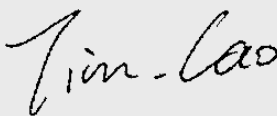


Test report No:
25C0463R.704

TEST REPORT

Product Name	WiFi/BT Module
Trademark	Hisense
Model and /or type reference	MWH653S
FCC ID	2AJVQ-MWH653S
Applicant's name / address	Qingdao Intelligent & Precise Electronics Co., Ltd. No.218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, Shandong Province, China
Test method requested, standard	47 CFR FCC Part 15 (Section 15.407) ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024
Verdict Summary	IN COMPLIANCE
Documented by (name / position & signature)	Tim Cao / Project Manager 
Approved by (name / position & signature)	Frank He / Technical Manager 
Date of issue	2026-01-27
Report Version	V1.0
Report template No.	Template_FCC Part 15C-RF-V1.0

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COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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GENERAL CONDITIONS

Test Location A	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Test Facility A	A2LA (Certificate No. 3235.01) CNAS (Certificate No. L5313) FCC - Designation Number: CN1199 Test Firm Registration Number: 566524 ISED - CAB identifier: CN0040 IC#: 4075B
Test Location B	No. 8213, Fanhua Avenue, Baohe District, Hefei City, Anhui Province, China
Test Facility B	A2LA (Certificate No. 6579.01) CNAS (Certificate No. L21125) FCC - Designation Number: CN1231 Test Firm Registration Number: 690292 ISED - CAB identifier: CN0175 IC#: 32222
Date(receive sample)	Dec. 15, 2025
Date (start test)	Dec. 16, 2025
Date (finish test)	Jan. 21, 2026

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.



DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
25C0463R.704	V1.0	Initial issue of report.	2026-01-27

TEST SUMMARY

Test Item	Band ^{l1} J	FCC rules No.	Test Requirements	Result
Antenna Requirement	--	15.203/15.407(a)	--	PASS
26dB Emission Bandwidth	Band I	15.407(a)(1)	No limit.	PASS
	Band II-A	15.407(a)(2)		
	Band II-C	15.407(a)(2)		
6dB Emission Bandwidth	Band III	15.407(e)	≥ 500 kHz.	PASS
99% Occupied Bandwidth	Band I	KDB 789033 D02§ D	No limit.	PASS
	Band II-A			
	Band II-C			
	Band III			
Duty Cycle	Band I Band II-A Band II-C Band III	--	No limit.	PASS
Maximum Conducted Output Power	Band I	15.407(a)	< 250mW	PASS
	Band II-A	15.407(a)(2)	<MIN{250mW,11dBm+10*lg(EBW)}	
	Band II-C			
	Band III	15.407(a)(3)	< 1W	
Maximum Power Spectral Density	Band I	15.407(a)	<11dBm/MHz	PASS
	Band II-A	15.407(a)(2)	<11dBm/MHz	
	Band II-C			
	Band III	15.407(a)(3)	<30dBm/500KHz	
Unwanted Emissions that fall Out of the Restricted Bands (Radiated)	Band I	15.209 15.407(b)	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.	PASS
	Band II-A	15.407(b) 15.209	For transmitters operating in the 5.25-5.35 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.	PASS
	Band II-C	15.407(b) 15.209	For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.	PASS
	Band III	15.407(b) 15.209	For transmitters operating solely in the 5.725-5.850 GHz band: (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	PASS

			(ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.			
Unwanted Emissions in the Restricted Bands (Radiated)	Band I Band II-A Band II-C Band III	15.209	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				
			** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.			
AC Power Line Conducted Emissions	Band I Band II-A Band II-C Band III	15.207	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.			
Frequency Stability	Band I Band II-A Band II-C Band III	15.407(g)	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual			N/A
Dynamic Frequency Selection (DFS)	Band II-A Band II-C	15.407(h)	---			PASS
Remark: Band I: 5150-5250MHz Band II-A: 5250-5350MHz Band II-C: 5470-5725MHz Band III: 5725-5850MHz Note: EUT is DC powered Note: Frequency stability is claimed by the equipment manufacturer to ensure that the transmitted signal remains within the operating frequency band under all normal operating conditions specified in the user manual.						

Requirement – Test case	Location	Remark
Radiated Emission	B	Test data please refer to appendix
Emission bandwidth and occupied bandwidth	A	Test data please refer to appendix
6dB Emission Bandwidth	A	Test data please refer to appendix

Requirement – Test case	Location	Remark
Duty cycle	A	Test data please refer to appendix
Power Output	A	Test data please refer to appendix
Peak Power Spectral Density	A	Test data please refer to appendix
Radiated Emission Band Edge	B	Test data please refer to appendix
Dynamic Frequency Selection (DFS)	A	Test data please refer to appendix
Antenna Requirement	A	---
Note: Radiated Emission and Radiated Emission Band Edge were completed at Test Location B, and other tests were completed at Test Location A.		

USED EQUIPMENT

Test Location A: Conducted Test/ TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Wireless Connectivity Tester	R&S	CMW 270	102593	2025.05.10	2026.05.09
High and low temperature and fast temperature change test box	ASTUOD	ASTD-FBT-225K	N/A	2025.03.15	2026.03.14
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2025.06.17	2026.06.16
MAX Signal Analyzer	Agilent	N9020A	MY49100159	2025.10.15	2026.10.14
RF Control Unit	Tonscend	JS0806-2	22G8060594	2025.01.26	2026.01.25
Vector Signal Genertor	R&S	SMM 100A	101853	2025.09.20	2026.09.19
EXG-B MW Analog Signal Generator	Keysight	N5173B	MY61252566	2025.05.10	2026.05.09
Test Software	Tonscend	TS1120	JS1120-3	N/A	N/A

Test Location A: Radiated Emission(9KHz-1GHz) / AC2

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Anechoic chamber	Quietek	9m*6m*6m	AC2	2024.07.07	2029.07.06
EMI Test Receiver	R&S	ESCI	100573	2025.12.07	2026.12.06
EMI Test Receiver	R&S	ESCI	100573	2025.12.07	2026.12.06
Bilog Antenna	Teseq GmbH	CBL6112D	27611	2025.03.24	2026.03.23
Temperature/Humidity Meter	RTS	RTS-1909	THM-021	2025.04.30	2026.04.29
Dekra test software	Dekra	N/A	N/A	N/A	N/A

Test Location B: Radiated Emission Band Edge / AC103

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Fully-anechoic chamber	Maorui	9m*6m*6m	AC103	2023.08.23	2028.08.22
MAX Signal Analyzer	Keysight	N9020B	MY63490118	2025.08.08	2026.08.07
Horn Antenna	RF SPIN	DRH18-E	KV2D11A18ES	2025.09.06	2026.09.05
Low Noise Amplifier	Tonscend	TAP01018048S	AP23J8060307	2025.10.17	2026.10.16
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	01312	2025.10.18	2026.10.17
Low Noise Amplifier	ESE	LNA1840	LNA23070301	2025.10.17	2026.10.16
Temperature/Humidity Meter	RITERS	RTS-8S	029	2025.08.25	2026.08.24
Temperature/Humidity Meter	RITERS	RTS-8S	010	2025.08.25	2026.08.24
Test Software	Tonscend	J536	JS36-RSE	N/A	N/A

UNCERTAINTY

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95% .

Test item Test Location A	Uncertainty
AC Power Line Conducted Emission	9kHz~150kHz: 2.8 dB 150kHz~30MHz: 2.4 dB
Peak Power Output	± 1.3 dB
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 3.5 dB 300MHz~1GHz: 3.6 dB Vertical: 30MHz~200MHz: 3.6 dB 300MHz~1GHz: 3.5 dB
Radiated Emission(1GHz~26.5GHz)	Horizontal: 1GHz~18GHz: 5.0 dB Vertical: 1GHz~18GHz: 4.8 dB Horizontal: 18GHz~26.5GHz: 5.3 dB Vertical: 18GHz~26.5GHz: 4.9 dB
RF antenna conducted test	± 1.3 dB
Carrier Frequency Separation	± 1.0 kHz
Number of Hopping Frequencies	± 1.0 kHz
Time of Occupancy (Dwell Time)	± 0.10 us
Radiated Emission Band Edge	± 3.9 dB
DTS Bandwidth	± 1.0 kHz
Occupied Bandwidth	± 1.0 kHz
Power Density	± 1.3 dB

Test item Test Location B	Uncertainty
Radiated Emission(30MHz~1GHz)	Horizontal: 30MHz~200MHz: 4.86 dB 300MHz~1GHz: 4.86 dB Vertical: 30MHz~200MHz: 4.92 dB 300MHz~1GHz: 4.92 dB
Radiated Emission(1GHz~40GHz)	Horizontal: 1GHz~18GHz: 5.99 dB Vertical: 1GHz~18GHz: 5.76 dB Horizontal: 18GHz~40GHz: 5.99 dB Vertical: 18GHz~40GHz: 5.76 dB
Radiated Emission Band Edge	± 5.99 dB

1 GENERAL INFORMATION

Product Name	WiFi/BT Module		
Model No.	MWH653S		
Trademark	Hisense		
FCC ID	2AJVQ-MWH653S		
SN	Conducted: 25C0463R-1		
	Radiated: 25C0463R-3		
Manufacturer	Qingdao Intelligent & Precise Electronics Co., Ltd.		
Manufacturer Address	No.218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, Shandong Province, China		
Power Supply	3.3 Vdc		
Wireless specification	Wi-Fi		
Frequency Range	U-NII-1: 5150 MHz to 5250 MHz		
	U-NII-2A: 5250 MHz to 5350 MHz		
	U-NII-2C: 5470 MHz to 5725 MHz		
	U-NII-3: 5725 MHz to 5850 MHz		
Channel Spacing	802.11a 20 MHz		
	802.11n 20 MHz, 40 MHz		
	802.11ac 20 MHz, 40 MHz, 80 MHz		
	802.11ax 20 MHz, 40 MHz, 80 MHz		
Modulation technology	OFDM / OFDMA		
Smart System	☒	SISO	
	☒	MIMO-CDD	
DFS Function	☐	Master device	
	☐	Slave with radar detection	
	☒	Slave without radar detection	
TPC Function:	☐	Support	☒ Not Support
Antenna type	FPCB		
Antenna Gain	SISO	Ant1: 5.91 dBi Ant2: 4.58 dBi	
	MIMO-CDD	5.91dBi for power, 8.92dBi for PSD	

Remark:

- As above information is provided and confirmed by the applicant. DEKRA is not liable to the accuracy, suitability, reliability or/and integrity of the information.
- 802.11ax/be support full RU tone and partial RU tone, both full RU and partial RU-left (for low CH) and partial RU-right (for high CH) are tested for conducted power/PSD/Channel Mask in appendix, all the other test case were performed with full RU with its maximum power/PSD.
- This device is equipped with two Wi-Fi 5GHz antennas. We tested the output power of both chains separately. When testing other conduction test items, only the chain with higher power was selected for testing. When testing radiated spurious emissions, we tested the data of both antenna chains and MIMO mode, but only the data of MIMO(ANT1+ANT2), was shown in the report.
- The test carrier board was provided by the customer.

<Small size RU 52+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	26	52	1	38	1
20MHz	52	26	38	4	2
20MHz	52	26	39	7	3

<Small size RU 106+26 Tone>:

Bandwidth	Tones		Index		For test modes configure
20MHz	106	26	53	4	1
20MHz	26	106	4	54	2

1.1 Power setting in test

Mode	Channel / Frequency	Data Rate	Power setting
802.11a	36 / 5180	6	15.50
	40 / 5200	6	15.50
	48 / 5240	6	15.50
	52 / 5260	6	16.00
	56 / 5280	6	16.00
	64 / 5320	6	16.00
	100 / 5500	6	18.00
	116 / 5580	6	19.50
	140 / 5700	6	19.50
	149 / 5745	6	20.50
	157 / 5785	6	20.00
	165 / 5825	6	19.50
802.11n(20MHz)	36 / 5180	MCS0	13.50
	40 / 5200	MCS0	13.50
	48 / 5240	MCS0	14.00
	52 / 5260	MCS0	14.00
	56 / 5280	MCS0	14.00
	64 / 5320	MCS0	14.00
	100 / 5500	MCS0	14.50
	116 / 5580	MCS0	15.50
	140 / 5700	MCS0	17.50
	149 / 5745	MCS0	17.50
	157 / 5785	MCS0	17.50
	165 / 5825	MCS0	17.50
802.11n(40MHz)	38 / 5190	MCS0	12.00
	46 / 5230	MCS0	13.00
	54 / 5270	MCS0	12.50
	62 / 5310	MCS0	12.50
	102 / 5510	MCS0	14.50
	110 / 5550	MCS0	15.00
	134 / 5670	MCS0	16.00
	151 / 5755	MCS0	16.00
	159 / 5795	MCS0	16.00
802.11ac(20MHz)	36 / 5180	MCS0	12.50
	40 / 5200	MCS0	12.50
	48 / 5240	MCS0	13.00
	52 / 5260	MCS0	13.00
	56 / 5280	MCS0	13.00
	64 / 5320	MCS0	13.50
	100 / 5500	MCS0	14.50
	116 / 5580	MCS0	15.00
	140 / 5700	MCS0	17.50
	149 / 5745	MCS0	17.50

	157 / 5785	MCS0	17.50
	165 / 5825	MCS0	17.50
802.11ac(40MHz)	38 / 5190	MCS0	12.00
	46 / 5230	MCS0	13.00
	54 / 5270	MCS0	12.50
	62 / 5310	MCS0	12.50
	102 / 5510	MCS0	14.50
	110 / 5550	MCS0	15.00
	134 / 5670	MCS0	16.00
	151 / 5755	MCS0	16.00
	159 / 5795	MCS0	16.00
802.11ac(80MHz)	42 / 5210	MCS0	10.50
	58 / 5290	MCS0	11.00
	106 / 5530	MCS0	12.50
	122 / 5610	MCS0	13.00
	155 / 5775	MCS0	14.50
802.11ax(20MHz)	36 / 5180	MCS0	12.50
	40 / 5200	MCS0	12.50
	48 / 5240	MCS0	13.00
	52 / 5260	MCS0	13.00
	56 / 5280	MCS0	13.00
	64 / 5320	MCS0	13.50
	100 / 5500	MCS0	14.50
	116 / 5580	MCS0	15.00
	140 / 5700	MCS0	17.50
	149 / 5745	MCS0	17.50
	157 / 5785	MCS0	17.50
	165 / 5825	MCS0	17.50
802.11ax(40MHz)	38 / 5190	MCS0	12.00
	46 / 5230	MCS0	13.00
	54 / 5270	MCS0	12.50
	62 / 5310	MCS0	12.50
	102 / 5510	MCS0	14.50
	110 / 5550	MCS0	15.00
	134 / 5670	MCS0	16.00
	151 / 5755	MCS0	16.00
	159 / 5795	MCS0	16.00
802.11ax(80MHz)	42 / 5210	MCS0	10.50
	58 / 5290	MCS0	11.00
	106 / 5530	MCS0	12.50
	122 / 5610	MCS0	13.00
	155 / 5775	MCS0	14.50

Channel/ Frequency (MHz)	RU configure	Data rate	Power setting
36/ 5180	26/0	MCS0	7.0
36/ 5180	52/37	MCS0	10.0
36/ 5180	106/53	MCS0	12.0
52 / 5260	26/8	MCS0	9.0
52 / 5260	52/40	MCS0	11.0
52 / 5260	106/54	MCS0	13.0
100/ 5500	26/0	MCS0	7.0
100/ 5500	52/37	MCS0	10.0
100/ 5500	106/53	MCS0	12.0
149 / 5745	26/8	MCS0	10.0
149 / 5745	52/40	MCS0	14.0
149 / 5745	106/54	MCS0	16.0

1.2 Worst-case configuration and mode

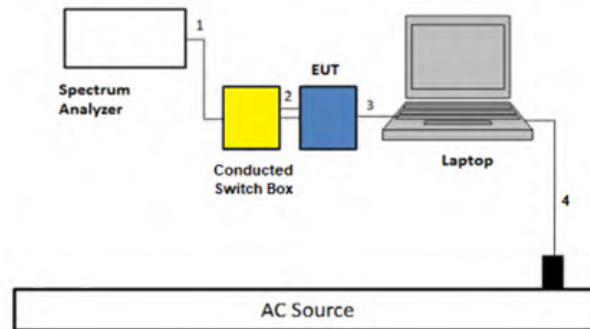
Low data rate was used to test on antenna port conducted tests and radiated spurious emissions since it has the highest maximum power. Following are the worst-case data rates set for test:

Modulation Type	SISO - Data Rate	MIMO - Data Rate
802.11a	6Mbps	N/A
802.11n (HT 20)	MCS0(6.5 Mbps)	MCS0(6.5 Mbps)
802.11n (HT 40)	MCS0(13.5 Mbps)	MCS0(13.5 Mbps)
802.11ac (VHT 20)	MCS0(6.5 Mbps)	MCS0(6.5 Mbps)
802.11ac (VHT 40)	MCS0(13.5 Mbps)	MCS0(13.5 Mbps)
802.11ac (VHT 80)	MCS0(29.3 Mbps)	MCS0(29.3 Mbps)
802.11ax (EHT 20)	MCS0(6.5 Mbps)	MCS0(7.3 Mbps)
802.11ax (EHT 40)	MCS0(13.5 Mbps)	MCS0(14.6 Mbps)
802.11ax (EHT 80)	MCS0(29.3 Mbps)	MCS0(30.6 Mbps)

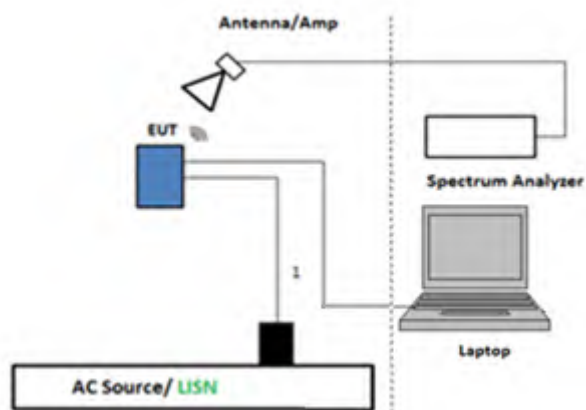
Note: EUT supports SISO Ant 1 antenna mode, SISO Ant 2 mode and MIMO Ant 1+2 mode. What is shown in the report is the data of the worst antenna mode.

2 DESCRIPTION OF TEST SETUP

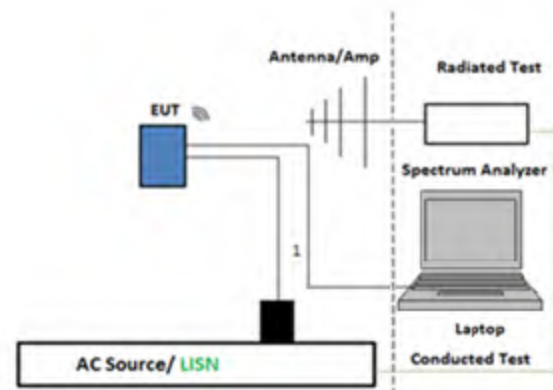
Auxiliary equipment	Type / Version	Manufacturer	Supplied by
(1) Notebook	Think pad x220	Lenovo	Adapter
(2) Ethernet cable	N/A	N/A	N/A
(3) Ethernet cable	N/A	N/A	N/A
Software	Type / Version	Manufacturer	Supplied by
Hammer	1.4.5.2	Seekwave	N/A



Conducted RF



Radiated Test Above 1GHz



Radiated Test Below 1GHz

Accessories Information	Cable		
	Length used during test [m]	Attached during test	Shielded
(2) Ethernet cable	1	☒	☒
(3) Ethernet cable	8	☒	☒

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart E	2024	FCC CFR Title 47 Part 15 Subpart E
ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024	2024	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 789033 D02V02r01	2017	This document provides guidance for determining emissions compliance of U-NII devices under Part 15, Subpart E of the FCC rules.
KDB 662911 D01V02r01	2020	Provision to Allow Measurement of Directional Gain of Multi-Antenna Systems for Compliance Verification
KDB 905462 D02V02	2016	UNII DFS Compliance Procedures New Rules

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

(Please define the deviations from the standard(s) if applicable)

4 TEST ITEMS OF LIMIT/SETUP/PROCEDURE

4.1 AC Power Line Conducted Emission

VERDICT: N/A

4.1.1 Limit

Standard	FCC Part 15 Subpart C Paragraph 15.207	
Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾]	Limit: AV [dB(μV) ¹⁾]
0,15 - 0,50	66 - 56 ²⁾	56 - 46 ²⁾
0,50 - 5,0	56	46
5,0 - 30	60	50

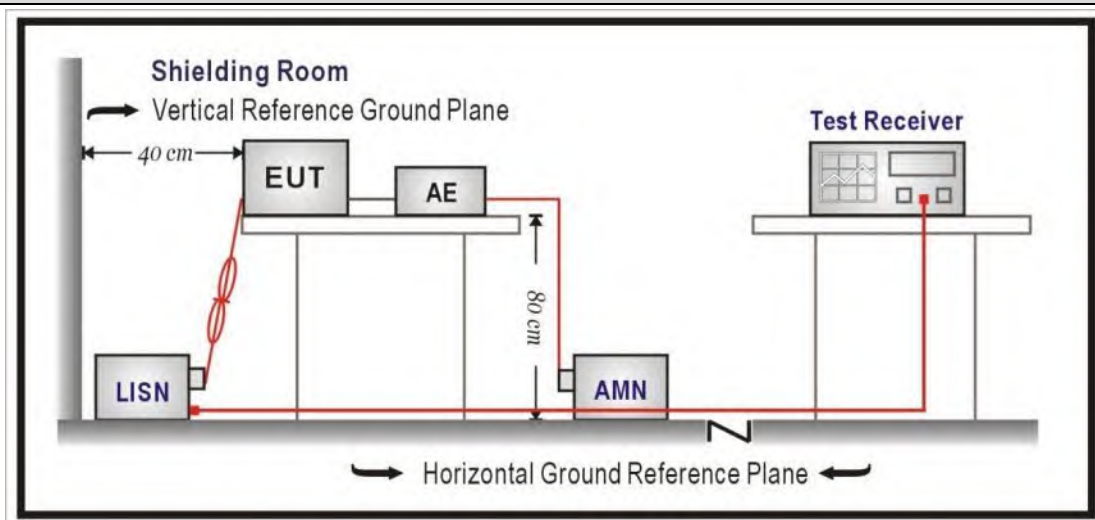
¹⁾ At the transition frequency, the lower limit applies.

²⁾ The limit decreases linearly with the logarithm of the frequency.

NOTE 1: The exclusion band for transmitters shall be considered for transmitters operating at frequencies below 30 MHz.

NOTE 2: Where the AC output port is directly connected (or via a circuit breaker) to the AC power input port of the EUT the AC power output port need not to be tested.

4.1.2 Test Setup



4.1.3 Test Procedure

	References Rule	Chapter	Item
☒	ANSI C63.10	6.2	Standard test method for ac power-line conducted emissions from unlicensed wireless devices

4.2 Radiated Emissions**VERDICT: PASS****4.2.1 Limit****Standard** FCC Part 15 Subpart C Paragraph 15.205

Restricted Bands of operation

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			

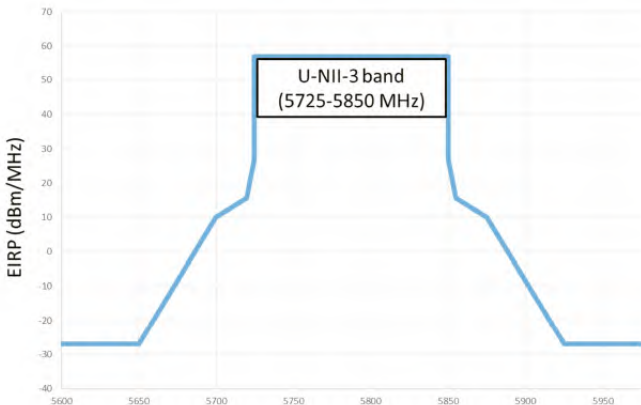
¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.²Above 38.6

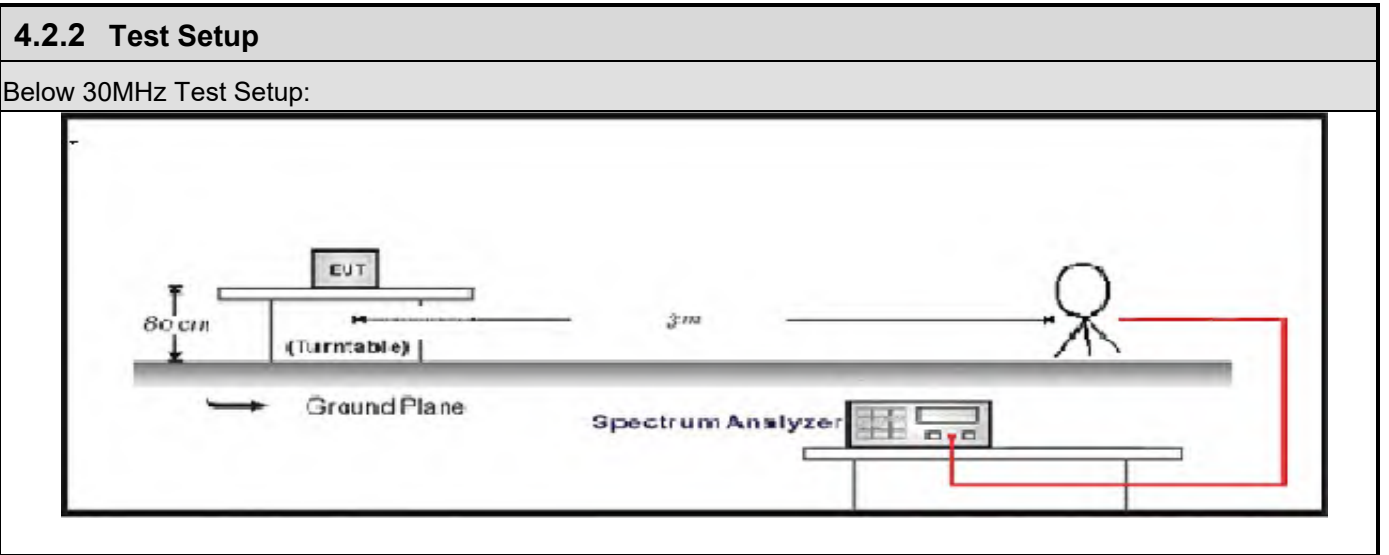
FCC Part 15 Subpart C Paragraph 15.209 (Restricted Band Emissions Limit)

Frequency (MHz)	Field strength (μV/m)	Field strength (dB μV/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 - 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

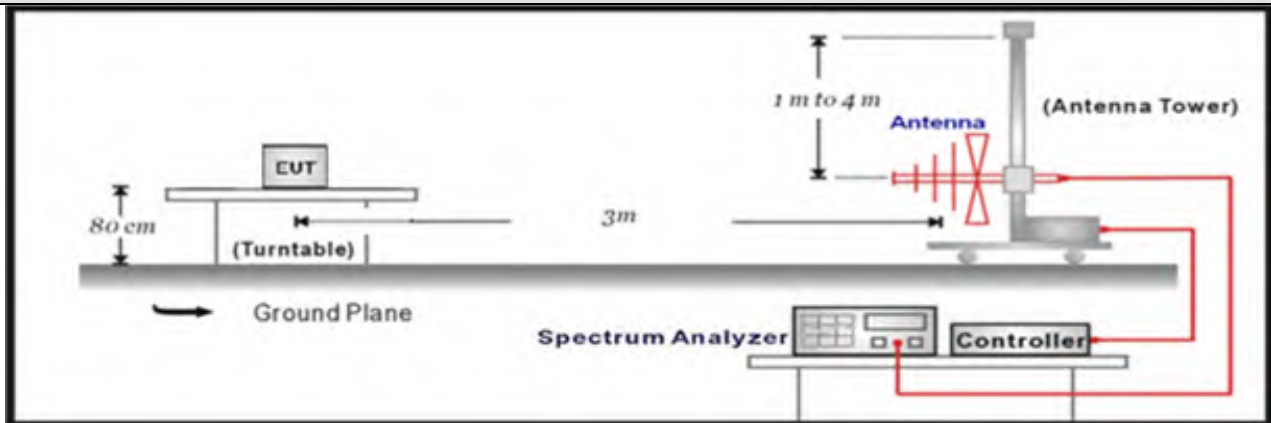
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

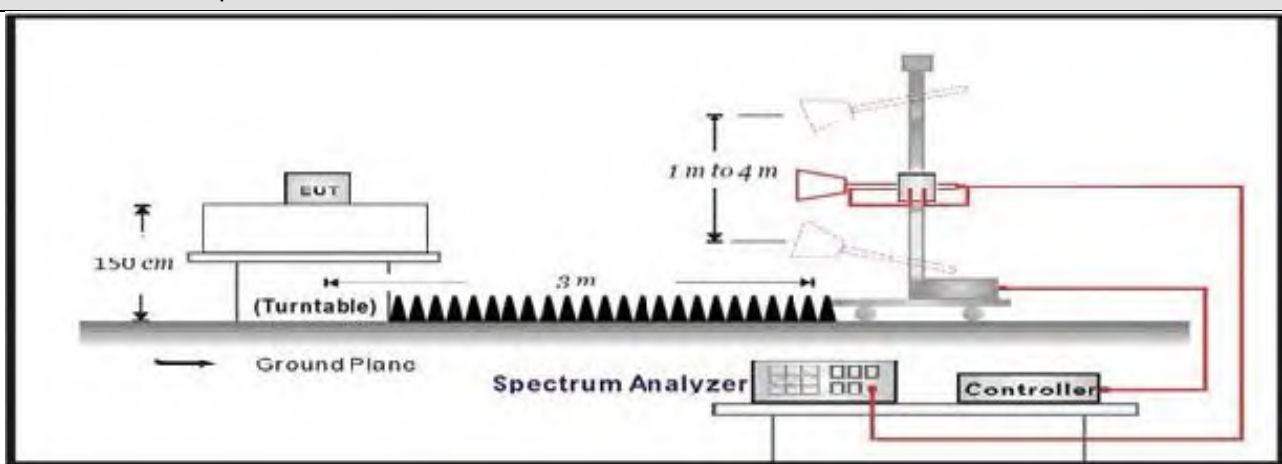
FCC Part 15 Subpart C Paragraph 15.407(5)(b) (Unrestricted Band Emissions Limit)		
Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength at 3m (dBμV/m)
5150 - 5250	-27	68.3
5250 - 5350	-27	68.3
5470 - 5725	-27	68.3
Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)	
5725 - 5850		



30MHz-1GHz Test Setup:



Above 1GHz Test Setup:



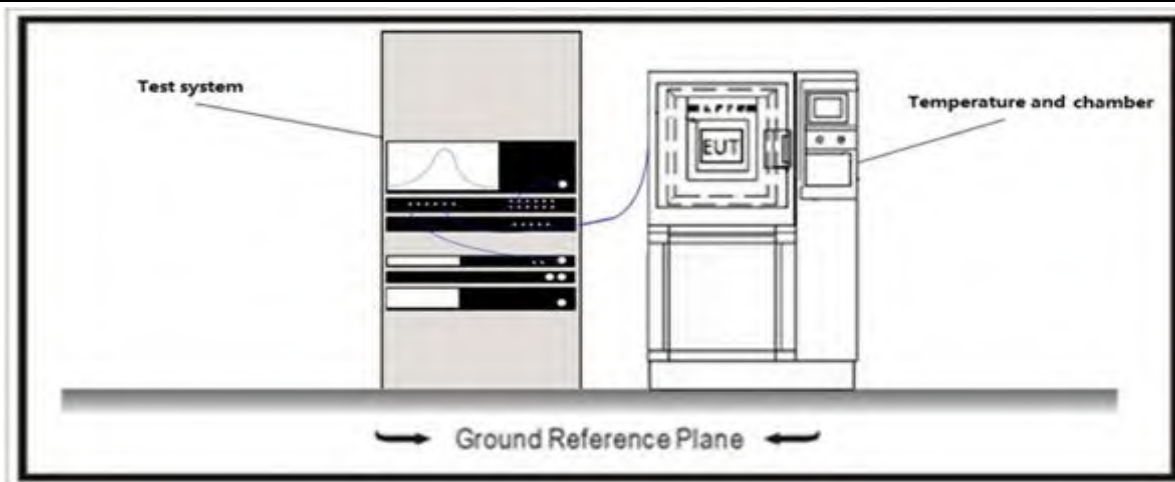
4.2.3 Test Procedure

Test Method			
	References Rule	Chapter	Description
☐	ANSI C63.10	12.7.3	Emissions in non-restricted frequency bands
☒	ANSI C63.10	12.7.2	Emissions in restricted frequency bands
☒	ANSI C63.10	12.7.5	Radiated emission measurements
☒	ANSI C63.10	12.7.6	Procedure for peak unwanted emissions measurements above 1000 MHz
☒	ANSI C63.10	12.7.7	Procedures for average unwanted emissions measurements above 1000 MHz
☐	ANSI C63.10	12.7.7.2	Method AD (average detection)—primary method
☒	ANSI C63.10	12.7.7.3	Method VB-A (Alternative)
☒	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☒	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☒	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz

4.3 Emission bandwidth**VERDICT: PASS****4.3.1 Limit**

Standard	FCC CFR Title 47 Part 15 Subpart E: Section 15.407
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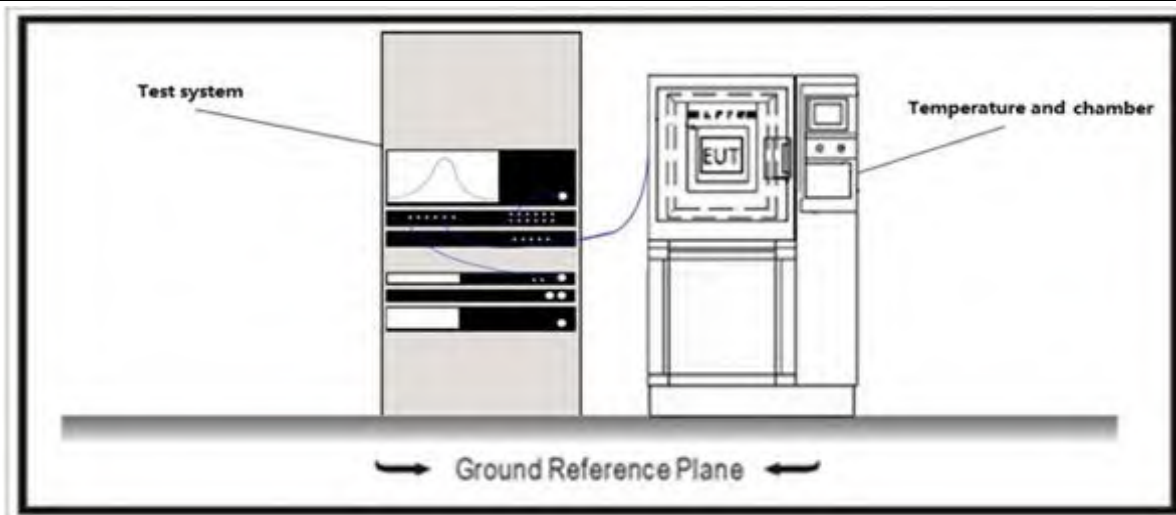
Whin the Frequency band.

4.3.2 Test Setup**4.3.3 Test Procedure****Test Method**

	References Rule	Chapter	Description
☒	FCC KDB 789033 D02v02r01	C	Bandwidth Measurement
☒	FCC KDB 789033 D02v02r01	C.1	Emission Bandwidth (26dB)
☐	FCC KDB 789033 D02v02r01	C.2	Minimum Emission Bandwidth for the band 5.725-5.85 GHz (6dB)
☒	FCC KDB 789033 D02v02r01	D	99 Percent Occupied Bandwidth

4.4 6dB bandwidth**VERDICT: PASS****4.4.1 Limit****Standard**

FCC CFR Title 47 Part 15 Subpart E: Section 15.407(e)

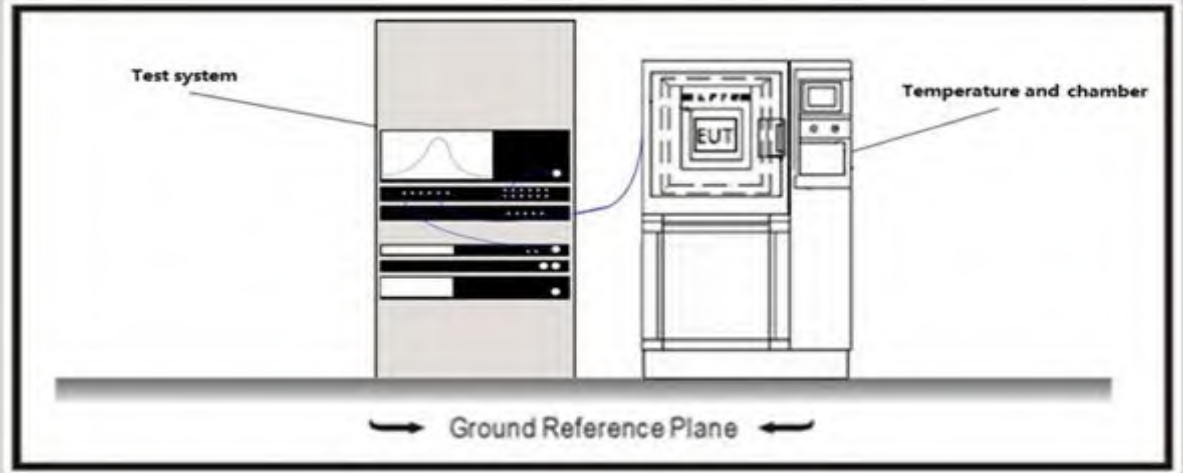
6dB Bandwidth $\geq 500\text{kHz}$ **4.4.2 Test Setup****4.4.3 Test Procedure**

Test Method

	References Rule	Chapter	Description
☒	FCC KDB 789033 D02v02r01	C	Bandwidth Measurement
☐	FCC KDB 789033 D02v02r01	C.1	Emission Bandwidth (26dB)
☒	FCC KDB 789033 D02v02r01	C.2	Minimum Emission Bandwidth for the band 5.725-5.85 GHz (6dB)
☐	FCC KDB 789033 D02v02r01	D	99 Percent Occupied Bandwidth

4.5 Duty cycle	VERDICT: PASS
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4.5.1 Limit
N/A

4.5.2 Test Setup


4.5.3 Test Procedure			
References Rule		Chapter	Description
☒	ANSI C63.10	12.2	Duty cycle (D), transmission duration (T), and maximum power control level

4.6 Power Output

VERDICT: PASS

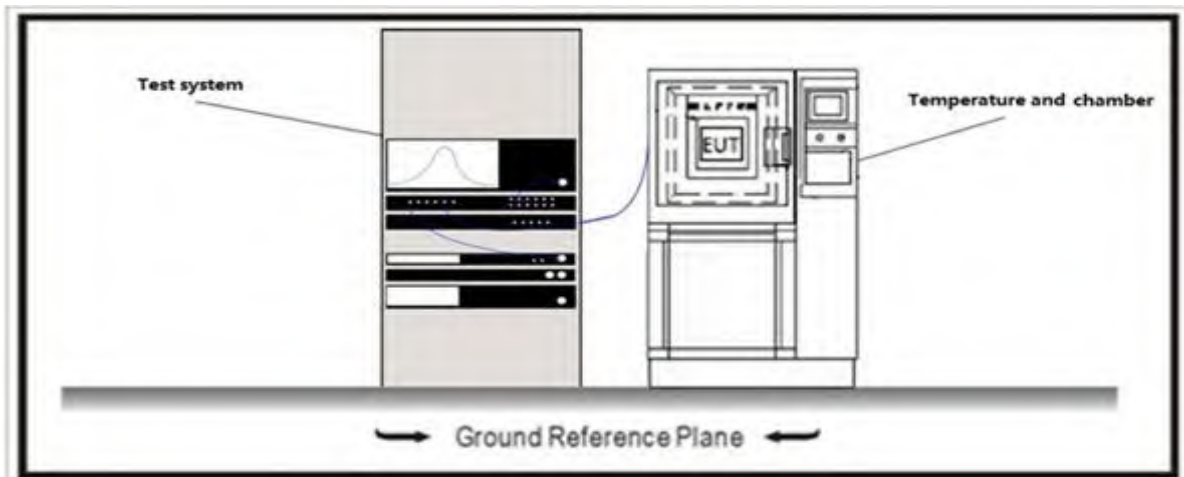
4.6.1 Limit

Standard		FCC Part 15 Subpart E Paragraph 15.407 (a)
☒	For the band 5.15-5.25 GHz	
	☒	Client Devices: the maximum conducted output power shall not exceed 250 mW. If $G_{TX} > 6\text{dBi}$
☒	For the band 5.25-5.35 GHz:	
	☒	The maximum conducted output power shall not exceed 250mW or 11dBm+10 Log B, where B is the 26dB emission bandwidth in MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq (\text{The lesser of 24 or } 11\text{dBm} + 10 \text{ Log B}) - (G_{TX} - 6)$
☒	For the 5.47-5.725 GHz:	
	☒	The maximum conducted output power shall not exceed 250mW or 11dBm+10 Log B, where B is the 26dB emission bandwidth in MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq (\text{The lesser of 24 or } 11\text{dBm} + 10 \text{ Log B}) - (G_{TX} - 6)$
☒	For the band 5.725-5.85 GHz:	
	☒	Point-to-multipoint systems (P2M): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W. If $G_{TX} > 6 \text{ dBi}$, then $P_{Out} = 30 - (G_{TX} - 6)$
	☐	Point-to-point systems (P2P): the maximum conducted output power (P_{Out}) shall not exceed the lesser of 1 W

Note 1 : GTX directional gain of transmitting antennas.

Note 2 : Pout is maximum conducted output power .

4.6.2 Test Setup



4.6.3 Test Procedure

	References Rule		Chapter	Description
☒	ANSI C63.10		12.4	Maximum conducted output power
	☒	ANSI C63.10	12.4.2	Maximum conducted output power measurement using a spectrum analyzer (SA) or EMI receiver
	☐	ANSI C63.10	12.4.2.2	Method SA-1

	☐	ANSI C63.10	12.4.2.3	Method SA-1A (alternative)
	☒	ANSI C63.10	12.4.2.4	Method SA-2
	☐	ANSI C63.10	12.4.2.5	Method SA-2A (alternative)
	☐	ANSI C63.10	12.4.2.6	Method SA-3
	☐	ANSI C63.10	12.4.2.7	Method SA-3A (alternative)

Directional Gain Calculations for In-Band test method				
	References Rule		Chapter	Description
☐	KDB 662911		F2)a)	Basic methodology
	☐	KDB 662911	F2)a) (i)	transmit signals are correlated
	☐	KDB 662911	F2)a) (ii)	transmit signals are uncorrelated
☐	KDB 662911		F2)b)	Sectorized antenna systems.
☐	KDB 662911		F2)c)	Cross-polarized antennas
	☐	ANSI C63.10	F2)c) (i)	Cross-polarized antennas
	☐	ANSI C63.10	F2)c) (ii)	Multiple antennas
☐	KDB 662911		F2)e)	Spatial stream
	☐	KDB 662911	F2)e) (i)	Antennas have the same gain
	☐	KDB 662911	F2)e) (ii)	Antenna have the different gain with one spatial stream
	☐	KDB 662911	F2)e) (iii)	Antenna have the different gain with more than one spatial stream
☒	KDB 662911		F2)f)	Cyclic Delay Diversity (CDD)
	☒	KDB 662911	F2)f) (i)	Antennas have the same gain
	☐	KDB 662911	F2)f) (ii)	Antenna have the different gain with one spatial stream
	☐	KDB 662911	F2)f) (iii)	Antenna have the different gain with more than one spatial stream

4.7 Maximum Power Spectral Density**VERDICT: PASS****4.7.1 Limit****Standard** FCC Part 15 Subpart E Paragraph 15.407 (a)

☒	For the band 5.15-5.25 GHz
☒	Outdoor access point: the maximum power spectral density shall not exceed 17 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 17 - (G_{TX} - 6)$
☒	For the 5.25-5.35 GHz:
☒	The maximum power spectral density shall not exceed 11 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 11 - (G_{TX} - 6)$
☒	For the 5.47-5.725 GHz:
☒	The maximum power spectral density shall not exceed 11 dBm/MHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 11 - (G_{TX} - 6)$
☒	For the band 5.725-5.85 GHz:
☒	The maximum power spectral density shall not exceed 30 dBm/500KHz. If $G_{TX} > 6\text{dBi}$, then $P_{out} \leq 30 - (G_{TX} - 6)$

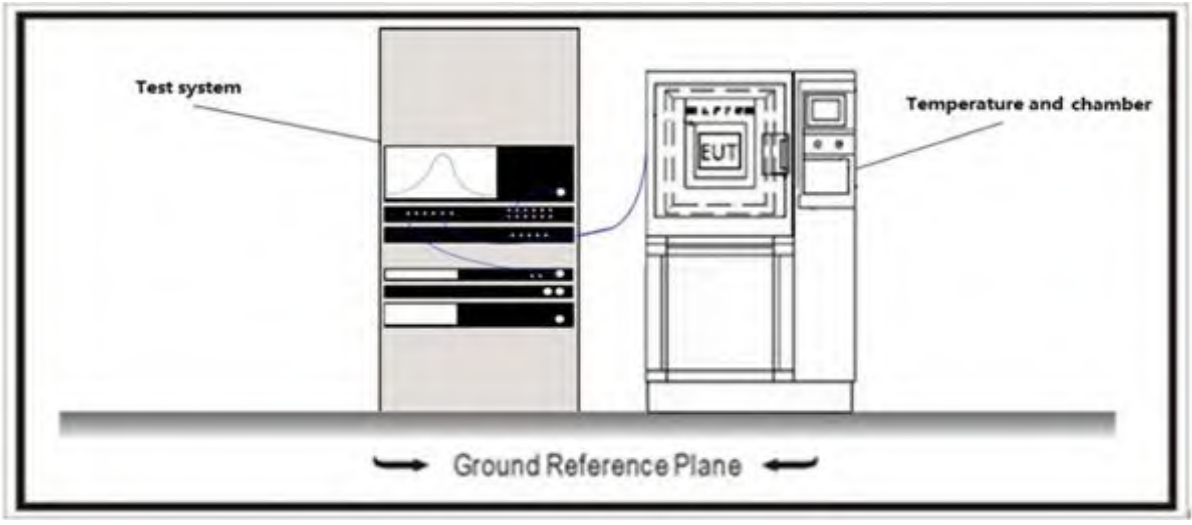
Note 1 : GTX directional gain of transmitting antennas.

Note 2 : Pout is maximum conducted output power .

Directional Gain Calculations for In-Band test method

	References Rule	Chapter	Description
☒	KDB 662911	E2)c)	In-Band Power Spectral Density (PSD) Measurements
☒	KDB 662911	F2)f)	Cyclic Delay Diversity (CDD)
☒	KDB 662911	F2)f) (i)	Antennas have the same gain
☐	KDB 662911	F2)f) (ii)	Antenna have the different gain with one spatial stream
☐	KDB 662911	F2)f) (iii)	Antenna have the different gain with more than one spatial stream

4.7.2 Test Setup



4.7.3 Test Procedure

	References Rule	Chapter	Description
☒	FCC KDB 789033 D02v02r01	F	Maximum Power Spectral Density (PSD)

4.8 Radiated Emission Band Edge**VERDICT: PASS****4.8.1 Limit****Standard** FCC Part 15 Subpart C Paragraph 15.205

Restricted Bands of operation

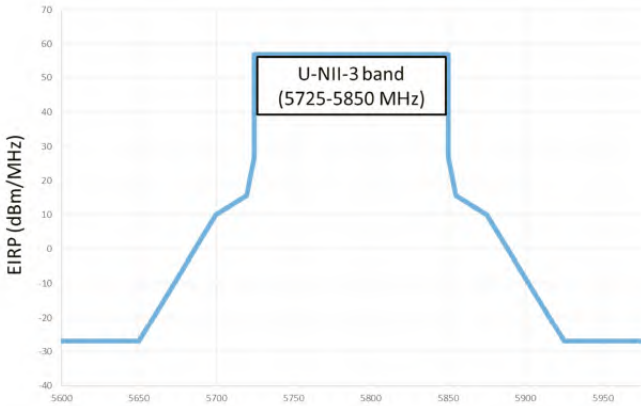
MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
¹ 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	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			

¹Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.²Above 38.6**FCC Part 15 Subpart C Paragraph 15.209 (Restricted Band Emissions Limit)**

Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

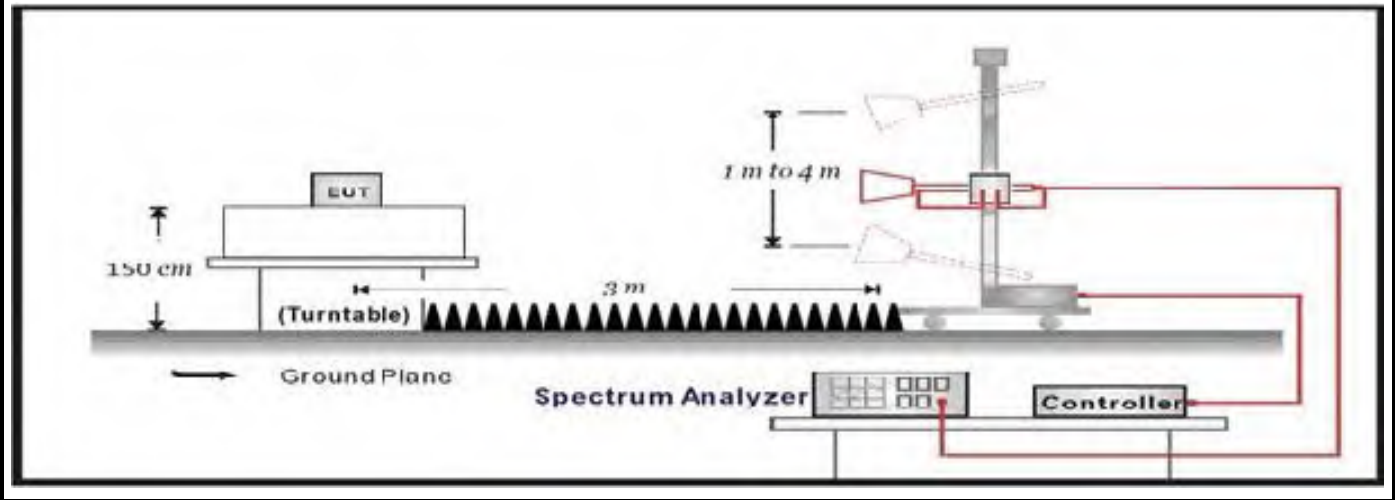
Note 1: At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

FCC Part 15 Subpart C Paragraph 15.407(5)(b) (Unrestricted Band Emissions Limit)		
Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength at 3m (dBμV/m)
5150 - 5250	-27	68.3
5250 - 5350	-27	68.3
5470 - 5725	-27	68.3
Operating Frequency Band (MHz)	EIRP Limit (dBm/MHz)	
5725 - 5850		

4.8.2 Test Setup

Above 1GHz Test Setup:



4.8.3 Test Procedure			
	References Rule	Chapter	Description

☐	ANSI C63.10	12.7.3	Emissions in non-restricted frequency bands
☒	ANSI C63.10	12.7.2	Emissions in restricted frequency bands
☐	ANSI C63.10	12.7.5	Radiated emission measurements
☒	ANSI C63.10	12.7.6	Procedure for peak unwanted emissions measurements above 1000 MHz
☒	ANSI C63.10	12.7.7	Procedures for average unwanted emissions measurements above 1000 MHz
☐	ANSI C63.10	12.7.7.2	Method AD (average detection)—primary method
☒	ANSI C63.10	12.7.7.3	Method VB-A (Alternative)
☐	ANSI C63.10	6.4	Radiated emissions from unlicensed wireless devices below 30 MHz
☐	ANSI C63.10	6.5	Radiated emissions from unlicensed wireless devices in the frequency range of 30 MHz to 1000 MHz
☐	ANSI C63.10	6.6	Radiated emissions from unlicensed wireless devices above 1 GHz
☐	FCC KDB 789033 D02v02r01	G.2	Unwanted Emissions that fall Outside of the Restricted Bands
☐	FCC KDB 789033 D02v02r01	G.1	Unwanted Emissions in the Restricted Bands
☐	FCC KDB 789033 D02v02r01	G.4	Procedure for Unwanted Emissions Measurements below 1000 MHz
☐	FCC KDB 789033 D02v02r01	G.5	Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz
☐	FCC KDB 789033 D02v02r01	G.6	Procedures for Average Unwanted Emissions Measurements above 1000 MHz
☐	FCC KDB 789033 D02v02r01	G.6.c	Method AD (Average detection)—primary method
☐	FCC KDB 789033 D02v02r01	G.6.d	Method VB (Averaging using reduced video bandwidth): Alternative method.

4.9 Frequency Stability

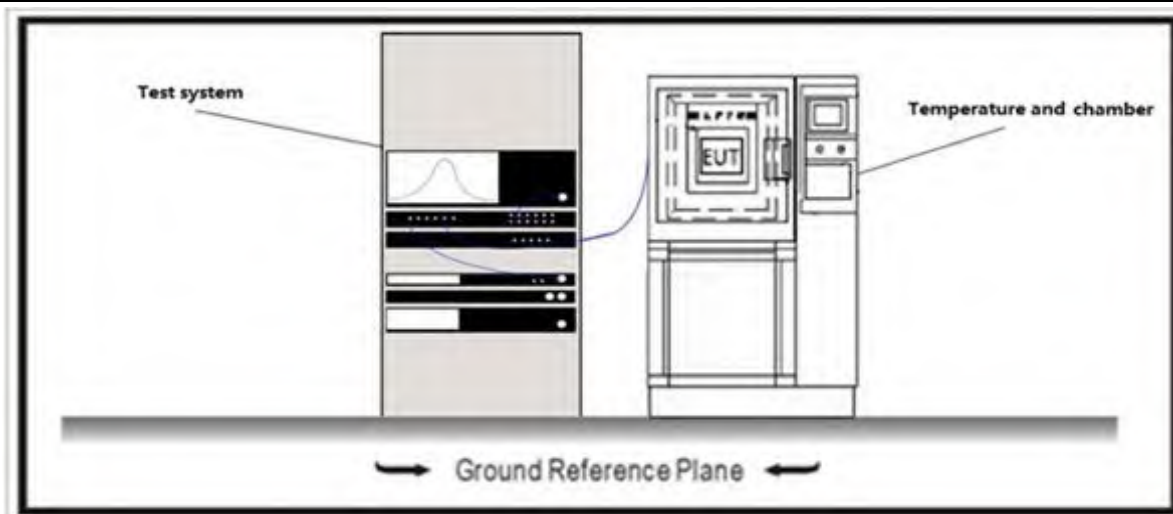
VERDICT: N/A

4.9.1 Limit:

In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band and ± 25 ppm maximum for the 2.4 GHz band.

4.9.2 Test Setup



4.9.3 Test Procedure

	References Rule		Chapter	Description
☒	ANSI C63.10		6.8	Frequency stability tests
	☒	ANSI C63.10	6.8.1	Frequency stability with respect to ambient temperature
	☒	ANSI C63.10	6.8.2	Frequency stability when varying supply voltage

4.10 Dynamic Frequency Selection (DFS)**VERDICT: PASS****4.10.1 Limit**

Standard	FCC Part 15 Subpart E Paragraph 15.407(h)
Channel Availability Check (CAC)	
60 Seconds	
Radar Detection Threshold Level	
EIRP $\geq$ 200 milliwatt, level value: -64 dBm EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz, level value: -62 dBm EIRP < 200 milliwatt that do not meet the power spectral density requirement, level value: -62 dBm Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	
U-NII Detection Bandwidth	
Minimum 100% of the UNII 99% transmission power bandwidth. See Note Note: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	
In-Service Monitoring	
the RLAN device shall be capable of detecting any of the radar test signals. Detection Probability (P_d): 60%	
Channel Shutdown - Channel Move Time.	
10 Seconds	
Channel Shutdown - Channel Closing Transmission Time	
200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.(See Notes 1 and 2) Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions. Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	
Non-Occupancy Period	
Minimum 30 minutes	

4.10.2 Test Setup

UNII Device Description

The UUT operates in the following band:

1. 5250-5350 MHz
2. 5470-5725 MHz.

The UUT is a Client Device that does not have radar detection capability and ad-hoc function. The highest gain antenna assembly utilized with the EUT has a maximum gain refer to clause 1.1. The 50-ohm Tx/Rx antenna port is connected to the test system to perform conducted tests. TPC is not required since the maximum EIRP is less than 500mW (27dBm).

The UUT utilizes 802.11a/n/ac/ax IP based architecture. Three nominal channel bandwidths, 20 MHz, 40MHz and 80MH are implemented.

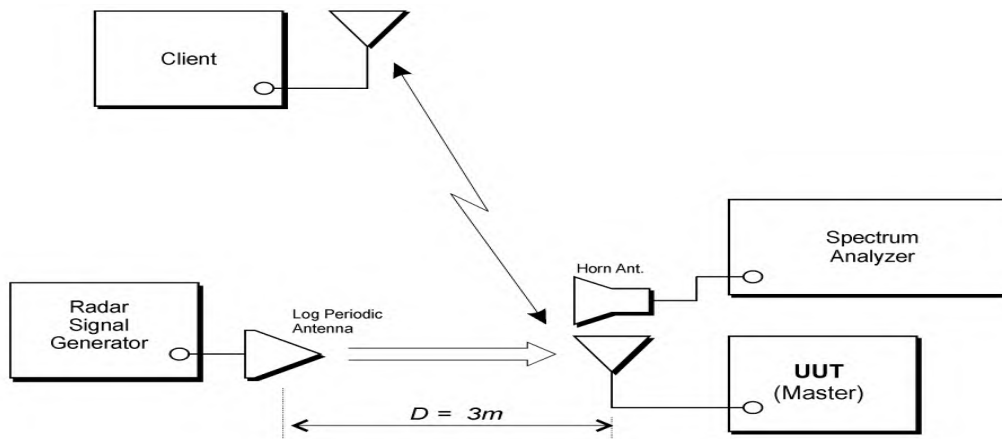
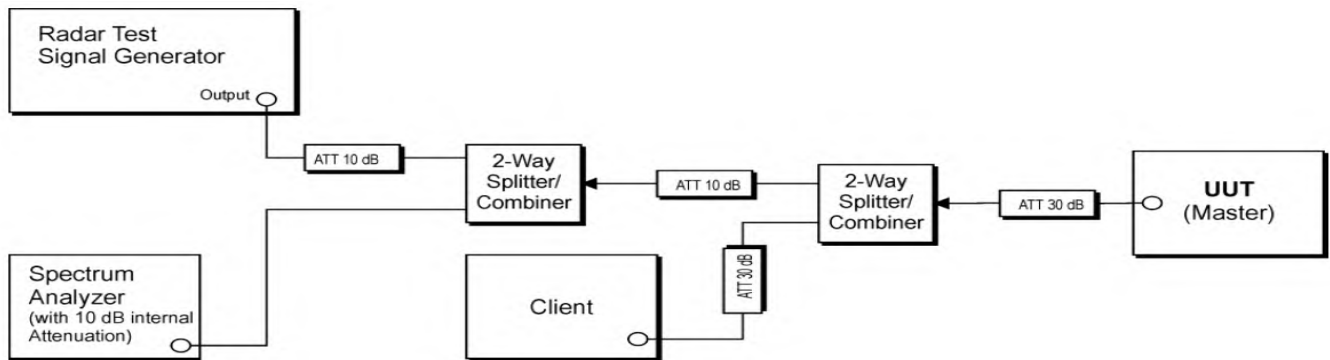
The master device is an ASUS 802.11a/b/g/n/ac/ax/be Access Point. The ASUS Access Point FCC ID: MSQ-RTBE6X00.

The time required for the master and slave devices to fully start is 120 seconds.

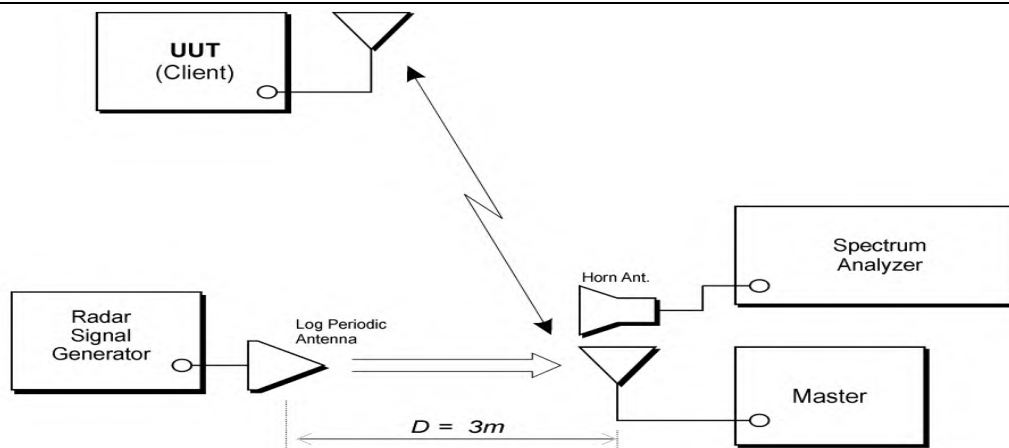
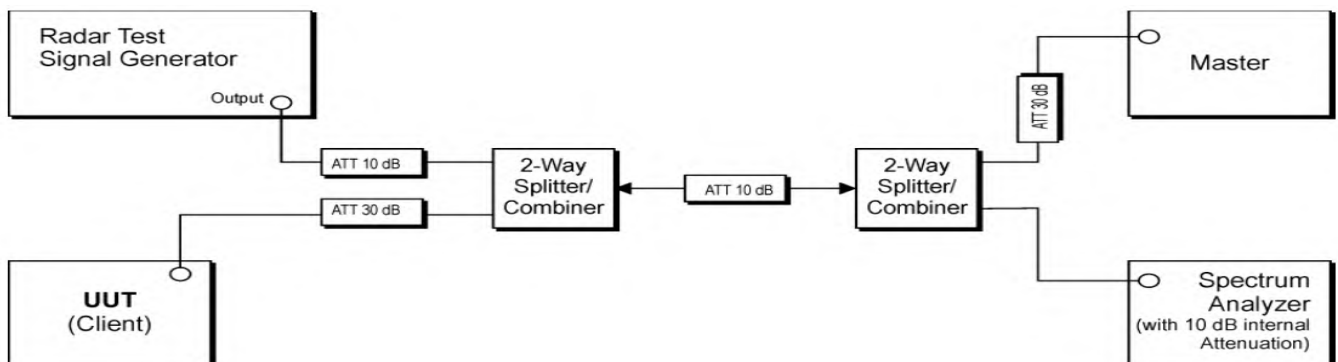
The UUT is a client device without radar detection therefore the interference threshold level is not required.

Statement: Information regarding the parameters of the detected Radar Waveforms is not available to the end user.

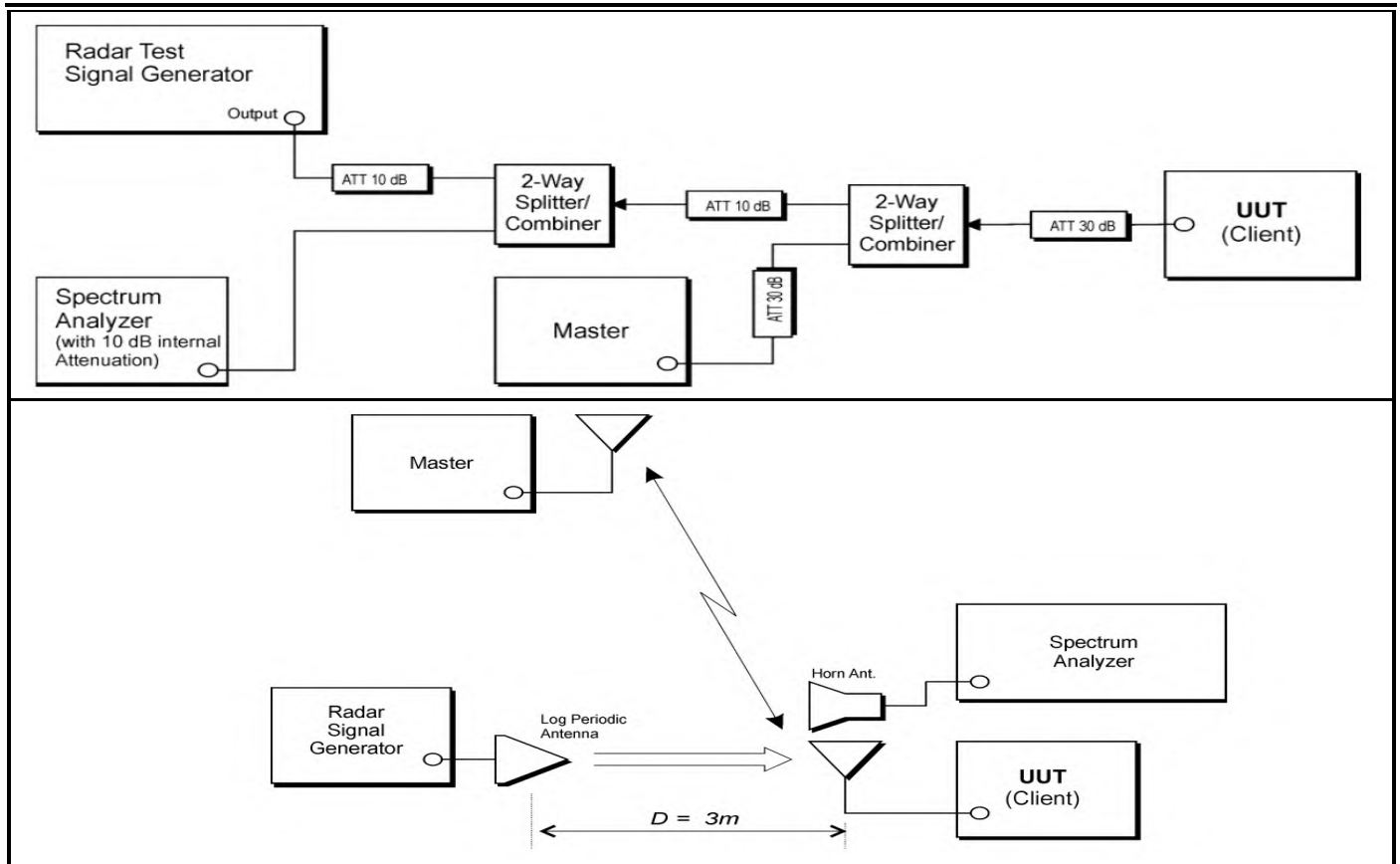
Master with injection at the Master



Client with injection at the Master



Client with injection at the Client



4.10.3 Test Procedure

References Rule	Description
☒ KDB 905462 D02	Dynamic Frequency Selection (DFS)

For a UUT with antenna connector(s) and using dedicated external antenna(s), or for a UUT with integral antenna(s) but with a temporary antenna connector(s) provided, conducted measurements shall be used.

When performing DFS testing on smart antenna systems, a power splitter/combiner shall be used to combine all the receive chains (antenna inputs) into a single test point. The insertion loss of the splitter/combiner shall be taken into account.

The UUT shall be configured to operate at the highest transmitter output power setting.

Beamforming gain Y of smart antenna systems, operating in a mode where beamforming is active, is ignored in order to test the worst case.

The centre frequencies of the radar test signals used in the test procedures below shall fall within the central 80 % of the Occupied Channel Bandwidth of the RLAN channel under test.

Tests with a radar burst at the beginning of the Channel Availability Check Time

- The signal generator and UUT are connected using Set-up A as described in clause 5.4.8.1.3.1. The power of the UUT is switched off.
- The UUT is powered on at T_0 . T_1 denotes the instant when the UUT has completed its power-up sequence ($T_{\text{power_up}}$) and is ready to start the radar detection. The *Channel Availability Check* is expected to commence on Chr at instant T_1 and is expected to end no sooner than $T_1 + T_{\text{ch_avail_check}}$ unless the radar test signal is detected sooner. Additional verification may be needed to define T_1 in case it is not exactly known or indicated by the UUT.
- A single radar burst is generated on Chr using the reference test signal defined in table D.3 at a level of up to 10 dB above the level defined in clause 5.4.8.2.1.1. This single-burst radar test signal shall commence within 2 s after time T_1 .
- It shall be recorded if the radar test signal was detected.
- A timing trace or description of the observed timing and behaviour of the UUT shall be recorded.

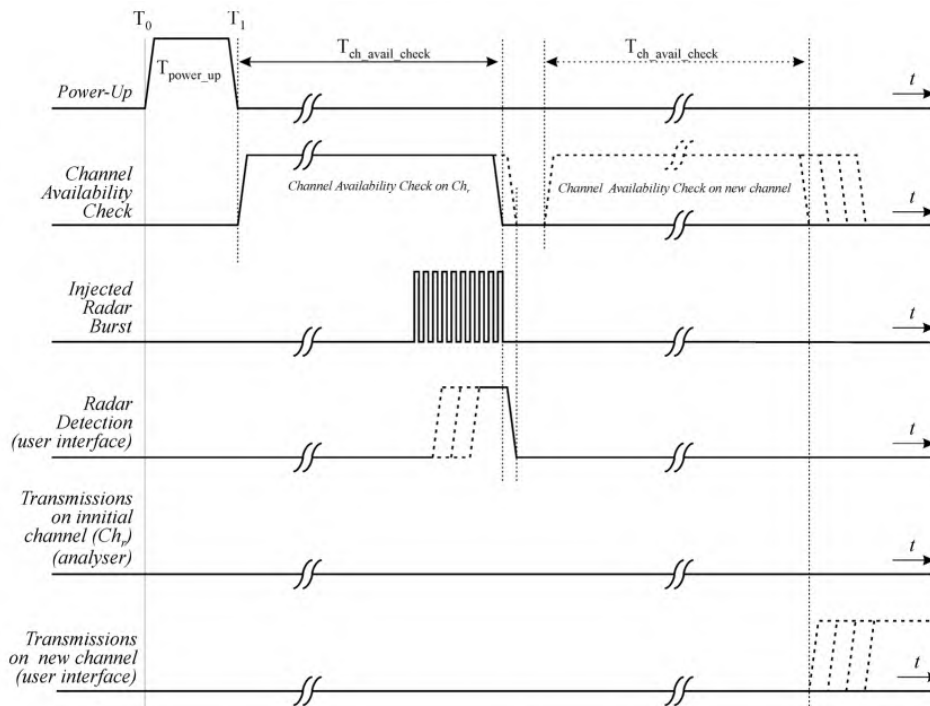


Figure 9: Example of timing for radar testing towards the end of the Channel Availability Check Time

In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

These tests define how the following DFS parameters are verified during *In-Service Monitoring*;

- Channel Closing Transmission Time
- Channel Move Time
- Non-Occupancy Period

The steps below define the procedure to determine the above mentioned parameters when a radar Burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the UNII device (In- Service Monitoring).

- a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected.
- b) In case the UUT is a U-NII device operating as a Client Device (with or without DFS), a U-NII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will Associate with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.
- c) Stream the channel loading test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
- d) At time T_0 the Radar Waveform generator sends a Burst of pulses for one of the Radar Type 0 in **Table 5** at levels defined in **Table 3**, on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- e) Observe the transmissions of the UUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs. **Figure 17** illustrates Channel Closing Transmission Time.
- f) When operating as a Master Device, monitor the UUT for more than 30 minutes following instant T_2 to verify that the UUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.
- g) In case the UUT is a U-NII device operating as a Client Device with In-Service Monitoring, perform steps a) to f).

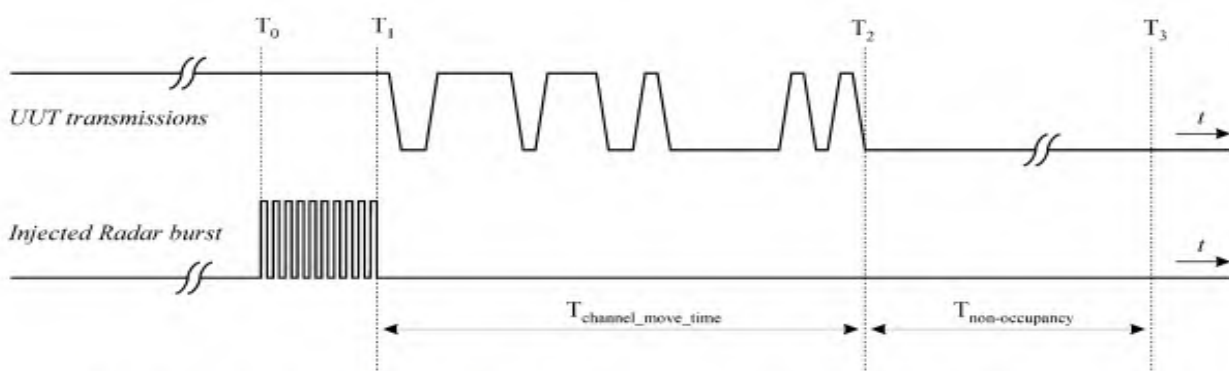


Figure 17: Example of Channel Closing Transmission Time & Channel Closing Time

Statistical Performance Check

The steps below define the procedure to determine the minimum percentage of successful detection requirements found in **Tables 5-7** when a radar burst with a level equal to the DFS Detection Threshold + 1dB is generated on the Operating Channel of the U-NII device (In- Service Monitoring).

- a) One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.
- b) In case the UUT is a U-NII device operating as a Client Device (with or without Radar Detection), a U-NII device operating as a Master Device will be used to allow the UUT (Client device) to Associate with the Master Device. In case the UUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will Associate with the UUT (Master). In both cases for conducted tests, the Radar Waveform generator will be connected to the Master Device. For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.
- c) Stream the channel loading test file from the Master Device to the Client Device on the test Channel for the entire period of the test.
- d) At time T₀ the Radar Waveform generator sends the individual waveform for each of the Radar Types 1- 6 in **Tables 5-7**, at levels defined in **Table 3**, on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
- e) Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 10 seconds for Radar Type 0 to ensure detection occurs.
- f) Observe the transmissions of the UUT at the end of the Burst on the Operating Channel for duration greater than 22 seconds for Long Pulse Radar Type 5 to ensure detection occurs.
- g) In case the UUT is a U-NII device operating as a Client Device with In-Service Monitoring, perform steps a) to f).

Radar Detection Threshold Level (during Off-Channel CAC)

- a) The signal generator, the UUT (master device) and a slave device associated with the UUT, are connected using *Set-up A* described in clause 5.4.8.1.3.1.
- b) The UUT shall transmit a test transmission sequence in accordance with clause 5.3.1.2 on (all) the *Operating Channel(s)*.
- c) A multi burst radar test signal is generated on Chr using any of the radar test signals defined in table D.4 at a level defined in clause 5.4.8.2.1.1. The radar test signal used shall be recorded in the report. This multi burst radar test signal shall commence at T₃ and shall continue for the total duration of the *Off-Channel CAC Time* ($T_{\text{Off-Channel_CAC}}$) as declared by the manufacturer in accordance with table D.1. For channels within the 5 600 MHz to 5 650 MHz band test signals #3 and #4 shall not be used and the Burst Interval Time (BIT) during the test shall be varied between 8 min and 10 min. For channels outside this band, the Burst Interval Time (BIT) during the test shall be varied between 45 s and 60 s.
- d) The UUT shall detect the radar test signal before the end of the *Off-Channel CAC Time* and this shall be recorded. For the purpose of reducing test time, the test may be terminated immediately once the UUT has reported detection of the radar test signal.

Detection Probability (P_d)

- This test may be facilitated by disabling the *Channel Shutdown* feature for the duration of the test.
- For channels outside the 5 600 MHz to 5 650 MHz band, the test in clause 5.4.8.2.1.4.2 is sufficient to demonstrate that the UUT meets the Detection Probability (P_d) defined in table D.5.
- Where the declared channel plan includes channels whose nominal bandwidth falls completely or partly within the 5 600 MHz to 5 650 MHz band, the procedure in the steps below has to be performed on one of these channels. See clause 5.3.2.
- a) A multi burst radar test signal is generated on Chr using any of the radar test signals defined in table D.4 (except signals #3 and #4) at a level of 10 dB above the level defined in clause 5.4.8.2.1.1. The radar test signal used shall be recorded in the report. This multi burst radar test signal shall commence at T₃ and shall continue for the total duration of the *Off-Channel CAC Time* ($T_{\text{Off-Channel_CAC}}$) as declared by the manufacturer in accordance with table D.1. The Burst Interval Time (BIT) during the test shall be varied between 8 minutes and 10 minutes.

b) It shall be recorded how many bursts have been detected by the UUT at the end of the *Off-Channel CAC Time*. The minimum number of bursts that the UUT shall detect in order to comply with the detection probability defined for this frequency range in table D.5 is given by table 12.

For the purpose of reducing test time, the test may be terminated immediately the UUT has reported the minimum number of burst detections required.

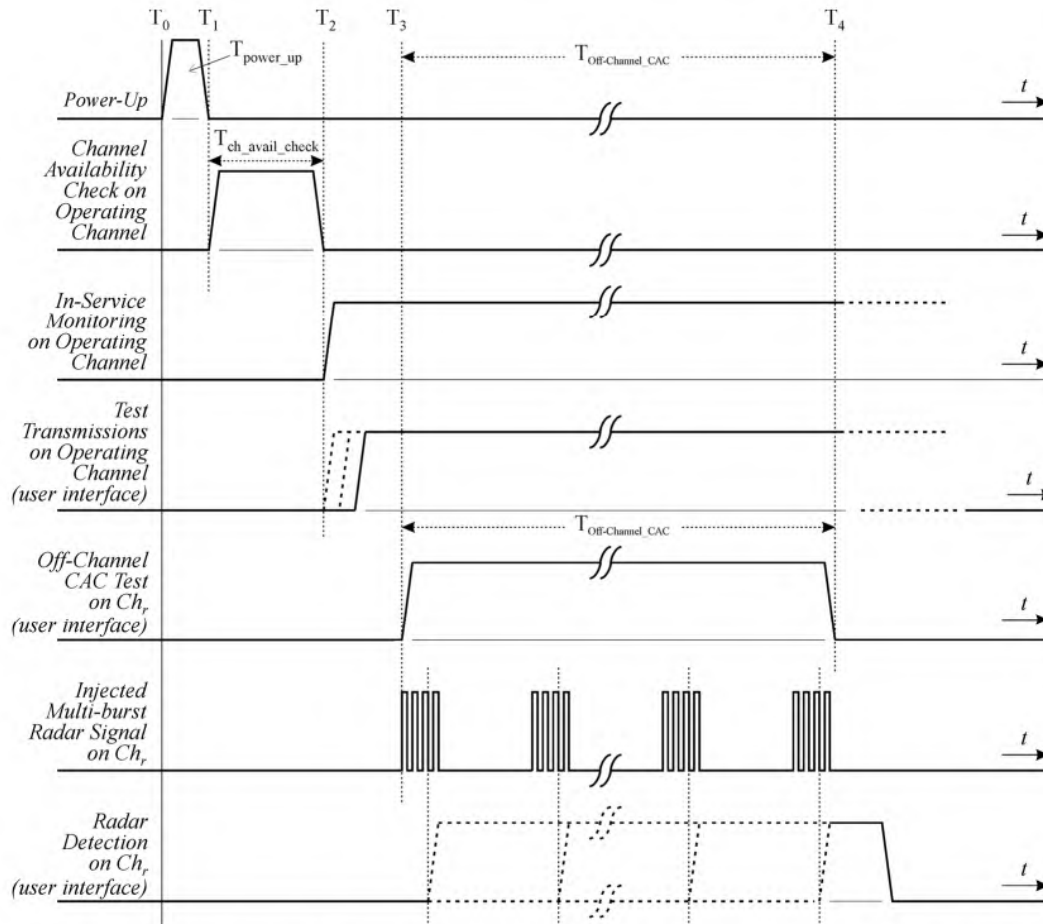


Figure 11: Example of timing for radar testing during the Off-Channel CAC

In-Service Monitoring

The steps below define the procedure to verify the *In-Service Monitoring* and the *Radar Detection Threshold Level* during the *In-Service Monitoring*.

The channel, on which the *In-Service Monitoring* test will be performed, shall be selected in accordance with clause 5.3.2. This channel, designated as Ch_r , is an *Operating Channel*.

a) When the UUT is a master device, a slave device will be used that associates with the UUT. The signal generator and the UUT are connected using *Set-up A* described in clause 5.4.8.1.3.1.

When the UUT is a slave device with a *Radar Interference Detection* function, the UUT shall associate with a master device. The signal generator and the UUT are connected using *Set-up C* described in clause 5.4.8.1.3.3.

b) The UUT shall transmit a test transmission sequence in accordance with clause 5.3.1.2 on the selected channel Ch_r . While the testing is performed on Ch_r , the equipment is allowed to have simultaneous transmissions on other adjacent or non-adjacent *Operating Channels*.

c) At a certain time T_0 , a single burst radar test signal is generated on Ch_r using radar test signal #1 defined in table D.4 and at a level defined in clause 5.4.8.2.1.1. T_1 denotes the end of the radar burst.

d) It shall be recorded if the radar test signal was detected.

e) Step b) to step d) shall be performed 20 times, each time a random value shall be chosen for pulse width and pulse repetition frequency from the corresponding ranges provided in table D.4. For radar test signal #5 and radar

test signal #6 provided in table D.4 the number of PRF values shall vary between 2 or 3. The radar test signal shall be detected at least 12 times out of the 20 trials in order to comply with the detection probability specified in table D.5.

f) Step b) to step e) shall be repeated for each of the radar test signals defined in table D.4 and as described in clause 5.4.8.1.2.

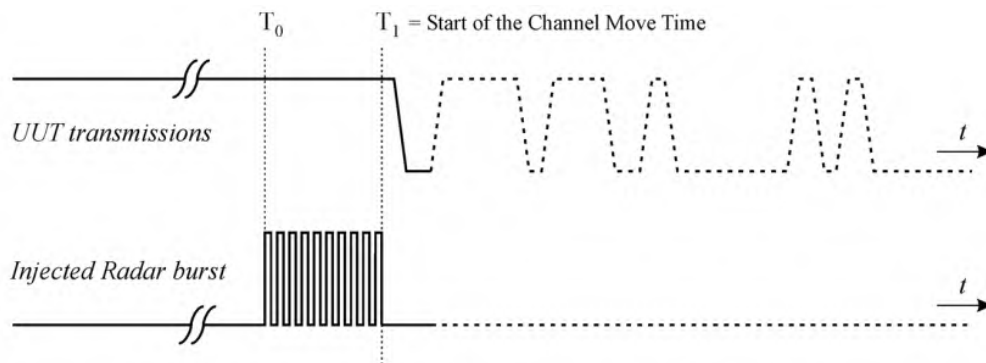


Figure 12: Example of timing for radar testing during In-Service Monitoring

Channel Shutdown and Non-Occupancy period

The steps below define the procedure to verify the *Channel Shutdown* process and to determine the *Channel Closing Transmission Time*, the *Channel Move Time* and the *Non-Occupancy Period*. This is illustrated in figure 13.

The channel, on which these tests will be performed, shall be selected in accordance with clause 5.3.2. This channel, designated as Chr, is an *Operating Channel*.

a) When the UUT is a master device, a slave device will be used that associates with the UUT. The signal generator and the UUT shall be connected using *Set-up A* described in clause 5.4.8.1.3.1.

When the UUT is a slave device (with or without a *Radar Interference Detection* function), the UUT shall associate with a master device. The signal generator and the UUT shall be connected using *Set-up B* described in clause 5.4.8.1.3.2.

In both cases, it is assumed that the channel selection mechanism for the *Uniform Spreading* requirement is disabled in the master.

b) The UUT shall transmit a test transmission sequence in accordance with clause 5.3.1.2 on the selected channel Chr. While the testing is performed on Chr, the equipment is allowed to have simultaneous transmissions on other adjacent or non-adjacent *Operating Channels*.

c) At a certain time T_0 , a single burst test signal is generated on Chr 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 on the selected channel. T_1 denotes the end of the radar burst.

d) The transmissions of the UUT following instant T_1 on the selected channel Chr shall be observed for a period greater than or equal to the *Channel Move Time* defined in table D.1. The aggregate duration (*Channel Closing Transmission Time*) of all transmissions from the UUT on Chr during the *Channel Move Time* shall be compared to the limit defined in table D.1. For equipment capable of having simultaneous transmissions on multiple (adjacent or non-adjacent) *Operating Channels*, the equipment is allowed to continue transmissions on other *Operating Channels* (different from Chr).

The aggregate duration of all transmissions of the UUT does not include quiet periods in between transmissions of the UUT.

e) T_2 denotes the instant when the UUT has ceased all transmissions on the channel Chr. The time difference between T_1 and T_2 shall be measured. This value (*Channel Move Time*) shall be noted and compared with the limit defined in table D.1.

f) Following instant T_2 , the selected channel Chr shall be observed for a period equal to the *Non-Occupancy Period* ($T_3 - T_2$) to verify that the UUT does not resume any transmissions on this channel.

g) When the UUT is a slave device with a *Radar Interference Detection* function step b) to step f) shall be repeated with the generator connected to the UUT using *Set-up C* as described in clause 5.4.8.1.3.3. See also note 2 in table D.2.

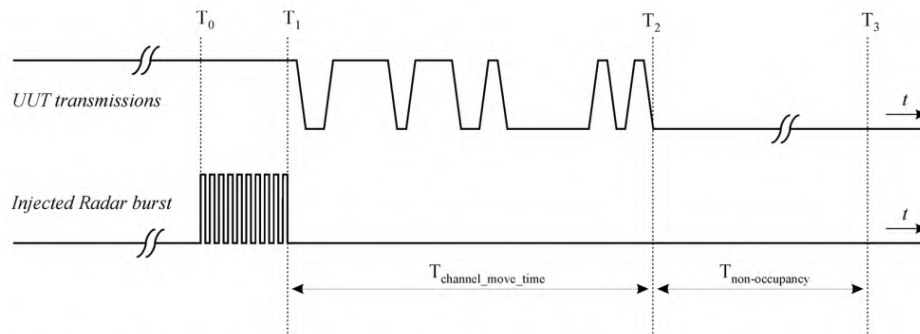


Figure 13: Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period

4.11 Antenna Requirement**VERDICT: PASS****4.11.1 Limit:**

Standard	FCC Part 15 Subpart C Paragraph 15.203;
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.	

4.11.2 Antenna Connector Construction:

☐	The use of a permanently attached antenna
☐	The antenna use of a unique coupling to the intentional radiator
☒	The use of a nonstandard antenna jack or electrical connector
Please refer to the attached document "Internal Photograph" to show the antenna connector.	

5 TEST SETUP PHOTO AND EUT PHOTO

Remark: The test setup photo and EUT Photo please see appendix.

APPENDIX

Emission Bandwidth Test Result

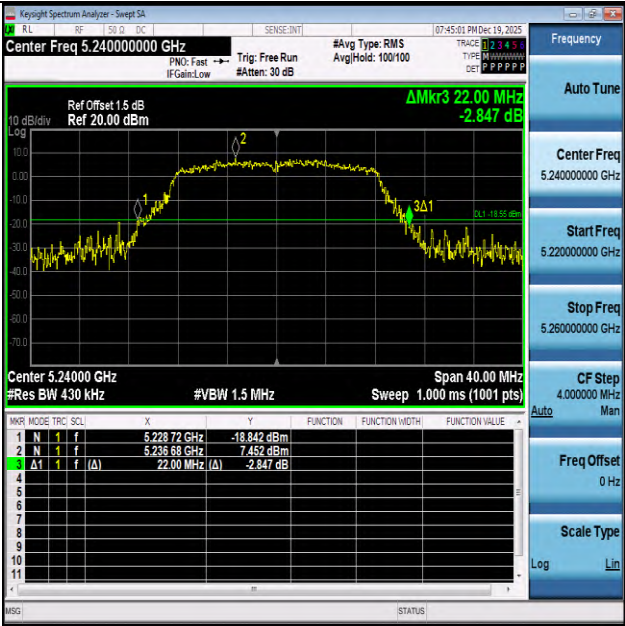
TestMode	Frequency[MHz]	26db EBW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11A	5180	21.760	5169.120	5190.880	Within band	Pass
11A	5200	23.440	5186.920	5210.360	Within band	Pass
11A	5240	22.000	5228.720	5250.720	Within band	Pass
11A	5260	24.400	5248.920	5273.320	Within band	Pass
11A	5280	21.720	5269.280	5291.000	Within band	Pass
11A	5320	21.640	5309.200	5330.840	Within band	Pass
11A	5500	23.520	5489.200	5512.720	Within band	Pass
11A	5580	28.640	5566.520	5595.160	Within band	Pass
11A	5700	21.720	5688.920	5710.640	Within band	Pass
11A	5745	21.880	5733.720	5755.600	Within band	Pass
11A	5785	22.040	5774.200	5796.240	Within band	Pass
11A	5825	23.000	5814.120	5837.120	Within band	Pass
11N20	5180	21.720	5169.040	5190.760	Within band	Pass
11N20	5200	27.240	5188.960	5216.200	Within band	Pass
11N20	5240	22.360	5228.920	5251.280	Within band	Pass
11N20	5260	21.800	5249.160	5270.960	Within band	Pass
11N20	5280	21.720	5269.240	5290.960	Within band	Pass
11N20	5320	22.040	5309.000	5331.040	Within band	Pass
11N20	5500	22.040	5489.000	5511.040	Within band	Pass
11N20	5580	22.080	5568.840	5590.920	Within band	Pass
11N20	5700	21.560	5689.200	5710.760	Within band	Pass
11N20	5745	21.760	5734.240	5756.000	Within band	Pass
11N20	5785	22.200	5774.160	5796.360	Within band	Pass
11N20	5825	21.680	5814.200	5835.880	Within band	Pass
11N40	5190	40.960	5169.440	5210.400	Within band	Pass
11N40	5230	40.800	5209.840	5250.640	Within band	Pass
11N40	5270	41.200	5249.280	5290.480	Within band	Pass
11N40	5310	40.720	5289.760	5330.480	Within band	Pass
11N40	5510	40.800	5489.600	5530.400	Within band	Pass
11N40	5550	40.960	5529.440	5570.400	Within band	Pass
11N40	5670	40.720	5649.680	5690.400	Within band	Pass
11N40	5755	52.880	5727.800	5780.680	Within band	Pass
11N40	5795	49.840	5770.520	5820.360	Within band	Pass
11AC20	5180	24.080	5168.920	5193.000	Within band	Pass
11AC20	5200	22.880	5189.040	5211.920	Within band	Pass
11AC20	5240	22.080	5229.120	5251.200	Within band	Pass
11AC20	5260	22.520	5249.080	5271.600	Within band	Pass
11AC20	5280	21.960	5269.000	5290.960	Within band	Pass
11AC20	5320	21.920	5308.720	5330.640	Within band	Pass
11AC20	5500	22.240	5488.840	5511.080	Within band	Pass
11AC20	5580	25.960	5567.120	5593.080	Within band	Pass
11AC20	5700	33.640	5682.680	5716.320	Within band	Pass
11AC20	5745	33.600	5728.280	5761.880	Within band	Pass
11AC20	5785	30.280	5768.840	5799.120	Within band	Pass
11AC20	5825	27.880	5810.120	5838.000	Within band	Pass
11AC40	5190	41.360	5169.520	5210.880	Within band	Pass

11AC40	5230	40.720	5209.840	5250.560	Within band	Pass
11AC40	5270	40.640	5249.520	5290.160	Within band	Pass
11AC40	5310	39.680	5290.400	5330.080	Within band	Pass
11AC40	5510	39.840	5490.160	5530.000	Within band	Pass
11AC40	5550	42.880	5527.120	5570.000	Within band	Pass
11AC40	5670	58.880	5641.280	5700.160	Within band	Pass
11AC40	5755	54.960	5728.680	5783.640	Within band	Pass
11AC40	5795	46.880	5772.680	5819.560	Within band	Pass
11AC80	5210	80.800	5170.000	5250.800	Within band	Pass
11AC80	5290	81.120	5249.520	5330.640	Within band	Pass
11AC80	5530	81.440	5489.520	5570.960	Within band	Pass
11AC80	5610	90.720	5563.440	5654.160	Within band	Pass
11AC80	5775	111.840	5725.400	5837.240	Within band	Pass
11AX20	5180	22.320	5168.920	5191.240	Within band	Pass
11AX20	5200	23.280	5188.840	5212.120	Within band	Pass
11AX20	5240	22.160	5229.880	5252.040	Within band	Pass
11AX20	5260	21.320	5249.480	5270.800	Within band	Pass
11AX20	5280	21.800	5269.040	5290.840	Within band	Pass
11AX20	5320	21.960	5308.600	5330.560	Within band	Pass
11AX20	5500	21.640	5489.040	5510.680	Within band	Pass
11AX20	5580	25.760	5565.280	5591.040	Within band	Pass
11AX20	5700	31.880	5684.440	5716.320	Within band	Pass
11AX20	5745	35.800	5729.040	5764.840	Within band	Pass
11AX20	5785	24.960	5773.000	5797.960	Within band	Pass
11AX20	5825	22.520	5814.040	5836.560	Within band	Pass
11AX40	5190	41.600	5169.520	5211.120	Within band	Pass
11AX40	5230	40.960	5209.520	5250.480	Within band	Pass
11AX40	5270	40.480	5250.080	5290.560	Within band	Pass
11AX40	5310	40.400	5289.760	5330.160	Within band	Pass
11AX40	5510	40.480	5489.600	5530.080	Within band	Pass
11AX40	5550	40.720	5529.520	5570.240	Within band	Pass
11AX40	5670	51.680	5642.640	5694.320	Within band	Pass
11AX40	5755	52.400	5730.120	5782.520	Within band	Pass
11AX40	5795	40.000	5774.920	5814.920	Within band	Pass
11AX80	5210	81.920	5169.360	5251.280	Within band	Pass
11AX80	5290	82.560	5248.880	5331.440	Within band	Pass
11AX80	5530	81.600	5489.520	5571.120	Within band	Pass
11AX80	5610	82.080	5569.040	5651.120	Within band	Pass
11AX80	5775	83.200	5733.720	5816.920	Within band	Pass

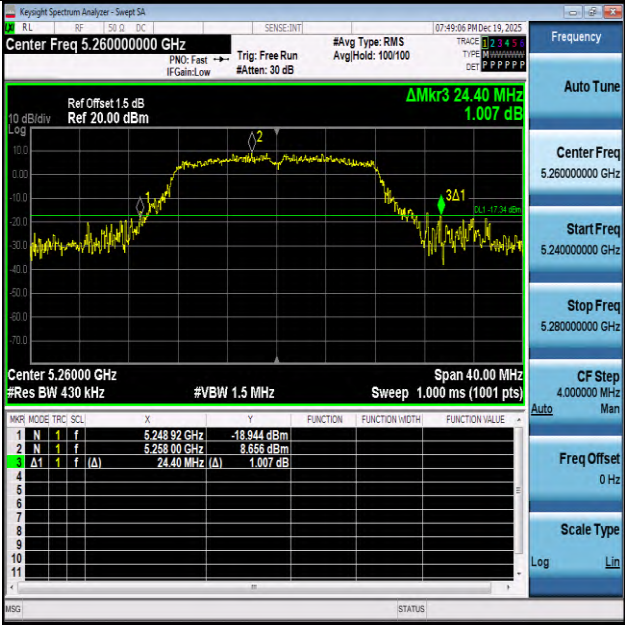
Note : We have evaluated both SISO-Ant1, SISO-Ant2 and MIMO mode, only worst data shown in this report.

Test Graphs

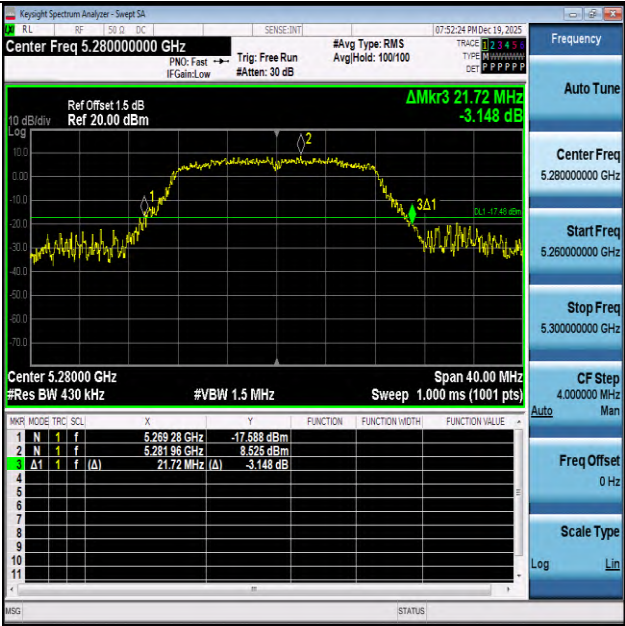




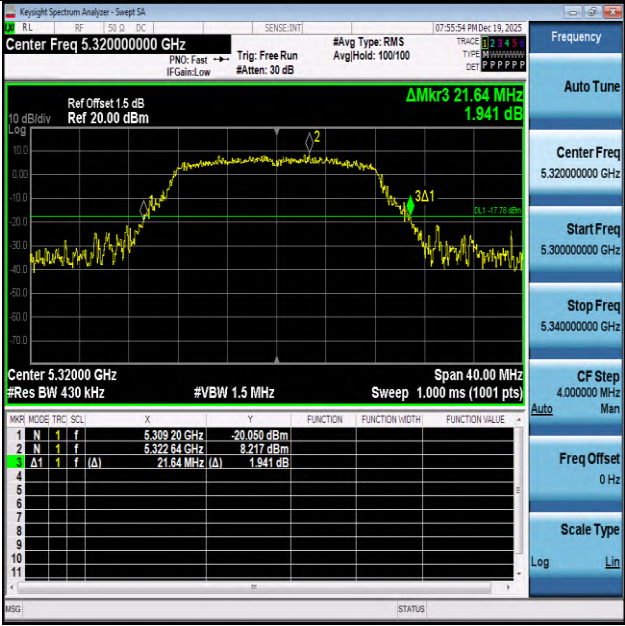
11A-5240



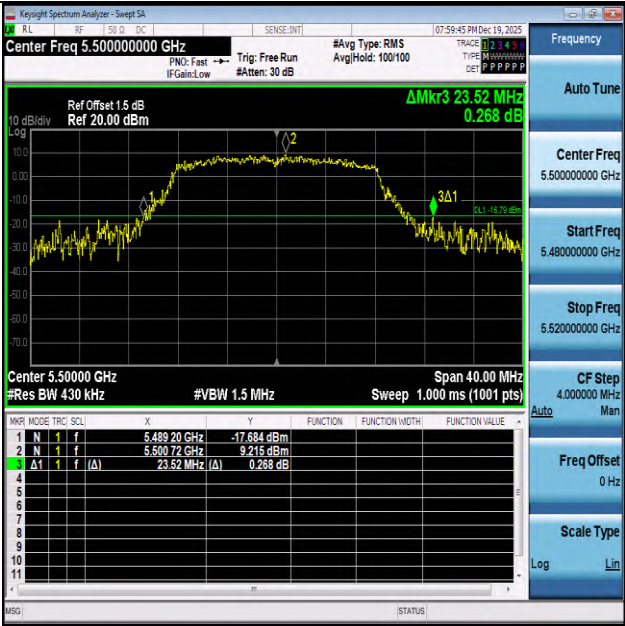
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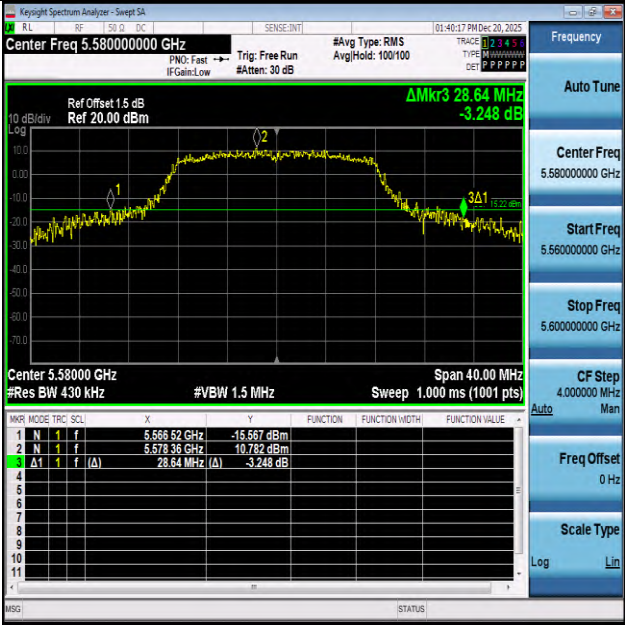
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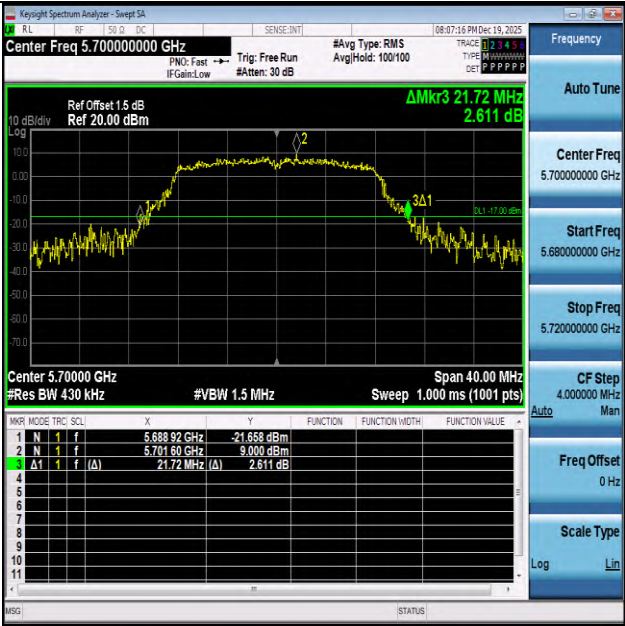
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11A-5500



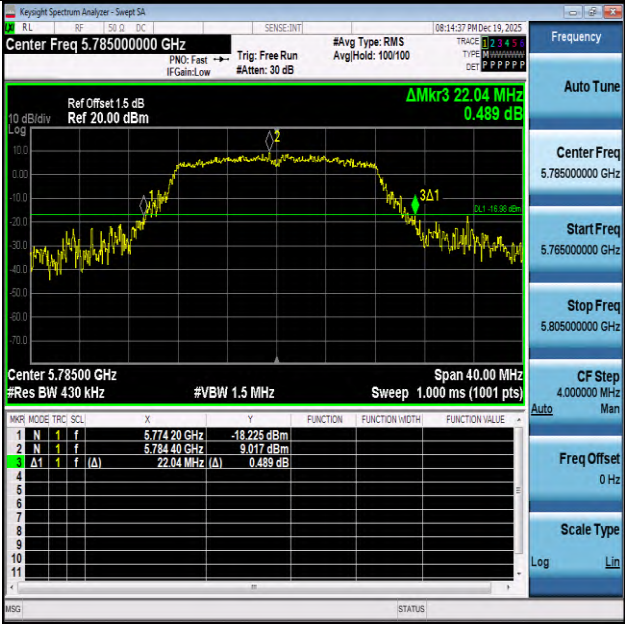
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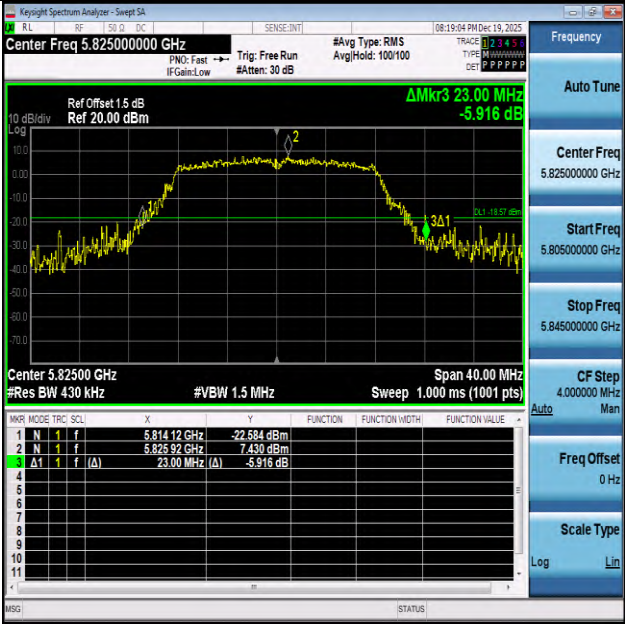
11A-5700



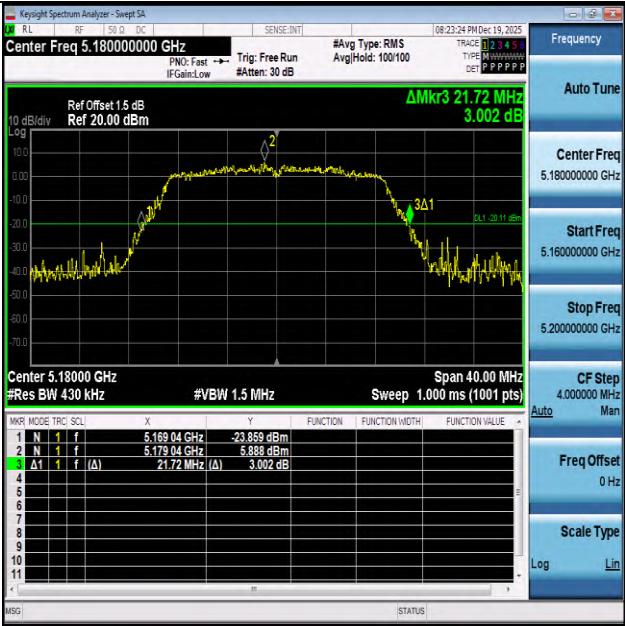
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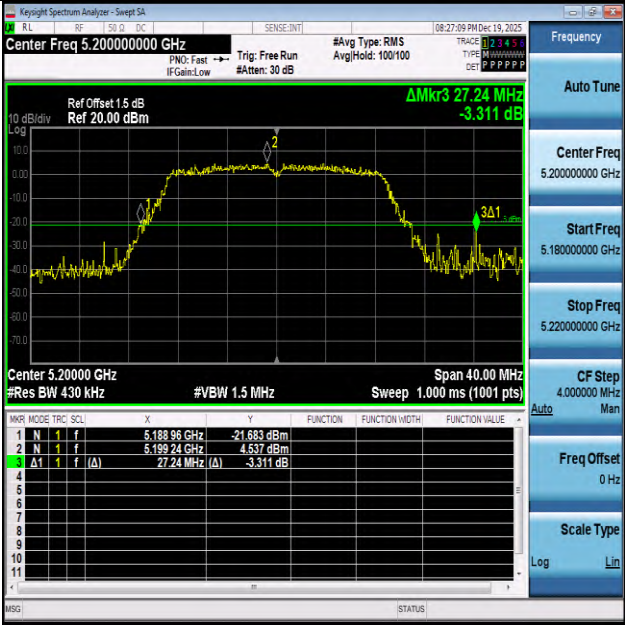
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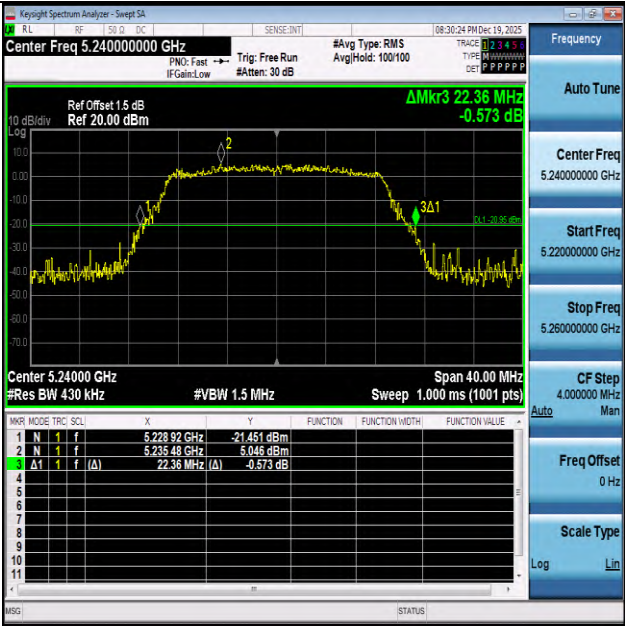
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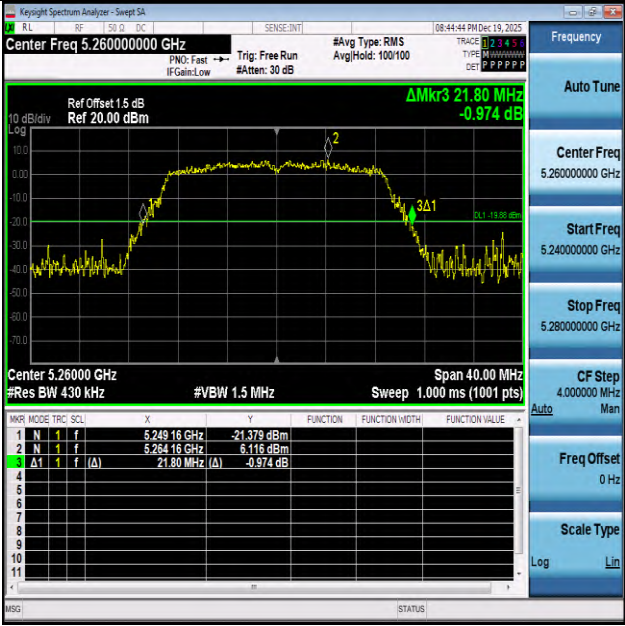
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11N20-5200



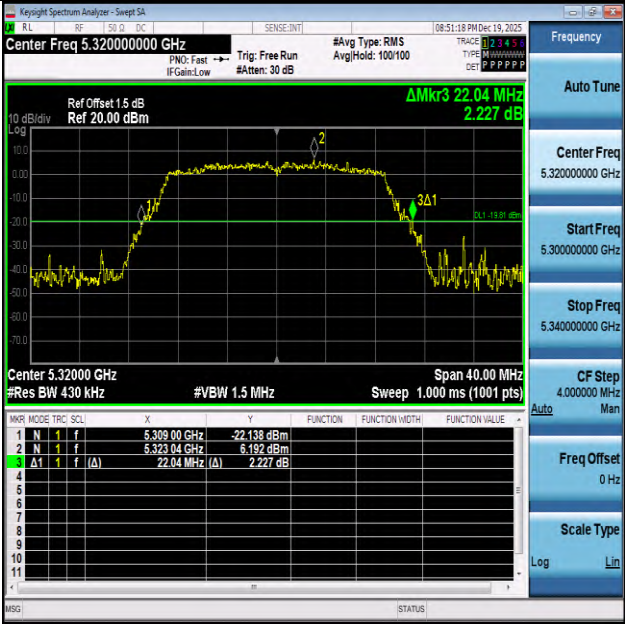
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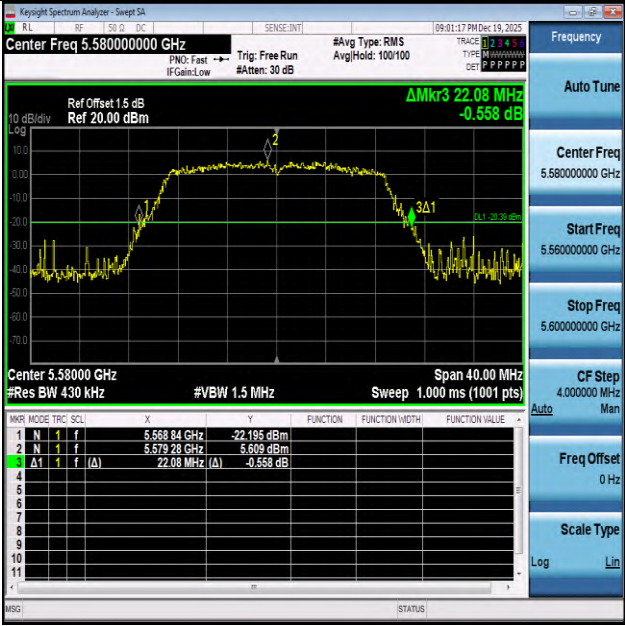
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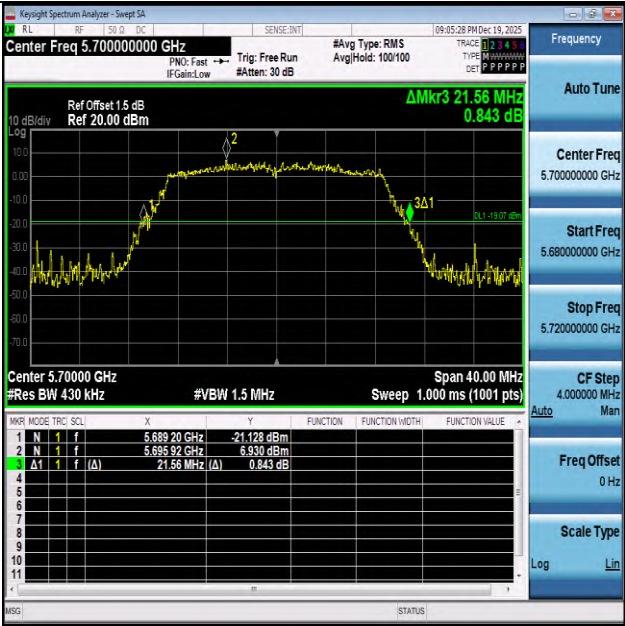
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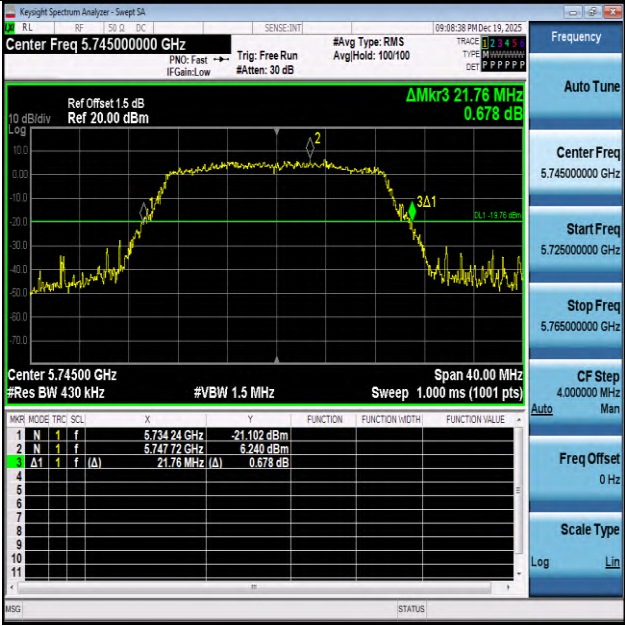
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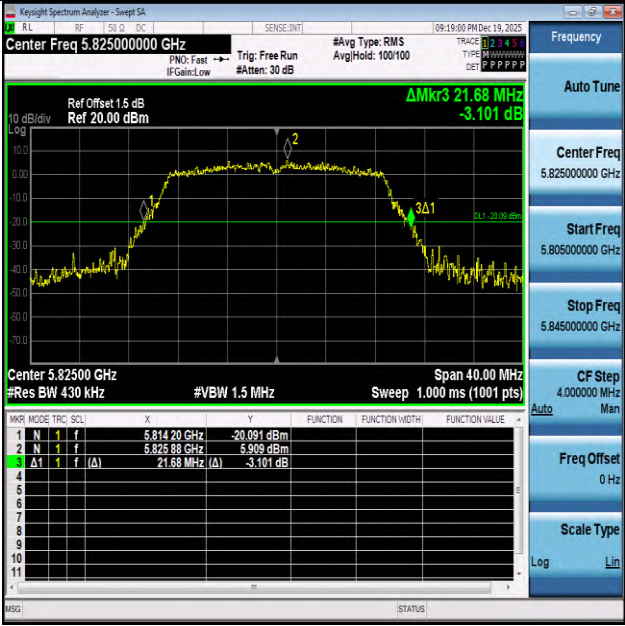
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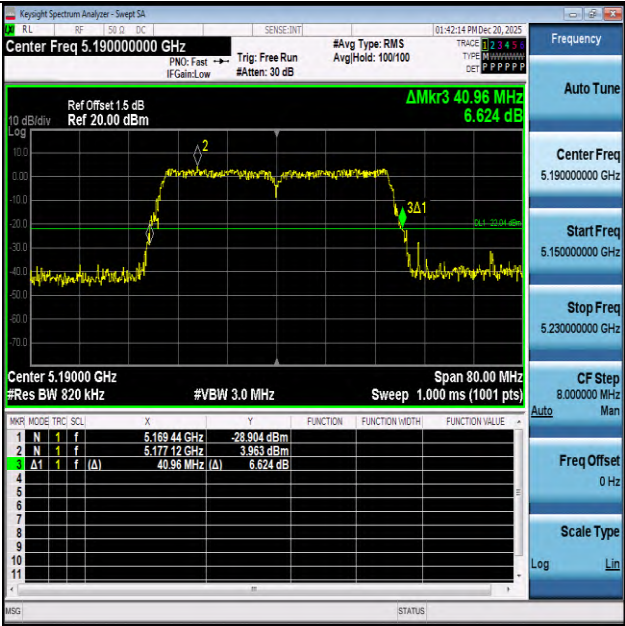
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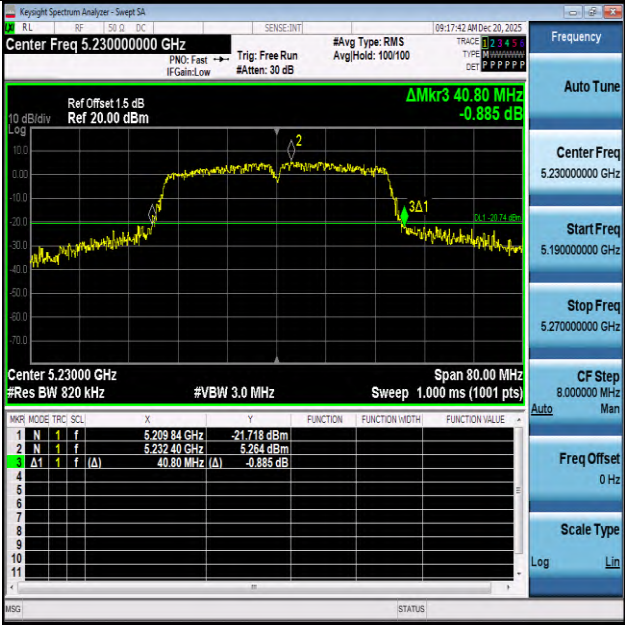
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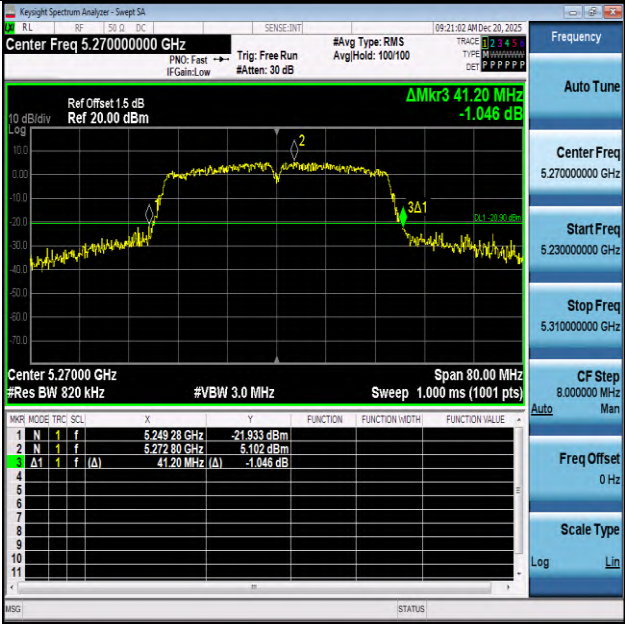
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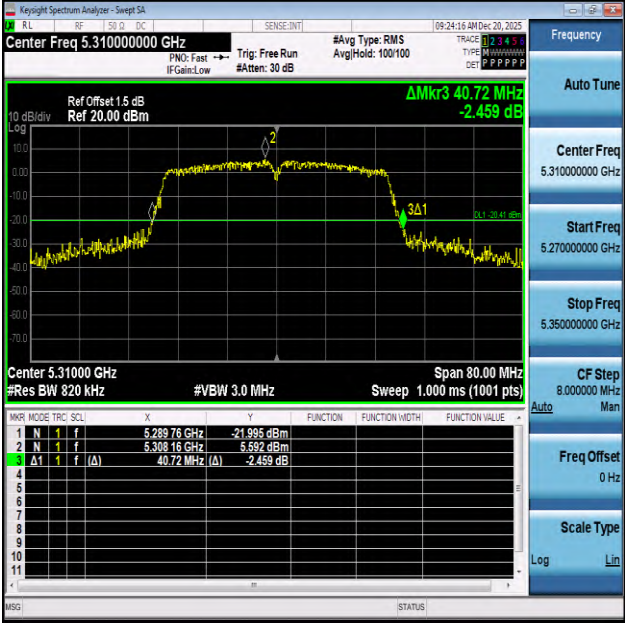
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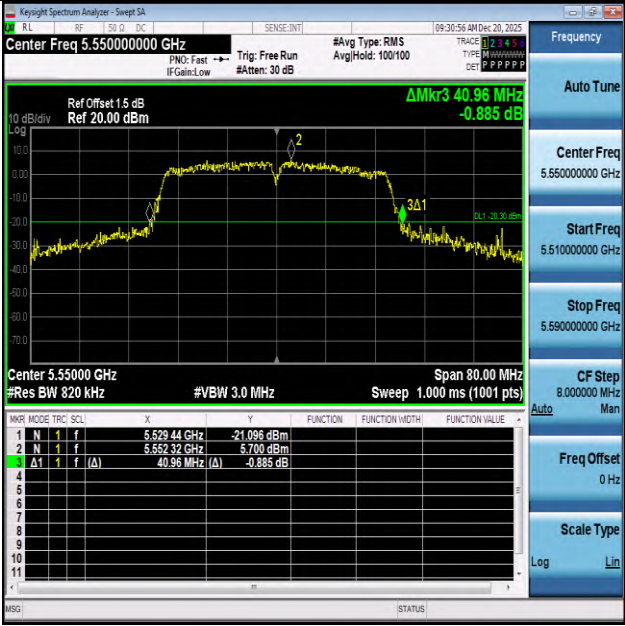
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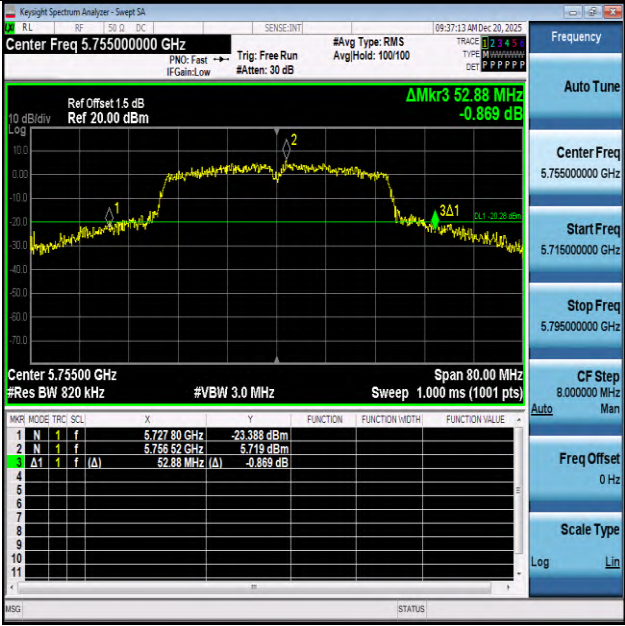
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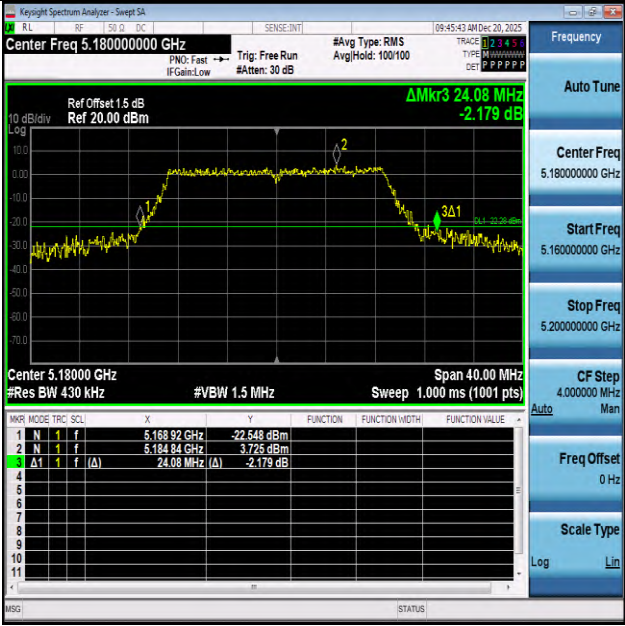
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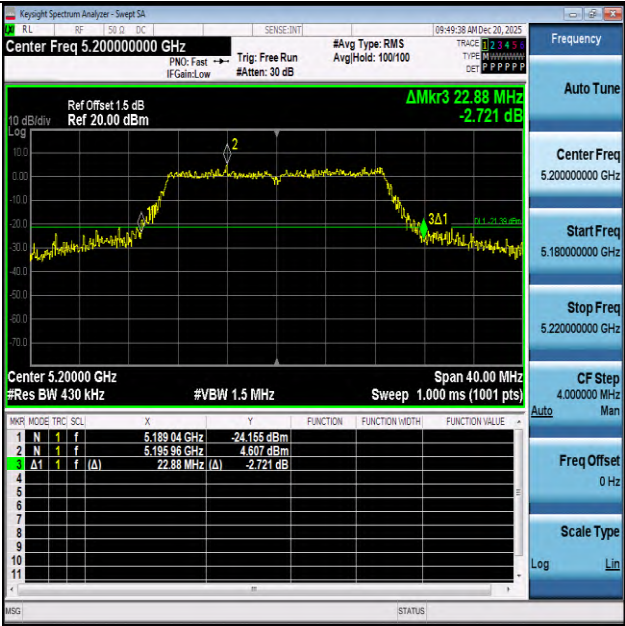
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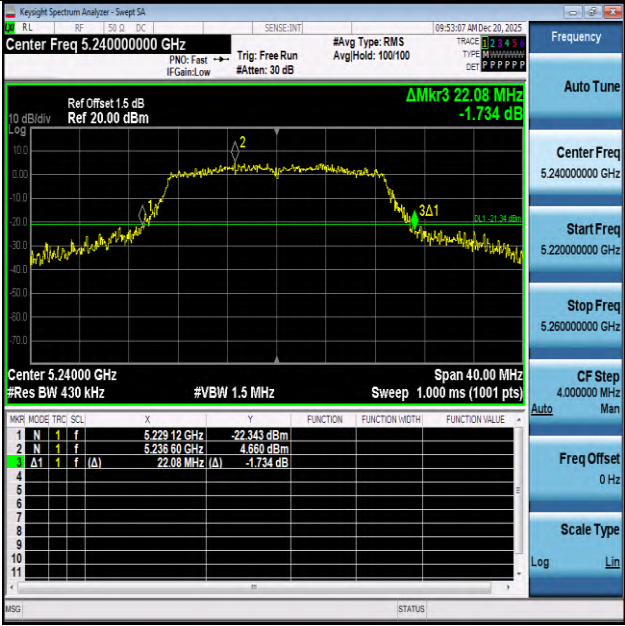
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11AC20-5180



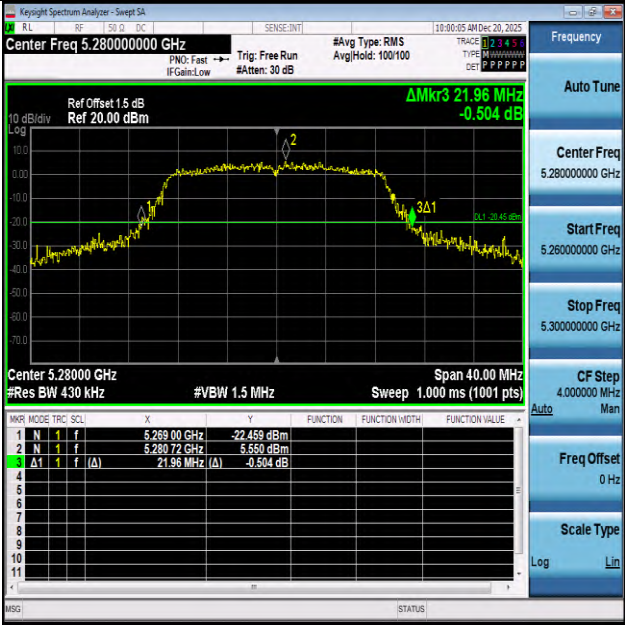
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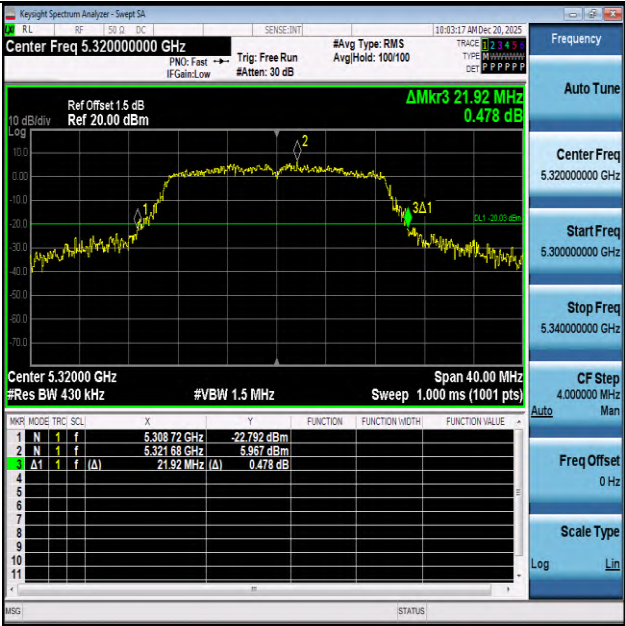
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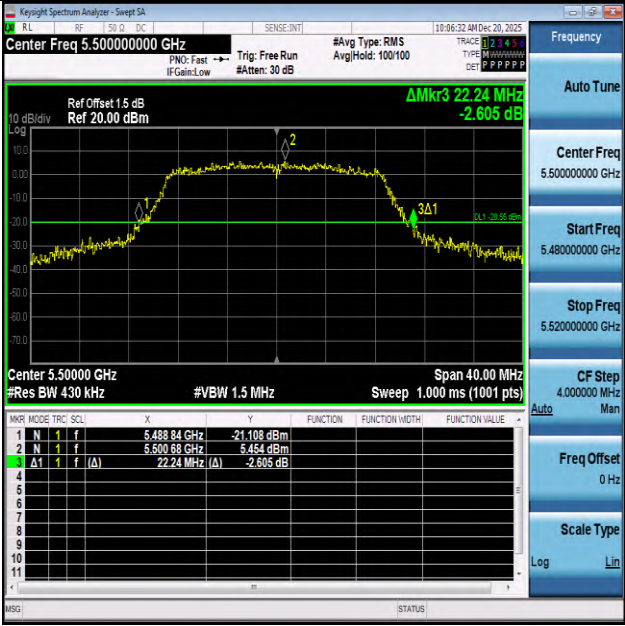
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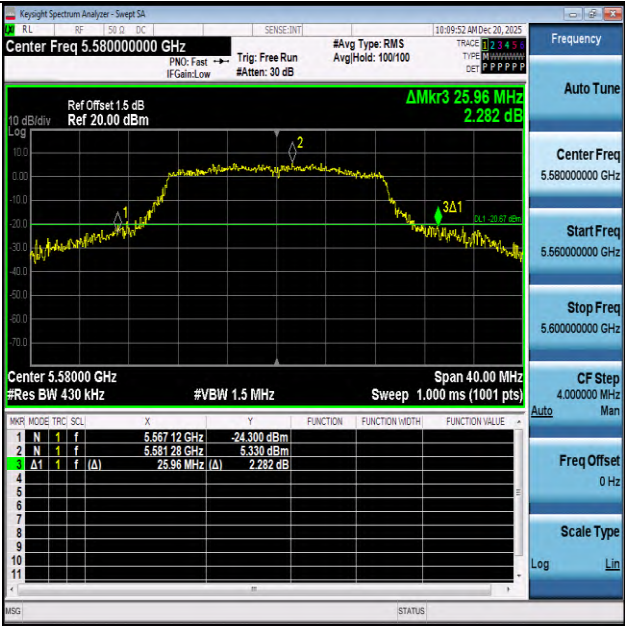
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11AC20-5320



11AC20-5500



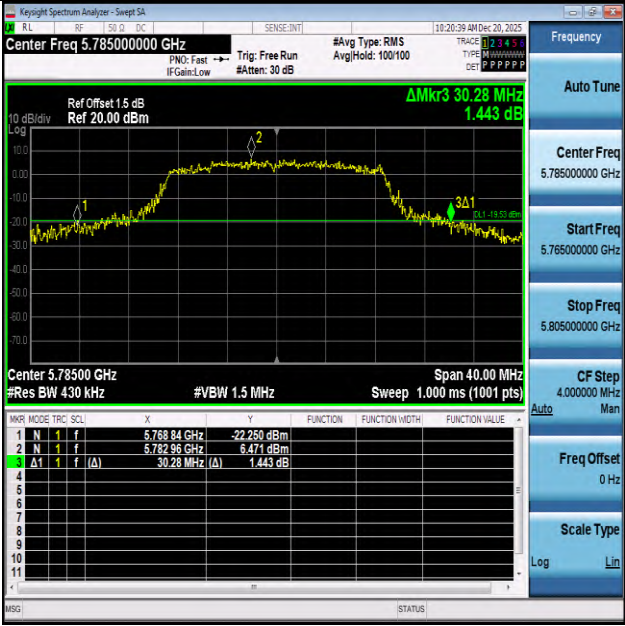
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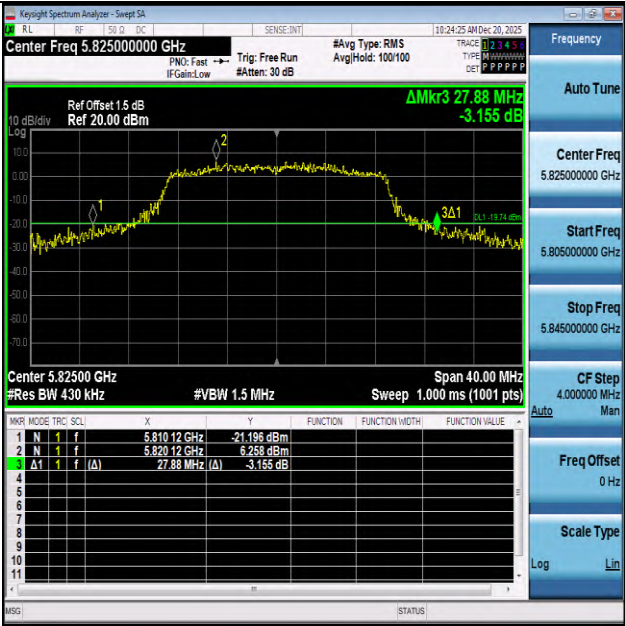
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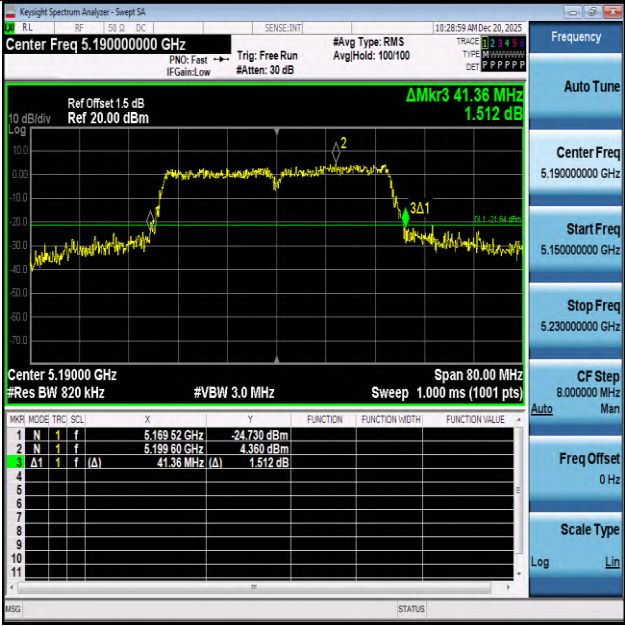
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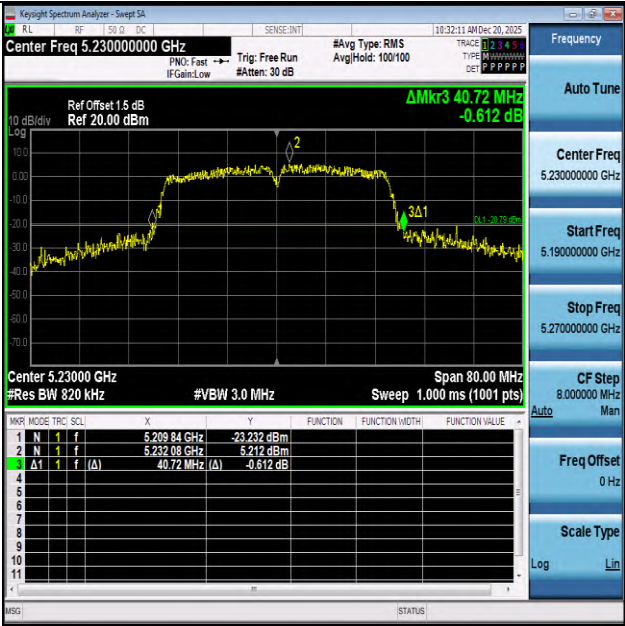
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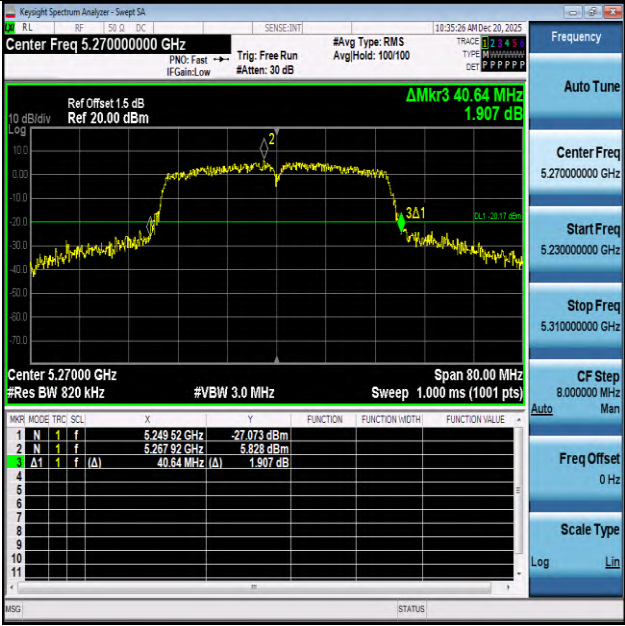
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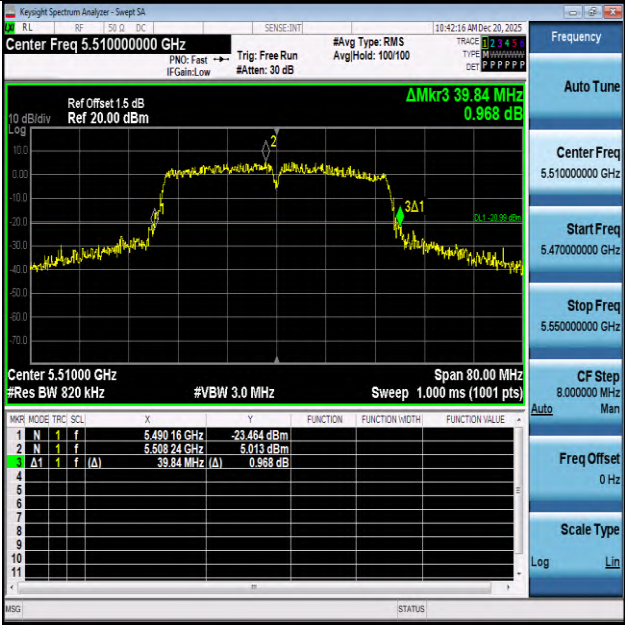
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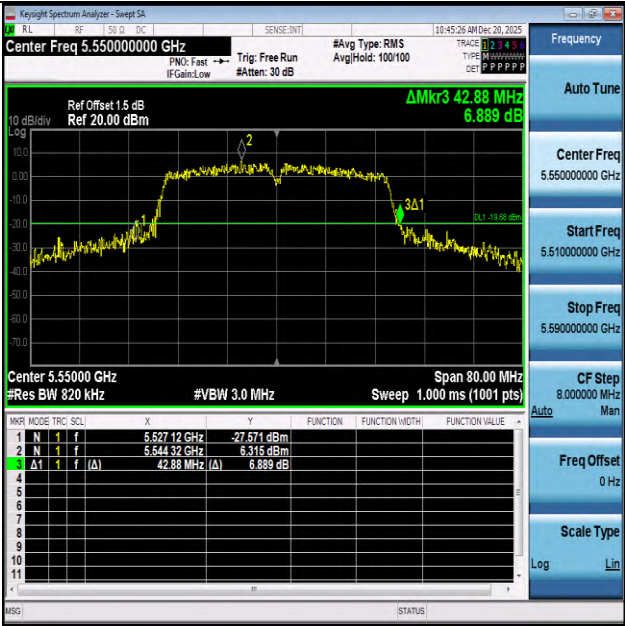
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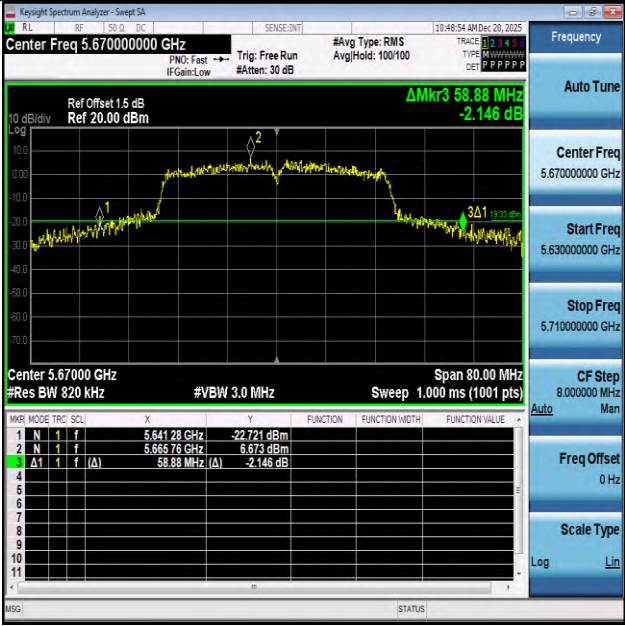
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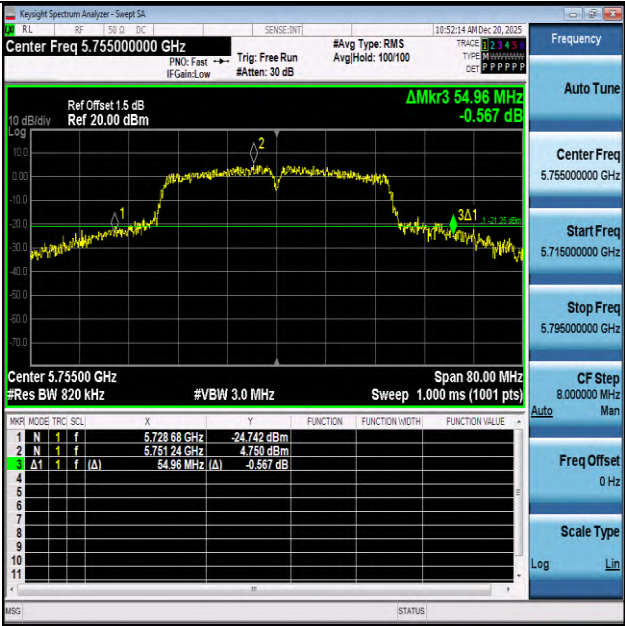
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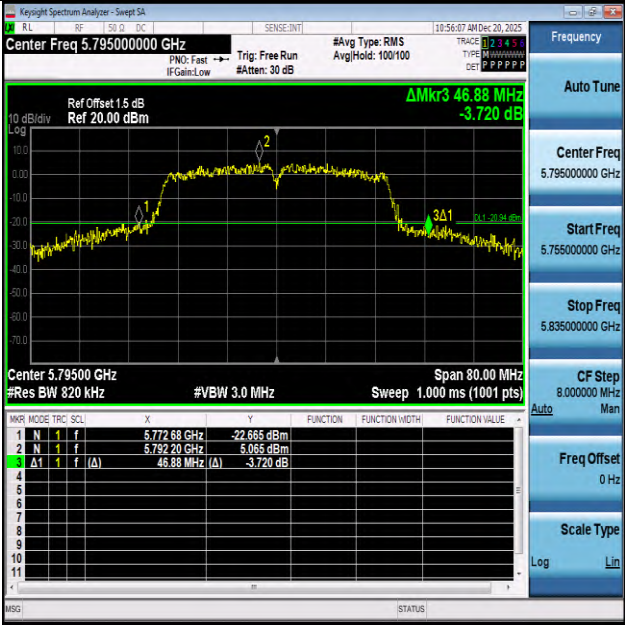
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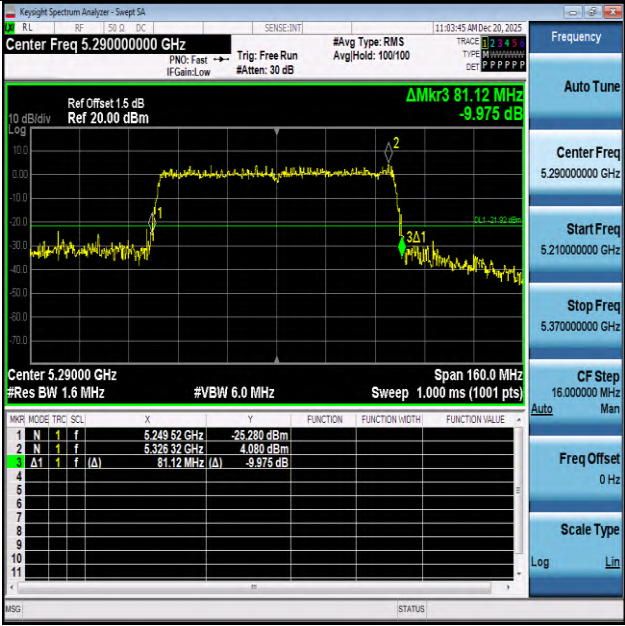
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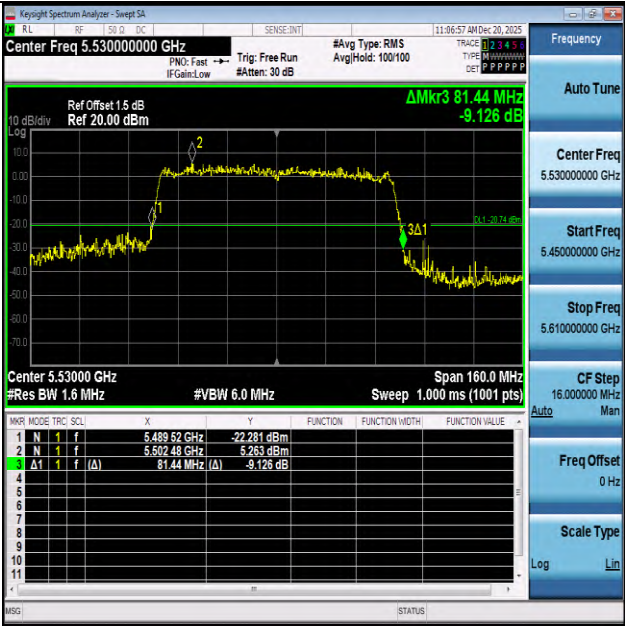
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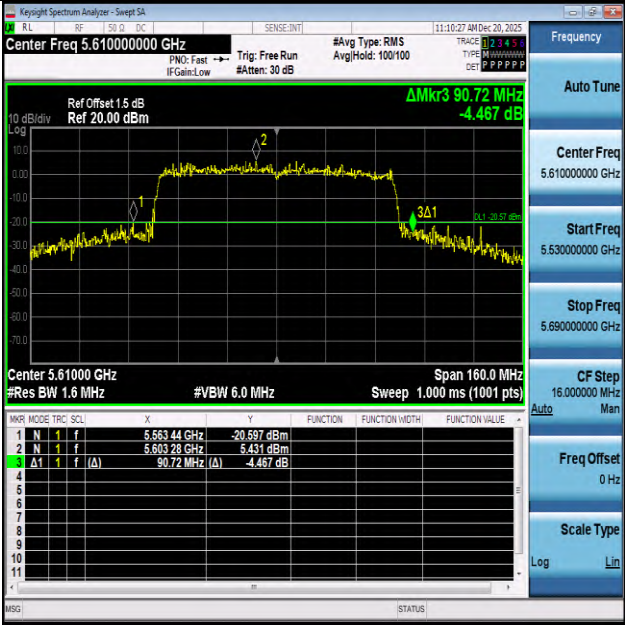
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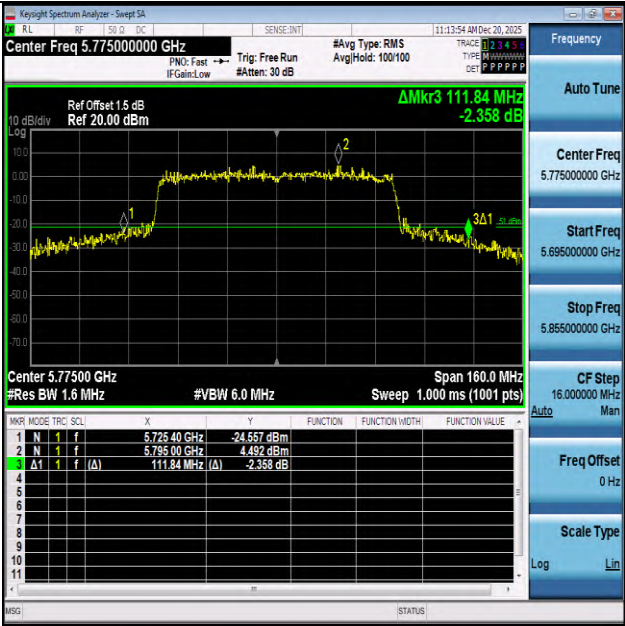
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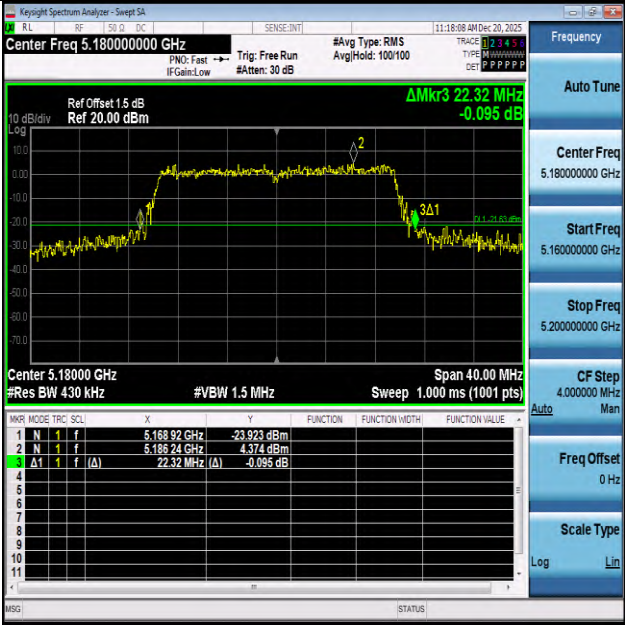
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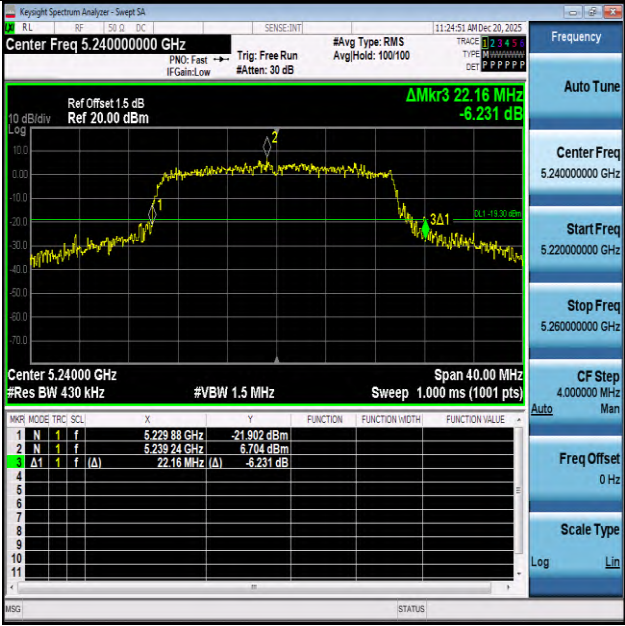
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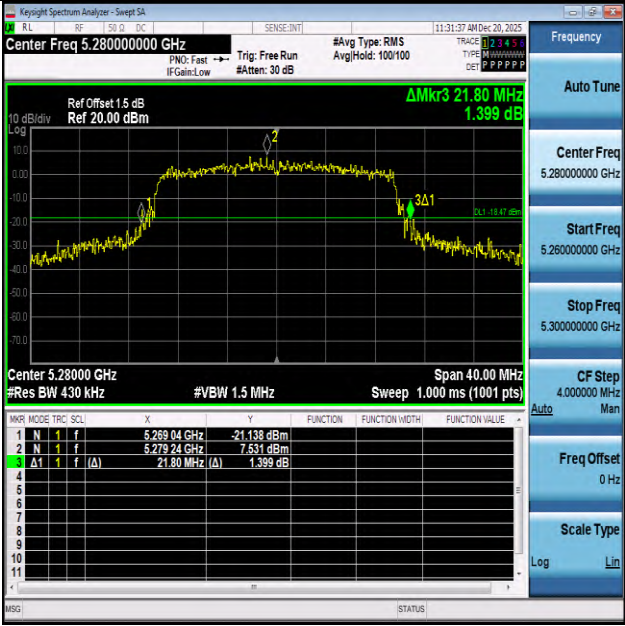
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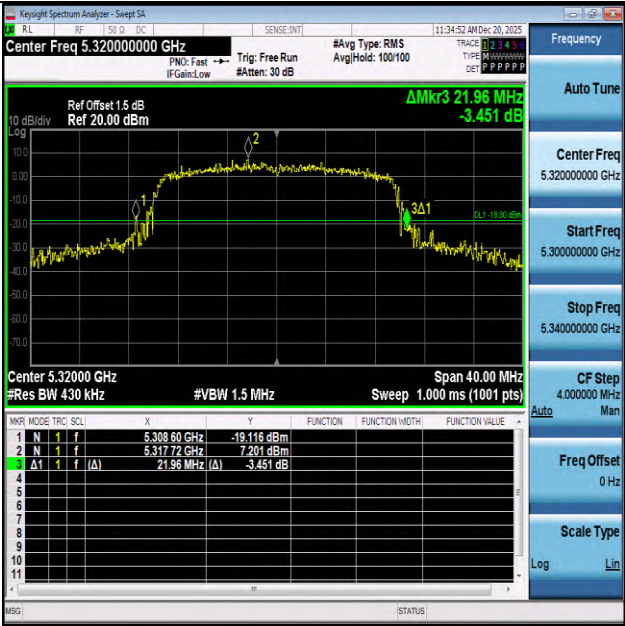
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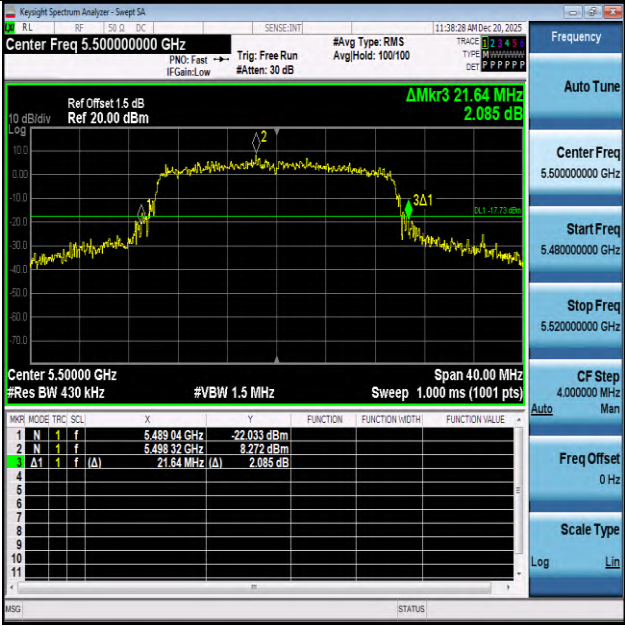
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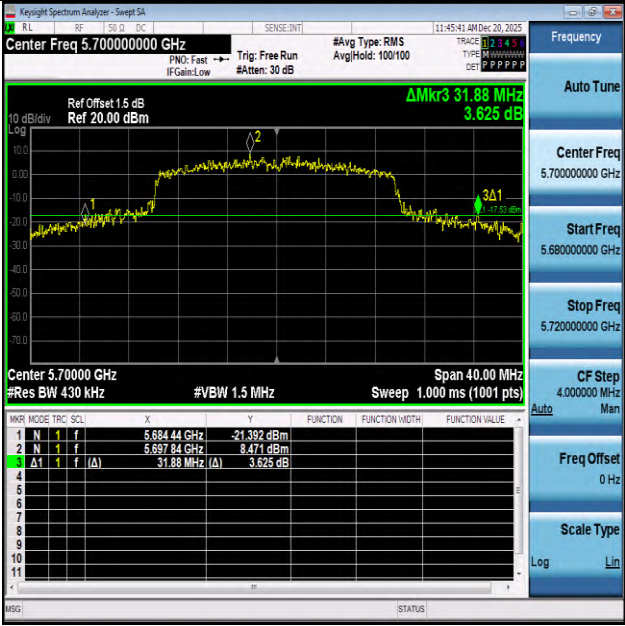
11AX20-5320



11AX20-5500



11AX20-5580



11AX20-5700