NON-ISOLATED DC/DC CONVERTERS

4.5V-14V Input 0.75V-3.63V/10A Output

S7BC-10E2Ax Series

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

Description

The Bel S7BC-10E2Ax 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 (Vin = 4.5V-14V). The Bel S7BC-10E2Ax has a sequencing feature that enables designers to implement various types of output voltage sequencing when powering. The efficiency is typically 93% at 3.3V output at 12V input 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	10A	36.3W	93%	S7BC-10E2AL	S7BC-10E2A0

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	-	Vin	
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-10E2Ax 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 Vin or leave it unconnected.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage Vo,set < 3.0 Vo,set ≥ 3.0	 4.5V Vo,set +1.5V	 - -	 14V 14V	
Input Current (full load)	-	-	8.6A	An input line fuse must always be used.
Input Current (no load)	-	40mA	-	
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 4 × 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^2t Inrush Current Transient	-	$0.04A^2s$	$0.08A^2s$	
Turn-on Voltage Threshold	-	4.3V		
Turn-off Voltage Threshold	-	4.0V		

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

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	-	
Line Regulation	-	0.1%Vo,set	-	
Regulation Over Temperature (-40°C to +85°C)	-	0.3Vo,set	-	Tref=Ta, min to Ta, max
Output Current	0A	-	10A	
Current Limit Threshold	-	200% Io,out	-	
Short Circuit Surge Transient	-	$1A^2s$	$3A^2s$	
Ripple and Noise (pk-pk)	-	30mV	75mV	Tested with 0-20MHz, with 10uF tantalum capacitor & 1uF ceramic capacitor at the output
Ripple and Noise (RMS)	-	12mV	35mV	
Turn on Time	-	8mS	20mS	
Overshoot at Turn on	-	-	1%	
Output Capacitance	0uF	-	5600uF	
Transient Response				
50% ~ 100% Max Load	Vo = 0.75V - 3.63V	-	160mV	-	di/dt=2.5A/uS; Vin=5V & 12V; and with 470uF tantalum capacitor at the output
Settling Time		-	50uS	-	
100% ~ 50% Max Load		-	160mV	-	
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				
Vo=3.3V	-	92%	-	Measured at Vin=5V, full load
Vo=2.5V	-	91%	-	
Vo=1.8V	-	89%	-	
Vo=1.5V	-	88%	-	
Vo=1.2V	-	86%	-	
Vo=0.75V	-	80%	-	
Efficiency				
Vo=3.3V	-	93%	-	Measured at Vin=12V, full load
Vo=2.5V	-	92%	-	
Vo=1.8V	-	90%	-	
Vo=1.5V	-	89%	-	
Vo=1.2V	-	87.5%	-	
Vo=0.75V	-	81%	-	
Switching Frequency	265KHz	300KHz	335KHz	
Over Temperature Shutdown[1]	-	130°C	-	
Output Voltage Trim Range	0.7525V	-	3.63V	
Remote Sense Compensation	-	-	0.5V	
MTBF	4,982,651 hours			Calculated Per Bell Core TR-332 (I_O =80%Io,max; Vo=3.3V; Vin=12V; T_a = 30°C)
Dimensions				
Inches (L × W × H)	1.3 x 0.53 x 0.315			
Millimeters (L × W × 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-10E2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2V	-	0.3V	S7BC-10E2AL; 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	-	300mV	500mV	

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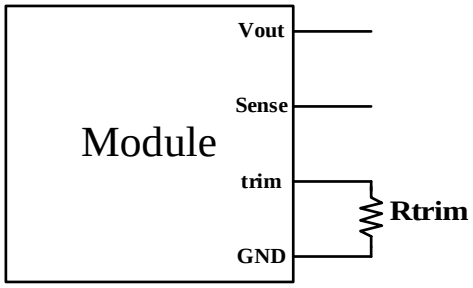
Output Trim Equations

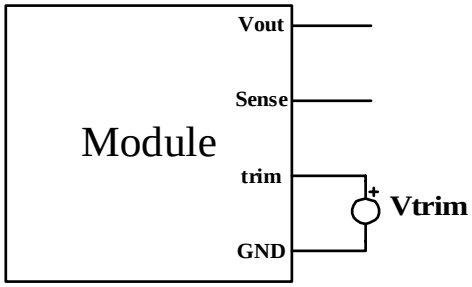
Equation for calculating the trim resistor (in Ω) given the desired output voltage (Vo) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{trimup} = \frac{10500}{Vo - 0.7525} - 1000$$



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

$$V_{trimup} = 0.7 - 0.0667 \times (Vo - 0.7525)$$



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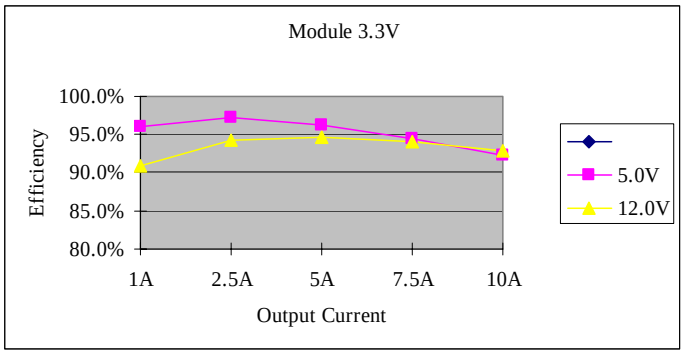
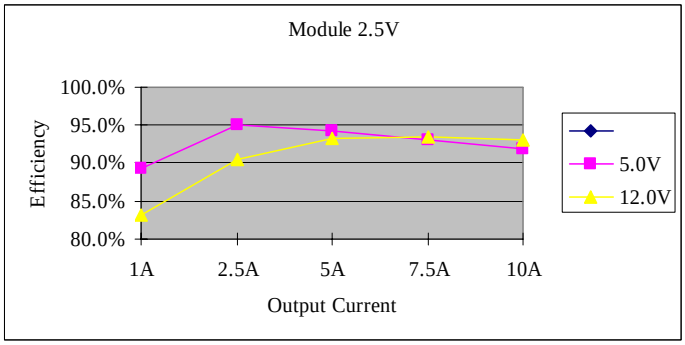
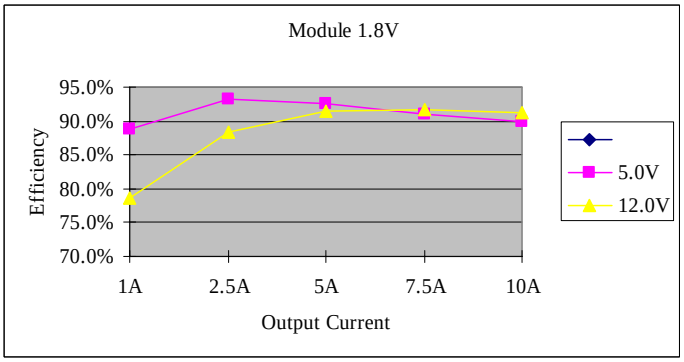
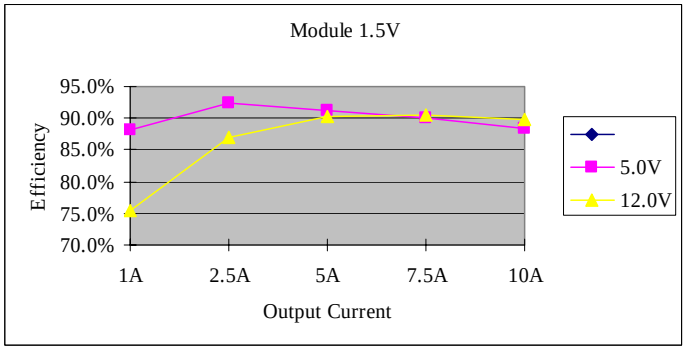
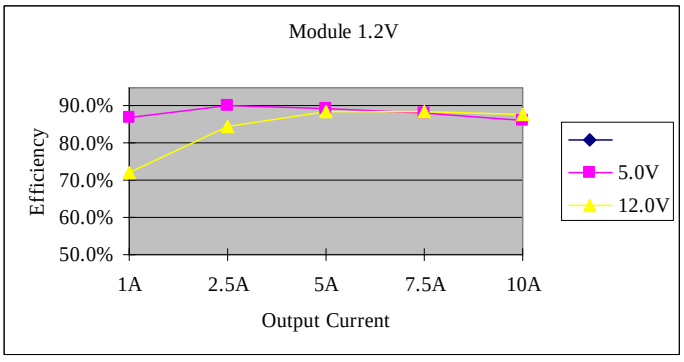
Efficiency Data

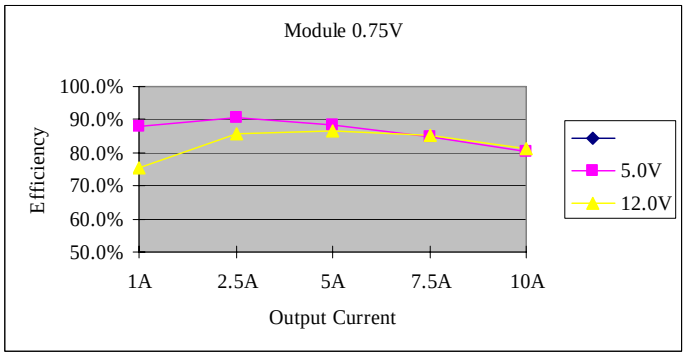












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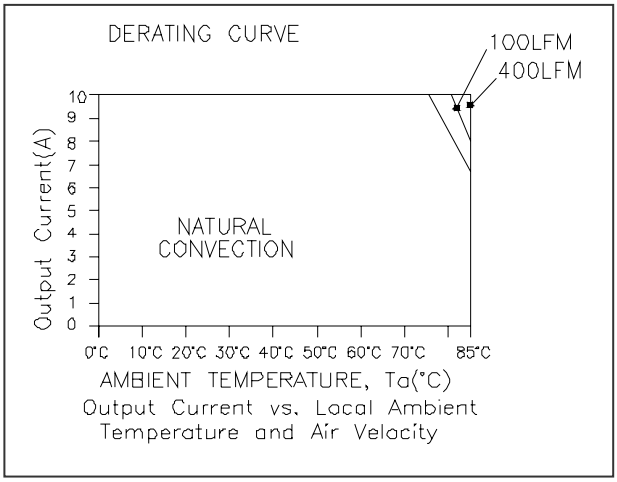
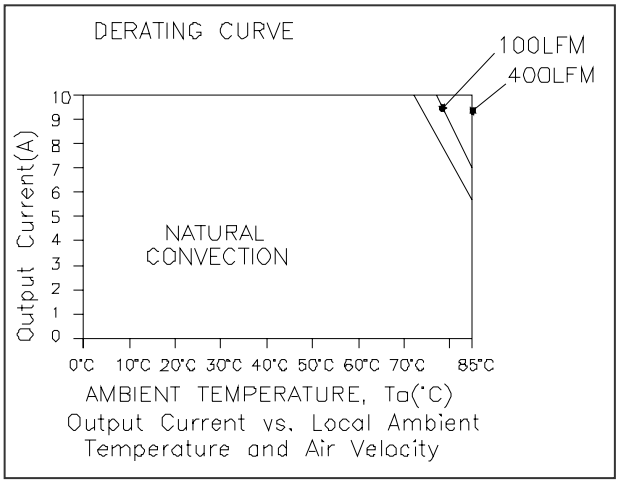
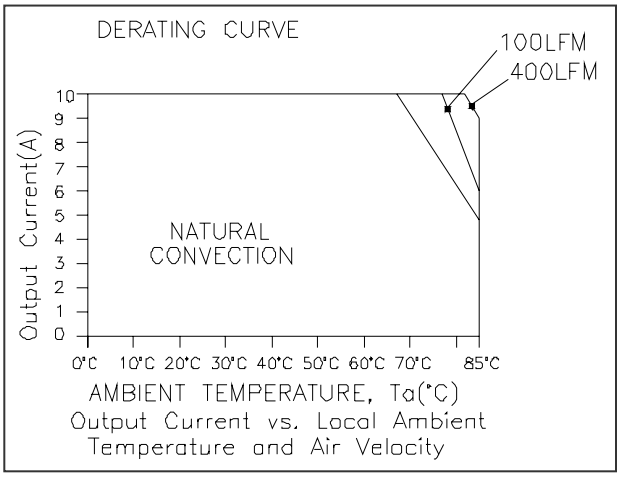
Thermal Derating Curves



S7BC-10E2Ax, Vo=0.75V



S7BC-10E2Ax, Vo=1.8V



S7BC-10E2Ax, Vo=3.3V

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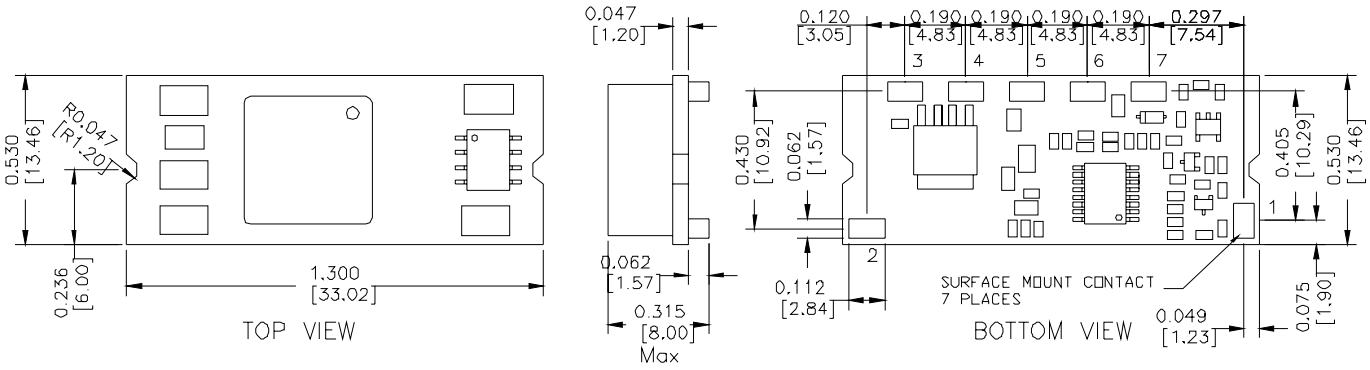

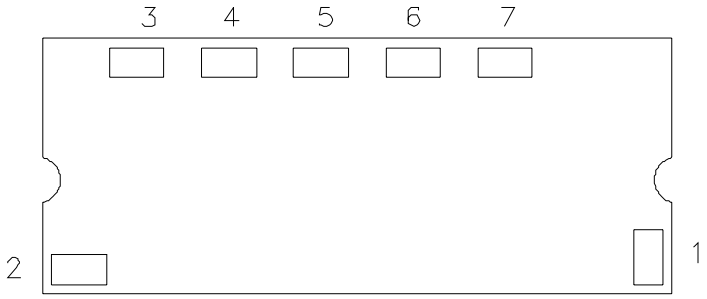

Pin Connections

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

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