February 17, 2022

Phoenix Contact Devel Manf.
Thomas Olsen
586 Fulling Mill Road
Middletown, PA 17057

Dear Thomas Olsen,

Enclosed is the Wireless Electromagnetic Compatibility test report for the Phoenix Contact Devel Manf., SHR-900, tested to the Intentional Radiator requirements of:

- Title 47 of the CFR, Ch. 1 (10-1-06), Part 15 Subpart C (§15.247 DSS)

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. Please contact me if you have any questions regarding these results or if Eurofins E&E can be of further service to you.

Sincerely,

Jennifer Warnell

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIR108967-FCC247 DSS Rev. 3

A2LA ACCREDITED TESTING CERT #0591.01

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	May 18, 2021	Initial Issue.
1	December 14, 2021	Output Power Section Updated
2	February 10, 2022	Fixed Formatting on Summary Results Table
3	February 17, 2022	RF Exposure Section Removed per TCB Comment

Table of Contents

List of Tables

1.0 Testing Summary

The Phoenix Contact Devel Manf., SHR-900 was found to be compliant to the following specification(s).

- FCC Part 15 Subpart C (§15.247 DSS)

Donald Salguero
EMC/WIR Laboratory Engineer

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements.

Steve Pitta
Director, Operations Strategy

2.0 Overview

Eurofins Electrical and Electronic Testing NA, Inc. was contracted by Phoenix Contact Devel Manf. to perform testing on the SHR-900, under purchase order number 3001088. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the SHR-900. Phoenix Contact Devel Manf. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the SHR-900, has been **permanently** discontinued.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of Phoenix Contact Devel Manf., SHR-900. All tests were conducted using measurement procedure ANSI C63.10-2013.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	SHR-900
Equipment Emissions Class:	B
FCC ID:	SGV-SHR-900
Equipment Code:	DSS
Type of Modulation:	GMSK
EUT Frequency Range(s):	902 – 928 MHz
Peak RF Output Power:	29.68 dBm; 0.929mW
Transmit Speeds:	16kbps, 125kbps, 250kbps, 500kbps
Antenna Type:	1/4 wave Whip & YAGI
Antenna Gain:	1 and 12 dBi
Firmware Version:	Kernel

2.1 Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 914 West Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology. Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.01) in accordance with ISO/IEC 17025:2017.

2.2 References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
KDB 558074 v05r02	Guidance For Performing Compliance Measurements On Digital Transmission Systems (DTS) Operating Under Section 15.247

2.3 Measurement Uncertainty

Measurement uncertainty calculated as per NIST Technical Note (TN) 1297 and ANSI / NCSL Z540-2, as equivalent to EN 55016-4-2 / IEC CISPR 16-4-2.

Test Method	Typical Expanded Uncertainty	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.20	2	95%
Radiated Emissions, (1 GHz – 6 GHz)	±2.52	2	95%
Conducted Emission Voltage	±2.03	2	95%
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Measurement Uncertainty

2.4 Summary Results

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with SHR-900, purchase order number 3001088. All tests were conducted using measurement procedure ANSI C63.10-2013.

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
Title 47 of the CFR, Part 15 §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	Conducted Emission Limits	Not Applicable
Title 47 of the CFR, Part 15 §15.247(a)(1)	20 dB Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(a)(1)	Average Time of Occupancy (Dwell Time)	Not Tested/Evaluated
Title 47 of the CFR, Part 15 §15.247(a)(1)	Number of RF Channels	Not Tested/Evaluated
Title 47 of the CFR, Part 15 §15.247(a)(1)	RF Channel Separation	Not Tested/Evaluated
Title 47 of the CFR, Part 15 §15.247(b)	Peak Power Output	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	Radiated Spurious Emissions	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	Spurious Conducted Emissions	Compliant
Title 47 of the CFR, Part 15 §15.247(g) & (h)	Declaration Statements for FHSS	Not Tested/Evaluated
Title 47 of the CFR, Part 15 §15.247(i)	Maximum Permissible Exposure (MPE)	Not Tested/Evaluated

Table 1. Summary Results

2.5 Equipment Overview and Test Configuration

Name of EUT/Model:	SHR-900
Description of EUT and Intended Use:	The SHR-900 is a frequency hopping spread spectrum data transceiver module intended for use in Phoenix Contact process control and industrial automation equipment.
Selected Operation Mode(s):	16 kbps Transmit Mode 125 kbps Transmit Mode 250 kbps Transmit Mode 500 kbps Transmit Mode 16 kbps Receive Mode 125 kbps Receive Mode 250 kbps Receive Mode 500 kbps Transmit Mode
Rational for the selection of the Operation Mode(s):	These are the four user selectable data rates. The EUT alternates between transmitting and receiving in a frequency hopping manner
Monitoring Method(s):	An LED alternated between Red and Green in order to indicate Transmit and Receive mode respectively. A factory diagnostic PC utility is used to command the unit into the required non-hopping test modes via a console terminal port. Responses from the UUT indicate that commands are accepted.
Emissions Class Declaration:	Class A
Configurations:	1) 1 dBi Antenna 2) 12 dBi Antenna
EUT Power Requirement	
Voltage:	4
AC or DC:	DC
Voltage Frequency:	N.A.
Number of Phases:	1
Current:	2
Physical Description	
EUT Arrangement:	Table Top
system with Multiple Chassis?	False
Size (HxWxD) inches:	2.0 x 1.8 x 0.4
Weight (lbs):	11g
Highest Internal Frequency (MHz):	928MHz
Other Info	
EUT Software (Internal to EUT):	
Support Software (used by support PC to exercise EUT:	Siwi Tool
Firmware:	Kernel

Transmitter Parameters	
Description of your unit:	FHSS
Modulation Type:	GMSK
Number of Channels:	49
Frequency Range (Mhz):	902 - 928
Antenna Type:	1/4 wave Whip & YAGI
Antenna Gain (db):	1 and 12 dBi
PMN:	Not sold as Module
HVIN:	05
FVIN:	
HMN:	RAD-900-IFS
Data Rates:	16 kbps, 125 kbps, 250 kbps, and 500 kbps
Expected Power Level:	1 Watt
Number of Antenna:	1
Number of Intentional Transmitters:	1
Number of Certified Intentional Transmitter Modules:	1

Ref.ID	Name/Description	Model Number	Part Number	Serial Number	Rev. #
--	--	SHR-900	--	--	--
--	Test Fixture	--	--	--	--
--	RF Cable	--	--	--	--
--	1 dBi Antenna	S331AM-915	--	--	--
--	12 dBi Antenna	5606614	--	--	--
--	Power Cable	--	--	--	--
--	Laptop	--	--	--	--
--	Power Supply	--	--	--	--
--	Test Fixture	--	--	--	--
--	RF Cable	--	--	--	--
--	1 dBi Antenna	S331AM-915	--	--	--
--	12 dBi Antenna	5606614	--	--	--
--	Power Cable	--	--	--	--
--	Laptop	--	--	--	--
--	Power Supply	--	--	--	--
--	Test Fixture	--	--	--	--
--	RF Cable	--	--	--	--
--	1 dBi Antenna	S331AM-915	--	--	--
--	12 dBi Antenna	5606614	--	--	--
--	Power Cable	--	--	--	--
--	Laptop	--	--	--	--
--	Power Supply	--	--	--	--
--	Test Fixture	--	--	--	--
--	RF Cable	--	--	--	--
--	1 dBi Antenna	S331AM-915	--	--	--

Ref.ID	Name/Description	Model Number	Part Number	Serial Number	Rev. #
--	12 dBi Antenna	5606614	--	--	--
--	Power Cable	--	--	--	--
--	Laptop	--	--	--	--
--	Power Supply	--	--	--	--

Table 2. EUT List

Ref.ID	Name/Description	Manufacturer	Model Number	Customer Supplied Calibration Data
--	Test Fixture	Phoenix Contact	N/A	N/A
--	RF Cable	Phoenix Contact	N/A	N/A
--	1 dBi Antenna	Phoenix Contact	--	N/A
--	12 dBi Antenna	Phoenix Contact	5606614	N/A
--	Power Cable	Phoenix Contact	N/A	N/A
--	Laptop	--	--	N/A

Table 3. Support Equipment List

Ref.ID	Port Name on EUT	Cable Desc. or reason for none	QTY	Length as tested (m)	Max Length (m)	Shielded?	Termination Box ID & Port Name
--	Power	Pair	2 wires	Enough to exit chamber	N/A in use	No	Lab Supply
--	Control	Serial	3 Wires	24" Coiled	N/A in use	No	USB-Serial adapter, not used during testing
--	RF	Antenna	1	0, 18"	--	No	--

Table 4. Ports and Cabling Information

2.6 Modifications to the EUT

No modifications were made to the EUT.

2.7 Modifications to the Standard

No modifications were made to the Test Standard.

2.8 Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to Phoenix Contact Devel Manf. upon completion of testing.

3.0 Electromagnetic Compatibility Criteria for Intentional Radiators

3.1 §15.203 Antenna Requirement

Test Requirement: **§ 15.203:** 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is compliant the criteria of §15.203.

Test Engineer(s): Donald Salguero

Gain	Type	Model	Manufacturer
1dBi	¼ Wave	2885676	Phoenix Contact
12dBi	Yagi	5606614	Phoenix Contact

Table 5. Antenna List

3.2 §15.207(a) Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Results: The EUT was not appliable with this requirement. EUT is DC powered, and will be embedded into a host device which provides regulated power.

3.3 §15.247(a)(1) 20 dB Bandwidth

Test Requirements: **§ 15.247(a):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1)(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Test Procedure: The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1-5% of the total emission bandwidth. The 20 dB bandwidth was measured and recorded.

Test Results The EUT was compliant with § 15.247 (a)(2).

Test Engineer(s): Donald Salguero

Test Date(s): 05/11/2021

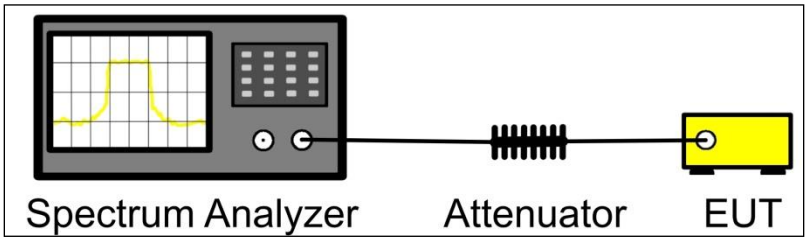


Figure 1. Block Diagram, Occupied Bandwidth Test Setup

Test Results

Data Rate (kbps)	Center Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
16	902.3	20.01	<500
	915	19.876	<500
	927.675	19.85	<500
125	902.25	160.605	<500
	915	160.286	<500
	927.75	159.987	<500
250	902.25	308.768	<500
	915	308.516	<500
	927.75	309.693	<500
500	902.5	478.732	<500
	915	478.897	<500
	927.5	478.899	<500

Table 6. 20 dB Occupied Bandwidth, Test Results

3.4 §15.247(b) Conducted Power Output

Test Requirements: (2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

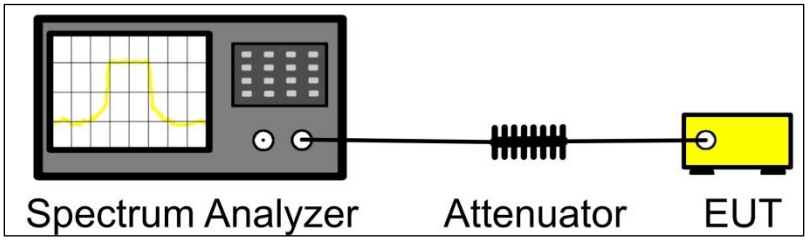
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Procedure: The transmitter was connected to a calibrated spectrum analyzer. The EUT was measured at the low, mid and high channels of each band transmitting at max power. Procedure 7.8.5 from ANSI C63.10-2013 was used to measure the peak power output.

Test Results: The EUT was compliant with the Peak Power Output limits of **§15.247(b)**.

Test Engineer(s): Donald Salguero

Test Date(s): 03/25/2021 – 03/30/2021; 12/6/2021



Power Output Test Setup

Test Results

Data Rate (kbps)	Center Frequency (MHz)	Antenna Gain (dBi)	Peak Power (dBm)	Limit (dBm)	Margin (dB)	EIRP (dBm)	Limit (dBm)	EIRP Margin (dB)
16	902.3	1	28.52	30	-1.48	29.52	36	-6.48
		12	20.95	24	-3.05	32.95	36	-3.05
	915	1	29.33	30	-0.67	30.33	36	-5.67
		12	22.43	24	-1.57	34.43	36	-1.57
	927.675	1	29.23	30	-0.77	30.23	36	-5.77
		12	23.57	24	-0.43	35.57	36	-0.43
125	902.25	1	28.48	30	-1.52	29.48	36	-6.52
		12	20.7	24	-3.3	32.7	36	-3.3
	915	1	29.68	30	-0.32	30.68	36	-5.32
		12	22.59	24	-1.41	34.59	36	-1.41
	927.75	1	29.43	30	-0.57	30.43	36	-5.57
		12	23.23	24	-0.77	35.23	36	-0.77
250	902.25	1	28.57	30	-1.43	29.57	36	-6.43
		12	20.82	24	-3.18	32.82	36	-3.18
	915	1	29.64	30	-0.36	30.64	36	-5.36
		12	22.35	24	-1.65	34.35	36	-1.65
	927.75	1	29.29	30	-0.71	30.29	36	-5.71
		12	22.96	24	-1.04	34.96	36	-1.04
500	902.5	1	29.08	30	-0.92	30.08	36	-5.92
		12	20.98	24	-3.02	32.98	36	-3.02
	915	1	29.6	30	-0.4	30.6	36	-5.4
		12	22.44	24	-1.56	34.44	36	-1.56
	927.5	1	29.61	30	-0.39	30.61	36	-5.39
		12	23.47	24	-0.53	35.47	36	-0.53

Table 7. Maximum Conducted Power Output, Test Results

3.5 §15.209/§15.247(d) Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110----------	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505----------	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905----------	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128----------	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775----------	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775----------	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218----------	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825----------	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225----------	123–138	2200–2300	14.47–14.5
8.291–8.294----------	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366----------	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675----------	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475----------	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293----------	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025----------	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725----------	322–335.4	3600–4400	([2])
13.36-13.41			

Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

§ 15.209 (a): Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the table below.

Frequency (MHz)	§ 15.209(a),Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

Test Procedure: The transmitter was set to the mid channel at the highest output power and placed on a 0.8 m high wooden table inside in a semi-anechoic chamber. Measurements were performed with the EUT rotated 360 degrees and varying the adjustable antenna mast with 1 m to 4 m height to determine worst case orientation for maximum emissions. Measurement were repeated the measurement at the low and highest channels.

For frequencies from 30 MHz to 1 GHz, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

In accordance with §15.35(b) the limit on the radio frequency emissions as measured using instrumentation with a peak detector function shall be 20 dB above the maximum permitted average limit for the frequency being investigated unless a different peak emission limit is otherwise specified in the rules.

Radiated Band Edge Test Procedures: The transmitter was turned on. Measurements were performed of the low and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.247(d) and § 15.209**. Emissions apparent to be over the limit fall outside restricted band; therefore, the limit is being attenuated 20dB from carrier.

Test Engineer(s): Donald Salguero

Test Date(s): 03/22/2021 – 03/25/2021

Test Results

Data Rate (kbps)	Carrier Channel	Frequency (MHz)	Antenna Gain (dBi)	Corrected 100kHz RBW amplitude (dBuV/m)	Carrier Corrected Amplitude (dBuV/m)	dBc	Limit (dBc)
125	high	1.8554	1	66.59	120	-53.41	-20
125	hopping	1.838	1	69.57	122	-52.43	-20
125	low	1.8044	1	54.74	122	-67.26	-20
125	mid	1.8299	1	60.7	112.37	-51.67	-20
16	high	1.8553	1	65.23	122	-56.77	-20
16	hopping	1.8334	1	64.67	122	-57.33	-20
16	low	1.8046	1	60.92	120	-59.08	-20
16	mid	1.83	1	64.05	112.36	-48.31	-20
250	high	1.8554	1	58.14	120	-61.86	-20
250	hopping	1.8479	1	69.12	122	-52.88	-20
250	low	1.8044	1	57	122	-65	-20
250	mid	1.8299	1	62.17	112.39	-50.22	-20
500	high	1.8527	1	61.64	122	-60.36	-20
500	low	1.8047	1	57.43	122	-64.57	-20
500	mid	1.8287	1	58.76	112.31	-53.55	-20

Table 8. Radiated Spurious Emissions, Test Results

3.6 §15.247(d) Spurious Emissions in Non-restricted Bands

Test Requirement: **15.247(d)** In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

The EUT was connected to a spectrum analyzer through a cable and an attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels for all its bandwidths at maximum power. Conducted spurious emissions were measured according to sections 11.11.2 and 11.11.3 of ANSI C63.10-2013.

Test Results: The EUT was compliant with the Spurious Emission limits of **§15.247(d)**.

Test Engineer(s): Donald Salguero

Test Date(s): 03/25/2021 – 03/30/2021

Test Results

Data Rate (kbps)	Carrier Channel	Frequency (MHz)	Antenna Gain (dBi)	100kHz RBW Amplitude (dBm)	Carrier Reference Amplitude (dBm)	dBc	Limit (dBc)
125	low	902	1	5.367	28.47	-23.103	-20
125	hopping	902	1	-40.07	1.55	-41.62	-20
125	hopping	928	1	-32.17	1.55	-33.72	-20
125	high	928	1	8.002	29.7	-21.698	-20
125	low	902	12	-15.35	20.72	-36.07	-20
125	hopping	902	12	-10.13	24.72	-34.85	-20
125	hopping	928	12	-14.98	24.72	-39.7	-20
125	high	928	12	-9.36	22.71	-32.07	-20
16	low	902	1	-24.59	28.52	-53.11	-20
16	hopping	902	1	-32.21	30.08	-62.29	-20
16	hopping	928	1	-13.16	30.08	-43.24	-20
16	high	928	1	-12.53	29.23	-41.76	-20
16	low	902	12	-31.76	20.95	-52.71	-20
16	hopping	902	12	-38.14	24.05	-62.19	-20
16	hopping	928	12	-20.56	24.05	-44.61	-20
16	high	928	12	-18.26	23.57	-41.83	-20
250	low	902	1	-34.32	-0.39	-33.93	-20
250	hopping	902	1	-25.31	1	-26.31	-20
250	hopping	928	1	-23.78	1	-24.78	-20
250	high	928	1	-22.61	0.05	-22.66	-20
250	low	902	12	-2.44	20.81	-23.25	-20
250	hopping	902	12	-2.2	24.48	-26.68	-20
250	hopping	928	12	-0.74	24.48	-25.22	-20
250	high	928	12	-0.14	22.92	-23.06	-20
500	low	902	1	-5.852	28.52	-34.372	-20
500	hopping	902	1	-36.52	0.95	-37.47	-20
500	hopping	928	1	-28.3	0.95	-29.25	-20
500	high	928	1	1.514	29.48	-27.966	-20
500	low	902	12	-16.69	21.14	-37.83	-20
500	hopping	902	12	-17.24	24.67	-41.91	-20
500	hopping	928	12	-7.29	24.67	-31.96	-20
500	high	928	12	-6.95	23.26	-30.21	-20

Table 9. Conducted Spurious Emissions, Test Results

4.0 Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Asset	Equipment	Manufacturer	Model	Calibration Date	Calibration Due Date
1T4753	Antenna - Bilog	Sunol Sciences	JB6	12/21/2020	6/21/2022
1T4757	Antenna; Horn	ETS-Lindgren	3117	6/29/2020	12/29/2021
1T4409	EMI Receiver	Rohde & Schwarz	ESIB7	1/21/2021	1/21/2022
1T4612	Spectrum Analyzer	Agilent Technologies	E4407B	3/4/2020	9/4/2021
1T6658	Spectrum Analyzer	Agilent Technologies	E4407B	9/7/2021	3/7/2023
1T8744	Spectrum Analyzer (PSA)	Agilent Technologies	E4440A	12/14/2020	6/14/2022
1T8743	Preamplifier	A.H. Systems, Inc.	PAM-0118P	See Note	
1T4300B	Semi-Anechoic 3m Chamber sVSWR	EMC TEST SYSTEMS	NONE	8/16/2019	8/16/2021
1T4300	SEMI-ANECHOIC CHAMBER (NSA)	EMC TEST SYSTEMS	NONE	8/16/2019	8/16/2021

Table 10. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

END OF REPORT