

Triple Output TWR Models

Miniature, 18-72V Input Range
12-15 Watt, DC/DC Converters

Features

- Output voltages: +5V/±12V or +5V/±15V
- Ultra-wide, 18-72V, input voltage ranges
- Miniature, 2" x 2" x 0.45" packages
- Guaranteed efficiencies to 80%
- Fully isolated (750Vdc minimum)
- -25 to +105°C operating temperature
- Input/output protected
- Shielded (5-side) metal cases with insulated baseplates
- UL 1950, CSA 22.2 No. 234 and IEC 950
- EMI/EMC characterization data
- Modifications and customs available

Featuring DATEL's ultra-wide, 18-72V, input voltage range, these TWR Model triple-output DC/DC converters were specifically designed for automotive, process-control, airborne, computer and telecommunications applications with distributed power systems running 24/28/36/48/60 Volt intermediate power buses. One of these fully isolated, miniature power converters can satisfy all your power needs in a local mixed analog/digital system partition.

Each model offers a +5V primary output (with output current as high as 1.8A) and either ±12V or ±15V auxiliary outputs (with currents as high as ±250mA). Line regulation is an impressive ±1% max. (primary output) and ±5% max. (auxiliary outputs) over the full 4:1 input voltage range.

These low-cost, high-density, switching DC/DC's derive their outstanding price/performance ratios from their highly efficient, high-frequency, current-mode, circuit topologies; their contemporary, highly reliable, SMT-on-ceramic construction techniques; and their new, thermally conductive potting compound.

Each of these full featured triples has non-latching output current limiting, input reverse-polarity protection, and output overvoltage clamping to protect both the power converter and its load. All models are fully isolated (750Vdc minimum) and have 5-sided shielding with non-conductive headers on the bottom of their package permitting pc-card runs to pass beneath the package.

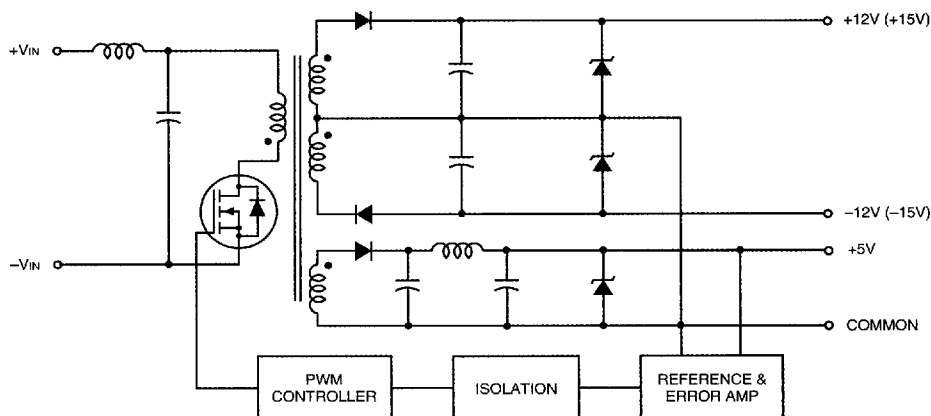


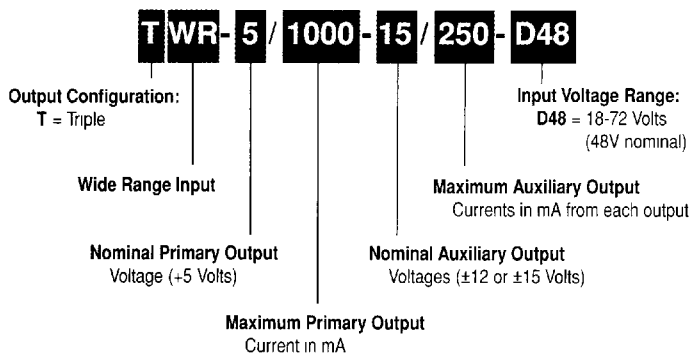
Figure 1. Simplified Schematic

Performance Specifications and Ordering Guide ①

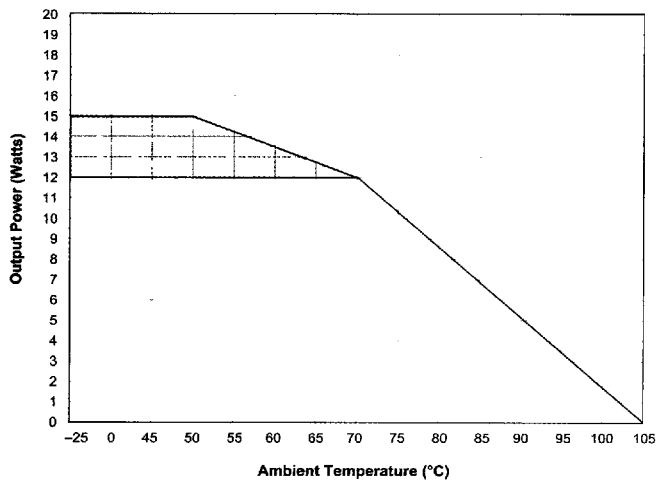
| Model | Output | | | | | Input | | | Efficiency (Min.) | Package (Case, Pinout) |
|-----------------------|--------------------------|-----------------------------|------------------------------|-------------------|--------|------------------------------|---------------|------------------------------|-------------------|------------------------|
| | V _{OUT} (Volts) | I _{OUT} (mA, Max.) | Ripple/Noise ② (mVp-p, Max.) | Regulation (Max.) | | V _{IN} Nom. (Volts) | Range (Volts) | I _{IN} ④ (mA, max.) | | |
| | | | | Line | Load ③ | | | | | |
| TWR-5/1200-12/250-D48 | +5 | 1200 | 75 | ±1.0% | ±2.0% | 48 | 18-72 | 50/340 | 76% | C4, P8 |
| | ±12 | ±250 | 175 | ±5.0% | ±5.0% | | | | | |
| TWR-5/1500-12/250-D48 | +5 | 1500 | 75 | ±1.0% | ±2.0% | 48 | 18-72 | 50/360 | 76% | C4, P8 |
| | ±12 | ±250 | 175 | ±5.0% | ±5.0% | | | | | |
| TWR-5/1800-12/200-D48 | +5 | 1800 | 75 | ±1.0% | ±2.0% | 48 | 18-72 | 50/400 | 80% | C4, P8 |
| | ±12 | ±200 | 175 | ±5.0% | ±5.0% | | | | | |
| TWR-5/1000-15/250-D48 | +5 | 1000 | 75 | ±1.0% | ±2.0% | 48 | 18-72 | 50/350 | 79% | C4, P8 |
| | ±15 | ±250 | 175 | ±5.0% | ±5.0% | | | | | |
| TWR-5/1500-15/250-D48 | +5 | 1500 | 75 | ±1.0% | ±2.0% | 48 | 18-72 | 50/410 | 79% | C4, P8 |
| | ±15 | ±250 | 175 | ±5.0% | ±5.0% | | | | | |
| TWR-5/1800-15/150-D48 | +5 | 1800 | 75 | ±1.0% | ±2.0% | 48 | 18-72 | 50/400 | 80% | C4, P8 |
| | ±15 | ±150 | 175 | ±5.0% | ±5.0% | | | | | |

① Typical @ T_A = +25°C under nominal line voltage and full load conditions unless otherwise noted ② 20MHz bandwidth
 ③ For the +5V output, listed spec applies over the 10% to 100% load range For the ±12V and ±15V outputs listed spec applies for balanced loads over the 20% to 100% load range For improved load regulation on the auxiliary outputs, DATEL can add linear regulators to each output Contact us for details
 ④ Nominal line voltage, no load/full load conditions

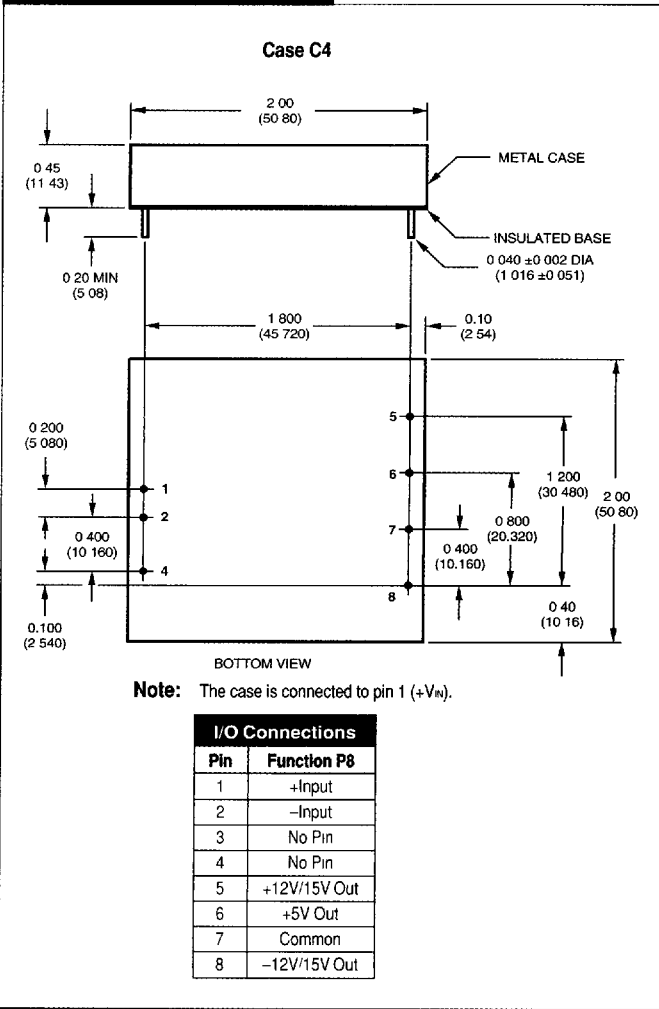
Part Number Structure



Temperature Derating



Mechanical Specifications



Performance/Functional Specifications

Typical @ $T_A = +25^\circ\text{C}$ under nominal line voltage and full load conditions unless noted ①

| Input | |
|--|--|
| Input Voltage Range | 18-72 Volts (48V nominal) |
| Input Current | See Ordering Guide |
| Input Filter Type ② | Inductive |
| Reverse-Polarity Protection | Yes (Instantaneous, 6A maximum) |
| Output | |
| V_{OUT} Accuracy (50% loads): | |
| +5V Output | $\pm 1\%$ |
| $\pm 12\text{V}$ or $\pm 15\text{V}$ Outputs | $\pm 3\%$ |
| Temperature Coefficient | $\pm 0.02\%$ per $^\circ\text{C}$ |
| Ripple/Noise (20MHz BW) ② | See Ordering Guide |
| Line/Load Regulation | See Ordering Guide |
| Efficiency | See Ordering Guide |
| Isolation Voltage ③ | 750Vdc, minimum |
| Isolation Capacitance | 680pF |
| Current Limiting | Auto-recovery |
| Overvoltage Protection | Clamp, 2W transorb |
| Dynamic Characteristics | |
| Transient Response (50% load step) | 200 μsec max. to $\pm 2\%$ of final value |
| Switching Frequency | 165kHz ($\pm 15\text{kHz}$) |
| Environmental | |
| Operating Temperature (ambient): ④ | |
| Without Derating | -25 to $+50$ - 70°C (Model dependent) |
| With Derating | to $+105^\circ\text{C}$ (See Derating Curve) |
| Storage Temperature | -55 to $+125^\circ\text{C}$ |
| Physical | |
| Dimensions | 2" x 2" x 0.45" (51 x 51 x 11.4mm) |
| Shielding | 5-sided ⑤ |
| Case Connection | Pin 1 (+VIN) |
| Case Material | Corrosion resistant steel with epoxy-based enamel finish |
| Pin Material | Brass, solder coated |
| Weight | 2.6 ounces (74 grams) |

① These power converters require a minimum 10% loading on their primary output and a minimum 20% loading on their auxiliary outputs to maintain specified regulation. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.

② Application-specific internal input/output filtering can be added on request. Contact DATEL for details.

③ Devices can be screened for higher guaranteed isolation voltages. Contact DATEL for details.

④ Devices can be screened for -40°C operation. Contact DATEL for details.

⑤ Cases can be provided with 6-sided shielding. Contact DATEL for details.

Absolute Maximum Ratings

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied. Storage temperatures have been verified for 168 hours.

| | |
|--------------------------------------|---|
| Input Voltage | 76 Volts |
| Input Reverse-Polarity Protection | Current must be $< 6\text{A}$. Brief duration only. Fusing recommended. |
| Output Overvoltage Protection: | |
| +5V Output | 6.8 Volts, limited duration |
| $\pm 12\text{V}$ Outputs | ± 13 Volts, limited duration |
| $\pm 15\text{V}$ Outputs | ± 16 Volts, limited duration |
| Output Current | Current limited. Max. current and short-circuit duration model dependent. |
| Storage Temperature | -55 to $+125^\circ\text{C}$ |
| Lead Temperature (soldering, 10sec.) | $+300^\circ\text{C}$ |

Technical Notes

Filtering and Noise Reduction

All TWR 12-15 Watt DC/DC Converters achieve their rated ripple and noise specifications without the use of external input/output capacitors. In critical applications, input/output ripple and noise may be further reduced by installing electrolytic capacitors across the input terminals and/or low-ESR tantalum or electrolytic capacitors across the output terminals. Output capacitors should be connected between their respective output pin (pin 5, 6 or 8) and Common (pin 7) as shown in Figure 2. The caps should be located as close to the power converters as possible. Typical values are listed below. In most applications, using values greater than those listed will yield better results.

To Reduce Input Ripple 10 μF , 100V

To Reduce Output Ripple

+5V Output 47 μF , 10V, Low ESR

$\pm 12/15\text{V}$ Outputs 22 μF , 20V, Low ESR

In critical, space-sensitive applications, DATEL can easily tailor the internal input/output filtering of these devices to meet your specific requirements. Please contact us for additional details.

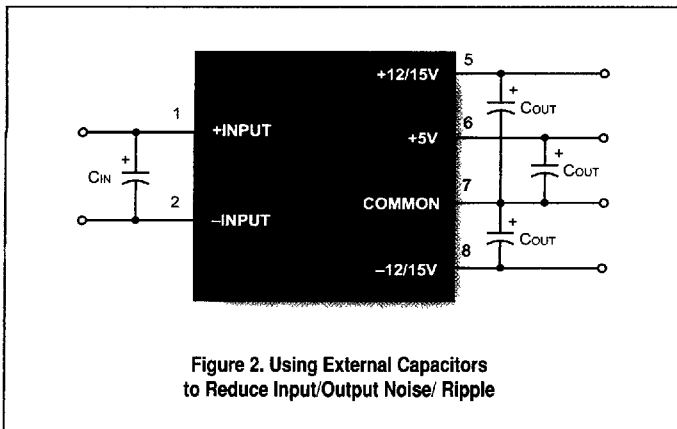


Figure 2. Using External Capacitors to Reduce Input/Output Noise/ Ripple

Input Fusing

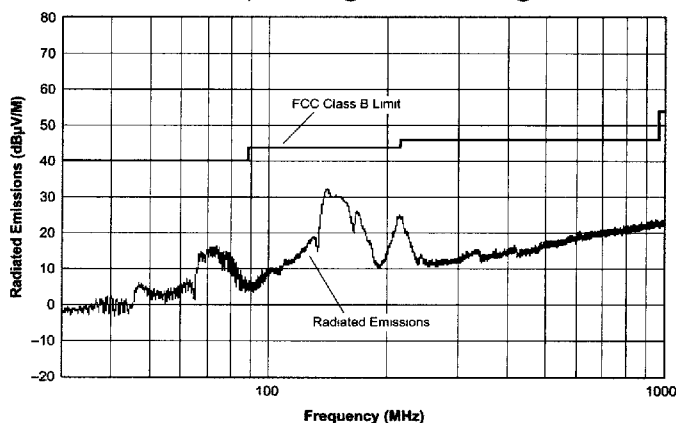
Certain applications and/or safety agencies may require the installation of fuses at the inputs of power conversion components. For DATEL TWR 12-15 Watt DC/DC Converters, you should use slow-blow type fuses with values no greater than 2A.

EMI Radiated Emissions

If you're designing with EMC in mind, please note that all of DATEL's TWR 12-15 Watt DC/DC Converters have been characterized for radiated and conducted emissions in our new EMI/EMC laboratory. Testing is conducted in an EMCO 5305 GTEM test cell utilizing EMCO automated EMC test software. Radiated emissions are tested to the limits of FCC Part 15, Class B and CISPR 22 (EN 55022), Class B. Correlation to other specifications can be supplied upon request. Radiated emissions plots to FCC and CISPR 22 for model TWR-5/1000-15/250-D48 appear below. Published EMC test reports are available for each model number. Contact DATEL's Applications Engineering Department for more details.

TWR-5/1000-15/250-D48 Radiated Emissions

FCC Part 15 Class B, 3 Meters
 Converter Output = +5Vdc @ 800mA and ±15Vdc @ 200mA



TWR-5/1000-15/250-D48 Radiated Emissions

EN 55022 Class B, 10 Meters
 Converter Output = +5Vdc @ 800mA and ±15Vdc @ 200mA

