

MPE TEST REPORT

Applicant	Copeland Comfort Control LP
FCC ID	2A4JN-VX4001
Product	VX4
Brand	Verdant
Model	VX4-TR-W; VX4-TR-B; VX4-NTR-W; VX4-NTR-B; VX4-WU-W; VX4-WU-B; VX4-NWU-W; VX4-NWU-B; VX4-TVF-W; VX4-TVF-B; VX4-RSR-W; VX4-RSR-B; VX4-NTVF-W; VX4-NTVF-B; VX4-NRSR-W; VX4-NRSR-B
Report No.	R2312A1367-M1
Issue Date	December 11, 2024

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Wei Fangying

Approved by: Xu Kai

Eurofins TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

Table of Contents

1	Test Laboratory	3
1.1	Notes of the Test Report.....	3
1.2	Test Facility	3
1.3	Testing Location.....	3
1.4	Laboratory Environment	3
2	Description of Equipment Under Test	4
3	Maximum Output Power and Antenna Gain	6
4	Test Result.....	7
	ANNEX A: The EUT Appearance	9

1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **Eurofins TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test Facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

1.3 Testing Location

Company: Eurofins TA Technology (Shanghai) Co., Ltd.
Address: Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City: Shanghai
Post code: 201201
Country: P. R. China
Contact: Xu Kai
Telephone: +86-021-50791141/2/3
Fax: +86-021-50791141/2/3-8000
Website: <https://www.eurofins.com/electrical-and-electronics>
E-mail: Kain.Xu@cpt.eurofinscn.com

1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25°C
Relative humidity	Min. = 20%, Max. = 80%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment Under Test

Client Information

Applicant	Copeland Comfort Control LP
Applicant address	8100 West Florissant Ave, St. Louis, United States of America
Manufacturer	Copeland Comfort Control LP
Manufacturer address	8100 West Florissant Ave, St. Louis, United States of America

General Technologies

EUT Description			
Model	VX4-TR-W; VX4-TR-B; VX4-NTR-W; VX4-NTR-B; VX4-WU-W; VX4-WU-B; VX4-NWU-W; VX4-NWU-B; VX4-TVF-W; VX4-TVF-B; VX4-RSR-W; VX4-RSR-B; VX4-NTVF-W; VX4-NTVF-B; VX4-NRSR-W; VX4-NRSR-B		
Lab internal SN	VX4-TR-B	R2312A1367/S01	
Hardware Version	0059-5510 REV.003		
Software Version	fcc_test_01		
Frequency	Band	TX (MHz)	RX (MHz)
	Model 900MHz	902.46 ~ 927.54	902.46 ~ 927.54
Date of Testing	December 19, 2023 ~ December 20, 2023		
Date of Sample Received	December 18, 2023		
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant. 2. All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

Items	Model name & Shell color -White	Model name & Shell color -Black	Heat/Cool Relays (6pcs)	RS485/UART with Dry Contact Relay	UART (Protocol) with Dry Contact Relay	PIR Sensor	Notes	Test description
1	VX4-TR-W	VX4-TR-B	6	--	--	√	The only differences between models are color, icon and selling channels. Powered by 12VDC and 24VAC	VX4-TR-B for test all test items.
2	VX4-NTR-W	VX4-NTR-B	6	--	--	--	The only differences between models are color, icon and selling channels. Powered by 12VDC and 24VAC	/
3	VX4-WU-W	VX4-WU-B	0	--	--	√	The only differences between models are color, icon and selling channels. Powered by 12VDC, 24VAC or/and battery 3VDC (Two batteries are in series, 1.5VDC for each)	/
4	VX4-NWU-W	VX4-NWU-B	0	--	--	--	The only differences between models are color, icon and selling channels. Powered by 12VDC, 24VAC or/and battery 3VDC (Two batteries are in series, 1.5VDC for each)	/
5	VX4-NRSR-W	VX4-NRSR-B	1	√	--	--	The only differences between models are color, icon and selling channels. Powered by 12VDC	/
6	VX4-RSR-W	VX4-RSR-B	1	√	--	√	The only differences between models are color, icon and selling channels. Powered by 12VDC	/
7	VX4-TVF-W	VX4-TVF-B	1	--	√	√	The only differences between models are color, icon and selling channels. Powered by 12VDC	/
8	VX4-NTVF-W	VX4-NTVF-B	1	--	√	--	The only differences between models are color, icon and selling channels. Powered by 12VDC	/
Note : All these model's PCB Layout, compnents, operating principle, and antenna are the same.								

3 Maximum Output Power and Antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by
$$\text{Numeric gain (G)} = 10^{(\text{antenna gain}/10)}$$

Band	Maximum Output Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
Model 900MHz	9.23	8.38	-3.19	0.48

4 Test Result

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following.

TABLE 1 – LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Note1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The maximum permissible exposure for 300~1500 MHz is f/1500. So

Band	The Maximum Permissible Exposure (mW/cm ²)
Model 900MHz	0.60

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 447498 D01 is used in the calculation.

Equation from KDB 447498 D01 General RF Exposure Guidance v06 (10/23/2015) is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Maximum Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm ²)	Limit Value (mW/cm ²)
Model 900MHz	9.23	-3.19	6.04	4.02	0.001	0.60
Note: R = 20cm π= 3.1416						

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

*****END OF REPORT *****