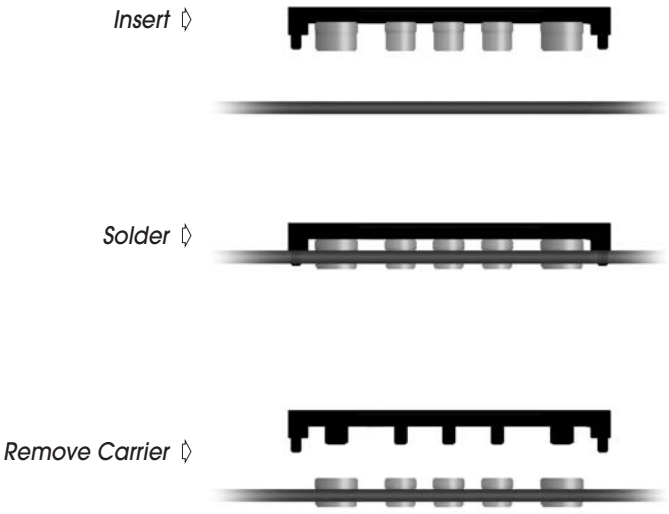
InMate“ Design Guide

Socket Mount, Up to 100 A
Using Vicor's Maxi, Mini, Micro Series Modules

Contents

The InMate Socket System

InMates are an innovative solution for thru hole socket requirements. Consisting of individual plastic carriers for the input and the output, each contains an array of sockets for either a full, half or quarter brick sized module. The sockets are factory loaded into the carrier, which holds them rigidly in place throughout the assembly and soldering process. The carriers are later removed, leaving the sockets accurately positioned.



Designed for use with pin compatible Maxi, Mini, Micro Series Vicor bricks, InMates are available for a wide range of PCB sizes and mounting styles. PCB thicknesses can range from 0.055" to 0.1375". Sockets also allow for mounting modules either inboard, with a cutout in the PCB for the module to minimize the height above the board, or onboard. InMates are part of the ModuMate interconnect family and, as such, are rated for up to 100 Amps.

InMates are available in standard recyclable JEDEC style trays for use with automated pick and place equipment and are compatible with most standard wave or hand solder operations. The sockets are soldered into the board as part of the PCB assembly process. The module can then be plugged into place at anytime later.

Vicor's comprehensive line of power solutions includes modular high density DC-DC converters and accessory components, configurable power supplies and custom power supplies.

InMates require the use of modules with the ModuMate pin option and are not designed for use with standard tin-lead pins.

Part Numbers and Guide to InMate Selection

① **Select board thickness.**
Nominal 0.063", 0.094"or 0.125".

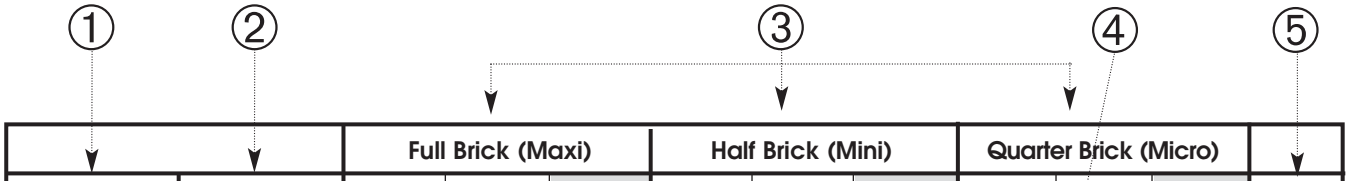
② **Select mounting style.**
Inboard requires a PCB cutout for the "belly" of the module. See dotted lines on PCB drawings page for cut out area.

③ **Identify module type.**
Full brick (maxi), half brick (mini) or quarter brick (micro).

④ **Select the ordering part number.**
Order packages of 5 input/output sets or in higher quantities order input and output InMates separately. For individual input or output InMates, minimum orders of 35 for maxi or mini and 40 for micro apply.

⑤ **Verify correct pin style for the module.**
For predefined parts, "S" or "F"= short ModuMate and "N" or "G"= long ModuMate

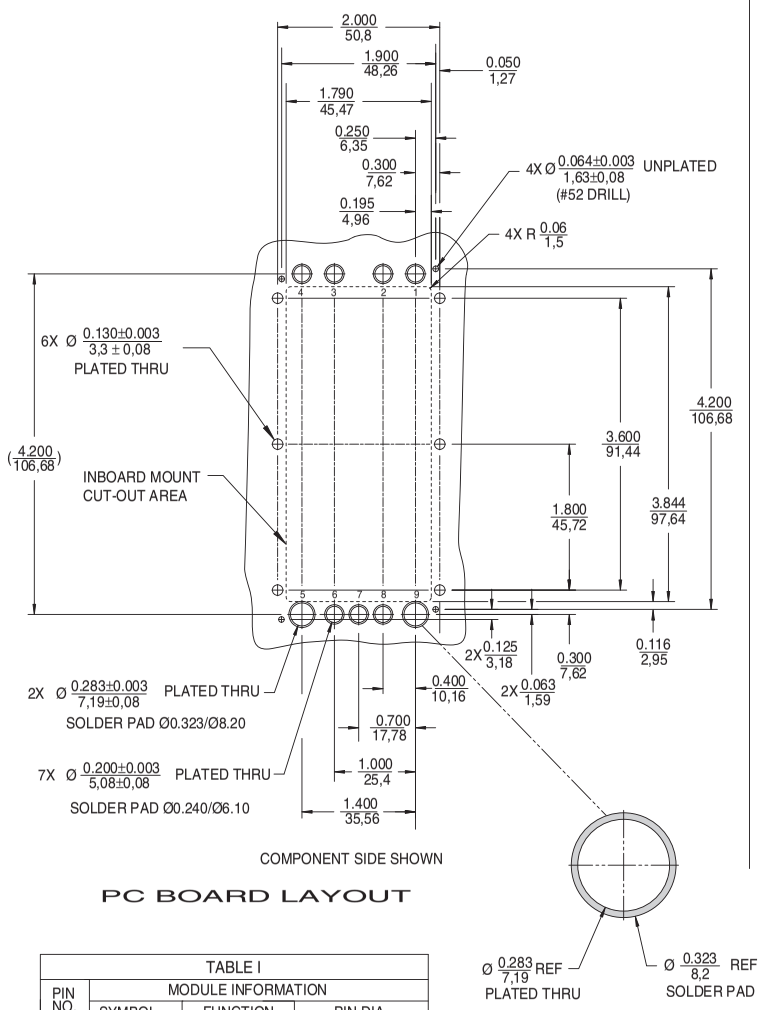
⑥ **See page 9 for standoff recommendations.**



		Full Brick (Maxi)			Half Brick (Mini)			Quarter Brick (Micro)			
Board Thickness	**Mounting Style**	**Input**	**Output**	**5 Sets**	**Input**	**Output**	**5 Sets**	**Input**	**Output**	**5 Sets**	**Pin Style**
Nominal 0.063"	Inboard	18374	18382	18362	18374	18384	18366	18376	18386	18370	S or F
Min/Max 0.055"/0.071"	Onboard	18378	18388	18364	18378	18390	18368	18380	18392	18372	N or G
Nominal 0.094"	Inboard	18375	18383	18363	18375	18385	18367	18377	18387	18371	S or F
Min/Max 0.084"/0.104"	Onboard	18379	18389	18365	18379	18391	18369	18381	18393	18373	N or G
Nominal 0.125" Min/Max 0.1125"/0.1375"	Onboard	21539	21543	21510	21539	21544	21511	21540	21545	21512	N or G

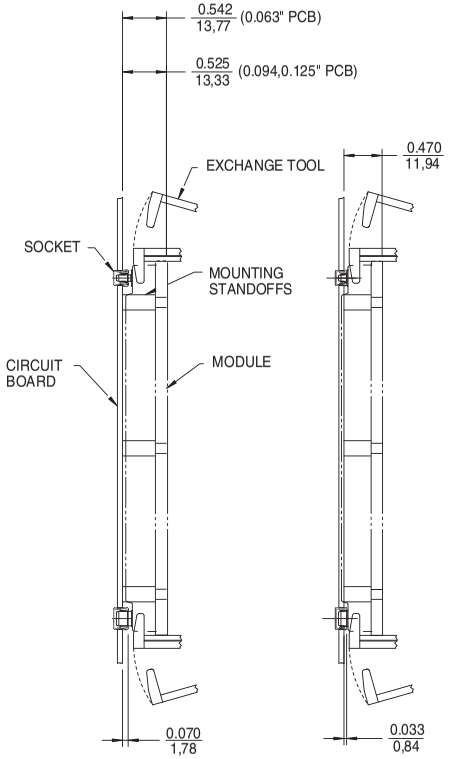
PCB Layout - Full Brick (Maxi)

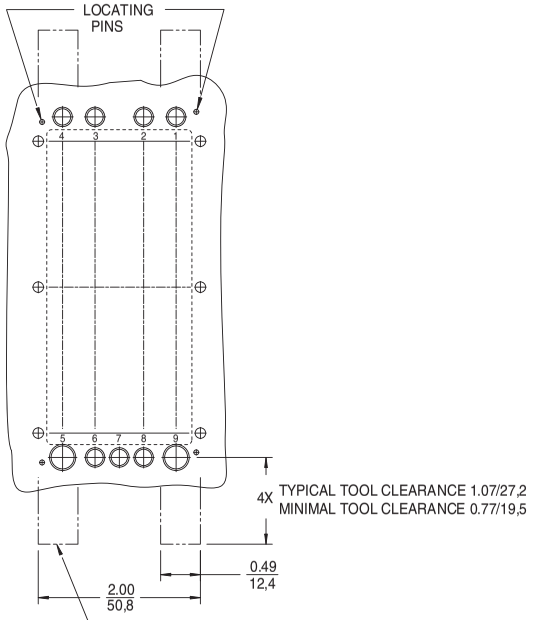
Inboard and Onboard

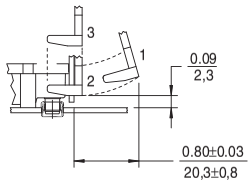


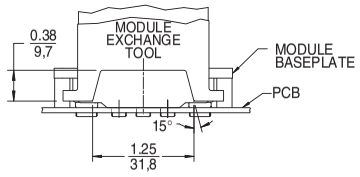
PC BOARD LAYOUT

TABLE I			
PIN NO.	MODULE INFORMATION		
	SYMBOL	FUNCTION	PIN DIA.
1	+	+ I N	0.080 / 2,03
2	PC	PRIM CONTROL	0.080 / 2,03
3	PR	PARALLEL	0.080 / 2,03
4	–	– I N	0.080 / 2,03
5	–	– OUT	0.180 / 4,57
6	–S	– SENSE	0.080 / 2,03
7	SC	SEC CONTROL	0.080 / 2,03
8	+S	+ SENSE	0.080 / 2,03
9	+	+ OUT	0.180 / 4,57









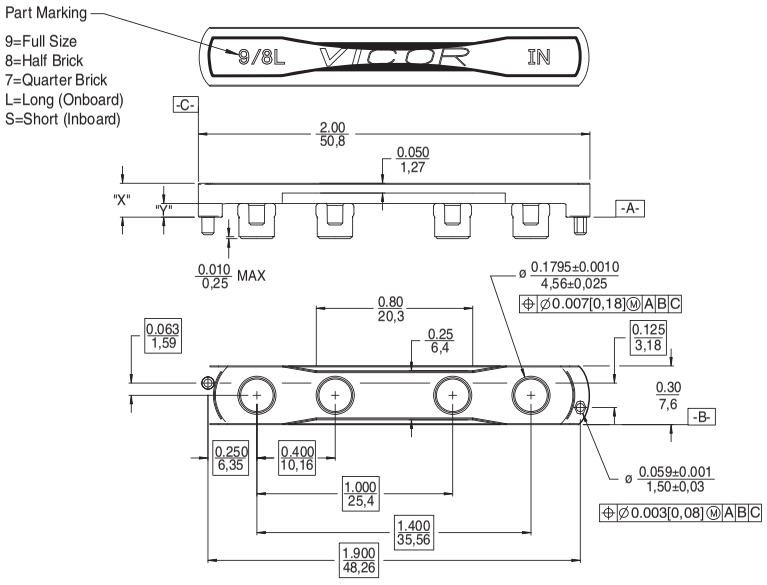
NOTES:

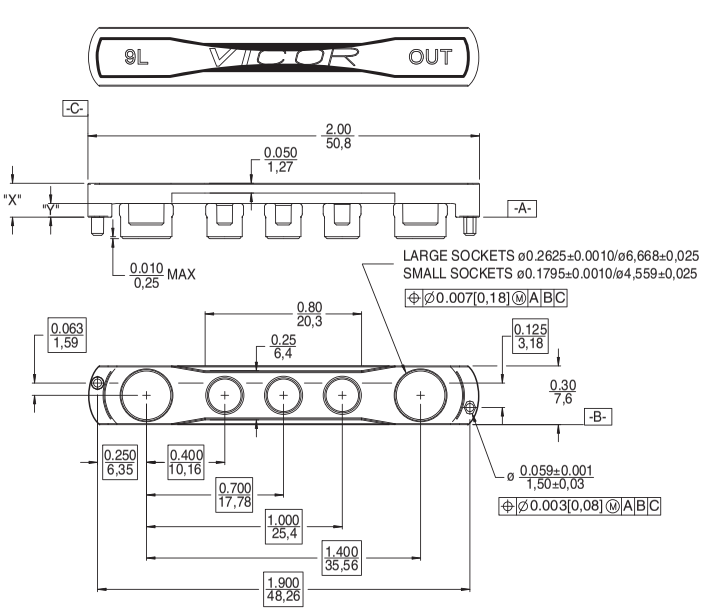
1. ALL DIMENSIONS ARE $\frac{\text{INCH}}{\text{METRIC}}$ OR INCH / METRIC

2. ANS/IPC-D-300 SPECIFICATIONS APPLY FOR CLASS "B" BOARDS

InMate and Socket Assembly Outlines

Full Brick (Maxi)





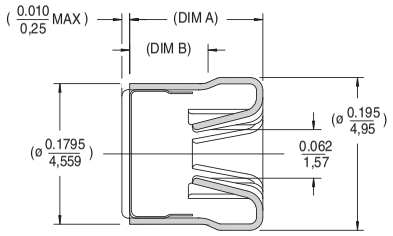
MOUNTING STYLE	DIM "X" INCH/MM	DIM "Y" INCH/MM
INBOARD	0.136/3,45	0.033/0,84
ONBOARD	0.173/4,39	0.070/1,78

MATERIALS: INMATES: PPS Ryton™ R-7
SOCKETS: BE-CU #25, Au PLATED.
DIMENSIONS ARE IN INCH OR INCH / METRIC
MM

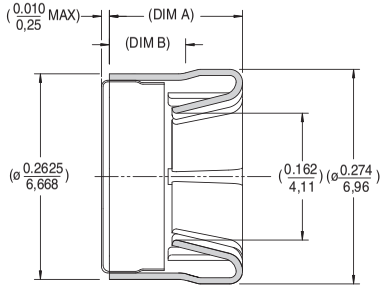
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES –
TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
±1/64	.XX = ±.01	±1°
	.XXX = ±.005	

SOCKET DETAIL



0.080" SOCKET

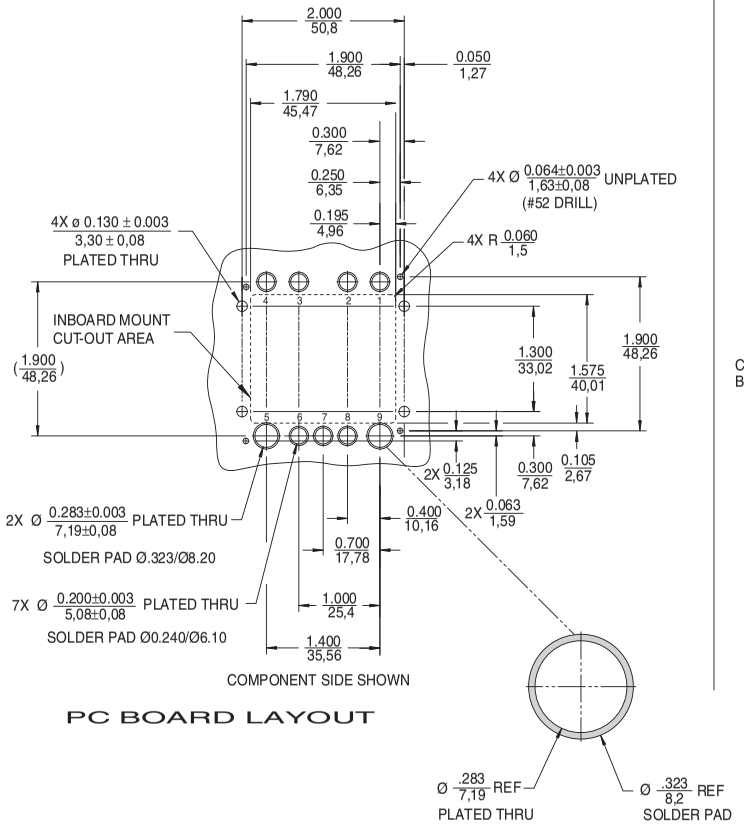


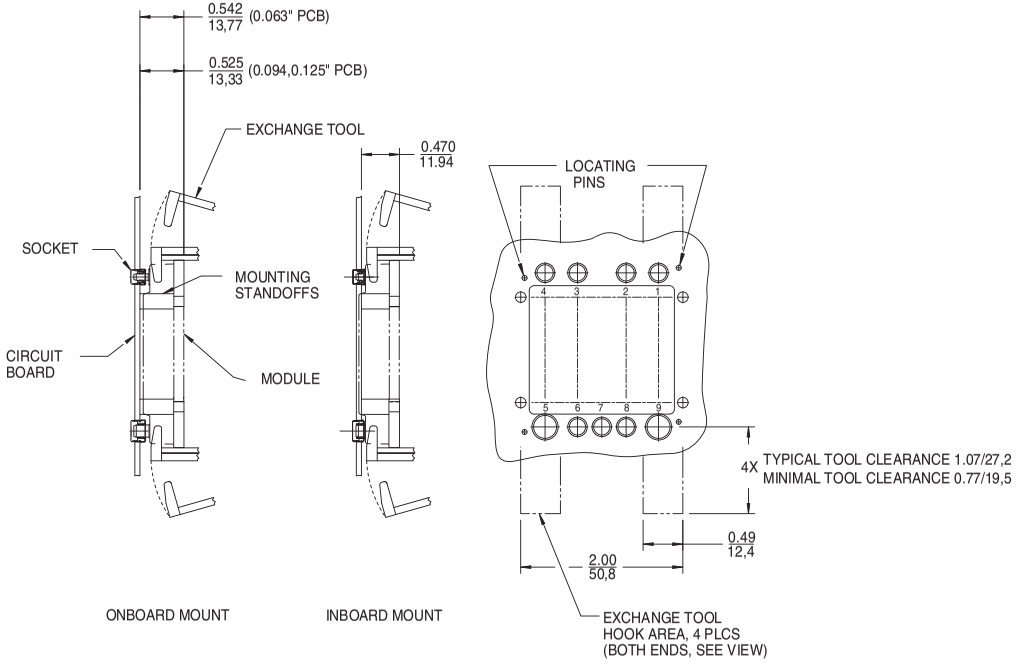
0.180" SOCKET

Mounting	Board Thk	DIM A	DIM B
Inboard	0.063/1,60	0.133/3,79	0.100/2,54
Onboard	0.063/1,60	0.170/4,32	0.100/2,54
Inboard	0.094/2,39	0.168/4,27	0.135/3,43
Onboard	0.094/2,39	0.205/5,21	0.135/3,43
Onboard	0.125/3,18	0.230/5,84	0.160/4,06

PCB Layout - Half Brick (Mini)

Inboard and Onboard





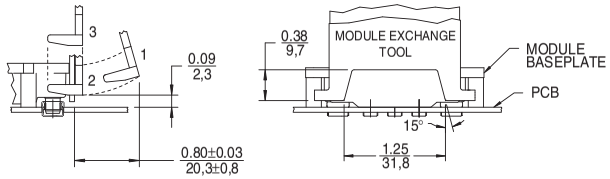


TABLE I							
	Mini		FARM		FIAM		
PIN NO.	SYMBOL	FUNCTION	SYMBOL	FUNCTION	SYMBOL	FUNCTION	PIN DIA. (inches / mm)
1	+	+IN	N	Neutral	+	+IN	0.080 / 2,03
2	PC	Prim. Control	EMI GRD	EMI	N/C	No Connection	0.080 / 2,03
3	PR	Parallel	NC	No Connection	EMI/GRD	Ground	0.080 / 2,03
4	–	–IN	L	Line	–	–IN	0.080 / 2,03
5	–	–OUT	–	– Out	–	–OUT	0.150 / 3,81
6	–S	– Sense	EN	Enable	ON/OFF	ON/OFF	0.080 / 2,03
7	SC	Sec. Control	ST	Strap	N/C	No Connection	0.080 / 2,03
8	+S	+Sense	BOK	BUS OK	N/C	No Connection	0.080 / 2,03
9	+	+Out	+	+ OUT	+	+Out	0.150 / 3,81

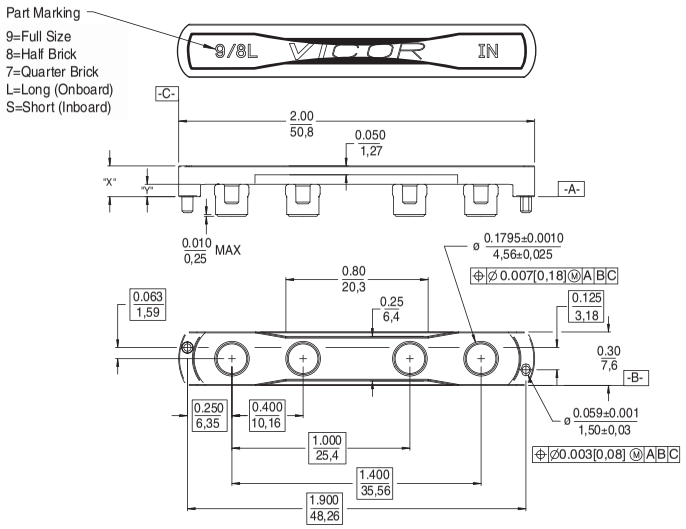
NOTES:

1. ALL DIMENSIONS ARE INCH / METRIC OR INCH / METRIC

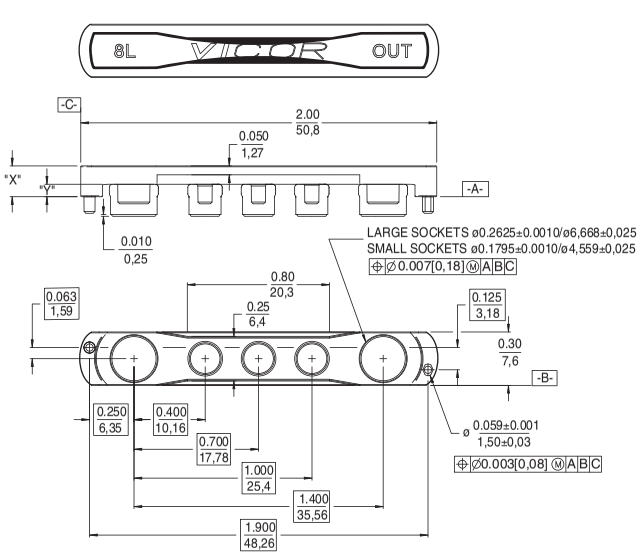
2. ANS/IPC-D-300 SPECIFICATIONS APPLY FOR CLASS "B" BOARDS

InMate and Socket Assembly Outlines

Half Brick (Mini)



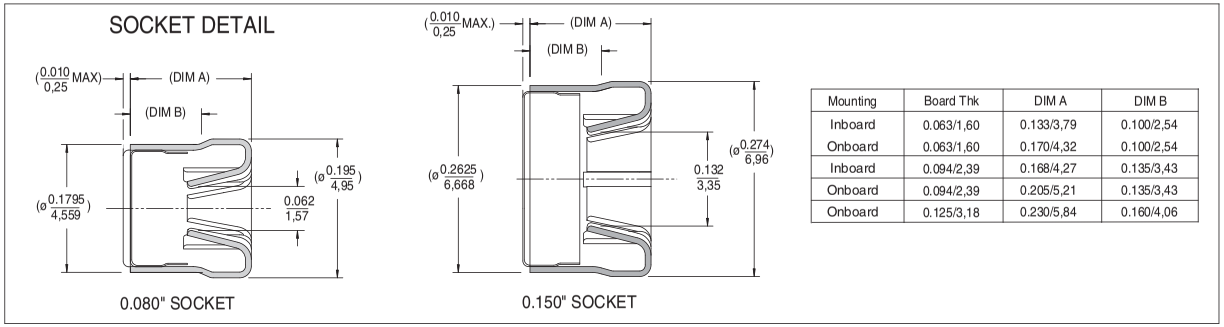
MOUNTING STYLE	DIM "X" INCH/MM	DIM "Y" INCH/MM
INBOARD	0.136/3,45	0.033/0,84
ONBOARD	0.173/4,39	0.070/1,78



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES –
TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
±1/64	.XX = ±.01	±1°
	.XXX = ±.005	

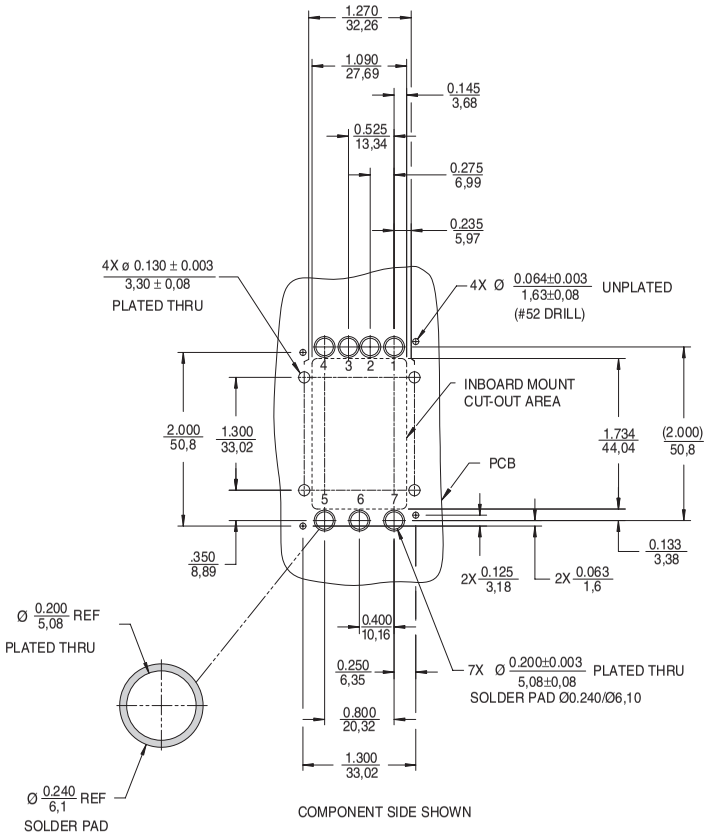
MATERIALS: INMATES: PPS Ryton™ R-7
SOCKETS: BE-CU #25, Au PLATED.
DIMENSIONS ARE IN INCH OR INCH / METRIC
MM



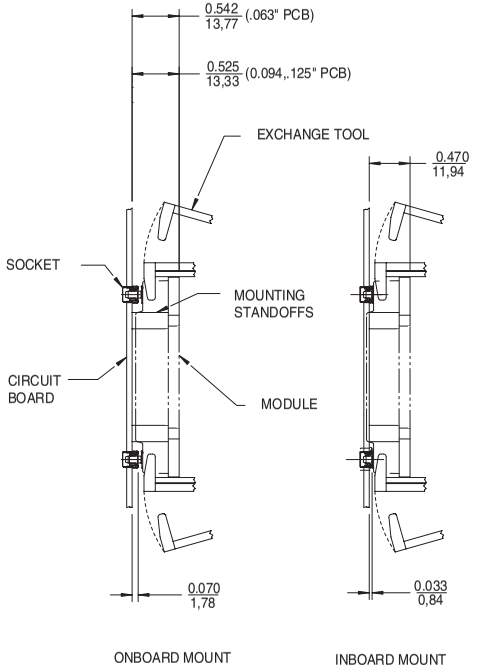
Mounting	Board Thk	DIM A	DIM B
Inboard	0.063/1,60	0.133/3,79	0.100/2,54
Onboard	0.063/1,60	0.170/4,32	0.100/2,54
Inboard	0.094/2,39	0.168/4,27	0.135/3,43
Onboard	0.094/2,39	0.205/5,21	0.135/3,43
Onboard	0.125/3,18	0.230/5,84	0.160/4,06

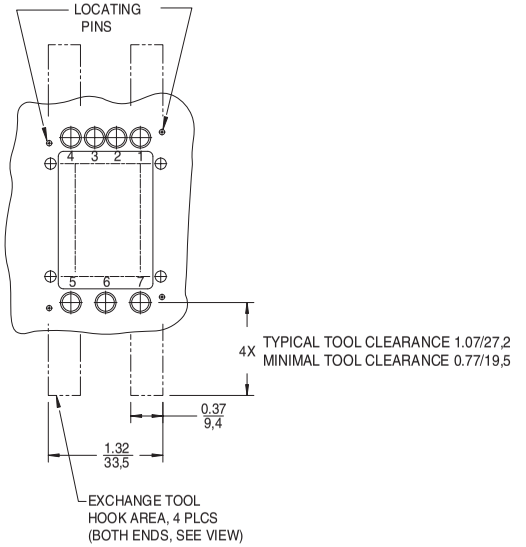
PCB Layout - Quarter Brick (Micro)

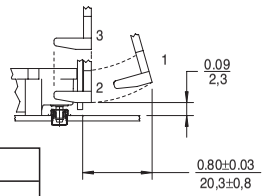
Inboard and Onboard



PC BOARD LAYOUT







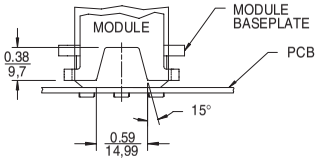


TABLE I

	Micro		VI-ARM		FiltMod		IAM 48		
PIN NO.	SYMBOL	FUNCTION	SYMBOL	FUNCTION	SYMBOL	FUNCTION	SYMBOL	FUNCTION	PIN DIA. (inches / mm)
1	+	+IN	–	-Out	+	+IN	–	-Out	0.080 / 2,03
2	PC	Prim. Control	EN	Enable	N/C	No Connection	N/C	No Connection	0.080 / 2,03
3	PR	Parallel	B OK	-Bus OK	N/C	No Connection	ON/OFF	ON/OFF	0.080 / 2,03
4	–	–IN	+	+Out	–	-IN	+	+OUT	0.080 / 2,03
5	–	–OUT	N	Neutral	–	-OUT	+	+IN	0.080 / 2,03
6	SC	Sec. Control	ST	Strap	GRD	Ground	N/C	No Connection	0.080 / 2,03
7	+	+OUT	L	Line	+	+OUT	–	–IN	0.080 / 2,03

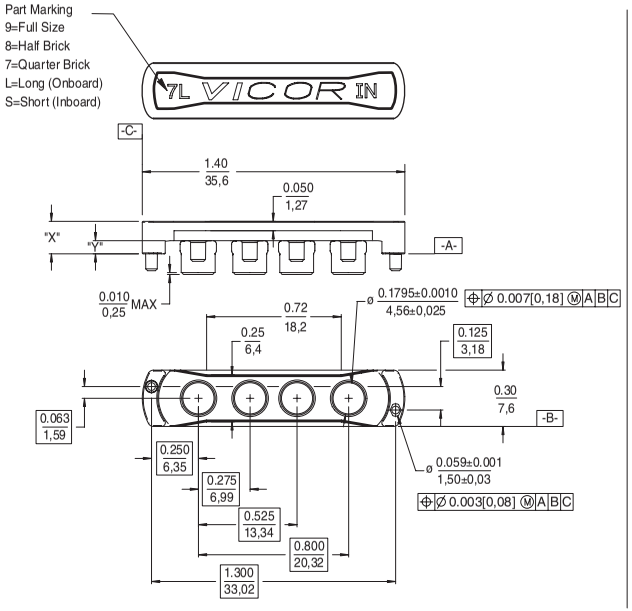
NOTES:

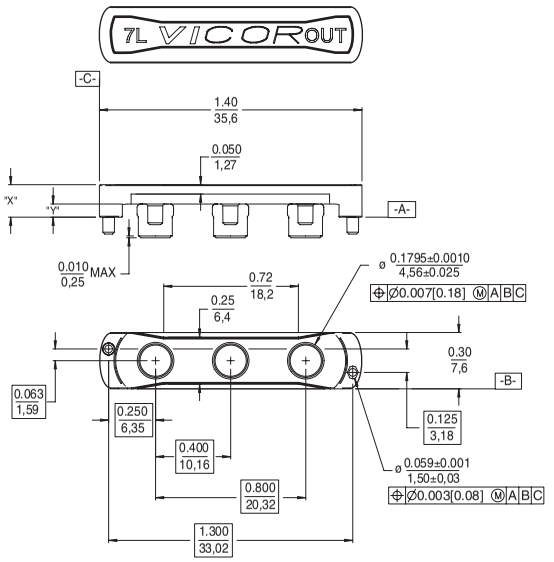
1. ALL DIMENSIONS ARE INCH / METRIC OR INCH / METRIC

2. ANS/IPC-D-300 SPECIFICATIONS APPLY FOR CLASS "B" BOARDS

InMate and Socket Assembly Outlines

Quarter Brick (Micro)





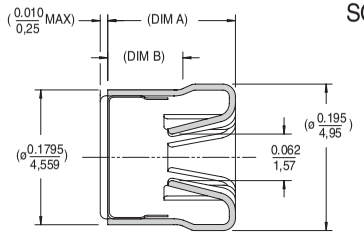
MOUNTING STYLE	DIM "X" INCH/MM	DIM "Y" INCH/MM
INBOARD	0.136/3,45	0.033/0,84
ONBOARD	0.173/4,39	0.070/1,78

MATERIALS: INMATES: PPS Ryton™ R-7
SOCKETS: BE-CU #25, Au PLATED.
DIMENSIONS ARE IN INCH OR INCH / METRIC
MM

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE INCHES –
TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
±1/64	.XX = ±.01	±1°
	.XXX = ±.005	

SOCKET DETAIL



0.080" SOCKET

Mounting	Board Thk	DIM A	DIM B
Inboard	0.063/1,60	0.133/3,79	0.100/2,54
Onboard	0.063/1,60	0.170/4,32	0.100/2,54
Inboard	0.094/2,39	0.168/4,27	0.135/3,43
Onboard	0.094/2,39	0.205/5,21	0.135/3,43
Onboard	0.125/3,18	0.230/5,84	0.160/4,06

Specifications and Materials

Parameter	Specification Value	Reference
Compatibility Module pin styles See P/N selection (pg1)	S = short Au plated	Short ModuMate pins
	N = long Au plated	Long ModuMate pins
Mechanical Contact normal force	100 grams EOL min	GR-1217-CORE, R5-23
Number of mating cycles	5 min	Exception to GR-1217-CORE which specifies 25 mating cycle
Module engagement force	32 lbs per connector max	GR-1217-CORE, R5-31,32
Module disengagement force	32 lbs per connector max	GR-1217-CORE, R5-31,32
Electrical Current rating	100 Amps - Maxi 50 Amps - Mini 25 Amps - Micro (Based on 120°C max socket temperature & 30°C max temperature rise of contact)	Gold plating standards, and accepted industry standards such as IICIT, EIA, Bellcore guidelines
Low level contact resistance 0.080" dia socket (LLCR)	400 µ Ohms max	GR-1217-CORE, 6.2.1
Low level contact resistance 0.150" dia socket (LLCR)	300 µ Ohms max	GR-1217-CORE, 6.2.1
Low level contact resistance 0.180" dia sockets (LLCR)	200 µ Ohms max	GR-1217-CORE, 6.2.1
Thermal Max socket temperature	120°C max	Max continuous use temperature for gold plating
Temperature rise	30°C max EIA-364-70A[2]	GR-1217-CORE[1]
Environmental Shock and vibration	InMate products are tested in random vibration environments to best simulate the broad spectrum of frequencies and amplitudes that may be encountered in typical applications. Actual system resonant frequencies will depend on PCB construction and mounting details. For critical, or unusual, shock and vibration environments, the performance of the system should be independently verified.	

Material Properties of InMate Components

Headers Material: Ryton™ R–7 PPS, 65% glass fiber and mineral filled compound	Poly-Phenylene Sulfide
Flammability	UL94 V-0/5VA
Thermal stability (short term)	260°C (500°F)
Thermal stability (long term)	200°C (392°F)
Solder Cap Material	305 stainless steel
Plating	Clear passivate to repel solder
Sockets Material	Brush Wellman Alloy #25 C17200 deep draw quality or equiv. 0.010" thick
Plating	Woods nickel strike followed by 50 µ in min low stress sulfamate-based electrolytic nickel, followed by 20 µ in min hard goldfollowed by 10µin min soft gold

[1]GR-1217-CORE issue 1, November 1995
Generic Requirements for Separable Electrical Connectors Used in Telecommunications Hardware. A module of NEBSFR, FR-2063

[2]ANSI/EIA-364 American National Standards Institute/
Electronic Industries Association
(Electronic Components, Assemblies & Materials Association)

Standoff Recommendations
(Slotted Baseplate Modules Only)

InBoard	OnBoard	
All board sizes	*0.063" or high mount 0.094" and 0.125"*	*0.094" and 0.125" PCB*
		
0.348" Standoff *Ordering Part Number, Bags of 100* 19129 F-F 19130 M-F*	**0.420" Standoff** *Ordering Part Number, Bags of 100* 19134 F-F 19135 M-F*	**0.403" Standoff** *Ordering Part Number, Bags of 100* 19132 F-F 19133 M-F*

** Threaded heat sink*

View standoff drawings online at vicorpower.com/support/apps-info/standoffs.htm

Screws with Thread Lock, 100pc packages

Part Number	Length	Recommended Use	
		PCB Side	Heat Sink or Baseplate Side
19141	3/16"	Inboard 0.063", 0.094"	———
19142	1/4"	Onboard 0.063", 0.094"	———
19143	5/16"	Onboard 0.125", In-Board M-F	Baseplate only, No Heat Sink
19144	3/8"	Onboard M-F	———
19145	1/2"	———	Standard Heat Sink

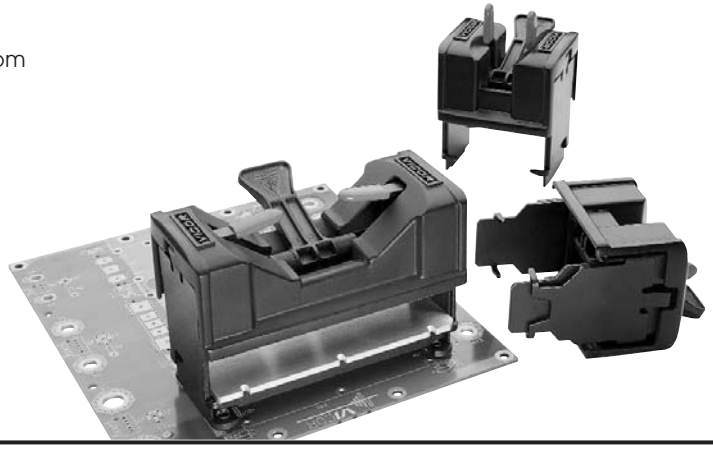
Kits: Pre-Packaged Standoff and Screw Kits (Enough for one module)

PCB	Module	Full Size Brick			Half and Quarter Size Brick		
		No Heat Sink	Thru hole Heat Sink	Threaded Heat Sink	No Heat Sink	Thru hole Heat Sink	Threaded Heat Sink
0.063"	Inboard	19228	18153	18154	19228	18169	18170
	Onboard	19229	18158	18159	19229	18174	18175
0.094"	Inboard	19228	18153	18154	19228	18169	18170
	Onboard	19227	18156	18157	19227	18172	18173
0.125"	Onboard	24146	24054	18157	24146	24058	18173

Module Exchange Tools

Used in facilitating the proper extraction of modules from thru hole or InMate sockets. **Removal without using the exchange tool may cause damage to the sockets.**

Description	Part Number
Maxi Exchange Tool	22827
Mini Exchange Tool	22828
Micro Exchange Tool	22829



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vicorpower.com

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