



### DESCRIPTION

The VR11C Series is the no load line (droopless) version of the VRM 11.0 models where the output voltage stays constant over the output load range. High efficiency of 85% at full load for reduced power dissipation simplifies system thermal management. Available in 2U and 1U form factors, the VR11C Series is ideal for use in a wide variety of non-Intel® processor applications where high current and low voltage is required.

### FEATURES

- VRM 11.0 VID Range – No Load Line
- 150A in 1U or 2U height
- 80A in 1U height
- 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](http://www.murata-ps.com/rohs)

### SELECTION GUIDE - NO LOAD LINE VERSION

Order Code	Input Voltage Range (V)	Output Voltage Range (V)	Peak Current (A)	Device Height	Applicator Height
VR11CB150CS-1C	11.04 – 12.60	0.8375 – 1.60	150	2.5" (63.5mm)	2U
VR11CB150CU-1C				1.18" (29.9mm)	1U
VR11CB080CU-1C			80	1.18" (29.9mm)	1U

### INPUT CHARACTERISTICS - ALL MODELS

Parameter	Conditions <sup>1</sup>	MIN.	TYP.	MAX.	Units
Input voltage operating range		11.04	12.0	12.60	V
Under voltage lockout	Turn-on threshold		5.8		
	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	Sanyo 16SP270M		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 <sup>1</sup>	MIN.	TYP.	MAX.	Units
Voltage set point	7-Bit DAC controlled	0.8375		1.6	V
Line regulation		-2	0	2	mV
Ripple & noise <sup>2</sup>	20MHz bandwidth		6.4		mVp-p
Current operating range		0		150	A
Efficiency for 11.0 TDC	I <sub>O</sub> = 130A, VID = 1.325	84	85		%
Turn-on time	V <sub>IN</sub> present: enable to 90% V <sub>OUT</sub>		4	10	mS
Transient response <sup>3</sup>	100A step, 100A/μS, ΔV <sub>O</sub> , Adjustable		70		mV
Remote sense compensation range <sup>4</sup>				300	mV
Recommended ceramic <sup>5</sup>	Murata GRM Series or equivalent		50		each
Recommended bulk output	UCC 4PS560MH11 or equivalent		17		

### OUTPUT CHARACTERISTICS - 80A Model

Parameter	Conditions <sup>1</sup>	MIN.	TYP.	MAX.	Units
Voltage set point	7-Bit DAC controlled	0.8375		1.6	V
Line regulation		-2	0	2	mV
Ripple & noise <sup>2</sup>	20MHz bandwidth		6.4		mVp-p
Current operating range		0		80	A
Efficiency for 11.0 TDC	I <sub>O</sub> = 40A, VID = 1.325	84	87		%
Turn-on time	V <sub>IN</sub> present: enable to 90% V <sub>OUT</sub>		4	10	mS
Transient response <sup>3</sup>	46A step, 100A/μS, ΔV <sub>O</sub> , Adjustable		45		mV
Remote sense compensation range <sup>4</sup>				300	mV
Recommended ceramic <sup>5</sup>	Murata GRM Series or equivalent		46		each
Recommended bulk output	UCC 4PS560MH11 or equivalent		10		

GENERAL CHARACTERISTICS					
Parameter	Conditions <sup>1</sup>	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 model	Calculated (RAC PRISM) 45°C			1.097 1.118	x10 <sup>6</sup> 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	3.8" x 0.870" x 2.5"	96.52mm x 22.10mm x 63.50mm
	1U	VR11CB150CU-1C	3.8" x 0.870" x 1.18"	96.52mm x 22.10mm x 29.97mm
	1U	VR11CB080CU-1C	3.8" x 0.475" x 1.18"	96.52mm x 0.475mm x 29.97mm
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

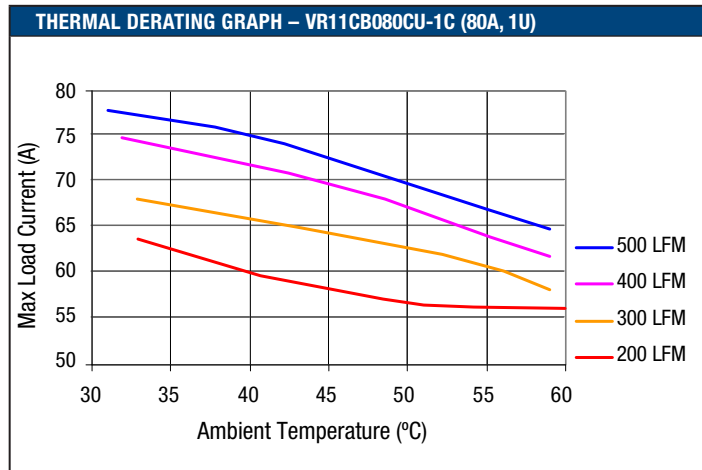
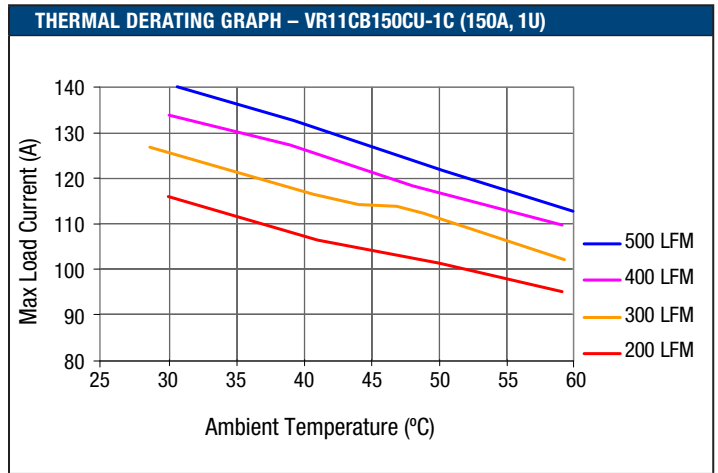
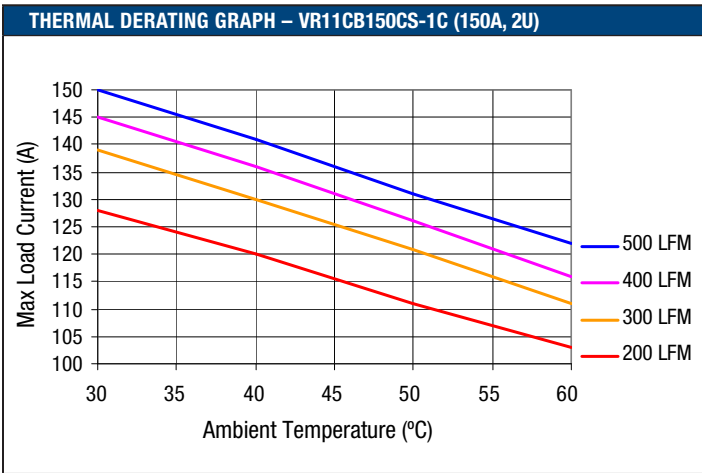
PROTECTION CHARACTERISTICS – 150A Models					
Parameter	Conditions <sup>1</sup>	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Latching	160		190	A
Overvoltage shutdown	Latching, above VID		200		mV
Overtemperature indicator	Non-latching, at hot spots		125		°C
	Worst case junction temperature				
Load 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 – 80A Model					
Parameter	Conditions <sup>1</sup>	MIN.	TYP.	MAX.	Units
Output overcurrent shutdown	Latching	83		115	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	

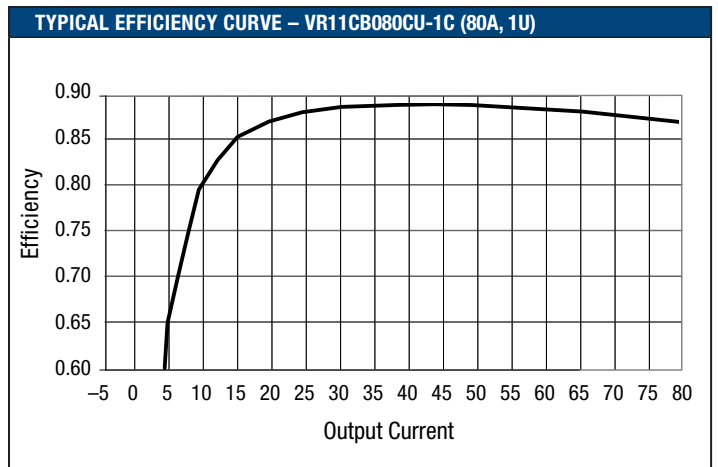
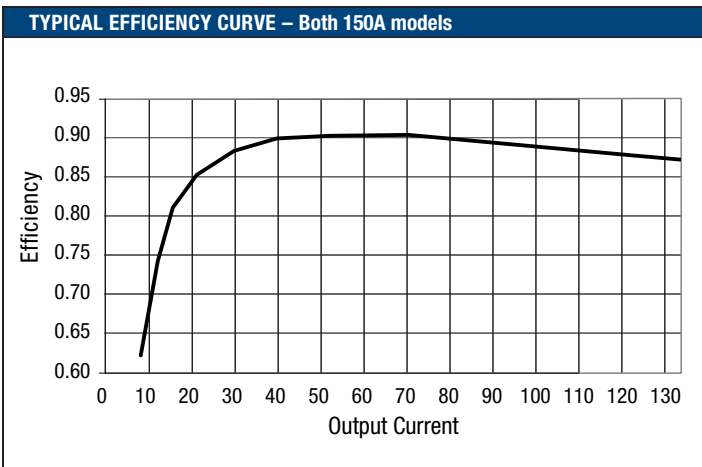
### NOTES

1.  $V_{IN} = 12V_{dc}$ ,  $T_A = 25^\circ C$ , 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 Vo(+) and Vo(-) respectively.
5. 10 $\mu$ F ceramic X5R or X6S.
6. VRM\_PRES and VRM\_ID are connected to Vss on the VRM through a 100 $\Omega$  resistor.

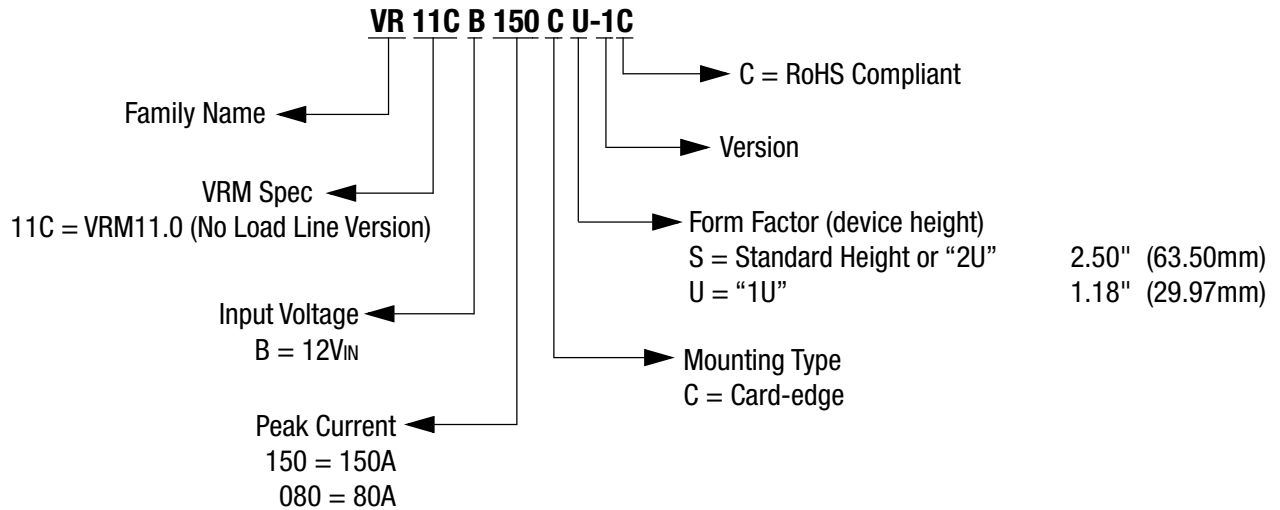
**Typical Performance Curves - Derating**  
( $V_{IN} = 12V$ ;  $VID = 1.325V$ )



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

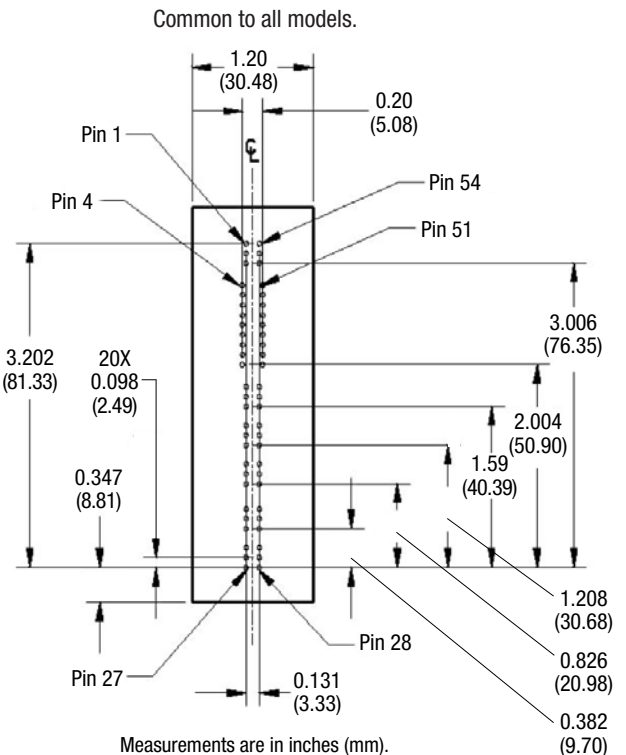


**PART NUMBER CODING**



**PACKAGE SPECIFICATIONS**

PIN ASSIGNMENT - ALL VR11C MODELS			
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 <sup>6</sup>	VRM_PRES	43 <sup>6</sup>	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
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24	VSS	31	VSS
25	VO+	30	VO+
26	VO+	29	VO+
27	VO+	28	VO+

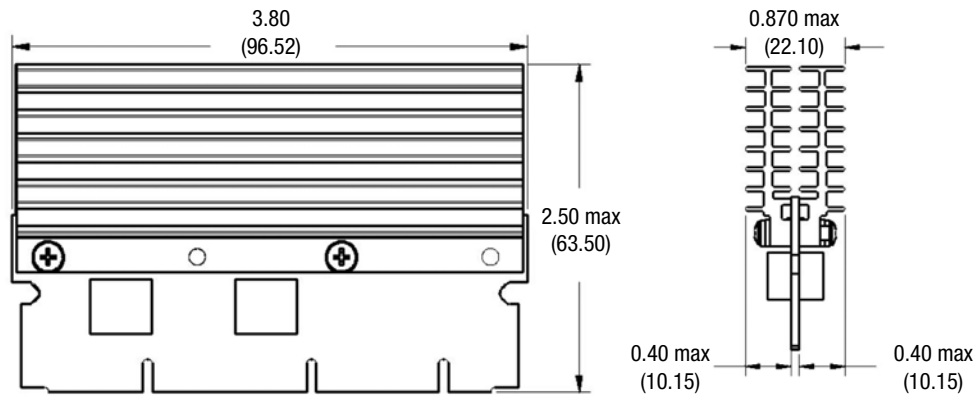


Note: Check with manufacturer for recommended PCB layout.

**Recommended Interface Connector Options**

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

**MECHANICAL DIMENSIONS – VR11CB150CS-1C (150A, 2U)**



Tolerances are:

.x ±.10

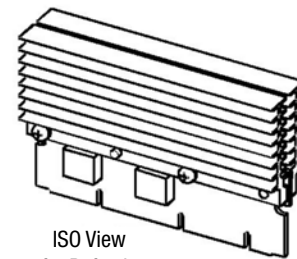
.xx ±.03

.xxx ±.010

(Unless otherwise specified)

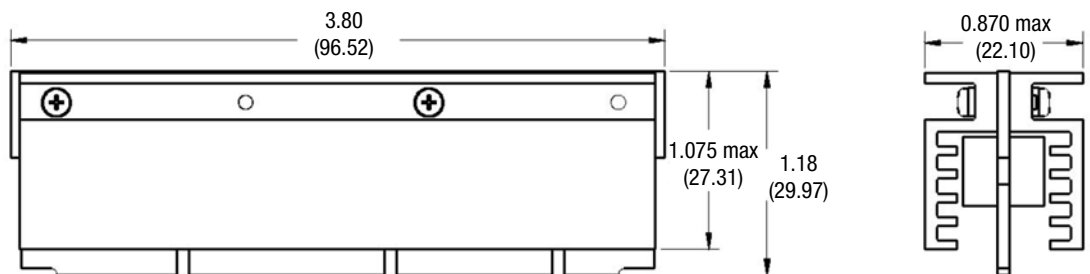
Dimensions in inches (mm)

Installed  
height  
2.525  
(64.14)



ISO View  
for Ref only

**MECHANICAL DIMENSIONS – VR11CB150CU-1C (150A, 1U)**



Tolerances are:

.x ±.10

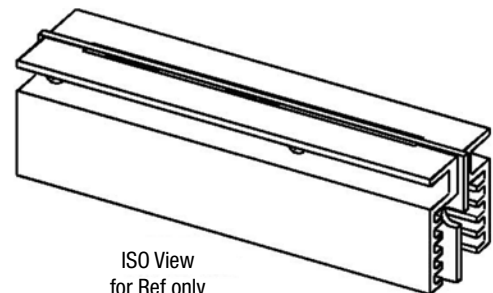
.xx ±.03

.xxx ±.010

(Unless otherwise specified)

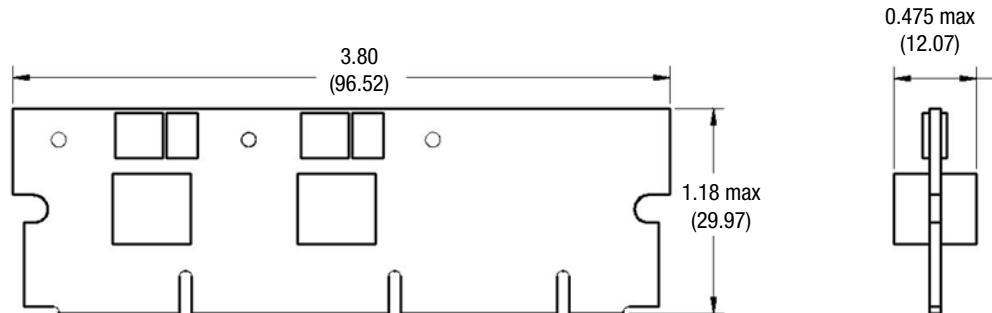
Dimensions in inches (mm)

Installed  
height  
1.25  
(31.75)



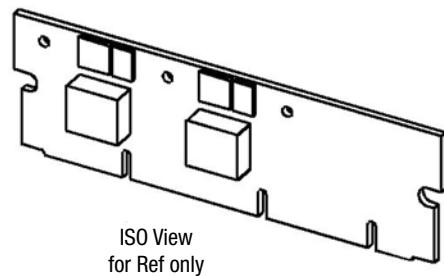
ISO View  
for Ref only

**MECHANICAL DIMENSIONS – VR11CB080CU-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)



**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).

- VR110CB150CS-1C
- VR110CB150CU-1C
- VR110CB080CU-1C

**RoHS PROCESS NOTE**

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