



Size:  
2.00 x 1.00 x 0.40 inches  
(50.8 x 25.4 x 10.2 mm)

**Applications:**

- Automation
- Datacom
- IPC
- Industry Control Systems
- Measurement
- Telecom

**FEATURES**

- Input Under Voltage Protection
- High Efficiency up to 92%
- Remote ON/OFF Control
- 2:1 Wide Input Voltage Ranges
- Six-Sided Continuous Shielding
- Low Stand-by Power Consumption
- No Minimum Load Required
- Single and Dual Outputs
- 1600VDC I/O Isolation
- Short Circuit, Over Voltage, Over Load, & Over Temp. Protection
- Wide Operating Temperature Range: -40°C to +105°C or -55°C to +105°C
- CE Marked
- RoHS & REACH Compliant
- IEC/UL/EN60950-1 UL: E193009 and IEC/UL/EN62368-1 CB:UL (Demko) Safety Approvals
- Optional Heatsink Available (Suffix "HS")

**DESCRIPTION**

The CR series of DC/DC power converters provides up to 40 Watts of output power in an industry standard 2.00" x 1.00" x 0.40" package and footprint. This series has single and dual output models with 2:1 wide input voltage ranges of 9-18VDC, 18-36VDC, and 36-75VDC. Some features include high efficiency up to 92%, 1600VDC I/O isolation, six-sided shielding, and remote ON/OFF control. These converters are also protected against short circuit, over voltage, over load, and over temperature conditions. All models are RoHS and REACH compliant, and have IEC/UL/EN60950-1 UL: E193009 and IEC/UL/EN62368-1 safety approvals. This series is best suited for use in automation, telecom/datacom, IPC, measurement, and industry control systems.

**MODEL SELECTION TABLE**

**SINGLE OUTPUT MODELS**

Model Number	Input Voltage Range	Output Voltage	Output Current		Output Ripple & Noise	No Load Input Current	Output Power	Efficiency	Maximum Capacitive Load
			Min Load	Max Load					
CR12S33-33	12 VDC (9 - 18 VDC)	3.3 VDC	0mA	10A	75mVp-p	20mA	33W	90%	26600µF
CR12S05-40		5 VDC	0mA	8A	75mVp-p	20mA	40W	91%	20000µF
CR12S12-40		12 VDC	0mA	3.333A	100mVp-p	20mA	40W	91%	3900µF
CR12S15-40		15 VDC	0mA	2.666A	100mVp-p	20mA	40W	91%	2600µF
CR12S24-40		24 VDC	0mA	1.666A	150mVp-p	20mA	40W	91%	1300µF
CR24S33-33	24 VDC (18 - 36 VDC)	3.3 VDC	0mA	10A	75mVp-p	15mA	33W	91%	26600µF
CR24S05-40		5 VDC	0mA	8A	75mVp-p	15mA	40W	92%	20000µF
CR24S12-40		12 VDC	0mA	3.333A	100mVp-p	15mA	40W	92%	3900µF
CR24S15-40		15 VDC	0mA	2.666A	100mVp-p	15mA	40W	92%	2600µF
CR24S24-40		24 VDC	0mA	1.666A	150mVp-p	15mA	40W	91%	1300µF
CR48S33-33	48 VDC (36 - 75 VDC)	3.3 VDC	0mA	10A	75mVp-p	10mA	33W	91%	26600µF
CR48S05-40		5 VDC	0mA	8A	75mVp-p	10mA	40W	92%	20000µF
CR48S12-40		12 VDC	0mA	3.333A	100mVp-p	10mA	40W	92%	3900µF
CR48S15-40		15 VDC	0mA	2.666A	100mVp-p	10mA	40W	92%	2600µF
CR48S24-40		24 VDC	0mA	1.666A	150mVp-p	10mA	40W	92%	1300µF

**MODEL SELECTION TABLE**

**DUAL OUTPUT MODELS**

Model Number	Input Voltage Range	Output Voltage	Output Current		Output Ripple & Noise	No Load Input Current	Output Power	Efficiency	Maximum Capacitive Load
			Min Load	Max Load					
CR12D12-40	12 VDC (9 - 18 VDC)	±12 VDC	0mA	±1.666A	100mVp-p	20mA	40W	90%	±2600µF
CR12D15-40		±15 VDC	0mA	±1.333A	100mVp-p	20mA	40W	91%	±1600µF
CR12D24-40		±24 VDC	0mA	±0.833A	150mVp-p	20mA	40W	91%	±650µF
CR24D12-40	24 VDC (18 - 36 VDC)	±12 VDC	0mA	±1.666A	100mVp-p	15mA	40W	90%	±2600µF
CR24D15-40		±15 VDC	0mA	±1.333A	100mVp-p	15mA	40W	91%	±1600µF
CR24D24-40		±24 VDC	0mA	±0.833A	150mVp-p	15mA	40W	91%	±650µF
CR48D12-40	48 VDC (36 - 75 VDC)	±12 VDC	0mA	±1.666A	100mVp-p	10mA	40W	91%	±2600µF
CR48D15-40		±15 VDC	0mA	±1.333A	100mVp-p	10mA	40W	91%	±1600µF
CR48D24-40		±24 VDC	0mA	±0.833A	150mVp-p	10mA	40W	90%	±650µF

**TECHNICAL SPECIFICATIONS: CR SERIES**

All specifications are typical at Nominal Input, Full Load, and 25°C unless otherwise noted.  
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
<b>INPUT SPECIFICATIONS</b>						
Input Voltage Range	12VDC nominal input models		9	12	18	VDC
	24VDC nominal input models		18	24	36	
	48VDC nominal input models		36	48	75	
Start-Up Voltage	12VDC nominal input models				9	VDC
	24VDC nominal input models				18	
	48VDC nominal input models				36	
Shutdown Voltage	12VDC nominal input models		7	8	8.8	VDC
	24VDC nominal input models		15	16	17.5	
	48VDC nominal input models		32	33.5	35	
Input Surge Voltage (1sec, max.)	12VDC nominal input models				25	VDC
	24VDC nominal input models				50	
	48VDC nominal input models				100	
Input Current	No Load		See Table			
Input Filter			Pi type			
<b>OUTPUT SPECIFICATIONS</b>						
Output Voltage			See Table			
Voltage Accuracy			-1.0		+1.0	%
Line Regulation	Low line to high line at full load		-0.2		+0.2	%
Load Regulation	No load to full load	Single Output Models	-0.5		+0.5	%
		Dual Output Models	-1.0		+1.0	
Cross Regulation	Dual Output Models, Asymmetrical load 25% / 100% FL		-5.0		+5.0	%
Voltage Adjustability	Single Output Models	3.3V, 5V, & 12V Output Models	-10		+10	%
		15V & 24V Outputs Models	-10		+20	
Output Power			See Table			
Output Current			See Table			
Minimum Load			0			%
Maximum Capacitive Load	Minimum input and constant resistive load		See Table			
Ripple & Noise	Measured by 20MHz bandwidth and with a 0.1µF/50V X7R MLCC capacitor	3.3V & 5V Output Models		75	100	mVp-p
		12V & 15V Output Models		100	125	
		24V Output Models		150	200	
Transient Response Recovery Time	25% load step change			250		µs
Start-Up Time	Constant resistive load	Power Up		60		ms
		Remote On/Off		60		
Temperature Coefficient			-0.02		+0.02	%/°C
<b>PROTECTION</b>						
Short Circuit Protection			Continuous, automatic recovery			
Over Load Protection	% of rated Iout; hiccup mode			150		%
Over Voltage Protection	Zener diode clamp	3.3V Output Models		3.9		VDC
		5V Output Models		6.2		
		12V Output Models		15		
		15V Output Models		20		
		24 V Output Models		30		
Over Temperature Protection				+115		°C
<b>GENERAL SPECIFICATIONS</b>						
Efficiency	Nominal input voltage and full load		See Table			
Switching Frequency			225	250	275	kHz
Isolation Voltage	1 minute	Input to Output	1600			VDC
		Input to Case	1600			
		Output to Case	1600			
Isolation Resistance	500VDC		1			GΩ
Isolation Capacitance					1500	pF

**TECHNICAL SPECIFICATIONS: CR SERIES**

All specifications are typical at Nominal Input, Full Load, and 25°C unless otherwise noted.  
 We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
<b>REMOTE ON/OFF (See Note 3)</b>						
Positive Logic (standard)	Referenced to –Input pin	DC/DC ON	Open or 3V ~ 12 VDC			
		DC/DC OFF	Short or 0 ~ 1.2 VDC			
Negative Logic (optional)	Referenced to –Input pin	DC/DC ON	Short or 0 ~ 1.2 VDC			
		DC/DC OFF	Open or 3V ~ 12 VDC			
Input Current of Remote Control Pin	Nominal Vin		-0.5		+0.5	mA
Remote OFF State Input Current	Nominal Vin			3		mA
<b>ENVIRONMENTAL SPECIFICATIONS</b>						
Operating Ambient Temperature	Standard with Derating		-40		+105	°C
	M3 Version with Derating		-55		+105	
Maximum Case Temperature					+105	°C
Storage Temperature			-55		+125	°C
Thermal Impedance (See Note 4)	Without Heatsink			10.8		°C/W
	With Heatsink			10.3		
Relative Humidity			5		95	% RH
Thermal Shock			MIL-STD-810F			
Shock			MIL-STD-810F			
Vibration			MIL-STD-810F			
MTBF	MIL-HDBK-217F, Full Load		1,066,000 hours			
<b>PHYSICAL SPECIFICATIONS</b>						
Weight			1.13oz (32g)			
Dimensions (L x W x H)			2.00in x 1.00in x 0.40in (50.8mm x 25.4mm x 10.2mm)			
Case Material			Copper			
Base Material			FR4 PCB			
Potting Material			Silicon (UL94-V0)			
Shielding			Six-sided			
<b>SAFETY &amp; EMC CHARACTERISTICS</b>						
Safety Approvals (See Note 5)		IEC/UL/EN60950-1 IEC/UL/EN62368-1				UL: E193009 CB: UL (Demko)
EMI (See Note 1)	EN55022					Class A, Class B
ESD	EN61000-4-2	Air ±8kV Contact ±6kV				Perf. Criteria A
Radiated Immunity	EN61000-4-3	20 V/m				Perf. Criteria A
Fast Transient (See Note 2)	EN61000-4-4	±2kV				Perf. Criteria A
Surge (See Note 2)	EN61000-4-5	±2kV				Perf. Criteria A
Conducted Immunity	EN61000-4-6	10 Vrms				Perf. Criteria A
Power Frequency Magnetic Field	EN61000-4-8	100A/m continuous; 1000A/m 1 second				Perf. Criteria A

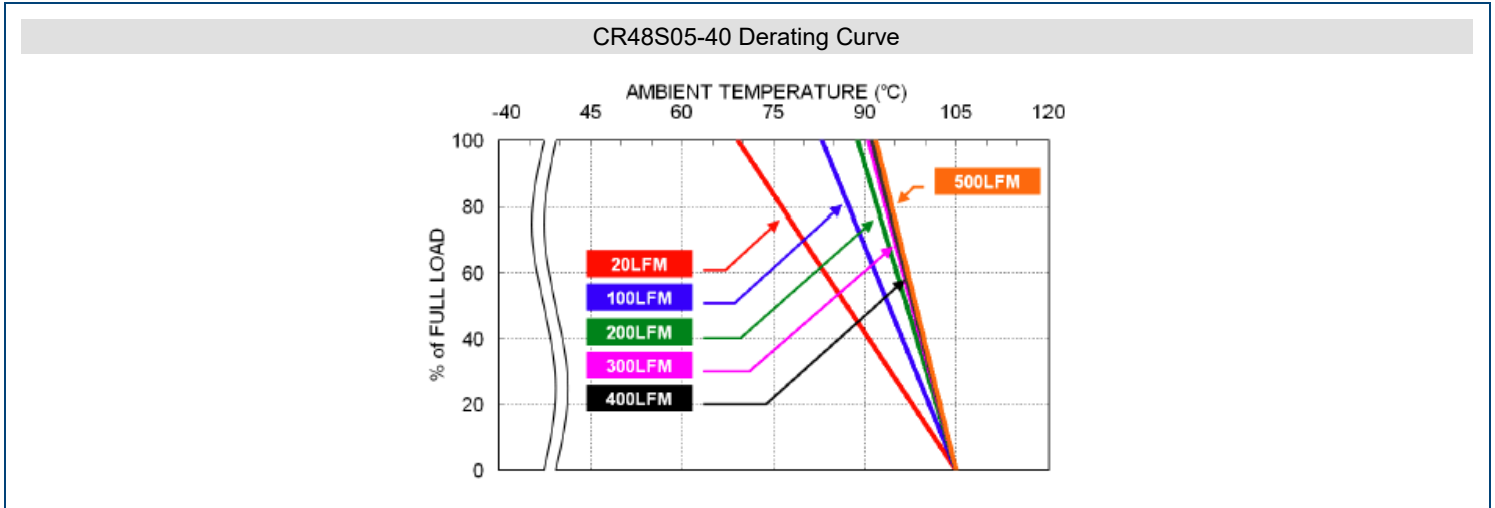
**NOTES**

- The CR series can only meet EMI Class A or Class B with external components added. Please contact factory for more information.
- An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. For 12VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ58A, 58V, 3000 Watt peak pulse power) diode in parallel. For 24VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ64A, 64V, 3000 Watt peak pulse power) diode in parallel. For 48VDC nominal input models we recommend connecting an aluminum electrolytic capacitor (Nippon chemi-con KY series, 220µF/100V) and a TVS (SMDJ120A, 120V, 3000 Watt peak pulse power) in parallel.
- Both positive logic and negative logic remote ON/OFF control is available. Positive logic remote ON/OFF comes standard; for negative logic remote ON/OFF add the suffix "R" to the model number (Ex: CR48S05-40R).
- Optional heatsink is available. Please call factory for ordering details.
- This product is Listed to applicable standards and requirements by UL.

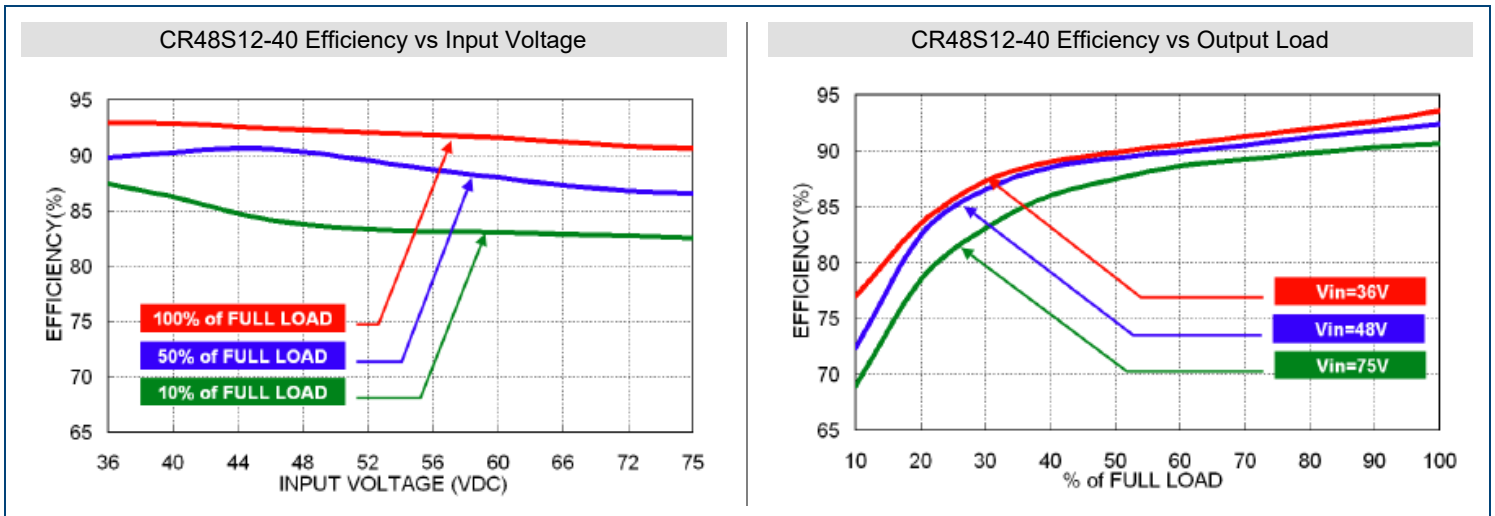
**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

Due to advances in technology, specifications subject to change without notice.

**DERATING CURVES**



**EFFICIENCY CURVES**



**FUSE CONSIDERATION**

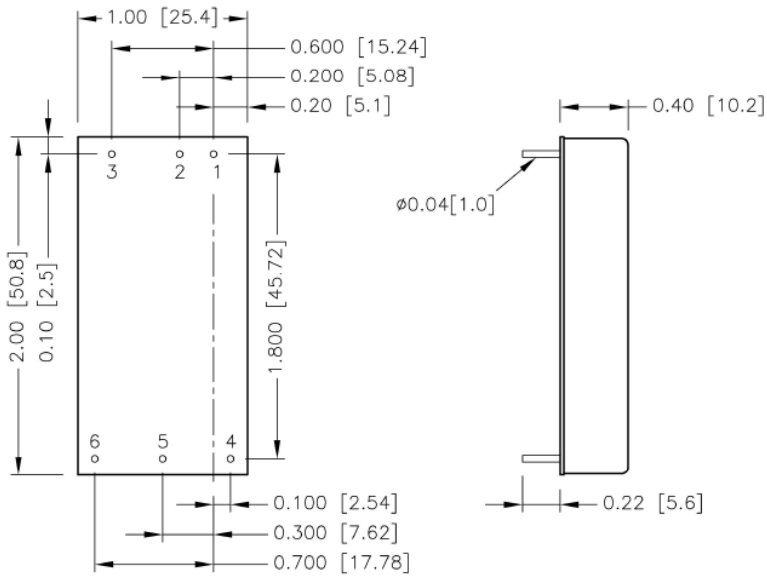
This power module is not internally fused. An input line fuse must always be used. This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture. To maximize flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always used an input line fuse.

Input line fuse suggestion:

Model	Fuse Rating (A)	Fuse Type
CR12xxx-xx	8	Fast-Acting
CR24xxx-xx	4	Slow-Blow
CR48xxx-xx	2	Slow-Blow

The table is based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin.

MECHANICAL DRAWING



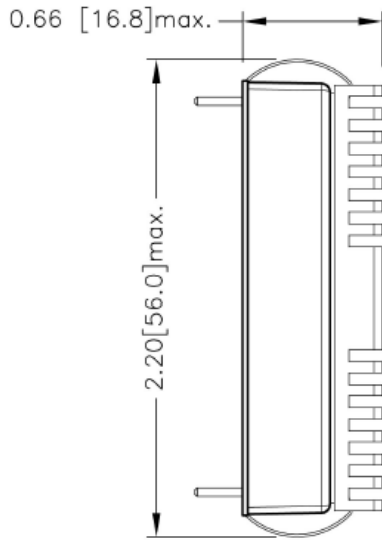
BOTTOM VIEW

PIN Connection		
PIN	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Ctrl	Ctrl
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

Notes:

1. All dimensions in inch [mm]
2. Tolerance: x.xx±0.02 [x.x±0.5]  
x.xxx±0.01 [x.xx±0.25]
3. Pin pitch tolerance ±0.01 [0.25]
4. Pin dimension tolerance ±0.004 [0.10]

Heatsink with Clamps (-HC)

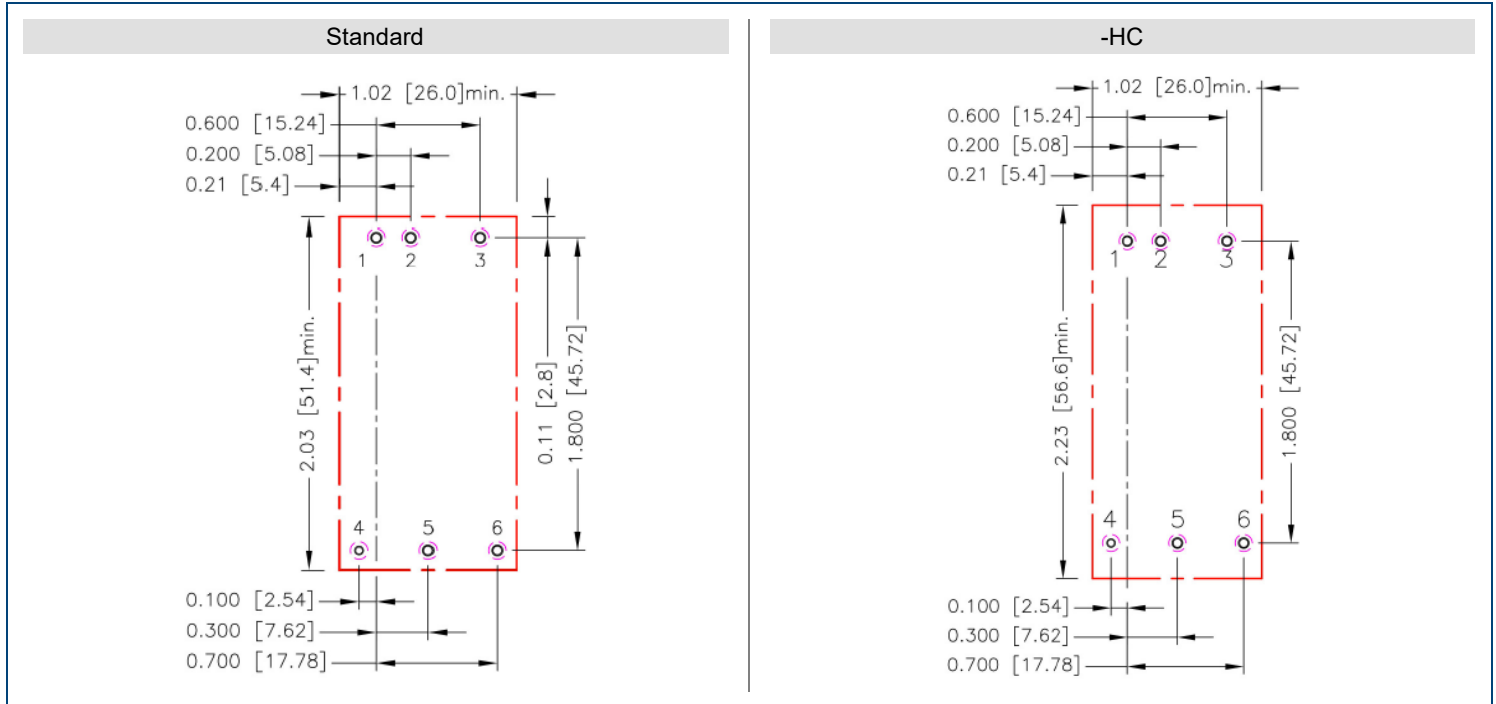


SIDE VIEW

Notes:

1. All dimensions in inch [mm]

RECOMMENDED PAD LAYOUT

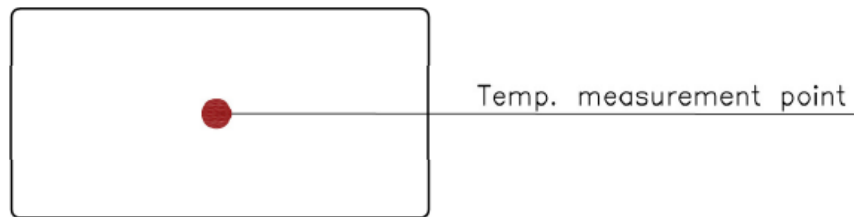


- Notes:
1. All dimensions in inch [mm]
  2. Pad size (lead free recommended)
  3. Through Hole 1.2.3.4.5.6:  $\Phi 0.051$  [1.30]
  4. Top View Pad 1.2.3.4.5.6:  $\Phi 0.064$  [1.63]
  5. Bottom View Pad 1.2.3.4.5.6:  $\Phi 0.102$  [2.60]

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments. However, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. Proper cooling can be verified by measuring the point in the figure below. The temperature at this location should not exceed "Maximum case temperature". When operating, adequate cooling must be provided to maintain the test point temperature at or below "maximum case temperature". You can limit this temperature to a lower value for extremely high reliability.

Thermal test condition with vertical direction by natural convection (20LFM).



TOP VIEW

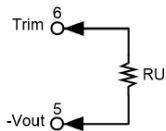
**OUTPUT VOLTAGE ADJUSTMENT**

Output voltage set point adjustment allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either the +Output or -Output pins. With an external resistor between the Trip and -Vout, the output voltage set point increases. With an external resistor between the Trim and +Vout, the output voltage set point decreases. The external Trim resistor needs to be at least 1/16W of rated power.

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using the method shown below.

**Trim-Up**



**3.3V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.630
RU (kΩ)	57.93	26.165	15.577	10.283	7.106	4.988	3.476	2.341	1.459	0.753

**5V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	5.050	5.100	5.150	5.200	5.250	5.300	5.350	5.400	5.450	5.500
RU (kΩ)	36.57	16.58	9.917	6.585	4.586	3.253	2.302	1.588	1.032	0.588

**12V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	12.120	12.240	12.360	12.480	12.600	12.720	12.840	12.960	13.080	13.200
RU (kΩ)	367.91	165.95	98.636	64.977	44.782	31.318	21.701	14.488	8.879	4.391

**15V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	15.150	15.300	15.450	15.600	15.750	15.900	16.050	16.200	16.350	16.500
RU (kΩ)	419.81	199.91	126.60	89.95	67.96	53.30	42.83	34.98	28.87	23.98

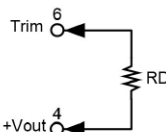
ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	16.650	16.800	16.950	17.100	17.250	17.400	17.550	17.700	17.850	18.000
RU (kΩ)	19.98	16.65	13.83	11.42	9.32	7.49	5.87	4.43	3.15	1.99

**24V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	24.40	24.480	24.720	24.960	25.200	25.440	25.680	25.920	26.160	26.400
RU (kΩ)	1275.2	606.60	383.73	272.30	205.44	160.87	129.03	105.15	86.58	71.72

ΔV (%)	11	12	13	14	15	16	17	18	19	20
Vout (V)	26.640	26.880	27.120	27.360	27.600	27.840	28.080	28.320	28.560	28.800
RU (kΩ)	59.56	49.43	40.86	33.51	27.15	21.57	16.66	12.29	8.38	4.86



**3.3V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.970
RU (kΩ)	69.47	31.235	18.49	12.117	8.294	5.745	3.924	2.559	1.497	0.647

**5V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	4.950	4.900	4.850	4.800	4.750	4.700	4.650	4.600	4.550	4.500
RU (kΩ)	45.533	20.612	12.306	8.152	5.66	3.999	2.812	1.922	1.23	0.676

**12V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	11.880	11.760	11.640	11.520	11.400	11.280	11.160	11.040	10.920	10.800
RU (kΩ)	460.99	207.95	123.6	81.423	56.118	39.249	27.199	18.162	11.132	5.509

**15V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	14.850	14.700	14.550	14.400	14.250	14.100	13.950	13.800	13.650	13.500
RU (kΩ)	284.89	128.68	76.61	50.58	34.96	24.55	17.11	11.53	7.19	3.72

**24V Output Models**

ΔV (%)	1	2	3	4	5	6	7	8	9	10
Vout (V)	23.760	23.520	23.280	23.040	22.800	22.560	22.320	22.080	21.840	21.600
RU (kΩ)	838.15	376.78	222.98	146.09	99.95	69.19	47.22	30.74	17.93	7.68



MODEL NUMBER SETUP

CR	48	S	05	-	40	R	H	M3
Series Name	Input Voltage	Output Quantity	Ouptut Voltage		Output Power	Remote ON/OFF	Heatsink	Temperature
	<b>12:</b> 9-18 VDC	<b>S:</b> Single Output	<b>33:</b> 3.3 VDC		<b>33:</b> 33 Watts	<b>None:</b> Positive Logic	<b>None:</b> No Heatsink	<b>None:</b> -40 to 105°C
	<b>24:</b> 18-36 VDC		<b>05:</b> 5 VDC		<b>40:</b> 40 Watts	<b>R:</b> Negative Logic	<b>H:</b> Heatsink	<b>M3:</b> -55 to 105°C
	<b>48:</b> 36-75 VDC		<b>12:</b> 12 VDC				<b>HC:</b> Heatsink with clamp	
		<b>D:</b> Dual Output	<b>15:</b> 15 VDC					
			<b>24:</b> 24 VDC					
			<b>12:</b> ±12 VDC					
			<b>15:</b> ±15 VDC					
			<b>24:</b> ±24 VDC					

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

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