**RF EXPOSURE EVALUATION**  
**Maximum Permissible Exposure (MPE)****Applicant Name:**Pivotal Commware  
10801 120th Ave NE #200,  
Kirkland, WA 98033  
United States**Date of Testing:**

02/20/2023-03/31/2023

**Test Report Issue Date:**

04/05/2023

**Test Site/Location:**

Element lab., Columbia, MD, USA

**Test Report Serial No.:**


1M2302160010-02.2AUVU

**FCC ID:** 2AUVU-5620-12-28**APPLICANT:** Pivotal Commware**Application Type:** Certification**Model:** 5620-12-28**EUT Type:** 5G mmWave Repeater**FCC Classifications:** Part 20 Industrial Booster (CMRS) (B2I)**FCC Rule Parts:** FCC Part 1 (§1.1310) and Part 2 (§2.1091)**Test Procedure(s):** KDB 447498 D01 v06

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC KDB 447498 D01 v06. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


**RJ Ortanez**  
**Executive Vice President**

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# 1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

## 1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310(e)(1), is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).


Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

\* = Plane-wave equivalent power density

**Table 1-1. Limits for Maximum Permissible Exposure (MPE)**

## 1.2 EUT Description

The **Pivotal Commware Device FCC ID: 2AUVU-5620-12-28** is a bidirectional, two-unit repeater system consisting of a Donor Unit (DU) and a Service Unit (SU). Both units are required for operation as neither can be operated in a standalone configuration. This RF exposure analysis is for the DU.

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### 1.3 Procedure

This RF exposure analysis aims to achieve two things:

- 1) Exemption from routine environmental evaluation where the criteria is outlined in §1.1307(b)(3)(i)(C) and
- 2) Compliance with the MPE limits based on calculations for worst-case operation

The Donor Unit (DU) operating at a maximum single antenna polarization EIRP of 41dBm +/- 1.5dB. Additionally, the DU contains an FCC certified LTE module (FCC ID: XMR201906EG21G) operating on Bands 2, 4, 12, and 13. For RF Exposure analysis, we will consider LTE Band 13 as it has the tightest limit per §1.1310.

The ERP Threshold is calculated per 1.1307(b)(3)(i)(C) Table 1 for LTE (0.0128 R<sup>2f</sup>) and for 5G NR FR2 (19.2R<sup>2</sup>).


Donor Unit	5G NR FR2	LTE	
Frequency	27500	699	MHz
$\lambda$	0.0109	0.4292	m
$\lambda/2\pi$	0.0017	0.0683	m
R	1.09	1.09	m
Threshold ERP	22.81152	10.6301683	W
Threshold ERP	43.58	40.27	dBm
Threshold EIRP	45.73	42.42	dBm

**Table 1-2. Threshold ERP/EIRP Levels Per 1.1307(b)(3)(i)(C) for Donor Unit**

A determination of exemption of routine environmental evaluation to demonstrate compliance with the RF exposure limits is allowed for multiple RF sources per 1.1307(b)(3)(ii)(B):

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

The DU transmits simultaneously from two orthogonally polarized antennas, each transmitting at 42.5dBm EIRP. The DU also contains an LTE module transmitting at a maximum of 28.1dBm EIRP.

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Based on these EIRP levels and the above calculated threshold levels, the summations are determined as follows:

	Donor Unit	
EIRP_H	42.5	dBm
EIRP_H	17.783	W
EIRP_th,H	37.411	W
EIRP_H/EIRP_th,H	0.475	
EIRP_V	42.5	dBm
EIRP_V	17.783	W
EIRP_th,V	37.411	W
EIRP_V/EIRP_th,V	0.475	
EIRP_LTE	28.1	dBm
EIRP_LTE	0.646	W
EIRP_th,LTE (f = 699MHz)	17.433476	W
EIRP_LTE/EIRP_th,LTE	0.037	
Summation	0.988	


**Table 1-3. RF Exposure Compliance for Simultaneous Transmissions**

These calculations demonstrate that the DU, operating at a distance of 1.09m, is exempt from routine environmental evaluation for RF exposure compliance.

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## 2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 1.09m separation distance as specified in §2.1091 of the FCC Rules and Regulations. An appropriate RF exposure compliance statement will be placed in the user's manual.

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