



VR11C & VR11E Series

Alternate Load Line (Droop) Versions of Intel® VRM 11.0

To Be Discontinued*



DESCRIPTION

Our VR11C and VR11E models are alternate load line (droop) VRM's which are otherwise compliant to the latest Intel® VRM 11.0 specifications.

The VR11C is the 0mΩ load line (droopless) version where the output voltage stays constant over the output load range. Available in 1U and 2U form factors, the VR11C Series is ideal for use in a wide variety of non-Intel® processor applications where high current and low voltage are required. They are also an ideal solution for the Memory (DIMM) and other I/O requirements outlined in the latest Intel® VRM 11.1 specifications.

The VR11E is a new addition to the family, offering Intel® VRM 11.0 compliance with a special 1.4mΩ load line (droop) setting. This model was developed for the specific purpose of powering Vcache in applications using certain Intel® Nehalem processors. The VR11EB080CU-1C provides up to 80A in a 1U form factor.

FEATURES

- Two Load Line Options: 0mΩ or 1.4mΩ
- 150A in 1U or 2U height (0mΩ only)
- 80A in 1U height with 2 load line options
- DAC programmable output voltage
- Power good output
- 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
- Fused Input



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

SELECTION GUIDE - ALTERNATE LOAD LINE VERSION

Order Code	Input Voltage Range (V)	Output Voltage Range (V)	Peak Current (A)	Device Height	Load Line (Droop)
VR11CB150CS-1C	11.04 – 12.60	0.81875 – 1.60	150	2.41" (61.15mm)	0mΩ
VR11CB150CU-1C				1.187" (30.15mm)	0mΩ
VR11CB080CU-1C			80	1.187" (30.15mm)	0mΩ
VR11CB080CE-1C				1.187" (30.15mm)	0mΩ
VR11EB080CU-1C				1.187" (30.15mm)	1.4mΩ
VR11CB080CA-1C				0.78" (19.9mm)	0mΩ

INPUT CHARACTERISTICS - ALL MODELS

Parameter	Conditions ①	MIN.	TYP.	MAX.	Units
Input voltage operating range		11.04	12.0	12.60	
Under voltage lockout	Turn-on threshold		5.8		V
	Turn-off threshold		5.0		
	Hysteresis voltage	0.6		1.1	
Maximum input current	Typical: 130A, 1.325VID		17.1		A
	Max: 150A, 1.6VID			25	
Recommended input capacitor	Nichicon RHT1C331MDN1		2		each
No-load input current	Enable state, no load		300		mA
Disabled input current	Disabled state		40		
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
Output voltage range	7-Bit DAC controlled	0.81875		1.6	V
Line regulation		-2	0	2	mV
Load Line (Droop)		0	0	0	mΩ
Ripple & noise ②	20MHz bandwidth		6.4		mVp-p
Output current range	Continuous (TDC)	0		130	A
	Peak, <10 mS	0		150	
Efficiency for 11.0 TDC	IO = 130A, VID = 1.325	84	85		%
Turn-on time	V _{IN} present: enable to 90% V _{OUT}		4	10	mS
Transient response ③	100A step, 100A/μS, Δ Vo, Adj		70		mV
Remote sense ④	Compensation range			300	mV
Recommended ceramic ⑤	Murata GRM Series or equivalent	10	50		each
Recommended bulk output	UCC 4PS560MH11 or equivalent	5	17		

OUTPUT CHARACTERISTICS - 80A Models

Parameter	Conditions ①	MIN.	TYP.	MAX.	Units
Output voltage range	7-Bit DAC controlled	0.81875		1.6	V
Line regulation		-2	0	2	mV
Load Line (Droop)					
	VR11CB080Cx-1C	0	0	0	mΩ
	VR11EB080CU-1C	1.37	1.40	1.43	mΩ
Ripple & noise ②	20MHz bandwidth		6.4		mVp-p
Output current range	Continuous (TDC)	0		70	A
	Peak, <10 mS	0		80	
Efficiency for 11.0 TDC	IO = 70A, VID = 1.325	84	87		%
Turn-on time	V _{IN} present: enable to 90% V _{OUT}		4	10	mS
Transient response ②	46A step, 100A/μS, Δ Vo, Adj		45		mV
Remote sense ④	Compensation range			300	mV
Recommended ceramic ⑤	Murata GRM Series or equivalent	10	46		each
Recommended bulk output	UCC 4PS560MH11 or equivalent	5	10		

GENERAL CHARACTERISTICS					
Parameter	Conditions ①	MIN.	TYP.	MAX.	Units
Operating temperature range		0		65	°C
Storage temperature range	Non-condensing	-40		85	
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	VR11CB150CS-1C	3.799" x 0.85" x 2.41"	96.49mm x 21.5mm x 61.15mm
	1U	VR11CB150CU-1C	3.799" x 0.92" x 1.187"	96.49mm x 23.2mm x 30.15mm
	1U	VR11CB080CU-1C	3.799" x 0.46" x 1.187"	96.49mm x 11.7mm x 30.15mm
	1U	VR11CB080CE-1C	3.799" x 0.46" x 1.187"	96.49mm x 11.7mm x 30.15mm
	1U	VR11EB080CU-1C	3.799" x 0.46" x 1.187"	96.49mm x 11.7mm x 30.15mm
Parameter	Form Factor	Part Number	US (oz)	Metric (g)
Weight	2U	VR11CB150CS-1C	3.53	100
	1U	VR11CB150CU-1C	3.0	85
	1U	VR11CB080CU-1C	1.06	30
	1U	VR11CB080CE-1C	1.41	40
	1U	VR11EB080CU-1C	1.06	30

PROTECTION CHARACTERISTICS – 150A Models					
Parameter	Conditions ①	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Latching	160		190	A
Overvoltage shutdown	Latching, above VID	100	150	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	

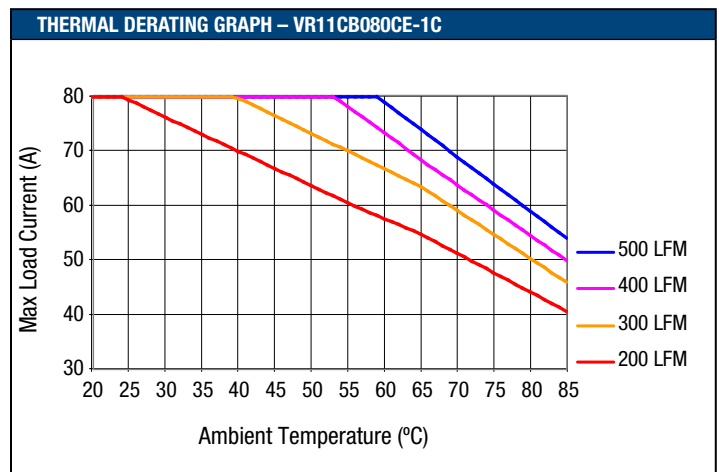
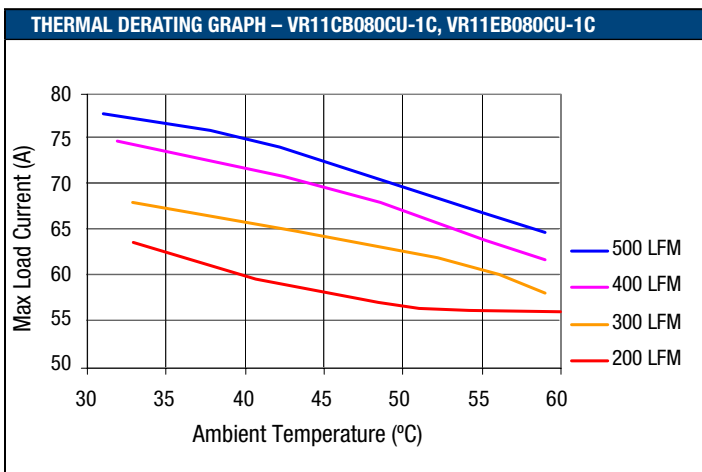
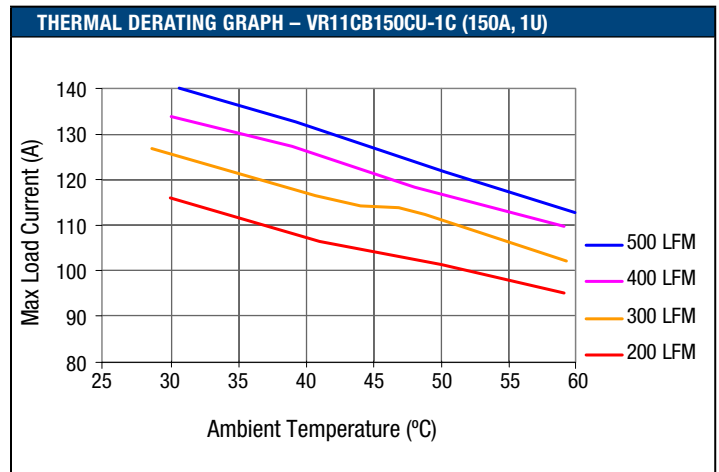
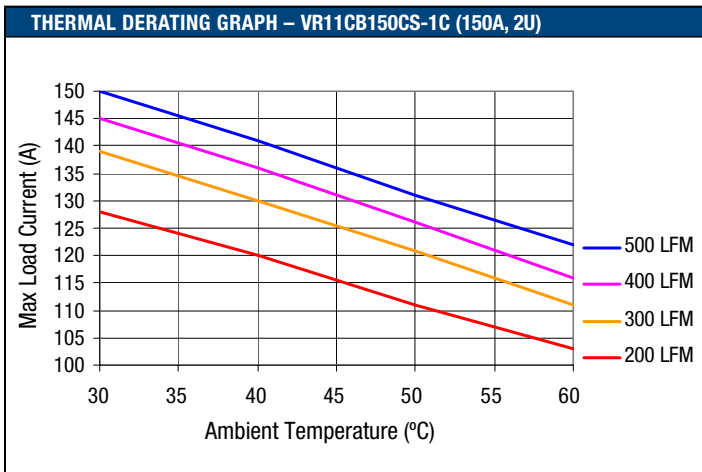
PROTECTION CHARACTERISTICS – 80A Models					
Parameter	Conditions ①	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Latching	83		115	A
Overvoltage shutdown	Latching, above VID	100	150	200	mV
Overtemperature indicator	Non-latching, at hot spots		125		°C
	Worst case junction temperature				
Load indicator 80A	VID = 1.325	0A load	0.0	0.22	V
		40A load	0.9	1.2	
		80A load	1.7	2.4	

NOTES

- ① $V_{IN} = 12Vdc$, $T_A = 25^\circ C$, Airflow = 400LFM unless otherwise noted.
- ② Output ripple voltage is specified when measured with Intel specified capacitance at the output of the converter.
- ③ Transient response is specified with Intel specified capacitors at the output of the converter.
- ④ If remote sense is not required or used, the Sense(+) and Sense(-) pins must be connected to $V_o(+)$ and $V_o(-)$ respectively.
- ⑤ 10 μF ceramic X5R or X6S.

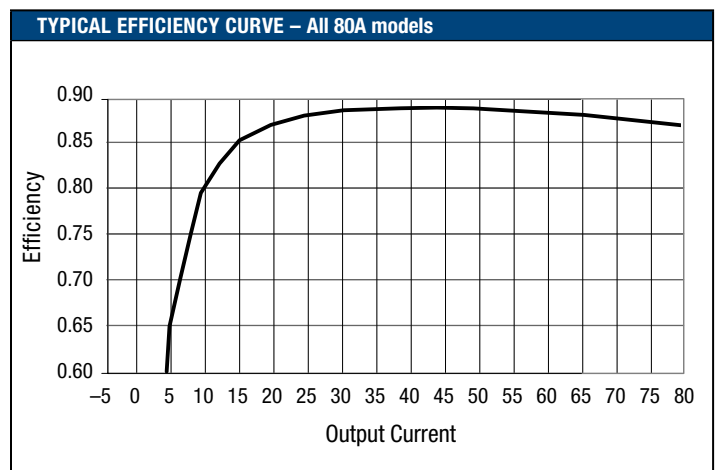
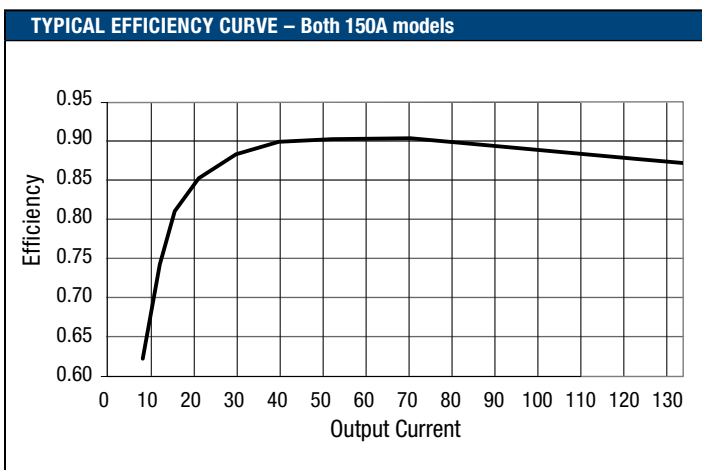
Typical Performance Curves - Derating

($V_{IN} = 12V$; $V_{ID} = 1.325V$ unless otherwise noted)

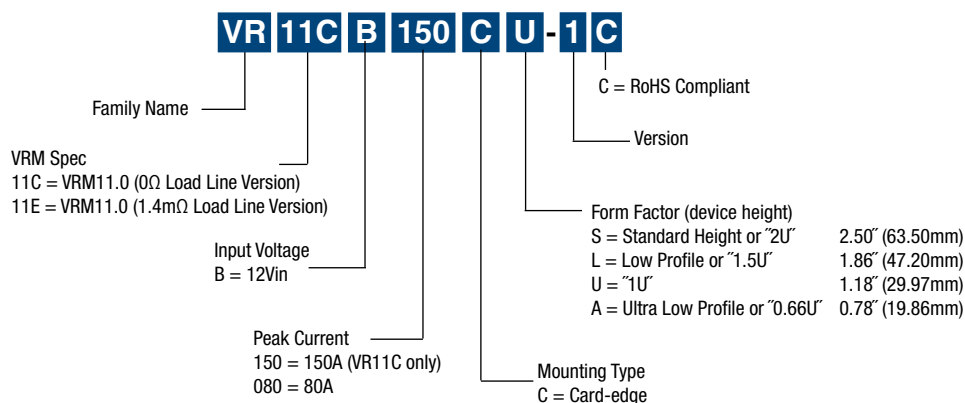


Typical Performance Curves - Efficiency

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



PART NUMBER CODING



PACKAGE SPECIFICATIONS

PIN ASSIGNMENT

Pin	Signal	Pin	Signal
1	VSS	54	VIN+
2	VSS	53	VIN+
3	VSS	52	VIN+
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	LLO
10	LOAD CURRENT	45	LL1
11	VID6	44	VID_SELECT
12*	VRM_PRES	43*	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+

* VRM_PRES and VRM_ID are connected to Vss on the VRM through a 100Ω resistor.

MECHANICAL DIMENSIONS – ALL MODELS

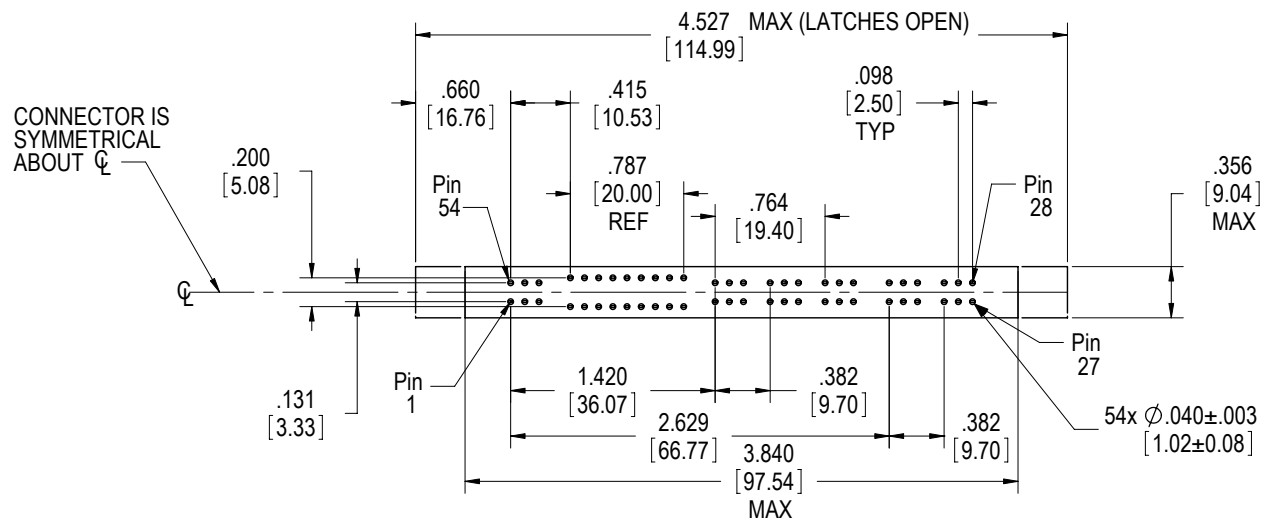


Figure 1. Connector Footprint (Thru-Hole Connector) Viewed From VRM (Top) Side

Recommended Mating Connectors

Tyco 1651826-1 (Vertical, 0.18" Solder Tail, Long)
 1651929-1 (Vertical, 0.12" Solder Tail, Short)
 1766336-1 (Vertical, Surface Mount)
 1766436-1 (Vertical, Compliant Pin)

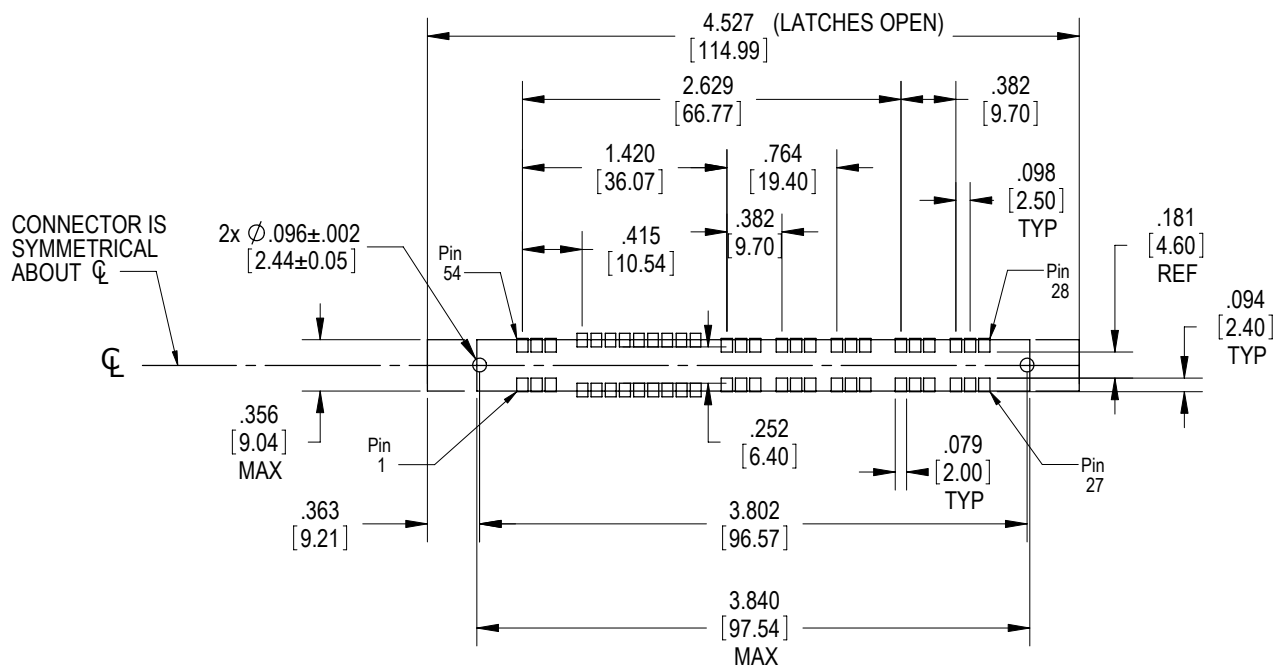
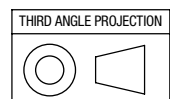


Figure 2. Connector Footprint (Surface Mount Connector) Viewed From VRM (Top) Side

Dimensions are in inches [mm]

Tolerances (Unless otherwise Specified)
 X.XX ±.02 (±0.5mm)
 X.XXX ±.010 (±0.25mm)



MECHANICAL DIMENSIONS

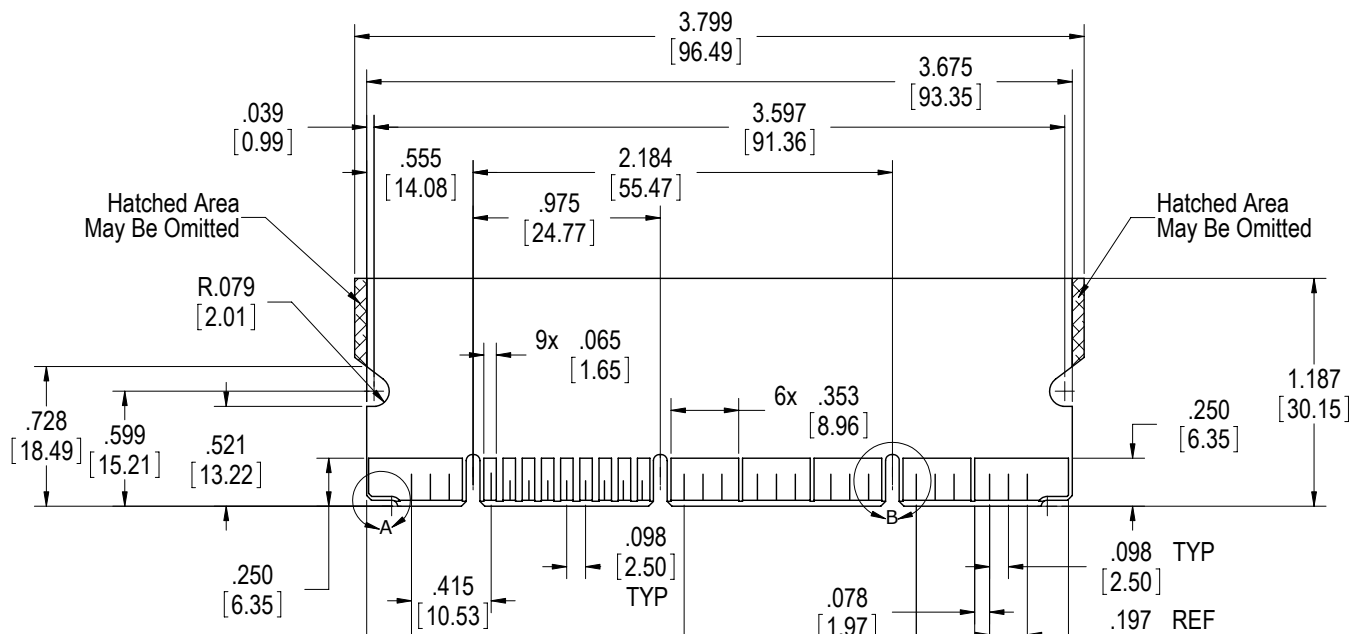


Figure 3. Circuit Board Outline

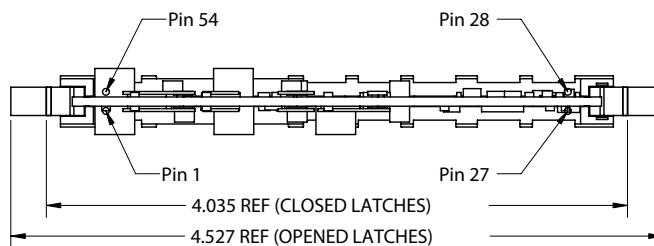
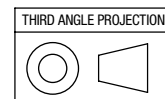


Figure 4. Top View (shown without heat sinks)

Dimensions are in inches [mm]

Tolerances (Unless otherwise Specified)
X.XX ±.02 (±0.5mm)
X.XXX ±.010 (±0.25mm)



MECHANICAL DIMENSIONS

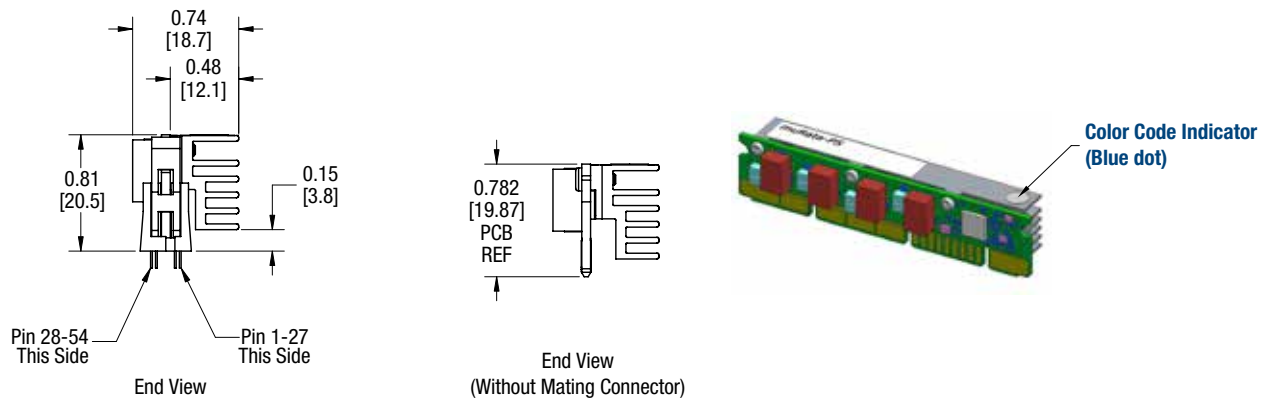


Figure 5. VR11CB080CA-1C (80A, .066U)

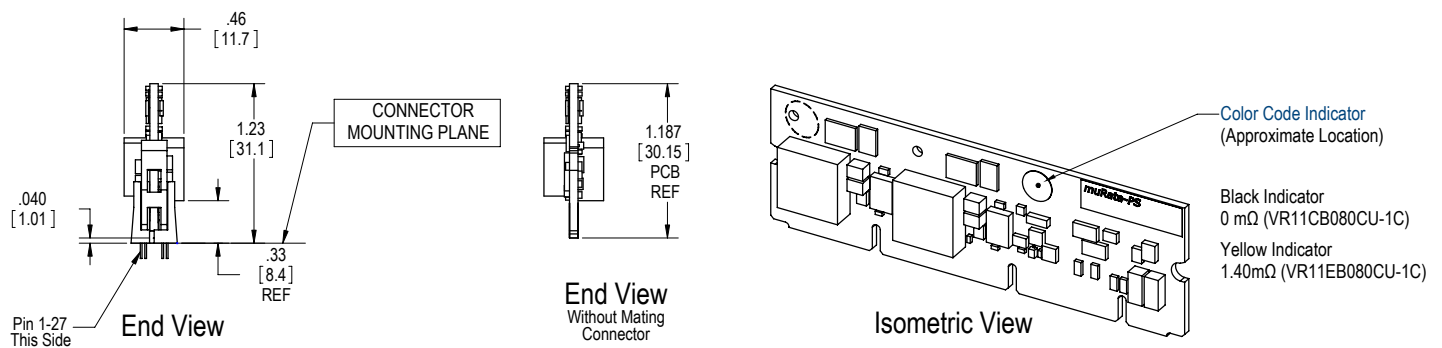


Figure 6. VR11CB080CU-1C, VR11EB080CU-1C (80A, 1U)

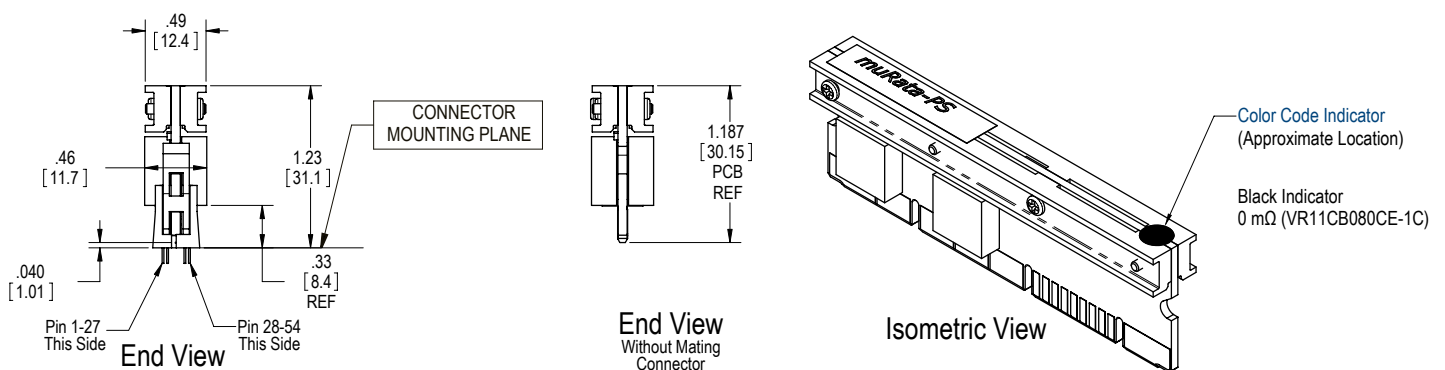


Figure 7. VR11CB080CE-1C (80A, 1U)

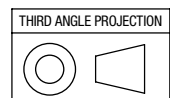
Notes

- Characters are shown on labels only to depict orientation.
- Color code dots shall be placed approximately as shown on the surfaces indicated.

Dimensions are in inches [mm]

Tolerances (Unless otherwise Specified)

X.XX	±.02 (±0.5mm)
X.XXX	±.010 (±0.25mm)



Color Code Indicator
 $\varnothing 0.26"$ [6.6mm] Round
 "Stick-on Colored Dot"

MECHANICAL DIMENSIONS

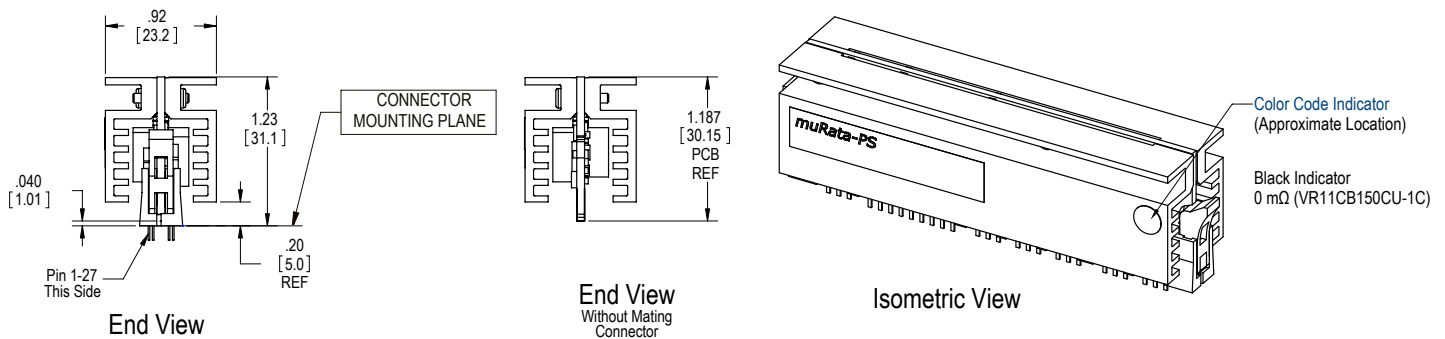


Figure 8. VR11CB150CU-1C (150A, 1U)

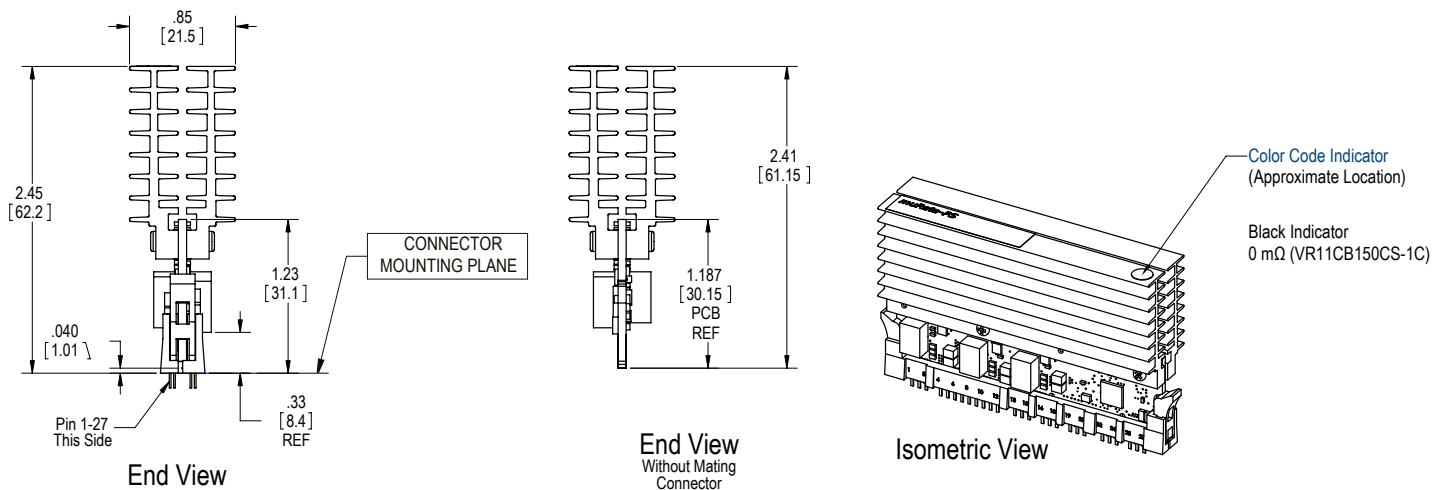


Figure 9. VR11CB150CS-1C (150A, 2U)

Color Code Indicator
 $\varnothing 0.26" [6.6mm]$ Round
 "Stick-on Colored Dot"

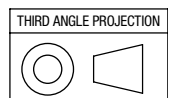
Notes

- A. Characters are shown on labels only to depict orientation.
- B. Color code dots shall be placed approximately as shown on the surfaces indicated.

Dimensions are in inches [mm]

Tolerances (Unless otherwise Specified)

X.XX	$\pm .02$ ($\pm 0.5mm$)
X.XXX	$\pm .010$ ($\pm 0.25mm$)



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).

VR11CB150CS-1C
VR11CB150CU-1C
VR11CB080CU-1C
VR11CB080CE-1C
VR11EB080CU-1C

RoHS PROCESS NOTE

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

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ISO 9001 and 14001 REGISTERED



This product is subject to the following [operating requirements](#) and the [Life and Safety Critical Application Sales Policy](#):
Refer to: <http://www.murata-ps.com/requirements/>

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