

**Wall Industries, Inc.**

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# SP24S12-100

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100W DC-DC Converter  
18-36 Vdc Input  
12 Vdc Output at 8.33A  
Half-Brick Package

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**Features:**

- **82% Efficient at Full Load**
- **Fast Transient Response**
- **Operation to No Load**
- **100% Burn In**
- **Remote ON/OFF (Active High/Low)**
- **Remote Sense Compensation**
- **UL 1950 Listed - CE Mark**
- **Low Output Ripple**
- **Fixed Switching Frequency**
- **Output Over Current Protection**
- **Output Short Circuit Protection**
- **Over Temperature Protection**
- **1500 Vdc Isolation**
- **Test Board Available**

**Description:**

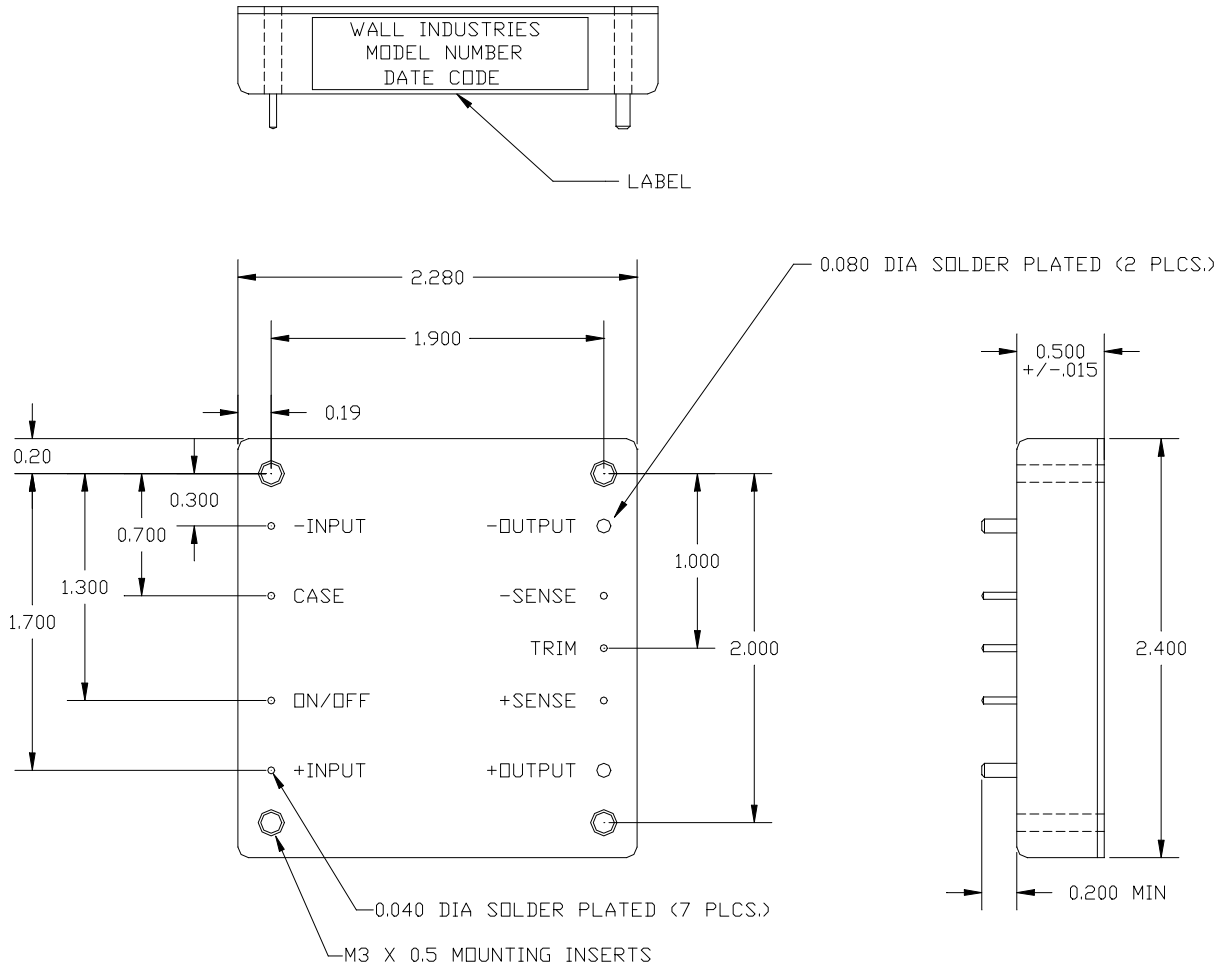
The SP & SPW series is a high-density half brick converter that incorporates the desired features required in today's demanding applications. When performance, reliability, and low cost are needed, the SP & SPW series delivers.

Technical Specifications		Model No.		SP24S12-100			
All specifications are based on 25C, Nominal Line and Full Load unless otherwise noted. We reserve the right to change specifications based on technological advances.							
SPECIFICATION	Related condition			MIN	NOM	MAX	Unit Measured
<b>INPUT</b>							
Turn on at					17		Volt DC
Turn off at					16		Volt DC
Input Over voltage Shutdown							
Turn off at					38		Volt DC
Turn on at					37		Volt DC
Operating Voltage Range	Rated Input Voltage			18	24	36	Volt DC
Maximum Input Current	Low Line 100% load				7		A
No Load Input Current					58		mA
Input Current under "LOGIC OFF"					<1		mA
Inrush Current Transient Rating					1		A <sup>2</sup> Sec
Reflected Ripple Current	12uH / 33uF input filter				20		mA
<b>OUTPUT</b>							
Output Voltage Set point				11.88	12	12.12	Volt DC
Output Voltage Regulation							
Over Load					± 0.1		%
Over Line					± 0.1		%
Over Temperature					0.02		% / °C
Output Voltage Ripple and Noise							
Basic Ripple					60		mV
Spikes P-P					120	180	mV
Output Current Ranges	Rated Output Current			0		8.333	A
Output Current Limit	Self Resetting			10	11.666	13.333	A
Short Term Output Current Surge							A/sec
<b>DYNAMIC CHARACTERISTICS</b>							
Input Voltage Ripple Rejection	120 Hz				60		dB
Output Transient and Load Changes							
Load step / ΔV	X	50 to 75%	50 to 100%		160		mV
Load step / ΔV	X	75 to 50%	100 to 50 %		170		mV
Recovery Time	To within 1% Rated Vo				150		μsec
Turn on Delay	From Vin(nom) to 90% Vout (nom)				225		msec
Overshoot of Output Voltage	Full Load Resistive				0		%
<b>EFFICIENCY</b>							
@ 100% load					82		%
@ 75% load					84		%
@ 50% load					85		%
@ 25% load					84		%
<b>TEMPERATURE CONSIDERATIONS</b>							
Thermal Resistance							
Normal Convection	Rθc-a				7.5		°C/Watt
100 lfm					6.2		°C/Watt
200 lfm					5.1		°C/Watt
300 lfm					4.3		°C/Watt
400 lfm					3.5		°C/Watt
Heatsink Considerations	Available, Contact Factory						
<b>General Technical Data</b>							
Switching Frequency	Fixed				400		KHz
Remote ON OFF Control <i>(See Note Below)</i>	Active HIGH, Open Collector						TTL
Trimmability				10.8		13.2	Volt DC
Over Temperature Shutdown	Case Temperature					105	°C
<b>MTBF</b>							
	Bellcore TR-332				3.51E6		Hours

Note: Positive Remote ON/OFF control is standard. To order negative logic Remote ON/OFF control add the suffix "R" to the part number.

**Figure 1: Mechanical Dimensions**

Unit: inches



Tolerance: X.XX ±0.020  
 X.XXX±0.010

## Output Voltage Trim

The following information is provided to allow quick calculation of the trim resistor value for a desired output voltage. The general procedure for calculating a trim resistor is as follows:

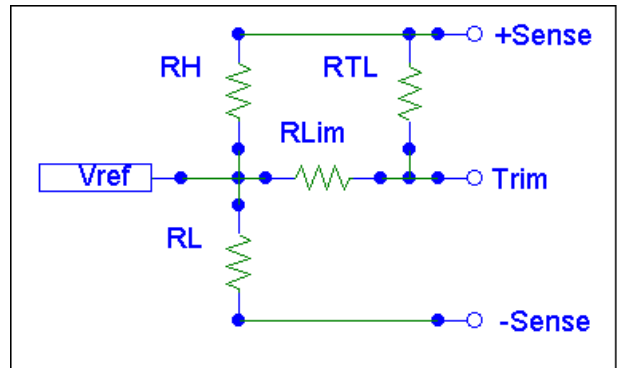
1. Determine the desired output voltage (Vo)
2. Select Equation. (Trim Low/Trim High)
3. Use the data in Table 1 to complete the equation.
4. Evaluate.

In order to trim low use Equation 1 and Table 1 to calculate resistor RTL for the desired output voltage.

### Equation 1: Trim Low

$$RT_L = \left[ \frac{V_o - V_{REF}}{\left(\frac{V_{REF}}{R_L}\right) - \left(\frac{1}{R_H} \cdot (V_o - V_{REF})\right)} \right] - R_{LIM}$$

*Vo* - Desired output voltage.  
All resistor values in K ohms.



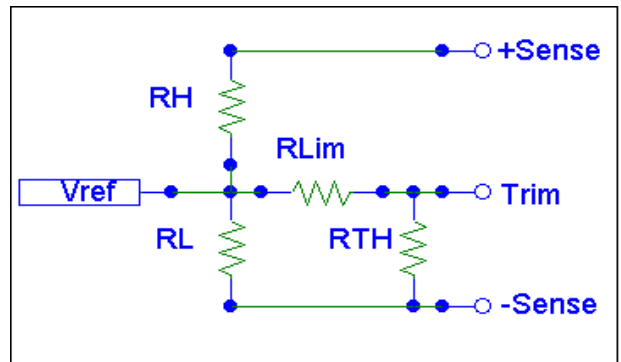
**Schematic 1: Trim Low**

In order to trim high use Equation 2 and Table 1 to calculate resistor RTH for the desired output voltage.

### Equation 2: Trim High

$$RT_H = \left[ \frac{V_{REF}}{\left(\frac{V_o - V_{REF}}{R_H}\right) - \left(\frac{V_{REF}}{R_L}\right)} \right] - R_{LIM}$$

*Vo* - Desired output voltage.  
All resistor values in K ohms.

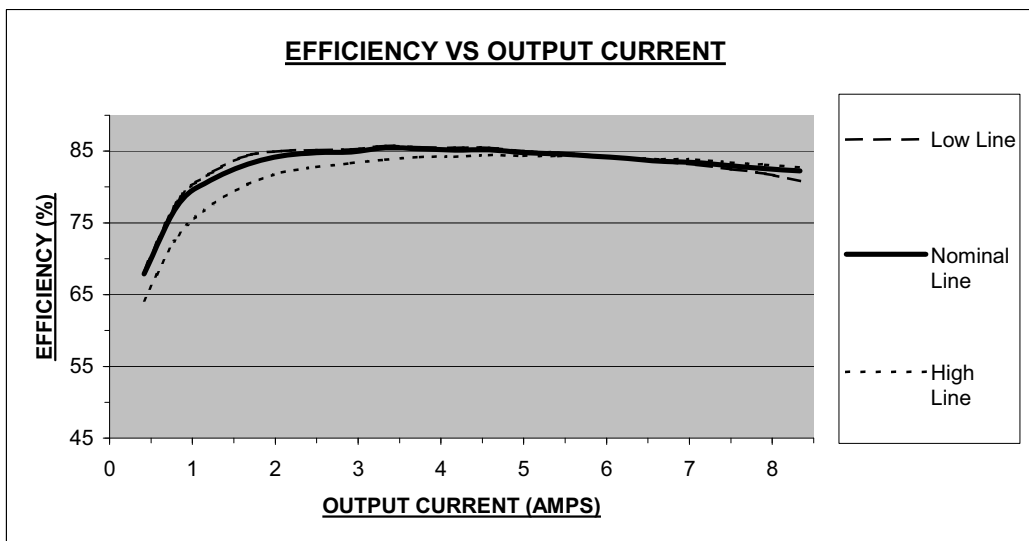
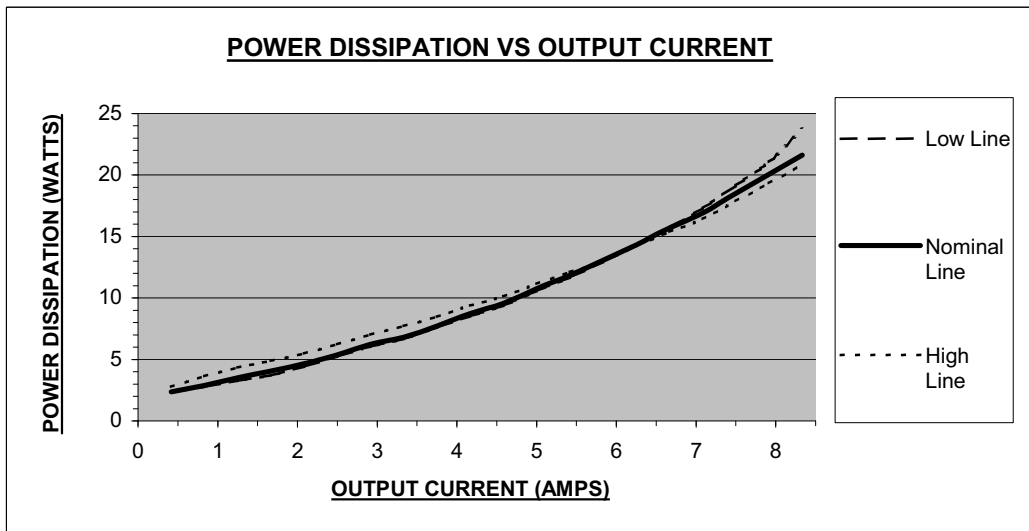
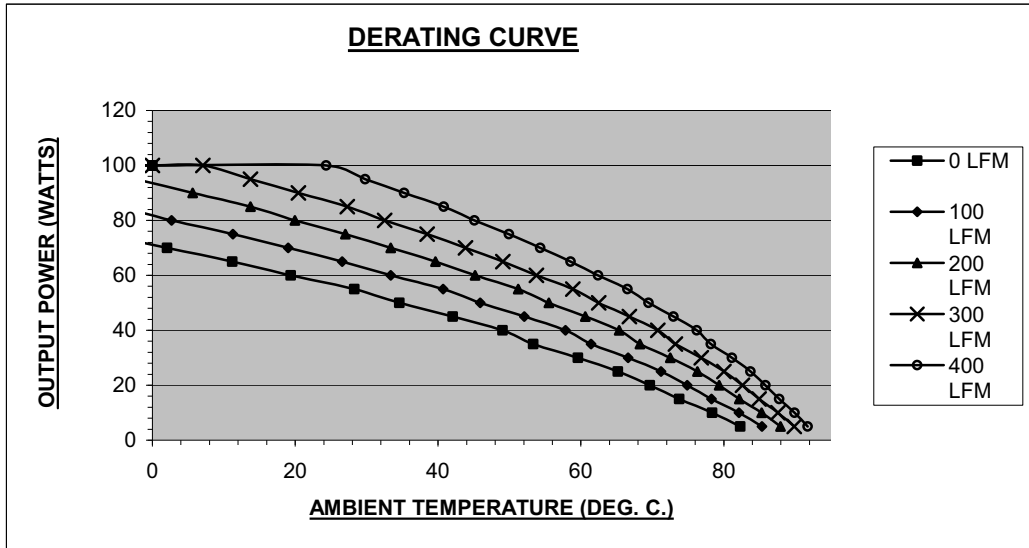


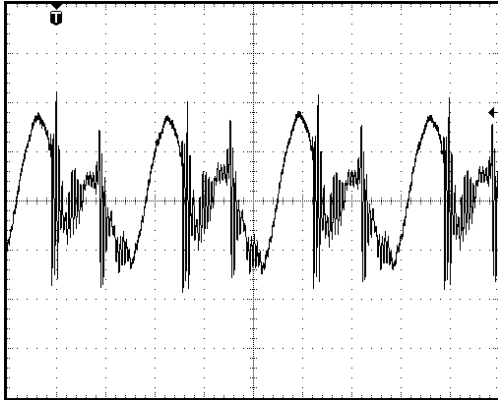
**Schematic 2: Trim High**

MODEL (Output Voltage)	R <sub>H</sub> (K OHMS)	R <sub>LIM</sub> (K OHMS)	R <sub>L</sub> (K OHMS)	V <sub>REF</sub> (VOLTS)
3.3V	0.750	0.499	2.32	2.495
5.0V	2.49	10.0	2.49	2.495
8.0V	5.49	10.0	2.49	2.495
9.0V	6.49	10.0	2.49	2.495
12.0V	9.53	13.7	2.49	2.495
15.0V	12.4	13.7	2.49	2.495
24.0V	21.5	15.4	2.49	2.495
26.0V	17.6	15.4	1.87	2.495
32.0V	23.7	12.7	2.00	2.495

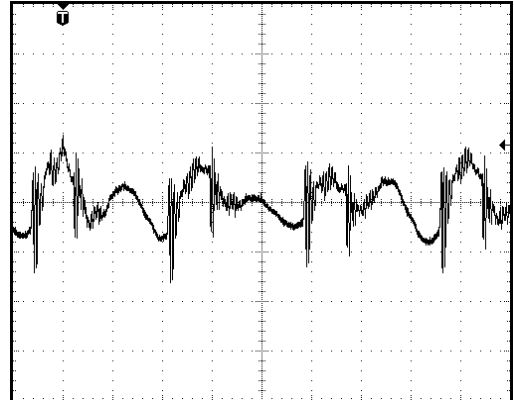
**Table 1 : Trim Low/High Data Table.**

Note: Output trim +/- 10% max.

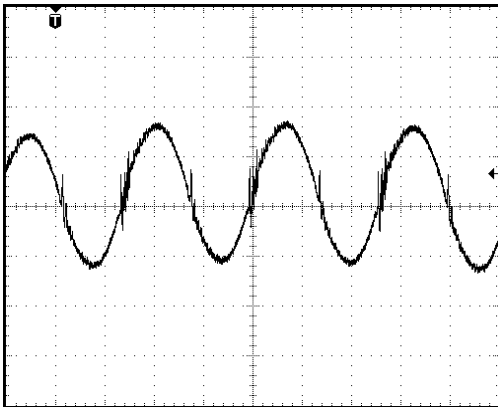




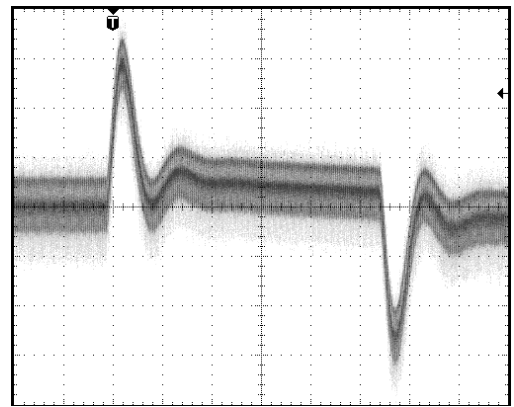
**TYPICAL OUTPUT RIPPLE**  
 20mV/div, 1uS/div, full load, 18Vin  
 10uF // 0.1uF decoupling cap at room temp



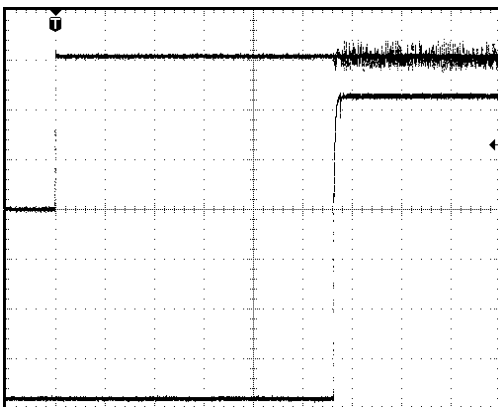
**TYPICAL OUTPUT RIPPLE**  
 50mV/div, 1uS/div, full load 36Vin  
 10uF // 0.1uF decoupling cap at room temp



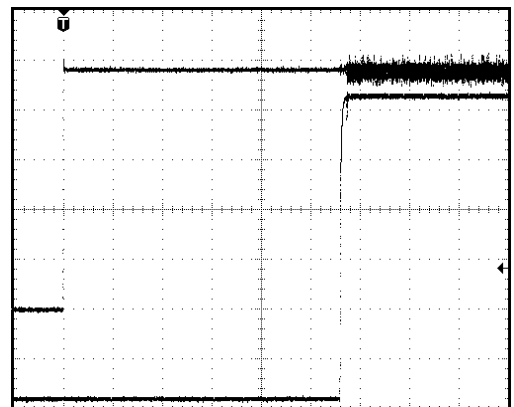
**TYPICAL INPUT RIPPLE CURRENT**  
 10mA/div, 1uS/div, full load 24Vin at  
 room temp with a 12uH / 33uF input filter



**TYPICAL TRANSIENT RESPONSE**  
 50mV/div, 200uS/div, 50% full load  
 to 75% full load 24Vin room temp



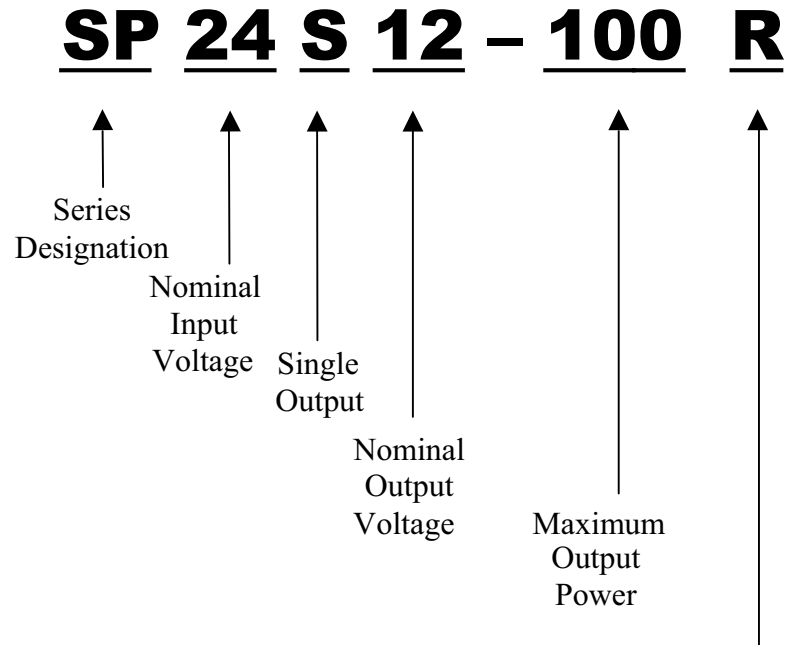
**TYPICAL RISE TIME & TURN-ON DELAY**  
 USING LOGIC ENABLE  
 2V/div, 40mS/div (Vout), 2V/div 40mS/div (logic  
 enable) 18Vin, full load at room temp



**TYPICAL RISE TIME & TURN-ON DELAY**  
 WITH Vin 0-24V  
 2V/div, 40mS/div (Vout), 5V/div, 40mS/div (Vin)  
 at room temp

**Ordering Information:**

Part Number Example:



Options	
Blank	Leave Blank for Active High Enable
R	Active Low Enable

**Company Information:**

Wall Industries, Inc. has created custom and modified units for over 40 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on time and on budget. Our ISO9001-2000 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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