PRELIMINARY

DATEL®
INNOVATION and EXCELLENCE

Single Output
UHE Models

High-Density, 1.6" x 2"
2.5-10 Amp, 12-30 Watt DC/DC's

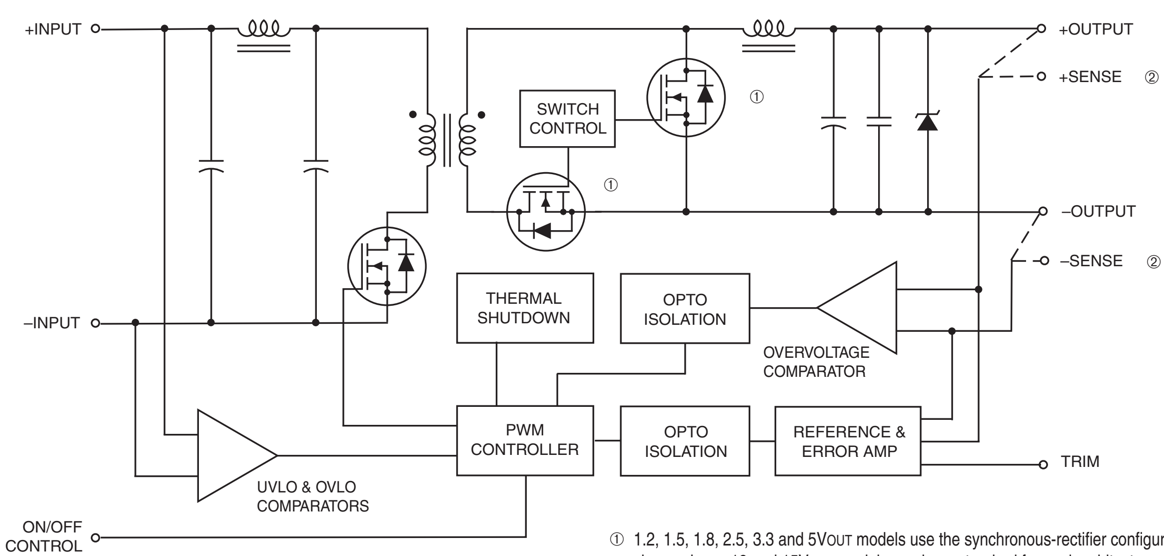
Features

- **The most I_{OUT} available in this format**
- **Small, 1.6" x 2" plastic package; Standard, 2" x 2" pinout**
- **Output voltages/currents:**
  1.2/1.5/1.8/2.5V_{OUT} @ 10 Amps
  3.3V_{OUT} @ 7.5 Amps
  5V_{OUT} @ 5/6 Amps
  12V_{OUT} @ 2.5 Amps
  15V_{OUT} @ 2 Amps
- **Input voltage ranges include:**
  10-18V (D12) 18-75V (Q48)
  10-36V (Q12) 36-75V (D48)
  18-36V (D24)
- **High efficiency (>90%); Stable no-load operation**
- **On/off control, V_{OUT} trim, sense pins**
- **Fully I/O protected; Thermal Shutdown**
- **Fully isolated (1500Vdc); BASIC insulation**
- **UL60950/EN60950 certified; CE marked**

Housed in smaller, 1.6" x 2" (41mm x 51mm) packages carrying the standard 2" x 2" pinout, DATEL's new UHE Series DC/DC Converters deliver more current/power (up to 10A/30W) than currently available from either package size. UHE, 12-30W Series, high-efficiency, isolated DC/DC's provide output power options ranging from 10 Amps @ 1.2-2.5V to 2 Amps @ 15V. Offering both 2:1 and 4:1 input voltage ranges (model dependent), UHE's meet V_{IN} requirements from 10 to 75 Volts.

Taking full advantage of the fully synchronous, forward topology, UHE's boast outstanding efficiency (many models exceed 90%) enabling full-power operation to ambient temperatures of +60°C, without air flow. Assembled using fully automated, SMT-on-pcb techniques, UHE's provide stable no-load operation, excellent line (±0.2%) and load (±0.5%) regulation, quick step response (200µsec), and low output ripple/noise (80mVp-p). All devices feature full I/O fault protection including: input overvoltage and undervoltage shutdown, precise output overvoltage protection (a rarity on low-voltage outputs), output current limiting, short-circuit protection, and thermal shutdown.

All UHE models incorporate a V_{OUT} Trim function and a Remote On/Off Control pin (positive or negative polarity). Low-voltage (1.2-2.5V), 10 Amp models offer optional sense pins facilitating remote load regulation and current sharing for true N+1 redundancy. All models are certified to the BASIC-insulation requirements of UL60950/EN60950, and 48V_{IN} models carry the CE mark.



① 1.2, 1.5, 1.8, 2.5, 3.3 and 5V_{OUT} models use the synchronous-rectifier configuration shown above. 12 and 15V_{OUT} models employ a standard forward architecture.
② Sense pins are optional with 1.2, 1.5, 1.8, 2.5V_{OUT} models ("R" suffix)

Figure 1. Simplified Schematic

Performance Specifications and Ordering Guide ①

	Model	Output						Input			Efficiency		Package (Case, Pinout)
		VOUT (Volts)	IOUT (Amps)	R/N (mVp-p) ②		Regulation (Max.)		VIN Nom. (Volts)	Range (Volts)	IIN ④ (mA)			
				Typ.	Max.	Line	Load ③				Min.	Typ.	
PRELIMINARY	UHE-1.2/10000-D12	1.2	10	50	75	±0.2%	±0.5%	12	10-18	TBD	TBD	TBD	C32, P52
PRELIMINARY	UHE-1.2/10000-D24	1.2	10	50	75	±0.2%	±0.5%	24	18-36	TBD	TBD	TBD	C32, P52
PRELIMINARY	UHE-1.2/10000-D48	1.2	10	50	75	±0.2%	±0.5%	48	36-75	TBD	TBD	TBD	C32, P52
PRELIMINARY	UHE-1.5/10000-D12	1.5	10	50	75	±0.2%	±0.5%	12	10-18	35/1600	TBD	78%	C32, P52
PRELIMINARY	UHE-1.5/10000-D24	1.5	10	50	75	±0.2%	±0.5%	24	18-36	35/781	TBD	79%	C32, P52
PRELIMINARY	UHE-1.5/10000-D48	1.5	10	50	75	±0.2%	±0.5%	48	36-75	35/381	TBD	80%	C32, P52
PRELIMINARY	UHE-1.8/10000-D12	1.8	10	50	75	±0.2%	±0.5%	12	10-18	35/1899	TBD	79%	C32, P52
PRELIMINARY	UHE-1.8/10000-D24	1.8	10	50	75	±0.2%	±0.5%	24	18-36	35/937	TBD	80%	C32, P52
PRELIMINARY	UHE-1.8/10000-D48	1.8	10	50	75	±0.2%	±0.5%	48	36-75	35/462	TBD	81%	C32, P52
PRELIMINARY	UHE-2.5/10000-D12	2.5	10	TBD	TBD	±0.2%	±0.5%	12	10-18	35/2570	TBD	81%	C32, P52
PRELIMINARY	UHE-2.5/10000-D24	2.5	10	TBD	TBD	±0.2%	±0.5%	24	18-36	35/1270	TBD	82%	C32, P52
PRELIMINARY	UHE-2.5/10000-D48	2.5	10	TBD	TBD	±0.2%	±0.5%	48	36-75	35/620	TBD	84%	C32, P52
	UHE-3.3/7500-Q12	3.3	7.5	80	100	±0.2%	±0.5%	24	10-36	35/920	TBD	88%	C32, P51
	UHE-3.3/7500-Q48	3.3	7.5	80	100	±0.2%	±0.5%	48	18-75	35/470	TBD	87%	C32, P51
	UHE-3.3/7500-D48	3.3	7.5	80	100	±0.2%	±0.5%	48	36-75	35/460	86.7%	88.5%	C32, P51
	UHE-5/5000-Q48	5	5	80	100	±0.2%	±0.5%	48	18-75	35/590	TBD	88%	C32, P51
	UHE-5/6000-D48	5	6	80	100	±0.2%	±0.5%	48	36-75	35/460	87.5%	89%	C32, P51
PRELIM.	UHE-12/2500-D24	12	2.5	TBD	TBD	±0.2%	±0.5%	24	18-36	TBD	TBD	TBD	C32, P51
PRELIM.	UHE-12/2500-D48	12	2.5	TBD	TBD	±0.2%	±0.5%	48	36-75	TBD	TBD	TBD	C32, P51
PRELIM.	UHE-15/2000-D24	15	2	TBD	TBD	±0.2%	±0.5%	24	18-36	TBD	TBD	TBD	C32, P51
PRELIM.	UHE-15/2000-D48	15	2	TBD	TBD	±0.2%	±0.5%	48	36-75	TBD	TBD	TBD	C32, P51

① Typical at TA = +25°C under nominal line voltage and full-load conditions, unless noted.
② Ripple/Noise (R/N) is tested/specified over a 20MHz bandwidth. All models are specified with an external 0.47µF multi-layer ceramic capacitors installed across their output pins.
③ Load regulation is specified over load conditions. 1.2-5VOUT models are stable and regulate under no-load conditions. 12/15VOUT models have minimum loading requirements. See Performance/Functional Specifications.
④ Nominal line voltage, no-load/full-load conditions.

PART NUMBER STRUCTURE

U HE - 3.3 / 7500 - D48 N R

Output Configuration:
U = Unipolar

High Efficiency

Nominal Output Voltage:
1.2,1.5, 1.8, 2.5, 3.3, 5, 12 or 15 Volts

Maximum Output Current
in mA

Add "N," "R" or "NR" suffix as desired

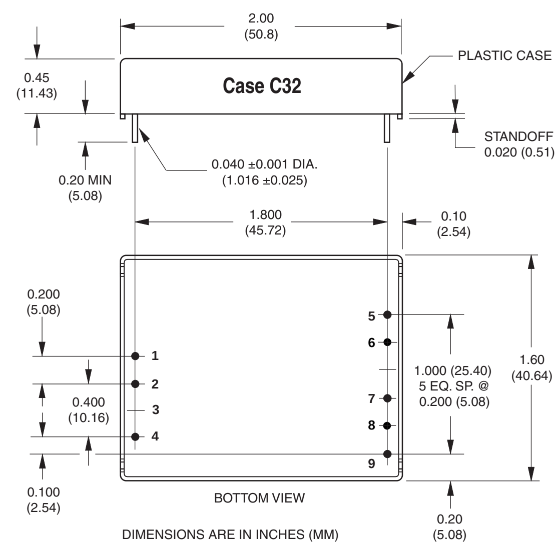
Input Voltage Range:
D12 = 10-18 Volts (12V nominal)
D24 = 18-36 Volts (24V nominal)
D48 = 36-75 Volts (48V nominal)
Q12 = 10-36 Volts (24V nominal)
Q48 = 18-75 Volts (48V nominal)

Part Number Suffixes

UHE DC/DC's are designed so an On/Off Control function with either positive polarity (no suffix), or negative polarity ("N" suffix) can be added to the pin 4 position. A Remote Sense function ("R" suffix) can be added to the pins 6 and 8 positions.

No Suffix	On/Off Control function (positive polarity) on pin 4
N	On/Off Control function (negative polarity) on pin 4
R	Remote Sense function optional on pins 6 and 8 for 1.2/1.5/1.8/2.5V Models only

MECHANICAL SPECIFICATIONS



I/O Connections		
Pin	Function P51	Function P52
1	+Input	+Input
2	–Input	–Input
3	No Pin	No Pin
4	On/Off Control	On/Off Control
5	No Pin	+Sense*
6	+Output	+ Output
7	–Output	–Output
8	No Pin	–Sense*
9	Trim	Trim

* Pins 5 and 8 are installed for optional R-suffix versions of 1.2/1.5/1.8/2.5VOUT Models.

Performance/Functional Specifications

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

Input	
Input Voltage Range:	
D12 Models	10-18 Volts (12V nominal)
Q12 Models	10-36 Volts (24V nominal)
D24 Models	18-36 Volts (24V nominal)
Q48 Models	18-75 Volts (48V nominal)
D48 Models	36-75 Volts (48V nominal)
Overvoltage Shutdown:	
D12 Models	18.5-21 Volts (20V typical)
Q12/D24 Models	37-40 Volts (38V typical)
Q48 Models	77-81 Volts (79V typical)
D48 Models	77-81 Volts (78.5V typical)
Start-Up Threshold: ③	
D12 Models	9.4-9.8 Volts (9.6V typical)
Q12 Models	9.4-10 Volts (9.6V typical)
D24 Models	16.5-18 Volts (17V typical)
Q48 Models	16-18 Volts (17V typical)
D48 Models	34-36 Volts (35V typical)
Undervoltage Shutdown: ③	
D12 Models	7.5-8.5 Volts (8V typical)
Q12 Models	7.0-8.5 Volts (8V typical)
D24/Q48 Models	16-17 Volts (16.5V typical)
D48 Models	32.5-35.5 Volts (34.5V typical)
Input Current:	
Normal Operating Conditions	See Ordering Guide
Standby Mode (Off, OV, UV)	5mA
Input Reflected Ripple Current	12µH source impedance 20MHzbandwidth,TBDmAp-p
Input Filter Type	Pi (0.039µF-2.2µH-2µF)
Reverse-Polarity Protection	Brief duration, 5A maximum
On/Off Control: ④ ⑤	On = open or 13V - +V_{IN}, I_{IN} = 1.6mA max. Off = 0-0.8V, I_{IN} = 2mA max.
"N" Models	On = 0-0.5V, I_{IN} = 2mA max. Off = open or 3.3-5.5V, I_{IN} = 1mA max.

Output	
V_{OUT} Accuracy (50% load):	±1.5%, maximum
Minimum Loading for Specification: ②	
1.5V/1.8V/2.5V/3.3V/5V Outputs	No load
12V Outputs	250mA
15V Outputs	200mA
Minimum Loading for Stability: ⑦	
1.5V/1.8V/2.5V/3.3V/5V Outputs	No load
12V Outputs	TBD mA
15V Outputs	TBDmA
Ripple/Noise (20MHz BW) ① ⑥	See Ordering Guide
Line/Load Regulation	See Ordering Guide
Efficiency	See Ordering Guide
Output Voltage Sense Range ②	5% maximum
Trim Range ②	±5%
Isolation Voltage:	
Input-to-Output	1500Vdc minimum
Isolation Capacitance	650pF
Isolation Resistance	100MΩ

Output	
Current Limit Inception (@98%V_{OUT}):	
10 Amp Models	TBD Amps
7.5 Amp Models	8.2-9.2 Amps
6 Amp Models	6.6-7.9 Amps
5 Amp Models	TBD Amps
2.5 Amp Models	TBD Amps
2.0 Amp Models	TBD Amps
Short Circuit Current:	
10 Amp Models	TBD Amps
7.5 Amp Models	2 Amps
6 Amp Models	2 Amps
5 Amp Models	2 Amps
2.5 Amp Models	TBD Amps
2.0 Amp Models	TBD Amps
Overvoltage Protection:	Output voltage comparator
1.5V Outputs	TBD
1.8V Outputs	TBD
2.5V Outputs	2.85 to 3.4 Volts
3.3V Outputs	3.8 to 4.5 Volts
5V Outputs	5.7-6.8 Volts
12V Outputs	TBD
15V Outputs	TBD
Maximum Capacitive Loading:	
1.5V Outputs	TBD µF
1.8V Outputs	TBD µF
2.5V Outputs	TBD µF
3.3V Outputs	TBD µF
5V Outputs	TBD µF
12V Outputs	TBD µF
15V Outputs	TBD µF
Temperature Coefficient	±0.02% per °C.

Dynamic Characteristics	
Dynamic Load Response:	
(50-100% load step to 3% V_{OUT})	200µsec maximum
Start-Up Time:	
V_{IN} to V_{OUT}	TBD
On/Off to V_{OUT}	TBD
Switching Frequency:	
3.3V, D48 Models	310kHz (±10%)
3.3V, Q48 Models	220kHz (±10%)
5V, D48 Models	360kHz (±10%)
5V, Q48 Models	220kHz (±10%)

Environmental	
MTBF ⑥	Bellcore, ground fixed, full power 25°C ambient, TBD million hours
Operating Temperature (Ambient): ②	
Without Derating	
1.5/1.8/2.5V Output	TBD
3.3V Output	+60°C
5V Output	TBD
12/15V Output	TBD
With Derating	To +100°C (see Derating Curves)
Thermal Shutdown	TBD
Storage Temperature	–40 to +120°C

Performance/Functional Specifications

Typical @ T_A = +25°C under nominal line voltage and full-load conditions, unless noted. ①②

Physical	
Dimensions	1.6" x 2" x 0.42" (40.64 x 50.8 x 11.43mm)
Case Material	Diallyl Phthalate
Pin Material	Brass, solder coated
Weight:	1.51 ounces (46.9 grams)
Primary to Secondary Insulation Level	Basic

① All models are specified with external 0.47μF ceramic output capacitor.
② See Technical Notes/Graphs for details.
③ Applying a voltage to On/Off Control (pin 4) when no input power is applied to the converter can cause permanent damage.
④ Output noise may be further reduced with the addition of additional external output capacitors. See Technical Notes.
⑤ The On/Off Control is designed to be driven with open-collector logic or the application of appropriate voltage levels. Voltages may be referenced to the –Input (pin 2).
⑥ Demonstrated MTBF available on request.
⑦ For conditions with less than minimum loading, outputs remain stable. However, regulation performance may degrade.

Absolute Maximum Ratings	
Input Voltage:	
Continuous:	
D12 Models	23 Volts
D24/Q12 Models	42 Volts
D48/Q48 Models	81 Volts
Transient (100msec):	
D12 Models	50 Volts
D24/Q12 Models	50 Volts
D48/Q48 Models	100 Volts
On/Off Control (pin 4) Max. Voltages	
Referenced to –Input (pin 2)	
No Suffix	$+V_{IN}$
"N" Suffix	+7 Volts
Input Reverse-Polarity Protection	Current must be <5 Amps. Brief duration only. Fusing recommended.
Output Current	Current limited. Devices can withstand sustained output short circuits without damage.
Case Temperature	+100°C
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.

TECHNICAL NOTES

Floating Outputs

Since these are isolated DC/DC converters, their outputs are "floating," with respect to the input. Designers will normally use the –Output (pin 7) as the ground/return of the load circuit. You can, however, use the +Output (pin 5) as ground/return to effectively reverse the output polarity.

Minimum Output Loading Requirements

UHE converters employ a synchronous-rectifier design topology. All models regulate within spec and 1.2-5V_{OUT} models are stable under no-load conditions. 12/15V models employ a traditional forward architecture and require a minimum 10% loading (250mA for 12V models, 200mA for 15V models) to achieve their listed regulation specs. 12/15V models also have a minimum-load-for-stability requirement (TBDmA). For 12/15V models, operation between TBDmA and 10% loading will result in stable operation but regulation may degrade. Operation under no-load conditions will not damage the 12/15V devices; however they may not meet all listed specifications.

Filtering and Noise Reduction

All UHE 15-30 Watt DC/DC Converters achieve their rated ripple and noise specifications using the external input and output capacitors specified in the Performance/Functional Specifications table. In critical applications, input/output noise may be further reduced by installing additional external I/O caps. Input capacitors should be selected for bulk capacitance, low ESR and high rms-ripple-current ratings. Input capacitors serve as energy-storage devices to minimize variations in line voltage caused by transient IR drops in PCB conductors from backplane to the DC/DC. Output capacitors should be selected for low ESR and appropriate frequency response. All caps should have appropriate voltage ratings and be mounted as close to the converters as possible.

The most effective combination of external I/O capacitors will be a function of your particular load and layout conditions. Our Applications Engineers can recommend potential solutions. 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. Fuses should also be used if the possibility of sustained, non-current-limited, input-voltage polarity reversals exists. For DATEL A-Series UHE 15-30 Watt DC/DC Converters, you should use slow-blow type fuses with values no greater than the following.

Model		Fuse Value
1.5/1.8V_{OUT}	D12 Models	TBD Amps
	D24 Models	TBD Amps
	D48 Models	TBD Amps
2.5V_{OUT}	D12 Models	TBD Amps
	D24 Models	TBD Amps
	D48 Models	TBD Amps
3.3V_{OUT}	Q12 Models	TBD Amps
	Q48 Models	TBD Amps
	D48 Models	TBD Amps
5V_{OUT}	Q48 Models	TBD Amps
	D48 Models	TBD Amps
12/15V_{OUT}	D24 Models	TBD Amps
	D48 Models	TBD Amps

On/Off Control

The input-side, remote On/Off Control function (pin 4) can be ordered to operate with either polarity. Positive-polarity devices (standard, no part-number suffix) are enabled when pin 4 is left open or is pulled high (+13V to V_{IN} applied with respect to –Input, pin 2, (see Figure 2). Positive-polarity devices are disabled when pin 4 is pulled low (0-0.8V with respect to –Input). Negative-polarity devices are off when pin 4 open or pulled high (3.3V to 5.5.V), and on when pin 4 is pulled low (0-0.5V). See Figure 3.

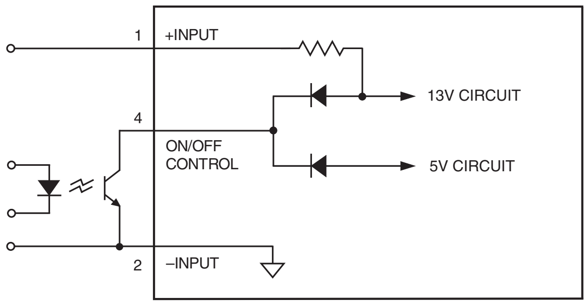


Figure 2. Driving the Positive Polarity On/Off Control Pin

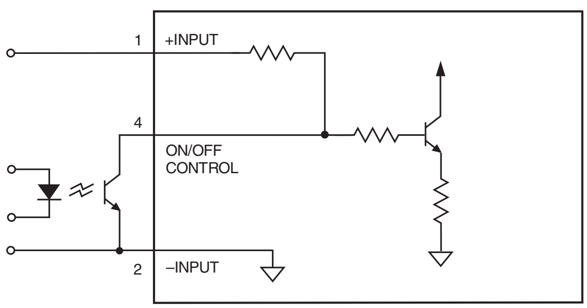


Figure 3. Driving the Negative Polarity On/Off Control Pin

Dynamic control of the remote on/off function is best accomplished with a mechanical relay or an open-collector/open-drain drive circuit (optically isolated if appropriate). The drive circuit should be able to sink appropriate current (see Performance Specs) when activated and withstand appropriate voltage when deactivated.

Applying an external voltage to pin 4 when no input power is applied to the converter can cause permanent damage to the converter.

Sync Function (Optional)

Contact DATEL for further information.

Start-Up Time

The V_{IN} to V_{OUT} start-up time is the interval of time where the input voltage crosses the turn-on threshold point, and the fully loaded output voltage enters and remains within its specified accuracy band. Actual measured times will vary with input source impedance, external input/output capacitance, and load. The UHE Series implements a soft start circuit that limits the duty cycle of the PWM controller at power up, thereby limiting the Input Inrush current.

The On/Off Control to V_{OUT} start-up time assumes the converter has its nominal input voltage applied but is turned off via the On/Off Control pin. The specification defines the interval between the time at which the converter is turned on and the fully loaded output voltage enters and remains within its specified accuracy band. Similar to the V_{IN} to V_{OUT} start-up, the On/Off Control to V_{OUT} start-up time is also governed by the internal soft start circuitry and external load capacitance.

Input Overvoltage/Undervoltage Shutdown and Start-Up Threshold

Under normal start-up conditions, devices will not begin to regulate until the ramping-up input voltage exceeds the Start-Up Threshold Voltage (35V for "D48" models). Once operating, devices will not turn off until the input voltage drops below the Undervoltage Shutdown limit (34V for "D48" models). Subsequent re-start will not occur until the input is brought back up to the Start-Up Threshold. This built in hysteresis prevents any unstable on/off situations from occurring at a single input voltage.

Input voltages exceeding the input overvoltage shutdown specification listed in the Performance/Functional Specifications will cause the device to shutdown. A built-in hysteresis of 0.6 to 1.6 Volts for all models will not allow the converter to restart until the input voltage is sufficiently reduced.

Current Limiting

When output power increases to TBD% to TBD% of the rated output current, the DC/DC converter will go into a current limiting mode. In this condition the output voltage will decrease proportionately with increases in output current, thereby maintaining a somewhat constant power dissipation. This is commonly referred to as power limiting (see Figure 4). Current limit inception is defined as the point where the full-power output voltage falls below the specified tolerance. See Performance/Functional Specifications. If the load current being drawn from the converter is significant enough, the unit will go into a short circuit condition. See "Short Circuit Condition."

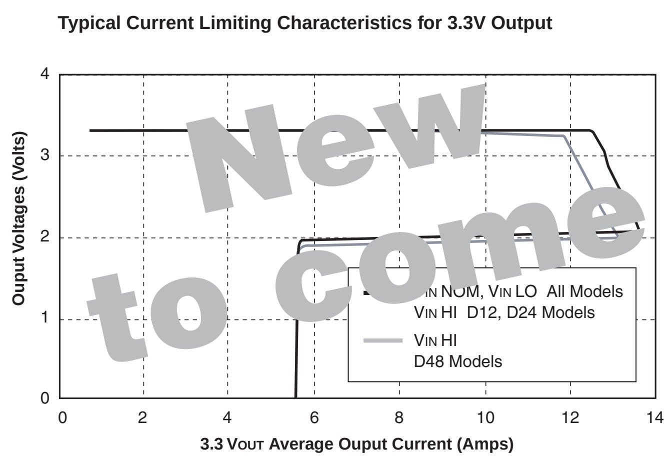


Figure 4. Current Limiting Characteristics for 3.3V Output

Short Circuit Condition

When a converter is in current limit mode the output voltages will drop as the output current demand increases (see Figure 4). If the output voltage drops too low, the magnetically coupled voltage used to develop primary side voltages will also drop, thereby shutting down the PWM controller.

Following a time-out period the PWM will restart causing the output voltages to begin ramping to their appropriate values. If the short-circuit condition persists, another shutdown cycle will be initiated. This on/off cycling is referred to as "hiccup" mode. The hiccup cycling reduces the average output current, thereby preventing internal temperatures from rising to excessive levels. The UHE is capable of enduring an indefinite short circuit output condition.

Thermal Shutdown

These UHE converters are equipped with Thermal Shutdown Circuitry. If environmental conditions cause the internal temperature of the DC/DC converter rises above the designed operating temperature, a precision temperature sensor will power down the unit. When the internal temperature decreases below the threshold of the temperature sensor the unit will self start. See Performance/Functional Specifications.

Output Overvoltage Protection

UHE output voltages are monitored for an overvoltage condition via a comparator which is optically coupled to the primary side. If the output voltage should rise to a level which could be damaging to the load circuitry, the sensing circuitry will power down the PWM controller causing the output voltages to decrease. Following a time-out period the PWM will restart, causing the output voltages to ramp to their appropriate values. If the fault condition persists, and the output voltages again climb to excessive levels, the overvoltage circuitry will initiate another shutdown cycle. This on/off cycling is referred to as "hiccup" mode.

Trimming Output Voltage

UHE converters have a trim capability (pin 9) that allows users to adjust the output voltages ±5%. Adjustments to the output voltages can be accomplished via a trim pot (Figure 5) or a single fixed resistor as shown in Figures 6 and 7. A single fixed resistor can increase or decrease the output voltage depending on its connection. Resistors should be located close to the converter and have TCR's less than 100ppm/°C to minimize sensitivity to changes in temperature. If the trim function is not used, leave the trim pin floating.

A single resistor connected from the Trim (pin 9) to the +Output (pin 5), +Sense where applicable, will decrease the output voltage. A resistor connected from the Trim (pin 9) to the –Output (pin 7) , –Sense where applicable, will increase the output voltage.

Trim adjustments greater than the specified ±5% can have an adverse affect on the converter's performance and are not recommended. Excessive voltage differences between V_{OUT} and Sense in conjunction with trim adjustment of the output voltage can cause the overvoltage protection circuitry to activate (see Performance Specifications for overvoltage limits). Power derating is based on maximum output current and voltage at the converter's output pins. Use of trim (and sense functions) can cause output voltages to increase thereby increasing output power beyond the UHE's specified rating or cause output voltages to climb into the output overvoltage region. Therefore:

(V_{OUT} at pins) x (I_{OUT}) <= rated output power

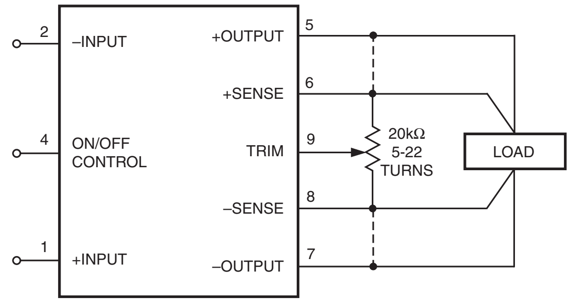


Figure 5. Trim Connections Using A Trimpot

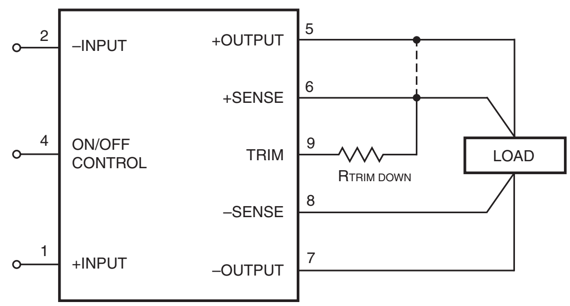


Figure 6. Trim Connections To Decrease Output Voltages Using Fixed Resistors

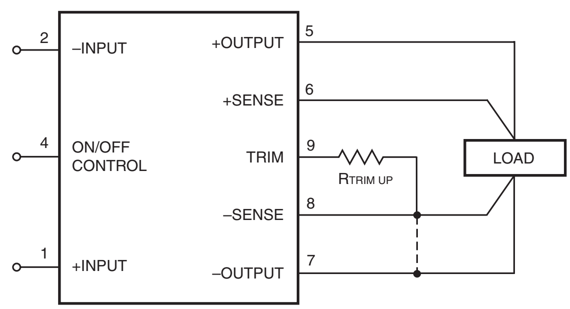


Figure 7. Trim Connections To Increase Output Voltages Using Fixed Resistors

Trim Equations For 3.3 Volt Models

$$R_{T_{DOWN}}(k\Omega) = \frac{3.48(V_O - 1.57)}{3.3 - V_O} - 28$$

$$R_{T_{UP}}(k\Omega) = \frac{2.18}{V_O - 3.3} - 28$$

Note: Resistor values are in kΩ. Accuracy of adjustment is subject to the tolerances of resistors and factory-adjusted output accuracy. V_O = desired output voltage.

Remote Sense (Optional on 1.5/1.8/2.5V_{OUT} models)

Note: The Sense and V_{OUT} lines are internally connected through TBD value resistors, however, if the sense function is not used for remote regulation the user should connect the +Sense to +V_{OUT} and –Sense to –V_{OUT} at the DC/DC converter pins.

UHE series converters have a sense feature to provide point of use regulation, thereby overcoming moderate IR drops in PCB conductors or cabling. The remote sense lines carry very little current and therefore require a minimal cross-sectional area conductor. The sense lines, are used by the feed-back control-loop to regulate the output. As such, they are not low impedance points and must be treated with care in layouts and cabling. Sense lines on a PCB should be run adjacent to DC signals, preferably ground. In cables and discrete wiring applications twisted pair or other techniques should be implemented.

UHE DC/DC converters will compensate for drops between the output voltage at the DC/DC and the sense voltage at the DC/DC provided that:

$$[V_{OUT}(+) - V_{OUT}(-)] - [Sense(+) - Sense(-)] \leq 5\% \; V_{OUT}$$

Output overvoltage protection is monitored at the output voltage pin, not the Sense pin. Therefore, excessive voltage differences between V_{OUT} and Sense in conjunction with trim adjustment of the output voltage can cause the overvoltage protection circuitry to activate (see Performance Specifications for overvoltage limits). Power derating is based on maximum output current and voltage at the converter's output pins. Use of trim and sense functions can cause output voltages to increase thereby increasing output power beyond the UHE's specified rating or cause output voltages to climb into the output overvoltage region. Therefore, the designer must ensure:

$$(V_{OUT} \text{ at pins}) \times (I_{OUT}) \leq \text{rated output power}$$

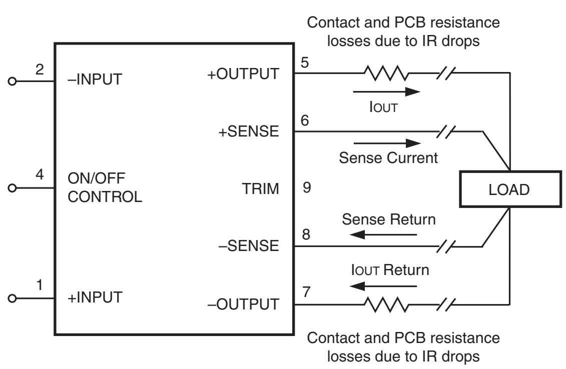
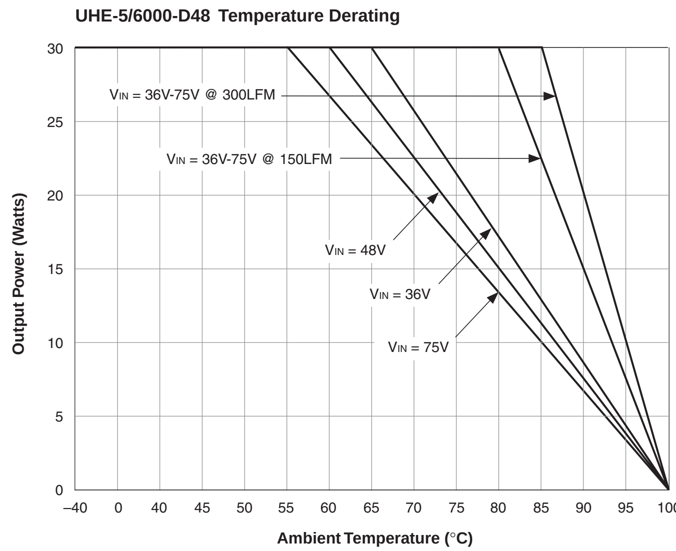
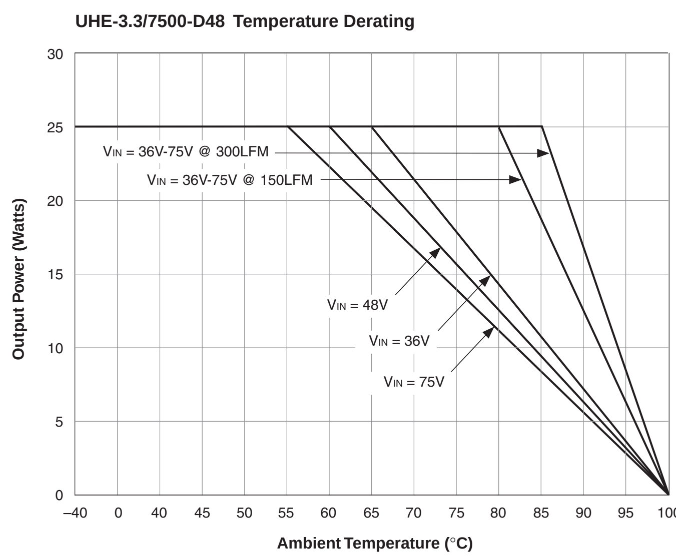


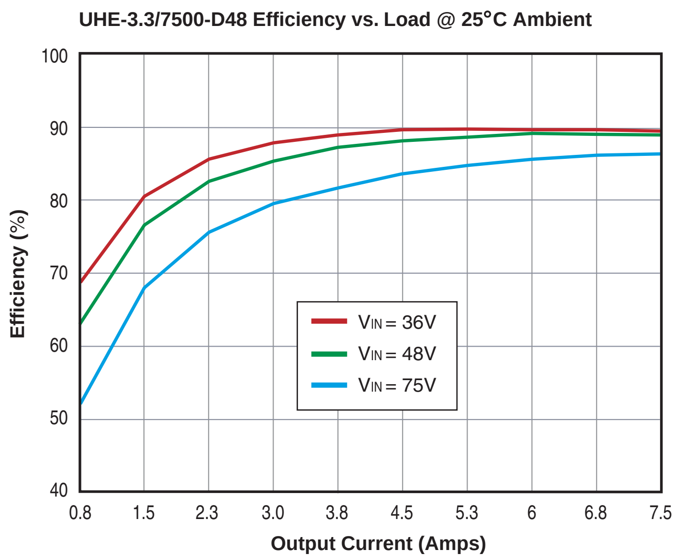
Figure 8. Remote Sense Circuit Configuration

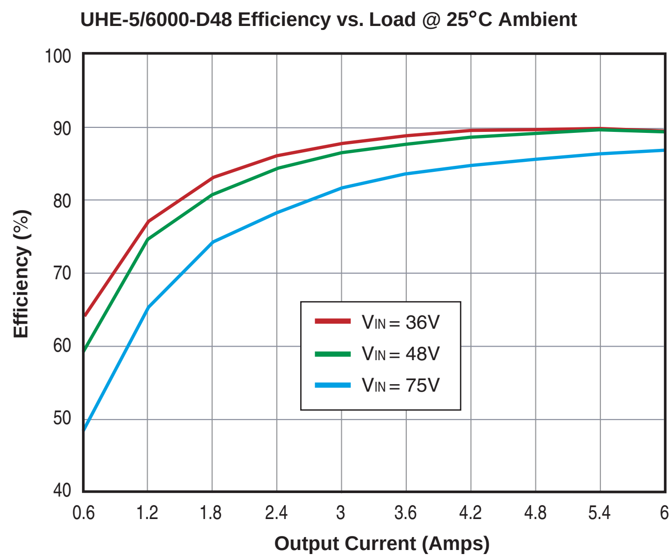
TEMPERATURE DERATING

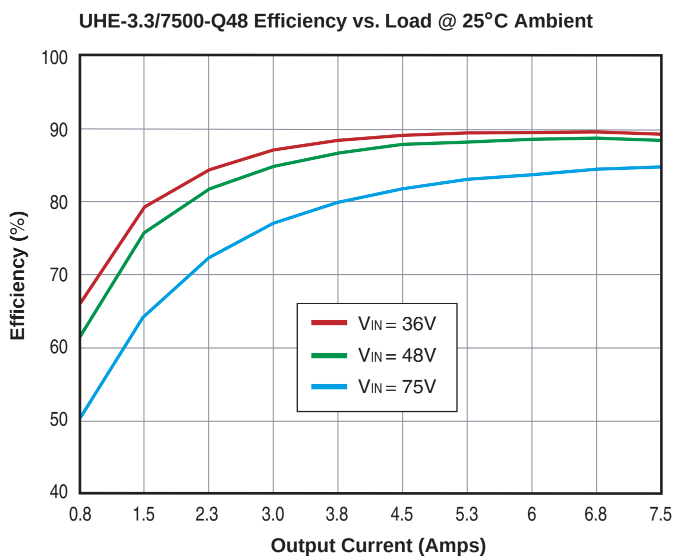


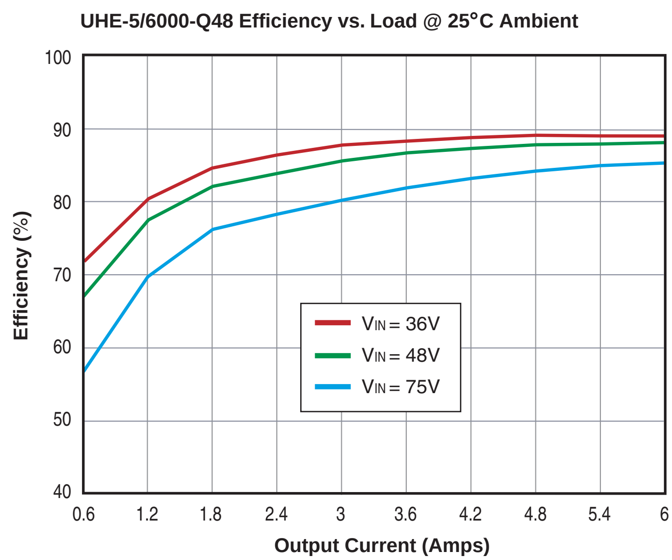


TYPICAL PERFORMANCE CURVES









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