

NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input

0.75V-3.63V/16A Output

bel
POWER PRODUCTS

S7BC-16E2Ax Series

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage Sequencing (option)
- Able to Sink & Source Current
- Industrial Temperature Range
- Under-voltage Lockout (UVLO)
- Over Temperature Protection
- OCP/SCP
- Wide Input
- Wide Trim
- Remote On/Off
- Active Low/High (option)
- Remote Sense



Description

The Bel S7BC-16E2Ax is part of the non-isolated DC/DC power converter series. The modules use a SMT package. These converters are available in a range of output voltages from 0.75V to 3.63V over a wide range of input voltage ($V_{in} = 4.5V-14V$). The Bel S7BC-16E2Ax has a sequencing feature that enables designers to implement various types of output voltage sequencing when powering. The efficiency is typically 92% at 3.3V output at full load.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High
0.75 – 3.63V	4.5V – 14V	16A	58W	92%	S7BC-16E2AL	S7BC-16E2A0

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	-	15V	
Output Enable Terminal Voltage	-0.3V	-	15V	
Sequencing Voltage ¹	-0.3V	-	V_{in}	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-55°C	-	125°C	

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

1. S7BC-16E2Ax series of modules include a sequencing feature that enables users to implement various types of output voltage sequencing in their applications. This is accomplished via an additional sequencing pin. When not using the sequencing feature, either, tie the SEQ pin to V_{in} or leave it unconnected.

NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input

0.75V-3.63V/16A Output



Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	4.5V	-	14V	
	$V_{o,set} < 3.0$	-	14V	
	$V_{o,set} \geq 3.0$	-	14V	
Input Current (full load)	-	-	15A	
Input Current (no load)	-	100mA	-	
Remote Off Input Current	-	2mA	-	
Input Reflected Ripple Current (pk-pk)	-	-	400mA	Tested with one 1000uF/25V AL input capacitor with ESR=0.03 ohm max and 6 x 47uF/16V tan capacitors with ESR=0.013 ohm max at 100KHz, & simulated source impedance of 1000nH, 5Hz to 20MHz.
Input Reflected Ripple Current (RMS)	-	-	150mA	
I ² t Inrush Current Transient	-	0.2A ² s	0.4A ² s	
Turn-on Voltage Threshold	-	4.2V	-	
Turn-off Voltage Threshold	3.7V	-	4.2V	

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2% $V_{o,set}$	-	2% $V_{o,set}$	$V_{in}=12V$, full load
Load Regulation	-	0.1% $V_{o,set}$	-	$I_o=I_o$, min to I_o , max
Line Regulation	-	0.1% $V_{o,set}$	-	$V_{in}=V_{in}$, min to V_{in} , max
Regulation Over Temperature (-40°C to +85°C)	-	0.3% $V_{o,set}$	-	$T_{ref}=T_a$, min to T_a , max
Output Current	0A	-	16A	
Current Limit Threshold	-	180% I_o	-	
Short Circuit Surge Transient	-	1A ² s	3A ² s	
Ripple and Noise (pk-pk)	-	30mV	75mV	Tested with 0-20MHz, 10uF tantalum capacitor & 1uF TDK ceramic capacitor at the output
Ripple and Noise (RMS)	-	12mV	30mV	
Turn on Time	-	12mS	20mS	
Overshoot at Turn on	-	-	1% $V_{o,set}$	
Output Capacitance	-	-	5000uF	
Transient Response				
50% ~ 100% Max Load	All	-	150mV	di/dt=2.5A/uS; $V_{in}=12V$; and with 2 x 150uF polymer capacitors at the output
Settling Time		-	50uS	
100% ~ 50% Max Load		-	150mV	
Settling Time		-	50uS	

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

NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input

0.75V-3.63V/16A Output



General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=12V, full load
Vo=3.3V	-	92%	-	
Vo=2.5V	-	90%	-	
Vo=1.8V	-	88%	-	
Vo=1.5V	-	87%	-	
Vo=1.2V	-	85%	-	
Vo=0.75V	-	79%	-	
Efficiency				Measured at Vin=5V, full load
Vo=3.3V	-	92%	-	
Vo=2.5V	-	90%	-	
Vo=1.8V	-	87%	-	
Vo=1.5V	-	86%	-	
Vo=1.2V	-	83%	-	
Vo=0.75V	-	78%	-	
Switching Frequency	200KHz	230KHz	260KHz	
Over Temperature Shutdown ¹	-	130°C	-	
Output Trim Range (Wide Trim)	0.7525V	-	3.63V	
Remote Sense Compensation	-	-	0.5V	
MTBF	2,666,488 hours			Calculated Per Bell Core TR-332 (Io =80%Io, max; Vo=3.3V; Vin=12V; Ta = 25°C)
Dimensions				
Inches (L x W x H)	1.30 x 0.53 x 0.315			
Millimeters (L x W x H)	33.02 x 13.46 x 8.00			
Weight	-	8g	-	

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

Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2V	-	0.3V	S7BC-16E2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2V	-	0.3V	S7BC-16E2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5V	-	Vin, max	
Voltage Sequencing				
Sequencing Delay Time	25mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Sequencing Slew Rate Capability	-	-	2V/mS	Vin, min to Vin, max; Io, min to Io, max; Vseq<Vo
Tracking Accuracy				
Power-Up	-	100mV	200mV	
Power-Down	-	200mV	400mV	

NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input

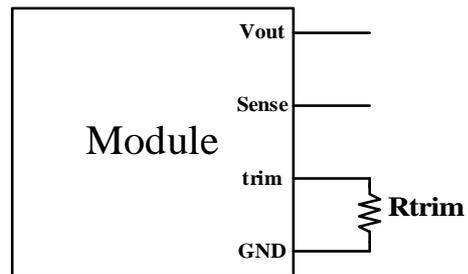
0.75V-3.63V/16A Output

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POWER PRODUCTS

Output Trim Equations

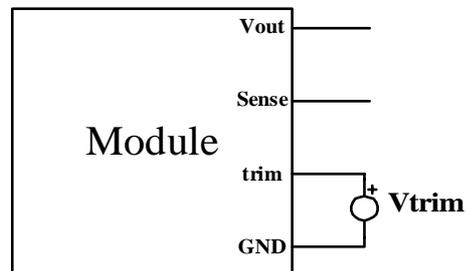
Equation for calculating the trim resistor (in Ω) given the desired output voltage (V_o) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{TrimUp} = \frac{10500}{V_o - 0.7525} - 1000$$



Equation for calculating the trim voltage (in V) given the desired output voltage (V_o) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

$$V_{TrimUp} = 0.7 - 0.0667 \times (V_o - 0.7525)$$



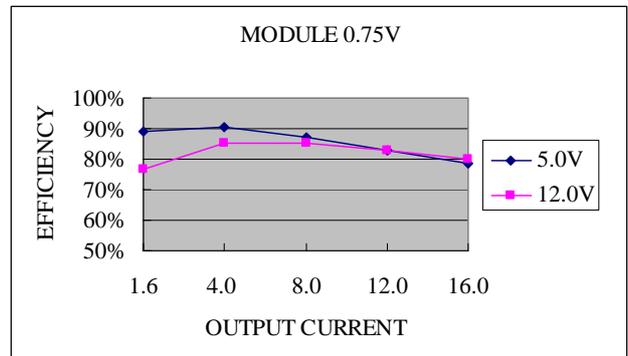
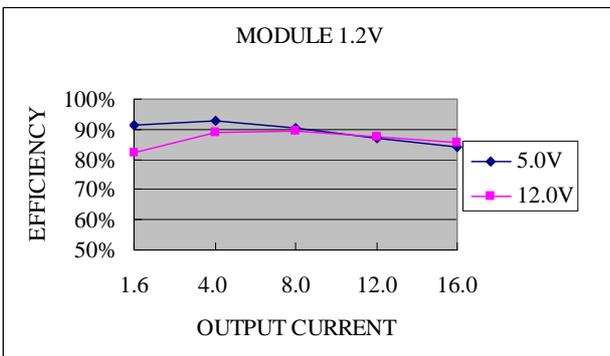
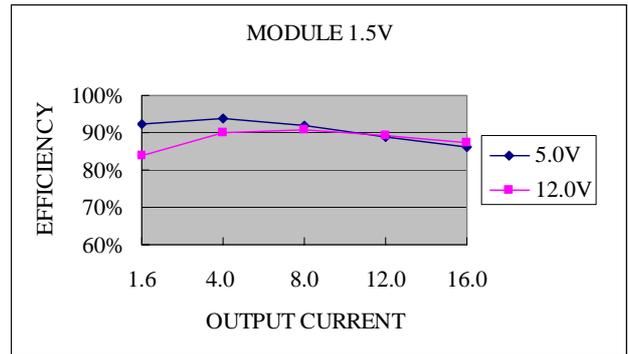
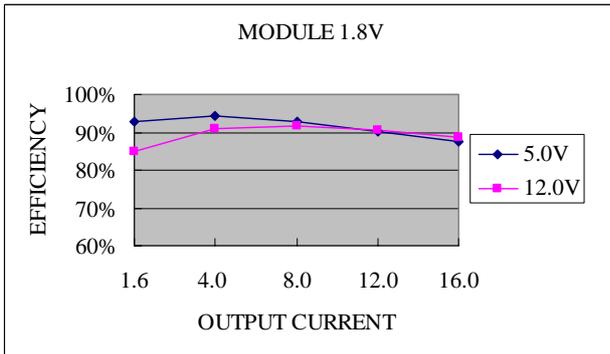
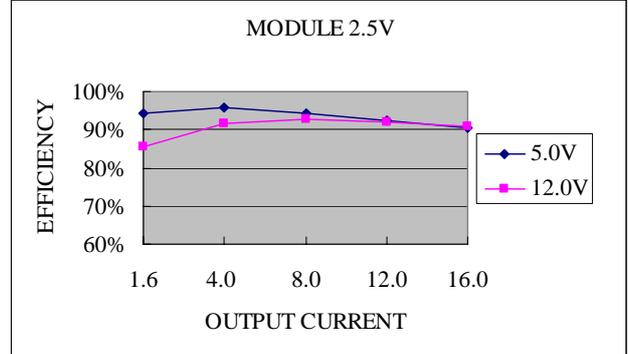
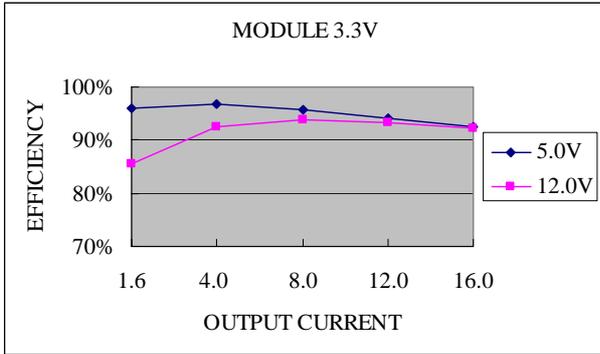
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4.5V-14V Input

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Efficiency Data



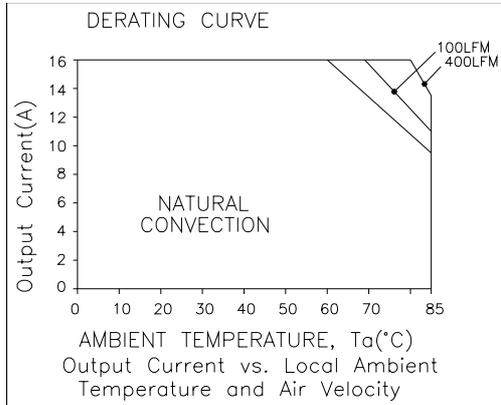
NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input

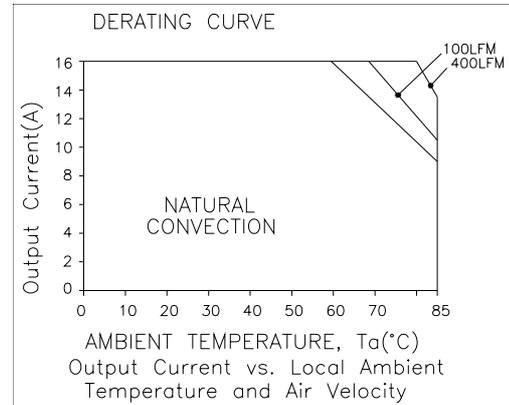
0.75V-3.63V/16A Output



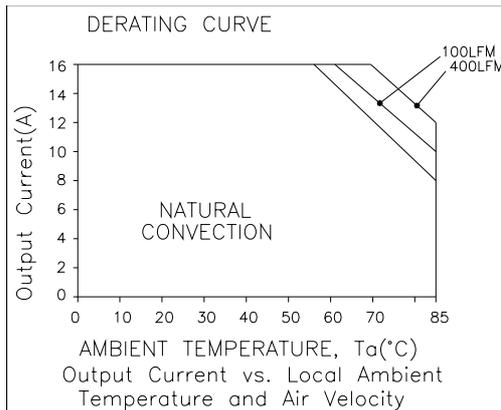
Thermal Derating Curves



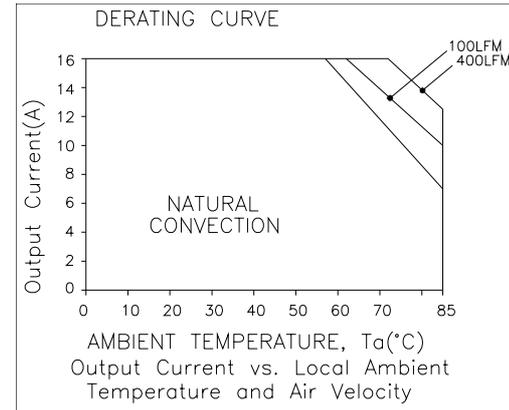
Vin=5V, Vo=0.75V



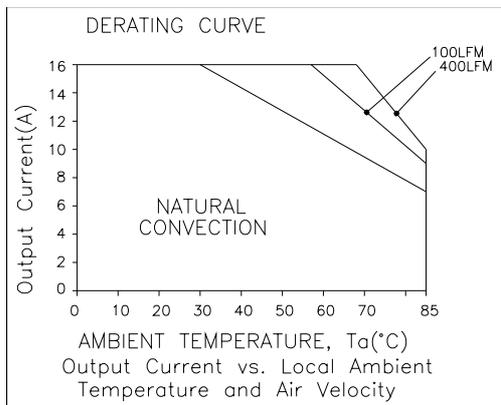
Vin=12V, Vo=0.75V



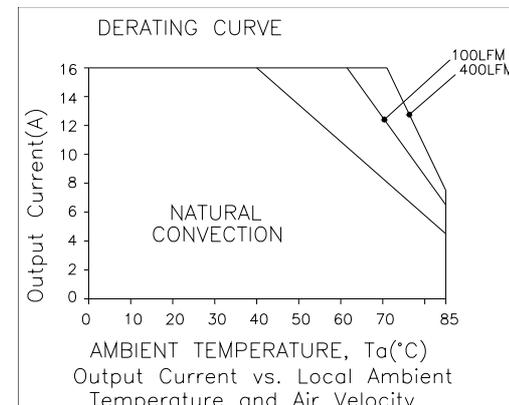
Vin=5V, Vo=1.8V



Vin=12V, Vo=1.8V



Vin=5V, Vo=3.3V

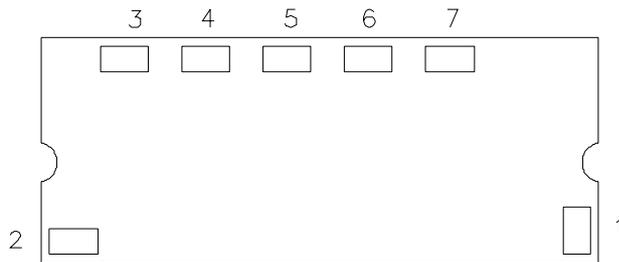
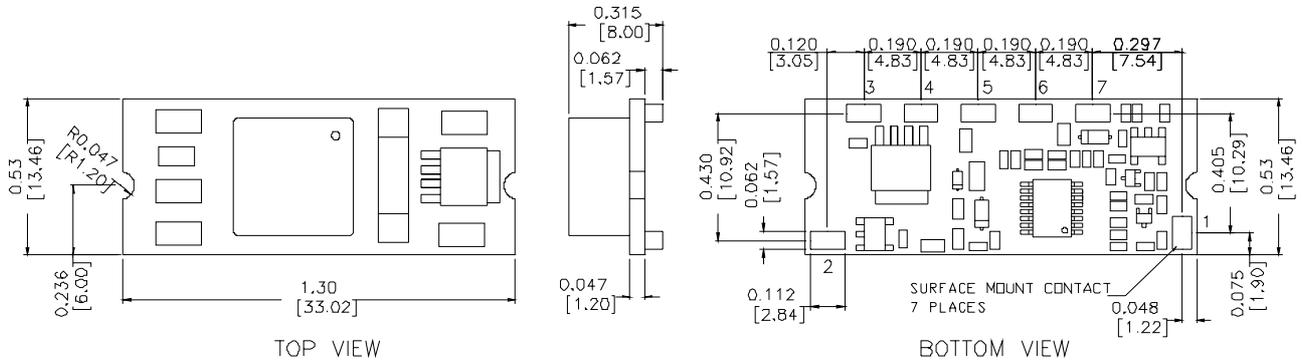


Vin=12V, Vo=3.3V

NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input

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Pin Connections

Pin	Function
1	Remote On/Off
2	Vin
3	SEQ
4	Ground
5	Vout
6	Trim
7	Remote Sense

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