NON-ISOLATED DC/DC CONVERTERS

12V Input 0.9V-5.0V/20A Output

x7PF-20A1A0

- Non-Isolated
- Fixed Frequency (275KHz)
- High Efficiency
- High Power Density
- Power Good Output Signal (open collector)
- Under-Voltage Lockout (UVLO)
- Wide Trim Range
- Converter Can Sink and Source Current
- OCP/SCP
- Remote On/Off
- Low Cost

Description

The Bel x7PF-20A1A0 is a new high density open frame non-isolated converter series for space sensitive applications. Each model has a wide input range (10.2V-13.8V) and offers a wide range of output voltage (0.9V - 5.0V) with a 20A load. An external resistor adjusts the output voltage from its pre-set value of 0.9V to any value up to the 5.0V maximum. Typical efficiency is 92% at Vo=5V, Vin=12V at full load. Typical features include remote on/off, under-voltage lockout, over-current protection and short circuit protection.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Vertical Mount	Model Number Horizontal Mount
0.9V – 5.0V	12V	20A	100W	92%	V7PF-20A1A0	07PF-20A1A0

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	-	13.8V	
Output Enable Terminal Voltage	-0.3V	-	13.8V	
Ambient Temperature	0°C	-	80°C	
Storage Temperature	-40°C	-	125°C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	10.2V	-	13.8V	
Input Current (Source) Vo=5.0V Vo=2.5V Vo=0.9V	 - - -	 9.1A 4.9A 2.2A	 - - -	
Input Current (Sink) Vo=2.5V Vo=0.9V	 - -	 -3.44A -0.97 A	 - -	Able to sink 20A output current at any output voltage up to and including 2.5V.
Input Current (No Load)	-	95mA	-	
Remote Off Input Current	-	5mA	10mA	

Input Specifications (continued)

Parameter	Min	Typ	Max	Notes
Input Reflected Ripple Current (pk-pk)				Tested with simulated source impedance of 1.5uH 5Hz to 20MHz, and 2 × 270uF/16V Oscon capacitors (ESR ≤ 20 mΩ) at the input
Vo=5.0V	-	280mA	350mA	
Vo=3.3V	-	250mA	320mA	
Vo=2.5V	-	200mA	280mA	
Vo=0.9V	-	150mA	250mA	
Input Reflected Ripple Current (RMS)				
Vo=5.0V	-	80mA	120mA	
Vo=3.3V	-	70mA	100mA	
Vo=2.5V	-	45mA	80mA	
Vo=0.9V	-	40mA	60mA	
External Input Capacitance	-	540uF	-	
Turn-on Voltage Threshold	8.5V	9.0V	9.5V	
Turn-off Voltage Threshold	7.0V	7.6V	8.3V	

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

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2.5%Vo,set	-	2.5%Vo,set	Vin=12V, Io=Iomax, full load
Output Voltage Set Point	-3.5%Vo,set	-	3.5%Vo,set	Over all operating input voltage, resistive load, and temperature conditions
Load Regulation				Io=Iomin to Iomax
Vo=5.0V	-	-	0.4%Vo,set	
Vo=3.3V	-	-	0.4%Vo,set	
Vo=2.5V	-	-	0.5%Vo,set	
Vo=0.9V	-	-	1%Vo,set	
Line Regulation	-	-	0.5%Vo,set	Vin=Vinmin to Vinmax
Output Ripple and Noise (pk-pk)				Tested at 0-20MHz BW, with a 680uF/6.3V Oscon capacitor (ESR ≤ 12 mΩ), 10uF/16V Tantalum capacitor, and 10nF ceramic capacitor at the output.
Vo=5.0V	-	65mV	80mV	
Vo=3.3V	-	60mV	75mV	
Vo=2.5V	-	55mV	70mV	
Vo=0.9V	-	45mV	55mV	
Output Ripple and Noise (RMS)				
Vo=5.0V	-	18mV	25mV	
Vo=3.3V	-	15mV	25mV	
Vo=2.5V	-	15mV	20mV	
Vo=0.9V	-	10mV	15mV	
Output Current	0A	-	20A	
Current Limit Threshold	25A	-	40A	
Short Circuit Surge Transient	-	-	$0.1A^2s$	
Turn on Time	-	5mS	10mS	
Overshoot at Turn on	-	0%Vo	3%Vo	
Output Capacitance				
Vo=5.0V	680uF	-	5080uF	
Vo=2.5V	680uF	-	7840uF	
Vo=0.9V	680uF	-	11000uF	
Transient Response				
50% ~ 75% Max Load	Vo=0.9V-5.0V	-	100mV	150mV	Test conditions: di/dt=2.5A/uS; Vin=12V; with a 680uF/6.3V Oscon capacitor (ESR ≤ 12mΩ),10uF/16V Tantalum capacitor, and 10nF ceramic capacitor at the output.
Settling Time		-	40uS	80uS	
75% ~ 50% Max Load		-	100mV	150mV	
Settling Time		-	40uS	80uS	

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

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency (Current Source)				Measured at Vin=12V, full load.
Vo=5.0V	89%	92%	-	
Vo=3.3V	86%	89%	-	
Vo=2.5V	83%	86%	-	
Vo=0.9V	65%	69%	-	
Efficiency (Current Sink)				
Vo=2.5V	79%	82%	-	
Vo=0.9V	60%	63%	-	
Switching Frequency	240KHz	275KHz	310KHz	
Output Voltage Trim Range	0.9V	-	5.0V	Vo=0.9V when the Trim pin is open.
MTBF	5,570,000 hours			Calculated Per Bell Core TR-332 (Io = Nominal; Ta = 25°C)
Dimensions				V7PF-20A1A0
Inches (L × W × H)	1.2 x 1.1 x 0.457			
Millimeters (L × W × H)	30.48 x 27.94 x 11.6			
Dimensions				07PF-20A1A0
Inches (L × W × H)	1.2 x 1.1 x 0.508			
Millimeters (L × W × H)	30.48 x 27.94 x 12.91			
Weight	-	15g	-	

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	-	0.8V	Remote On/Off pin open, unit on.
Signal High (Unit On)	2.4V	-	13.8V	
Power Good				
Power Good Delay [1]	-	-	8mS	

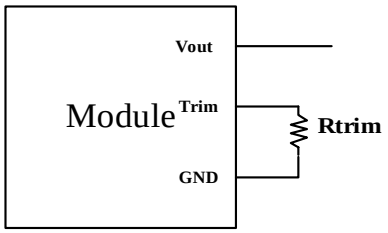
Note: All specifications are typical at 25°C unless otherwise stated.

1. the power good signal is an open collector output. When the output of the module reaches 90% of the nominal set point, the power good pin is set high.

Output Trim Equations

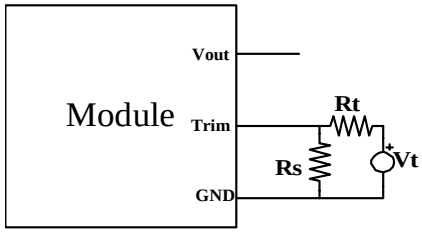
Equation for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground. Trim values should not be less than 280Ω.

$$R_{trim} = \frac{1.17}{V_{adj} - 0.9}$$

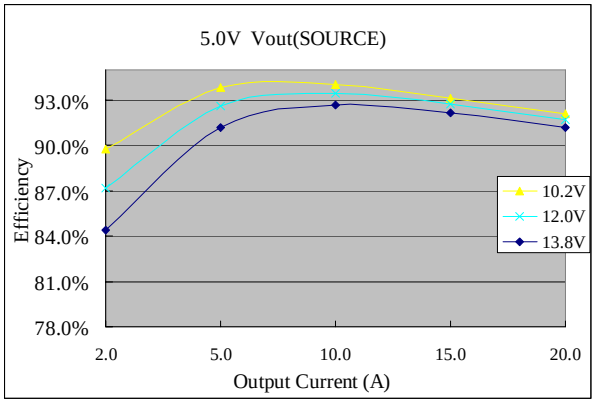


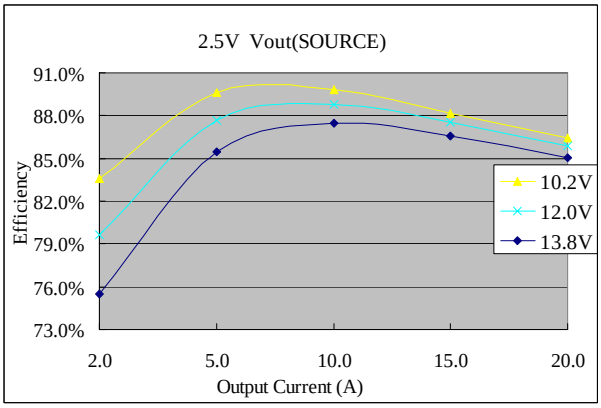
Equation for calculating the trim voltage (in V) given the desired adjusted voltage (Vadj) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

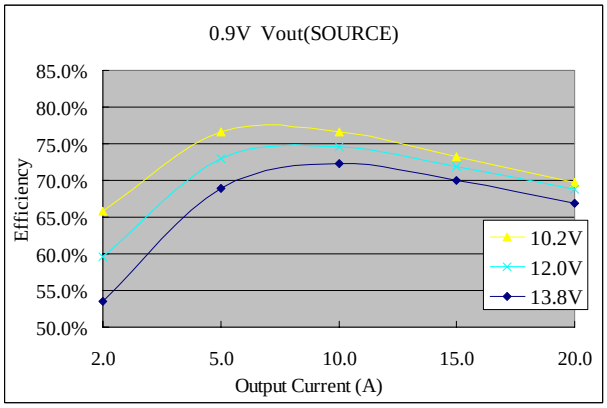
$$Rt = \frac{Rs \times (1.3Vt - 1.17)}{1.17 - Rs \times (V_{adj} - 0.9)}$$



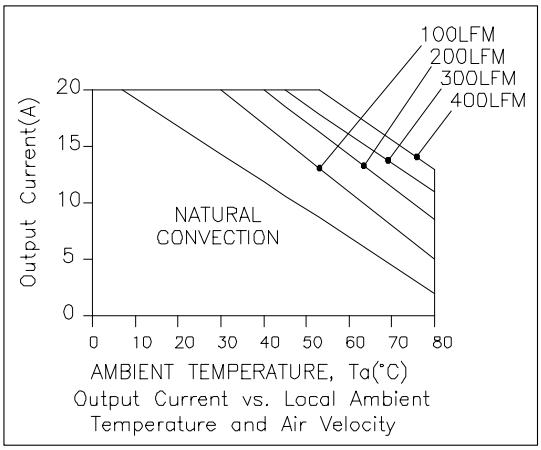
Efficiency Data



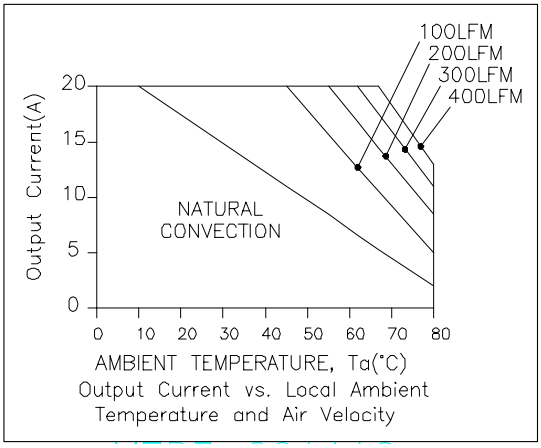




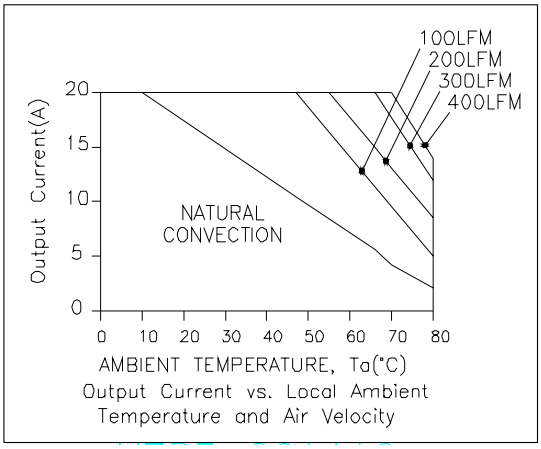
Thermal Derating Curves



Vo=5V; Vin=12V

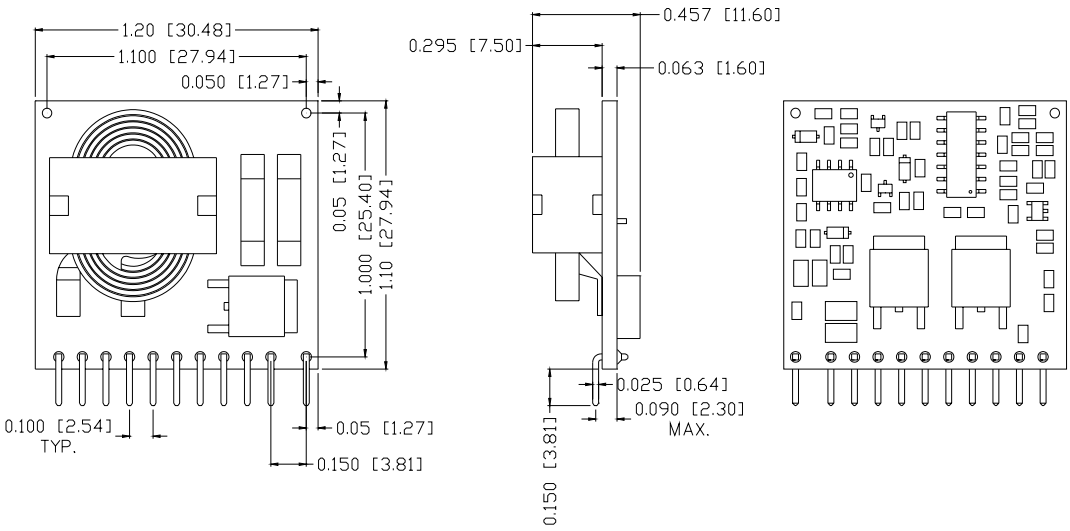


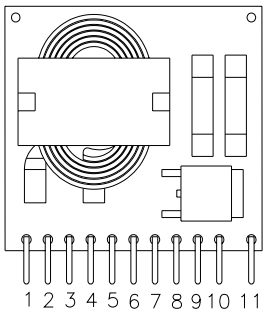
Vo=2.5V; Vin=12V



Vo=0.9V; Vin=12V

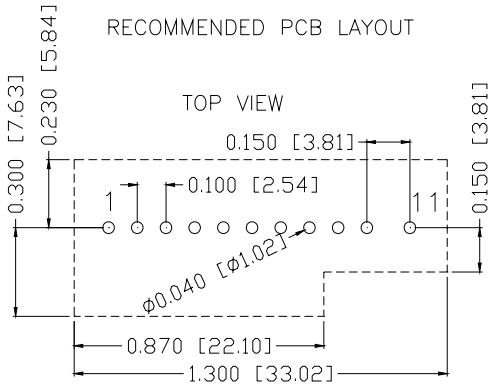
V7PF-20A1A0





Pin Connections

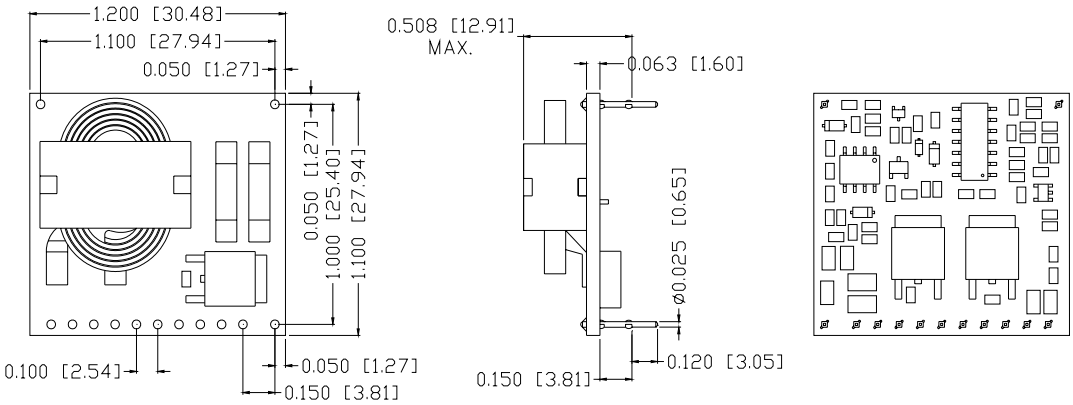
Pin	Function
1	Vout
2	Vout
3	Vout
4	Trim
5	Remote On/Off
6	Power Good
7	Ground
8	Ground
9	Reserved
10	Vin
11	Vin

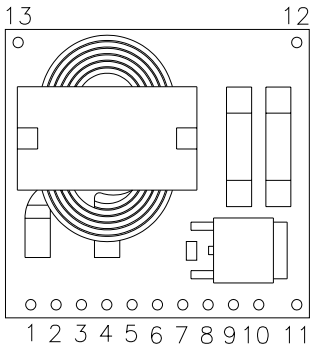


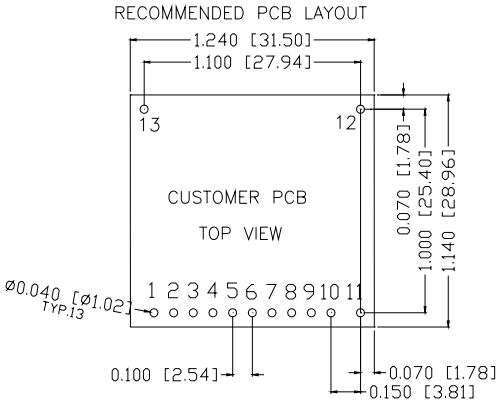
NON-ISOLATED DC/DC CONVERTERS

12V Input 0.9V-5.0V/20A Output

07PF-20A1A0







Pin Connections

Pin	Function
1	Vout
2	Vout
3	Vout
4	Trim
5	Remote On/Off
6	Power Good
7	Ground
8	Ground
9	Pwrgd_set
10	Vin
11	Vin
12	Support Pin
13	Support Pin

CORPORATE

Bel Fuse Inc.
206 Van Vorst Street
Jersey City, NJ 07302
Tel 201-432-0463
Fax 201-432-9542
www.belfuse.com

FAR EAST

Bel Fuse Ltd.
8F/ 8 Luk Hop Street
San Po Kong
Kowloon, Hong Kong
Tel 852-2328-5515
Fax 852-2352-3706
www.belfuse.com

EUROPE

Bel Fuse Europe Ltd.
Preston Technology Management Centre
Marsh Lane, Suite G7, Preston
Lancashire, PR1 8UD, U.K.
Tel 44-1772-556601
Fax 44-1772-888366
www.belfuse.com