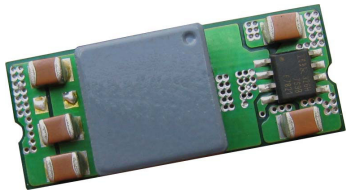
NON-ISOLATED DC/DC CONVERTERS

8.3V-14V Input 0.75V-5.0V/10A Output

S7BC-10A2Ax Series

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage Sequencing
- 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-10A2Ax modules are a series of non-isolated DC/DC power converters that deliver up to 10A of output current with full load efficiency of 93% 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 (8.3V-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, 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
0.75 - 5.0V	8.3 - 14V	10A	50.0W	95%	S7BC-10A2AL	S7BC-10A2A0

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-10A2Ax 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 Vin or leave it unconnected.

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage Vo, set ≤ 3.63V Vo, set > 3.63V	 8.3V 8.3V	 12V 12V	 14V 13.2V	
Input Current (full load)	-	-	6.5A	An input line fuse must always be used.
Input Current (no load)	-	50mA	-	
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	-	8.2V		
Turn-off Voltage Threshold	-	7.9V		

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)	-	0.3%Vo,set	-	Tref=Ta, min to Ta, max
Output Current	0A	-	10A	
Current Limit Threshold	-	200% Io	-	
Short Circuit Surge Transient	-	$1A^2s$	$3A^2s$	
Ripple and Noise (pk-pk)	-	50mV	100mV	Tested with 0-20MHz, with 10uF tantalum capacitor & 1uF ceramic capacitor
Ripple and Noise (RMS)	-	20mV	40mV	
Turn on Time	-	6mS	10mS	
Overshoot at Turn on	-	-	1%Vo,set	
Output Capacitance	-	-	5000uF	
Transient Response				
50% ~ 100% Max Load	Vo = 0.75V - 5V	-	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	-	

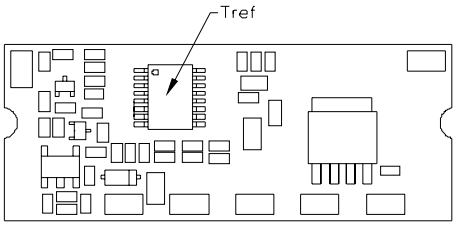
Note: All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency Vo=5.0V Vo=3.3V Vo=2.5V Vo=1.8V Vo=1.5V Vo=1.2V Vo=0.75V	 - - - - - - -	 95% 93% 92% 90% 89% 87.5% 81%	 - - - - - - -	Measured at Vin=12V, full load
Switching Frequency	265KHz	300KHz	335KHz	
Over Temperature Shutdown[1]	-	130°C	-	
Output Voltage Trim Range	0.7525V	-	5.0V	
Remote Sense Compensation	-	-	0.5V	
MTBF	4,982,651 hours			Calculated Per Bell Core TR-332 (Io = 80%Io,max; Vo=5V; Vin=12V; Ta = 25°C)
Dimensions Inches (L × W × H) Millimeters (L × W × H)	 1.3 x 0.53 x 0.315 33.02 x 13.46 x 8.00			
Weight	-	8g	-	

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

1. The Tref temperature measurement location:



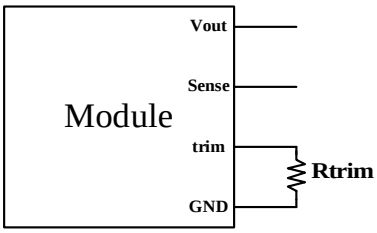
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2V	-	0.3V	S7BC-10A2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2V	-	0.3V	S7BC-10A2AL; 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	Vin, min to Vin, max; Io, min to Io, max; Vseq<Vo
Tracking Accuracy Power-Up Power-Down	 - -	 100mV 300mV	 200mV 500mV	

Output Trim Equations

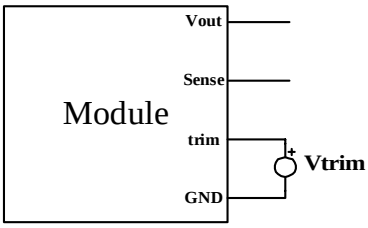
Equation for calculating the trim resistor (in Ω) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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

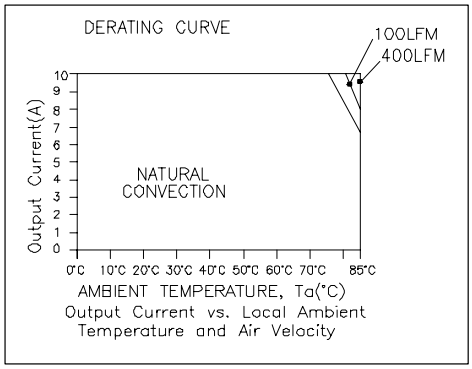


Equation for calculating the trim voltage (in V) given the desired adjusted voltage (Vadj) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

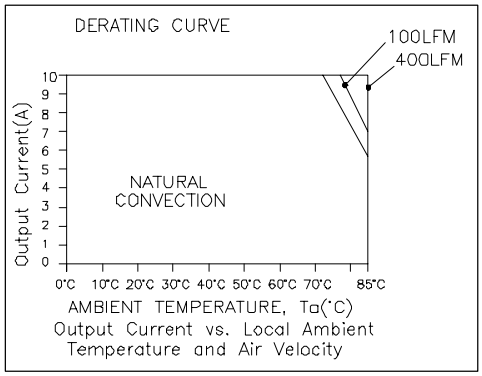
$$V_{TrimUp} = 0.7 - 0.0667 \times (V_{adj} - 0.7525)$$



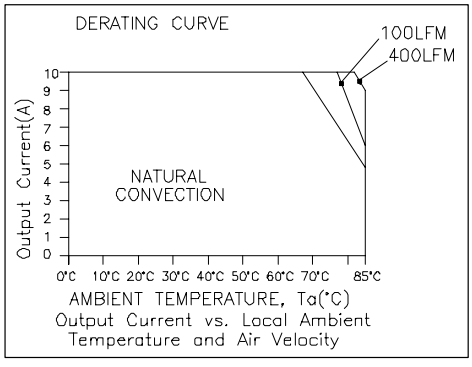
Thermal Derating Curves



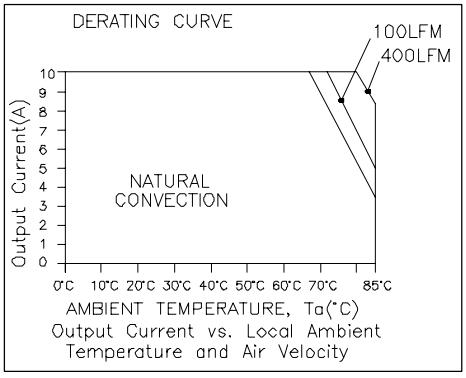
S7BC-10A2Ax, Vo=0.75V



S7BC-10A2Ax, Vo=1.8V

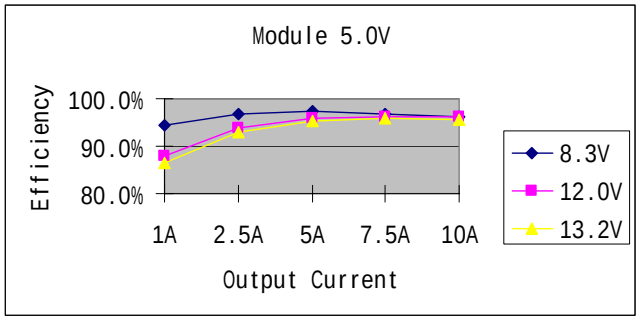


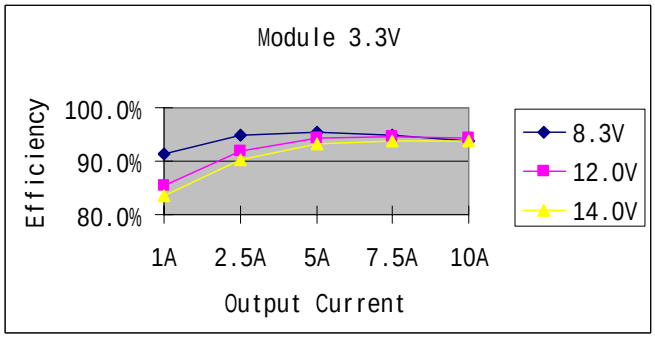
S7BC-10A2Ax, Vo=3.3V

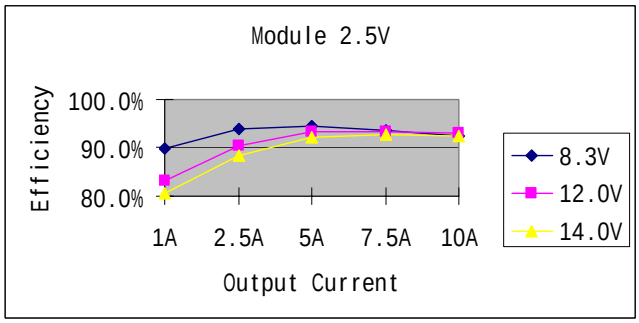


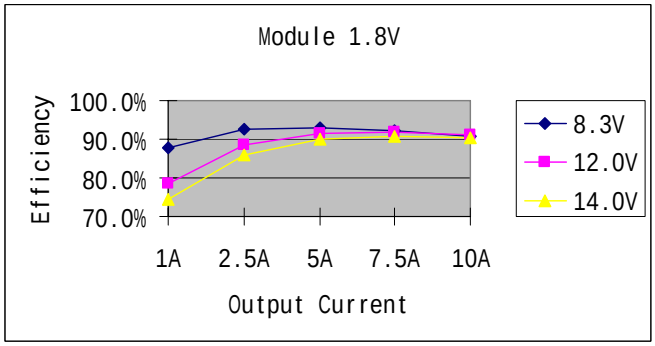
S7BC-10A2Ax, Vo=5.0V

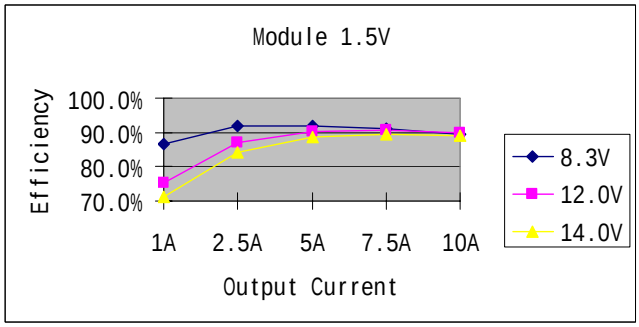
Efficiency Data

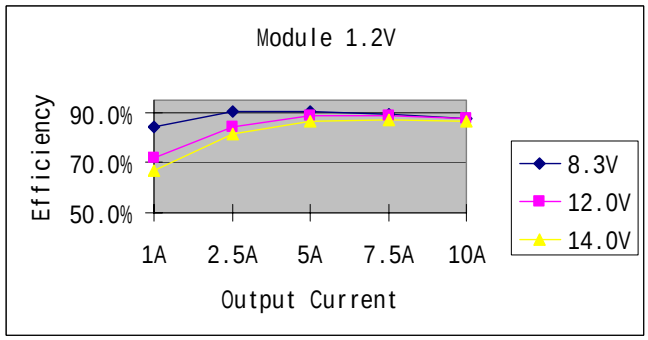


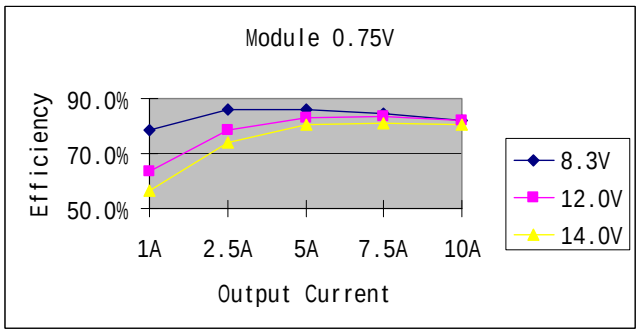












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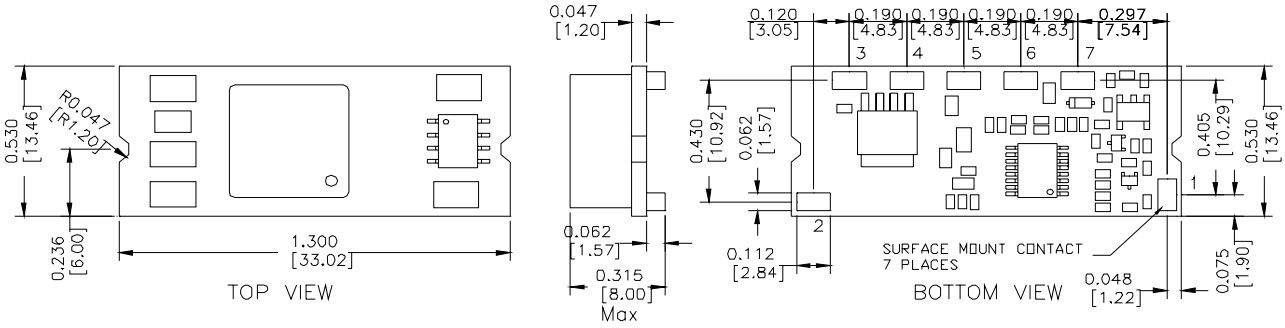

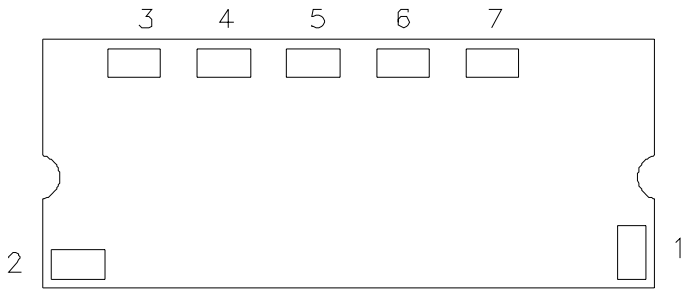

BOTTOM VIEW

Pin Connections

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

CORPORATE

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