Amber Helm Development L.C.
92723 Michigan Hwy-152
Sister Lakes, Michigan 49047 USA
Tel: 888-847-8027

AWLTINT-WR2432TXB
Issued: **December 20, 2024**

DTS Test Report

regarding

USA: CFR Title 47, Part 15.247 (Emissions)
Canada: ISED RSS-247v3 (Emissions)

for

47723023

Category: DTS Transceiver

Judgments:
Aligns with FCC Part 15.247 and ISED RSS-247v3
Testing Completed: December 19, 2024

TESTING
NVLAP LAB CODE 200129-0

Prepared for:

Allegion, PLC

11819 North Pennsylvania Street, Carmel Indiana 46032 USA
Phone: +1 (317) 810-3362, Fax: +1 (317) 810-3193
Contact: Frank Nardelli, Frank.Nardelli@allegion.com

Data Rec./Rev. by: John Nantz — John Nantz

Rpt. Auth. by: Dr. Joseph Brunett, EMC-002790-NE

Rpt. Prep./Rev. by: John Nantz — John Nantz

Date of Issue: December 20, 2024

Revision History

Rev. No.	Date	Details	Revised By
r0	December 20, 2024	Initial Draft.	J. Nantz
r1	January 21, 2025	Minor typo corr.	J. Brunett
r2	February 14, 2025	Minor typo corr.	J. Nantz
r3	March 31, 2025	Operating Freq. corr.	J. Nantz

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1 Test Report Scope and Limitations

1.1 Laboratory Authorization

Test Facility description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: US5348 and US5356) and with ISED Canada, Ottawa, ON (File Ref. No: 3161A and 24249). Amber Helm Development L.C. holds accreditation under NVLAP Lab Code 200129-0.

1.2 Report Retention

For equipment verified to comply with the regulations herein, the manufacturer is obliged to retain this report with the product records for the life of the product, and no less than ten years. A copy of this Report will remain on file with this laboratory until January 2035.

1.3 Subcontracted Testing

This report does not contain data produced under subcontract.

1.4 Test Data

This test report contains data included within the laboratory's scope of accreditation. Any data in this report that is not covered under the laboratory's scope is clearly identified.

1.5 Limitation of Results

The test results contained in this report relate only to the item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require reevaluation.

1.6 Copyright

1.7 Endorsements

This report shall not be used to claim product endorsement by any accrediting, regulatory, or governmental agency.

1.8 Test Location

The EUT was fully tested by **Amber Helm Development L.C.**, headquartered at 92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA. Table 1.8.0 lists all sites employed herein. Specific test sites utilized are also listed in the test results sections of this report where needed.

Table 1.8.0 Test Site List.

Description	Location	Quality Num.
OATS (3 meter)	3615 E Grand River Rd., Williamston, Michigan 48895	OATSD

1.9 Traceability and Equipment Used

Pertinent test equipment used for measurements at this facility is listed in Table 1.9.0 . The quality system employed at Amber Helm Development L.C. has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards. All equipment is evaluated on a cycle no greater than 12 months following laboratory validation procedures and is calibrated following manufacturer recommended intervals.

Table 1.9.0 Equipment List.

Description	Manufacturer/Model	SN	Quality Num.	Cal/Ver By / Date Due
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Keysight / Aug-2025
Log Periodic Antenna	EMCO / 3146	9305-3614	LOGEMCO01	Keysight / Aug-2025
BNC-BNC Coax	WRTL / RG58/U	001	CAB001-BLACK	AHD / Sept-2025
3.5-3.5MM Coax	Coax / Coax	001	CAB018-WHT	AHD / Sept-2025
6dB Attenuator	Pasternack / PE7087-6	1	ATTEN01	AHD / On-Use
Spectrum Analyzer	R & S / FSV30	101660	RSFSV3001	RS / Apr-2025
EMI Receiver	R & S / ESW26	101313	RSESW2601	RS / Dec-2025
Quad Ridge Horn	Singer / A6100	C35200	HQR1TO18S01	Keysight / Aug-2025
K-Band Horn	JEF / NRL Std.	001	HRNK01	AHD / On Use

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The goal of Allegion, PLC is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the Allegion, PLC 47723023 for compliance to:

Country/Region/Manu.	**Rules or Directive**	**Referenced Section(s)**
United States	Code of Federal Regulations	CFR Title 47, Part 15.247
Canada	ISED Canada	ISED RSS-247v3

It has been determined that the equipment under test is subject to the rules and directives above at the date of this testing. In conjunction with these rules and directives, the following specifications and procedures are followed herein to demonstrate compliance (in whole or in part) with these regulations.

ANSI C63.4:2014	"Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
ANSI C63.10:2020	"American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
KDB 558074 D01 v05r02	"GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES "
KDB 662911 D01v02r01	"Emissions Testing of Transmitters with Multiple Outputs in the Same Band"
KDB 662911 D02 v01	"MIMO with Cross-Polarized Antenna"
WR-ITP0102RA	"AHD Internal Document - Radiated Emissions Test Method"
WR-ITP0101LC	"AHD Internal Document - Conducted Emissions Test Method"

3 Configuration and Identification of the Equipment Under Test

3.1 Description and Declarations

The EUT is a key free access control module. The EUT is approximately 14 x 7.5 x 6 cm max. in dimension, and is depicted in Figure 3.1.0 . It is powered by 6 Vdc internal battery power. This product is used as an access reader to enable key free door access. Table 3.1.0 outlines provider declared EUT specifications.

Figure 3.1.0 Photos of EUT.

Table 3.1.0 EUT Declarations.

General Declarations	
Equipment Type:	DTS Transceiver
Country of Origin:	USA
Nominal Supply:	6 Vdc
Oper. Temp Range:	Not Declared
Frequency Range:	2412 – 2462 MHz
Antenna Dimension:	Not Declared
Antenna Type:	Integral PCB Trace
Antenna Gain:	1.5 dBi (meas.)
Number of Channels:	11
Channel Spacing:	5 MHz
Alignment Range:	Not Declared
Type of Modulation:	GFSK, OFDM
United States	
FCC ID Number:	XPB-SENSEPRO2
Classification:	DTS
Canada	
IC Number:	8053B-SENSEPRO2
Classification:	Other

3.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 3.1.1 .

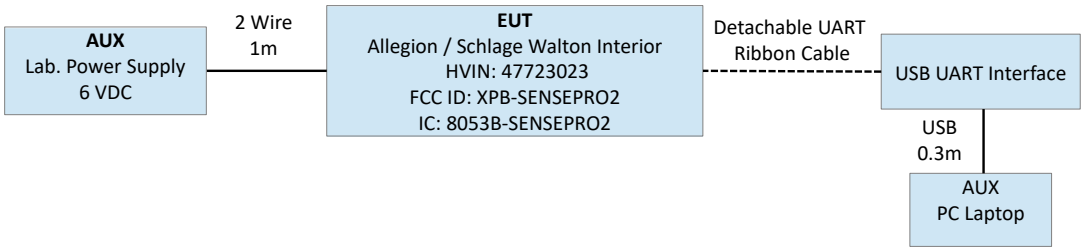


Figure 3.1.1 EUT Test Configuration Diagram.

3.1.2 Modes of Operation

The EUT includes a single onboard DTS radio capable of Wifi 802.11b, 802.11g, 802.11n(20) and 802.11ax modulations in the 2.4 Ghz band only, all of which are tested herein. The EUT was placed into maximum possible transmission on-time and measured in line with DTS guidelines. In addition to its Wifi radio functionality, the EUT is also co-located with an onboard BLE/THREAD radio (addressed in AHD Report No. AWLTINT-WR2432TXA). The integral WLAN + BLE/THREAD radios are capable of simultaneous transmission of which the intermodulation products are addressed in AHD Report No. AWLTINT-WR2432TXA.

3.1.3 Variants

There is only a single version of the EUT.

3.1.4 Test Samples

Two samples of the EUT were provided for WLAN testing, one modified for conducted measurements via an SMA coax connection (SN: DV3) and one normal sample without modification (SN: INT1). Both samples were capable of CW and modulated WLAN radio transmissions via a PC serial UART interface that could be attached and then detached from the EUT during testing.

3.1.5 Functional Exerciser

Normal operating EUT functionality was verified by observation of transmitted signal.

3.1.6 Modifications Made

In order to meet the regulatory limits, the following WLAN power level settings were adopted in pretesting: Power Level Setting 802.11b = 16 (CH1-10), 11 (CH11); 802.11g = 18 (CH1-9), 17 (CH10), 12 (CH11); 802.11n(20) = 18

(CH1-10), 12 (CH11); and 802.11ax = 18 (CH1-9), 16 (CH10), 12 (CH11).

3.1.7 Production Intent

The EUT appears to be a production ready sample.

3.1.8 Declared Exemptions and Additional Product Notes

In addition to its WLAN radio functionality, the EUT is also co-located with an onboard BLE/THREAD radio (addressed in AHD Report No. AWLTINT-WR2432TXA). The integral WLAN + BLE/THREAD radios are capable of simultaneous transmission. Furthermore, the EUT may be co-located with the manufacturer's radio device placed on the exterior (keypad) side of the door (FCC ID: XPB-SENSEPRO1, IC: 8053B-SENSEPRO1), and is evaluated for multi-transmitter co-location with Spurious digital emissions in AHD Report No. AWLTKEY-WR2431TXD.

4 Emissions

4.1 General Test Procedures

4.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first pre-scanned in our screen room. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.8 are employed. After pre-scan, emission measurements are made on the test site of record. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in relevant test standards are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 4.1.1 . All intentionally radiating elements that are not fixed-mounted in use are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded. If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied.

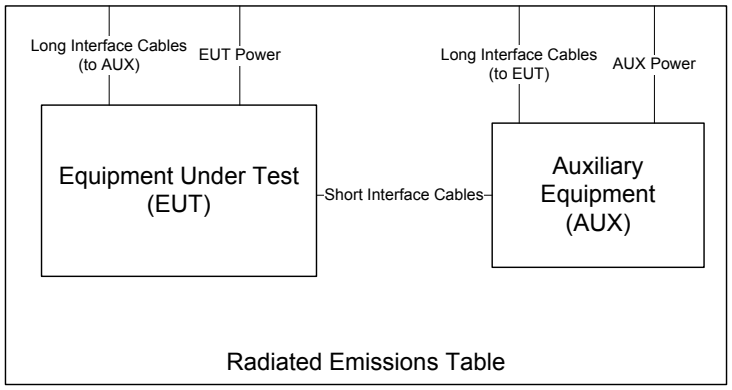


Figure 4.1.1 Radiated Emissions Diagram of the EUT.

For devices with intentional emissions below 30 MHz, a shielded loop antenna and/or E-field and H-Field broadband probes are used depending on the regulation. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, 10cm diameter single-axis broadband probes meeting the requirements of ISED RSS-102.NS.MEAS are employed. Measurements are repeated and summed over three axes, and the entire frequency range is measured with and without the EUT transmitting.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through 360^o in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Emissions above 1 GHz are characterized using standard gain or broadband ridge-horn antennas on our OATS with a 4×5 m rectangle of ECCOSORB absorber covering the OATS ground screen and a 1.5m table height. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced. Photographs of the test setup employed are depicted in Figure 4.1.1 .

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to dBμV/m at the regulatory distance, using

$$E_{dist} = 107 + P_R + K_A - K_G + K_E - C_F$$

where P_R is the power recorded on spectrum analyzer, in dBm, K_A is the test antenna factor in dB/m, K_G is the combined pre-amplifier gain and cable loss in dB, K_E is duty correction factor (when applicable) in dB, and C_F is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is computed, it is computed as

$$EIRP(dBm) = E_{3m}(dB\mu V/m) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.

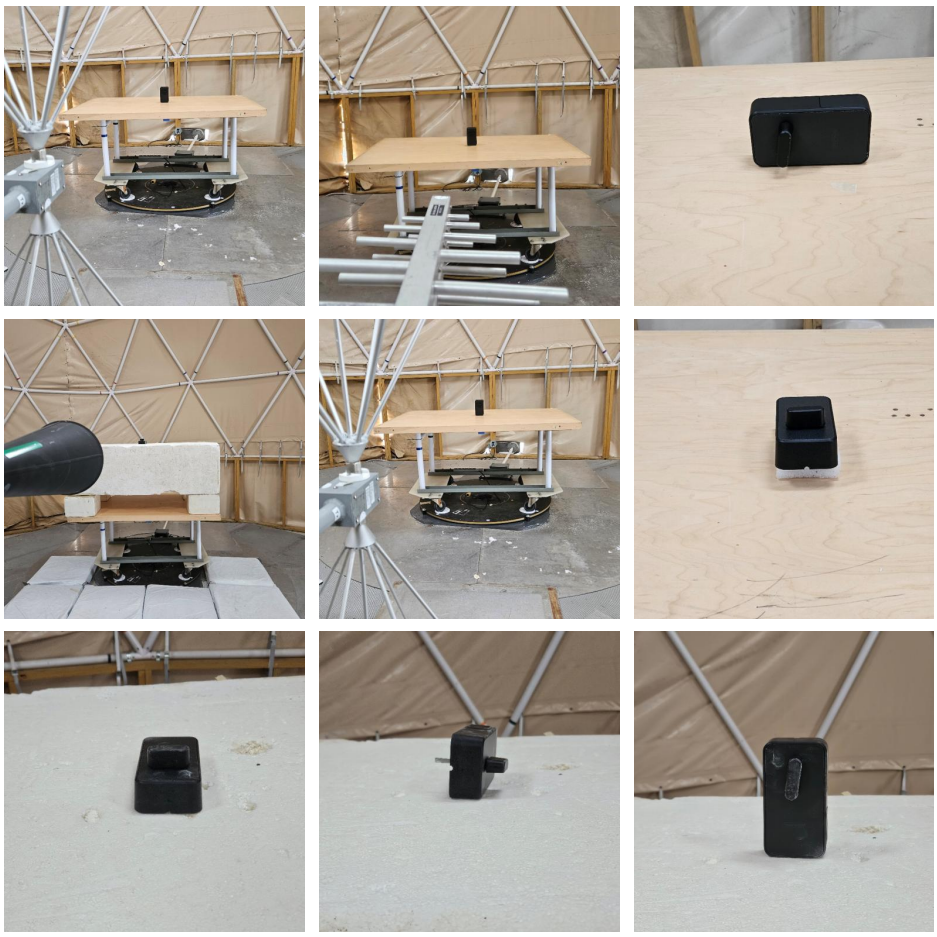


Figure 4.1.1 Radiated Emissions Test Setup Photograph(s).

4.1.2 Power Supply Variation

Tests at extreme supply voltages are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case the EUT is designed for operation from a battery power source, the extreme test voltages are evaluated over the range specified in the test standard; no less than ±10% of the nominal battery voltage declared by the manufacturer. For all battery operated equipment, worst case intentional and spurious emissions are re-checked employing a new (fully charged) battery.

4.2 Intentional Emissions

4.2.1 Duty and Transmission Cycle, Pulsed Operation

The details and results of testing the EUT for pulsed operation are summarized in Table 4.2.1 . Plots showing the measurements made to obtain these values are provided in Figure 4.2.1 .

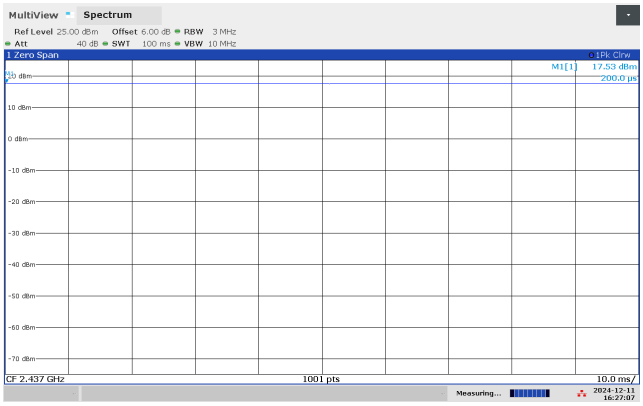
Table 4.2.1 Pulsed Emission Characteristics (Duty Cycle).

Test Date: 7-Nov-24
Test Engineer: J. Nantz
EUT Allegion 47723023
Meas. Distance: Conducted

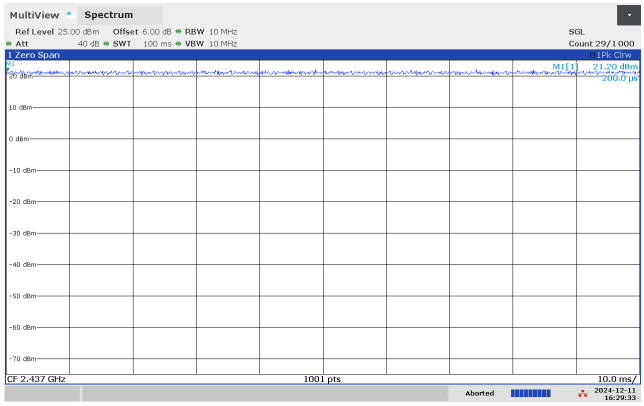
	Test Mode Pulsed Operation / Average Measurement Duty Cycle							
#	Mode	Data Rate Mbps	Voltage V	Oper. Freq MHz	Pulse Length	Pulse Period	Duty Cycle %	Power Correction dB
R1	802.11b	1.0	6.0	2437.0	-	-	100	0.00
R2	802.11g	6.0	6.0	2437.0	-	-	100	0.00
R3	802.11n(20)	MCS0	6.0	2437.0	-	-	100	0.00
R4	802.11ax	MCS0	6.0	2437.0	-	-	100	0.00
#	C1	C3	C4	C5	C6	C7	C8	C9

* Duty Cycle is measured in line with DTS guidance 558074 D01 v5 r02 section 6(b) for averaging only over full-power transmission pulses.

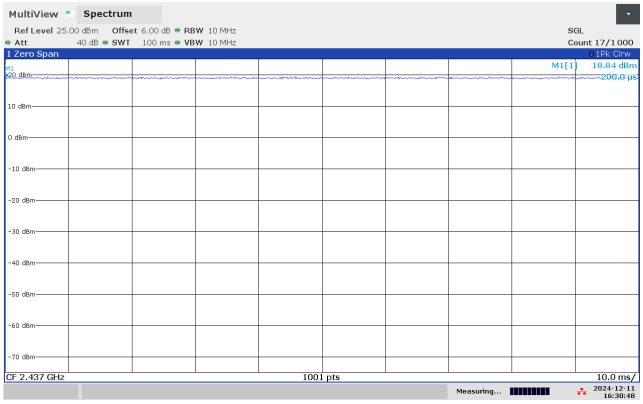
802.11b



802.11g



802.11n(20)



802.11ax

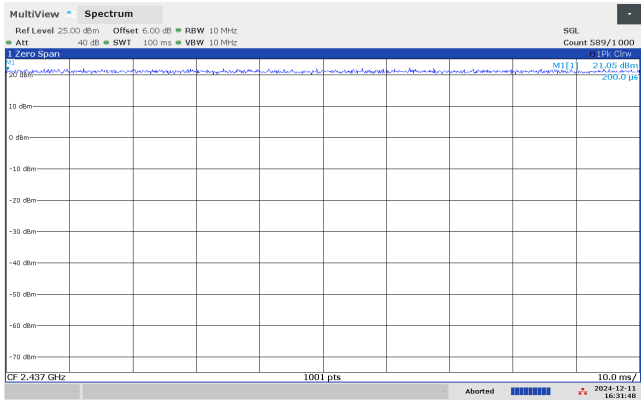


Figure 4.2.1 Example Pulsed Emission Characteristics (Duty Cycle).

4.2.2 Fundamental Emission Bandwidth

Emission bandwidth (EBW) of the EUT is measured with the device placed in the test mode(s) with the shortest available packet length and minimum packet spacing. Radiated emissions are recorded following the test procedures listed in Section 2.1. The 6 dB bandwidth is measured for the lowest, middle, and highest channels available. The 99% emission bandwidth per IC test procedures is also reported. The results of this testing are summarized in Table 4.2.2 . Plots showing measurements employed obtain the emission bandwidths reported are provided in Figure 4.2.2 .

Table 4.2.2 Intentional Emission Bandwidth.

Test Date: 7-Nov-24
Test Engineer: J. Nantz
EUT Allegion 47723023
Meas. Distance: Conducted

	Occupied Bandwidth							
R0	Transmit Mode	Data Rate (Mbps)	Voltage (V)	Oper. Freq (MHz)	DTS 6 dB BW (MHz)	DTS 6 dB BW Limit (MHz)	99% OBW (MHz)	Pass/Fail
R1	802.11b	1.0	6.0	2412.0	9.02	0.50	13.29	Pass
R2				2437.0	9.01	0.50	13.25	Pass
R3				2462.0	8.55	0.50	13.20	Pass
R4	802.11g	6.0	6.0	2412.0	16.56	0.50	16.54	Pass
R5				2437.0	16.56	0.50	16.91	Pass
R6				2462.0	16.56	0.50	16.65	Pass
R7	802.11n(20)	MCS0	6.0	2412.0	17.76	0.50	17.82	Pass
R8				2437.0	17.78	0.50	17.80	Pass
R9				2462.0	17.76	0.50	17.91	Pass
R10	802.11ax	MCS0	6.0	2412.0	19.01	0.50	18.84	Pass
R11				2437.0	19.00	0.50	18.90	Pass
R12				2462.0	18.95	0.50	18.89	Pass
#	C1	C2	C3	C4	C5	C6	C7	C8

ROW COLUMN NOTE

802.11b

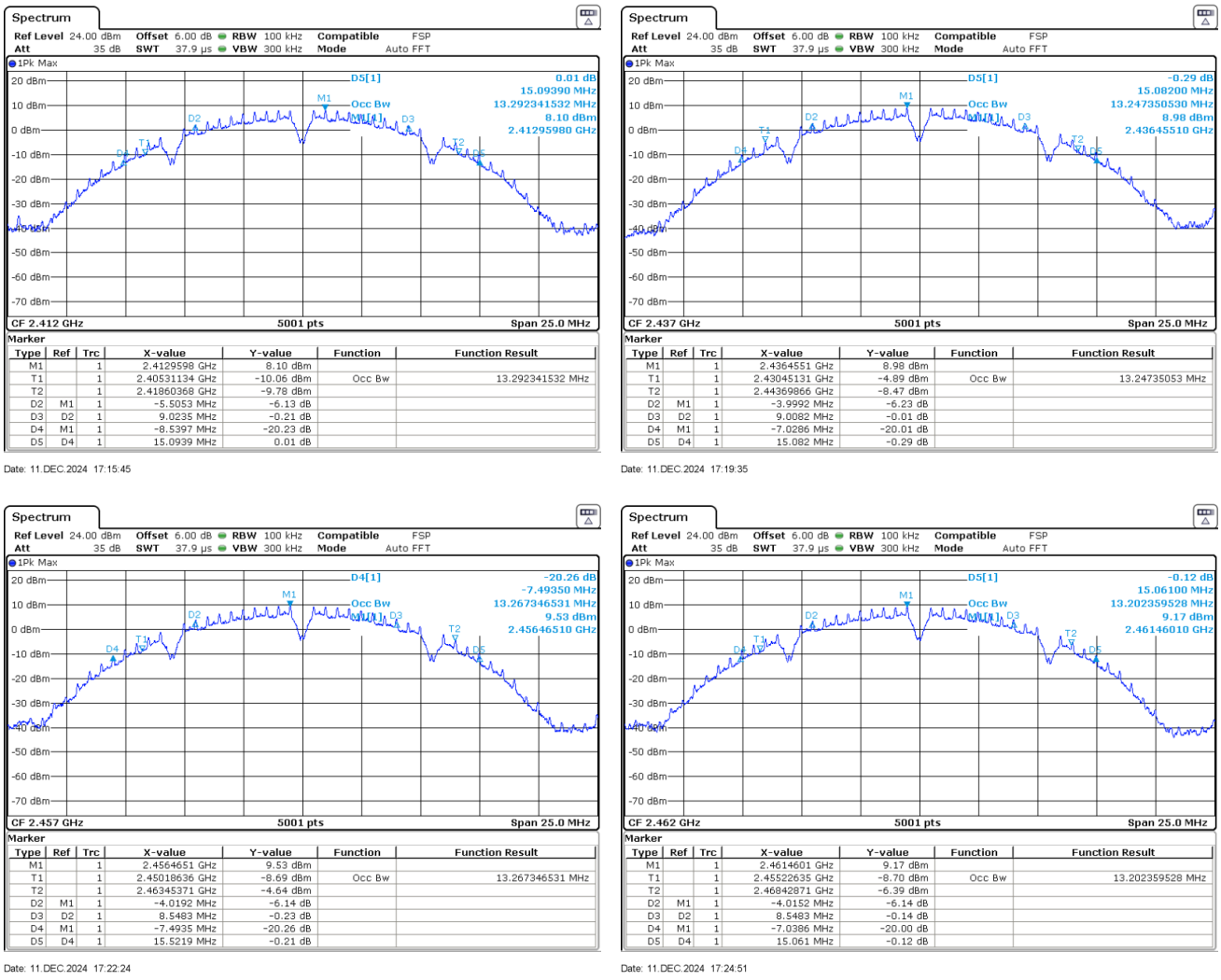


Figure 4.2.2 (i) Example Intentional Emission Bandwidth Plots.

802.11g

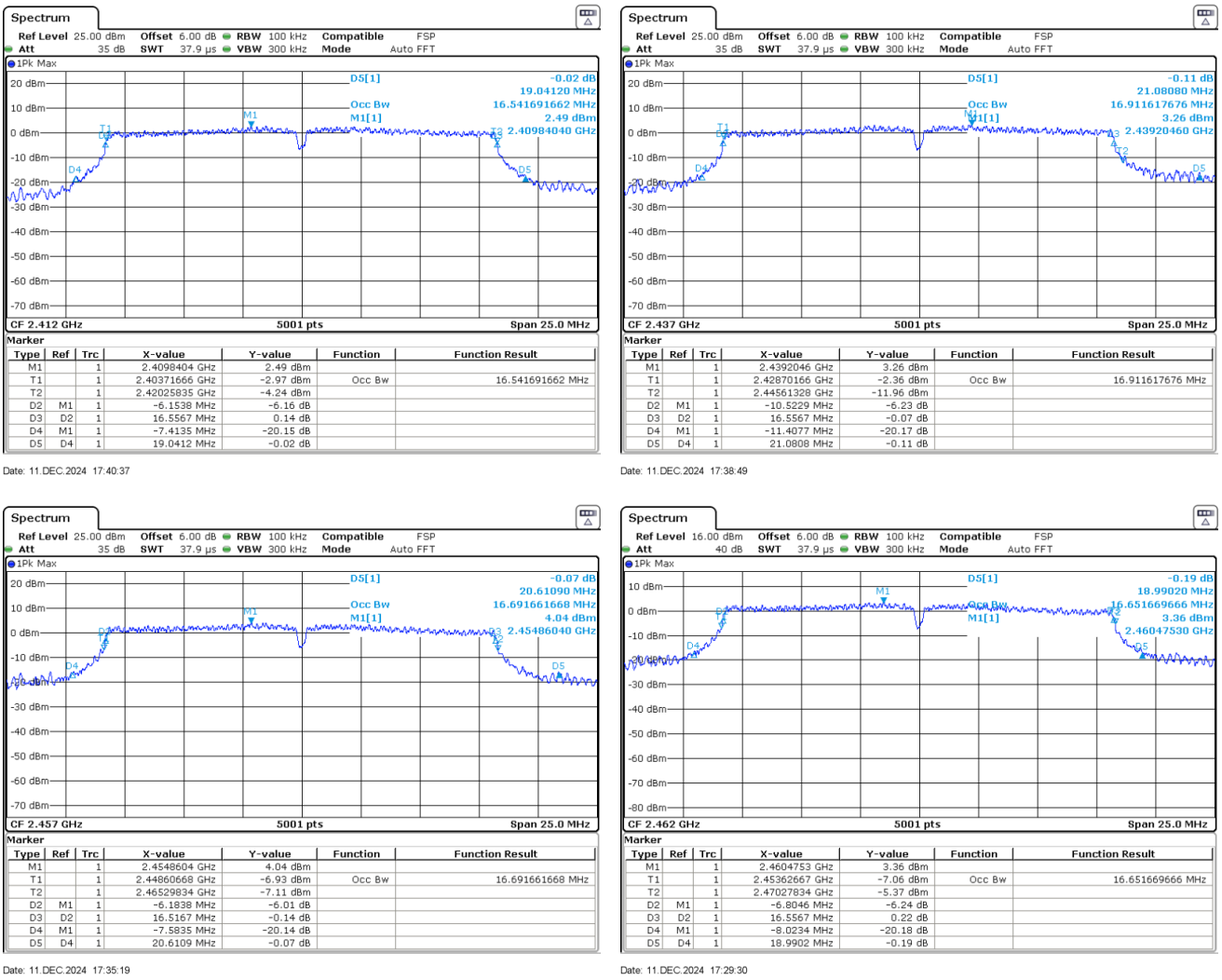


Figure 4.2.2 (ii) Example Intentional Emission Bandwidth Plots.

802.11n(20)

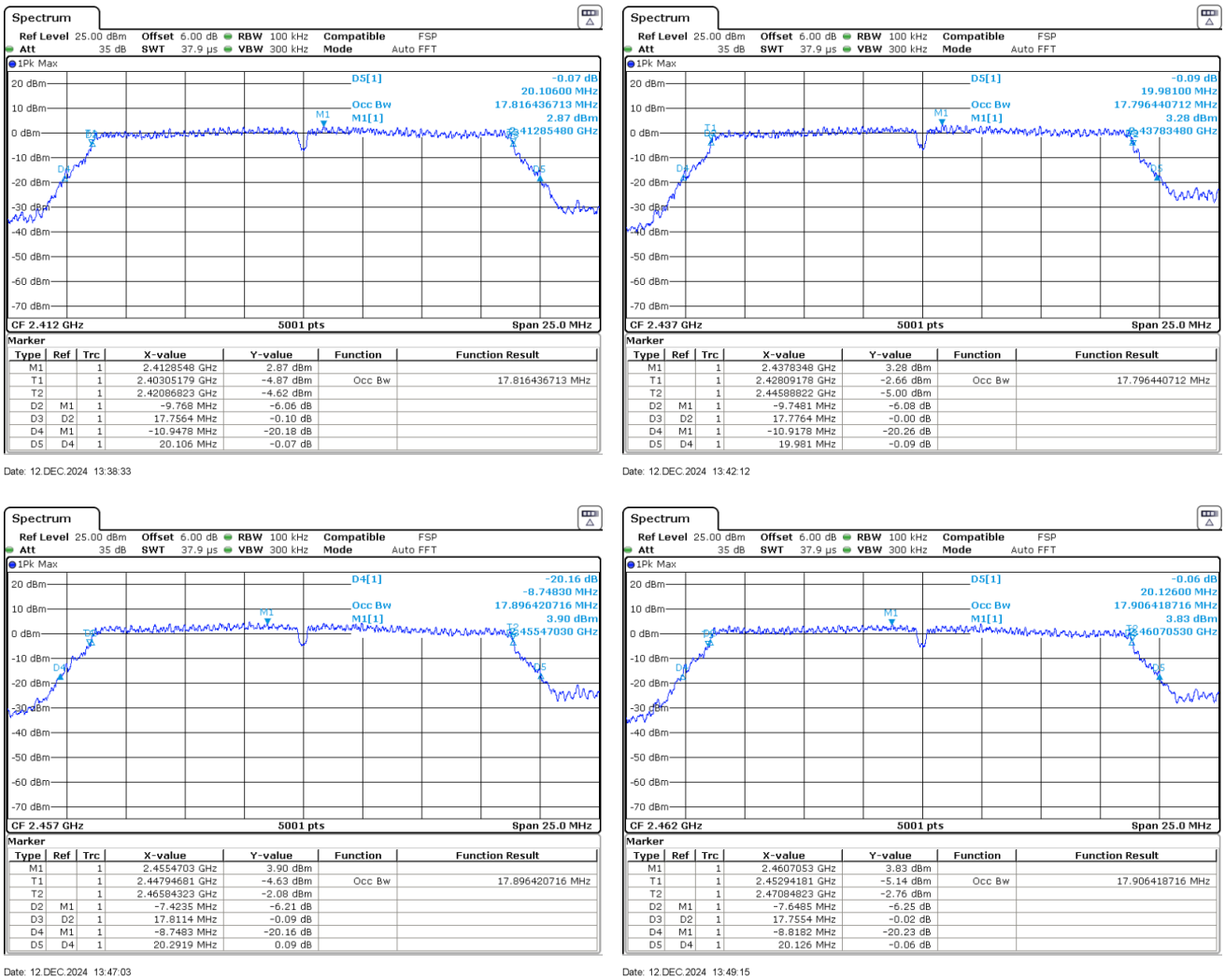


Figure 4.2.2 (iii) Example Intentional Emission Bandwidth Plots.

802.11ax

Figure 4.2.2 (iv) Example Intentional Emission Bandwidth Plots.

4.2.3 Effective Isotropic Radiated Power

The EUT's radiated power is computed from antenna port conducted power measurements and the gain of the EUT antenna(s). Where the EUT is not sold with an antenna connector, a modified product has been provided including such. The results of this testing are summarized in Table 4.2.3 .

Table 4.2.3 Tx. Power Results.

Test Date:	7-Nov-24
Test Engineer:	J. Nantz
EUT:	Allegion 47723023
Meas. Distance:	Conducted

	Fundamental Power												
R0	Mode	Channel	Freq. MHz	Pout (Pk) dBm	Pout (Avg) dBm	Duty dB	Pout (Avg) + Duty dBm	Ant Gain dBi	EIRP (Avg) dBm	EIRP (Avg) Limit dBm	Pass dB	Comments
R1	802.11b	1	2412.0		13.48	0.0	13.5	2.0	15.5	36.0	20.5	
R2		6	2437.0		14.39	0.0	14.4	2.0	16.4	36.0	19.6	
R3		10	2457.0		14.74	0.0	14.7	2.0	16.7	36.0	19.3	
R4		11	2462.0		6.81	0.0	6.8	2.0	8.8	36.0	27.2	
R5	802.11g	1	2412.0		15.80	0.0	15.8	2.0	17.8	36.0	18.2	
R6		6	2437.0		16.67	0.0	16.7	2.0	18.7	36.0	17.3	
R7		10	2457.0		16.94	0.0	16.9	2.0	18.9	36.0	**17.1**	
R8		11	2462.0		10.98	0.0	11.0	2.0	13.0	36.0	23.0	
R9	802.11n(20)	1	2412.0		15.49	0.0	15.5	2.0	17.5	36.0	18.5	
R10		6	2437.0		15.71	0.0	15.7	2.0	17.7	36.0	18.3	
R11		10	2457.0		15.98	0.0	16.0	2.0	18.0	36.0	18.0	
R12		11	2462.0		10.60	0.0	10.6	2.0	12.6	36.0	23.4	
R13	802.11ax	1	2412.0		15.61	0.0	15.6	2.0	17.6	36.0	18.4	
R14		6	2437.0		16.12	0.0	16.1	2.0	18.1	36.0	17.9	
R15		10	2457.0		14.83	0.0	14.8	2.0	16.8	36.0	19.2	
R16		11	2462.0		11.02	0.0	11.0	2.0	13.0	36.0	23.0	
#	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12

(ROW)	(COLUMN)	NOTES
R0	C8	Minimum allowed reported antenna gain of 2 dBi > EUT Ant Gain per ANSI C63.10 11.12.2.6
R0	C4	Measured conducted per DTS Guidance 558074 D01 v5 r02 / ANSI C63.10 11.9.1.3 (PKPM1)
R0	C5	Measured conducted per DTS Guidance 558074 D01 v5 r02 / ANSI C63.10 11.9.2.2.2 (AVGSA)

4.2.4 Power Spectral Density

For this test, the EUT was attached directly to the test receiver. Following FCC DTS measurement procedures, the emission spectrum is first scanned for maximum spectral peaks, the span and receiver bandwidth are then reduced until the power spectral density is measured in the prescribed receiver bandwidth. The results of this testing are summarized in Table 4.2.4 . Plots showing how these measurements were made are depicted in Figure 4.2.4 .

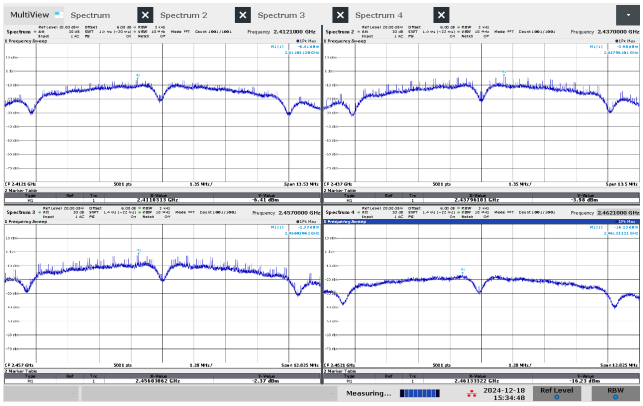
Table 4.2.4 Power Spectral Density Results.

Frequency Range	**Detector**	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	7-Nov-24
2400-2483.5	Pk	3 kHz	10 kHz	**Test Engineer:**	J. Nantz
				EUT:	Allegion 47723023
				Meas. Distance:	Conducted

3kHz Power Spectral Density							
#	Mode	Channel	Frequency (MHz)	Ant. Used	PSDcond (meas)* (dBm/3kHz)	PSD Limit (dBm/3kHz)	Pass By (dB)
R1	802.11b	1	2412.0	Cond.	-6.4	8.00	14.4
R2		6	2437.0	Cond.	-4.0	8.00	12.0
		10	2457.0	Cond.	-2.4	8.00	10.4
R3		11	2462.0	Cond.	-16.2	8.00	24.2
R4	802.11g	1	2412.0	Cond.	-9.0	8.00	17.0
R5		6	2437.0	Cond.	-8.8	8.00	16.8
		10	2457.0	Cond.	-8.4	8.00	16.4
R6		11	2462.0	Cond.	-14.6	8.00	22.6
R7	802.11n(20)	1	2412.0	Cond.	-8.7	8.00	16.7
R8		6	2437.0	Cond.	-9.3	8.00	17.3
		10	2457.0	Cond.	-7.5	8.00	15.5
R9		11	2462.0	Cond.	-14.9	8.00	22.9
R10	802.11ax	1	2412.0	Cond.	-10.3	8.00	18.3
R11		6	2437.0	Cond.	-10.5	8.00	18.5
		10	2457.0	Cond.	-10.7	8.00	18.7
R12		11	2462.0	Cond.	-16.0	8.00	24.0
#	C1	C2	C3	C4	C5	C6	C7

* PSD measured conducted following DTS guidance 558074 D01 v5 r02 8.4 / ANSI C63.10 11.10 PKPSD procedure.

802.11b



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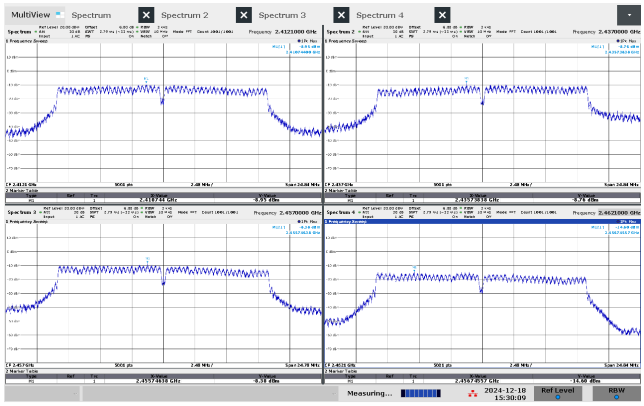
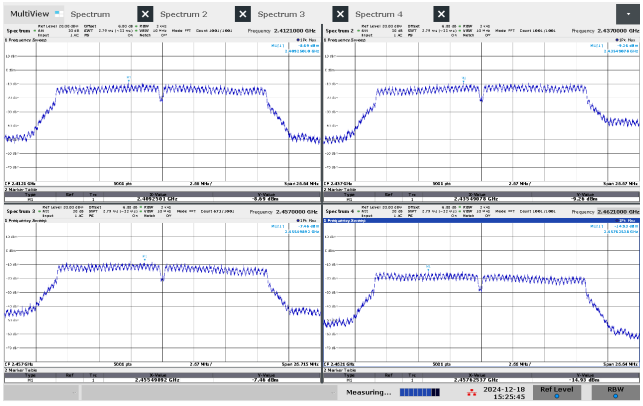
802.11g



03:30:10 PM 12/18/2024

802.11n(20)



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802.11ax

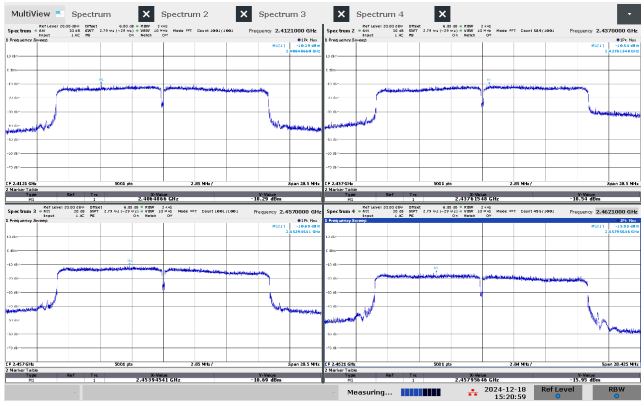

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Figure 4.2.4 Power Spectral Density Plots.

4.3 Unintentional Emissions

4.3.1 Restricted Band Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 4.3.1 . Measurements are performed to 10 times the highest fundamental operating frequency.

Table 4.3.1 (i) Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
30 >= f > 1000 MHz	Pk/QPk	100 kHz	300 kHz	**Test Date:**	7-Nov-24
f < 1000 MHz	Pk/Avg	1 MHz	3 MHz	**Test Engineer:**	J. Nantz
				EUT:	Allegion 47723023
				Meas. Distance:	Conducted

Transmitter Spurious in Restricted Bands														FCC/IC
	Mode	Frequency		Meas. Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Qpk	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Qpk	Limit Qpk		
R0		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R1	802.11b	30	88	-88.8		2.0	4.7	0.0	13.1			40	26.9	max L,M,H channels or noise
R2	802.11b	88	216	-88.7		2.0	4.7	0.0	13.2			43	29.8	max L,M,H channels or noise
R3	802.11b	216	1000	-88.7		2.0	4.7	0.0	13.2			46	32.8	max L,M,H channels or noise
	Mode	Frequency		Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Avg	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Avg	Limit Avg		
R4		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R5	Fundamental Restricted Band Edge (Low Side)													
R6	802.11b	2390.0	2390.0	-46.6	-58.0	2.0	0.0	0.0	50.6	74.0	39.2	54.0	14.8	max all - L,M,H channels
R7	Fundamental Restricted Band Edge (High Side)													
R8	802.11b	2483.5	2483.5	-41.4	-50.3	2.0	0.0	0.0	55.8	74.0	46.9	54.0	7.1	max all - L,M,H channels
R9														
R10	802.11b	4824.0	4824.0	-43.8	-44.8	2.0	0.0	0.0	53.5	74.0	52.4	54.0	**1.6**	max all - L channel
R11	802.11b	4874.0	4874.0	-43.9	-44.9	2.0	0.0	0.0	53.3	74.0	52.3	54.0	1.7	max all - M channel
R12	802.11b	4924.0	4924.0	-55.0	-57.9	2.0	0.0	0.0	42.2	74.0	39.3	54.0	14.7	max all - H channel
R13	802.11b	7236.0	7236.0	-74.0	-76.7	2.0	0.0	0.0	23.2	74.0	20.5	54.0	33.5	max all - L channel
R13	802.11b	7311.0	7311.0	-52.3	-56.7	2.0	0.0	0.0	44.9	74.0	40.5	54.0	13.5	max all - M channel
R13	802.11b	7386.0	7386.0	-61.9	-73.7	2.0	0.0	0.0	35.3	74.0	23.5	54.0	30.5	max all - H channel
R14	802.11b	1000.0	4000.0	-72.6	-77.3	2.0	0.0	0.0	24.6	74.0	19.9	54.0	34.1	max L,M,H channels or noise
R15	802.11b	4000.0	6000.0	-43.8	-44.8	2.0	0.0	0.0	53.5	74.0	52.4	54.0	1.6	max L,M,H channels or noise
R16	802.11b	6000.0	8400.0	-52.3	-56.7	2.0	0.0	0.0	44.9	74.0	40.5	54.0	13.5	max L,M,H channels or noise
R17	802.11b	8400.0	12500.0	-62.1	-70.4	2.0	0.0	0.0	35.1	74.0	26.8	54.0	27.2	max L,M,H channels or noise
R18	802.11b	12500.0	26000.0	-62.9	-75.6	2.0	0.0	0.0	34.3	74.0	21.6	54.0	32.4	max L,M,H channels or noise
#	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14

(ROW)	(COLUMN)	NOTES
ALL	C4, C5	Conducted measurements were made in line with DTS guidance 558074 D01 v5 r02 sections 8.5, 8.6, 8.7 / ANSI C63.10 11.10, 11.11, 11.12
ALL	C6	Minimum allowed antenna gain per ANSI C63.10 11.12.2.6 set to 2 dBi. Measured antenna gain ~ 1.5 dBi.
ALL	C7	Ground Reflection Factor as described in ANSI C63.10-2013 section 11.12.2.2c
ALL	C9, C11	Computed according to ANSI C63.10-2013 section 11.12.2.2e

Table 4.3.1 (ii) Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
30 >= f > 1000 MHz	Pk/QPk	100 kHz	300 kHz	**Test Date:**	7-Nov-24
f < 1000 MHz	Pk/Avg	1 MHz	3 MHz	**Test Engineer:**	J. Nantz
				EUT:	Allegion 47723023
				Meas. Distance:	Conducted

Transmitter Spurious in Restricted Bands FCC/IC

	Mode	Frequency		Meas. Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Qpk	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Qpk	Limit Qpk		
R0		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R1	802.11g	30	88	-88.8		2.0	4.7	0.0	13.1			40	26.9	max L,M,H channels or noise
R2	802.11g	88	216	-89.8		2.0	4.7	0.0	12.1			43	30.9	max L,M,H channels or noise
R3	802.11g	216	1000	-87.8		2.0	4.7	0.0	14.1			46	31.9	max L,M,H channels or noise
	Mode	Frequency		Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Avg	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Avg	Limit Avg		
R4		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R5	Fundamental Restricted Band Edge (Low Side)													
R6	802.11g	2390.0	2390.0	-30.4	-44.5	2.0	0.0	0.0	66.8	74.0	52.7	54.0	1.3	max all - L,M,H channels
R7	Fundamental Restricted Band Edge (High Side)													
R8	802.11g	2483.5	2483.5	-25.4	-43.9	2.0	0.0	0.0	71.8	74.0	53.3	54.0	**0.7**	max all - L,M,H channels
R9														
R10	802.11g	4824.0	4824.0	-43.2	-56.0	2.0	0.0	0.0	54.0	74.0	41.2	54.0	12.8	max all - L channel
R11	802.11g	4874.0	4874.0	-43.6	-56.0	2.0	0.0	0.0	53.6	74.0	41.2	54.0	12.8	max all - M channel
R12	802.11g	4924.0	4924.0	-43.6	-57.2	2.0	0.0	0.0	53.6	74.0	40.0	54.0	14.0	max all - H channel
R13	802.11g	7236.0	7236.0	-41.2	-58.2	2.0	0.0	0.0	56.0	74.0	39.0	54.0	15.0	max all - L channel
R13	802.11g	7311.0	7311.0	-47.1	-59.2	2.0	0.0	0.0	50.1	74.0	38.0	54.0	16.0	max all - M channel
R13	802.11g	7386.0	7386.0	-49.0	-62.2	2.0	0.0	0.0	48.2	74.0	35.0	54.0	19.0	max all - H channel
R14	802.11g	1000.0	4000.0	-25.4	-43.9	2.0	0.0	0.0	71.8	74.0	53.3	54.0	0.7	max L,M,H channels or noise
R15	802.11g	4000.0	6000.0	-43.2	-56.0	2.0	0.0	0.0	54.0	74.0	41.2	54.0	12.8	max L,M,H channels or noise
R16	802.11g	6000.0	8400.0	-41.2	-58.2	2.0	0.0	0.0	56.0	74.0	39.0	54.0	15.0	max L,M,H channels or noise
R17	802.11g	8400.0	12500.0	-61.8	-76.2	2.0	0.0	0.0	35.4	74.0	21.0	54.0	33.0	max L,M,H channels or noise
R18	802.11g	12500.0	26000.0	-62.9	-75.7	2.0	0.0	0.0	34.3	74.0	21.5	54.0	32.5	max L,M,H channels or noise
#	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14

(ROW)	(COLUMN)	NOTES
ALL	C4, C5	Conducted measurements were made in line with DTS guidance 558074 D01 v5 r02 sections 8.5, 8.6, 8.7 / ANSI C63.10 11.10, 11.11, 11.12
ALL	C6	Minimum allowed antenna gain per ANSI C63.10 11.12.2.6 set to 2 dBi. Measured antenna gain ~ 1.5 dBi.
ALL	C7	Ground Reflection Factor as described in ANSI C63.10-2013 section 11.12.2.2c
ALL	C9, C11	Computed according to ANSI C63.10-2013 section 11.12.2.2 e

Table 4.3.1 (iii) Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
30 >= f > 1000 MHz	Pk/QPk	100 kHz	300 kHz	**Test Date:**	7-Nov-24
f < 1000 MHz	Pk/Avg	1 MHz	3 MHz	**Test Engineer:**	J. Nantz
				EUT:	Allegion 47723023
				Meas. Distance:	Conducted

Transmitter Spurious in Restricted Bands FCC/IC

	Mode	Frequency		Meas. Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Qpk	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Qpk	Limit Qpk		
R0		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R1	802.11n(20)	30	88	-88.9		2.0	4.7	0.0	13.0			40	27.0	max L,M,H channels or noise
R2	802.11n(20)	88	216	-89.8		2.0	4.7	0.0	12.1			43	30.9	max L,M,H channels or noise
R3	802.11n(20)	216	1000	-86.0		2.0	4.7	0.0	15.9			46	30.1	max L,M,H channels or noise
	Mode	Frequency		Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Avg	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Avg	Limit Avg		
R4		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R5	Fundamental Restricted Band Edge (Low Side)													
R6	802.11n(20)	2390.0	2390.0	-32.9	-46.1	2.0	0.0	0.0	64.3	74.0	51.1	54.0	2.9	max all - L,M,H channels
R7	Fundamental Restricted Band Edge (High Side)													
R8	802.11n(20)	2483.5	2483.5	-30.3	-43.6	2.0	0.0	0.0	66.9	74.0	53.6	54.0	**0.4**	max all - L,M,H channels
R9														
R10	802.11n(20)	4824.0	4824.0	-43.8	-57.2	2.0	0.0	0.0	53.4	74.0	40.0	54.0	14.0	max all - L channel
R11	802.11n(20)	4874.0	4874.0	-43.3	-57.3	2.0	0.0	0.0	53.9	74.0	39.9	54.0	14.1	max all - M channel
R12	802.11n(20)	4924.0	4924.0	-54.2	-66.9	2.0	0.0	0.0	43.0	74.0	30.3	54.0	23.7	max all - H channel
R13	802.11n(20)	7236.0	7236.0	-50.6	-65.9	2.0	0.0	0.0	46.6	74.0	31.3	54.0	22.7	max all - L channel
R13	802.11n(20)	7311.0	7311.0	-48.9	-62.2	2.0	0.0	0.0	48.3	74.0	35.0	54.0	19.0	max all - M channel
R13	802.11n(20)	7386.0	7386.0	-58.5	-72.0	2.0	0.0	0.0	38.7	74.0	25.2	54.0	28.8	max all - H channel
R14	802.11n(20)	1000.0	4000.0	-30.3	-43.6	2.0	0.0	0.0	66.9	74.0	53.6	54.0	0.4	max L,M,H channels or noise
R15	802.11n(20)	4000.0	6000.0	-43.3	-57.2	2.0	0.0	0.0	53.9	74.0	40.0	54.0	14.0	max L,M,H channels or noise
R16	802.11n(20)	6000.0	8400.0	-48.9	-62.2	2.0	0.0	0.0	48.3	74.0	35.0	54.0	19.0	max L,M,H channels or noise
R17	802.11n(20)	8400.0	12500.0	-62.2	-76.4	2.0	0.0	0.0	35.0	74.0	20.8	54.0	33.2	max L,M,H channels or noise
R18	802.11n(20)	12500.0	26000.0	-63.2	-75.7	2.0	0.0	0.0	34.0	74.0	21.5	54.0	32.5	max L,M,H channels or noise
#	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14

(ROW)	(COLUMN)	NOTES
ALL	C4, C5	Conducted measurements were made in line with DTS guidance 558074 D01 v5 r02 sections 8.5, 8.6, 8.7 / ANSI C63.10 11.10, 11.11, 11.12
ALL	C6	Minimum allowed antenna gain per ANSI C63.10 11.12.2.6 set to 2 dBi. Measured antenna gain ~ 1.5 dBi.
ALL	C7	Ground Reflection Factor as described in ANSI C63.10-2013 section 11.12.2.2 ©
ALL	C9, C11	Computed according to ANSI C63.10-2013 section 11.12.2.2 (e)

Table 4.3.1 (iv) Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
30 >= f > 1000 MHz	Pk/QPk	100 kHz	300 kHz	**Test Date:**	7-Nov-24
f < 1000 MHz	Pk/Avg	1 MHz	3 MHz	**Test Engineer:**	J. Nantz
				EUT:	Allegion 47723023
				Meas. Distance:	Conducted

Transmitter Spurious in Restricted Bands FCC/IC

	Mode	Frequency		Meas. Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Qpk	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Qpk	Limit Qpk		
R0		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R1	802.11ax	30	88	-88.9		2.0	4.7	0.0	13.0			40	27.0	max L,M,H channels or noise
R2	802.11ax	88	216	-89.8		2.0	4.7	0.0	12.1			43	30.9	max L,M,H channels or noise
R3	802.11ax	216	1000	-84.6		2.0	4.7	0.0	17.3			46	28.7	max L,M,H channels or noise
	Mode	Frequency		Output Power		Ant	GR Factor	Mode Duty	Electric Field @ 3m				Pass	
		Start	Stop	Pk	Avg	Gain		Cycle	Meas. Pk	Limit Pk	Meas. Avg	Limit Avg		
R4		MHz	MHz	dBm	dBm	dBi	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	Comments
R5	Fundamental Restricted Band Edge (Low Side)													
R6	802.11ax	2390.0	2390.0	-29.1	-43.6	2.0	0.0	0.0	68.1	74.0	53.6	54.0	0.4	max all - L,M,H channels
R7	Fundamental Restricted Band Edge (High Side)													
R8	802.11ax	2483.5	2483.5	-25.0	-43.3	2.0	0.0	0.0	72.2	74.0	53.9	54.0	**0.1**	max all - L,M,H channels
R9														
R10	802.11ax	4824.0	4824.0	-43.8	-56.6	2.0	0.0	0.0	53.4	74.0	40.6	54.0	13.4	max all - L channel
R11	802.11ax	4874.0	4874.0	-43.2	-56.7	2.0	0.0	0.0	54.0	74.0	40.5	54.0	13.5	max all - M channel
R12	802.11ax	4924.0	4924.0	-43.7	-58.3	2.0	0.0	0.0	53.5	74.0	38.9	54.0	15.1	max all - H channel
R13	802.11ax	7236.0	7236.0	-48.4	-65.3	2.0	0.0	0.0	48.8	74.0	31.9	54.0	22.1	max all - L channel
R13	802.11ax	7311.0	7311.0	-45.4	-60.1	2.0	0.0	0.0	51.8	74.0	37.1	54.0	16.9	max all - M channel
R13	802.11ax	7386.0	7386.0	-49.3	-63.7	2.0	0.0	0.0	47.9	74.0	33.5	54.0	20.5	max all - H channel
R14	802.11ax	1000.0	4000.0	-25.0	-43.3	2.0	0.0	0.0	72.2	74.0	53.9	54.0	0.1	max L,M,H channels or noise
R15	802.11ax	4000.0	6000.0	-43.2	-56.6	2.0	0.0	0.0	54.0	74.0	40.6	54.0	13.4	max L,M,H channels or noise
R16	802.11ax	6000.0	8400.0	-45.4	-60.1	2.0	0.0	0.0	51.8	74.0	37.1	54.0	16.9	max L,M,H channels or noise
R17	802.11ax	8400.0	12500.0	-63.5	-76.5	2.0	0.0	0.0	33.7	74.0	20.7	54.0	33.3	max L,M,H channels or noise
R18	802.11ax	12500.0	26000.0	-61.9	-75.7	2.0	0.0	0.0	35.3	74.0	21.5	54.0	32.5	max L,M,H channels or noise
#	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14

(ROW)	(COLUMN)	NOTES
ALL	C4, C5	Conducted measurements were made in line with DTS guidance 558074 D01 v5 r02 sections 8.5, 8.6, 8.7 / ANSI C63.10 11.10, 11.11, 11.12
ALL	C6	Minimum allowed antenna gain per ANSI C63.10 11.12.2.6 set to 2 dBi. Measured antenna gain ~ 1.5 dBi.
ALL	C7	Ground Reflection Factor as described in ANSI C63.10-2013 section 11.12.2.2 ©
ALL	C9, C11	Computed according to ANSI C63.10-2013 section 11.12.2.2 (e)

4.3.2 OOB Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions relative to the fundamental in a 100 kHz receiver bandwidth (at the nominal voltage and temperature) in the worst cases are provided in Figure 4.3.2 below.

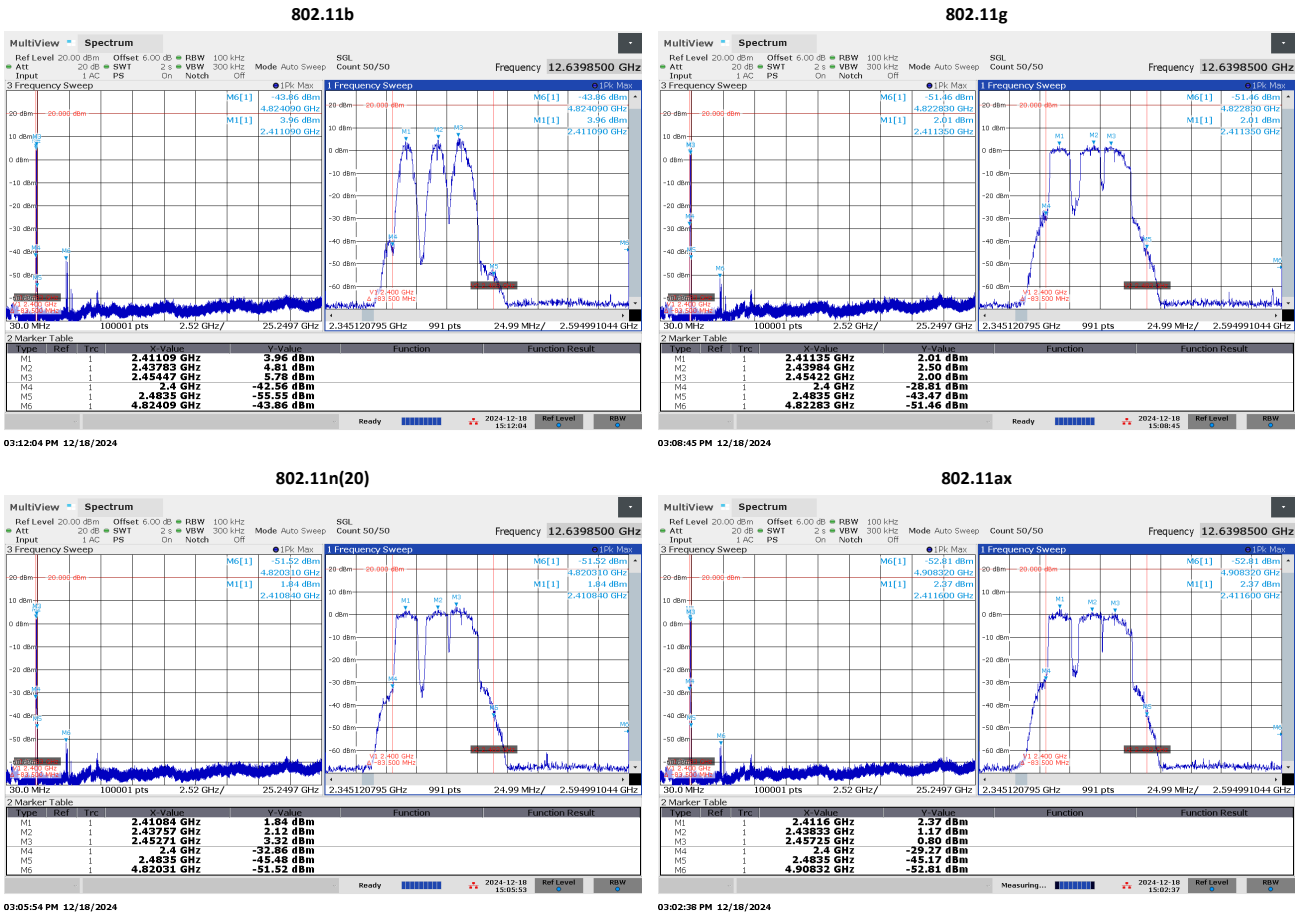

Figure 4.3.2 Worst Case Transmitter OOB Emissions Measured.

5 Measurement Uncertainty and Accreditation Documents

The maximum values of measurement uncertainty for the laboratory test equipment and facilities associated with each test are given in the table below. This uncertainty is computed for a 95.45% confidence level based on a coverage factor of $k = 2$.

Table 5.0.0 Measurement Uncertainty.

Measured Parameter	Measurement Uncertainty†
Radio Frequency	$\pm(f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS-1))/2 + 1\,\text{Hz})$
Conducted Emm. Amplitude	$\pm 1.9\,\text{dB}$
Radiated Emm. Amplitude ($f < 30\,\text{MHz}$)	$\pm 3.1\,\text{dB}$
Radiated Emm. Amplitude ($30 - 200\,\text{MHz}$)	$\pm 4.0\,\text{dB}$
Radiated Emm. Amplitude ($200 - 1000\,\text{MHz}$)	$\pm 5.2\,\text{dB}$
Radiated Emm. Amplitude ($f > 1000\,\text{MHz}$)	$\pm 3.7\,\text{dB}$

†Ref: CISPR 16-4-2:2011+A1:2014


United States Department of Commerce
National Institute of Standards and Technology

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NVLAP LAB CODE: 200129-0

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is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique on ISO/IEC 17025).

2024-06-13 through 2025-06-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

Figure 5.0.0 Accreditation Documents