NON-ISOLATED DC/DC CONVERTERS

8.3 Vdc - 14 Vdc Input 0.75 Vdc - 5.0 Vdc/10 A Output

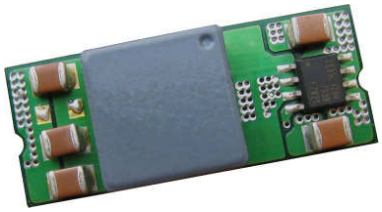
Jan. 06, 2015

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

SRBC-10A2Ax RoHS Compliant Rev.D

Features

- Non-Isolated
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- Low Cost
- Flexible Output Voltage Sequencing
- Remote Sense
- 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)
- Industrial Temperature Range
- Certificated to UL60950-1/CSA C22.2 No.60950-1, 2rd edition, am1



Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The Bel SRBC-10A2Ax 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). 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
0.75 V - 5.0 V	8.3 V - 14 V	10 A	50.0 W	95%	SRBC-10A2AL	SRBC-10A2A0

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

Part Number Explanation

S R BC – 10 A 2A x y
1 2 3 4 5 6 7 8

1---Surface 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.
8---Package

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	
Sequencing Voltage [1]	-0.3 V	-	Vin	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	
Altitude	-	-	2000m	

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

1. SRBC-10A2Ax 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 Vin or leave it unconnected.

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage Vo, set ≤ 3.63 V Vo, set > 3.63 V	 8.3 V 8.3 V	 12 V 12 V	 14 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 1000 uF/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^2s	0.08 A^2s	
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% Vo,set	-	2% Vo,set	Vin=12 V, full load
Load Regulation	-	0.1% Vo,set	-	
Line Regulation	-	0.1% Vo,set	-	
Regulation Over Temperature (-40 °C to +85 °C)	-	0.3% Vo,set	-	Tref=Tamin to Tamax
Output Current	0 A	-	10 A	
Current Limit Threshold	-	200% Io	-	
Short Circuit Surge Transient	-	1 A^2s	3 A^2s	
Ripple and Noise (pk-pk)	-	50 mV	100 mV	Tested with 0-20 MHz, with 10 uF tantalum capacitor & 1 uF ceramic capacitor
Ripple and Noise (rms)	-	20 mV	40 mV	
Turn on Time	-	6 mS	10 mS	
Overshoot at Turn on	-	-	1% Vo,set	
Output Capacitance	-	-	5000 uF	

Output Specifications

Parameter	Min	Typ	Max	Notes
Transient Response				
50% ~ 100% Max Load	Vo = 0.75 V - 5 V	-	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	-	

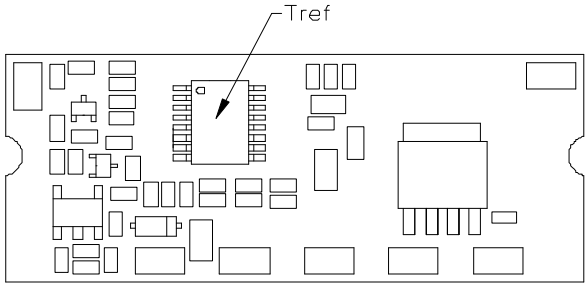
Note: All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

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	
MTBF	4,982,651 hours			Calculated Per Bell Core SR-332 (Io = 80% load; Vo=5 V; Vin=12 V; Ta = 25°C)
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:



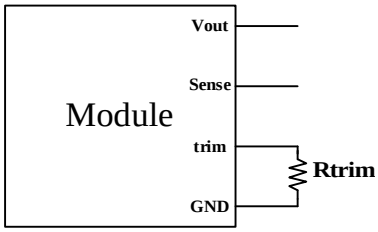
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit Off)	-0.2 V	-	0.3 V	SRBC-10A2A0; Remote On/Off pin open, Unit on.
Signal High (Unit On)	-	-	Vin, max	
Signal Low (Unit On)	-0.2 V	-	0.3 V	SRBC-10A2AL; Remote On/Off pin open, Unit on.
Signal High (Unit Off)	2.5 V	-	Vin, max	
Voltage Sequencing				
Sequencing Delay Time	10 mS	-	-	Delay from Vin, min to application of voltage on SEQ pin
Sequencing Slew Rate Capability	-	-	2 V/mS	Vinmin to Vinmax; Iomin to Iomax; Vseq<Vo
Tracking Accuracy Power-Up Power-Down	 - -	 100 mV 300 mV	 200 mV 500 mV	

Output Trim Equations

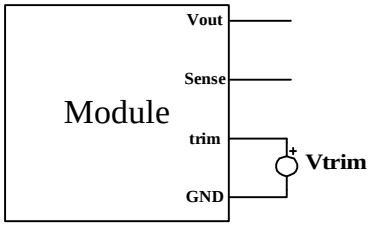
Equation for calculating the trim resistor (in Ω) given the desired adjusted voltage (Vadj) is shown below. The Trim Up resistor should be connected between the Trim pin and Ground.

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

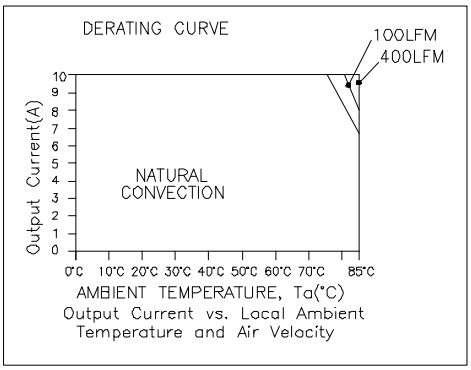


Equation for calculating the trim voltage (in V) given the desired adjusted voltage (Vadj) is shown below. The Trim Up voltage should be connected between the Trim pin and Ground.

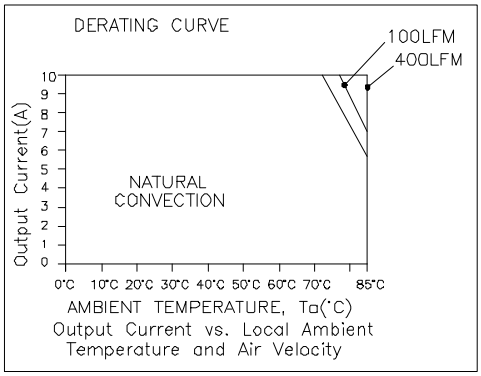
$$V_{trimup} = 0.7 - 0.0667 \times (V_{adj} - 0.7525)$$



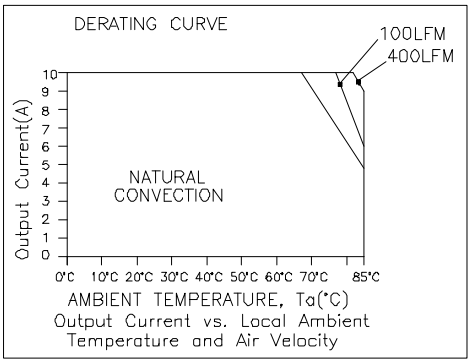
Thermal Derating Curves



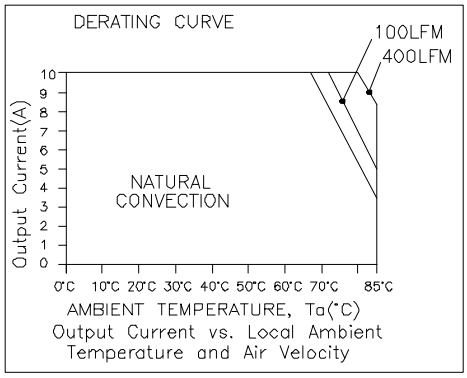
Vo=0.75 V



Vo=1.8 V

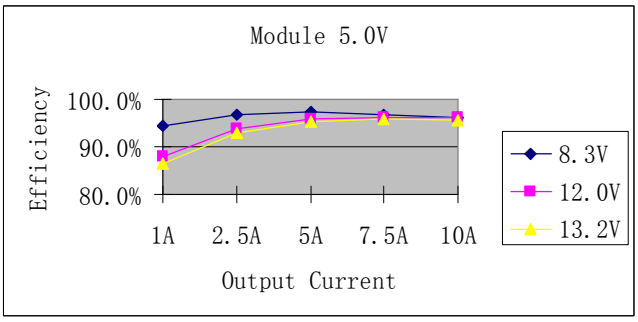


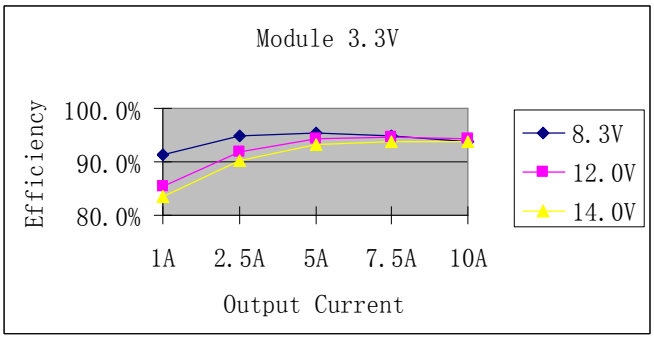
Vo=3.3 V

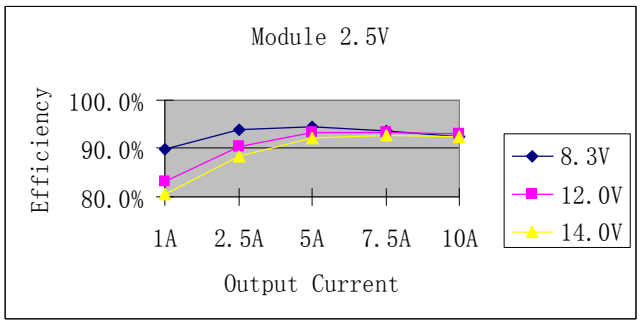


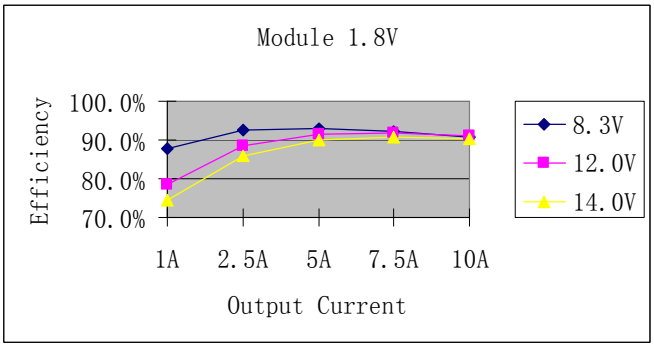
Vo=5.0 V

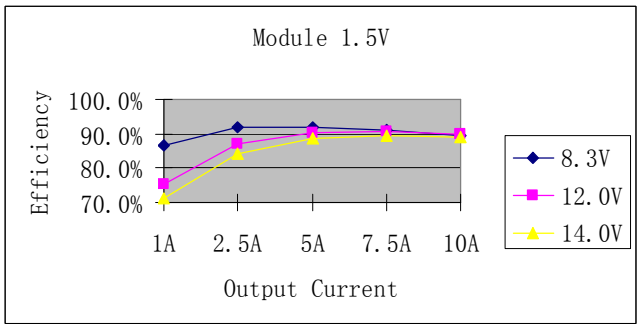
Efficiency Data

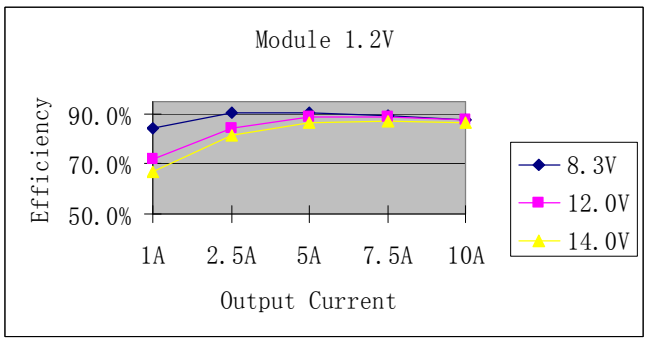


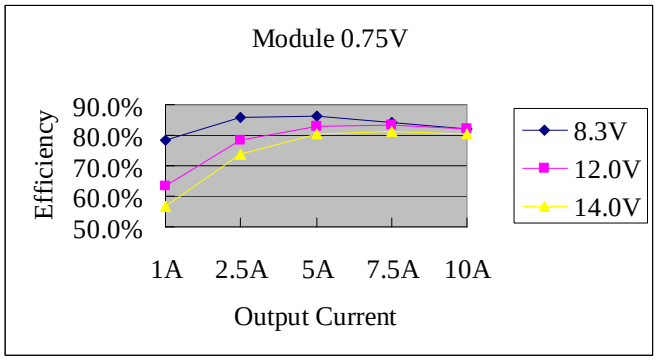




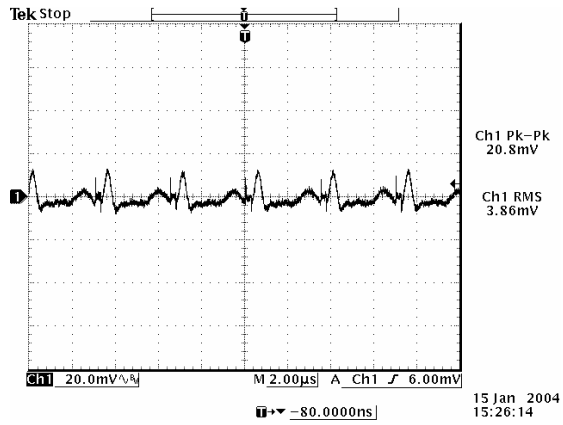




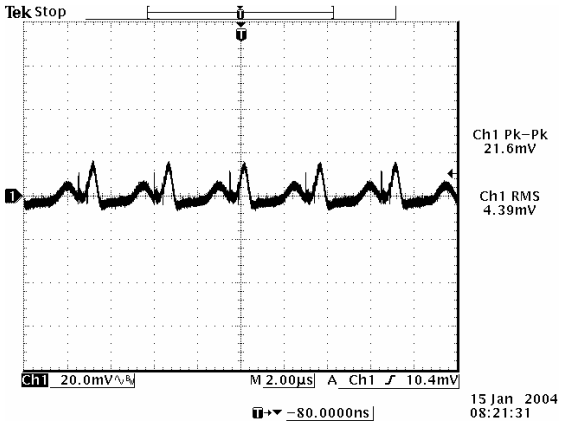




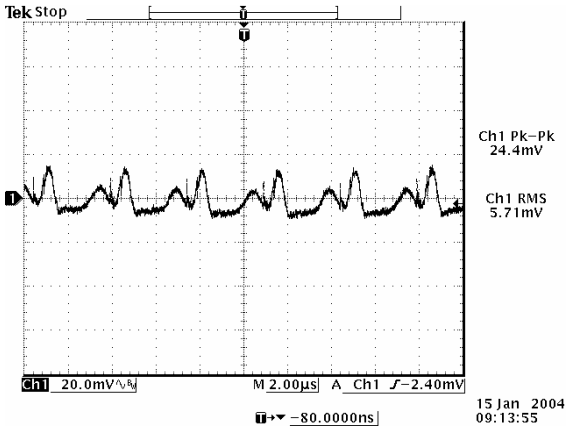
Ripple and Noise Waveforms



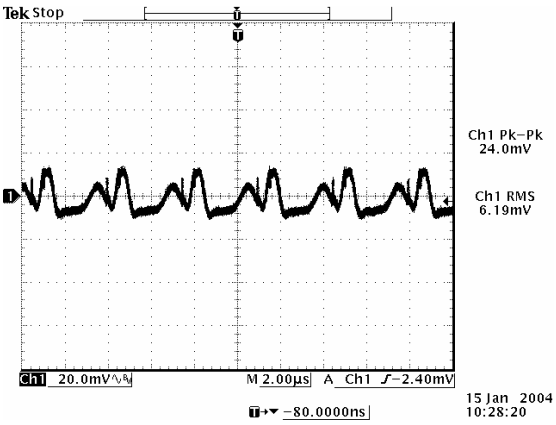
Ripple and noise at max load 0.75 Vdc output



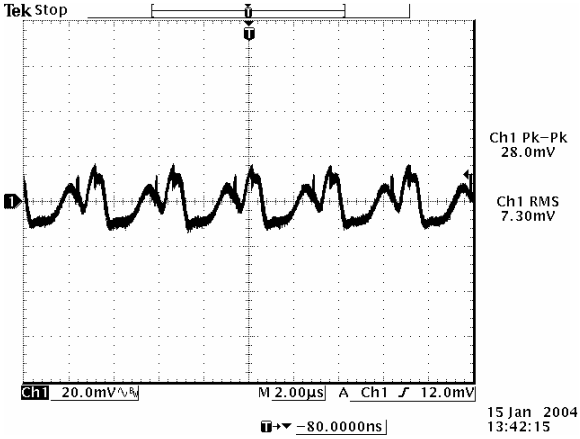
Ripple and noise at max load 1.2 Vdc output



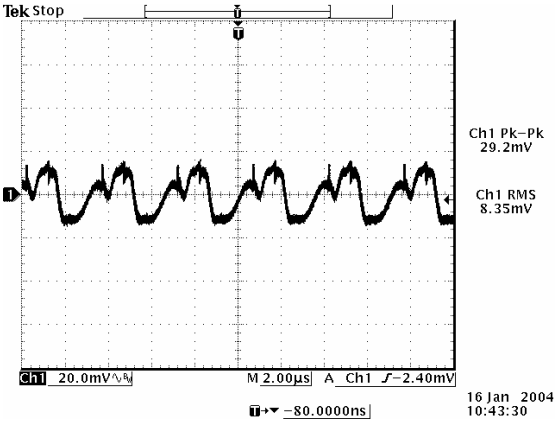
Ripple and noise at max load 1.5 Vdc output



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

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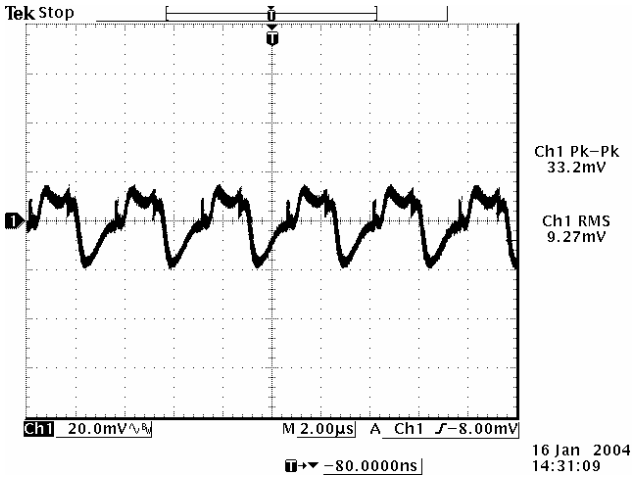
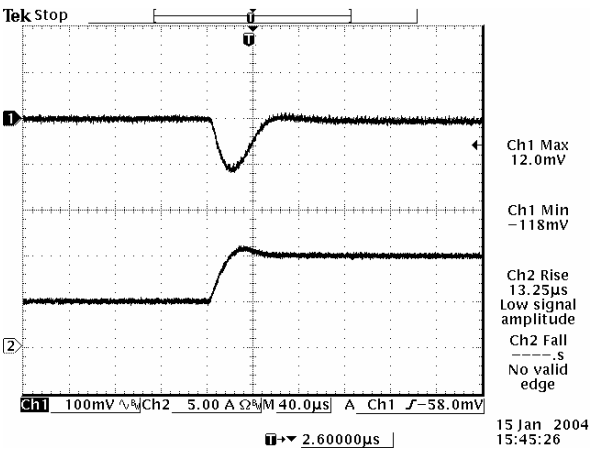
Ripple and Noise Waveforms (continued)



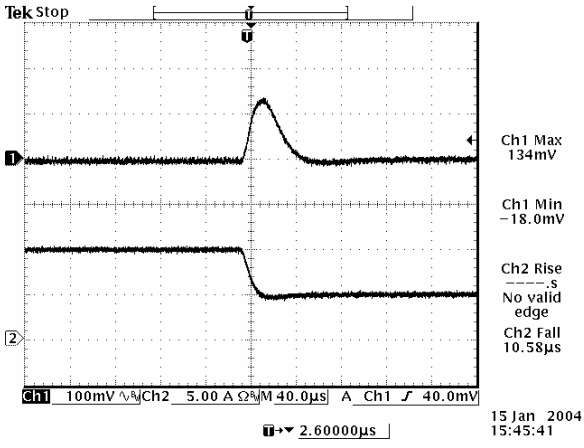
Ripple and noise at max load 5.0 Vdc output

Note: Ripple and Noise at 12 V input, with 10 uF tantalum capacitor and 1 uF ceramic capacitor at the output, and Ta=25 deg C.

Transient Response Waveforms

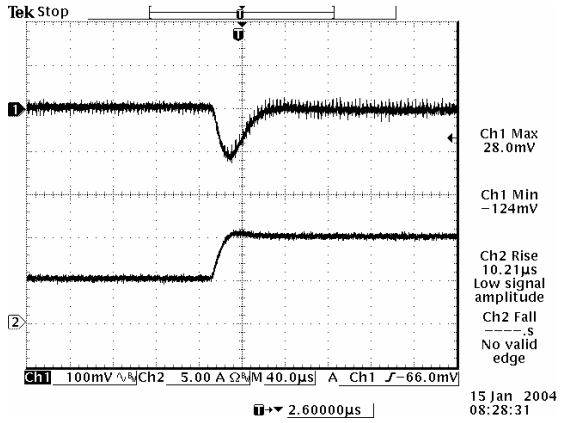


Transients 50% to 100% load 0.75 Vdc output

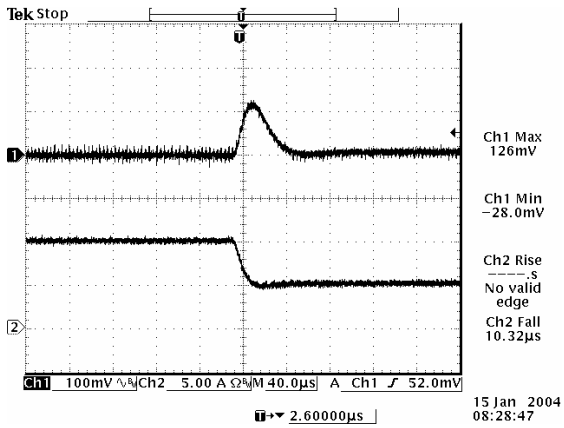


Transients 100% to 50% load 0.75 Vdc output

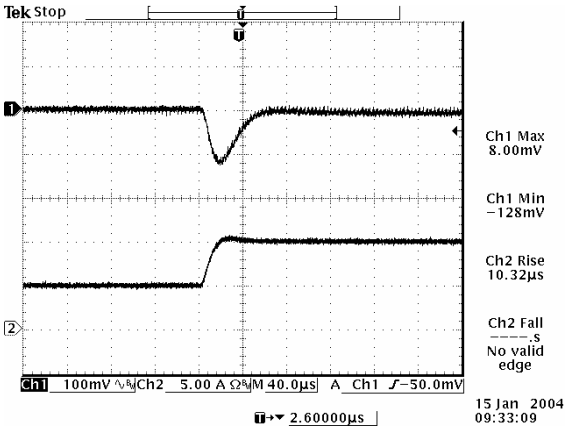
Transient Response Waveforms (continued)



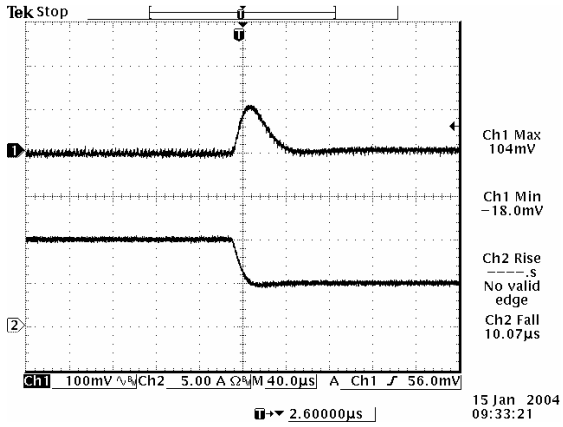
Transients 50% to 100% load 1.2 Vdc output



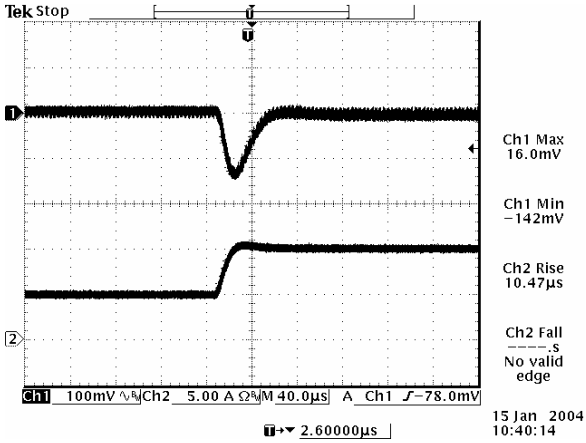
Transients 100% to 50% load 1.2 Vdc output



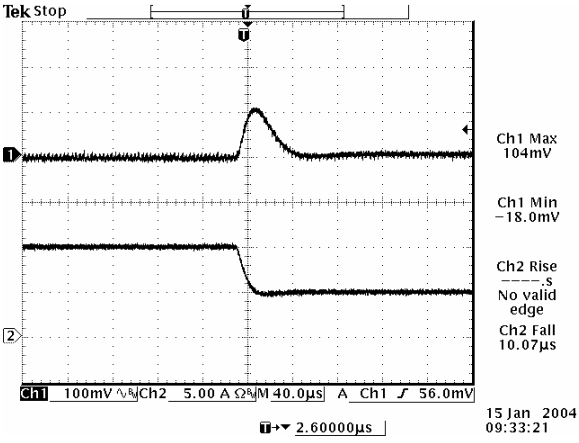
Transients 50% to 100% load 1.5 Vdc output



Transients 100% to 50% load 1.5 Vdc output

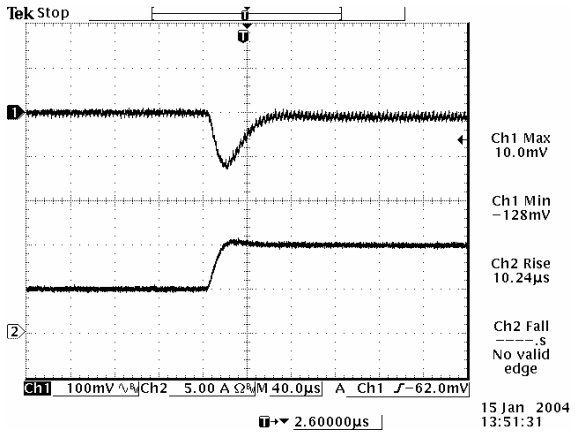


Transients 50% to 100% load 1.8 Vdc output

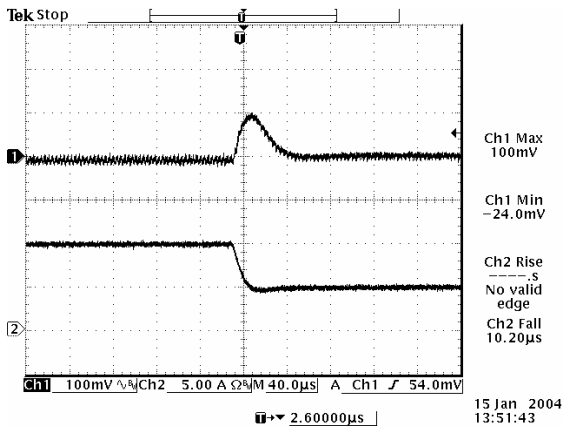


Transients 100% to 50% load 1.8 Vdc output

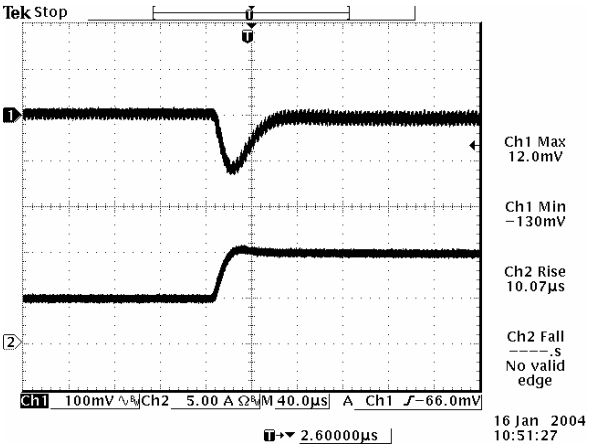
Transient Response Waveforms (continued)



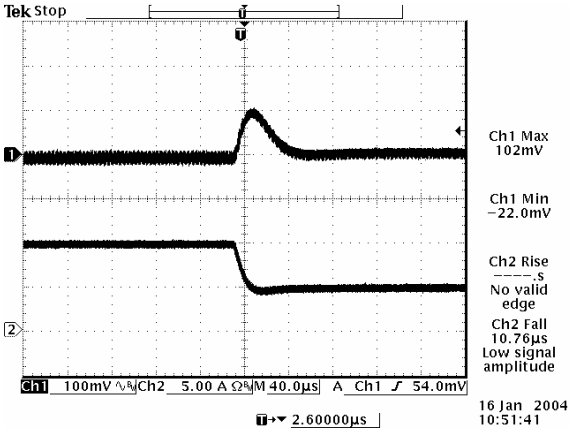
Transients 50% to 100% load 1.5 Vdc output



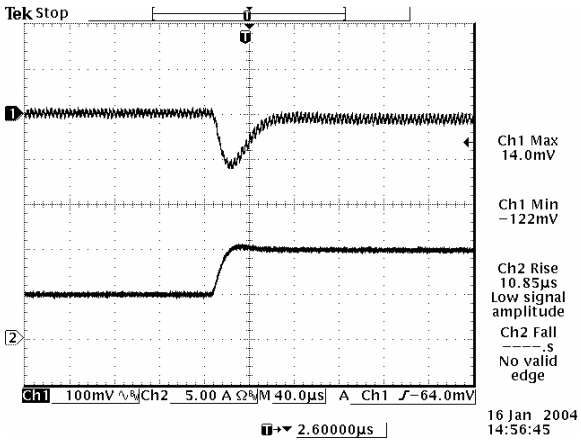
Transients 100% to 50% load 2.5 Vdc output



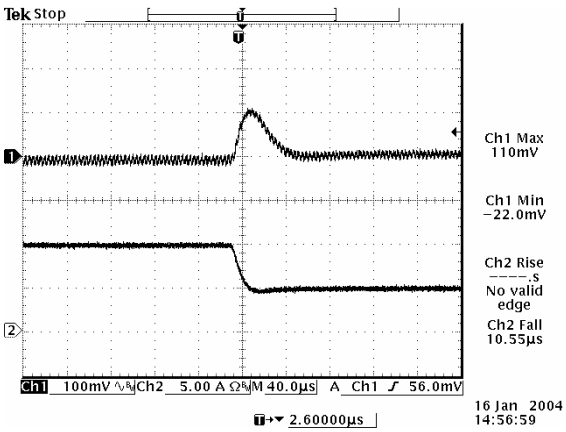
Transients 50% to 100% load 3.3 Vdc output



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/uS, with external 2 x 150 uF polymer capacitor at the output, Ta=25 deg C.

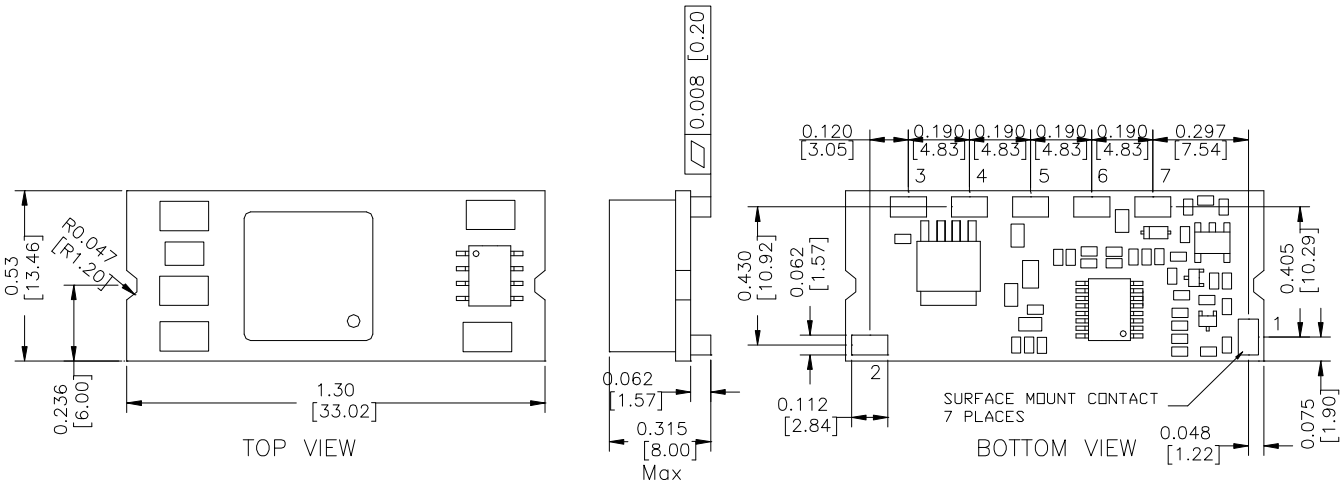
NON-ISOLATED DC/DC CONVERTERS

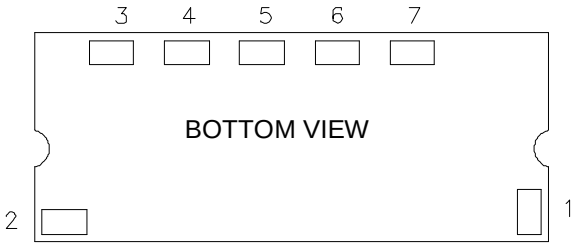
8.3 Vdc - 14 Vdc Input **0.75 Vdc - 5.0 Vdc/10 A Output**

Jan. 06, 2015

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

Mechanical Outline

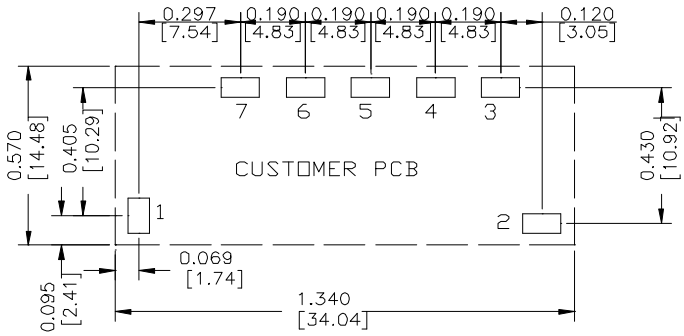




RECOMMENDED PAD LAYOUT

Pin Connections

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



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.

Note:

1) All Pins: Material - Copper Alloy;
Finish – 3 micro inches minimum Gold over 50 micro inches minimum Nickel plate.

2) Undimensioned components are shown for visual reference only.

3) All dimensions in inches (mm); Tolerances: x.xx +/-0.02 in[0.5mm], x.xxx +/-0.010 in[0.25mm].

Revision History

Date	Revision	Changes Detail	Approval
2007-01-16	A	Change version to A;RoHS	Lynn
2011-08-25	B	Update the reflow solder temperature.	HL
2013-01-25	C	Update UL.	HL
2015-1-6	D	Update MD.	XF

RoHS Compliance

Complies with the European Directive 2011/65/EU, calling for the elimination of lead and other hazardous substances from electronic products.

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