Using the PT3100/4100 Series 15-Watt Isolated DC-DC Converter

The PT3100/4100 Series of 15W Isolated DC-DC Converters from Power Trends are designed for Industrial, Telecom, Computer, Medical and other distributed power applications requiring input to output isolation. These high power density converters are capable of delivering a regulated 15 watts of output power at 5, 12, and 15 volts DC with a wide input voltage range. The overall dimensions of the regulator are 1.64" x 1.45" x 0.38" (H). The PT3100/4100 Series can deliver its full rated load over an operating ambient temperature range of -20° to +70°C or -40° to +85°C.

The key features of the PT3100/4100 Series are:

- Power Density of 15 Watts/In3
- 2:1 Input Voltage Range
- Operating Temperature Range of -20° to +70°C (PT3100) or -40° to +85°C (PT4100)
- Efficiency > 80% @ full load
- Excellent Line and Load Regulation
- Short Circuit Protection
- Over-Temperature Protection
- 500 VDC or 1500 VDC Isolation
- Laser Trim adjustments for Output Voltage, Switching Frequency, and Current Limit
- Fixed Switching Frequency
- Remote ON/OFF Control
- Planar Magnetics
- Complete Surface Mount Assembly
- MTBF > 1,000,000 Hours
- Fast Transient Response

In view of these key features, the PT3100/4100 Series can be used in all distributed power applications requiring input to output isolation. Also, its electrical isolation allows the input or output to be configured for either positive or negative DC voltages.

Input Source Requirements The PT3100/4100 Series Isolated DC-DC Converter can operate from a variable or semi-regulated DC source. The DC source should be capable of supplying the necessary peak and inrush current requirements (1A for 5 µsec) to operate. Although the PT3100/4100 Series has a .47µF capacitor as an input filter, "upstream" ripple, reflected ripple current, and conducted RFI can be reduced to a lower level by adding a small LC filter at the input terminals.

Ripple and Noise Typically, the PT3101A (48/5V) Converter produces output ripple/noise of 50 mV_{pp} at its maximum rated load. The output ripple/noise increases with increasing output load current. To reduce the amount of output ripple/noise, additional output capacitance may be added directly at the output terminals. However, care should be taken in the selection of a capacitor, because it may affect the stability of the Converter. Ceramic capacitors of 1µF to 4.7µF are the preferable choice.

Over-Temperature Protection When the internal junction temperature of the custom control IC in the Converter reaches 125°C, the PT3100/4100 Series will automatically shut down. It will automatically restart when the junction temperature cools below 115°C. In an extreme environment, where the ambient temperature is too high for the input voltage/output current operating point, the Converter will cycle on and off continuously at a frequency as high as 2 to 3 kHz.

Over Current Protection Two independent output current detection circuits protect the PT3100/4100 Series from any damage if the output is overloaded or shorted. Due to its current mode control and laser trimming of the current sense resistor, a precision current limit operating point is set. During an overload condition, the output voltage and duty cycle are reduced. When a short-circuit or very low impedance condition, such as a shorted capacitor, is present, the Converter operates at a very narrow duty cycle to limit its internal power dissipation. The Converter will automatically resume normal operation after the overload or short-circuit condition is removed.

Reliability The reliability of the PT3100/4100 Series is calculated to be 401 FIT using the parts count method from the Bellcore specification TR-NWT-000332.

Remote ON/OFF This feature allows the PT3100/4100 Series to turn off or start up with external control by using an external open collector NPN transistor or mechanical switch. The Converter turns off when the voltage at the remote on/off pin is 0.8V or less with respect to the negative input pin. The Converter operates normally when the remote on/off pin is left floating. The remote on/off pin can also be used to provide an input over-voltage or under-voltage lockout function. On/Off control inputs require a rise time of less than 10µsec.

PC Board Considerations The PT3100/4100 Series has an internal copper leadframe that provides excellent heat transfer to the leads of the Converter. By simply increasing the PC board copper area attached to the leads, a significant amount of heat will be conducted away, effectively using the PC board copper as a heatsink. For better thermal performance, it is recommended that the printed circuit board utilize 2 oz. copper traces.

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