



Shenzhen Huaxia Testing Technology Co., Ltd

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640

Fax: +86-755-26648637

Website: www.cqa-cert.com

Report Template Version: V05

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Test Report

Report No.: CQASZ20230801414E-01
Applicant: Shenzhen Hollyland Technology Co., Ltd
Address of Applicant: 8F, 5D Building, Skyworth Innovation Valley, Tangtou, Shiyan, Baoan District Shenzhen, China.
Equipment Under Test (EUT):
Product: WIRELESS VIDEO TRANSMISSION SYSTEM
Model No.: MARS 400S PRO II
Test Model No.: MARS 400S PRO II
Brand Name: HOLLYLAND
FCC ID: 2ADZC-9802FPROR
Standards: 47 CFR Part 15, Subpart E
KDB 789033 D02 General UNII Test Procedures New Rules v02r01
Date of Receipt: 2023-08-01
Date of Test: 2023-08-01 to 2023-09-13
Date of Issue: 2023-10-11
Test Result: **PASS***

*In the configuration tested, the EUT complied with the standards specified above.

Tested By:

Lewis Zhou

(Lewis Zhou)

Reviewed By:

Timo Lei

(Timo Lei)

Approved By:

Jack Ai

(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20230801414E-01	Rev.01	Initial report	2023-10-11

2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15 Subpart C Section 15.203	ANSI C63.10-2013; KDB789033	PASS
AC Power Line Conducted Emission	47 CFR Part 15 Subpart E Section 15.207	ANSI C63.10-2013; KDB789033	PASS
Maximum Conducted Output Power	47 CFR Part 15 Subpart C Section 15.407 (a)	ANSI C63.10-2013; KDB789033	PASS
Emission Bandwidth	47 CFR Part 15 Subpart C Section 15.407 (a)(e)	ANSI C63.10-2013; KDB789033	PASS
Maximum Power Spectral Density	47 CFR Part 15 Subpart E Section 15.407 (a)	ANSI C63.10-2013; KDB789033	PASS
Band Edge Measurements	47 CFR Part 15 Subpart C Section 15.209 & 15.407(b)	ANSI C63.10-2013; KDB789033	PASS
Frequency stability	47 CFR Part 15 Subpart E Section 15.407 (g)	ANSI C63.10-2013; KDB789033	PASS
Operation in the absence of information to the transmit	47 CFR Part 15 Subpart E Section 15.407 (c)	47 CFR Part 15 Subpart E	PASS
Radiated Spurious Emissions	47 CFR Part 15 Subpart E Section 15.407 (b)	ANSI C63.10-2013; KDB789033	PASS

Remark:

The tested sample(s) and the sample information are provided by the client.

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application

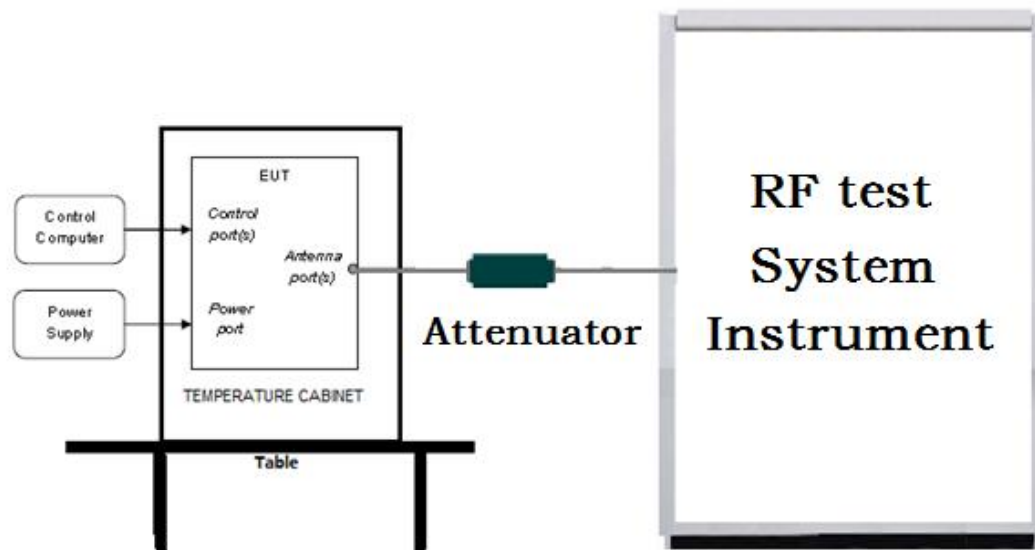
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4 Test Requirement

4.1 Test setup

4.1.1 For Conducted test setup



4.1.2 For Radiated Emissions test setup

Radiated Emissions setup:

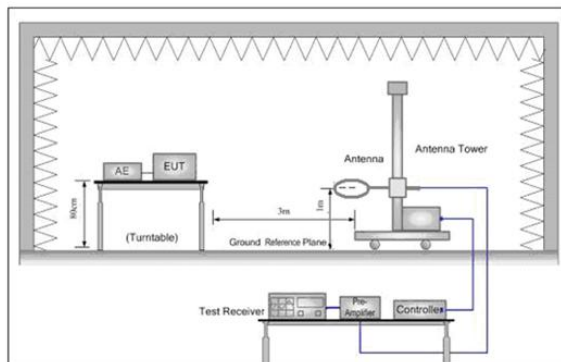


Figure 1. Below 30MHz

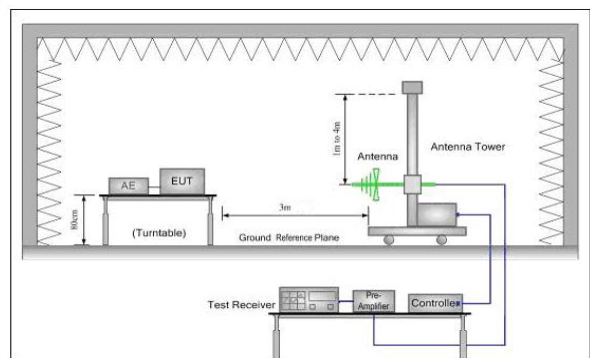


Figure 2. 30MHz to 1GHz

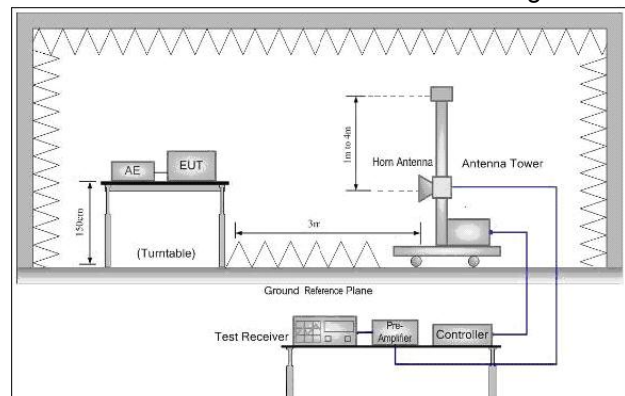
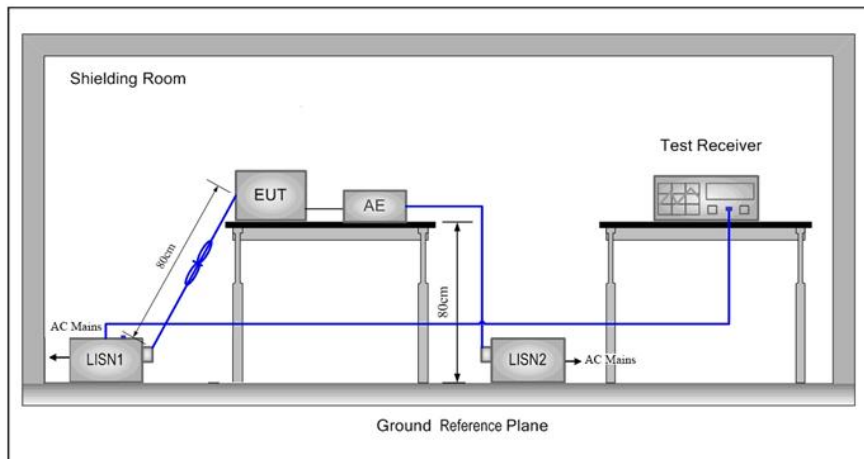


Figure 3. Above 1GHz

4.1.3 For Conducted Emissions test setup

Conducted Emissions setup



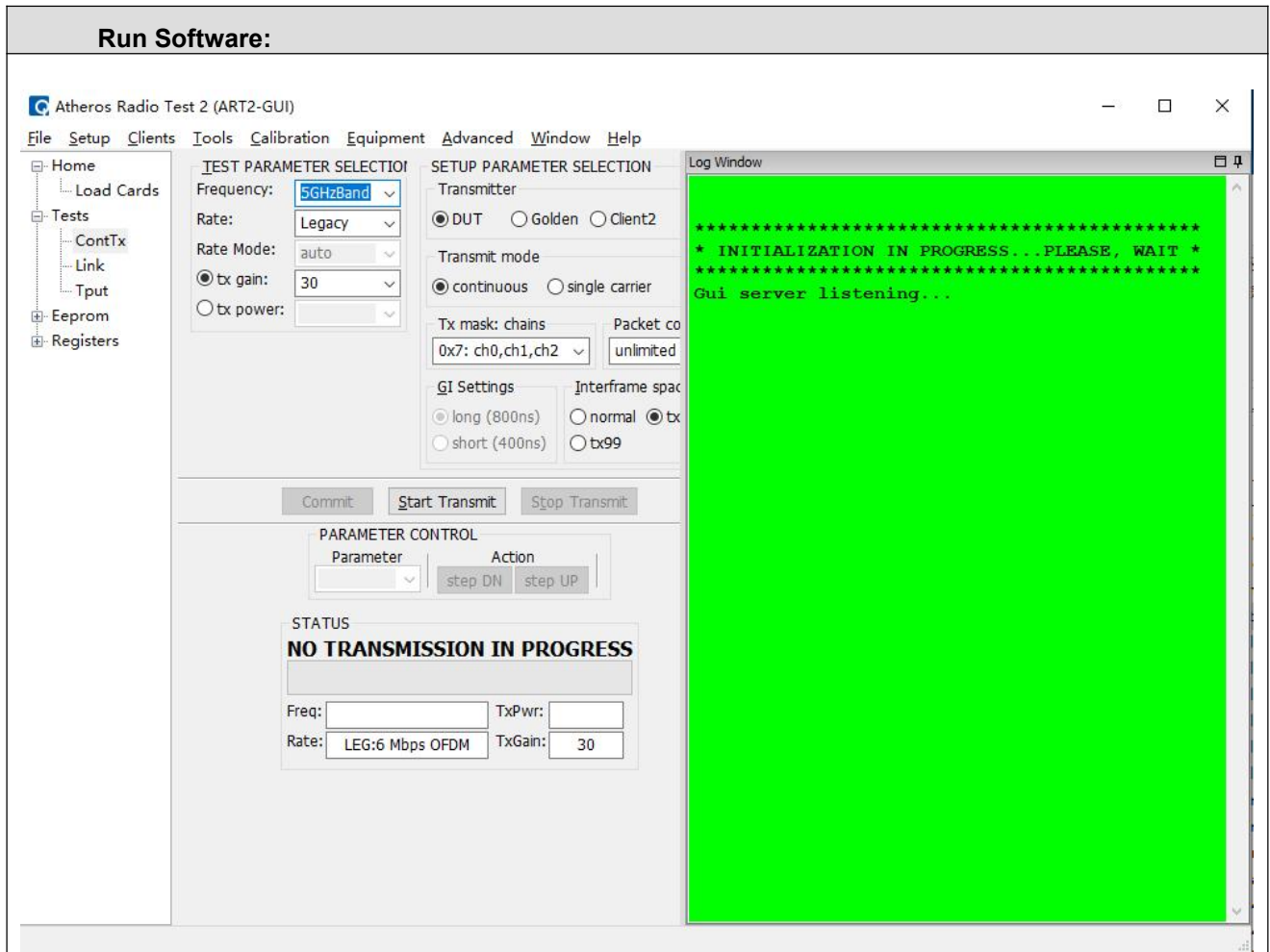
4.2 Test Environment

Operating Environment:		
Conducted Emissions:		
Temperature:	25.6 °C	
Humidity:	60 % RH	
Atmospheric Pressure:	1009 mbar	
Radiated Emissions:		
Temperature:	25.5 °C	
Humidity:	54 % RH	
Atmospheric Pressure:	1009mbar	
Radio conducted item test (RF Conducted test room):		
Temperature:	25.3 °C	
Humidity:	50 % RH	
Atmospheric Pressure:	1009 mbar	
Test Condition	Temperature (°C)	Voltage (V)
TN/VN	+15 to +35	12
TL/VL	-30	10.8
TH/VL	50	10.8
TL/VH	-30	13.2
TH/VH	50	13.2
Remark:		
1)The EUT just work in such extreme temperature of 0 °C to 50 °C and the extreme voltage of 0.8V to 13.2V, so here the EUT is tested in the temperature of 0 °C to 50 °C and the voltage of 0.8V to 13.2V.		
2)VN: Normal Voltage; TN: Normal Temperature;		
TL: Low Extreme Test Temperature; TH: High Extreme Test Temperature;		
VL: Low Extreme Test Voltage; VH: High Extreme Test Voltage.		

4.3 Test Condition

Test channel:

Test Mode	Tx/Rx	RF Channel		
		Low(L)	Middle(M)	High(H)
802.11a/n(20M)	5150MHz ~5250 MHz	Channel 36	Channel 40	Channel 48
		5180MHz	5200MHz	5240MHz
802.11a/n(20M)	5725MHz ~5850 MHz	Channel 149	Channel 157	Channel 165
		5745MHz	5785MHz	5825MHz



Test mode:

Pre-scan under all rate at lowest channel for Ant1

Through Pre-scan, 6Mbps is the worst case of 802.11a (20M); MCS0 is the worst case of 802.11n (20M).

5 General Information

5.1 Client Information

Applicant:	Shenzhen Hollyland Technology Co., Ltd
Address of Applicant:	8F, 5D Building, Skyworth Innovation Valley, Tangtou, Shiyan, Baoan District Shenzhen, China.
Manufacturer:	Shenzhen Hollyland Technology Co., Ltd
Address of Manufacturer:	8F, 5D Building, Skyworth Innovation Valley, Tangtou, Shiyan, Baoan District Shenzhen, China.
Factory:	Shenzhen Hollyland Technology Co., Ltd
Address of Factory:	8F, 5D Building, Skyworth Innovation Valley, Tangtou, Shiyan, Baoan District Shenzhen, China.

5.2 General Description of EUT

Product Name:	WIRELESS VIDEO TRANSMISSION SYSTEM
Model No.:	MARS 400S PRO II
Test Model No.:	MARS 400S PRO II
Trade Mark:	HOLLYLAND
Hardware Version:	V1.0.0.9
Software Version:	V18
EUT Power Supply:	Model:GQ24-120200-AX Input:100-240V~50/60Hz 1.0A Output:12V 2.0A 24W
EUT Supports Radios application:	5GHz: Wi-Fi: U-NII-1: 5.15-5.25GHz; U-NII-3: 5.725-5.850GHz
EUT Type:	Client devices

5.3 Product Specification subjective to this standard

Operation Frequency:	IEEE 802.11a/n(20M): 5150MHz ~5250 MHz IEEE 802.11a/n(20M): 5725MHz ~5850 MHz
Channel Numbers:	IEEE 802.11a/n(20M): 5150MHz ~5250MHz/ 4 channel IEEE 802.11a/n(20M): 5725MHz ~5850MHz/ 4 channel
Type of Modulation:	OFDM
Sample Type:	☒ Mobile ☐ Portable
Test Software of EUT:	Atheros Radio Test
Antenna Type:	External antenna
Antenna gain:	ANT1:0.18dBi@5GHz: Wi-Fi: U-NII-1, -0.14dBi@5GHz: Wi-Fi: U-NII-3 ANT2:0.18dBi@5GHz: Wi-Fi: U-NII-1, -0.14dBi@5GHz: Wi-Fi: U-NII-3 Direction gain: 3.19dBi@5GHz: Wi-Fi: U-NII-1, 2.87dBi@5GHz: Wi-Fi: U-NII-3
Cable loss:	1.0 dB

Note:

The above parameters will directly affect the test results. The information is provided by the applicant.

Operation Frequency each of channel

For 802.11a/n(20M) Operation in the 5150MHz ~5250 MHz band			
Channel	Frequency	Channel	Frequency
36	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz
For 802.11a/n(20M) Operation in the 5725MHz ~5850 MHz band			
Channel	Frequency	Channel	Frequency
149	5745MHz	165	5825MHz
153	5765MHz	/	/
157	5785MHz	/	/

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Certification	Supplied by
/	/	/	/	/

5.5 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China

5.6 Test Facility

• **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

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

No.	Item	Measurement Uncertainty
1	Radio Frequency	3×10^{-8}
2	RF power, conducted	0.86dB
3	Radiated Spurious emission test	5.12dB (Below 1GHz)
		4.6dB (Above 1GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.8°C
6	Humidity test	2.0%
7	DC power voltages	0.5%

6 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Spectrum analyzer	R&S	FSU26	CQA-038	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Spectrum analyzer	R&S	FSU40	CQA-075	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Preamplifier	EMCI	EMC184055SE	CQA-089	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2021/09/16	2024/09/15
Bilog Antenna	R&S	HL562	CQA-011	2021/09/16	2024/09/15
Horn Antenna	R&S	HF906	CQA-012	2021/09/16	2024/09/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/09/16	2024/09/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C007	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Coaxial Cable (Below 1GHz)	CQA	N/A	C013	2022/09/09 2023/09/08	2023/09/08 2024/09/07
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Antenna Connector	CQA	RFC-01	CQA-080	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Power Sensor	KEYSIGHT	U2021XA	CQA-30	2022/09/09 2023/09/08	2023/09/08 2024/09/07
N1918A Power Analysis Manager Power Panel	Agilent	N1918A	CQA-074	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Power meter	R&S	NRVD	CQA-029	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2022/09/09 2023/09/08	2023/09/08 2024/09/07
EMI Test Receiver	R&S	ESR7	CQA-005	2022/09/09 2023/09/08	2023/09/08 2024/09/07
LISN	R&S	ENV216	CQA-003	2022/09/09 2023/09/08	2023/09/08 2024/09/07
Coaxial cable	CQA	N/A	CQA-C009	2022/09/09 2023/09/08	2023/09/08 2024/09/07
DC power	KEYSIGHT	E3631A	CQA-028	2022/09/09 2023/09/08	2023/09/08 2024/09/07

Test software:

	Manufacturer	Software brand
Radiated Emissions test software	Tonscend	JS1120-3
Conducted Emissions test software	Audix	e3
RF Conducted test software	Audix	e3

7 Radio Technical Requirements Specification

Reference documents for testing:

No.	Identity	Document Title
1	FCC Part15E	Subpart C-Intentional Radiators
2	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
3	KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	Guidelines for compliance testing of unlicensed national information infrastructure (U-NII) device part 15, subpart E
4	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

Appendix A): Emission Bandwidth

26dB Emission bandwidth

Test Requirement: 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II C 1

6 dB bandwidth (5.725-5.85 GHz band)

Test Requirement 47 CFR Part 15, Subpart C 15.407 (e)

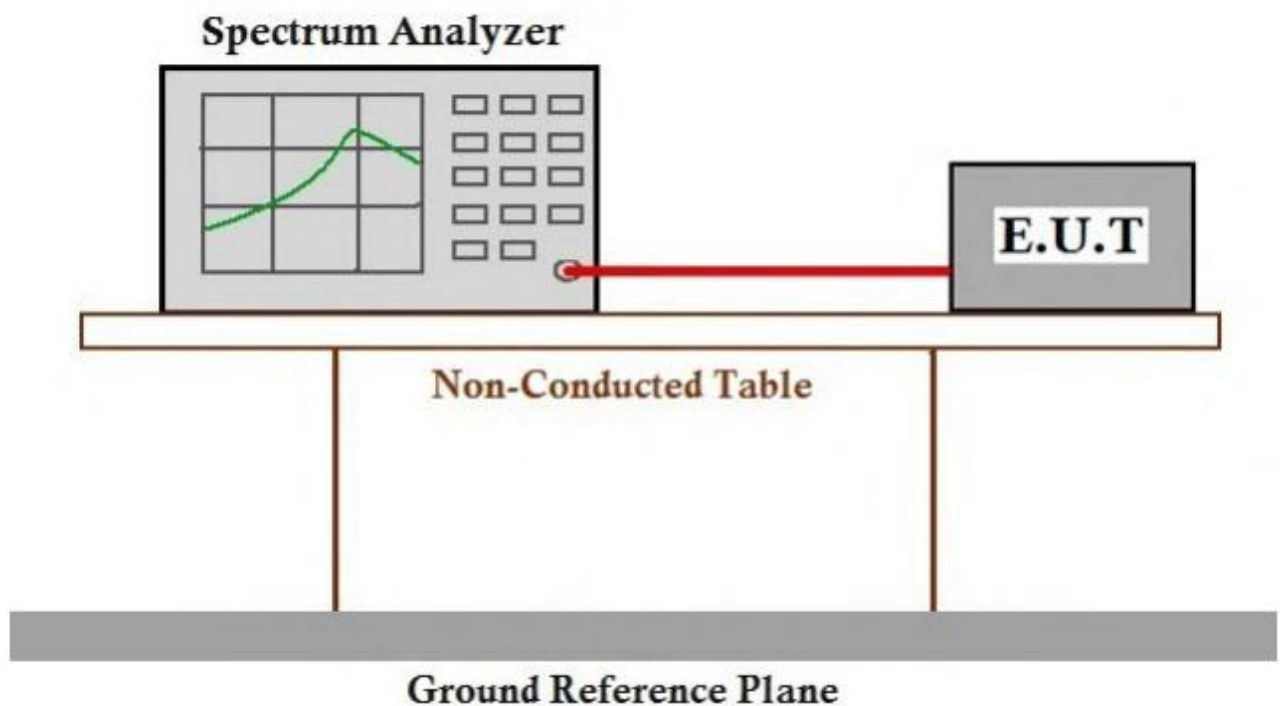
Test Method: KDB 789033 D02 II C 2

Limit: ≥ 500 kHz

Test Procedure:

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Test Setup Diagram



Result Table

Ant1:

TestMode	Freq(MHz)	26db EBW [MHz]	FL[MHz]	FH[MHz]
11A	5180	20.52	5169.64	5190.16
	5200	21.16	5189.40	5210.56
	5240	20.96	5230.08	5251.04
11N20SISO	5180	21.72	5169.04	5190.76
	5200	21.48	5189.32	5210.80
	5240	21.16	5229.76	5250.92

TestMode	Freq(MHz)	6db EBW [MHz]	Limit[MHz]	Verdict
11A	5745	16.04	0.5	PASS
	5785	16.32	0.5	PASS
	5825	16.28	0.5	PASS
11N20SISO	5745	15.68	0.5	PASS
	5785	17.16	0.5	PASS
	5825	16.96	0.5	PASS

Ant2:

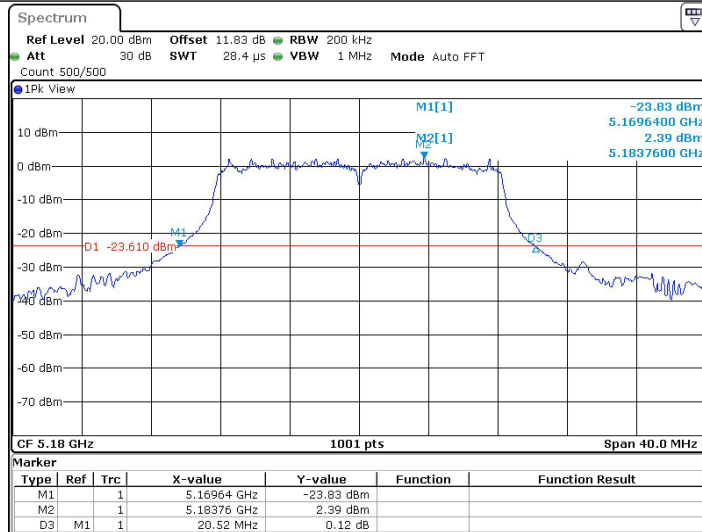
TestMode	Freq(MHz)	26db EBW [MHz]	FL[MHz]	FH[MHz]
11A	5180	20.52	5169.64	5190.16
	5200	21.44	5189.32	5210.76
	5240	21.48	5229.52	5251.00
11N20SISO	5180	21.72	5169.36	5191.08
	5200	21.96	5188.92	5210.88
	5240	21.48	5229.68	5251.16

TestMode	Freq(MHz)	6db EBW [MHz]	Limit[MHz]	Verdict
11A	5745	16.36	0.5	PASS
	5785	16.40	0.5	PASS
	5825	16.36	0.5	PASS
11N20SISO	5745	17.64	0.5	PASS
	5785	17.68	0.5	PASS
	5825	17.72	0.5	PASS

Test Graph

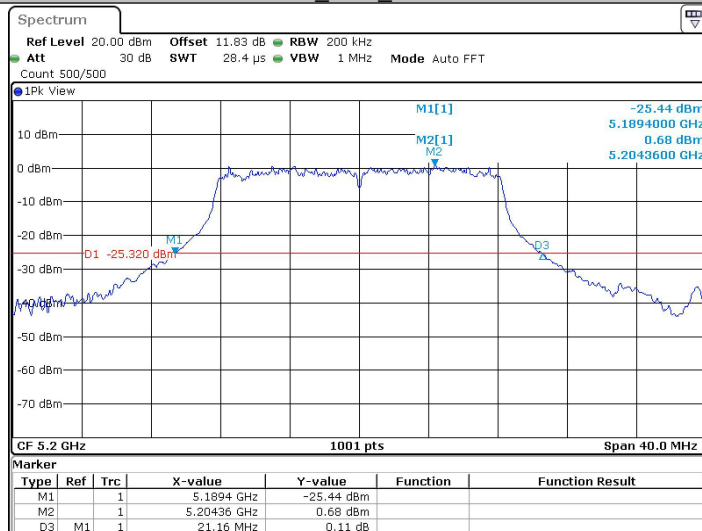
EBW:

11A_Ant1_5180



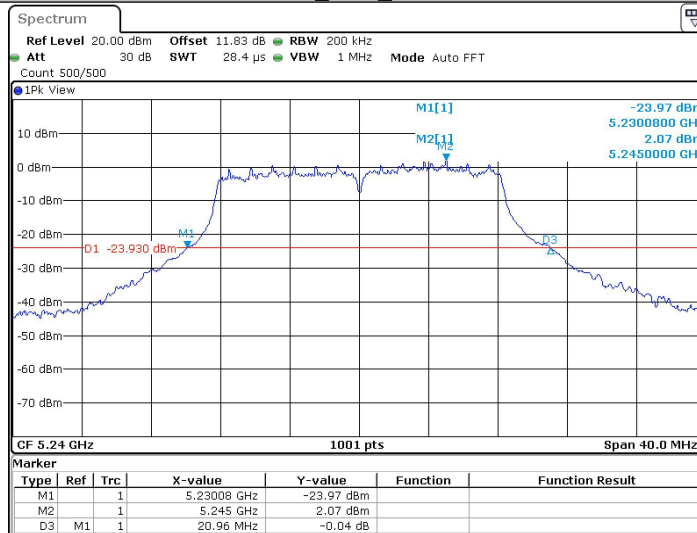
Date: 12 SEP. 2023 14:42:56

11A_Ant1_5200



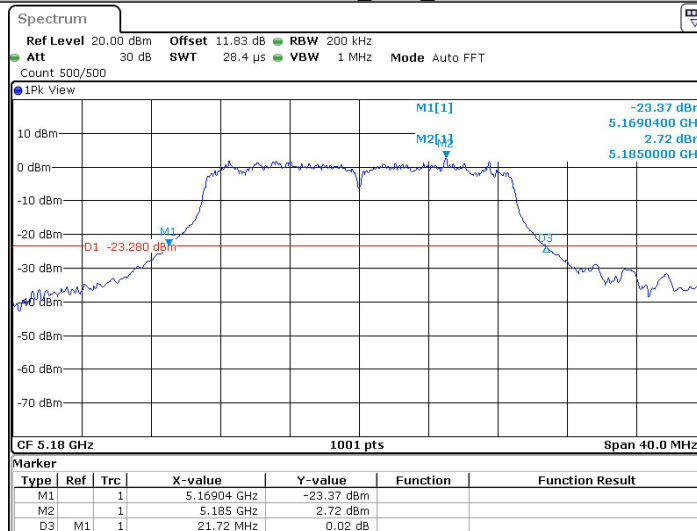
Date: 12 SEP. 2023 14:45:55

11A_Ant1_5240



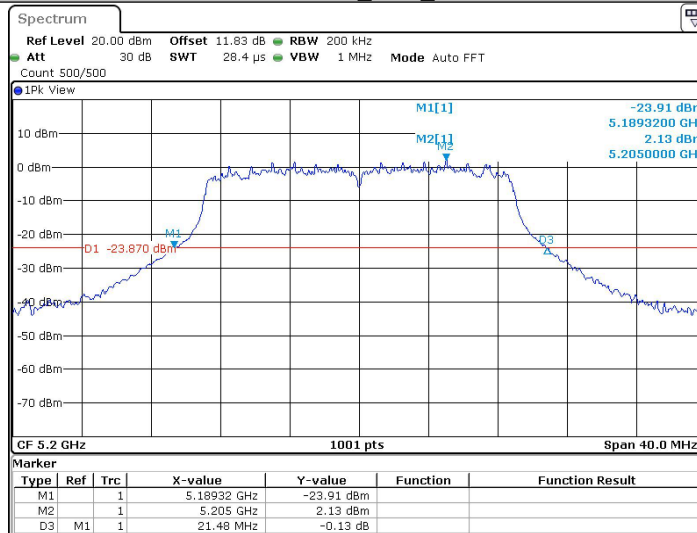
Date: 12.SEP.2023 14:47:20

11N20SISO_Ant1_5180



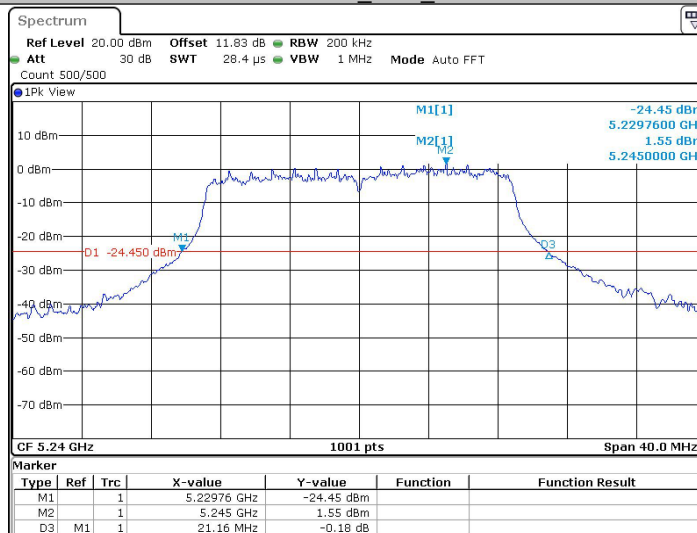
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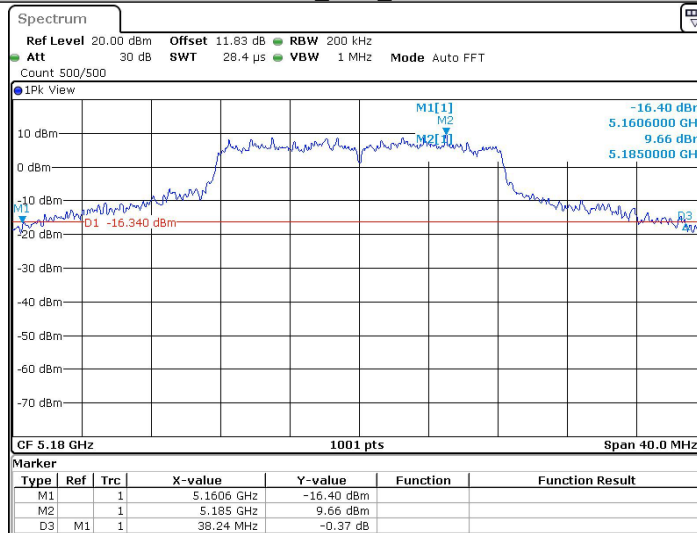
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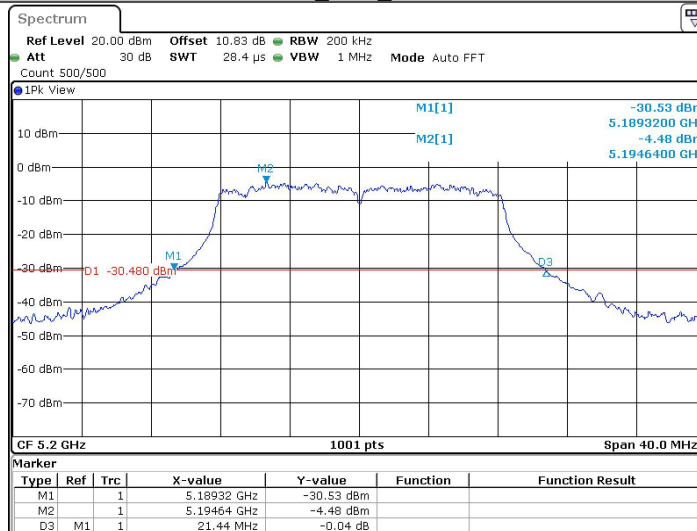
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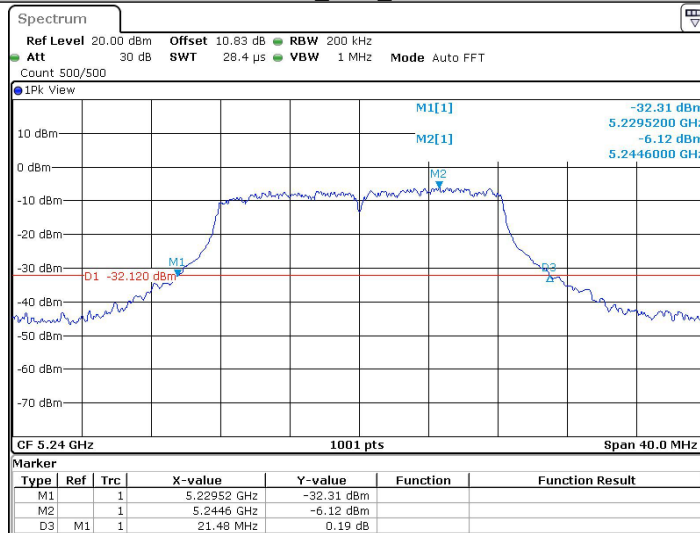
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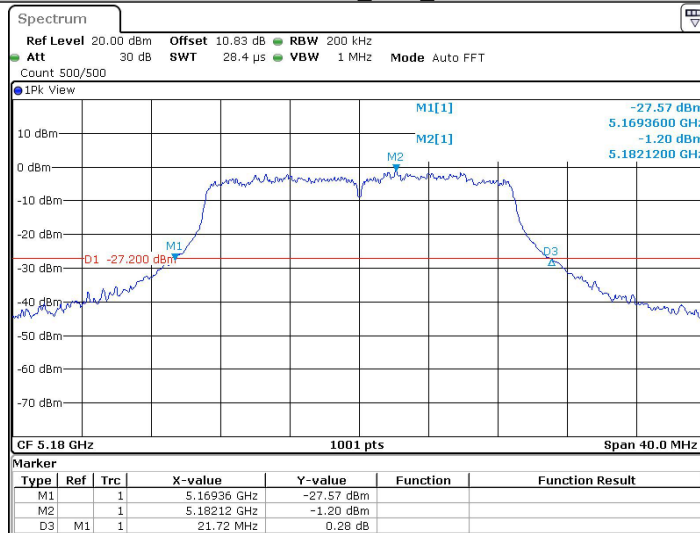
Date: 9 AUG. 2023 16:58:46

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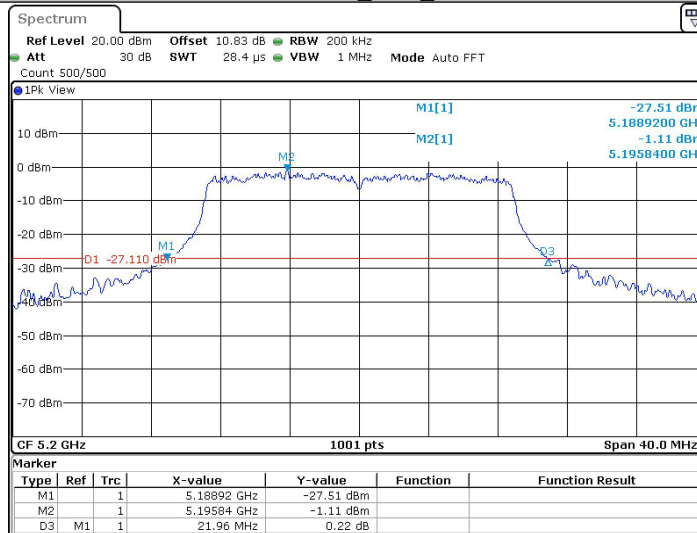
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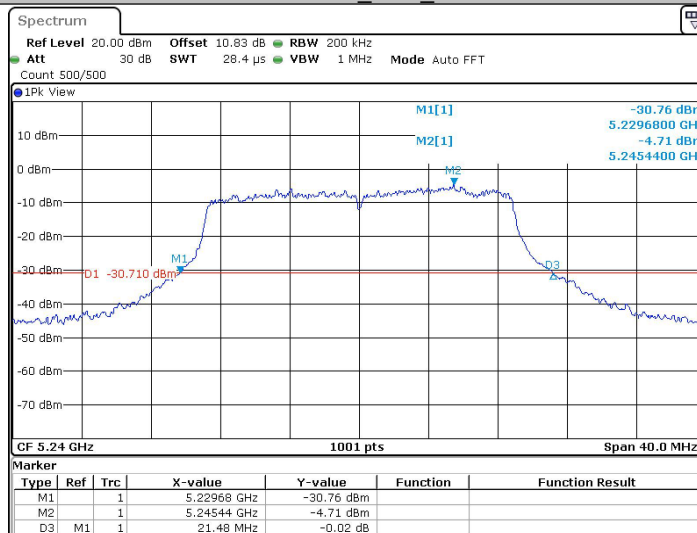
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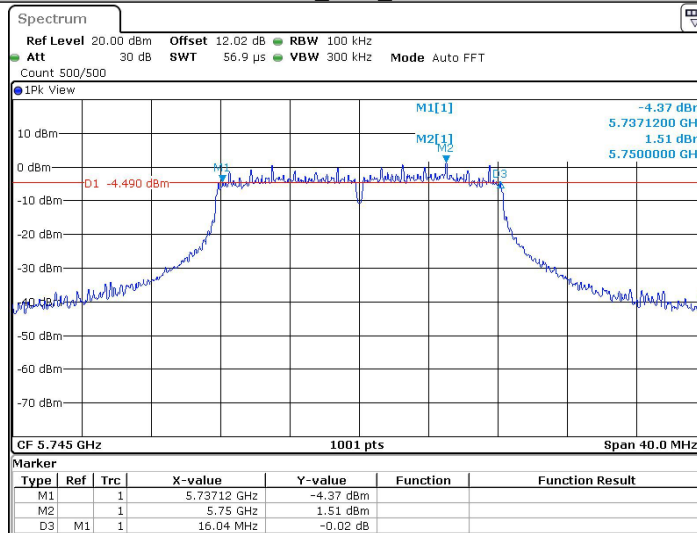
Date: 10.AUG.2023 10:18:07

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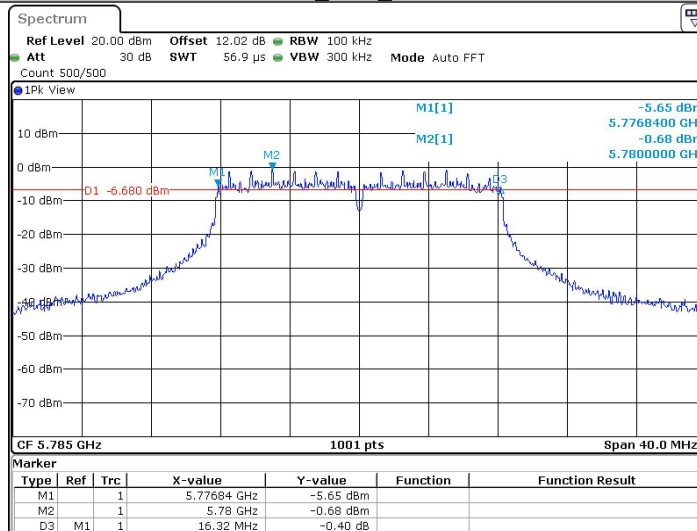
Date: 10.AUG.2023 10:25:59

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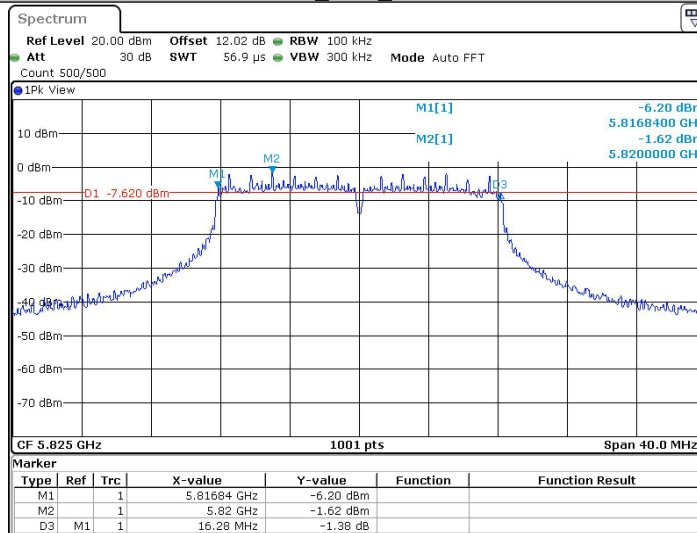
Date: 12.SEP.2023 14:50:16

11A_Ant1_5785



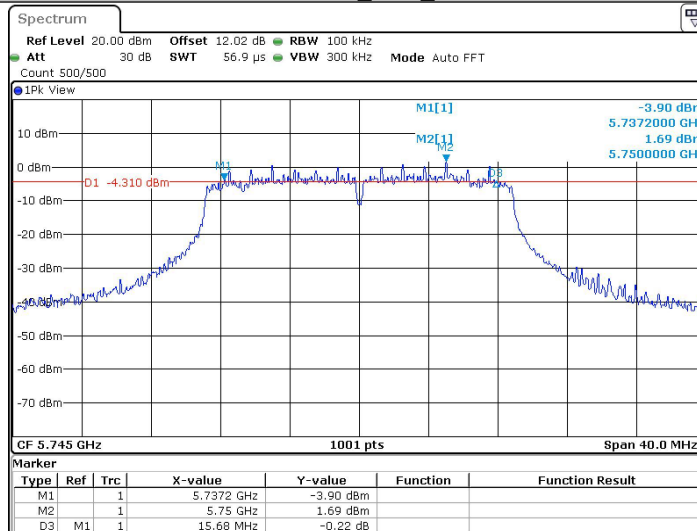
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11A_Ant1_5825



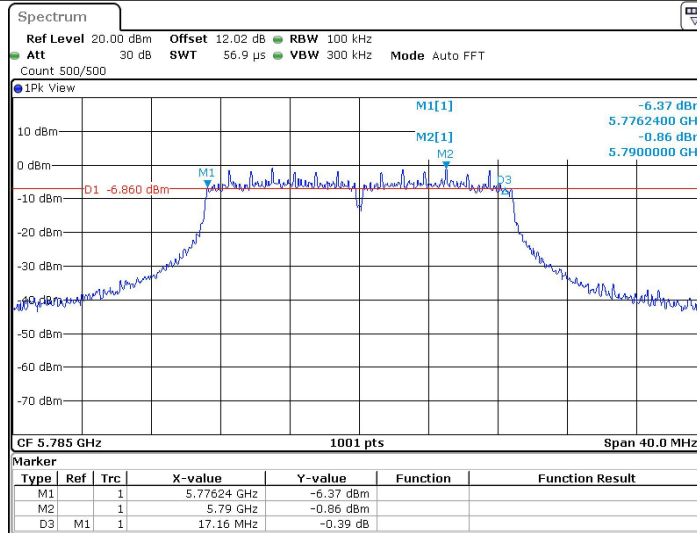
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11N20SISO_Ant1_5745



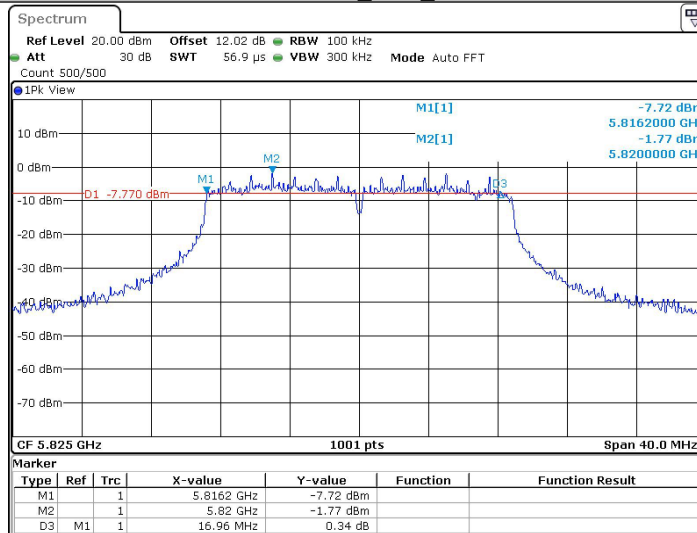
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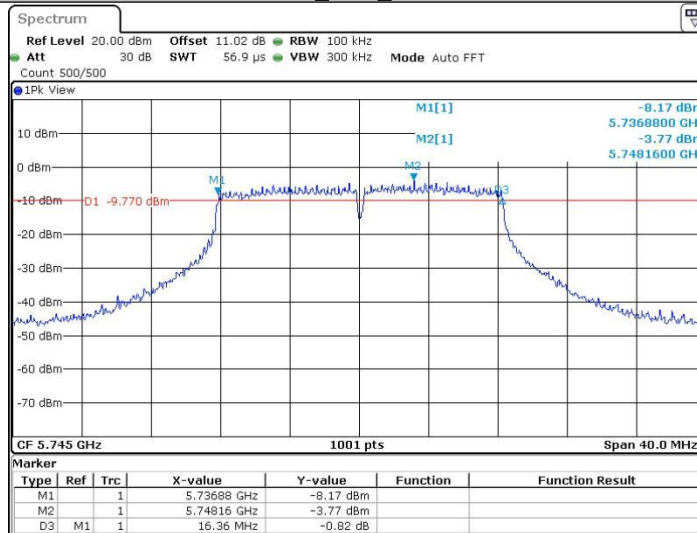
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11N20SISO_Ant1_5825



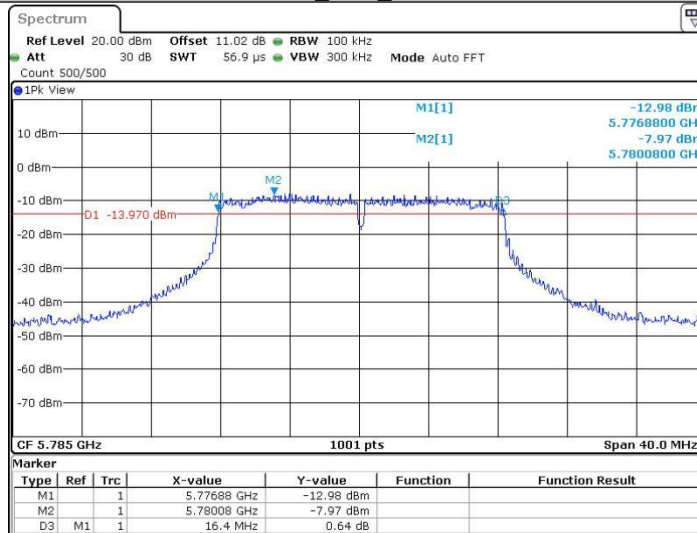
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11A_Ant2_5745



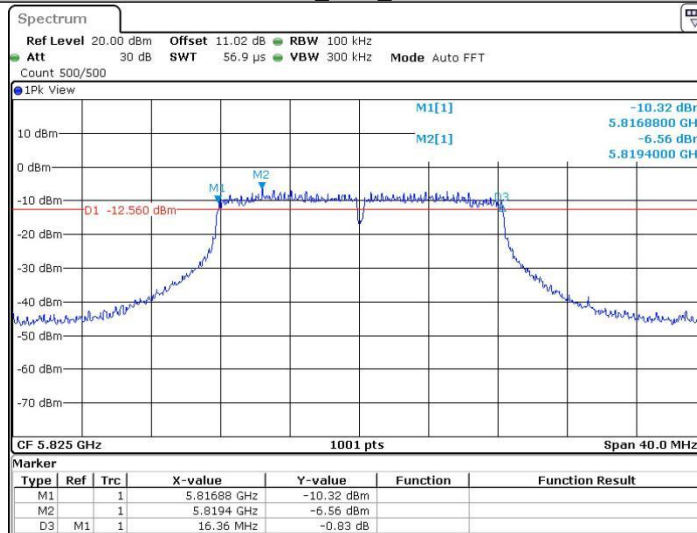
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11A_Ant2_5785



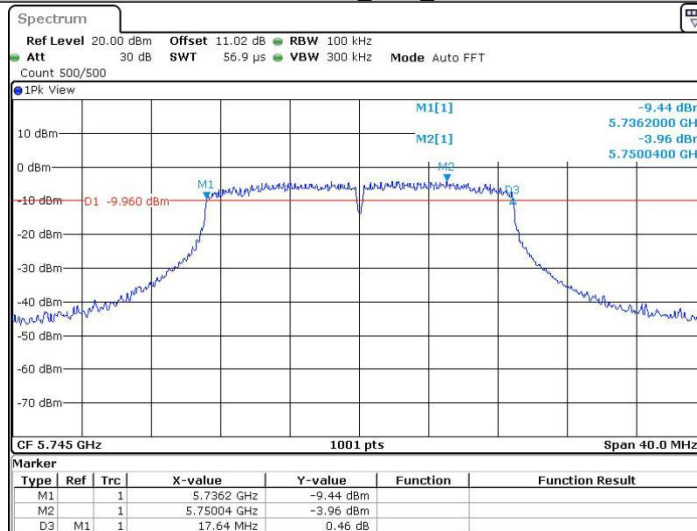
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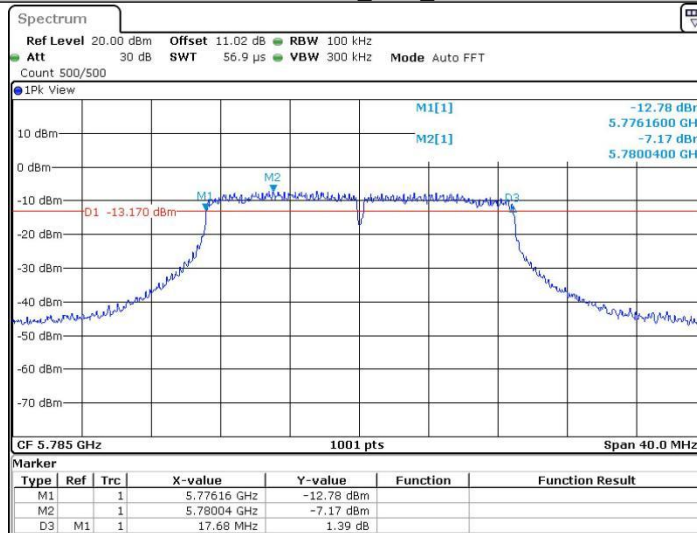
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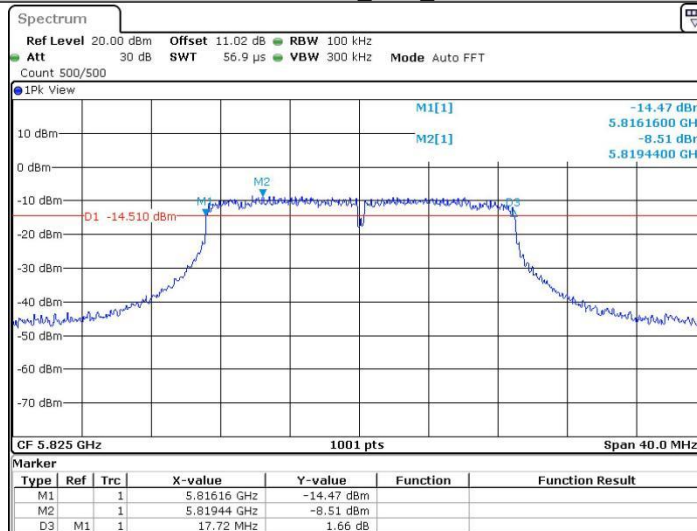
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11N20SISO_Ant2_5785



Date: 10 AUG 2023 10:42:22

11N20SISO_Ant2_5825



Date: 10 AUG 2023 10:51:28

Appendix B): Maximum Conduct Output Power

Test Requirement 47 CFR Part 15, Subpart C 15.407 (a)

Test Method: KDB 789033 D02 II E

Limit:

Frequency band(MHz)	Limit
5150-5250	$\leq 1\text{W}(30\text{dBm})$ for master device
	$\leq 250\text{mW}(24\text{dBm})$ for client device
5250-5350	$\leq 250\text{mW}(24\text{dBm})$ for client device or $11\text{dBm}+10\log B^*$
5470-5725	$\leq 250\text{mW}(24\text{dBm})$ for client device or $11\text{dBm}+10\log B^*$
5725-5850	$\leq 1\text{W}(30\text{dBm})$
Remark:	* Where B is the 26dB emission bandwidth in MHz. The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Test Procedure:

Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

- (1) Set RBW = 1 MHz.
- (2) Set VBW ≥ 3 MHz.
- (3) Detector = power average
- (4) Sweep time = auto.
- (5) Add duty cycle to the measured average power.

Test Setup Diagram

