DATEL®
INNOVATION and EXCELLENCE

Single Output
UNR Series

Non-Isolated, 5V-to-2.5V 12 Amp, DC/DC Converters

Features

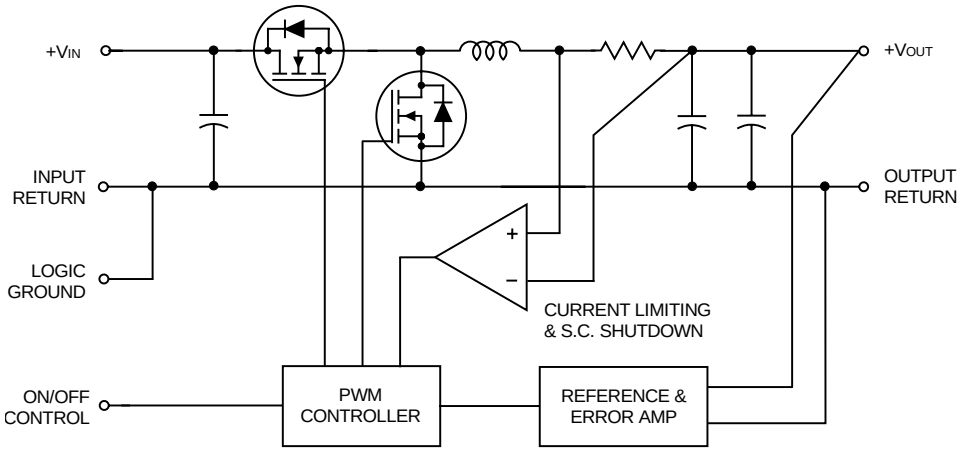
- **Low cost!**
- **+4.75V to +5.5V input**
- **+2.5V (±25mV), 12 Amp output**
- **200kHz, synchronous-rectifier topology**
- **High efficiency, 87%**
- **Low output noise, 40mVp-p**
- **Quick transient response, 30µsec**
- **–40 to +50°C operation with no derating**
- **Highly reliable, 100% SMT construction**
- **Remote on/off control**
- **Output short-circuit protection**
- **1" x 2" metal package; EMC compliant**
- **IEC950/EN60950/UL1950 pending**
- **Modifications and customs for OEM's**

As supply voltages trend lower and load currents increase, centralized power becomes more impractical. The tight accuracy, low noise and quick transient response demanded by today's low-voltage CPU's, ASIC's and DSP's make power processing at the "point of use" the only viable solution. As voltages decrease much below 3.3V, the task of designing your own circuit to efficiently derive low-voltage power from higher-voltage buses (5V, 12V, 48V, etc.) becomes significantly more challenging.

When you are designing power-hungry 2.5V partitions or boards, consider DATEL's new UNR-2.5/12-D5. This non-isolated, 5V-to-2.5V DC/DC delivers a full 12 Amps at an impressive 87% efficiency. Packaged in a 1" x 2" x 0.44" metal case, the converter exploits synchronous rectification, planar magnetics and 100% automatic SMT assembly to bring you an incomparable 30 Watts of 2.5V power.

The UNR-2.5/12-D5 delivers full power over the –40 to +50°C temperature range without heat sinking or forced-air cooling. It is fully line (±0.1%) and load (±0.5%) regulated and features low noise (40mVp-p) and quick (30µsec) transient response. The unit offers remote on/off control, and it can withstand a sustained output short circuit with full recovery to rated accuracy.

Designing your own 2.5V step-down buck regulator may be practical for low-power applications. When you need 12 Amps, the task becomes significantly more time consuming. Consider that the high efficiency, ease-of-use, and overall cost effectiveness of DATEL's new 2.5V UNR Series make the quick solution the best solution.



Signals applied to the On/Off Control are referenced to Logic Ground which is internally connected to Input/Output Return. The Logic Ground pin is not designed to carry heavy current. Do not install units with the Return pins open or connected via high-impedance runs.

Figure 1. Simplified Schematic

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Performance/Functional Specifications

Typical @ T_A = +25°C under nominal line voltage and full-load conditions, unless noted. ① ②

Input	
Input Voltage Range	4.75-5.5 Volts (5V nominal)
Input Current ③	0.15/6.9 Amps
Input Filter Type	Capacitive
Overvoltage Protection	None
Reverse-Polarity Protection	None
On/Off Control (Pin 2) ④	TTL high (or open) = on, low = off
Output	
V_{OUT} **Accuracy** (50% load)	±1% (±25mV) maximum
Temperature Coefficient	±0.02% per °C
Ripple/Noise (20MHz BW) ⑤	40mVp-p typical, 80mVp-p maximum
Line/Load Regulation	±0.1% maximum/±0.5% maximum
Efficiency	87% typical, 84% minimum
Current Limiting ⑥	Auto-recovery
Dynamic Characteristics	
Transient Response (50% load step)	30µsec to ±1% of final value
Switching Frequency	200kHz (±20kHz)
Environmental	
Operating Temperature (Ambient):	
Without Derating	–40 to +50°C
With Derating	to +100°C (Straight line to 0 Watts)
Storage Temperature	–40 to +105°C
.Physical	
Dimensions	2" x 1" x 0.44" (51 x 25 x 11.2mm)
Shielding	5-sided
Case Connection	Pin 5 (Input Return)
Case Material	Corrosion resistant steel with non-conductive, epoxy-based, black enamel finish and plastic baseplate
Pin Material	Brass, solder coated
Weight	1.6 ounces (45.4 grams)

① These devices have no minimum load requirements and will regulate under no-load conditions.
② Achieving specified performance requires the installation of an external 470µF input capacitor with an ESR of 20mΩ and an rms ripple current rating of 6 Amps, as well as an external 22µF output capacitor with an ESR of 200mΩ or less.
③ No-load/full-load conditions. When the unit is off, the input "standby" current is typically 10mA.
④ See On/Off Control Functionality.
⑤ Output noise may be reduced by installing additional external capacitors across the output terminals. Caps should be selected for low ESR (typically 60mΩ) and located as close to the unit as possible.
⑥ Current limiting initiates at approximately 30% above rated load. Under short-circuit conditions, output current folds back to approximately 1A and remains there until the short is removed.

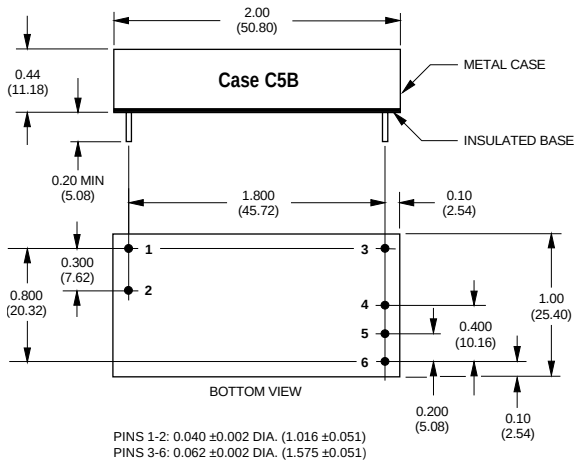
Absolute Maximum Ratings	
Input Voltage	7 Volts
Output Current	Current limited. Devices can withstand a sustained output short circuit without damage.
Storage Temperature	–40 to +105°C
Lead Temperature (soldering, 10 sec.)	+300°C

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.

On/Off Control Functionality

The On/Off Control pin has an internal 5kΩ pull-up resistor to $+V_{IN}$. It can be driven with any logic circuit capable of meeting the following drive requirements. Logic "0" = 0 to +0.8V. Logic "1" = +2.0V to $+V_{IN}$. I_{IH} (@V_{IN} = +2.0V) = –0.7mA. I_{IL} (@V_{IN} = 0V) = –1.1mA. Open collector logic or a single NPN drive transistor can be used. The drive circuit should be rated for more than 5.5V. Applying a voltage to pin 2 when no input power is applied to the converter can cause permanent damage to the converter.

MECHANICAL SPECIFICATIONS



I/O Connections	
Pin	**Function P9**
1	Logic Ground
2	On/Off Control
3	+Output
4	Output Return
5	Input Return
6	+Input

Note:

The case is connected to pin 5 (Input Return).

ORDERING INFORMATION

UNR-2.5/12-D5 Non-Isolated, 5V-to-2.5V, 30 Watt, DC/DC Converter

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ISO-9001 REGISTERED

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NON-ISOLATED DC/DC CONVERTER SELECTION GUIDE

2.5V SINGLE OUTPUT, NON-ISOLATED

Output Current (Amps, Max.)	Input Voltage, Nominal (Range) (Volts)	Package ①		Regulation		Ripple / Noise ② (mVp-p)	Efficiency (Min.)	DATEL Model Number	Data Sheet @ www.datel.com
		Dimensions (Inches)	Case, Pinout	Line (Max.)	Load (Max.)				
2	5 (4.75-5.5)	1 x 1 x 0.45	C7A, P9	±0.25%	±0.5%	30	83%	UNR-2.5/2-D5	UNR, 5W
8	5 (4.75-5.5)	2 x 1 x 0.39	C5A, P9	±0.1%	±0.5%	40	86%	UNR-2.5/8-D5	UNR, 20/25W
	12 (10.4-13.6)	2 x 1 x 0.48	C5C, P9	±0.1%	±0.6%	40	85%	UNR-2.5/8-D12	UNR, 20/25W
10	5 (4.75-5.5)	2 x 1 x 0.39	C5A, P9	±0.1%	±0.5%	40	85%	UNR-2.5/10-D5	UNR, 20/25W
	12 (10.4-13.6)	2 x 1 x 0.48	C5C, P9	±0.1%	±0.6%	40	83%	UNR-2.5/10-D12	UNR, 20/25W
12	5 (4.75-5.5)	2 x 1 x 0.44	C5B, P9	±0.1%	±0.5%	40	84%	UNR-2.5/12-D5	UNR, 30W
20	5 (4.5-5.5)	2 x 2 x 0.49	C21, P26	±0.1%	±1.0%	60	85%	UNR-2.5/20-D5 ③	Contact DATEL

3.3V SINGLE OUTPUT, NON-ISOLATED

3	5 (4.75-5.5)	1 x 1 x 0.45	C7A, P9	±0.4%	±0.5%	30	86%	UNR-3.3/3-D5	UNR, 10W
	7.5 (4.75-13.6)	2 x 0.4 x 0.8 ④	B1, P18	±1.0%	±3.0%	50	90% ⑥	UNS-3.3/3-D5	UNS, 10/15W
	7.5 (4.75-13.6)	2 x 0.8 x 0.4 ⑤	B2, P18	±1.0%	±3.0%	50	90% ⑥	UNS-3.3/3-D5D	UNS, 10/15W
	12 (10.4-13.6)	1 x 1 x 0.45	C7A, P9	±0.25%	±0.5%	100	87%	UNR-3.3/3-D12	UNR, 10W
8	5 (4.75-5.5)	2 x 1 x 0.39	C5A, P9	±0.1%	±0.5%	40	88%	UNR-3.3/8-D5	UNR, 26/33W
	5 (4.75-5.5)	2 x 1 x 0.39	C16A, P23	±0.1%	±0.5%	40	88%	UNR-3.3/8-D5T ③ ⑧	Contact DATEL
	5 (4.75-5.5)	2 x 0.4 x 0.53 ⑨	B3, P27	±0.1%	±0.5%	40	88%	USN-3.3/8-D5 ③	Contact DATEL
	12 (10.4-13.6)	2 x 1 x 0.48	C5C, P9	±0.1%	±0.6%	60	86%	UNR-3.3/8-D12	UNR, 26/33W
	12 (10.4-13.6)	2 x 1 x 0.48	C16C, P23	±0.1%	±0.6%	60	86%	UNR-3.3/8-D12T ③ ⑧	Contact DATEL
10	5 (4.75-5.5)	2 x 1 x 0.39	C5A, P9	±0.1%	±0.5%	40	86%	UNR-3.3/10-D5	UNR, 26/33W
	5 (4.75-5.5)	2 x 1 x 0.39	C16A, P23	±0.1%	±0.5%	40	86%	UNR-3.3/10-D5T ③ ⑧	Contact DATEL
	5 (4.75-5.5)	2 x 0.4 x 0.53 ⑨	B3, P27	±0.1%	±0.5%	40	86%	USN-3.3/10-D5 ③	Contact DATEL
	12 (10.4-13.6)	2 x 1 x 0.48	C5C, P9	±0.1%	±0.6%	60	85%	UNR-3.3/10-D12	UNR, 26/33W
	12 (10.4-13.6)	2 x 1 x 0.48	C16C, P23	±0.1%	±0.6%	60	85%	UNR-3.3/10-D12T ③ ⑧	Contact DATEL
12	5 (4.75-5.5)	2 x 1 x 0.44	C5B, P9	±0.1%	±0.5%	40	87%	UNR-3.3/12-D5	UNR, 40W
20	5 (4.5-5.5)	2 x 2 x 0.49	C21, P26	±0.1%	±1.0%	50	87%	UNR-3.3/20-D5 ③	Contact DATEL

5V SINGLE OUTPUT, NON-ISOLATED

3	12 (6-16.5)	2 x 0.4 x 0.8 ④	B1, P18	±1.0%	±3.0%	50	92% ⑥	UNS-5/3-D12	UNS, 10/15W
	12 (6-16.5)	2 x 0.8 x 0.4 ⑤	B2, P18	±1.0%	±3.0%	50	92% ⑥	UNS-5/3-D12D	UNS, 10/15W
5 ⑦	12 (10.4-13.6)	2 x 1 x 0.48	C13, P21	±0.25%	±0.5%	60	87%	UNR-5/5-D12	UNR, 25W

Listed specifications are typical at T_A = +25°C under nominal line voltage and full-load conditions, unless noted.
① See individual product data sheets for mechanical specifications and pinouts.
② Ripple/Noise is specified over a 20MHz bandwidth.
③ Listed specifications for these products are preliminary.
④ 10-pin SIP package.
⑤ 10-pin DIP package.
⑥ Listed specification is a typical.
⑦ Output voltage is user adjustable from 3.3 to 6V.
⑧ Output voltage is user adjustable from 1.4 to 3.6V.
⑨ Industry-standard, 11-pin SIP package.

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