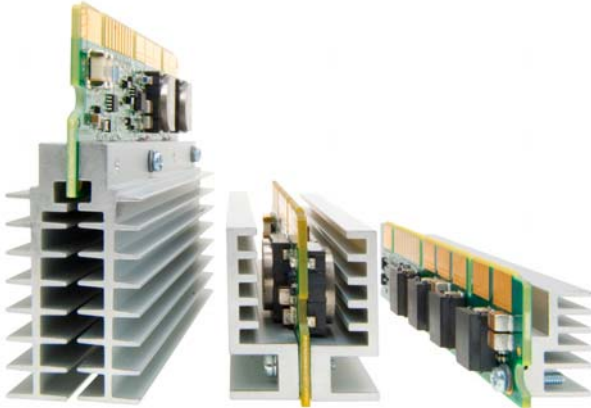


SELECTION GUIDE - STANDARD LOAD LINE					
Model	Input Voltage Range (V)	Output Voltage Range (V)	Peak Current (A)	Device Height	Application Height
VR110B150CS-1C	11.04 – 12.60	0.8375 – 1.60	150	2.5" (63.5mm)	2U
VR110B150CL-1C				1.86" (47.2mm)	1.5U
VR110B150CU-1C				1.18" (29.9mm)	1U
VR110B080CU-1C			80	1.18" (29.9mm)	1U
VR110B080CA-1C				0.78" (19.9mm)	<1U

INPUT CHARACTERISTICS - ALL MODELS					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Input voltage operating range		11.04	12.0	12.60	V
Under voltage lockout VR110B080CA-1C only	Turn-on threshold		9.5		V
	Turn-off threshold		8.2		
	Hysteresis voltage		1.4		
Under voltage lockout All other models	Turn-on threshold		5.8		V
	Turn-off threshold		5.0		
	Hysteresis voltage		0.85		
Maximum input current	Typical: 130A, 1.325VID		15.3		A
	Max: 150A, 1.6VID			22.4	
No-load input current	Enable state, no load		300		mA
Recommended input capacitance	Sanyo 16SP270M		2		each
Disabled input current	Disabled state		40		mA
Enable - positive logic	On state range	0.9		5.0	V
	Off state range	-0.3		0.4	

OUTPUT CHARACTERISTICS - 150A Models					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Voltage set point	7-Bit DAC controlled	0.8375		1.6	V
Line regulation		-2	0	2	mV
Load Line ²		1.22	1.25	1.28	mΩ
Ripple & noise ³	20MHz bandwidth		6.4		mVp-p
Current operating range		0		150	A
Efficiency for 11.0 TDC	I _O = 130A, VID = 1.325	83	84		%
Turn-on time	V _{IN} present: enable to 90% V _{OUT}		4	10	mS
Transient response ⁴	100A step, 100A/μS, ΔV _O , Adj	120	125	130	mV
Remote sense ⁵	Compensation range			300	mV
Recommended ceramic ⁶	Murata GRM Series or equivalent		50		each
Recommended bulk output	UCC 4PS560MH11 or equivalent		17		

OUTPUT CHARACTERISTICS - 80A Models					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Voltage set point	7-Bit DAC controlled	0.8375		1.6	V
Line regulation VR110B080CU-1C VR110B080CA-1C		-2	0	2	mV
		-4	0	3	mV
Load Line ²		1.22	1.25	1.28	mΩ
Ripple & noise ³	20MHz bandwidth		6.4		mVp-p
Current operating range		0		80	A
Efficiency for 11.0 TDC VR110B080CU-1C VR110B080CA-1C	I _O = 40A, VID = 1.325	83	84		%
	I _O = 40A, VID = 1.325	86	88		%
Turn-on time	V _{IN} present: enable to 90% V _{OUT}		4	10	mS
Transient response ⁴	40A step, 100A/μS, ΔV _O , Adj	45	50	55	mV
Remote sense ⁵	Compensation range			300	mV
Recommended ceramic ⁶	Murata GRM Series or equivalent	46	50		Each
Recommended bulk output	UCC 4PS560MH11 or equivalent	10	17		



DESCRIPTION

The VR110 Series is designed to meet the fast load transients required by Intel® Xeon® processors and is fully compliant with the latest Intel® VRM 11.0 specifications. High efficiency of 84% at full load for reduced power dissipation simplifies system thermal management. Available in 2U, 1.5U, 1U and new 0.66U form factors, the VR110 Series is ideal for use in a wide variety of server applications.

FEATURES

- Intel® VRM 11.0 compliant
- 4 height options 2.5", 1.86", 1.18" and 0.78" (63.5mm, 47.2mm, 29.9mm and 19.9mm)
- DAC programmable output voltage
- Power good output signal
- Differential remote sense
- Remote enable
- Supervisory functions
 - Output overcurrent
 - Short circuit protection
 - Overtemperature indicator
 - Output current level indicator
- Tri-state output when disabled
- Dynamic VID capability
- EN/IEC60950-1 Safety Approval (CB Report)



For full details go to www.murata-ps.com/rohs

GENERAL CHARACTERISTICS					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Operating temperature range		0		65	°C
Storage temperature range	Non-condensing	-40		85	
Semiconductor junction	Package rated to 150°C				
MTBF 150A models 80A models	Calculated (RAC PRISM) 45°C			1.097 1.118	x10 ⁶ Hrs
Switching frequency	Per phase		300		KHz
Material flammability		UL 94V-0			
Safety Agency Approval	IEC/EN60950-1	VDE REG.-Nr. C663/CB Certificate #DE1-39070			

MECHANICAL CHARACTERISTICS				
Parameter	Form Factor	Part Number	US (L x W x H)	Metric (L x W x H)
Dimensions	2U	VR110B150CS-1C	3.8" x 0.870" x 2.5"	96.52mm x 22.10mm x 63.50mm
	1.5U	VR110B150CL-1C	3.8" x 1.0" x 1.86"	96.52mm x 24.50mm x 47.24mm
	1U	VR110B150CU-1C	3.8" x 0.870" x 1.18"	96.52mm x 22.10mm x 29.97mm
	1U	VR110B080CU-1C	3.8" x 0.475" x 1.18"	96.52mm x 0.475mm x 29.97mm
	0.66U	VR110B080CA-1C	3.675" x 0.75" x 0.782"	93.35mm x 19.05mm x 19.86mm
Parameter	Form Factor	Part Number	US (oz)	Metric (g)
Weight	2U	VR110B150CS-1C	3.53	100
	1.5U	VR110B150CL-1C	3.0	85
	1U	VR110B150CU-1C	3.0	85
	1U	VR110B080CU-1C	1.06	30
	0.66U	VR110B080CA-1C	TBD	TBD

PROTECTION CHARACTERISTICS – 150A Models					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Latching	160		190	A
Overvoltage shutdown	Latching, above VID		200		mV
Overtemperature indicator	Non-latching, at hot spots		125		°C
	Worst case junction temperature				
Load indicator 150A	VID = 1.325	0A load	0.0	0.22	V
		75A load	0.9	1.2	
		150A load	1.7	2.4	

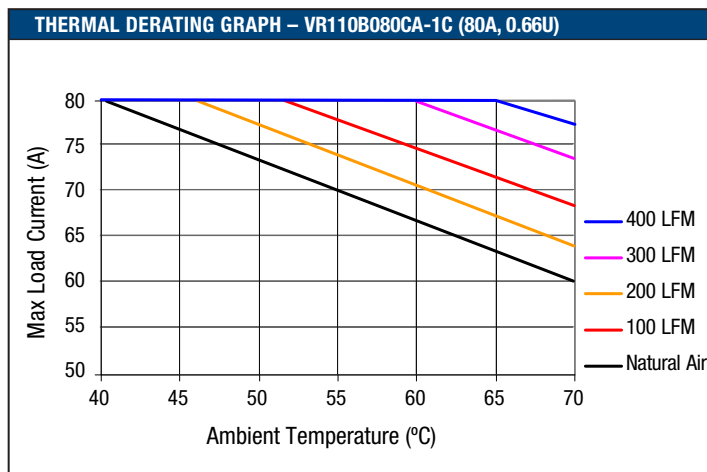
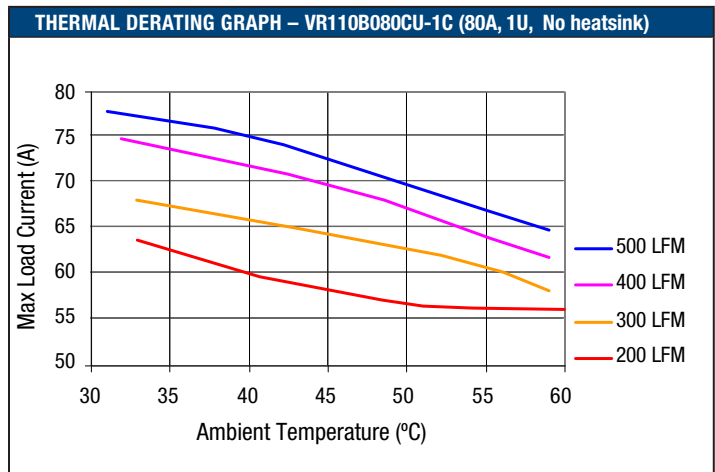
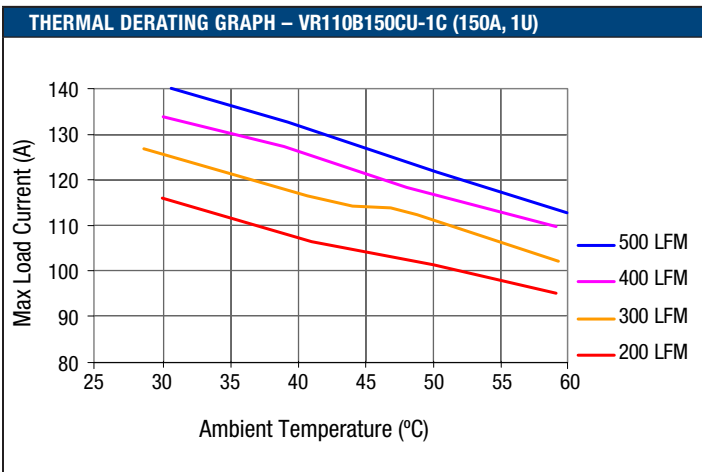
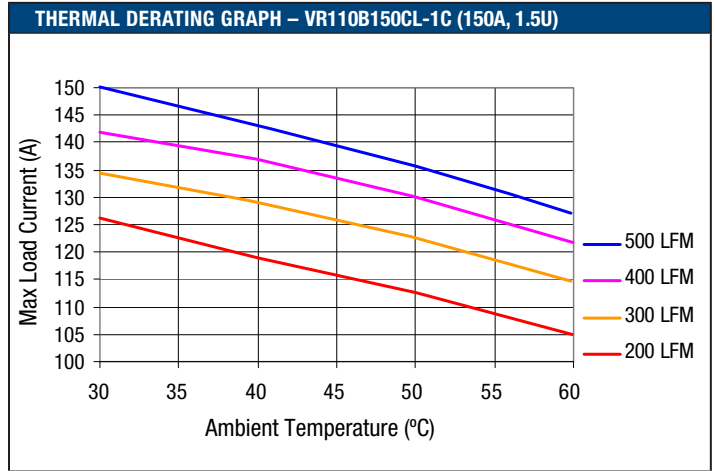
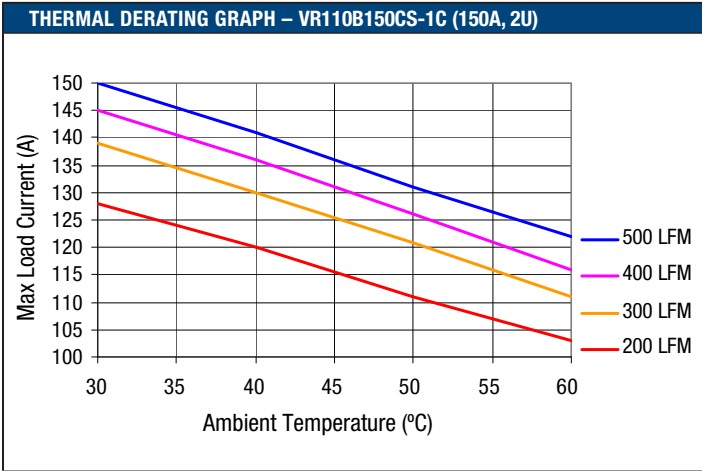
PROTECTION CHARACTERISTICS – VR110B080CU-1C (80A, 1U, No heatsink)					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Latching	100		120	A
Overvoltage shutdown	Latching, above VID		200		mV
Overtemperature indicator	Non-latching, at hot spots		125		°C
	Worst case junction temperature				
Load indicator 80A	VID = 1.325	0A load	0.0	0.22	V
		40A load	0.9	1.2	
		80A load	1.7	2.4	

PROTECTION CHARACTERISTICS – VR110B080CA-1C (80A, 0.66U)					
Parameter	Conditions ¹	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Non-latching	100		120	A
Overvoltage shutdown	Non-latching, above VID		175		mV
Overtemperature indicator	Non-latching, at hot spots		125		°C
	Worst case junction temperature				
Load indicator 80A	VID = 1.325	0A load	0.02	0.17	V
		40A load	0.55	0.75	
		80A load	1.1	1.5	

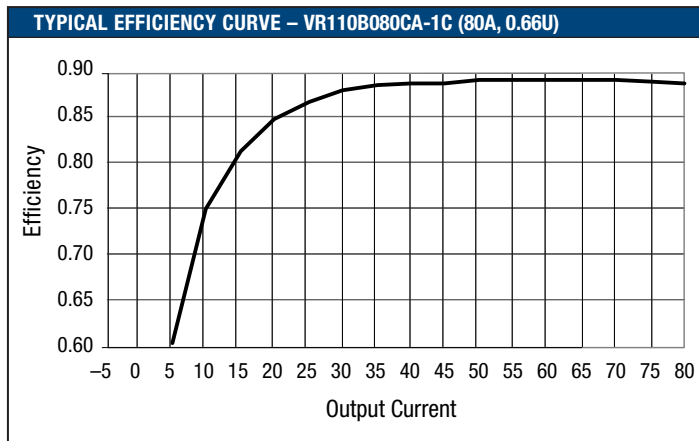
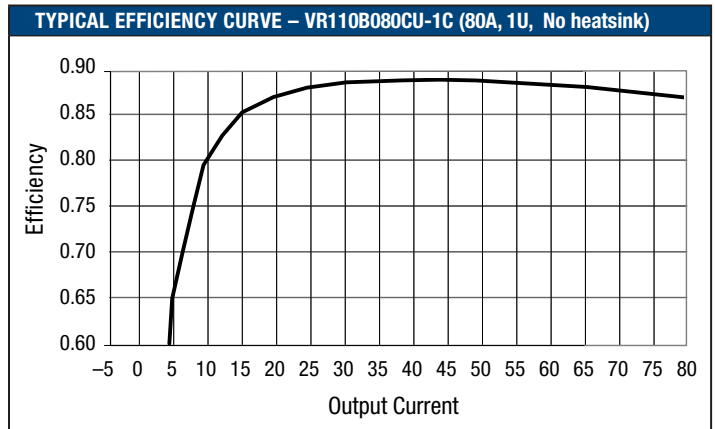
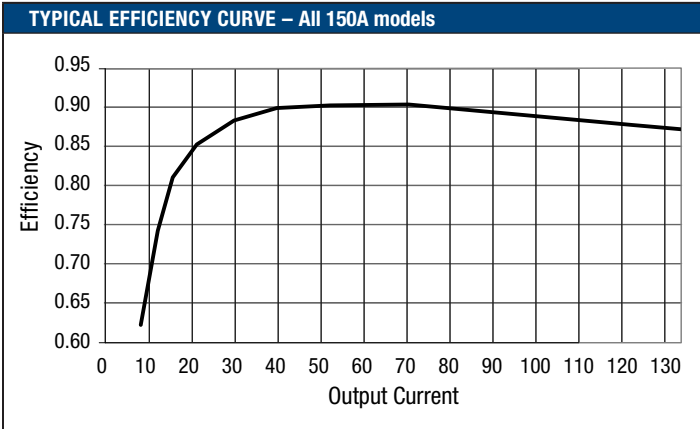
NOTES

- V_{IN} = 12Vdc, T_A = 25°C, Airflow = 400LFM unless otherwise noted.
- The output impedance is 1.25mΩ.
- Output ripple voltage is specified when measured with Intel® specified capacitance at the output of the converter.
- Transient response is specified with Intel® specified capacitors at the output of the converter.
- If remote sense is not required or used, the Sense(+) and Sense(-) pins must be connected to Vo(+) and Vo(-) respectively.
- 10µF ceramic X5R or X6S.
- VRM_PRES and VRM_ID are connected to Vss on the VRM through a 100Ω resistor.
- LLO, LL1 gives 1.25mΩ load line only.

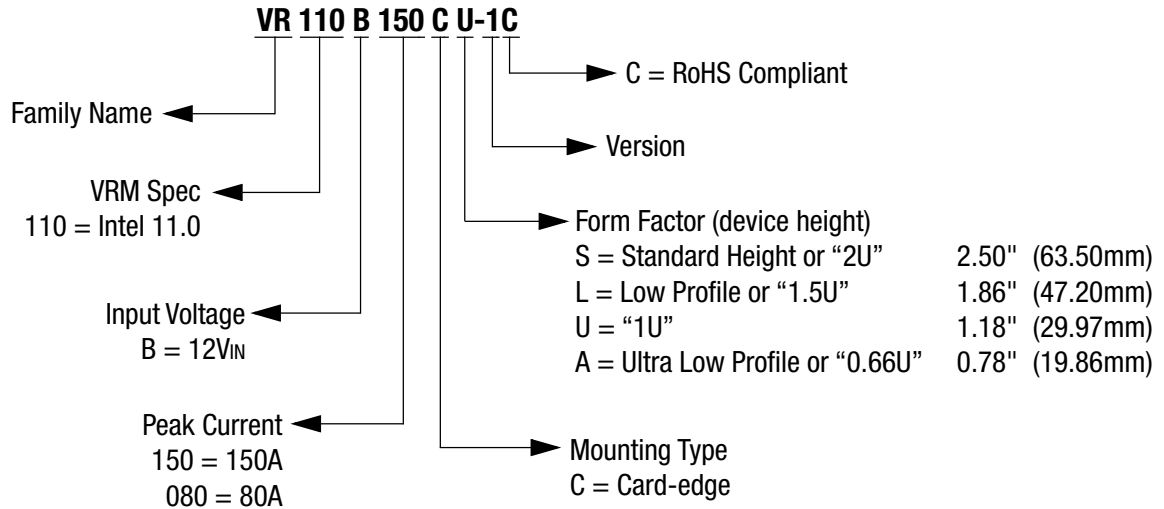
Typical Performance Curves - Derating
($V_{IN} = 12V$; $V_{ID} = 1.325V$)



Typical Performance Curves - Efficiency
($V_{IN} = 12V$; $V_{ID} = 1.325V$; $T_{AMB} = 25^{\circ}C$ with 400 LFM airflow)

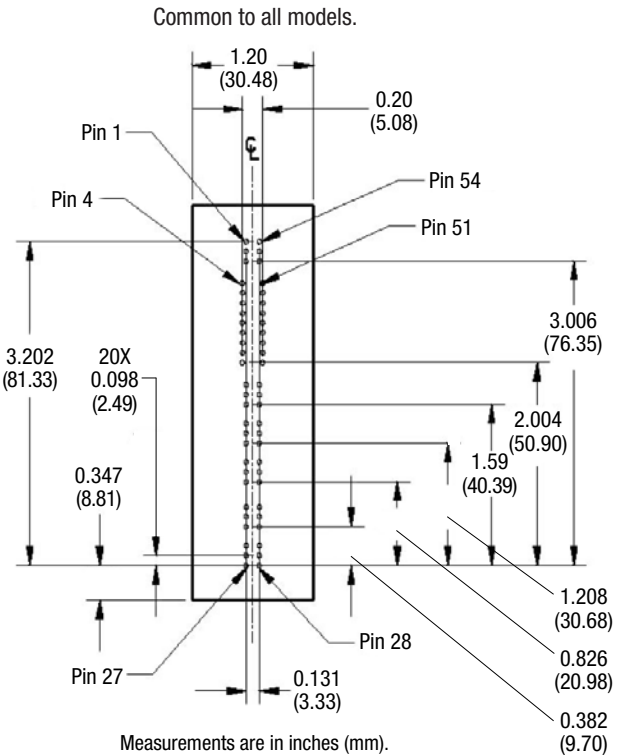


PART NUMBER CODING



PACKAGE SPECIFICATIONS

PIN ASSIGNMENT - ALL VR110 MODELS			
Pin	Signal	Pin	Signal
1	VSS	54	V _{IN} +
2	VSS	53	V _{IN} +
3	VSS	52	V _{IN} +
4	VID4	51	VID3
5	VID2	50	VID1
6	VID0	49	VID5
7	VO _{SEN} +	48	VO _{SEN} -
8	PWRGD	47	VR_HOT
9	OUTEN	46 ⁸	LLO
10	LOAD CURRENT	45 ⁸	LL1
11	VID6	44	VID_SELECT
12 ⁷	VRM_PRES	43 ⁷	VRM_ID
13	VO+	42	VO+
14	VO+	41	VO+
15	VO+	40	VO+
16	VSS	39	VSS
17	VSS	38	VSS
18	VSS	37	VSS
19	VO+	36	VO+
20	VO+	35	VO+
21	VO+	34	VO+
22	VSS	33	VSS
23	VSS	32	VSS
24	VSS	31	VSS
25	VO+	30	VO+
26	VO+	29	VO+
27	VO+	28	VO+

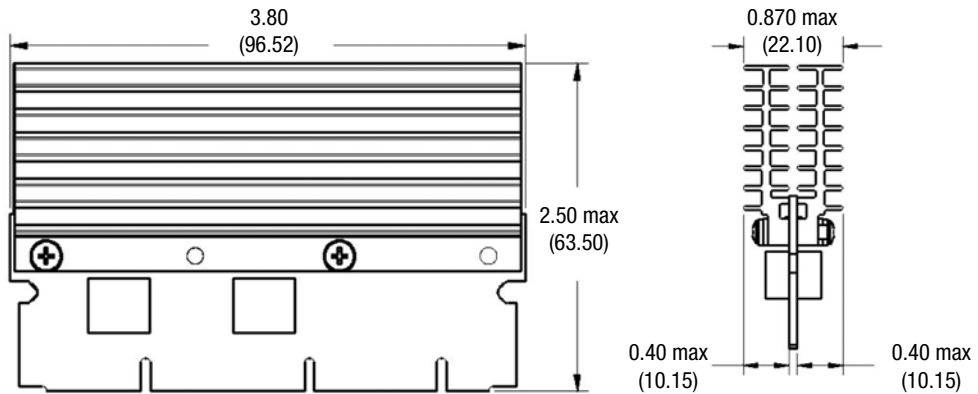


Note: Check with manufacturer for recommended PCB layout.

Recommended Interface Connector Options

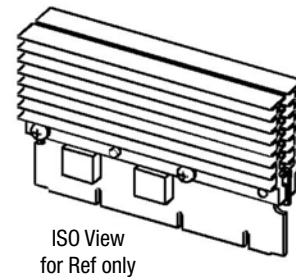
- Tyco/Elcon 281303 (Solder Tail, Long)
- 283-0172-02303 (Solder Tail, Short)
- 284-0202-03003 (Surface Mount)

MECHANICAL DIMENSIONS – VR110B150CS-1C (150A, 2U)

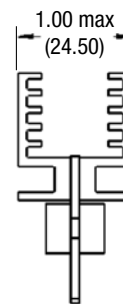
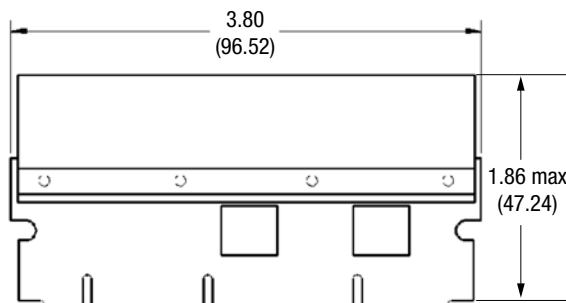


Tolerances are:
 .x ±.10
 .xx ±.03
 .xxx ±.010
 (Unless otherwise specified)
 Dimensions in inches (mm)

Installed height
 2.525
 (64.14)

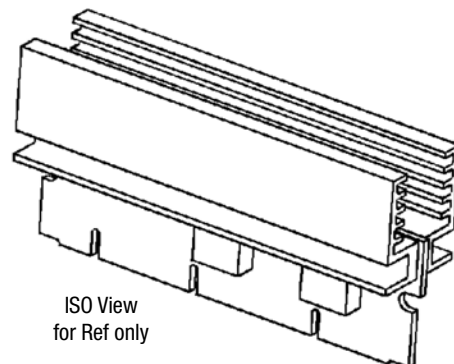


MECHANICAL DIMENSIONS – VR110B150CL-1C (150A, 1.5U)

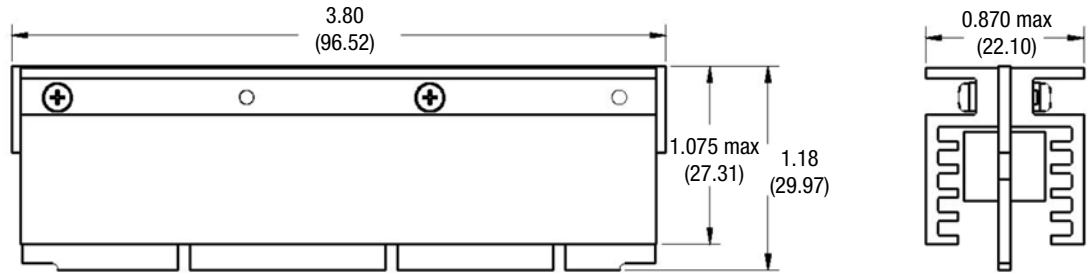


Tolerances are:
 .x ±.10
 .xx ±.03
 .xxx ±.010
 (Unless otherwise specified)
 Dimensions in inches (mm)

Installed height
 1.895
 (48.13)

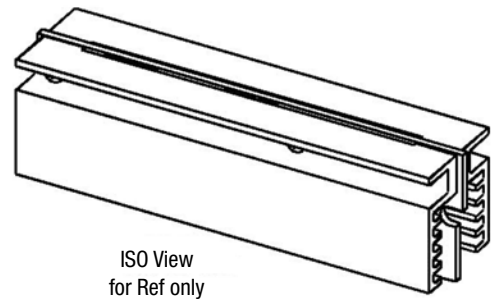


MECHANICAL DIMENSIONS – VR110B150CU-1C (150A, 1U)

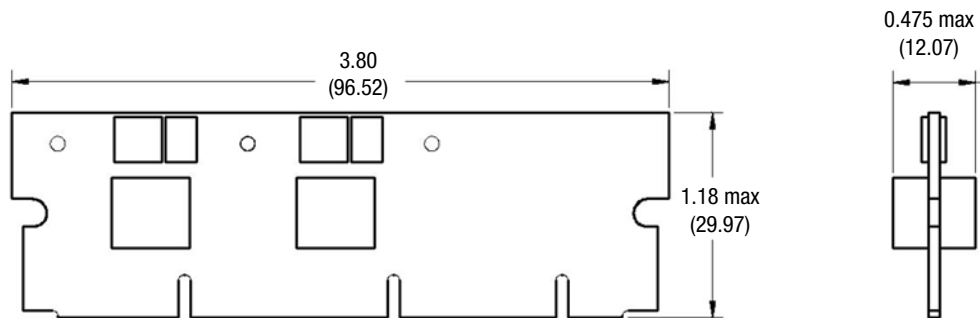


Tolerances are:
 .x ±.10
 .xx ±.03
 .xxx ±.010
 (Unless otherwise specified)
 Dimensions in inches (mm)

Installed height
 1.25 (31.75)

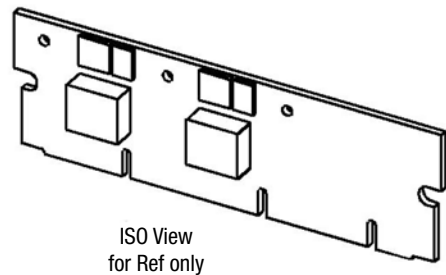


MECHANICAL DIMENSIONS – VR110B080CU-1C (80A, 1U, No heatsink)

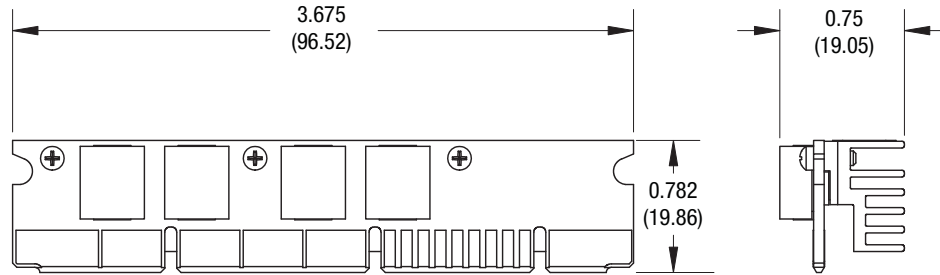


Tolerances are:
 .x ±.10
 .xx ±.03
 .xxx ±.010
 (Unless otherwise specified)
 Dimensions in inches (mm)

Installed height
 1.25 (31.75)

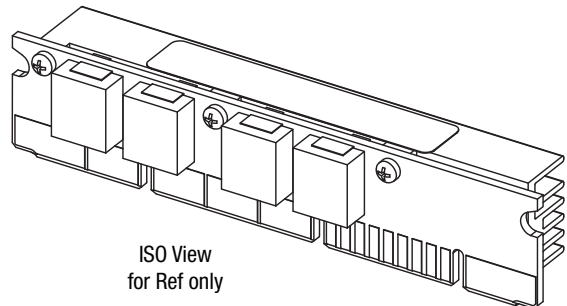


MECHANICAL DIMENSIONS – VR110B080CA-1C (80A, 0.66U)



Tolerances are:
 .x ±.10
 .xx ±.03
 .xxx ±.010
 (Unless otherwise specified)
 Dimensions in inches (mm)

Installed height
 0.807
 (20.49)



RoHS COMPLIANCY

The following parts are in compliance with the European Union Directive 2002/95/EC (RoHS) with respect to the following substances: lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

- VR110B150CS-1C
- VR110B150CL-1C
- VR110B150CU-1C
- VR110B080CU-1C
- VR110B080CA-1C

RoHS PROCESS NOTE

These products are not intended to go through a reflow solder process. See recommended interface options.