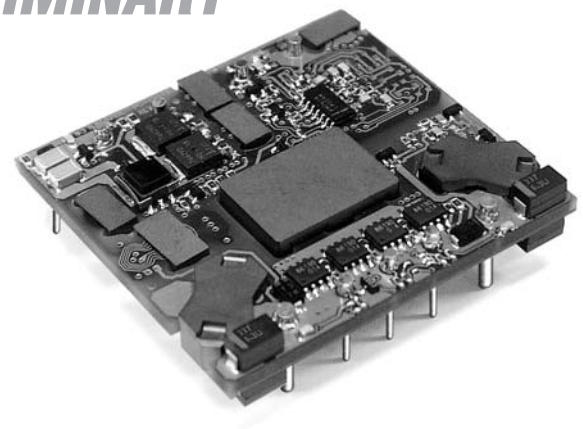
PRELIMINARY

DATEL®
INNOVATION and EXCELLENCE



Single Output
UHP Series

Open-Frame, Low V_{OUT} to 50A Half-Brick, DC/DC Converters

Features

- 1.5/1.8/2.5/3.3V outputs @ up to 50 Amps
- Input range: 36V-75V
- Open frame: 2.3" x 2.4" x 0.47"
- Industry-standard package/pinout
- Light weight: 2.24 ounces (63.5g)
- Remose sense, Trim, On/Off Control
- High efficiency: 89%
- Fully isolated, 1500Vdc guaranteed
- Input under and overvoltage shutdown
- Output overvoltage protection
- Short circuit protection; thermal shutdown
- UL60950 and EN60950 safety approvals
- CE mark

DATEL's fully isolated UHP series of DC/DC converters affords users a practical solution for their low-voltage/high-current applications. With an input voltage range of 36 to 75 Volts, the UHP Series delivers up to 50 Amps of output current from a fully regulated 1.5V output (UHP-1.5/50-D48) or or 45 Amps of 2.5V (UHP-2.5/45-D48). Using both surface-mount technology and planar magnetics, these converters are manufactured on a 2.3" x 2.4" open-frame package with an industry-standard pinout configuration.

UHP converters utilize a full-bridge, fixed-frequency topology along with synchronous output rectification to achieve a high efficiency of 89%. This efficiency, coupled with the open-frame package that allows unrestricted air flow, reduces internal component temperatures thereby allowing operation at elevated ambient temperatures.

These DC/DC's provide output trim, sense pins and primary side on/off control (available with positive or negative logic) or sync. Standard features also include input overvoltage and undervoltage shutdown circuitry, output overvoltage protection, output short-circuit and current limiting protection and thermal shutdown. All devices meet IEC950, UL60950 and EN60950 safety standards and carry the CE mark (meet LVD) requirements). CB reports are available on request.

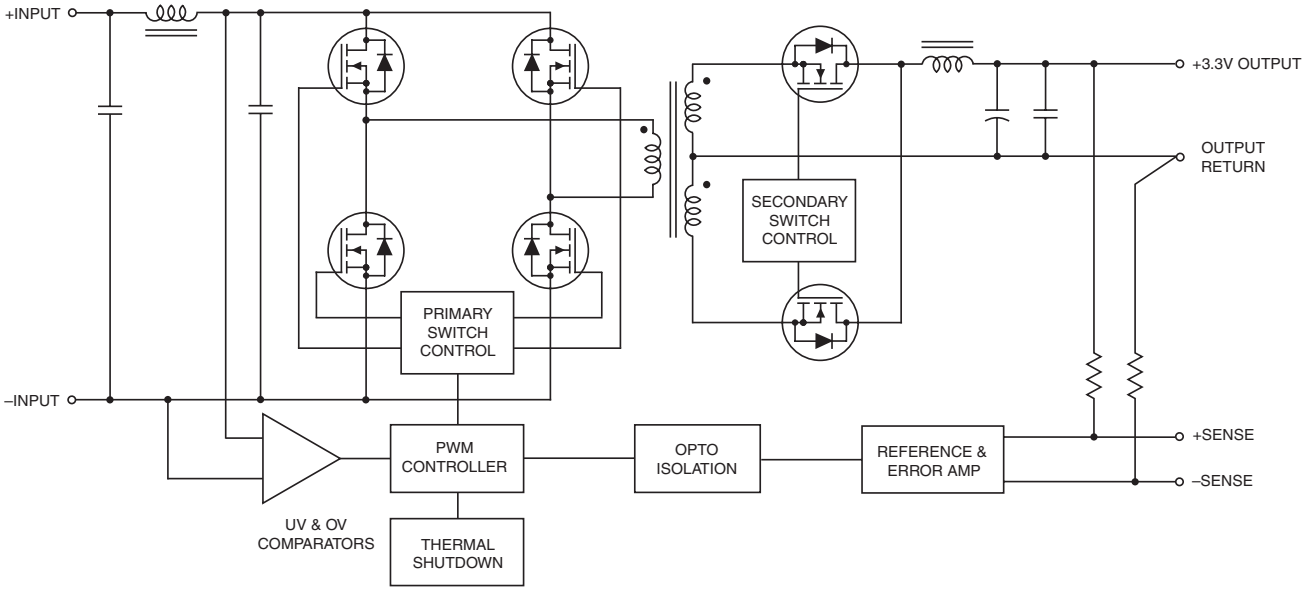


Figure 1. Simplified Schematic

Performance Specifications and Ordering Guide ①

Model	Output						Input			Efficiency		Package (Case, Pinout)
	V_{OUT} (Volts)	I_{OUT} ② (Amps)	R/N (mVp-p) ②		Regulation (Max.)		V_{IN} Nom. (Volts)	Range (Volts)	I_{IN} ④ (mA)			
			Typ.	Max.	Line	Load ③				Min.	Typ.	
UHP-1.5/50-D48	1.5	50	TBD	TBD	±1%	±1%	48	36-75	TBD	TBD	TBD	C27, P53
UHP-1.8/50-D48	1.8	50	TBD	TBD	±1%	±1%	48	36-75	TBD	TBD	TBD	C27, P53
UHP-2.5/45-D48	2.5	45	80	120	±1%	±1%	48	36-75	TBD	TBD	TBD	C27, P53
UHP-3.3/40-D48	3.3	40	150	190	±1%	±1%	48	36-75	120/2340	86.5%	88%	C27, P53

① Typical at T_A = +25°C under nominal line voltage and full-load conditions.
② Ripple/Noise (R/N) measured over a 20MHz bandwidth with 10µFtantalum and 1µF ceramic output capacitors.
③ Tested from no load to 100% load.
④ Nominal line voltage, no load/full load condition.

PART NUMBER STRUCTURE

UHP - 3.3 / 40 - D48 N

Unipolar High-Power Series

Nominal Output Voltage: 2.5, 3.3 Volts

Maximum Output Current: 30 Amps

Input Voltage Range: **D48** = 36-75 Volts (48V nominal)

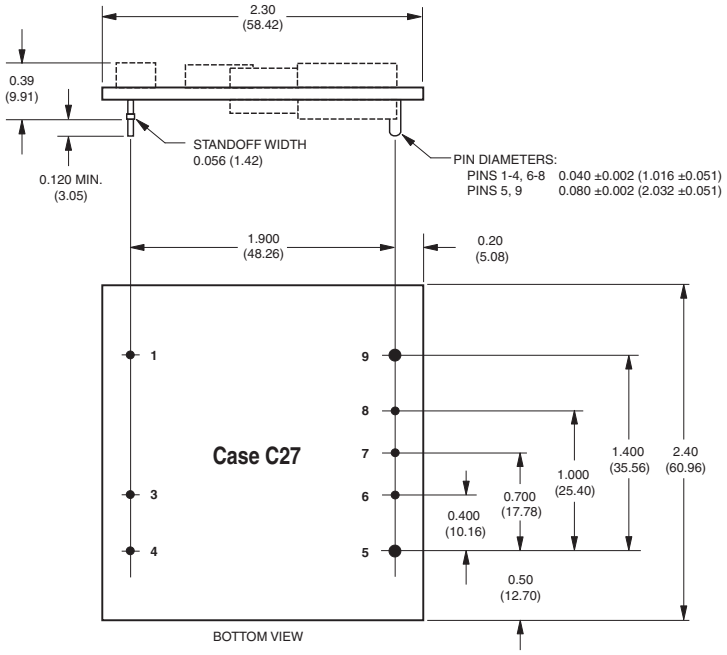
Add "N" or "S" suffix as desired

Part Number Suffixes

UHP 30 Amp DC/DC's are designed so a negative logic on/off control ("N" suffix) or a Sync function ("S" suffix) can be added in the pin 3 position.

No Suffix On/Off Control function (positive polarity)
N Negative polarity on/off control
S Sync function

MECHANICAL SPECIFICATIONS



I/O Connections	
Pin	**Function P53**
1	–Input
2	No Pin
3	On/Off Control
4	+Input
5	+Output
6	+Sense
7	Trim
8	–Sense
9	–Output

Performance/Functional Specifications

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

Input	
Input Voltage Range	36-75 Volts (48V nominal)
Overvoltage Shutdown	77-81 Volts (79V typical)
Start-Up Threshold	34-36 Volts (35V typical)
Undervoltage Shutdown	32.5-34.5 Volts (33.5V typical)
Input Current:	
Normal Operating Conditions	See Ordering Guide
Standby Mode:	
Off, OV, UV, Thermal Shutdown	TBD typical
Input Reflected Ripple Current:	
Source Impedance	<0.1Ω, no external input filtering
	TBD
Internal Input Filter Type	Pi (0.01µF - TBDµH - 3.3µF)
Reverse-Polarity Protection	1 minute duration, 5A maximum
On/Off Control (Pin 3): ③ ④ ⑥	On = open or 2.5V to +V_{IN}, I_{IN} = less than 50µA
	Off = 0-0.8V, I_{IN} = 200µA @ 0V
"N" Suffix Models	On = 0-0.8V, I_{IN} = TBD @ 0V
	Off = open or TBD Volts
Sync (Option, Pin 6): ③ ④ ⑥	
Input Threshold	TBD Volts
Input Voltage Low	TBD Volts
Input Voltage High	TBD Volts
Input Resistance	TBD minimum
Output High Voltage (100µA load)	TBD Volts
Output Drive Current	TBD
Input/Output Pulse Width	TBD nsec
Output	
V_{OUT} Accuracy:	
2.5V, 3.3V Output	±1.0% maximum
Minimum Loading Per Specification	No load
Ripple/Noise (20MHz BW) ⑤	See Ordering Guide
Line/Load Regulation	See Ordering Guide
Efficiency	See Ordering Guide
Output Voltage Sense Range	+10%
Trim Range ②	±10%, –20%
Isolation Voltage:	
Input-to-Output	1500Vdc minimum
Isolation Resistance	100MΩ
Isolation Capacitance	940pF
Current Limit Inception:	Model dependent
98.5% V_{OUT}	45-55 Amps
Short Circuit Current:	TBD Amps average current
Overvoltage Protection:	Comparator, latching
1.5V Output	TBD Volts
1.8V Output	TBD Volts
2.5V Output	TBD Volts
3.3V Output	TBD Volts
Maximum Capacitive Loading	TBD µF
Temperature Coefficient	±0.02% per °C
Dynamic Characteristics	
Dynamic Load Response:	
1.5V (50-100% load step to 1% V_{OUT})	TBDµsec maximum
1.8V (50-100% load step to 1% V_{OUT})	TBDµsec maximum
2.5V (50-100% load step to 1% V_{OUT})	TBDµsec maximum
3.3V (50-100% load step to 1% V_{OUT})	TBDµsec maximum

Dynamic Characteristics (continued)	
Start-Up Time:	
V_{IN} to V_{OUT}	TBD
On/Off to V_{OUT}	TBD
Switching Frequency	350kHz (±35kHz)
Environmental	
MTBF ⑦	TBD million hours
Operating Temperature (Ambient): ②	
Without Derating (200lfm)	
1.5V Output	TBD
1.8V Output	TBD
2.5V Output	+42°C
3.3V Output	+49°C
With Derating	See Derating Curves
Thermal Shutdown	TBD
Storage Temperature	–40 to +120°C
Physical	
Dimensions	2.3" x 2.4" x 0.465" (58.4 x 61 x 11.8mm)
Pin Material	Brass, solder coated
Weight:	2.24 ounces (63.5 grams)
Primary to Secondary Insulation Level	Operational

① All models are specified with external 10µF tantalum and 1µF ceramic output capacitors.
② See Technical Notes/Graphs for details.
③ The On/Off Control function can be replaced with a Sync function. See Part Number Suffixes and Technical Notes for details.
④ Applying a voltage to On/Off Control (pin 3) when no input power is applied to the converter can cause permanent damage.
⑤ Output noise may be further reduced with the installation of additional external output capacitors. See Technical Notes.
⑥ On/Off control is designed to be driven with open collector or by appropriate voltage levels. Voltages must be referenced to the –Input (pin 1).
⑦ MTBF's are calculated using Telcordia (Bellcore), ground fixed conditions, +25°C ambient air, and full-load conditions. Contact DATEL for demonstrated life-test data.

Absolute Maximum Ratings	
Input Voltage:	
Continuous:	81 Volts
Transient (100msec):	100 Volts
Input Reverse-Polarity Protection	Input Current must be <5A. 1 minute duration. Fusing recommended.
Output Current	Current limited. Devices can withstand an indefinite output short circuit.
On/Off Control (Pin 3) Max. Voltages	
Referenced to –Input (pin 1)	+V_{IN}
Storage Temperature	–40 to +120°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, nor recommended.

TECHNICAL NOTES

Trimming Output Voltages

UHP converters have a trim capability (pin 7) that allows users to adjust the output voltage 5%. Adjustments can be accomplished via a trim pot, Figure 2, or a single fixed resistor as shown in Figures 3 and 4. A single fixed resistor can increase or decrease the output voltage depending on its connection. Fixed resistors should have absolute TCR's less than 100ppm/°C to minimize sensitivity to changes in temperature.

A single resistor connected from the Trim (pin 7) to the +Sense (pin 6), see Figure 3, will increase the output voltage. A resistor connected from the Trim (pin 7) to the –Sense (pin 8) will decrease the output voltage. See Figure 4.

Trim adjustments greater than +10%/–20% can have an adverse effect on the converter's performance and are not recommended.

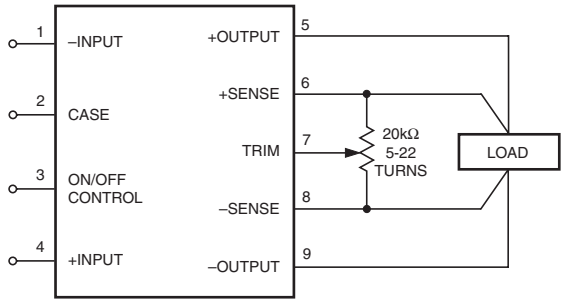


Figure 2. Trim Connections Using A Trim Pot

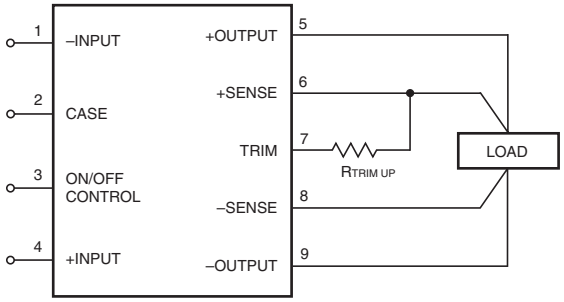


Figure 3. Trim Connections To Increase Output Voltages Using Fixed Resistors

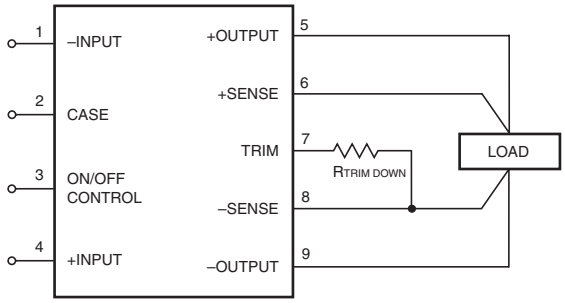


Figure 4. Trim Connections To Decrease Output Voltages Using Fixed Resistors

3.3VOUT Trim Up Equation

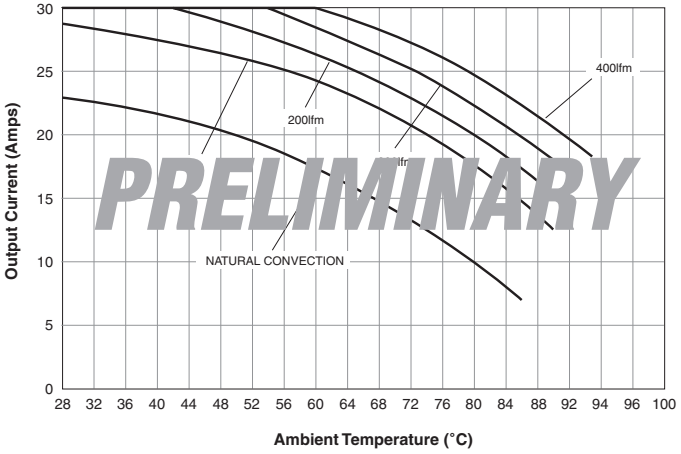
$$R_{T_{UP}}\ (k\Omega) = \frac{13.3(V_O - 1.226)}{V_O - 3.3} - 10.2$$

3.3VOUT Trim Down Equation

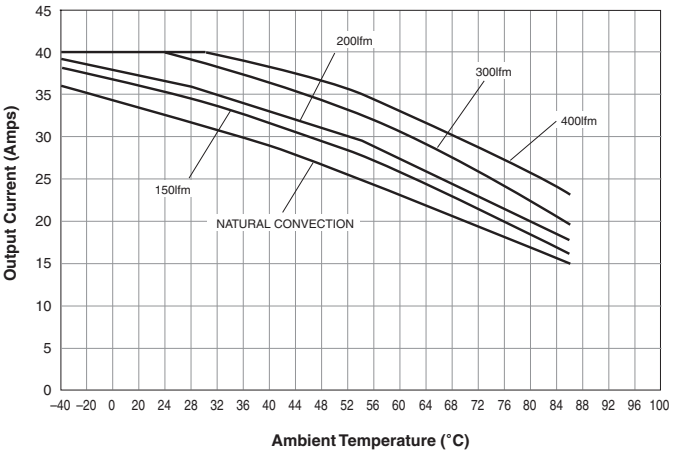
$$R_{T_{DOWN}}\ (k\Omega) = \frac{16.31}{3.3 - V_O} - 10.2$$

Accuracy of adjustment is subject to tolerances or resistor values and factory-adjusted output accuracy. V_O = desired output voltage.

UHP-2.5/45-D48 Temperature Derating
V_{IN} = 48V (air flow direction from output pins to input pins)



UHP-3.3/40-D48 Temperature Derating
V_{IN} = 48V (air flow direction from output pins to input pins)



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