CERTIFICATION TEST REPORT

Report Number. : U-4791479848-FR1V3

Applicant	:	SAMSUNG ELECTRONICS CO., LTD. 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA
Model	:	WCF934M
FCC ID	:	A3LWCF934M
IC	:	649E-WCF934M
EUT Description	:	DTS/UNII a/b/g/n/ac/ax module and BT/BLE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-247 Issue 3 INDUSTRY CANADA RSS-GEN Issue 5

Date Of Issue:
2025-02-11

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IAS ACCREDITED
Testing Laboratory
TL-1087

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2025-02-04	Initial issue	Jaehyeok Bang
V2	2025-02-07	Updated to address TCB`s question	Jaehyeok Bang
V3	2025-02-11	Updated to address TCB`s question	Jaehyeok Bang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	DTS/UNII a/b/g/n/ac/ax module and BT/BLE
MODEL NUMBER:	WCF934M
SERIAL NUMBER:	4C573957D7D2, 4C573957D552, 4C573957D870 (CONDUCTED); 4C573957D760, 4C573957D5A8, 4C573957D91C (RADIATED);
DATE TESTED:	2025-01-06 - 2025-02-07

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
47 CFR Part 15 Subpart C	Complies
INDUSTRY CANADA RSS-247 Issue 3	Complies
INDUSTRY CANADA RSS-GEN Issue 5	Complies

UL KOREA LTD. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL KOREA LTD. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL KOREA LTD. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL KOREA LTD. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL KOREA LTD. By:

Changmin Kim
Senior Laboratory Engineer
UL Korea, Ltd.

Tested By:

Jaehyeok Bang
Laboratory Test Engineer
UL Korea, Ltd.

2. MANUFACTURER INFORMATION

Applicant Information

Company Name: SAMSUNG ELECTRONICS CO., LTD.
Address: 129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI, GYEONGGI-DO, 16677, KOREA

Manufacturer Information 1

Company Name: Chengdu Xuguang Technology Co., Ltd.
Address: No.86 2nd Section, Park Road, Longquanyi District, Chengdu City, Sichuan Province, P.R.China

Manufacturer Information 2

Company Name: CHEMTROVINA COMPANY LIMITED
Address: Nhon Trach 2 – Loc Khang IZ, Hiep Phuoc Town, Nhon Trach District,, Dong Nai Province, Vietnam

Manufacturer Information 3

Company Name: CHEMTRONICS CO., LTD.
Address: 35, Buk-ri, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

Manufacturer Information 4

Company Name: SJIT CO., LTD.
Address: #54-11, Dongtanhana 1 gil, Hwaseong-si, Gyeonggi-Do, Korea

Company Name: SJIT VINA Co., Ltd
Address: Lot X2, Ho Nai Industrial Zone, Ho Nai 3 Commune, Trang Bom District, Dong Nai Province, Vietnam

3. TEST METHODOLOGY

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 15.
3. KDB 558074 D01 DTS Meas Guidance v05r02.
4. KDB 662911 D01 Multiple Transmitter Output v02r01
5. IC RSS-247 Issue 3.
6. IC RSS-Gen Issue 5.
7. ANSI C63.10-2020.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 42, Obongsandan 1-ro, Uiwang-si, Gyeonggi-do, Republic of Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

42, Obongsandan 1-ro
☒ Chamber 1
☒ Chamber 2

Used ISED Test Site Reg. (SATELLITE company number): 32001
CAB Identifier: KR0161

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-1087. The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2022/05/TL-1087-Cert-New.pdf

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
28.9 dBuV/m = 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB

AC Corrected Reading (dBuV) = Measured Voltage (dBuV) + Extension Cord Loss (dB) + Cable Loss (dB)
44.72 dBuV = 34.72 dBuV + 9.9 dB + 0.1 dB

MIMO total corr'd power (dBm) = ANT1's Avearage Power (dBm) + ANT2's Average Power (dBm)
$17.95\ \text{dBm} = 10*\text{LOG}(10^{14.51\ \text{dBm}/10} + 10^{15.33\ \text{dBm}/10})$

MIMO total corr'd PSD (dBm) = ANT1 Meas PSD (dBm) + ANT2 Meas PSD (dBm) + Duty Cycle CF (dB)
$-0.51\ \text{dBm} = 10*\text{LOG}(10^{-4.16\ \text{dBm}/10} + 10^{-3.75\ \text{dBm}/10}) + 0.43\ \text{dB}$

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Common Items

PARAMETER	UNCERTAINTY
RF Output Power	0.94 dB
Power Spectral Density	0.85 dB
Occupied Bandwidth	0.07 %
Conducted Spurious Emissions	1.21 dB
AC Power Line Conducted Emissions	2.32 dB

Uncertainty figures are valid to a confidence level of 95%, k=2

Chamber 1

PARAMETER	UNCERTAINTY
Radiated Disturbance, 30 MHz to 1 GHz	3.64 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.38 dB
Radiated Disturbance, Above 18 GHz	6.23 dB

Uncertainty figures are valid to a confidence level of 95%, k=2

Chamber 2

PARAMETER	UNCERTAINTY
Radiated Disturbance, 9 kHz to 30 MHz	1.66 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.39 dB

Uncertainty figures are valid to a confidence level of 95%, k=2

5.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Clause 4.3.3 in IEC Guide 115:2023. Measurement Uncertainty is not applied when providing statements of conformity in accordance with IEC Guide 115:2023, 4.3.3

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6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

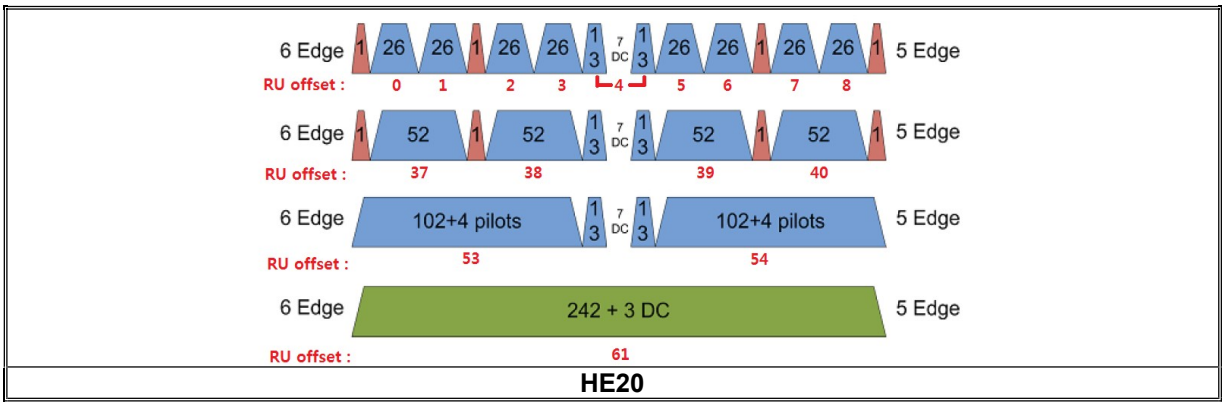
The EUT is a DTS/UNII a/b/g/n/ac/ax module and BT/BLE.
This test report addresses the DTS(WLAN) operational mode.

Representative model	Software	Hardware Type	Difference
WCF934M	Same	Type1	Basic: PCB top IR LED
		Type2	PCB bottom IR LED
		Type3	PCB top IR LED / MIC removed
Note1. H/W changes that are not RF related. Spot-Check test was performed on Type2 and Type3. The hardware Type 1 was used for final testing and is representative of the test results in this report.			

WiFi operating mode

Frequency rage	Mode	ANT0	ANT1
2.4GHz (2412 MHz - 2472 MHz)	802.11b SISO	TX/RX	TX/RX
	802.11g SISO	TX/RX	TX/RX
	802.11n(HT20) MIMO	TX/RX	
	802.11ax(HE20) MIMO	TX/RX	

802.11ax RU allocations



HE20

Test RU offset for tones

Mode	Tones number in RU	RU offset
HE20	26T	0
		4
		8
	52T	37
		38
		40
	106T	53
		54
	242T / SU Note 1	61 / -

Note. Full RU(Resource Unit) 242T mode and SU(Single Unit) mode have no difference in physical waveform. This report has been reported the Full RU mode with highest output power in MIMO.

6.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]		Antenna gain [dBi]		e.i.r.p Note1 [dBm]	
		ANT1	ANT2	ANT1	ANT2	ANT1	ANT2	ANT1	ANT2
2412 - 2472	802.11b SISO	15.81	18.45	38.11	69.98	0.13	-0.20	15.94	18.25
	802.11g SISO	17.21	18.27	52.60	67.14	0.13	-0.20	17.34	18.07

Frequency Range [MHz]	Mode	Output Power [dBm]	Output Power [mW]	Directional Gain [dBi]	e.i.r.p Note1 [dBm]
2412 - 2472	802.11n(HT20) MIMO	20.66	116.41	2.98	23.64
	802.11ax(HE20) MIMO	20.65	116.14	2.98	23.63

Note 1: e.i.r.p = Output Power[dBm] + Antenna gain[dBi]

6.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 internal antenna was Permanently attached.
Therefore, this E.U.T Complies with the requirement of §15.203.

"WiFi Chain0" and "WiFi Chain1" as indicated in block diagram are written as ANT1 and ANT2 in this report.

Bands [MHz]	ANT1 [dBi]	ANT2 [dBi]	Correlated Directional Gain [dBi]
2 412 ~ 2 472	0.13	-0.20	2.98

Directional gain for the MIMO operations is determined using KDB 662911 D01 Multiple Transmitter Output section F (2)(d)(1) for *Unequal antenna gains, with equal transmit powers*. The gain is calculated using the formula for correlated transmissions across the two transmit antennas. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}$] dBi.

Sample calculation for this device with $N_{ANT} = 2$

Directional gain = 10 log[$(10^{0.13/20} + 10^{-0.20/20})^2 /2$] = 2.98 dBi

6.4. TESTED CHANNELS LIST

Ch.	Frequency [MHz]	11b		11g		11n(HT20)		11ax(HE20)	
		SISO	MIMO	SISO	MIMO	SISO	MIMO	SISO	MIMO
1	2 412	O		O			O		O
2	2 417			O			O		O
6	2 437	O		O			O		O
9	2 452						O		O
10	2 457			O			O		O
11	2 462	O		O			O		O
12	2 467	O		O			O		O
13	2 472	O		O			O		O

Note. SISO mode test was performed only to check average power. Because MIMO mode target power is 3dB higher than SISO mode.

6.5. WORST-CASE CONFIGURATION AND MODE

Both SISO and MIMO have been investigated and confirmed MIMO was the worst case set for radiated band edge and spurious emission tests except 11b & 11g.

ANT1	ANT2	MIMO
Z	Y	X

Radiated harmonics spurious 1~18 GHz Low/Mid/High channels,18-26GHz were performed with the EUT set at the 2TX MIMO mode. Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Simultaneous transmission with related transmitters were investigated and no noticeable emission was found.

For 802.11ax mode, output power and PSD tests were investigated between all different tones and found that RU 26T has the highest PSD readings which was documented in this report. And after some pre-tests, Full RU(Resource Unit) mode was determined as the worst case set for final conducted/radiated band edge tests with some spot-check performed at the lowest RU offset of the lowest frequency and the highest RU offset of the highest frequency.

For conducted/radiated spurious tests, 802.11ax Full RU(Resource Unit) mode has lower PSD results than 802.11ax RU 26T and therefore, 802.11ax RU 26T's highest power offset was set for full test.

In case of 6dB Bandwidth, it was tested at the RU allocation with lowest tones number, RU 26Tones as the worst-case scenario.

Based on the baseline scan, the worst-case data rates were:
802.11b mode: 1 Mbps 1TX
802.11g mode: 6 Mbps 1TX
802.11n HT20 mode: MCS0 2TX
802.11ax HE20 mode: MCS0 2TX

6.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Test Jig	MediaTek	-	-	N/A
Laptop	Lenovo	TP00136D	PF-4M6STB	N/A
Charger	Lenovo	ADLX45YCC3G	8SSA10R16915C2TJ	N/A

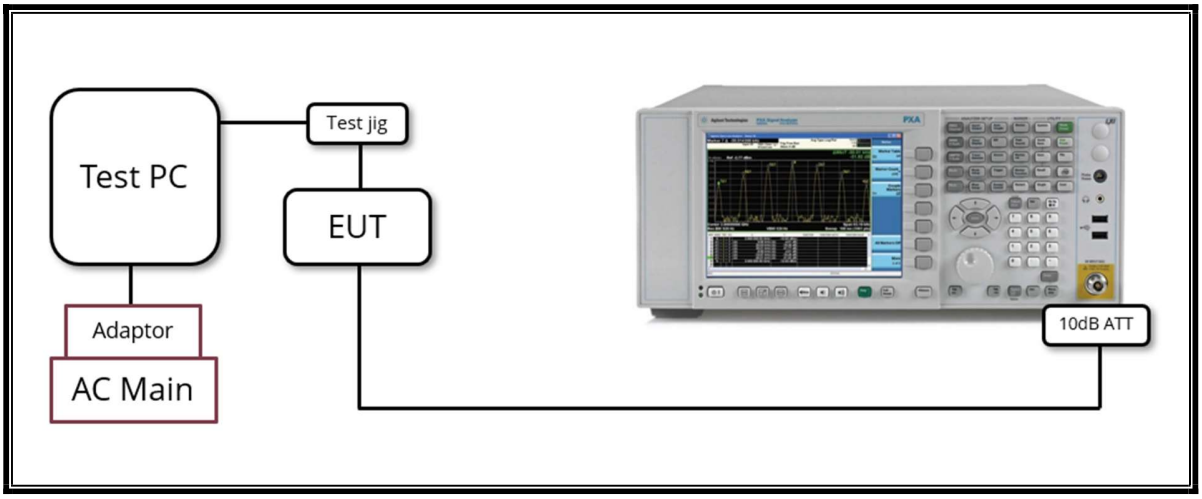
I/O CABLE

I/O Cable List						
Cable No.	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC Power and Data	1	24 pin	Unshielded	20 cm	N/A

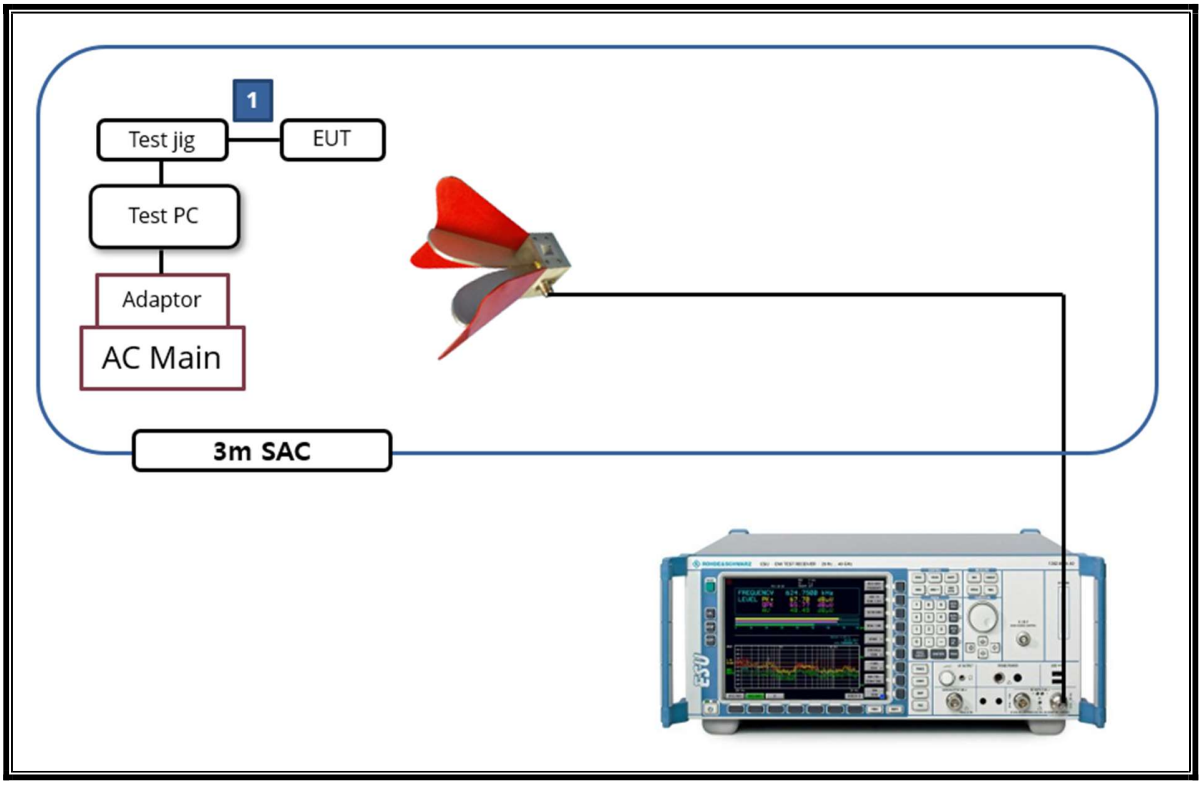
TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software exercised the EUT to enable DTS mode.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



7. MEASUREMENT METHOD

6 dB BW : ANSI C63.10-2020, Section 11.8.2 Option 2

OUTPUT POWER : ANSI C63.10-2020, Section 11.9.2.3.1 Method AVGPM

POWER SPECTRAL DENSITY : ANSI C63.10-2020, Section 11.10.3 & 11.10.5 Method AVGPSD-1 and Method AVGPSD-2

Out-of-band Emissions (Conducted) : ANSI C63.10-2020, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Non-restricted Bands: ANSI C63.10-2020, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Restricted Bands: ANSI C63.10-2020, Section 11.12 Emissions in restricted frequency bands

AC Power Line Conducted Emission : ANSI C63.10-2020, Section 6.2

8. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due date
Spectrum Analyzer	KEYSIGHT	N9030B	MY57143717	2024-07-23	2025-07-23
EMI Test Receiver	Rohde & Schwarz	ESW44	103297	2024-07-18	2025-07-18
EMI Test Receiver	Rohde & Schwarz	ESW44	103313	2024-01-29	2025-01-29
				2025-01-22	2026-01-22
EMI Test Receiver	Rohde & Schwarz	ESW44	103350	2024-04-08	2025-04-08
EMI Test Receiver	Rohde & Schwarz	ESR7	102328	2024-01-29	2025-01-29
				2025-01-22	2026-01-22
2 Line LISN	Rohde & Schwarz	EVN216	102638	2024-01-30	2025-01-30
				2025-01-23	2026-01-23
Signal Generator	Rohde & Schwarz	SMB100B	103196	2024-07-18	2025-07-18
Signal Generator	Rohde & Schwarz	SMB100A	184060	2024-07-18	2025-07-18
Loop Antenna	TESEQ	HLA 6121	65111	2023-08-01	2025-08-01
TRILOG BROADBAND ANTENNA	Schwarzbeck	VULB 9163	01670	2023-10-17	2025-10-17
Double-Ridged Guide Antenna	ETS LINDGREN	3117	00261223	2024-09-24	2025-09-24
Double-Ridged Guide Antenna	ETS LINDGREN	3117	00261463	2024-09-20	2025-09-20
DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS LINDGREN	3116C	00261440	2024-09-20	2025-09-20
Amplifier	ETS LINDGREN	3116C-PA	00261440	2024-09-20	2025-09-20
Signal Conditioning Unit	Rohde & Schwarz	SCU01F	100316	2024-03-22	2025-03-22
Amplifier	EXYNOD	ELNA03-40D	631509	2024-07-18	2025-07-18
Amplifier	BNZ	BZR-01001800-231040-182020	28452	2024-04-08	2025-04-08
Amplifier	BNZ	BZR-01001800-231040-181515	31049	2024-07-18	2025-07-18
Power Sensor	Rohde & Schwarz	111164	NRP8S	2024-07-23	2025-07-23
Power Sensor	Rohde & Schwarz	104521	NRP8S	2024-07-25	2025-07-25
Attenuator	Centric RF	C040-10	N/A	2024-01-11	2025-01-11
				2025-01-10	2026-01-10
Attenuator	Centric RF	C040-10	N/A	2024-01-11	2025-01-11
				2025-01-10	2026-01-10
Attenuator	EXYNOD	RLAN-210-18G	10A001	2024-04-08	2025-04-08
Fixed Attenuator	PASTERNACK	PE7087-10	2241	2024-07-18	2025-07-18
Low Pass Filter	Micro-Tronics	LPS17541	019	2024-07-18	2025-07-18
Low Pass Filter	Micro-Tronics	LPS17541	050	2024-04-08	2025-04-08
High Pass Filter	Micro-Tronics	HPM50107	G115	2024-07-18	2025-07-18
High Pass Filter	Micro-Tronics	HPM17543	021	2024-07-18	2025-07-18
High Pass Filter	Micro-Tronics	HPS17542	020	2024-07-18	2025-07-18
High Pass Filter	Micro-Tronics	HPM17543	051	2024-04-08	2025-04-08
High Pass Filter	Micro-Tronics	HPS17542	051	2024-04-08	2025-04-08
Humidity/Baro/Temp DATA RECORDER	Lutron	MHB-382SD	AL.92208	2024-07-23	2025-07-23
Humidity/Baro/Temp DATA RECORDER	Lutron	MHB-382SD	AM.00223	2024-01-11	2025-01-11
				2025-01-02	2026-01-02
Humidity/Baro/Temp DATA RECORDER	Lutron	MHB-382SD	AM.00227	2024-01-11	2025-01-11
				2025-01-02	2026-01-02
Digital Multimeter	Fluke Corporation	17B+	51260820WS	2024-07-18	2025-07-18

Measurement Software			
Description	Manufacturer	Model	Version
Radiated software	UL	UL EMC	Ver 9.5
AC Line Conducted Software	Rohde & Schwarz	EMC32	Ver 11.10.00

9. SUMMARY TABLE

FCC Part Section	IC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	RSS-247 5.2(a)	Occupied Bandwidth (6dB & 99%)	> 500kHz	Conducted	Complies
2.1051, 15.247(d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20 dBc		Complies
15.247 (b)(3)	RSS-247 5.4(d)	TX conducted output power	< 30 dBm		Complies
15.247(e)	RSS-247 5.2(b)	PSD	< 8 dBm/3kHz		Complies
15.207(a)	RSS-GEN Clause 8.8	AC Power Line conducted emissions	Section 12	Power Line conducted	Complies
15.205, 15.209	RSS-GEN Clause 8.9 & 8.10	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	Complies

10. ANTENNA PORT TEST RESULTS

10.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]	1/T Minimum VBW[kHz]
802.11b SISO	8.384	8.818	0.951	95.078	0.22	0.12
802.11g SISO	2.756	3.232	0.853	85.272	0.69	0.36
802.11n(HT20) MIMO	5.084	5.614	0.906	90.559	0.43	0.20
802.11ax(HE20) MIMO 26T	1.604	2.008	0.799	79.880	0.98	0.62
802.11ax(HE20) MIMO 52T	1.524	1.928	0.790	79.046	1.02	0.66
802.11ax(HE20) MIMO 106T	1.400	1.831	0.765	76.461	1.17	0.71
802.11ax(HE20) MIMO 242T	1.212	1.652	0.734	73.366	1.35	0.83

Note. According to ANSI C63.10 Section 11.6, do not apply the Duty Cycle Correction Factor judging that a duty cycle of greater than or equal to 98% is continuous signal.

802.11ax(HE20) MIMO 242T

10.2. 6 dB & 99% BANDWIDTH

LIMITS

FCC §15.247 (a) (2), RSS-247 5.2 (a)
The minimum 6 dB bandwidth shall be at least 500 kHz.

Occupied Bandwidth:
None; for reporting purposes only.

TEST PROCEDURE

Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to 1% to 5% of the OBW(but not less than 100 kHz), the VBW >= 3 x RBW, peak detector and max hold.

RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS(6dB BANDWIDTH)

ANT1	ANT2
802.11ax HE20 26T / 13 CHANNEL	802.11ax HE20 26T / 6 CHANNEL
	

WORST CASE TEST PLOTS(99% BANDWIDTH)

ANT1	ANT2
802.11ax HE20 Full RU 242T / 9 CHANNEL	802.11ax HE20 Full RU 242T / 9 CHANNEL
	

10.2.1. 802.11b SISO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	8.172	8.152	0.5
6	2 437	8.165	8.159	
11	2 462	8.164	**8.151**	
12	2 467	**8.155**	8.156	
13	2 472	8.161	8.153	
Worst		**8.151**		

Channel	Frequency [MHz]	99% Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	**12.799**	12.401	N/A
6	2 437	12.655	12.540	
11	2 462	12.602	12.528	
12	2 467	12.616	12.691	
13	2 472	12.615	12.480	
Worst		**12.799**		

10.2.2. 802.11g SISO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	15.98	16.18	0.5
2	2 417	**15.72**	16.09	
6	2 437	16.22	16.16	
10	2 457	16.31	16.23	
11	2 462	16.31	16.22	
12	2 467	16.02	**15.75**	
13	2 472	16.10	16.18	
Worst		**15.72**		

Channel	Frequency [MHz]	99% Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	16.552	16.521	N/A
2	2 417	16.570	16.515	
6	2 437	**17.107**	17.088	
10	2 457	17.075	**17.187**	
11	2 462	17.033	17.062	
12	2 467	16.527	16.537	
13	2 472	16.464	16.563	
Worst		**17.187**		

10.2.3. 802.11n HT20 MIMO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	17.21	17.34	0.5
2	2 417	**17.01**	**17.12**	
6	2 437	17.52	17.50	
9	2 452	17.39	17.46	
10	2 457	17.43	17.49	
11	2 462	17.50	17.53	
12	2 467	17.03	17.33	
13	2 472	17.22	17.22	
Worst		**17.01**		

Channel	Frequency [MHz]	99% Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	17.600	17.568	N/A
2	2 417	17.613	17.609	
6	2 437	18.154	**18.277**	
9	2 452	**18.212**	18.231	
10	2 457	18.197	18.185	
11	2 462	18.191	18.211	
12	2 467	17.584	17.610	
13	2 472	17.619	17.578	
Worst		**18.277**		

10.2.4. 802.11ax HE20(26T:6dB, 242T:99%) MIMO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	2.177	2.173	0.5
6	2 437	2.259	**2.082**	
11	2 462	2.174	2.260	
12	2 467	2.176	2.168	
13	2 472	**2.093**	2.137	
Worst		**2.082**		

Channel	Frequency [MHz]	99% Bandwidth [MHz]		Minimum Limit [MHz]
		ANT1	ANT2	
1	2 412	18.761	18.780	N/A
2	2 417	18.791	18.802	
6	2 437	18.946	18.947	
9	2 452	**18.984**	**18.961**	
10	2 457	18.980	18.946	
11	2 462	18.962	18.948	
12	2 467	18.787	18.780	
13	2 472	18.794	18.779	
Worst		**18.984**		

10.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3), RSS-247 5.4(d)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband RF frame average power sensor.
The cable assembly insertion loss and duty cycle correction factor was entered as an offset in the power sensor to allow for direct reading of power.
Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains.
The directional gain is:

Bands [MHz]	ANT1 [dBi]	ANT2 [dBi]	Correlated Directional Gain [dBi]
2 412 - 2 472	0.13	-0.20	2.98

Note. Since the correlated directional gain does not exceed 6dBi, it is not mentioned further below.

10.3.1. TEST RESULTS

- 802.11b,g,n,ax(Full RU 242T) mode

Mode	Channel	Frequency [MHz]	Average Power [dBm]			Power Limit [dBm]
			ANT1	ANT2	Total Corr'd Power [dBm]	
802.11b	1	2 412	15.81	18.45		30.00
	6	2 437	12.04	17.01		
	11	2 462	12.53	18.16		
	12	2 467	12.04	17.01		
	13	2 472	12.00	14.19		
Worst Case			**15.81**	**18.45**		
802.11g	1	2 412	15.08	15.45		
	2	2 417	16.58	17.28		
	6	2 437	16.17	17.12		
	10	2 457	17.21	18.27		
	11	2 462	15.77	16.42		
	12	2 467	13.80	13.95		
	13	2 472	10.02	9.08		
Worst Case			**17.21**	**18.27**		
802.11n HT20	1	2 412	14.51	15.33	17.95	
	2	2 417	16.48	17.26	19.90	
	6	2 437	16.25	16.99	19.65	
	9	2 452	17.29	17.99	20.66	
	10	2 457	16.43	17.39	19.95	
	11	2 462	14.88	16.00	18.49	
	12	2 467	11.03	12.06	14.59	
	13	2 472	6.14	7.14	9.68	
Worst Case					**20.66**	
802.11ax HE20(Full RU 242T)	1	2 412	14.62	15.24	17.95	
	2	2 417	16.47	17.06	19.79	
	6	2 437	16.55	17.11	19.85	
	9	2 452	17.32	17.93	20.65	
	10	2 457	16.50	17.35	19.96	
	11	2 462	14.80	15.75	18.31	
	12	2 467	11.46	12.43	14.98	
	13	2 472	11.35	12.30	14.86	
Worst Case					**20.65**	

- Calculation of Output Power result

Average Power = Meas. Power (dBm) + Duty Cycle CF (dB)

Total corr'd power = ANT1's Avearage Power (dBm) + ANT2's Average Power (dBm)= $10*LOG(10^{ANT1/10} + 10^{ANT2/10})$

- 802.11ax (RU) mode

Channel	Frequency [MHz]	Tones	RU Offset	MIMO Average Power [dBm]			Power Limit [dBm]
				ANT1	ANT2	Total Corr'd Power [dBm]	
1	2 412	26T	0	11.96	12.57	15.29	30.00
			4	12.17	12.80	15.51	
			8	12.10	12.65	15.39	
6	2 437	26T	0	12.02	12.58	15.32	
			4	12.14	12.67	15.42	
			8	12.06	12.75	15.43	
11	2 462	26T	0	11.70	12.46	15.11	
			4	12.30	12.78	15.56	
			8	11.73	12.70	15.25	
12	2 467	26T	0	11.65	12.56	15.14	
			4	11.95	12.89	15.46	
			8	11.99	12.92	15.49	
13	2 472	26T	0	1.06	2.39	4.79	
			4	1.34	2.76	5.12	
			8	1.30	2.81	5.13	
Worst Case						**15.56**	

- Calculation of Output Power result

Average Power = Meas. Power (dBm) + Duty Cycle CF (dB)

Total corr'd power = ANT1's Avearage Power (dBm) + ANT2's Average Power (dBm)= $10*LOG(10^{ANT1/10} + 10^{ANT2/10})$

10.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e), RSS-247 5.2(b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

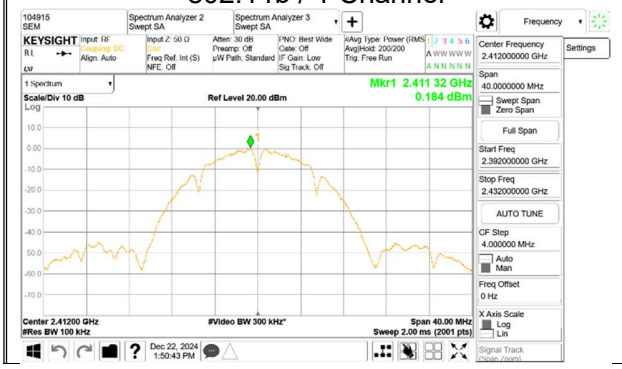
TEST PROCEDURE

Power Spectral Density was performed utilizing the section8.4 under KDB558074 D01 15.247 Meas Guidance.

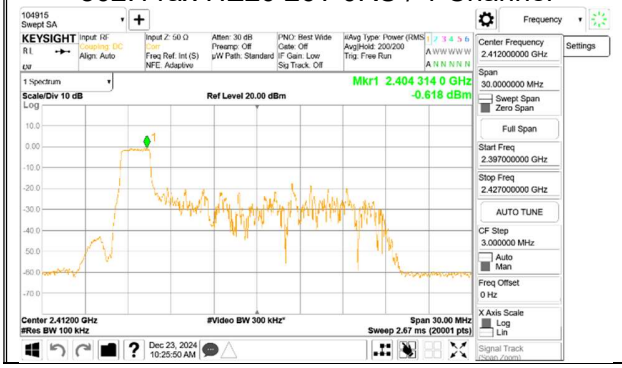
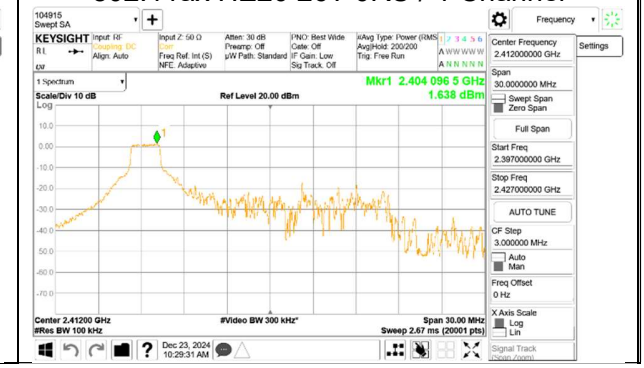
RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS(SISO MODE)

ANT1	ANT2
802.11b / 1 Channel	802.11b / 1 Channel
	

WORST CASE TEST PLOTS(MIMO MODE)

ANT1	ANT2
802.11ax HE20 26T 0RU / 1 Channel	802.11ax HE20 26T 0RU / 1 Channel
	

10.4.1. 802.11b/g/n HT20/ax HE20 MODE TEST RESULTS

- SISO Mode

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/100kHz]		DCCF	Corr'd PSD [dBm/100kHz]		PSD Limit [dBm/3kHz]
			ANT1	ANT2		ANT1	ANT2	
802.11b	**1**	**2 412**	**0.18**	**2.97**	**0.22**	**0.40**	**3.19**	8.00 Note
	6	**2 437**	-4.06	0.49	0.22	-3.84	0.71	
	11	**2 462**	-3.82	2.22	0.22	-3.60	2.44	
	12	**2 467**	-3.93	1.13	0.22	-3.71	1.35	
	13	**2 472**	-3.84	-1.74	0.22	-3.62	-1.52	
802.11g	**1**	**2 412**	-3.68	-3.84	0.69	-3.46	-3.62	
	2	**2 417**	-2.58	-1.81	0.69	-2.36	-1.59	
	6	**2 437**	-2.81	-1.92	0.69	-2.59	-1.70	
	10	**2 457**	-1.86	-0.75	0.69	-1.64	-0.53	
	11	**2 462**	-2.90	-2.74	0.69	-2.68	-2.52	
	12	**2 467**	-4.37	-4.98	0.69	-4.15	-4.76	
	13	**2 472**	-8.79	-9.86	0.69	-8.57	-9.64	

- MIMO Mode

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/100kHz]		DCCF	Total Corr'd PSD [dBm/100kHz]	PSD Limit [dBm/3kHz]
			ANT1	ANT2			
802.11n HT20	**1**	**2 412**	-4.16	-3.75	0.43	-0.51	8.00 Note
	2	**2 417**	-2.32	-2.04	0.43	1.27	
	6	**2 437**	-3.00	-2.20	0.43	0.86	
	9	**2 452**	-1.62	-1.05	0.43	2.12	
	10	**2 457**	-2.49	-1.67	0.43	1.38	
	11	**2 462**	-4.20	-3.24	0.43	-0.25	
	12	**2 467**	-8.02	-7.19	0.43	-4.14	
	13	**2 472**	-12.99	-11.81	0.43	-8.92	
802.11ax HE20 (Full RU 242T)	**1**	**2 412**	-6.52	-5.80	1.35	-1.78	
	2	**2 417**	-4.26	-3.81	1.35	0.33	
	6	**2 437**	-4.65	-3.82	1.35	0.15	
	9	**2 452**	-3.18	-2.70	1.35	1.43	
	10	**2 457**	-4.86	-3.62	1.35	0.17	
	11	**2 462**	-5.92	-5.41	1.35	-1.30	
	12	**2 467**	-9.21	-8.51	1.35	-4.48	
	13	**2 472**	-10.41	-9.25	1.35	-5.43	

Calculation of Output PSD result
- 1TX : Corr'd PSD = Meas PSD + Duty Cycle CF
- 2TX : Total Corr'd PSD =ANT1 Meas PSD (dBm) + ANT2 Meas PSD (dBm) + Duty Cycle CF (dB)
  = $10*LOG(10^{ANT1/10}+10^{ANT2/10})$ + DCCF (dB)

Note. RBW 100kHz measurement data is lower than 3kHz limit.

- MIMO Mode(802.11ax HE20 RU mode)

Channel	Frequency [MHz]	Tones	RU Offset	Meas PSD [dBm/100kHz]		DCCF	Total Corr'd PSD [dBm/100kHz]	PSD Limit [dBm/3kHz]
				ANT1	ANT2			
1	2 412	26T	**0**	**-0.62**	**1.64**	**0.98**	**4.65**	8.00 Note
			4	-0.35	0.99	0.98	4.36	
			8	-0.52	1.32	0.98	4.49	
6	2 437	26T	**0**	-0.81	0.52	0.98	3.89	
			4	-0.55	0.60	0.98	4.05	
			8	-0.87	1.52	0.98	4.48	
11	2 462	26T	**0**	-0.86	0.25	0.98	3.72	
			4	-0.85	0.36	0.98	3.79	
			8	-0.91	-0.23	0.98	3.43	

Calculation of Output PSD result
- 1TX : Corr'd PSD = Meas PSD + Duty Cycle CF
- 2TX : Total Corr'd PSD =ANT1 Meas PSD (dBm) + ANT2 Meas PSD (dBm) + Duty Cycle CF (dB)
  $= 10*LOG(10^{ANT1/10}+10^{ANT2/10}) + DCCF\ (dB)$

Note. RBW 100kHz measurement data is lower than 3kHz limit.

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10.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

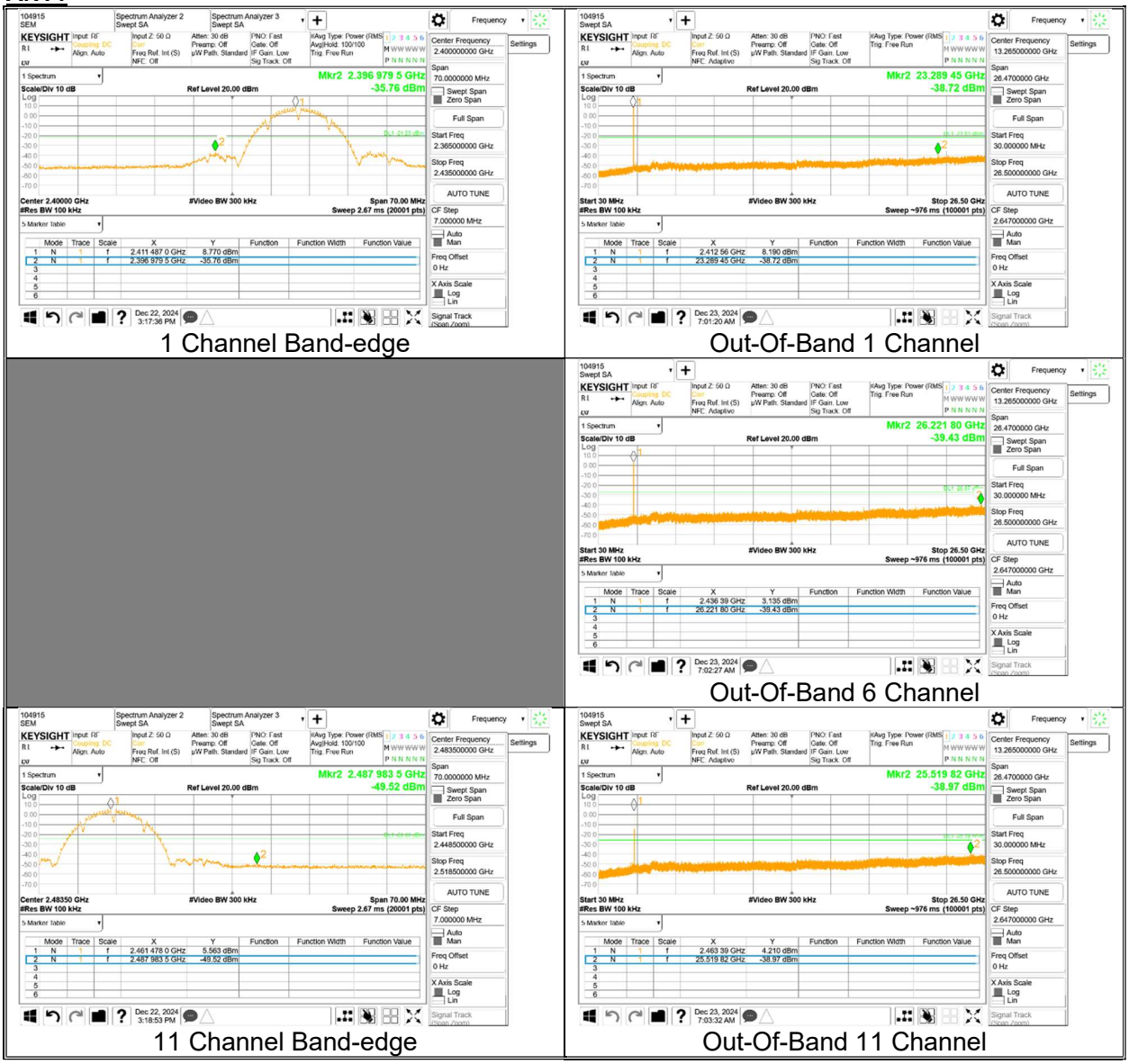
FCC §15.247 (d), RSS-247 5.5

Output power was measured based on the use of average measurement, therefore the required attenuation is 30 dB.

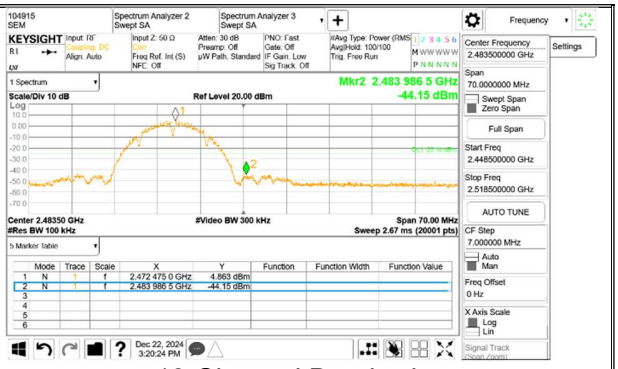
RESULTS

10.5.1. 802.11b MODE

ANT1

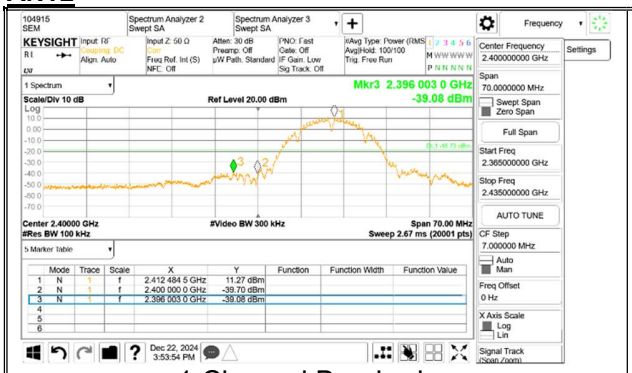


12 Channel Band-edge



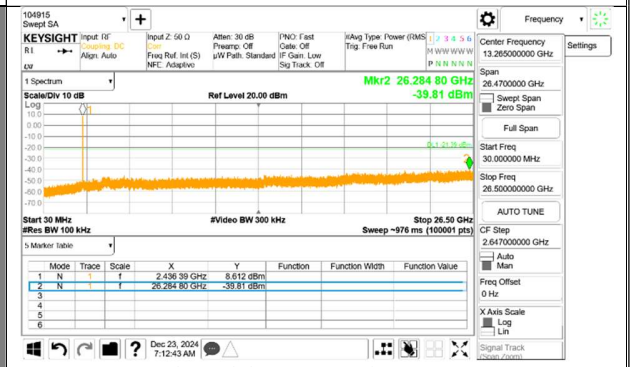
13 Channel Band-edge

ANT2



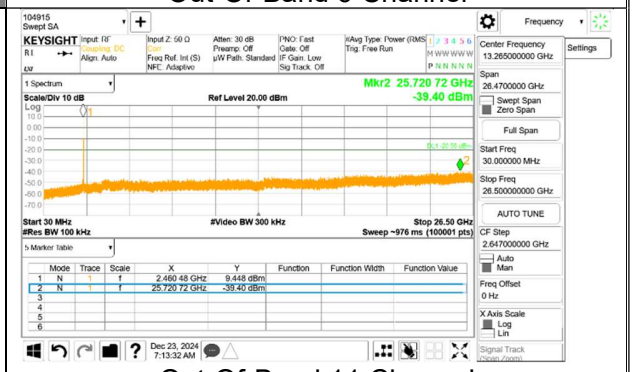
1 Channel Band-edge

Out-Of-Band 1 Channel

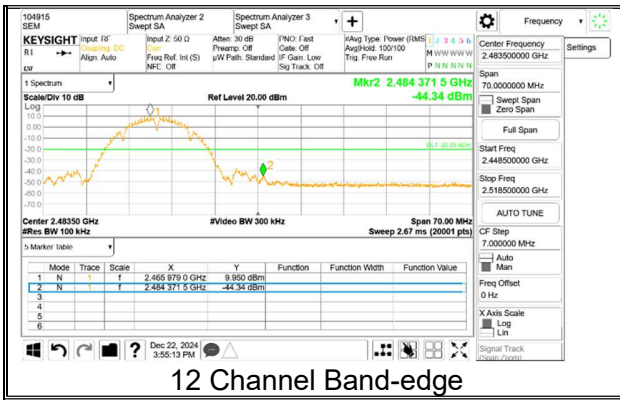


Out-Of-Band 6 Channel

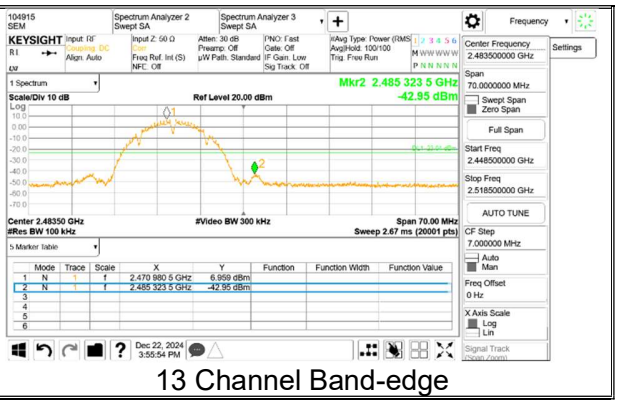
11 Channel Band-edge



Out-Of-Band 11 Channel



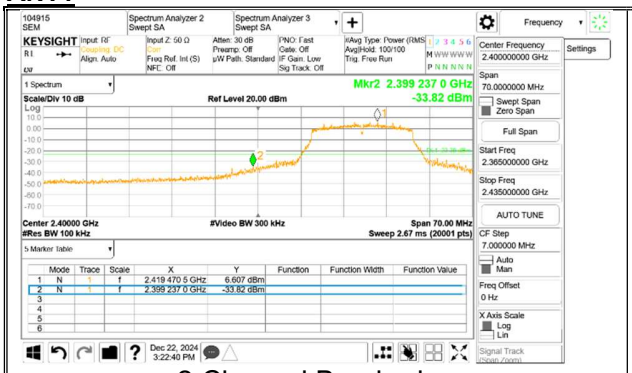
12 Channel Band-edge



13 Channel Band-edge

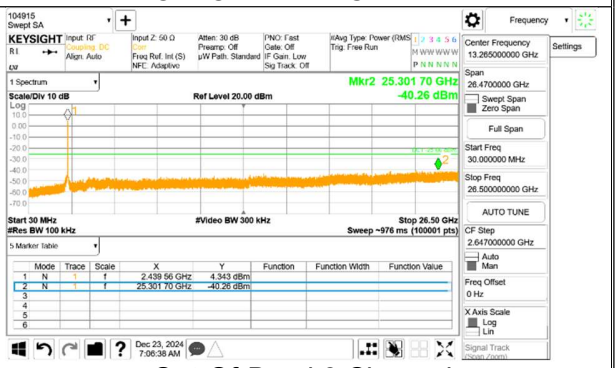
10.5.2. 802.11g MODE

ANT1

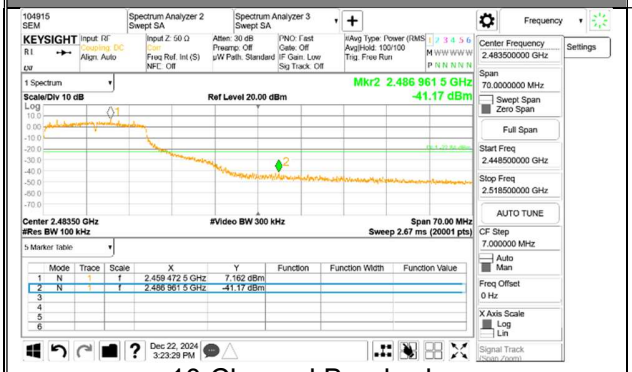


2 Channel Band-edge

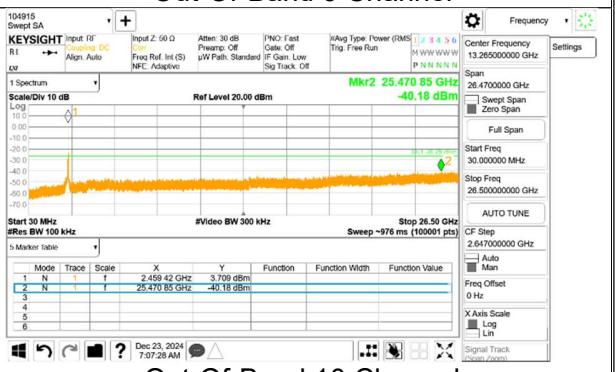
Out-Of-Band 2 Channel



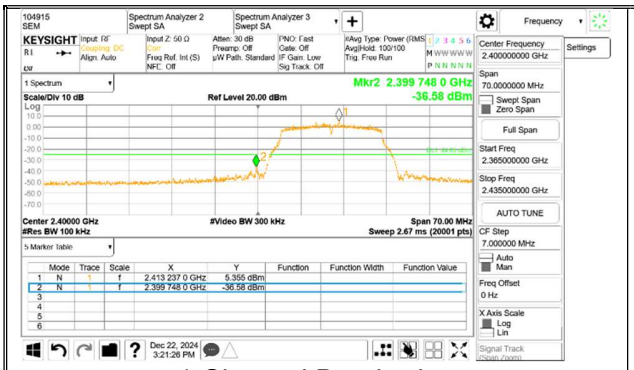
Out-Of-Band 6 Channel

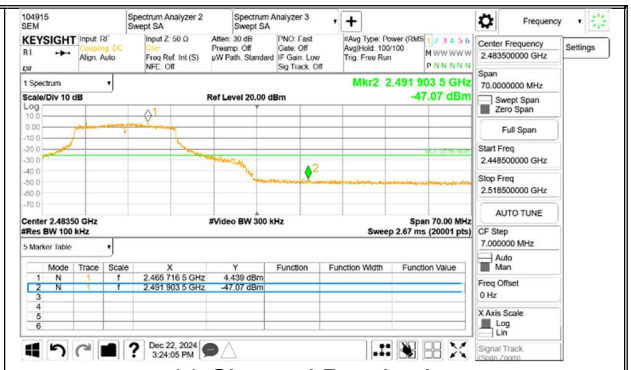


10 Channel Band-edge

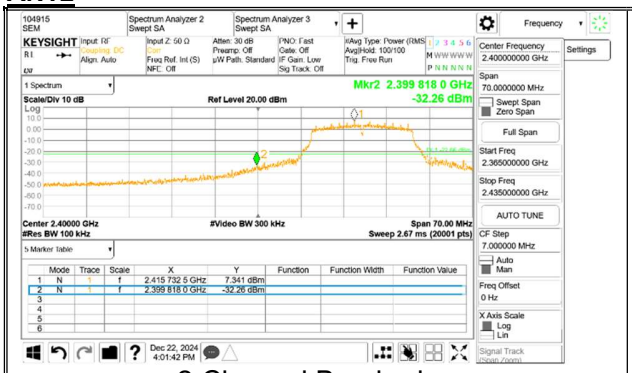


Out-Of-Band 10 Channel



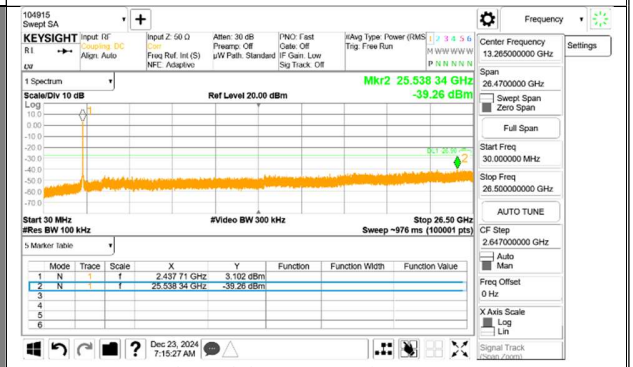


ANT2

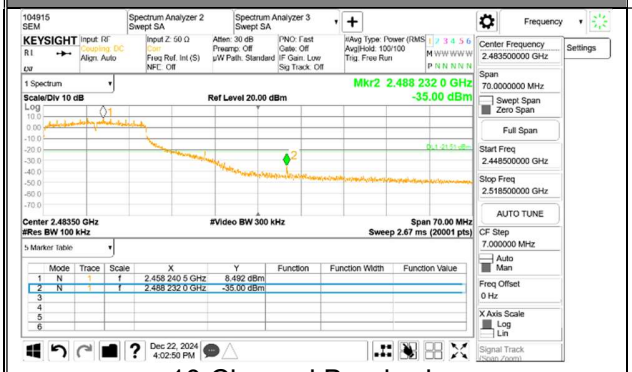


2 Channel Band-edge

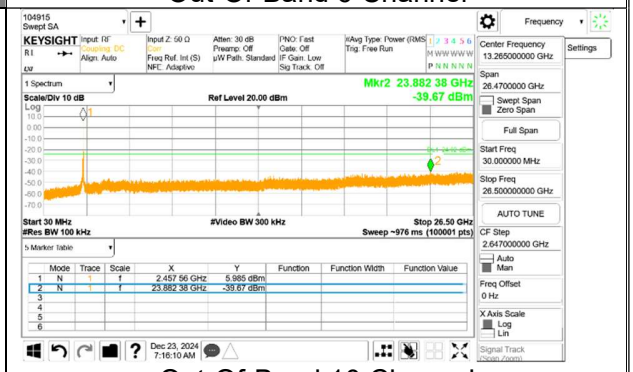
Out-Of-Band 2 Channel



Out-Of-Band 6 Channel



10 Channel Band-edge

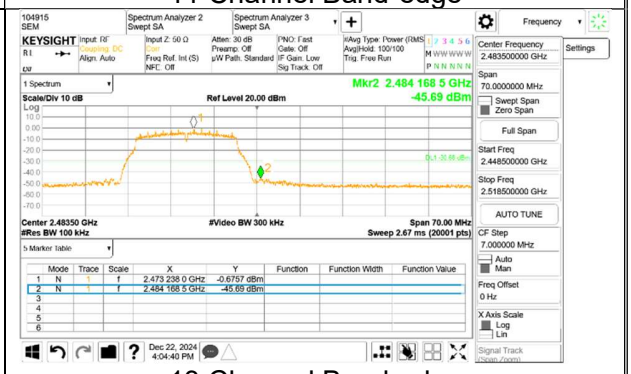


Out-Of-Band 10 Channel

1 Channel Band-edge

11 Channel Band-edge

12 Channel Band-edge



13 Channel Band-edge