Wall Industries, Inc.

SP24S12-100

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



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:

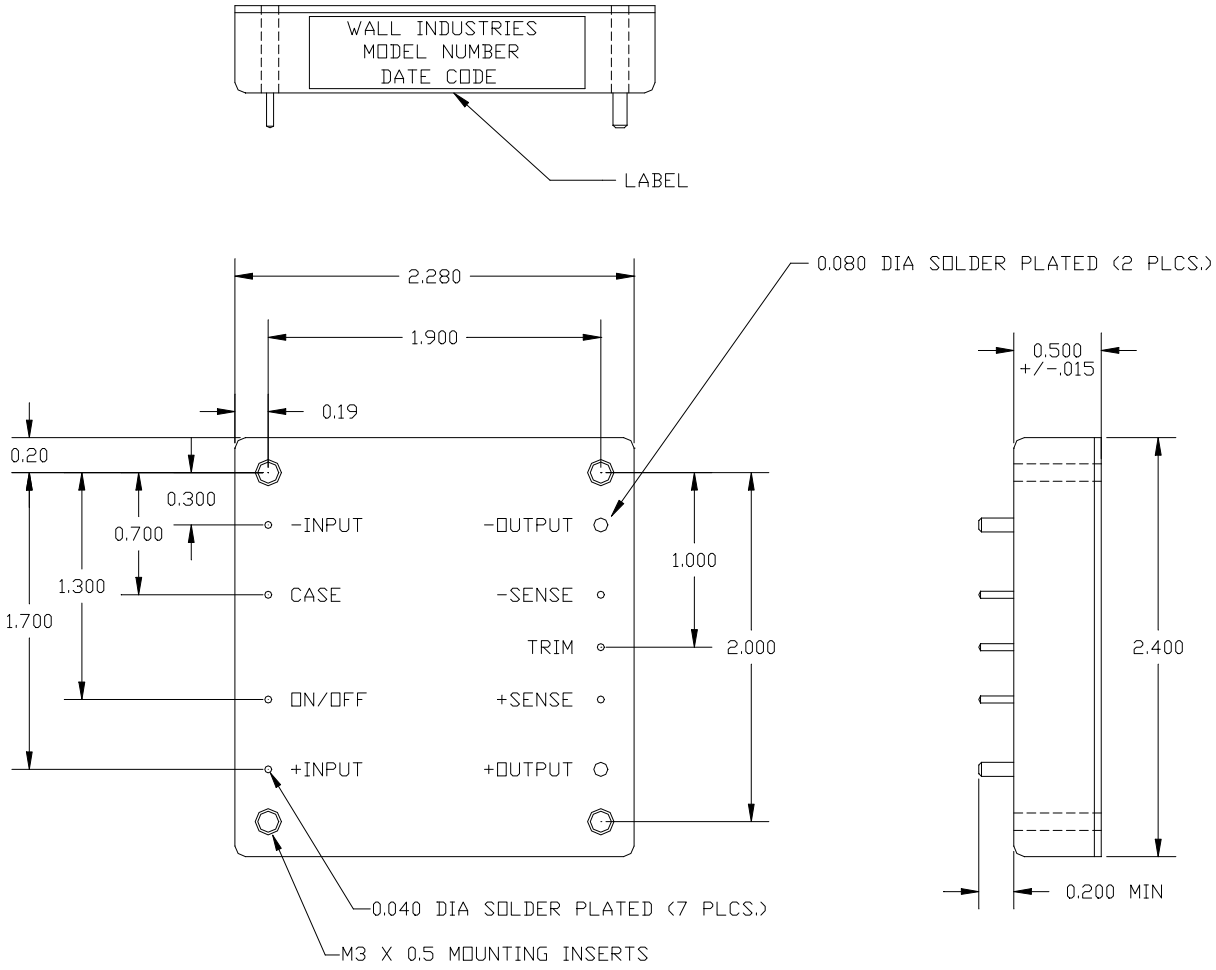
The SP & SPW series is a high-density half brick converter that incorporates the desired features required in today's demanding applications. When performance, reliability, and low cost are needed, the SP & SPW series delivers.

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**
INPUT					
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^2 Sec
Reflected Ripple Current	12uH / 33uF input filter		**20**		mA
OUTPUT					
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
DYNAMIC CHARACTERISTICS					
Input Voltage Ripple Rejection	120 Hz		**60**		dB
Output Transient and Load Changes					
Load step / Δ V	**X** 50 to 75% ☐ 50 to 100%		**160**		mV
Load step / Δ V	**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**		%
EFFICIENCY					
@ 100% load			**82**		%
@ 75% load			**84**		%
@ 50% load			**85**		%
@ 25% load			**84**		%
TEMPERATURE CONSIDERATIONS					
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				
General Technical Data					
Switching Frequency	Fixed		**400**		KHz
Remote ON OFF Control *(See Note Below)*	Active HIGH, Open Collector				TTL
Trimmablility		**10.8**		**13.2**	Volt DC
Over Temperature Shutdown	Case Temperature			**105**	°C
MTBF					
	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:

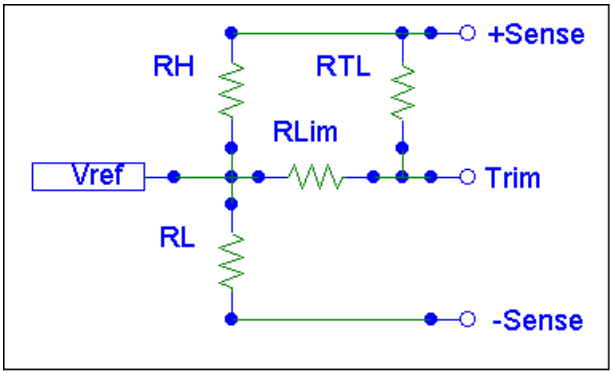
1. Determine the desired output voltage (Vo)
2. Select Equation. (Trim Low/Trim High)
3. Use the data in Table 1 to complete the equation.
4. Evaluate.

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

Equation 1: Trim Low

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

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



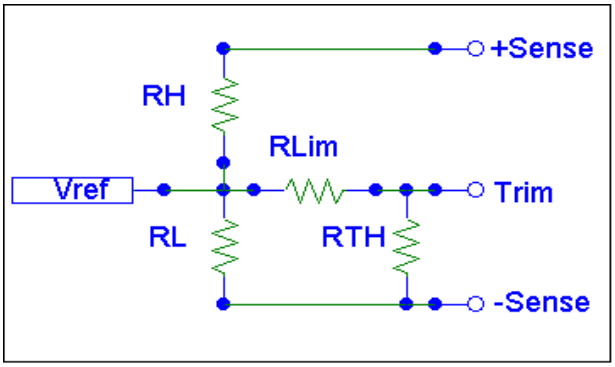
Schematic 1: Trim Low

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.

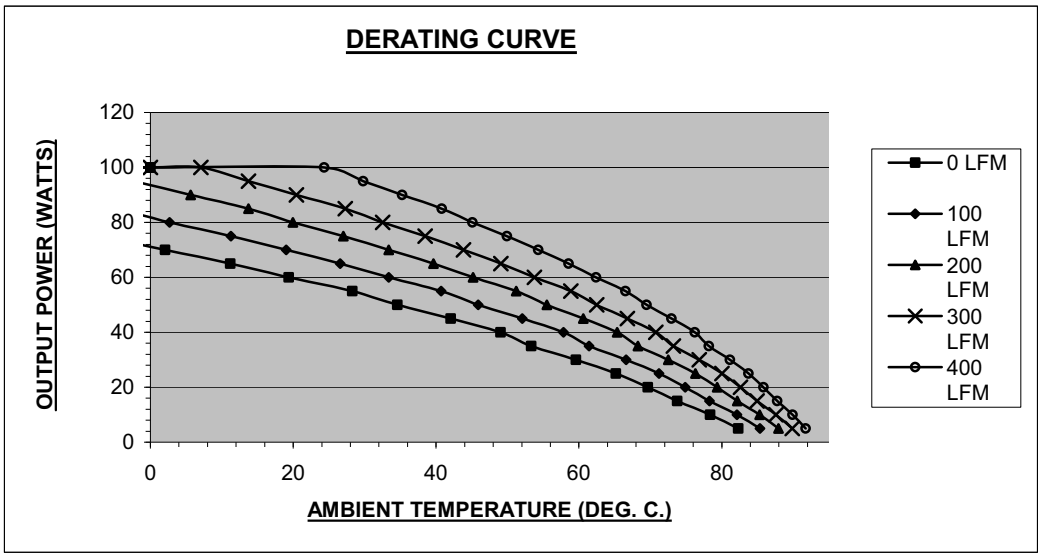


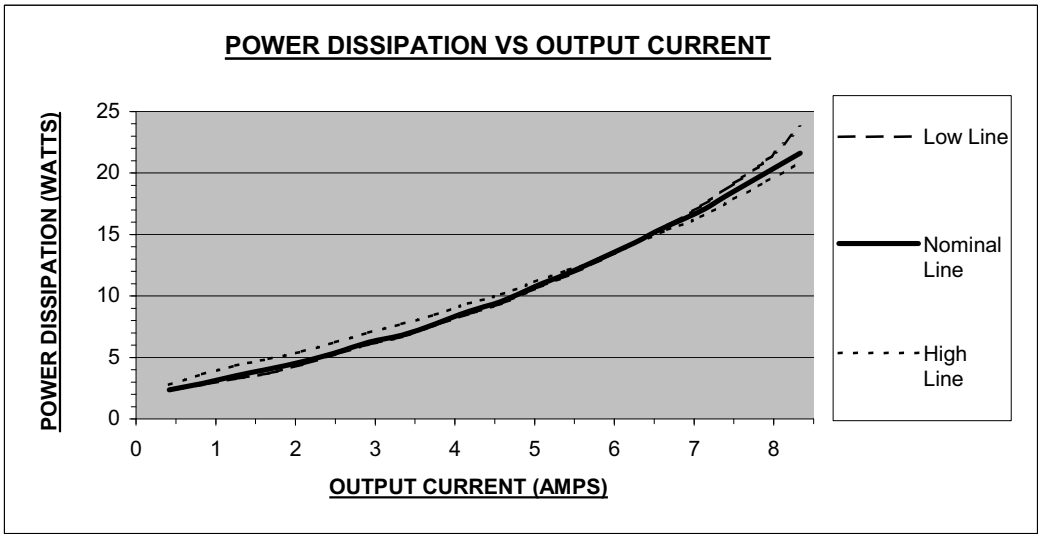
Schematic 2: Trim High

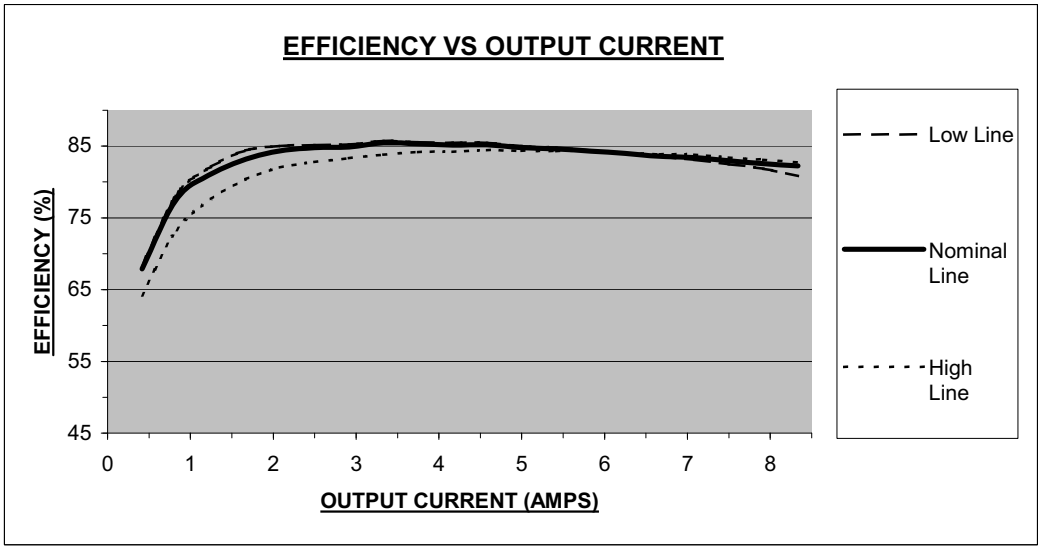
MODEL (Output Voltage)	R_H (K OHMS)	R_{LIM} (K OHMS)	R_L (K OHMS)	V_{REF} (VOLTS)
3.3V	0.750	0.499	2.32	2.495
5.0V	2.49	10.0	2.49	2.495
8.0V	5.49	10.0	2.49	2.495
9.0V	6.49	10.0	2.49	2.495
12.0V	9.53	13.7	2.49	2.495
15.0V	12.4	13.7	2.49	2.495
24.0V	21.5	15.4	2.49	2.495
26.0V	17.6	15.4	1.87	2.495
32.0V	23.7	12.7	2.00	2.495

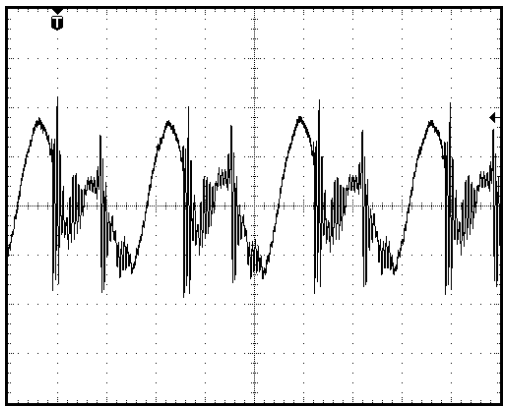
Table 1 : Trim Low/High Data Table.

Note: Output trim +/- 10% max.

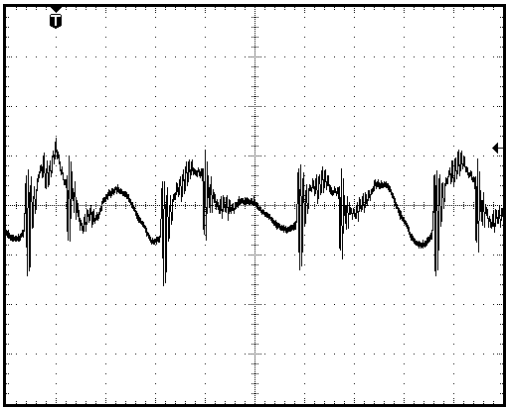

DERATING CURVE
OUTPUT POWER (WATTS)
120
100
80
60
40
20
0
0
20
40
60
80
AMBIENT TEMPERATURE (DEG. C.)
0 LFM
100 LFM
200 LFM
300 LFM
400 LFM


POWER DISSIPATION VS OUTPUT CURRENT
POWER DISSIPATION (WATTS)
25
20
15
10
5
0
0
1
2
3
4
5
6
7
8
OUTPUT CURRENT (AMPS)
Low Line
Nominal Line
High Line

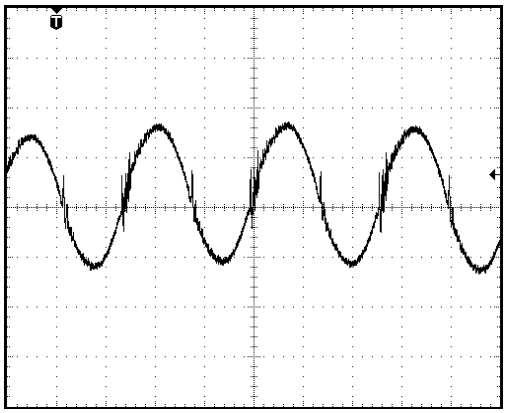

EFFICIENCY VS OUTPUT CURRENT
EFFICIENCY (%)
85
75
65
55
45
0
1
2
3
4
5
6
7
8
OUTPUT CURRENT (AMPS)
Low Line
Nominal Line
High Line



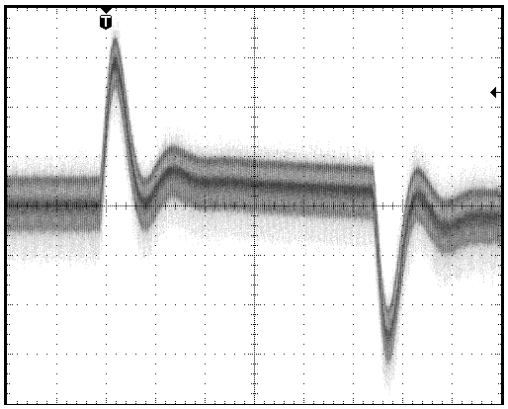
TYPICAL OUTPUT RIPPLE
20mV/div, 1uS/div, full load, 18Vin
10uF // 0.1uF decoupling cap at room temp



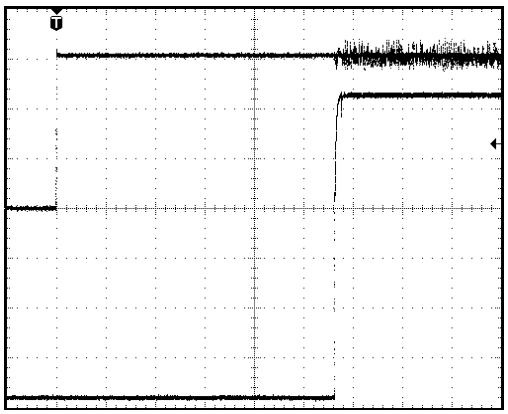
TYPICAL OUTPUT RIPPLE
50mV/div, 1uS/div, full load 36Vin
10uF // 0.1uF decoupling cap at room temp



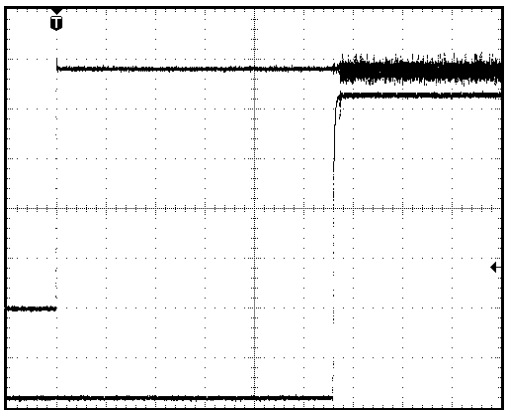
TYPICAL INPUT RIPPLE CURRENT
10mA/div, 1uS/div, full load 24Vin at
room temp with a 12uH / 33uF input filter



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



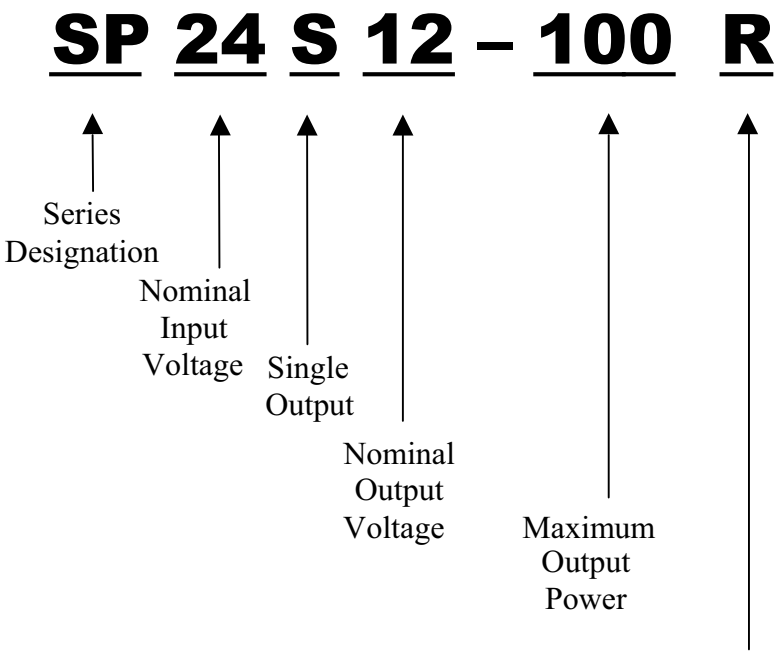
TYPICAL RISE TIME & TURN-ON DELAY
USING LOGIC ENABLE
2V/div, 40mS/div (Vout), 2V/div 40mS/div (logic
enable) 18Vin, full load at room temp



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.

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