

NON-ISOLATED DC/DC CONVERTERS

2.4V-5.5V Input

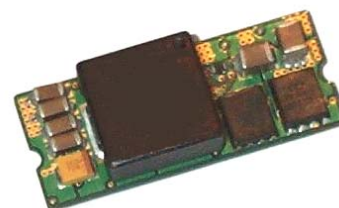
0.75V-3.63V/16A Output

bel
POWER PRODUCTS

S7BC-16F2AX Series

PRELIMINARY

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage Sequencing
- 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)
- Remote Sense



Description

The Bel S7BC-16F2AX modules are a series of non-isolated dc-dc converters that deliver up to 16A of output current with full load efficiency of 94% at 3.3V output. These modules provide precisely regulated voltage programmable via external resistor from 0.75V to 3.63V over a wide range of input voltage (2.4-5.5V). 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
0.75 – 3.63V	2.4 – 5.5V	16A	58.1W	94%	S7BC-16F2AL	S7BC-16F2A0

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3V	-	5.8V	
Output Enable Terminal Voltage	-0.3V	-	5.8V	
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-16F2AX 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				
Vo=3.3V	4.5V	-	5.5V	
Vo=2.5V	3.0V	-	5.5V	
Vo ≤ 1.8V	2.4V	-	5.5V	
Input Current (full load)				
Vo=3.3V	-	11.23A	15.10A	
Vo=2.5V	-	8.70A	14.81A	
Vo=1.8V	-	6.40A	13.64A	
Vo=1.5V	-	5.45A	11.76A	
Vo=1.2V	-	4.52A	9.64A	
Vo=0.75V	-	3.05A	6.69A	
Input Current (no load)	-	80mA	-	
Remote Off Input Current	-	10mA	22mA	
Input Reflected Ripple Current (pk-pk)	-	100mA	-	Tested with two 100uF/10V tan input capacitors (P/N: TPSC107K010R0075 AVX) & simulated source impedance of 1uH, 5Hz to 20MHz.
Input Reflected Ripple Current (RMS)	-	40mA	-	
I ² t Inrush Current Transient	-	0.15A ² s	0.3A ² s	
Turn-on Voltage Threshold	-	1.95V	2.15V	
Turn-off Voltage Threshold	-	1.87V	1.95V	

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2%Vo,set	-	2%Vo,set	Vin=5V, 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	-	16A	
Current Limit Threshold	22A	-	42A	
Short Circuit Surge Transient	-	1.6A ² s	2A ² s	
Ripple and Noise (pk-pk)	-	25mV	50mV	Tested with 0-20MHz, 10uF/10V tantalum capacitor & 1uF/10V TDK ceramic capacitor at output
Ripple and Noise (RMS)	-	8mV	15mV	
Turn on Time	-	3mS	6mS	
Overshoot at Turn on	-	0%Vo,set	3%Vo,set	
Output Capacitance				
ESR ≥ 1mohm	0uF	-	1000uF	
ESR ≥ 10mohm	0uF	-	5000uF	
Transient Response				
50% ~ 100% Max Load	Vo=0.75V - 3.3V	-	300mV	di/dt=2.5A/uS; Vin=5V; and with two 100uF/10V tantalum capacitors & 1uF/10V ceramic capacitor at output
Settling Time		-	50uS	
100% ~ 50% Max Load		-	300mV	
Settling Time		-	50uS	

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

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0.75V-3.63V/16A Output



General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=5V, full load
Vo=3.3V	92%	94%	-	
Vo=2.5V	90%	92%	-	
Vo=1.8V	88%	90%	-	
Vo=1.5V	85%	88%	-	
Vo=1.2V	82%	85%	-	
Vo=0.75V	76%	79%	-	
Switching Frequency	250KHz	300KHz	350KHz	
Over Temperature Shutdown	-	125°C	-	
Output Trim Range (Wide Trim)	0.7525V	-	3.63V	
Remote Sense Compensation	-	-	5%	
Dimensions				
Inches (L × W × H)	1.30 x 0.53 x 0.315			
Millimeters (L × W × H)	33.02 x 13.46 x 8.00			
Weight	-	6.6g	-	

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

Control Specifications

Parameter	Min	Typ	Max	Notes
Signal Low (Unit Off)	-0.3V	-	0.3V	S7BC-16F2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	1.5V	-	5.8V	
Signal Low (Unit On)	-0.3V	-	0.3V	S7BC-16F2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	1.5V	-	5.8V	
Sequencing Voltage	0.05V	-	Vin	Sequencing Voltage 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	

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.

$$R_{TrimUp} = \frac{21.07}{V_{adj} - 0.7525} - 5.11$$

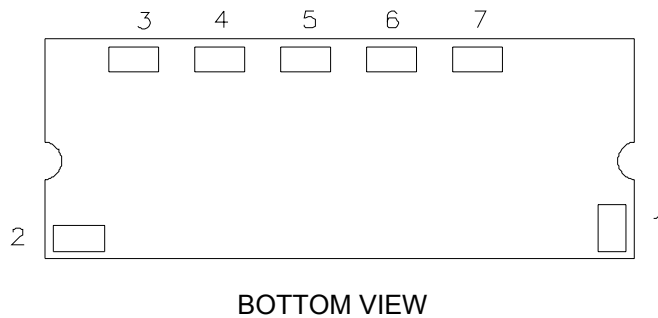
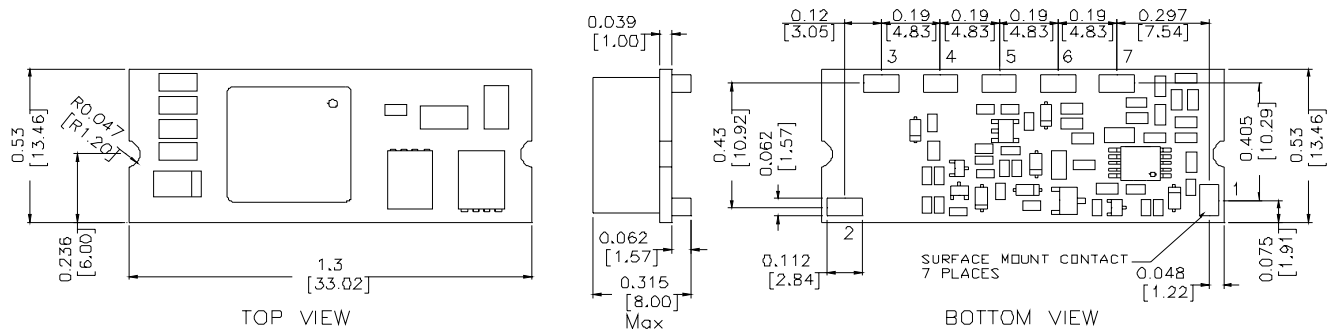
Equation for calculating the trim voltage (in V) given the desired adjusted voltage (Vadj) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

$$V_{TrimUp} = 0.7 - 0.1698 \times (V_{adj} - 0.7525)$$

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Pin Connections

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

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