

VICOR

VICOR MIL COTS POWER



Military Standards

MIL-STD-704: Aircraft Electrical Power Characteristics				
Product	MIL-STD-704A	MIL-STD-704D	MIL-STD-704E	MIL-STD-704F
V•I Chip 28 Vdc		•	•	•
MI-J2x-xx	• ^[a]	•	•	•
MI-J6x-xx	N/A	•	•	•
MI-22x-xx	• ^[a]	•	•	•
MI-26x-xx	N/A	•	•	•
MI-A22-xx	•	•	•	•
MI-A66-xx	N/A	•	•	•
MI-AIM-xx	•	•	•	•
24 / 28 Vin Maxi, Mini, Micro	• ^[d]	• ^[d]	• ^[b,d]	• ^[b,d]
300 Vin Maxi, Mini, Micro	N/A		•	•
M-FIAM3	N/A		•	•
M-FIAM5B			•	•
M-FIAM7, M-FIAM7B, M-FIAM9 MR028B036M012FPT, MF028AMFPT	•	•	•	•
MI-CompPAC 28 Vdc	•	•	•	•
MI-CompPAC 270 Vdc	N/A	•	•	•
MI-MegaMod 28 Vdc	• ^[a]	•	•	•
MI-MegaMod 270 Vdc	N/A	•	•	•
MIL-VIPAC 28 Vdc	•	•	•	•
MIL-STD-1275: Military Vehicle 28 Vdc Electrical Characteristics				
Product	MIL-STD-1275A	MIL-STD-1275B	MIL-STD-1275D	
MI-J2x-xx, MI-22x-xx	• ^[a]	• ^[a]	• ^[a]	
24 / 28 Vin Maxi, Mini, Micro	• ^[d]	• ^[d]	• ^[d]	
V•I Chip 28 Vdc	• ^[c]	• ^[c]	• ^[c]	
MI-A22-xx	•	•	•	
M-FIAM7, M-FIAM7B, M-FIAM9 MR028B036M012FPT, MF028AMFPT	•	•	•	
MI-CompPAC 28 Vdc	•	•	•	
MIL-VIPAC 28 Vdc				
MIL-STD-1399: Interface Standard for Shipboard Systems				
Product	MIL-STD-1399A	MIL-STD-1399B	MIL-STD-1399C	
MI-J5x-xx	•	•	•	
MI-25x-xx	•	•	•	
MI-MegaMod 155 Vdc	•	•	•	
MIL-STD-461: Electromagnetic Emissions and Susceptibility Requirements				
Product	MIL-STD-461C	MIL-STD-461D	MIL-STD-461E ^[e]	
MI-A22-xx, MI-A66-xx	CE01, CE03, CE07, CS01, CS02, CS06	CE101, CE102, CS101, CS114, CS115, CS116	CE101, CE102, CS101, CS114, CS115, CS116	
M-FIAM3, M-FIAM5B, M-FIAM7, M-FIAM7B, M-FIAM9, MQPI-18 MR028B036M012FPT, MF028AMFPT			CE101, CE102, CS101, CS114, CS115, CS116	
MI-AIM-xx	CE102	CE102		
MI-CompPAC 28 Vdc, 270 Vdc	CE01, CE03, CE07, CS01, CS02, CS06	CE101, CE102, CS101, CS114, CS116	CE101, CE102, CS101, CS114, CS116	
MIL-VIPAC 28 Vdc			CE101, CE102, CS101, CS114, CS115, CS116	

^[a] with MI-IAM ^[b] with M-FIAM5B ^[c] with M-FIAM7 or M-FIAM7B ^[d] with M-FIAM9

^[e] selected products are compliant to MIL-STD-461F, consult factory for more information

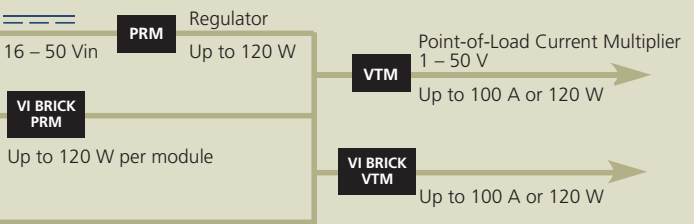
MIL-COTS Products Overview

V-I Chip / VI BRICK Solutions

DC-DC Products

28 Vdc		EMI (MIL-STD-461) / Transient protection (MIL-STD-1275) Up to 400 W
28 Vdc		EMI Filter (MIL-STD-461) Up to 7 A
28 Vdc		MF028AMFPT
28 Vdc		MR028B036M012FPT

DC-DC Products



Component Power Solutions: MI-200 & MI-J00 Series

AC-DC Products

115 Vac
47 – 440 Hz



Rectifier / EMI Filter
Up to 250 W

DC-DC Products

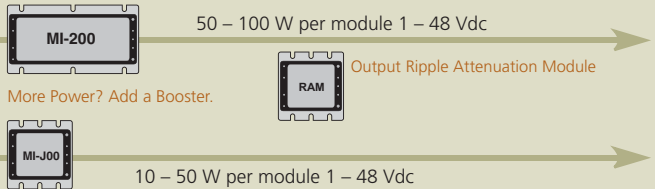
Nominal Input
18 – 400 Vdc

28 Vdc, 270 Vdc



EMI Filter / Transient protection
Up to 200 W

DC-DC Products



Component Power Solutions: Maxi, Mini, Micro Series

DC-DC Products

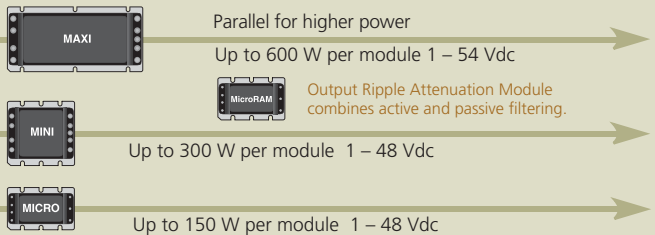
Nominal Input
18 – 425 Vdc

24 Vdc, 300 Vdc



EMI filter / Transient protection
Up to 20 A

DC-DC Products



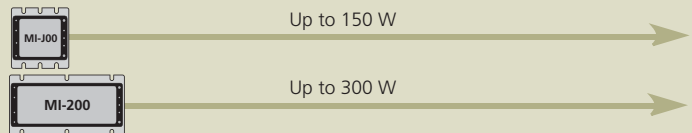
Configurable Power Solutions

MI-MegaMod Family (Chassis Mount)

DC Inputs
18 – 400 Vdc



1 – 3 Outputs using MI-200 or MI-J00 Family modules

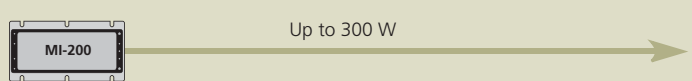


MI-ComPAC Family

DC Inputs
28 Vdc, 270 Vdc



1 – 3 Outputs using MI-200 Family modules
EMI filter / Transient protection

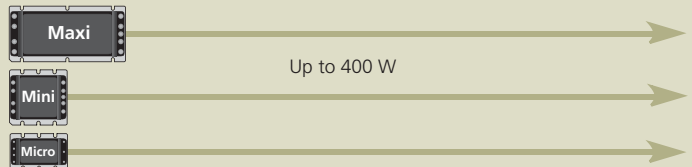


MIL-VIPAC Power Systems

28 Vdc



1 – 3 Outputs using Maxi, Mini, Micro Family modules
EMI filter / Transient protection

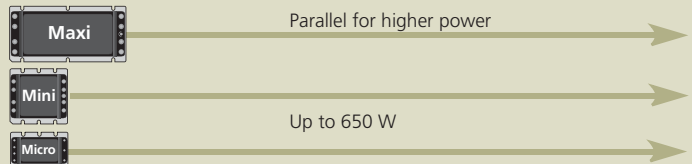


MIL-VIPAC Array Power Systems

DC Inputs
24 Vdc, 28 Vdc, 300 Vdc



1 – 4 Outputs using Maxi, Mini, Micro Family modules

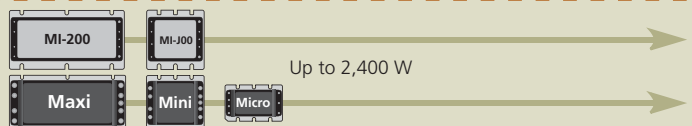


Westcor MI-Family

85 – 264 Vac
100 – 380 Vdc



1 – 32 Outputs





Field Tested Proven Reliability

Partial Listing

F-15 Fighter Aircraft

F-16 Fighting Falcon Multi-Role Fighter Aircraft

F/A-18 Super Hornet Strike Attack Aircraft

F/A-22 Raptor Advanced Tactical Fighter Aircraft

F-35 Joint Strike Fighter

Eurofighter Typhoon Aircraft

Rafale Multi-Role Combat Fighter

Tornado Multi-Role Combat Fighter

B-1B Lancer Strategic Bomber

B-52 Stratofortress Long-Range Multi-Role Bomber

CH-53 Super Stallion Heavy-Lift Helicopter

AH-64 Apache Attack Helicopter

CH-47/MH-47 Chinook Heavy-Lift Helicopter

Black Hawk Multi-Mission Helicopter

AWACS Airborne Warning & Control System

E-2C Hawkeye Airborne Early Warning Aircraft

EA-6B Prowler Electronic Warfare Aircraft

Global Hawk High Altitude, Long Endurance Unmanned Reconnaissance Aircraft

Predator Unmanned Aerial Vehicle

JSTARS Joint Surveillance & Target Attack Radar System

NIMROD MR4A Maritime Reconnaissance Aircraft

P-3C Orion Maritime Patrol & Anti-Submarine Warfare

T-50 Golden Eagle Jet Trainer & Light Attack Aircraft

C-130 Hercules Tactical Transport Aircraft

KC-135 Stratotanker Air-to-Air Refueling Aircraft

C-17 Globemaster Tactical Transport Aircraft

V-22 Osprey Medium-Lift, Multi-Mission, Tilt-Rotor Aircraft

Patriot Missile Air Defense System

THAAD Terminal High Altitude Area Defense Missile System



NASAMS Norwegian Surface-to-Air Missile System

MLRS Multiple Launch Rocket System

TOW Anti-Tank Missile

Tomahawk Cruise Missile

Harpoon Anti-Ship Missile

NSM Naval Strike Missile

TAURUS KEPD 350 Stand-off-Weapon

Sting Ray Lightweight Torpedo

Bradley M2/M3 Tracked Armored Fighting Vehicle

PUMA Tracked Infantry Fighting Vehicle

TETS Third Echelon Test System

Stryker 8-Wheel Drive Armored Combat Vehicle

Fire Finder Radar

Paladin 155mm Self-Propelled Howitzer

M1A1/M1A2 Abrams Main Battle Tank

CREW Counter Electronic Warfare

Blue Force Movement Tracking System

JTRS Joint Tactical Radio System

Falcon Tactical Radio

AEGIS Guided Missile Destroyer

DDG 1000 Zumwalt Class Destroyer

SSN Seawolf Class Attack Submarine

NSSN Virginia Class Attack Submarine

CEC Cooperative Engagement Capability

MCMV Hunt Class Mine Countermeasures Vehicle

NASA Space Shuttle

International Space Station

Vicor Military COTS products have a long and successful record of supporting the most demanding applications.



Contents

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AC-DC or DC-DC complete turnkey solutions		Chassis mount DC-DC converters for 24 and 300 Vdc systems		Expert instruction on the most-asked-about power system design topics	
VI BRICK	7	PFC MegaPAC MI	34	VicorStore Online	47
Thermally enhanced package for V•I Chip family of DC-DC converters		PFC combined with the configurability of the MegaPAC family		Purchase all of your power prototypes at the VicorStore	
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DC-DC Converter Modules		Sockets, standoffs, capacitors, inductors, heat sinks, etc.			
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Output ripple attenuator modules					



Specifications are subject to change without notice - please visit vicorpower.com for the latest product information.

**Small company
RESPONSIVENESS,
large company
RESOURCES**

Vicor Custom Power has the capability to design, manufacture and certify semi-custom or full-custom power supplies. By utilizing standard Vicor component power modules (more than 8,000 active models), we can offer the shortest lead time with the lowest risk.

Our experience providing unique and demanding power solutions for the military & aerospace market span over 20 years. We have invested in tools and resources that allow us to offer full service solutions from prototype to mass production.

Contact us to learn more about Vicor Custom Power solutions.

Applications Support:

800-496-5570

apps@vicorcustom.com



Custom Power

Total Solutions for Military & Aerospace Applications

General Capabilities

- Complete AC-DC or DC-DC turnkey solutions from prototype to production
- Conduction-cooled, fan-cooled or natural convection
- Harsh environment enclosures
- Environmental stress screening
- Radiation tolerant systems
- Mechanical and electrical design
 - Solidworks 3D modeling
 - AutoCAD
- Compliance certification
 - EMI
 - Input transients
 - Life testing
 - Environmental qualification
- Thermal and vibration analysis
- MTBF calculations
- Program management



vicorcustom.com



AC-DC Solutions

- 85 – 264 V single phase
- 208 – 480 V three phase
- Power Factor Correction (PFC)
- High frequency, up to 880 Hz

DC-DC Solutions

- Inputs: 10 – 425 V
- Output power – watts to kilowatts
- Multiple outputs – up to 400 V

Standards Compliance

- MIL-STD-461
- MIL-STD-704
- MIL-STD-1275
- MIL-STD-810
- MIL-STD-202
- MIL-STD-1399
- DO-160





Vicor Custom Power Customers *Partial Listing*

AAI	GE	SmartSat
AAR	Goodrich	Syracuse Research
Analogic	Harris	US Marines
Areté	Herley	US Navy
ArgonST	HP	
BAE	Hybricon	
Boeing	L-3	
Carlo Gavazzi	Lockheed Martin	
Cubic Defense	Med-Eng / Allen	
CSPI	Vanguard	
DME	Mercury Computer	
DRS	NASA	
DRT	NATO	
ELMA	Naval Undersea	
Fairbanks Morse	Warfare Center	
FLIR	Northrop Grumman	
Gamber Johnson	Raytheon	
General Dynamics	Rockwell Collins	
	Sanmina-SCI	

Custom Power Design Centers

Aegis Power Systems

Murphy, NC
Tel: 828-837-4029
aegispower.com

Convertec Corporation

Roseville, MN
Tel: 651-604-0289
convertecpower.com

Freedom Power Systems

Cedar Park, TX
Tel: 512-259-0941
freedompower.com

Granite Power Technologies

Manchester, NH
Tel: 603-623-3222
granitepower.com

Mission Power Solutions

Oceanside, CA
Tel: 760-631-6846
mpwrs.com

Northwest Power Integrations

Milwaukie, OR
Tel: 503-652-6161
npi-inc.com

Off-the-Shelf Configurable Power Supplies

VME Family

Features

- 28 Vdc per MIL-STD-704F (VME450)
- 28 Vdc per MIL-STD-1275D (VME450G and VME225)
- Vin max range: 18 – 36 Vdc
- Up to four output voltages
- Up to 550 W (VME450 Family), 225 W (VME225)
- MIL-STD-810F environments
- MIL-STD-461E EMI
- Utilizes Vicor's V•I Chips
- Temperature: –40°C to +85°C
- Single or half slot VME



The VME power supply family – filtered 28 Vdc, up to four outputs (3.3, 5, ± 12 V), up to 550 W – is a MIL-COTS solution that is compliant to the input transients per MIL-STD-704F (VME450) or MIL-STD-704A/F and MIL-STD-1275D (VME450G and VME225) as well as the vibration requirements per MIL-STD-810F and EMI per MIL-STD-461E. When compared to conventional technology VME power supplies, VME family provides users with higher efficiency (up to 85%), lower weight (VME450 – 2.4 lbs, VME225 – 1.2 lbs), and higher power (up to 550 W).

Convection cooled options available, consult factory.

Badger™

The Badger is a rugged PFC multi-output power supply, capable of withstanding extreme environments and stresses often inherent with military applications.



Product	Dimensions	Input Voltage	Max # of Outputs	Maximum Power	Cooling	Notes
Badger	2.55" x 7.0" x 13.75" (64,8 x 177,8 x 349,3 mm)	85 – 264 Vac	12	1,800 W	Internal fans	OCP, OVP, and OTP on all outputs

Javelin™

The Javelin is an AC input power supply with a single DC output, capable of up to 5,400 W, in a rugged package suitable for industrial and military applications.



Product	Dimensions	Input Voltage	Max # of Outputs	Maximum Power	Cooling
Javelin I	4.9" x 7.0" x 10.75" (124,5 x 177,8 x 273,05 mm)	85 – 254 Vac	1	600 – 1,800 W	Internal fans
Javelin II	4.9" x 7.0" x 9.5" (124,5 x 177,8 x 241,3 mm)	85 – 254 Vac	1	600 – 1,800 W	No fan
Javelin III	7.0" x 16.0" x 13.0" (177,8 x 406,4 x 330,2 mm)	85 – 254 Vac 3-Phase	1	1,800 – 5,400 W	Internal fans

Bricks-on-a-Plate™

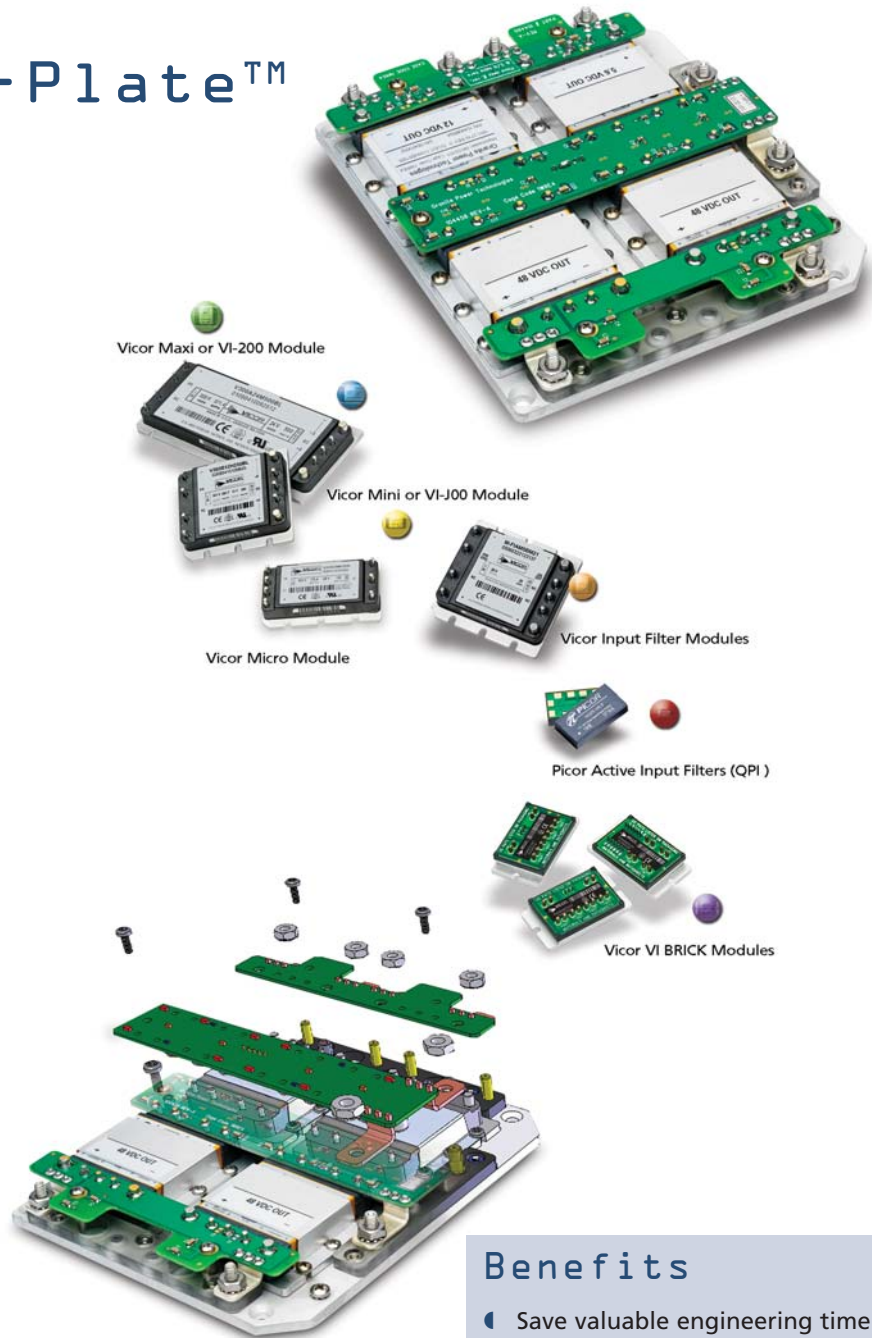
AC-DC or DC-DC
complete turnkey
solutions

Highlights

Vicor's **Bricks-On-A-Plate** power solution offers unique configuration flexibility, high power density, high reliability, and quick time to market at prices not usually found in custom solutions. Vicor's unique mass-customization capability allows you to choose from thousands of power modules and filter options. Examples of solutions include DC-powered designs without filters, DC-powered designs with filters, and AC-powered designs with filters.

Features

- Complete AC-DC or DC-DC turnkey solutions, from prototype to production
- Conduction-cooled, fan-cooled or natural convection
- Enclosed, open frame chassis or harsh environment enclosures
- Environmental stress screening
- Mechanical design to military or commercial specifications such as:
 - MIL-STD-461
 - MIL-STD-704
 - MIL-STD-1275
 - MIL-STD-810
 - MIL-STD-202
 - MIL-STD-1399
 - DO-160
- Shock, vibration and thermal analysis
- MTBF calculations
- UL and other certifications, as required
- Multiple input and output voltage options



See pages 30 – 33 for Vicor's line of standard VIPAC and VIPAC Array products.

Benefits

- Save valuable engineering time
- Risk mitigation
- Reduce cost
- Improve time to market



Bricks-on-a-Plate Brochure

For semi-custom packaging options, see our Bricks-on-a-Plate capabilities brochure.

Visit custompower.com

VI BRICK™

VI BRICK PRM / VTM / BCM Thermally Enhanced Package

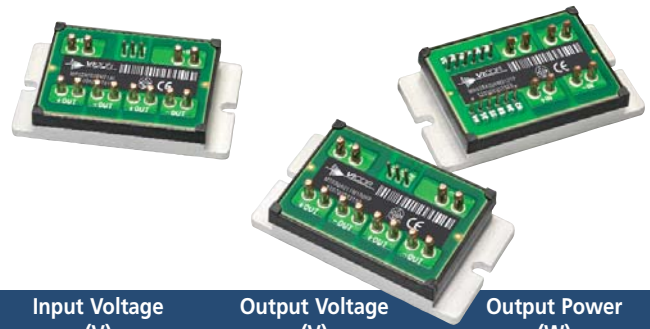
Highlights

The **PRM Regulator Module** is a very efficient non-isolated regulator specifically designed to provide a controlled Factorized Bus distribution voltage for powering downstream VI BRICK Voltage Transformation Modules. The thermally enhanced **VTM point-of-load current multiplier** excels at speed, density and efficiency to meet the demands of advanced power applications. In combination, VI BRICK PRMs and VTMs form a complete DC-DC converter subsystem offering all of the unique benefits of Vicor's Factorized Power Architecture (FPA): high density and efficiency; low noise operation; architectural flexibility; extremely fast transient response; elimination of bulk capacitance at the point of load (POL); in a thermally enhanced package.

The MIL-COTS VI BRICK **BCM Bus Converter Module** provides high power density and efficiency, superior transient response, and improved thermal management. These modules can be used to provide an isolated intermediate bus to power non-isolated POL converters and due to the fast response time and low noise of the BCM, capacitance can be reduced or eliminated near the load.

Features

- -55°C to 100°C baseplate
- Sine Amplitude Converter (VTM/BCM)
- ZVS buck-boost regulator (PRM)
- Regulation 1% (Adaptive Loop)
- Small footprint: 1.64 and 2.08 in²
- 16 – 50 Vin or 240 – 330 Vin
- 1 – 50 Vout
- Up to 235 W of output
- High efficiency: Up to 96.5%
- Low profile 0.37" flanged model
- Power density: Up to 312 Win³
- Flexible architecture
- Low noise
- Fast transient response



PRM Model Number	Input Voltage (V)	Output Voltage (V)	Output Power (W)
MR028A036M012FP	16.1 – 50 ^[a]	26 – 50	120

^[a] will operate down to 13.5 V after start up ≥ 16 V

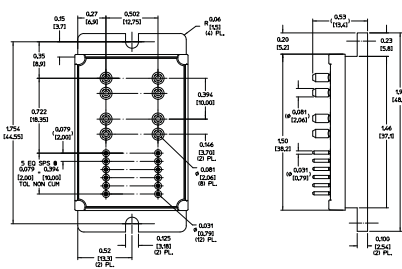
VTM Model Number	K-Factor	No Load Output Voltage (V)		Output Current (A)
		26 Vin	50 Vin	
MT036A011M100FP	1/32	0.82	1.55	100
MT036A015M080FP	1/24	1.1	2.0	80
MT036A022M055FP	1/16	1.6	3.1	55
MT036A030M040FP	1/12	2.2	4.1	40
MT036A045M027FP	1/8	3.3	6.2	27
MT036A060M020FP	1/6	4.3	8.3	20
MT036A072M017FP ^[b]	1/5	6.4 ^[b]	10.0	16.6
MT036A090M013FP	1/4	6.5	12.5	13.3
MT036A120M010FP	1/3	8.7	16.6	10.0
MT036A180M007FP	1/2	13.0	25.0	6.7
MT036A240M005FP	2/3	17.4	33.0	5.0
MT036A360M003FP	1	26.0	50.0	3.3

^[b] Low line input voltage 32 V

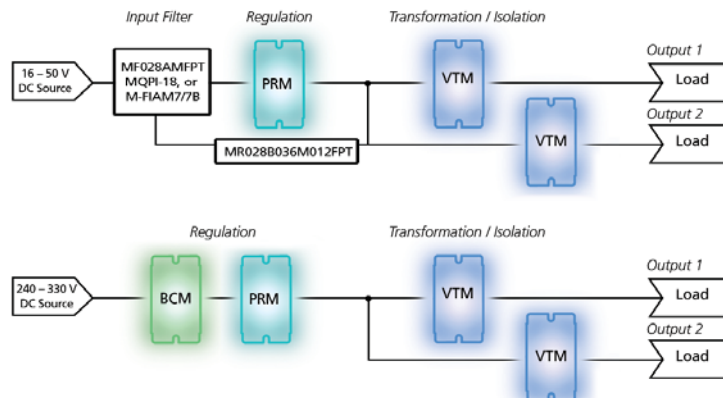
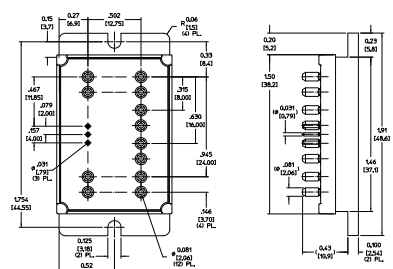
BCM Model Number	Input Voltage (V)	Output Voltage (V)	Output Current (A)	Output Power (W)
MC270A330M024FP	240 – 330	30.0 – 41.25	7.3	235

Mechanical Drawings

VI BRICK PRM



VI BRICK VTM/BCM



V-I Chip™ DC-DC Modules

PRM™ Regulator and BCM High Voltage Bus Converter



Input Filters Available
See pages 12 - 13

Highlights

The **PRM** is a high-efficiency non-isolated regulator capable of both boosting and bucking a wide-range input voltage. PRMs may be used independently, as stand-alone regulators, or together with downstream Voltage Transformation Modules — fast, efficient, isolated low-noise point-of-load (POL) converters. The MIL-COTS PRM operates from a wide input range of 16 – 50 Vdc, meeting many of the ground vehicle and airborne requirements of MIL-STD-1275 and MIL-STD-704. Rated for 120 W, the 28 V PRM produces a nominal Factorized Bus voltage of 36 Vdc, controllable over the range of 26 – 50 Vdc. The downstream isolated VTM™ (Current Multiplier) is available with twelve voltage division ratios to supply up to 100 A or 120 W from 1 – 50 Vdc.

The MIL-COTS Bus Converter Module (**BCM**) is a high efficiency converter operating from MIL-STD-704E/F 270 V and delivering an isolated 30.0 – 41.3 V. The BCM is suitable for use with the MIL-COTS PRM–Regulator and VTM–Current Multiplier, and is ideal for aircraft distributed power applications.

PRM Features

- Input: 16 – 50 Vdc^[a]
- Programmable output: 26 – 50 Vdc
- Power: Up to 120 W
- 1.3 MHz switching frequency
- Efficiency: 95%
- Size: 1.28" x 0.87" x 0.26" (32,5 x 22 x 6,6 mm)

BCM Features

- Input: 240 – 330 Vdc
- Output: 30.0 – 41.25 Vdc
- Power: Up to 235 W
- Size: 1.28" x 0.87" x 0.26" (32,5 x 22 x 6,6 mm)

PRM General Specifications

(Full load, 25°C ambient)

Parameter	Min	Typ	Max	Unit	Note
PRM Input Characteristics					
Input voltage range	16.1 ^[a]	28	50	Vdc	
Input undervoltage turn-on		15.9	16.1	Vdc	Increases linearly to 17 V at 100°C
Input undervoltage turn-off	12.2	13.5		Vdc	
Input overvoltage turn-on	50.5	52.5		Vdc	
Input overvoltage turn-off		53.5	55.0	Vdc	
Input current		4.5		Adc	
No load power dissipation		2.75	5.5	W	
Recommended external input capacitance		1,000		µF	Source impedance dependent

Parameter	Min	Typ	Max	Unit	Note
PRM Output Characteristics					
Output voltage range	26	36	50	Vdc	Factorized Bus voltage (Vf) set by Ros
Output power	0		120	W	
Output current	0		3.33	Adc	
DC current limit	3.5	3.9	4.4	Adc	IL pin floating
Set point accuracy		1.5		%	
Line regulation		0.1	0.2	%	Low line to high line
Load regulation		0.1	0.2	%	No CD resistor
Load regulation (at VTM output)		1.0	2.0	%	Adaptive Loop
Efficiency					
Full load	94	95.6		%	
Output overvoltage set point	56		59.4	Vdc	

^[a] Will operate down to 13.5 V after start up ≥16 V

BCM General Specifications

(Full load, 25°C ambient)

Parameter	Min	Typ	Max	Unit	Note
BCM Input Characteristics					
Input voltage range	240	270	330	Vdc	
DC input current			0.95	A	Continuous
No load power dissipation			10	W	

Parameter	Min	Typ	Max	Unit	Note
BCM Output Characteristics					
Output voltage range	30.0		41.25	Vdc	
Output power			235	W	
Output current			7.3	A	
Efficiency		95.4		%	

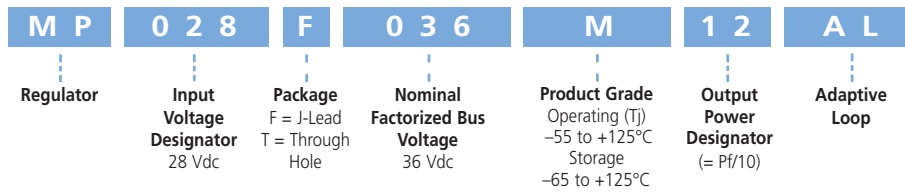
BCM Part Numbering

VMB0004MFJ – MIL-COTS High Voltage BCM, J-Leads

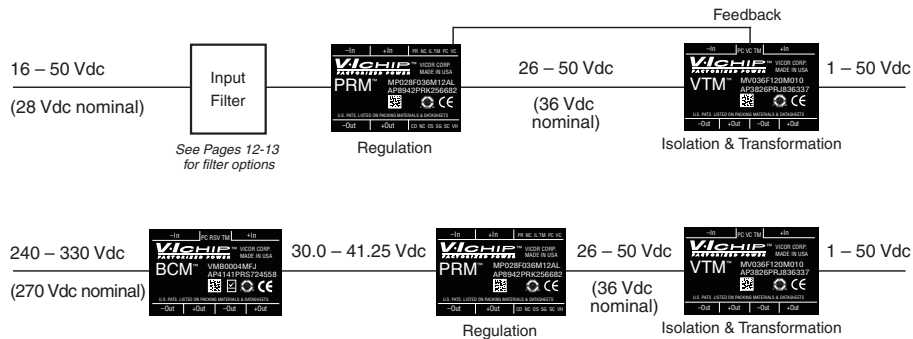
VMB0004MFT – MIL-COTS High Voltage BCM, Through Hole



PRM Part Numbering



DC-DC Conversion Using V•I Chip Modules

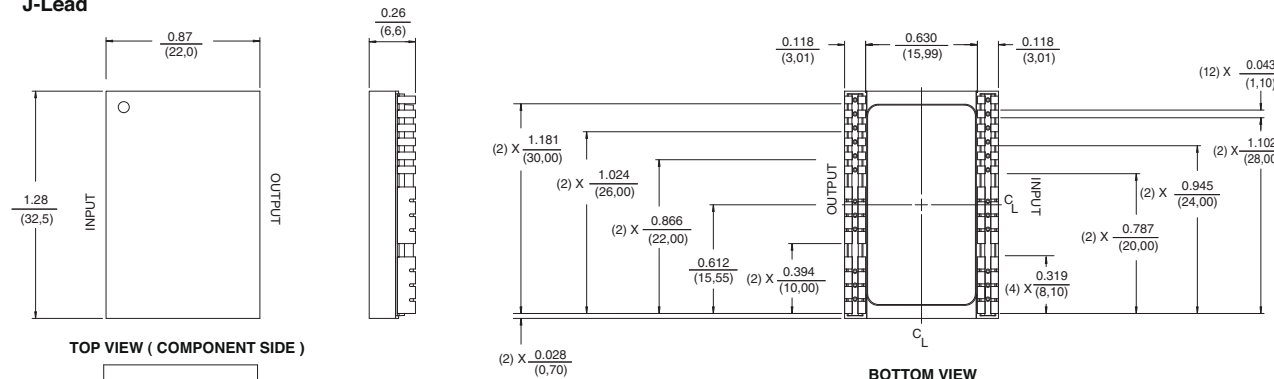


Together, the PRM and the VTM chip set provides the full functionality of a DC-DC converter, but with breakthrough performance and flexibility in a rugged, miniature package.

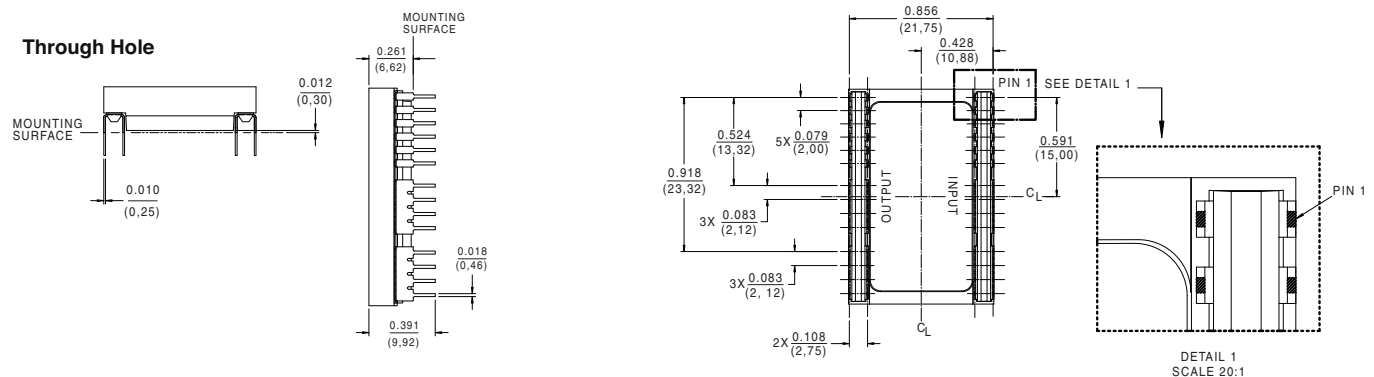
PRM Mechanical Drawing $\frac{in}{(mm)}$

(see data sheet for BCM outline drawing)

J-Lead

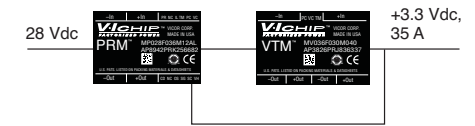


Through Hole

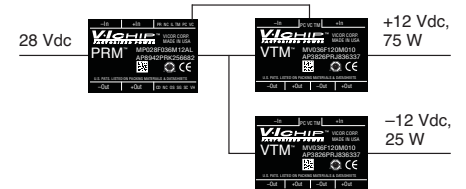


Application Examples

Tightly Regulated Single Output



Multiple Outputs with a Single PRM



Parallel for Higher Power



28 V V-I Chip™ DC-DC Modules

VTM™ Point-of-Load Current Multiplier

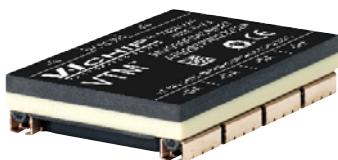
Highlights

The **VTM** put isolated current multiplication and voltage division directly at the point-of-load (POL) and an upstream PRM controls the Factorized Bus voltage supplied to the VTM to provide line and load regulation. Utilizing a Sine Amplitude Converter (SAC), VTMs offer unprecedented performance in the critical areas of speed, noise, efficiency and density.

The isolated VTM is available with twelve voltage division ratios from 1:1 to 1:32 and provides the user with flexibility to supply up to 100 A or 120 W at any output voltage from 1 to 50 Vdc in a surface mount package occupying only 1 in².

Features

- Isolated 1 – 50 Vdc output
- Power: Up to 100 A or 120 W
- 1 μ s transient response
- 3 MHz switching frequency
- Efficiency: Up to 96.5%
- –55°C to +125°C operation (Tj)
- Size: 1.28" x 0.87" x 0.26"
(32,5 x 22 x 6,6 mm)



General Specifications

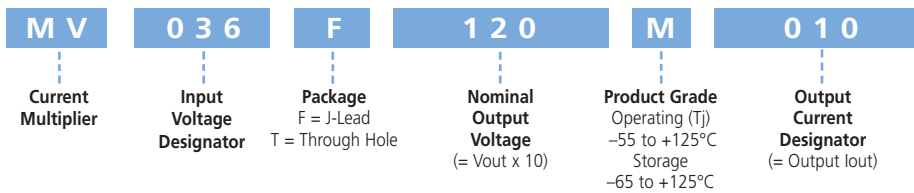
(36 Vin, full load, 25°C ambient)

Parameter	Min	Typ	Max	Unit	Note
Input Characteristics					
Input voltage range	26	36	50	Vdc	
Input dV/dt			1.0	V/ μ s	
Input overvoltage turn-on	50.5	54.4		Vdc	
Input overvoltage turn-off		55.5	57.5	Vdc	
Input current			3.5	Adc	Continuous
No load power dissipation	1.5	3.0	6.0	W	Low line to high line

Parameter	Min	Typ	Max	Unit	Note
Output Characteristics					
Output voltage range	See Table 1			Vdc	
Rated DC current	0		100	Adc	26 – 50 Vin (see table)
Peak repetitive current			150	% Imax (A)	Pulse width 1 ms, max duty cycle 10%, baseline power 50%
DC current limit		160		%Imax (A)	Module will shut down when current limit is reached or exceeded
Current share accuracy		5.0	10	%	
Efficiency			96.5	%	Model dependent
Output overvoltage set point		110	115	%	Vout max
Output ripple voltage				mV	
No external bypass	50		250	mV	
With 10 μ F bypass capacitor	2.0		20	mV	
Switching frequency	2.5	3.0	3.6	MHz	Model dependent
Line regulation (K)	0.99	1	1.01		Vout = K•Vin at no load
Load Regulation	Rout Min		Rout Max	m Ω	See Table 1
Transient response					
Response time		200		ns	
Recovery time		1.0		μ s	

Parameter	Min	Typ	Max	Unit	Note
General Characteristics					
MTBF (MV036F030M040)					
MIL-HDBK-217F	4,832			1,000 hrs	25°C, GB
	869				50°C NS
	681				65°C AIC
Isolation specifications					
Voltage	2,250			Vdc	Input to Output
Capacitance		3,000		pF	Input to Output
Resistance	10			M Ω	Input to Output
Mechanical					
Weight		0.53 / 15		oz / g	
Dimensions					
Length		1.28 / 32,5		in / mm	
Width		0.87 / 22		in / mm	
Height		0.26 / 6,6		in / mm	
Thermal					
Over temperature shut down	+125	+130	+135	°C	Junction temperature
Thermal capacity		9.3		Ws/°C	
Junction-to-case thermal impedance (R θ JC)		1.1		°C/W	
Junction-to-ambient (R θ JA)		5.0		°C/W	With 0.25" heat sink

Part Numbering



VTM Family Part Numbers & Ranges

Part Number	K-Factor	Nominal Vout Range (Vdc)	Rated Output Current (A)	Min	Rout (mΩ) Nom	Max
MV036F011M100	1/32	0.8 – 1.6	100	0.5	0.85	1.3
MV036F015M080	1/24	1.1 – 2.0	80	1.0	1.25	1.5
MV036F022M055	1/16	1.7 – 3.1	55	1.4	1.75	2.0
MV036F030M040	1/12	2.2 – 4.1	40	1.45	2.4	3.4
MV036F045M027	1/8	3.3 – 6.2	27	3.5	5.1	6.6
MV036F060M020	1/6	4.3 – 8.3	20	5.0	8.0	10
MV036F072M017 ^[a]	1/5	6.4 – 10.0	16.6	6.0	9.6	12
MV036F090M013	1/4	6.5 – 12.5	13.3	6.9	9.3	11.6
MV036F120M010	1/3	8.7 – 16.6	10.0	25	31	35
MV036F180M007	1/2	13.0 – 25.0	6.7	27.5	35.7	46.4
MV036F240M005	2/3	17.4 – 33.3	5.0	49.3	70.6	91.8
MV036F360M003	1	26.0 – 50.0	3.3	140	170	200

Table 1

^[a] Low line input voltage 32 V

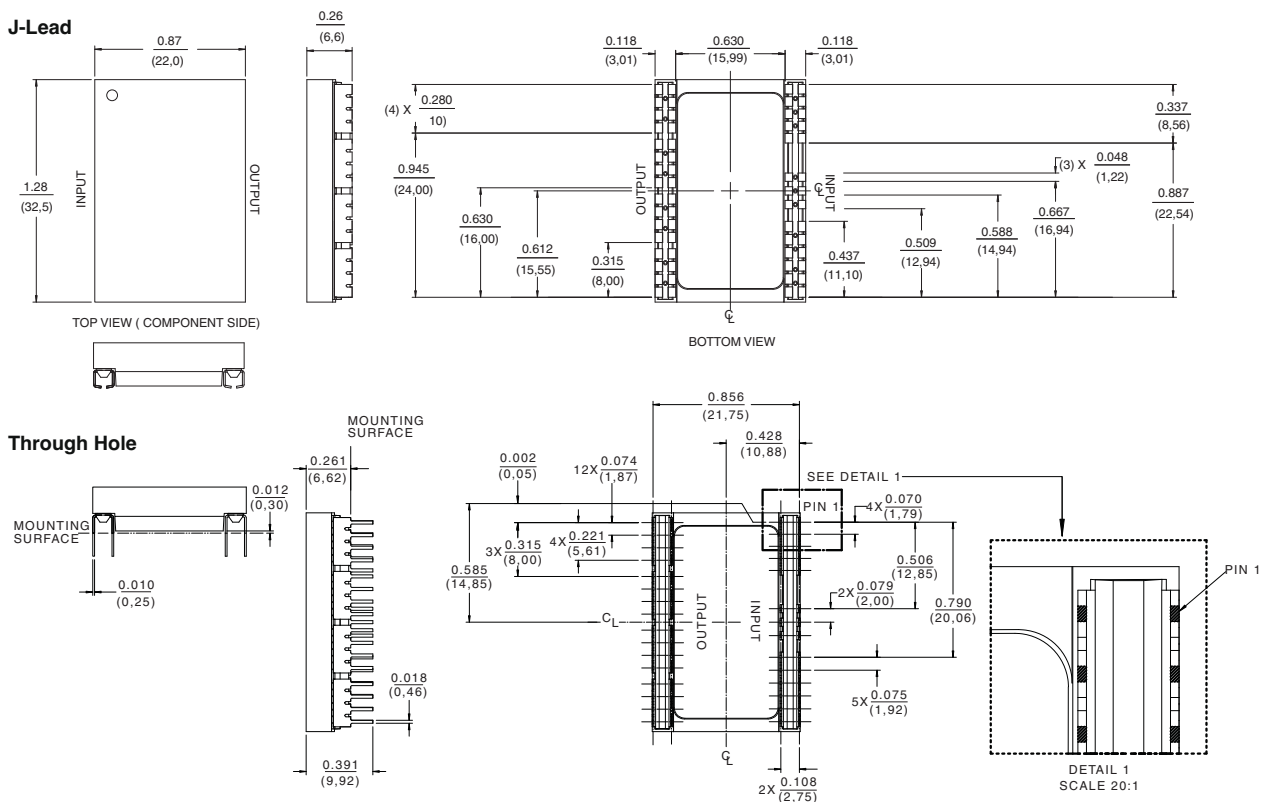
Evaluation Boards

Vicor has created a simple, convenient way to evaluate the entire family of MIL-COTS 28 V DC-DC V•I Chip Modules. Each PRM and VTM are surface mounted to a unique PWB and can be mated together using the integral connectors. Just add -CB to the suffix of any PRM or VTM to specify the requested evaluation boards. An input filter evaluation board (MQPI-18) is also available.

See Page 13 for more information.



Mechanical Drawing ⁱⁿ (mm)



V•I Chip™ Filters and Front Ends

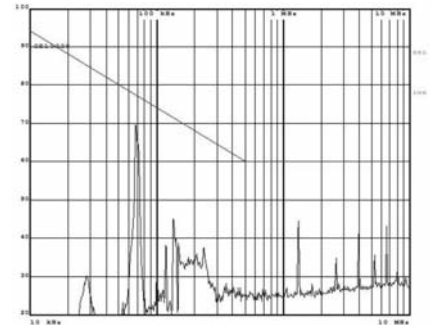
MF028AMFPT MIL-COTS V•I Chip Filter

Highlights

The **MIL-COTS filter** is a DC front-end module that provides EMI filtering and transient protection. The filter enables designers using Vicor's MIL-COTS PRM VI BRICKS and V•I Chips to meet conducted emission / conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-704A/E/F, MIL-STD-1275A/B/D and DO-160E. The MIL-COTS PRM filter accepts an input voltage of 16.5 – 50 Vdc and delivers output power up to 120 W.

Features

- –55°C to 100°C baseplate operation
- Vin range: 16.5 – 50 Vdc
EMI filtering: MIL-STD-461E/F
- Transient protection
MIL-STD-1275 A/B/D,
MIL-STD-701A/E/F and DO-160E
- Small size: 1.91" x 1.09" x 0.37"
(46,6 x 27,7 x 9,5 mm)
- Low weight: 2.19 oz (62.1g)
- Typical efficiency: 99%
- Architectural flexibility



Conducted Noise; MF028AMFPT and
MP028F036M12AL + MV036F120M010 DC-DC
V•I Chip modules operating at 28 Vdc, 120 W.

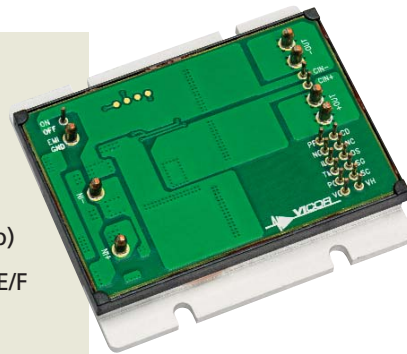
MR028B036M012FPT MIL-COTS V•I Chip Filter with Integrated PRM

Highlights

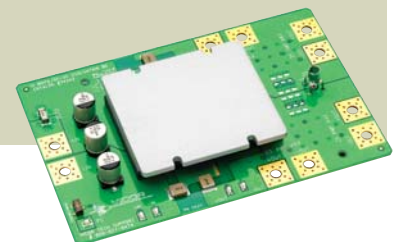
The VI BRICK Pre-Regulator Module with integrated filter is a very efficient non-isolated regulator capable of both boosting and bucking a wide range input voltage. It is specifically designed to provide a controlled Factorized Bus distribution voltage for powering downstream VI BRICK Current Multiplier Modules — fast, efficient, isolated, low noise Point-of-Load (POL) converters. In combination, VI BRICK PRMs and VTMs form a complete DC-DC converter subsystem offering all of the unique benefits of Vicor's Factorized Power Architecture (FPA): high density and efficiency; low noise operation; architectural flexibility; extremely fast transient response; and elimination of bulk capacitance at the Point-of-Load (POL). In addition, the integrated filter provides compliance to MIL-STD-1275, MIL-STD-704 and DO-160E for (transients) and MIL-STD-461 (EMI).

Features

- –55°C to 100°C baseplate operation
- Vin range: 16.5 – 50 Vdc,
(13.9 – 50 Vdc after startup)
- EMI filtering: MIL-STD-461E/F
- Transient protection
MIL-STD-704A/E/F,
MIL-STD-1275A/B/D and DO-160E
- High density: up to 78 W/in³
- Small size: 2.19" x 1.91" x 0.37"
(53,7 x 48,6 x 9,5 mm)
- Low weight: 2.19 oz (62.1g)
- ZVS buck-boost regulator
- Typical efficiency: 95%
- 1.3 MHz switching frequency
- Low noise operation
- Architectural flexibility



Evaluation Boards
Available
for
MF028AMFPT
and
MR028B036M012FPT
(see website for details)



V•I Chip™ Filters and Front Ends

M-FIAM7/M-FIAM7B Filter Input Attenuator Module

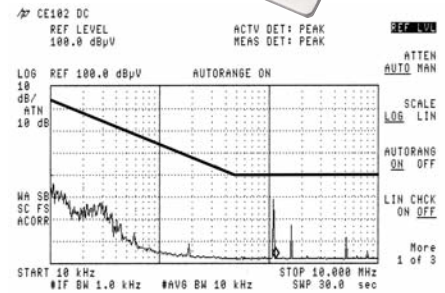
Highlights

The **M-FIAM7** and **M-FIAM7B** are DC front-end modules that provides EMI filtering and transient protection. These products enable designers using Vicor's 28 V DC-DC V•I Chip or VI BRICK modules to meet conducted emission / conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-1275A/B/D, MIL-STD-704A-F and DO-160E. The M-FIAM7 and M-FIAM7B accept an input voltage of 14 – 50 Vdc and deliver output power up to 400 W.

M-FIAM7 and M-FIAM7B are housed in an industry standard "half-brick" module measuring 2.28" x 2.2" x 0.5" and depending upon model selected, may be mounted onboard or inboard for height critical applications.

Features

- EMI filtering per MIL-STD-461E
- Transient protection- MIL-STD-1275A/B/D, MIL-STD-704A-F and DO-160E
- Environments-MIL-STD-810, MIL-STD-202
- Environmental stress screening
- Low profile mounting options
- Output power up to 400 W
- Mini sized package
- Inrush current limiting
- Reverse polarity protection



Conducted Noise; M-FIAM7 and MP028F036M12AL + MV036F120M010 DC-DC V•I Chip modules operating at 28 Vdc, 120 W.

Part Numbering

M	F I A M	7	M	2	1
Military Product	Filter Input Attenuator Module	Input 7 = 28 V / 130 W 7B = 28 V / 400 W	Product Grade H = -40°C to +100°C M = -55°C to +100°C	Pin Style 1 = Short 2 = Long S = Short ModuMate ^[a] N = Long ModuMate ^[a]	Baseplate 1 = Slotted 2 = Threaded 3 = Through hole

^[a] Compatible with SurfMate and InMate socketing system.

MQPI-18 Input EMI Filter

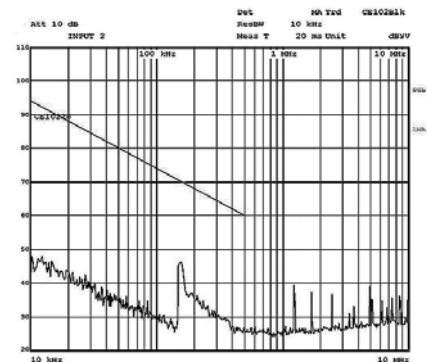
Highlights

The **MQPI-18** is a surface mount DC front-end filter that provides EMI filtering for Vicor's 28 V DC-DC V•I Chip or VI BRICK modules. The MQPI-18 enables designers to meet conducted emission / conducted susceptibility per MIL-STD-461E. The MQPI-18 accepts an input voltage of 10 – 80 Vdc and delivers output current up to 7 A.

MQPI-18 is housed in a very compact 0.98" x 0.49" x 0.18" (24,8 x 12,4 x 4,5 mm) package requiring only 0.5 in² of board space and weighing only 2.4 grams.

Features

- EMI filtering per MIL-STD-461E
- 80 Vdc (max input)
- Output current: Up to 7 A
- Small size: 0.98" x 0.49" x 0.18" (24,8 x 12,4 x 4,5 mm)
- Low profile LGA package
- 55° to +100°C operating temperature
- Efficiency >99%



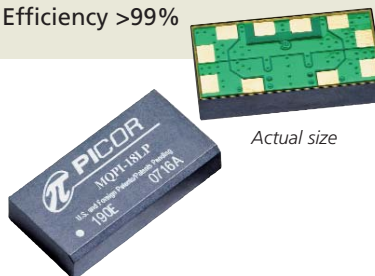
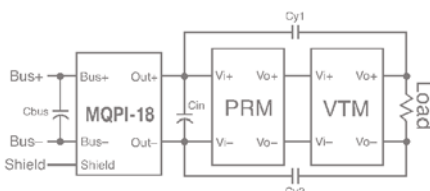
MIL-STD-461E, CE102 compliance with MIL-COTS V•I Chips.

Part Numbering

Part Number	Description
MQPI-18LP	LGA, lidded package
MQPI-18LP-01	LGA, open frame package

MQPI-18-CB1 Evaluation Board

The MQPI-18-CB1 evaluation board is a convenient, simple-to-use tool to evaluate the MQPI with the MIL-COTS 28 V DC-DC V•I Chip evaluation board.



MI-200™

50 to 100 W DC-DC Converter / Booster Module

Highlights

The **MI-Family** is designed for applications utilizing distributed power architecture and is based on Vicor's VI-200 / VI-J00 family of zero-current switching, component level DC-DC converters. Operating at frequencies up to 1 MHz, the MI-Family offers exceptional performance in terms of power density, efficiency, noise, ease of use, and reliability.

Fully encapsulated in Vicor's industry standard package, the MI-Family meets MIL-STD-810 environmental requirements for humidity, fungus, salt-fog, explosive atmosphere, acceleration, vibration, and shock.

Standard features such as wide output trimming / programming, current limiting, remote sense, output inhibit, and latching OVP and OTP combine to offer the highest degree of protection, versatility, and reliability for power systems.

Features

- Inputs:
 - 28 Vdc per MIL-STD-704D/E/F
 - 155 Vdc per MIL-STD-1399A
 - 270 Vdc per MIL-STD-704D/E/F
- Single output: 2 – 48 Vdc
- Up to 23 W/in³
- MIL-STD-810 environments
- Efficiency: Up to 90%
- Remote sense
- Current limit
- OVP and thermal shut down
- Power boosters for higher power outputs
- ZCS power architecture
- Low noise FM control
- Size: 4.6" x 2.4" x 0.5"
(116,8 x 61,0 x 12,7 mm)



General Specifications

(At TBP = 25°C, nominal line and 75% load, unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Note
Input Characteristics					
Input voltage range	See input voltage chart				
No load power dissipation		1.35	2.0	Watts	
Output Characteristics					
Set point accuracy		0.5	1.0	% Vnom	
Load / line regulation		0.05 0.2	0.2 0.5	% Vnom % Vnom	LL to HL, 10% to FL LL to HL, NL to 10%
Output temperature drift		0.01	0.02	%/°C	
Output noise - pp		1.0 100	1.5 150	% Vnom mV	} Whichever is greater 20 MHz BW
Output voltage trimming ^[a]	50		110	% Vnom	
Remote sense compensation	0.5			Vdc	
OVP set point	115	125	135	% Vnom	Latching
Current limit	105		125	% Inom	Auto restart
Short circuit current ^[b]	20		130	% Inom	
Control Pin Characteristics					
Gate in high threshold		6.0		Vdc	
Gate in low threshold	0.65			Vdc	
Gate in low current			6.0	mA	
Power sharing accuracy	0.95		1.05		
Isolation Characteristics					
Isolation (input to output)	3,000			Vrms	
Isolation (output to baseplate)	500			Vrms	
Isolation (input to baseplate)	1,500			Vrms	
Input / output capacitance		50	75	pF	
Environmental – MIL-STD-810					
Altitude - Method 500.2	70,000			feet	Procedure II
Humidity - Method 507.2	88 / 240			% / hrs	Procedure I, cycle 1
Acceleration - Method 513.3	9.0			g	Procedure II
Vibration - Method 514.3	20			g	Procedure I, category 6
Shock - Method 516.3	40			g	Procedure I
Reliability – MIL-HDBK-217F (MI-22L-MW)					
25°C Ground Benign: G.B.		3,552		1,000 hrs	
50°C Naval Sheltered: N.S.		639		1,000 hrs	
65°C Airborne Inhabited Cargo: A.I.C.		501		1,000 hrs	
Thermal Characteristics					
Efficiency	80 – 90			%	
Baseplate to sink	0.07			°C/W	With thermal pads
Thermal shut down ^[c]	+90	+95	+105	°C	Latching
Baseplate operating temperature			+85	°C	See product grade
Storage temperature			+100	°C	See product grade
Mechanical Specifications					
Weight		7.3 (208)		ounces (grams)	

^[a] 10 V, 12 V, and 15 V outputs, standard trim range $\pm 10\%$. Consult factory for wider trim range

^[b] Output voltages of 5 V or less incorporate foldback current limiting; outputs of 10 V and above provide constant current limiting

^[c] No over temperature protection in booster modules

Configuration Chart

MI - 2

Semi-custom driver and booster modules available: Consult factory.

^[d] 16 V operation at 75% load.
^[e] These units rated at 75% load from 125 – 150 Vin:
MI-26Z-xV • MI-26Y-xV • MI-260-xW

^[f] 75 W max power for 28 V input

28 Vdc input per MIL-STD 704D/E/F
155 Vdc input per MIL-STD-1399A
270 Vdc input per MIL-STD-704D/E/F

Input Voltage		
Nominal	Range	Transient
2 = 28 V	18 – 50 V ^[d]	60 V
5 = 155 V	100 – 210 V	230 V
6 = 270 V	125 – 400 V ^[e]	475 V
7 = 165 V	100 – 310 V	

Output Voltage		
Z = 2 V	T = 6.5 V ^[f]	N = 18.5 V
Y = 3.3 V	R = 7.5 V ^[f]	3 = 24 V
0 = 5 V	M = 10 V	L = 28 V
X = 5.2 V	1 = 12 V	J = 36 V
W = 5.5 V	P = 13.8 V	K = 40 V
V = 5.8 V	2 = 15 V	4 = 48 V

Product Grade		Operating Temp.
I	=	–40°C to +85°C
M	=	–55°C to +85°C

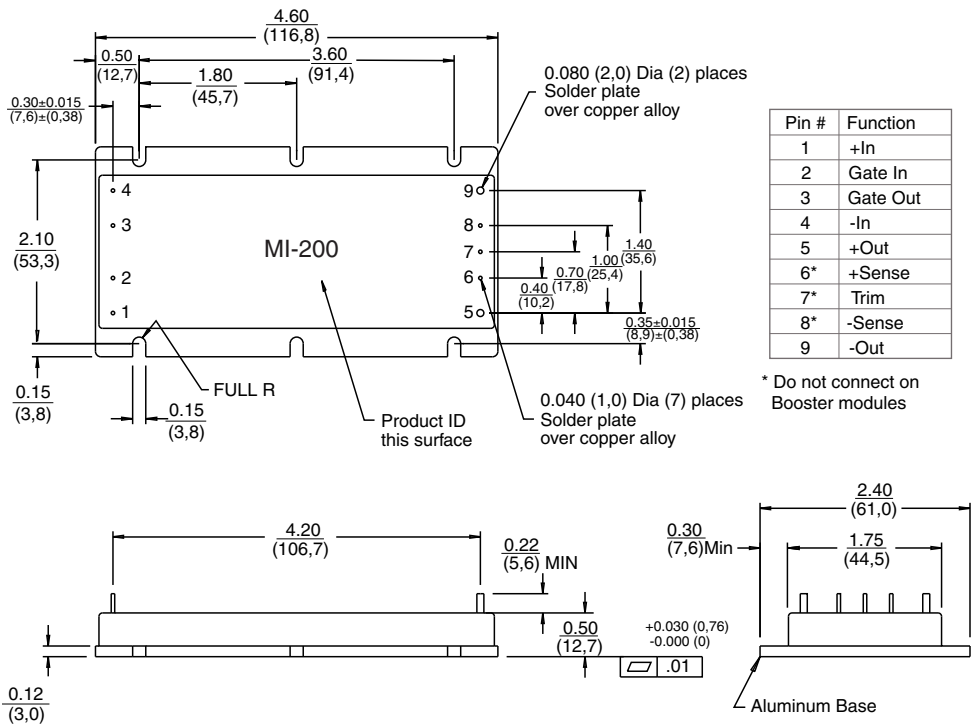
Output Power / Current		
	≥5 V	<5 V
Y	= 50 W	10 A
X	= 75 W	15 A
W	= 100 W	20 A
V	= —	30 A
For additional power, 100 W and 75 W booster modules are available. Change MI-2xx-xx to MI-Bxx-xx.		

Product Grade Specifications

Parameter	Product Grade	
	I-Grade	M-Grade
Storage temperature	–55°C to +100°C	–65°C to +100°C
Operating temperature (baseplate)	–40°C to +85°C	–55°C to +85°C
Power cycling burn-in	12 hrs, 29 cycles	96 hrs, 213 cycles
Temperature cycled with power off	12 cycles	12 cycles
17°C per minute rate of change	–65°C to +100°C	–65°C to +100°C
Test data supplied at these temperatures ^[g]	–40°C, +80°C	–55°C, +80°C
Warranty	2 years	2 years
Environmental compliance	MIL-STD-810	MIL-STD-810
Derating	NAVMAT P-4855-1A	NAVMAT P-4855-1A

^[g] Test data available for review or download from vicorpower.com

Mechanical Drawing ⁱⁿ/_(mm)



MI-J00™

10 to 50 W DC-DC Converter Modules

Highlights

The **MI-J00** family of miniaturized DC-DC converters is designed for applications utilizing distributed power architectures. Based on Vicor's VI-200 / VI-J00 family of zero-current switching, component-level, DC-DC converters, the MI-J00 family offers exceptional performance in terms of power density, efficiency, noise, ease of use, and reliability.

The MI-J00 family meets all steady-state, transient and under / overvoltage requirements of MIL-STD-704D/E/F for both 28 Vdc input (MI-J2X) and 270 Vdc input (MI-J6X), and the worst case envelope of MIL-STD-1399A for 155 Vdc input (MI-J5X).

The output voltage can be externally trimmed or programmed from 50% to 110% of nominal output. Current limiting, remote sense, and an inhibit pin all combine to offer a high degree of protection, versatility, and reliability for power systems.

Fully encapsulated in Vicor's industry standard package, the MI-J00 family units meet MIL-STD-810 environmental testing requirements for humidity, fungus, salt-fog, explosive atmosphere, acceleration, vibration, and shock.

Features

- Inputs:
 - 28 Vdc per MIL-STD-704D/E/F
 - 155 Vdc per MIL-STD-1399A
 - 270 Vdc per MIL-STD-704D/E/F
- Single output: 2 – 48 Vdc
- Up to 23 W/in³
- MIL-STD-810 environments
- Efficiency: Up to 90%
- Remote sense
- Current limit
- ZCS power architecture
- Low noise FM control
- Size: 2.28" x 2.4" x 0.5"
(57,9 x 61,0 x 12,7 mm)



General Specifications

(At TBP = 25°C, nominal line and 75% unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Note
Input Characteristics					
Input voltage range	See input voltage chart on the next page				
No load power dissipation		1.35	2.0	Watts	
Output Characteristics					
Set point accuracy		0.5	1.0	% Vnom	
Load / line regulation		0.05	0.2	% Vnom	LL to HL, 10% to FL
		0.2	0.5	% Vnom	LL to HL, NL to 10%
Output temperature drift		0.01	0.02	%/°C	
Output noise - pp		1.0	1.5	% Vnom	} Whichever is greater 20 MHz BW
		100	150	mV	
Output voltage trimming ^[a]	50		110	% Vnom	
Remote sense compensation	0.5			Vdc	
Current limit	105		125	% Inom	Auto restart
Short circuit current	105		130	% Inom	
Control Pin Characteristics					
Gate in high threshold		6.0		Vdc	
Gate in low threshold	0.65			Vdc	
Gate in low current			6.0	mA	
Isolation Characteristics					
Isolation (input to output)	3,000			Vrms	
Isolation (output to baseplate)	500			Vrms	
Isolation (input to baseplate)	1,500			Vrms	
Input / output capacitance		50	75	pF	
Environmental – MIL-STD-810					
Altitude - Method 500.2	70,000			feet	Procedure II
Humidity - Method 507.2	88 / 240			% / hrs	Procedure I, cycle 1
Acceleration - Method 513.3	9.0			g	Procedure II
Vibration - Method 514.3	20			g	Procedure I, category 6
Shock - Method 516.3	40			g	Procedure I
Reliability – MIL-HDBK-217F (MI-J2L-MY)					
25°C Ground Benign: G.B.		3,732		1,000 hrs	
50°C Naval Sheltered: N.S.		672		1,000 hrs	
65°C Airborne Inhabited Cargo: A.I.C.		526		1,000 hrs	
Thermal Characteristics					
Efficiency	80 – 90			%	
Baseplate to sink	0.14			°C/W	With thermal pads
Thermal shut down	N/A				
Baseplate operating temperature			+100	°C	See product grade
Storage temperature			+125	°C	See product grade
Mechanical Specifications					
Weight		3.7 (107)		ounces (grams)	

^[a] 10 V, 12 V, and 15 V outputs, standard trim range ±10%. Consult factory for wider trim range

Configuration Chart

MI-J -

Semi-custom modules available:
Consult factory.

^[b] 16 V operation at 75% load.

^[c] These units rated at 75% load from 125 – 150 Vin:

MI-J6Z-xY • MI-J6Y-xY • MI-J60-xY

28 Vdc input per MIL-STD 704D/E/F
155 Vdc input per MIL-STD-1399A
270 Vdc input per MIL-STD-704D/E/F

Input Voltage

Nominal	Range	Transient
2 = 28 V	18 – 50 V ^[b]	60 V
5 = 155 V	100 – 210 V	230 V
6 = 270 V	125 – 400 V ^[c]	475 V
7 = 165 V	100 – 310 V	

Output Voltage

Z = 2 V	T = 6.5 V	N = 18.5 V
Y = 3.3 V	R = 7.5 V	3 = 24 V
0 = 5 V	M = 10 V	L = 28 V
X = 5.2 V	1 = 12 V	J = 36 V
W = 5.5 V	P = 13.8 V	K = 40 V
V = 5.8 V	2 = 15 V	4 = 48 V

Product Grade Operating Temp.

I	=	–40°C to +100°C
M	=	–55°C to +100°C

Output Power / Current

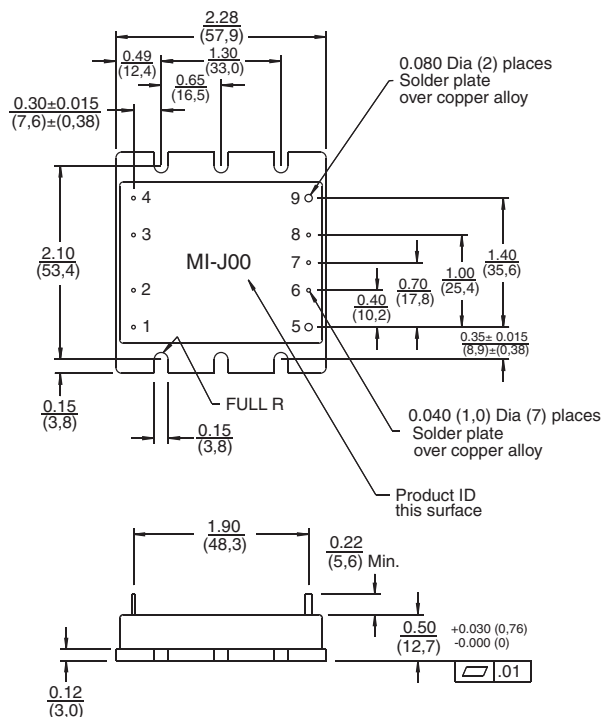
	≥5 V	<5 V
A	= 10 W	—
Z	= 25 W	5 A
Y	= 50 W	10 A

Product Grade Specifications

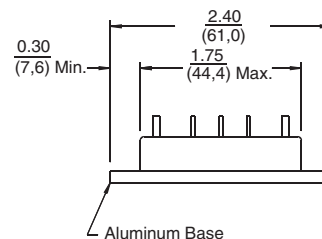
Parameter	I-Grade	M-Grade
Storage temperature	–55°C to +125°C	–65°C to +125°C
Operating temperature (baseplate)	–40°C to +100°C	–55°C to +100°C
Power cycling burn-in	12 hrs, 29 cycles	96 hrs, 213 cycles
Temperature cycled with power off	12 cycles	12 cycles
17°C per minute rate of change	–65°C to +100°C	–65°C to +100°C
Test data supplied at these temperatures ^[d]	–40°C, +80°C	–55°C, +80°C
Warranty	2 years	2 years
Environmental compliance	MIL-STD-810	MIL-STD-810
Derating	NAVMAT P-4855-1A	NAVMAT P-4855- 1A

^[d] Test data available for review or download from vicorpower.com

Mechanical Drawing ⁱⁿ (mm)



Pin #	Function
1	+In
2	Gate In
3	Gate Out
4	–In
5	+Out
6	+Sense
7	Trim
8	–Sense
9	–Out



Maxi, Mini, Micro Family

DC-DC Converter Modules

Highlights

Vicor's **Maxi, Mini, Micro Family** DC-DC converter modules use advanced power processing, control and packaging technologies to provide the performance, flexibility, reliability and cost effectiveness of a mature power component. High frequency ZCS/ZVS switching provides high power density with low noise and high efficiency.

Fully encapsulated, Vicor Maxi, Mini, Micro modules utilize a proprietary spin fill process that assures complete, void free encapsulation making them suitable for the most harsh environments. Two grades (H & M) are available with temperatures to -55°C operating and -65°C storage. H & M-Grade modules have been subjected to the environmental testing requirements of MIL-STD-810, MIL-S-901, MIL-STD-202 and undergo 100% environmental stress screening.

Features

- 24 & 300 Vdc compliant to MIL-STD-704E/F
- Single outputs: 2 – 48 Vdc
- MIL-STD-810 environments
- Operating temperatures from -55°C to 100°C
- ZVS/ZCS power architecture
- Environmental stress screening
- Programmable output: 10 to 110% of Vnom
- OVP and thermal shut down
- Power density: Up to 100 W/in³
- Input undervoltage lockout
- Parallelable for increased power



General Specifications

(See vicorpower.com for model specific data sheets)

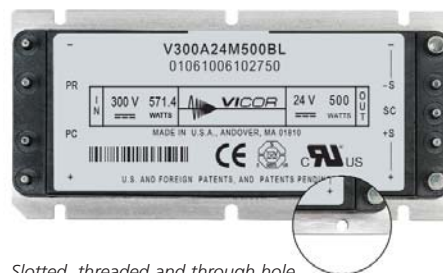
Parameter	Min	Typ	Max	Unit	Notes
Input Characteristics					
Undervoltage turn-on	24 V	17.5	17.9	Vdc	
	28 V	8.7	8.9	Vdc	
	48 V	34.9	35.7	Vdc	
	300 V	174.6	178.2	Vdc	
	375 V	242.5	247.5	Vdc	
Undervoltage turn-off	24 V	14.8	15.3	Vdc	
	28 V	7.4	7.6	Vdc	
	48 V	29.4	30.5	Vdc	
	300 V	147.4	152.8	Vdc	
	375 V	204.7	212.2	Vdc	
Overvoltage turn-off / on	24 V	36.3	37.8	Vdc	
	28 V	36.3	37.8	Vdc	
	48 V	75.7	78.8	Vdc	
	300 V	Not Included		Vdc	
	375 V	429.2	446.3	Vdc	
Output Characteristics					
Line regulation		±0.02	±0.20	%	Low line to high line; full load
Temperature regulation		±0.002	±0.005	%/°C	Over operating temp. range
Power sharing accuracy		±2	±5	%	10 to 100% of full load
Programming range	10		110	% Vnom	For trimming below 90% of nominal, a minimum load may be required
Current limit		115		% Iout	Output voltage 95% of nominal
Short circuit current		115		% Iout	Output voltage <250 mV
Isolation Characteristics					
Isolation voltage (in to out)		3,000		Vrms	Complies with reinforced insulation requirements
Isolation voltage (in to base)	1,550			Vrms	Complies with basic insulation requirements
Isolation voltage (out to base)	500			Vrms	Complies with operational insulation requirements
Isolation resistance (in to out)		10		MΩ	
Thermal Characteristics					
Operating temperature (H-grade)	-40 to +100			°C	Baseplate
Storage temperature (H-grade)	-55 to +125			°C	
Operating temperature (M-grade)	-55 to +100			°C	Baseplate
Storage temperature (M-grade)	-65 to +125			°C	
Temperature limiting (typical)		+115		°C	

Environmental Stress Screening

See Page 42 for details

Part Numbering

V	300	A	24	M	500	B	L	
Input Voltage		Package A = Maxi B = Mini C = Micro	Output Voltage	Product Grade H = -40°C to +100°C M = -55°C to +100°C	Output Power		Pin Style Blank = Short Solder L = Long Solder S = Short ModuMate ^[a] N = Long ModuMate ^[a]	Baseplate Blank = Slotted 2 = Threaded 3 = Through Hole



Slotted, threaded and through hole baseplate options.

^[a] Compatible with InMate and SurfMate socketing systems

Examples

Maxi Converter
V300A24M500BL
300 Vin, Maxi, 24 Vout @ 500 W,
long pins, slotted baseplate

Mini Converter
V300B15M250BL2
300 Vin, Mini, 15 Vout @ 250 W,
long pins, threaded baseplate

Micro Converter
V300C24M150B3
300 Vin, Micro, 24 Vout @ 150 W,
short pins, through hole baseplate

Typical Input Voltages

Nominal	Range	Transient	MIL Compliance
24 V	16 – 36 V ^[b]	50 V, 12.5 ms 100 V, 50 ms	MIL-STD-704E/F for 28 Vin ^[c] MIL-STD-1275A/B/D ^[d]
28 V	9 – 36 V ^[e]	50 V, 12.5 ms 100 V, 50 ms	MIL-STD-704E/F for 28 Vin ^[c] MIL-STD-1275A/B/D ^[d]
48 V	36 – 75 V	100 V, 100 ms	
300 V	180 – 375 V	400 V, 100 ms	MIL-STD-704E/F
375 V	250 – 425 V	500 V, 100 ms	

^[b] The following models will operate down to 16 V at 75% rated power after start up at >17.9 V

Maxi — selected models

Mini — all models

Micro — all models

^[c] With M-FIAM5B input filter

^[d] With M-FIAM9 input filter

^[e] 10 – 36 Vdc input range for selected Maxi modules. All others derate power 75% for 9 – 10 Vin.

Configuration Chart

Lower power options available, visit vicorpower.com.

Input Voltages	Maximum Power available for Maxi (Full Brick)								
	Output Voltages								
	3.3 V	5 V	8 V	12 V	15 V	24 V	28 V	36 V	48 V
24 (18 – 36)	264 W	400 W	300 W	400 W	400 W	400 W	400 W	400 W	400 W
28 (9 – 36)	150 W	175 W	200 W	200 W	200 W	200 W	200 W	200 W	200 W
48 (36 – 75)	264 W	400 W	--	500 W	500 W	500 W	500 W	500 W	500 W
72 (43 – 110)	264 W	300 W	--	400 W	400 W	400 W	400 W	400 W	400 W
110 (66 – 154)	200 W	300 W	--	400 W	400 W	400 W	400 W	400 W	400 W
150 (100 – 200)	264 W	400 W	400 W	500 W	500 W	500 W	500 W	500 W	500 W
300 (180 – 375)	264 W	400 W	400 W	500 W	500 W	500 W	500 W	500 W	500 W
375 (250 – 425)	264 W	400 W	400 W	600 W	600 W	600 W	600 W	600 W	600 W
Input Voltages	Maximum Power available for Mini (Half Brick)								
	Output Voltages								
	3.3 V	5 V	8 V	12 V	15 V	24 V	28 V	36 V	48 V
24 (18 – 36)	150 W	200 W	200 W	200 W	200 W	200 W	200 W	200 W	200 W
28 (9 – 36)	75 W	75 W	--	125 W	150 W	150 W	150 W	150 W	150 W
48 (36 – 75)	150 W	200 W	--	250 W	250 W	250 W	250 W	250 W	250 W
72 (43 – 110)	100 W	150 W	--	250 W	250 W	250 W	250 W	250 W	250 W
110 (66 – 154)	100 W	150 W	--	200 W	200 W	200 W	200 W	200 W	200 W
150 (100 – 200)	150 W	200 W	200 W	250 W	250 W	250 W	250 W	250 W	250 W
300 (180 – 375)	150 W	200 W	200 W	250 W	250 W	250 W	250 W	250 W	250 W
375 (250 – 425)	150 W	200 W	200 W	300 W	300 W	300 W	300 W	300 W	300 W
Input Voltages	Maximum Power available for Micro (Quarter Brick)								
	Output Voltages								
	3.3 V	5 V	8 V	12 V	15 V	24 V	28 V	36 V	48 V
24 (18 – 36)	75 W	100 W	100 W	100 W	100 W	100 W	100 W	100 W	100 W
28 (9 – 36)	50 W	50 W	--	100 W	100 W	100 W	100 W	100 W	100 W
48 (36 – 75)	75 W	100 W	--	150 W	150 W	150 W	150 W	150 W	150 W
72 (43 – 110)	75 W	100 W	--	150 W	150 W	150 W	150 W	150 W	150 W
110 (66 – 154)	50 W	75 W	--	100 W	100 W	100 W	100 W	100 W	100 W
150 (100 – 200)	75 W	100 W	100 W	150 W	150 W	150 W	150 W	150 W	150 W
300 (180 – 375)	75 W	100 W	100 W	150 W	150 W	150 W	150 W	150 W	150 W
375 (250 – 425)	75 W	100 W	100 W	150 W	150 W	150 W	150 W	150 W	150 W

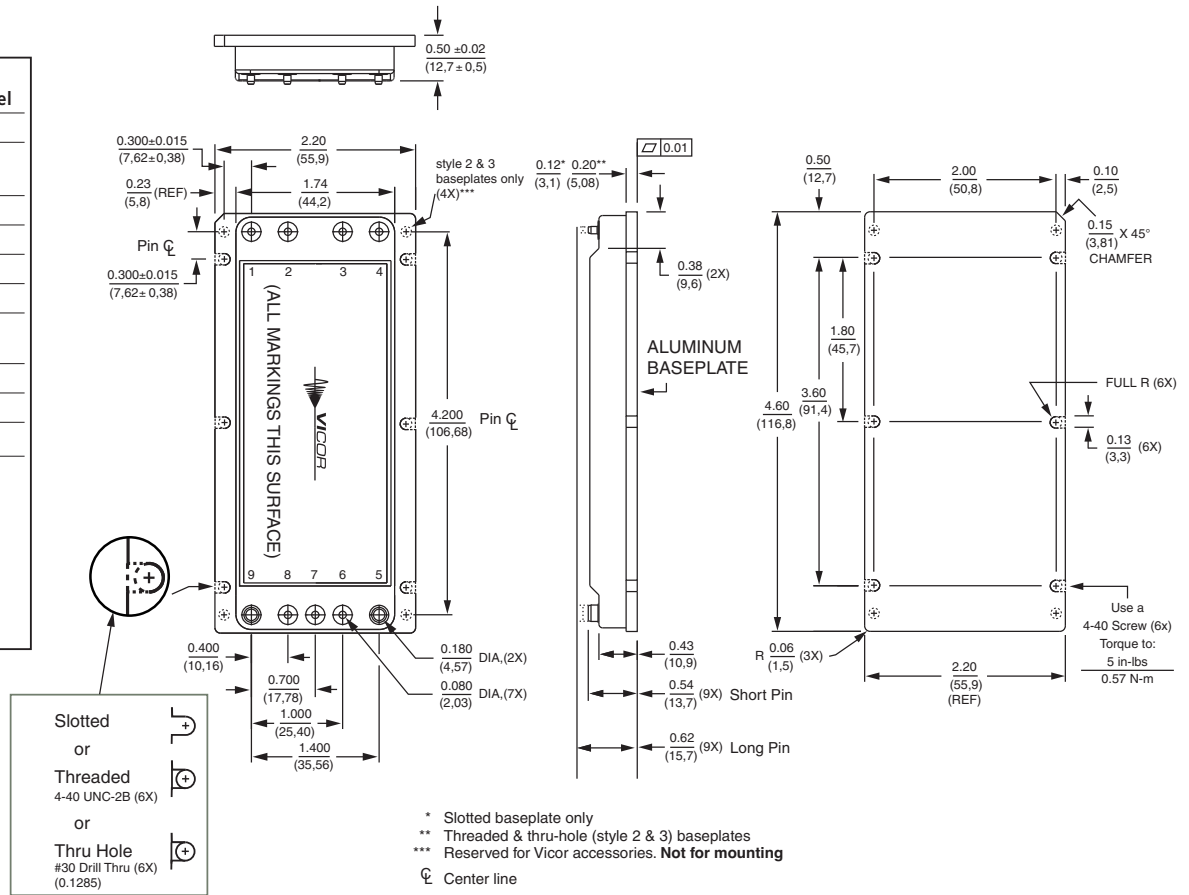
Maxi, Mini, Micro Family

Mechanical Drawings $\frac{in}{(mm)}$

Maxi

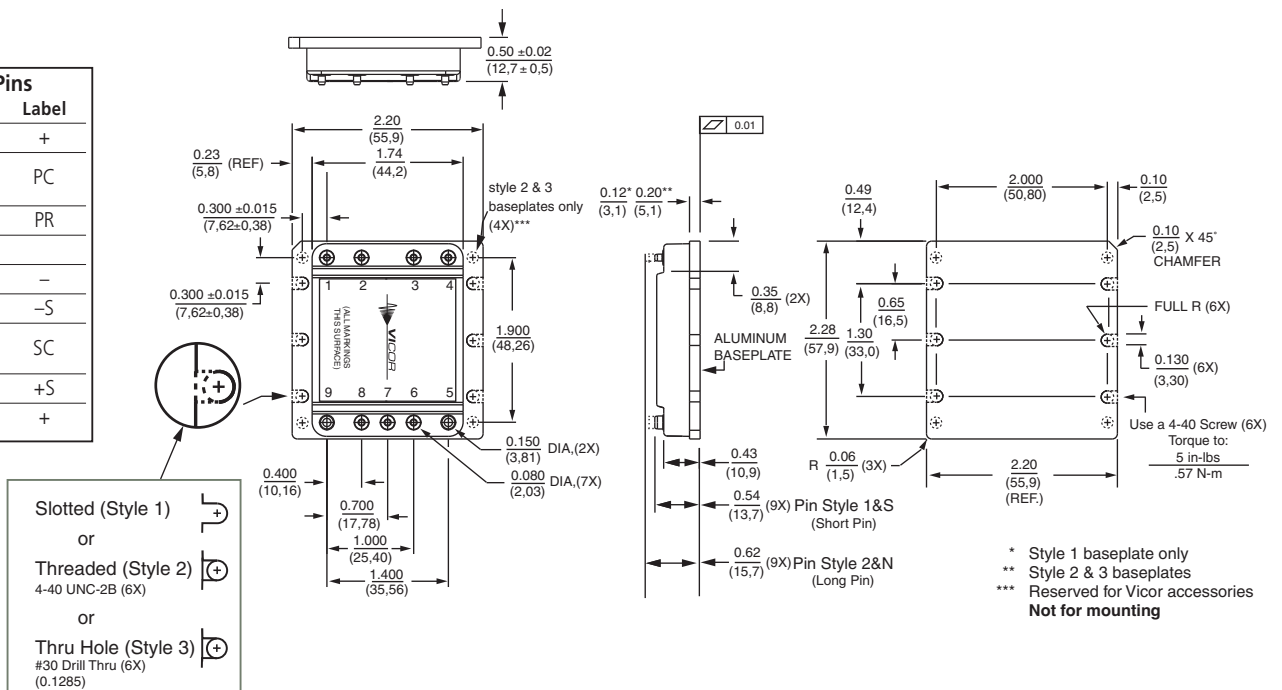
Converter Pins		
No.	Function	Label
1	+In	+
2	Primary Control	PC
3	Parallel	PR
4	-In	-
5	-Out	-
6	-Sense	-S
7	Secondary Control	SC
8	+Sense	+S
9	+Out	+

Pin Styles	
Tin / Lead	
Hot Solder Dip	(Pin Style 1 & 2)
Gold Plated Copper	(Pin Style S & N)
Same on Mini & Micro	

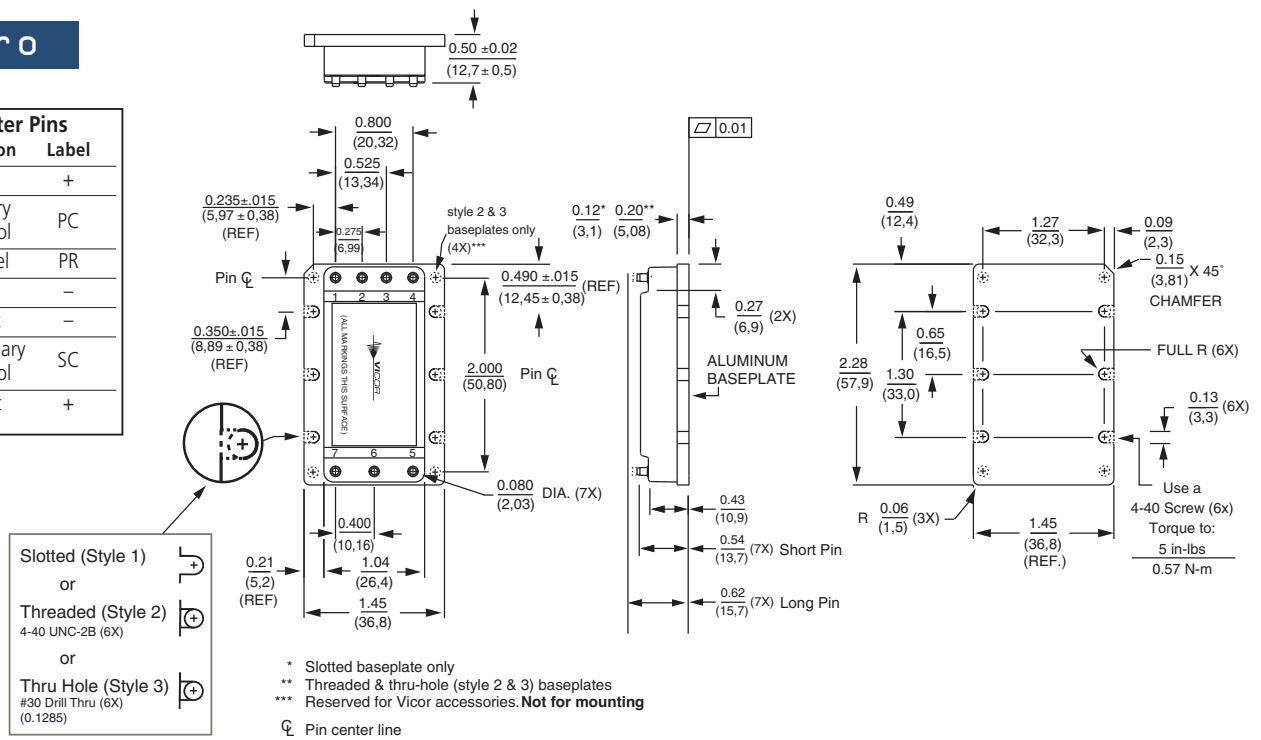


Mini

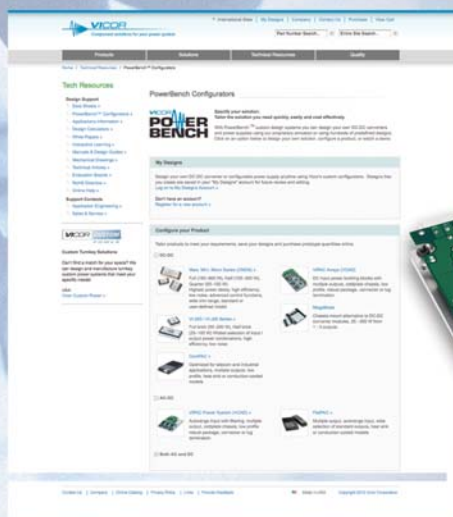
Converter Pins		
No.	Function	Label
1	+In	+
2	Primary Control	PC
3	Parallel	PR
4	-In	-
5	-Out	-
6	-Sense	-S
7	Secondary Control	SC
8	+Sense	+S
9	+Out	+



Converter Pins		
No.	Function	Label
1	+In	+
2	Primary Control	PC
3	Parallel	PR
4	-In	-
5	-Out	-
6	Secondary Control	SC
7	+Out	+

The logo for Vicor PowerBench is a circular emblem with a blue gradient background and a dark blue border. The word "VICOR" is in a smaller, black, sans-serif font at the top left. Below it, the words "POWER" and "BENCH" are stacked in a large, bold, black, sans-serif font. A stylized blue waveform, resembling a sine wave or a power signal, is superimposed over the text "POWER".

See page 46



Filter and Front-End Modules

MI-IA™

Input Attenuator Modules

Highlights

The **MI-IA** is an accessory product to Vicor's MI-Family of DC-DC converters that provides the EMI filtering and transient protection. Designed for use with all 28 V and 270 V input MI-200 or MI-J00 converters, the MI-IA can drive any number of modules with output loads to 200 W.

The MI-IA meets the conducted emissions specifications of MIL-STD-461C/D/E and offers complete input transient, surge, and spike protection to the most severe levels of MIL-STD-1275, MIL-STD-704 and DO-160E. Reverse polarity protection and overvoltage lockout provide additional safeguards against potentially damaging line conditions. High power arrays can be configured using the expansion port capability of the MI-IA.

Features

- Inputs: 28 Vdc and 270 Vdc
- MIL-STD-461C/D/E EMI compliance
- MIL-STD-810 environments
- MIL-STD-704A-F, MIL-STD-1275A/B/D & DO-160E transients and spikes
- Reverse polarity protection
- Output power: Up to 200 W from any combination of MI-200 or MI-J00 modules
- Expansion port for additional power
- Short circuit protected
- Size: 2.28" x 2.4" x 0.5" (57,9 x 61,0 x 12,7 mm)



General Specifications

(At TBP = 25°C, nominal line and 75% load, unless otherwise specified)

Parameter	Min	Typ	Max	Unit	Note
Input Characteristics					
28 Vdc modules	Steady state input	16	28	50	Vdc
	Input spike limit	-600		600	Vdc 10 µs, per MIL-STD-704A
		-250		250	Vdc 70 µs, 15 mJ per MIL-STD-1275A/B/D
	Input surge limit			100	Vdc 50 ms, 0.5 Ω per MIL-STD-1275A/B/D
				80	Vdc 100 ms per DO-160E
	Overvoltage shut down ^[a]	50			Vdc 100 ms, automatic recovery
	Reverse polarity protection				Shunt diode: input fuse required
270 Vdc modules	Recommended fuse			20	Amps F03A type
	Steady state input	125	270	400	Vdc
	Input spike limit			800	Vdc 10 µs, 50 Ω
		-600		600	Vdc 100 µs, 15 mJ
	Input surge limit			500	Vdc 100 ms, 0.5 Ω
	Overvoltage shut down ^[a]	400			Vdc 100 ms, automatic recovery
	Reverse polarity protection				Shunt diode: input fuse required
All models	Recommended fuse			4.0	Amps F03A type
	No load power dissipation		0.5	1.5	Watts
	Inrush current		110	125	% IIN Steady state, lin 10 ms

EMI Characteristics MIL-STD-461

Input power leads	Conducted emissions	CE01, CE03, CE07	MIL-STD-461C
		CE101, CE102	MIL-STD-461D/E
Conducted susceptibility		CS01, CS02, CS06, CS101	MIL-STD-461C
		CS114, CS115, CS116	MIL-STD-461D/E

Parameter	Min	Typ	Max	Unit	Note
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Output Characteristics					
Clamp voltage	28 Vdc input		60	Vdc	
	270 Vdc input		420	Vdc	
Output power			250	Watts	
Internal voltage drop	28 Vdc input	0.6		Vdc	
	270 Vdc input	0.85		Vdc	
Overload protection	28 Vdc input	20	Amps	Foldback threshold; auto recovery with latched shut down after 10 ms	
	270 Vdc input	4			

Isolation Characteristics

Input to base	1,500	Vrms
Output to base	1,500	Vrms

Environmental – MIL-STD-810

Altitude - Method 500.2	70,000	feet	Procedure II
Humidity - Method 507.2	88 / 240	% / hrs	Procedure I, cycle 1
Acceleration - Method 513.3	9	g	Procedure II
Vibration - Method 514.3	20	g	Procedure I, category 6
Shock - Method 516.3	40	g	Procedure I

Reliability – MIL-HDBK-217F (MI-A22-MU)

25°C Ground Benign: G.B.	5,637	1,000 hrs
50°C Naval Sheltered: N.S.	1,014	1,000 hrs
65°C Airborne Inhabited Cargo: A.I.C.	795	1,000 hrs

Thermal Characteristics

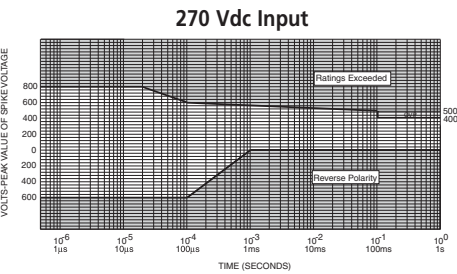
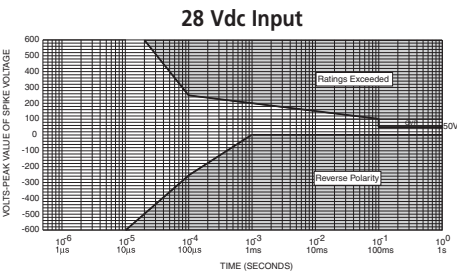
Efficiency	97	%
Baseplate to sink	0.14	°C /Watt
Operating temperature, baseplate	+100	°C See product grade specifications
Storage temperature	+125	°C See product grade specifications

Mechanical Specifications

Weight	3.0 (85)	ounces (grams)
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^[a] The MI-IA disables downstream converters and clamps the converter input voltage at a safe level

Safe Operating Area [b]



[b] Refer to input characteristics on previous page.

Model Selection Chart

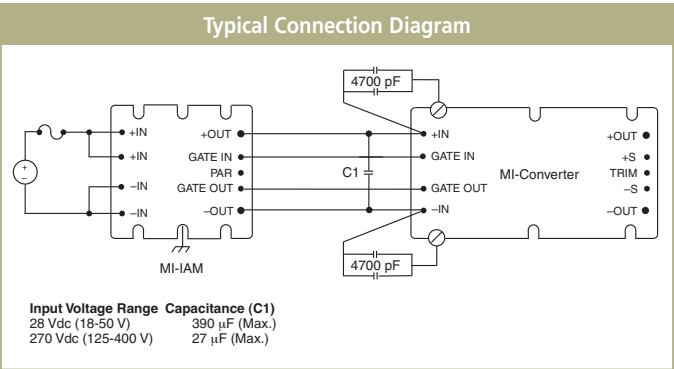
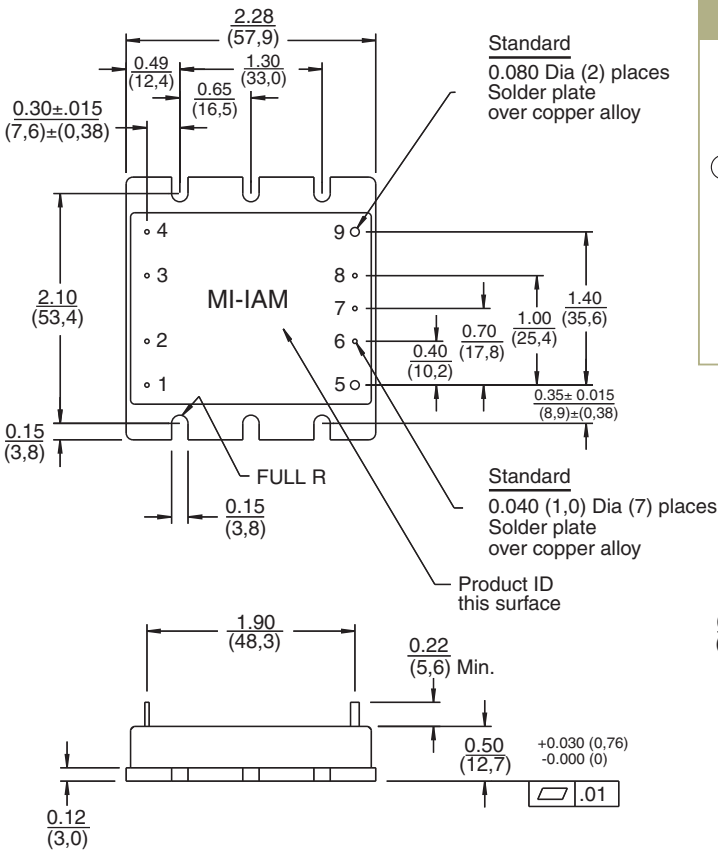
Model Number	Nominal Input Voltage	Input Range	Compatible MI-Family	Converter
MI-A22-MU	28 Vdc	16 – 50 Vdc	MI-22x-Mx and MI-J2x-Mx	M-Grade
MI-A66-MU	270 Vdc	125 – 400 Vdc	MI-26x-Mx and MI-J6x-Mx	M-Grade
MI-A22-IU	28 Vdc	16 – 50 Vdc	MI-22x-Ix and MI-J2x-Ix	I-Grade
MI-A66-IU	270 Vdc	125 – 400 Vdc	MI-26x-Ix and MI-J6x-Ix	I-Grade

Product Grade Specifications

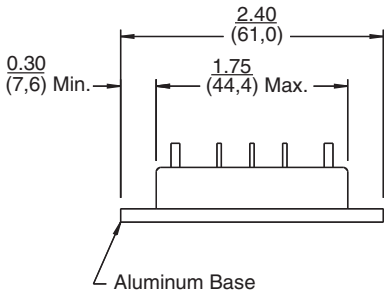
Parameter	I-Grade	M-Grade
Storage temperature	–55°C to +125°C	–65°C to +125°C
Operating temperature (baseplate)	–40°C to +100°C	–55°C to +100°C
Power cycling burn-in	12 hrs, 29 cycles	96 hrs, 213 cycles
Temperature cycled with power off	12 cycles	12 cycles
17°C per minute rate of change	–65°C to +100°C	–65°C to +100°C
Test data supplied at these temperatures ^[c]	–40°C, +80°C	–55°C, +80°C
Warranty	2 years	2 years
Environmental compliance	MIL-STD-810	MIL-STD-810
Derating	NAVMAT P-4855-1A	NAVMAT P-4855-1A

[c] Test data available for review or download from vicorpower.com

Mechanical Drawing ⁱⁿ_(mm)



Pin #	Function
1	+In
2	+In
3	-In
4	-In
5	+Out
6	Gate In
7	Parallel
8	Gate Out
9	-Out



Filter and Front-End Modules

M-FIAM3 / M-FIAM5B / M-FIAM9™

Filter Input Attenuator Modules

Highlights

The **M-FIAM** is a family of DC front-end modules that provide EMI filtering and transient protection. The M-FIAM3 / 5B / 9 enable designers using Vicor Maxi, Mini, Micro Family 24, 28, and 300 V DC-DC converters to meet conducted emission / conducted susceptibility per MIL-STD-461E; and input transients per MIL-STD-704E/F and MIL-STD-1275A/B/D.

Features

- MIL-STD-461E EMI compliant
- MIL-STD-810, MIL-STD-202 environments
- MIL-STD-704 input transient protection
- MIL-STD-1275 input transient protection (M-FIAM9)
- Reverse polarity protection
- Environmental stress screening
- Low profile mounting options
- Inrush current limiting
- Size: 2.28" x 2.2" x 0.5" (57,9 x 55,9 x 12,7 mm)



MVA-FIAM5B & MVA-FIAM9

A coldplate and connector option.

The MVA-FIAM5B and MVA-FIAM9 provide a coldplate and connector option for use with either 24 and 28 V input Maxi, Mini, Micro series DC-DC converters or VIPAC Arrays.

Visit vicorpower.com for more details.



General Specifications

(At TBP = 25°C, nominal line and 75% load, unless otherwise specified)

Parameter		Min	Typ	Max	Unit	Note
Input Characteristics						
28 Vdc modules (M-FIAM5B)	Steady state input	14	28	36	Vdc	Continuous
	Input transient			50	Vdc	12.5 ms, MIL-STD-704E/F, continuous operation
	Inrush limiting			0.007	A/μF	
28 Vdc modules (M-FIAM9)	Steady state input	10	28	36	Vdc	Continuous
	Input transient			100	Vdc	50 ms per MIL-STD-1275A/B/D
				250	Vdc	70 μs per MIL-STD-1275A/B/D
				70	Vdc	20 ms per MIL-STD-704A
				50	Vdc	12.5 ms per MIL-STD-704E/F
	Inrush limiting			0.007	A/μF	
270 Vdc modules (M-FIAM3)	Steady state input	180	270	375	Vdc	
	Input transient			400	Vdc	100 ms, MIL-STD-704E/F
	Inrush limiting			0.018	A/μF	
EMI Characteristics MIL-STD-461E						
Input power leads	Conducted emissions			CE101, CE102		
	Conducted susceptibility			CS101, CS114, CS115, CS116		

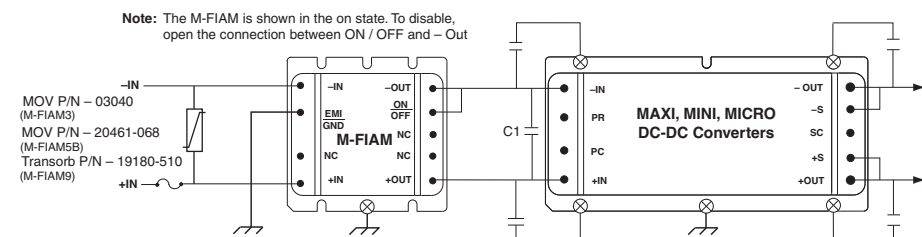
Parameter	Min	Typ	Max	Unit	Note
Output Characteristics					
Output current					
28 Vdc input (M-FIAM5B)			20	Amps	
28 Vdc input (M-FIAM9)			18	Amps	
270 Vdc input (M-FIAM3)			3.0	Amps	
Internal voltage drop					
28 Vdc input (M-FIAM5B)		0.5	1.0	Vdc	@ 20 A, 100°C baseplate
28 Vdc input (M-FIAM9)		0.85	1.5	Vdc	@ 18 A, 25°C baseplate
270 Vdc input (M-FIAM3)		3.0	5.0	Vdc	@ 3 A, 100°C baseplate
Isolation Characteristics					
Dielectric withstand	1,500			Vrms	Input / output to baseplate
	2,121			Vdc	Input / output to baseplate
Thermal Characteristics					
Efficiency	96	98		%	
Baseplate to sink; flat, greased surface		0.16		°C / Watt	
Baseplate to sink; thermal pad (P/N 20264)		0.1		°C / Watt	
Baseplate to ambient		7.9		°C / Watt	
Baseplate to sink; 1000 LFM		2.2		°C / Watt	

Part Numbering

M	FIAM	5B	M	2	1
Military Product	Filter Input Attenuator Module	Input Voltage 3 = 270 Vdc 5B = 28 Vdc 9 = 28 Vdc	Product Grade H = -40°C to +100°C M = -55°C to +100°C	Pin Style 1 = Short 2 = Long S = Short ModuMate ^[a] N = Long ModuMate ^[a]	Baseplate 1 = Slotted 2 = Threaded 3 = Through Hole

^[a] Compatible with SurfMate and InMate socketing systems

M-FIAM3 / 5B / 9 Typical Connection



Model Number	Nominal Input Voltage	Input Range	Compatible Products
M-FIAM3xxx	270 Vdc	180 – 375 V	V300 Maxi, Mini, Micro Family
M-FIAM5Bxxx	28 Vdc	14 – 36 V	V24 Maxi, Mini, Micro Family
M-FIAM9xxx	28 Vdc	10 – 36 V	V24 and V28 Maxi, Mini, Micro Family

MTBF per MIL-HDBK-217F

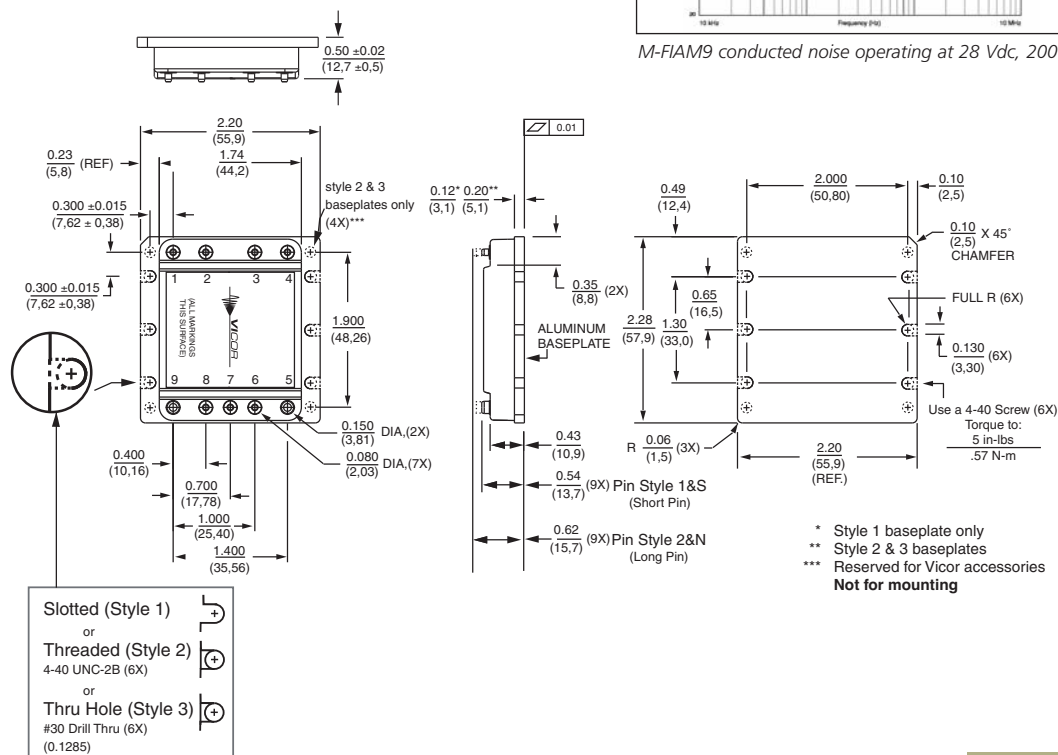
Temp.	Environment	MTBF			Unit
		M-FIAM3M21	M-FIAM5BM21	M-FIAM9M21	
25°C	Ground Benign: G.B.	3,646	2,943	3,587	1,000 hrs
50°C	Naval Sheltered: N.S.	656	456	1,108	1,000 hrs
65°C	Airborne Inhabited Cargo: A.I.C	514	375	868	1,000 hrs

Parameter	Product Grade	
	H-Grade	M-Grade
Storage temperature	–55°C to +125°C	–65°C to +125°C
Operating temperature (baseplate)	–40°C to +100°C	–55°C to +100°C
Power cycling burn-in	12 hrs, 29 cycles	24 hrs, 58 cycles
Temperature cycled with power off	12 cycles	12 cycles
17°C per minute rate of change	–65°C to +100°C	–65°C to +100°C
Test data supplied at these temperatures ^[b]	–40°C, +100°C	–55°C, +100°C
Warranty	2 years	2 years
Environmental compliance	MIL-STD-810	MIL-STD-810

^[b] Test data available for review or download from vicorpower.com

Converter Pins		
No.	Function	Label
1	+In	+
2	No Connection	NC
3	Ground	EMI/GND
4	-In	-
5	-Out	-
6	ON/OFF	ON/OFF
7	No Connection	NC
8	No Connection	NC
9	+Out	+

Pin Styles	
Tin / Lead	
Hot Solder Dip	
(Pin Style 1 & 2)	
Gold Plated Copper	
(Pin Style S & N)	



Filter and Front-End Modules

MI-AIM™

Highlights

The **AC input module** interfaces directly with AC mains to provide line rectification, EMI filtering, transient protection, and inrush limiting. These front-end modules accept 115 Vac and provide 250 W of output power for any of Vicor's MI-x7x family of standard and junior-size modules.

The MI-AIM meets CE102 conducted emissions requirements of MIL-STD-461D/E and the transient and spike requirements of MIL-STD-704A-F.

Fully encapsulated in Vicor's industry standard package, the MI-AIM meets MIL-STD-810 Environmental testing requirements for humidity, fungus, salt-fog, explosive atmosphere, acceleration, vibration and shock.

Features

- Inputs: 115 Vac 60/400 Hz
- Output power: 250 W
- MIL-STD-704A-F input transients protection
- MIL-STD-461D/E EMI compliant
- MIL-STD-810, MIL-STD-202 environments
- Compatible with MI-x7x family modules
- Efficiency: 95%
- Operating temperature to +100°C
- Size: 2.28" x 2.4" x 0.5" (57,9 x 61,0 x 12,7 mm)



General Specifications

(At TBP = 25°C, unless otherwise specified)

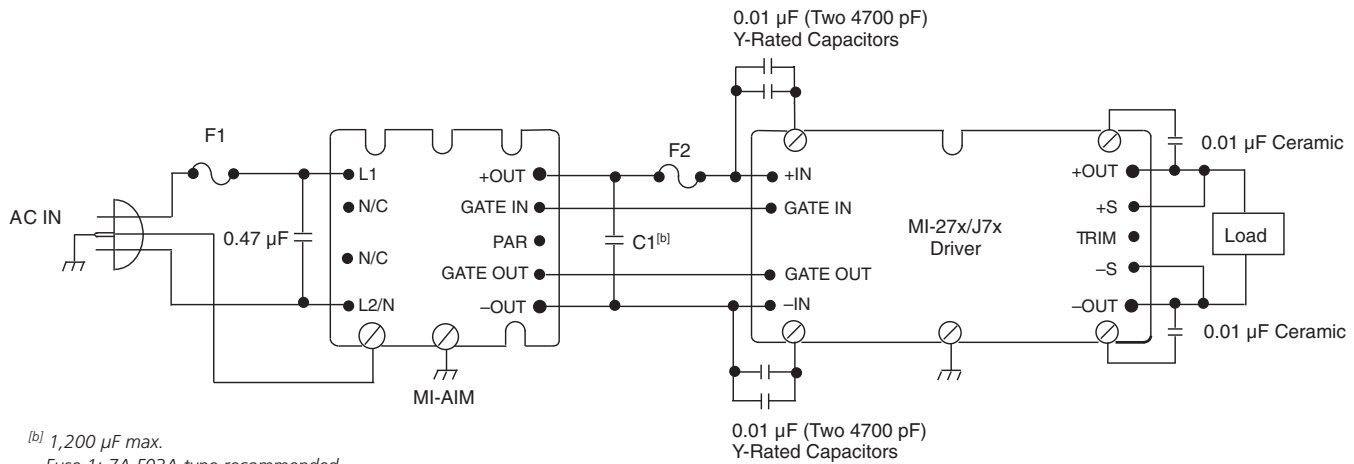
Parameter	Min	Typ	Max	Unit	Note
Input Characteristics (per MIL-STD-704A)					
Steady state input	(V)	85	115	140	Vrms
	(f)	47	60 / 400	440	Hz Operates over entire range
Transient input	(V)	80			Vrms 20 ms, per MIL-STD-704A
				180	Vrms 100 ms, per MIL-STD-704A
	(f)			480	Hz Peak, per MIL-STD-704A
Inrush current			40	A, peak	125 Vac
Conducted EMI	CE102 per MIL-STD-461D/E				100 – 125 Vac; 60 Hz
Efficiency		95		%	115 Vac; 60 / 400 Hz
Spikes			±50	%	Nominal line voltage, 50 µs
Output Characteristics					
Power		250		W	100°C
Ext. capacitance (C1)		1,200		µF	See connection diagram
Isolation					
Input to output	none				Provided by converter
Input to baseplate	1500			Vrms	
Environmental – MIL-STD-810					
Altitude - Method 500.2	70,000			feet	Procedure II
Humidity - Method 507.2	88 / 240			% / hs	Procedure I, cycle 1
Acceleration - Method 513.3	9.0			g	Procedure II
Vibration - Method 514.3	20			g	Procedure I, category 6
Shock - Method 516.3	40			g	Procedure I
Reliability – MIL-HDBK-217F (MI-AIM-M1)					
25°C Ground Benign: G.B.		5,355		1,000 hrs	
50°C Naval Sheltered: N.S.		964		1,000 hrs	
65°C Airborne Inhabited Cargo: A.I.C.		755		1,000 hrs	
Mechanical Characteristics					
Thermal resistance		0.14		°C/W	Baseplate to sink, w/thermal pad
Weight		3.5 (85)		ounces (grams)	

Product Grade Specifications

Parameter	I-Grade	Product Grade	M-Grade
Part number	MI-AIM-I1		MI-AIM-M1
Storage temperature	–55°C to +125°C		–65°C to +125°C
Operating temperature (baseplate)	–40°C to +100°C		–55°C to +100°C
Power cycling burn-in	12 hrs, 29 cycles		96 hrs, 213 cycles
Temperature cycled with power off	12 cycles		12 cycles
17°C per minute rate of change	–65°C to +100°C		–65°C to +100°C
Test data supplied at these temperatures ^[a]	–40°C, +80°C		–55°C, +80°C
Warranty	2 years		2 years
Environmental compliance	MIL-STD-810		MIL-STD-810

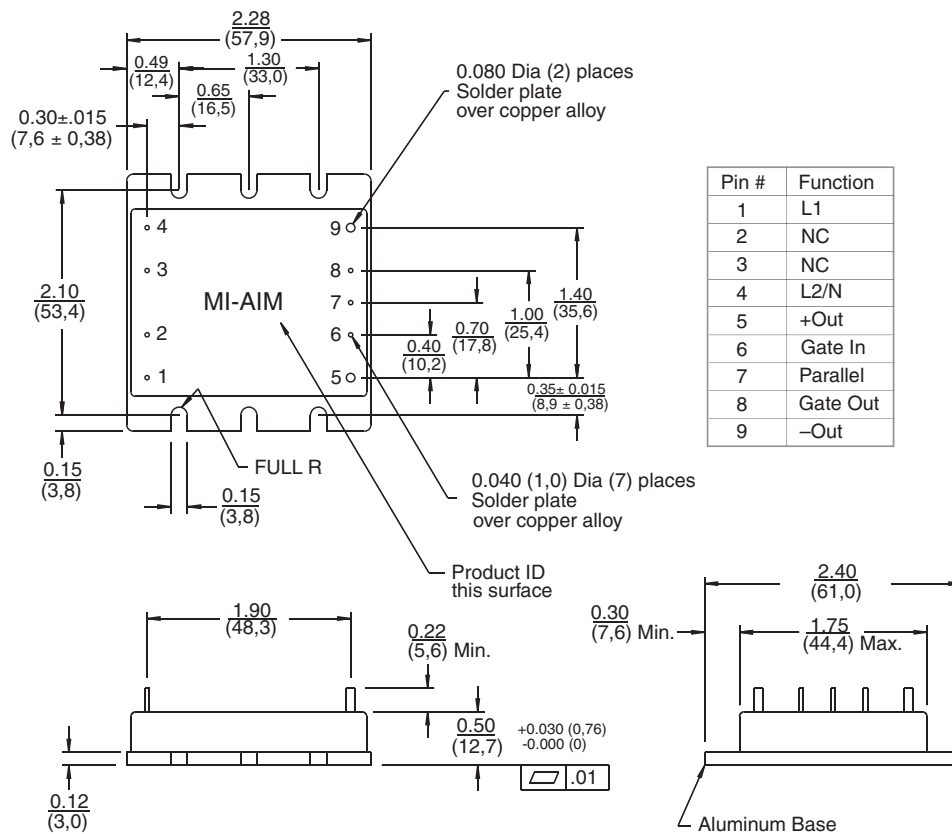
^[a] Test data available for review or download from vicorpower.com

Connection Diagram

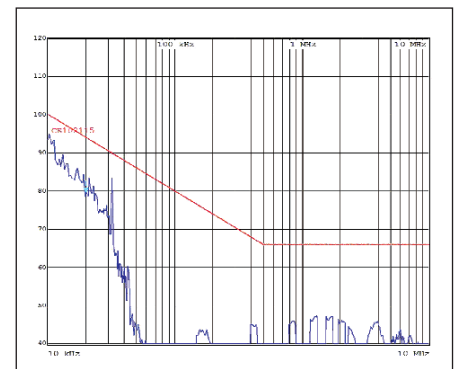


^[b] 1,200 μ F max.
Fuse 1: 7A F03A type recommended
Fuse 2: MI-x7x-xx – Buss PC – TRON 2 – 5 A (450 V)

Mechanical Drawing $\frac{in}{(mm)}$



EMI Compliance



MIL-STD-461E, CE102 compliance with MI-AIM
and MI-200 operating at 115 Vac / 60 Hz input
and 12 Vdc / 100 W output

Filter and Front-End Modules

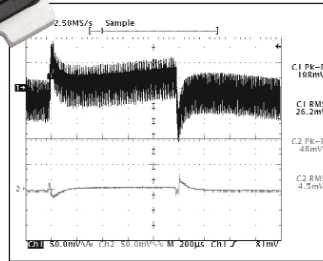
MicroRAM™ Ripple Attenuation Module

Highlights

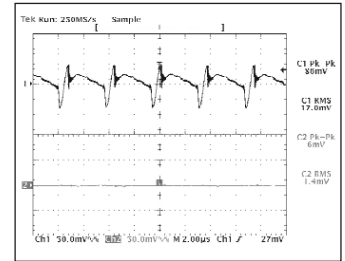
Vicor's **MicroRAM** output ripple attenuation module combines both active and passive filtering to achieve greater than 40 dB of noise attenuation from 60 Hz to 1 MHz. The MicroRAM operates over a range of 3 to 30 Vdc, is available in either 20 or 30 A models, and is compatible with all manufacturers switching converters including Vicor's MI-200, MI-J00 Family and Maxi, Mini, Micro Family DC-DC converters.

The MicroRAM's closed loop architecture greatly improves load transient response and with dual mode control, insures precise point-of-load voltage regulation. The MicroRAM supports redundant and parallel operation with its integrated ORing diode function.

It is available in Vicor's standard Micro package (quarter brick) with a variety of terminations for through-hole, socket, or surface-mount applications.



Typical input and output dynamic response. CTRAN; 35% of load



Typical input and output ripple @ 50%
(10 A) load

General Specifications

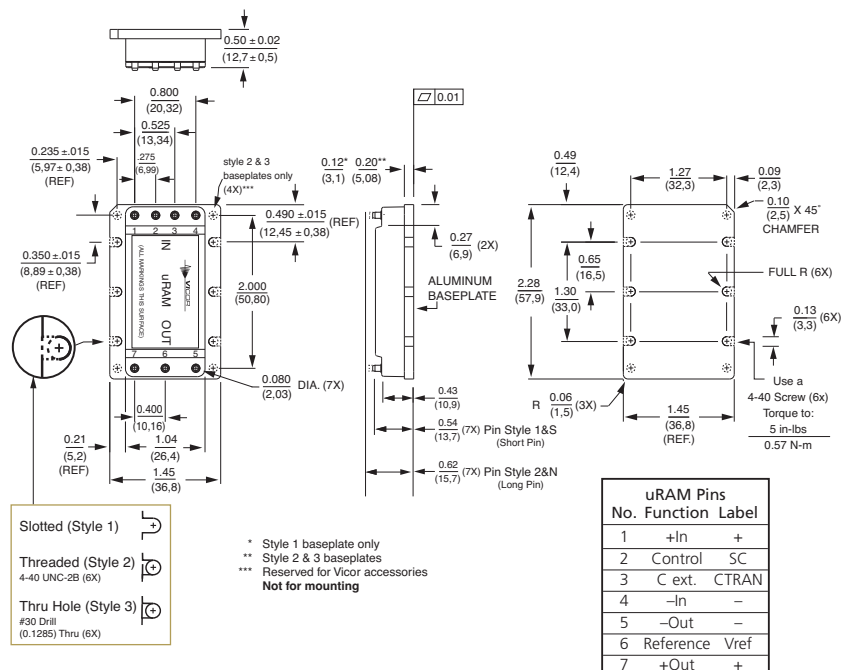
Parameter	Min	Typ	Max	Unit	Note
Characteristics					
Output ripple			10.0	mV p-p	
Input voltage range	3.0		30.0	Vdc	
Operating current					
uRAM2xxx	0.02		20	A	No internal current limiting
uRAM3xxx	0.02		30	A	No internal current limiting
Power Dissipation					
uRAM2xxx Vhr 380 mV @ 1 A		7.5		W	Vin 28 V; Iout 20 A
uRAM3xxx Vhr 380 mV @ 1 A		11.5		W	Vin 28 V; Iout 30 A

Part Numbering

uRAM	2	M	2	1
Product Type	Current Rating	Product Grade	Pin Style	Baseplate
	2 = 20 A 3 = 30 A	H = -40°C to +100°C M = -55°C to +100°C	1 = Short Solder 2 = Long Solder S = Short ModuMate ^[a] N = Long ModuMate ^[a]	1 = Slotted 2 = Threaded 3 = Through Hole

^[a] Compatible with SurfMate and InMate socketing systems

Mechanical Drawing $\frac{in}{(mm)}$



Features

- >40 dB ripple attenuation from 60 Hz to 1 MHz
- 20 – 30 Amp ratings
- 3 – 30 Vdc input range
- Efficiency: Up to 98%
- Environmental stress screening
- Integrated ORing diode supports N+1 redundancy
- Combined active and passive filtering
- Size: 2.28" x 1.45" x 0.5" (57.9 x 36.8 x 12.7 mm)

Configurable Solutions

28 V MIL-VIPAC

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 Family DC-DC converters (H or M-Grade), and a choice of output connections and mechanical platforms. The 28 Vdc VIPAC can be specified with one, two or three outputs with voltages as low as 3.3 Vdc to as high as 48 Vdc and power levels from 50 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".

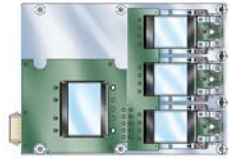
For additional technical or design information; or to create a 28 Vdc VIPAC tailored to your specific requirements using Vicor's online configurator, visit vicorpower.com/powerbench.

Features

- 28 Vdc input
- -55°C operation
- MIL-STD-461E EMI compliance^[a]
- MIL-STD-704A/E/F and MIL-STD-1275A/B/D input transient protection
- Compliant to MIL-STD-810F for vibration (Method 514.5, Procedure I) & shock (Method 516.5, Procedure I)
- One, two, or three outputs
- Outputs from 3.3 to 48 Vdc
- 50 to 400 W per output
- Environmental stress screening (modules only)
- Two output termination styles
- Low profile

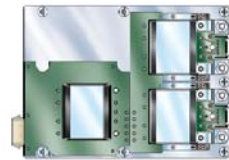
^[a] CE102 compliant with loads in excess of 30% of rated output; loads below 30% may need additional input capacitance for compliance

Configurations



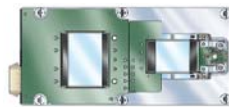
3 Micros

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



2 Minis

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



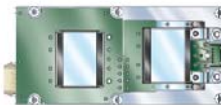
1 Micro

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



2 Micros

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



1 Mini

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



1 Maxi

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

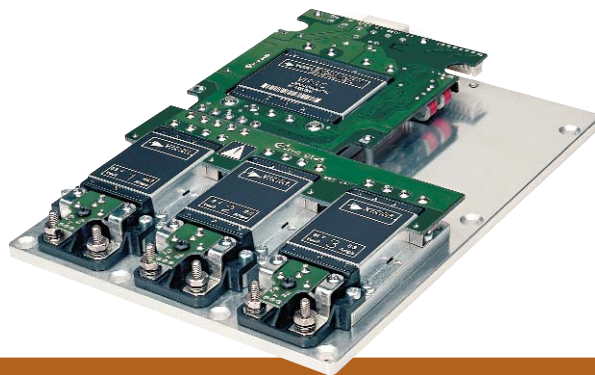
^[b] Weight is for the coldplate version only. Please refer to the VIPAC design guide for weight using finned heat sinks.



For AC-DC or DC-DC custom VIPAC solutions, see Vicor's Bricks-on-a-Plate power solutions on page 6, or contact Vicor.

General Specifications

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



Parameter	Min	Typ	Max	Units	Notes
Input Characteristics					
Input voltage	18	28	36	Vdc	Continuous
Inrush limiting			0.007	A/μF	
Transient immunity	M-FIAM5B (MVC-xxx)		50	Vdc	12.5 ms per MIL-STD-704E/F, continuous operation
			100	Vdc	50 ms per MIL-STD-1275A/B/D, continuous operation
	M-FIAM9 (MVX-xxx)		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 ^[d]
Conducted susceptibility					CS101, CS114, CS115, CS116
Reverse polarity protection					Internally fused

^[d] CE102 compliant with loads in excess of 30% of rated output; loads below 30% may need additional input capacitance for compliance

Parameter	Min	Typ	Max	Units	Notes
Output Characteristics					
Output voltage set point			±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 shut down		+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



Parameter	Min	Typ	Units	Notes
Environmental Characteristics				
Dielectric withstand, input to chassis	1,500 / 2,121		Vrms / Vdc	
Dielectric withstand, input to output	3,000 / 4,242		Vrms / Vdc	
Operating temperature, ambient				
H-Grade	-40	+65	°C	Max chassis temp; 95°C
M-Grade	-55	+65	°C	Max chassis temp; 95°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 – 2,000 Hz at 5 G rms

Configurable Solutions

MIL-VIPAC Array™ Chassis Mount DC-DC

Highlights

MIL-VIPAC Arrays are a highly flexible system of DC input power building-blocks that can be configured with as many as four user-definable outputs on a low profile, coldplate chassis. Using Vicor's VCAD design tool, designers are able to specify MIL-VIPAC Arrays with Maxi, Mini and Micro Family H- or M- Grade converters with inputs of 24, 28 or 300 Vdc (additional input voltages available) and outputs from 2 to 48 Vdc at power levels up to 500 W per output. MIL-VIPAC Arrays are ideal for use in distributed and modular power systems where power density and reliable operation are critical. Fully connectorized input and output terminations speed system installation and a versatile coldplate chassis simplifies thermal management.

For additional technical or design information; or to create a MIL-VIPAC Array tailored to your specific requirements using Vicor's online configurator, visit vicorpower.com/powerbench.



Features

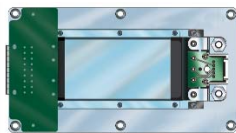
- 24, 28 or 300 V input
48, 72, 110, 150, and 375 V inputs also available
- -55°C operation
- Configurable single, dual, triple & quad outputs
- Outputs 2 – 48 Vdc; Up to 650 W
- Compliant to MIL-STD-810F for shock (Method 516.5, Procedure I) & vibration (Method 514.5, Procedure I)
- Current share option for high power / redundant operation
- High temperature capability
- Rugged, low profile, coldplate chassis
- Fully connectorized input & output for simplified hook up

Configurations



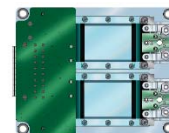
2 Minis

- 3.62" x 6.69" (92,0 x 170,0 mm)
- 1.25 lbs (567 g)
- Single or dual outputs
- Up to 500 W



1 Maxi

- 3.62" x 6.69" (92,0 x 170,0 mm)
- 1.05 lbs (476 g)
- Single output
- Up to 500 W



2 Micros

- 3.62" x 4.39" (92,0 x 112,0 mm)
- 0.7 lbs (318 g)
- Single or dual outputs
- Up to 300 W



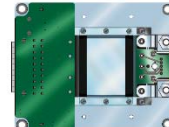
1 Mini, 2 Micros

- 3.62" x 6.69" (92,0 x 170,0 mm)
- 1.3 lbs (590 g)
- Dual or triple outputs
- Up to 550 W



1 Micro, 2 Minis

- 3.62" x 7.52" (92,0 x 191,0 mm)
- 1.35 lbs (612 g)
- Dual or triple outputs
- Up to 650 W



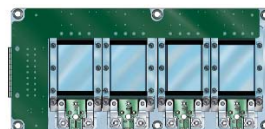
1 Mini

- 3.62" x 4.39" (92,0 x 112,0 mm)
- 0.7 lbs (318 g)
- Single output
- Up to 250 W
- Current share option



3 Micro

- 3.62" x 6.69" (92,0 x 170,0 mm)
- 1.3 lbs (590 g)
- Dual or triple outputs
- Up to 450 W



4 Micros

- 3.15" x 6.8" (92,0 x 191,0 mm)
- 1.3 lbs (590 g)
- Dual, triple or quad outputs
- Up to 600 W

For custom VIPAC Array solutions, see Vicor's Bricks-on-a-Plate power solutions on page 6, or contact Vicor.

General Specifications

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

Parameter	Min	Typ	Max	Units	Notes
Operating – 24 V Input					
Operating input voltage	18	24	36	Vdc	For 16 V operation ^[a]
Input surge withstand			50	Vdc	<100 ms
Output voltage set point			±1	% Vout nom.	Nominal input; full load; 25°C

Parameter	Min	Typ	Max	Units	Notes
Operating – 28 V Input					
Operating input voltage	9	28	36	Vdc	From 9 – 10 V, available power is reduced to 75% of max rating. Selected Maxi modules have a minimum operating voltage of 10 V.
Input surge withstand			50	Vdc	<100 ms
Output voltage set point			±1	% Vout nom.	Nominal input; full load; 25°C

Parameter	Min	Typ	Max	Units	Notes
Operating – 300 V Input					
Operating input voltage	180	300	375	Vdc	
Input surge withstand			400	Vdc	<100 ms
Output voltage set point			±1	% Vout nom.	Nominal input; full load; 25°C

Parameter	Min	Typ	Max	Units	Notes
Input – 24 V Input					
Undervoltage turn-on		17.5	17.9	Vdc	
Undervoltage turn-off	14.8	15.3		Vdc	
Overvoltage turn-off / on	36.3	37.8	39.6	Vdc	

Parameter	Min	Typ	Max	Units	Notes
Input – 28 V Input					
Undervoltage turn-on		8.75	8.9	Vdc	For selected Maxi modules, undervoltage turn-on is 9.9 Vdc max.
Input surge withstand		8.5		Vdc	For selected Maxi modules, undervoltage turn-off is 9.5 Vdc typ.
Overvoltage turn-off / on	36.3	37.8	39.6	Vdc	

Parameter	Min	Typ	Max	Units	Notes
Input – 300 V Input					
Undervoltage turn-on		174.6	178.2	Vdc	
Undervoltage turn-off	147.4	152.8		Vdc	
Overvoltage turn-off / on				Vdc	Not included

Parameter	Min	Typ	Max	Units	Notes
Environmental					
Dielectric withstand, input to chassis	1500 / 2121			Vrms / Vdc	
Dielectric withstand, input to output	3000 / 4242			Vrms / Vdc	
Operating temperature - Ambient					
H-Grade	–40		+65	°C	Max chassis temp., 95°C
M-Grade	–55		+65	°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 rms

^[a] The following models will operate down to 16 V at 75% rated power after start up at >17.9 V

Maxi — selected models, Mini — all models, Micro — all models

Configurable Solutions

PFC MegaPAC MI AC-DC Power Supplies

Highlights ■■■■

The **PFC MegaPAC MI** and **PFC MegaPAC-High Power MI** combine power factor correction (PFC) with the configurability of the MegaPAC family of power supplies. The PFC MegaPAC MI and PFC MegaPAC – High Power MI provide up to 1,600 W and 2,400 W of output powers respectively. The chassis has 8 slots and can provide as many as 32 outputs for the PFC MegaPAC MI and 25 outputs for the PFC MegaPAC – High Power MI. The PFC MegaPAC MI and PFC MegaPAC – High Power MI have the same input and output connections, mounting points, and the same dimensions.

These ruggedized chassis bring a new level of configurability and ease of use to COTS applications. Based on Vicor's proven family of reliable modules and incorporating powerful and flexible PFC front ends, these products easily meet MIL specs for shock, vibration, wide temperature range, and demanding electrical environments. The PFC MegaPAC MI and PFC MegaPAC HP MI will also work well in demanding industrial environments.



Features

- AC inputs available: 85 – 264 Vac
- Power factor corrected
- DC inputs available: 100 – 380 Vdc
- User and field configurable
- Up to 2,400 W
- 47 – 500 Hz operation
- Fan cooled
- Efficiency > 80%
- MIL-STD-810 for shock and vibration
- MIL-STD-704 and 1399 for overvoltage and transients
- -40C operation available
- Optional conformal coating
- Up to 32 regulated outputs (8 slots) from 1 to 95 Vdc and above
- Safety agency approvals: UL, cTÜVus

FlatPAC-EN MI AC-DC Power Supplies

Highlights ■■■■

With a power density greater than 7 W/in³, Westcor's **FlatPAC-EN MI** is an ultra low profile, compact, EN compliant autoranging AC-DC switcher. It is capable of providing up to 500 W from up to four isolated outputs.

For maximum versatility and flexibility, the FlatPAC-EN MI can be configured with standard Vicor DC-DC converter modules – full, half and quarter-brick sizes. These modules cover the entire range of outputs from 1 to 100 Vdc and 25 to 500 Watts, as well as an array of non-standard voltages. The optimum FlatPAC-EN MI solution can be factory configured based on your exact voltage and power requirements.

For conducted EMI the FlatPAC-EN MI conforms with FCC Class A and B; and EN55022 Class A. Compliance with EN55022 Class B and MIL-STD-461 are configuration dependent.

Features

- EN61000-3-2 harmonic current compliance
- Low profile package (1.4 in / 35,6 mm)
- Output power to 500 W (425 W for EN compliance)
- Up to four user specifiable outputs
- Meets MIL-STD-810 for shock and vibration
- RS-232 microcontroller interface
- Safety agency approvals: CE Marked, cTÜVus
- -40C operation available
- Optional conformal coating
- Conduction or convection cooling



Configurable Solutions

LoPAC MI Family AC-DC Power Supplies

Highlights

The MI versions of the **PFC MicroS**, **PFC Micro** and **PFC Mini** are new members of the LoPAC family specifically designed for demanding environments such as military and heavy industry. Available as a one, two or three slot package, respectively, each LoPAC slot can be configured with standard Vicor DC-DC converter modules enabling up to six user-specifiable isolated outputs with a power density of up to 11 W/in³.

For maximum versatility and flexibility, the LoPAC can be configured with VI-26x (full brick), VI-J6x (half brick) or Maxi, Mini, Micro V375 Series full, half and quarter-brick modules. These modules cover the entire range of outputs from 1 to 100 Vdc and 25 to 600 Watts. The optimum solution can be factory configured based on your exact voltage and power requirements.

The LoPACs are designed to meet MIL-STD-810G for shock and vibration, MIL-STD-704 and 1399 for transients and overvoltage, and have optional -40°C operational temp rating and conformal coating. The supplies are compliant with all EN61000-6-1 for conducted and radiated immunity, as well as EN61000-3-2 for harmonic currents emissions and EN61000-3-3 for voltage flicker.

Features

- Near unity power factor
- EN61000-3-2 harmonic current compliance
- Low profile package
- Output power to 1,500 W
- Up to six user specifiable outputs
- AC input: 25 – 264 Vac
- DC input: 100 – 380 Vdc (PFC Mini MI) or 100 – 300 (PFC Micro MI and PFC MicroS MI)
- Power density up to 11 W/in³
- Integral cooling fans
- 47 – 500 Hz operation
- Safety agency approvals: UL, cTÜVus
- MIL-STD-810G for vibration and shock
- MIL-STD 704 and 1399 for overvoltage and transients
- -40°C operation available
- Optional conformal coating



LoPAC Slot Configurations

The DC-DC converter modules are used to populate each LoPAC converter slot. Each slot can be configured in different ways depending on module sizes and power limitations. The following table summarizes the available slot configurations for each of the three LoPAC packages.

Model Type	# Slots	Maximum Output Power		Modules per Slot
		Total		
		@ 230 Vac	@ 115 Vac	
PFC Mini MI	3	1,500 W	800 W	1 Full or 2 Half
PFC Micro MI	2	800 W	500 W	1 Full or 2 Half or 3 Quarter
PFC MicroS MI	1	600 W	500 W	1 Full or 2 Half or 3 Quarter

Part Numbering

PM	X₁	—	X₂	X₃	X₄	XXXX	-X₅	-X₆
Product Prefix PM = PFC Mini MI PC = PFC Micro MI PS = PFC MicroS MI	Number of Output Voltages		Number of VI-200 / VI-J00 module(s)	Number of Maxi/ Mini / Micro module(s)	Optional Factory Assigned	Factory Assigned	Optional Factory Assigned MI = Rugged Chassis MC = Conformed Coat	Optional Codes^[a] LL = Low Leakage QF = Quiet Fan (only available on PFC Mini MI)

^[a] Refer to model type design guide for more on the optional codes.

Configurable Solutions

MI-MegaMod Chassis-Mount DC-DC Converter

Highlights

Vicor's **MI-MegaMod** family of single, dual, and triple output DC-DC converters provide power system designers with cost-effective, high-performance, off-the-shelf solutions to applications that might otherwise require a custom supply.

Incorporating standard MI-200 or MI-J00 family converters in rugged, chassis-mount packages, MegaMods can be ordered with single, dual, or triple outputs, having a combined output power of up to 300 W. Totally isolated outputs eliminate efficiency penalties and output interaction problems.

Features

- Inputs: 28, 155, 165 and 270 Vdc
- One, two, or three outputs
- Output from 2 to 48 Vdc
- Up to 13.5 W/in³
- High efficiency
- Remote sense
- ZCS power architecture
- Low noise FM control



Full-size MegaMod

Parameter	Min	Typ	Max	Units	Notes
Input Characteristics					
Inrush charge		120 x 10 ⁻⁶	200 x 10 ⁻⁶	Coulombs	Nominal line, per module
Input reflected ripple current – pp		10		% lin	Nominal line, full load
No load power dissipation		1.35	2.0	Watts	Per module
Output Characteristics					
Set point accuracy		0.5	1.0	% Vnom	
Load / line regulation		0.05	0.2	% Vnom	LL to HL, 10% to FL
Load / line regulation		0.2	0.5	% Vnom	LL to HL, NL to 10%
Output temperature drift		0.01	0.02	% / °C	Over rated temperature
Long term drift		0.02		% / 1K hrs	
Output ripple – p-p: <10 V		80	150	mV	20 MHz bandwidth
12 – 48 V		0.75	1.5	%	20 MHz bandwidth
Output voltage trimming ^[a]	50		110	% Vnom	
Total remote sense compensation	0.5			Vdc	0.25 V max. neg. leg
OVP set point	115	125	135	% Vnom	Recycle power
Current limit	105		125	% Inom	Automatic restart
Short circuit current			130	% Inom	
Isolation Characteristics					
Isolation (input to output)	3,000			Vrms	
Isolation (output to baseplate)	500			Vrms	
Isolation (input to baseplate)	1,500			Vrms	
Thermal Characteristics					
Efficiency		80 – 90		%	
Baseplate to chassis		0.1		°C/Watt	
Thermal shut down	+90	+95	+105	°C	

Half-size MegaMod

Parameter	Min	Typ	Max	Units	Notes
Input Characteristics					
Inrush charge		60 x 10 ⁻⁶	100 x 10 ⁻⁶	Coulombs	Nominal line, per module
Input reflected ripple current – pp		10		% lin	Nominal line, full load
No load power dissipation		1.35	2.0	Watts	Per module
Output Characteristics					
Set point accuracy		0.5	1.0	% Vnom	
Load / line regulation		0.05	0.2	% Vnom	LL to HL, 10% to FL
Load / line regulation		0.2	0.5	% Vnom	LL to HL, NL to 10%
Output temperature drift		0.01	0.02	% / °C	Over rated temperature
Long term drift		0.02		% / 1K hrs	
Output ripple – p-p: <10 V		80	150	mV	20 MHz bandwidth
12 – 48 V		0.75	1.5	%	20 MHz bandwidth
Output voltage trimming ^[a]	50		110	% Vnom	
Total remote sense compensation	0.5			Vdc	0.25 V max. neg. leg
Current limit	105	125	135	% Inom	Automatic restart
Isolation Characteristics					
Isolation (input to output)	3,000			Vrms	
Isolation (output to baseplate)	500			Vrms	
Isolation (input to baseplate)	1,500			Vrms	
Thermal Characteristics					
Efficiency		80 – 90		%	
Baseplate to chassis		0.1		°C / Watt	

^[a] 10 V, 12 V, and 15 V outputs, standard trim range ±10%. Consult factory for wider trim range.

Configuration Chart

Full-size MegaMods

Single Output	Power	Size	Weight	# of MI-200
MI-L 	50 – 100 W	4.9" x 2.5" x 0.62" 124,5 x 63,5 x 15,7 mm	9.0 oz. (255 g)	1
MI-M 	150 – 200 W	4.9" x 4.9" x 0.62" 124,5 x 124,5 x 15,7 mm	1.2 oz. (525 g)	2
MI-N 	300 W	4.9" x 7.3" x 0.62" 124,5 x 185,4 x 15,7 mm	1.7 oz. (780 g)	3

Dual Outputs

MI-P 	100 – 200 W	4.9" x 4.9" x 0.62" 124,5 x 124,5 x 15,7 mm	1.2 oz. (525 g)	2
MI-Q 	200 – 300 W	4.9" x 7.3" x 0.62" 124,5 x 185,4 x 15,7 mm	1.7 oz. (780 g)	3

Triple Outputs

MI-R 	150 – 300 W	4.9" x 7.3" x 0.62" 124,5 x 185,4 x 15,7 mm	1.7 oz. (780 g)	3
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Half-size MegaMods

Single Output	Power	Size	Weight	# of MI-J00
MI-U 	10 – 50 W	2.58" x 2.5" x 0.62" 65,5 x 63,5 x 15,7 mm	4.5 oz. (127 g)	1

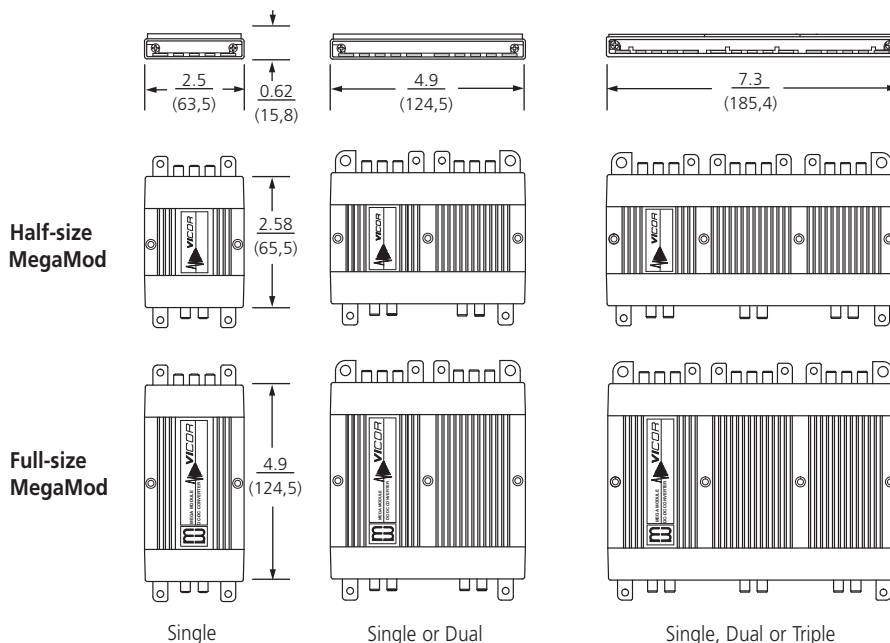
Dual Outputs

MI-PJ 	20 – 100 W	2.58" x 4.9" x 0.62" 65,5 x 124,5 x 15,7 mm	8.8 oz. (250 g)	2
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Triple Outputs

MI-RJ 	30 – 150 W	2.58" x 7.3" x 0.62" 65,5 x 185,4 x 15,7 mm	13.3 oz. (377 g)	3
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Mechanical Drawing $\frac{in}{(mm)}$



Input Voltage

Nominal	Range	Transient
2 = 28 Vdc	18 – 50 V ^[b]	60 V
5 = 155 Vdc	100 – 210 V	230 V
6 = 270 Vdc	125 – 400 V ^[c]	475 V
7 = 165 Vdc	100 – 310 V ^[d]	

Output Voltage

Z = 2 V	T = 6.5 V ^[e]	N = 18.5 V
Y = 3.3 V	R = 7.5 V ^[e]	3 = 24 V
O = 5 V	M = 10 V	L = 28 V
X = 5.2 V	1 = 12 V	J = 36 V
W = 5.5 V	P = 13.8 V	K = 40 V
V = 5.8 V	2 = 15 V	4 = 48 V

Product Grade

Full Size

I = -40°C to +85°C
M = -55°C to +85°C

Half Size

I = -40°C to +100°C
M = -55°C to +100°C

Output Power / Current

Full Size		Half Size	
≥5 V	<5 V	≥5 V	<5 V
Y = 50 W	10 A	A = 10 W	—
X = 75 W	15 A	Z = 25 W	5 A
W = 100 W	20 A	Y = 50 W	10 A
V = —	30 A		

Output Power / Current

	≥5 V	<5 V
V =	150 W	30 A
U =	200 W	—
S =	—	60 A

Output Power / Current

	≥5 V	<5 V
S =	300 W	—
P =	—	90 A

^[b] 16 V operation at 75% load

^[c] These units rated at 75% load from

125 – 150 Vin: Full-size – 5 Vout @

100 W; 2 Vout and 3.3 Vout @ 30 A;

Half-Size – 5 Vout @ 50 W; 2 V and 3.3 V @ 10 A

^[d] For use with Vicor's MI-AIM

^[e] 75 W max module power for 28 V input

Configurable Solutions

MI-ComPAC™ DC-DC Power Supply Up to 300 W

Highlights

The **MI-ComPAC** is a complete single, dual, or triple output DC-DC power supply that delivers up to 300 W from inputs of 28 Vdc or 270 Vdc.

The MI-ComPAC meets the conducted emissions and conducted susceptibility specifications of MIL-STD-461C/D/E and offers complete input transient, surge, and spike protection to the most severe levels of MIL-STD-1275, MIL-STD-704 and DO-160E.

Reverse polarity protection and over / undervoltage lockout provide additional safeguards against potentially damaging line conditions. The MI-ComPAC also features a master disable.

Features

- Transient protection: 28 Vdc per MIL-STD-704A, MIL-STD 1275A/B/D & DO-160E, 270 Vdc per MIL-STD-704D/E/F
- One, two, or three outputs
- Outputs from 2 to 48 Vdc
- Up to 5 W/in³
- High efficiency
- Remote sense
- ZCS power architecture
- Low noise FM control
- MIL-STD-461C/D/E EMI compliance
- Reverse polarity protection



General Specifications

At TBP = 25°C, nominal line and 75% load, unless otherwise specified

Parameter	Min	Typ	Max	Units	Notes
Input Characteristics					
28 Vdc input modules					
Steady state input	18	28	50	Vdc	
Low line lockout			17.5	Vdc	Automatic recovery
Input spike limit	-600		+600	Vdc	10 μs, 50 Ω per MIL-STD-704A
	-250		+250	Vdc	70 μs, 15 mJ per MIL-STD-1275A/B/D
Input surge limit			100	Vdc	50 ms, 0.5 Ω per MIL-STD-1275A/B/D
			80	Vdc	100 ms per DO-160E
Overvoltage shut down	50			Vdc	100 ms automatic recovery
Reverse polarity protection					Shunt diode: input fuse required
Recommended fuse			10 ^[a]	Amps	F03A type
270 Vdc input modules					
Steady state input	125	270	400	Vdc	
Low line lockout			125	Vdc	Automatic recovery
Input spike limit			+800	Vdc	10 μs, 50 Ω
	-600		+600	Vdc	100 μs, 15 mJ
Input surge limit			500	Vdc	100 ms, 0.5Ω
Overvoltage shut down	400			Vdc	100 μs automatic recovery
Reverse polarity protection					Shunt diode: input fuse required
Recommended fuse			2 ^[a]	Amps	F03A type
All models					
No load power dissipation		1.5 ^[a]	2 ^[a]	Watts	
Master disable input current ^[b] (Absolute max., 20 mA)	4			mA	Sink; disables all outputs
Inrush current		110	125	%, lin	Steady state lin, 10 ms
EMC Characteristics – MIL-STD-461C/D/E					
Input power leads					
Conducted emissions	CE01, CE03, CE07			MIL-STD-461C — 1-up	
	CE101, CE102			MIL-STD-461D — 1-up	
	CE101			MIL-STD-461E — 2-up & 3-up	
Conducted susceptibility	CS01, CS02, CS0			MIL-STD-461C — 1-up	
	CS101, CS114, CS116			MIL-STD-461D — 1-up	
	CS101, CS114, CS116			MIL-STD-461E — 2-up & 3-up	
Output Characteristics					
Set point accuracy		0.5	1.0	% Vnom	
Load / line regulation		0.2	0.5	% Vnom	LL to HL, NL to 10%
		0.05	0.2	% Vnom	LL to HL, 10% to FL
Output temperature drift		0.01	0.02	%/°C	
Output noise – p-p		1.0	1.5	% Vnom	} Whichever is greater 20 MHz BW
		100	150	mV	
Output voltage trimming ^[c]	50		110	% Vnom	
Remote sense compensation	0.5			Vdc	
OVP set point	115	125	135	% Vnom	Latching
Current limit	105		125	% Inom	Auto restart
Short circuit current ^[d]	20		130	% Inom	
Isolation Characteristics					
Input to output	4,242			Vrms	
Input to case					
28 Vdc input	2,121			Vrms	
270 Vdc input	2,500			Vrms	
Output to case	500			Vrms	
Thermal Characteristics					
Efficiency		81		%	
Operating temperature, case			+85	°C	See product grade
Storage temperature			+100	°C	See product grade
Shut down temperature	+90	+95	+105	°C	Cool and recycle power to restart

^[a] Per internal module configuration

^[b] Multiply minimum x 2 for 2-ups and x 3 for 3-ups

^[c] 10 V, 12 V, and 15 V outputs, standard trim range ±10%. Consult factory for wider trim range

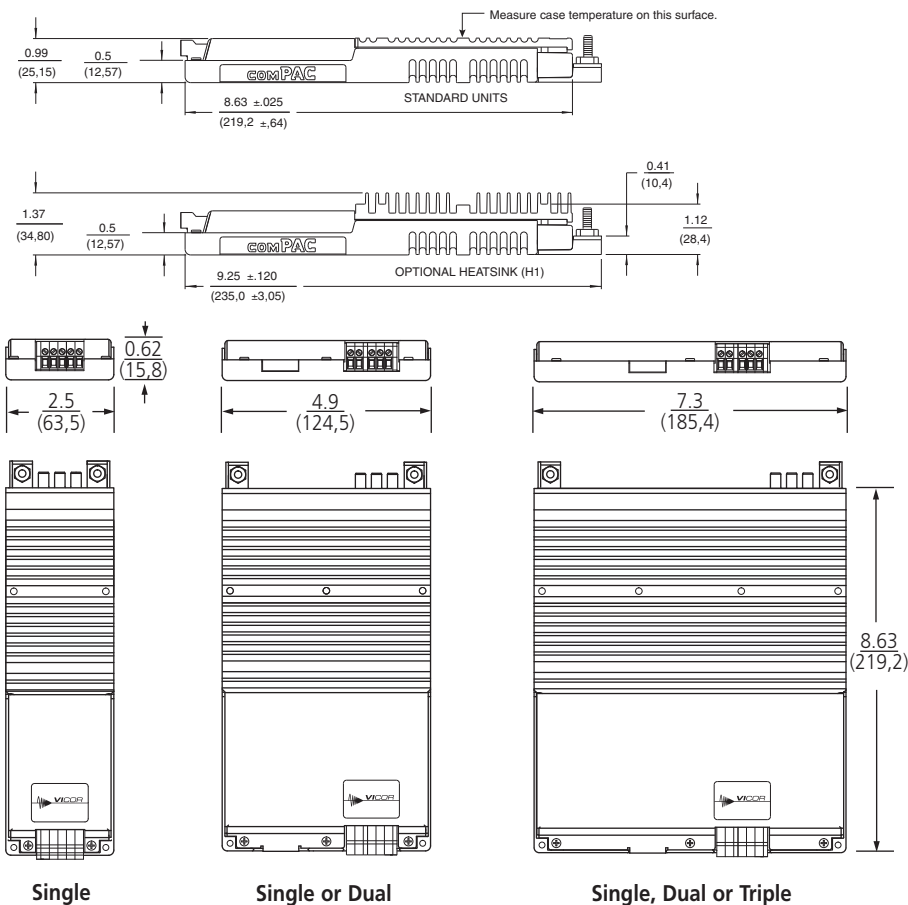
^[d] Output ranges of 5 V or less incorporate foldback current limiting, outputs of 10 V and above incorporate straight line current limiting

Configuration Chart

Single Output	Power	Size	Weight	No. of Modules
MI-LC 	50 – 100 W	8.6" x 2.5" x 0.99" 219,2 x 64,5 x 25,1 mm	1.2 lbs. (544 g)	1
MI-MC 	150 – 200 W	8.6" x 4.9" x 0.99" 219,2 x 126,0 x 25,1 mm	2.4 lbs. (1248 g)	2
MI-NC 	300 W	8.6" x 7.3" x 0.99" 219,2 x 187,5 x 25,1 mm	3.6 lbs. (1633 g)	3
Dual Outputs				
MI-PC 	100 – 200 W	8.6" x 4.9" x 0.99" 219,2 x 126,0 x 25,1 mm	2.4 lbs. (1248 g)	2
MI-QC 	200 – 300 W	8.6" x 7.3" x 0.99" 219,2 x 187,5 x 25,1 mm	3.6 lbs. (1633 g)	3
Triple Outputs				
MI-RC 	150 – 300 W	8.6" x 7.3" x 0.99" 219,2 x 187,5 x 25,1 mm	3.6 lbs. (1633 g)	3

Conduction-cooled models available, add "-CC" to the end of the part number. (Consult factory for details)

Mechanical Drawing $\frac{in}{(mm)}$



Input Voltage		
Nominal	Range	Transient
2 = 28 Vdc	18 – 50 V ^[b]	60 V
5 = 155 Vdc	100 – 210 V	230 V
6 = 270 Vdc	125 – 400 V ^[c]	475 V
7 = 165 Vdc	100 – 310 V ^[d]	

Output Voltage		
Z = 2 V	T = 6.5 V ^[e]	N = 18.5 V
Y = 3.3 V	R = 7.5 V ^[e]	3 = 24 V
O = 5 V	M = 10 V	L = 28 V
X = 5.2 V	1 = 12 V	J = 36 V
W = 5.5 V	P = 13.8 V	K = 40 V
V = 5.8 V	2 = 15 V	4 = 48 V

Product Grade	
I = -40°C to +85°C	
M = -55°C to +85°C	

Output Power / Current			
Full Size		Half Size	
≥5 V	<5 V	≥5 V	<5 V
Y = 50 W	10 A	A = 10 W	—
X = 75 W	15 A	Z = 25 W	5 A
W = 100 W	20 A	Y = 50 W	10 A
V = —	30 A		

Output Power / Current		
	≥5 V	<5 V
V =	150 W	30 A
U =	200 W	—
S =	—	60 A

Output Power / Current		
	≥5 V	<5 V
S =	300 W	—
P =	—	90 A

[b] 16 V operation at 75% load
[c] These units rated at 75% load from 125 – 150 Vin: Full-size – 5 Vout @ 100 W; 2 Vout and 3.3 Vout @ 30 A: Half-Size – 5 Vout @ 50 W; 2 V and 3.3 V @ 10 A
[d] For use with Vicor's MI-AIM
[e] 75 W max module power for 28 V input

Accessories

For MI-200 / MI-J00 DC-DC Converters

Mounting

Sockets

Sockets are available for all Vicor MI-200 / MI-J00 modules and are intended for applications requiring ease of module installation or removal. Vicor modules have nine pins; seven of which are 0.040" and two are 0.080".

Pin Size	Finish	Part Number
0.040" (1,01 mm)	Electro-tin	30074
0.080" (2,03 mm)	Electro-tin	30075

Module Standoffs

For mechanical mounting of MI-200 / MI-J00 modules. Also provides grounding of the module from the baseplate to the printed circuit board. (Sold individually)

Description	Part Number
0.525" Long., 0.25" Hex	32183-01
(13,3 mm) Long., (6,35 mm) Hex	



Inductors/Capacitors

Inductors, Differential Mode

Output inductors may be used to reduce differential output noise by approximately 20 dB.

Inductance @ max. A	DC Current max.	Part Number
0.2 μ H	40 A	30268



Inductors, Common Mode

Common-mode inductors provide a high level of attenuation of common-mode currents.

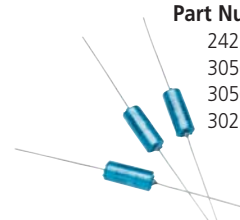
Inductance/ Winding	DC Current/ Resistance	Part Number
1000 μ H	12 A / 6.5 m Ω	31743
3000 μ H	7 A / 18 m Ω	31742



Capacitors, Tantalum

Solid tantalum capacitor used to reduce output ripple.

Description	Part Number
270 μ F / 10 V	24252
120 μ F / 20 V	30506
68 μ F / 30 V	30507
27 μ F / 50 V	30259



Capacitors, Y-Type

For EMI considerations, Y capacitors should be used with any of Vicor's DC-DC converter modules.

Description	Part Number
"Y" Cap., 1500 pF	00770
"Y" Cap., 4700 pF	01000



Thermal Management

ThermMate™ Thermal Pads

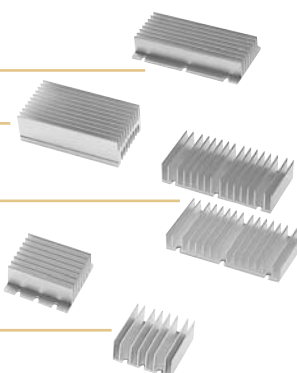
For use with Vicor modules, ThermMate thermal pads are a "dry" alternative to thermal compound and are pre-cut to the outline dimensions of the module.

Thermal Pad	Thickness	Part Number
Full-Size MI-200	0.007" (0,177mm)	20266
		(10 pc. pkg.)
Half-Size MI-J00	0.007" (0,177mm)	20267
		(10 pc. pkg.)



Heat Sinks

Fin Style	Module Style	Fin Height	Part Number
Longitudinal	MI-200	0.90" (22,8 mm)	30089
Longitudinal	MI-200	0.70" (17,7 mm)	30775
Longitudinal	MI-200	1.45" (36,83 mm)	30780
Transverse	MI-200	0.90" (22,8 mm)	30080
Transverse	MI-200	0.70" (17,7 mm)	30193
Transverse	MI-200	0.40" (10,16 mm)	30194
Longitudinal	MI-J00	0.90" (22,8 mm)	30191
Transverse	MI-J00	0.90" (22,8 mm)	30771
Transverse	MI-J00	0.40" (10,16 mm)	30140



Accessories

For Maxi, Mini, Micro and V•I Chip Products

Mounting

SurfMate™

Surface Mount Sockets

Packaged in five pair sets.

Description	Pin Style	Part Number
Maxi	S	16017
Mini	S	16021
Micro	S	16025



InMate – Through hole Sockets

All sockets are supplied on InMate headers to assure proper alignment during installation. InMate through hole sockets are available for board thicknesses between 0.063" and 0.125". Min / Max 0.055" / 0.071". InMates are packaged in five pair sets. See vicorpower.com for larger quantities.

Board Thickness	Mounting Style	Pin Style	Module Style	Part Number
0.063" (1,60 mm)	Inboard	S	Maxi	18362
0.063" (1,60 mm)	Inboard	S	Mini	18366
0.063" (1,60 mm)	Inboard	S	Micro	18370
0.063" (1,60 mm)	Onboard	N	Maxi	18364
0.063" (1,60 mm)	Onboard	N	Mini	18368
0.063" (1,60 mm)	Onboard	N	Micro	18372
0.094" (2,38 mm)	Onboard	N	Maxi	18365
0.094" (2,38 mm)	Onboard	N	Mini	18369
0.094" (2,38 mm)	Onboard	N	Micro	18373
0.125" (3,17 mm)	Onboard	N	Maxi	21510
0.125" (3,17 mm)	Onboard	N	Mini	21511
0.125" (3,17 mm)	Onboard	N	Micro	21512



Magnetics

PR Bus Isolation Transformer

Developed for isolation of PR Bus signal when used with Maxi, Mini, Micro family parallel configurations. Consult Vicor for applications instruction.

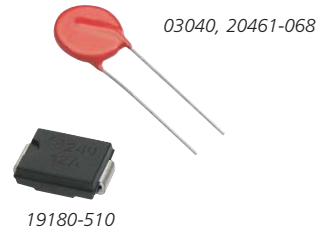
Part Number
29768



MOVs / Transorbs

For M-FIAM Products

Description	Part Number
MOV for M-FIAM3	03040
MOV for M-FIAM5B	20461-068
Transorb for M-FIAM7	19180-510
Transorb for M-FIAM9	19180-510

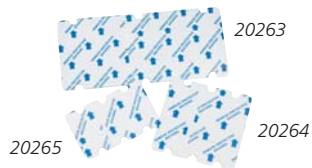


Thermal Management

ThermMate™ Thermal Pads

For use with Vicor modules, ThermMate thermal pads are a "dry" alternative to thermal compound and are pre-cut to the outline dimensions of the module baseplate.

Thermal Pad	Thickness	Part Number
Maxi	0.007" (0,177 mm)	20263 (10 pc. pkg.)
Mini	0.007" (0,177 mm)	20264 (10 pc. pkg.)
Micro	0.007" (0,177 mm)	20265 (10 pc. pkg.)



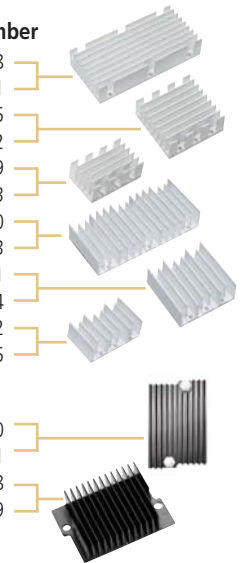
Heat Sinks

Fin Style	Baseplate Style	Fin Height	Module Style	Part Number
Longitudinal	Through Hole	0.4" (10,16 mm)	Maxi	30718
Longitudinal	Through Hole	0.9" (22,8 mm)	Maxi	30181
Longitudinal	Through Hole	0.4" (10,16 mm)	Mini	30195
Longitudinal	Through Hole	0.9" (22,8 mm)	Mini	30182
Longitudinal	Through Hole	0.4" (10,16 mm)	Micro	30719
Longitudinal	Through Hole	0.9" (22,8 mm)	Micro	30183
Transverse	Through Hole	0.4" (10,16 mm)	Maxi	30720
Transverse	Through Hole	0.9" (22,8 mm)	Maxi	30723
Transverse	Through Hole	0.4" (10,16 mm)	Mini	30721
Transverse	Through Hole	0.9" (22,8 mm)	Mini	30724
Transverse	Through Hole	0.4" (10,16 mm)	Micro	30722
Transverse	Through Hole	0.9" (22,8 mm)	Micro	30725

V•I Chip Heat Sinks

Longitudinal	Through Hole	0.43" (10,92 mm)	V•I Chip	32440
Longitudinal	Through Hole	0.25" (6,35 mm)	V•I Chip	32441
Transverse	Through Hole	0.43" (10,92 mm)	V•I Chip	32438
Transverse	Through Hole	0.25" (6,35 mm)	V•I Chip	32439

V•I Chip Push Pins	Size	Part Number
0.051" – 0.069" PCB	(1,29 – 1,75 mm)	32434
0.070" – 0.104" PCB	(1,17 – 2,64 mm)	32435
0.105" – 0.132" PCB	(2,66 – 3,35 mm)	32436
0.133" – 0.156" PCB	(3,37 – 3,96 mm)	32437



Environmental Stress Screening

Highlights

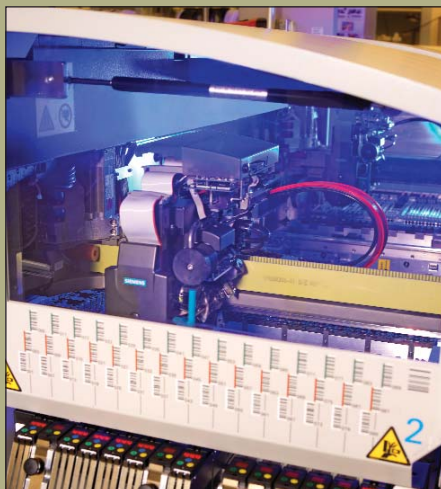
Every module undergoes extensive post-production environmental stress screening (ESS) before shipment to verify compliance with Vicor's high quality and performance standards and to eliminate early life failures. To ensure the most effective routine for precipitating module failures, Vicor continually evaluates its ESS program and makes appropriate changes as new data becomes available or as product improvements occur. After burn-in and temperature cycling, each module undergoes final electrical testing over the specified temperature range.

MI-200 / MI-J00 Module Screening		I-Grade	M-Grade
Operating temperature	MI-200	-40°C to +85°C	-55°C to +85°C
	MI-J00	-40°C to +100°C	-55°C to +100°C
Storage temperature	MI-200	-55°C to +100°C	-65°C to +100°C
	MI-J00	-55°C to +125°C	-65°C to +125°C
Temperature cycling 17°C per minute nominal rate of change, dwell time until product stabilization		12 cycles -65°C to +100°C	12 cycles -65°C to +100°C
Ambient test at 25°C		Yes	Yes
Power cycling burn-in power on 10 minute, off 15 minute; module temperature cycling 35°C to 80°C; load up to 100 W; module output continuously monitored while enabled		12 hrs 29 cycles	96 hrs 213 cycles
Functional and parametric ATE tests at low / high temperature.		-40°C / +85°C	-55°C / +85°C
Hi-Pot test		Yes	Yes
Visual inspection before packing into ESD containers		Yes	Yes
Test data		vicorquality.com	vicorquality.com

Maxi, Mini, Micro Module Screening		H-Grade	M-Grade
Operating temperature		-40°C to +100°C	-55°C to +100°C
Storage temperature		-55°C to +125°C	-65°C to +125°C
Temperature cycling 17°C per minute nominal rate of change, dwell time until product stabilization		12 cycles -65°C to +100°C	12 cycles -65°C to +100°C
Ambient test at 25°C		Yes	Yes
Power cycling burn-in Power on 10 minutes, off 15 minutes; Module temperature cycling 35°C to 80°C; load up to 100 W; module output continuously monitored while enabled.		12 hrs 29 cycles	24 hrs 58 cycles
Functional and parametric ATE tests at low / high temperature.		-40°C to +100°C	-55°C to +100°C
Hi-Pot test		Yes	Yes
Visual inspection before packing into ESD containers		Yes	Yes
Test data		vicorquality.com	vicorquality.com



MTBF



Highlights

Because operating temperature is one of the most important factors in determining overall module reliability, it is imperative that the user's system design allow for efficient heat transfer from the baseplate to system ambient. Since temperature and failure rate are exponentially related, just a 10°C decrease in baseplate temperature can have a dramatic increase in MTBF. Due to patented zero-voltage / zero-current switching topology, Vicor converters are highly efficient compared to those with more traditional topologies. High efficiency translates into both smaller size and lower temperature rises. To minimize thermal impedance, all major power dissipating components are mounted directly to the baseplate.

Listed to the right are representative calculated MTBF values based on MIL-HDBK-217F. If you require information about a specific model, contact Vicor with the model number, expected baseplate temperature, and operating environment to obtain an individually prepared report.

MI-200 / MI-J00 Modules		MTBF in 1,000 Hours			
Model No.	Baseplate Temp.	G.B.	G.F.	A.I.C.	N.S.
MI-J21-MY	25°C	3,803	1,902	1,141	1,122
	50°C	2,320	1,160	696	684
	65°C	1,787	894	536	527
MI-220-MW	25°C	3,559	1,779	1,068	1,050
	50°C	2,171	1,085	651	640
	65°C	1,673	836	502	493

Maxi, Mini, Micro Modules		MTBF in 1,000 Hours			
Model No.	Baseplate Temp.	G.B.	G.F.	A.I.C.	N.S.
V24C8M100BL (Micro)	25°C	5,216	2,608	1,565	1,539
	50°C	3,182	1,591	955	939
	65°C	2,452	1,226	736	723
V24B12M200BL (Mini)	25°C	4,806	2,403	1,442	1,418
	50°C	2,931	1,466	879	865
	65°C	2,259	1,129	678	666
V24A5M400BL (Maxi)	25°C	3,274	1,637	982	966
	50°C	1,997	999	599	589
	65°C	1,539	769	462	454

28 Vdc V•I Chip Modules		MTBF in 1,000 Hours			
Model No.	Baseplate Temp.	G.B.	G.F.	A.I.C.	N.S.
MP028F036M12AL (28 V PRM)	25°C	2,941	1,470	882	868
	50°C	1,794	897	538	529
	65°C	1,382	691	415	408
MV036F240M005 (28 V VTM)	25°C	4,833	2,416	1,450	1,426
	50°C	2,948	1,473	884	870
	65°C	2,271	1,136	681	670



Environmental Quality

Highlights

As a manufacturer of reliable, high-density power components, Vicor's products are extremely rugged and suitable for the harshest environments, allowing designers to streamline development cycles and minimize time to market.

All Vicor products are manufactured in ISO 9001 registered facilities.

To verify the suitability of Vicor products for harsh application environments, modules have been subjected to the environmental testing requirements of MIL-STD-810, MIL-S-901, MIL-STD-202 and JEDEC. Many of these tests are performed at an independent laboratory. Additional environmental tests can be done upon individual customer request.

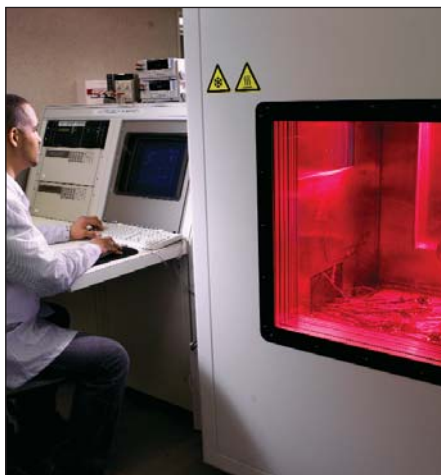
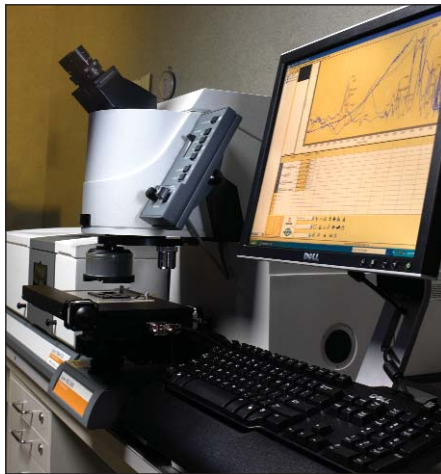


MI-200 / MI-J00 Modules

Altitude	MIL-STD-810D, Method 500.2, Procedure III, explosive decompression (40 K ft.). MIL-STD-810D, Method 500.2, Procedure II, 40,000 ft., 1000 – 1500 ft./min. to 70,000 ft., unit functioning
Explosive Atmosphere	MIL-STD-810C, Method 511.1, Procedure I
Vibration	MIL-STD-810D, Method 514.3, Procedure I, category 6, helicopter, 20 g MIL-STD-810D, Method 514.3 random: 10 – 300 Hz @ 0.02 g2/Hz, 2000 Hz @ 0.002 g2/Hz, 3.9 total G rms 3 hrs/axis Sine: 30 Hz @ 20 g, 60 Hz @ 10 g, 90 Hz @ 6.6 g, 120 Hz @ 5.0 g, 16.0 total G rms, 3 axes MIL-STD-810E, Method 514.4, Table 514.4-VII, ± 6 db/octave, 7.7 G rms, 1hr/axis
Shock	MIL-STD-810D, Method 516.3, Procedure I, functional shock, 40 g MIL-STD-202F, Method 213B, 18 pulses, 60 g, 9 msec MIL-STD-202F, Method 213B, 75 g, 11 ms saw tooth shock MIL-STD-202F, Method 207A, 3 impacts / axis, 1, 3, 5 feet
Acceleration	MIL-STD-810D, Method 513.3, Procedure II Operational test, 9 g for 1 minute along 3 mutually perpendicular axes
Humidity	MIL-STD-810D, Method 507.2, Procedure I, cycle I, 240 hrs, 88% relative humidity
Solder Test	MIL-STD-202, Method 208, 8 hr. aging
Fungus	MIL-STD-810C, Method 508.1
Salt-Fog	MIL-STD-810C, Method 509.1

Maxi, Mini, Micro Modules

Altitude	MIL-STD-810F, Method 500.4, 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 G rms 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 G rms for 1 hr per axis
Shock	MIL-STD-810F, Method 516.5, Procedure I, functional shock, 40 g MIL-S-901D, lightweight hammer shock, 3 impacts/axis, 1, 3, 5 ft. MIL-STD-202F, Method 213B, 60 g, 9 ms half sine MIL-STD-202F, Method 213B, 75 g, 11 ms saw tooth shock
Acceleration	MIL-STD-810F, Method 513.5, Procedure II, Table 513.5-II, Operational, 2 – 7 g, 6 directions
Humidity	MIL-STD-810F, Method 507.4
Solder Test	MIL-STD-202G, Method 208H, 8 hr aging
Fungus	MIL-STD-810F, Method 508.5
Salt-Fog	MIL-STD-810F, Method 509.4



V•I Chip Modules

Altitude	MIL-STD-810D, Method 500.4, Procedure I & II, 40,000 ft. and 70,000 ft. Operational
Explosive Atmosphere	MIL-STD-810F, Method 511.4, Procedure I, Operational
Vibration	JESD22-B103B, Service Condition B, Vibration from 2 – 500 Hz, 30 minutes / axis, 3 axis, 90 minutes total
Shock	JESD22-B104C, Service Condition C, 100 g, 2 ms shock, 10 shock / axis, 3 axis, 30 total
Acceleration	MIL-STD-810F, Method 513.5, Procedure II, Operational, Acceleration step 2 g, 6 direction
Humidity	MIL-STD-810F, Method 507.4, 240 hours, 95% RH
Solder Test	MIL-STD-202G, Method 208H
Fungus	MIL-STD-810E, Method 508.4, Section II
Salt-Fog	MIL-STD-810F, Method 509.4

VI BRICK Modules

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 G rms for 4 hours per axis JESD22-B103B, Service Condition B, Vibration from 2 – 500 Hz, 30 minutes / axis, 3 axis, 90 minutes total
Shock	MIL-STD-810F, Method 516.5, Procedure I, functional shock, 40 g, 15-23 ms saw tooth, 3 $\pm$ shocks per axis, 18 total MIL-STD-810F, Method 516.5, Crash Hazard V, 75g, 8-13 ms saw tooth, 3 $\pm$ shocks per axis, 18 total JESD22-B104C, Service Condition C, 100 g, 2 ms shock, 10 shock / axis, 3 axis, 30 total
Acceleration	MIL-STD-810F, Method 513.5, Procedure I, Operational, 2-7 g (table 513.5 II Helicopter) 6 directions
Humidity	MIL-STD-810F, Method 507.4, 240 hours, 95% RH
Solder Test	MIL-STD-202G, Method 208H
Fungus	MIL-STD-810F, Method 508.5
Salt-Atmosphere	MIL-STD-810F, Method 509.4 - 48 hr exposure
Resistance to Solvents	MIL-STD-202G, Method 215K
Terminal Strength	MIL-STD-202G, Method 211A, Test Condition A

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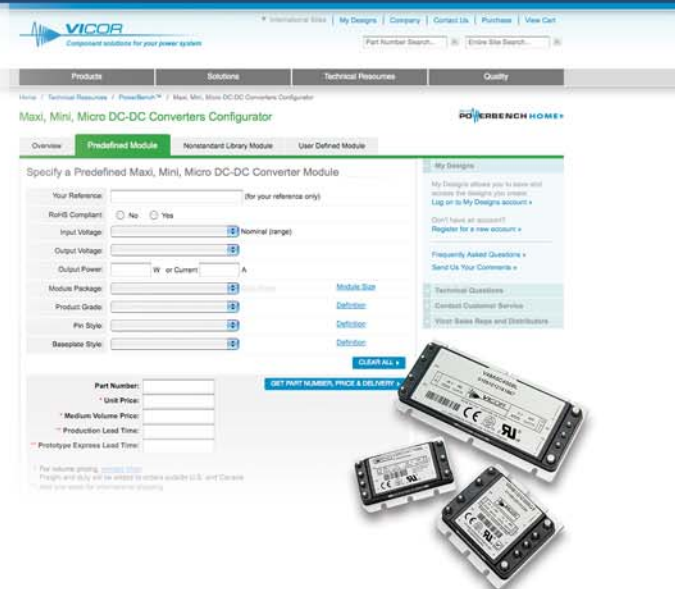
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Vicor Corporation

Vicor designs, manufactures, and markets modular, high density power components and complete configurable power systems used primarily by original equipment manufacturers (OEMs) in the communications, data processing, industrial control, test equipment, medical, and defense electronics markets.

World Class Manufacturing

The standardization in design for all Vicor products enables the company to use high speed automated mass production to dramatically reduce the time and cost of delivering products that conform to specific customer requirements. Flexible, highly computer-integrated processes allow Vicor to produce thousands of products a day in thousands of variations. The repeatable precision of automated manufacture ensures the consistent high quality of all our products at the most competitive prices and in the shortest time possible. Vicor's operations, at its headquarters in Andover, Massachusetts, are registered to the ISO 9001 international quality standard.



Technical Support

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Vicor global offices are fully equipped and staffed with application engineers and customer service representatives to provide the product information and technical assistance customers need concerning Vicor products and power solutions.

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- Answer technical questions (by phone, fax, email, or the Vicor website)
- Assist with component-based power system design
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