



166 South Carter, Genoa City, WI 53128

Company: RF Technologies
Model Tested: 9450-6262
Report Number: 23685b
Project Number: 9618

Code of Federal Regulations 47 Part 15 – Radio Frequency Devices

Subpart C – Intentional Radiators

Section 15.209

Radiated Emission Limits: General Requirements

THE FOLLOWING **MEETS** THE ABOVE TEST SPECIFICATION

FCC ID: KXU-CBTX3

Formal Name: Smart Sense Infant Transmitter
Kind of Equipment: Wireless Infant Security Device
Frequency Range: 318 MHz and 262 kHz
Test Configuration: Body-worn, battery operated device tested in three orthogonal positions.
Model Number(s): 9450-6262
Model(s) Tested: 9450-6262
Serial Number(s): Test Sample 1A – normal operation
Test Sample 262A – FCC test firmware
Date of Tests: April 25th through 27th, 2018
Test Conducted For: RF Technologies, Inc.
3125 N. 126th Street
Brookfield, WI 53005

NOTICE: “This test report relates only to the items tested and must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government”. Please see the "Description of Test Sample" page listed inside of this report.

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SIGNATURE PAGE

Report By:

A handwritten signature in black ink that reads "Craig Brandt". The signature is written in a cursive style with a long horizontal stroke at the end.

Craig Brandt
Test Engineer

Reviewed By:

A handwritten signature in black ink that reads "William Stumpf". The signature is written in a cursive style with a long horizontal stroke at the end.

William Stumpf
OATS Manager

Approved By:

A handwritten signature in black ink that reads "Brian J. Mattson". The signature is written in a cursive style with a long horizontal stroke at the end.

Brian Mattson
General Manager



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United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

*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 17025:2005.
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 dated January 2009).*

2017-09-29 through 2018-09-30
Effective Dates



[Signature]
For the National Voluntary Laboratory Accreditation Program

**ELECTROMAGNETIC
COMPATIBILITY &
TELECOMMUNICATIONS**

NVLAP LAB CODE 100276-0

Emissions

Designation

Off-site test location

Description

D.L.S. Electronics performs radiated emissions testing at an additional location, 166 South Carter Street, Genoa City, WI 53128.



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1.0 Summary of Test Report

It was determined that the Smart Sense Infant Transmitter, Model 9450-6262, complies with the requirements of CFR 47 Part 15 Subpart C Section 15.209.

Subpart C Applicable Technical Requirements Tested:

Section	Description	Procedure	Note	Compliant?
15.35(c)	Duty Cycle Correction for Pulsed operation	ANSI C63.10-2013	2	Informative
15.209	Intentional Radiator - General Requirements -	ANSI C63.10-2013	1,2	Yes

Note 1: Tested in 3 orthogonal planes.
Note 2: Radiated emission measurement.

2.0 Introduction

On April 25th through 27th, 2018 the Smart Sense Infant Transmitter, Model 9450-6262, as provided from RF Technologies Inc. was tested to the requirements of CFR 47 Part 15 Subpart C Section 15.209. To meet these requirements, the procedures contained within this report were performed by personnel of D.L.S Electronic Systems, Inc.

3.0 Test Facilities

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Innovation Science and Economic Development Canada, and VCCI.

Wisconsin Test Facility:
D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

Wheeling Test Facility:
D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, IL 60090

FCC Registration #90531



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4.0 Description of Test Sample

Description:

The device is a wireless security device intended to prevent the abduction of an infant from a healthcare facility. The device is attached to the ankle of an infant with a stretchable band material, and it is this attachment which enables the monitoring features. Once enabled, the device will periodically send status OK messages wirelessly on a 318 MHz signal to a central computer server which means the infant is within the safe boundary at the healthcare facility. The device can sense security breaches using one or more of the following features: physical cutting of the stretchy band material, a change in resistance of the band material, or a change in capacitive patient proximity measurement. Once a security breach is experienced, the device sends a special alarm signal wirelessly on a 318 MHz RF signal to a central computer server thereby notifying the facility staff. The device also transmits wirelessly periodically at 262 kHz which will cause wireless receivers mounted, for example, at doors to indicate a security breach in the event the device is brought in close proximity to those receivers. The transmitters do not transmit simultaneously on the 318 MHz and 262 kHz.

Type of Equipment / Frequency Range:

Body-Worn / 318 MHz and 262 kHz

Physical Dimensions of Equipment Under Test:

Length: 1.6 in. x Width: 1.2 in. x Height: 0.675 in.

Power Source:

3.6 VDC battery

Internal Frequencies:

16.777216 MHz

Transmit Frequencies Used For Test Purpose:

262 kHz



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4.0 Description of Test Sample (continued)

Type of Modulation(s) / Antenna Type:

OOK / 262 kHz transmitter uses a coil on the circuit board

Description of Circuit Board(s) / Part Number:

PCB Assembly, Smart Sense Tx, 262 kHz	0830-0202
---------------------------------------	-----------

5.0 Test Equipment

A list of the equipment used can be found in the table below. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.

D.L.S. Wisconsin – OATS Site 2 - Test Equipment:

Description	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Dates	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	4-11-18	4-11-19
Cable	Manhattan/CDT	RG-223/U	CBL-031	9 kHz – 1 GHz	2-20-18	2-20-19
Loop Antenna	Electro-Metrics	6502	1027	9 kHz – 30 MHz	8-22-17	8-22-19
Test Software	Rohde & Schwarz	ESK1	V1.7.1	N/A	N/A	N/A



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6.0 Test Arrangements

Radiated Emissions Measurement Arrangement:

All radiated emission measurements were performed at D.L.S. Electronic Systems, Inc. and set up according to ANSI C63.10-2013, unless otherwise noted. Description of procedures and measurements can be found in Appendix B – Measurement Data. See Appendix A for additional photos of the test set up. See Appendix C for measurement uncertainty.

Unless otherwise noted, the bandwidth of the measuring receiver / analyzer used during testing is shown below.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

7.0 Test Conditions

Temperature and Humidity:

70°F at 29% RH

Battery Voltage:

3.6 VDC

8.0 Modifications Made To EUT For Compliance

None noted at time of test.



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9.0 Additional Descriptions

The EUT was programmed to transmit in a special test mode that allowed it to stay transmitting for one second, then off for three seconds, and then repeat that sequence continuously. For testing done in “normal operation mode” the EUT was programmed to use the largest duty cycle possible during normal operation.

10.0 FCC 15.31 (e) Supply Voltage Requirement statement

FCC 15.31 (e) - For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Compliance Statement: This device complies with the requirements of Part 15.31(e):

- This device is battery operated. All tests were performed using a new (or fully charged) battery.
- This device provides a constant regulated voltage to the RF circuitry regardless of supply voltage (see schematic diagrams).
- This device does not provide a constant regulated voltage to the RF circuitry regardless of supply voltage. Data has been supplied in this test report that supports compliance. Details:



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11.0 FCC 15.203 Antenna Requirement statement

SECTION 15.203 ANTENNA 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.... This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221.

Statement: This wireless device (Intentional Radiator) meets the requirements of FCC Part 15.203:

- The antenna is permanently attached
- The antenna has a unique coupling to the intentional radiator.
Description of coupling:
- This intentional radiator is professionally installed
- This intentional radiator, in accordance with Section 15.31(d), must be measured at the installation site.

12.0 Results

Measurements were performed in accordance with ANSI C63.10-2013. Graphical and tabular data can be found in Appendix B at the end of this report.

13.0 Conclusion

The Smart Sense Infant Transmitter, Model 9450-6262 as provided from RF Technologies, Inc., tested on April 25th through 27th, 2018 **meets** the requirements of CFR 47 Part 15 Subpart C Section 15.209.



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Appendix A – Test Setup Photos

Photo Information and Test Setup:

Item: EUT – Smart Sense Infant Transmitter

Radiated X Position



Appendix A

Radiated Y Position





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Appendix A

Radiated Z Position



Appendix B – Measurement Data



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1.0 Field Strength of Emissions – Fundamental and Spurious (262 kHz)

Rule Part: Section 15.209

Test Procedure: ANSI C63.10-2013

Limits:
15.209 (a)

Results: Compliant

Sample Equations:

Total Level = Level + System Loss + Antenna Factor
Final Corrected = Total Level - Duty Cycle Correction
Margin = Limit - Final Corrected

Notes:

Tested at a 3 meter distance.
All other emissions at least 60 dB below the limit.
Since the EUT was not able to transmit continuously, compliance is shown by measurement with a peak detector and applying a duty cycle corrected value to the average limit (see above equations).



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Appendix B

Radiated Fundamental and Spurious Emissions – 9 kHz to 30 MHz
Tested at a 3 Meter Distance

EUT:	9450-6262: Smart Sense Infant Transmitter
Manufacturer:	RF Technologies
Operating Condition:	70 deg F; 26% R.H.
Test Site:	Site 2
Operator:	Craig B
Test Specification:	FCC Part 15.209
Comment:	Battery Operated
Date:	04-26-2018

Notes: All other emissions at least **60** dB under the limit.
 Since unit was not able to transmit continuously, compliance is shown by comparing Peak data against the Average limits.

Frequency (kHz)	Measurement Type	Antenna Polarization	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	EUT Angle (deg)	Comment
196.000	Max Peak	Vert	53.70	10.10	0.1	63.9	0	63.9	121.74	57.8	1.0	270	Spur
	Average						20	43.9	101.74				
262.000	Max Peak	Vert	69.97	10.04	0.1	80.11	0	80.11	119.24	39.1	1.0	90	Fund
	Average						20	60.11	99.24				
524.000	Max Peak	Vert	40.18	10.20	0.1	50.48	0	50.48	93.22	42.7	1.0	90	Harm
	Average						20	30.48	73.22				

Legend: H=Harmonic ; RB=Restricted Band ; F=Fundamental

Level = Total Level - System Loss - Antenna Factor

Final Corrected = Total Level - Duty Cycle Correction

Margin = Limit - Final Corrected



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2.0 Duty Cycle Correction (262 kHz)

Rule Part:

15.35 (c)

Test Procedure:

ANSI C63.10-2013

Limit:

Informative

Results:

Duty Cycle Correction Factor = -40.8 dB

Sample Equation(s):

Five pulses at 0.1804 ms each

Total ON time in 100 ms = 0.902 ms

Duty Cycle correction = $20 \text{ Log}(0.902/100) = -40.8 \text{ dB}$

Notes:

Since the unit was not able to transmit continuously, compliance is determined by comparing peak data, minus duty cycle correction, to the average limit.

Since there is a limit of Peak emission that is only 20 dB above the limit of Average emission, a duty cycle correction factor greater than 20 dB would not be beneficial. Therefore, a duty cycle correction of 20 dB was applied to the Peak detector measurement level to show compliance to the average limits.



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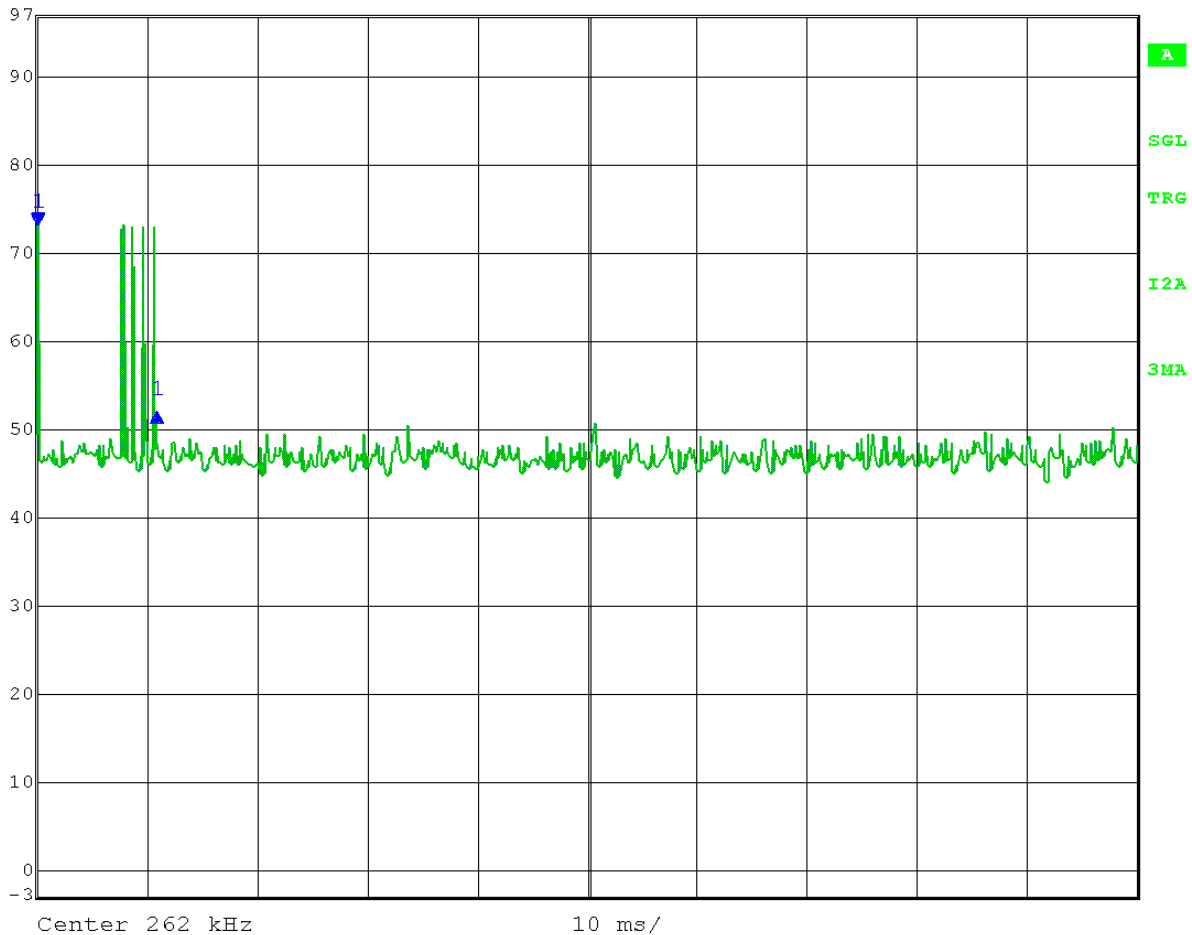
Normal Operation

Test Date: 04-26-2018
Company: RF Technologies
EUT: 9450-6262: Smart Sense Infant Transmitter
Test: Duty Cycle – worst case for normal operation
Operator: Craig B

Comment: Five pulses at 0.1804 ms each
Total ON time in 100 ms = 0.902 ms
Duty Cycle correction = $20 \text{ Log}(0.902/100) = -40.8 \text{ dB}$

100 ms sweep:

	Delta 1 [T3]	RBW	30 kHz	RF Att	10 dB
	Ref Lvl	-21.12 dB	VBW	100 kHz	
	97 dBμV	10.821643 ms	SWT	100 ms	Unit dBμV



Date: 26.APR.2018 14:55:59



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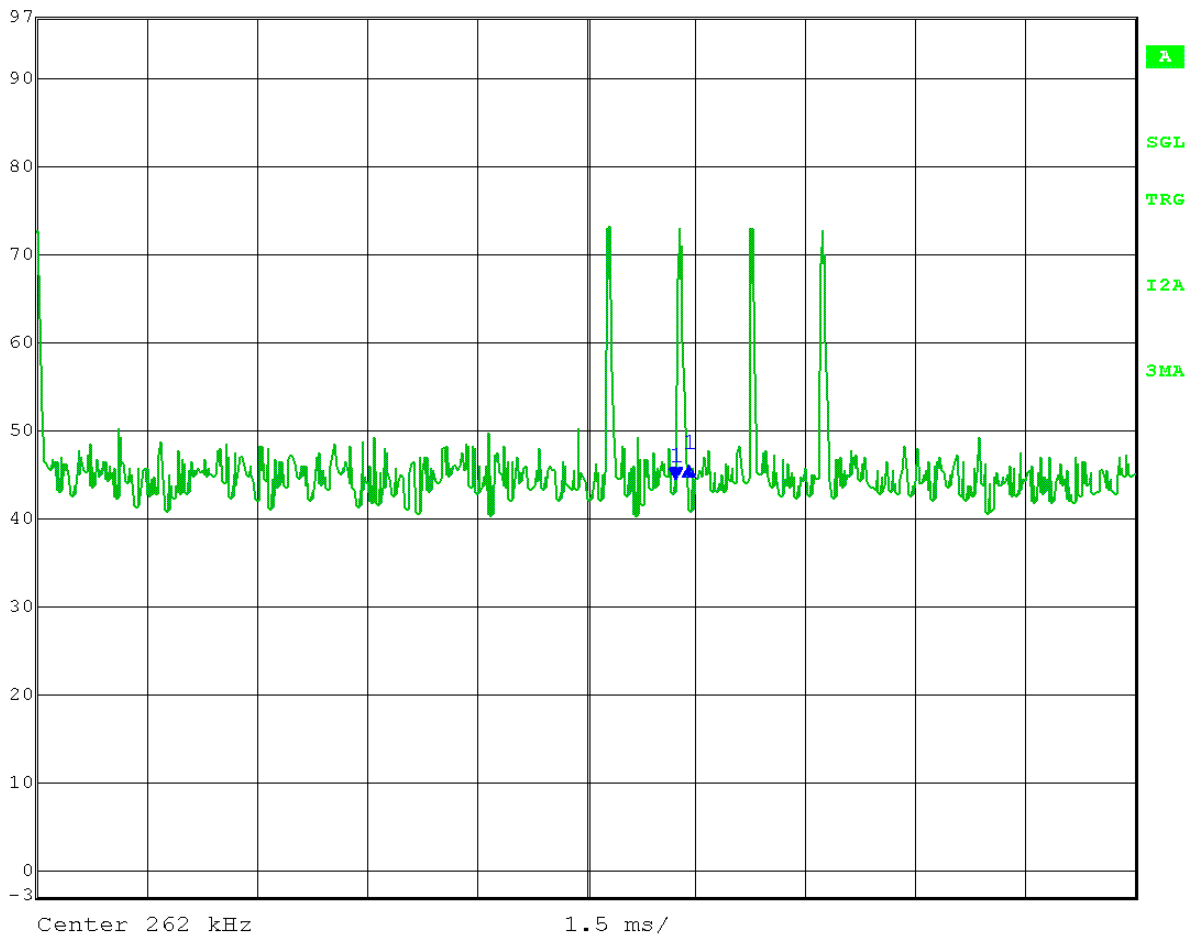
Normal Operation

Test Date: 04-26-2018
Company: RF Technologies
EUT: 9450-6262: Smart Sense Infant Transmitter
Test: Duty Cycle – worst case for normal operation
Operator: Craig B

Comment: Five pulses at 0.1804 ms each
Total ON time in 100 ms = 0.902 ms
Duty Cycle correction = $20 \text{ Log}(0.902/100) = -40.8 \text{ dB}$

ON time of one pulse:

	Delta 1 [T3]	RBW	30 kHz	RF Att	10 dB
	Ref Lvl	1.68 dB	VBW	100 kHz	
	97 dBμV	180.360721 μs	SWT	15 ms	Unit dBμV



Date: 26.APR.2018 14:57:28



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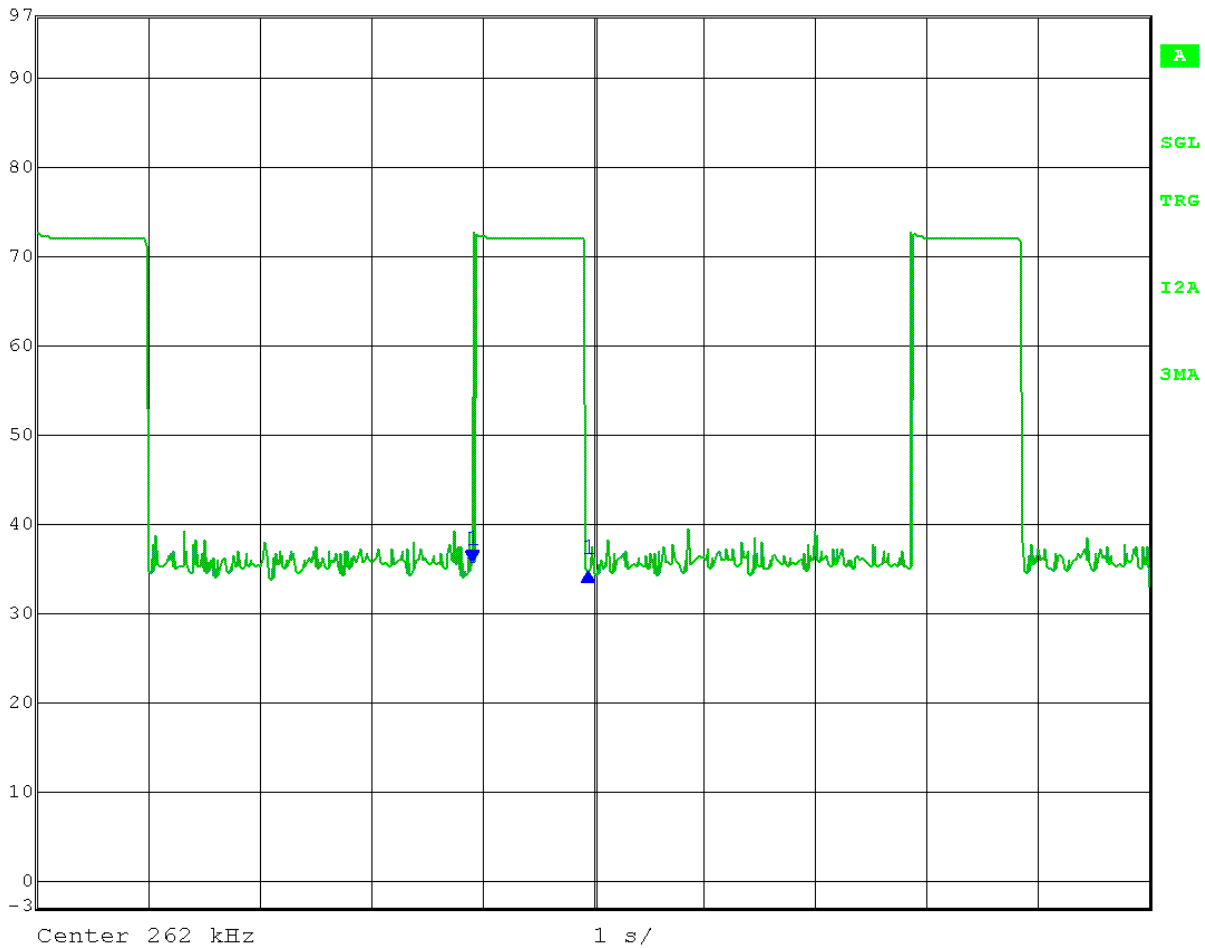
Test Mode

Test Date: 04-26-2018
Company: RF Technologies
EUT: 9450-6262: Smart Sense Infant Transmitter
Test: Duty Cycle – special mode for testing purposes
Operator: Craig B

Comment: ON for 1 second, OFF for 3 seconds.



	Delta 1 [T3]	RBW	3 kHz	RF Att	10 dB
Ref Lvl	-1.06 dB	VBW	10 kHz		
97 dBμV	1.042265 s	SWT	10 s	Unit	dBμV



Date: 26.APR.2018 15:04:04



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Appendix C – Measurement Uncertainty

Compliance with the limits in this standard are based on the results of the compliance measurement. Our calculated measurement uncertainty including the measurement instrumentation, associated connections between the various instruments in the measurement chain, and other contributions, are provided in this section of the test report.

Radiated Emission 9 kHz to 30 MHz Uncertainty

		Uncertainty (+ / - dB)	Uncertainty (+ / - dB)
Contribution	Probability Distribution	3M	3M
		9 kHz - 150 kHz	150 kHz - 30 MHz
Combined Standard Uncertainty	Normal	1.60	1.60
Expanded Uncertainty	Normal (k=2)	3.19	3.19



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END OF REPORT

Revision #	Date	Comments	By
1.0	05-03-2018	Initial Release	CB
2.0	05-21-2018	Removed 318 MHz transmitter data	CB
2.1	05-22-2018	Corrected test equipment list (Loop Antenna)	CB