

COMPLIANCE WORLDWIDE INC. TEST REPORT 236-24RFR1

In Accordance with the Requirements of
Federal Communications Commission CFR Title 47 Part 2.1093:2020
Radio Frequency Exposure Evaluation: Portable Devices
Innovation, Science and Economic Development Canada
RSS-102, Issue 6
Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus

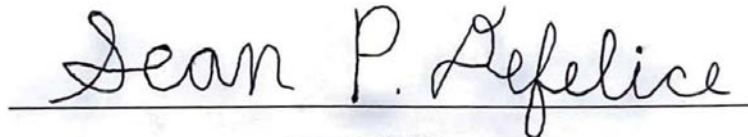
Issued to
Building 36 Technologies
160 Gould Street, Suite 201
Needham, MA 02494

for the
ADC-T25 Thermostat

FCC ID: 2AC3T-B36T25RA
IC: 12323A-B36T25RA

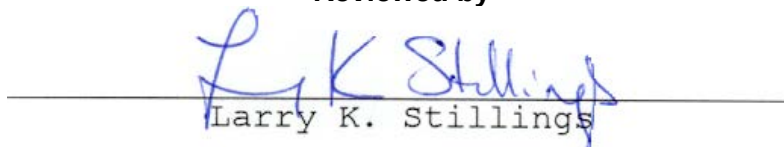
Report Issued on October 24, 2024
Revision R1 Issued on January 23, 2025

Tested by



Sean P. Defelice

Reviewed by



This test report shall not be reproduced, except in full, without written permission from Compliance Worldwide, Inc.

Table of Contents

1. Scope.....	3
2. Product Details.....	3
2.1. Manufacturer	3
2.2. Model Number	3
2.3. Serial Number	3
2.4. Description	3
2.5. Power Source	3
2.6. EMC Modifications.....	3
3. Product Configuration.....	3
3.1. EUT Hardware.....	3
3.2. Support Equipment.....	3
3.3. Cables	3
3.4. Operational Characteristics and Software.....	4
3.5. Block Diagram	4
4. Measurements Parameters	4
4.1. Measurement Equipment Used to Perform Test	4
4.2. Software used to perform the test.....	5
4.3. Measurement & Equipment Setup	5
4.4. Measurement Uncertainty.....	5
5. Choice of Equipment for Test Suits	6
6. Measurement Data.....	7
6.1. Maximum Conducted Output Power	7
6.2. Duty Cycle	9
6.3. Radiated Field Strength of the Fundamental	12
6.4. Public Exposure to Radio Frequency Energy Levels	14
6.5. Radio Frequency (RF) Exposure of Radiocommunication Apparatus.....	15

1. Scope

This test report certifies that the Building 36 Technologies ADC-T25 Thermostat, as tested, meets the FCC Part 2.1093 requirements and the ISED RSS-102, Issue 6 Section 6.1 requirements exempting the device from a SAR Evaluation.

The scope of this test report is limited to the test sample provided by the client, only in as much as that sample represents other production units. If any significant changes are made to the unit, the changes shall be evaluated and a retest may be required. Measurement Uncertainty will not be applied to any of the measurement / testing results in this test report to determine pass/fail criteria per the Decision Rule as defined in ISO/IEC Guide 17025-2017 Clause 3.7. Revision R1 updates the report from Mobile to Portable Exposure since the device can be touched.

2. Product Details

2.1. Manufacturer:	Building 36 Technologies.
2.2. Model Numbers:	ADC-T25
2.3. Serial Numbers:	Pre-production prototype
2.4. Description:	Z-Wave wireless thermostat supporting short range and long-range channel frequencies.
2.5. Power Source:	24 VAC via transformer or two AA Batteries
2.6. Hardware Revision:	Rev E
2.7. Software Revision:	N/A
2.8. Modulation Type:	Gaussian frequency shift keying
2.9. Operating Frequency:	908.4, 912, 916 & 920 MHz
2.10. EMC Modifications:	None

3. Product Configuration

3.1. EUT Hardware

Manufacturer	Model	Serial Number	Input Volts	Freq (Hz) Or DC	Description/Function
Building 36 Technologies	ADC-T25	Pre-production	24 3	AC DC	Wireless Thermostat

3.2. Support Equipment

Device	Manufacturer	Model	Serial No.	Comment
Laptop	Lenovo	P50	PC0MHJ8Y	For setting up EUT

3.3. Cables

Cable Type	Length	Shield	From	To
Power / Low voltage	3M	No	EUT	Power Adapter

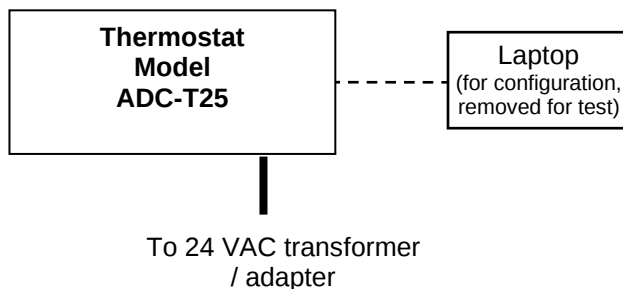
3. Product Configuration (continued)

3.4. Operational Characteristics & Software

Install the battery to the device under test or apply AC power.

Special test firmware was loaded into the EUT so that channel and frequency could be selected and set via a temporary serial connection through a laptop. The device is configured using this firmware to modulate test frequencies at 908.4 MHz, 912 MHz, 916 MHz and 920 MHz

3.5. Block Diagram



4. Measurements Parameters

4.1. Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Test Receiver, 9kHz - 7GHz ¹	Rohde & Schwarz	ESR7	101156	10/16/2024	3 Years
EMI Test Receiver, 10 Hz - 7GHz ¹	Rohde & Schwarz	ESR7	101770	7/23/2025	1 Year
EMI Test Receiver, 9 kHz – 26.5 GHz ¹	Rohde & Schwarz	ESR26	101693	6/26/2025	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz ³	Rohde & Schwarz	FSV40	100899	6/27/2025	1 Year
Biconilog Antenna, 30 MHz - 2 GHz	Sunol Sciences	JB1	A050913	7/1/2025	4 Years
Barometric Pressure/Humidity & Temp Datalogger	Extech Instruments	SD700	Q590483	4/4/2025	1 Year

¹ ESR7/26 Firmware revision: V3.48 SP3, Date installed: 09/30/2020

Previous V3.48 SP2, installed 07/23/2020.

³ FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016

Previous V2.30 SP1, installed 10/22/2014.

4. Measurements Parameters (continued)

4.2. Software Used to Perform Test

Manufacturer	Software Description	Title or Model #	Rev.	Report Sections
Compliance Worldwide	Test Report Generation Software	Test Report Generator	1.0	Used to process conducted emissions data

4.3 Measurement & Equipment Setup

Test Dates:	10/23/2024
Test Engineer:	Sean Defelice
Site Temperature (°C):	21.5
Relative Humidity (%RH):	52
Frequency Range:	9 kHz to 1 GHz
Measurement Distance:	3 Meters and 1 Meter
EMI Receiver IF Bandwidth:	200 Hz (30 kHz – 150 kHz) 9 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1 GHz)
EMI Receiver Avg Bandwidth:	≥ 3 * RBW or IF(BW)
Detector Functions:	Peak, Quasi-Peak and Average

4.4 Test Procedure

Test measurements were made in accordance FCC Part 15.247: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5850 MHz, and 24.0 - 24.25 GHz.

The measurement procedures in this report are in accordance with ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices. FCC OET Publication Number KDB 558074 D01 v05r02, Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS), Frequency Hopping Spread Spectrum Systems, and Hybrid System Devices Operating Under §15.247, dated April 2, 2019 and ISED RSS-247, Issue 2, were referenced for the test procedures used to generate the data in this report. All references to these publications refer to this versions and dates detailed in this paragraph.

In addition, FCC KDB 447498 D01 General RF Exposure Guidance v06, October 23, 2015 are referenced for the testing and requirements detailed in this report.

Test measurements were made in accordance FCC Part 15.249, ISED RSS-210 B.10: Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, 5725 - 5875 MHz, and 24.0 - 24.25 GHz, ISED RSS-210, Issue 10 and RSS-GEN, Issue 5

In addition, ISED RSS-102, Issue 6, (December 15, 2023) are referenced for the testing and requirements detailed in this report.

5. Choice of Equipment for Test Suits

5.1 Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2 Presentation

This test sample was tested with all required ancillary equipment. Refer to Section 3 of this report for product equipment configuration.

5.3 Choice of Operating Frequencies

The device under test utilizes four operating frequencies: 908.4 MHz, 912 MHz, 916 MHz and 920 MHz, all frequencies were tested.

5.4 EUT Position for Emissions Measurements

During all radiated mode measurement testing, the EUT was mounted on a polystyrene foam to simulate the device being wall mounted.

6. Measurement Data (continued)

6.1. Maximum Conducted Output Power (FCC 15.247 (b)(3), ISED RSS-247 5.4 d)

Requirement: (15.247 (b) (3))

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt (+30 dBm).

Procedure: This test was performed in accordance with the procedure detailed in FCC OET publication number KDB 558074, Section 8.3.2 using ANSI C63:2013 Subclause 11.9.2.2 for measuring average power.

Test Note: A spectrum analyzer resolution bandwidth of 1 MHz and a video bandwidth of 3 MHz were used.

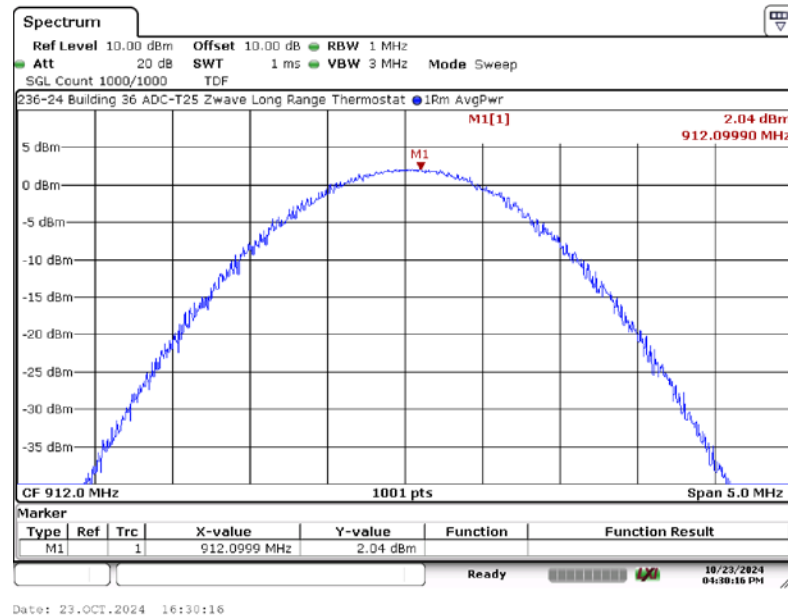
Results: The device under test meets the required maximum peak conducted output power level of 1 Watt (30 dBm).

Channel	Frequency	Maximum Average Conducted Output Power	Duty Cycle Correction 10 * LOG (1/D)	Maximum Peak Conducted Output Power	Peak Limit	Margin	Result
	(MHz)	(dBm)	(dB)	(dBm)	(dBm)	(dB)	
Low	912	2.04	17.16	19.20	30	-10.80	Compliant
High	920	2.01	17.16	19.17	30	-10.83	Compliant

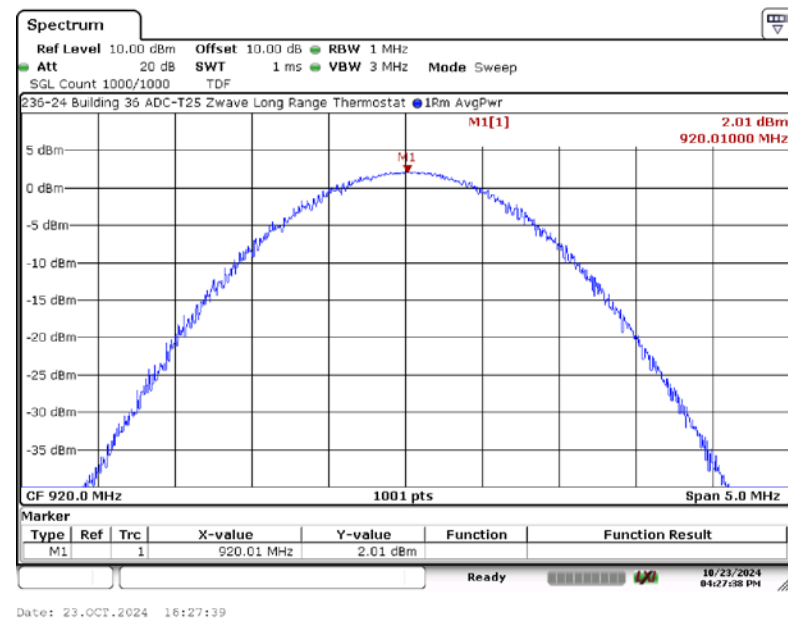
6. Measurement Data (continued)

6.1. Maximum Conducted Output Power (FCC 15.247 (b)(3), ISED RSS-247 5.4 d)

6.1.1. Low Channel – 912 MHz



6.1.2. High Channel – 920 MHz



6. Measurement Data (continued)

6.2. Duty Cycle

Requirement: (FCC OET publication number 558074)

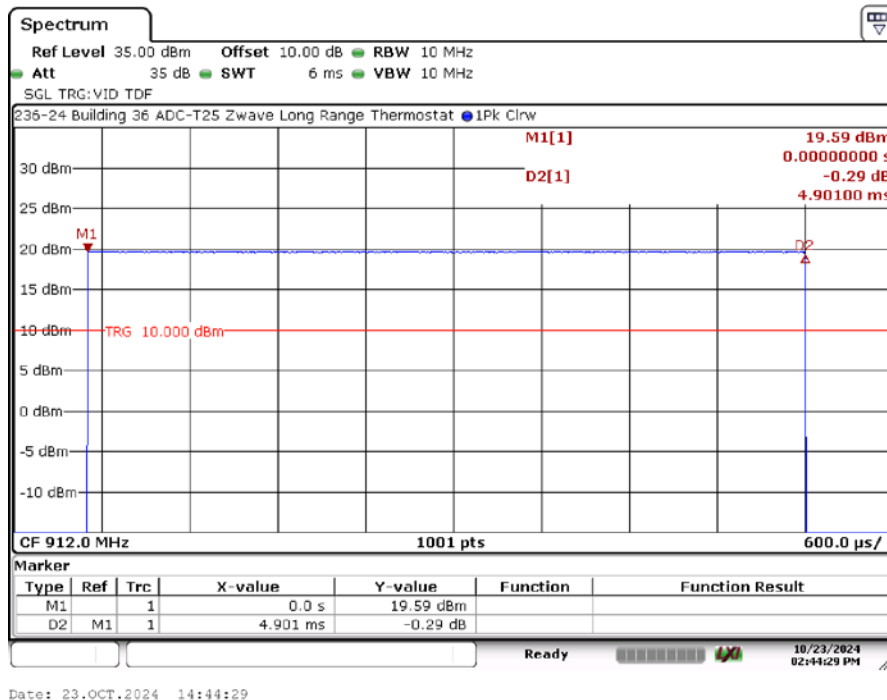
Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%).

Procedure: Duty cycle measurements were made according to the procedure detailed ANSI C63.10-2013, Section 11.6(b).

Results: Duty cycle measurements are listed in the following table.

Channel	Frequency	Time High	Time per Period	Duty Cycle	
	(MHz)	(mS)	(mS)	(Numeric)	(%)
Low	912	4.901	255.1	0.019	1.92
High	920	4.901	255.1	0.019	1.92

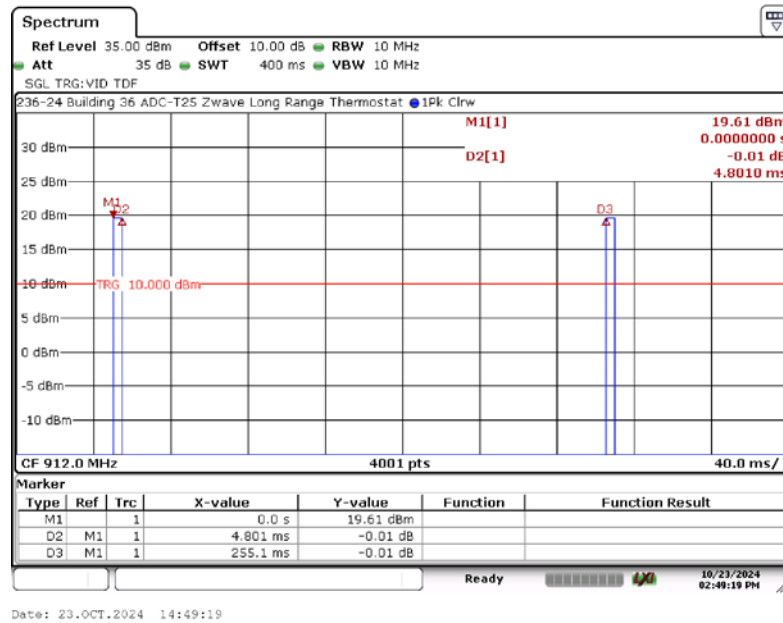
6.2.1. Low Channel – 912 MHz On Time



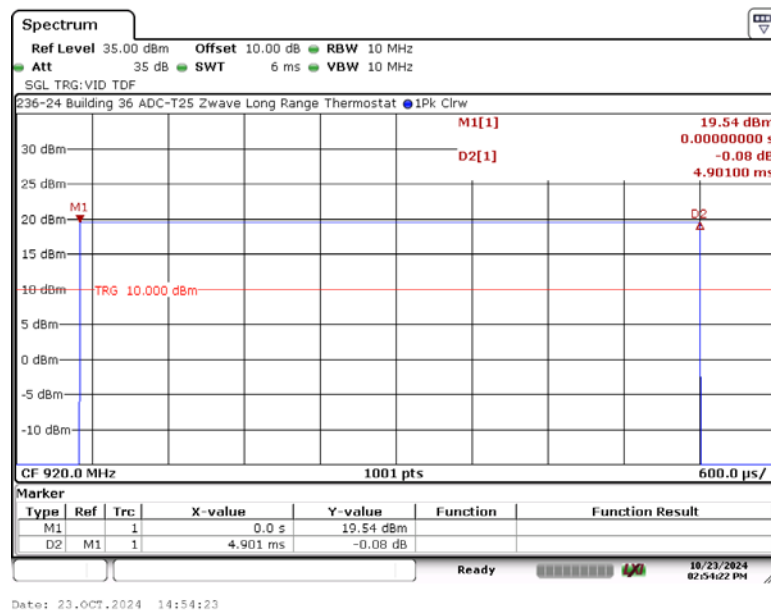
6. Measurement Data (continued)

6.2. Duty Cycle (continued)

6.2.2 Low Channel – 912 MHz Cycle Time



6.2.3. High Channel – 920 MHz On Time





Test Number: 236-24RFR1



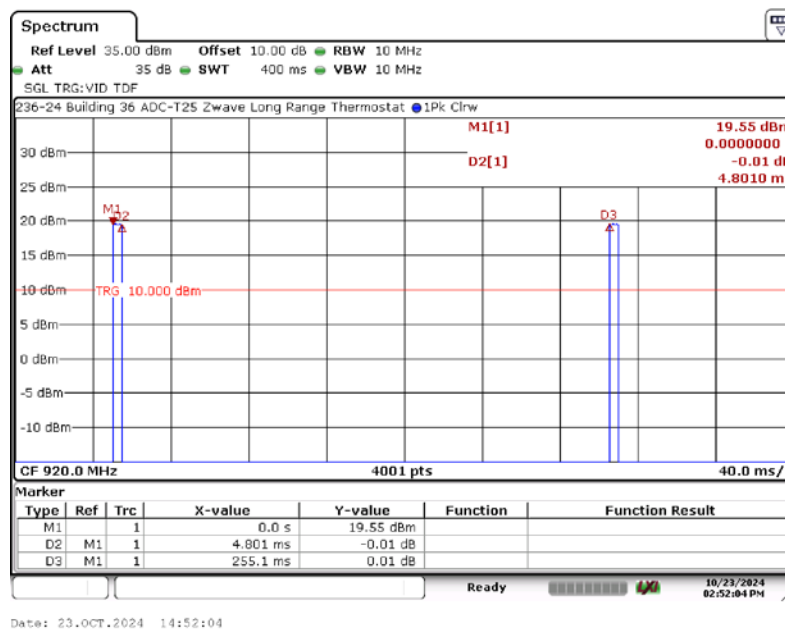
TESTING CERT #1673.01

Issue Date: 1/23/2025

6. Measurement Data (continued)

6.2. Duty Cycle (continued)

6.2.4 high Channel – 920 MHz Cycle Time



6. Measurement Data (continued)

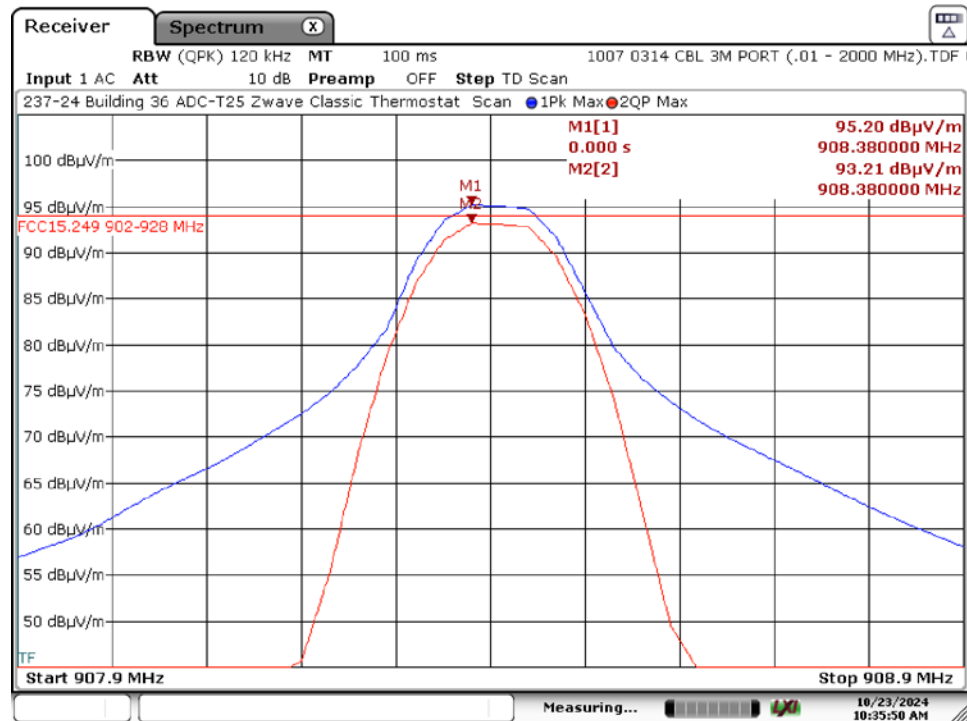
6.3. Radiated Field Strength of Fundamental (15.249, Section (a), (c), ISED RSS-210 B.10)

Requirement: The 3-meter field strength of the fundamental emissions from intentional radiators operating within the 902-928 MHz frequency band shall comply with the following requirement: 50 millivolts/meter (94 dB μ V/m) Quasi-Peak mode measurement.

Frequency (MHz)	Amplitude ¹ (dB μ V/m) at 3 Meters	Limit (dB μ V/m) at 3 Meters	Margin (dB μ V/m) at 3 Meters	Ant Polarity	Ant Height	Turntable Azimuth	Result
	Quasi-Pk	Quasi-Pk	Quasi-Pk	H/V	cm	Deg	
908.4	93.21	94.00	-0.79	V	116	220	Compliant
916.0	92.43	94.00	-1.57	V	106	220	Compliant

¹ All correction factors are included in measurement values.

6.3.1. Radiated Field Strength of Fundamental, 908.4 MHz (Worst case)

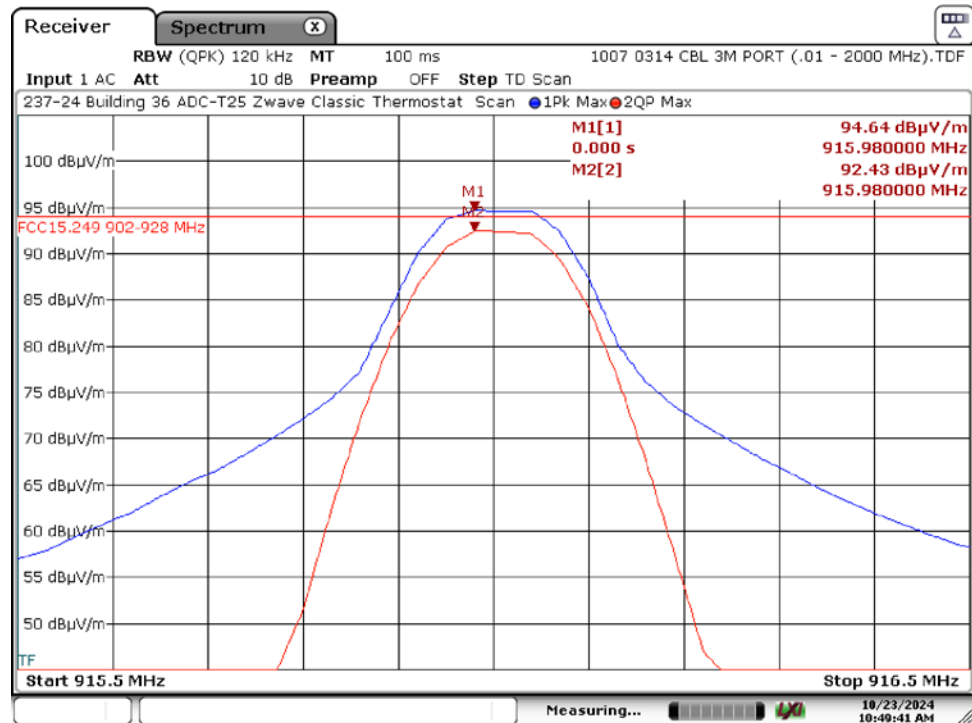


Date: 23.OCT.2024 10:35:51

6. Measurement Data (continued)

6.3. Radiated Field Strength of Fundamental (15.249, Section (a), (c), ISED RSS-210 B.10)

6.3.2. Radiated Field Strength of Fundamental, 916 MHz (Worst case)



Date: 23.OCT.2024 10:49:41

6. Measurement Data (continued)

6.4. Public Exposure to Radio Frequency Energy Levels (FCC Part 2.1093:2020)

6.4.1. 2.1093 Requirements

Requirement: Portable devices are subject to radio frequency radiation exposure requirements. For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

For a 1-g SAR, the test exclusion result must be ≤ 3.0 .

For a 10-g SAR, the test exclusion result must be ≤ 7.5 .

Test Notes: The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by the following formula:

$$\text{SAR Test Exclusion} = \frac{P_{\text{MAX}}}{d_{\text{MIN}}} \times \sqrt{f_{\text{(GHz)}}} \quad (1)$$

P_{MAX} mW Maximum power of channel, including tune-up tolerance

d_{MIN} mm Minimum test separation distance, mm (≤ 50 mm)

$f_{\text{(GHz)}}$ GHz $f_{\text{(GHz)}}$ is the RF channel transmit frequency in GHz (>100 MHz and <6 GHz)

Using the Average power of the device, the extremity is the following.

Channel:		908.4	916	912	920	
Input ¹ :	P_{MAX}^1	0.63	0.53	1.60	1.59	mW
	d_{MIN}^2	5.00	5.00	5.00	5.00	mm
	$f_{\text{(GHz)}}$	0.9084	0.916	0.912	0.920	GHz
Test Exclusion:		0.12	0.10	0.31	0.30	
Extremity Limit Exemption		7.5	7.5	7.5	7.5	
Result:		Compliant	Compliant	Compliant	Compliant	

¹ Taken from the average power and field strength of this report and converted to mW

² When the minimum test separation distance is < 5 mm, a distance of 5 mm according to KDB 447498, 4.1 f) is applied to determine SAR test exclusion.

Conclusion: Compliant - The device under test meets the exclusion requirement detailed in FCC OET 447498, dated October 23, 2015 Clause 4.3.1 (a).

6. Measurement Data (continued)

6.5. Radio Frequency (RF) Exposure of Radiocommunication Apparatus (RSS-102, Issue 6)

6.5.1. RSS-102 Issue 6 Requirements

Requirement: Devices operating at or below the applicable output power levels (adjusted for tune-up tolerance) specified in Table 11, based on the separation distance, are exempt from SAR evaluation. The separation distance, defined as the distance between the user and/or bystander and the antenna and/or radiating element of the device or the outer surface of the device, shall be less than or equal to 20 cm for these exemption limits to apply.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in Table 11 are multiplied by a factor of 2.5.

When the operating frequency of the device is between two frequencies located in Table 11, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in Table 11, linear interpolation may be applied for the applicable frequency.

Table Frequency (MHz)	Table Limit ≤ 5mm (mW)	Limb-Worn Devices (mW)
835.00	21.00	52.50
1900.00	6.00	15.00

Frequency	Separation Distance	Maximum Power ¹	RSS-102 Limit	Result
MHz	mm	mW	mW	
908.4	≤5	0.63	49.92	Compliant
916	≤5	0.53	49.65	Compliant
912	≤5	1.60	49.79	Compliant
920	≤5	1.59	49.51	Compliant

¹ Taken from the average power and field strength of this report and converted to mW

Result: Compliant, the device meets the exemption limits from Table 11 of RSS-102, Issue 6 at less than or equal to 5mm separation.