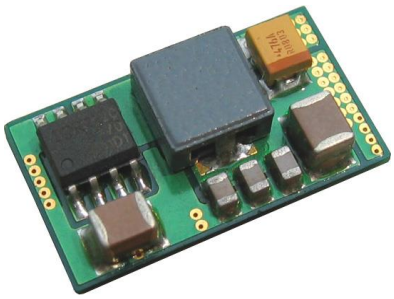
SRBA-06A2A

Non-Isolated DC-DC Converter

The Bel SRBA-06A2A modules are a series of non-isolated dc/dc converters that deliver up to 6 A of output current with full load efficiency of 92% at 5.0 VDC output. These modules provide precisely regulated voltage programmable via external resistor from 0.75 to 5.5 VDC over a wide range of input voltage (8.3 - 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.



RoHS Compliant

Key Features & Benefits

- Non-Isolated
- High Efficiency
- High Power Density
- Fixed Frequency
- Flexible Output Voltage Sequencing
- Under-Voltage Lockout (UVLO)
- OCP/SCP
- Wide Input
- Wide Trim Range
- Remote On/Off
- Active Low/High
- Approved to IEC/EN 62368-1
- Approved to CSA/UL 62368-1

Applications

- Networking
- Computers and Peripherals
- Telecommunications

Please read our datasheet & drawing disclaimer here.

1. MODEL SELECTION

MODEL NUMBER ACTIVE LOW	MODEL NUMBER ACTIVE HIGH	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
SRBA-06A2ALG	SRBA-06A2A0G					
SRBA-06A2ALH	SRBA-06A2A0H	0.75 - 5.5 V	8.3 - 14 V	6 A	33 W	92%
SRBA-06A2ALR	SRBA-06A2A0R					

PART NUMBER EXPLANATION

S	R	BA	-	06	A	2A	x	y
Mounting Type	RoHS Status	Series Name		Output Current	Input Range	Output Voltage	Active Logic	Package Type
Surface Mount	RoHS	Bobcat		6 A	8.3 - 14 V	0.75 - 5.5 V	L – Active Low 0 – Active High	G - Tray Package H - Tray Package [1] R - Tape & Reel Package

NOTE: [1] Add "H" suffix at the end of the model number to indicate Tray packaging and RoHS compliant without requiring exemption 7c-III.

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Input Voltage (Continuous)		-0.3	-	15	V
Output Enable Terminal Voltage		-0.3	-	15	V
Sequencing Voltage [1]		-0.3		Vin	V
Ambient Temperature		-40	-	85	°C
Storage Temperature		-55	-	125	°C
Altitude		-	-	2000	m

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

[1] SRBA-06A2A 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 the SEQ pin floating.

3. INPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Input Voltage		8.3	12	14	V
Input Current (full load)	Vo = 5.0 V	-	2.75	4.0	A
	Vo = 3.3 V	-	1.85	2.8	
	Vo = 2.5 V	-	1.45	2.2	
	Vo = 1.8 V	-	1.05	1.6	
	Vo = 1.2 V	-	0.75	1.1	
	Vo = 0.75 V	-	0.55	0.8	
Input Current (no load)	Vo = 5.0 V	-	-	100	mA
	Vo = 0.75 V	-	-	20	
Remote Off Input Current		-	1	2	mA
Input Reflected Ripple Current (pk-pk)	Tested with two 100 µF/25 V tan input capacitors & simulated source impedance of 1 µH, 5 Hz to 20 MHz.	-	120	-	mA
Input Reflected Ripple Current (rms)		-	40	-	mA
I^2t Inrush Current Transient		-	0.002	0.02	A^2s
Turn-on Voltage Threshold		-	8.1	8.2	V
Turn-off Voltage Threshold		-	7.5	8.0	V

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4. OUTPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION		MIN	TYP	MAX	UNIT
Output Voltage Set Point	Vin = 12 V, full load.		-2%	-	2%	Vo,set
Output Voltage Set Point	Over entire operating input voltage range, resistive loads and temperature conditions		-2.5%	-	3.5%	Vo,set
Adjustment Range Selected by External Resistor or Voltage			0.7525	-	5.5	V
Load Regulation	Io = Io, min to Io, max		-	0.4%	-	Vo,set
Line Regulation	Vin = Vin, min to Vin, max		-	0.3%	-	Vo,set
Regulation Over Temperature (-40 °C to +85 °C)	Tref=Ta,min to Ta,max		-	0.5%	-	Vo,set
Output Current Range			0	-	6	A
Current Limit Threshold			7.2	-	18	A
Short Circuit Surge Transient			-	0.25	-	A^2s
Ripple and Noise (Pk-Pk)	Vo = 0.75 -3.63 V	Tested with 0-20 MHz, with 10 µF/ 10 V tantalum capacitor & 1 µF/10 V TDK ceramic capacitor at the output	-	50	75	mV
Ripple and Noise (RMS)			-	15	30	mV
Ripple and Noise (Pk-Pk)	Vo = 5.0 V		-	75	100	mV
Ripple and Noise (RMS)			-	30	40	mV
Turn on Time			-	8	10	ms
Overshoot at Turn on			-	0%	3%	Vo,set
Output Capacitance	ESR ≥ 1 mΩ		0	-	1000	µF
	ESR ≥ 10 mΩ		0	-	3000	
Transient Response						
△V 50%~100% of Max Load	Vo = 0.75 - 5.5 V	di/dt = 2.5 A/µs; Vin = 12 V; and with 10 µF/10 V tantalum capacitor & 1 µF /10 V ceramic capacitor at the output	-	200	-	mV
Settling Time			-	50	-	µs
△V 100%~50% of Max Load			-	200	-	mV
Settling Time			-	50	-	µs

5. GENERAL SPECIFICATIONS

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

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency	Vo = 5.0 V	Measured at Vin = 12 V, full load	90%	92%	-	-
	Vo = 3.3 V		87%	89%	-	
	Vo = 2.5 V		85%	88%	-	
	Vo = 1.8 V		83%	86%	-	
	Vo = 1.2 V		79%	82%	-	
	Vo = 0.75 V		71%	74%	-	
Switching Frequency			250	300	350	kHz
Over Temperature Shutdown			-	135	-	°C
Output Trim Range (Wide Trim)			0.7525	-	5.5	V
MTBF		Calculated Per Bell Core SR-332 (Io = Nominal; Ta = 25°C)	-	3,079,469	-	hour
Weight			-	3	-	g
Dimensions (L × W × H)			0.8 x 0.45 x 0.251			inch
			20.32 x 11.42 x 6.39			mm

6. CONTROL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Remote on/off					
Signal Low (Unit Off)	SRBA-06A2A0; Remote On/Off pin open, Unit on.	-0.3	-	0.4	V
Signal High (Unit On)		2.5	-	14	V
Signal Low (Unit On)	SRBA-06A2AL; Remote On/Off pin open, Unit on.	-0.3	-	0.4	V
Signal High (Unit Off)		2.5	-	14	V
Voltage Sequencing					
Sequencing Voltage	Sequencing Voltage applied on SEQ pin should be higher than output voltage.	0	-	Vin	V
Sequencing Slew Rate Capability		-	-	2	V/ms
Sequencing Delay Time	Delay from Vin, min to application of voltage on SEQ pin	10	-	-	ms
Tracking Accuracy	Power-Up	-	100	200	mV
	Power-Down	-	200	400	mV

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7. EFFICIENCY DATA

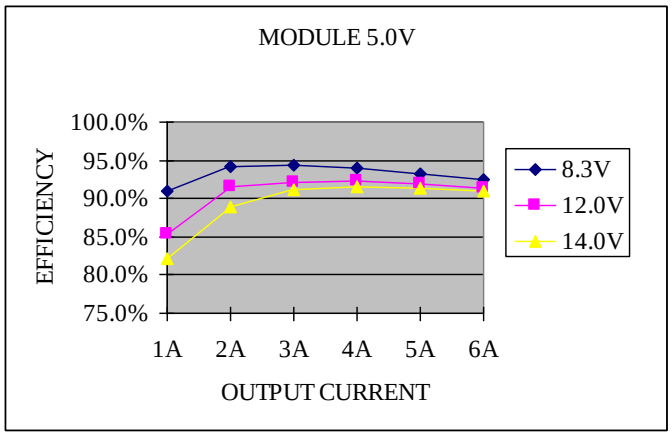


Figure 1. Vo = 5.0 V

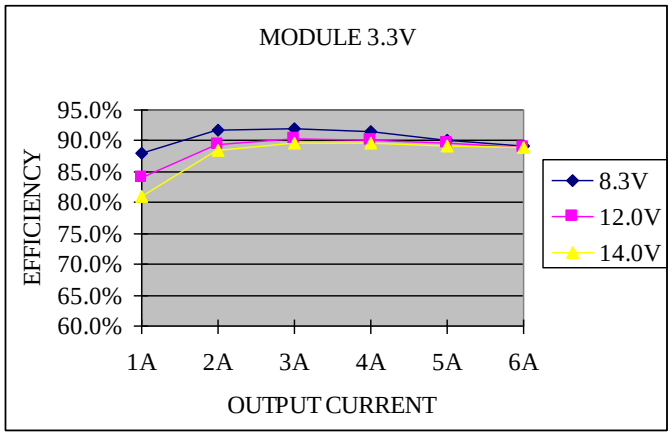


Figure 2. Vo = 3.3 V

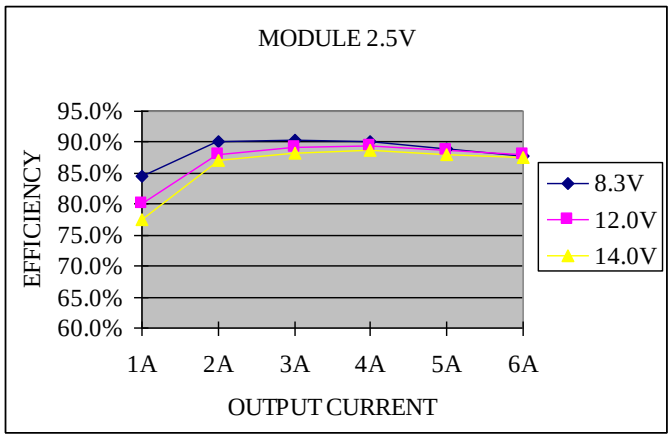


Figure 3. Vo = 2.5 V

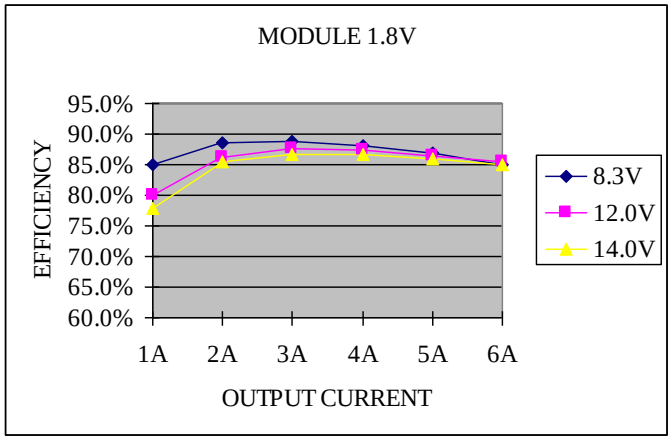


Figure 4. Vo = 1.8 V

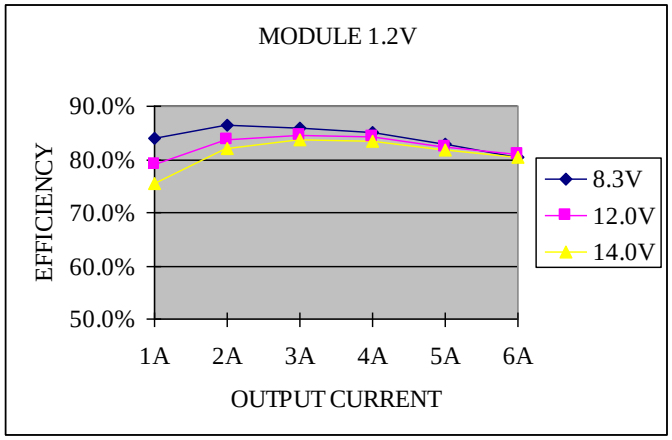


Figure 5. Vo = 1.2 V

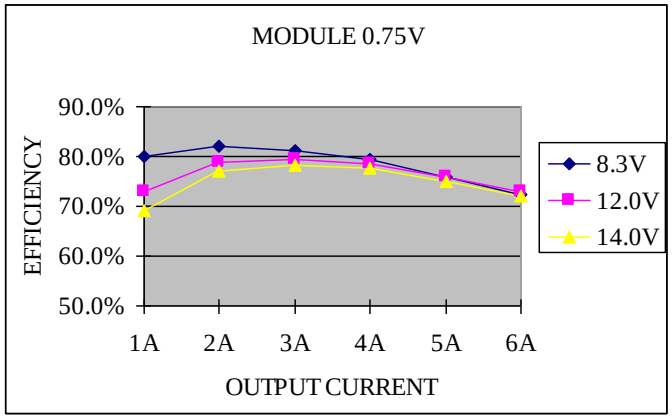


Figure 6. Vo = 0.75 V

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8. 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.

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

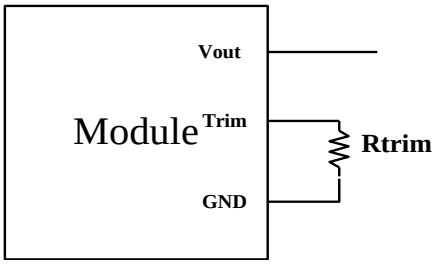


Figure 7. Trim up circuit-1

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.

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

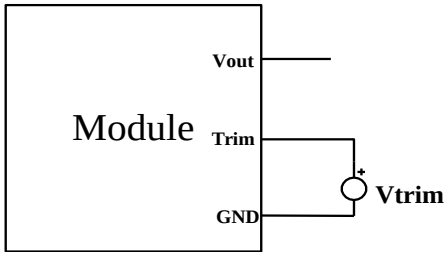


Figure 8. Trim up circuit-2

9. RIPPLE AND NOISE WAVEFORMS

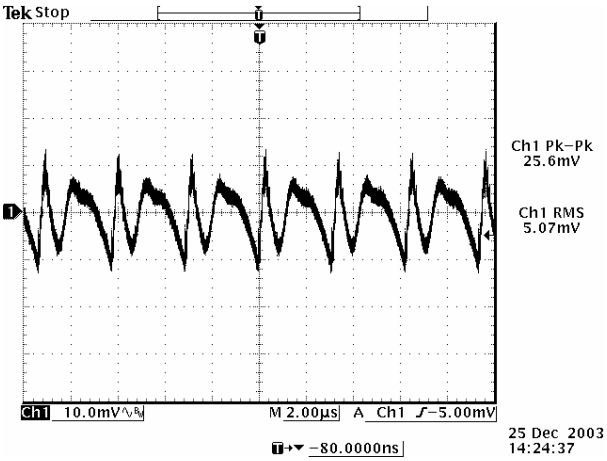


Figure 9. Ripple and noise, Vin = 12 V, Vo = 0.75 V

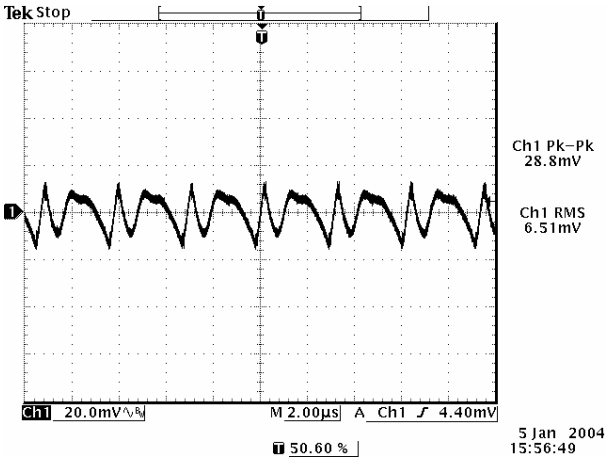


Figure 10. Ripple and noise, Vin = 12 V, Vo = 1.2 V

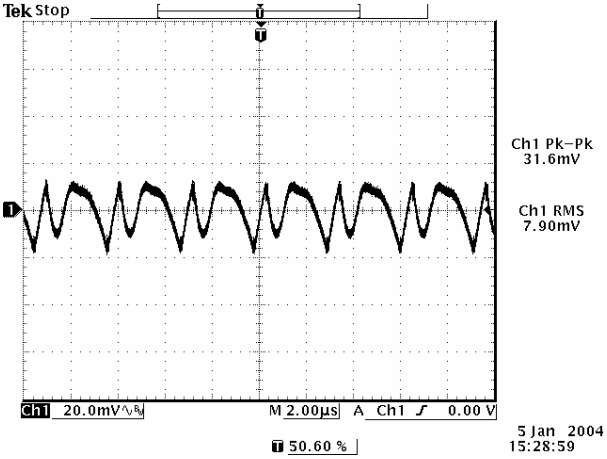


Figure 11. Ripple and noise, Vin = 12 V, Vo = 1.8 V

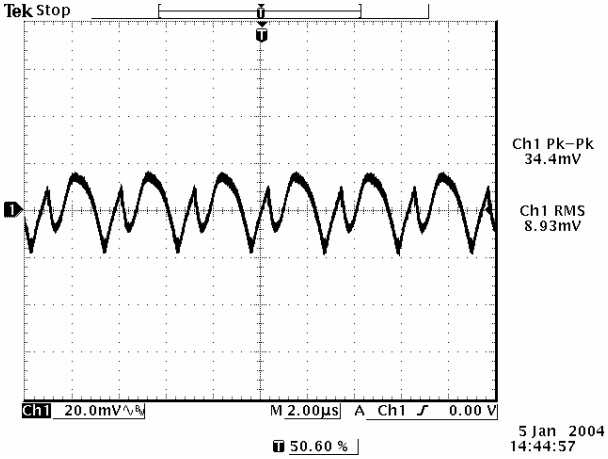


Figure 12. Ripple and noise, Vin = 12 V, Vo = 2.5 V

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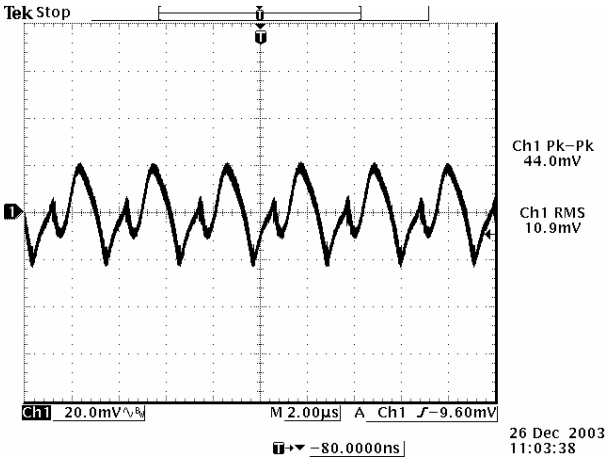


Figure 13. Ripple and noise, Vin = 12 V, Vo = 3.3 V

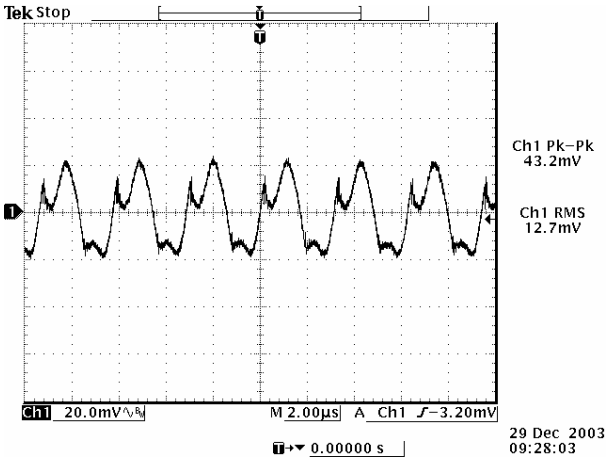


Figure 14. Ripple and noise, Vin = 12 V, Vo = 5.0 V

Note: The output ripple and noise are tested at 0-20 MHz BW, 10 µF/10 V tantalum capacitor and 1 µF/10 V ceramic capacitor, Ta = 25°C.

10. TRANSIENT RESPONSE WAVEFORMS

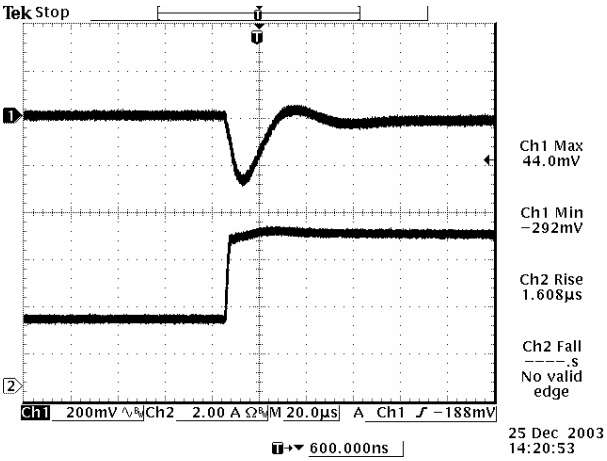


Figure 15. 50% to 100% load step at Vin = 12 V, Vo = 0.75 V

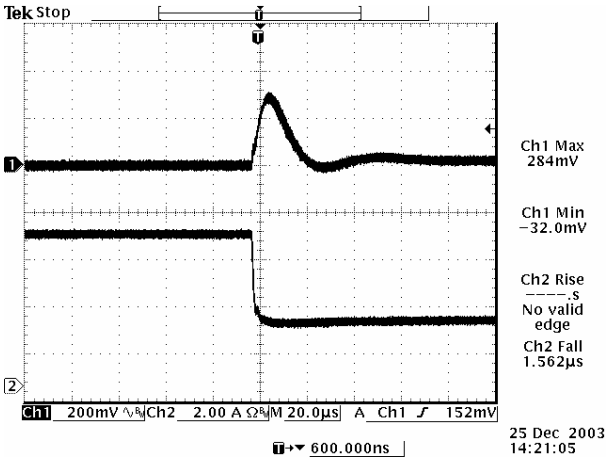


Figure 16. 100% to 50% load step at Vin = 12 V, Vo = 0.75 V

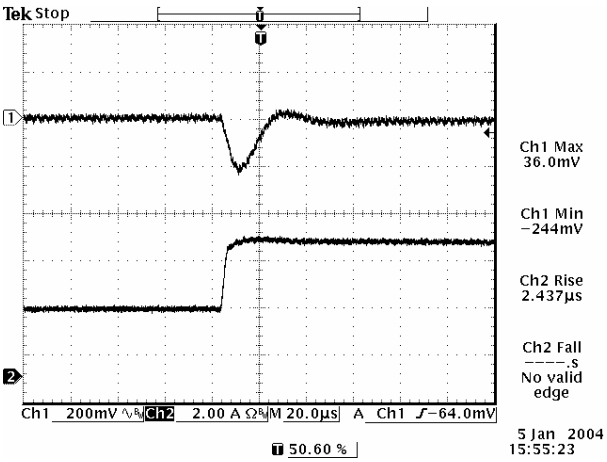


Figure 17. 50% to 100% load step at Vin = 12 V, Vo = 1.2V

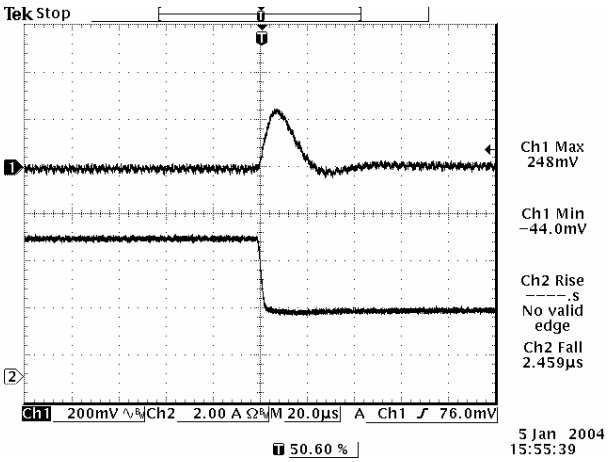


Figure 18. 100% to 50% load step at Vin = 12 V, Vo = 1.2 V

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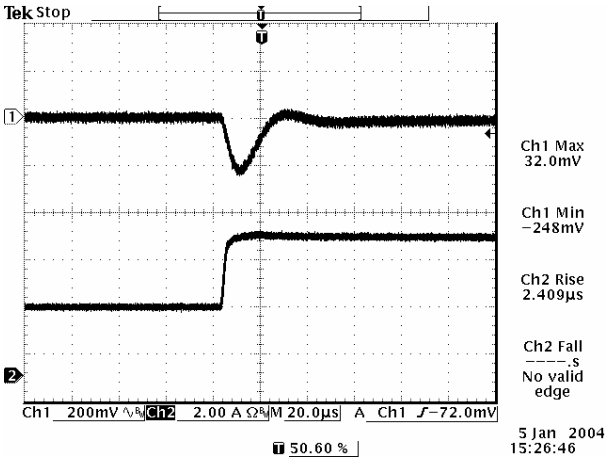


Figure 19. 50% to 100% load step at Vin = 12 V, Vo = 1.8 V

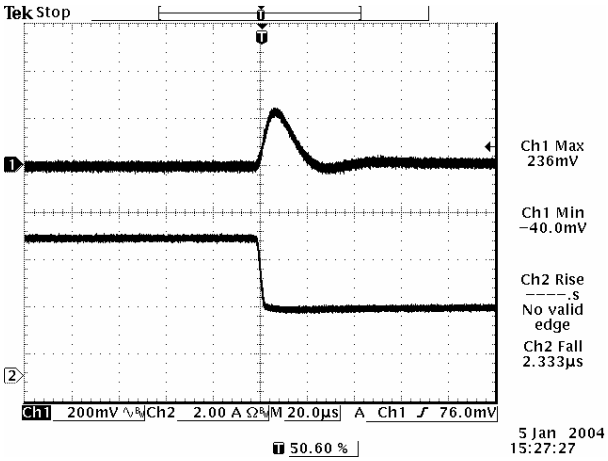


Figure 20. 100% to 50% load step at Vin = 12 V, Vo = 1.8 V

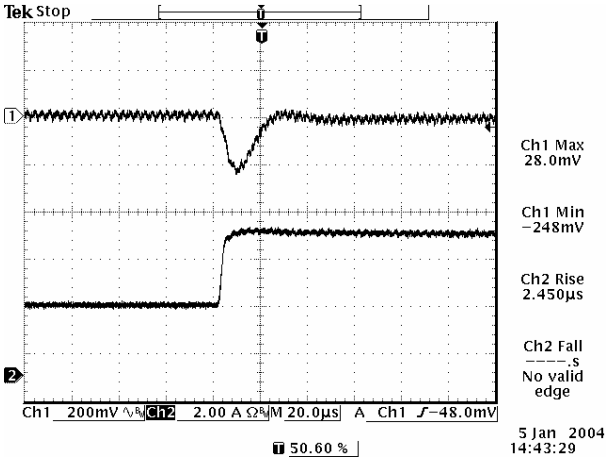


Figure 21. 50% to 100% load step at Vin = 12 V, Vo = 2.5 V

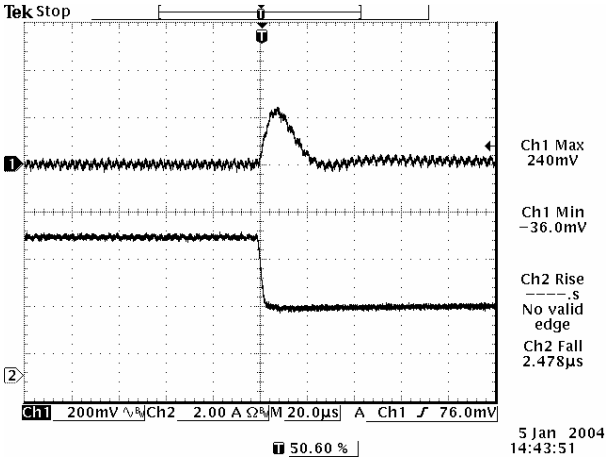


Figure 22. 100% to 50% load step at Vin = 12 V, Vo = 2.5 V

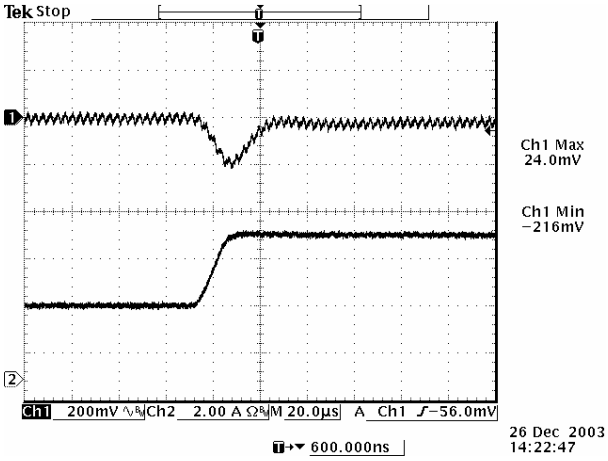


Figure 23. 50% to 100% load step at Vin = 12 V, Vo = 3.3 V

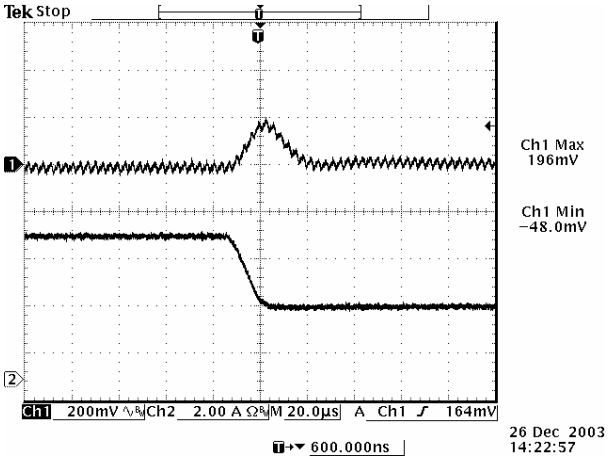


Figure 24. 100% to 50% load step at Vin = 12 V, Vo = 3.3 V

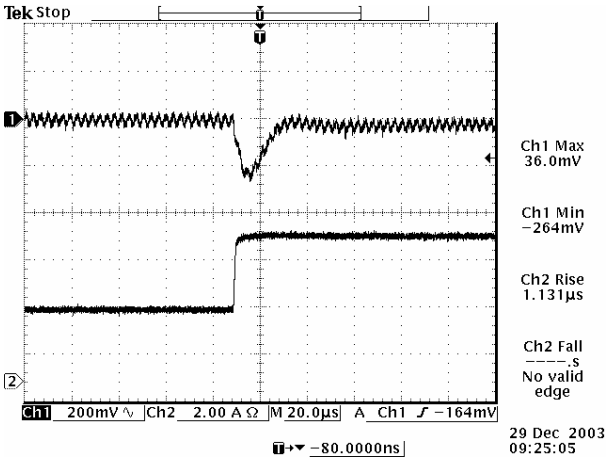


Figure 25. 50% to 100% load step at Vin = 12 V, Vo = 5.0 V

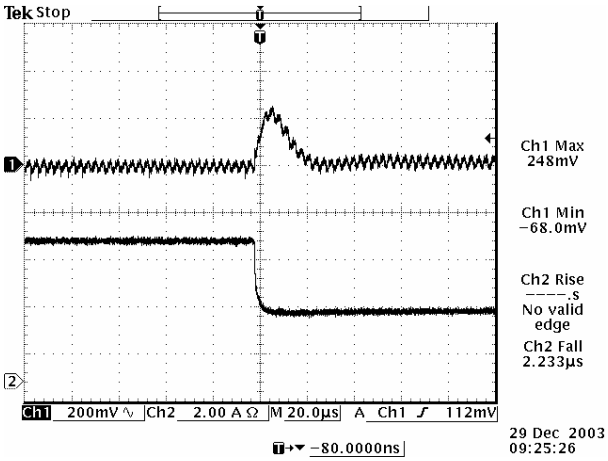


Figure 26. 100% to 50% load step at Vin = 12 V, Vo = 5.0 V

Note: Transient response is tested at di/dt = 2.5 A/us, with 10 µF/10 V tantalum capacitor and 1 µF/10 V ceramic capacitor, Ta=25°C.

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11. THERMAL DERATING CURVE

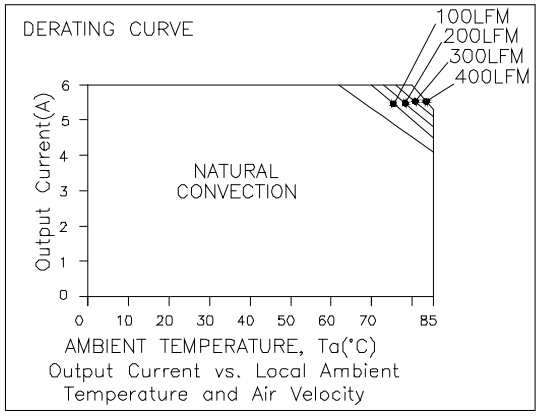


Figure 27. Vin = 12 V, Vo = 0.75 V

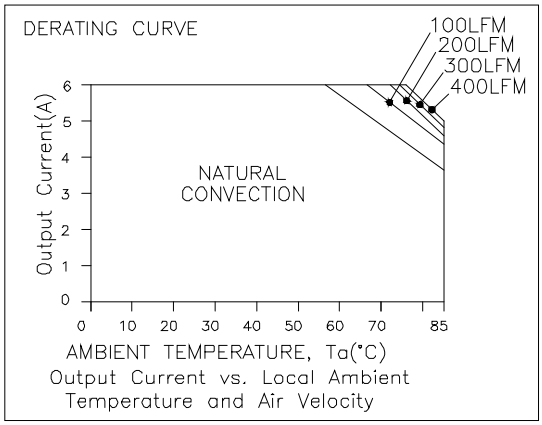


Figure 28. Vin = 12 V, Vo = 2.5 V

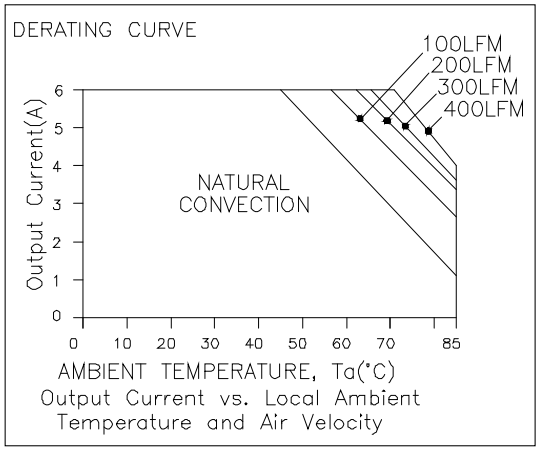


Figure 29. Vin = 12 V, Vo = 5.0 V

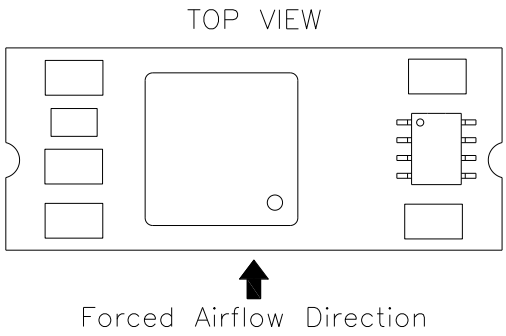


Figure 30. Airflow direction

12. MECHANICAL DIMENSIONS

OUTLINE

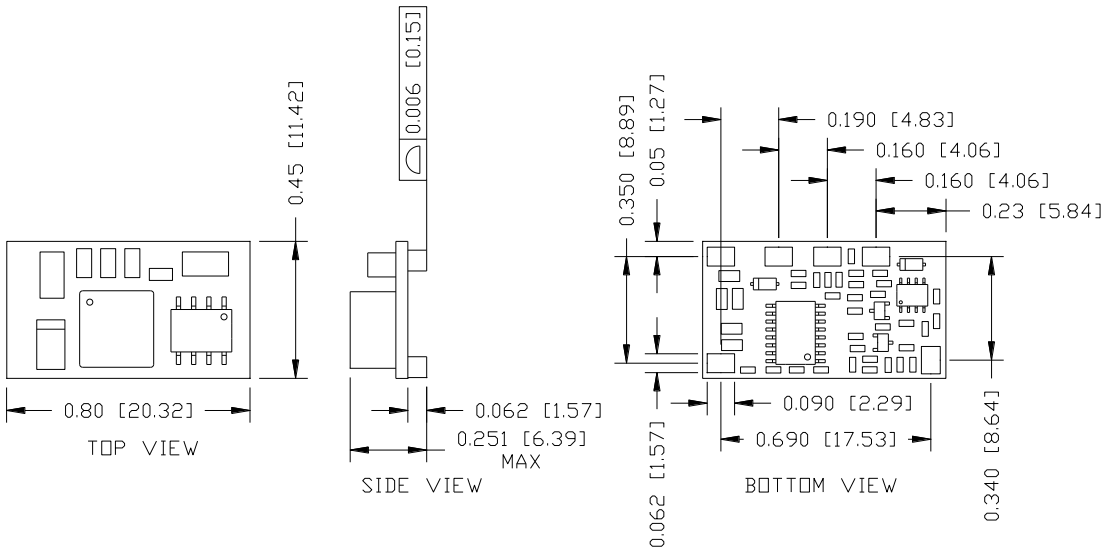


Figure 31. Outline

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.

Notes:

1) All Pins: Material - Copper Alloy;
   Finish - Gold plated.
2) Un-dimensioned components are shown for visual reference only.
3) All dimensions in inch [mm]; Tolerances: x.xx +/-0.02 inch [0.51 mm]. x.xxx +/-0.010 inch [0.25 mm].

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PIN DEFINITIONS

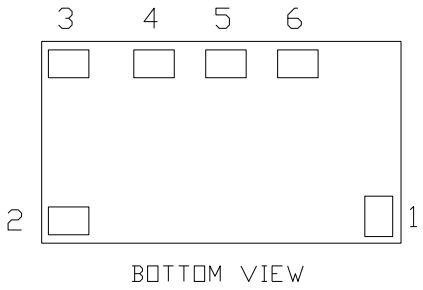


Figure 32. Pins

PIN	FUNCTION	PIN	FUNCTION
1	Remote On/Off	4	Ground
2	Vin (+)	5	Trim
3	SEQ	6	Vout (+)

RECOMMENDED PAD LAYOUT

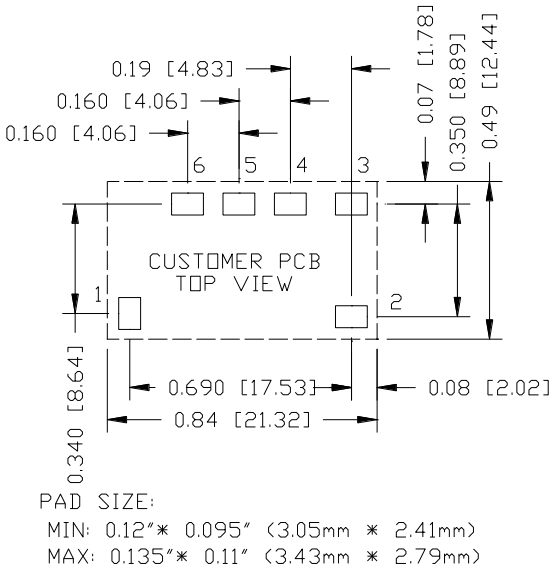


Figure 33. Recommended pad layout

13. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2007-07-12	A	First release.	Lynn
2011-08-25	B	Update the reflow solder temperature.	HL.Lu
2012-07-05	C	Adding the 7C-III compliance suffix statement.	HL.Lu
2013-01-25	D	Update UL.	HL.Lu
2021-08-02	AE	Add object ID, altitude, thermal test setup and tape & reel package. Update to new form. Update safety certificate and mechanical outline.	XF.Jiang

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.
TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.

bel POWER SOLUTIONS & PROTECTION
a bel group

Asia-Pacific +86 755 298 85888
Europe, Middle East +353 61 49 8941
North America +1 866 513 2839

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