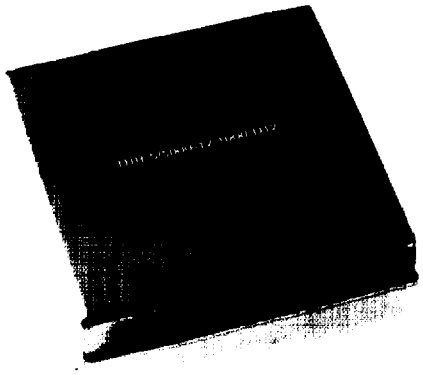
XHR SERIES

DATEL
INNOVATION and EXCELLENCE



Triple Output
THR Models
Ruggedized, Power-Sharing 30 Watt, DC/DC Converters

Preliminary

Features

- Full 30 Watts output power
- Power is user-allocated among outputs
- Output voltages: +5V/±12V or +5V/±15V
- Ultra-wide input voltage ranges: 9-36V or 18-72V
- Ruggedized design, all metal-ceramic construction
- Low junction-to-baseplate thermal resistance
- Solder sealed, no potting compounds
- Industry-standard pinouts
- Fully isolated (1500Vdc min.) and I/O protected
- Guaranteed efficiencies to 81%
- External V_{OUT} trim, remote on/off control
- Modifications and customs for OEM's

The triple-output (THR) models of DATEL's new XHR Series of ruggedized, wide-input-range DC/DC converters each offer a +5V primary and either ±12V or ±15V auxiliary outputs. "D12" and "D48" models achieve fully specified performance over input voltage ranges of 9-36V and 18-72V, respectively.

Employing DATEL's unique "power-sharing" architecture, THR Model triples provide a full 30 Watts output power under a variety of output-current conditions. The primary +5V output sources current up to 5 Amps (primary power = 25W); while the auxiliary ±12/15V outputs provide currents up to ±1 Amp (auxiliary power = 24/30W). Devices can supply any combination of primary plus auxiliary power not exceeding 30W. This unique feature permits designers to select a single device to fulfill a number of different requirements.

Each of these triples has input overvoltage shutdown and reverse-polarity protection, as well as non-latching output current limiting and output overvoltage clamping to protect both the power converter and its load. All models are fully isolated (1500Vdc minimum) in 3" x 3" x 0.5" packages with standard pinouts.

The THR Models' all metal-ceramic construction technique eliminates the need for thermally-conductive potting compounds. All electrical components are surface-mount soldered to a 60 mil (0.06"/1.52mm) ceramic baseplate for low junction-to-case thermal resistance. Package pins are soldered through the baseplate via pre-cut holes. The tin plated, steel cover is soldered to the baseplate creating a level of hermiticity not available in other commercial power modules. The bottom of the baseplate has a conductive layer that provides 6-sided shielding. It is also insulated so pc-card runs can pass beneath the package.

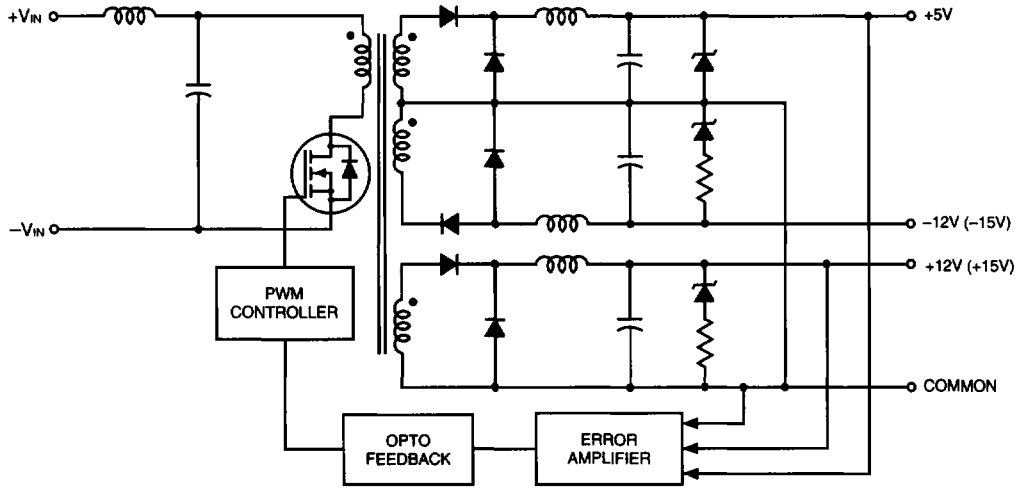


Figure 1. Simplified Schematic

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.)		
THR-5/5000-12/1000-D12	+5	5000	75	±1.0%	±1.5%	24	9-36	75/1719	80%	C9, P14
	±12	±1000	120	±8.0%	±8.0%					
THR-5/5000-12/1000-D48	+5	5000	75	±1.0%	±1.5%	48	18-72	25/849	81%	C9, P14
	±12	±1000	120	±8.0%	±8.0%					
THR-5/5000-15/1000-D12	+5	5000	75	±1.0%	±1.5%	24	9-36	75/1719	80%	C9, P14
	±15	±1000	120	±8.0%	±8.0%					
THR-5/5000-15/1000-D48	+5	5000	75	±1.0%	±1.5%	48	18-72	25/849	81%	C9, P14
	±15	±1000	120	±8.0%	±8.0%					

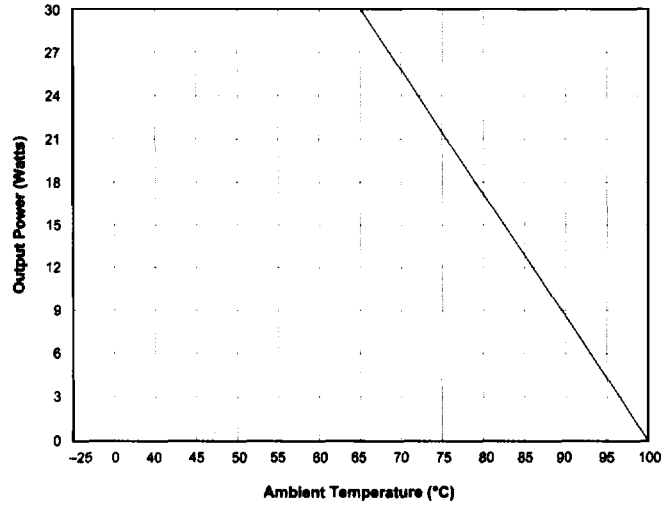
① Typical @ T_A = +25°C under nominal line voltage and "full load" conditions unless otherwise noted. For testing and specification purposes, "full load" is defined as 3.6A on the primary +5V output and ±500/400mA on the auxiliary ±12/15V outputs. This corresponds to a total output power of 30W.
② 20MHz bandwidth.
③ For the +5V output, listed spec applies over the 10% to 100% load range. For the ±12/15V outputs, listed spec applies for balanced loads over the 20% to 100% load range.
④ Nominal line voltage, no load/full load conditions.

Part Number Structure

T HR - 5 / 5000 - 15 / 1000 - D48

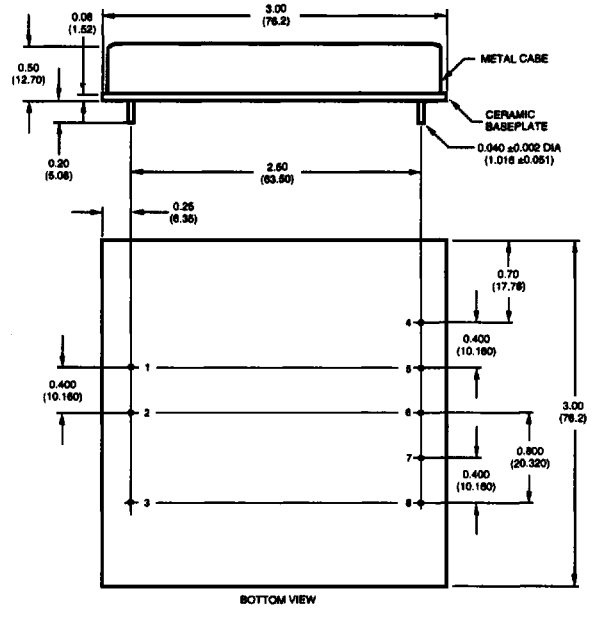
- **Output Configuration:** T = Triple
- **Metal-Ceramic Construction Wide Range Input**
- **Nominal Primary Output** Voltage (+5 Volts)
- **Maximum Primary Output** Current in mA
- **Nominal Auxiliary Output** Voltages (±12 or ±15 Volts)
- **Maximum Auxiliary Output** Currents in mA from each output
- **Input Voltage Range:** D12 = 9-36 Volts (24V nominal); D48 = 18-72 Volts (48V nominal)

Temperature Derating



Mechanical Specifications

Case C9



I/O Connections	
Pin	Function P14
1	-Input
2	+Input
3	Control
4	-12V/15V Out
5	+12V/15V Out
6	Common
7	+5V Out
8	Trim

Notes:

For "D12" models, the case is connected to pin 1 ($-V_{IN}$).

For "D48" models, the case is connected to pin 2 ($+V_{IN}$).

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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 Range:	
"D12" Models	9-36 Volts (24V nominal)
"D48" Models	18-72 Volts (48V nominal)
Input Current	See Ordering Guide
Input Filter Type ②	Inductive
Overvoltage Shutdown:	
"D12 Models"	40 Volts
"D48 Models"	75 Volts
Reverse-Polarity Protection	Yes (Instantaneous, 10A maximum)
On/Off (Sync.) Control (Pin 3) ③	TTL high = off, low (or open) = on
Output	
V_{OUT} Accuracy:	
+5V Output	±1%
±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	1500Vdc, minimum
Isolation Capacitance	500pF
Current Limiting	Auto-recovery
Overvoltage Protection	Clamp, 2W transorb
Dynamic Characteristics	
Transient Response (50% load step)	300µsec max. to ±3% of final value
Switching Frequency	165kHz (±15kHz)
Environmental	
Operating Temperature (ambient):	
Without Derating	–25 to +65°C
With Derating	to +100°C (See Derating Curve)
Storage Temperature	–55 to +125°C
Physical	
Dimensions	3" x 3" x 0.5" (76 x 76 x 12.7mm)
Shielding	6-sided
Case Connection:	
"D12" Models	Pin 1 ($-V_{IN}$)
"D48" Models	Pin 2 ($+V_{IN}$)
Case Material	Tin plated steel cover Ceramic (0.06"/1.52 mm) baseplate
Pin Material	Brass, solder coated
Weight	3 ounces (85 grams)

① These 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. For testing and specification purposes, "full load" is defined as 3.6A on the primary +5V output and ±500/400mA on the auxiliary ±12/15V outputs. This corresponds to a total output power of 30W.

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

③ Applying a voltage to the Control pin when no input power is applied to the converter can cause permanent damage to the converter.

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:	
"D12" Models	44 Volts
"D48" Models	80 Volts
Input Reverse-Polarity Protection	Current must be <10A. Brief duration only. Fusing recommended.
Output Overvoltage Protection:	
+5V Output	6.8 Volts, limited duration
±12V Outputs	±15 Volts, limited duration
±15V Outputs	±18 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 THR 30 Watt DC/DC Converters achieve their rated ripple and noise specifications without the use of external input/output capacitors. In critical applications, input/output noise may be further reduced by installing electrolytic capacitors across the input and/or low-ESR, tantalum or electrolytic capacitors across the output terminals 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

"D12" Models	20µF, 50V, Electrolytic
"D48" Models	10µF, 100V, Electrolytic

To Reduce Output Ripple

+5V Output	47µF, 10V, Low ESR
±12/15V Outputs	33µF, 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. Contact us for additional details.

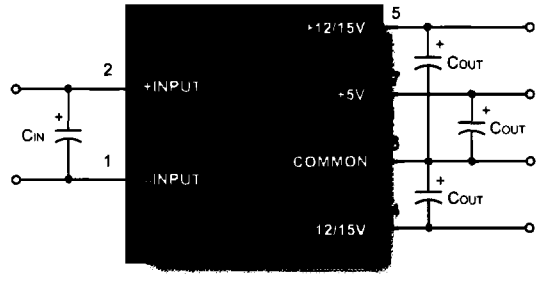

Figure 2. Using External Capacitors to Reduce Input/Output Noise/ Ripple

Input Fusing

Certain applications and/or safety agencies may require the installation of fuses at the inputs of power conversion components. For DATEL THR 30 Watt DC/DC Converters, you should use slow-blow type fuses with values no greater than 4A for "D12" models and 2A for "D48" models.

On/Off Control

The On/Off Control pin (pin 3) may be used for remote on/off operation. A TTL logic high (+2 to +5 Volts, 250µA max.) applied to pin 4 disables the converter. A TTL logic low (0 to +0.8 Volts, 70µA max.), or no connection, enables the converter. Control voltages should be referenced to pin 1 (–Input). Applying a voltage to the Control pin when no input power is applied to the converter can cause permanent damage to the converter.

Synchronization

In certain applications employing multiple THR converters and also demanding minimal noise levels, some improvements may be had by synchronizing the switching of the various converters. The synchronizing clock should be applied to pin 3 (Control) of each device. It should be a square wave with a maximum 1µsec "high" duration and an amplitude between +2V and +5V (see On/Off Control) referenced to pin 1 (–Input). The frequency of the synchronizing clock should be higher than that of any individual converter. Therefore, it should be 185kHz ±5kHz.

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