

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc. , a subsidiary of Bel Fuse, Inc.

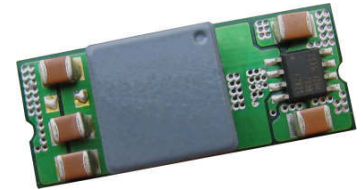
SRBC-10A1Ax

RoHS Compliant

Rev.C

Features

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage
- Remote Sense
- Able to Sink/Source Current
- Certificated to UL60950-1/CSA C22.2 No.60950-1, 2rd edition, am1
- Under-voltage Lockout (UVLO)
- Over Temperature Protection
- OCP/SCP
- Wide Input
- Wide Trim
- Remote On/Off
- Active Low/High (option)
- Industrial Temperature Range



Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The Bel SRBC-10A1Ax modules are a series of non-isolated dc/dc converters that deliver up to 10 A of output current with full load efficiency of 93% at 3.3 Vdc output. These modules provide precisely regulated voltage programmable via external resistor from 0.75 Vdc to 5.0 Vdc over a wide range of input voltage (8.3 Vdc - 14 Vdc). 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 V - 5.0 V	8.3 V - 14 V	10 A	50.0 W	95%	SRBC-10A1AL	SRBC-10A1A0

Notes: 1. Add "G" suffix at the end of the model number to indicate "Tray Packaging".

Part Number Explanation

$\frac{S}{1} \frac{R}{2} \frac{BC}{3} - \frac{10}{4} \frac{A}{5} \frac{1A}{6} \frac{x}{7}$

1---Surface mount Vertical mount

2---RoHS 6, change "R" to "7" means RoHS 5

3---Series name

4---Series code

5---Wide input range (8.3-14V)

6---Wide trim

7---Option, "x" of the model part number to be 0-9, A-Z, which will represent the special request of customer.

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	15 V	
Output Enable Terminal Voltage	-0.3 V	-	15 V	
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				
$V_o, \text{set} \leq 3.63 \text{ V}$	8.3 V	12 V	14 V	
$V_o, \text{set} > 3.63 \text{ V}$	8.3 V	12 V	13.2 V	
Input Current (full load)	-	-	6.5 A	An input line fuse must always be used.
Input Current (no load)	-	50 mA	-	
Remote Off Input Current	-	2 mA	-	
Input Reflected Ripple Current (pk-pk)	-	-	400 mA	Tested with one 1000uF/25 V AL input capacitor with ESR=0.03 ohm max and 4 × 47 uF/16 V tan capacitors with ESR=0.013 ohm max at 100 kHz, & simulated source impedance of 1000 nH, 5 Hz to 20 MHz.
Input Reflected Ripple Current (rms)	-	-	150 mA	
I^2t Inrush Current Transient	-	0.04 A ² s	0.08 A ² s	
Turn-on Voltage Threshold	-	8.2 V		
Turn-off Voltage Threshold	-	7.9 V		

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

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-2% $V_{o,\text{set}}$	-	2% $V_{o,\text{set}}$	$V_{in}=12 \text{ V}$, full load
Load Regulation	-	0.1% $V_{o,\text{set}}$	-	
Line Regulation	-	0.1% $V_{o,\text{set}}$	-	
Regulation Over Temperature (-40 °C to +85 °C)	-	0.3% $V_{o,\text{set}}$	-	$T_{\text{ref}}=T_{\text{amin}}$ to T_{amax}
Output Current	0 A	-	10 A	
Current Limit Threshold	-	200% $I_{o,\text{out}}$	-	
Short Circuit Surge Transient	-	1 A ² s	3 A ² s	
Ripple and Noise (pk-pk)	-	50 mV	100 mV	Tested with 0-20 MHz, with 10 uF tantalum capacitor & 1 F ceramic capacitor
Ripple and Noise (rms)	-	20 mV	40 mV	
Turn on Time	-	6 mS	10 mS	
Overshoot at Turn on	-	0%	1%	
Output Capacitance $\text{ESR} \geq 10 \text{ mohm}$	0 uF	-	5000 uF	

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc. , a subsidiary of Bel Fuse, Inc.

Output Specifications(continued)

Parameter	Min	Typ	Max	Notes
Transient Response				
50% ~ 100% Max Load	-	100 mV	-	di/dt=2.5 A/uS; Vin=12 V; and with 2 × 150 uF polymer capacitors at the output
Settling Time	-	50 uS	-	
100% ~ 50% Max Load	-	100 mV	-	
Settling Time	-	50 uS	-	

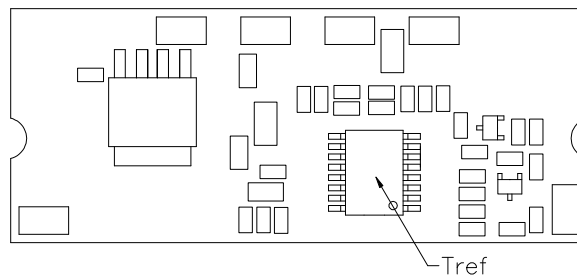
Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency				Measured at Vin=12 V, full load
Vo=5.0 V	-	95%	-	
Vo=3.3 V	-	93%	-	
Vo=2.5 V	-	92%	-	
Vo=1.8 V	-	90%	-	
Vo=1.5 V	-	89%	-	
Vo=1.2 V	-	87.5%	-	
Vo=0.75 V	-	81%	-	
Switching Frequency	265 kHz	300 kHz	335 kHz	
Over Temperature Shutdown ¹	-	130 °C	-	
Output Voltage Trim Range	0.7525 V	-	5.0 V	
Remote Sense Compensation	-	-	0.5 V	
Dimensions				
Inches (L × W × H)	1.3 x 0.53 x 0.315			
Millimeters (L × W × H)	33.02 x 13.46 x 8.00			
Weight	-	8 g	-	

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

1. The Tref temperature measurement location:



NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

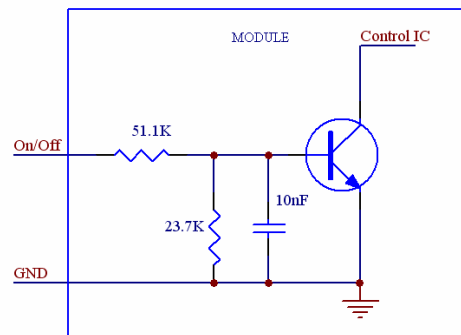
Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2 V	-	0.3 V	SRBC-10A1A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	V _{in} , max	
Signal Low (Unit On)	-0.2 V	-	0.3 V	SRBC-10A1AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5 V	-	V _{in} , max	

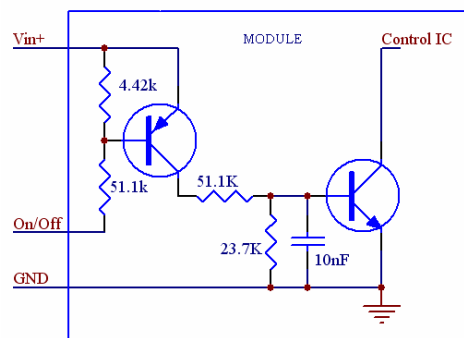
Remote Enable Specifications

The SRBC-10A1AL modules feature an enable pin with negative logic. If not using the enable pin, leave the pin open (the module will be on). During logic_high, the module is turned off, during logic_low, the module is turned on. Its inner circuit impedance is shown as figure.



SRBC-10A1AL

The SRBC-10A1A0 modules feature an enable pin with Positive logic. If not using the enable pin, leave the pin open (the module will be on). During logic_high, the module is turned on, during logic_low, the module is turned off. Its inner circuit impedance is shown as figure.



SRBC-10A1A0

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

0.75 Vdc - 5.0 Vdc/10 A Output



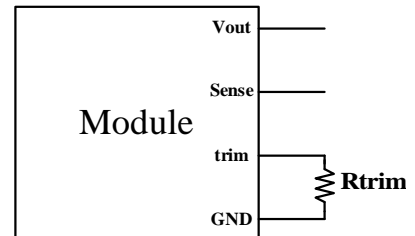
Jan. 25, 2013

Bel Power, Inc. , a subsidiary of Bel Fuse, Inc.

Output Trim Equations

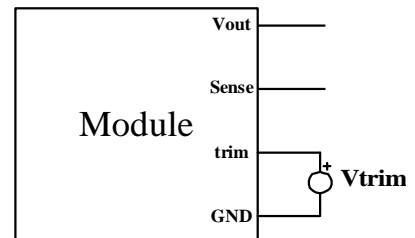
Equation for calculating the trim resistor (in Ω) given the desired adjusted voltage (V_{adj}) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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



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

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



NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

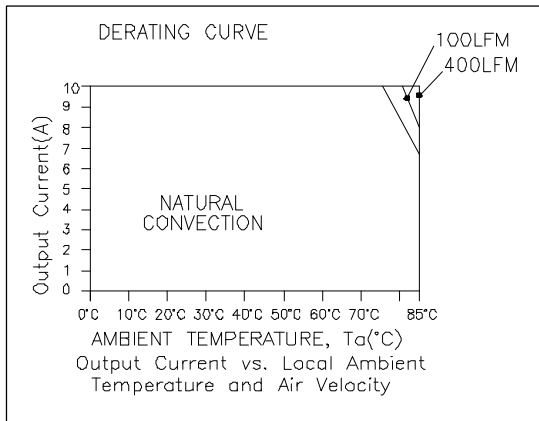
0.75 Vdc - 5.0 Vdc/10 A Output



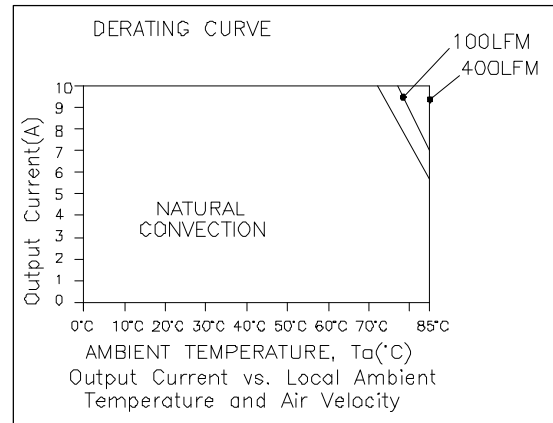
Jan. 25, 2013

Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

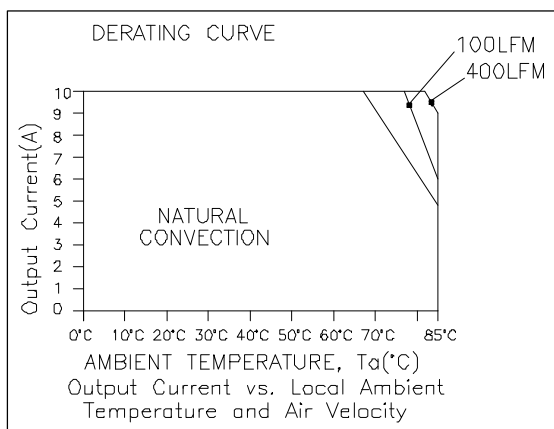
Thermal Derating Curves



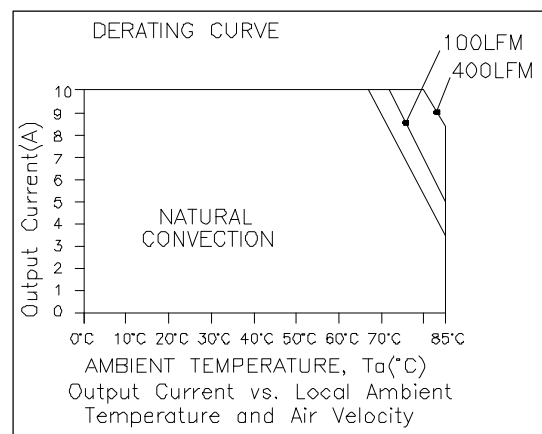
SRBC-10A1AL, Vo=0.75 V



SRBC-10A1AL, Vo=1.8 V



SRBC-10A1AL, Vo=3.3 V



SRBC-10A1AL, Vo=5.0 V

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

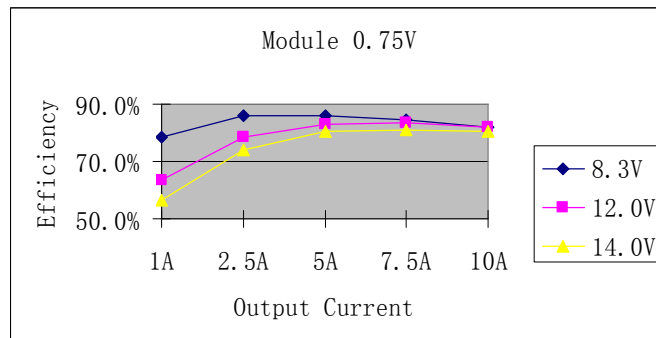
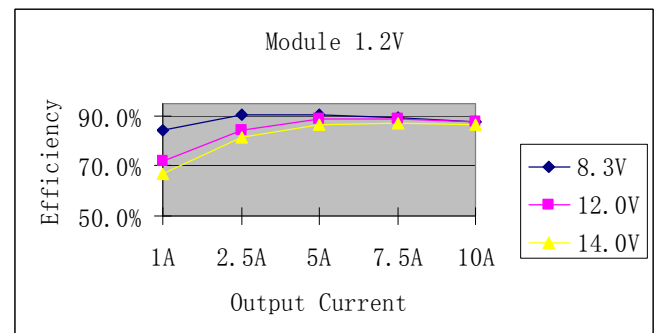
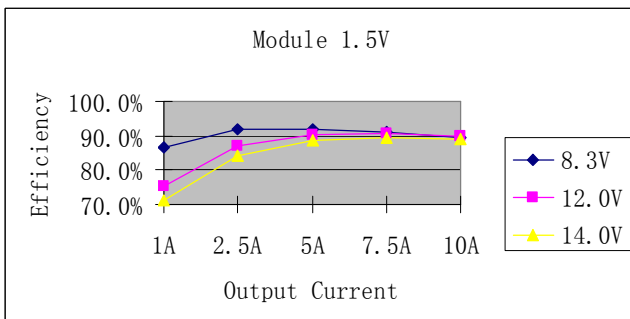
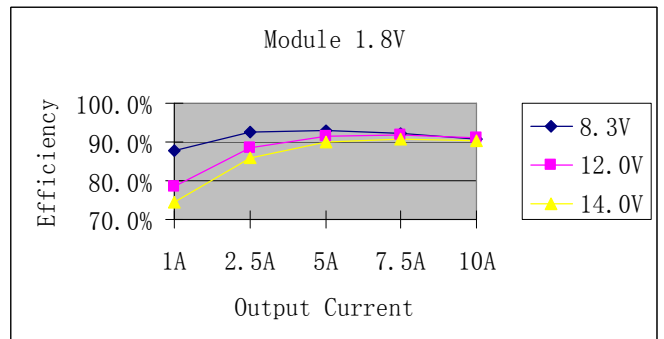
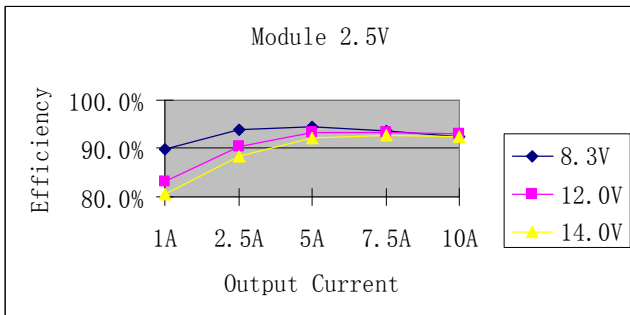
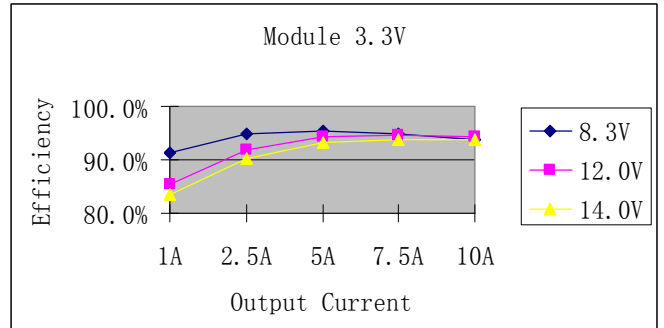
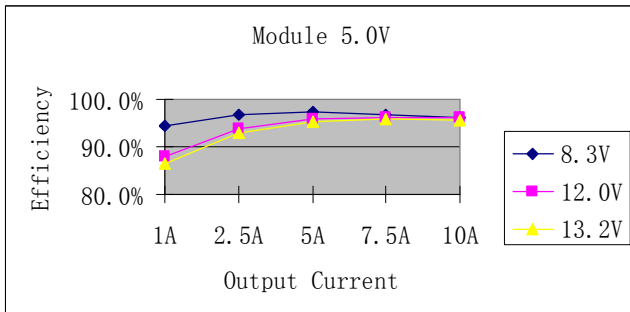
0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

Efficiency Data



NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

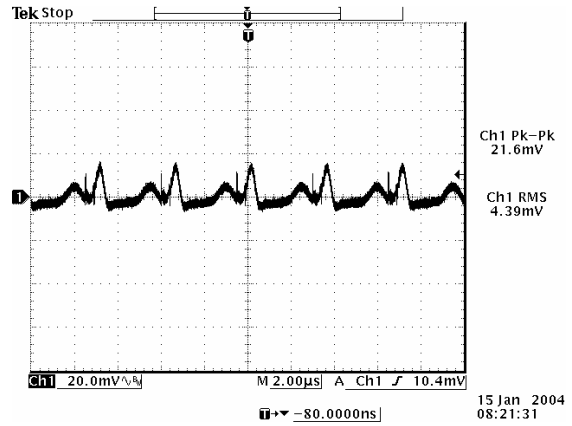
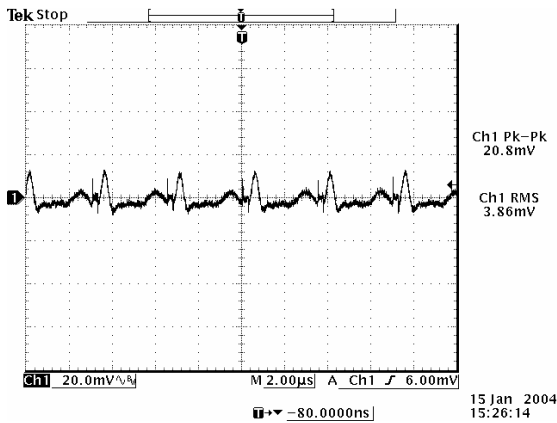
0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

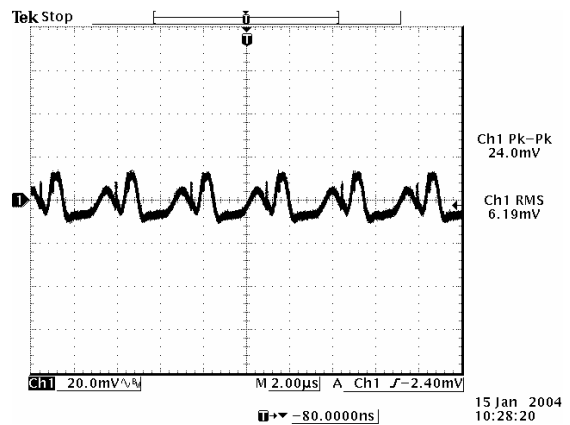
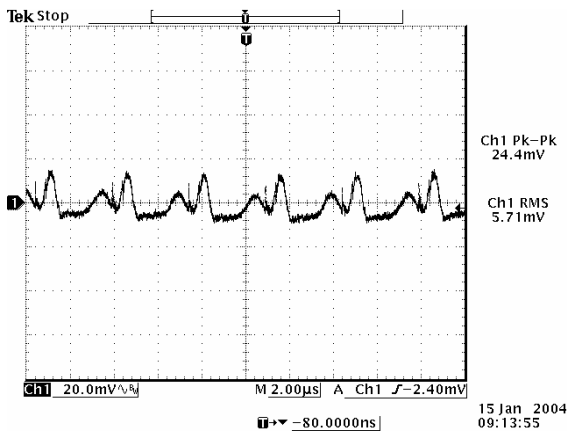
Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

Ripple and Noise Waveforms



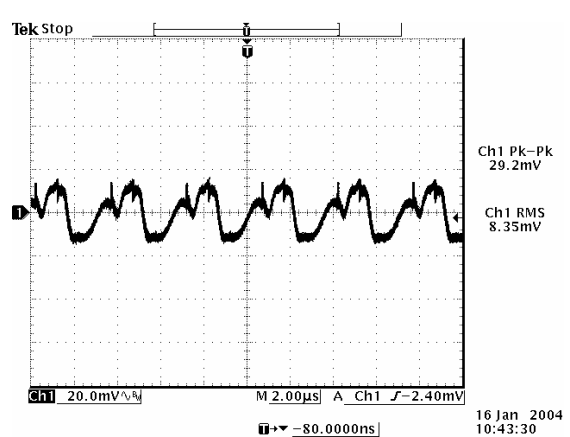
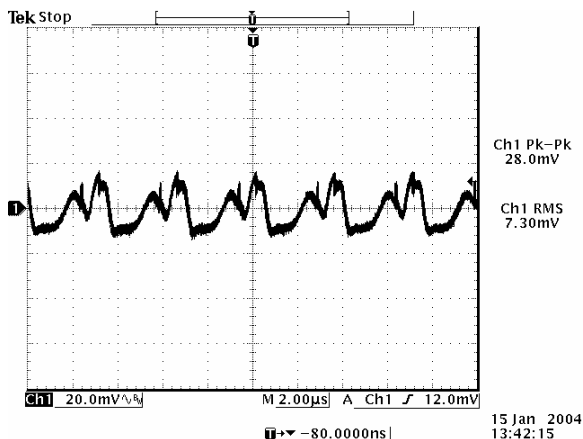
Ripple and noise at max load 0.75 Vdc output

Ripple and noise at max load 1.2 Vdc output



Ripple and noise at max load 1.5 Vdc output

Ripple and noise at max load 1.8 Vdc output



Ripple and noise at max load 2.5 Vdc output

Ripple and noise at max load 3.3 Vdc output

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

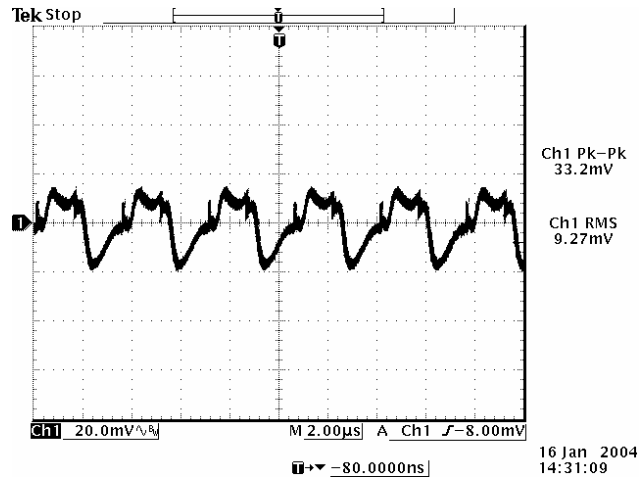
0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

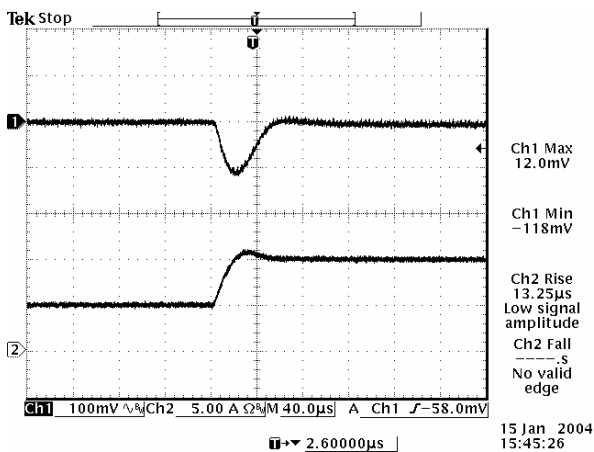
Ripple and Noise Waveforms (continued)



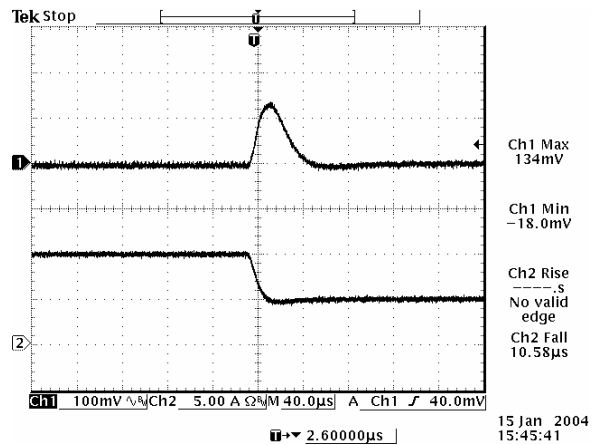
Ripple and noise at max load 5.0 Vdc output

Note: Ripple and Noise at 12 V input, with 10 μ F tantalum capacitor and 1 μ F ceramic capacitor at the output, and $T_a=25$ deg C.

Transient Response Waveforms



Transients 50% to 100% load 0.75 Vdc output



Transients 100% to 50% load 0.75 Vdc output

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

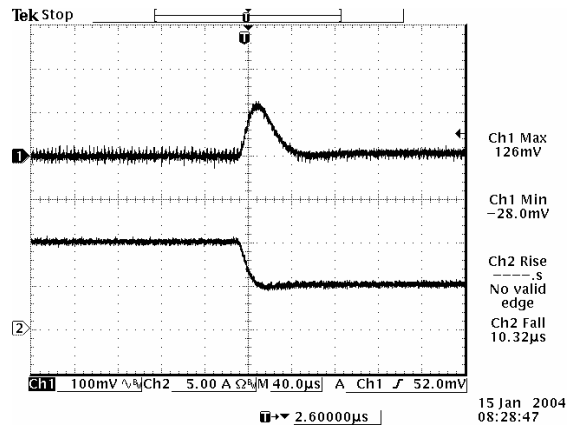
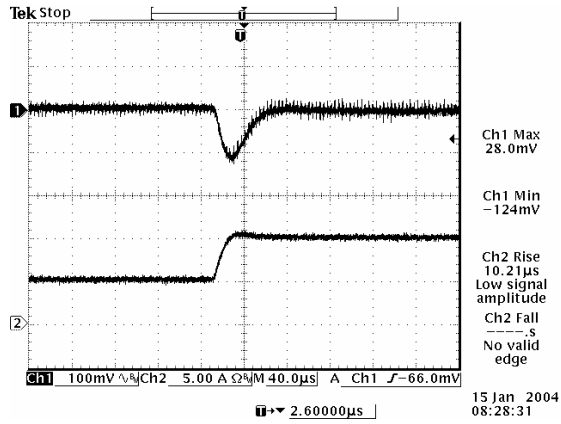
0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

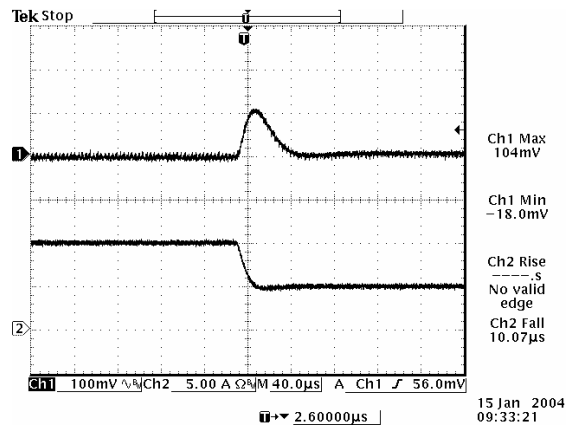
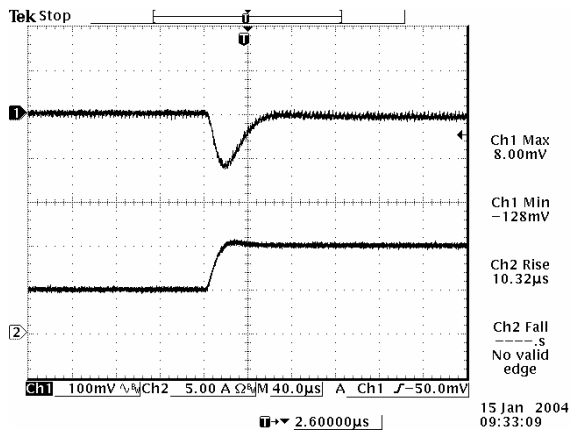
Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

Transient Response Waveforms (continued)



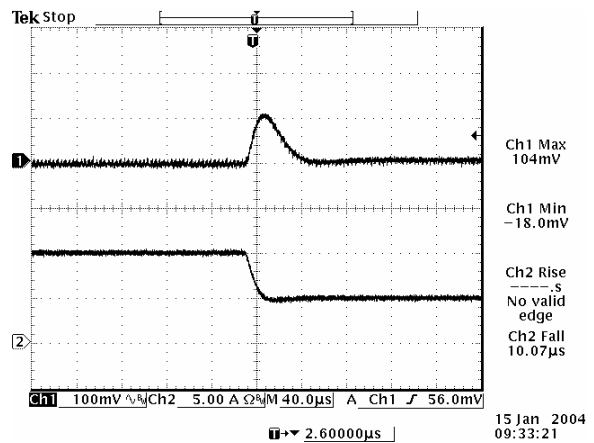
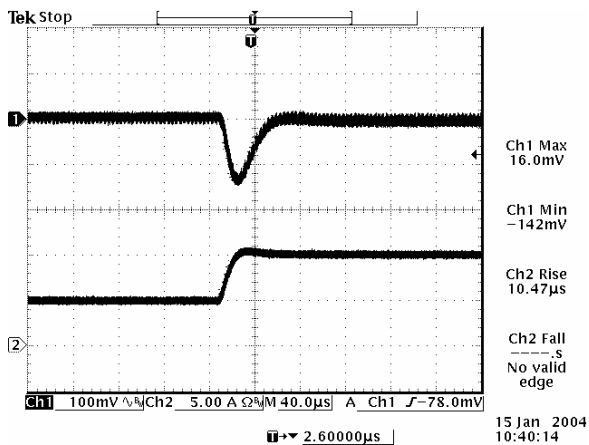
Transients 50% to 100% load 1.2 Vdc output

Transients 100% to 50% load 1.2 Vdc output



Transients 50% to 100% load 1.5 Vdc output

Transients 100% to 50% load 1.5 Vdc output



Transients 50% to 100% load 1.8 Vdc output

Transients 100% to 50% load 1.8 Vdc output

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

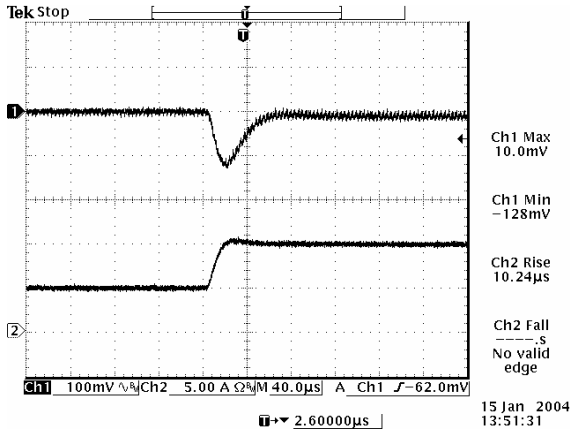
0.75 Vdc - 5.0 Vdc/10 A Output



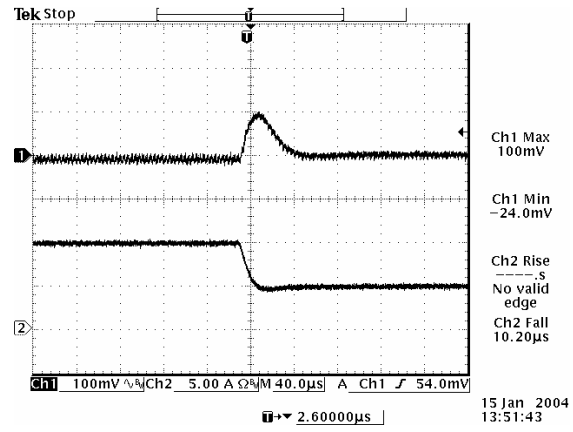
Jan. 25, 2013

Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

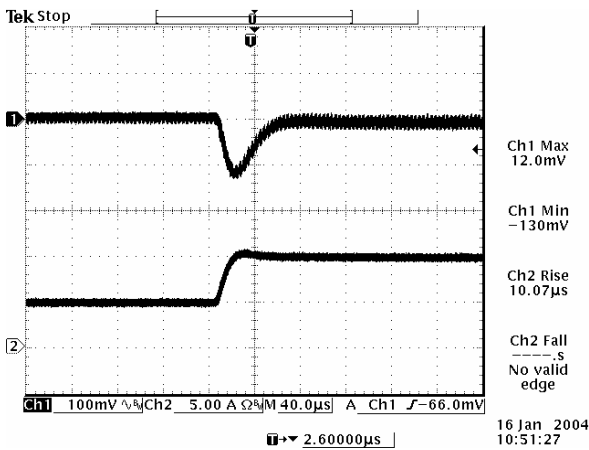
Transient Response Waveforms (continued)



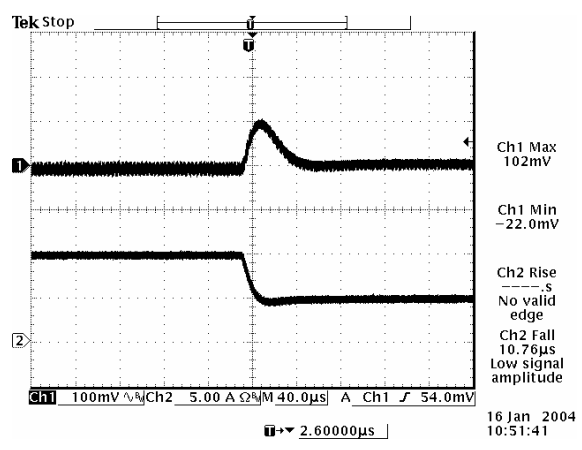
Transients 50% to 100% load 2.5 Vdc output



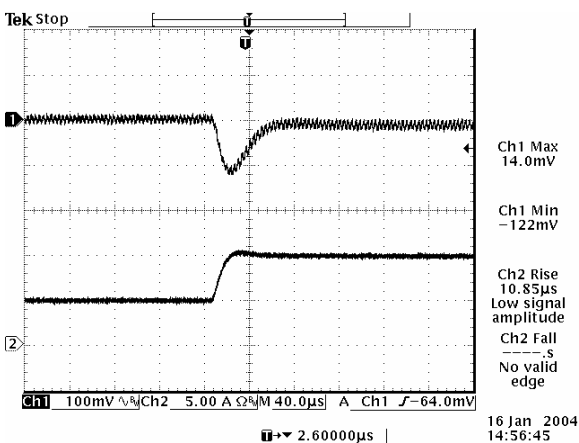
Transients 100% to 50% load 2.5 Vdc output



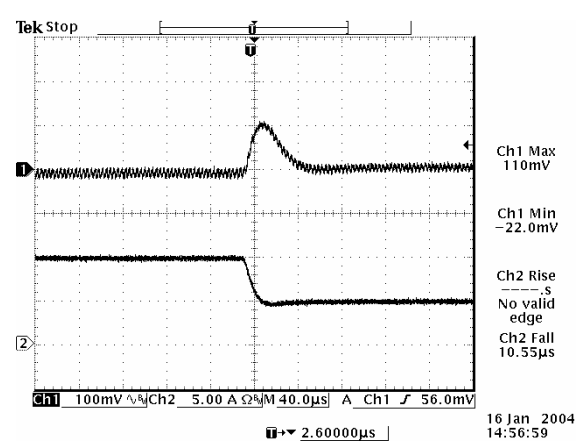
Transients 50% to 100% load 3.3 Vdc output



Transients 100% to 50% load 3.3 Vdc output



Transients 50% to 100% load 5.0 Vdc output



Transients 100% to 50% load 5.0 Vdc output

Note: Transient response at 12 V input, $di/dt=2.5$ A/ μ S, with external 2 x 150 μ F polymer capacitor at the output, $T_a=25$ deg C.

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

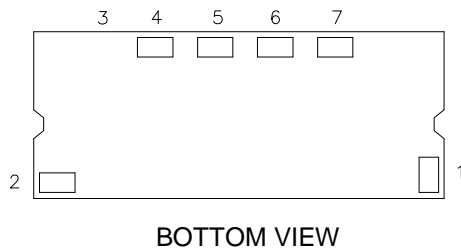
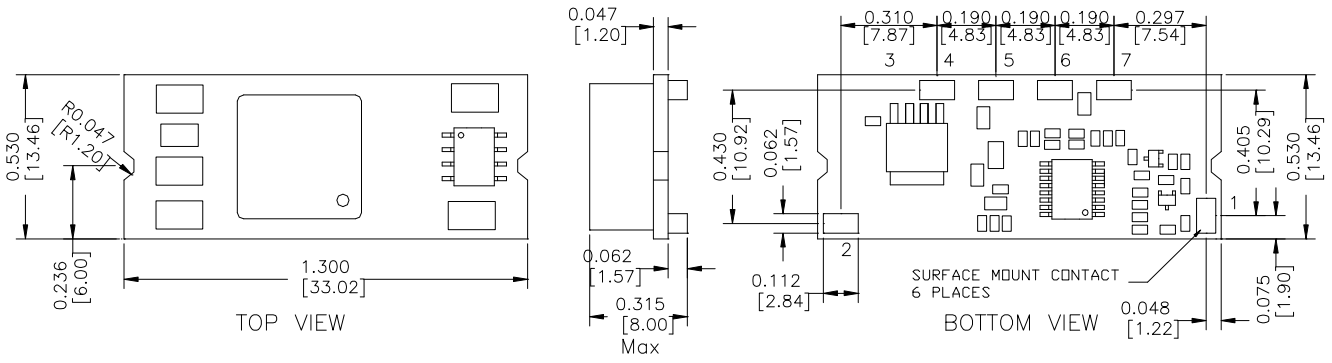
0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc., a subsidiary of Bel Fuse, Inc.

Mechanical Outline

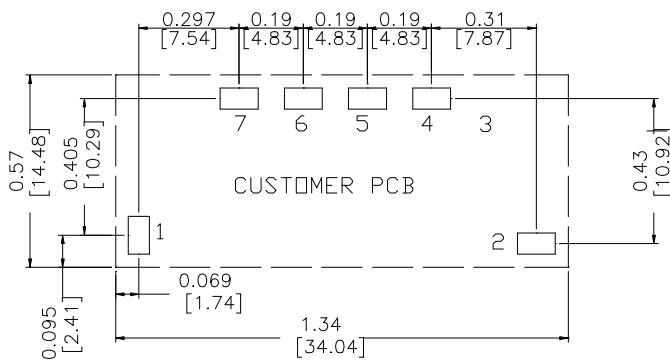


BOTTOM VIEW

Pin Connections

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

RECOMMENDED PAD LAYOUT



PAD SIZE:
 MIN: 0.14" * 0.095" (3.56mm * 2.41mm)
 MAX: 0.165" * 0.11" (4.19mm * 2.79mm)

Note: These parts are not however compatible with the higher temperatures associated with lead free solder processes and must be soldered using a reflow profile with a peak temperature of no more than 245 °C.

NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input

0.75 Vdc - 5.0 Vdc/10 A Output



Jan. 25, 2013

Bel Power, Inc. , a subsidiary of Bel Fuse, Inc.

Revision History

Date	Revision	Changes Detail	Approval
2007-01-17	A	Change version to A	Lynn
2011-08-25	B	Update the reflow solder temperature.	HL
2013-01-25	C	Update UL.	HL

RoHS Compliance

Complies with the European Directive 2002/95/EC, calling for the elimination of lead and other hazardous substances from electronic products.



©2013 Bel Fuse Inc. Specifications subject to change without notice. 012513

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