RF EXPOSURE EVALUATION
Maximal Permissible Exposure [MPE]

Applicant Name:
Pivotal Commware
10801 120th Ave NE #200,
Kirkland, WA 98033
United States

Date of Testing:
9/17/2020-10/16/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2010120161-06.2AUVU

FCC ID:	**2AUVU-UBR410M**
APPLICANT:	**Pivotal Commware**

Application Type:	Class II Permissive Change
Model:	UBR410M
EUT Type:	Multi-Band Cat. M1 LTE Module
FCC Classifications:	PCS Licensed Tansmitter (PCB)
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.

Randy Ortanez
President

ilac-MRA

A2LA
ACCREDITED
CERT #2041.01

1.1 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements. The radiated power (EIRP) generated by 5G mmWave antennas are measured for both the horizontal and vertical components using a spectrum analyzer. The LTE and WiFi powers used for the MPE evaluation were taken from the power levels shown on the respective Grants of Authorization.

Through use of the Friis transmission formula and knowledge of the maximum antenna gain to be used, the power density level is calculated at the minimum distance required to show compliance to the MPE limit.

Friis Transmission Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4\pi r^2)$

Where,

P_d = Power Density (mW/cm^2) π = 3.1416
P_{out} = output power to antenna (mW)   r = distance between observation point and center of the radiator (cm)
G = gain of antenna in linear scale

Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the limits found in FCC Part 1 (§1.1310).

Radio	Frequency (GHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	Tolerance (dB)	Tolerance Maximum Power (dBm)	Measurement Distance (cm)	Calculated MPE (mW/cm^2)	MPE Limit (mW/cm^2)
		SU (Horizontal-DL+ Vertical-DL + LTE + WiFi)						
Horizontal-DL	27.5 - 28.35	20.00	11.50	1.50	33.00	21	0.360	1.0
Vertical-DL	27.5 - 28.35	20.00	11.50	1.50	33.00	21	0.360	1.0
WiFi	2.4	18.72	1.00	-	19.72	21	0.017	1.0
LTE	0.777 - 0.787	25.00	2.50	-	27.50	21	0.101	0.518
						Total:	0.933	1.0

Table 1. Calculated MPE Data for Simultaneous Transmissions

FCC ID: 2AUVU-UBR410M	PCTEST Proud to be part of element	MAXIMUM PERMISSIBLE EXPOSURE REPORT	PIVOTAL COMMWARE	Approved by: Technical Manager
Test Report S/N: 1M2010120161-06.2AUVU	**Test Dates:** 9/17/2020-10/16/2020	**EUT Type:** Multi-Band Cat. M1 LTE Module		Page 2 of 2

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