



COMPLIANCE WORLDWIDE INC. TEST REPORT 107-24

In Accordance with the Requirements of

Federal Communications Commission CFR Title 47 Part 15.231, Subpart C Intentional Radiators

Issued to

Napco Security Technologies, Inc. 333 Bayview Avenue Amityville, NY 11701

> for the Prima Models: PSMKCO, PSMK 433.9 MHz

FCC ID: AD8SMK433

Report Issued on January 31, 2024

Tested by Sean P. Defelice **Reviewed by**

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1. Scope

This test report certifies that the Napco Security Technologies Prima PSMKCO, PSMK 433.9 MHz Transmitter, as tested, meets the Subpart C, FCC Part 15.231 requirements. 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.

2. Product Details

2.1. Manufacturer:	Napco Security Technologies
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- 2.2. Model Number: PSMKCO, PSMK
- **2.3 Serial Number:** 5967815
- **2.4 Description of EUT:** The Prima PSMK Photoelectric Smoke Detector is effective for detecting smoke in your home. The Prima PSMKCO is a high-quality combination photoelectric smoke detector (conforms to UL 268) and carbon monoxide detector (conforms to UL 2075) and is equipped with a supervised digitally coded radio transmitter
- **2.5 Power Source:** 3V lithium Duracell D123A or Panasonic CR123A
- 2.6 Hardware Revision: Ver 2.0
- 2.7 Software/Firmware Revision: N/A

2.8. Modulation Type:	Pulsed
2.9. Operating Frequency:	433.9 MHz
2.10. EMC Modifications:	None

3. Product Configuration

3.1. Operational Characteristics & Software

The EUT was configured to continuously transmit when the battery is installed.

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Volts	Freq (Hz)	Description/Function
Napco Security	PSMKCO	5967815	3	DC	Smoke / Co Detector

3.3. Support Equipment

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Freq (Hz)	Description/Function
None					





3. Product Configuration (continued)

3.4. Equipment Cables

Cable Type	Length	Shield	From	То
None				

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	10/26/2024	3 Years
EMI Test Receiver, 10 Hz - 7GHz ¹	Rohde & Schwarz	ESR7	101770	7/23/2024	3 Years
Spectrum Analyzer, 2 Hz to 26.5 GHz ²	Rohde & Schwarz	FSW26	102057	6/24/2024	3 Years
Spectrum Analyzer, 9 kHz to 40 GHz ³	Rohde & Schwarz	FSV40	100899	8/12/2024	4 Years
Spectrum Analyzer 10 Hz – 40 GHz ¹	Rohde & Schwarz	FSVR40	100909	9/18/2024	4 Years
Biconilog Antenna, 30 MHz - 2 GHz	Sunol Sciences	JB1	A050913	7/1/2024	3 Years
Loop Antenna 9 kHz - 30 MHz	EMCO	6512	9309-1139	4/14/2024	2 Years
Dbl Ridged Guide Antenna 1- 18 GHz	ETS-Lindgren	3117	00143292	5/11/2024	2 Years
Dbl Ridged Guide Antenna 1- 18 GHz	ETS-Lindgren	3117	00227631	4/21/2024	2 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B	3008A01323	11/30/2024	3 Years
Preamplifier, 1 GHz to 26.5 GHz	Hewlett Packard	8449B H02	3008A00329	1/20/2025	3 Years
LISN	EMCO	3825/2	9109-1860	1/4/2025	1 Year
Digital Barometer	Control Company	4195	ID236	1/27/2025	3 Years
¹ ESR7 Firmware revision: V3.47 ² FSW26 Firmware revision: V4.7 ³ FOV42 Firmware revision: V4.7	1 SP1, Date installed:	11/16/2020	Previous V3.48 Previous V4.61	, installed	d 08/11/2020.

³ FSV40 Firmware revision: V2.30 SP4, Date installed: 05/04/2016 ⁴ FSVR40 Firmware revision: V2.23 SP1, Date installed: 08/19/2016

Previous V2.23,

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

1/15/2024, 1/26/2024,

4.3 Measurement & Equipment Setup

Test Dates:

	1/29/2024
Test Engineer:	Sean Defelice
Site Temperature (°C):	21.5
Relative Humidity (%RH):	29
Frequency Range:	30 kHz to 5 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)
	1 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 15.231: Periodic operation within the bands 40.66 – 40.70 MHz and above 70 MHz.

The test methods used to generate the data in this test report are in accordance with ANSI C63.10: 2013, American National Standard for Methods for Unlicensed Wireless Devices.





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

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

5.3. Choice of Operating Frequencies

The transmitter in the unit under test utilizes a single operating frequency at approximately 433.9 MHz.





6. Measurement Summary

Test Requirement	FCC Requirement	Test Report Section	Result	Comment
Antenna Requirement	15.203	7.1	Compliant	The antenna is enclosed within the device under test.
	15.231 (a)(1)	7.2.1	N/A	The EUT is not a manually operated transmitter
	15.231 (a)(2)	7.2.2	Compliant	
Operational Requirements	15.231 (a)(3)	7.2.3	Compliant	
	15.231 (a)(4)	7.2.4	N/A	Not something that is measured.
	15.231 (a)(5)	7.2.5	N/A	Not something that is measured
Radiated Field Strength of Fundamental	15.231 (b)	7.3	Compliant	
Radiated Field Strength of Harmonics	15.231 (b)(3)	7.4	Compliant	
Spurious Radiated Emissions	15.231 (b)(3), 15.209	7.5	Compliant	
Emission Bandwidth (20 dB)	15.231 (c)	7.6	Compliant	
Conducted Emissions	15.207	7.7	Compliant	
Determination of Average Factor (Duty Cycle)	15.35 (c)	7.8	N/A	For pulsed transmissions less than 100 mS, PRF <=20 Hz





7. Measurement Data

7.1. Antenna Requirement (Section 15.203)

Requirement: 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.

Status: Compliant - The antenna utilized by the device under test is etched on a printed circuit board

7.2. Operational Requirements (Section 15.231(a))

- 7.2.1. Requirement: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released (Section 15.231(a)(1)).
 - Status: Compliant, When the EUTs button is pushed it sends out 8, 18.3 mS bursts over 1.2 seconds to communicate with a panel and stops transmitting.

Receiv	ver	5	pectrum	×								
Ref Lo Att SGL TR				T 2 s 🖷	RBW 100 kHz VBW 300 kHz		In	put 1 /	/C			
107-24	Napco	Wirele	ss Smoke Dete	ctor 433	MHz 🔵 1Pk Clrw							
							М	1[1]			93	.50 dBµV/n 0.00000 :
100 dBL	JV/m− 03						D:	2[1]				0.01 di 18.30 m
90 dBh/	//m—					╞	-					
		RG 80.	400 dBµV/m									
70 dBµ\ (м) 60 dBµ\) I lance	hunpe	where we want	unubru	nor workening	6,0	, and the hase of	hyperter	thyburnhelye.	hyperperiod	uniter with the	untrationspectations
50 dBµ\	//m-											
40 dBµ\	//m-											
CF 433	.9 MH	Iz			1001	pts	;					200.0 ms/
Marker												
Type	Ref	Trc	X-value		Y-value	1	Func	tion		Fun	ction Resu	lt
M1		1		0.0 s	93.50 dBµ∀/	m						
D2 D3	M1 M1	1		3.3 ms 0.0 ms	0.01 0							
							Re	ady			L)a	01/15/2024 02:30:29 PM

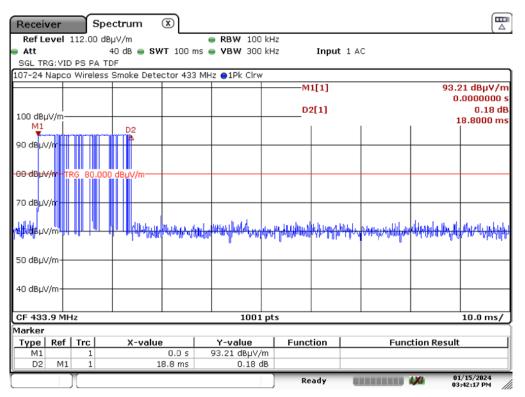
Date: 15.JAN.2024 14:30:29





7.2. Operational Requirements (Section 15.231(a))

- 7.2.2. Requirement: A transmitter activated automatically shall cease transmission within 5 seconds after activation (Section 15.231(a)(2)).
 - Status: Compliant The device's longest transmission is 18.3 mS which it performs once an hour.



Date: 15.JAN.2024 15:42:18





7.2. Operational Requirements (Section 15.231(a))

- 7.2.3. Requirement: Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour (Section 15.231(a)(3)).
 - Status: Compliant, the device sends a 18.3 mS message once an hour.
- 7.2.4. Requirement: Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition. (Section 15.231(a)(4)).
 Status: Noted.
- 7.2.5. Requirement: Transmission of set-up information for security systems may exceed the transmission duration limits in paragraphs (a)(1) and (a)(2) of this section, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include
 - Status: Noted.

data.





7.3. Radiated Field Strength of Fundamental (15.231, Section (b))

Requirement: The 3 meter field strength of the fundamental emissions from intentional radiators operating within the 260-470 MHz frequency bands shall comply with the limits specified in FCC Part 15.231, Section (b). The limit is based on a linear interpolation of the following field strength:

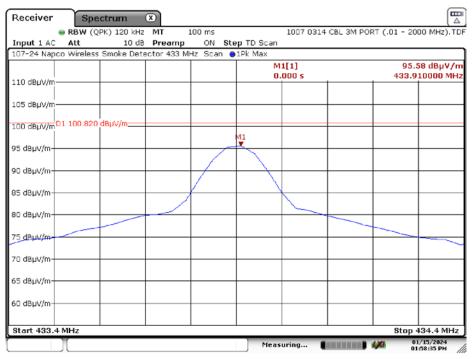
Fundamental Frequency	Field Strength of Fundamental
(MHz)	(μV/m)
260–470	3,750 to 12,500 μV/m

Fundamental Limit at 433.9 MHz = 10,996 μ V/m = 80.82 dB μ V/m

Conclusion: Compliant - The radiated field strength of the device under test complies with the requirements detailed in FCC Part 15.231, Section (b).

7.3.1. Worst Case Radiated Field Strength of Fundamental

Frequency (MHz)	Amplitude ¹ (dBµV/m)		Duty Cycle Correction	Amplitude (dBµV/m)	Limit (dBµV/m)		Margin (dB)		Ant Polarity	Ant Height	Turntable Azimuth	Result
(Peak	QP	dB	Average	Peak	Average	Peak	Ave	H/V	cm	Deg	
433.9	95.98		-20.14	75.84	100.82	80.82	-4.84	-4.98	Н	215	74	Compliant



Date: 15.JAN.2024 13:58:36





7.4. Radiated Field Strength of Harmonics (15.231, Section (b))

Requirement: The 3 meter field strength of the harmonic emissions from intentional radiators operating within the 260-470 MHz frequency band shall comply with the limits specified in FCC Part 15.231, Section (b). The limit is based on a linear interpolation of the following field strength:

Fundamental	Field Strength of
Frequency	Spurious Emissions
(MHz)	(μV/m)
260–470	375 to 1250

Spurious Emissions Limit = 1,099.58 μ V/m = 60.82 dB μ V/m

- Test Notes: For emissions falling within in the restricted bands of operation (reference FCC Part 15.205), the lower FCC Part 15.209 limits take precedence. The peak field strength may not be greater than 20 dB above the average limit.
- Conclusion: Compliant The device under test complies with the requirements detailed in FCC 15.231, Section (b).

7.4.1. Harmonics < 1 GHz

Freq. (MHz)	Measured Peak Field Strength (dBµV/m)		Duty Cycle CF	Strength	Limit (dBµV/m)		Margin (dBµV/m)		Ant. Pol. (H/V)	Ant. Ht. (cm)	Table Position (Deg)	Result
	Peak		(dB)	(dBµV/m)¹	Peak	Avg.	Peak	Avg.				
867.80	54.83		-20.14	34.69	80.82	60.82	-25.99	-26.13	Н	100	318	Compliant
867.80	52.79		-20.14	32.65	80.82	60.82	-28.03	-28.17	V	184	34	Compliant

¹ Average Field Strength = Peak Field Strength – Duty Cycle Correction Factor

7.4.2. Harmonics > 1 GHz

Freq. (MHz)	Measured Peak Field Strength (dBµV/m)		Duty Cycle CF	Average Field Strength	Lin (dBµ'			rgin V/m)²	Ant. Pol. (H/V)	Ant. Ht. (cm)	Table Position (Deg)	Result
	Peak	Peak Avg.	(dB)	(dBµV/m)¹	Peak	Avg.	Peak	Avg.	Avg.			
1301.70	55.82		-20.14	35.68	74.00	54.00	-18.18	-18.32	Н	145	163	Compliant
1735.60	56.60		-20.14	36.46	80.82	60.82	-24.22	-24.36	Н	252	181	Compliant
2169.50	63.14		-20.14	43.00	80.82	60.82	-17.68	-17.82	Н	165	316	Compliant
2603.40	62.29		-20.14	42.15	80.82	60.82	-18.53	-18.67	Н	380	93	Compliant
3037.30	63.22		-20.14	43.08	80.82	60.82	-17.60	-17.74	Н	352	115	Compliant
3471.20	58.25		-20.14	38.11	80.82	60.82	-22.57	-22.71	Н	284	183	Compliant
3905.10	53.82		-20.14	33.68	74.00	54.00	-20.18	-20.32	Н	278	155	Compliant
4339.00	54.63		-20.14	34.49	74.00	54.00	-19.37	-19.51	Н	194	163	Compliant

¹ Average Field Strength = Peak Field Strength – Duty Cycle Correction Factor

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- 7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231, Section (b)
 - Requirement: The spurious radiated emissions requirements for intentional radiators shall demonstrate compliance with the field strength limits detailed in Part 15.231, Section b, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.
 - Procedure: This test was performed in accordance with the information provided in 47CFR Part 15.231, Section (b).

Test measurements were made in accordance with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

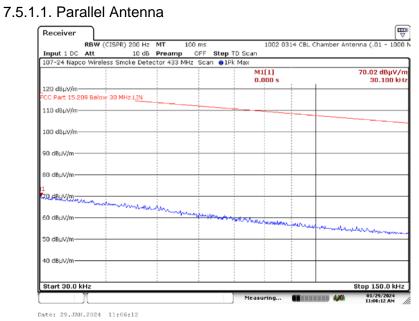
Conclusion: Compliant - The Emissions from the DUT did not exceed the field strength levels specified in Part 15.231, Section (b).



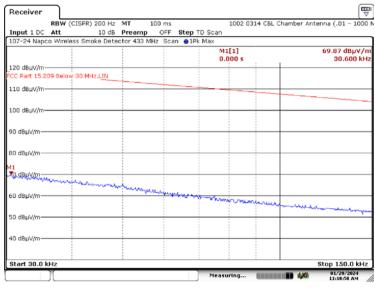


7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b)) (continued)

7.5.1. Spurious Radiated Emissions, 30 kHz to 150 kHz Test Results



7.5.1.2. Perpendicular Antenna



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7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b)) (continued)

7.5.1. Spurious Radiated Emissions, 30 kHz to 150 kHz Test Results

7.5.1.3. Ground Parallel Antenna

	10 dB Preamp			
107-24 Napco Wirele:	ss Smoke Detector 433	MHz Scan 🔵1Pl	k Max	
			M1[1] 0.000 s	70.03 dBµV/n 32.550 kH
120 dBµV/m				
CC Part 15.209 Below	30 MHz.LIN			
110 dBµV/m				
100 dBµV/m				
90 dBuV/m				
80 dBµV/m				
M1 70 dB W/m			an manage and a marked	
man and the with many	an mound and an			
60 dBuN/m	and the second	minghan		
co apprym			monore and here where where	
50 dBµV/m				and the second s
50 ubpv/m				
40 dBuV/m				
HO UBDV/III				
Start 30.0 kHz				Stop 150.0 kHz

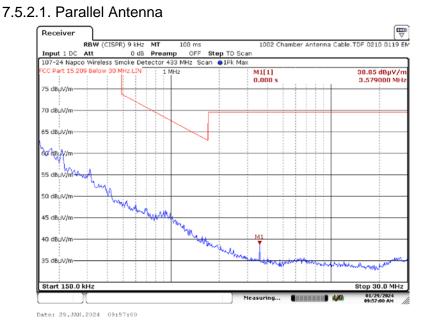
Date: 29.JAN.2024 11:00:59



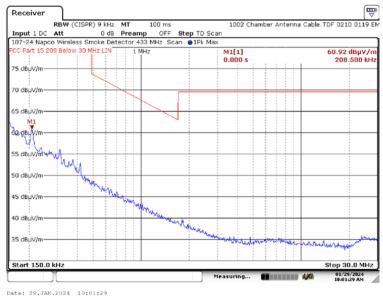


7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b)) (continued)

7.5.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results



7.5.2.2. Perpendicular Antenna



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7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b)) (continued)

7.5.2. Spurious Radiated Emissions, 150 kHz to 30 MHz Test Results

7.5.2.3. Ground Parallel Antenna



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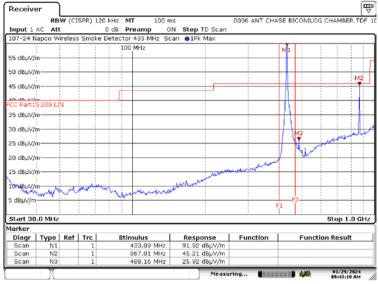




7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b)) (continued)

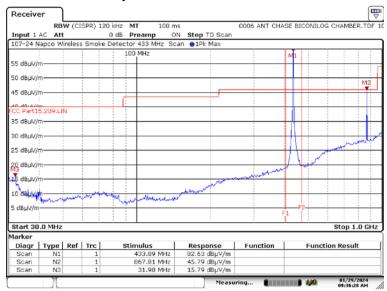
7.5.3. Spurious Radiated Emissions, 30 MHz to 1 GHz Test Results

7.5.3.1. Horizontal Polarity



Date: 29.JAN.2024 09:43:10

7.5.3.2. Vertical Polarity



Date: 29.JAN.2024 09:36:28

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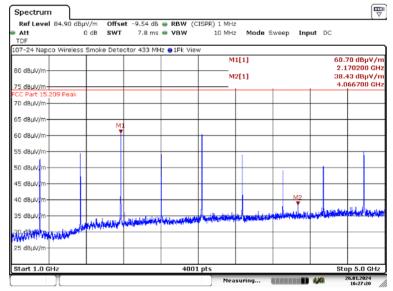




7.5. Spurious Radiated Emissions, 30 kHz to 5 GHz (15.231(b)) (continued)

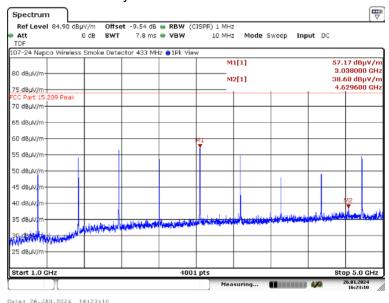
7.5.4. Spurious Radiated Emissions, 1 to 5 GHz Test Results

7.5.4.1. Horizontal Polarity



Date: 26.JAN.2024 16:27:20

7.5.4.2. Vertical Polarity



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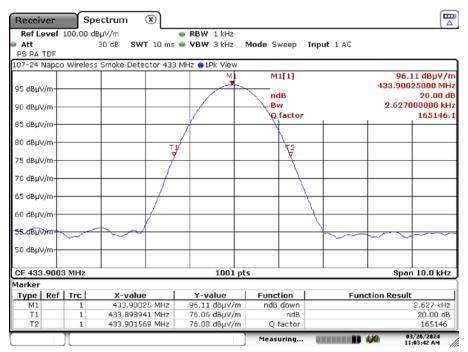




7.6. Emission Bandwidth (FCC P15.231 (c)

- Requirement: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.
- Test Note: Reference ANSI C63.10:2013, Section 6.9.2. The span range for the SA display shall be between two times and five times the OBW. The nominal IF filter bandwidth (3 dB RBW) should be approximately 1% to 5% of the OBW, unless otherwise specified, depending on the applicable requirement. The dynamic range of the SA at the selected RBW shall be more than 10 dB below the target "dB down" (attenuation) requirement.
- Conclusion: Compliant The DUT emission bandwidth meets the above requirement.

Fundamental Frequency	-20 dB Bandwidth	Limit	Result	
(MHz)	(MHz)	(MHz)		
433.9	0.002627	1.0848	Compliant	



Date: 26.MAR.2024 11:03:42





7.7. Conducted Emissions Test Setup

7.7.1. Regulatory Limit: FCC Part 15.207

Frequency Range (MHz)	Limits (dBµV)					
(Quasi-Peak	Average				
0.15 to 0.50	66 to 56*	56 to 46*				
0.50 to 5.0	56	46				
5.0 to 30.0	60	50				
* Decreases with the logarithm of the frequency.						

7.7.2. Measurement Equipment and Software Used to Perform Test

Device	Manufacturer	Model No.	Serial No.	Cal Due
LISN	EMCO	3825/2	9109-1860	1/4/2024
EMI Test Receiver	eiver Rohde & Schwarz ESR7		101156	10/16/2024
Manufacturer	Software De	scription	Title/Model #	Rev.
Compliance Worldwide	Test Report Gener	ation Software	Test Report Generator	1.0

7.7.3. Measurement & Equipment Setup

Test Date:	N/A
Test Engineer:	N/A
Site Temperature (°C):	N/A
Relative Humidity (%RH):	N/A
Frequency Range:	0.15 MHz to 30 MHz
EMI Receiver IF Bandwidth:	9 kHz
EMI Receiver Avg Bandwidth:	≥ 3 * RBW or IF(BW)
Detector Functions:	Peak, Quasi-Peak. & Average
Measurement Uncertainty	± 3.56 dB

7.7.4. Test Procedure

Test measurements were made in accordance with ANSI C63.4-2014, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

Sample Calculation: Final Result = Measurement Value + LISN Factor + Cable Loss.

> Note: All correction factors are loaded into the measurement instrument prior to testing to determine the final result.

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7.8. Duty Cycle Calculations (ANSI C63.10:2013, Section 7.5)

Requirement: When the average value of the pulsed emissions from a DUT must be determined, the average can be found by measuring the peak pulse amplitude and determining the duty cycle correction factor of the pulse modulation. The duty cycle correction factor δ may be expressed in dB as in the following equation:

$$\delta$$
 (dB) = 20_{logdB} (δ)

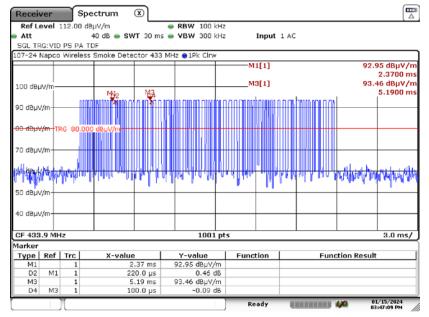
The longest transmitted frame is less than 100 mS, therefore a duty cycle correction factor is applied to the measured peak values.

Note: The EUT's transmission consisted of 50 short pulses and 22 long pulses which were summed to determine the total on time.

7.8.1. Duty Cycle for the Device as Tested

Frequ	nnel Jency Hz)	Time of One Full Cycle (ms)	Time On per One Full Cycle (ms)	Duty Cycle	Duty Cycle Correction Factor 20 * Log (On/Total)	Short Pulses	Long Pulses
433	8.90	100.00	9.840	9.84%	-20.14	50 * 100 µS	22 * 220 µS

7.8.2. Duty Cycle Transmission Time (On Time - long and short pulses)



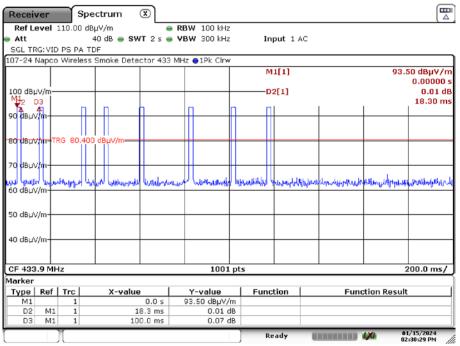
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7.8. Duty Cycle Calculations (ANSI C63.10:2013, Section 7.5)

7.8.3 Repetition Time (Off Time)



Date: 15.JAN.2024 14:30:29





8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with the Federal Communications Commission (FCC) and Innovation Science and Economic Development Canada (ISED) standards. Through our American Association for Laboratory Accreditation (A2LA) ISO Guide 17025 Accreditation our test sites are designated with the FCC (designation number **US1091**), Industry Canada (file number **IC 3023A-1)** and VCCI (Member number 3168) under registration number A-0274.

Compliance Worldwide is also designated as a Phase 1 CAB under APEC-MRA (US0132) for Australia/New Zealand AS/NZS CISPR 22, Chinese-Taipei (Taiwan) BSMI CNS 13438 and Korea (RRA) KN 11, KN 13, KN 14-1, KN 22, KN 32, KN 61000-6-3, KN 61000-6-4.

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022. A second conducted emissions site is also located in the basement of the OATS site with a 2.3 x 2.5 meter ground plane and a 2.4 x 2.4 meter vertical wall.

The radiated emissions test site for measurements above 1GHz is a 3 Meter open area test site (OATS) with a 3.6 by 3.6 meter anechoic absorber floor patch to achieve a quasi-free space measurement environment per ANSI C63.4/C63.10 and CISPR 16-1-4 standards.

The sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.





9.1. Radiated Emissions Front View (Below 30 MHz)







9.2. Radiated Emissions Rear View < 30 MHz



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9.3. Radiated Emissions Front View 30 MHz - 1 GHz







9.4. Radiated Emissions Rear View 30 MHz - 1 GHz



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9. Test Setup Photographs 9.5. Radiated Emissions Front View > 1 GHz







9. Test Setup Photographs 9.6. Radiated Emissions Rear View > 1 GHz



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