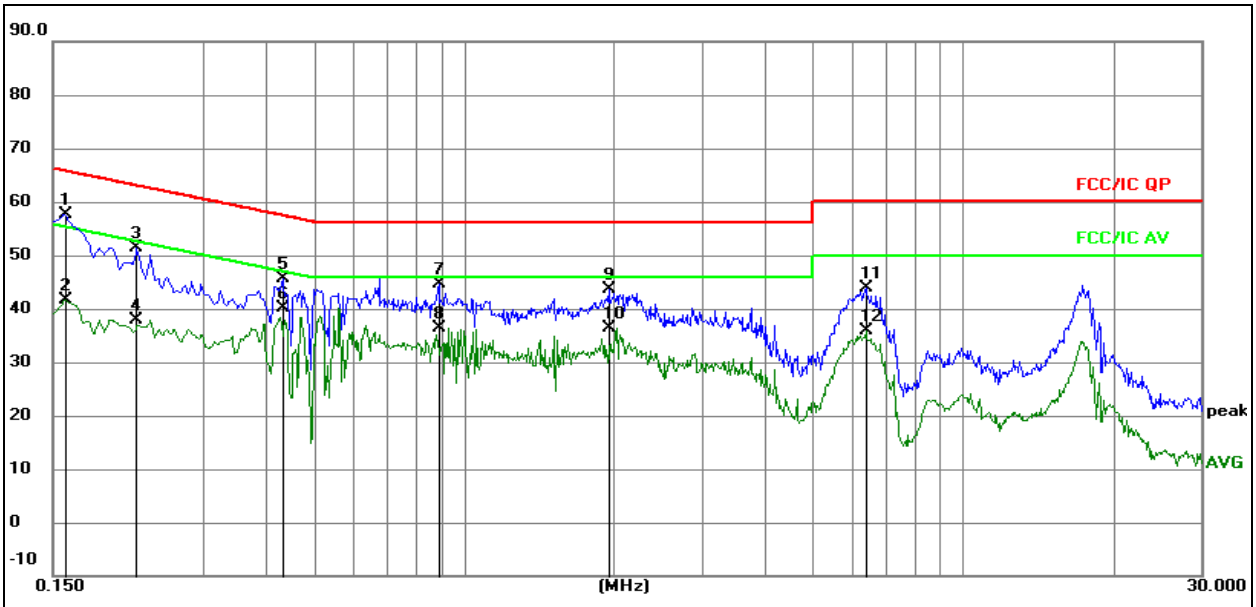
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		0.1524	38.29	19.68	57.97	65.87	-7.90	QP
2		0.1524	23.04	19.68	42.72	55.87	-13.15	AVG
3		0.4380	25.52	19.74	45.26	57.10	-11.84	QP
4	*	0.4380	21.57	19.74	41.31	47.10	-5.79	AVG
5		0.7304	24.10	19.74	43.84	56.00	-12.16	QP
6		0.7304	15.42	19.74	35.16	46.00	-10.84	AVG
7		0.9960	23.18	19.76	42.94	56.00	-13.06	QP
8		0.9960	14.90	19.76	34.66	46.00	-11.34	AVG
9		6.5130	21.13	20.17	41.30	60.00	-18.70	QP
10		6.5130	12.96	20.17	33.13	50.00	-16.87	AVG
11		17.5470	20.82	20.40	41.22	60.00	-18.78	QP
12		17.5470	9.26	20.40	29.66	50.00	-20.34	AVG

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	Neutral
Test Voltage ：	AC 120V/60Hz	Test Mode：	Mode 2



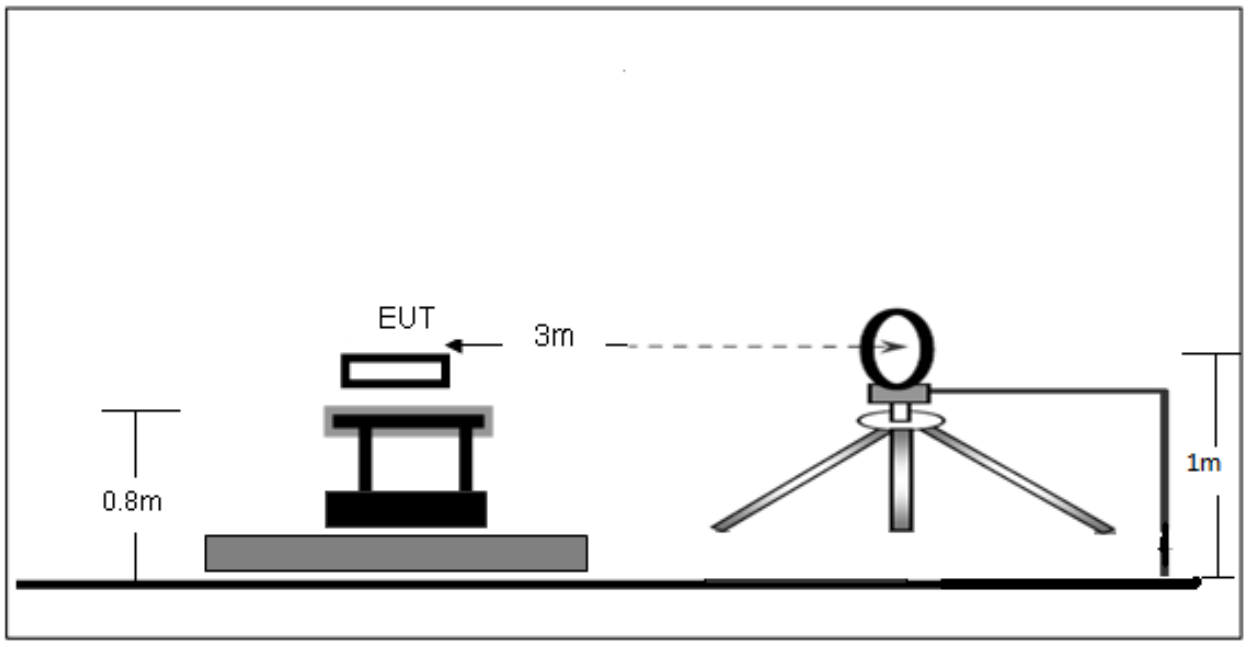
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement=Reading Level+ Correct Factor
4. Over=Measurement-Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.1582	38.02	19.69	57.71	65.56	-7.85	QP
2		0.1582	21.90	19.69	41.59	55.56	-13.97	AVG
3		0.2208	31.55	19.79	51.34	62.79	-11.45	QP
4		0.2208	18.06	19.79	37.85	52.79	-14.94	AVG
5		0.4328	25.84	19.74	45.58	57.20	-11.62	QP
6	*	0.4328	20.51	19.74	40.25	47.20	-6.95	AVG
7		0.8897	24.92	19.75	44.67	56.00	-11.33	QP
8		0.8897	16.64	19.75	36.39	46.00	-9.61	AVG
9		1.9489	23.79	19.87	43.66	56.00	-12.34	QP
10		1.9489	16.52	19.87	36.39	46.00	-9.61	AVG
11		6.3859	23.71	20.16	43.87	60.00	-16.13	QP
12		6.3859	15.67	20.16	35.83	50.00	-14.17	AVG

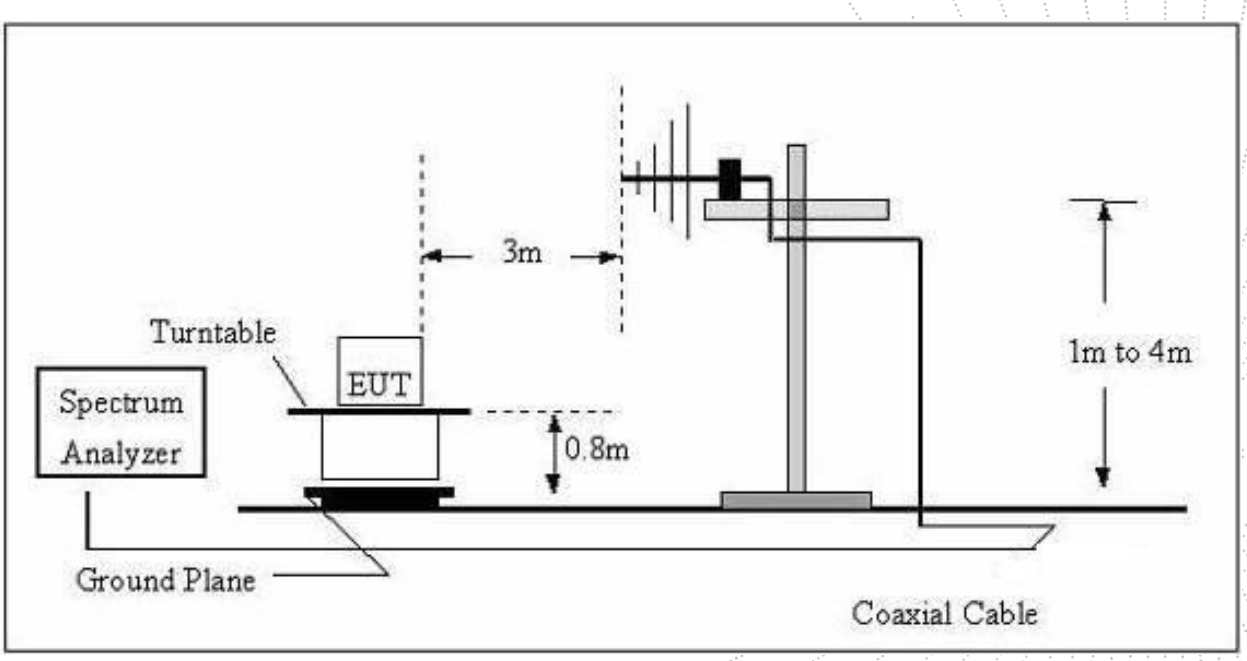
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

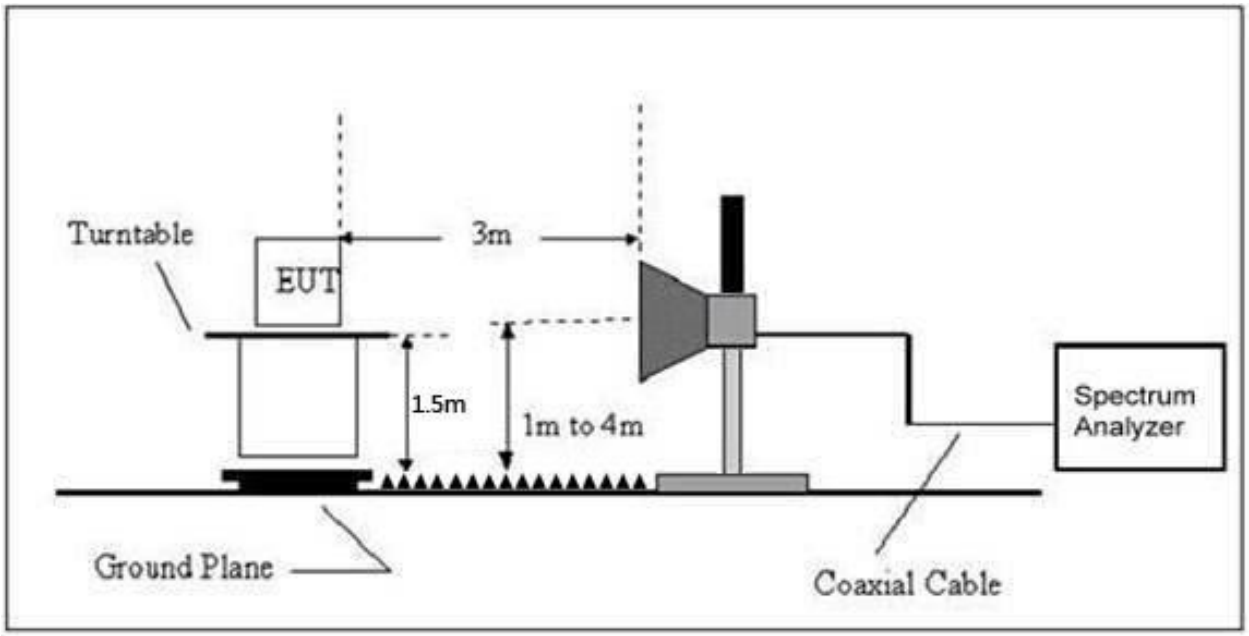
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

7.3 Test Procedure

Receiver Parameter	Setting
Attenuation	Auto
9kHz~150kHz	RBW 200Hz for QP
150kHz~30MHz	RBW 9kHz for QP
30MHz~1000MHz	RBW 120kHz for QP

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel.

Note:

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

Above 1GHz test procedure as below:
a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the Highest channel.
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

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

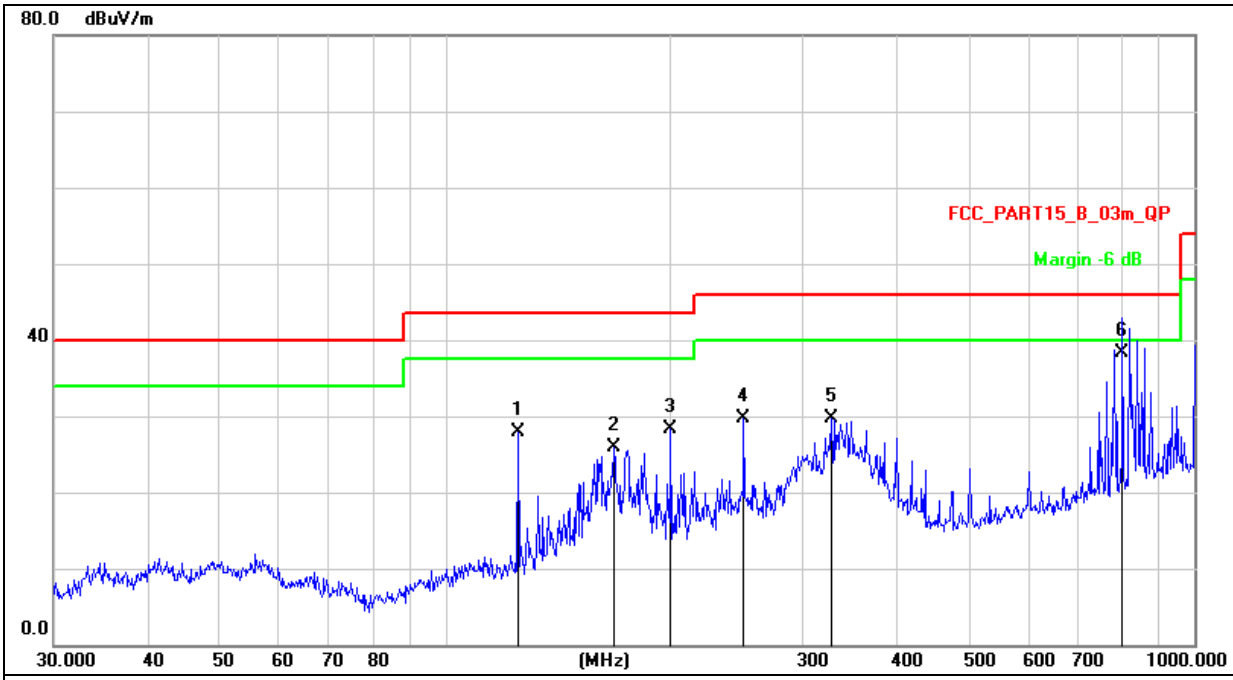
Temperature：	26℃	Relative Humidity:	54%
Pressure：	101 kPa	Test Voltage :	DC 5V from adapter
Test Mode ：	Mode 1	Polarization :	--

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

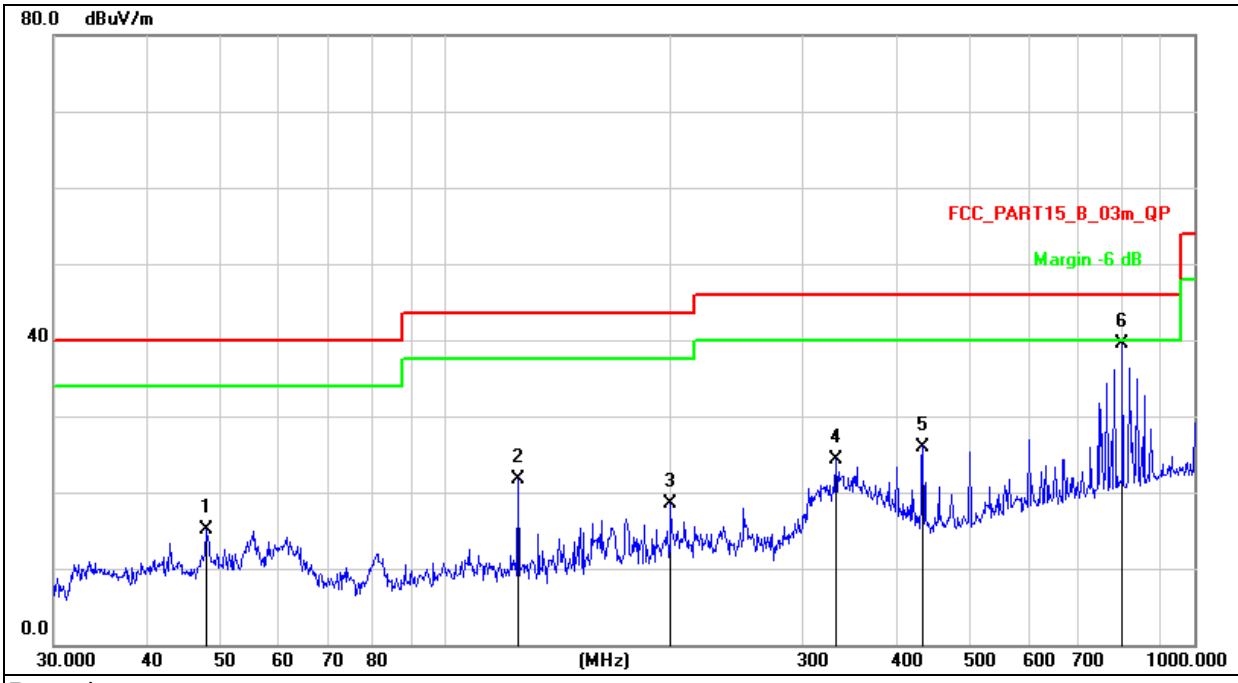
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		125.0066	45.80	-17.89	27.91	43.50	-15.59	QP
2		167.8243	44.24	-18.36	25.88	43.50	-17.62	QP
3		199.9856	44.62	-16.30	28.32	43.50	-15.18	QP
4		250.3012	44.85	-15.14	29.71	46.00	-16.29	QP
5		327.8873	42.47	-12.84	29.63	46.00	-16.37	QP
6	*	799.9683	41.96	-3.64	38.32	46.00	-7.68	QP

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		47.9940	30.05	-14.96	15.09	40.00	-24.91	QP
2		125.0066	39.64	-17.89	21.75	43.50	-21.75	QP
3		199.9856	34.75	-16.30	18.45	43.50	-25.05	QP
4		332.5187	37.05	-12.71	24.34	46.00	-21.66	QP
5		434.0651	36.33	-10.33	26.00	46.00	-20.00	QP
6	*	801.7863	43.16	-3.60	39.56	46.00	-6.44	QP

Between 1GHz – 25GHz
802.11b

Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)	Over (dB)	Detector Type
Low channel:2412MHz							
V	4824.00	53.09	-0.43	52.66	74.00	-21.34	PK
V	4824.00	42.55	-0.43	42.12	54.00	-11.88	AV
V	7236.00	42.54	8.31	50.85	74.00	-23.15	PK
V	7236.00	32.58	8.31	40.89	54.00	-13.11	AV
H	4824.00	48.90	-0.43	48.47	74.00	-25.53	PK
H	4824.00	37.91	-0.43	37.48	54.00	-16.52	AV
H	7236.00	40.90	8.31	49.21	74.00	-24.79	PK
H	7236.00	33.58	8.31	41.89	54.00	-12.11	AV
Middle channel:2437MHz							
V	4874.00	49.11	-0.38	48.73	74.00	-25.27	PK
V	4874.00	40.30	-0.38	39.92	54.00	-14.08	AV
V	7311.00	41.37	8.83	50.20	74.00	-23.80	PK
V	7311.00	31.47	8.83	40.30	54.00	-13.70	AV
H	4874.00	45.20	-0.38	44.82	74.00	-29.18	PK
H	4874.00	35.52	-0.38	35.14	54.00	-18.86	AV
H	7311.00	38.40	8.83	47.23	74.00	-26.77	PK
H	7311.00	29.88	8.83	38.71	54.00	-15.29	AV
High channel:2462MHz							
V	4924.00	51.19	-0.32	50.87	74.00	-23.13	PK
V	4924.00	40.31	-0.32	39.99	54.00	-14.01	AV
V	7386.00	43.14	9.35	52.49	74.00	-21.51	PK
V	7386.00	33.29	9.35	42.64	54.00	-11.36	AV
H	4924.00	48.91	-0.32	48.59	74.00	-25.41	PK
H	4924.00	38.33	-0.32	38.01	54.00	-15.99	AV
H	7386.00	40.26	9.35	49.61	74.00	-24.39	PK
H	7386.00	31.41	9.35	40.76	54.00	-13.24	AV

Remark:
1.Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2.If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11g

Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)	Over (dB)	Detector Type
Low channel:2412MHz							
V	4824.00	52.16	-0.43	51.73	74.00	-22.27	PK
V	4824.00	42.36	-0.43	41.93	54.00	-12.07	AV
V	7236.00	45.08	8.31	53.39	74.00	-20.61	PK
V	7236.00	34.33	8.31	42.64	54.00	-11.36	AV
H	4824.00	50.25	-0.43	49.82	74.00	-24.18	PK
H	4824.00	40.12	-0.43	39.69	54.00	-14.31	AV
H	7236.00	42.84	8.31	51.15	74.00	-22.85	PK
H	7236.00	33.85	8.31	42.16	54.00	-11.84	AV
Middle channel:2437MHz							
V	4874.00	50.01	-0.38	49.63	74.00	-24.37	PK
V	4874.00	42.57	-0.38	42.19	54.00	-11.81	AV
V	7311.00	41.45	8.83	50.28	74.00	-23.72	PK
V	7311.00	32.00	8.83	40.83	54.00	-13.17	AV
H	4874.00	47.49	-0.38	47.11	74.00	-26.89	PK
H	4874.00	37.30	-0.38	36.92	54.00	-17.08	AV
H	7311.00	39.95	8.83	48.78	74.00	-25.22	PK
H	7311.00	32.49	8.83	41.32	54.00	-12.68	AV
High channel:2462MHz							
V	4924.00	52.48	-0.32	52.16	74.00	-21.84	PK
V	4924.00	42.10	-0.32	41.78	54.00	-12.22	AV
V	7386.00	45.40	9.35	54.75	74.00	-19.25	PK
V	7386.00	35.98	9.35	45.33	54.00	-8.67	AV
H	4924.00	50.75	-0.32	50.43	74.00	-23.57	PK
H	4924.00	40.30	-0.32	39.98	54.00	-14.02	AV
H	7386.00	43.15	9.35	52.50	74.00	-21.50	PK
H	7386.00	35.21	9.35	44.56	54.00	-9.44	AV

Remark:
1.Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2.If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

802.11n20

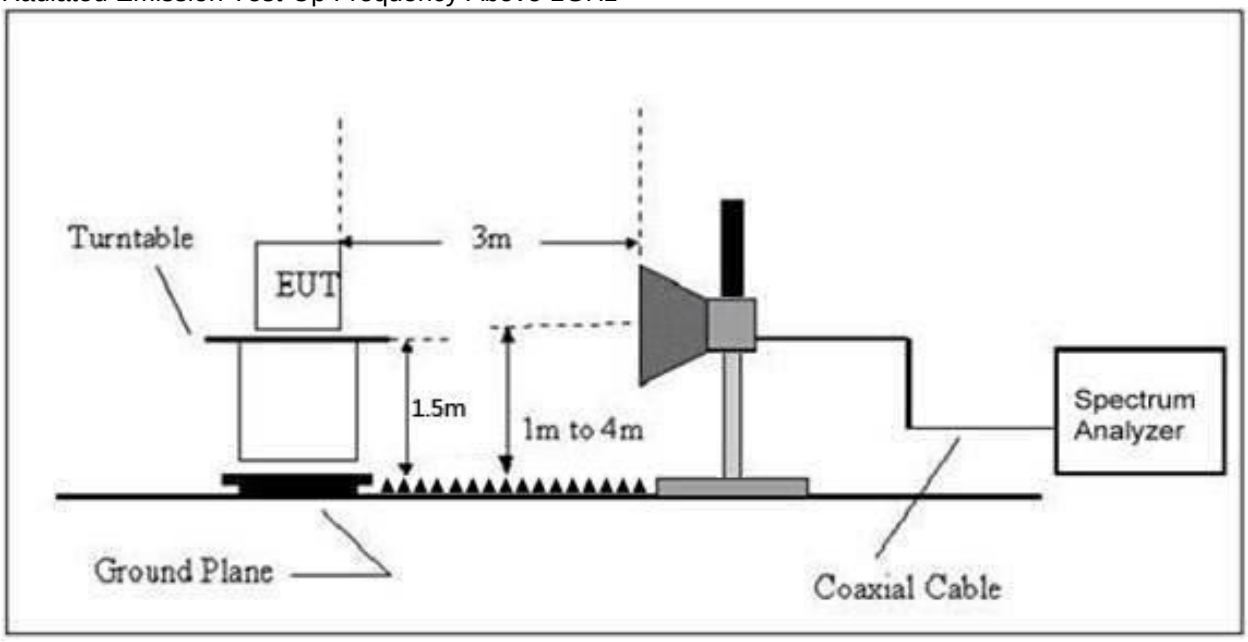
Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)	Over (dB)	Detector Type
Low channel:2412MHz							
V	4824.00	54.81	-0.43	54.38	74.00	-19.62	PK
V	4824.00	45.11	-0.43	44.68	54.00	-9.32	AV
V	7236.00	46.61	8.31	54.92	74.00	-19.08	PK
V	7236.00	37.12	8.31	45.43	54.00	-8.57	AV
H	4824.00	53.09	-0.43	52.66	74.00	-21.34	PK
H	4824.00	42.13	-0.43	41.70	54.00	-12.30	AV
H	7236.00	45.29	8.31	53.60	74.00	-20.40	PK
H	7236.00	37.05	8.31	45.36	54.00	-8.64	AV
Middle channel:2437MHz							
V	4874.00	51.41	-0.38	51.03	74.00	-22.97	PK
V	4874.00	42.54	-0.38	42.16	54.00	-11.84	AV
V	7311.00	40.73	8.83	49.56	74.00	-24.44	PK
V	7311.00	31.30	8.83	40.13	54.00	-13.87	AV
H	4874.00	47.68	-0.38	47.30	74.00	-26.70	PK
H	4874.00	38.35	-0.38	37.97	54.00	-16.03	AV
H	7311.00	38.84	8.83	47.67	74.00	-26.33	PK
H	7311.00	31.30	8.83	40.13	54.00	-13.87	AV
High channel:2462MHz							
V	4924.00	54.07	-0.32	53.75	74.00	-20.25	PK
V	4924.00	45.88	-0.32	45.56	54.00	-8.44	AV
V	7386.00	47.57	9.35	56.92	74.00	-17.08	PK
V	7386.00	38.46	9.35	47.81	54.00	-6.19	AV
H	4924.00	52.78	-0.32	52.46	74.00	-21.54	PK
H	4924.00	43.57	-0.32	43.25	54.00	-10.75	AV
H	7386.00	45.07	9.35	54.42	74.00	-19.58	PK
H	7386.00	37.25	9.35	46.60	54.00	-7.40	AV

Remark:
1.Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2.If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8. Radiated Band Emission Measurement And Restricted Bands Of Operation

8.1 Block Diagram Of Test Setup

Radiated Emission Test-Up Frequency Above 1GHz



8.2 Limit

FCC Part15 C Section 15.209 and 15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

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).

8.3 Test Procedure

Receiver Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Above 1GHz test procedure as below:
a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the Highest channel.
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

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

	Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)		Result
					PK	PK	AV	
802.11b	Low Channel 2412MHz							
	H	2390.00	53.62	-6.70	46.92	74.00	54.00	PASS
	H	2400.00	58.05	-6.71	51.34	74.00	54.00	PASS
	V	2390.00	53.46	-6.70	46.76	74.00	54.00	PASS
	V	2400.00	56.86	-6.71	50.15	74.00	54.00	PASS
	High Channel 2462MHz							
	H	2483.50	57.94	-6.79	51.15	74.00	54.00	PASS
	H	2500.00	52.22	-6.81	45.41	74.00	54.00	PASS
	V	2483.50	56.81	-6.79	50.02	74.00	54.00	PASS
	V	2500.00	52.92	-6.81	46.11	74.00	54.00	PASS
802.11g	Low Channel 2412MHz							
	H	2390.00	53.15	-6.70	46.45	74.00	54.00	PASS
	H	2400.00	57.39	-6.71	50.68	74.00	54.00	PASS
	V	2390.00	52.87	-6.70	46.17	74.00	54.00	PASS
	V	2400.00	57.45	-6.71	50.74	74.00	54.00	PASS
	High Channel 2462MHz							
	H	2483.50	55.70	-6.79	48.91	74.00	54.00	PASS
	H	2500.00	51.58	-6.81	44.77	74.00	54.00	PASS
	V	2483.50	56.32	-6.79	49.53	74.00	54.00	PASS
	V	2500.00	53.74	-6.81	46.93	74.00	54.00	PASS

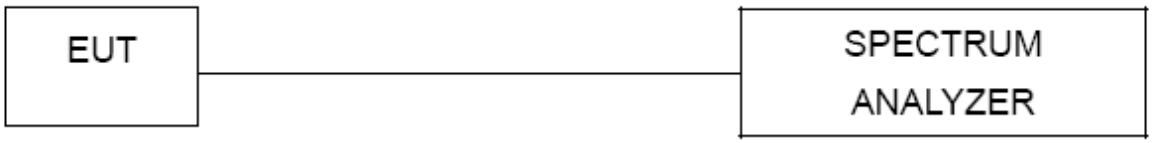
Remark:
1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level – Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

	Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)		Result
					PK	PK	AV	
802.11 n20	Low Channel 2412MHz							
	H	2390.00	54.29	-6.70	47.59	74.00	54.00	PASS
	H	2400.00	58.41	-6.71	51.70	74.00	54.00	PASS
	V	2390.00	53.40	-6.70	46.70	74.00	54.00	PASS
	V	2400.00	58.32	-6.71	51.61	74.00	54.00	PASS
	High Channel 2462MHz							
	H	2483.50	58.41	-6.79	51.62	74.00	54.00	PASS
	H	2500.00	51.63	-6.81	44.82	74.00	54.00	PASS
	V	2483.50	57.84	-6.79	51.05	74.00	54.00	PASS
	V	2500.00	54.91	-6.81	48.10	74.00	54.00	PASS

Remark:
1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level – Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

9. Power Spectral Density Test

9.1 Block Diagram Of Test Setup



9.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

9.3 Test Procedure

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

.

9.4 EUT Operating Conditions

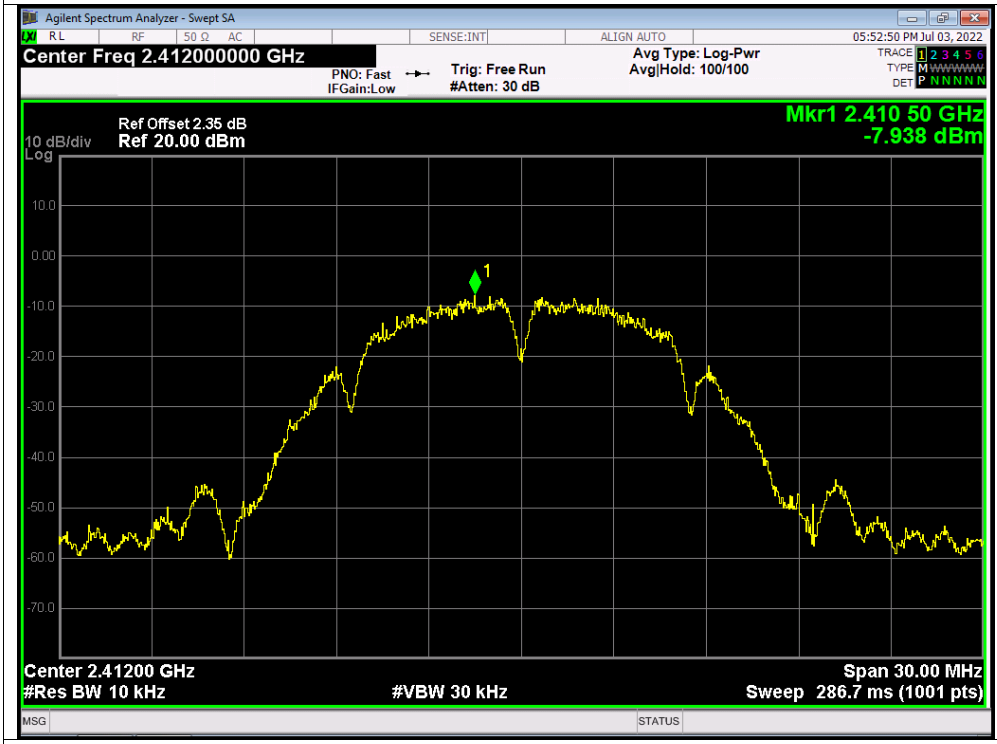
The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

9.5 Test Result

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter

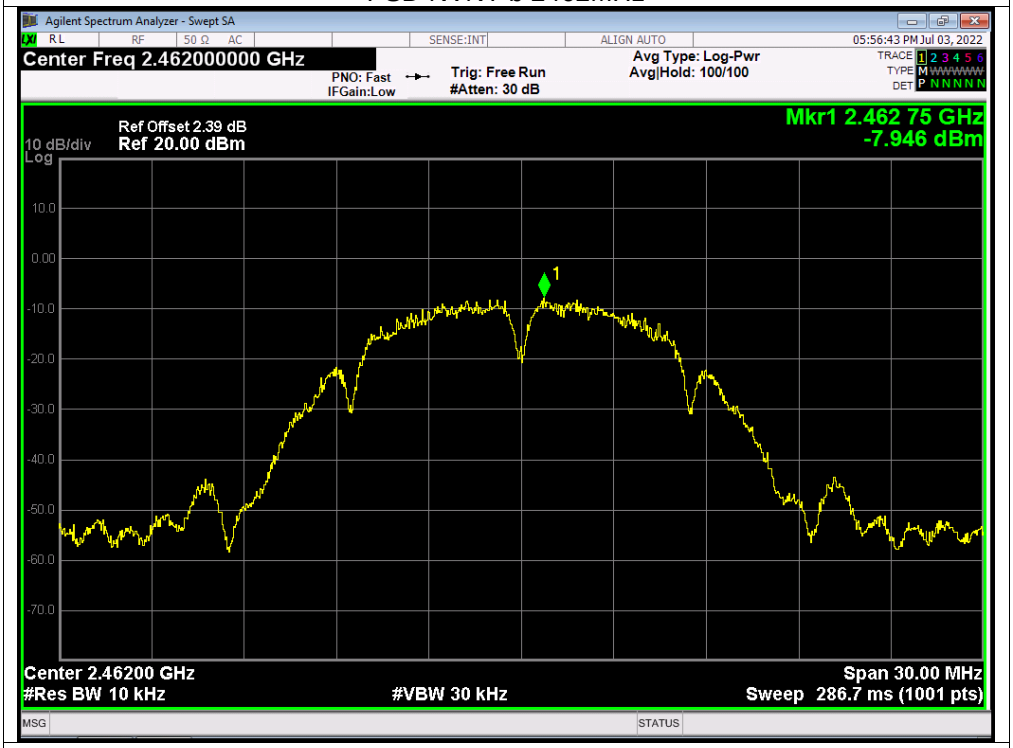
Test Mode	Frequency	Power Spectral Density (dBm/10kHz)	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
TX b Mode	2412 MHz	-7.94	-13.17	8	PASS
	2437 MHz	-7.44	-12.67	8	PASS
	2462 MHz	-7.95	-13.18	8	PASS
TX g Mode	2412 MHz	-14.21	-19.44	8	PASS
	2437 MHz	-13.34	-18.57	8	PASS
	2462 MHz	-13.52	-18.75	8	PASS
TX n Mode(20M)	2412 MHz	-14.68	-19.91	8	PASS
	2437 MHz	-13.93	-19.16	8	PASS
	2462 MHz	-13.93	-19.16	8	PASS
Note: Correction Factor = 10log(3KHz/RBW in measurement) =-5.23 Power Spectral Density (dBm/3kHz)= Power Spectral Density (dBm/10kHz)-5.23					

Test Graphs
PSD NVNT b 2412MHz

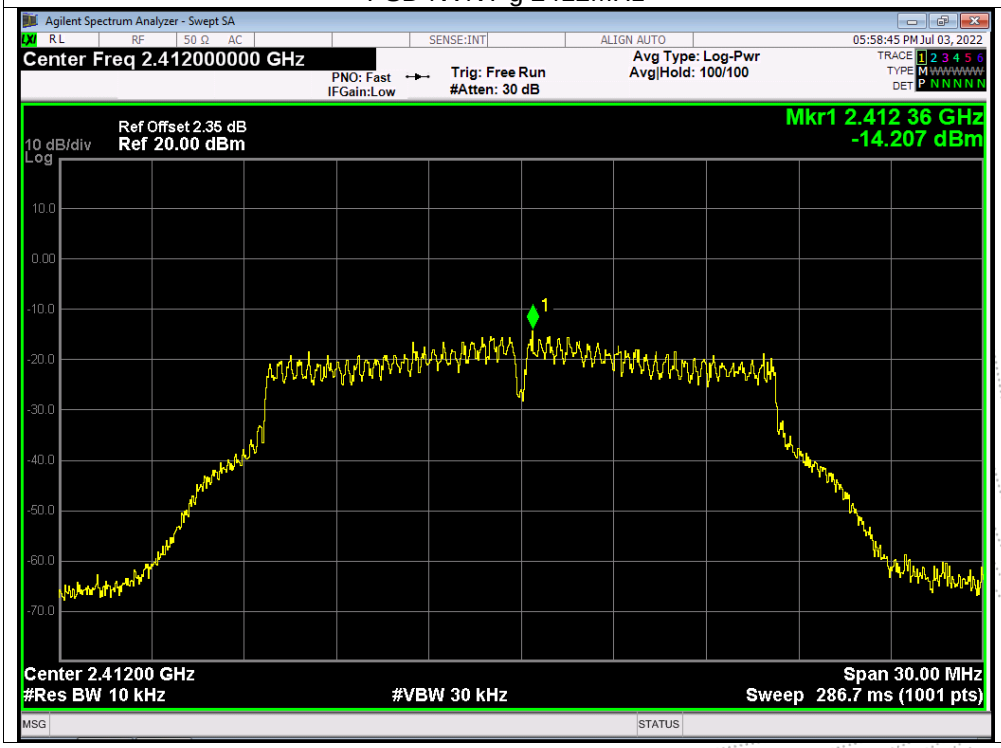


PSD NVNT b 2437MHz

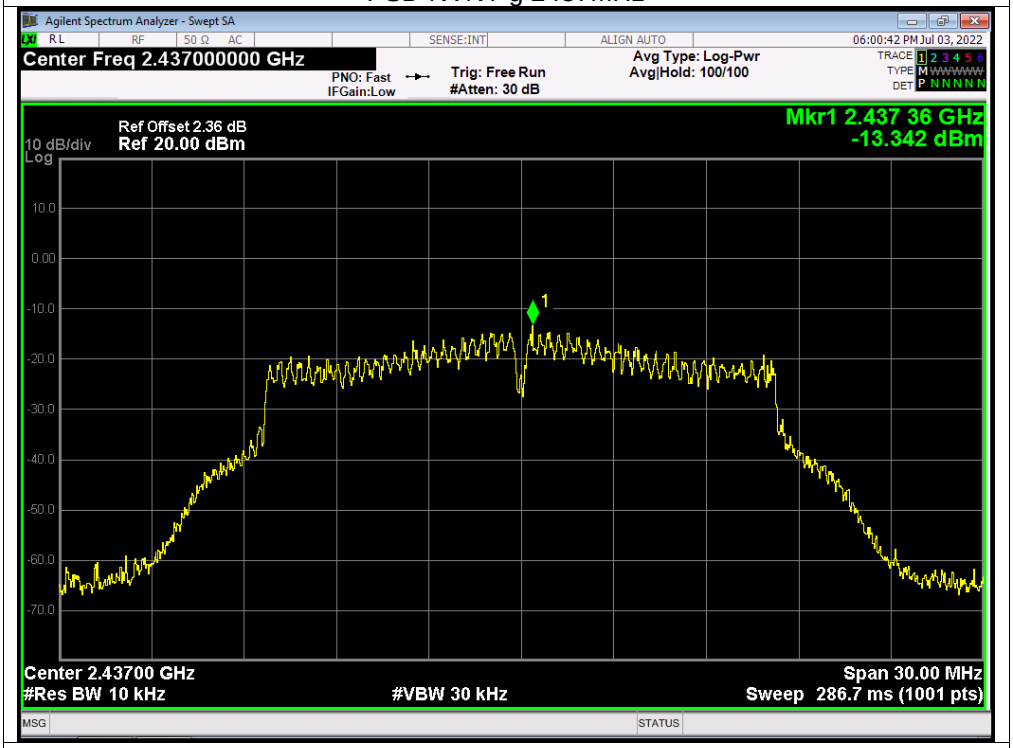
PSD NVNT b 2462MHz



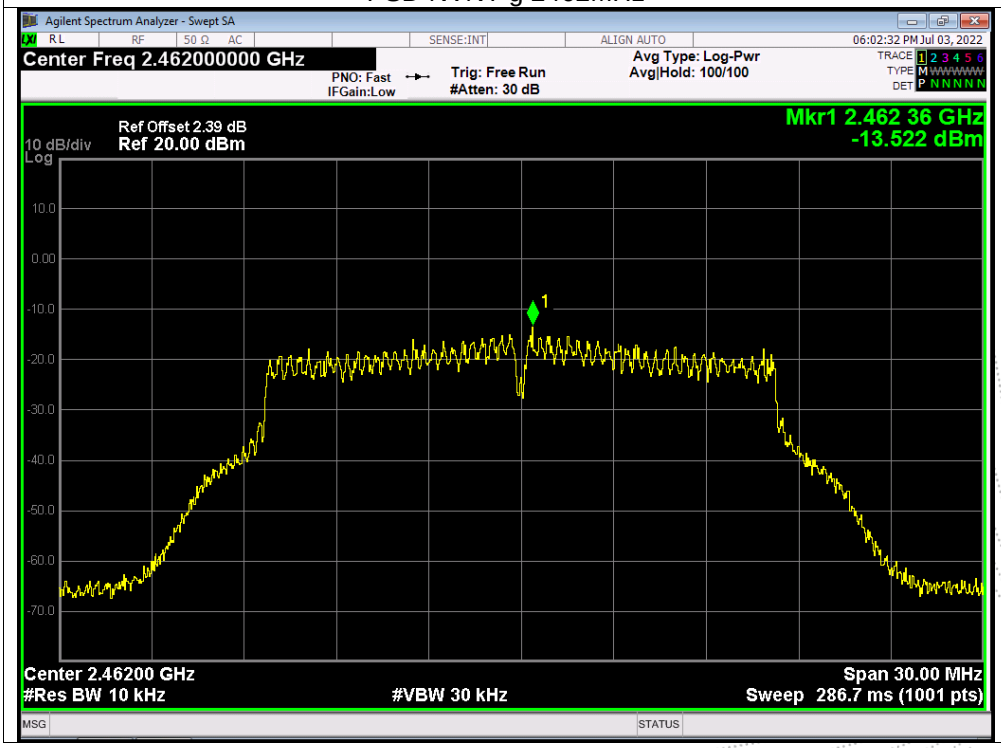
PSD NVNT g 2412MHz



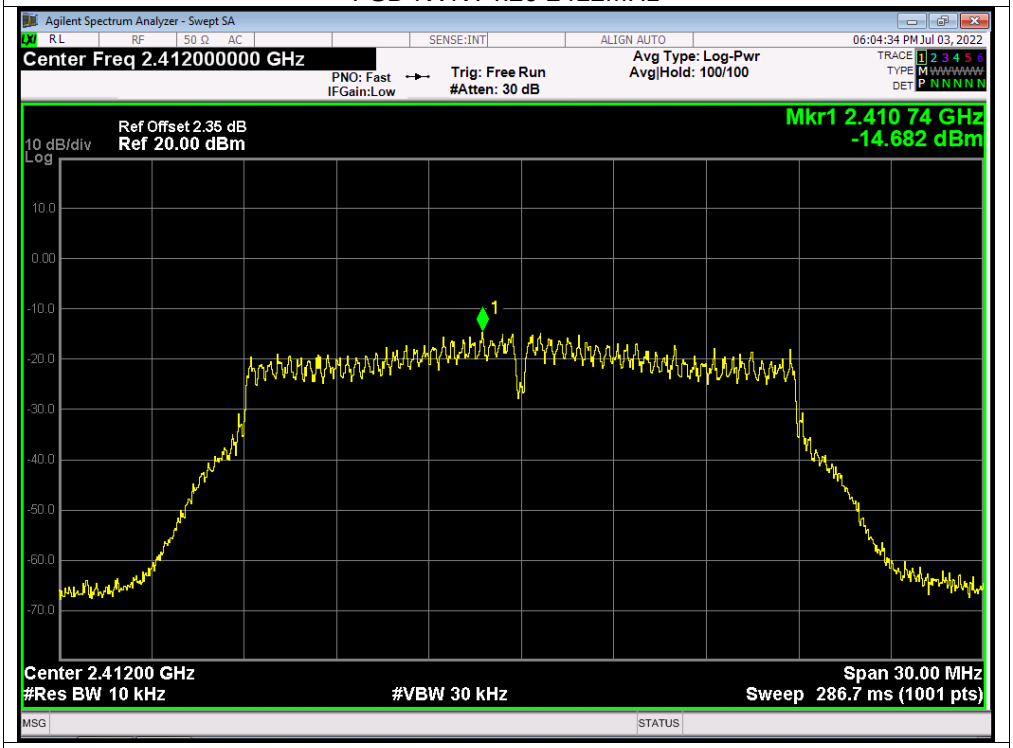
PSD NVNT g 2437MHz



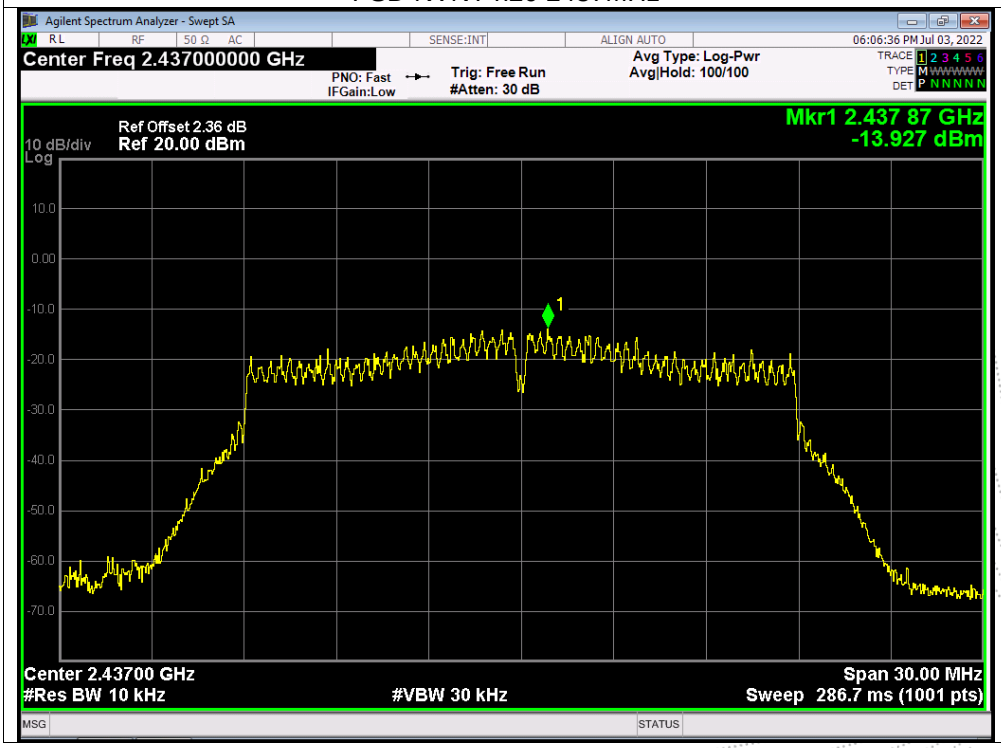
PSD NVNT g 2462MHz



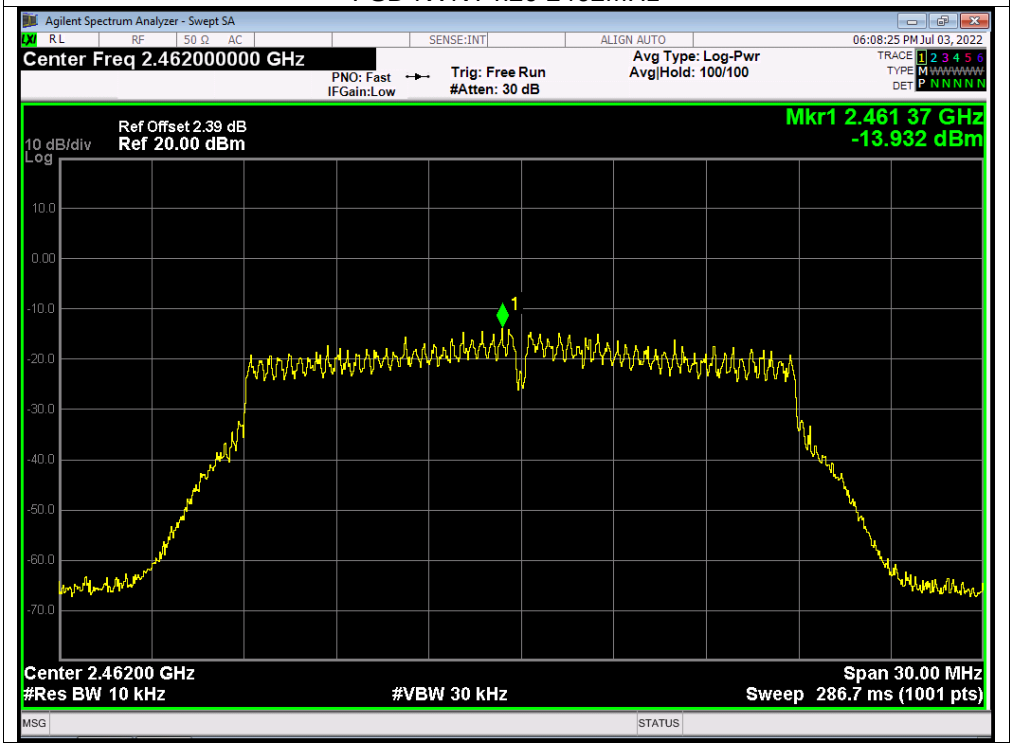
PSD NVNT n20 2412MHz



PSD NVNT n20 2437MHz

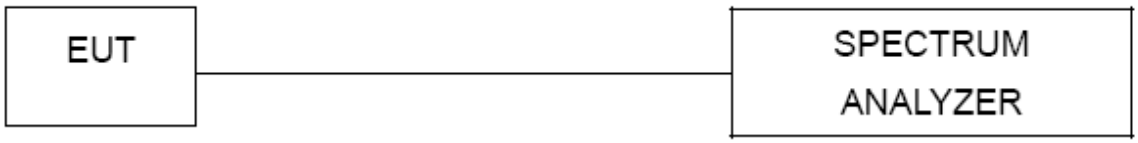


PSD NVNT n20 2462MHz



10. Bandwidth Test

10.1 Block Diagram Of Test Setup



10.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

10.3 Test Procedure

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. .

10.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

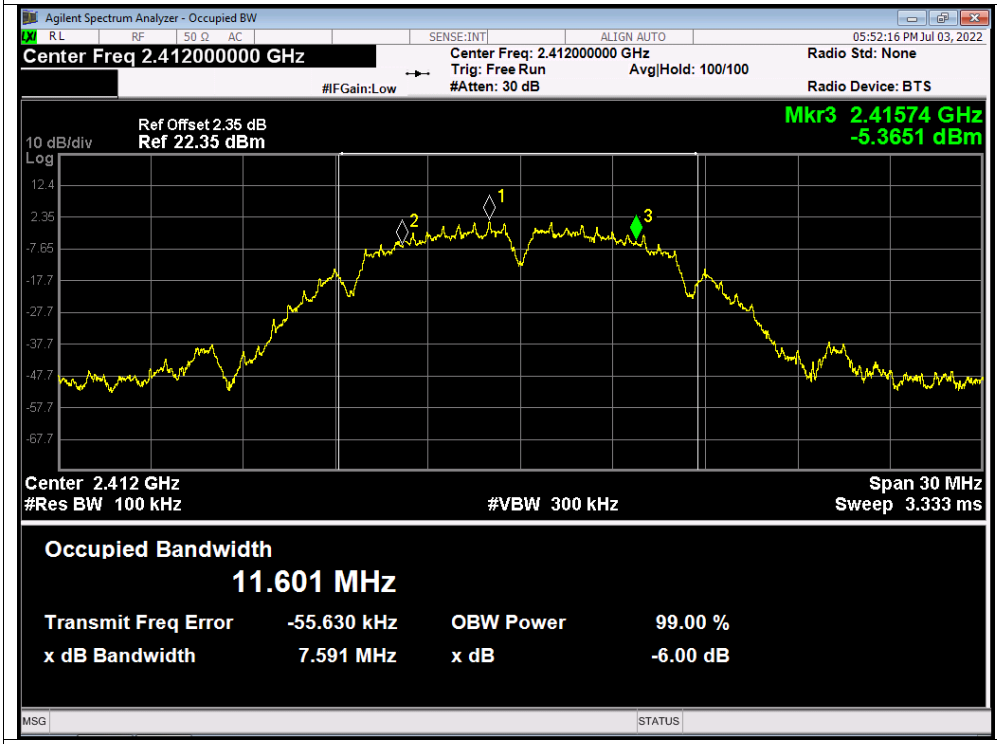
10.5 Test Result

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter

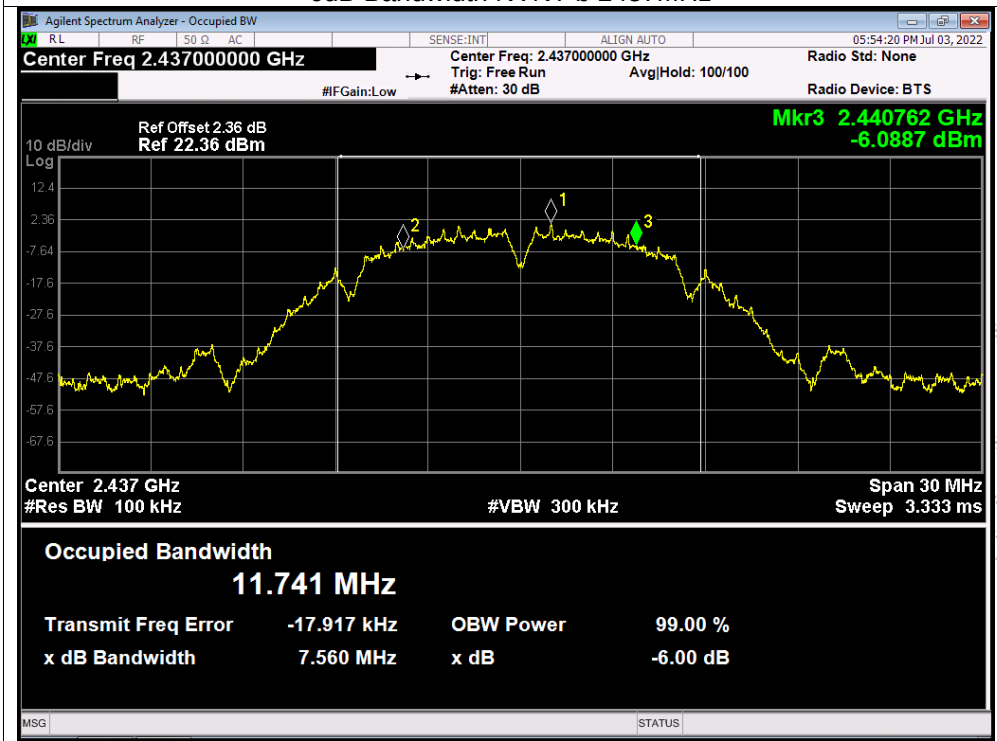
Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
b	2412	7.591	0.5	Pass
b	2437	7.56	0.5	Pass
b	2462	7.966	0.5	Pass
g	2412	16.261	0.5	Pass
g	2437	15.457	0.5	Pass
g	2462	16.049	0.5	Pass
n20	2412	16.258	0.5	Pass
n20	2437	13.921	0.5	Pass
n20	2462	16.29	0.5	Pass

Test Graphs

-6dB Bandwidth NVNT b 2412MHz

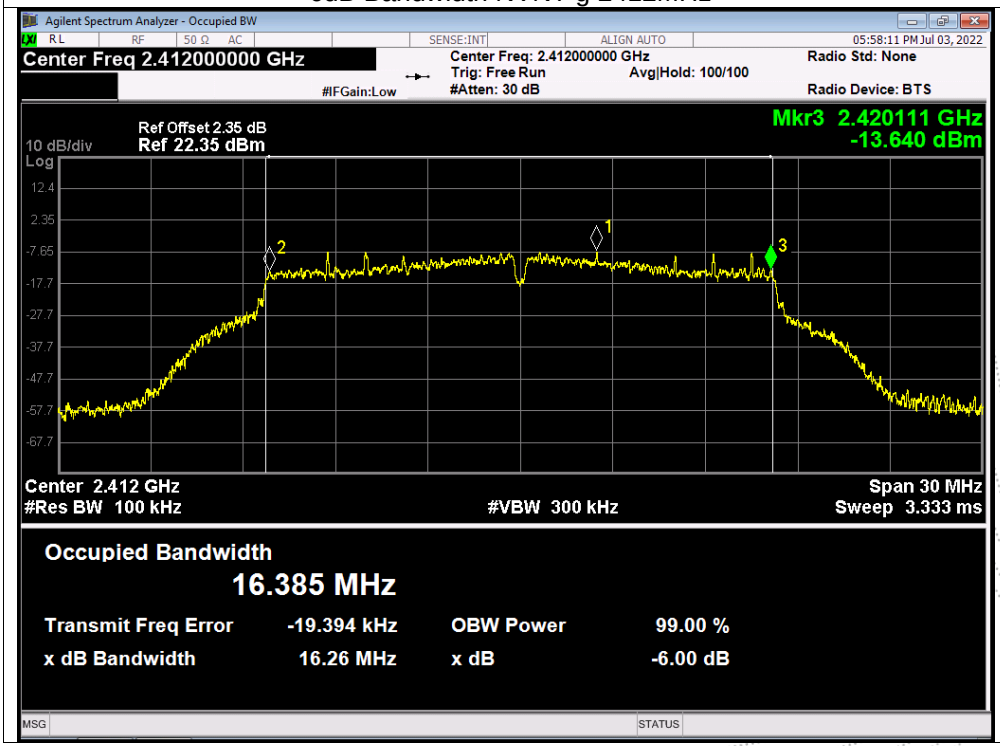


-6dB Bandwidth NVNT b 2437MHz

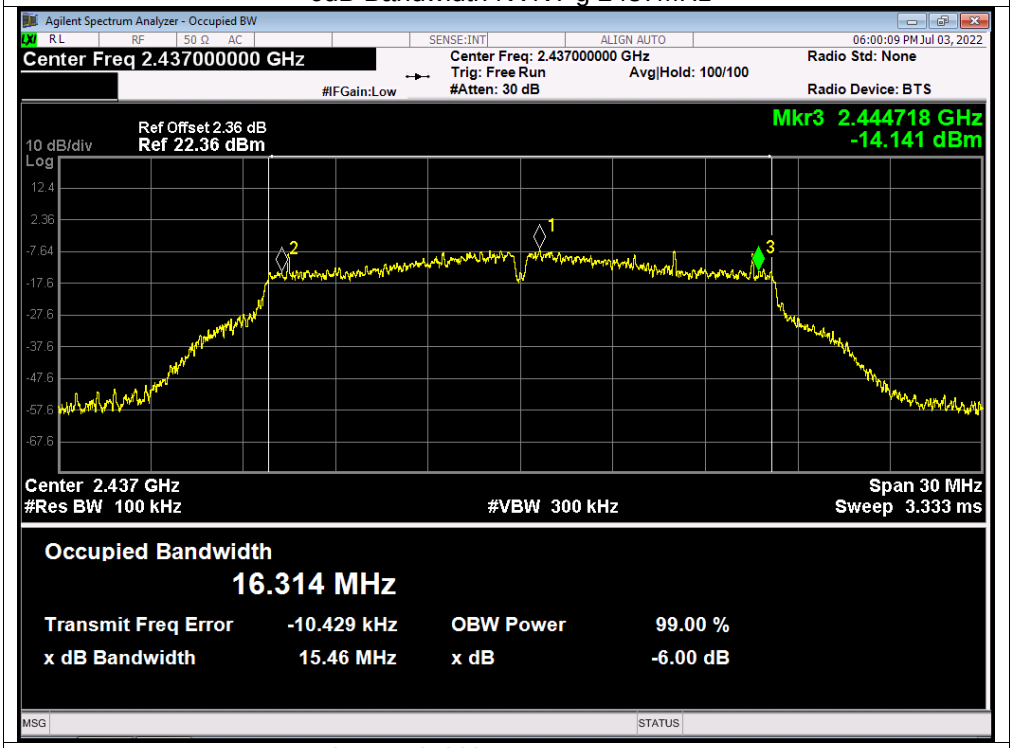


-6dB Bandwidth NVNT b 2462MHz

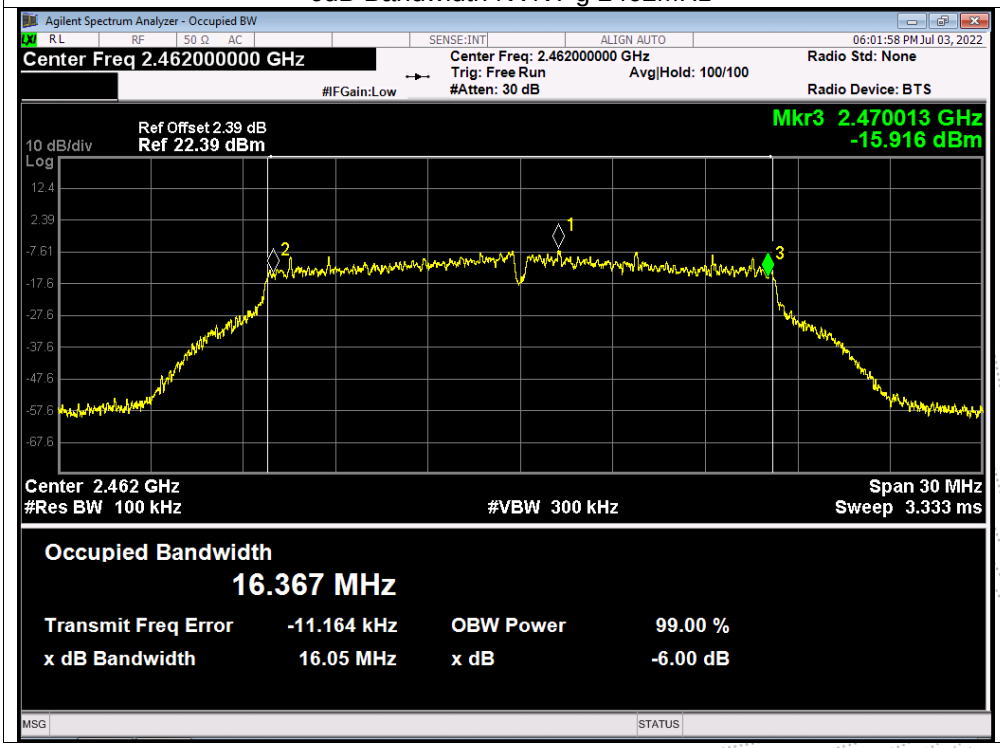
-6dB Bandwidth NVNT g 2412MHz



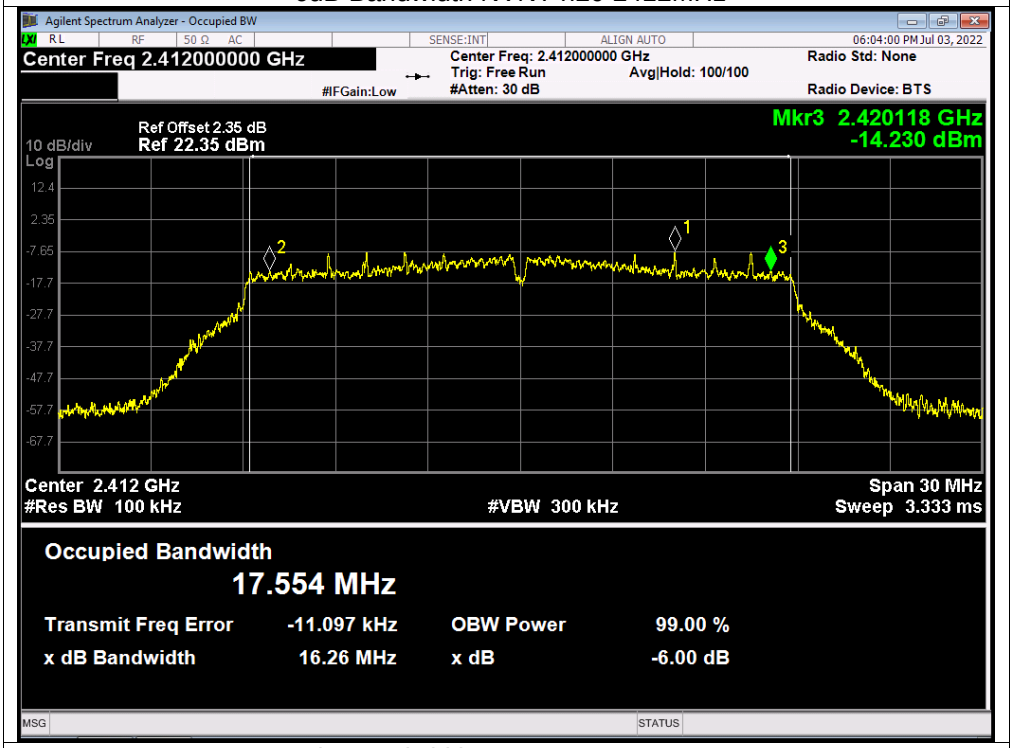
-6dB Bandwidth NVNT g 2437MHz



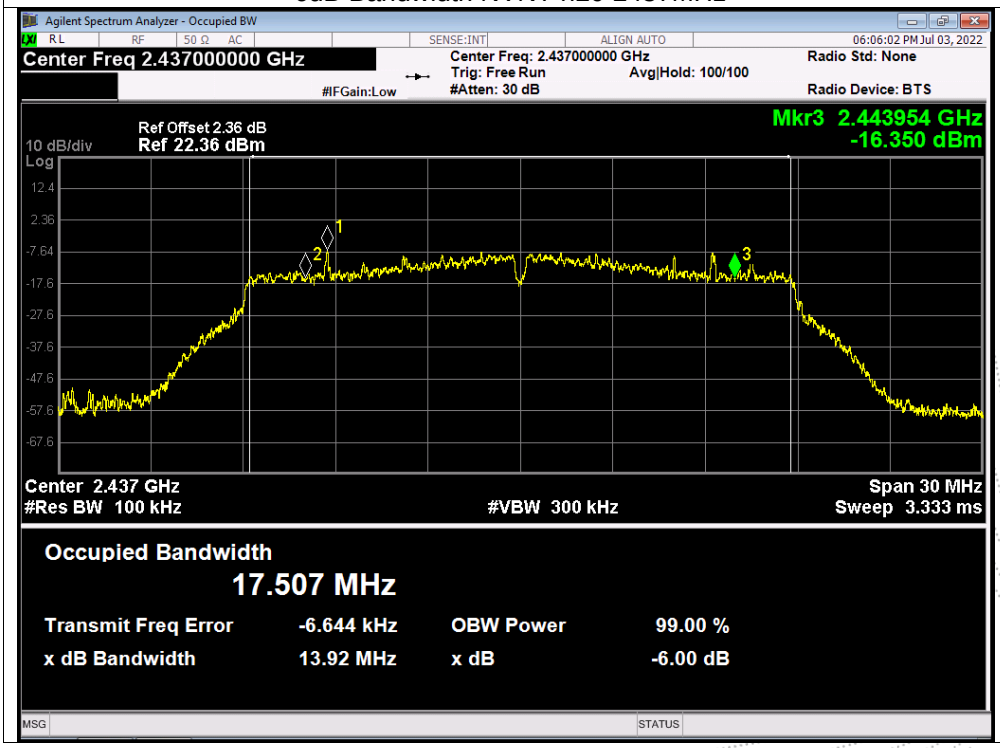
-6dB Bandwidth NVNT g 2462MHz



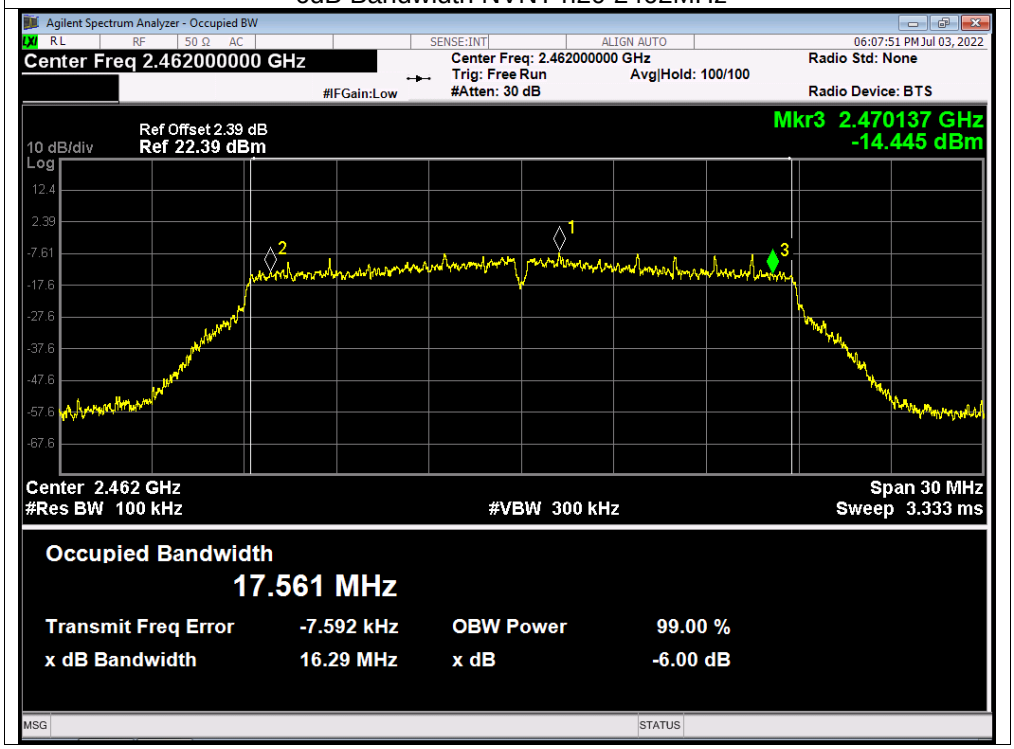
-6dB Bandwidth NVNT n20 2412MHz



-6dB Bandwidth NVNT n20 2437MHz

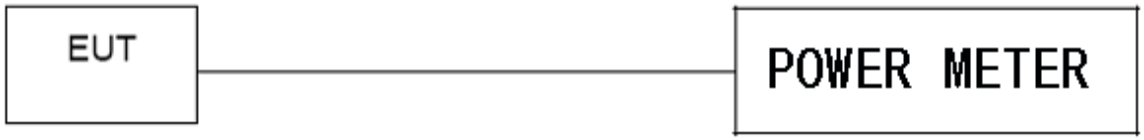


-6dB Bandwidth NVNT n20 2462MHz



11. Peak Output Power Test

11.1 Block Diagram Of Test Setup



11.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

11.3 Test Procedure

a. The EUT was directly connected to the Power meter

11.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

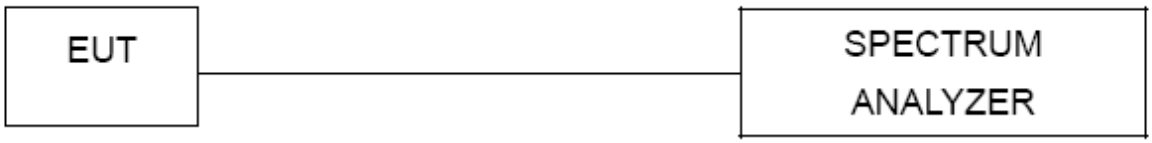
11.5 Test Result

Temperature：	26℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter

Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
b	2412	12.65	30	Pass
b	2437	12.57	30	Pass
b	2462	12.44	30	Pass
g	2412	11.61	30	Pass
g	2437	11.45	30	Pass
g	2462	11.39	30	Pass
n20	2412	11.27	30	Pass
n20	2437	11.09	30	Pass
n20	2462	11.15	30	Pass

12. 100 KHz Bandwidth Of Frequency Band Edge

12.1 Block Diagram Of Test Setup



12.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

12.3 Test Procedure

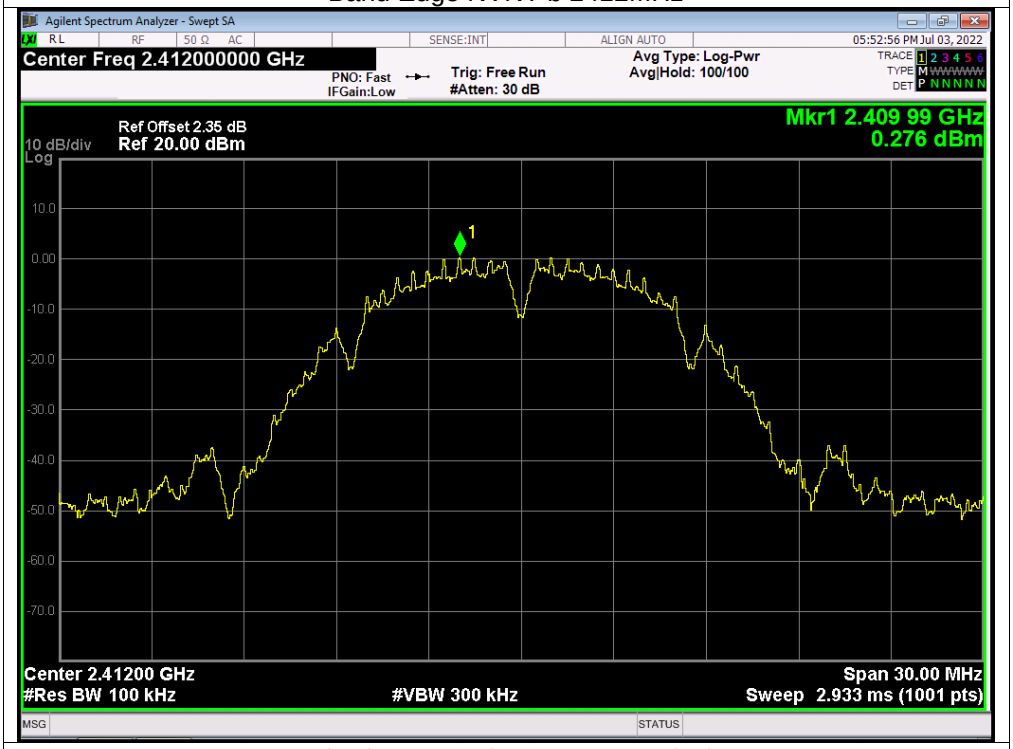
Using the following spectrum analyzer setting:
a) Set the RBW = 100KHz.
b) Set the VBW = 300KHz.
c) Sweep time = auto couple.
d) Detector function = peak.
e) Trace mode = max hold.
f) Allow trace to fully stabilize..

12.4 EUT Operating Conditions

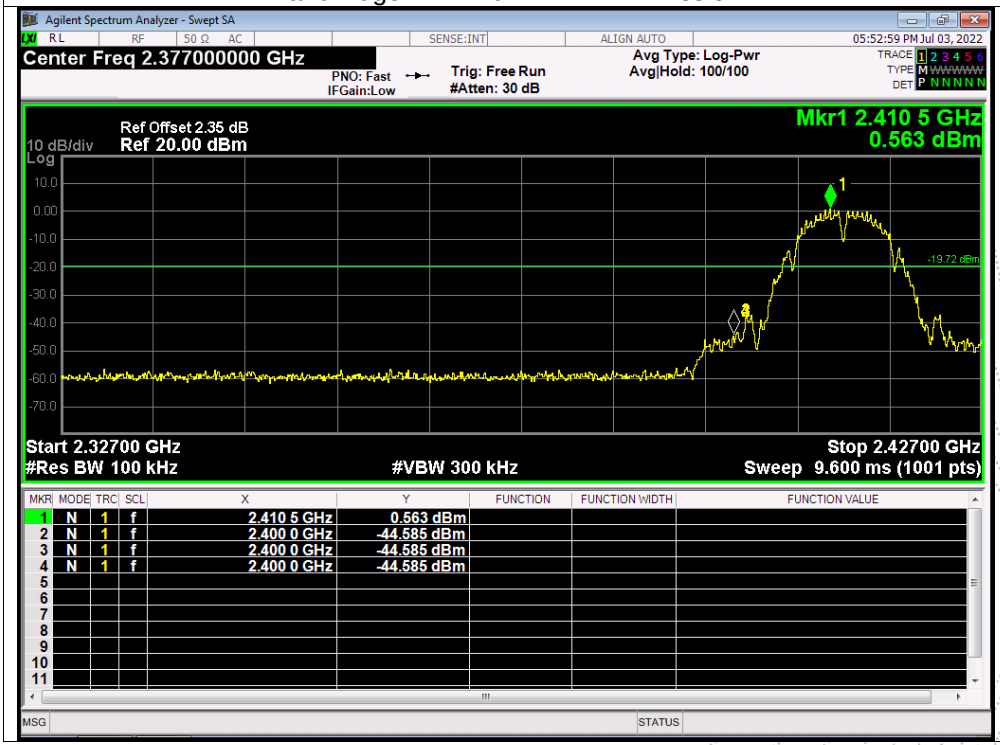
The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

12.5 Test Result

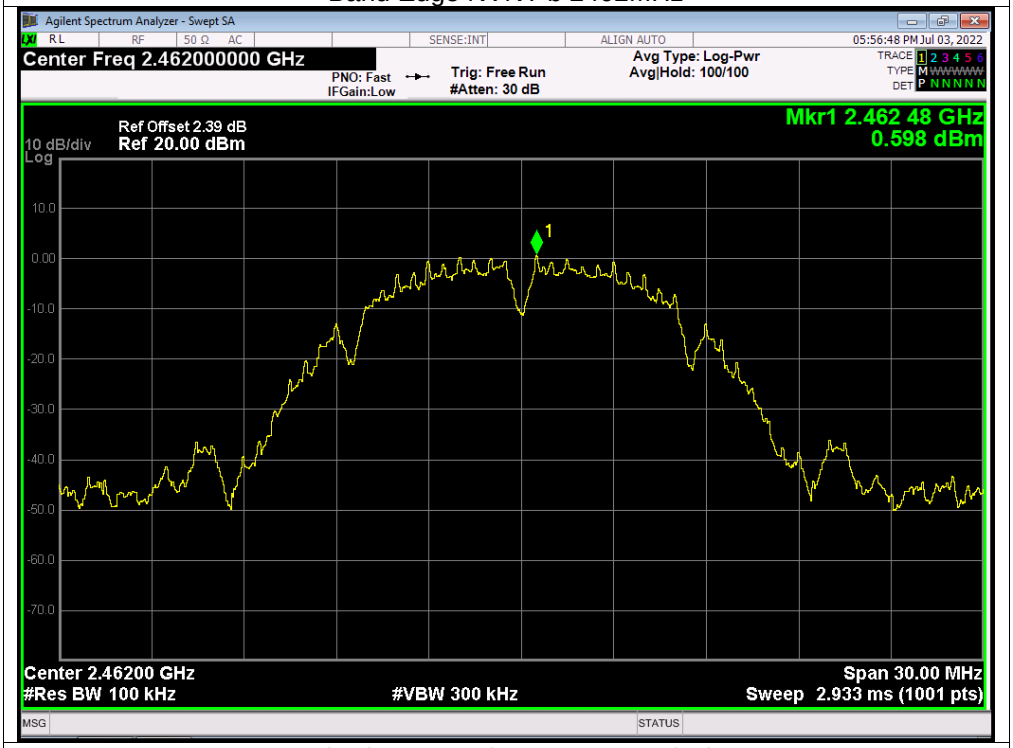
Test Graphs
Band Edge NVNT b 2412MHz



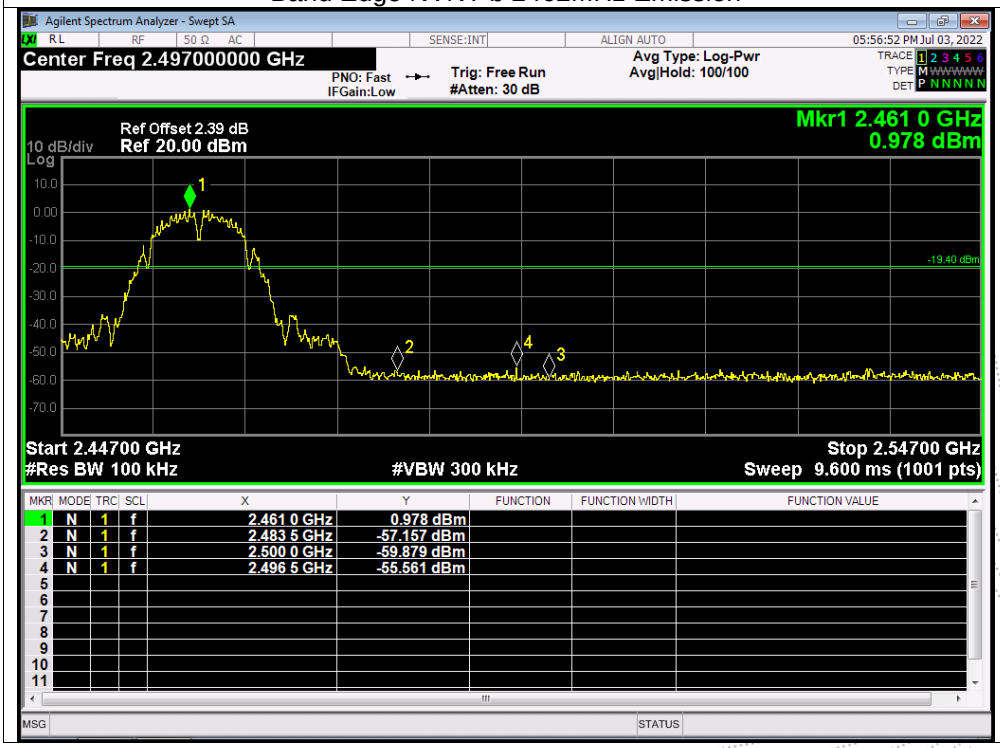
Band Edge NVNT b 2412MHz Emission



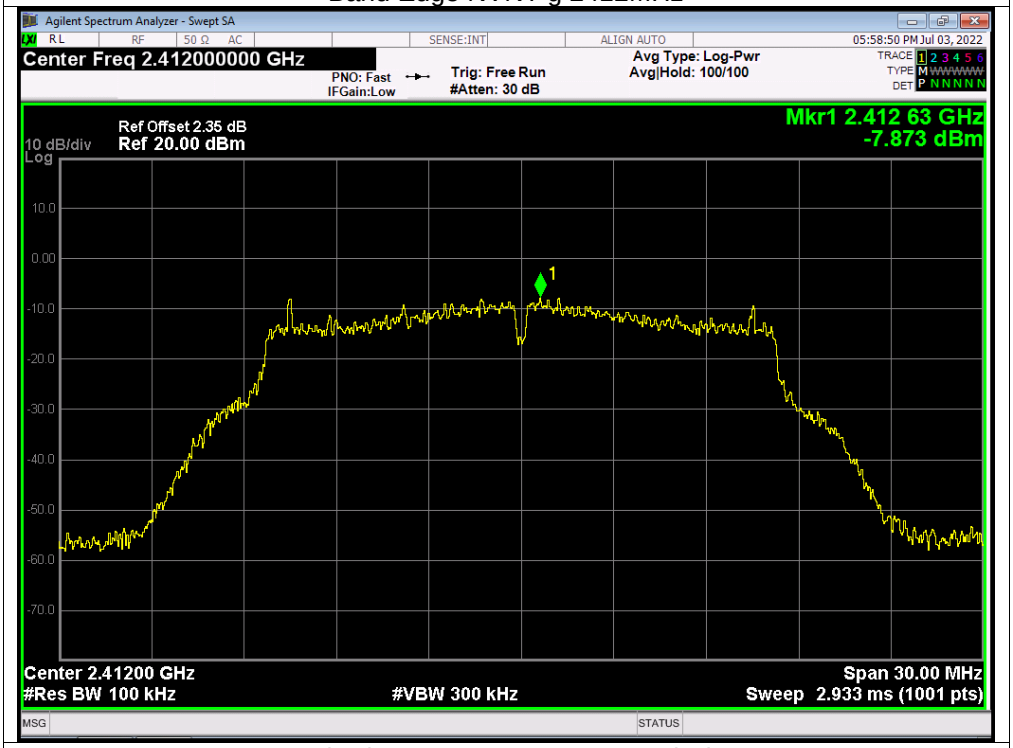
Band Edge NVNT b 2462MHz



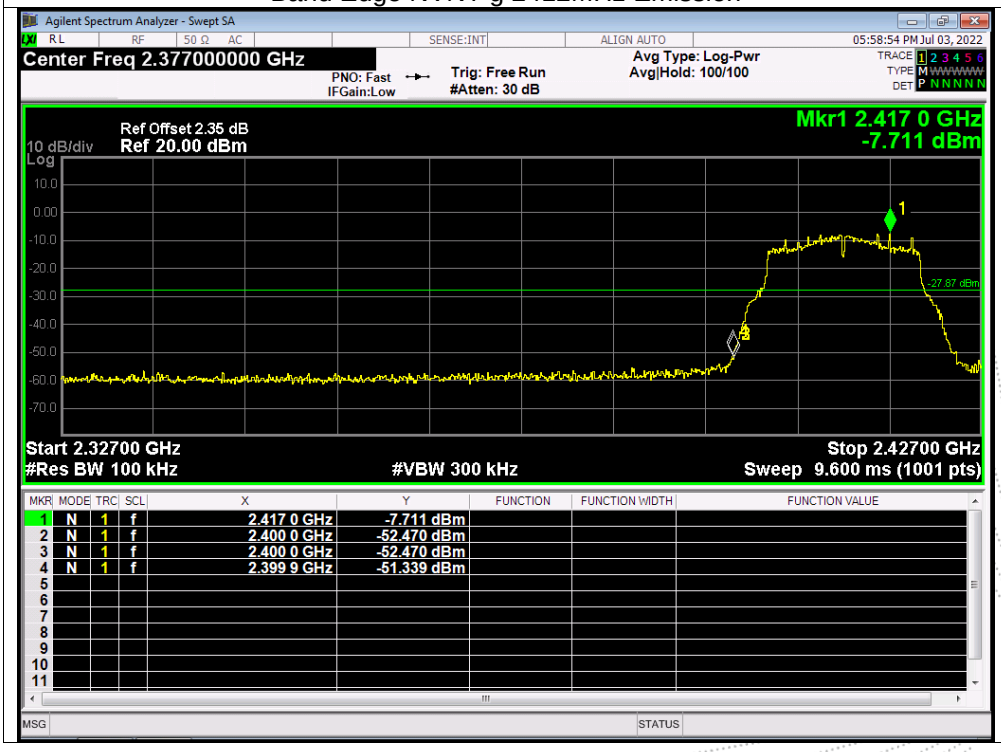
Band Edge NVNT b 2462MHz Emission



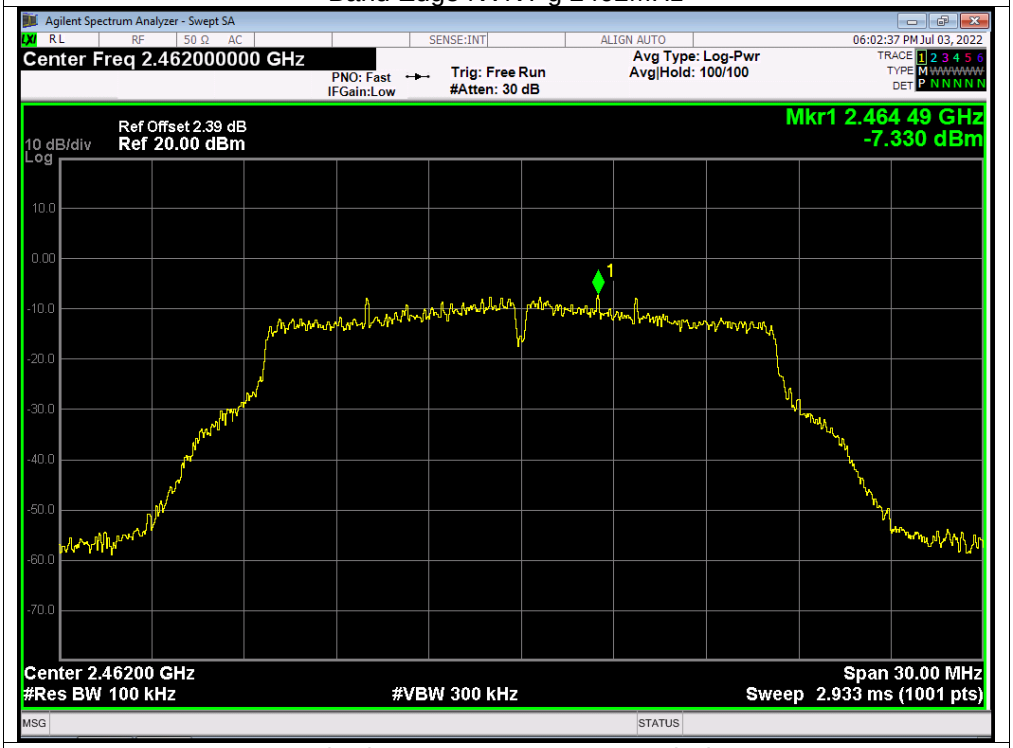
Band Edge NVNT g 2412MHz



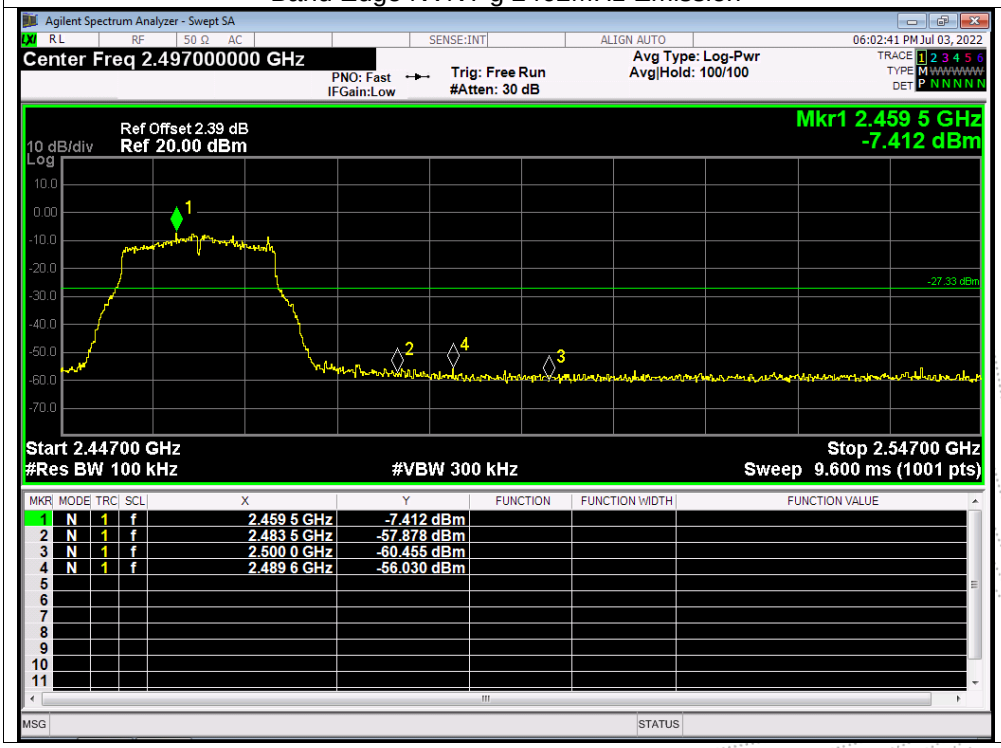
Band Edge NVNT g 2412MHz Emission



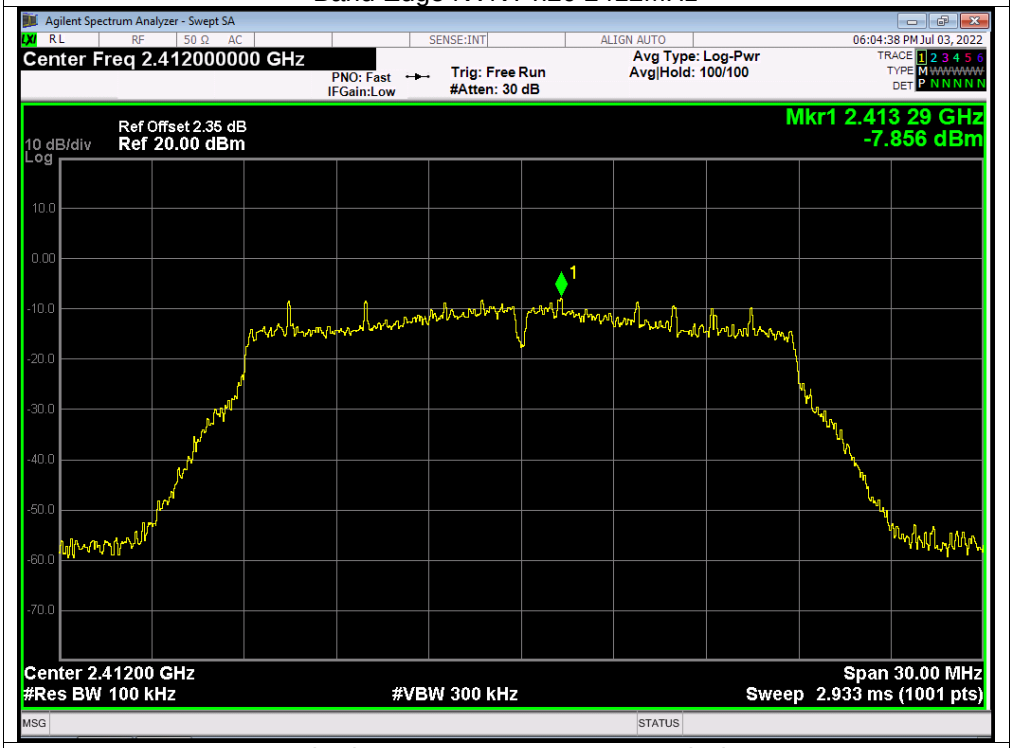
Band Edge NVNT g 2462MHz



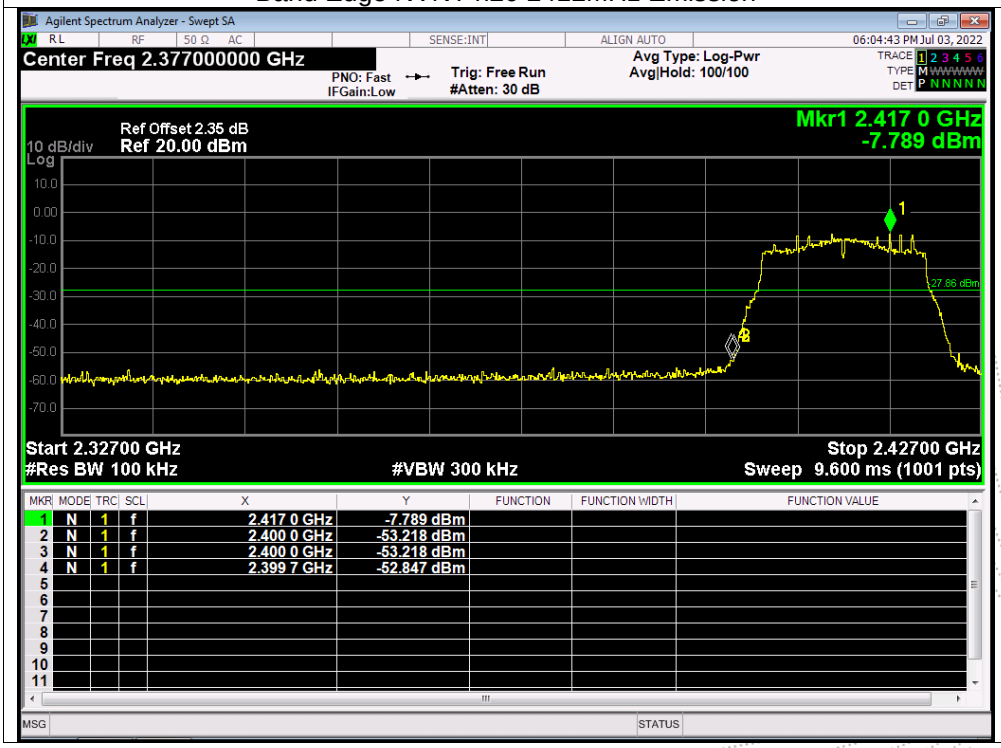
Band Edge NVNT g 2462MHz Emission



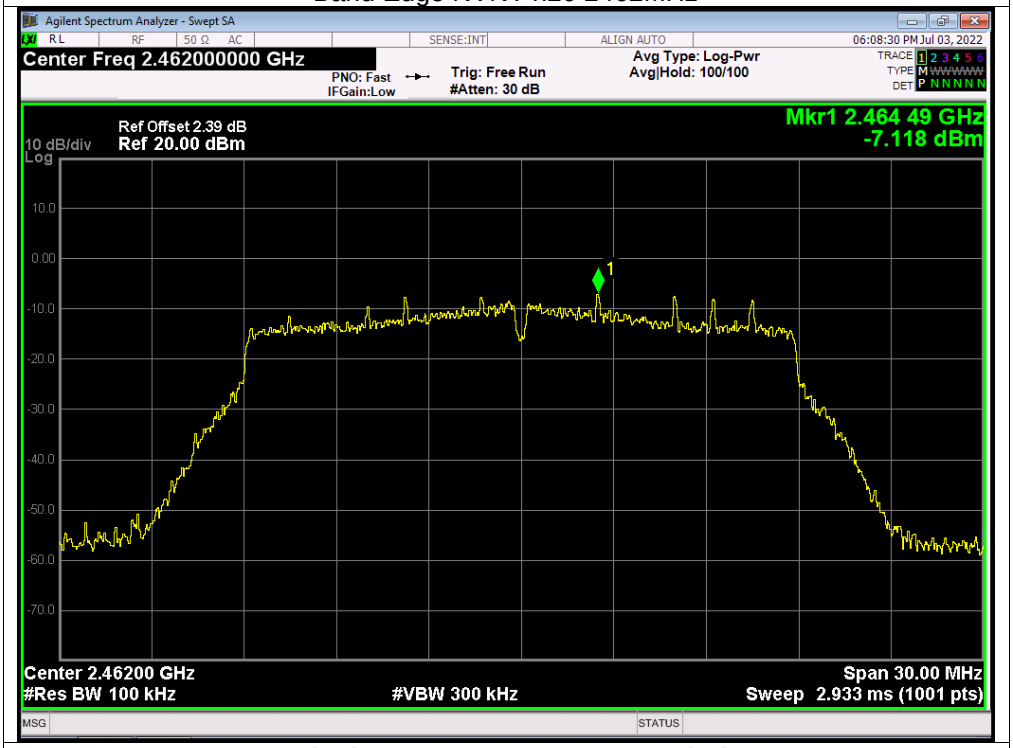
Band Edge NVNT n20 2412MHz



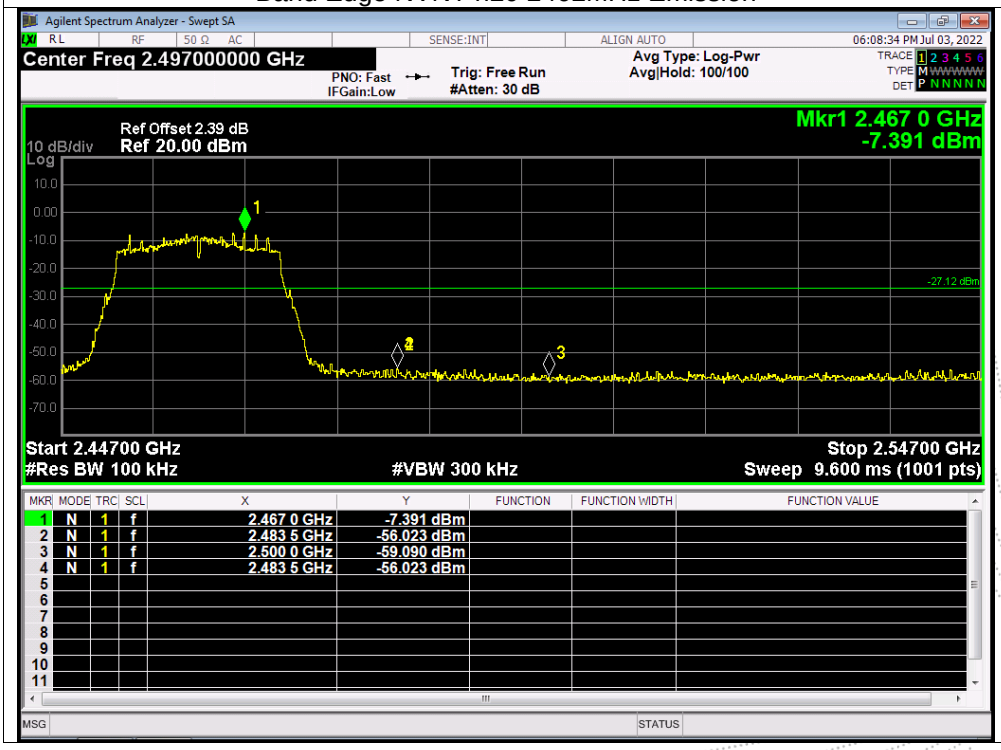
Band Edge NVNT n20 2412MHz Emission



Band Edge NVNT n20 2462MHz

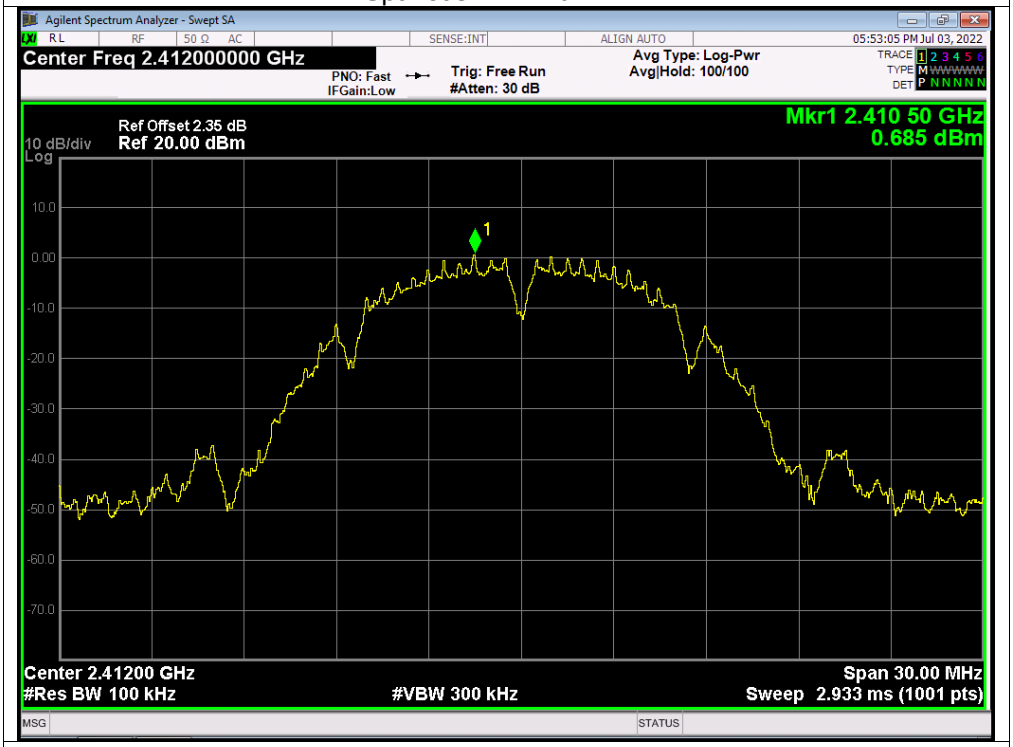


Band Edge NVNT n20 2462MHz Emission

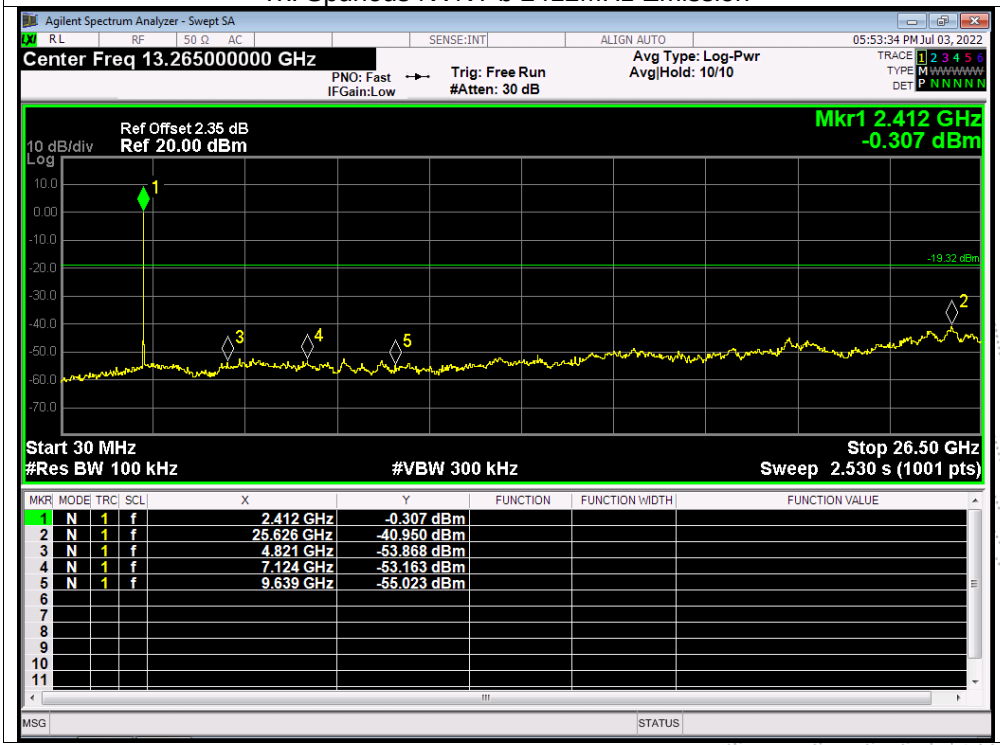


Test Graphs

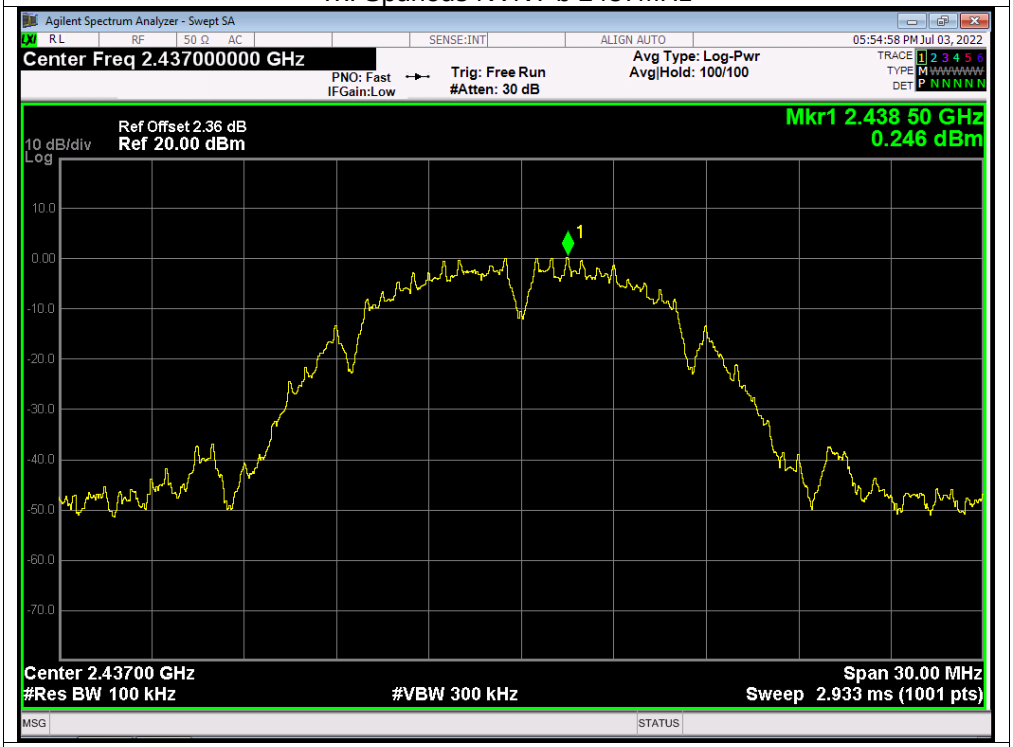
Tx. Spurious NVNT b 2412MHz



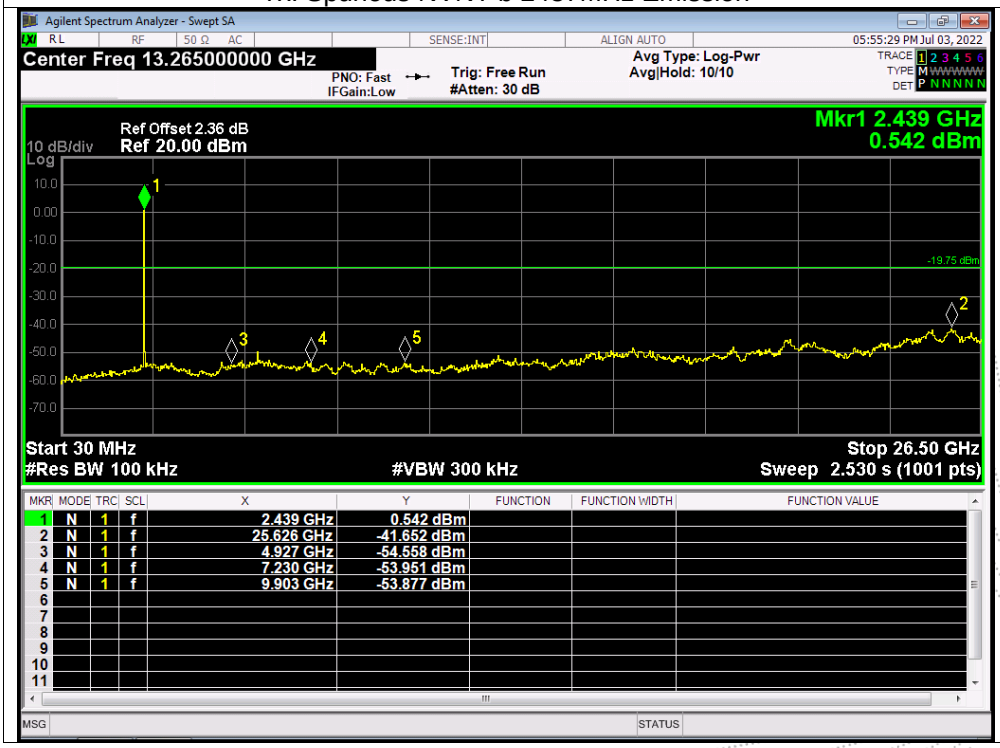
Tx. Spurious NVNT b 2412MHz Emission



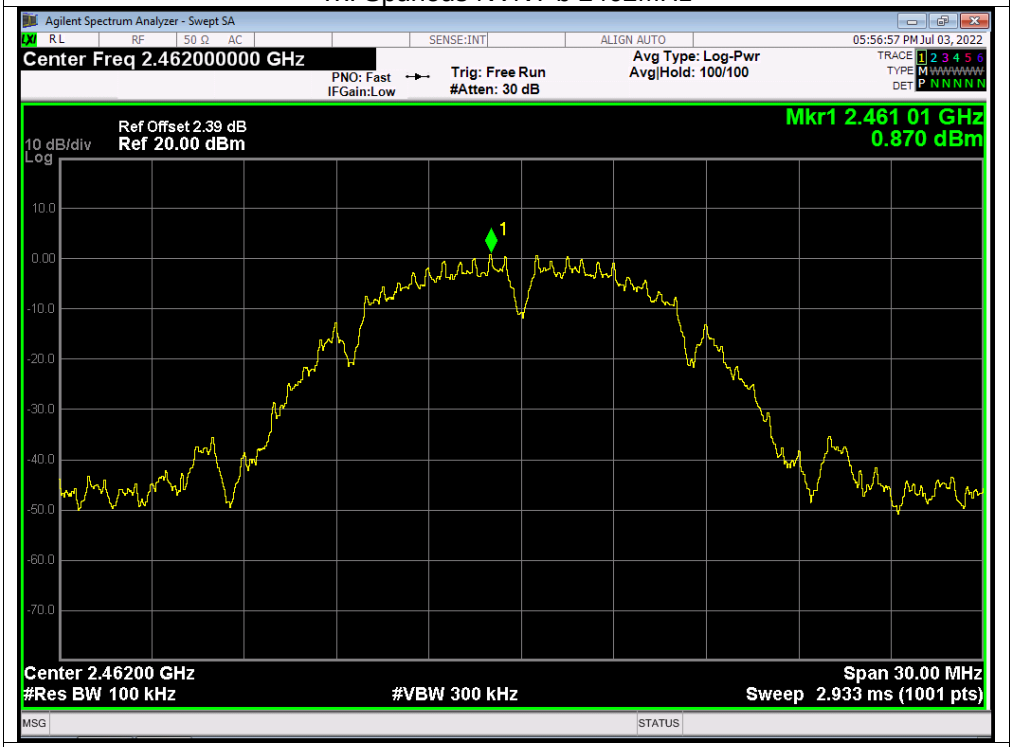
Tx. Spurious NVNT b 2437MHz



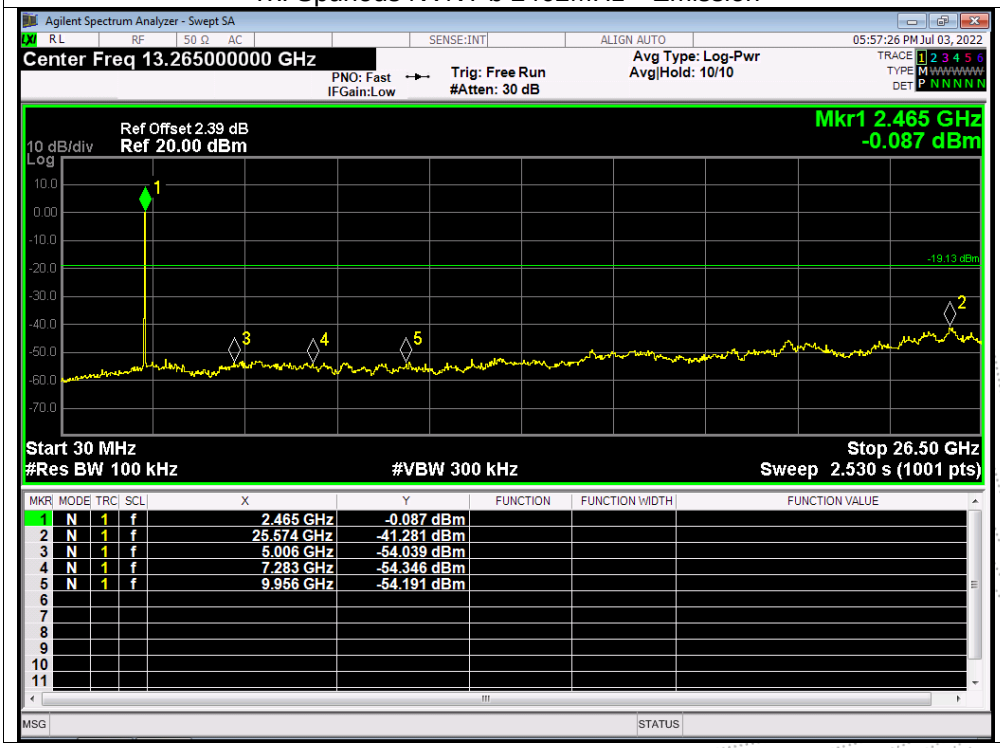
Tx. Spurious NVNT b 2437MHz Emission



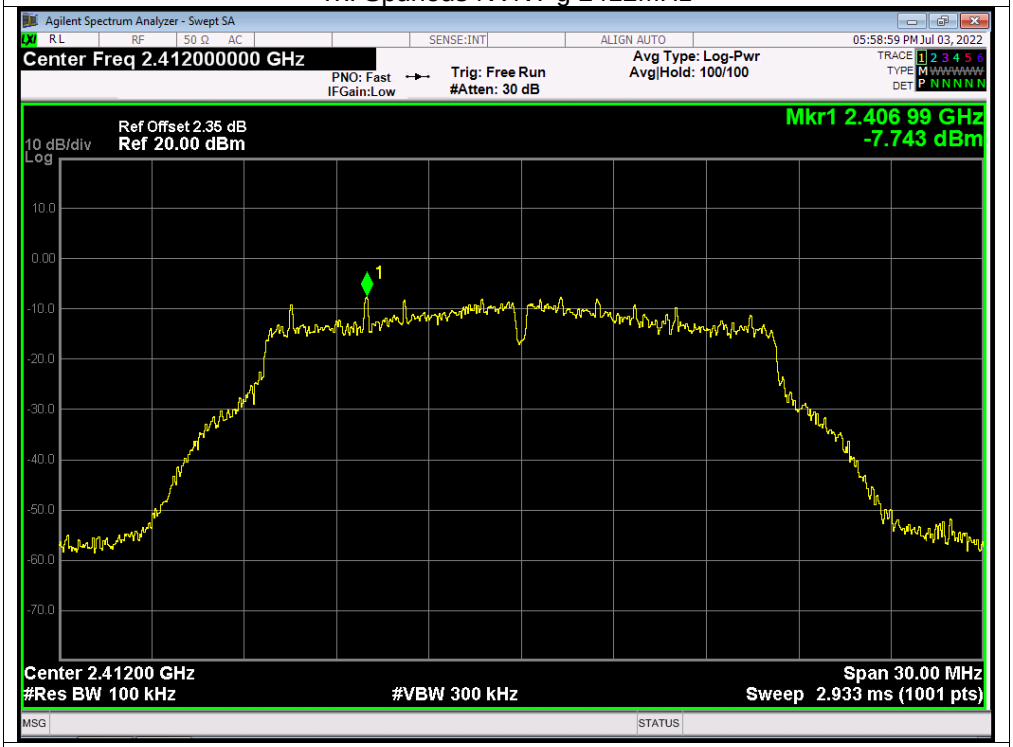
Tx. Spurious NVNT b 2462MHz



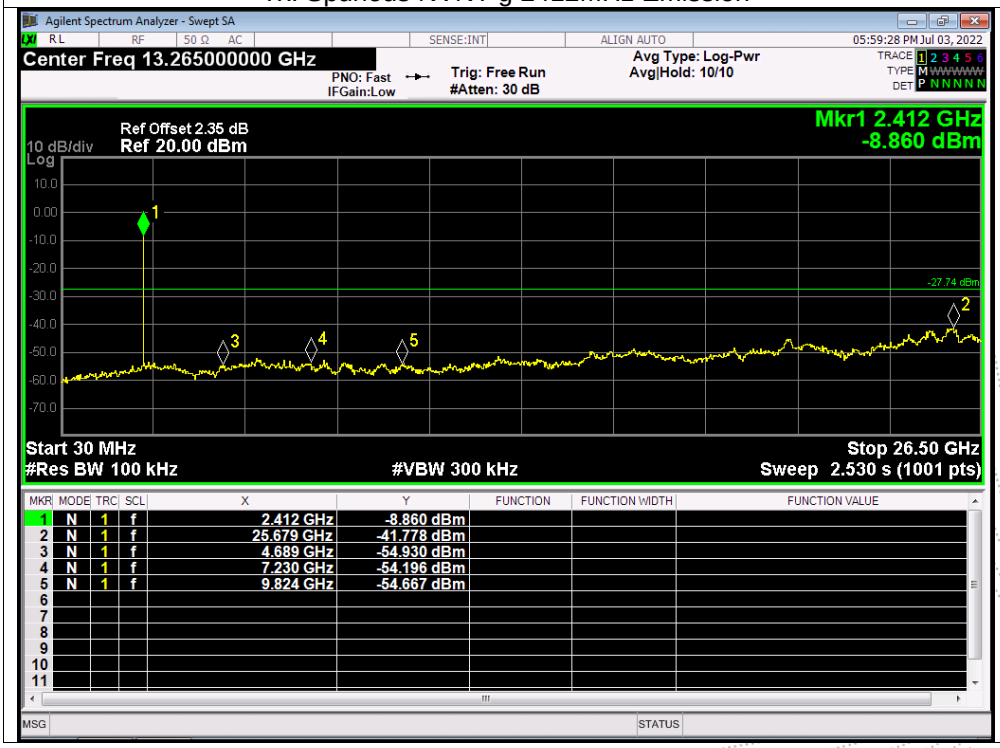
Tx. Spurious NVNT b 2462MHz Emission



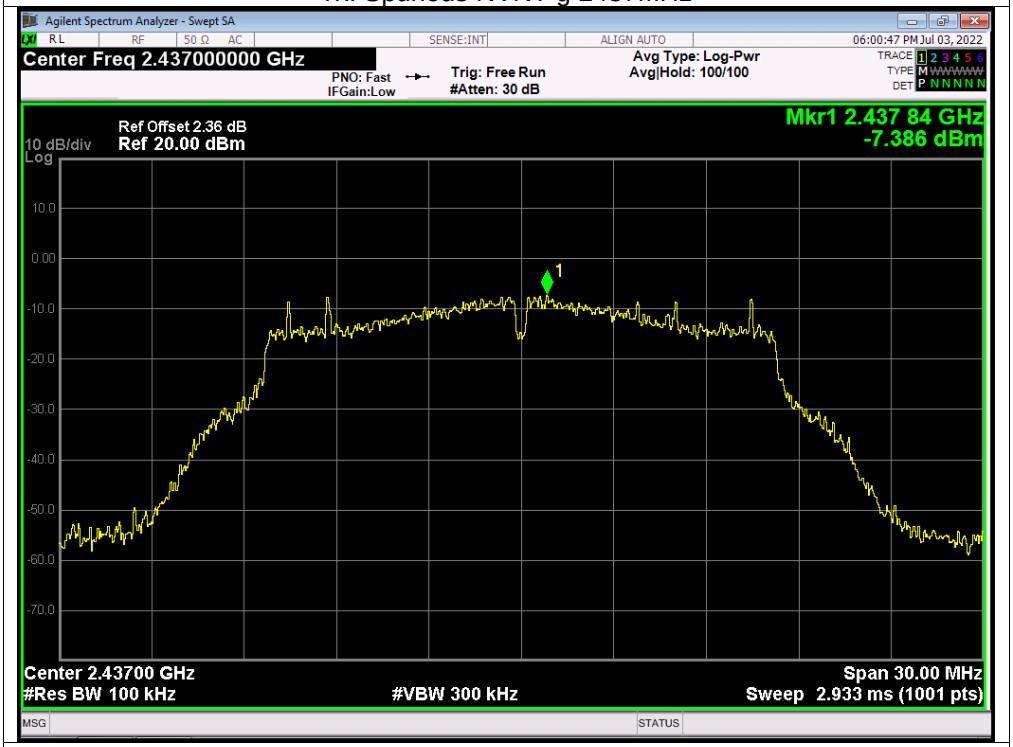
Tx. Spurious NVNT g 2412MHz



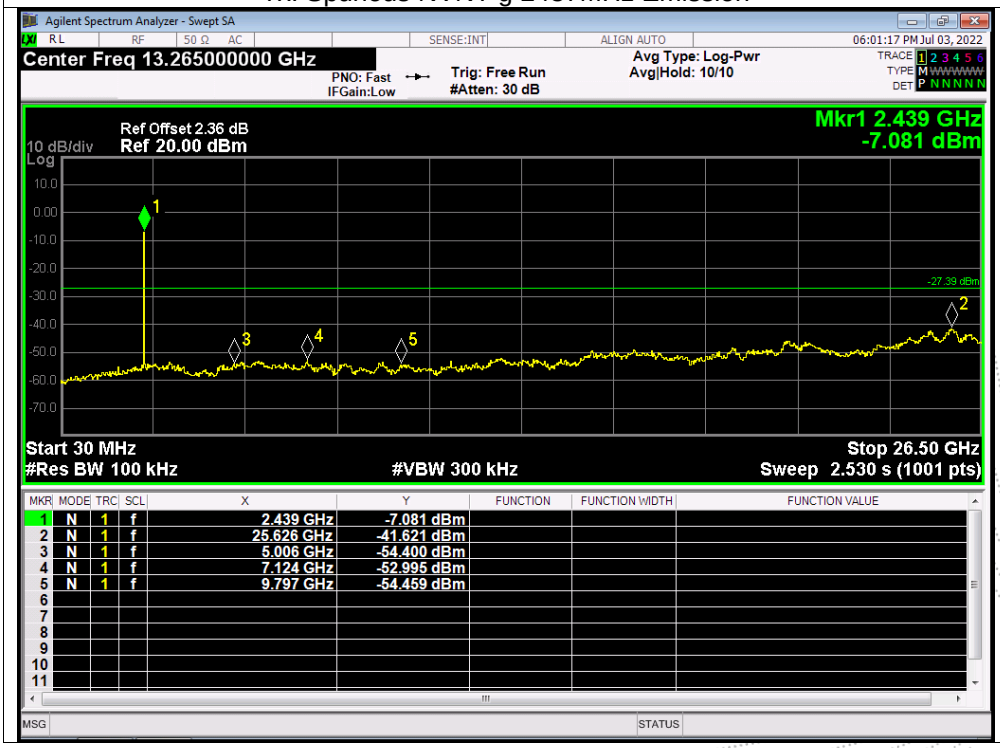
Tx. Spurious NVNT g 2412MHz Emission



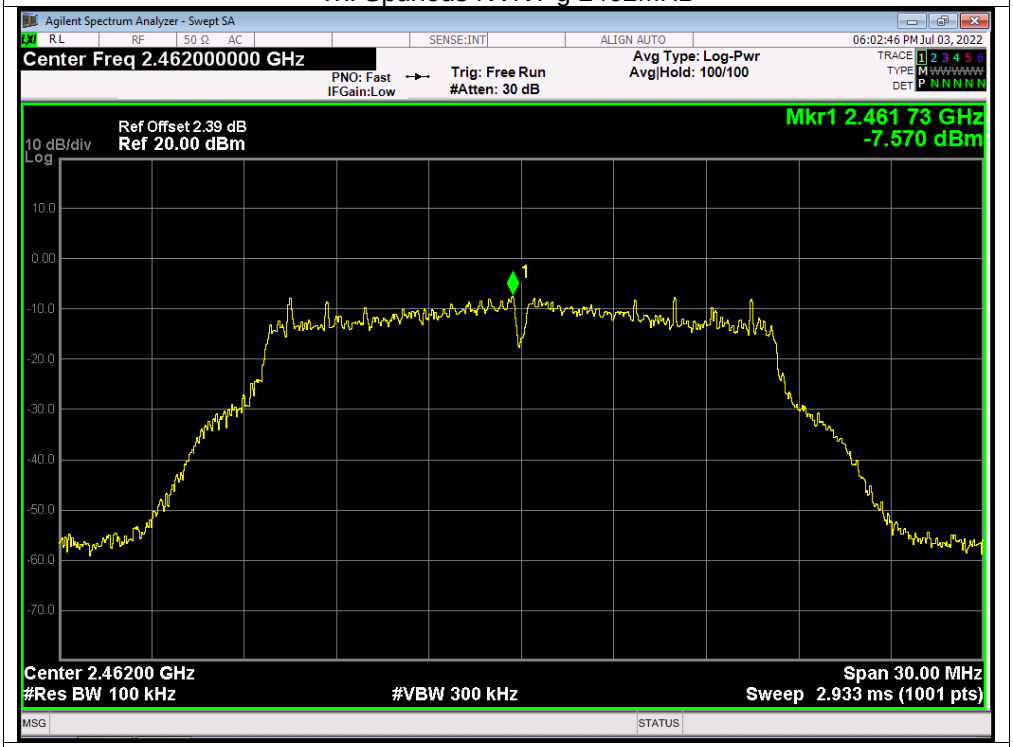
Tx. Spurious NVNT g 2437MHz



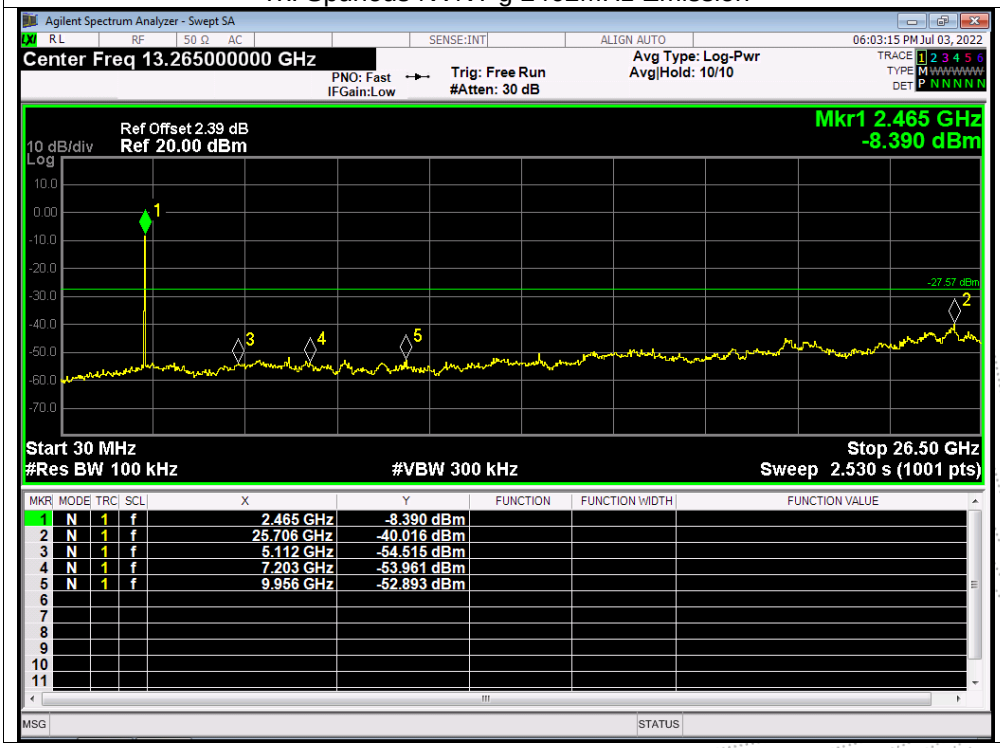
Tx. Spurious NVNT g 2437MHz Emission



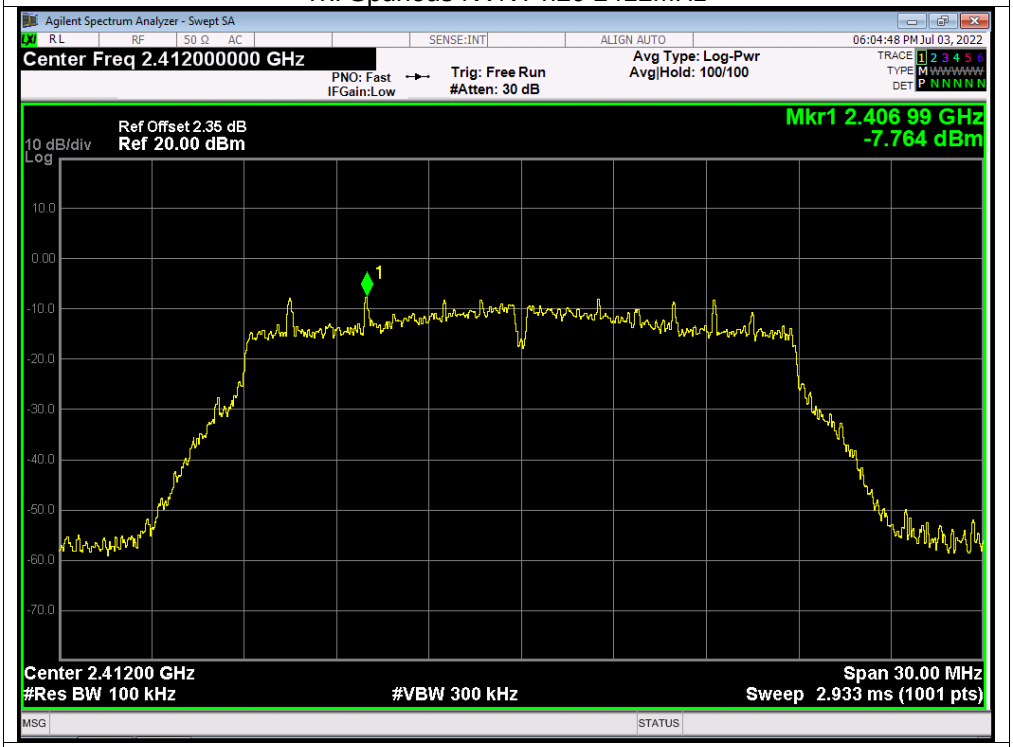
Tx. Spurious NVNT g 2462MHz



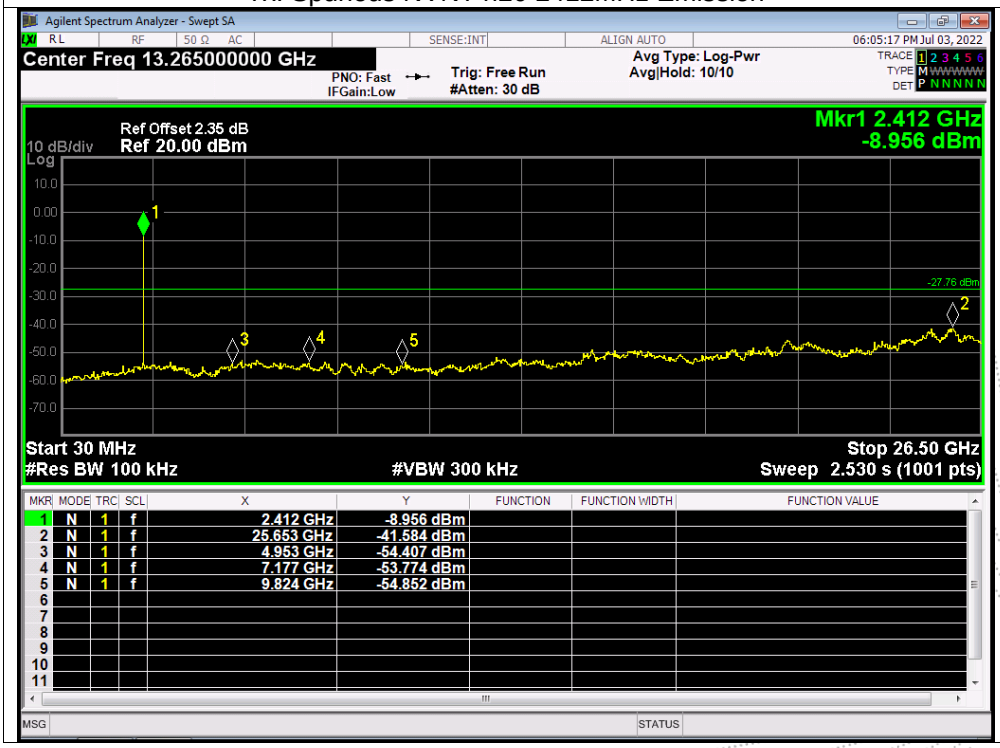
Tx. Spurious NVNT g 2462MHz Emission



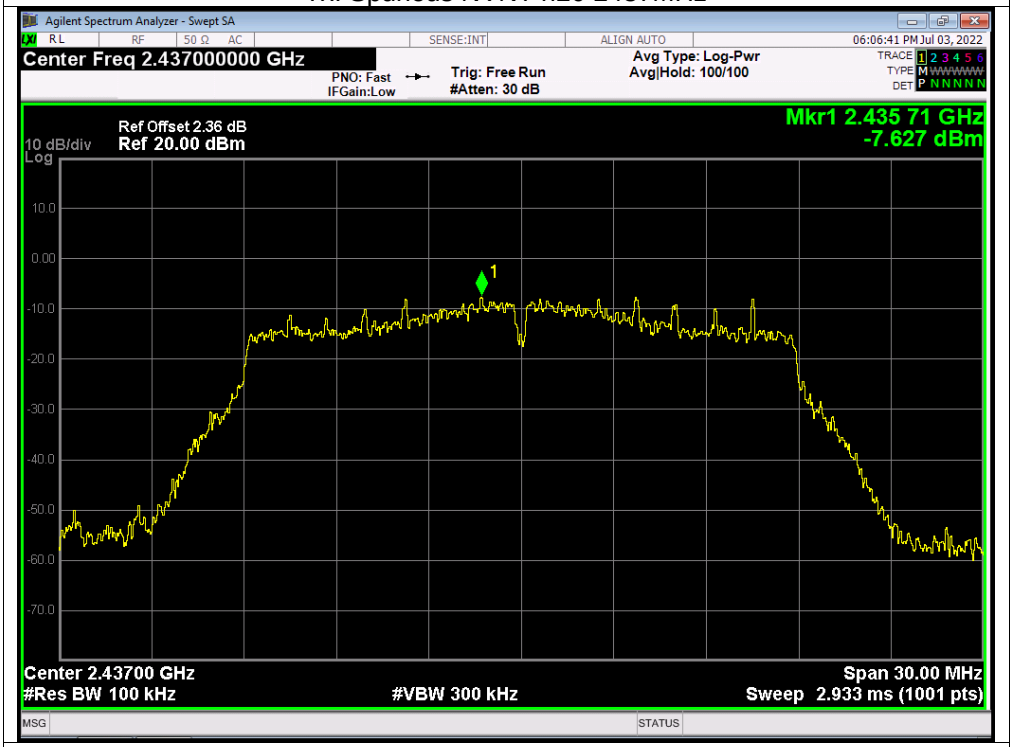
Tx. Spurious NVNT n20 2412MHz



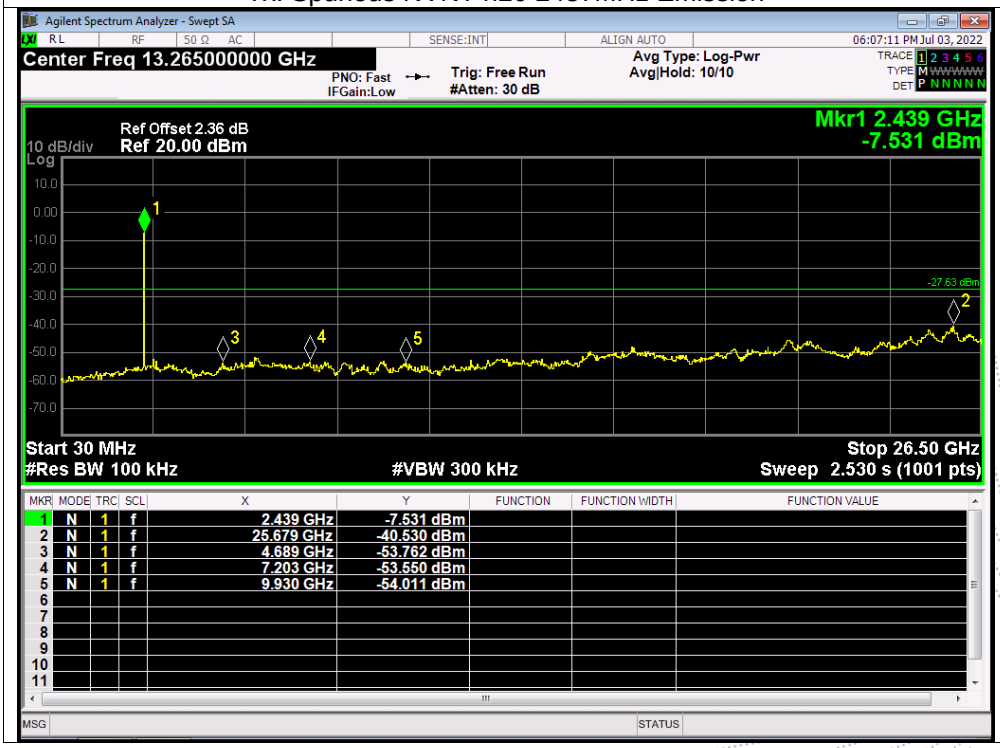
Tx. Spurious NVNT n20 2412MHz Emission



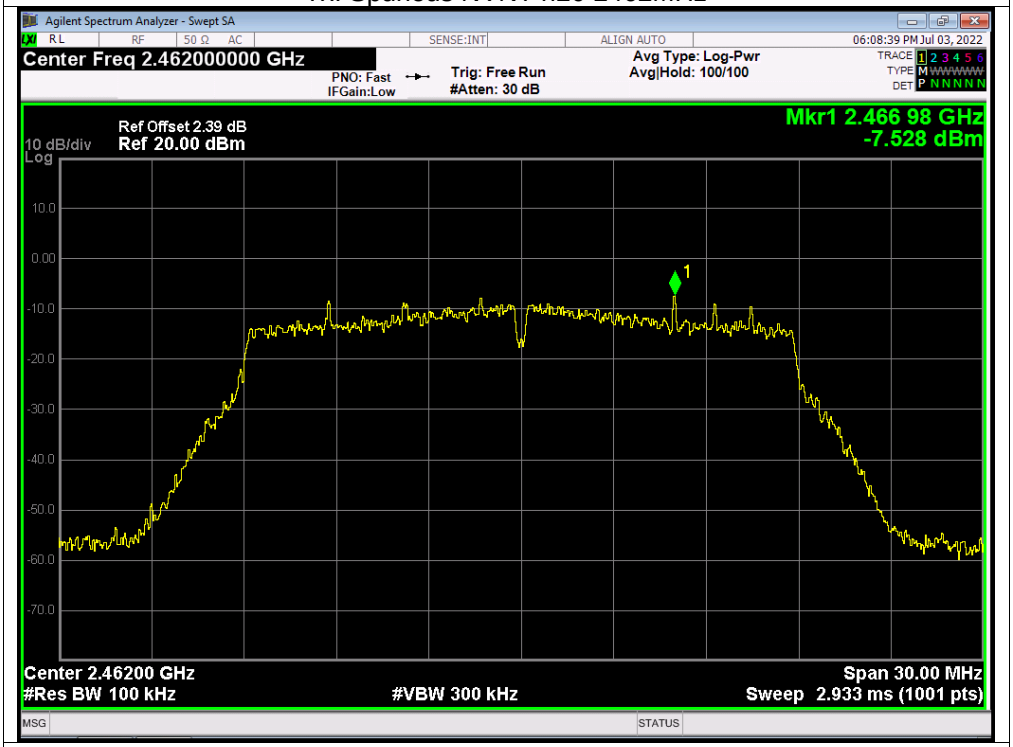
Tx. Spurious NVNT n20 2437MHz



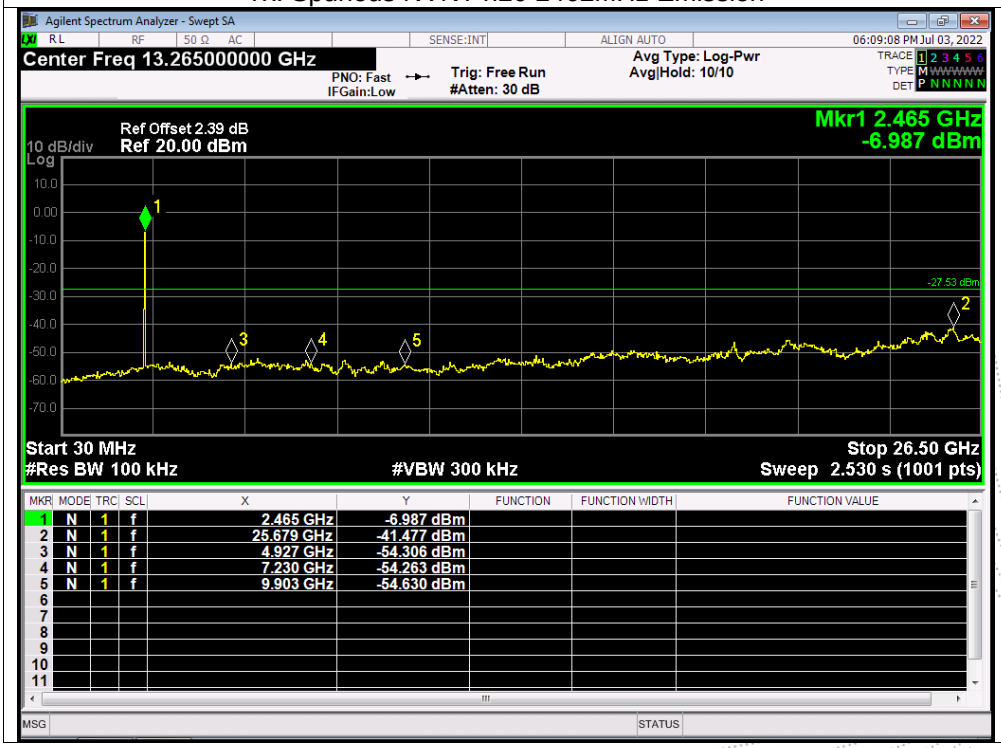
Tx. Spurious NVNT n20 2437MHz Emission



Tx. Spurious NVNT n20 2462MHz



Tx. Spurious NVNT n20 2462MHz Emission



13. Duty Cycle Of Test Signal

13.1 Standard Requirement

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

13.2 Formula

Duty Cycle = Ton / (Ton+Toff)

13.3 Test Procedure

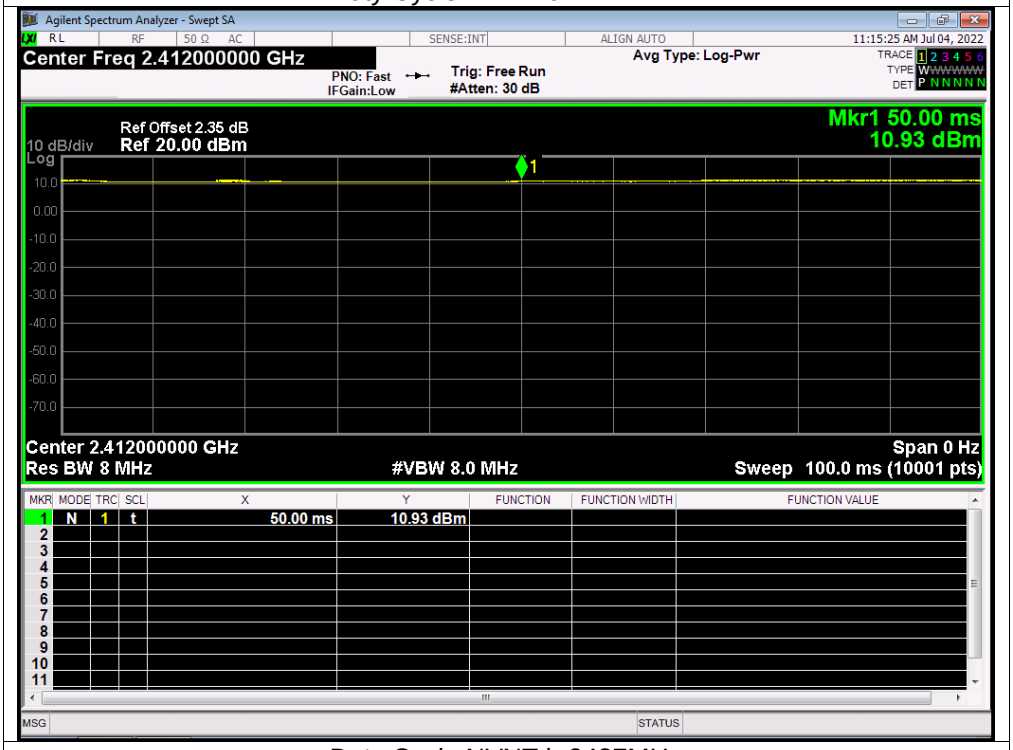
1.Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

13.4 Test Result

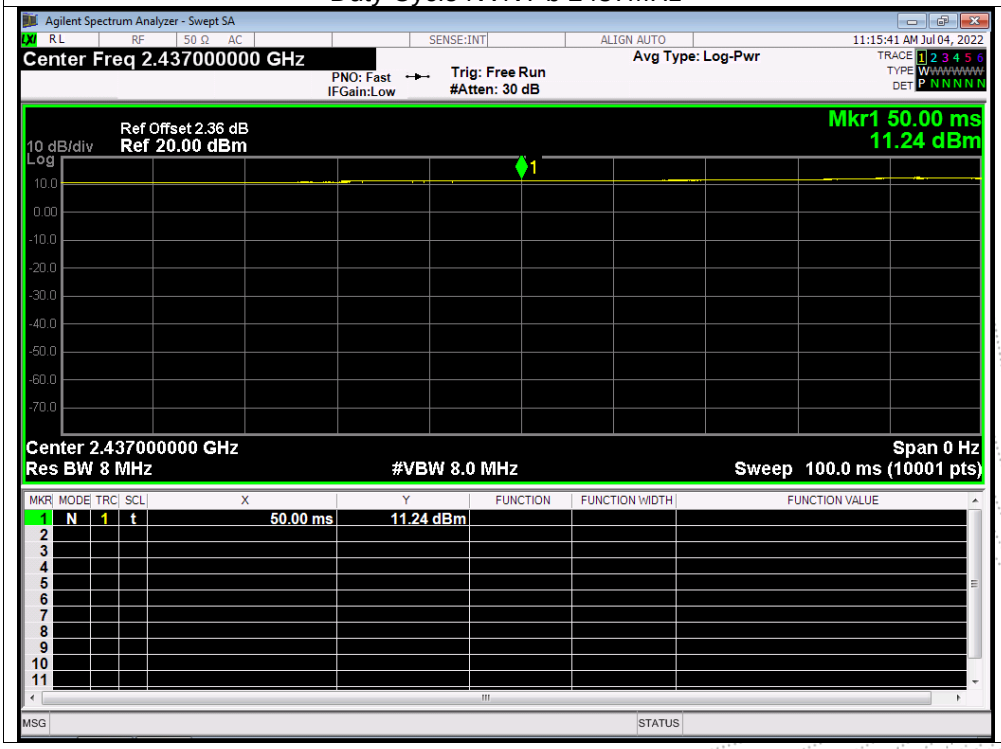
Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)	1/T (kHz)
b	2412	100	0	0
b	2437	100	0	0
b	2462	100	0	0
g	2412	100	0	0
g	2437	100	0	0
g	2462	100	0	0
n20	2412	100	0	0
n20	2437	100	0	0
n20	2462	100	0	0

Test Graphs

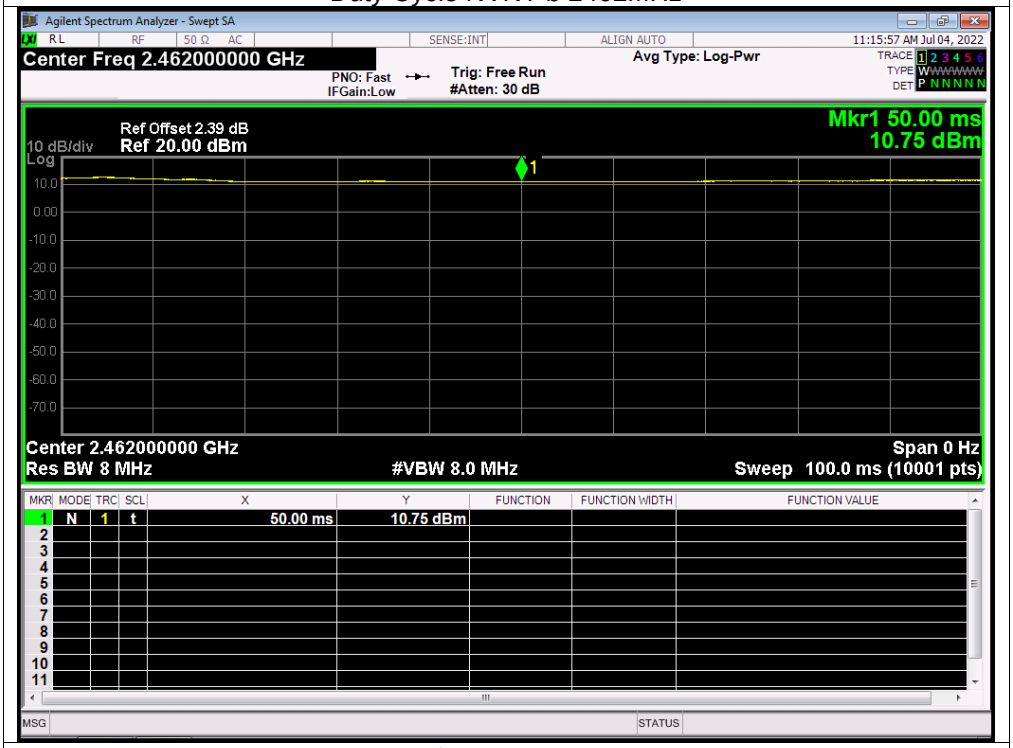
Duty Cycle NVNT b 2412MHz



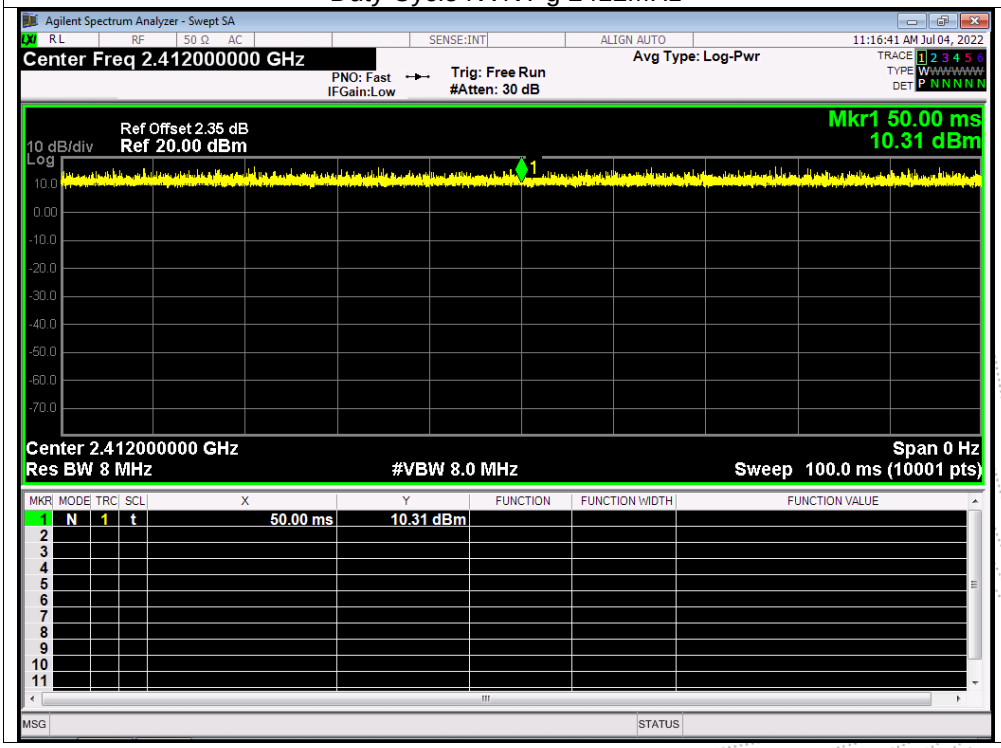
Duty Cycle NVNT b 2437MHz



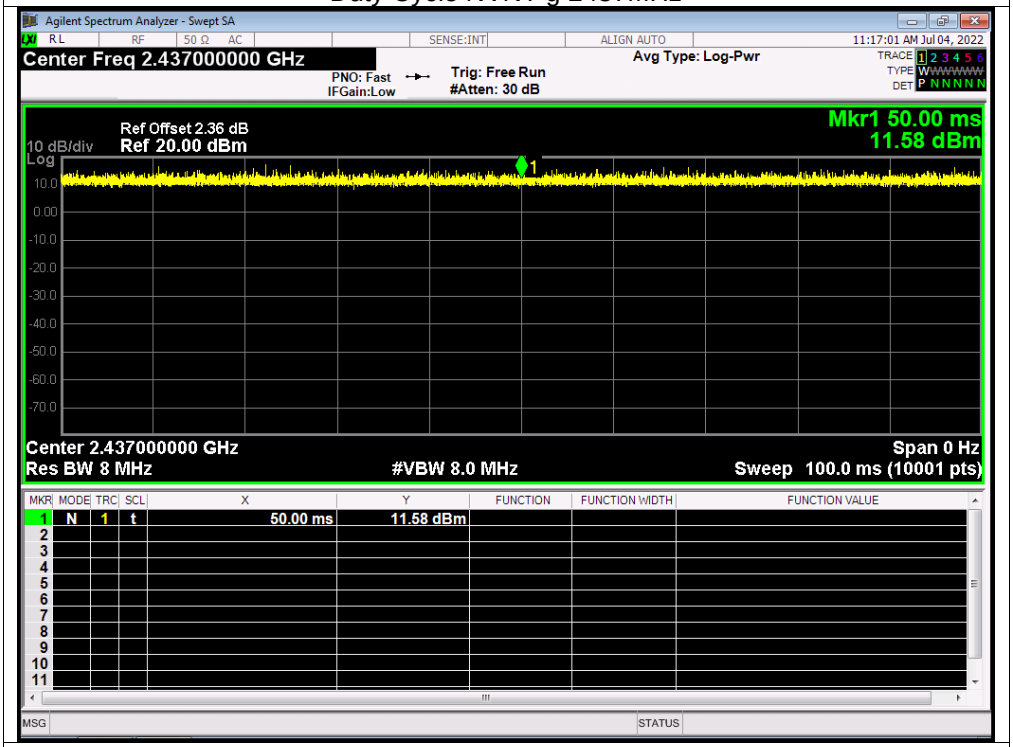
Duty Cycle NVNT b 2462MHz



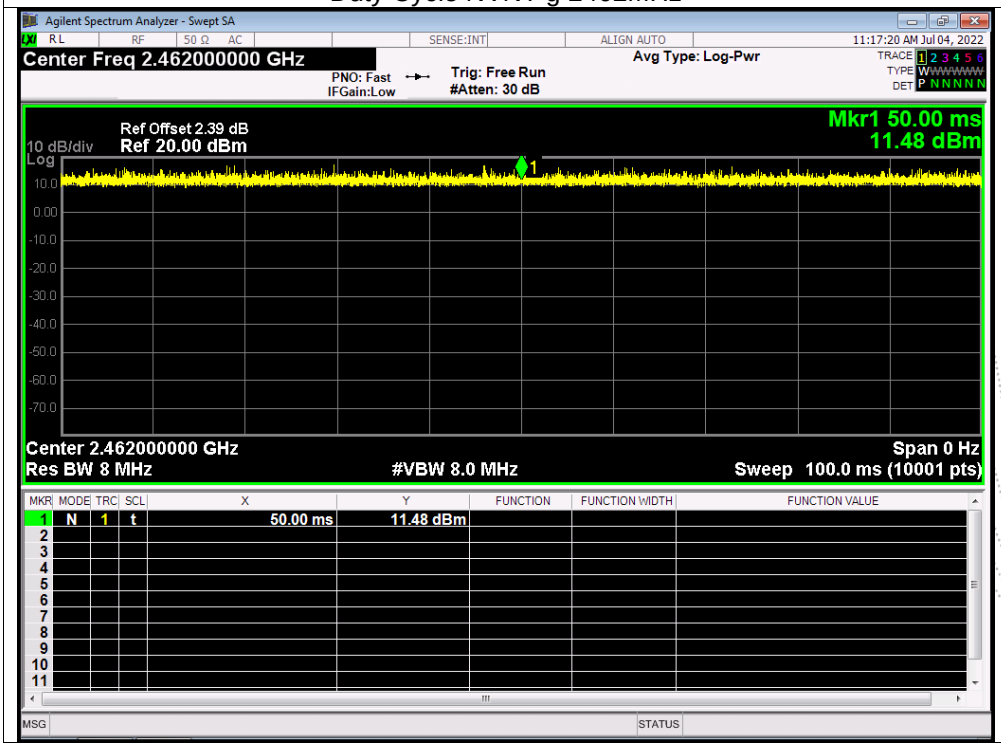
Duty Cycle NVNT g 2412MHz



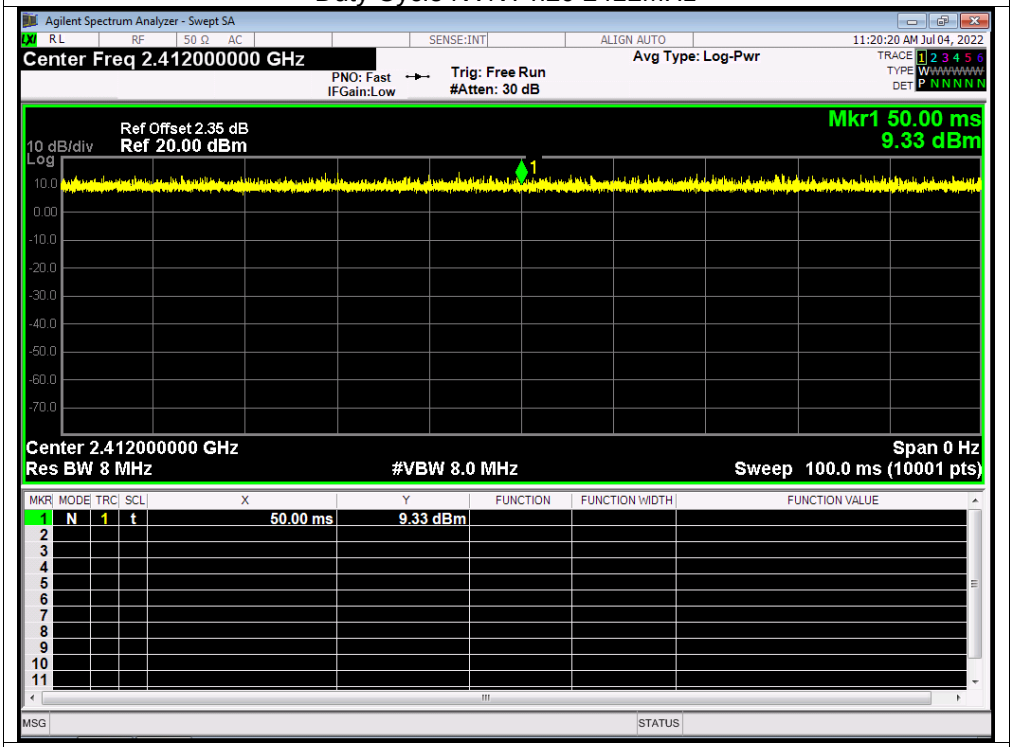
Duty Cycle NVNT g 2437MHz



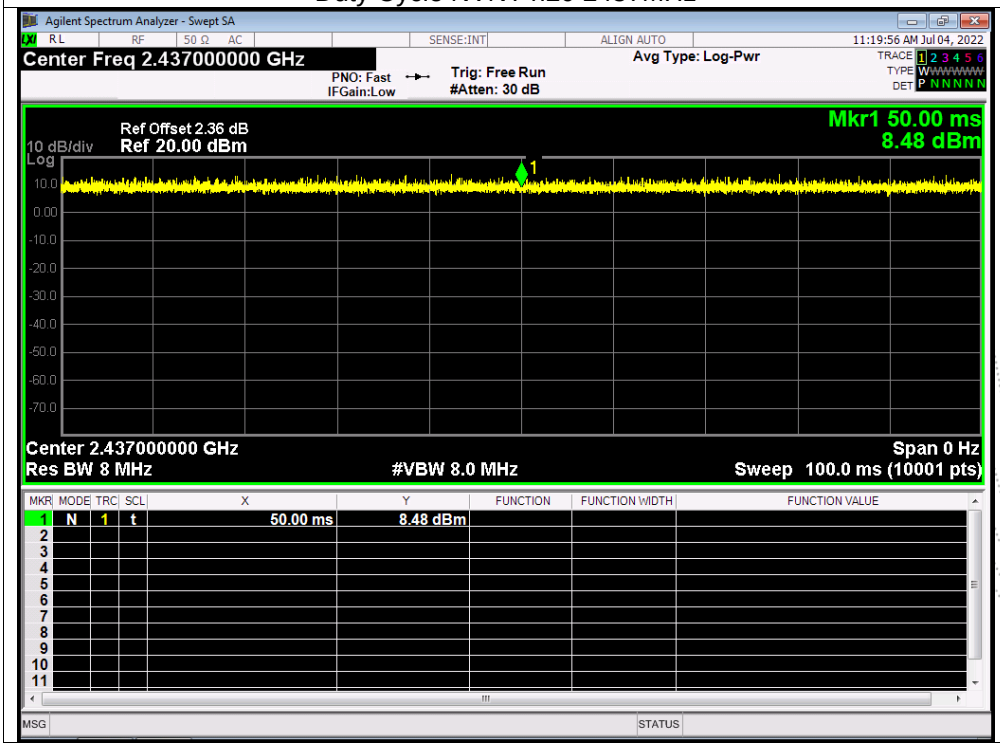
Duty Cycle NVNT g 2462MHz



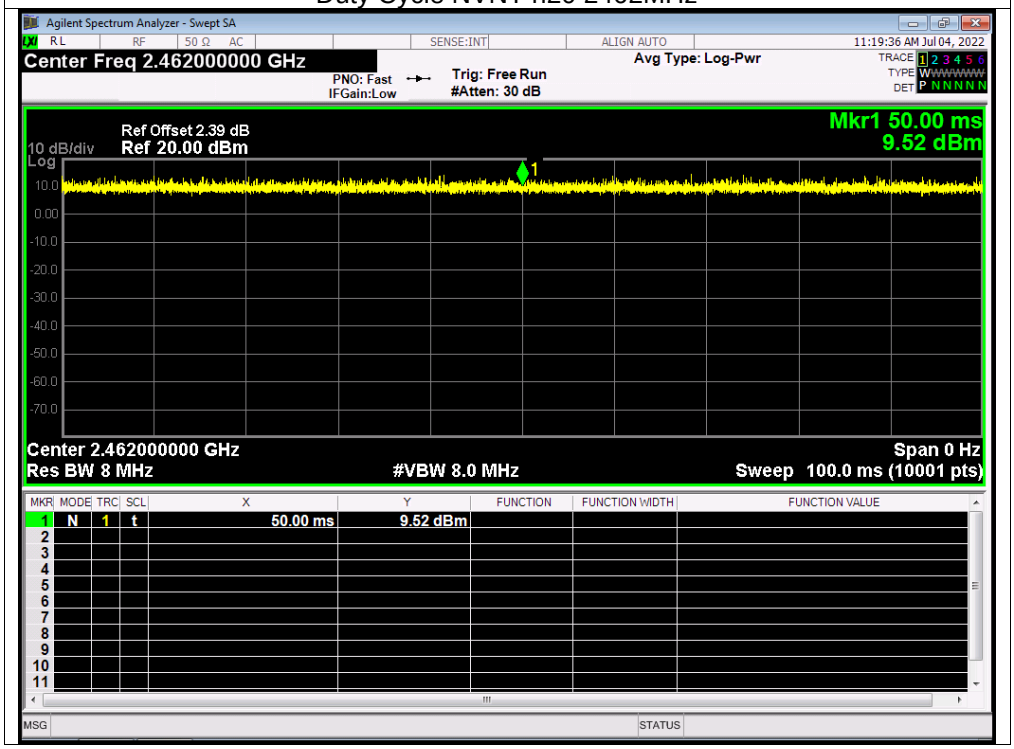
Duty Cycle NVNT n20 2412MHz



Duty Cycle NVNT n20 2437MHz



Duty Cycle NVNT n20 2462MHz



14. Antenna Requirement

14.1 Limit

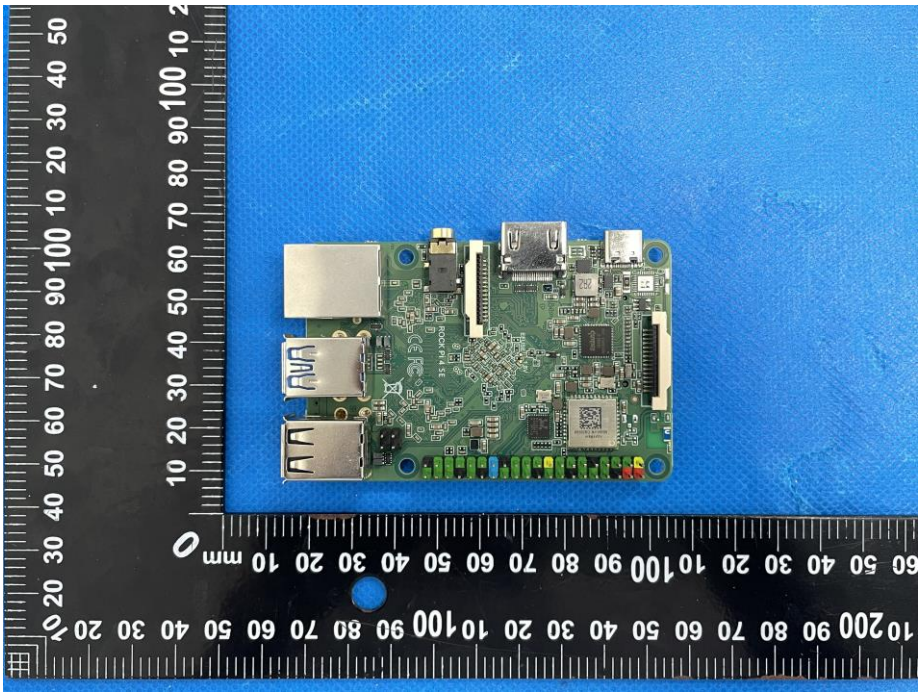
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

14.2 Test Result

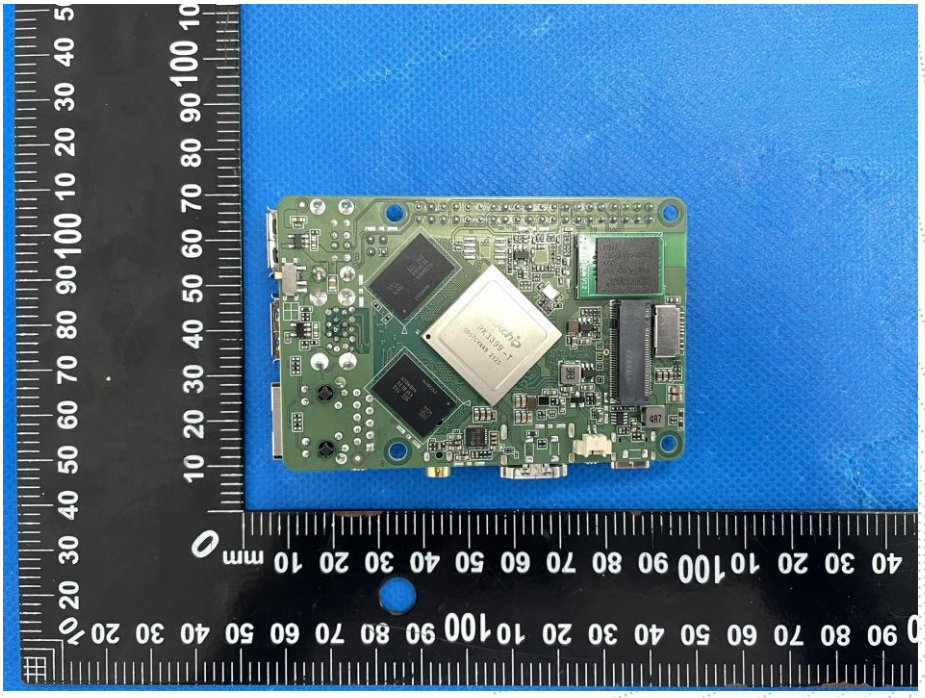
The EUT antenna is Chip antenna, fulfill the requirement of this section.

15. EUT Photographs

EUT Photo 1



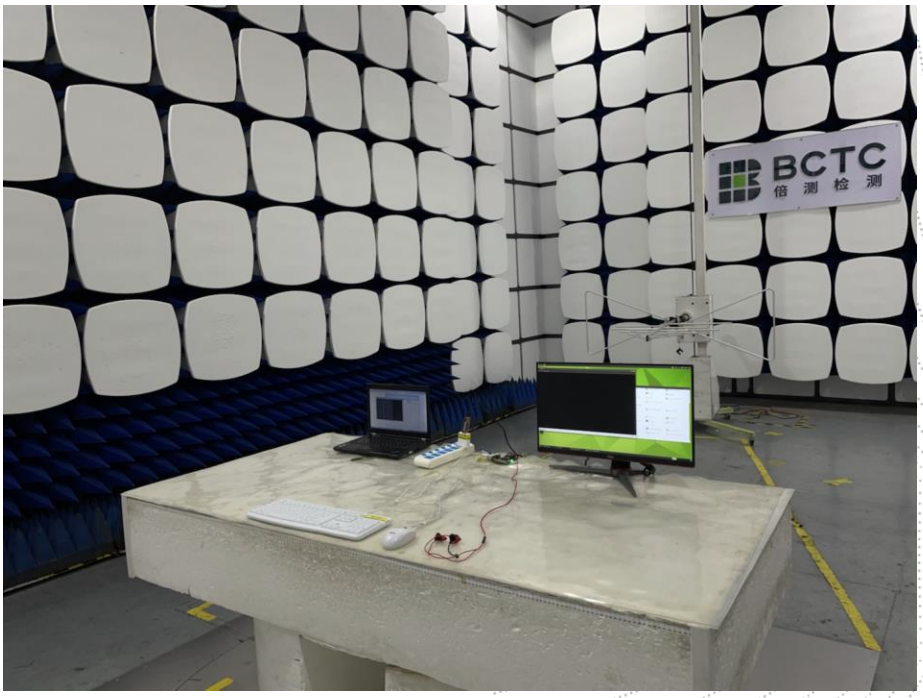
EUT Photo 2

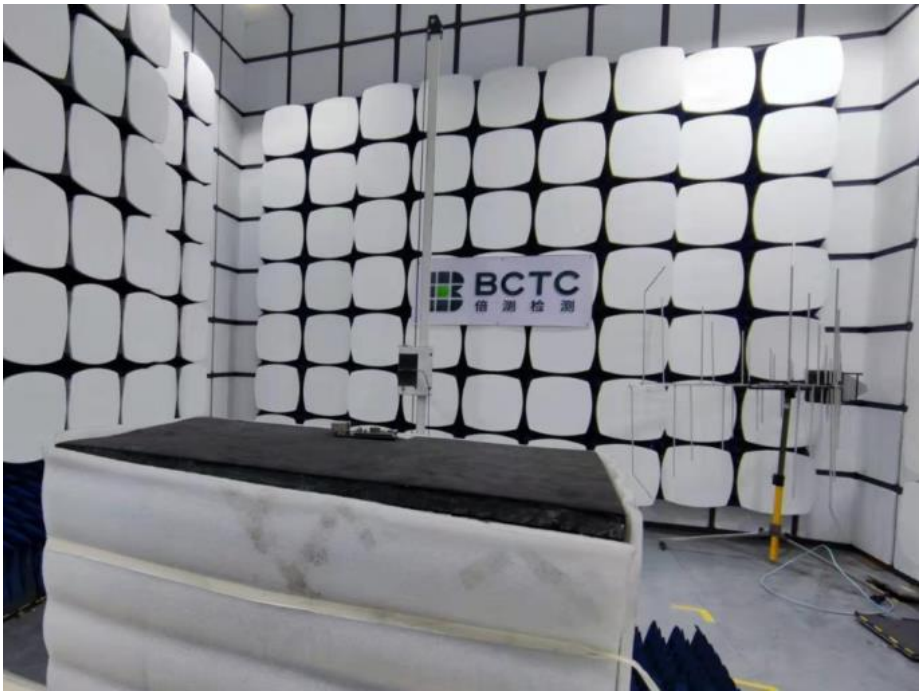


16. EUT Test Setup Photographs

Conducted emissions Photo

Radiated Measurement Photos




BCTC
倍测检测

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** ※※※※※

TEST REPORT

Report No.:	BCTC2206634854-4E
Applicant:	ROCKPI TRADING LIMITED
Product Name:	ROCK Pi 4/ROCK 4
Model/Type Ref.:	ROCK 4 SE
Tested Date:	2022-06-30 to 2022-07-05
Issued Date:	2022-07-05

Shenzhen BCTC Testing Co., Ltd.

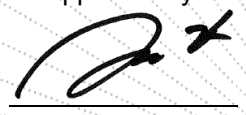
FCC ID: 2A3PA-ROCK4SE

Product Name:	ROCK Pi 4
Trademark:	N/A
Model/Type Ref.:	ROCK 4 SE ROCK Pi 4 A, ROCK Pi 4 B, ROCK Pi 4 A+, ROCK Pi 4 B+, ROCK 4 SE, ROCK 4 A, ROCK 4 B, ROCK 4 A+, ROCK 4 B+
Prepared For:	ROCKPI TRADING LIMITED
Address:	Room 11, 27 / f, Ga wah international centre, 191 Javaroad, north point, Hong Kong
Manufacturer:	ROCKPI TRADING LIMITED
Address:	Room 11, 27 / f, Ga wah international centre, 191 Javaroad, north point, Hong Kong
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:	2022-06-30
Sample tested Date:	2022-06-30 to 2022-07-05
Issue Date:	2022-07-05
Report No.:	BCTC2206634854-4E
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/ Project Handler

Approved by:



Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2206634854-4E	2022-07-05	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)(1) 15.407 (b)(4) 15.407 (b)(6)	PASS
2	Conducted Emission	15.207	N/A
3	26 dB and 99% Emission Bandwidth	15.407 (a)(5) 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

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

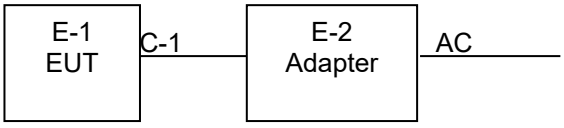
4.1 Product Information

Model/Type Ref.:	ROCK 4 SE ROCK Pi 4 A, ROCK Pi 4 B, ROCK Pi 4 A+, ROCK Pi 4 B+, ROCK 4 SE, ROCK 4 A, ROCK 4 B, ROCK 4 A+, ROCK 4 B+
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 Mode Supported	802.11a/n/ac(20MHz channel bandwidth) 802.11n/ac(40MHz channel bandwidth) 802.11ac(80MHz channel bandwidth)
Operation Frequency:	5180-5240MHz for 802.11a/n/ac(HT20); 5190-5230MHz for 802.11n/ac(HT40); 5210MHz for 802.11 ac80;
Data Rate	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
Type of Modulation:	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;
Number Of Channel	4 channels for 802.11a/n20 in the 5180-5240MHz band ; 2 channels for 802.11 n40 in the 5190-5230MHz band ; 1 channels for 802.11 ac80 in the 5210MHz band ;
Antenna installation:	Chip antenna
Antenna Gain:	2 dBi
Ratings:	DC 5V From adapter

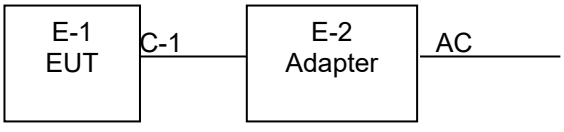
4.2 Test Setup Configuration

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

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	ROCK Pi 4/ROCK 4	N/A	ROCK 4 SE	N/A	EUT
E-2	Adapter	N/A	BCTC001	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	0.3M	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

802.11a/n/ac(20MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220	40	5200	48	5240
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)
38	5190	46	5230	-	-	-	-
151	5755	159	5795	-	-	-	-

802.11ac (80MHz) Carrier Frequency Channel	
Channel	Frequency (MHz)
42	5210

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/ ac 20 CH36/ CH40/ CH 48
Mode 2	802.11n/ ac40 CH38/ CH 46
Mode 3	802.11 ac80 CH 42
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a / n/ ac 20 CH36/ CH40/ CH 48
Mode 2	802.11n/ ac40 CH38/ CH 46
Mode 3	802.11 ac80 CH 42/
Mode 4	802.11a / n/ ac 20 CH36/ CH40/ CH 48
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, 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

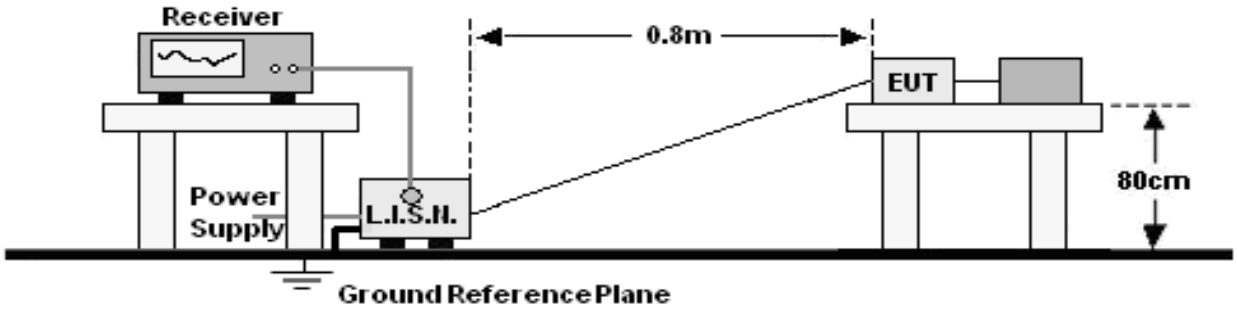
Conducted Emissions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR3	102075	May 24, 2022	May 23, 2023
LISN	R&S	ENV216	101375	May 24, 2022	May 23, 2023
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Attenuator	\	10dB DC-6GHz	1650	May 24, 2022	May 23, 2023

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power Metter	Keysight	E4419	\	May 24, 2022	May 23, 2023
Power Sensor (AV)	Keysight	E9300A	\	May 24, 2022	May 23, 2023
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 24, 2022	May 23, 2023
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	\	May 24, 2022	May 23, 2023

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 24, 2022	May 23, 2023
Receiver	R&S	ESRP	101154	May 24, 2022	May 23, 2023
Amplifier	SKET	LAPA_01G18G-45dB	\	May 24, 2022	May 23, 2023
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 24, 2022	May 23, 2023
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 26, 2022	May 25, 2023
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 24, 2022	May 23, 2023
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 24, 2022	May 23, 2023
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 24, 2022	May 23, 2023
Loop Antenna(9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	May 26, 2022	May 25, 2023
RF cables1(9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	May 26, 2022	May 25, 2023
RF cables2(30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	May 26, 2022	May 25, 2023
RF cables3(1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	May 24, 2022	May 23, 2023
Power Metter	Keysight	E4419	\	May 26, 2022	May 25, 2023
Power Sensor (AV)	Keysight	E9300A	\	May 26, 2022	May 25, 2023
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 26, 2022	May 25, 2023
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	\	May 26, 2022	May 25, 2023
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

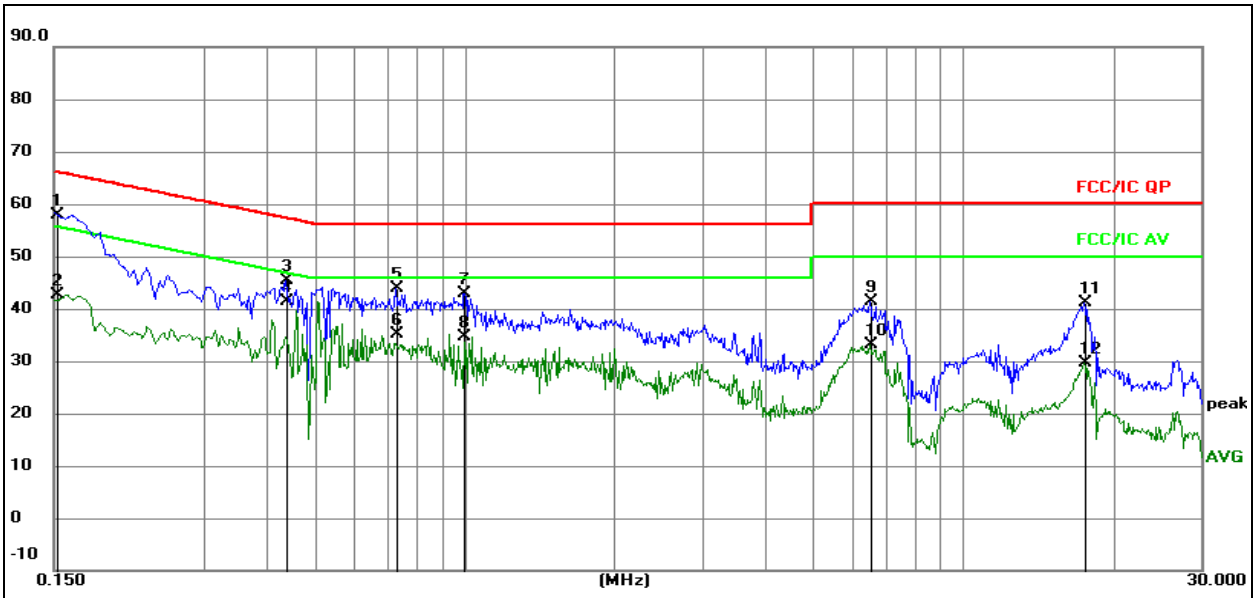
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak 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.
We pretest AC 120V and AC 240V, the worst voltage was AC 120V and the data recording in the report.

6.5 Test Result

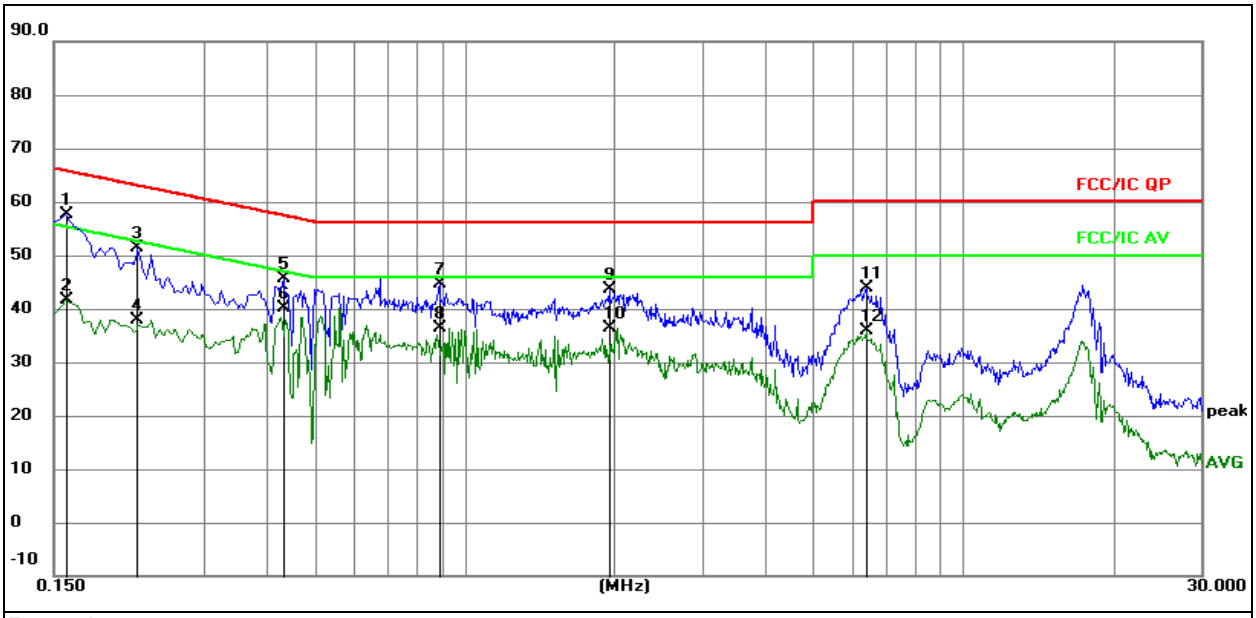
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		0.1524	38.29	19.68	57.97	65.87	-7.90	QP
2		0.1524	23.04	19.68	42.72	55.87	-13.15	AVG
3		0.4380	25.52	19.74	45.26	57.10	-11.84	QP
4	*	0.4380	21.57	19.74	41.31	47.10	-5.79	AVG
5		0.7304	24.10	19.74	43.84	56.00	-12.16	QP
6		0.7304	15.42	19.74	35.16	46.00	-10.84	AVG
7		0.9960	23.18	19.76	42.94	56.00	-13.06	QP
8		0.9960	14.90	19.76	34.66	46.00	-11.34	AVG
9		6.5130	21.13	20.17	41.30	60.00	-18.70	QP
10		6.5130	12.96	20.17	33.13	50.00	-16.87	AVG
11		17.5470	20.82	20.40	41.22	60.00	-18.78	QP
12		17.5470	9.26	20.40	29.66	50.00	-20.34	AVG

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Phase：	Neutral
Test Voltage ：	DC 5V from adapter	Test Mode：	Mode 2



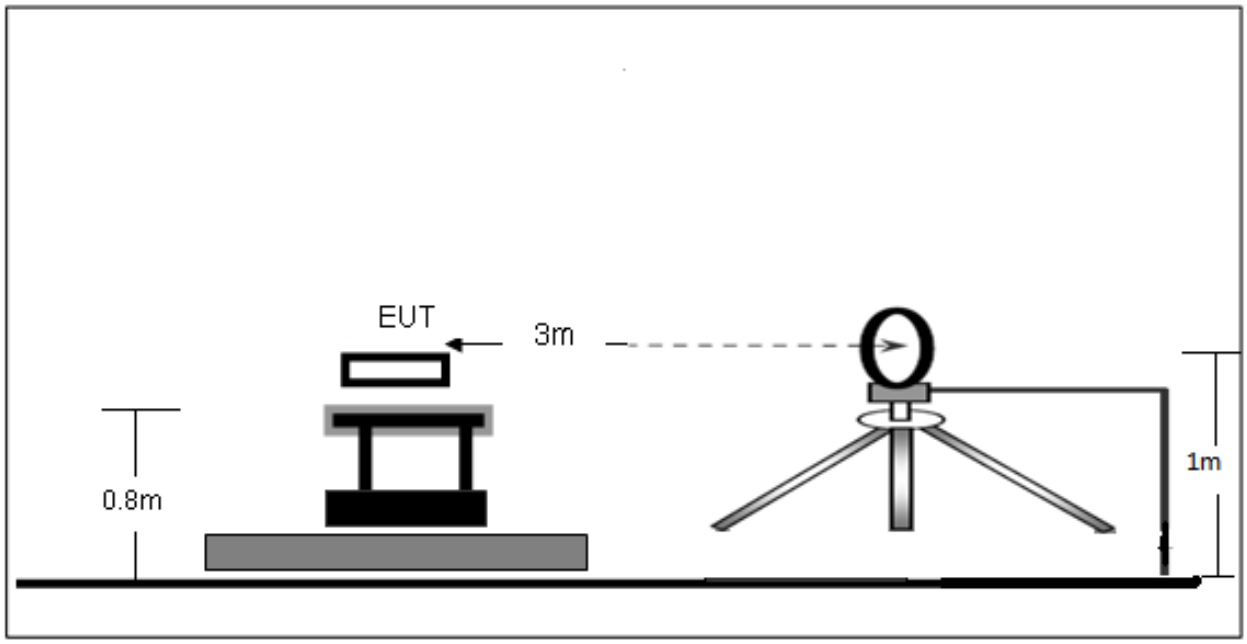
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement=Reading Level+ Correct Factor
4. Over=Measurement-Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.1582	38.02	19.69	57.71	65.56	-7.85	QP
2		0.1582	21.90	19.69	41.59	55.56	-13.97	AVG
3		0.2208	31.55	19.79	51.34	62.79	-11.45	QP
4		0.2208	18.06	19.79	37.85	52.79	-14.94	AVG
5		0.4328	25.84	19.74	45.58	57.20	-11.62	QP
6	*	0.4328	20.51	19.74	40.25	47.20	-6.95	AVG
7		0.8897	24.92	19.75	44.67	56.00	-11.33	QP
8		0.8897	16.64	19.75	36.39	46.00	-9.61	AVG
9		1.9489	23.79	19.87	43.66	56.00	-12.34	QP
10		1.9489	16.52	19.87	36.39	46.00	-9.61	AVG
11		6.3859	23.71	20.16	43.87	60.00	-16.13	QP
12		6.3859	15.67	20.16	35.83	50.00	-14.17	AVG

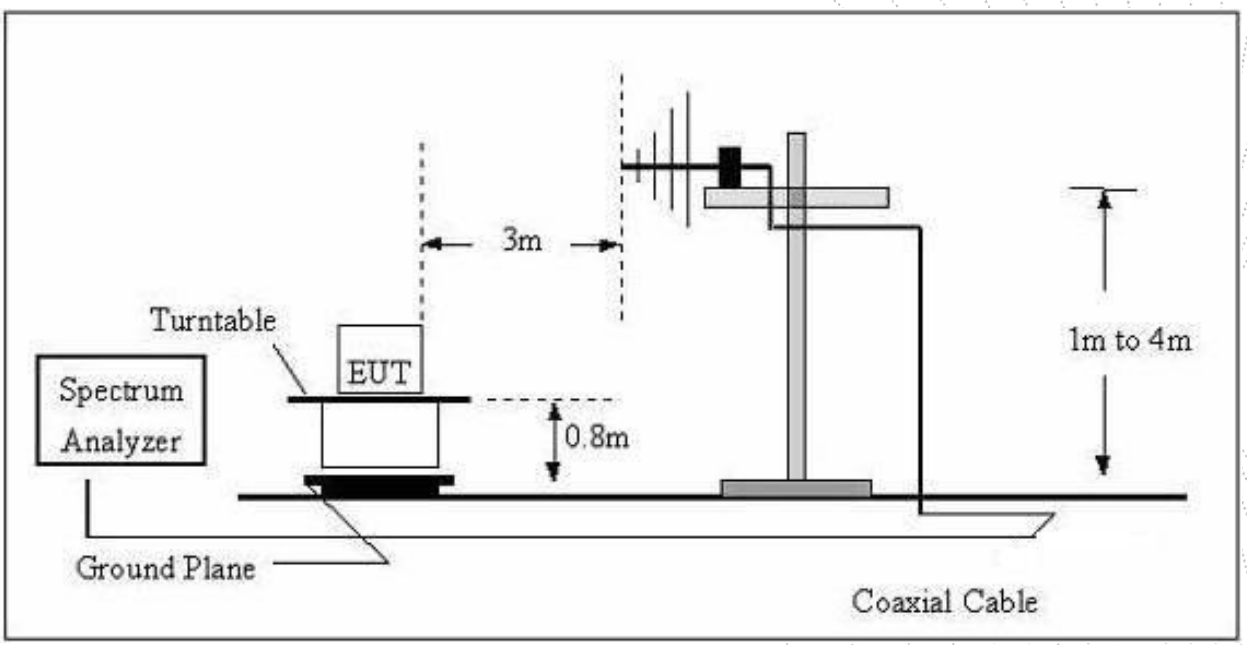
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

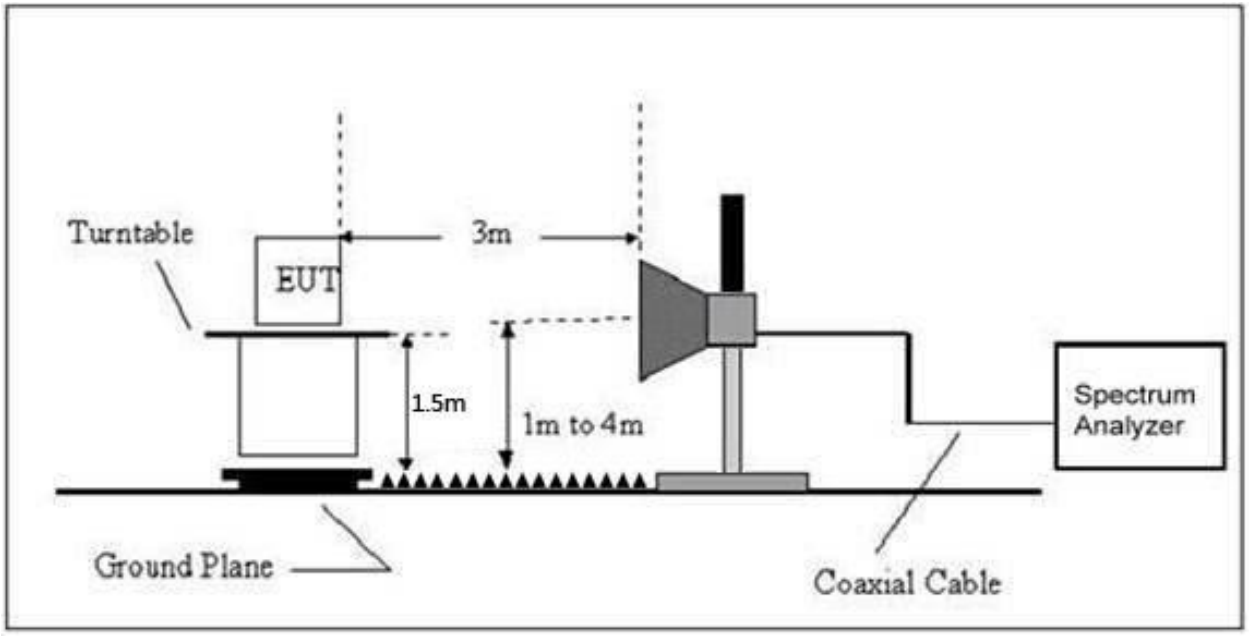
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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.

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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

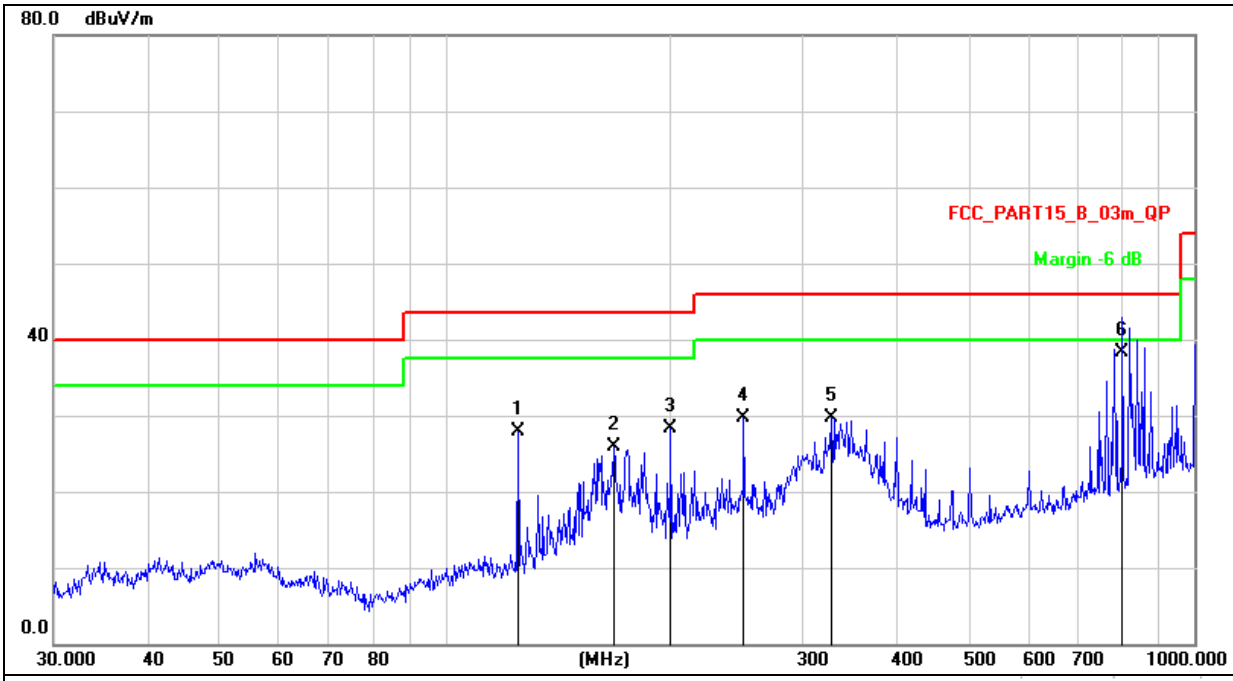
Temperature：	26℃	Relative Humidity：	24%
Pressure：	101 kPa	Test Voltage :	DC 5V from adapter
Test Mode ：	Mode 1	Polarization :	--

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

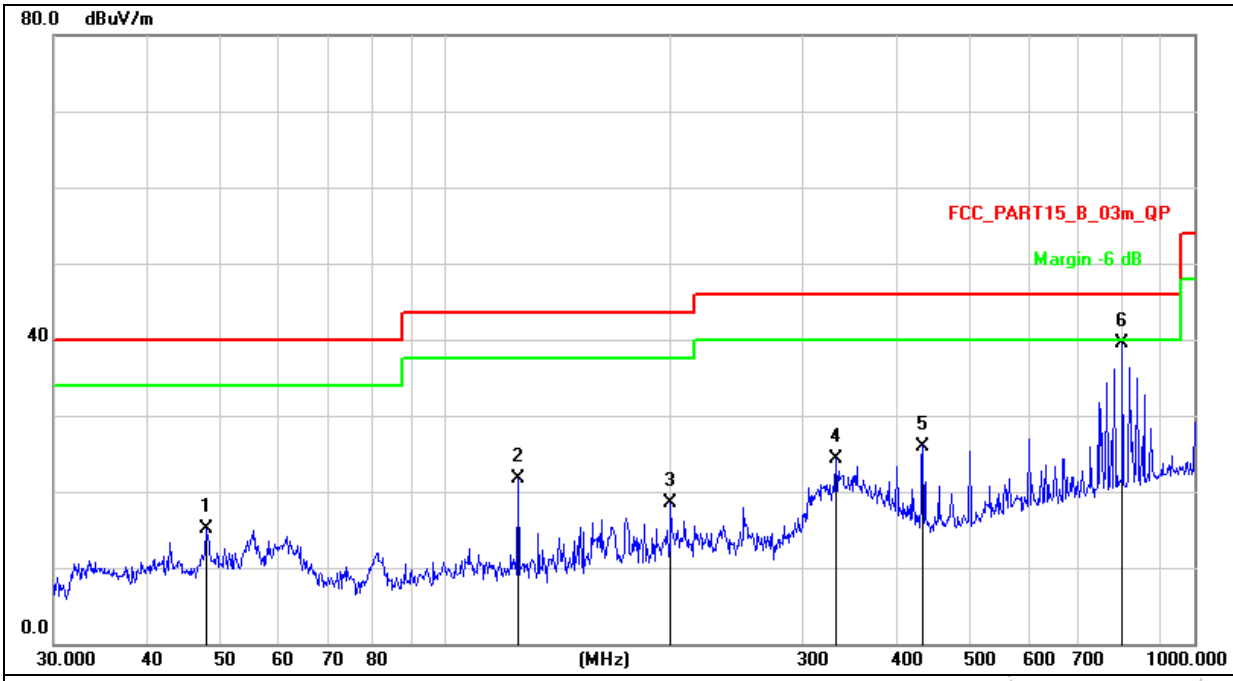
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		125.0066	45.80	-17.89	27.91	43.50	-15.59	QP
2		167.8243	44.24	-18.36	25.88	43.50	-17.62	QP
3		199.9856	44.62	-16.30	28.32	43.50	-15.18	QP
4		250.3012	44.85	-15.14	29.71	46.00	-16.29	QP
5		327.8873	42.47	-12.84	29.63	46.00	-16.37	QP
6	*	799.9683	41.96	-3.64	38.32	46.00	-7.68	QP

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		47.9940	30.05	-14.96	15.09	40.00	-24.91	QP
2		125.0066	39.64	-17.89	21.75	43.50	-21.75	QP
3		199.9856	34.75	-16.30	18.45	43.50	-25.05	QP
4		332.5187	37.05	-12.71	24.34	46.00	-21.66	QP
5		434.0651	36.33	-10.33	26.00	46.00	-20.00	QP
6	*	801.7863	43.16	-3.60	39.56	46.00	-6.44	QP

Between 1GHz – 40GHz

Test Mode :	TX(5.1G) - 802.11a

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 (5180 MHz)-Above 1G									
V	4434.045	60.57	5.94	35.40	44.00	57.91	68.2	-10.29	PK
V	4434.045	43.74	5.94	35.40	44.00	41.08	54	-12.92	AV
V	10360.045	60.41	8.46	39.75	44.50	64.12	68.2	-4.08	PK
V	10360.045	43.07	8.46	39.75	44.50	46.78	54	-7.22	AV
V	15540.148	62.67	10.12	38.80	44.10	67.49	74	-6.51	PK
V	15540.148	43.28	10.12	38.80	42.70	49.50	54	-4.50	AV
H	4434.034	61.31	5.94	35.18	44.00	58.43	68.2	-9.77	PK
H	4434.034	43.86	5.94	35.18	44.00	40.98	54	-13.02	AV
H	10360.032	51.87	8.46	38.71	44.50	54.54	68.2	-13.66	PK
H	10360.032	44.69	8.46	38.71	44.50	47.36	54	-6.64	AV
H	15540.027	51.81	10.12	38.38	44.10	56.21	74	-17.79	PK
H	15540.027	44.59	10.12	38.38	44.10	48.99	54	-5.01	AV
middle Channel (5200 MHz)-Above 1G									
V	4592.190	60.84	6.48	36.35	44.05	59.62	74	-14.38	PK
V	4592.190	43.67	6.48	36.35	44.05	42.45	54	-11.55	AV
V	10400.131	60.67	8.47	37.88	44.51	62.51	68.2	-5.69	PK
V	10400.131	43.54	8.47	37.88	44.51	45.38	54	-8.62	AV
V	15600.156	64.84	10.12	38.80	44.10	69.66	74	-4.34	PK
V	15600.156	43.23	10.12	38.80	42.70	49.45	54	-4.55	AV
H	4592.193	62.47	6.48	36.37	44.05	61.27	74	-12.73	PK
H	4592.193	43.09	6.48	36.37	44.05	41.89	54	-12.11	AV
H	10400.196	53.51	8.47	38.64	44.50	56.12	68.2	-12.08	PK
H	10400.196	42.31	8.47	38.64	44.50	44.92	54	-9.08	AV
H	15600.104	53.44	10.12	38.38	44.10	57.84	74	-16.16	PK
H	15600.104	43.58	10.12	38.38	44.10	47.98	54	-6.02	AV
High Channel (5240 MHz)-Above 1G									
V	4739.141	61.86	7.10	37.24	43.50	62.70	74	-11.30	PK
V	4739.141	43.15	7.10	37.24	43.50	43.99	54	-10.01	AV
V	10480.082	62.83	8.46	37.68	44.50	64.47	68.2	-3.73	PK
V	10480.082	43.02	8.46	37.68	44.50	44.66	54	-9.34	AV
V	15720.130	62.29	10.12	38.80	44.10	67.11	74	-6.89	PK
V	15720.130	43.68	10.12	38.80	42.70	49.90	54	-4.10	AV
H	4739.006	61.06	7.10	37.24	43.50	61.90	74	-12.10	PK
H	4739.006	43.26	7.10	37.24	43.50	44.10	54	-9.90	AV
H	10480.032	52.01	8.46	38.57	44.50	54.54	68.2	-13.66	PK
H	10480.032	43.93	8.46	38.57	44.50	46.46	54	-7.54	AV
H	15720.135	54.49	10.12	38.38	44.10	58.89	74	-15.11	PK
H	15720.135	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.

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

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 (5180 MHz)-Above 1G									
V	4434.066	60.76	5.94	35.40	44.00	58.10	68.2	-10.10	PK
V	4434.066	43.40	5.94	35.40	44.00	40.74	54	-13.26	AV
V	10360.089	63.00	8.46	39.75	44.50	66.71	68.2	-1.49	PK
V	10360.089	43.79	8.46	39.75	44.50	47.50	54	-6.50	AV
V	15540.184	60.28	10.12	38.80	44.10	65.10	74	-8.90	PK
V	15540.184	43.46	10.12	38.80	42.70	49.68	54	-4.32	AV
H	4434.181	63.48	5.94	35.18	44.00	60.60	68.2	-7.60	PK
H	4434.181	43.08	5.94	35.18	44.00	40.20	54	-13.80	AV
H	10360.017	50.48	8.46	38.71	44.50	53.15	68.2	-15.05	PK
H	10360.017	42.14	8.46	38.71	44.50	44.81	54	-9.19	AV
H	15540.146	51.46	10.12	38.38	44.10	55.86	74	-18.14	PK
H	15540.146	44.09	10.12	38.38	44.10	48.49	54	-5.51	AV
middle Channel (5200 MHz)-Above 1G									
V	4592.074	63.84	6.48	36.35	44.05	62.62	74	-11.38	PK
V	4592.074	43.73	6.48	36.35	44.05	42.51	54	-11.49	AV
V	10400.089	63.36	8.47	37.88	44.51	65.20	68.2	-3.00	PK
V	10400.089	43.95	8.47	37.88	44.51	45.79	54	-8.21	AV
V	15600.005	64.60	10.12	38.80	44.10	69.42	74	-4.58	PK
V	15600.005	43.03	10.12	38.80	42.70	49.25	54	-4.75	AV
H	4592.060	62.27	6.48	36.37	44.05	61.07	74	-12.93	PK
H	4592.060	43.92	6.48	36.37	44.05	42.72	54	-11.28	AV
H	10400.017	52.68	8.47	38.64	44.50	55.29	68.2	-12.91	PK
H	10400.017	40.53	8.47	38.64	44.50	43.14	54	-10.86	AV
H	15600.191	51.77	10.12	38.38	44.10	56.17	74	-17.83	PK
H	15600.191	41.95	10.12	38.38	44.10	46.35	54	-7.65	AV
High Channel (5240 MHz)-Above 1G									
V	4739.075	62.17	7.10	37.24	43.50	63.01	74	-10.99	PK
V	4739.075	43.46	7.10	37.24	43.50	44.30	54	-9.70	AV
V	10480.075	64.33	8.46	37.68	44.50	65.97	68.2	-2.23	PK
V	10480.075	43.22	8.46	37.68	44.50	44.86	54	-9.14	AV
V	15720.077	64.91	10.12	38.80	44.10	69.73	74	-4.27	PK
V	15720.077	43.69	10.12	38.80	42.70	49.91	54	-4.09	AV
H	4739.134	62.66	7.10	37.24	43.50	63.50	74	-10.50	PK
H	4739.134	43.22	7.10	37.24	43.50	44.06	54	-9.94	AV
H	10480.132	52.04	8.46	38.57	44.50	54.57	68.2	-13.63	PK
H	10480.132	41.37	8.46	38.57	44.50	43.90	54	-10.10	AV
H	15720.101	51.07	10.12	38.38	44.10	55.47	74	-18.53	PK
H	15720.101	44.84	10.12	38.38	44.10	49.24	54	-4.76	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 (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 (5190 MHz)-Above 1G									
V	4434.169	62.30	5.94	35.40	44.00	59.64	68.2	-8.56	PK
V	4434.169	43.77	5.94	35.40	44.00	41.11	54	-12.89	AV
V	10380.043	60.83	8.46	39.75	44.50	64.54	68.2	-3.66	PK
V	10380.043	43.28	8.46	39.75	44.50	46.99	54	-7.01	AV
V	15570.180	60.46	10.12	38.80	44.10	65.28	74	-8.72	PK
V	15570.180	43.46	10.12	38.80	42.70	49.68	54	-4.32	AV
H	4434.044	62.88	5.94	35.18	44.00	60.00	74	-14.00	PK
H	4434.044	43.83	5.94	35.18	44.00	40.95	54	-13.05	AV
H	10380.045	51.96	8.46	38.71	44.50	54.63	68.2	-13.57	PK
H	10380.045	43.37	8.46	38.71	44.50	46.04	54	-7.96	AV
H	15570.045	51.22	10.12	38.38	44.10	55.62	74	-18.38	PK
H	15570.045	40.77	10.12	38.38	44.10	45.17	54	-8.83	AV
middle Channel (5230 MHz)-Above 1G									
V	4739.011	61.17	6.48	36.35	44.05	59.95	68.2	-8.25	PK
V	4739.011	43.24	6.48	36.35	44.05	42.02	54	-11.98	AV
V	10460.117	60.69	8.47	37.88	44.51	62.53	68.2	-5.67	PK
V	10460.117	43.09	8.47	37.88	44.51	44.93	54	-9.07	AV
V	15690.090	64.07	10.12	38.80	44.10	68.89	74	-5.11	PK
V	15690.090	43.37	10.12	38.80	42.70	49.59	54	-4.41	AV
H	4739.071	63.80	6.48	36.37	44.05	62.60	68.2	-5.60	PK
H	4739.071	43.38	6.48	36.37	44.05	42.18	54	-11.82	AV
H	10460.166	52.22	8.47	38.64	44.50	54.83	68.2	-13.37	PK
H	10460.166	42.10	8.47	38.64	44.50	44.71	54	-9.29	AV
H	15690.055	52.15	10.12	38.38	44.10	56.55	74	-17.45	PK
H	15690.055	43.66	10.12	38.38	44.10	48.06	54	-5.94	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) - 802.11 AC20

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 (5180 MHz)-Above 1G									
V	4434.050	62.43	5.94	35.40	44.00	59.77	68.2	-8.43	PK
V	4434.050	43.45	5.94	35.40	44.00	40.79	54	-13.21	AV
V	10360.130	60.38	8.46	39.75	44.50	64.09	68.2	-4.11	PK
V	10360.130	43.18	8.46	39.75	44.50	46.89	54	-7.11	AV
V	15540.119	61.37	10.12	38.80	44.10	66.19	74	-7.81	PK
V	15540.119	43.88	10.12	38.80	42.70	50.10	54	-3.90	AV
H	4434.123	62.89	5.94	35.18	44.00	60.01	68.2	-8.19	PK
H	4434.123	43.60	5.94	35.18	44.00	40.72	54	-13.28	AV
H	10360.067	51.58	8.46	38.71	44.50	54.25	68.2	-13.95	PK
H	10360.067	42.36	8.46	38.71	44.50	45.03	54	-8.97	AV
H	15540.082	54.37	10.12	38.38	44.10	58.77	74	-15.23	PK
H	15540.082	41.79	10.12	38.38	44.10	46.19	54	-7.81	AV
middle Channel (5200 MHz)-Above 1G									
V	4592.091	63.59	6.48	36.35	44.05	62.37	74	-11.63	PK
V	4592.091	43.89	6.48	36.35	44.05	42.67	54	-11.33	AV
V	10400.125	60.96	8.47	37.88	44.51	62.80	68.2	-5.40	PK
V	10400.125	43.02	8.47	37.88	44.51	44.86	54	-9.14	AV
V	15600.050	64.56	10.12	38.80	44.10	69.38	74	-4.62	PK
V	15600.050	43.96	10.12	38.80	42.70	50.18	54	-3.82	AV
H	4592.007	62.34	6.48	36.37	44.05	61.14	74	-12.86	PK
H	4592.007	43.65	6.48	36.37	44.05	42.45	54	-11.55	AV
H	10400.073	53.04	8.47	38.64	44.50	55.65	68.2	-12.55	PK
H	10400.073	44.21	8.47	38.64	44.50	46.82	54	-7.18	AV
H	15600.151	52.59	10.12	38.38	44.10	56.99	74	-17.01	PK
H	15600.151	40.90	10.12	38.38	44.10	45.30	54	-8.70	AV
High Channel (5240 MHz)-Above 1G									
V	4739.108	62.16	7.10	37.24	43.50	63.00	74	-11.00	PK
V	4739.108	43.15	7.10	37.24	43.50	43.99	54	-10.01	AV
V	10480.152	64.15	8.46	37.68	44.50	65.79	68.2	-2.41	PK
V	10480.152	43.50	8.46	37.68	44.50	45.14	54	-8.86	AV
V	15720.101	63.66	10.12	38.80	44.10	68.48	74	-5.52	PK
V	15720.101	43.22	10.12	38.80	42.70	49.44	54	-4.56	AV
H	4739.002	61.38	7.10	37.24	43.50	62.22	74	-11.78	PK
H	4739.002	43.82	7.10	37.24	43.50	44.66	54	-9.34	AV
H	10480.148	53.78	8.46	38.57	44.50	56.31	68.2	-11.89	PK
H	10480.148	44.52	8.46	38.57	44.50	47.05	54	-6.95	AV
H	15720.009	50.71	10.12	38.38	44.10	55.11	74	-18.89	PK
H	15720.009	44.12	10.12	38.38	44.10	48.52	54	-5.48	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) - 802.11 AC40

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 (5190 MHz)-Above 1G									
V	4434.015	63.45	5.94	35.40	44.00	60.79	68.2	-7.41	PK
V	4434.015	43.27	5.94	35.40	44.00	40.61	54	-13.39	AV
V	10380.055	62.20	8.46	39.75	44.50	65.91	68.2	-2.29	PK
V	10380.055	43.51	8.46	39.75	44.50	47.22	54	-6.78	AV
V	15570.057	62.34	10.12	38.80	44.10	67.16	74	-6.84	PK
V	15570.057	43.81	10.12	38.80	42.70	50.03	54	-3.97	AV
H	4434.157	62.64	5.94	35.18	44.00	59.76	74	-14.24	PK
H	4434.157	43.34	5.94	35.18	44.00	40.46	54	-13.54	AV
H	10380.097	50.64	8.46	38.71	44.50	53.31	68.2	-14.89	PK
H	10380.097	41.84	8.46	38.71	44.50	44.51	54	-9.49	AV
H	15570.068	50.43	10.12	38.38	44.10	54.83	74	-19.17	PK
H	15570.068	41.65	10.12	38.38	44.10	46.05	54	-7.95	AV
middle Channel (5230 MHz)-Above 1G									
V	4739.009	61.67	6.48	36.35	44.05	60.45	68.2	-7.75	PK
V	4739.009	43.25	6.48	36.35	44.05	42.03	54	-11.97	AV
V	10460.159	62.44	8.47	37.88	44.51	64.28	68.2	-3.92	PK
V	10460.159	43.95	8.47	37.88	44.51	45.79	54	-8.21	AV
V	15690.098	64.03	10.12	38.80	44.10	68.85	74	-5.15	PK
V	15690.098	43.91	10.12	38.80	42.70	50.13	54	-3.87	AV
H	4739.178	63.11	6.48	36.37	44.05	61.91	68.2	-6.29	PK
H	4739.178	43.56	6.48	36.37	44.05	42.36	54	-11.64	AV
H	10460.195	51.45	8.47	38.64	44.50	54.06	68.2	-14.14	PK
H	10460.195	42.94	8.47	38.64	44.50	45.55	54	-8.45	AV
H	15690.143	54.84	10.12	38.38	44.10	59.24	74	-14.76	PK
H	15690.143	43.96	10.12	38.38	44.10	48.36	54	-5.64	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.

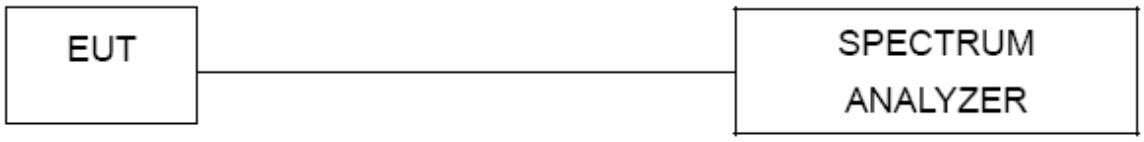
Test Mode :	TX(5.1G) - 802.11 AC80

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
(5210 MHz)-Above 1G									
V	4434.147	60.17	5.94	35.40	44.00	57.51	68.2	-10.69	PK
V	4434.147	43.36	5.94	35.40	44.00	40.70	54	-13.30	AV
V	10420.072	61.15	8.46	39.75	44.50	64.86	68.2	-3.34	PK
V	10420.072	43.42	8.46	39.75	44.50	47.13	54	-6.87	AV
V	15630.164	63.43	10.12	38.80	44.10	68.25	74	-5.75	PK
V	15630.164	43.99	10.12	38.80	42.70	50.21	54	-3.79	AV
H	4434.039	64.90	5.94	35.18	44.00	62.02	68.2	-6.18	PK
H	4434.039	43.48	5.94	35.18	44.00	40.60	54	-13.40	AV
H	10420.041	50.85	8.46	38.71	44.50	53.52	68.2	-14.68	PK
H	10420.041	40.52	8.46	38.71	44.50	43.19	54	-10.81	AV
H	15630.080	50.97	10.12	38.38	44.10	55.37	74	-18.63	PK
H	15630.080	43.85	10.12	38.38	44.10	48.25	54	-5.75	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 ≥ 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.

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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.

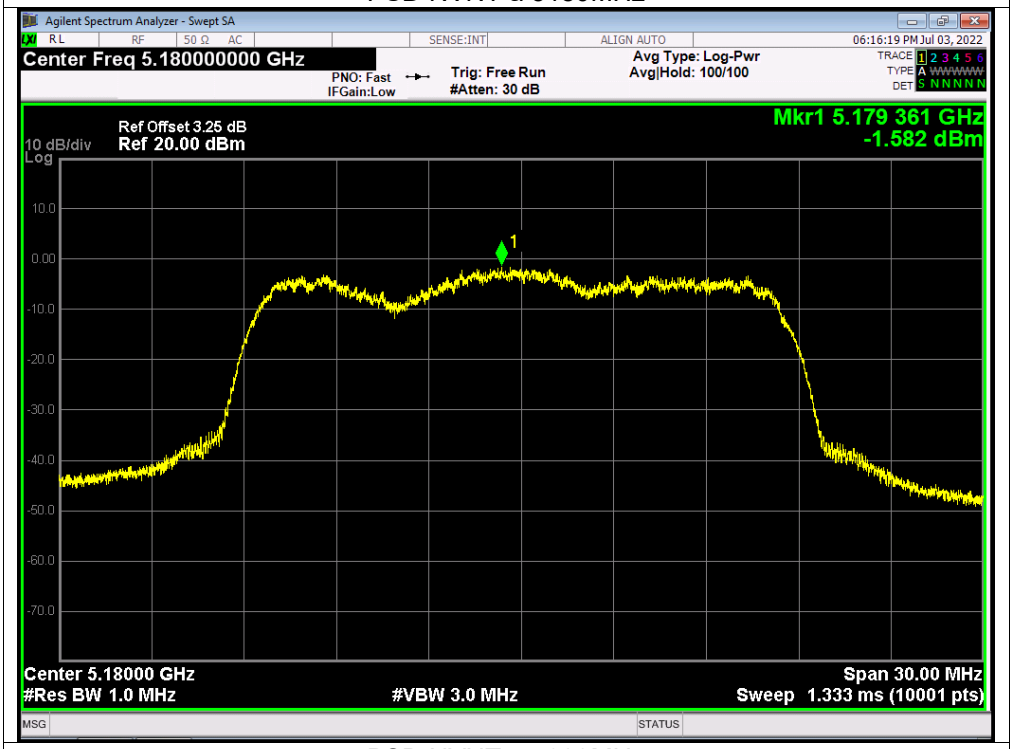
8.5 Test Result

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter
Test Mode ：	TX Frequency U-NII-1 (5180-5240MHz)		

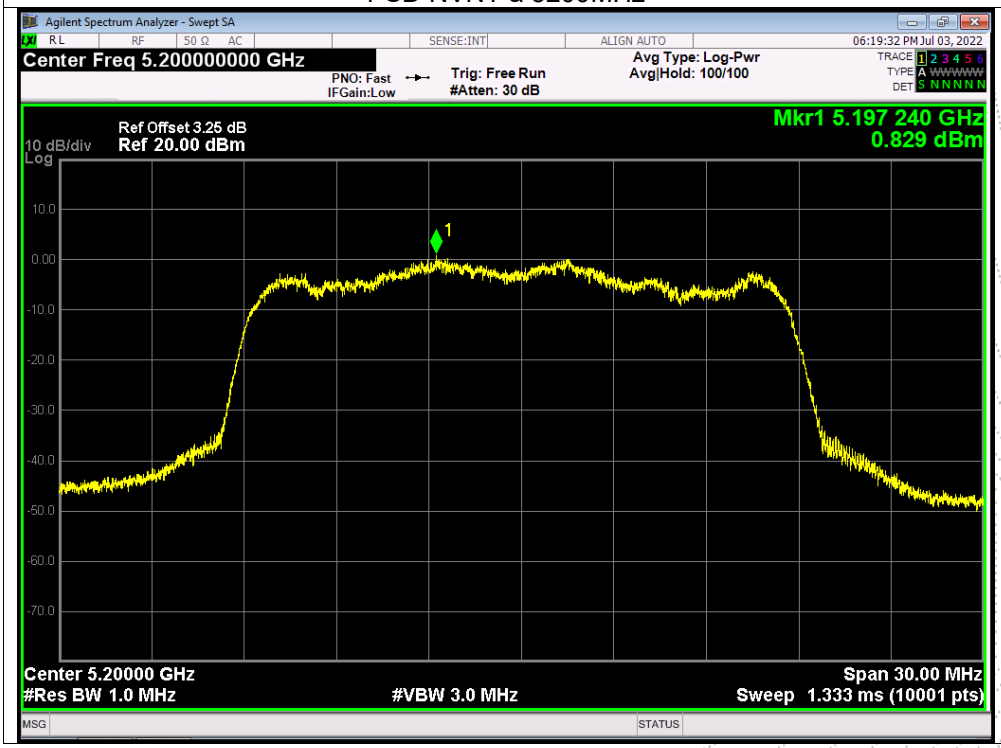
Test Mode	Frequency	Measured Power Density (dBm/MHz)	Limit (dBm/MHz)	Result
802.11 a	5180 MHz	-1.58	11	PASS
	5200 MHz	0.83	11	PASS
	5240 MHz	-2.23	11	PASS
802.11 n20	5180 MHz	-3.4	11	PASS
	5200 MHz	-4.34	11	PASS
	5240 MHz	-3.35	11	PASS
802.11 n40	5190 MHz	-7.94	11	PASS
	5230 MHz	-9.82	11	PASS
802.11 AC20	5180 MHz	-3.06	11	PASS
	5200 MHz	-2.72	11	PASS
	5240 MHz	-2.78	11	PASS
802.11 AC40	5190 MHz	-8.54	11	PASS
	5230 MHz	-7.71	11	PASS
802.11 AC80	5210 MHz	-13.82	11	PASS

Test Graphs

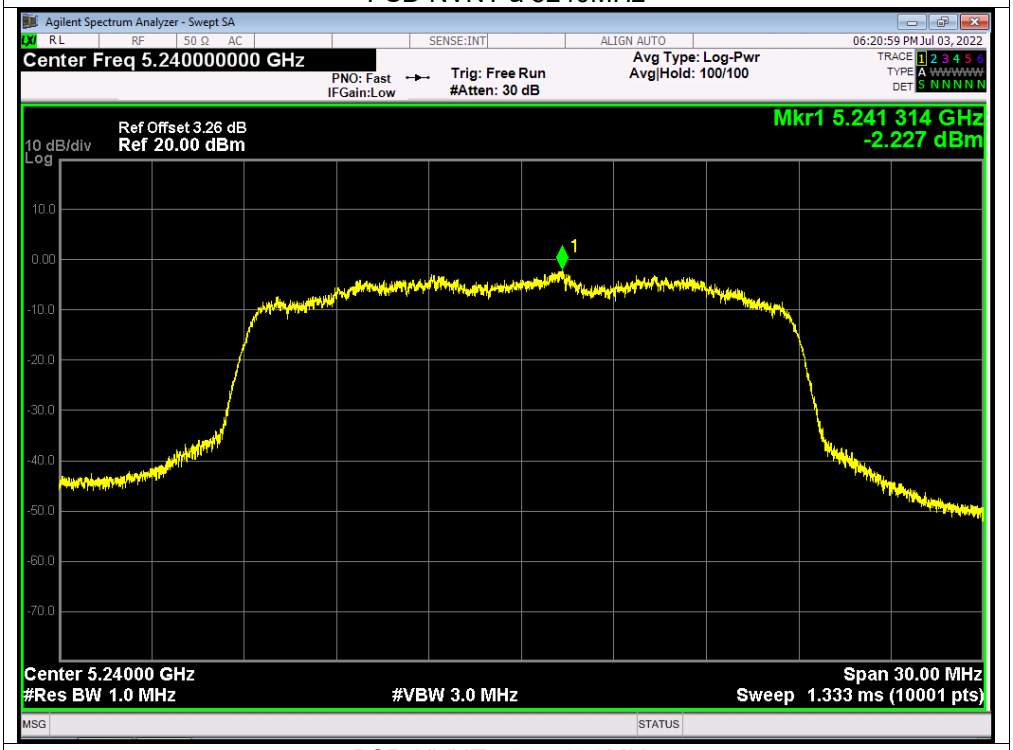
PSD NVNT a 5180MHz



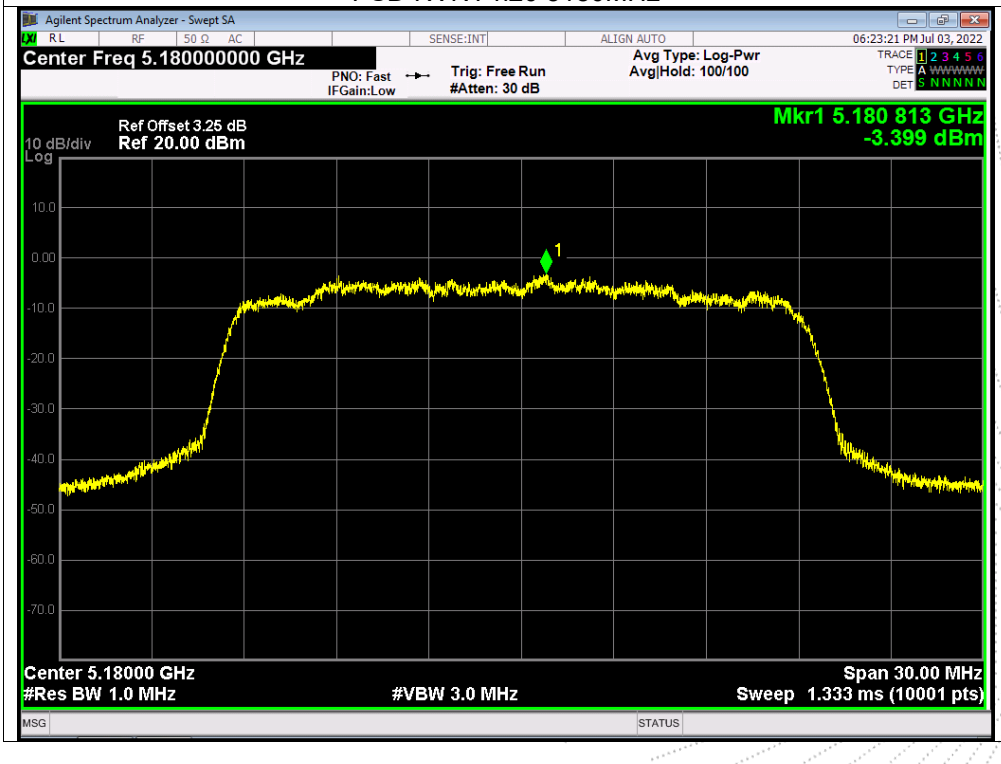
PSD NVNT a 5200MHz



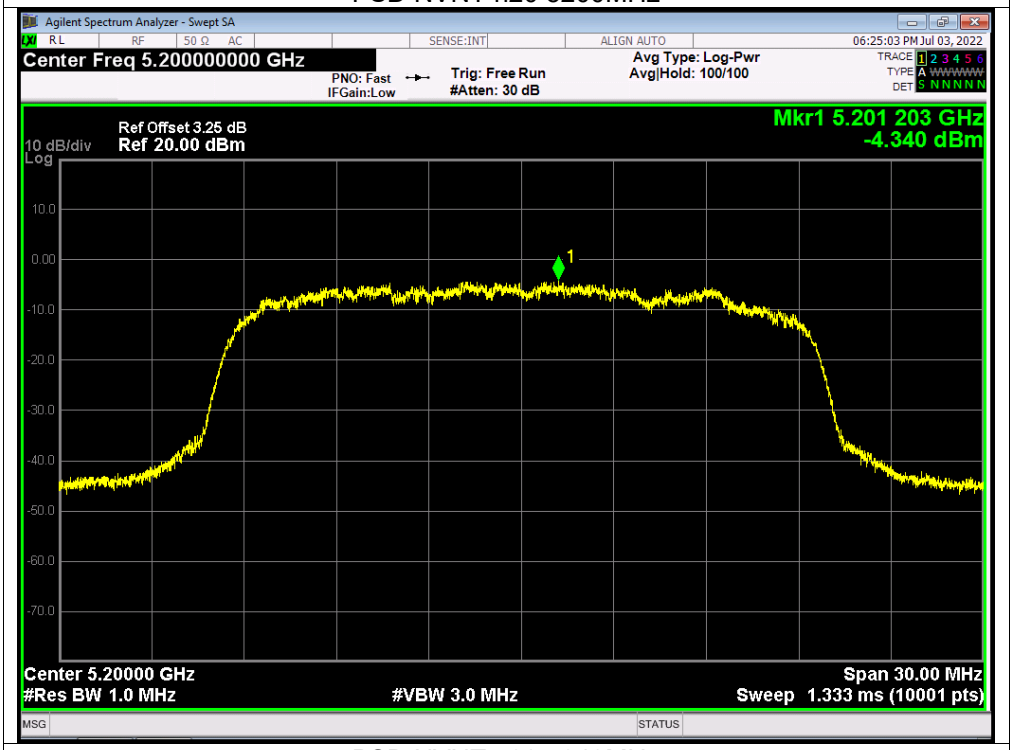
PSD NVNT a 5240MHz



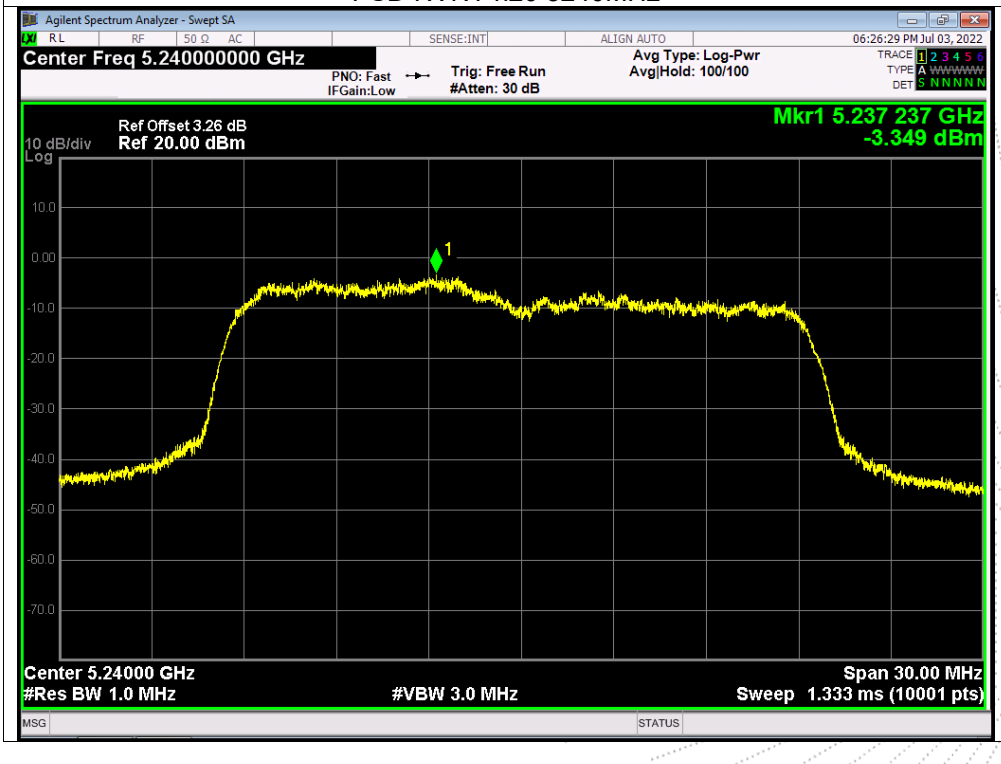
PSD NVNT n20 5180MHz



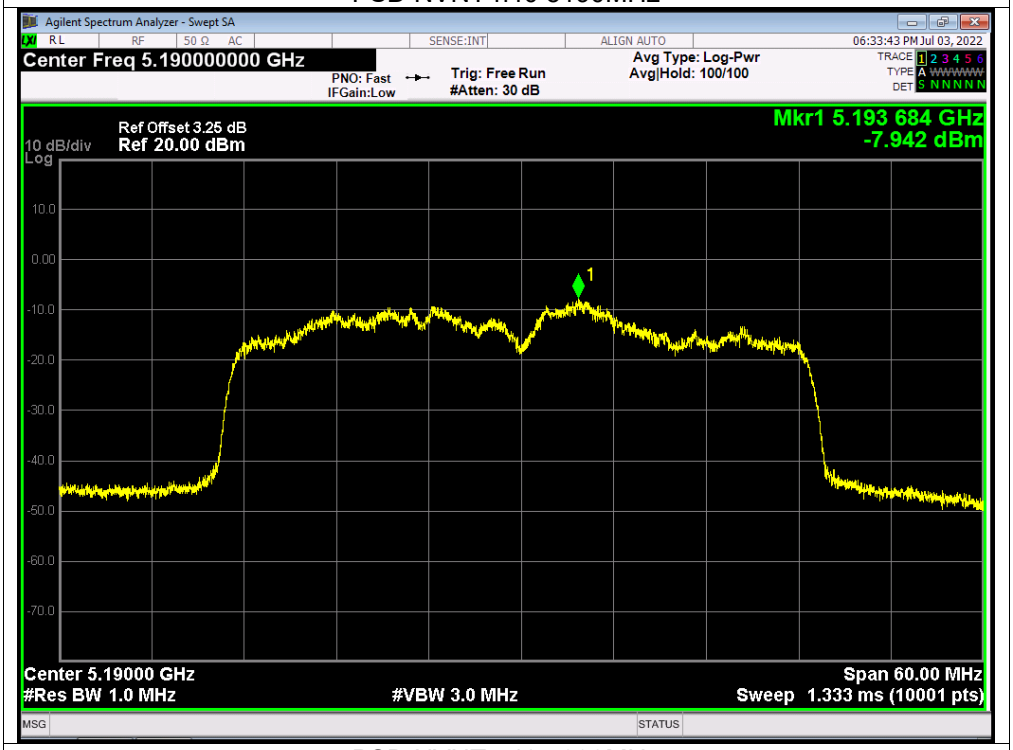
PSD NVNT n20 5200MHz



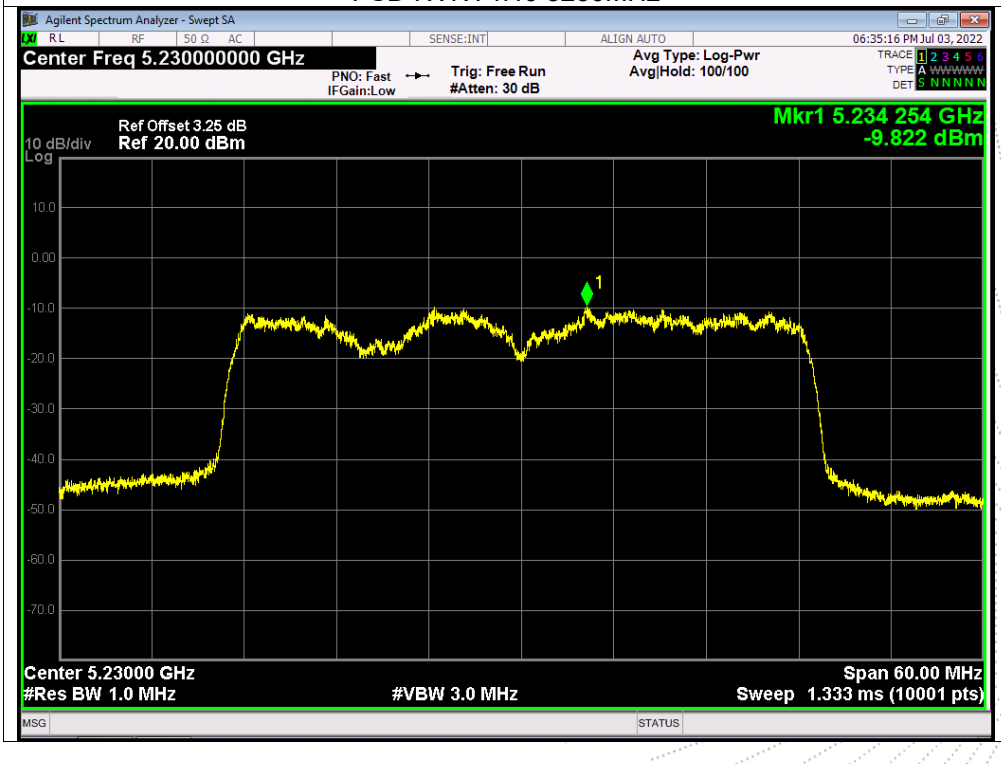
PSD NVNT n20 5240MHz



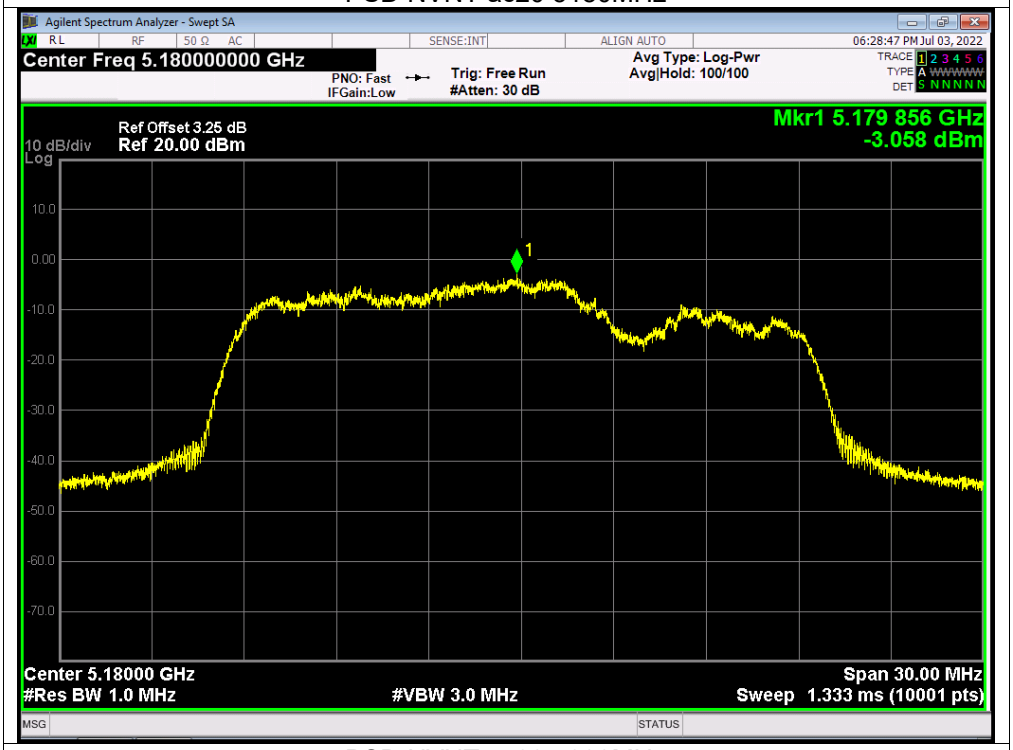
PSD NVNT n40 5190MHz



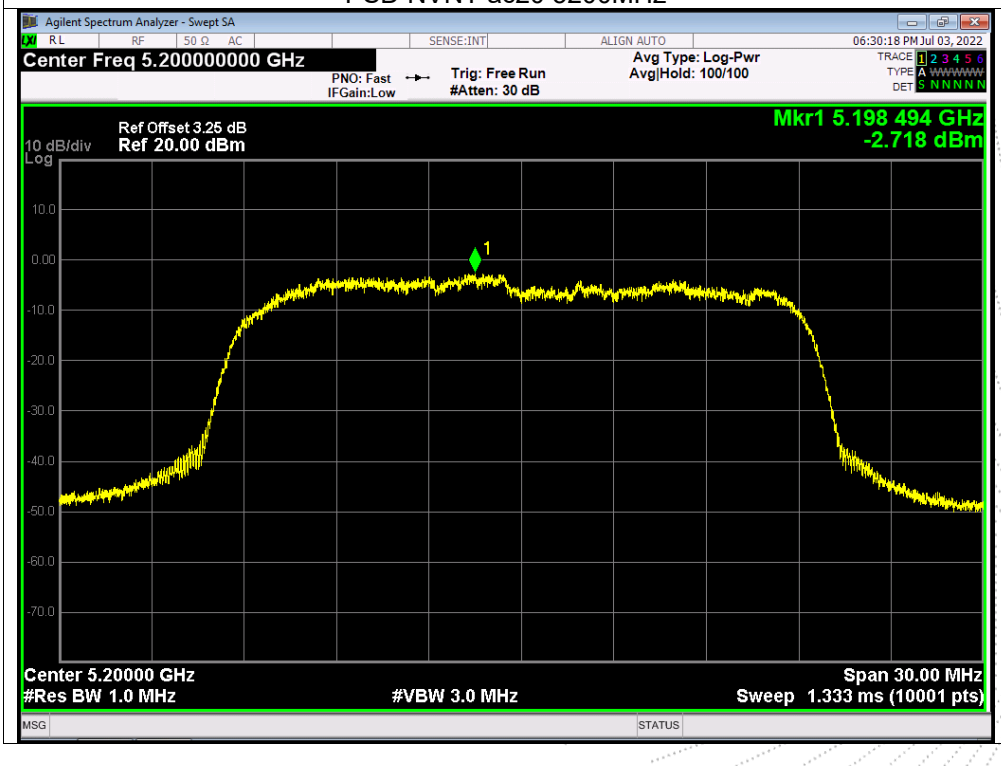
PSD NVNT n40 5230MHz



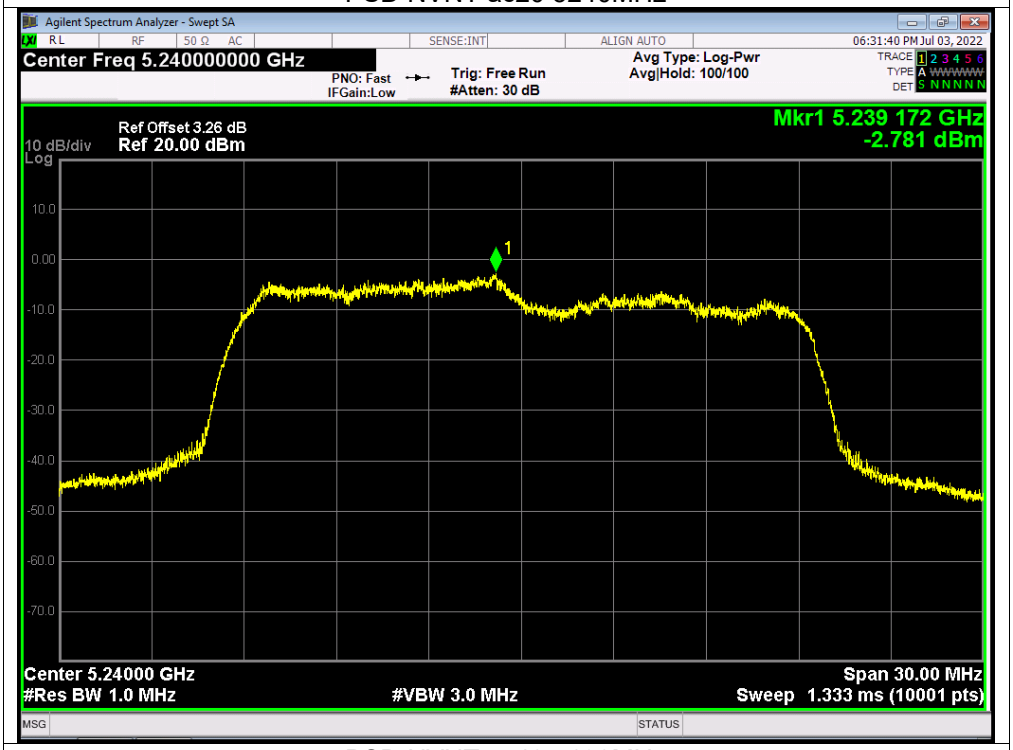
PSD NVNT ac20 5180MHz



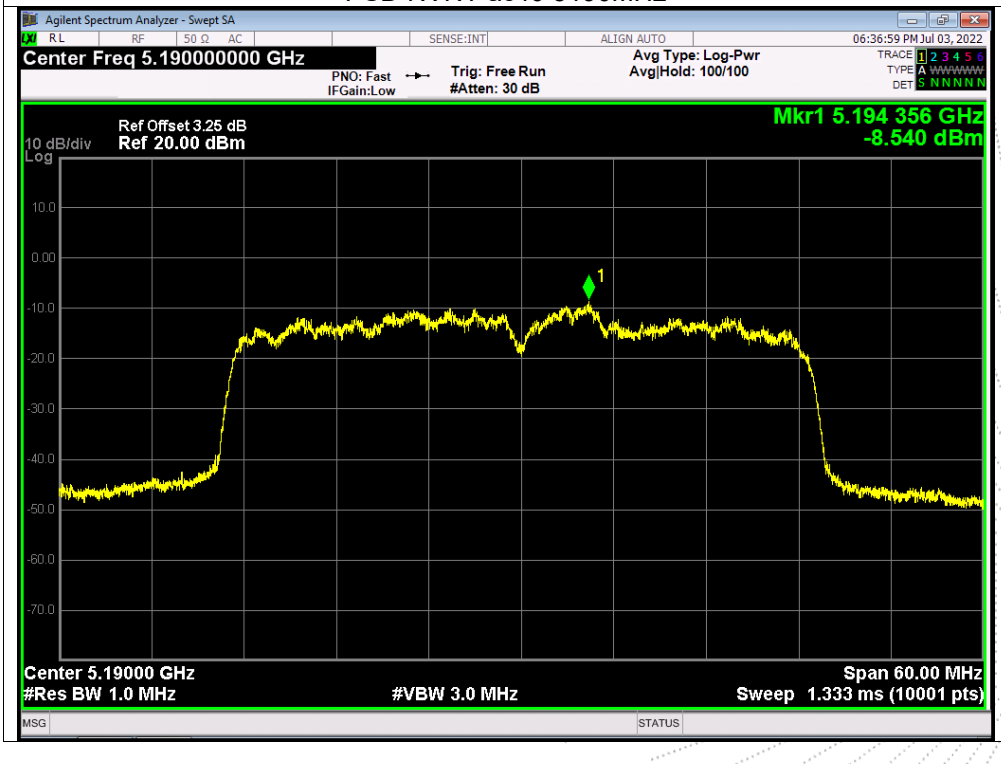
PSD NVNT ac20 5200MHz



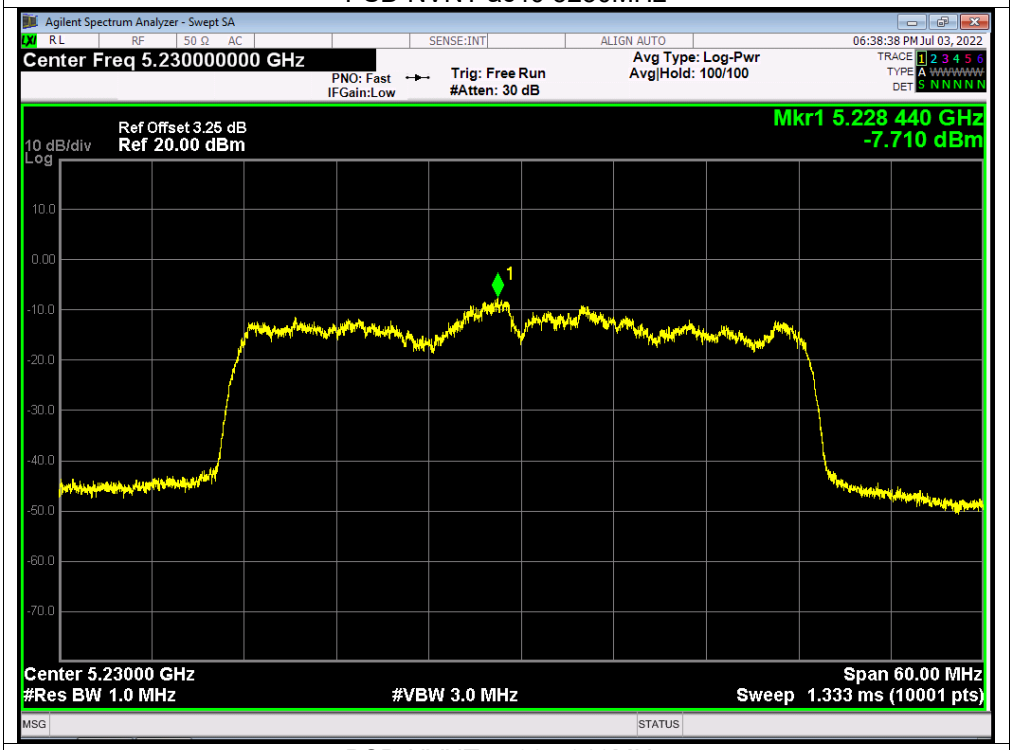
PSD NVNT ac20 5240MHz



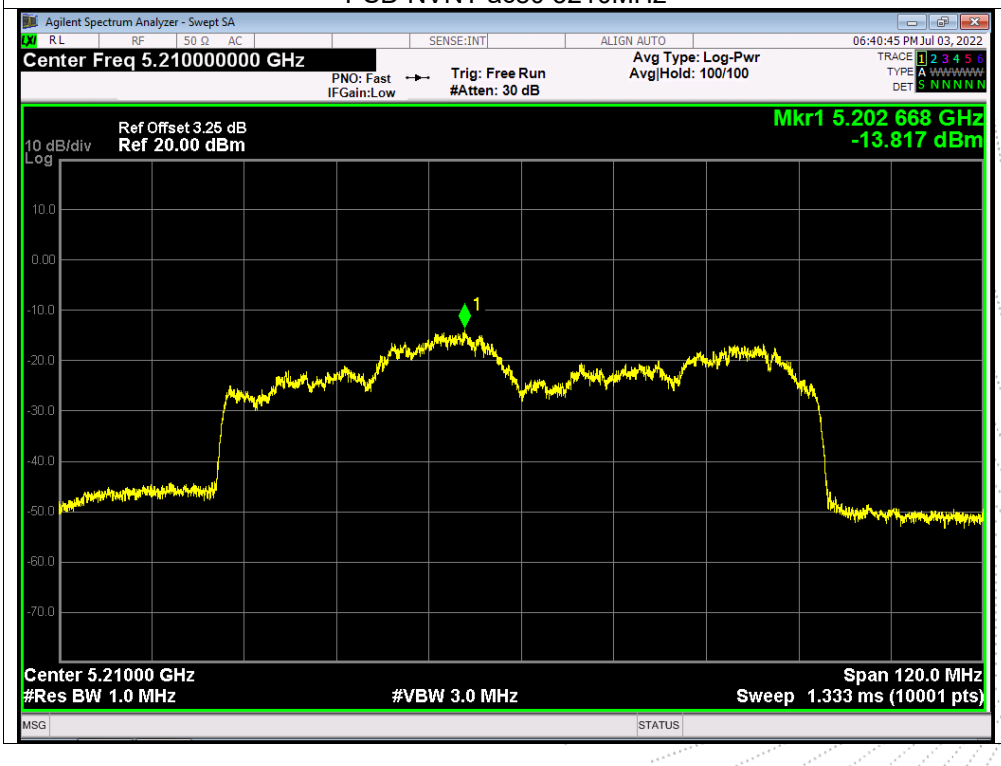
PSD NVNT ac40 5190MHz



PSD NVNT ac40 5230MHz

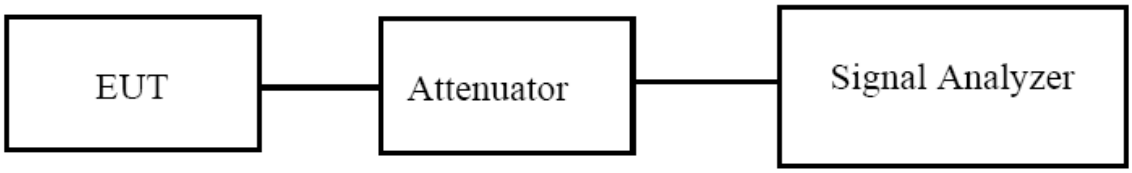


PSD NVNT ac80 5210MHz



9. 26dB & 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 ≥ 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.

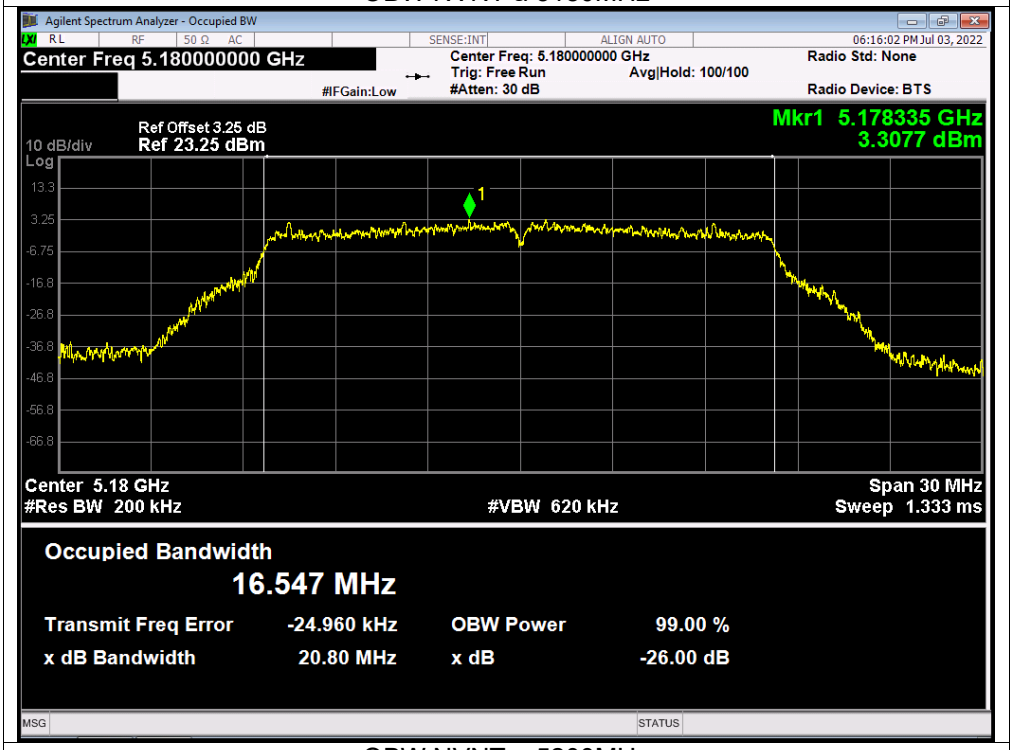
9.5 Test Result

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter
Test Mode ：	TX Frequency U-NII-1 (5180-5240MHz)		

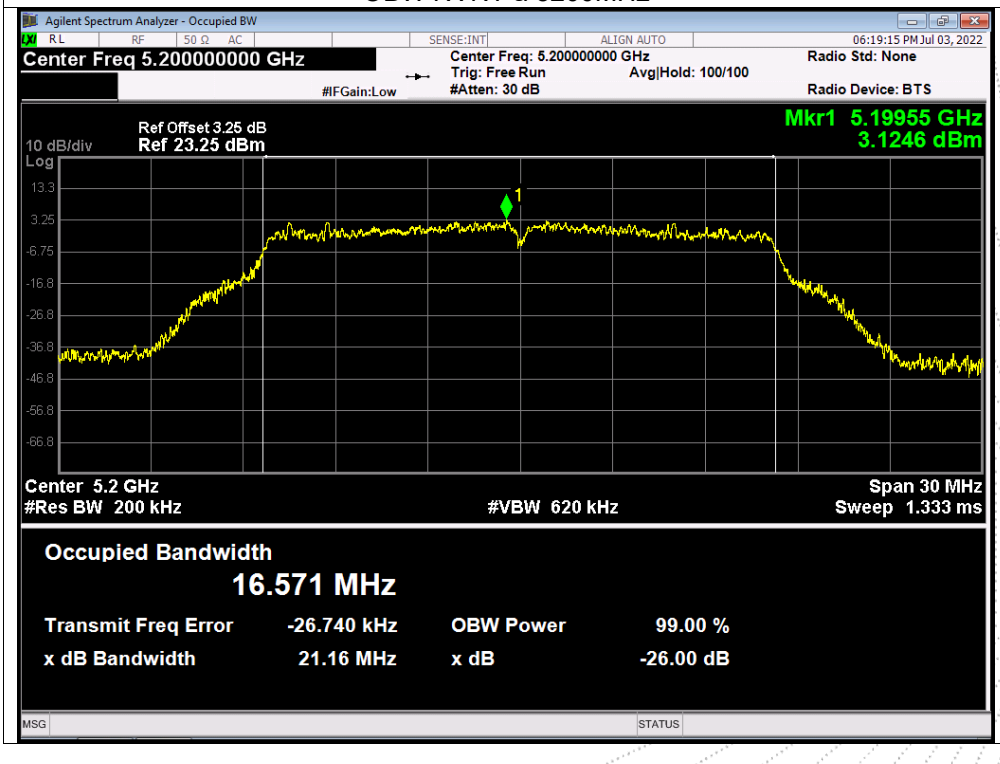
Mode	Channel	Frequency (MHz)	99% bandwidth(MHz)	26dB bandwidth(MHz)	Result
802.11a	CH36	5180	16.547	21.316	Pass
	CH40	5200	16.571	21.284	Pass
	CH48	5240	16.55	21.211	Pass
802.11 n20	CH36	5180	17.711	21.477	Pass
	CH40	5200	17.717	21.385	Pass
	CH48	5240	17.736	21.524	Pass
802.11 n40	CH 38	5190	36.183	40.397	Pass
	CH 46	5230	36.177	40.584	Pass
802.11 AC20	CH36	5180	17.73	21.715	Pass
	CH40	5200	17.696	21.414	Pass
	CH48	5240	17.744	21.392	Pass
802.11 AC40	CH 38	5190	36.153	40.323	Pass
	CH 46	5230	36.189	40.454	Pass
802.11 AC80	CH 42	5210	75.477	81.196	Pass

99% OBW

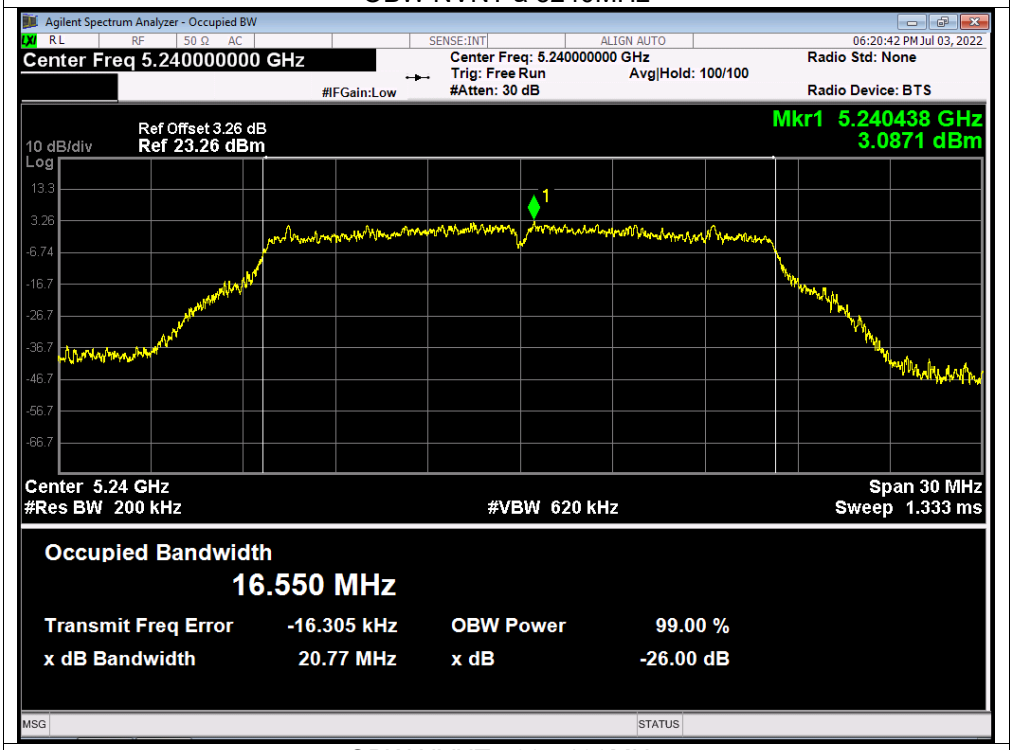
Test Graphs
OBW NVNT a 5180MHz



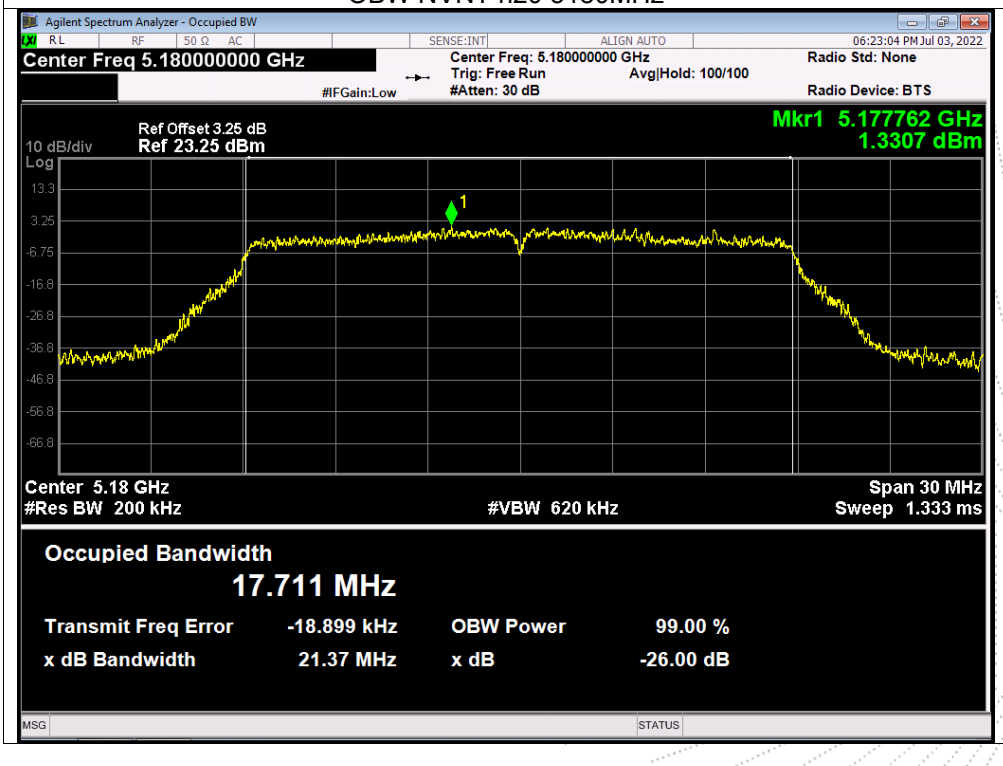
OBW NVNT a 5200MHz



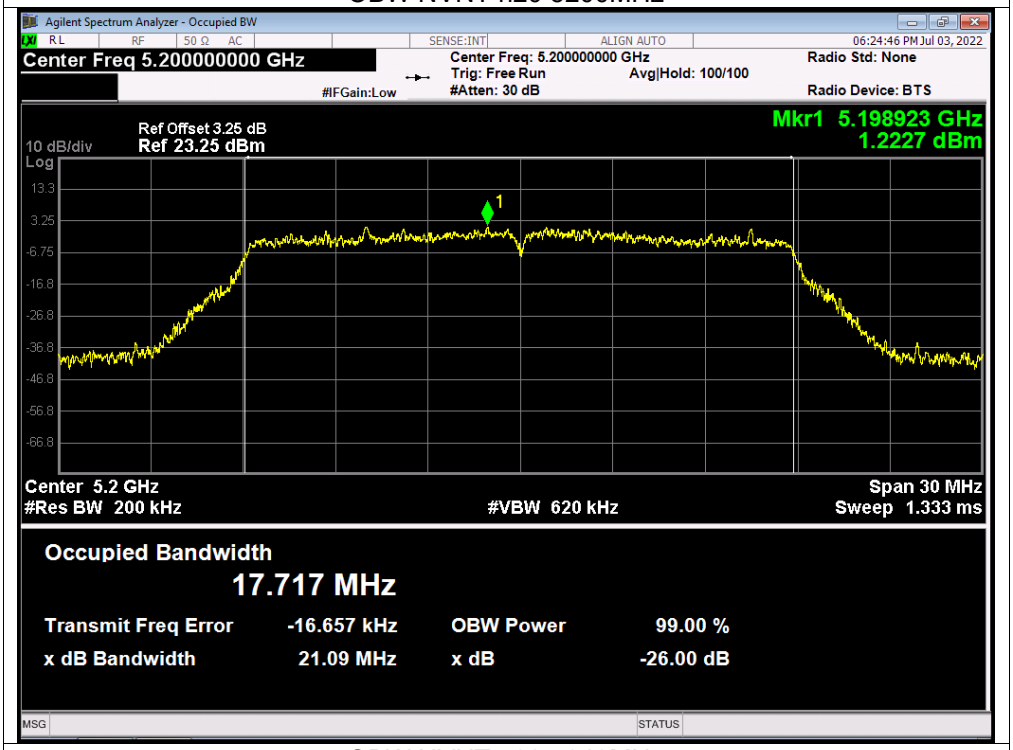
OBW NVNT a 5240MHz



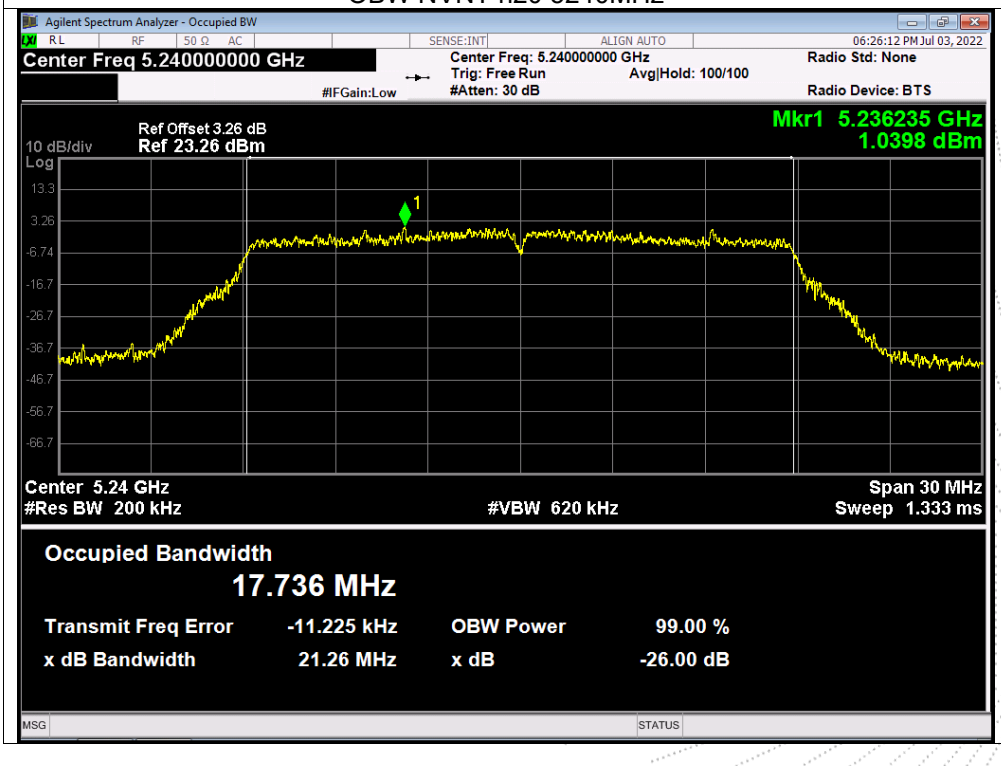
OBW NVNT n20 5180MHz



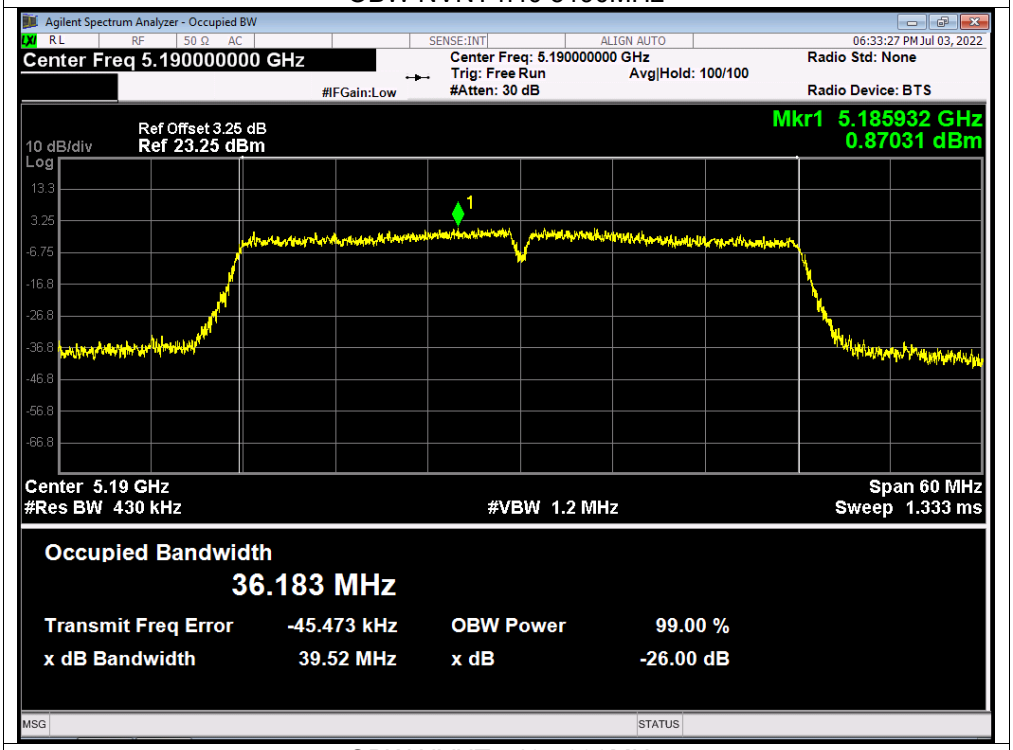
OBW NVNT n20 5200MHz



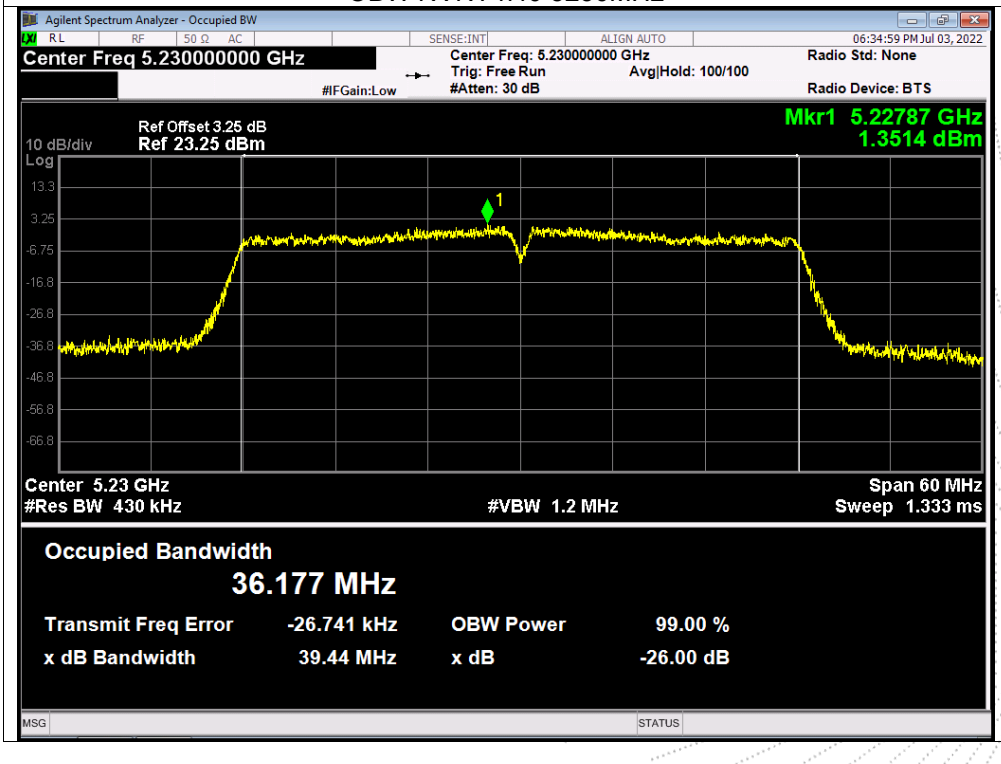
OBW NVNT n20 5240MHz



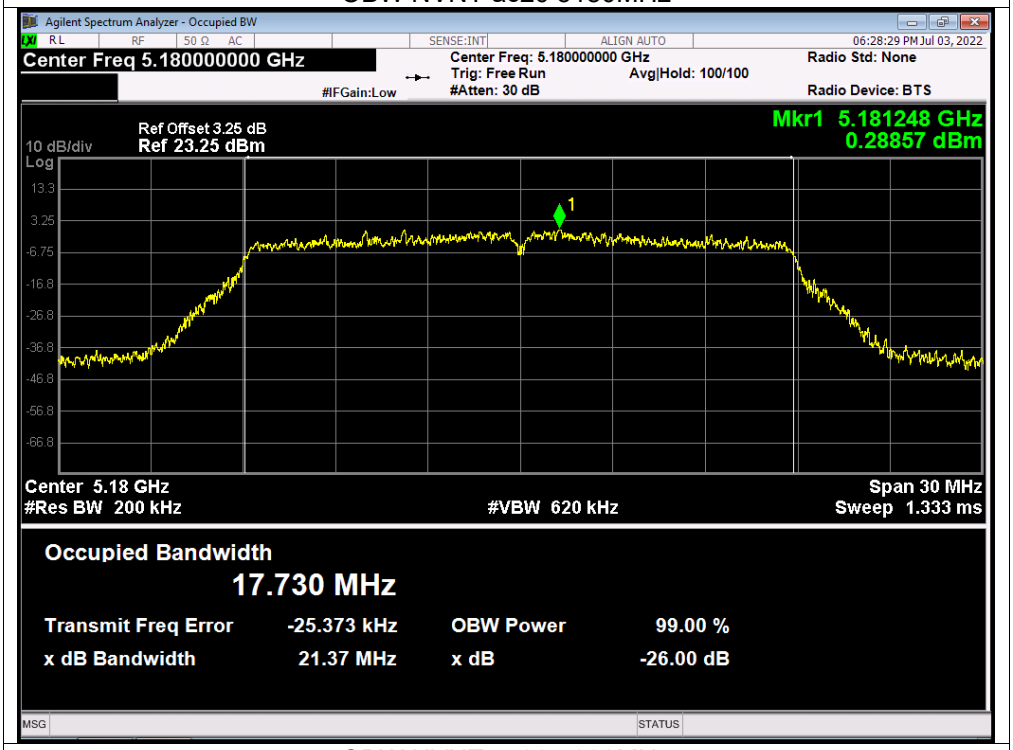
OBW NVNT n40 5190MHz



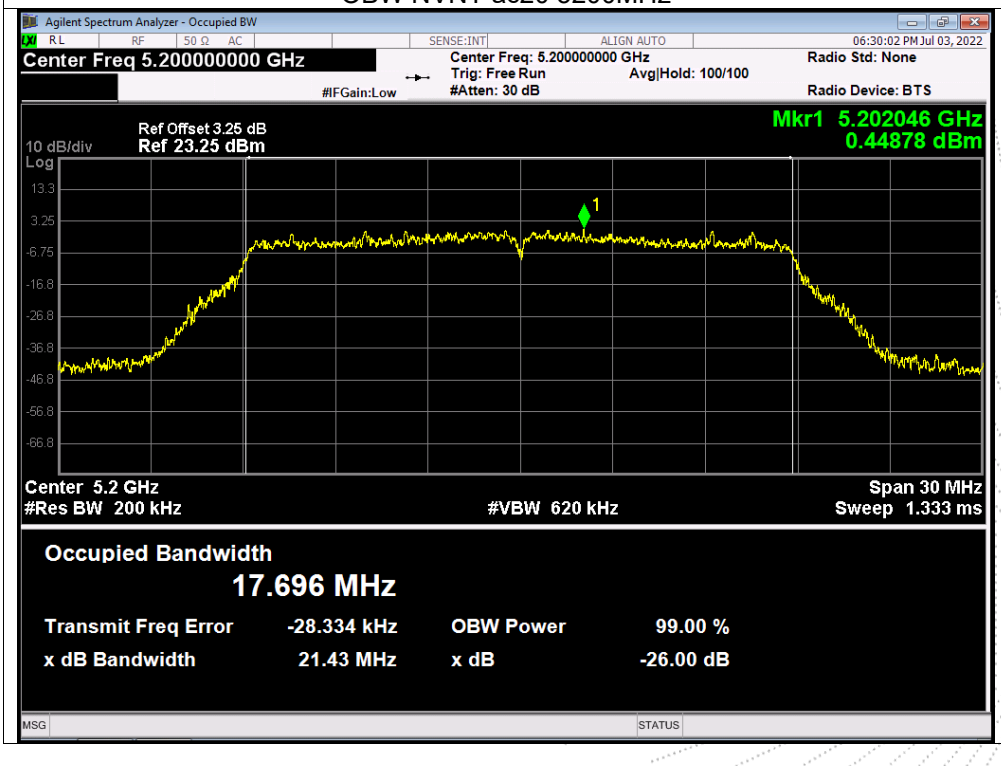
OBW NVNT n40 5230MHz



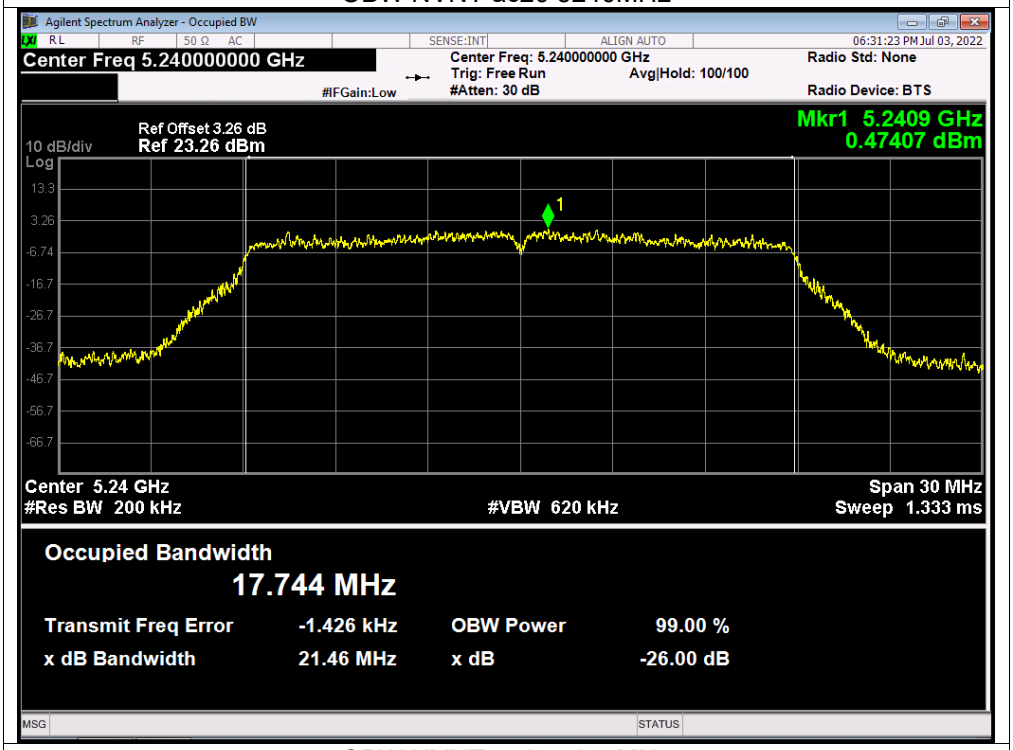
OBW NVNT ac20 5180MHz



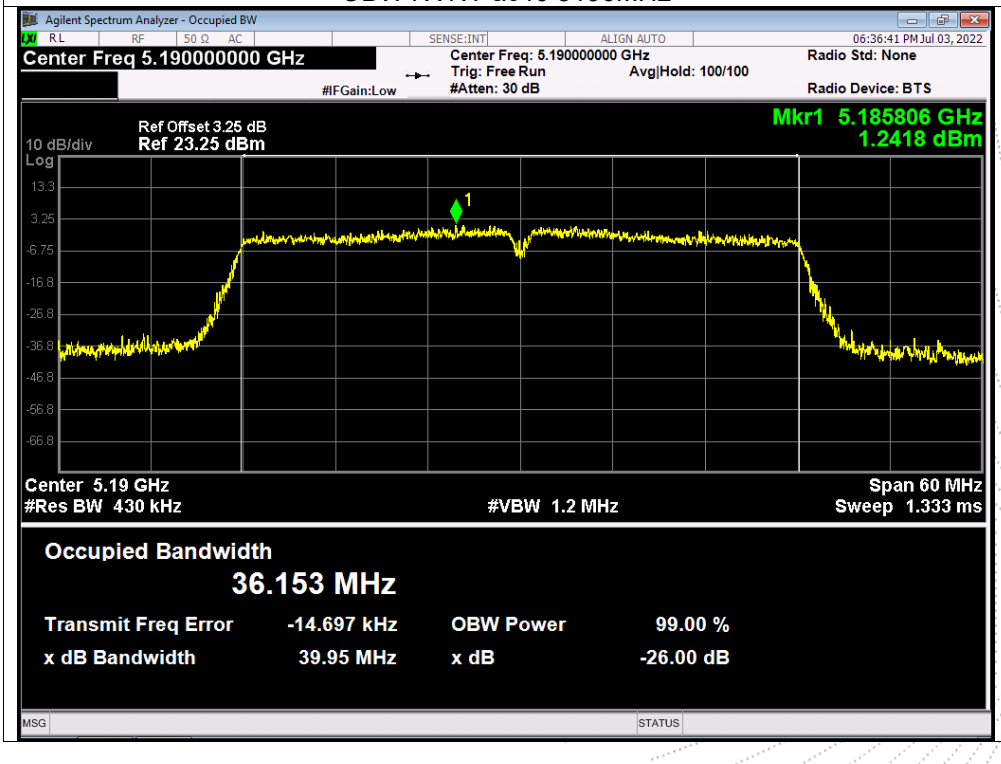
OBW NVNT ac20 5200MHz



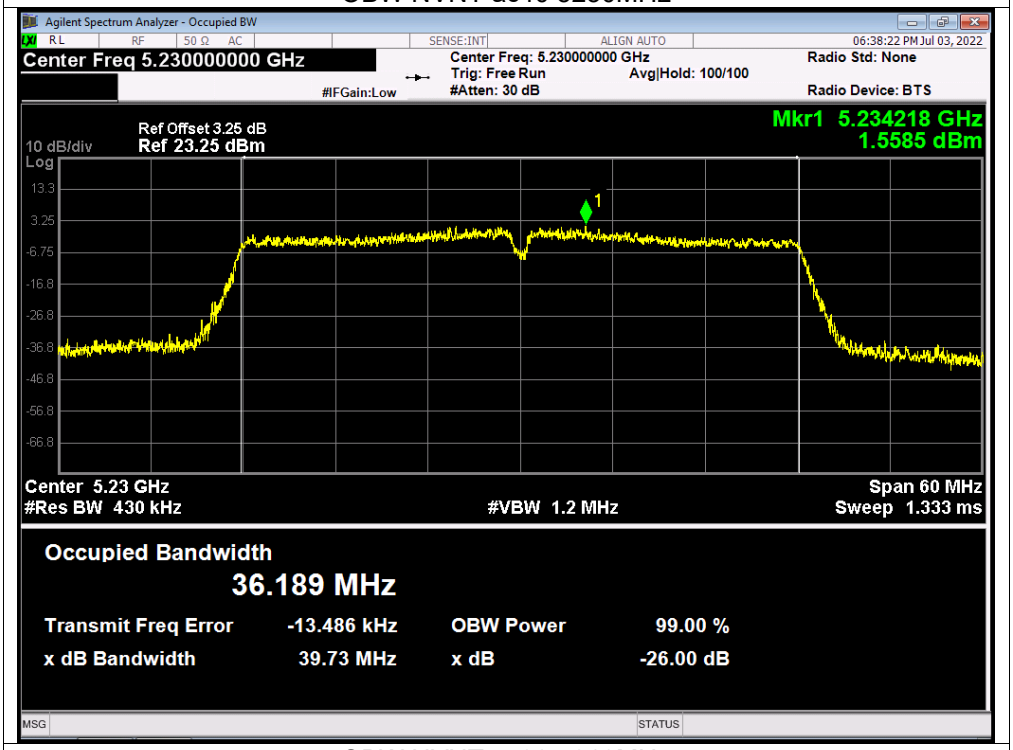
OBW NVNT ac20 5240MHz



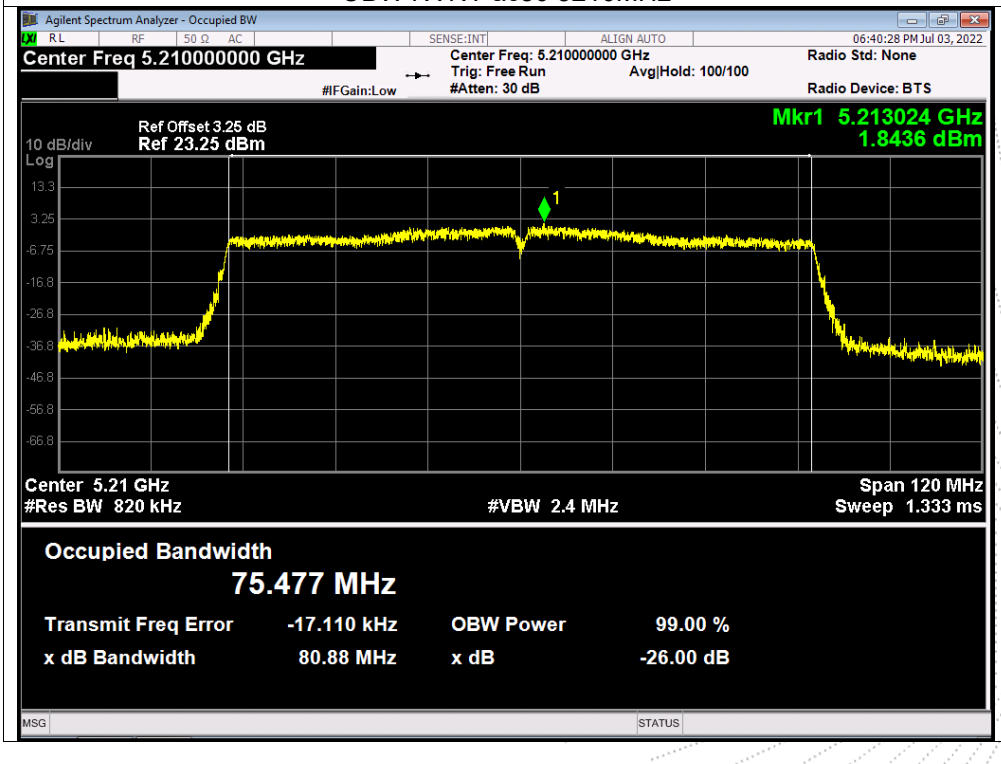
OBW NVNT ac40 5190MHz



OBW NVNT ac40 5230MHz



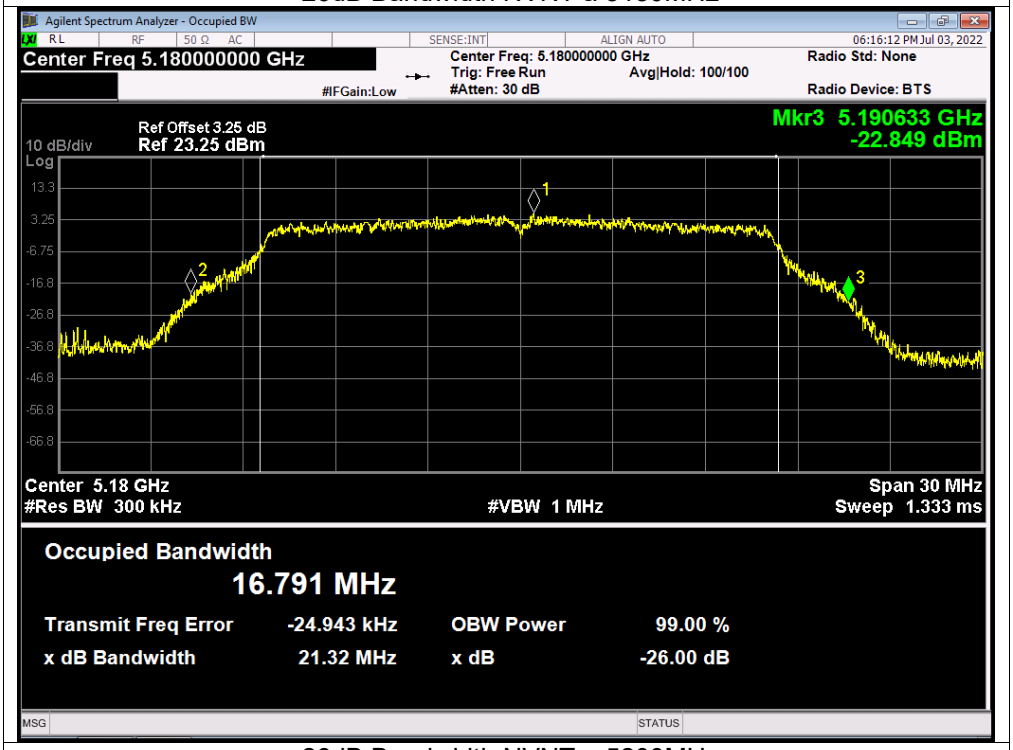
OBW NVNT ac80 5210MHz



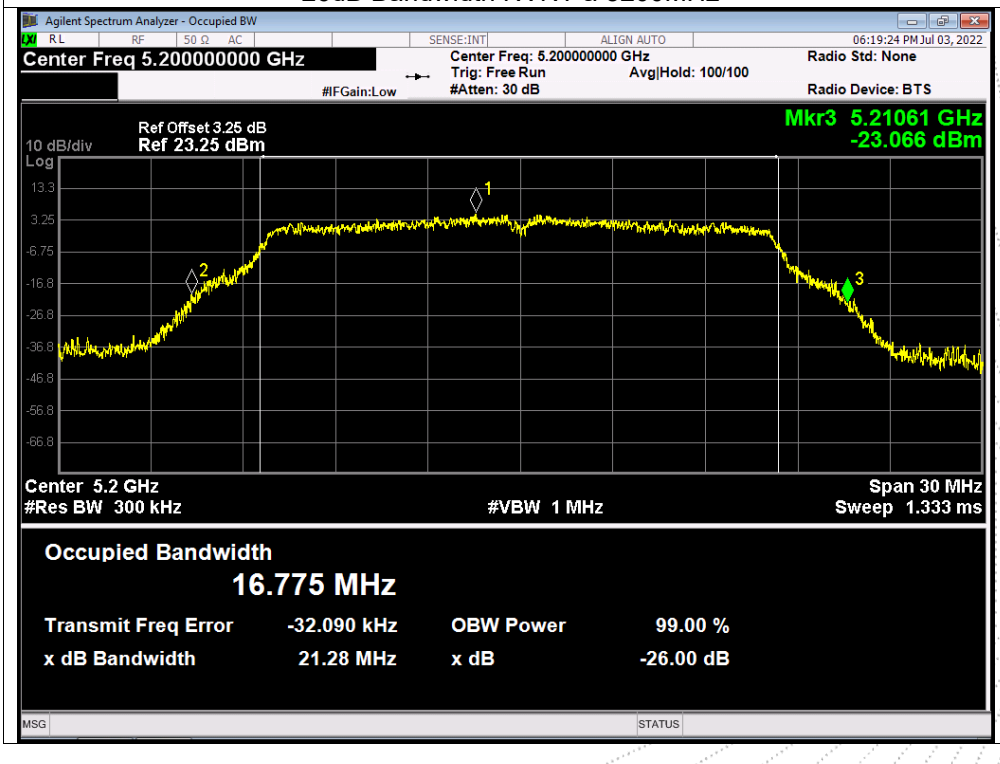
-26dB Bandwidth

Test Graphs

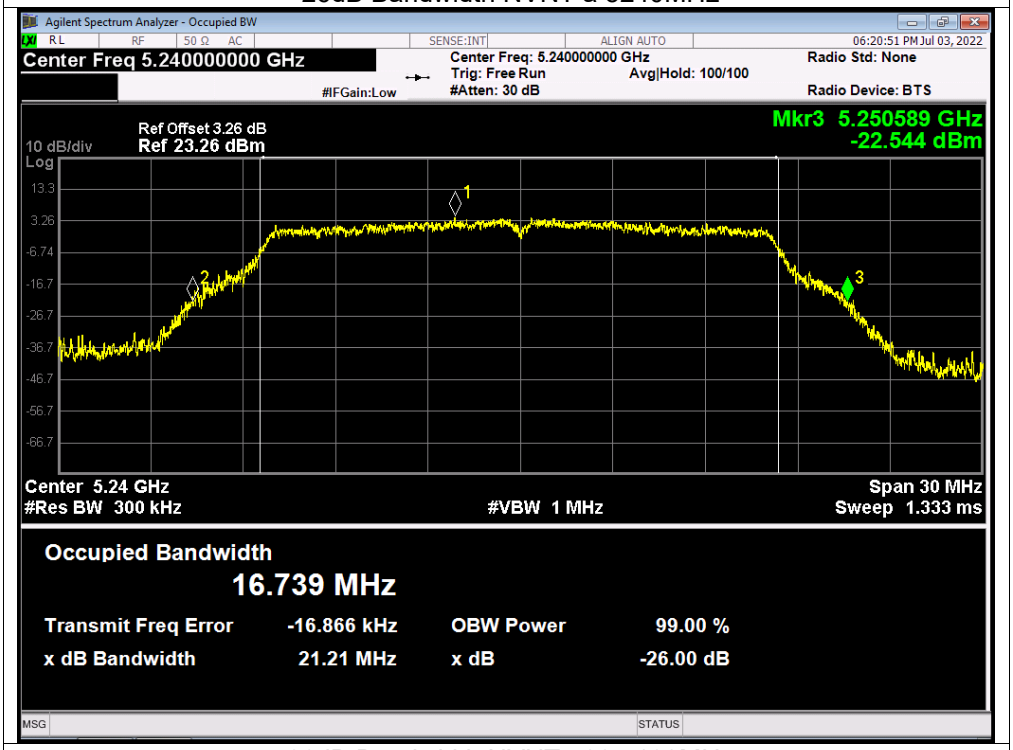
-26dB Bandwidth NVNT a 5180MHz



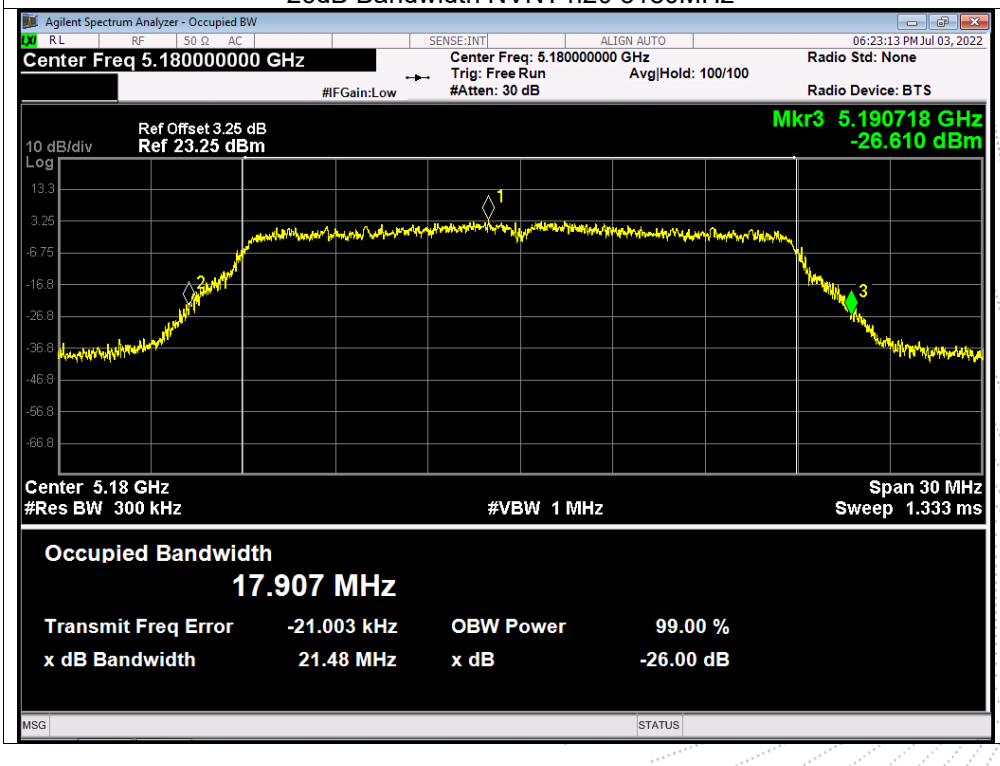
-26dB Bandwidth NVNT a 5200MHz



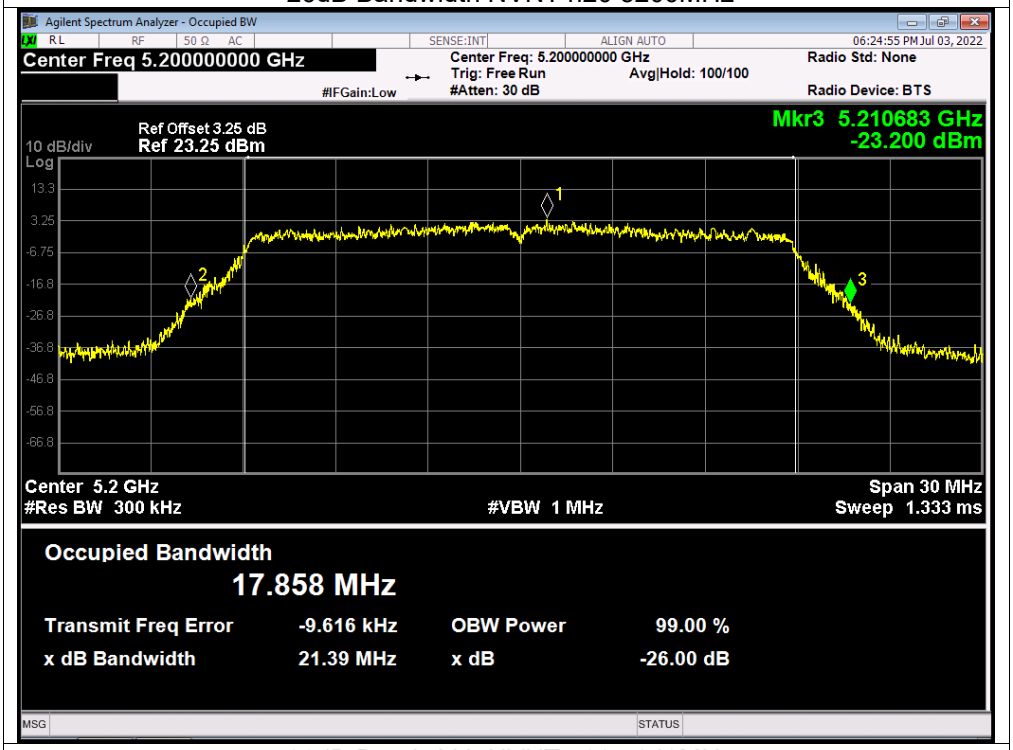
-26dB Bandwidth NVNT a 5240MHz



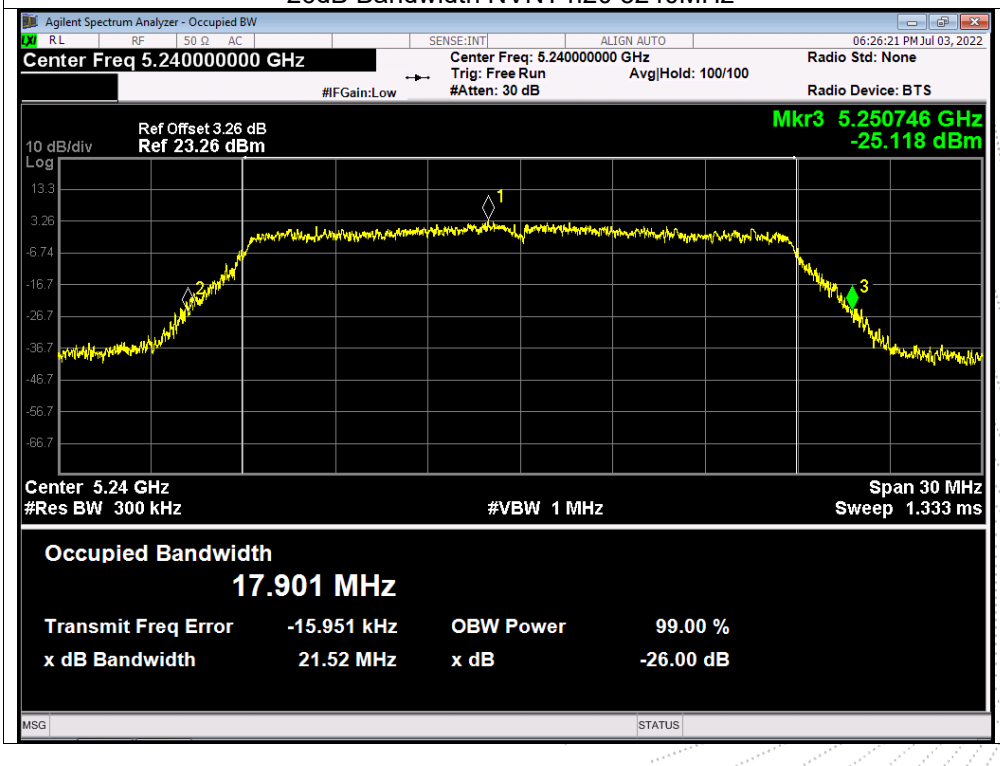
-26dB Bandwidth NVNT n20 5180MHz



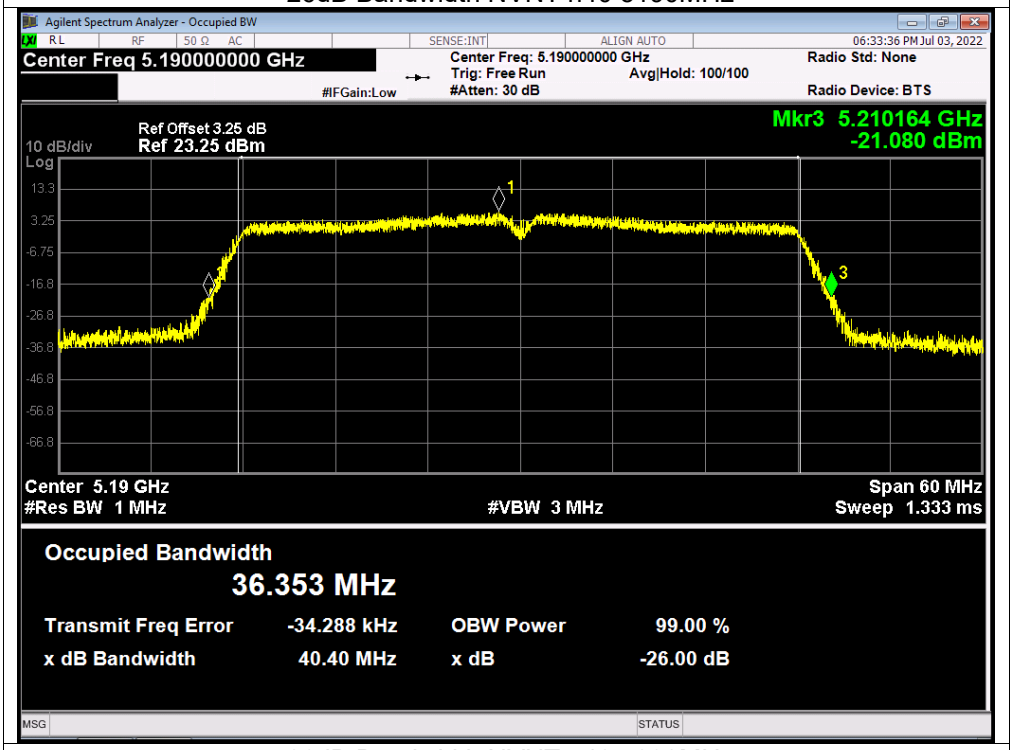
-26dB Bandwidth NVNT n20 5200MHz



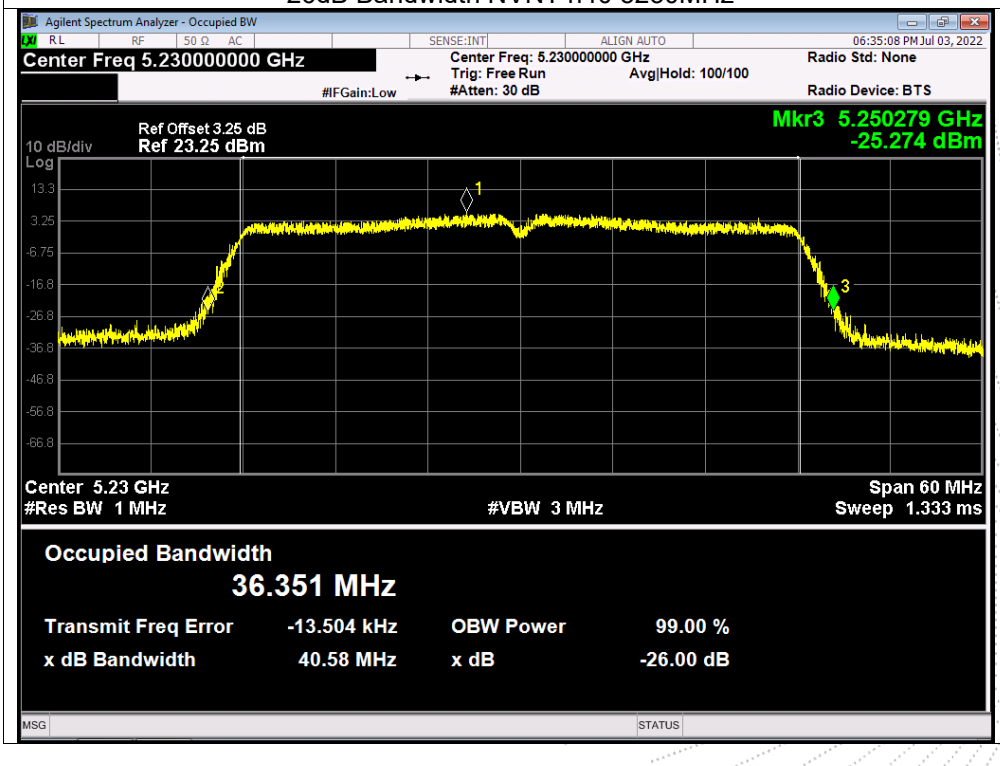
-26dB Bandwidth NVNT n20 5240MHz



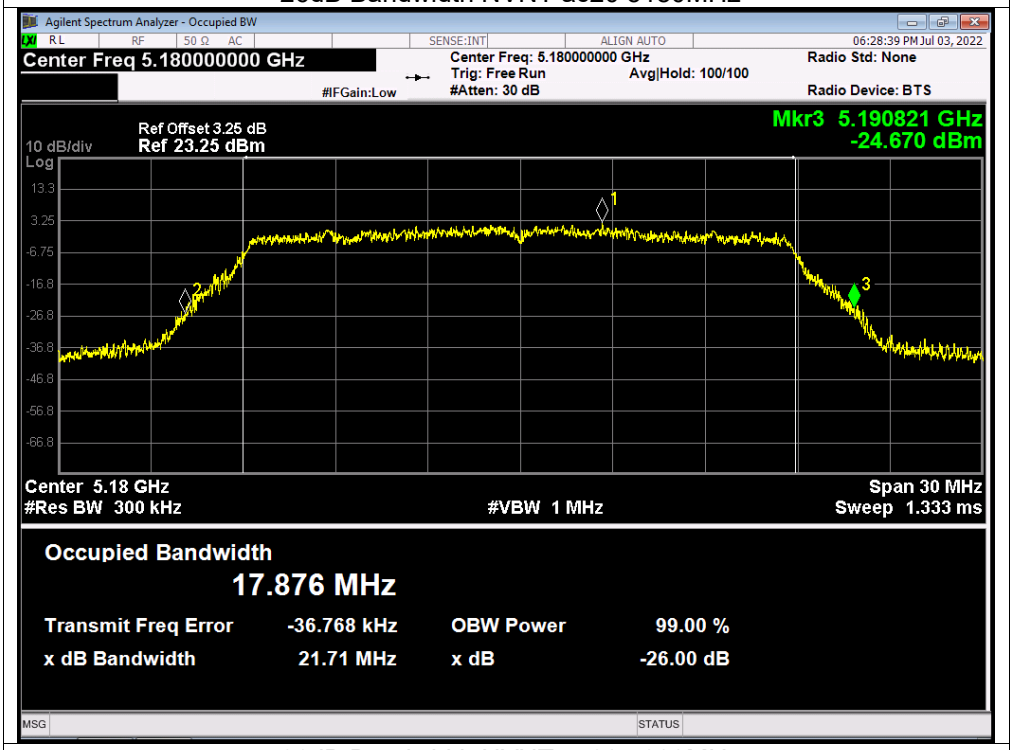
-26dB Bandwidth NVNT n40 5190MHz



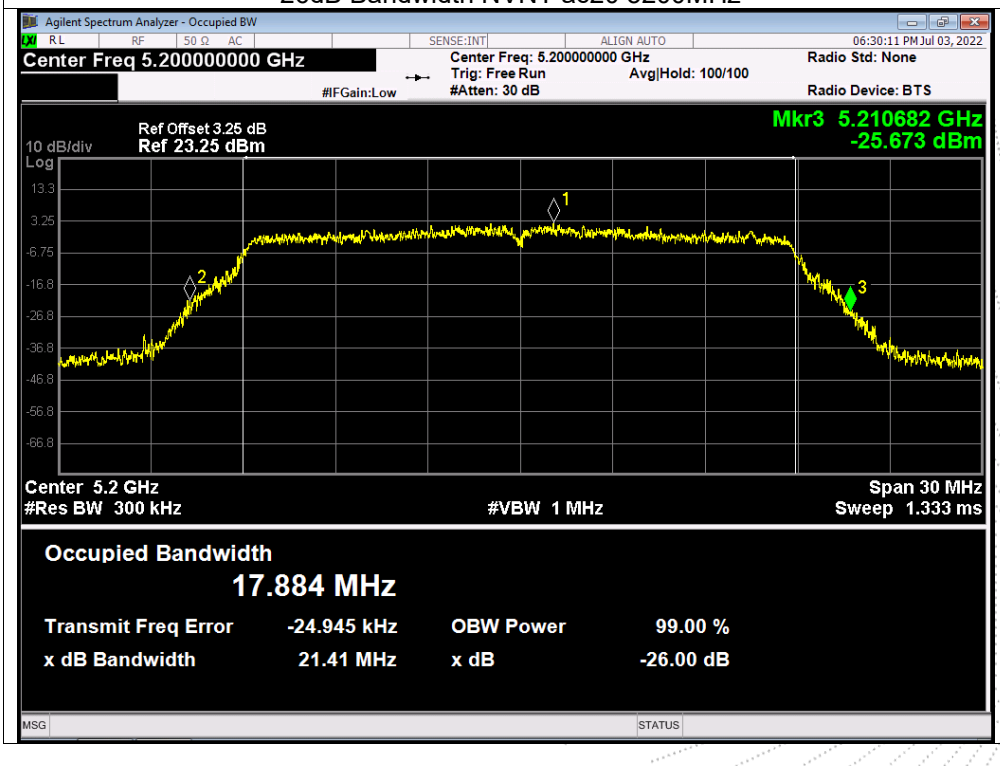
-26dB Bandwidth NVNT n40 5230MHz



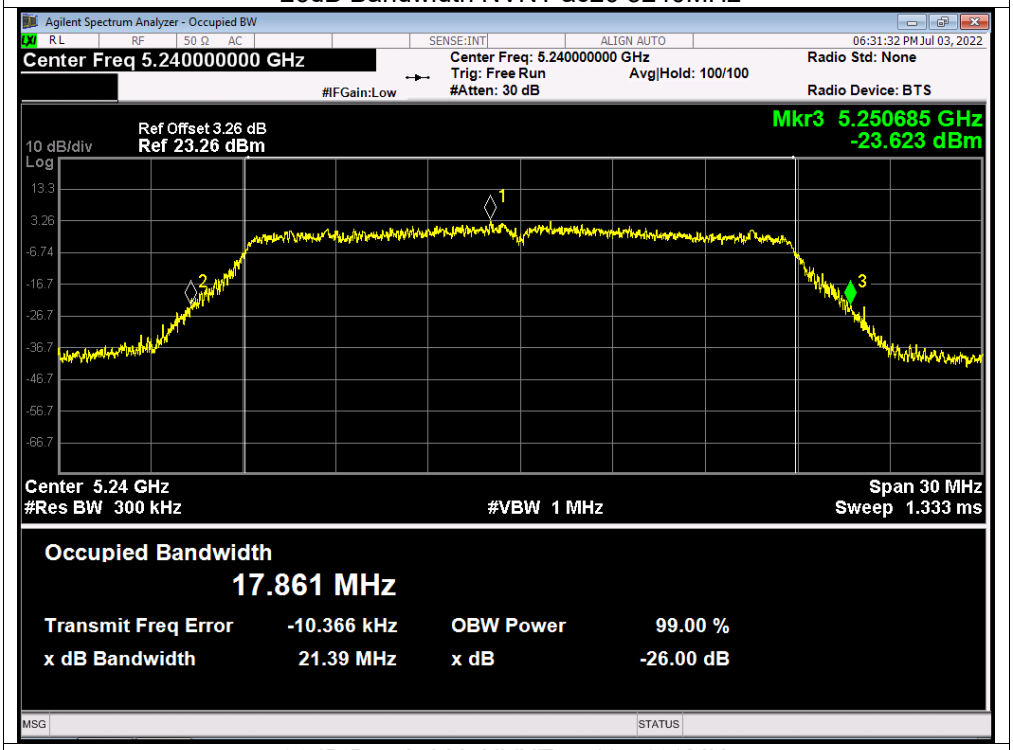
-26dB Bandwidth NVNT ac20 5180MHz



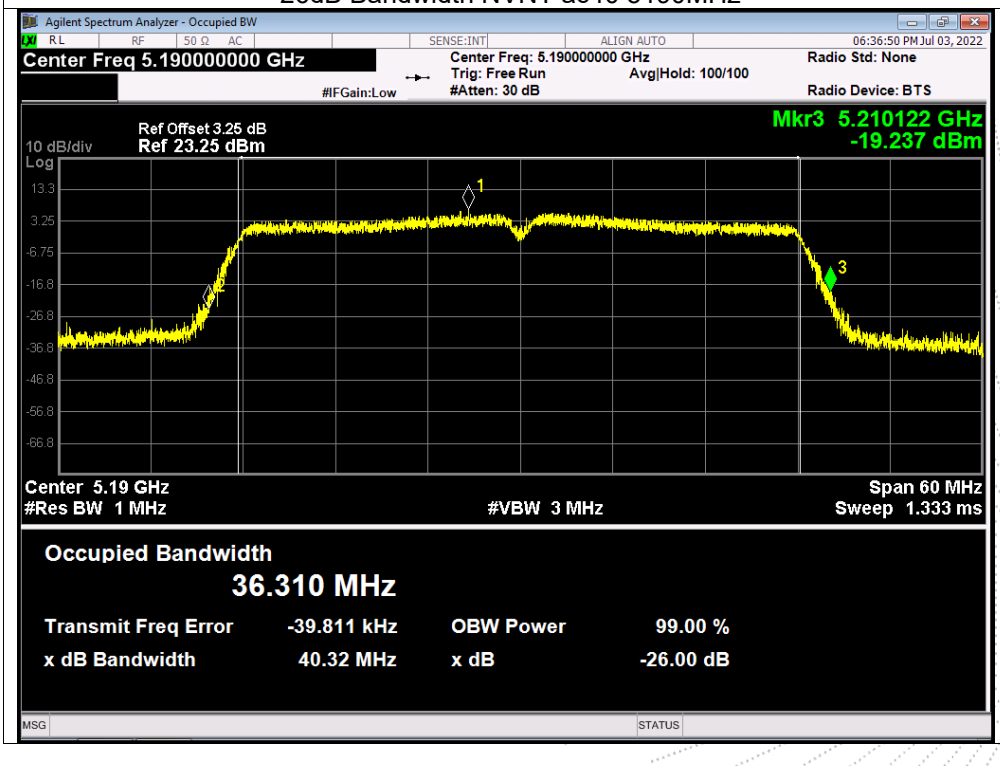
-26dB Bandwidth NVNT ac20 5200MHz



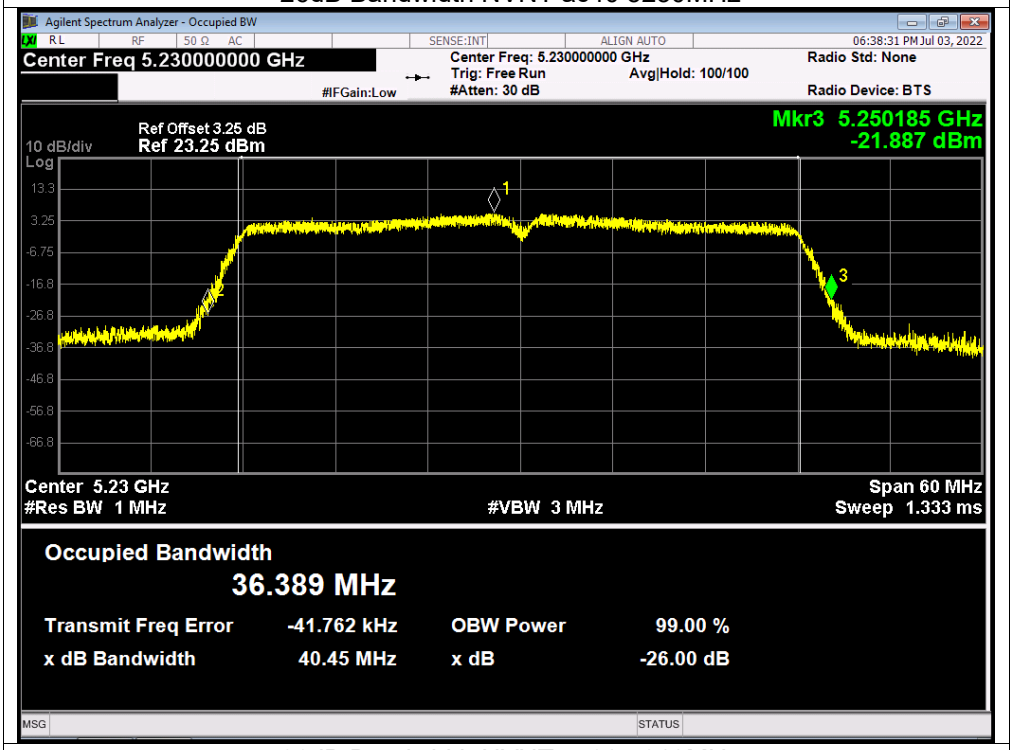
-26dB Bandwidth NVNT ac20 5240MHz



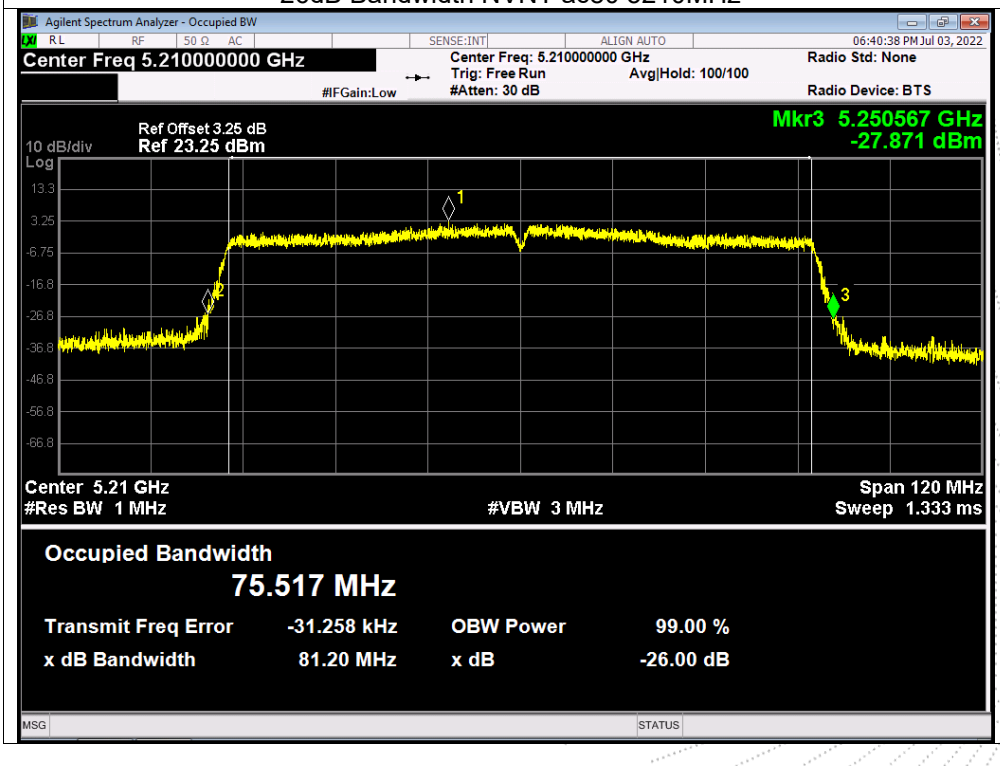
-26dB Bandwidth NVNT ac40 5190MHz



-26dB Bandwidth NVNT ac40 5230MHz

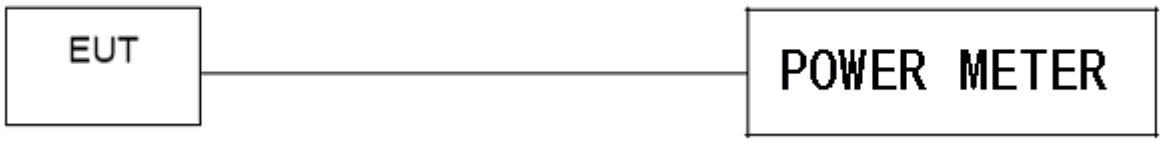


-26dB Bandwidth NVNT ac80 5210MHz



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	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.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.

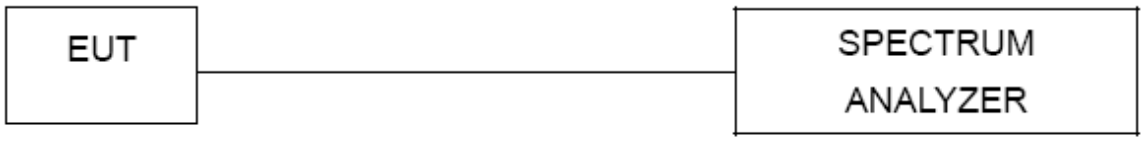
10.5 Test Result

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter
Test Mode ：	TX (5.1G) Mode Frequency U-NII-1 (5180-5240MHz)		

Mode	Test Channel	Frequency	Maximum output power. Antenna port (AV)	LIMIT	Result
		(MHz)	(dBm)	dBm	
TX 802.11a Mode	CH36	5180	10.97	24	Pass
	CH40	5200	10.88	24	Pass
	CH48	5240	10.87	24	Pass
TX 802.11 n20M Mode	CH36	5180	9.45	24	Pass
	CH40	5200	9.33	24	Pass
	CH48	5240	9.53	24	Pass
TX 802.11 n40M Mode	CH38	5190	8.62	24	Pass
	CH46	5230	8.5	24	Pass
TX 802.11 AC20M Mode	CH36	5180	8.75	24	Pass
	CH40	5200	8.63	24	Pass
	CH48	5240	9.94	24	Pass
TX 802.11 AC40M Mode	CH38	5190	8.57	24	Pass
	CH46	5230	8.47	24	Pass
TX 802.11 AC80M Mode	CH42	5210	7.39	24	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

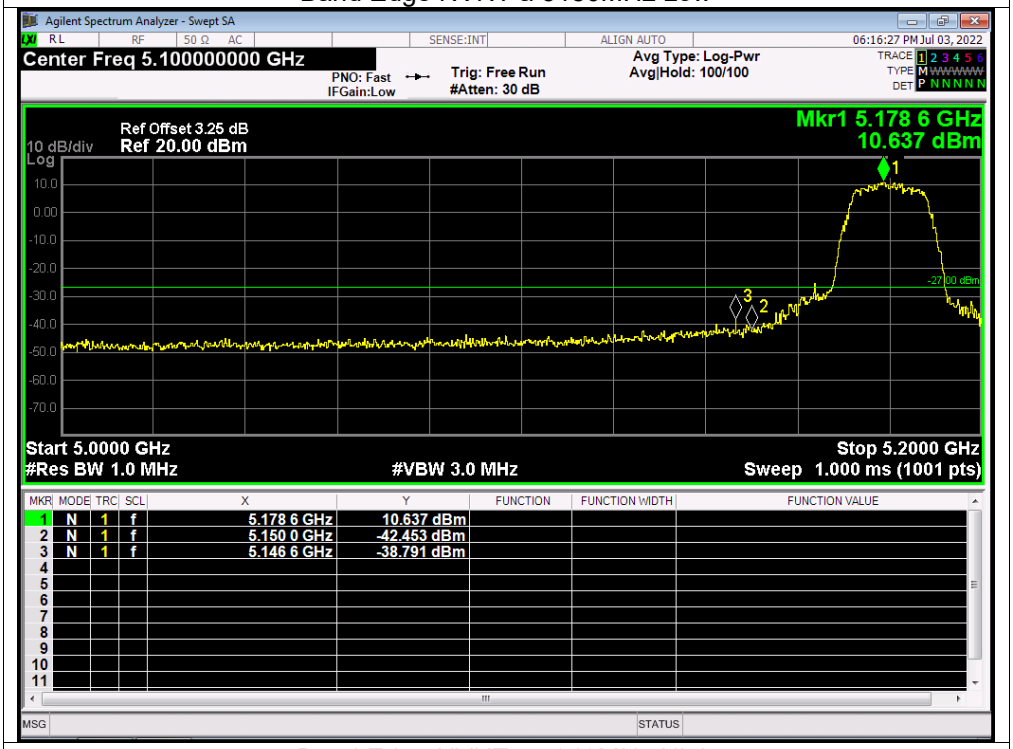
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data

11.5 Test Result

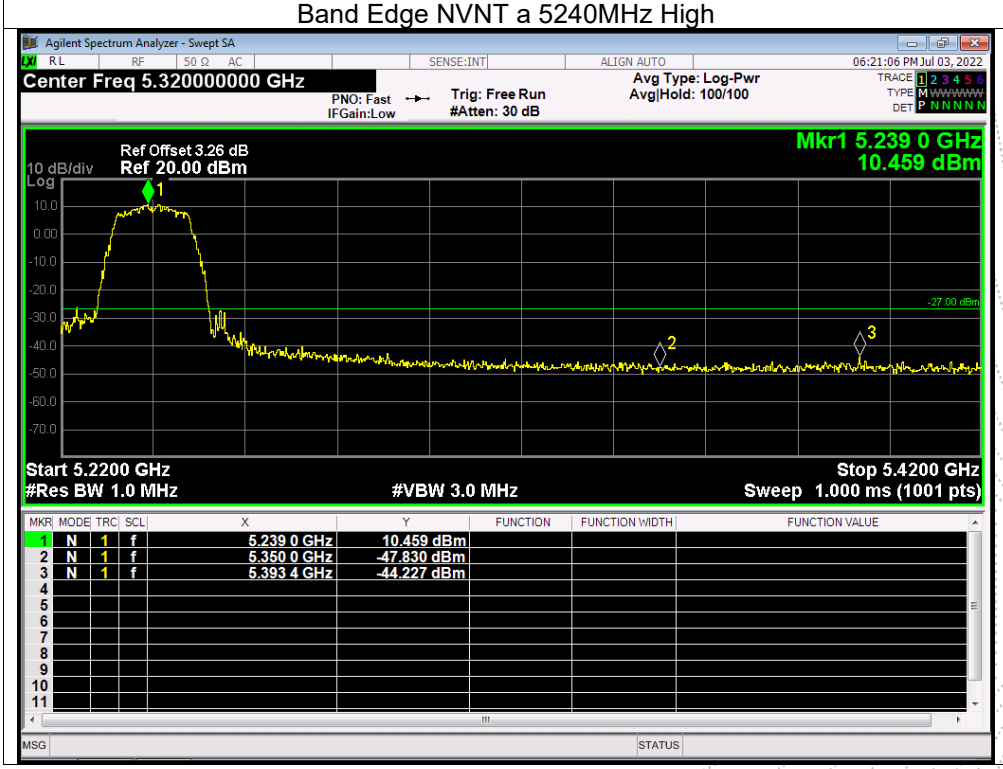
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter
Test Mode ：	TX (5.1G) Mode Frequency U-NII-1 (5180-5240MHz)		

Condition	Mode	Frequency (MHz)	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	a	5180	-38.79	-27	Pass
NVNT	a	5240	-44.22	-27	Pass
NVNT	n20	5180	-39.46	-27	Pass
NVNT	n20	5240	-44.6	-27	Pass
NVNT	n40	5190	-35.45	-27	Pass
NVNT	n40	5230	-45.31	-27	Pass
NVNT	ac20	5180	-42.86	-27	Pass
NVNT	ac20	5240	-45.71	-27	Pass
NVNT	ac40	5190	-33.96	-27	Pass
NVNT	ac40	5230	-45.5	-27	Pass
NVNT	ac80	5210	-43.13	-27	Pass
NVNT	ac80	5210	-32.28	-27	Pass

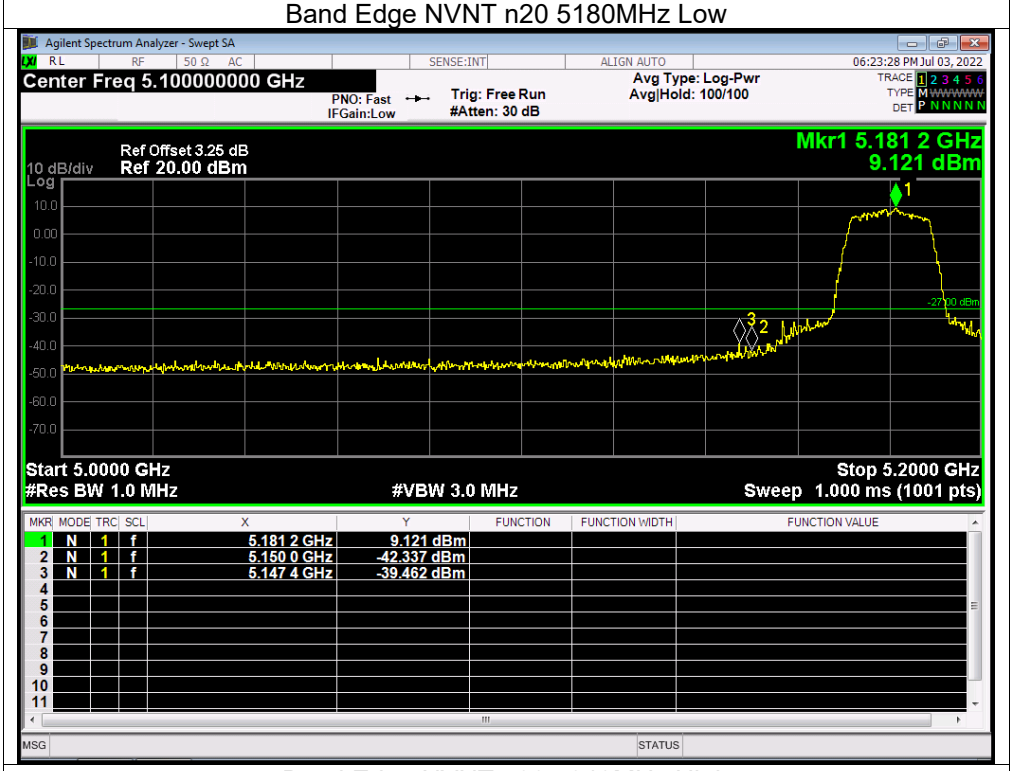
Test Graphs
Band Edge NVNT a 5180MHz Low



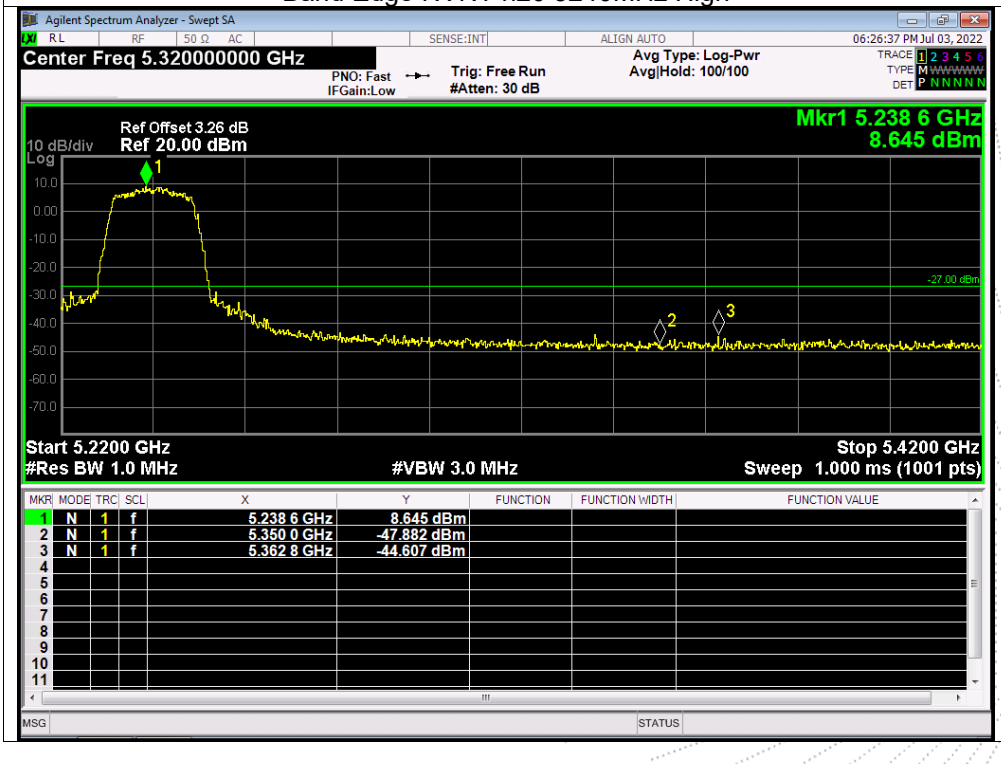
Band Edge NVNT a 5240MHz High



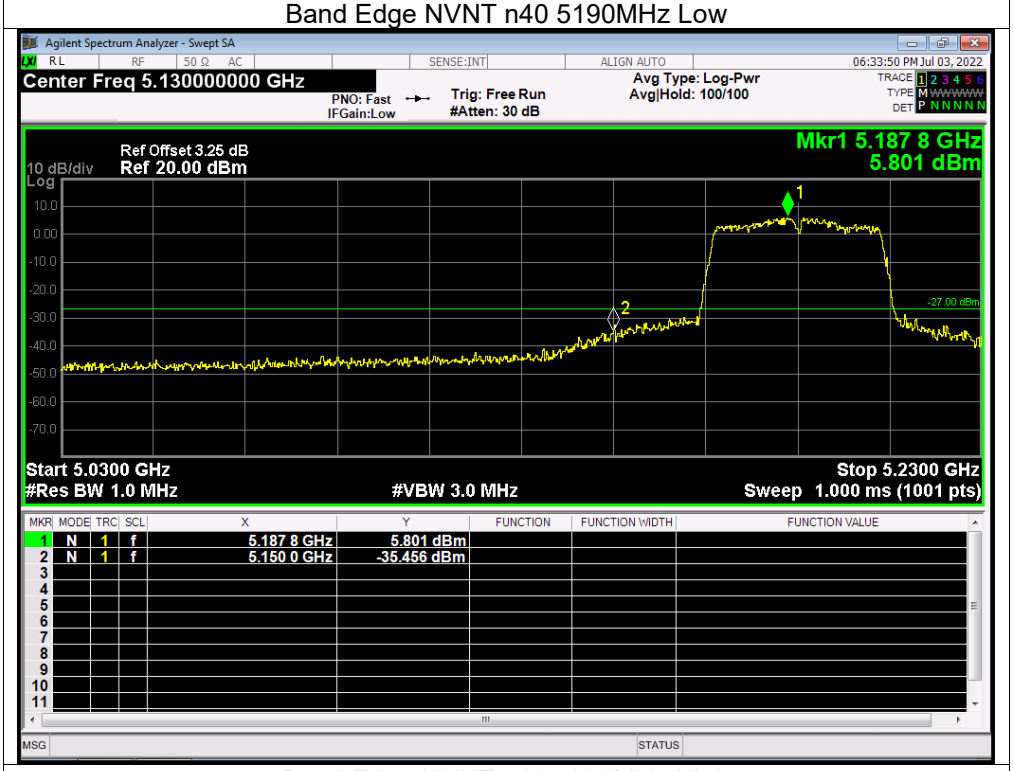
Band Edge NVNT n20 5180MHz Low



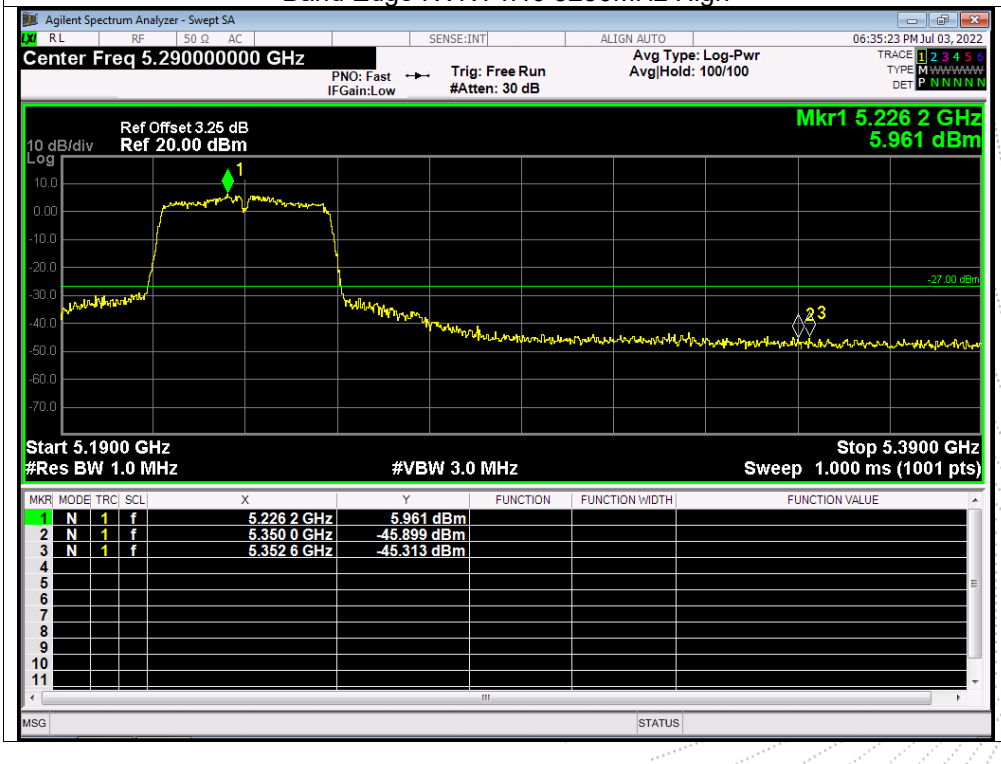
Band Edge NVNT n20 5240MHz High



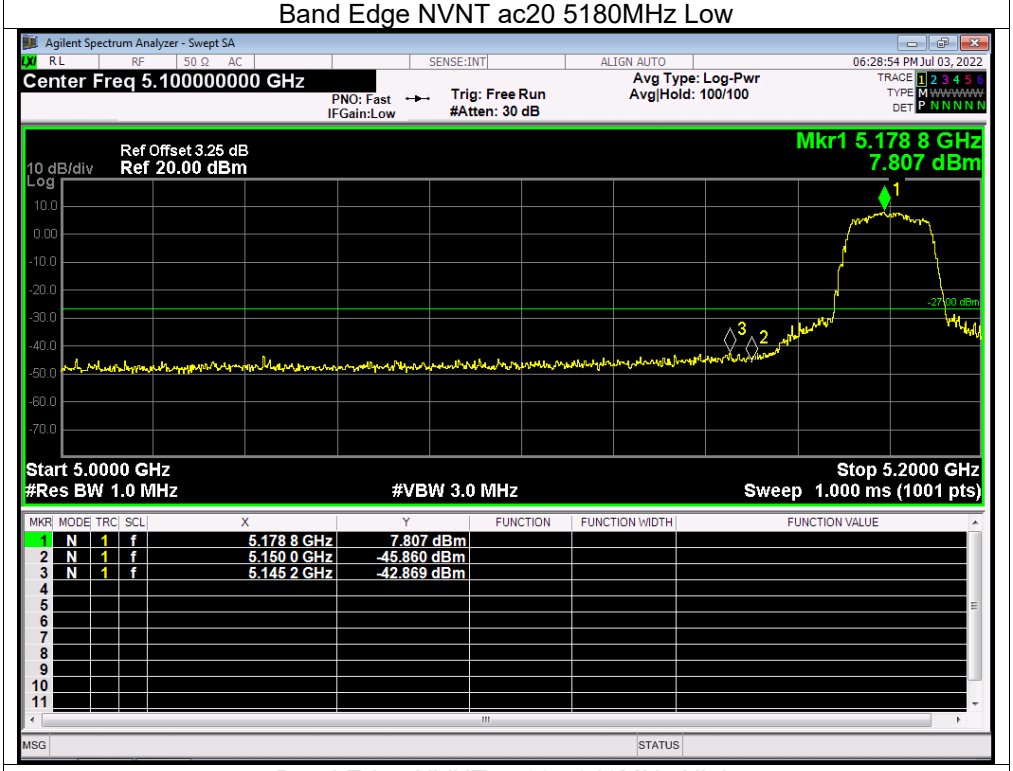
Band Edge NVNT n40 5190MHz Low



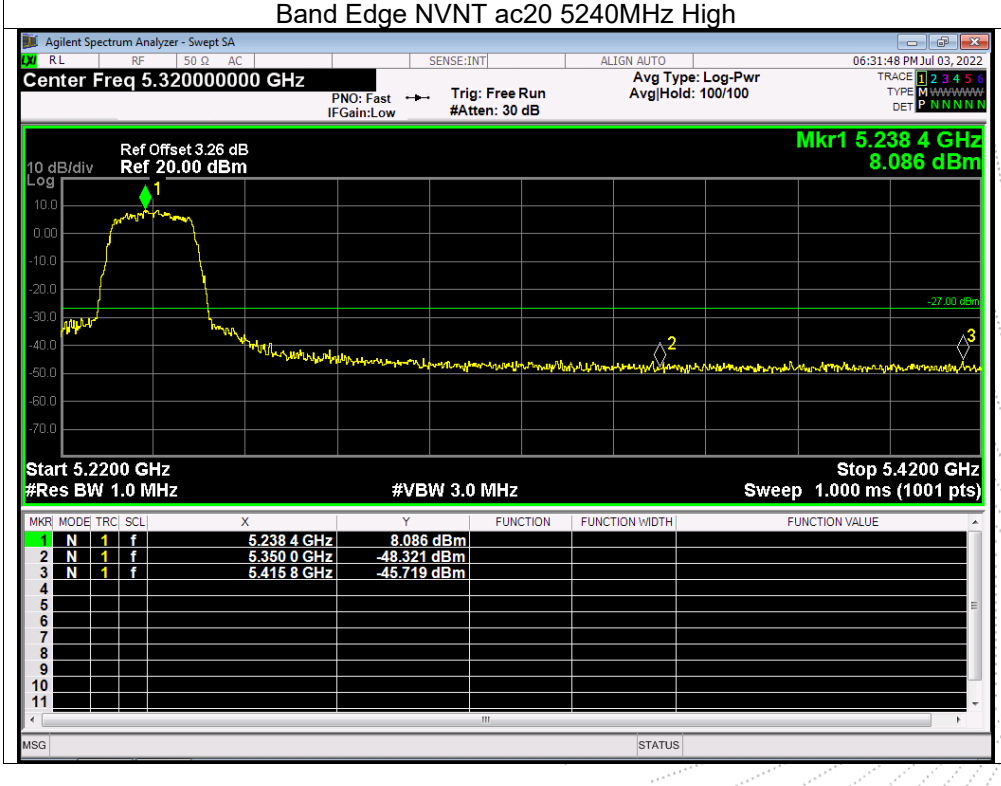
Band Edge NVNT n40 5230MHz High



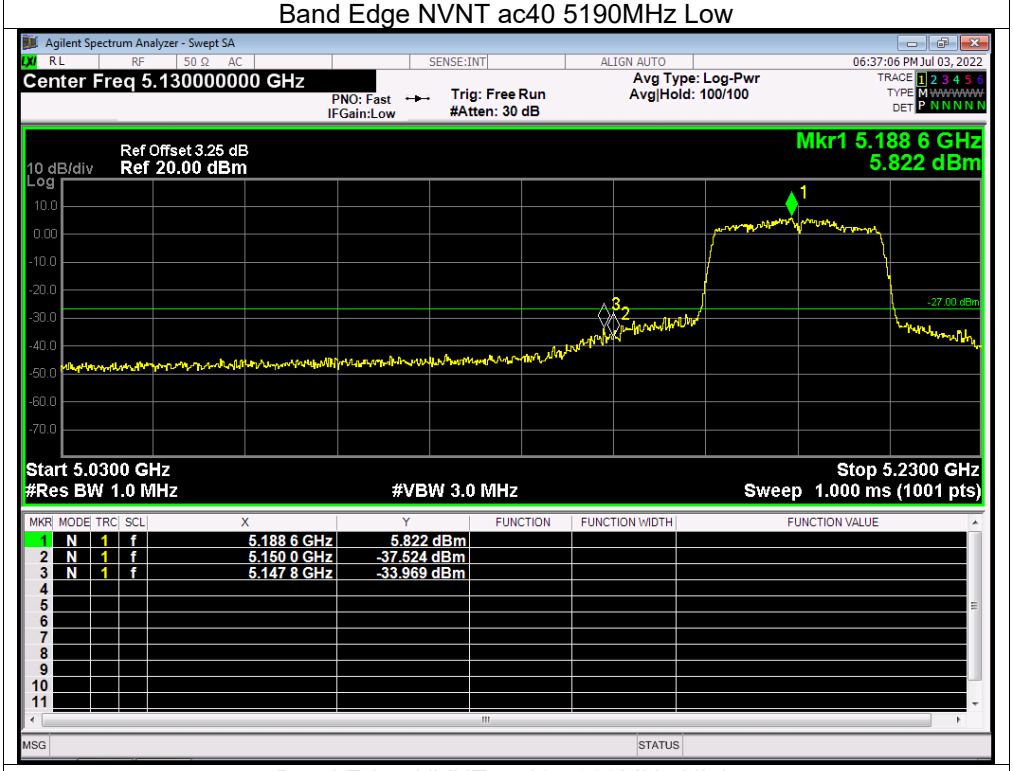
Band Edge NVNT ac20 5180MHz Low



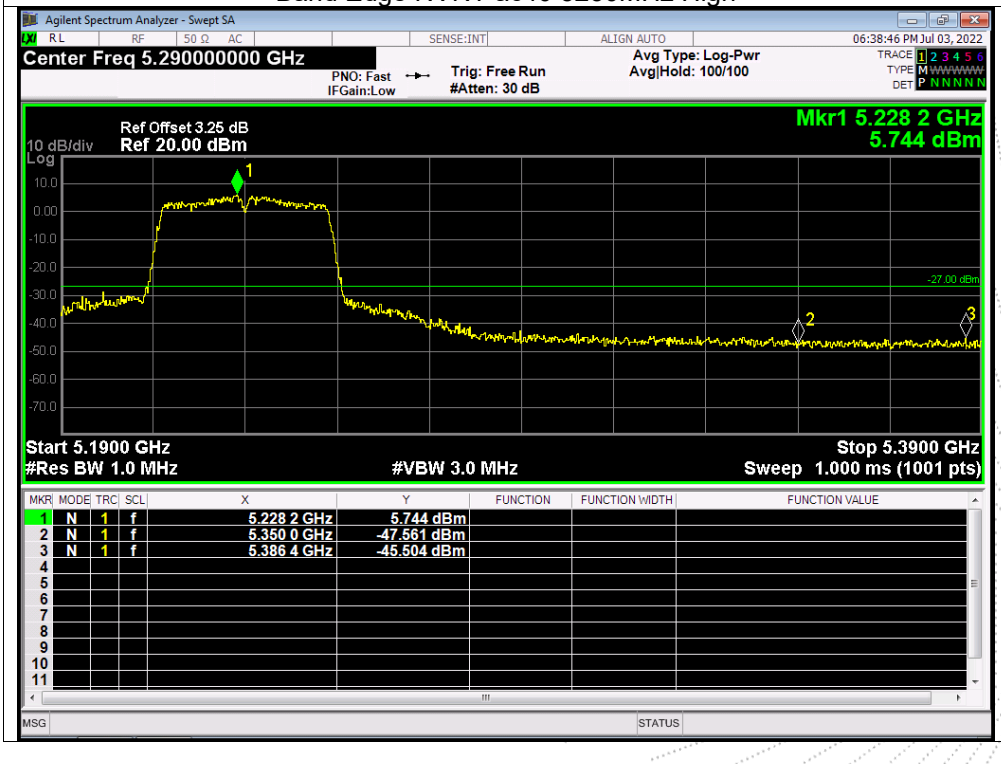
Band Edge NVNT ac20 5240MHz High



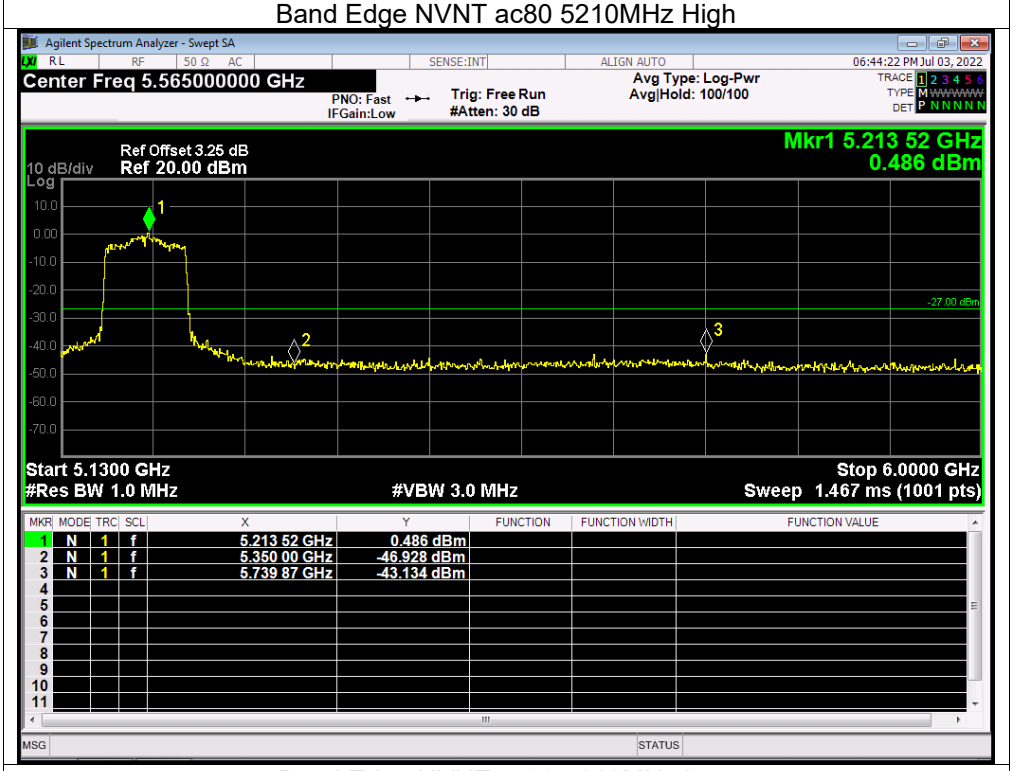
Band Edge NVNT ac40 5190MHz Low



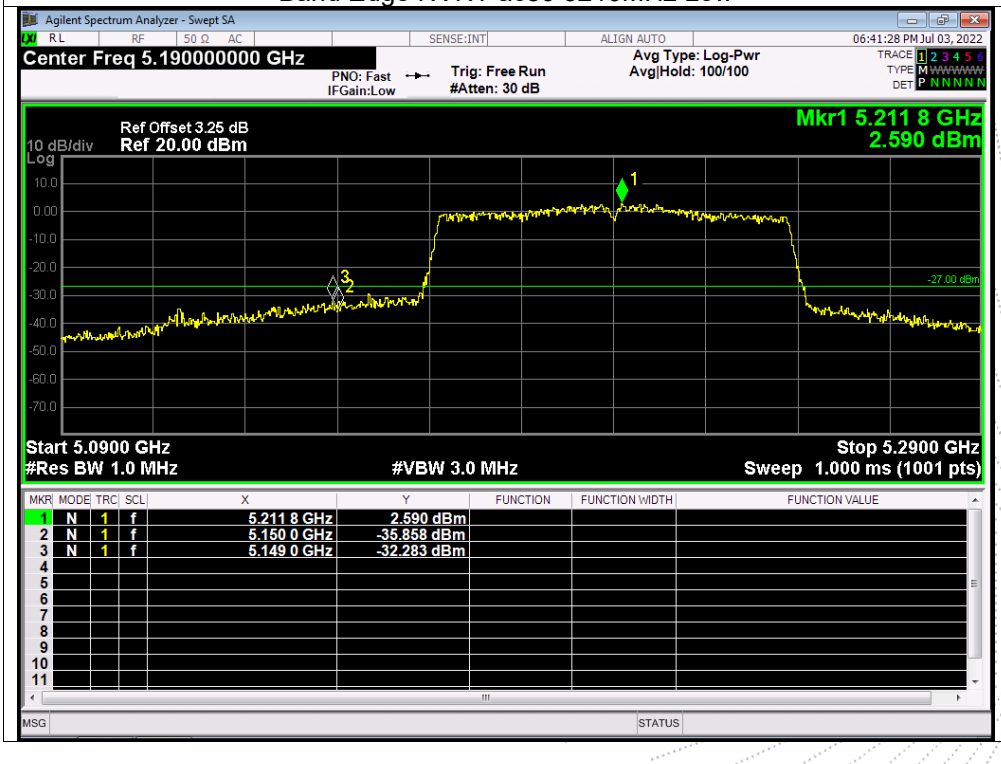
Band Edge NVNT ac40 5230MHz High



Band Edge NVNT ac80 5210MHz High

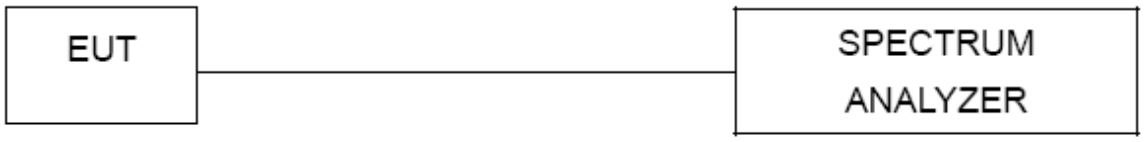


Band Edge NVNT ac80 5210MHz Low



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.

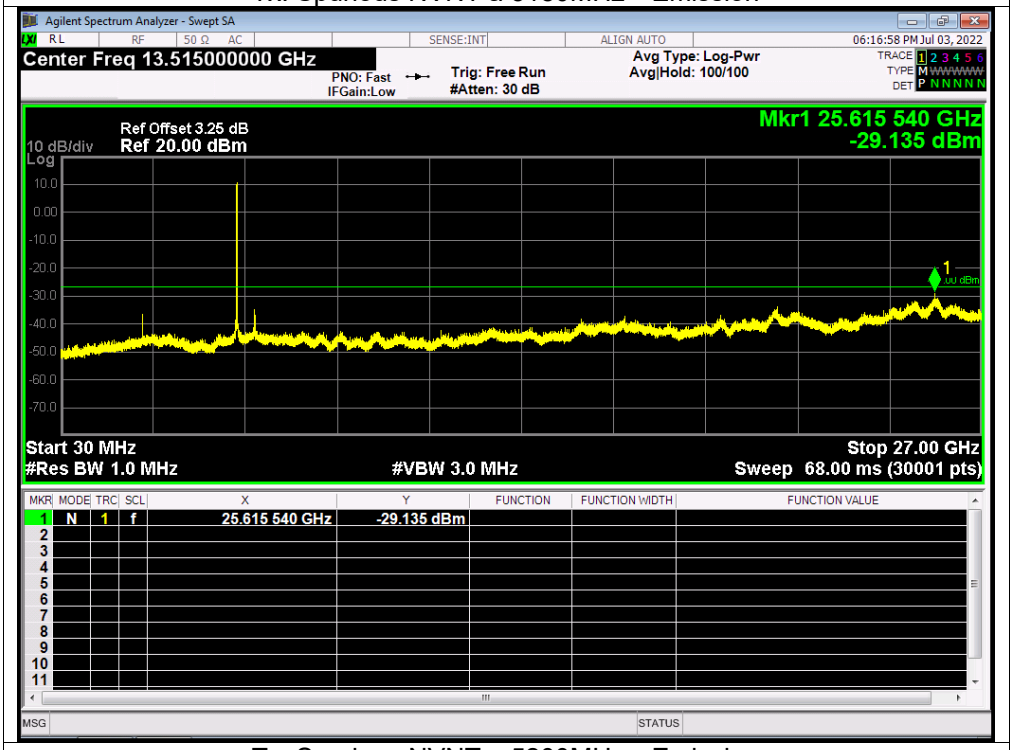
12.4 Test Result

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 bandege measurement data.

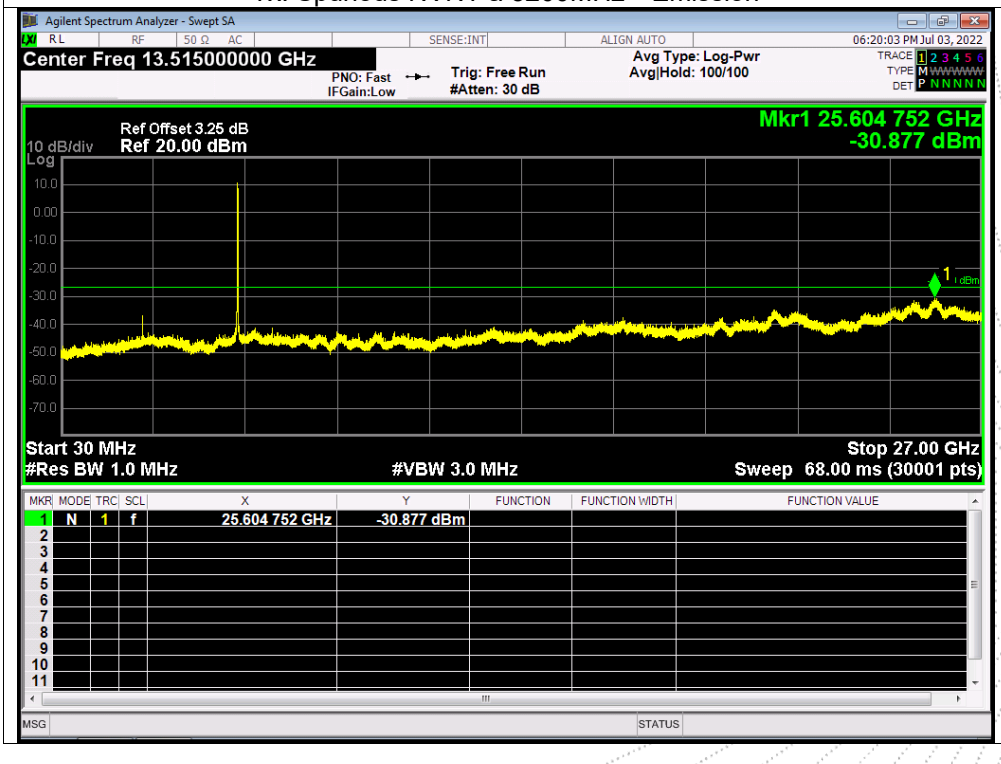
About:26.5GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

5.1G

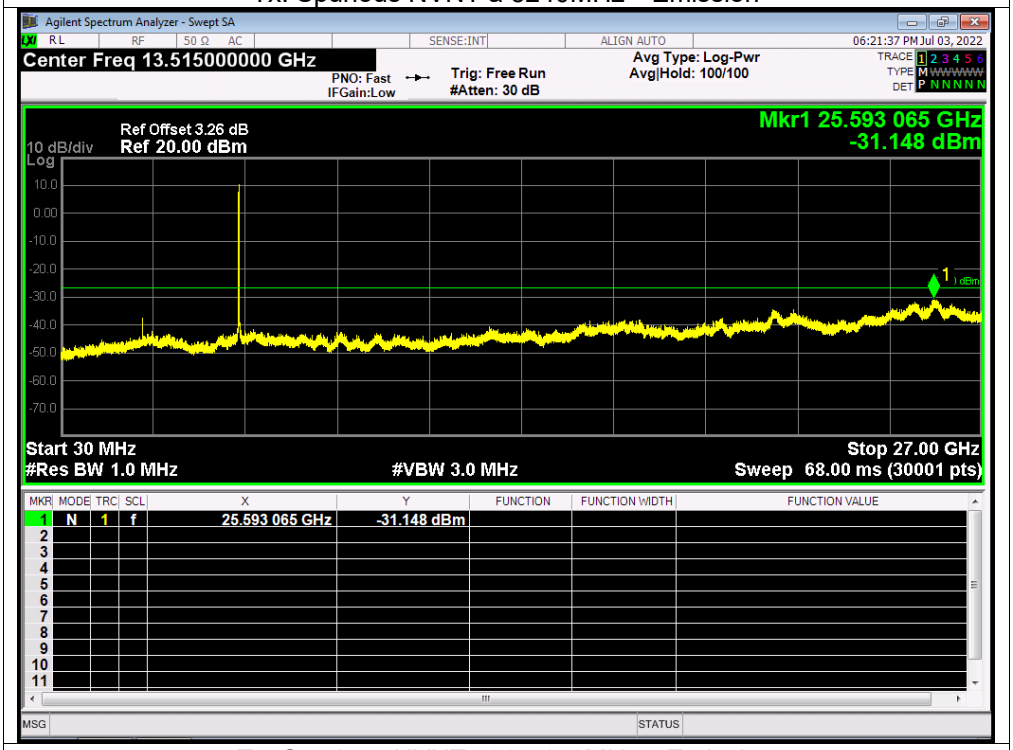
Test Graphs
Tx. Spurious NVNT a 5180MHz Emission



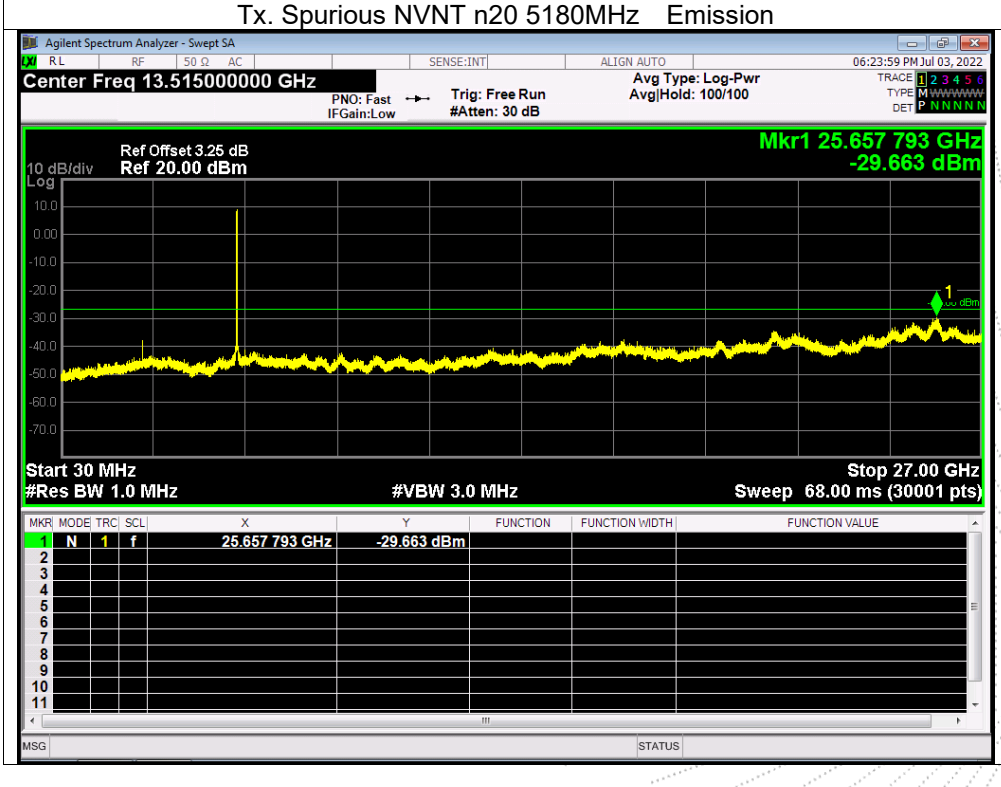
Tx. Spurious NVNT a 5200MHz Emission



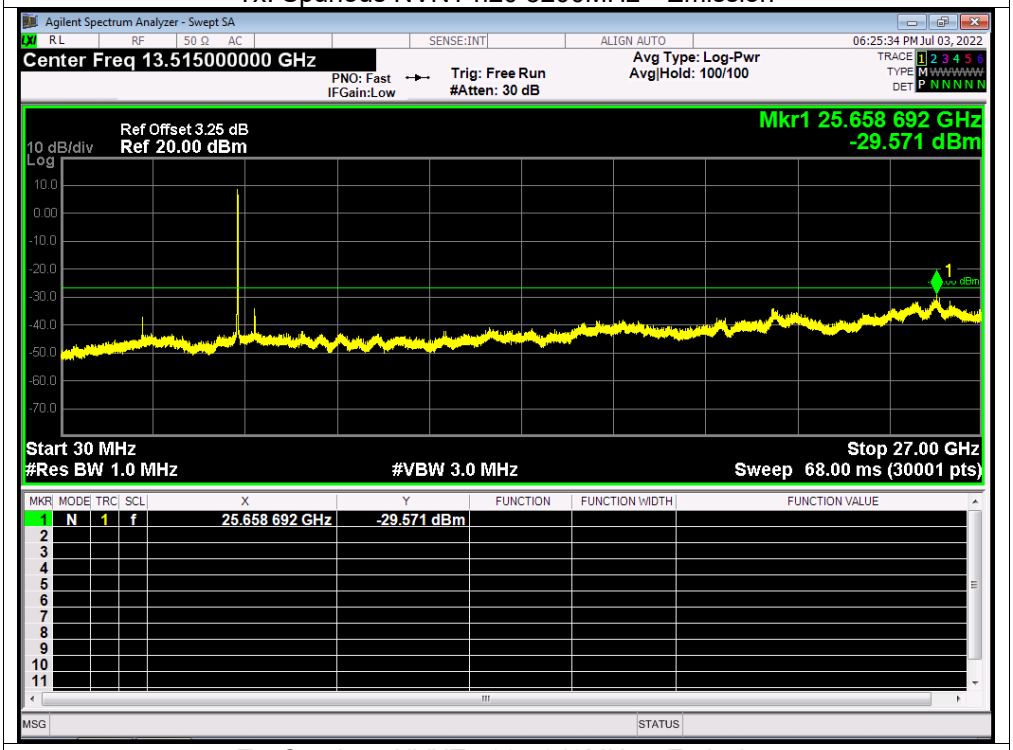
Tx. Spurious NVNT a 5240MHz Emission



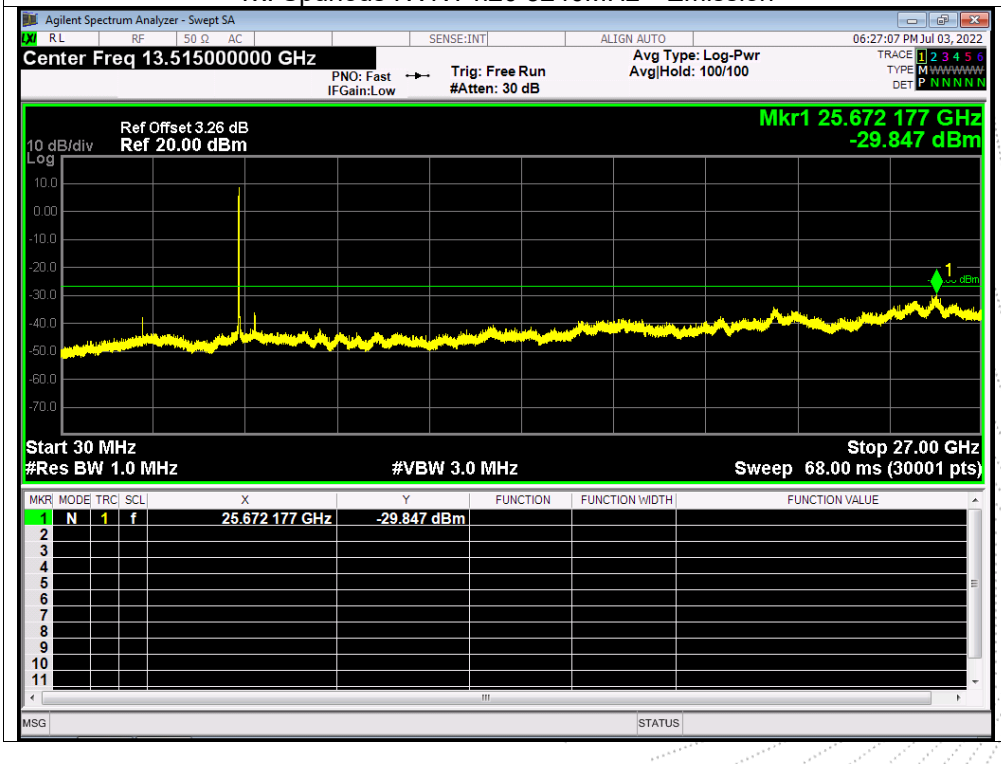
Tx. Spurious NVNT n20 5180MHz Emission



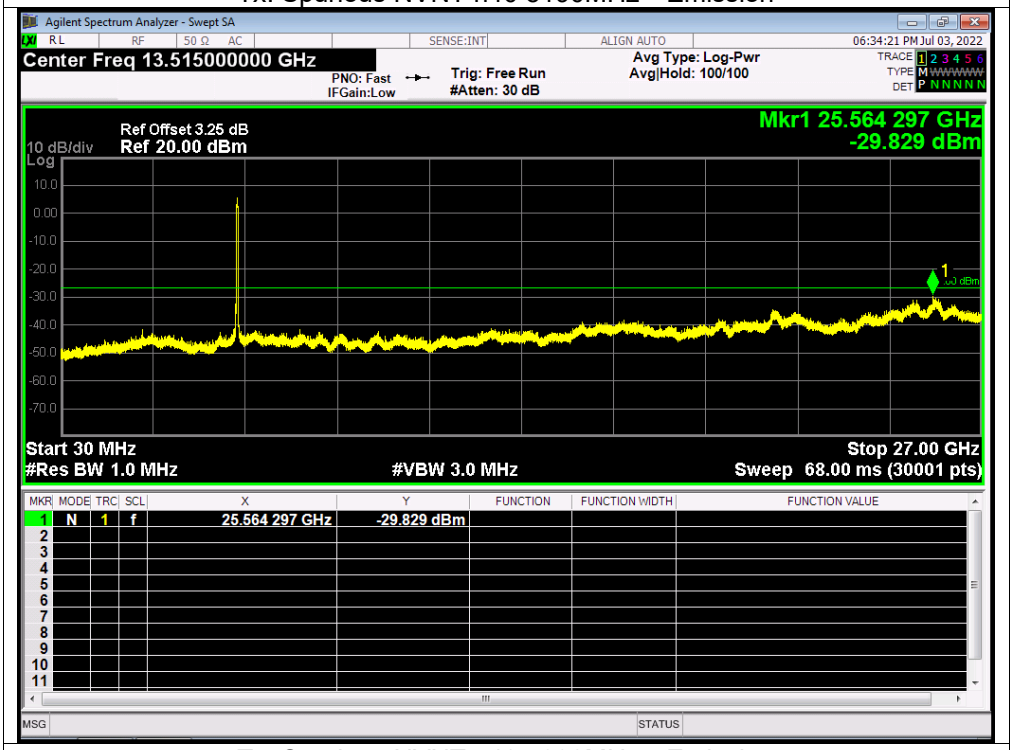
Tx. Spurious NVNT n20 5200MHz Emission



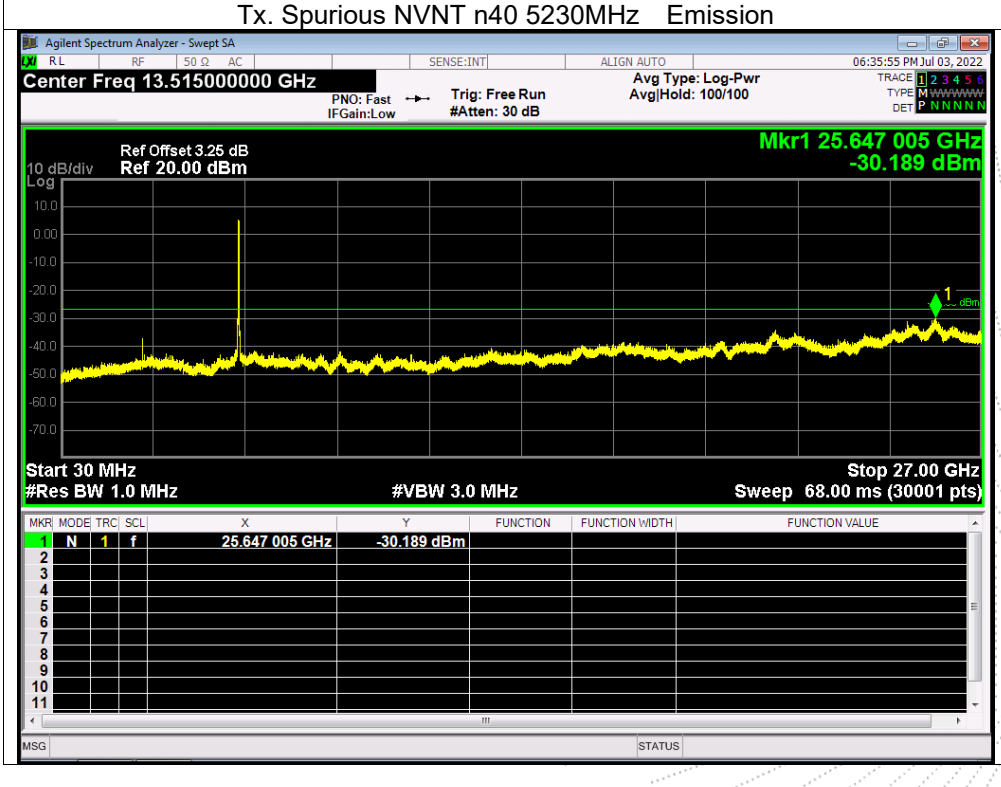
Tx. Spurious NVNT n20 5240MHz Emission



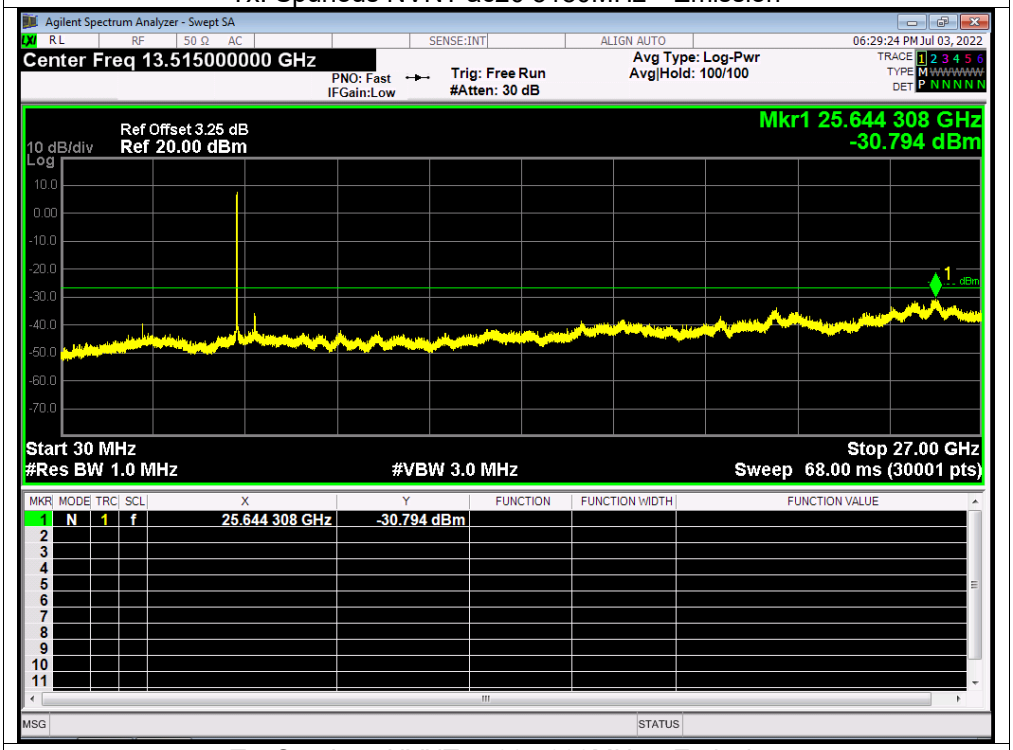
Tx. Spurious NVNT n40 5190MHz Emission



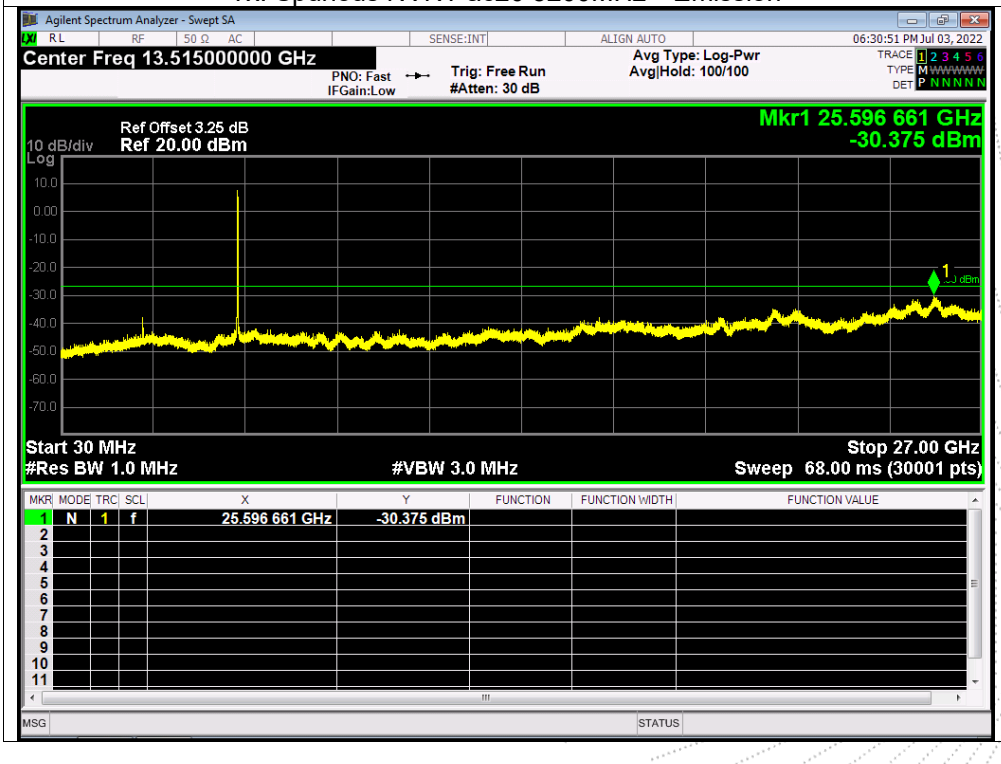
Tx. Spurious NVNT n40 5230MHz Emission



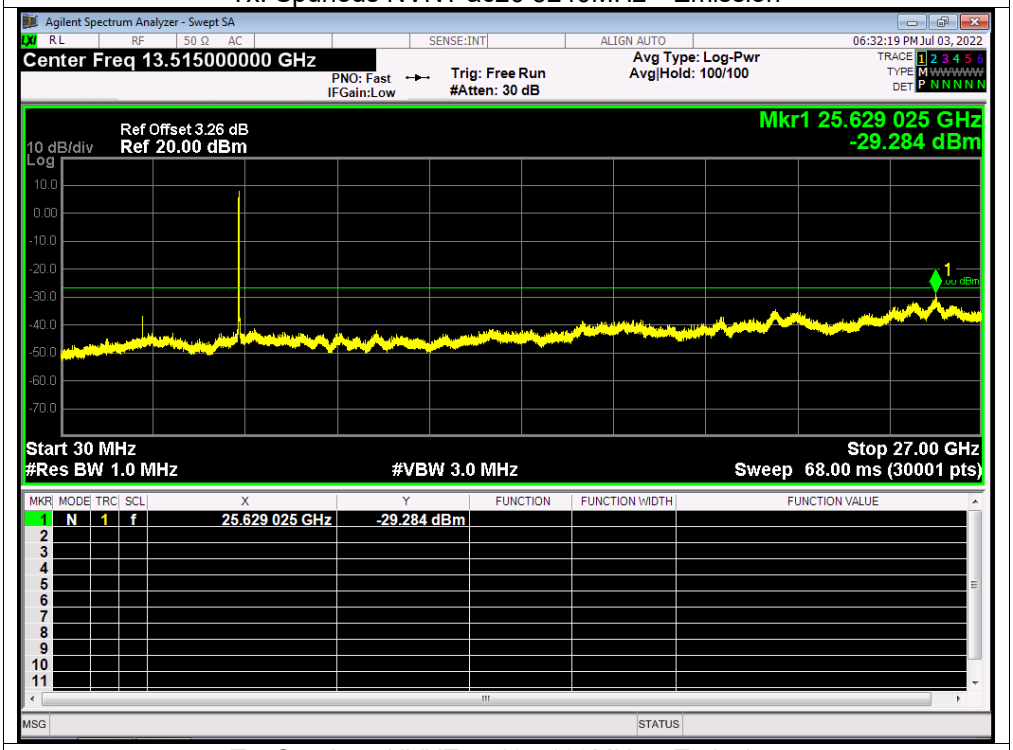
Tx. Spurious NVNT ac20 5180MHz Emission



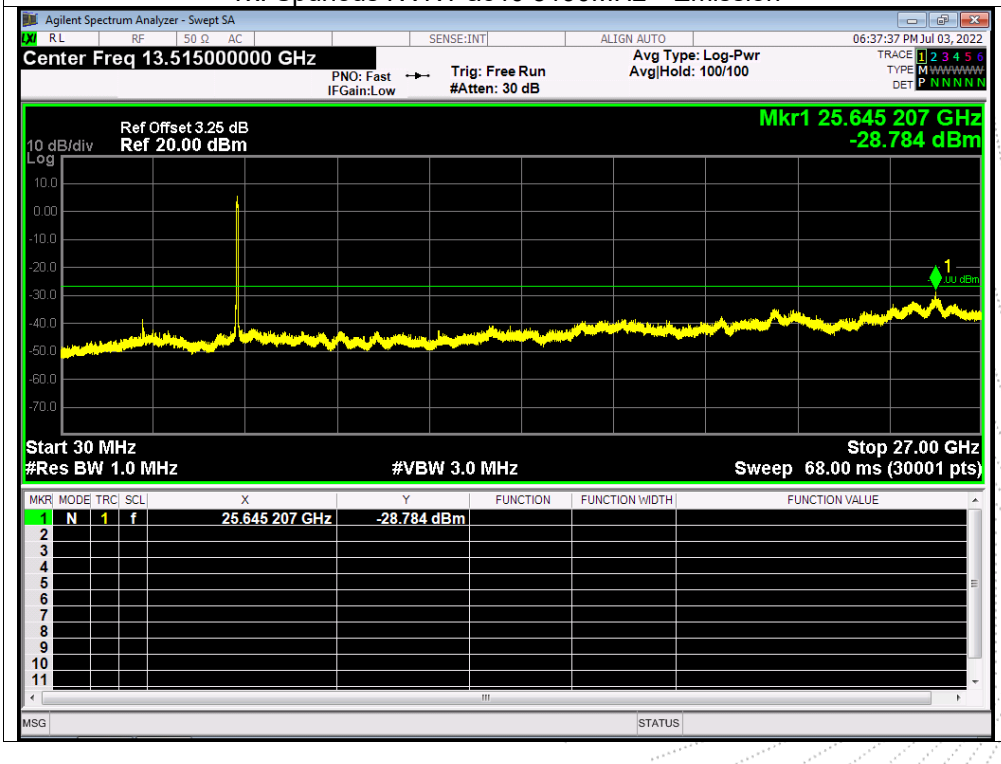
Tx. Spurious NVNT ac20 5200MHz Emission



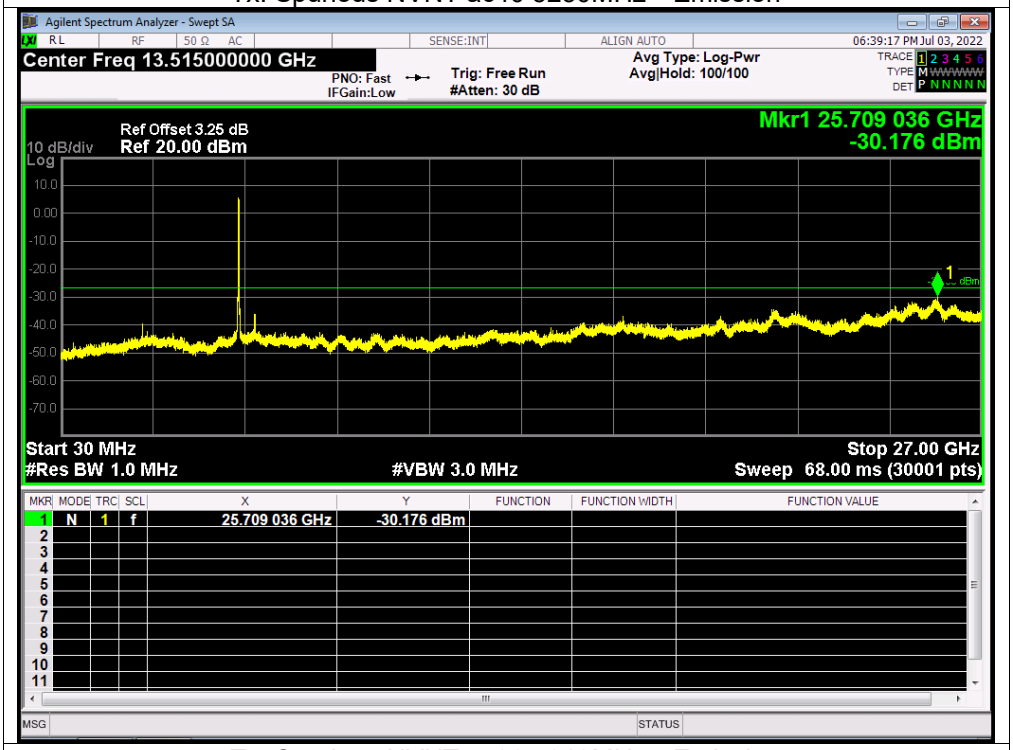
Tx. Spurious NVNT ac20 5240MHz Emission



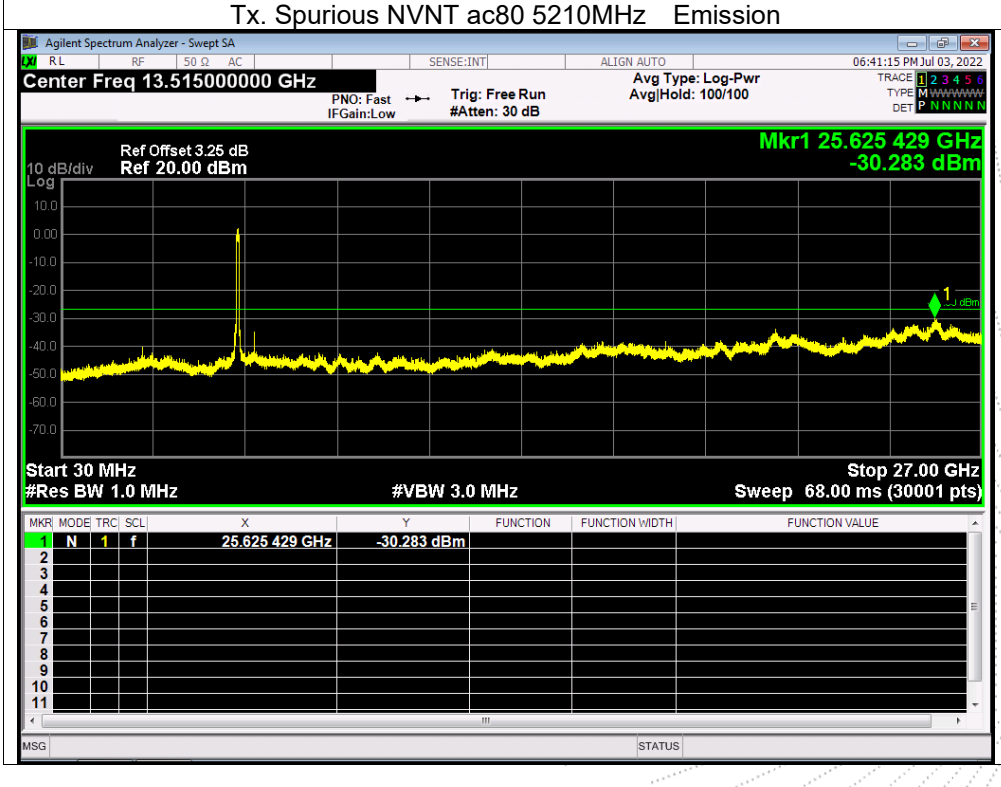
Tx. Spurious NVNT ac40 5190MHz Emission



Tx. Spurious NVNT ac40 5230MHz Emission

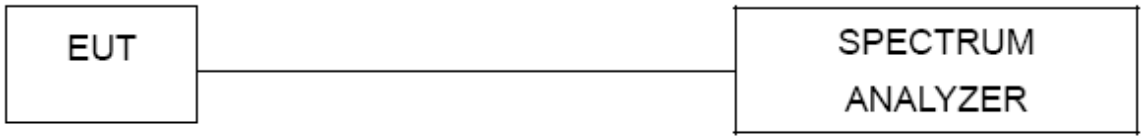


Tx. Spurious NVNT ac80 5210MHz Emission



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. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 106 ppm and he limit is less than ±20ppm (IEEE 802.11nspecification).
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°C~70°C.

13.4 Test Result

Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	101kPa	Test Voltage ：	DC 5V from adapter
Test Mode ：	TX Frequency U-NII-1 (5180-5240MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5180.0026	5180	0.0026	0.4936
		V max (V)	5.75	5180.0096	5180	0.0096	1.8475
		V min (V)	4.25	5180.0074	5180	0.0074	1.4344
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	DC 5V	T (°C)	-20	5180.0134	5180	0.0134	2.5810
		T (°C)	-10	5180.0126	5180	0.0126	2.4380
		T (°C)	0	5180.0046	5180	0.0046	0.8894
		T (°C)	10	5180.0041	5180	0.0041	0.7931
		T (°C)	20	5180.0080	5180	0.0080	1.5487
		T (°C)	30	5180.0128	5180	0.0128	2.4689
		T (°C)	40	5180.0007	5180	0.0007	0.1432
		T (°C)	50	5180.0109	5180	0.0109	2.1085
		T (°C)	60	5180.0082	5180	0.0082	1.5882
		T (°C)	70	5180.0101	5180	0.0101	1.9564
Limits				5150-5250 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5200.0107	5200	0.0107	2.0556
		V max (V)	5.75	5200.0034	5200	0.0034	0.6567
		V min (V)	4.25	5200.0020	5200	0.0020	0.3893
Limits				5725-5850 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	DC 5V	T (°C)	-20	5200.00918	5200	0.00918	1.7654
		T (°C)	-10	5200.00925	5200	0.00925	1.7783
		T (°C)	0	5200.00911	5200	0.00911	1.7527
		T (°C)	10	5200.00140	5200	0.00140	0.2692
		T (°C)	20	5200.00479	5200	0.00479	0.9215
		T (°C)	30	5200.00154	5200	0.00154	0.2963
		T (°C)	40	5200.00015	5200	0.00015	0.0296
		T (°C)	50	5200.01203	5200	0.01203	2.3131
		T (°C)	60	5200.00610	5200	0.00610	1.1726
		T (°C)	70	5200.00034	5200	0.00034	0.0654
Limits				5150-5250 MHz			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	5.00	5240.0051	5240	0.0051	0.9752
		V max (V)	5.75	5240.0113	5240	0.0113	2.1474
		V min (V)	4.25	5240.0126	5240	0.0126	2.4076
Limits				5150-5250 MHz			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	DC 5V	T (°C)	-20	5240.0111	5240	0.0111	2.1112
		T (°C)	-10	5240.0102	5240	0.0102	1.9514
		T (°C)	0	5240.0047	5240	0.0047	0.8922
		T (°C)	10	5240.0030	5240	0.0030	0.5644
		T (°C)	20	5240.0063	5240	0.0063	1.2027
		T (°C)	30	5240.0110	5240	0.0110	2.1039
		T (°C)	40	5240.0046	5240	0.0046	0.8720
		T (°C)	50	5240.0077	5240	0.0077	1.4687
		T (°C)	60	5240.0019	5240	0.0019	0.3718
		T (°C)	70	5240.0043	5240	0.0043	0.8203
Limits				5150-5250 MHz			
Result				Complies			

14. Antenna Requirement

14.1 Limit

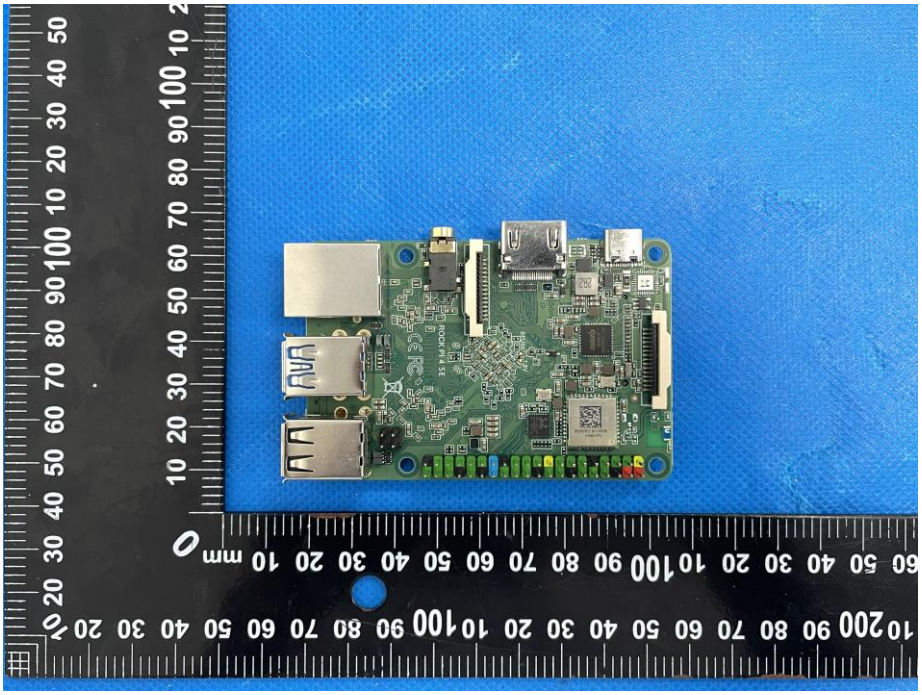
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

14.2 Test Result

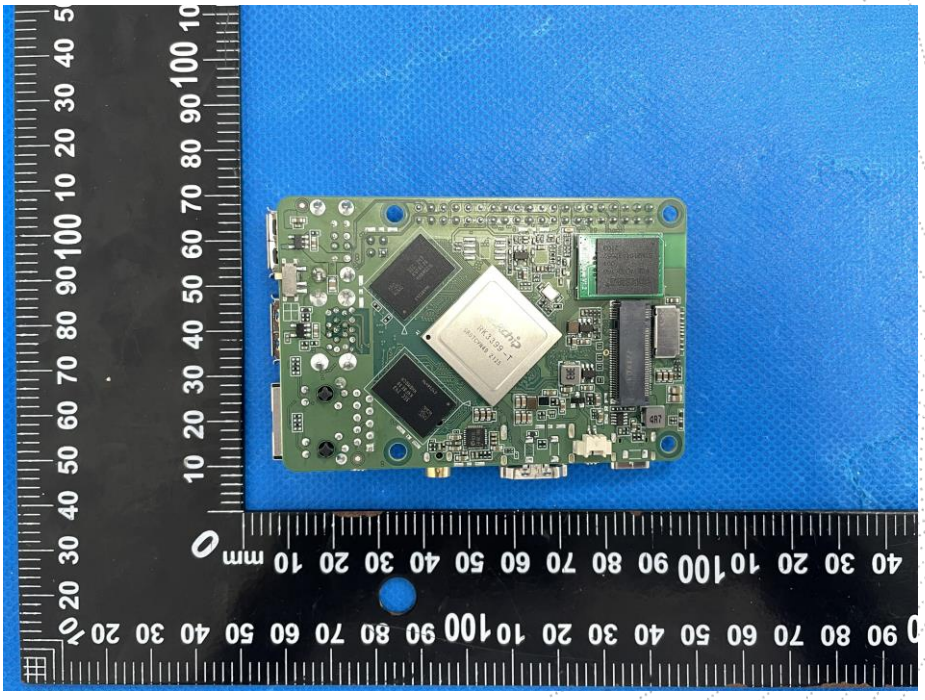
The EUT antenna is Chip Antenna (antenna gain:2 dBi). It comply with the standard requirement.

15. EUT Photographs

EUT Photo 1



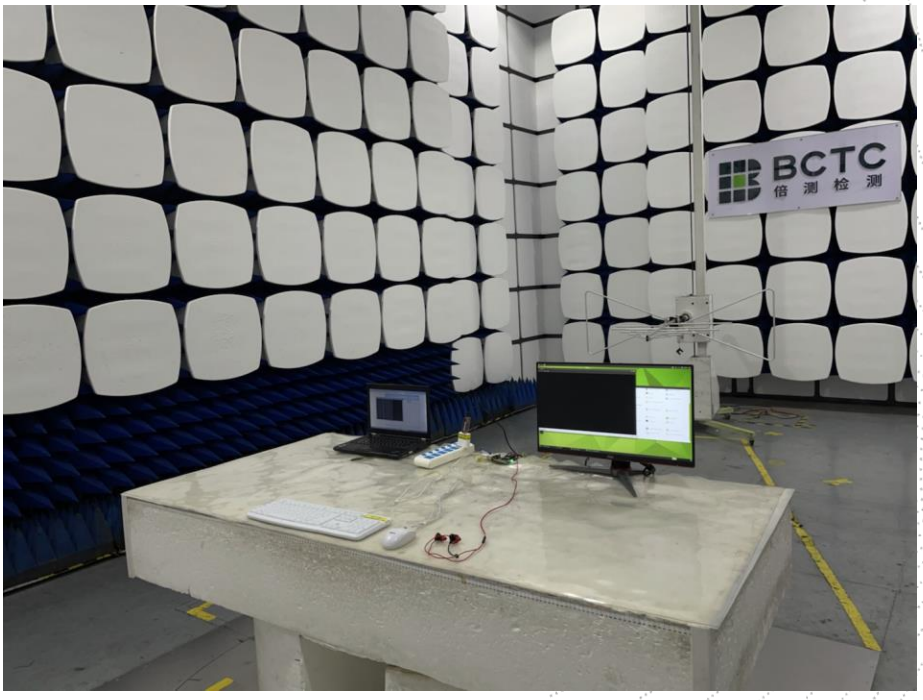
EUT Photo 2

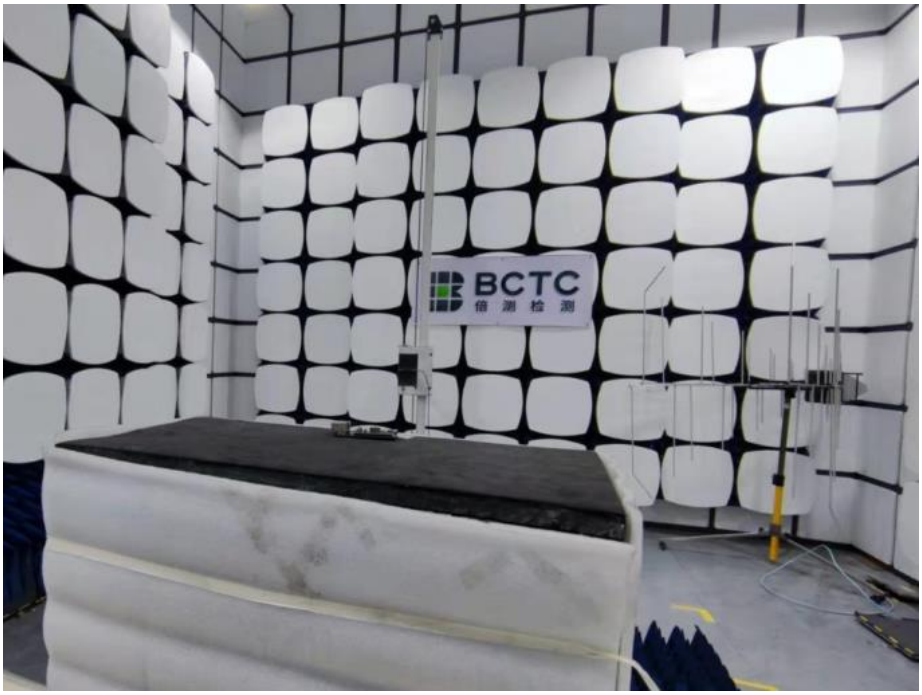


16. EUT Test Setup Photographs

Conducted Measurement Photo

Radiated Measurement Photos




BCTC
倍测检测

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** ※※※※※

TEST REPORT

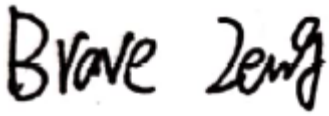
Report No.:	BCTC2206634854-2E
Applicant:	ROCKPI TRADING LIMITED
Product Name:	ROCK Pi 4/ROCK 4
Model/Type Ref.:	ROCK 4 SE
Tested Date:	2022-06-30 to 2022-07-05
Issued Date:	2022-07-05

Shenzhen BCTC Testing Co., Ltd.

FCC ID: 2A3PA-ROCK4SE

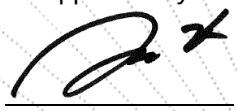
Product Name:	ROCK Pi 4/ROCK 4
Trademark:	N/A
Model/Type Ref.:	ROCK 4 SE ROCK Pi 4 A, ROCK Pi 4 B, ROCK Pi 4 A+, ROCK Pi 4 B+, ROCK 4 SE, ROCK 4 A, ROCK 4 B, ROCK 4 A+, ROCK 4 B+
Prepared For:	ROCKPI TRADING LIMITED
Address:	Room 11, 27 / f, Ga wah international centre, 191 Javaroad, north point, Hong Kong
Manufacturer:	ROCKPI TRADING LIMITED
Address:	Room 11, 27 / f, Ga wah international centre, 191 Javaroad, north point, Hong Kong
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:	2022-06-30
Sample tested Date:	2022-06-30 to 2022-07-05
Issue Date:	2022-07-05
Report No.:	BCTC2206634854-2E
Test Standards:	FCC Part15.247 ANSI C63.10-2013
Test Results:	PASS
Remark:	This is Bluetooth BLE radio test report.

Tested by:



Brave Zeng/ Project Handler

Approved by:



Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2206634854-2E	2022-07-05	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Conducted Emission	15.207	PASS
2	6dB Bandwidth	15.247 (a)(2)	PASS
3	Peak Output Power	15.247 (b)	PASS
4	Radiated Spurious Emission	15.247 (d), 15.205	PASS
5	Power Spectral Density	15.247 (e)	PASS
6	Restricted Band of Operation	15.205	PASS
7	Band Edge (Out of Band Emissions)	15.247(d)	PASS
8	Antenna Requirement	15.203	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℃

4. Product Information And Test Setup

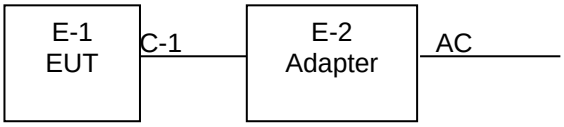
4.1 Product Information

Model/Type Ref.:	ROCK 4 SE ROCK Pi 4 A, ROCK Pi 4 B, ROCK Pi 4 A+, ROCK Pi 4 B+, ROCK 4 SE, ROCK 4 A, ROCK 4 B, ROCK 4 A+, ROCK 4 B+
Model differences:	All the model are the same circuit and RF module, except model names.
Bluetooth Version:	5.0
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK
Number Of Channel	40CH
Antenna installation:	Chip antenna
Antenna Gain:	2 dBi
Ratings:	DC 5V From adapter

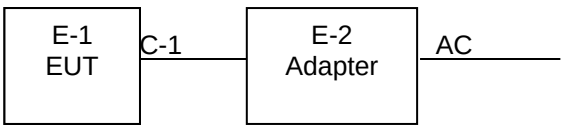
4.2 Test Setup Configuration

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

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	ROCK Pi 4/ROCK 4	N/A	ROCK 4 SE	N/A	EUT
E-2	Adapter	N/A	BCTC001	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	0.3M	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

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	11	2422	21	2442
02	2404	12	2424	22	2444
03	2406	13	2426	23	2446
~	~	~	~	~	~
09	2418	19	2438	39	2478
10	2420	20	2440	40	2480

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.

For All Mode	Description	Modulation Type
Mode 1	CH01	GFSK
Mode 2	CH20	
Mode 3	CH40	
Mode 4	Charging (Conducted emission)	
Mode 5	Link mode (Radiated emission)	

Note:
(1) The measurements are performed at the highest, middle, lowest available channels.
(2) Fully-charged battery is used during the test

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		
Frequency	2402 MHz	2440 MHz	2480 MHz
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.

5.2 Test Instrument Used

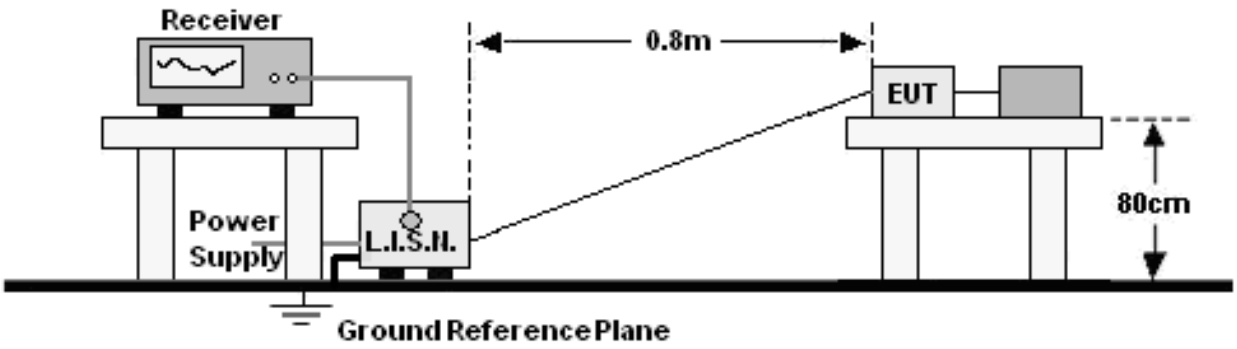
Conducted Emissions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR3	102075	May 24, 2022	May 23, 2023
LISN	R&S	ENV216	101375	May 24, 2022	May 23, 2023
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Attenuator	\	10dB DC-6GHz	1650	May 24, 2022	May 23, 2023

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power Metter	Keysight	E4419	\	May 24, 2022	May 23, 2023
Power Sensor (AV)	Keysight	E9300A	\	May 24, 2022	May 23, 2023
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 24, 2022	May 23, 2023
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	\	May 24, 2022	May 23, 2023

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 24, 2022	May 23, 2023
Receiver	R&S	ESRP	101154	May 24, 2022	May 23, 2023
Amplifier	SKET	LAPA_01G18G-45dB	\	May 24, 2022	May 23, 2023
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 24, 2022	May 23, 2023
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 26, 2022	May 25, 2023
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 24, 2022	May 23, 2023
Horn Antenn(18GHz-40GHz)	Schwarzbeck	BBHA9170	00822	May 24, 2022	May 23, 2023
Amplifier(18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 24, 2022	May 23, 2023
Loop Antenna(9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	May 26, 2022	May 25, 2023
RF cables1(9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	May 26, 2022	May 25, 2023
RF cables2(30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	May 26, 2022	May 25, 2023
RF cables3(1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	May 24, 2022	May 23, 2023
Power Metter	Keysight	E4419	\	May 26, 2022	May 25, 2023
Power Sensor (AV)	Keysight	E9300A	\	May 26, 2022	May 25, 2023
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 26, 2022	May 25, 2023
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	\	May 26, 2022	May 25, 2023
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

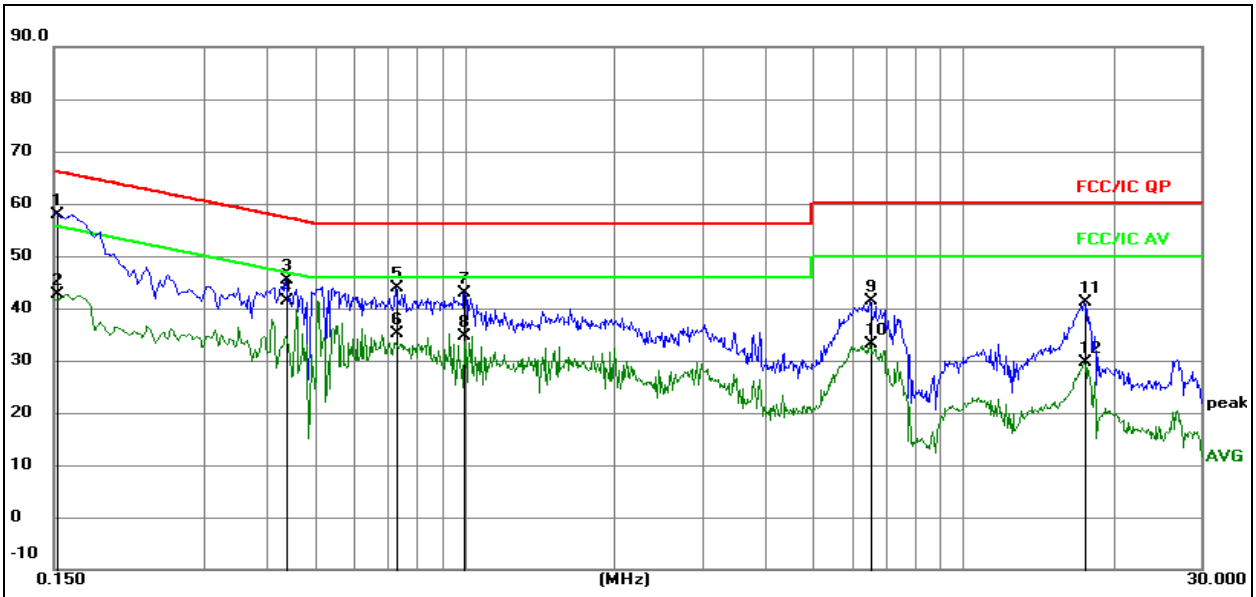
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak 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

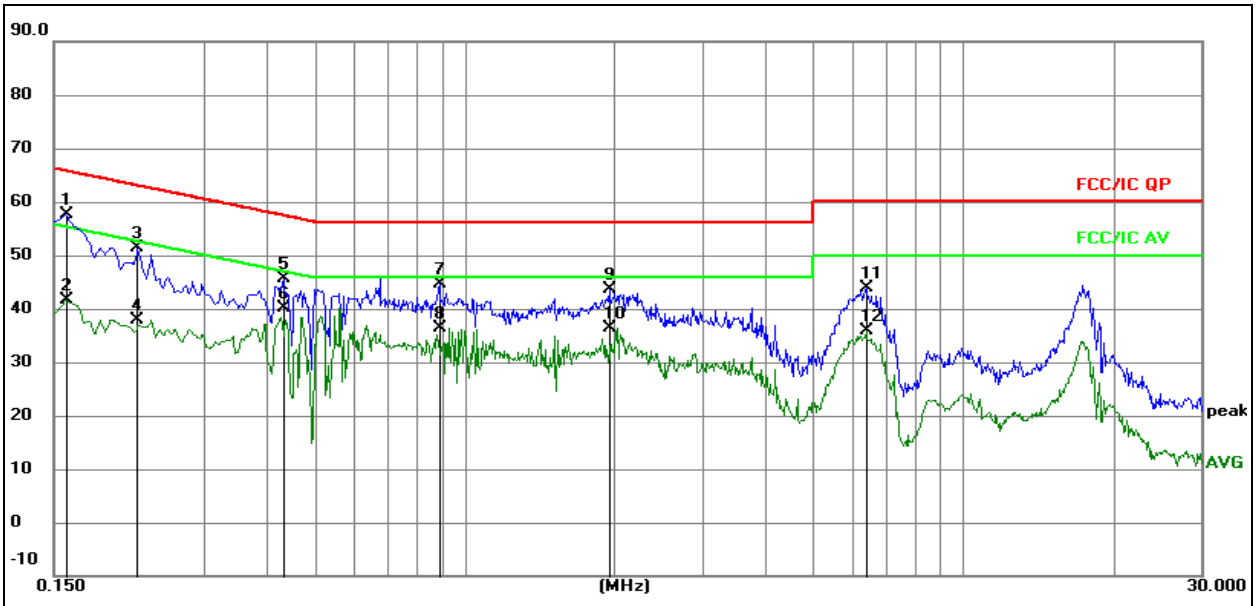
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		0.1524	38.29	19.68	57.97	65.87	-7.90	QP
2		0.1524	23.04	19.68	42.72	55.87	-13.15	AVG
3		0.4380	25.52	19.74	45.26	57.10	-11.84	QP
4	*	0.4380	21.57	19.74	41.31	47.10	-5.79	AVG
5		0.7304	24.10	19.74	43.84	56.00	-12.16	QP
6		0.7304	15.42	19.74	35.16	46.00	-10.84	AVG
7		0.9960	23.18	19.76	42.94	56.00	-13.06	QP
8		0.9960	14.90	19.76	34.66	46.00	-11.34	AVG
9		6.5130	21.13	20.17	41.30	60.00	-18.70	QP
10		6.5130	12.96	20.17	33.13	50.00	-16.87	AVG
11		17.5470	20.82	20.40	41.22	60.00	-18.78	QP
12		17.5470	9.26	20.40	29.66	50.00	-20.34	AVG

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	N
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



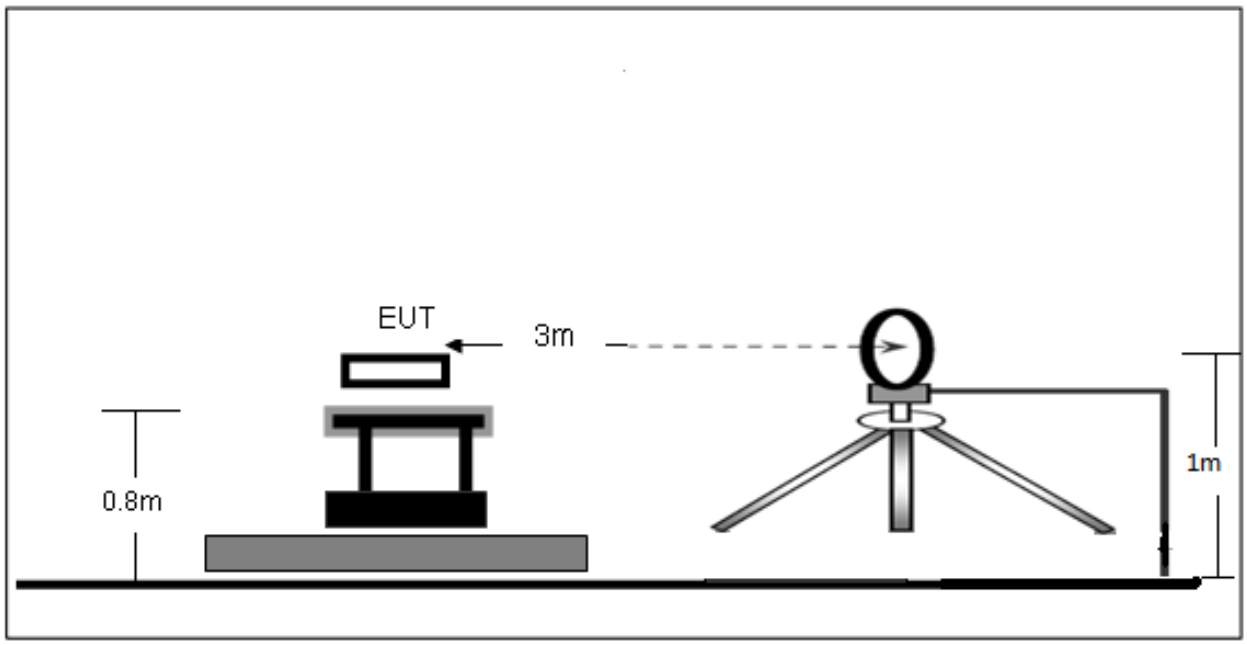
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement=Reading Level+ Correct Factor
4. Over= Measurement-Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.1582	38.02	19.69	57.71	65.56	-7.85	QP
2		0.1582	21.90	19.69	41.59	55.56	-13.97	AVG
3		0.2208	31.55	19.79	51.34	62.79	-11.45	QP
4		0.2208	18.06	19.79	37.85	52.79	-14.94	AVG
5		0.4328	25.84	19.74	45.58	57.20	-11.62	QP
6	*	0.4328	20.51	19.74	40.25	47.20	-6.95	AVG
7		0.8897	24.92	19.75	44.67	56.00	-11.33	QP
8		0.8897	16.64	19.75	36.39	46.00	-9.61	AVG
9		1.9489	23.79	19.87	43.66	56.00	-12.34	QP
10		1.9489	16.52	19.87	36.39	46.00	-9.61	AVG
11		6.3859	23.71	20.16	43.87	60.00	-16.13	QP
12		6.3859	15.67	20.16	35.83	50.00	-14.17	AVG

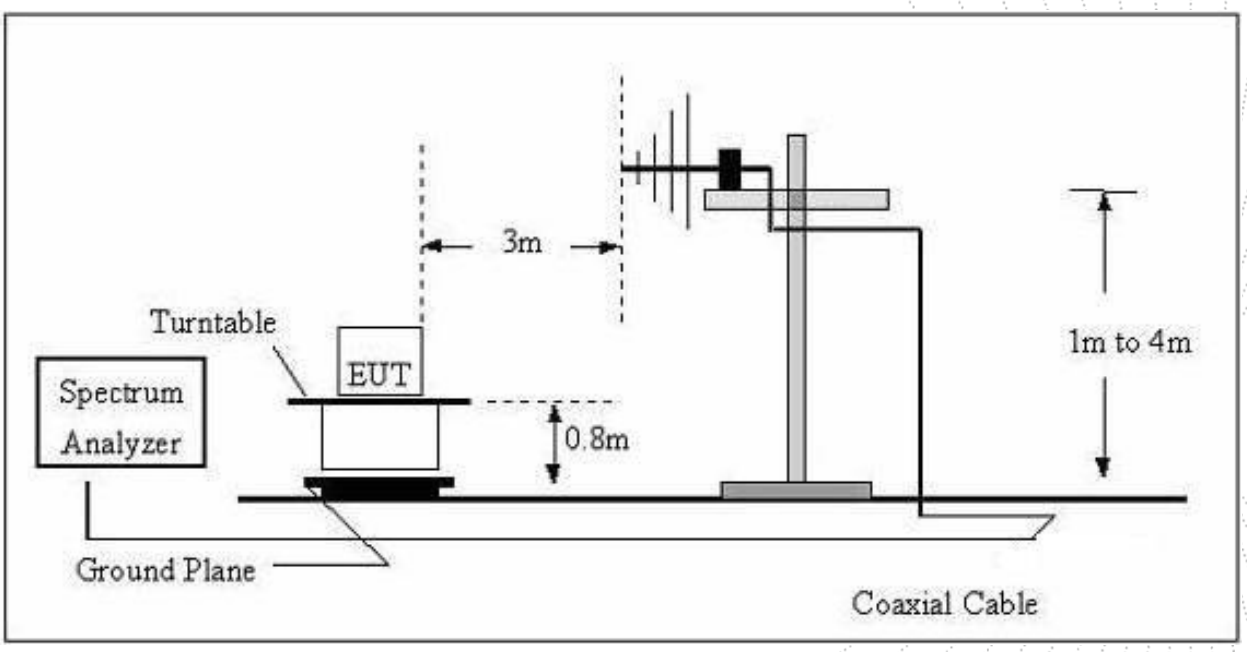
7. Radiated Emissions

7.1 Block Diagram Of Test Setup

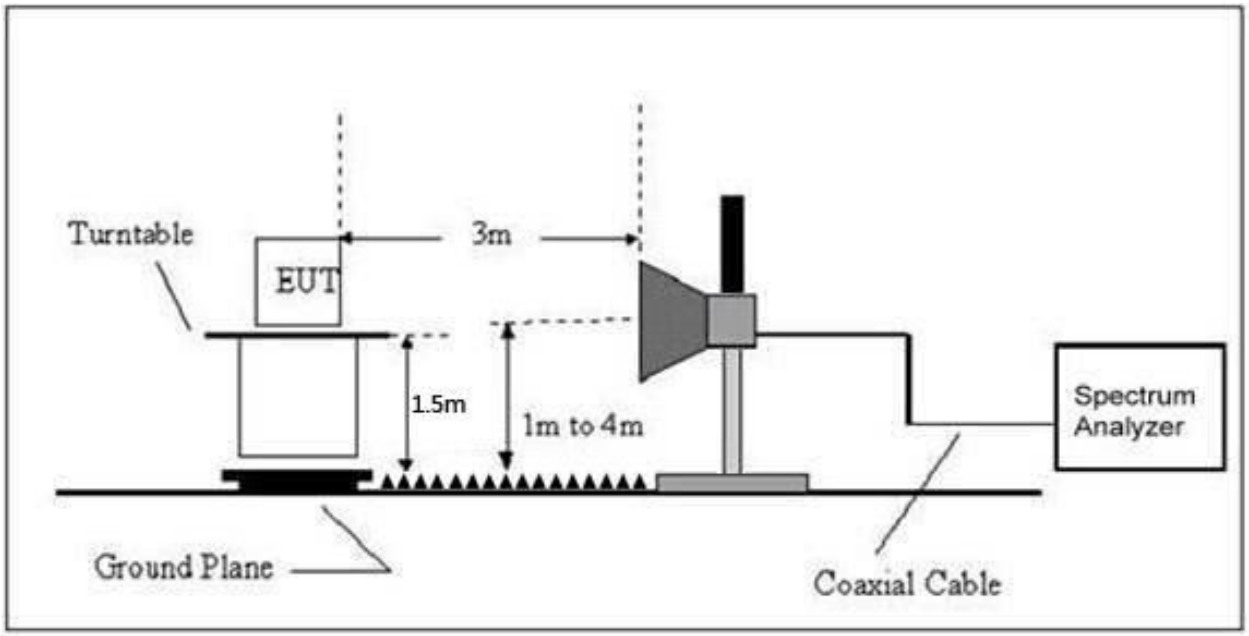
（A）Radiated Emission Test-Up Frequency Below 30MHz



（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).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

7.3 Test Procedure

Receiver Parameter	Setting
Attenuation	Auto
9kHz~150kHz	RBW 200Hz for QP
150kHz~30MHz	RBW 9kHz for QP
30MHz~1000MHz	RBW 120kHz for QP

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel.

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

Above 1GHz test procedure as below:
a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the Highest channel.
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

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

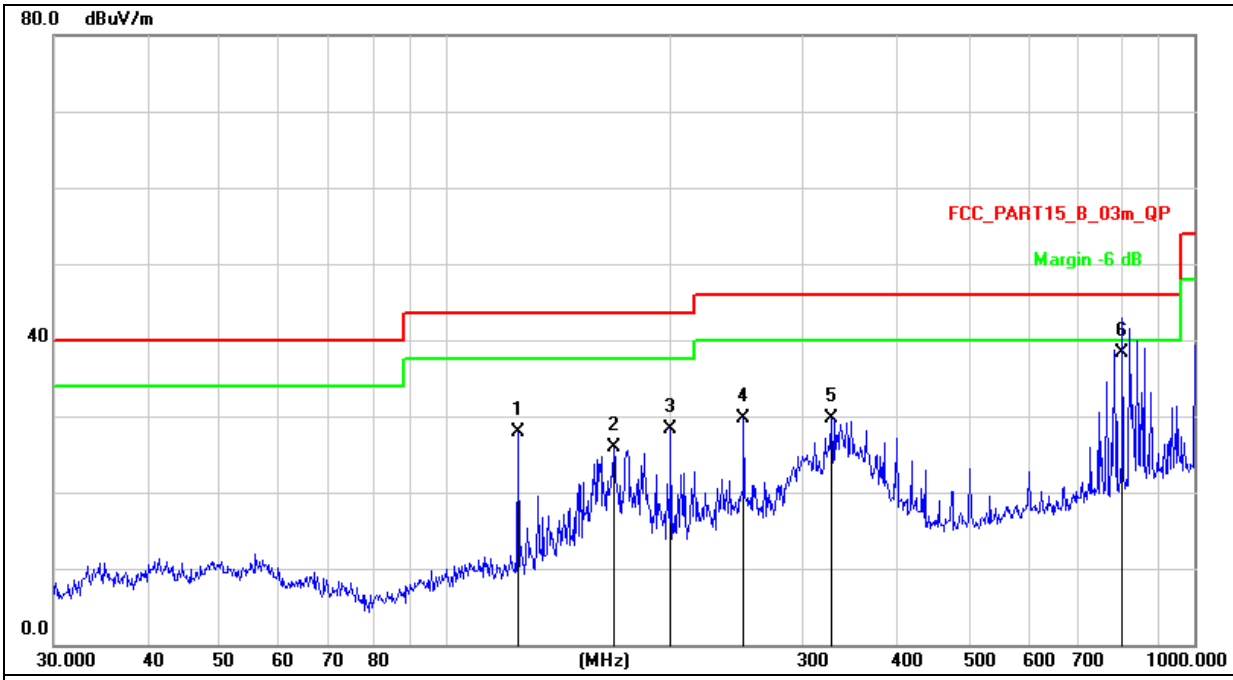
Temperature：	26℃	Relative Humidity：	24%
Pressure：	101 kPa	Test Voltage :	DC 5V from adapter
Test Mode ：	Mode 1	Polarization :	--

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

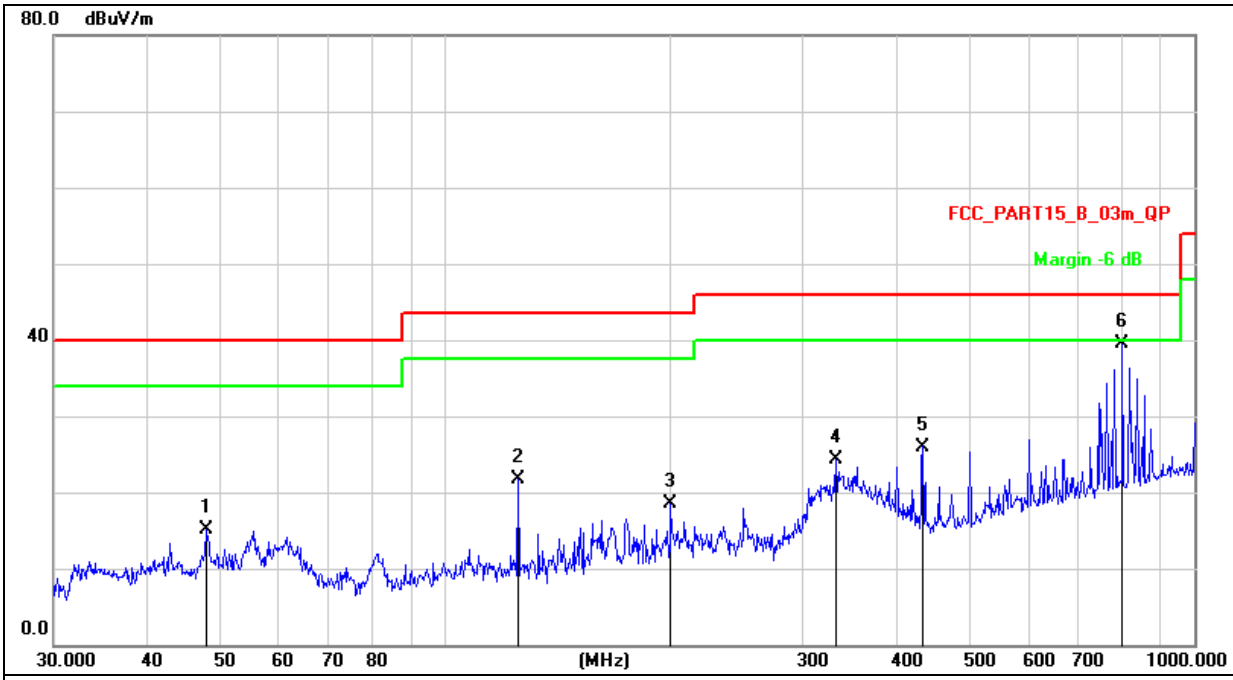
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		125.0066	45.80	-17.89	27.91	43.50	-15.59	QP
2		167.8243	44.24	-18.36	25.88	43.50	-17.62	QP
3		199.9856	44.62	-16.30	28.32	43.50	-15.18	QP
4		250.3012	44.85	-15.14	29.71	46.00	-16.29	QP
5		327.8873	42.47	-12.84	29.63	46.00	-16.37	QP
6	*	799.9683	41.96	-3.64	38.32	46.00	-7.68	QP

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 1	Test Voltage :	DC 5V from adapter



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		47.9940	30.05	-14.96	15.09	40.00	-24.91	QP
2		125.0066	39.64	-17.89	21.75	43.50	-21.75	QP
3		199.9856	34.75	-16.30	18.45	43.50	-25.05	QP
4		332.5187	37.05	-12.71	24.34	46.00	-21.66	QP
5		434.0651	36.33	-10.33	26.00	46.00	-20.00	QP
6	*	801.7863	43.16	-3.60	39.56	46.00	-6.44	QP

Between 1GHz – 25GHz

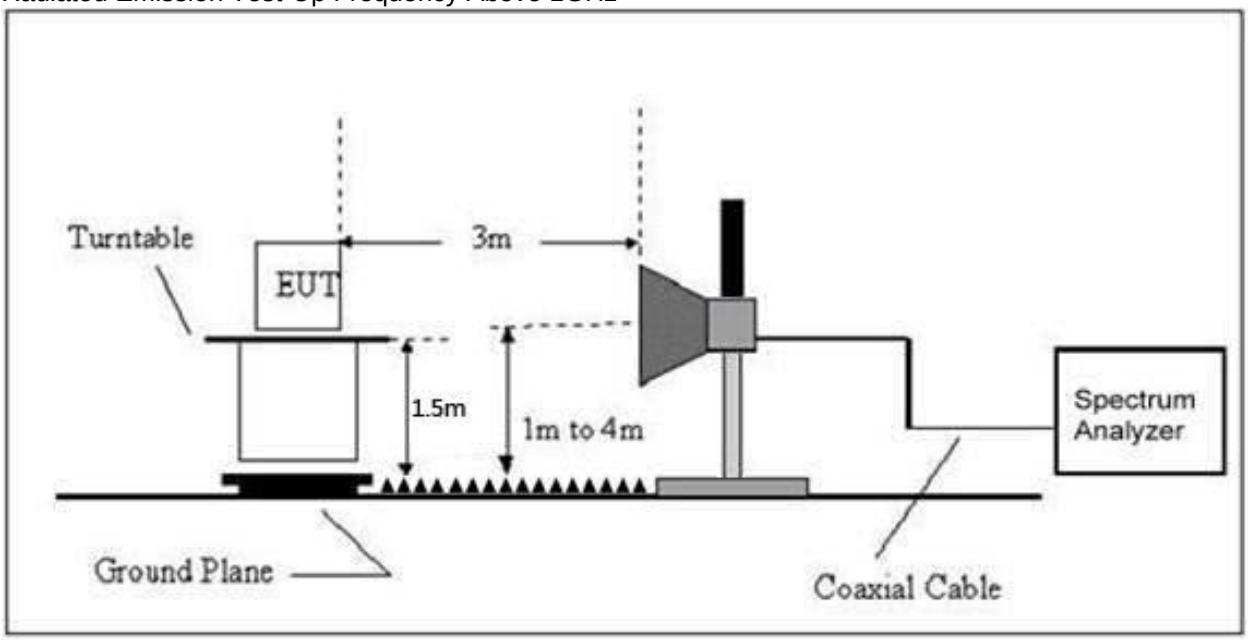
GFSK							
Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)	Over (dB)	Detector Type
Low channel							
V	4804.00	53.84	-0.43	53.41	74.00	-20.59	PK
V	4804.00	44.13	-0.43	43.70	54.00	-10.30	AV
V	7206.00	45.54	8.31	53.85	74.00	-20.15	PK
V	7206.00	35.37	8.31	43.68	54.00	-10.32	AV
H	4804.00	51.74	-0.43	51.31	74.00	-22.69	PK
H	4804.00	42.64	-0.43	42.21	54.00	-11.79	AV
H	7206.00	43.63	8.31	51.94	74.00	-22.06	PK
H	7206.00	35.06	8.31	43.37	54.00	-10.63	AV
Middle channel							
V	4880.00	51.84	-0.38	51.46	74.00	-22.54	PK
V	4880.00	43.59	-0.38	43.21	54.00	-10.79	AV
V	7320.00	42.41	8.83	51.24	74.00	-22.76	PK
V	7320.00	33.23	8.83	42.06	54.00	-11.94	AV
H	4880.00	48.03	-0.38	47.65	74.00	-26.35	PK
H	4880.00	38.62	-0.38	38.24	54.00	-15.76	AV
H	7320.00	41.24	8.83	50.07	74.00	-23.93	PK
H	7320.00	33.84	8.83	42.67	54.00	-11.33	AV
High channel							
V	4960.00	53.65	-0.32	53.33	74.00	-20.67	PK
V	4960.00	44.49	-0.32	44.17	54.00	-9.83	AV
V	7440.00	45.79	9.35	55.14	74.00	-18.86	PK
V	7440.00	36.14	9.35	45.49	54.00	-8.51	AV
H	4960.00	51.11	-0.32	50.79	74.00	-23.21	PK
H	4960.00	40.71	-0.32	40.39	54.00	-13.61	AV
H	7440.00	43.16	9.35	52.51	74.00	-21.49	PK
H	7440.00	35.69	9.35	45.04	54.00	-8.96	AV

Remark:
1.Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level - Limit
2.If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
5.This report only shows the worst case test data.

8. Radiated Band Emission Measurement And Restricted Bands Of Operation

8.1 Block Diagram Of Test Setup

Radiated Emission Test-Up Frequency Above 1GHz



8.2 Limit

FCC Part15 C Section 15.209 and 15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

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).

8.3 Test Procedure

Receiver Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Above 1GHz test procedure as below:
a. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the Highest channel.
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

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.

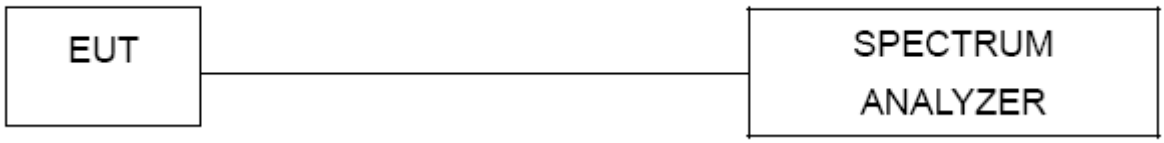
8.5 Test Result

	Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)		Result
					PK	PK	AV	
GFSK	Low Channel 2402MHz							
	H	2390.00	54.20	-6.70	47.50	74.00	54.00	PASS
	H	2400.00	58.63	-6.71	51.92	74.00	54.00	PASS
	V	2390.00	53.54	-6.70	46.84	74.00	54.00	PASS
	V	2400.00	56.93	-6.71	50.22	74.00	54.00	PASS
	High Channel 2480MHz							
	H	2483.50	56.47	-6.79	49.68	74.00	54.00	PASS
	H	2500.00	51.60	-6.81	44.79	74.00	54.00	PASS
	V	2483.50	57.83	-6.79	51.04	74.00	54.00	PASS
	V	2500.00	54.06	-6.81	47.25	74.00	54.00	PASS

Remark:
1. Emission Level = Meter Reading + Factor,
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level – Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
5. This report only shows the worst case test data.

9. Power Spectral Density Test

9.1 Block Diagram Of Test Setup



9.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

9.3 Test Procedure

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

.

9.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

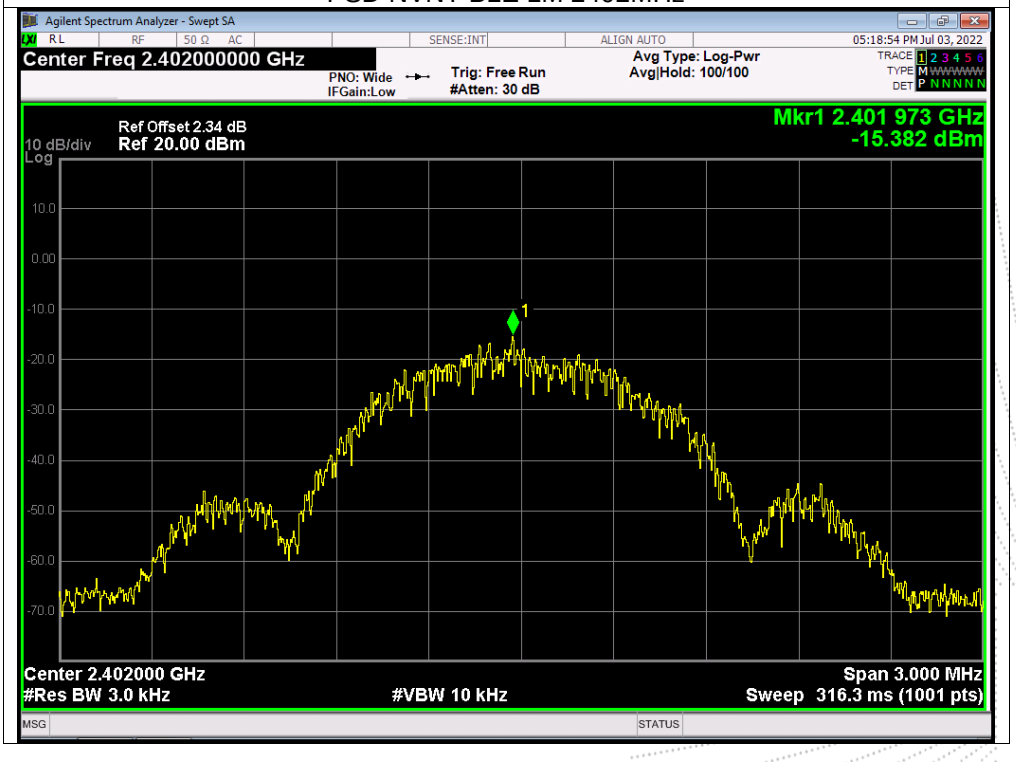
9.5 Test Result

Temperature：	26℃	Relative Humidity：	54%
Test Mode ：	GFSK	Test Voltage ：	DC 5V from adapter

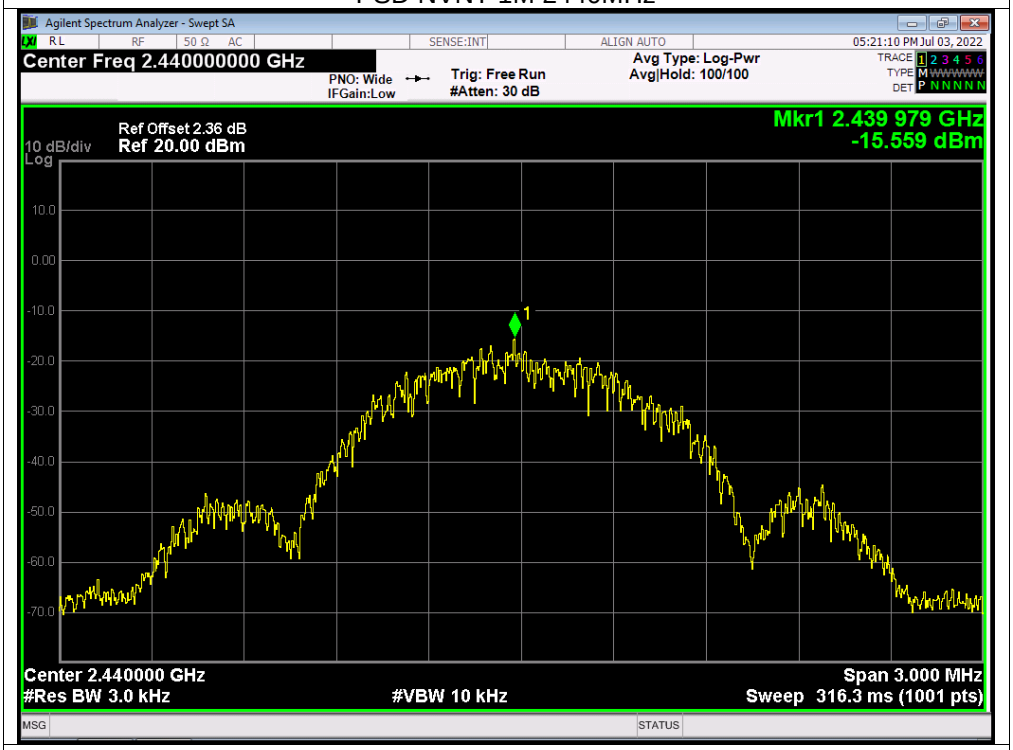
Condition	Mode	Frequency (MHz)	Conducted PSD (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	-15.38	8	Pass
NVNT	BLE 1M	2440	-15.56	8	Pass
NVNT	BLE 1M	2480	-17.53	8	Pass

Test Graphs

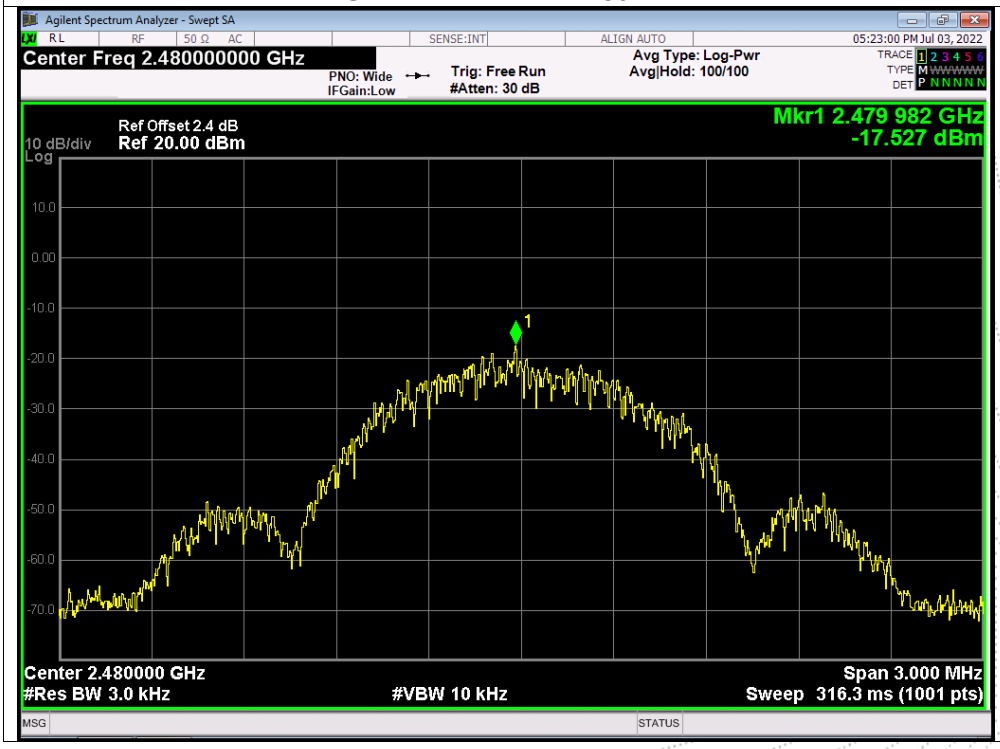
PSD NVNT BLE 1M 2402MHz



PSD NVNT 1M 2440MHz

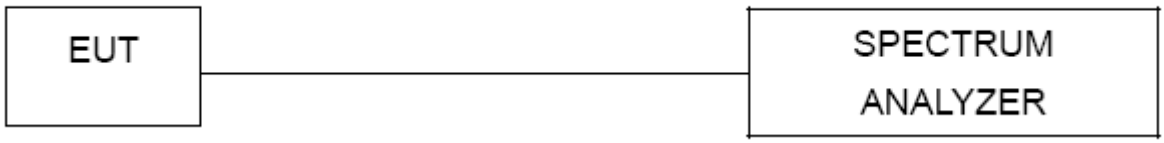


PSD NVNT BLE 1M 2480MHz



10. Bandwidth Test

10.1 Block Diagram Of Test Setup



10.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

10.3 Test Procedure

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. .

10.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

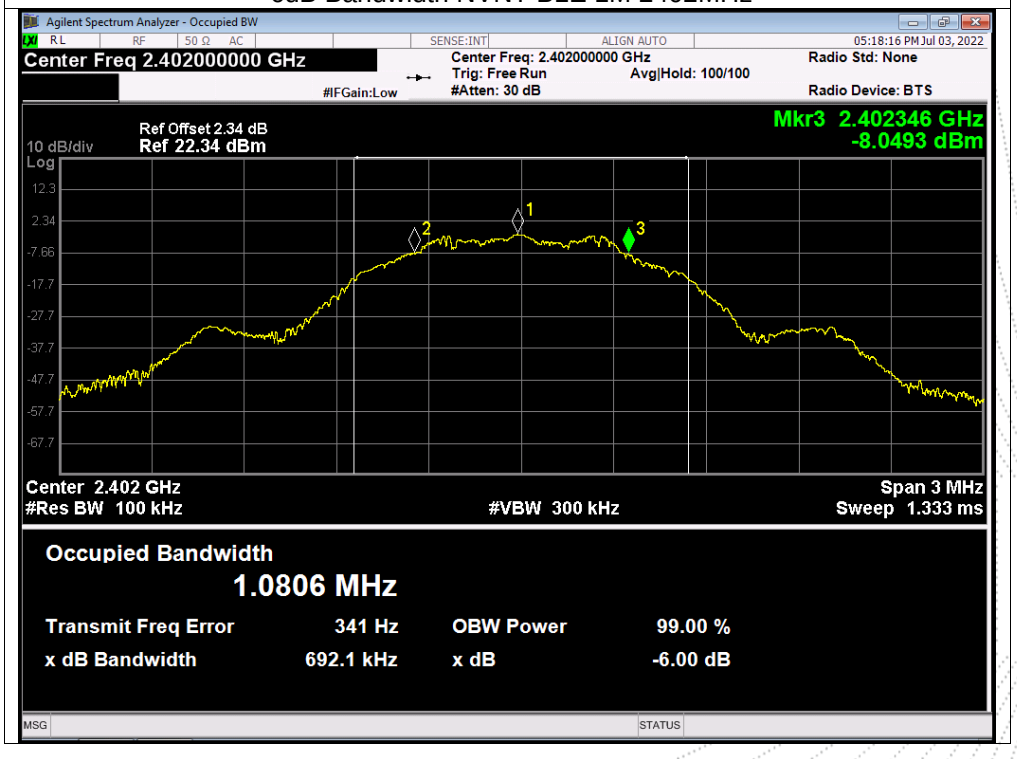
10.5 Test Result

Temperature：	26℃	Relative Humidity：	54%
Test Mode ：	GFSK	Test Voltage ：	DC 5V from adapter

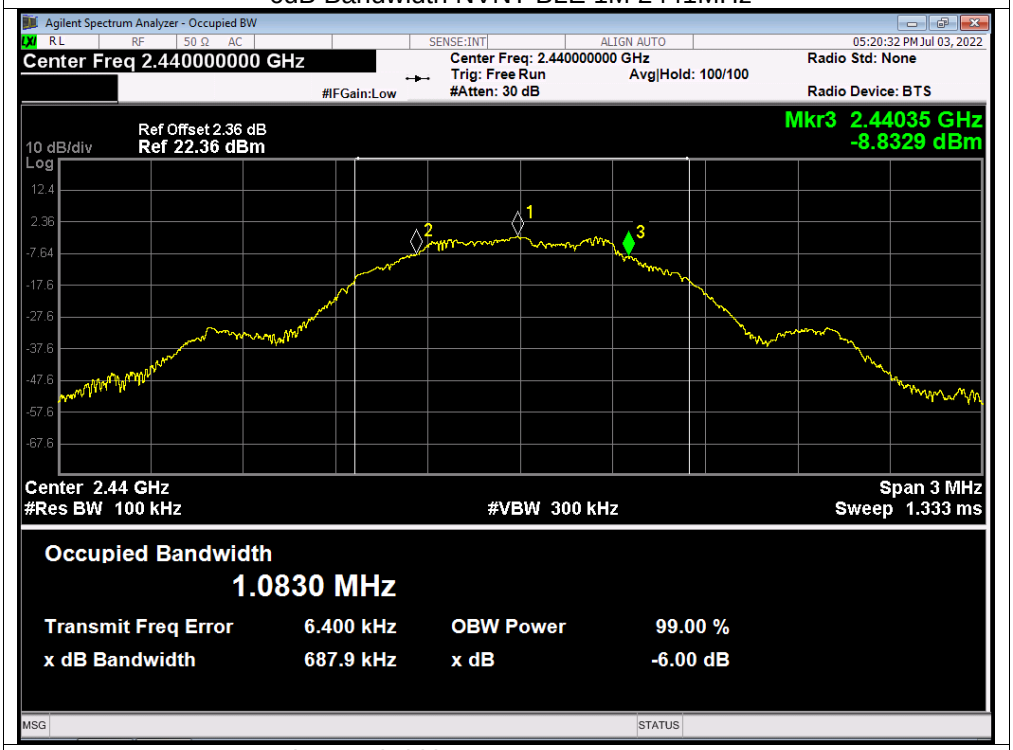
Condition	Mode	Frequency (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	BLE 1M	2402	0.692	0.5	Pass
NVNT	BLE 1M	2440	0.688	0.5	Pass
NVNT	BLE 1M	2480	0.698	0.5	Pass

Test Graphs

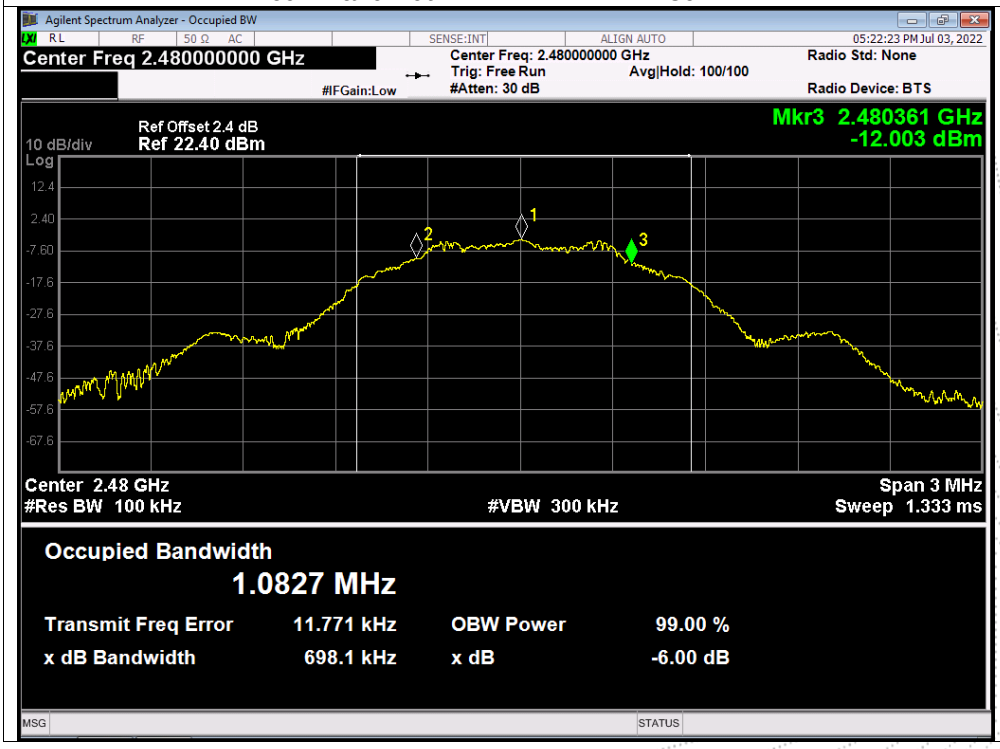
-6dB Bandwidth NVNT BLE 1M 2402MHz



-6dB Bandwidth NVNT BLE 1M 2441MHz

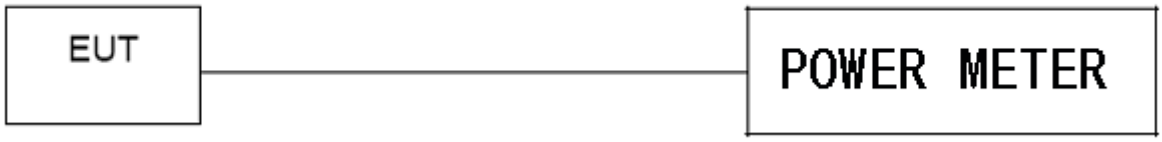


-6dB Bandwidth NVNT BLE 1M 2480MHz



11. Peak Output Power Test

11.1 Block Diagram Of Test Setup



11.2 Limit

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

11.3 Test Procedure

a. The EUT was directly connected to the Power meter

11.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

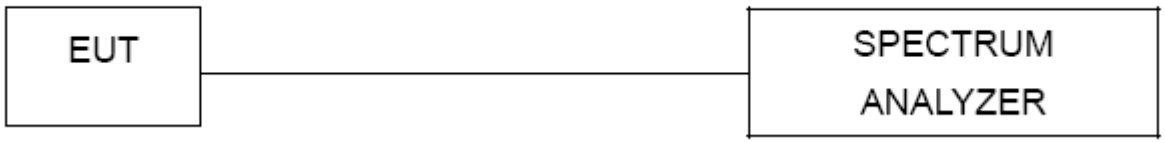
11.5 Test Result

Temperature：	26℃	Relative Humidity：	54%
Test Mode ：	GFSK	Test Voltage ：	DC 5V from adapter

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	BLE 1M	2402	-1.31	30	Pass
NVNT	BLE 1M	2440	-1.59	30	Pass
NVNT	BLE 1M	2480	-3.56	30	Pass

12. 100 KHz Bandwidth Of Frequency Band Edge

12.1 Block Diagram Of Test Setup



12.2 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

12.3 Test Procedure

Using the following spectrum analyzer setting:
a) Set the RBW = 100KHz.
b) Set the VBW = 300KHz.
c) Sweep time = auto couple.
d) Detector function = peak.
e) Trace mode = max hold.
f) Allow trace to fully stabilize..

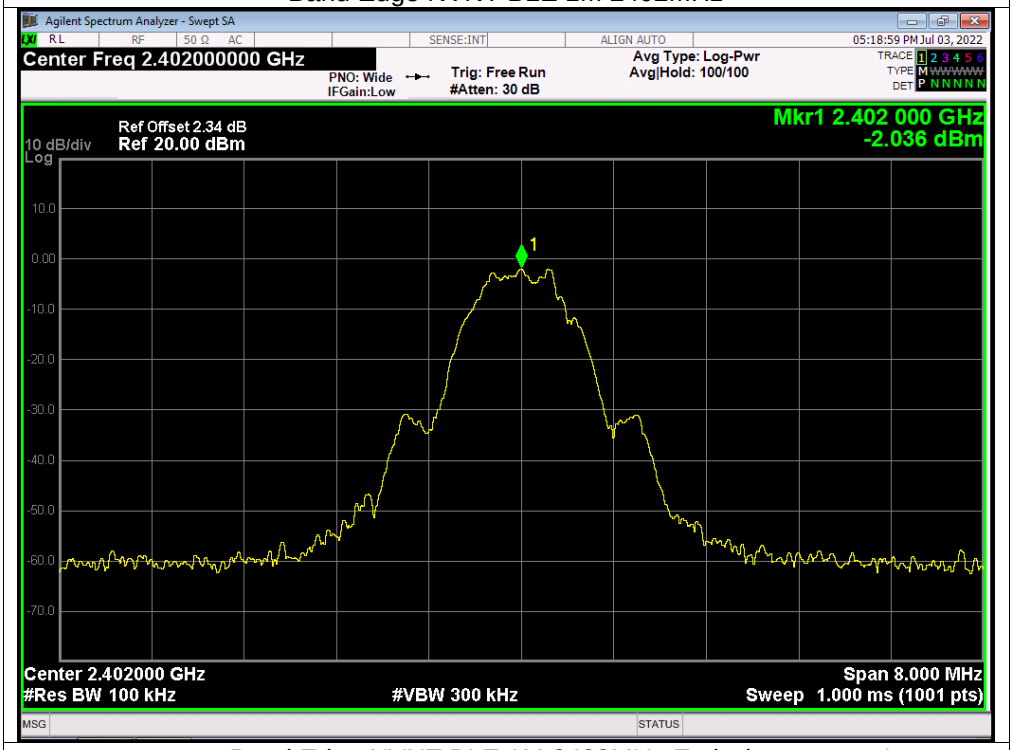
12.4 EUT Operating Conditions

The EUT tested system was configured as the statements of 4.6 Unless otherwise a special operating condition is specified in the follows during the testing.
Note: Power Spectral Density(dBm)=Reading+Cable Loss

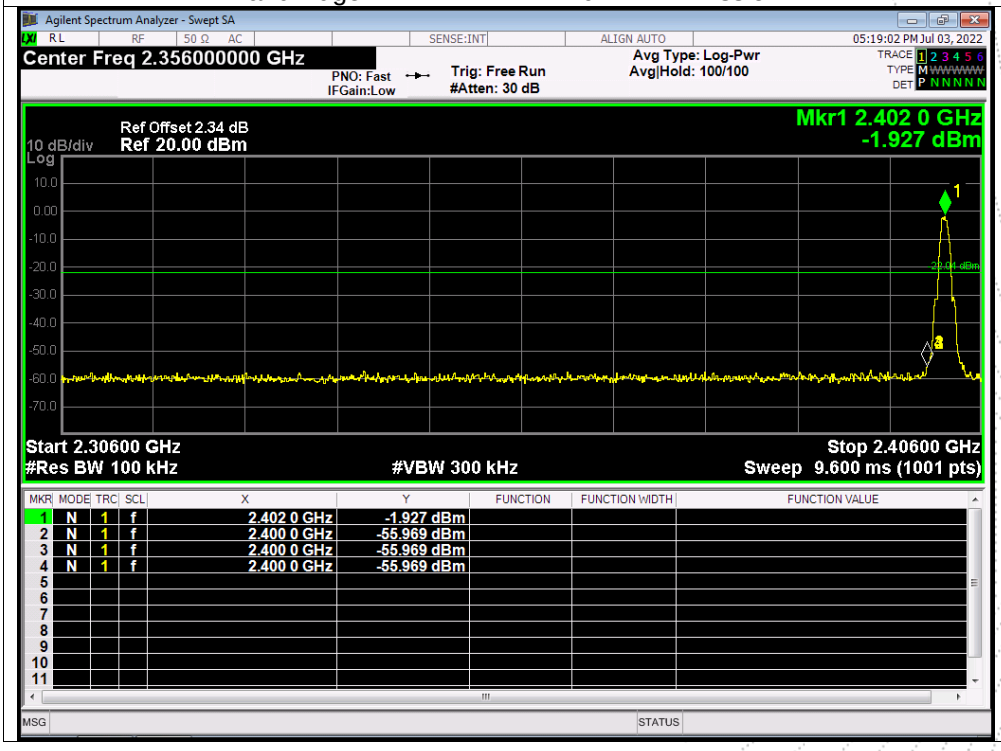
12.5 Test Result

Band Edge

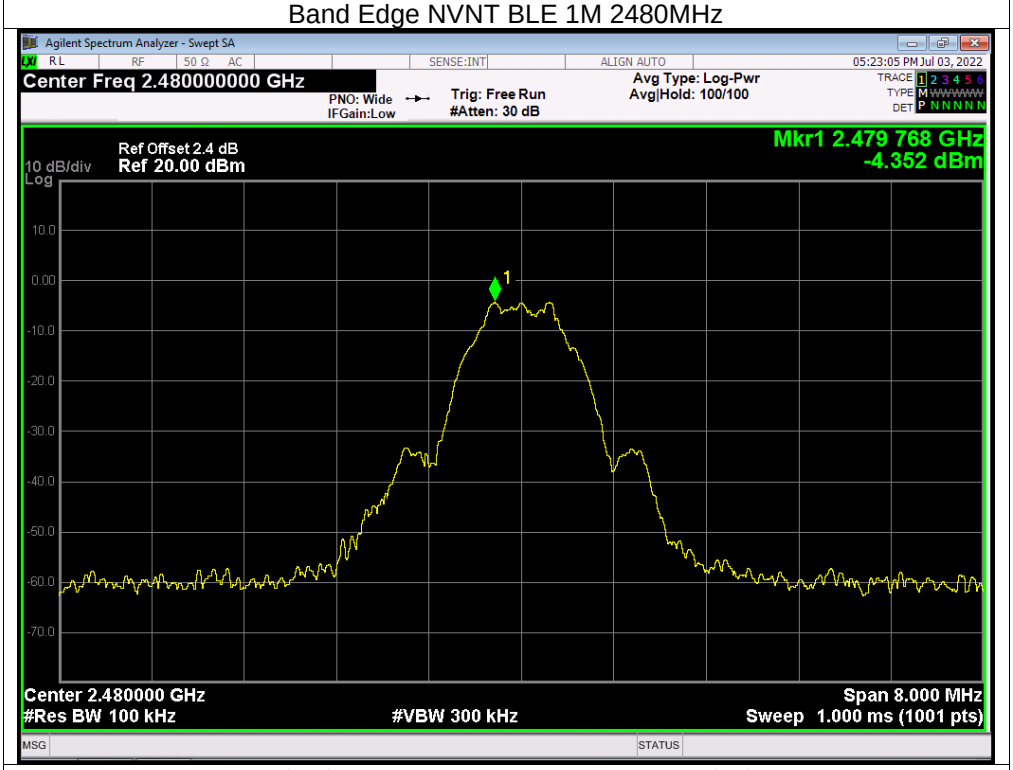
Test Graphs
Band Edge NVNT BLE 1M 2402MHz



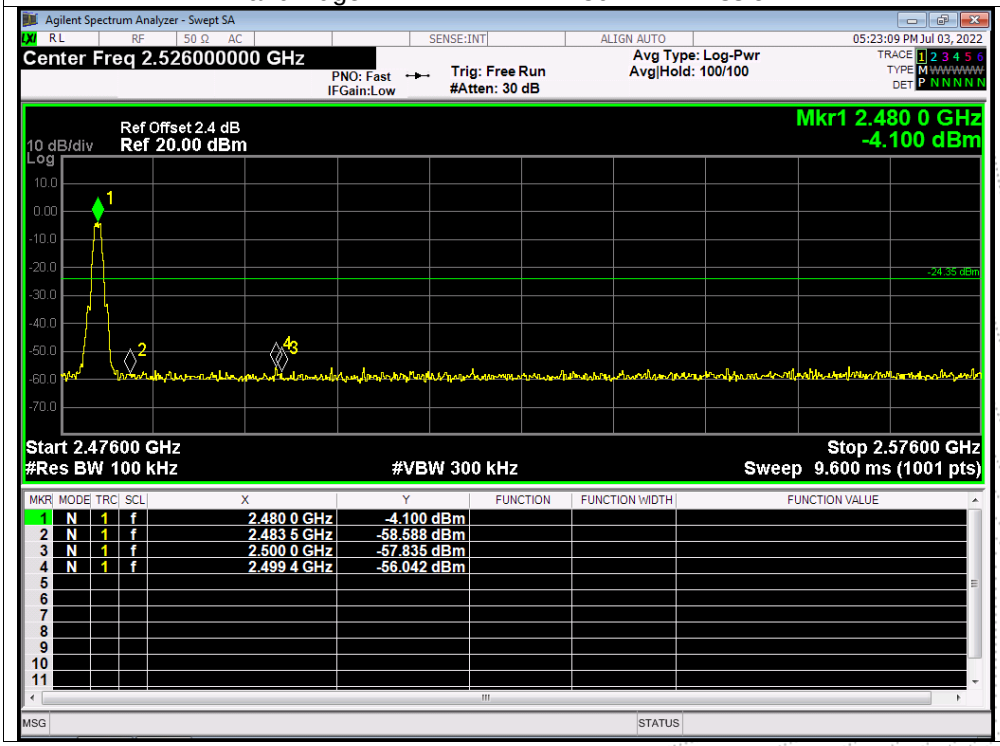
Band Edge NVNT BLE 1M 2402MHz Emission



Band Edge NVNT BLE 1M 2480MHz

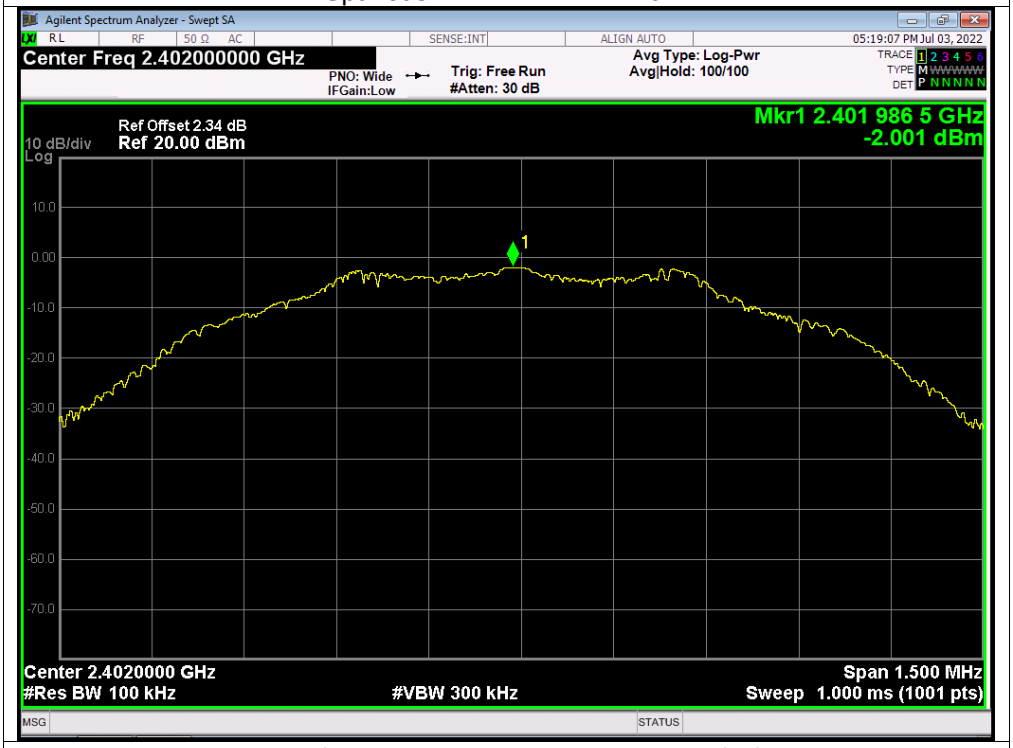


Band Edge NVNT BLE 1M 2480MHz Emission

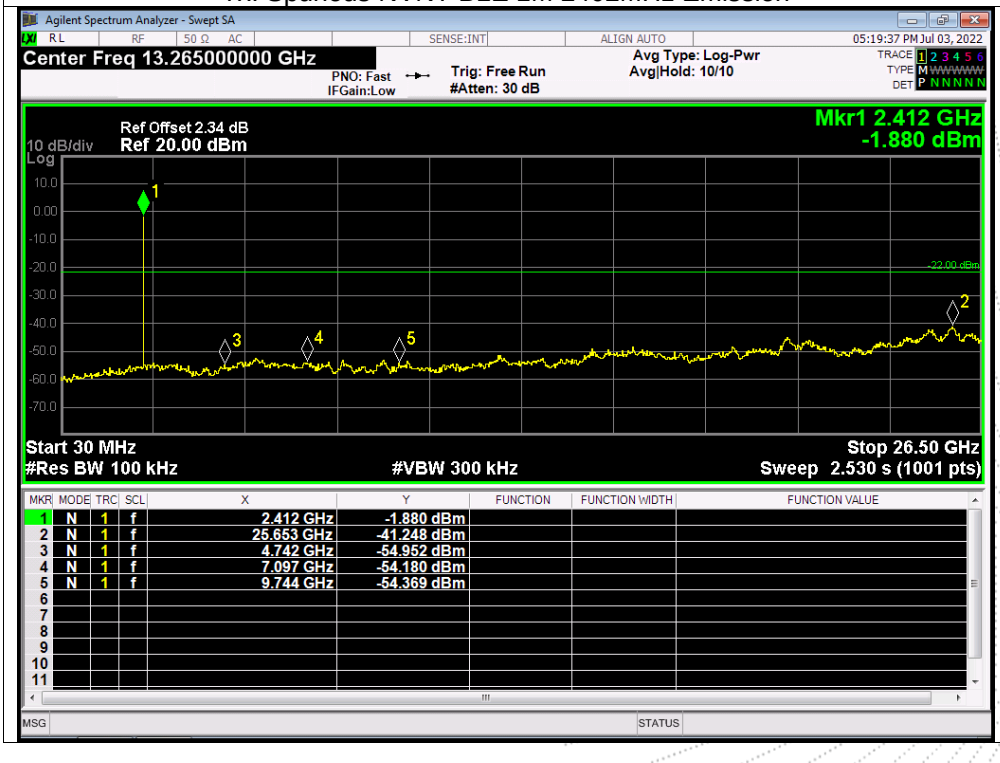


Test Graphs

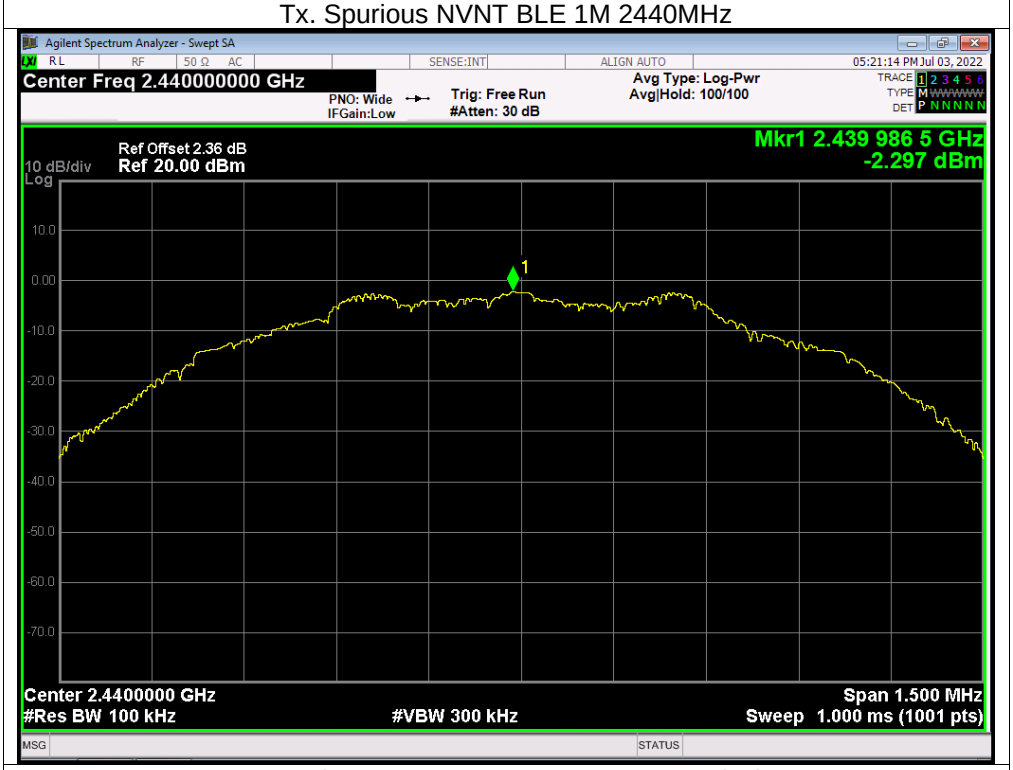
Tx. Spurious NVNT BLE 1M 2402MHz



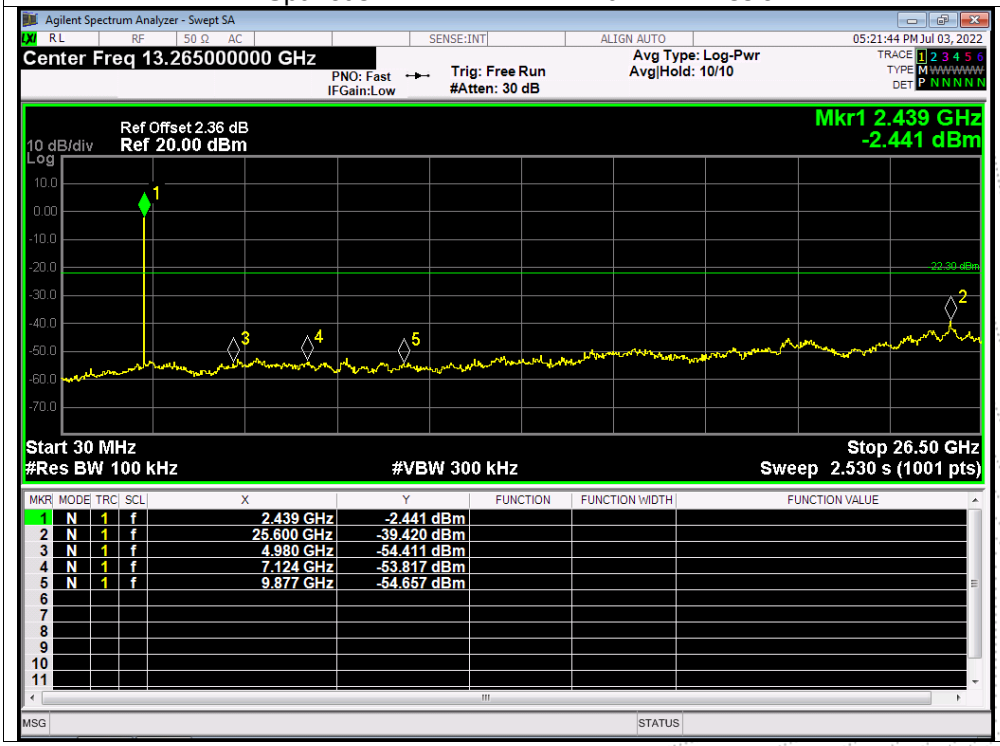
Tx. Spurious NVNT BLE 1M 2402MHz Emission



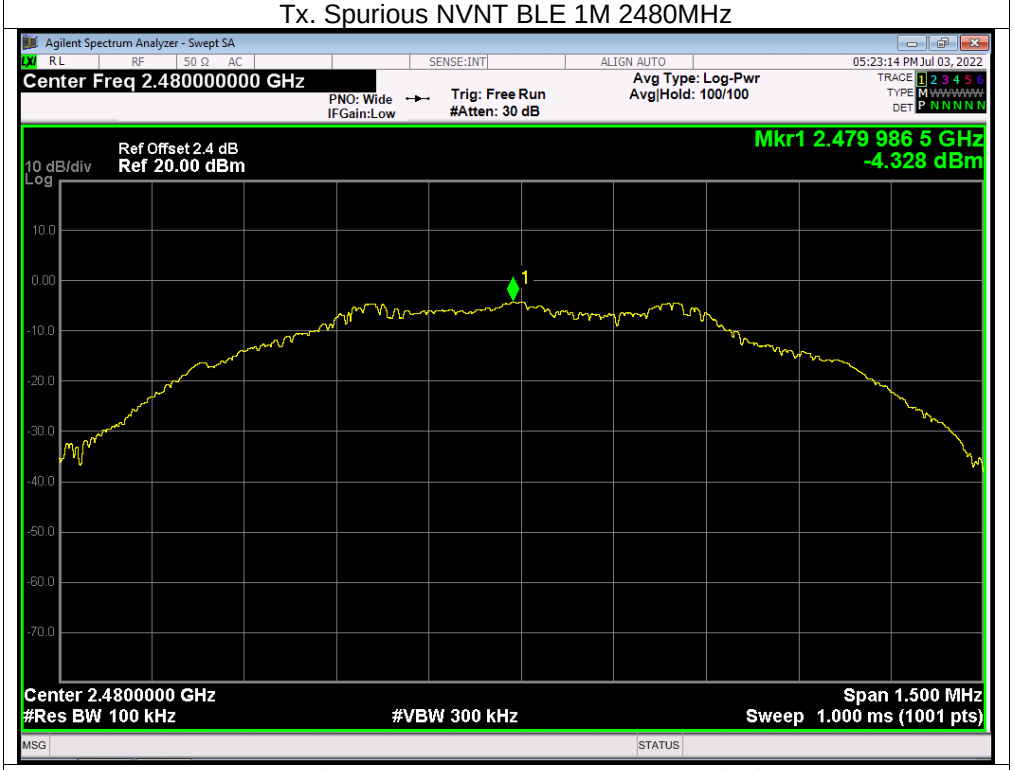
Tx. Spurious NVNT BLE 1M 2440MHz



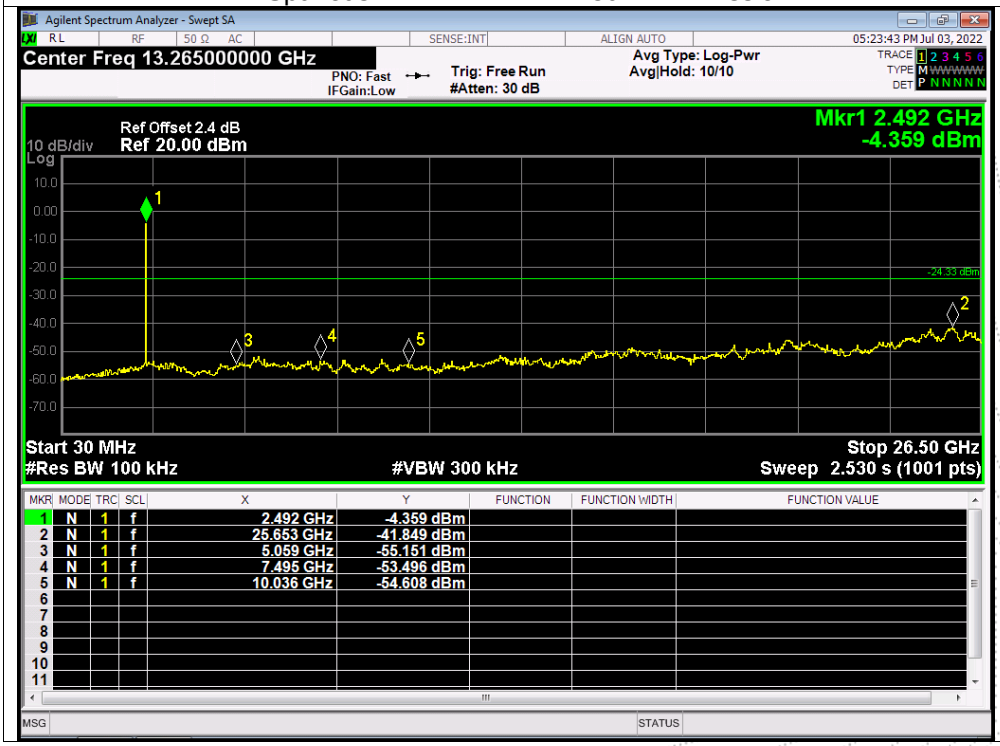
Tx. Spurious NVNT BLE 1M 2440MHz Emission



Tx. Spurious NVNT BLE 1M 2480MHz



Tx. Spurious NVNT BLE 1M 2480MHz Emission



13. Antenna Requirement

13.1 Limit

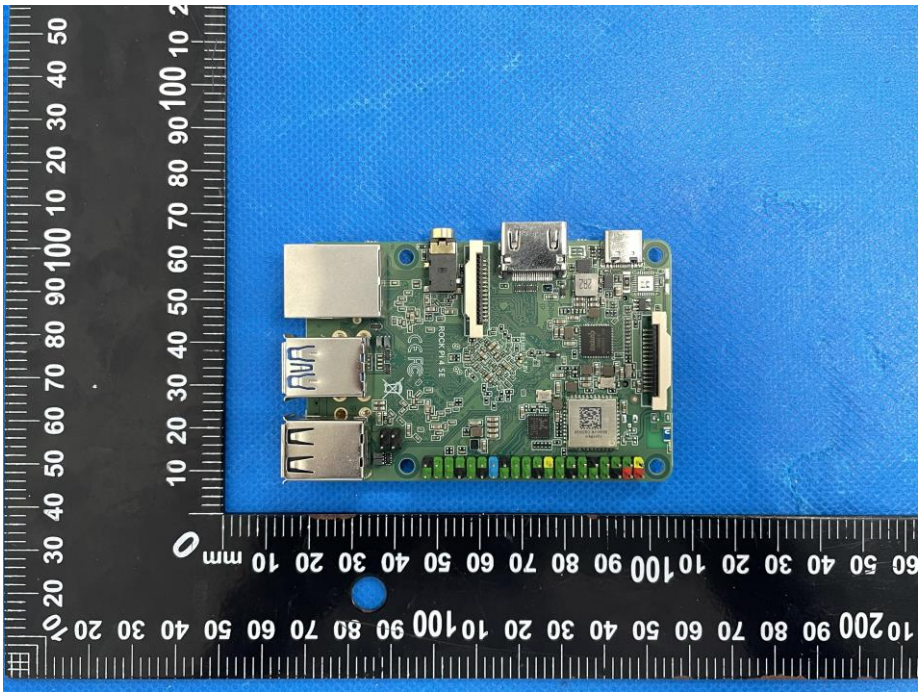
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

13.2 Test Result

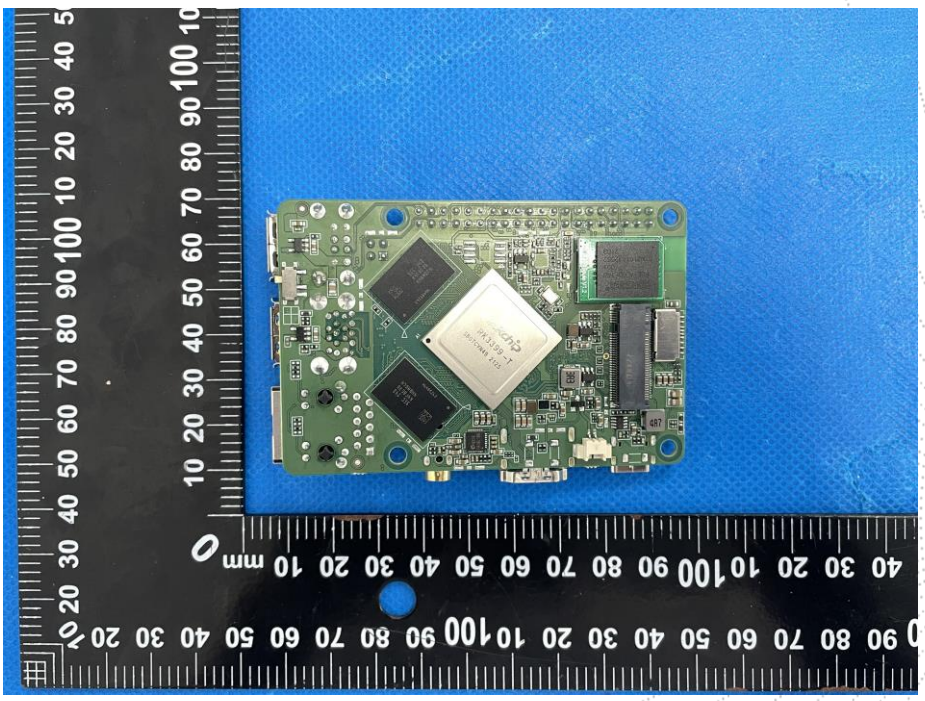
The EUT antenna is Chip antenna, Antenna Gain is 2dBi, fulfill the requirement of this section.

14. EUT Photographs

EUT Photo 1



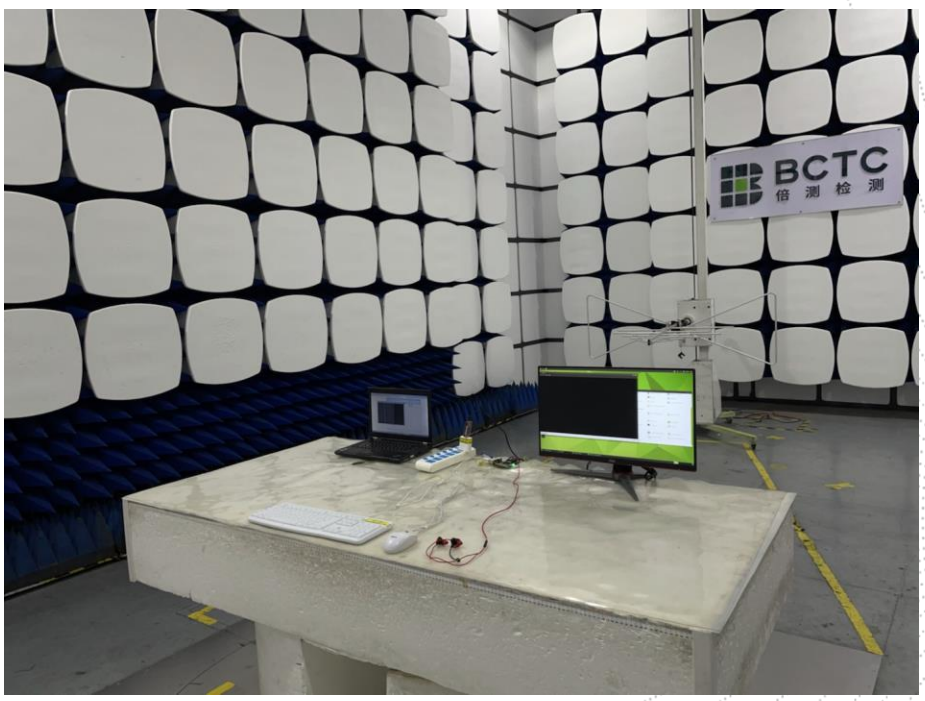
EUT Photo 2

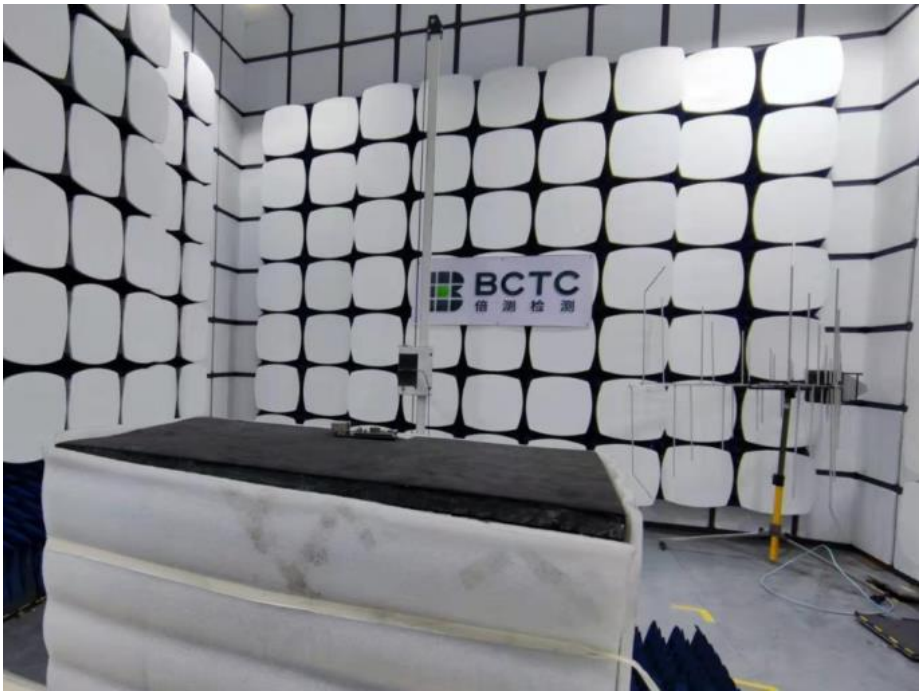


15. EUT Test Setup Photographs

Conducted Measurement Photo

Radiated Measurement Photos




BCTC
倍测检测

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** ※※※※※

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

MiCOM Labs
575 Boulder Court
Pleasanton, CA 94566

Date of Grant: 07/08/2022

Application Dated: 07/08/2022

ROCKPI TRADING LIMITED
Room 11, 27/f, Ga wah international centre,
191 Javaroad, north point,
Hong Kong,,
China

Attention: Luffy Wang

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2A3PA-ROCK4SE
Name of Grantee: ROCKPI TRADING LIMITED
Equipment Class: Part 15 Spread Spectrum Transmitter
Notes: ROCK Pi 4/ROCK 4
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
CC	15C	2402.0 - 2480.0	0.00126		

Output power listed is conducted power. OEM integrators must be provided with antenna installation instructions. The OEM integrators must be instructed to ensure that the end user has no manual instructions to remove or install the device. OEM integrators and end-users must be provided with transmitter operation conditions for satisfying RF exposure compliance. Only the antenna tested with the device or similar antennas with equal or lesser gain may be used with this transmitter. The antenna used with this transmitter must be installed to provide a minimum separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi- transmitter product procedures. End-users must be provided with operating procedures for satisfying RF exposure compliance.

CC: This device is certified pursuant to two different Part 15 rules sections.

TCB

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China

Attention: Luffy Wang

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2A3PA-ROCK4SE
Name of Grantee: ROCKPI TRADING LIMITED
Equipment Class: Digital Transmission System
Notes: ROCK Pi 4/ROCK 4
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
CC	15C	2402.0 - 2480.0	0.00074		
CC	15C	2412.0 - 2462.0	0.01841		

Single Modular Approval Output power listed is conducted power. OEM integrators must be provided with antenna installation instructions. The OEM integrators must be instructed to ensure that the end user has no manual instructions to remove or install the device. OEM integrators and end-users must be provided with transmitter operation conditions for satisfying RF exposure compliance. Only the antenna tested with the device or similar antennas with equal or lesser gain may be used with this transmitter. The antenna used with this transmitter must be installed to provide a minimum separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi- transmitter product procedures. End-users must be provided with operating procedures for satisfying RF exposure compliance.

CC: This device is certified pursuant to two different Part 15 rules sections.

TCB

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Pleasanton, CA 94566

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ROCKPI TRADING LIMITED
Room 11, 27/f, Ga wah international centre,
191 Javaroad, north point,
Hong Kong,,
China

Attention: Luffy Wang

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: 2A3PA-ROCK4SE
Name of Grantee: ROCKPI TRADING LIMITED
Equipment Class: Unlicensed National Information Infrastructure TX
Notes: ROCK Pi 4/ROCK 4
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
CC	15E	5180.0 - 5240.0	0.0125		

Single Modular Approval Output power listed is conducted power. This device contains 20, 40 and 80 MHz signal bandwidth. OEM integrators must be provided with antenna installation instructions. The OEM integrators must be instructed to ensure that the end user has no manual instructions to remove or install the device. OEM integrators and end-users must be provided with transmitter operation conditions for satisfying RF exposure compliance. Only the antenna tested with the device or similar antennas with equal or lesser gain may be used with this transmitter. The antenna used with this transmitter must be installed to provide a minimum separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with FCC multi- transmitter product procedures. End-users must be provided with operating procedures for satisfying RF exposure compliance.

CC: This device is certified pursuant to two different Part 15 rules sections.

BCTC

FCC §15.247 (i), §2.1091 – RF Exposure

FCC ID: 2A3PA-ROCK4SE

Applied procedures / limit

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

Note: f is frequency in MHz

* = Power density limit is applicable at frequencies greater than 100 MHz

Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz

* = Plane-wave equivalent power density

MPE PREDICTION

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna, R=0.2m

TEST RESULTS

	Tune up Produce power	Maximum peak output power (dBm)	Output power to antenna (mW)	Antenna Gain (numeric)	Power Density (S) (mW/ cm2)	Limit (mW / cm2)	Result
BT	0±1	1	1.26	1.58(2dBi)	0.000396	1	Pass
BLE	-2±1	-1	0.79	1.58(2dBi)	0.000248	1	Pass
2.4G WIFI	12±1	13	19.95	1.58(2dBi)	0.006273	1	Pass
5G WIFI	10±1	11	12.59	1.58(2dBi)	0.003959	1	Pass

For the max result : 0.006273≤ 1.0, compliance with FCC's RF Exposure