

NON-ISOLATED DC/DC CONVERTERS

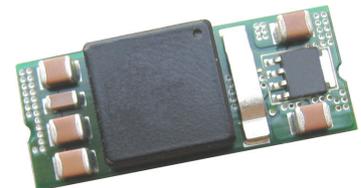
8.3V-14V Input

0.75V-5.0V/16A Output

bel
POWER PRODUCTS

S7BC-16A2Ax Series

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage Sequencing
- 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-16A2Ax modules are a series of non-isolated DC/DC power converters that deliver up to 16A of output current with full load efficiency of 92% at 3.3V output. These modules provide precisely regulated voltage programmable via external resistor from 0.75V to 5.0V over a wide range of input voltage (8.3-14V). These modules have a sequencing feature that enables designers to implement various types of output voltage sequencing when powering multiple voltages on a board. The open-frame construction and small footprint enable designers to develop cost and space-efficient solutions. Standard features include remote On/Off, remote sense, over current protection, short current protection, wide input, and programmable output voltage.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High
0.75V – 5.0V	8.3V – 14V	16A	80W	94%	S7BC-16A2AL	S7BC-16A2A0

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-16A2Ax 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 the sequencing feature is not used, tie the SEQ pin to V_{in} or leave it unconnected.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage				
Vo, set ≤ 3.63V	8.3V	12V	14V	
Vo, set > 3.63V	8.3V	12V	13.2V	
Input Current (full load)	-	-	11A	
Input Current (no load)	-	100mA	-	
Remote Off Input Current	-	2mA	-	
Input Reflected Ripple Current (pk-pk)	-	70mA	200mA	Tested with one 1000uF/25V AL input capacitor with ESR=0.03 ohm max and 6 × 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	-	8.0V	-	
Turn-off Voltage Threshold	-	7.5V	-	

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2%Vo,set	-	2%Vo,set	Vin=12V, full load
Load Regulation	-	0.1%Vo,set	-	Io=Io, min to Io, max
Line Regulation	-	0.1%Vo,set	-	Vin=Vin, min to Vin, max
Regulation Over Temperature (-40°C to +85°C)	-	0.3%Vo,set	-	Tref=Ta, min to Ta, max
Output Current	0A	-	16A	
Current Limit Threshold	-	180%Io	-	
Short Circuit Surge Transient	-	1A ² s	3A ² s	
Ripple and Noise (pk-pk)	-	75mV	100mV	Tested with 0-20MHz, 10uF tantalum capacitor & 1uF TDK ceramic capacitor at the output
Ripple and Noise (RMS)	-	30mV	45mV	
Turn on Time	-	6mS	10mS	
Overshoot at Turn on	-	-	1%Vo,set	
Output Capacitance	-	-	5000uF	
Transient Response				
50% ~ 100% Max Load	Vo=0.75V - 5.0V	-	100mV	di/dt=2.5A/uS; Vin=12V; and with 2 × 150uF polymer capacitors at the output
Settling Time		-	50uS	
100% ~ 50% Max Load		-	100mV	
Settling Time		-	50uS	

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

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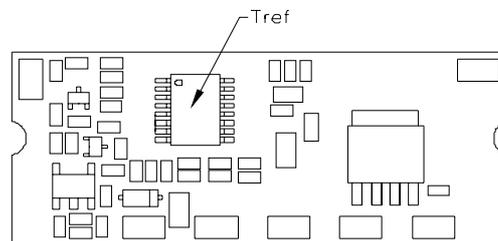


General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=12V, full load
Vo=5.0V	-	94%	-	
Vo=3.3V	-	92%	-	
Vo=2.5V	-	90%	-	
Vo=1.8V	-	88%	-	
Vo=1.5V	-	87%	-	
Vo=1.2V	-	85%	-	
Vo=0.75V	-	79%	-	
Switching Frequency	265KHz	300KHz	335KHz	
Over Temperature Shutdown ¹	-	130°C	-	
Output Trim Range (Wide Trim)	0.7525V	-	5V	
Remote Sense Compensation	-	-	0.5V	
MTBF	2,666,488 hours			Calculated Per Bell Core TR-332 (Io =80%Io,max; Vo=5V; 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	-	

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

1. The Tref temperature measurement location:



Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2V	-	0.3V	S7BC-16A2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2V	-	0.3V	S7BC-16A2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5V	-	Vin, max	
Voltage Sequencing				
Sequencing Delay Time	10mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Sequencing Slew Rate Capability	-	-	2V/mS	
Tracking Accuracy				Vin, min to Vin, max; Io, min to Io, max; Vseq<Vo
Power-Up	-	100mV	200mV	
Power-Down	-	300mV	500mV	

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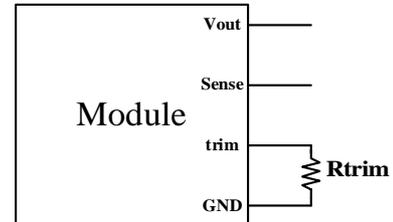
0.75V-5.0V/16A Output



Output Trim Equations

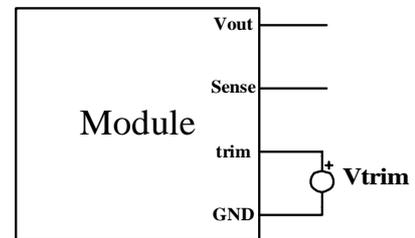
Equation for calculating the trim resistor (in Ω) given the desired adjusted voltage (V_{adj}) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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

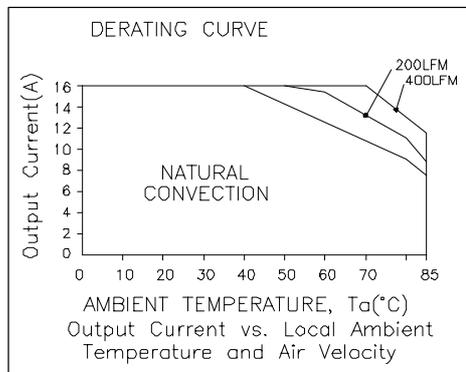


Equation for calculating the trim voltage (in V) given the desired adjusted voltage (V_{adj}) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

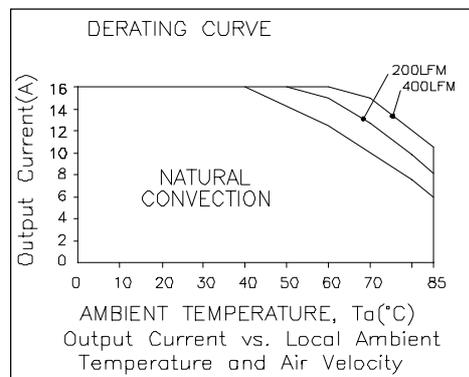
$$V_{TrimUp} = 0.7 - 0.0667 \times (V_{adj} - 0.7525)$$



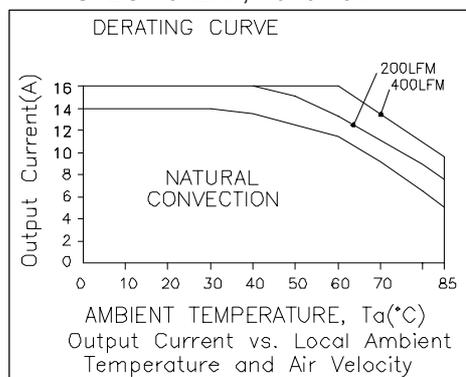
Thermal Derating Curves



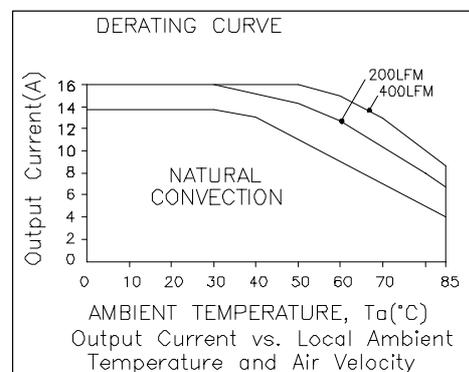
S7BC-16A2Ax, $V_o=0.75V$



S7BC-16A2Ax, $V_o=1.8V$



S7BC-16A2Ax, $V_o=3.3V$



S7BC-16A2Ax, $V_o=5.0V$

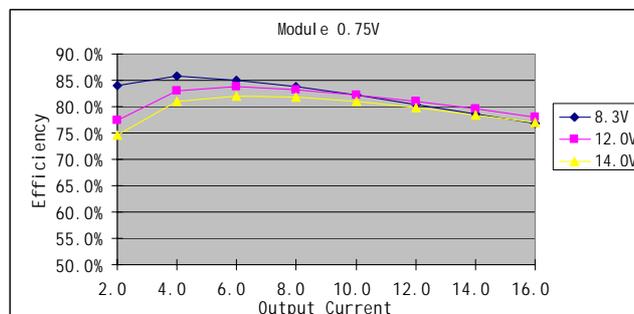
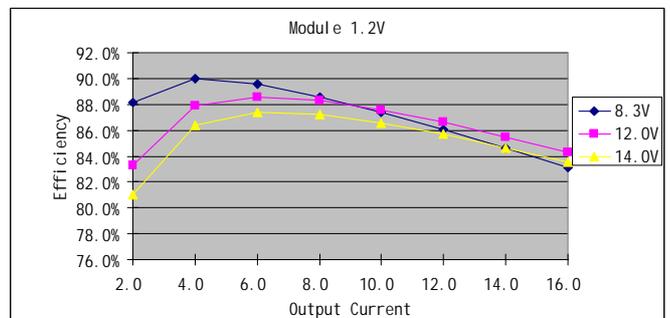
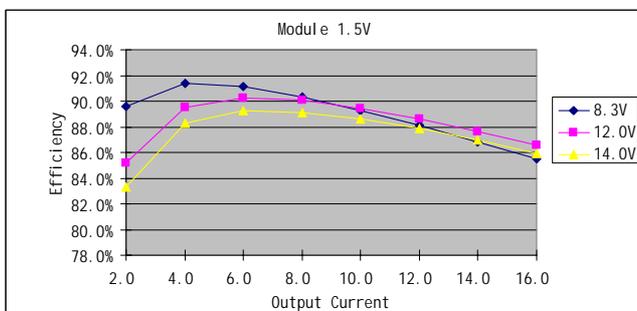
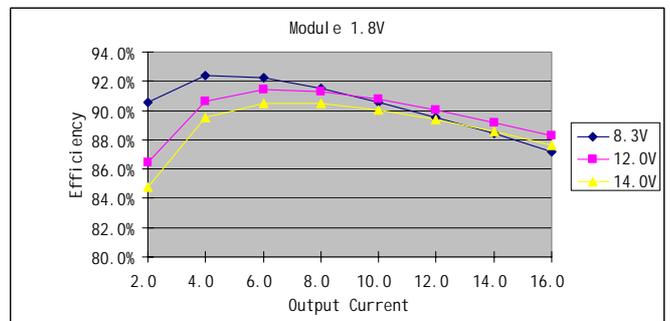
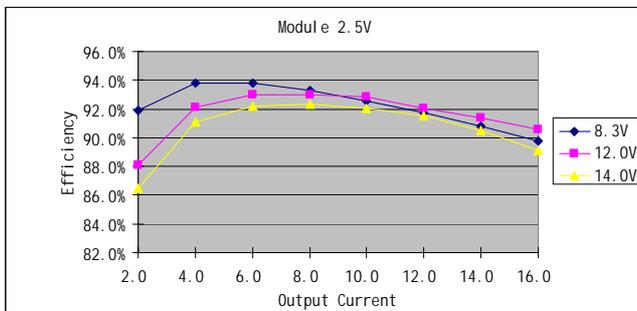
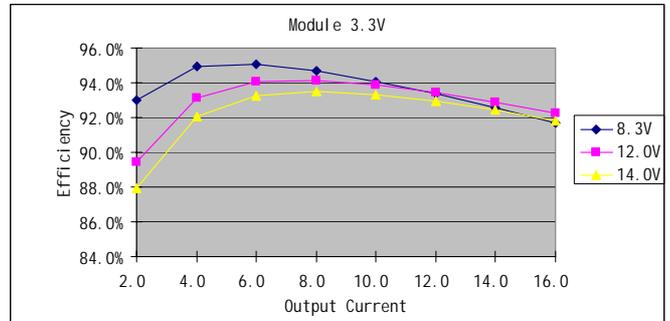
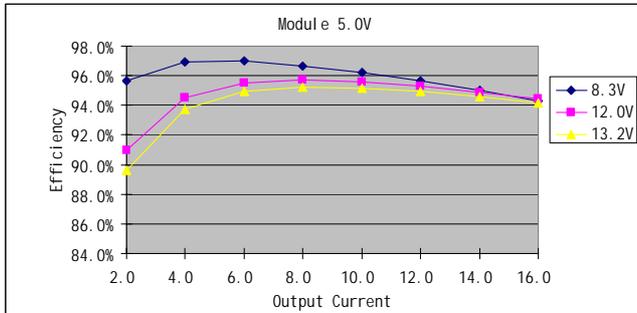
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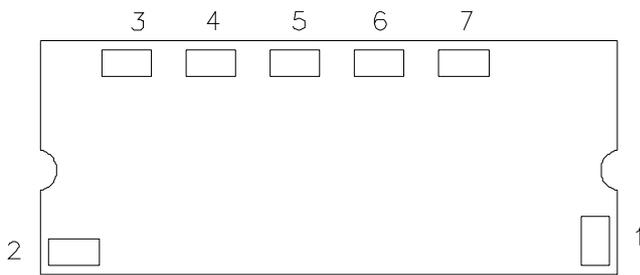
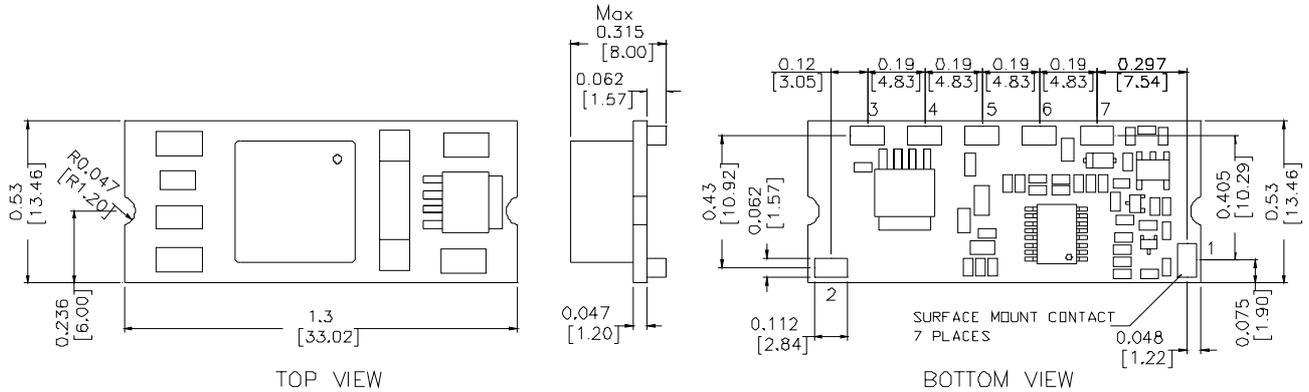
Efficiency Data



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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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