



**Application
For**

**Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an
Intentional Radiator per Part 15, Subpart C, paragraphs 15.207, 15.209 and 15.247**

And

**Innovation, Science, and Economic Development Canada
Certification Per
IC RSS-Gen (Issue 5), General Requirements for Radio Apparatus
And
RSS-247 (Issue 3), Digital Transmission Systems (DTSS), Frequency Hopping
Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices**

For the

Copeland Cold Chain LP

Model Number: PSASII-04

**FCC ID: WPEPSASII-04
IC: 8031A-PSASII04**

**UST Project: 23-0218
Issue Date: April 22, 2024**

Total Pages: 54

**3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
www.ustech-lab.com**



Testing Tomorrow's Technology

I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: Alan Ghasiani

Title: Compliance Engineer – President

Date: April 22, 2024



This report shall not be reproduced except in full. This report may be copied in part only with the prior written approval of US Tech. The results contained in this report are subject to the adequacy and representative character of the sample provided. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the Federal Government.

3505 Francis Circle Alpharetta, GA 30004
PH: 770-740-0717 Fax: 770-740-1508
www.ustech-lab.com

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

MEASUREMENT TECHNICAL REPORT

COMPANY NAME: Copeland Cold Chain LP
MODEL: PSASII-04
FCC ID: WPEPSASII-04
IC: 8031A-PSASII04
DATE: April 22, 2024

This report concerns (check one): ☒ Original ☐ Class II Permissive Change

Equipment type: 900 MHz ISM Radio Transceiver Module.

Technical Information:

Radio Technology:	DTS
Frequency of Operation (MHz):	902.75 – 927.25
Output Power (dBm):	3.0
Type of Modulation:	FSK
Data/Bit Rate:	100 kbps
Antenna Gain (dBi):	2.0
Software used to program EUT:	SSH
EUT firmware:	N/A
Power setting:	“Default”

3505 Francis Circle Alpharetta, GA 30004

PH : 770-740-0717 Fax : 770-740-1508

www.ustech-lab.com

Table of Contents

<u>Paragraph Title</u>	<u>Page</u>
1 General Information.....	7
1.1 Purpose of this Report	7
1.2 Characterization of Test Sample.....	7
1.3 Product Description	7
1.4 Configuration of Tested System.....	8
1.5 Test Facility.....	8
1.6 Related Submittal(s)/Grant(s)	8
2 Tests and Measurements	10
2.1 Test Equipment.....	10
2.2 Modifications to EUT Hardware	10
2.3 Number of Measurements for Intentional Radiators (15.31(m), RSS-Gen 6.8)	11
2.4 Frequency Range of Radiated Measurements (Part 15.33, RSS-Gen 6.13)	11
2.4.1 Intentional Radiator.....	11
2.4.2 Unintentional Radiator	11
2.5 Measurement Detector Function and Bandwidth (CFR 15.35, RSS-Gen 6.9, 6.13)	12
2.5.1 Detector Function and Associated Bandwidth	12
2.5.2 Corresponding Peak and Average Requirements.....	12
2.6 EUT Antenna Requirements (CFR 15.203, RSS-Gen 6.7)	12
2.7 Restricted Bands of Operation (Part 15.205, RSS-Gen 8.10).....	14
2.8 Transmitter Duty Cycle (Part 15.35 (c), RSS-Gen 6.10)	14
2.9 Antenna Conducted Intentional and Spurious Emissions (CFR 15.209, 15.247(d)) (IC RSS 247, 5.5))	17
2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d), RSS-247, 5.5)	24
2.11 Band Edge Measurements (CFR 15.247(d), RSS-247, 5.5).....	27
2.12 Six (6) dB Bandwidth (CFR 15.247(a)(2), RSS-247, 5.2(a)).....	30
2.13 Occupied Bandwidth, (99% bandwidth)(RSS-GEN (6.6)).....	34
2.14 Maximum Peak Conducted Output Power (CFR 15.247 (b) (3))	38
2.15 Power Spectral Density (CFR 15.247(e), RSS-247, 5.2(b))	42
2.16 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207, RSS-Gen 8.8).....	46
2.17 Intentional Radiator, Radiated Emissions (CFR 15.209, RSS-Gen, 8.9)	48
2.18 Measurement Uncertainty	54

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.18.1 Conducted Emissions Measurement Uncertainty	54
2.18.2 Radiated Emissions Measurement Uncertainty	54
3 Conclusions	54

List of Figures

<u>Figures</u>	<u>Title</u>	<u>Page</u>
Figure 1.	Block Diagram of Test Configuration	13
Figure 2.	Duty Cycle On Time.....	15
Figure 3.	Duty Cycle Off Time.....	16
Figure 4.	Low Channel Active, 30-1000 MHz.....	18
Figure 5.	Low Channel Active, 1 – 18 GHz.....	19
Figure 6.	Mid Channel Active, 30-1000 MHz	20
Figure 7.	Mid Channel Active, 1 – 18 GHz.....	21
Figure 8.	High Channel Active, 30-1000 MHz.....	22
Figure 9.	High Channel Active, 1 – 18 GHz	23
Figure 10.	Band Edge Compliance Low Channel Delta - Peak.....	28
Figure 11.	Band Edge Compliance High Channel Delta - Peak.....	29
Figure 12.	6 dB Bandwidth Low Channel.....	31
Figure 13.	6 dB Bandwidth Mid Channel.....	32
Figure 14.	6 dB Bandwidth High Channel	33
Figure 15.	99% Occupied Bandwidth Low Channel	35
Figure 16.	99% Occupied Bandwidth Mid Channel.....	36
Figure 17.	99% Occupied Bandwidth High Channel	37
Figure 18.	Peak Antenna Conducted Output Power, b mode Low Channel	39
Figure 19.	Peak Antenna Conducted Output Power, b mode Mid Channel	40
Figure 20.	Peak Antenna Conducted Output Power, g mode High Channel.....	41
Figure 21.	Power Spectral Density, b mode Low Channel.....	43
Figure 22.	Power Spectral Density, b mode Mid Channel.....	44
Figure 23.	Power Spectral Density, b mode High Channel	45
Figure 24.	Radiated Emissions RX, 30 MHz - 1000 MHz – Horizontal	51
Figure 25.	Radiated Emissions RX, 30 MHz - 1000 MHz - Vertical	51
Figure 26.	Radiated Emissions RX, 1 GHz - 12 GHz – Horizontal.....	53
Figure 27.	Radiated Emissions RX, 1 GHz - 12 GHz – Vertical.....	53

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

List of Tables

<u>Table</u>	<u>Title</u>	<u>Page</u>
Table 1.	EUT and Peripherals.....	9
Table 2.	Test Instruments	10
Table 3.	Number of Test Frequencies for Intentional Radiators.....	11
Table 4.	Antenna.....	12
Table 5.	Peak Radiated Fundamental & Harmonic Emissions.....	25
Table 6.	Average Radiated Fundamental & Harmonic Emissions	26
Table 7.	Six (6) dB Bandwidth	30
Table 8.	99% Occupied Bandwidth	34
Table 9.	Peak Antenna Conducted Output Power per Part 15.247 (b)(3)	38
Table 10.	Power Spectral Density for Low, Mid and High Bands.....	42
Table 11.	Power Line Conducted Emissions	47
Table 12.	Spurious Radiated Emissions (150 kHz-30MHz)	49
Table 13.	Spurious Radiated Emissions (30 MHz – 1 GHz), Part 15.209(a).....	50
Table 14.	Spurious Radiated Emissions (30 MHz – 1 GHz), Part 15.247(d).....	50
Table 15.	Spurious Radiated Emissions – (Above 1 GHz).....	52

List of Attachments

FCC Agency Agreement	Test Configuration Photographs
IC Agency Agreement	External Photographs
FCC Application Forms	Internal Photographs
IC Application Forms	Theory of Operation
Letter of Confidentiality	RF Exposure
Equipment Label(s)	User's Manual
Block Diagram(s)	IC Cross Reference
Schematic(s)	FCC Modular Approval Letter
	IC Modular Approval Letter

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results and information concerning the suitability of this exact product for public distribution according to ISED RSS-Gen (I5) and RSS-247 (I3) and FCC Rules and Regulations Part 15, Section 247.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on October 3, 2023 in good operating condition.

1.3 Product Description

The EUT is a 900 MHz band radio transceiver used to communicate with other Copeland products. The EUT is declared to be a 902-928 MHz band radio, using FSK modulation with an output power setting of +2.6 dBm max.

This radio transceiver is a being approved as a limited modular radio. This radio is designed to be used in Copeland Cold Chain products such as the CloudGate. Copeland Cold Chain will control the implementation of this radio module. An integration guide will be provided to all module integrators contracted by Copeland Cold Chain.

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.10:2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices* for the intentional radiator aspect of the device and *ANSI C63.4:2014, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2014)* for the unintentional radiator aspect of the device as well as FCC subpart B and C of Part 15 and per FCC KDB Publication number 558074 v03r05 for Digital Transmission Systems Operating Under section 15.247.

Digital RF conducted and radiated emissions data below 1 GHz were taken with the measuring receiver (or spectrum analyzer's) resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements performed above 1.0 GHz were made with a RBW of 1 MHz. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was set to 3 times the RBW or as required per the standard throughout the evaluation process.

A list of EUT and Peripherals is found in Table 1. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are provided in separate Appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its designation number is US5301. Additionally, this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 9900A-1.

1.6 Related Submittal(s)/Grant(s)

The EUT is subject to the following FCC Equipment Authorizations:

- a) Certification of the transmitter incorporated within the EUT, see test data presented herein.

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC/IC ID	CABLES P/D
EUT/ Copeland	CTGX	Engineering Sample	FCC ID: WPEPSASII-04 (Pending) IC: 8031A-PSASII04 (Pending)	PU/DU
Cloudgate-Host Copeland	CG0124	KW4AM7T675	None	PU
Power Adapter	KL-AD-120100	N/A	N/A	N/A

S= Shielded, U= Unshielded, P= Power, D= Data

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2 Tests and Measurements

2.1 Test Equipment

The table below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are included herein.

Table 2. Test Instruments

TEST INSTRUMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DUE DATE
Spectrum Analyzer	Agilent	E4407B	US41442935	9/21/2024 2 yr.
Spectrum Analyzer	Rigol*	DSA815	DSA8A180300138	1/6/2024 2 yr.
Rf Preamp 100 Khz To 1.3 Ghz	Hewlett-Packard	8447D	1937A02980	7/20/2024
Preamp 1.0 Ghz To 26.0 Ghz	Hewlett-Packard*	8449B	3008A00480	3/03/2024
Loop Antenna	ETS Lindgren	6502	9810-3246	12/7/2024 2 yr.
Biconical Antenna	EMCO	3110B	9307-1431	1/13/2025 2 yr.
Log Periodic Antenna	EMCO	3146	9110-3236	12/13/2023 2 yr.
Horn Antenna	EMCO	3115	9107-3723	4/28/2024 2 yr.
High Pass Filter	Microwave Circuits	H3R020G2	001DC9528	8/2/2024
LISN X 2	Solar Electronics	9247-50- TS-50-N	955824 and 955825	4/28/2024

* Instrument calibration date was valid at time of testing.

The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

2.2 Modifications to EUT Hardware

No modifications were made by US Tech to bring the EUT into compliance with FCC Part 15.247 or IC RSS-247 (I3) requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m), RSS-Gen 6.8)

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated, with the device operating at the number of frequencies in each band specified in Table 3.

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates over 902.75 to 927.25 MHz, 3 test frequencies will be used.

2.4 Frequency Range of Radiated Measurements (Part 15.33, RSS-Gen 6.13)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to the range specified in 2.4.1 above, whichever is the higher range of investigation.

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.5 Measurement Detector Function and Bandwidth (CFR 15.35, RSS-Gen 6.9, 6.13)

The radiated and conducted emissions limits shown herein are based on the following:

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.6 EUT Antenna Requirements (CFR 15.203, RSS-Gen 6.7)

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.

Table 4. Antenna

Manufacturer	Model	Type	Gain (dBi)	Connector
Nearson	S463XX-915	Dipole	+2.0	SMA

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

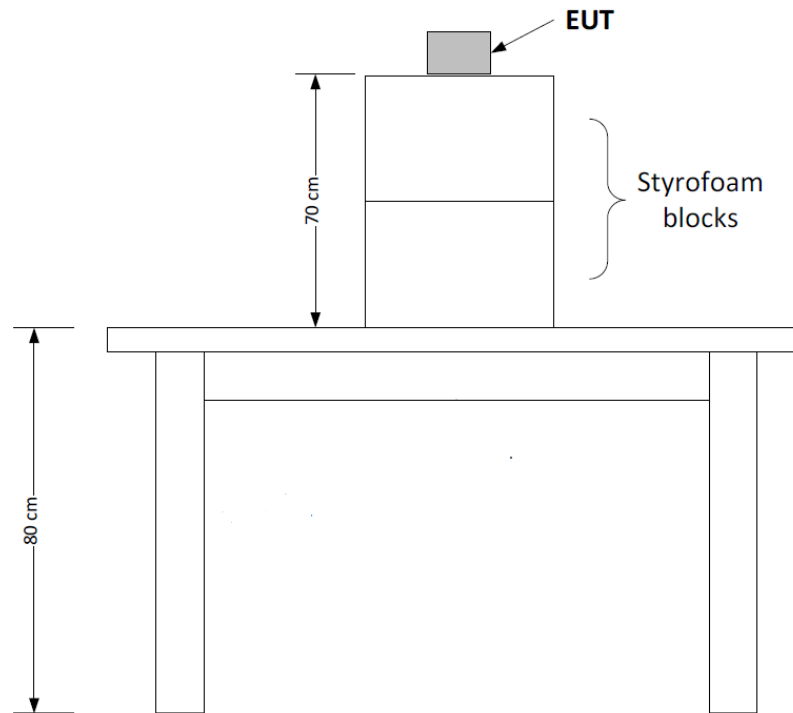


Figure 1. Block Diagram of Test Configuration

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.7 Restricted Bands of Operation (Part 15.205, RSS-Gen 8.10)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.10.

2.8 Transmitter Duty Cycle (Part 15.35 (c), RSS-Gen 6.10)

The EUT employs pulse transmission however for testing purpose the EUT was programmed to transmit at a rate >98%. The pulse transmission requirements of this subpart were acknowledge and considered during testing.

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may also be expressed logarithmically in dB.

The EUT duty cycle has been collected and presented below.

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

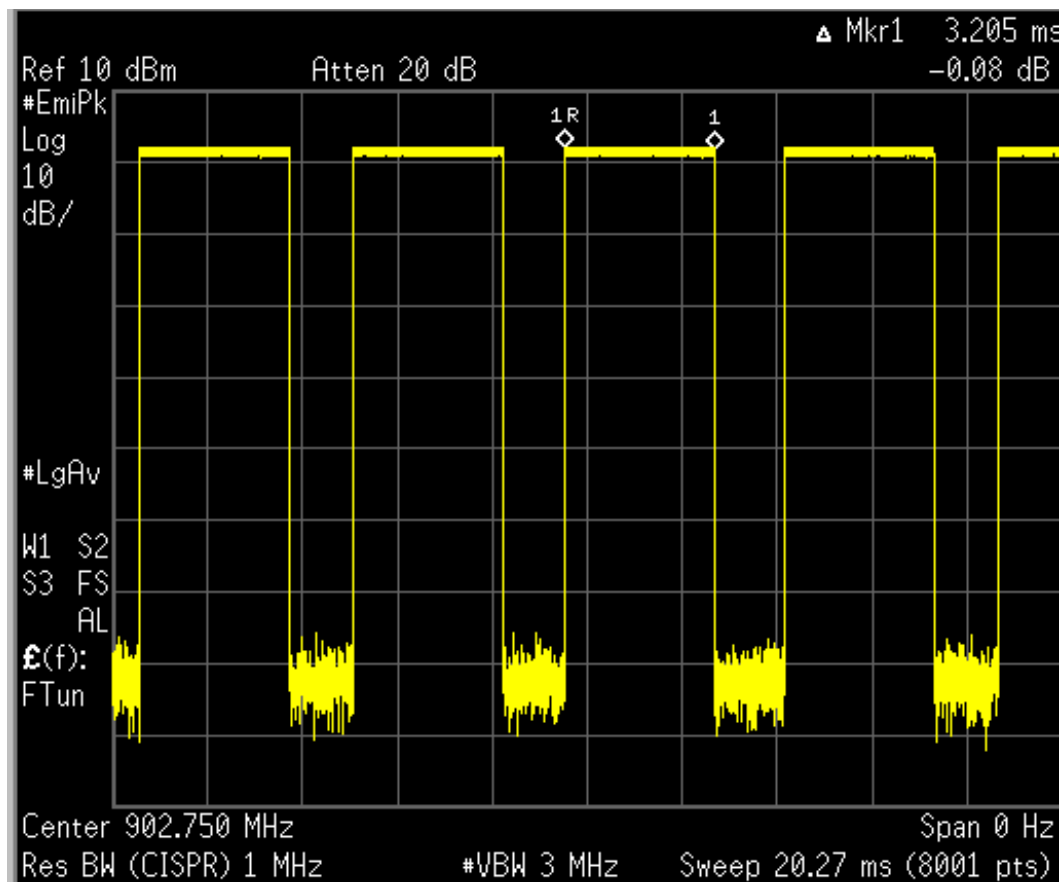


Figure 2. Duty Cycle On Time

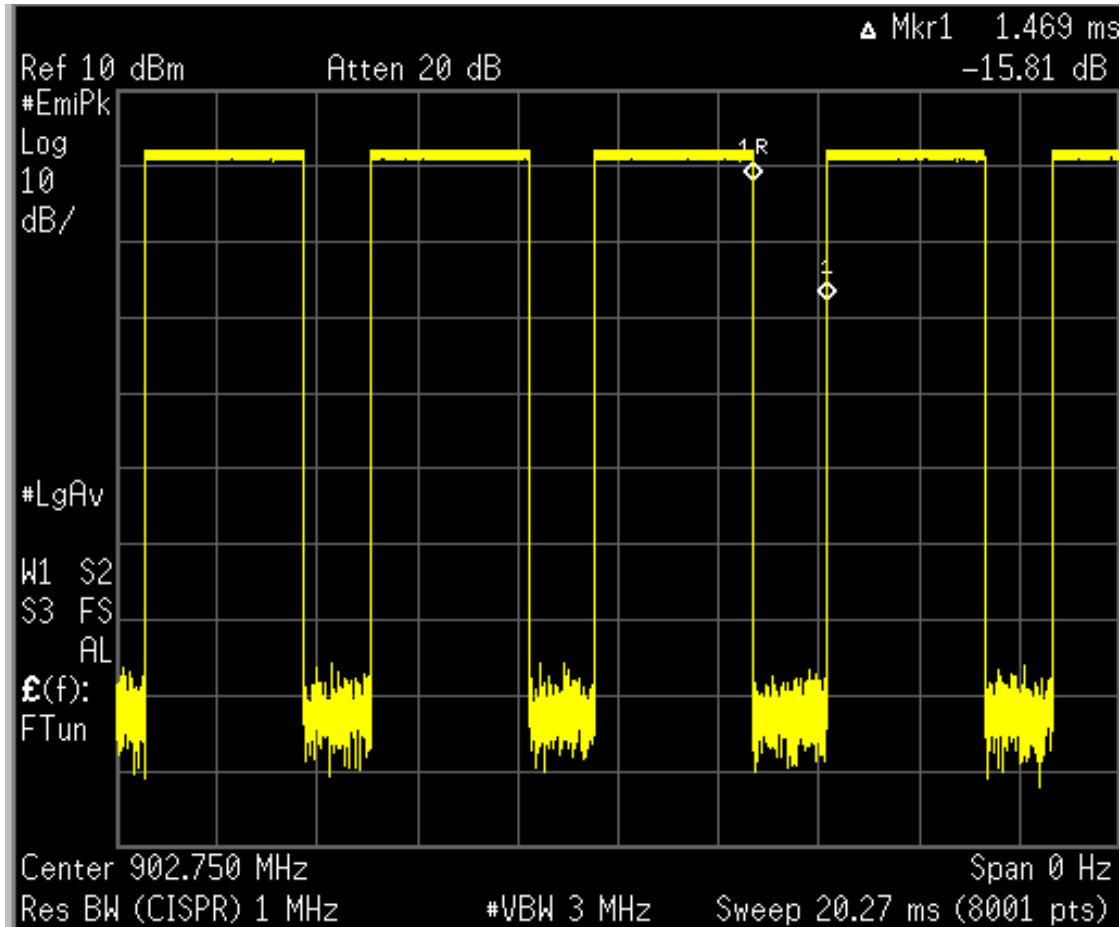


Figure 3. Duty Cycle Off Time

The duty cycle de-rating factor used in the calculation of average radiated limits per CFR 15.35(c) is described below. This factor was calculated by first determining the worst case scenario for system operation. With the worst case operating scenario the transmission duty cycle is calculated as:

3.20 mSec = ON time (Figure 2 above)
 1.47 mSec = OFF time (Figure 3 above)

Duty Cycle Factor= ON time / (ON time+OFF time) = X
 20 Log (X) = DC factor

3.20 mSec/ (4.67 mSec) = 0.68 or 68%
 20 log (0.68) = -3.35 dB = DC factor

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.9 Antenna Conducted Intentional and Spurious Emissions (CFR 15.209, 15.247(d)) (IC RSS 247, 5.5))

The EUT was put into a continuous-transmit mode of operation and tested per ANSI C63.10-2013 for conducted out of band emissions emanating from the antenna port over the frequency range of 30 MHz to ten times the highest clock frequency generate or used in this case, 25 GHz. A conducted scan was performed on the EUT to identify and record spurious signals that were related to the transmitter. Antenna Conducted Emissions of a significant magnitude that fell within restricted bands were then measured as radiated emissions in the EMC Chamber. The conducted emissions graphs are found in the figures below. The limit for antenna conducted power is 1 Watt (30 dBm) per 15.247 (b)(3).

For Conducted RF antenna tests, the RBW was set to 100 kHz, video bandwidth (VBW)> RBW, scan up through the 10th harmonic of the fundamental frequency. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

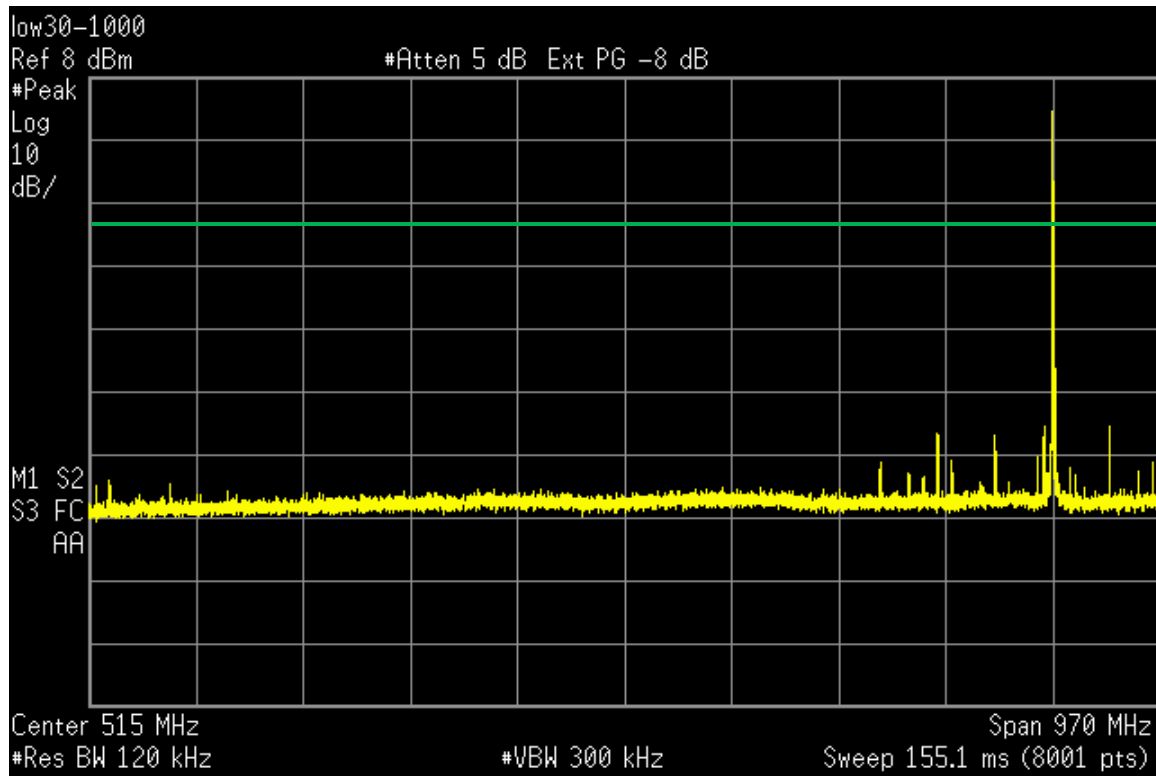


Figure 4. Low Channel Active, 30-1000 MHz

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

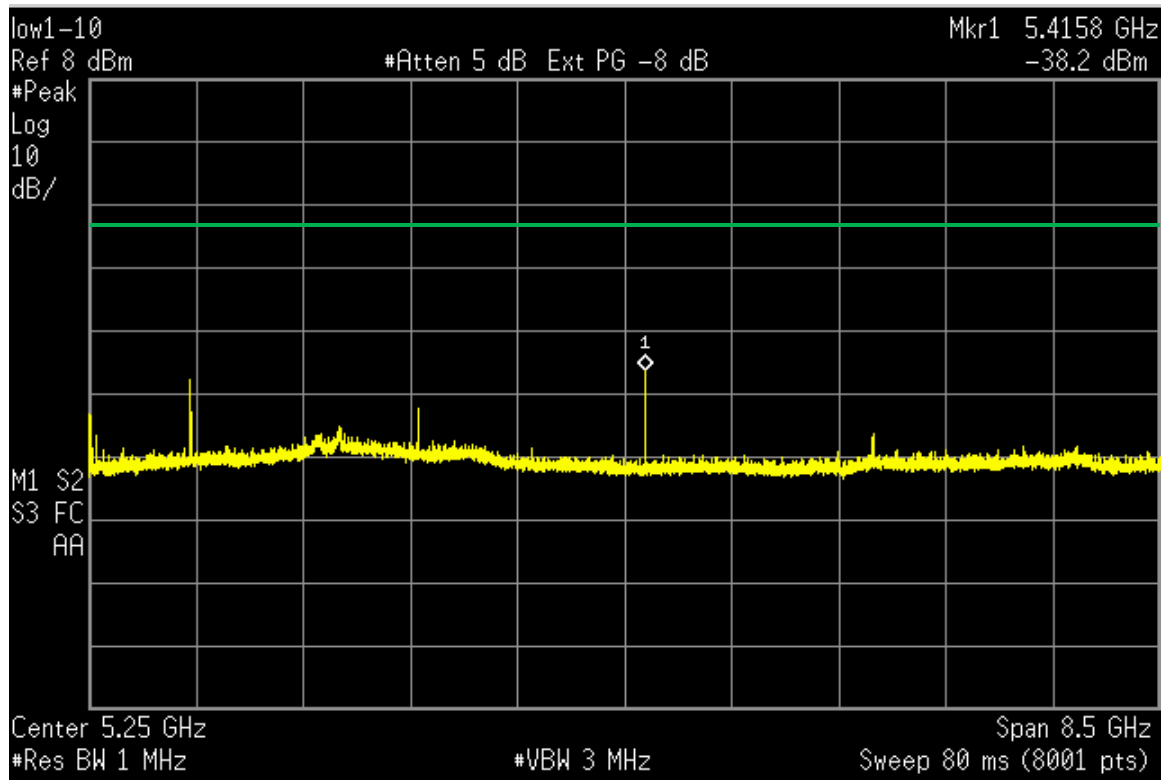


Figure 5. Low Channel Active, 1 – 18 GHz

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

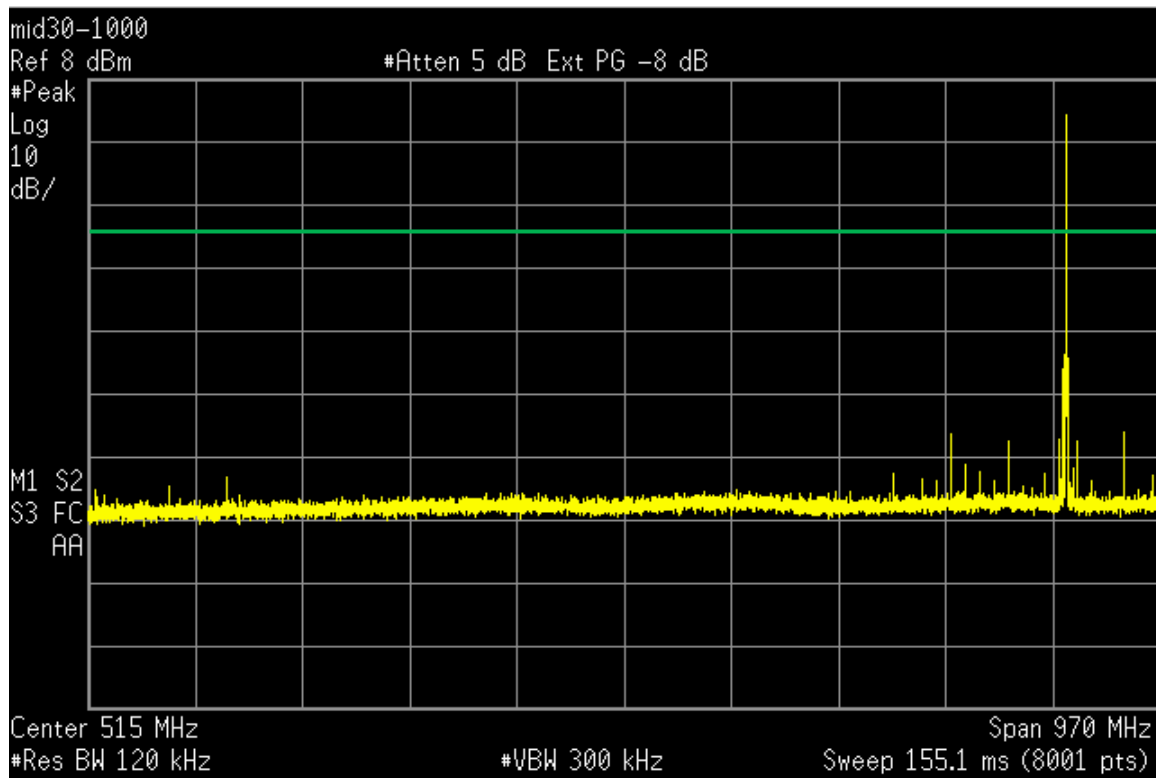


Figure 6. Mid Channel Active, 30-1000 MHz

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

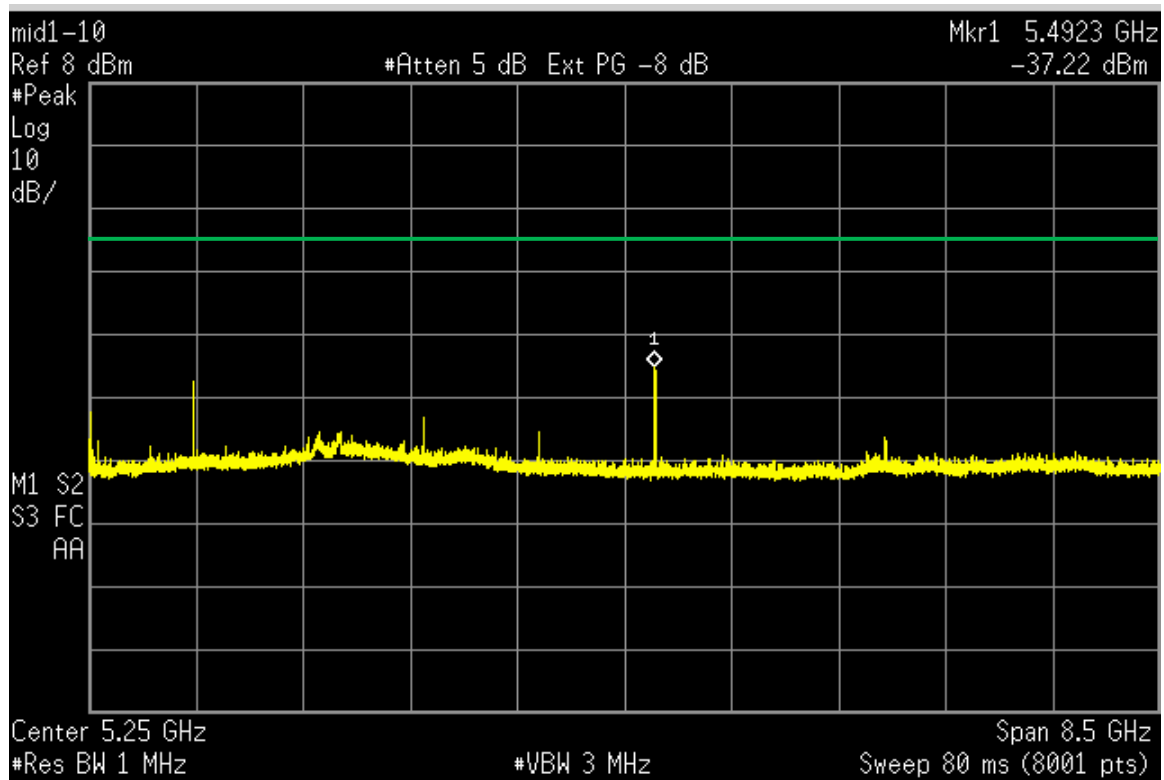


Figure 7. Mid Channel Active, 1 – 18 GHz

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

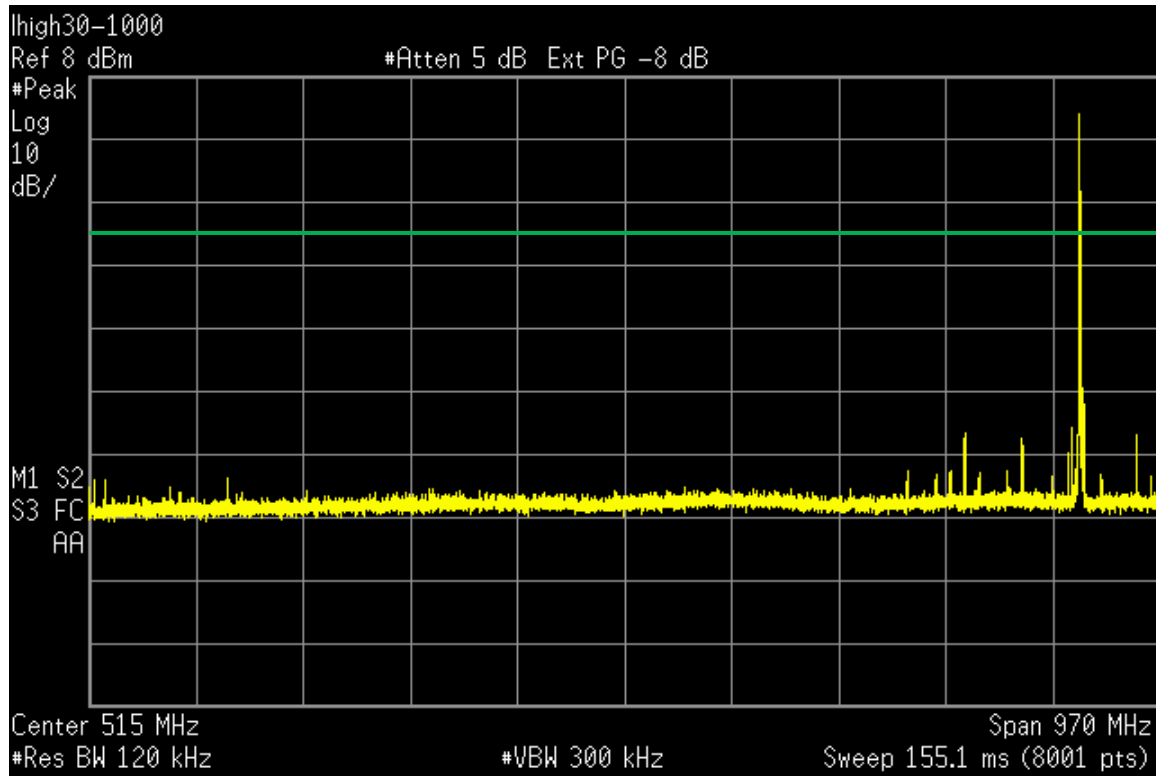


Figure 8. High Channel Active, 30-1000 MHz

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

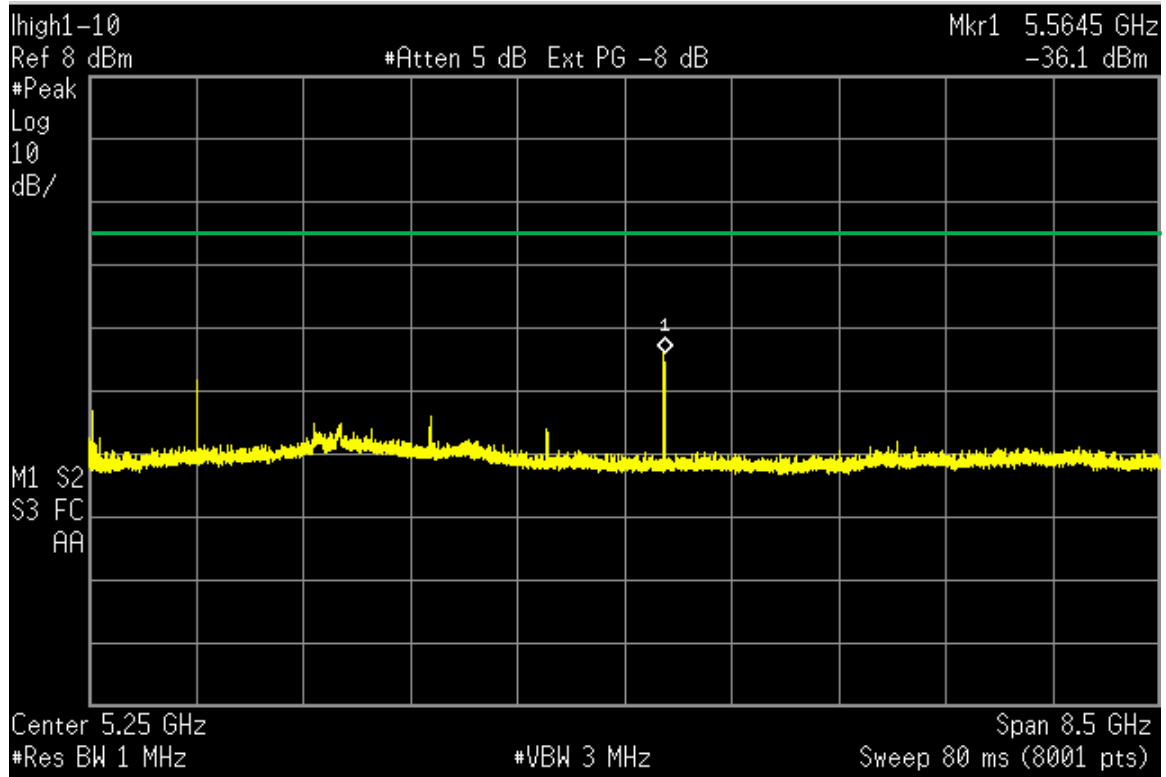


Figure 9. High Channel Active, 1 – 18 GHz

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.10 Intentional Radiator, Radiated Emissions (CFR 15.209, 15.247(d), RSS-247, 5.5)

On the test site, the EUT was placed on top of a non-conductive table, 80 cm above the floor for measurements below 1 GHz and 150 cm above the floor for measurements > 1 GHz. The EUT was also evaluated in three orthogonal positions to determine the worst case position. The front of the EUT faced the measurement antenna located 3 meters away. Each signal measured was maximized by raising and lowering the receive antenna between 1 and 4 meters in height while monitoring the ever changing spectrum analyzer display (with channel A in the Clear-Write mode and channel B in the Max-Hold mode) for the largest signal visible. That exact antenna height where the signal was maximized was recorded for reproducibility purposes. Also, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum. The EUT azimuth was recorded for reproducibility purposes. The EUT was measured when both maxima were simultaneously satisfied.

For radiated measurements, the EUT was set into a continuous transmission mode. Below 1 GHz, the RBW of the measuring instrument was set equal to 120 kHz. Peak measurements above 1 GHz were measured using a RBW = 1 MHz, with a VBW $\geq$ RBW. The results of peak radiated spurious emissions falling within restricted bands are given in Table 6 below.

For Average measurements above 1 GHz, the emissions were measured using RBW = 1 MHz and VBW = 10 Hz or the duty cycle correction factor was applied to the Peak recorded value.

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

Table 5. Peak Radiated Fundamental & Harmonic Emissions

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector
Low Channel - PEAK							
902.70	82.04	25.95	107.99	--	3.0m./HORZ	--	PK
1805.00	70.43	-9.55	60.88	74.0	3.0m./HORZ	13.1	PK
2708.00*	48.20	-5.15	43.05	74.0	3.0m./HORZ	30.9	PK
3610.00*	51.10	-2.66	48.44	74.0	3.0m./HORZ	25.6	PK
4513.00	44.40	-0.82	43.58	74.0	3.0m./HORZ	30.4	PK
5416.00	58.05	3.03	61.08	74.0	3.0m./HORZ	12.9	PK
Mid Channel – PEAK							
915.00	82.01	26.19	108.20	--	3.0m./HORZ	--	PK
1830.00	70.70	-9.23	61.47	74.0	3.0m./HORZ	12.5	PK
2745.00*	47.08	-4.99	42.09	74.0	3.0m./HORZ	31.9	PK
3661.00*	50.53	-2.72	47.81	74.0	3.0m./HORZ	26.2	PK
4576.00	47.94	-0.46	47.48	74.0	3.0m./HORZ	26.5	PK
5491.00	57.72	3.18	60.90	74.0	3.0m./HORZ	13.1	PK
High Channel– PEAK0							
927.25	80.91	26.27	107.18	--	3.0m./HORZ	--	PK
1854.00	65.21	-9.18	56.03	74.0	3.0m./HORZ	18.0	PK
2782.00*	49.01	-5.04	43.97	74.0	3.0m./HORZ	30.0	PK
3709.00*	55.40	-2.15	53.25	74.0	3.0m./HORZ	20.7	PK
4636.00	45.31	-0.44	44.87	74.0	3.0m./HORZ	29.1	PK
5563.00	57.01	3.28	60.29	74.0	3.0m./HORZ	13.7	PK

- (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209& 15.247.
- No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
- The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
- Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 902.7 MHz:

Magnitude of Measured Frequency	82.04	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	25.95	dB/m
Corrected Result	107.99	dBuV/m

Test Date: October 6, 2023

Tested By

Signature: 

Name: Ian Charboneau

US Tech Test Report:
 FCC ID:
 IC:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15/IC RSS Certification
 WPEPSASII-04
 8031A-PSASII04
 23-0218
 April 22, 2024
 Copeland Cold Chain
 PSASII-04

Table 6. Average Radiated Fundamental & Harmonic Emissions

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB/m)	Corrected Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	Detector
Low Channel - Average							
902.75	60.41	25.95	86.36	--	3.0m./HORZ	--	AVG
1805.00	50.43	-9.55	40.88	54.0	3.0m./HORZ	13.1	AVG
2708.00*	25.78	-5.15	20.63	54.0	3.0m./HORZ	33.4	AVG
3610.00*	35.40	-2.66	32.73	54.0	3.0m./HORZ	21.3	AVG
4513.00	29.26	-0.82	28.44	54.0	3.0m./HORZ	25.6	AVG
5416.00	42.16	3.03	45.20	54.0	3.0m./HORZ	8.8	AVG
Mid Channel-Average							
915.00	60.34	26.19	86.53	--	3.0m./HORZ	--	AVG
1830.00	48.60	-9.23	39.37	54.0	3.0m./HORZ	14.6	AVG
2745.00*	31.91	-4.99	26.92	54.0	3.0m./HORZ	27.1	AVG
3661.00*	35.42	-2.72	32.70	54.0	3.0m./HORZ	21.3	AVG
4576.00	32.65	-0.46	32.19	54.0	3.0m./HORZ	21.8	AVG
5491.00	42.76	3.18	45.93	54.0	3.0m./HORZ	8.1	AVG
7322.00	30.34	7.06	37.39	54.0	3.0m./HORZ	16.6	AVG
High Channel-Average							
927.25	58.71	26.27	85.01	--	3.0m./HORZ	--	AVG
1854.00	43.52	-9.23	34.29	54.0	3.0m./HORZ	19.7	AVG
2782.00*	33.38	0.22	33.61	54.0	3.0m./HORZ	20.4	AVG
3709.00*	39.70	-2.72	36.98	54.0	3.0m./HORZ	17.0	AVG
4636.00	30.35	-0.46	29.89	54.0	3.0m./HORZ	24.1	AVG
5563.00	41.60	3.18	44.78	54.0	3.0m./HORZ	9.2	AVG

- (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 CFR 15.35.
- No other signals detected within 20 dB of specification limit. Harmonics investigated up to the 10th harmonic
- The EUT was placed in three orthogonal positions, tested while broadcasting from each antenna, and the transmitter was in constant broadcast mode, with a duty cycle of greater than 98%. The emissions were measured with the receive antenna in vertical and horizontal polarizations. The data listed in the above table was worst case.
- Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 1805.00MHz:

Magnitude of Measured Frequency	50.43	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	-9.55	dB/m
Corrected Result	40.88	dBuV/m

Test Date: October 6, 2023

Tested By
 Signature: 

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.11 Band Edge Measurements (CFR 15.247(d), RSS-247, 5.5)

Band Edge measurements are made following the guidelines in ANSI C63.10-2013 Clause 6.10 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Restricted band and band edge test is performed as radiated measurements. The test instrument used for testing has both Peak and Average detection. In consideration of Clause 5.8 of ANSI C63.10-2013, the EUT antenna is connected to its antenna port during testing. The EUT was set to its highest rated output power level during testing. The results are collected and presented below.

US Tech Test Report:
 FCC ID:
 IC:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15/IC RSS Certification
 WPEPSASII-04
 8031A-PSASII04
 23-0218
 April 22, 2024
 Copeland Cold Chain
 PSASII-04

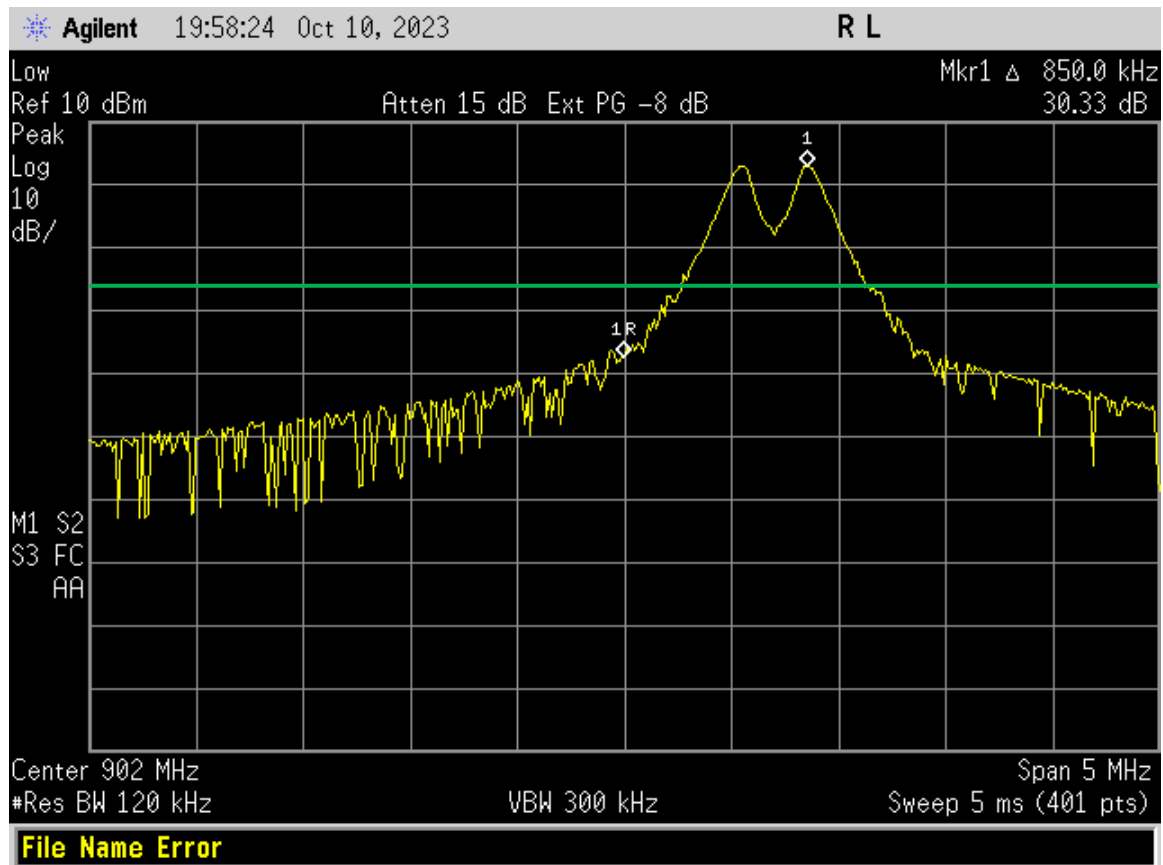


Figure 10. Band Edge Compliance Low Channel Delta - Peak

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	30.33	dB
Band Edge Limit	20.00	dB
Band Edge Margin	10.33	dB

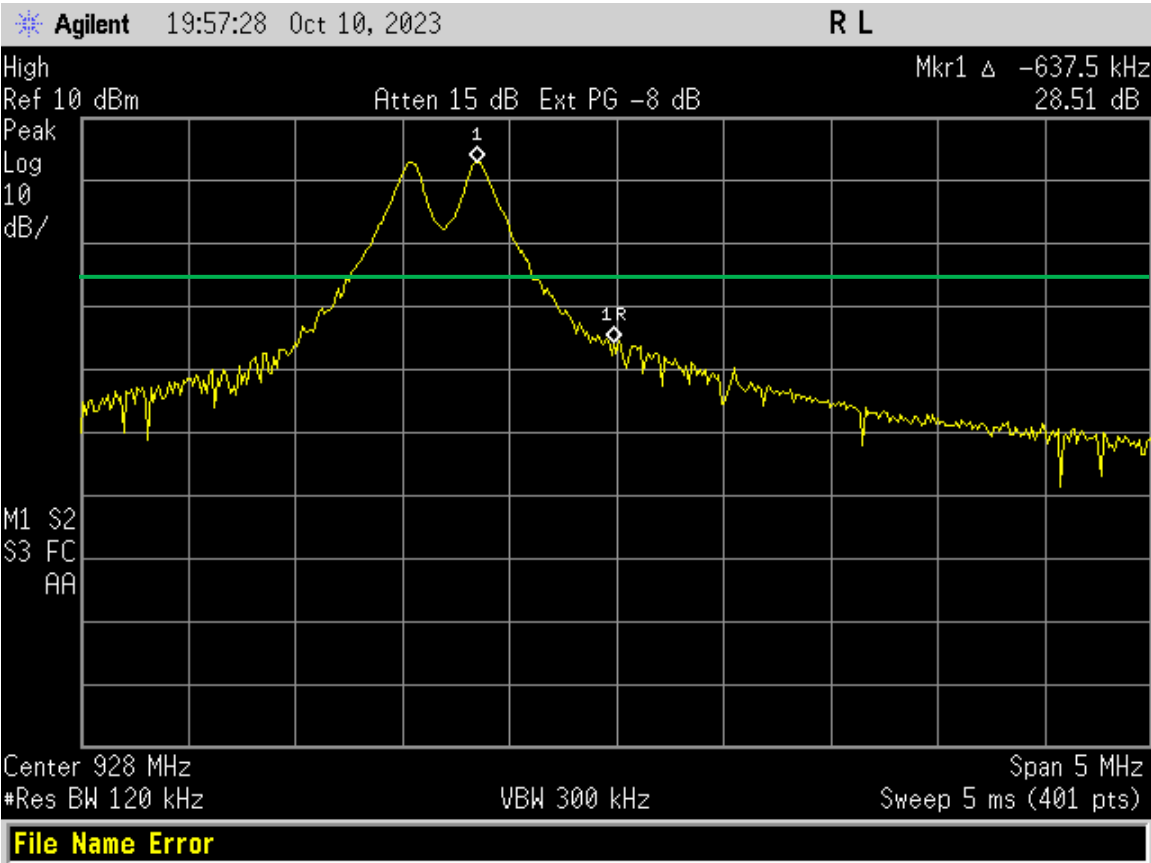


Figure 11. Band Edge Compliance High Channel Delta - Peak

Lower band edge must be 20 dB below the fundamental. This requirement is met.

Measured Result	28.51	dB
Band Edge Limit	20.00	dB
Band Edge Margin	8.51	dB

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.12 Six (6) dB Bandwidth (CFR 15.247(a)(2), RSS-247, 5.2(a))

The EUT antenna port was connected to a spectrum analyzer having a 50 Ω input impedance. Measurements were performed per ANSI C63.10-2013, clause 11.8. The RBW was set to 100 kHz and the VBW $\geq$ RBW. The results of this test are given in the table below and figures below.

Table 7. Six (6) dB Bandwidth

Frequency (MHz)	6 dB Bandwidth (KHz)	Minimum FCC Bandwidth (KHz)
902.75	554.92	500
913.75	558.57	500
927.25	551.07	500

Test Date: October 10, 2023

Tested By

Signature: Ian Charboneau

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

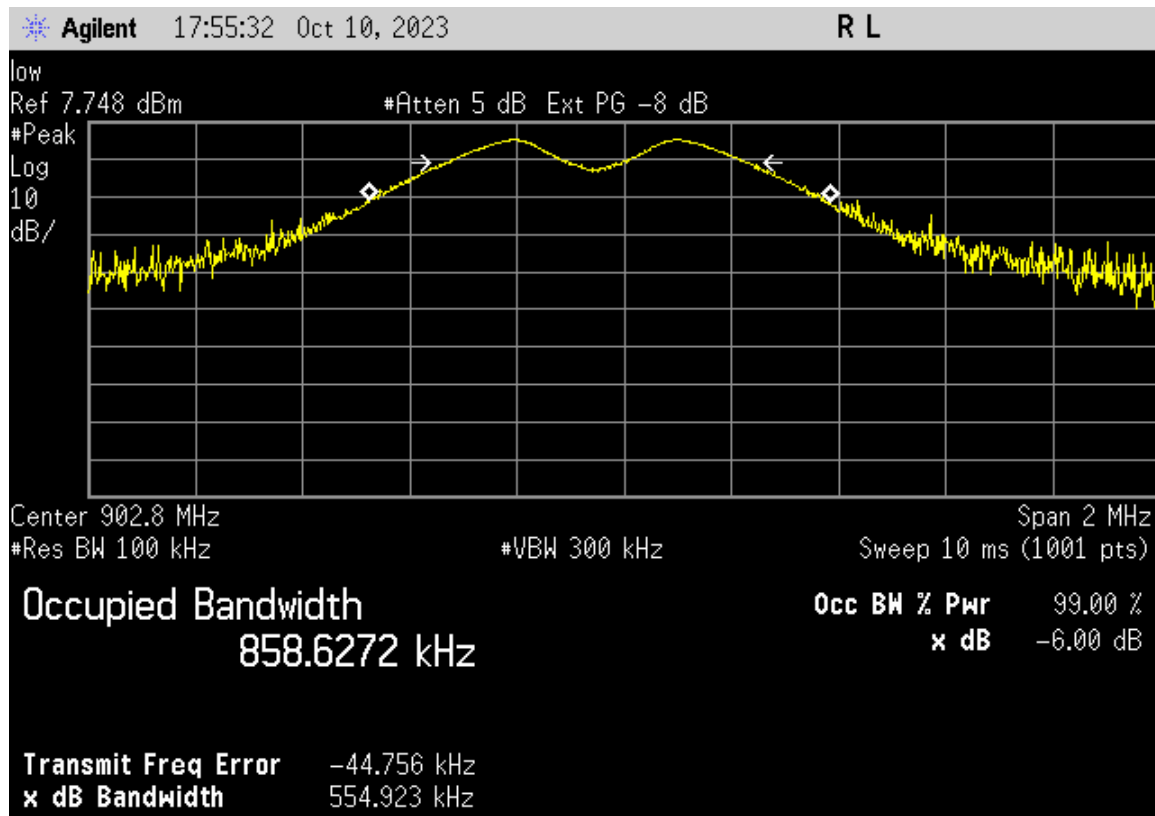


Figure 12. 6 dB Bandwidth Low Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

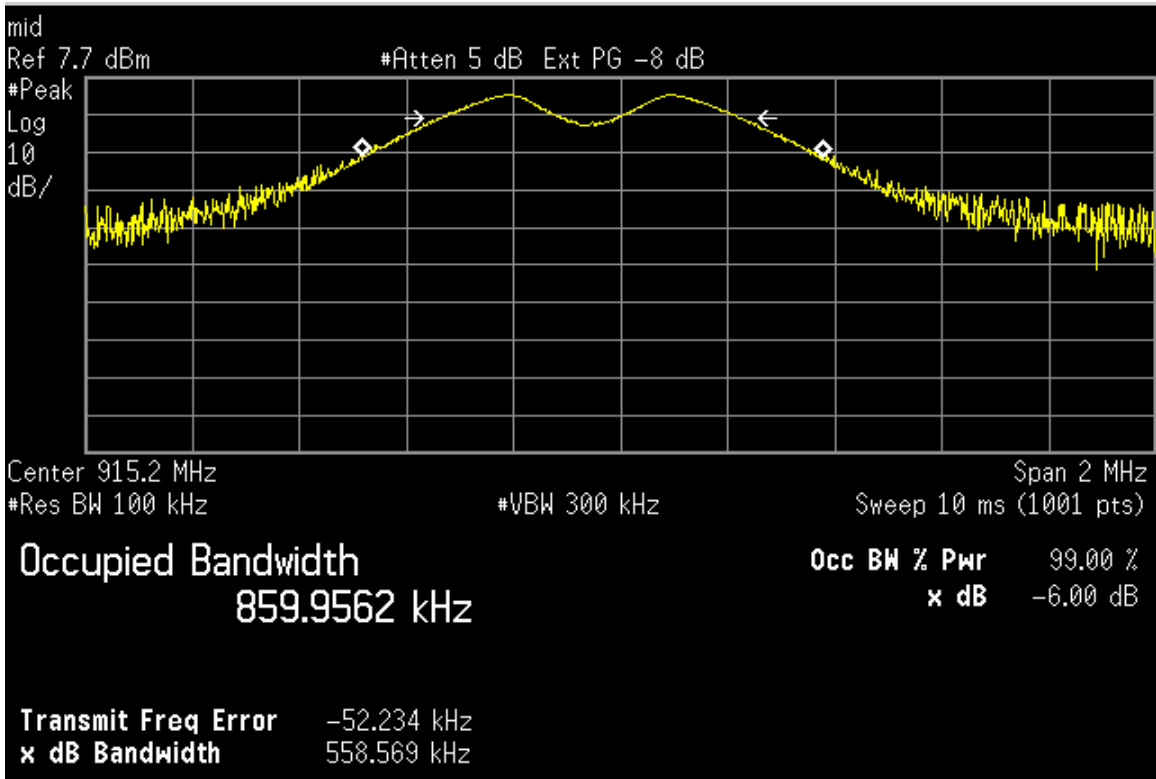


Figure 13. 6 dB Bandwidth Mid Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

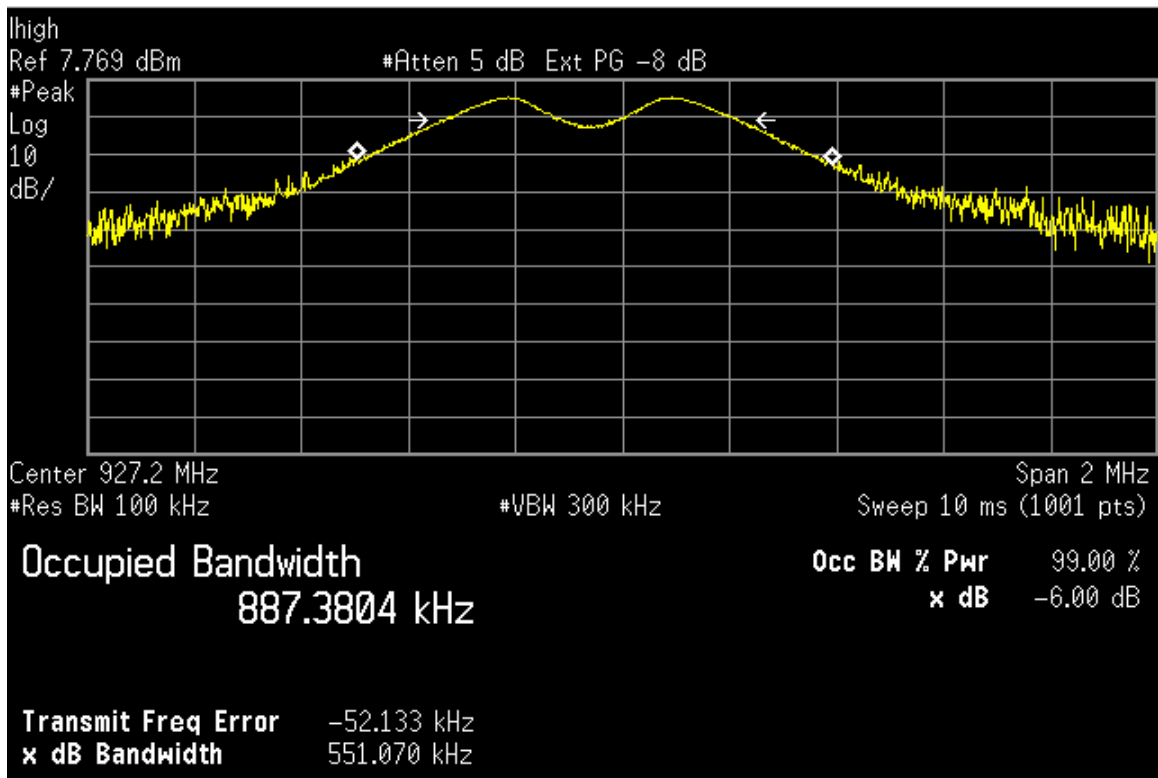


Figure 14. 6 dB Bandwidth High Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.13 Occupied Bandwidth, (99% bandwidth)(RSS-GEN (6.6))

The EUT antenna port was connected to a spectrum analyzer having a 50Ω input impedance. Measurements were performed similar to the method of FCC, KDB Publication No. 558074 v03r05 for a bandwidth of 20 dB. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW $\geq$ RBW. The results of this test are given in Table 17 and presented in the figures in section 2.12 above.

Table 8. 99% Occupied Bandwidth

Frequency (MHz)	99% Occupied Bandwidth (MHz)
902.75	0.652
913.75	0.652
927.25	0.645

Test Date: October 10, 2023

Tested By

Signature: Ian Charboneau

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

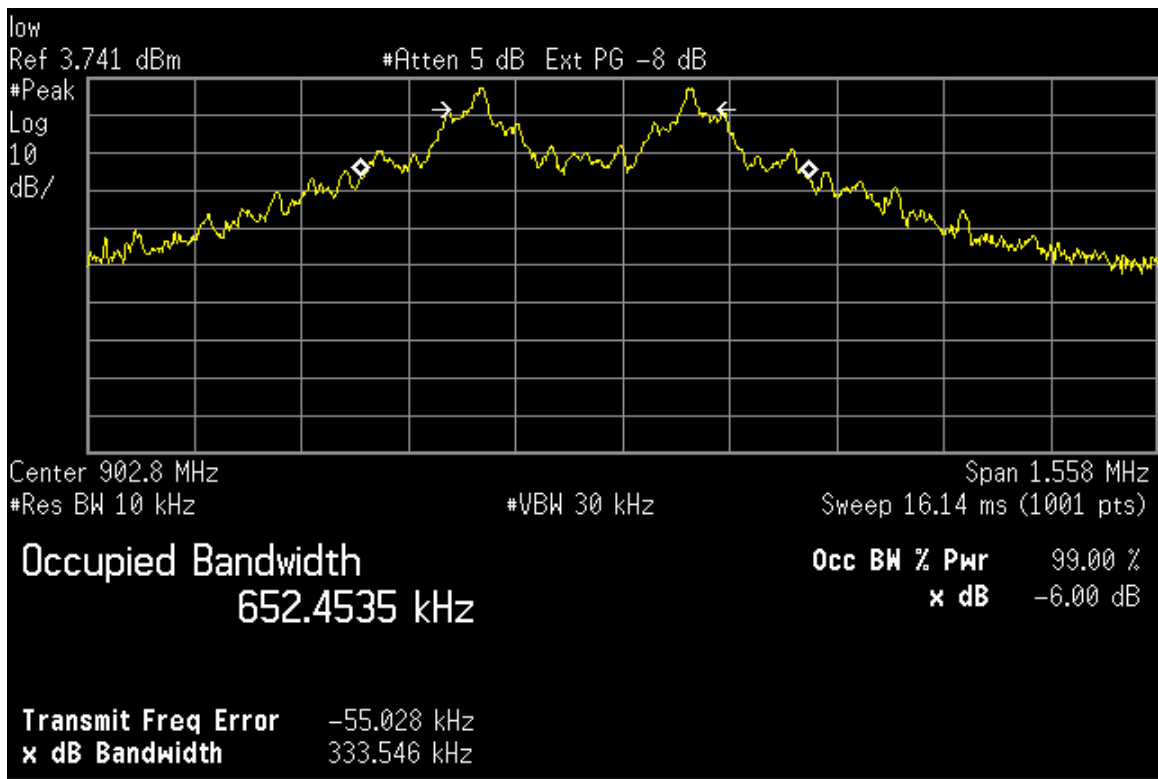


Figure 15. 99% Occupied Bandwidth Low Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

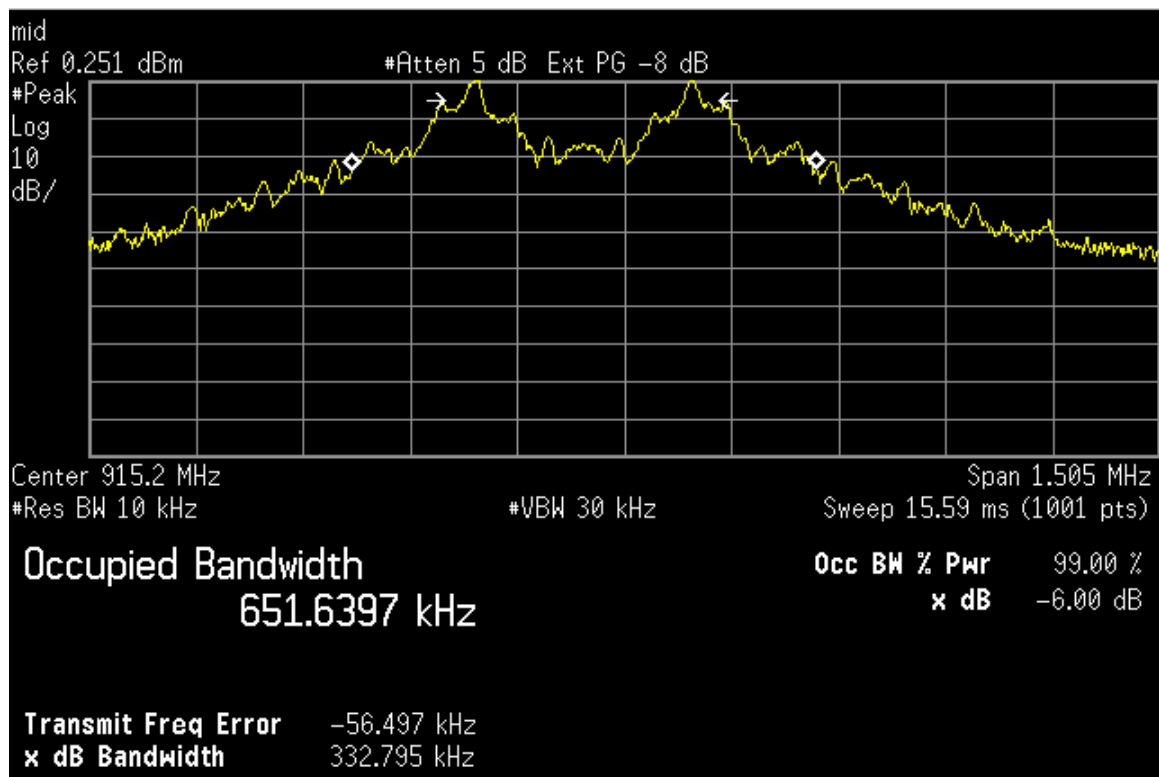


Figure 16. 99% Occupied Bandwidth Mid Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

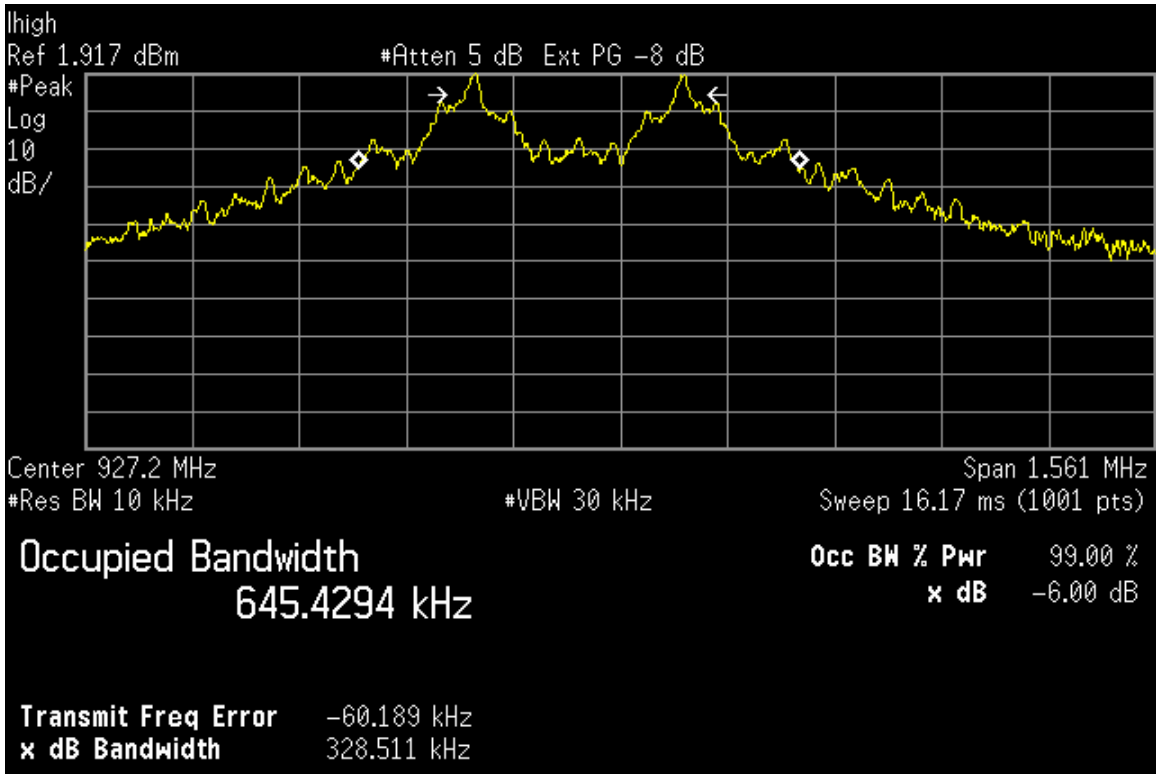


Figure 17. 99% Occupied Bandwidth High Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.14 Maximum Peak Conducted Output Power (CFR 15.247 (b) (3))

The transmitter was programmed to operate at a maximum output power across the bandwidth. For this test the output power of the radio was set to the default value, +2.6 dBm.

Peak power was measured per ANSI C63.10-2013 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, and attenuators to the antenna output terminals on the EUT. The spectrum analyzer was set to a RBW of 1 MHz, and the VBW $\geq$ RBW. Peak antenna conducted output power is tabulated in the table below.

Table 9. Peak Antenna Conducted Output Power per Part 15.247 (b)(3)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Converted Data (mW)	FCC Limit (mW Maximum)
902.75	2.97	1.98	1000
915.75	3.09	2.04	1000
927.25	2.98	1.99	1000

Test Date: October 10, 2023

Tested By

Signature: Ian Charboneau

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

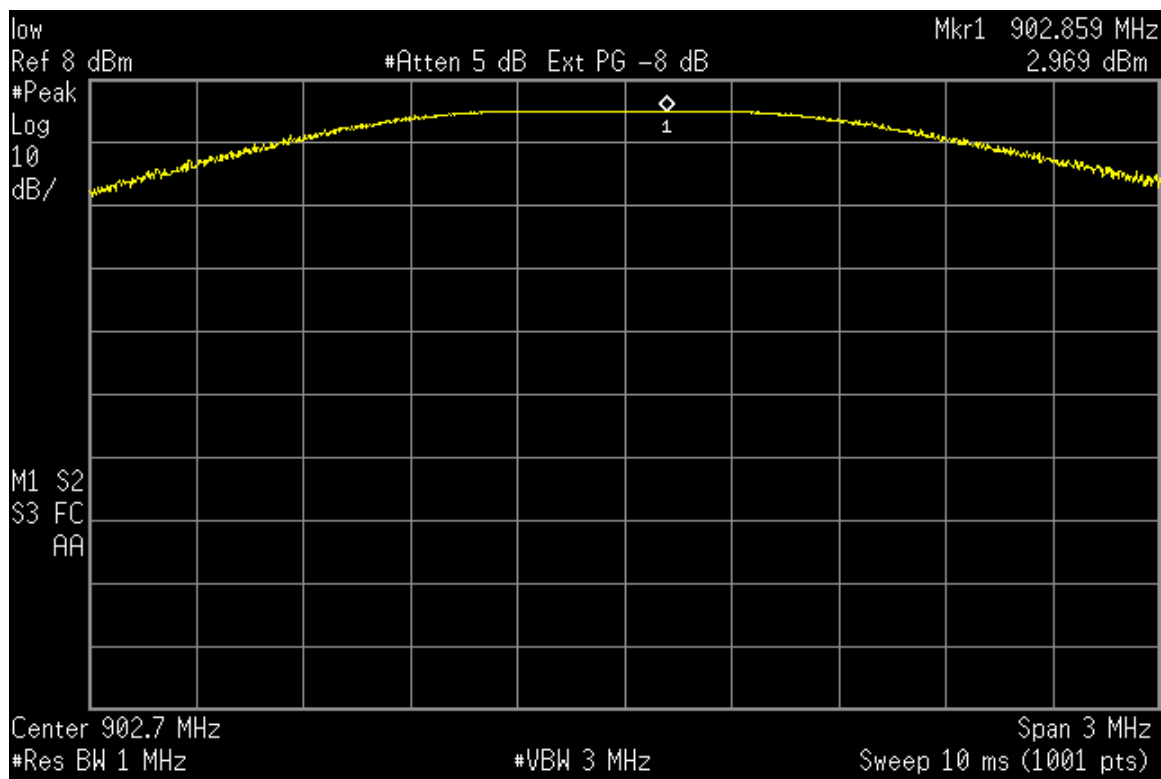


Figure 18. Peak Antenna Conducted Output Power, b mode Low Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

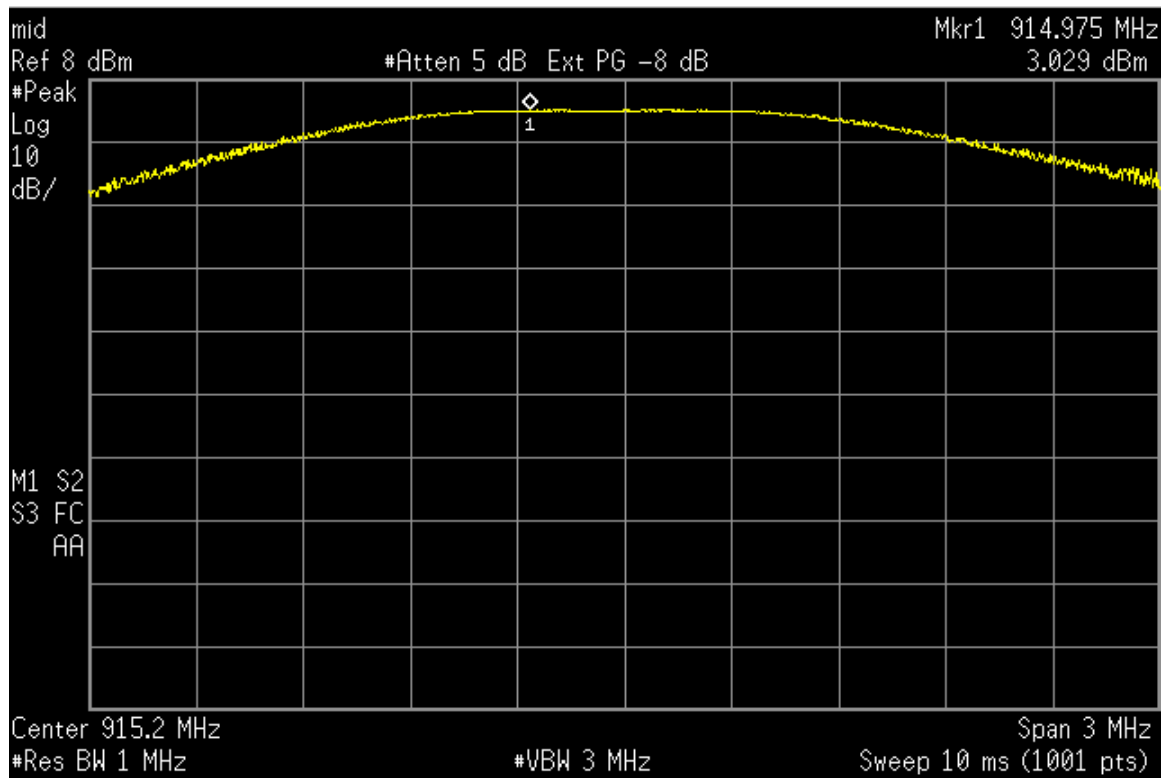


Figure 19. Peak Antenna Conducted Output Power, b mode Mid Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

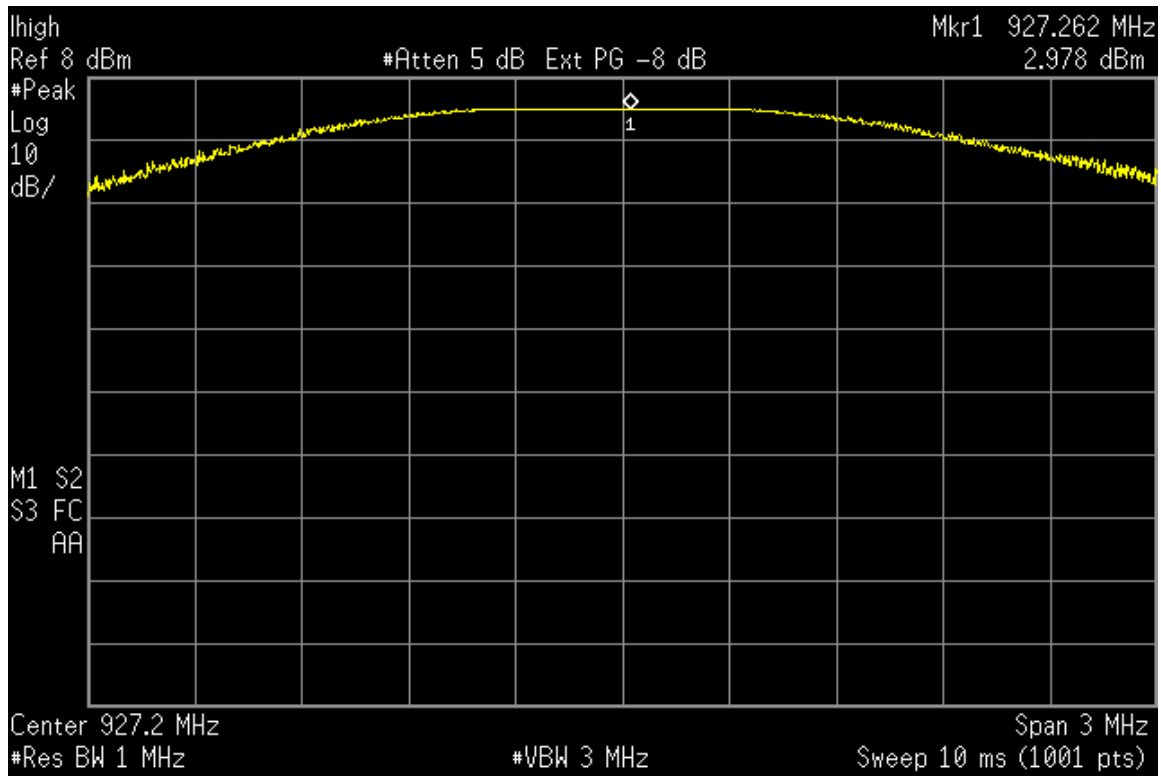


Figure 20. Peak Antenna Conducted Output Power, g mode High Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.15 Power Spectral Density (CFR 15.247(e), RSS-247, 5.2(b))

The transmitter was placed into a continuous mode of operation at all applicable frequencies. The measurements were performed per the procedures of ANSI C63.10-2013. The RBW was set to 3 kHz and the Video Bandwidth was set to $\geq$ RBW. The trace capture time was set to (Span/3 kHz).

In accordance with 15.247 (e), the power spectral density shall be no greater than +8 dBm per any 3 kHz band.

Results are shown in the table below and figures below. All are less than +8 dBm per 3 kHz band. See figures below.

Table 10. Power Spectral Density for Low, Mid and High Bands

Frequency (MHz)	Measured Result (dBm/3kHz)	FCC Limit (dBm/3 kHz)
902.75	1.760	+8.0
915.75	0.423	+8.0
927.25	1.750	+8.0

Note: dBm/Hz correct to dBm/kHz using the following formula, $10 \log \text{RBW ref/RBW measured}$.

Test Date: October 10, 2023

Tested By

Signature: 

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

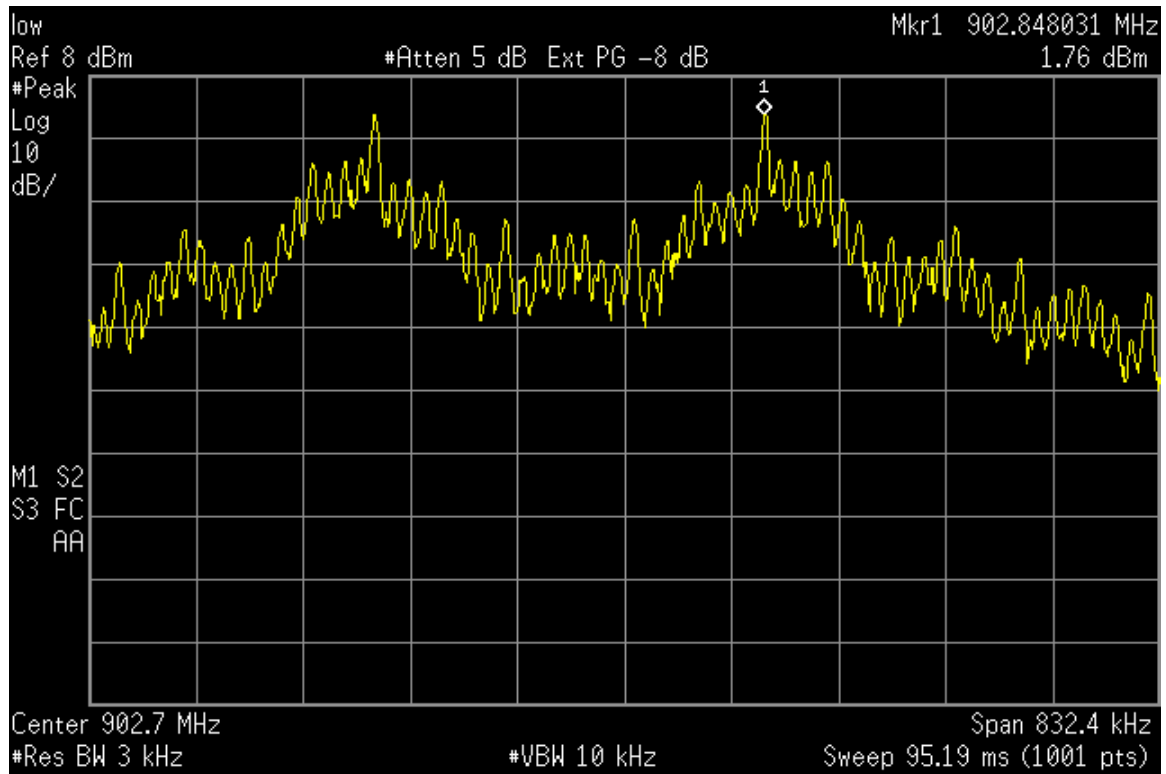


Figure 21. Power Spectral Density, b mode Low Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

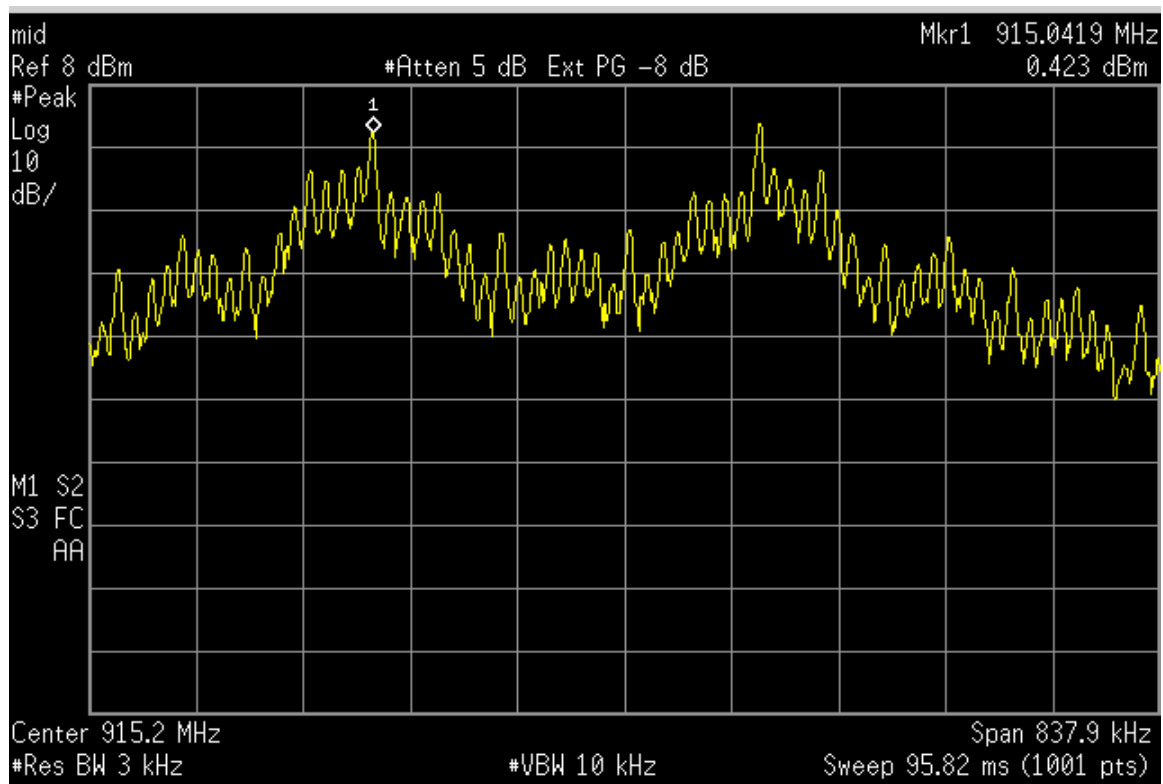


Figure 22. Power Spectral Density, b mode Mid Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

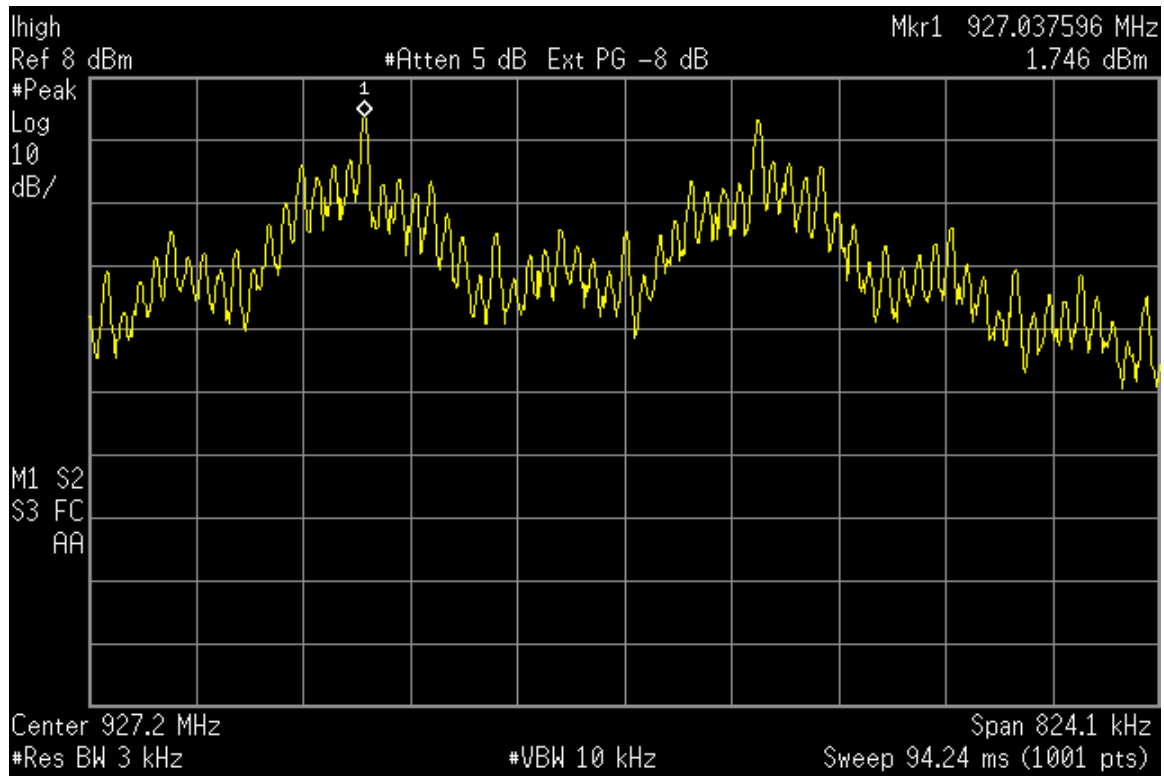


Figure 23. Power Spectral Density, b mode High Channel

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.16 Intentional Radiator Power Lines Conducted Emissions (CFR 15.207, RSS-Gen 8.8)

The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.10:2013, Clause 6.2, with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions were determined to be produced when the EUT was operating under continuous transmission. The worst-case measurement was 11.19 dB from the applicable limit. All other emissions were at least 17.51 dB from the limit. Those results are given in the table following.

US Tech Test Report:
 FCC ID:
 IC:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15/IC RSS Certification
 WPEPSASII-04
 8031A-PSASII04
 23-0218
 April 22, 2024
 Copeland Cold Chain
 PSASII-04

Table 11. Power Line Conducted Emissions

Conducted Emissions 150 kHz to 30 MHz						
Frequency (MHz)	Test Data (dBuV)	LISN+CL (dB)	Corrected Results (dBuV)	AVG Limits (dBuV)	Margin (dB)	Detector
Phase @ 120 Vac / 60Hz						
0.384	51.89	2.92	54.81	66	11.19	PK
0.572	39.06	0.45	39.51	60	20.49	PK
4.37	38.56	0.24	38.80	60	21.20	PK
7.25	34.46	0.42	34.88	60	25.12	PK
13.42	41.60	0.89	42.49	60	17.51	PK
21.65	39.52	1.23	40.75	60	19.25	PK
28.68	34.56	1.90	36.46	60	23.54	PK
Neutral @ 120 Vac / 60Hz						
0.381	47.98	0.29	48.27	66	17.73	PK
0.642	35.51	0.73	36.24	60	23.76	PK
4.40	35.46	0.31	35.77	60	24.23	PK
6.53	32.88	0.54	33.42	60	26.58	PK
14.20	34.30	1.13	35.43	60	24.57	PK
21.65	36.95	1.63	38.58	60	21.42	PK

Sample Calculation At: 0.384 MHz

Magnitude of Measured Frequency	51.89	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	2.92	dB
Corrected Result	54.81	dBuV/m

Test Date: October 10, 2023

Tested By
 Signature: 

Name: Ian Charboneau

2.17 Intentional Radiator, Radiated Emissions (CFR 15.209, RSS-Gen, 8.9)

The test data provided herein is to support the verification requirement for radiated emissions coming for the EUT in a transmitting state per 15.209 and were investigated from 9kHz or the lowest operating clock frequency to 25 GHz and tested as detailed in ANSI C63.10:2013, Clause 6.4-6.6.

Radiated emissions within the band of 9 kHz to 30 MHz were investigated using a calibrated Loop Antenna and per the requirements of ANSI C63.10:2013.

Measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth; 1 MHz RBW and 3 MHz VBW. The test data were maximized for magnitude by rotating the turn-table through 360 degrees and raising and lowering the receiving antenna between 1 to 4 meters in height as a part of the measurement procedure.

The worst-case radiated emission was greater than 20.0 dB below the specification limit. The results are shown in the table following. These results are meant to show that this EUT has met the intentional transmitter requirements of CFR Part 15.209.

Any emissions found that were outside the restricted bands were compared to limits based on Part 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 15.247(b)(3), the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in 15.209(a) is not required.

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

Table 12. Spurious Radiated Emissions (150 kHz-30MHz)

Test: FCC Part 15.209							
Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP/AVG
All emissions were more than 20 dB below the applicable limit.							

AF = antenna factor.
CL = cable loss.
PA = preamplifier gain.

Sample Calculation: N/A

Test Date: October 6-9, 2023

Tested By

Signature: 

Name: Ian Charboneau

US Tech Test Report:
 FCC ID:
 IC:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15/IC RSS Certification
 WPEPSASII-04
 8031A-PSASII04
 23-0218
 April 22, 2024
 Copeland Cold Chain
 PSASII-04

Table 13. Spurious Radiated Emissions (30 MHz – 1 GHz), Part 15.209(a)

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP/AVG
108.20	54.02	-14.34	39.68	43.5	3m./HORZ	3.8	PK
123.78	54.06	-13.06	41.00	43.5	3m./HORZ	2.5	PK
967.05	49.97	1.42	51.38	54.0	3m./HORZ	1.6	PK
108.20	56.05	-13.54	42.51	43.5	3m./VERT	1.5	PK
123.78	54.25	-12.76	41.50	43.5	3m./VERT	2.5	PK
163.79	53.02	-10.71	41.31	43.5	3m./VERT	1.7	PK

AF is antenna factor. CL is cable loss. PA is preamplifier gain.

Table 14. Spurious Radiated Emissions (30 MHz – 1 GHz), Part 15.247(d)

Frequency (MHz)	Test Data (dBuV)	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP/AVG
195.81*	54.30	-9.11	45.20	65.0*	3m./HORZ	22.0	PK
811.36*	49.10	-0.53	48.58	65.0*	3m./HORZ	21.6	PK
863.06*	52.51	0.53	43.03	65.0*	3m./HORZ	24.2	PK
172.23*	52.01	-10.32	41.68	65.0*	3m./VERT	25.5	PK
863.06*	50.60	-1.87	48.73	65.0*	3m./VERT	18.5	PK

*= Emissions not in restricted band, limit is Fundamental -20 dB. AVG limits applied.
 AF is antenna factor. CL is cable loss. PA is preamplifier gain.

Sample Calculation At: 108.20 MHz

Magnitude of Measured Frequency	54.02	dBuV
+Antenna Factor + Cable Loss+ Amplifier Gain	-14.34	dB
Corrected Result	39.68	dBuV/m

Test Date: October 6-9, 2023

Tested By
 Signature: 

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

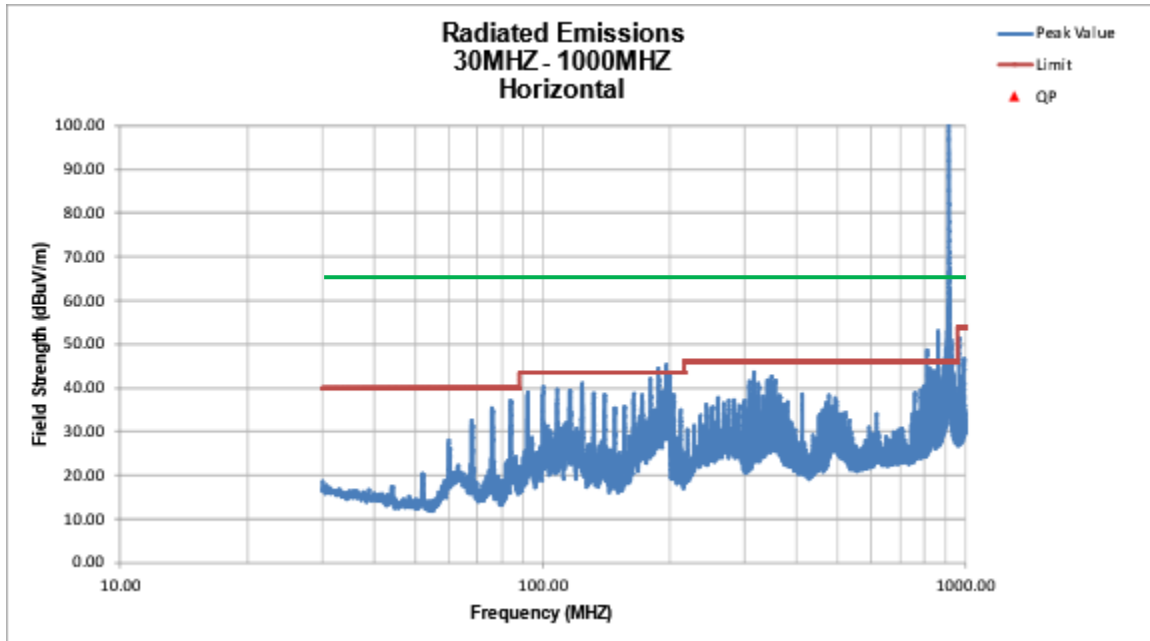


Figure 24. Radiated Emissions RX, 30 MHz - 1000 MHz – Horizontal
*GREEN is 15.247(d) limit.

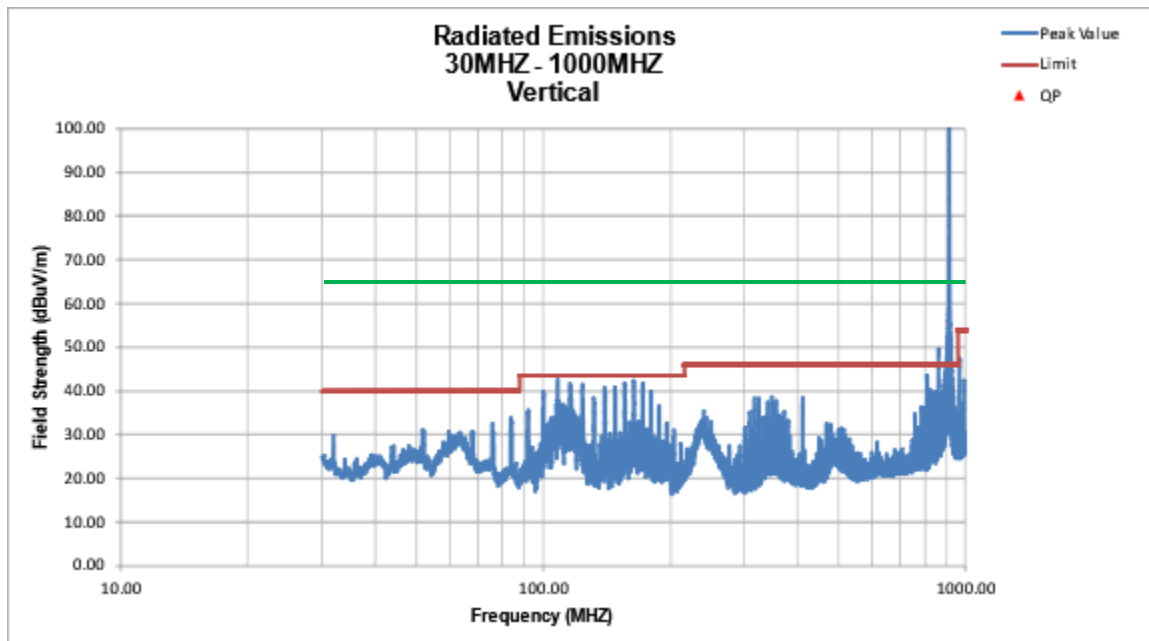


Figure 25. Radiated Emissions RX, 30 MHz - 1000 MHz - Vertical
*GREEN is 15.247(d) limit.

US Tech Test Report:
 FCC ID:
 IC:
 Test Report Number:
 Issue Date:
 Customer:
 Model:

FCC Part 15/IC RSS Certification
 WPEPSASII-04
 8031A-PSASII04
 23-0218
 April 22, 2024
 Copeland Cold Chain
 PSASII-04

Table 15. Spurious Radiated Emissions – (Above 1 GHz)

Test: FCC Part 15.109/15.209								
Frequency (MHz)	Test Data (dBuV)	Additional Factors	AF+CL-PA (dB)	Results (dBuV/m)	Limits (dBuV/m)	Distance / Polarization	Margin (dB)	DETECTOR PK / QP/AVG
1019.06	65.16	0.0	-14.36	50.80	54.0	3.0m./HORZ	3.2	PK
2428.35	52.18	0.0	-5.82	46.36	54.0	3.0m./HORZ	7.6	PK
6404.97	37.36	0.0	2.87	40.63	54.0	1.0m./HORZ	13.4	PK
8237.86	37.76	0.0	3.26	41.01	54.0	1.0m./HORZ	13.0	PK
1019.37	60.43	0.0	-14.40	46.03	54.0	3.0m./VERT	8.0	PK
2428.35	50.34	0.0	-5.73	44.61	54.0	3.0m./VERT	9.4	PK
3661.40	47.38	0.0	-3.82	43.57	54.0	3.0m./VERT	10.4	PK
6407.22	41.60	0.0	2.85	44.44	54.0	1.0m./VERT	9.6	PK
7320.29	43.01	0.0	4.39	47.56	54.0	1.0m./VERT	6.4	PK
Other than harmonics signals, all emissions were more than 20 dB below the applicable limit.								

Note: Measurement at 1 meters corrected using inverse extrapolation factor of -9.5 dB to correct the value for 3 meter.

Sample Calculation at 1019.06MHz:

Magnitude of Measured Frequency	65.16	dBuV
+Additional Factor (filter + duty cycle)	0.00	dB
+Antenna Factor + Cable Loss+ Amplifier Gain – Duty Cycle	-14.36	dB/m
Corrected Result	50.80	dBuV/m

Test Date: October 6-9, 2023

Tested By

Signature: 

Name: Ian Charboneau

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

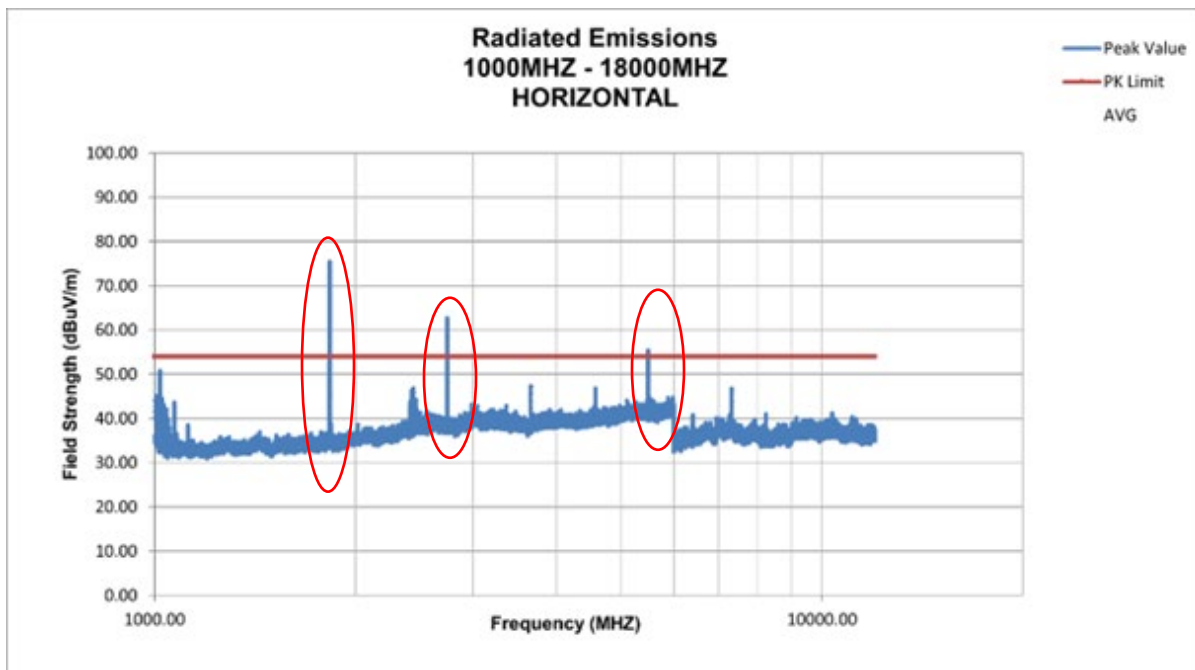


Figure 26. Radiated Emissions RX, 1 GHz - 12 GHz – Horizontal

*Circled emissions are harmonics of fundamental

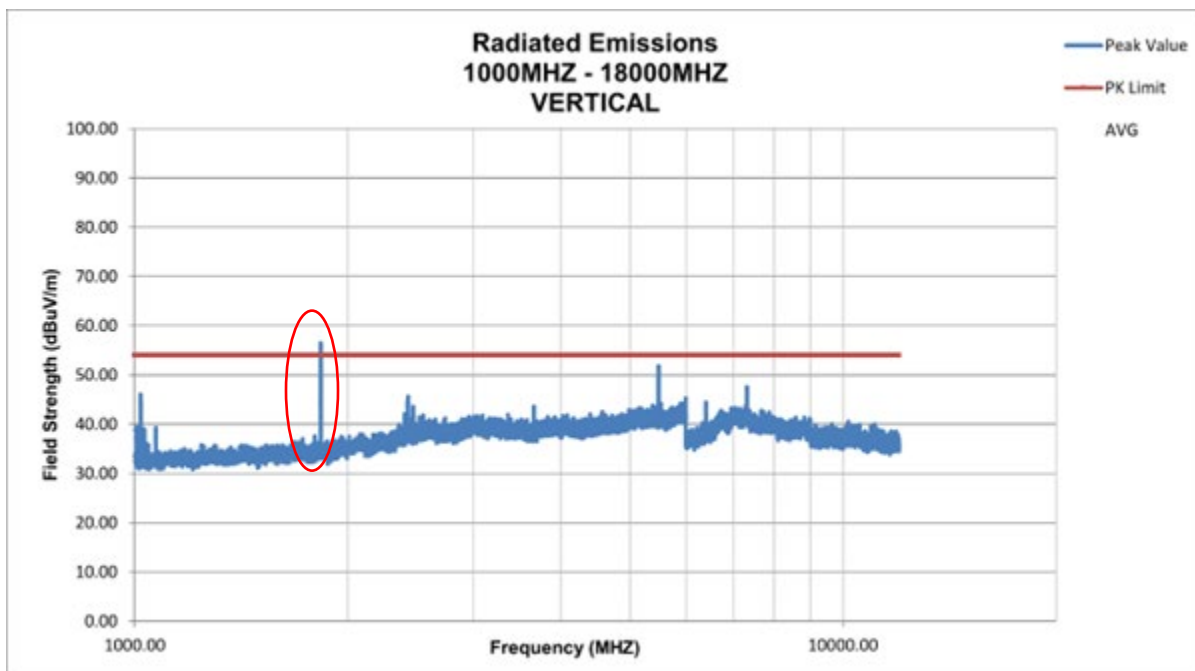


Figure 27. Radiated Emissions RX, 1 GHz - 12 GHz – Vertical

*Circled emissions are harmonics of fundamental

US Tech Test Report:
FCC ID:
IC:
Test Report Number:
Issue Date:
Customer:
Model:

FCC Part 15/IC RSS Certification
WPEPSASII-04
8031A-PSASII04
23-0218
April 22, 2024
Copeland Cold Chain
PSASII-04

2.18 Measurement Uncertainty

The measurement uncertainties given were calculated using the method detailed in CISPR 16-4-2:2011. A coverage factor of $k=2$ was used to give a level of confidence of approximately 95%.

2.18.1 Conducted Emissions Measurement Uncertainty

Measurement Uncertainty (within a 95% confidence level) for this test is ± 2.85 dB.

2.18.2 Radiated Emissions Measurement Uncertainty

For a measurement distance of 3 m the measurement uncertainty (with a 95% confidence level) for this test using a Biconical Antenna (30 MHz to 200 MHz) is ± 5.2 dB. This value includes all elements of measurement.

The measurement uncertainty (with a 95% confidence level) for this test using a Log Periodic Antenna (200 MHz to 1000 MHz) is ± 5.2 dB.

The measurement uncertainty (with a 95% confidence level) for this test using a Horn Antenna is ± 5.2 dB.

3 Conclusions

The EUT is deemed to have met the requirements of the standards cited within the test report when tested as detailed in the present test report.