

## Low Profile, Configurable Power Solution

### Features

- DC input: 28 Vdc
- Output voltages:  
3.3 – 48 Vdc  
40 – 400 W total  
1, 2, or 3 outputs
- Protective features:  
Inrush current limiting  
Input transient protection:  
– per MIL-STD-704E/F (M-FIAM5B)  
– per MIL-STD-704A/E/F &  
MIL-STD-1275A/B/D (M-FIAM9)  
EMI filtering per MIL-STD-461E
- Local or remote control
- Compliant to MIL-STD-810F for  
vibration (Method 514.5, Procedure I)  
and shock (Method 516.5, Procedure I)  
Module environmental stress screening
- Package style:  
Low profile mounting options  
Optional finned heat sink

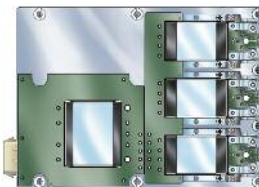
### Product Highlights

The 28 Vdc MIL-COTS VIPAC family of power systems is a new class of user-defined, modular power solutions for the most demanding military applications. It incorporates preassembled and tested front ends (M-FIAM5B or M-FIAM9), Vicor Maxi, Mini and Micro series DC-DC converters (H or M-Grade), a choice of output connections and mechanical platforms. The 28 Vdc VIPAC can be specified with 1, 2 or 3 outputs with voltages as low as 3.3 Vdc to as high as 48 Vdc and power levels from 40 to 400 W per output. Additionally, the wide trim range of the modules can provide operating voltages from 500 mv to 52.8 V. The MIL VIPAC is available with an input of 28 Vdc in a variety of packages with profiles as low as 0.75".

For additional technical or design information; or to create a 28 Vdc VIPAC tailored to your specific requirements using Vicor's online configurator, please visit [vicorpower.com](http://vicorpower.com).

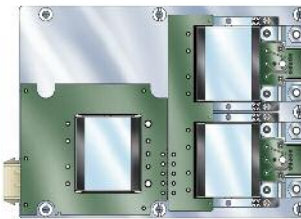


### Configurations



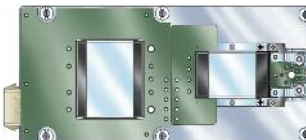
#### 3 Micros (MVC-Axxx, MVX-Axxx)

- 4.96" x 6.8" (126,0 x 172,7 mm)
- Dual or triple output
- Up to 300 W
- 1.4 lbs (640 g)



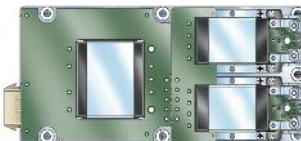
#### 2 Minis (MVC-Bxxx, MVX-Bxxx)

- 4.96" x 6.8" (126,0 x 172,7 mm)
- Single or dual output
- Up to 400 W
- 1.4 lbs (640 g)



#### 1 Micro (MVC-Gxxx, MVX-Gxxx)

- 3.15" x 6.8" (80,0 x 172,7 mm)
- Single output
- Up to 100 W
- 0.9 lbs (411 g)



#### 2 Micros (MVC-Dxxx, MVX-Dxxx)

- 3.15" x 6.8" (80,0 x 172,7 mm)
- Single or dual output
- Up to 200 W
- 1.0 lbs (457 g)



#### 1 Mini (MVC-Exxx, MVX-Exxx)

- 3.15" x 6.8" (80,0 x 172,7 mm)
- Single output
- Up to 200 W
- 1.0 lbs (457 g)



#### 1 Maxi (MVC-Fxxx, MVX-Fxxx)

- 3.15" x 9.15" (80,0 x 234,4 mm)
- Single output
- Up to 400 W
- 1.3 lbs (594 g)

Note: Weights are for coldplate versions • MVC-xxx refers to M-FIAM5B • MVX-xxx refers to M-FIAM9

## MIL VIPAC GENERAL SPECIFICATIONS

Typical at 25 °C, nominal line and load, unless otherwise specified.

### ■ INPUT SPECIFICATIONS

| Parameter                     | Min | Typ                        | Max   | Unit | Notes                                                                                                                        |
|-------------------------------|-----|----------------------------|-------|------|------------------------------------------------------------------------------------------------------------------------------|
| Input voltage                 | 18  | 28                         | 36    | Vdc  | Continuous                                                                                                                   |
| Inrush limiting               |     |                            | 0.007 | A/μF |                                                                                                                              |
| Transient immunity (M-FIAM5B) |     |                            | 50    | Vdc  | 12.5 ms per MIL-STD-704E/F, continuous operation<br>Test conditions AA and FF normal overvoltage transients per MIL-HDBK-704 |
| Transient immunity (M-FIAM9)  |     |                            | 100   | Vdc  | 50 ms per MIL-STD-1275A/B/D, continuous operation                                                                            |
|                               |     |                            | 250   | Vdc  | 70 μs per MIL-STD-1275A/B/D, continuous operation                                                                            |
|                               |     |                            | 70    | Vdc  | 20 ms per MIL-STD-704A, continuous operation                                                                                 |
|                               |     |                            | 50    | Vdc  | 12.5 ms per MIL-STD-704E/F, continuous operation                                                                             |
| EMI                           |     | MIL-STD-461E               |       |      |                                                                                                                              |
| Conducted emissions           |     | CE101, CE102*              |       |      |                                                                                                                              |
| Conducted susceptibility      |     | CS101, CS114, CS115, CS116 |       |      |                                                                                                                              |

\*CE102 compliant with loads in excess of 30% of rated output; loads below 30% may need additional input capacitance for compliance.

### ■ ENVIRONMENTAL - SYSTEM

| Parameter                               | Min       | Typ | Max | Unit     | Notes                               |
|-----------------------------------------|-----------|-----|-----|----------|-------------------------------------|
| Dielectric withstand, input to chassis  | 1500/2121 |     |     | Vrms/Vdc |                                     |
| Operating chassis temperature           |           |     |     |          |                                     |
| H-Grade                                 | -40       |     | 95  | °C       |                                     |
| M-Grade                                 | -55       |     | 95  | °C       |                                     |
| Storage temperature                     |           |     |     |          |                                     |
| H-Grade                                 | -55       |     | 125 | °C       |                                     |
| M-Grade                                 | -65       |     | 125 | °C       |                                     |
| Shock                                   |           |     |     |          |                                     |
| MIL-STD-810F, Method 516.5, Procedure I |           |     |     |          | 40 g for 15-23 ms, 75 g for 8-13 ms |
| Vibration                               |           |     |     |          |                                     |
| MIL-STD-810F, Method 514.5, Procedure I |           |     |     |          | 20-2000 Hz at 5 g                   |

### ■ OUTPUT SPECIFICATIONS

| Parameter                 | Min | Typ    | Max    | Unit       | Notes                                                                                                      |
|---------------------------|-----|--------|--------|------------|------------------------------------------------------------------------------------------------------------|
| Output voltage setpoint   |     |        | ±1     | %          | Vout nom                                                                                                   |
| Line regulation           |     | ±0.02  | ±0.2   | %          | Low line to high line; full load                                                                           |
| Temperature regulation    |     | ±0.002 | ±0.005 | %/°C       | Over operating temperature range                                                                           |
| Over temperature shutdown |     | 115    |        | °C         |                                                                                                            |
| Power sharing accuracy    |     | ±2     | ±5     | %          |                                                                                                            |
| Programming range         | 10  |        | 110    | %          | Of nominal voltage. (For trimming below 90% of nominal, a minimum load of 10% rated power may be required) |
| Current limit             |     | 115    |        | % Iout max | Output voltage 95% of nominal                                                                              |
| Short circuit current     |     | 115    |        | % Iout max | Output voltage <250 mV                                                                                     |

# MIL VIPAC SPECIFIC SPECIFICATIONS

## ■ ENVIRONMENTAL - MODULES

### Altitude

MIL-STD-810C, Method 500.2, Procedure I & II, 40,000 ft. and 70,000 ft. Operational.

### Explosive Atmosphere

MIL-STD-810F, Method 511.4, Procedure I, Operational.

### Vibration

MIL-STD-810F, Method 514.5, Procedure I, Category 14, Sine and Random vibration per Table 514.5C for Helicopter AH-6J Main Rotor with overall level of 5.6 grams for 4 hours per axis. MIL-STD-810F, Method 514.5C, General Minimum Integrity Curve per Figure 514.5C-17 with overall level of 7.7 grams for 1 hour per axis.

### Shock

MIL-STD-810-F, Method 516.5, Procedure I, Functional Shock, 40 G's. MIL-S-901D, Lightweight Hammer Shock, 3 impacts/axis, 1,3,5 ft. MIL-STD-202F, Method 213B, 60 G's, 9ms half sine. MIL-STD-202F, Method 213B, 75 G's, 11ms Saw Tooth Shock.

### Acceleration

MIL-STD-810F, Method 513.5, Procedure II, Table 513.5-II, Operational, 2-7 G's, 6 directions.

### Humidity

MIL-STD-810F, Method 507.4, Procedure I, Cycle I, 240 hrs, 95% RH.

### Solder Test

MIL-STD-202F, Method 208, 8 hour aging.

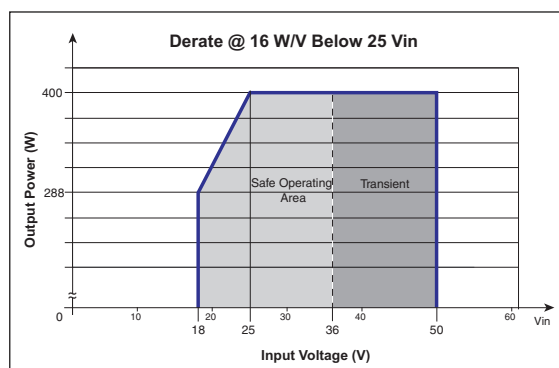
## ■ MIL-COTS 28 Vdc VIPAC OUTPUT POWER OPTIONS (Output power based on 28 Vdc nominal input voltage)

| VIPAC Configuration       | No. of Outputs | Power (W) |     |      |      |      |      |      |                    |
|---------------------------|----------------|-----------|-----|------|------|------|------|------|--------------------|
|                           |                | 3.3 V     | 5 V | 12 V | 15 V | 24 V | 28 V | 48 V | Total <sup>2</sup> |
| Single micro <sup>1</sup> | Single         | 75        | 100 | 100  | 100  | 100  | 100  | 100  | 100                |
|                           | Single //      | 150       | 200 | 200  | 200  | 200  | 200  | 200  | 200                |
| Dual micro <sup>1</sup>   | Dual           | 75        | 100 | 100  | 100  | 100  | 100  | 100  | 200                |
|                           |                |           | 75  | 100  | 100  | 100  | 100  | 100  | 100                |
| Triple micro <sup>1</sup> | Dual           | 150       | 200 | 200  | 200  | 200  | 200  | 200  | 300                |
|                           |                | 75        | 100 | 100  | 100  | 100  | 100  | 100  |                    |
|                           | Triple         | 75        | 100 | 100  | 100  | 100  | 100  | 100  | 300                |
|                           |                | 75        | 100 | 100  | 100  | 100  | 100  | 100  |                    |
|                           |                | 75        | 100 | 100  | 100  | 100  | 100  | 100  |                    |
| Single mini <sup>1</sup>  | Single         | 150       | 200 | 200  | 200  | 200  | 200  | 200  | 200                |
| Dual mini <sup>1</sup>    | Single //      | 300       | 400 | 400  | 400  | 400  | 400  | 400  | 400                |
|                           | Dual           | 150       | 200 | 200  | 200  | 200  | 200  | 200  | 400                |
|                           |                | 150       | 200 | 200  | 200  | 200  | 200  | 200  |                    |
| Maxi <sup>1</sup>         | Single         | 264       | 400 | 400  | 400  | 400  | 400  | 400  | 400                |

// = parallel

<sup>1</sup> Lower power modules available – consult website for more information.

<sup>2</sup> Derate output power per chart below.



28 V MIL-COTS VIPAC Derating Curve

## MIL VIPAC SPECIFIC SPECIFICATIONS (CONT.)

### ■ MICRO MODULES

| Parameter                  | 3.3 V | 5 V  | 12 V | 15 V | 24 V | 28 V | 48 V | Unit   | Notes                                    |
|----------------------------|-------|------|------|------|------|------|------|--------|------------------------------------------|
| Efficiency (typ)           | 79    | 84   | 85.8 | 89   | 88   | 89   | 87.7 | %      |                                          |
| Ripple & noise, p-p (typ)  | 140   | 100  | 209  | 100  | 70   | 85   | 100  | mV     | 20 MHz bandwidth                         |
| Output power               | 75    | 100  | 100  | 100  | 100  | 100  | 100  | Watts  | 95 °C Chassis                            |
| Output OVP setpoint        | 4.3   | 6.25 | 14.3 | 17.8 | 28.1 | 32.7 | 55.7 | Volts  | Recycle input volt. to restart (1 m off) |
| Dissipation, standby (typ) | 4     | 3.2  | 4.4  | 4.6  | 3.6  | 3.3  | 3    | Watts  | No load                                  |
| Load reg. (max)            | 0.02  | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | ±%Vout | No load to full load                     |

Note: 50 W Micro models are now available.

### ■ MINI MODULES

| Parameter                  | 3.3 V | 5 V  | 12 V | 15 V | 24 V | 28 V | 48 V | Unit   | Notes                                    |
|----------------------------|-------|------|------|------|------|------|------|--------|------------------------------------------|
| Efficiency (typ)           | 79    | 82.5 | 86   | 86.6 | 87   | 87   | 87.5 | %      |                                          |
| Ripple & noise, p-p (typ)  | 100   | 95   | 360  | 250  | 260  | 180  | 225  | mV     | 20 MHz bandwidth                         |
| Output power               | 150   | 200  | 200  | 200  | 200  | 200  | 200  | Watts  | 95 °C Chassis                            |
| Output OVP setpoint        | 4.3   | 6.3  | 14.4 | 17.8 | 28.5 | 32.8 | 55.8 | Volts  | Recycle input volt. to restart (1 m off) |
| Dissipation, standby (typ) | 5     | 5.1  | 4.6  | 3.4  | 5.1  | 4.5  | 5.4  | Watts  | No load                                  |
| Load reg. (max)            | 0.02  | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | ±%Vout | No load to full load                     |

### ■ MAXI MODULES

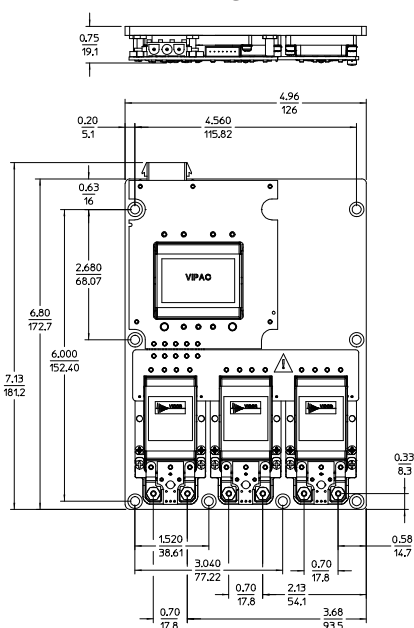
| Parameter                  | 3.3 V | 5 V  | 12 V | 15 V | 24 V | 28 V | 48 V | Unit   | Notes                                    |
|----------------------------|-------|------|------|------|------|------|------|--------|------------------------------------------|
| Efficiency (typ)           | 78.5  | 82   | 86.8 | 87.5 | 88.5 | 87.8 | 86.7 | %      |                                          |
| Ripple & noise, p-p (typ)  | 75    | 152  | 70   | 60   | 80   | 172  | 58   | mV     | 20 MHz bandwidth                         |
| Output power               | 264   | 400  | 400  | 400  | 400  | 400  | 400  | Watts  | 95 °C Chassis                            |
| Output OVP setpoint        | 4.3   | 6.25 | 14.3 | 17.8 | 28.1 | 32.7 | 55.8 | Volts  | Recycle input volt. to restart (1 m off) |
| Dissipation, standby (typ) | 8     | 6.8  | 6.8  | 6.3  | 11   | 6.3  | 11.8 | Watts  | No load                                  |
| Load reg. (max)            | 0.02  | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | ±%Vout | No load to full load                     |

Note: 300 W (200 W @ 3.3V) Maxi models are also available.

# MECHANICAL DRAWINGS

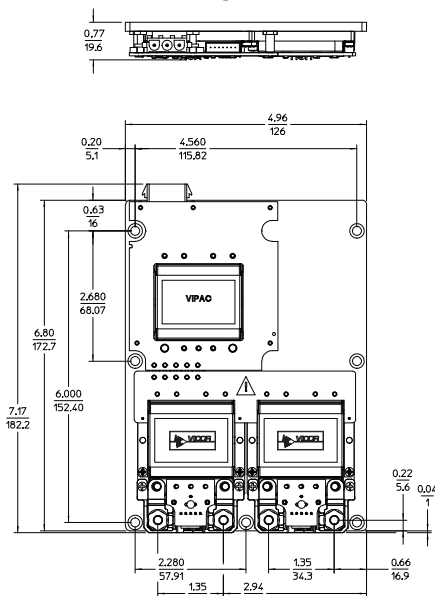
**Configuration MVC-A / MVX-A**

**LugMates**



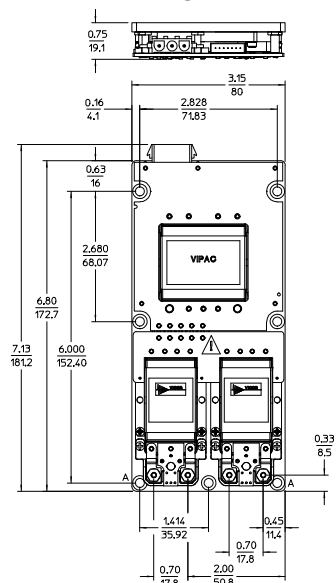
**Configuration MVC-B / MVX-B**

**LugMates**



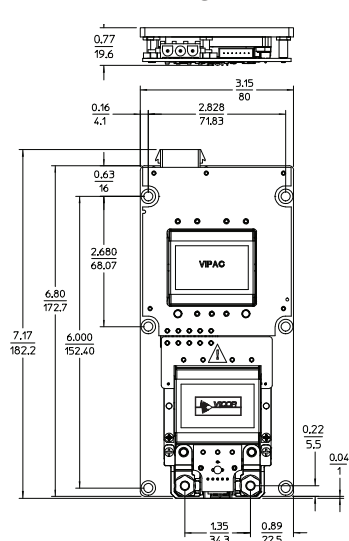
**Configuration MVC-D / MVX-D**

**LugMates**



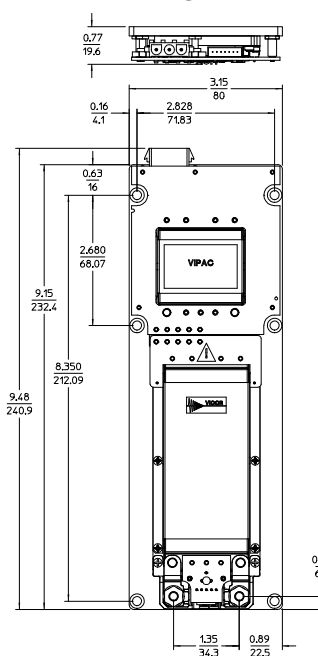
**Configuration MVC-E / MVX-E**

**LugMates**



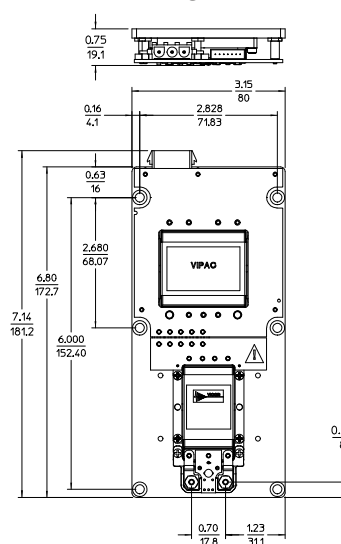
**Configuration MVC-F / MVX-F**

**LugMates**



**Configuration MVC-G / MVX-G**

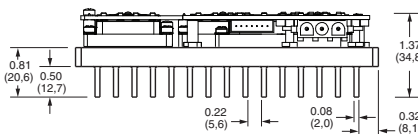
**LugMates**



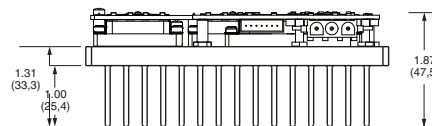
## HEAT SINK OPTIONS



**Coldplate**



**0.5" Fin Option**



**1" Fin Option**

Fin spacing and relief are the same for both Fin options

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