NON-ISOLATED DC/DC CONVERTERS

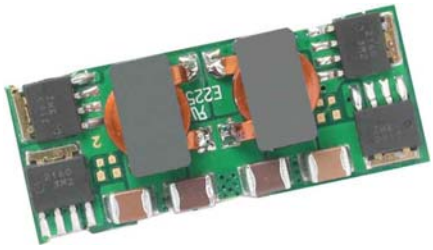
6 Vdc - 14 Vdc Input 0.8 Vdc - 3.63 Vdc/25 A or 30 A Output

Mar. 19, 2010

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

SRBC-30E2AL RoHS Compliant Rev.H

- Non-Isolated
- High Efficiency
- Fixed Frequency
- Wide Trim
- Low Cost
- Flexible Output Voltage Sequencing
- Industrial Temperature Range
- Under-Voltage Lockout (UVLO)
- Over Temperature ShutDown
- OCP/SCP
- Remote On/Off
- Remote Sense
- Parallel Operation With Active Current Sharing (Option)
- UL60950-1 Recognized (UL/cUL)



Description

The Bel SRBC-30E2AL is part of the non-isolated dc/dc converter Power Module series. The modules use a SMT package. These converters are available in a range of output voltages from 0.8 Vdc to 3.63 Vdc over a wide range of input voltage (Vin = 6 Vdc - 14 Vdc). The Bel SRBC-30E2AL has a sequencing feature that enables designers to implement various types of output voltage sequencing when powering. The efficiency is typically 92% at 3.3 Vdc output at full load.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low
Vo≤ 2.5 V	6 V - 14 V	30 A	75 W	87%	SRBC-30E2AL
Vo > 2.5 V		25 A	90 W	92%	

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

Part Number Explanation

S	R	BC	–	30	E	2A	L
1	2	3		4	5	6	7

1---Surface mount
2---RoHS 6, change “R” to “7” means RoHS 5
3---Series name, bobcat
4---Series code
5--- Input range (6-14V)
6---Output voltage, wide trim
7---Suffix, active low

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.

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Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	6 V	12 V	14 V	
Input Current [1] (full load)	-	-	26 A	
Input Current (no load)	-	150 mA	300 mA	
Remote Off Input Current	-	2 mA	-	
Input Reflected Ripple Current (pk-pk)	-	100 mA	-	With simulated source impedance of 1000 nH, 5 Hz to 20 MHz, and use a 220 uF/25 V AL-Cap, 270 uF/16 V Osc-Cap and 2 x 22 uF/25 V ceramic capacitors at 100 kHz at 25°C.
Input Reflected Ripple Current (rms)	-	40 mA	-	
I^2t Inrush Current Transient	-	-	1 A^2s	
Turn-on Voltage Threshold	-	5.0 V	-	
Turn-off Voltage Threshold	-	4.6 V	-	

Notes: 1.This power module is not internally fused. An input line fuse must always be used.
All specifications are typical at nominal input, full load at 25 °C unless otherwise stated.

Output Specifications

Parameter	Min	Typ	Max	Notes
Output Voltage Set Point	-1.5% Vo,set	-	1.5% Vo,set	Vin=12 V, Io=half load
Load Regulation	-	-	0.4% Vo,set	
Line Regulation	-	-	0.3% Vo,set	
Regulation Over Temperature (-40 °C to +85 °C)	-	-	0.8% Vo,set	
Output Current Vo, set ⩽ 2.5 V Vo, set > 2.5 V	 0 A 0 A	 - -	 30 A 25 A	
Current Limit Threshold	105% Io	140% Io	-	
Short Circuit Surge Transient	-	1 A^2s	3 A^2s	
Ripple and Noise (pk-pk)	-	50 mV	100 mV	0-20 MHz BW
Ripple and Noise (rms)	-	30 mV	60 mV	
Turn on Time	-	10 mS	20 mS	
Overshoot at Turn on	-	-	3% Vo,set	
Output Capacitance	242 uF	-	10000 uF	ESR>0.01 ohm max
Transient Response				
50% ~ 100% Max Load	Vo=3.3 V	-	150 mV	-	di/dt=1 A/uS; Vin=12 V
Settling Time		-	25 uS	-	
100% ~ 50% Max Load		-	150 mV	-	
Settling Time		-	25 uS	-	

Note: All specifications are typical at nominal input, full load at 25°C, with a 22 uF ceramic and a 220 uF tantalum cap at the output unless otherwise stated.

General Specifications

Parameter	Min	Typ	Max	Notes
Efficiency Vo=3.3 V Vo=1.8 V Vo=0.8 V	 - - -	 92% 87% 77%	 - - -	Measured at Vin=12 V, full load
Switching Frequency	-	300 kHz	-	
Over Temperature Shutdown	-	125 °C	-	
Output Trim Range (Wide Trim)	0.8 V	-	3.63 V	
Remote Sense Compensation	-	-	0.5 V	
MTBF	3,289,732 hours			Calculated Per Bell Core SR-332 (Io =80% Iomax; Vo=3.3 V; Vin=12 V; 200LFM forced air flow; T_a = 25 °C)
Dimensions Inches (L × W × H) Millimeters (L × W × H)	 1.3 x 0.53 x 0.358 33 x 13.5 x 9.10			
Weight	-	6.5 g	-	

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

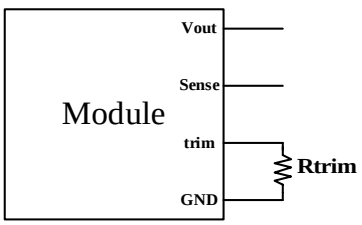
Control Specifications

Parameter	Min	Typ	Max	Notes
Remote On/Off				
Signal Low (Unit On)	-0.3 V	-	1.2 V	When Enable pin floating ,the unit is on.
Signal High (Unit Off)	3 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	Vin min to Vin max; Io min to Io max; Vseq<Vo
Tracking Accuracy Power-Up Power-Down	 - -	 100 mV 200 mV	 200 mV 400 mV	
Forced Load Share Accuracy	-	10% Io	-	
Number of Units in Parallel	-	-	5	

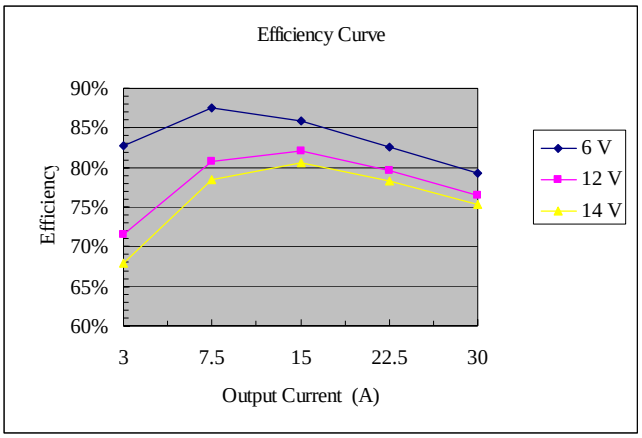
Output Trim Equations

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

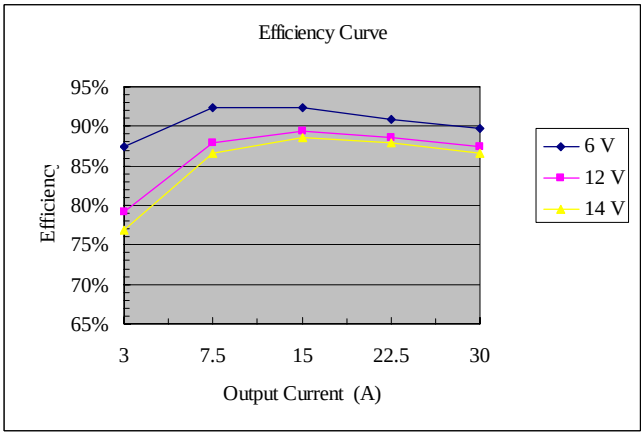
$$R_{trim} = \left[\frac{1200}{Vo - 0.8} - 100 \right]$$



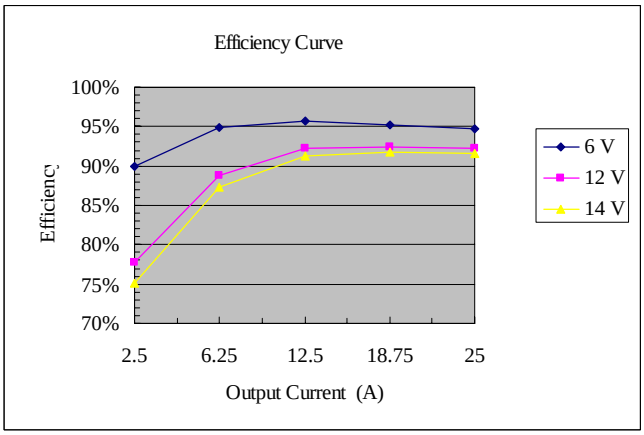
Efficiency Data



Vo=0.8 V

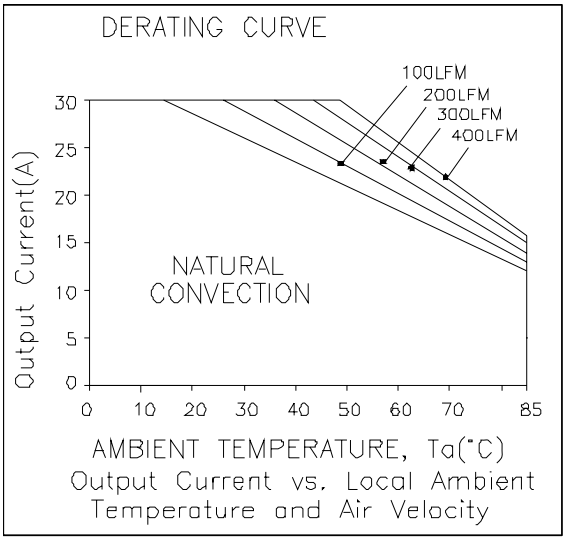


Vo=1.8 V

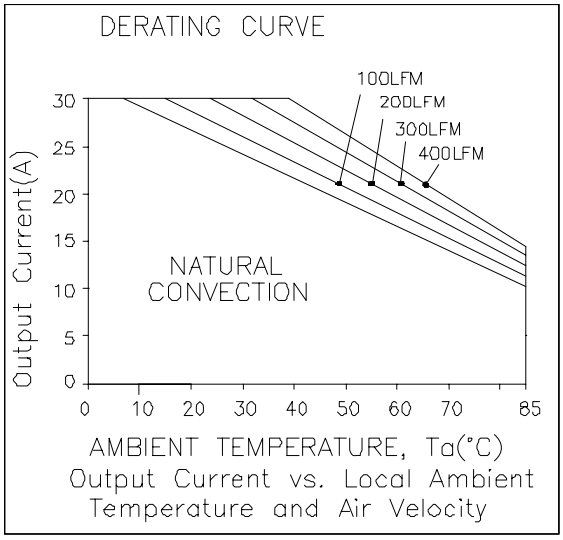


Vo=3.3 V

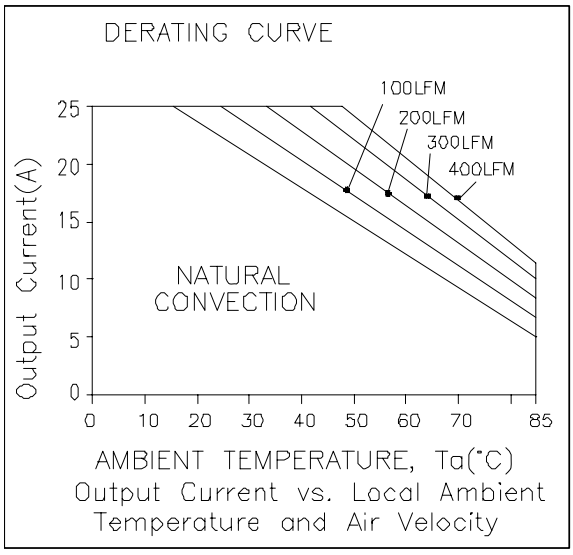
Thermal Derating Curves



Vin=12 V, Vo=0.8 V



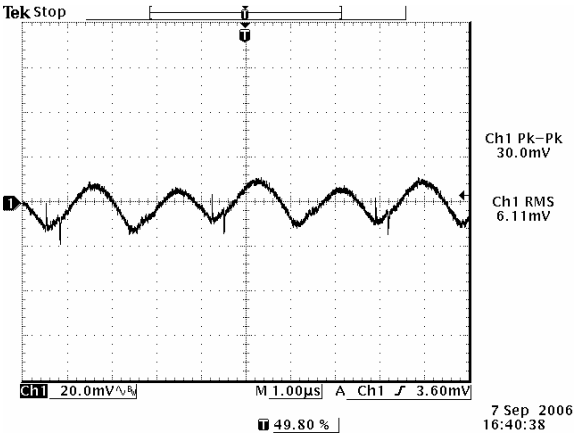
Vin=12 V, Vo=1.8 V



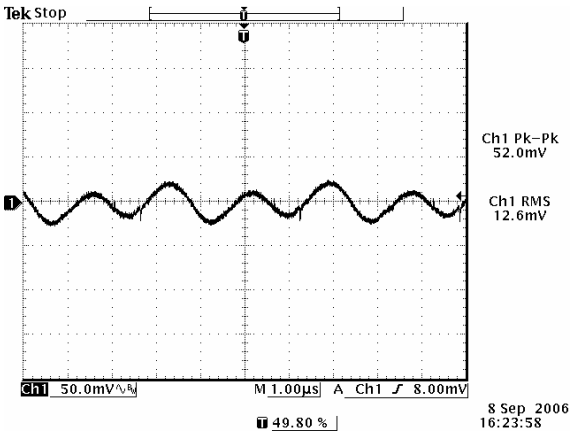
Vin=12 V, Vo=3.3 V

Note: Maximum junction temperature of semiconductors derated to 120C.

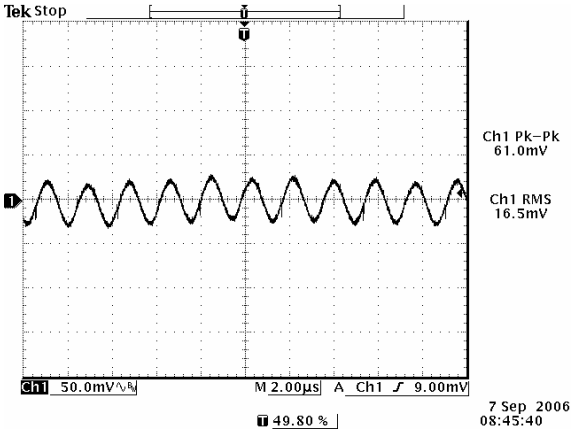
Ripple and Noise Waveforms



0.8 Vdc/30 A output



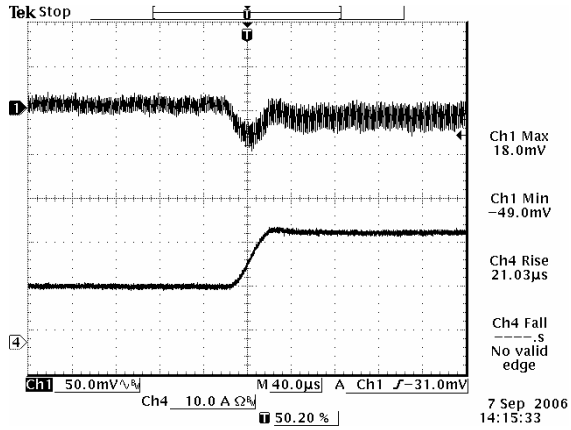
1.8 Vdc/30 A output



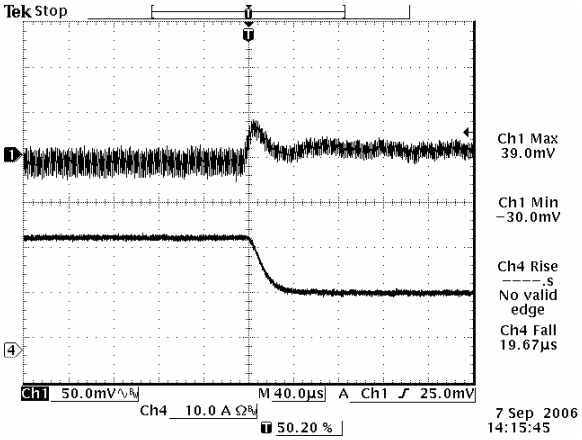
3.3 Vdc/25 A output

Note: Ripple and noise at full load, 12 Vdc input, with a 22 uF ceramic cap and a 220 uF Tantalum cap at the output, and Ta=25 deg C.

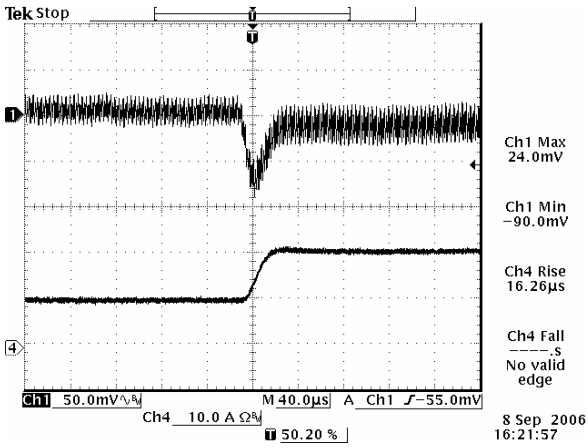
Transient Response Waveforms



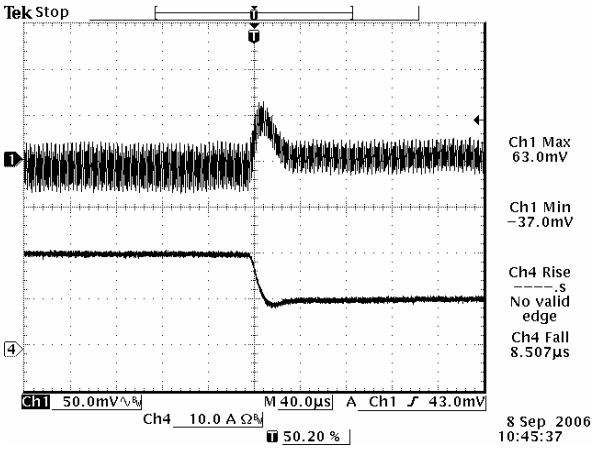
Vout= 0.8 V 50%-100% Load Transients



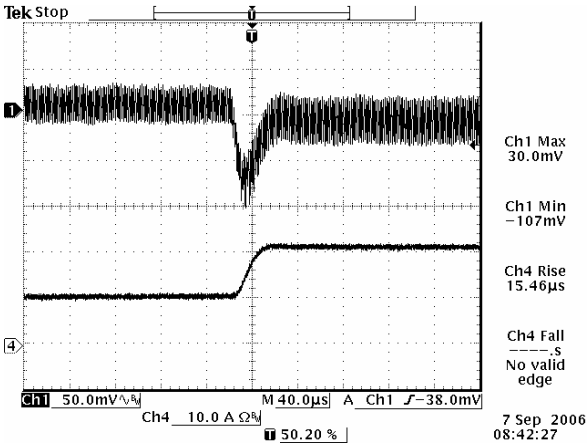
Vout= 0.8 V 100%-50% Load Transients



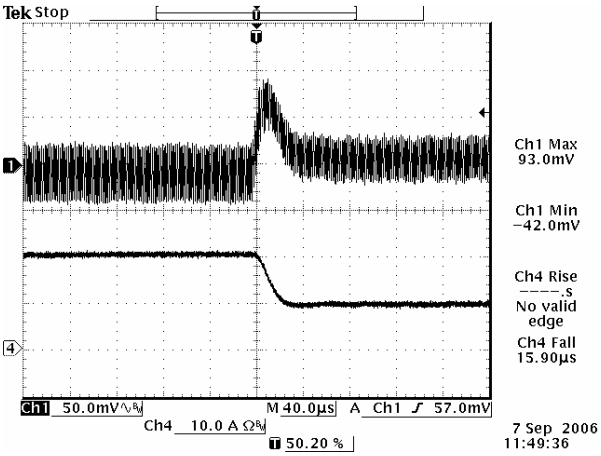
Vout= 1.8 V 50%-100% Load Transients



Vout= 1.8 V 100%-50% Load Transients



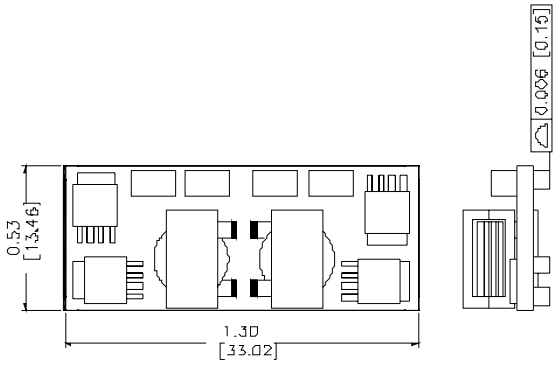
Vout= 3.3 V 50%-100% Load Transients



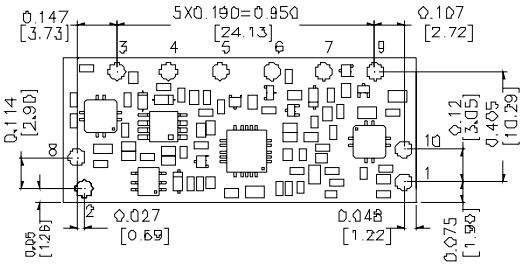
Vout= 3.3 V 100%-50% Load Transients

Note: Transients response at di/dt=1 A/uS, 12 V input, Ta=25 deg C.

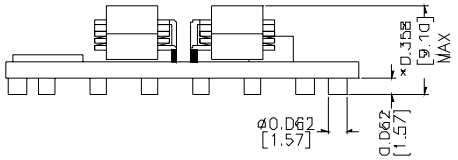
Mechanical Outline



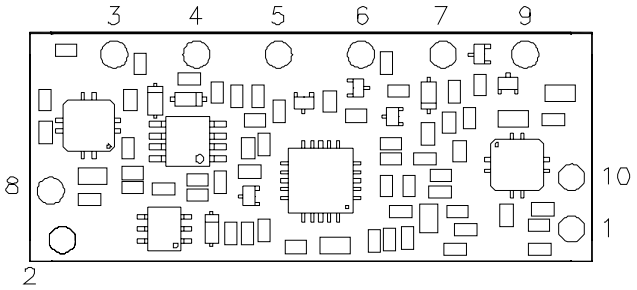
TOP VIEW



BOTTOM VIEW

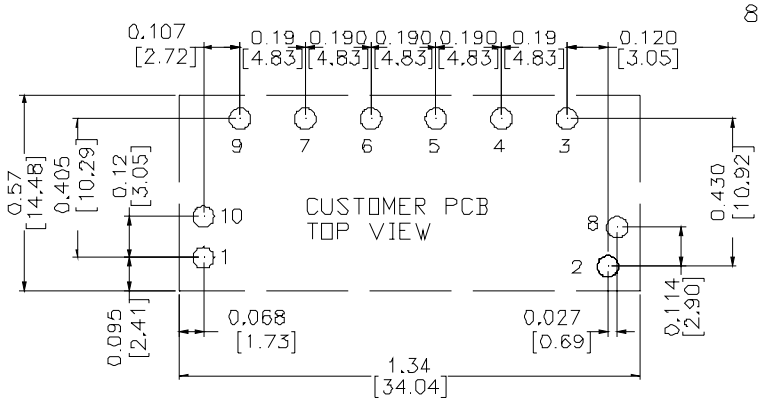


UNIT: INCH [mm]



BOTTOM VIEW

RECOMMENDED PAD LAYOUT



PAD SIZE:
Min. ø0.080" [2.03]
Max. ø0.098" [2.50]

Pin Connections

Pin	Function	Pin	Function
1	On/Off	6	Trim
2	Vin	7	SENSE
3	SEQ	8	GND(-H)
4	GND	9	SHARE
5	Vout	10	GND(-H)

Revision

Date	Revision	Changes Detail	Approval
2010-3-19	H	1. Update thermal derating curves; 2. Change to new datasheet format; 3. Add part number explanation.	XF

RoHS Compliance

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

CORPORATE

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