

NON-ISOLATED DC/DC CONVERTERS

8.3V-14V Input

0.75V-5.0V/6A Output



S7BA-06A2Ax Series

- Non-Isolated
- High Efficiency
- High Power Density
- Fixed Frequency
- Remote On/Off
- Active Low/High
- Under-Voltage Lockout (UVLO)
- OCP/SCP
- Wide Input
- Wide Trim Range
- Flexible Output Voltage Sequencing



Description

The Bel S7BA-06A2Ax modules are a series of non-isolated DC/DC converters that deliver up to 6A of output current with full load efficiency of 92% at 5.0V 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
0.75V - 5.0V	8.3V - 14V	6A	30.0W	92%	S7BA-06A2AL	S7BA-06A2A0

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. S7BA-06A2Ax 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}.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	8.3V	12V	14V	
Input Current (full load)				
Vo=5.0V	-	2.75A	4.0A	
Vo=3.3V	-	1.85A	2.8A	
Vo=2.5V	-	1.45A	2.2A	
Vo=1.8V	-	1.05A	1.6A	
Vo=1.2V	-	0.75A	1.1A	
Vo=0.75V	-	0.55A	0.8A	
Input Current (no load)				
Vo=5.0V	-	-	100mA	
Vo=0.75V	-	-	20mA	
Remote Off Input Current	-	1mA	2mA	
Input Reflected Ripple Current (pk-pk)	-	120mA	-	Tested with two 100uF/25V tan input capacitors & simulated source impedance of 1uH, 5Hz to 20MHz.
Input Reflected Ripple Current (RMS)	-	40mA	-	
I ² t Inrush Current Transient	-	0.002A ² s	0.02A ² s	
Turn-on Voltage Threshold	-	8.1V	8.2V	
Turn-off Voltage Threshold	-	7.5V	8.0V	

Notes: 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
Output Voltage Set Point	-2.5%Vo,set	-	3.5%Vo,set	Over all operating input voltages, resistive loads and temperature conditions
Adjustment Range Selected by External Resistor or Voltage	0.7525V	-	5.0V	
Load Regulation	-	0.4%Vo,set	-	Io=Io, min to Io, max
Line Regulation	-	0.3%Vo,set	-	Vin=Vin, min to Vin, max
Regulation Over Temperature (-40°C to +85°C)	-	0.5%Vo,set	-	Tref=Ta, min to Ta, max
Output Current	0A	-	6A	
Current Limit Threshold	7.2A	-	18A	
Short Circuit Surge Transient	-	0.25A ² s	-	
Ripple and Noise (pk-pk)				Tested with 0-20MHz, with 10uF/10V tantalum capacitor & 1uF/10V TDK ceramic capacitor at the output.
Vo=0.75V-3.63V	-	50mV	75mV	
Ripple and Noise (RMS)				
Vo=0.75V-3.63V	-	15mV	30mV	
Ripple and Noise (pk-pk)				
Vo=5.0V	-	75mV	100mV	
Ripple and Noise (RMS)				
Vo=5.0V	-	30mV	40mV	
Turn on Time	-	8mS	10mS	
Overshoot at Turn on	-	0%	3%	
Output Capacitance				
ESR ≥ 1mohm	0uF	-	1000uF	
ESR ≥ 10mohm	0uF	-	3000uF	

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Output Specifications (Continued)

Parameter	Min	Typ	Max	Notes
Transient Response				
50% ~ 100% Max Load	Vo = 0.75V - 5V	-	200mV	di/dt=2.5A/uS; Vin=12V; and with 10uF/10V tantalum capacitor & 1uF/10V ceramic capacitor at the output.
Settling Time		-	50uS	
100% ~ 50% Max Load		-	200mV	
Settling Time		-	50uS	

Note: All specifications are typical at nominal input (Vin=12V), full load at 25°C unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=12V, full load
Vo=5.0V	90%	92%	-	
Vo=3.3V	87%	89%	-	
Vo=2.5V	85%	88%	-	
Vo=1.8V	83%	86%	-	
Vo=1.2V	79%	82%	-	
Vo=0.75V	71%	74%	-	
Switching Frequency	250KHz	300KHz	350KHz	
Over Temperature Shutdown	-	135°C	-	
Output Trim Range (wide trim)	0.7525V	-	5V	
MTBF	3,079,469 hours			Calculated Per Bell Core TR-332 (Io = Nominal; Ta = 25°C)
Dimensions				
Inches (L x W x H)	0.8 x 0.45 x 0.251			
Millimeters (L x W x H)	20.32 x 11.42 x 6.38			
Weight	-	3g	-	

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

Control Specifications

Parameter	Min	Typ	Max	Notes
Signal Low (Unit Off)	-0.3V	-	0.4V	S7BA-06A2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	2.5V	-	14V	
Signal Low (Unit On)	-0.3V	-	0.4V	S7BA-06A2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5V	-	14V	
Sequencing Voltage	0V	-	Vin	Sequencing Voltage applied on SEQ pin should be higher than output voltage.
Sequencing Slew Rate Capability	-	-	2V/mS	
Sequencing Delay Time	10mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Tracking Accuracy				
Power-Up	-	100mV	200mV	
Power-Down	-	200mV	400mV	

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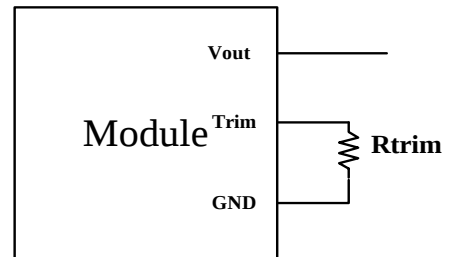
0.75V-5.0V/6A Output



Output Trim Equations

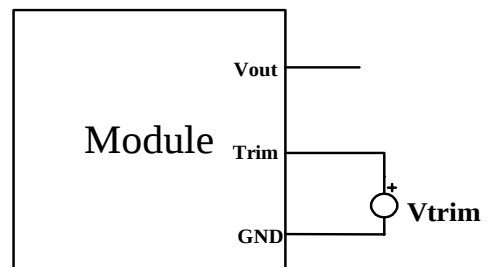
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (V_{adj}) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

$$R_{trim} = \frac{10.507}{V_{adj} - 0.7525} - 1$$



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.

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



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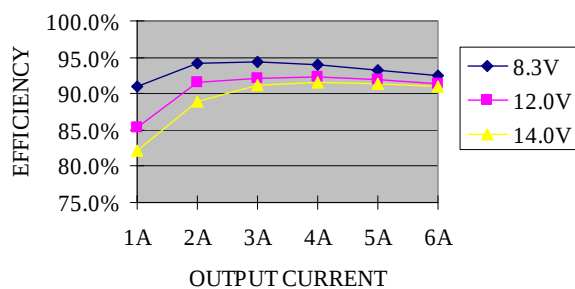
8.3V-14V Input

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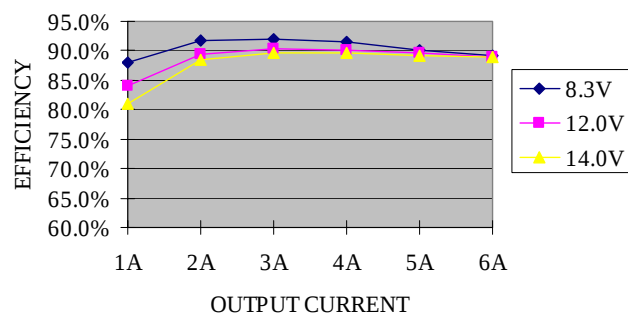


Efficiency Data

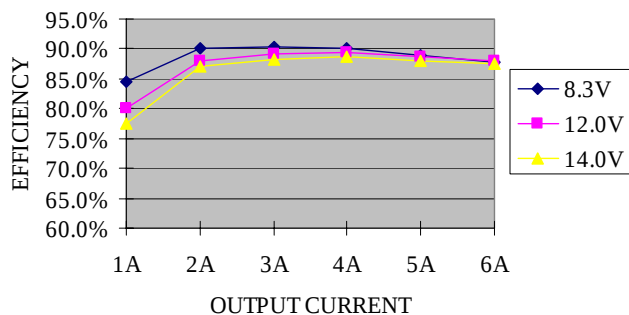
MODULE 5.0V



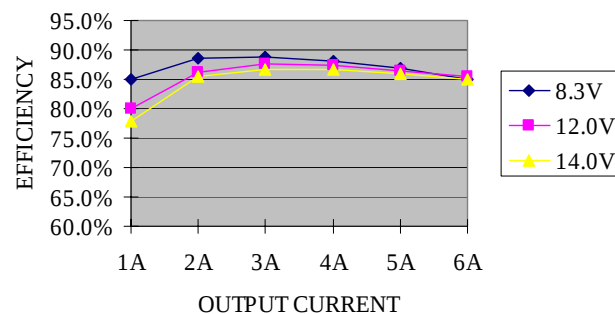
MODULE 3.3V



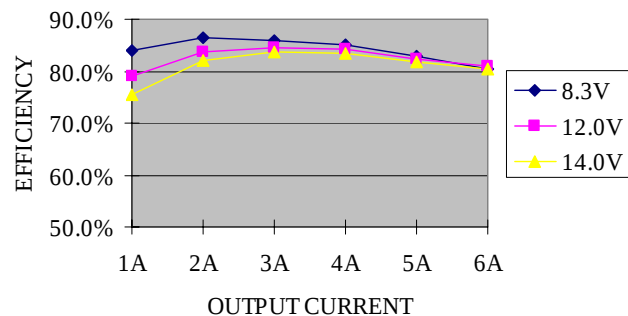
MODULE 2.5V



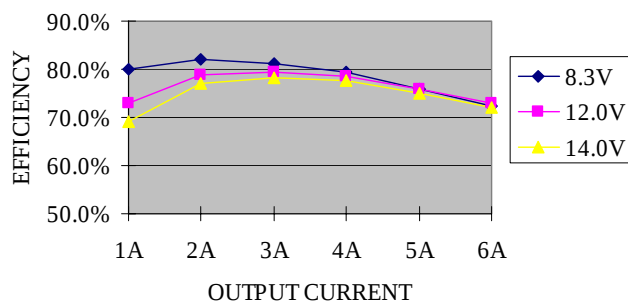
MODULE 1.8V



MODULE 1.2V



MODULE 0.75V



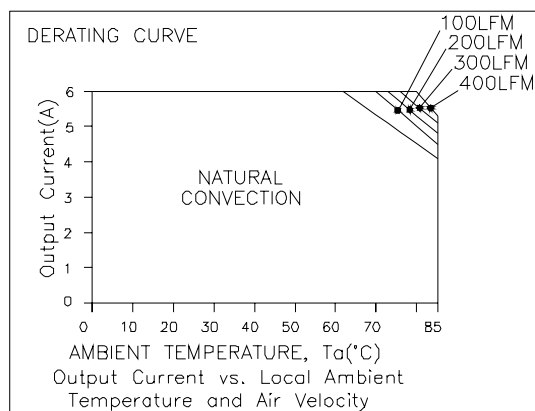
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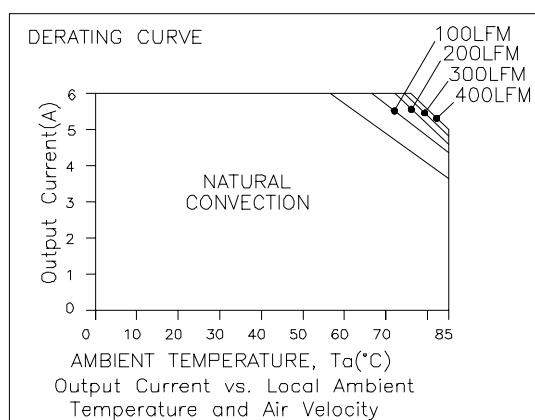
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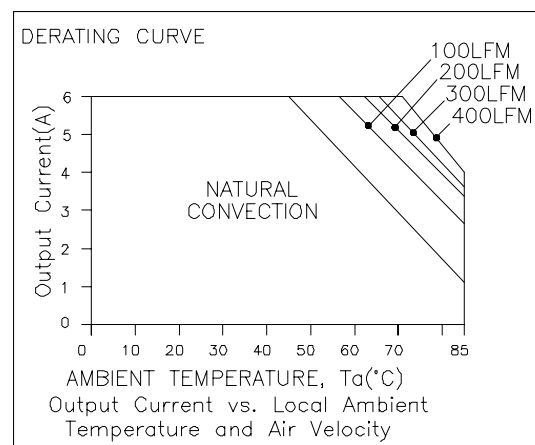
Thermal Derating Curves



$V_{in}=12\text{V}$, $V_o=0.75\text{V}$



$V_{in}=12\text{V}$, $V_o=2.5\text{V}$



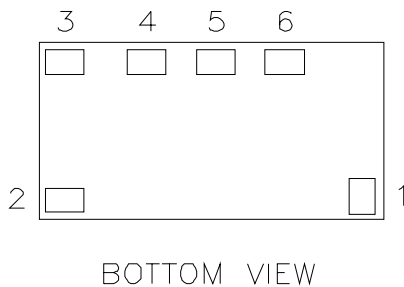
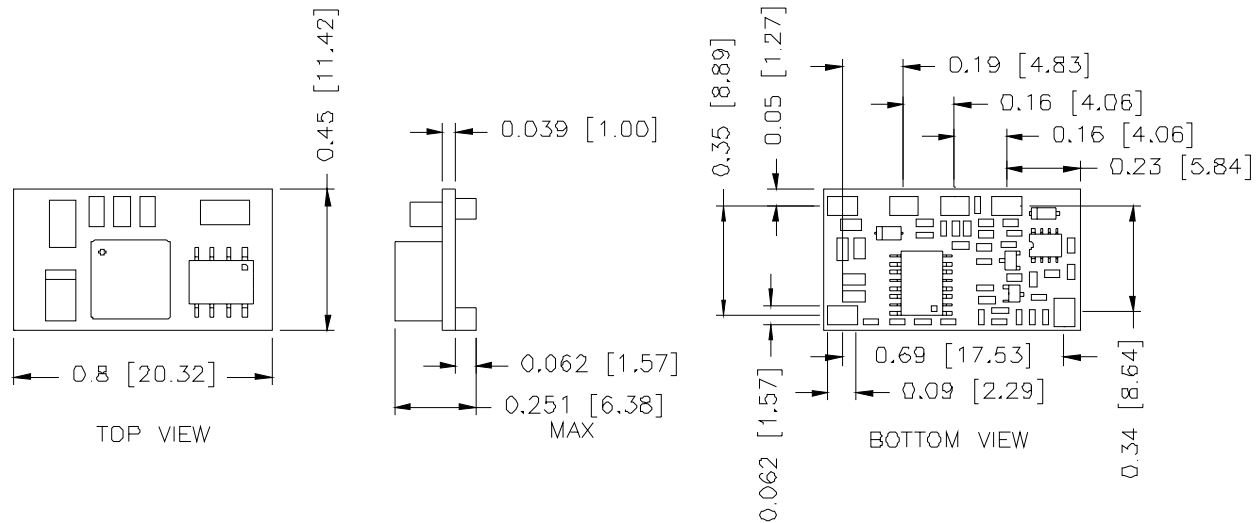
$V_{in}=12\text{V}$, $V_o=5.0\text{V}$

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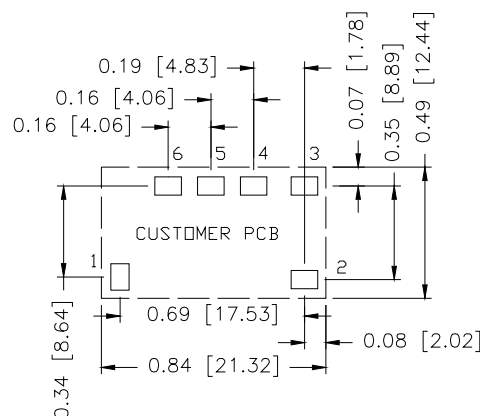
bel
POWER PRODUCTS



Pin Connections

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

RECOMMENDED PAD LAYOUT



PAD SIZE:

MIN: 0.12" * 0.095" (3.05mm * 2.41mm)

MAX: 0.135" * 0.11" (3.43mm * 2.79mm)

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