

## NON-ISOLATED DC/DC CONVERTER

3.3V Input 0.9V to 2.5V/12A Output

**bel**  
POWER PRODUCTS

### S7DB-12C1AH

- Non-Isolated
- Fixed frequency (300kHz)
- Low profile package (8.5mm)
- Remote Sense
- Remote On/Off (Active High Logic)
- Input Under-voltage Lockout (UVLO)
- OCP/SCP
- Wide Trim Output



### Description

The S7DB-12C1AH is part of the low cost non-isolated DC/DC power converter series. The module uses a DIP package for ease of layout and space savings, with a low profile of 8.5mm. The output is widely trimmed from 0.9V to 2.5V, and the efficiency of 2.5V output module is typically 92% at full load. Features include remote sense, remote on/off, short circuit protection, over current protection and input under-voltage lockout.

### Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number
0.9 – 2.5V	3.3V	12A	30W	92%	S7DB-12C1AH

**Note:** Add “R” suffix at the end of the model number to indicate “Reel Packaging”, and “G” for “Tray Packaging”.

### Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3V	-	7V	
Output Enable Terminal Voltage	-0.3V	-	3.9V	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-55°C	-	100°C	

### Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	3V	3.3V	3.6V	
Input Current (full load)				
Vo=2.5V	-	-	12.0A	
Vo=1.8V	-	-	9.3A	
Vo=1.5V	-	-	8.0A	
Vo=1.2V	-	-	6.6A	
Vo=1.0V	-	-	5.7A	
Vo=0.9V	-	-	5.2A	
Input Current (no load)	-	-	150mA	
Remote Off Input Current		10mA	20mA	
Input Reflected Ripple Current (pk-pk)	-	80mA	160mA	Tested with simulated source impedance of 500Hz to 20MHz & two 270uF/10V Oscon capacitors with ESR=0.018 ohm max. at 100KHz
Input Reflected Ripple Current (RMS)	-	25mA	50mA	
I <sup>2</sup> t Inrush Current Transient	-	0.1A <sup>2</sup> s	0.2A <sup>2</sup> s	
Turn-on Voltage Threshold	-	2.85V	-	
Turn-off Voltage Threshold	-	2.3V	-	

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

# NON-ISOLATED DC/DC CONVERTER

3.3V Input 0.9V to 2.5V/12A Output



## Output Specifications

Parameter	Min	Typ	Max	Notes			
Output Voltage Set Point				Vin=3.3V, full load.			
Vo=2.5V	2.450V	2.500V	2.550V				
Vo=1.8V	1.764V	1.800V	1.836V				
Vo=1.5V	1.470V	1.500V	1.530V				
Vo=1.2V	1.176V	1.200V	1.224V				
Vo=1.0V	0.980V	1.000V	1.020V				
Vo=0.9V	0.882V	0.900V	0.918V				
Line Regulation	-	2mV	5mV				
Load Regulation	-	4mV	8mV				
Regulation Over Temperature (-40°C to +85°C)							
Vo=2.5V	-	19mV	38mV				
Vo=1.8V	-	13mV	26mV				
Vo=1.5V	-	11mV	22mV				
Vo=1.2V	-	9mV	18mV				
Vo=1.0V	-	6mV	12mV				
Vo=0.9V	-	5mV	10mV				
Output Current	0A	-	12A				
Current Limit Threshold	15.6A	-	30A				
Ripple and Noise (RMS)	-	10mV	25mV	Test conditions: 0-20MHz BW; 1uF ceramic capacitor & 10uF aluminum capacitor at the output.			
Ripple and Noise (pk-pk)							
Vo=2.5V	-	35mV	75mV				
Vo=1.8V	-	40mV	80mV				
Vo=1.5V	-	40mV	80mV				
Vo=1.2V	-	40mV	80mV				
Vo=1.0V	-	35mV	75mV				
Vo=0.9V	-	35mV	75mV				
Short Circuit Surge Transient	-	0.2A <sup>2</sup> s	0.4A <sup>2</sup> s				
Turn on Time	-	10mS	20mS				
Overshoot at Turn on	-	0%	3%				
Output Capacitance	0uF		4800uF				
<b>Transient Response</b>							
50% ~ 100% Max Load	Overshoot	Vo=1.8V to 2.5V	-	100mV	140mV	Test conditions: di/dt=0.5A/uS, Vin=3.3V, with a 470uF (ESR=0.9 ohm) tantalum capacitor at the output.	
	Settling Time		-	50uS	100uS		
100% ~ 50% Max Load	Overshoot		-	100mV	140mV		
	Settling Time		-	50uS	100uS		
50% ~ 100% Max Load	Overshoot		Vo=0.9V to 1.5V	-	90mV		130mV
	Settling Time			-	50uS		100uS
100% ~ 50% Max Load	Overshoot	-		90mV	130mV		
	Settling Time	-		50uS	100uS		

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

# NON-ISOLATED DC/DC CONVERTER

3.3V Input 0.9V to 2.5V/12A Output



## General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				
Vo=2.5V	89%	92%	-	Vin=3.3V, full load
Vo=1.8V	85%	88%	-	
Vo=1.5V	83%	86%	-	
Vo=1.2V	80%	83%	-	
Vo=1.0V	78%	81%	-	
Vo=0.9V	77%	80%	-	
Switching Frequency	250KHz	300KHz	340KHz	
Output Voltage Trim Range	0.855V	-	2.625V	Total adjustment of trim, setpoint and remote sense combined should not exceed 2.625V. Vo=0.9V when trim pin open
Remote Sense Compensation	-	-	10%	
MTBF	5,443,290 hours			Calculated Per Bell Core TR-332 (Io =9.6A, Vin=3.3V; Ta = 25°C)
Dimensions	Inches millimeters	1.22 x 0.827 x 0.345 31.0 x 21.0 x 8.75		
Weight	-	10.5g	-	

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

## Control Specifications

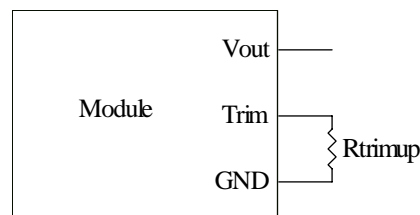
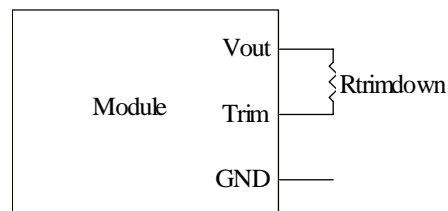
Parameter	Min	Typ	Max	Notes
<b>Remote On/Off</b>				
Signal Low (Unit Off)	Active High	-0.3V	-	Remote on/off pin open, unit on.
Signal High (Unit On)		2.8V	-	

## Output Trim Equations

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) and the nominal output voltage of the converter (Vnom) are shown below. The Trim Down resistor should be connected between the Trim pin and Vout. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

$$R_{TrimDown} = \frac{0.697}{V_{nom} - V_{adj}} - 8.28$$

$$R_{TrimUp} = \frac{5.2}{V_{adj} - V_{nom}} - 1.78$$

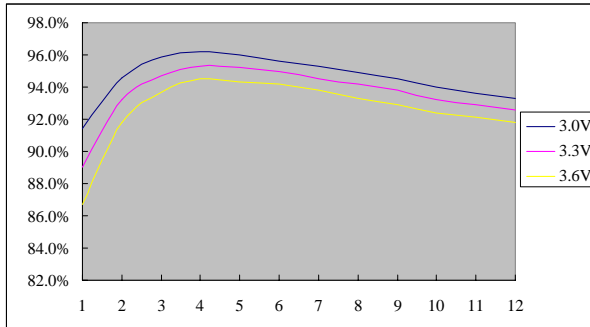


**Note:** The output voltage Vnom = 0.907V.

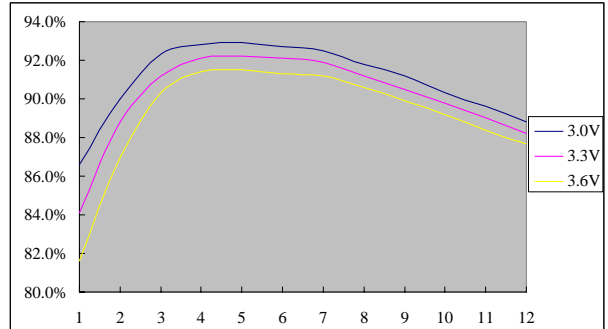
**NON-ISOLATED DC/DC CONVERTER**  
**3.3V Input 0.9V to 2.5V/12A Output**



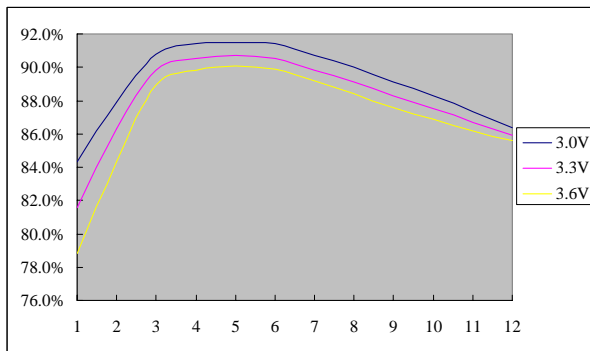
**Efficiency Data**



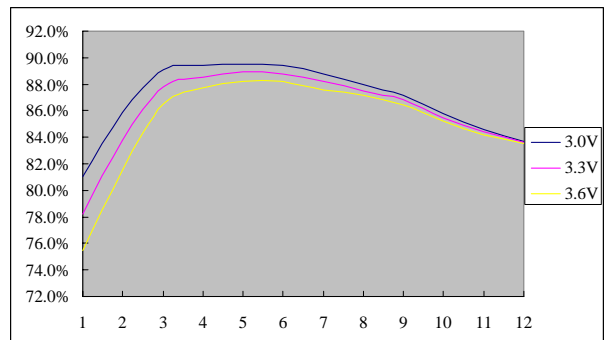
**Vo = 2.5V**



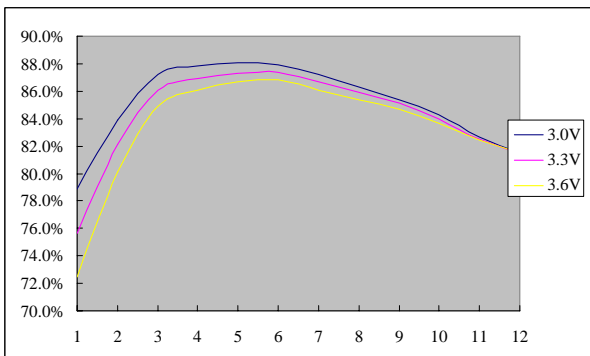
**Vo = 1.8V**



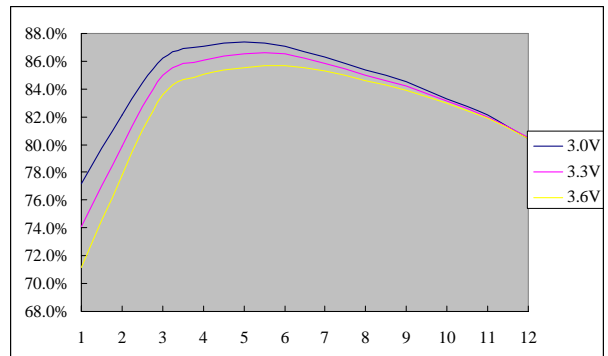
**Vo = 1.5V**



**Vo = 1.2V**



**Vo = 1.0V**



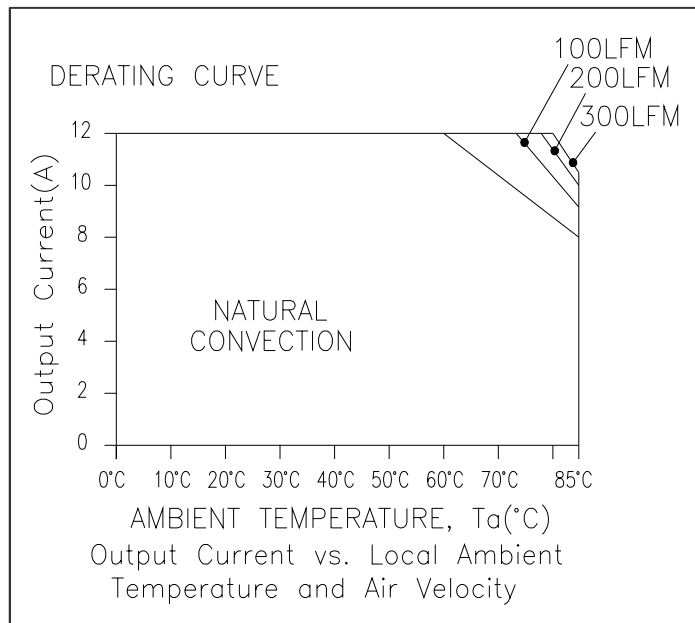
**Vo = 0.9V**

## NON-ISOLATED DC/DC CONVERTER

3.3V Input 0.9V to 2.5V/12A Output

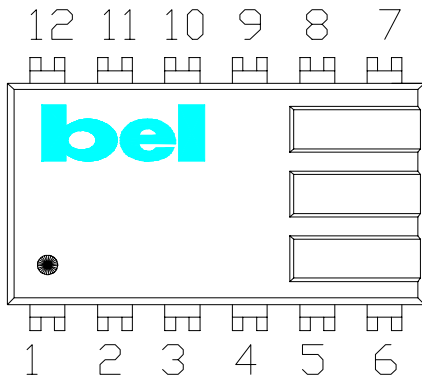
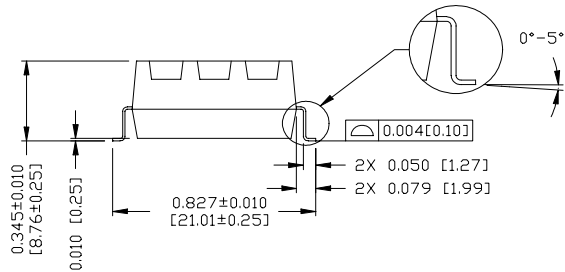
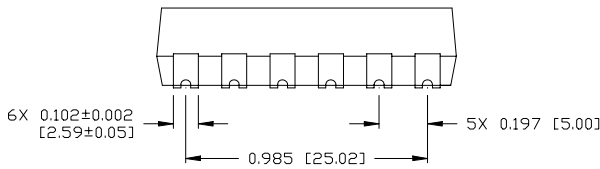
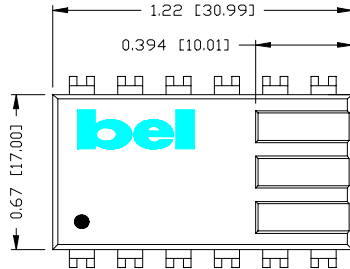
**bel**  
POWER PRODUCTS

### Thermal Derating Curve



**Test Condition:** Derating curve is tested at nominal input voltage.

**NON-ISOLATED DC/DC CONVERTER**  
**3.3V Input 0.9V to 2.5V/12A Output**



**Pin Connections**

Pin	Function
1	GND
2	GND
3	GND
4	GND
5	Vin
6	Vin
7	Trim
8	Remote On/Off
9	Remote Sense(+)
10	Vo
11	Vo
12	Vo

©2004 Bel Fuse Inc. Specifications subject to change without notice. 112604

**CORPORATE**

**Bel Fuse Inc.**  
 206 Van Vorst Street  
 Jersey City, NJ 07302  
 Tel 201-432-0463  
 Fax 201-432-9542  
[www.belfuse.com](http://www.belfuse.com)

**FAR EAST**

**Bel Fuse Ltd.**  
 8F/ 8 Luk Hop Street  
 San Po Kong  
 Kowloon, Hong Kong  
 Tel 852-2328-5515  
 Fax 852-2352-3706  
[www.belfuse.com](http://www.belfuse.com)

**EUROPE**

**Bel Fuse Europe Ltd.**  
 Preston Technology Management Centre  
 Marsh Lane, Suite G7, Preston  
 Lancashire, PR1 8UD, U.K.  
 Tel 44-1772-556601  
 Fax 44-1772-888366  
[www.belfuse.com](http://www.belfuse.com)