AIM™ in a VIA™ Package
AIM1714xB6MC7D5yzz

Universal AC Input Module

Features & Benefits

- Universal input (85 – 264V_{AC}, 47 – 63Hz)
- Chassis-mount or PCB-mount form factor
- Small robust package
- Low profile
- EMI filtering
- Meets EN61000-4-5 Class 3 surge protection when used with external MOV and fuse, paired with Vicor PFM4414 products

Typical Applications

- Small cell base stations
- Telecom switching equipment
- LED lighting
- Test and Measurement Equipment
- 200 – 400W Industrial Power Systems
- Office Equipment

Product Ratings	
V_{IN} = 85 – 264V	P_{OUT} = up to 450W
V_{OUT} = Rectified AC	I_{OUT} = 5.3A

Product Description

The AIM in a VIA Package (AC Input Module) is a front-end module designed to interface directly with worldwide AC mains and provide a rectified AC input to the Vicor family of PFM4414 VIA products. The AIM combines a bridge rectifier, EMI filter and surge protection circuitry in an easy-to-use VIA plastic housing. The AIM and PFM components in a VIA Package can realize a small, efficient and simple AC-DC solution for a broad range of end applications.

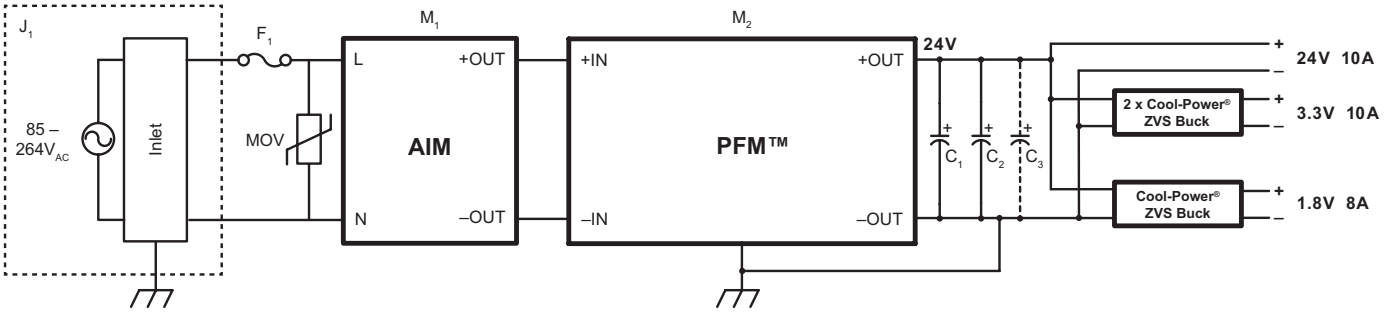


Size:
1.76 x 1.40 x 0.37in
[44.6 x 35.5 x 9.3mm]

Part Ordering Information

Product Function	Package Length	Package Width	Package Type	Input Voltage	Range Ratio	Output Voltage (Range)	Max Output Power	Product Grade	Option Field	
AIM	17	14	x	B6	M	C7	D5	y	z	z
AIM = AC Input Module	Length in Inches x 10	Width in Inches x 10	**B** = Board VIA **V** = Chassis VIA	Internal Reference				**C** = –20 to 100°C **T** = –40 to 100°C	**00** = Chassis/Always On **04** = Short Pin/Always On **08** = Long Pin/Always On	

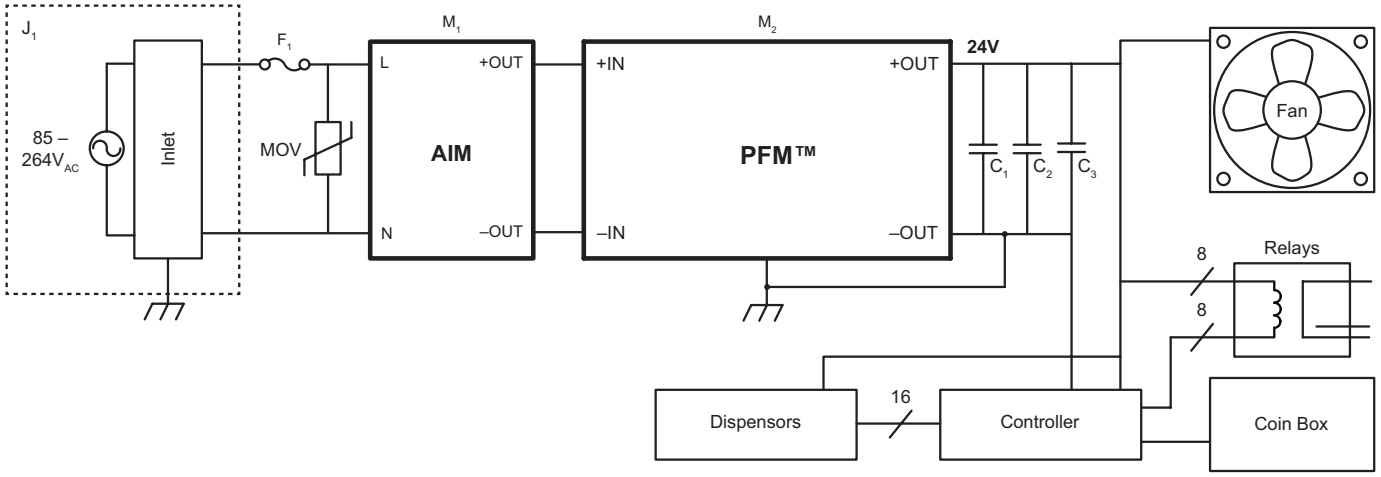
Typical PCB Mount Applications



The PCB terminal option allows mounting on an industry standard printed circuit board, with two different pin lengths.

Parts List for Typical PCB Mount Applications	
J1	**Qualtek** 703W IEC 320-C14 Power Inlet
F1	**Littelfuse** 0216008.MXP 8A 250V_{AC} 5 x 20mm holder
M1	**Vicor AIM™** AIM1714BB6MC7D5yzz
M2	**Vicor PFM™** PFM4414BB6M24D0yzz **or** **Vicor PFM** PFM4414BB6M48D0yzz
C1, C2, (C3)	Select capacitors based on 4414 VIA PFM model used, as per typical application parts list.
MOV	**Littelfuse** TMOV20RP300E VARISTOR 10kA 30V 250 J 20mm

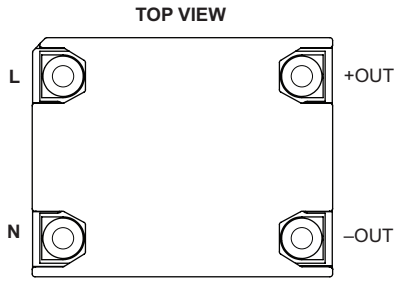
Typical Chassis Mount Applications



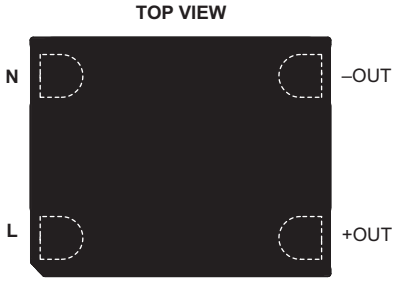
The AIM and PFM are available in chassis-mount option, saving the cost of a PCB and allowing access to both sides of the power supply for cooling. The parts list below minimizes the number of interconnects required between necessary components, and selects components with terminals traditionally used for point-to-point chassis wiring.

Parts List for Typical Chassis Mount Applications	
J1	**Qualtek** 719W or 723W IEC 320-C14 Power Inlet
F1	**Littelfuse** 0216008.MXP 8A 250V_{AC} 5 x 20mm in a J1, or separate fuse holder
M1	**Vicor AIM™** AIM1714VB6MC7D5y00
M2	**Vicor PFM™** PFM4414VB6M24D0y00 **or** **Vicor PFM** PFM4414VB6M48D0y00
C1, C2, C3	Select capacitors based on PFM4414 VIA model used, as per typical application parts list.
MOV	**Littelfuse** TMOV20RP300E VARISTOR 10kA 300V 250 J 20mm

Pin Configuration



AIM1714 VIA - Chassis Mount - Terminals Up



AIM1714 VIA - PCB Mount - Pins Down

Please note that these pin drawings are not to scale.

Pin Descriptions

Signal Name	Type	Function
N	INPUT POWER RETURN	AC Neutral / Line 2 input
L	INPUT POWER	AC Line 1 input
–OUT	OUTPUT POWER RETURN	Negative output power terminal
+OUT	OUTPUT POWER	Positive output power terminal

Absolute Maximum Ratings

The absolute maximum ratings below are stress ratings only. Operation at or beyond these maximum ratings can cause permanent damage to the device.

Parameter	Comments	Min	Max	Unit
Peak Voltage at Input Terminals, 1ms Max		0	600	V_{PK}
Input Voltage (AC RMS) Continuous		0	275	V_{RMS}
Output Current (Continuous)		0	5.3	A_{RMS}
Operating Internal Temperature		–40	125	°C
Storage Temperature		–65	125	°C
Input / Output Pin Torque and Mounting Torque			4 [0.45]	in·lbs [N·m]

Electrical Specifications

Specifications apply over all line and load conditions, 50Hz and 60Hz line frequencies, T_C = 25°C, unless otherwise noted.
Boldface specifications apply over the temperature range of the specified product grade.

Attribute	Symbol	Conditions / Notes	Min	Typ	Max	Unit
Input Specification						
Input Voltage Range, Continuous Operation	V_{IN}		**85**		**264**	V_{RMS}
Input Voltage Range, Transient, Non-Operational (Peak), 30s Minimum Interval	V_{IN}				600	V
Source Line Frequency Range	f_{line}		**47**		**63**	Hz
Power Factor	PF	Please see PFM in VIA package datasheet for power factor.				-
Output Specification						
Output Power	P_{OUT}				**450**	W
Output Current (Continuous)	I_{OUT}				**5.3**	A

Block Diagram



Application Characteristics

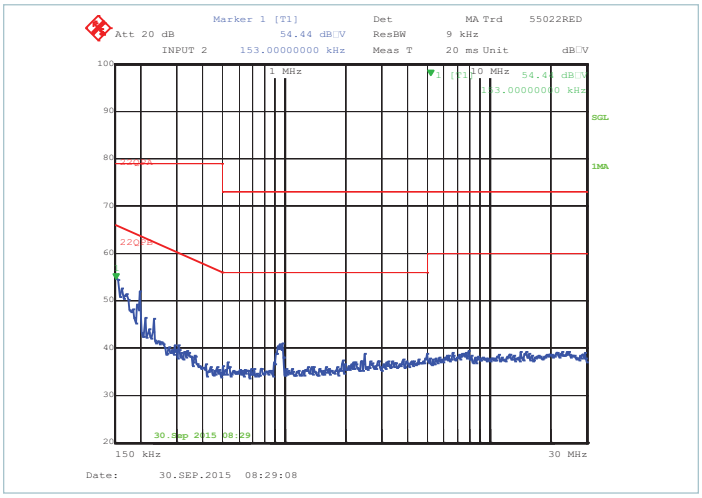


Figure 1 — *Typical conducted emissions, peak scan, with PFM4414 VIA, 115V, 90% load with PFM –OUT connected to GND*

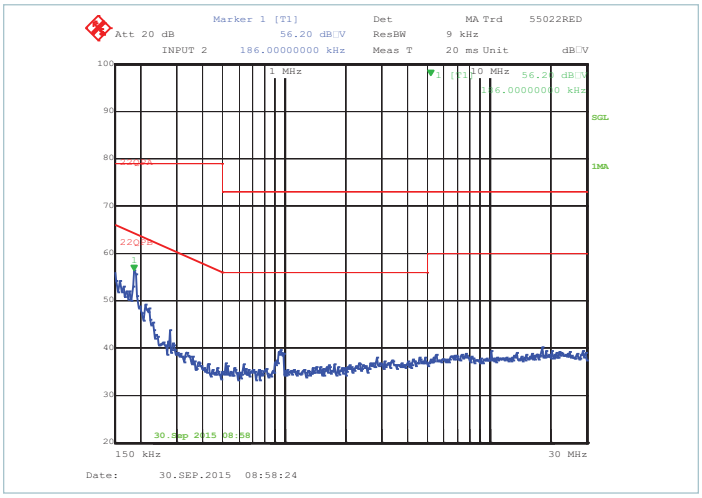


Figure 2 — *Typical conducted emissions, peak scan, with PFM4414 VIA, 230V, 90% load with PFM –OUT connected to GND*

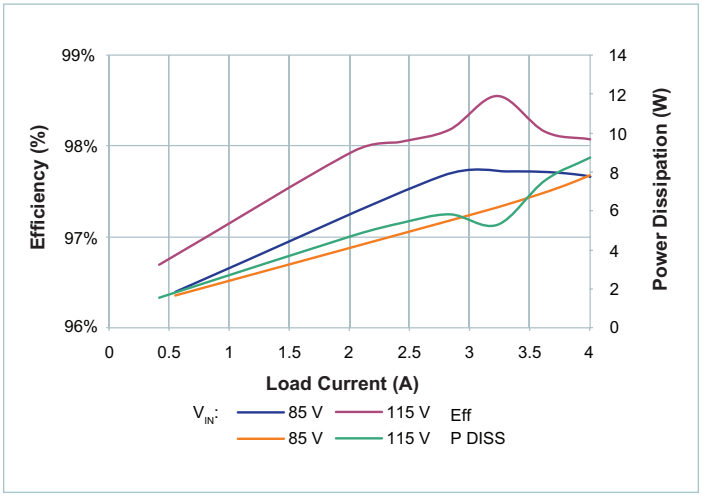


Figure 3 — *V_{IN} to V_{OUT} efficiency and power dissipation vs. V_{IN} and I_{OUT}, T_{CASE} = 20°C*

General Characteristics

Specifications apply over all line and load conditions, 50Hz and 60Hz line frequencies, T_C = 25°C, unless otherwise noted.
Boldface specifications apply over the temperature range of the specified Product Grade.

Attribute	Symbol	Conditions / Notes	Min	Typ	Max	Unit
Mechanical						
Length	L			44.6 [1.76]		mm [in]
Width	W			35.5 [1.40]		mm [in]
Height	H			9.3 [0.37]		mm [in]
Volume	Vol	Without heatsink		14.5 [0.88]		cm^3 [in^3]
Mass (Weight)	M			35 [1.2]		g [oz]
Pin Material		C145 copper, half hard				
Underplate		Low-stress ductile nickel	50		100	µin
Pin Finish		Palladium	0.8		6	µin
		Soft Gold	0.12		2	µin
Thermal						
Operating Case Temperature	T_C	C-Grade	–20		100	°C
		T-Grade	–40		100	°C
Thermal Resistance, Internal to Case Non-Pin Side	$\theta_{INT_NON_PIN_SIDE}$	Estimated thermal resistance to maximum temperature internal component from isothermal non-pin/ non-terminal housing		2.2		°C/W
Thermal Design		See Thermal Considerations on Page 10				
Soldering						
Temperature		See: AN:401 PCB Mount VIA Soldering Guidelines				
Reliability						
MTBF		MIL-HDBK-217FN2 Parts Count - 25°C Ground Benign, Stationary, Indoors / Computer		8.2		MHrs
		Telcordia Issue 2 - Method I Case III; 25°C		28.6		
		MIL-HDBK-217FN2 - 25°C Ground Benign, Stationary, Indoors / Computer		7.4		
Safety						
Agency Approvals / Standards		EN60950-1; CE marked for low voltage directive and RoHS recast directive, as applicable				
Dielectric Withstand (Hipot)		IN / OUT to Case	1500			V_{AC}
Leakage Current / Touch Current		No Y capacitor connection of GND connection within package		Negligible		
EMI/EMC Compliance						
FCC Part 15, EN55022, CISPR22: 2006 + A1: 2007, Conducted Emissions		Class B Limits - with PFM4414 VIA –OUT connected to GND				
EN61000-4-5: 2006, Surge Immunity		Level 3, Immunity Criteria A with PFM in a VIA Package with external TMOV and fuse, shown on page 2 or 3, required.				

Environmental Qualification

Testing Activity	Reference Standard	Test Details
High Temperature Operating Bias/Life (HTOB/HTOL)	JESD22-A108D	1000hrs. Nominal Full Load at Max operating temperature
Temperature Cycling Test (TCT)	IPC-9592B	125˚C to –40˚C, 700 cycles
Temperature Humidity Bias (THB)	JESD22-A101C	1000hrs. Nominal Input voltage, Minimal load 85˚C, 85% RH
High Temperature Storage (HTS)	JESD22-A103D	1000hrs. 125˚C
Low Temperature Storage (LTS)	JESD22–A119	1000hrs. –65˚C
Random Vibration	MIL-STD-810G	Method 514.6, Procedure I, Category 24, 20-2000Hz, @7.7g_{RMS}, 1hour /axis for 3 axis. Product mounted on an evaluation board, nominal line 50% load.
Mechanical Shock	MIL-STD-810G	Method 516.5, Procedure I, Functional shock 40G, total of 18 shocks. Product mounted on an evaluation board, nominal Line 50% load.
Highly Accelerated Life Test (HALT)	Internal Vicor Procedure - DP-0265	Low and high temperature tests, rapid thermal cycling, random vibration testing, combined stress testing and destruct testing.
Res. Solvents	MIL-STD-202G	Method 215K, 3 minutes exposure
ESD Human Body Model	JEDEC JS-001-2012	Class 1C (HBM) Minimum
ESD Charged Device Model	JESD22-C101E	Class II (CDM) Minimum

Thermal Considerations

The AIM in a VIA package can be cooled using single-side cooling from the non-pin side. Since the AIM has a maximum internal temperature rating, it is necessary to estimate this internal temperature based on a system-level thermal solution. To this purpose, it is helpful to simplify the thermal solution into a roughly equivalent circuit where power dissipation is modeled as a current source, isothermal surface temperatures are represented as voltages sources, and thermal resistances are represented as resistors. Figure 4 shows the non-pin-side cooling "thermal circuit" for the AIM in VIA package:

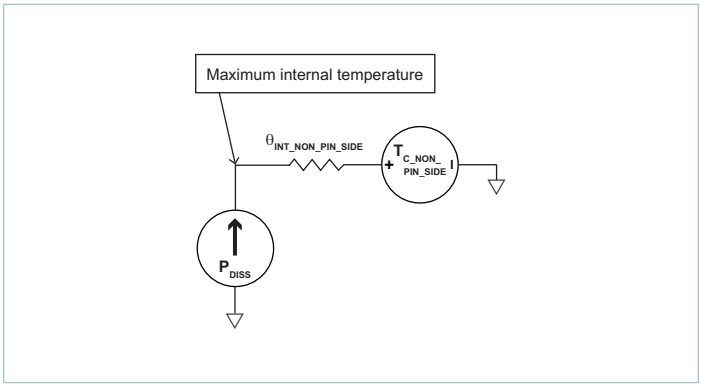
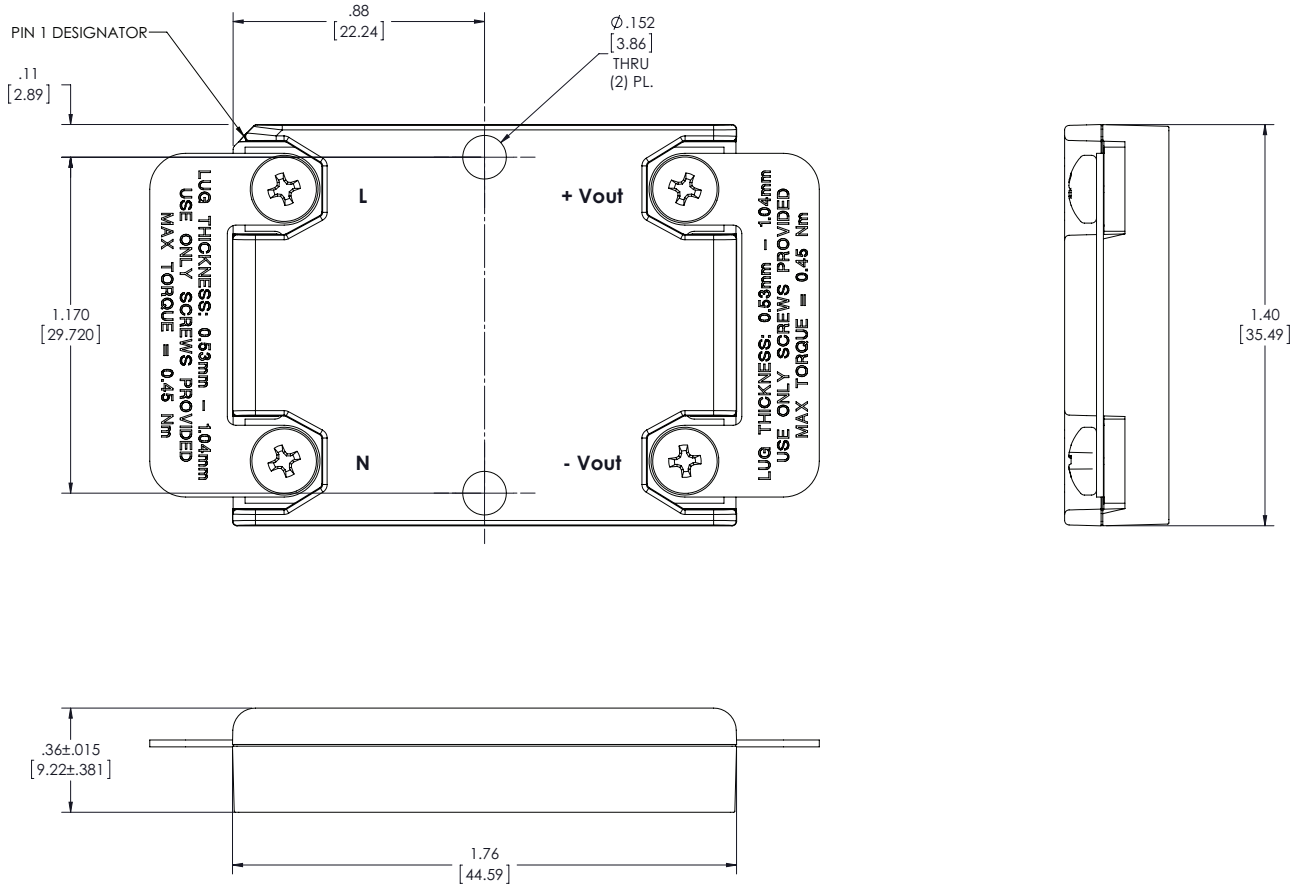


Figure 4 — *Single-side cooling thermal model*

The internal power dissipation is P_{DISS}, $\theta_{INT_NON_PIN_SIDE}$ is the thermal resistance characteristic of the VIA package and the non-pin-side surface temperature is represented as $T_{C_NON_PIN_SIDE}$. The AIM is best attached to a material with high thermal conductivity (e.g., aluminum or copper) to maintain temperature uniformity across the non-pin side.

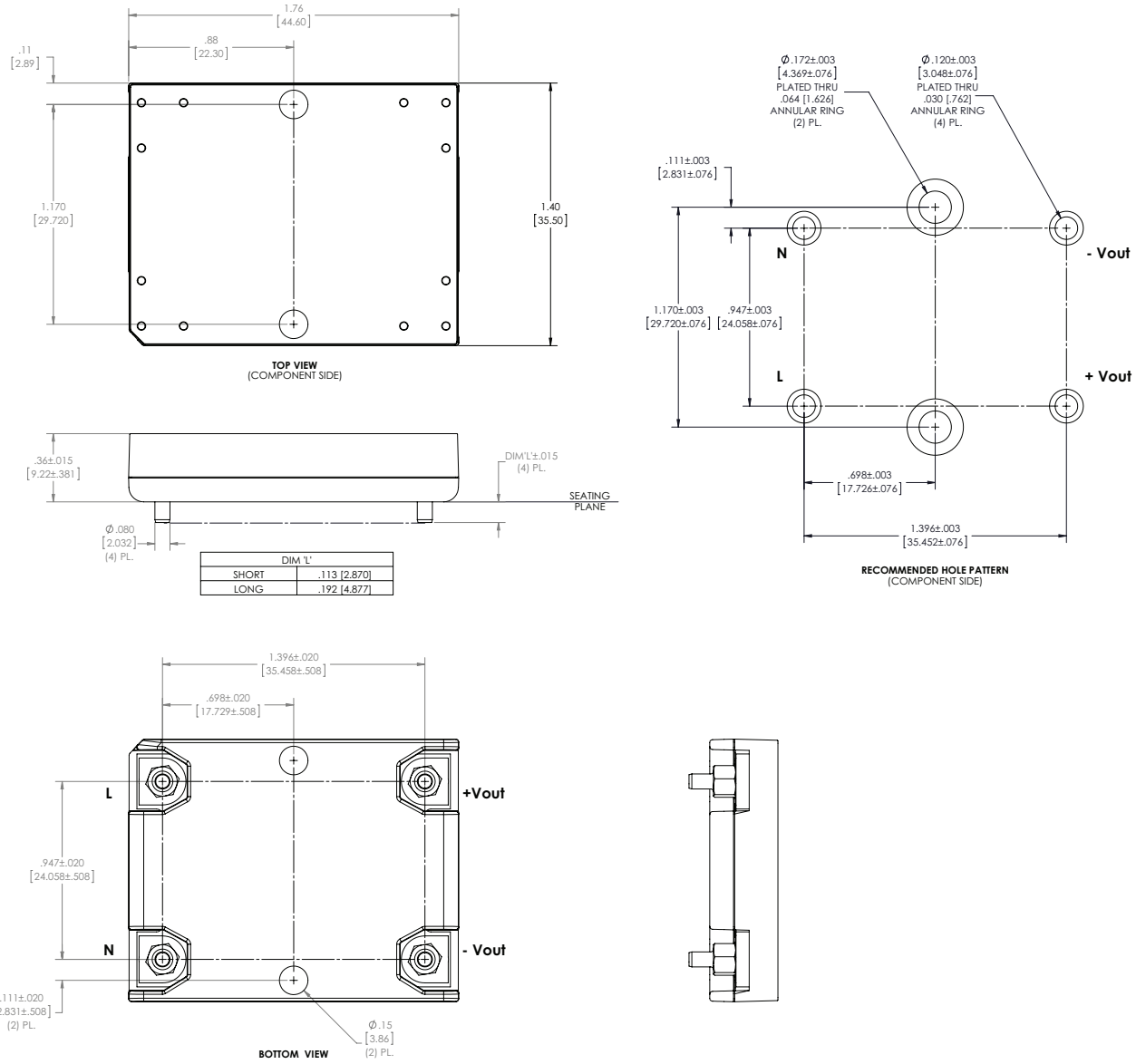
AIM in a VIA Package Chassis-Mount Package Mechanical Drawing



NOTE: UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE : INCH [MM]

Product outline drawing; product outline drawings are available in .pdf and .dxf formats.
3D mechanical models are available in .pdf and .step formats.

AIM in a VIA Package Board-Mount Package Mechanical Drawing



NOTE: UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE : INCH [MM]

Revision History

Revision	Date	Description	Page Number(s)
1.0	12/24/15	Intitial release	n/a
1.1	07/21/16	Updated dimensions Added "Mass" attribute and soldering temperature note Revised mechanical drawing to show correct PCB pin diameter	1 & 8 8 12
1.2	08/02/17	Removed specific bulk caps in typical application circuit so force user to refer to 24V or 48V PFM specific documentation. Revised min storage temp to –65C. Added note stating no touch current in safety table and added fuse to note under surge in compliance table Clarified which side is the bottom in thermal section	2 – 3 4 8 10
1.3	09/27/18	Updated mechanical drawings	11, 12

Vicor's comprehensive line of power solutions includes high density AC-DC and DC-DC modules and accessory components, fully configurable AC-DC and DC-DC power supplies, and complete custom power systems.

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Visit http://www.vicorpower.com/ac-input-front-end-module for the latest product information.

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Vicor Corporation
25 Frontage Road
Andover, MA, USA 01810
Tel: 800-735-6200
Fax: 978-475-6715
www.vicorpower.com

email
Customer Service: custserv@vicorpower.com
Technical Support: apps@vicorpower.com

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