

ISOLATED DC/DC CONVERTERS

48 Vdc Input 1.2 Vdc /50 A Output



Aug. 10, 2010

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

0RCY-C2TV2x RoHS Compliant Rev.C

Features

- Isolated
- High Efficiency
- Fixed Frequency (300 KHz)
- High Power Density
- Low Cost
- Remote On/Off
- Positive/Negative Remote Sense
- Class 1, Category 2, Isolated DC/DC Converter (refer to IPC-9592)
- UL60950-1 Recognized (UL/cUL) (Pending)
- Input Under/Over Voltage Lockout
- Output Voltage Trim
- Basic Insulation
- OCP/SCP
- Over Temperature Protection
- Output Over-Voltage Protection with Auto-recovery

Applications

- Networking
- Computers and peripherals
- Telecommunications

Description

The 0RCY-C2TV2x is isolated dc/dc converter that operates from a nominal 48 Vdc source. This unit will provide up to 60 W of output power from a nominal 48 Vdc input. This unit is designed to be highly efficient and low cost. Features include remote on/off, over current protection and under-voltage lockout. This converter is provided in an industry standard eighth brick package.

Part Selection

Output Voltage	Input Voltage	Max. Output Current	Max. Output Power	Typical Efficiency	Model Number Active High	Model Number Active Low
1.2 Vdc	48 Vdc	50 A	60 W	86%	0RCY-C2TV20	0RCY-C2TV2L

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

Part Number Explanation

0 R CY - C2 T V2 x
1 2 3 4 5 6 7

- 1---Through hole mount
- 2---RoHS 6, change "R" to "7" means RoHS 5
- 3---Series name
- 4---Series code
- 5--- Input range (36-75V)
- 6---Output voltage (1.2V)
- 7---Suffix

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Absolute Maximum Ratings

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

Note: Ratings used beyond the maximum ratings may cause a reliability degradation of the converter or may permanently damage the device.

Input Specifications

Parameter	Min	Typ	Max	Unit	Notes
Input Voltage	36	48	75	V	
Input Voltage Transient Rate	-	-	7	V/mS	
Input Current (full load)	-	-	3.0	A	
Input Current (no load)	-	-	60	mA	
Remote Off Input Current	-	10	15	mA	
Input Reflected Ripple Current (rms)	-	5	10	mA	With simulated source impedance of 10 uH, 5Hz to 20MHz. Use a 100 uF/100 V electrolytic cap with ESR=1 ohm max, at 200 KHz@25°C.
Input Reflected Ripple Current (pk-pk)	-	-	30	mA	
I ² t Inrush Current Transient	-	-	0.1	A ² s	
Turn-on Voltage Threshold	33	-	35.5	V	
Turn-off Voltage Threshold	32	-	34.5	V	

CAUTION: This converter is not internally fused. An input line fuse must be used in application.

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

Output Specifications

Parameter	Min	Typ	Max	Unit	Notes
Output Voltage Set Point	1.176	1.20	1.224	V	Vin=48 V, Io=50%load
Load Regulation	-	±3	±6	mV	
Line Regulation	-	±3	±5	mV	
Regulation Over Temperature (-40deg.C-85deg.C)	-	±4	±9	mV	
Total Regulation	-	±10	±19	mV	
Ripple and Noise (rms)	-	-	10	mV	Vin=75 V, 0-20MHz BW, with a 1µF ceramic capacitor and a 100 µF Tantalum cap at output.
Ripple and Noise (pk-pk)	-	-	50	mV	
Output Current Range	0	-	50	A	

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Output Specifications (continued)

Parameter		Min	Typ	Max	Unit	Notes	
Output DC Current Limit		52	-	62	A		
Short Circuit Surge Transient		-	2	4	A ² s		
Turn on Time		-	-	40	mS		
Overshoot at Turn on		-	0	-	%		
Output Capacitance		0	-	20,000	uF		
Transient Response							
25% ~ 50% Max Load	Overshoot	Vo= 1.2V	-	-	50	mV	di/dt=0.1A/us, Vin=48Vdc, with a 1µF ceramic capacitor and a 330 µF ESR≤50mOhm cap at output.
	Settling Time		-	-	250	uS	
50% ~ 25% Max Load	Overshoot		-	-	50	mV	
	Settling Time		-	-	250	uS	

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

General Specifications

Parameter	Min	Typ	Max	Unit	Notes
Efficiency (full load)	84	86	-	%	Measured at Vin=48 V
Efficiency (half load)	85	89	-	%	
Switching Frequency	270	300	330	kHz	
Isolation capacitance	-	2200	-	pF	
Over Voltage Trim Range	90	-	110	%	The total voltage increased by trim and remote sense should not exceed 10%Vo.
Remote Sense Compensation	-	-	10	%	
Over Temperature Protection	-	125	-	°C	
Over Voltage Protection	1.39	-	1.6	V	
Weight	-	28	-	g	
FIT	TBD			-	Calculated Per Bell Core SR-332 (Vin=48V, Io=80%load, Ta = 25 °C, FIT=10 ⁹ /MTBF)
Dimensions				-	
	Inches (L x W x H)	2.30 x 0.90 x 0.40			
	Millimeters (L x W x H)	58.42 x 22.78 x 10.26			

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

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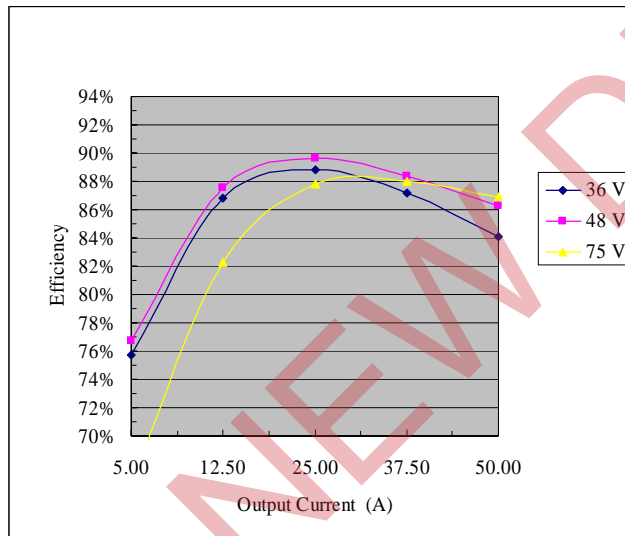
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Remote On/Off

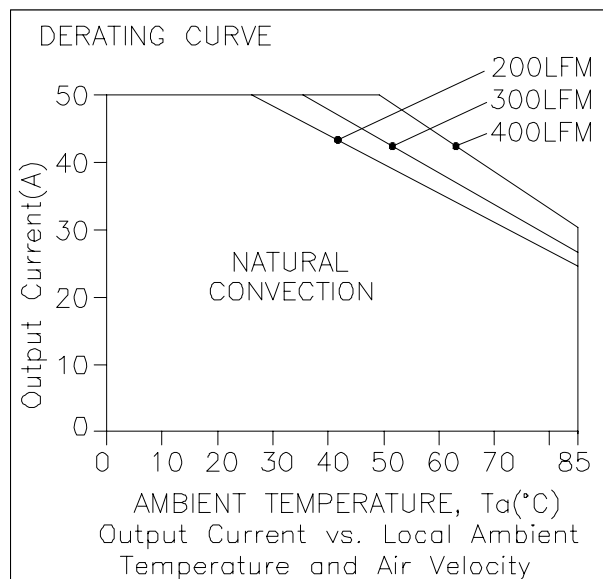
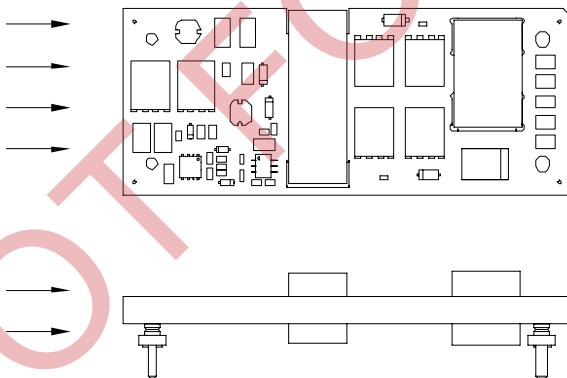
Parameter		Min	Typ	Max	Unit	Notes
Signal Low (Unit On)	Active Low	-0.7	-	0.8	V	The remote on/off pin open, Unit off.
Signal High (Unit Off)		2.4	-	18	V	
Signal Low (Unit Off)	Active High	-0.7	-	0.8	V	The remote on/off pin open, Unit on.
Signal High (Unit On)		2.4	-	18	V	
Current Sink		0	-	1	mA	

Efficiency Data



Thermal Derating Curve

AIR FLOW



Vin=48V, with maximum junction temperature of semiconductors derated to 120C

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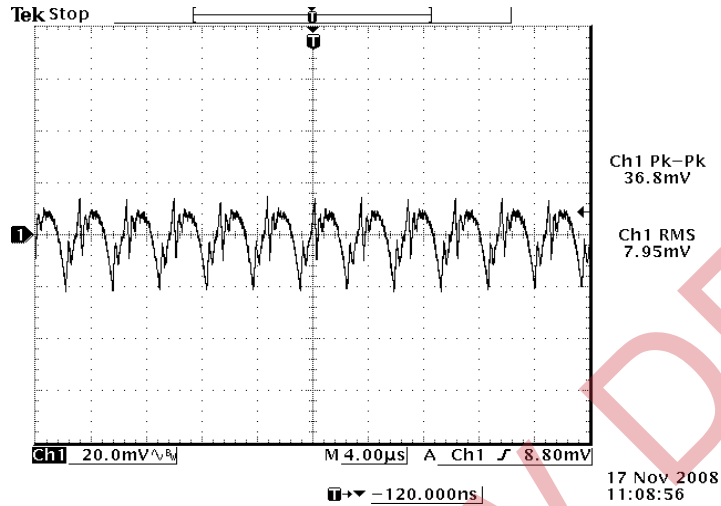
48 Vdc Input 1.2 Vdc /50 A Output



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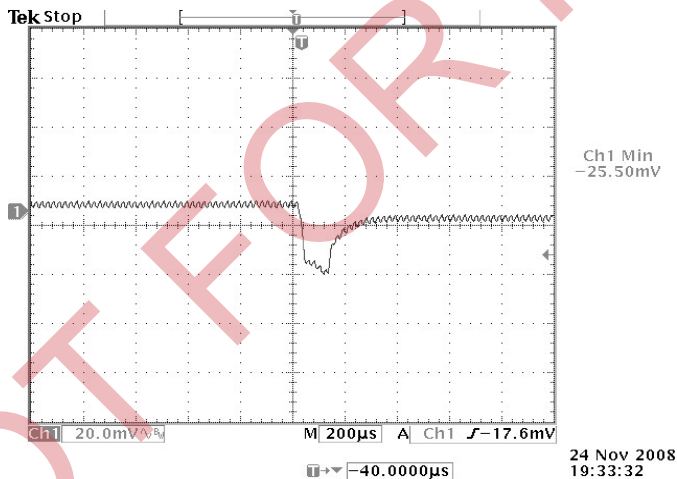
Ripple and Noise Waveform



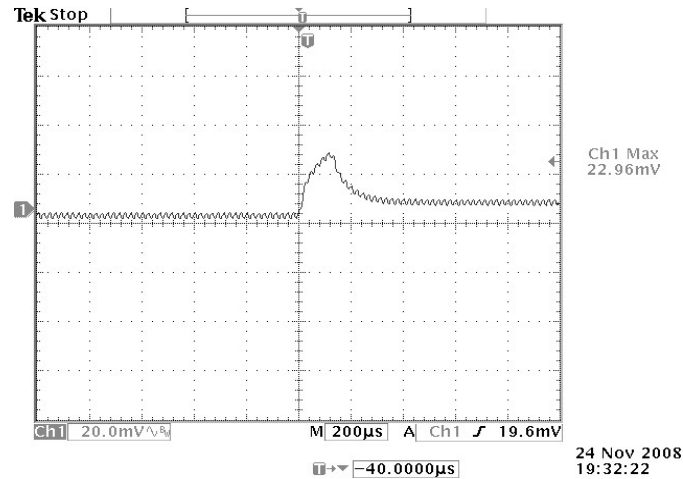
75Vdc input, 1.2Vdc/50A output

Note: Ripple and noise at full load, with a 1µF ceramic cap and a 100µF Tantalum cap at output, and $T_a=25$ deg C.

Transient Response Waveforms



Vout=1.2V, 50% to 75% Load Transients



Vout=1.2V, 75% to 50% Load Transients

Note: Transient response at $di/dt=0.1A/\mu s$, $V_{in}=48Vdc$, $T_a=25^\circ C$, with a 1µF ceramic capacitor and 330µF ESR $\leq 50m\Omega$ Cap at output.

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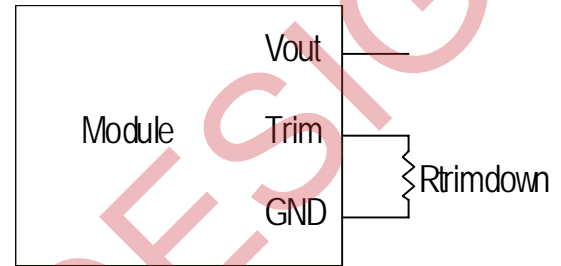
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Output Trim Equations

Equations for calculating the trim resistor are shown below. The Trim Down resistor should be connected between the Trim pin and Sense(-) pin. The Trim Up resistor should be connected between the Trim pin and the Sense(+) pin. Only one of the resistors should be used for any given application.

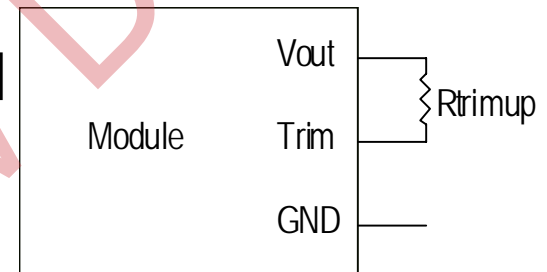
$$R_{trimdown} = \frac{511}{|\delta|} - 10.22 [k\Omega]$$

Connecting an external resistor between the TRIM pin and the Sense (-) pin decreases the output voltage set point.



$$R_{trimup} = \frac{(100 + \delta) \cdot V_o \cdot 5.11}{0.6125 \cdot \delta} - \frac{511}{\delta} - 10.22 [k\Omega]$$

Connecting an external resistor between the TRIM pin and the Sense (+) pin increases the output voltage set point.

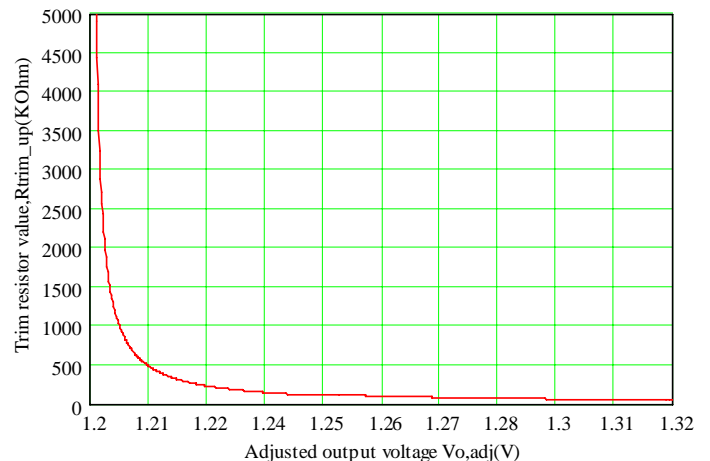
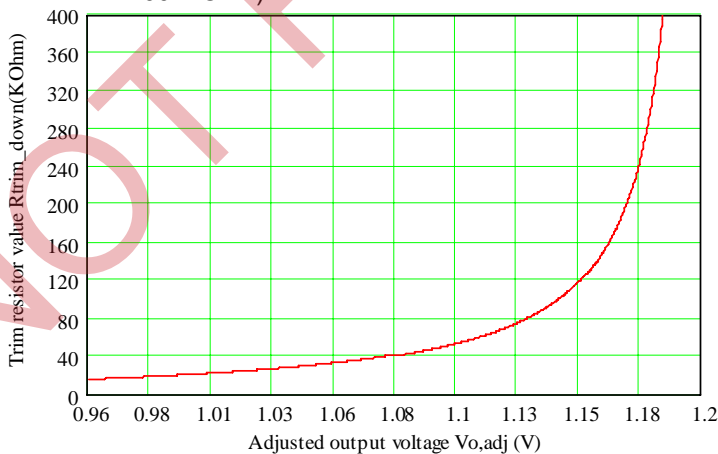


Note:

$$\delta = \frac{(V_o_{req} - V_o)}{V_o} \times 100 [\%]$$

V_o_{req} = Desired (trimmed) output voltage [V]
Output voltage $V_o = 1.2$ V

Remote sense minimizes the effects of distribution losses by regulating the voltage at the remote-sense connections. The voltage between the remote-sense pins and the output terminals must not exceed the output voltage sense range: $\leq 10\% \times V_{out}$. If not using the remote-sense feature to regulate the output voltage at the point of load, connect SENSE (+) to Vout and SENSE (-) to GND at the module. The tracks, that connect the sense pins to the load, must have a resistance \ll than 10 ohm (for example maximum 100 mOhm).



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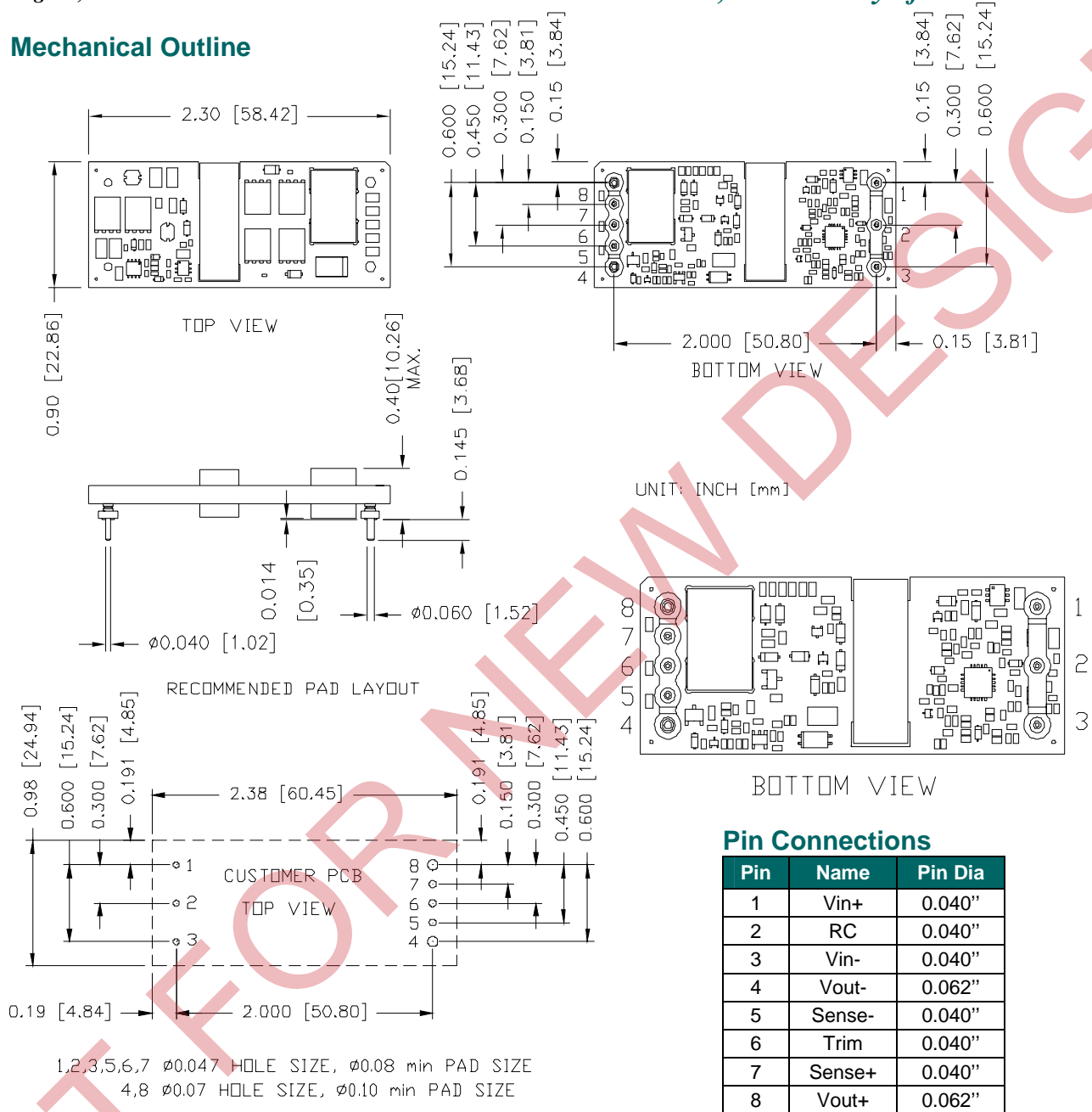
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Mechanical Outline



Note: This module is recommended and compatible with Pb-Free Wave Soldering and must be soldered using a peak solder temperature of no more than 260 °C for less than 5 seconds.

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. (x.x +/-0.5mm) x.xxx +/-0.010 in. (x.xx +/-0.25mm).

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Revision History

Date	Revision	Changes Detail	Approval
2008-04-21	PA	First release	HF Fan
2008-11-25	B	Update load regulation, output noise, OCP, turn on time, transient, TD, NR, TR, MD and trim down	HF Fan
2010-08-10	C	update TR, cover, TD, MD and No load input current	JZ Wang

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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