RF REPORT

FCC ID: 2AZFE-AN1

On Behalf of

Shenzhen Shadow Crown Technology Co.,Ltd.

LED Projector

Model No.: An1, An2, An3, E88, LU-1, An2 Pro, E88 Pro, NX-2, NS-1, NS-1 PRO

Prepared for	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th Floor, Industrial Building,Longwang Miao, Fuyong District , Shenzhen, Guangdong, P.R.China.

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2303044-C01-R03
Date of Receipt	:	March 23, 2023
Date of Test	:	March 23, 2023 to April 13, 2023
Date of Report	:	April 13, 2023
Version Number	:	V0

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TEST REPORT DECLARATION

Applicant	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th Floor, Industrial Building,Longwang Miao, Fuyong District , Shenzhen, Guangdong, P.R.China.
Manufacturer	:	Shenzhen Shadow Crown Technology Co.,Ltd.
Address	:	A9 East 5th Floor, Industrial Building,Longwang Miao, Fuyong District , Shenzhen, Guangdong, P.R.China.
EUT Description	:	LED Projector
(A) Model No.	:	An1, An2, An3, E88, LU-1, An2 Pro, E88 Pro, NX-2, NS-1, NS-1 PRO
(B) Trademark	:	N/A

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart E

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with above listed standard(s) requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature)	:	Yannis Wen Project Engineer
Approved by (name + signature)	:	Reak Yang Project Manager
Date of issue	:	April 13, 2023

Revision History

Revision	Issue Date	Revisions	Revised By
V0	April 13, 2023	Initial released Issue	Yannis Wen

1 General Information

1.1 Description of Device (EUT)

Product Name	:	LED Projector
Trademark	:	N/A
Model Number	:	An1, An2, An3, E88, LU-1, An2 Pro, E88 Pro, NX-2, NS-1, NS-1 PRO
DIFF	:	There is no difference between the models except the appearance color. So all the test were performed on the model An1.
Operation Frequency	:	802.11a/n(HT20): U-NII Band 1: 5180MHz to 5240MHz; U-NII Band 3: 5745MHz to 5825MHz; 802.11n(HT40): U-NII Band 1: 5190MHz to 5230MHz; U-NII Band 3: 5755MHz to 5795MHz;
Number of Channels	:	802.11a/n(HT20): U-NII Band 1: 4; U-NII Band 3: 5; 802.11n(HT40): U-NII Band 1: 2; U-NII Band 3: 2;
Modulation Type	:	802.11a: OFDM(BPSK, QPSK, 16QAM, 64QAM); 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM);
Antenna Type	:	FPC antenna
Antenna Gain	:	3.54dBi（Max）

1.2 Test Lab information

Shenzhen Alpha Product Testing Co., Ltd Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China
June 21, 2018 File on Federal Communication Commission Registration Number: 293961 Designation Number: CN1236 July 15, 2019 Certificated by IC Registration Number: CN0085

2 Summary of test

2.1 Test Standard description:

The tests were performed according to following standards:

FCC Part 15E: Unlicensed National Information Infrastructure Devices

2.2 Summary of test

Item	Requirement	Method	Result
Antenna requirement	Part 15.203		Pass
Conducted Emission at AC power line	FCC Part 15.207(a)	ANSI C63.10-2013 section 6.2	Pass
Maximum conducted output power	FCC Part 15.407(a)(1)(i) FCC Part 15.407(a)(1)(ii) FCC Part 15.407(a)(1)(iii) FCC Part 15.407(a)(1)(iv) FCC Part 15.407(a)(3)(i)	ANSI C63.10-2013, section 12.3	Pass
Power spectral density	FCC Part 15.407(a)(1)(i) FCC Part 15.407(a)(1)(ii) FCC Part 15.407(a)(1)(iii) FCC Part 15.407(a)(1)(iv) FCC Part 15.407(a)(3)(i)	ANSI C63.10-2013, section 12.5	Pass
Emission bandwidth and occupied bandwidth	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. FCC Part 15.407(e)	ANSI C63.10-2013, section 6.9.3 & 12.4 KDB 789033 D02, Clause C.2	Pass
Band edge emissions (Radiated)	FCC Part 15.407(b)(1) FCC Part 15.407(b)(4) FCC Part 15.407(b)(10)	ANSI C63.10-2013, section 12.7.4, 12.7.5, 12.7.6	Pass
Undesirable emission limits (below 1GHz)	FCC Part 15.407(b)(9)	ANSI C63.10-2013, section 12.7.4, 12.7.5, 12.7.6	Pass
Undesirable emission limits (above 1GHz)	FCC Part 15.407(b)(1) FCC Part 15.407(b)(4) FCC Part 15.407(b)(10)	ANSI C63.10-2013, section 12.7.4, 12.7.5, 12.7.6	Pass

2.3 Test Mode Description

No	Title	Description
TM1	802.11a mode	Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11a modulation type. All data rates has been tested and found the data rate @ 6Mbps is the worst case. Only the data of worst case is recorded in the report.
TM2	802.11n mode	Keep the EUT connect to AC power line and works in continuously transmitting mode with 802.11n modulation type. All bandwidth and data rates has been tested and found the data rate @ MCS0 is the worst case. Only the data of worst case is recorded in the report.

2.4 Measurement Uncertainty (95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8}GHz
Uncertainty for conducted RF Power	0.40dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.5 Test Equipment

Equipment	Manufacture	Model No.	Firmware version	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	/	N/A	2022.05.17	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	2.3	102137	2022.08.22	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2022.08.22	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2022.08.22	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2022.08.22	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2021.08.30	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	/	00059	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	/	RE1	2022.08.22	1Year
RF Cable	Resenberger	Cable 2	/	RE2	2022.08.22	1Year
RF Cable	Resenberger	Cable 3	/	CE1	2022.08.22	1Year
Pre-amplifier	HP	HP8347A	/	2834A00455	2022.08.22	1Year
Pre-amplifier	Agilent	8449B	/	3008A02664	2022.08.22	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	/	8126-466	2022.08.22	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	/	101043	2022.08.23	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	/	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840-50	/	SK2018101801	2022.08.22	1 Year
Power Meter	Agilent	E9300A	/	MY41496628	2022.08.22	1 Year
Power Sensor	DARE	RPR3006W	/	15100041SNO91	2022.08.22	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000-40-880	/	100631	2022.08.22	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2022.08.22	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	farad	Alpha-3A1
CE	EZ-EMC	farad	Alpha-3A1
RF-CE	MTS 8310	MWRFtest	2.0.0.0

3 Evaluation Results (Evaluation)

3.1 Antenna requirement

Test Requirement:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.1.1 Conclusion:

The antenna is FPC antenna. The best case gain of the antenna is 3.54dBi, for 5180~5240MHz; 5745~5825MHz

4 Radio Spectrum Matter Test Results (RF)

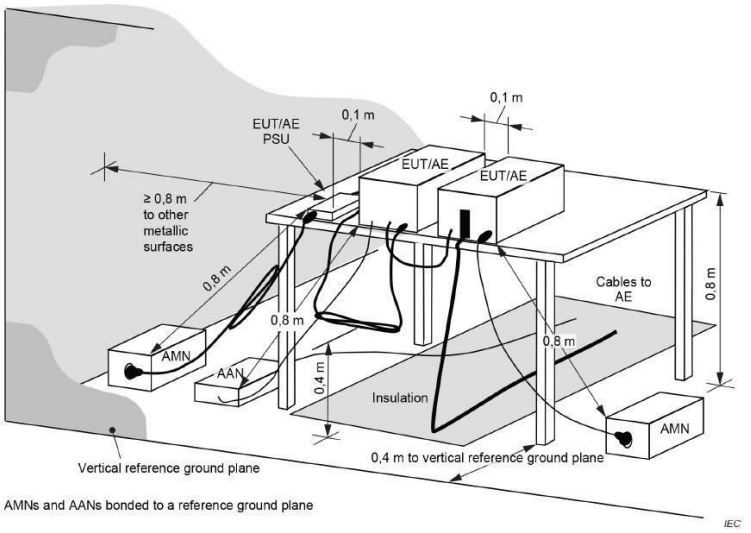
4.1 Conducted Emission at AC power line

Test Requirement:	FCC Part 15.207(a)
Test Limit:	Frequency of emission (MHz) / Conducted limit (dBμV): Quasi-peak / Average 0.15-0.5: 66 to 56* / 56 to 46* 0.5-5: 56 / 46 5-30: 60 / 50 *Decreases with the logarithm of the frequency.
Test Method:	Refer to ANSI C63.10-2013 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.1.1 E.U.T. Operation:

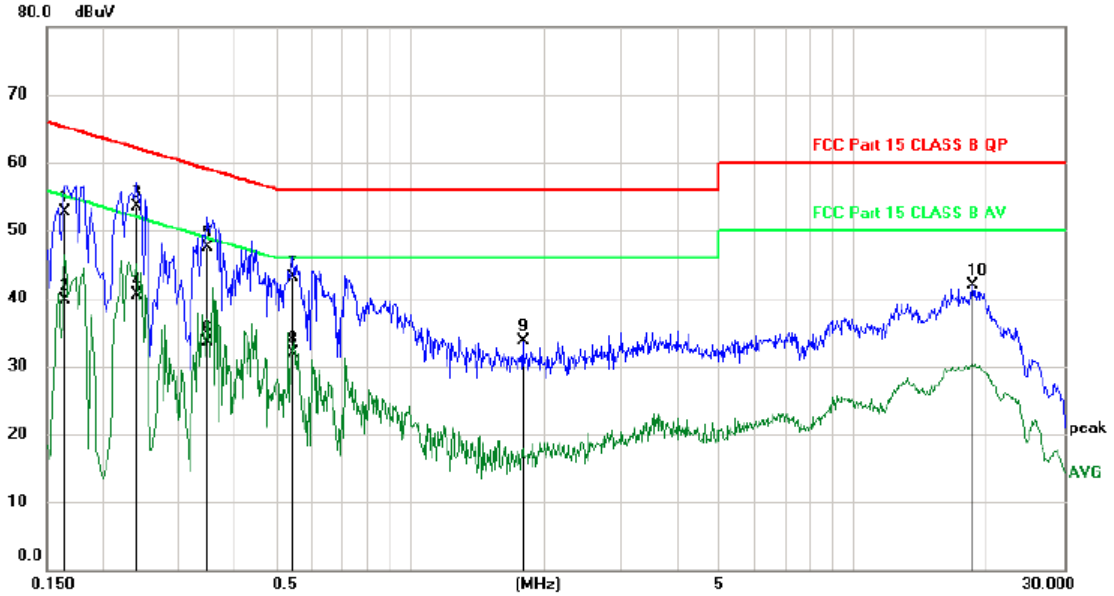
Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.1.2 Test Setup Diagram:



4.1.3 Test Result:

Line: Line / Band: U-NII Band 1 a / BW: 20 / CH: L

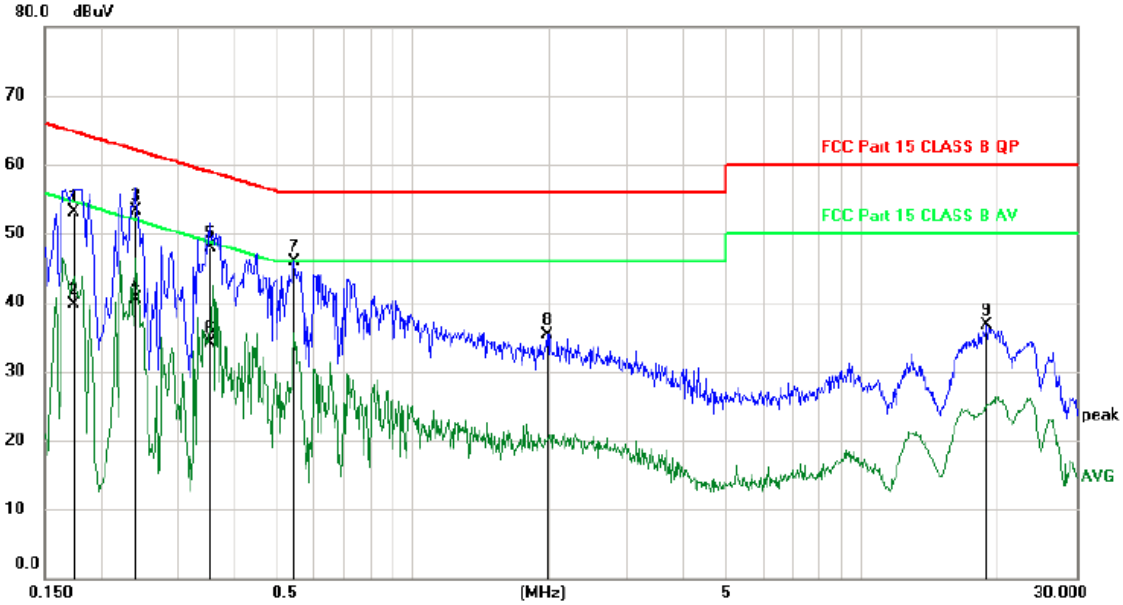


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1650	42.70	9.93	52.63	65.21	-12.58	QP	
2		0.1650	29.79	9.93	39.72	55.21	-15.49	AVG	
3	*	0.2400	43.64	9.96	53.60	62.10	-8.50	QP	
4		0.2400	30.51	9.96	40.47	52.10	-11.63	AVG	
5		0.3480	37.63	9.95	47.58	59.01	-11.43	QP	
6		0.3480	23.64	9.95	33.59	49.01	-15.42	AVG	
7		0.5429	33.19	9.94	43.13	56.00	-12.87	QP	
8		0.5429	22.06	9.94	32.00	46.00	-14.00	AVG	
9		1.7970	23.84	9.89	33.73	56.00	-22.27	peak	
10		18.7050	31.48	10.43	41.91	60.00	-18.09	peak	

*:Maximum data x:Over limit l:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Line: Neutral / Band: U-NII Band 1 a / BW: 20 / CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1740	43.09	9.93	53.02	64.77	-11.75	QP	
2		0.1740	29.83	9.93	39.76	54.77	-15.01	AVG	
3	*	0.2400	43.38	9.96	53.34	62.10	-8.76	QP	
4		0.2400	30.46	9.96	40.42	52.10	-11.68	AVG	
5		0.3509	37.93	9.95	47.88	58.94	-11.06	QP	
6		0.3509	24.14	9.95	34.09	48.94	-14.85	AVG	
7		0.5429	35.87	9.94	45.81	56.00	-10.19	peak	
8		1.9830	25.51	9.88	35.39	56.00	-20.61	peak	
9		19.0200	26.23	10.44	36.67	60.00	-23.33	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

This Report only show the test plots of the worst case (U-NII-1).

4.2 Maximum conducted output power

Test Requirement:	FCC Part 15.407(a)(1)(i) FCC Part 15.407(a)(1)(ii) FCC Part 15.407(a)(1)(iii) FCC Part 15.407(a)(1)(iv) FCC Part 15.407(a)(3)(i)
Test Limit:	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm). For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations. For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Test Method:	ANSI C63.10-2013, section 12.3

Procedure:	Method SA-1 a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal. b) Set RBW = 1 MHz. c) Set VBW >= 3 MHz. d) Number of points in sweep >= [2 × span / RBW]. (This gives bin-to-bin spacing <= RBW / 2, so that narrowband signals are not lost between frequency bins.) e) Sweep time = auto. f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle >= 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.” h) Trace average at least 100 traces in power averaging (rms) mode. i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

4.2.2 Test Result:

Band 1 (5180-5240 MHz)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Limit (dBm)	Verdict
NVNT	a	5180	Ant1	16.656	0	24	Pass
NVNT	a	5200	Ant1	16.415	0	24	Pass
NVNT	a	5240	Ant1	16.607	0	24	Pass
NVNT	n20	5180	Ant1	16.584	0	24	Pass
NVNT	n20	5200	Ant1	16.214	0	24	Pass
NVNT	n20	5240	Ant1	16.383	0	24	Pass
NVNT	n40	5190	Ant1	16.587	0	24	Pass
NVNT	n40	5230	Ant1	16.711	0	24	Pass

Band 4 (5745 - 5825)

Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Duty Factor (dB)	Limit (dBm)	Verdict
NVNT	a	5745	Ant1	16.579	0	30	Pass
NVNT	a	5785	Ant1	17.341	0	30	Pass
NVNT	a	5825	Ant1	15.483	0	30	Pass
NVNT	n20	5745	Ant1	16.103	0	30	Pass
NVNT	n20	5785	Ant1	15.552	0	30	Pass
NVNT	n20	5825	Ant1	15.753	0	30	Pass
NVNT	n40	5755	Ant1	15.928	0	30	Pass
NVNT	n40	5795	Ant1	15.683	0	30	Pass

4.3 Power spectral density

Test Requirement:	FCC Part 15.407(a)(1)(i) FCC Part 15.407(a)(1)(ii) FCC Part 15.407(a)(1)(iii) FCC Part 15.407(a)(1)(iv) FCC Part 15.407(a)(3)(i)
Test Limit:	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations. For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Test Method:	ANSI C63.10-2013, section 12.5
Procedure:	a) Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.3.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2,

	SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.) b) Use the peak search function on the instrument to find the peak of the spectrum. c) Make the following adjustments to the peak value of the spectrum, if applicable: 1) If method SA-2 or SA-2A was used, then add [10 log (1 / D)], where D is the duty cycle, to the peak of the spectrum. 2) If method SA-3A was used and the linear mode was used in step h) of 12.3.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging. d) The result is the PPSD. e) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities.This requirement also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply: 1) Set RBW >= 1 / T, where T is defined in 12.2 a). 2) Set VBW >= [3 × RBW]. 3) Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

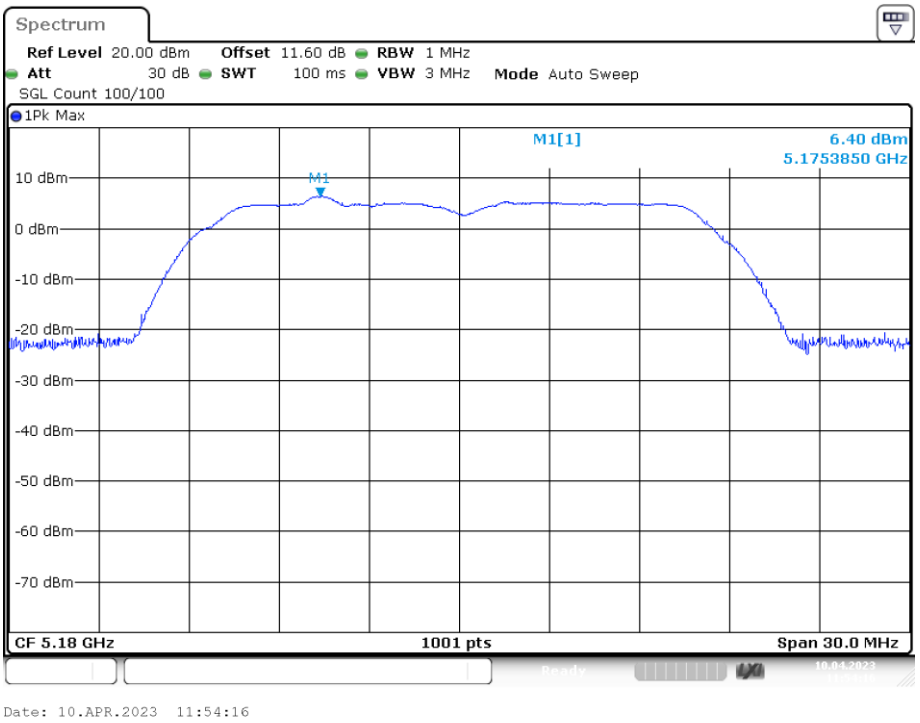
4.3.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

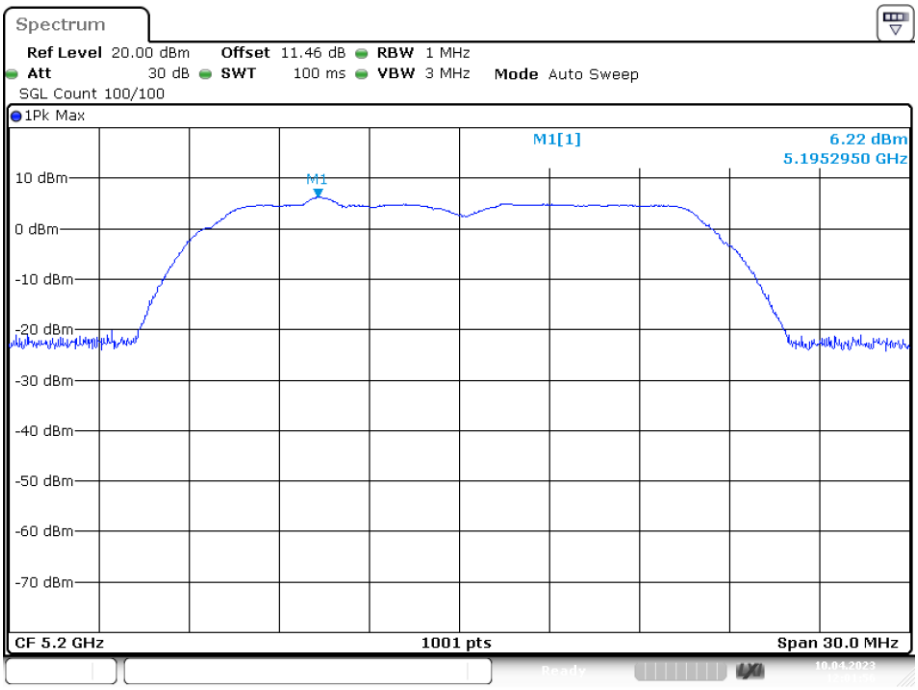
4.3.2 Test Result:

Band 1 (5180-5240 MHz)						
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	Ant1	6.402	11	Pass
NVNT	a	5200	Ant1	6.22	11	Pass
NVNT	a	5240	Ant1	6.299	11	Pass
NVNT	n20	5180	Ant1	4.88	11	Pass
NVNT	n20	5200	Ant1	4.659	11	Pass
NVNT	n20	5240	Ant1	4.919	11	Pass
NVNT	n40	5190	Ant1	2.273	11	Pass
NVNT	n40	5230	Ant1	2.358	11	Pass

PSD NVNT a 5180MHz Ant1



PSD NVNT a 5200MHz Ant1



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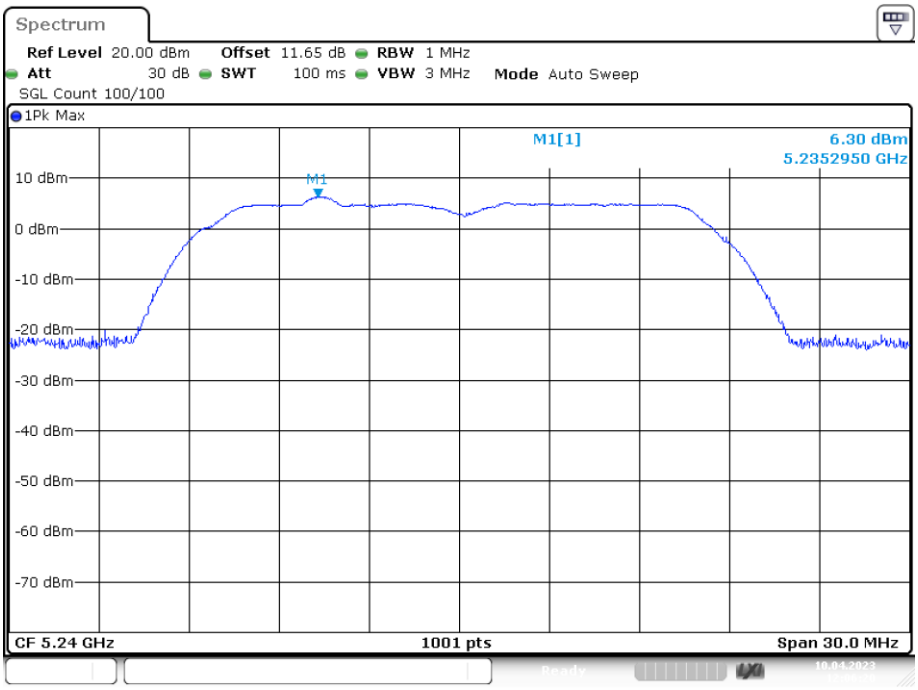
PSD NVNT a 5240MHz Ant1



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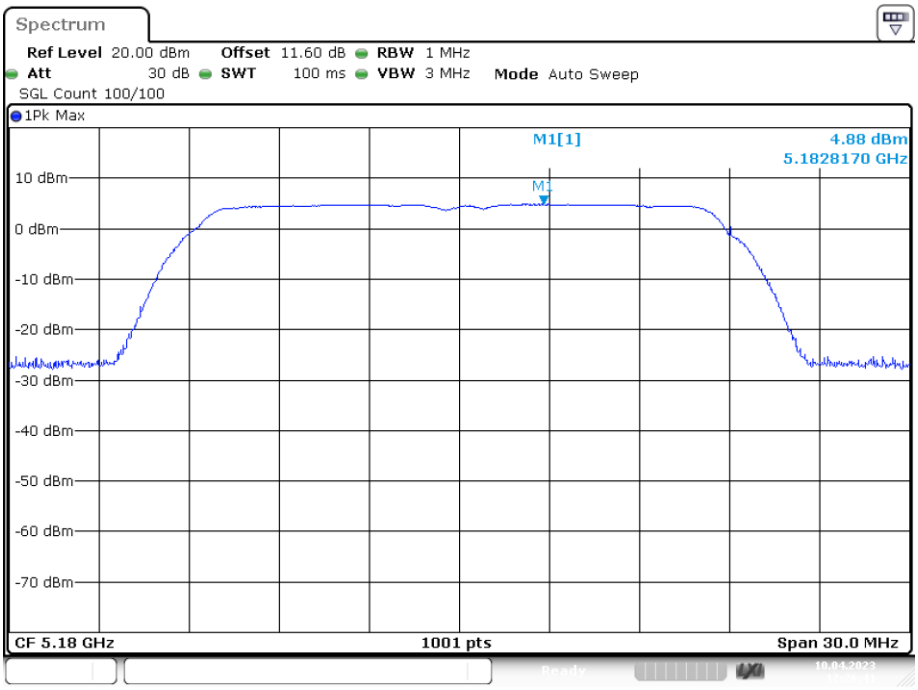
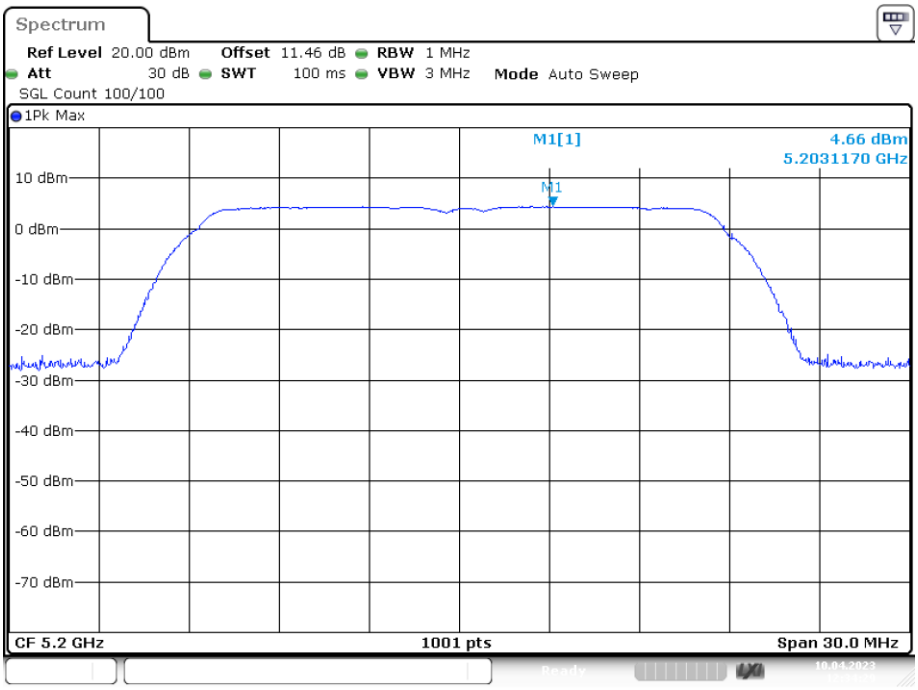
PSD NVNT n20 5180MHz Ant1



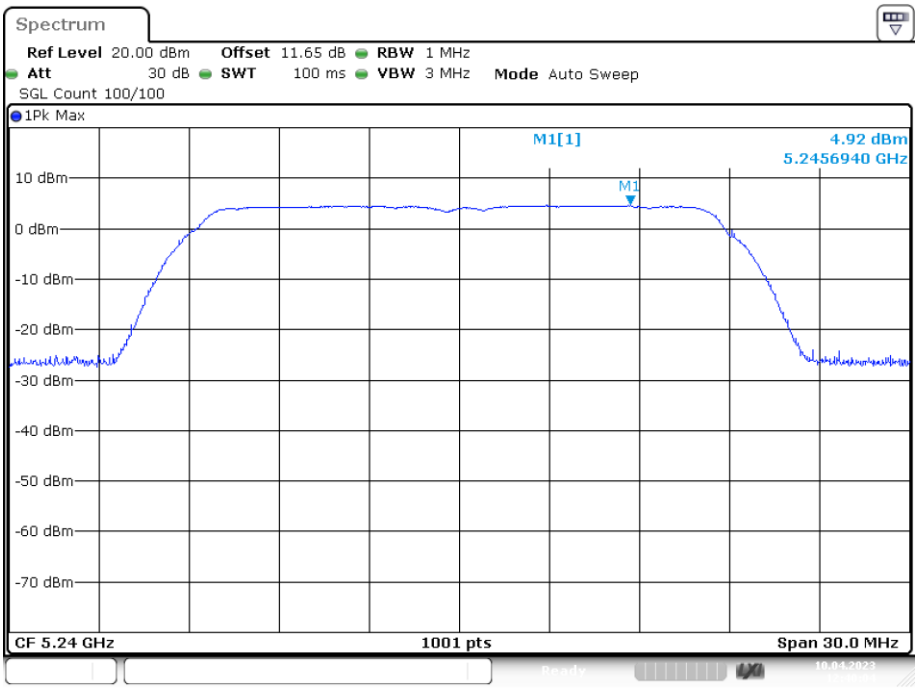
Date: 10.APR.2023 12:26:40

PSD NVNT n20 5200MHz Ant1



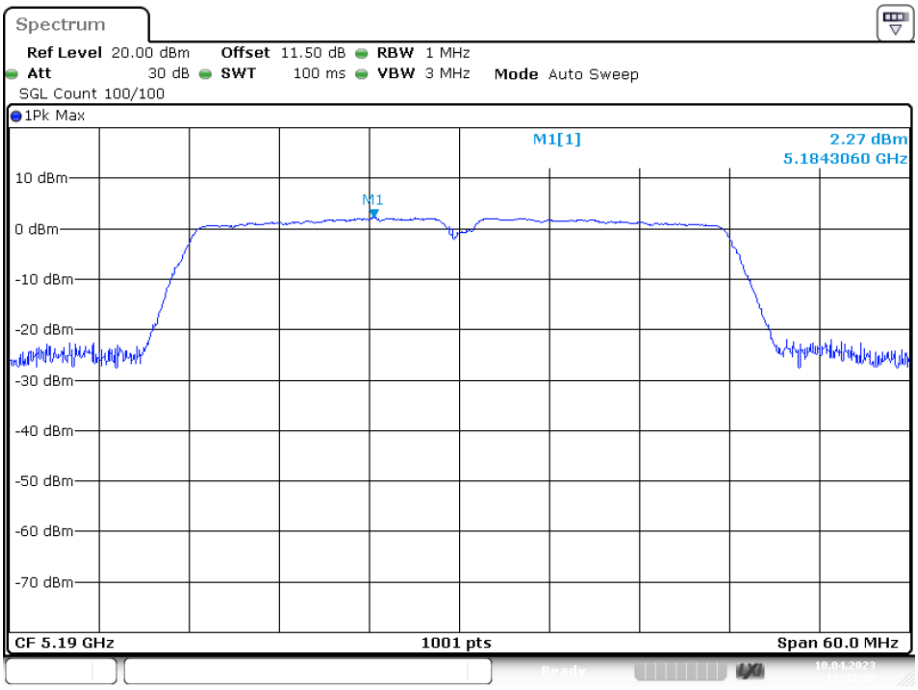
Date: 10.APR.2023 12:34:28

PSD NVNT n20 5240MHz Ant1



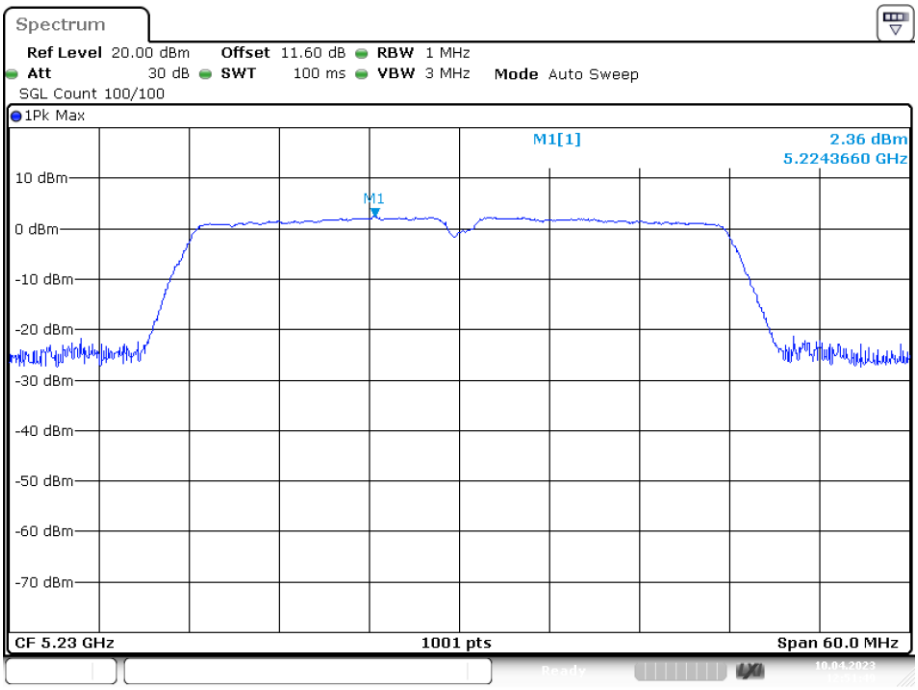
Date: 10.APR.2023 12:40:04

PSD NVNT n40 5190MHz Ant1



Date: 10.APR.2023 12:47:06

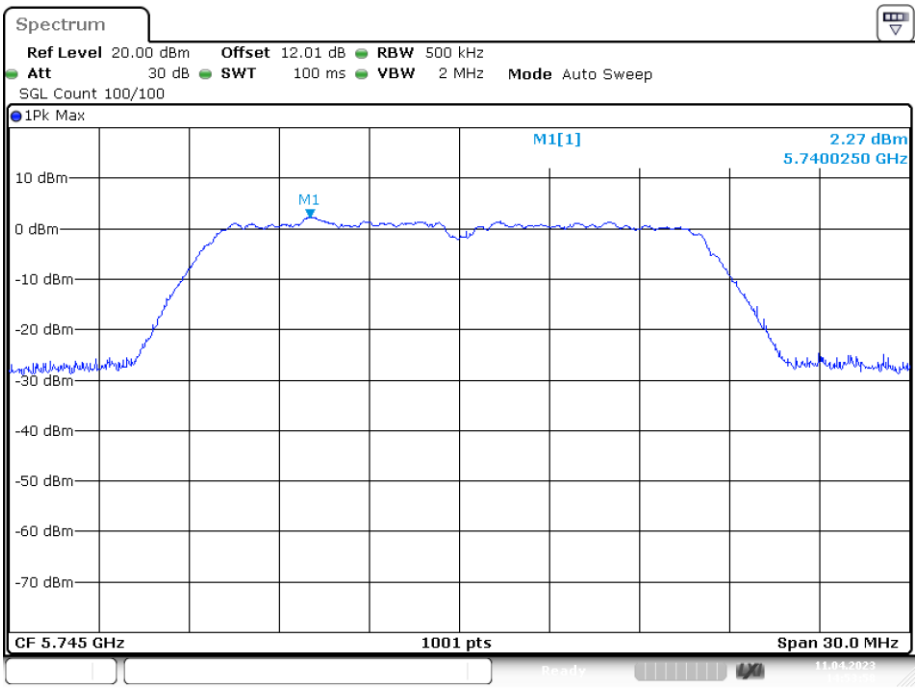
PSD NVNT n40 5230MHz Ant1



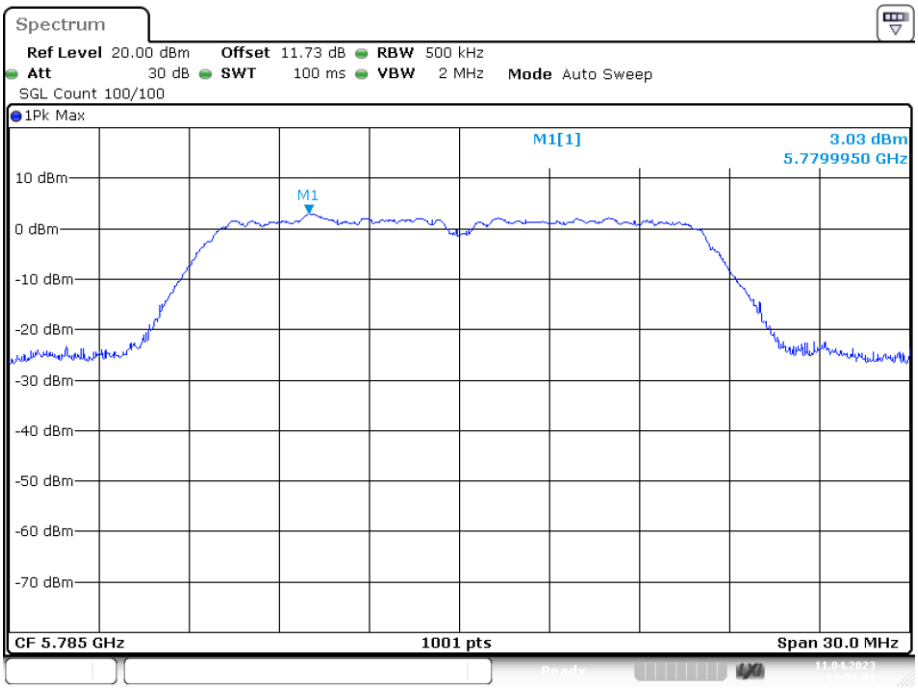
Date: 10.APR.2023 12:51:48

Band 4 (5745 - 5825)						
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	Ant1	2.269	30	Pass
NVNT	a	5785	Ant1	3.029	30	Pass
NVNT	a	5825	Ant1	1.331	30	Pass
NVNT	n20	5745	Ant1	1.154	30	Pass
NVNT	n20	5785	Ant1	0.484	30	Pass
NVNT	n20	5825	Ant1	0.569	30	Pass
NVNT	n40	5755	Ant1	-1.206	30	Pass
NVNT	n40	5795	Ant1	-1.938	30	Pass

PSD NVNT a 5745MHz Ant1

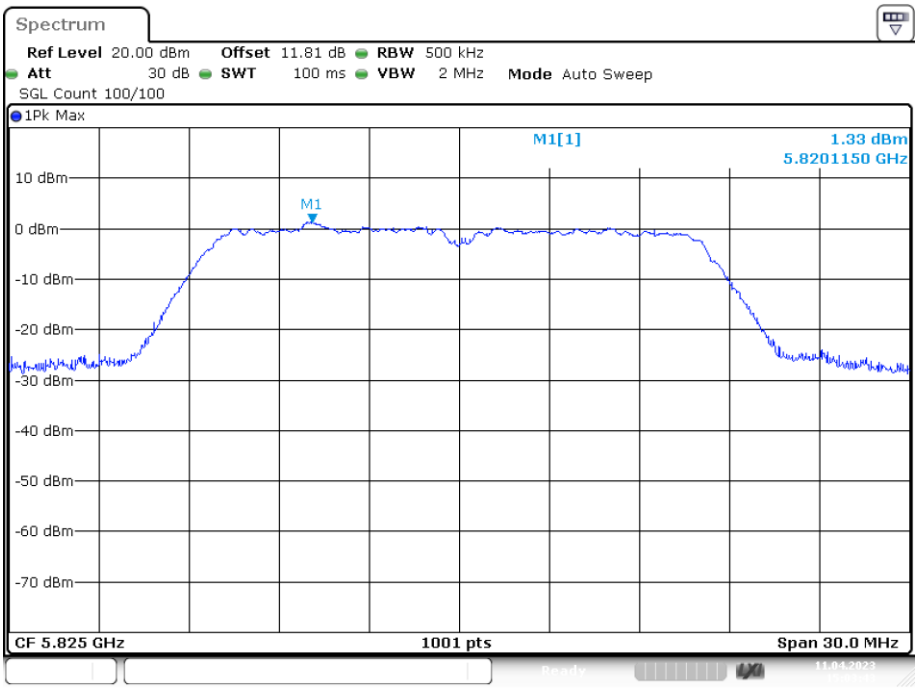


PSD NVNT a 5785MHz Ant1



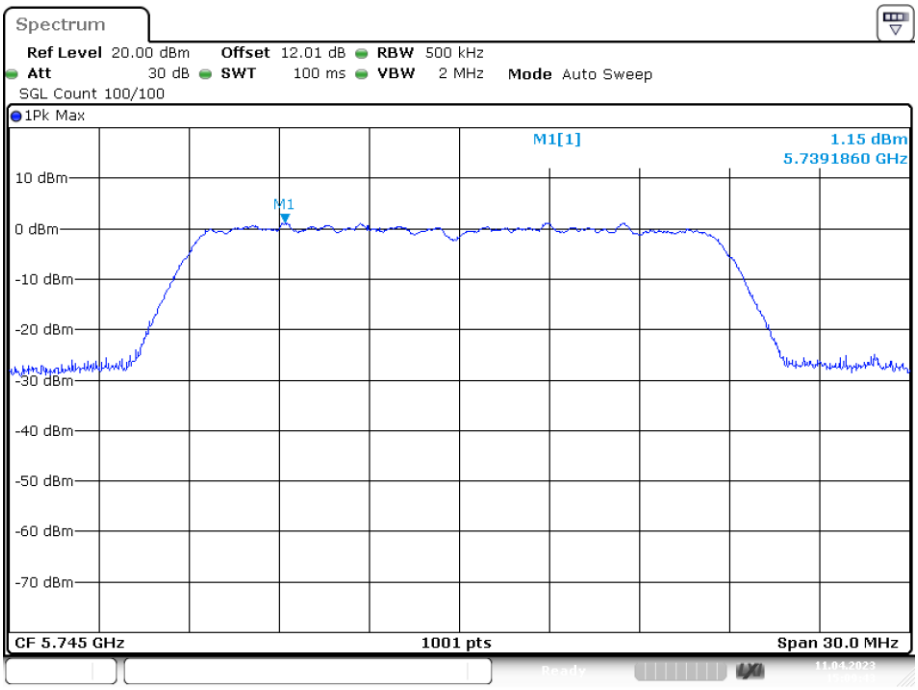
Date: 11.APR.2023 14:59:03

PSD NVNT a 5825MHz Ant1



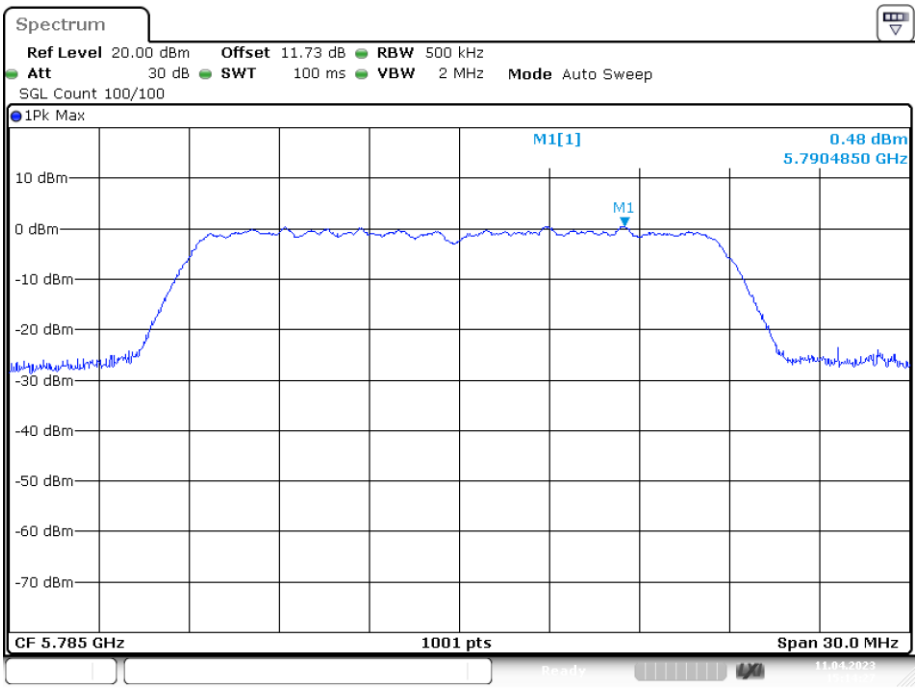
Date: 11.APR.2023 15:03:43

PSD NVNT n20 5745MHz Ant1



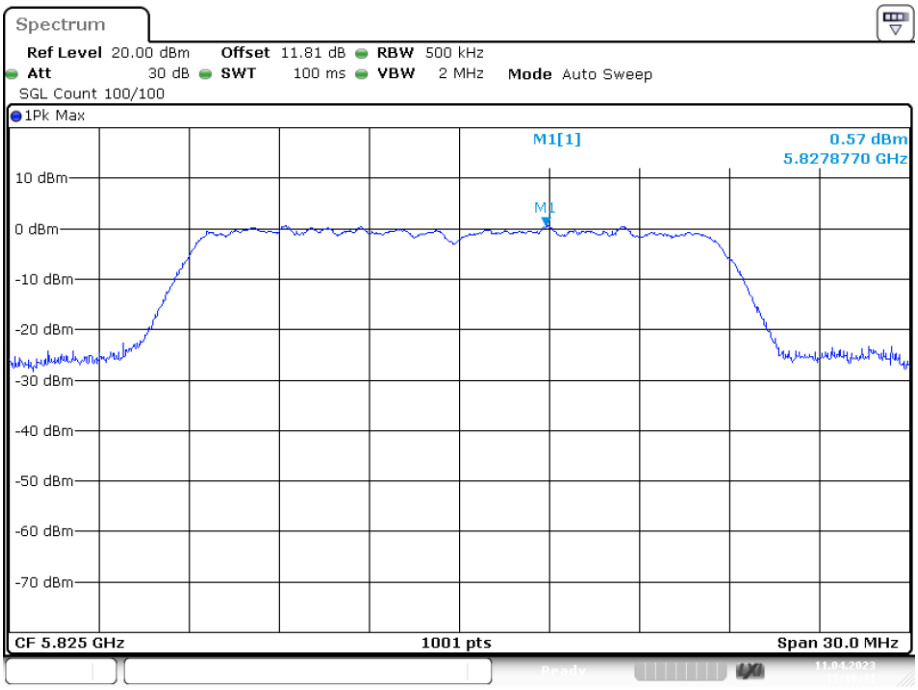
Date: 11.APR.2023 15:09:43

PSD NVNT n20 5785MHz Ant1



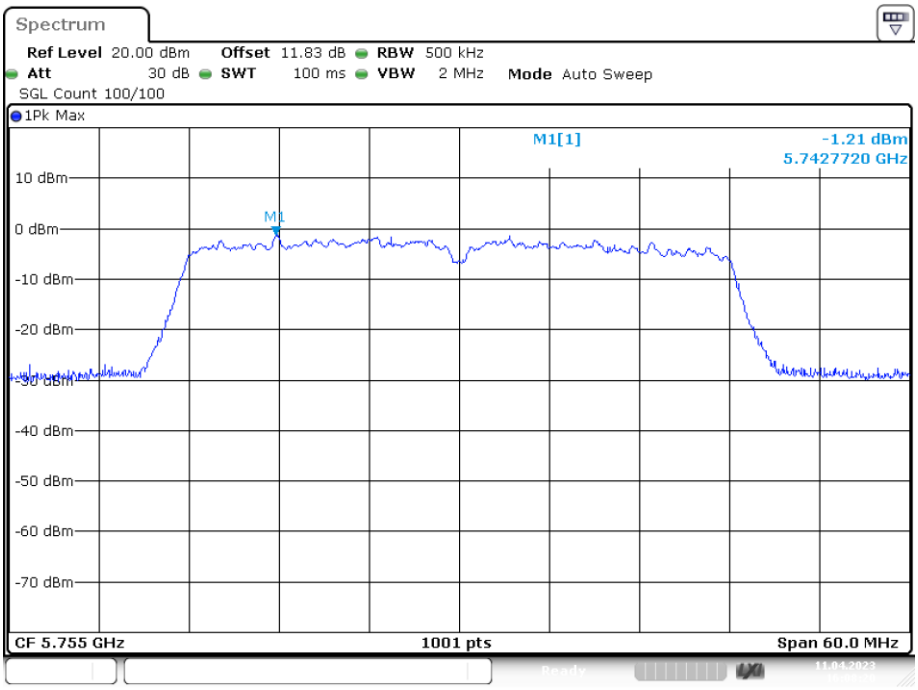
Date: 11.APR.2023 15:14:27

PSD NVNT n20 5825MHz Ant1



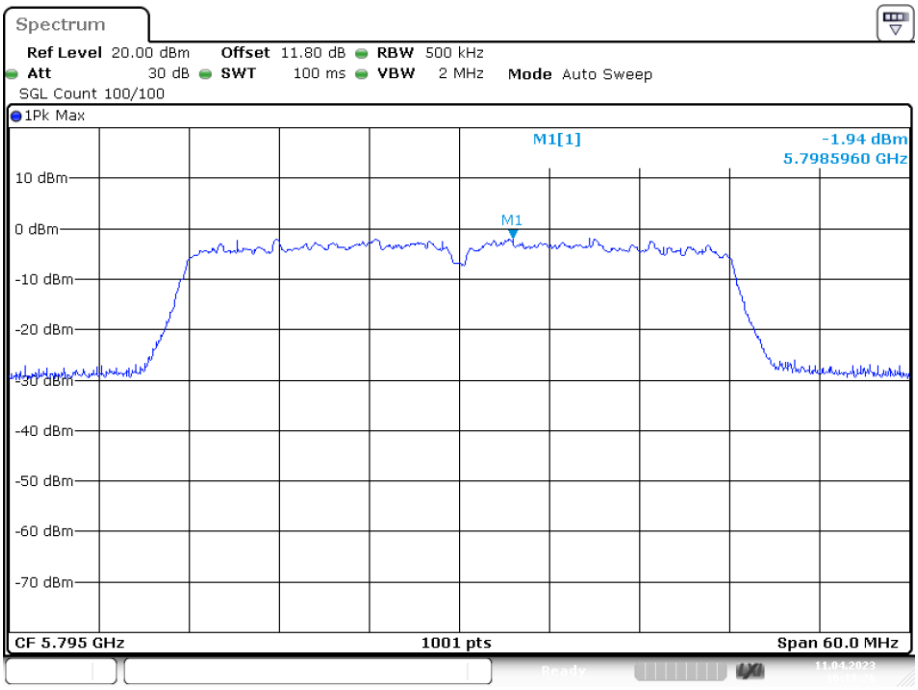
Date: 11.APR.2023 15:18:40

PSD NVNT n40 5755MHz Ant1



Date: 11.APR.2023 16:08:20

PSD NVNT n40 5795MHz Ant1



Date: 11.APR.2023 16:18:26

4.4 Emission bandwidth and occupied bandwidth

Test Requirement:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: FCC Part 15.407(e)
Test Limit:	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
Test Method:	ANSI C63.10-2013, section 6.9.3 & 12.4 KDB 789033 D02, Clause C.2
Procedure:	Emission bandwidth: a) Set RBW = approximately 1% of the emission bandwidth. b) Set the VBW > RBW. c) Detector = peak. d) Trace mode = max hold. e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%. Occupied bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth. g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

	h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s). 6 dB emission bandwidth: a) Set RBW = 100 kHz. b) Set the video bandwidth (VBW) ≥ 3 >= RBW. c) Detector = Peak. d) Trace mode = max hold. e) Sweep = auto couple. f) Allow the trace to stabilize. g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

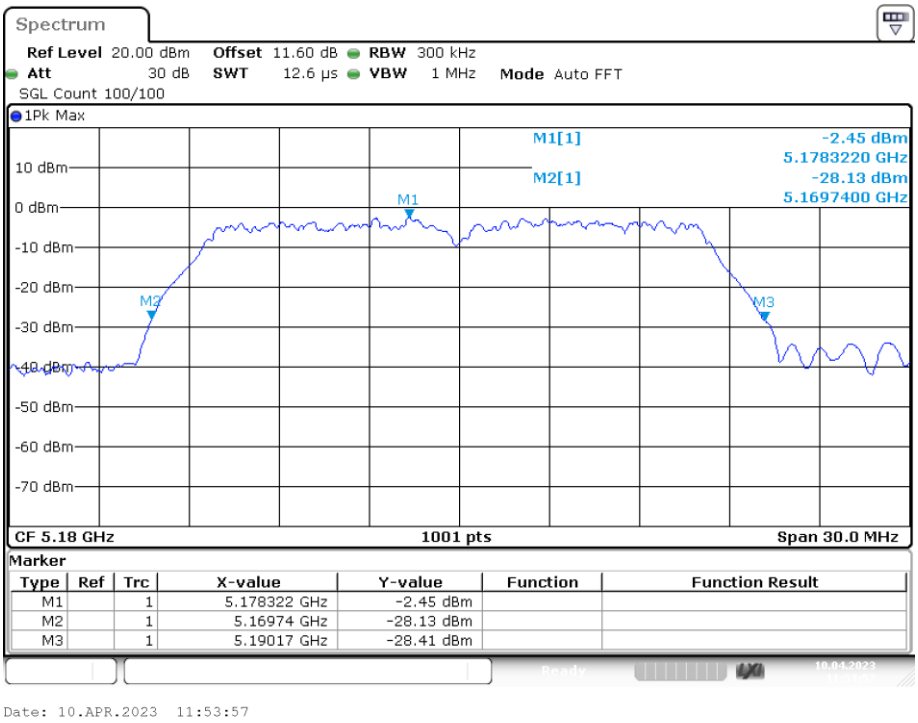
4.4.2 Test Result:

Band 1 (5150-5250 MHz)

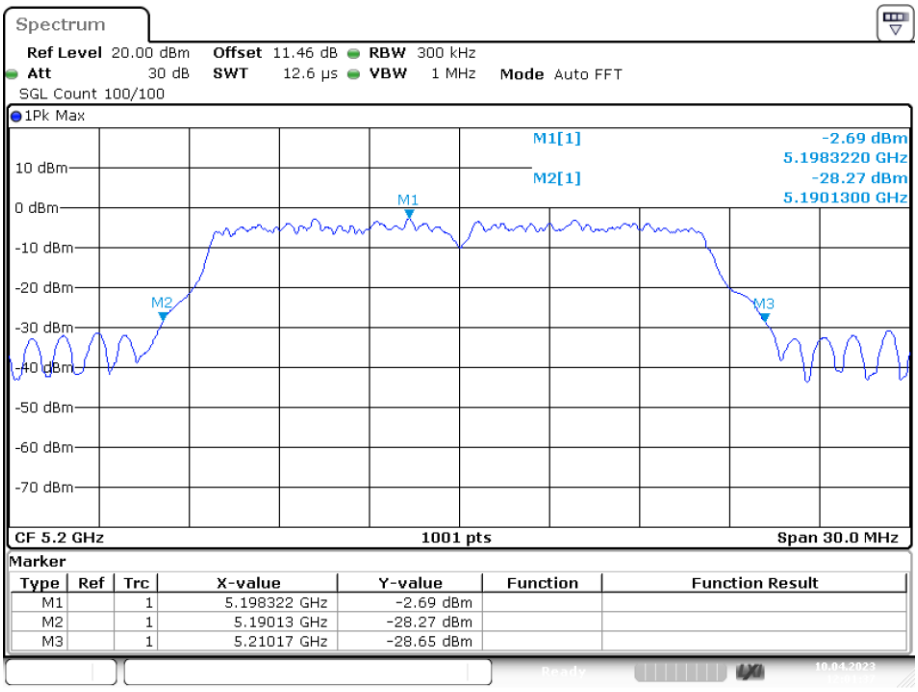
-26dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-26 dB Bandwidth (MHz)	Limit -26 dB Bandwidth (MHz)	Verdict
NVNT	a	5180	Ant1	20.43	0.5	Pass
NVNT	a	5200	Ant1	20.04	0.5	Pass
NVNT	a	5240	Ant1	20.31	0.5	Pass
NVNT	n20	5180	Ant1	20.61	0.5	Pass
NVNT	n20	5200	Ant1	20.49	0.5	Pass
NVNT	n20	5240	Ant1	20.7	0.5	Pass
NVNT	n40	5190	Ant1	39.72	0.5	Pass
NVNT	n40	5230	Ant1	40.02	0.5	Pass

-26dB Bandwidth NVNT a 5180MHz Ant1

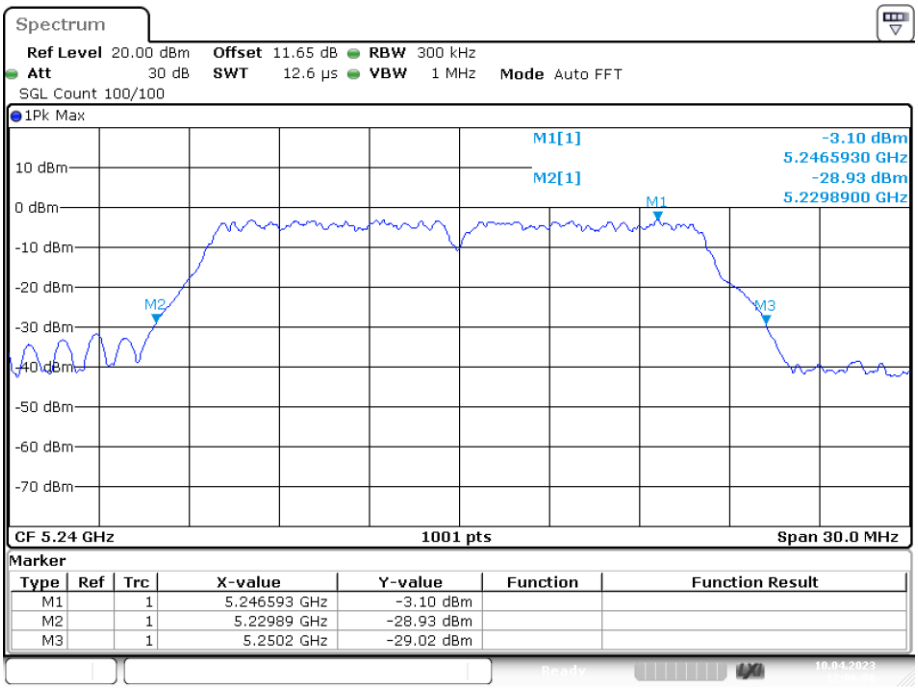


-26dB Bandwidth NVNT a 5200MHz Ant1



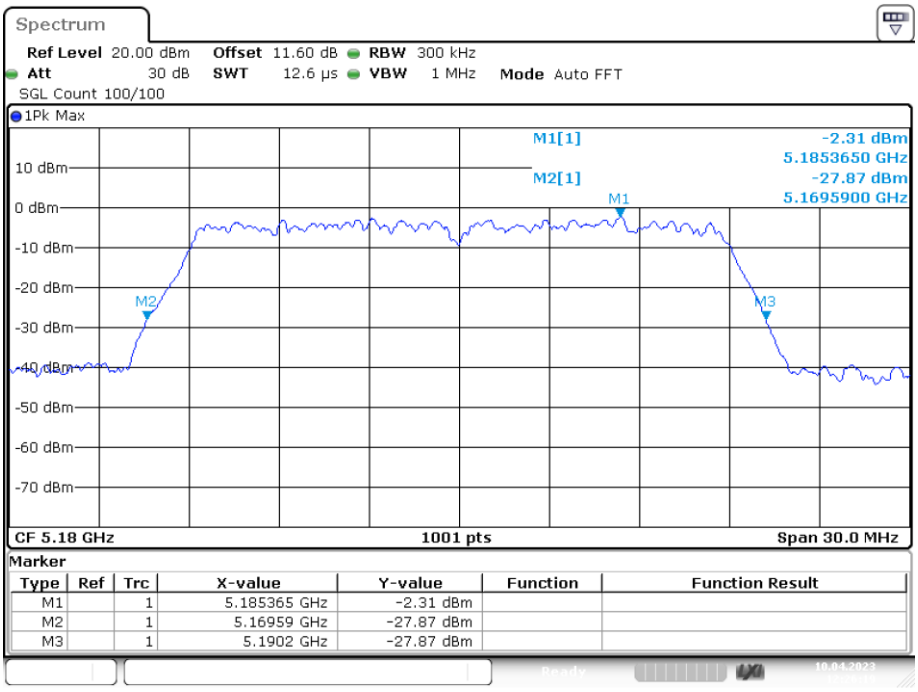
Date: 10.APR.2023 12:01:37

-26dB Bandwidth NVNT a 5240MHz Ant1



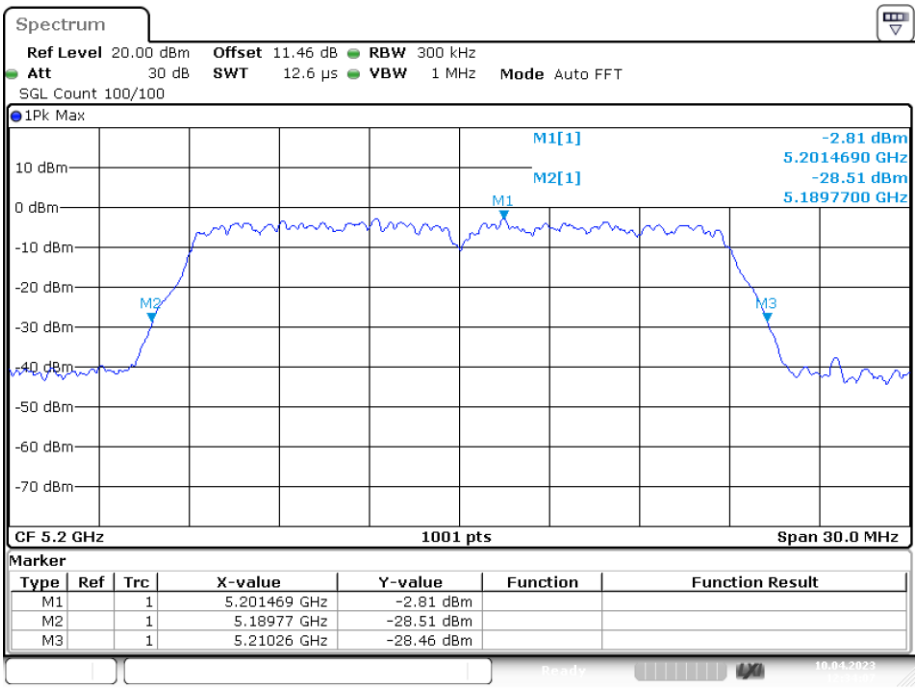
Date: 10.APR.2023 12:06:00

-26dB Bandwidth NVNT n20 5180MHz Ant1



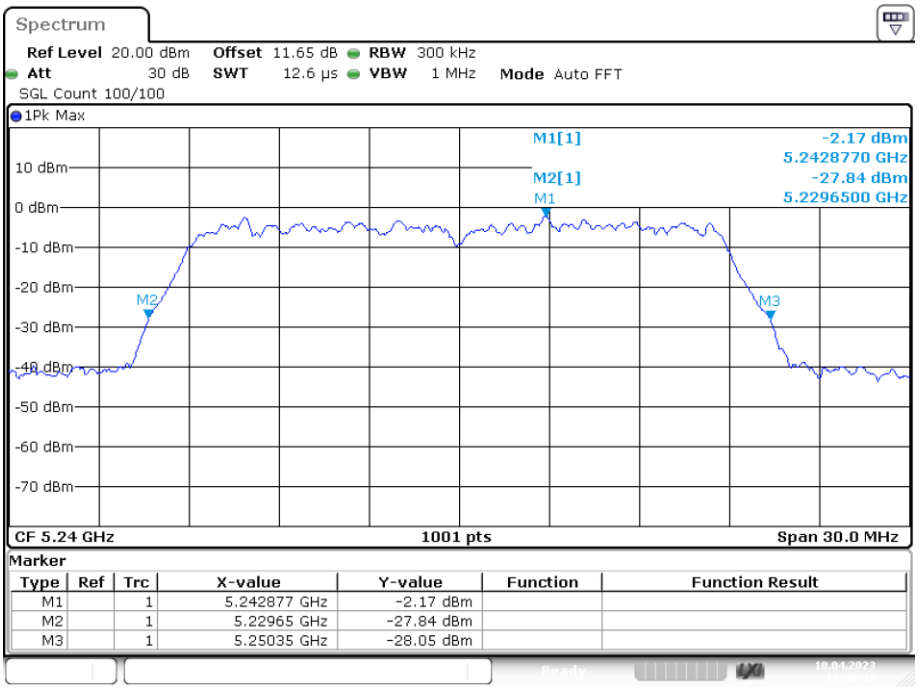
Date: 10.APR.2023 12:26:18

-26dB Bandwidth NVNT n20 5200MHz Ant1



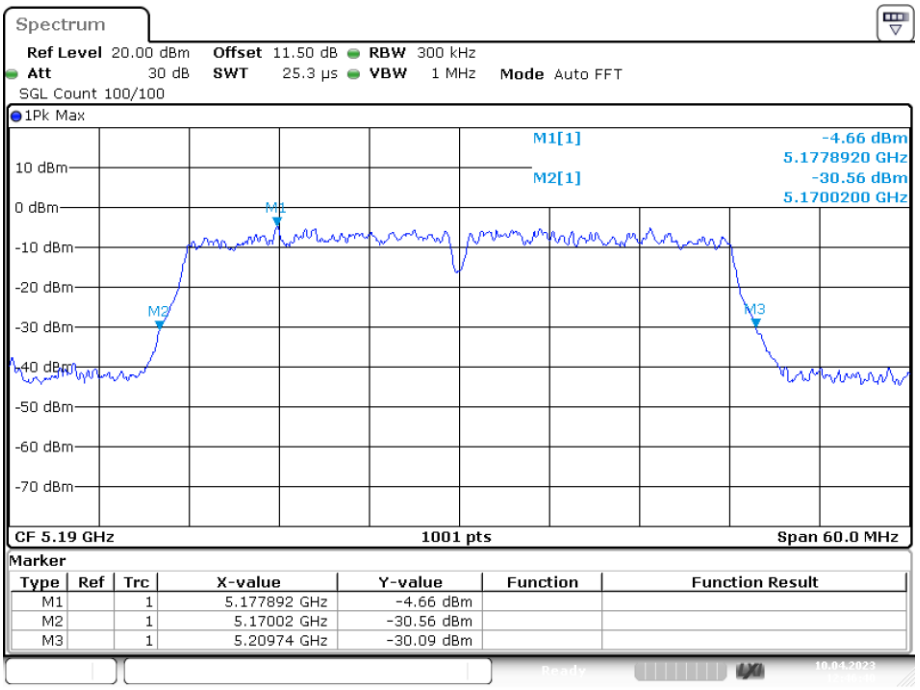
Date: 10.APR.2023 12:34:06

-26dB Bandwidth NVNT n20 5240MHz Ant1



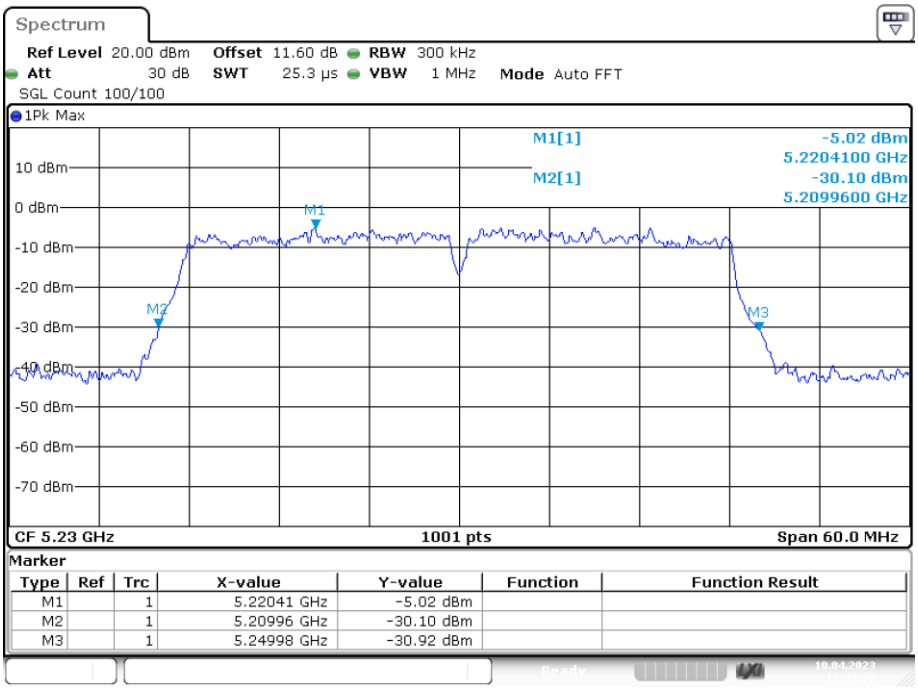
Date: 10.APR.2023 12:39:40

-26dB Bandwidth NVNT n40 5190MHz Ant1



Date: 10.APR.2023 12:46:40

-26dB Bandwidth NVNT n40 5230MHz Ant1

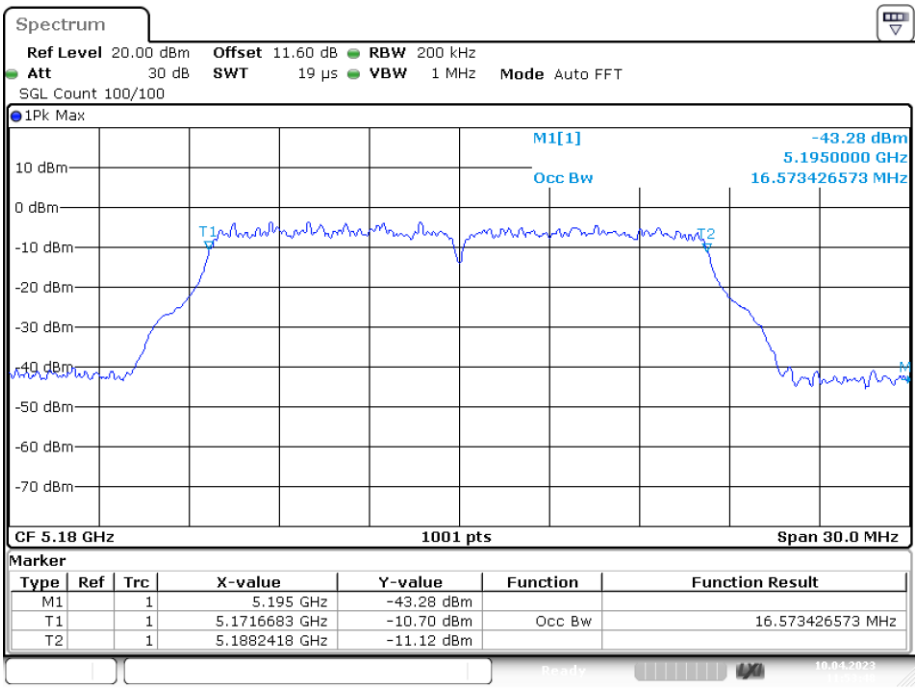


Date: 10.APR.2023 12:51:21

Occupied Channel Bandwidth

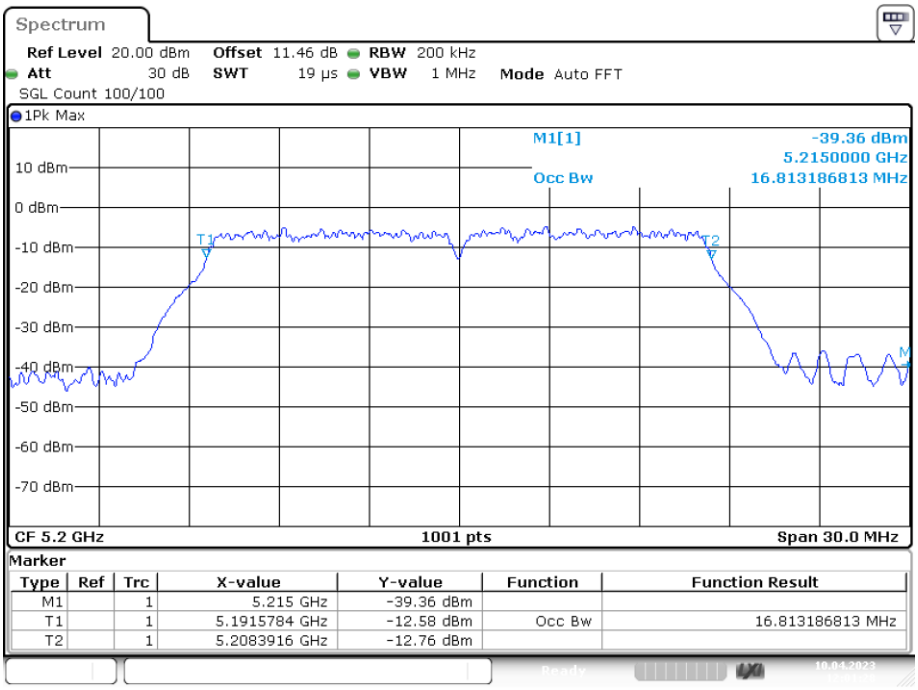
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	a	5180	Ant1	16.573
NVNT	a	5200	Ant1	16.813
NVNT	a	5240	Ant1	16.663
NVNT	n20	5180	Ant1	17.802
NVNT	n20	5200	Ant1	17.772
NVNT	n20	5240	Ant1	17.742
NVNT	n40	5190	Ant1	36.264
NVNT	n40	5230	Ant1	36.384

OBW NVNT a 5180MHz Ant1



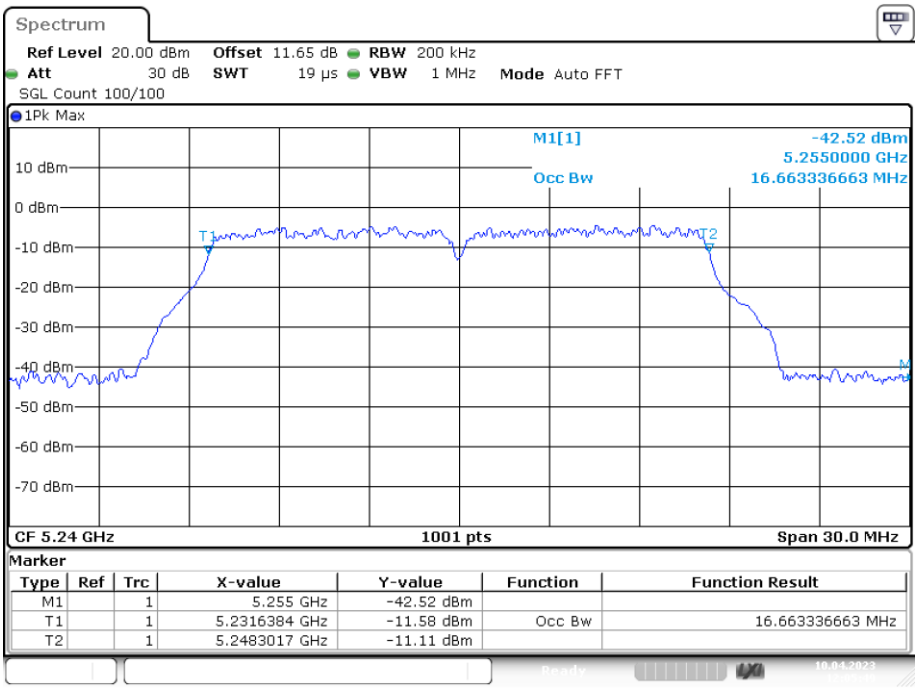
Date: 10.APR.2023 11:53:48

OBW NVNT a 5200MHz Ant1



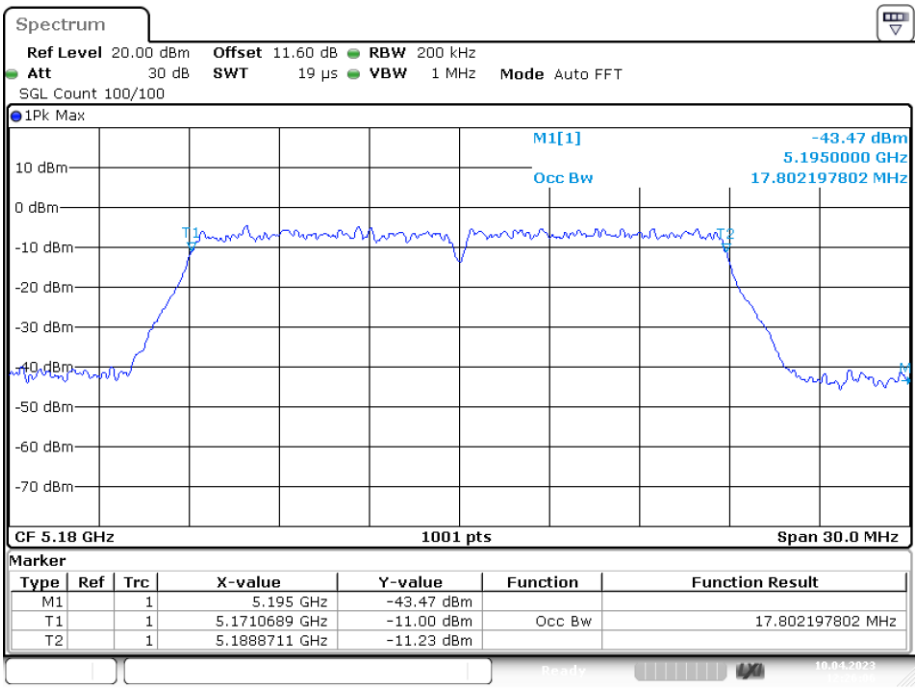
Date: 10.APR.2023 12:01:27

OBW NVNT a 5240MHz Ant1



Date: 10.APR.2023 12:05:48

OBW NVNT n20 5180MHz Ant1



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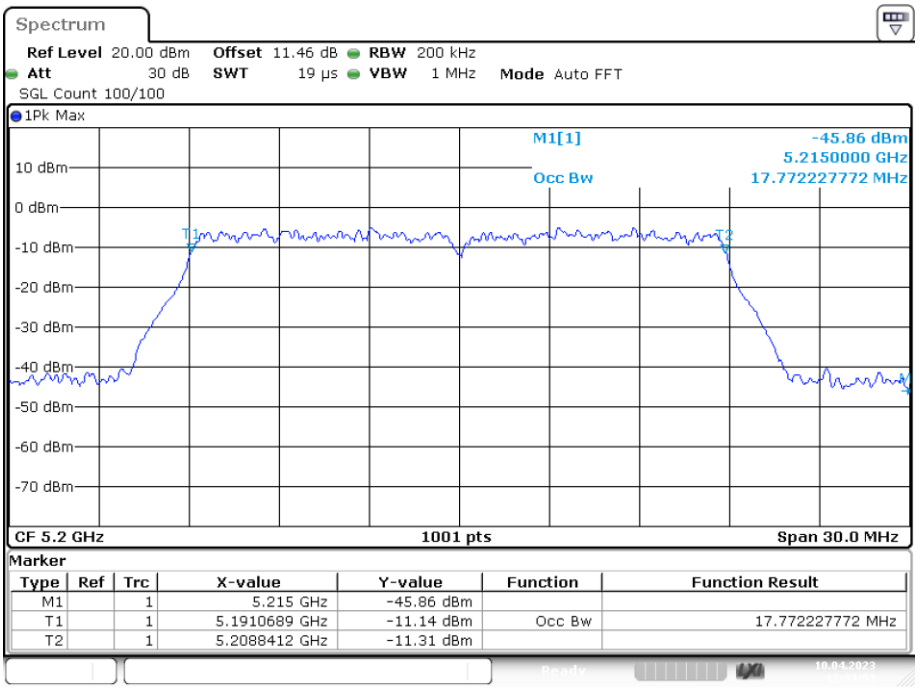
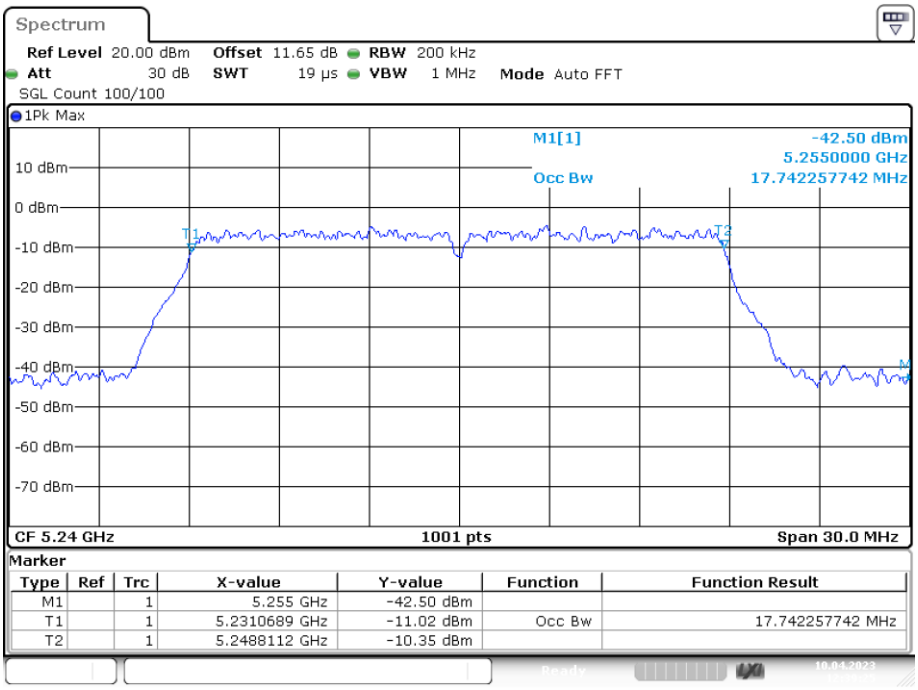
OBW NVNT n20 5200MHz Ant1



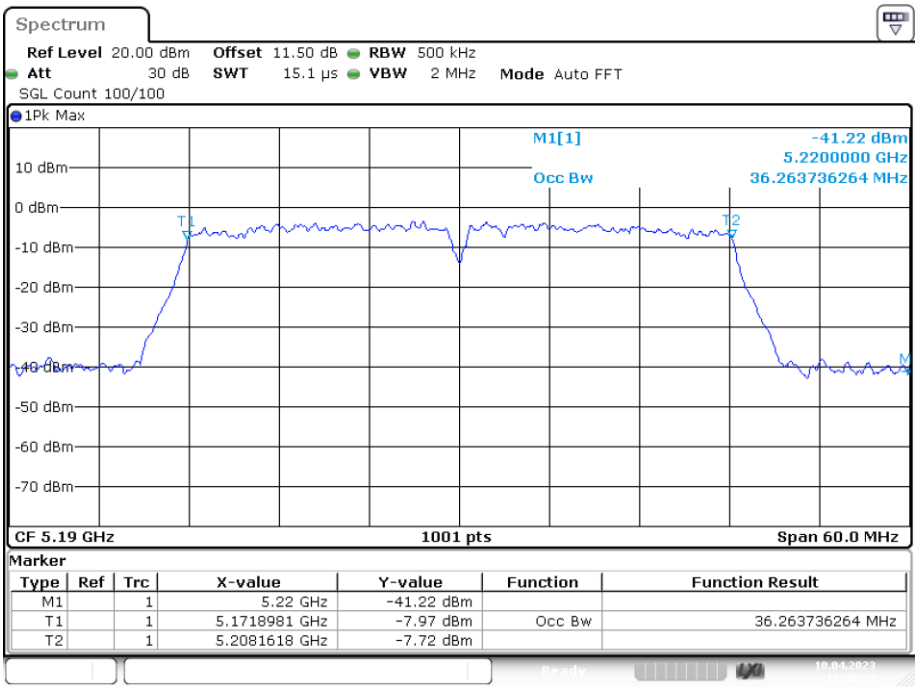
Date: 10.APR.2023 12:33:53

OBW NVNT n20 5240MHz Ant1



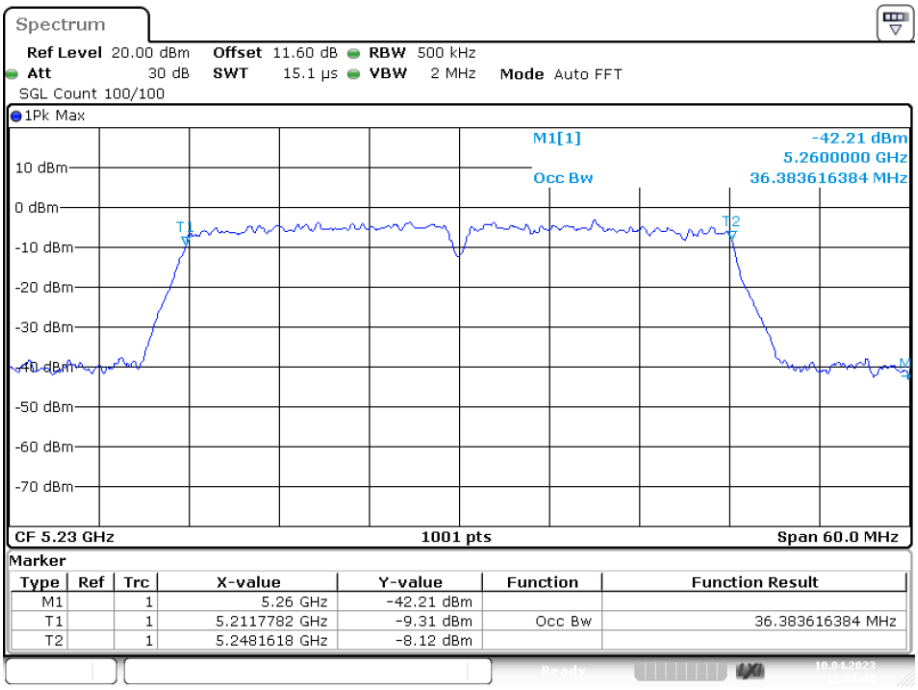
Date: 10.APR.2023 12:39:25

OBW NVNT n40 5190MHz Ant1



Date: 10.APR.2023 12:46:23

OBW NVNT n40 5230MHz Ant1

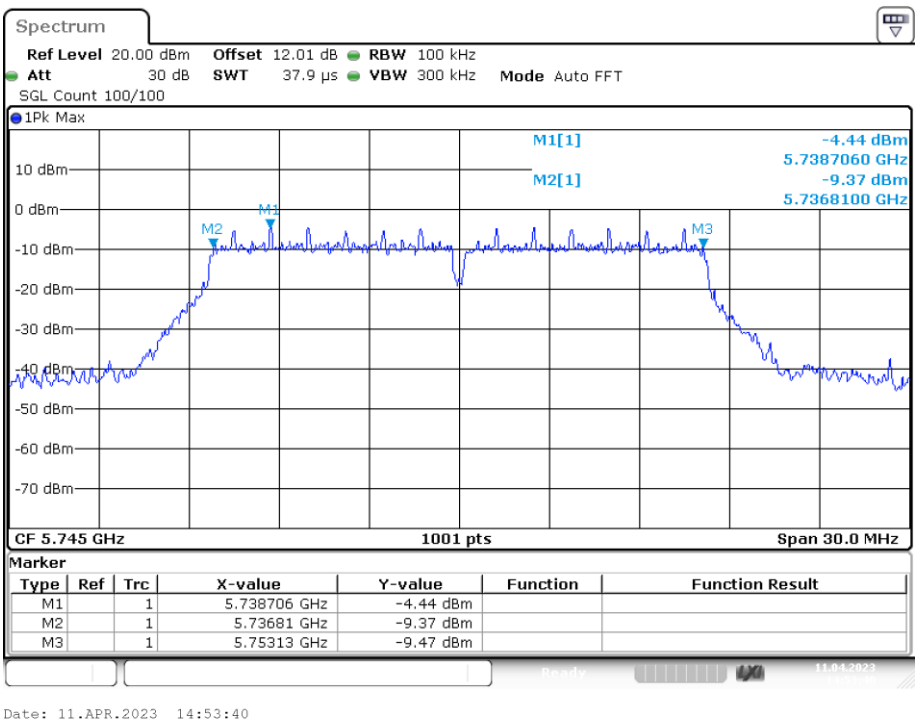


Date: 10.APR.2023 12:51:02

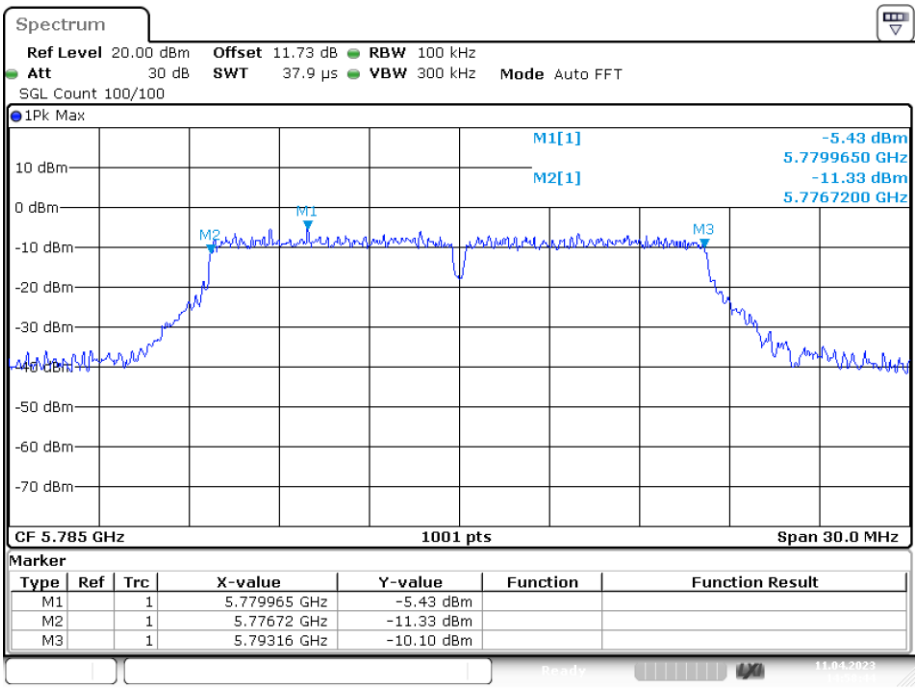
Band 4(5745-5825MHz):
-6dB Bandwidth

Condition	Mode	Frequency (MHz)	Antenna	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	a	5745	Ant1	16.32	0.5	Pass
NVNT	a	5785	Ant1	16.44	0.5	Pass
NVNT	a	5825	Ant1	16.56	0.5	Pass
NVNT	n20	5745	Ant1	17.79	0.5	Pass
NVNT	n20	5785	Ant1	17.58	0.5	Pass
NVNT	n20	5825	Ant1	17.58	0.5	Pass
NVNT	n40	5755	Ant1	36.3	0.5	Pass
NVNT	n40	5795	Ant1	36.54	0.5	Pass

-6dB Bandwidth NVNT a 5745MHz Ant1

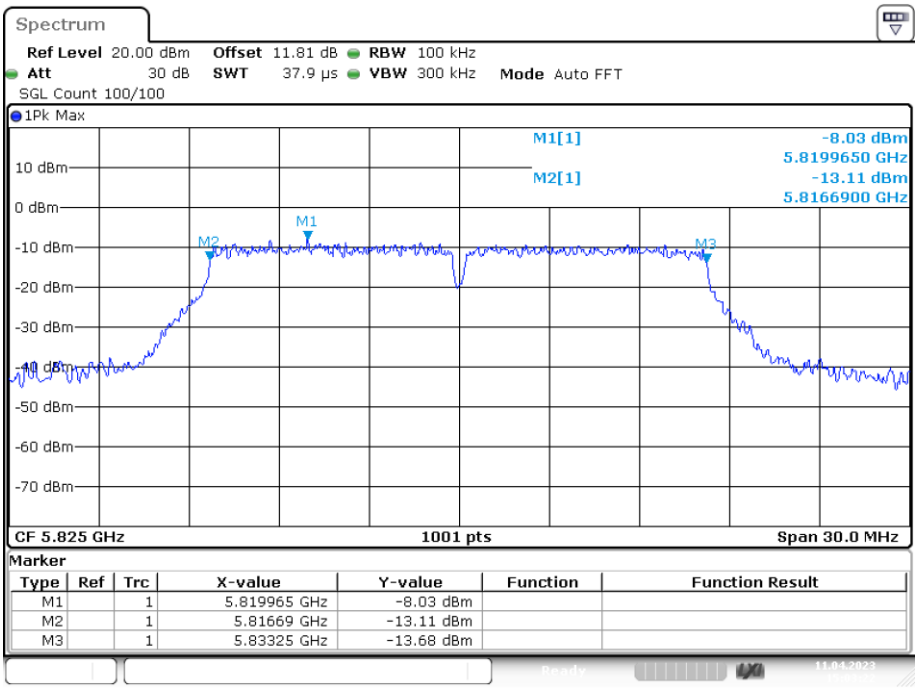


-6dB Bandwidth NVNT a 5785MHz Ant1



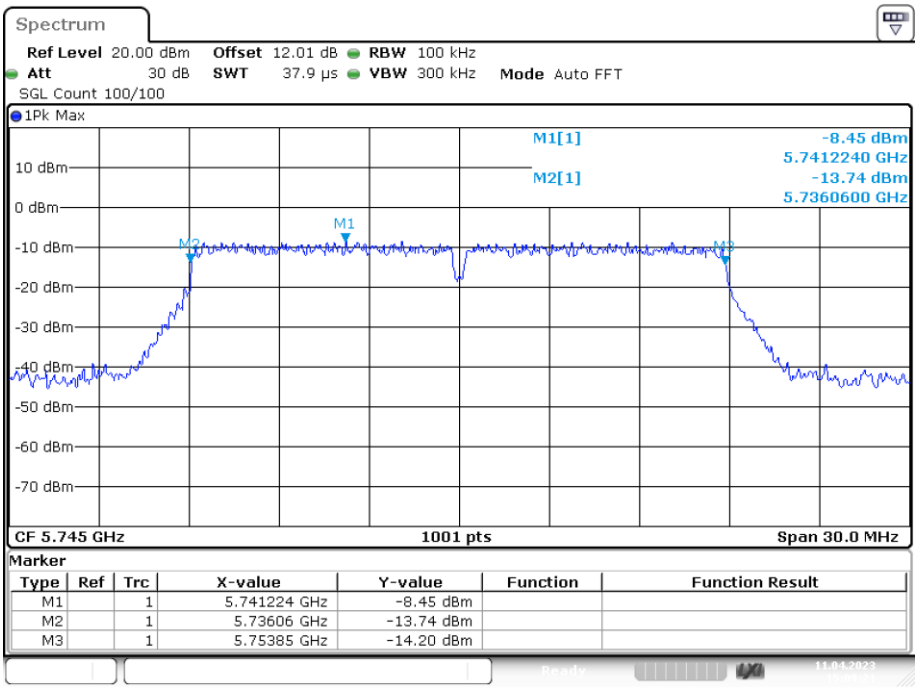
Date: 11.APR.2023 14:58:44

-6dB Bandwidth NVNT a 5825MHz Ant1



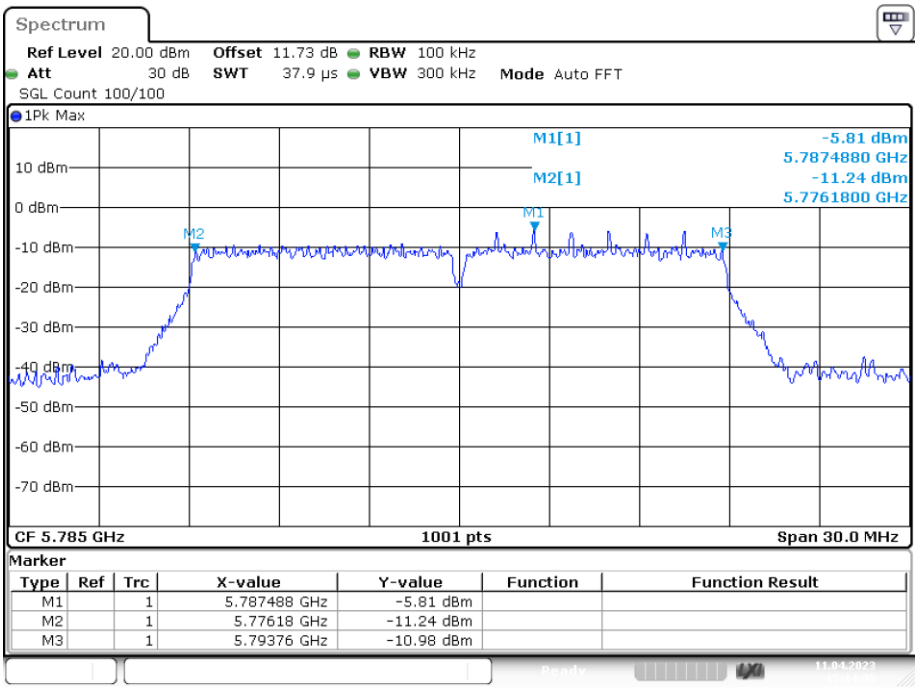
Date: 11.APR.2023 15:03:22

-6dB Bandwidth NVNT n20 5745MHz Ant1



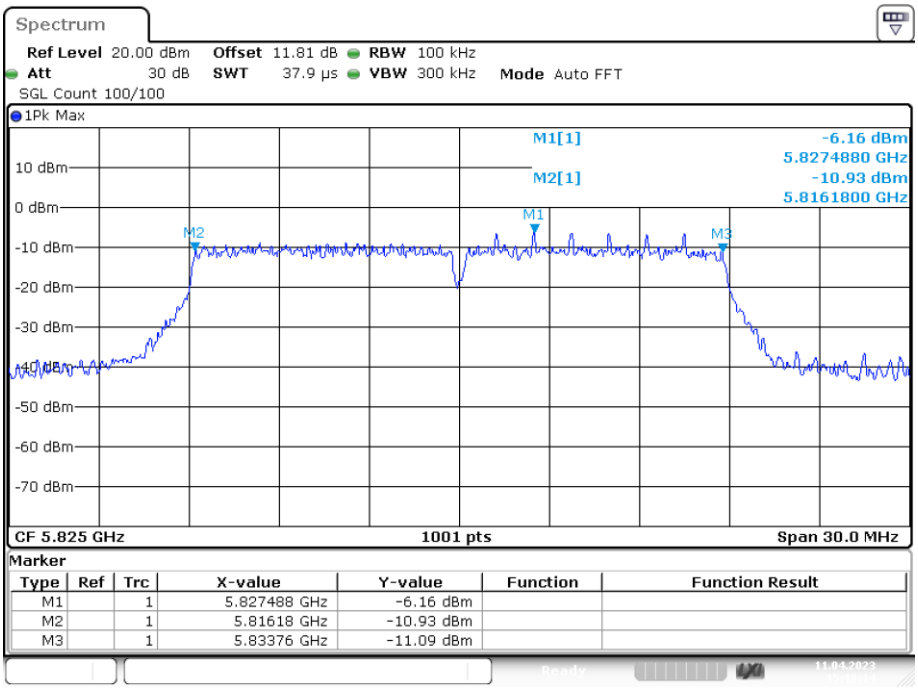
Date: 11.APR.2023 15:09:21

-6dB Bandwidth NVNT n20 5785MHz Ant1



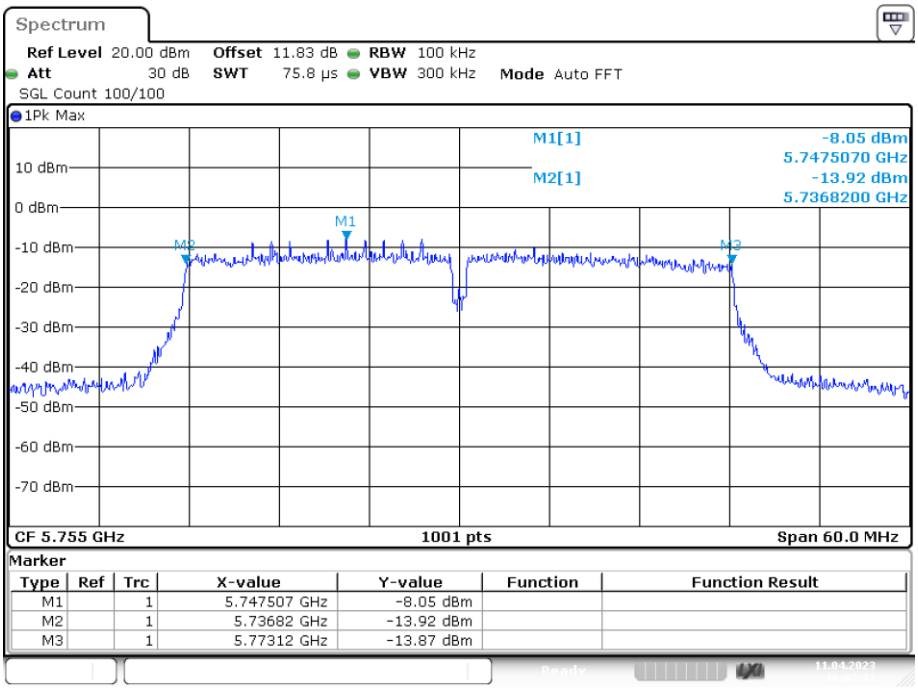
Date: 11.APR.2023 15:14:04

-6dB Bandwidth NVNT n20 5825MHz Ant1



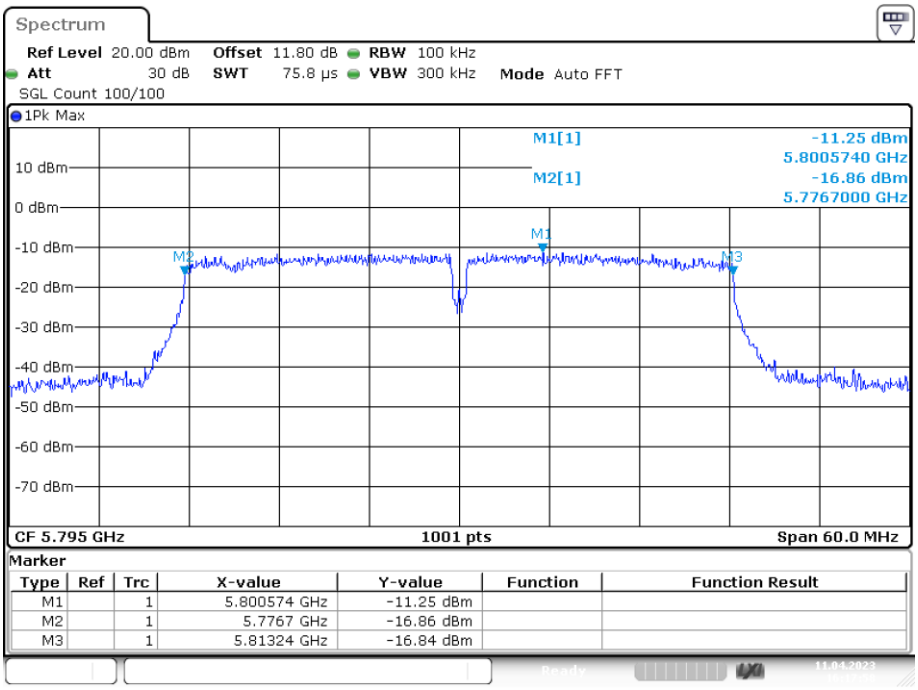
Date: 11.APR.2023 15:18:15

-6dB Bandwidth NVNT n40 5755MHz Ant1



Date: 11.APR.2023 16:07:52

-6dB Bandwidth NVNT n40 5795MHz Ant1

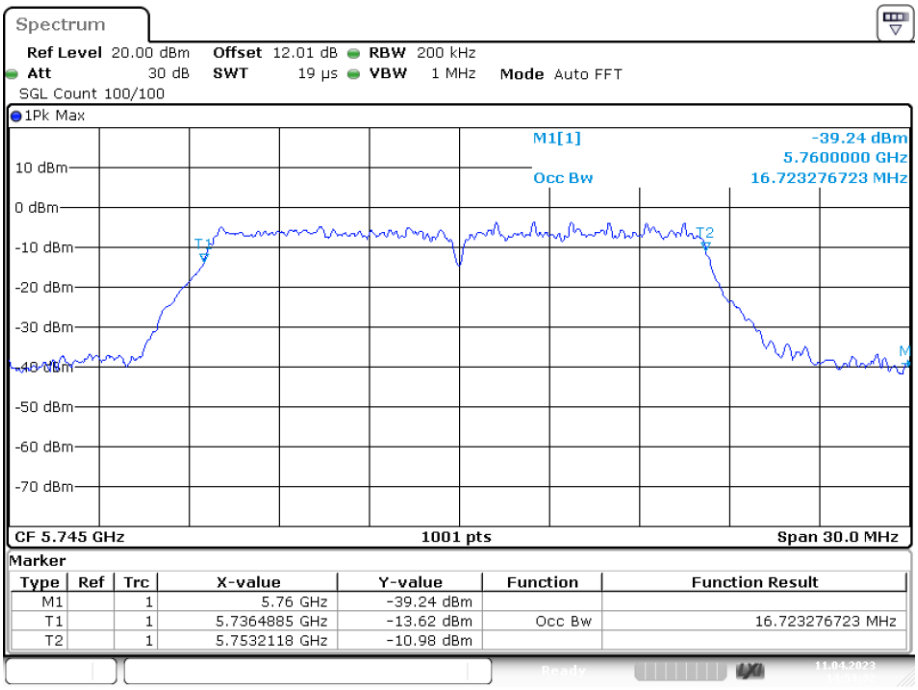


Date: 11.APR.2023 16:17:58

Occupied Channel Bandwidth

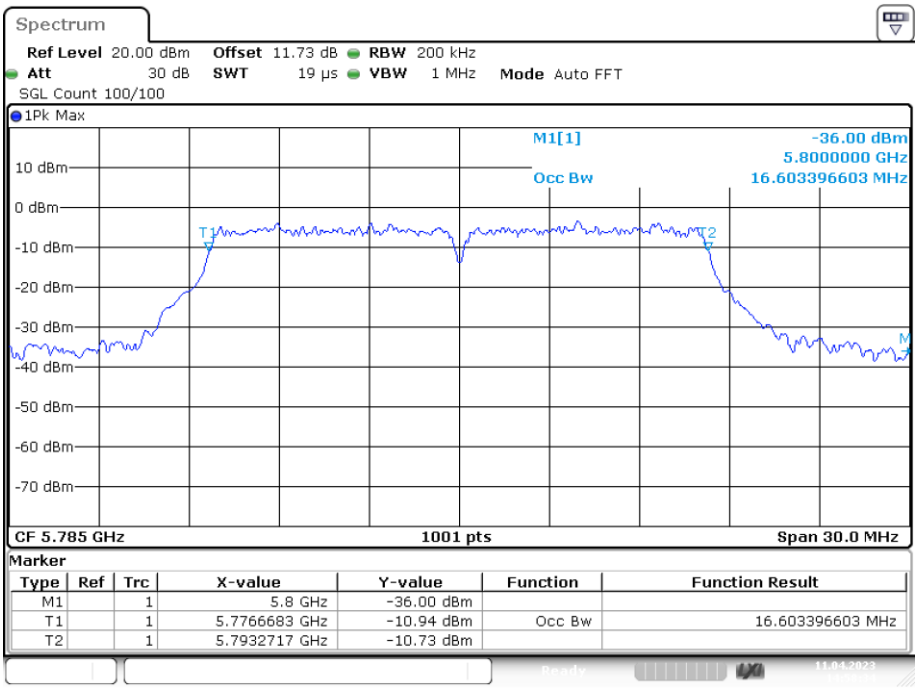
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)
NVNT	a	5745	Ant1	16.723
NVNT	a	5785	Ant1	16.603
NVNT	a	5825	Ant1	16.633
NVNT	n20	5745	Ant1	17.742
NVNT	n20	5785	Ant1	17.742
NVNT	n20	5825	Ant1	17.802
NVNT	n40	5755	Ant1	36.324
NVNT	n40	5795	Ant1	36.324

OBW NVNT a 5745MHz Ant1



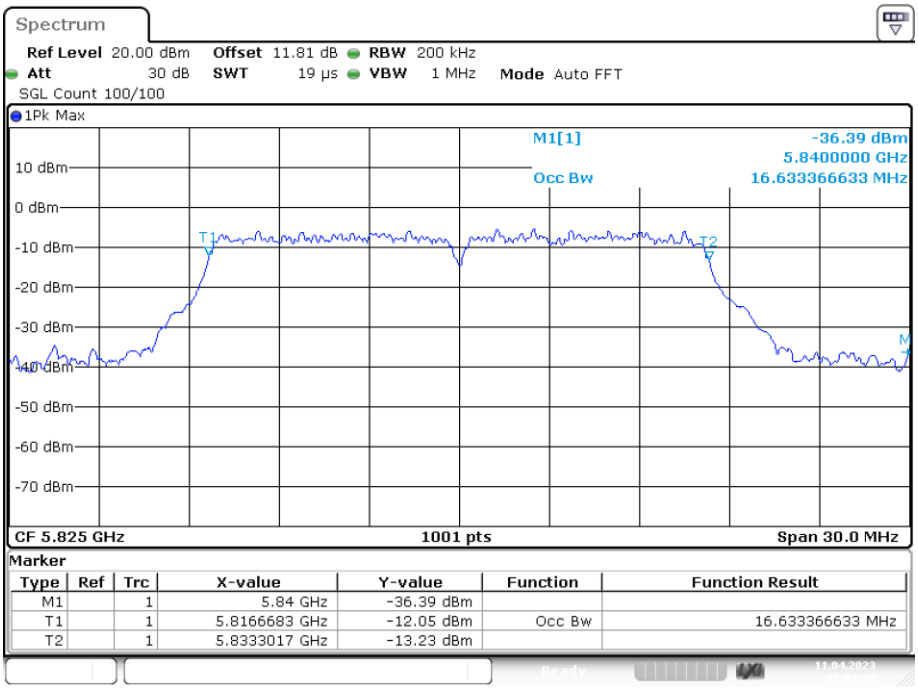
Date: 11.APR.2023 14:53:31

OBW NVNT a 5785MHz Ant1



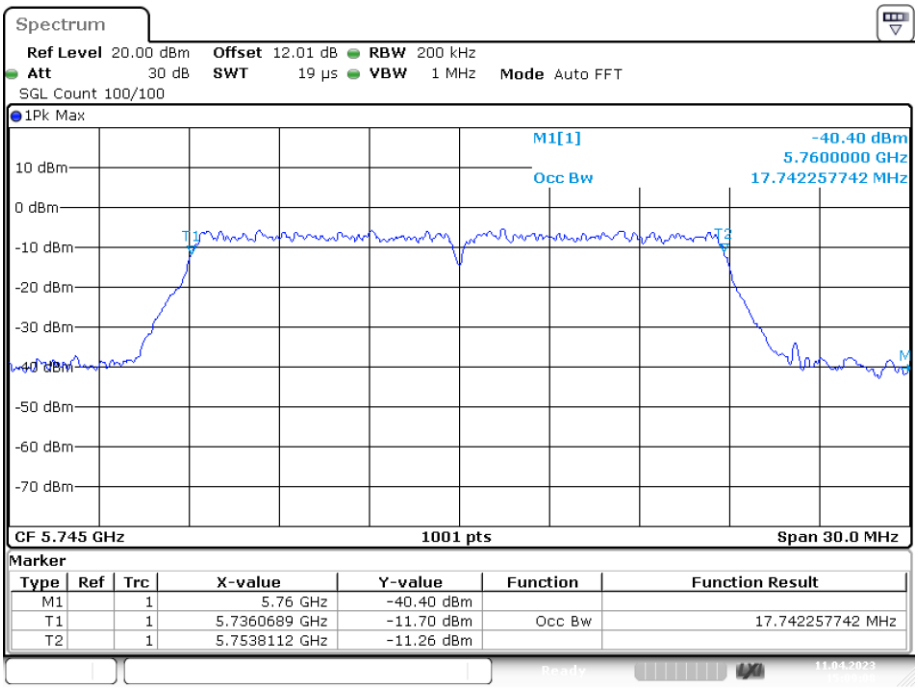
Date: 11.APR.2023 14:58:34

OBW NVNT a 5825MHz Ant1



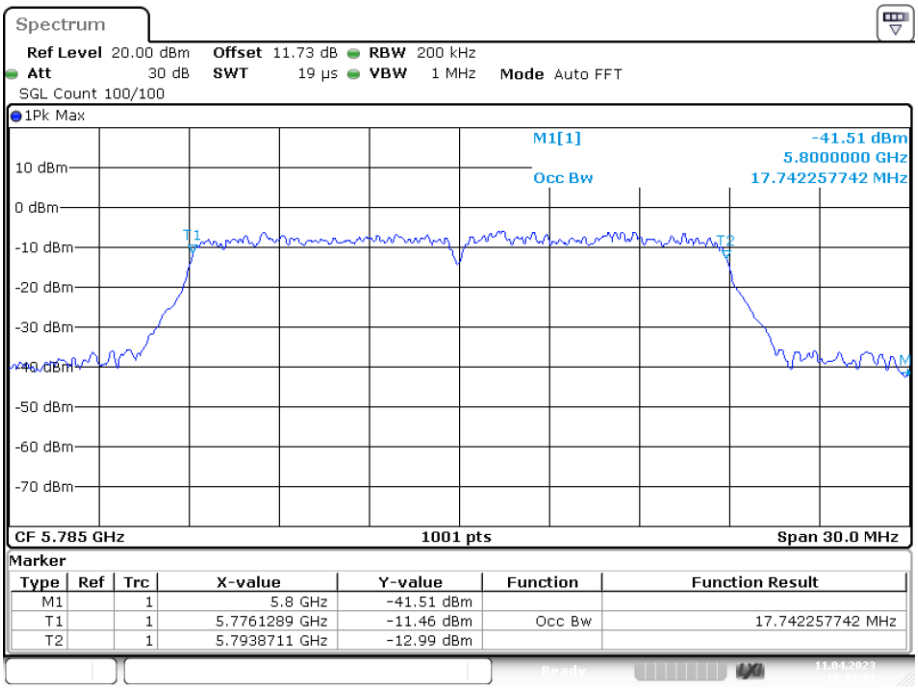
Date: 11.APR.2023 15:03:12

OBW NVNT n20 5745MHz Ant1



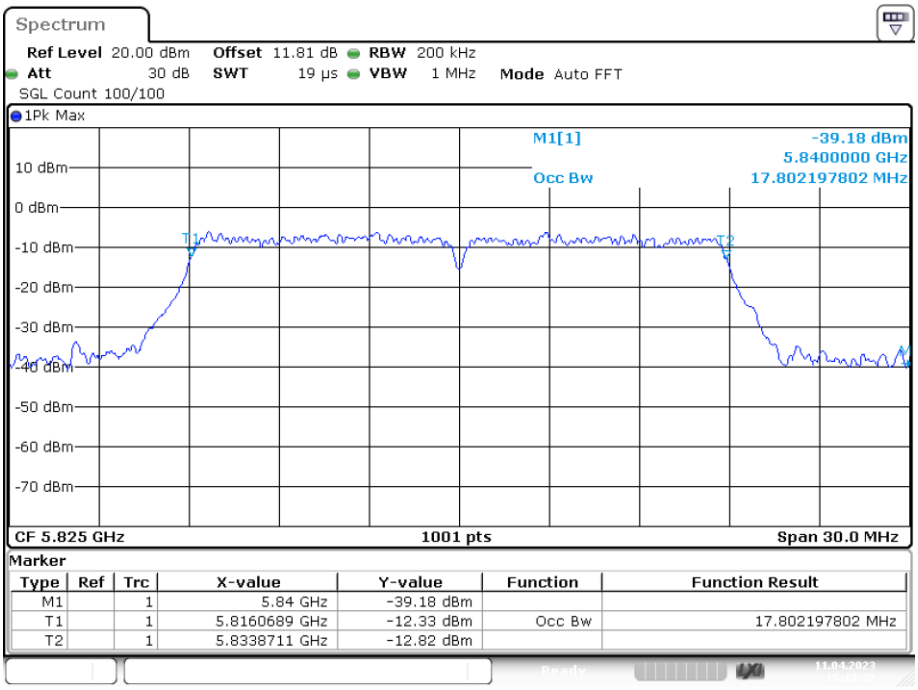
Date: 11.APR.2023 15:09:08

OBW NVNT n20 5785MHz Ant1



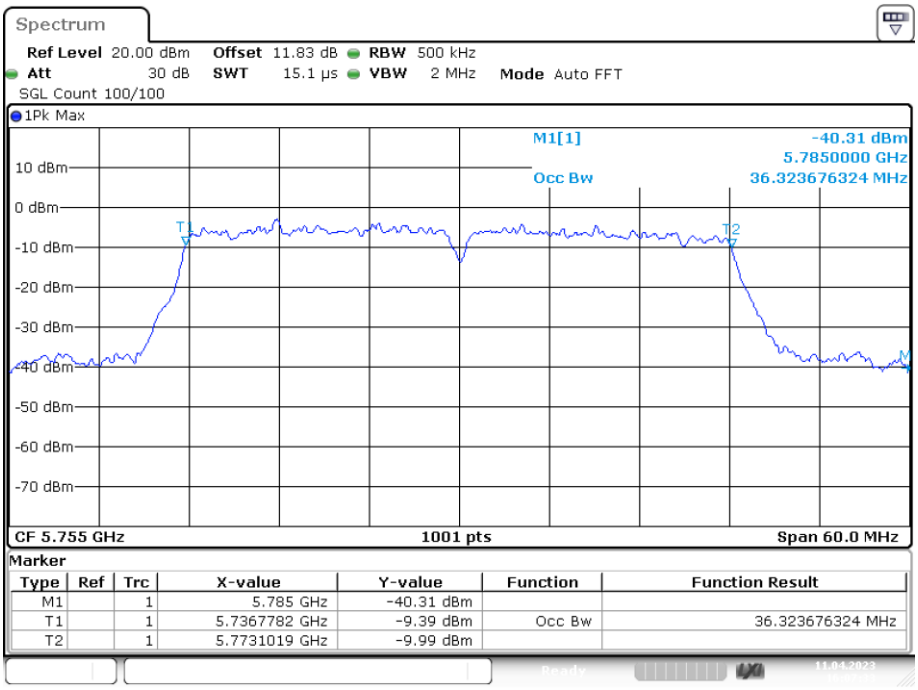
Date: 11.APR.2023 15:13:50

OBW NVNT n20 5825MHz Ant1



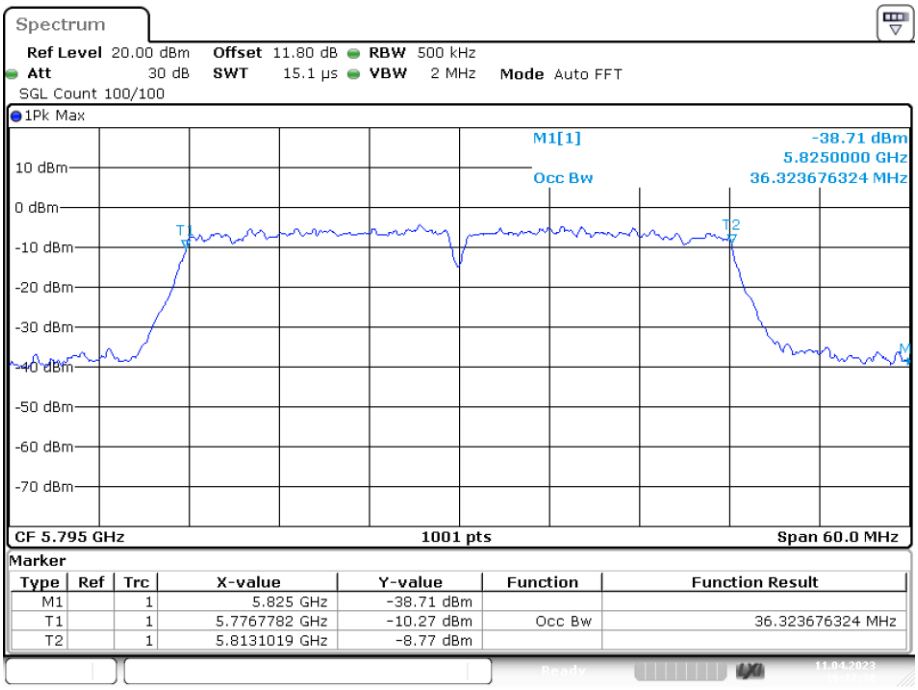
Date: 11.APR.2023 15:17:57

OBW NVNT n40 5755MHz Ant1



Date: 11.APR.2023 16:07:34

OBW NVNT n40 5795MHz Ant1



Date: 11.APR.2023 16:17:38

4.5 Band edge emissions (Radiated)

Test Requirement:	FCC Part 15.407(b)(1) FCC Part 15.407(b)(4) FCC Part 15.407(b)(10)
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

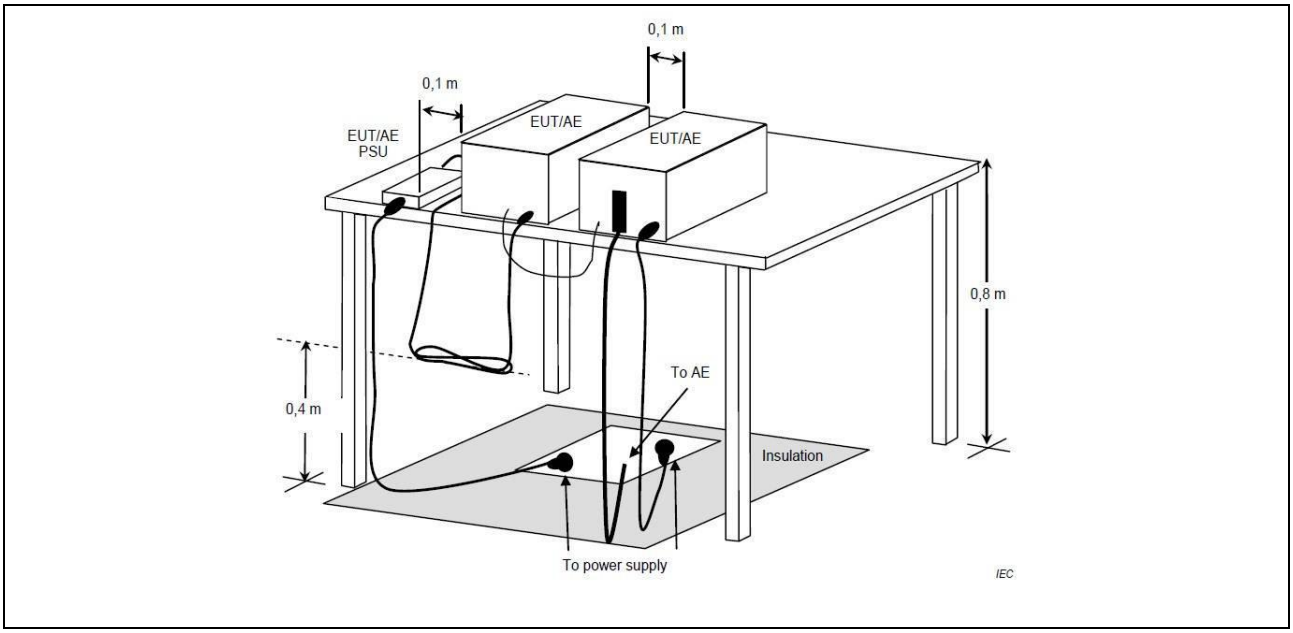
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3

	216-960	200 **	3
	Above 960	500	3
Test Method:	ANSI C63.10-2013, section 12.7.4, 12.7.5, 12.7.6		
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.		

4.5.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	All modes				

4.5.2 Test Setup Diagram:



4.5.3 Test Result:

Band1

Mode:		802.11a		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	34.47	17.18	51.65	68.20	-16.55	PK
V	5150.00	35.03	17.18	52.21	68.20	-15.99	PK

Mode:		802.11a		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	24.65	17.18	41.83	54.00	-12.17	AV
V	5150.00	26.24	17.18	43.42	54.00	-10.58	AV

Mode:		802.11a		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	37.86	17.18	55.04	68.20	-13.16	PK
V	5350.00	36.15	17.18	53.33	68.20	-14.87	PK

Mode:		802.11a		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	25.76	17.18	42.94	54.00	-11.06	AV
V	5350.00	23.63	17.18	40.81	54.00	-13.19	AV

Mode:		802.11n(HT20)		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	37.47	17.21	54.68	68.20	-13.52	PK
V	5150.00	35.58	17.21	52.79	68.20	-15.41	PK

Mode:		802.11n(HT20)		Frequency:		5180MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	26.88	17.21	44.09	54.00	-9.91	AV
V	5150.00	25.95	17.21	43.16	54.00	-10.84	AV

Mode:		802.11n(HT20)		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	38.48	17.21	55.69	68.20	-12.51	PK
V	5350.00	37.98	17.21	55.19	68.20	-13.01	PK

Mode:		802.11n(HT20)		Frequency:		5240MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	24.88	17.21	42.09	54.00	-11.91	AV
V	5350.00	26.08	17.21	43.29	54.00	-10.71	AV

Mode:		802.11n(HT40)		Frequency:		5190MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	34.07	17.18	51.25	68.20	-16.95	PK
V	5150.00	35.16	17.18	52.34	68.20	-15.86	PK

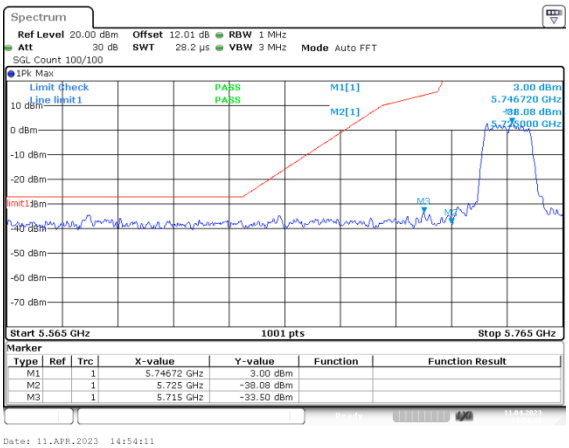
Mode:		802.11n(HT40)		Frequency:		5190MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5150.00	26.06	17.18	43.24	54.00	-10.76	AV
V	5150.00	26.02	17.18	43.20	54.00	-10.80	AV

Mode:		802.11n(HT40)		Frequency:		5230MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	37.84	17.18	55.02	68.20	-13.18	PK
V	5350.00	34.39	17.18	51.57	68.20	-16.63	PK

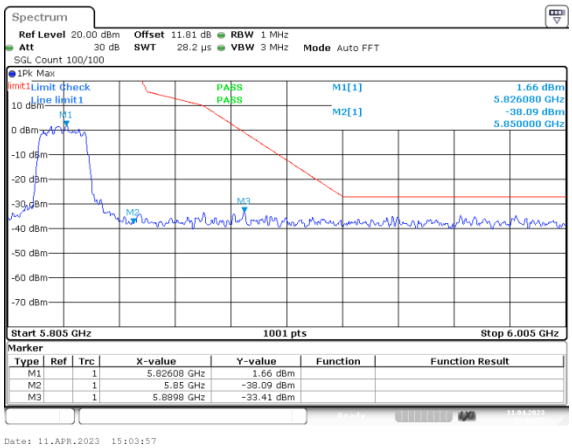
Mode:		802.11n(HT40)		Frequency:		5230MHz	
Antenna Pol.	Frequency (MHz)	Reading Level (dBuV)	Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over limit(dB)	Detector
H	5350.00	26.83	17.18	44.01	54.00	-9.99	AV
V	5350.00	26.65	17.18	43.83	54.00	-10.17	AV

Band4

802.11a

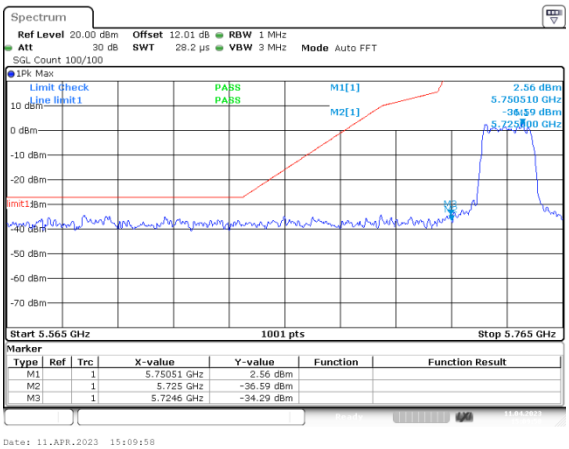


Low: 5745MHz

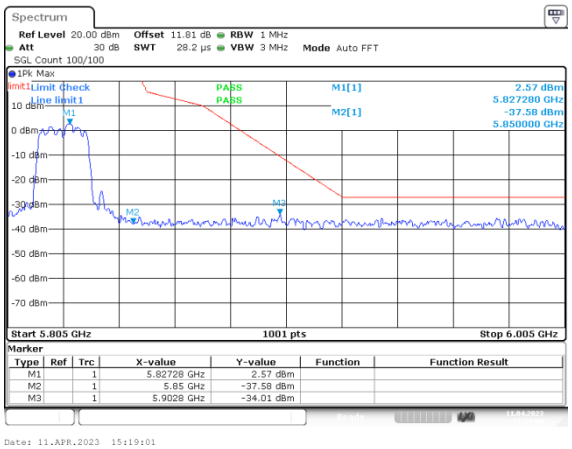


High: 5825MHz

802.11n(HT20)

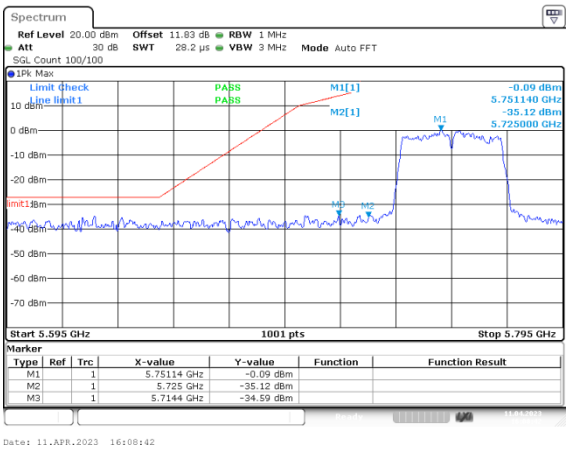


Low: 5745MHz

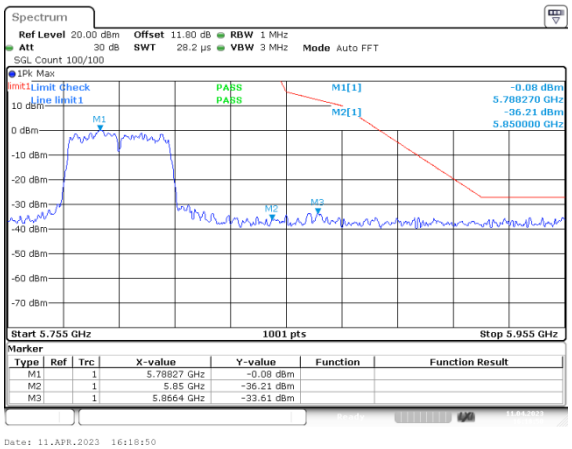


High: 5825MHz

802.11n(HT40)



Low: 5755MHz



High: 5795MHz

4.6 Undesirable emission limits (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>FCC Part 15.407(b)(9)</td></tr>
<tr><td>Test Limit:</td><td>Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:
<table>
<tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table></td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2013, section 12.7.4, 12.7.5, 12.7.6</td></tr>
<tr><td>Procedure:</td><td>Below 1GHz:
a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using quasi-peak method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middle channel, the Highest channel.
h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.
i. Repeat above procedures until all frequencies measured was complete.
Remark:
1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor
2. Scan from 9kHz to 30MHz, the disturbance below 30MHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
3. The disturbance below 1GHz was very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

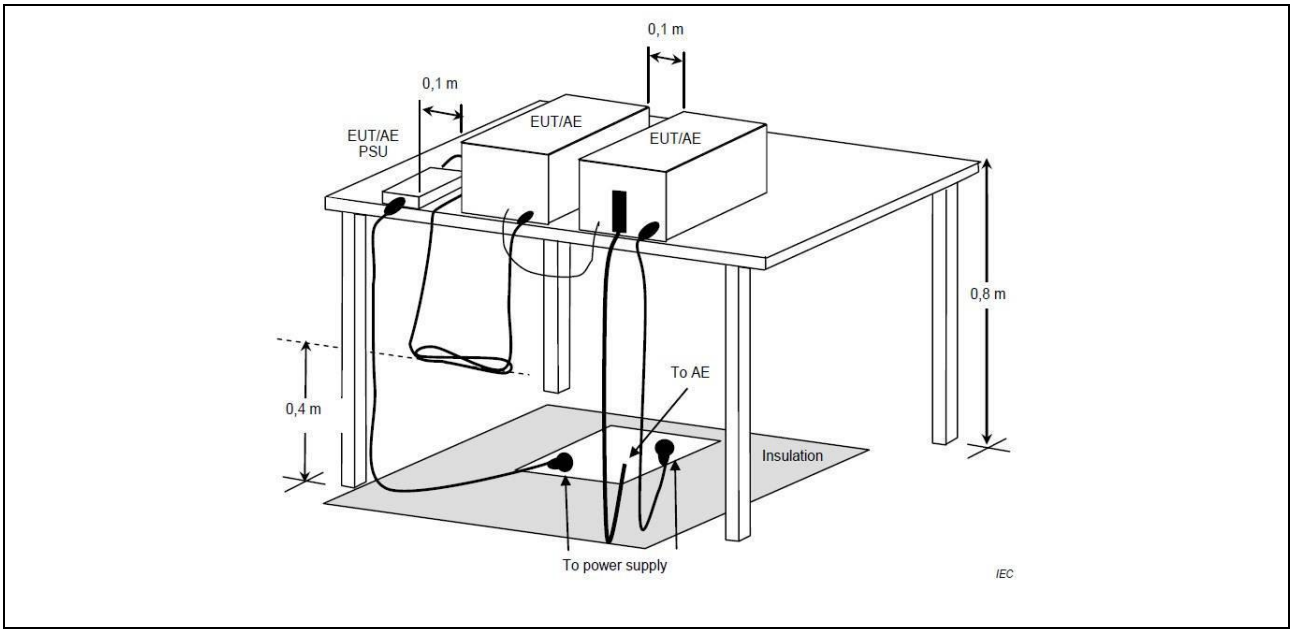
Above 1GHz:
a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</td></tr>
</table>

	c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

4.6.1 E.U.T. Operation:

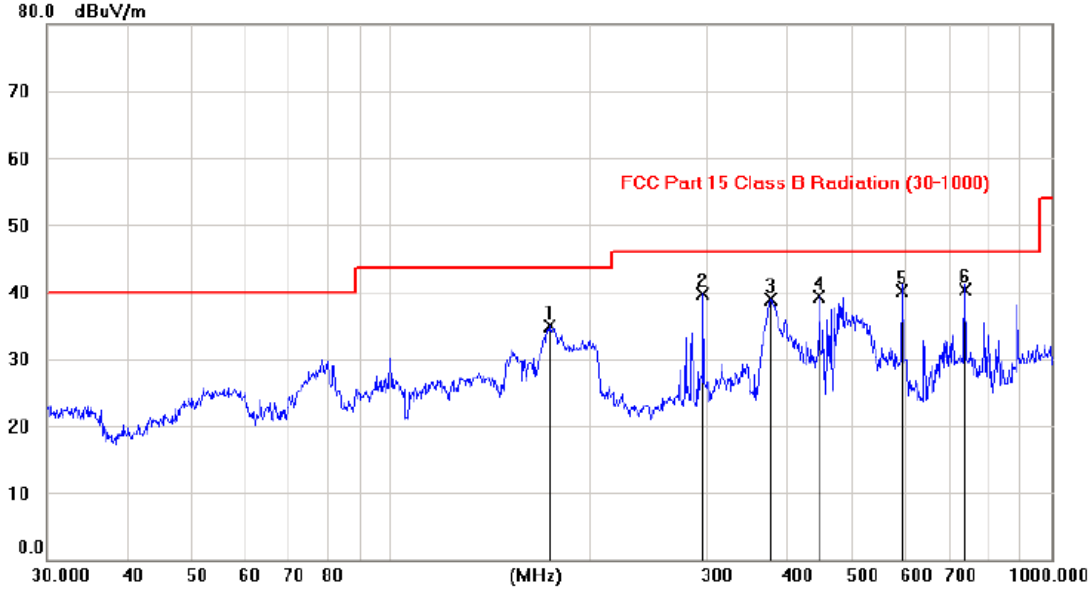
Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	U-NII-1				

4.6.2 Test Setup Diagram:



4.6.3 Test Result:

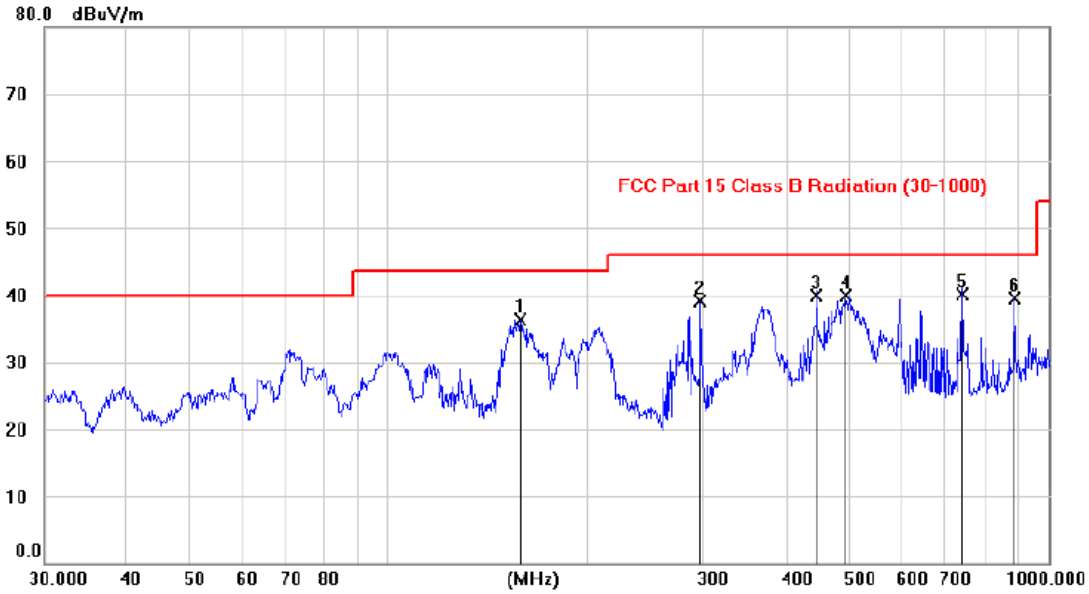
Polarization: Horizontal / Band: U-NII Band 1 a / BW: 20 / CH: L CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		173.7322	21.44	13.56	35.00	43.50	-8.50	peak			
2		296.7033	25.71	14.03	39.74	46.00	-6.26	peak			
3		375.4553	23.20	15.79	38.99	46.00	-7.01	peak			
4		445.0593	21.93	17.45	39.38	46.00	-6.62	peak			
5		593.3962	19.95	20.09	40.04	46.00	-5.96	QP			
6	*	741.8250	17.94	22.29	40.23	46.00	-5.77	QP			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Polarization: Vertical / Band: U-NII Band 1 a / BW: 20 / CH: L CH: L



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		158.3711	21.21	15.04	36.25	43.50	-7.25	peak			
2		296.7033	25.16	14.03	39.19	46.00	-6.81	peak			
3		445.0593	22.44	17.45	39.89	46.00	-6.11	QP			
4		493.5056	21.77	18.13	39.90	46.00	-6.10	peak			
5	*	741.8250	17.76	22.29	40.05	46.00	-5.95	QP			
6		890.1032	15.52	23.91	39.43	46.00	-6.57	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Note:

1. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.
2. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.
3. This Report only show the test plots of the worst case (U-NII-1).

4.7 Undesirable emission limits (above 1GHz)

Test Requirement:	FCC Part 15.407(b)(1) FCC Part 15.407(b)(4) FCC Part 15.407(b)(10)
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating solely in the 5.725-5.850 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3

	216-960	200 **	3
	Above 960	500	3
Test Method:	ANSI C63.10-2013, section 12.7.4, 12.7.5, 12.7.6		
Procedure:	Above 1GHz: a. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel, the middle channel, the Highest channel. h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case. i. Repeat above procedures until all frequencies measured was complete. Remark: 1. Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor 2. Scan from 18GHz to 40GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported. 3. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report. 4. The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.		

4.7.1 E.U.T. Operation:

Operating Environment:					
Temperature:	23.8 °C	Humidity:	54.2 %	Atmospheric Pressure:	101.6 kPa
Pre test mode:	All modes				
Final test mode:	U-NII-1				

4.7.2 Test Result:

Above 1GHz:

802.11a(HT20) 5180MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.63	28.91	11.25	14.62	32.65	22.13	74	-51.87	Vertical
15540.03	31.16	11.93	17.66	34.46	26.29	74	-47.71	Vertical
10360.57	32.71	9.4	14.62	32.65	24.08	74	-49.92	Horizontal
15540.92	31.74	8.5	17.66	34.46	23.44	74	-50.56	Horizontal

802.11a(HT20) 5200MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.01	29.03	11.25	14.62	32.65	22.25	74	-51.75	Vertical
15540.32	30.85	11.93	17.66	34.46	25.98	74	-48.02	Vertical
10360.07	32.37	9.4	14.62	32.65	23.74	74	-50.26	Horizontal
15540.57	31.62	8.5	17.66	34.46	23.32	74	-50.68	Horizontal

802.11a(HT20) 5240MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.19	28.88	11.25	14.62	32.65	22.10	74	-51.90	Vertical
15540.18	30.38	11.93	17.66	34.46	25.51	74	-48.49	Vertical
10360.41	32.82	9.4	14.62	32.65	24.19	74	-49.81	Horizontal
15540.66	31.87	8.5	17.66	34.46	23.57	74	-50.43	Horizontal

802.11n(HT20) 5180MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.50	28.25	11.25	14.62	32.65	21.47	74	-52.53	Vertical
15540.78	30.27	11.93	17.66	34.46	25.40	74	-48.60	Vertical
10360.45	32.08	9.4	14.62	32.65	23.45	74	-50.55	Horizontal
15540.57	31.45	8.5	17.66	34.46	23.15	74	-50.85	Horizontal

802.11n(HT20) 5200MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.34	28.20	11.25	14.62	32.65	21.42	74	-52.58	Vertical
15540.39	31.17	11.93	17.66	34.46	26.30	74	-47.70	Vertical
10360.92	32.16	9.4	14.62	32.65	23.53	74	-50.47	Horizontal
15540.30	31.73	8.5	17.66	34.46	23.43	74	-50.57	Horizontal

802.11n(HT20) 5240MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.10	28.82	11.25	14.62	32.65	22.04	74	-51.96	Vertical
15540.05	30.70	11.93	17.66	34.46	25.83	74	-48.17	Vertical
10360.35	33.05	9.4	14.62	32.65	24.42	74	-49.58	Horizontal
15540.48	32.22	8.5	17.66	34.46	23.92	74	-50.08	Horizontal

802.11n(HT40) 5190MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.69	28.58	11.25	14.62	32.65	21.80	74	-52.20	Vertical
15540.36	30.30	11.93	17.66	34.46	25.43	74	-48.57	Vertical
10360.01	32.75	9.4	14.62	32.65	24.12	74	-49.88	Horizontal
15540.27	32.00	8.5	17.66	34.46	23.70	74	-50.30	Horizontal

802.11n(HT40) 5230MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.89	28.92	11.25	14.62	32.65	22.14	74	-51.86	Vertical
15540.40	31.06	11.93	17.66	34.46	26.19	74	-47.81	Vertical
10360.50	32.50	9.4	14.62	32.65	23.87	74	-50.13	Horizontal
15540.14	32.13	8.5	17.66	34.46	23.83	74	-50.17	Horizontal

802.11ac(HT40) 5190MHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
10360.18	28.50	11.25	14.62	32.65	21.72	74	-52.28	Vertical
15540.21	30.21	11.93	17.66	34.46	25.34	74	-48.66	Vertical
10360.02	32.48	9.4	14.62	32.65	23.85	74	-50.15	Horizontal
15540.24	32.21	8.5	17.66	34.46	23.91	74	-50.09	Horizontal

Note:

1. Level = Read Level + Antenna Factor+ Cable loss- Preamp Factor.

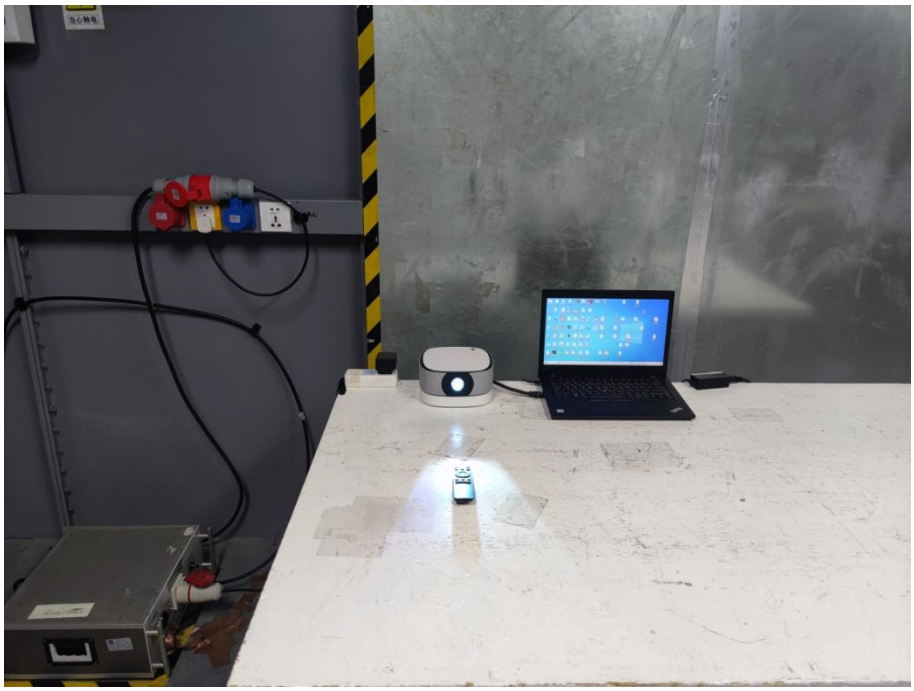
2. The test trace is same as the ambient noise (the test frequency range: 18GHz~40GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

4. This Report only show the test plots of the worst case (U-NII-1).

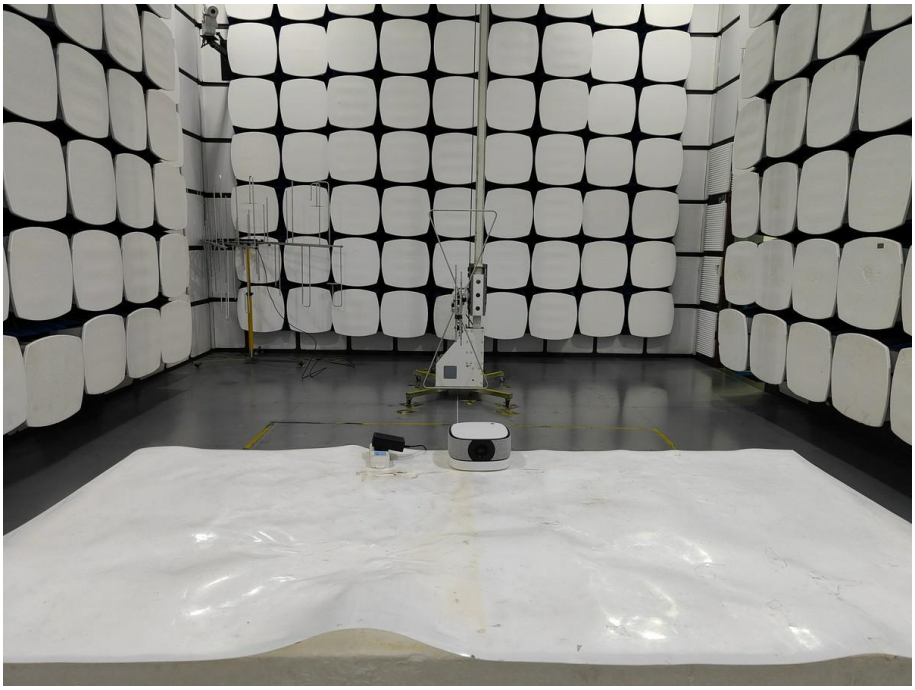
5 Test Setup Photos

Conducted Emission at AC power line



Band edge emissions (Radiated)
Undesirable emission limits (above 1GHz)

Undesirable emission limits (below 1GHz)



6 EUT Constructional Details (EUT Photos)

Please refer to the report A2303044-C01-R01.

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