ISOLATED DC/DC CONVERTERS

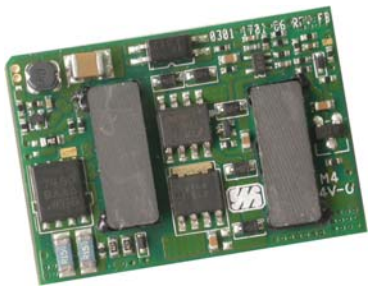
48 Vdc Input, 1.2 Vdc - 12 Vdc / 15 A - 3 A Outputs, 1/16 Brick Converter

Apr. 09, 2010

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

xRSB-30T Series RoHS Compliant Rev.B

- Isolated
- Fixed Frequency (550 kHz)
- High Efficiency
- High Power Density
- Low Cost
- Output Voltage Trim
- Basic Insulation
- UL60950-1 Recognized (UL/cUL)
- Input Under-Voltage Lockout
- Output Over-Voltage Shutdown
- OCP/SCP
- Over Temperature Protection
- Remote On/Off (Option)
- Positive/Negative Remote Sense
- Through Hole and SMT(Option)



Description

The xRSB-30T series are isolated dc/dc converters that operate from a nominal 48 Vdc source. These units will provide up to 30 W of output power from a nominal 48 Vdc input. These units are designed to be highly efficient and low cost. Features include remote on/off, over current protection and under voltage lockout. These converters are provided in an industry standard sixteenth brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active Low	Model Number Active High
1.2 Vdc	36 Vdc - 75 Vdc	15 A	18 W	84%	xRSB-30TV2L	xRSB-30TV20
1.5 Vdc	36 Vdc - 75 Vdc	13 A	19.5 W	86%	xRSB-30TV5L	xRSB-30TV50
1.8 Vdc	36 Vdc - 75 Vdc	13 A	23 W	86%	xRSB-30TV8L	xRSB-30TV80
2.5 Vdc	36 Vdc - 75 Vdc	10 A	25 W	89%	xRSB-30T02L	xRSB-30T025
3.3 Vdc	36 Vdc - 75 Vdc	10 A	30 W	90%	xRSB-30T03L	xRSB-30T033
5.0 Vdc	36 Vdc - 75 Vdc	7 A	35 W	90%	xRSB-30T05L	xRSB-30T050
12 Vdc	36 Vdc - 75 Vdc	3 A	36 W	89%	xRSB-30T12L	xRSB-30T120

Notes: 1. Add “G” suffix at the end of the model number to indicate Tray Packaging. Replace”x” with “S” to indicate SMT package, or “0” to indicate through hole package.
2. All part numbers above indicate RoHS 6. Change the second letter "R" to "7" for RoHS 5 part numbers

Absolute Maximum Ratings

Parameter	Min	Typ	Max	Notes
Input Voltage (continuous)	-0.3 V	-	80 V	
Input Voltage Transient (100 ms)	-0.3 V		100 V	
Remote On/Off	-0.3 V	-	18 V	
I/O Isolation Voltage	-	-	1500 V	
Ambient Temperature	-40 °C	-	85 °C	
Storage Temperature	-55 °C	-	125 °C	

Input Specifications

Parameter	Min	Typ	Max	Notes
Input Voltage	36 V	48 V	75 V	
Input Current (full load)	-	-	1.6 A	
Input Current (no load)	-	30 mA	120 mA	
Remote Off Input Current	-	2 mA	6 mA	
Input Reflected Ripple Current (pk-pk)	-	20 mA	50 mA	Tested with simulated source impedance of 15 uH, 5 Hz to 20 MHz; use a 100 uF/100 V electrolytic capacitor with ESR=1 ohm max at 200 kHz at the input.
Input Reflected Ripple Current (rms)	-	3 mA	7 mA	
I^2t Inrush Current Transient	-	0.01 A^2s	0.02 A^2s	
Turn On Voltage Threshold	31 V	33 V	35 V	
Turn Off Voltage Threshold	28 V	32 V	35 V	

Note: 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				
Vo=1.2 V	1.182 V	1.2 V	1.218 V	
Vo=1.5 V	1.478 V	1.5 V	1.523 V	
Vo=1.8 V	1.773 V	1.8 V	1.827 V	Test conditions:
Vo=2.5 V	2.463 V	2.5 V	2.538 V	Vin=48 V; Io=50% load
Vo=3.3 V	3.250 V	3.3 V	3.350 V	
Vo=5.0 V	4.900 V	5.0 V	5.100 V	
Vo=12 V	11.750 V	12.0 V	12.250 V	
Line Regulation				
Vo=1.2 - 1.8 V	-	±0.5 mV	±3 mV	
Vo=2.5 V	-	±2.0 mV	±6 mV	
Vo=3.3 V	-	±3.0 mV	±8 mV	
Vo=5.0 V	-	±4.0 mV	±9 mV	
Vo=12 V	-	±6.0 mV	±20 mV	
Load Regulation				
Vo=1.2 - 2.5 V	-	±3 mV	±5 mV	
Vo=3.3 - 5.0 V	-	±4 mV	±9 mV	
Vo=12 V	-	±5 mV	±10 mV	
Regulation Over Temperature (-40 °C to +85 °C)				
Vo=1.2 - 1.8 V	-	±7 mV	±15 mV	
Vo=2.5 - 3.3 V	-	±9 mV	±16 mV	
Vo=5.0 V	-	±15 mV	±30 mV	
Vo=12 V	-	±20 mV	±35 mV	
Output Current				
Vo=1.2 V	0 A	-	15 A	
Vo=1.5 V	0 A	-	13 A	
Vo=1.8 V	0 A	-	13 A	
Vo=2.5 V	0 A	-	10 A	
Vo=3.3 V	0 A	-	10 A	
Vo=5.0 V	0 A	-	7 A	
Vo=12 V	0 A	-	3 A	

Output Specifications (continued)

Parameter			Min	Typ	Max	Notes
Current Limit Threshold						
		Vo=1.2 V	18 A	24 A	30 A	
		Vo=1.5 V	14 A	20 A	26 A	
		Vo=1.8 V	14 A	19 A	24 A	
		Vo=2.5 V	11 A	16 A	21 A	
		Vo=3.3 V	10.5 A	15.5 A	25 A	
		Vo=5.0 V	7.5 A	9.5 A	14 A	
		Vo=12 V	3.5 A	4.5 A	6 A	
Short Circuit Surge Transient			-	0.5 A^2s	1 A^2s	
Ripple and Noise (rms)						Tested at 0-20 MHz BW, with a 1 uF ceramic capacitor and a 10 uF Tantalum capacitor at the output.
		Vo=1.2 - 2.5 V	-	10 mV	20 mV	
		Vo=3.3 V	-	15 mV	30 mV	
		Vo=5.0 - 12 V	-	30 mV	55 mV	
Ripple and Noise (pk-pk)						
		Vo=1.2 - 2.5 V	-	40 mV	70 mV	
		Vo=3.3 V	-	65 mV	110 mV	
		Vo=5.0 V	-	90 mV	150 mV	
		Vo=12 V	-	80 mV	140 mV	
Turn on Time			-	35 mS	70 mS	
Overshoot at Turn on			-	0%	5%	
Output Capacitance						
		Vo=1.2 - 1.5 V	220 uF	-	15000 uF	
		Vo=1.8 V	220 uF	-	10000 uF	
		Vo=2.5 V	220 uF	-	6800 uF	
		Vo=3.3 V	0 uF	-	4700 uF	
		Vo=5.0 V	0 uF	-	2200 uF	
		Vo=12 V	0 uF	-	330 uF	
Transient Response						
25% ~ 50% Max Load	Overshoot	Vo=1.2 V	-	100 mV	150 mV	Test conditions: di/dt = 0.1 A/uS, Vin=48 V, with a 1uF ceramic capacitor and a 10 uF Tantalum capacitor at the output.
	Settling Time		-	100 uS	150 uS	
50% ~ 25% Max Load	Overshoot		-	100 mV	150 mV	
	Settling Time		-	100 uS	150 uS	
25% ~ 50% Max Load	Overshoot	Vo=1.5 - 1.8 V	-	150 mV	200 mV	
	Settling Time		-	120 uS	200 uS	
50% ~ 25% Max Load	Overshoot		-	150 mV	200 mV	
	Settling Time		-	120 uS	200 uS	
25% ~ 50% Max Load	Overshoot	Vo=2.5 V	-	200 mV	300 mV	
	Settling Time		-	100 uS	150 uS	
50% ~ 25% Max Load	Overshoot		-	200 mV	300 mV	
	Settling Time		-	100 uS	150 uS	
25% ~ 50% Max Load	Overshoot	Vo=3.3 V	-	200 mV	350 mV	
	Settling Time		-	200 uS	350 uS	
50% ~ 25% Max Load	Overshoot		-	200 mV	350 mV	
	Settling Time		-	200 uS	350 uS	
25% ~ 50% Max Load	Overshoot	Vo=5.0 V	-	350 mV	500 mV	
	Settling Time		-	200 uS	350 uS	
50% ~ 25% Max Load	Overshoot		-	350 mV	500 mV	
	Settling Time		-	200 uS	350 uS	
25% ~ 50% Max Load	Overshoot	Vo=12 V	-	270 mV	450 mV	
	Settling Time		-	110 uS	200 uS	
50% ~ 25% Max Load	Overshoot		-	270 mV	450 mV	
	Settling Time		-	110 uS	200 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				
Vo=1.2 V	81%	84%	-	Vin=48 V, full load
Vo=1.5 V	83%	86%	-	
Vo=1.8 V	83%	86%	-	
Vo=2.5 V	84%	87%	-	
Vo=3.3 - 5.0 V	87%	90%	-	
Vo=12 V	86%	89%	-	
Switching Frequency	500 kHz	550 kHz	600 kHz	
Isolation Capacitance	-	3900 pF	-	
Output Voltage Trim Range	90% Vo	-	110% Vo	
Over Temperature Protection	120 °C	-	140 °C	
Over Voltage Protection	-	130% Vo	160% Vo	Test conditions: Vin=48 V, full load and short the feedback optocoupler.
MTBF	TBD			Calculated Per Bell Core SR-332 (I_O = Nominal; T_a = 25 °C)
Dimensions				
Inches (L × W × H)	1.3 x 0.9 x 0.364			SMT Package
Millimeters (L × W × H)	33.02 x 22.86 x 9.24			
Dimensions				
Inches (L × W × H)	1.3 x 0.9 x 0.388			Through Hole Package
Millimeters (L × W × H)	33.02 x 22.86 x 9.85			
Weight	-	13 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)	Active Low	-0.3 V	-	0.8 V	When Remote On/Off pin is open, for active low option, unit is off; for active high option, unit is on
Signal High (Unit Off)		2.95 V	-	18 V	
Signal Low (Unit Off)	Active High	-0.3 V	-	0.8 V	
Signal High (Unit On)		2.95 V	-	18 V	
Current Sink	-	0 mA	-	1 mA	

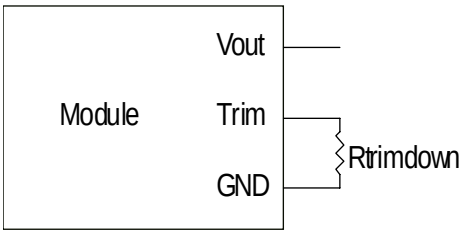
Output Trim Equations

Equations for calculating the trim resistor are shown below (Unit: kΩ). The Trim Down resistor should be connected between the Trim pin and Ground pin. The Trim Up resistor should be connected between the Trim pin and the Vout. Only one of the resistors should be used for any given application.

1) Trim Equations for Vo=1.2 V

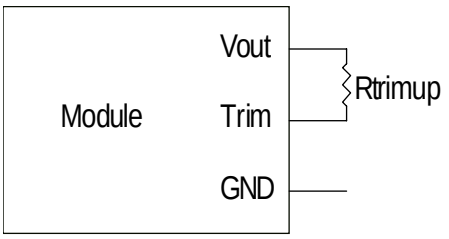
$$R_{trimdown} = \frac{511}{|delta|} - 10.22$$

$$R_{trimup} = \frac{(100 + delta) \cdot Vo \cdot 5.11 - 313}{0.6125 \cdot delta} - 10.22$$



Note:

$$delta = \frac{(Vo\_req - Vo)}{Vo} \times 100[\%]$$



Vo_req=Desired (trimmed) output voltage [V] Vo=1.202 V

2) Trim Equations for Vo=1.5 V - 12 V

$$R_{trimdown} = \frac{511}{|delta|} - 10.22$$

$$R_{trimup} = \frac{(100 + delta) \cdot Vo \cdot 5.11 - 626}{1.225 \cdot delta} - 10.22$$

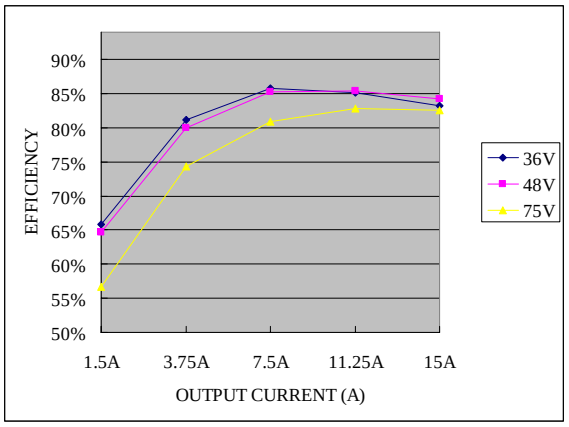
Note:

$$delta = \frac{(Vo\_req - Vo)}{Vo} \times 100[\%]$$

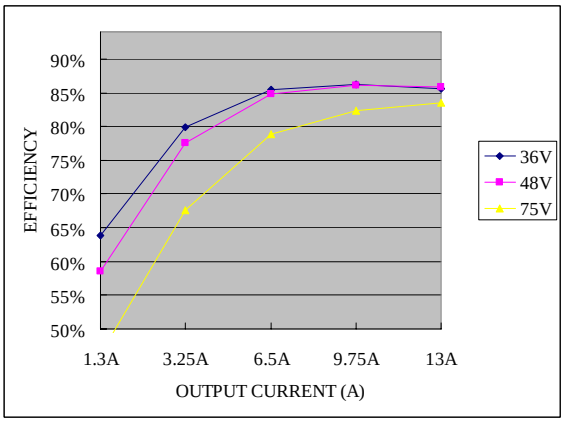
Vo_req=Desired (trimmed) output voltage [V]

Vo=1.503 V for 1.5 V output; Vo=1.804 V for 1.8 V output; Vo=2.505 V for 2.5 V output; Vo=3.308 V for 3.3 V output; Vo=5.002 V for 5 V output; Vo=12.007 V for 12 V output.

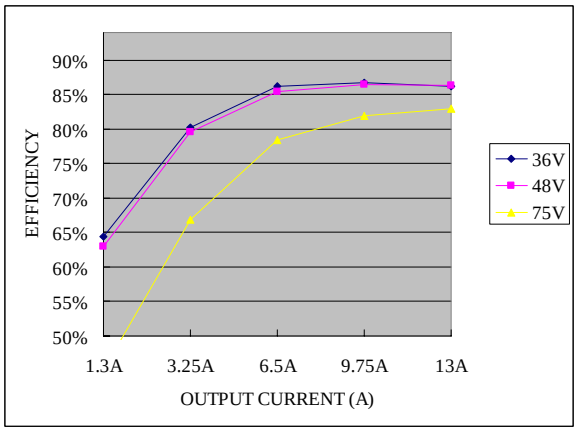
Efficiency Data



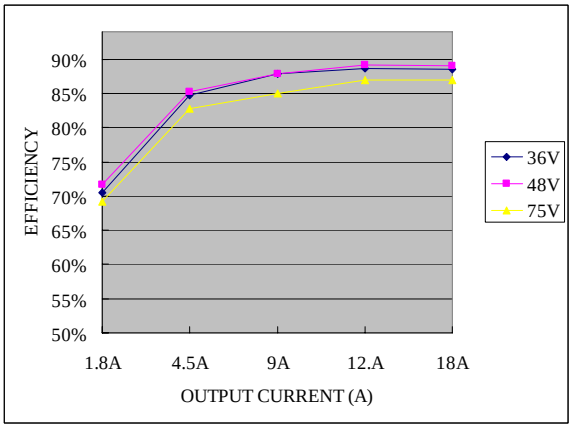
Vo=1.2 V



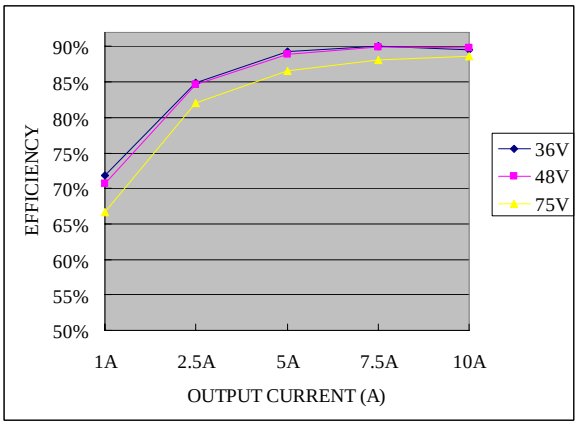
Vo=1.5 V



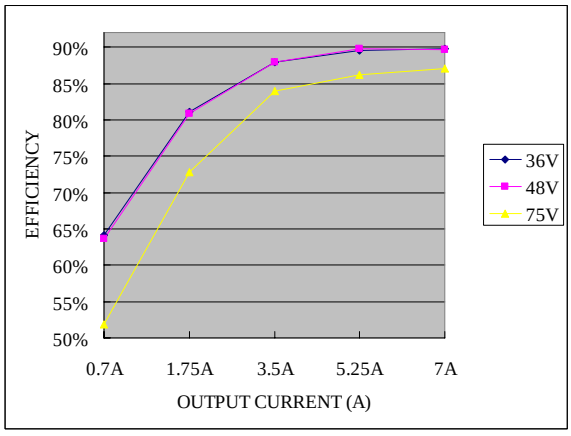
Vo=1.8 V



Vo=2.5 V

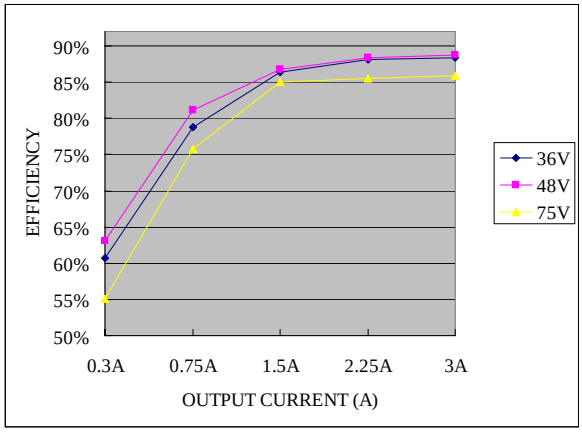


Vo=3.3 V



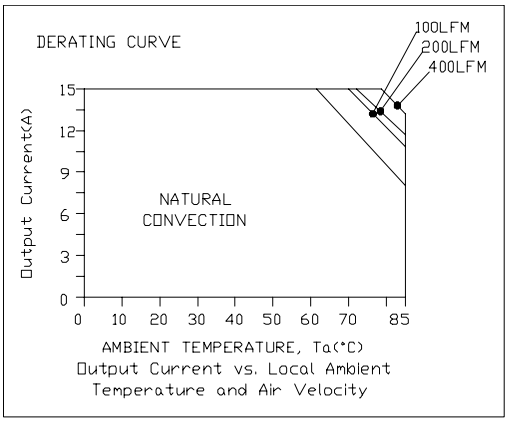
Vo=5.0 V

Efficiency Data (continued)

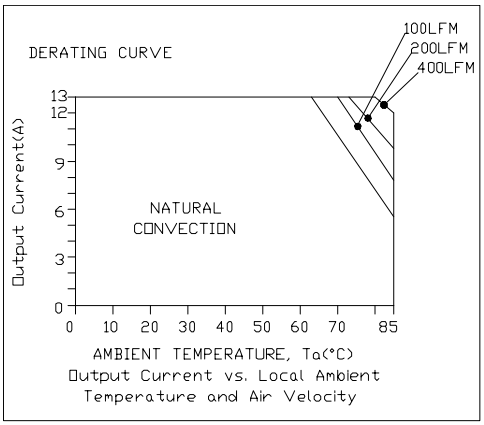


Vo=12 V

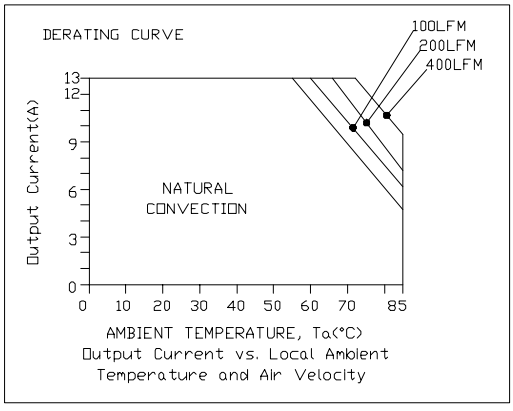
Thermal Derating Curves



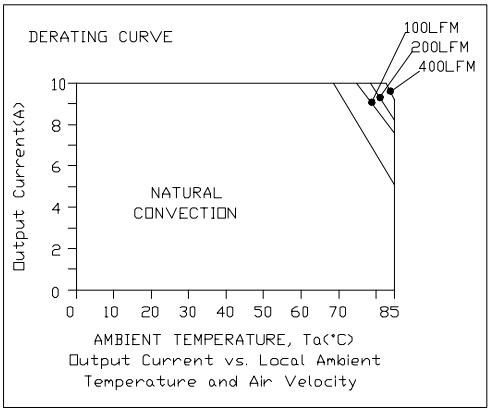
Vin=48 V, Vo=1.2 V



Vin=48 V, Vo=1.5 V

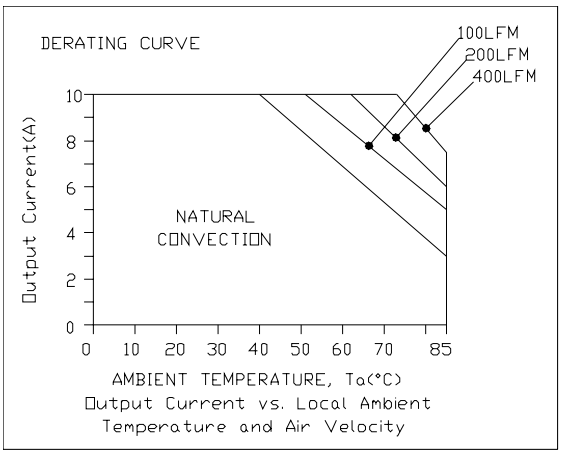


Vin=48 V, Vo=1.8 V

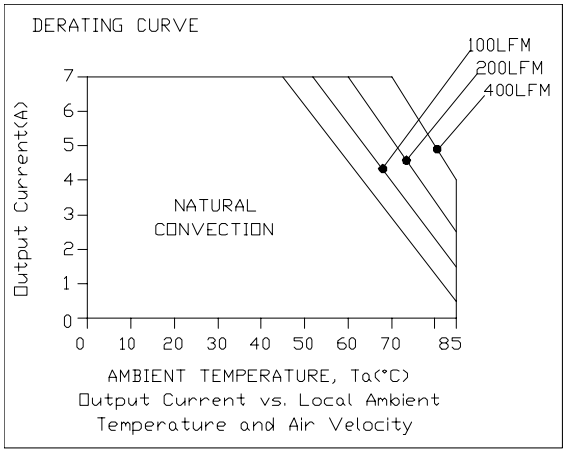


Vin=48 V, Vo=2.5 V

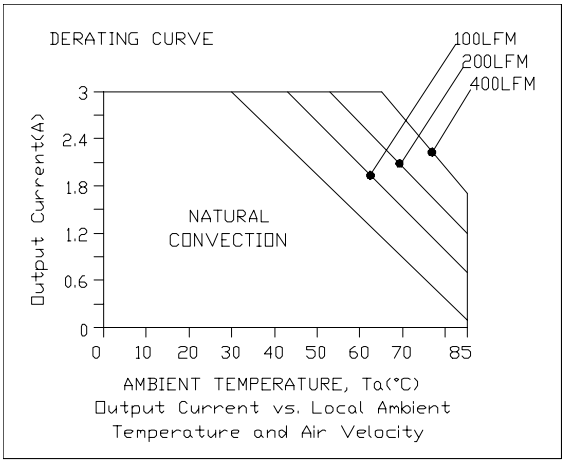
Thermal Derating Curves (continued)



Vin=48 V, Vo=3.3 V

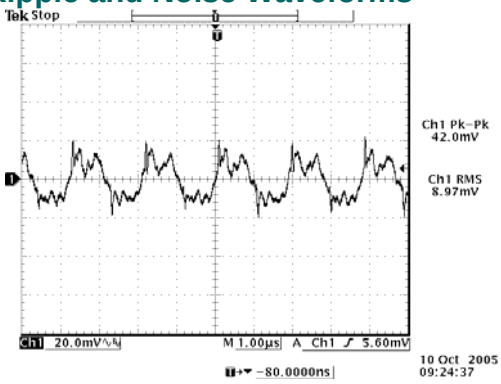


Vin=48 V, Vo=5.0 V

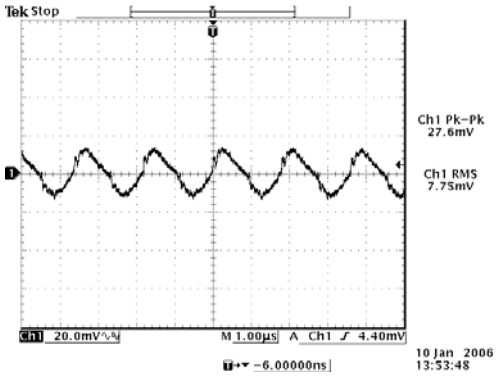


Vin=48 V, Vo=12 V

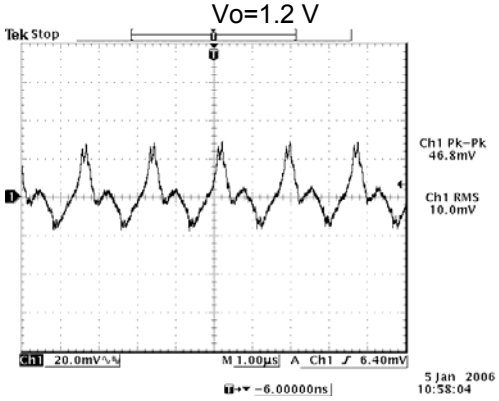
Ripple and Noise Waveforms



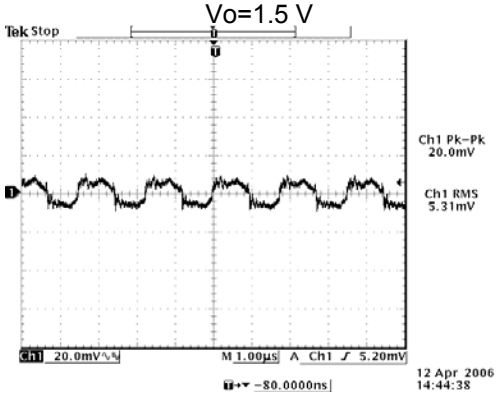
Vo=1.2 V



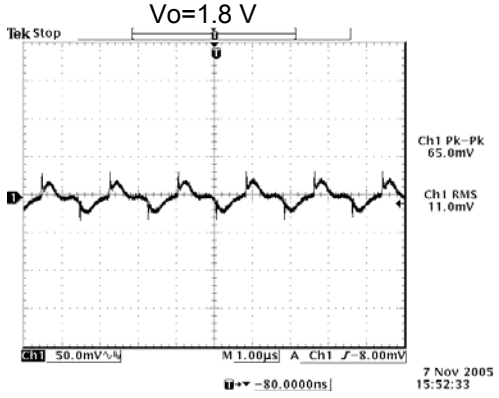
Vo=1.5 V



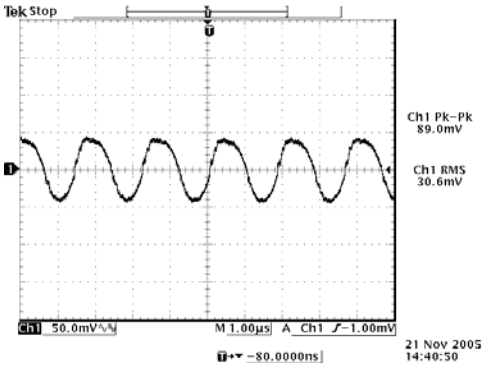
Vo=1.8 V



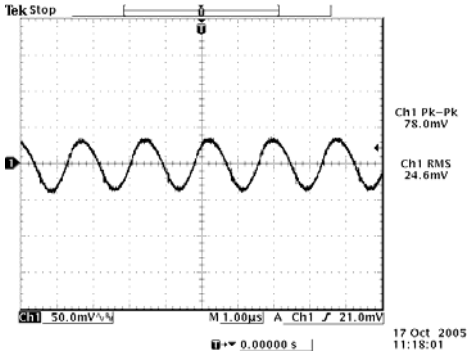
Vo=2.5 V



Vo=3.3 V



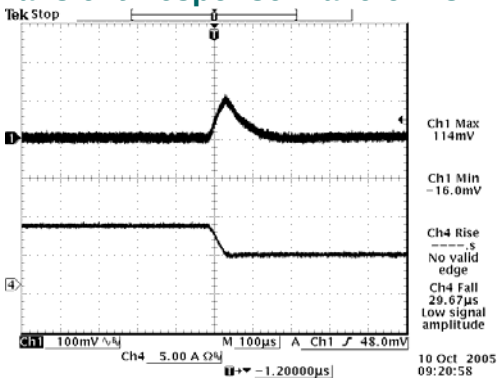
Vo=5.0 V



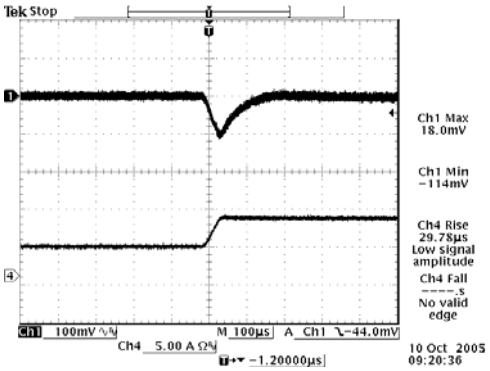
Vo=12 V

Note: Ripple and noise at full load, 48 V input, with a 1 uF ceramic capacitor and a 10 uF tantalum cap at the output, and Ta=25 deg C.

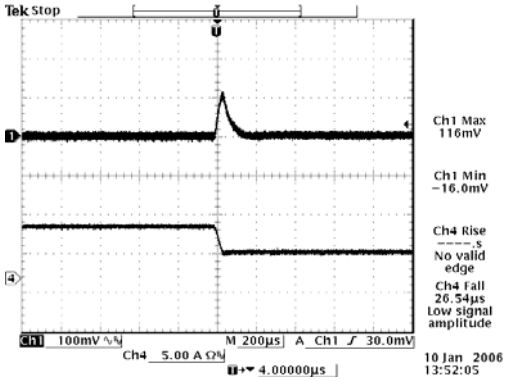
Transient Response Waveforms



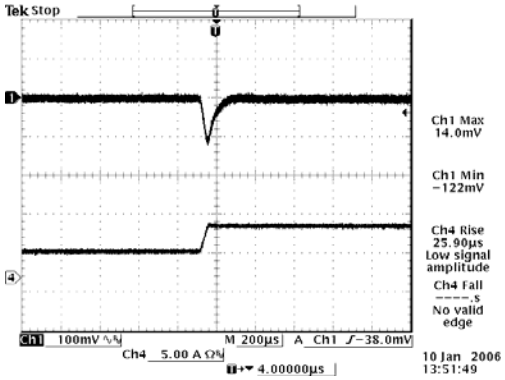
Vo=1.2 V 50% to 25% Load Transients



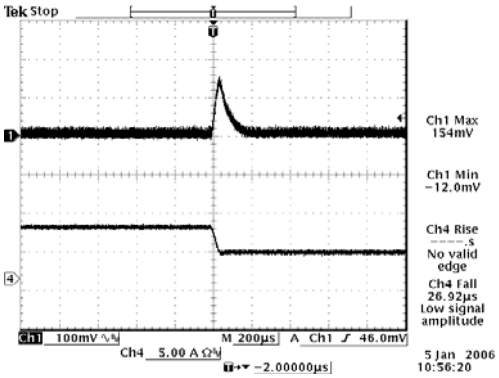
Vo=1.2 V 25% to 50% Load Transients



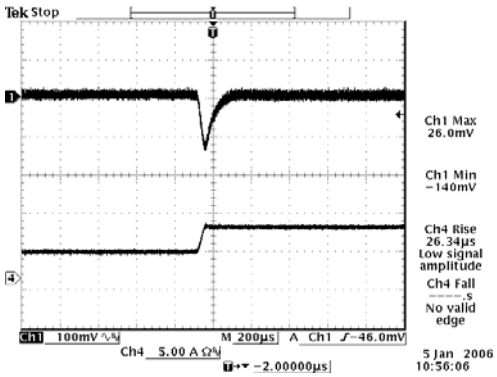
Vo=1.5 V 50% to 25% Load Transients



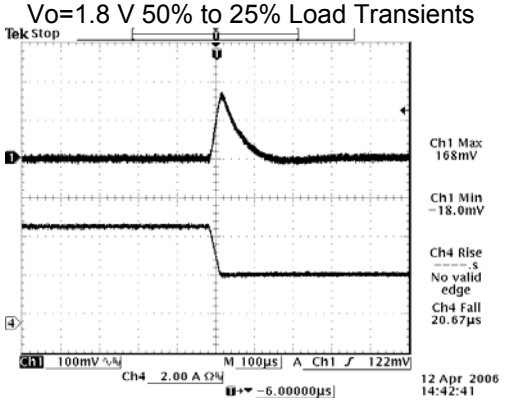
Vo=1.5 V 25% to 50% Load Transients



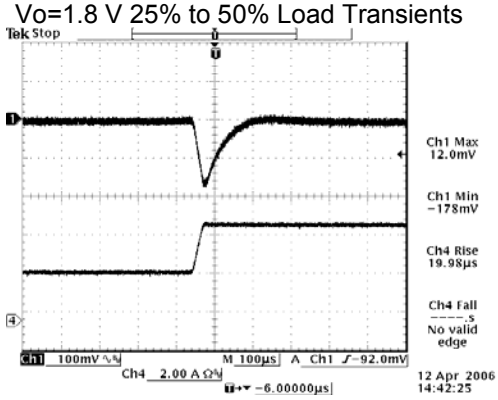
Vo=1.8 V 50% to 25% Load Transients



Vo=1.8 V 25% to 50% Load Transients

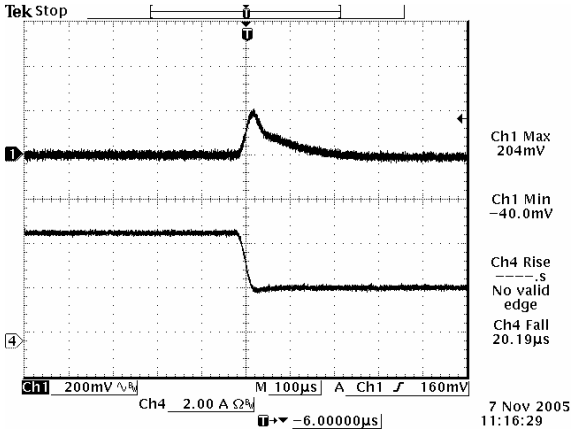


Vo=2.5 V 50% to 25% Load Transients

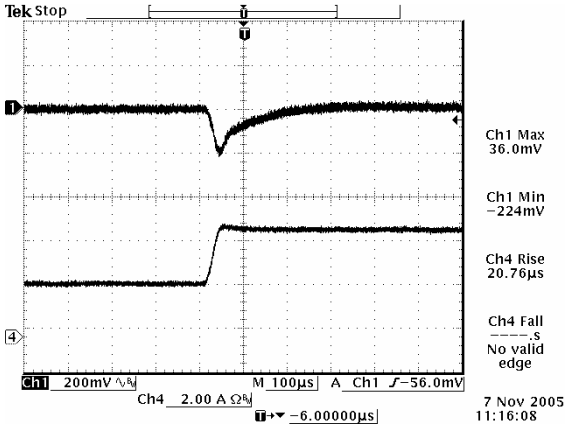


Vo=2.5 V 25% to 50% Load Transients

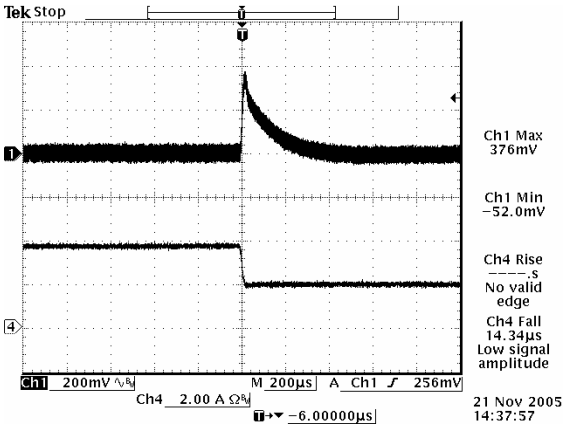
Transient Response Waveforms (continued)



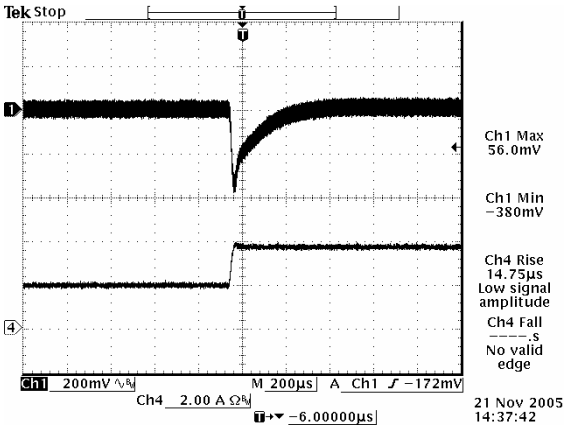
Vo=3.3 V 50% to 25% Load Transients



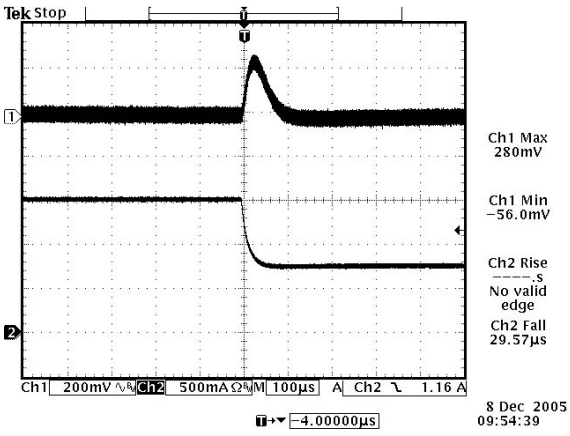
Vo=3.3 V 25% to 50% Load Transients



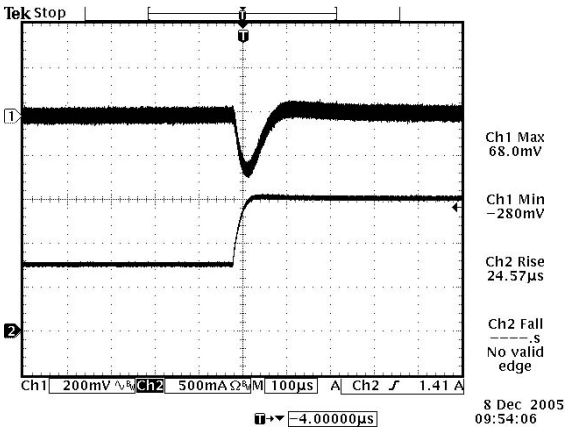
Vo=5.0 V 50% to 25% Load Transients



Vo=5.0 V 25% to 50% Load Transients



Vo=12 V 50% to 25% Load Transients

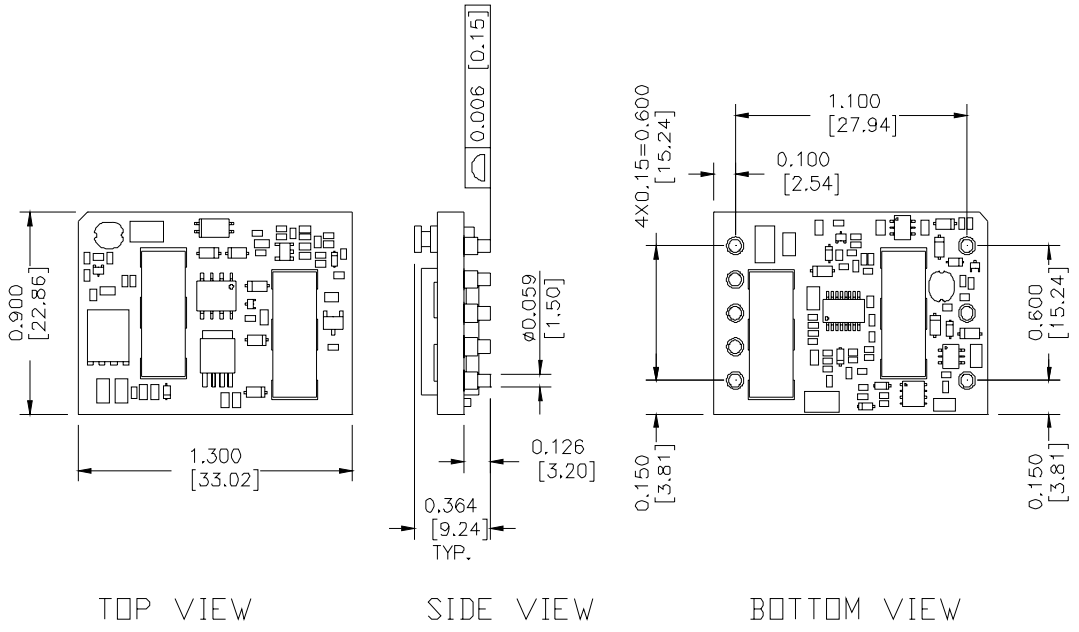


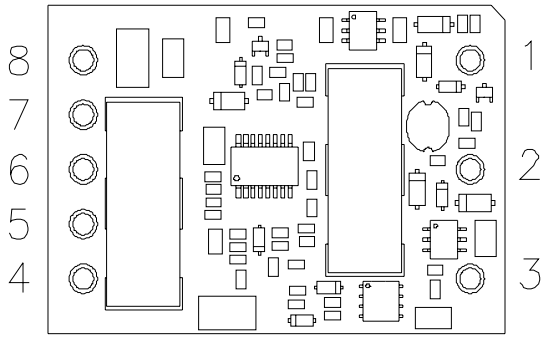
Vo=12 V 25% to 50% Load Transients

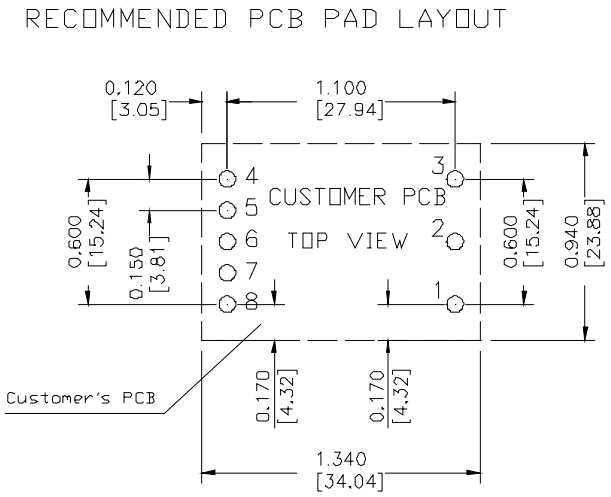
Note: Transient Response at Vin=48 V, di/dt=0.1A/uS, with external 220 uF tantalum capacitor and 1 uF ceramic capacitor, and Ta=25 deg C.

Mechanical Outline

SMT Package







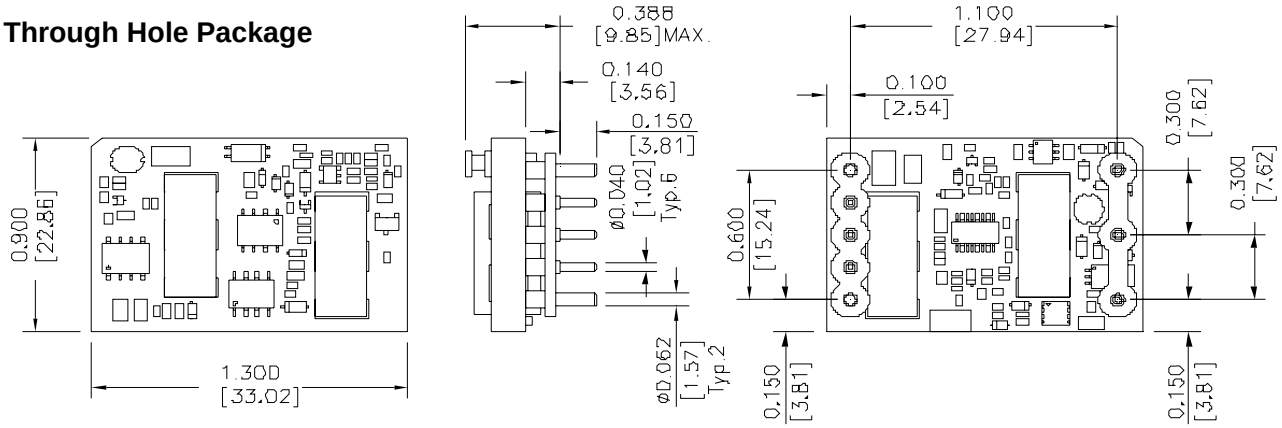
Recommended Surface Mount Pads
Min. ø0.080" [2.03]
Max. ø0.092" [2.34]

Pin Connections

Pin	Function
1	Vin (+)
2	Remote On/Off
3	Vin (-)
4	Vout-
5	Remote Sense (-)
6	Trim
7	Remote Sense (+)
8	Vout (+)

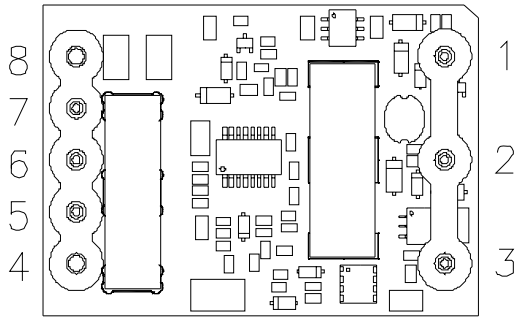
Mechanical Outline (continued)

Through Hole Package

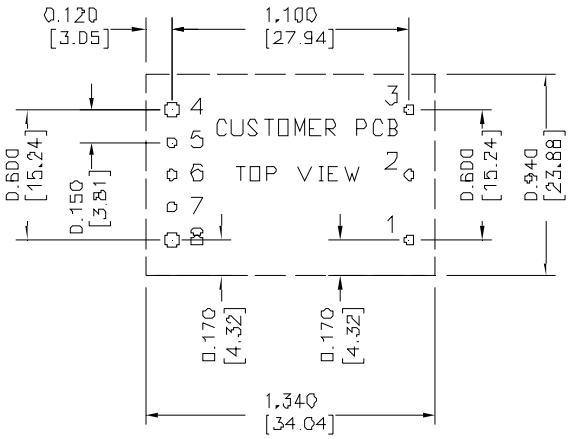


TOP VIEW SIDE VIEW BOTTOM VIEW

UNIT:INCH [mm]



RECOMMENDED PCB PAD LAYOUT



HOLE SIZE: 1-3, 5-7 Ø0.047[1.19],
4,8 Ø0.07 [1.78]
PAD SIZE: 1-3, 5-7 Ø0.08[2.03]
4,8 Ø0.10 [2.54]

Pin Connections

Pin	Function
1	Vin (+)
2	Remote On/Off
3	Vin (-)
4	Vout-
5	Remote Sense (-)
6	Trim
7	Remote Sense (+)
8	Vout (+)

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; Tolerances: x.xx +/-0.02 in. x.xxx +/-0.010 in. unless otherwise stated.

Revision History

Date	Revision	Changes Detail	Approval
2010-4-9	B	Update the 0RSB-30T series product height from 0.378'' to 0.388''.	Jack Fan

RoHS Compliance

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

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LifeElectronics
Живое партнерство

ООО «ЛайфЭлектроникс» **“LifeElectronics” LLC**

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

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- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

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- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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