

# ISOLATED DC/DC CONVERTERS

48V Input 3.3V/15A, 5V/12A, 12V/5A Outputs, 1/16 Brick Converter



S7SB-50T

Series

PRELIMINARY

- Isolated
- Fixed Frequency
- High Efficiency
- High Power Density
- Low Cost
- Active Low/High Option
- Input Under Voltage Lockout
- Output Over Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Remote On/Off



## Description

The S7SB-50T series are isolated DC/DC converters that operate from a nominal 48V source. These units will provide up to 60W of output power from a nominal 48V input. These units are designed to be highly efficient and low cost. Features include remote on/off, over current protection and under voltage lockout. These converters are provided in an industry standard sixteenth brick package.

## Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High
3.3V	36V - 75V	15A	50W	91%	S7SB-50T03L	S7SB-50T033
5.0V	36V - 75V	12A	60W	92%	S7SB-50T05L	S7SB-50T050
12V	36V - 75V	5A	60W	92%	S7SB-50T12L	S7SB-50T120

**Note:** Add "G" suffix at the end of the model number to indicate Tray Packaging.

## Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3V	-	80V	
Remote On/Off	-0.3V	-	18V	
I/O Isolation Voltage	-	-	1500V	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-55°C	-	125°C	

## Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36V	48V	75V	
Input Current (full load)	-	-	2A	Vo=3.3V, 5.0V, 12V
Input Current (no load)	-	40mA	200mA	Vo=3.3V, 5.0V, 12V
Remote Off Input Current	-	1mA	3mA	
Input Reflected Ripple Current (pk-pk)	-	20mA	50mA	Tested with simulated source impedance of 10uH, 5Hz to 20MHz; use a 100uF/100V electrolytic capacitor with ESR=1 ohm max at 200KHz at the input.
Input Reflected Ripple Current (RMS)	-	3mA	7mA	
I <sup>2</sup> t Inrush Current Transient	-	0.01A <sup>2</sup> s	0.02A <sup>2</sup> s	
Turn On Voltage Threshold	31V	32V	34V	
Turn Off Voltage Threshold	30V	31V	33V	

**Note:** All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

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## Output Specifications

Parameter	Min	Typ	Max	Notes		
Output Voltage Set Point				Test conditions: Vin=48V; Io=50% load		
	Vo=3.3V	3.250V	3.3V	3.350V		
	Vo=5.0V	4.925V	5.0V	5.075V		
	Vo=12V	11.820V	12V	12.180V		
Line Regulation						
	Vo=3.3V	-	±4mV	±9mV		
	Vo=5.0V	-	±5mV	±10mV		
	Vo=12V	-	±12mV	±24mV		
Load Regulation						
	Vo=3.3V	-	±7mV	±15mV		
	Vo=5.0V	-	±10mV	±20mV		
	Vo=12V	-	±30mV	±60mV		
Regulation Over Temperature				-40°C to +85°C		
	Vo=3.3V	-	±30mV	±50mV		
	Vo=5.0V	-	±45mV	±75mV		
	Vo=12V	-	±60mV	±100mV		
Output Current						
	Vo=3.3V	0A	-	15A		
	Vo=5.0V	0A	-	12A		
	Vo=12V	0A	-	5A		
Current Limit Threshold						
	Vo=3.3V	19A	22A	26A		
	Vo=5.0V	13A	15A	18A		
	Vo=12V	6A	7A	8A		
Short Circuit Surge Transient						
	-		0.5A <sup>2</sup> s	1A <sup>2</sup> s		
Ripple and Noise (RMS)				Tested at 0-20MHz BW, with a 1uF ceramic capacitor and a 10uF Tantalum capacitor at the output.		
	Vo=3.3V	-	12mV		25mV	
	Vo=5.0V	-	25mV		50mV	
	Vo=12V	-	25mV	50mV		
Ripple and Noise (pk-pk)				Test conditions: di/dt = 0.1A/uS, Vin=48V, with a 1uF ceramic capacitor and a 10uF Tantalum capacitor at the output.		
	Vo=3.3V	-	55mV		100mV	
	Vo=5.0V	-	110mV		150mV	
	Vo=12V	-	100mV	130mV		
Turn on Time						
	-		35mS	50mS		
Overshoot at Turn on						
	-		0%	5%		
Output Capacitance						
	Vo=3.3V	0uF	-	5600uF		
	Vo=5.0V	0uF	-	3300uF		
	Vo=12V	0uF	-	1000uF		
<b>Transient Response</b>						
25% ~ 50% Max Load	Overshoot	Vo=3.3V	-	130mV	200mV	Test conditions: di/dt = 0.1A/uS, Vin=48V, with a 1uF ceramic capacitor and a 10uF Tantalum capacitor at the output.
	Settling Time		-	80uS	150uS	
50% ~ 25% Max Load	Overshoot	Vo=3.3V	-	130mV	200mV	
	Settling Time		-	80uS	150uS	
25% ~ 50% Max Load	Overshoot	Vo=5.0V	-	200mV	300mV	
	Settling Time		-	120uS	250uS	
50% ~ 25% Max Load	Overshoot	Vo=5.0V	-	200mV	300mV	
	Settling Time		-	120uS	250uS	
25% ~ 50% Max Load	Overshoot	Vo=12V	-	300mV	400mV	
	Settling Time		-	150uS	300uS	
50% ~ 25% Max Load	Overshoot	Vo=12V	-	300mV	400mV	
	Settling Time		-	150uS	300uS	

**Note:** All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

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## General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Vin=48V, full load
Vo=3.3V	88%	91%	-	
Vo=5.0V	88%	92%	-	
Vo=12V	88%	92%	-	
Switching Frequency	540KHz	600KHz	660KHz	
Isolation Capacitance	-	1500pF	-	
Output Voltage Trim Range	90%Vo	-	110%Vo	
Over Temperature Protection	120°C	-	140°C	
Over Voltage Protection	117%Vo	122%Vo	126%Vo	
MTBF	TBD			Calculated Per Bell Core TR-332 (Io = Nominal; Ta = 25°C)
Dimensions				
Inches (L x W x H)	1.3 x 0.9 x 0.376			
Millimeters (L x W x H)	33.0 x 22.9 x 9.5			
Weight	-	15g	-	

**Note:** All specifications are typical at 25°C unless otherwise stated.

## Control Specifications

Parameter	Min	Typ	Max	Notes
<b>Remote On/Off</b>				
Signal Low (Unit On)	Active Low	-0.3V	-	The remote on/off pin open, Unit on.
Signal High (Unit Off)		2.4V	-	
Signal Low (Unit Off)	Active High	-0.3V	-	
Signal High (Unit On)		2.4V	-	
Current Sink	0mA	-	1mA	

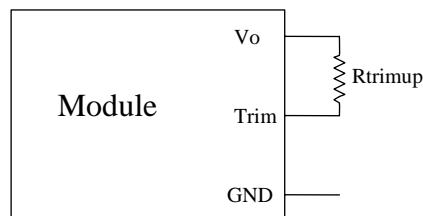
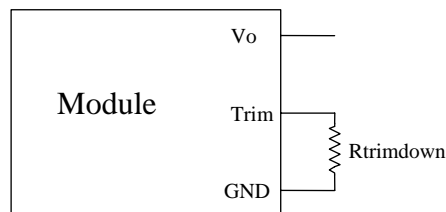
## Output Trim Equations

Equations for calculating the trim resistor are shown below (Unit: kΩ). The Trim Down resistor should be connected between the Trim pin and Ground pin. The Trim Up resistor should be connected between the Trim pin and the Vout. Only one of the resistors should be used for any given application.

$$R_{trimdown} = \frac{511}{|\delta|} - 10.22$$

$$R_{trimup} = \frac{(100 + \delta) \cdot V_o \cdot 511 - 626}{1.225 \cdot \delta} - 10.22$$

**Notes:** 
$$\delta = \frac{(V_o_{req} - V_o)}{V_o} \times 100[\%]$$



Vo\_req=Desired (trimmed) output voltage [V]

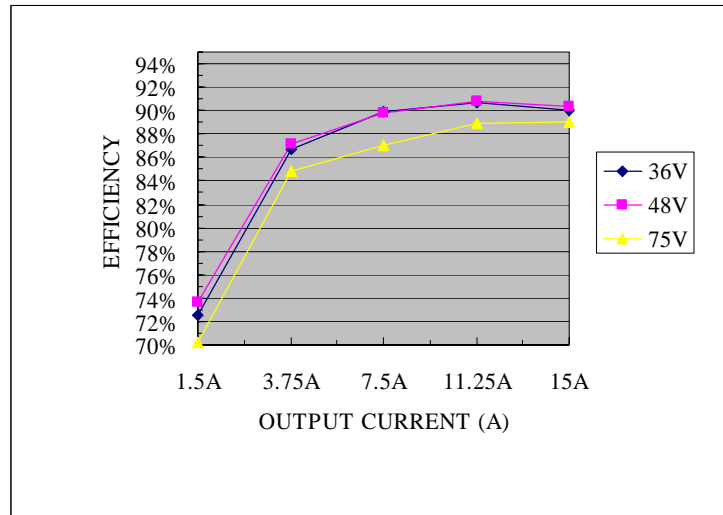
Vo=3.308V for 3.3V output; Vo=5.002 for 5V output; Vo=12.007 for 12V output.

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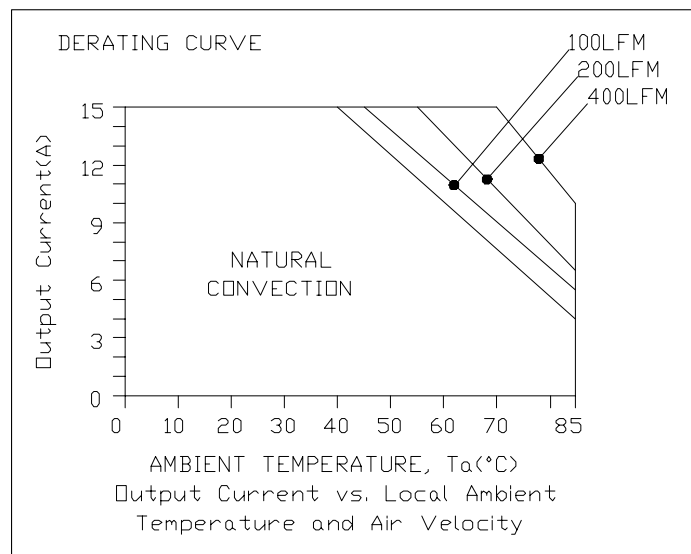


## Efficiency Data



S7SB-50T03x

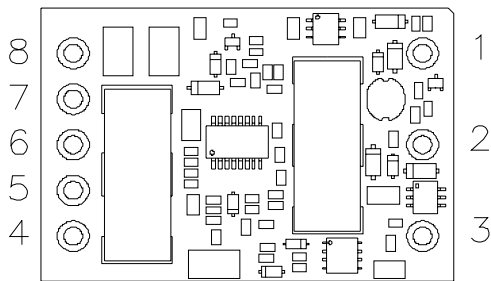
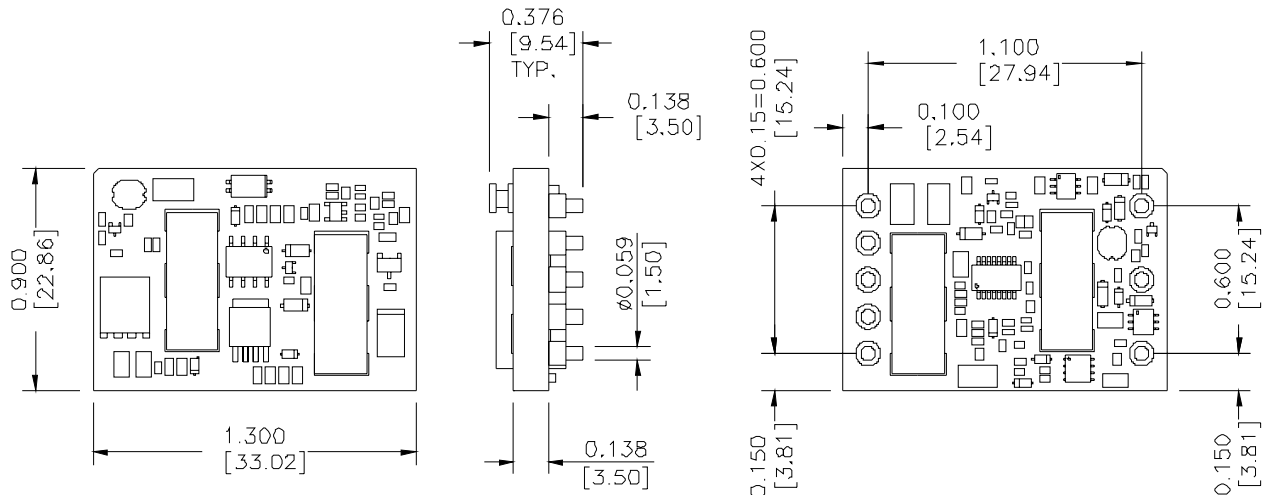
## Thermal Derating Curve



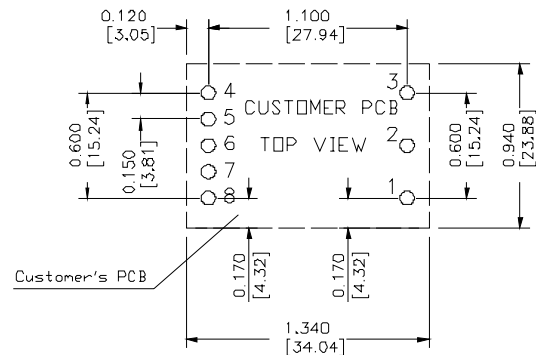
S7SB-50T03x

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## RECOMMENDED PCB PAD LAYOUT



Recommended Surface Mount Pads  
 Min.  $\phi 0.080$ " [2.03]  
 Max.  $\phi 0.092$ " [2.34]

## Pin Connections

Pin	Function
1	Vin (+)
2	Remote On/Off
3	Vin (-)
4	Vout-
5	Remote Sense (-)
6	Trim
7	Remote Sense (+)
8	Vout (+)

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