

TEST REPORT

Report No.: BCTC2401383633-5E

Applicant: REOLINK INNOVATION LIMITED

Product Name: WiFi IP Camera

Test Model: Argus 3 Ultra

Tested Date: 2023-05-18 to 2023-05-26

Issued Date: 2024-01-30

Shenzhen **BCTC** Testing Co., Ltd.



Product Name: WiFi IP Camera

Trademark:



Model/Type reference: Argus 3 Ultra
Argus 3 Plus 4K, Argus Series B350

Prepared For: REOLINK INNOVATION LIMITED

Address: FLAT/RM 705 7/F FA YUEN COMMERCIAL BUILDING 75-77 FA YUEN
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Manufacturer: REOLINK INNOVATION LIMITED

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Sample Received Date: 2023-05-18

Sample tested Date: 2023-05-18 to 2023-05-26

Issue Date: 2024-01-30

Report No.: BCTC2401383633-5E

Test Standards: ETSI EN 300 440 V2.2.1 (2018-07)

Test Results: PASS

Remark: This is WIFI-5.8GHz 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.

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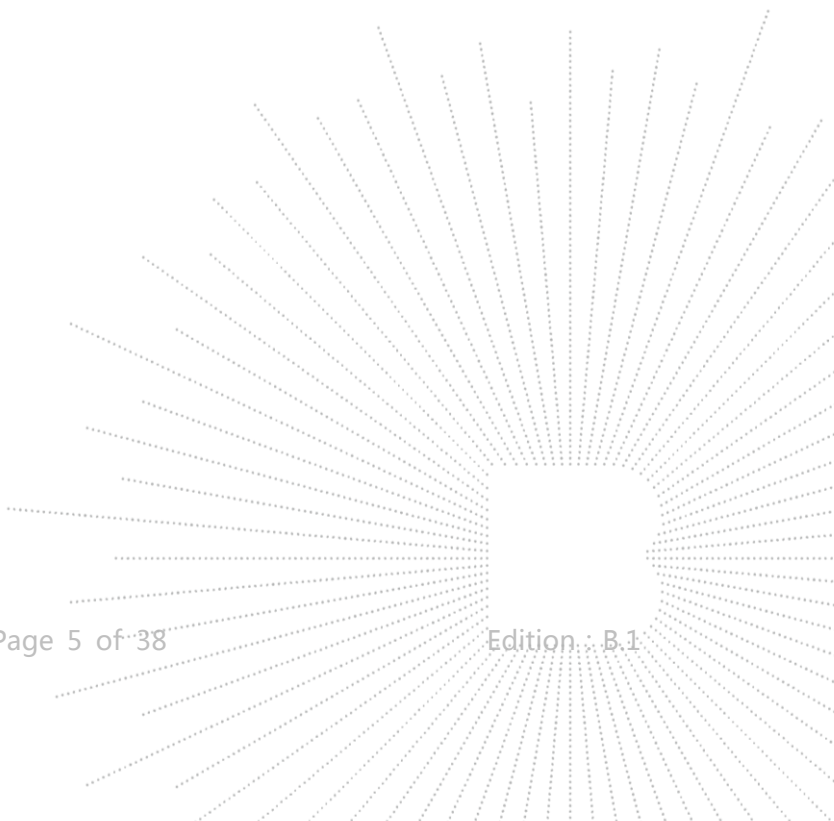
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(Note: N/A Means Not Applicable)

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1. Version

Report No.	Issue Date	Description	Approved
BCTC2401383633-5E	2024-01-30	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	4.4.35.4	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			

Remark: Based on the following changes in the original test report (BCTC2305647672E). Changes Model/Type reference, update the shell screen printing and label, not affect the test results, add EUT photo P18-P20.

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 x 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°C
Humidity	5.3%

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference	Argus 3 Ultra Argus 3 Plus 4K, Argus Series B350
Model differences:	All the model are the same circuit and RF module, except model names.
Hardware Version:	N/A
Software Version:	N/A
Type of Modulation:	WIFI(5.8GHz): IEEE 802.11a/n HT20:5745MHz-5825MHz
Max. RF output power:	WIFI(5.8GHz): 9.08 dBm
Type of Modulation:	WIFI(5.8GHz): OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna installation:	WIFI(5.8GHz):Internal antenna
Antenna Gain:	WIFI(5.8GHz): 4.35 dBi
Ratings:	DC 5V from adapter

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Shielded	Note
1	--	--	Applicant	---	Yes/No	With a ferrite ring in mid Detachable
2	--	--	BCTC	--	Yes/No	--

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	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)	5745MHz	5785MHz	5825MHz
Transmitting(802.11n HT20)	5745MHz	5785MHz	5825MHz
Receiving(802.11a)	5745MHz	5785MHz	5825MHz
Receiving(802.11n HT20)	5745MHz	5785MHz	5825MHz

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(KPa):	101
Temperature(°C):	26
Test Voltage(DC):	5V

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	LTLV	LTHV	HTHV	HTLV
Temperature (°C)	0	0	45	45
Test Voltage (DC)	4.5	5.5	5.5	4.5

5. Test Facility And Test Instrument Used

5.1 Test Facility

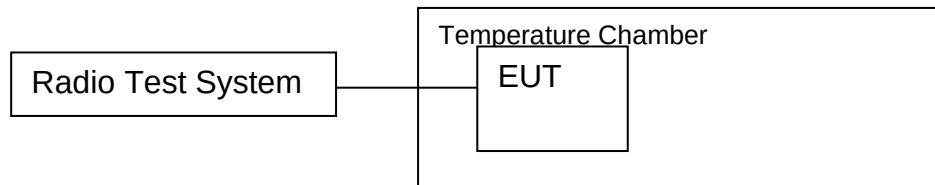
All measurement facilities used to collect the measurement data are located at 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements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

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 15, 2023	May 14, 2024
3	Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
4	Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
5	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	942	May 15, 2023	May 14, 2024
6	Loop Antenna	Schwarzbeck	FMZB1519B	00014	Jun. 06, 2022	Jun. 05, 2023
7	Amplifier	SKET	LAPA_01G18 G-45dB	\	May 15, 2023	May 14, 2024
8	Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 06, 2022	Jun. 05, 2023
9	Preamplifier	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
10	Horn antenna	Schwarzbeck	BBHA9170	00822	Jun. 06, 2022	Jun. 05, 2023
11	Spectrum Analyzer 9kHz-40GHz	R&S	FSP 40	100363	May 15, 2023	May 14, 2024
12	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
13	Spectrum Analyzer	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024
14	Signal Generator	Keysight	N5182B	MY56200519	May 15, 2023	May 14, 2024
15	Signal Generator	Keysight	83711B	US37100131	Aug. 29, 2022	Aug. 28, 2023
16	Communication test set	R&S	CMW500	126173	Nov. 08, 2022	Nov. 07, 2023
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Programmable constant temperature and humidity test chamber	DGBELL	BTKS5-150C	\	Jun. 30, 2022	Jun. 29, 2023
19	Radio frequency control box	MAIWEI	MW100-RFC B	\	\	\
20	Software	MAIWEI	MTS 8310	\	\	\

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:

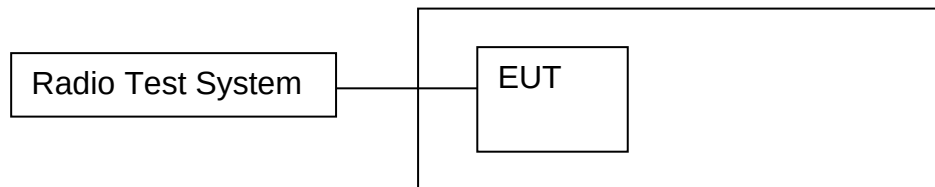
- the average output power of the transmitter shall be determined using a wideband, calibrated RF power meter with a matched thermocouple detector or an equivalent thereof and, where applicable, with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The 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)	Low Channel	Middle Channel	High Channel
		EIRP	EIRP	EIRP
802.11a	Normal	9.08	7.69	7.62
	Lower	8.46	7.25	6.86
	Upper	8.31	6.48	6.55
802.11n(HT20)	Normal	7.40	8.64	7.44
	Lower	6.49	7.98	6.99
	Upper	5.72	7.41	6.81
Limit		≤25mW (14dBm)		
Remark: P = A + G + Y,G=4.35 dBi, 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

- put the spectrum analyser in video averaging mode with a minimum of 50 sweeps selected;
- 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;
- 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;
- 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;
- 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

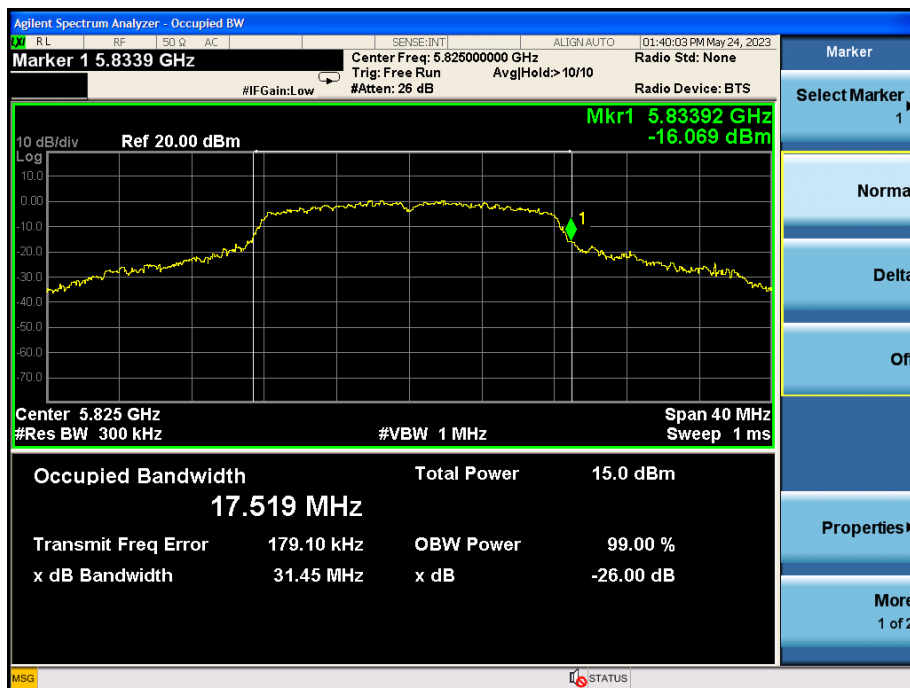
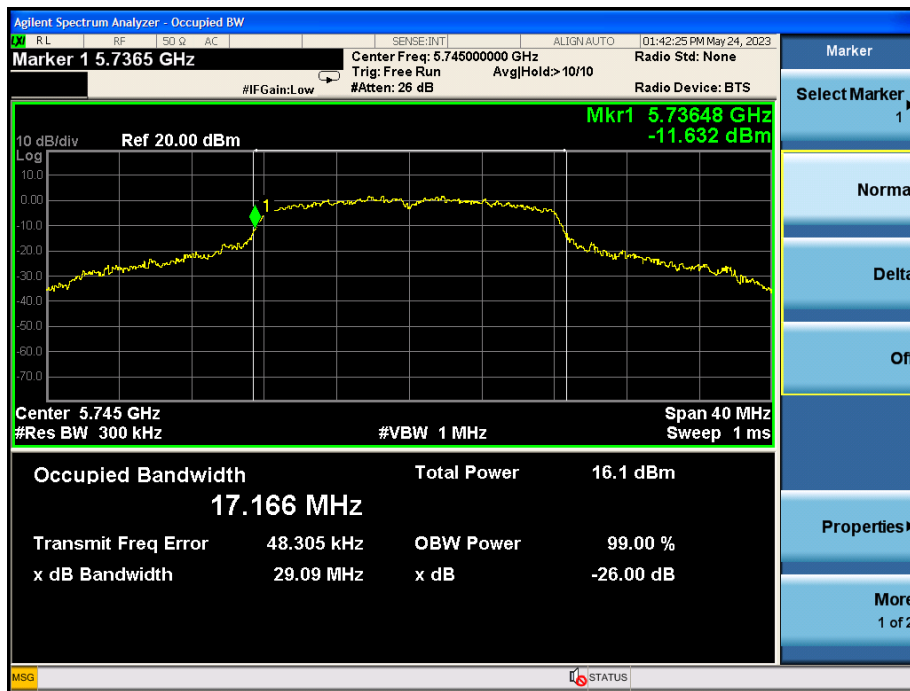
A mode 5745MHz-5825MHz

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5736.48	/	17.166
	/	5833.92	17.519
LTLV	5735.92	/	17.018
	/	5833.51	17.352
LTHV	5735.05	/	16.855
	/	5832.73	17.325
HTHV	5735.03	/	16.640
	/	5832.63	17.276
HTLV	5734.38	/	16.369
	/	5832.23	17.079

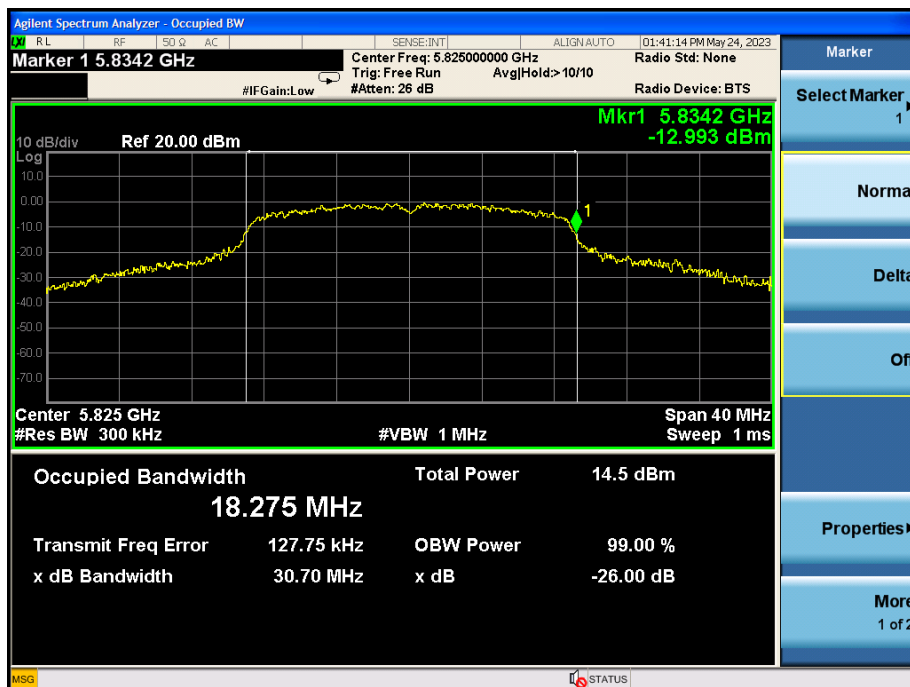
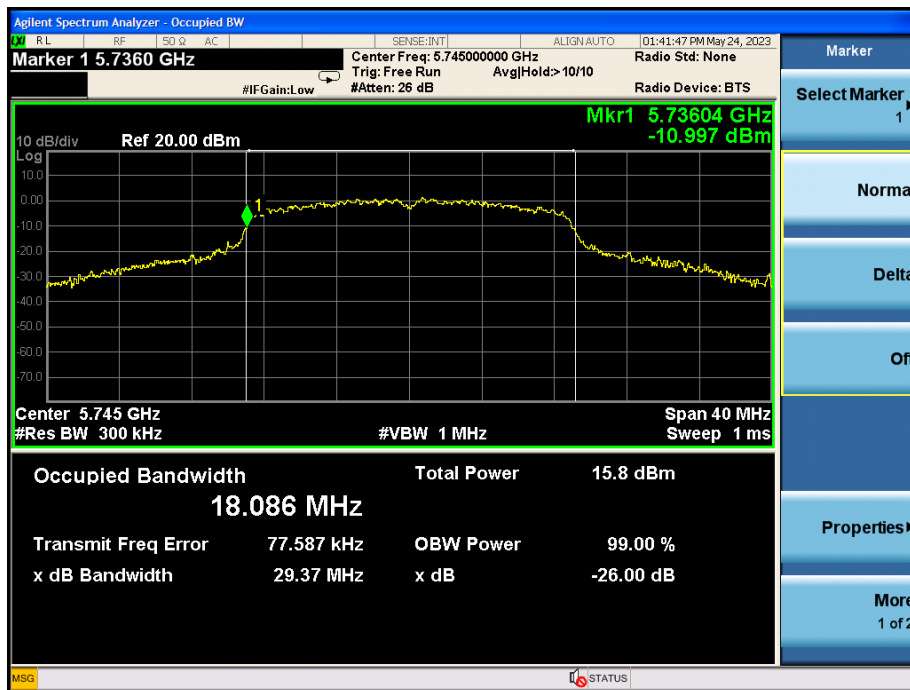
n20 mode 5745MHz-5825MHz

Test Conditions	Frequencies (MHz) at -30dBm/30kHz (EIRP)		Occupied Channel (MHz)
	Lowest Frequency (fL)	Highest Frequency (fH)	
Normal	5736.04	/	18.086
	/	5834.20	18.275
LTLV	5735.29	/	17.788
	/	5833.27	18.054
LTHV	5734.30	/	17.505
	/	5833.21	17.913
HTHV	5733.59	/	17.266
	/	5832.64	17.907
HTLV	5732.65	/	17.167
	/	5831.82	17.672

Test plots:
802.11 a



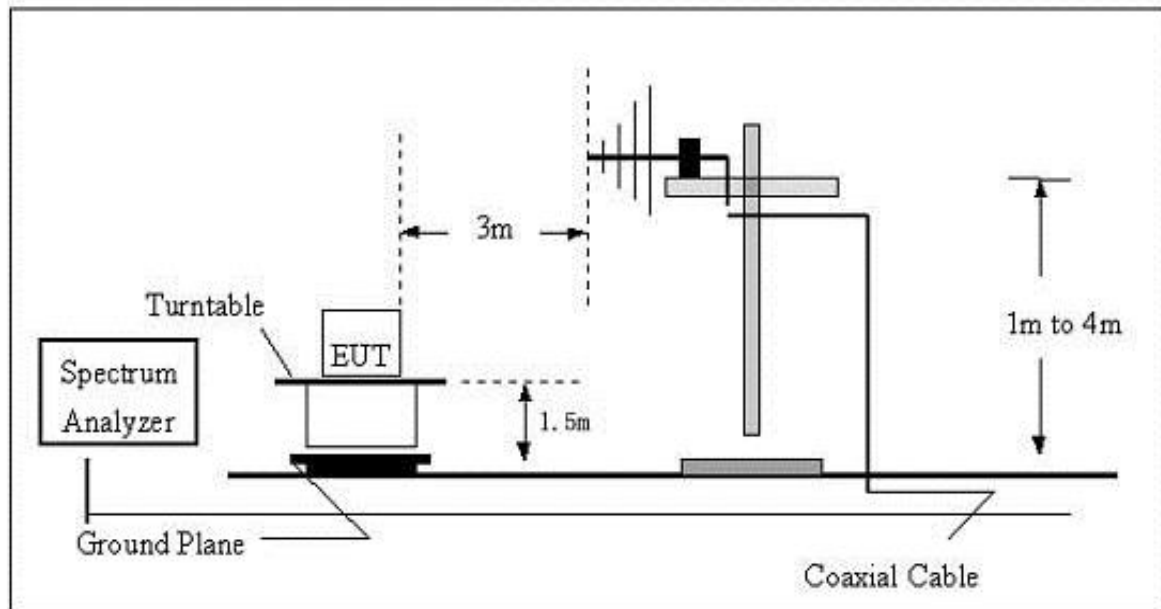
802.11 n20



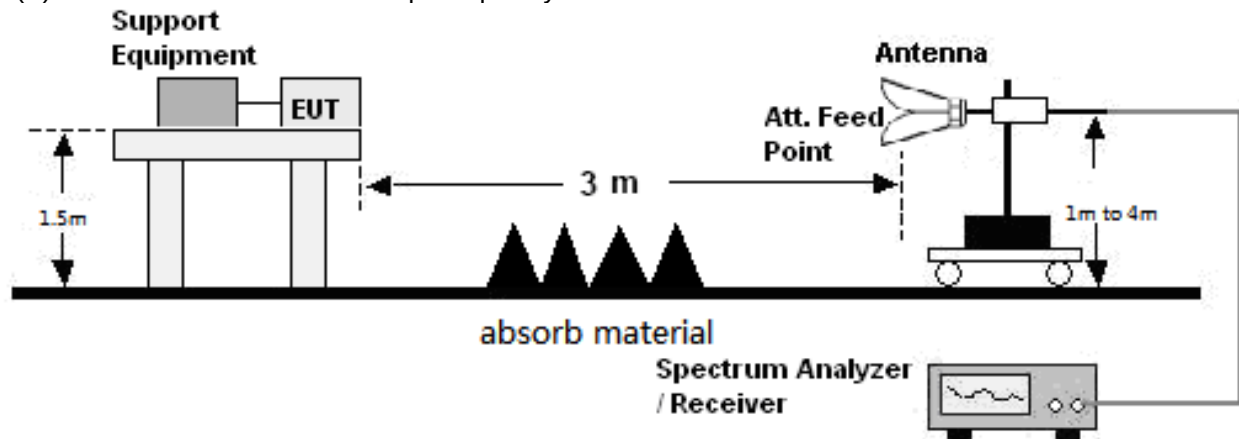
8. Spurious Emissions For Transmitter

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	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
State			
Operating	4 nW	250 nW	1 μW
Standby	2 nW	2 nW	20 nW

8.3 Test Procedure

30MHz ~ 1GHz:

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

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

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								
528.08	-51.92	9	1.9	H	-8.23	-60.16	-54	-6.16
528.08	-51.73	161	1.5	V	-8.23	-59.96	-54	-5.96
11490.00	-42.07	106	1.3	H	-0.43	-42.50	-30	-12.50
11490.00	-41.67	74	1.3	V	-0.43	-42.10	-30	-12.10
17235.00	-54.23	237	1.7	H	8.31	-45.92	-30	-15.92
17235.00	-57.35	50	1.1	V	8.31	-49.04	-30	-19.04
802.11a Mid channel								
528.08	-52.61	41	1.2	H	-8.23	-60.84	-54	-6.84
528.08	-52.17	6	2.0	V	-8.23	-60.40	-54	-6.40
11570.00	-42.08	240	1.2	H	-0.38	-42.46	-30	-12.46
11570.00	-41.01	29	1.2	V	-0.38	-41.39	-30	-11.39
17355.00	-53.57	103	1.5	H	8.83	-44.74	-30	-14.74
17355.00	-57.78	356	1.9	V	8.83	-48.95	-30	-18.95
802.11a high channel								
528.08	-52.40	133	1.7	H	-8.23	-60.64	-54	-6.64
528.08	-51.50	145	1.8	V	-8.23	-59.73	-54	-5.73
11650.00	-41.14	278	1.9	H	-0.32	-41.46	-30	-11.46
11650.00	-41.17	3	2.0	V	-0.32	-41.49	-30	-11.49
17475.00	-53.51	32	1.9	H	9.35	-44.16	-30	-14.16
17475.00	-57.13	119	1.4	V	9.35	-47.78	-30	-17.78

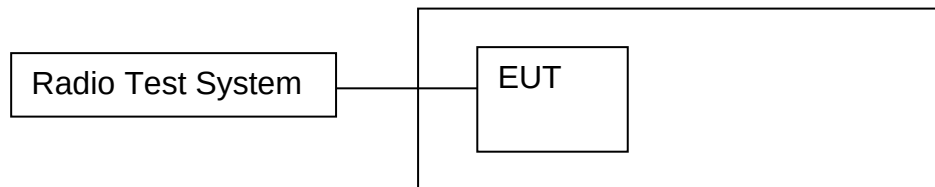
Remark:

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.

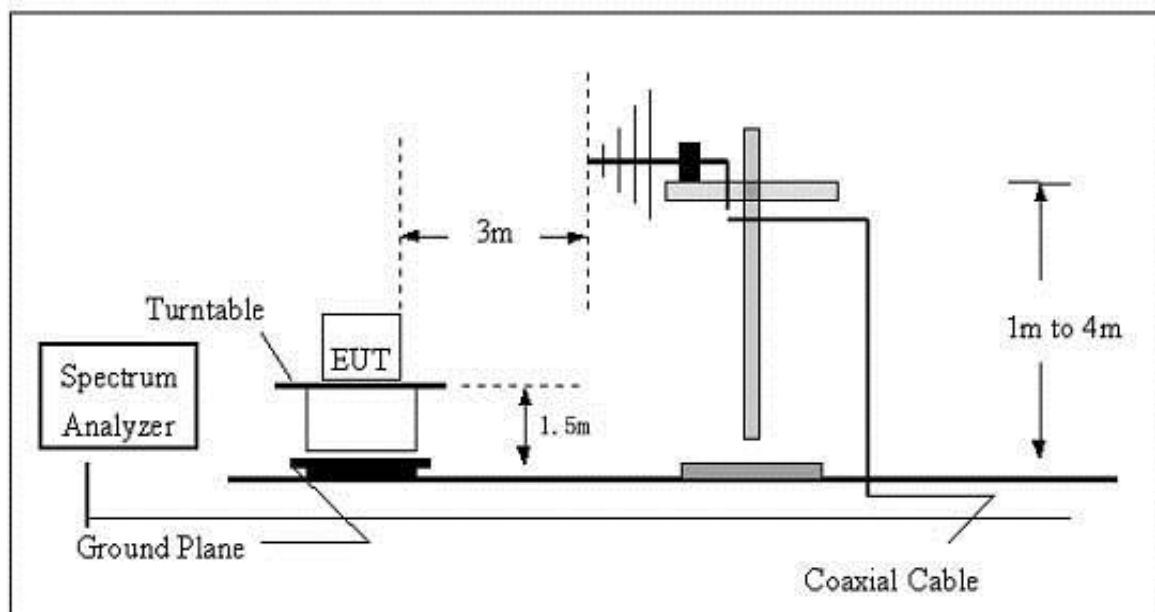
9.4 Test Result

For generic use devices operating at frequency range 5725-5875MHz, according to ETSI EN 300 440 V2.2.1 (2018-07), the duty cycle is no restriction.

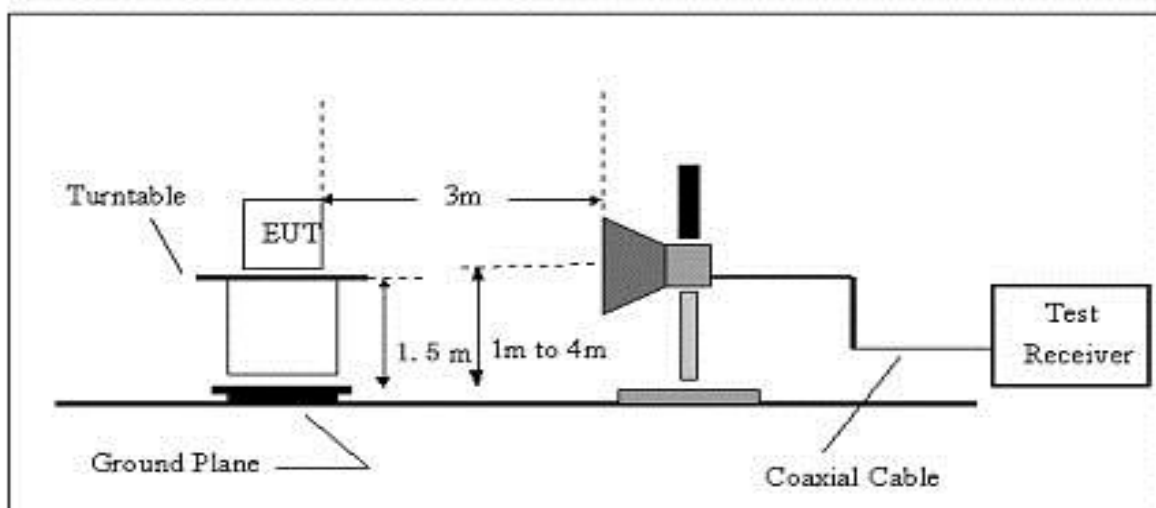
10. Spurious Emissions For Receiver

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:

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

- The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
- 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.
- 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								
382.50	-52.30	6	1.4	H	-11.48	-63.78	-57.00	-6.78
382.50	-52.67	340	1.3	V	-11.48	-64.15	-57.00	-7.15
2491.54	-51.65	44	1.1	H	-4.06	-55.70	-47.00	-8.70
2491.54	-54.09	181	1.5	V	-4.06	-58.15	-47.00	-11.15
802.11a Mid channel								
382.50	-52.81	40	1.7	H	-11.48	-64.29	-57.00	-7.29
382.50	-52.75	175	1.7	V	-11.48	-64.23	-57.00	-7.23
2491.54	-52.26	270	1.1	H	-4.06	-56.32	-47.00	-9.32
2491.54	-54.60	103	1.7	V	-4.06	-58.66	-47.00	-11.66
802.11a high channel								
382.50	-52.35	169	1.6	H	-11.48	-63.83	-57.00	-6.83
382.50	-53.24	167	1.4	V	-11.48	-64.72	-57.00	-7.72
2491.54	-51.57	148	1.5	H	-4.06	-55.63	-47.00	-8.63
2491.54	-53.22	344	1.8	V	-4.06	-57.28	-47.00	-10.28

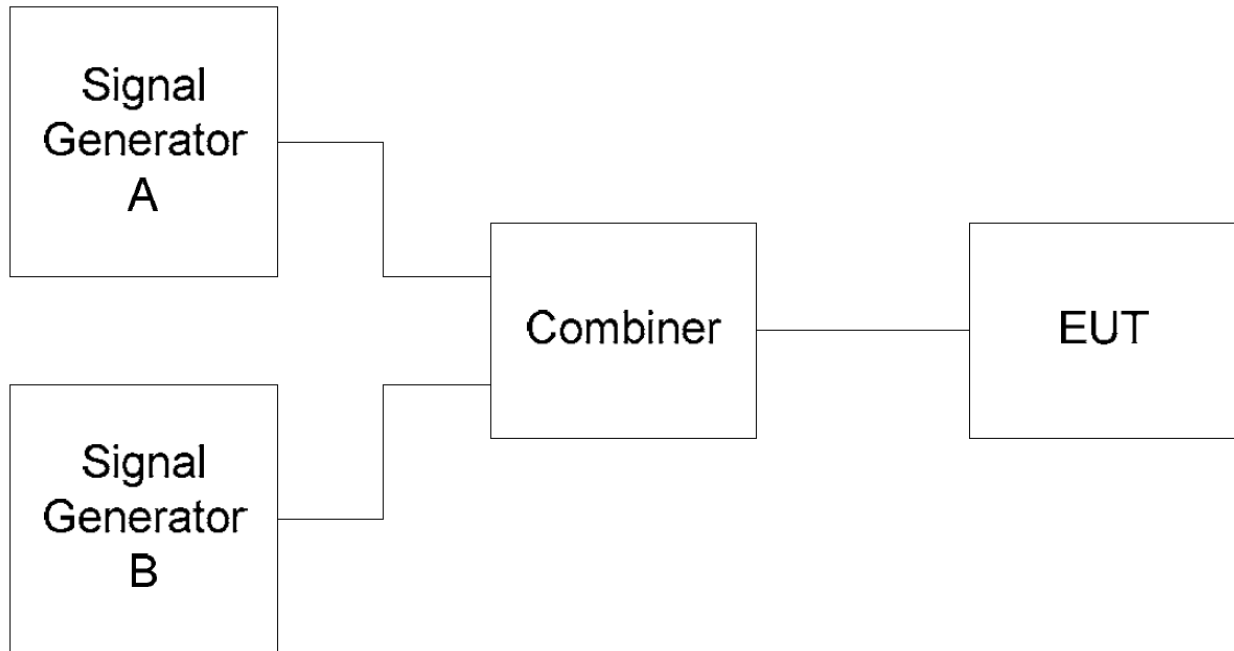
Remark:

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:

$$-40 \text{ dB} < k < 0 \text{ dB}.$$

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 802.11n20

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	-72.79	-9.79
	Centre Frequency + 10*BW	-63.00		-9.79
	Centre Frequency – 20*BW	-59.00		-13.79
	Centre Frequency + 20*BW	-60.00		-12.79
	Centre Frequency – 50*BW	-43.00		-29.79
	Centre Frequency + 50*BW	-42.00		-30.79
5825	Centre Frequency – 10*BW	-65.00	-73.91	-7.91
	Centre Frequency + 10*BW	-61.00		-11.91
	Centre Frequency – 20*BW	-56.00		-16.91
	Centre Frequency + 20*BW	-57.00		-15.91
	Centre Frequency – 50*BW	-44.00		-28.91
	Centre Frequency + 50*BW	-43.00		-29.91
Receiver BW=18.195MHz; K _{5745MHz} =-20log 5.745 -10log18.195=-27.79 K _{5825MHz} =-20log 5.825 -10log18.195=-27.91				

12. EUT Photographs

EUT Photo 1



EUT Photo 2



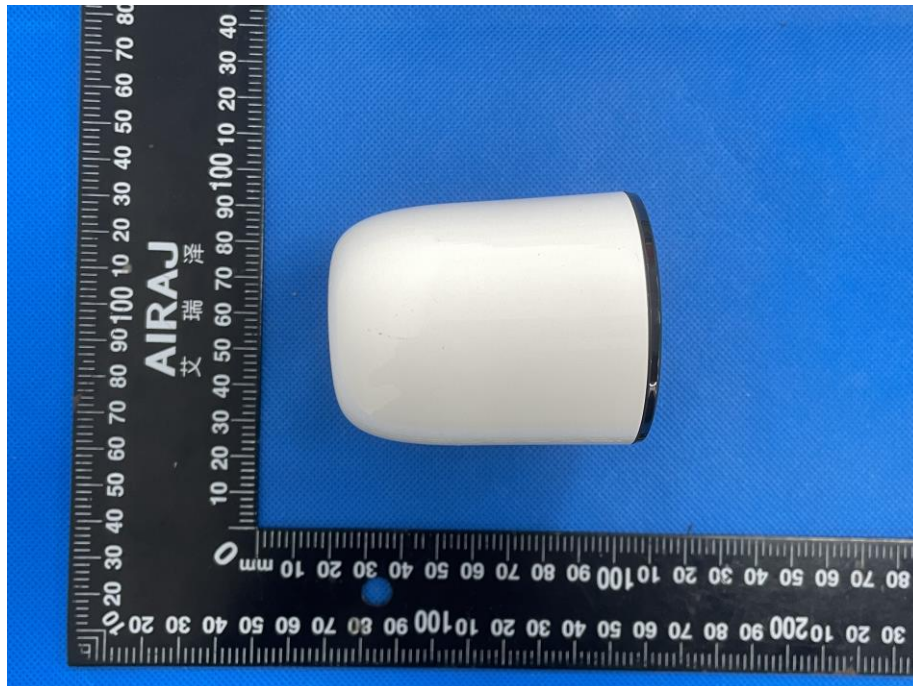
EUT Photo 3



EUT Photo 4



EUT Photo 5



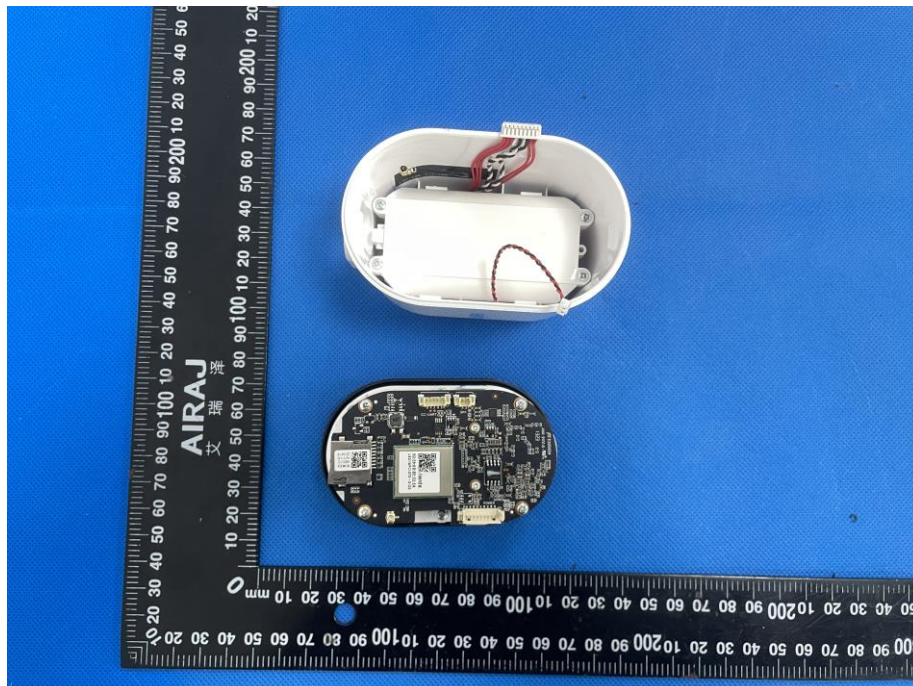
EUT Photo 6



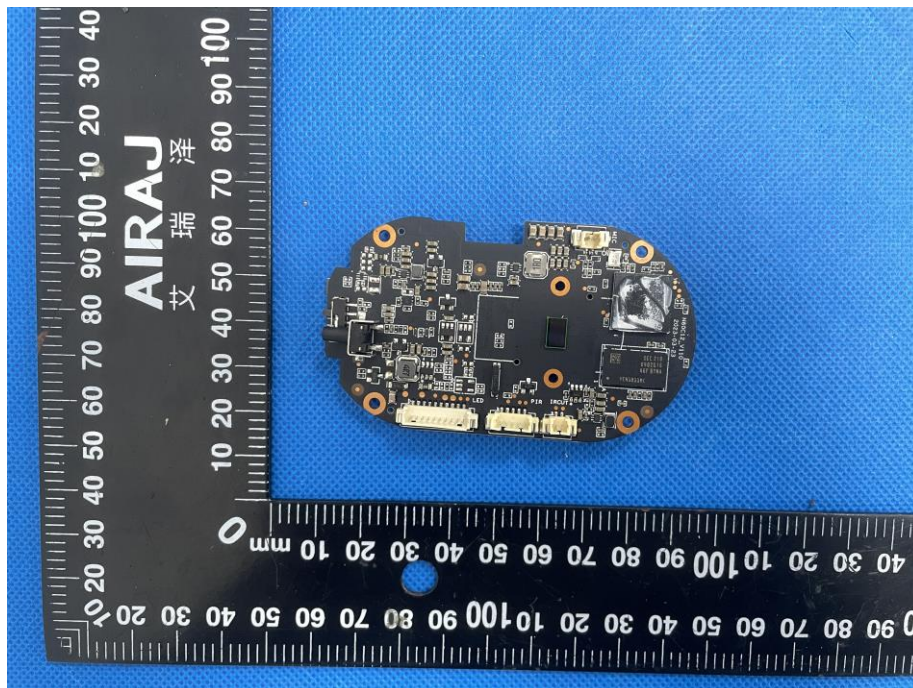
EUT Photo 7



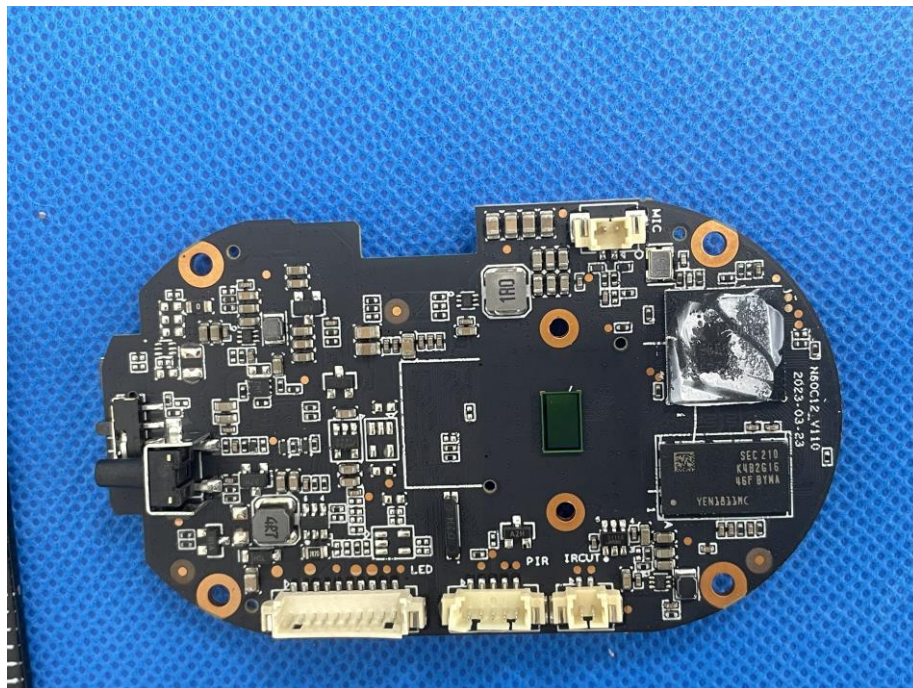
EUT Photo 8



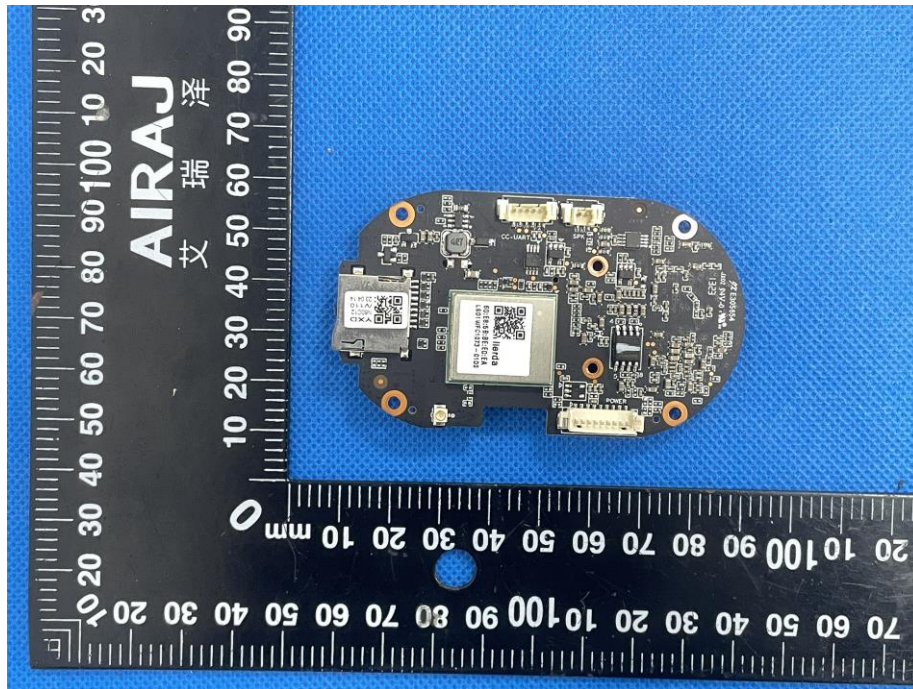
EUT Photo 9



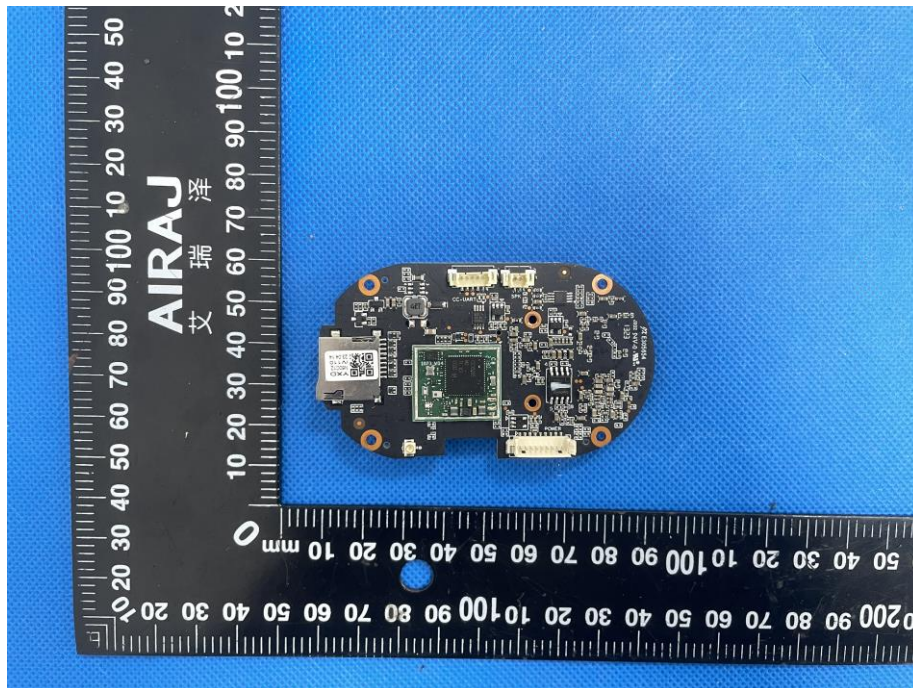
EUT Photo 10



EUT Photo 11



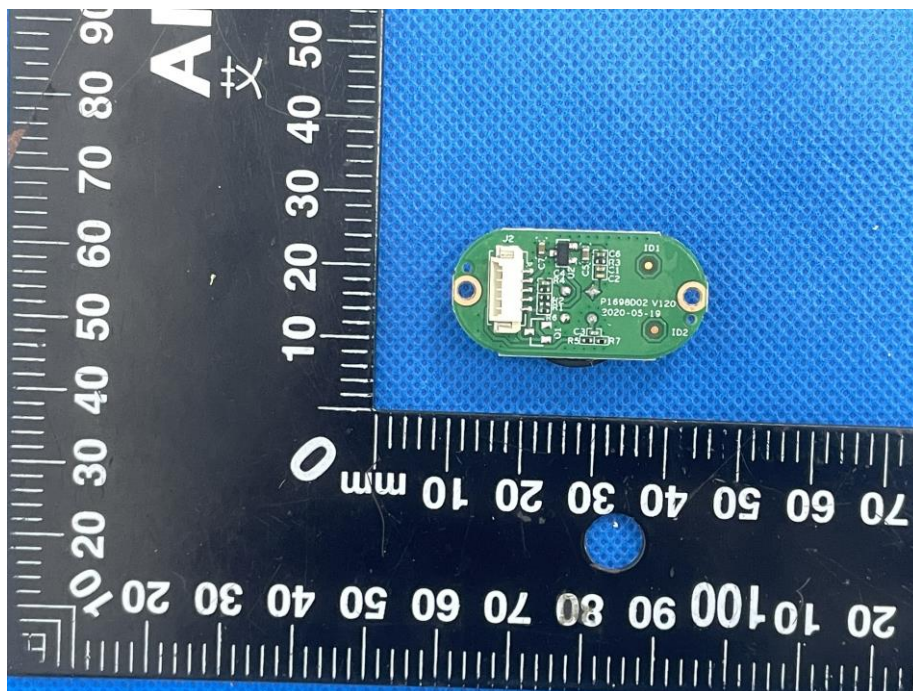
EUT Photo 12



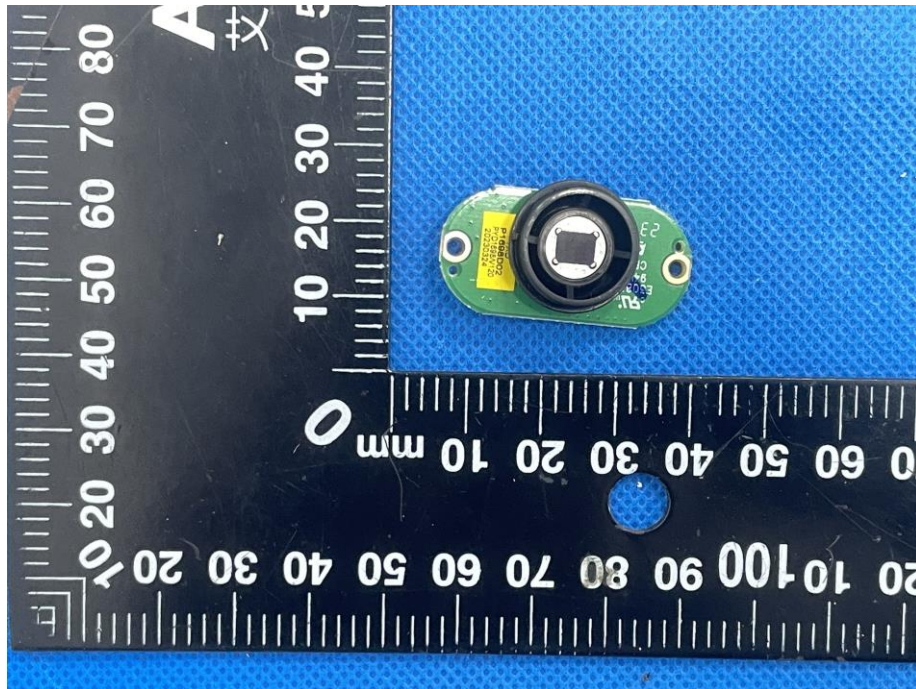
EUT Photo 13



EUT Photo 14



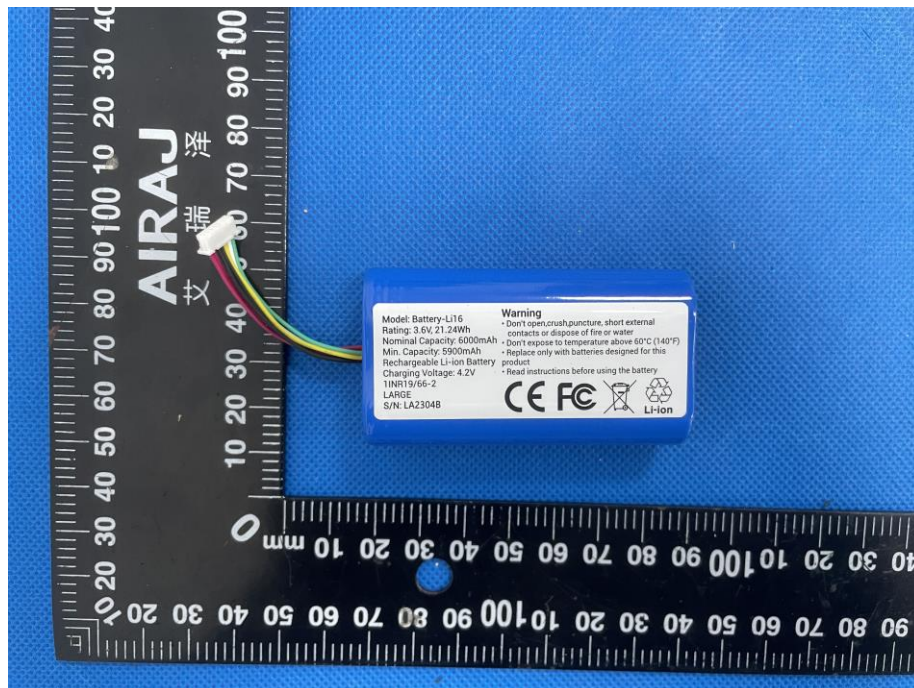
EUT Photo 15



EUT Photo 16



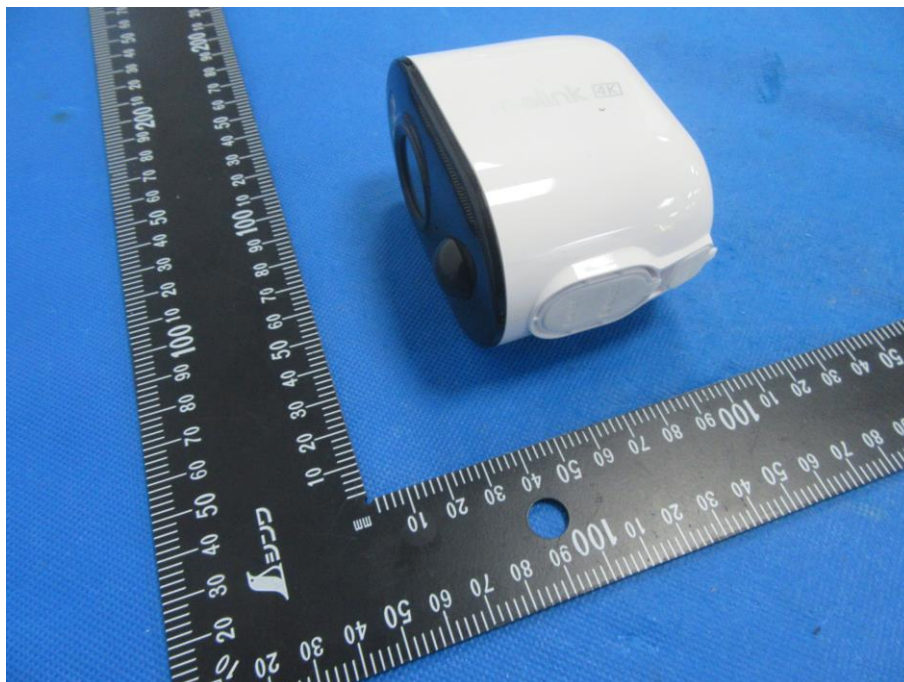
EUT Photo 17



EUT Photo 18



EUT Photo 19



EUT Photo 20



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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 the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test 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, Zhancheng, 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.: BCTC2401383633-3E

Applicant: REOLINK INNOVATION LIMITED

Product Name: WiFi IP Camera

Test Model: Argus 3 Ultra

Tested Date: 2023-05-18 to 2023-05-26

Issued Date: 2024-01-30

Shenzhen **BCTC** Testing Co., Ltd.



Product Name: WiFi IP Camera

Trademark: 

Model/Type reference: Argus 3 Ultra
Argus 3 Plus 4K, Argus Series B350

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, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

Sample Received Date: 2023-05-18

Sample tested Date: 2023-05-18 to 2023-05-26

Issue Date: 2024-01-30

Report No.: BCTC2401383633-3E

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.

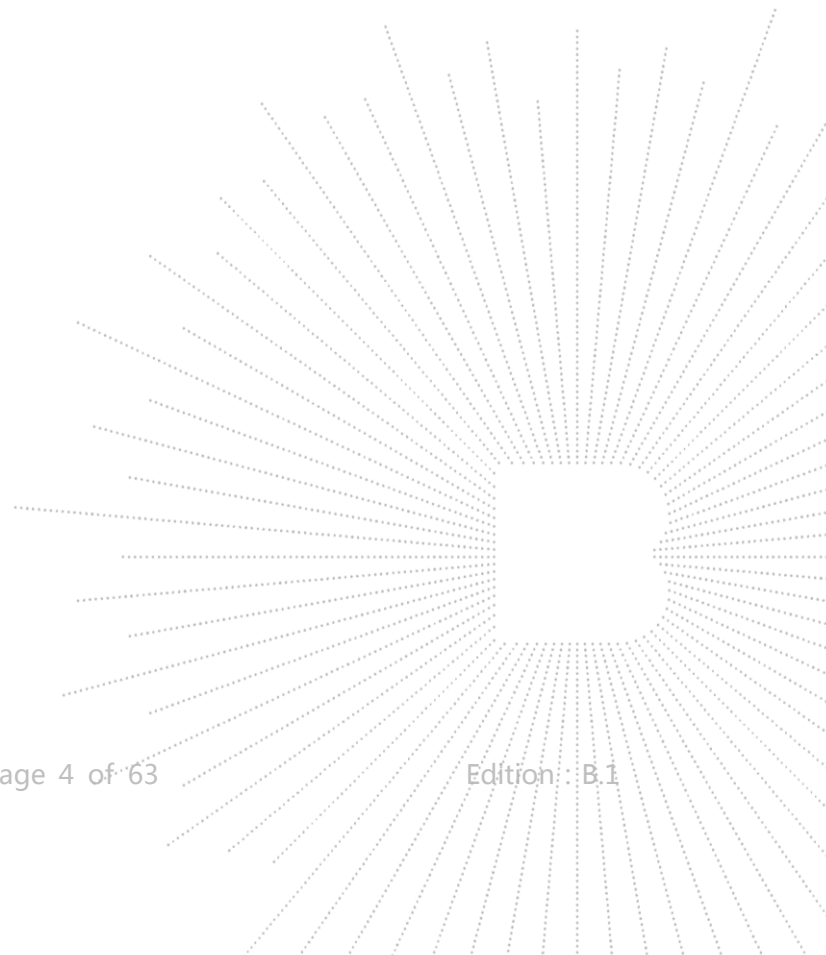
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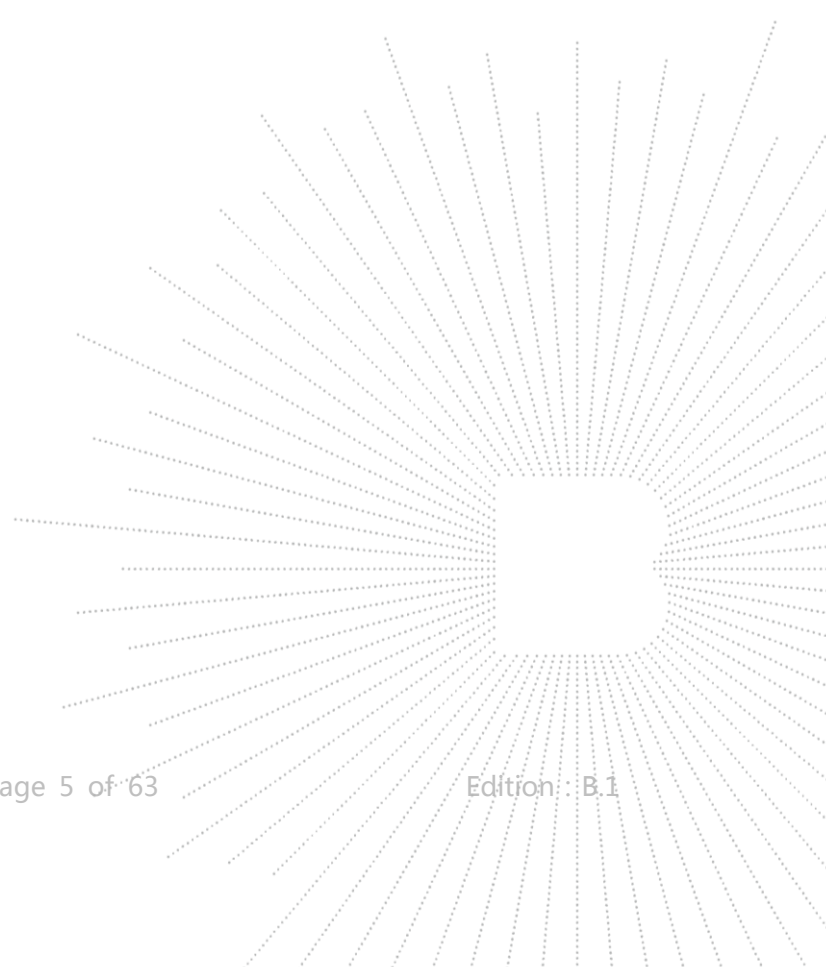
(Note: N/A Means Not Applicable)

TEST
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t See



1. Version

Report No.	Issue Date	Description	Approved
BCTC2401383633-3E	2024-01-30	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	N/A
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.

Remark: Based on the following changes in the original test report (BCTC2305647672E). Changes Model/Type reference, update the shell screen printing and label, not affect the test results, add EUT photo P18-P20.

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 °C
Humidity	5.3 %

4. Product Information And Test Setup

4.1 Product Information

Model/Type reference	Argus 3 Ultra Argus 3 Plus 4K, Argus Series B350
Model differences:	All the model are the same circuit and RF module, except model names.
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WIFI(2.4GHz): IEEE 802.11b/g/n HT20: 2412MHz-2472MHz
Max. RF output power:	WIFI(2.4GHz) : 13.13 dBm
Type of Modulation:	WIFI(2.4GHz): DSSS, OFDM
Antenna installation:	WIFI(2.4GHz): Internal antenna
Antenna Gain:	WIFI(2.4GHz): 4.11 dBi
Ratings:	DC 5V from adapter

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Shielded	Note
1	--	--	Applicant	---	Yes/No	With a ferrite ring in mid Detachable
2	--	--	BCTC	--	Yes/No	--

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
Receiving(802.11b/g/n20)	2412MHz	2442MHz	2472MHz

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(KPa):	101
Temperature(°C):	26
Test Voltage(DC):	5V

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 (°C)	-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 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

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 15, 2023	May 14, 2024
3	Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
4	Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
5	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	942	May 15, 2023	May 14, 2024
6	Loop Antenna	Schwarzbeck	FMZB1519B	00014	Jun. 06, 2022	Jun. 05, 2023
7	Amplifier	SKET	LAPA_01G18 G-45dB	\	May 15, 2023	May 14, 2024
8	Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 06, 2022	Jun. 05, 2023
9	Preamplifier	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
10	Horn antenna	Schwarzbeck	BBHA9170	00822	Jun. 06, 2022	Jun. 05, 2023
11	Spectrum Analyzer 9kHz-40GHz	R&S	FSP 40	100363	May 15, 2023	May 14, 2024
12	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
13	Spectrum Analyzer	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024
14	Signal Generator	Keysight	N5182B	MY56200519	May 15, 2023	May 14, 2024
15	Signal Generator	Keysight	83711B	US37100131	Aug. 29, 2022	Aug. 28, 2023
16	Communication test set	R&S	CMW500	126173	Nov. 08, 2022	Nov. 07, 2023
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Programmable constant temperature and humidity test chamber	DGBELL	BTKS5-150C	\	Jun. 30, 2022	Jun. 29, 2023
19	Radio frequency control box	MAIWEI	MW100-RFC B	\	\	\
20	Software	MAIWEI	MTS 8310	\	\	\

6. Information As Required

ETSI EN 300 328 V2.1.1 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: μ s
☐ 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: 802.11g
☒ 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: <i>17.523 MHz(802.11n20) Max.</i>																			
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:																			
☒ Internal Antenna																			
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:																			
<table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Assembly #</th> <th style="width: 25%;">Gain (dBi)</th> <th style="width: 25%;">e.i.r.p.(dBm)</th> <th style="width: 25%;">Part number or model name</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td></td> <td></td> <td></td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Assembly #	Gain (dBi)	e.i.r.p.(dBm)	Part number or model name	1				2				3			
Assembly #	Gain (dBi)	e.i.r.p.(dBm)	Part number or model name																
1																			
2																			
3																			

CO.LTD

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

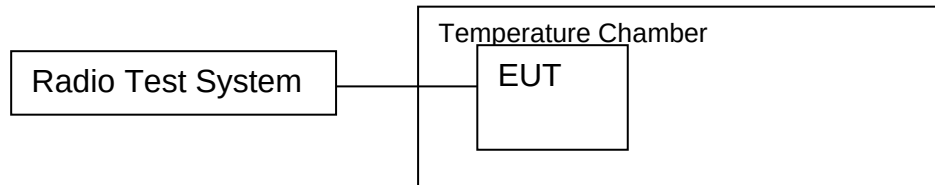
t) Describe the minimum performance criteria that apply to the equipment (see clause 4.3.1.12.3 or clause 4.3.2.11.3):

.....

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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:

$$P = A + G + Y$$

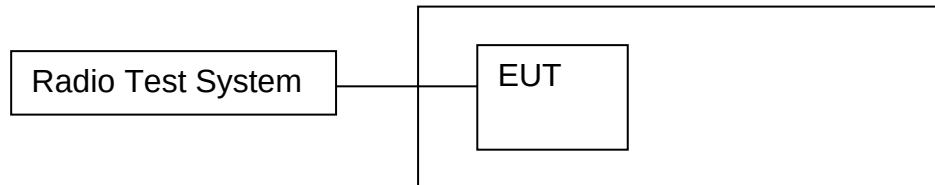
- This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

7.4 Test Result

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Burst Number	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	9	24	13.11	20	Pass
NVNT	b	2442	9.02	24	13.13	20	Pass
NVNT	b	2472	8.53	24	12.64	20	Pass
NVNT	g	2412	7.15	65	11.26	20	Pass
NVNT	g	2442	8.53	65	12.64	20	Pass
NVNT	g	2472	7.72	65	11.83	20	Pass
NVNT	n20	2412	6.17	70	10.28	20	Pass
NVNT	n20	2442	7.97	70	12.08	20	Pass
NVNT	n20	2472	7.24	70	11.35	20	Pass
NVLT	b	2412	8.79	24	12.90	20	Pass
NVLT	b	2442	8.60	24	12.71	20	Pass
NVLT	b	2472	7.91	24	12.02	20	Pass
NVLT	g	2412	6.35	65	10.46	20	Pass
NVLT	g	2442	8.43	65	12.54	20	Pass
NVLT	g	2472	7.28	65	11.39	20	Pass
NVLT	n20	2412	5.26	70	9.37	20	Pass
NVLT	n20	2442	7.86	70	11.97	20	Pass
NVLT	n20	2472	7.04	70	11.15	20	Pass
NVHT	b	2412	8.09	24	12.20	20	Pass
NVHT	b	2442	7.89	24	12.00	20	Pass
NVHT	b	2472	7.53	24	11.64	20	Pass
NVHT	g	2412	6.23	65	10.34	20	Pass
NVHT	g	2442	7.64	65	11.75	20	Pass
NVHT	g	2472	6.75	65	10.86	20	Pass
NVHT	n20	2412	5.25	70	9.36	20	Pass
NVHT	n20	2442	6.95	70	11.06	20	Pass
NVHT	n20	2472	6.34	70	10.45	20	Pass

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 $P_{Samplecorr}(n)$ (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.

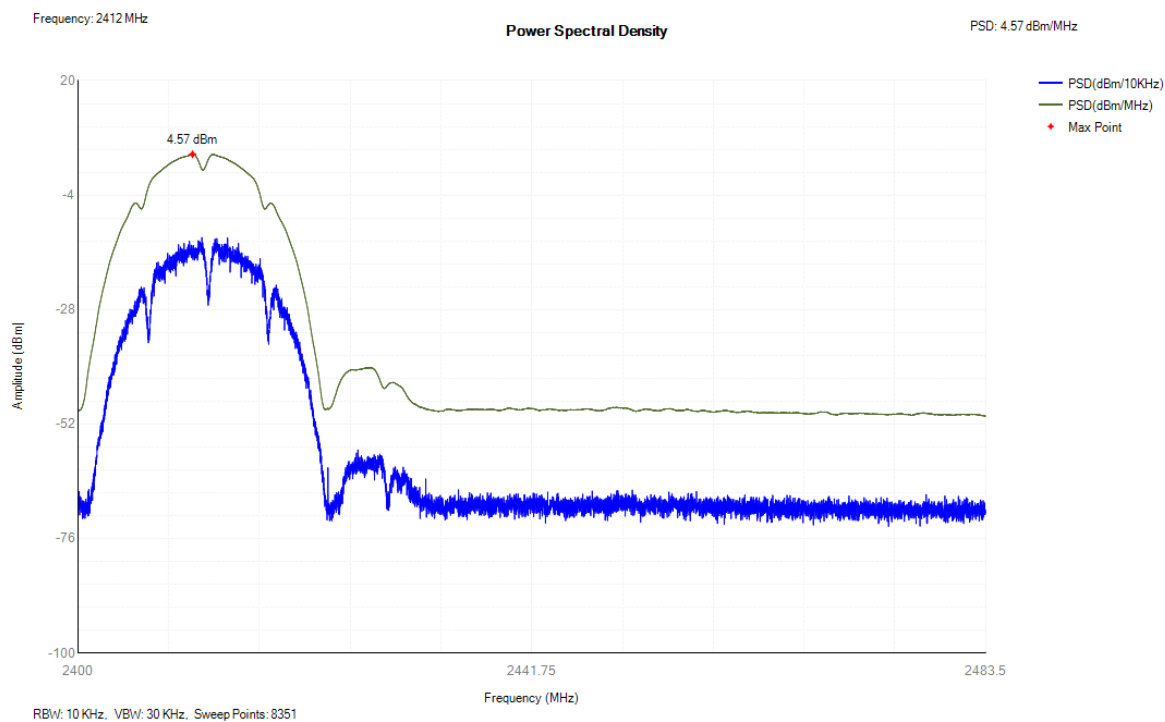
8.4 Test Result

Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	b	2412	4.57	10	Pass
NVNT	b	2442	4.64	10	Pass
NVNT	b	2472	4.12	10	Pass
NVNT	g	2412	1.65	10	Pass
NVNT	g	2442	2.06	10	Pass
NVNT	g	2472	1.26	10	Pass
NVNT	n20	2412	-0.48	10	Pass
NVNT	n20	2442	1.35	10	Pass
NVNT	n20	2472	0.55	10	Pass

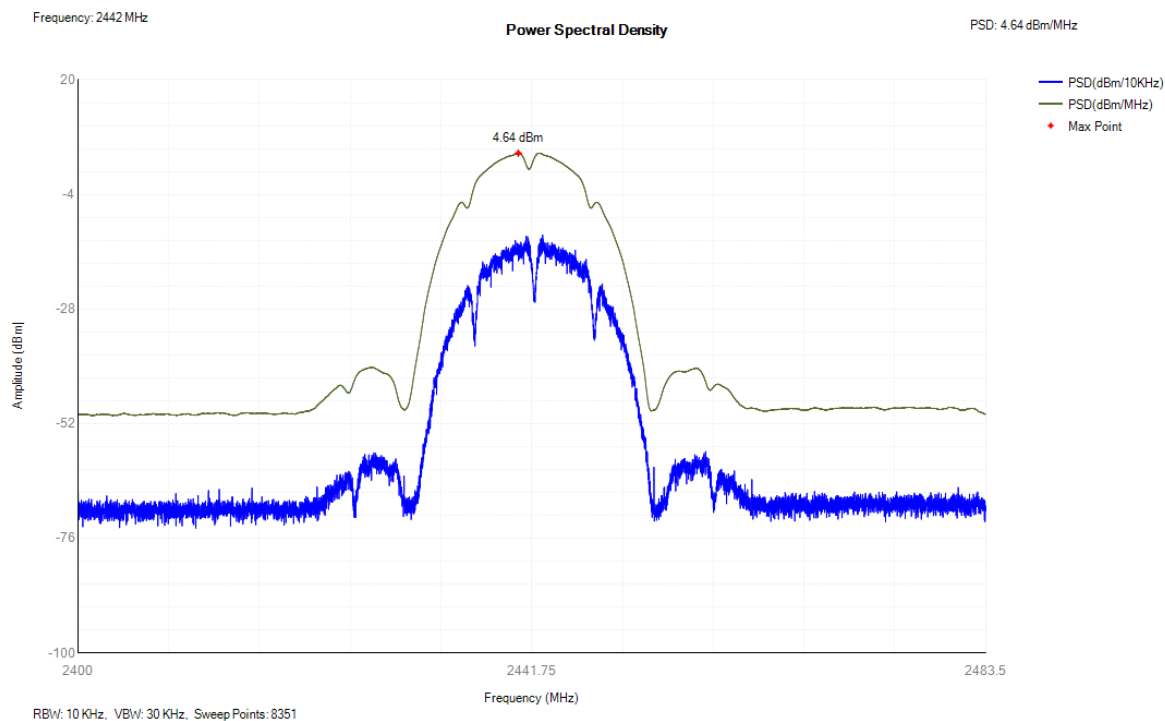
CO. LTD

Test Graphs

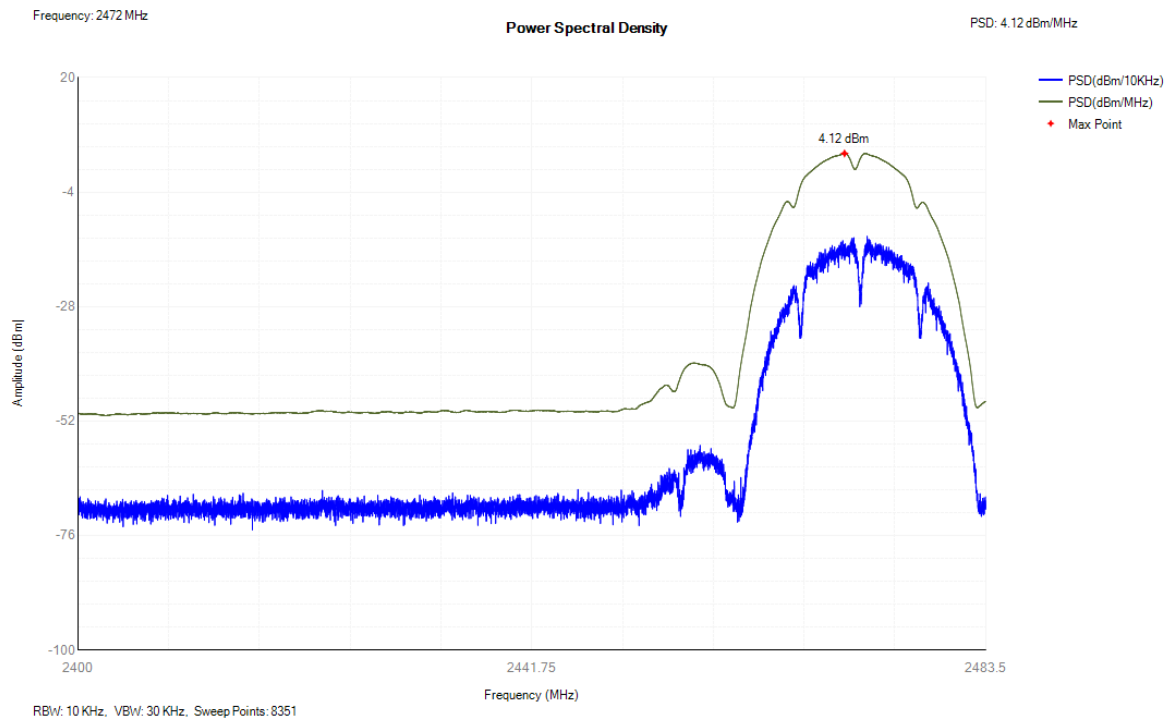
PSD NVNT b 2412MHz



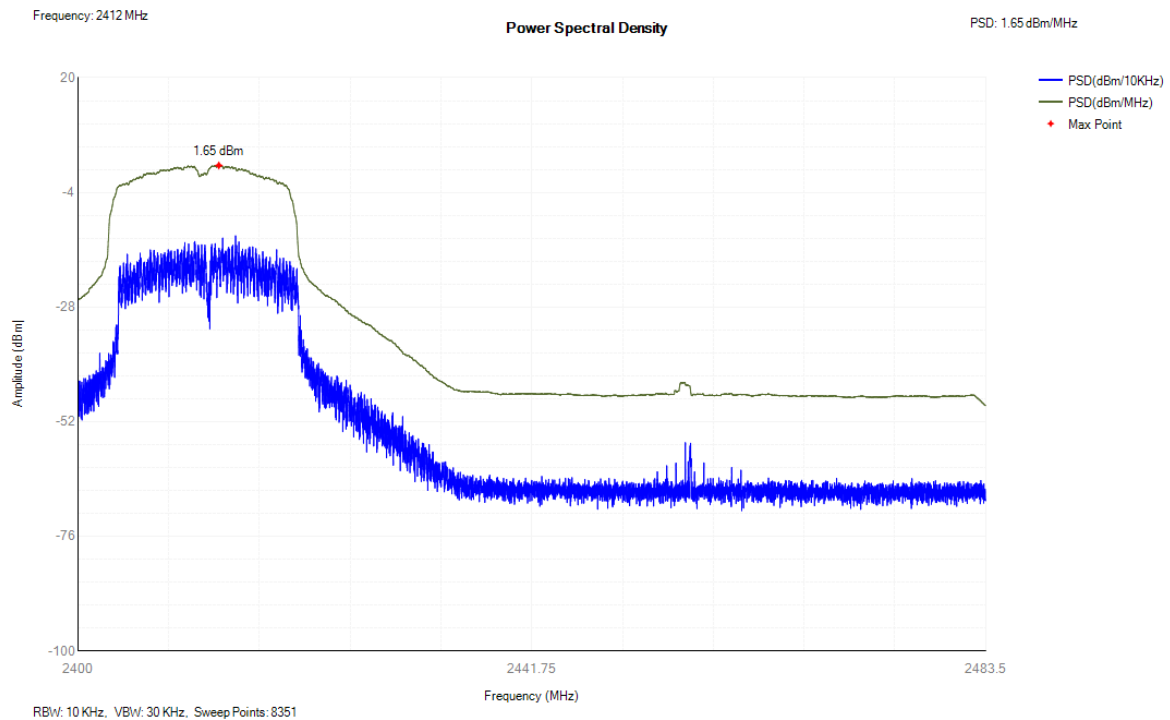
PSD NVNT b 2442MHz



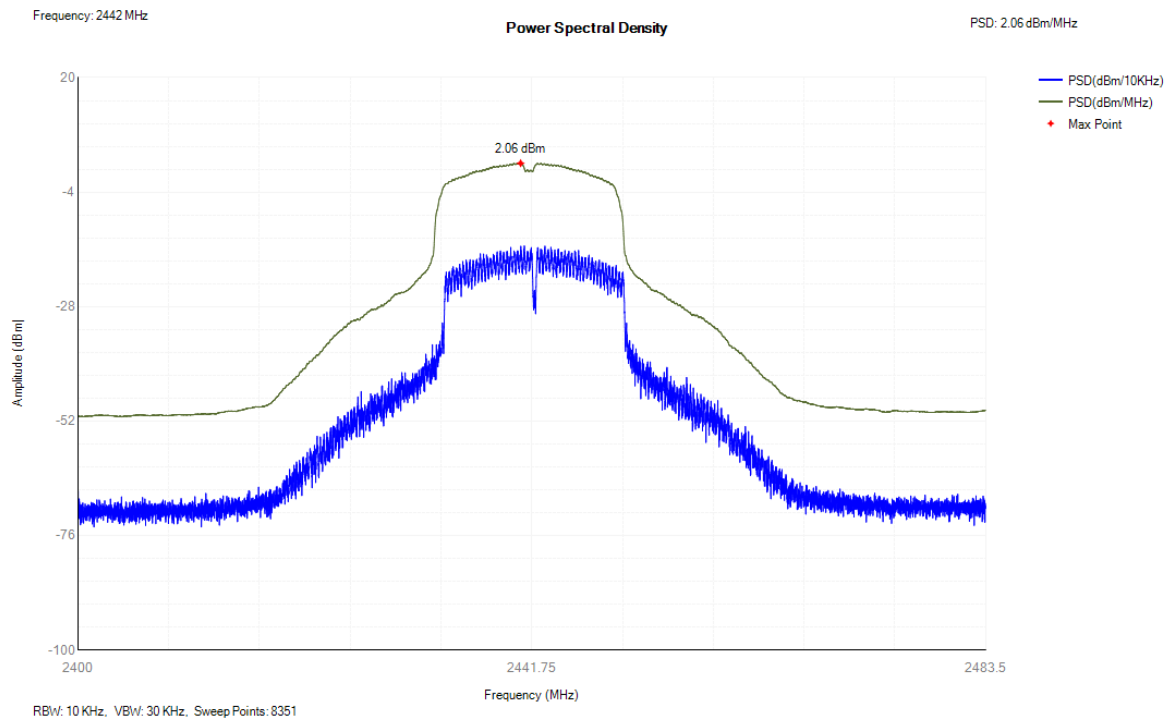
PSD NVNT b 2472MHz



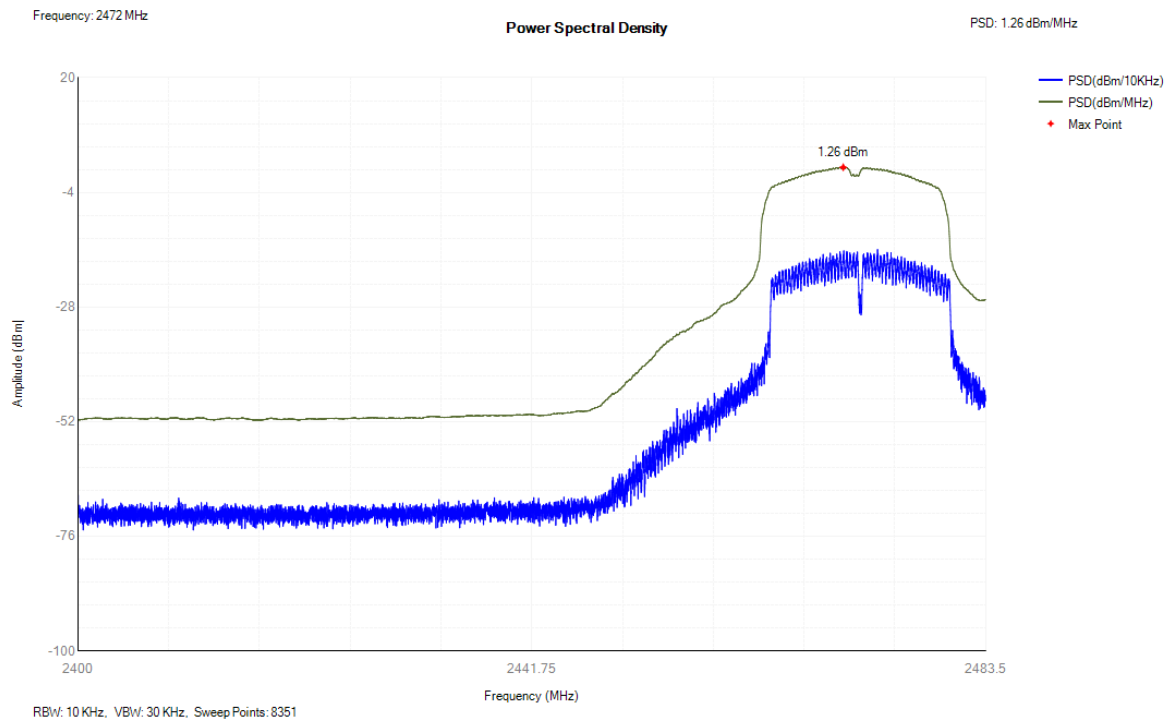
PSD NVNT g 2412MHz

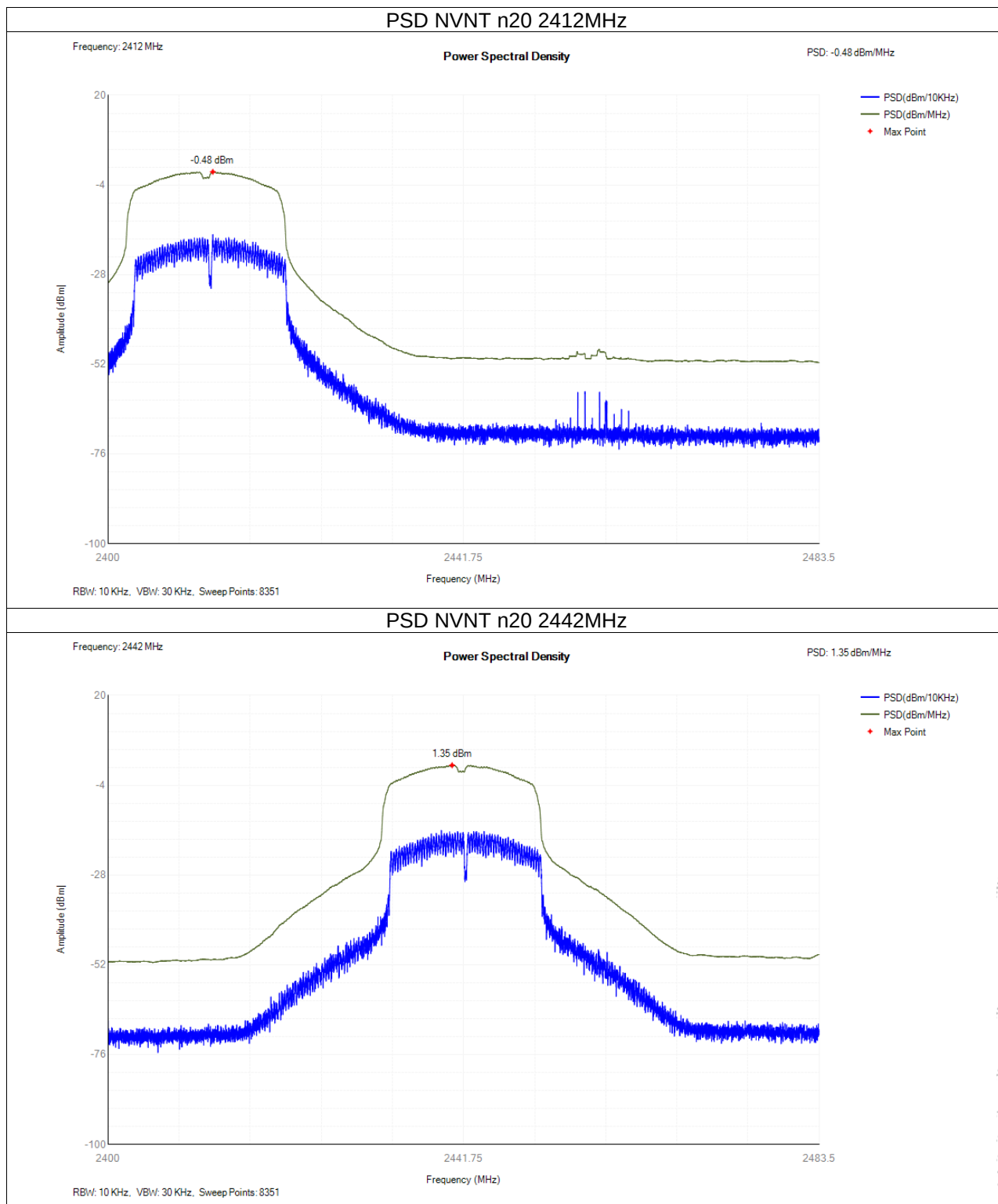


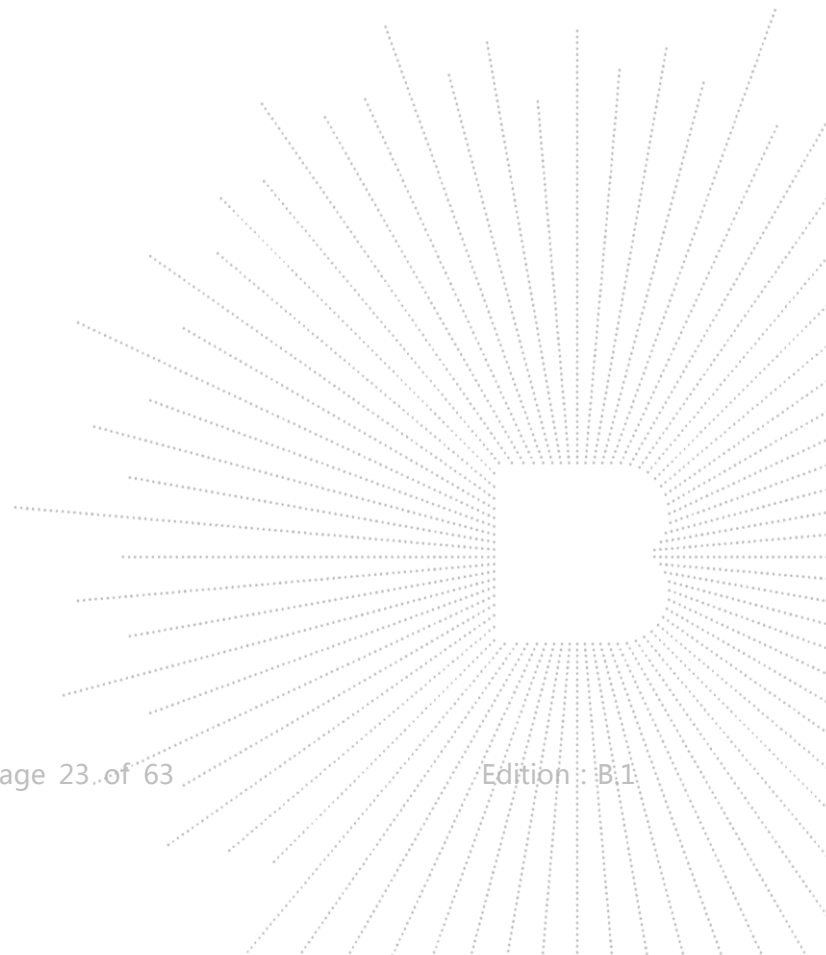
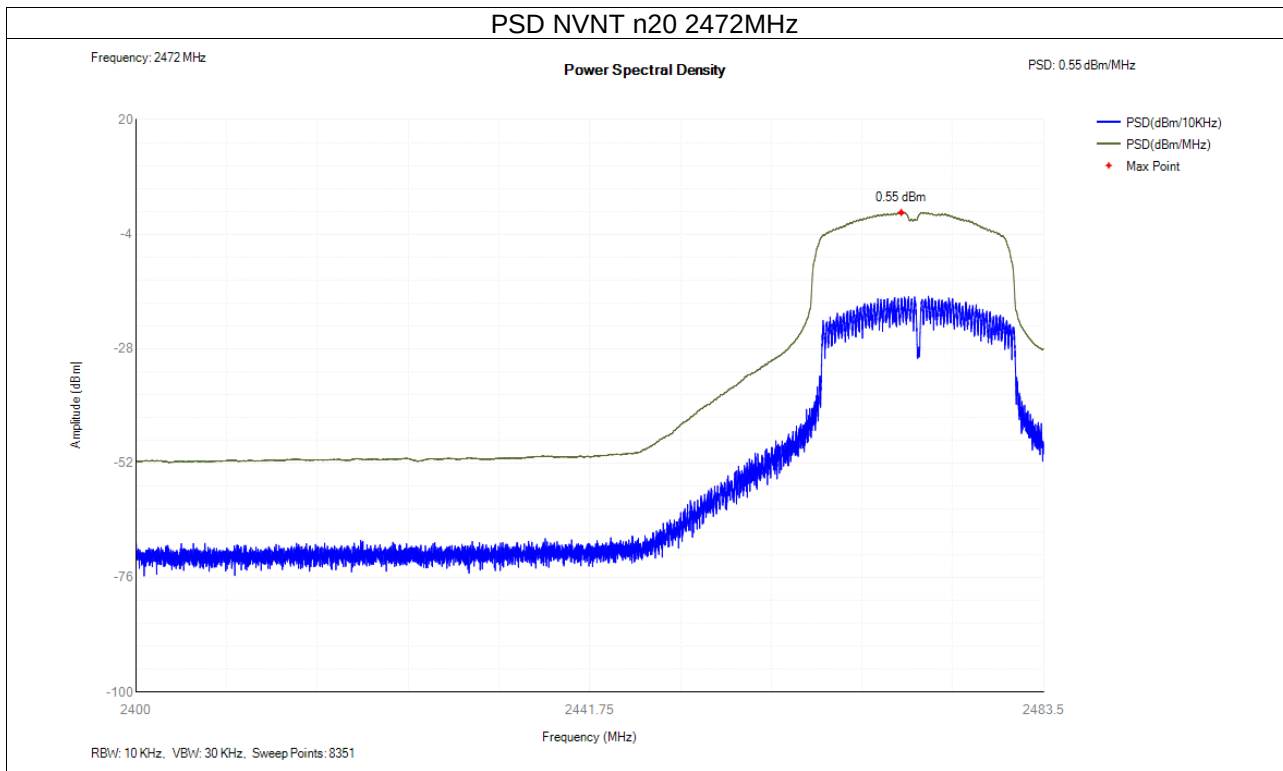
PSD NVNT g 2442MHz



PSD NVNT g 2472MHz

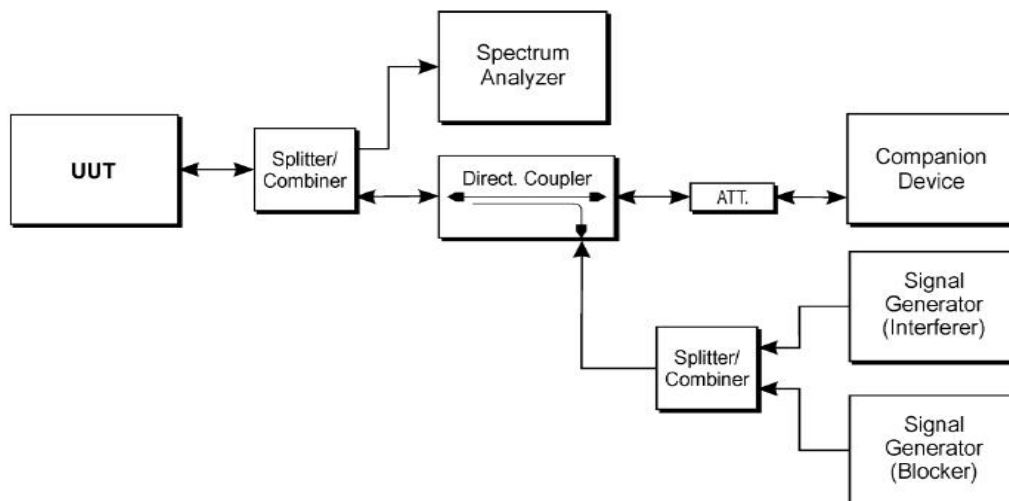






9. Adaptivity

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 $COT \leq 40$ ms;

3 Idle Period = 5% of COT;

4 Detection threshold level = $-70\text{dBm/MHz} + 20 - P_{out}$ E.I.R.P (P_{out} in dBm);

LBT based Detect and Avoid (Frame Based Equipment):

1 Minimum Clear Channel Assessment (CCA) time = 20 μ s;

2 CCA observation time declared by the supplier;

3 $COT = 1 \sim 10$ ms;

4 Idle Period = 5% of COT;

5 Detection threshold level = $-70\text{dBm/MHz} + 20 - P_{out}$ E.I.R.P (P_{out} in dBm);

LBT based Detect and Avoid (Load Based Equipment):

1 Minimum Clear Channel Assessment (CCA) time = 20 μ s;

2 CCA declared by the manufacturer;

3 $COT \leq (13 / 32) * q$ ms; $q = [4 \sim 32]$; 1.625ms~13ms;

4 Detection threshold level = $-73\text{dBm/MHz} + 20 - P_{out}$ 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: $\geq$ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
- VBW: $3 \times$ 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 $\pm 1,5$ 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.

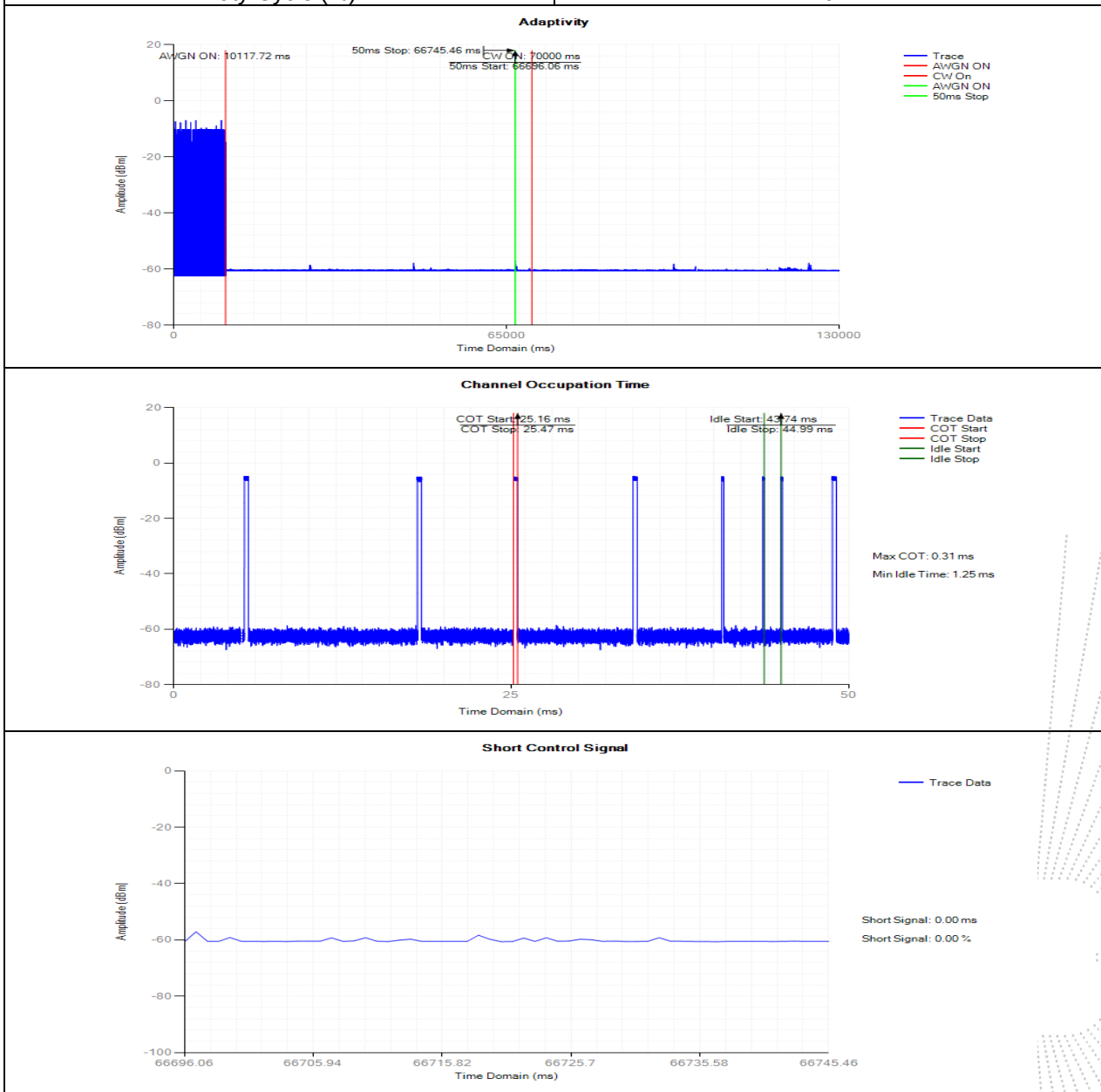
Step 7:

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

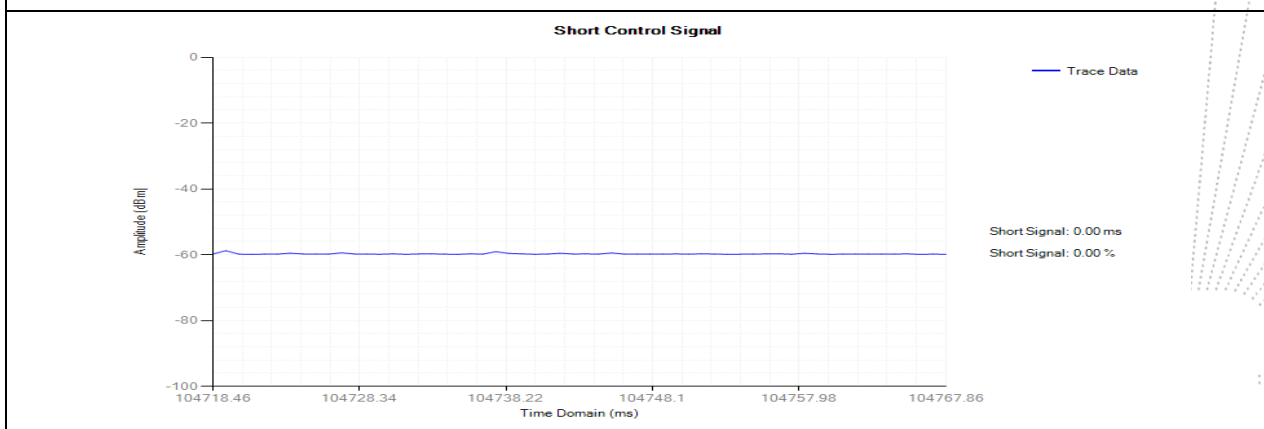
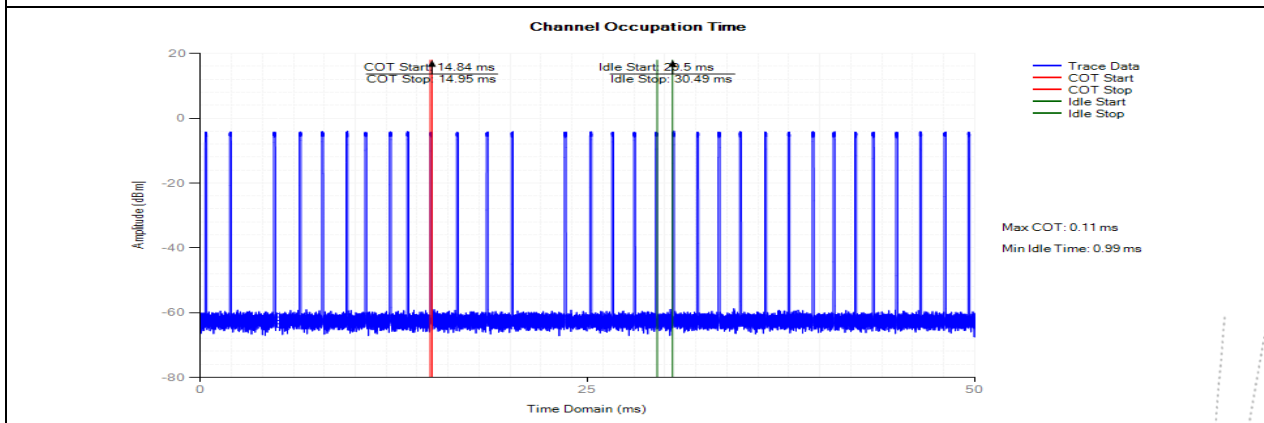
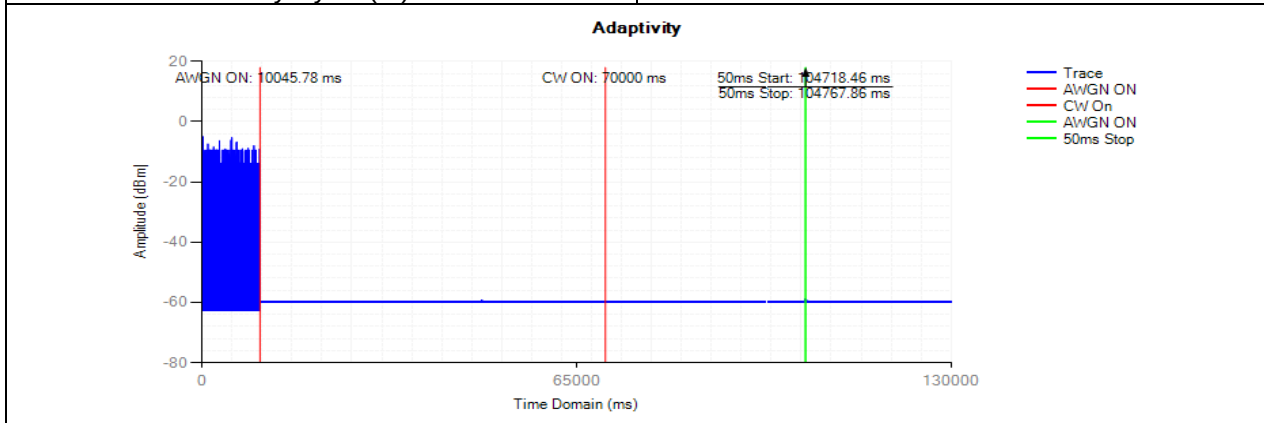
9.4 Test Result

Spectrum Setting:					
RBW:	8MHz	VBW:	8MHz	Span:	0Hz
Note: The highest available setting of RBW is 8MHz.					

Test Mode	802.11b	Test Channel	Lowest
AWGN Interference Level (dBm)		-66.70	
Blocking Interference Level (dBm)		-35.00	
Max COT (ms)		0.31	
Min Idle Time (ms)		1.25	
Interference time (s)		120	
Blocking time (s)		60	
Pulse width (ms)		0	
Duty Cycle (%)		0	

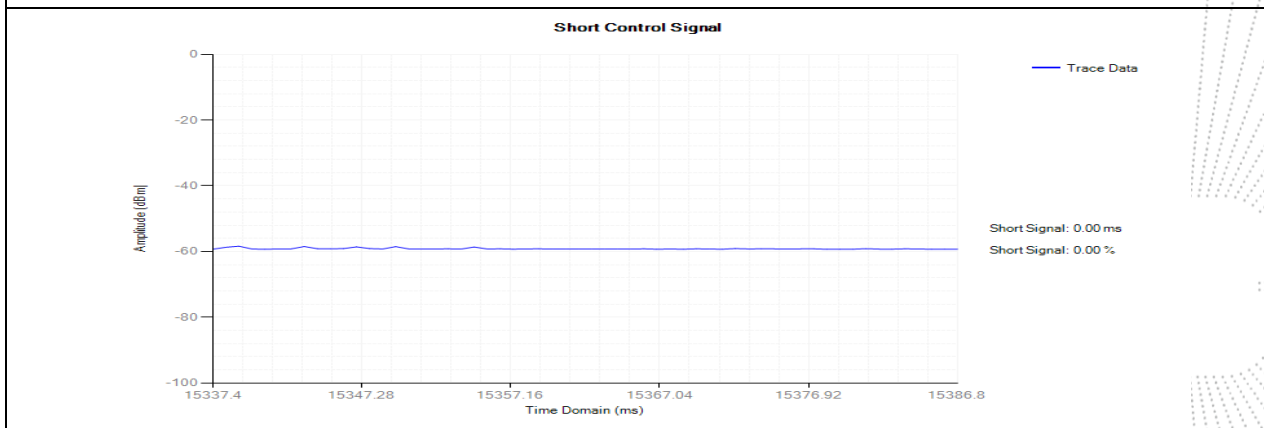
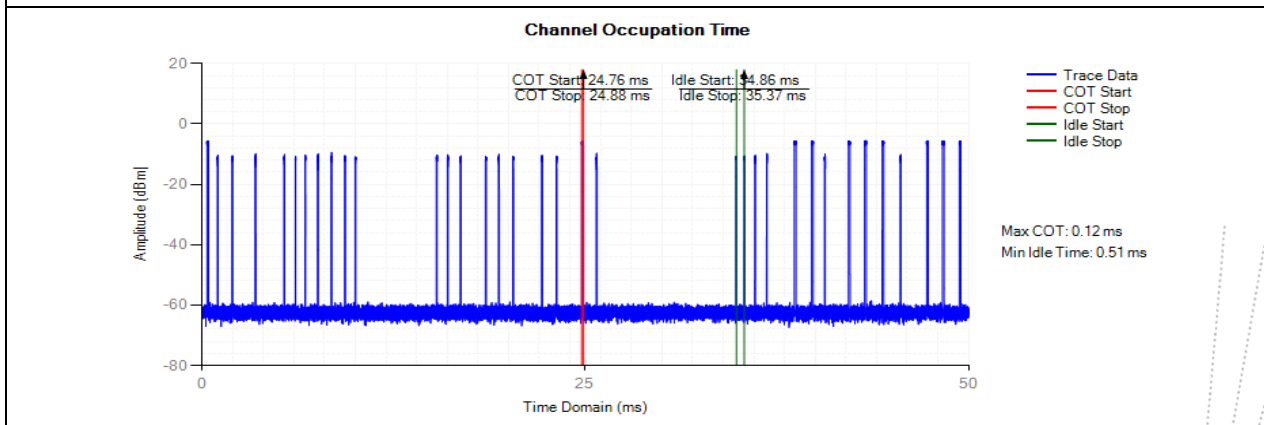
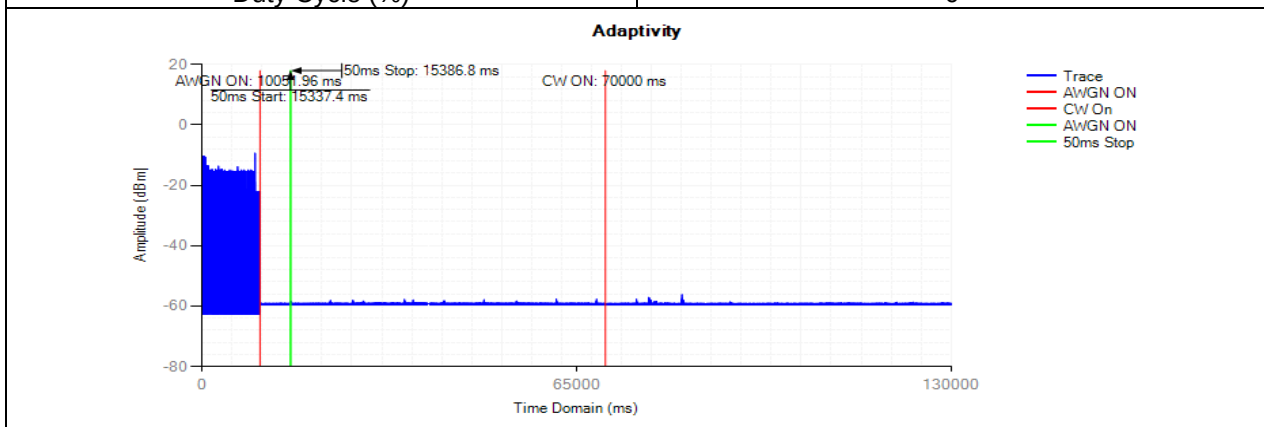


Test Mode	802.11b	Test Channel	Highest
AWGN Interference Level (dBm)			-64.96
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.11
Min Idle Time (ms)			0.99
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0

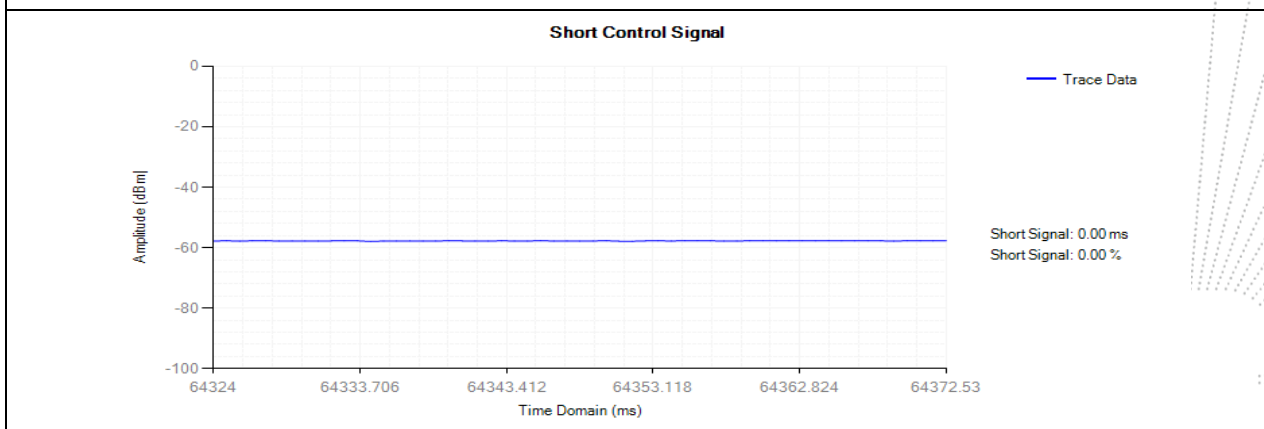
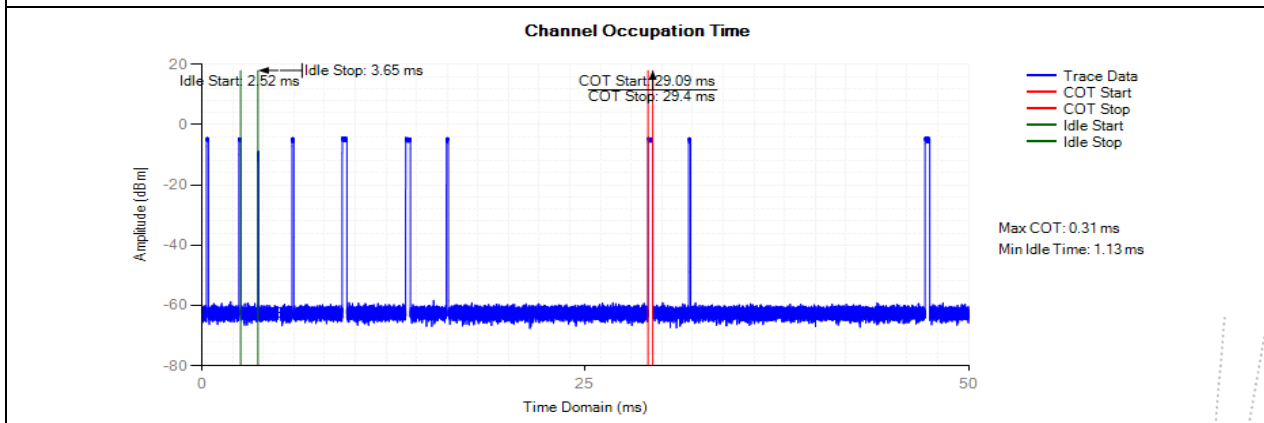
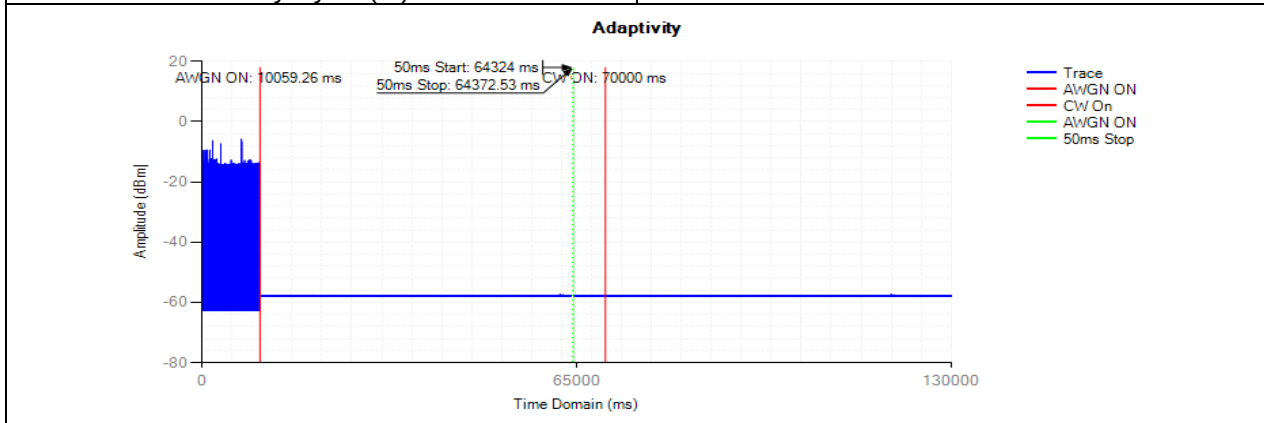


Spectrum Setting:					
RBW:	8MHz	VBW:	8MHz	Span:	0Hz
Note: The highest available setting of RBW is 8MHz.					

Test Mode	802.11g	Test Channel	Lowest
AWGN Interference Level (dBm)			-63.32
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.12
Min Idle Time (ms)			0.51
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0

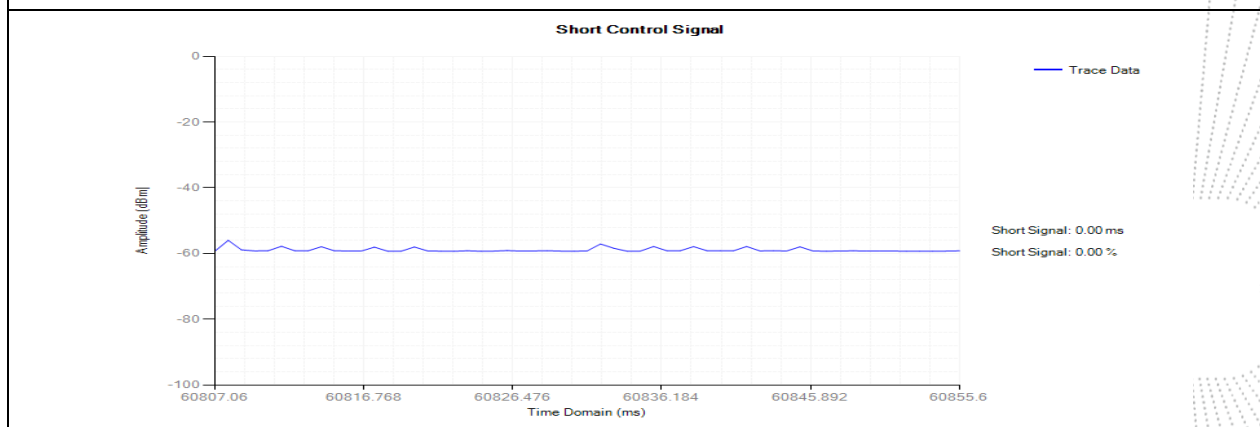
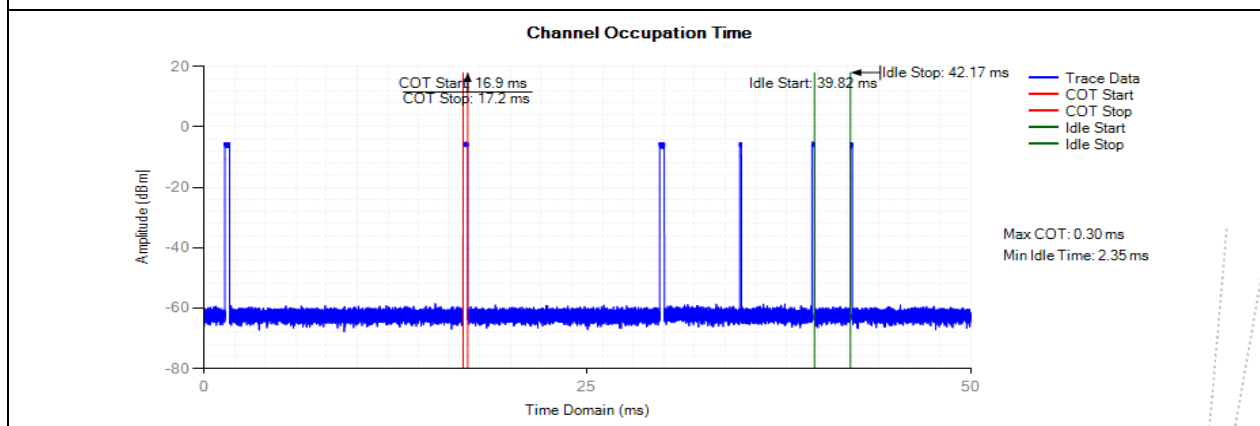
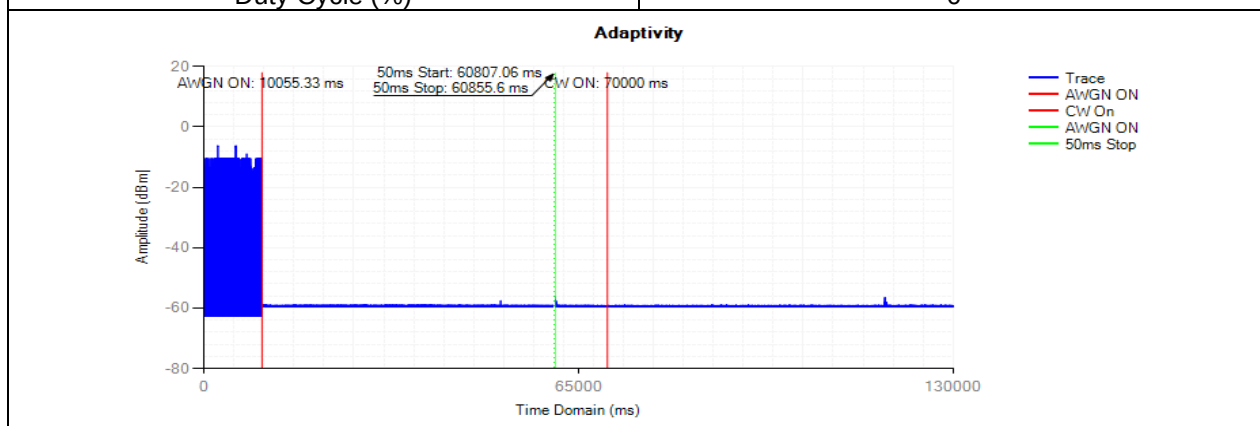


Test Mode	802.11g	Test Channel	Highest
AWGN Interference Level (dBm)			-62.21
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.31
Min Idle Time (ms)			1.13
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0

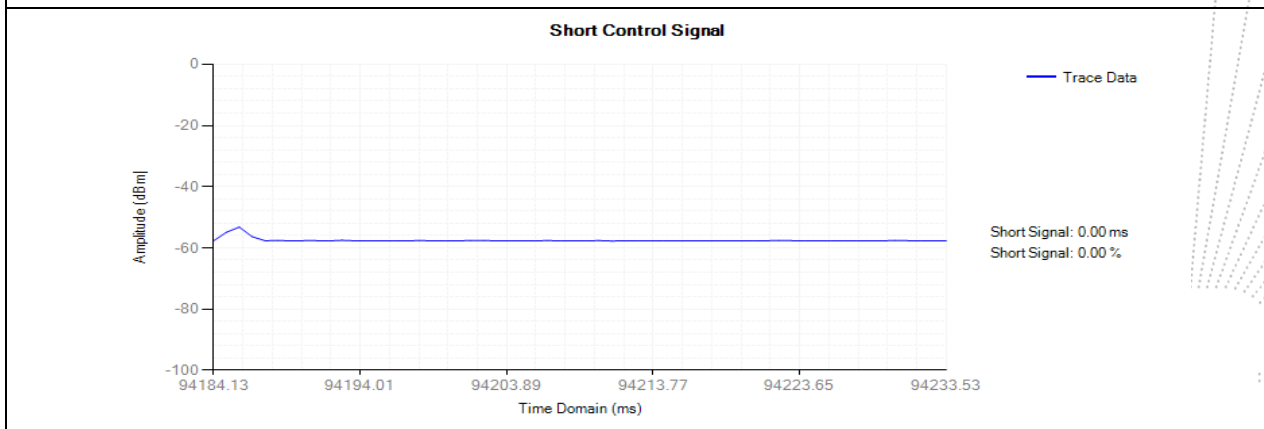
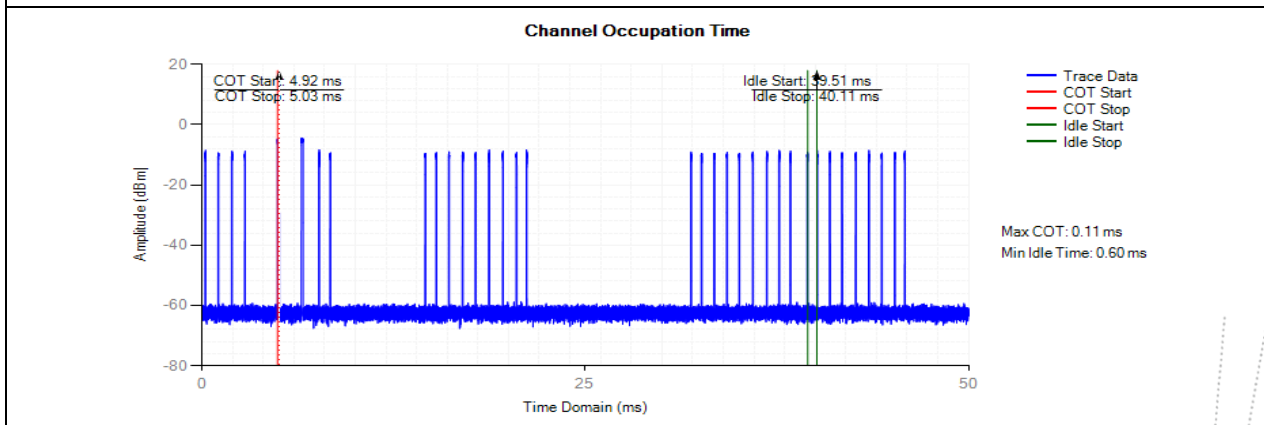
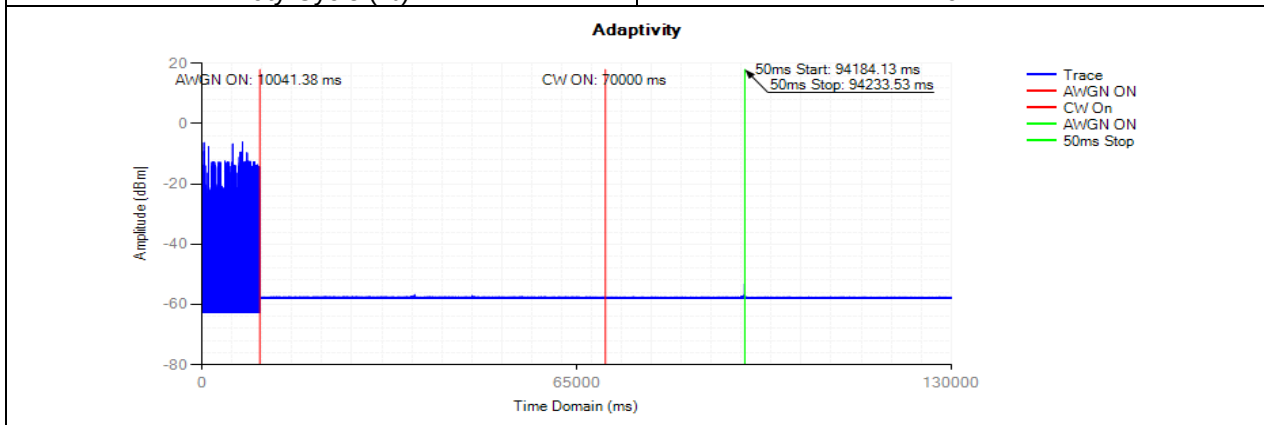


Spectrum Setting:					
RBW:	8MHz	VBW:	8MHz	Span:	0Hz
Note: The highest available setting of RBW is 8MHz.					

Test Mode	801.11n (HT20)	Test Channel	Lowest
AWGN Interference Level (dBm)			-63.40
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.30
Min Idle Time (ms)			2.35
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0

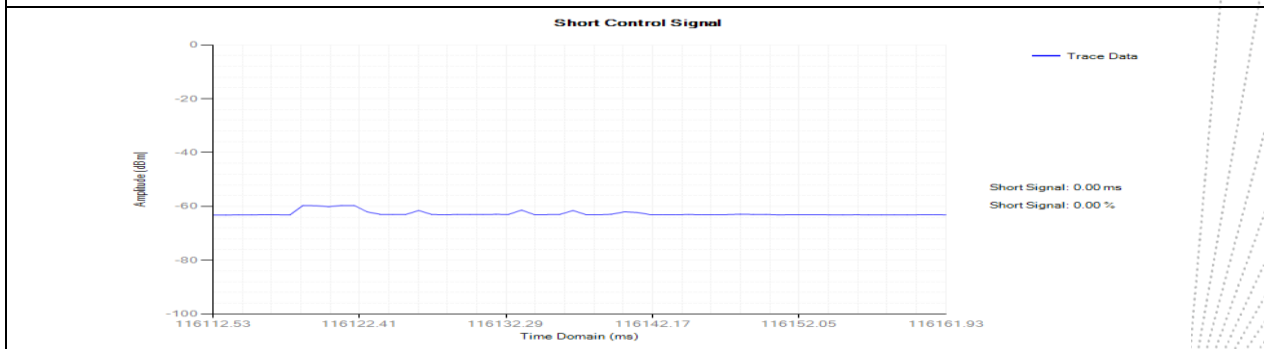
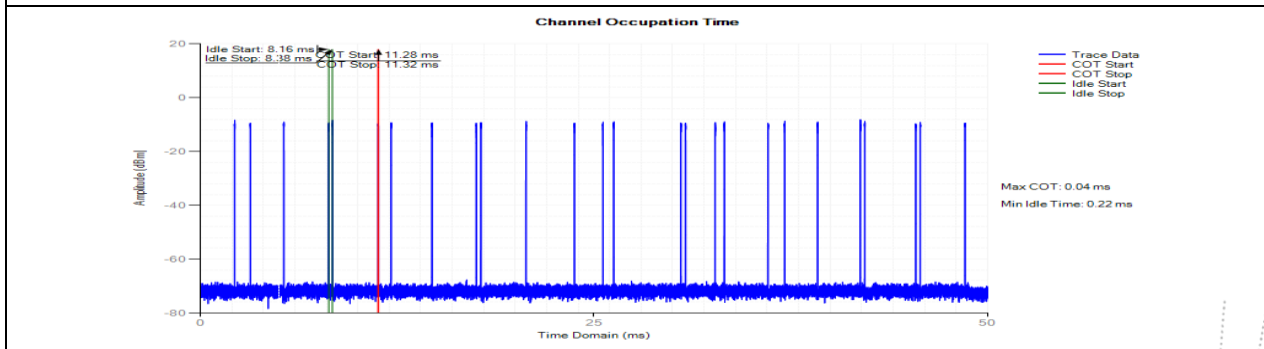
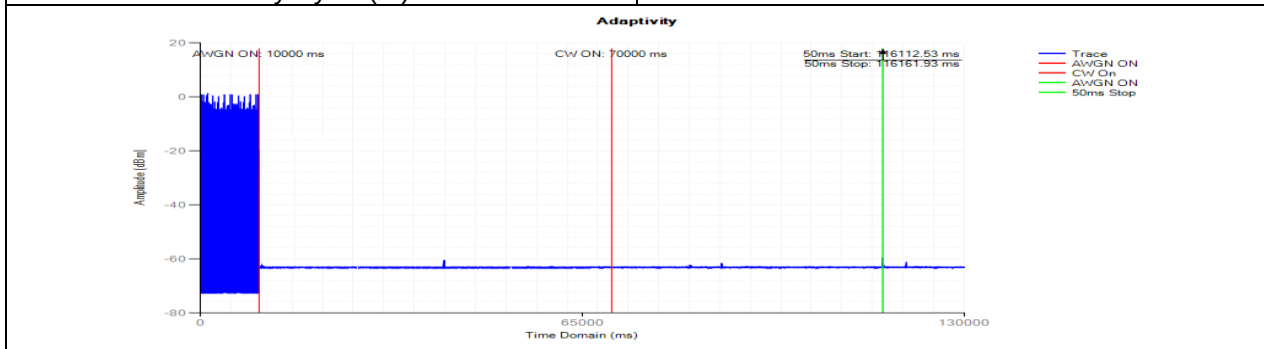


Test Mode	801.11n (HT20)	Test Channel	Highest
AWGN Interference Level (dBm)			-62.32
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.11
Min Idle Time (ms)			0.60
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0

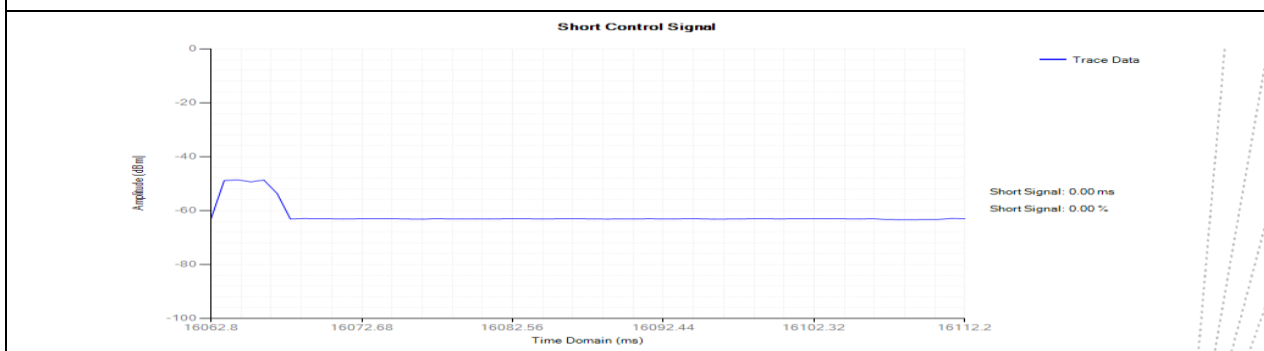
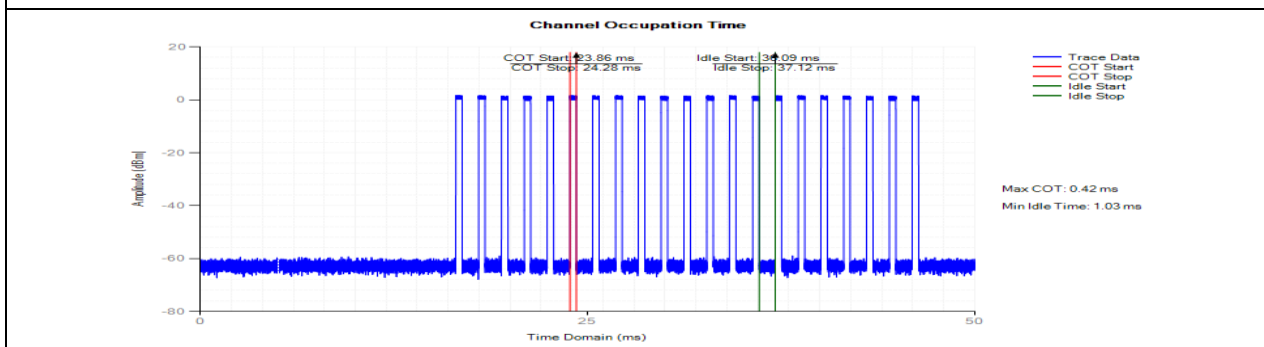
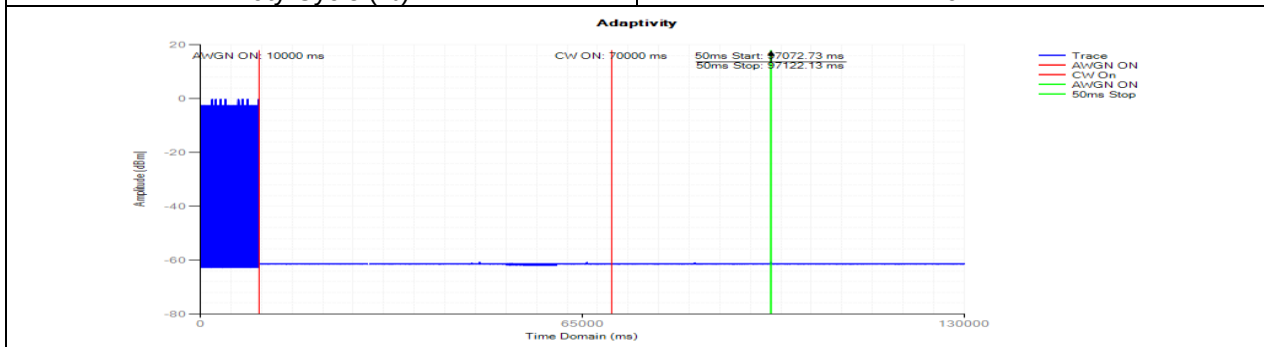


Spectrum Setting:					
RBW:	8MHz	VBW:	8MHz	Span:	0Hz
Note: The highest available setting of RBW is 8MHz.					

Test Mode	802.11n (HT40)	Test Channel	Lowest
AWGN Interference Level (dBm)			-62.75
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.04
Min Idle Time (ms)			0.22
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0

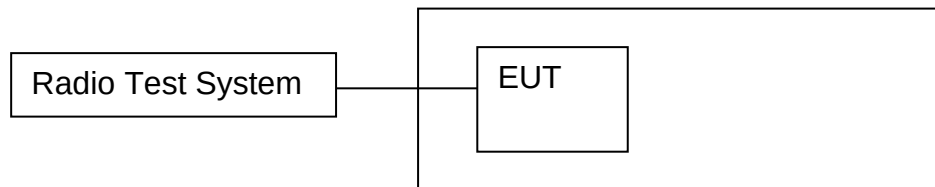


Test Mode	802.11n (HT40)	Test Channel	Highest
AWGN Interference Level (dBm)			-62.44
Blocking Interference Level (dBm)			-35.00
Max COT (ms)			0.42
Min Idle Time (ms)			1.03
Interference time (s)			120
Blocking time (s)			60
Pulse width (ms)			0
Duty Cycle (%)			0



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 4.1135GHz. 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:

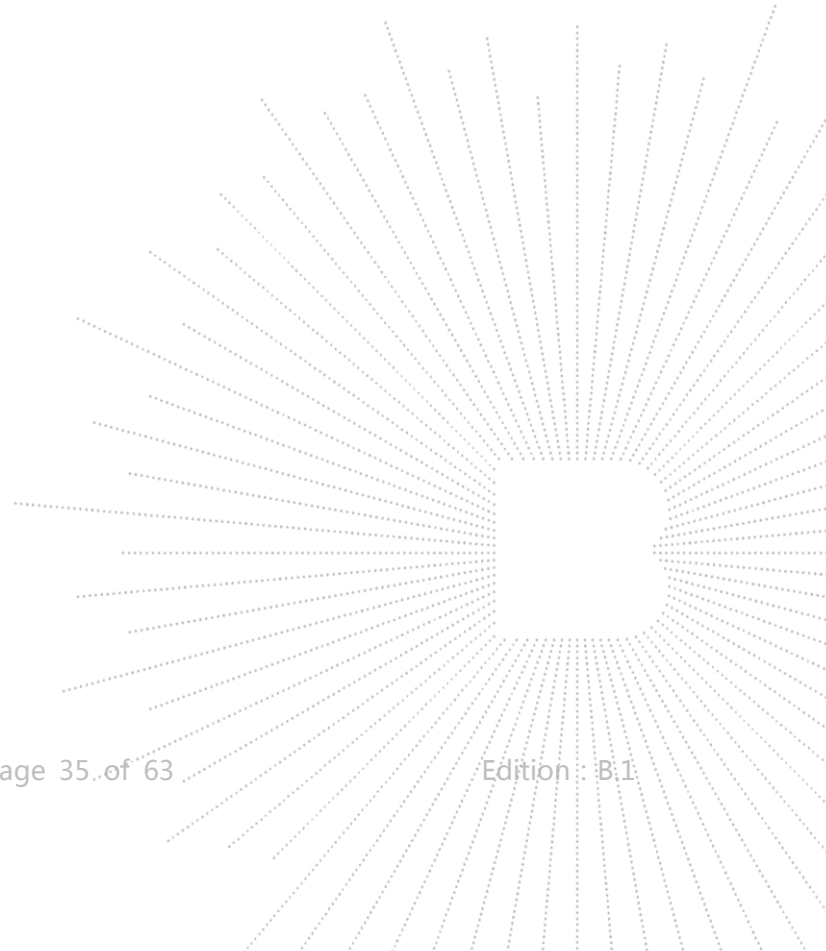
Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT.

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.

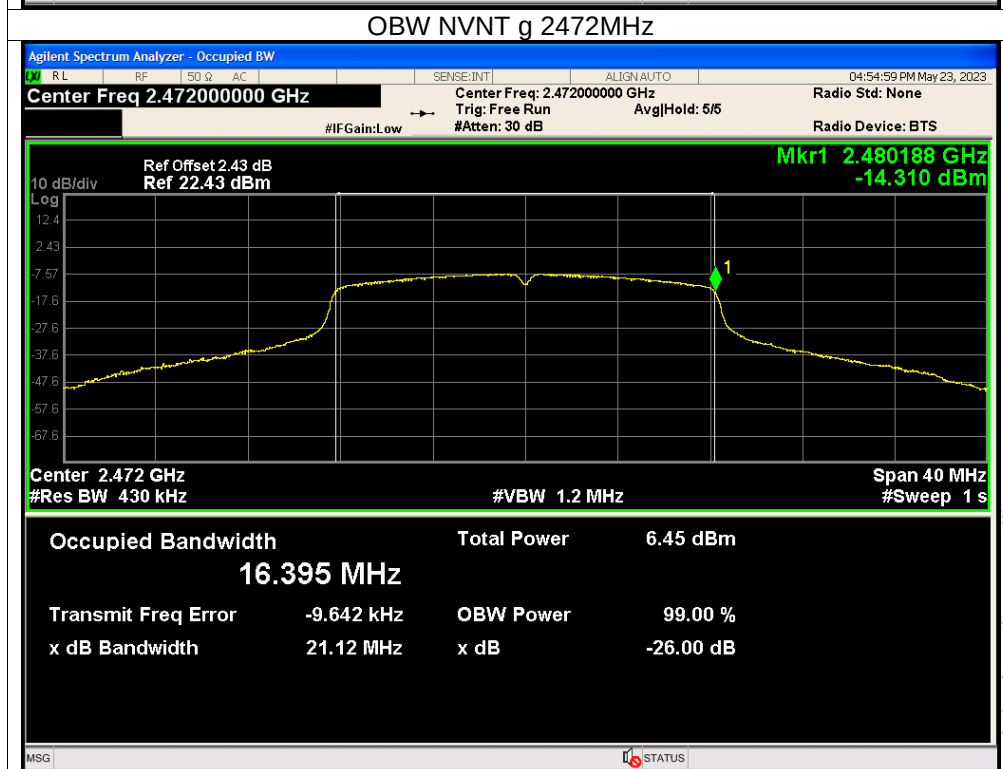
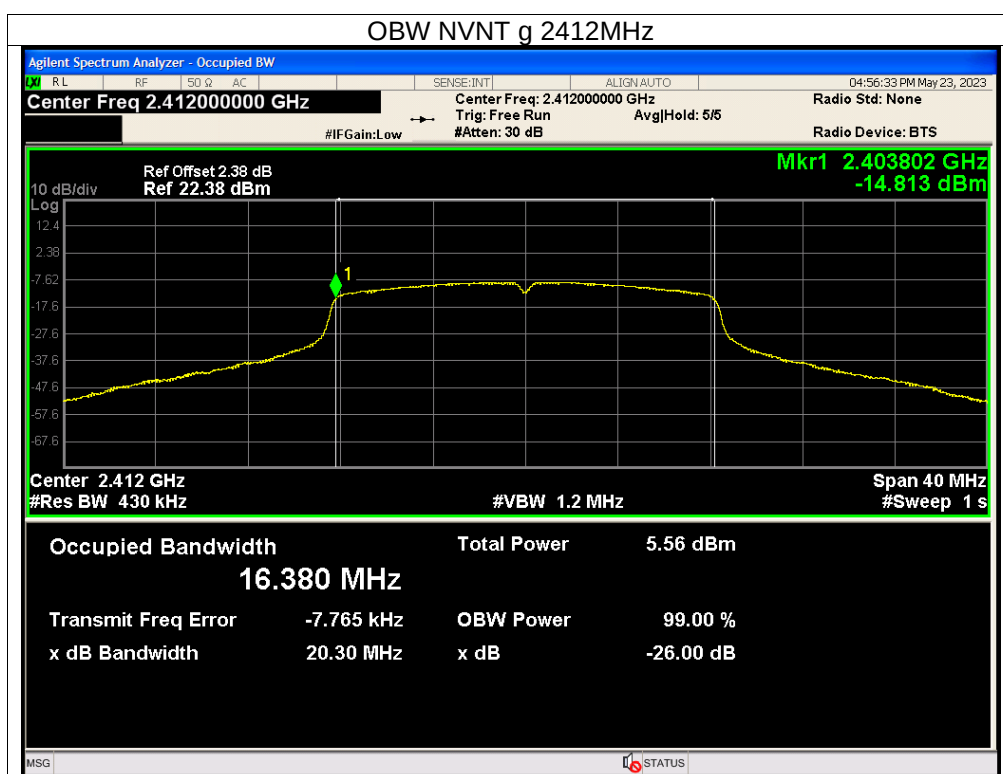
10.4 Test Result

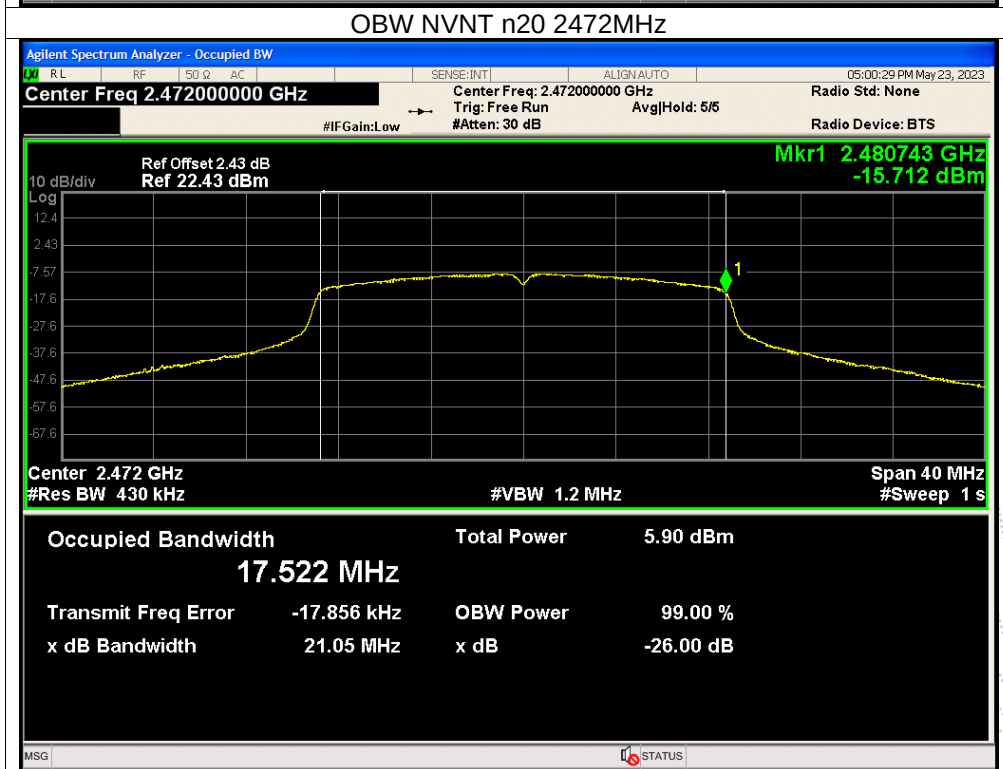
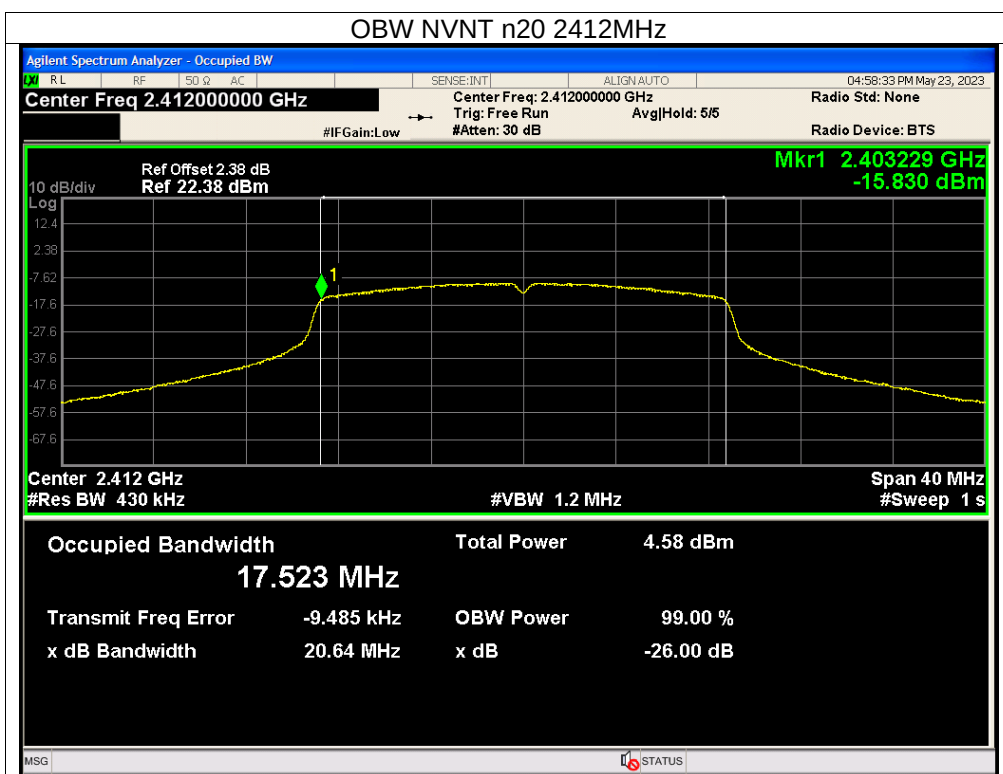
Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Lower Edge (MHz)	Upper Edge (MHz)	Limit OBW (MHz)	Verdict
NVNT	b	2412	2412.013	14.085	2404.971	2419.056	2400 - 2483.5MHz	Pass
NVNT	b	2472	2472.022	14.106	2464.969	2479.075	2400 - 2483.5MHz	Pass
NVNT	g	2412	2411.992	16.38	2403.802	2420.182	2400 - 2483.5MHz	Pass
NVNT	g	2472	2471.99	16.395	2463.793	2480.188	2400 - 2483.5MHz	Pass
NVNT	n20	2412	2411.991	17.523	2403.229	2420.752	2400 - 2483.5MHz	Pass
NVNT	n20	2472	2471.982	17.522	2463.221	2480.743	2400 - 2483.5MHz	Pass





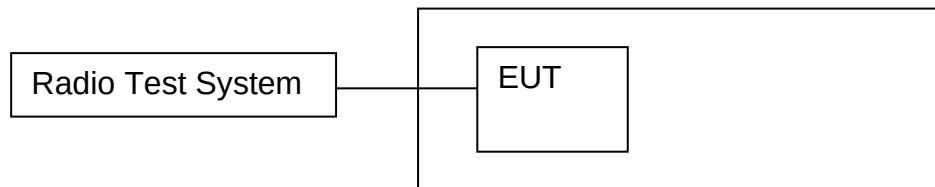
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11. Transmitter Unwanted Emissions In The Out-Of-Band Domain

11.1 Block Diagram Of Test Setup



11.2 Limit

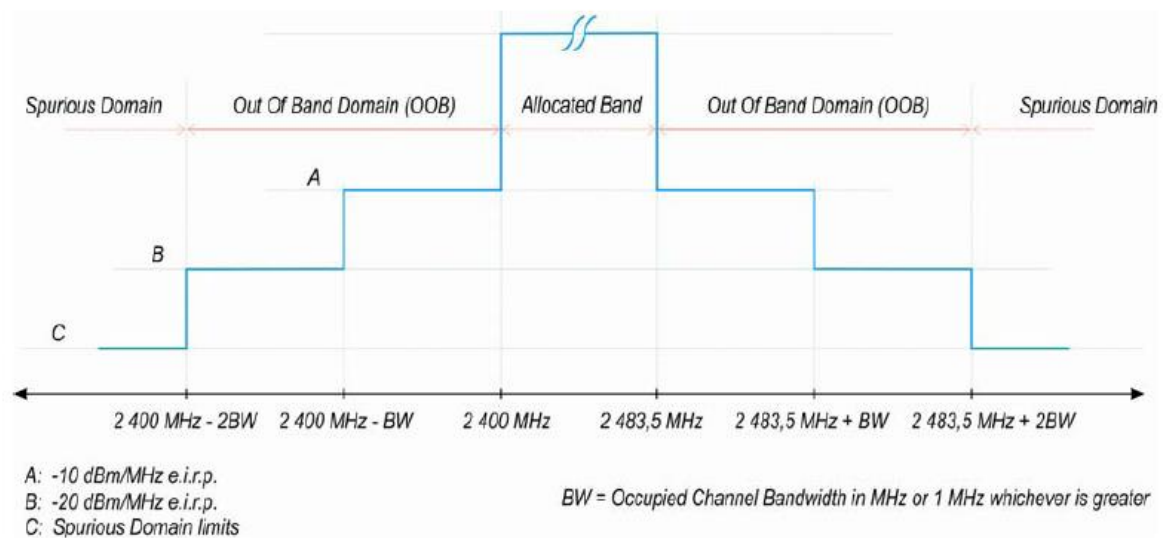


Figure 3: Transmit mask

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 μ s) 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:

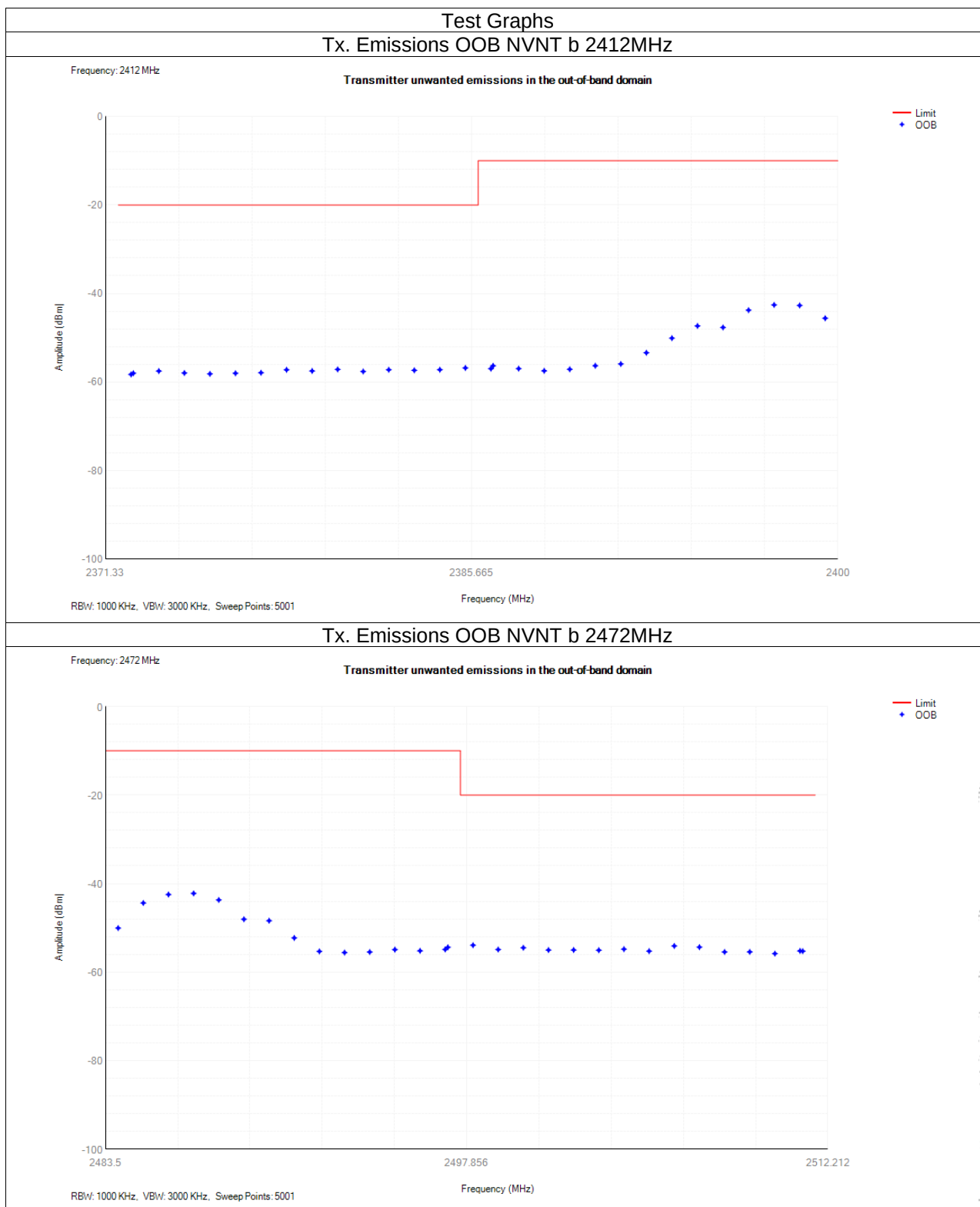
- Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3.

- Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

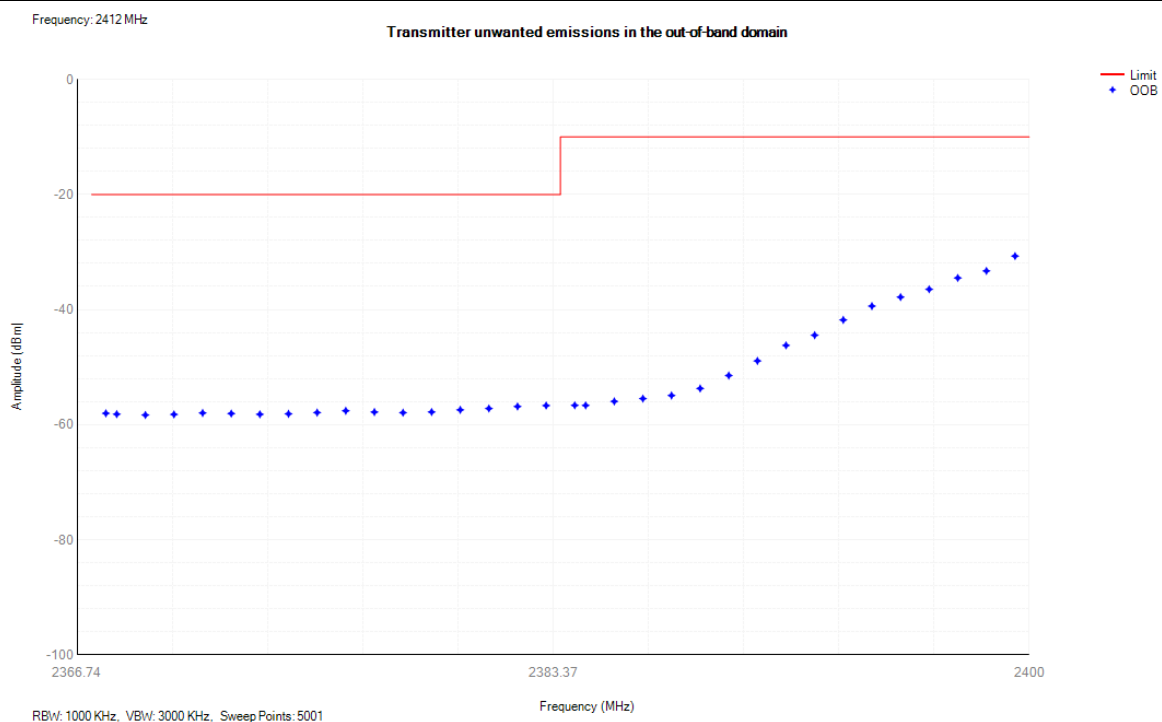
NOTE 2: A_{ch} refers to the number of active transmit chains.

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

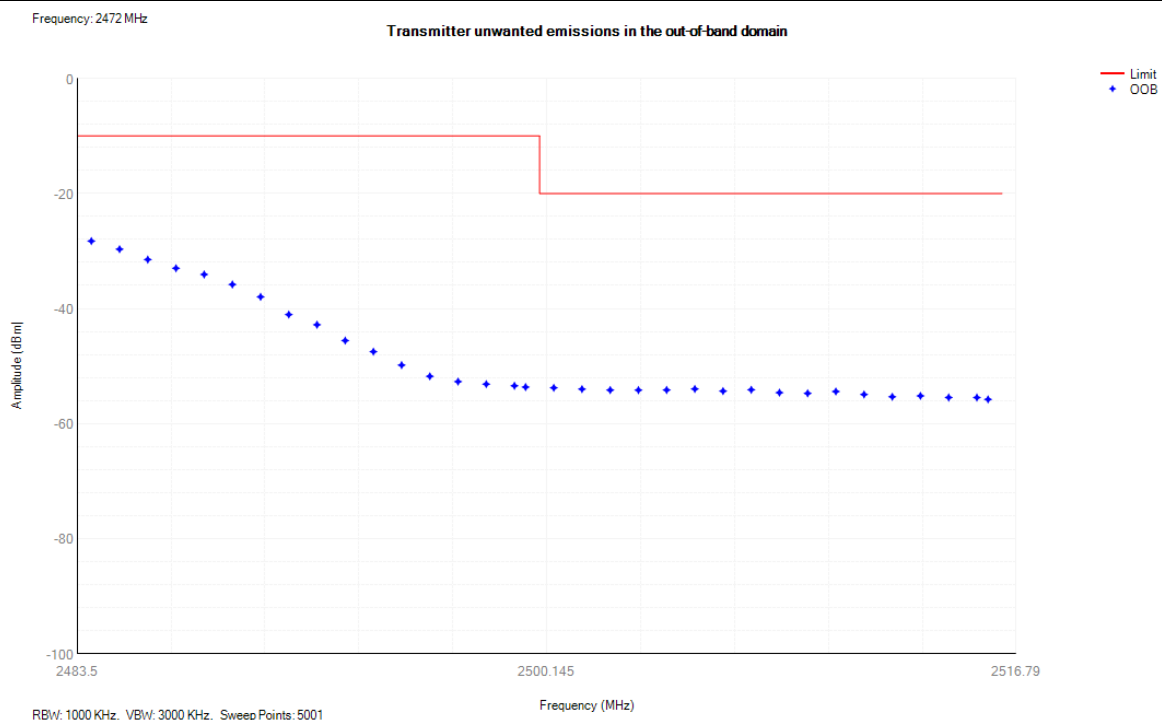
11.4 Test Result



Tx. Emissions OOB NVNT g 2412MHz

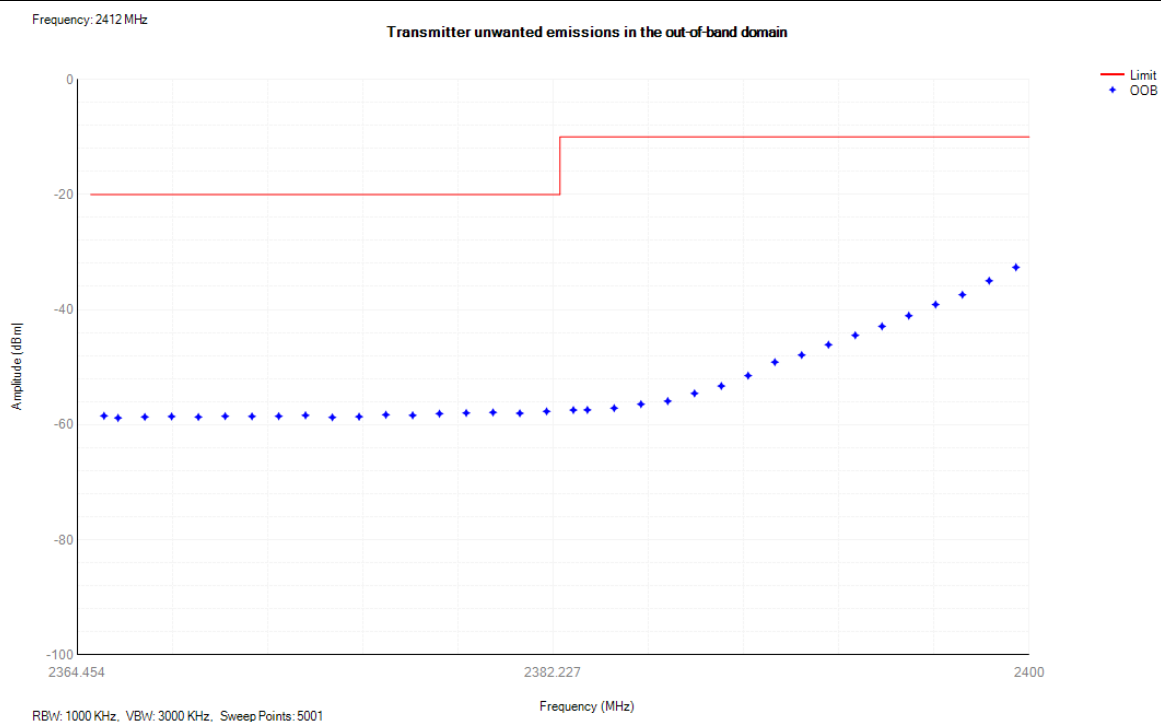


Tx. Emissions OOB NVNT g 2472MHz

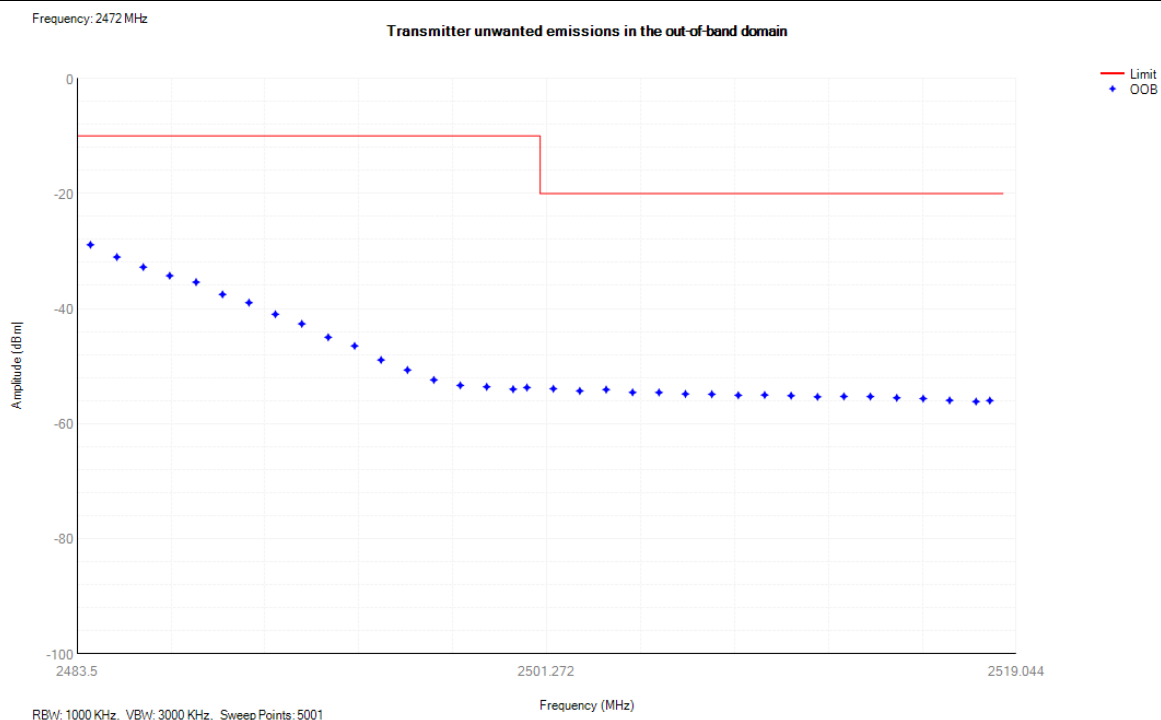


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Tx. Emissions OOB NVNT n20 2412MHz



Tx. Emissions OOB NVNT n20 2472MHz

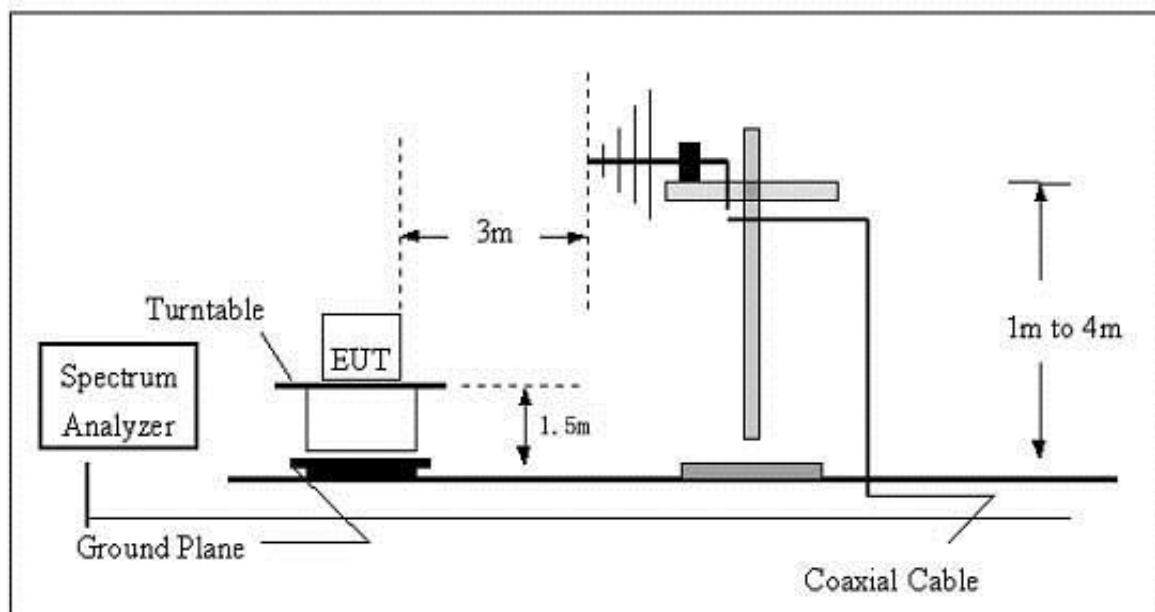


SHENZHEN

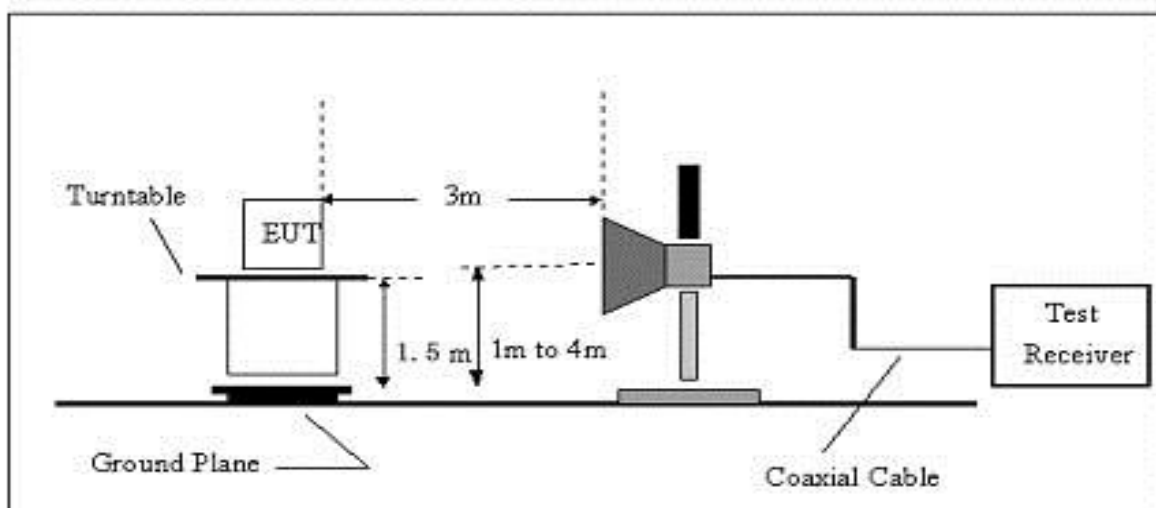
12. Transmitter Unwanted Emissions In The Spurious Domain

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:

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

- The Product was placed on the non-conductive turntable 1.5 m above the ground in a full anechoic chamber..
- 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.
- 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 : 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								
530.07	-51.35	248	1.0	H	-8.18	-59.53	-54	-5.53
530.07	-52.81	132	2.0	V	-8.18	-60.99	-54	-6.99
4844.00	-40.30	350	1.2	H	-0.43	-40.73	-30	-10.73
4844.00	-41.44	60	1.5	V	-0.43	-41.87	-30	-11.87
7266.00	-56.22	177	1.7	H	8.31	-47.91	-30	-17.91
7266.00	-59.58	168	1.6	V	8.31	-51.27	-30	-21.27
802.11b Mid channel								
530.07	-51.13	201	1.6	H	-8.18	-59.31	-54	-5.31
530.07	-51.83	195	1.5	V	-8.18	-60.01	-54	-6.01
4884.00	-40.92	317	1.2	H	-0.38	-41.30	-30	-11.30
4884.00	-41.09	240	1.6	V	-0.38	-41.47	-30	-11.47
7326.00	-56.57	219	1.7	H	8.83	-47.74	-30	-17.74
7326.00	-60.23	15	1.9	V	8.83	-51.40	-30	-21.40
802.11b high channel								
530.07	-51.67	239	1.9	H	-8.18	-59.86	-54	-5.86
530.07	-52.60	49	1.7	V	-8.18	-60.78	-54	-6.78
4924.00	-41.08	281	1.2	H	-0.32	-41.40	-30	-11.40
4924.00	-40.86	86	1.8	V	-0.32	-41.18	-30	-11.18
7386.00	-57.09	260	1.0	H	9.35	-47.74	-30	-17.74
7386.00	-59.35	90	1.4	V	9.35	-50.00	-30	-20.00

Remark:

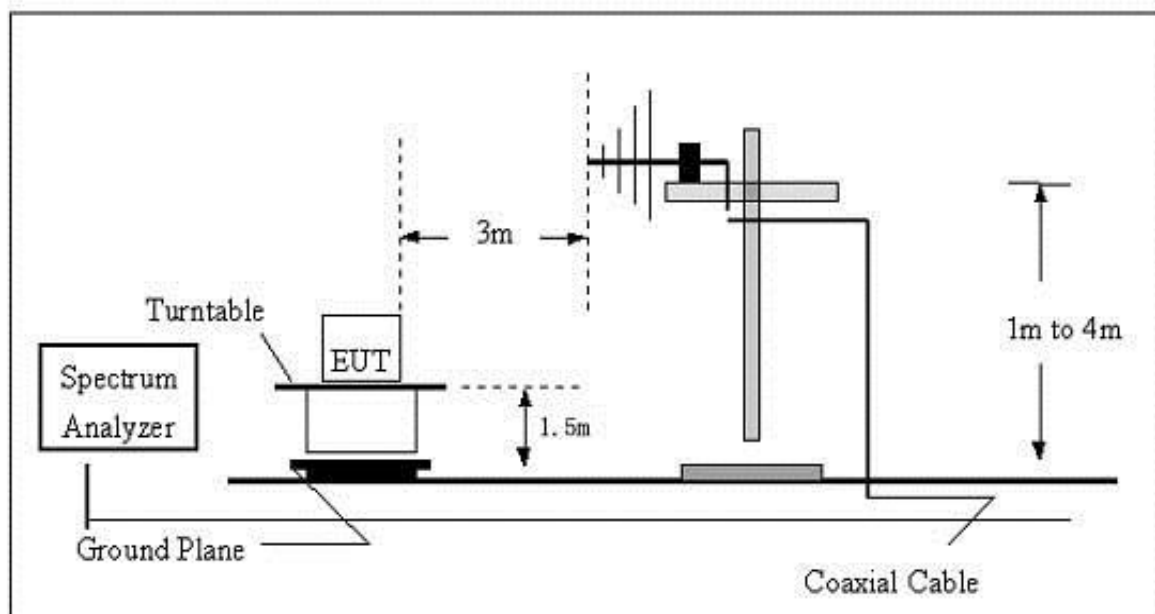
Absolute Level = Receiver Reading + Factor

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

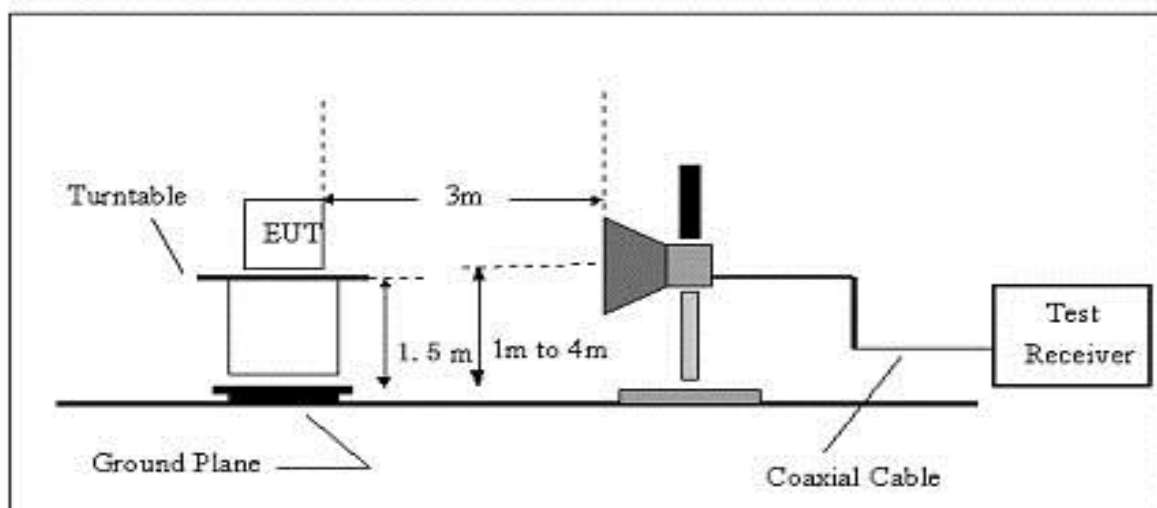
13. Receiver Spurious Emissions

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:

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

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

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13.4 Test Results

Modulation : 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								
377.90	-52.04	87	1.1	H	-11.59	-63.62	-57.00	-6.62
377.90	-52.67	103	1.8	V	-11.59	-64.26	-57.00	-7.26
2489.81	-51.63	3	1.7	H	-4.07	-55.70	-47.00	-8.70
2489.81	-54.13	291	1.6	V	-4.07	-58.20	-47.00	-11.20
802.11b Mid channel								
377.90	-51.51	338	1.6	H	-11.59	-63.10	-57.00	-6.10
377.90	-53.44	272	2.0	V	-11.59	-65.03	-57.00	-8.03
2489.81	-51.08	263	1.2	H	-4.07	-55.14	-47.00	-8.14
2489.81	-54.44	111	1.4	V	-4.07	-58.51	-47.00	-11.51
802.11b high channel								
377.90	-51.52	37	1.8	H	-11.59	-63.11	-57.00	-6.11
377.90	-53.64	23	1.5	V	-11.59	-65.23	-57.00	-8.23
2489.81	-50.94	26	1.1	H	-4.07	-55.01	-47.00	-8.01
2489.81	-54.21	286	1.9	V	-4.07	-58.28	-47.00	-11.28

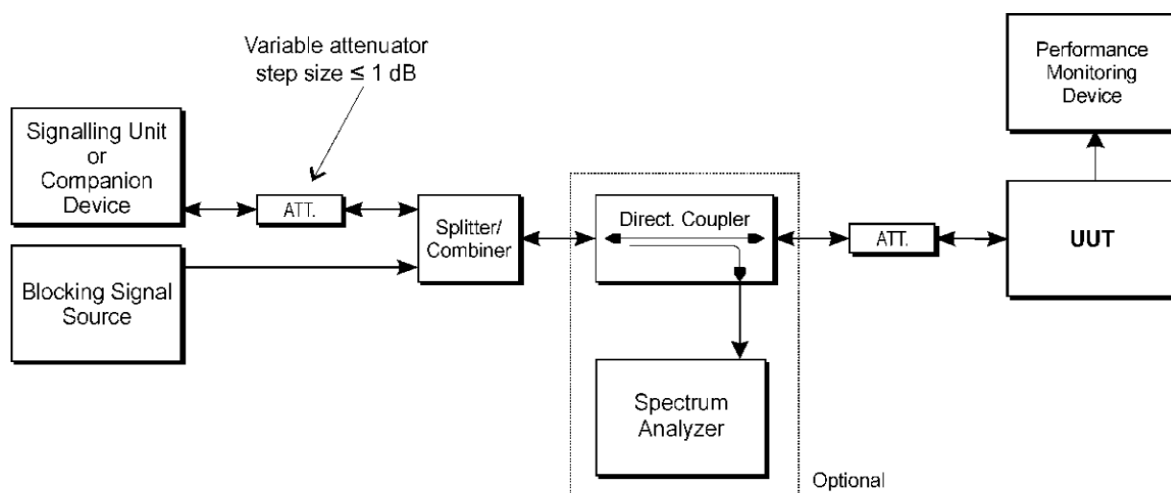
Remark:

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 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × log ₁₀ (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × log ₁₀ (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		
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: 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} + 20 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 4: 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 : 802.11b (the worst data)

Receiver Category 1					
802.11b	P _{min} (dBm)	Blocking Frequency (MHz)	Blocking Power(dB)	Measured PER(%)	Limit (%)
2412	-68	2380	-34	2.84	10
2412	-74	2300	-34	3.85	10
2412	-74	2330	-34	3.03	10
2412	-74	2360	-34	2.23	10
2472	-68	2504	-34	2.98	10
2472	-74	2524	-34	1.99	10
2472	-74	2584	-34	2.22	10
2472	-74	2674	-34	4.94	10
Note: This report only shows the worst case test data. OCBW=14106000Hz (-133dBm+10*log10(OCBW))=-61.51dBm -68dBm≤-61.51dBm Wanted Signal Power=-68dBm (-139dBm+10*log10(OCBW))=-67.51dBm -74dBm≤-67.51dBm Wanted Signal Power=-74dBm					

15. EUT Photographs

EUT Photo 1



EUT Photo 2



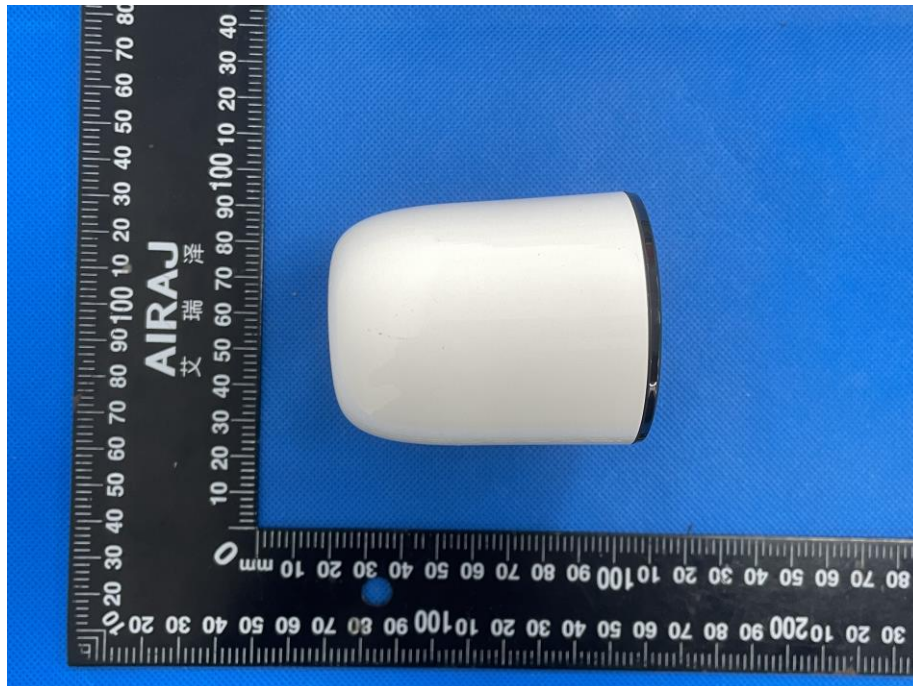
EUT Photo 3



EUT Photo 4



EUT Photo 5



EUT Photo 6

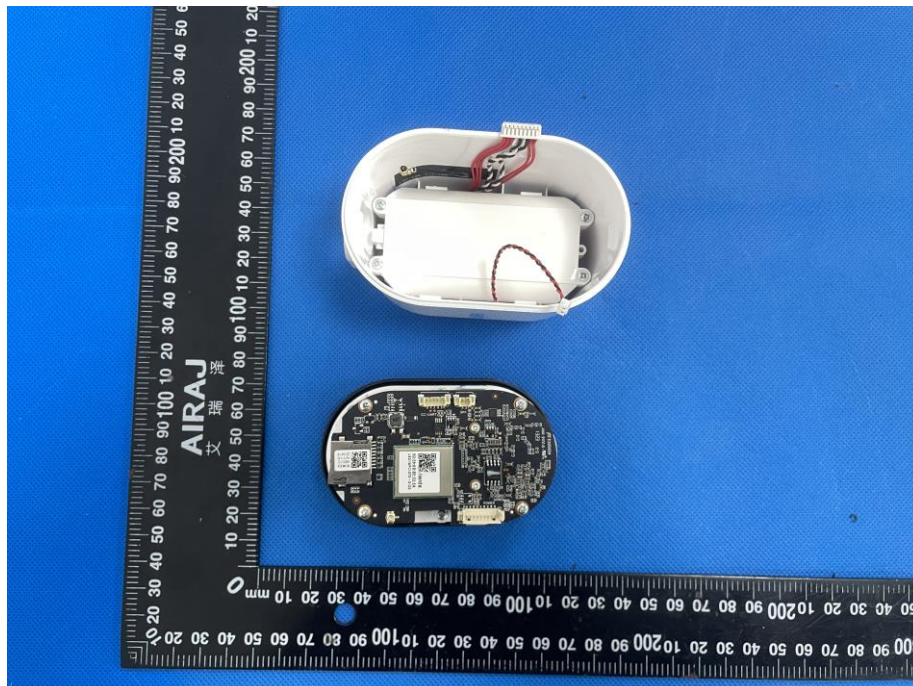


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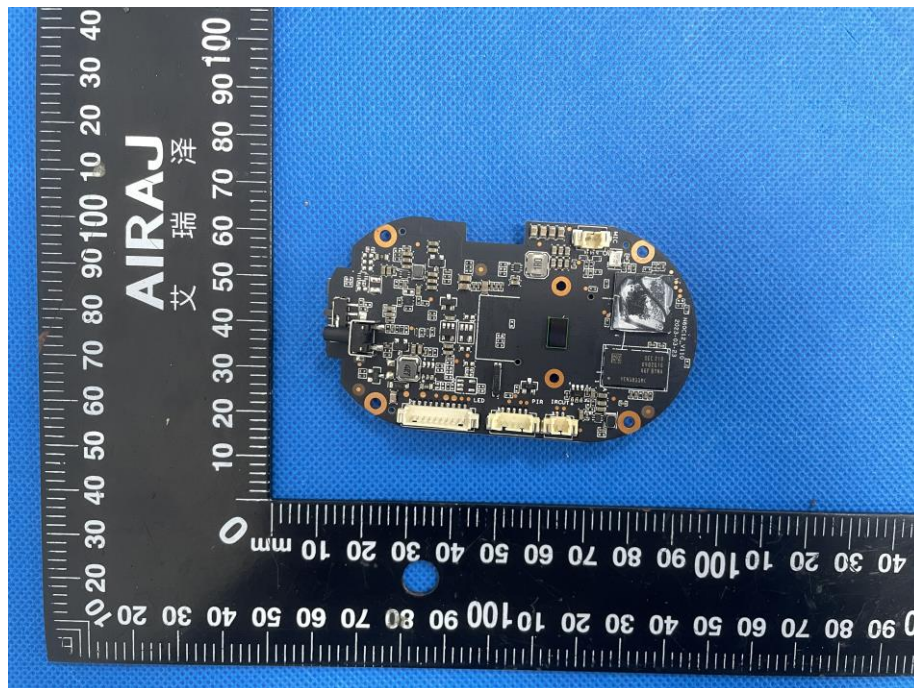
EUT Photo 7



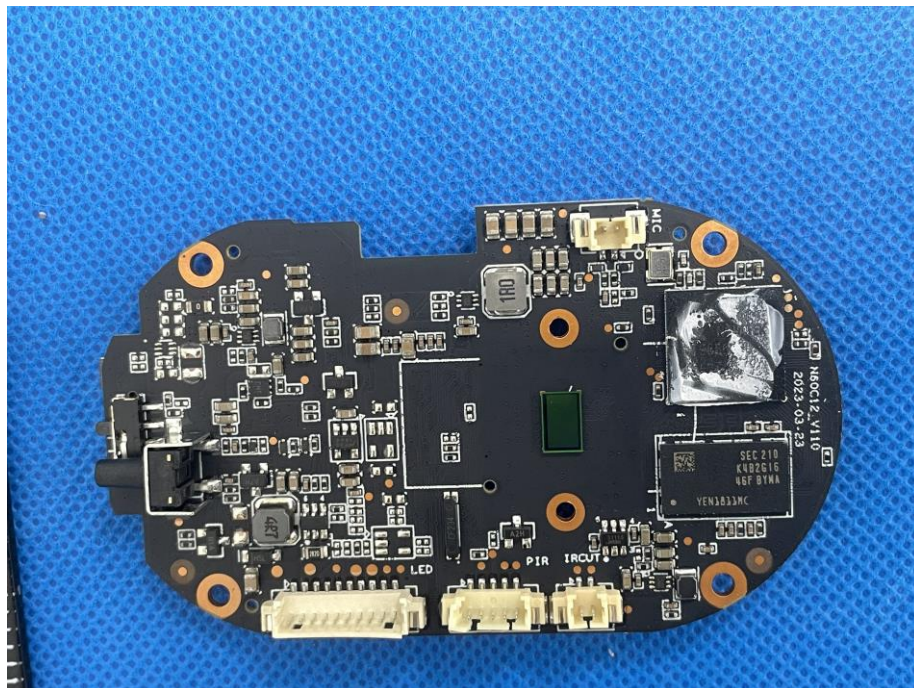
EUT Photo 8



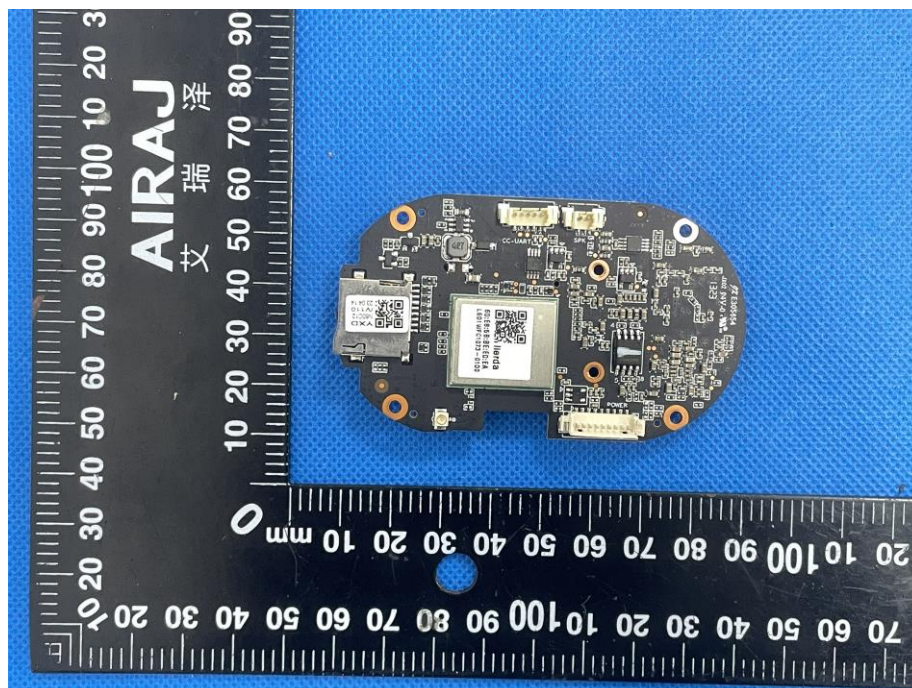
EUT Photo 9



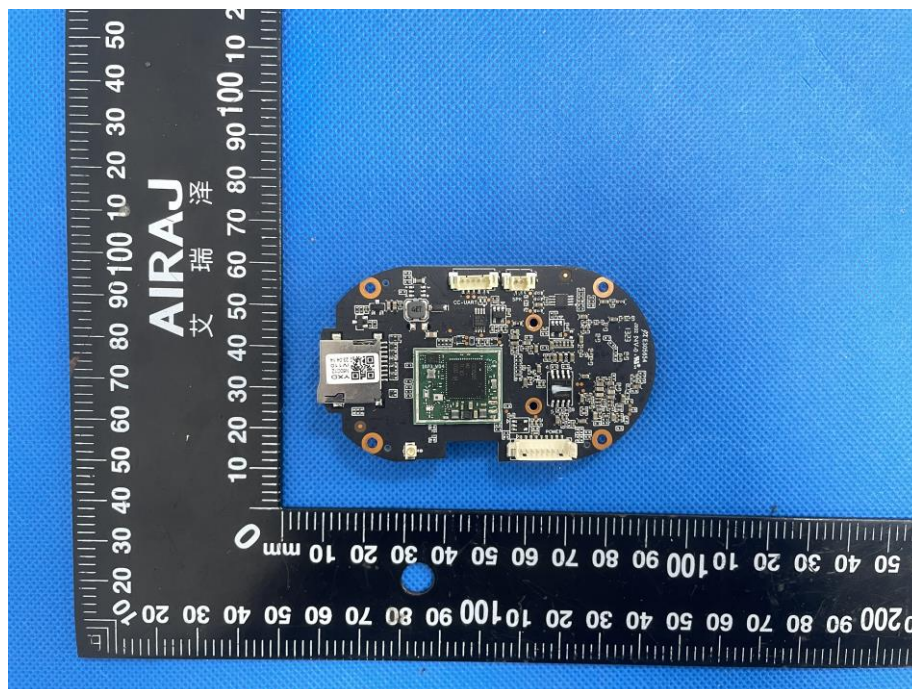
EUT Photo 10



EUT Photo 11



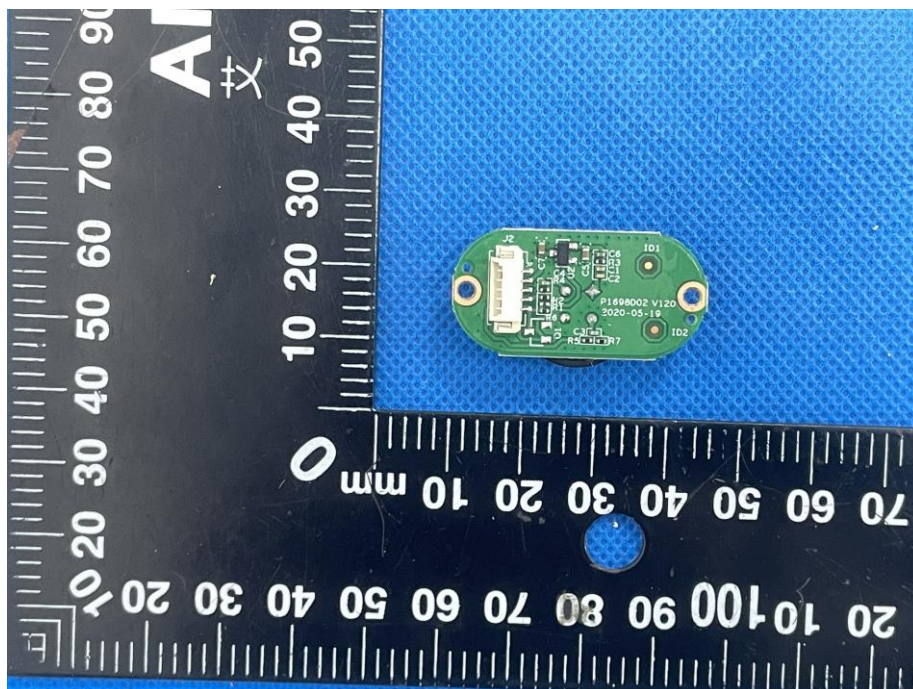
EUT Photo 12



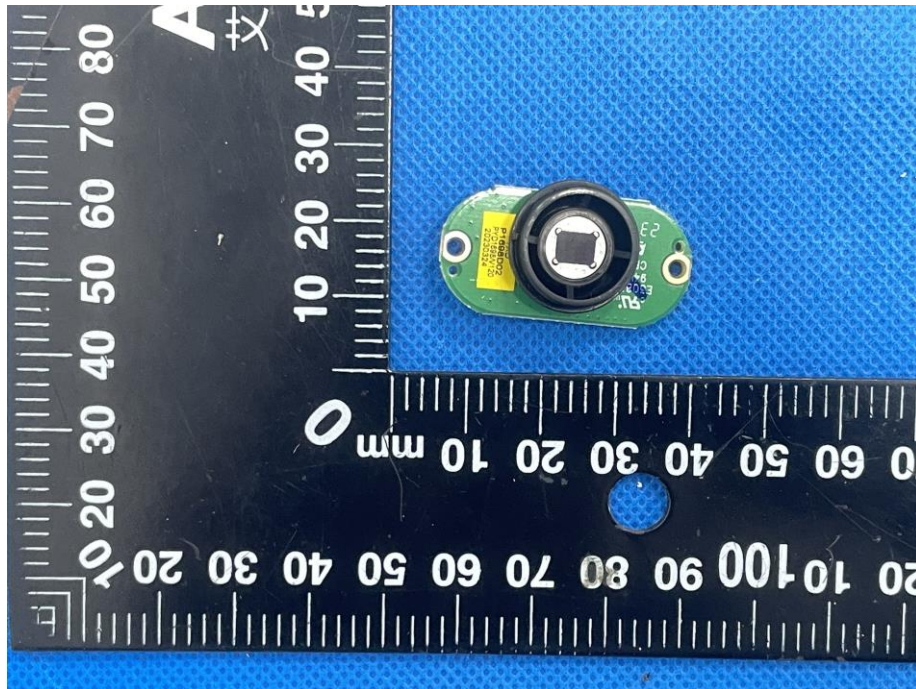
EUT Photo 13



EUT Photo 14



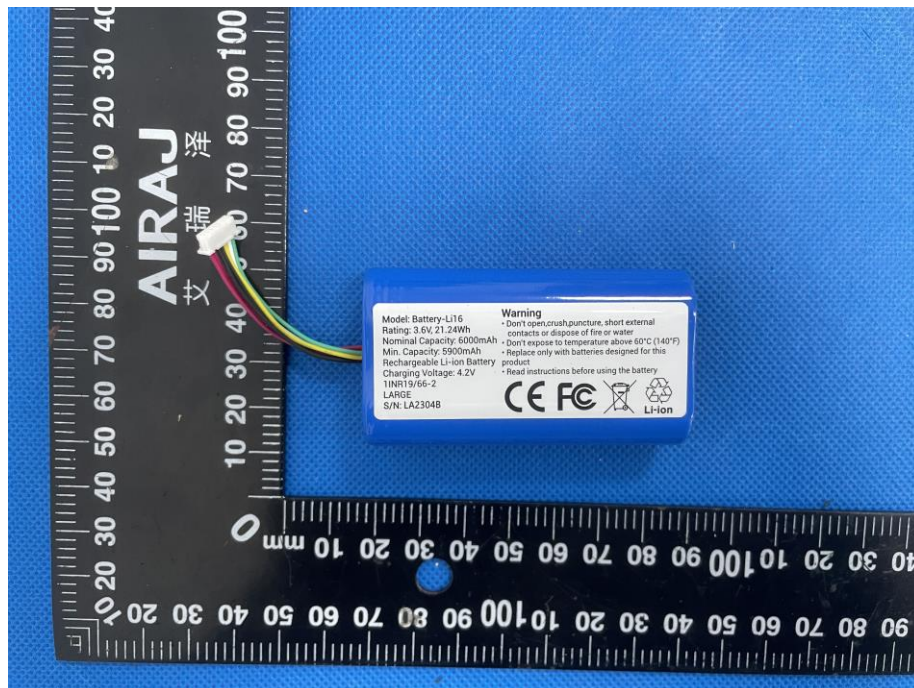
EUT Photo 15



EUT Photo 16



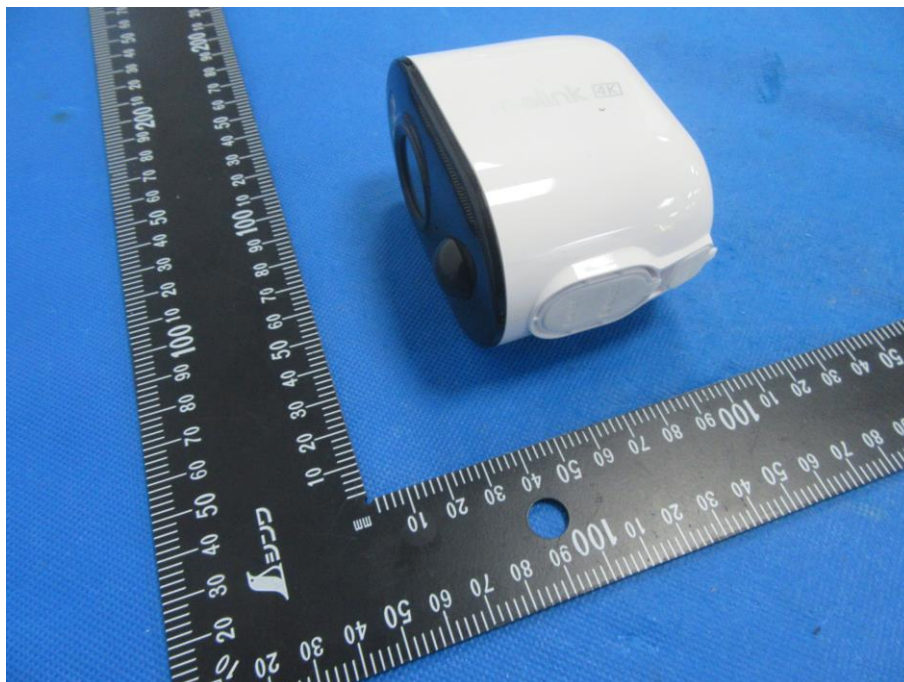
EUT Photo 17



EUT Photo 18



EUT Photo 19



EUT Photo 20



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 the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test 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, Zhancheng, 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 *****

2017

TEST REPORT

Report No.: BCTC2401383633-4E

Applicant: REOLINK INNOVATION LIMITED

Product Name: WiFi IP Camera

Test Model: Argus 3 Ultra

Tested Date: 2023-05-18 to 2023-05-26

Issued Date: 2024-01-30

Shenzhen **BCTC** Testing Co., Ltd.



Product Name: WiFi IP Camera

Trademark: 

Model/Type reference: Argus 3 Ultra
Argus 3 Plus 4K, Argus Series B350

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, Shiyuan 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, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

Sample Received Date: 2023-05-18

Sample tested Date: 2023-05-18 to 2023-05-26

Issue Date: 2024-01-30

Report No.: BCTC2401383633-4E

Test Standards: ETSI EN 301 893 V2.1.1 (2017-05)

Test Results: PASS

Remark: This is WIFI-5.1GHz 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.

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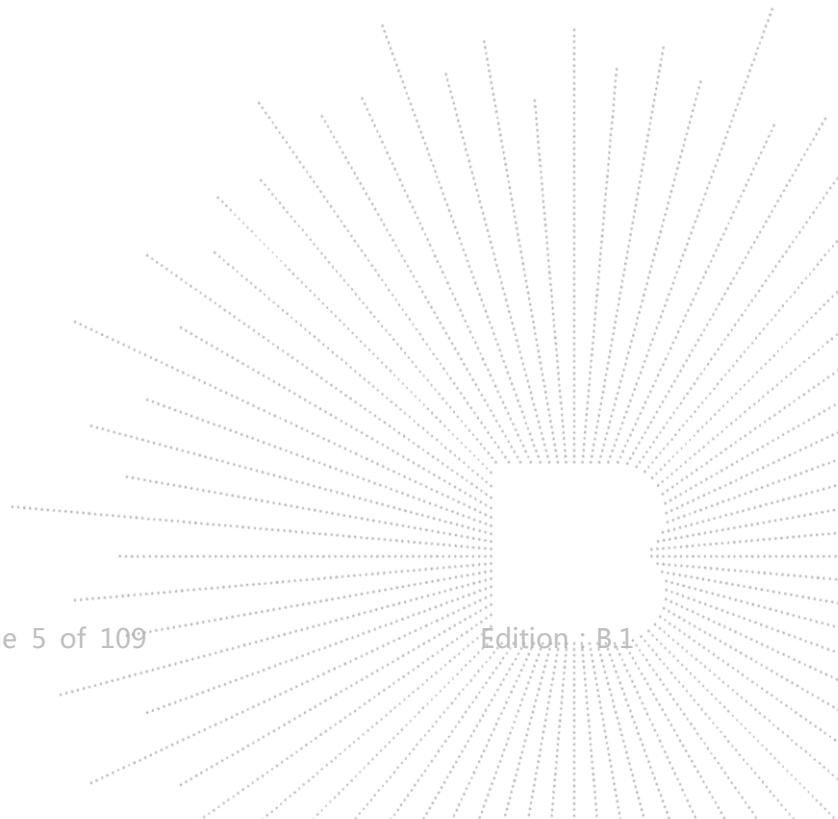
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(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2401383633-4E	2024-01-30	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	4.4.35	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.

Remark: Based on the following changes in the original test report (BCTC2305647672E). Changes Model/Type reference, update the shell screen printing and label, not affect the test results, add EUT photo P18-P20.

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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	Argus 3 Ultra Argus 3 Plus 4K, Argus Series B350
Model differences:	All the model are the same circuit and RF module, except model names.
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WIFI(5GHz): 5150MHz-5350MHz, 5470MHz-5725MHz
Max. RF output power:	WIFI(5.1GHz): 10.86 dBm WIFI(5.3GHz): 12.92 dBm WIFI(5.6GHz): 10.26 dBm
Type of Modulation:	WIFI(5GHz): OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna installation:	WIFI(5GHz): Internal antenna
Antenna Gain:	WIFI(5GHz): 4.35 dBi
Ratings:	DC 5V from adapter

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Shielded	Note
1	--	--	Applicant	---	Yes/No	With a ferrite ring in mid Detachable
2	--	--	BCTC	--	Yes/No	--

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

RF General Information			
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
5150-5250	a	5180-5240	36-48 [4]
5250-5350		5260-5320	52-64 [4]
5470-5725		5500-5700	100-140 [11]
5150-5250	n (HT20)	5180-5240	36-48 [4]
5250-5350		5260-5320	52-64 [4]
5470-5725		5500-5700	100-140 [11]

Note 1: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

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 Channel Frequencies Configuration		
Frequency Range (MHz)	IEEE Std. 802.11	Test Channel Freq. (MHz)
5150-5350MHz	a/n (HT20)	5180, 5260, 5320
5470-5725MHz	a/n (HT20)	5500, 5600, 5700

4.6 Test Environment

1. Normal Test Conditions:

Humidity(%):	54
Atmospheric Pressure(KPa):	101
Temperature(°C):	26
Test Voltage(DC):	5V

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 (°C)	0	35

5. Test Facility And Test Instrument Used

5.1 Test Facility

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

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 15, 2023	May 14, 2024
3	Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
4	Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
5	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	942	May 15, 2023	May 14, 2024
6	Loop Antenna	Schwarzbeck	FMZB1519B	00014	Jun. 06, 2022	Jun. 05, 2023
7	Amplifier	SKET	LAPA_01G18 G-45dB	\	May 15, 2023	May 14, 2024
8	Horn Antenna	Schwarzbeck	BBHA9120D	1541	Jun. 06, 2022	Jun. 05, 2023
9	Preamplifier	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
10	Horn antenna	Schwarzbeck	BBHA9170	00822	Jun. 06, 2022	Jun. 05, 2023
11	Spectrum Analyzer 9kHz-40GHz	R&S	FSP 40	100363	May 15, 2023	May 14, 2024
12	Software	Frad	EZ-EMC	FA-03A2 RE	\	\
13	Spectrum Analyzer	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024
14	Signal Generator	Keysight	N5182B	MY56200519	May 15, 2023	May 14, 2024
15	Signal Generator	Keysight	83711B	US37100131	Aug. 29, 2022	Aug. 28, 2023
16	Communication test set	R&S	CMW500	126173	Nov. 08, 2022	Nov. 07, 2023
17	D.C. Power Supply	LongWei	TPR-6405D	\	\	\
18	Programmable constant temperature and humidity test chamber	DGBELL	BTKS5-150C	\	Jun. 30, 2022	Jun. 29, 2023
19	Radio frequency control box	MAIWEI	MW100-RFC B	\	\	\
20	Software	MAIWEI	MTS 8310	\	\	\

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:
• The number of Transmit chains:
• Equal power distribution among the transmit chains: ☐ Yes ☐ No
• In case of beamforming, the maximum (additional) beamforming gain: Db
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 %.

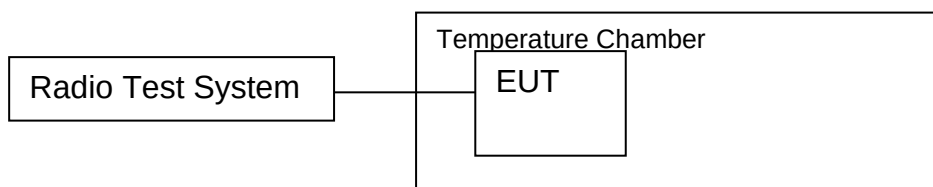
u) The theoretical maximum radio performance of the equipment (e.g. maximum throughput) (see ETSI EN 301 893 V2.1.1, clause 5.4.9.3.1):

N/A

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7. Nominal Centre Frequencies

7.1 Block Diagram Of Test Setup



7.2 Limit

The Nominal Centre Frequencies (f_c) for a Nominal Channel Bandwidth of 20 MHz are defined by equation (1). See also figure 3.

$f_c = 5\,160 + (g \times 20)$ MHz, where $0 \leq g \leq 9$ or $16 \leq g \leq 27$ 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 $f_c \pm 20$ 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 f_1 .

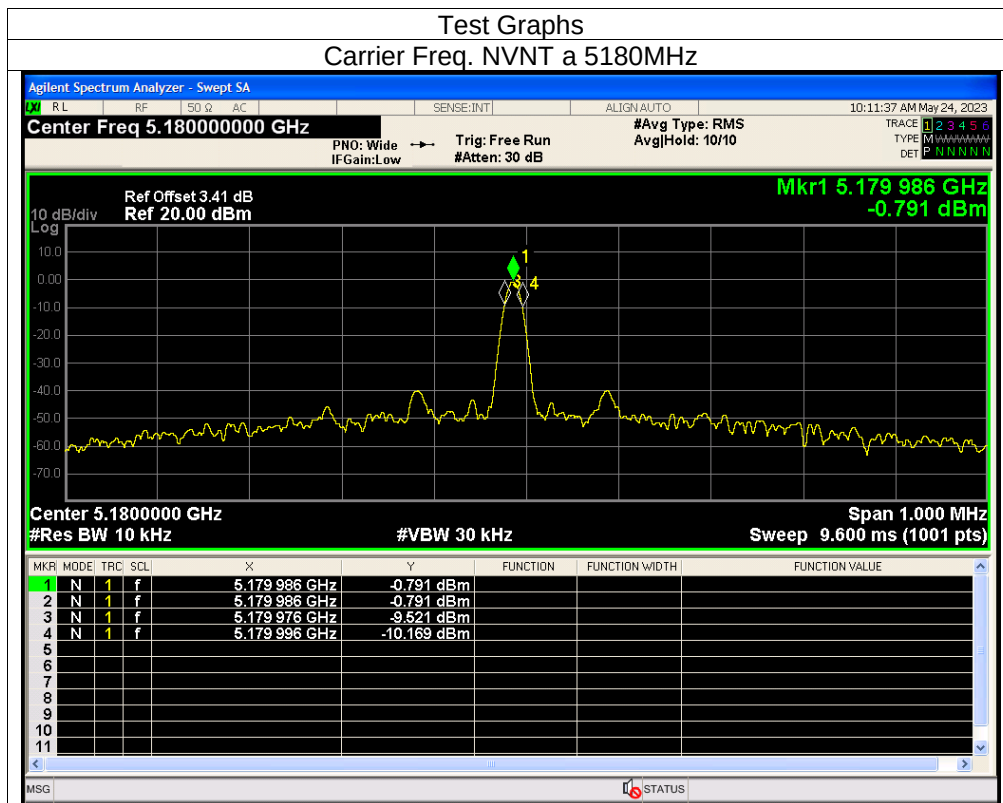
The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f_2 .

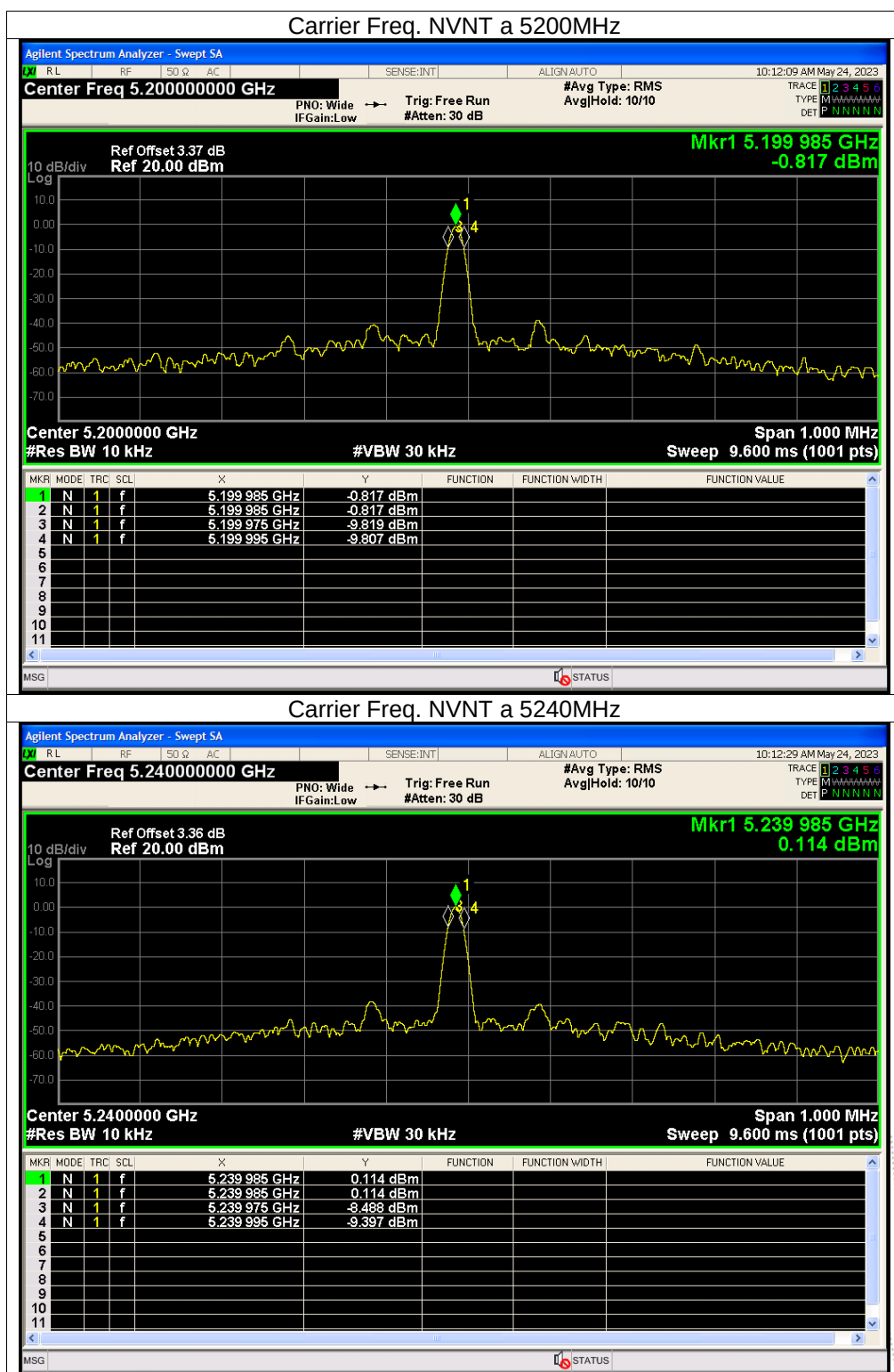
The centre frequency is calculated as $(f_1 + f_2) / 2$.

7.4 Test Result

5.1G

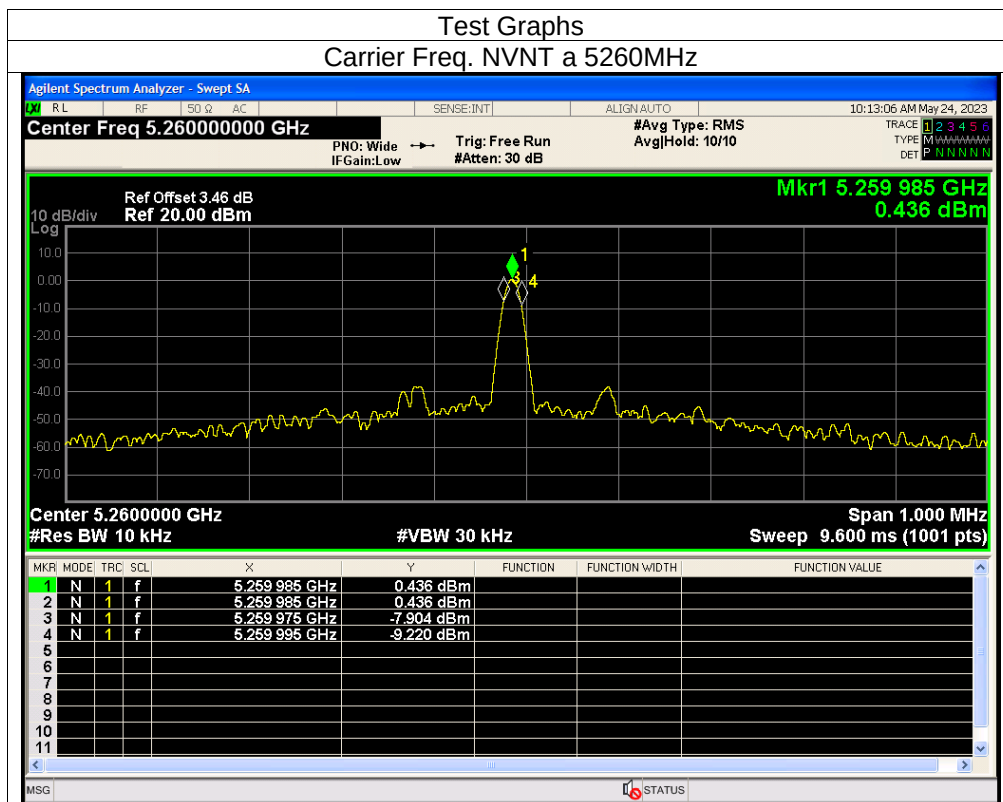
Condition	Mode	Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	a	5180	5179.986	-14000	-2.7	20	Pass
NVNT	a	5200	5199.985	-15000	-2.88	20	Pass
NVNT	a	5240	5239.985	-15000	-2.86	20	Pass

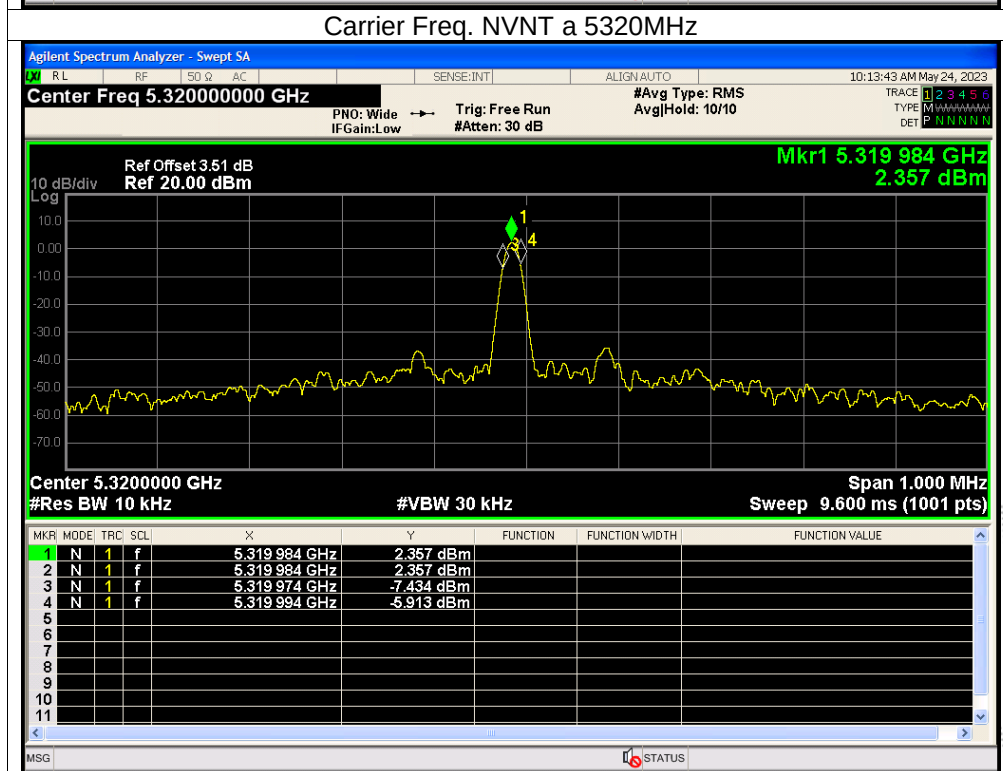
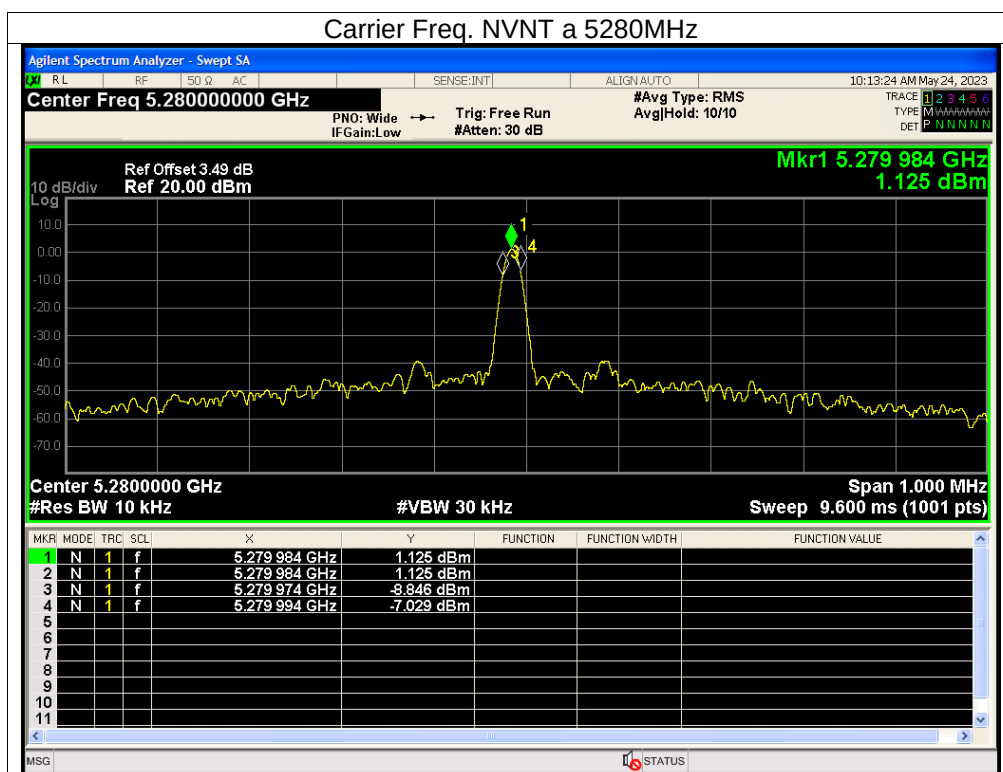




5.3G

Condition	Mode	Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	a	5260	5259.985	-15000	-2.85	20	Pass
NVNT	a	5280	5279.984	-16000	-3.03	20	Pass
NVNT	a	5320	5319.984	-16000	-3.01	20	Pass

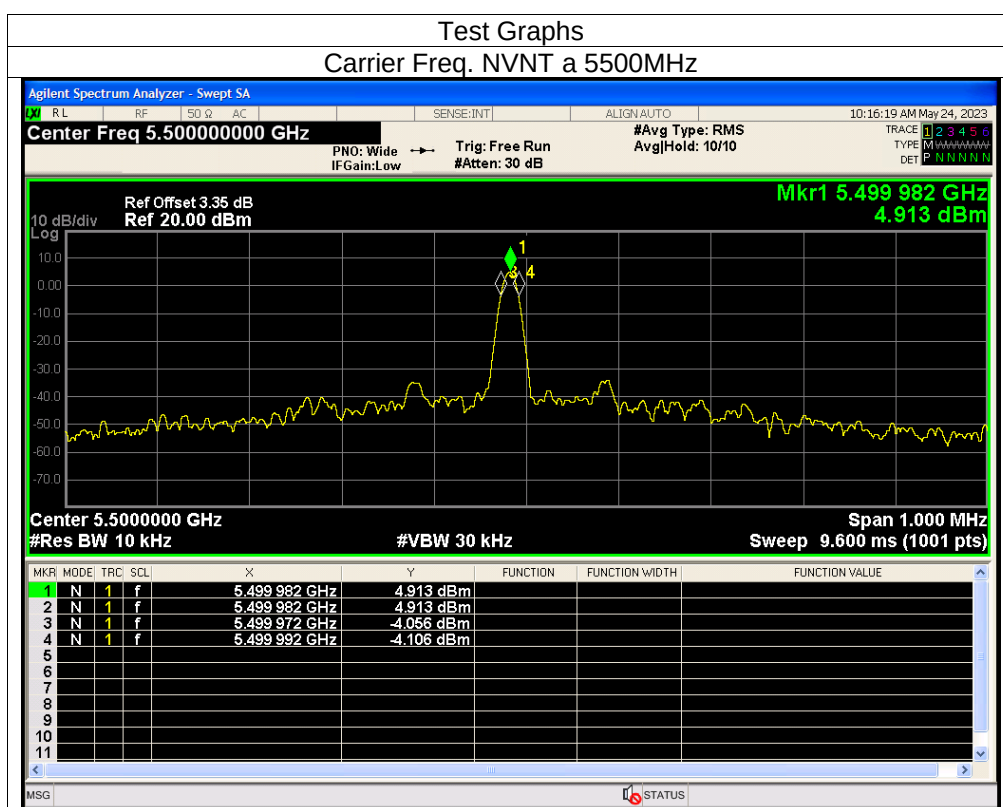


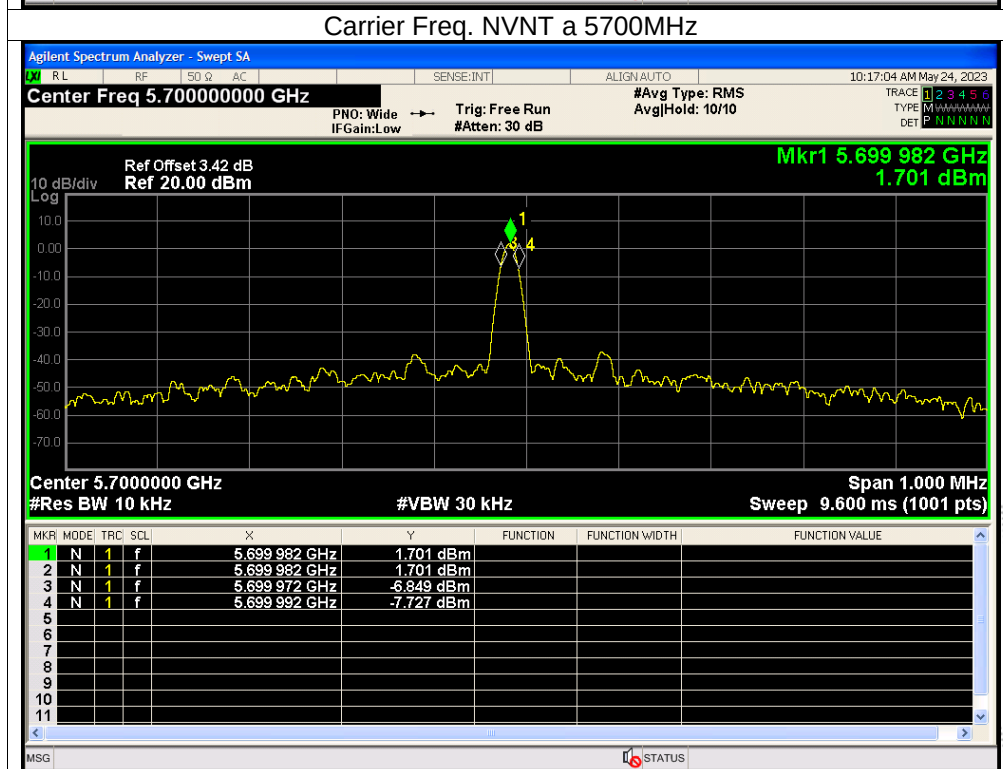
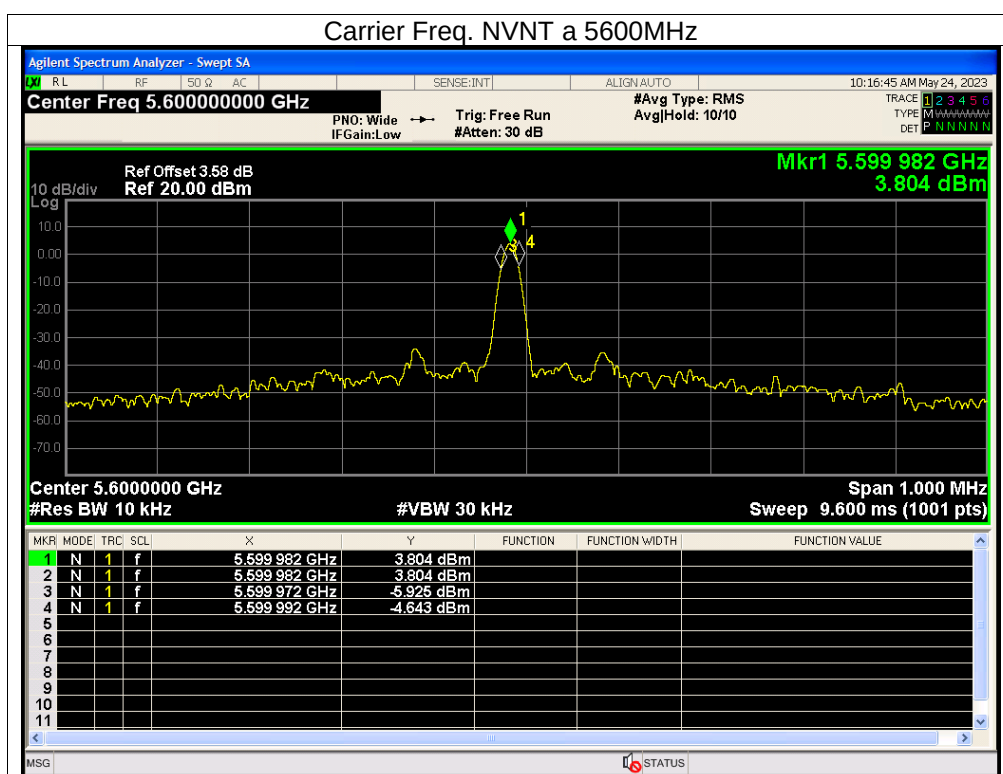


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5.6G

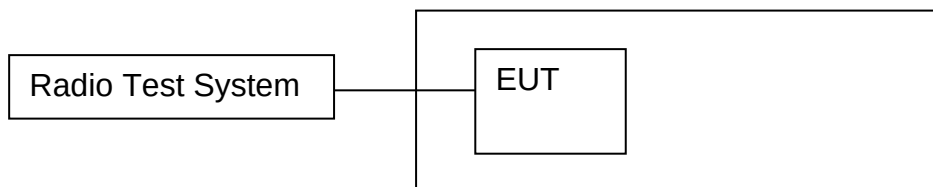
Condition	Mode	Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
NVNT	a	5500	5499.982	-18000	-3.27	20	Pass
NVNT	a	5600	5599.982	-18000	-3.21	20	Pass
NVNT	a	5700	5699.982	-18000	-3.16	20	Pass





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: $2 \times$ 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.

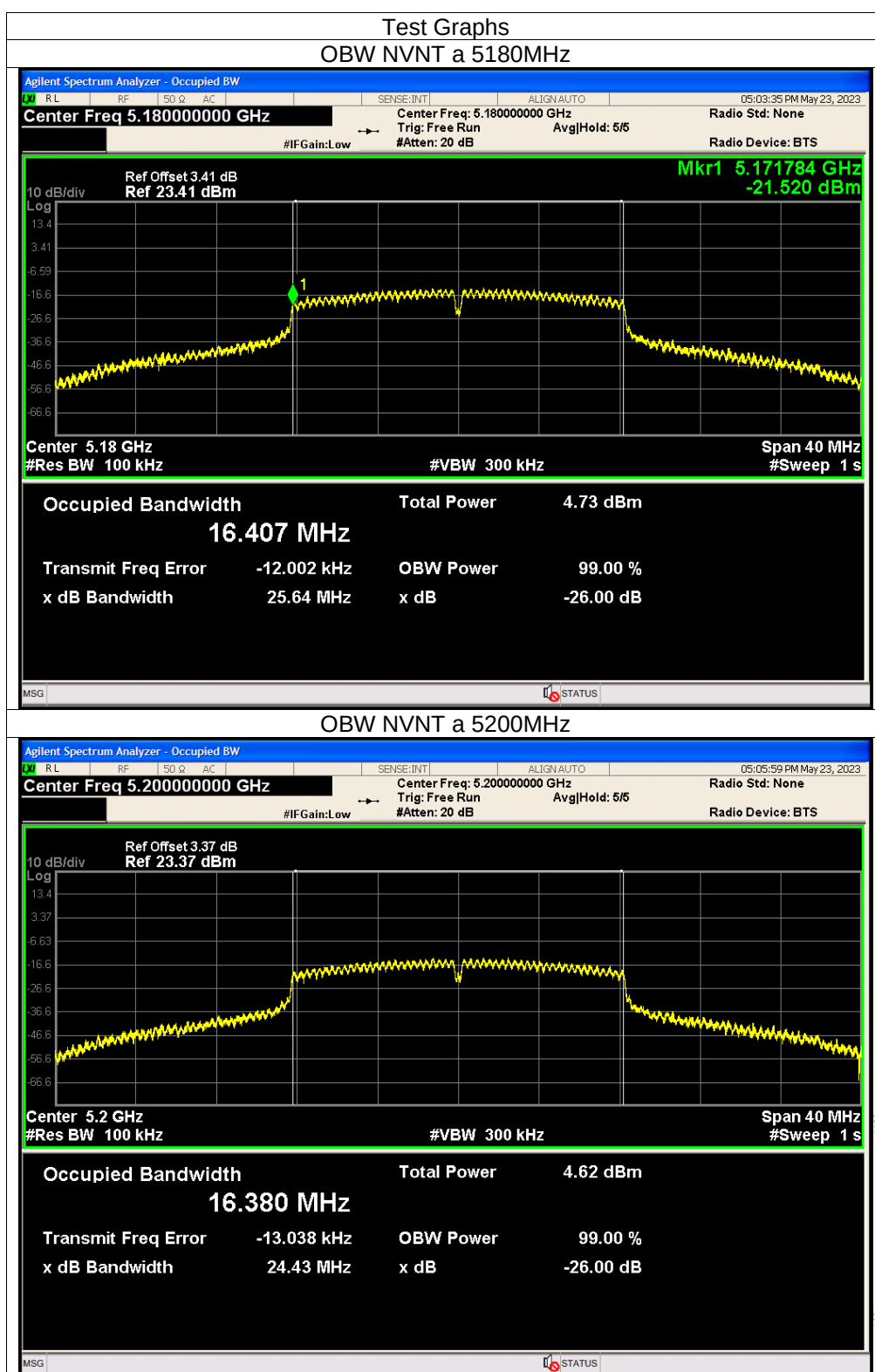
Step 3:

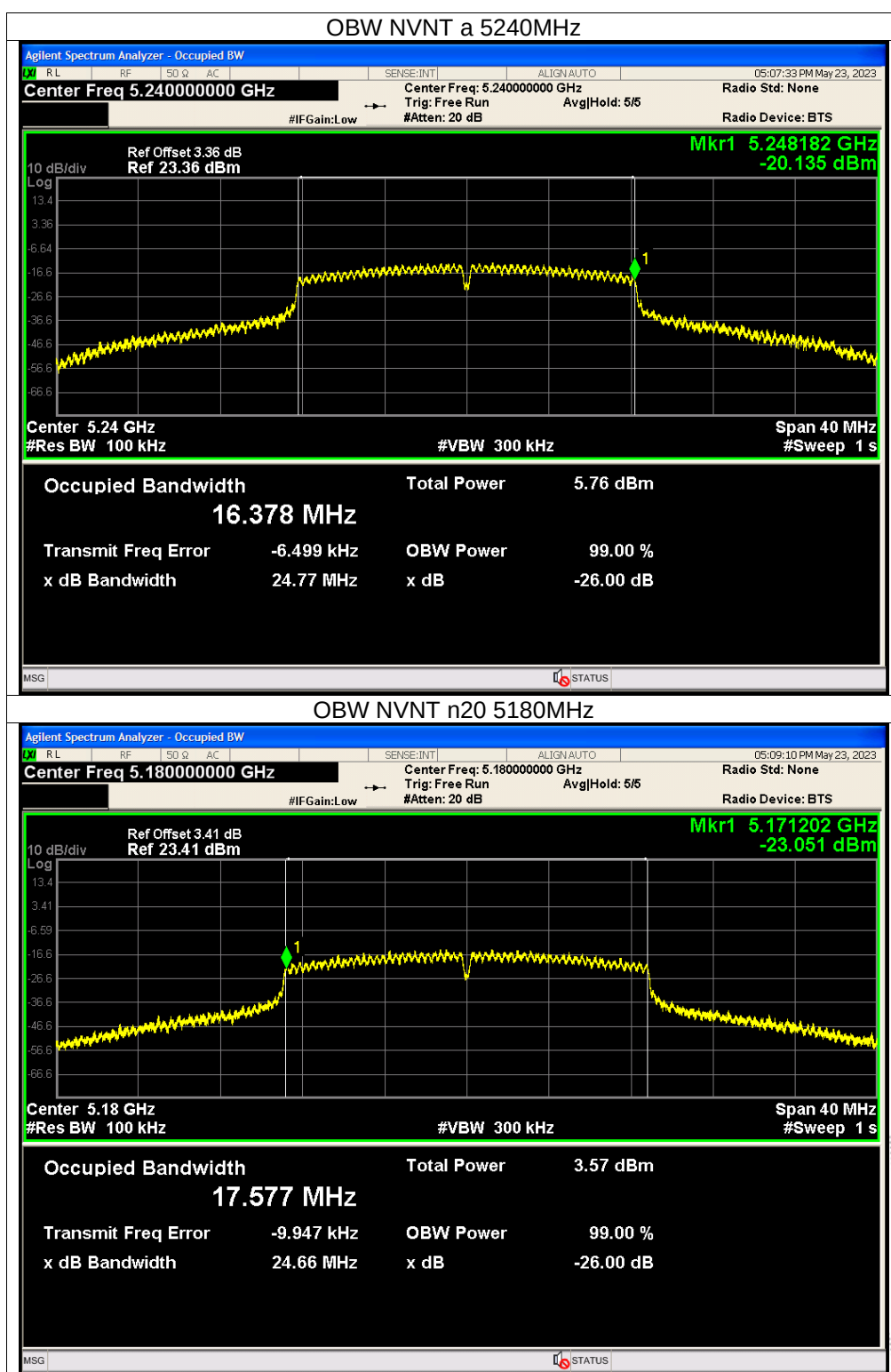
- Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
 - Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth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

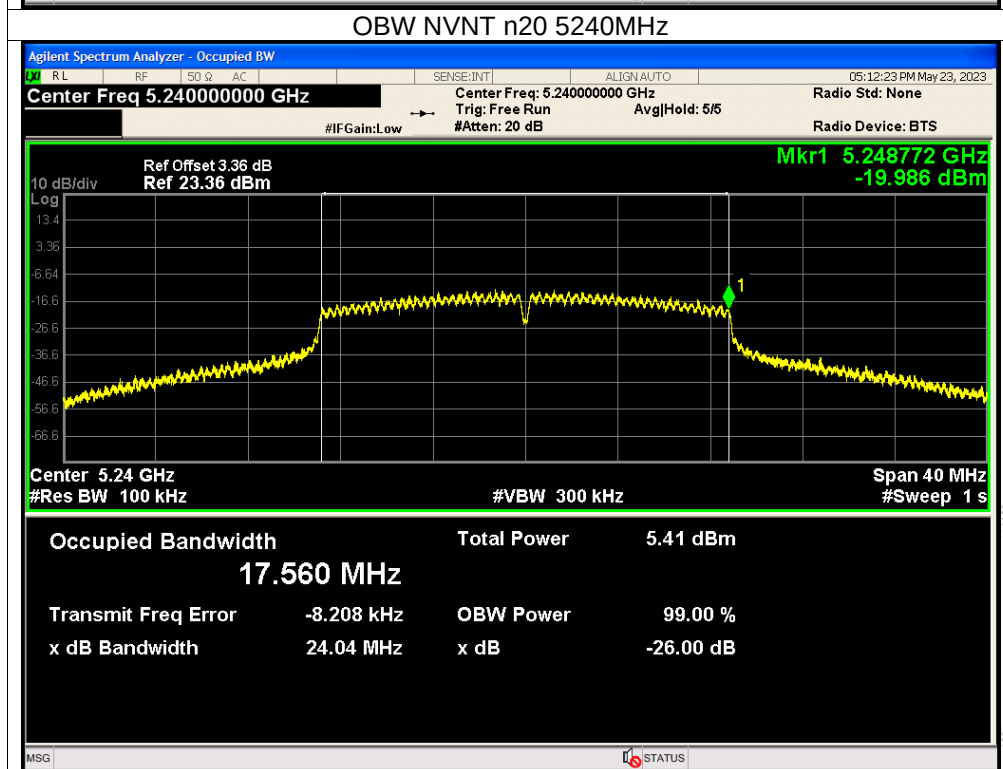
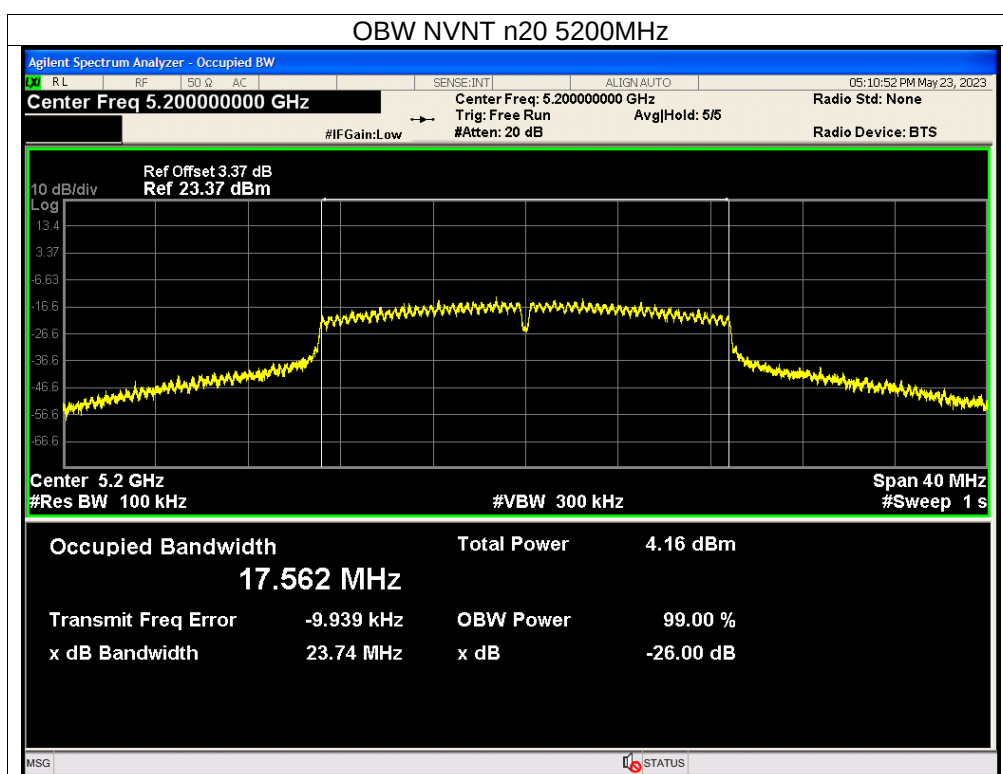
5.1G

Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Verdict
NVNT	a	5180	5179.988	16.407	Pass
NVNT	a	5200	5199.987	16.38	Pass
NVNT	a	5240	5239.994	16.378	Pass
NVNT	n20	5180	5179.99	17.577	Pass
NVNT	n20	5200	5199.99	17.562	Pass
NVNT	n20	5240	5239.992	17.56	Pass





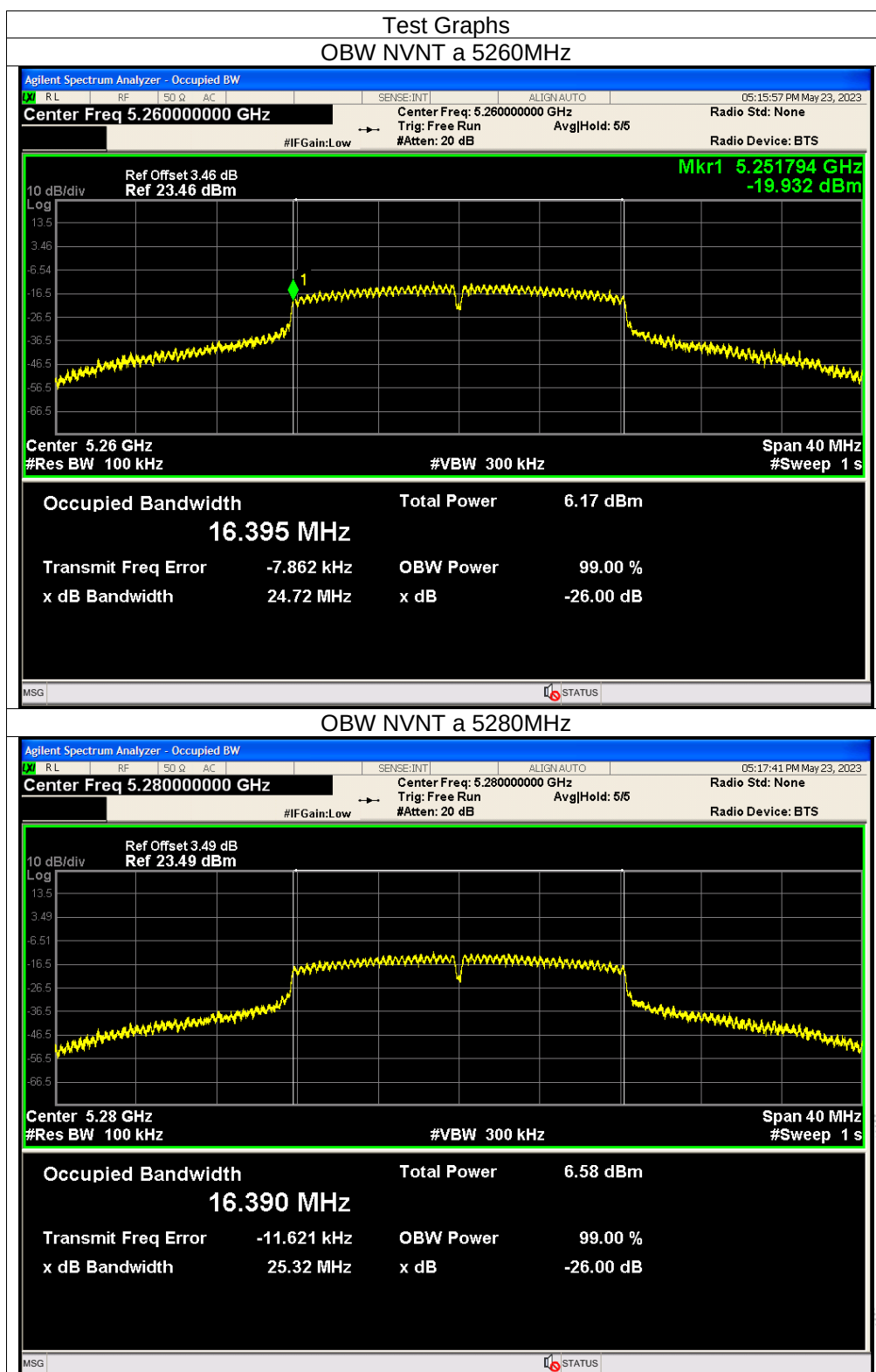
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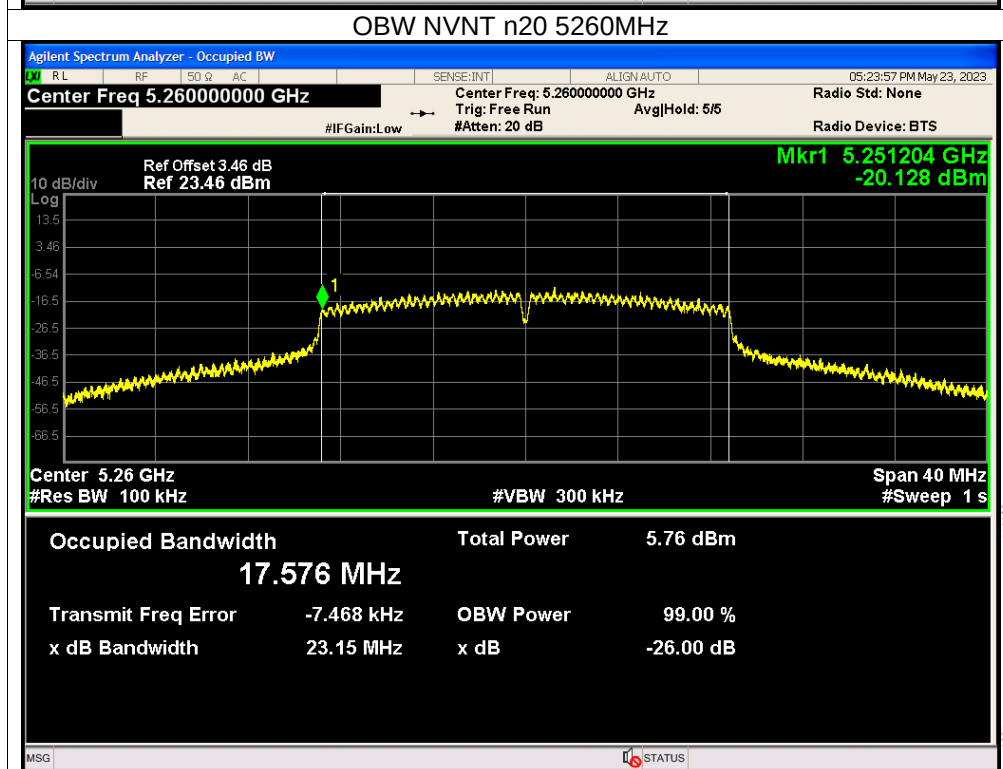
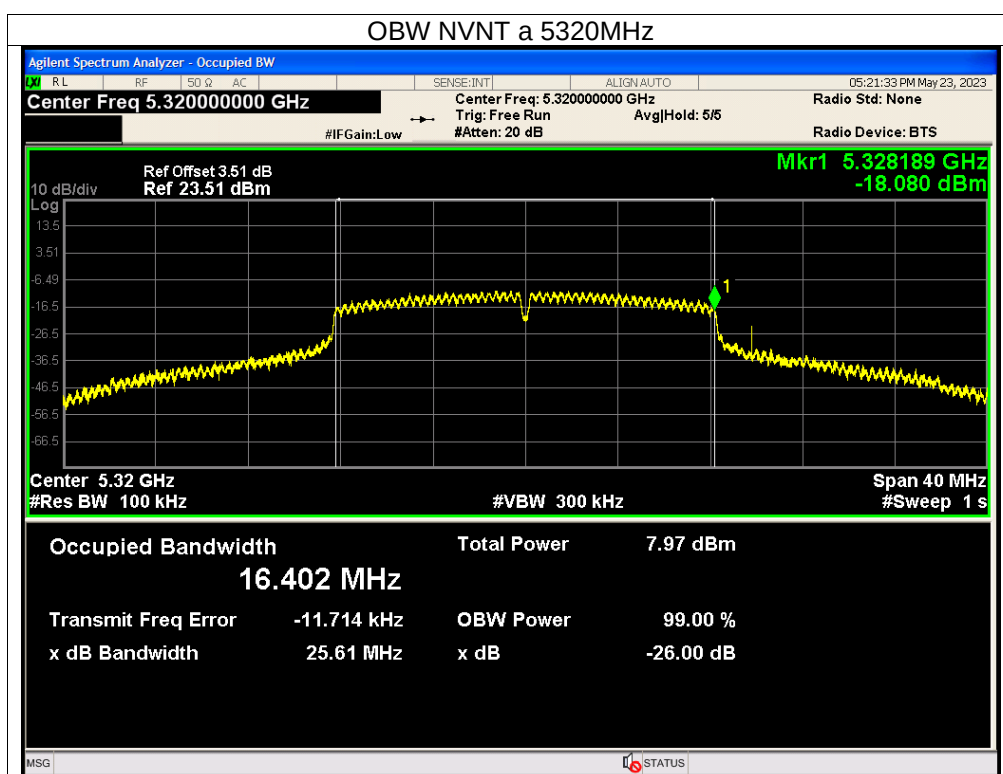
5.3G

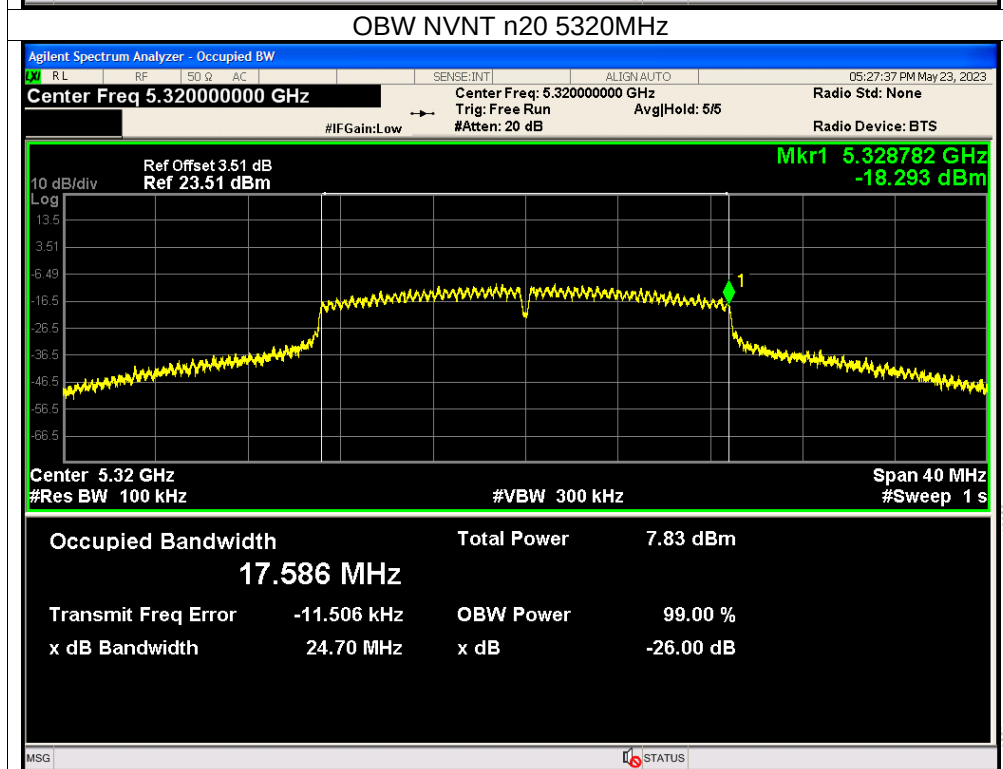
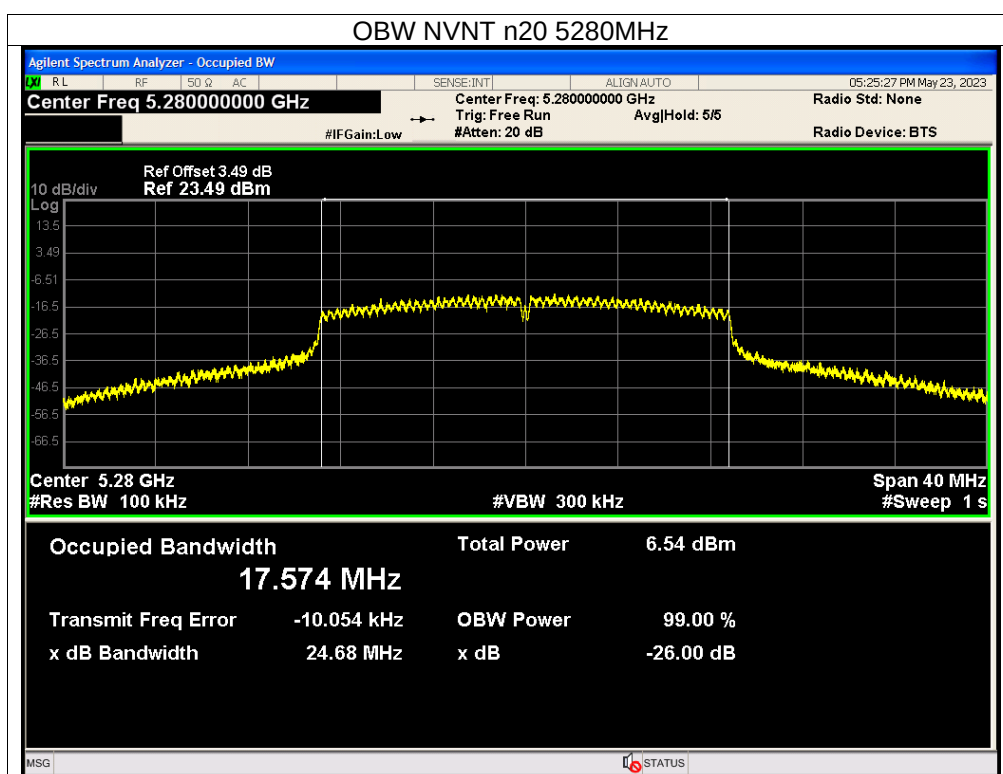
Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Verdict
NVNT	a	5260	5259.992	16.395	Pass
NVNT	a	5280	5279.988	16.39	Pass
NVNT	a	5320	5319.988	16.402	Pass
NVNT	n20	5260	5259.993	17.576	Pass
NVNT	n20	5280	5279.99	17.574	Pass
NVNT	n20	5320	5319.988	17.586	Pass





TC
BC
PPR
Report

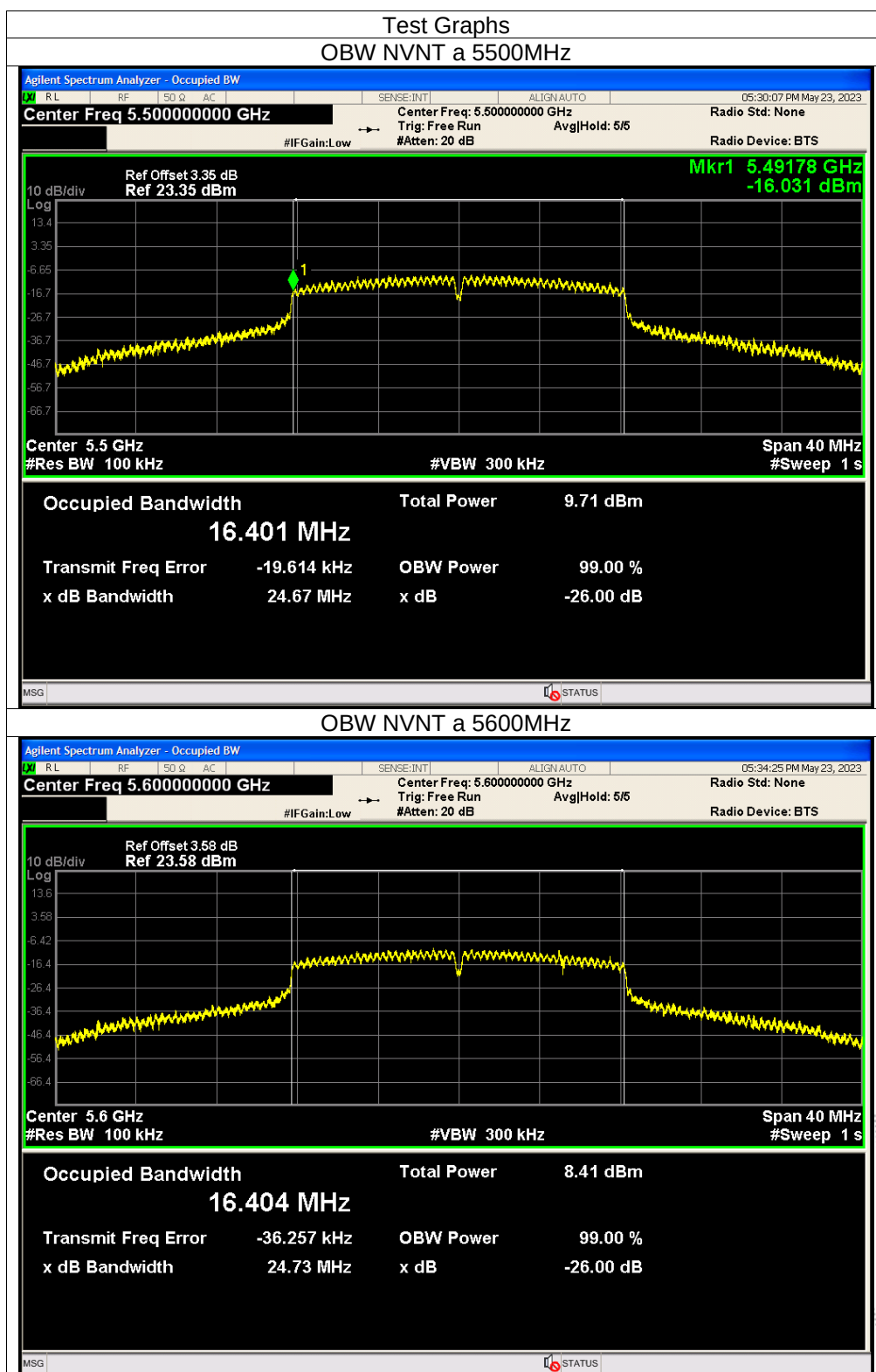


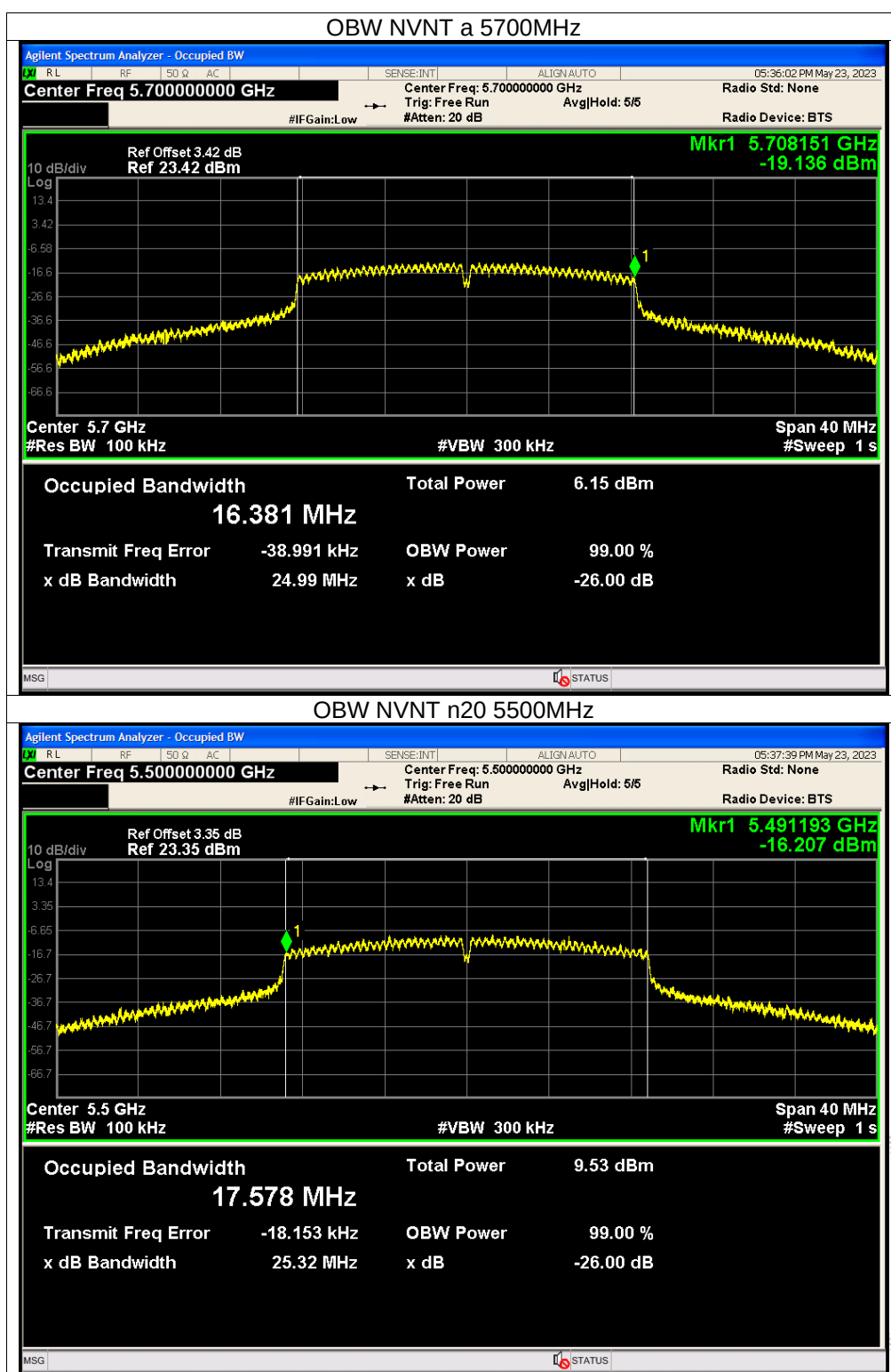


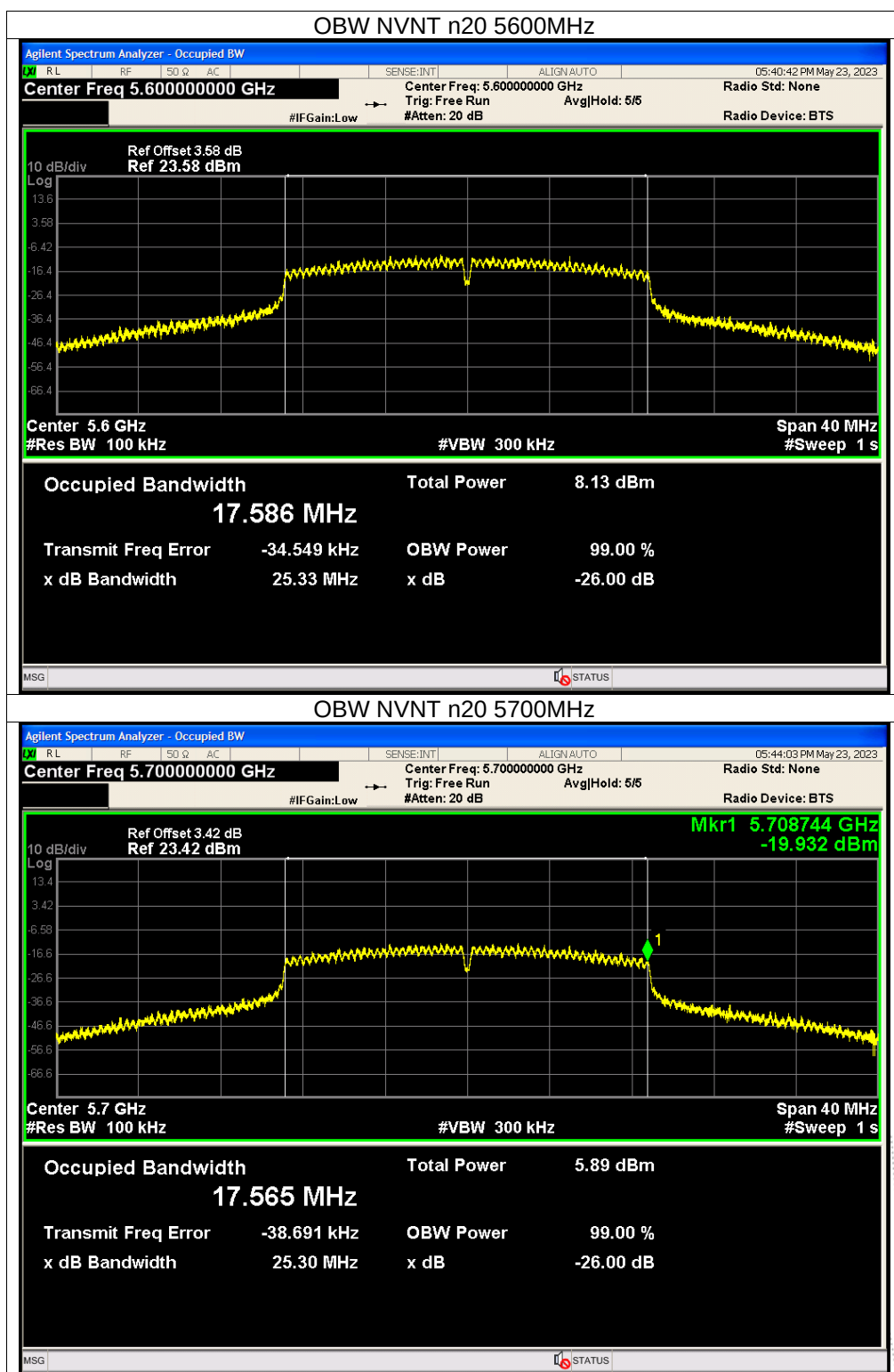
5.6G

Condition	Mode	Frequency (MHz)	Center Frequency (MHz)	OBW (MHz)	Verdict
NVNT	a	5500	5499.98	16.401	Pass
NVNT	a	5600	5599.964	16.404	Pass
NVNT	a	5700	5699.961	16.381	Pass
NVNT	n20	5500	5499.982	17.578	Pass
NVNT	n20	5600	5599.965	17.586	Pass
NVNT	n20	5700	5699.961	17.565	Pass

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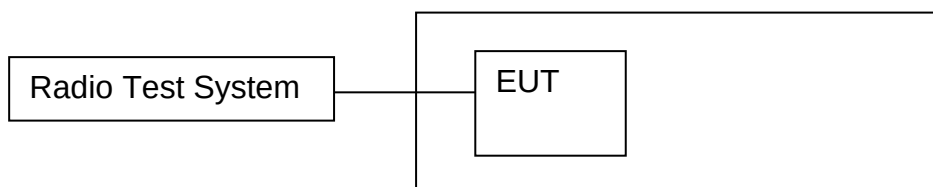






9. RF Output Power, Transmit Power Control (TPC)

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 ($0 < x \leq 1$), 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 P_H (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.

$$PH = A + G + Y + 10 \times \log (1 / x) \text{ (dBm)}. (5)$$

- 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

Remark: $PH = A + G + Y + 10 \times \log (1 / x) \text{ (dBm)}$

Antenna Gain $G=4.35 \text{ dBi}$, beamforming gain $Y= 0 \text{ dB}$, duty cycle $X=100\%$

5.1G

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Burst Number	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	4.84	65	9.19	23	Pass
NVNT	a	5200	5.03	66	9.38	23	Pass
NVNT	a	5240	6.51	65	10.86	23	Pass
NVNT	n20	5180	4.21	70	8.56	23	Pass
NVNT	n20	5200	4.77	70	9.12	23	Pass
NVNT	n20	5240	6.17	71	10.52	23	Pass

5.3G

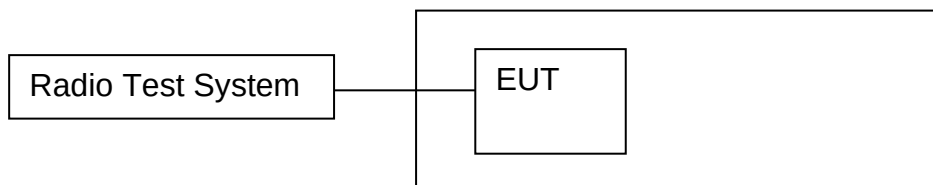
Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Burst Number	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	a	5260	7.56	67	11.91	23	Pass
NVNT	a	5280	7.8	65	12.15	23	Pass
NVNT	a	5320	8.65	66	13	23	Pass
NVNT	n20	5260	7.33	70	11.68	23	Pass
NVNT	n20	5280	7.65	71	12	23	Pass
NVNT	n20	5320	8.57	70	12.92	23	Pass

5.6G

Condition	Mode	Frequency (MHz)	Max Burst RMS Power (dBm)	Burst Number	Max EIRP (dBm)	Limit (dBm)	Verdict
NVNT	a	5500	10.26	66	10.26	23	Pass
NVNT	a	5600	9.15	66	9.15	23	Pass
NVNT	a	5700	7.16	66	7.16	23	Pass
NVNT	n20	5500	10.21	71	10.21	23	Pass
NVNT	n20	5600	9.07	70	9.07	23	Pass
NVNT	n20	5700	7.01	85	7.01	23	Pass

10. Power 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: $2 \times$ 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:

$$PD = D + G + Y + 10 \times \log (1 / x) \text{ (dBm / MHz) (14)}$$

10.4 Test Result

Remark: $PH = A + G + Y + 10 \times \log (1 / x) \text{ (dBm)}$

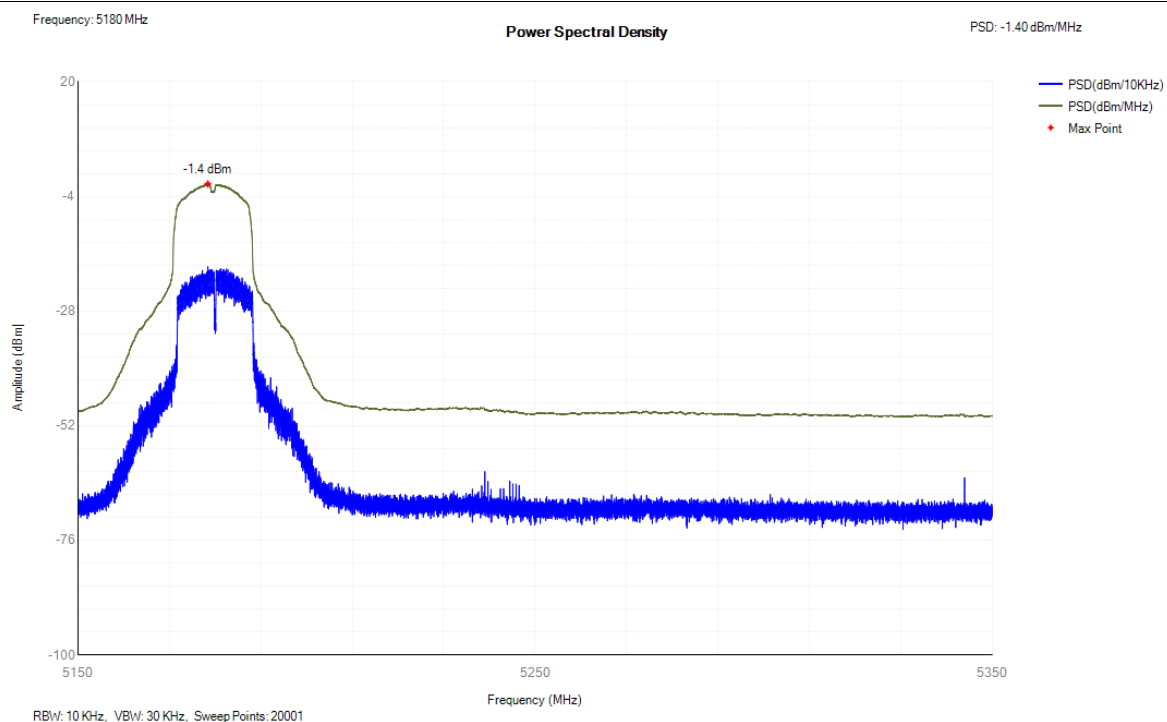
G= Antenna Gain=4.35 dBi, beamforming gain Y= 0 dB, duty cycle X=100%

5.1G

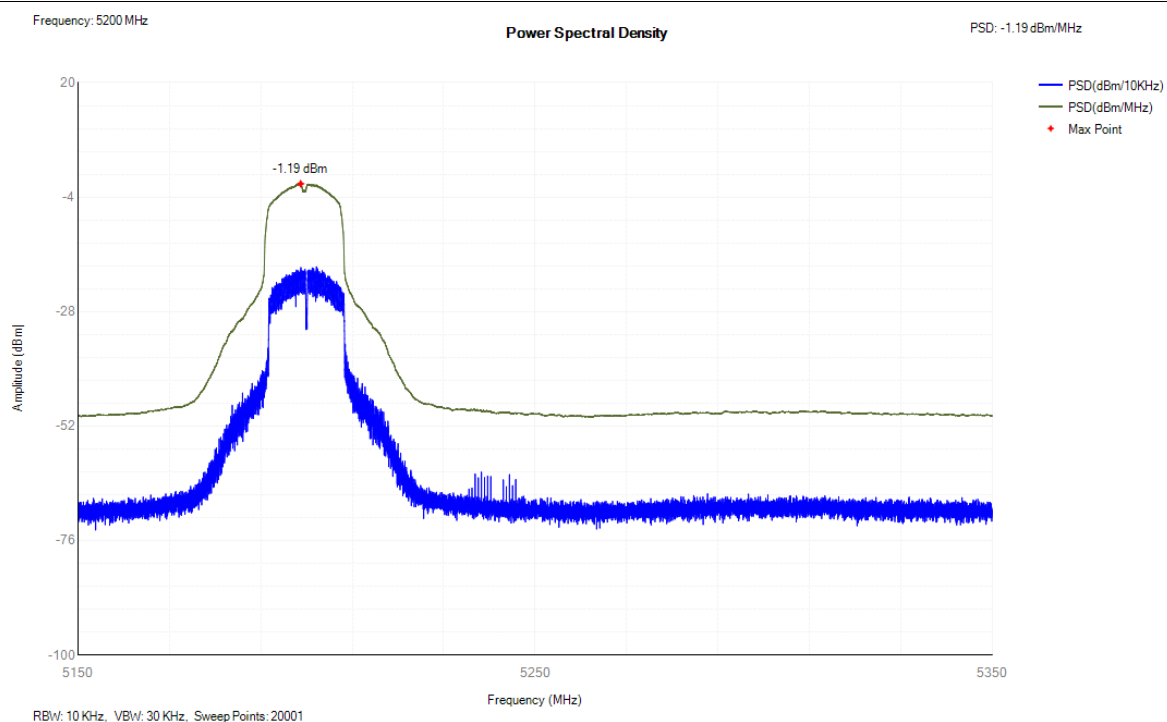
Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	a	5180	-1.4	10	Pass
NVNT	a	5200	-1.19	10	Pass
NVNT	a	5240	0.22	10	Pass
NVNT	n20	5180	-2.25	10	Pass
NVNT	n20	5200	-1.67	10	Pass
NVNT	n20	5240	-0.22	10	Pass

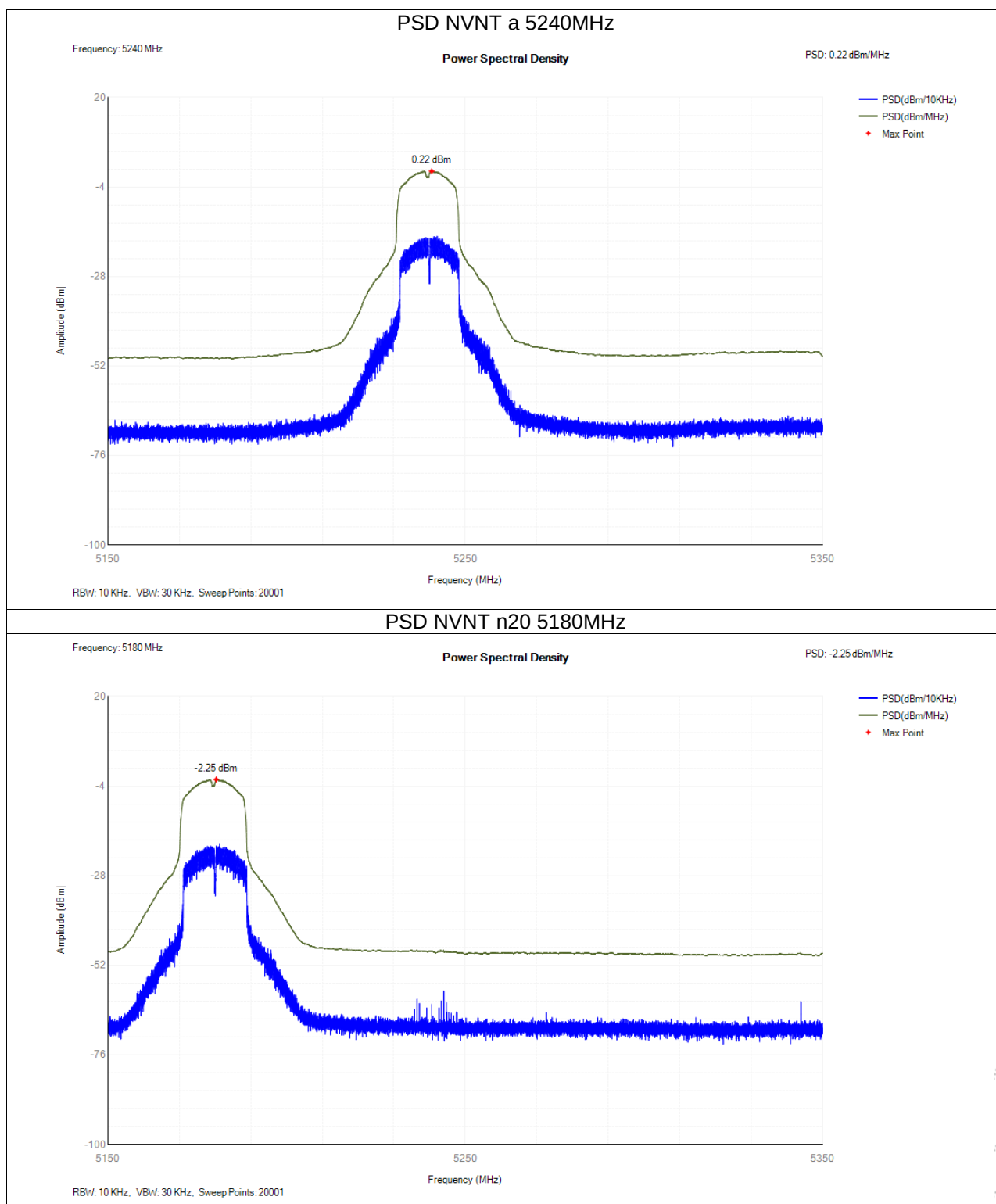
Test Graphs

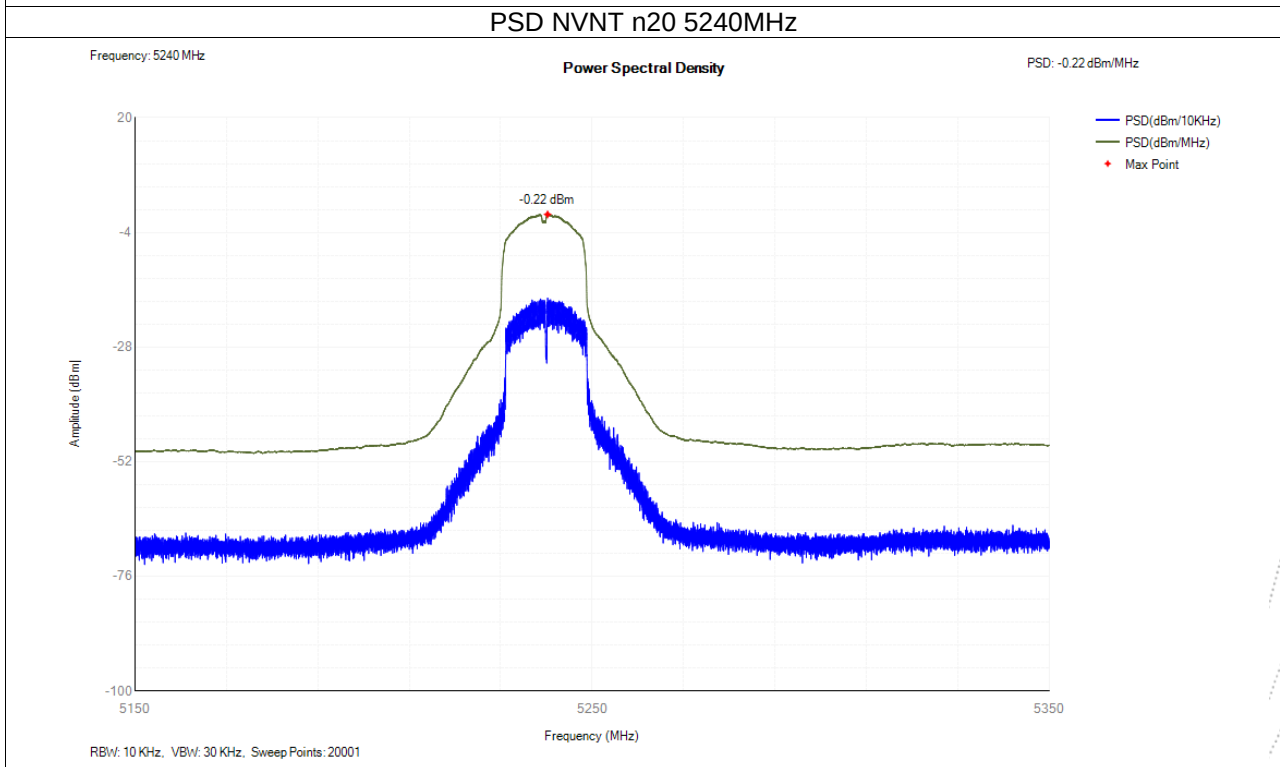
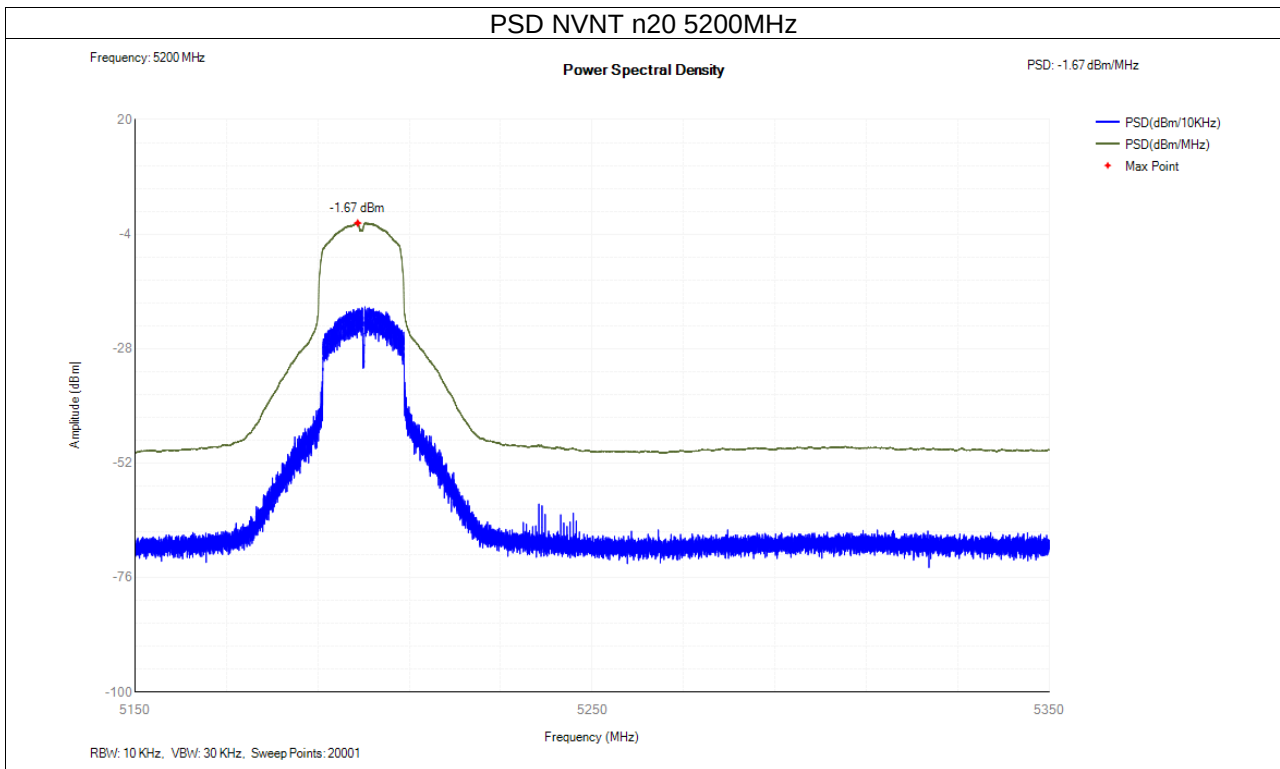
PSD NVNT a 5180MHz



PSD NVNT a 5200MHz

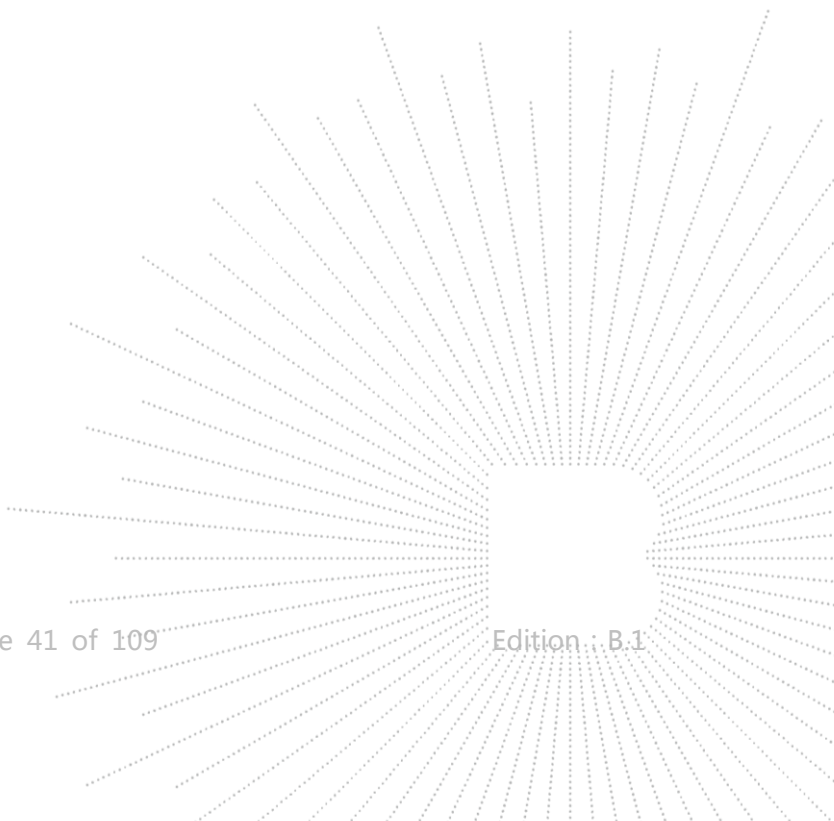






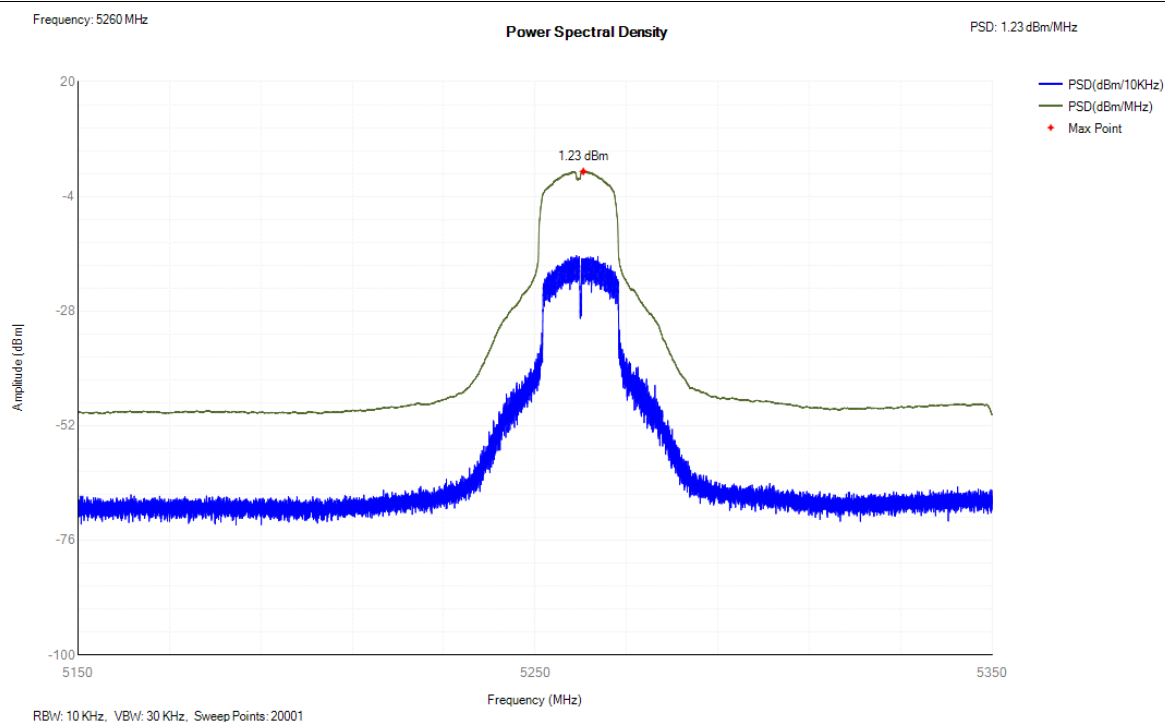
5.3G

Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	a	5260	1.23	10	Pass
NVNT	a	5280	1.5	10	Pass
NVNT	a	5320	2.37	10	Pass
NVNT	n20	5260	0.85	10	Pass
NVNT	n20	5280	1.2	10	Pass
NVNT	n20	5320	2.1	10	Pass

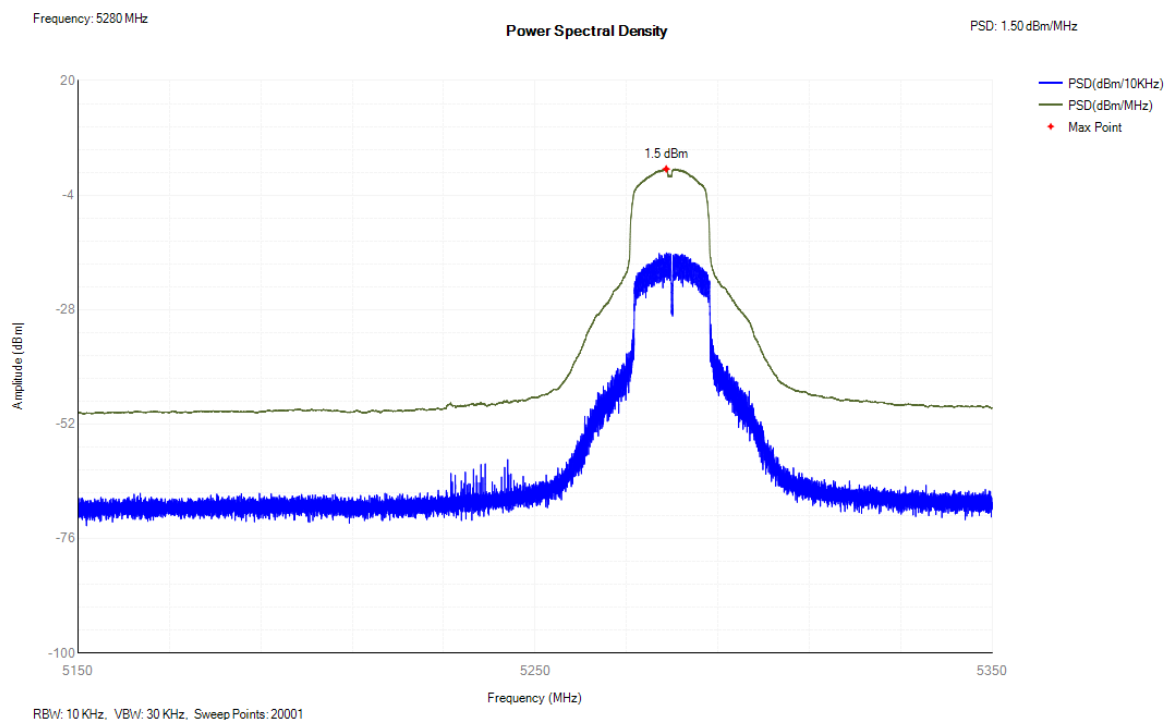


Test Graphs

PSD NVNT a 5260MHz

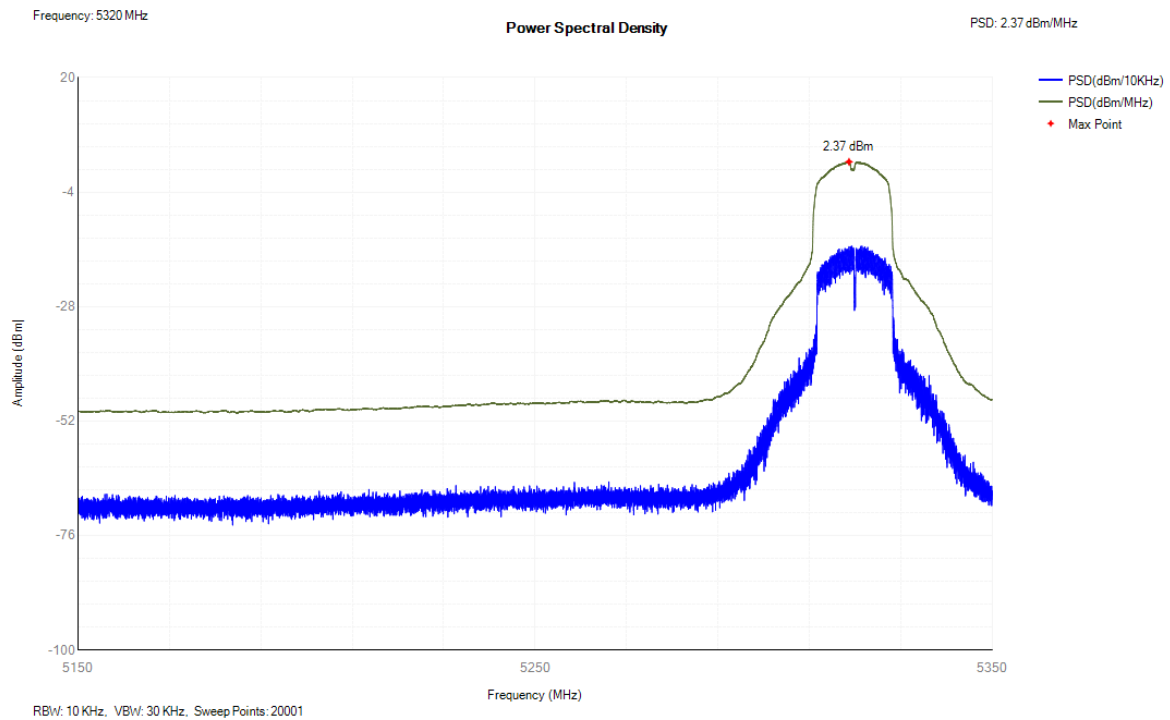


PSD NVNT a 5280MHz

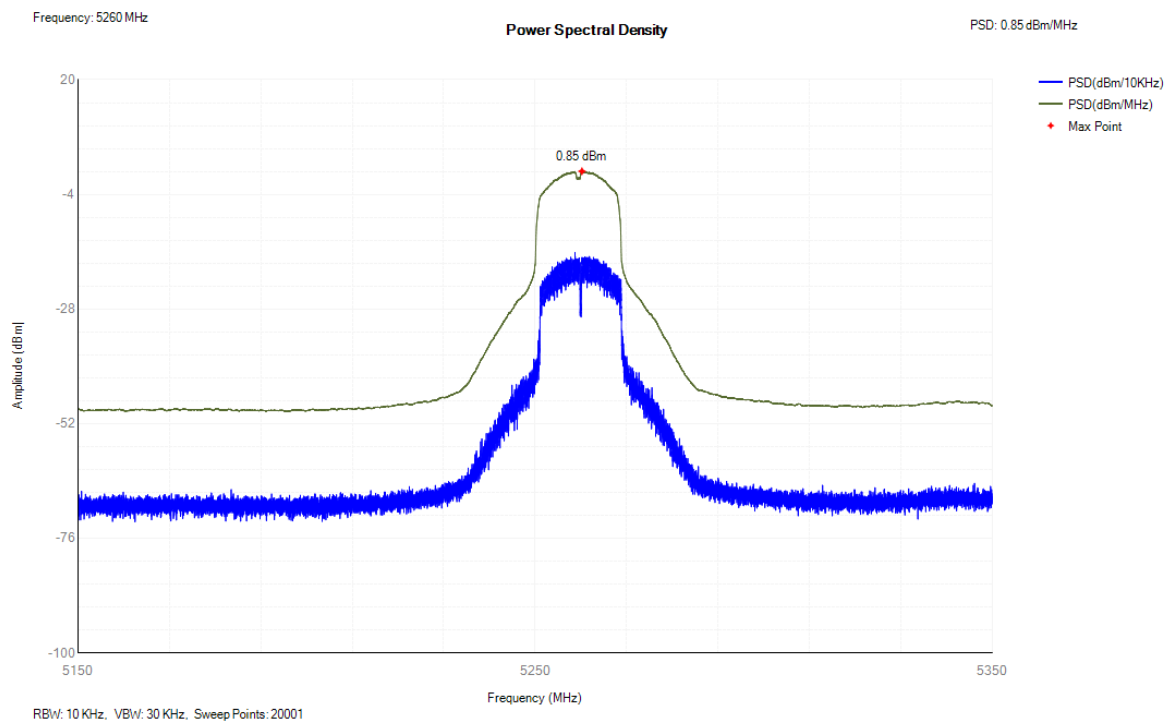


CO., LTD.

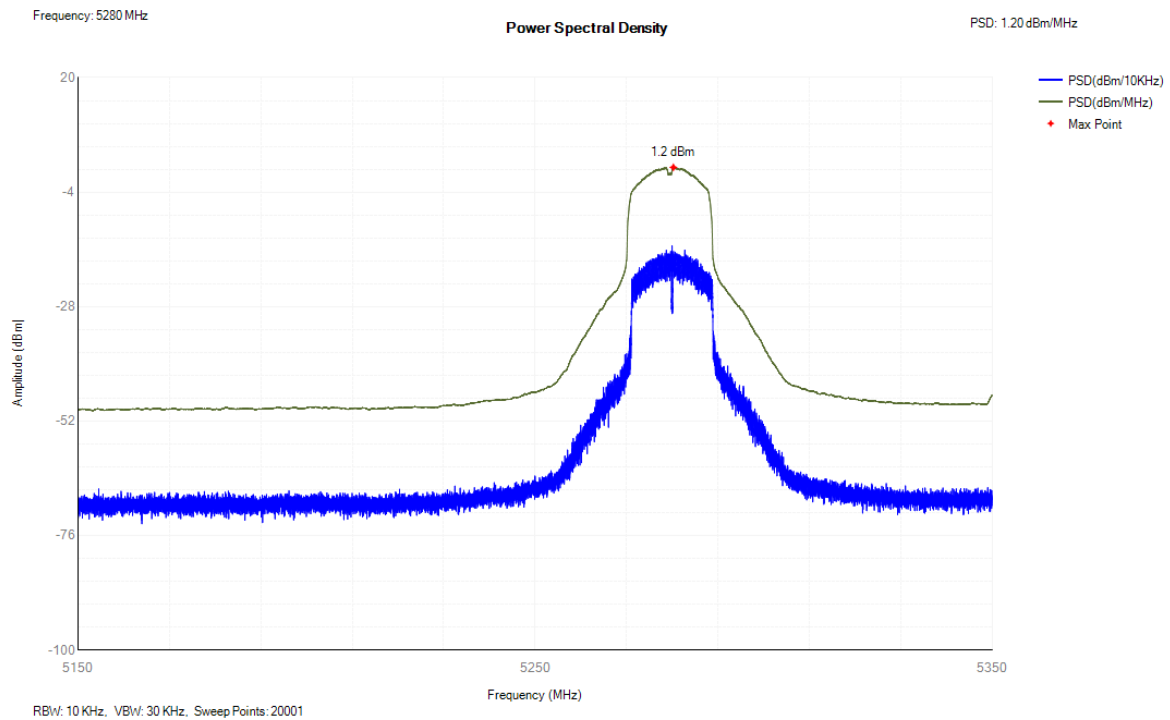
PSD NVNT a 5320MHz



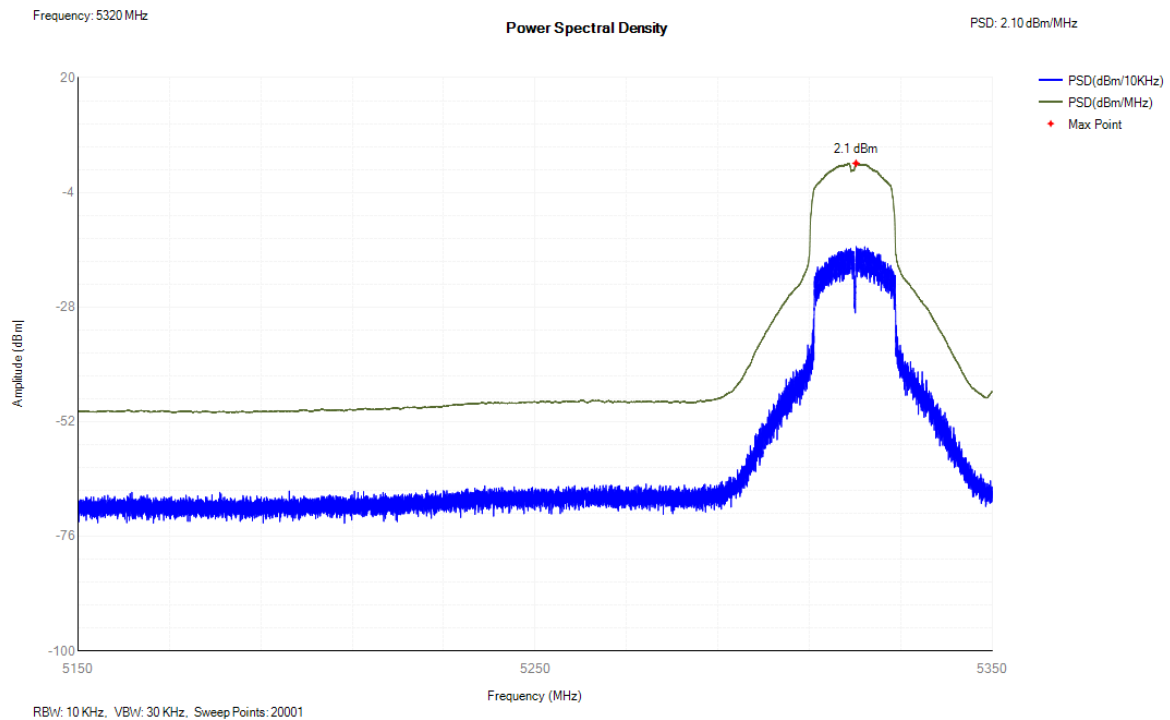
PSD NVNT n20 5260MHz



PSD NVNT n20 5280MHz



PSD NVNT n20 5320MHz

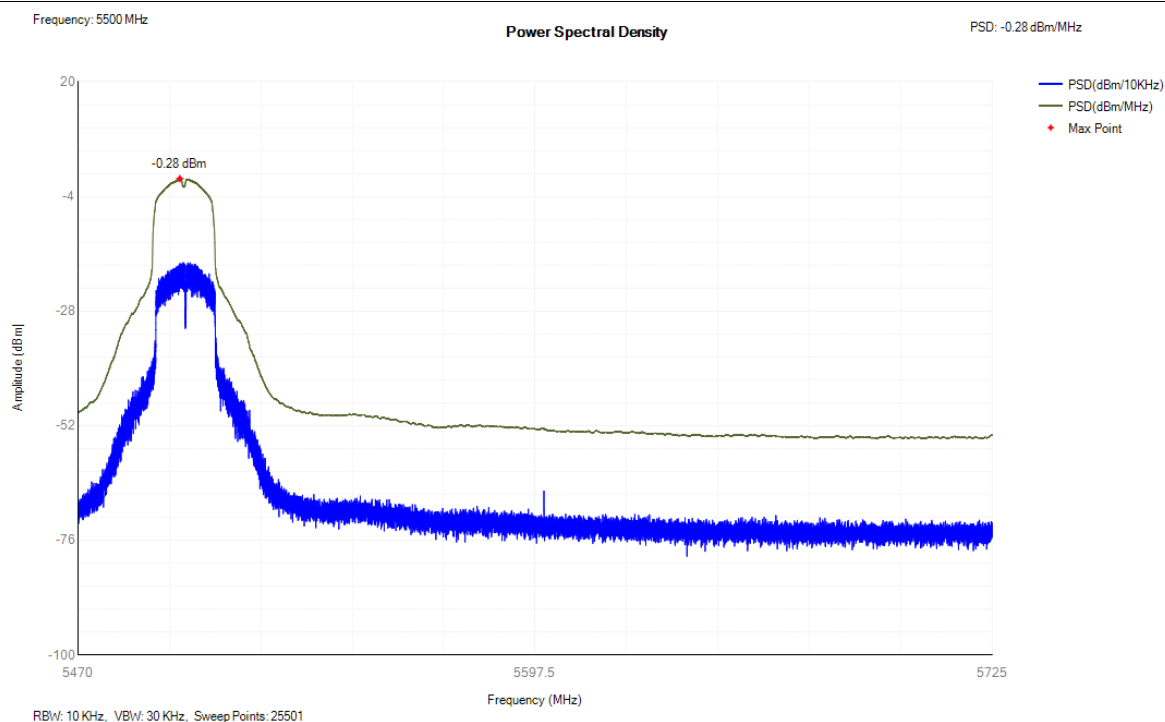


5.6G

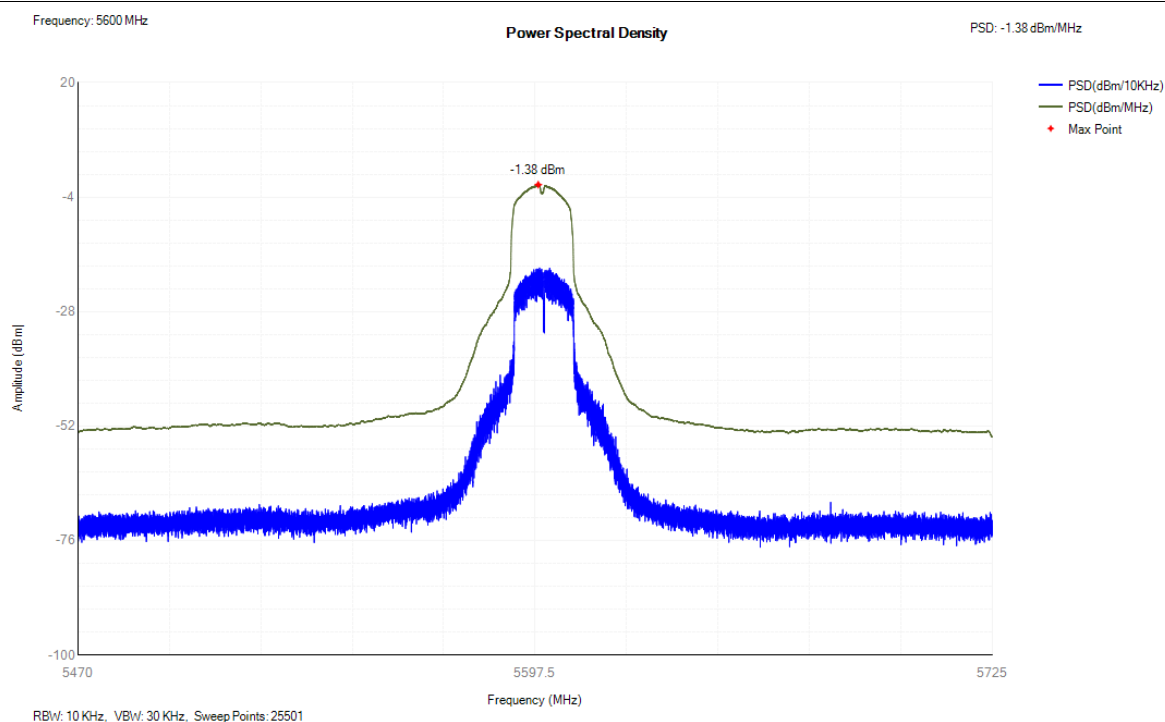
Condition	Mode	Frequency (MHz)	Max PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
NVNT	a	5500	-0.28	10	Pass
NVNT	a	5600	-1.38	10	Pass
NVNT	a	5700	-3.35	10	Pass
NVNT	n20	5500	-0.61	10	Pass
NVNT	n20	5600	-1.61	10	Pass
NVNT	n20	5700	-3.86	10	Pass

Test Graphs

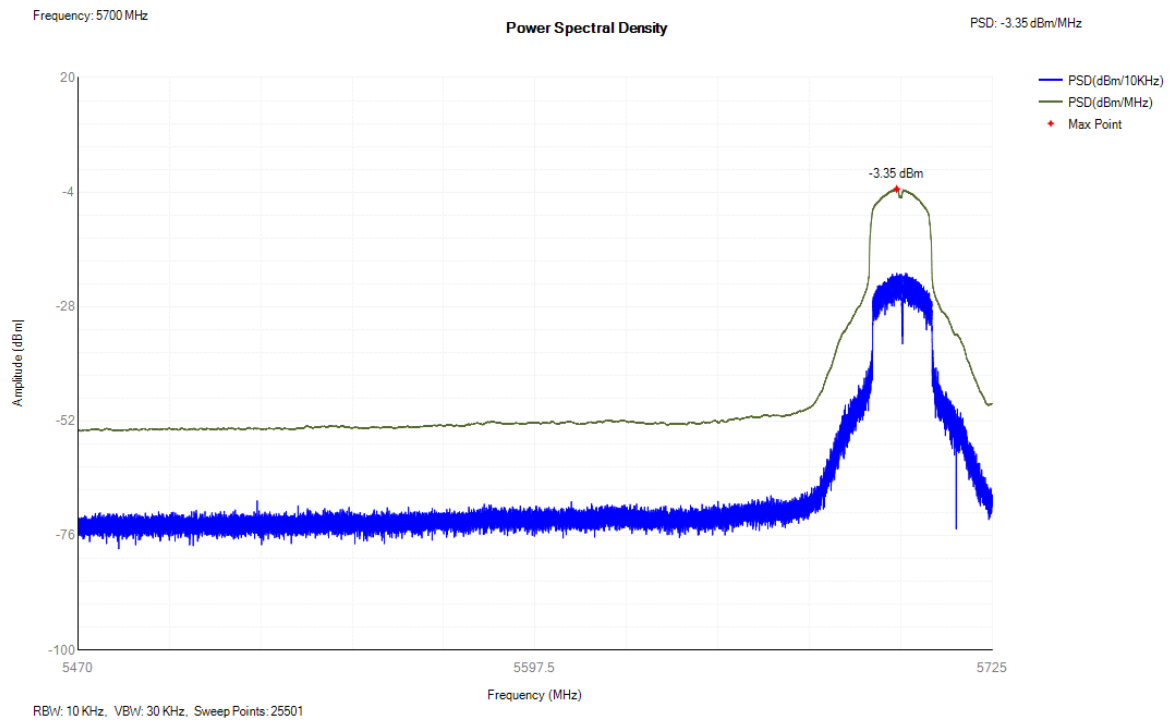
PSD NVNT a 5500MHz



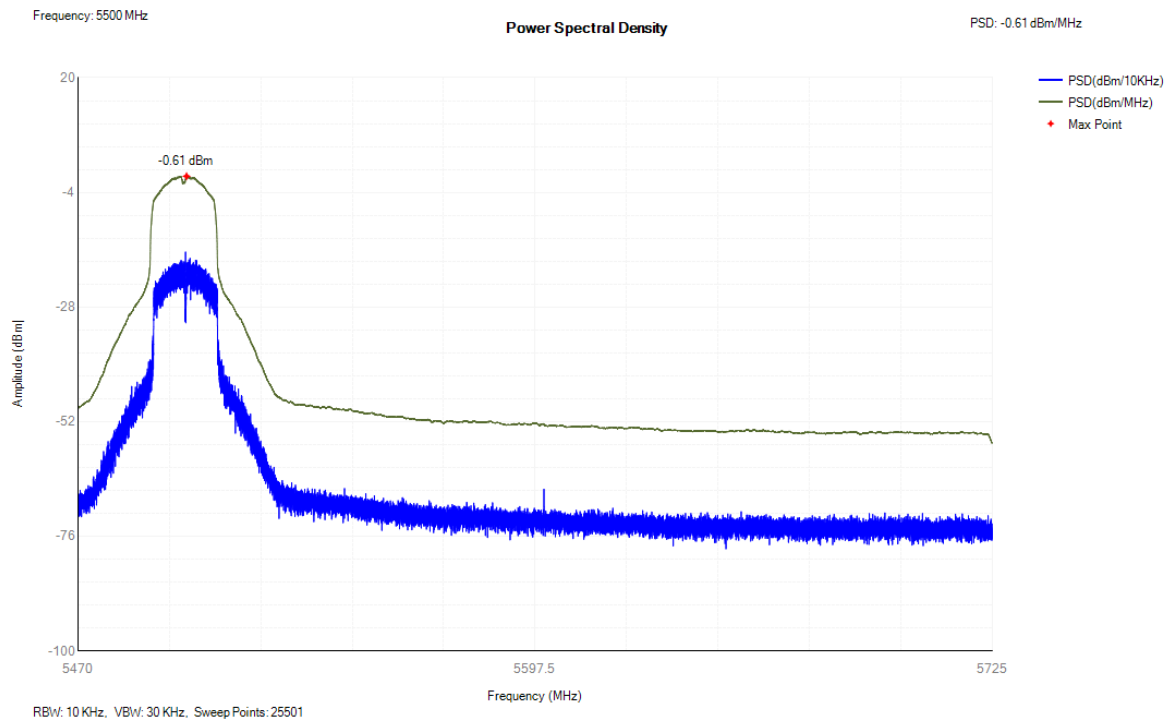
PSD NVNT a 5600MHz

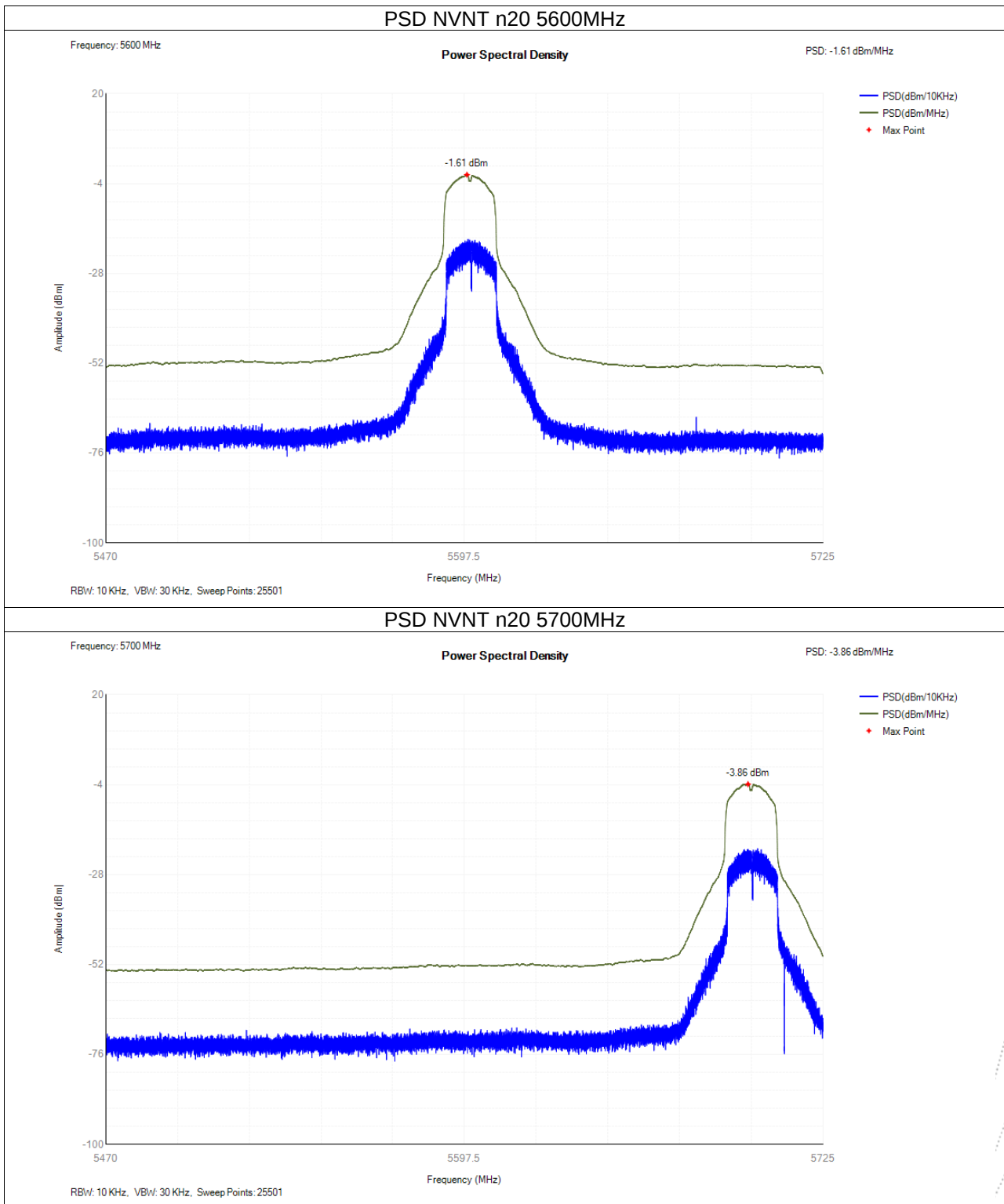


PSD NVNT a 5700MHz



PSD NVNT n20 5500MHz

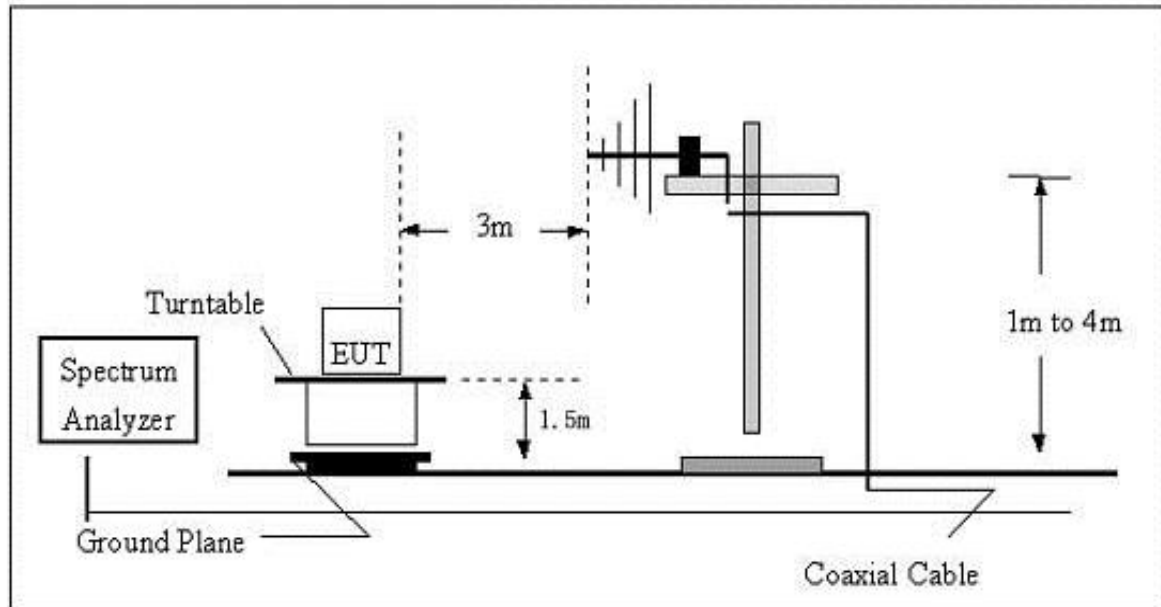




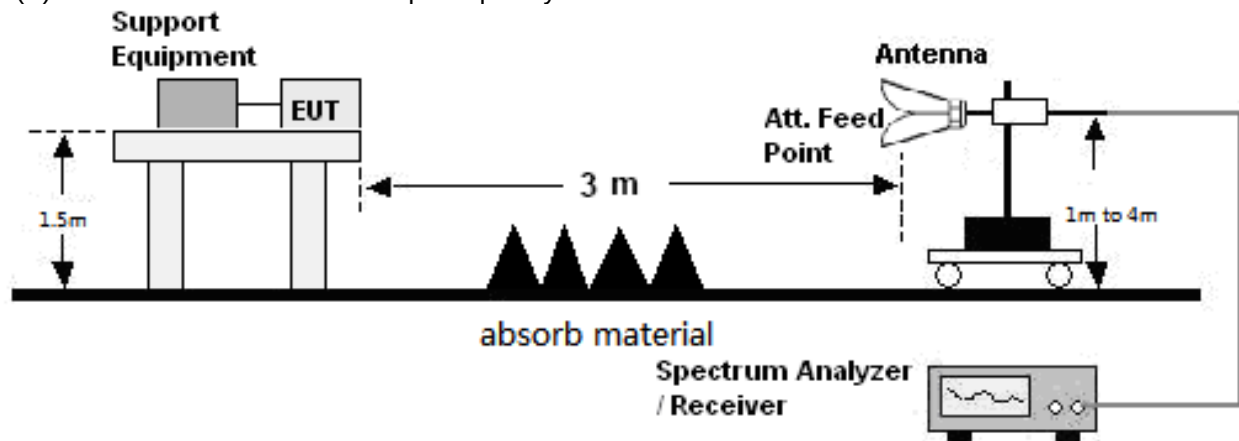
11. Transmitter Unwanted Emissions In The Spurious Domain

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:

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

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

Test Mode: Transmitting 802.11n20
5.1 G

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								
526.32	-54.17	257	1.7	H	-8.28	-62.45	-54	-8.45
526.32	-51.46	70	1.6	V	-8.28	-59.74	-54	-5.74
10360.00	-40.86	327	1.9	H	-0.43	-41.29	-30	-11.29
10360.00	-40.07	237	1.4	V	-0.43	-40.50	-30	-10.50
15540.00	-57.83	81	1.2	H	8.31	-49.52	-30	-19.52
15540.00	-57.50	48	1.3	V	8.31	-49.19	-30	-19.19
802.11n20 Mid channel								
526.32	-54.02	129	1.0	H	-8.28	-62.29	-54	-8.29
526.32	-51.45	160	1.3	V	-8.28	-59.73	-54	-5.73
10400.00	-40.21	141	1.5	H	-0.38	-40.59	-30	-10.59
10400.00	-40.08	236	1.3	V	-0.38	-40.46	-30	-10.46
15600.00	-57.23	161	1.9	H	8.83	-48.40	-30	-18.40
15600.00	-58.37	288	1.0	V	8.83	-49.54	-30	-19.54
802.11n20 high channel								
526.32	-54.41	152	1.3	H	-8.28	-62.69	-54	-8.69
526.32	-51.61	62	1.7	V	-8.28	-59.88	-54	-5.88
10480.00	-40.20	55	1.4	H	-0.32	-40.52	-30	-10.52
10480.00	-39.44	182	1.7	V	-0.32	-39.76	-30	-9.76
15720.00	-58.26	102	1.1	H	9.35	-48.91	-30	-18.91
15720.00	-57.05	31	1.9	V	9.35	-47.70	-30	-17.70

Remark:

Absolute Level = Receiver Reading + Factor

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

5.3 G

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								
530.02	-50.21	71	1.7	H	-8.18	-58.39	-54	-4.39
530.02	-55.30	208	1.9	V	-8.18	-63.48	-54	-9.48
10520.00	-41.15	296	1.3	H	-0.43	-41.58	-30	-11.58
10520.00	-43.35	113	1.9	V	-0.43	-43.78	-30	-13.78
15780.00	-58.84	10	1.0	H	8.31	-50.53	-30	-20.53
15780.00	-61.85	178	1.9	V	8.31	-53.54	-30	-23.54
802.11n20 Mid channel								
530.02	-50.53	38	1.9	H	-8.18	-58.71	-54	-4.71
530.02	-56.02	261	1.8	V	-8.18	-64.20	-54	-10.20
10560.00	-40.75	24	1.9	H	-0.38	-41.13	-30	-11.13
10560.00	-43.63	183	1.6	V	-0.38	-44.01	-30	-14.01
15840.00	-59.36	248	1.5	H	8.83	-50.53	-30	-20.53
15840.00	-61.75	78	1.4	V	8.83	-52.92	-30	-22.92
802.11n20 high channel								
530.02	-50.24	213	1.4	H	-8.18	-58.42	-54	-4.42
530.02	-54.78	164	1.7	V	-8.18	-62.96	-54	-8.96
10640.00	-41.52	183	1.6	H	-0.32	-41.84	-30	-11.84
10640.00	-42.66	317	1.7	V	-0.32	-42.98	-30	-12.98
15960.00	-59.64	210	1.5	H	9.35	-50.29	-30	-20.29
15960.00	-61.84	161	1.6	V	9.35	-52.49	-30	-22.49

Remark:

Absolute Level = Receiver Reading + Factor

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

5.6 G

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								
532.43	-52.06	53	1.3	H	-8.12	-60.18	-54	-6.18
532.43	-53.12	5	1.7	V	-8.12	-61.24	-54	-7.24
11000.00	-43.35	354	1.9	H	-0.43	-43.78	-30	-13.78
11000.00	-38.01	176	1.9	V	-0.43	-38.44	-30	-8.44
16500.00	-54.88	142	1.8	H	8.31	-46.57	-30	-16.57
16500.00	-62.04	116	1.8	V	8.31	-53.73	-30	-23.73
802.11n20 Mid channel								
532.43	-52.15	208	1.6	H	-8.12	-60.28	-54	-6.28
532.43	-53.82	198	1.2	V	-8.12	-61.94	-54	-7.94
11200.00	-43.38	63	1.4	H	-0.38	-43.76	-30	-13.76
11200.00	-37.68	170	1.6	V	-0.38	-38.06	-30	-8.06
16800.00	-55.28	246	1.1	H	8.83	-46.45	-30	-16.45
16800.00	-62.99	75	1.6	V	8.83	-54.16	-30	-24.16
802.11n20 high channel								
532.43	-52.93	69	1.8	H	-8.12	-61.05	-54	-7.05
532.43	-54.02	116	1.8	V	-8.12	-62.14	-54	-8.14
11400.00	-44.34	4	1.2	H	-0.32	-44.66	-30	-14.66
11400.00	-38.92	50	1.3	V	-0.32	-39.24	-30	-9.24
17100.00	-55.13	14	1.9	H	9.35	-45.78	-30	-15.78
17100.00	-61.96	13	1.7	V	9.35	-52.61	-30	-22.61

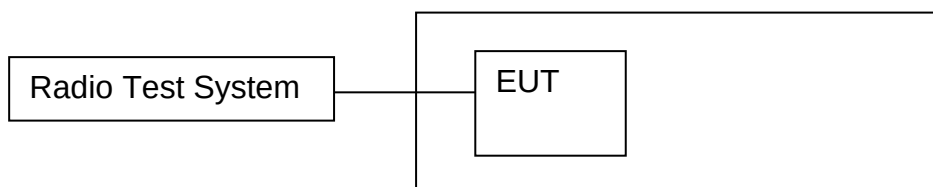
Remark:

Absolute Level = Receiver Reading + Factor

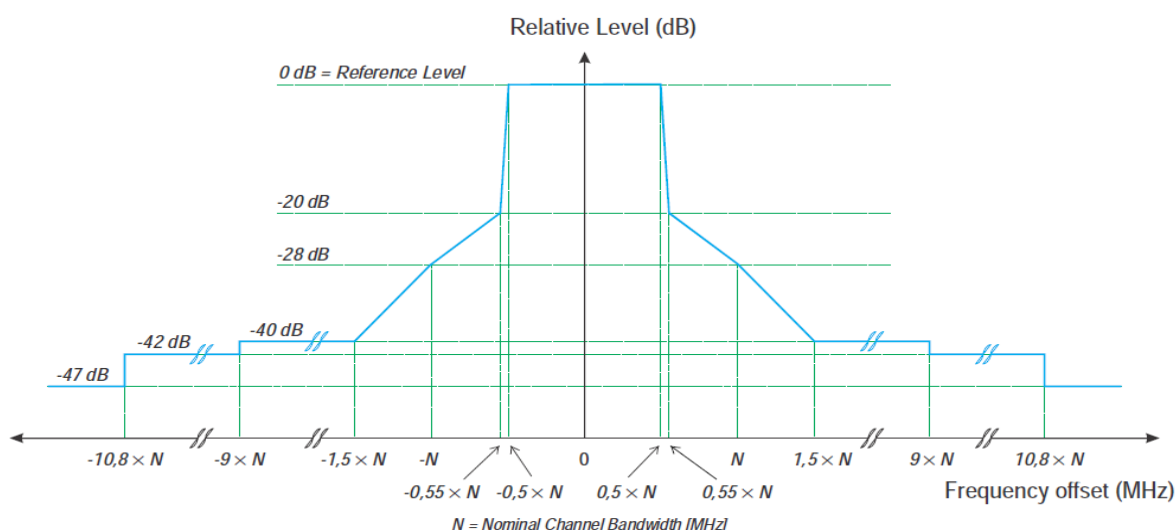
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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.

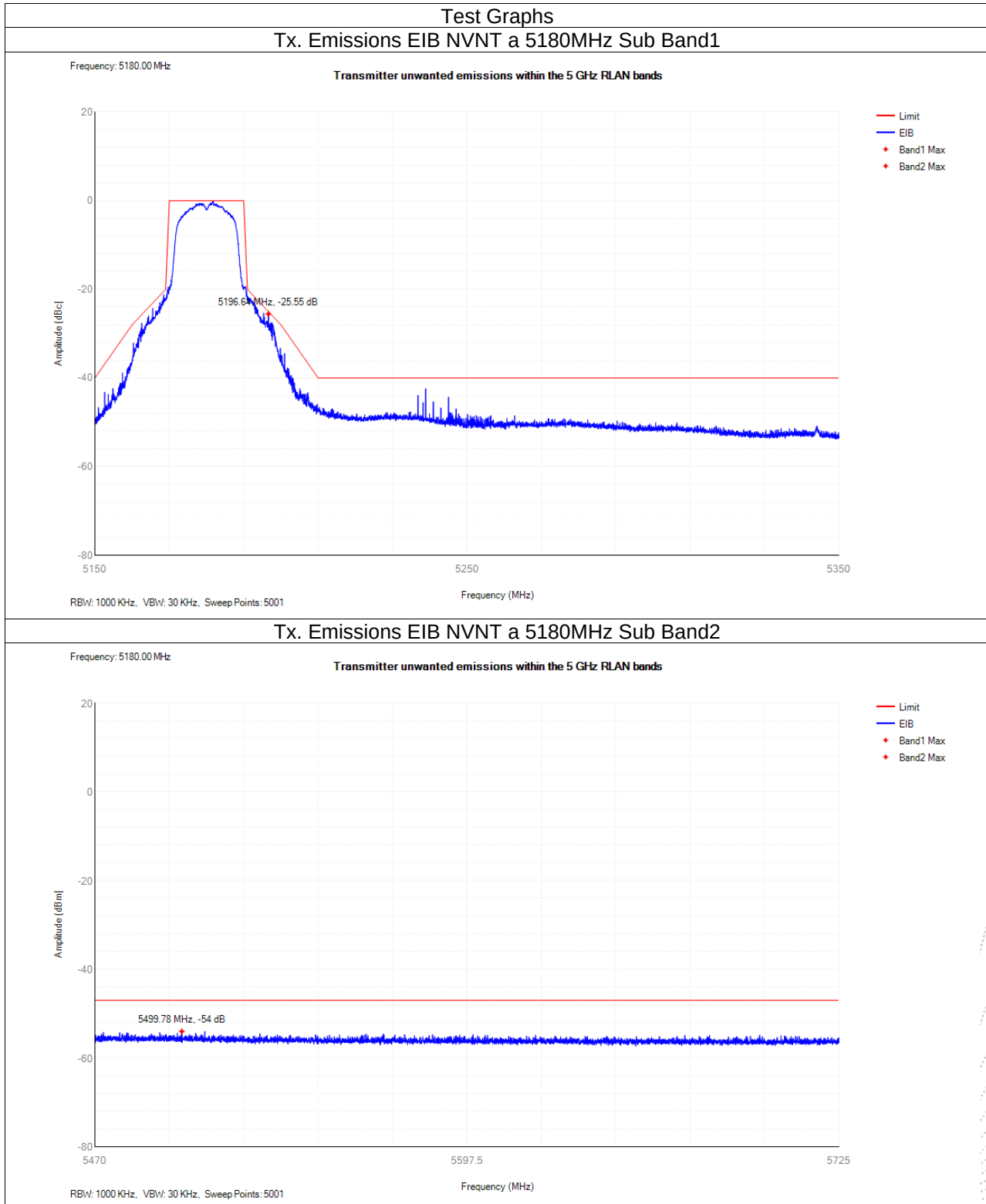
- Spectrum analyser settings:
 - Resolution bandwidth: 1 MHz
 - Video bandwidth: 30 kHz
 - Detector mode: Peak
 - Trace mode: Video Average
 - Sweep Time: Coupled
 - Centre Frequency: Centre frequency of the channel being tested
 - Span: $2 \times$ Nominal Channel Bandwidth
- Use the marker to find the 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.

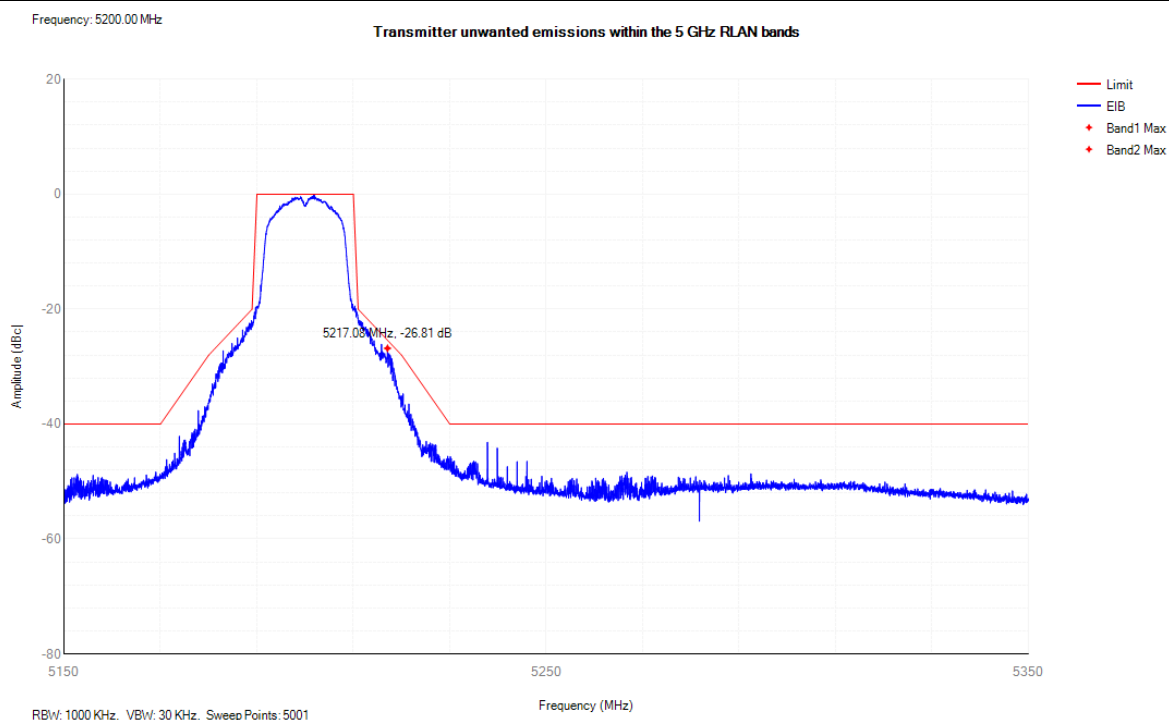
- Adjust the frequency range of the spectrum analyser to allow the measurement to be performed within the sub-bands 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz. No other parameter of the spectrum analyser should be changed.
- Compare the relative power envelope of the UUT with the limits defined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

12.4 Test Result

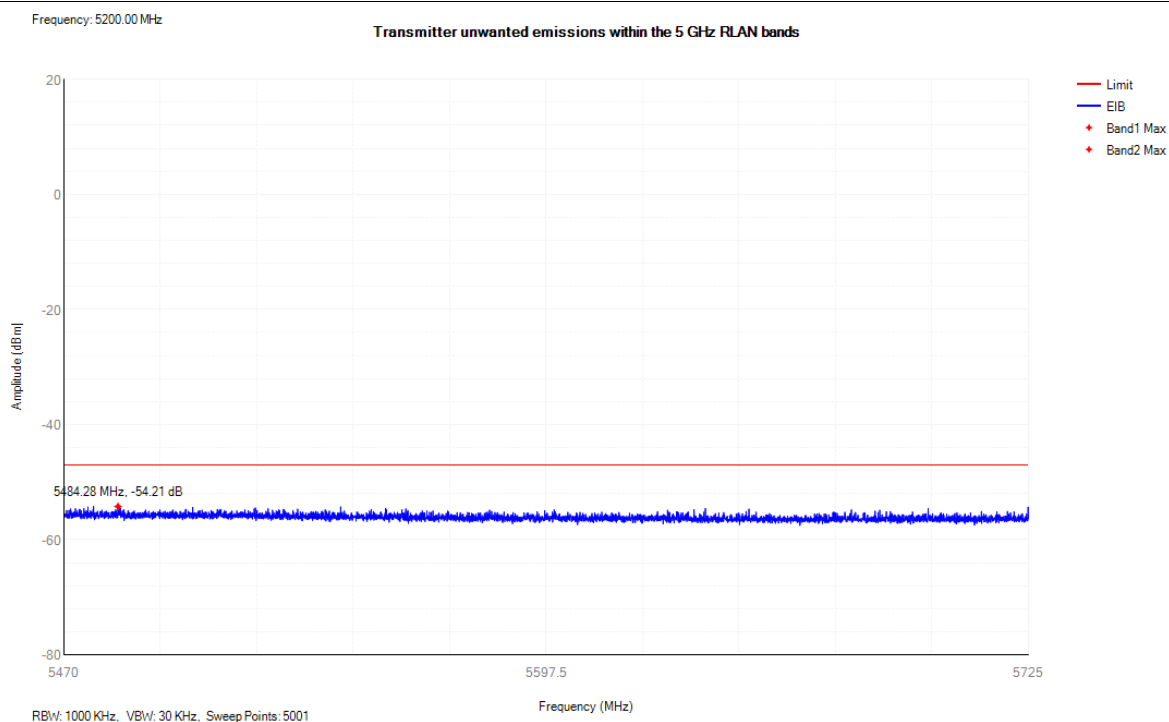
5.1G



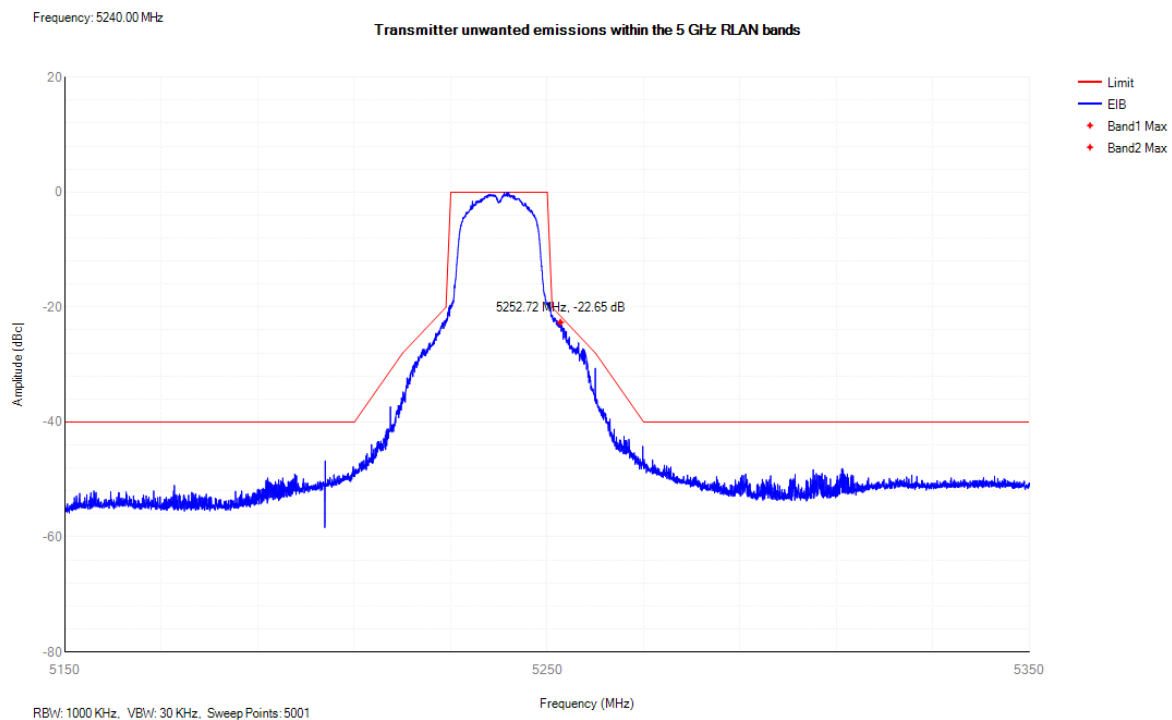
Tx. Emissions EIB NVNT a 5200MHz Sub Band1



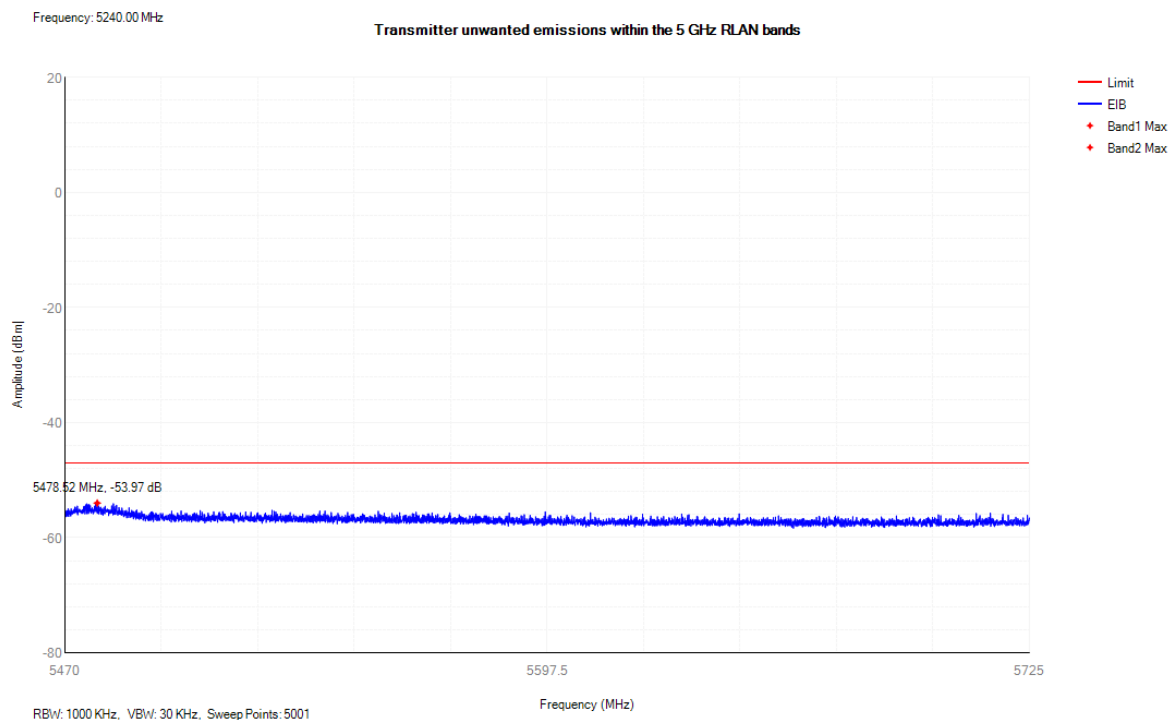
Tx. Emissions EIB NVNT a 5200MHz Sub Band2



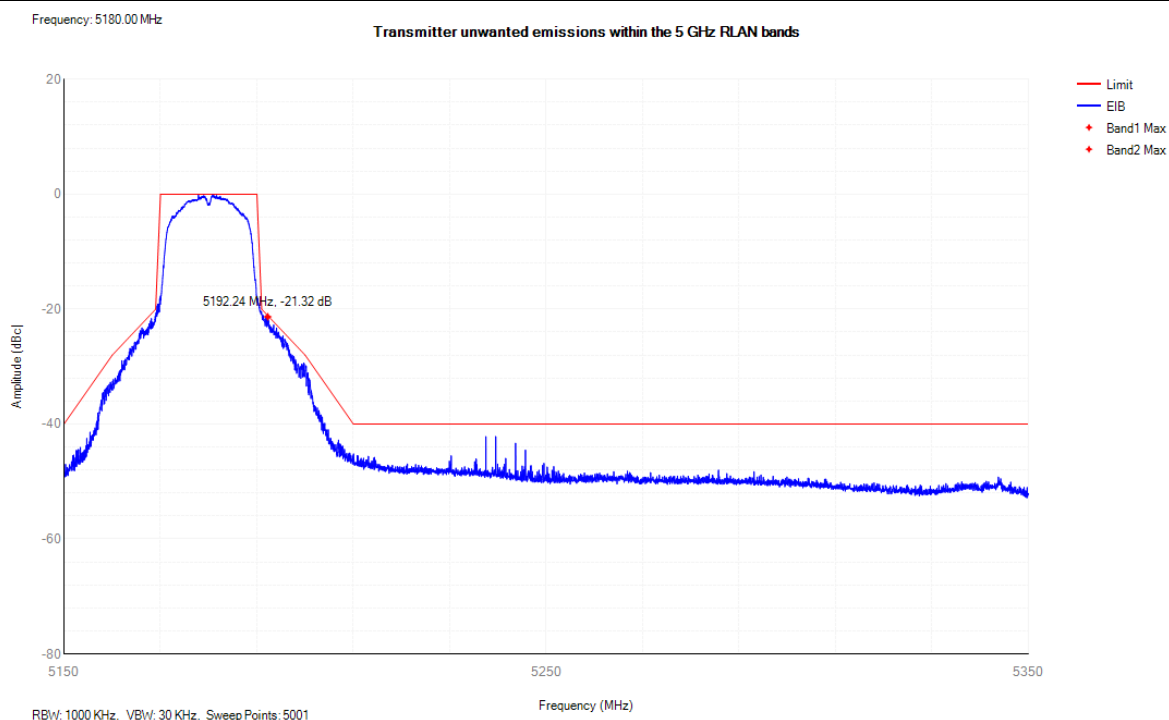
Tx. Emissions EIB NVNT a 5240MHz Sub Band1



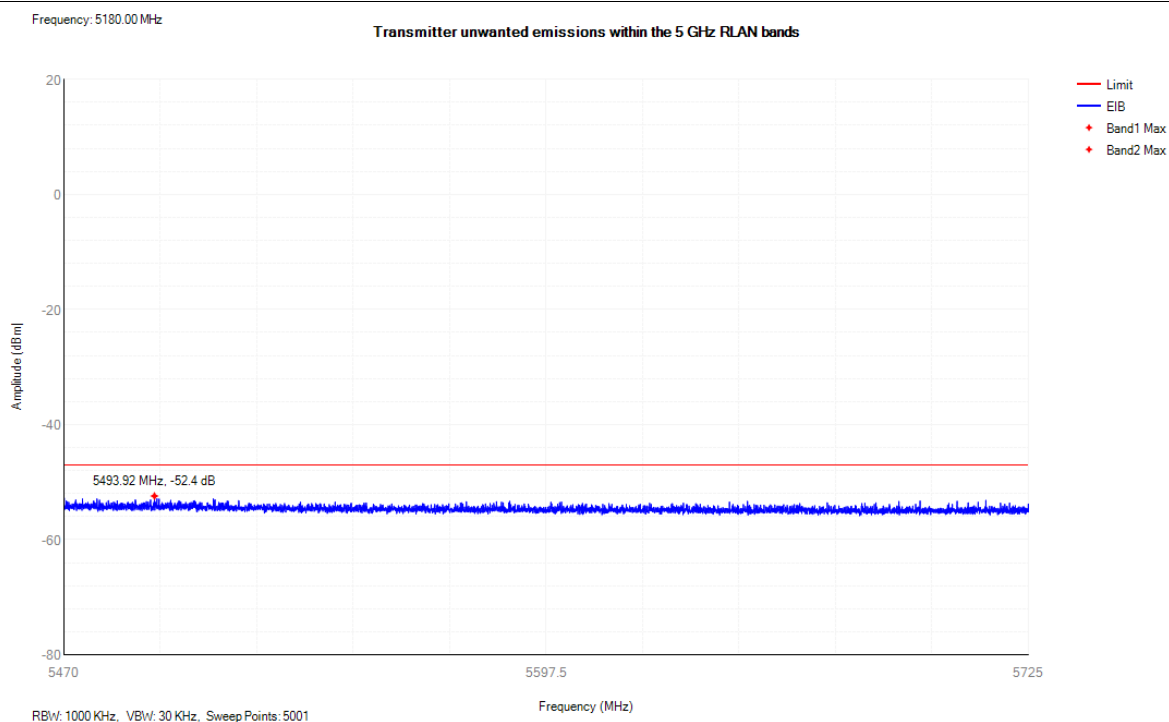
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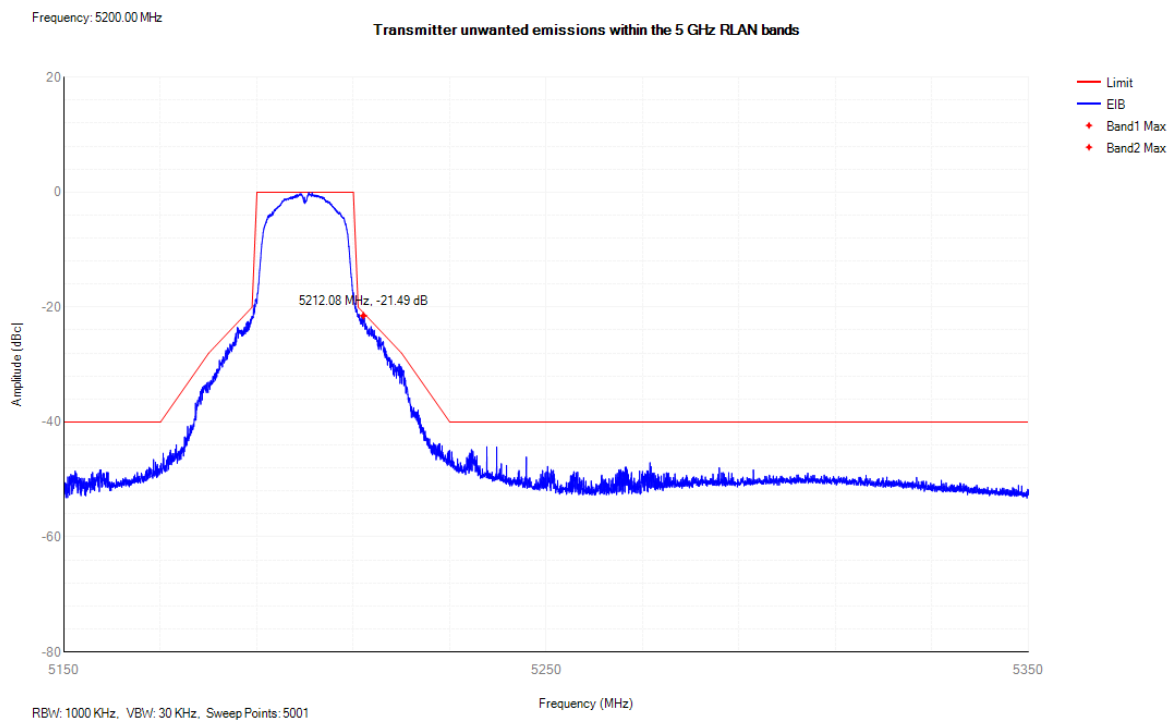
Tx. Emissions EIB NVNT n20 5180MHz Sub Band1



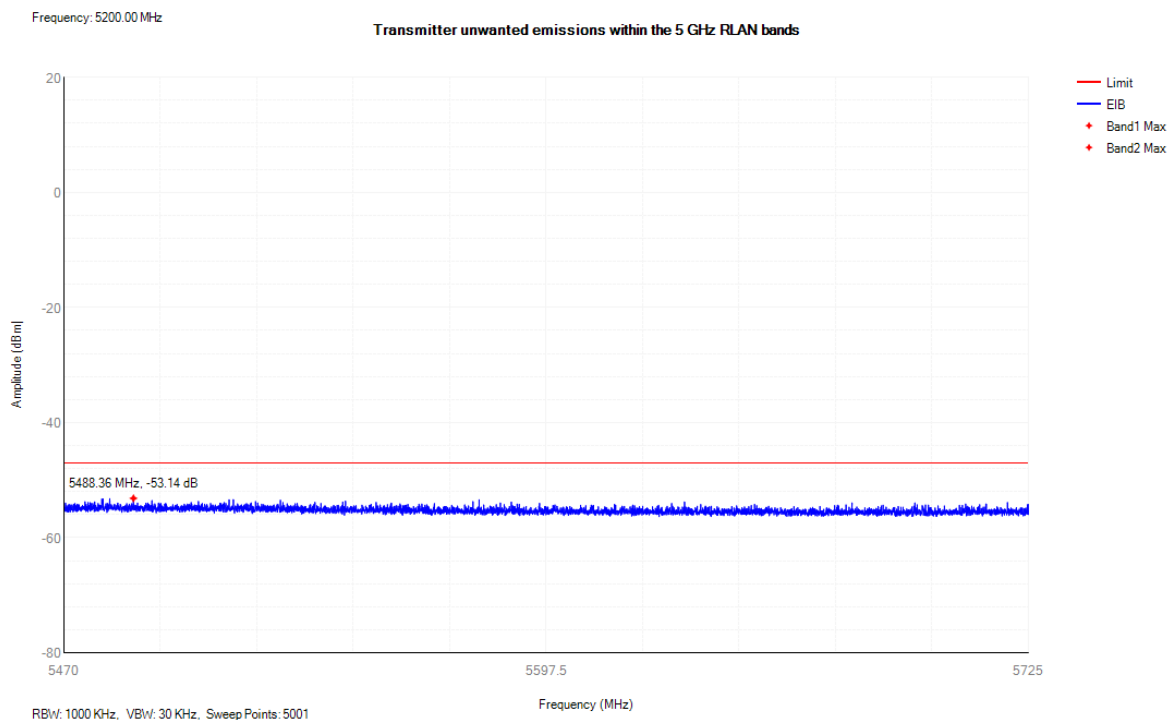
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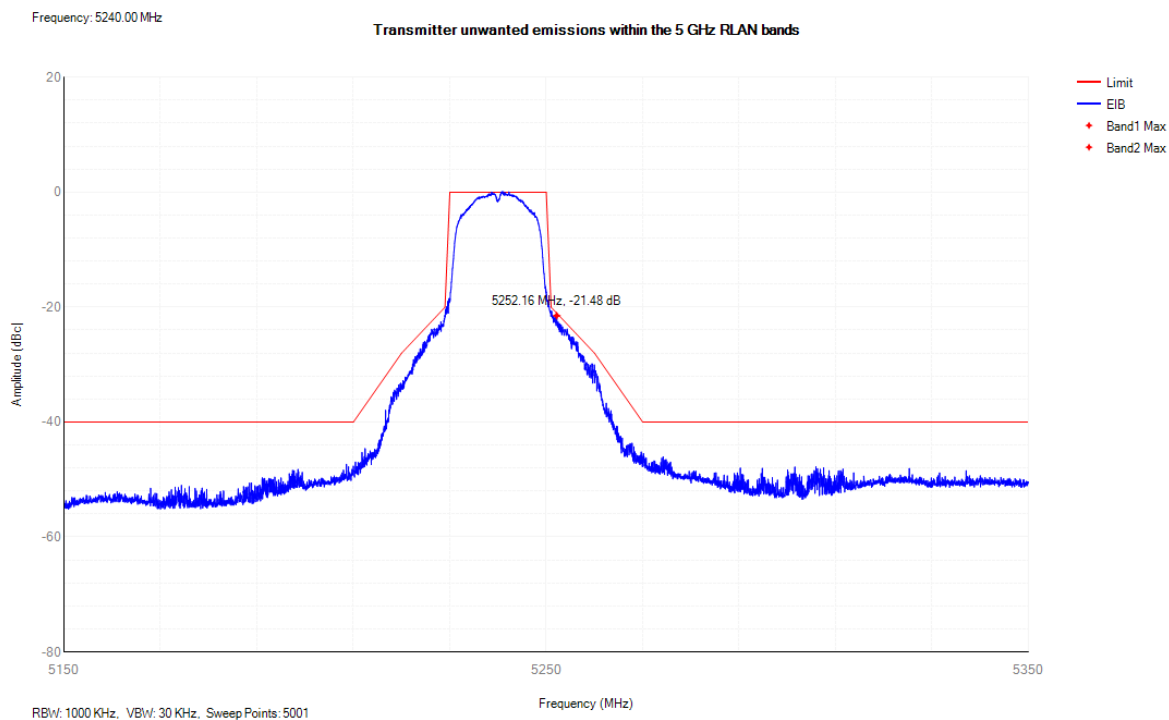
Tx. Emissions EIB NVNT n20 5200MHz Sub Band1



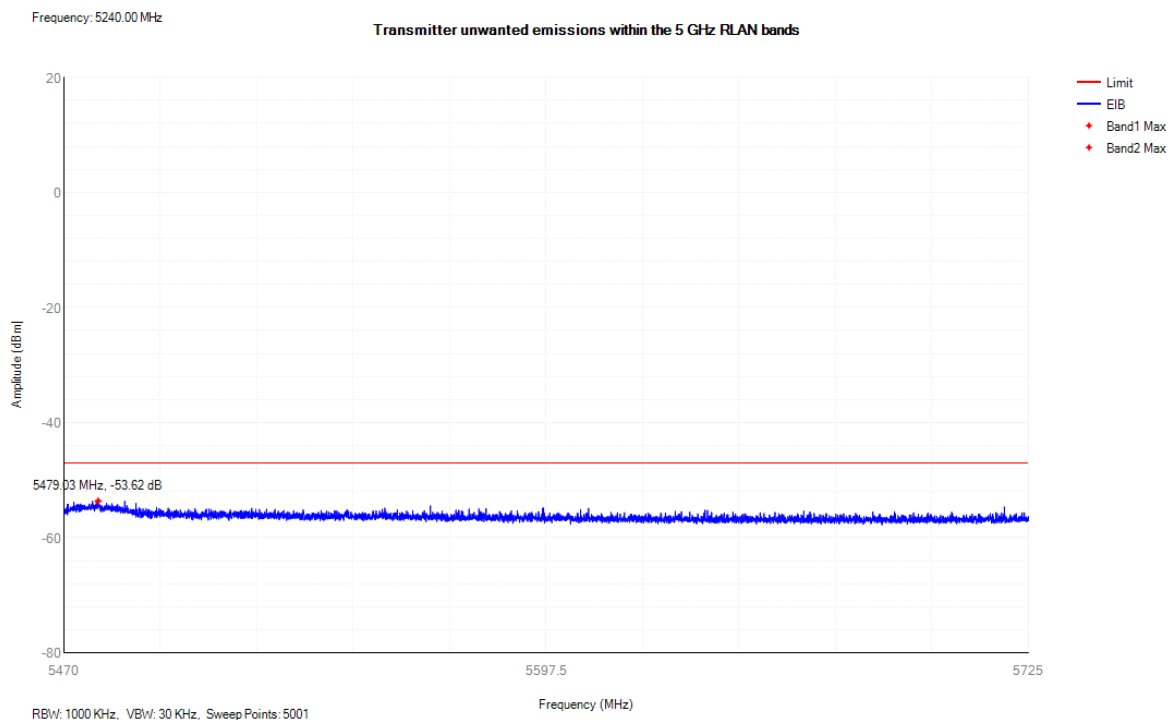
Tx. Emissions EIB NVNT n20 5200MHz Sub Band2

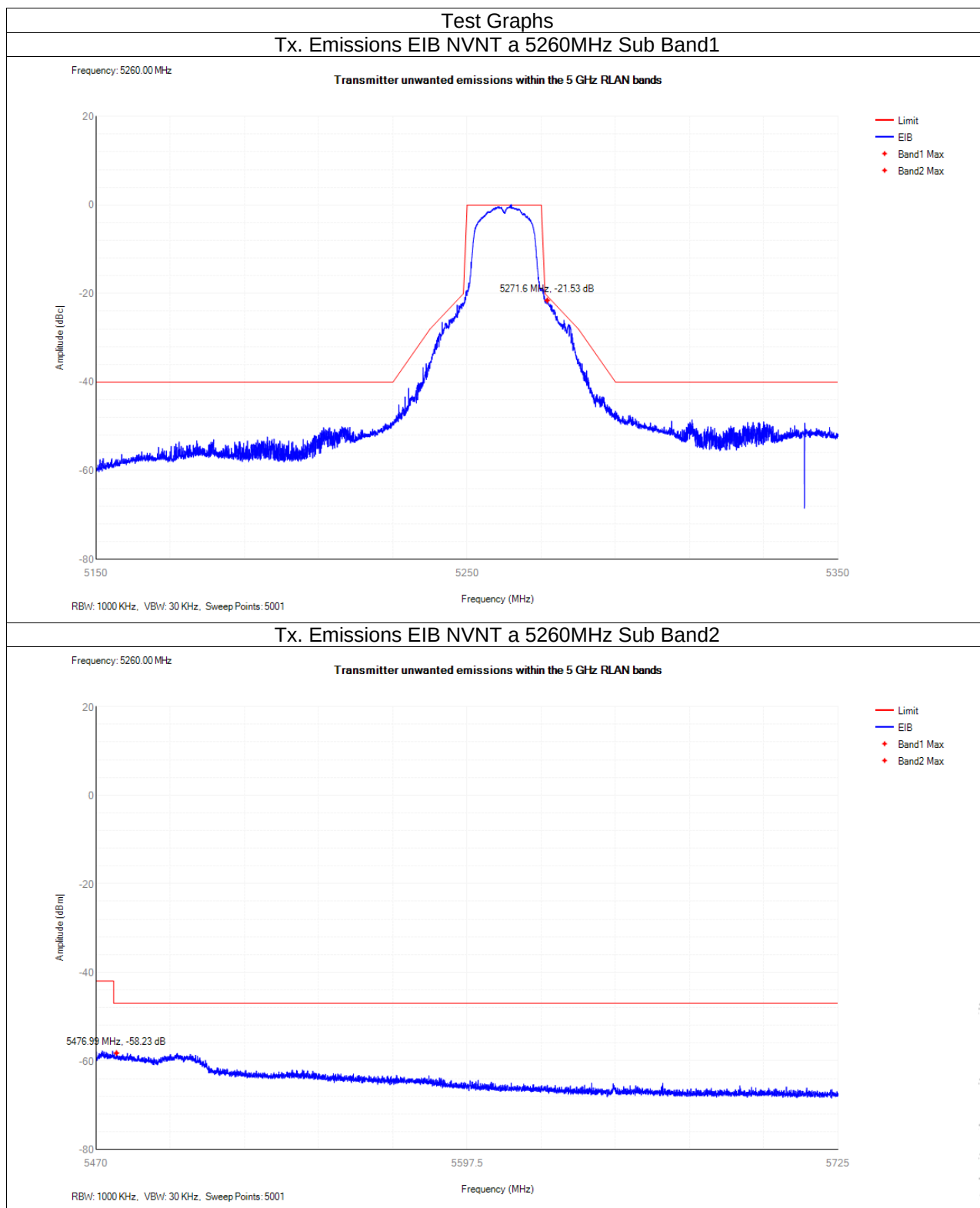


Tx. Emissions EIB NVNT n20 5240MHz Sub Band1

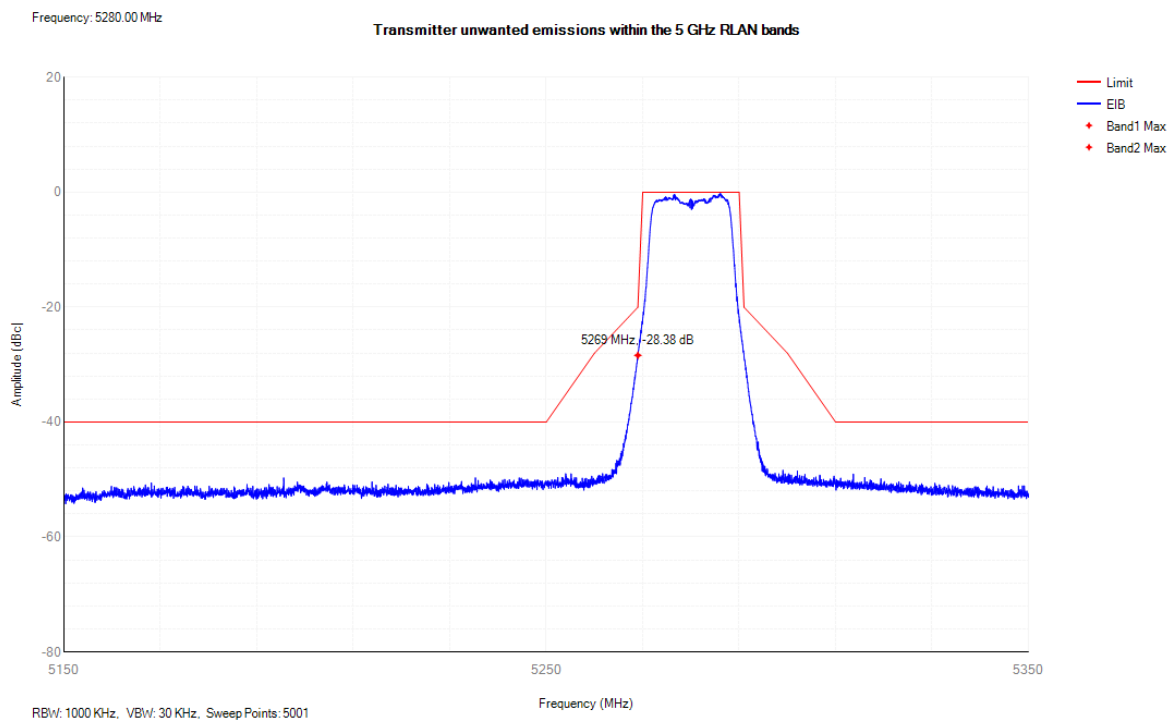


Tx. Emissions EIB NVNT n20 5240MHz Sub Band2

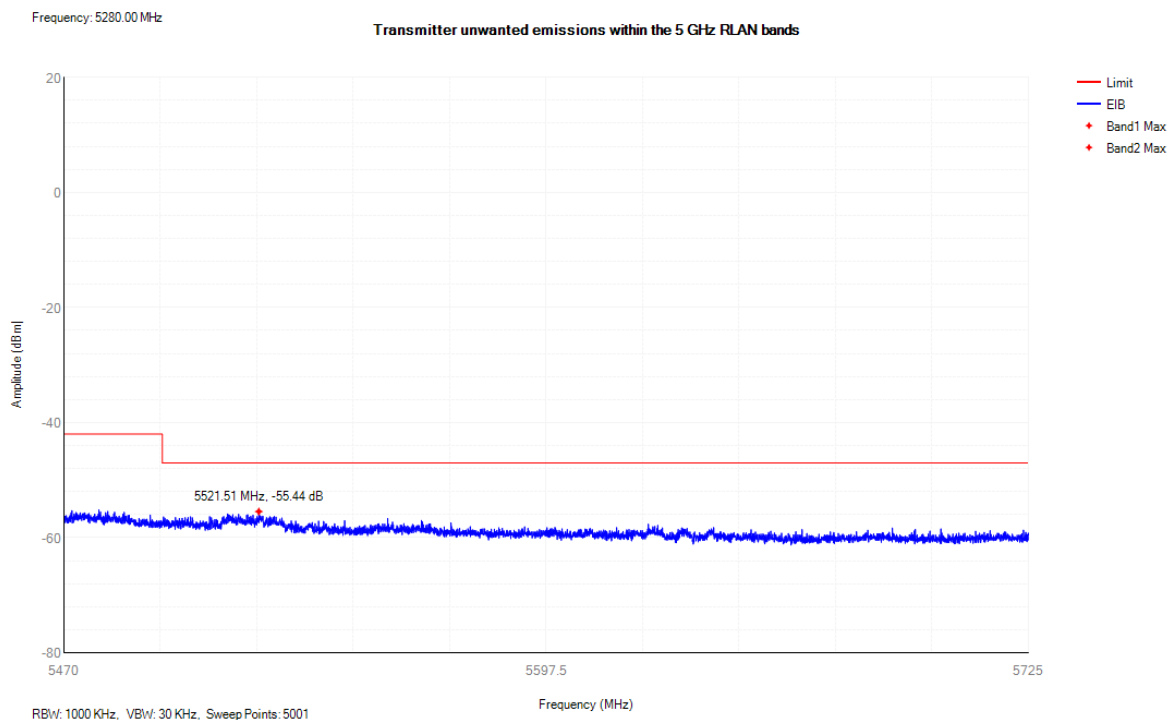


5.3G


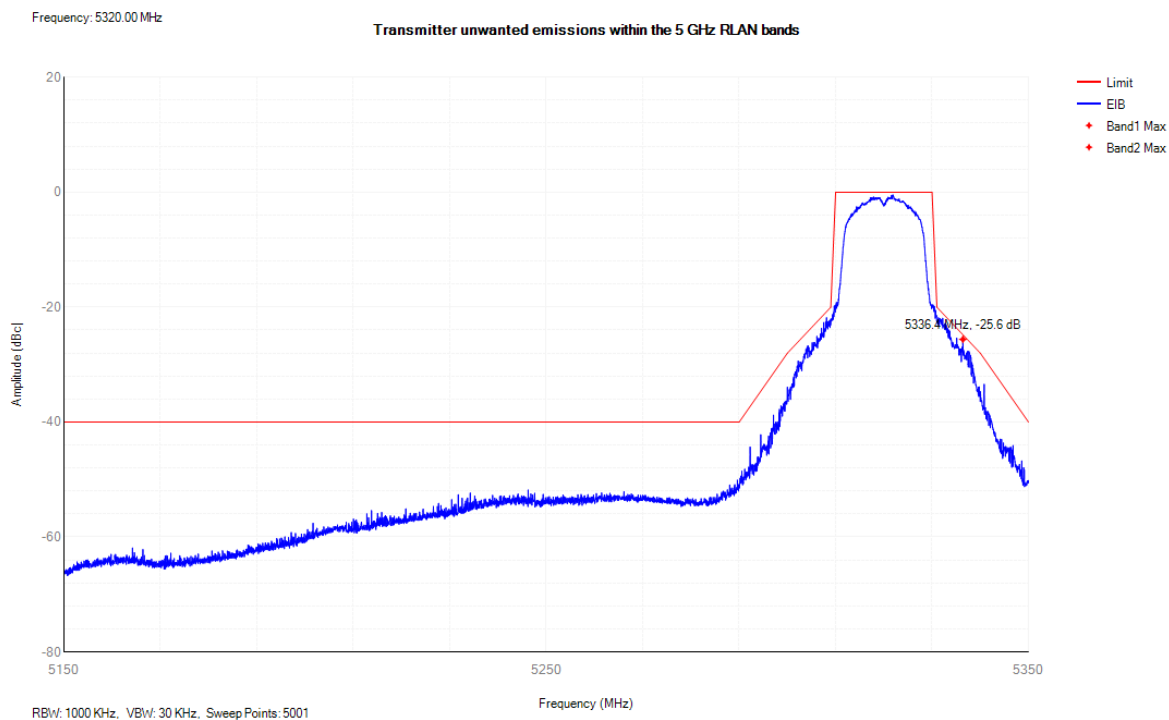
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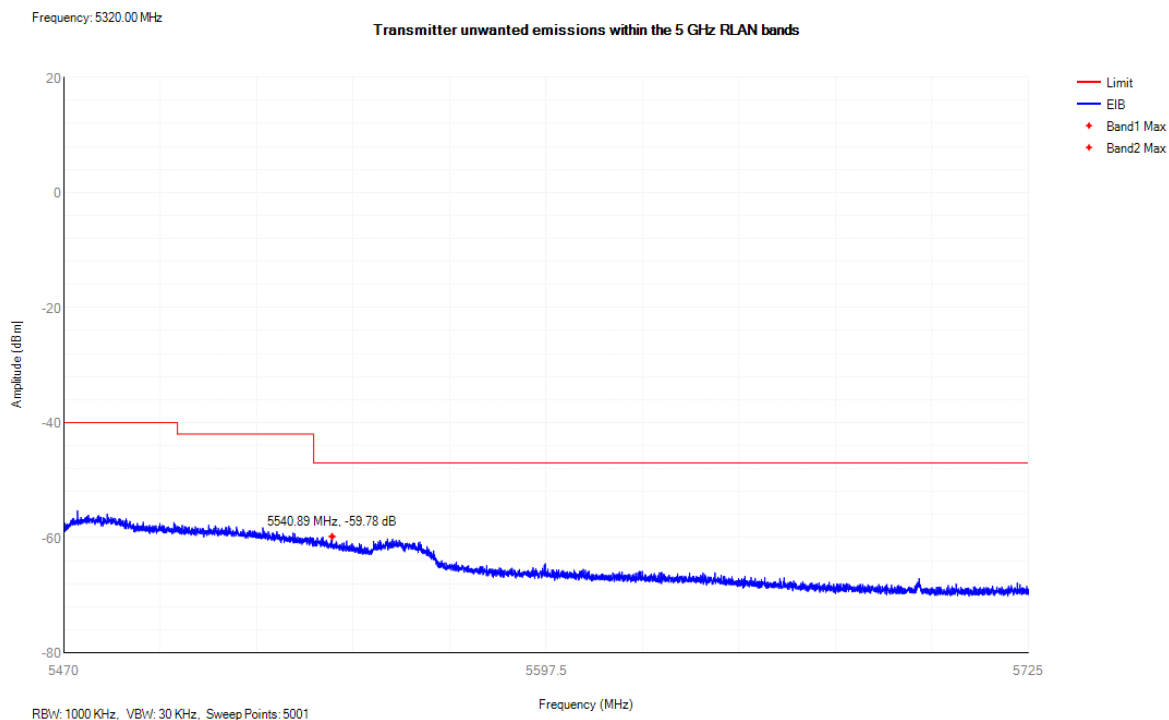
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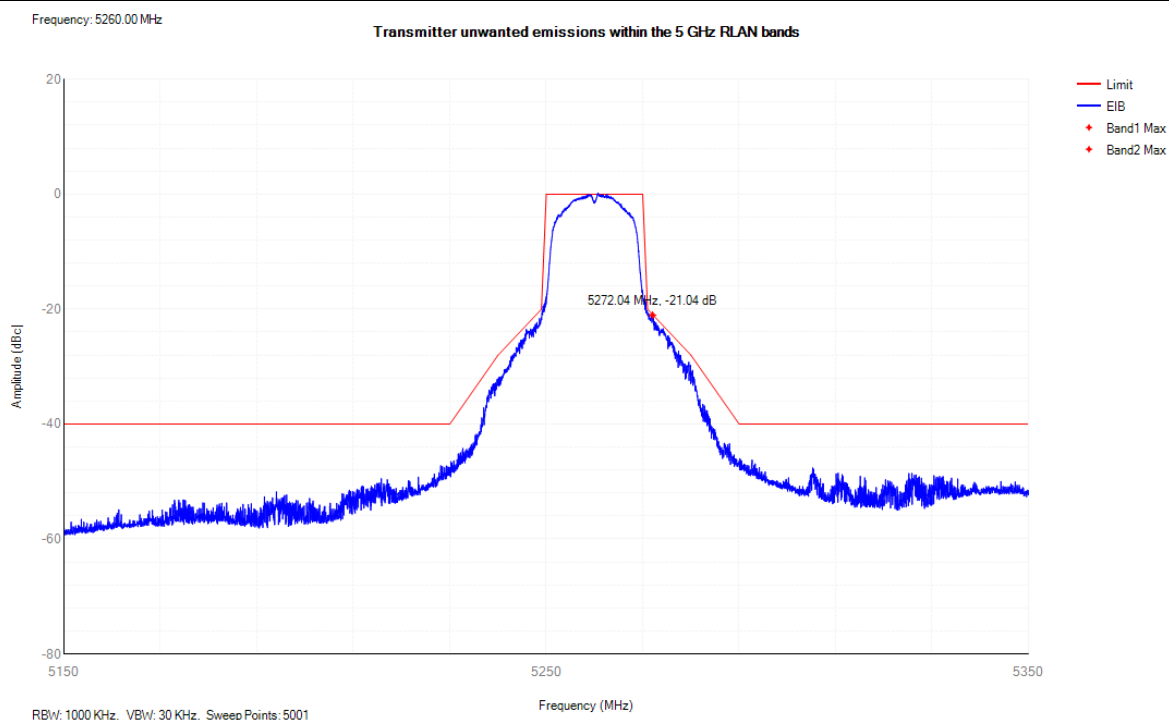
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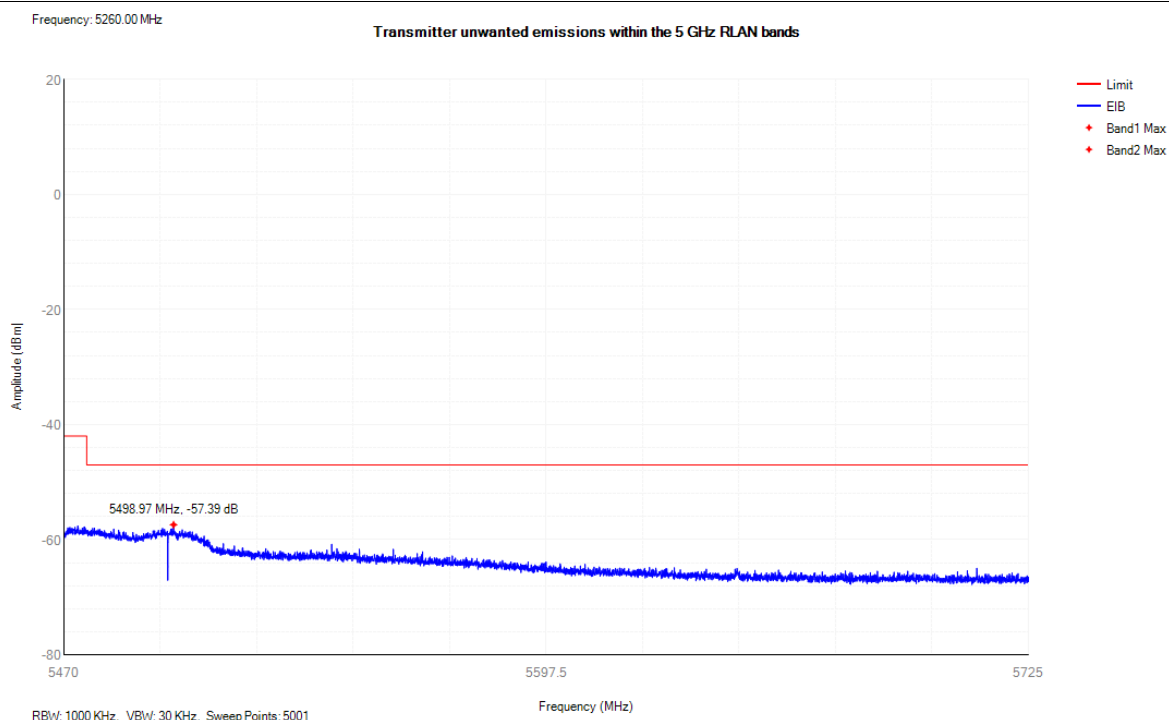
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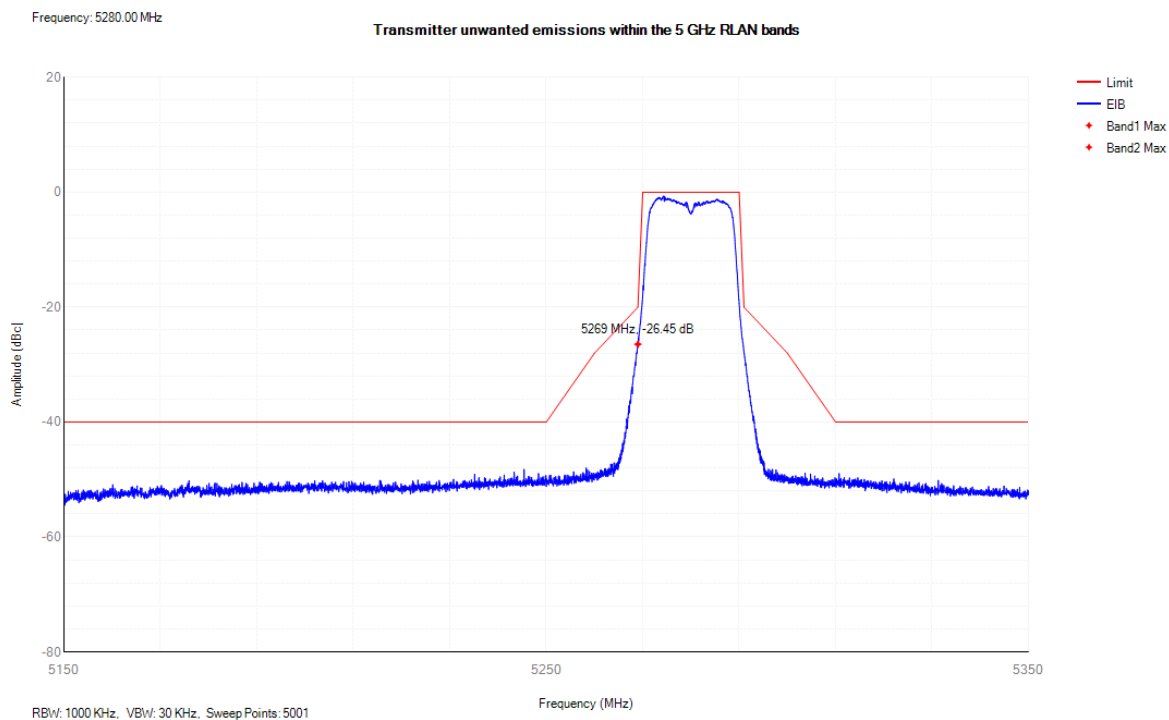
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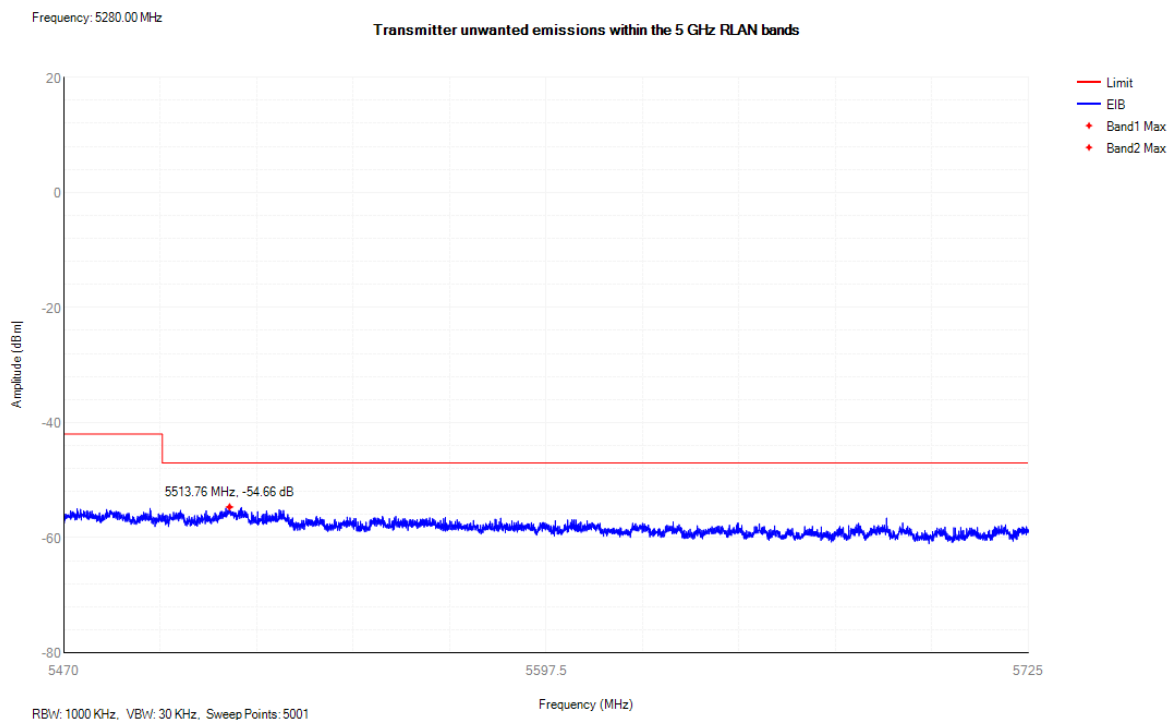
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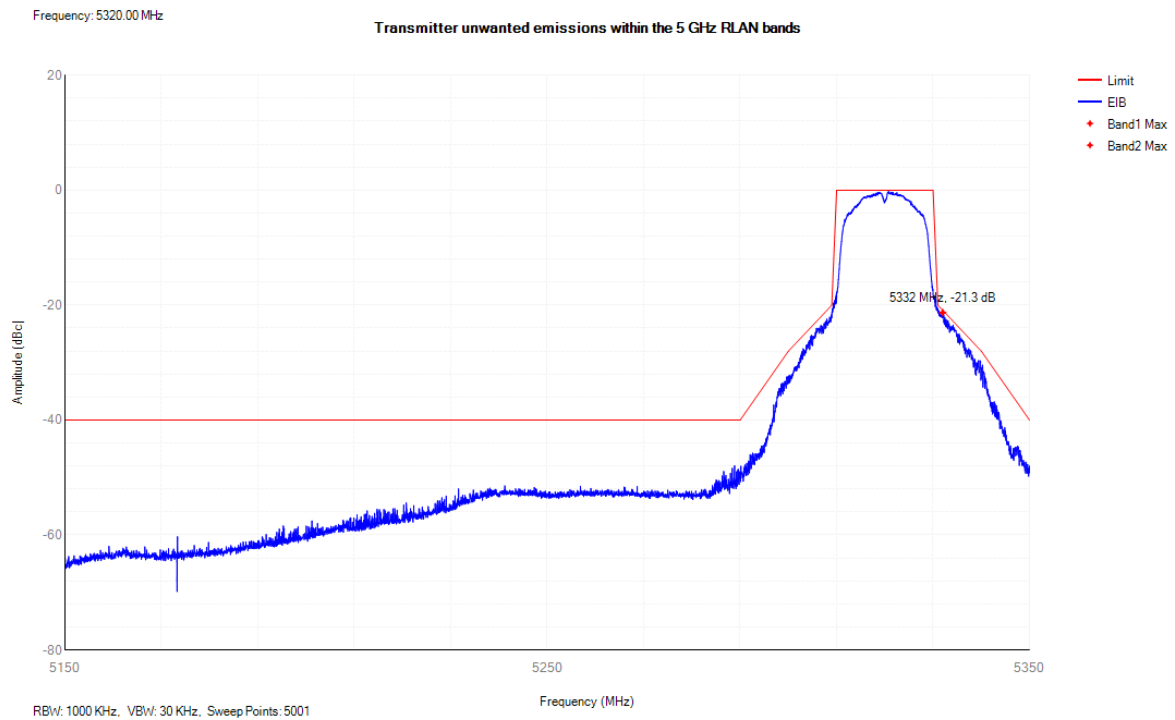
Tx. Emissions EIB NVNT n20 5280MHz Sub Band1



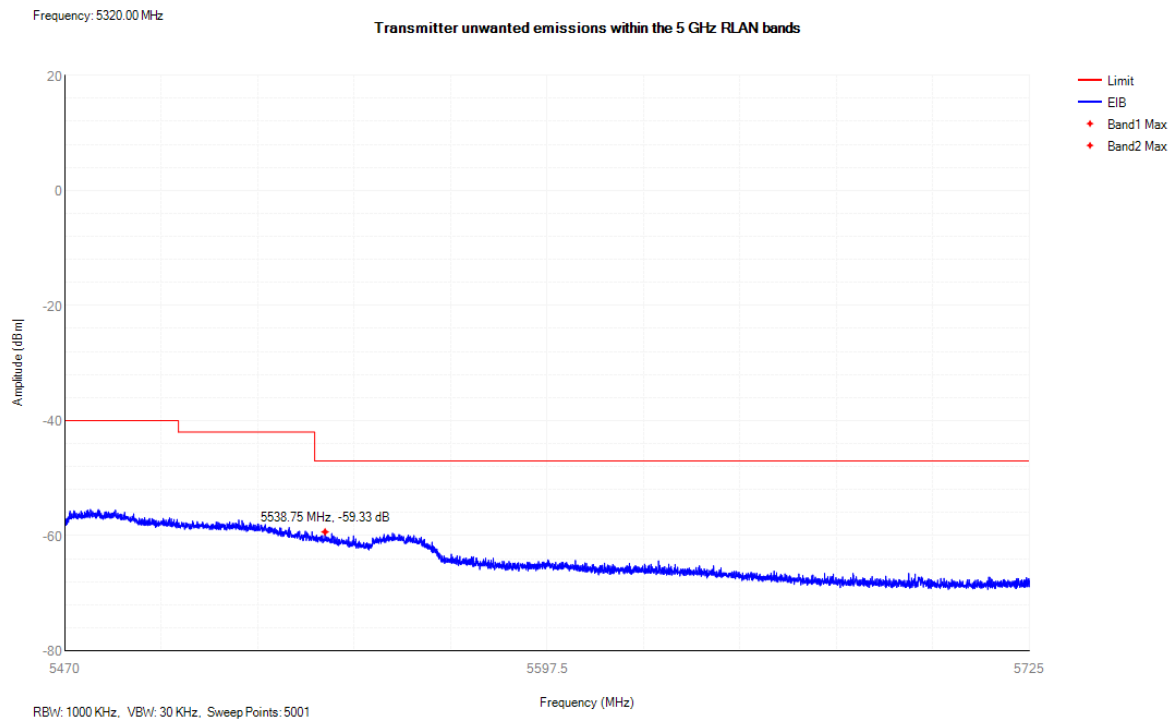
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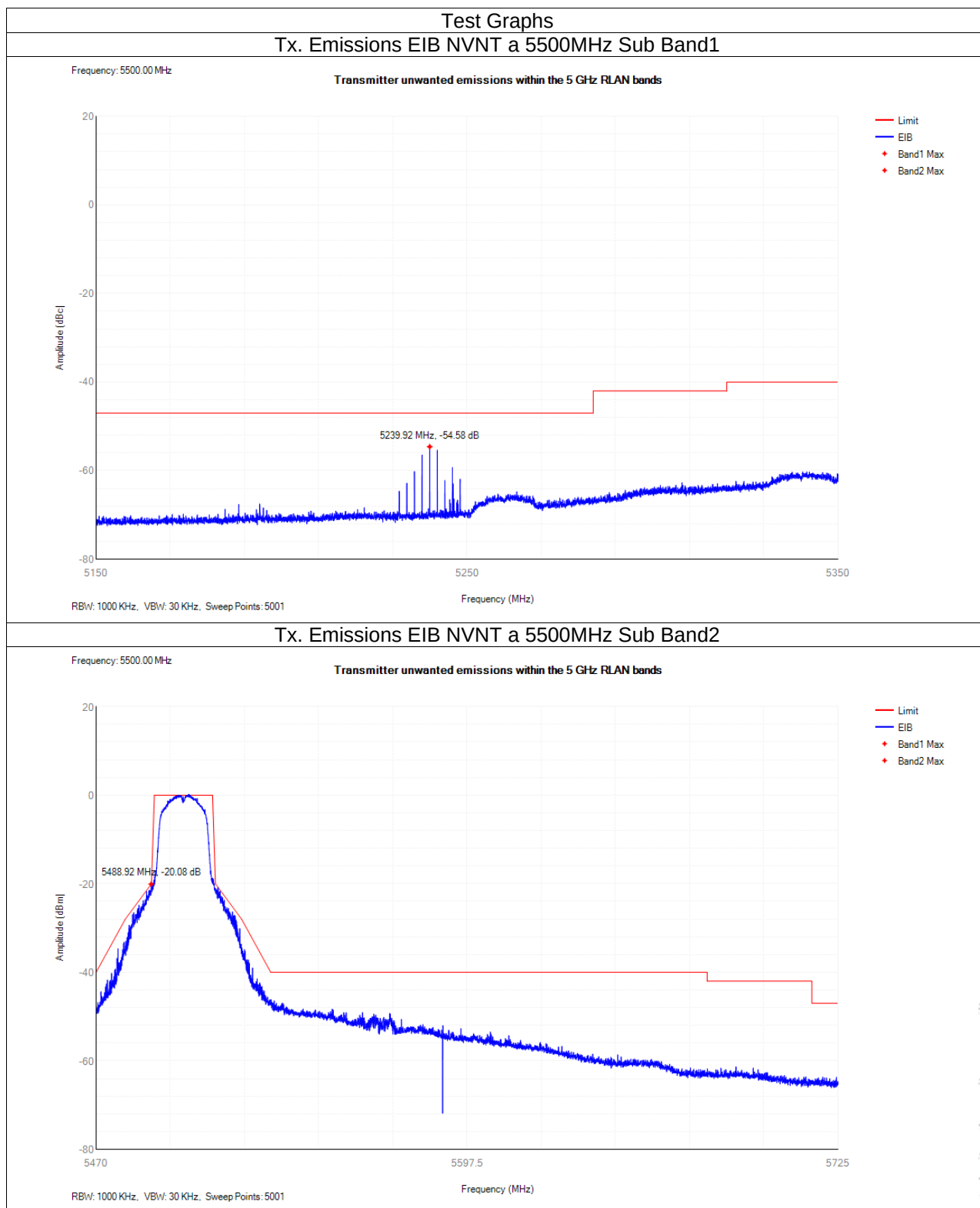


Tx. Emissions EIB NVNT n20 5320MHz Sub Band1

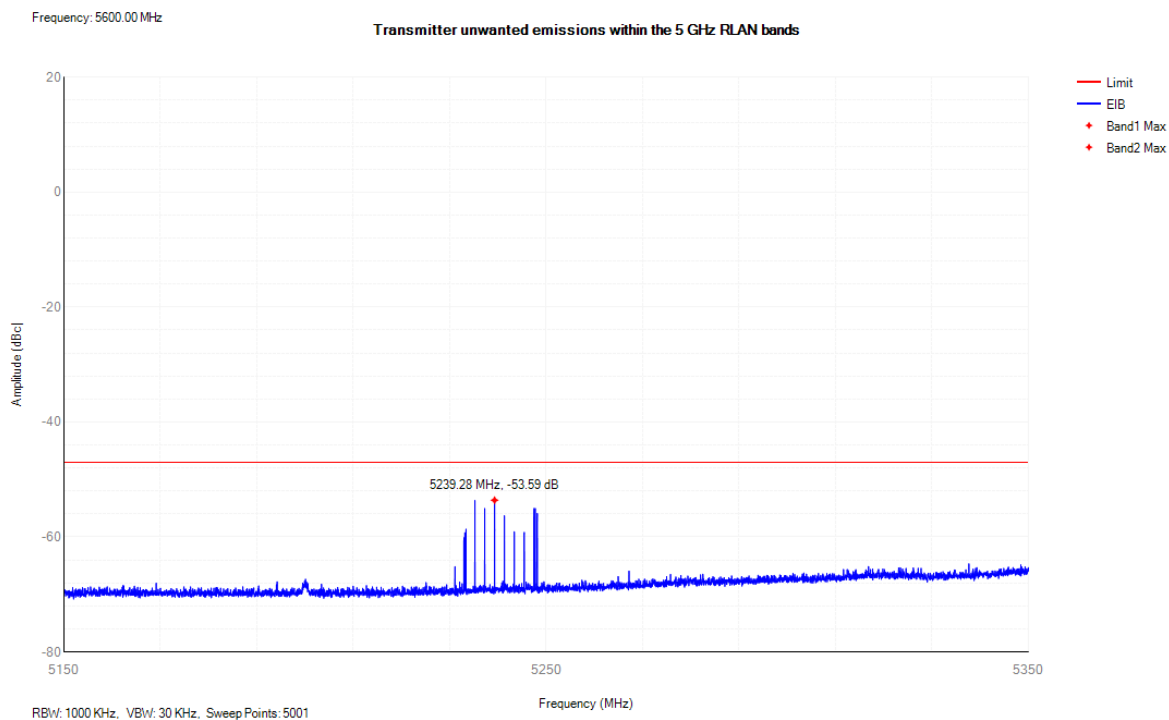


Tx. Emissions EIB NVNT n20 5320MHz Sub Band2

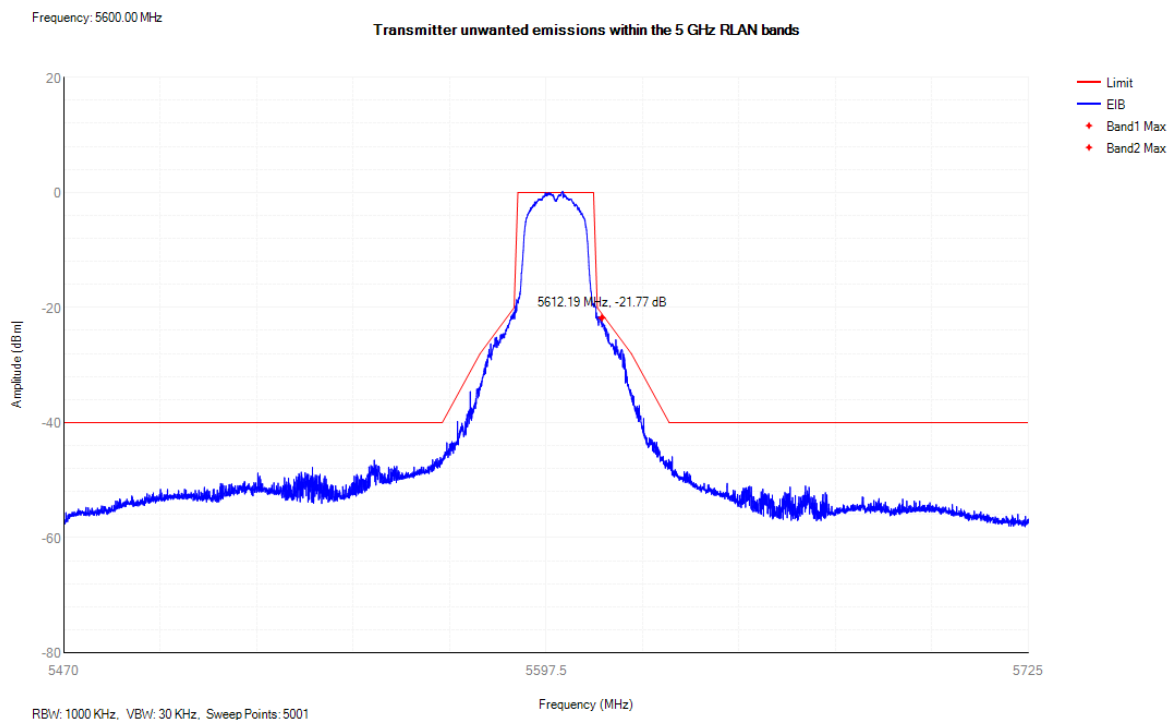


5.6G


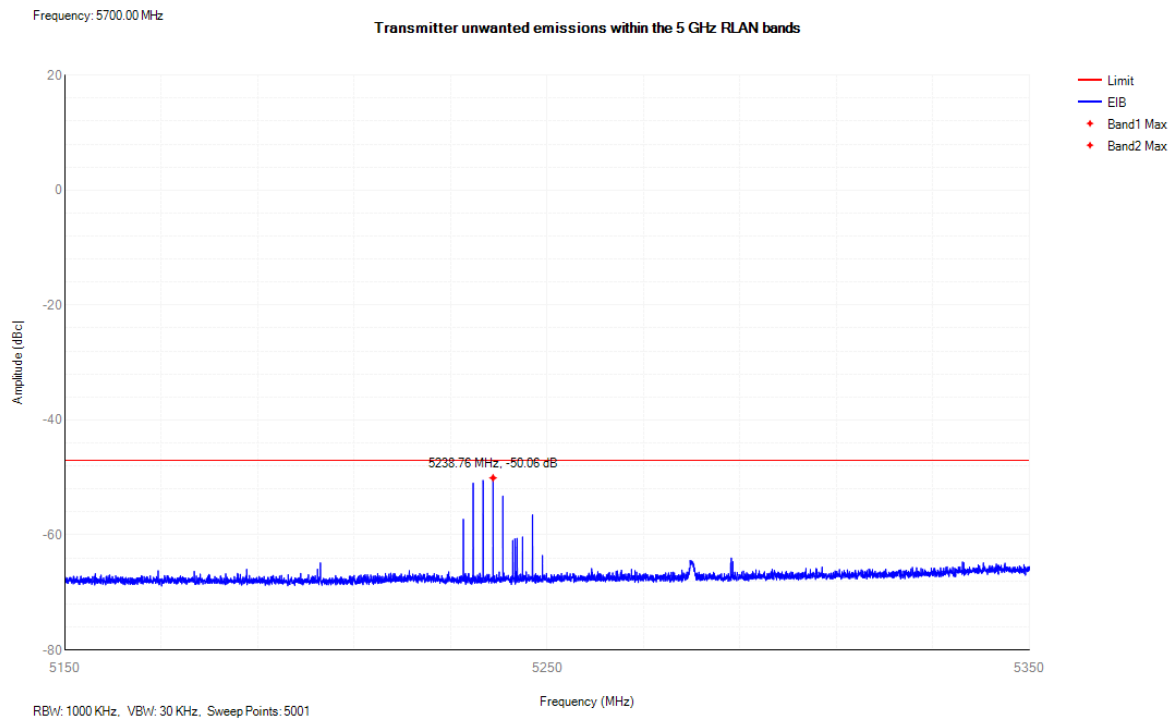
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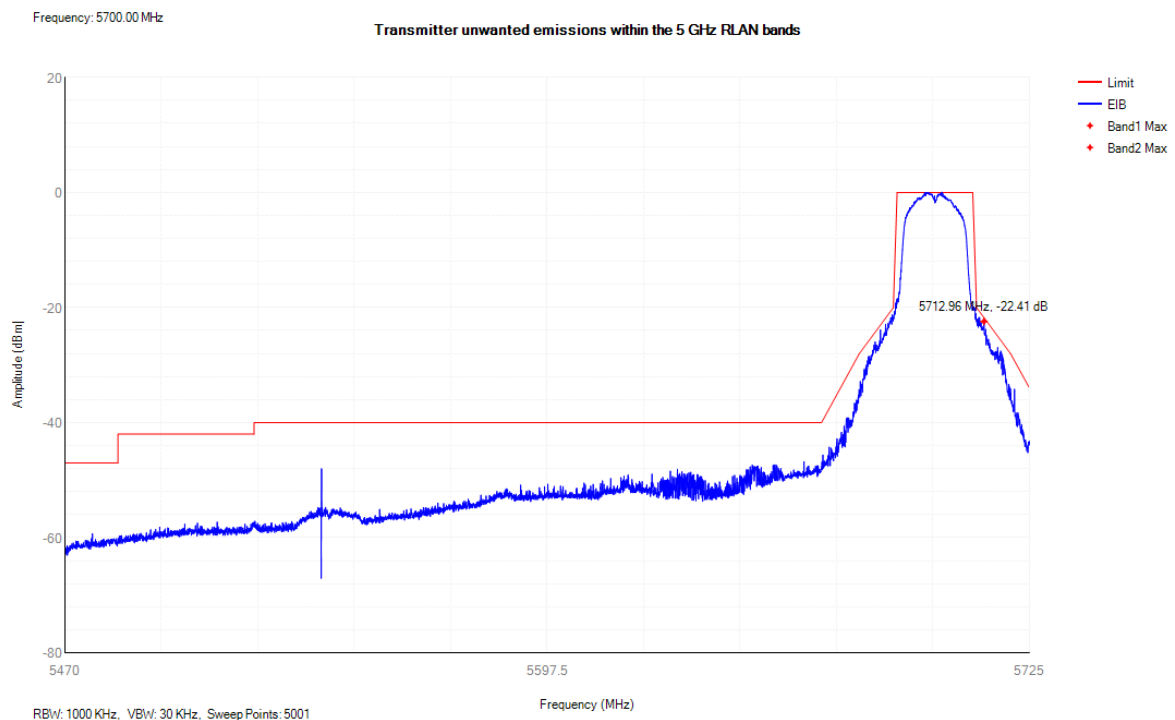
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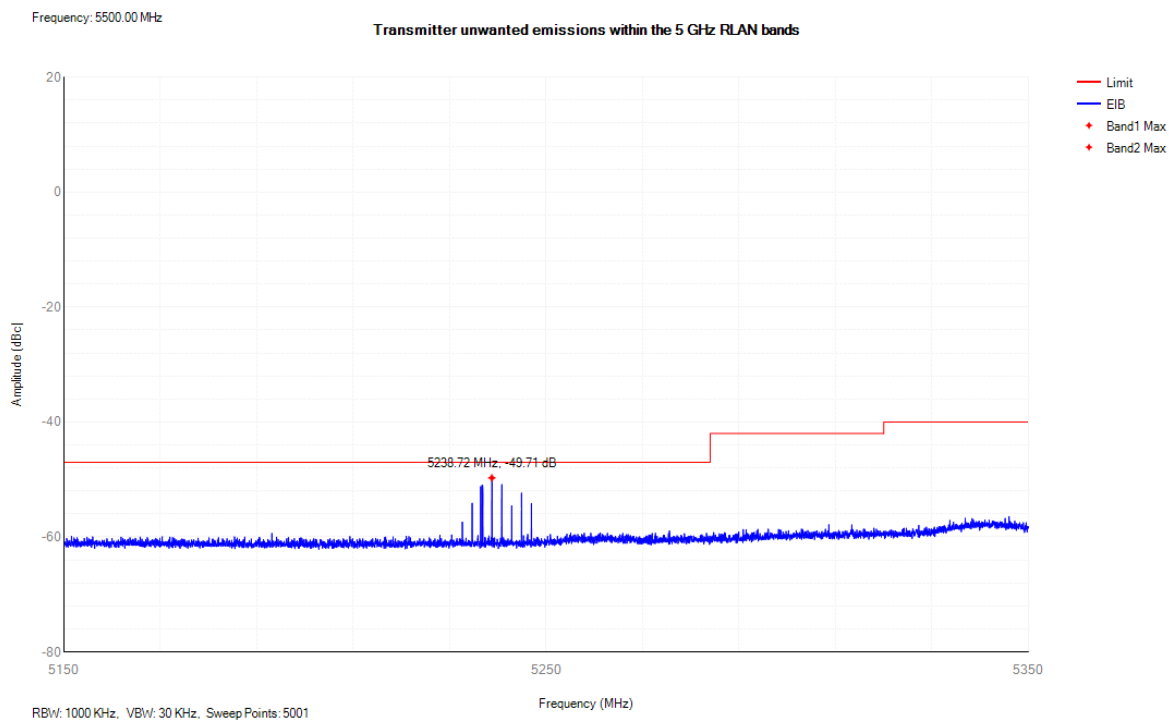
Tx. Emissions EIB NVNT a 5700MHz Sub Band1



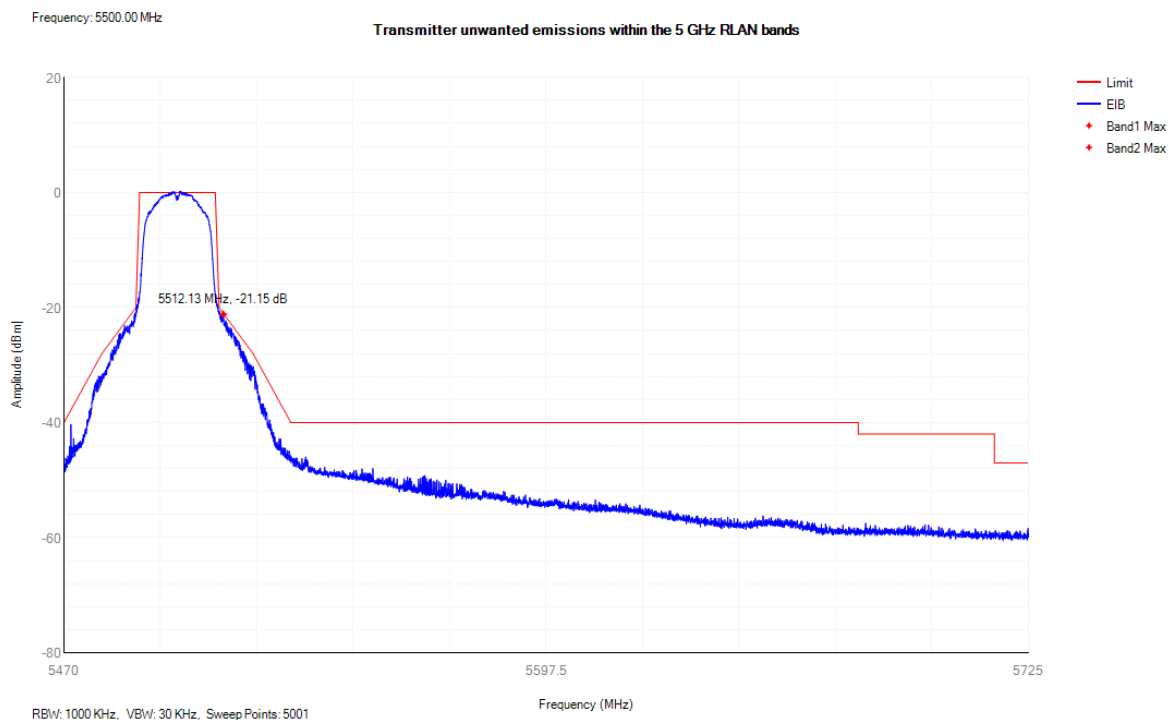
Tx. Emissions EIB NVNT a 5700MHz Sub Band2



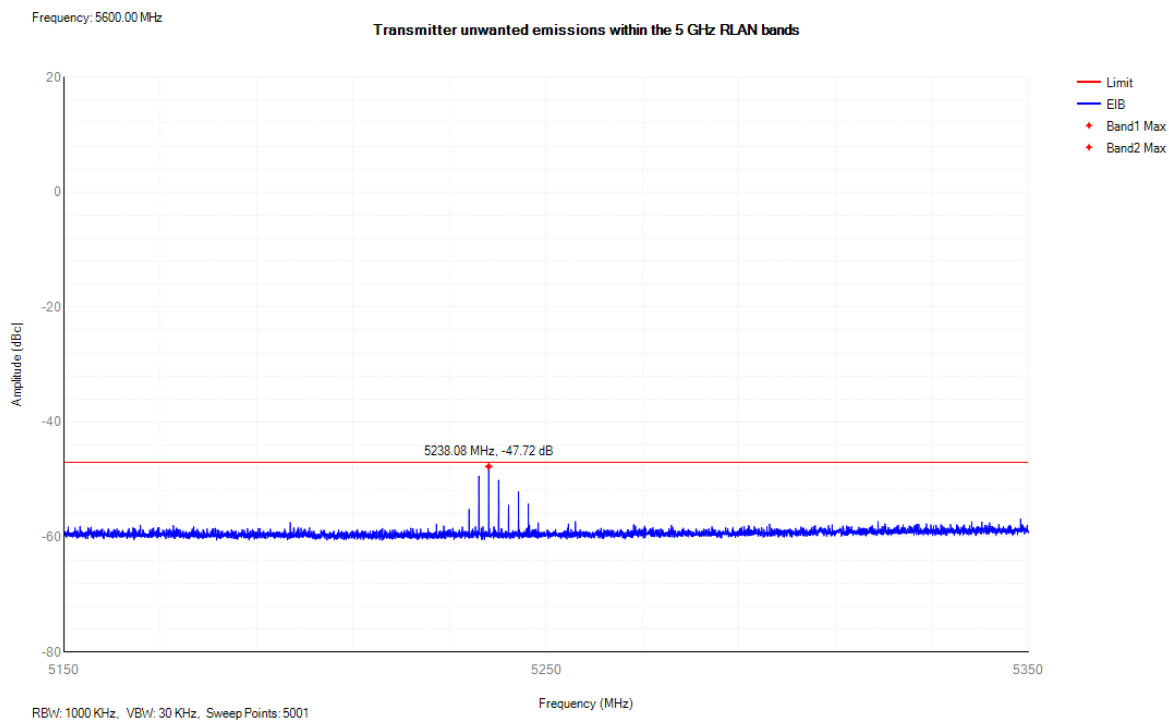
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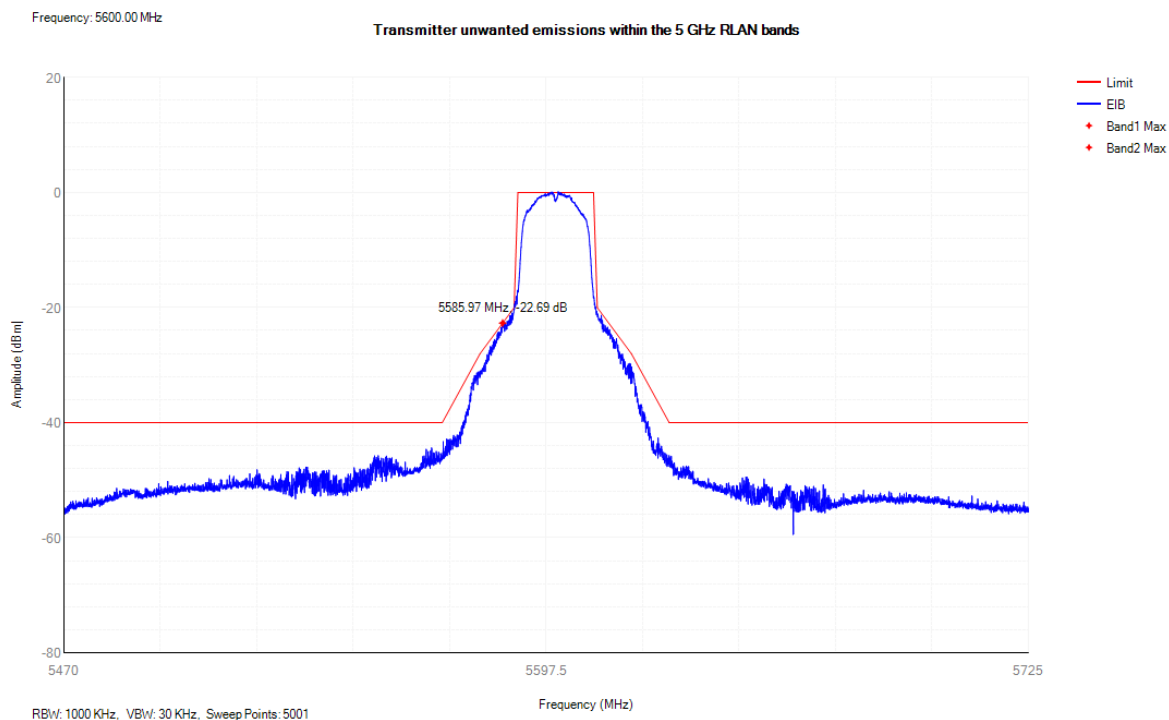
Tx. Emissions EIB NVNT n20 5500MHz Sub Band2



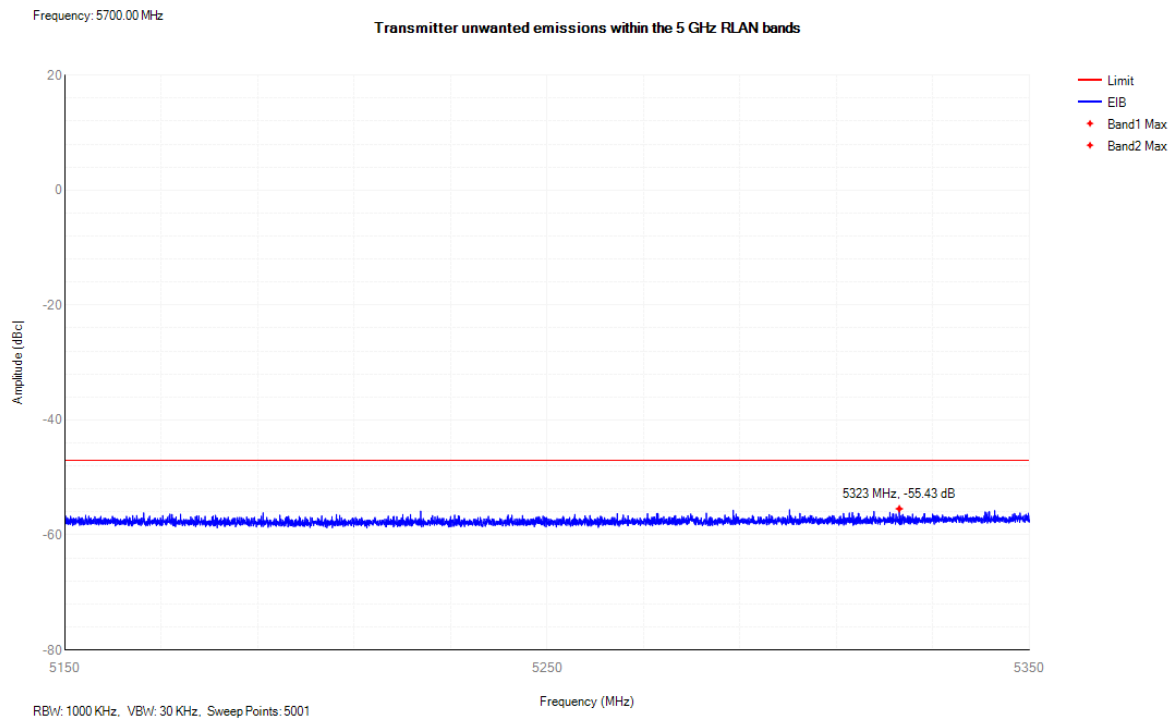
Tx. Emissions EIB NVNT n20 5600MHz Sub Band1



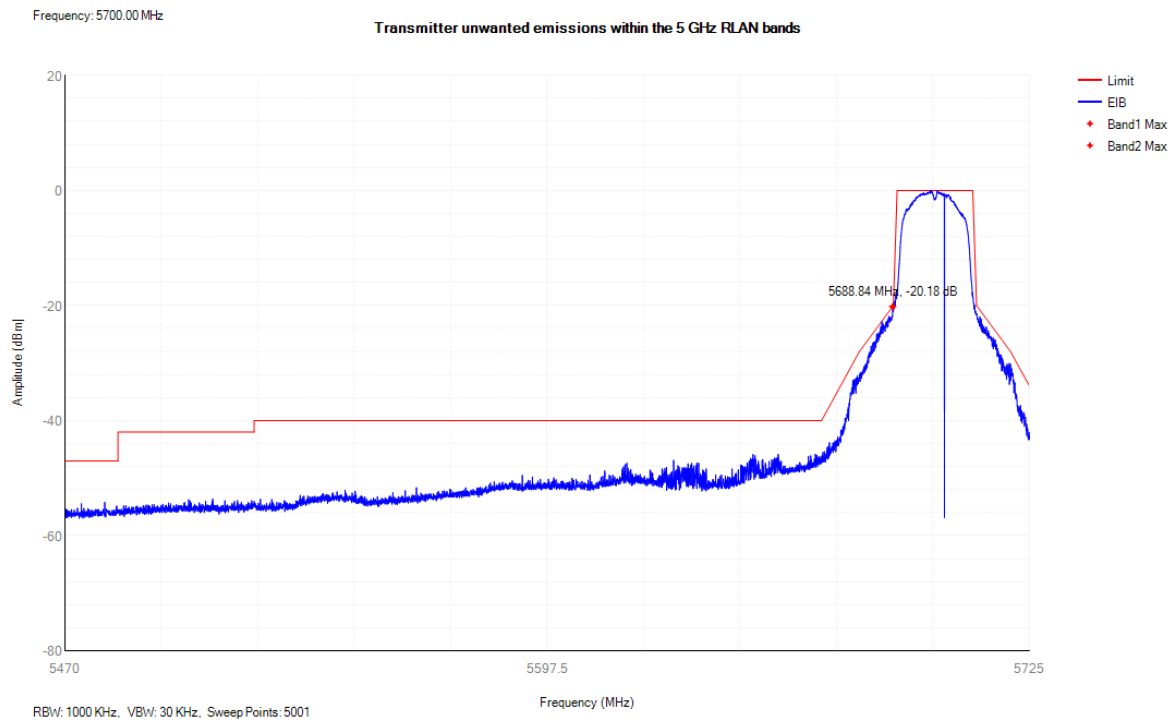
Tx. Emissions EIB NVNT n20 5600MHz Sub Band2



Tx. Emissions EIB NVNT n20 5700MHz Sub Band1



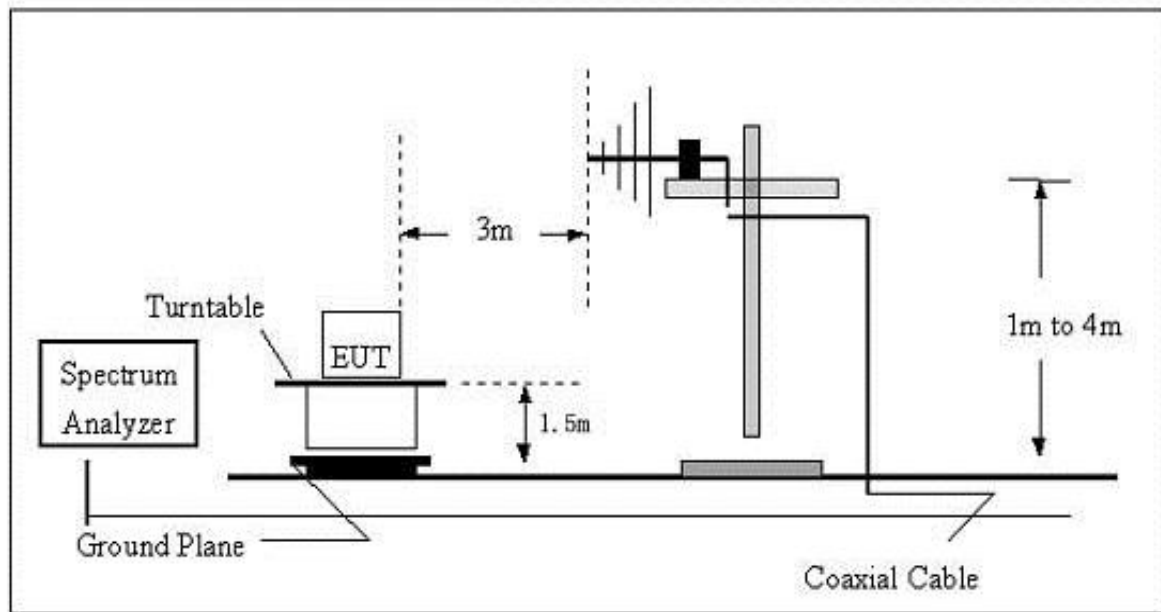
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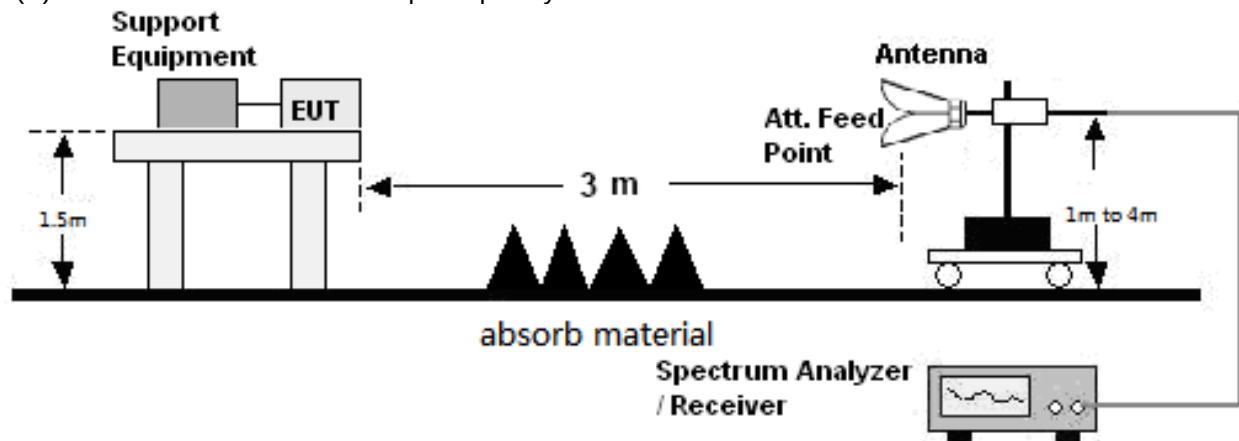
13. Receiver Spurious Emissions

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
1000-12750	-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)

5.1G

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								
377.76	-52.99	167	1.9	H	-11.59	-64.58	-57.00	-7.58
377.76	-52.71	306	1.6	V	-11.59	-64.30	-57.00	-7.30
2490.47	-51.46	285	1.9	H	-4.06	-55.52	-47.00	-8.52
2490.47	-54.70	286	1.7	V	-4.06	-58.76	-47.00	-11.76
802.11n20 Mid channel								
377.76	-53.13	107	1.1	H	-11.59	-64.72	-57.00	-7.72
377.76	-53.66	114	1.5	V	-11.59	-65.25	-57.00	-8.25
2490.47	-51.03	308	1.9	H	-4.06	-55.09	-47.00	-8.09
2490.47	-55.42	128	1.8	V	-4.06	-59.48	-47.00	-12.48
802.11n20 high channel								
377.76	-52.29	273	1.1	H	-11.59	-63.88	-57.00	-6.88
377.76	-51.77	295	1.2	V	-11.59	-63.35	-57.00	-6.35
2490.47	-51.31	68	1.2	H	-4.06	-55.37	-47.00	-8.37
2490.47	-55.27	325	1.9	V	-4.06	-59.33	-47.00	-12.33

Remark:

Absolute Level = Receiver Reading + Factor

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

5.3G

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								
379.32	-52.12	137	1.9	H	-11.55	-63.68	-57.00	-6.68
379.32	-52.43	43	1.3	V	-11.55	-63.98	-57.00	-6.98
2489.97	-51.40	295	1.5	H	-4.07	-55.46	-47.00	-8.46
2489.97	-54.87	195	1.0	V	-4.07	-58.94	-47.00	-11.94
802.11n20 Mid channel								
379.32	-51.87	178	1.9	H	-11.55	-63.42	-57.00	-6.42
379.32	-51.86	249	1.7	V	-11.55	-63.41	-57.00	-6.41
2489.97	-51.46	193	1.8	H	-4.07	-55.53	-47.00	-8.53
2489.97	-55.85	157	1.0	V	-4.07	-59.92	-47.00	-12.92
802.11n20 high channel								
379.32	-52.15	329	1.8	H	-11.55	-63.71	-57.00	-6.71
379.32	-51.90	82	1.6	V	-11.55	-63.45	-57.00	-6.45
2489.97	-51.50	241	1.8	H	-4.07	-55.56	-47.00	-8.56
2489.97	-55.60	99	1.2	V	-4.07	-59.67	-47.00	-12.67

Remark:

Absolute Level = Receiver Reading + Factor

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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								
368.09	-52.42	130	1.7	H	-11.80	-64.23	-57.00	-7.23
368.09	-52.81	222	1.5	V	-11.80	-64.62	-57.00	-7.62
2491.20	-51.98	295	1.6	H	-4.06	-56.04	-47.00	-9.04
2491.20	-54.37	221	1.7	V	-4.06	-58.43	-47.00	-11.43
802.11n20 Mid channel								
368.09	-51.51	200	1.4	H	-11.80	-63.32	-57.00	-6.32
368.09	-52.05	342	1.5	V	-11.80	-63.86	-57.00	-6.86
2491.20	-51.65	321	1.3	H	-4.06	-55.71	-47.00	-8.71
2491.20	-54.22	229	1.9	V	-4.06	-58.28	-47.00	-11.28
802.11n20 high channel								
368.09	-52.86	52	1.1	H	-11.80	-64.66	-57.00	-7.66
368.09	-52.61	235	1.4	V	-11.80	-64.41	-57.00	-7.41
2491.20	-51.95	72	1.2	H	-4.06	-56.01	-47.00	-9.01
2491.20	-54.30	231	1.3	V	-4.06	-58.36	-47.00	-11.36

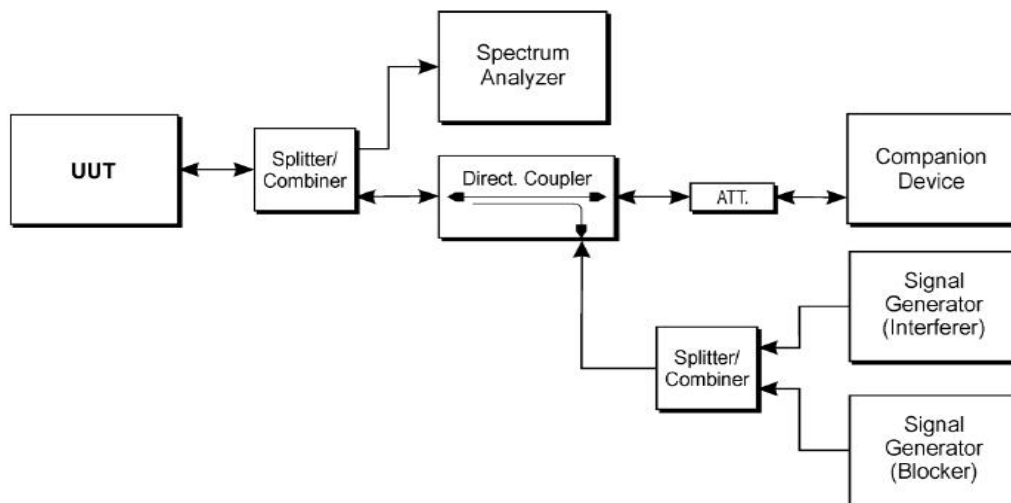
Remark:

Absolute Level = Receiver Reading + Factor

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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 802.11TM-2007[9], clauses 15 and 17, in IEEE 802.11nTM-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.

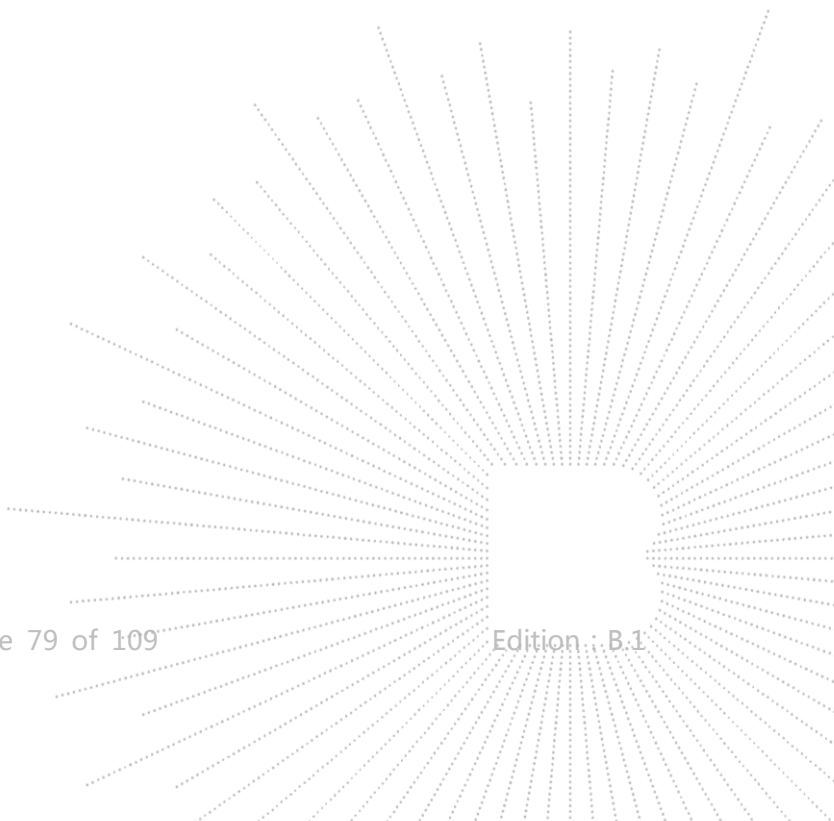
14.3 Test Procedure

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: $\geq$ Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used)
 - VBW: $\geq$ 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: $> 2 \times$ Channel Occupancy Time
 - Trace Mode: Clear/Write
 - Trigger Mode: Video or RF/IF Power

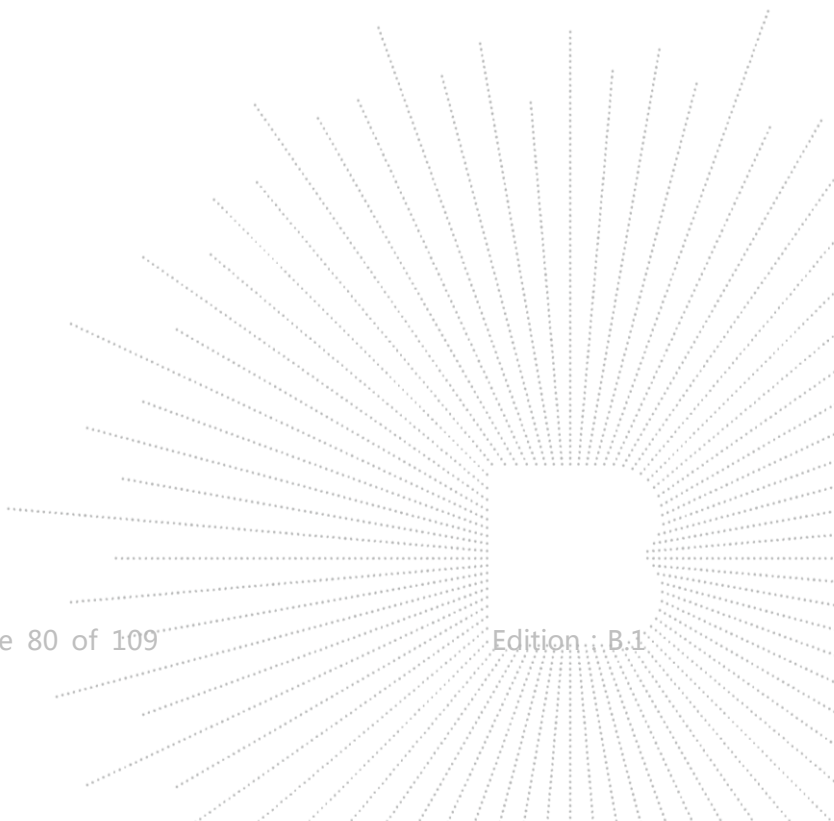
Step 2:

- 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.



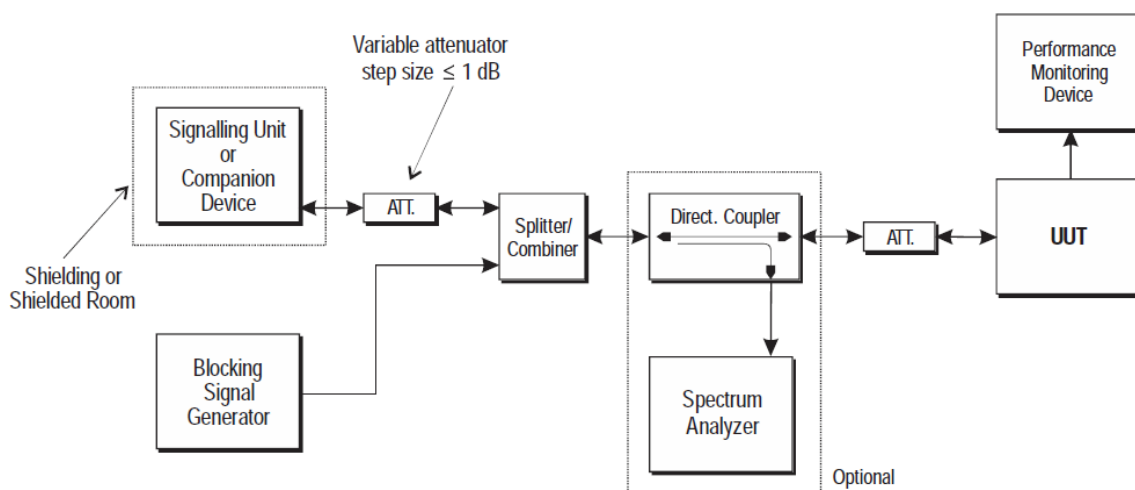
14.4 Test Result

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)	
P _{min} + 6 dB	5 100	-53	-59	Continuous Wave
P _{min} + 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 P_{min} .
 - This signal level (P_{min}) is increased by 6 dB resulting in a new level ($P_{min} + 6$ 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

Only the worst mode A mode is displayed

5.1G

Transmitting	P _{min} (dBm)	Blocking Frequency (MHz)	Blocking Power(dB)	Measured PER(%)	Limit (%)
5180	-74	5100	-53	1.84	10
5180	-74	4900	-47	3.17	10
5180	-74	5000	-47	3.72	10
5180	-74	5975	-47	4.74	10
5240	-73	5100	-53	1.09	10
5240	-73	4900	-47	4.59	10
5240	-73	5000	-47	3.44	10
5240	-73	5975	-47	2.61	10

5.3G

Only the worst mode A mode is displayed

Transmitting	P _{min} (dBm)	Blocking Frequency (MHz)	Blocking Power(dB)	Measured PER(%)	Limit (%)
5260	-74	5100	-53	4.65	10
5260	-74	4900	-47	5.89	10
5260	-74	5000	-47	3.98	10
5260	-74	5975	-47	1.93	10
5320	-73	5100	-53	3.94	10
5320	-73	4900	-47	6.05	10
5320	-73	5000	-47	2.74	10
5320	-73	5975	-47	1.40	10

5.6G

Only the worst mode A mode is displayed

Transmitting	P _{min} (dBm)	Blocking Frequency (MHz)	Blocking Power(dB)	Measured PER(%)	Limit (%)
5500	-74	5100	-53	2.43	10
5500	-74	4900	-47	3.62	10
5500	-74	5000	-47	3.01	10
5500	-74	5975	-47	1.91	10
5700	-73	5100	-53	3.17	10
5700	-73	4900	-47	1.99	10
5700	-73	5000	-47	1.98	10
5700	-73	5975	-47	5.07	10

16. Dynamic Frequency Selection (DFS)

16.1 Radar Detection Threshold

A radar burst using a test signal defined in table D.4 of EN 301 893 is generated on selected channel during the Channel Availability Check Time at a level defined in clause 5.3.8.2.1.1.

The test was performed 20 times and each time a unique radar test signal was generated from options provided in table D.4. When selecting these 20 unique radar test signals, the radar test signals #1 to #6 from table D.4 were included as well as variations of pulse width, pulse repetition frequency and number of different PRFs (if applicable) within the ranges given.

Result: N/A, The UUT is a slave device and maximum transmit power less than 200 mW e.i.r.p.

16.2 In service Monitoring

Test Specification

Test Requirement: ETSI EN 301 893 clause 4.2.6.2.4

Test Method: ETSI EN 301 893 clause 5.4.8.2.1.5

Limit:

The In-Service Monitoring shall be used to monitor each Operating Channel.

The In-Service-Monitoring shall start immediately after the RLAN device has started transmissions on a channel.

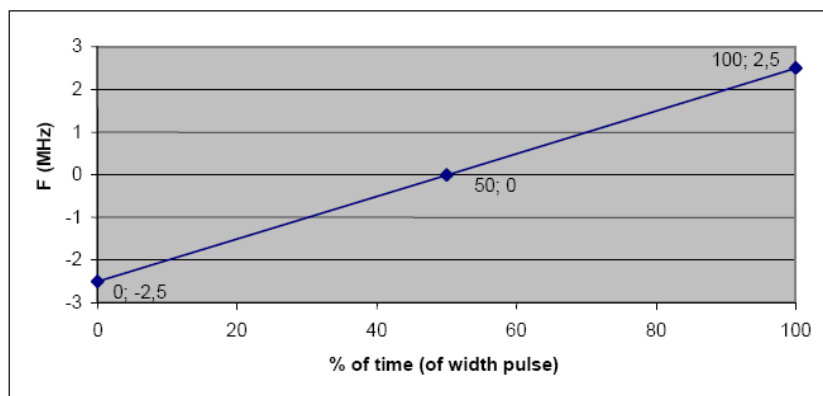
During the In-Service Monitoring, the RLAN device shall be capable of detecting any of the radar test signals that fall within the ranges given by table D.4 with a level above the Radar Detection Threshold defined in table D.2.

Table D.4: Parameters of radar test signals

Radar test signal # (see note 1 to note 3)	Pulse width W (μs)		Pulse repetition frequency PRF (PPS)		Number of different PRFs	Pulses per burst for each PRF (PPB) (see note 5)
	Min	Max	Min	Max		
1	0,5	5	200	1 000	1	10 (see note 6)
2	0,5	15	200	1 600	1	15 (see note 6)
3	0,5	15	2 300	4 000	1	25
4	20	30	2 000	4 000	1	20
5	0,5	2	300	400	2/3	10 (see note 6)
6	0,5	2	400	1 200	2/3	15 (see note 6)

NOTE 1: Radar test signals #1 to #4 are constant PRF based signals. See figure D.1. These radar test signals are intended to simulate also radars using a packet based Staggered PRF. See figure D.2.

NOTE 2: Radar test signal #4 is a modulated radar test signal. The modulation to be used is a chirp modulation with a $\pm 2,5$ MHz frequency deviation which is described below.



NOTE 3: Radar test signals #5 and #6 are single pulse based Staggered PRF radar test signals using 2 or 3 different PRF values. For radar test signal #5, the difference between the PRF values chosen shall be between 20 PPS and 50 PPS. For radar test signal #6, the difference between the PRF values chosen shall be between 80 PPS and 400 PPS. See figure D.3.

NOTE 4: Apart for the Off-Channel CAC testing, the radar test signals above shall only contain a single burst of pulses. See figure D.1, figure D.3 and figure D.4. For the Off-Channel CAC testing, repetitive bursts shall be used for the total duration of the test. See figure D.2 and figure D.5. See also clause 4.2.6.2.3, clause 5.4.8.2.1.4.2 and clause 5.4.8.2.1.4.3.

NOTE 5: The total number of pulses in a burst is equal to the number of pulses for a single PRF multiplied by the number of different PRFs used.

NOTE 6: For the CAC and Off-Channel CAC requirements, the minimum number of pulses (for each PRF) for any of the radar test signals to be detected in the band 5 600 MHz to 5 650 MHz shall be 18.

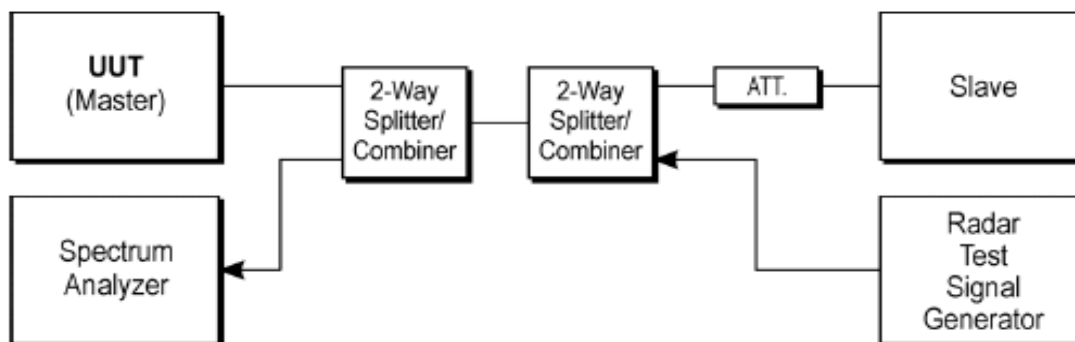
Table D.2: Radar Detection Threshold Levels

e.i.r.p. Spectral Density (dBm/MHz)	Value (see note 1 and note 2)
10	-62 dBm
NOTE 1: This is the level at the input of the receiver of an RLAN device with a maximum e.i.r.p. density of 10 dBm/MHz and assuming a 0 dBi receive antenna. For devices employing different e.i.r.p. spectral density and/or a different receive antenna gain G (dBi) the Radar Detection Threshold Level at the receiver input follows the following relationship: DFS Detection Threshold (dBm) = -62 + 10 - e.i.r.p. Spectral Density (dBm/MHz) + G (dBi); however the Radar Detection Threshold Level shall not be less than -64 dBm assuming a 0 dBi receive antenna gain. NOTE 2: Slave devices with a maximum e.i.r.p. of less than 23 dBm do not have to implement radar detection unless these devices are used in fixed outdoor point to point or fixed outdoor point to multipoint applications (see clause 4.2.6.1.3).	

The minimum required detection probability associated with a given radar test signal is defined in table D.5.

Table D.5: Detection probability

Parameter	Detection Probability (P_d)	
	Channels whose nominal bandwidth falls partly or completely within the 5 600 MHz to 5 650 MHz band	Other channels
CAC, Off-Channel CAC	99.99 %	60 %
In-Service Monitoring	60 %	60 %
NOTE: P_d gives the probability of detection per simulated radar burst and represents a minimum level of detection performance under defined conditions. Therefore P_d does not represent the overall detection probability for any particular radar under real life conditions.		

Test Setup:

Figure 4: Set-up A
Test Procedure:

1. Test performed with tested device in normal conditions. The UUT was tested as a master device.
2. The test "Set-up A" was used. Radar test signals are injected into the UUT. This set-up also contained an RLAN device operating in slave mode which is associated with the UUT. When performing DFS testing, a power splitter/combiner has been used to combine all the receive chains (antenna inputs) into a single test point. The insertion loss of the splitter/combiner has been taken into account.

Test Instrument: Refer to Item 4.3

Test Result: N/A, The UUT is a slave device and maximum transmit power less than 200 mW e.i.r.p.

16.3 Channel Shutdown and Non-Occupancy period

Test Specification

Test Requirement: ETSI EN 301 893 clause 4.2.6.2.5 and 4.2.6.2.6

Test Method: ETSI EN 301 893 clause 5.4.8.2.1.6

Limit:

The Channel Move Time shall not exceed the limit defined in table D.1.

The Channel Closing Transmission Time shall not exceed the limit defined in table D.1.

The Non-Occupancy Period shall not be less than the value defined in table D.1.

Table D.1: DFS requirement values

Parameter	Value
Channel Availability Check Time	60 s (see note 1)
Minimum Off-Channel CAC Time	6 minutes (see note 2)
Maximum Off-Channel CAC Time	4 hours (see note 2)
Channel Move Time	10 s
Channel Closing Transmission Time	1 s
Non-Occupancy Period	30 minutes
NOTE 1: For channels whose nominal bandwidth falls completely or partly within the band 5 600 MHz to 5 650 MHz, the <i>Channel Availability Check Time</i> shall be 10 minutes.	
NOTE 2: For channels whose nominal bandwidth falls completely or partly within the band 5 600 MHz to 5 650 MHz, the <i>Off-Channel CAC Time</i> shall be within the range 1 hour to 24 hours.	

Test Setup:

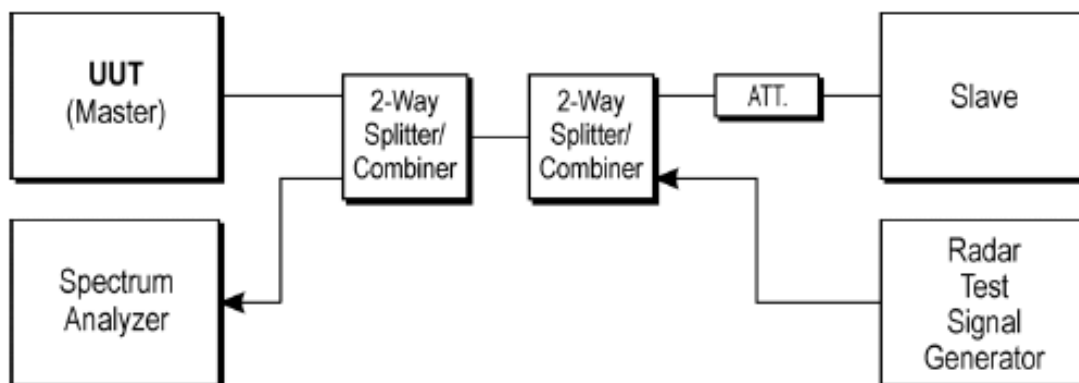


Figure 4: Set-up A

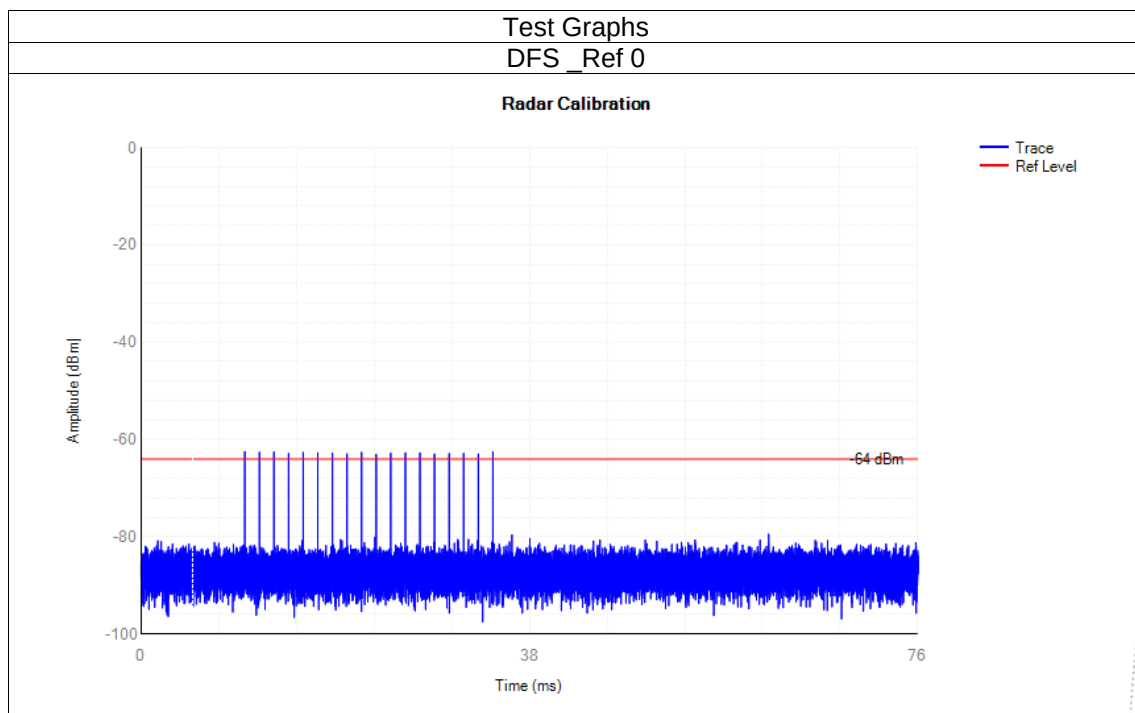
Test Procedure:

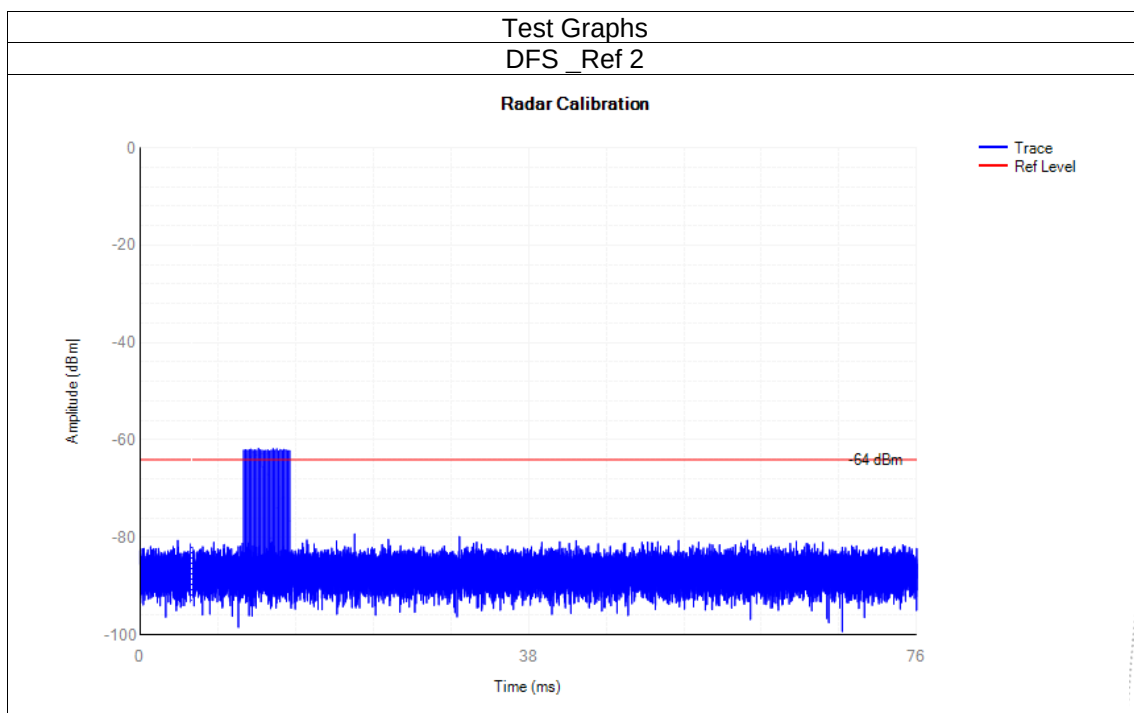
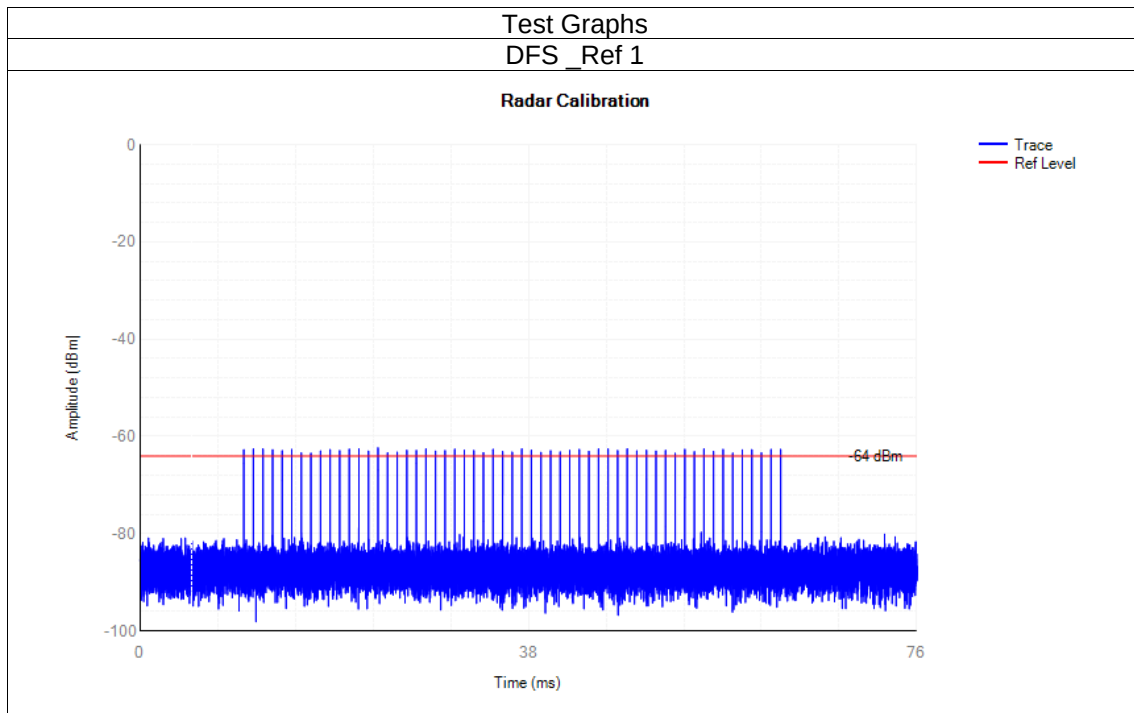
1. Test performed with tested device in normal conditions. The UUT was tested as a master device.
2. The test "Set-up A" was used. Radar test signals are injected into the UUT. This set-up also contained an RLAN device operating in slave mode which is associated with the UUT. When performing DFS testing, a power splitter/combiner has been used to combine all the receive chains(antenna inputs) into a single test point. The insertion loss of the splitter/combiner has been taken into account.

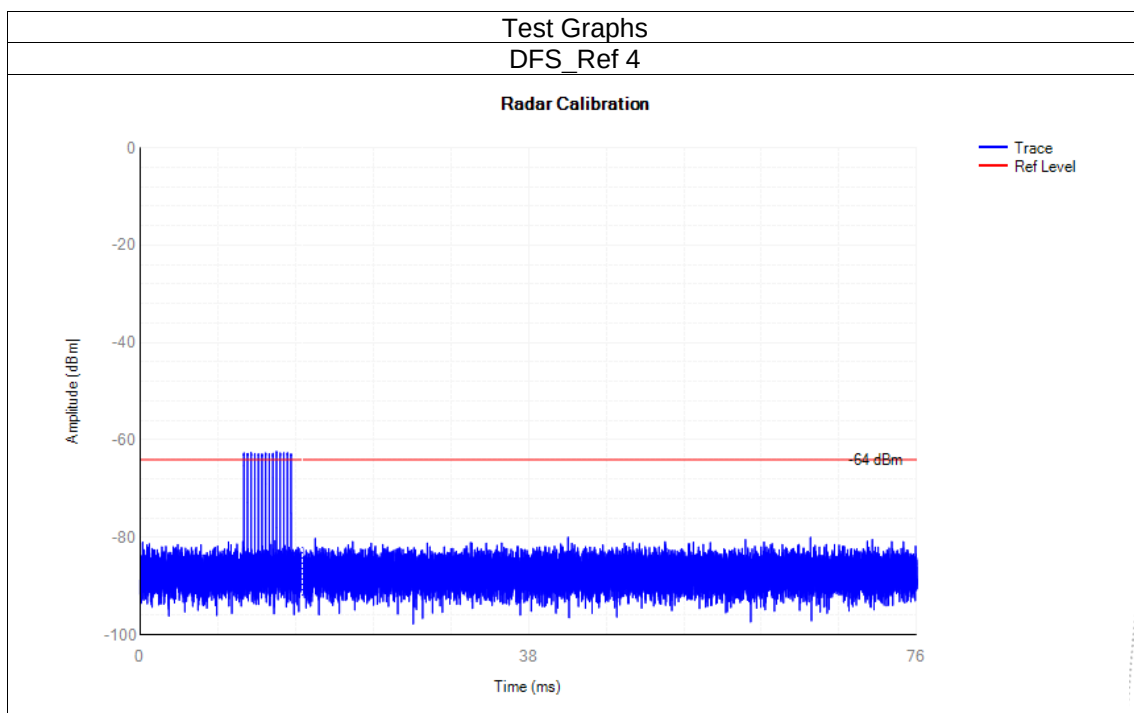
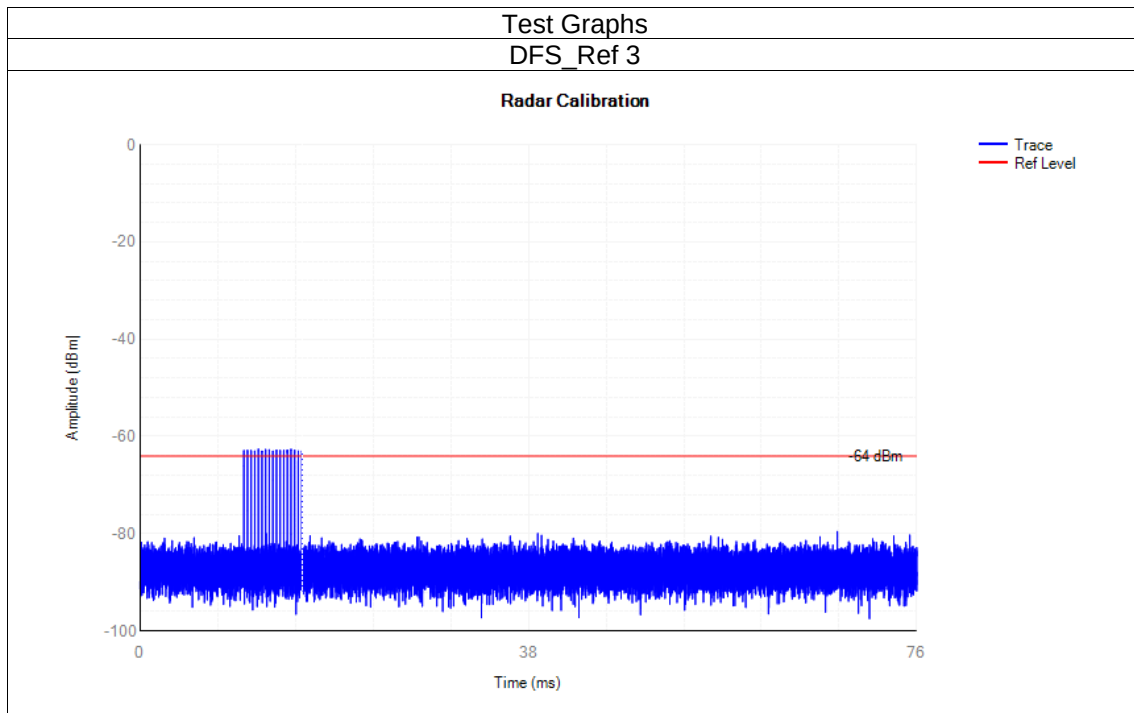
Test Instrument: Refer to Item 4.3

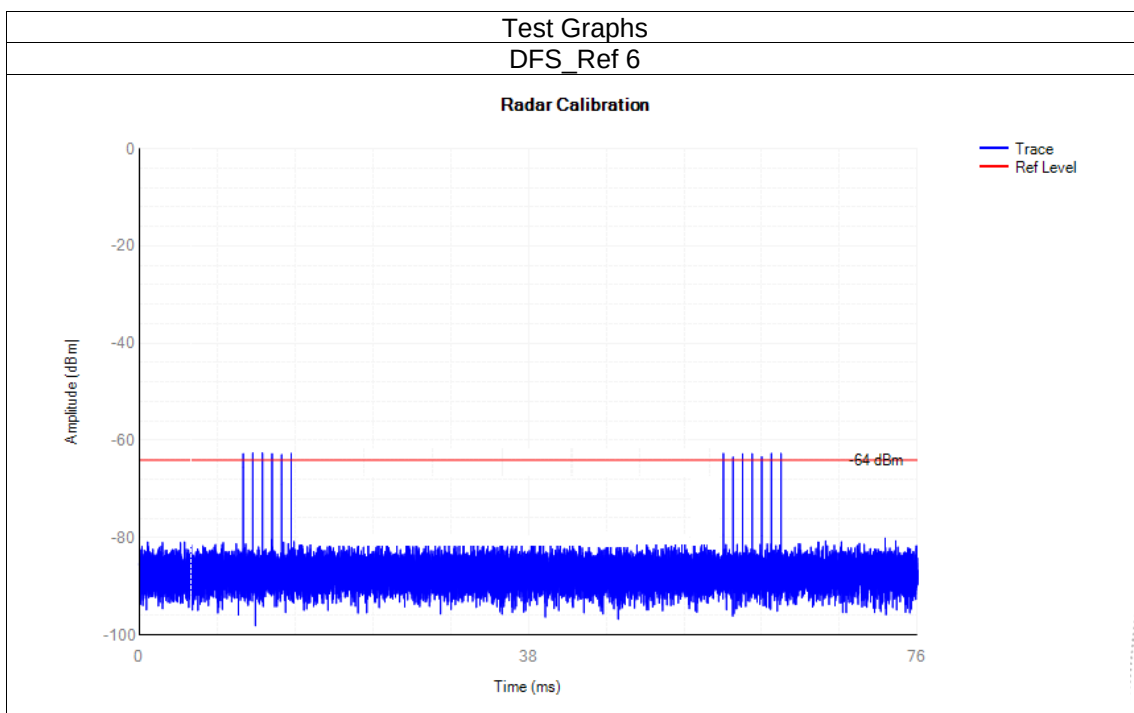
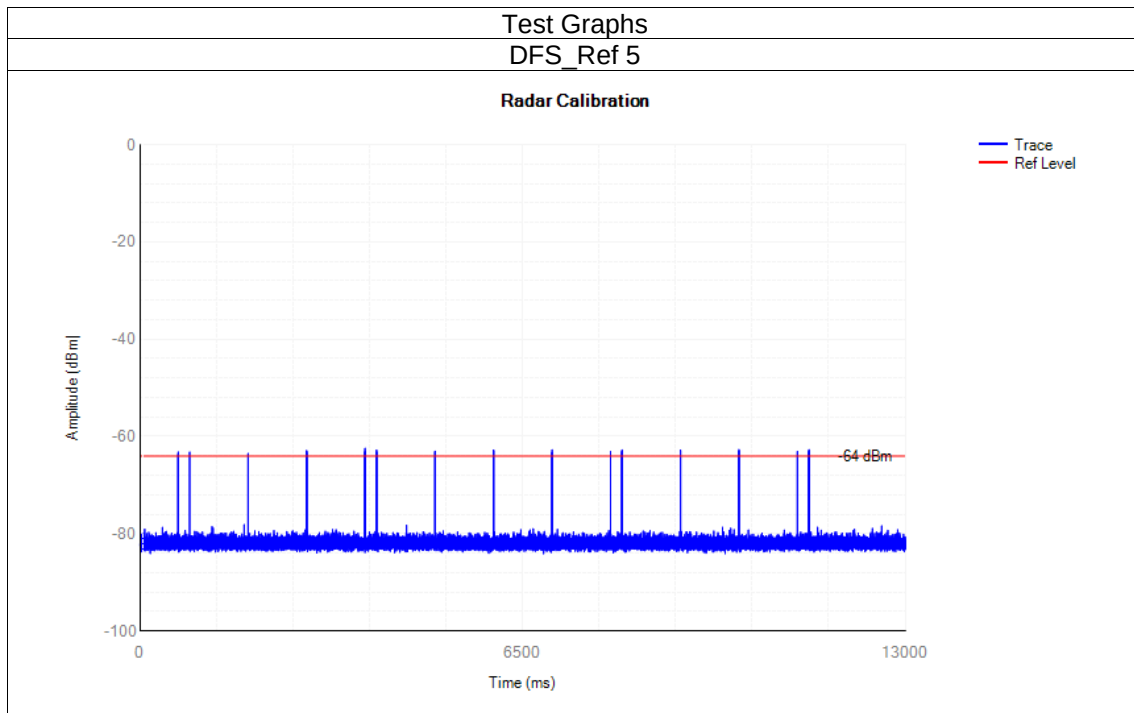
Test Result: PASS

Note: While the UUT was transmitting a test transmission sequence in accordance with clause 5.3.1.2 on the selected channel at a certain time T0, a single burst test signal was generated on selected channel using the reference DFS test signal defined in table D.3 and at a level of up to 10 dB above the level defined in clause 5.4.8.2.1.1. T1 denotes the end of the radar burst. The transmissions of the UUT following the end of the burst (T1) on the selected channel were observed for a period greater than to the Channel Move Time defined in table D.1. The aggregate duration (Channel Closing Transmission Time) of all transmissions from the UUT on selected channel during the Channel Move Time was compared to the limit defined in table D.1. T2 denotes the instant when the UUT has ceased all transmissions on the selected channel. Following instant T2, the selected channel was observed for a period equal to the Non-Occupancy Period (T3-T2) to verify that the UUT does not resume any transmissions on this channel.

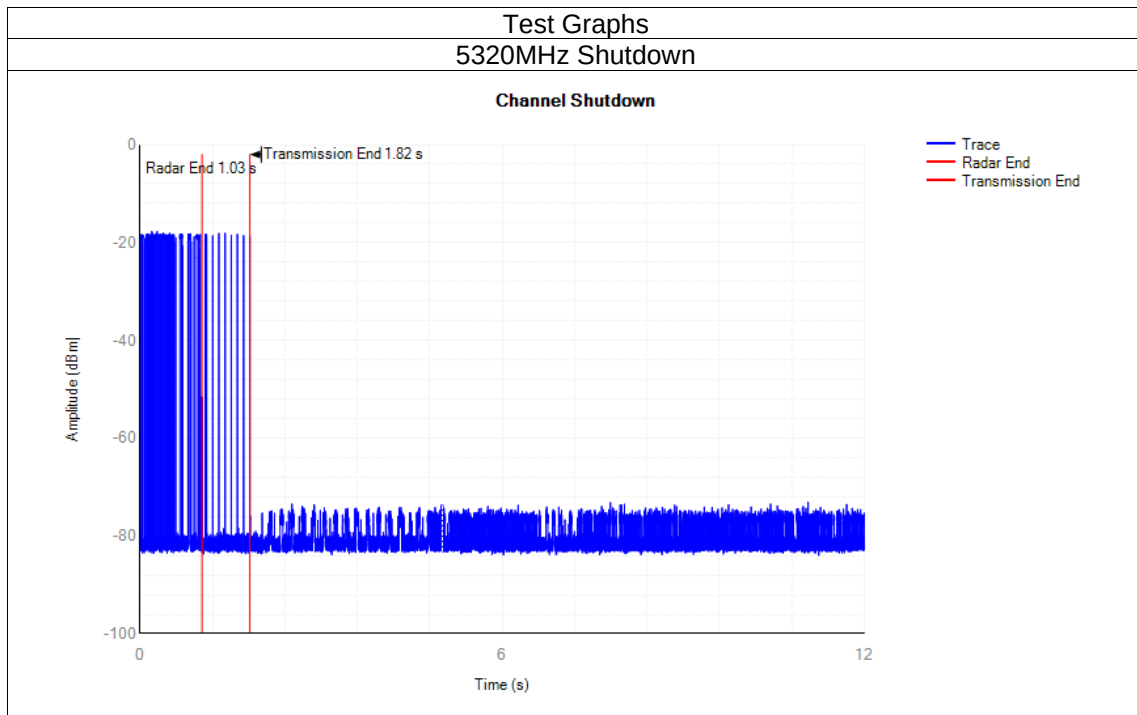




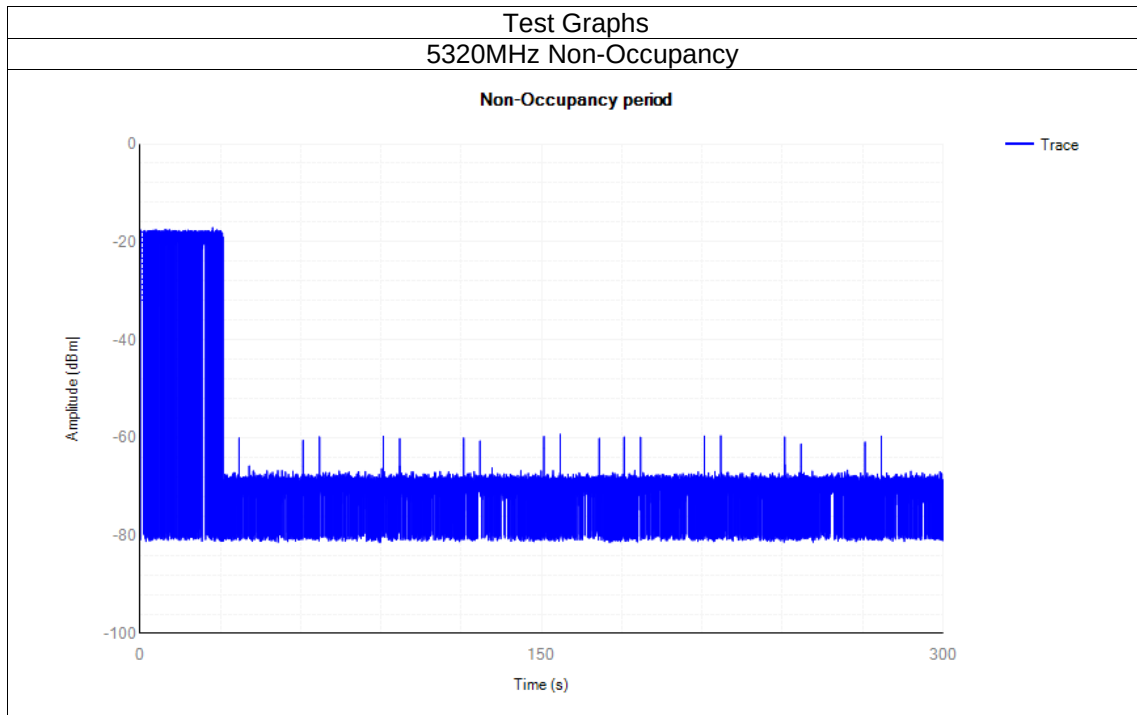




Channel Closing Transmission Time and Channel Move Time Result						
Mode	Frequency (MHz)	Channel Move Time (s)	Limit Channel Move Time (s)	Close Transmission Time (s)	Limit Close Transmission Time (s)	Verdict
N20	5320	0.7914	10	0.0284	1	Pass

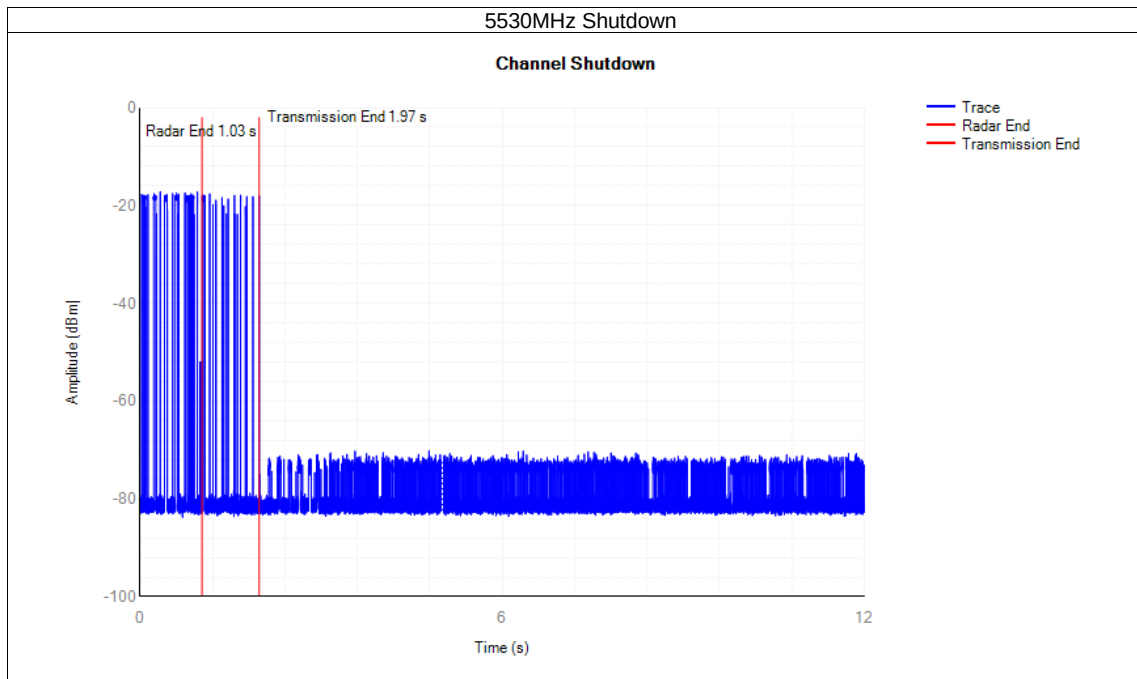


Non-Occupancy Period Result				
Modulation Mode	Freq. (MHz)	Non-Occupancy Period		
		Measured	Limit	Verdict
N20	5320	>30min	30min	PASS
1850 sec Timing Plot				

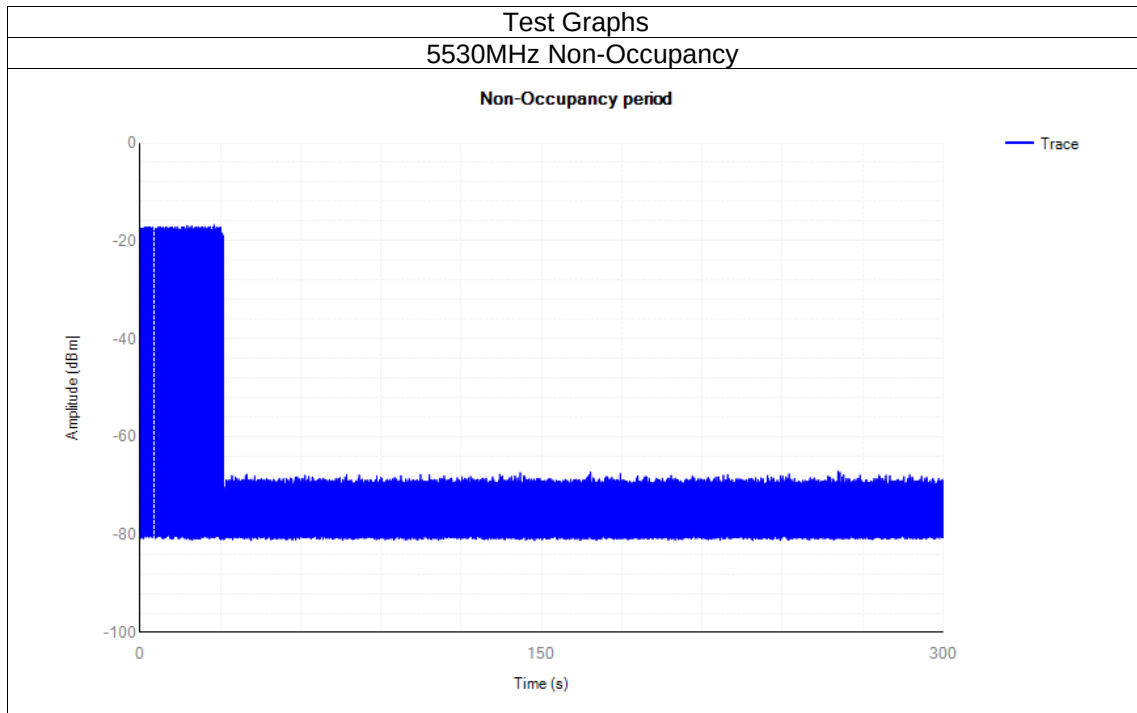


Channel Closing Transmission Time and Channel Move Time Result

Mode	Frequency (MHz)	Channel Move Time (s)	Limit Channel Move Time (s)	Close Transmission Time (s)	Limit Close Transmission Time (s)	Verdict
N20	5700	0.9462	10	0.08564	1	Pass



Non-Occupancy Period Result				
Modulation Mode	Freq. (MHz)	Non-Occupancy Period		
		Measured	Limit	Verdict
N20	5700	>30min	30min	PASS
1850 sec Timing Plot				



16.4 Uniform Spreading

Test Specification

Test Requirement: ETSI EN 301 893 clause 4.2.6.2.7

Test Method: N/A

Limit:

Each of the declared Channel Plans (refer to EN301893 clause 3.1) shall make use of at least 60 % of the spectrum available in the applicable sub-band(s).

The Uniform Spreading is limited to the usable channels being declared as part of the channel plan.

Usable channels do not include channels which are precluded by either:

- 1) the intended outdoor usage of the RLAN; or
- 2) previous detection of a radar on the channel (Unavailable Channel or Unusable Channel); or
- 3) national regulations; or
- 4) the restriction to only operate in the band 5 150 MHz to

5250 MHz for RLAN devices without a radar detection capability. Each of the Usable Channels shall be used with approximately equal probability. RLAN equipment for which the declared channel plan includes channels whose nominal bandwidth falls completely or partly within the band

5600 MHz to 5650 MHz may omit these channels from the list of Usable Channels at initial power up or at initial installation. Channels being used by other RLAN equipment may be omitted from the list of Usable Channels.

Result: N/A, The UUT is a slave device.

17. EUT Photographs

EUT Photo 1



EUT Photo 2



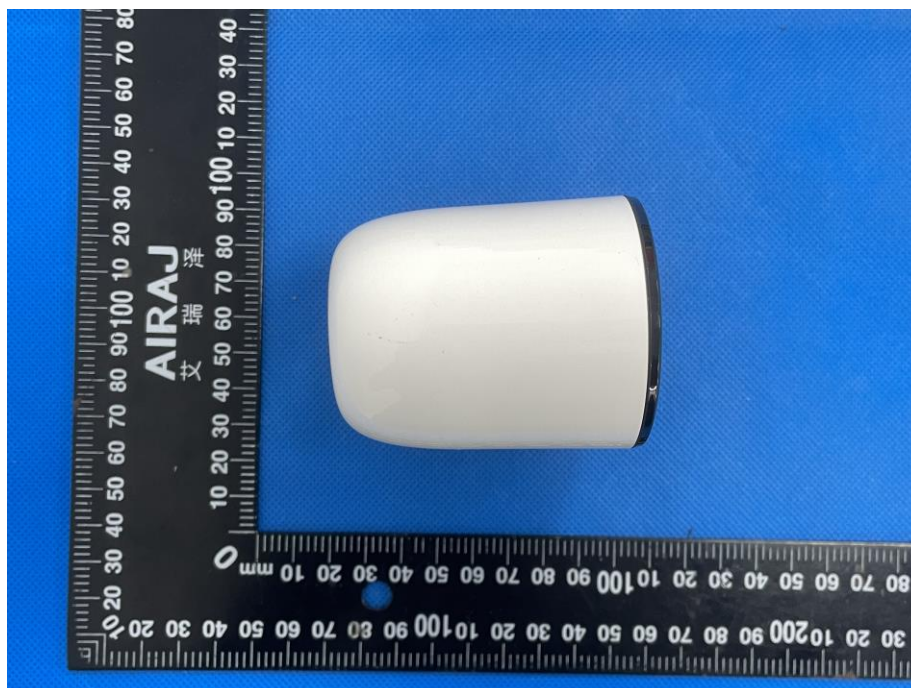
EUT Photo 3



EUT Photo 4



EUT Photo 5



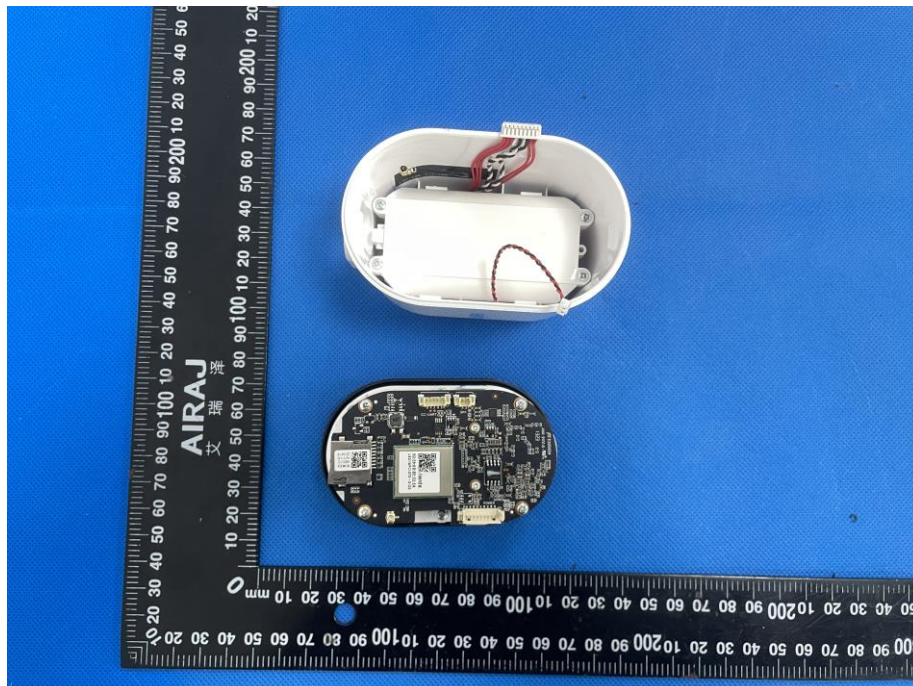
EUT Photo 6



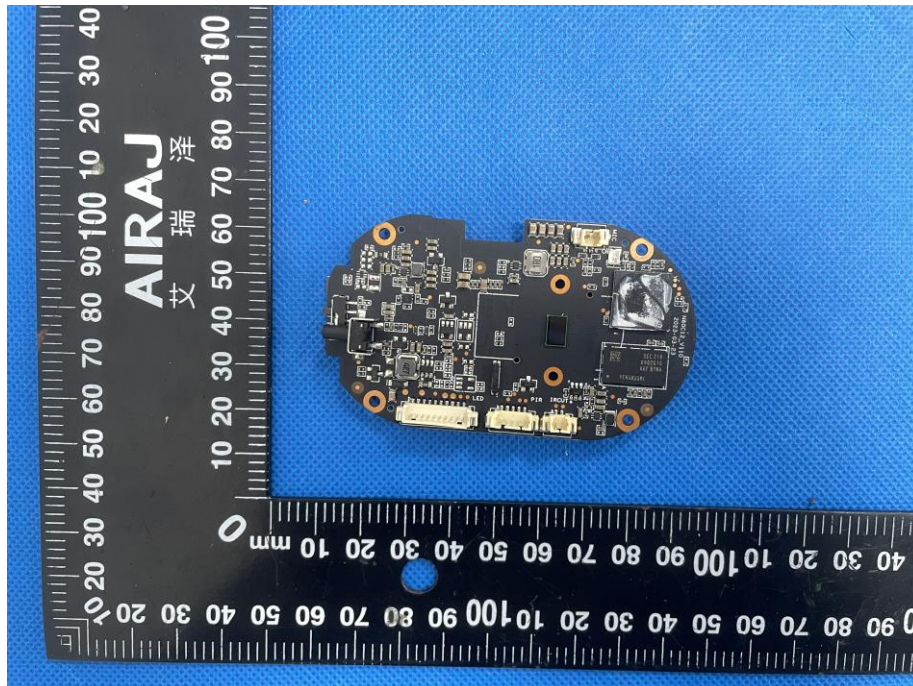
EUT Photo 7



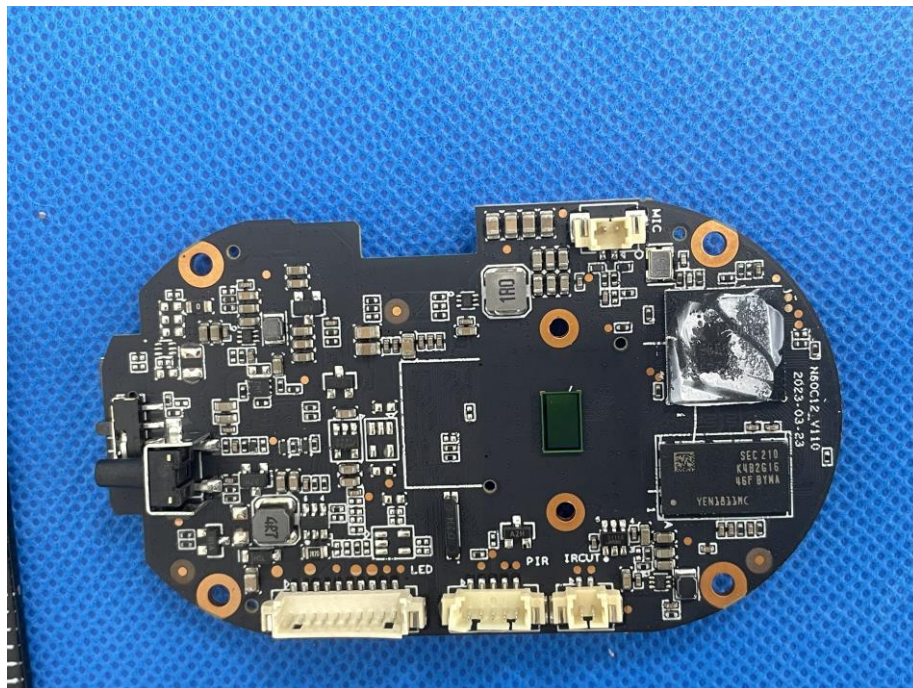
EUT Photo 8



EUT Photo 9

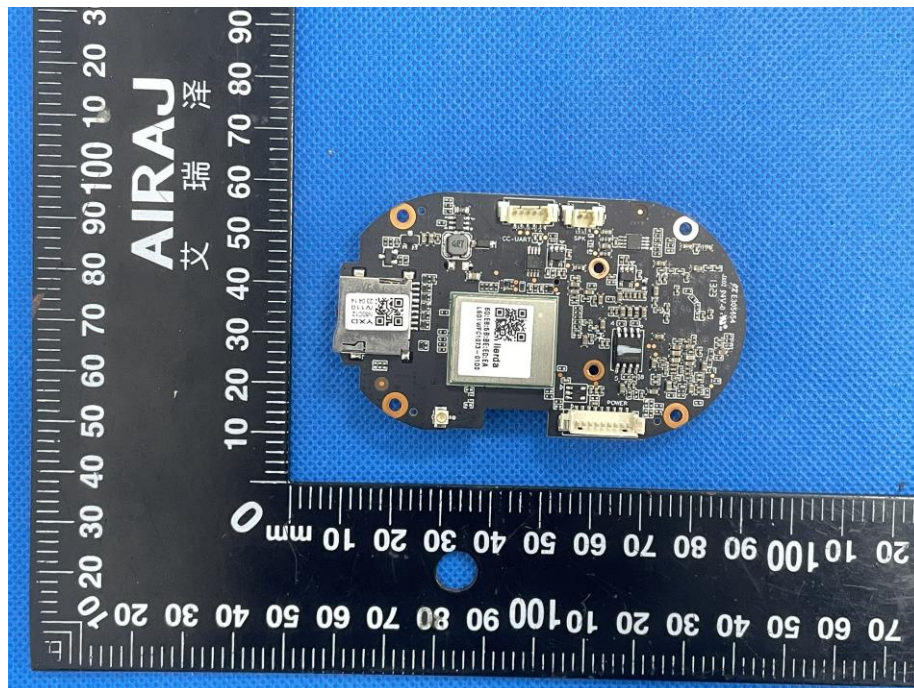


EUT Photo 10

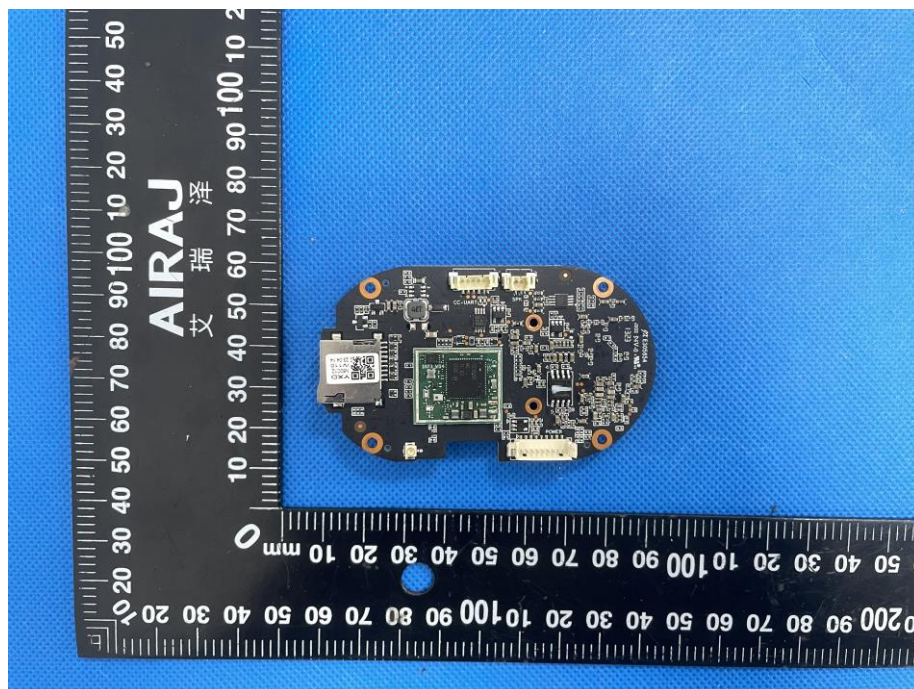


CO., LTD.

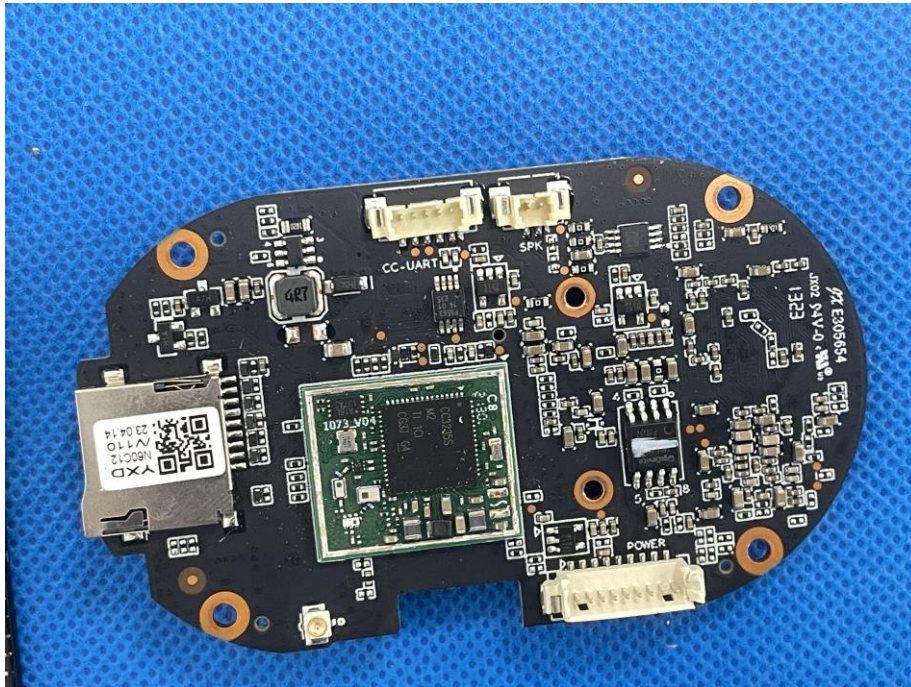
EUT Photo 11



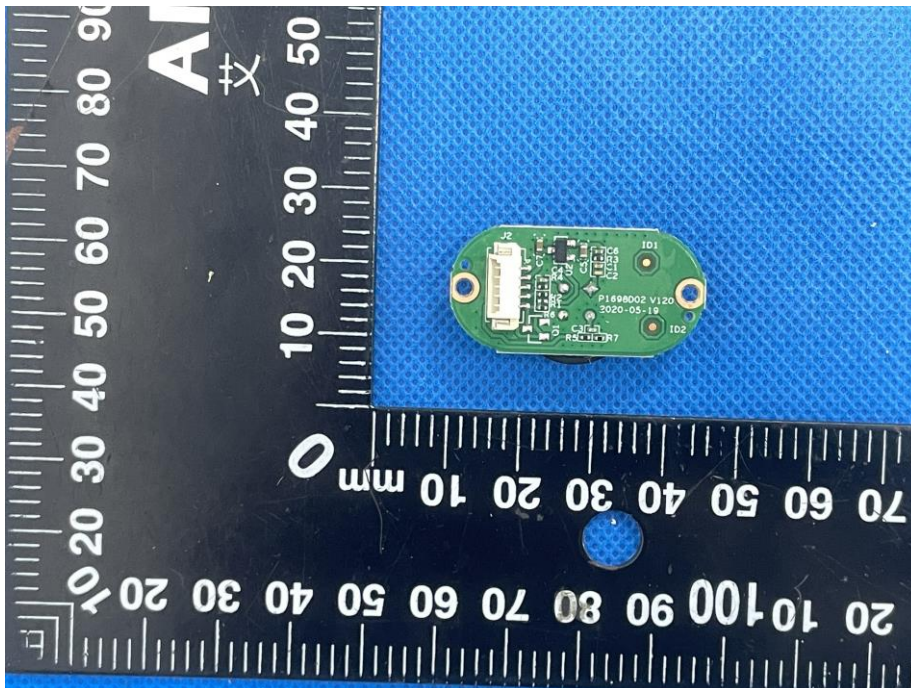
EUT Photo 12



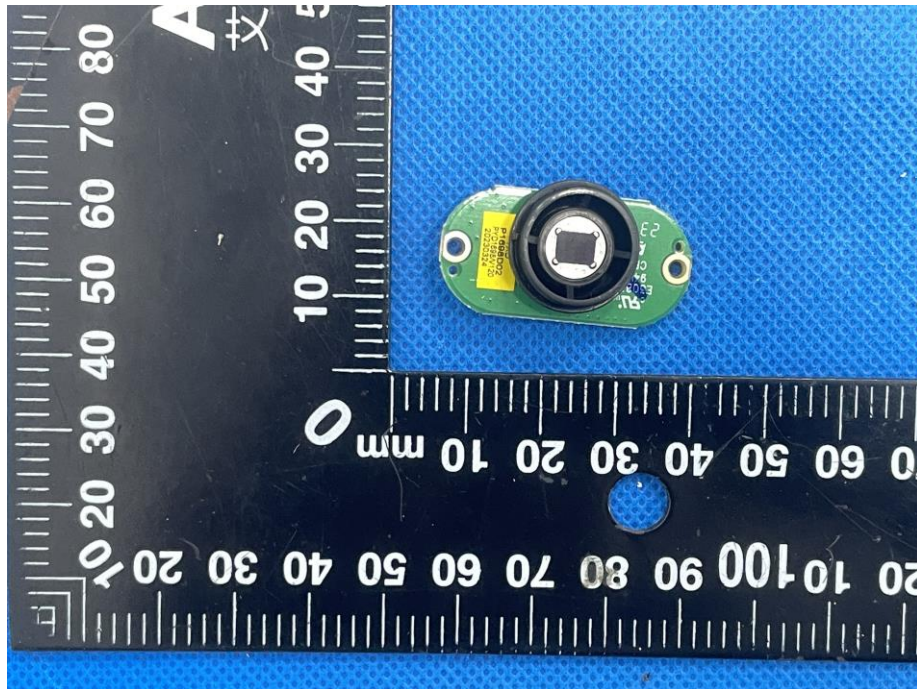
EUT Photo 13



EUT Photo 14



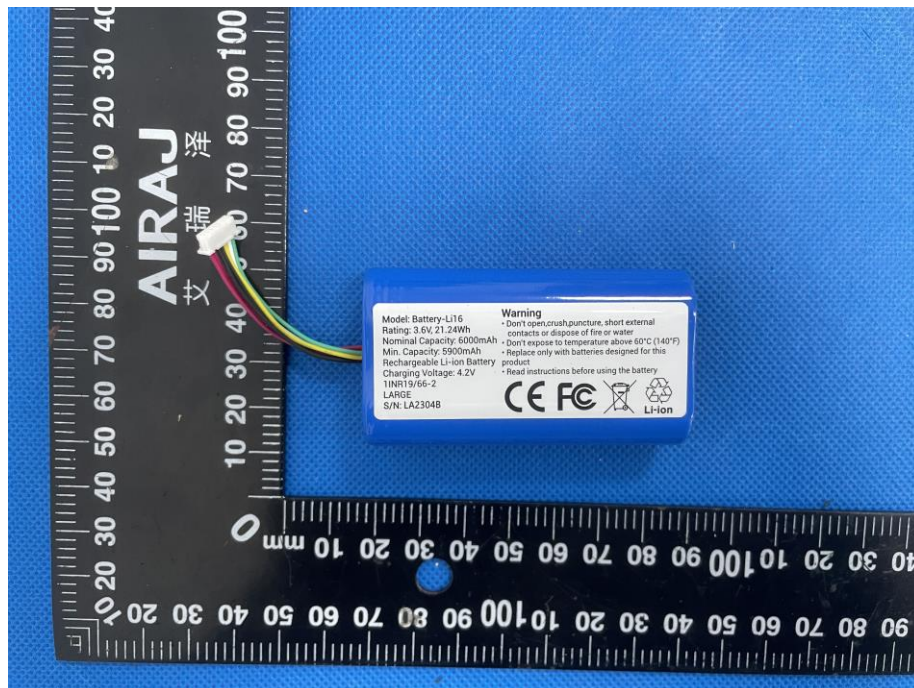
EUT Photo 15



EUT Photo 16



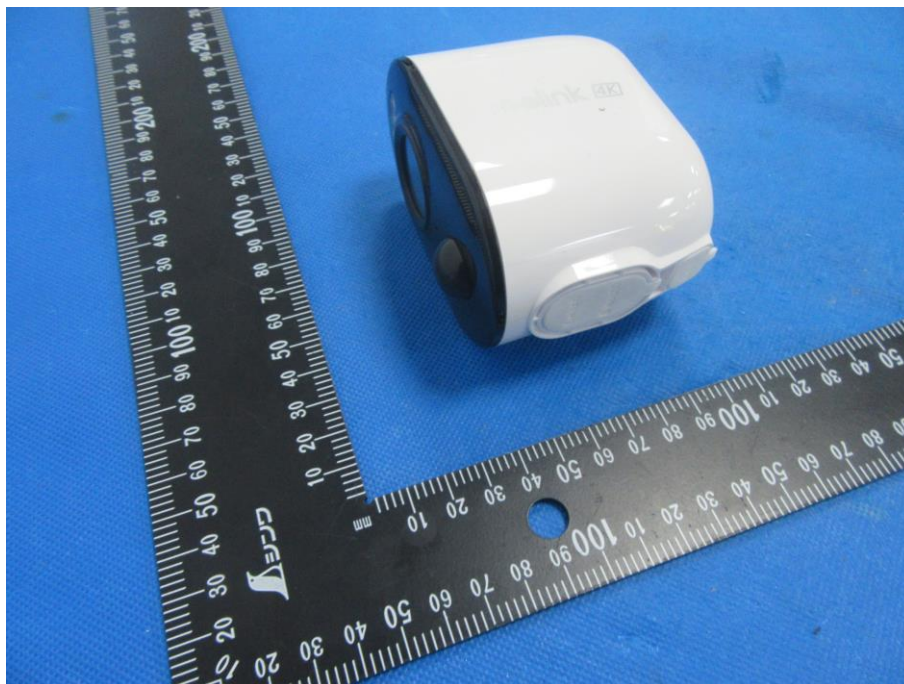
EUT Photo 17



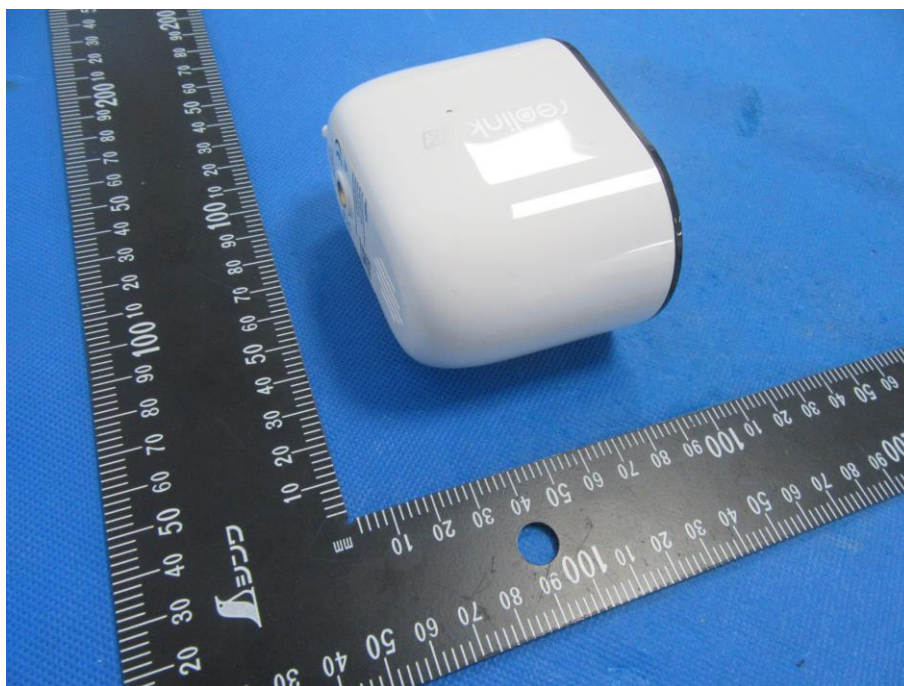
EUT Photo 18



EUT Photo 19



EUT Photo 20



TEST
FOR
OVER
SEAL

18. EUT Test Setup Photographs

Spurious emissions



DFS



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 the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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P.C.: 518103

FAX: 0755-33229357

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

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

***** END *****