XWR SERIES

DATEL
INNOVATION and EXCELLENCE

Triple Output
TWR Models
High-Density, 2" x 1"
8-11 Watt, DC/DC Converters

Features

- The smallest, full featured triples
- Output voltages: +5V/±12V or +5V/±15V
- Input voltages: 4.7-7V or 9-18V
- Miniature, 2" x 1" x 0.375" packages
- Thermally efficient, SMT-on-ceramic construction
- Guaranteed efficiencies to 79%
- Power densities to 14.7W/in³
- Fully isolated (750Vdc minimum)
- –25 to +100°C operating temperature
- Shielded (5-side) metal cases with insulated baseplates
- UL 1950, CSA 22.2 No. 234 and IEC 950
- Modifications and customs available

These miniature (2" x 1"), fully isolated (750Vdc guaranteed), high-density (to 14.7W/in³), triple-output DC/DC converters were designed for use in distributed power systems running 4.7V to 18V intermediate power buses. Their impressively small size derives from their thermally efficient, SMT-on-ceramic assembly technique and their high-efficiency (to 79% minimum) circuit architecture. They are excellent choices for powering mixed-signal, analog/digital partitions in either predominantly digital systems (with 5V supplies) or battery-powered applications (with 9-18V supplies).

For applications driven from 9-36V or 18-72V supply lines, see DATEL's TWR Model 11 to 30 Watt DC/DC's described in companion data sheets.

Each of these fully line and load-regulated triples offers a +5V primary output (with output current as high as 1A) and either ±12V or ±15V auxiliary outputs (with currents as high as ±200mA).

Each 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 have 5-sided shielding with non-conductive headers on the bottom of their package permitting pc-card runs to pass beneath the package.

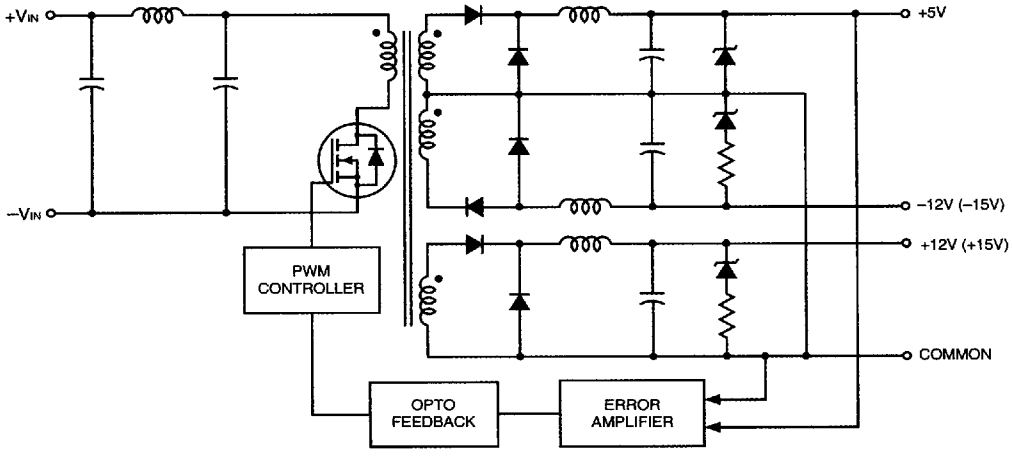


Figure 1. Simplified Schematic

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.) Line	Regulation (Max.) Load ③	V_{IN} Nom. (Volts)	Range (Volts)	I_{IN} ④ (mA, Max.)		
TWR-5/1000-12/125-D5	+5	1000	75	±1.0%	±2.0%	5	4.7-7	100/2400	72%	C3, P5
	±12	±125	150	±5.0%	±5.0%					
TWR-5/1000-12/210-D12	+5	1000	75	±1.0%	±2.0%	12	9-18	35/1050	79%	C3, P5
	±12	±210	150	±5.0%	±5.0%					
TWR-5/800-15/150-D5	+5	800	75	±1.0%	±2.0%	5	4.7-7	100/2400	73%	C3, P5
	±15	±150	150	±5.0%	±5.0%					
TWR-5/1000-15/200-D12	+5	1000	75	±1.0%	±2.0%	12	9-18	50/1200	79%	C3, P5
	±15	±200	150	±5.0%	±5.0%					

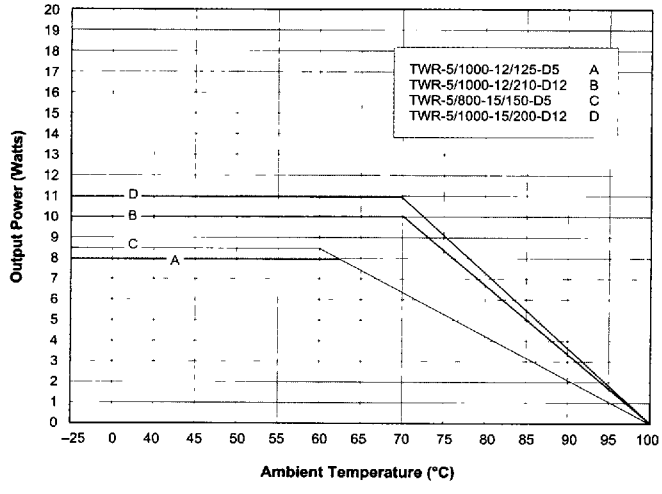
① Typical @ T_A = +25°C under nominal line voltage and full load conditions unless otherwise noted.
② 20MHz bandwidth. ±12/15V outputs are specified with 10µF, 25V output capacitors.
③ 5V output, 10% to 100% load ±12/15V outputs, balanced loads, 20% to 100% load
④ Nominal line voltage, no load/full load conditions

Part Number Structure

TWR-5/1000-15/200-D12

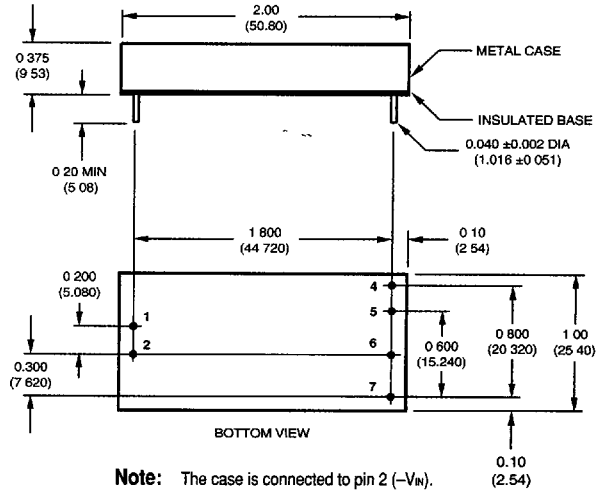
- **Output Configuration:** T = Triple
- **Wide Range Input**
- **Nominal Primary Output** Voltage (+5 Volts)
- **Maximum Primary Output** Current in mA
- **Nominal Auxiliary Output** Voltages (±12 or ±15 Volts)
- **Maximum Auxiliary Output** Currents in mA from each output
- **Input Voltage Range:** D5 = 4.7-7 Volts (5V nominal); D12 = 9-18 Volts (12V nominal)

Temperature Derating



Mechanical Specifications

Case C3



Note: The case is connected to pin 2 ($-V_{IN}$).

I/O Connections	
Pin	Function P5
1	+Input
2	–Input
3	No Pin
4	+12V/15V Out
5	–12V/15V Out
6	Common
7	+5V Out

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Performance/Functional Specifications

Typical @ T_A = +25°C under nominal line voltage and full load conditions unless noted ①

Input	
Input Voltage Ranges:	
"D5" Models	4.7-7 Volts (5V nominal)
"D12" Models	9-18 Volts (12V nominal)
Input Current	See Ordering Guide
Input Filter Type ②	Pi
Reverse-Polarity Protection	Yes (Instantaneous, 6A maximum)
Output	
V_{OUT} **Accuracy** (50% loads):	
+5V Output	±0.5%
±12V or ±15V Outputs	±3%
Temperature Coefficient	±0.02% per °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	300pF
Current Limiting	Auto-recovery
Overvoltage Protection	Clamp, 2W transorb
Dynamic Characteristics	
Transient Response (50% load step)	200µsec max. to ±2% of final value
Switching Frequency	175kHz
Environmental	
Operating Temperature (ambient): ④	
Without Derating	–25 to +60/70°C (model dependent)
With Derating	to +100°C (See Derating Curve)
Storage Temperature	–55 to +125°C
Physical	
Dimensions	2" x 1" x 0.375" (51 x 25 x 9.5mm)
Shielding	5-sided ⑤
Case Connection	Pin 2 ($-V_{IN}$)
Case Material	Corrosion resistant steel with epoxy-based enamel finish
Pin Material	Brass, solder coated
Weight	1.3 ounces (37 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:	
"D5" Models	10Volts
"D12" Models	20 Volts
Input Reverse-Polarity Protection	Current must be <6A. Brief duration only. Fusing recommended.
Output Overvoltage Protection:	
+5V Output	6.8 Volts, limited duration
±12V Outputs	±13 Volts, limited duration
±15V Outputs	±16 Volts, limited duration
Output Current	Current limited. Max. current and short-circuit duration model dependent.
Storage Temperature	–55 to +125°C
Lead Temperature (soldering, 10sec.)	+300°C

Technical Notes

Filtering and Noise Reduction

All TWR 8-11 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 4, 5 or 7) and Common (pin 6) 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

"D5" Models	47µF, 10V
"D12" Models	10µF, 25V

To Reduce Output Ripple

+5V Output	47µF, 10V, Low ESR
±12/15V Outputs	22µF, 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.

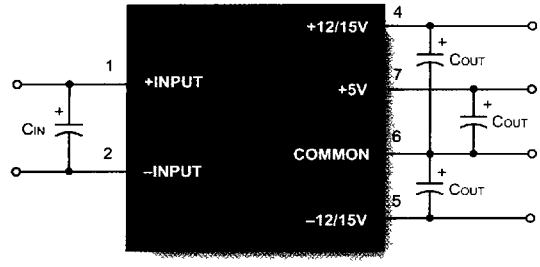


Figure 2. Using External Capacitors to Reduce Input/Output Noise/Ripple

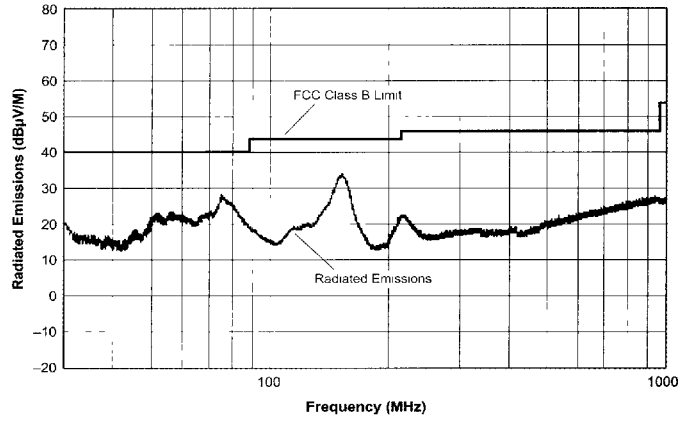
Input Fusing

Certain applications and/or safety agencies may require the installation of fuses at the inputs of power conversion components. For DATEL TWR 8-11 Watt DC/DC Converters, you should use slow-blow type fuses with values no greater than 3A.

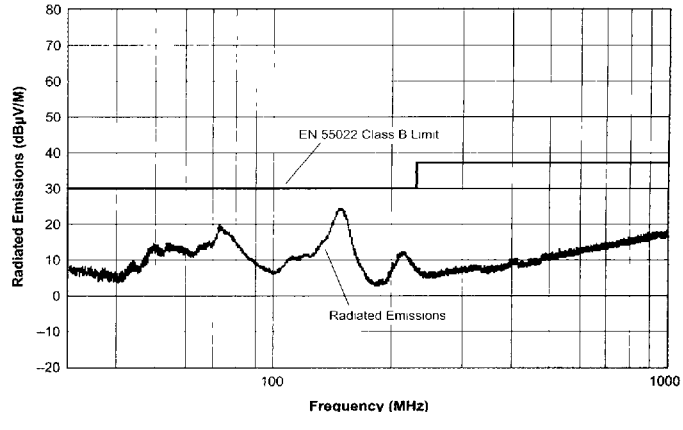
EMI Radiated Emissions

If you're designing with EMC in mind, please note that all of DATEL's TWR 8-11 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-5/1000-15/200-D12 appear below. Published EMC test reports are available for each model number. Contact DATEL's Applications Engineering Department for more details.

TWR-5/1000-15/200-D12 Radiated Emissions
FCC Part 15 Class B, 3 Meters
Converter Output = +5Vdc @ 800mA and ±15Vdc @ ±160mA



TWR-5/1000-15/200-D12 Radiated Emissions
EN 55022 Class B, 10 Meters
Converter Output = +5Vdc @ 800mA, ±15Vdc @ ±160mA



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