

NON-ISOLATED DC/DC CONVERTERS

10V-14V Input

0.75V-6.0V/6A Output

bel
POWER PRODUCTS

V7BA-06A1Ax Series

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



Description

The Bel V7BA-06A1Ax modules are a series of non-isolated DC/DC converters that can deliver up to 6A of output current with full load efficiency of 92% at 6.0V output. These modules provide precisely regulated voltage programmable via external resistor from 0.75V to 6.0V over input voltage (10V-14V). Their open-frame construction and small footprint enable designers to develop cost and space-efficient solutions. Standard features include remote On/Off, programmable output voltage and over current protection.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency at 6.0V	Model Number Active Low	Model Number Active High
0.75V – 6.0V	10V - 14V	6A	36W	92%	V7BA-06A1AL	V7BA-06A1A0

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	
Ambient Temperature	-40°C	-	85°C	
Storage Temperature	-55°C	-	125°C	

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

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	10V	12V	14V	
Input Current (full load)	Vo=6.0V	-	3.5A	-
	Vo=5.0V	-	2.8A	-
	Vo=3.3V	-	1.9A	-
	Vo=2.5V	-	1.5A	-
	Vo=1.8V	-	1.1A	-
	Vo=0.75V	-	0.55A	-
Input Current (no load)	Vo=6.0V	-	100mA	
	Vo=0.75V	-	20mA	
Remote Off Input Current	-	3mA	5mA	

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Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
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	-	9.5V	9.8V	
Turn-off Voltage Threshold	-	9.0V	9.5V	

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
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	7A	-	15A	
Short Circuit Surge Transient	-	0.25A ² s	-	
Ripple and Noise (pk-pk)				Tested with 0-20MHz, with 10uF/10V tantalum capacitor and 1uF/10V ceramic capacitor at the output
Vo=6.0V	-	85mV	-	
Vo=5.0V	-	75mV	-	
Vo=3.3V	-	60mV	-	
Vo=2.5V	-	50mV	-	
Vo=1.8V	-	40mV	-	
Ripple and Noise (RMS)				Tested with 0-20MHz, with 10uF/10V tantalum capacitor and 1uF/10V ceramic capacitor at the output
Vo=6.0V	-	30mV	-	
Vo=5.0V	-	25mV	-	
Vo=3.3V	-	20mV	-	
Vo=2.5V	-	15mV	-	
Vo=1.8V	-	12mV	-	
Vo=0.75V	-	7mV	-	
Turn on Time	-	15mS	25mS	
Overshoot at Turn on	-	0%	3%	
Output Capacitance				
ESR ≥ 1mohm	0uF	-	1000uF	
ESR ≥ 10mohm	0uF	-	3300uF	
Transient Response				
50% ~ 100% Max Load	Vo = 0.75V - 6.0V	-	200mV	di/dt=2.5A/uS; Vin=12V; and with 10uF/10V tantalum capacitor and 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.

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General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=12V, full load
Vo=6.0V	-	92%	-	
Vo=5.0V	-	90%	-	
Vo=3.3V	-	88%	-	
Vo=2.5V	-	85%	-	
Vo=1.8V	-	83%	-	
Vo=0.75V	-	71%	-	
Switching Frequency	280KHz	300KHz	320KHz	
Over Temperature Shutdown	-	135°C	-	
MTBF	3,266,517 hours			Calculated Per Bell Core TR-332 (Io = Nominal; Ta = 25°C)
Dimensions				
Inches (L x W x H)	1.0 x 0.5 x 0.243			
Millimeters (L x W x H)	25.4 x 12.7 x 6.16			
Weight	-	3g	-	

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

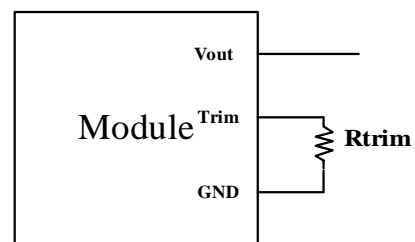
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.3V	-	0.4V	V7BA-06A1A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	2.5V	-	14V	
Signal Low (Unit On)	-0.3V	-	0.4V	V7BA-06A1AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5V	-	14V	
Output Voltage Trim Range (Wide Trim)	0.7525V	-	6.3V	

Output Trim Equations

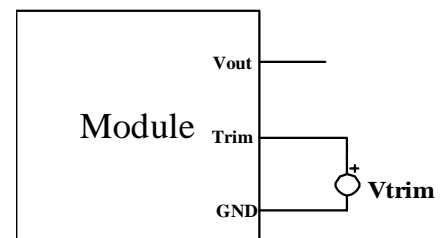
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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



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

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



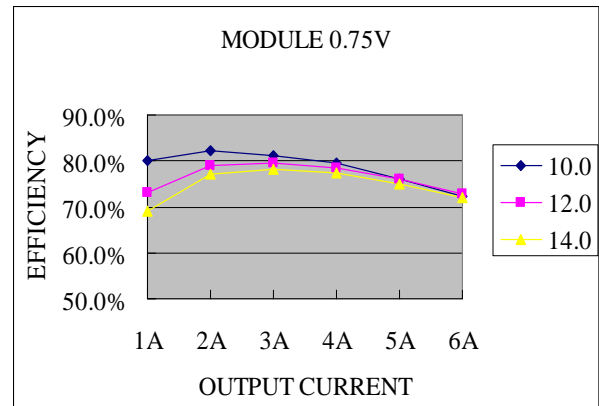
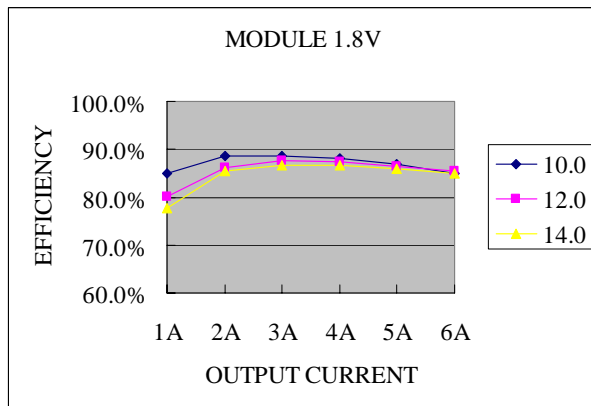
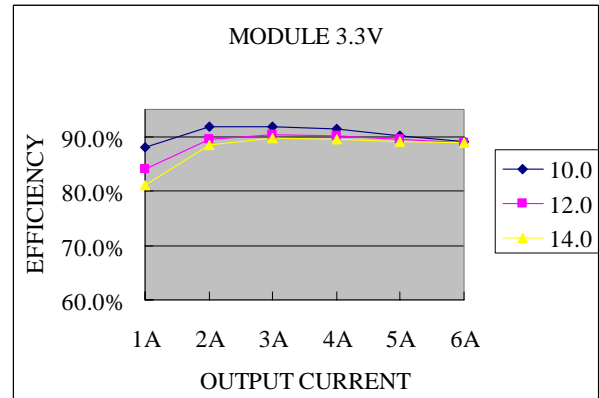
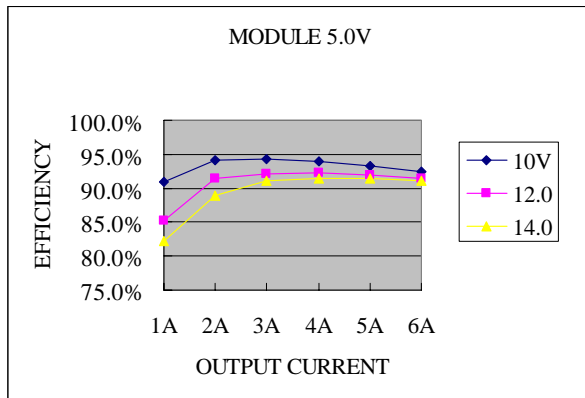
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Efficiency Data



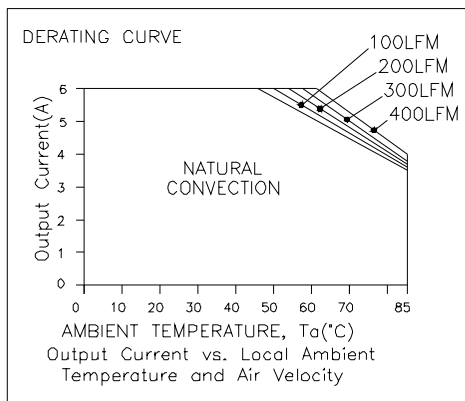
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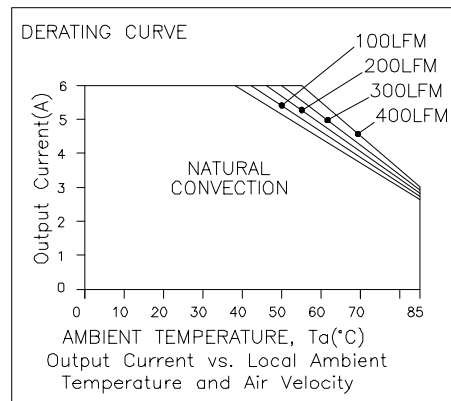
0.75V-6.0V/6A Output



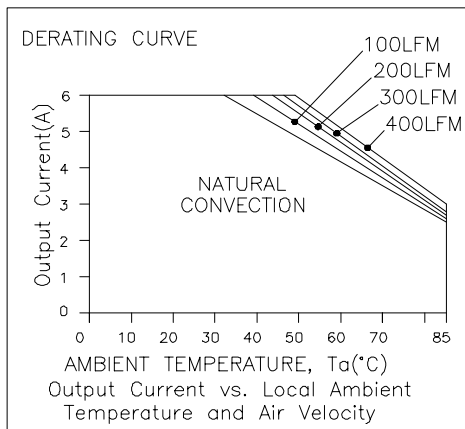
Thermal Derating Curves



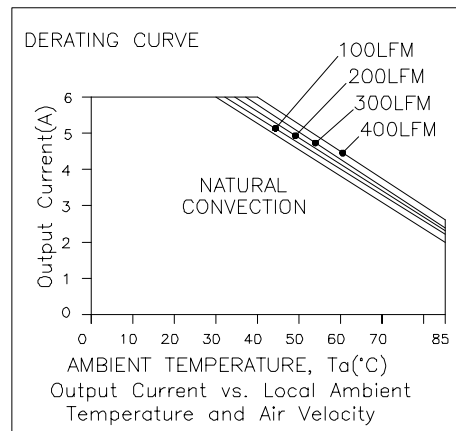
Vin=12V, Vo=0.75V



Vin=12V, Vo=2.5V



Vin=12V, Vo=3.3V

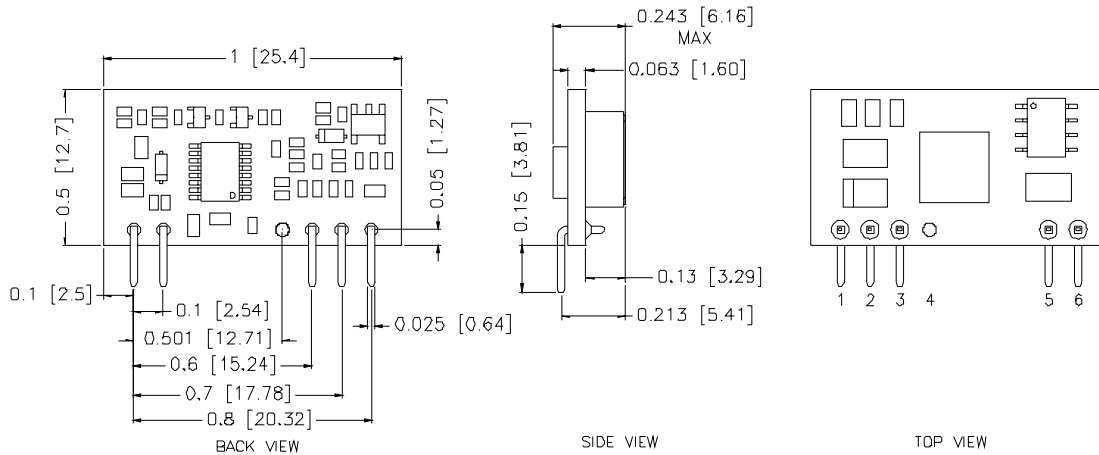


Vin=12V, Vo=6.0V

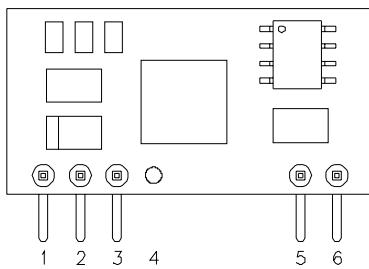
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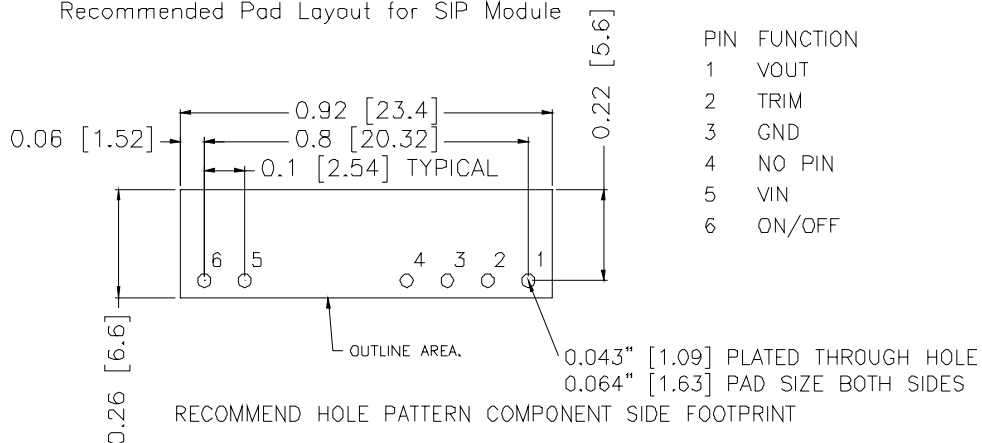


Pin Connections



Pin	Function
1	Vout
2	Trim
3	Ground
4	No Pin
5	Vin
6	Remote On/Off

Recommended Pad Layout for SIP Module



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