TEST REPORT

Report No.:	BCTC2202038154-3E
Applicant:	REOLINK INNOVATION LIMITED
Product Name:	WiFi IP Camera
Model/Type reference:	RLC-523WA
Tested Date:	2022-02-09 to 2022-03-03
Issued Date:	2022-03-24

Shenzhen BCTC Testing Co., Ltd.

Product Name:	WiFi IP Camera
Trademark:	reolink
Model/Type reference:	RLC-523WA
Prepared For:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Manufacturer:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Factory:	Shenzhen Reolink Technology Co., Ltd.
Address:	2-4th Floor, Building 2, Yuanling Industrial Park, ShangWu, Shiyan Street, Bao'an District, Shenzhen, China
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:	2022-02-09
Sample tested Date:	2022-02-09 to 2022-03-03
Issue Date:	2022-03-24
Report No.:	BCTC2202038154-3E
Test Standards:	ETSI EN 300 328 V2.2.2 (2019-07)
Test Results:	PASS
Remark:	This is WIFI-2.4GHz band radio test report.

Tested by:

Eric Yang/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
BCTC2202038154-3E	2022-03-24	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No.	Results
Transmitter Parameters			
1	RF output power	4.3.2.2	PASS
2	Power Spectral Density	4.3.2.3	PASS
3	Duty Cycle, Tx-sequence, Tx-gap	4.3.2.4	N/A
4	Medium Utilisation (MU) factor	4.3.2.5	N/A
5	Adaptivity (adaptive equipment using modulations other than FHSS)	4.3.2.6	PASS
6	Occupied Channel Bandwidth	4.3.2.7	PASS
7	Transmitter unwanted emissions in the out-of-band domain	4.3.2.8	PASS
8	Transmitter unwanted emissions in the spurious domain	4.3.2.9	PASS
Receiver Parameters			
9	Receiver spurious emissions	4.3.2.10	PASS
10	Receiver Blocking	4.3.2.11	PASS
11	Geo-location Capability	4.3.2.12	N/A

Remark:

N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.

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.

RF frequency	1×10^{-7}
RF power, conducted	± 1.0 dB
Conducted spurious emission (30MHz-1GHz)	1.28 dB
Conducted spurious emission (1GHz-18GHz)	1.576 dB
Radiated Spurious emission (30MHz-1GHz)	4.30 dB
Radiated Spurious emission (1GHz-18GHz)	4.5 dB
Temperature	0.59 ℃
Humidity	5.3 %

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	RLC-523WA
Model differences:	N/A
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WiFi (2.4GHz): IEEE 802.11b/g/n HT20: 2412-2472MHz HT40: 2422-2462MHz
Max. RF output power:	WiFi (2.4GHz): 8.12 dBm
Type of Modulation:	WiFi: DSSS, OFDM
Antenna installation:	External antenna*2
Antenna Gain:	WiFi (2.4GHz): Antenna A : 2.89 dBi Antenna B : 2.89 dBi
Ratings:	DC 12V
Adapter:	Model: DCT24W120200EU-A0 Input:100-204V~50/60Hz 0.7A max Output: DC 12.0V 2.0A 24.0W

4.2 Test Setup Configuration

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

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	--	---	---

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

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	2467
13	2472						

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting(802.11b/g/n20)	2412MHz	2442MHz	2472MHz
Transmitting(802.11n40)	2422MHz	2442MHz	2462MHz
Receiving(802.11b/g/n20)	2412MHz	2442MHz	2472MHz
Receiving(802.11 n40)	2422MHz	2442MHz	2462MHz

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(KPa):	101
Temperature(℃):	26
Test Voltage(AC):	230V

2.Extreme Test Conditions:

For tests at extreme temperatures, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

Test Conditions	LT	HT
Temperature (℃)	-10	35

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

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023
2	Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022
3	Spectrum Analyzer	Agilent	E4407B	MY45109572	May 28, 2021	May 27, 2022
4	Amplifier	SKET	LAPA_01G18G-45dB	\	May 28, 2021	May 27, 2022
5	Amplifier	Schwarzbeck	BBV9744	9744-0037	May 28, 2021	May 27, 2022
6	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	942	Jun. 01, 2021	May 31, 2022
7	Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 02, 2021	Jun. 01, 2022
8	band rejection filter	ZBSF	ZBSF-C2441.5	1706003606	May 28, 2021	May 27, 2022
9	Signal Generator	Keysight	N5181A	MY50143748	Jun. 29, 2021	Jun. 28, 2022
10	Communication test set	R&S	CMU200	119435	May 28, 2021	May 27, 2022
11	Spectrum Analyzer	Keysight	N9020A	MY49100060	May 28, 2021	May 27, 2022
12	Signal Generator	Keysight	N5182B	MY56200519	May 28, 2021	May 27, 2022
13	Power Meter	Keysight	E4419	\	May 28, 2021	May 27, 2022
14	Power Sensor	Keysight	E9300A	\	May 28, 2021	May 27, 2022
15	Horn antenna	Schwarzbeck	BBHA9170	00822	Jun. 15, 2021	Jun. 14, 2022
16	Preamplifier	MITEQ	TTA1840-35-HG	2034381	May 28, 2021	May 27, 2022
17	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
18	Software	Keysight	Keysight.ETSL Test system	1.02.05	\	\
19	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
20	Loop Antenna	Schwarzbeck	FMZB1519B	00014	Jun. 02, 2021	Jun. 01, 2022
21	Communication test set	Agilent	N4010A	MY49081107	May 28, 2021	May 27, 2022
22	Programmable constant temperature and humidity test chamber	DGBELL	BTKS5-150C	\	Jul.06, 2021	Jul.05, 2022

6. Information As Required

ETSI EN 300 328 V2.2.2 Annex E

a) The type of modulation used by the equipment:
☐FHSS ☒other forms of modulation
b) In case of FHSS modulation:
☐In case of non-Adaptive Frequency Hopping equipment:
The number of Hopping Frequencies: _
☐In case of Adaptive Frequency Hopping Equipment:
The maximum number of Hopping Frequencies: __ *The minimum number of Hopping Frequencies:* __
☐*The (average) Dwell Time: _____ maximum*
c) Adaptive / non-adaptive equipment:
☐non-adaptive Equipment ☒adaptive Equipment without the possibility to switch to a non-adaptive mode ☐adaptive Equipment which can also operate in a non-adaptive mode
d) In case of adaptive equipment:
The Channel Occupancy Time implemented by the equipment: __
☐The equipment has implemented an LBT based DAA mechanism
☐In case of equipment using modulation different from FHSS:
☐The equipment is Frame Based equipment ☒The equipment is Load Based equipment ☐The equipment can switch dynamically between Frame Based and Load Based equipment
The CCA time implemented by the equipment: ..... µs
☐The equipment has implemented an non-LBT based DAA mechanism
☐The equipment can operate in more than one adaptive mode
e) In case of non-adaptive Equipment:
The maximum RF Output Power (e.i.r.p.): _
The maximum (corresponding) Duty Cycle:
Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):…….
f) The worst case operational mode for each of the following tests:
☒RF Output Power: 802.11b
☒Power Spectral Density: 802.11b
☐Duty cycle, Tx-Sequence, Tx-gap
☐Accumulated Transmit time, Frequency Occupation & Hopping Sequence (only for FHSS equipment):
☐Hopping Frequency Separation (only for FHSS equipment):
☐Medium Utilization:
☐Adaptivity:
☒Nominal Channel Bandwidth: 802.11n (HT40)
☒Transmitter unwanted emissions in the OOB domain: 802.11b
☒Transmitter unwanted emissions in the spurious domain: 802.11b
☒Receiver spurious emissions : 802.11b
☒Receiver blocking : 802.11b
g) The different transmit operating modes (tick all that apply):
☐Operating mode 1: Single Antenna Equipment
☐Equipment with only one antenna
☐Equipment with two diversity antennas but only one antenna active at any moment in time
☒Smart Antenna Systems with two or more antennas, but operating in a (legacy) mode where only One antenna is used (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
☐Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
☐Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)

☐High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1
☐High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2
NOTE 1: Add more lines if more channel bandwidths are supported.
☐Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
☐Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)
☐High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 1
☐High Throughput (> 1 spatial stream) using Nominal Channel Bandwidth 2
NOTE 2: Add more lines if more channel bandwidths are supported.
h) In case of Smart Antenna Systems:
The number of Receive chains:
The number of Transmit chains:
☐symmetrical power distribution
☐asymmetrical power distribution
In case of beam forming, the maximum (additional) beam forming gain:
NOTE: The additional beam forming gain does not include the basic gain of a single antenna.
i) Operating Frequency Range(s) of the equipment:
Operating Frequency Range 1: Refer to section 4.1
Operating Frequency Range 2:_
NOTE: Add more lines if more Frequency Ranges are supported.
j) Nominal Channel Bandwidth(s):
Nominal Channel Bandwidth 1: *36.316 MHz(802.11n40) Max.*
NOTE: Add more lines if more channel bandwidths are supported.
k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):
☒Stand-alone
☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
☐Plug-in radio device (Equipment intended for a variety of host systems)
☐Other
l) The normal and the extreme operating conditions that apply to the equipment:
Refer to section 4.6
m) The intended combination(s) of the radio equipment power settings and one or more antenna assemblies and their corresponding e.i.r.p. levels:
Antenna Type:
☒External antenna (information to be provided in case of conducted measurements)
Antenna Gain: Refer to section 4.1
If applicable, additional beamforming gain (excluding basic antenna gain):
☐Temporary RF connector provided
☐No temporary RF connector provided
☐Dedicated Antennas (equipment with antenna connector)
☐Single power level with corresponding antenna(s)
☐Multiple power settings and corresponding antenna(s)
Number of different Power Levels:
Power Level 1:
Power Level 2:
Power Level 3:
NOTE 1: Add more lines in case the equipment has more power levels.
NOTE 2: These power levels are conducted power levels (at antenna connector).
For each of the Power Levels, provide the intended antenna assemblies, their corresponding gains (G) and the resulting e.i.r.p. levels also taking into account the beamforming gain (Y) if applicable
Power Level 1:
Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p.(dBm)	Part number or model name
1			
2			
3			
4			

NOTE 3: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 2:

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p.(dBm)	Part number or model name
1			
2			
3			
4			

NOTE 4: Add more rows in case more antenna assemblies are supported for this power level.

Power Level 3:

Number of antenna assemblies provided for this power level:

Assembly #	Gain (dBi)	e.i.r.p.(dBm)	Part number or model name
1			
2			
3			
4			

NOTE 5: Add more rows in case more antenna assemblies are supported for this power level.

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Refer to section 4.

o) Describe the test modes available which can facilitate testing: ……

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], IEEE 802.15.4™ [i.4], proprietary, etc.):……

q) If applicable, the statistical analysis referred to in clause 5.4.1 q)

(to be provided as separate attachment)

r) If applicable, the statistical analysis referred to in clause 5.4.1 r)

(to be provided as separate attachment)

s) Geo-location capability supported by the equipment:

☐Yes

☐The geographical location determined by the equipment as defined in clause 4.3.1.13.2 or clause 4.3.2.12.2 is not accessible to the user

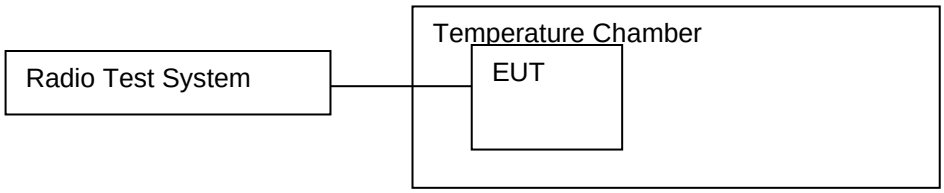
☒No

t) Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):

……..

7. RF Output Power

7.1 Block Diagram Of Test Setup



7.2 Limit

For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

Limit
20dBm

7.3 Test procedure

Step 1:

• Use a fast power sensor suitable for 2.4 GHz and capable of minimum 1 MS/s.
• Use the following settings:
- Sample speed 1 MS/s or faster.
- The samples shall represent the RMS power of the signal.
- Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.
NOTE 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.

Step 2:

• For conducted measurements on devices with one transmit chain:
- Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.
• For conducted measurements on devices with multiple transmit chains:
- Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
- Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
- For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples in all following steps.

Step 3:

• Find the start and stop times of each burst in the stored measurement samples.
The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.
NOTE 2: In case of insufficient dynamic range, the value of 30 dB may need to be reduced appropriately.

Step 4:

• Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with 'k' being the total number of samples and 'n' the actual sample number

Step 5:

• The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.

Step 6:

• Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.
• If applicable, add the additional beamforming gain "Y" in dB.
• If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
• The RF Output Power (P) shall be calculated using the formula below:

P = A + G + Y

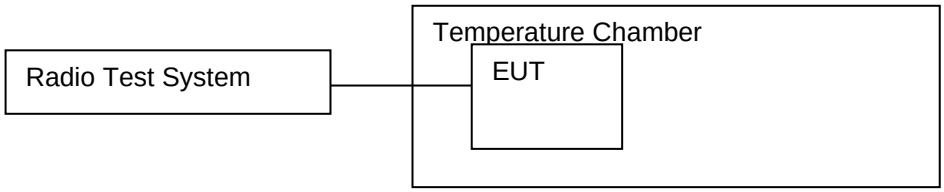
• This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

7.4 Test Result

Modulation	Test conditions (Temperature)	Antenna	Low Channel		Middle Channel		High Channel	
			EIRP	Total EIRP	EIRP	Total EIRP	EIRP	Total EIRP
802.11b	Normal	A	7.98	/	7.96	/	7.65	/
		B	7.25	/	7.38	/	7.16	/
	Lower	A	7.87	/	7.61	/	7.31	/
		B	7.08	/	7.25	/	6.86	/
	Upper	A	7.38	/	7.13	/	7.11	/
		B	6.73	/	6.96	/	6.67	/
802.11g	Normal	A	4.4	/	4.63	/	4.41	/
		B	5.29	/	5.4	/	5.19	/
	Lower	A	4.37	/	4.57	/	4.01	/
		B	4.99	/	5.18	/	4.99	/
	Upper	A	3.89	/	4.23	/	3.88	/
		B	4.79	/	4.86	/	4.55	/
802.11n(HT20)	Normal	A	4.3	7.74	4.41	7.89	4.25	7.71
		B	5.12		5.31		5.1	
	Lower	A	4.27	7.47	4.15	7.53	3.91	7.56
		B	4.65		4.86		5.10	
	Upper	A	3.97	7.28	3.78	7.11	3.66	7.38
		B	4.55		4.40		4.98	
802.11n(HT40)	Normal	A	4.52	8.01	4.65	**8.12**	4.52	8.01
		B	5.43		5.52		5.44	
	Lower	A	4.06	7.57	4.41	7.87	4.37	7.78
		B	5.01		5.26		5.14	
	Upper	A	3.78	7.20	4.12	7.65	4.31	7.75
		B	4.57		5.11		5.13	
Limit			≤100mW (20dBm)					
Remark: P = A + G + Y,G=Antenna Gain,x=100%								

8. Power Spectral Density

8.1 Block Diagram Of Test Setup



8.2 Limit

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

Limit
10dBm/MHz

8.3 Test procedure

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Start Frequency: 2 400 MHz
- Stop Frequency: 2 483,5 MHz
- Resolution BW: 10 kHz
- Video BW: 30 kHz
- Sweep Points: > 8 350

NOTE: For spectrum analysers not supporting this number of sweep points, the frequency band may be segmented.

- Detector: RMS
- Trace Mode: Max Hold
- Sweep time: 10 s; the sweep time may be increased further until a value where the sweep time has no impact on the RMS value of the signal

For non-continuous signals, wait for the trace to stabilize.

Save the data (trace data) set to a file.

Step 2:

For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.1.3.2), repeat the measurement for each of the transmit ports. For each sampling point (frequency domain), add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.

Step 3:

Add up the values for power for all the samples in the file using the formula below.

$$P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$$

with 'k' being the total number of samples and 'n' the actual sample number

Step 4:

Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.3.2 and save the corrected data. The following formulas can be used:

$$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$

$$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$

with 'n' being the actual sample number

Step 5:

Starting from the first sample PSamplecorr(n) (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 6:

Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).

Step 7:

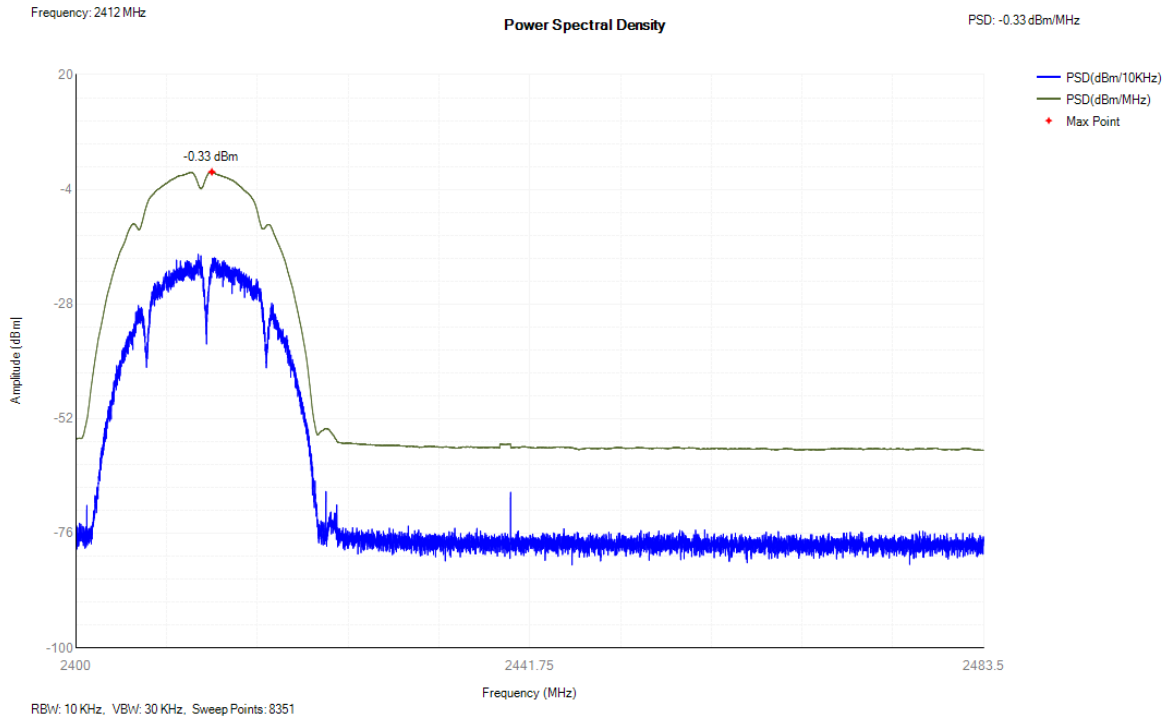
Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments.

From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.

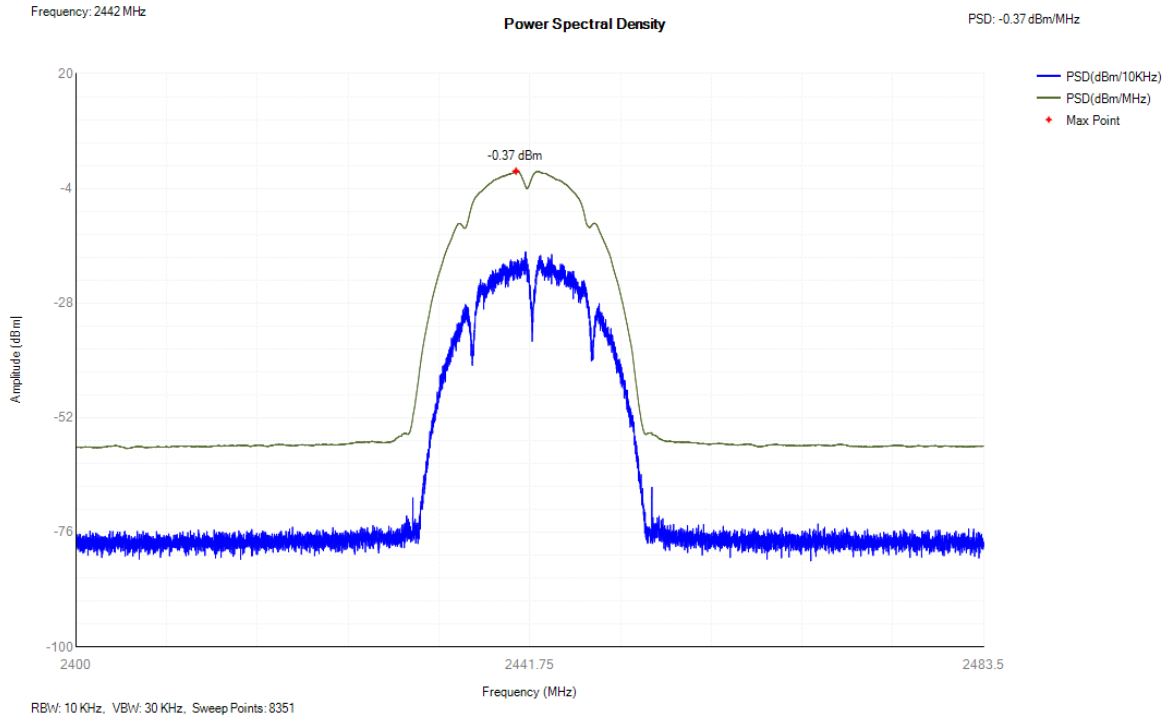
8.4 Test Result

Modulation	Test conditions (Temperature)	Antenna	Maximum e.i.r.p. Spectral Density (dBm/MHz)					
			Low Channel		Middle Channel		High Channel	
			/	Total	/	Total	/	Total
802.11b	Normal	A	-0.33	/	-0.37	/	-0.83	/
		B	-1.14	/	-1.08	/	-1.26	/
802.11g	Normal	A	-7.08	/	-6.78	/	-7	/
		B	-6.18	/	-6.03	/	-6.18	/
802.11n(HT20)	Normal	A	-7.31	-3.90	-7.23	-3.83	-7.47	-4.01
		B	-6.55		-6.49		-6.62	
802.11n(HT40)	Normal	A	-10.31	-6.87	-10.17	-6.66	-10.26	-6.75
		B	-9.49		-9.23		-9.31	
Limit			≤10dBm/MHz					

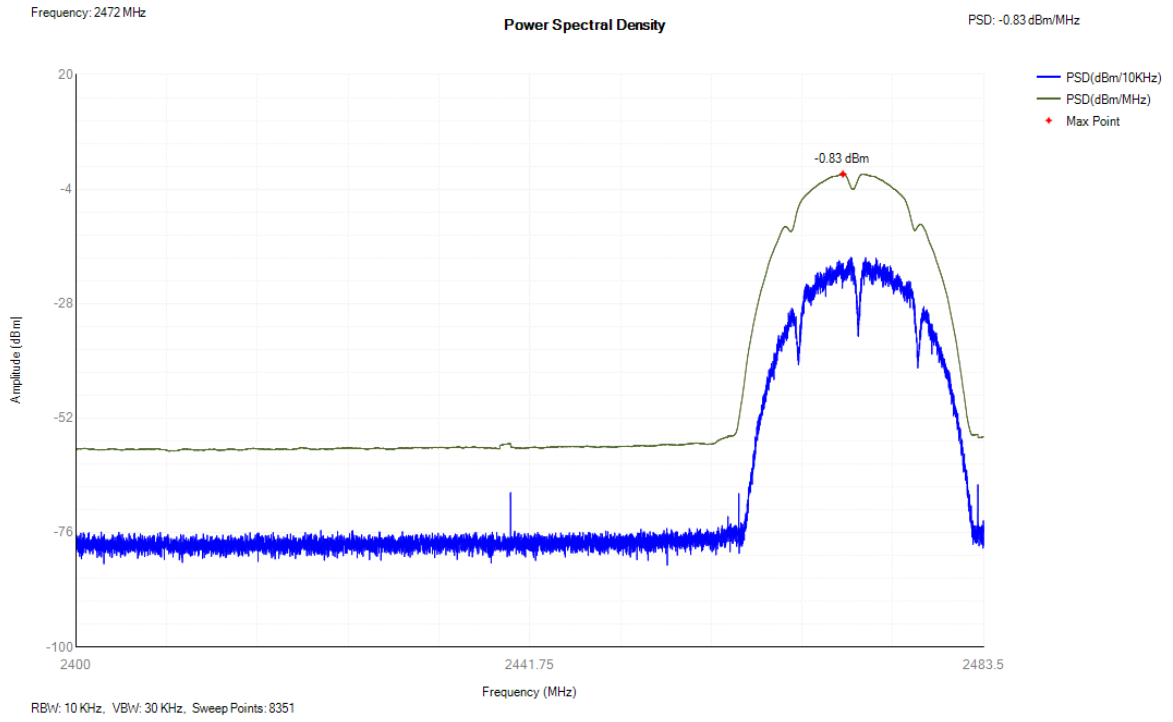
Test Graphs
PSD NVNT b 2412MHz Ant A



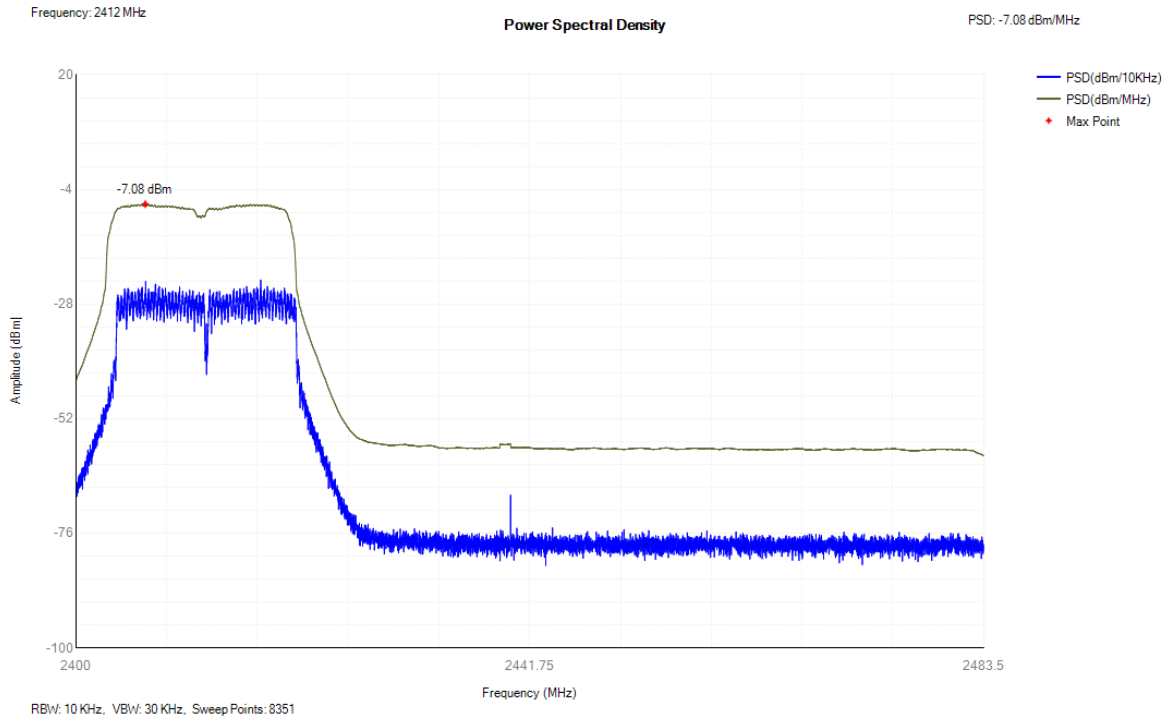
PSD NVNT b 2442MHz Ant A



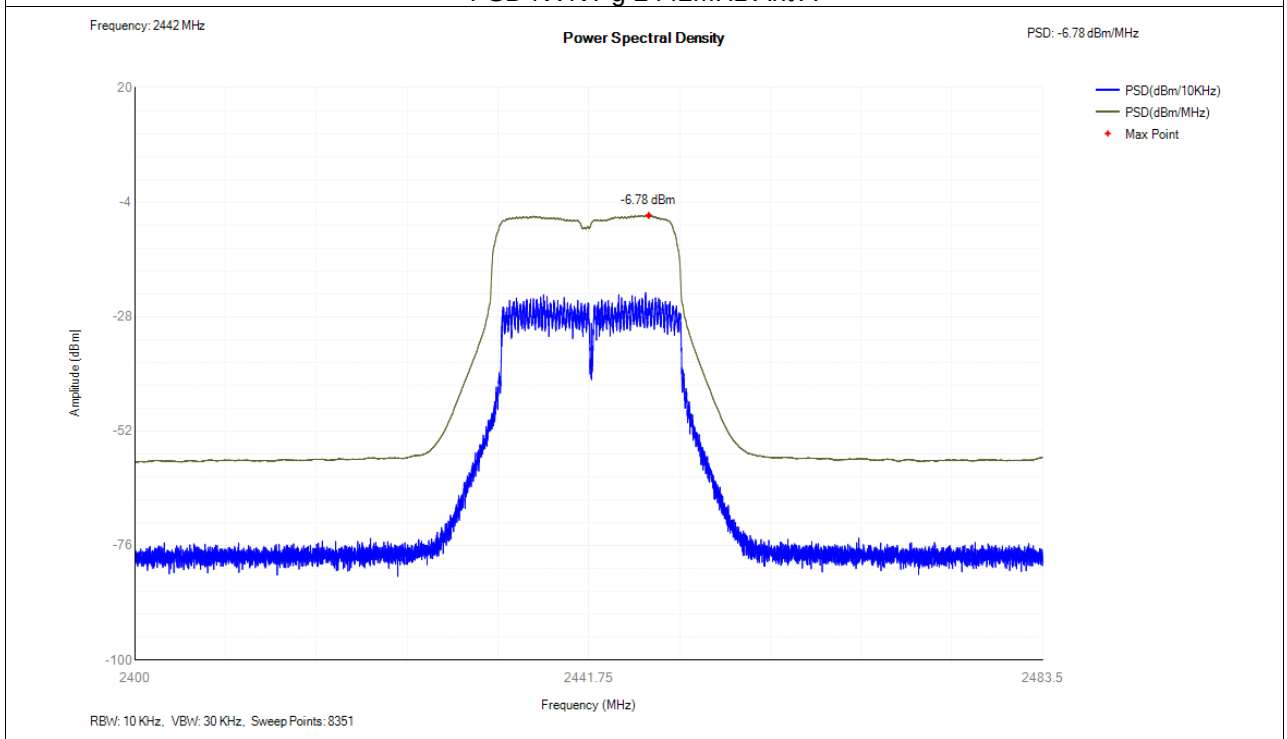
PSD NVNT b 2472MHz Ant A



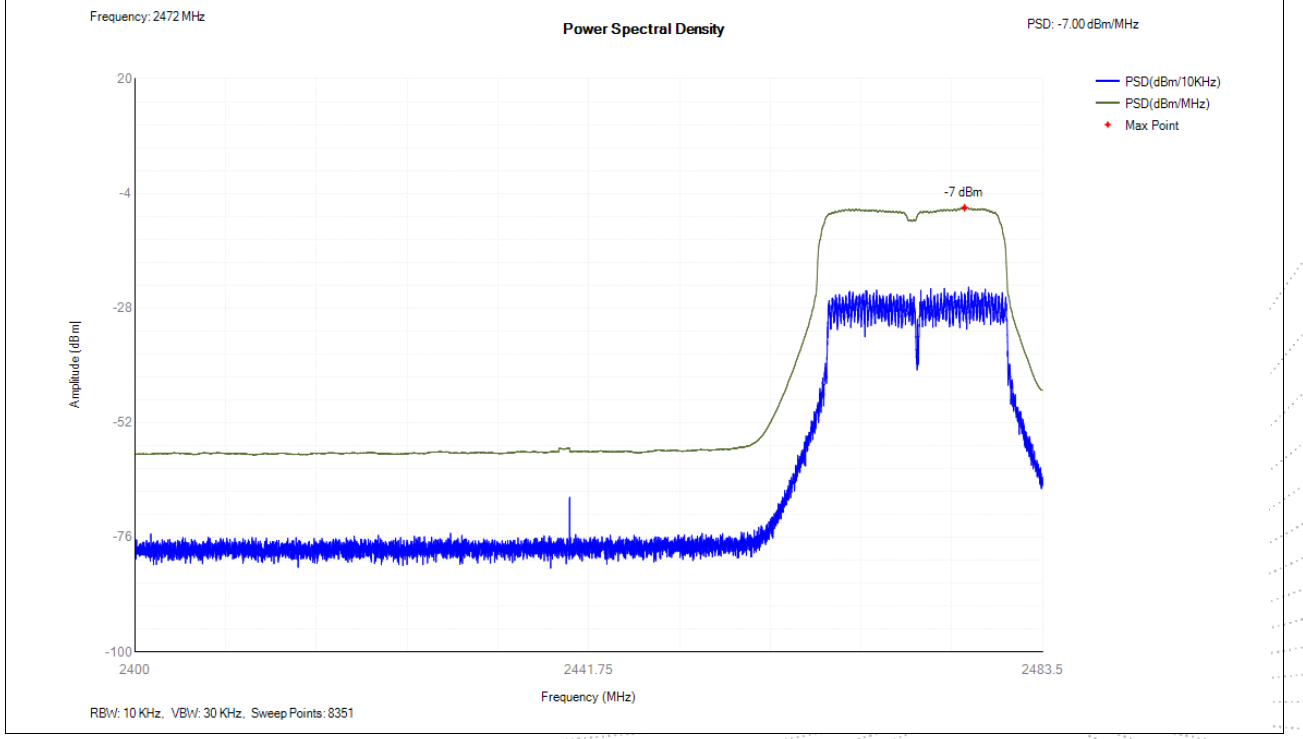
PSD NVNT g 2412MHz Ant A



PSD NVNT g 2442MHz Ant A



PSD NVNT g 2472MHz Ant A



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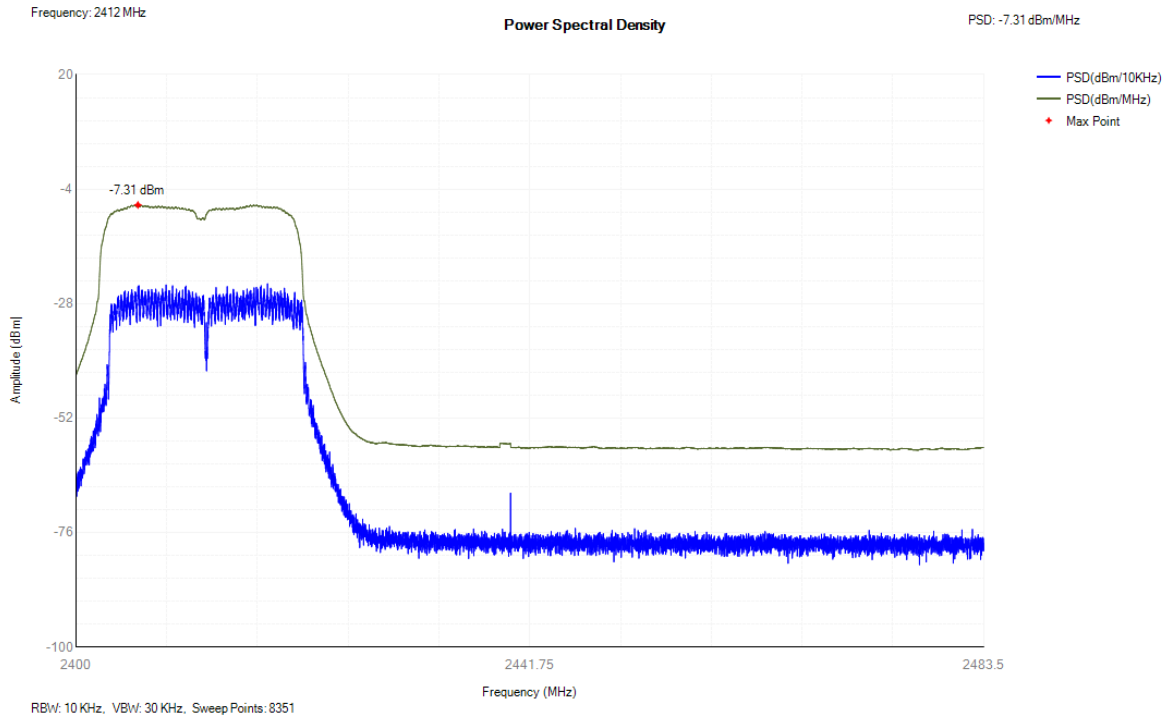

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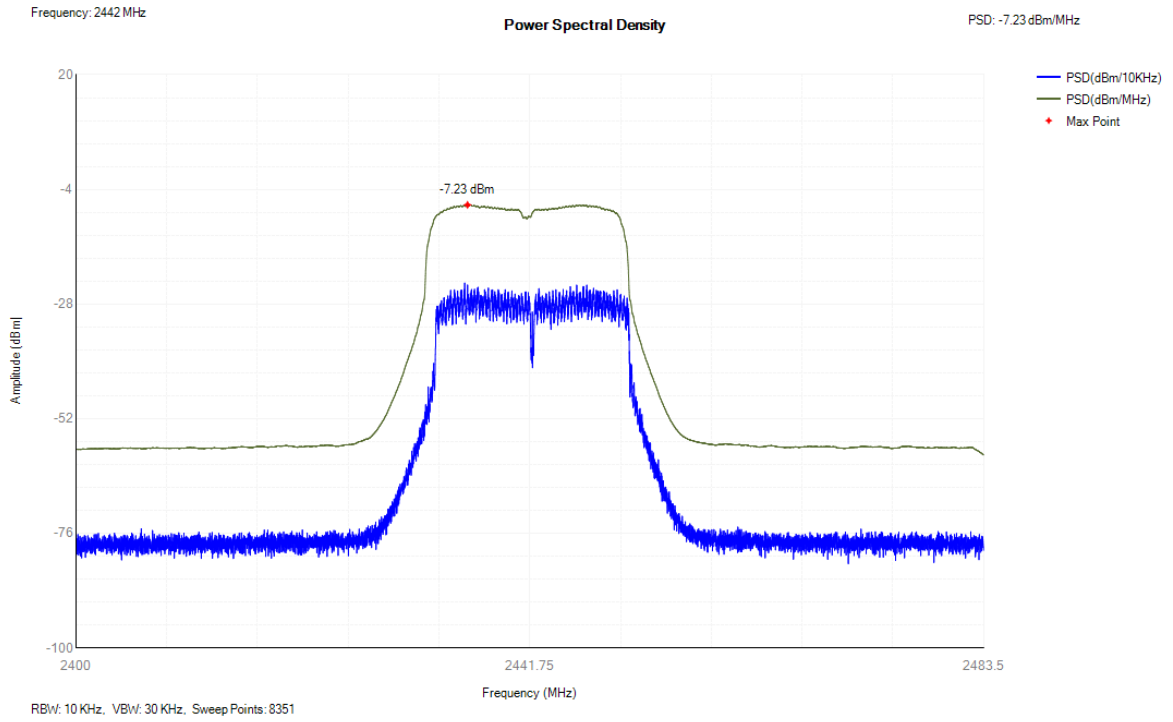

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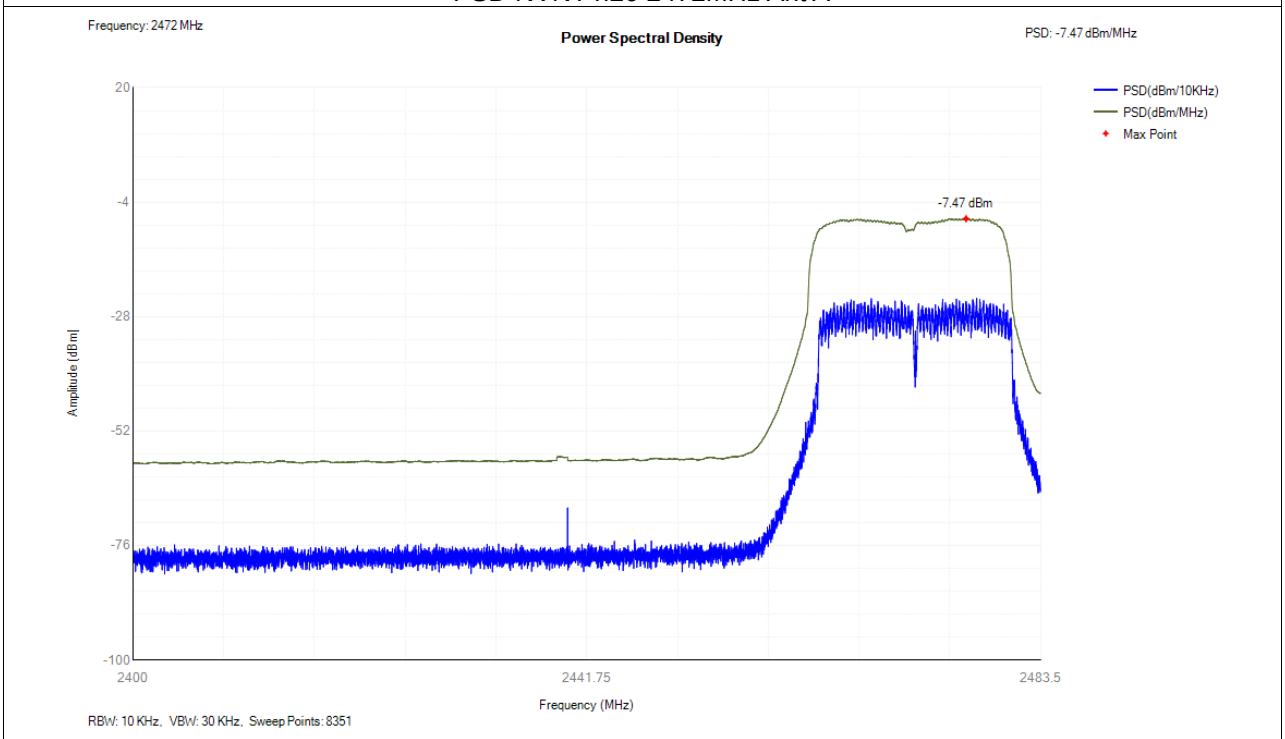

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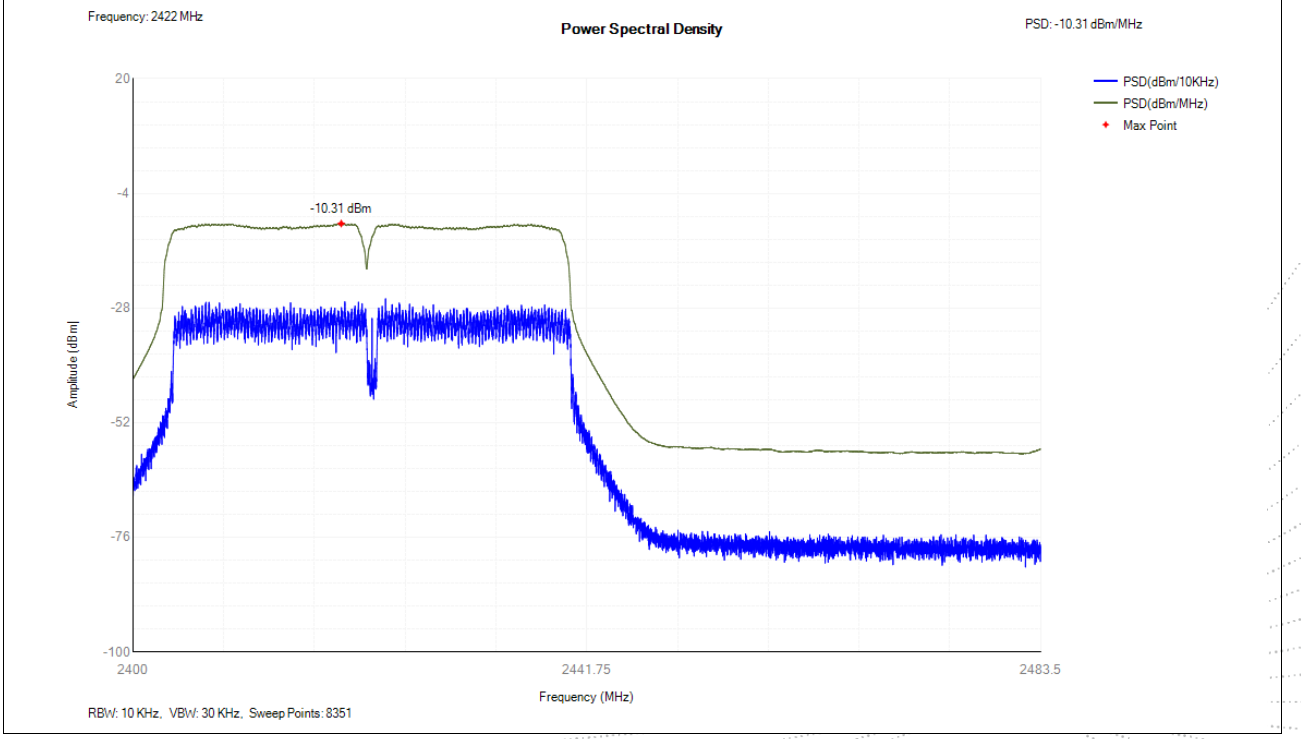

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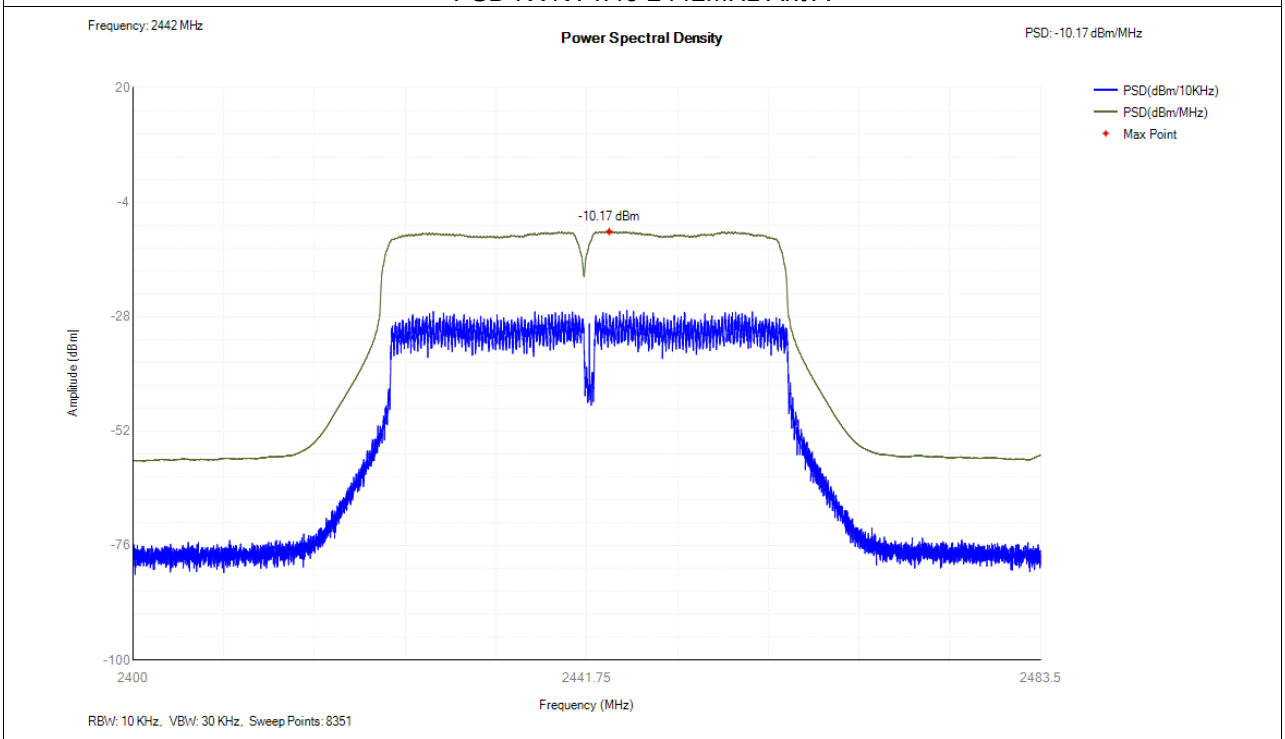
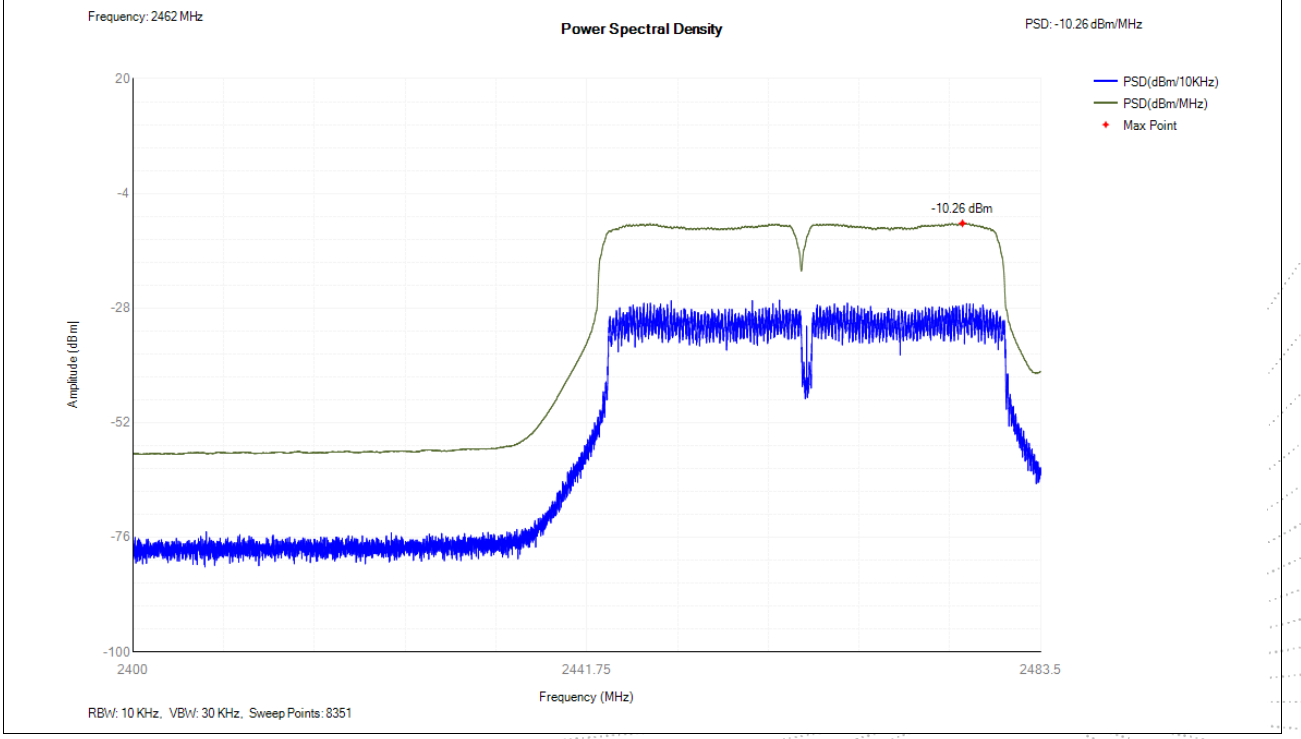
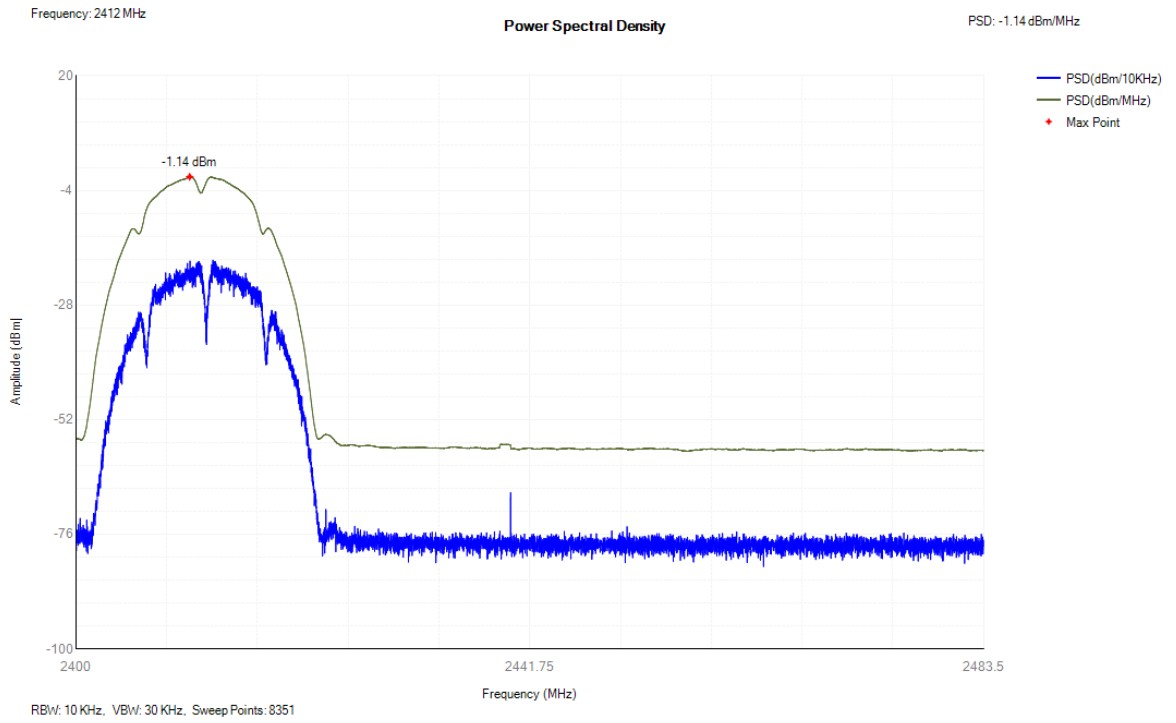


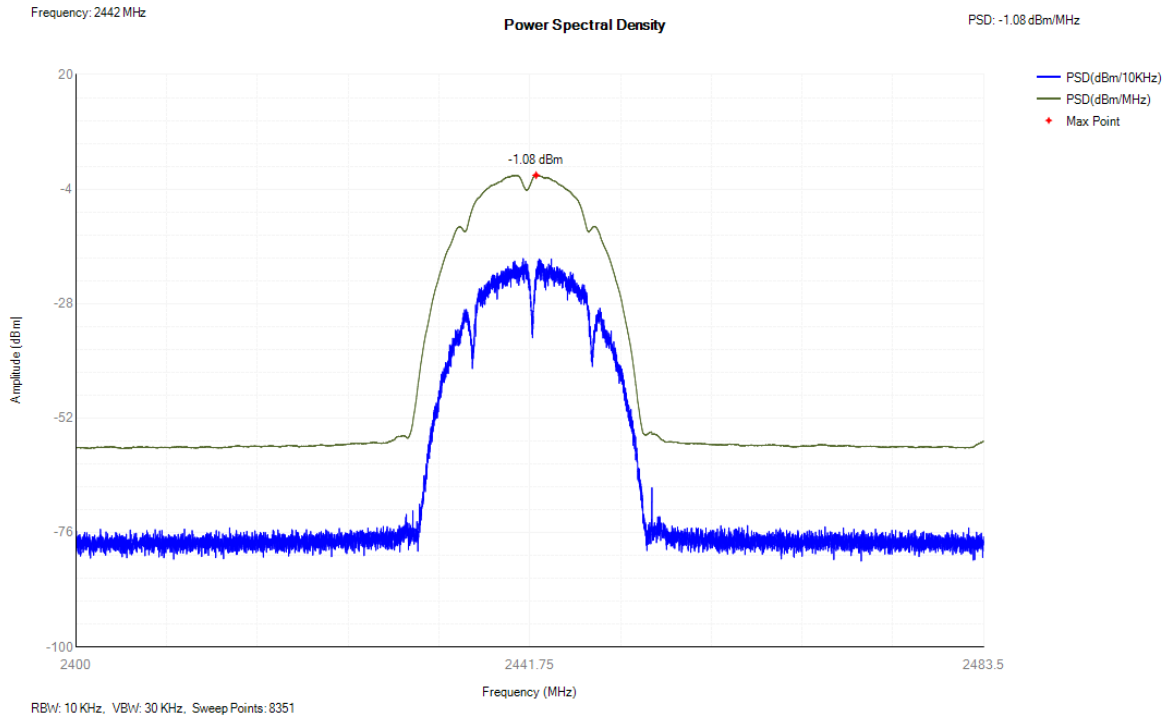
PSD NVNT n40 2462MHz Ant A



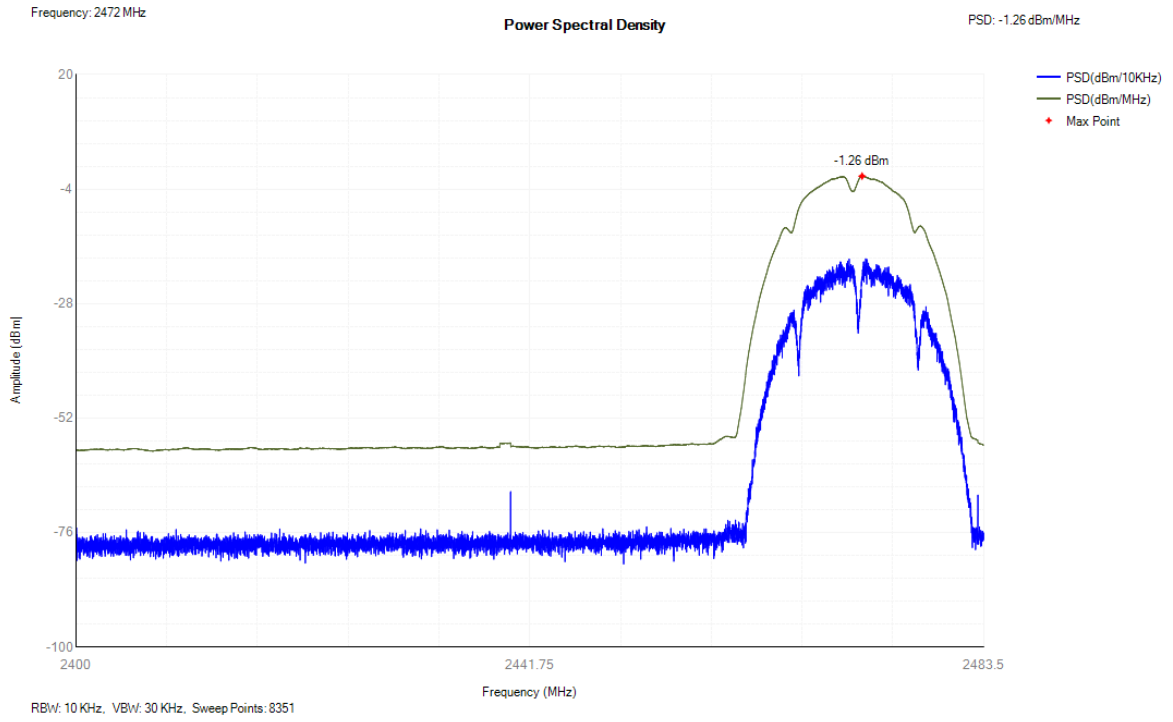
Test Graphs
PSD NVNT b 2412MHz Ant B



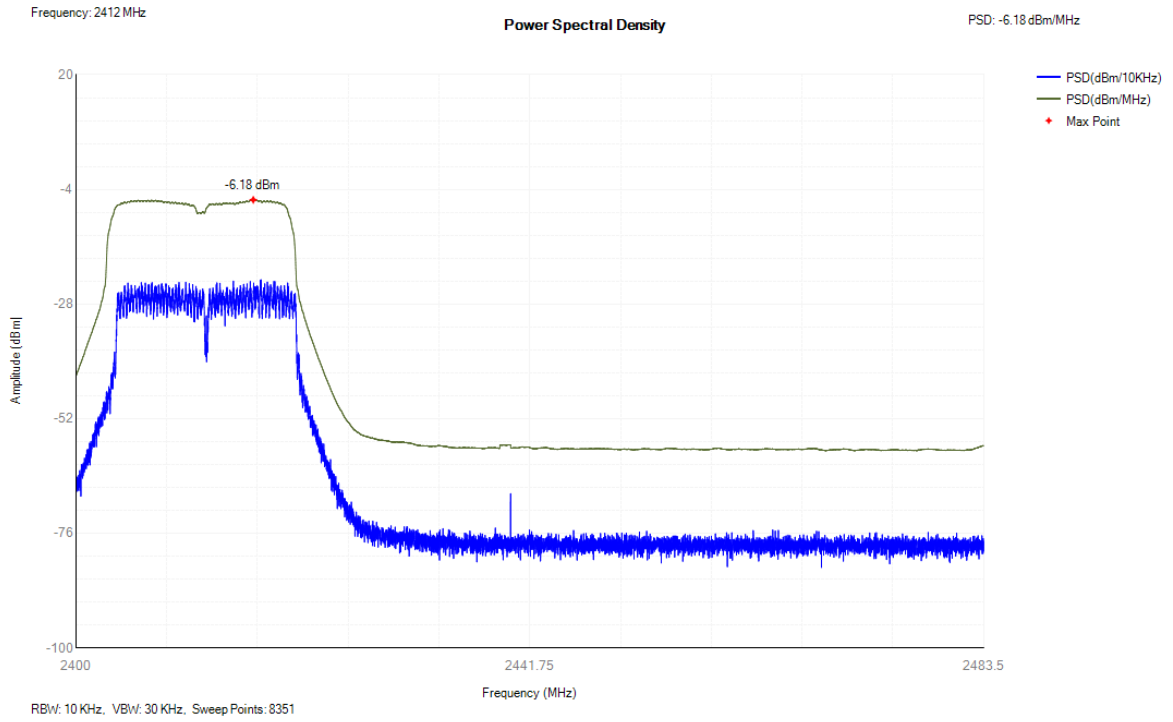
PSD NVNT b 2442MHz Ant B



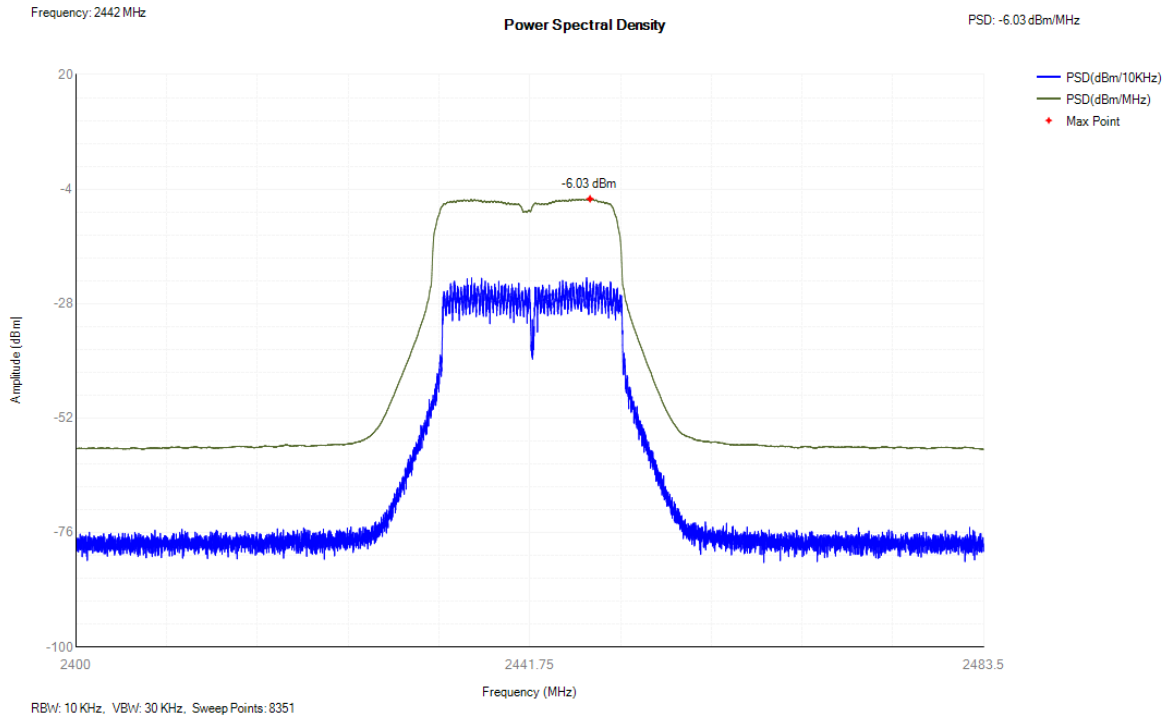
PSD NVNT b 2472MHz Ant B



PSD NVNT g 2412MHz Ant B



PSD NVNT g 2442MHz Ant B



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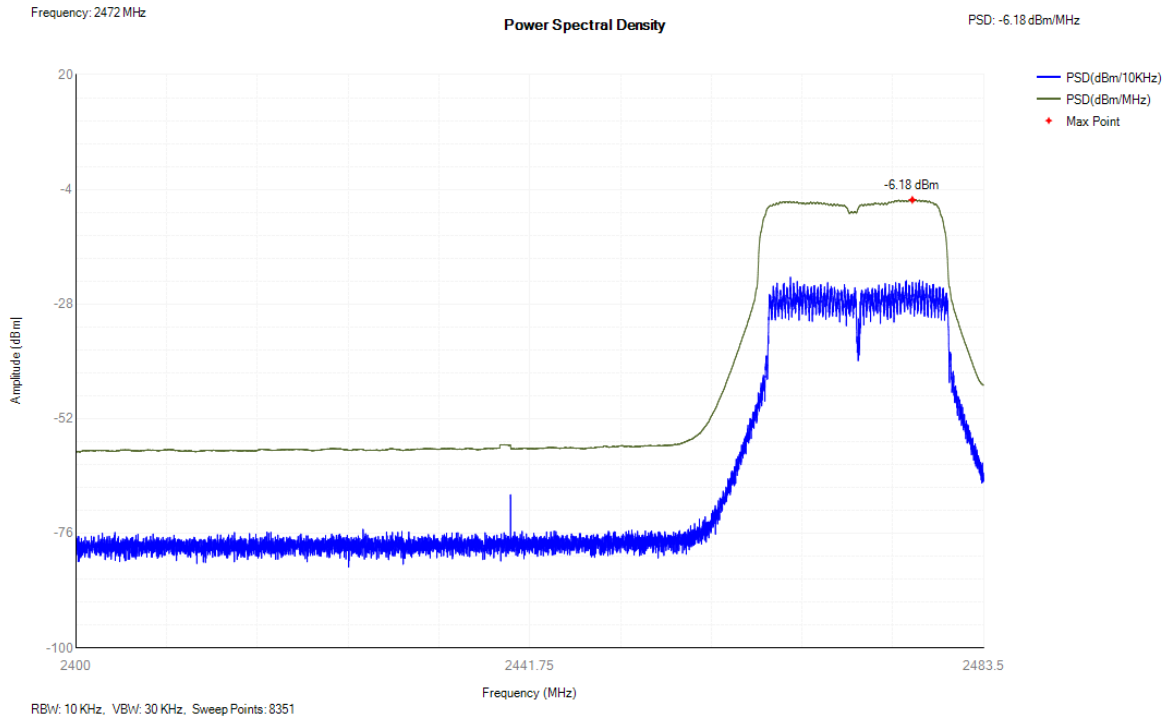

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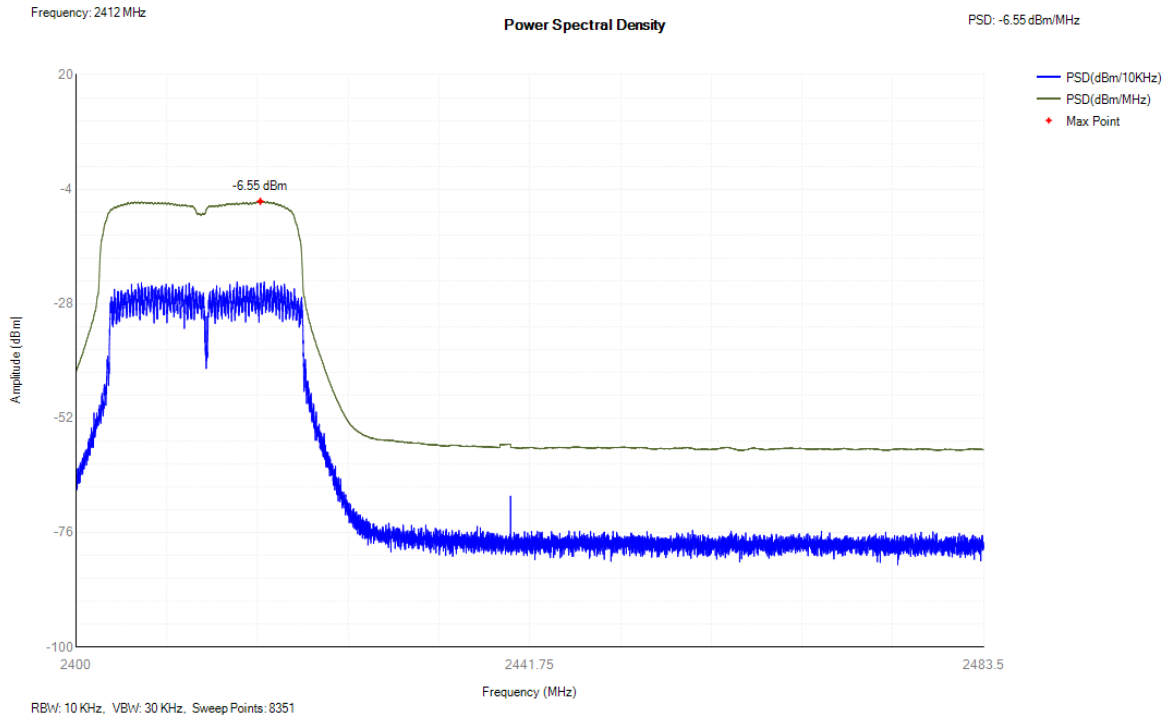

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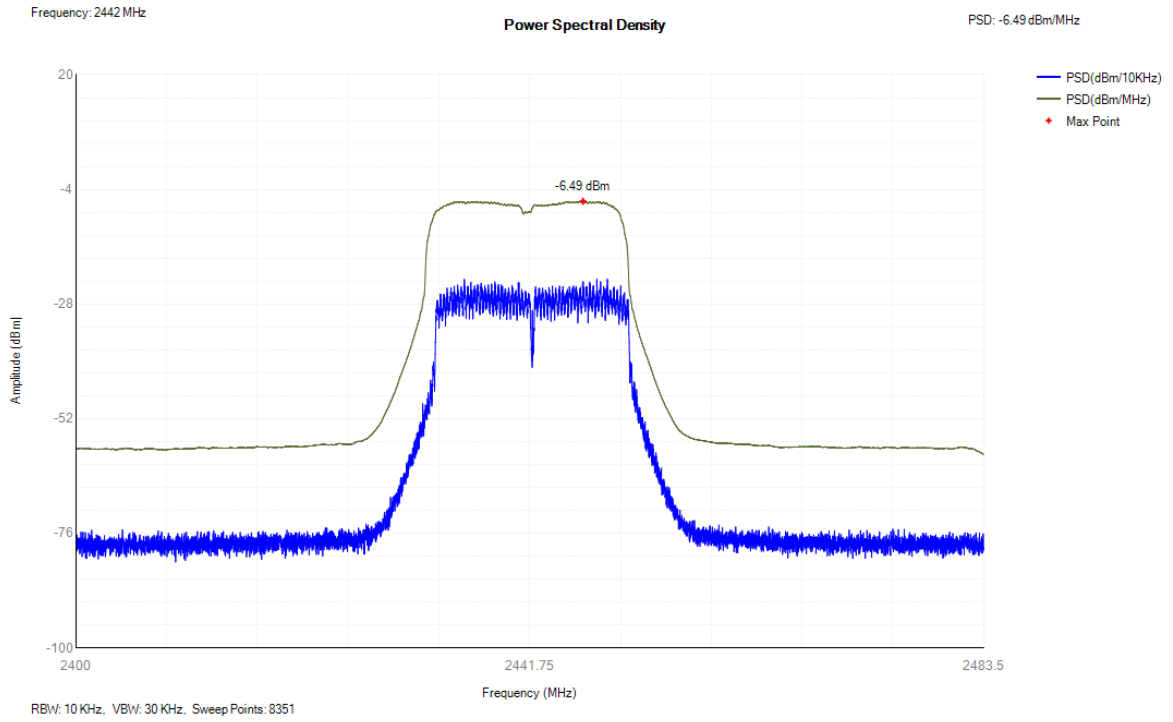

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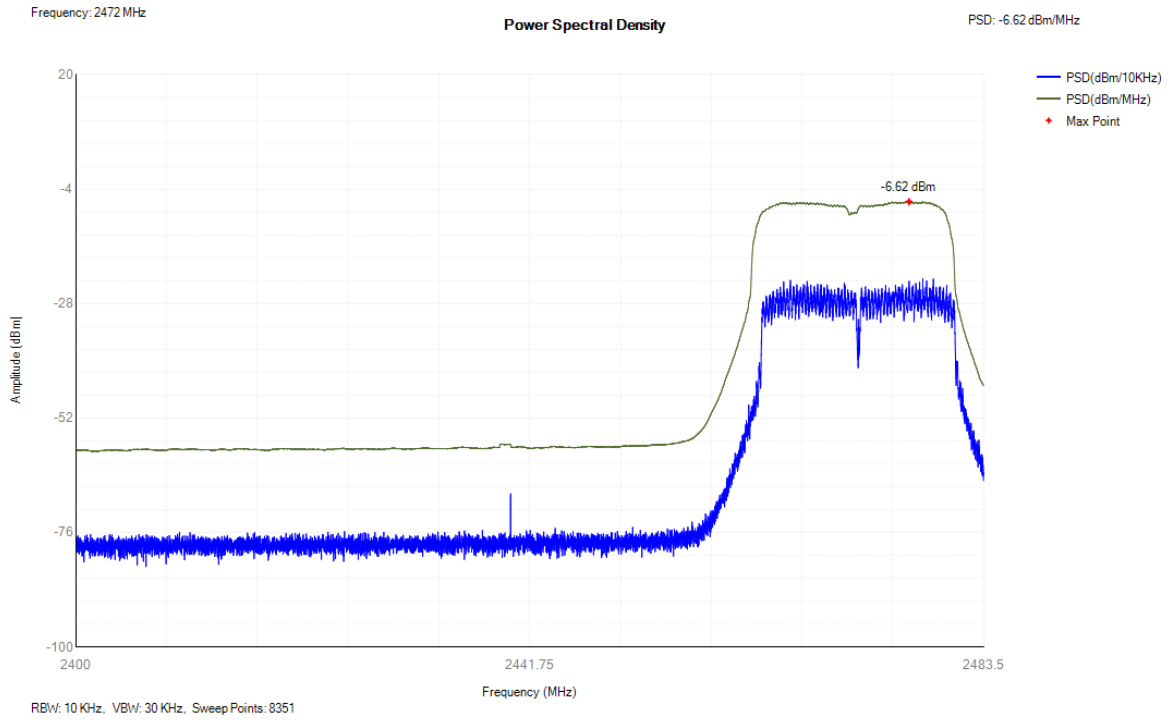
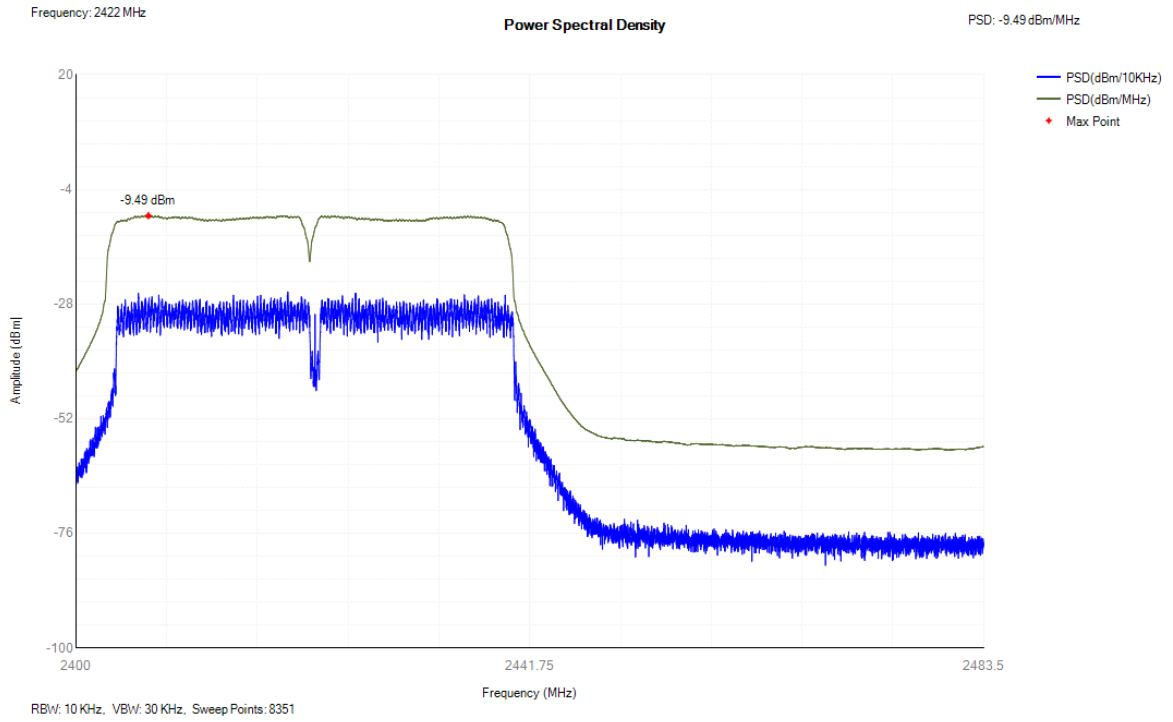
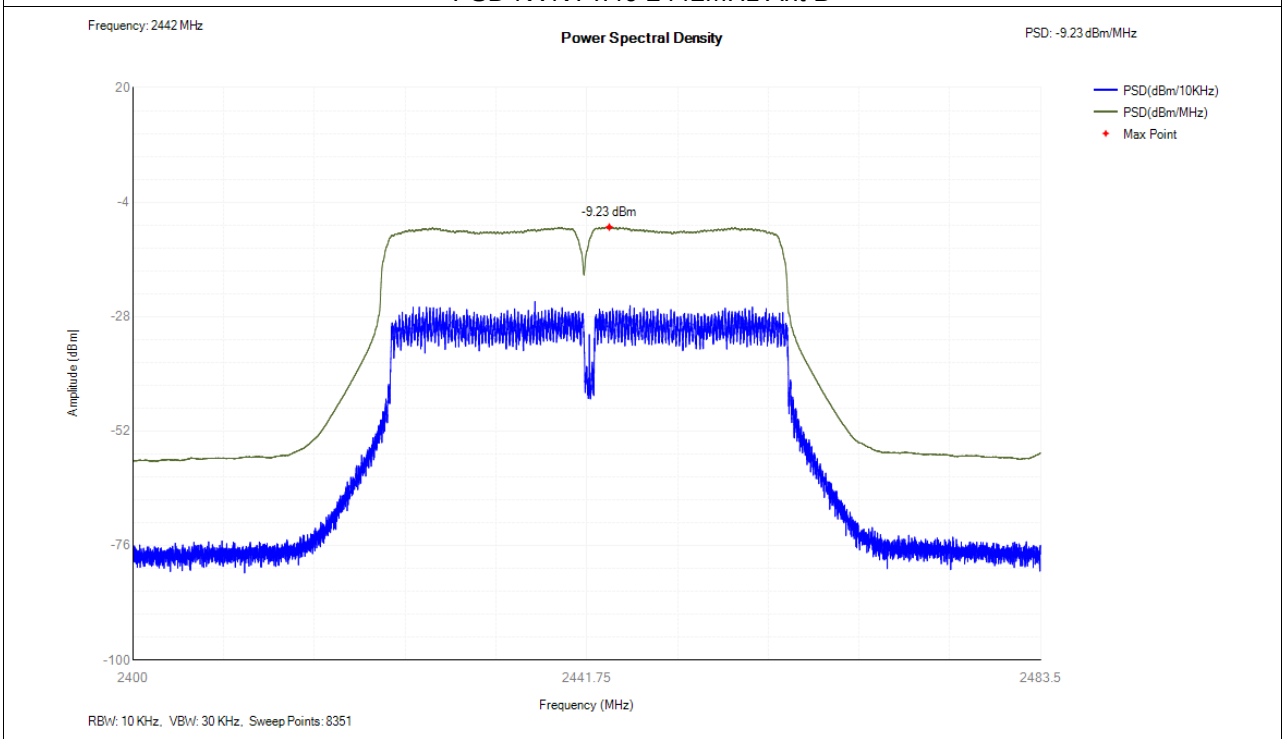


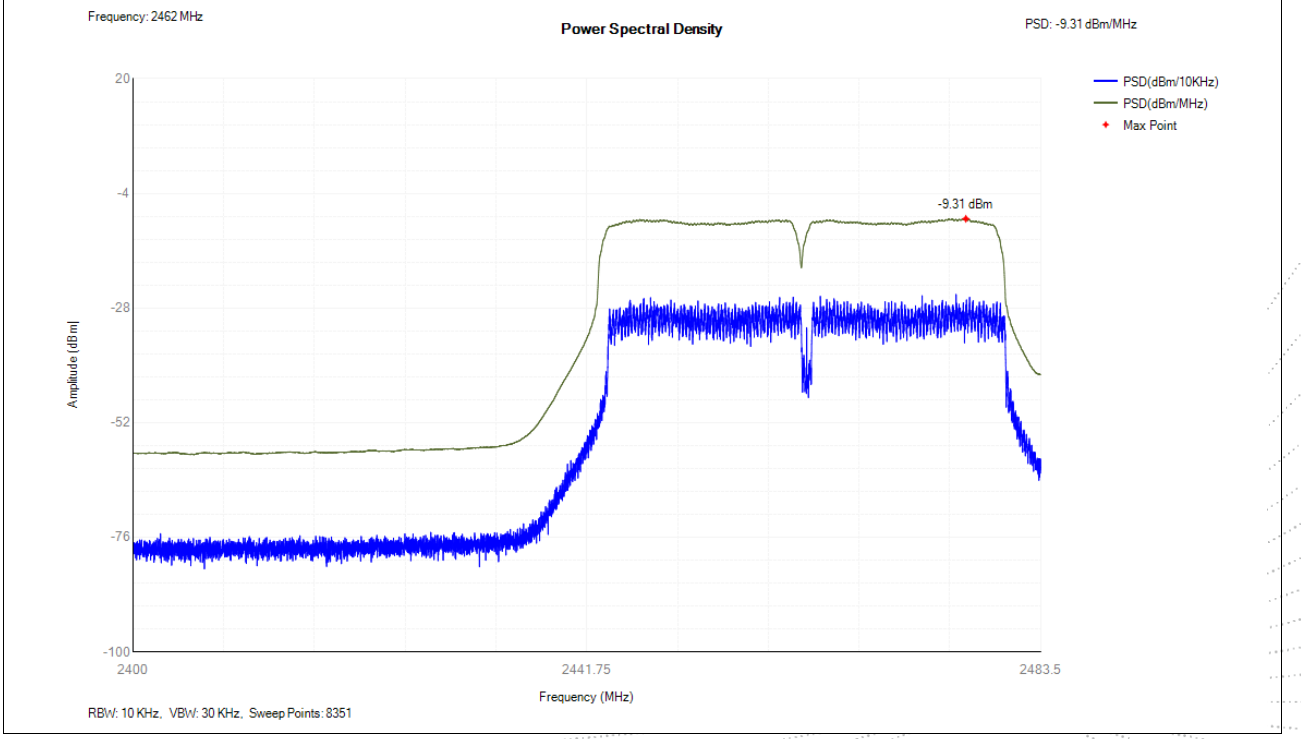
PSD NVNT n40 2422MHz Ant B



PSD NVNT n40 2442MHz Ant B

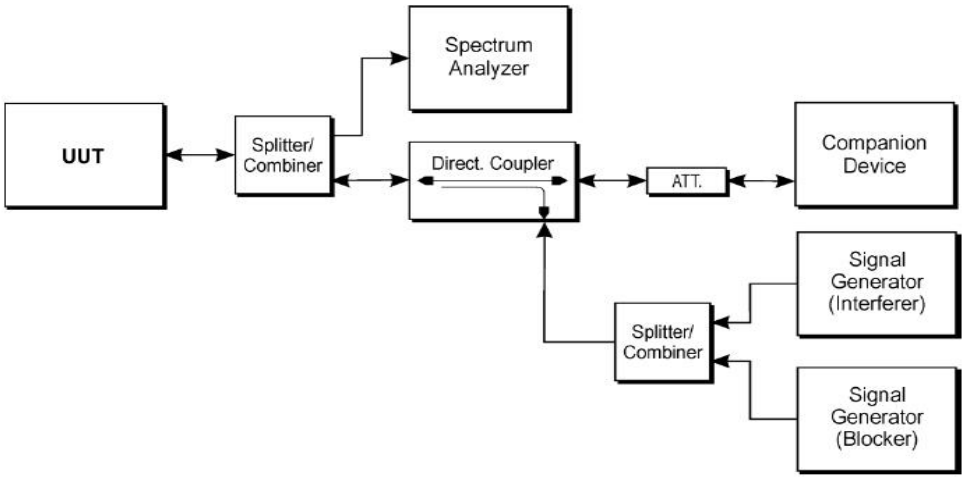


PSD NVNT n40 2462MHz Ant B



9. Adaptivity

9.1 Block Diagram Of Test Setup



9.2 Limit

The frequency range of the equipment is determined by the lowest and highest

Non-LBT based Detect and Avoid: 1 The frequency shall remain unavailable for a minimum time equal to 1 second after which the channel maybe considered again as an 'available' channel; 2 COT ≤ 40 ms; 3 Idle Period = 5% of COT; 4 Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
LBT based Detect and Avoid (Frame Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time = 20 us; 2 CCA observation time declared by the supplier; 3 COT = 1~10 ms; 4 Idle Period = 5% of COT; 5 Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
LBT based Detect and Avoid (Load Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time = 20 us; 2 CCA declared by the manufacturer; 3 COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; 4 Detection threshold level = -73dBm/MHz + 20 – Pout E.I.R.P (dBm);
Short Control Signalling Transmissions: Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

9.3 Test procedure

Step 1:

The UUT may connect to a companion device during the test. The interference signal generator, the blocking signal generator, the spectrum analyser, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and blocking signal generator do not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of the UUT in response to the interfering and the blocking signals.

Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 6
The analyzer shall be set as follows:
- RBW: ⩾ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
- VBW: 3 × RBW (if the analyser does not support this setting, the highest available setting shall be used)
- Detector Mode: RMS
- Centre Frequency: Equal to the centre frequency of the operating channel
- Span: 0 Hz
- Sweep time: > Channel Occupancy Time of the UUT
- Trace Mode: Clear/Write
- Trigger Mode: Video

Step 2:

Configure the UUT for normal transmissions with a sufficiently high payload to allow demonstration of compliance of the adaptive mechanism on the channel being tested
Using the procedure defined in clause 5.3.7.2.1.4, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period

Step 3: Adding the interference signal

A 100 % duty cycle interference signal is injected on the current operating channel of the UUT. This interference signal shall be a band limited noise signal which has a flat power spectral density, and shall have a bandwidth greater than the Occupied Channel Bandwidth of the UUT. The maximum ripple of this interfering signal shall be ±1,5 dB within the Occupied Channel Bandwidth and the power spectral density.

Step 4: Verification of reaction to the interference signal

The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel with the interfering signal injected. This may require the spectrum analyser sweep to be triggered by the start of the interfering signal.
Using the procedure defined in clause 5.3.7.2.1.4, it shall be verified that:
The UUT shall stop transmissions on the current operating channel being tested.
Apart from Short Control Signalling Transmissions (see iii) below), there shall be no subsequent transmissions on this operating channel for a (silent) period defined in clause 4.3.2.5.1.2 step 2. After that, the UUT may have normal transmissions again for the duration of a single Channel Occupancy Time period. Because the interference signal is still present, another silent period as defined in clause 4.3.2.5.1.2 step 2 needs to be included. This sequence is repeated as long as the interfering signal is present.
The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interference signal is present. These transmissions shall comply with the limits
Alternatively, the equipment may switch to a non-adaptive mode

Step 5: Adding the blocking signal

With the interfering signal present, a 100 % duty cycle CW signal is inserted as the blocking signal
Repeat step 4 to verify that the UUT does not resume any normal transmissions

Step 6: Removing the interference and blocking signal

On removal of the interference and blocking signal the UUT is allowed to start transmissions again on this channel however, it shall be verified that this shall only be done after the period defined in clause 4.3.2.5.1.2 step 2.

Step 7:

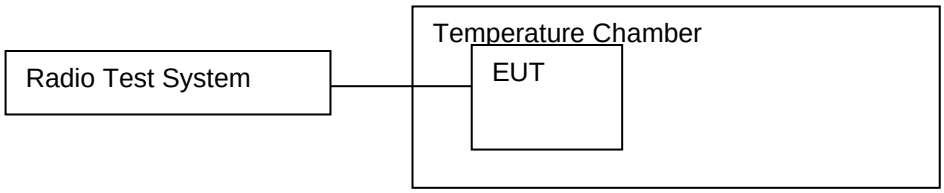
The steps 2 to 6 shall be repeated for each of the frequencies to be tested.

9.4 Test Result

Pass

10. Occupied Channel Bandwidth

10.1 Block Diagram Of Test Setup



10.2 Limit

The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.
In addition, for non-adaptive systems using wide band modulations other than FHSS and with e.i.r.p greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

10.3 Test procedure

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test
- Resolution BW: ~ 1 % of the span without going below 1 %
- Video BW: 3 × RBW
- Frequency Span: 2 × Nominal Channel Bandwidth
- Detector Mode: RMS
- Trace Mode: Max Hold
- Sweep time: 1 s

Step 2:

Wait for the trace to stabilize.
Find the peak value of the trace and place the analyser marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT.
This value shall be recorded.
NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

10.4 Test Result

Antenna A

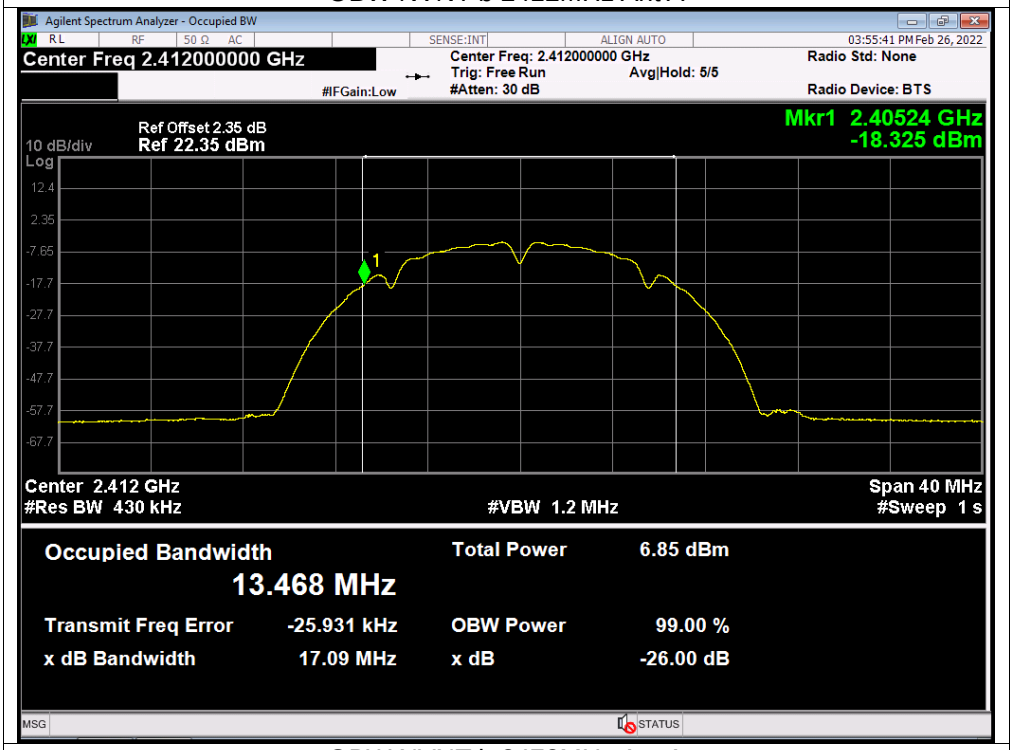
Modulation	Frequency (MHz)	Frequency Range (MHz)		Occupied Channel (MHz)
802.11b	Low	2405.24	/	13.468
	High	/	2478.761	13.494
802.11g	Low	2403.724	/	16.517
	High	/	2480.246	16.513
802.11n20	Low	2403.164	/	17.638
	High	/	2480.809	17.636
802.11n40	Low	2403.83	/	36.302
	High	/	2480.141	36.31

Antenna B

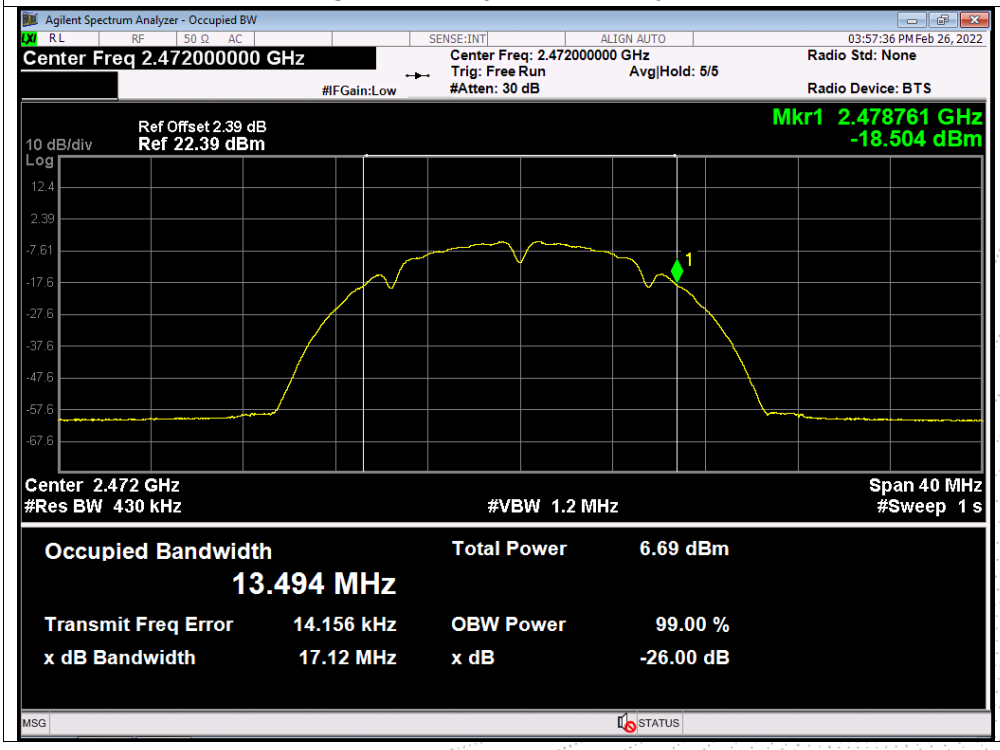
Modulation	Frequency (MHz)	Frequency Range (MHz)		Occupied Channel (MHz)
802.11b	Low	2405.23	/	13.493
	High	/	2478.776	13.514
802.11g	Low	2403.723	/	16.517
	High	/	2480.246	16.515
802.11n20	Low	2403.162	/	17.638
	High	/	2480.811	17.636
802.11n40	Low	2403.83	/	36.306
	High	/	2480.143	36.316

Test Graphs

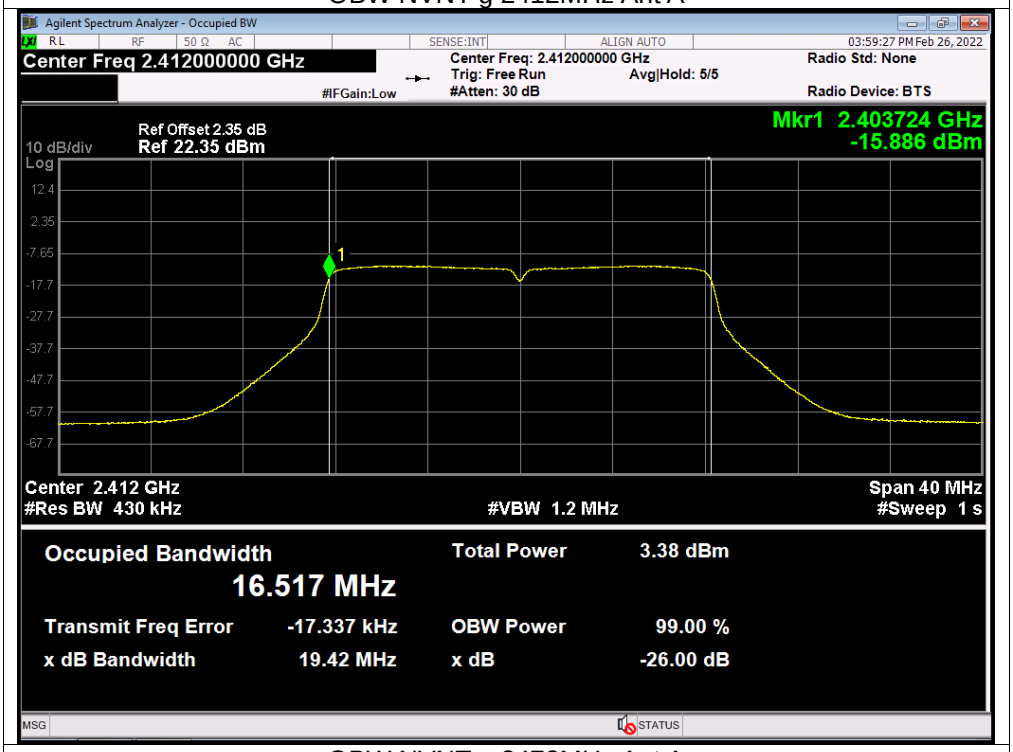
OBW NVNT b 2412MHz Ant A



OBW NVNT b 2472MHz Ant A



OBW NVNT g 2412MHz Ant A



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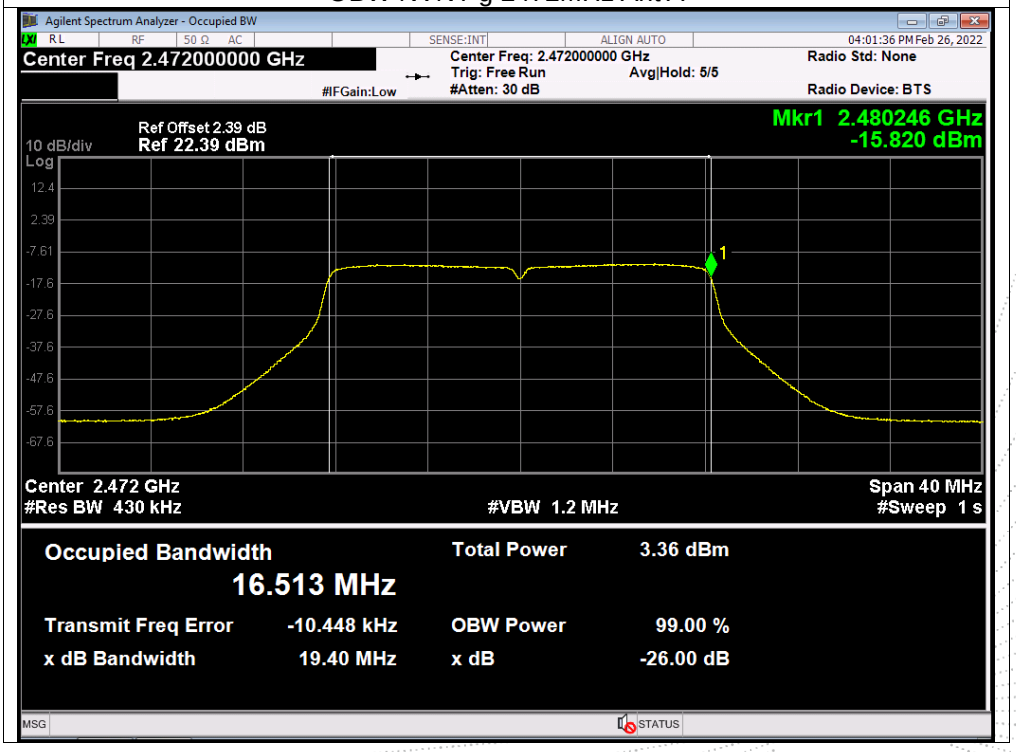
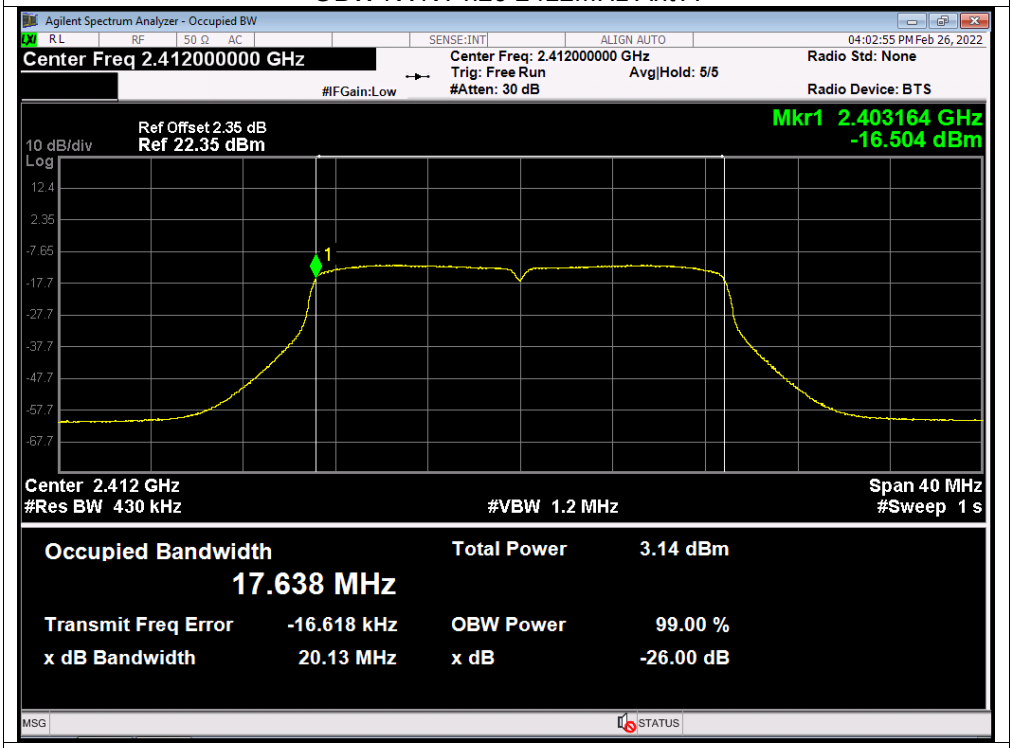


OBW NVNT n20 2412MHz Ant A



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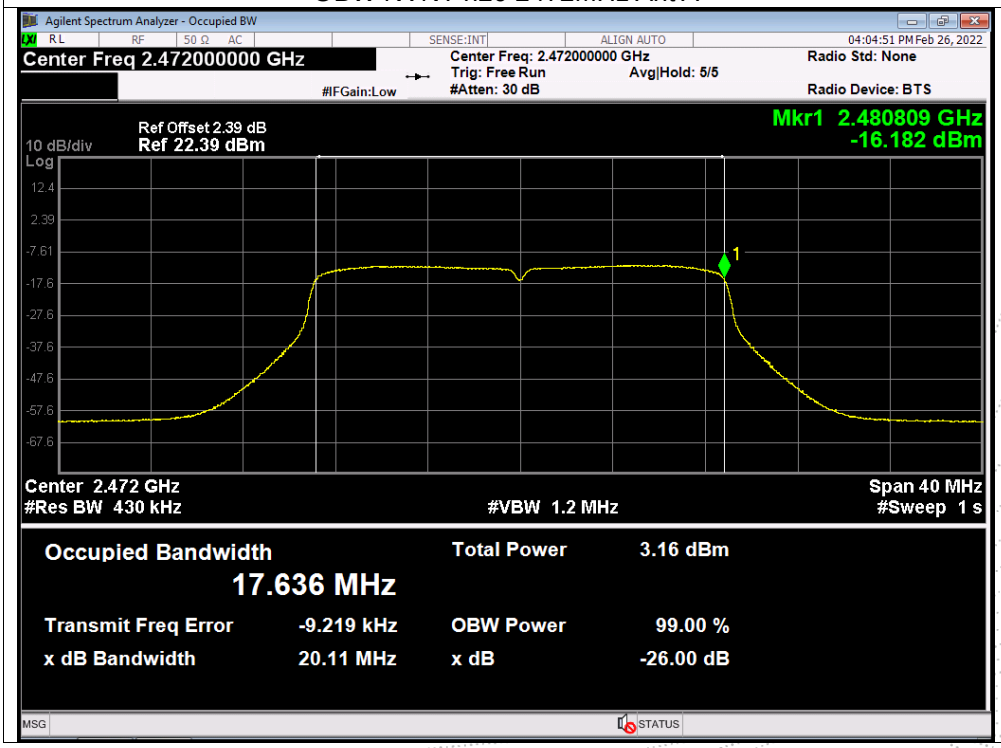
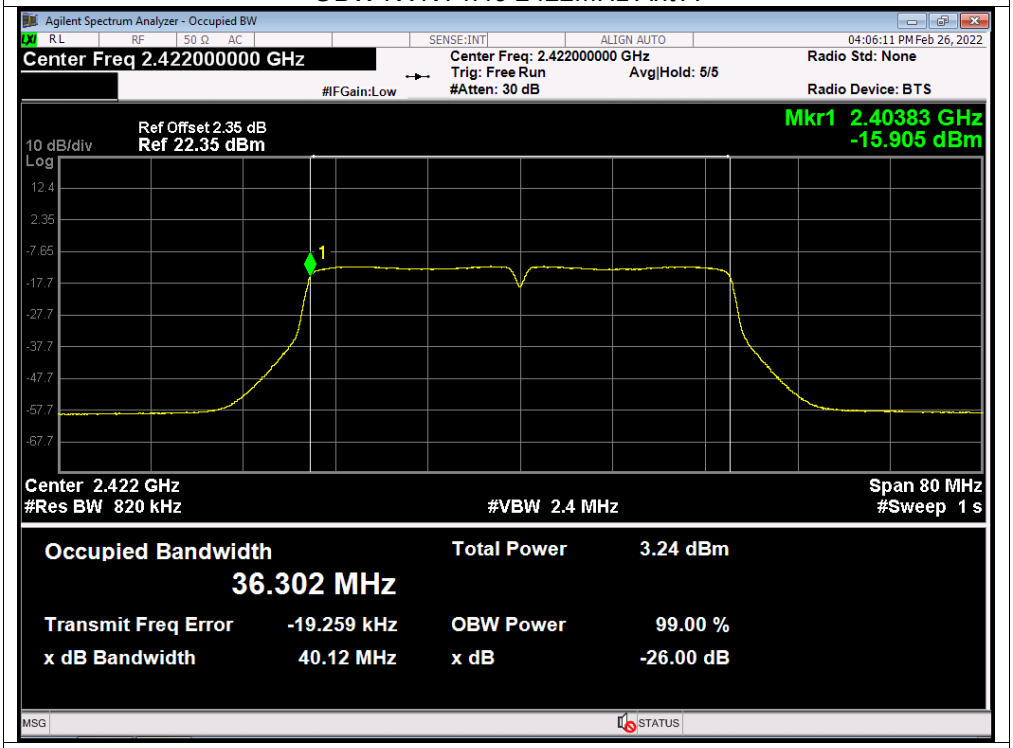
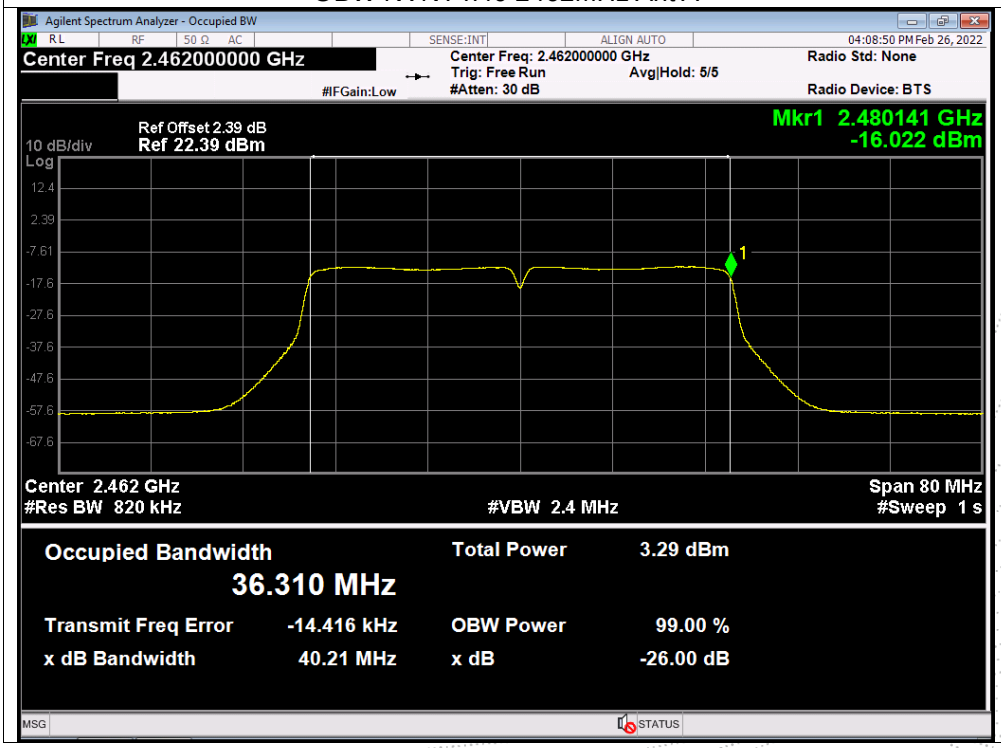


OBW NVNT n40 2422MHz Ant A

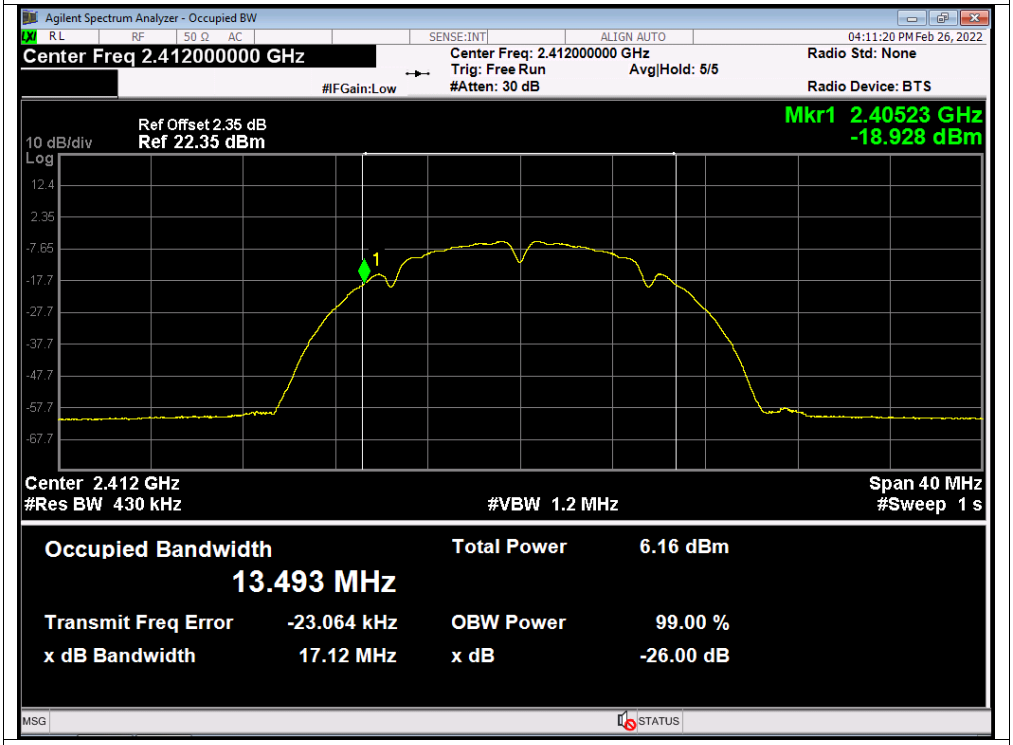


OBW NVNT n40 2462MHz Ant A

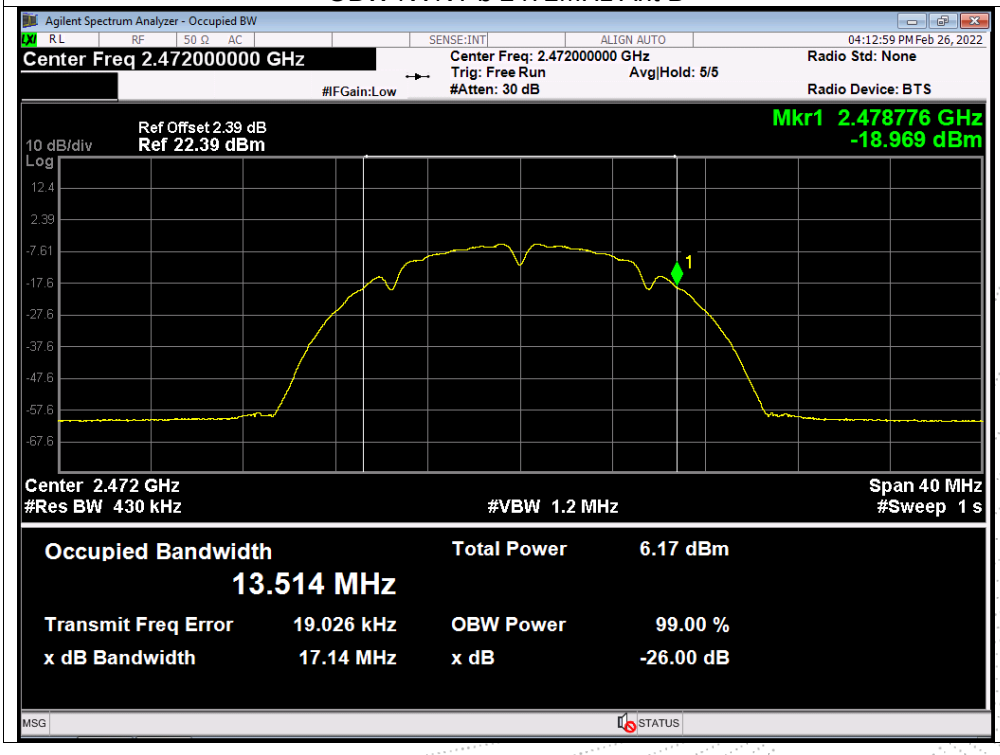


Test Graphs

OBW NVNT b 2412MHz Ant B



OBW NVNT b 2472MHz Ant B



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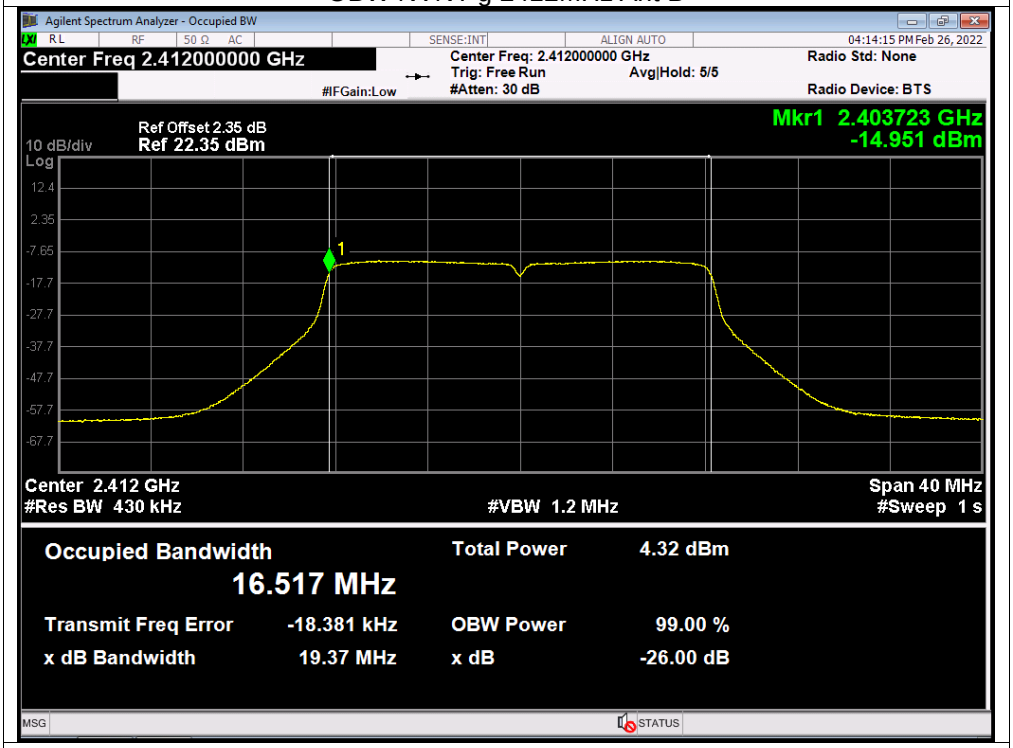

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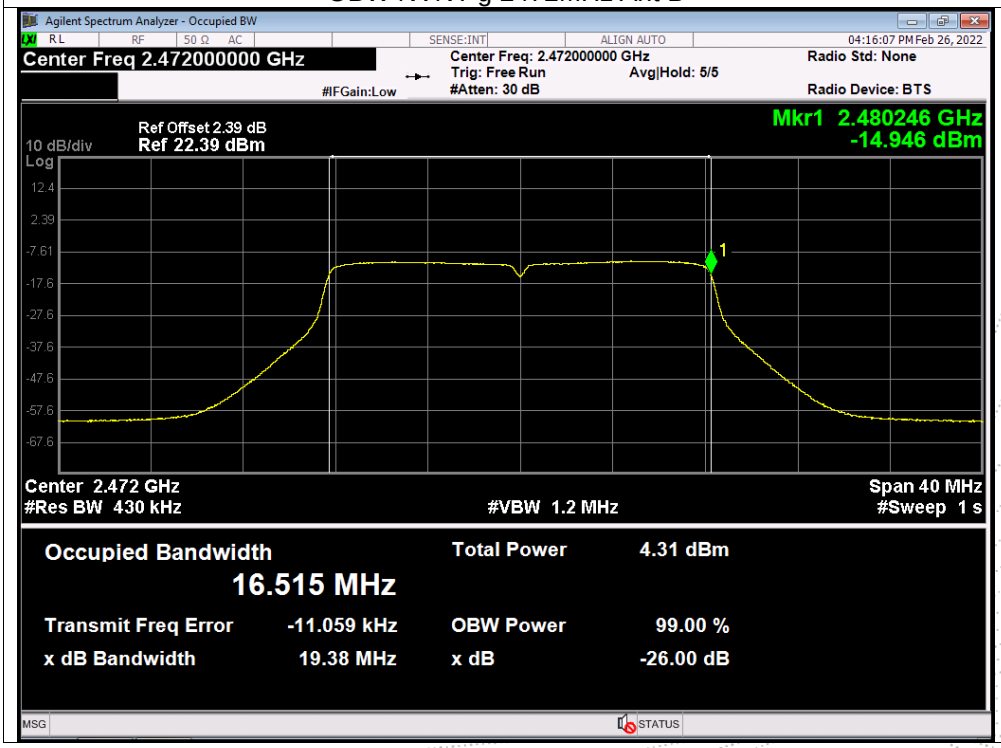
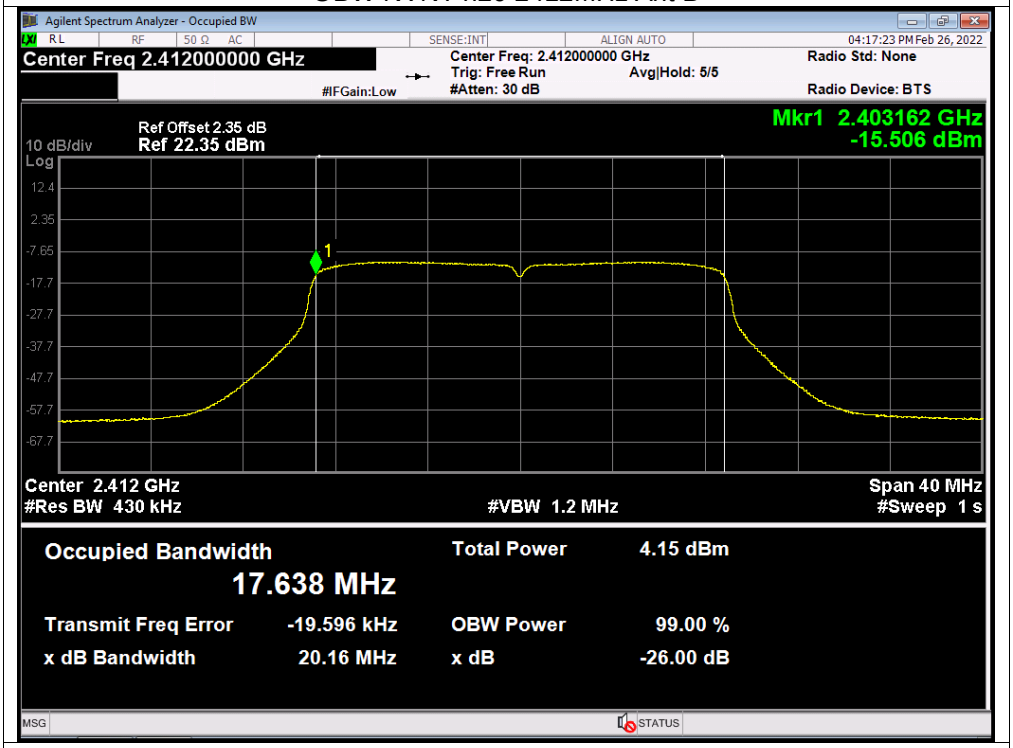


OBW NVNT n20 2412MHz Ant B



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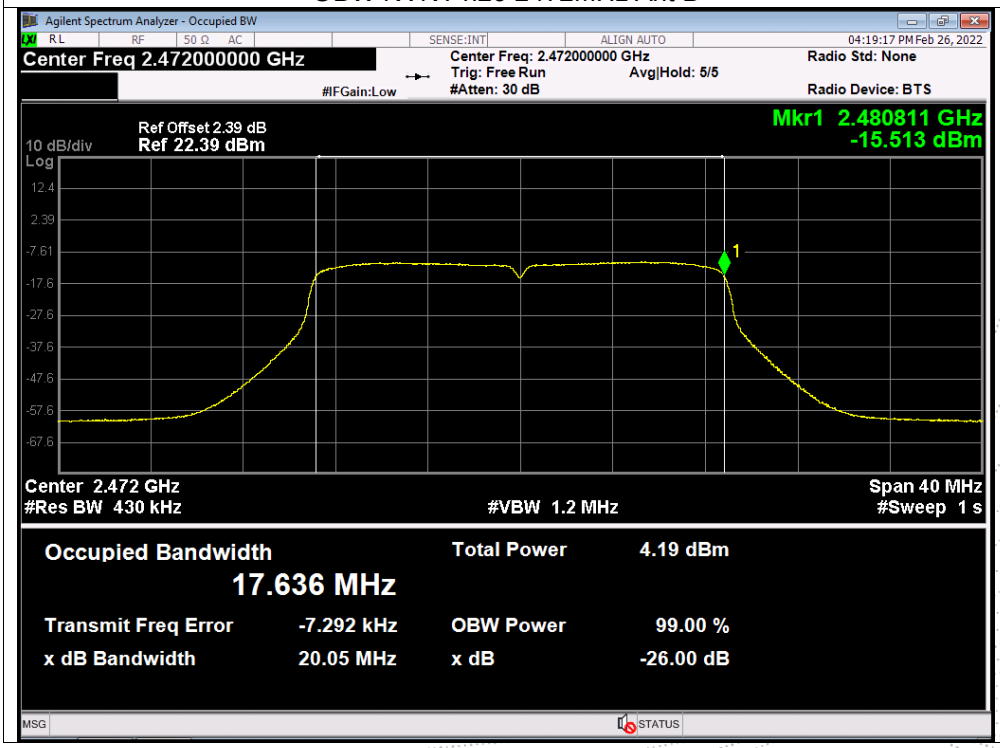

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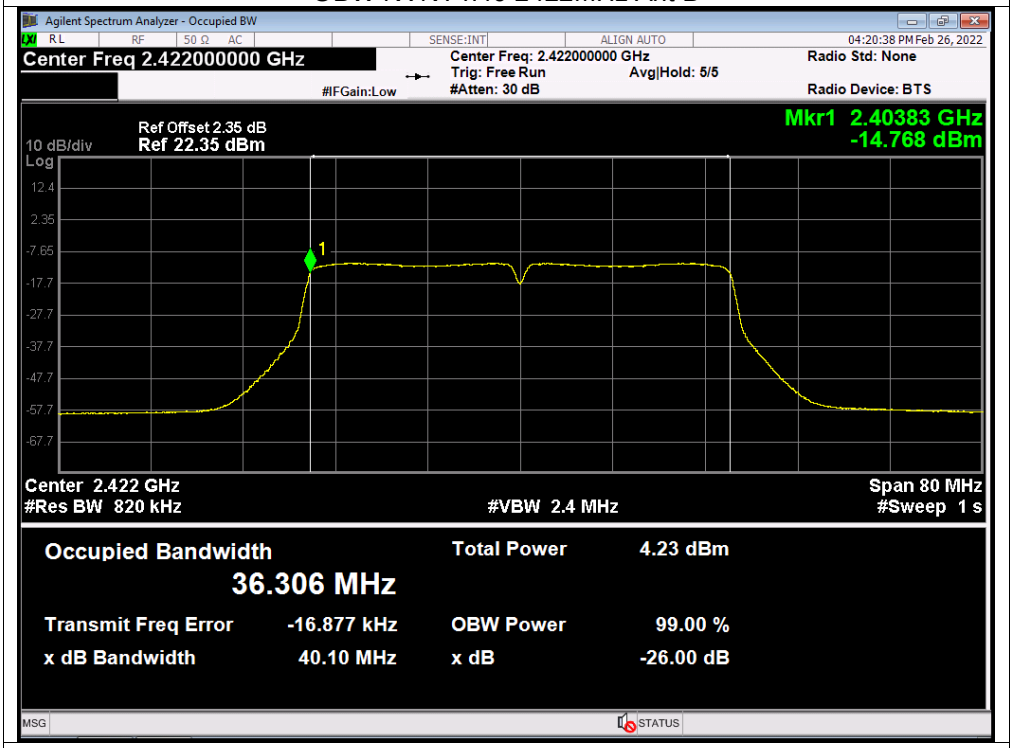
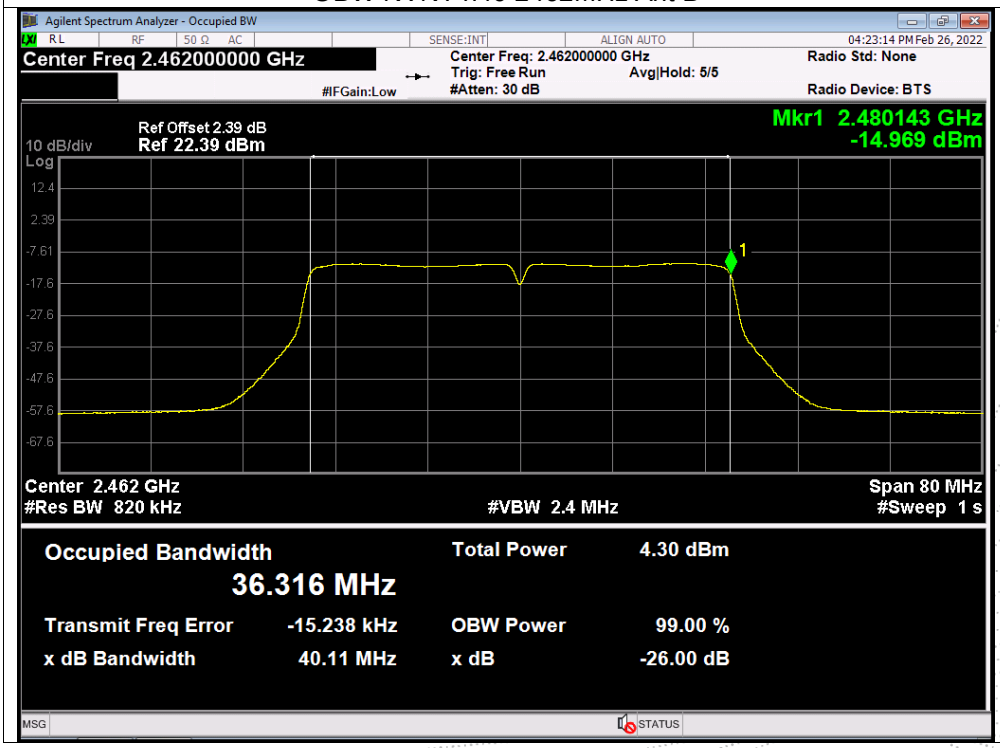
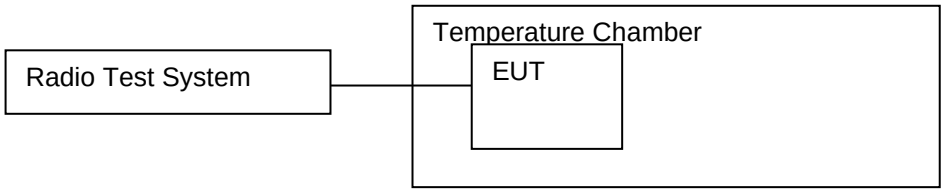


OBW NVNT n40 2462MHz Ant B



11. Transmitter Unwanted Emissions In The Out-Of-Band Domain

11.1 Block Diagram Of Test Setup



11.2 Limit

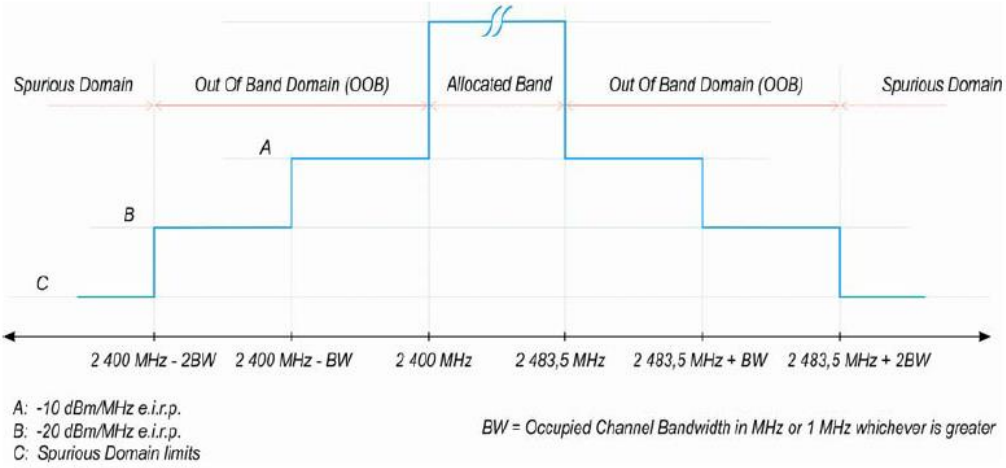


Figure 3: Transmit mask

11.3 Test procedure

The applicable mask is defined by the measurement results from the tests performed under clause 5.3.8 (Occupied Channel Bandwidth).

The test procedure is further as described under clause 5.3.9.2.1.

The Out-of-band emissions within the different horizontal segments of the mask provided in figures 1 and 3 shall be measured using the steps below. This method assumes the spectrum analyser is equipped with the Time Domain Power option.

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: 2 484 MHz

- Span: 0 Hz

- Resolution BW: 1 MHz

- Filter mode: Channel filter

- Video BW: 3 MHz

- Detector Mode: RMS

- Trace Mode: Max Hold

- Sweep Mode: Continuous

- Sweep Points: Sweep Time [s] / (1 µs) or 5 000 whichever is greater

- Trigger Mode: Video trigger

NOTE 1: In case video triggering is not possible, an external trigger source may be used.

- Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2 (segment 2 483,5 MHz to 2 483,5 MHz + BW):

• Adjust the trigger level to select the transmissions with the highest power level.

• For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.

• Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.

• Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

• Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3 (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW):

• Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

• Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1

MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2BW to 2 400 MHz - BW):

• Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 6:

• In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits

provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.

• In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:

- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.

- Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by

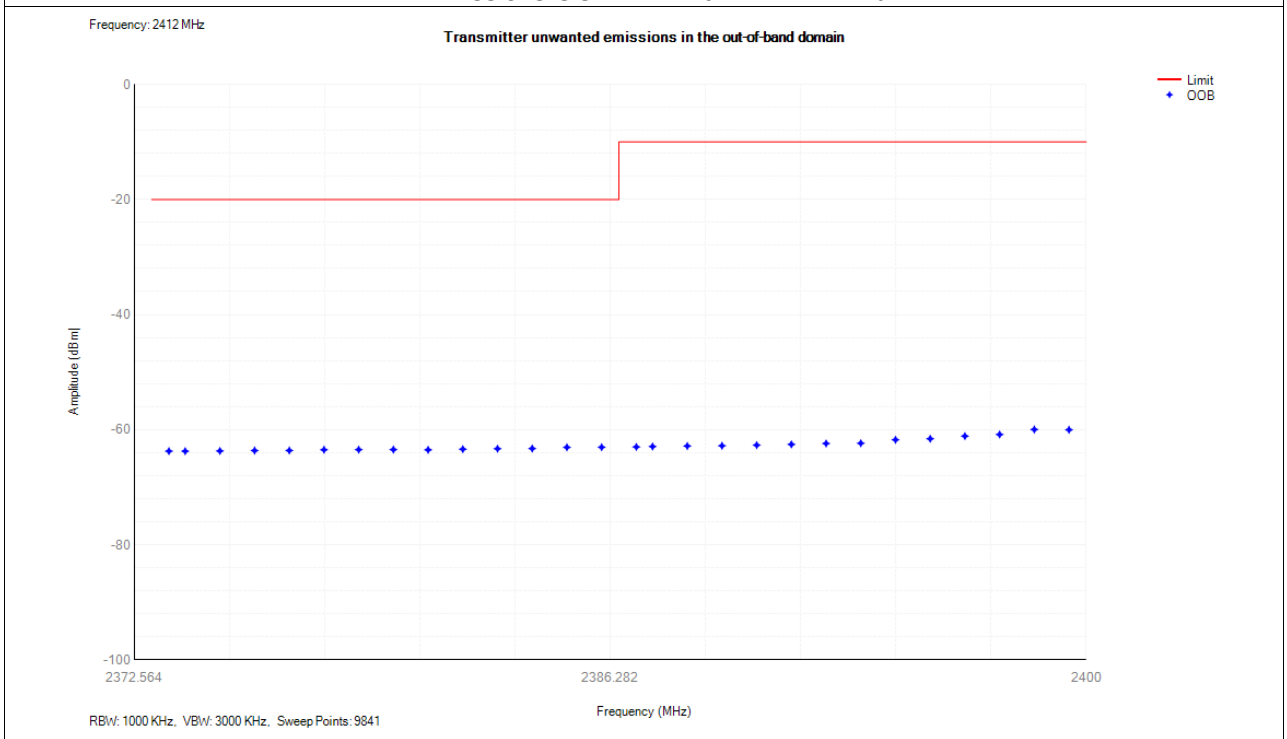
10 × log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

NOTE 2: Ach refers to the number of active transmit chains.

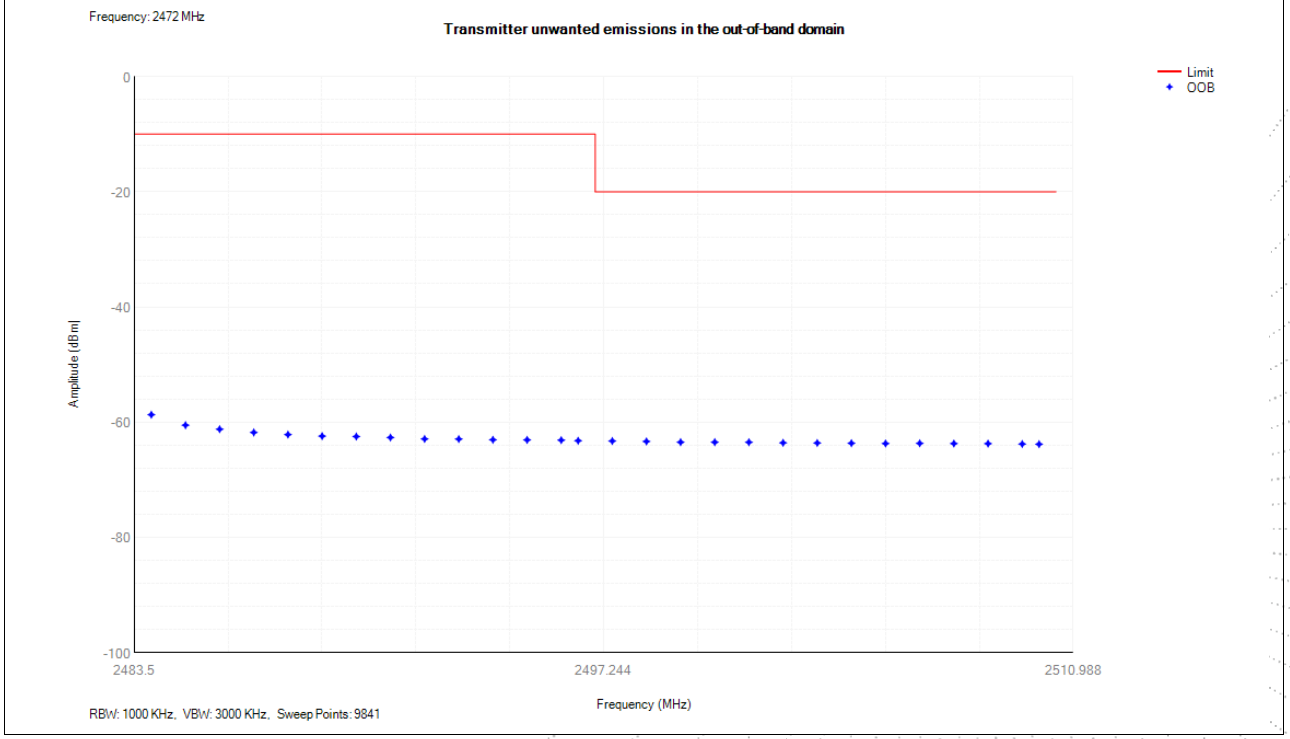
It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

11.4 Test Result

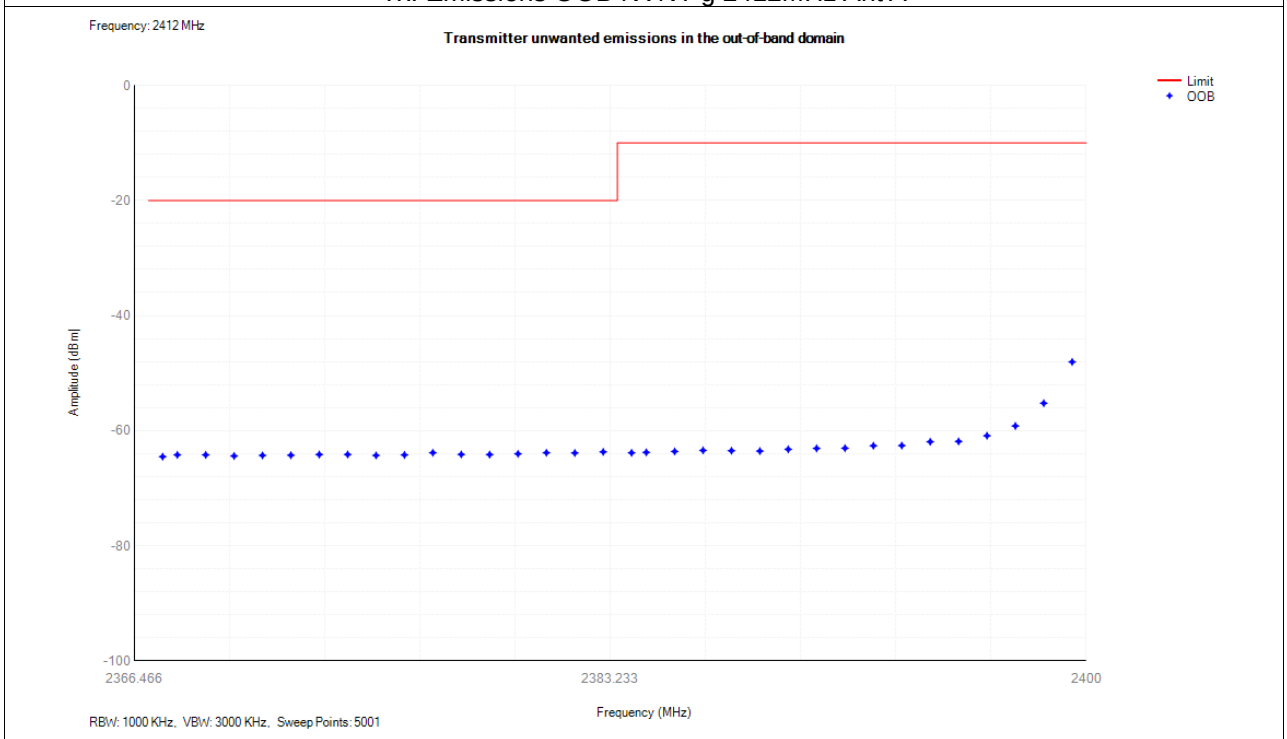
Test Graphs
Tx. Emissions OOB NVNT b 2412MHz Ant A



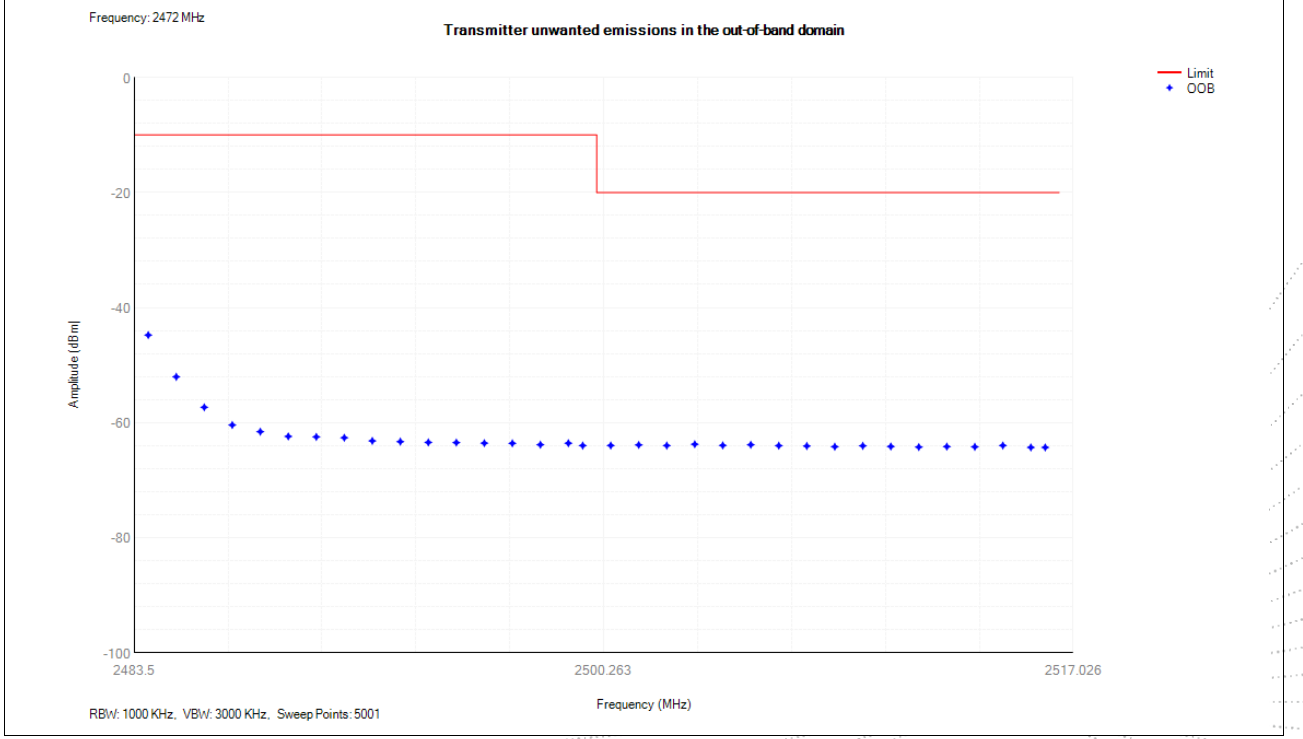
Tx. Emissions OOB NVNT b 2472MHz Ant A



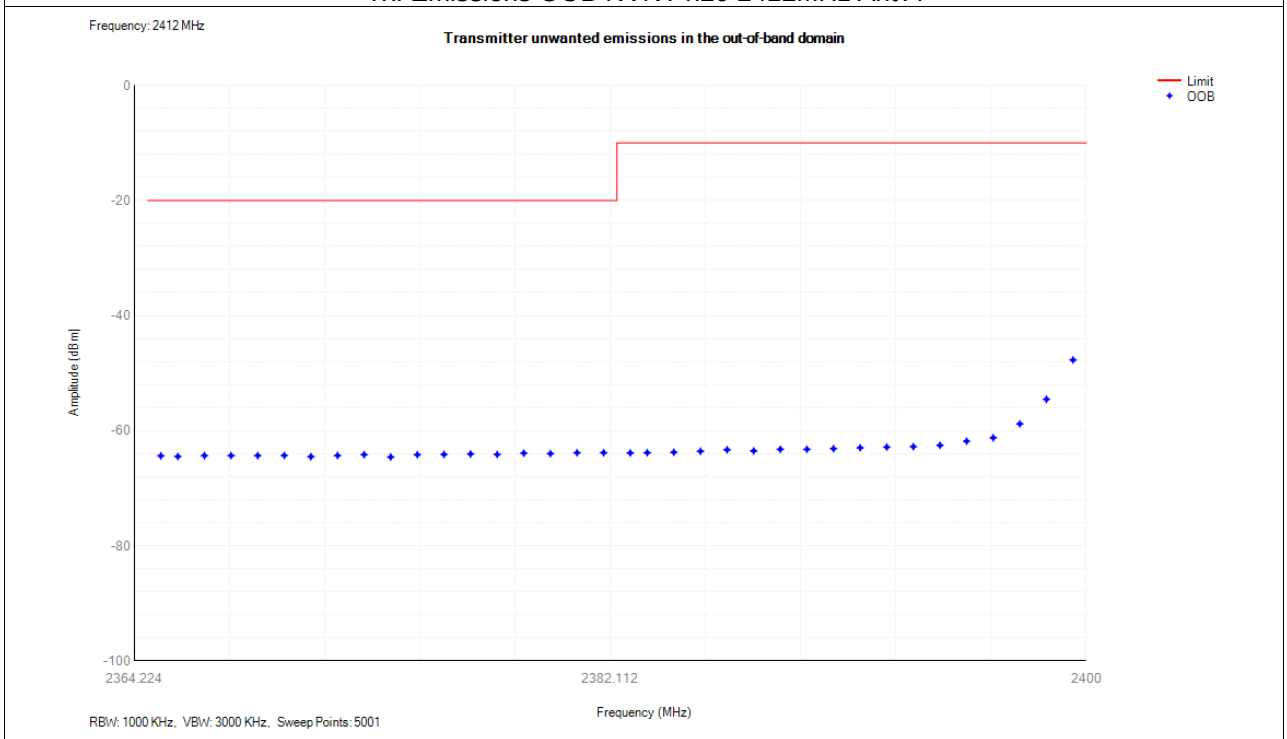
Tx. Emissions OOB NVNT g 2412MHz Ant A



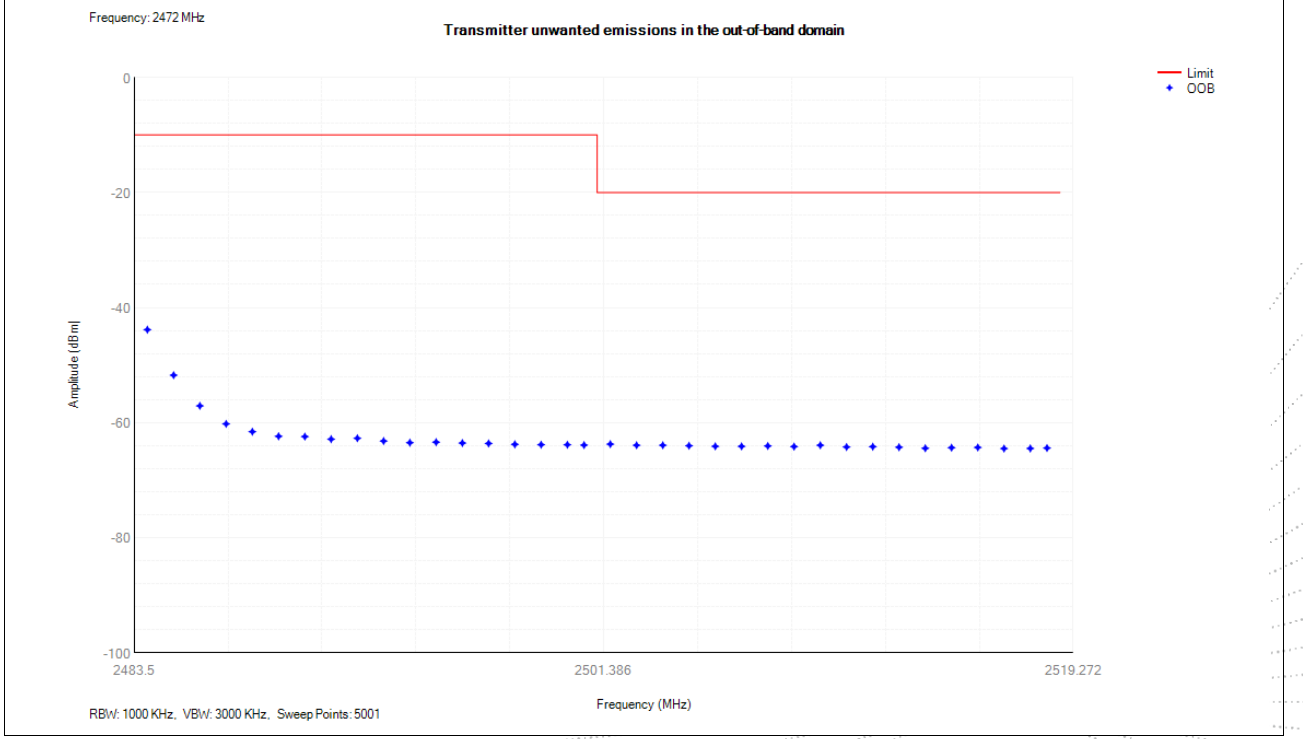
Tx. Emissions OOB NVNT g 2472MHz Ant A



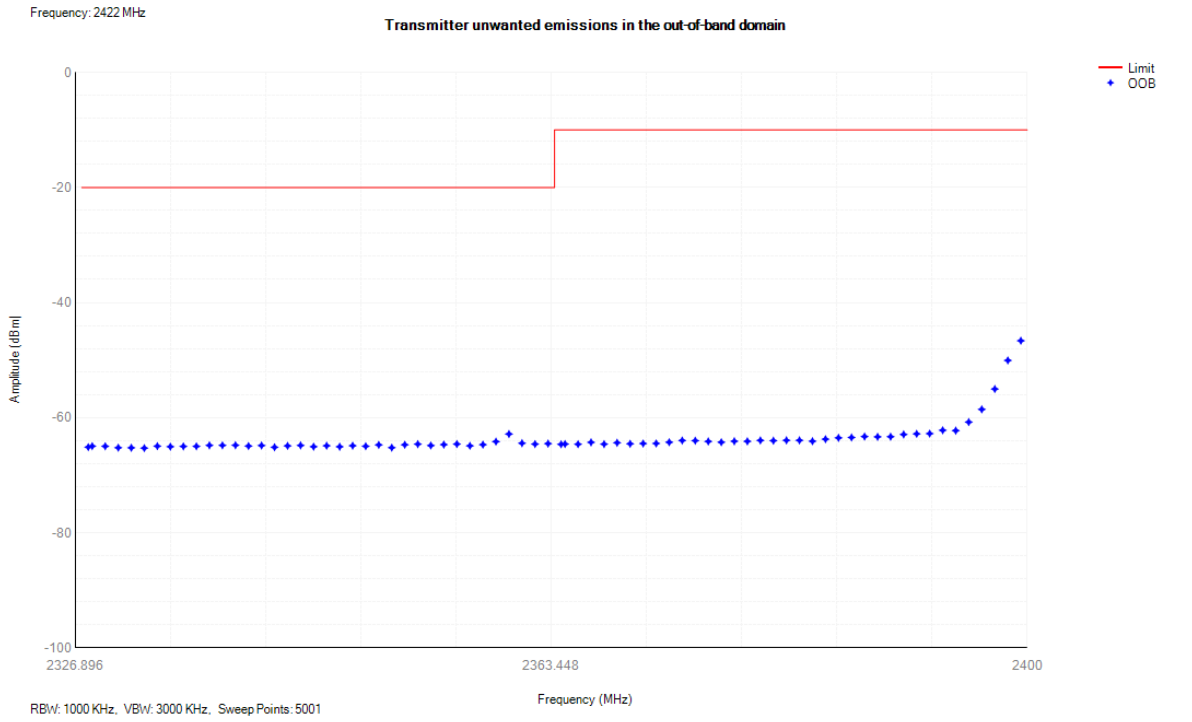
Tx. Emissions OOB NVNT n20 2412MHz Ant A



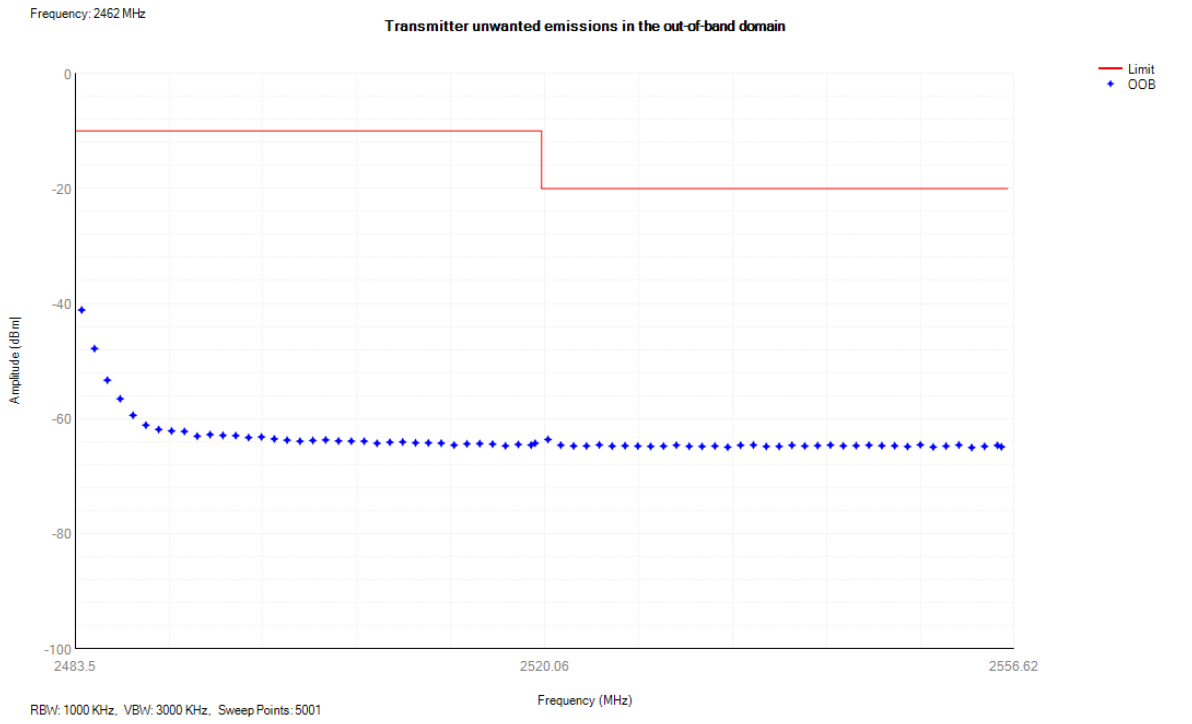
Tx. Emissions OOB NVNT n20 2472MHz Ant A



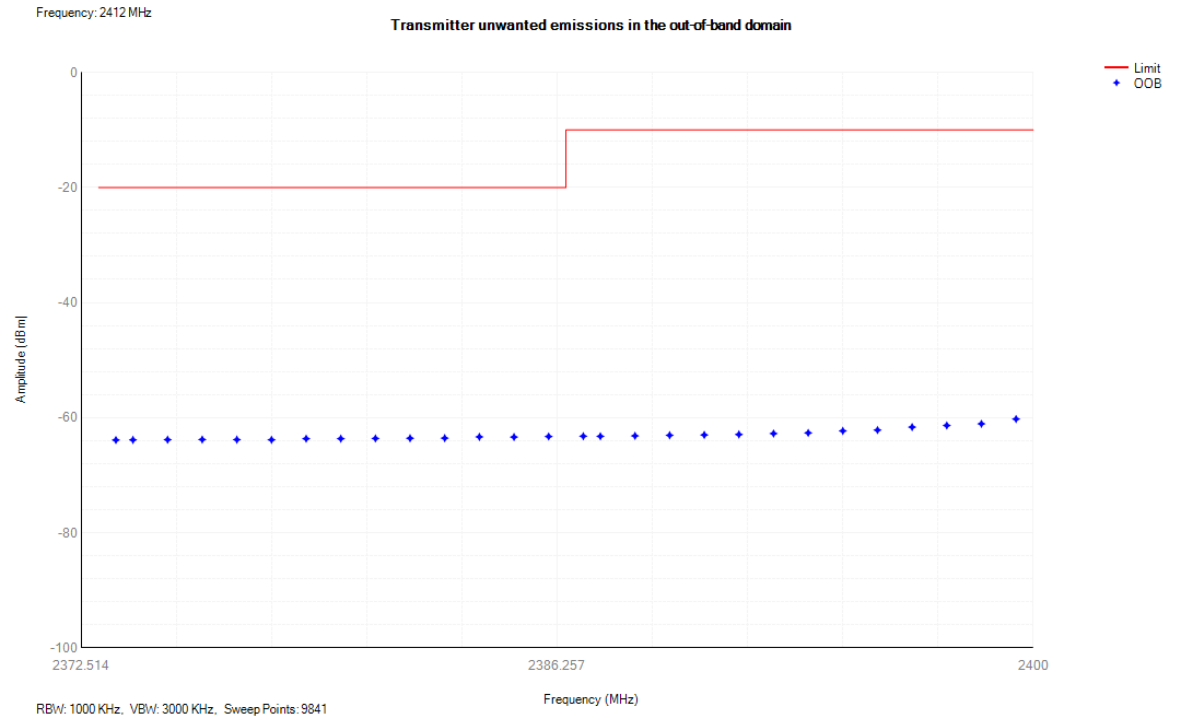
Tx. Emissions OOB NVNT n40 2422MHz Ant A



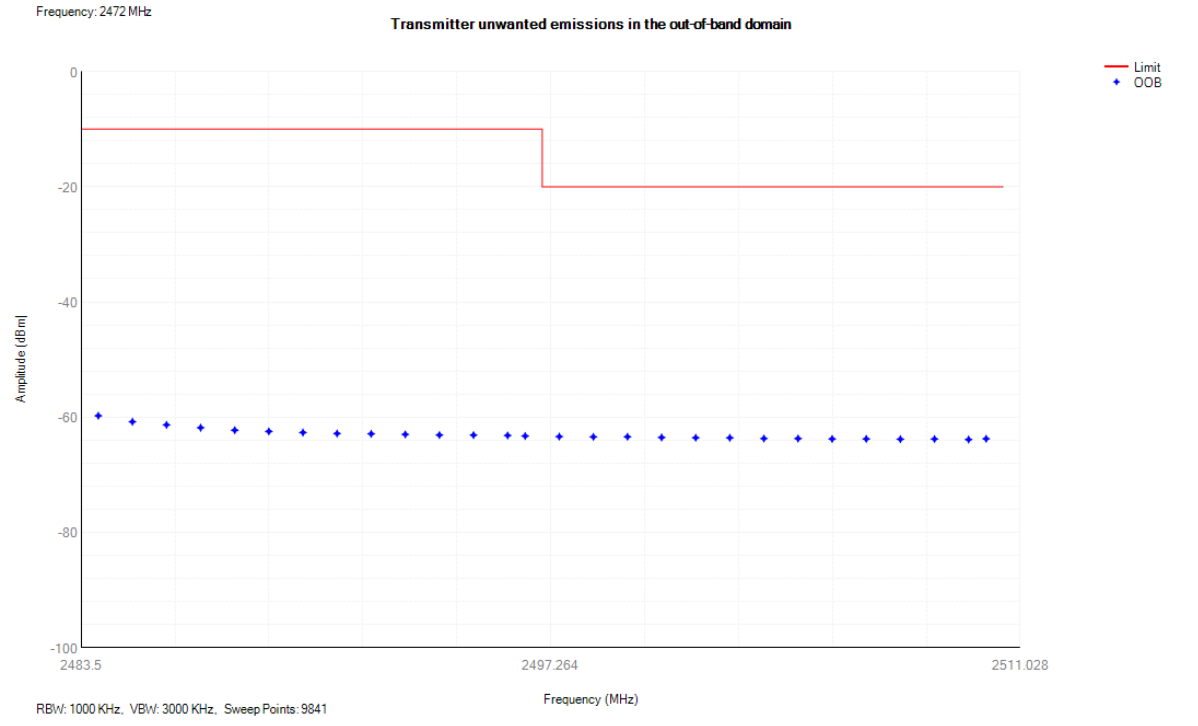
Tx. Emissions OOB NVNT n40 2462MHz Ant A



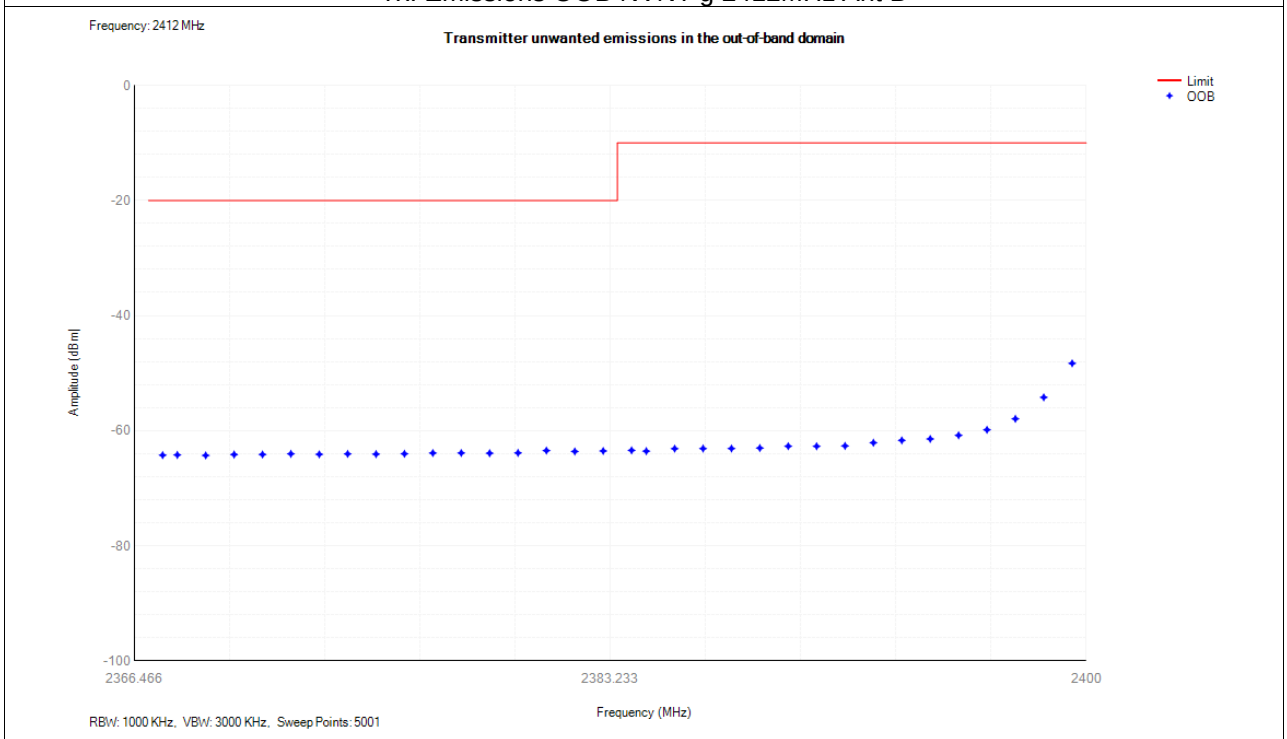
Test Graphs
Tx. Emissions OOB NVNT b 2412MHz Ant B



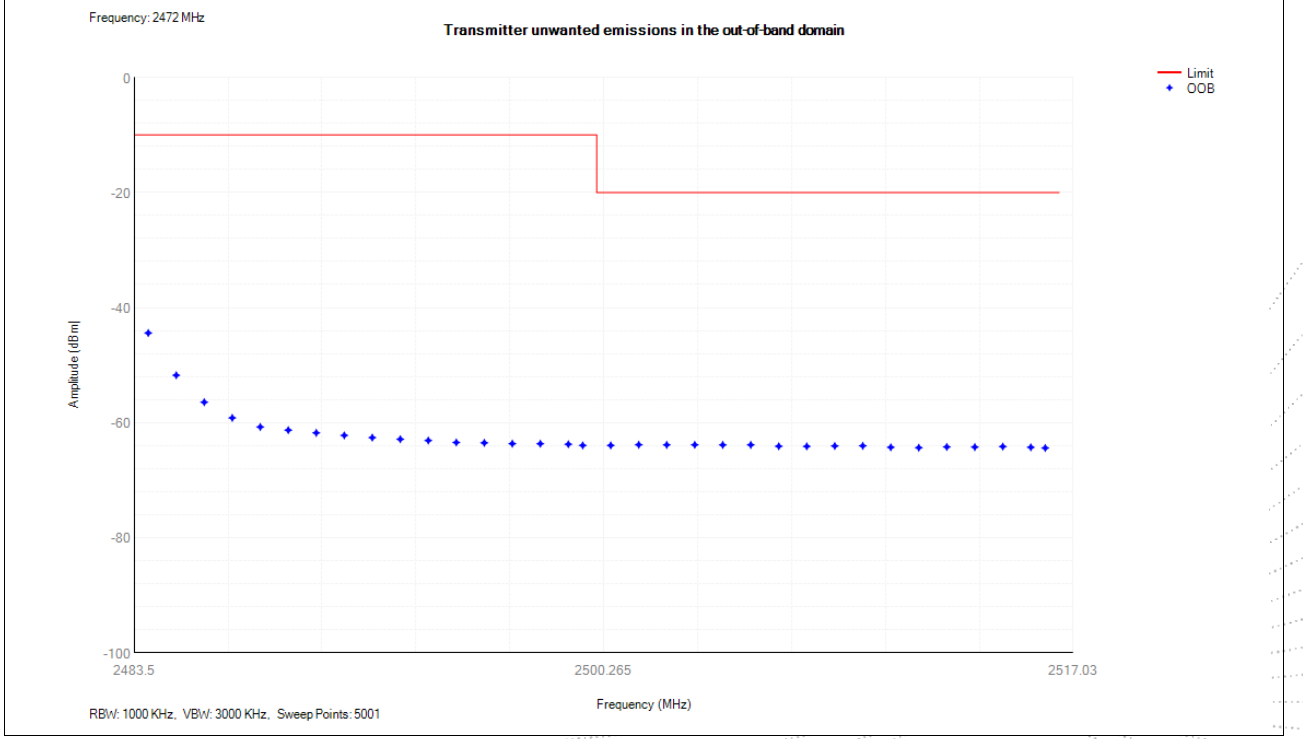
Tx. Emissions OOB NVNT b 2472MHz Ant B



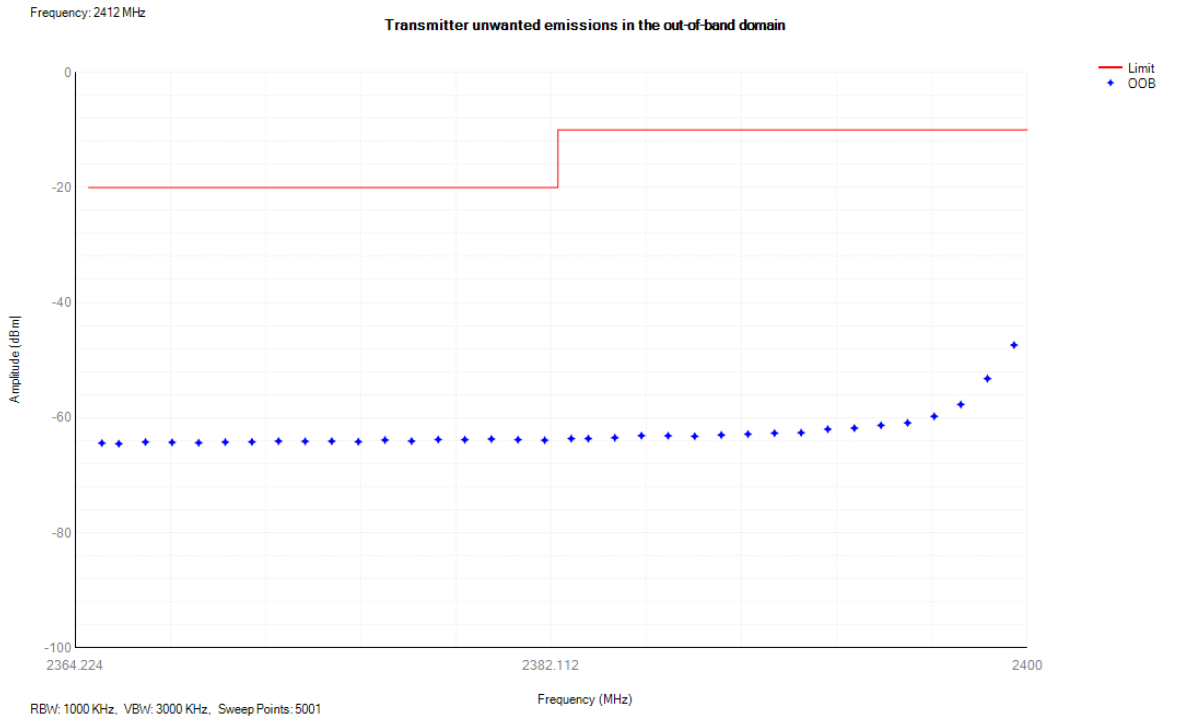
Tx. Emissions OOB NVNT g 2412MHz Ant B



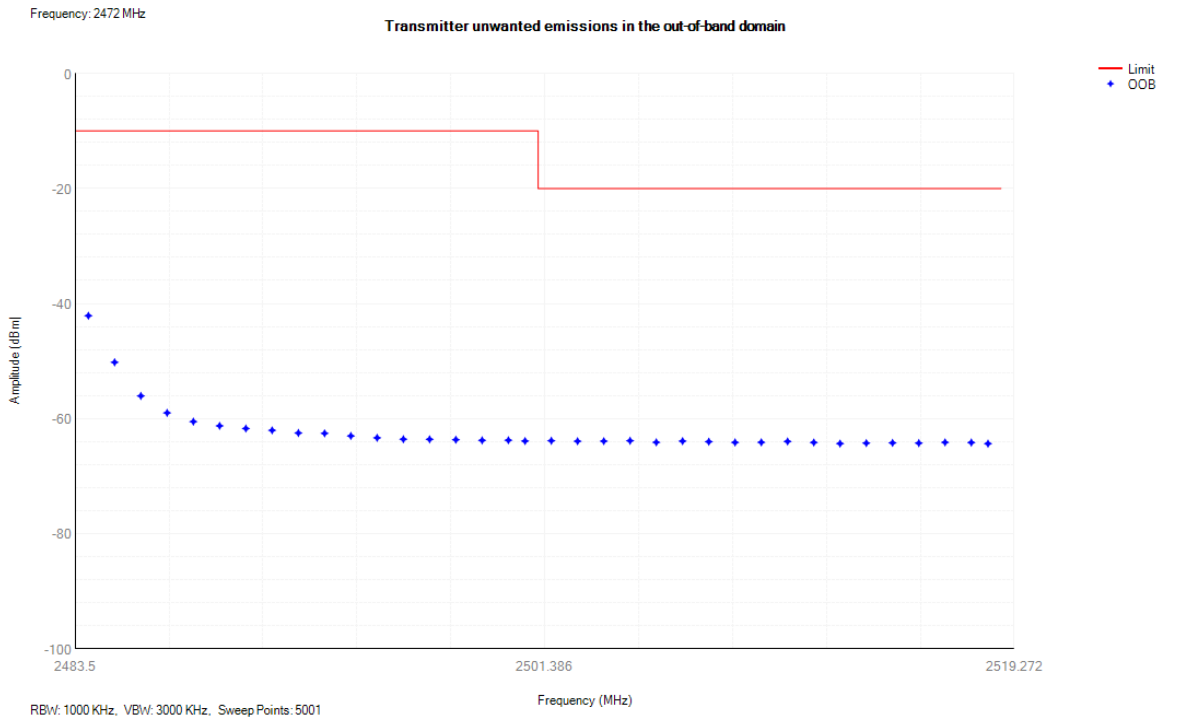
Tx. Emissions OOB NVNT g 2472MHz Ant B



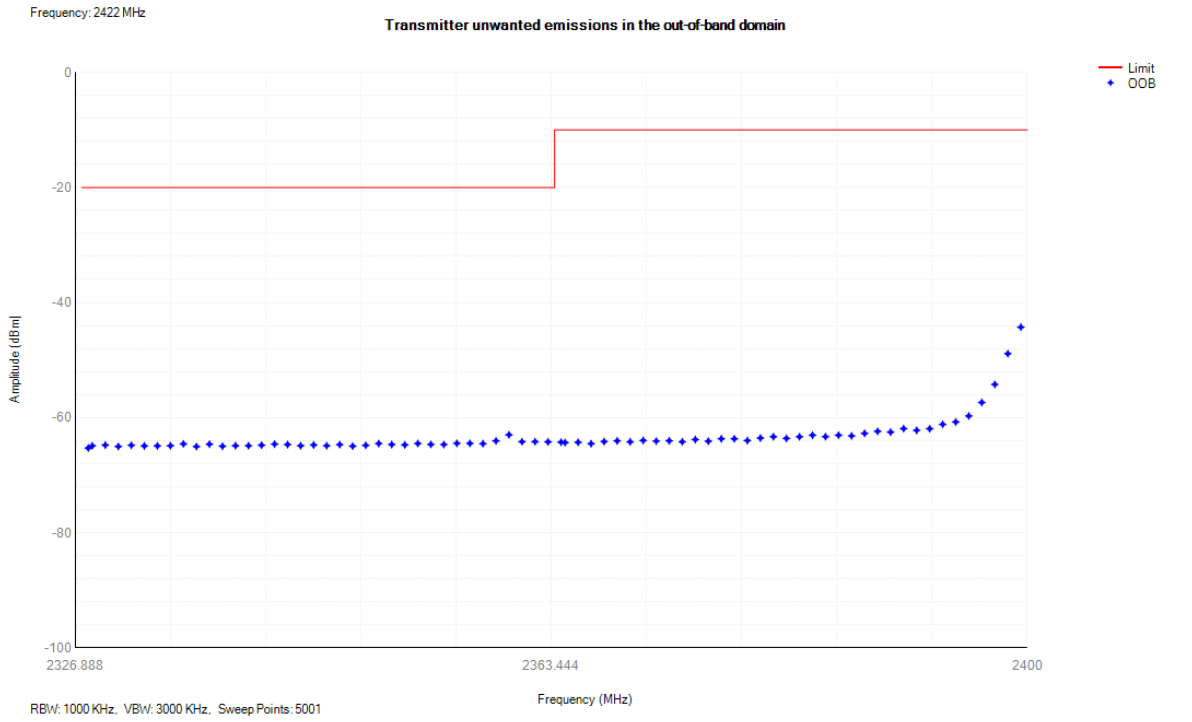
Tx. Emissions OOB NVNT n20 2412MHz Ant B



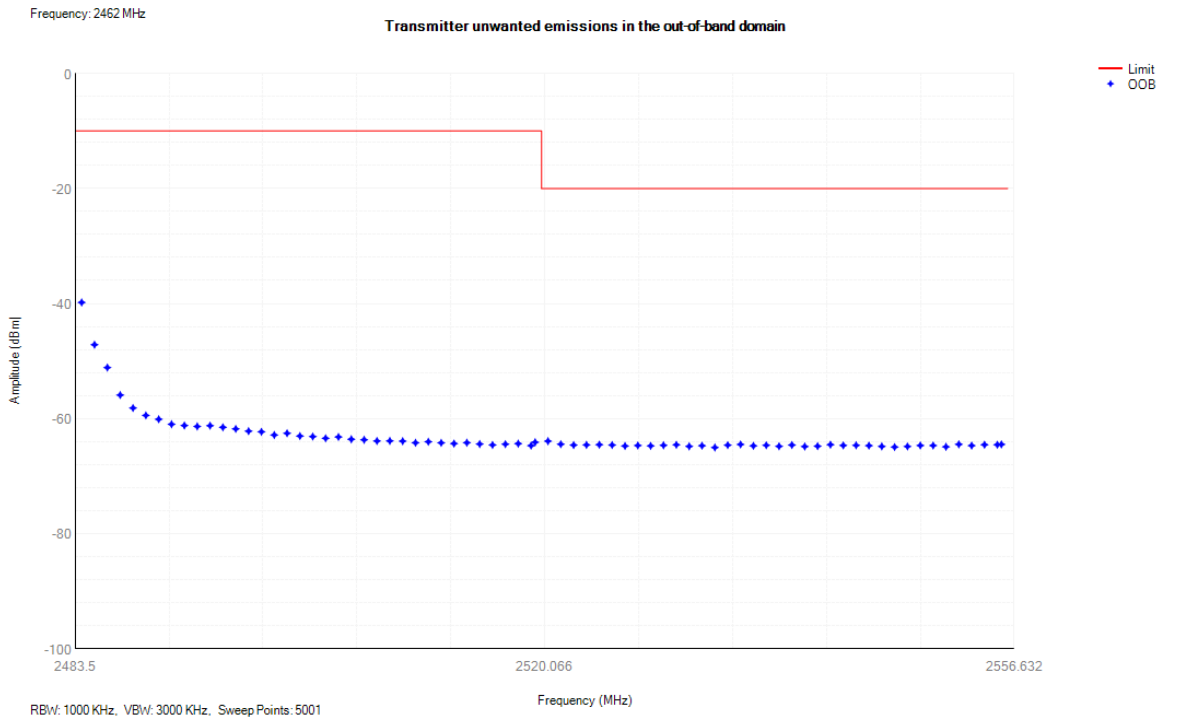
Tx. Emissions OOB NVNT n20 2472MHz Ant B



Tx. Emissions OOB NVNT n40 2422MHz Ant B



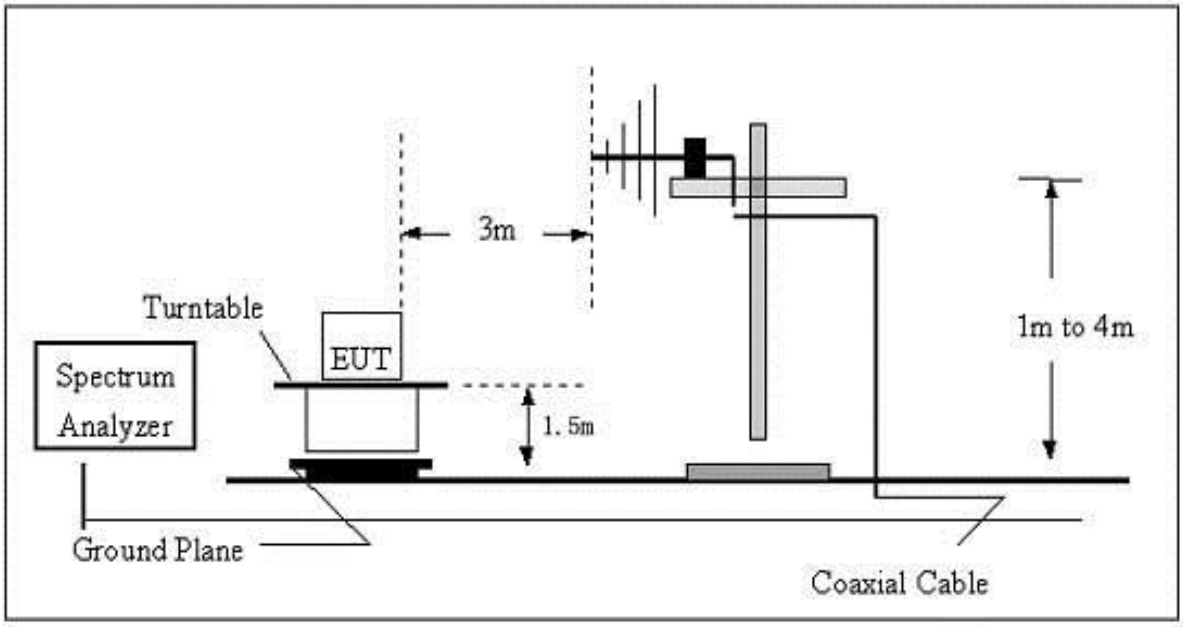
Tx. Emissions OOB NVNT n40 2462MHz Ant B



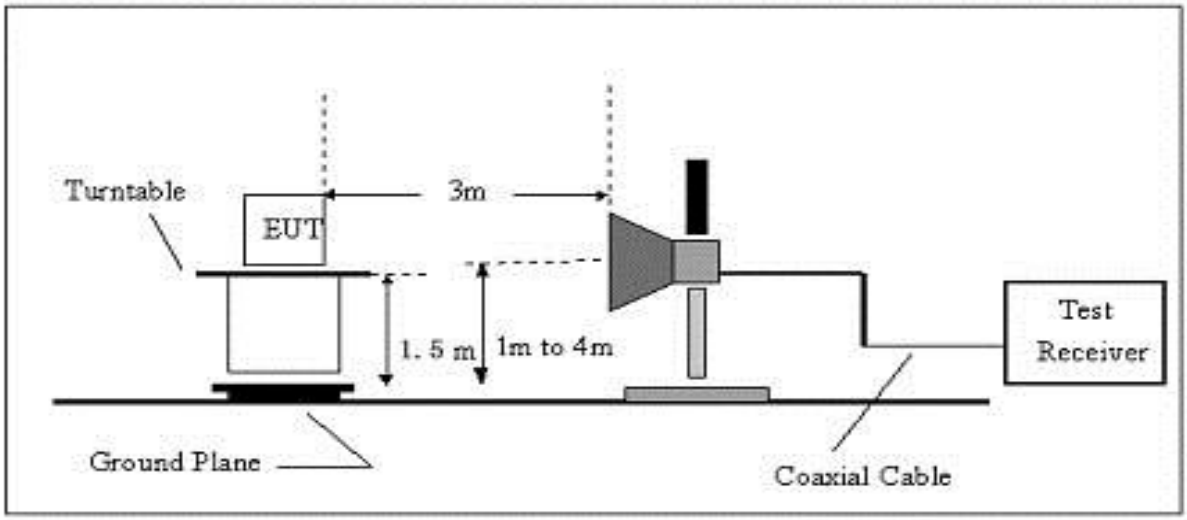
12. Transmitter Unwanted Emissions In The Spurious Domain

12.1 Block Diagram Of Test Setup

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



12.2 Limits

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz/
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

12.3 Test Procedure

30MHz ~ 1GHz:

a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

12.4 Test Results

Modulation : Antenna A 802.11b (the worst data)

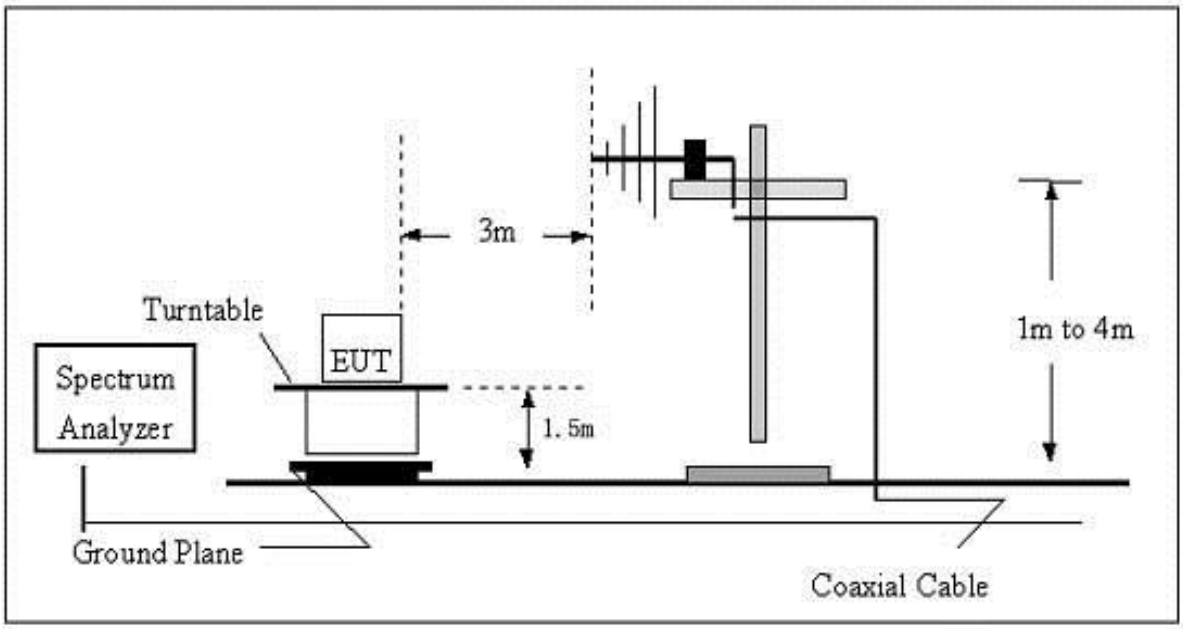
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
802.11b low channel								
552.86	-53.93	121	1.5	H	-7.61	-61.54	-54	-7.54
552.86	-51.90	98	1.0	V	-7.61	-59.51	-54	-5.51
4824.00	-45.26	56	1.6	H	-0.43	-45.69	-30	-15.69
4824.00	-38.60	213	1.6	V	-0.43	-39.03	-30	-9.03
7236.00	-55.21	208	1.7	H	8.31	-46.90	-30	-16.90
7236.00	-61.45	8	1.2	V	8.31	-53.14	-30	-23.14
802.11b Mid channel								
552.86	-54.01	204	1.3	H	-7.61	-61.62	-54	-7.62
552.86	-51.68	229	1.0	V	-7.61	-59.29	-54	-5.29
4884.00	-45.97	172	1.8	H	-0.38	-46.35	-30	-16.35
4884.00	-38.18	111	1.3	V	-0.38	-38.56	-30	-8.56
7326.00	-55.18	193	1.8	H	8.83	-46.35	-30	-16.35
7326.00	-61.43	249	1.1	V	8.83	-52.60	-30	-22.60
802.11b high channel								
552.86	-53.56	285	1.5	H	-7.61	-61.17	-54	-7.17
552.86	-51.53	293	1.5	V	-7.61	-59.14	-54	-5.14
4944.00	-45.17	276	1.1	H	-0.32	-45.49	-30	-15.49
4944.00	-37.87	298	1.7	V	-0.32	-38.19	-30	-8.19
7416.00	-55.22	206	1.8	H	9.35	-45.87	-30	-15.87
7416.00	-61.14	305	1.8	V	9.35	-51.79	-30	-21.79

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

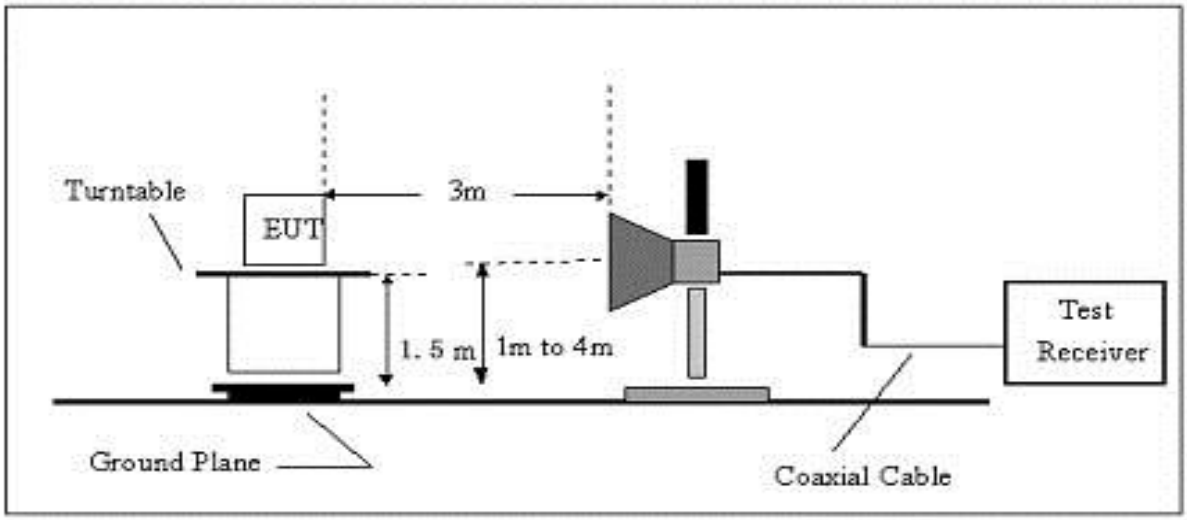
13. Receiver Spurious Emissions

13.1 Block Diagram Of Test Setup

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



13.2 Limits

Frequency(MHz)	Limit	Bandwidth
30-1000	-57dBm	100 kHz
1000-12750	-47dBm	1 MHz

13.3 Test Procedure

30MHz ~ 1GHz:

a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Above 1GHz:

a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..

b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.

c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

13.4 Test Results

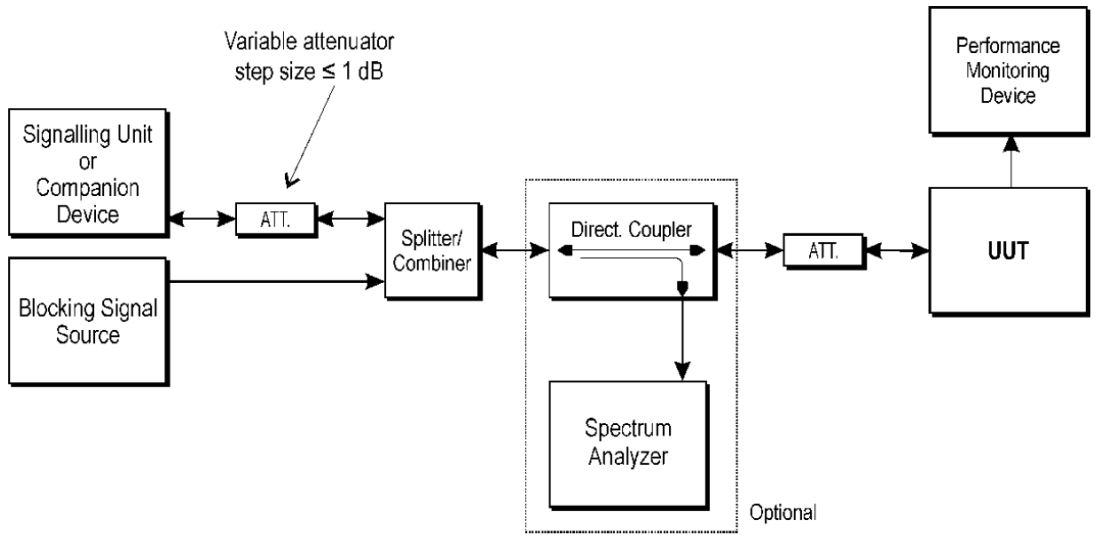
Modulation : Antenna A 802.11b (the worst data)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
802.11b Low channel								
236.95	-52.18	249	1.6	H	-15.55	-67.73	-57.00	-10.73
236.95	-54.68	31	1.0	V	-15.55	-70.23	-57.00	-13.23
2395.38	-48.90	129	1.9	H	-6.70	-55.60	-47.00	-8.60
2395.38	-50.45	141	1.3	V	-6.70	-57.15	-47.00	-10.15
802.11b Mid channel								
236.95	-51.36	194	1.2	H	-15.55	-66.91	-57.00	-9.91
236.95	-54.23	57	1.6	V	-15.55	-69.78	-57.00	-12.78
2395.38	-48.09	163	1.8	H	-6.70	-54.79	-47.00	-7.79
2395.38	-50.73	71	1.6	V	-6.70	-57.44	-47.00	-10.44
802.11b High channel								
236.95	-51.40	207	1.8	H	-15.55	-66.95	-57.00	-9.95
236.95	-53.89	201	1.1	V	-15.55	-69.44	-57.00	-12.44
2395.38	-47.94	236	1.4	H	-6.70	-54.64	-47.00	-7.64
2395.38	-50.63	165	1.5	V	-6.70	-57.33	-47.00	-10.33

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

14. Receiver Blocking

14.1 Block Diagram Of Test Setup



14.2 Limit

Table 7: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.			

14.3 Test procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.4.11.2.

14.4 Test Result

Modulation : Antenna A 802.11b (the worst data)

Receiver Category 2					
802.11b	**Wanted Signal Power(dBm)**	**Blocking Frequency(MHz)**	**Blocking Power(dB)**	**Measured PER(%)**	**Limit (%)**
2412	-64	2380	-34	1.43	10
2412	-64	2300	-34	1.29	10
2472	-64	2504	-34	1.70	10
2472	-64	2584	-34	1.90	10
NoteNote:This report only shows the worst case test data. OCBW=13514000Hz (-139dBm+10*log10(OCBW)+10dB)=-57.69 (-74dBm+10dB)=-64dBm -64dBm≤-57.69dBm Wanted Signal Power=-64dBm					

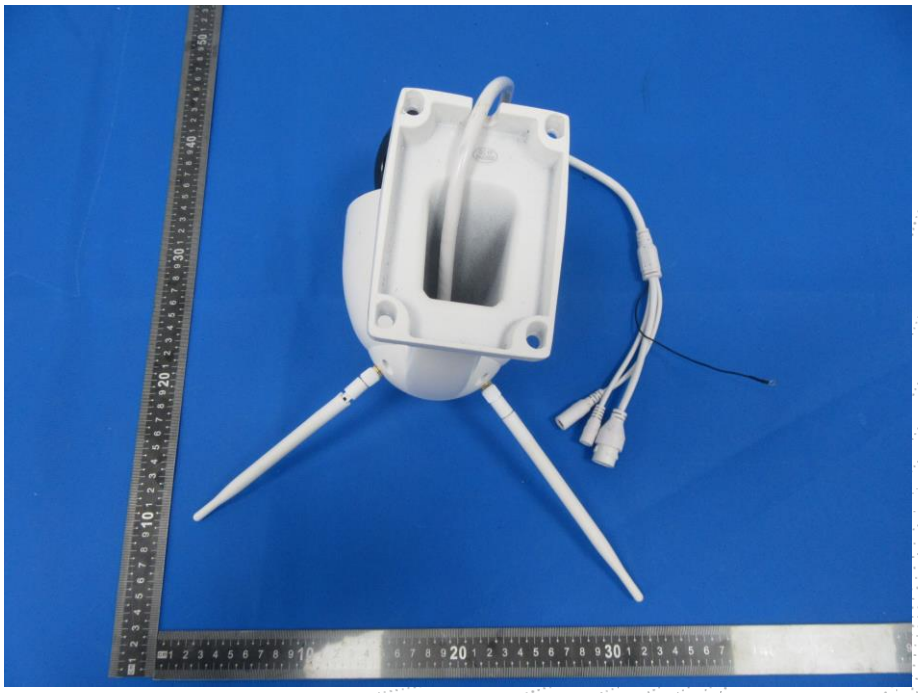
15. EUT Photographs

EUT Photo 1

EUT Photo 2

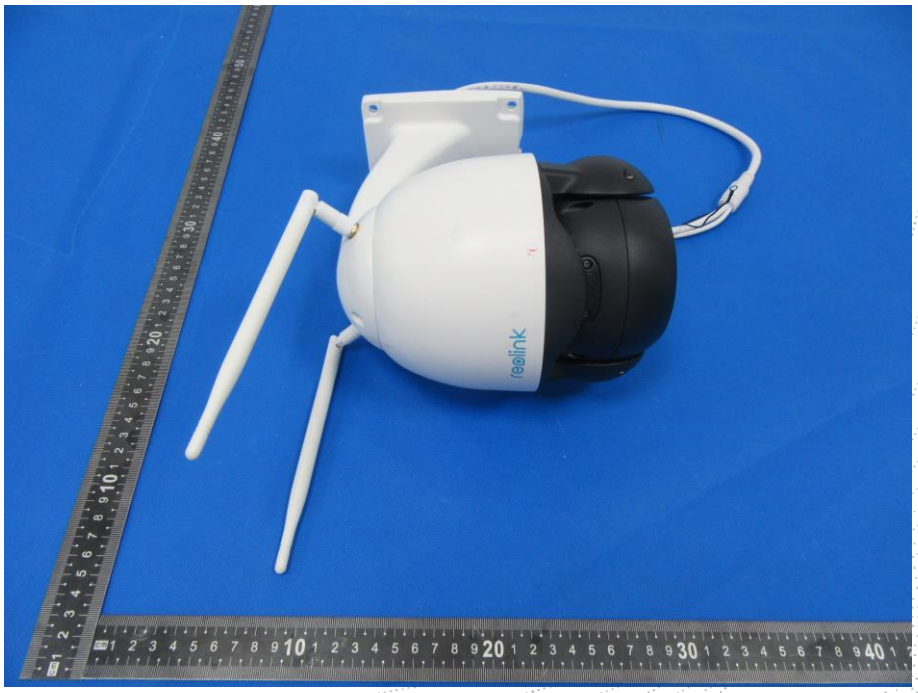
EUT Photo 3

EUT Photo 4



EUT Photo 5

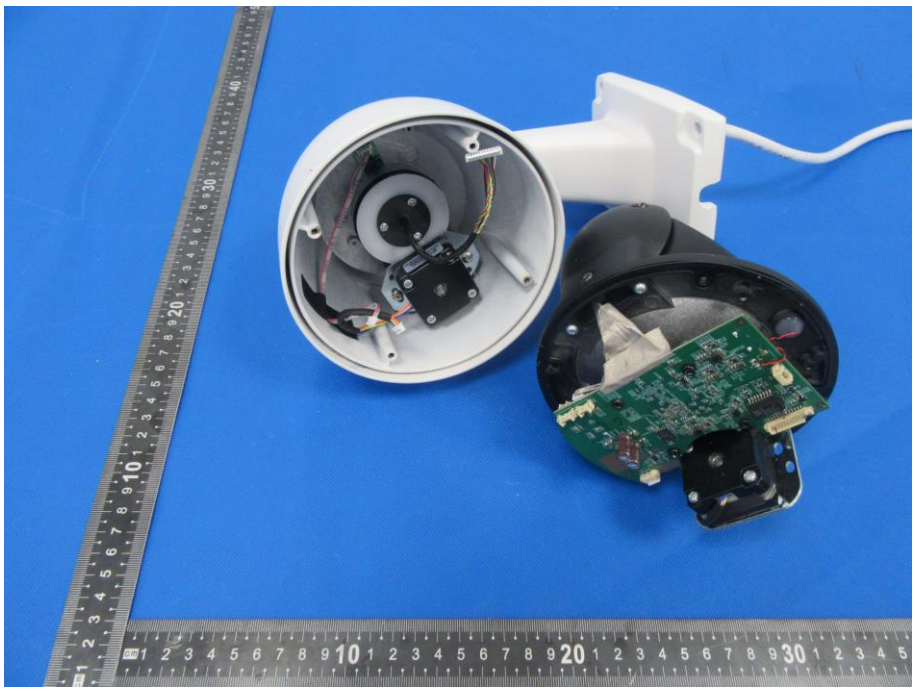
EUT Photo 6



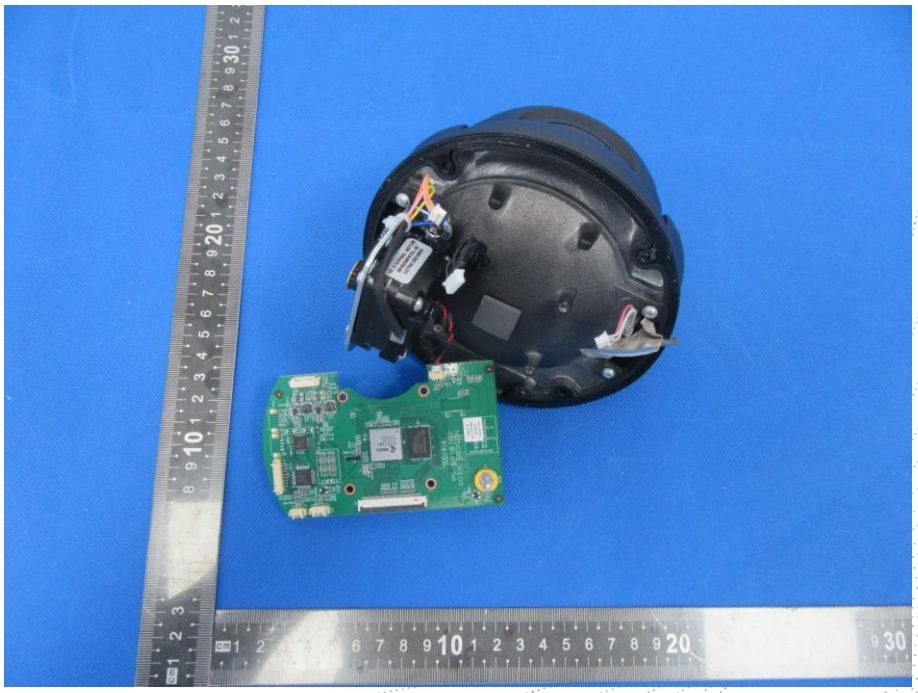
EUT Photo 7

EUT Photo 8

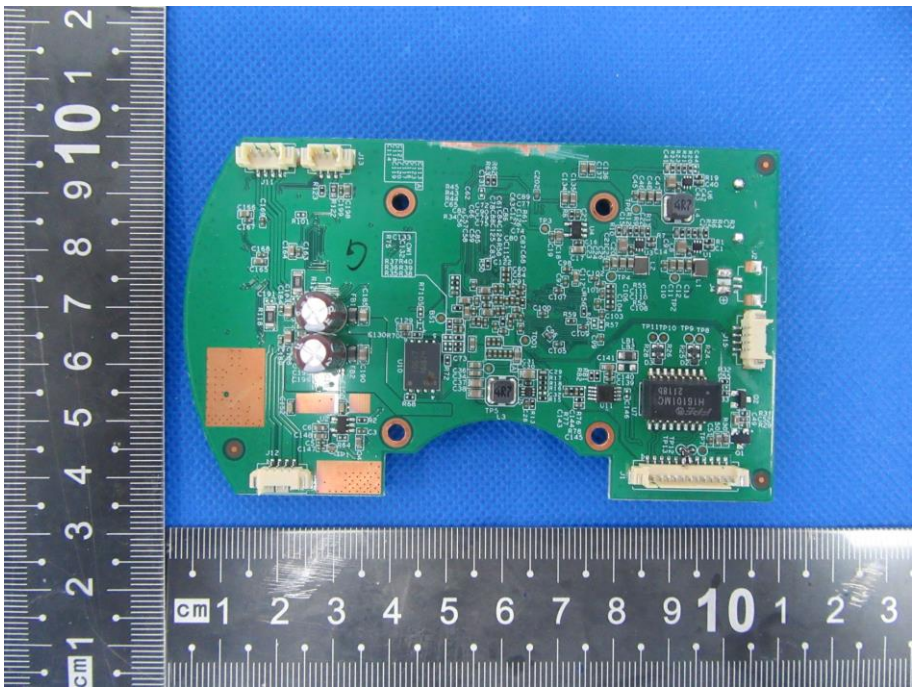
EUT Photo 9



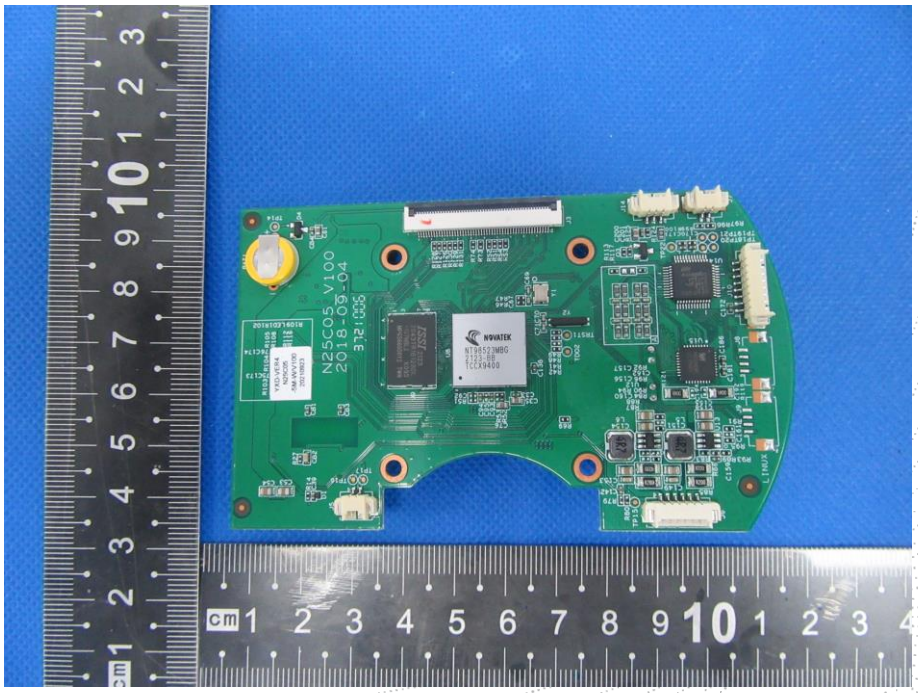
EUT Photo 10



EUT Photo 11

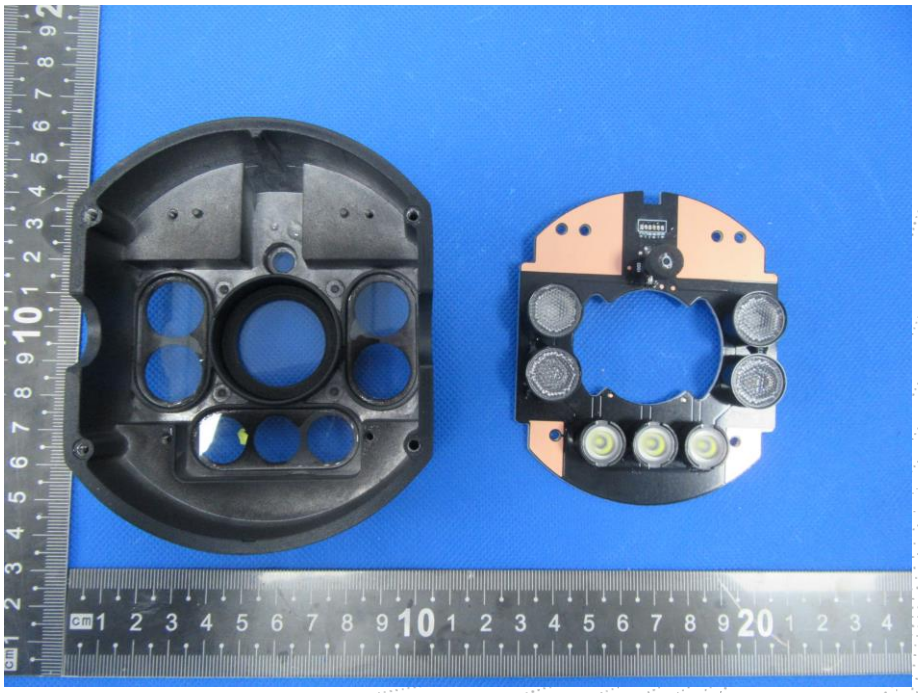


EUT Photo 12

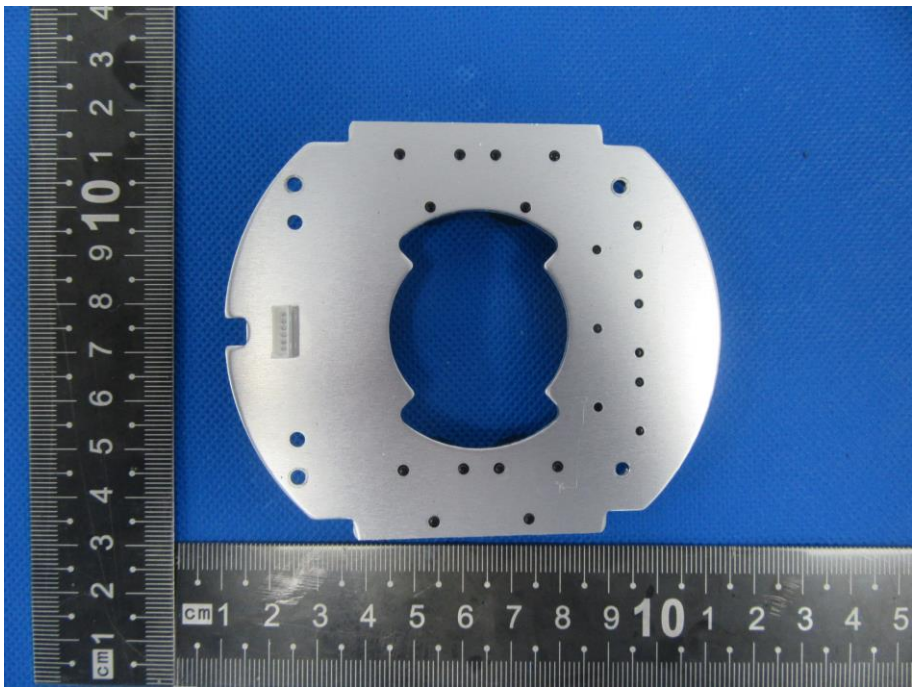


EUT Photo 13

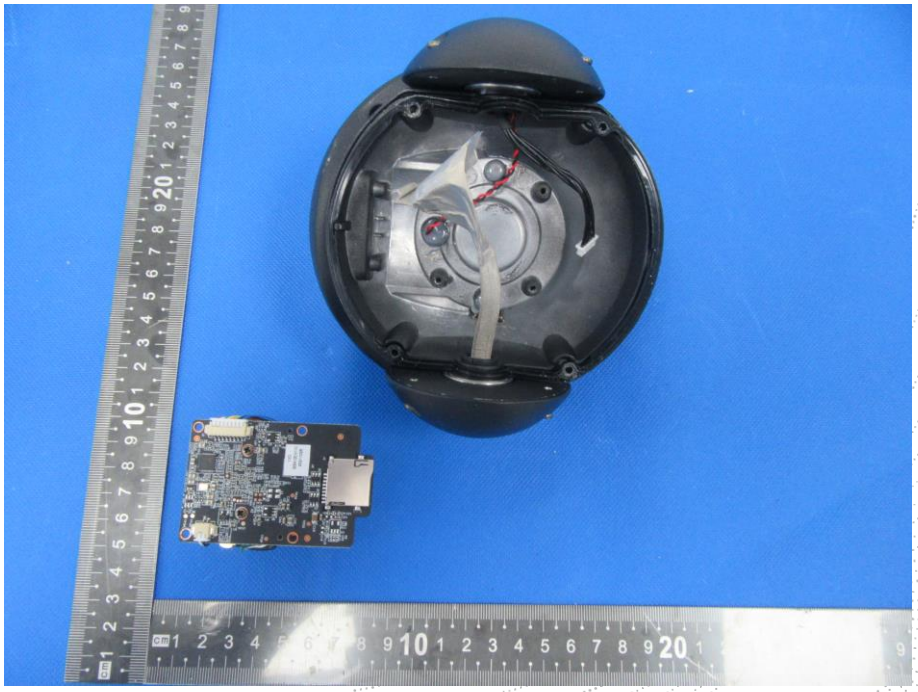
EUT Photo 14



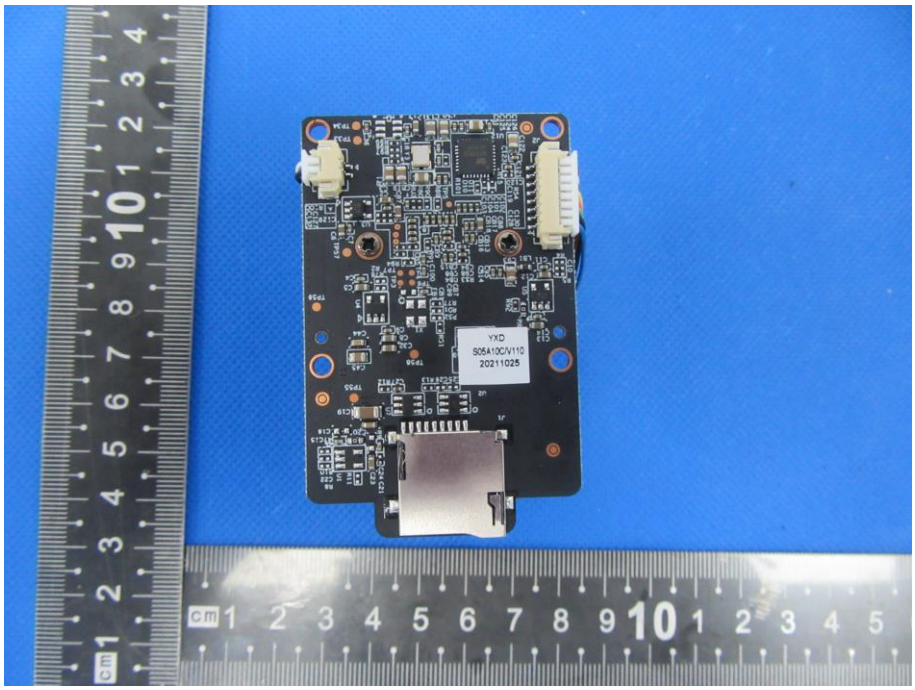
EUT Photo 15



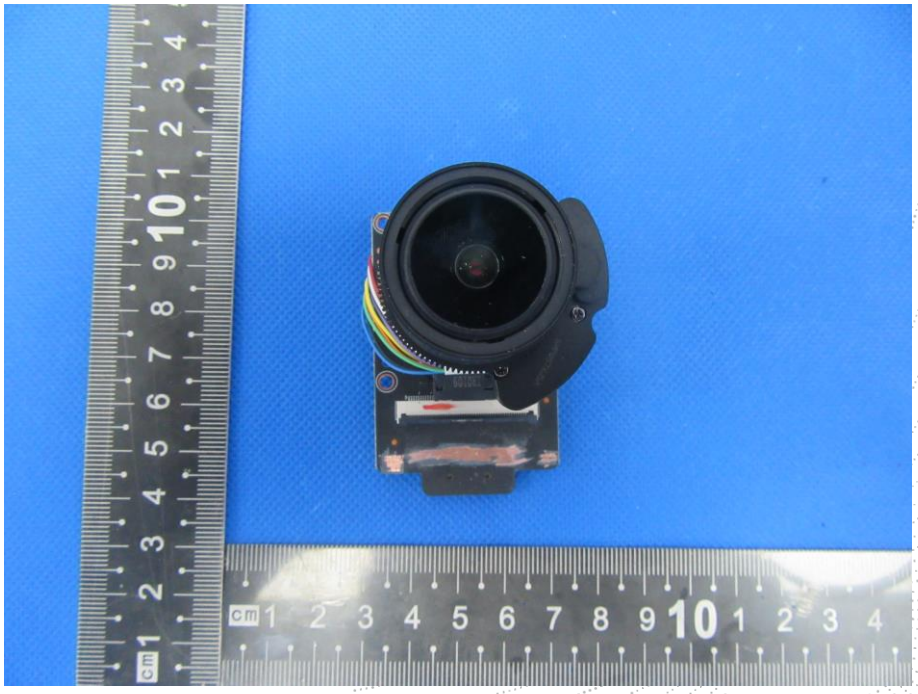
EUT Photo 16



EUT Photo 17



EUT Photo 18



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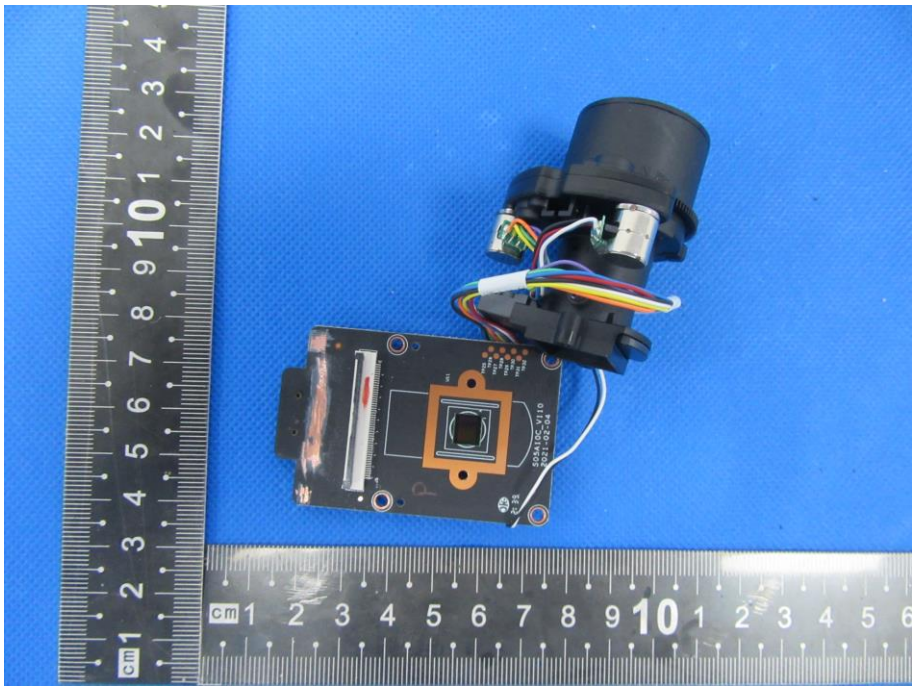
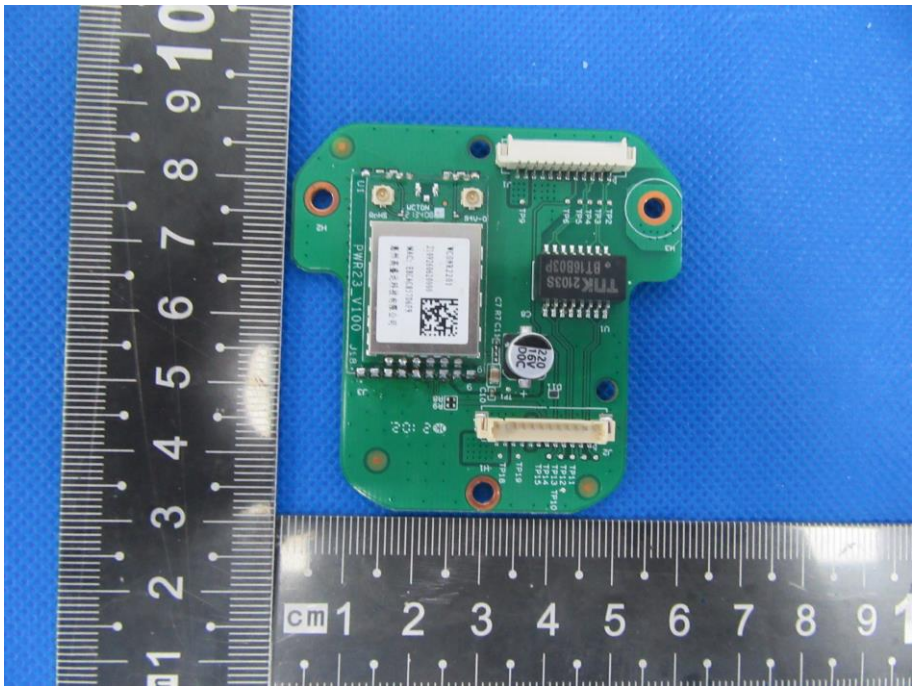


EUT Photo 20

EUT Photo 21



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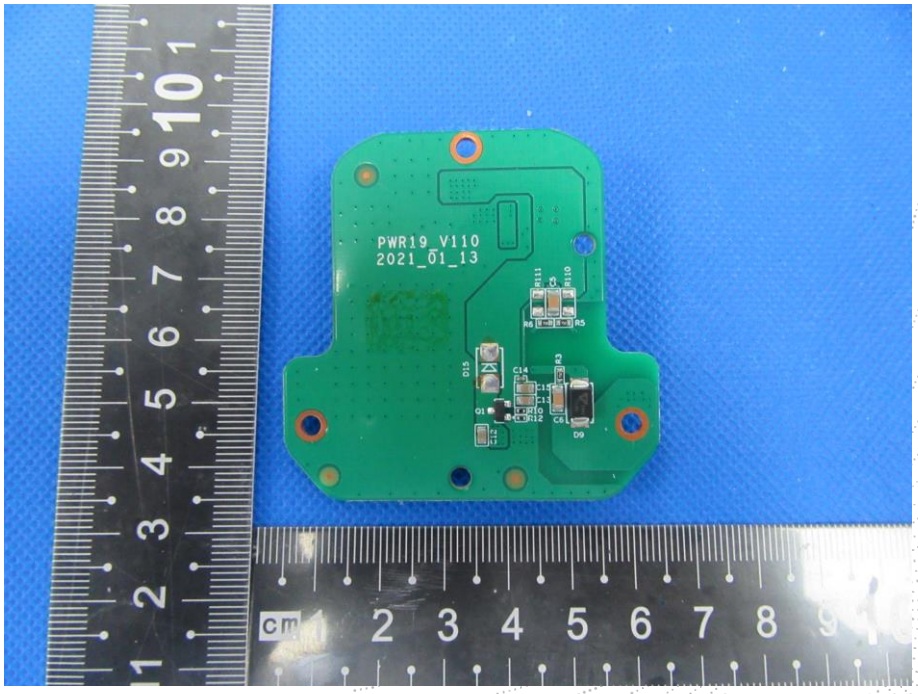
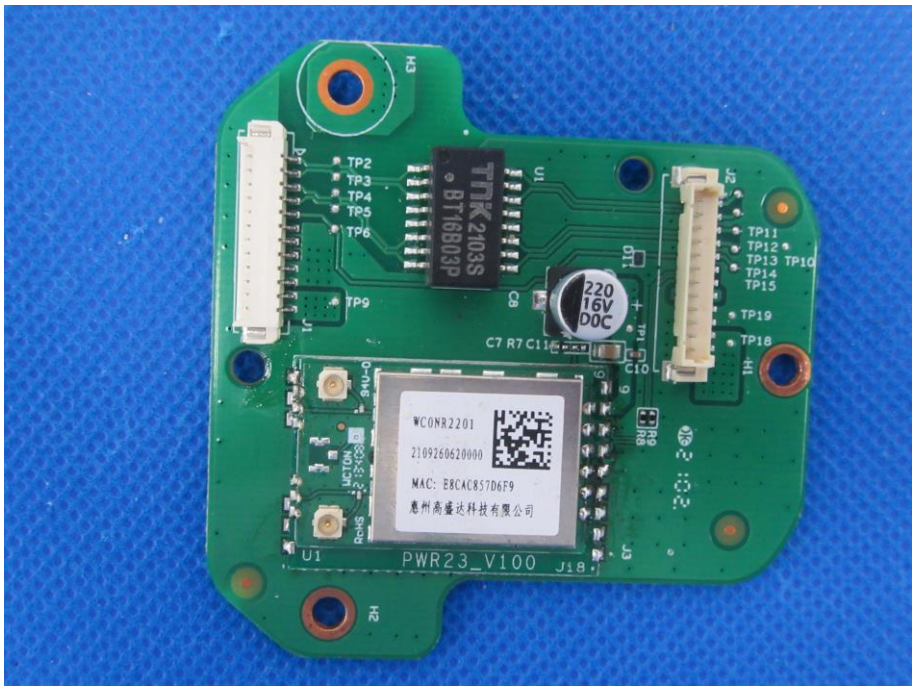


EUT Photo 23



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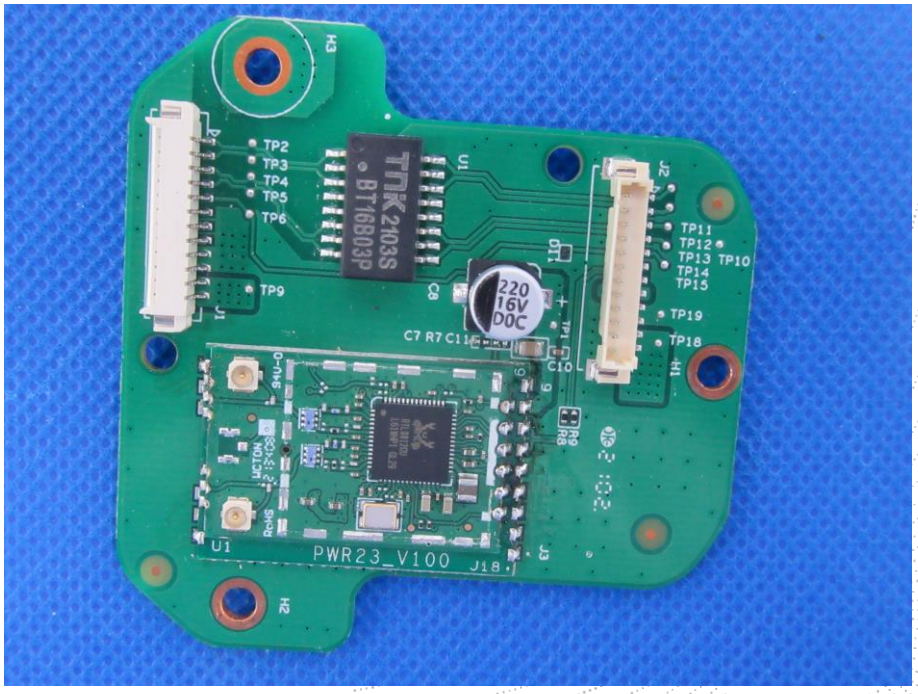
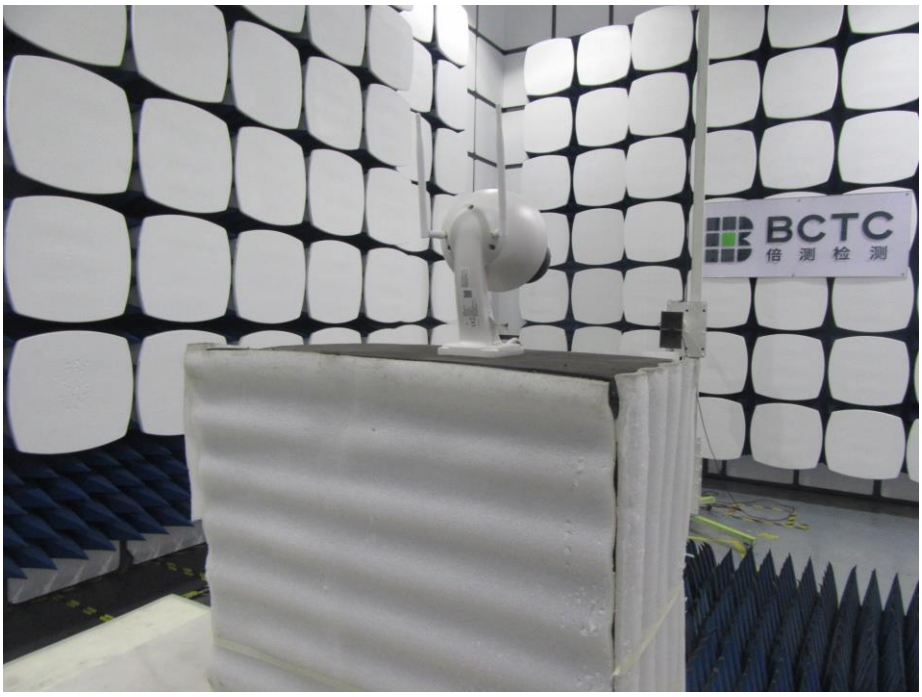


16. EUT Test Setup Photographs

Spurious emissions



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.:	BCTC2202038154-5E
Applicant:	REOLINK INNOVATION LIMITED
Product Name:	WiFi IP Camera
Model/Type reference:	RLC-523WA
Tested Date:	2022-02-09 to 2022-03-03
Issued Date:	2022-03-24

Shenzhen BCTC Testing Co., Ltd.

Product Name:	WiFi IP Camera
Trademark:	reolink
Model/Type reference:	RLC-523WA
Prepared For:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Manufacturer:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Factory:	Shenzhen Reolink Technology Co., Ltd.
Address:	2-4th Floor, Building 2, Yuanling Industrial Park, ShangWu, Shiyan Street, Bao'an District, Shenzhen, China
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:	2022-02-09
Sample tested Date:	2022-02-09 to 2022-03-03
Issue Date:	2022-03-24
Report No.:	BCTC2202038154-5E
Test Standards:	ETSI EN 301 893 V2.1.1 (2017-05)
Test Results:	PASS
Remark:	This is WIFI-5GHz band radio test report.

Tested by:

Eric Yang/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
BCTC2202038154-5E	2022-03-24	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Nominal Centre frequencies	4.2.1	PASS
2	Nominal Channel Bandwidth and Occupied Channel Bandwidth	4.2.2	PASS
3	RF output power, Transmit Power Control (TPC) and Power Density	4.2.3	PASS
4	Transmitter unwanted emissions	4.2.4	PASS
5	Receiver spurious emissions	4.2.5	PASS
6	Dynamic Frequency Selection (DFS)	4.2.6	N/A
7	Adaptivity (Channel Access Mechanism)	4.2.7	PASS
8	Receiver Blocking	4.2.8	PASS
9	User Access Restrictions	4.2.9	PASS
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			

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.

RF frequency	1×10^{-7}
RF power, conducted	± 1.0 dB
Conducted emission of receivers	± 1 dB
Radiated emission of transmitter	± 6 dB
Radiated emission of receiver	± 6 dB
Temperature	±1 degree
Humidity	± 5 %

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	RLC-523WA
Model differences:	N/A
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WiFi (5.1GHz): IEEE 802.11a/n/ac HT20:5180MHz-5240MHz IEEE 802.11n/ac HT40:5190MHz-5230MH IEEE 802.11ac HT80:5210MHz
Max. RF output power:	WiFi (5.1GHz): 5.77 dBm
Type of Modulation:	WiFi: DSSS, OFDM
Antenna installation:	External antenna*2
Antenna Gain:	WiFi (5.1GHz): Antenna A : 2.02 dBi Antenna B : 2.02 dBi
Ratings:	DC 12V
Adapter:	Model: DCT24W120200EU-A0 Input:100-204V~50/60Hz 0.7A max Output: DC 12.0V 2.0A 24.0W

4.2 Test Setup Configuration

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

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	---	---	---

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

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
36	5180	38	5190	40	5200	42	5210
44	5220	46	5230	48	5240		

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting(802.11a HT20)	5180MHz	5200 MHz	5240 MHz
Transmitting(802.11n HT20)	5180MHz	5200 MHz	5240 MHz
Transmitting(802.11ac HT20)	5180MHz	5200 MHz	5240 MHz
Transmitting(802.11n HT40)	5190Mhz	/	5230 MHz
Transmitting(802.1 ac HT40)	5190Mhz	/	5230 MHz
Transmitting(802.11ac HT80)	/	5210 MHz	/
Receiving(802.11a HT20)	5180MHz	5200 MHz	5240 MHz
Receiving(802.11n HT20)	5180MHz	5200 MHz	5240 MHz
Receiving(802.11ac HT20)	5180MHz	5200 MHz	5240 MHz
Receiving(802.11n HT40)	5190Mhz	/	5230 MHz
Receiving(802.11ac HT40)	5190Mhz	/	5230 MHz
Receiving(802.11ac HT80)	/	5210 MHz	/

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Temperature(℃):	26
Test Voltage(AC):	230V

2.Extreme Test Conditions:

For tests at extreme temperatures, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

For tests at extreme voltages, measurements shall be made over the extremes of the power source voltage range as declared by the manufacturer.

Test Conditions	LT	HT
Temperature (℃)	-10	35

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

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023
2	Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022
3	Spectrum Analyzer	Agilent	E4407B	MY45109572	May 28, 2021	May 27, 2022
4	Amplifier	SKET	LAPA_01G18G-45dB	\	May 28, 2021	May 27, 2022
5	Amplifier	Schwarzbeck	BBV9744	9744-0037	May 28, 2021	May 27, 2022
6	TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Jun. 01, 2021	May 31, 2022
7	Horn Antenna	SCHWARZBECK	BBHA9120D	1541	Jun. 02, 2021	Jun. 01, 2022
8	band rejection filter	ZBSF	ZBSF-C2441.5	1706003606	May 28, 2021	May 27, 2022
9	Signal Generator	Keysight	N5181A	MY50143748	May 29, 2021	May 28, 2022
10	Communication test set	R&S	CMU200	119435	May 28, 2021	May 27, 2022
11	Spectrum Analyzer	Keysight	N9020A	MY49100060	May 28, 2021	May 27, 2022
12	Signal Generator	Keysight	N5182B	MY56200519	May 28, 2021	May 27, 2022
13	Power Meter	Keysight	E4419B	\	May 28, 2021	May 27, 2022
14	Power Sensor	Keysight	E9 300A	\	May 28, 2021	May 27, 2022
15	Horn antenna	SCHWARZBECK	BBHA9170	00822	Jun. 15, 2021	Jun. 14, 2022
16	Preamplifier	MITEQ	TTA1840-35-HG	2034381	May 28, 2021	May 27, 2022
17	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
18	Software	Keysight	Keysight.ETSLTest system	1.02.05	\	\
19	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
20	Loop Antenna	Schwarzbeck	FMZB1519B	00014	Jun. 02, 2021	Jun. 01, 2022
21	Communication test set	Agilent	N4010A	MY49081107	May 28, 2021	May 27, 2022
22	Programmable constant temperature and humidity test chamber	DGBELL	BTKS5-150C	\	Jul. 14, 2020	Jul. 13, 2021

6. Information As Required

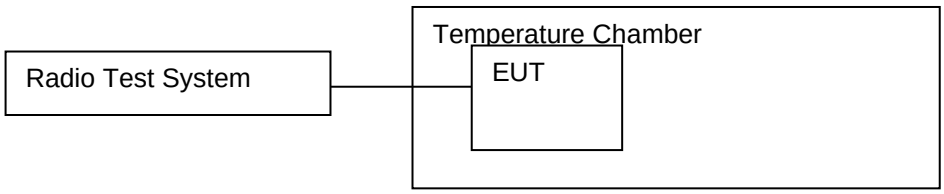
ETSI EN 301 893 V2.1.1 Annex G

a) The Nominal Channel Bandwidth(s):
Refer to section 4.4 channel list.
b) For Load Based Equipment that supports multi-channel operation:
N/A
c) The different transmit operating modes (see clause 5.3.3.2) (tick all that apply):
☐Operating mode 1: Single Antenna Equipment
☐a) Equipment with only 1 antenna
d) In case of Smart Antenna Systems or multiple antenna systems:
• The number of Receive chains: ..2 • The number of Transmit chains: ..2... • Equal power distribution among the transmit chains: ☒Yes ☐No • In case of beamforming, the maximum (additional) beamforming gain: .(Antenna B) : 2.71dBi NOTE: Beamforming gain does not include the basic gain of a single antenna (assembly).
e) TPC feature available:
☐Yes ☒No
f) For equipment with TPC range:
The lowest and highest power level (or lowest and highest e.i.r.p. level in case of integrated antenna equipment),intended antenna assemblies and corresponding operating frequency range for the TPC range (or for each of the TPC ranges if more than one is implemented).
g) For equipment without a TPC range:
Power Setting 1: Max.
h) The DFS related operating mode(s) of the equipment:
N/A
i) User access restrictions (please check box below to confirm):
N/A
j) For equipment with Off-Channel CAC functionality:
N/A
k) The equipment can operate in ad-hoc mode:
N/A
l) Operating Frequency Range(s):
Refer to section 4.1.
m) The extreme operating temperature and supply voltage range that apply to the equipment:
Refer to section 4.6
n) The test sequence/test software used (see also ETSI EN 301 893 (V2.1.1), clause 5.3.1.2):
Provide by manufacturer.
o) Type of Equipment:
☒Stand-alone ☐Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment) ☐Plug-in radio device (Equipment intended for a variety of host systems) ☐Other .....
p) Adaptivity (Channel Access Mechanism):
☐Frame Based Equipment ☒Load Based Equipment
q) With regards to Adaptivity for Frame Based Equipment
☒The Frame Based Equipment operates as an Initiating Device ☐The Frame Based Equipment operates as an Responding Device ☐The Frame Based Equipment can operate as an Initiating Device and as a Responding Device
r) With regards to Adaptivity for Load Based Equipment
N/A
s) The equipment supports a geo-location capability as defined in clause 4.2.10 of ETSI EN 301 893

V2.1.1:
☐Yes ☒No
t) The minimum performance criteria (see ETSI EN 301 893 V2.1.1, clause 4.2.8.3) that corresponds to the intended use of the equipment:
The minimum performance criterion is a PER of less than or equal to 10 %.
u) The theoretical maximum radio performance of the equipment (e.g. maximum throughput) (see ETSI EN 301 893 V2.1.1, clause 5.4.9.3.1):
N/A

7. Nominal Centre frequencies

7.1 Block Diagram Of Test Setup



7.2 Limit

The Nominal Centre Frequencies (fc) for a Nominal Channel Bandwidth of 20 MHz are defined by equation (1). See also figure 3.
fc = 5 160 + (g × 20) MHz, where 0 ⩽ g ⩽ 9 or 16 ⩽ g ⩽ 27 and where g shall be an integer.
A maximum offset of the Nominal Centre Frequency of ±200 kHz is permitted. Where the manufacturer decides to make use of this frequency offset, the manufacturer shall declare the actual centre frequencies used by the equipment.
See clause 5.4.1, item a).
The actual centre frequency for any given channel shall be maintained within the range fc ± 20 ppm.
Equipment may have simultaneous transmissions on more than one Operating Channel with a Nominal Channel Bandwidth of 20 MHz.

7.3 Test procedure

This method is an alternative to the above method in case the UUT cannot be operated in an un-modulated mode.
The UUT shall be connected to spectrum analyser.
Max Hold shall be selected and the centre frequency adjusted to that of the UUT.
The peak value of the power envelope shall be measured and noted. The span shall be reduced and the marker moved in a positive frequency increment until the upper, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f1.
The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f2.
The centre frequency is calculated as (f1 + f2) / 2.

7.4 Test Result

Ant A

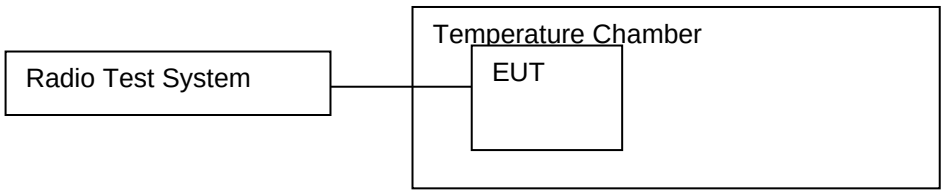
Condition	Mode	Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	a	5180	5179.98	-20000	-3.86	20	Pass
NVNT	a	5200	5199.98	-20000	-3.85	20	Pass
NVNT	a	5240	5239.98	-20000	-3.82	20	Pass
NVNT	n20	5180	5179.98	-20000	-3.86	20	Pass
NVNT	n20	5200	5199.96	-40000	-7.69	20	Pass
NVNT	n20	5240	5239.98	-20000	-3.82	20	Pass
NVNT	n40	5190	5189.96	-40000	-7.71	20	Pass
NVNT	n40	5230	5230	0	0	20	Pass
NVNT	ac20	5180	5179.98	-20000	-3.86	20	Pass
NVNT	ac20	5200	5199.96	-40000	-7.69	20	Pass
NVNT	ac20	5240	5239.98	-20000	-3.82	20	Pass
NVNT	ac40	5190	5190	0	0	20	Pass
NVNT	ac40	5230	5230	0	0	20	Pass
NVNT	ac80	5210	5209.92	-80000	-15.36	20	Pass

Ant B

Condition	Mode	Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	a	5180	5179.96	-40000	-7.72	20	Pass
NVNT	a	5200	5199.96	-40000	-7.69	20	Pass
NVNT	a	5240	5239.98	-20000	-3.82	20	Pass
NVNT	n20	5180	5179.98	-20000	-3.86	20	Pass
NVNT	n20	5200	5199.96	-40000	-7.69	20	Pass
NVNT	n20	5240	5239.96	-40000	-7.63	20	Pass
NVNT	n40	5190	5189.96	-40000	-7.71	20	Pass
NVNT	n40	5230	5229.96	-40000	-7.65	20	Pass
NVNT	ac20	5180	5179.96	-40000	-7.72	20	Pass
NVNT	ac20	5200	5199.96	-40000	-7.69	20	Pass
NVNT	ac20	5240	5239.98	-20000	-3.82	20	Pass
NVNT	ac40	5190	5189.96	-40000	-7.71	20	Pass
NVNT	ac40	5230	5229.96	-40000	-7.65	20	Pass
NVNT	ac80	5210	5209.92	-80000	-15.36	20	Pass

8. Nominal Channel Bandwidth and Occupied Channel Bandwidth

8.1 Block Diagram Of Test Setup



8.2 Limit

The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.
Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing they still comply with the Nominal Centre Frequencies defined in clause 4.2.1 (20 MHz raster).
The Occupied Channel Bandwidth shall be between 80 % and 100 % of the Nominal Channel Bandwidth.
In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.
The Occupied Channel Bandwidth might change with time/payload.

8.3 Test procedure

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test
- Resolution Bandwidth: 100 kHz
- Video Bandwidth: 300 kHz
- Frequency Span: 2 × Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Sweep time: > 1 s; for larger Nominal Bandwidths, the sweep time may be increased until a value where the sweep time has no impact on the RMS value of the signal
- Detector Mode: RMS
- Trace Mode: Max Hold

Step 2:

- Wait for the trace to stabilize.

Step 3:

- Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
- Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.

The measurement described in step 1 to step 3 above shall be repeated in case of simultaneous transmissions in non-adjacent channels.

8.4 Test Result

ANT A

Modulation	Test conditions	OCCUPIED CHANNEL BANDWIDTH (MHz)		
		Low Channel (5180MHz)	Middle Channel (5200MHz)	High Channel (5240MHz)
802.11a	Normal	16.381	16.383	16.389
802.11n HT20	Normal	17.555	17.556	17.559
802.11ac HT20	Normal	17.561	17.555	17.556

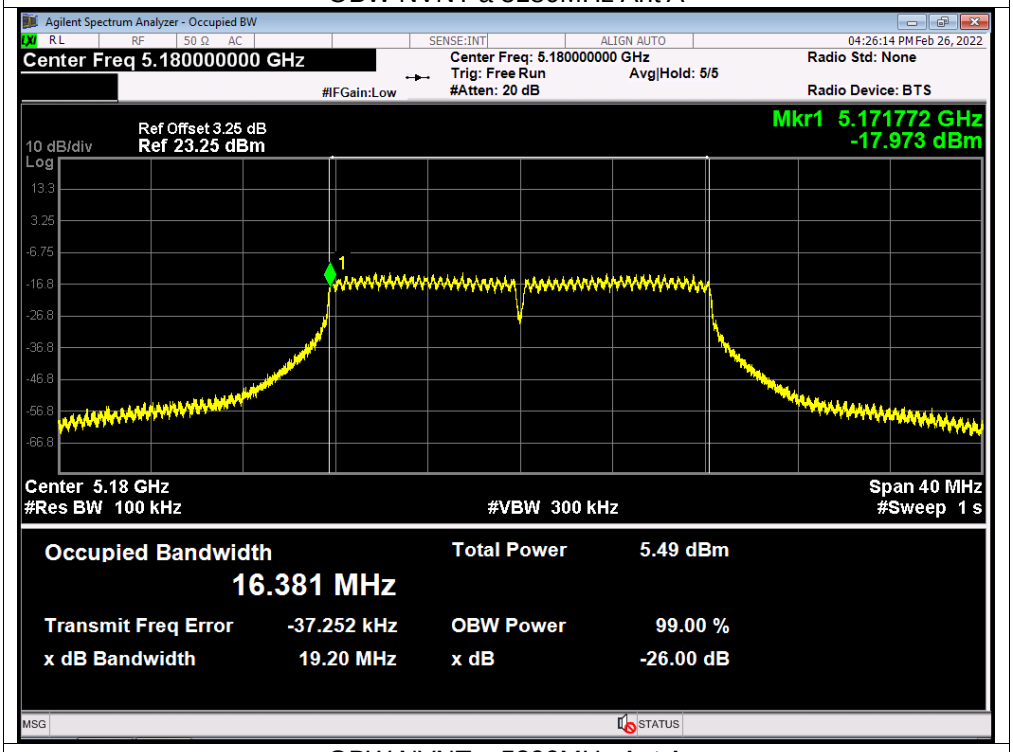
Modulation	Test conditions	OCCUPIED CHANNEL BANDWIDTH (MHz)		
		Low Channel (5190MHz)	Middle Channel (5210MHz)	High Channel (5230MHz)
802.11n HT40	Normal	36.150	/	36.151
802.11ac HT40	Normal	36.140	/	36.164
802.11ac HT80	Normal	/	75.190	/

ANT B

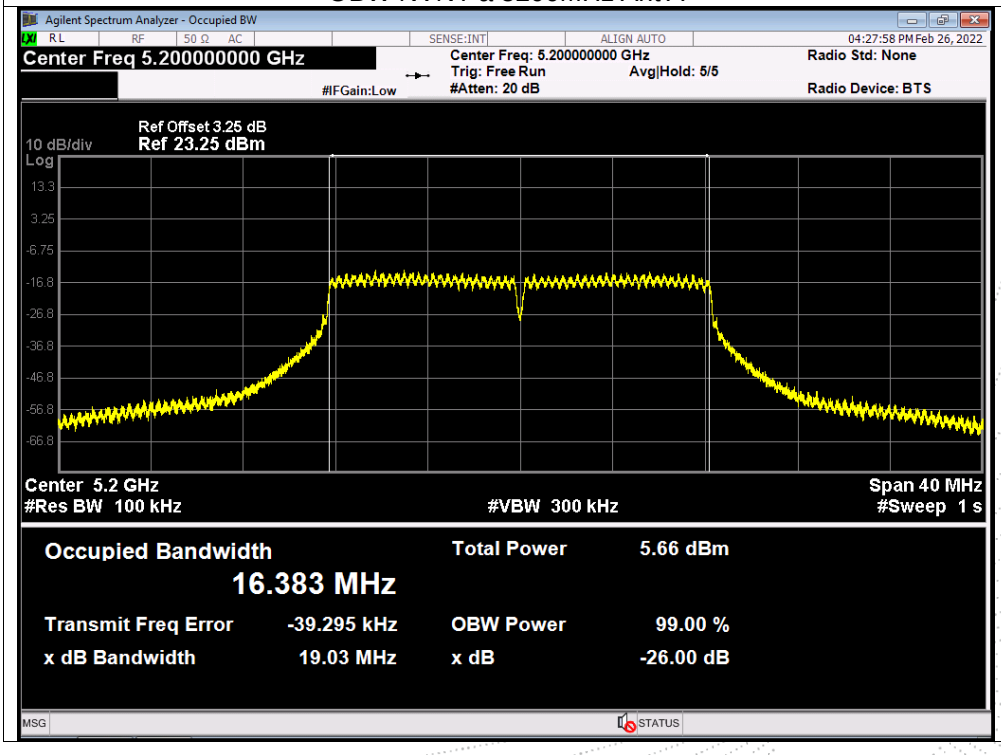
Modulation	Test conditions	OCCUPIED CHANNEL BANDWIDTH (MHz)		
		Low Channel (5180MHz)	Middle Channel (5200MHz)	High Channel (5240MHz)
802.11a	Normal	16.383	16.38	16.387
802.11n HT20	Normal	17.553	17.551	17.559
802.11ac HT20	Normal	17.553	17.548	17.557

Modulation	Test conditions	OCCUPIED CHANNEL BANDWIDTH (MHz)		
		Low Channel (5190MHz)	Middle Channel (5210MHz)	High Channel (5230MHz)
802.11n HT40	Normal	36.139	/	36.153
802.11ac HT40	Normal	36.145	/	36.168
802.11ac HT80	Normal	/	75.163	/

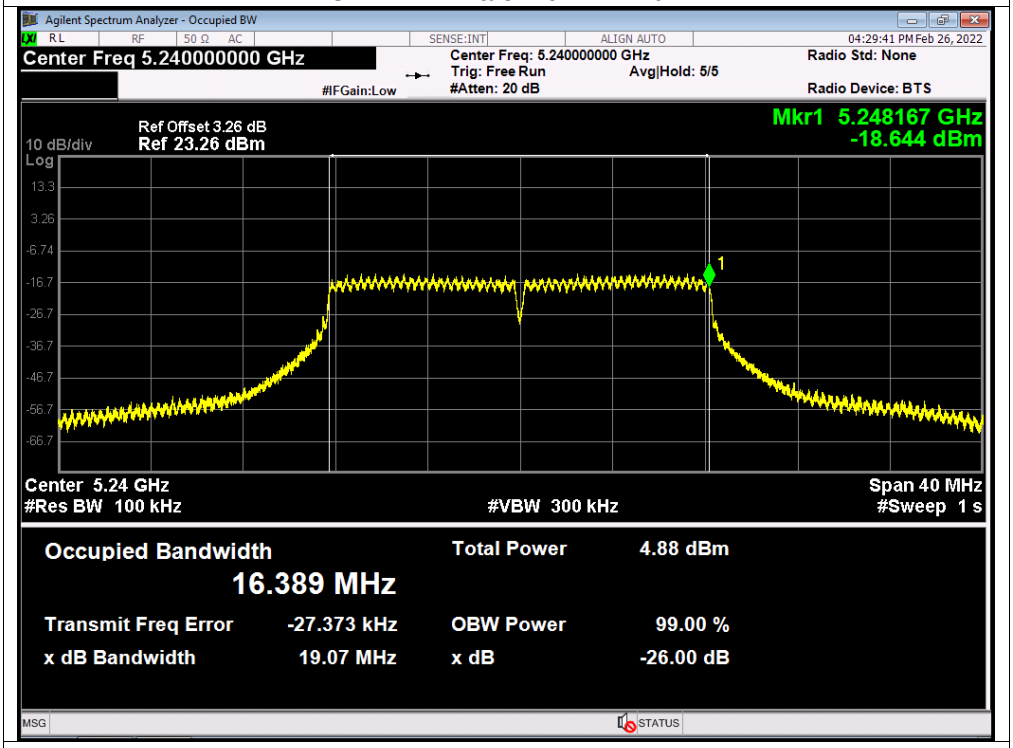
Test Graphs
OBW NVNT a 5180MHz Ant A



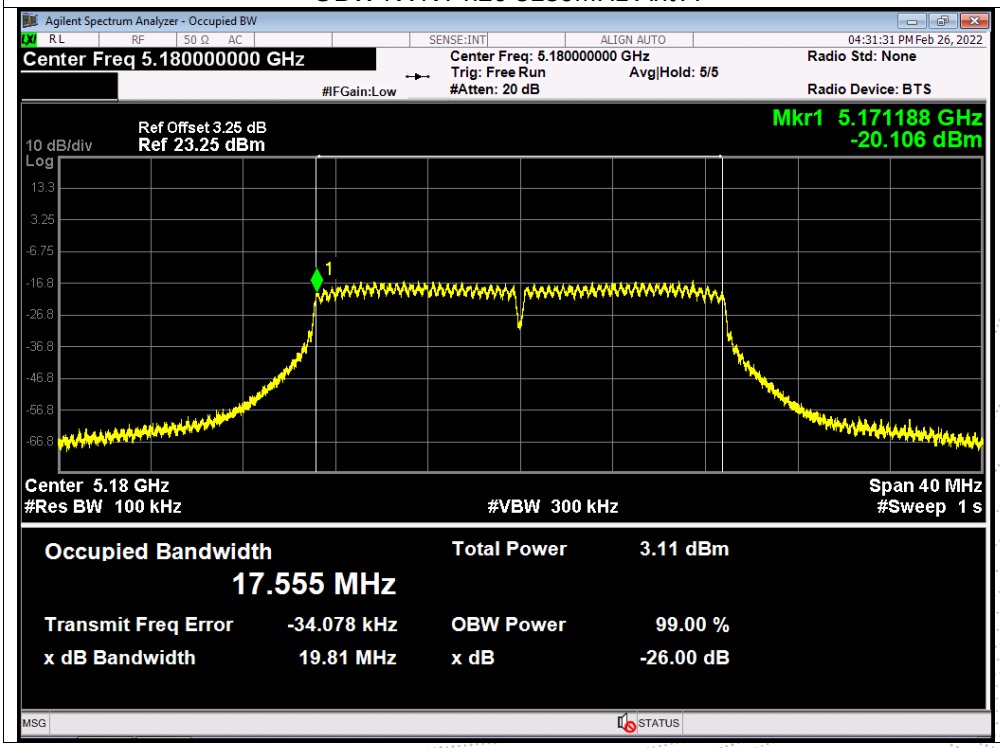
OBW NVNT a 5200MHz Ant A



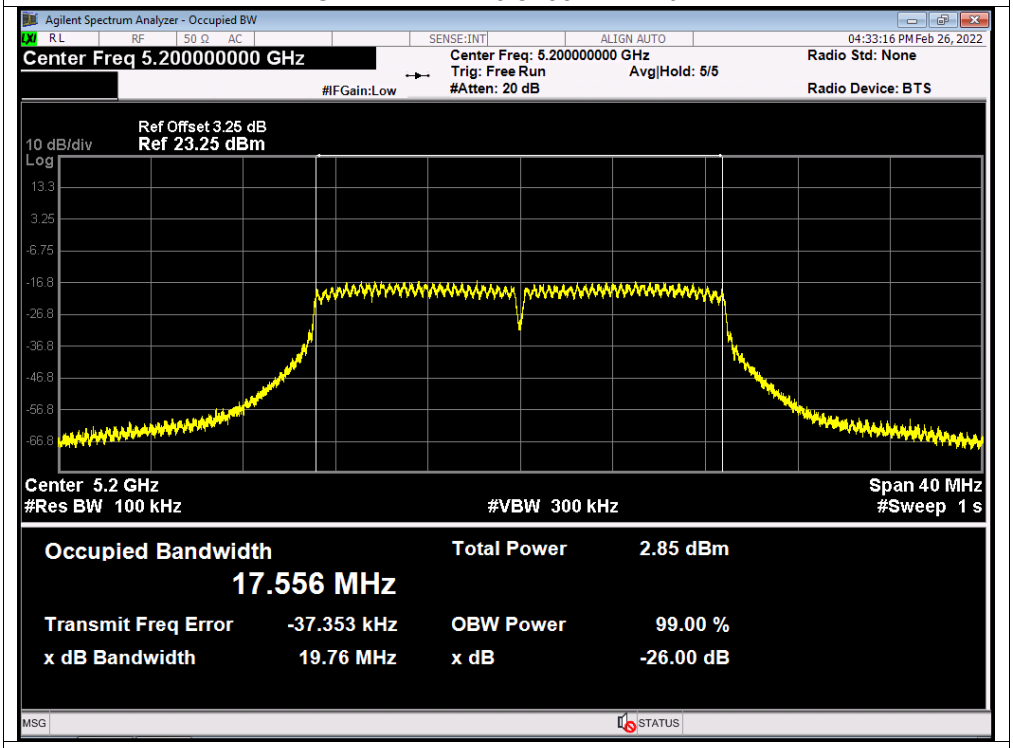
OBW NVNT a 5240MHz Ant A



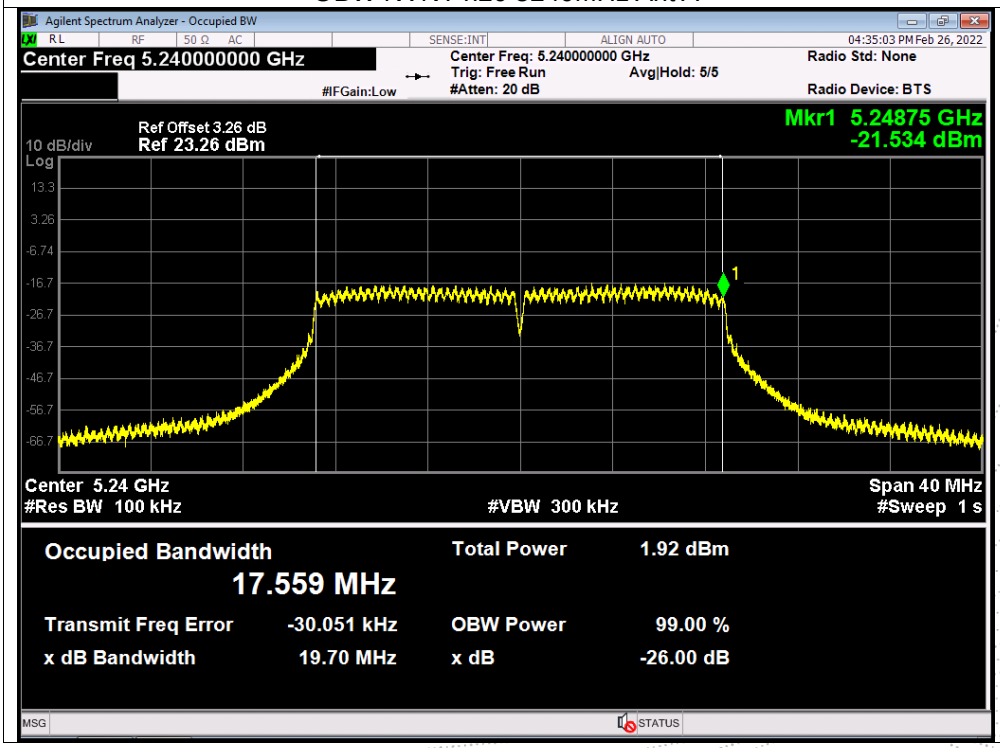
OBW NVNT n20 5180MHz Ant A



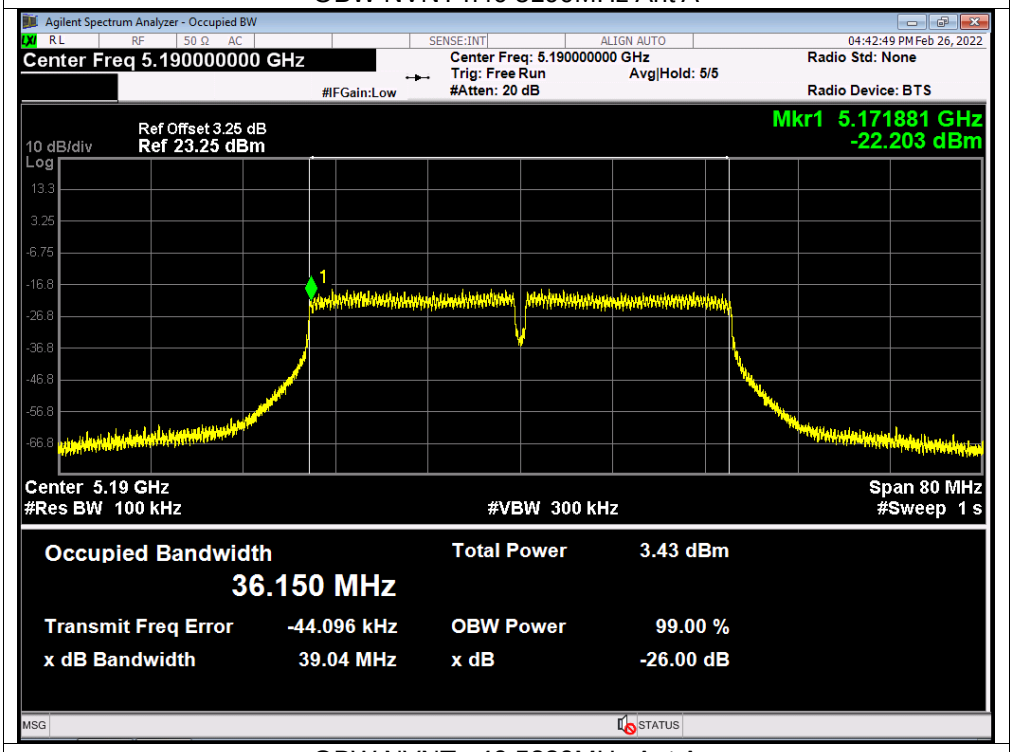
OBW NVNT n20 5200MHz Ant A



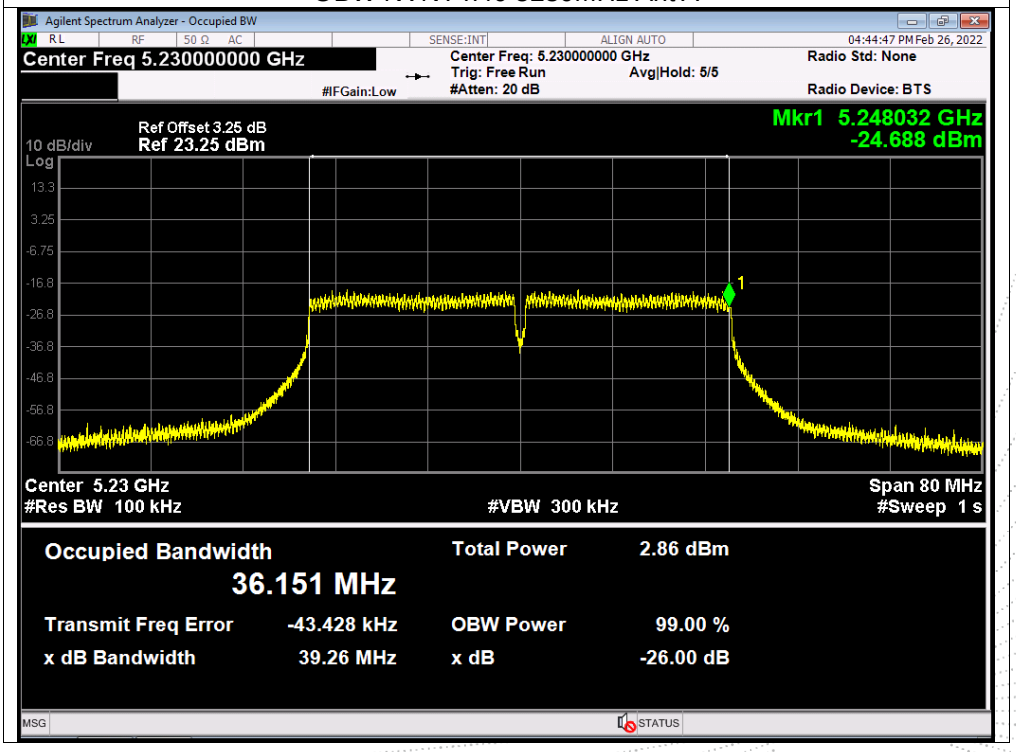
OBW NVNT n20 5240MHz Ant A



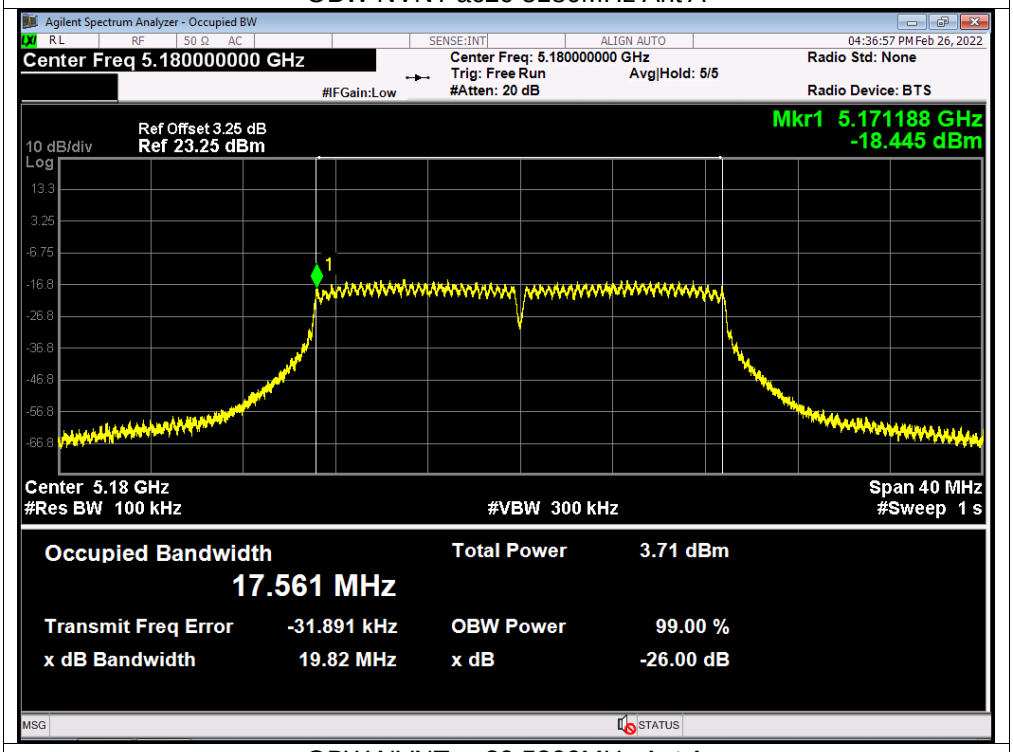
OBW NVNT n40 5190MHz Ant A



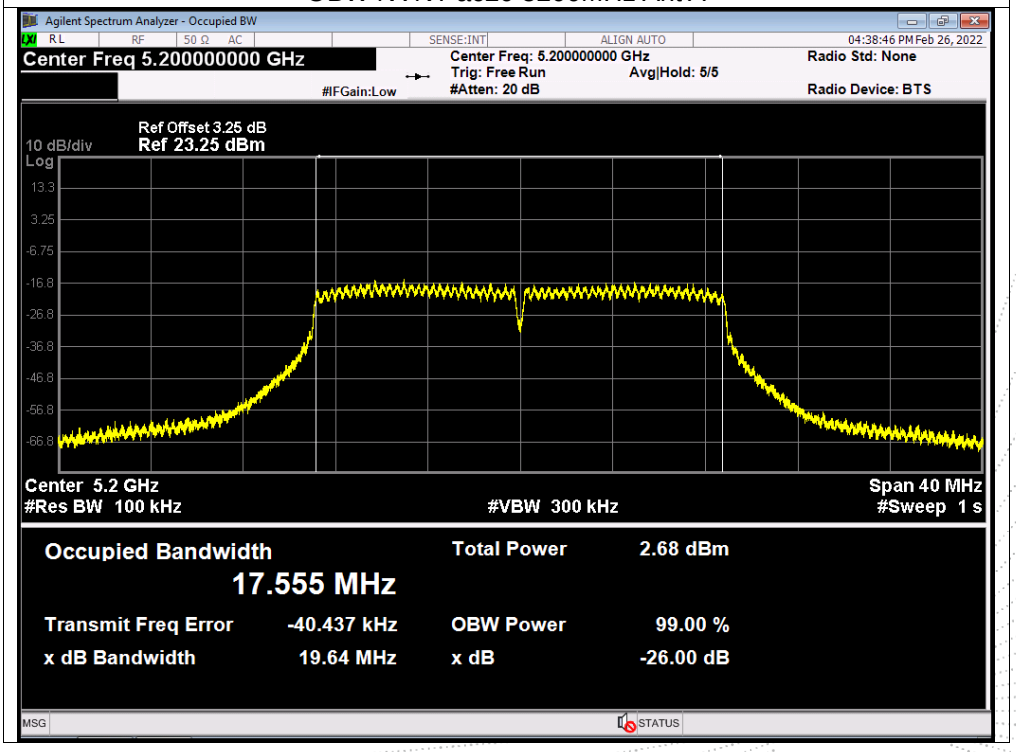
OBW NVNT n40 5230MHz Ant A



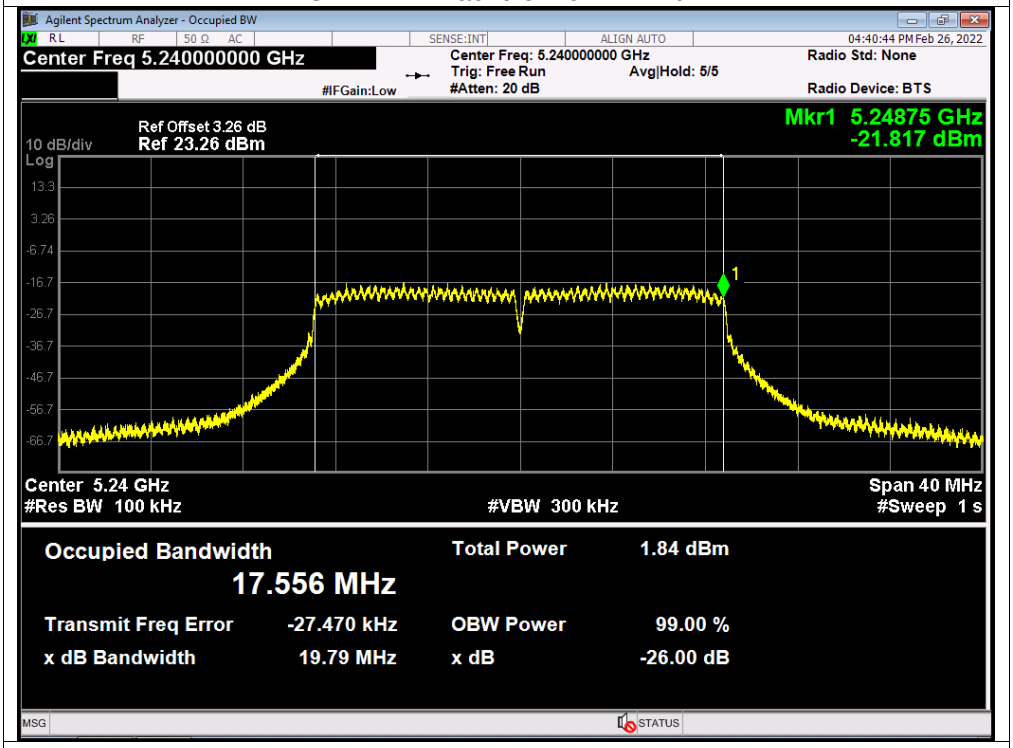
OBW NVNT ac20 5180MHz Ant A



OBW NVNT ac20 5200MHz Ant A



OBW NVNT ac20 5240MHz Ant A



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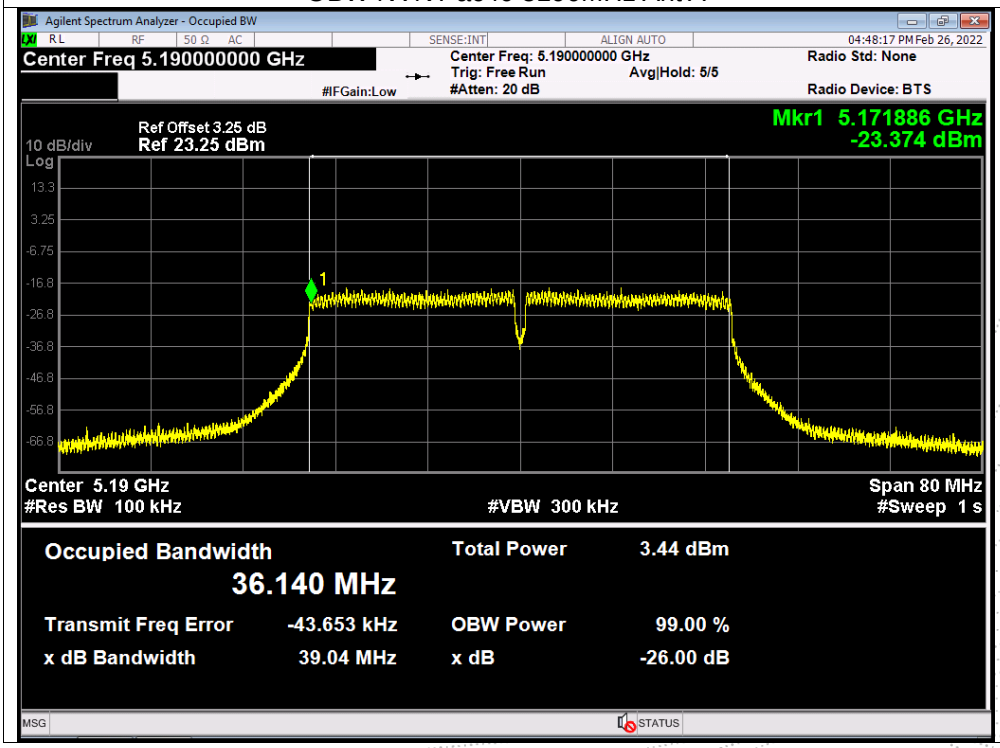

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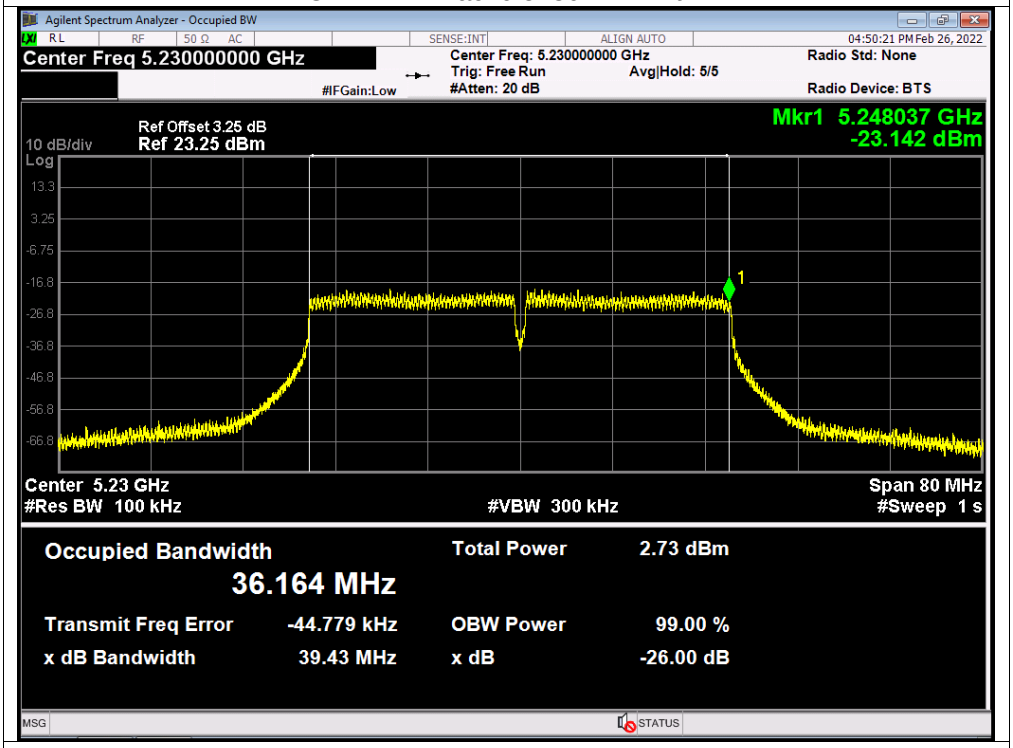
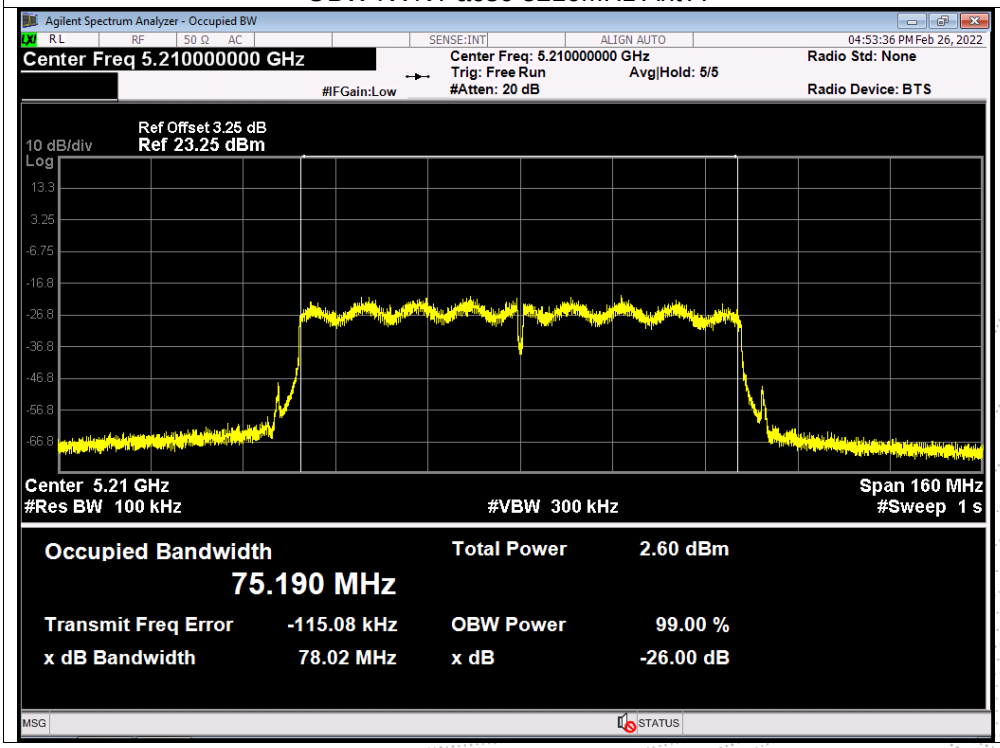
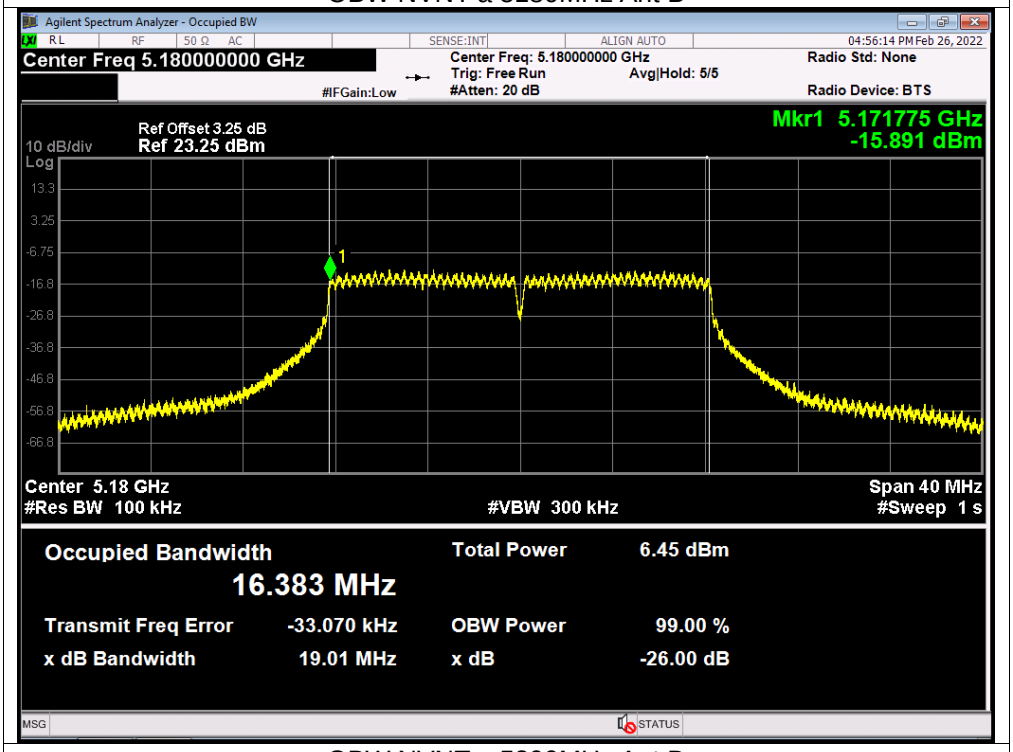


OBW NVNT ac80 5210MHz Ant A

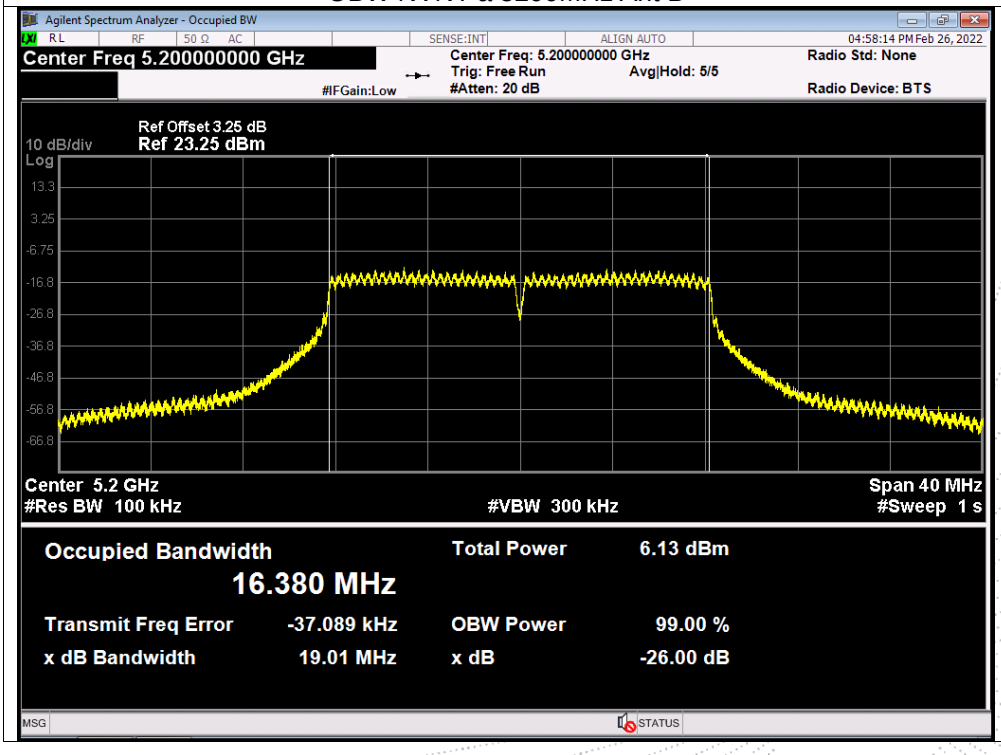


Test Graphs

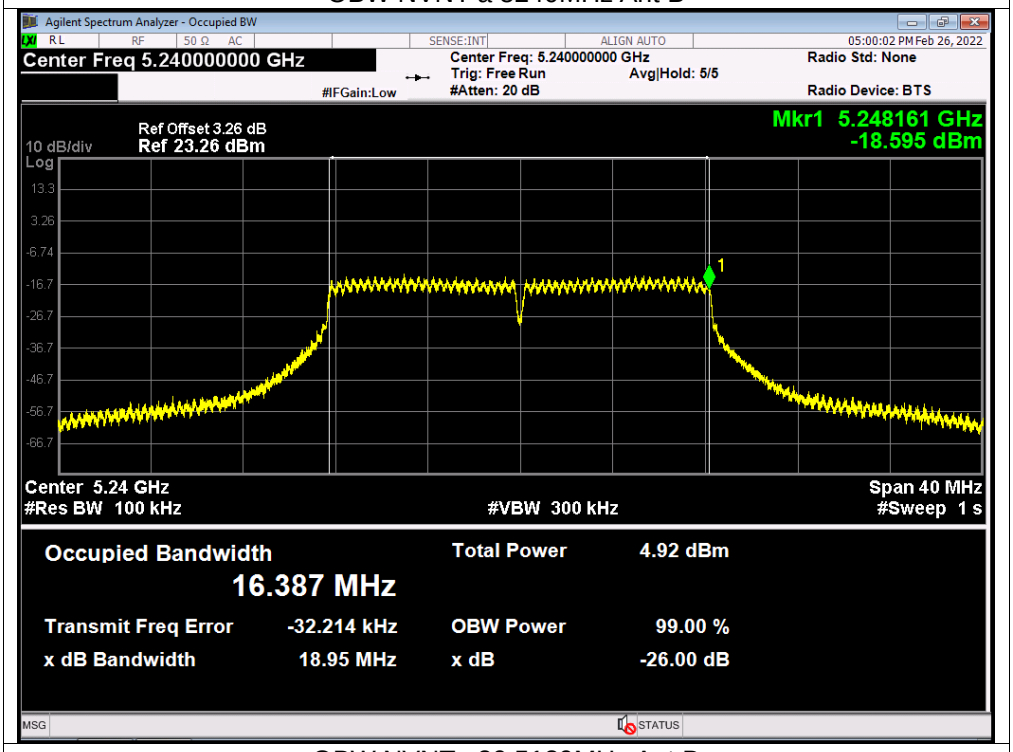
OBW NVNT a 5180MHz Ant B



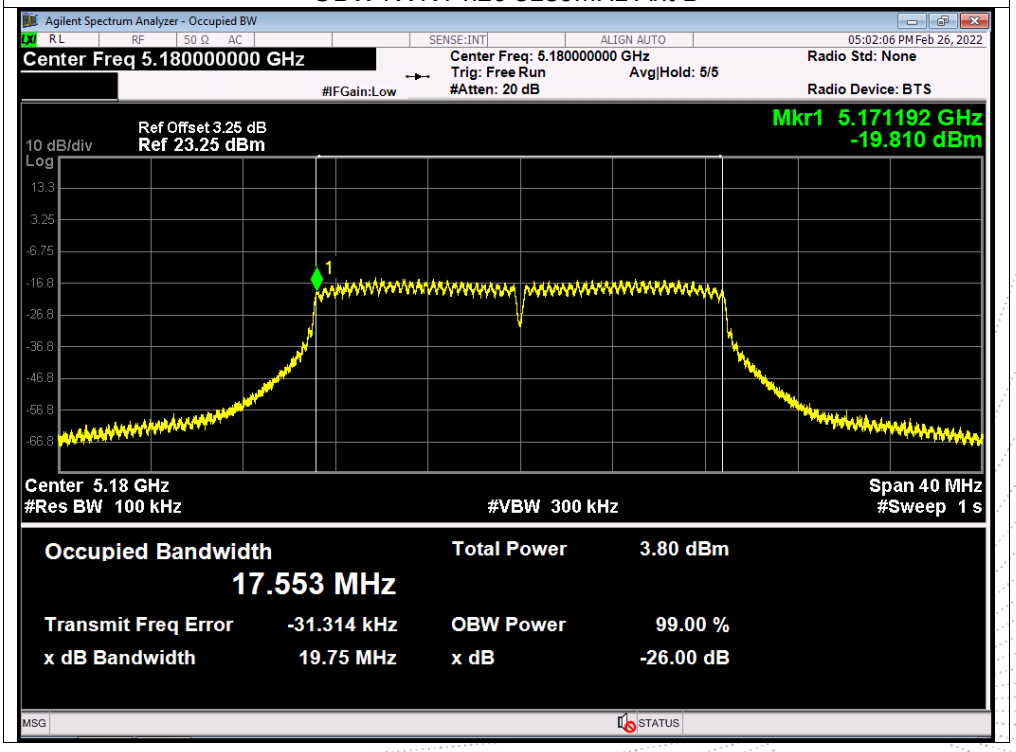
OBW NVNT a 5200MHz Ant B



OBW NVNT a 5240MHz Ant B



OBW NVNT n20 5180MHz Ant B



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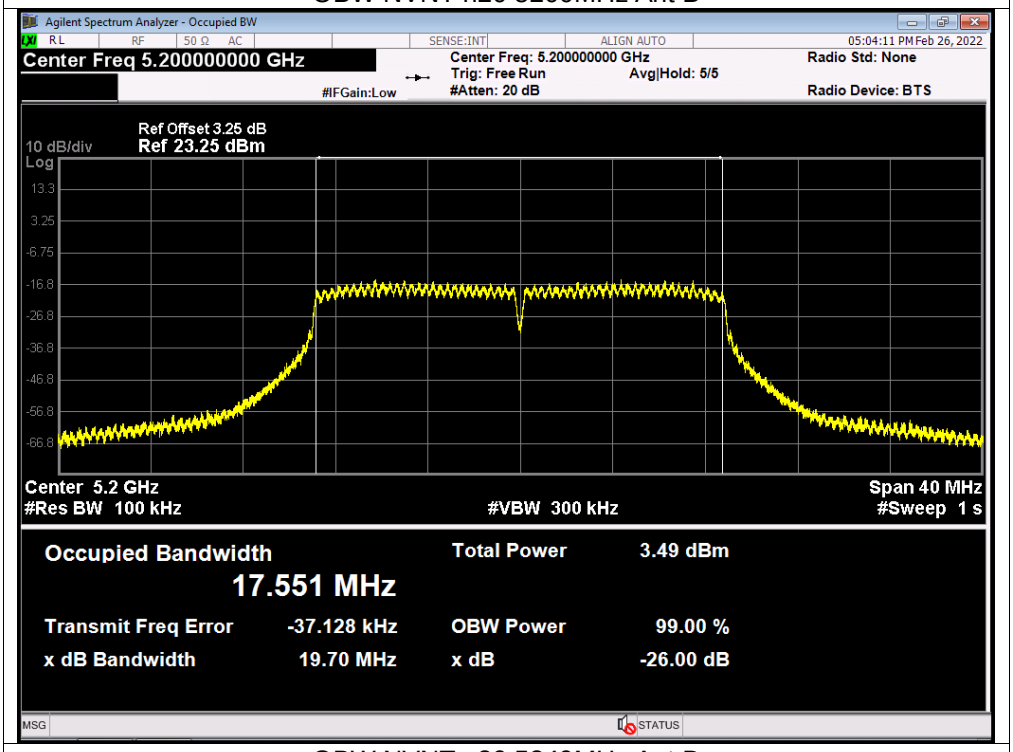

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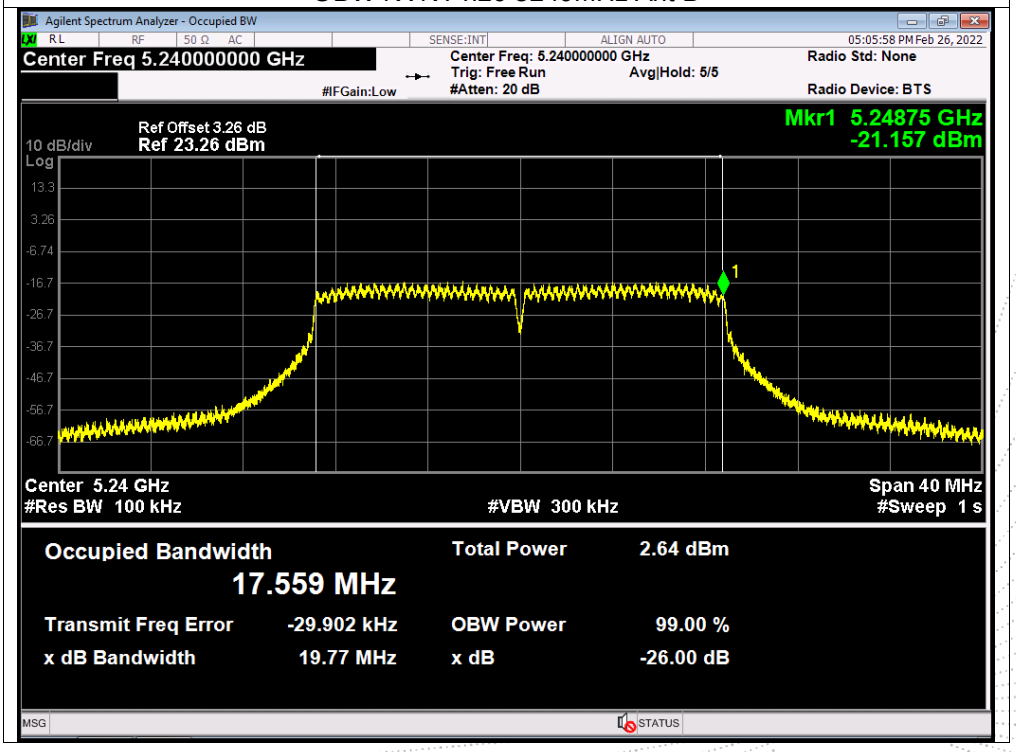
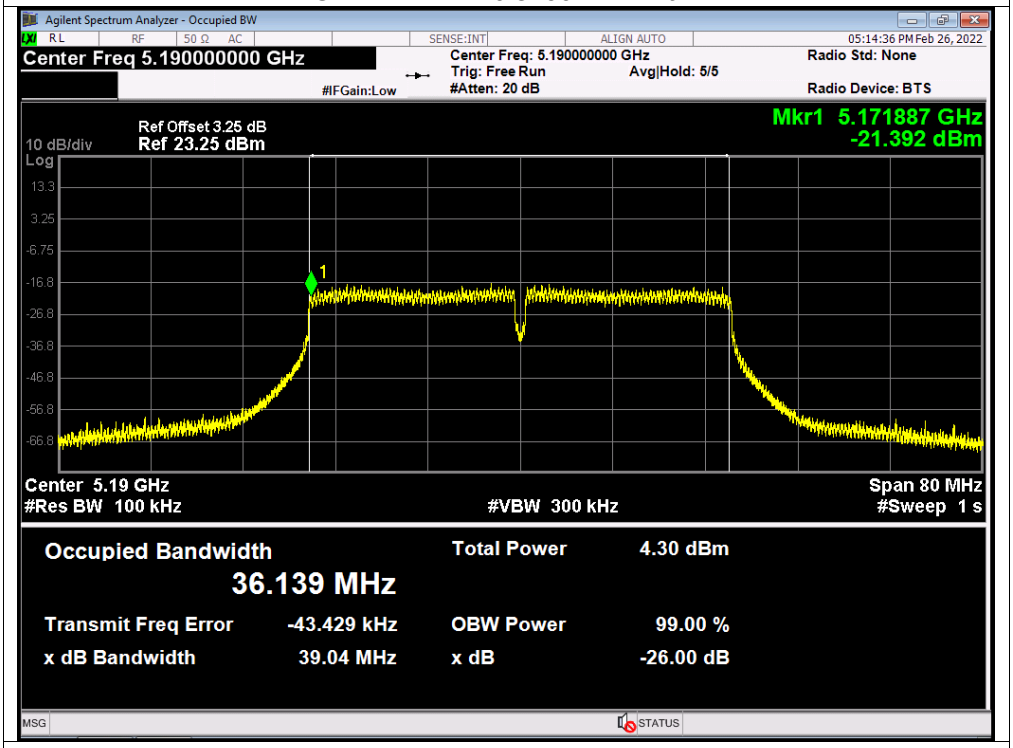
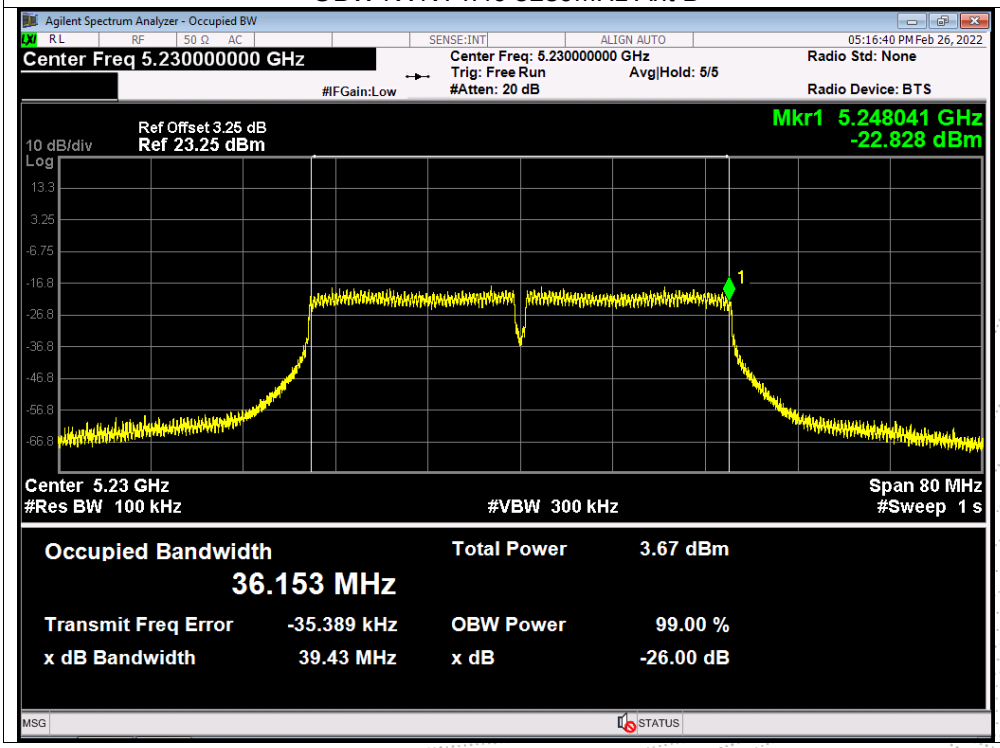


OBW NVNT n40 5190MHz Ant B



OBW NVNT n40 5230MHz Ant B



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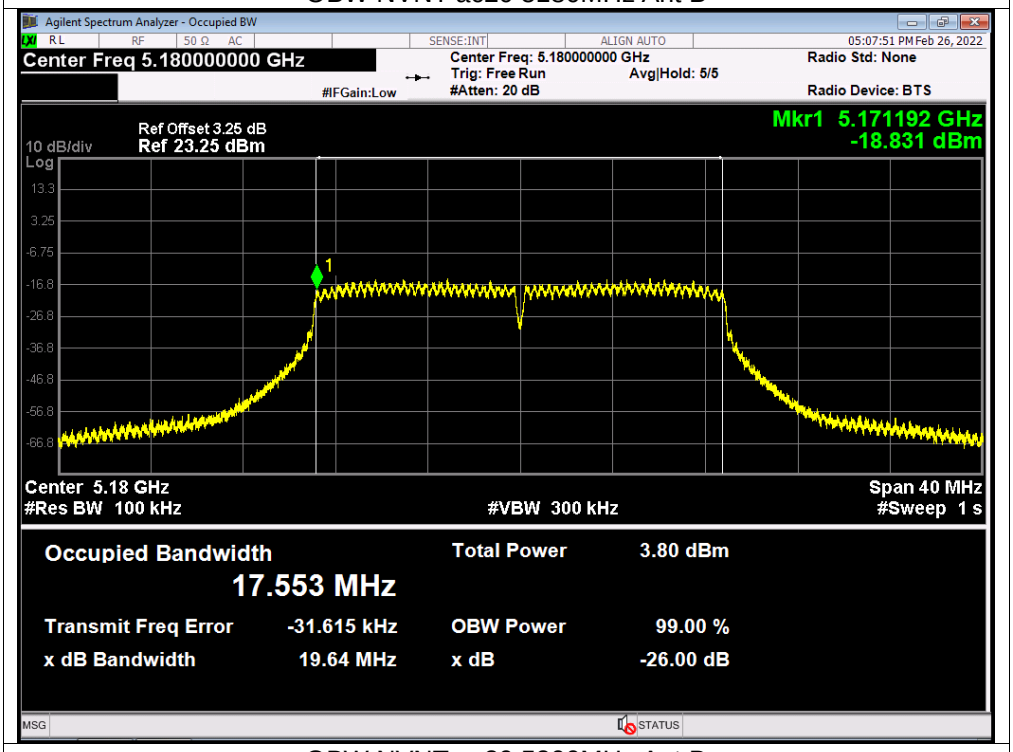

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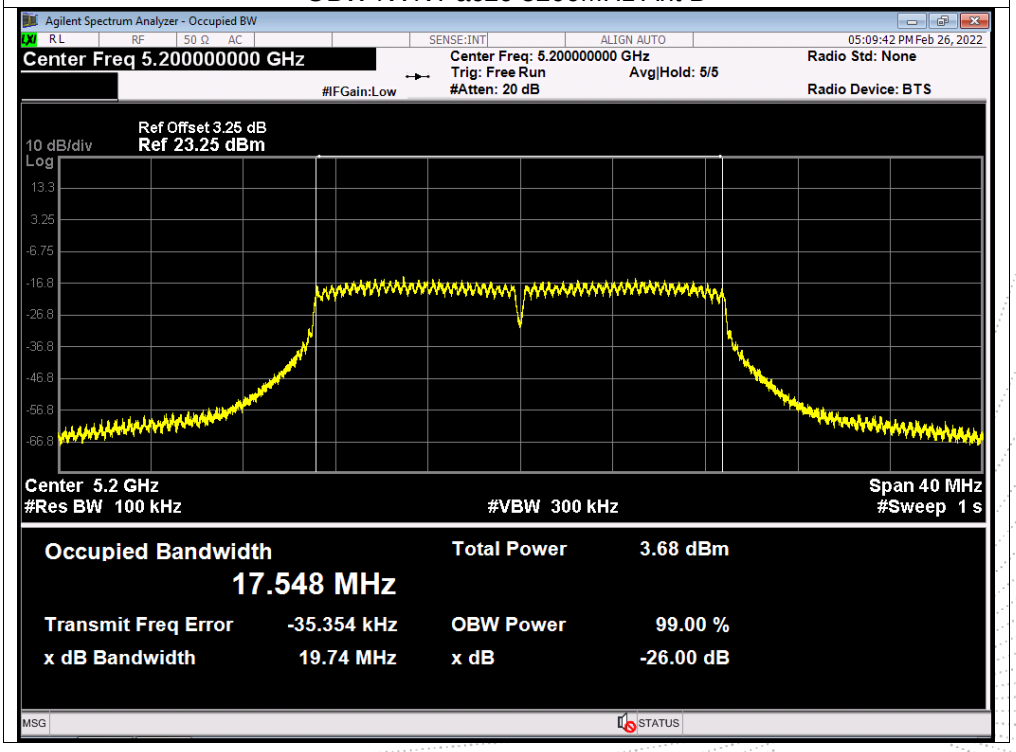
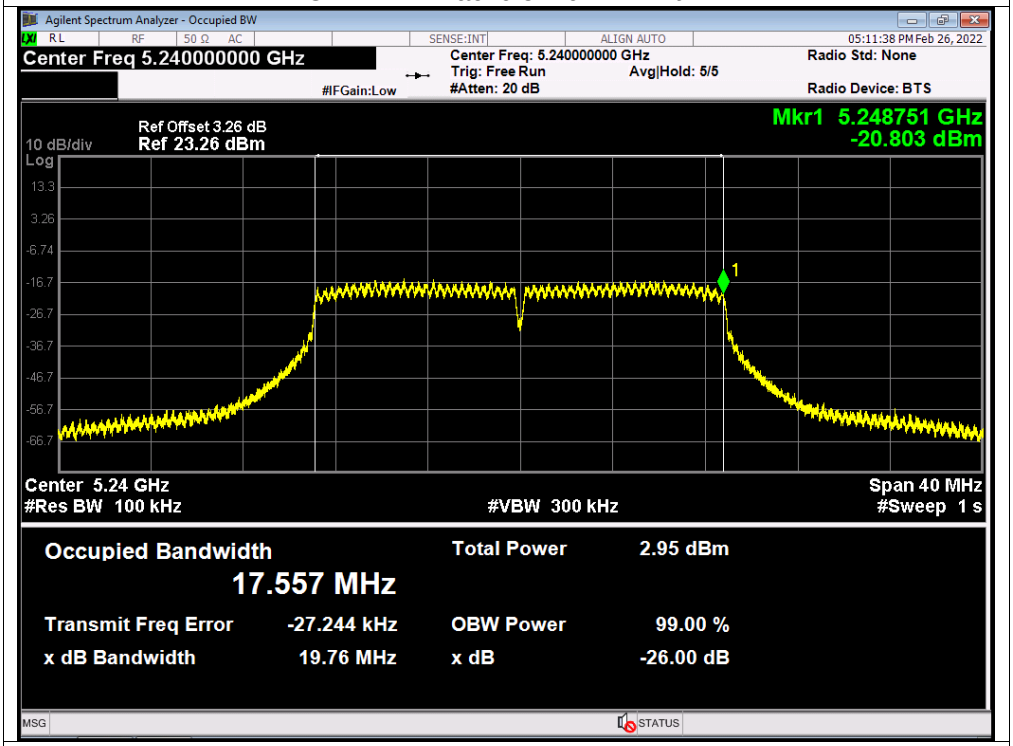


OBW NVNT ac20 5240MHz Ant B



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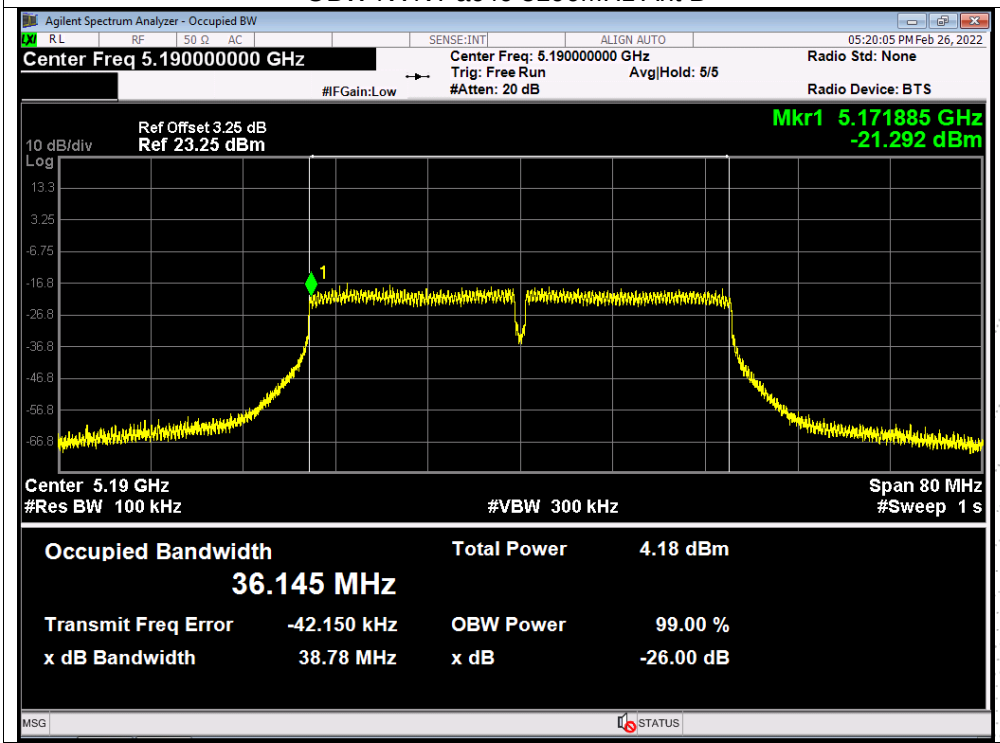

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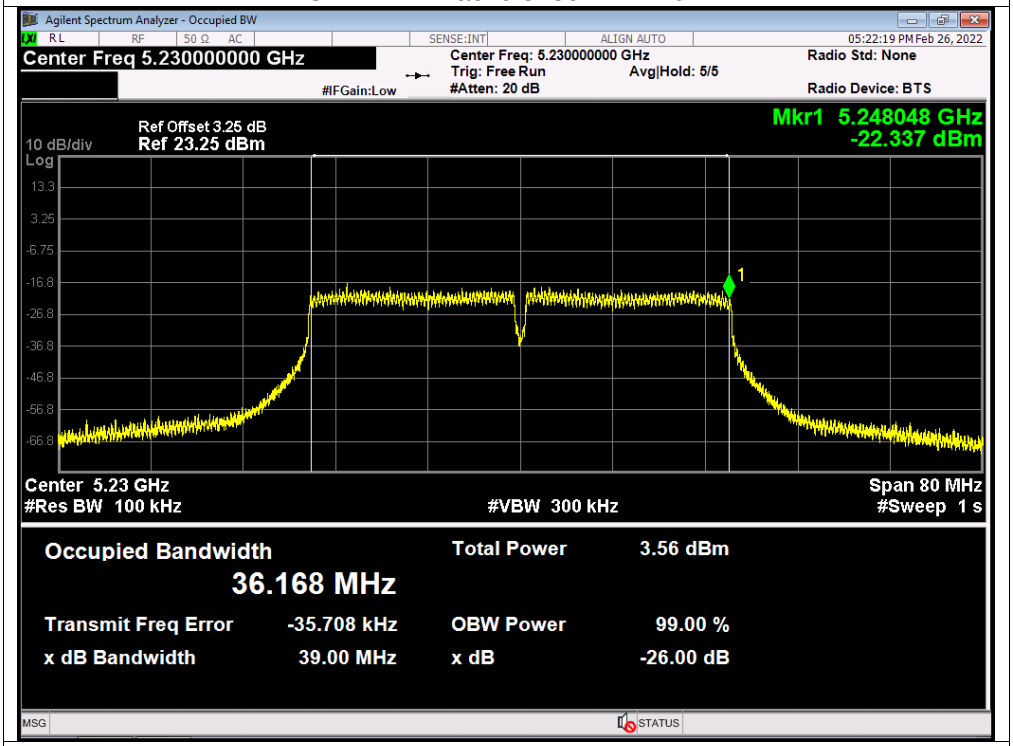
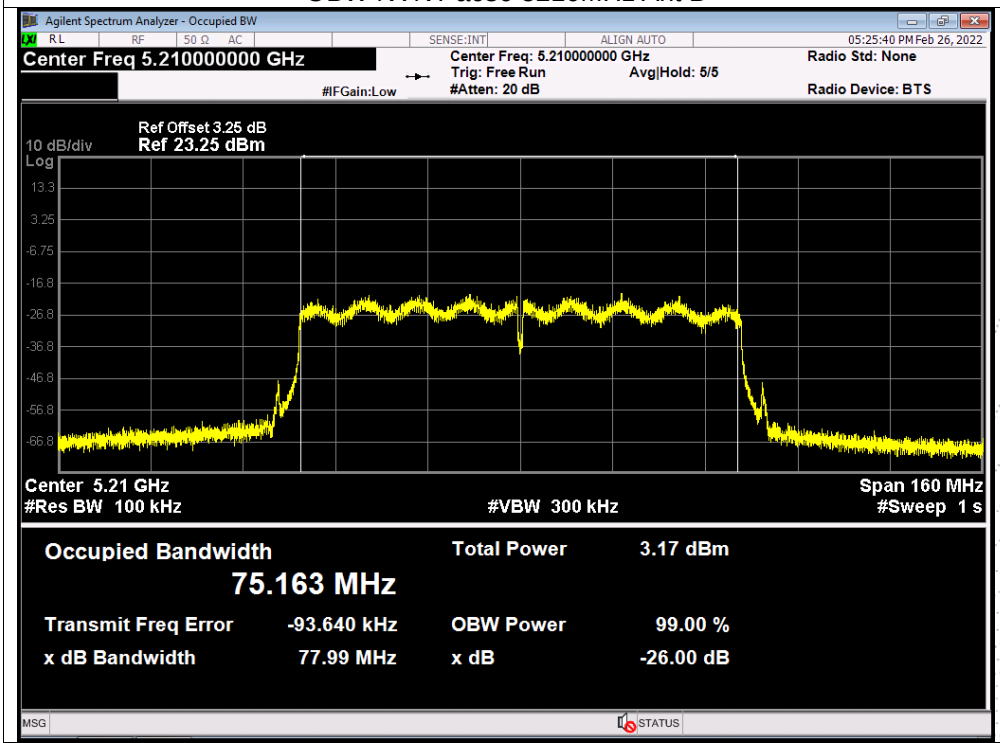
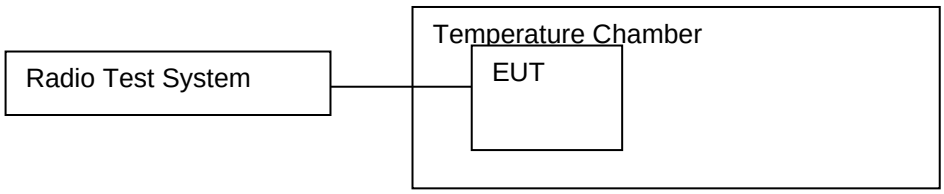


OBW NVNT ac80 5210MHz Ant B



9. RF Output Power, Transmit Power Control (TPC)

9.1 Block Diagram Of Test Setup



9.2 Limit

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)

NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.
NOTE 3: Slave devices without a *Radar Interference Detection* function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.

9.3 Test procedure

This option is for equipment that operates only in one sub-band or that is capable for operation in two sub-bands simultaneously but, for the purpose of the testing, the equipment can be configured to:

- operate in a continuous transmit mode or with a constant duty cycle (x), and
- operate only in one sub-band.

Step 1:

For equipment configured into a continuous transmit mode (x = 1), proceed immediately with step 2.

- The output power of the transmitter shall be coupled to a matched diode detector or equivalent thereof. The output of the diode detector shall be connected to the vertical channel of an oscilloscope.
- The combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the duty cycle of the transmitter output signal.
- The observed duty cycle of the transmitter (Tx on / (Tx on + Tx off)) shall be noted as x ($0 < x \leqslant 1$), and recorded in the test report.

Step 2:

- The RF output power shall be determined using a wideband RF power meter with a thermocouple detector or an equivalent thereof and with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be noted as A (in dBm).
- In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the output power of each transmit chain shall be measured separately to calculate the total power (value A in dBm) for the UUT.

Step 3:

- The RF output power at the highest power level PH (e.i.r.p.) shall be calculated from the above measured power output A (in dBm), the observed duty cycle x, the stated antenna gain G in dBi and if applicable the beamforming gain Y in dB, according to the formula below. This value shall be recorded in the test report.

If more than one antenna assembly is intended for this power setting or TPC range, the gain of the antenna assembly with the highest gain shall be used.
PH = A + G + Y + 10 × log (1 / x) (dBm). (5)

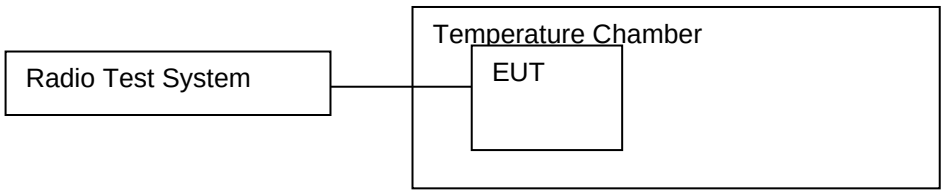
- This value PH shall be compared to the applicable limit contained in table 2 of clause 4.2.3.2.2.

9.4 Test Result

Modulation	Test conditions (Temperature)	Antenna	Low Channel		Middle Channel		High Channel	
			EIRP	Total EIRP	EIRP	Total EIRP	EIRP	Total EIRP
802.11a	Normal	A	5.39	/	4.65	/	4.4	/
		B	5.33	/	4.7	/	4.34	/
	Lower	A	5.32	/	4.32	/	4.22	/
		B	5.01	/	4.33	/	4.00	/
	Upper	A	5.30	/	3.97	/	3.84	/
		B	4.79	/	4.25	/	3.79	/
802.11n(HT 20)	Normal	A	2.13	5.46	1.54	4.86	1.3	4.71
		B	2.75		2.14		2.07	
	Lower	A	1.77	5.25	1.13	4.48	1.27	4.59
		B	2.66		1.78		1.87	
	Upper	A	1.65	5.00	1.00	4.25	0.92	4.22
		B	2.30		1.47		1.48	
802.11n(HT 40)	Normal	A	2.25	5.72	/	/	1.68	5.10
		B	3.12		/		2.47	
	Lower	A	2.20	5.63	/	/	1.24	4.71
		B	3.01		/		2.12	
	Upper	A	2.13	5.49	/	/	1.00	4.37
		B	2.80		/		1.69	
802.11ac(HT20)	Normal	A	2.77	**5.77**	1.66	5.06	1.34	4.85
		B	2.75		2.4		2.28	
	Lower	A	2.59	5.54	1.53	4.86	0.99	4.53
		B	2.47		2.14		1.99	
	Upper	A	2.46	5.38	1.39	4.58	0.88	4.23
		B	2.28		1.75		1.54	
802.11ac(HT40)	Normal	A	2.19	5.59	/	/	1.65	5.07
		B	2.93		/		2.44	
	Lower	A	2.11	5.49	/	/	1.47	4.76
		B	2.82		/		2.01	
	Upper	A	2.06	5.25	/	/	1.25	4.47
		B	2.42		/		1.66	
802.11ac(HT80)	Normal	A	/	/	1.61	4.91	/	/
		B	/		2.18		/	
	Lower	A	/	/	1.32	4.75	/	/
		B	/		2.12		/	
	Upper	A	/	/	1.07	4.60	/	/
		B	/		2.06		/	
Limit			≤100mW (20dBm)					
Remark: P = A + G + Y,G=Antenna Gain, x=100%								

10. Power Spectral Density

10.1 Block Diagram Of Test Setup



10.2 Limit

Frequency range (MHz)	Mean e.i.r.p. limit for P_H (dBm)		Mean e.i.r.p. density limit (dBm/MHz)	
	with TPC	without TPC	with TPC	without TPC
5 150 to 5 350	23	20/23 (see note 1)	10	7/10 (see note 2)
5 470 to 5 725	30 (see note 3)	27 (see note 3)	17 (see note 3)	14 (see note 3)
NOTE 1: The applicable limit is 20 dBm, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 23 dBm.				
NOTE 2: The applicable limit is 7 dBm/MHz, except for transmissions whose nominal bandwidth falls completely within the band 5 150 MHz to 5 250 MHz, in which case the applicable limit is 10 dBm/MHz.				
NOTE 3: Slave devices without a *Radar Interference Detection* function shall comply with the limits for the frequency range 5 250 MHz to 5 350 MHz.				

10.3 Test procedure

This option is for equipment that can be configured to operate in a continuous transmit mode or with a constant duty cycle (x).

Step 1:

- Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test
- RBW: 1 MHz
- VBW: 3 MHz
- Frequency Span: 2 × Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel)
- Detector Mode: Peak
- Trace Mode: Max Hold

Step 2:

- When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

- Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: Equal to the frequency recorded in step 2
- Frequency Span: 3 MHz
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep Time: 1 minute
- Detector Mode: RMS
- Trace Mode: Max Hold

Step 4:

- When the trace is complete, the trace shall be captured using the "Hold" or "View" option on the spectrum analyser.

• Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as the highest mean power (Power Density) D in a 1 MHz band.

• Alternatively, where a spectrum analyser is equipped with a function to measure spectral Power Density, this function may be used to display the Power Density D in dBm / MHz.

• In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the Power Density of each transmit chain shall be measured separately to calculate the total Power Density (value D in dBm / MHz) for the UUT.

Step 5:

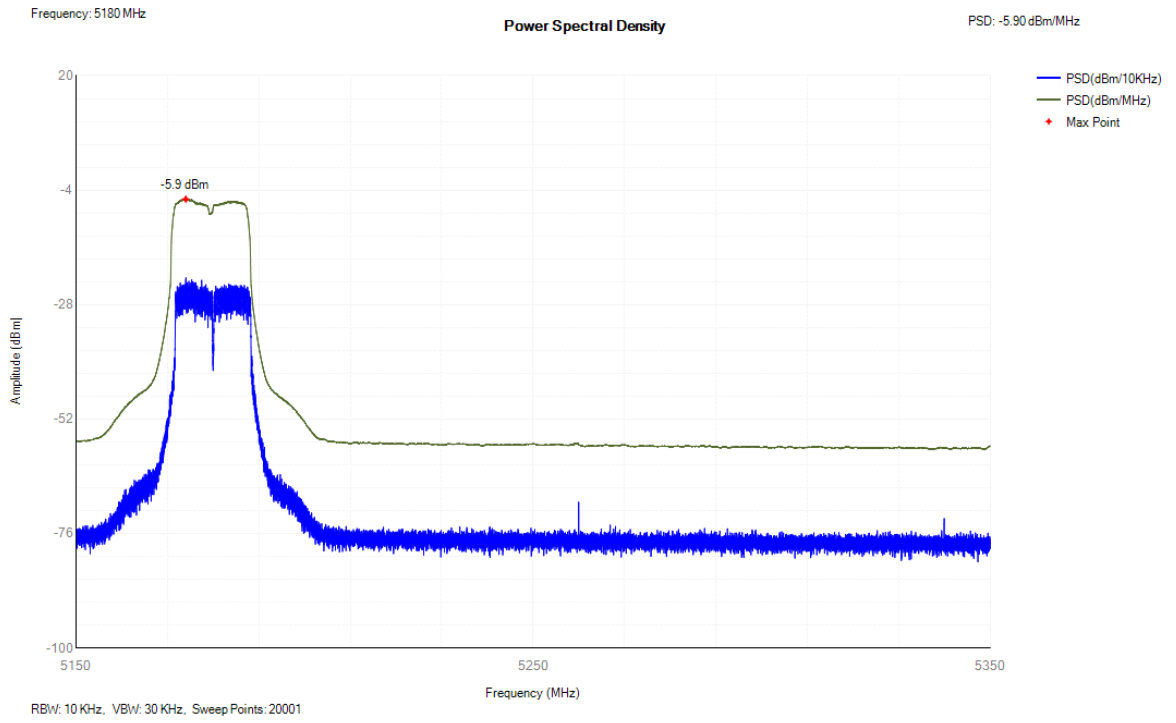
• The maximum spectral Power Density e.i.r.p. is calculated from the above measured Power Density D, the observed duty cycle x (see clause 5.4.4.2.1.1.2, step 1), the applicable antenna assembly gain G in dBi and if applicable the beamforming gain Y in dB, according to the formula below. This value shall be recorded in the test report. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used:

PD = D + G + Y + 10 × log (1 / x) (dBm / MHz) (14)

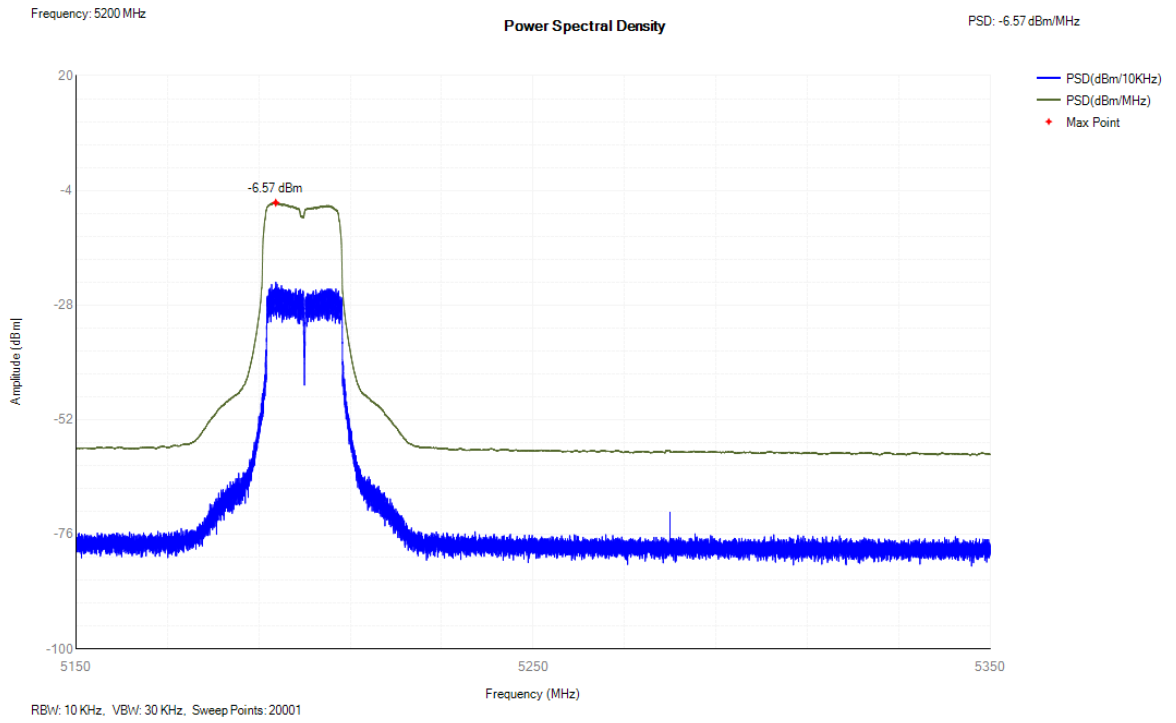
10.4 Test Result

Modulation	Test conditions (Temperature)	Antenna	Maximum e.i.r.p. Spectral Density (dBm/MHz)					
			Low Channel		Middle Channel		High Channel	
			/	Total	/	Total	/	Total
802.11a HT20	Normal	A	-5.9	/	-6.57	/	-6.79	/
		B	-6.06	/	-6.65	/	-7.08	/
802.11n HT20	Normal	A	-9.57	-6.17	-9.89	-6.63	-10.22	-6.92
		B	-8.82		-9.4		-9.65	
802.11n HT40	Normal	A	-12.39	-8.98	/	/	-13.07	-9.65
		B	-11.63		/		-12.29	
802.11ac HT20	Normal	A	-8.85	-5.86	-9.72	-6.38	-10.3	-6.79
		B	-8.89		-9.08		-9.36	
802.11ac HT40	Normal	A	-12.61	-9.20	/	/	-13.15	-9.75
		B	-11.85		/		-12.4	
802.11ac HT80	Normal	A	/	/	-14.66	-11.36	/	/
		B	/		-14.09		/	
Limit			≤10dBm/MHz					

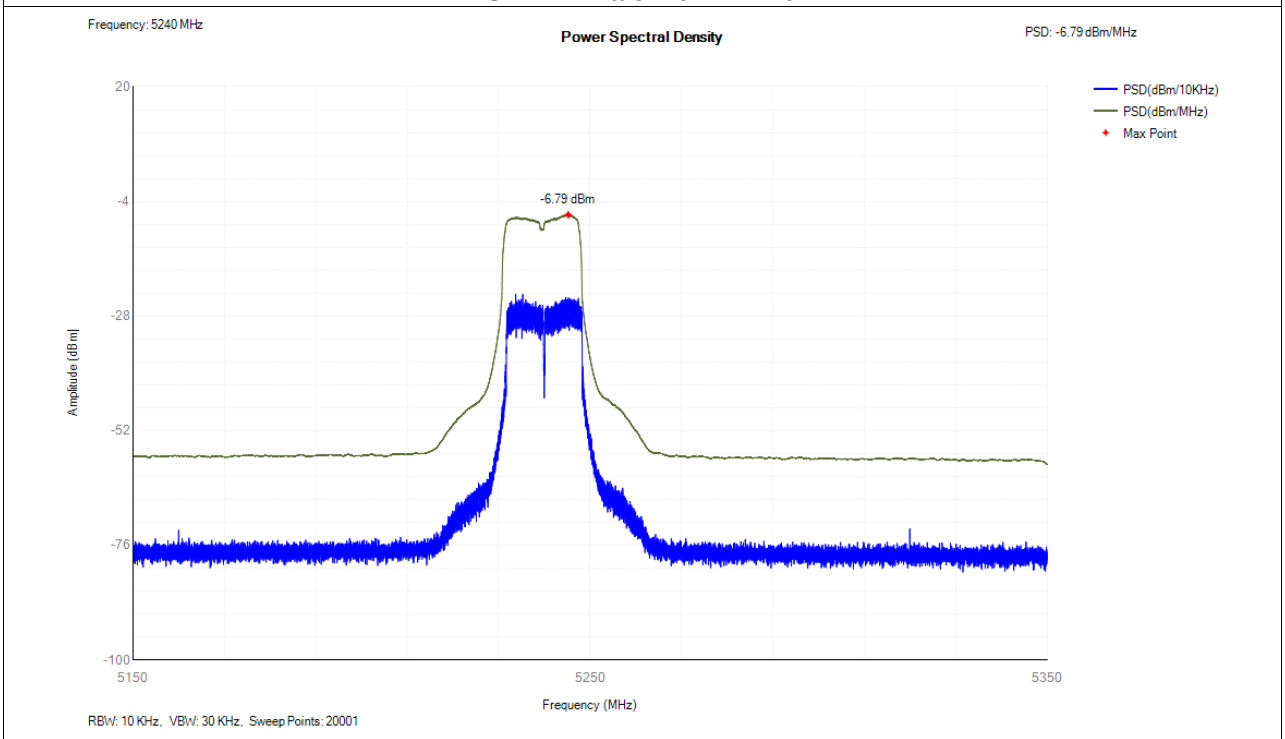
Test Graphs
PSD NVNT a 5180MHz Ant A



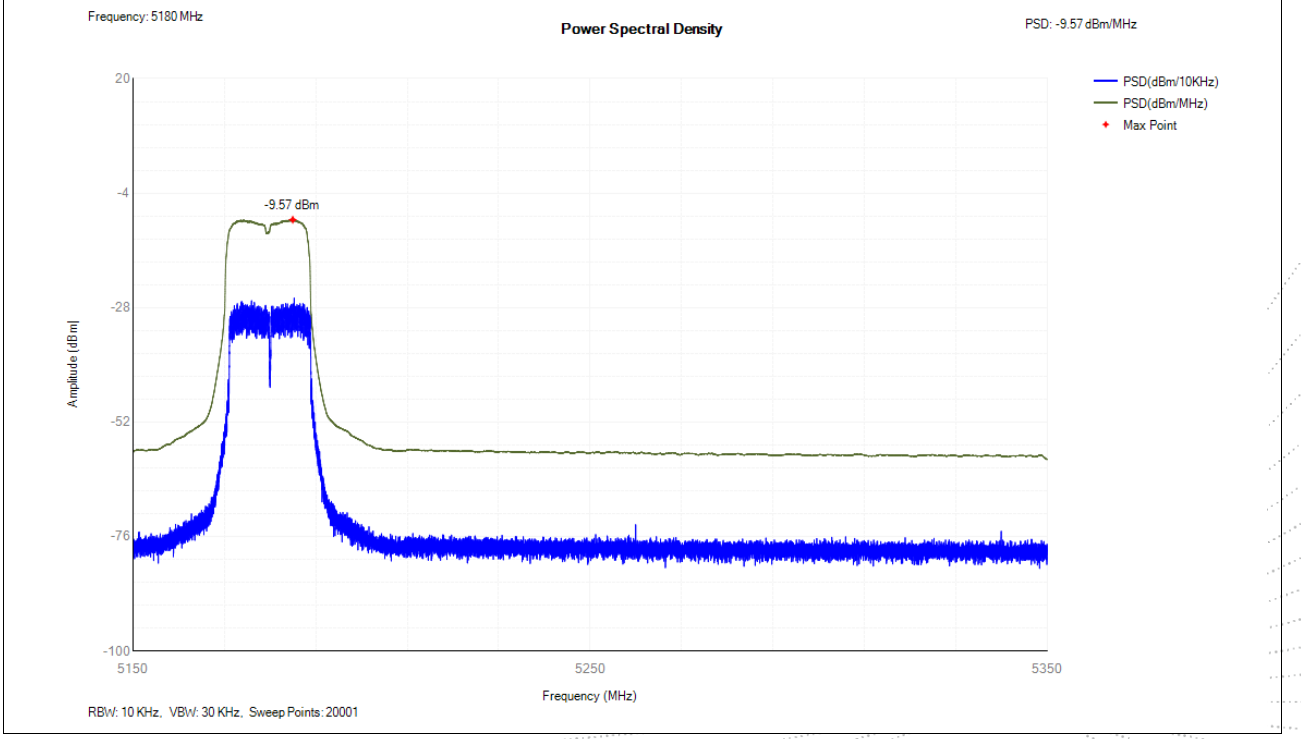
PSD NVNT a 5200MHz Ant A



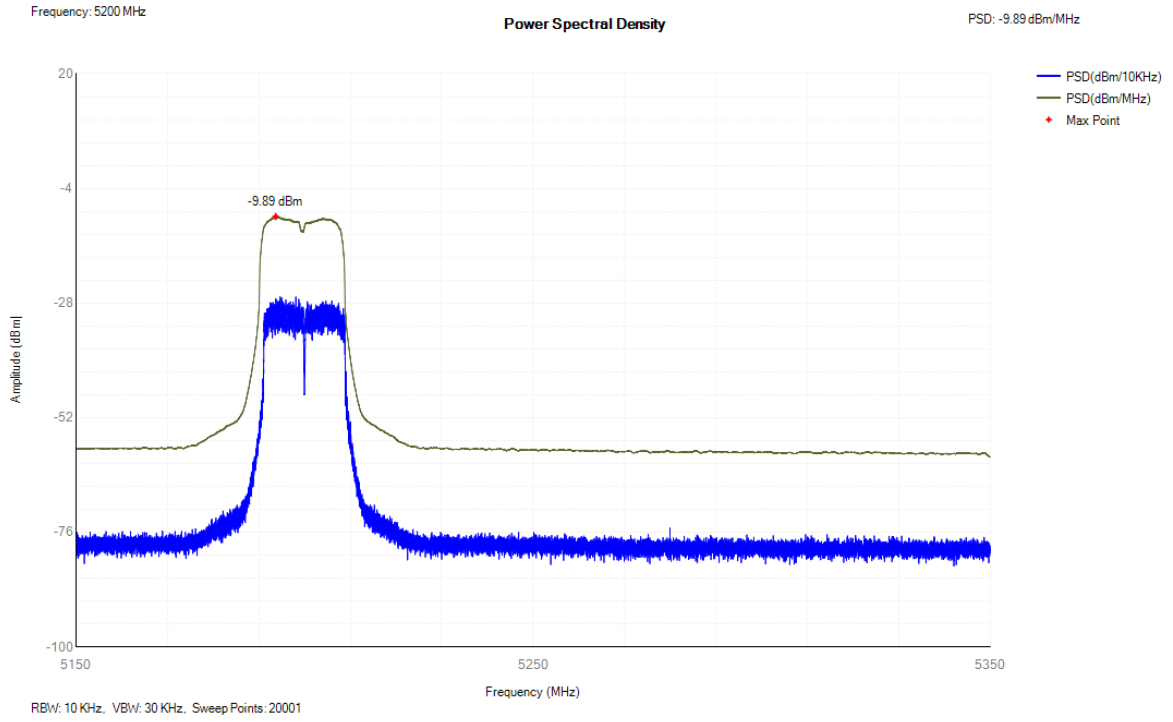
PSD NVNT a 5240MHz Ant A



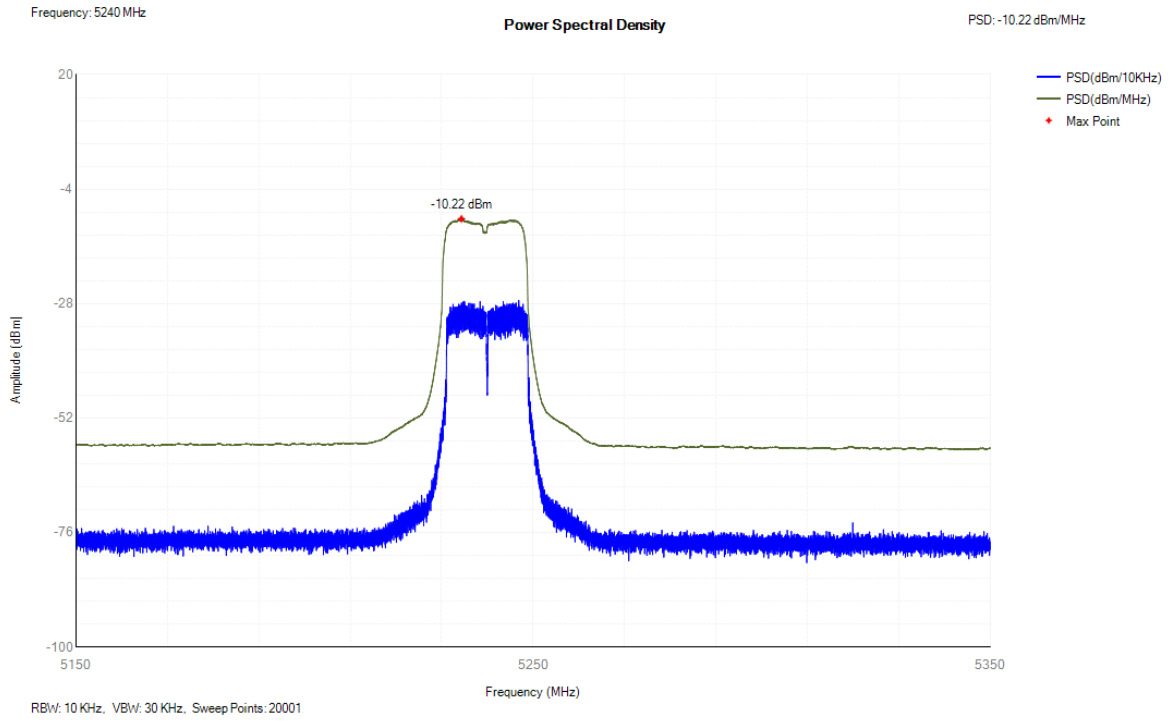
PSD NVNT n20 5180MHz Ant A



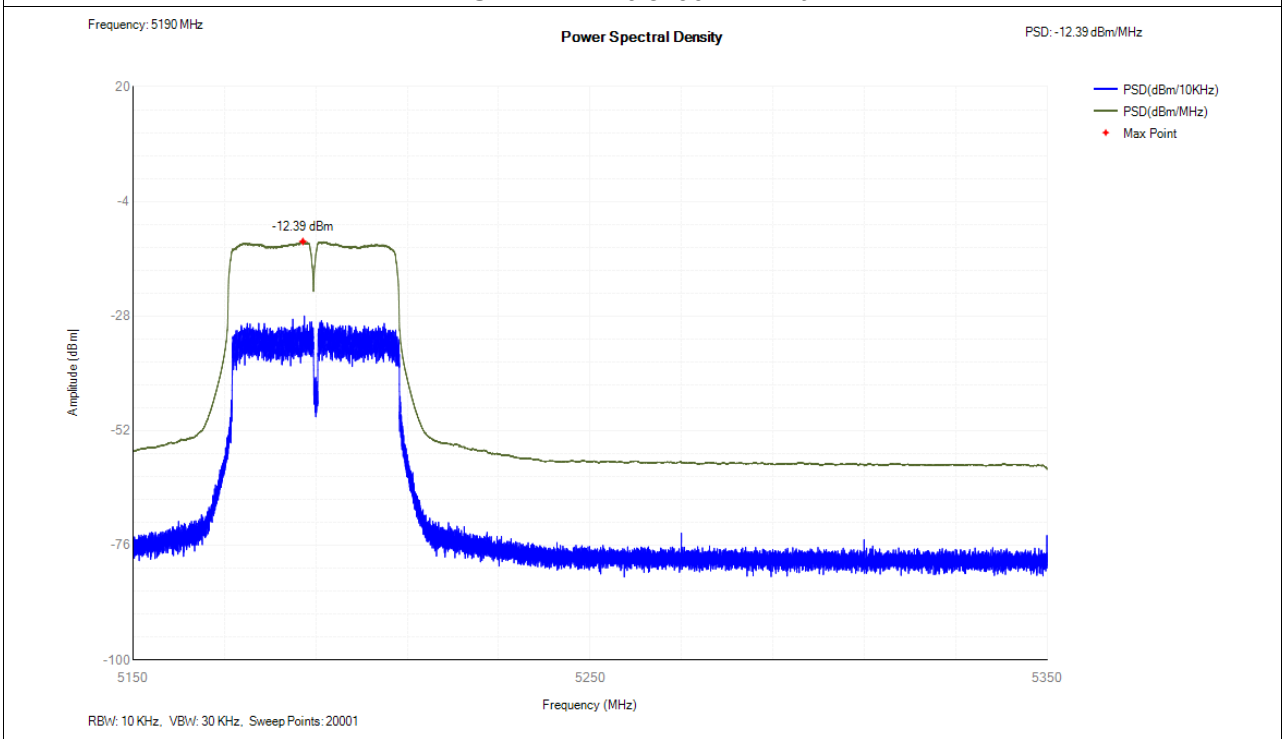
PSD NVNT n20 5200MHz Ant A



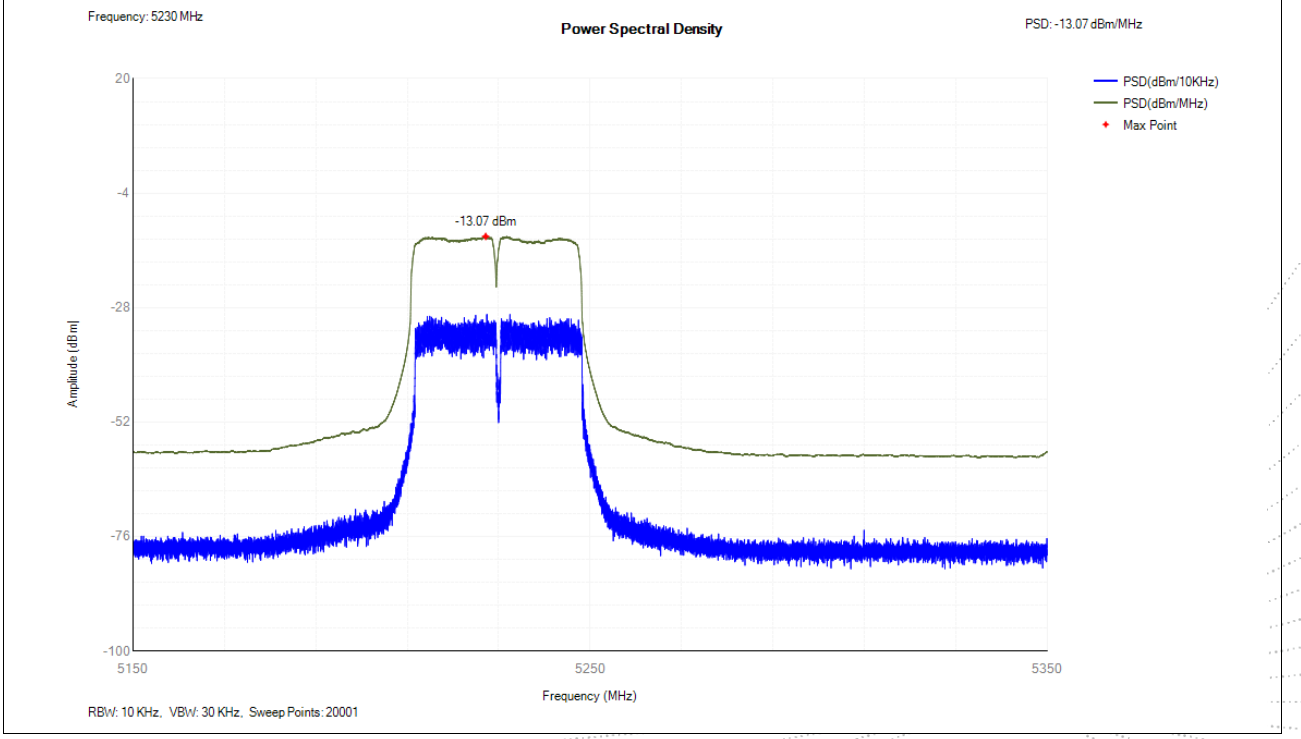
PSD NVNT n20 5240MHz Ant A



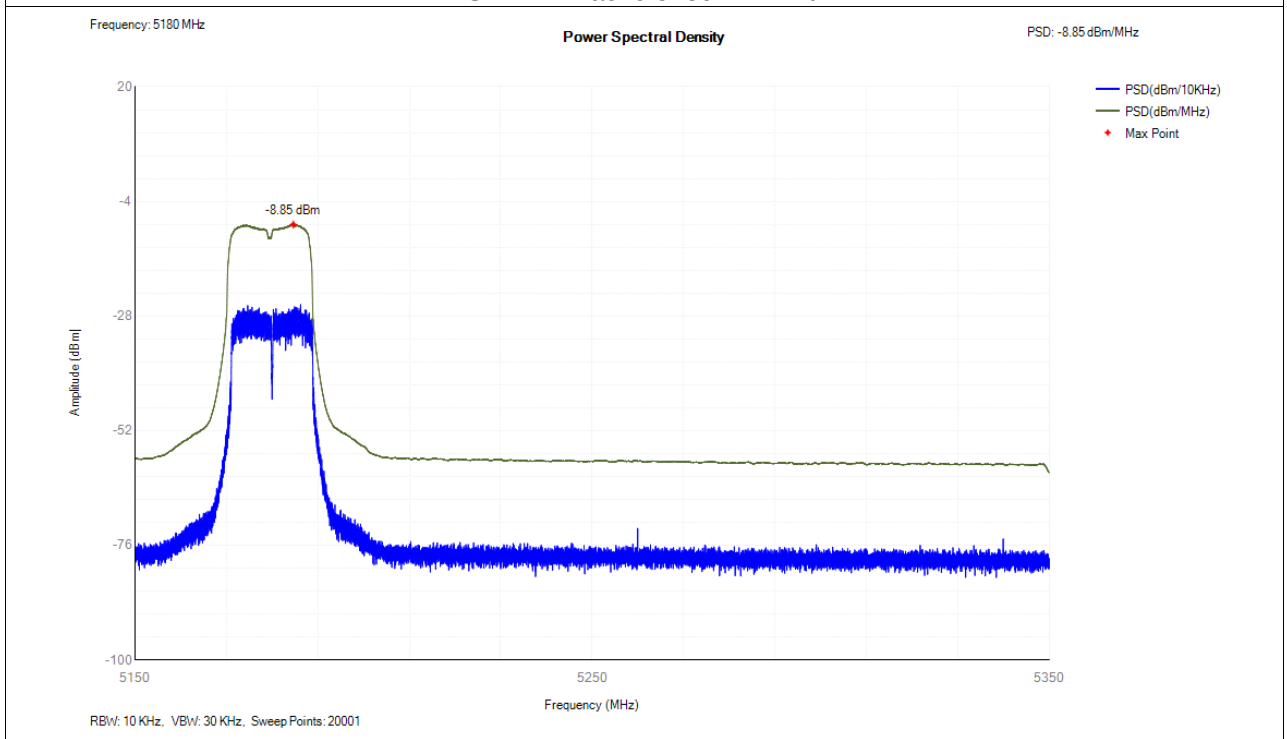
PSD NVNT n40 5190MHz Ant A



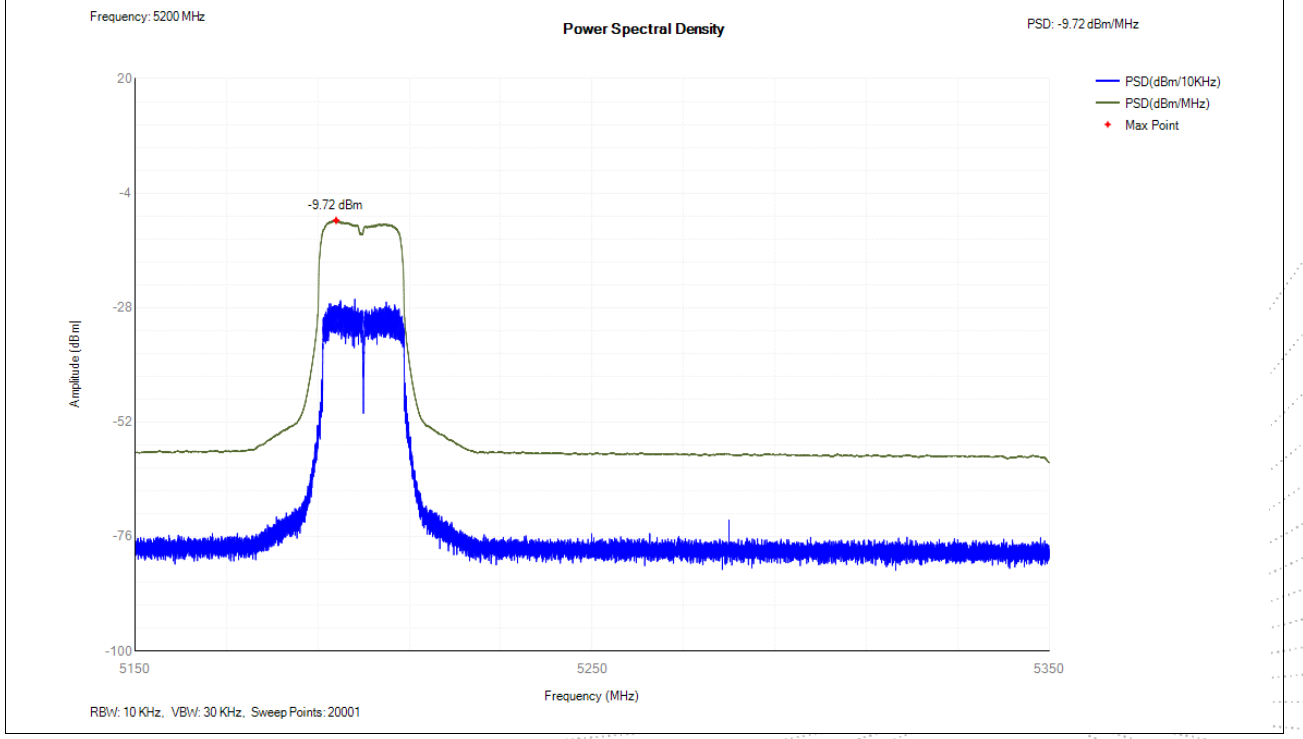
PSD NVNT n40 5230MHz Ant A



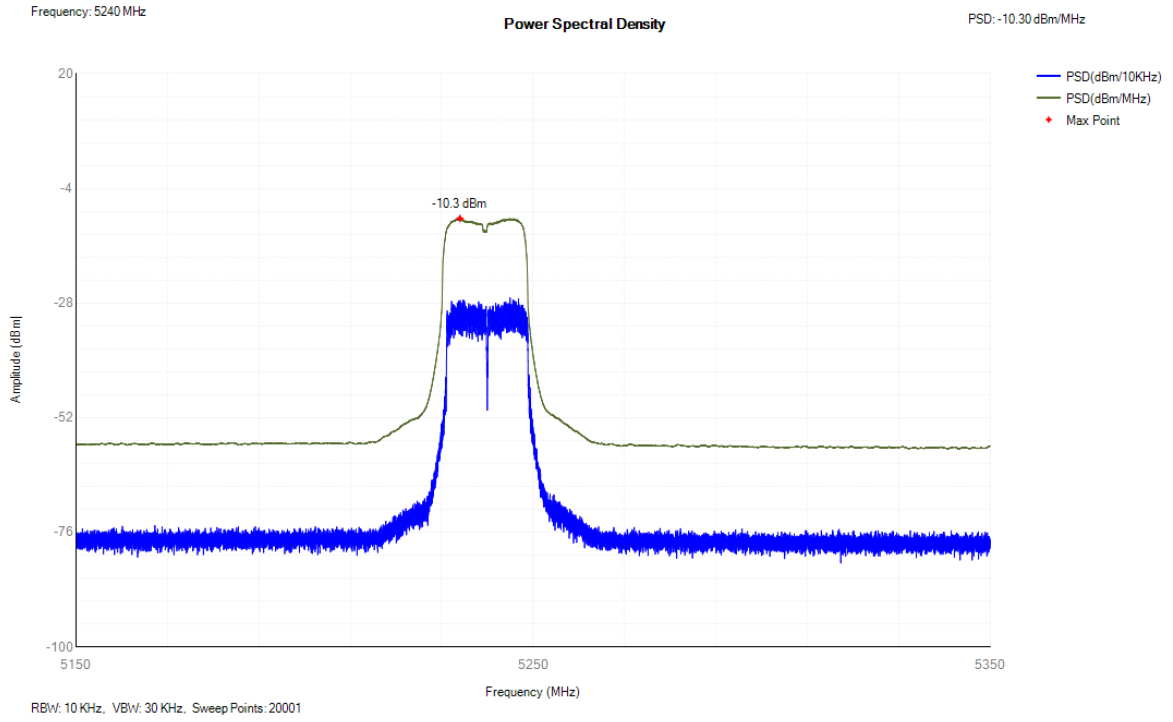
PSD NVNT ac20 5180MHz Ant A



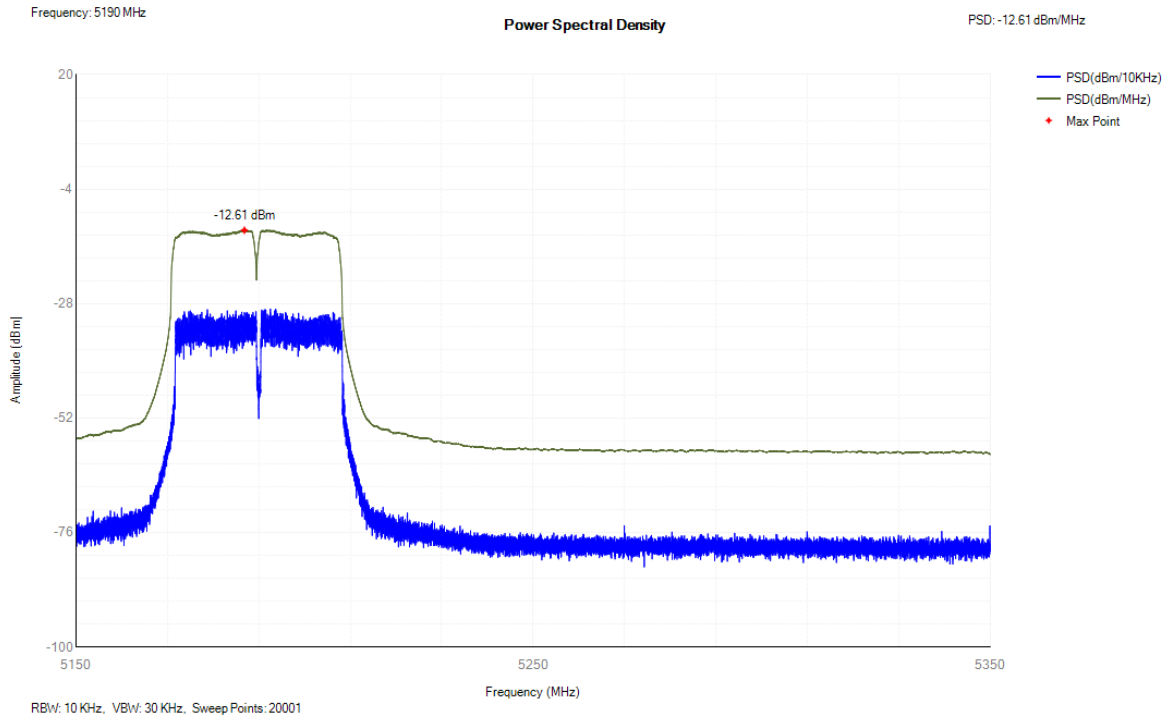
PSD NVNT ac20 5200MHz Ant A



PSD NVNT ac20 5240MHz Ant A



PSD NVNT ac40 5190MHz Ant A



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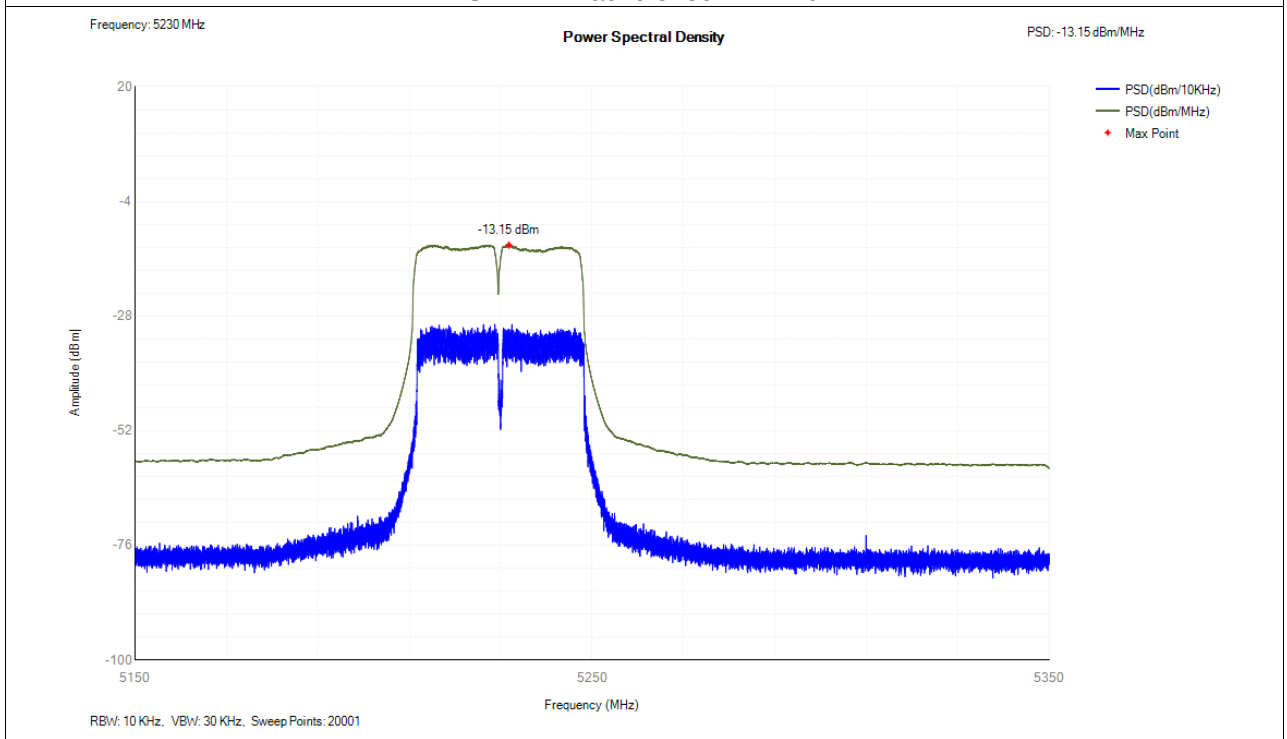
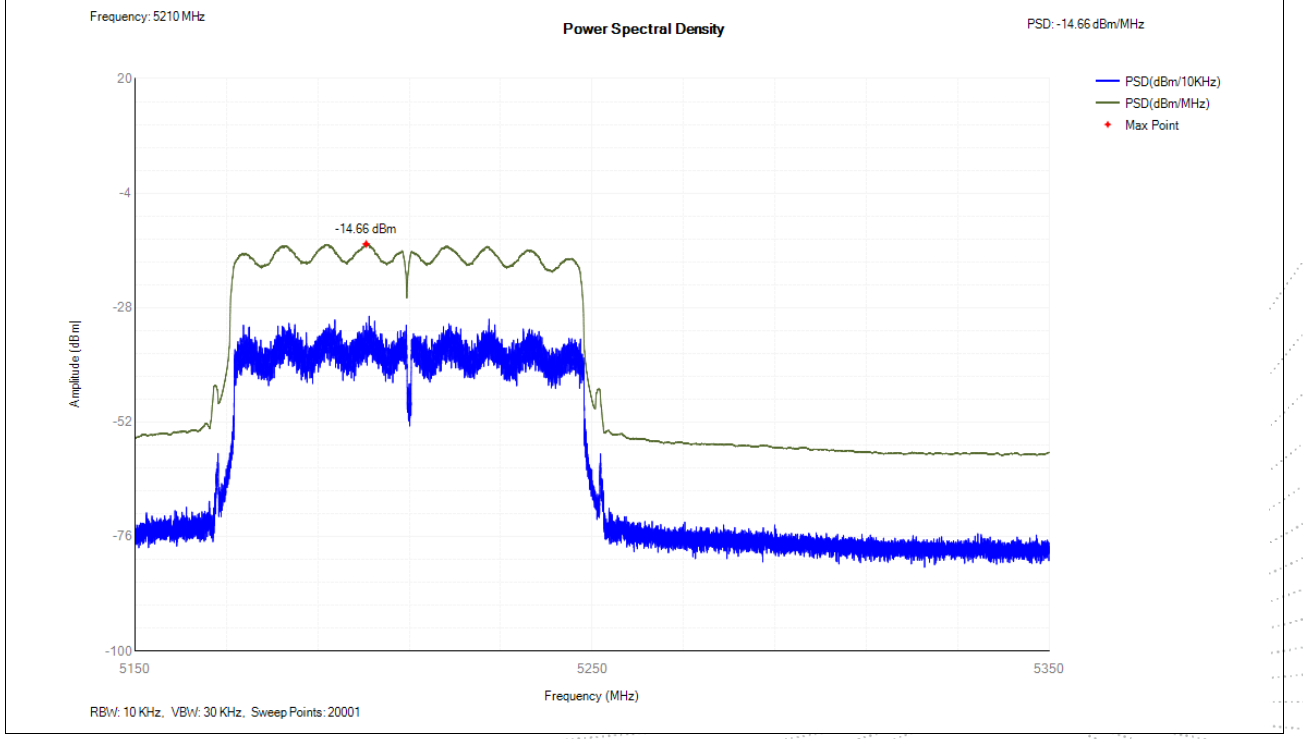
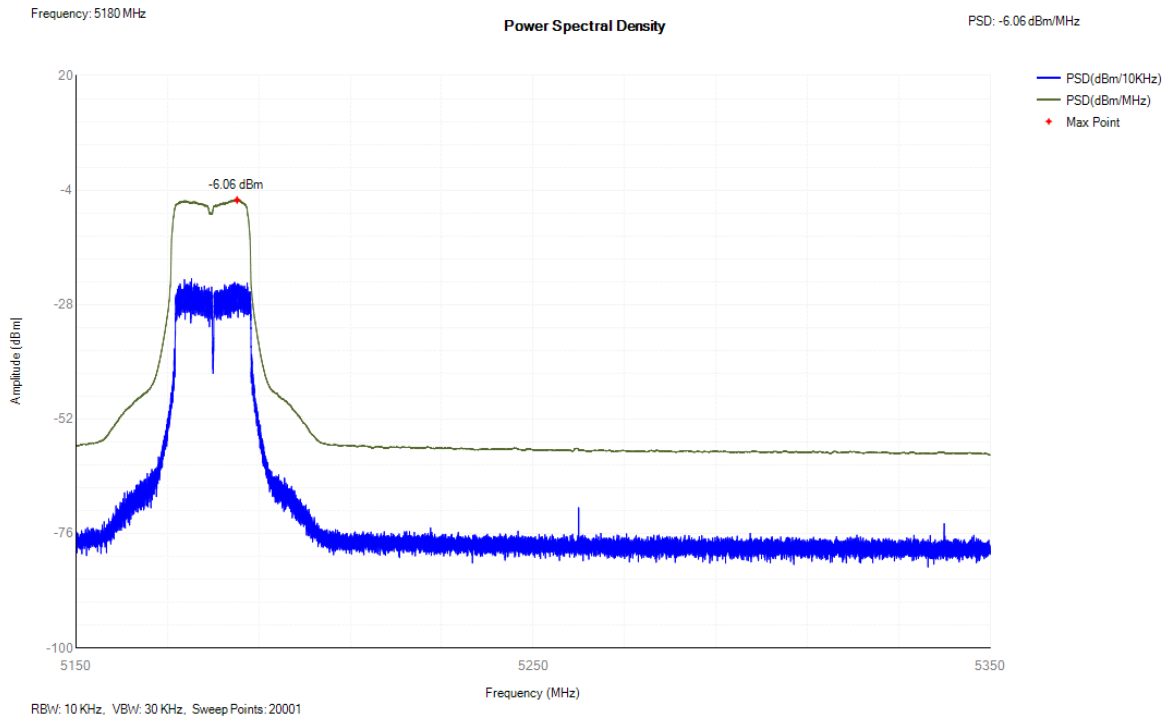


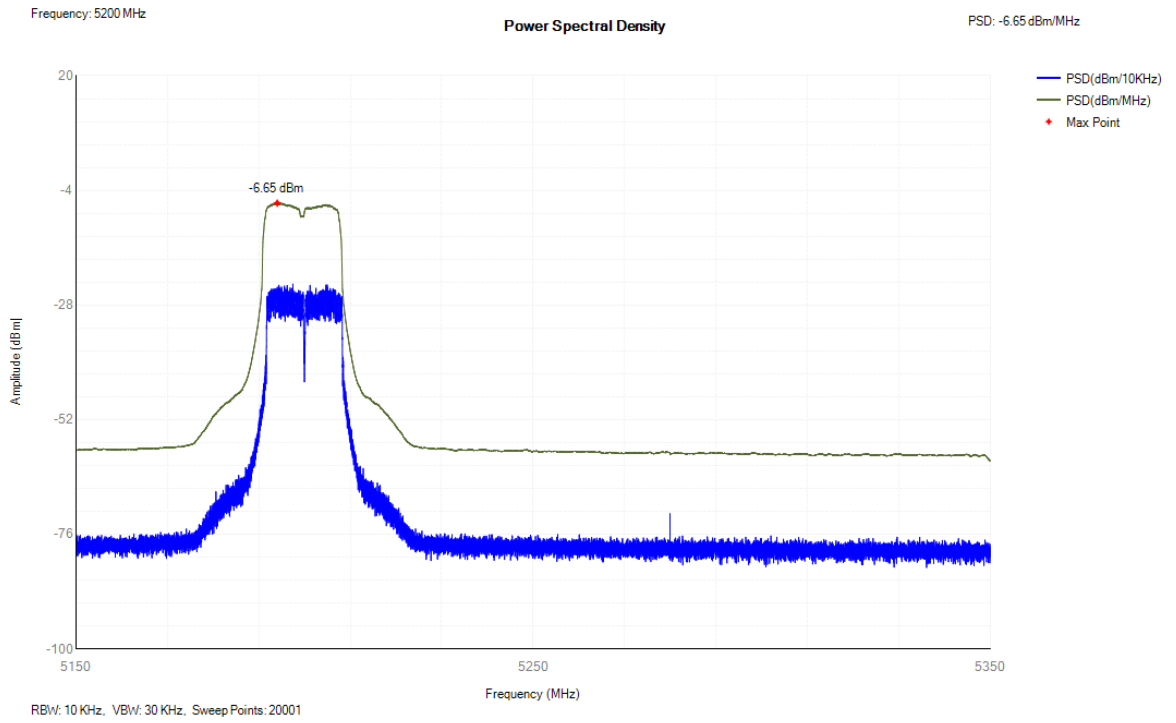
PSD NVNT ac80 5210MHz Ant A



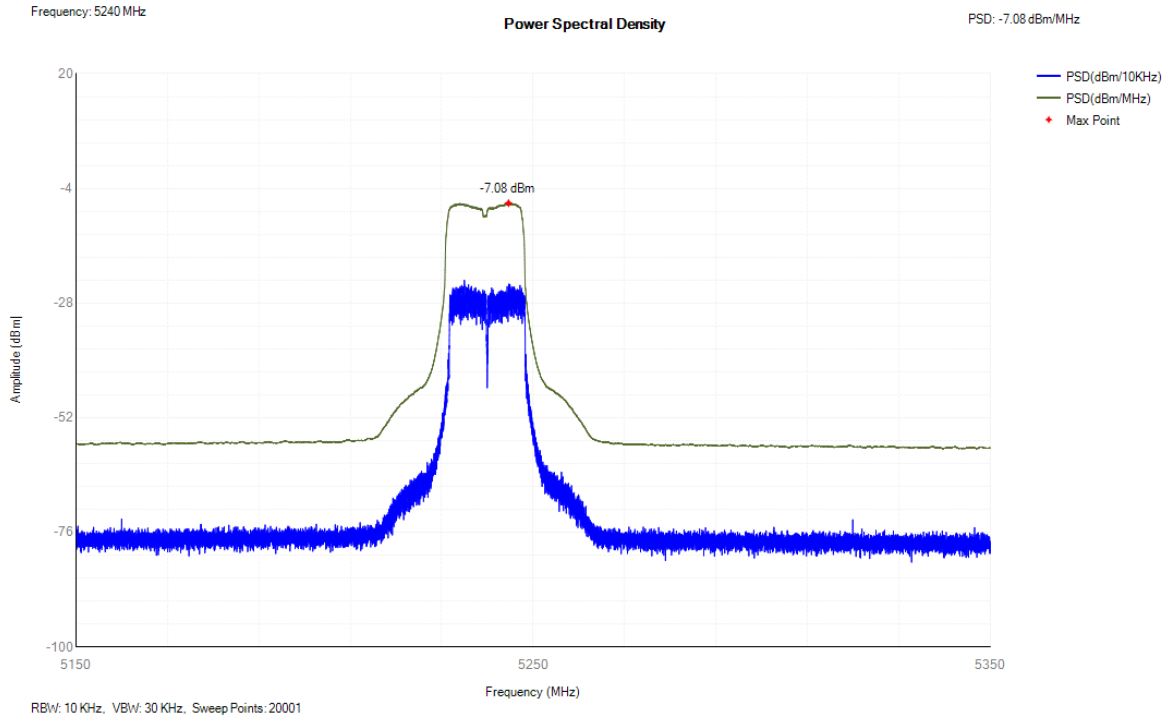
Test Graphs
PSD NVNT a 5180MHz Ant B



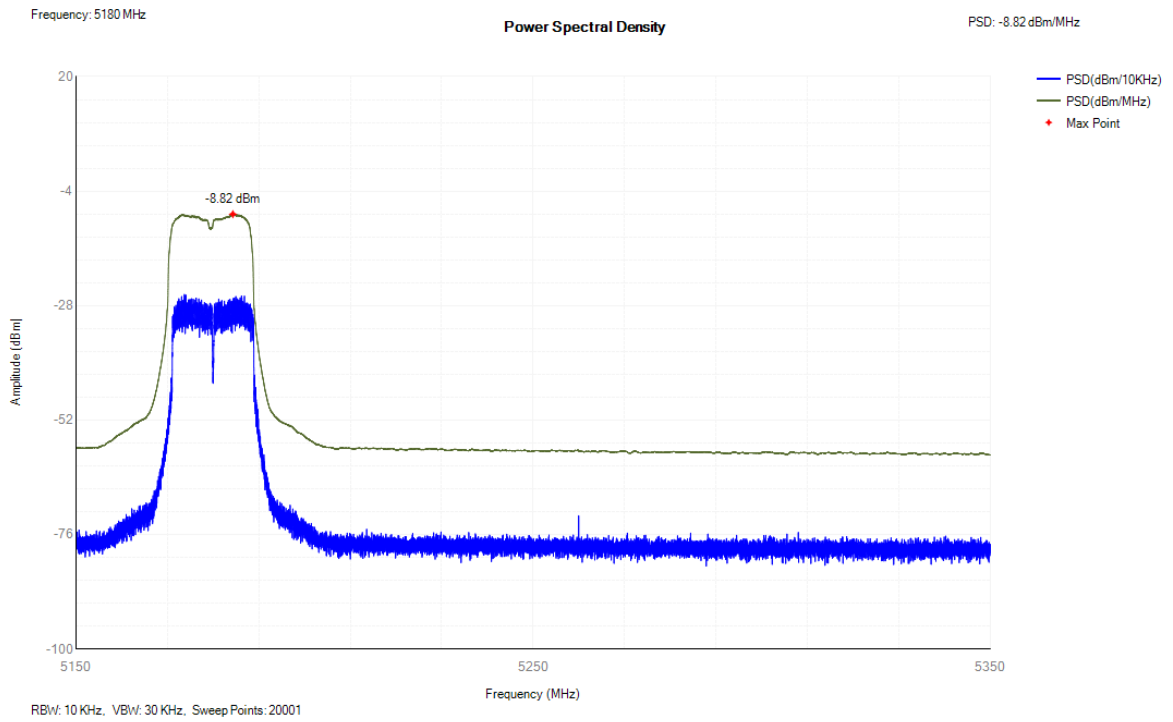
PSD NVNT a 5200MHz Ant B



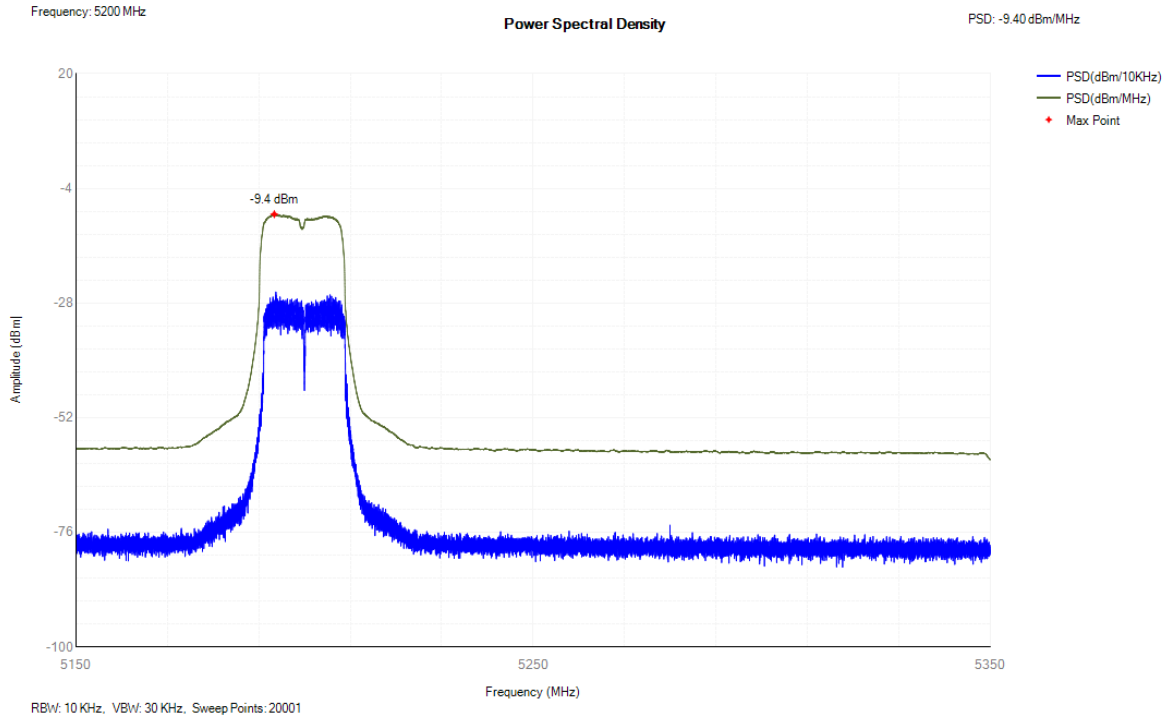
PSD NVNT a 5240MHz Ant B



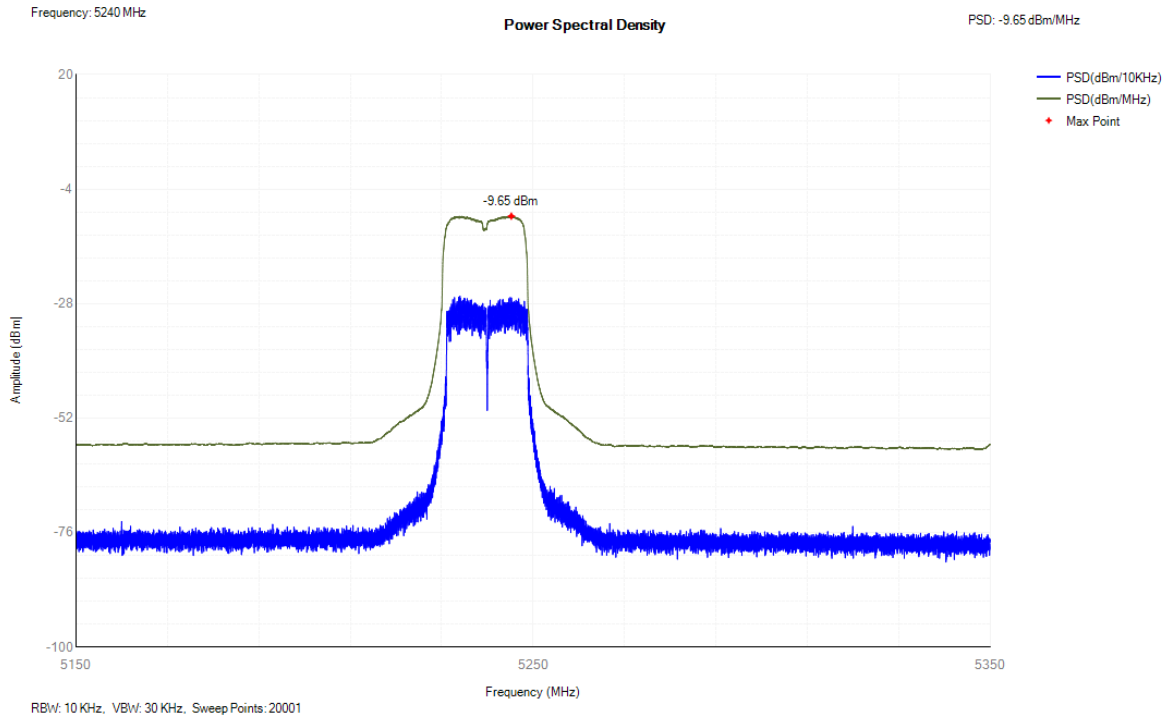
PSD NVNT n20 5180MHz Ant B



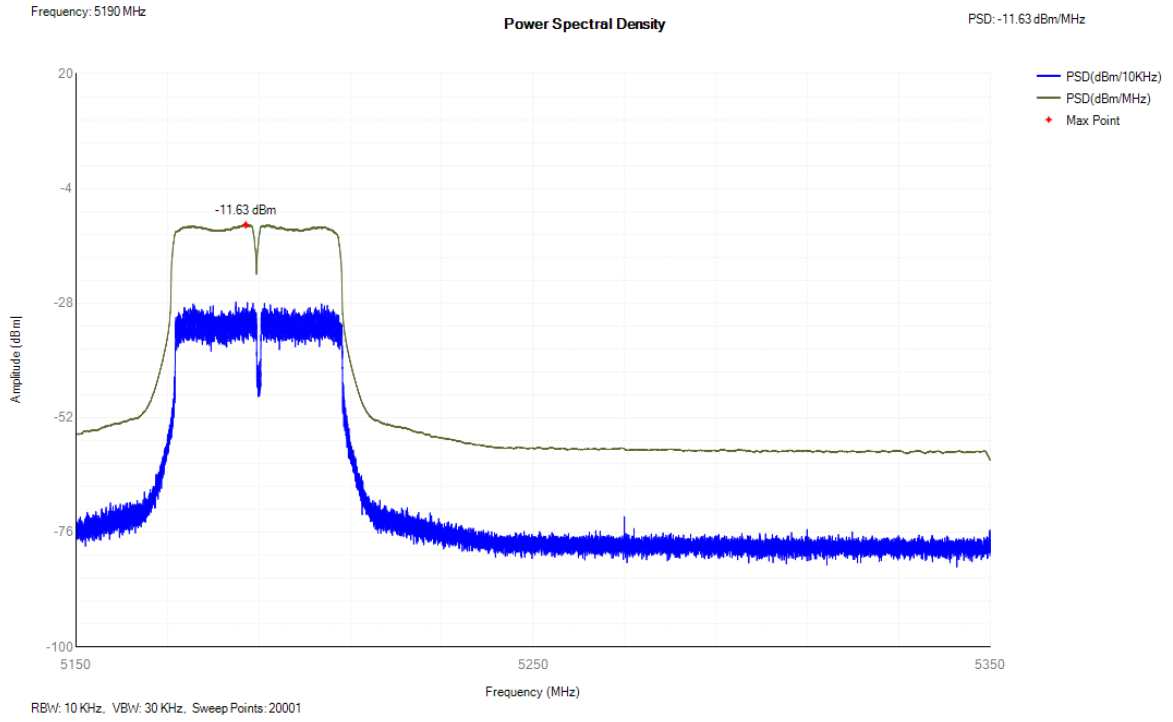
PSD NVNT n20 5200MHz Ant B



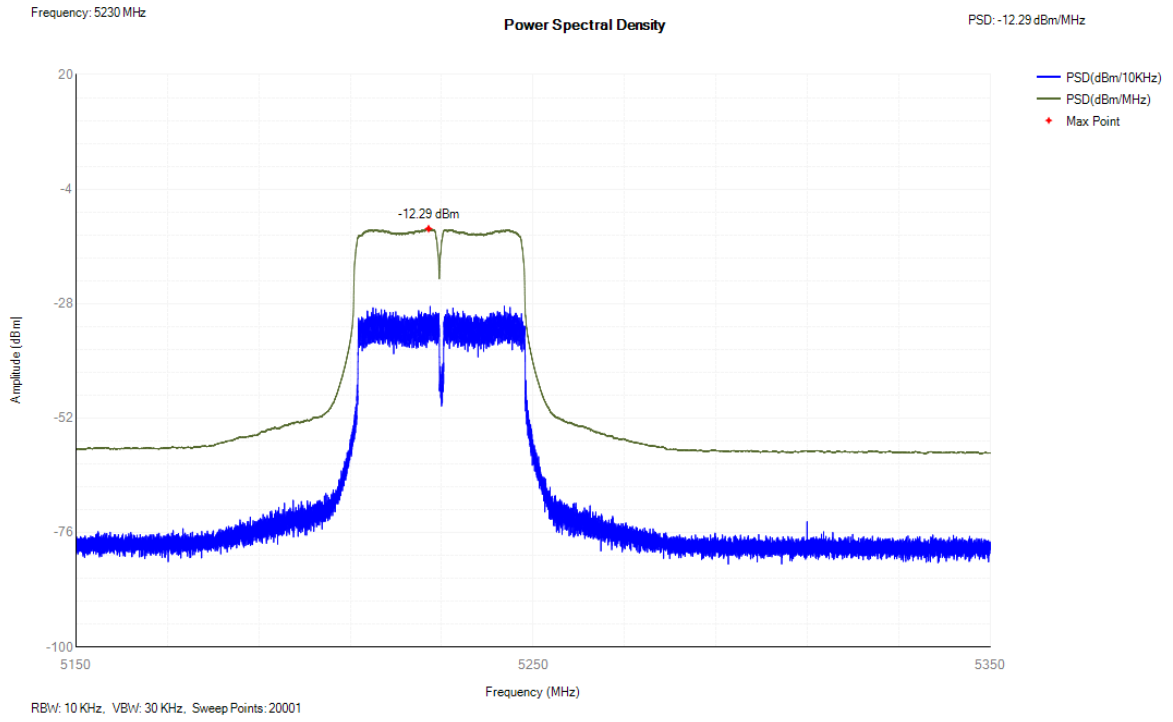
PSD NVNT n20 5240MHz Ant B



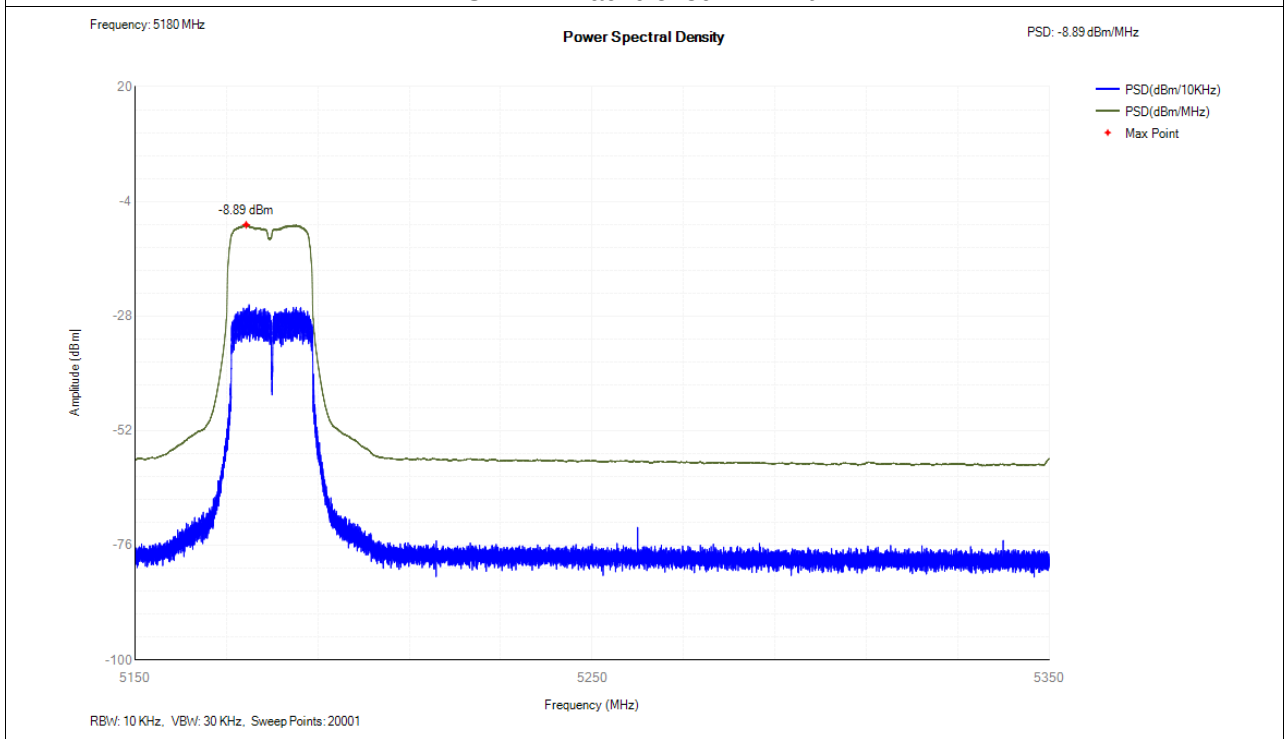
PSD NVNT n40 5190MHz Ant B



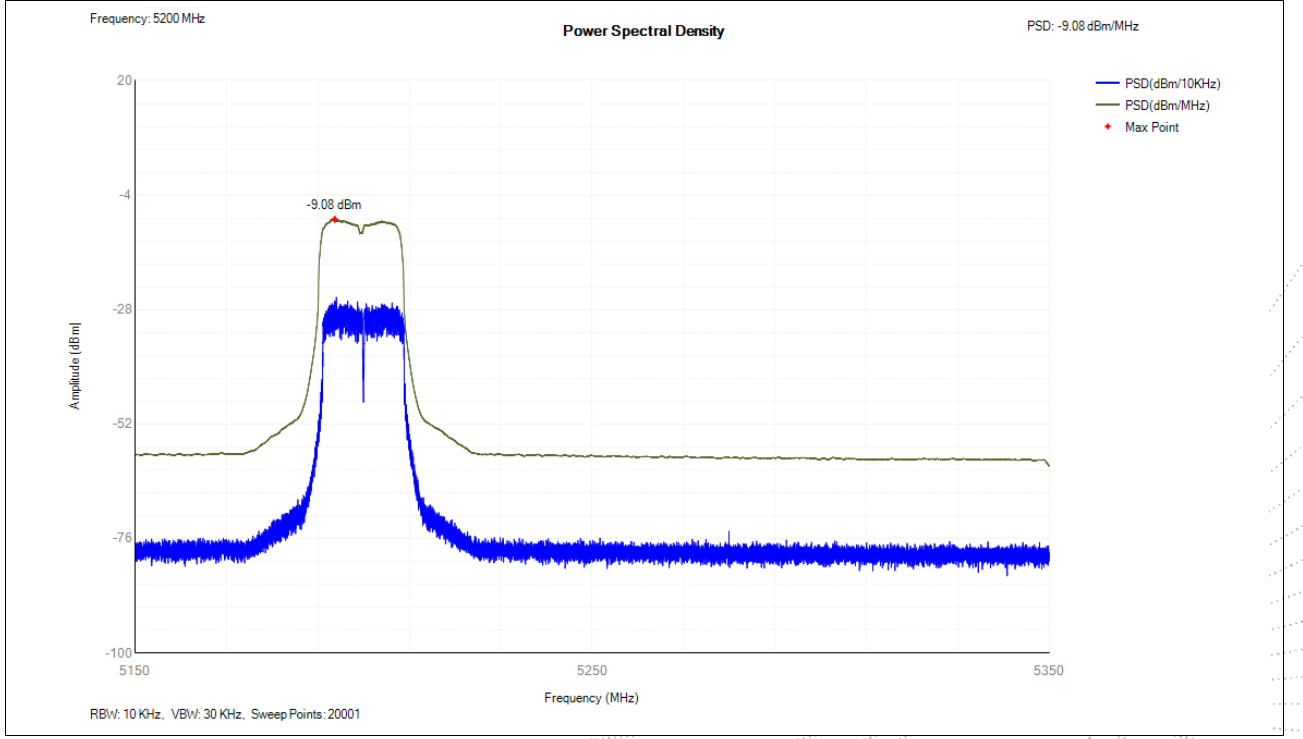
PSD NVNT n40 5230MHz Ant B



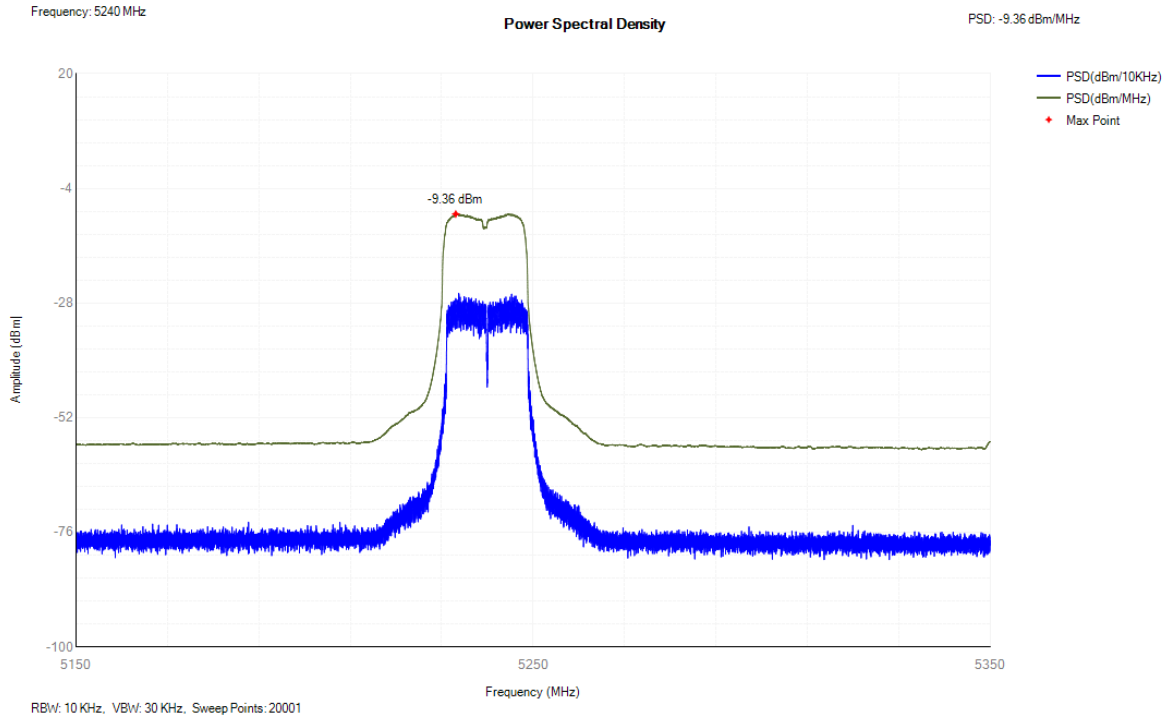
PSD NVNT ac20 5180MHz Ant B



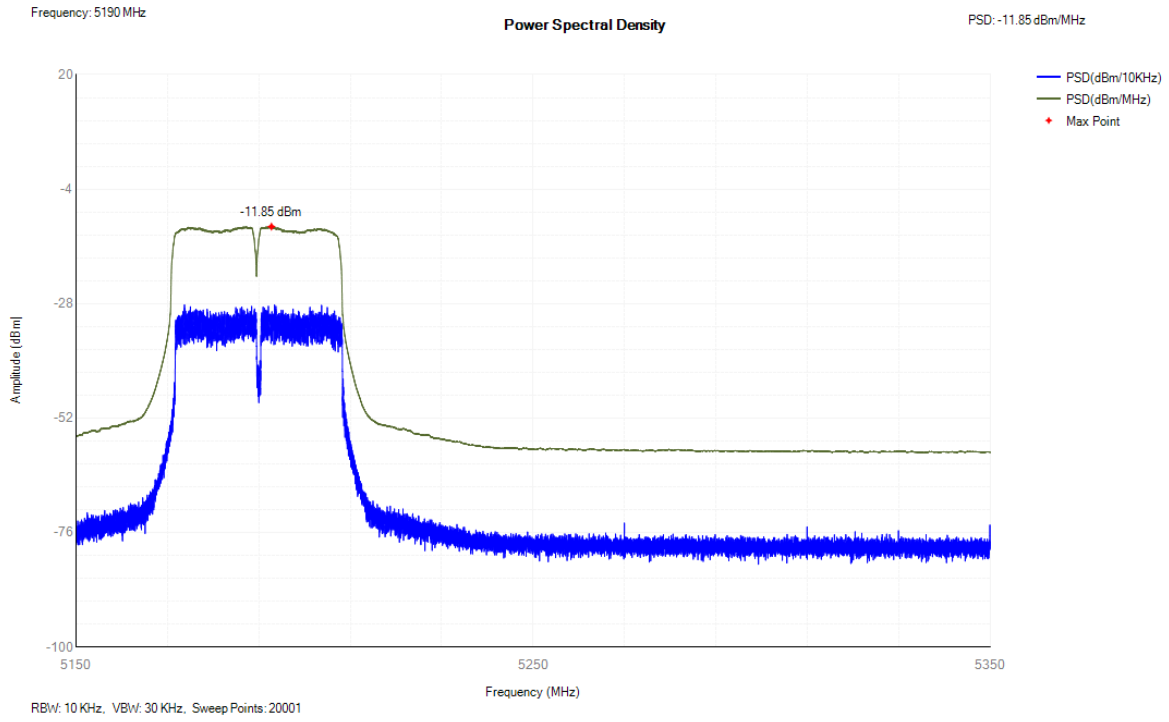
PSD NVNT ac20 5200MHz Ant B



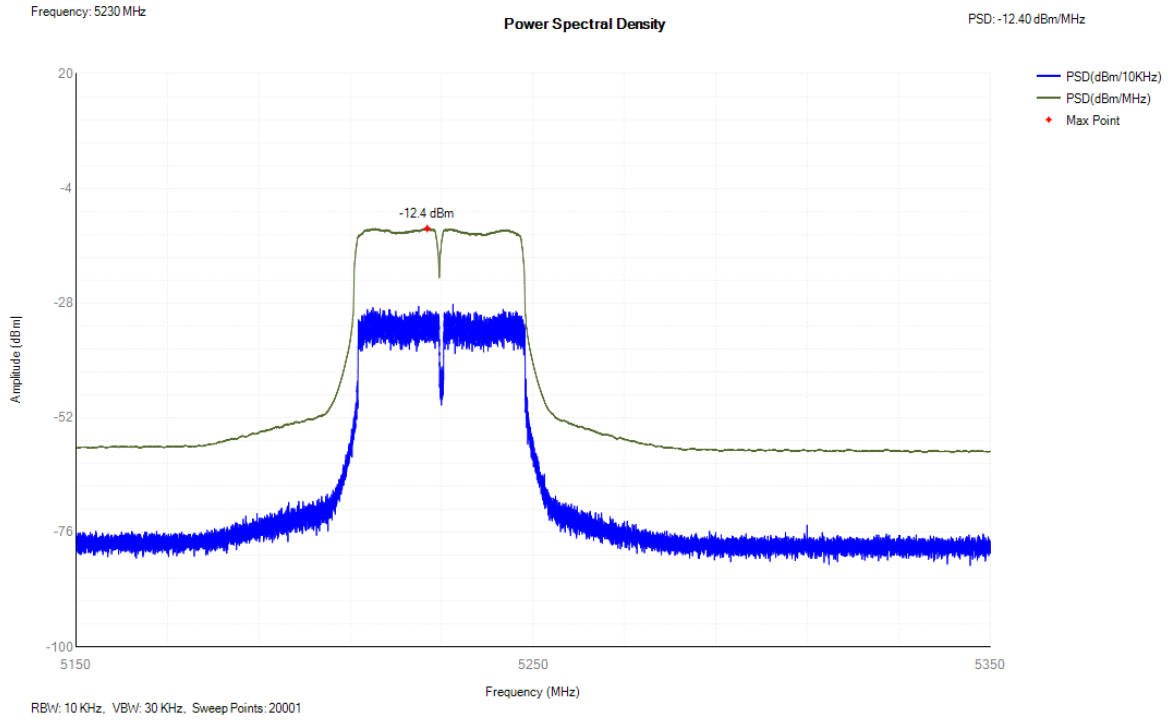
PSD NVNT ac20 5240MHz Ant B



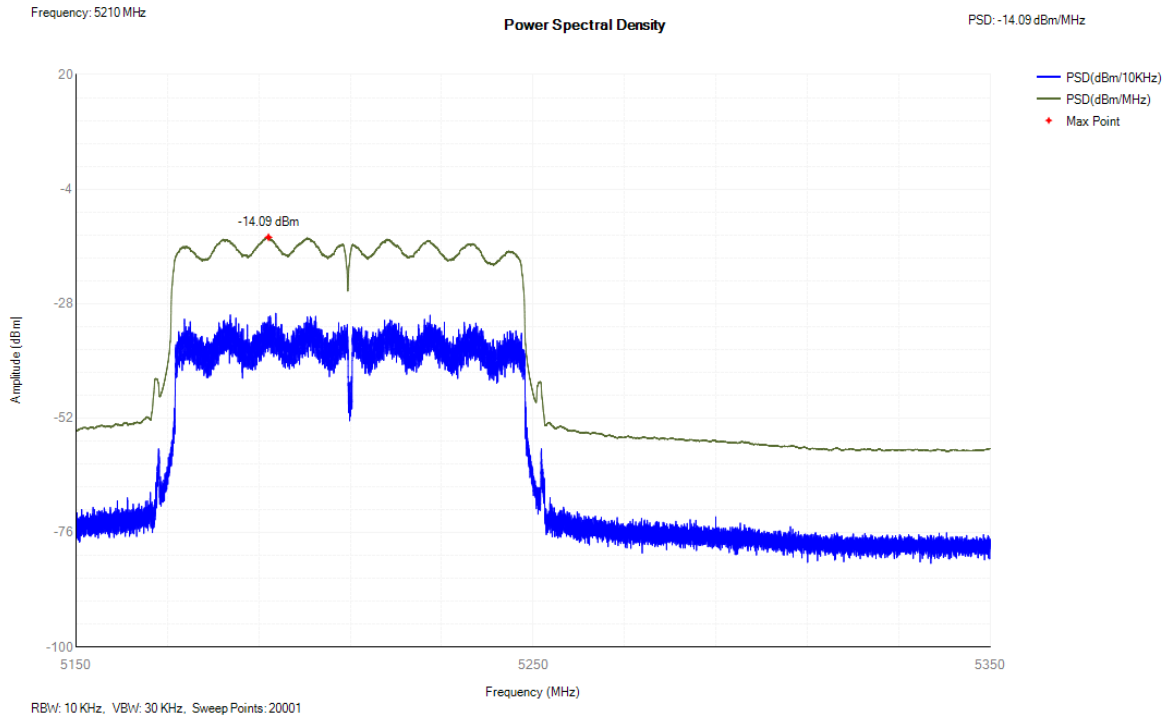
PSD NVNT ac40 5190MHz Ant B



PSD NVNT ac40 5230MHz Ant B



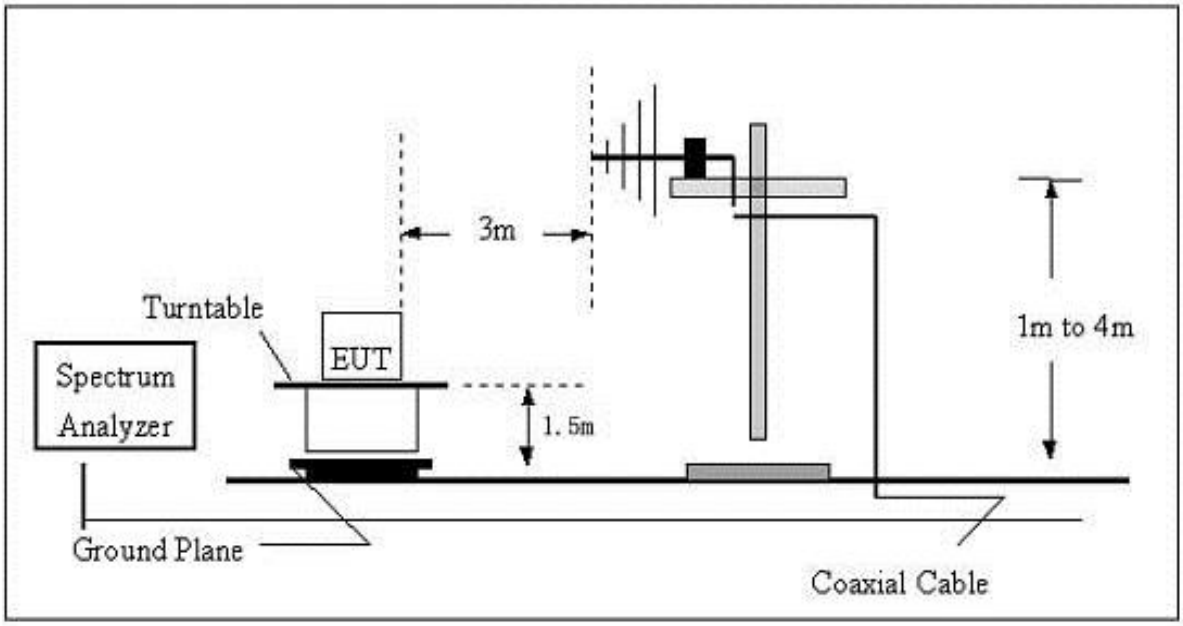
PSD NVNT ac80 5210MHz Ant B



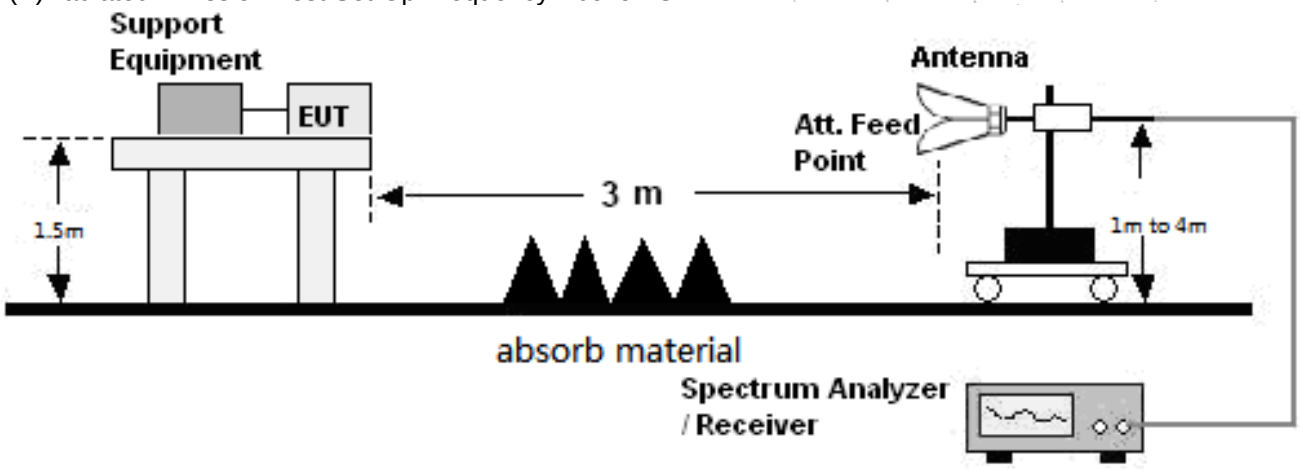
11. Transmitter Unwanted Emissions In The Spurious Domain

11.1 Block Diagram Of Test Setup

(A)Radiated Emission Test Set-Up Frequency Below 1GHz.



(B)Radiated Emission Test Set-Up Frequency Above 1GHz.



11.2 Limits

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz/300KHz
47 MHz to 74 MHz	-54 dBm	100 kHz/300KHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz/300KHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz/300KHz
118 MHz to 174 MHz	-36 dBm	100 kHz/300KHz
174 MHz to 230 MHz	-54 dBm	100 kHz/300KHz
230 MHz to 470 MHz	-36 dBm	100 kHz/300KHz
470 MHz to 862 MHz	-54 dBm	100 kHz/300KHz
862 MHz to 1 GHz	-36 dBm	100 kHz/300KHz
1 GHz to 5.15 GHz	-30 dBm	1 MHz/3MHz
5.35 GHz to 5.47 GHz	-30 dBm	1 MHz/3MHz
5.725 GHz to 26 GHz	-30 dBm	1 MHz/3MHz

11.3 Test Procedure

30MHz ~ 1GHz:
a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.
Above 1GHz:
a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

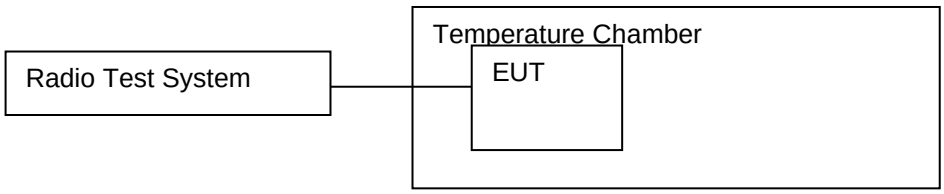
11.4 Test Results

All modes have been tested and reports show data in the worst mode
Test Mode: Transmitting 802.11n20 (worst case)

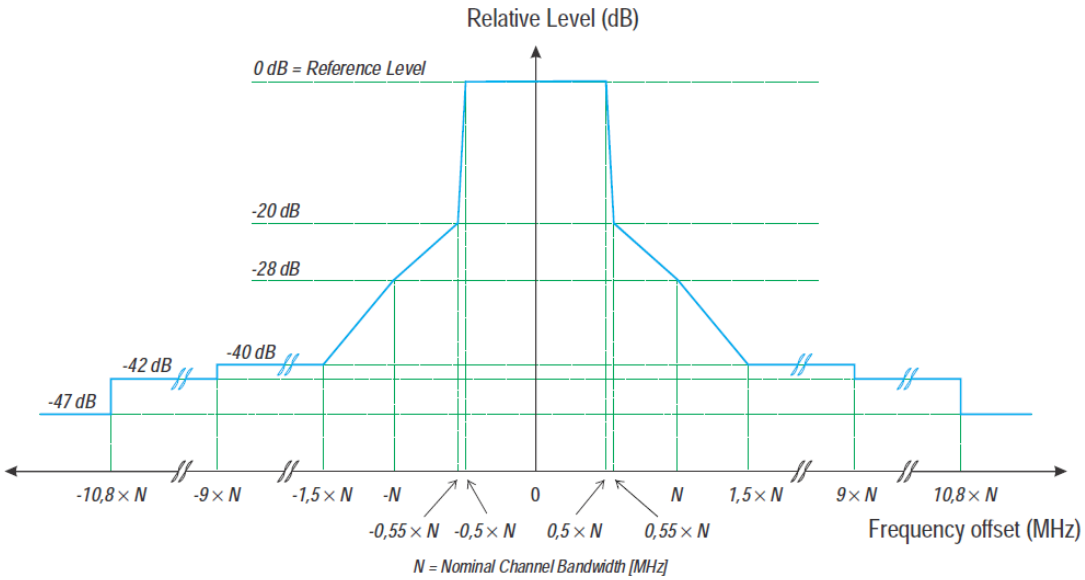
Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
802.11n20 low channel								
565.66	-53.51	224	1.4	H	-7.29	-60.80	-54	-6.80
565.66	-51.42	226	1.9	V	-7.29	-58.70	-54	-4.70
10360.00	-42.52	73	1.1	H	-0.43	-42.95	-30	-12.95
10360.00	-38.70	110	1.8	V	-0.43	-39.13	-30	-9.13
15540.00	-54.37	198	1.8	H	8.31	-46.06	-30	-16.06
15540.00	-61.21	49	1.3	V	8.31	-52.90	-30	-22.90
802.11n20 Mid channel								
565.66	-53.69	261	1.8	H	-7.29	-60.98	-54	-6.98
565.66	-50.63	350	1.5	V	-7.29	-57.91	-54	-3.91
10400.00	-43.47	171	1.8	H	-0.38	-43.85	-30	-13.85
10400.00	-38.20	183	1.3	V	-0.38	-38.58	-30	-8.58
15600.00	-54.66	270	1.2	H	8.83	-45.83	-30	-15.83
15600.00	-60.89	51	1.5	V	8.83	-52.06	-30	-22.06
802.11n20 high channel								
565.66	-54.26	102	1.4	H	-7.29	-61.54	-54	-7.54
565.66	-52.14	264	1.2	V	-7.29	-59.43	-54	-5.43
10480.00	-41.90	156	1.4	H	-0.32	-42.22	-30	-12.22
10480.00	-39.52	256	1.4	V	-0.32	-39.84	-30	-9.84
15720.00	-54.45	278	1.6	H	9.35	-45.10	-30	-15.10
15720.00	-61.37	110	1.2	V	9.35	-52.02	-30	-22.02

12. Transmitter Unwanted Emissions In The Out-Of-Band Domain

12.1 Block Diagram Of Test Setup



12.2 Limit



12.3 Test procedure

The UUT shall be configured for continuous transmit mode (duty cycle equal to 100 %). If this is not possible, then option 2 shall be used.

Step 1: Determination of the reference average power level.

- Spectrum analyser settings:

- Resolution bandwidth: 1 MHz
- Video bandwidth: 30 kHz
- Detector mode: Peak
- Trace mode: Video Average
- Sweep Time: Coupled
- Centre Frequency: Centre frequency of the channel being tested
- Span: 2 × Nominal Channel Bandwidth

- Use the marker to find the highest average power level of the power envelope of the UUT. This level shall be used as the reference level for the relative measurements.

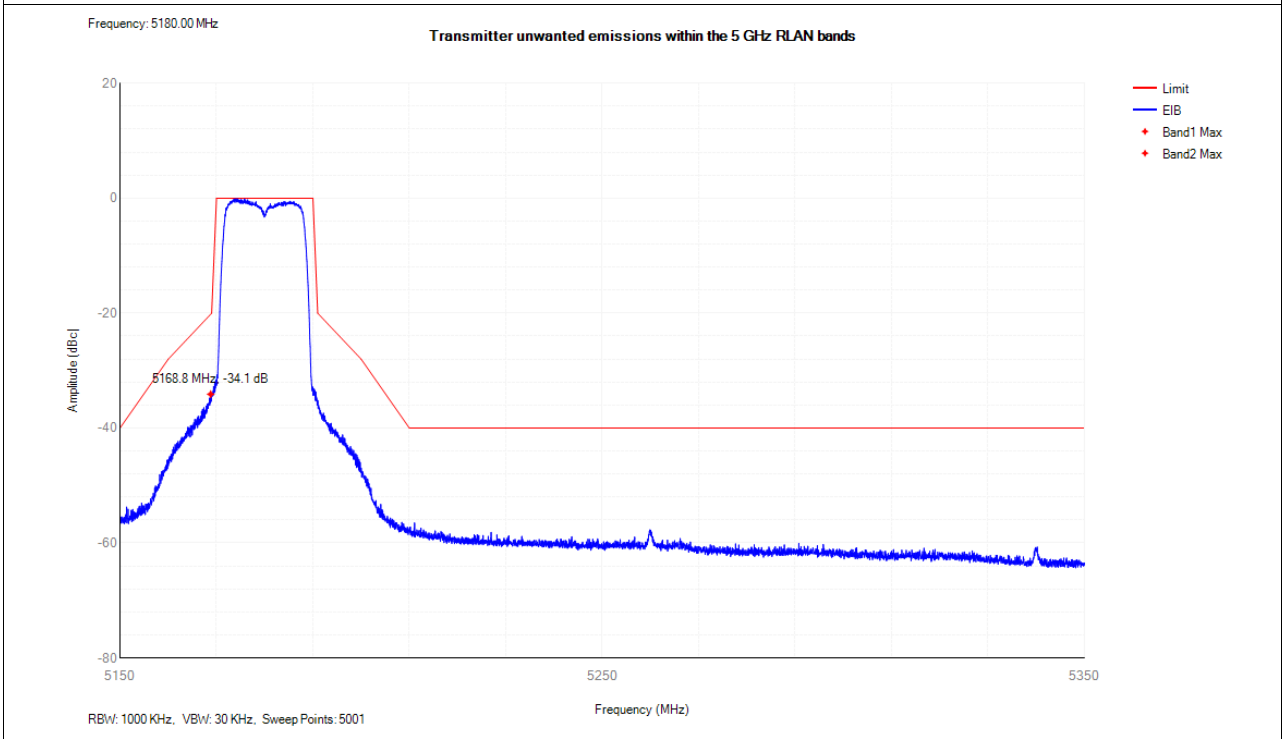
Step 2: Determination of the relative average power levels.

- Adjust the frequency range of the spectrum analyser to allow the measurement to be performed within the sub-bands 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz. No other parameter of the spectrum analyser should be changed.
- Compare the relative power envelope of the UUT with the limits defined in clause 4.2.4.2.2.

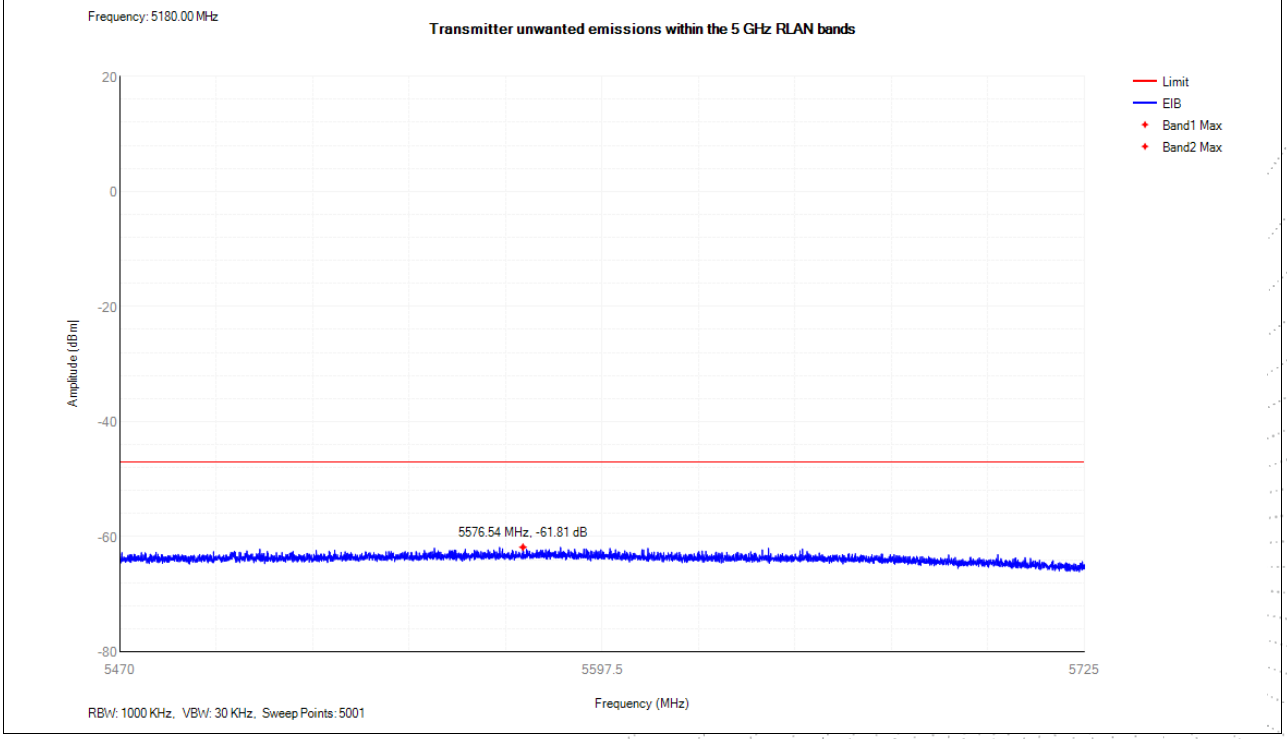
12.4 Test Result

Ant A:

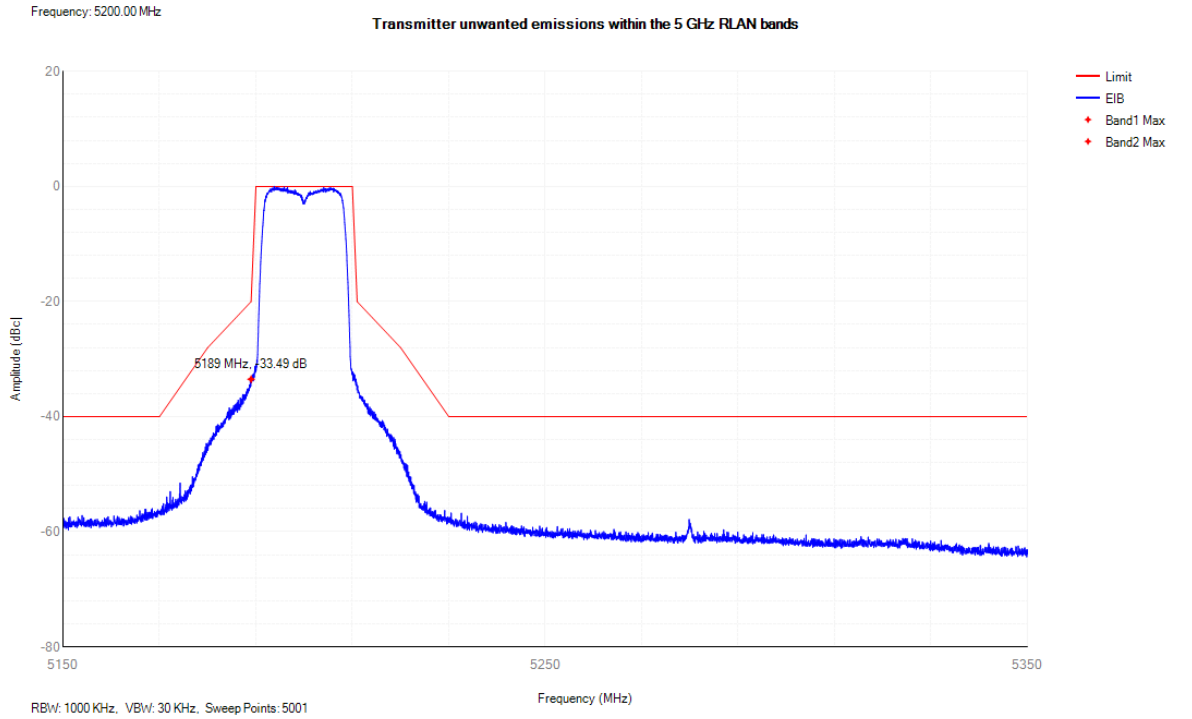
Test Graphs
Tx. Emissions EIB NVNT a 5180MHz Sub Band1



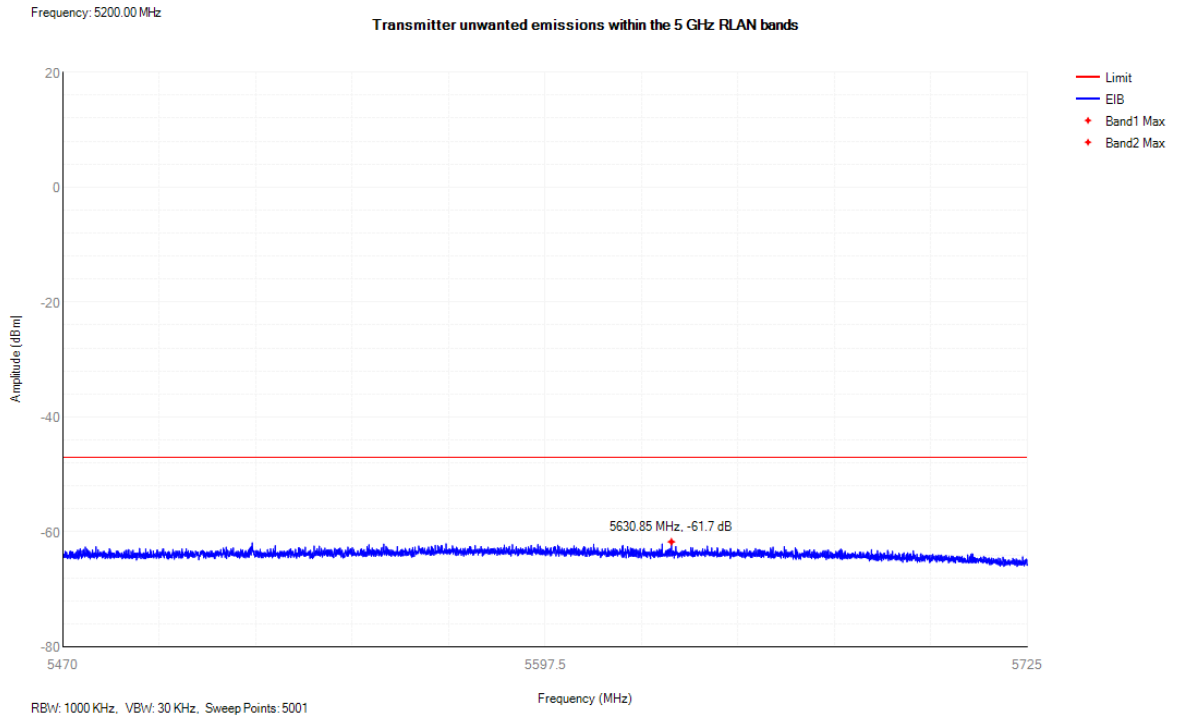
Tx. Emissions EIB NVNT a 5180MHz Sub Band2



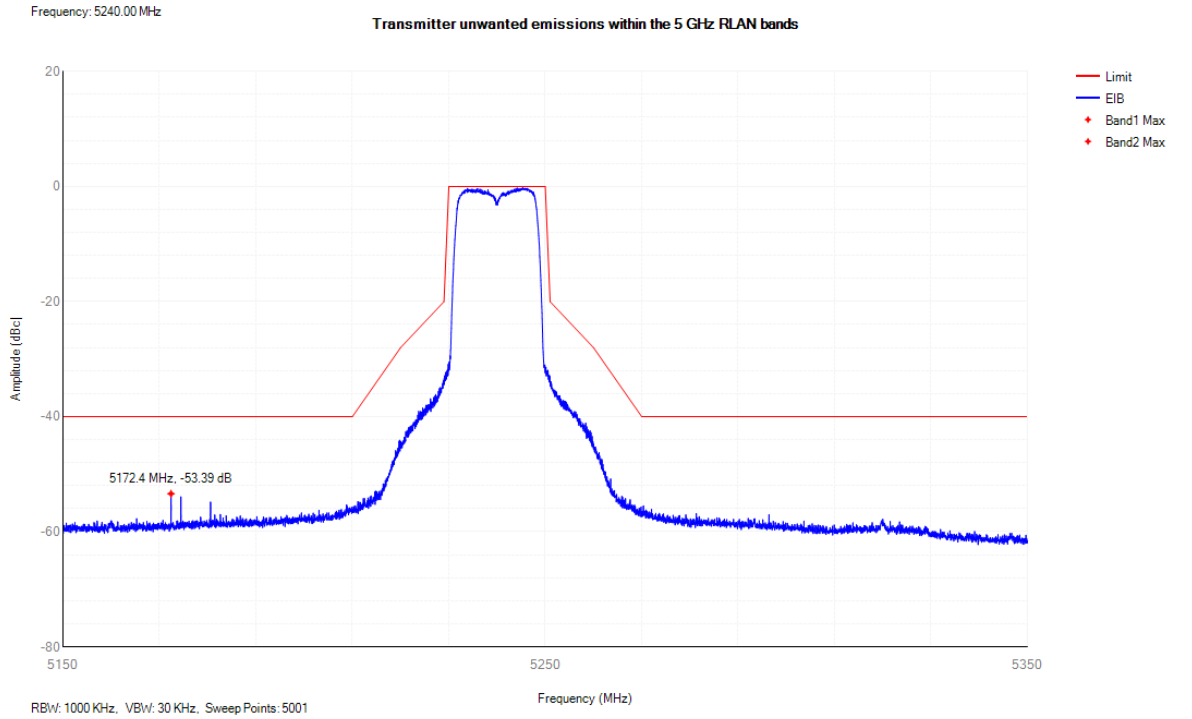
Tx. Emissions EIB NVNT a 5200MHz Sub Band1



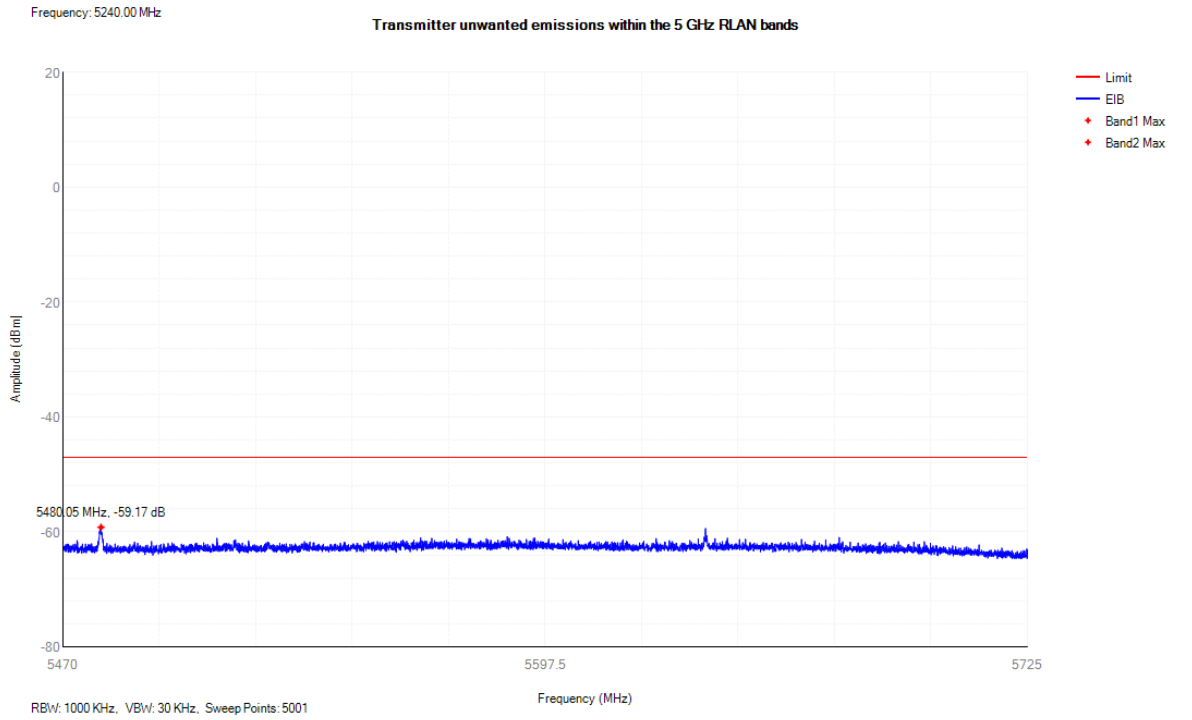
Tx. Emissions EIB NVNT a 5200MHz Sub Band2



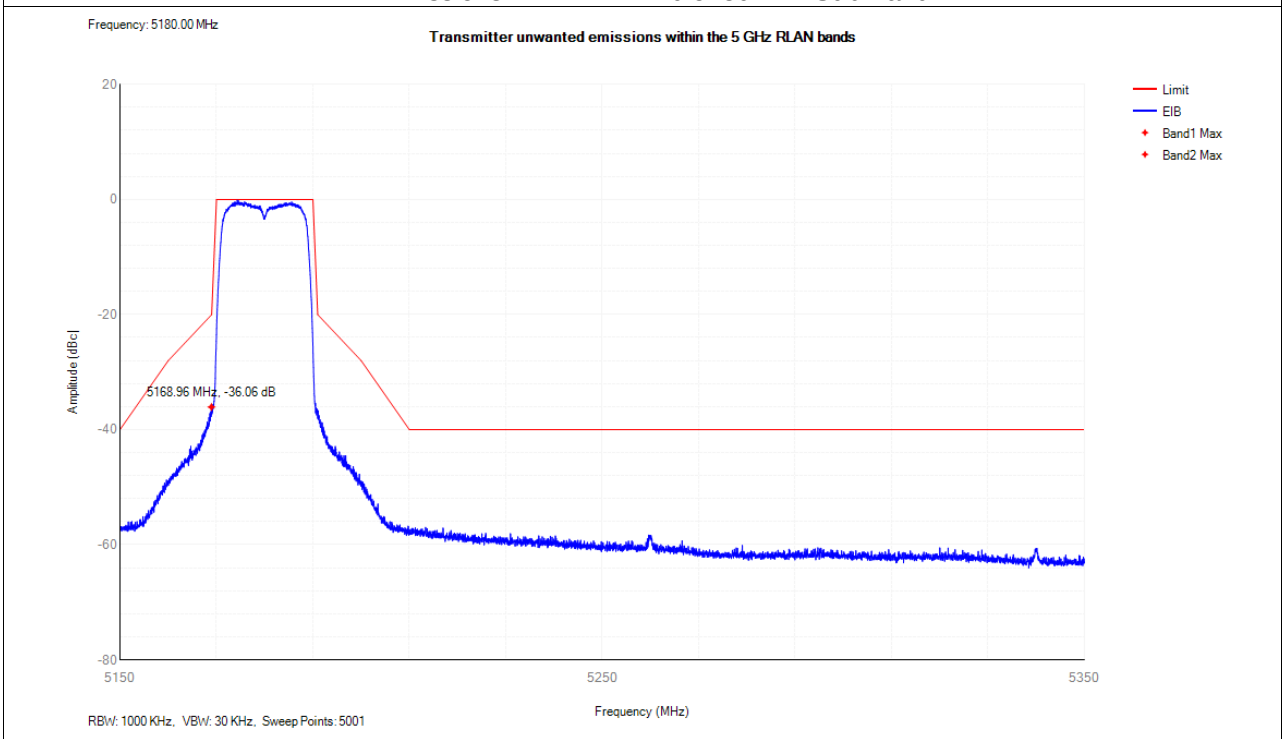
Tx. Emissions EIB NVNT a 5240MHz Sub Band1



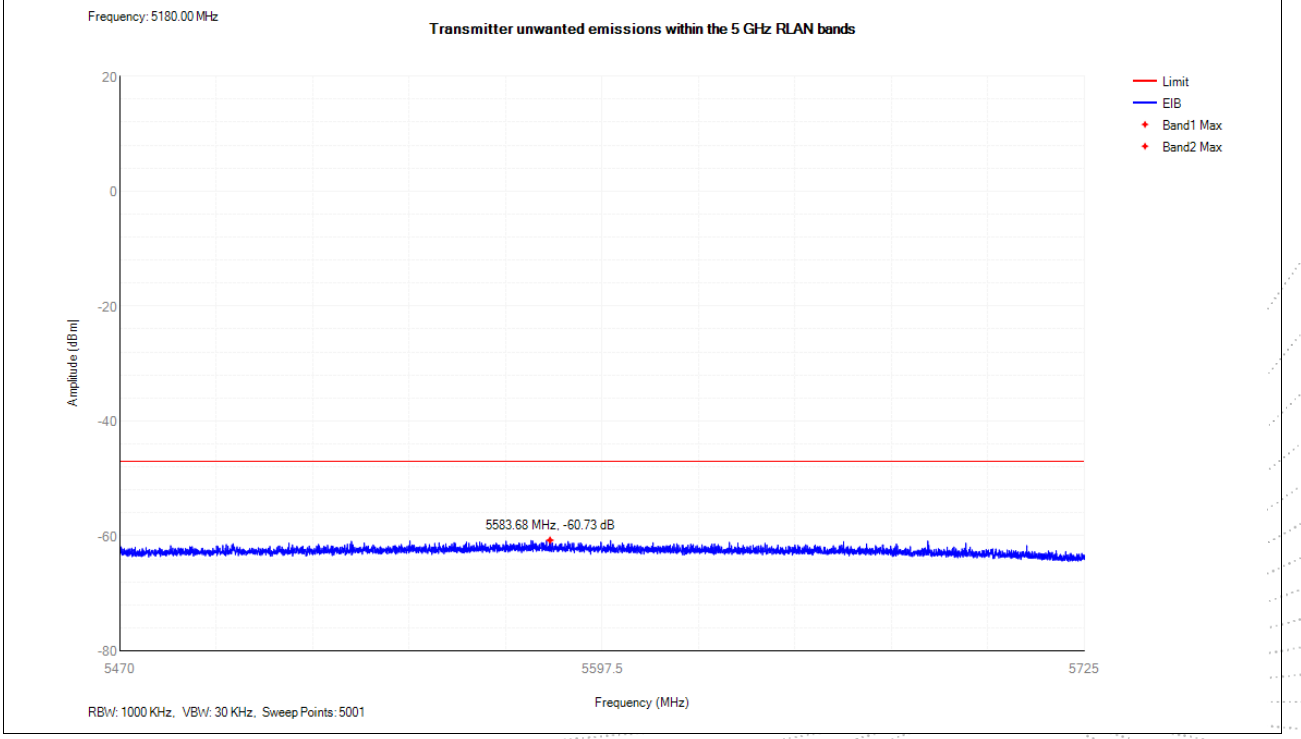
Tx. Emissions EIB NVNT a 5240MHz Sub Band2



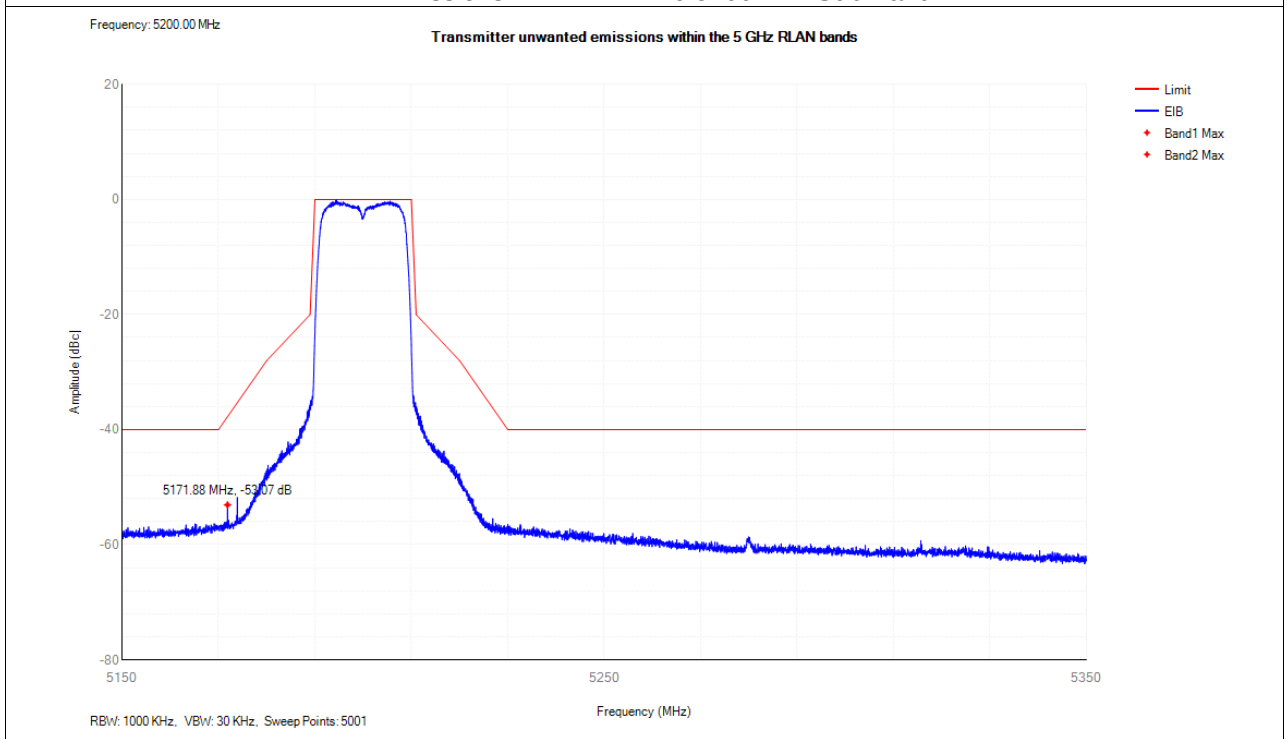
Tx. Emissions EIB NVNT n20 5180MHz Sub Band1



Tx. Emissions EIB NVNT n20 5180MHz Sub Band2



Tx. Emissions EIB NVNT n20 5200MHz Sub Band1



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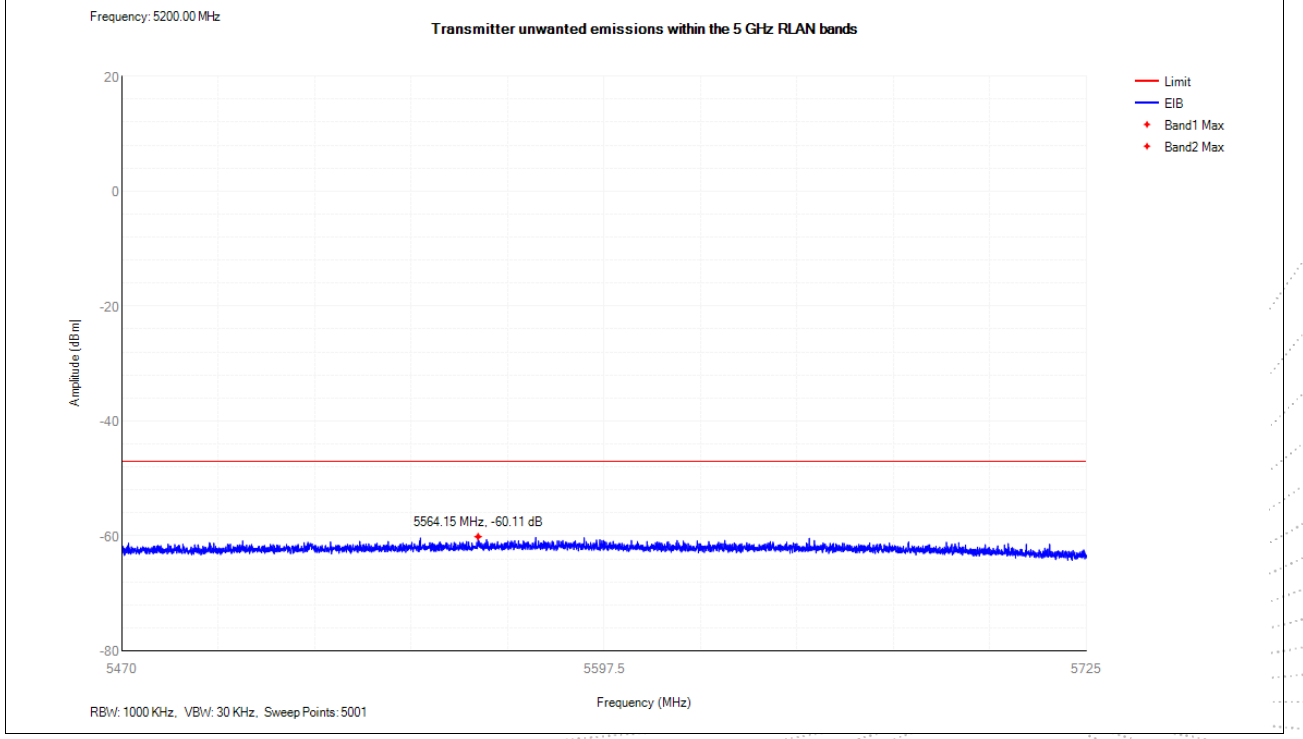
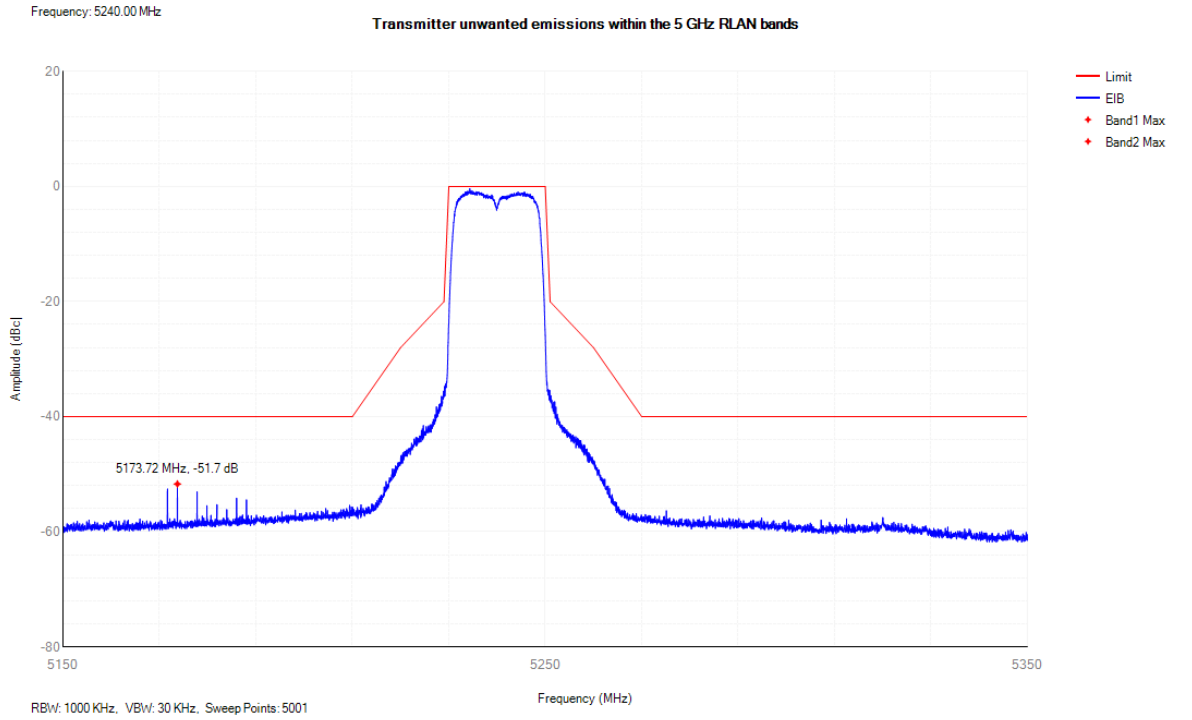
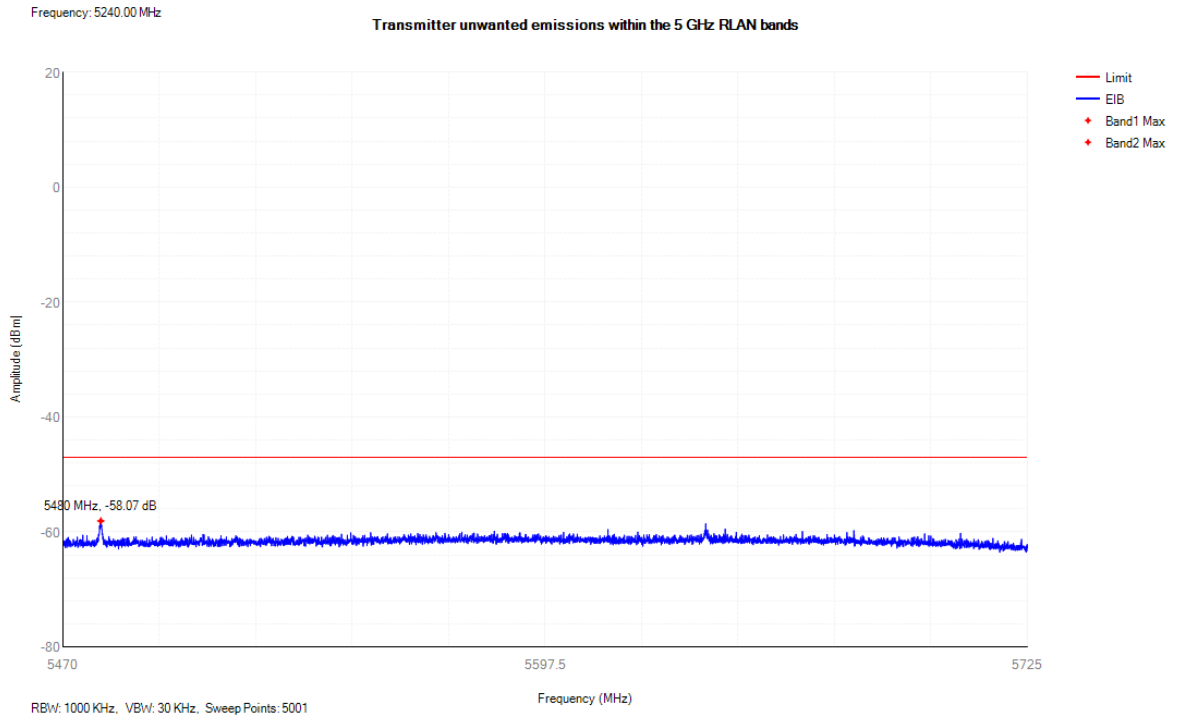


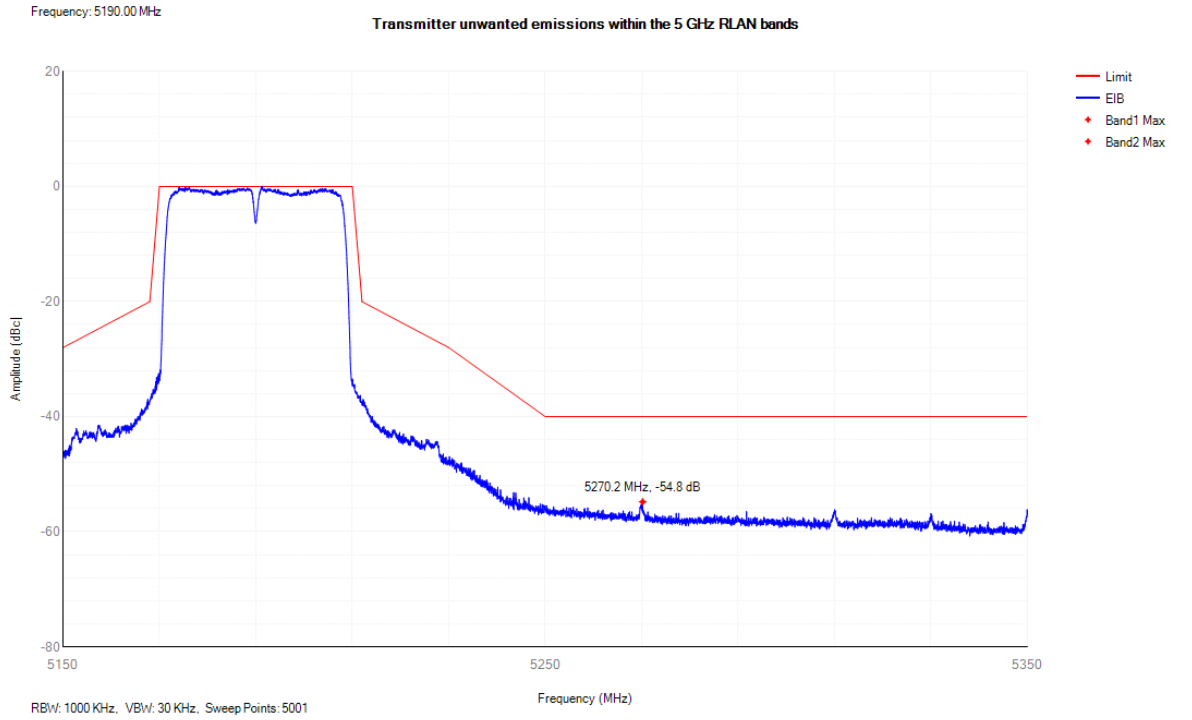
Tx. Emissions EIB NVNT n20 5240MHz Sub Band1



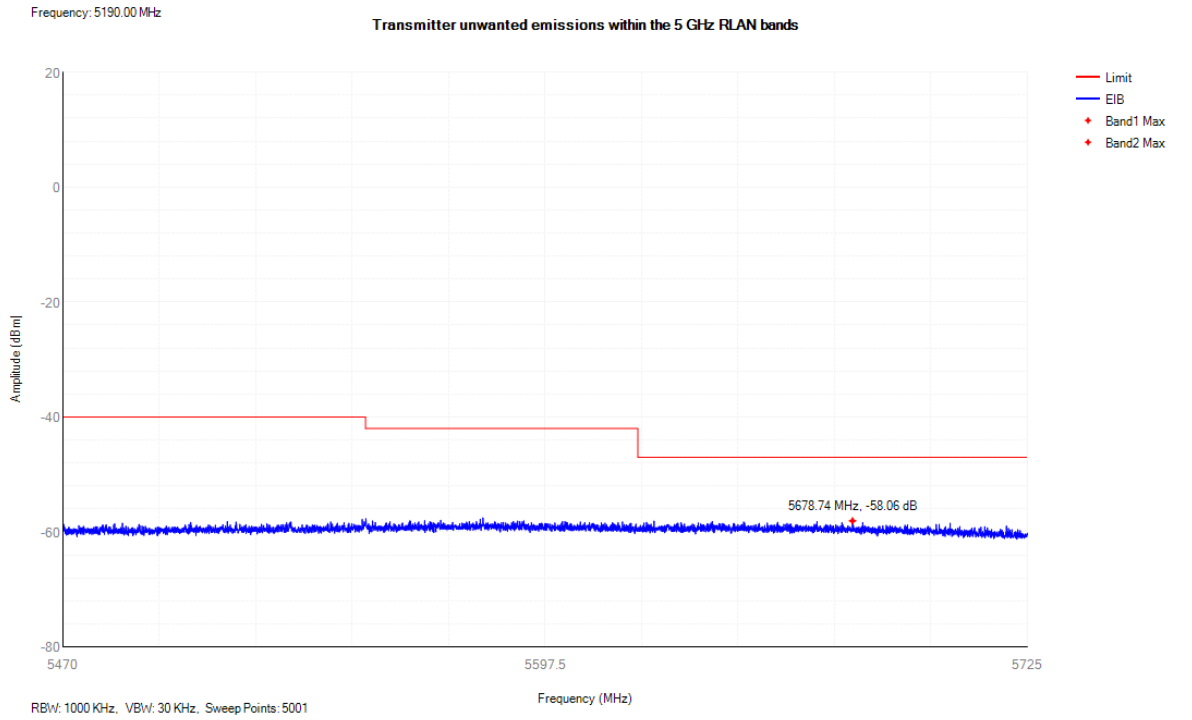
Tx. Emissions EIB NVNT n20 5240MHz Sub Band2



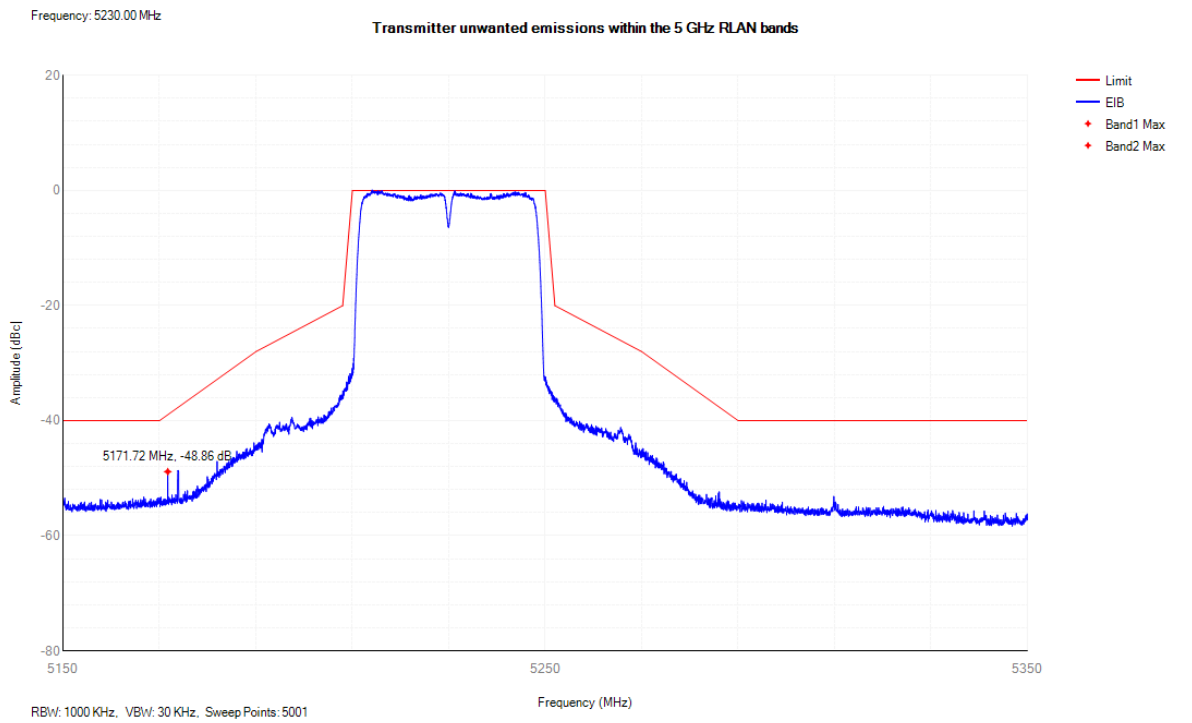
Tx. Emissions EIB NVNT n40 5190MHz Sub Band1



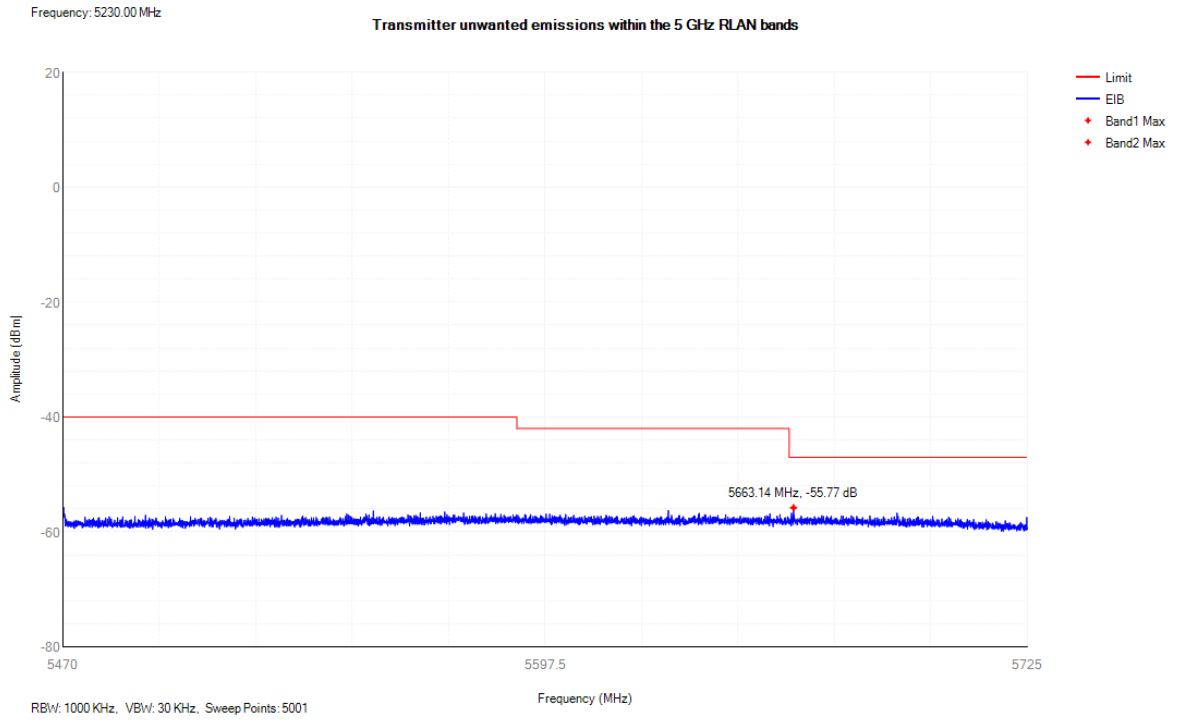
Tx. Emissions EIB NVNT n40 5190MHz Sub Band2



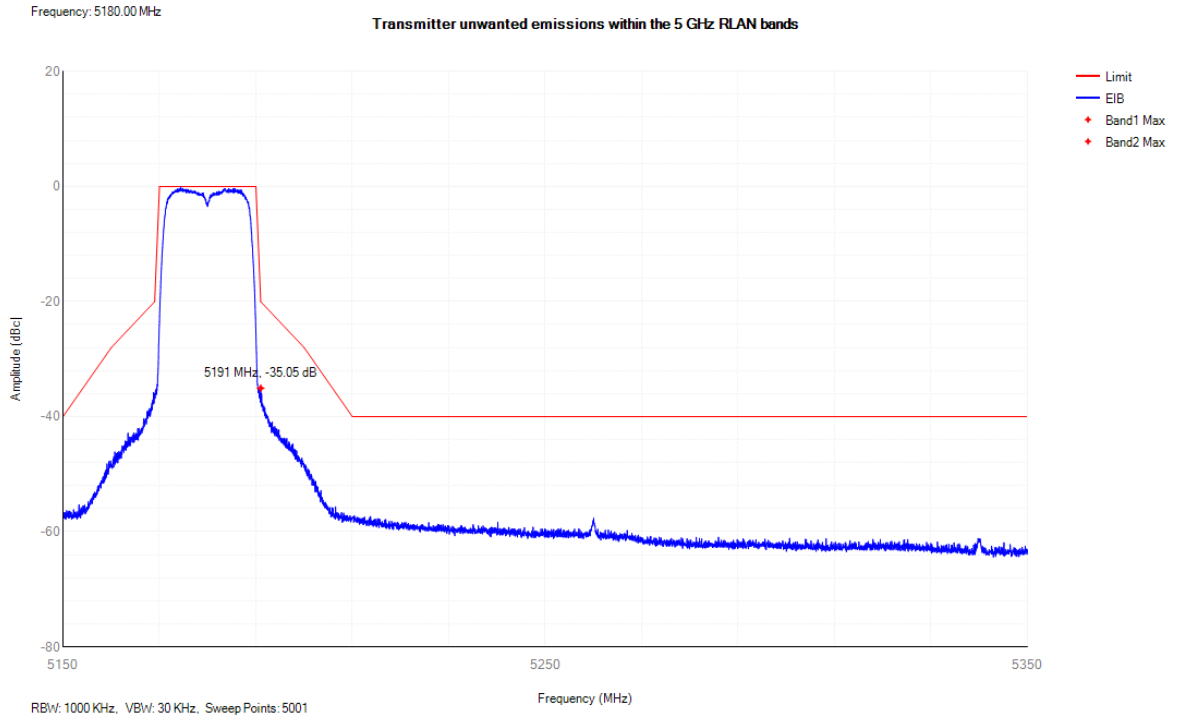
Tx. Emissions EIB NVNT n40 5230MHz Sub Band1



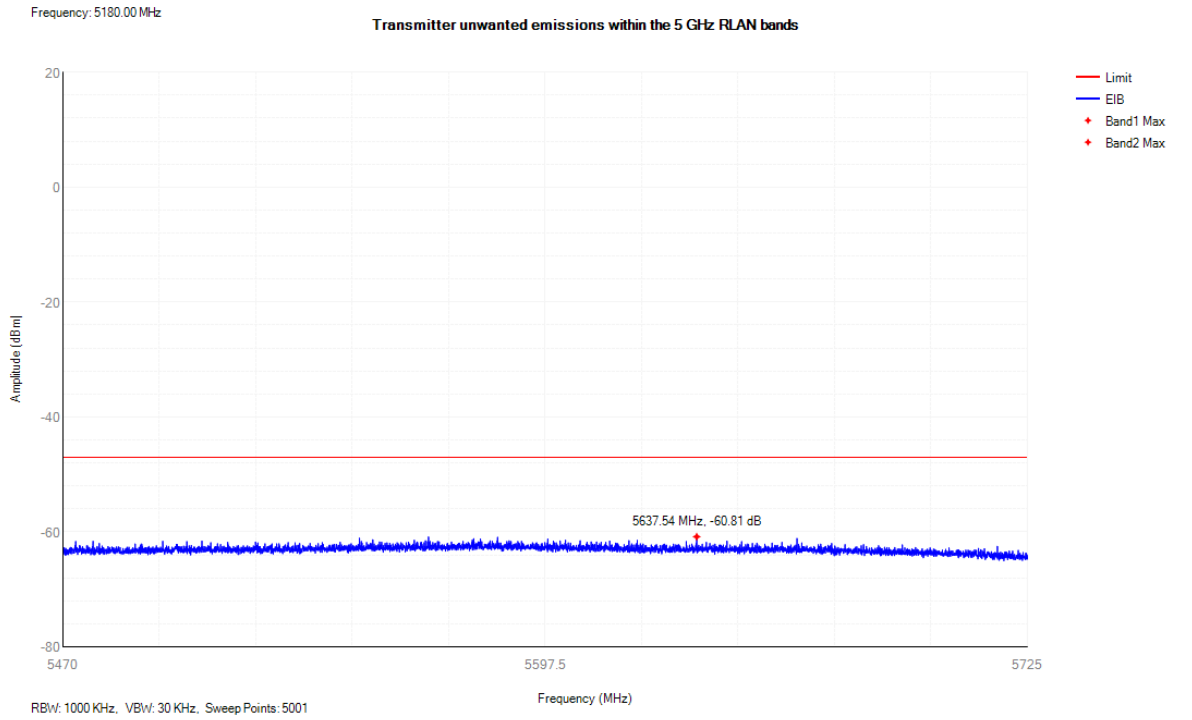
Tx. Emissions EIB NVNT n40 5230MHz Sub Band2



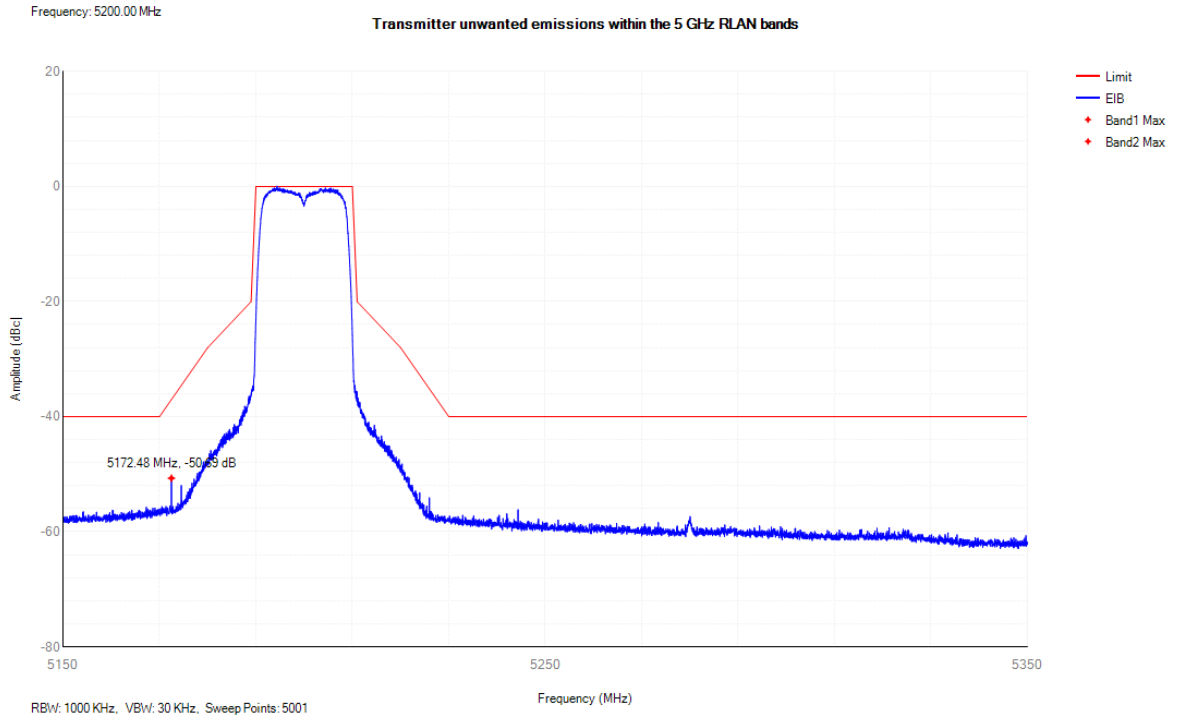
Tx. Emissions EIB NVNT ac20 5180MHz Sub Band1



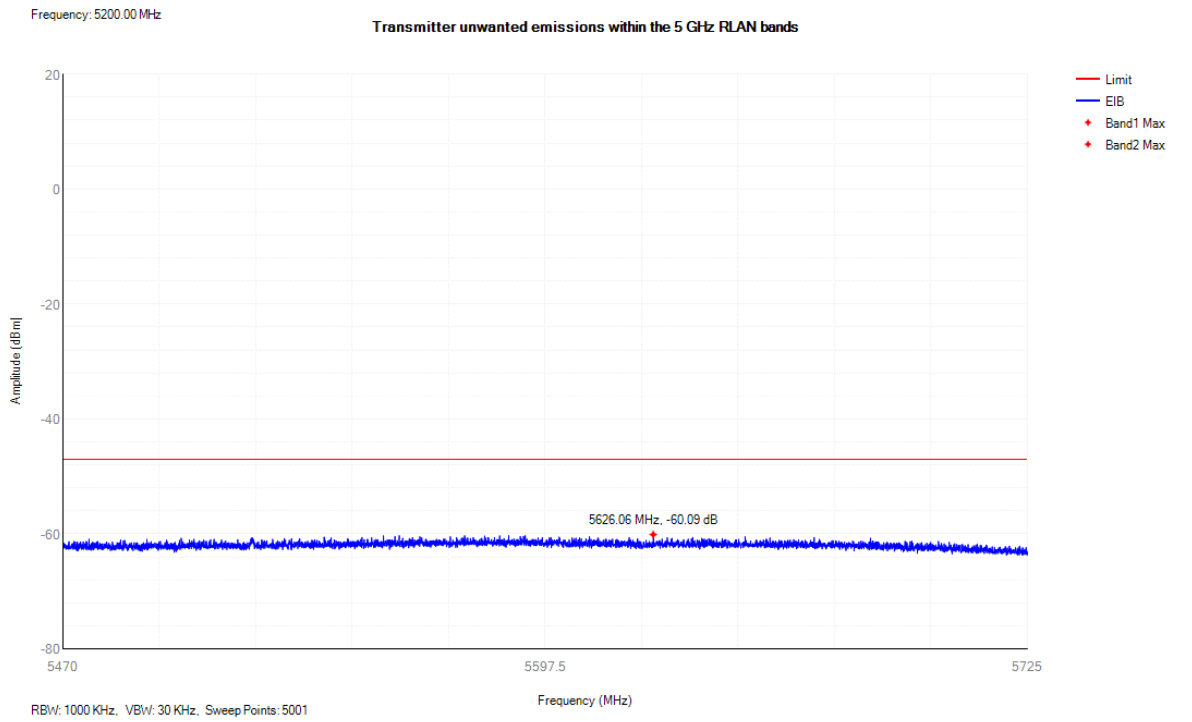
Tx. Emissions EIB NVNT ac20 5180MHz Sub Band2



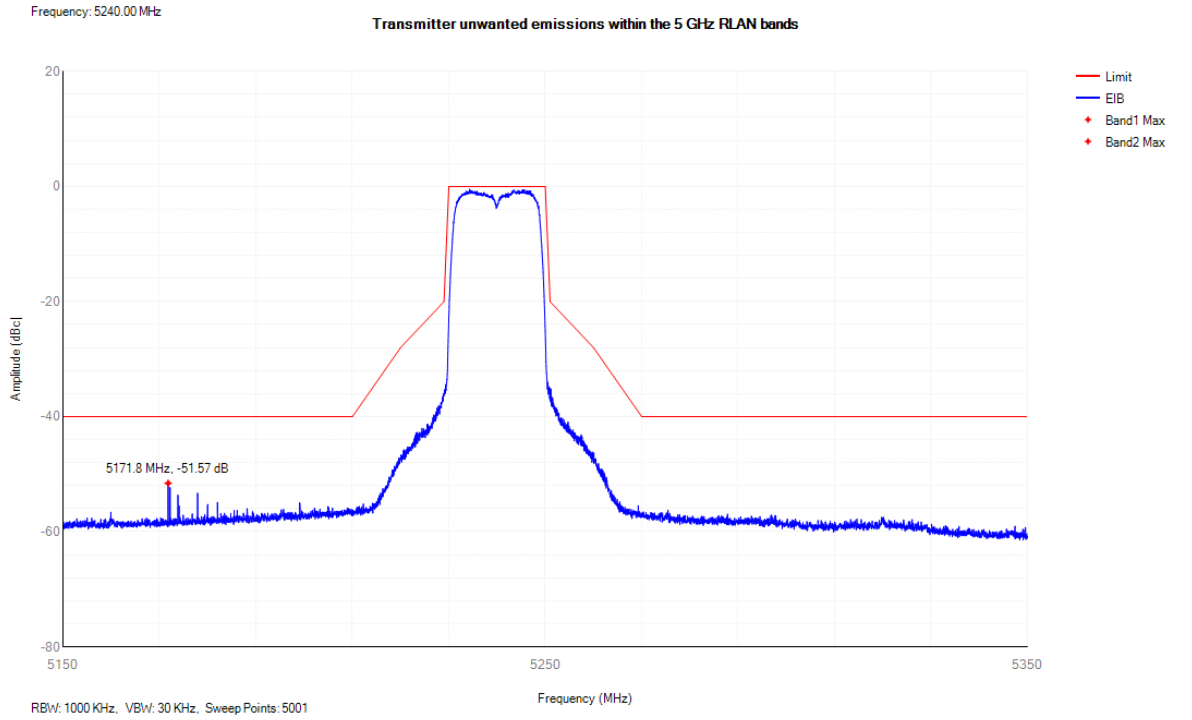
Tx. Emissions EIB NVNT ac20 5200MHz Sub Band1



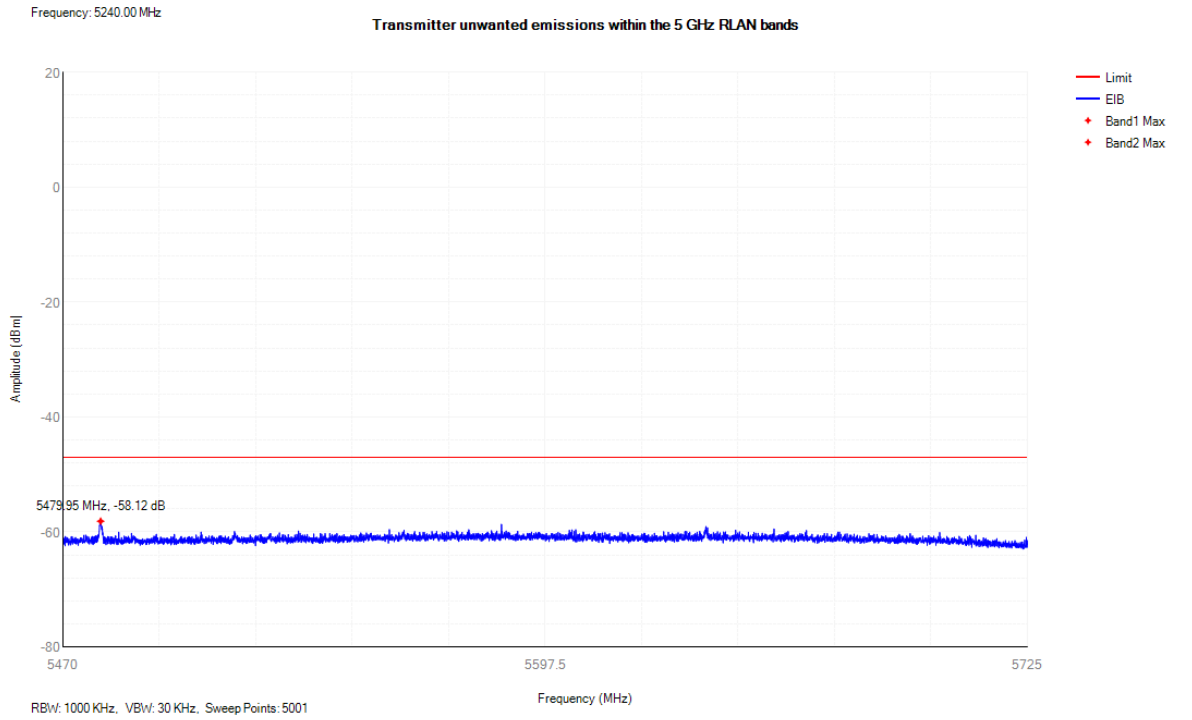
Tx. Emissions EIB NVNT ac20 5200MHz Sub Band2



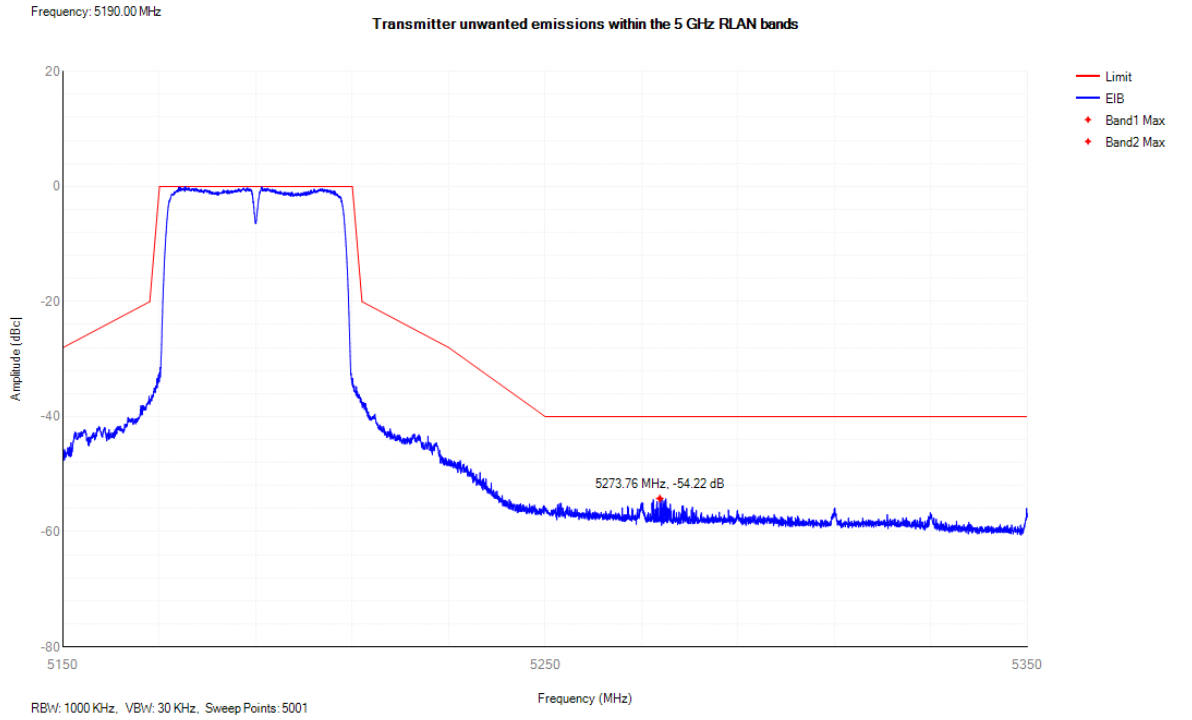
Tx. Emissions EIB NVNT ac20 5240MHz Sub Band1



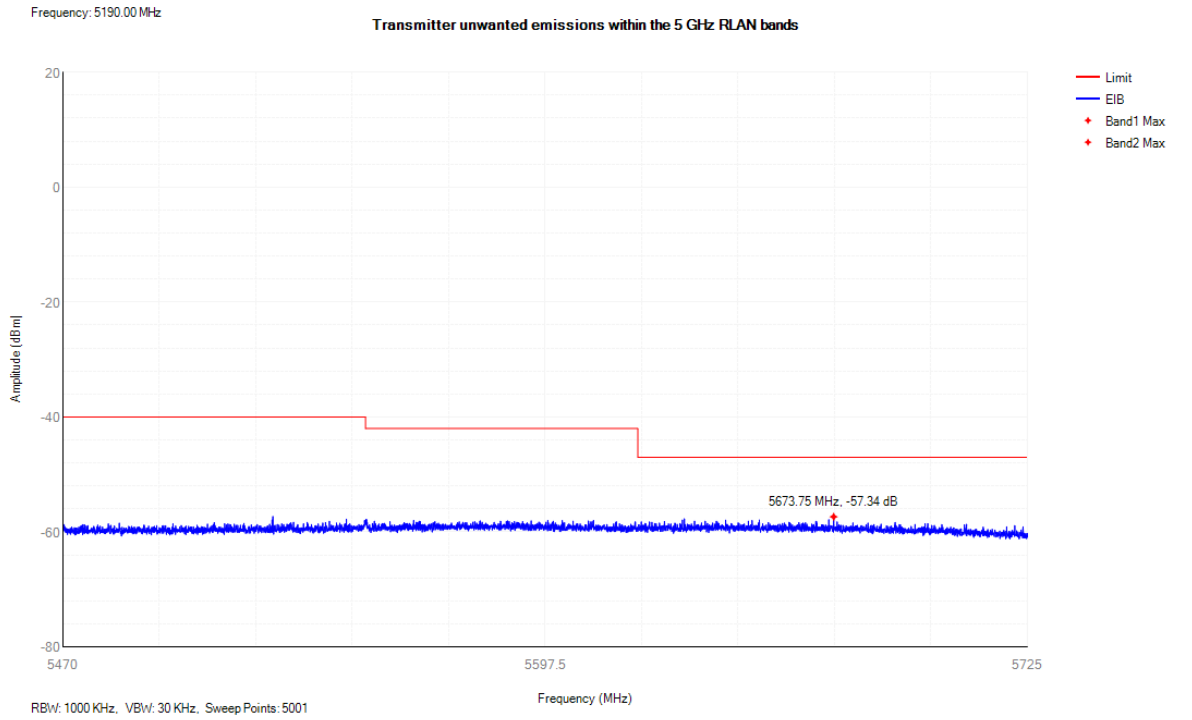
Tx. Emissions EIB NVNT ac20 5240MHz Sub Band2



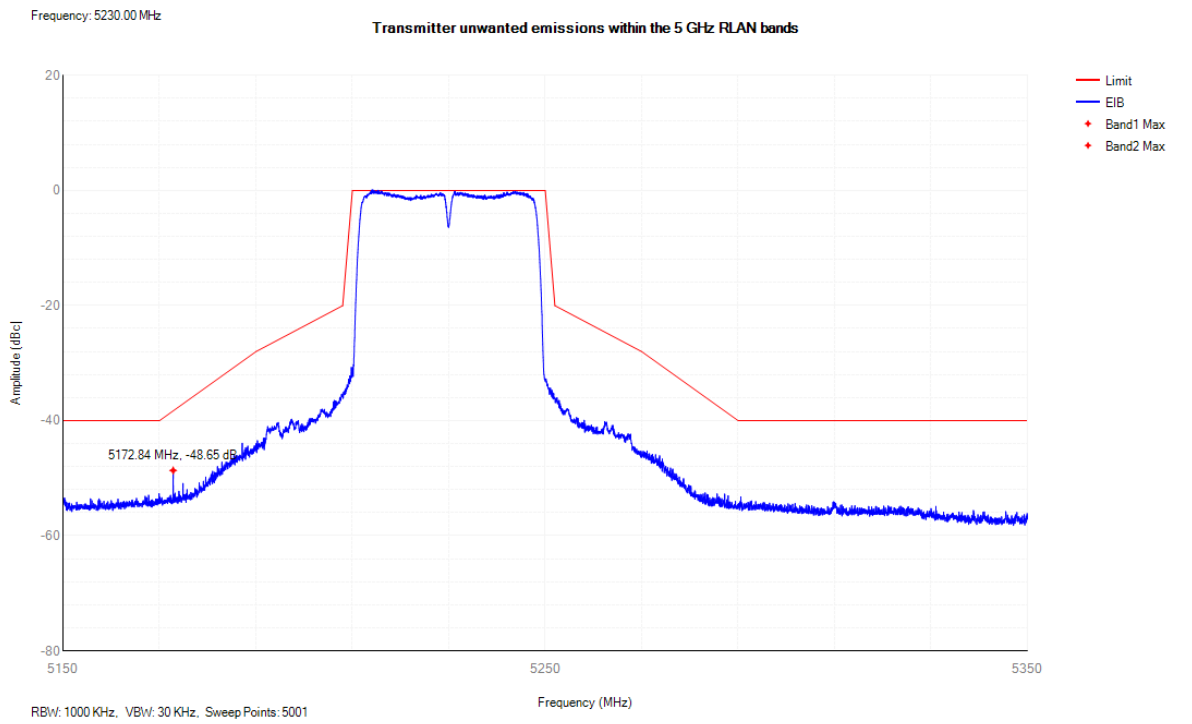
Tx. Emissions EIB NVNT ac40 5190MHz Sub Band1



Tx. Emissions EIB NVNT ac40 5190MHz Sub Band2



Tx. Emissions EIB NVNT ac40 5230MHz Sub Band1



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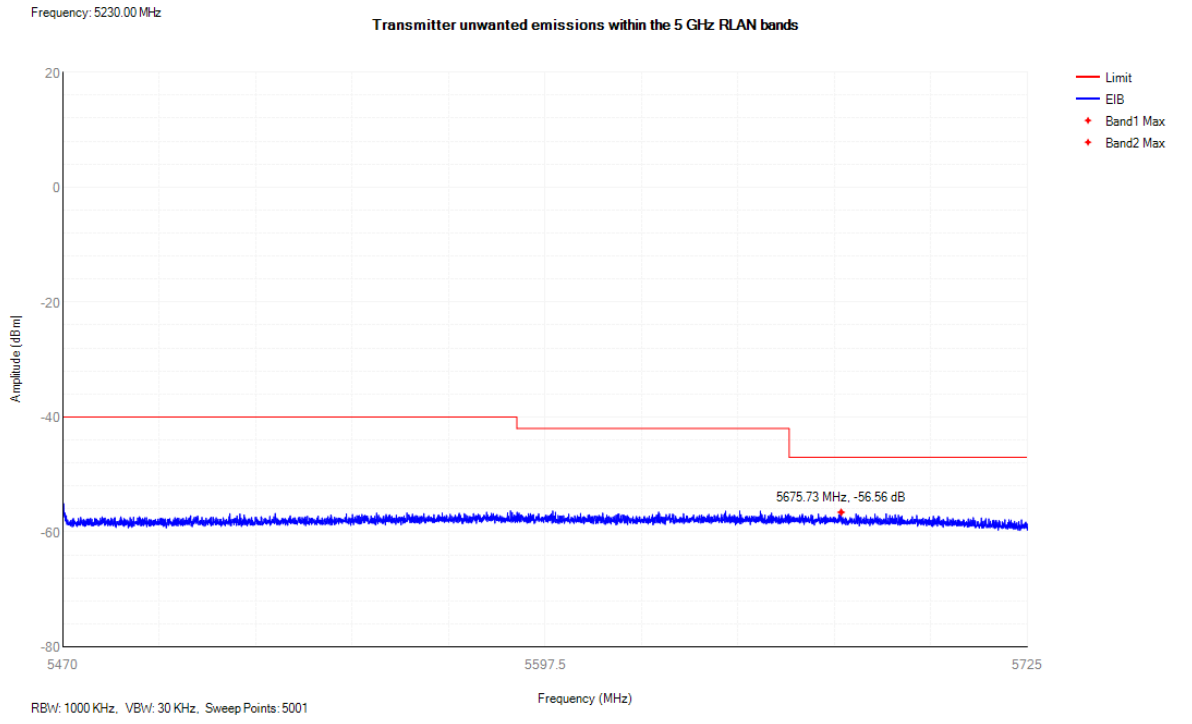
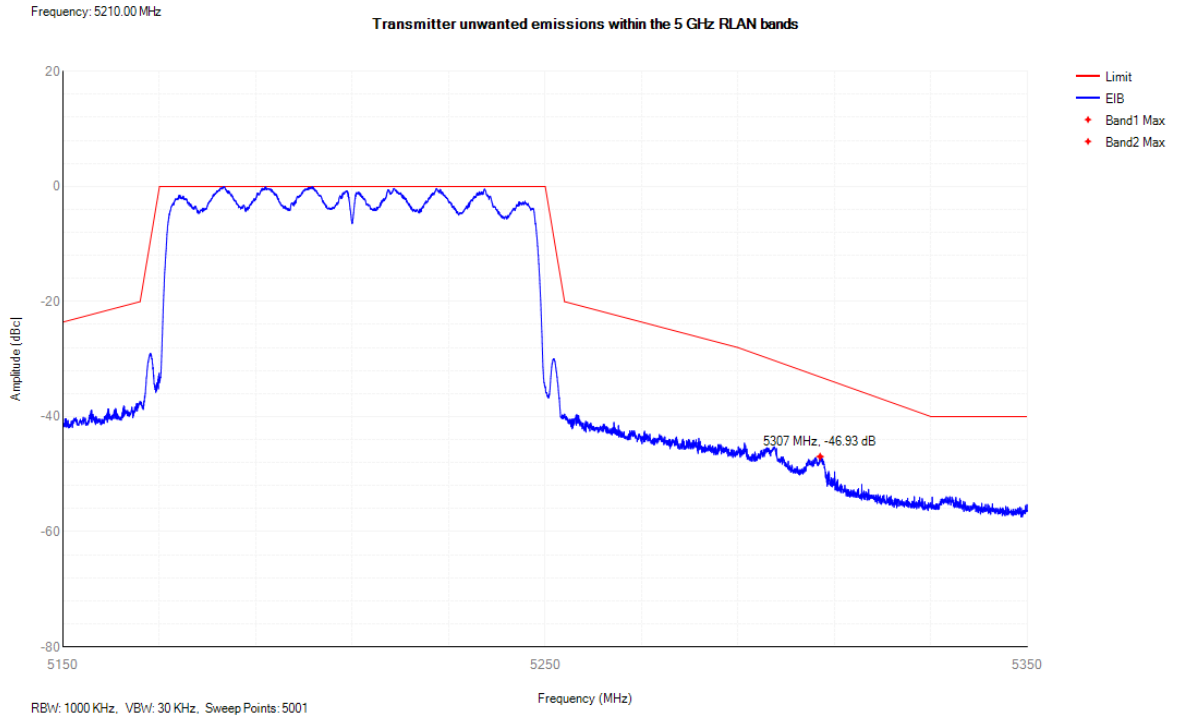


Tx. Emissions EIB NVNT ac80 5210MHz Sub Band1



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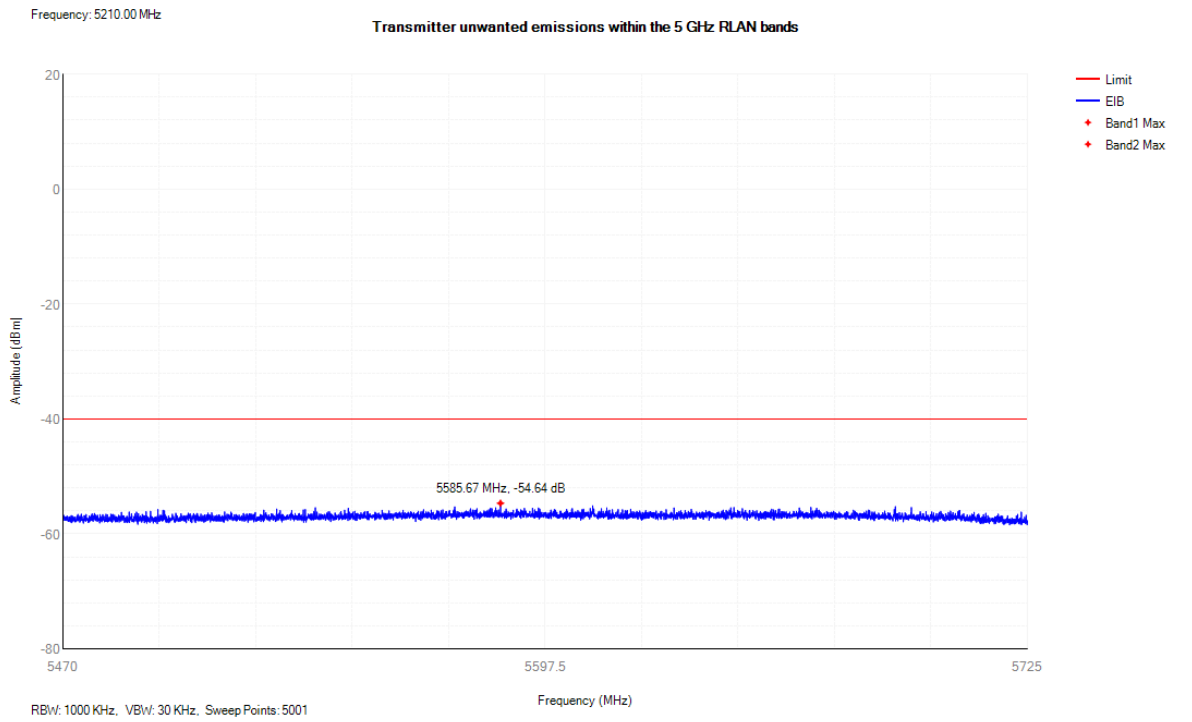
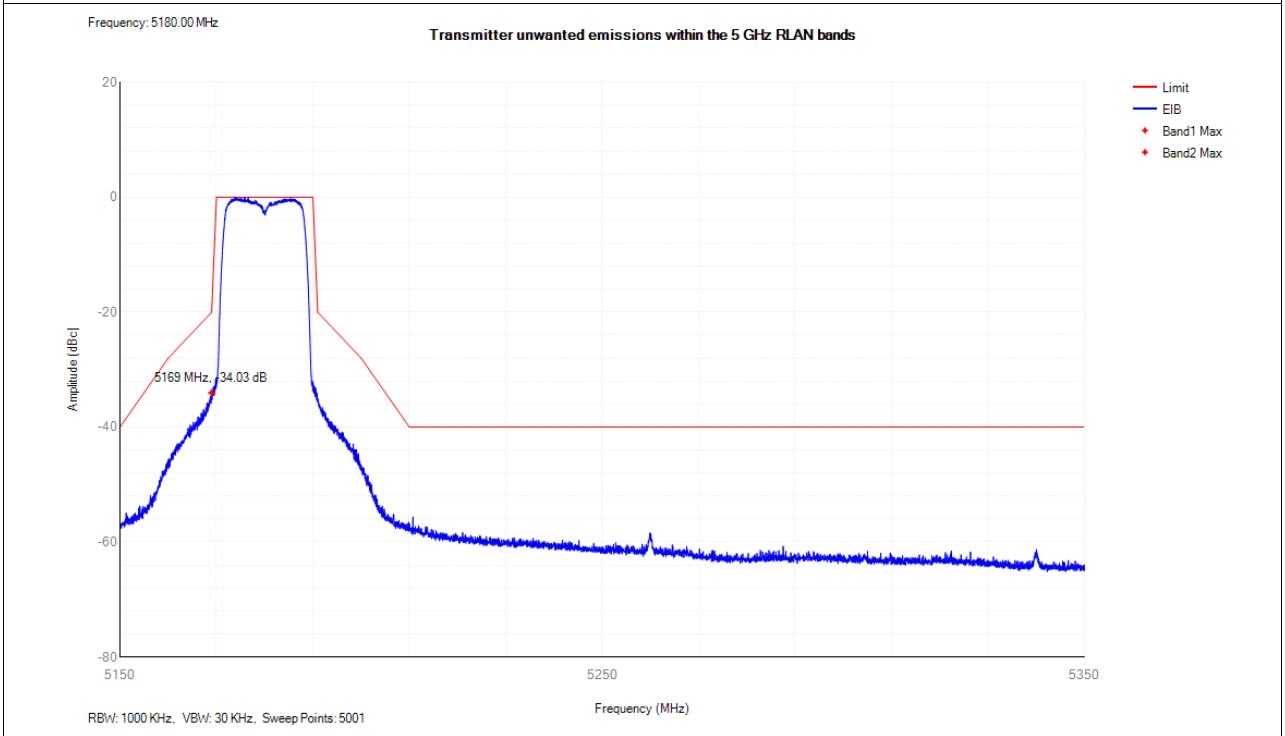
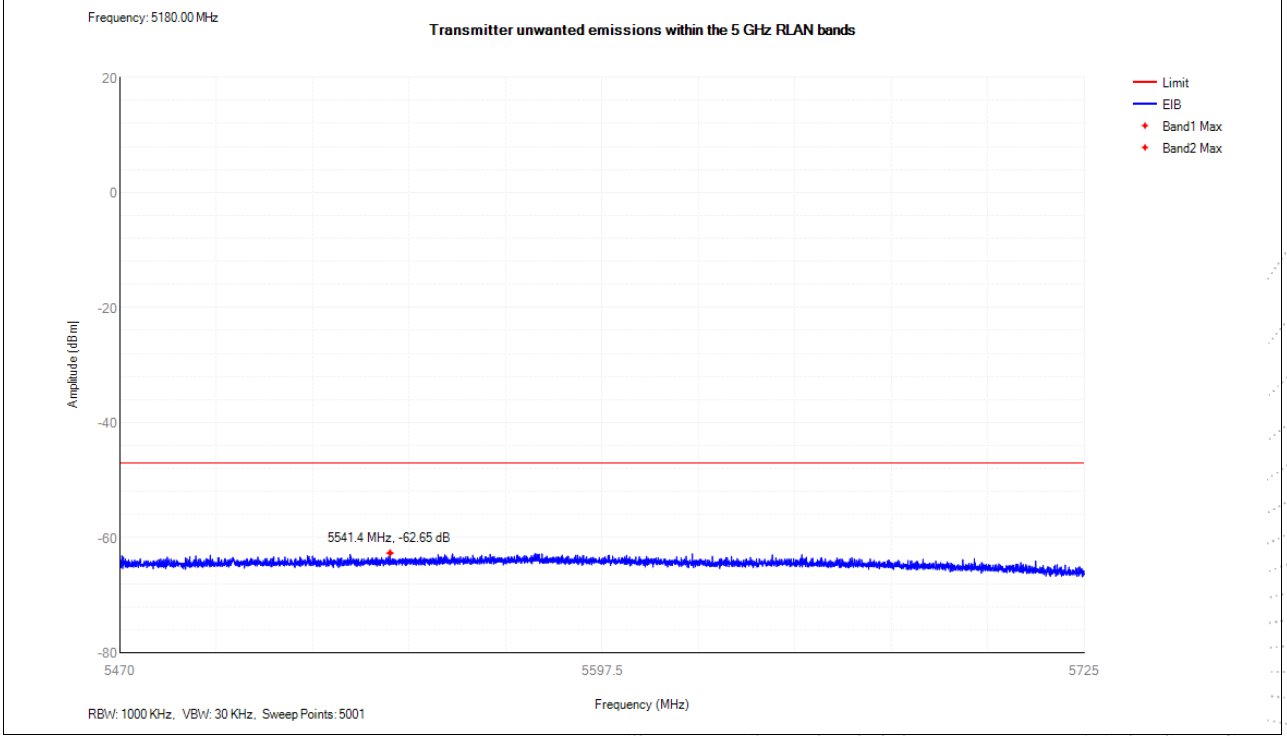


Ant B:

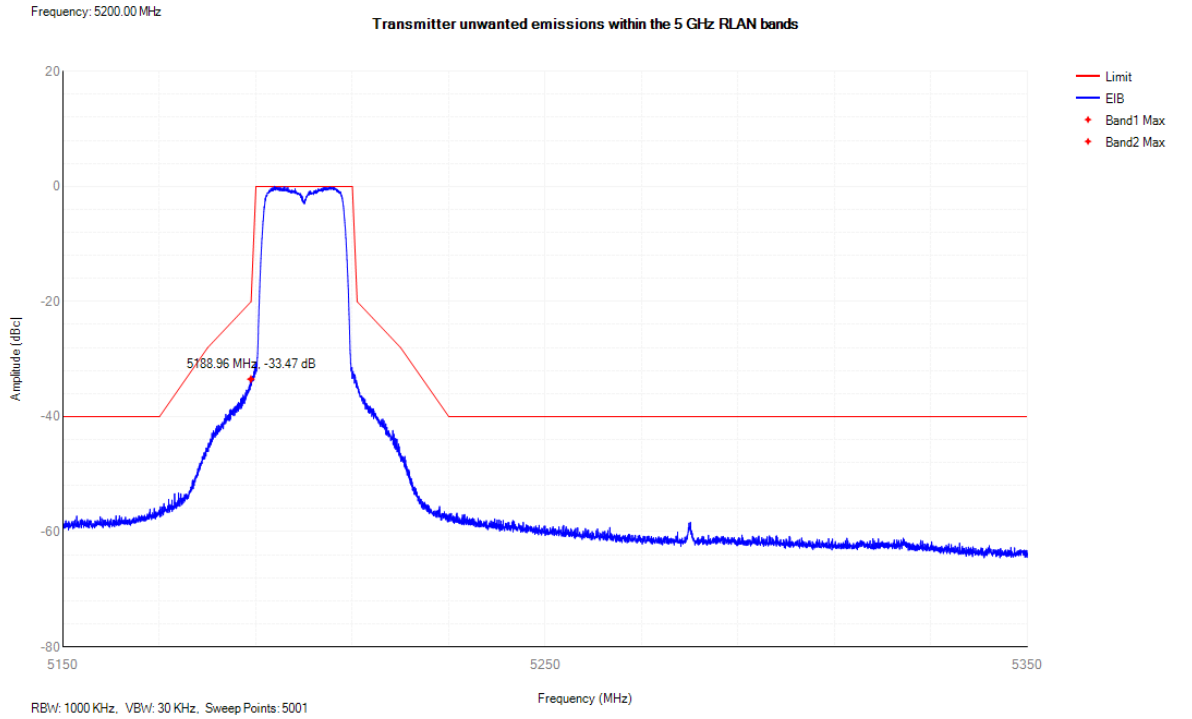
Test Graphs
Tx. Emissions EIB NVNT a 5180MHz Sub Band1



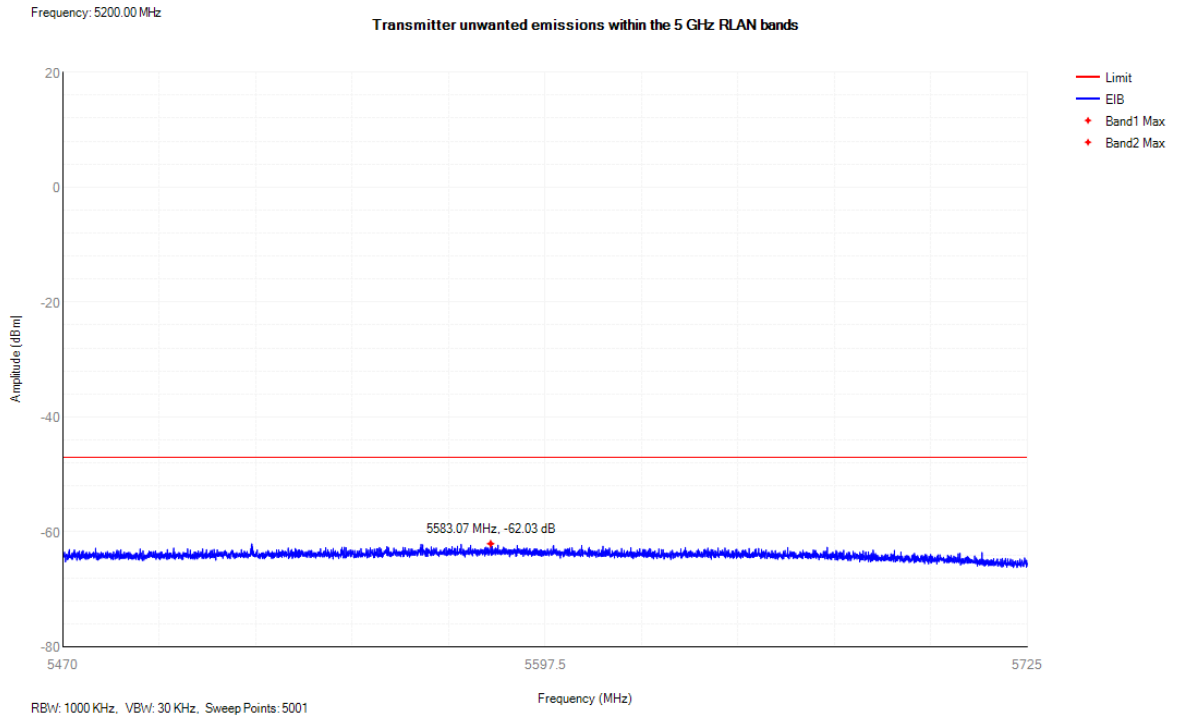
Tx. Emissions EIB NVNT a 5180MHz Sub Band2



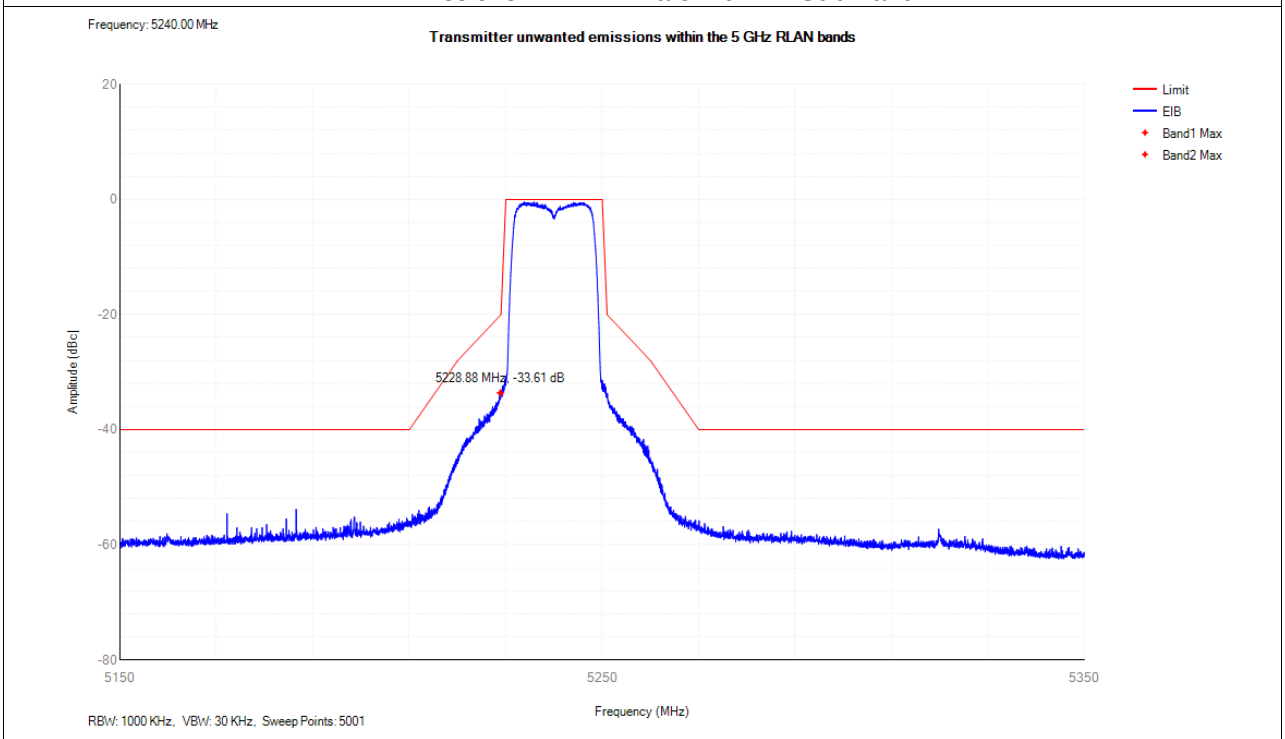
Tx. Emissions EIB NVNT a 5200MHz Sub Band1



Tx. Emissions EIB NVNT a 5200MHz Sub Band2



Tx. Emissions EIB NVNT a 5240MHz Sub Band1



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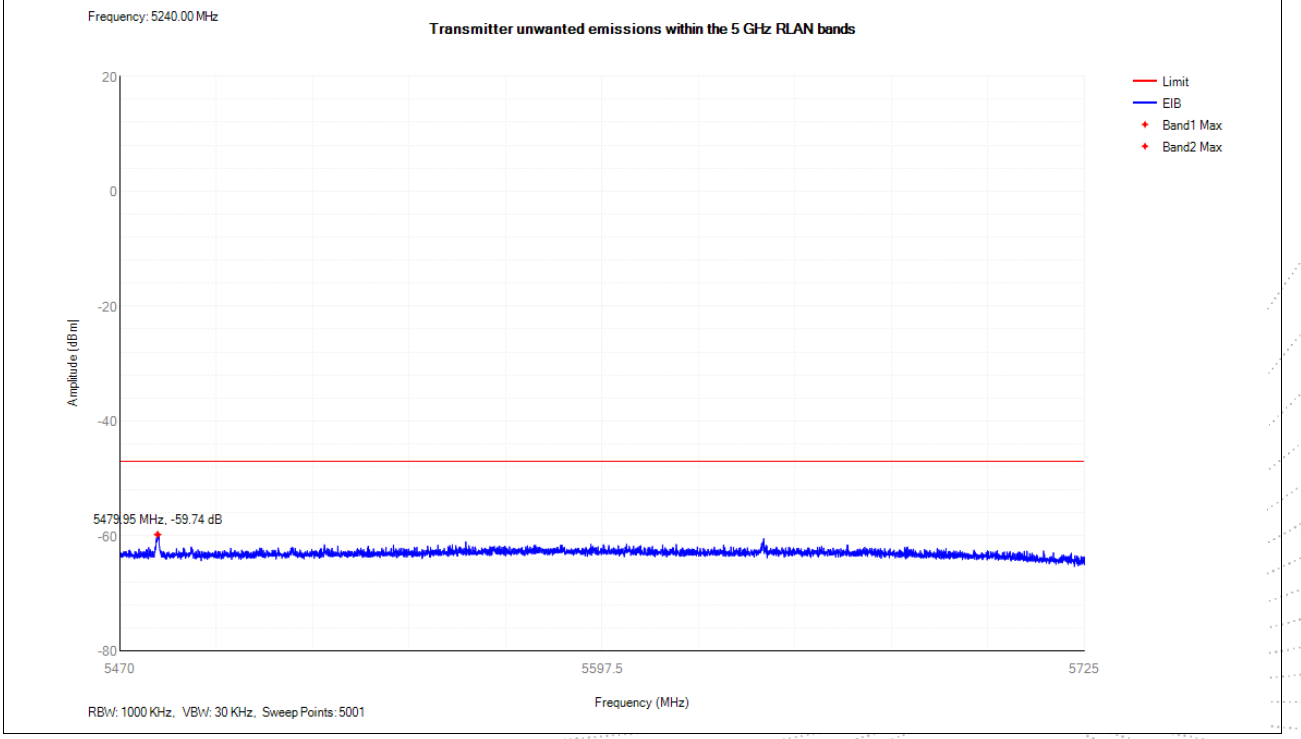
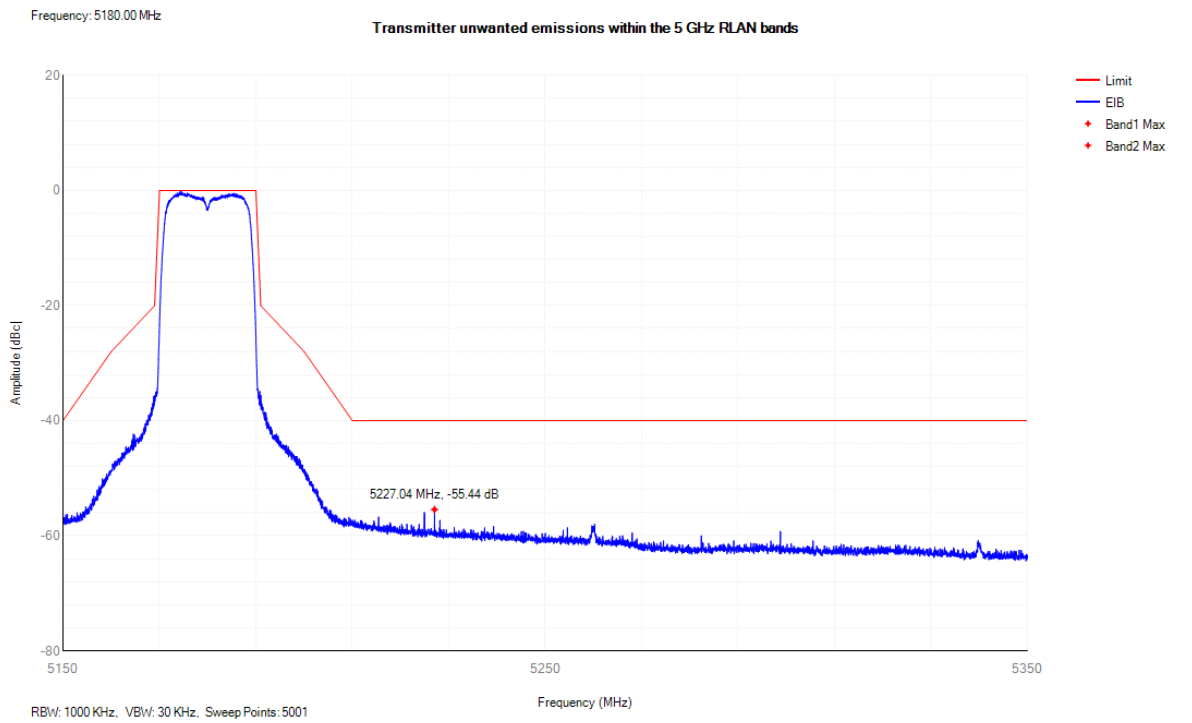
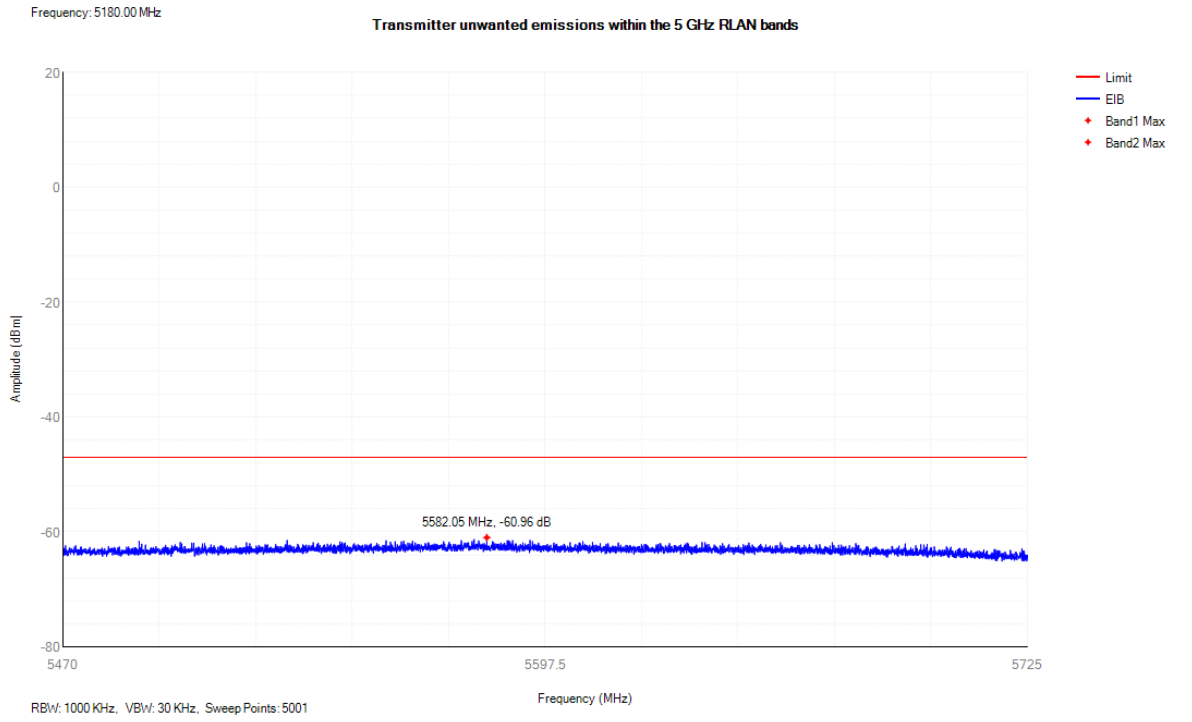


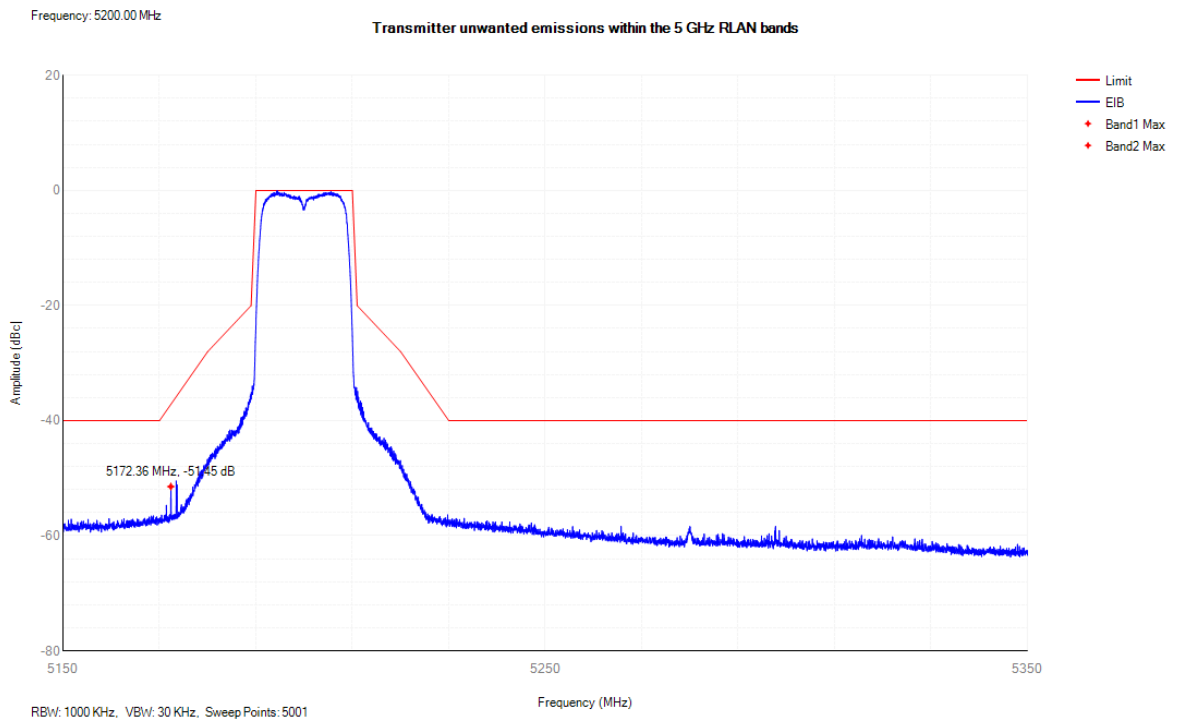
Tx. Emissions EIB NVNT n20 5180MHz Sub Band1



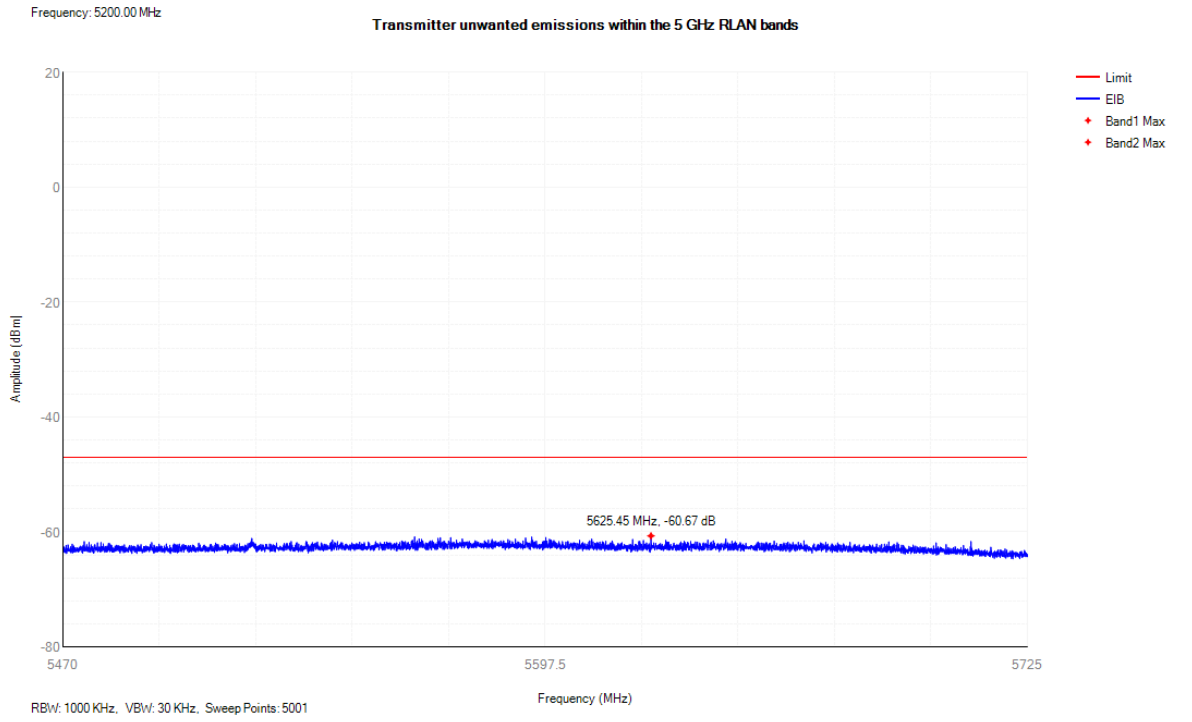
Tx. Emissions EIB NVNT n20 5180MHz Sub Band2



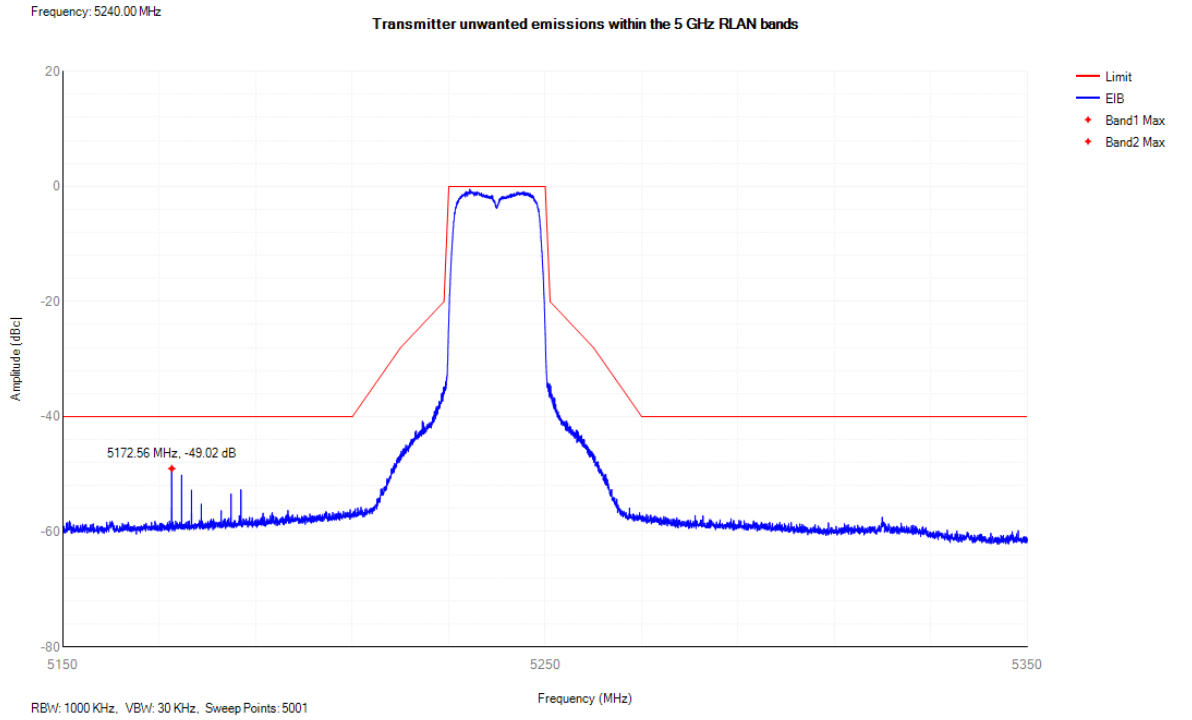
Tx. Emissions EIB NVNT n20 5200MHz Sub Band1



Tx. Emissions EIB NVNT n20 5200MHz Sub Band2



Tx. Emissions EIB NVNT n20 5240MHz Sub Band1



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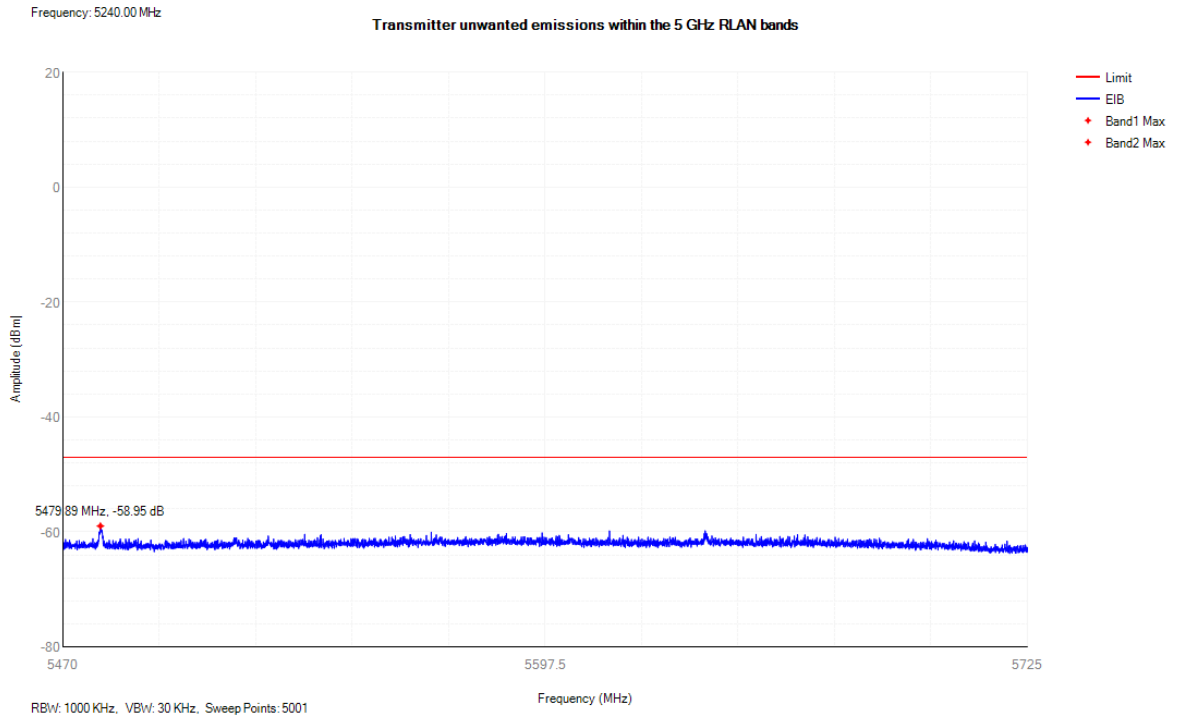
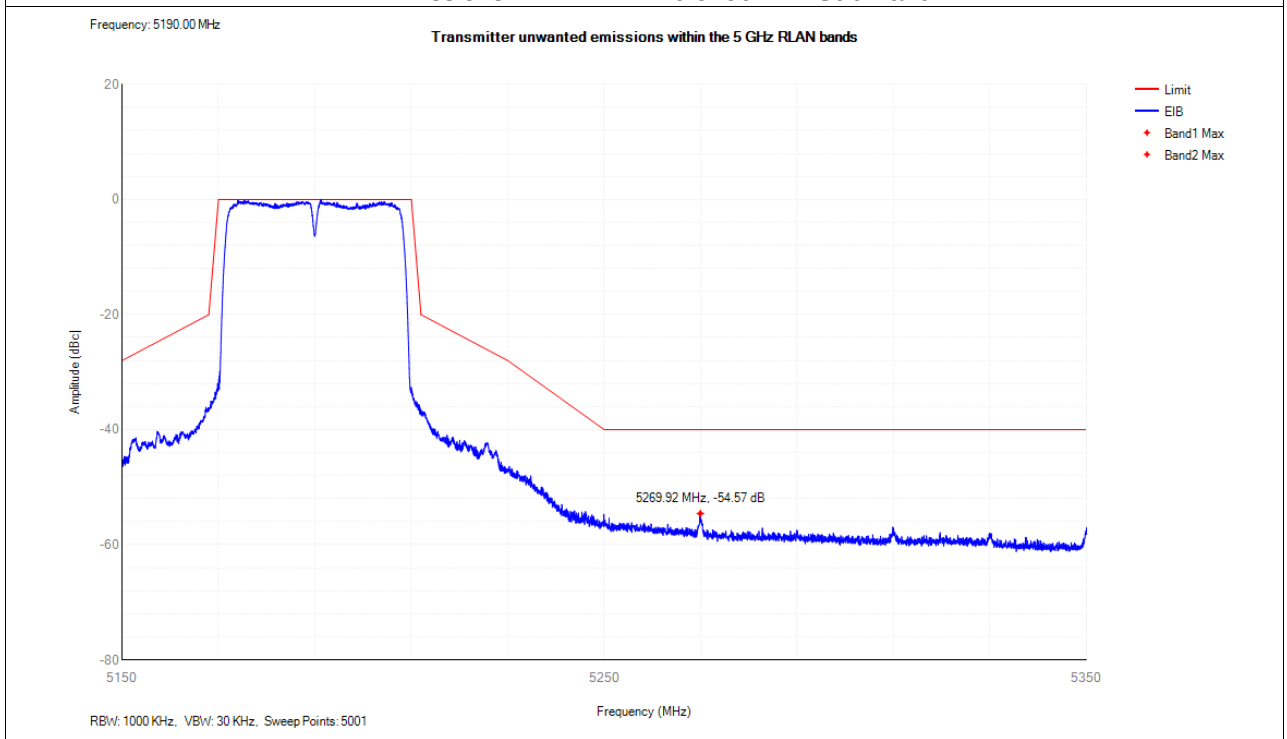


Tx. Emissions EIB NVNT n40 5190MHz Sub Band1



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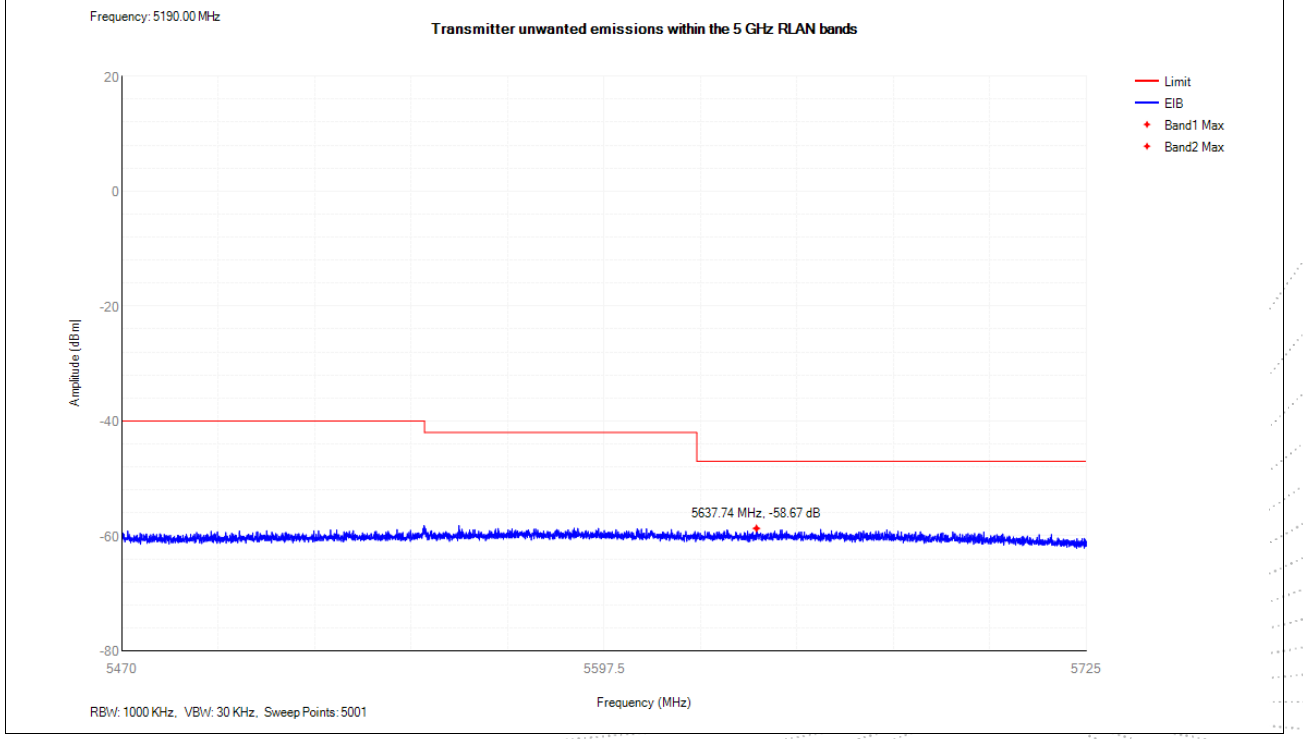
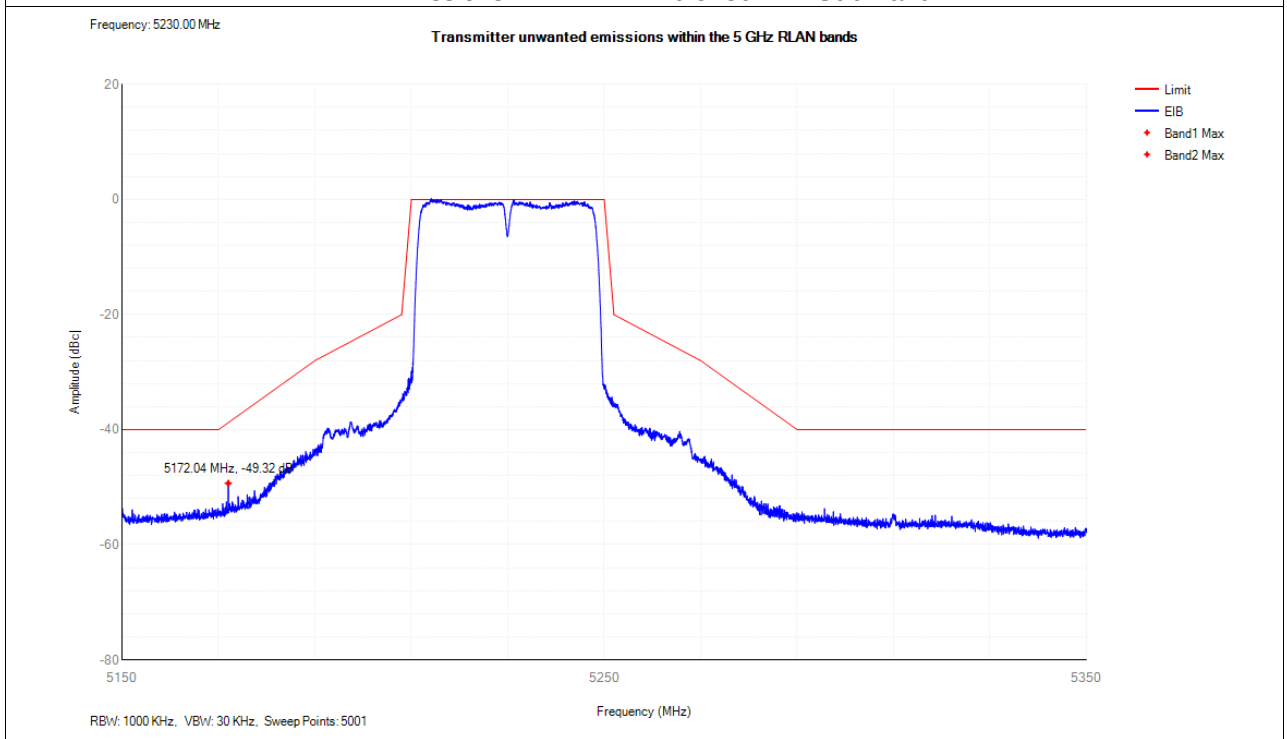
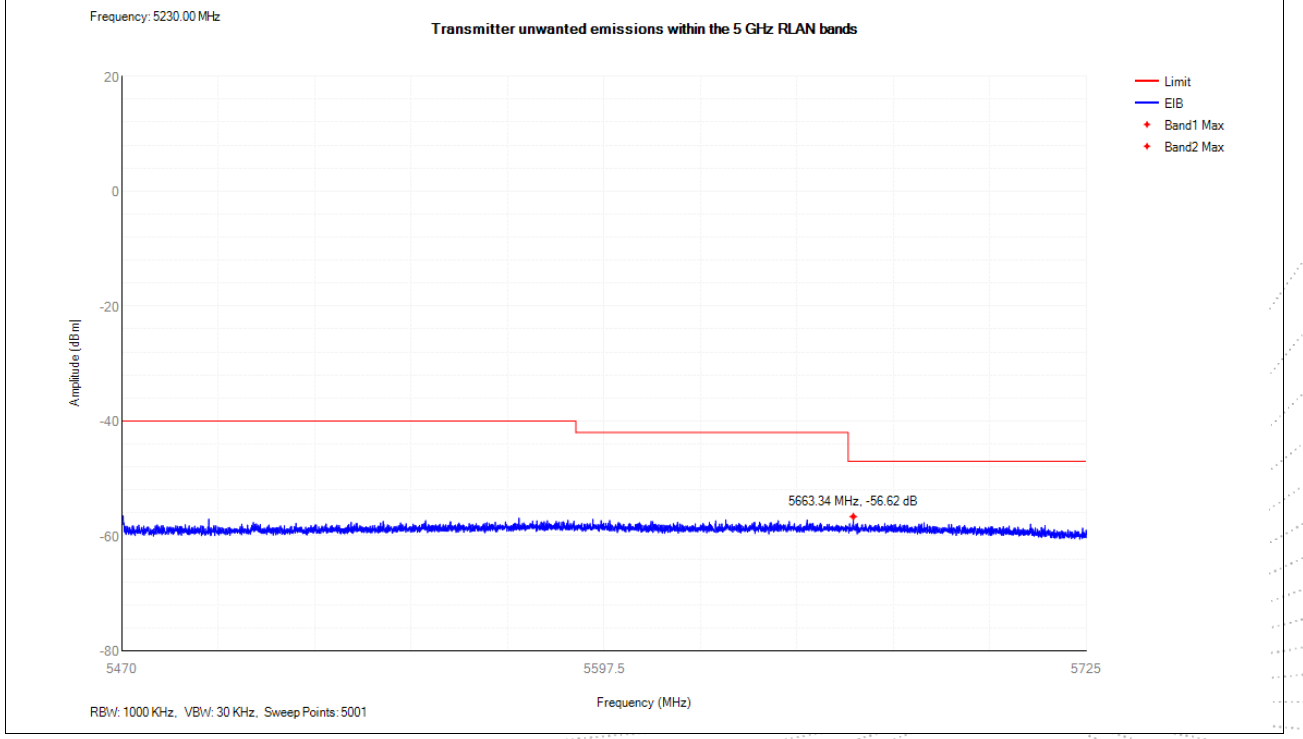


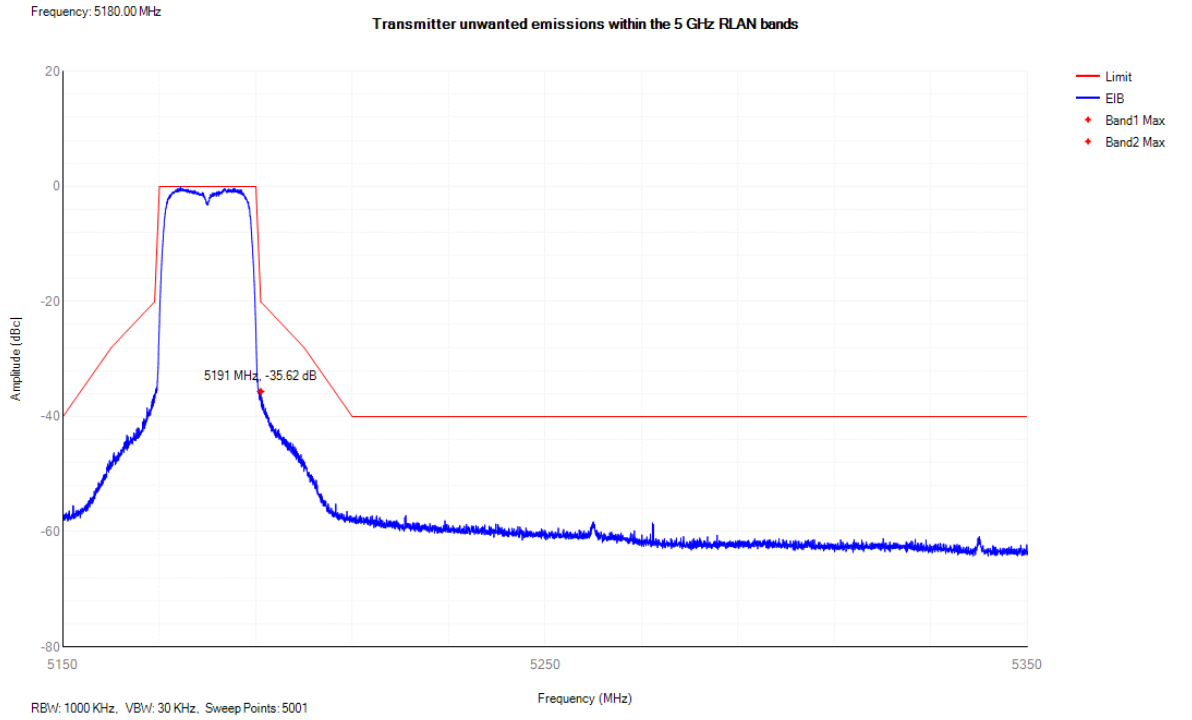
Tx. Emissions EIB NVNT n40 5230MHz Sub Band1



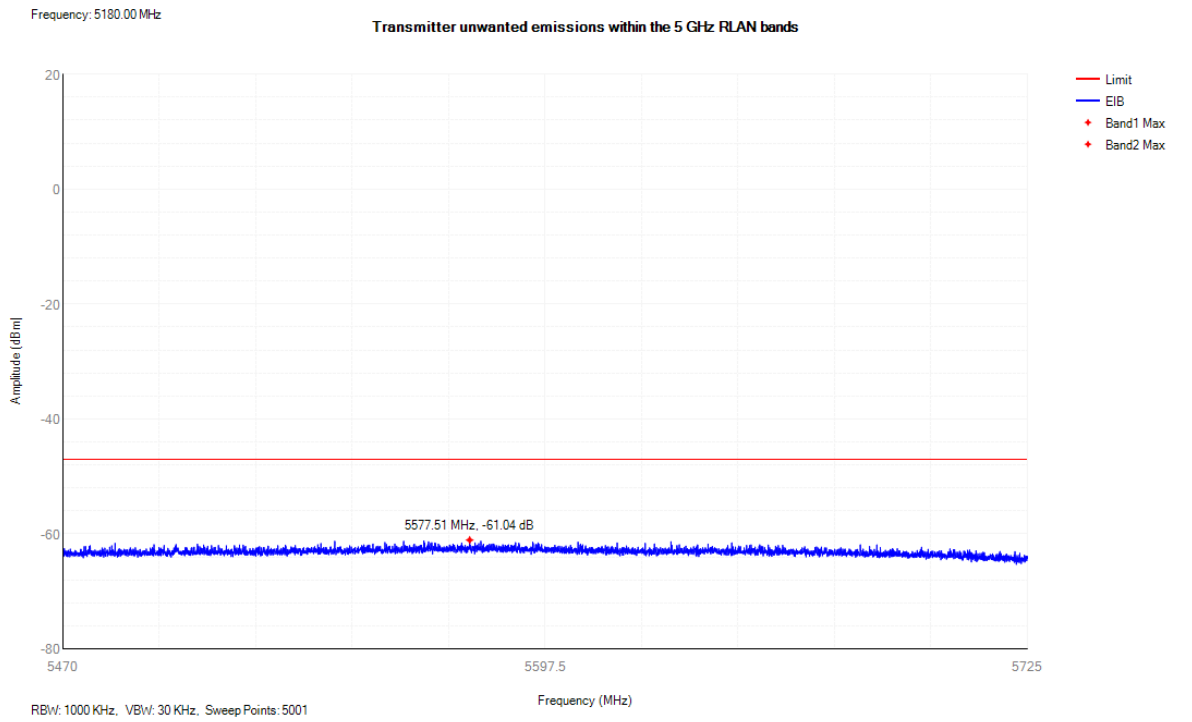
Tx. Emissions EIB NVNT n40 5230MHz Sub Band2



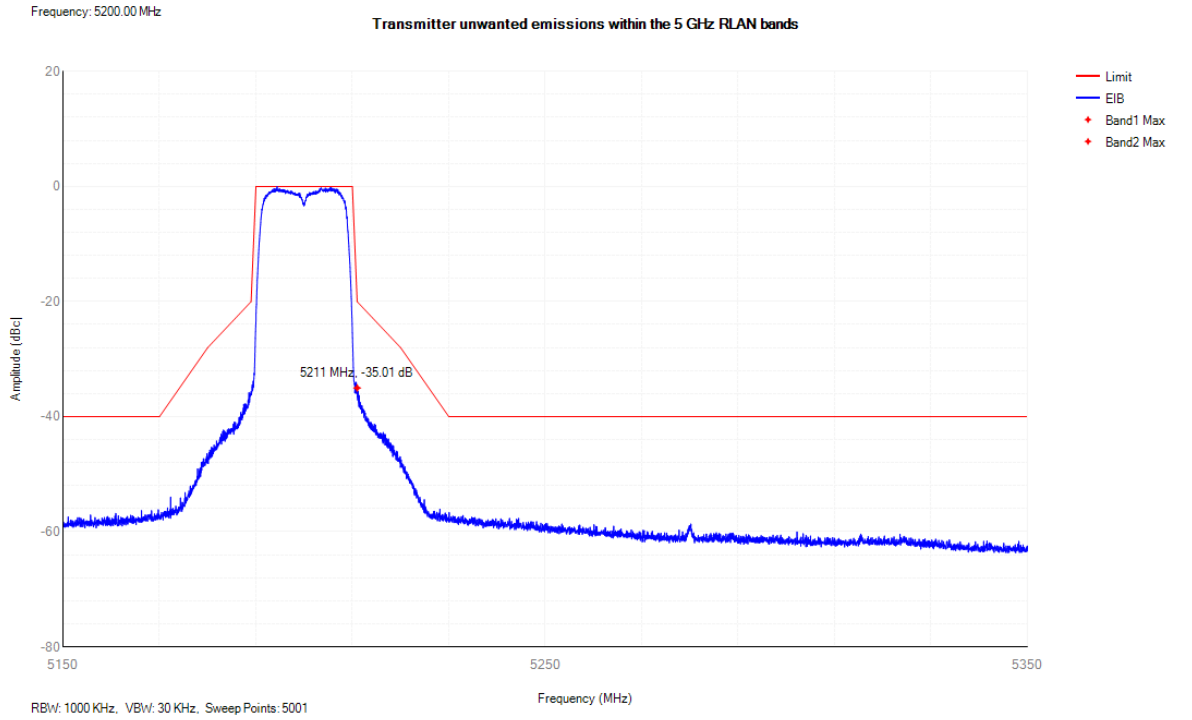
Tx. Emissions EIB NVNT ac20 5180MHz Sub Band1



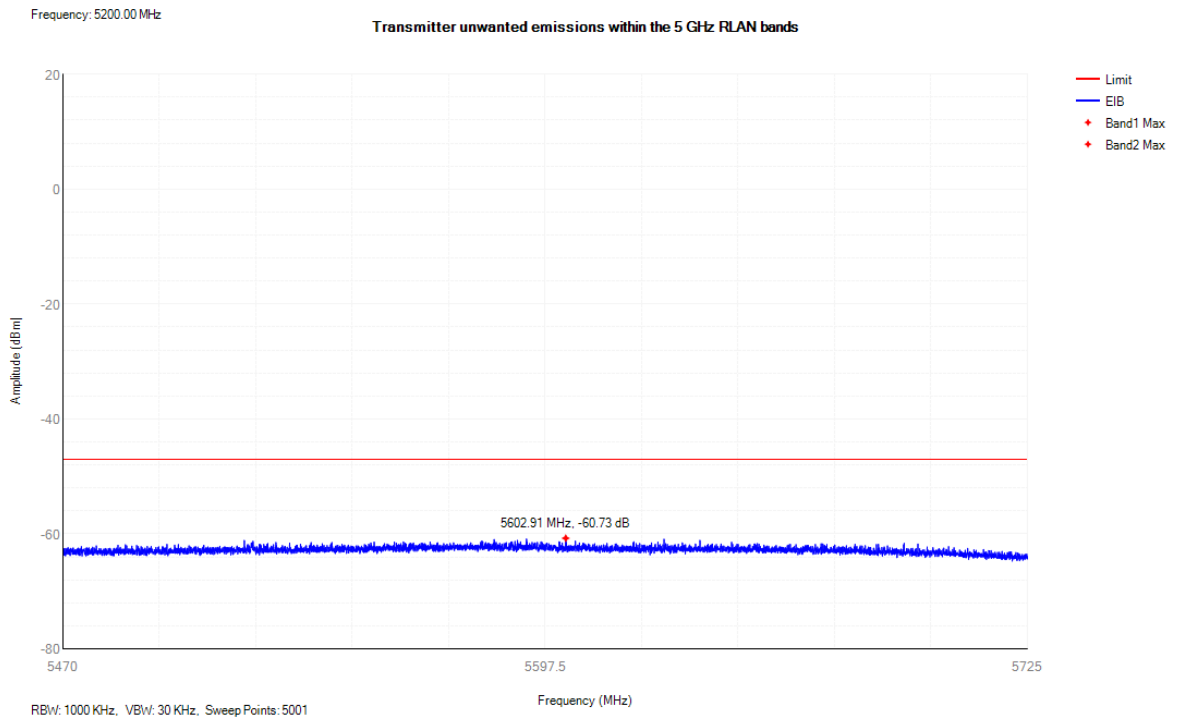
Tx. Emissions EIB NVNT ac20 5180MHz Sub Band2



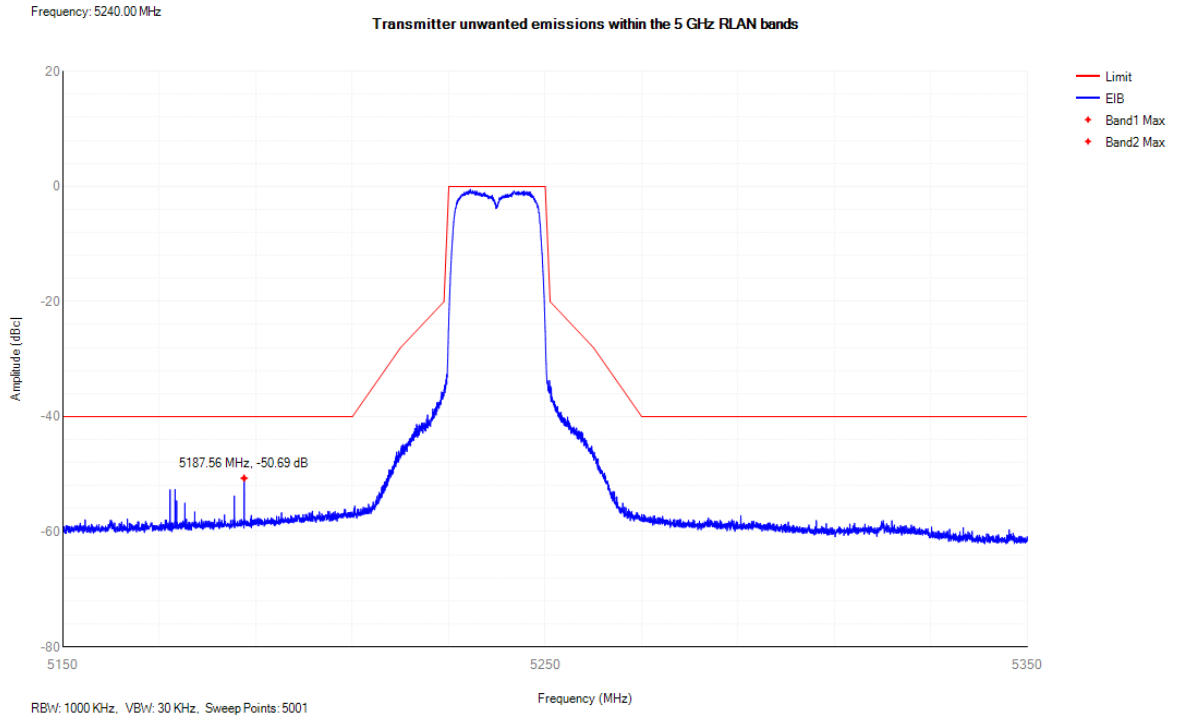
Tx. Emissions EIB NVNT ac20 5200MHz Sub Band1



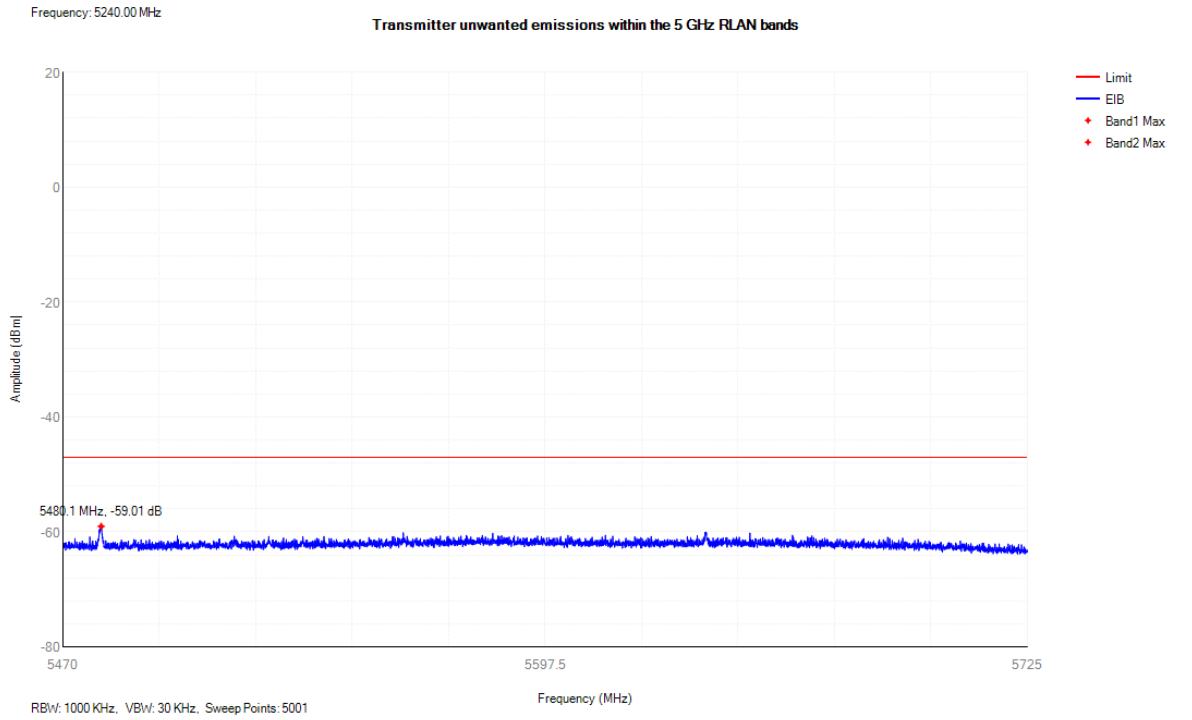
Tx. Emissions EIB NVNT ac20 5200MHz Sub Band2



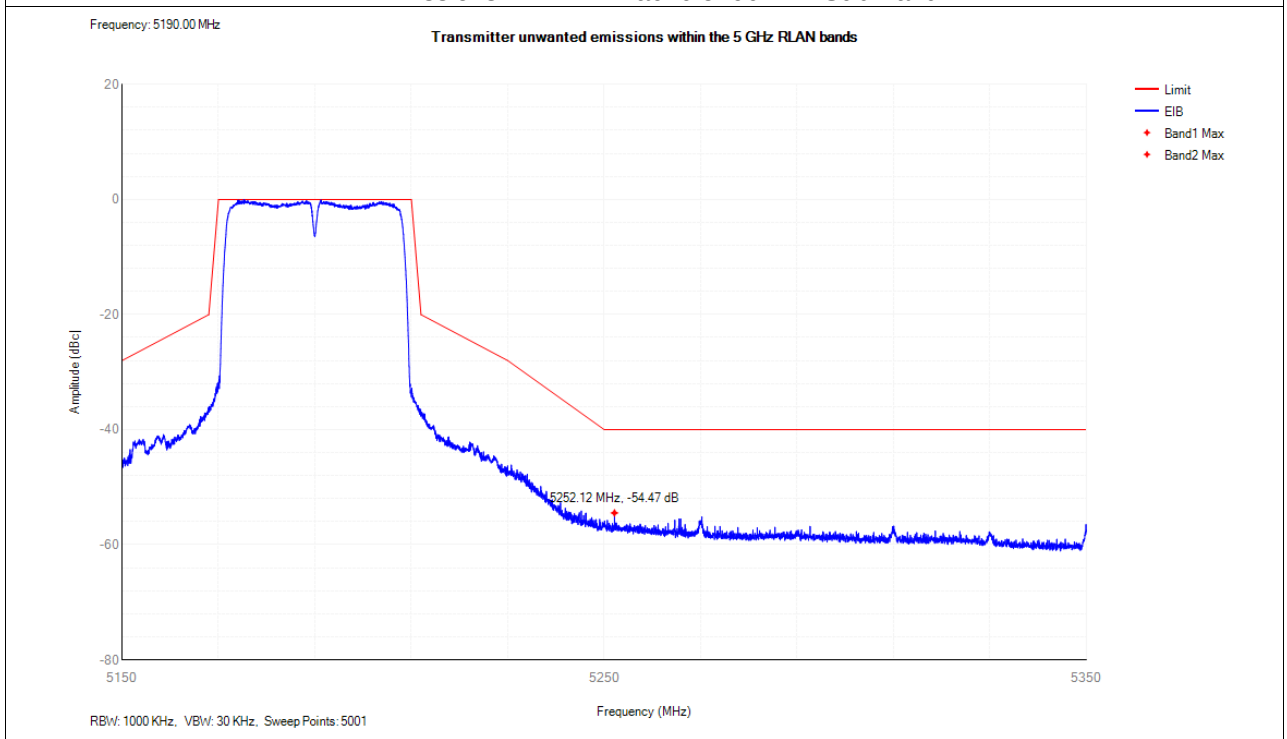
Tx. Emissions EIB NVNT ac20 5240MHz Sub Band1



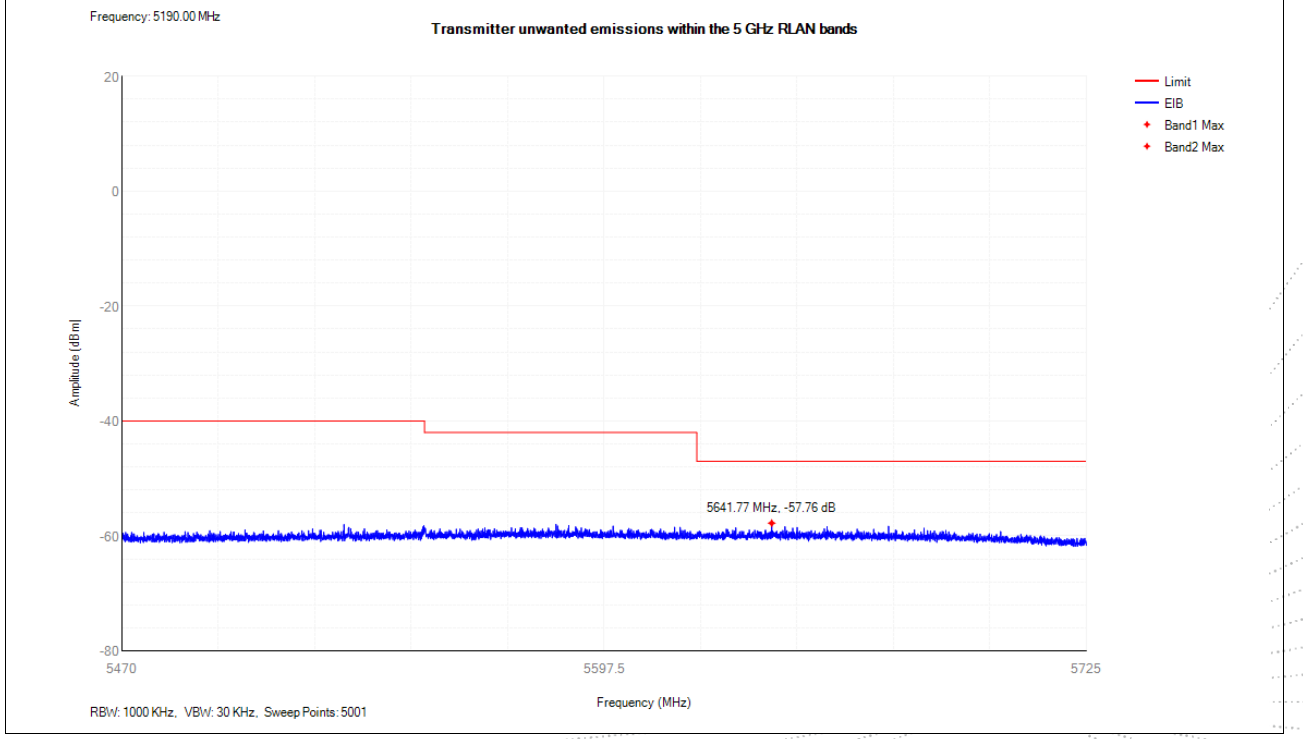
Tx. Emissions EIB NVNT ac20 5240MHz Sub Band2



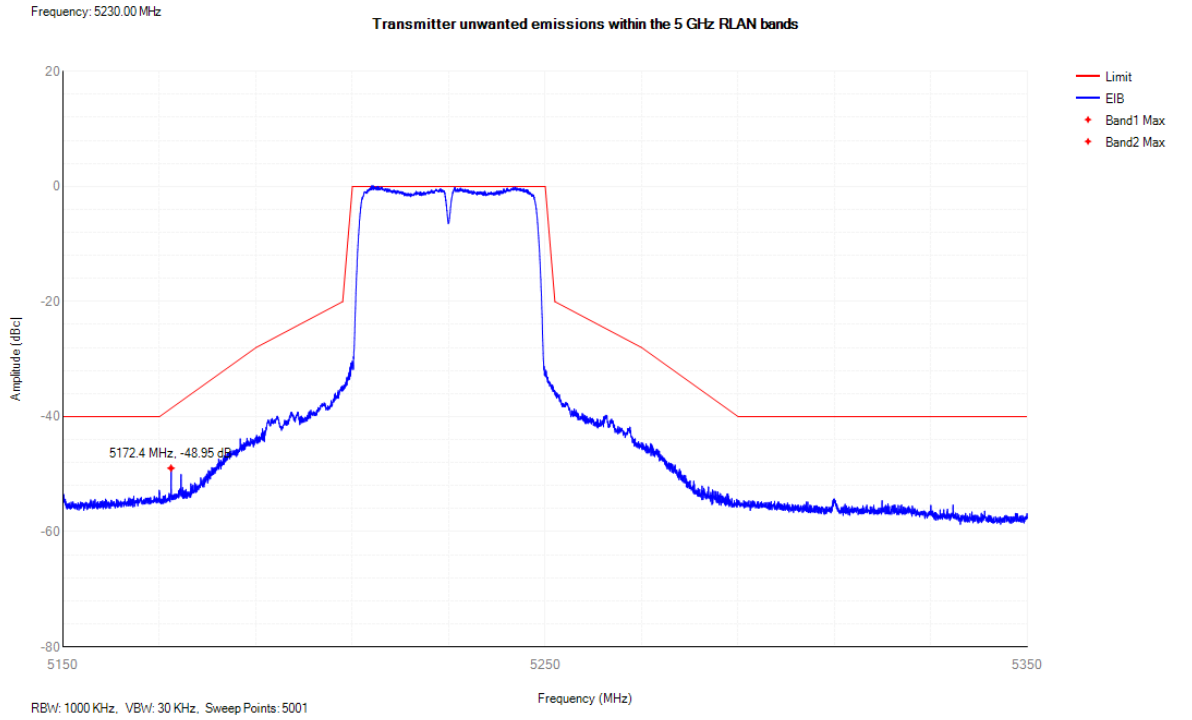
Tx. Emissions EIB NVNT ac40 5190MHz Sub Band1



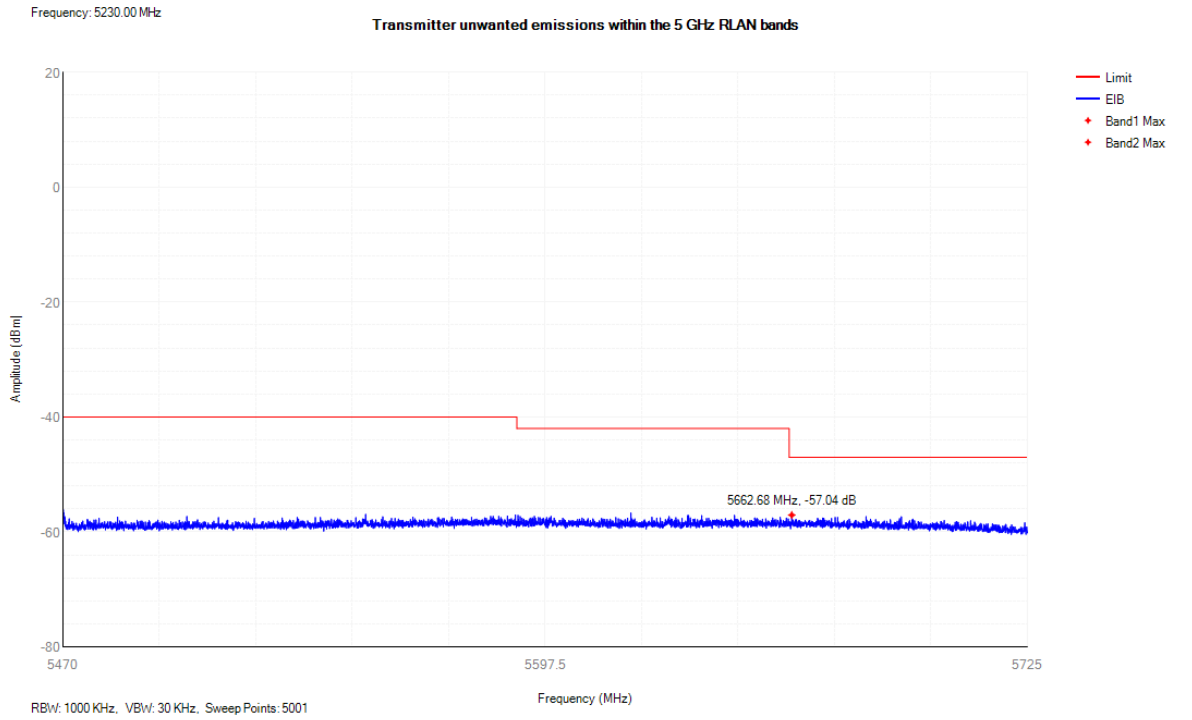
Tx. Emissions EIB NVNT ac40 5190MHz Sub Band2



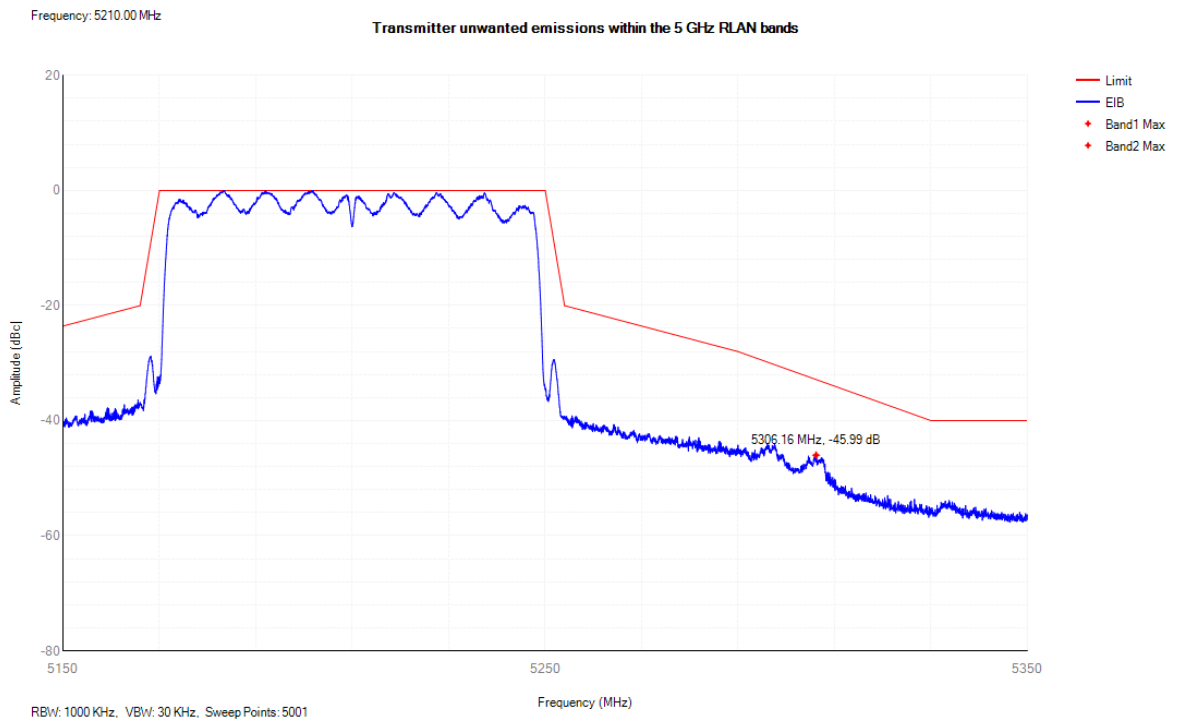
Tx. Emissions EIB NVNT ac40 5230MHz Sub Band1



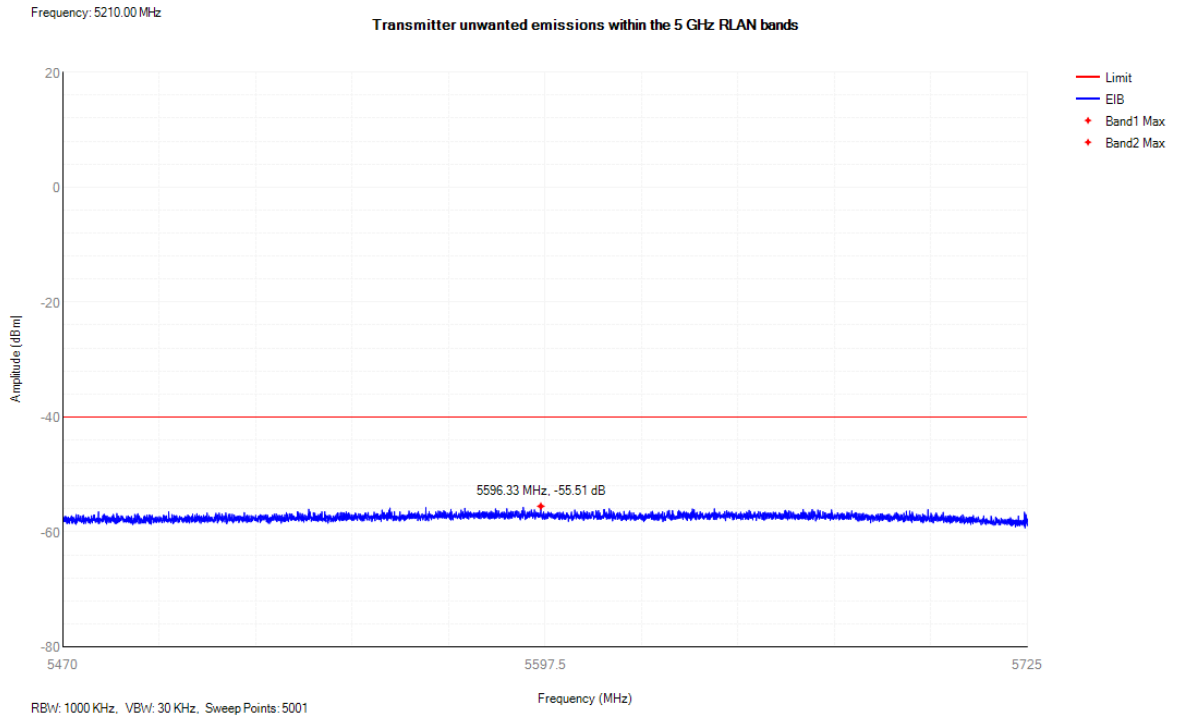
Tx. Emissions EIB NVNT ac40 5230MHz Sub Band2



Tx. Emissions EIB NVNT ac80 5210MHz Sub Band1



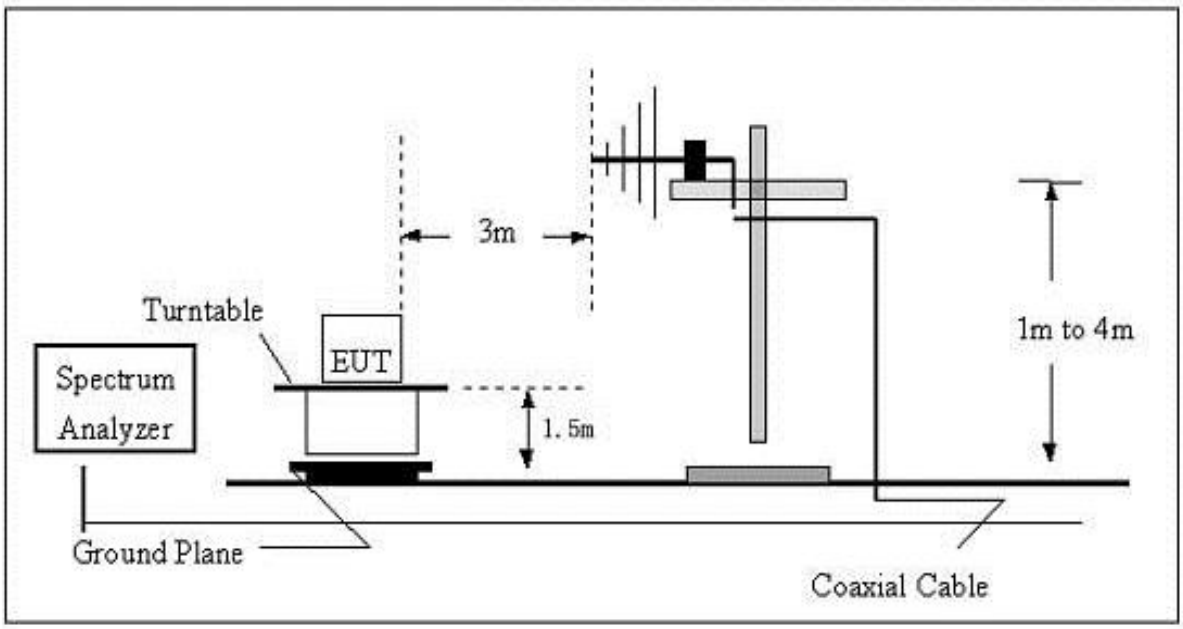
Tx. Emissions EIB NVNT ac80 5210MHz Sub Band2



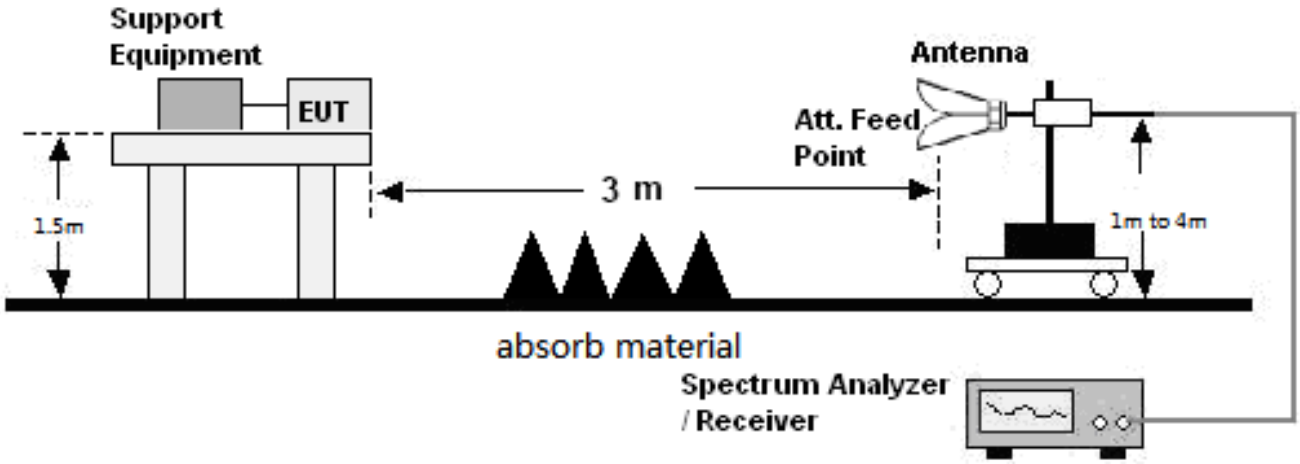
13. Receiver Spurious Emissions

13.1 Block Diagram Of Test Setup

(A)Radiated Emission Test Set-Up Frequency Below 1GHz.



(B)Radiated Emission Test Set-Up Frequency Above 1GHz.



13.2 Limits

Frequency(MHz)	Limit
30-1000	-57dBm
1000-26000	-47dBm

13.3 Test Procedure

30MHz ~ 1GHz:
a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.
Above 1GHz:
a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

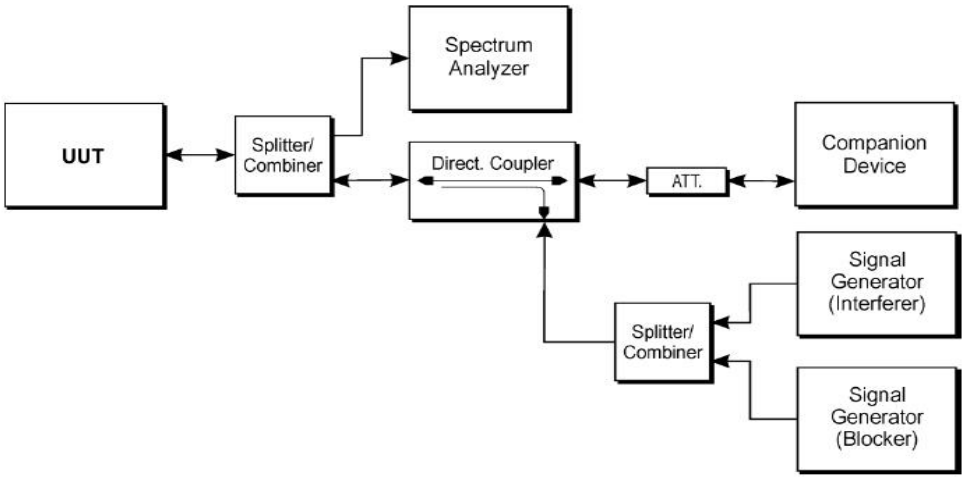
13.4 Test Results

All modes have been tested and reports show data in the worst mode
Test Mode: Transmitting 802.11n20 (worst case)

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
802.11n20 low channel								
238.08	-51.86	76	1.4	H	-15.52	-67.38	-57.00	-10.38
238.08	-53.03	338	1.6	V	-15.52	-68.55	-57.00	-11.55
2396.35	-49.36	15	1.5	H	-6.70	-56.07	-47.00	-9.07
2396.35	-50.15	53	1.4	V	-6.70	-56.85	-47.00	-9.85
802.11n20 Mid channel								
238.08	-52.55	42	1.6	H	-15.52	-68.07	-57.00	-11.07
238.08	-52.40	324	1.4	V	-15.52	-67.92	-57.00	-10.92
2396.35	-48.80	333	1.4	H	-6.70	-55.51	-47.00	-8.51
2396.35	-49.28	221	1.7	V	-6.70	-55.98	-47.00	-8.98
802.11 n20 high channel								
238.08	-50.97	48	1.5	H	-15.52	-66.49	-57.00	-9.49
238.08	-53.40	331	1.2	V	-15.52	-68.92	-57.00	-11.92
2396.35	-48.75	294	1.3	H	-6.70	-55.45	-47.00	-8.45
2396.35	-50.87	326	1.4	V	-6.70	-57.58	-47.00	-10.58

14. Adaptivity

14.1 Block Diagram Of Test Setup



14.2 Limit

Requirement	Operational Mode		
	Frame Based Equipment	Load Based Equipment (CCA using 'energy detect')	Load Based Equipment (CCA not using any of the mechanisms referenced)
Minimum Clear Channel Assessment (CCA) Time	20 us (see note 1)	(see note 2)	20 us (see note 1)
Maximum Channel Occupancy (COT) Time	1ms to 10 ms	(see note 2)	(13/32)*q ms (see note 3)
Minimum Idle Period	5% of COT	(see note 2)	NA
Extended CCA check	NA	(see note 2)	N*CCA (see note 4)
Short Control Signalling Transmissions	Maximum duty cycle of 5% within an observation period of 50 ms (see note 5)		

Note 1: The CCA time used by the equipment shall be declared by the manufacturer.
Note 2: LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using 'energy detect', as described in IEEE 802.11™-2007[9], clauses 15 and 17, in IEEE 802.11n ™ -2009[10], clauses 20.
Note 3: q is selected by the manufacturer in the range [4…32]
Note 4: The value of N shall be randomly selected in the range [1…q]
Note 5: Adaptive equipment may or may not have Short Control Signaling Transmissions.

14.3 Test procedure

Step 1:

- The UUT shall connect to a companion device during the test. The signal generator, the spectrum analyser, the UUT, the traffic source and the companion device are connected using a set-up equivalent to the example given by figure 14 although the interference source is switched off at this point in time. The spectrum analyser is used to monitor the transmissions of the UUT in response to the interference signal. The traffic source might be part of the UUT itself.
- The received signal level (wanted signal from the companion device) at the UUT shall be sufficient to maintain a reliable link for the duration of the test. A typical value for the received signal level which can be used in most cases is -50 dBm/MHz.
- The analyser shall be set as follows:

- RBW: ⩾ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
- VBW: ⩾ RBW (if the analyser does not support this setting, the highest available setting shall be used)
- Detector Mode: RMS
- Centre Frequency: Equal to the centre frequency of the operating channel
- Span: 0 Hz
- Sweep time: > 2 × Channel Occupancy Time
- Trace Mode: Clear/Write
- Trigger Mode: Video or RF/IF Power

Step 2:

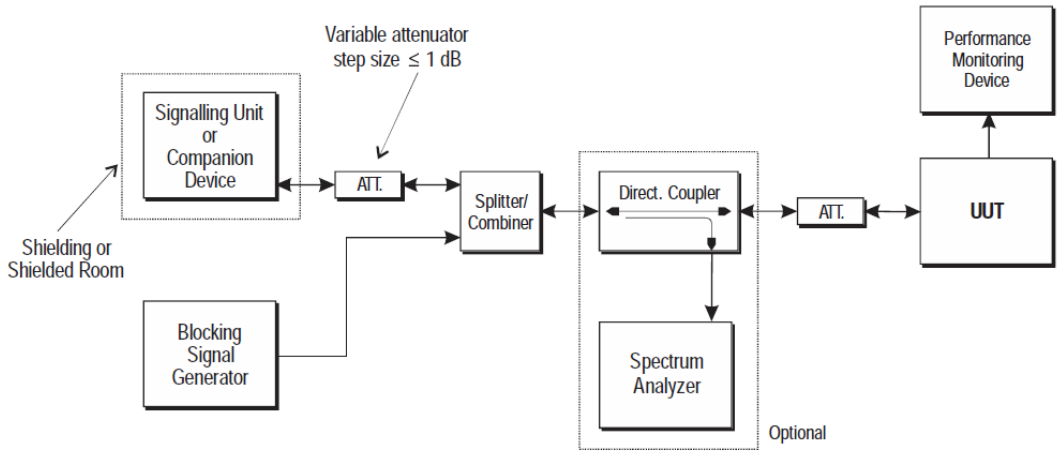
- Configure the traffic source so that it fills the UUT's buffers to a level causing the UUT to always have transmissions queued (buffer-ready-for-transmission condition) towards the companion device. Where this is not possible, the UUT shall be configured to occupy the Channel Occupancy Time of the Fixed Frame Period to the highest extent possible.
- To avoid adverse effects on the measurement results, a unidirectional traffic source should be used. An example of such a unidirectional traffic source not triggering reverse traffic on higher layer protocols is UDP.

14.4 Test Result

Pass

15. Receiver Blocking

15.1 Block Diagram Of Test Setup



15.2 Limit

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.				

15.3 Test procedure

Step 1:

- The UUT shall be set to the first operating frequency to be tested (see clause 5.3.2).

Step 2:

- The blocking signal generator is set to the first frequency as defined in table 9.

Step 3:

- With the blocking signal generator switched off a communication link is set up between the UUT and the associated companion device using the test setup shown in figure 18. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum

performance criteria as specified in clause 4.2.8.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin.

- This signal level (Pmin) is increased by 6 dB resulting in a new level (Pmin + 6 dB) of the wanted signal at the UUT receiver input.

Step 4:

- The level of the blocking signal at the UUT input is set to the level provided in table 9. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.2.8.3 are met.
- If the performance criteria as specified in clause 4.2.8.3 are met, the level of the blocking signal at the UUT may be further increased (e.g. in steps of 1 dB) until the level whereby the performance criteria as specified in clause 4.2.8.3 are no longer met. The highest level at which the performance criteria are met is recorded in the test report.

Step 5:

- Repeat step 4 for each remaining combination of frequency and level as specified in table 9.

Step 6:

- Repeat step 2 to step 5 with the UUT operating at the other operating frequencies at which the blocking test has to be performed. See clause 5.3.2.

15.4 Test Result

All modes have been tested and reports show data in the worst mode

The worst mode is 802.11 a (Ant B)

802.11 a	P_{min}(dBm)	Blocking Frequency(MHz)	Blocking Power(dB)	Measured PER(%)	Limit (%)
5180	-74	5100	-53	1.94	10
5180	-74	4900	-47	2.39	10
5180	-74	5000	-47	2.33	10
5180	-74	5975	-47	2.11	10
5240	-73	5100	-53	3.22	10
5240	-73	4900	-47	1.40	10
5240	-73	5000	-47	3.82	10
5240	-73	5975	-47	1.41	10

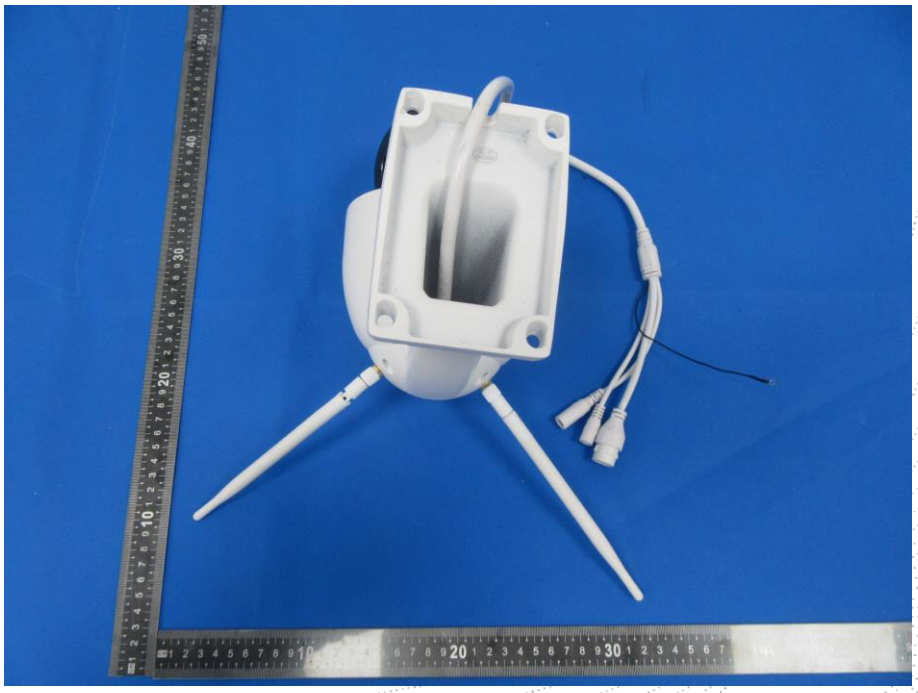
16. EUT Photographs

EUT Photo 1

EUT Photo 2

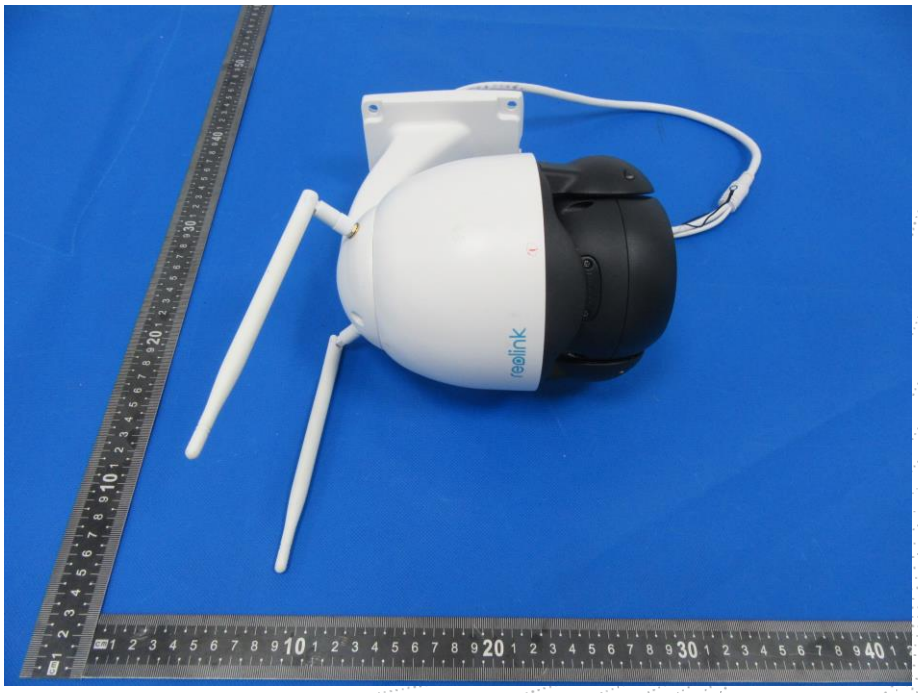
EUT Photo 3

EUT Photo 4



EUT Photo 5

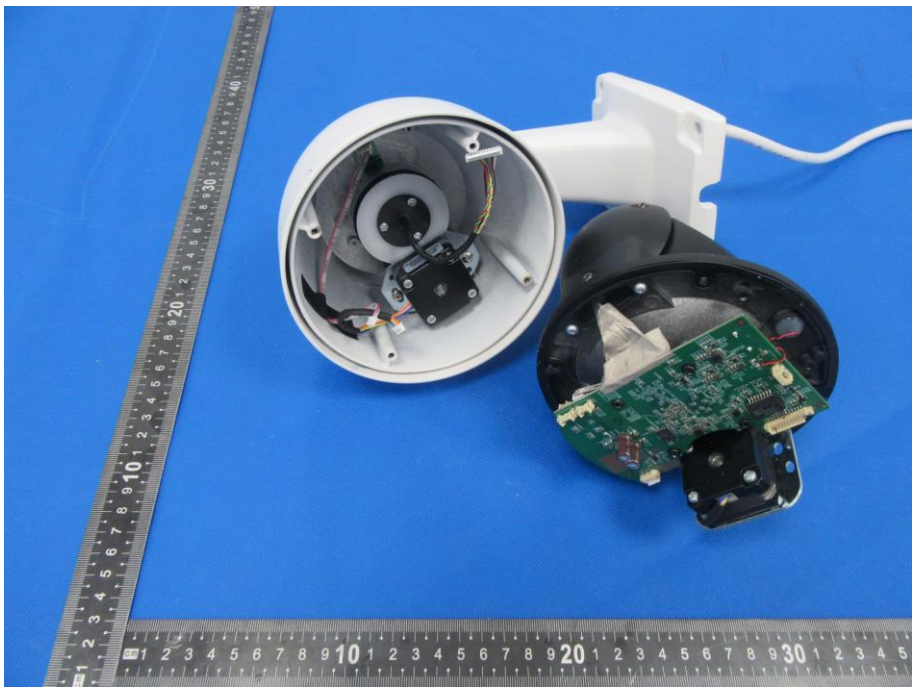
EUT Photo 6



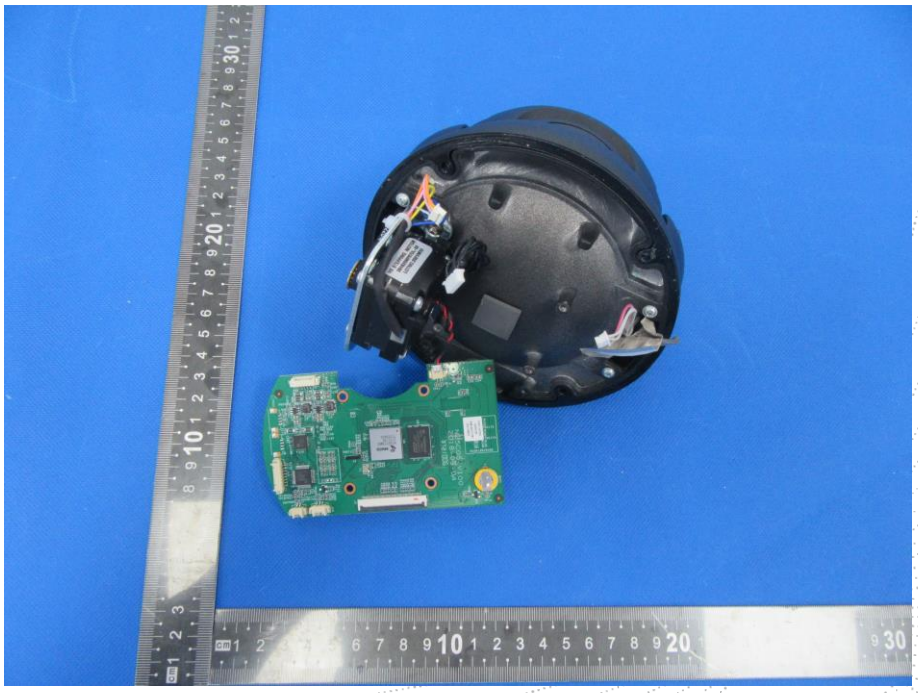
EUT Photo 7

EUT Photo 8

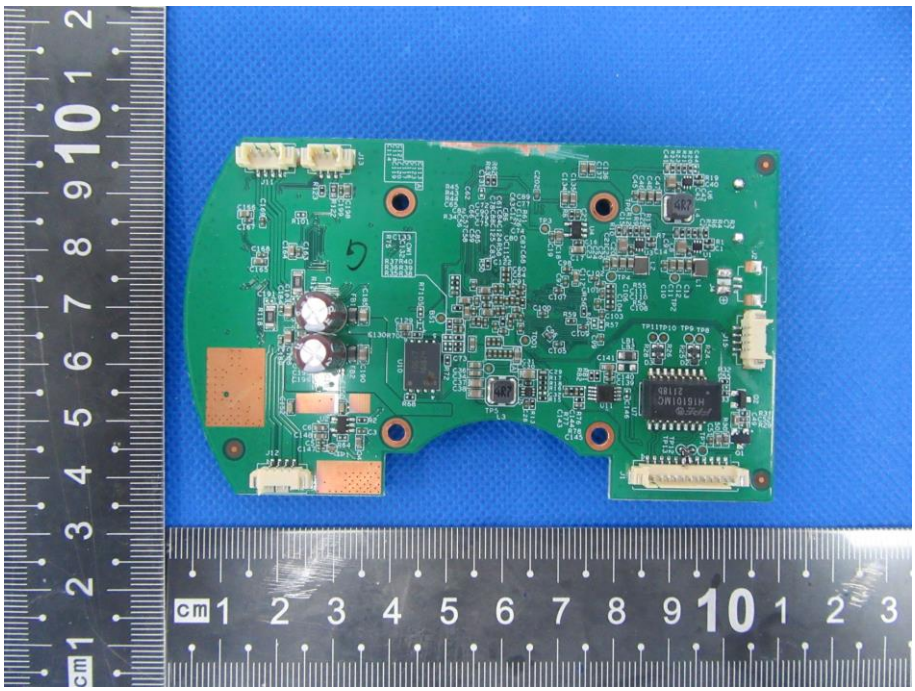
EUT Photo 9



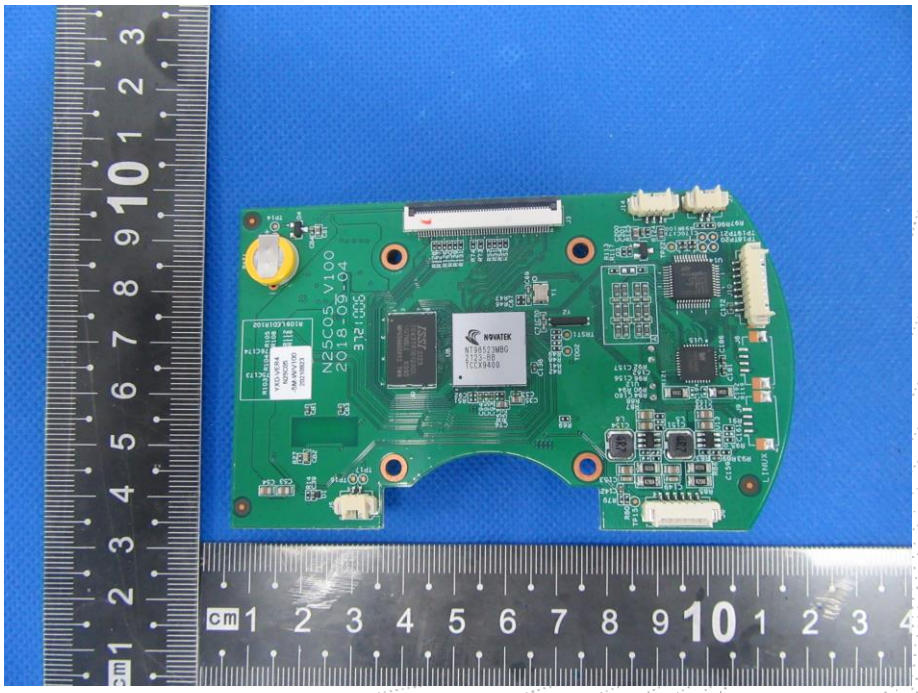
EUT Photo 10



EUT Photo 11

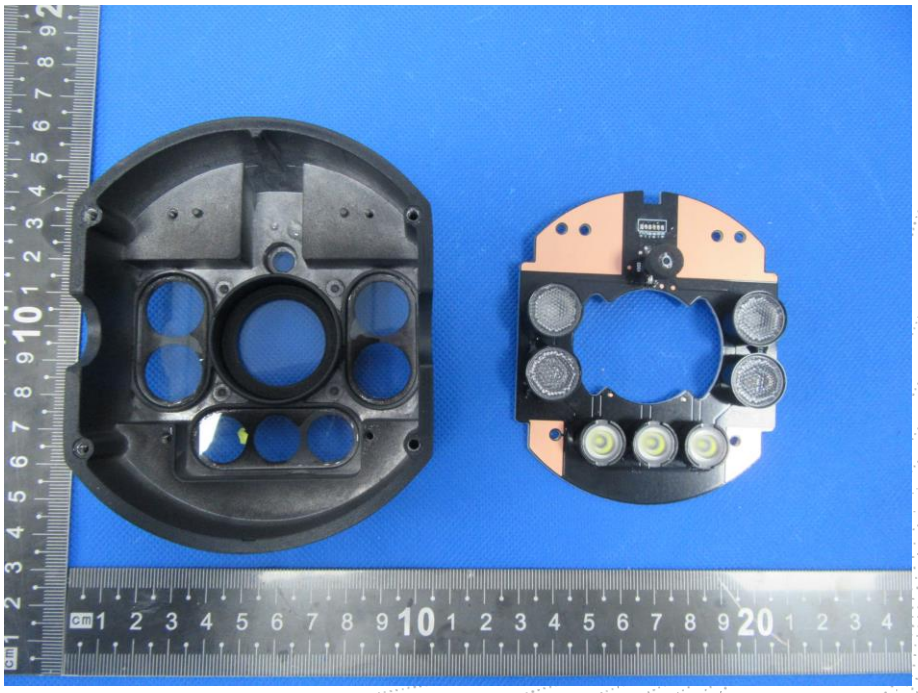


EUT Photo 12

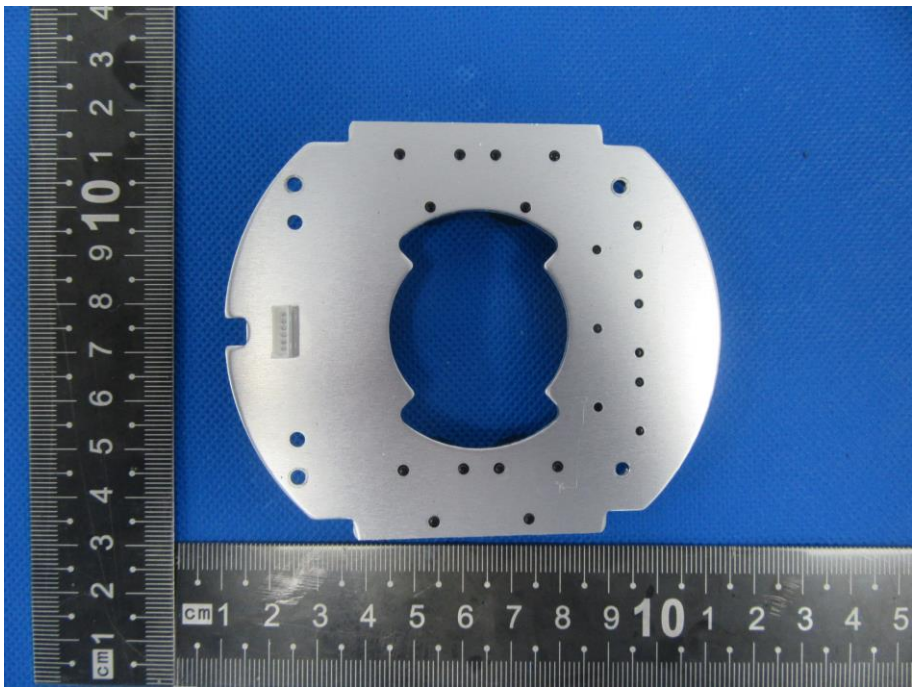


EUT Photo 13

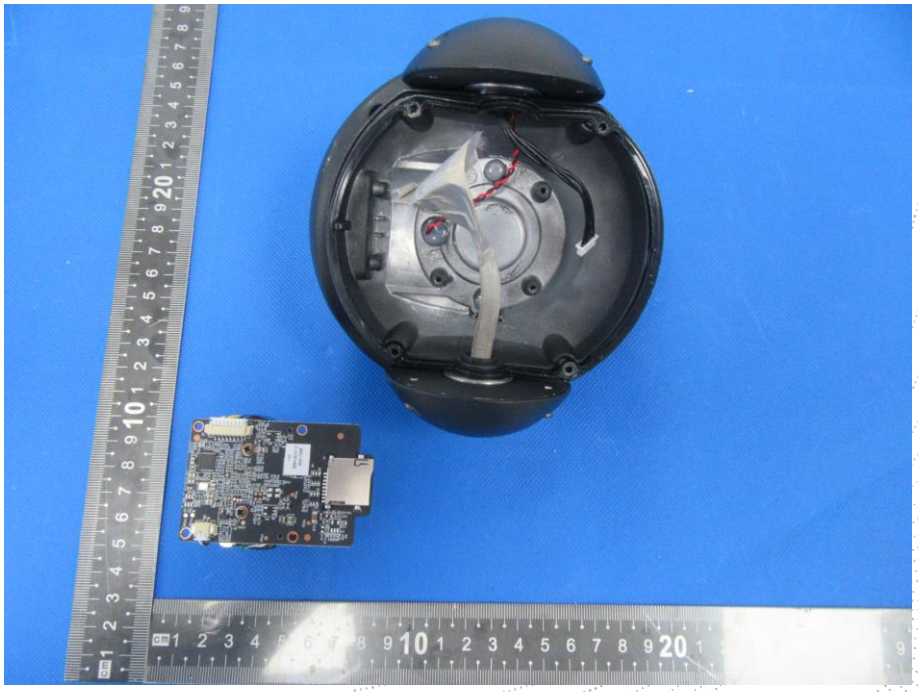
EUT Photo 14



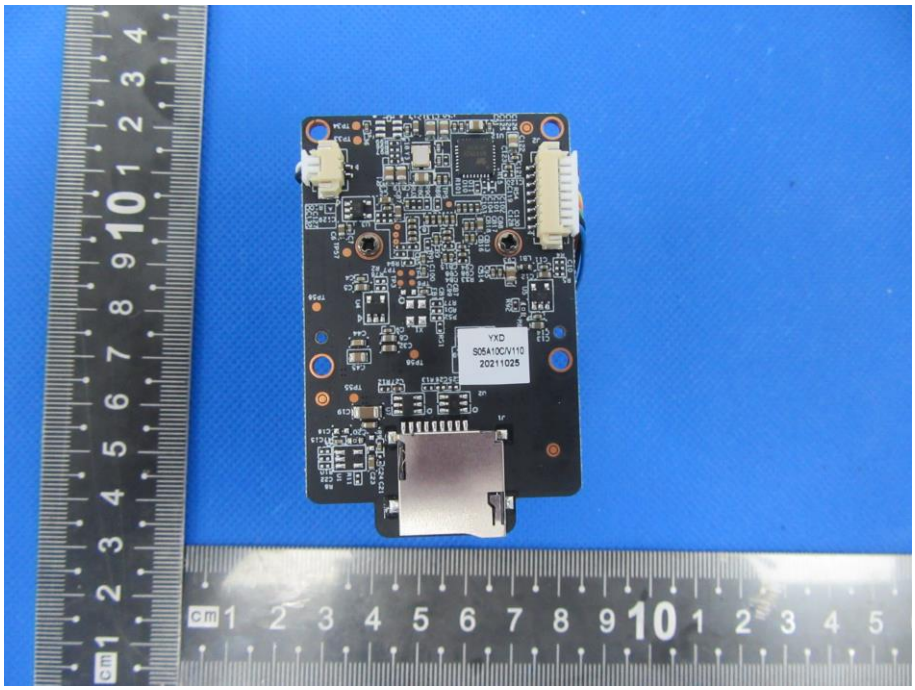
EUT Photo 15



EUT Photo 16

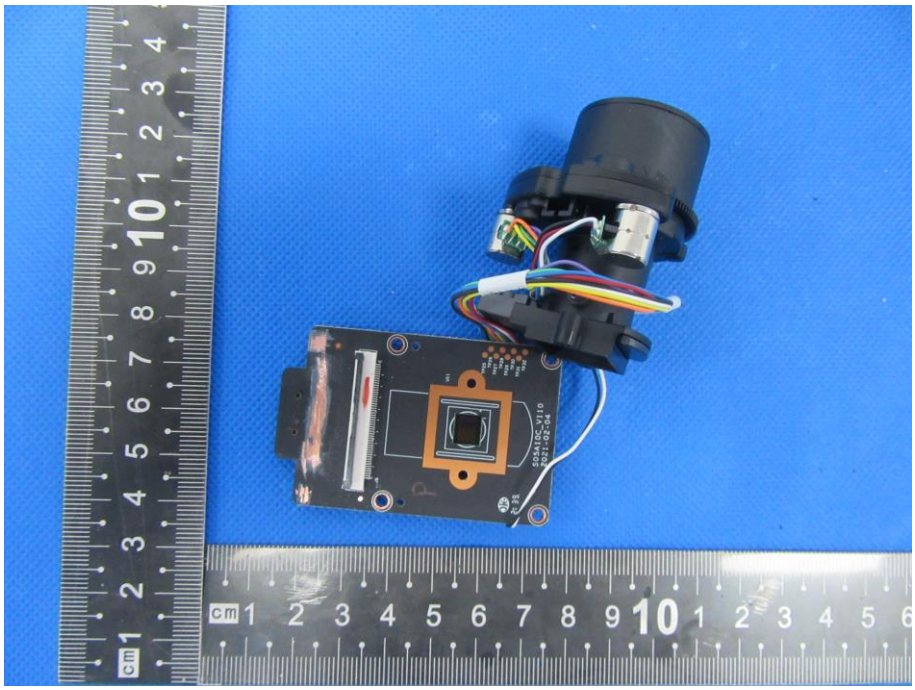


EUT Photo 17



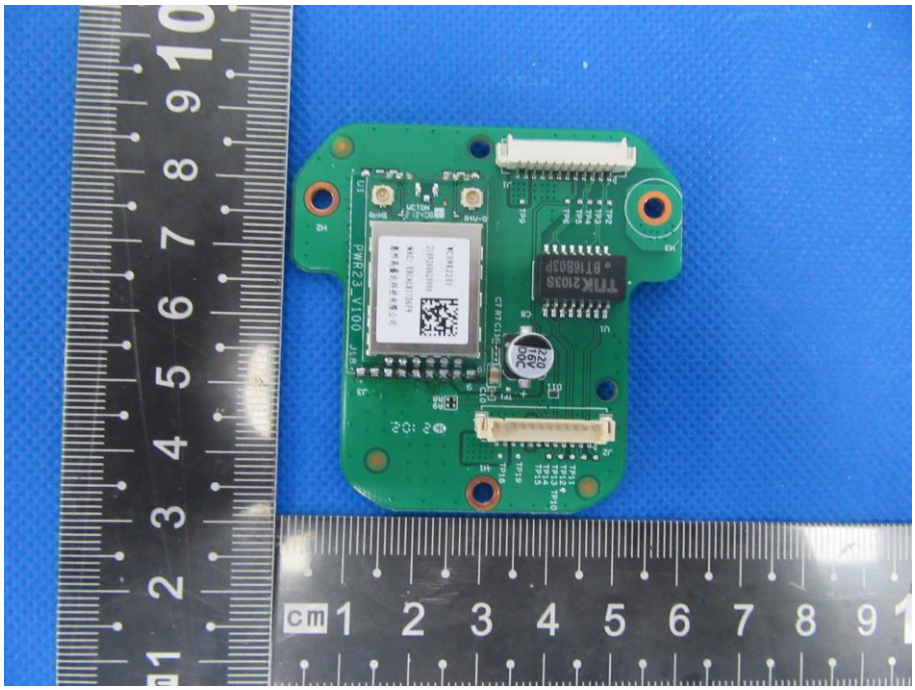
EUT Photo 18

EUT Photo 19

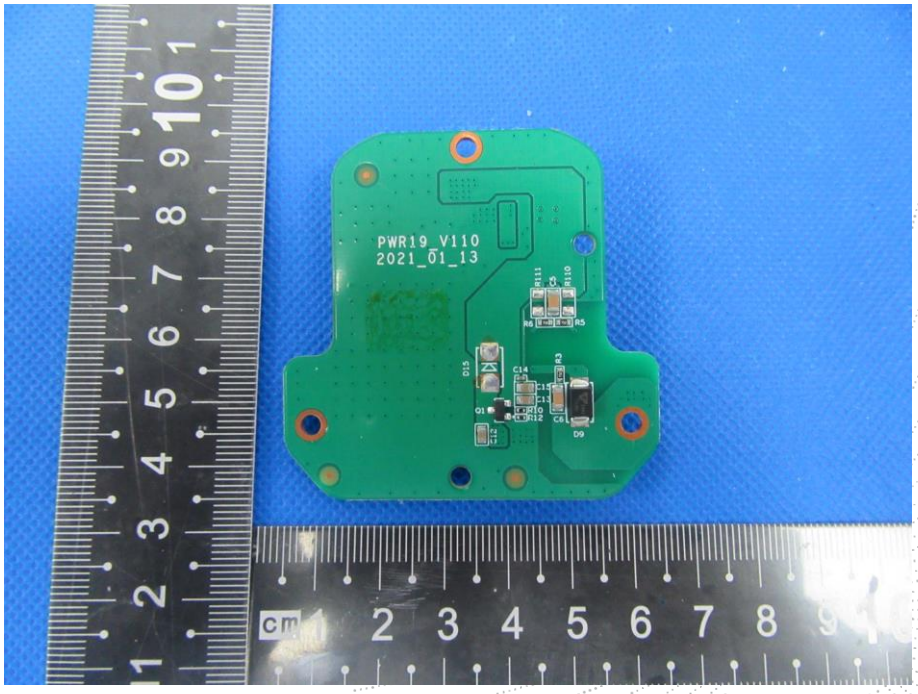


EUT Photo 20

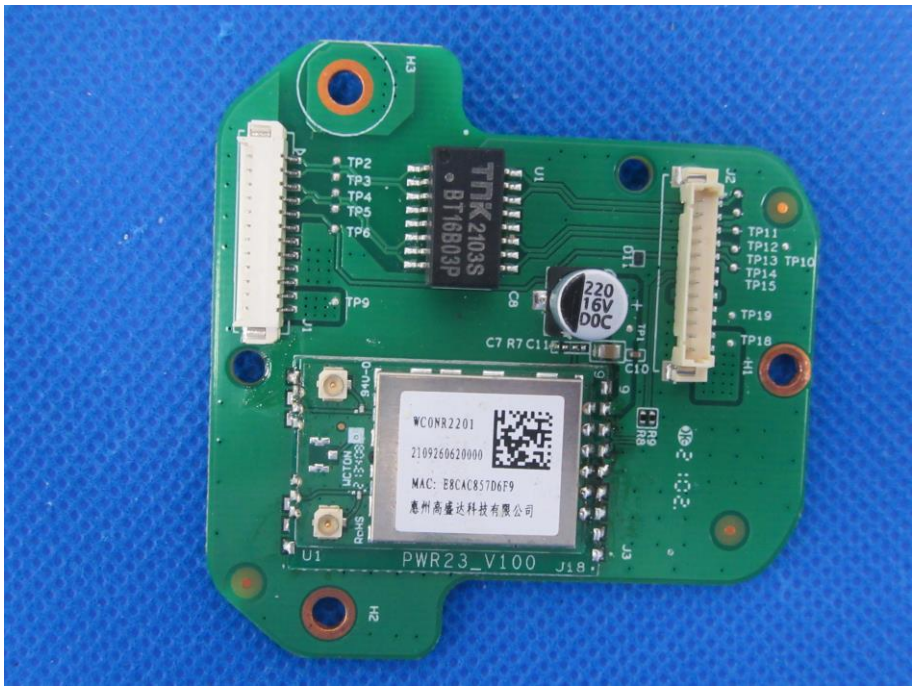
EUT Photo 21



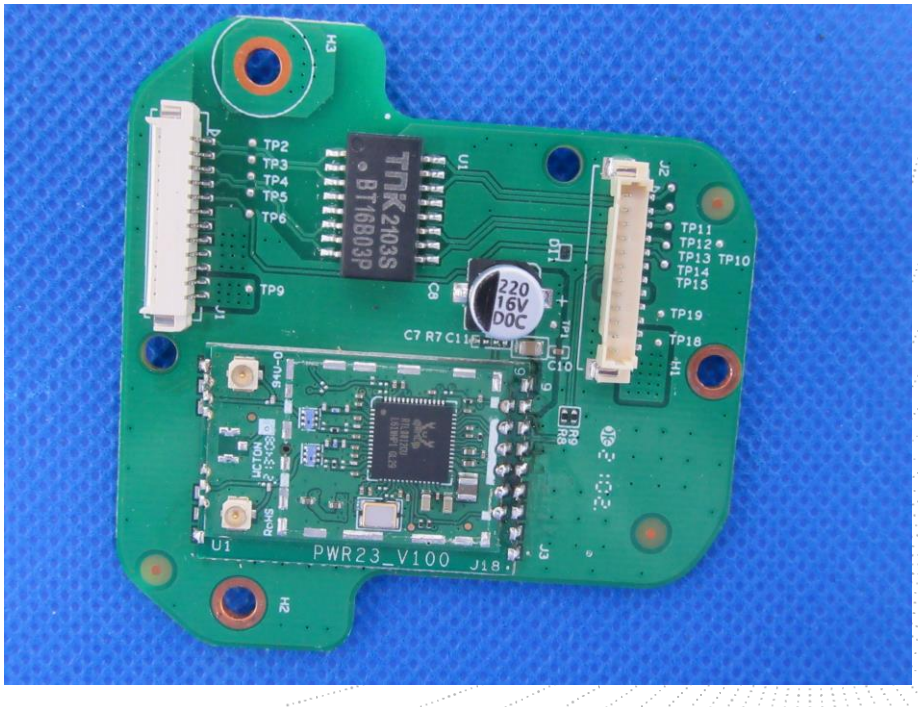
EUT Photo 22



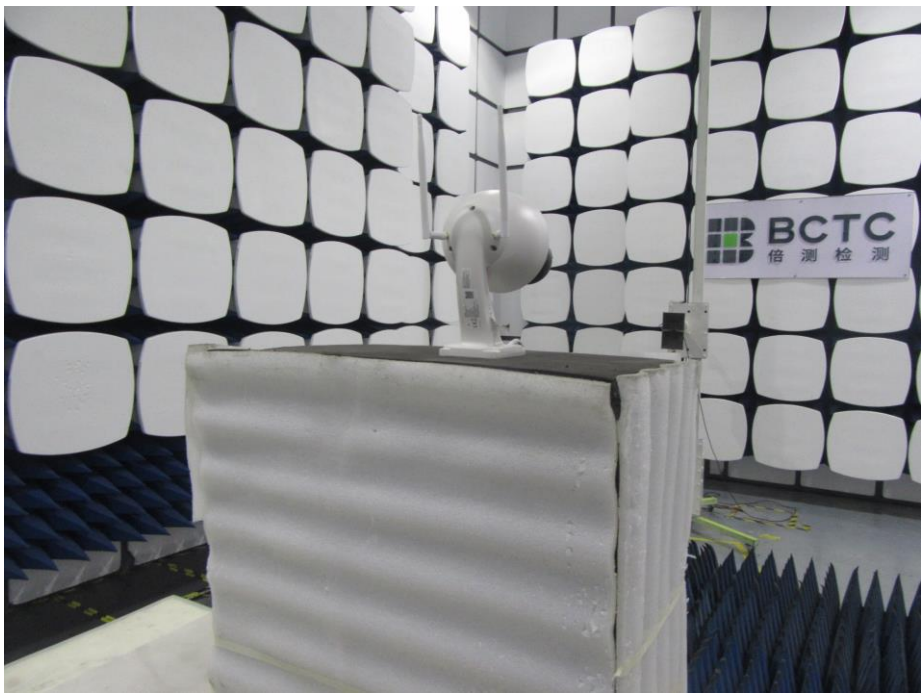
EUT Photo 23



EUT Photo 24



17. EUT Test Setup Photographs



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.:	BCTC2202038154-4E
Applicant:	REOLINK INNOVATION LIMITED
Product Name:	WiFi IP Camera
Model/Type reference:	RLC-523WA
Tested Date:	2022-02-09 to 2022-03-03
Issued Date:	2022-03-24

Shenzhen BCTC Testing Co., Ltd.

Product Name:	WiFi IP Camera
Trademark:	reolink
Model/Type reference:	RLC-523WA
Prepared For:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Manufacturer:	REOLINK INNOVATION LIMITED
Address:	FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN STREET MONG KOK KL HONG KONG
Factory:	Shenzhen Reolink Technology Co., Ltd.
Address:	2-4th Floor, Building 2, Yuanling Industrial Park, ShangWu, Shiyan Street, Bao'an District, Shenzhen, China
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:	2022-02-09
Sample tested Date:	2022-02-09 to 2022-03-03
Issue Date:	2022-03-24
Report No.:	BCTC2202038154-4E
Test Standards:	ETSI EN 300 440 V2.2.1 (2018-07)
Test Results:	PASS
Remark:	This is WIFI-5GHz band radio test report.

Tested by:

Eric Yang/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
BCTC2202038154-4E	2022-03-24	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No.	Results
Transmitter Parameters			
1	Equivalent isotropically radiated power (e.i.r.p.)	4.2.2	PASS
2	Permitted range of operating frequencies	4.2.3	PASS
3	Spurious radiation for transmitter	4.2.4	PASS
4	Duty Cycle	4.2.5.4	No Restriction
5	Additional requirements for FHSS equipment	4.2.6	N/A[1]
6	Adjacent channel selectivity	4.3.3	N/A[2]
7	Blocking or desensitization	4.3.4	PASS
8	Spurious radiation for receiver	4.3.5	PASS
9	Spectrum access techniques	4.4	N/A[3]
10	GBSAR antenna pattern	4.6.4	N/A[4]
11	Limits for GBSAR	Annex I	N/A[4]

This product is equipment Category 2 receivers

Note[1]:Applies to Equipment utilizing FHSS modulation

Note[2]:Applies to equipment Category 1 receivers

Note[3]:Applies to Equipment which are not using duty cycle restrictions for media access

Note[4]:Applies only GBSAR systems

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.

RF frequency	1×10^{-7}
RF power, conducted	1.38dB
Conducted spurious emission (30MHz-1GHz)	1.28dB
Conducted spurious emission (1GHz-18GHz)	1.576dB
Radiated Spurious emission (30MHz-1GHz)	4.3dB
Radiated Spurious emission (1GHz-18GHz)	4.5dB
Temperature	0.59℃
Humidity	5.3%

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference:	RLC-523WA
Model differences:	N/A
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WiFi (5.8GHz): IEEE 802.11a/n/ac HT20:5745MHz-5825MHz IEEE 802.11n/ac HT40:5755 MHz-5795MHz IEEE 802.11ac HT80:5775MHz
Max. RF output power:	WiFi (5.8GHz): 6.22 dBm
Type of Modulation:	WiFi: DSSS, OFDM
Antenna installation:	External antenna*2
Antenna Gain:	WiFi (5.8GHz): Antenna A : 2.19 dBi Antenna B : 2.19 dBi
Ratings:	DC 12V
Adapter:	Model: DCT24W120200EU-A0 Input:100-204V~50/60Hz 0.7A max Output: DC 12.0V 2.0A 24.0W

4.2 Test Setup Configuration

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

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	--	---	---

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

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
149	5745	151	5755	153	5765	155	5775
157	5785	159	5795	161	5805	165	5825

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting(802.11a HT20)	5745MHz	5785MHz	5825MHz
Transmitting(802.11n HT20)	5745MHz	5785MHz	5825MHz
Transmitting(802.11n HT40)	5755Mhz	/	5795MHz
Transmitting(802.11ac HT20)	5745MHz	5785MHz	5825MHz
Transmitting(802.11ac HT40)	5755Mhz	/	5795MHz
Transmitting(802.11ac HT80)	/	5775MHz	/
Receiving(802.11a HT20)	5745MHz	5785MHz	5825MHz
Receiving(802.11n HT20)	5745MHz	5785MHz	5825MHz
Receiving(802.11n HT40)	5755Mhz	/	5795MHz
Receiving(802.11ac HT20)	5745MHz	5785MHz	5825MHz
Receiving(802.11ac HT40)	5755Mhz	/	5795MHz
Receiving(802.11ac HT80)	/	5775MHz	/

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Temperature(℃):	26
Test Voltage(AC):	230V

2.Extreme Test Conditions:

For tests at extreme temperatures, measurements shall be made over the extremes of the operating temperature range as declared by the manufacturer.

Test Conditions	LT	HT
Temperature (℃)	-10	35

5. Test Facility And Test Instrument Used

5.1 Test Facility

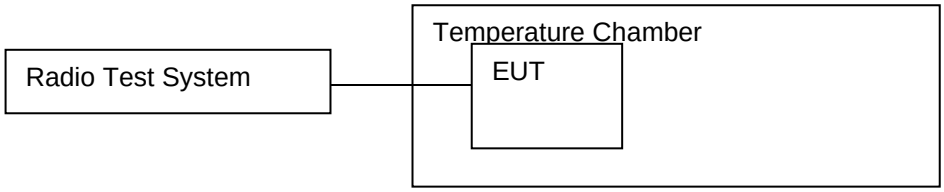
All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address:1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023
2	Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022
3	Spectrum Analyzer	Agilent	E4407B	MY45109572	May 28, 2021	May 27, 2022
4	Amplifier	SKET	LAPA_01G18G-45dB	\	May 28, 2021	May 27, 2022
5	Amplifier	Schwarzbeck	BBV9744	9744-0037	May 28, 2021	May 27, 2022
6	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	942	Jun. 01, 2021	May 31, 2022
7	Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 02, 2021	Jun. 01, 2022
8	band rejection filter	ZBSF	ZBSF-C2441.5	1706003606	May 28, 2021	May 27, 2022
9	Signal Generator	Keysight	N5181A	MY50143748	Jun. 29, 2021	Jun. 28, 2022
10	Communication test set	R&S	CMU200	119435	May 28, 2021	May 27, 2022
11	Spectrum Analyzer	Keysight	N9020A	MY49100060	May 28, 2021	May 27, 2022
12	Signal Generator	Keysight	N5182B	MY56200519	May 28, 2021	May 27, 2022
13	Power Meter	Keysight	E4419	\	May 28, 2021	May 27, 2022
14	Power Sensor	Keysight	E9300A	\	May 28, 2021	May 27, 2022
15	Horn antenna	Schwarzbeck	BBHA9170	00822	Jun. 15, 2021	Jun. 14, 2022
16	Preamplifier	MITEQ	TTA1840-35-HG	2034381	May 28, 2021	May 27, 2022
17	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
18	Software	Keysight	Keysight.ETSL Test system	1.02.05	\	\
19	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
20	Loop Antenna	Schwarzbeck	FMZB1519B	00014	Jun. 02, 2021	Jun. 01, 2022
21	Communication test set	Agilent	N4010A	MY49081107	May 28, 2021	May 27, 2022
22	Programmable constant temperature and humidity test chamber	DGBELL	BTKS5-150C	\	Jul.06, 2021	Jul.05, 2022

6. Equivalent Isotropically Radiated Power (E.I.R.P.)

6.1 Block Diagram Of Test Setup



6.2 Limit

25mW(14dBm)

6.3 Test procedure

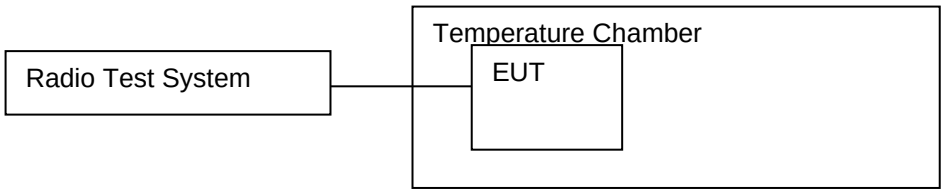
Step 1:
• using a suitable means, the output of the transmitter shall be coupled to a matched diode detector;
• the output of the diode detector shall be connected to the vertical channel of an oscilloscope;
• the combination of the diode detector and the oscilloscope shall be capable of faithfully reproducing the envelope peaks and the duty cycle of the transmitter output signal;
• the observed duty cycle of the transmitter (Tx on/(Tx on + Tx off)) shall be noted as x, (0 < x < 1) and recorded.
Step 2:
• the average output power of the transmitter shall be determined using a wideband, calibrated RF power meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be recorded as "A" (in dBm);
• the e.i.r.p. shall be calculated from the above measured power output A, the observed duty cycle x, and the applicable antenna assembly gain "G" in dBi, according to the formula:
- P = A + G + 10 log (1/x);

6.4 Test Result

Modulation	Test conditions (Temperature)	Antenna	Low Channel		Middle Channel		High Channel	
			EIRP	Total EIRP	EIRP	Total EIRP	EIRP	Total EIRP
802.11a	Normal	A	2.92	/	3.51	/	2.93	/
		B	2.81	/	3.24	/	2.83	/
	Lower	A	2.90	/	3.38	/	2.53	/
		B	2.61	/	3.22	/	2.65	/
	Upper	A	2.84	/	3.29	/	2.51	/
		B	2.37	/	2.78	/	2.31	/
802.11n(HT20)	Normal	A	2.74	5.77	3.26	**6.22**	2.96	5.85
		B	2.77		3.16		2.71	
	Lower	A	2.34	5.38	2.90	5.96	2.91	5.81
		B	2.39		2.99		2.68	
	Upper	A	2.14	5.13	2.64	5.76	2.90	5.74
		B	2.10		2.86		2.55	
802.11n(HT40)	Normal	A	0.98	3.84	/	/	0.33	3.36
		B	0.67		/		0.36	
	Lower	A	0.55	3.62	/	/	0.03	3.02
		B	0.66		/		-0.02	
	Upper	A	0.06	3.19	/	/	-0.32	2.81
		B	0.30		/		-0.09	
802.11ac(HT20)	Normal	A	2.98	5.85	3.10	6.07	3.03	5.91
		B	2.70		3.01		2.76	
	Lower	A	2.97	5.83	2.97	5.82	3.00	5.67
		B	2.67		2.64		2.30	
	Upper	A	2.64	5.64	2.57	5.40	2.52	5.37
		B	2.62		2.21		2.19	
802.11ac(HT40)	Normal	A	0.73	3.73	/	/	0.48	3.46
		B	0.70		/		0.42	
	Lower	A	0.47	3.41	/	/	0.04	3.19
		B	0.33		/		0.31	
	Upper	A	0.18	3.09	/	/	-0.34	2.94
		B	-0.02		/		0.18	
802.11ac(HT80)	Normal	A	/	/	-0.12	2.87	/	/
		B	/		-0.17		/	
	Lower	A	/	/	-0.55	2.53	/	/
		B	/		-0.42		/	
	Upper	A	/	/	-0.66	2.31	/	/
		B	/		-0.74		/	
Limit			≤25mW (14dBm)					
Remark: P = A + G + Y,G=Antenna gain, x=100%								

7. Permitted Range Of Operating Frequencies

7.1 Block Diagram Of Test Setup



7.2 Limit

5725 MHz to 5875 MHz

7.3 Test procedure

a) put the spectrum analyser in video averaging mode with a minimum of 50 sweeps selected;
b) select the lowest operating frequency of the equipment under test and activate the transmitter with modulation applied. The RF emission of the equipment shall be displayed on the spectrum analyser;
c) using the marker of the spectrum analyser, find the lowest frequency below the operating frequency at which the spectral power density drops below the level given in clause 4.2.3. This frequency shall be recorded in the test report;
d) select the highest operating frequency of the equipment under test and find the highest frequency at which the spectral power density drops below the value given in clause 4.2.3. This frequency shall be recorded in the test report;
e) the difference between the frequencies measured in steps c) and d) is the operating frequency range. It shall be recorded in the test report.

7.4 Test Result

(Antenna A The Worst Data)

802.11 a

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5736.71	/	16.570
	/	5833.19	16.588
LTLV	5735.88	/	16.480
	/	5832.40	16.543
LTHV	5735.07	/	16.278
	/	5831.61	16.218
HTHV	5734.88	/	16.032
	/	5831.12	16.111
HTLV	5733.96	/	15.707
	/	5830.72	15.812

802.11 n20

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5736.12	/	17.619
	/	5833.70	17.620
LTLV	5735.57	/	17.591
	/	5833.54	17.355
LTHV	5735.36	/	17.453
	/	5833.51	17.303
HTHV	5734.85	/	17.277
	/	5833.10	17.046
HTLV	5734.44	/	17.005
	/	5833.03	16.639

802.11 ac20

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5736.15	/	17.630
	/	5833.70	17.645
LTLV	5735.59	/	17.607
	/	5833.31	17.196
LTHV	5734.82	/	17.333
	/	5832.54	16.762
HTHV	5733.96	/	17.220
	/	5831.90	16.468
HTLV	5733.93	/	17.086
	/	5831.54	16.123

802.11 n40

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5737.00	/	36.166
	/	5813.00	36.123
LTLV	5736.05	/	36.113
	/	5812.03	35.653
LTHV	5735.54	/	35.708
	/	5811.18	35.543
HTHV	5734.96	/	35.241
	/	5810.82	35.415
HTLV	5734.82	/	35.157
	/	5810.67	35.296

802.11 ac40

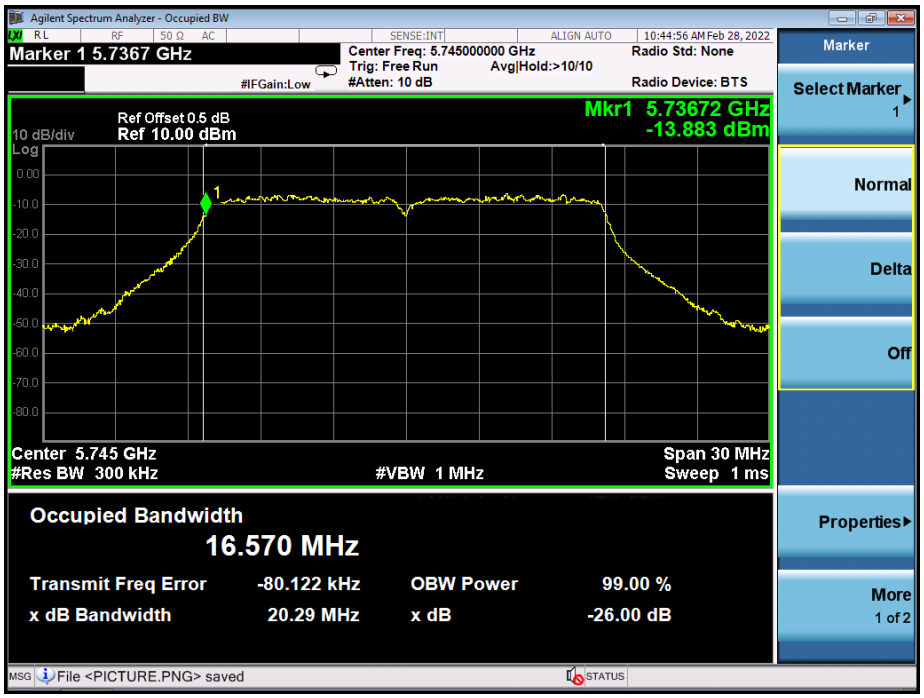
Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5736.94	/	36.146
	/	5812.88	36.113
LTLV	5736.49	/	35.925
	/	5812.24	35.641
LTHV	5736.48	/	35.503
	/	5811.52	35.637
HTHV	5735.75	/	35.334
	/	5810.73	35.227
HTLV	5735.60	/	35.201
	/	5810.60	35.217

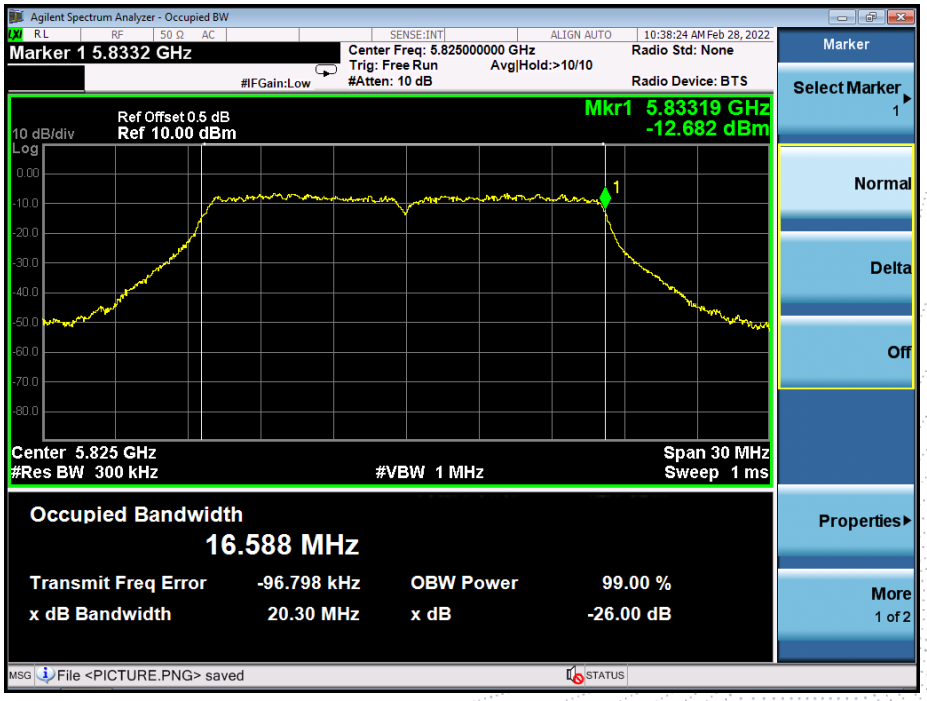
802.11 ac80

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5737.32	/	75.405
	/	5812.56	75.373
LTLV	5736.51	/	74.977
	/	5811.99	75.005
LTHV	5736.07	/	74.711
	/	5811.19	74.532
HTHV	5736.00	/	74.488
	/	5810.88	74.287
HTLV	5735.69	/	73.988
	/	5810.45	74.182

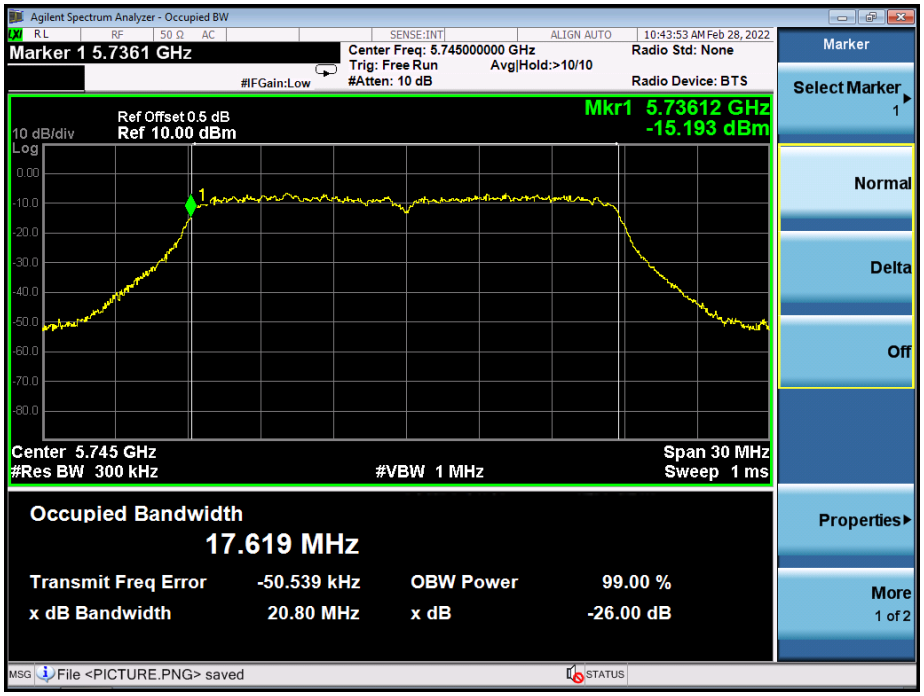
Test plots:
Ant B(The worst mode)

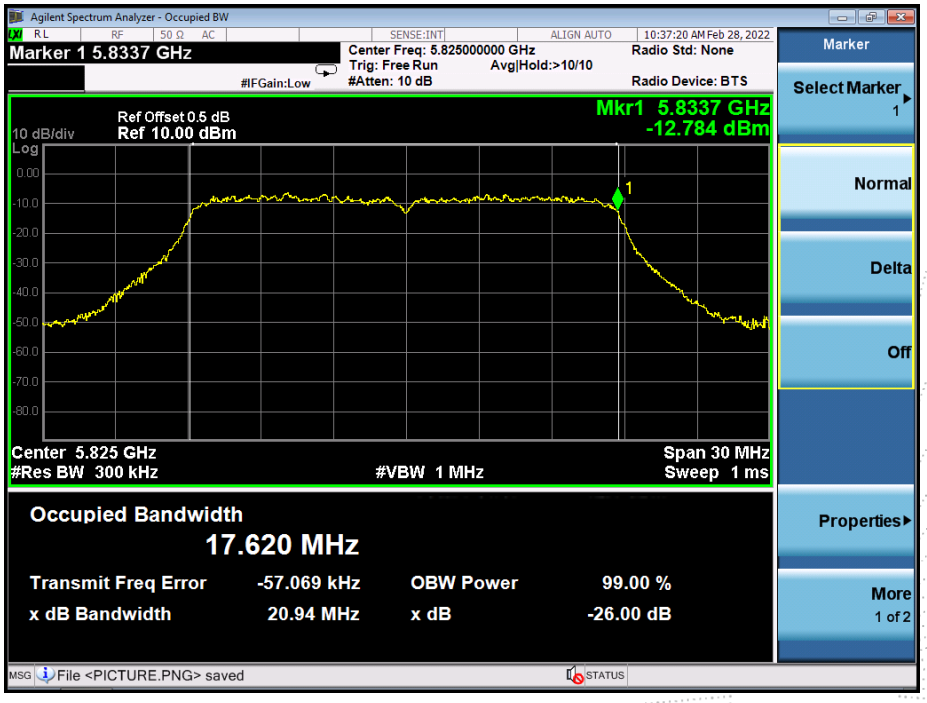
802.11 a



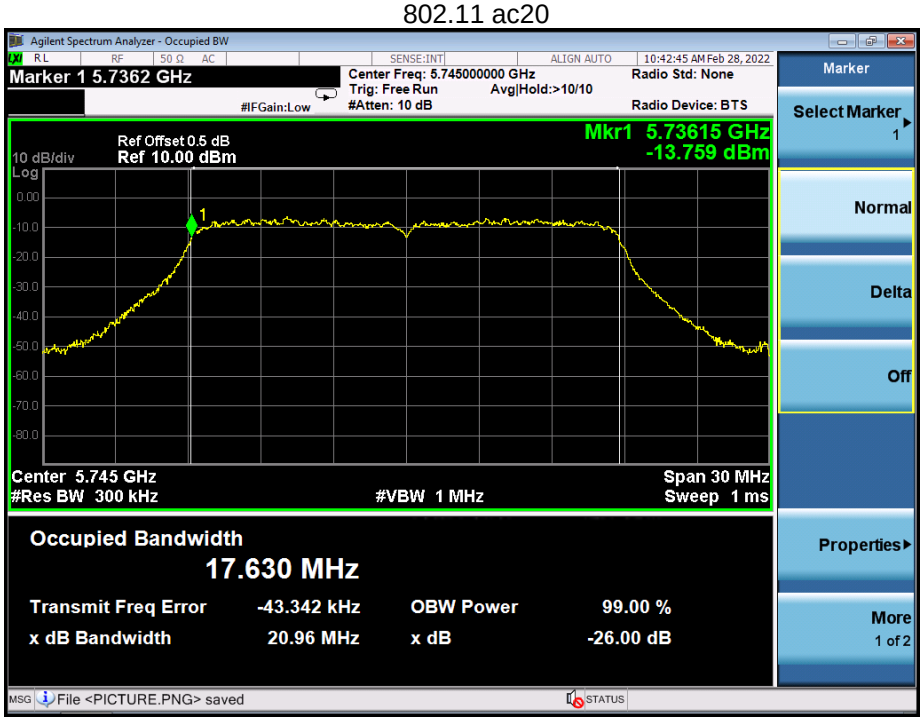


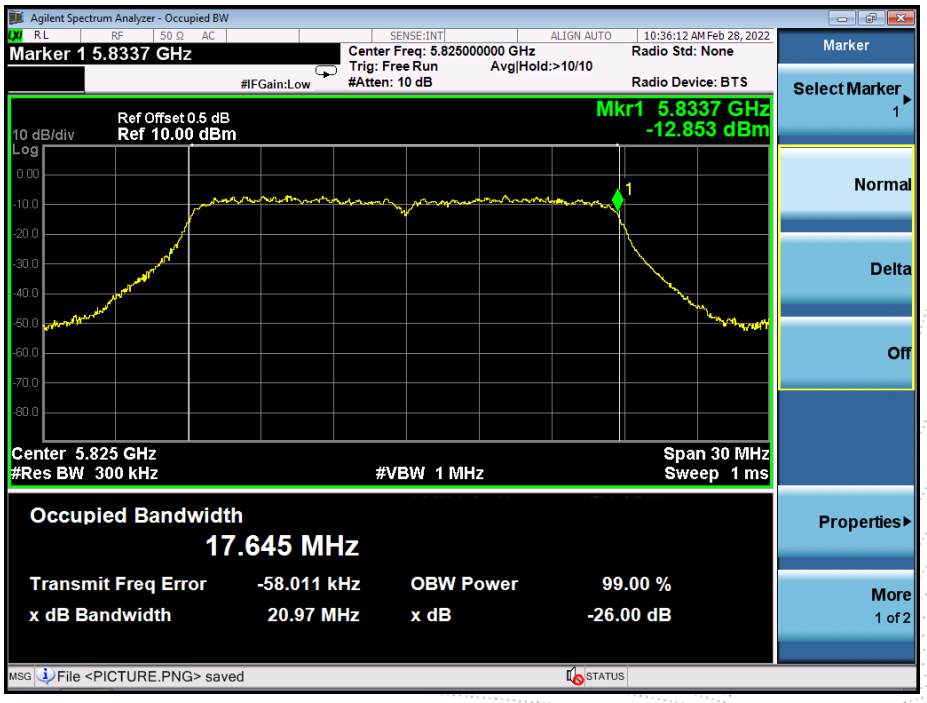
802.11 n20


Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.7361 GHz
Center Freq: 5.745000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
10:43:53 AM Feb 28, 2022
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.73612 GHz
-15.193 dBm
Center 5.745 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
Occupied Bandwidth
17.619 MHz
Transmit Freq Error -50.539 kHz
OBW Power 99.00 %
x dB Bandwidth 20.80 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2
File <PICTURE.PNG> saved
STATUS

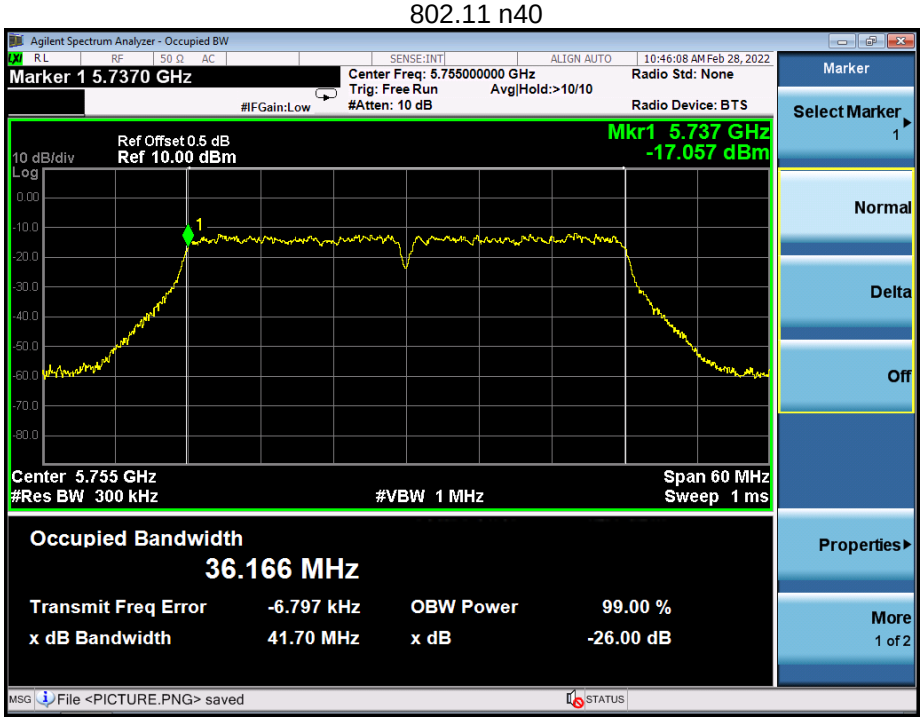

Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.8337 GHz
Center Freq: 5.825000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
10:37:20 AM Feb 28, 2022
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.8337 GHz
-12.784 dBm
Center 5.825 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
Occupied Bandwidth
17.620 MHz
Transmit Freq Error -57.069 kHz
OBW Power 99.00 %
x dB Bandwidth 20.94 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2
File <PICTURE.PNG> saved
STATUS

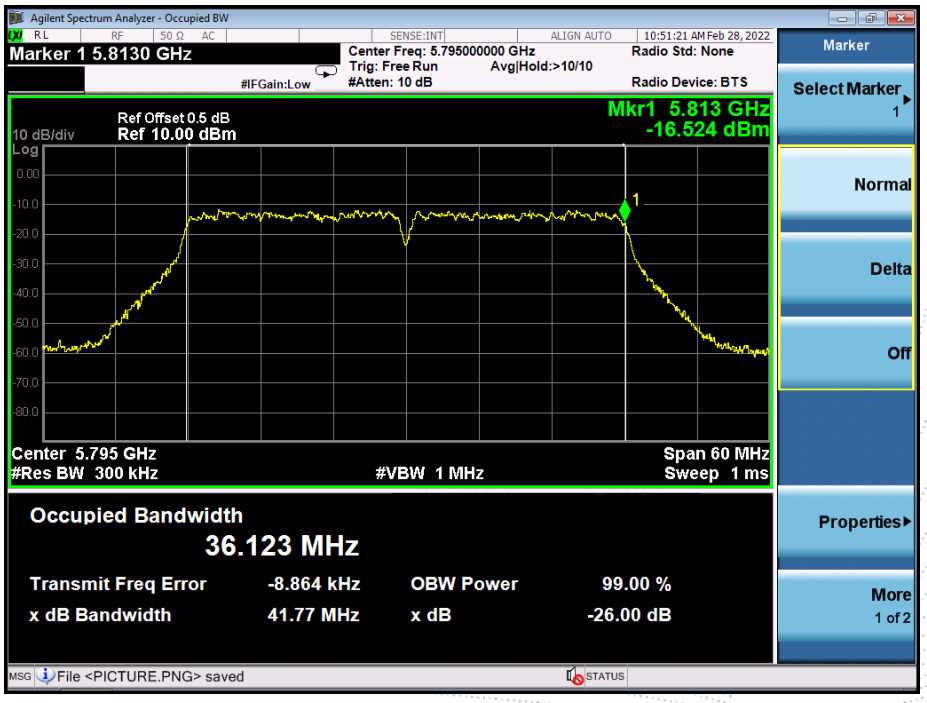
802.11 ac20


Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.7362 GHz
Center Freq: 5.745000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.73615 GHz
-13.759 dBm
Center 5.745 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
Occupied Bandwidth
17.630 MHz
Transmit Freq Error -43.342 kHz
OBW Power 99.00 %
x dB Bandwidth 20.96 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2
File <PICTURE.PNG> saved
STATUS

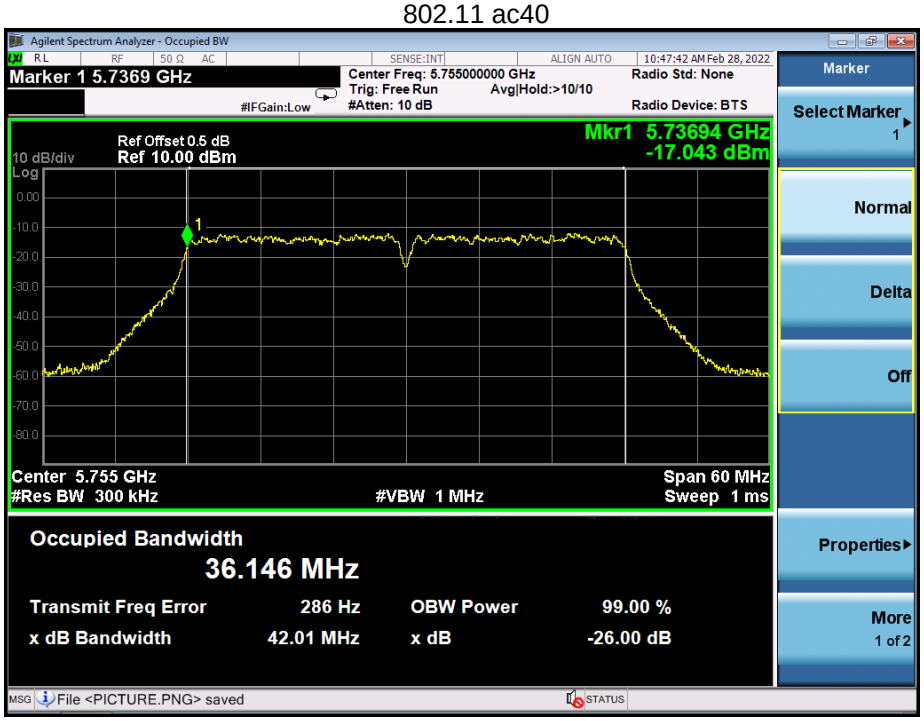

Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.8337 GHz
Center Freq: 5.825000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.8337 GHz
-12.853 dBm
Center 5.825 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
Occupied Bandwidth
17.645 MHz
Transmit Freq Error -58.011 kHz
OBW Power 99.00 %
x dB Bandwidth 20.97 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2
File <PICTURE.PNG> saved
STATUS

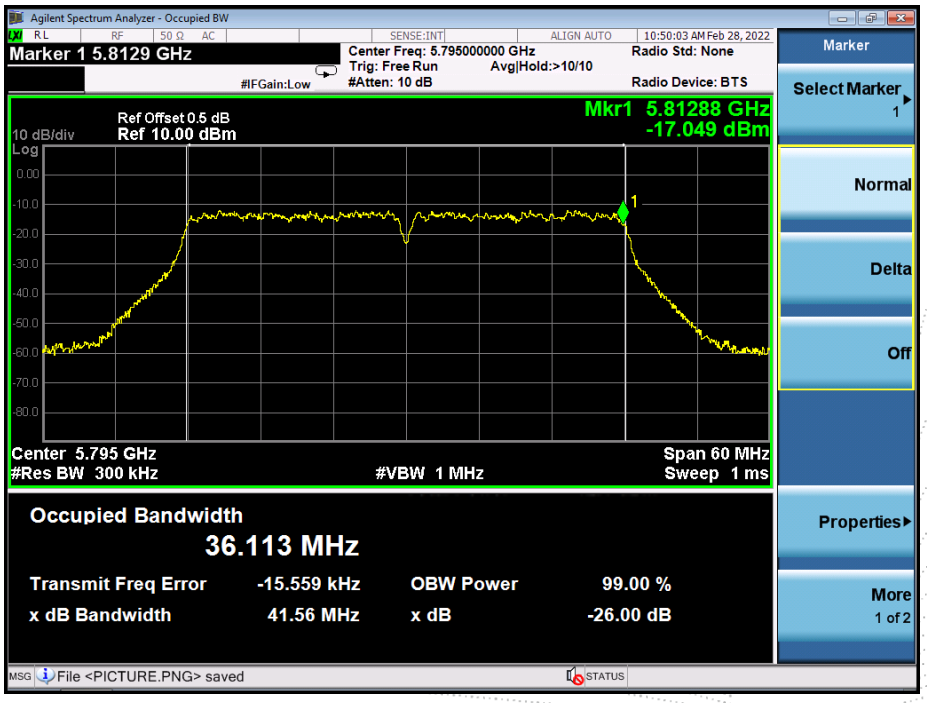
802.11 n40


Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.7370 GHz
Center Freq: 5.755000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.737 GHz
-17.057 dBm
Center 5.755 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.166 MHz
Transmit Freq Error -6.797 kHz
OBW Power 99.00 %
x dB Bandwidth 41.70 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2
File <PICTURE.PNG> saved
STATUS

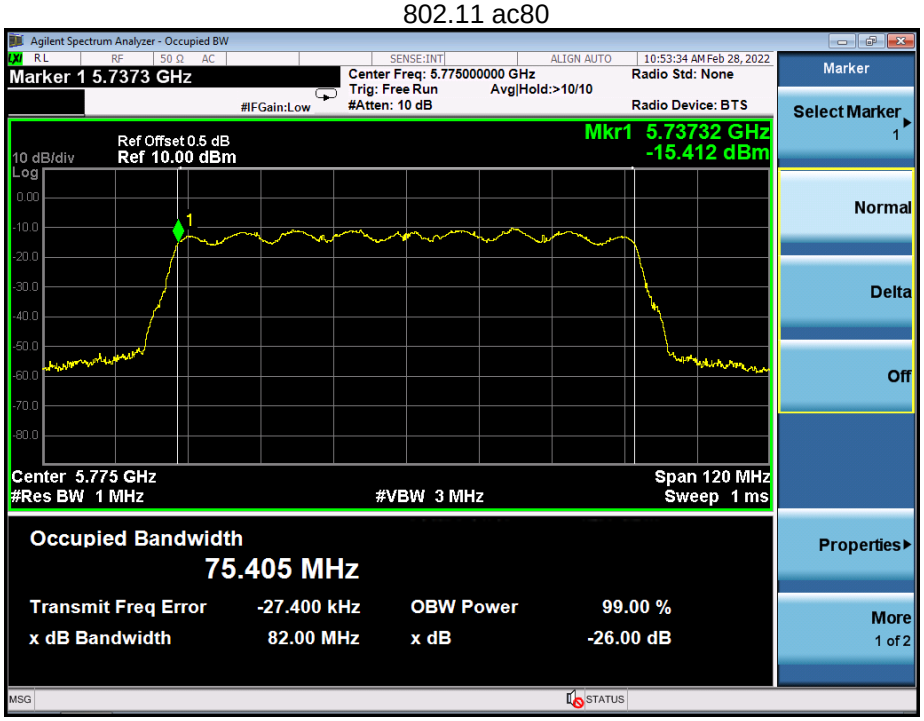

Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.8130 GHz
Center Freq: 5.795000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.813 GHz
-16.524 dBm
Center 5.795 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.123 MHz
Transmit Freq Error -8.864 kHz
OBW Power 99.00 %
x dB Bandwidth 41.77 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2
File <PICTURE.PNG> saved
STATUS

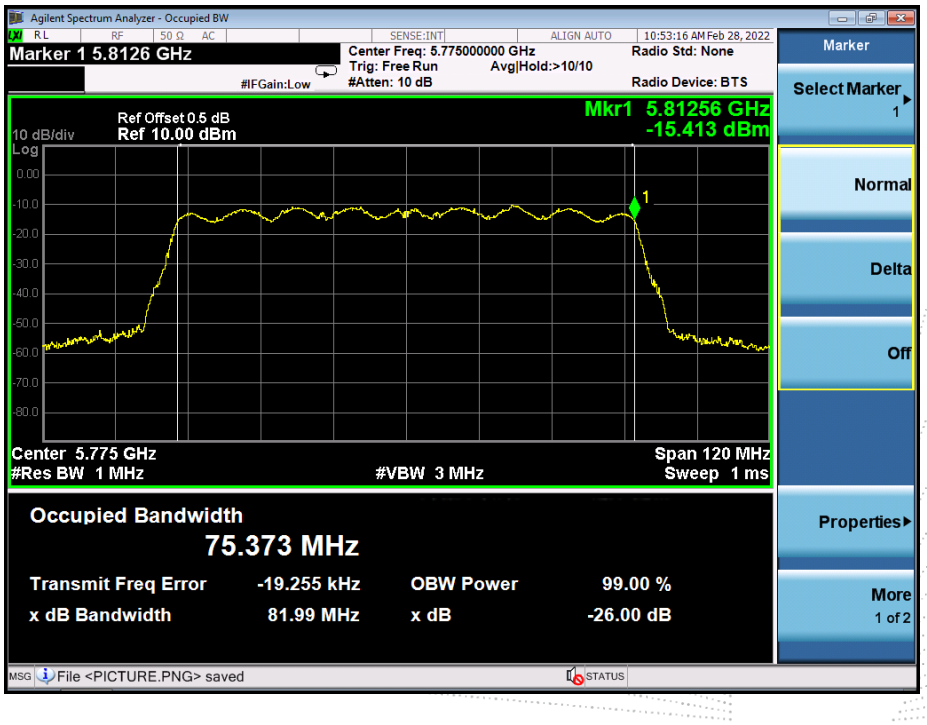
802.11 ac40


Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.7369 GHz
Center Freq: 5.755000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.73694 GHz
-17.043 dBm
Center 5.755 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.146 MHz
Transmit Freq Error 286 Hz
OBW Power 99.00 %
x dB Bandwidth 42.01 MHz
x dB -26.00 dB
File <PICTURE.PNG> saved
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2


Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.8129 GHz
Center Freq: 5.795000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.81288 GHz
-17.049 dBm
Center 5.795 GHz
#Res BW 300 kHz
#VBW 1 MHz
Span 60 MHz
Sweep 1 ms
Occupied Bandwidth
36.113 MHz
Transmit Freq Error -15.559 kHz
OBW Power 99.00 %
x dB Bandwidth 41.56 MHz
x dB -26.00 dB
File <PICTURE.PNG> saved
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2

802.11 ac80

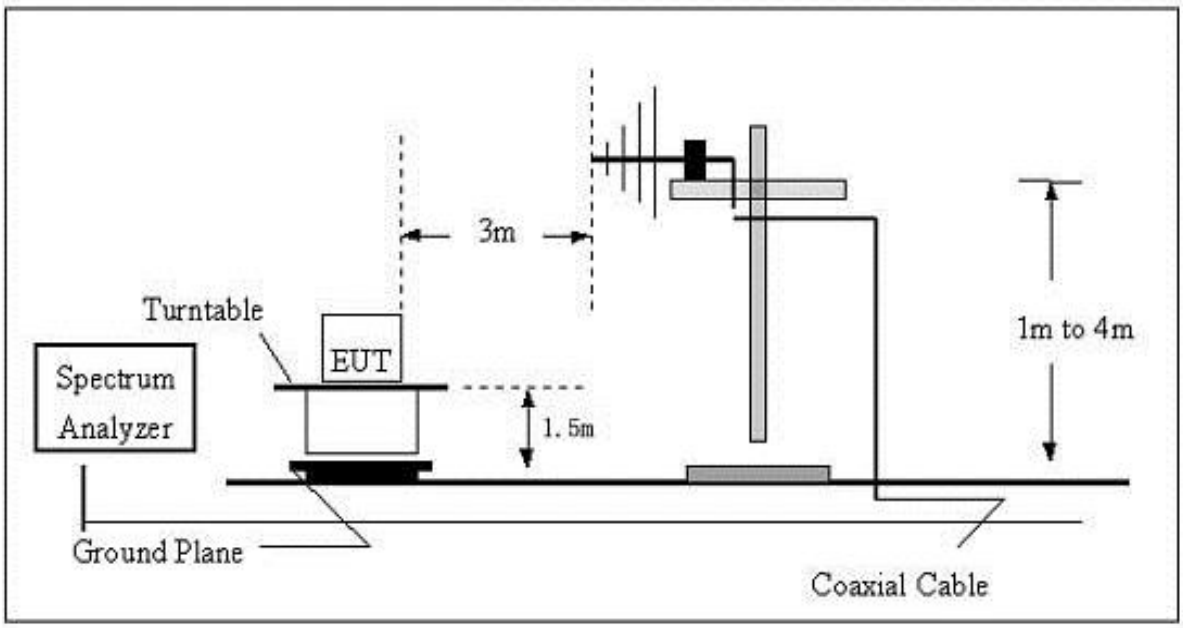

Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.7373 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.73732 GHz
-15.412 dBm
Center 5.775 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 120 MHz
Sweep 1 ms
Occupied Bandwidth
75.405 MHz
Transmit Freq Error -27.400 kHz
OBW Power 99.00 %
x dB Bandwidth 82.00 MHz
x dB -26.00 dB
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2


Agilent Spectrum Analyzer - Occupied BW
Marker 1 5.8126 GHz
Center Freq: 5.775000000 GHz
Trig: Free Run
Avg|Hold:>10/10
#Atten: 10 dB
Radio Std: None
Radio Device: BTS
#IFGain:Low
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 5.81256 GHz
-15.413 dBm
Center 5.775 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 120 MHz
Sweep 1 ms
Occupied Bandwidth
75.373 MHz
Transmit Freq Error -19.255 kHz
OBW Power 99.00 %
x dB Bandwidth 81.99 MHz
x dB -26.00 dB
File <PICTURE.PNG> saved
Marker
Select Marker
Normal
Delta
Off
Properties
More
1 of 2

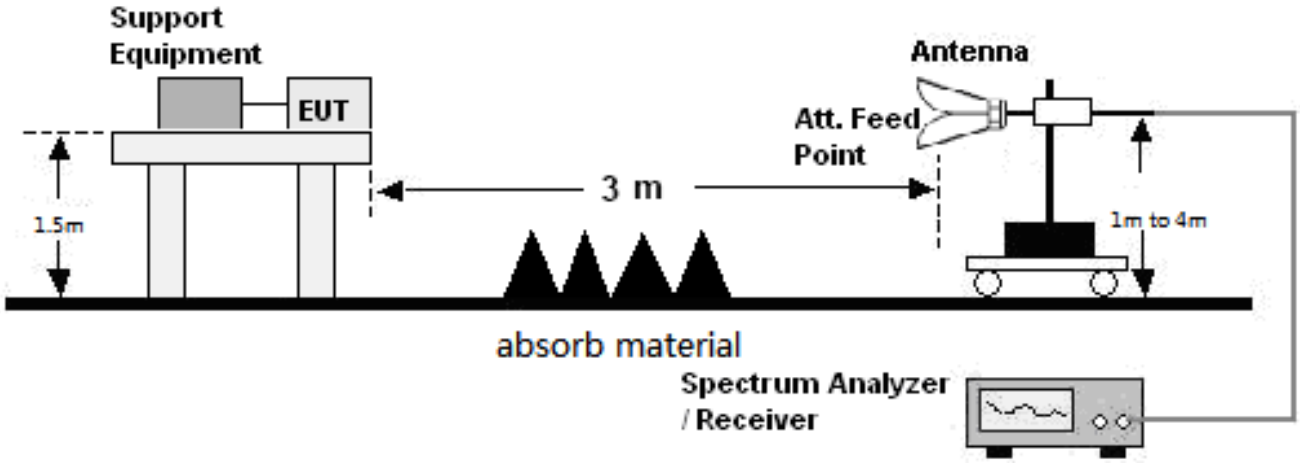
8. Spurious Emissions For Transmitter

8.1 Block Diagram Of Test Setup

(A)Radiated Emission Test Set-Up Frequency Below 1GHz.



(B)Radiated Emission Test Set-Up Frequency Above 1GHz.



8.2 Limits

Table 3: Spurious emissions

Frequency ranges / State	47 MHz to 74 MHz 87,5 MHz to 108 MHz 174 MHz to 230 MHz 470 MHz to 862 MHz	Other frequencies ≤ 1 000 MHz	Frequencies > 1 000 MHz
Operating	4 nW	250 nW	1 µW
Standby	2 nW	2 nW	20 nW

8.3 Test Procedure

30MHz ~ 1GHz:
a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.
Above 1GHz:
a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

8.4 Test Results

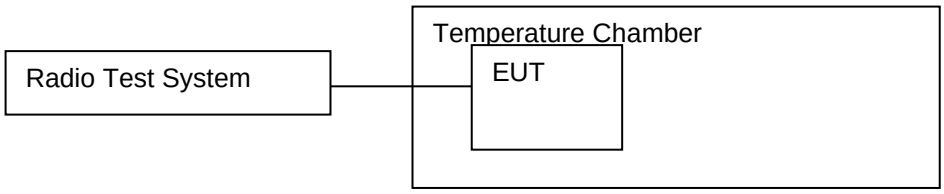
All modes have been tested and reports show data in the worst mode
Worst case at MIMO

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
802.11a low channel								
533.48	-51.67	283	1.2	H	-8.10	-59.77	-54	-5.77
533.48	-52.64	52	1.4	V	-8.10	-60.73	-54	-6.73
11490.00	-43.53	206	2.0	H	-0.43	-43.96	-30	-13.96
11490.00	-37.59	260	1.3	V	-0.43	-38.02	-30	-8.02
17235.00	-59.44	240	1.8	H	8.31	-51.13	-30	-21.13
17235.00	-56.72	272	1.4	V	8.31	-48.41	-30	-18.41
802.11a Mid channel								
533.48	-51.74	189	1.9	H	-8.10	-59.83	-54	-5.83
533.48	-53.20	304	1.9	V	-8.10	-61.30	-54	-7.30
11570.00	-43.45	346	1.3	H	-0.38	-43.83	-30	-13.83
11570.00	-37.40	143	1.9	V	-0.38	-37.78	-30	-7.78
17355.00	-59.15	257	1.7	H	8.83	-50.32	-30	-20.32
17355.00	-57.09	131	1.4	V	8.83	-48.26	-30	-18.26
802.11a high channel								
533.48	-52.20	237	1.5	H	-8.10	-60.30	-54	-6.30
533.48	-52.91	130	1.7	V	-8.10	-61.01	-54	-7.01
11650.00	-43.35	185	1.1	H	-0.32	-43.67	-30	-13.67
11650.00	-38.11	321	1.7	V	-0.32	-38.43	-30	-8.43
17475.00	-59.95	253	1.8	H	9.35	-50.60	-30	-20.60
17475.00	-56.65	166	1.7	V	9.35	-47.30	-30	-17.30

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

9. TX Duty Cycle

9.1 Block Diagram Of Test Setup



9.2 Limit

No Restriction

9.3 Test procedure

An assessment of the overall Duty Cycle shall be made for a representative period of Tobs over the observation bandwidth Fobs. Unless otherwise specified, Tobs is 1 hour and the observation bandwidth Fobs is the operational frequency band.
The representative period shall be the most active one in normal use of the device. As a guide "Normal use" is considered as representing the behaviour of the device during transmission of 99 % of the [emissions] generated during its operational lifetime.
Procedures such setup, commissioning, and maintenance are not considered part of normal operation.
For manual operated or event dependant devices, with or without software controlled functions, the manufacturer shall declare whether the device once triggered, follows a pre-programmed cycle, or whether the transmitter remains on until the trigger is released or the device is manually reset. The manufacturer shall also give a description of the application
for the device and include a typical usage pattern. The typical usage pattern as declared by the manufacturer shall be used to determine the duty cycle and compare to the limit in table 4.
Where an acknowledgement is required, the additional transmitter on-time shall be included and declared by the manufacturer.

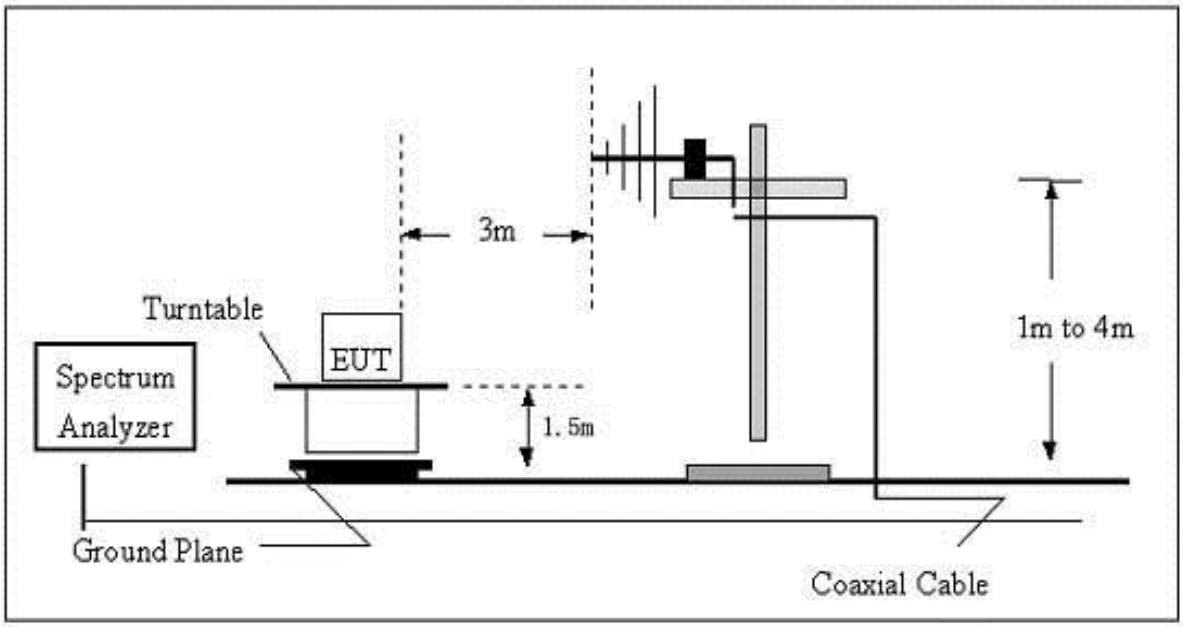
9.4 Test Result

For generic use devices operating at frequency range 5725-5875MHz, according to Final draft ETSI EN 300 440 V2.2.1 (2018-05), the duty cycle is no restriction.

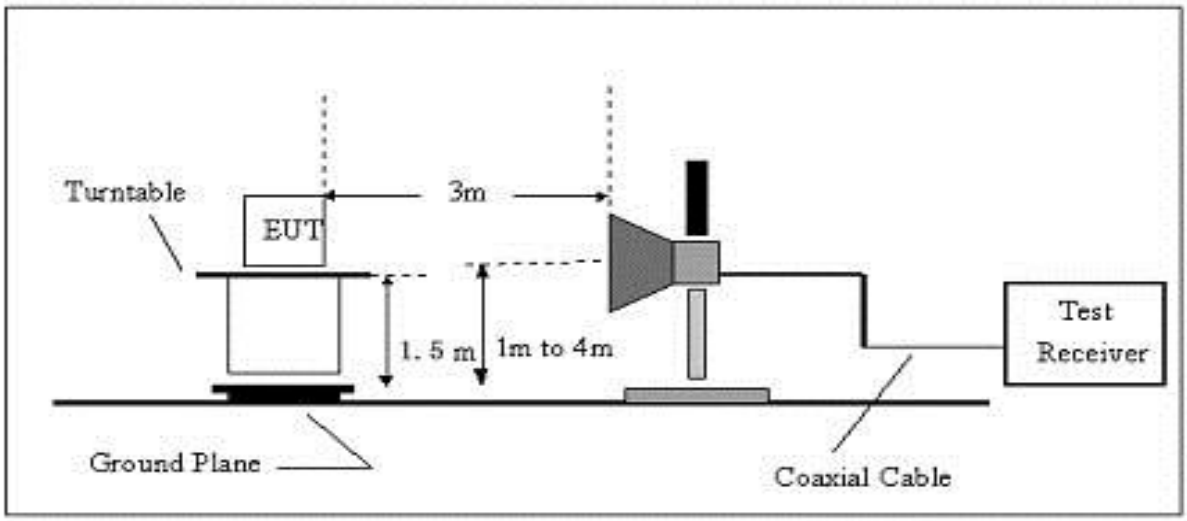
10. Spurious Emissions For Receiver

10.1 Block Diagram Of Test Setup

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



10.2 Limits

According to the Final draft ETSI EN 300 440 V2.2.1 (2018-05) Section 4.3.5.4, the power of any spurious emission shall not exceed 2 nW in the range 25 MHz to 1 GHz and shall not exceed 20 nW on frequencies above 1 GHz.

10.3 Test Procedure

30MHz ~ 1GHz:
a. The Product was placed on the nonconductive turntable 1.5m above the ground in a full anechoic chamber.
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.
Above 1GHz:
a. The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

10.4 Test Results

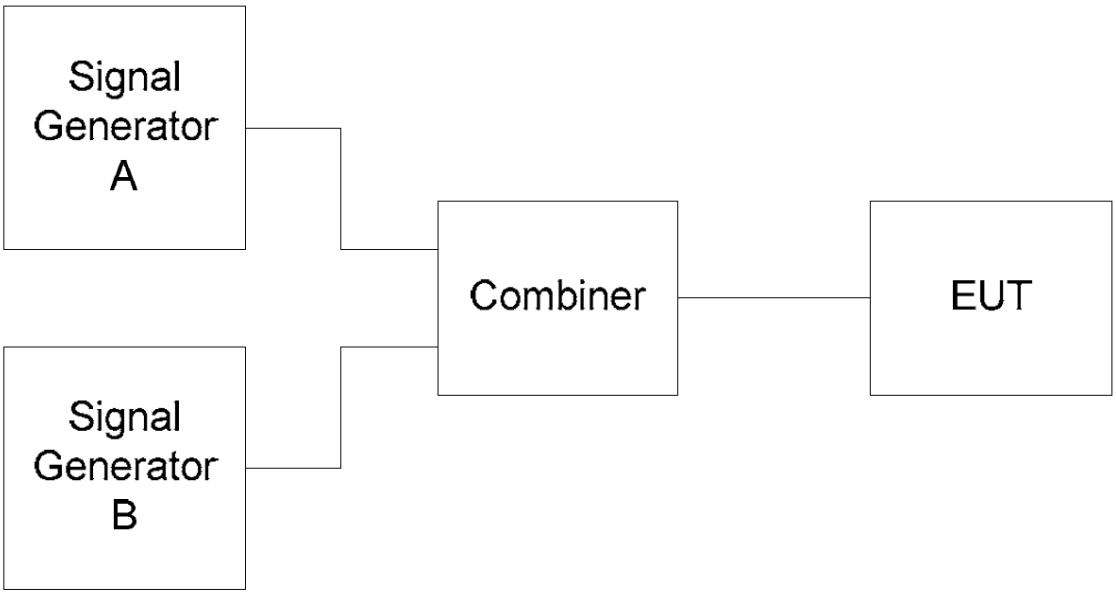
All modes have been tested and reports show data in the worst mode

Frequency	Receiver Reading	Turn table Angle	RX Antenna		Correct	Absolute Level	Result	
			Height	Polar	Factor		Limit	Margin
(MHz)	(dBm)	Degree	(m)	(H/V)	(dBm)	(dBm)	(dBm)	(dB)
802.11a low channel								
235.01	-54.60	123	1.1	H	-15.61	-70.22	-57.00	-13.22
235.01	-53.50	263	1.9	V	-15.61	-69.12	-57.00	-12.12
2395.92	-49.08	263	1.2	H	-6.70	-55.78	-47.00	-8.78
2395.92	-48.78	14	1.5	V	-6.70	-55.48	-47.00	-8.48
802.11a HT20 Mid channel								
235.01	-54.99	189	1.2	H	-15.61	-70.61	-57.00	-13.61
235.01	-53.84	51	1.1	V	-15.61	-69.46	-57.00	-12.46
2395.92	-49.56	310	1.6	H	-6.70	-56.26	-47.00	-9.26
2395.92	-49.39	331	1.3	V	-6.70	-56.09	-47.00	-9.09
802.11a high channel								
235.01	-55.09	202	1.5	H	-15.61	-70.70	-57.00	-13.70
235.01	-53.20	150	1.8	V	-15.61	-68.82	-57.00	-11.82
2395.92	-48.37	1	1.7	H	-6.70	-55.07	-47.00	-8.07
2395.92	-48.44	255	1.4	V	-6.70	-55.14	-47.00	-8.14

Remark:
Absolute Level = Receiver Reading + Factor
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

11. Blocking Or Desensitization

11.1 Block Diagram Of Test Setup



11.2 Limit

The adjacent channel selectivity of the equipment under specified conditions shall not be less than -30 dBm + k. The correction factor, k, is as follows:

Table 6: Limits for blocking or desensitization

Receiver category	Limit
1	-30 dBm + k
2	-45 dBm + k
3	-60 dBm + k

The correction factor, k, is as follows: $k = -20\log f - 10\log BW$

Where:

-f is the frequency in GHz;

-BW is the occupied bandwidth in MHz.

The factor k is limited within the following: -40 dB < k < 0 dB.

The measured blocking level shall be stated in the test report.

11.3 Test procedure

This measurement shall be conducted under normal conditions.
Two signal generators A and B shall be connected to the receiver via a combining network to the receiver, either:

a) via a test fixture or a test antenna to the receiver integrated, dedicated or test antenna; or
b) directly to the receiver permanent or temporary antenna connector.

The method of coupling to the receiver shall be stated in the test report.
Signal generator A shall be at the nominal frequency of the receiver, with normal modulation of the wanted signal. Signal generator B shall be unmodulated and shall be adjusted to a test frequency at approximately 10 times, 20 times and 50 times of the occupied bandwidth above upper band edge of occupied bandwidth. Initially signal generator B shall be switched off and using signal generator A the level which still gives sufficient response shall be established. The output level of generator A shall then be increased by 3 dB. Signal generator B is then switched on and adjusted until the wanted criteria are met. This level shall be recorded.
The measurement shall be repeated with the test frequency for signal generator B at 10 times, 20 times and 50 times of the occupied bandwidth below the lower band edge of the occupied bandwidth.
The blocking or desensitization shall be recorded as the level in dBm of lowest level of the unwanted signal (generator B).
For tagging systems (e.g. RF identification, anti-theft, access control, location and similar systems) signal generator A may be replaced by a physical tag positioned at 70 % of the measured system range in metres. In this case, the blocking or desensitization shall be recorded as the ratio in dB of lowest level of the unwanted signal (generator B) resulting in a non-read of the tag. to the declared sensitivity of the receiver +3 dB.

11.4 Test Result

The Worst mode 802.11a(Ant A)

Receiver category 2				
Channel Frequency (MHz)	**unwanted test signal Frequency**	**Signal generator B (Level)**	**Limit (dBm)**	**Margin (dBm)**
5745	Centre Frequency – 10*BW	-63.00	-72.38	-9.38
	Centre Frequency + 10*BW	-63.00		-9.38
	Centre Frequency – 20*BW	-59.00		-13.38
	Centre Frequency + 20*BW	-60.00		-12.38
	Centre Frequency – 50*BW	-43.00		-29.38
	Centre Frequency + 50*BW	-42.00		-30.38
5825	Centre Frequency – 10*BW	-65.00	-72.50	-7.50
	Centre Frequency + 10*BW	-61.00		-11.50
	Centre Frequency – 20*BW	-56.00		-16.50
	Centre Frequency + 20*BW	-57.00		-15.50
	Centre Frequency – 50*BW	-44.00		-28.50
	Centre Frequency + 50*BW	-43.00		-29.50
Receiver BW=16.592MHz; $K_{5745MHz}$=−20log 5.745 −10log16.592=-27.38 $K_{5825MHz}$=−20log 5.825 −10log16.592=-27.50				

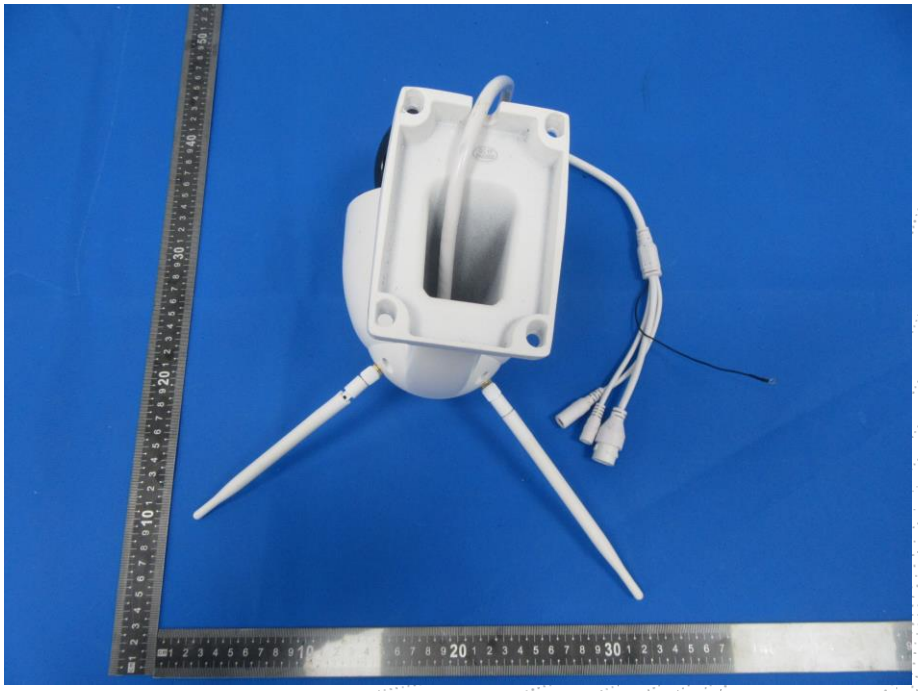
12. EUT Photographs

EUT Photo 1

EUT Photo 2

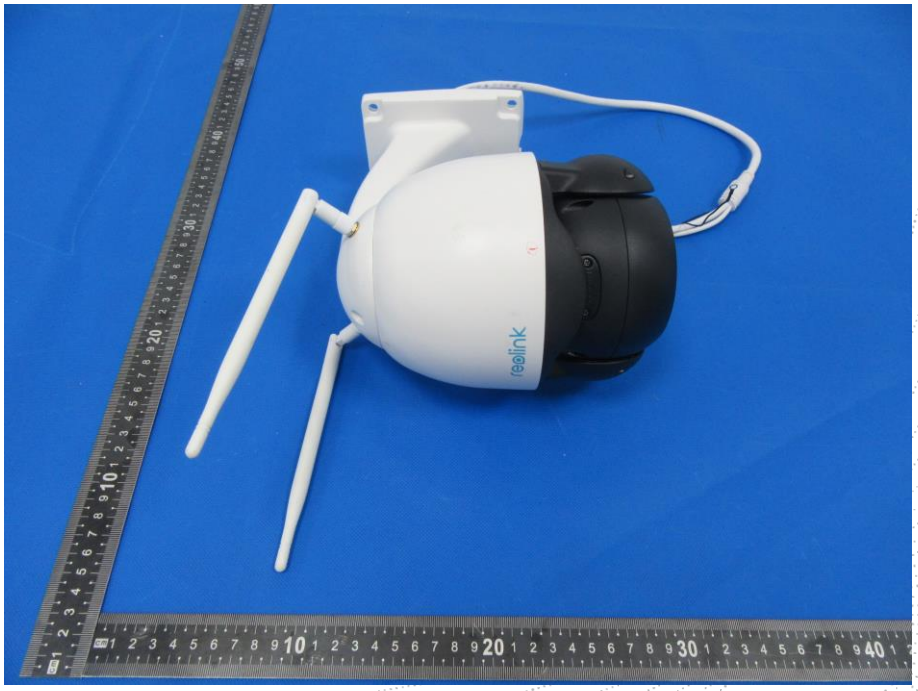
EUT Photo 3

EUT Photo 4



EUT Photo 5

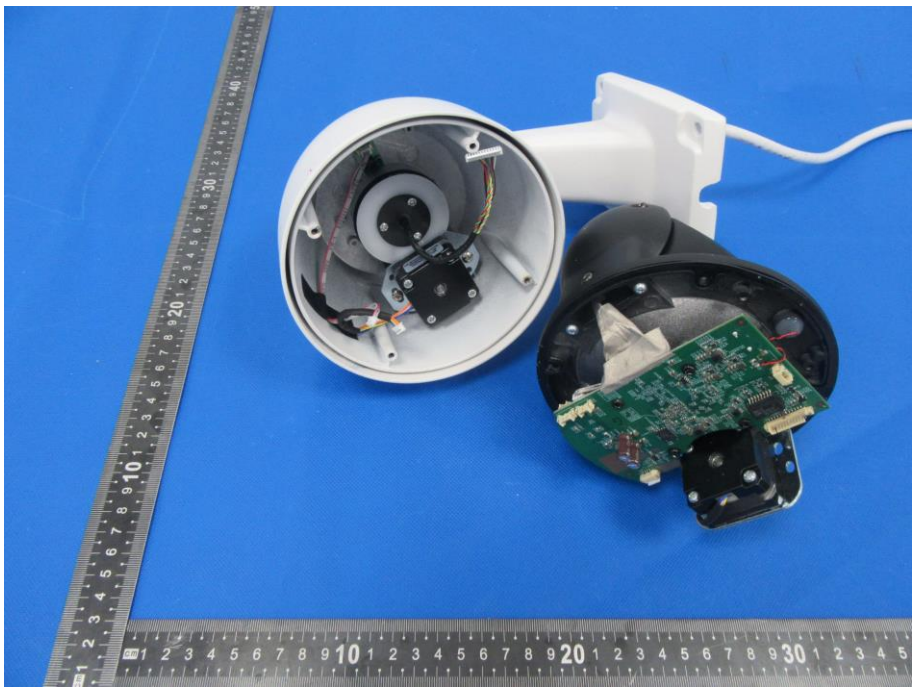
EUT Photo 6



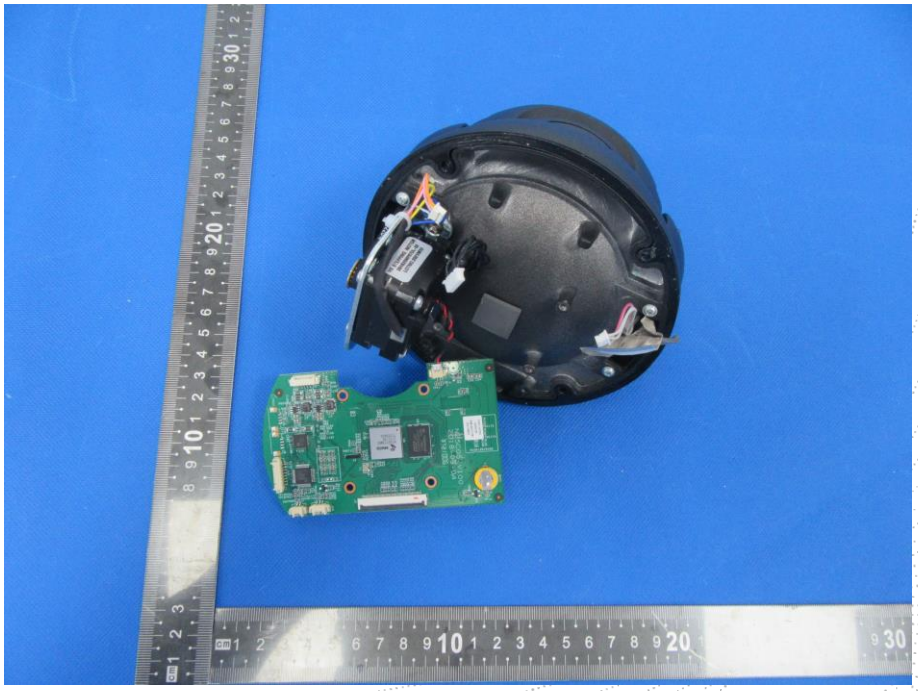
EUT Photo 7

EUT Photo 8

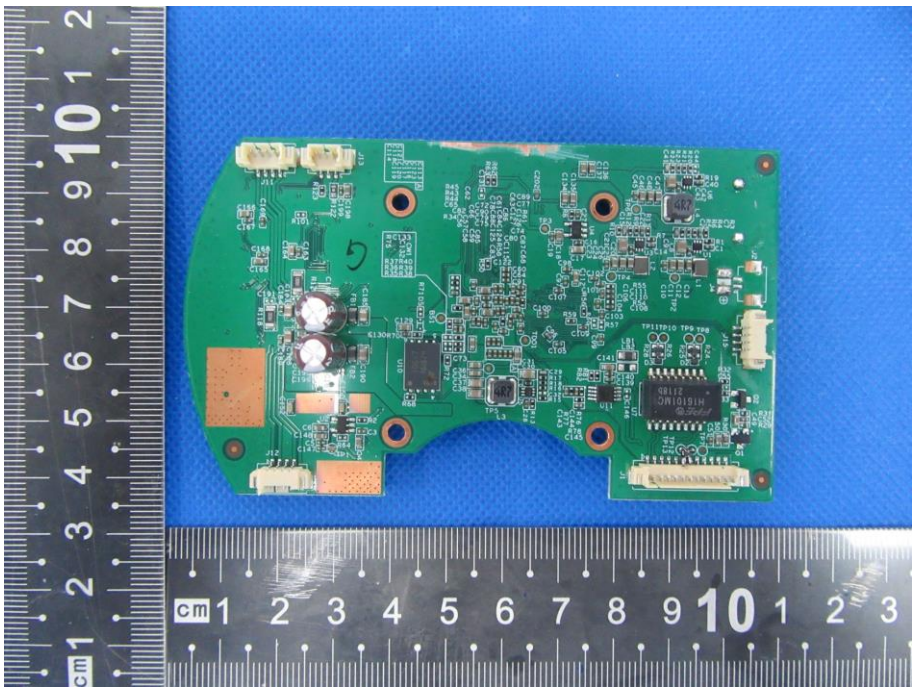
EUT Photo 9



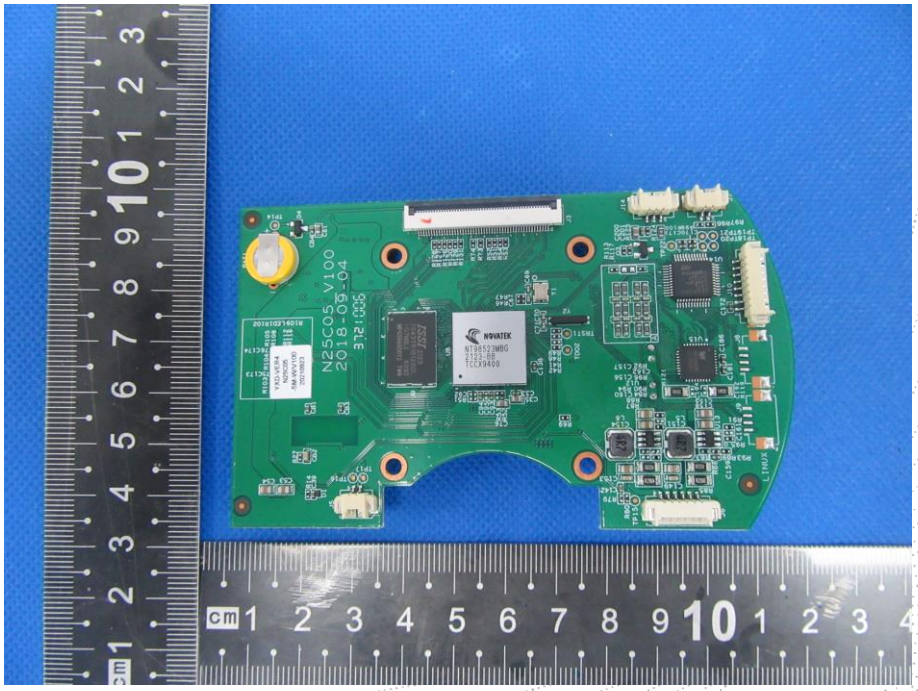
EUT Photo 10



EUT Photo 11

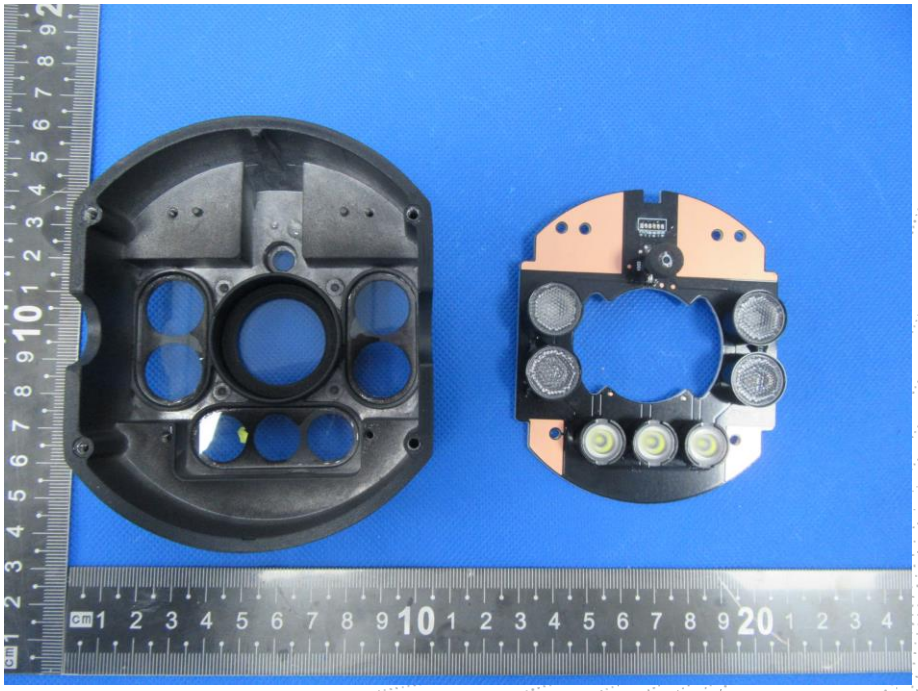


EUT Photo 12

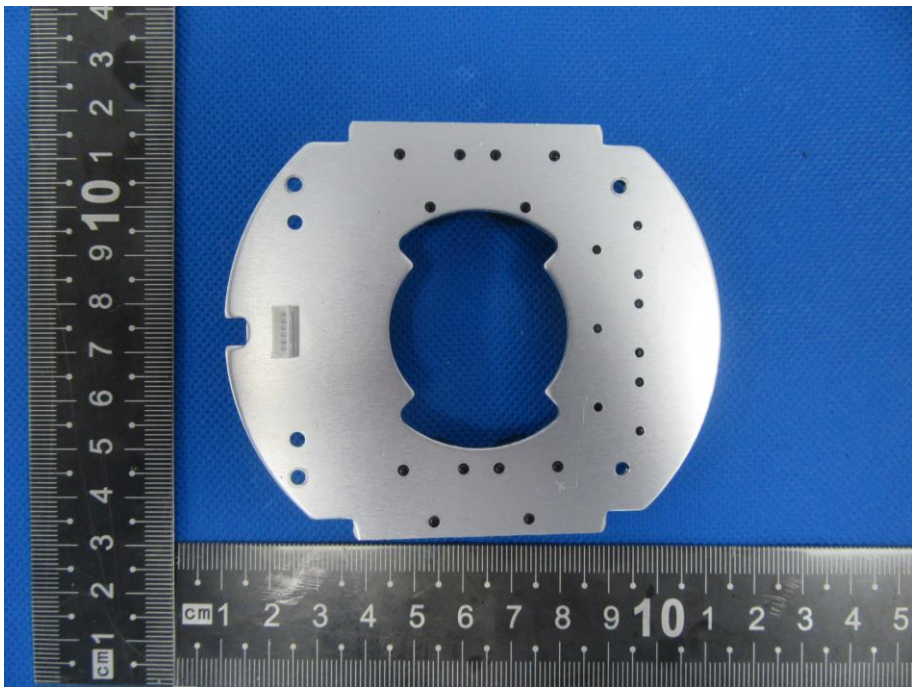


EUT Photo 13

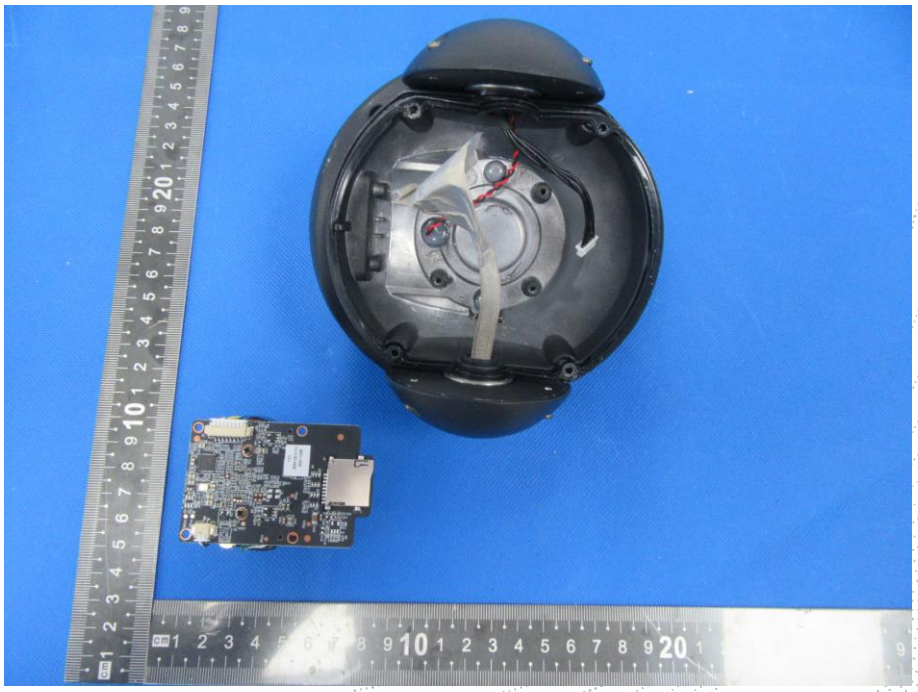
EUT Photo 14



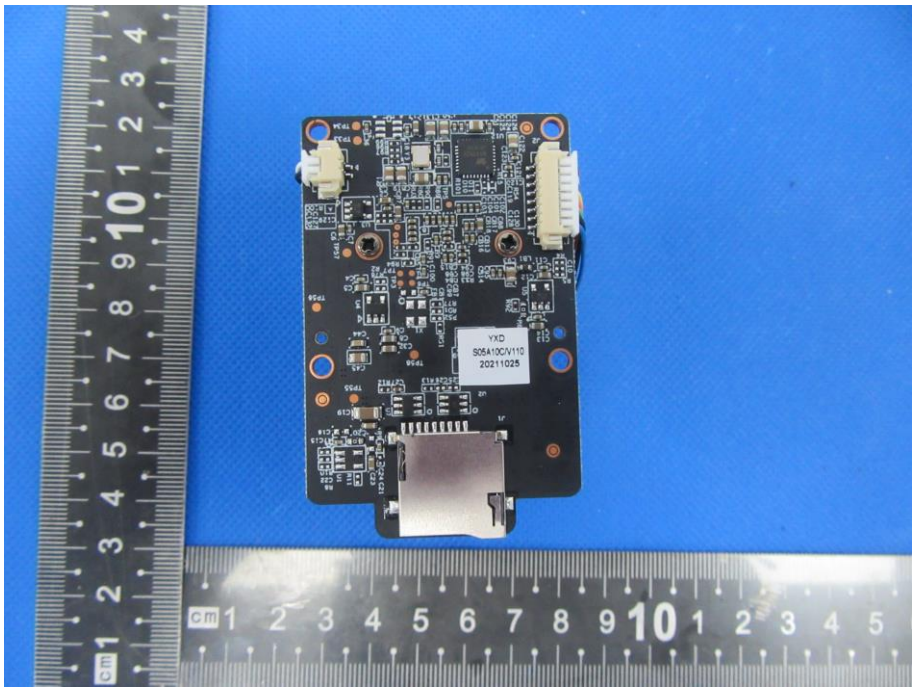
EUT Photo 15



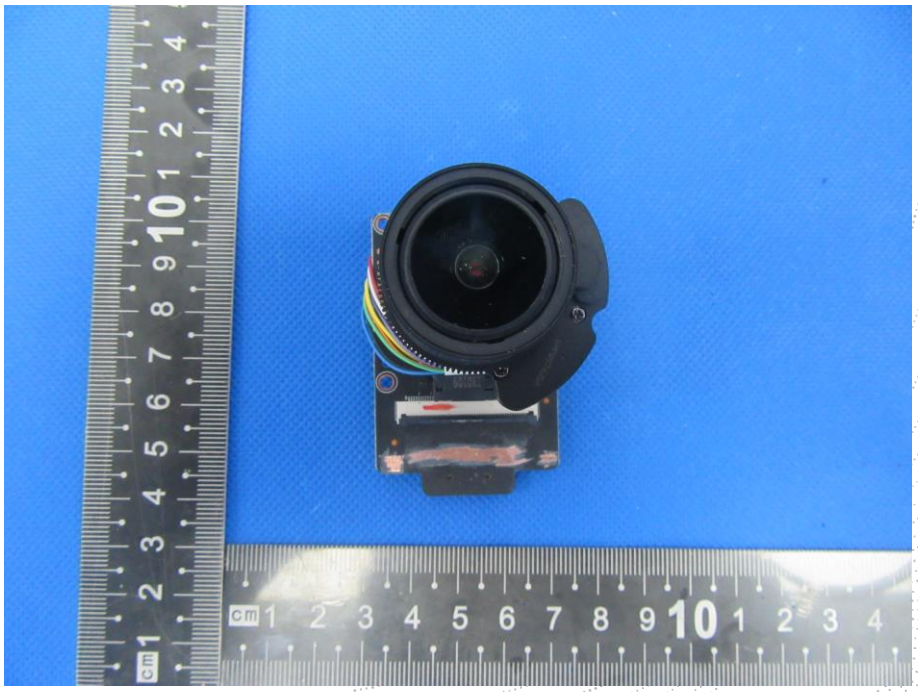
EUT Photo 16



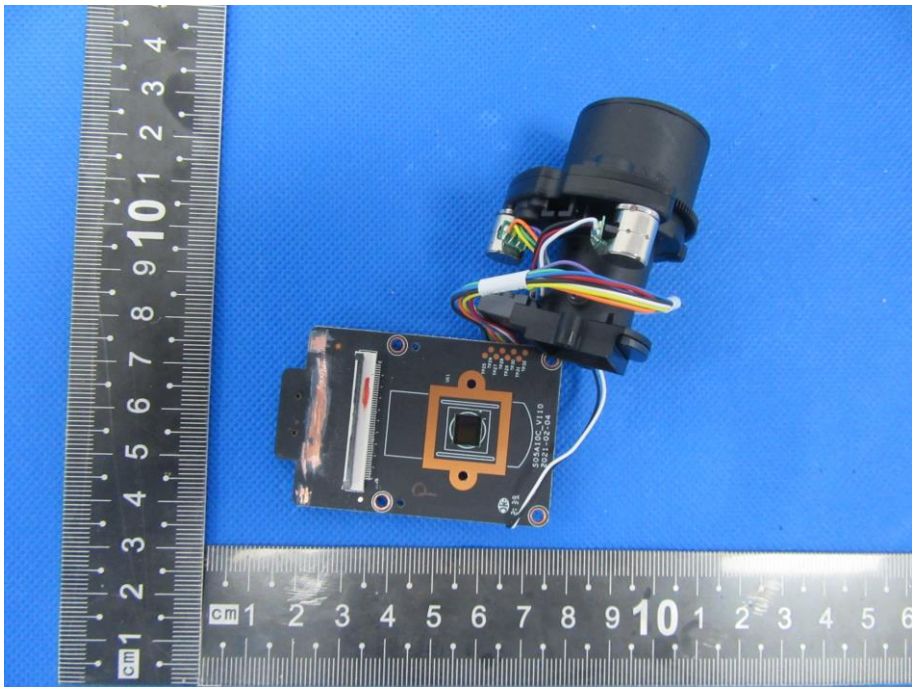
EUT Photo 17



EUT Photo 18

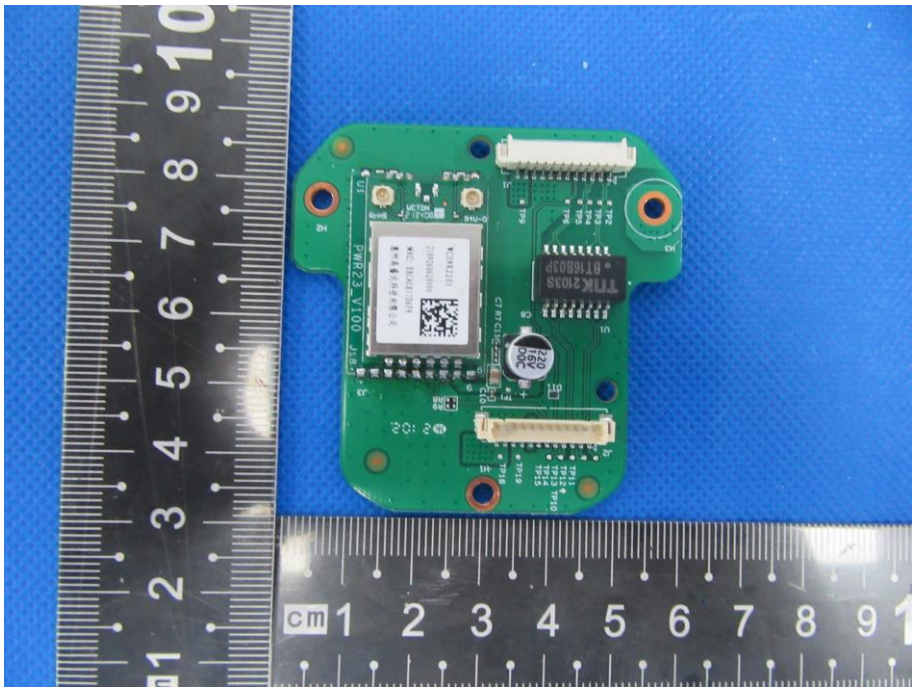


EUT Photo 19

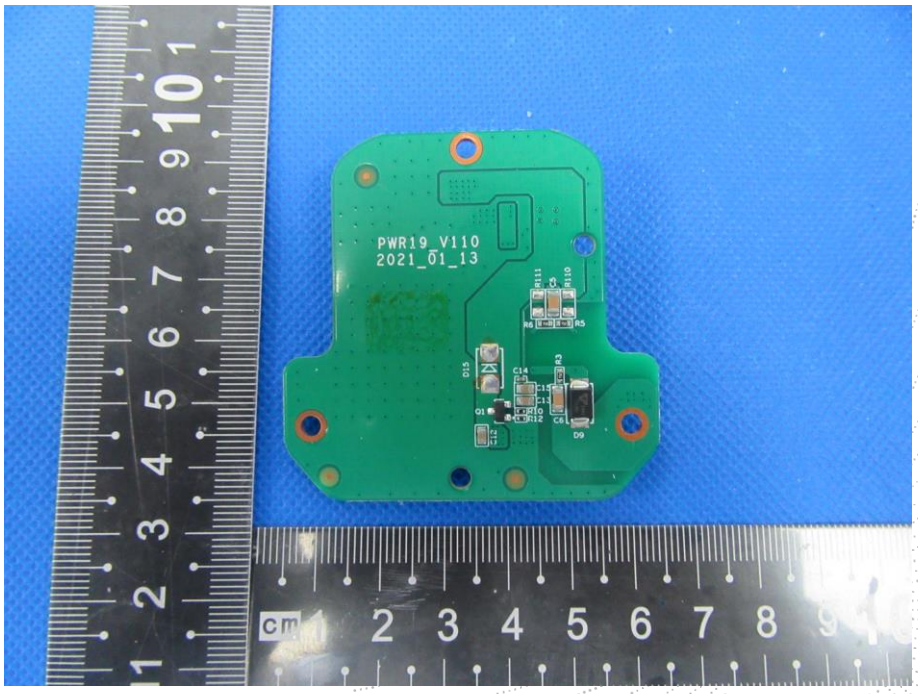


EUT Photo 20

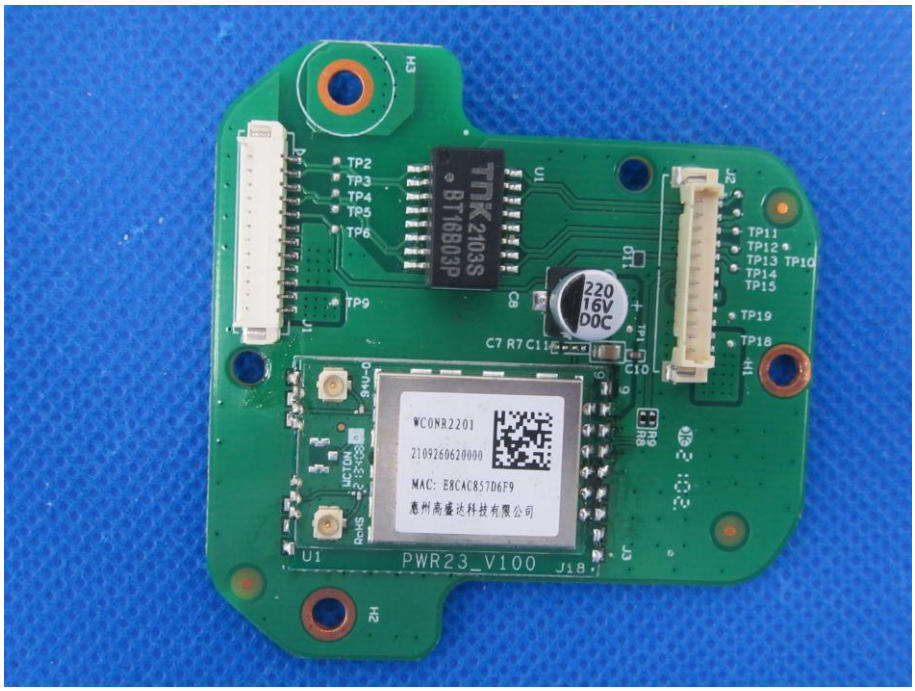
EUT Photo 21



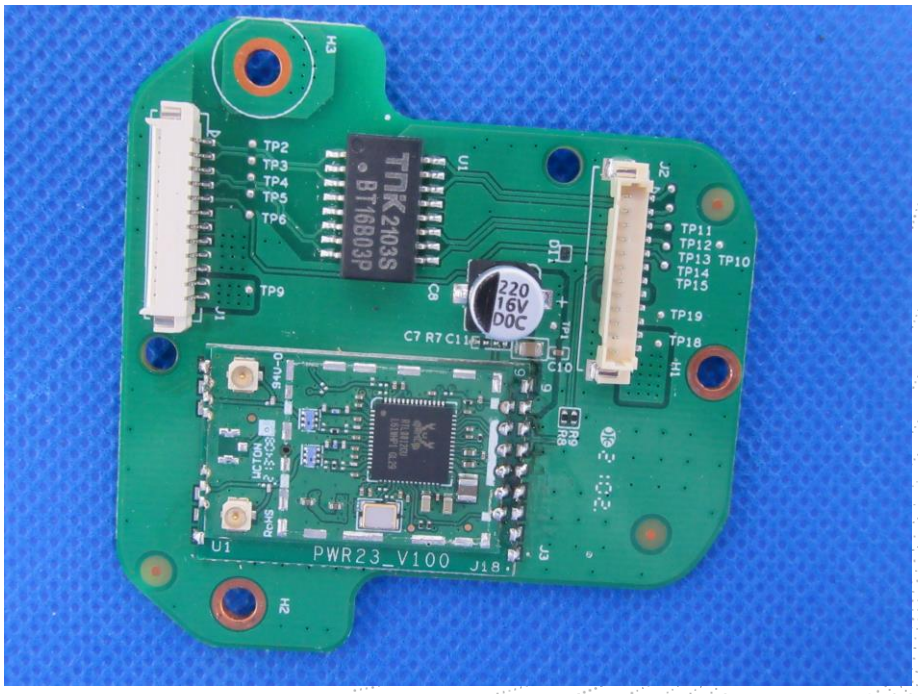
EUT Photo 22



EUT Photo 23

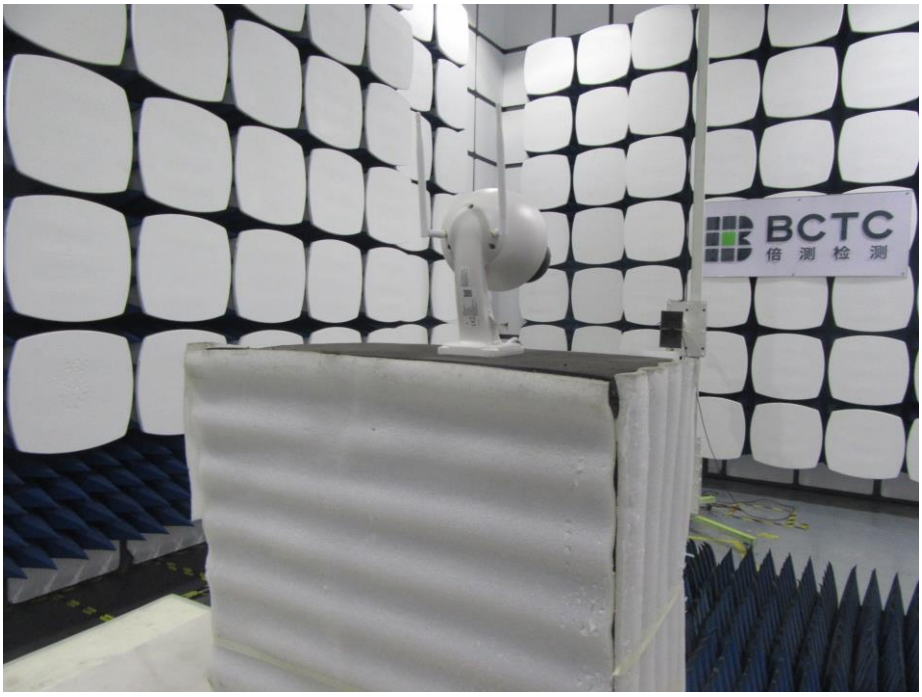


EUT Photo 24



13. EUT Test Setup Photographs

Spurious emissions



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.

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Website：http://www.chnbctc.com

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※※※※※ **END** ※※※※※