

UER MODELS

Single Output Low-Cost, Wide-Input-Range 12-15 Watt, DC/DC Converters

DATEL's UER Model single-output switching DC/DC converters were designed for cost-sensitive, moderate-power (12-15 Watts) applications requiring a reliable, off-the-shelf solution but not demanding all the high-performance characteristics of DATEL's A-Series UWR Model converters. Offering slightly wider electrical tolerances and slightly lower power densities (8.33W/in³), UER devices achieve their low cost through the use of plastic packaging (UL94V-0 rated material) and the exploitation of traditional, yet highly automated, SMT-on-pcb construction techniques. The result is a contemporary power converter whose cost/performance/reliability ratio far exceeds the competition.

UER Model DC/DC converters offer the ultra-wide, 9-to-36V and 18-to-72V, input voltage ranges that have come to be associated with DATEL power converters. Output voltages are 3.3V, 5V, 12V or 15V. Line and load regulation are both guaranteed not to exceed $\pm 1\%$. All models incorporate internal input/output filtering and require no external components for normal operation. All units guarantee output ripple/noise less than 100mVp-p.

These fully isolated (750Vdc guaranteed) devices are input overvoltage and reverse-polarity protected and employ output current limiting to protect both the power converter and its load. They offer V_{OUT} trim and remote on/off control capabilities. They function well in harsh environments and are popular for both commercial and industrial usage in computer, telecom, aerospace and process-control applications.

The industry-standard, 2" x 2", package size and pinout of the UER Models makes them ideal replacements for other, more costly, less reliable power converters. They are equally well suited for new design-ins in systems demanding both low cost and high reliability.

Features

- Low cost
- Rugged, fully potted, diallyl phthalate plastic packages
- Industry-standard form factor (2" x 2") and pinout
- 3.3, 5, 12 or 15 Volt outputs
- Wide input voltage ranges: 9-36V or 18-72V
- No external components required
- Guaranteed efficiencies to 82%
- Fully isolated (750Vdc guaranteed) and I/O protected
- V_{OUT} trim and on/off control
- UL, CSA, IEC safety approvals
- Modifications and customs for OEM's

Single Output

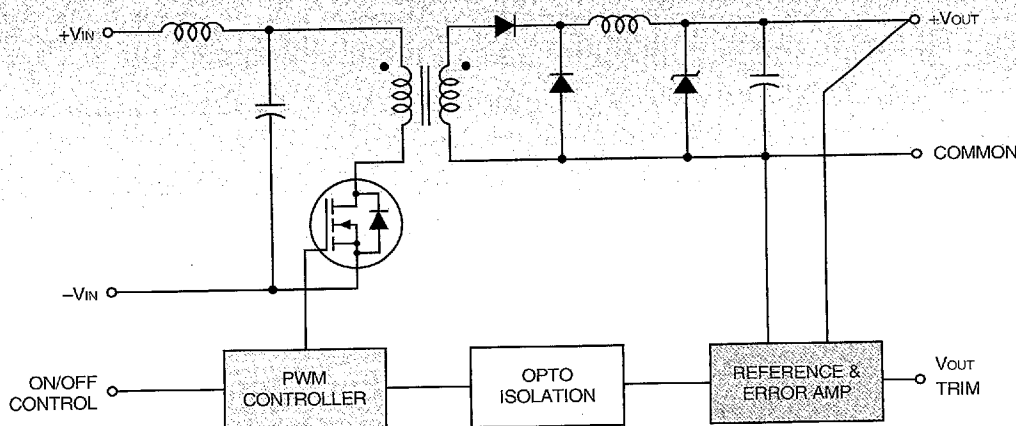


Figure 1. Simplified Schematic

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 Load ③	V _{IN} Nom. (Volts)	Range (Volts)	I _{IN} ④ (mA, Max.)		
UER-3.3/3650-D12	3.3	3650	75	±1.0% ±1.0%	24	9-36	45/672	77%	C4, P6
UER-3.3/3650-D48	3.3	3650	75	±1.0% ±1.0%	48	18-72	25/336	77%	C4, P6
UER-5/3000-D12	5	3000	100	±1.0% ±1.0%	24	9-36	45/789	80%	C4, P6
UER-5/3000-D48	5	3000	100	±1.0% ±1.0%	48	18-72	25/395	80%	C4, P6
UER-12/1250-D12	12	1250	100	±1.0% ±1.0%	24	9-36	45/770	82%	C4, P6
UER-12/1250-D48	12	1250	100	±1.0% ±1.0%	48	18-72	25/385	82%	C4, P6
UER-15/1000-D12	15	1000	100	±1.0% ±1.0%	24	9-36	45/770	82%	C4, P6
UER-15/1000-D48	15	1000	100	±1.0% ±1.0%	48	18-72	25/385	82%	C4, P6

① Typical at T_A = +25°C under nominal line voltage and full-load conditions, unless otherwise noted.

② Ripple/Noise (R/N) measured over a 20MHz bandwidth.

③ For 3.3V and 5V outputs, listed specifications apply over the 10% to 100% load range. For 12V and 15V outputs, 20% to 100% load range.

④ Nominal line voltage, no-load/full-load conditions.

Single Output

PART NUMBER STRUCTURE

U ER - 5 / 3000 - D48

Output Configuration:
U = Unipolar

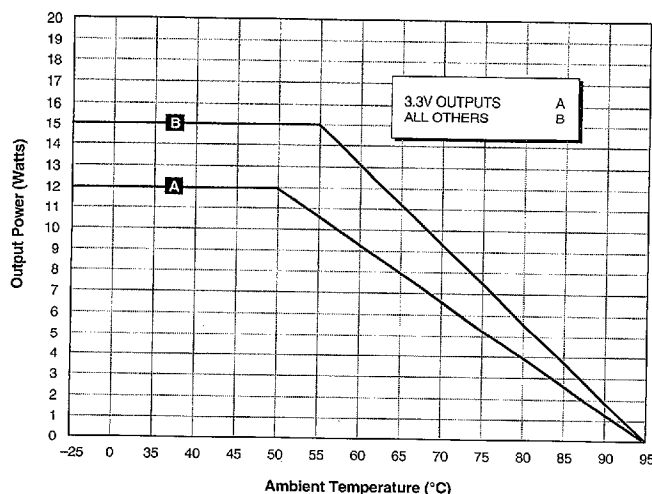
Low-Cost, Economy Package
Wide Range Input

Nominal Output Voltage:
3.3, 5, 12 or 15 Volts

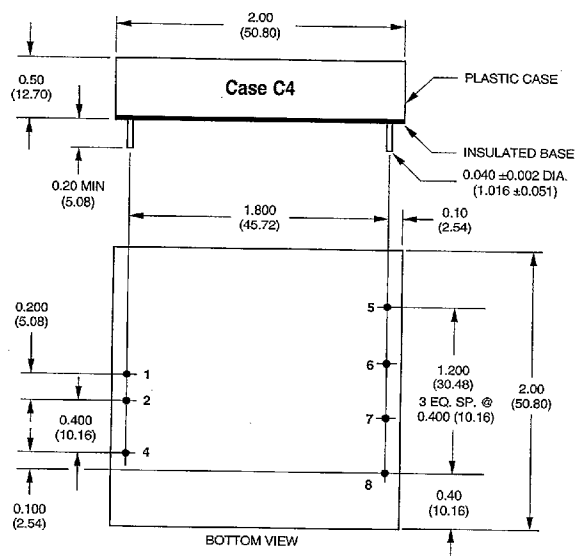
Input Voltage Range:
D12 = 9-36 Volts (24V nominal)
D48 = 18-72 Volts (48V nominal)

Maximum Output Current
in mA

TEMPERATURE DERATING



MECHANICAL SPECIFICATIONS



I/O Connections

Pin	Function P6
1	+Input
2	-Input
3	No Pin
4	On/Off Control
5	No Pin
6	+Output
7	Common
8	Trim

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	LC
Overvoltage Shutdown:	
"D12 Models"	40 Volts
"D48 Models"	80 Volts
Reverse-Polarity Protection	Yes (Instantaneous, 10A maximum)
On/Off (Sync) Control (Pin 4) ③	TTL high = off, low (or open) = on
OUTPUT	
V_{out} Accuracy (50% load)	±1%, maximum
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 ④	750Vdc, minimum
Isolation Capacitance	550pF
Short-Circuit Protection	Continuous, auto-recovery
Overvoltage Protection	Zener/transorb clamp, magnetic feedback
DYNAMIC CHARACTERISTICS	
Transient Response (50% load step)	200µsec max. to ±1.5% of final value
Switching Frequency	160kHz
ENVIRONMENTAL	
Operating Temperature (ambient): ⑤	
Without Derating	-25 to +50/55°C (Model dependent)
With Derating	to +95°C (See Derating Curves)
Storage Temperature	-40 to +100°C
PHYSICAL	
Dimensions	2" x 2" x 0.50" (51 x 51 x 12.7mm)
Shielding	None
Case Connection	None
Case Material	Diallyl phthalate, UL94V-0 rated
Pin Material	Brass, solder coated
Weight	2.7 ounces (75.6 grams)

① 3.3/5V devices require a minimum 10% loading and 12/15V devices require a minimum 20% loading 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 input/output filtering can be recommended and perhaps added internally upon request. Contact DATEL Applications Engineering for details.

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

④ Devices can be screened or modified for higher guaranteed isolation voltages. Contact DATEL Applications Engineering for details.

⑤ Devices can be warranted or screened for -40°C operation. Contact DATEL Applications Engineering for details.

ABSOLUTE MAXIMUM RATINGS

Input Voltage:	
"D12" Models	44 Volts
"D48" Models	88 Volts
Input Reverse-Polarity Protection	Current must be <10A. Brief duration only. Fusing recommended.
Output Overvoltage Protection:	
3.3V Outputs	No protection
5V Outputs	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 are model dependent.
Storage Temperature	-40 to +100°C
Lead Temperature (soldering, 10 sec.)	+300°C

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.

TECHNICAL NOTES

Floating Outputs

Since these are isolated DC/DC converters, their outputs are "floating." Users may ground either the Common (pin 7) for normal usage or the positive side (+Output, pin 6) to effectively reverse the output polarity.

Filtering and Noise Reduction

All UER 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 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. The caps should be located as close to the power converters as possible. Typical values are listed below. In many applications, using values greater than those listed will yield better results.

To Reduce Input Ripple

"D12" Models	20µF, 50V
"D48" Models	20-50µF, 100V

To Reduce Output Ripple

3.3V Outputs	100µF, 6V, Low ESR
5V Outputs	47µF, 10V, Low ESR
12/15V Outputs	22µF, 20V, Low ESR

In critical, space-sensitive applications, DATEL may be able to tailor the internal input/output filtering of these units to meet your specific requirements. Contact our Applications Engineering Group for additional details.

Input Fusing

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

V_{IN} Range	Fuse Value
"D12"	3A
"D48"	2A

On/Off Control

The On/Off Control pin (pin 4) may be used for remote on/off operation. A TTL logic high (+2 to +5 Volts, 250 μ A max.) applied to pin 4 disables the converter. A TTL logic low (0 to +0.8 Volts, 70 μ A max.), or no connection, enables the converter. Control voltages should be referenced to pin 2 (-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 critical applications employing multiple switching DC/DC converters, it may be desirable to intentionally synchronize the switching of selected converters (so the system noise can be reduced with notch filtering) or to purposely desynchronize the converters (to lessen the current-carrying requirements on intermediate dc buses). For multiple UER DC/DC Converters, an external clock can be applied to pin 4 (Control) of each device. It should be a square wave with a maximum 1 μ sec "high" duration and an amplitude between +2V and +5V (see On/Off Control) referenced to pin 2 (-Input). The frequency of the synchronizing clock should be higher than that of any individual converter. Therefore, it should be 185kHz \pm 5kHz.

Output Trimming

V_{OUT} may be trimmed \pm 5% via a single external trimpot or fixed resistor. The trimpot should be connected as shown in Figure 2a with its wiper connected to pin 8 (Trim). The trimpot can be used to determine the value of a single fixed resistor which should be connected as shown in Figure 2b. Connect the resistor between pin 8 (Trim) and pin 6 (+Output) to trim "down" the output voltage. Connect the resistor between pins 8 and 7 (Common) to trim "up" the output voltage. Fixed resistors should be metal-film types with absolute TCR's less than 100ppm/ $^{\circ}$ C to ensure stability.

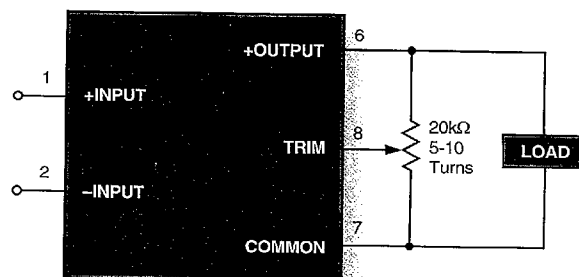


Figure 2a. Trim Connections Using a Trimpot

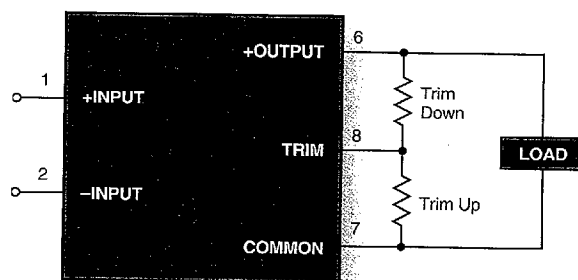


Figure 2b. Trim Connections Using Fixed Resistors

CUSTOM CAPABILITIES

DATEL's world-class design, development and manufacturing team stands ready to work with you to deliver the exact power converter you need for your demanding, large volume, OEM applications. And ... we'll do it on time and within budget!

Our experienced applications and design staffs; quick-turn prototype capability; highly automated, SMT assembly facilities; and in-line SPC quality-control techniques combine to give us the unique ability to design and deliver any quantity of power converters to the highest standards of quality and reliability.

We have compiled a large library of DC/DC designs that are currently used in a variety of telecom, medical, computer, railway, aerospace and industrial applications. We may already have the converter you need.

Contact us. Our goal is to provide you the highest-quality, most cost-effective power converters available.

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