Standard Models

Size: 2.40x 2.28 x 0.50 inches

Chassis Mount Models (Prefix "CM")

Size: 5.70 x 3.40 x 1.10 inches

Options:
- Heatsink
- Thru-Hole Inserts
- Chassis Mount
- Active Low Remote ON/OFF Control

FEATURES

- Soft-Start
- 200 Watts Output Power
- Under Voltage Lockout
- No Minimum Load Requirements
- Remote ON/OFF Control
- High Efficiency
- Fixed Switching Frequency
- Cost Efficient Solution
- Fast Transient Response
- Made in the USA
- 100% Burn-in
- 4:1 Ultra Wide Input Voltage Range: 9~36VDC
- Industry Standard Half-Brick Footprint
- Remote Sense Compensation to 10% Vout
- Single Outputs Ranging from 3.3VDC to 48VDC
- 1500VDC I/O Isolation
- Threaded Inserts & Thru-Hole Inserts Available
- Short Circuit, Over Voltage, Over Current, and Over Temperature Protection
- UL60950-1, EN60950-1, IEC60950-1, & EN50155 Safety Approvals
- Heat Sink and Chassis Mount Options Available

APPLICATIONS

- Telecommunications Equipment
- Network (LANs/WANs) Equipment
- Next Generation Low Voltage, High Current Microprocessors and ICs
- For Use in 12V and 24V Battery Applications
- For Use in Intermediate and Distributed Bus Architectures (IBA)
- Military Applications

DESCRIPTION

The LV200 is a high density, low input voltage, isolated converter with a 4:1 ultra wide input voltage range. Low input voltage converters are uncommon in the industry and the LV200 series offers the flexibility of operation with both 12V and 24V busses. This state-of-the-art converter's features include fast transient response, short circuit protection, over current protection, soft start, and many other features that are required for today's demanding applications.

MODEL SELECTION TABLE

Model Number	Input Voltage	Output Voltage	Output Current		No Load Input Current	Ripple & Noise	Output Power	Efficiency
			Min Load	Max Load				
LV12S3.3-200	12/24 VDC (9 - 36 VDC)	3.3 VDC	0mA	60.6A	TBD	TBD	200W	TBD
LV12S05-200		5 VDC	0mA	40A			200W	
LV12S12-200		12 VDC	0mA	16.67A			200W	
LV12S15-200		15 VDC	0mA	13.33A			200W	
LV12S24-200		24 VDC	0mA	8.33A			200W	
LV12S28-200		28 VDC	0mA	7.14A			200W	
LV12S48-200		48 VDC	0mA	4.17A			200W	

NOTES

1. The LV200 series converters may be paralleled both for redundancy and for higher output current. See page 11 for more details.
2. Maximum output deviation is +10% inclusive of remote sense and trim. If remote sense is not being used the +SENSE should be connected to its corresponding +OUTPUT and likewise the -SENSE should be connected to its corresponding –OUTPUT.
3. Output voltage is adjustable for 10% trim up or -10% trim down of nominal output voltage by connecting a single resistor between Trim and +Rs pins for trim up or between Trim and -Rs pins for trim down. To calculate the value of the resistor R_U and R_D for a particular output voltage see page 9.
4. This series comes with several different options: active low remote on/off control, heatsinks, chassis mount, and thru-hole inserts. See the "Model Number Setup" table on page 12 for more ordering information.

SPECIFICATIONS: LV200 SERIES

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range			9	12/24	36	VDC
UVLO Turn-On At					TBD	VDC
UVLO Turn-off At					TBD	VDC
Input Surge Voltage (100ms)					50	VDC
Input Current	No Load		See Table			
Input Filter			Pi type			
Reflected Ripple Current				TBD		mA
OUTPUT SPECIFICATIONS						
Output Voltage			See Table			
Voltage Set Point	±RS shorted to ±Vo		-1.0		+1.0	%
Line Regulation	±RS shorted to ±Vo			0.1	0.2	%
Load Regulation	±RS shorted to ±Vo			0.1	0.2	%
Voltage Adjustability	Max output limited to 200W		-10		+10	%
Remote Sense Compensation	Max output limited to 200W				10	%
Output Power			See Table			
Output Current			See Table			
Minimum Load			0			%
Ripple	1µF ceramic and 10µF tantalum				TBD	mVp-p
Spikes	1µF ceramic and 10µF tantalum				TBD	mVp-p
Temperature Drift				0.2		%/°C
DYNAMIC RESPONSE						
Load Step / ΔV	50% to 100% Io, di/dt=1A/uS			200		mV
Recovery Time	Recovery to within 1% Nominal Vo			TBD		ms
Turn-on Delay	From Vin(min) to Vout (nom)			TBD		ms
Turn-on Overshoot	Full Load Resistive			0		%
Hold-up Time	From Vin (min) to $V_{ULVO\_Turn\_Off}$		0			mS
REMOTE ON/OFF CONTROL						
Active High (standard)	Min High (ON/OFF pin)	Remote ON	2.2			VDC
	Max Low (ON/OFF pin)	Remote OFF			1.2	
Active Low (optional)	Max Low (ON/OFF pin)	Remote ON	N/A			VDC
	Min High (ON/OFF pin)	Remote OFF	N/A			
Remote ON/OFF Pin Floating	Over operating voltage range	Active High	2.5		5.0	VDC
		Active Low	N/A			
Turn-On Delay (Active High)	ON/OFF (max Low) to Vout (min)			9		ms
Turn-Off Delay (Active High)	ON/OFF (0V) to Vout (min)			160		µs
PROTECTION						
Short Circuit Protection			hiccup, automatic recovery			
Current Limit	Power limited-dependent upon SENSE compensation and TRIM adj.				TBD	%
Over Voltage Protection	Output clamped		115		130	%
Over Temperature Protection	Case temperature greater than			+95		°C
	Case temperature less than			+85		
GENERAL SPECIFICATIONS						
Efficiency	Nominal input voltage and full load		See Table			
Switching Frequency				400		kHz
Isolation Voltage	1 minute (basic insulation)	Input to Output		1500		VDC
		Input/Output to Case		500		
Isolation Resistance	500VDC		10			MΩ
Isolation Capacitance					TBD	pF
ENVIRONMENTAL SPECIFICATIONS						
Operating Case Temperature	Max ambient limited by OTP		-40		+100	°C
Storage Temperature			-50		+125	°C
Relative Humidity			5		95	% RH
MTBF	Calculated using BELLCORE TR-332 Method 1 case 3		TBD			hours

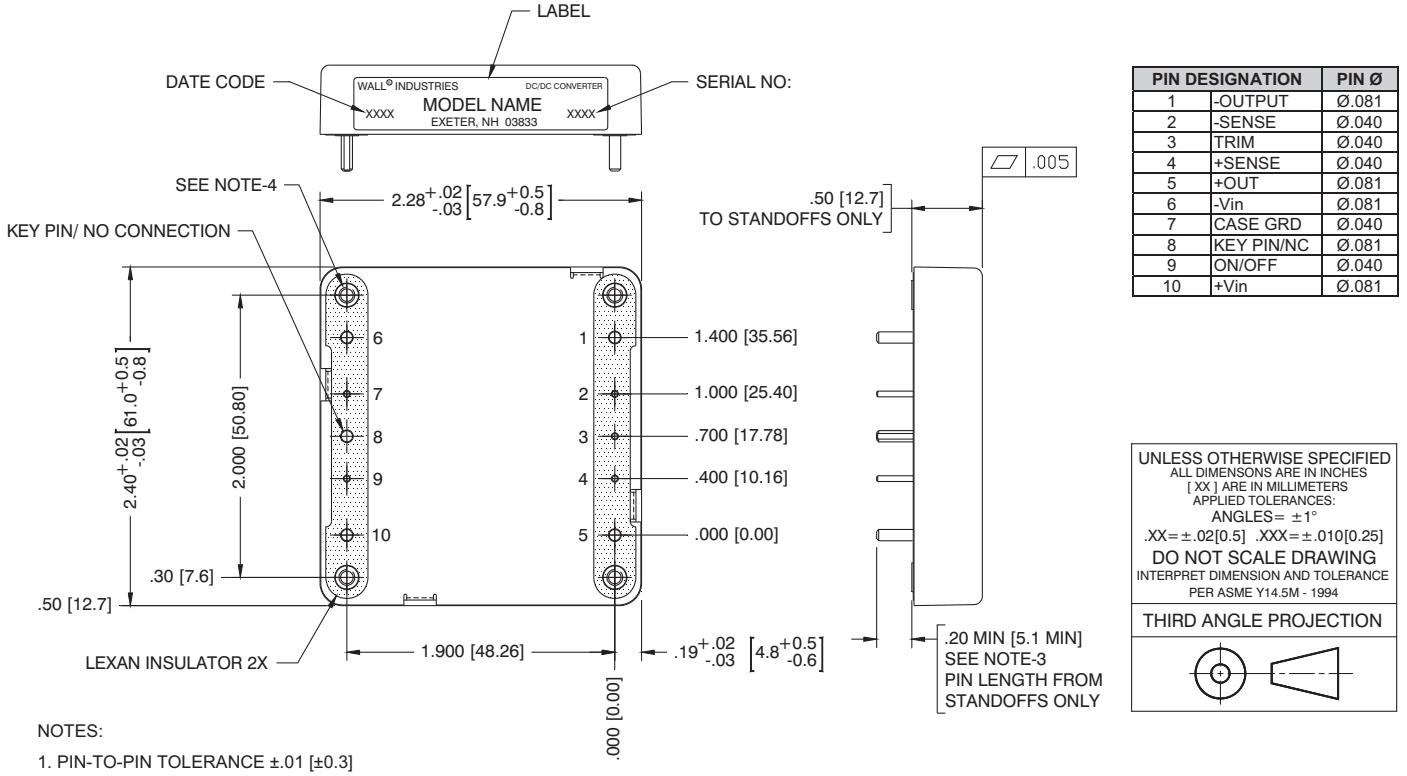
SPECIFICATIONS: LV200 SERIES

All specifications are based on 25°C, Nominal Input Voltage, and Maximum Output Current unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
PHYSICAL SPECIFICATIONS						
Weight	Standard models			4.0oz (113g)		
	Chassis Mount Models			7.52oz (213g)		
Dimensions (L x W x H)	Standard models			2.40 x 2.28 x 0.50 inches (61.0 x 57.9 x 12.7 mm)		
	Chassis Mount Models			5.70 x 3.40 x 1.10 inches (144.8 x 86.4 x 28.0 mm)		
Case Material				Thick, aluminum alloy		
Base Material				TBD		
Potting Material				TBD		
Shielding				Six-sided		
SAFETY & EMC CHARACTERISTICS						
Safety Approvals						IEC60950-1, UL60950-1, EN60950-1, EN50155
EMI	EN55011, EN55022					Class A
ESD	EN61000-4-2	Air ±8kV and Contact ±6kV				Perf. Criteria A
Radiated Immunity	EN61000-4-3	20 V/m				Perf. Criteria A
Fast Transient	EN61000-4-4	±2kV				Perf. Criteria A
Surge	EN61000-4-5	EN55024 ±2kV and EN50155 ±2kV				Perf. Criteria A
Conducted Immunity	EN61000-4-6	10 Vrms				Perf. Criteria A

MECHANICAL DRAWING

STANDARD MODELS



PIN DESIGNATION		PIN Ø
1	-OUTPUT	Ø.081
2	-SENSE	Ø.040
3	TRIM	Ø.040
4	+SENSE	Ø.040
5	+OUT	Ø.081
6	-Vin	Ø.081
7	CASE GRD	Ø.040
8	KEY PIN/NC	Ø.081
9	ON/OFF	Ø.040
10	+Vin	Ø.081

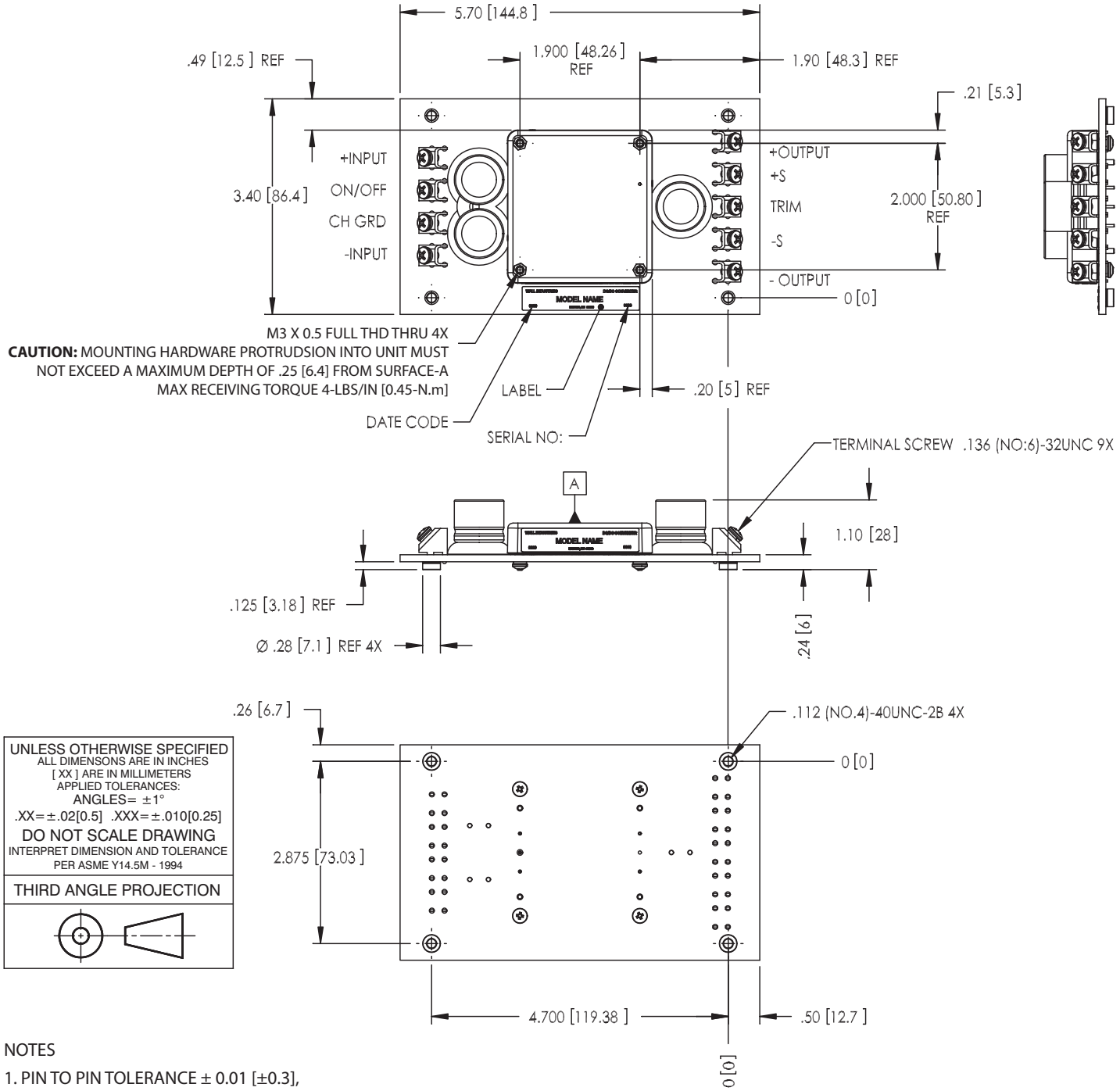
UNLESS OTHERWISE SPECIFIED
ALL DIMENSONS ARE IN INCHES
[XX] ARE IN MILLIMETERS
APPLIED TOLERANCES:
ANGLES= ±1°
.XX=±.02[0.5] .XXX=±.010[0.25]
DO NOT SCALE DRAWING
INTERPRET DIMENSION AND TOLERANCE
PER ASME Y14.5M - 1994
THIRD ANGLE PROJECTION

NOTES:

1. PIN-TO-PIN TOLERANCE ±.01 [±0.3]
   PIN DIAMETER TOLERANCE: ±.005 [±0.13]
2. CASE MATERIAL: 0.040 [1.02] THICK, ALUMINUM ALLOY 3003-0, PER: QQA 250/2
3. UNLESS OTHERWISE SPECIFIED
4. UNIT COMES WITH EITHER 3M x 0.5 THREADED THRU INSERTS OR FOR Ø.125 THRU-HOLE ADD "TH" SUFFIX TO THE MODEL NUMBER.
5. CONSULT FACTORY FOR OPTIONAL HEATSINK

MECHANICAL DRAWING

CHASSIS MOUNT MODELS (PREFIX "CM")



NOTES

1. PIN TO PIN TOLERANCE ± 0.01 [±0.3],
   PIN DIAMETER TOLERANCE: ±0.005 [±0.13].
2. CASE MATERIAL OF THE CONVERTER: Ø.040 [1.02] THICK, ALUMINUM ALLOY 3003-0, PER: QQA 250/2.
3. UNLESS OTHERWISE SPECIFIED.
4. UNIT COMES WITH EITHER .112 (NO.4)-4OUNC-2B THREADED THRU INSERTS OR FOR Ø.125 THRU-HOLE FOR THE CHASSIS MOUNT BOARD ADD: "TH" SUFFIX TO MODEL PART NUMBER. EXAMPLE: CMLV12S15-200TH

CHARACTERISTICS (Based on LV12S15-200)

Max Ambient vs Io (Vin=24VDC)

TBD

Efficiency vs Output Current

TBD

Input Current vs Input Voltage

TBD

Power Dissipation vs Input Voltage

TBD

Min Load Input Current & Power Dissipation vs Input Voltage

TBD

"Remote Off" Input Current & Power Dissipation vs Input Voltage

TBD

CHARACTERISTICS (Based on LV12S15-200)

Photo 1: Remote Turn On

TBD

Vin=24V, Iout=1.33A

Photo 2: Remote Turn Off

TBD

Vin=24V, Iout=13.33A

Photo 3: Normal Turn On

TBD

Vin=24V, Iout=1.33A

Photo 4: Normal Turn On

TBD

Vin=24V, Iout=13.33A

Photo 5: Remote Turn Off

TBD

Vin=24V, Iout=1.33A

Photo 6: Remote Turn Off

TBD

Vin=24V, Iout=13.33A

CHARACTERISTICS (Based on LV12S15-200)

Photo 7: Transient Response 50% to 100%

TBD

Vin = 24V, Iout = 6.66 to 13.33A, Cout = 1µF Ceramic + 10µF tantalum

Photo 8: Transient Response Min Load to Max Load

TBD

Vin = 24V, Iout = 1.33 to 13.33A, Cout = 1µF Ceramic + 10µF tantalum

Photo 9: Output Voltage Ripple (20MHz BW)

TBD

Vin = 24V, Iout = 1.33A, Cout = 1µF Ceramic + 10µF tantalum

Photo 10: Output Voltage Ripple (20MHz BW)

TBD

Vin = 24V, Iout = 13.33A, Cout = 1µF Ceramic + 10µF tantalum

Photo 11: Output Voltage Ripple (Spike)

TBD

Vin = 24V, Iout = 13.33A, Cout = 1µF Ceramic + 10µF tantalum

Photo 12: Input Reflected Ripple Voltage and Ripple Current

TBD

Vin = 24V, Iout = 13.33A
with 680µFaluminum electrolytic and 12µH series inductor

DESIGN CONSIDERATIONS

Under Voltage Lock Out (UVLO)

The converter output is disabled until the input voltage exceeds the UVLO turn-on limit. The converter will remain ON until the input voltage falls below the UVLO turn-off limit.

Over Current Protection

The converter is protected from short circuit and over current conditions. During these fault conditions, the converter output will 'hiccup'. The converter output will recover once the short or over current fault is removed.

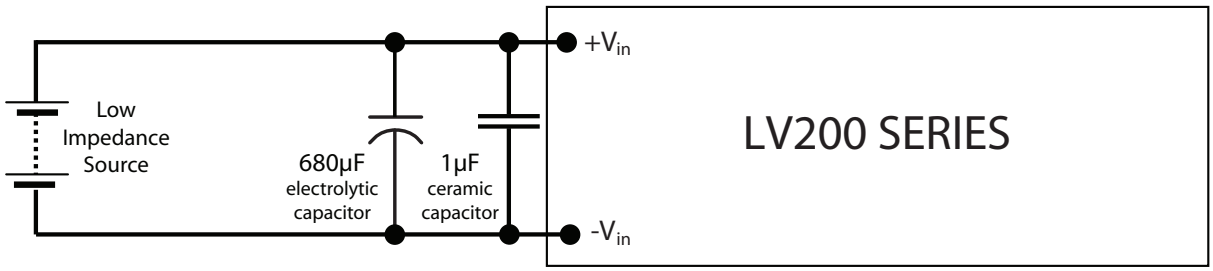
Over Temperature Protection (OTP)

The converter has internal thermal protection that will shut the converter OFF once the case temperature exceeds the OTP turn-off limit. The converter will resume operation when the case temperature has dropped below the OTP turn-on limit.

Input Filter

It is recommended to bypass the +Vin and –Vin pins of the converter with a minimum of 680µF (100V minimum) capacitor. No other bypassing is needed. However, to reduce the input ripple beyond what is seen in Photo 1, larger values of capacitance may be used. Additionally, an inductor may be placed between the source and the previously mentioned capacitor. No inductor should be placed between the capacitor and the input to the converter.

Input Filter Setup



Output Filter

No additional output capacitor is needed for the power supply to operate. However, to reduce the ripple and noise on the output, additional capacitance may be added. A 100µF Ceramic capacitor may be added across the +Vo and –Vo pins to reduce the ripple and spike noise. Additional capacitance in the form of a tantalum or aluminum electrolytic may also be placed across these pins in order reduce ripple and improve the transient peak-to-peak voltage deviation.

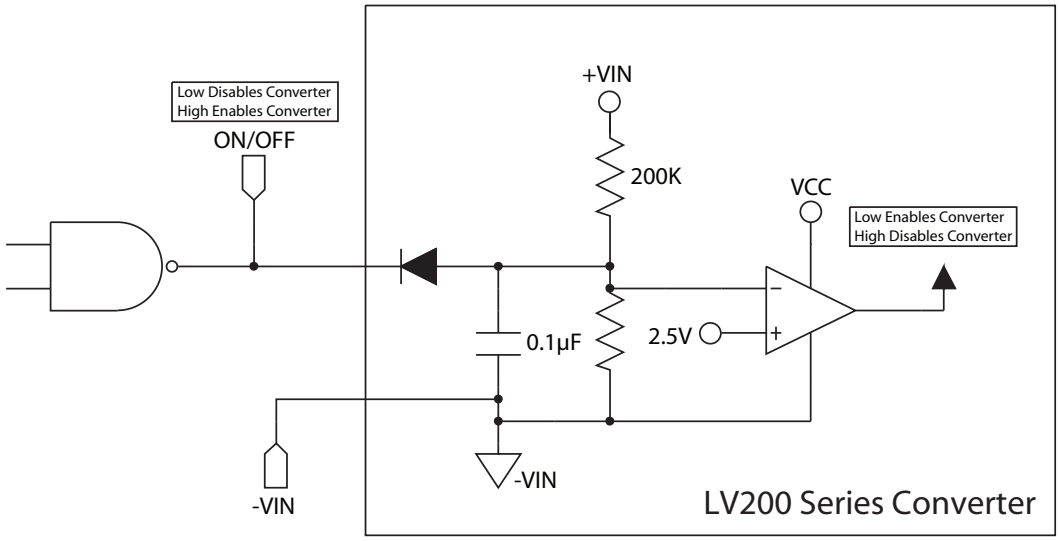
Remote Sense

To improve the regulation at the load, route the connections from the -RS and the +RS pins to the –Vo and +Vo connections at the load. This will force the converter to regulate the voltage at the load and not at the pins of the converter. If it is not desired to use the Remotes Sense feature, the –RS and +RS pins may be left open or they may be shorted to the -Vo and +Vo pins respectively. Shorting the RS pins to the Vo pins will reduce the voltage drops through the converter pins.

Remote ON/OFF

The converter has the ability to be remotely turned ON or OFF. The LV200 series is Active-High. Active-High means that a logic high at the ON/OFF pin will enable the supply. With Active-High, if the ON/OFF pin is left floating, the supply will be enabled.

Active High



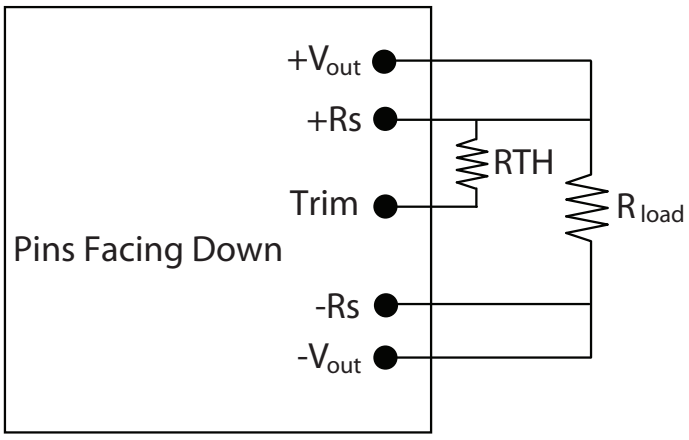
Output Voltage Trim

The output is adjustable ±10% of rated output voltage. To trim the output voltage down, place the trim resistor between the Trim and -Rs pins. To trim the output voltage up, place the trim resistor between the Trim and +Rs pins.

The value of the trim resistor with respect to the desired output voltage (Vo) can be derived from the following formulas.

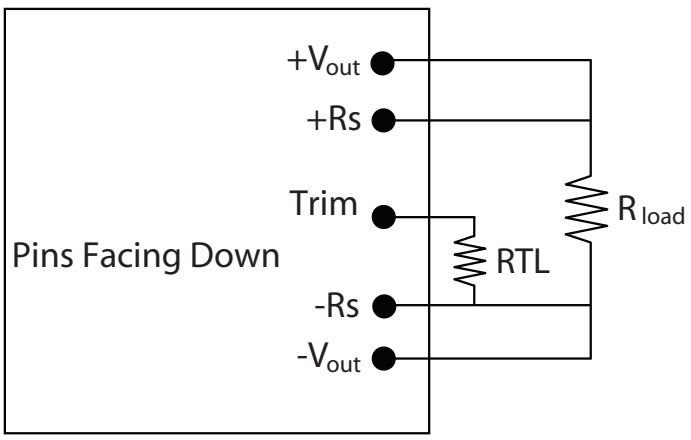
Trim Up

$$RTH = \frac{R_1 \cdot V_o \cdot \frac{V_{onom}}{U_1}}{V_o - V_{onom}} - \frac{R_1 \cdot V_o}{V_o - V_{onom}} - R_{lim} \quad (in\ K\Omega)$$



Trim Down

$$RTL = \frac{R_1 \cdot V_o}{V_{onom} - V_o} - R_{lim} \quad (in\ K\Omega)$$

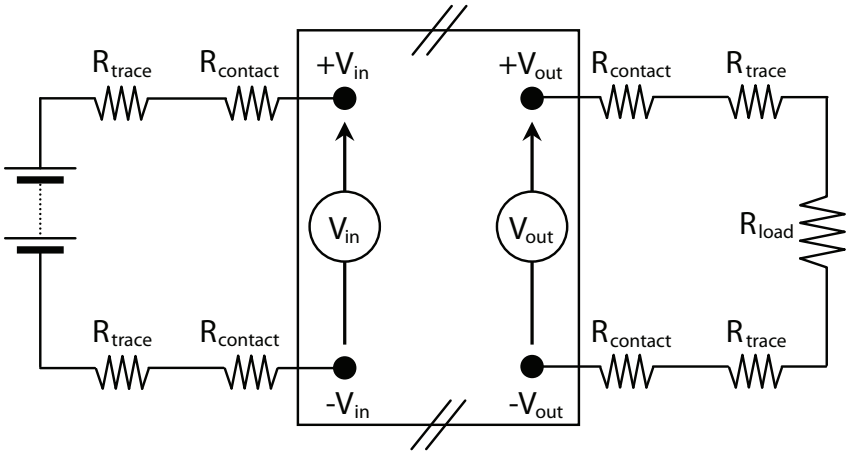


TEST SETUP

Regulation and Efficiency Setup

To ensure that accurate measurements are taken, the voltage measurements are taken directly at the terminal of the module. This minimizes errors due to contact and trace lengths between the load and the output of the supply. The following is a diagram of the test setup.

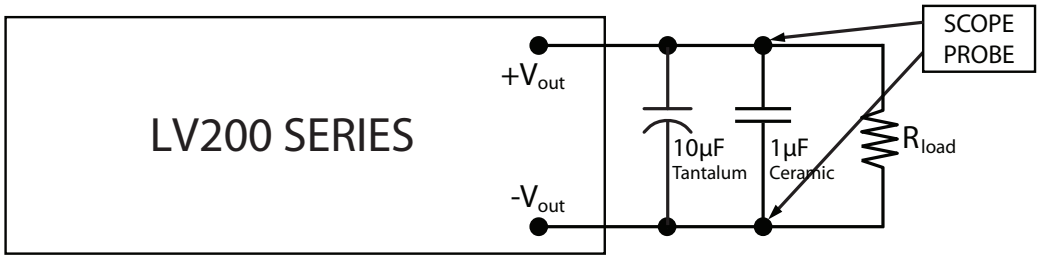
Regulation and Efficiency Probe Setup



Output Ripple Voltage Setup

The module is tested with a 1µF ceramic capacitor in parallel with a 10µF tantalum capacitor across the output terminals.

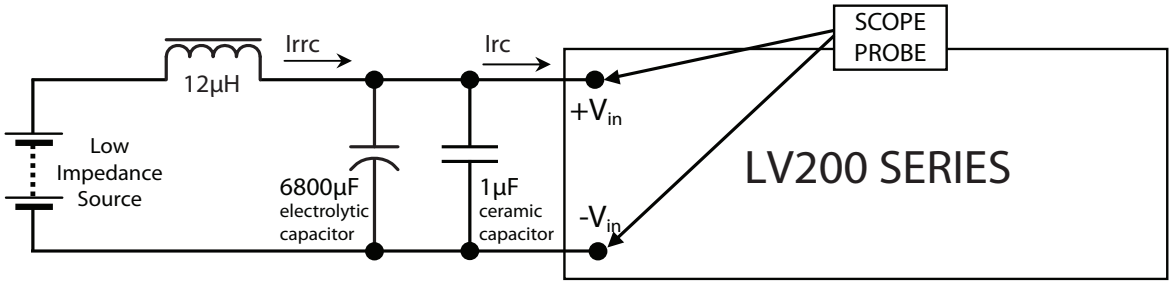
Ripple Voltage Probe Setup



Input Reflected Ripple Current & Input Ripple Current Setup

The module is tested for input reflected ripple current (Irrc) and input ripple current (Irc). The input ripple voltage is also measured at the pins with the following input filter. If there is a need to reduce input ripple current/voltage then additional ceramic capacitors can be added to the input of the converter.

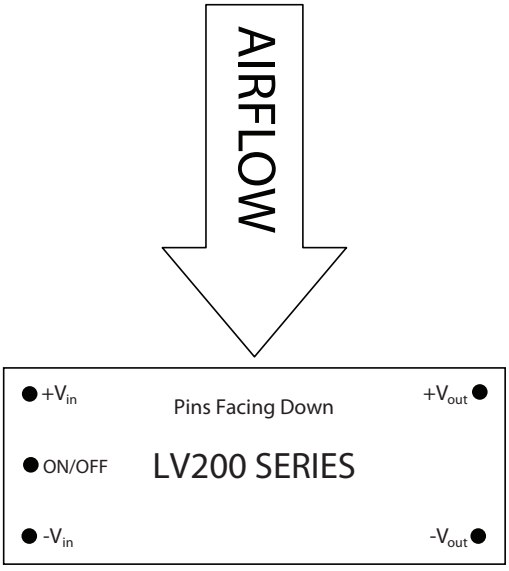
Ripple Current Setup



Converter Thermal Consideration

The converter is designed to operate without convective cooling if the derating curves are followed. The converter can operate at higher temperatures if airflow is applied. Airflow should be aligned lengthwise to the converter for optimum heat transfer.

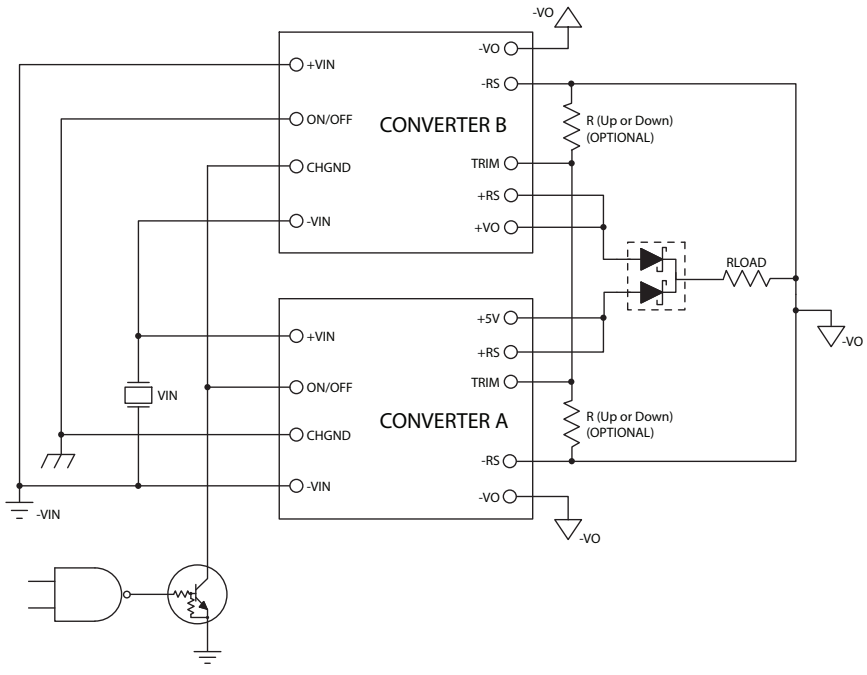
Airflow Orientation



Paralleling Converters

The LV200 series converters may be paralleled both for redundancy and for higher output current. However, in order to do this, a high-current, low Vf, schottky diode must be placed at the +Vo pin of each supply as shown below. To improve sharing, tie the two TRIM pins together. The converters may be trimmed by adding a resistor value from each TRIM pin to ±RS pin, or alternatively, a single resistor of half the value from the common TRIM pins to the common ±RS pins.

Paralleling Converters



MODEL NUMBER SETUP

CM	LV	12	S	15	-	200
Chassis Mount	Series Name	Input Voltage	Output Quantity	Ouptut Voltage		
None: Standard **CM:** Chassis Mount		**12:** 9-36VDC	**S:** Single Output	**3.3:** 3.3 VDC **05:** 5 VDC **12:** 12 VDC **15:** 15 VDC **24:** 24 VDC **28:** 28 VDC **48:** 48 VDC		**200:** 200 Watts

R	TH	HS
Remote ON/OFF	Inserts	Heatsink
None: Active High **R:** Active Low	**None:** Threaded **TH:** Thru-hole	**None:** No heatsink **H:** Heatsink

Note: Models with thru-hole inserts cannot be equipped with a heatsink.

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 ISO9001-2008 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.

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