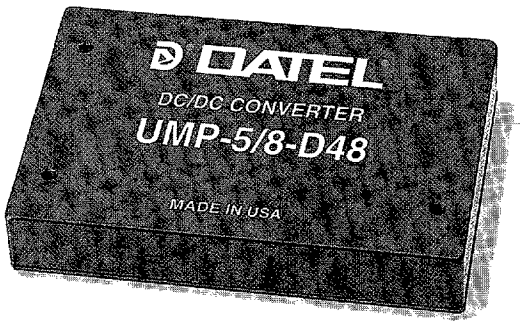


UMP MODELS

Single Output
High-Efficiency, Smaller-Package 25-40 Watt, DC/DC Converters

DATEL's new UMP Models are fully potted, 25-40 Watt DC/DC converters designed to meet UL1950 and EN60950 safety standards. The combination of the UMP's higher efficiencies and thermally conductive potting compound enables these devices to achieve higher operating temperatures without derating. The 2" x 3" UMP "footprint" conforms with the standard pinout and pin geometries of most 3" x 3" devices (a 33% space savings) while delivering as much as 60% more power (40W vs. 25W).

Applicable to a wide range of telecom, computer and other OEM applications, UMP Model DC/DC's operate from four input voltage ranges (10-36V for "Q12" models, 18-36V for "D24" models, 18-75V for "Q48" models, and 36-75V for "D48" models). Available output voltages are 5, 12 and 15 Volts.

For reliability and affordability, DATEL exploits contemporary, high-speed, automatic assembly to construct the UMP's traditional, field-proven, SMT-on-pcb designs. Devices employ corrosion-resistant metal cases with plastic headers. Heat generating transformer cores and power semiconductors are mounted directly to the cases, which have threaded inserts for add-on heat sinks or pcb mounting. Devices are specified for –40 to +100°C operation and derating information is provided for operation with/without heat sinks and forced air flow.

All devices feature input pi filters, input undervoltage and overvoltage shutdown, output overvoltage protection, output current limiting, and thermal shutdown. UL, CSA, EN and IEC compliance testing is currently in progress (75V-input devices will be CE marked) as are full EMI/EMC characterizations. Contact DATEL for the latest available information.

Features

- Higher operating temperatures
- Fully potted
- Designed to meet UL1950 and EN60950 (basic insulation)
- CE mark available (75V-input models)
- Fully isolated, 1500Vdc guaranteed
- 25/30/35/40W output power
- Standard pinout! Smaller size!
- New 2" x 3" package fits 3" x 3" footprint
- 5V, 12V or 15V outputs
- Four input voltage ranges:
  10-36V, 18-36V
  18-75V, 36-75V
- High efficiency (to 85%)
- Input under and overvoltage lockout
- VOUT trim and on/off control
- Modifications and customs for OEM's

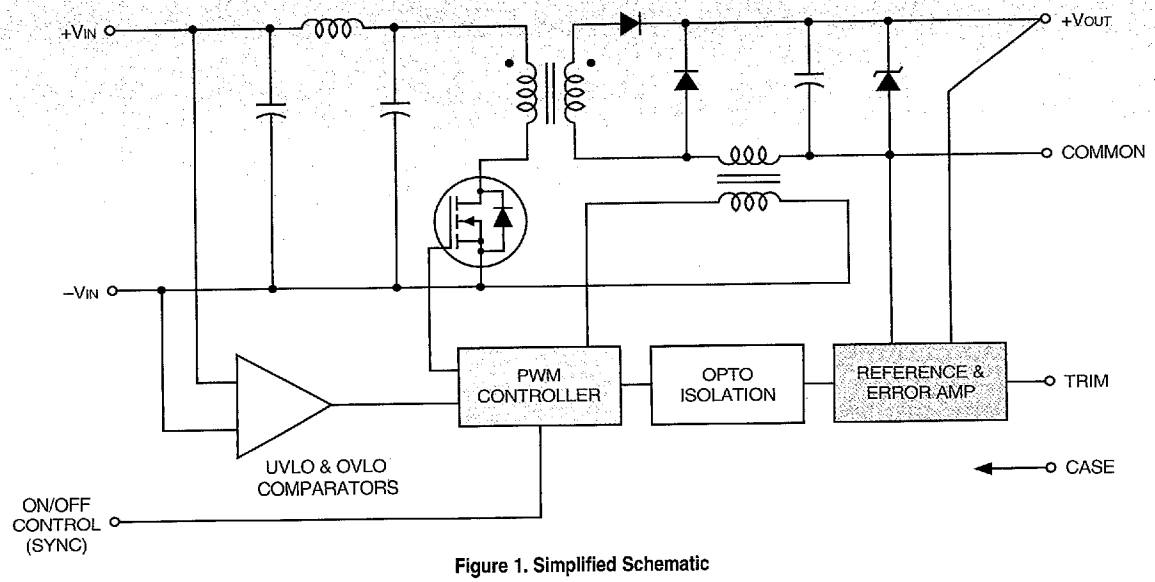


Figure 1. Simplified Schematic

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.	
UMP-5/5-Q12	5	5	75	100	±0.5%	±1%	24	10-36	50/1366	77%	79%	C11, P14
UMP-5/6-Q48	5	6	80	110	±0.5%	±1%	48	18-75	25/799	79%	80%	C11, P14
UMP-5/7-D24	5	7	75	100	±0.5%	±1%	24	18-36	25/1796	82%	83%	C11, P14
UMP-5/8-D48	5	8	75	100	±0.5%	±1%	48	36-75	25/1026	82%	84%	C11, P14
UMP-12/2.1-Q12	12	2.1	100	150	±0.5%	±1%	24	10-36	50/1326	80%	82%	C11, P14
UMP-12/2.5-Q48	12	2.5	100	150	±0.5%	±1%	48	18-75	30/770	82%	83%	C11, P14
UMP-12/3-D24	12	3	100	150	±0.5%	±1%	24	18-36	25/1825	82%	84%	C11, P14
UMP-12/3.3-D48	12	3.3	100	150	±0.5%	±1%	48	36-75	25/1004	83%	85%	C11, P14
UMP-15/1.7-Q12	15	1.7	100	150	±0.5%	±1%	24	10-36	50/1341	80%	82%	C11, P14
UMP-15/2-Q48	15	2	100	150	±0.5%	±1%	48	18-75	30/770	82%	83%	C11, P14
UMP-15/2.5-D24	15	2.5	100	150	±0.5%	±1%	24	18-36	25/1879	83%	84%	C11, P14
UMP-15/2.65-D48	15	2.65	100	150	±0.5%	±1%	48	36-75	25/1008	83%	85%	C11, P14

① Typical at TA = +25°C under nominal line voltage and full-load conditions, unless otherwise noted.
② Ripple/Noise (R/N) measured over a 20MHz bandwidth.
③ 10 to 100% load.
④ Nominal line voltage, no-load/full-load conditions.

Single Output

PART NUMBER STRUCTURE

U MP - 5 / 8 - D48

Output Configuration:
U = Unipolar

Fully Potted Metal Package

Nominal Output Voltage:
5, 12 or 15 Volts

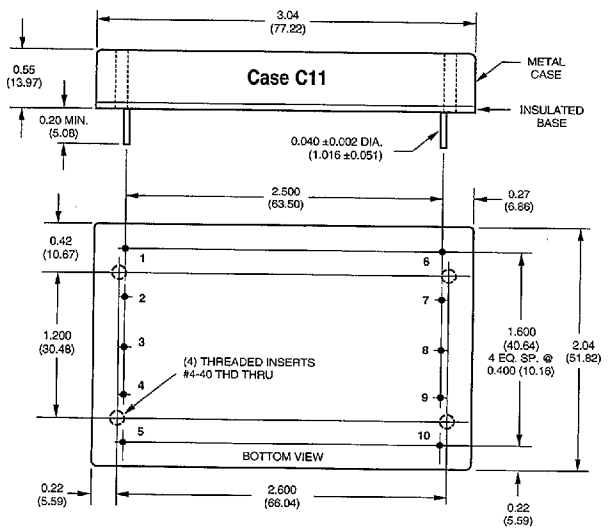
Maximum Output Current
in Amps

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

OUTPUT POWER CONSIDERATIONS

UMP Model DC/DC Converters are classified, by output power, into 25, 30, 35 and 40 Watt devices. For the single-output devices listed above, the maximum available output power is the product of the nominal output voltage and the maximum allowable output current indicated within the part number (see Part Number Structure). A UMP-5/6-Q48, for example, can source 6 Amps from its 5V output (over its entire 18-75V input voltage range) delivering an output power of 30 Watts. A UMP-5/8-D48 can deliver 40 Watts.

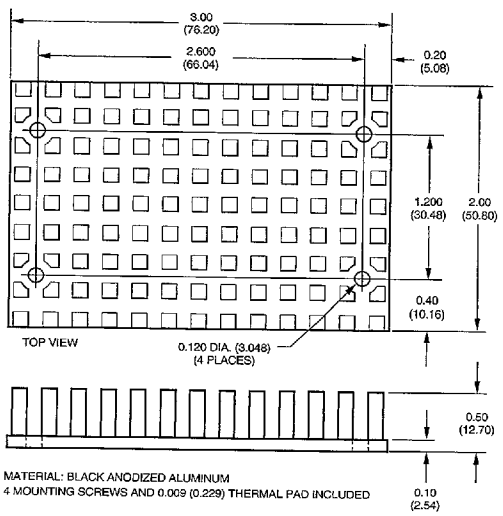
MECHANICAL SPECIFICATIONS



I/O Connections	
Pin	Function P15
1	No Pin
2	–Input
3	+Input
4	Case
5	On/Off Control*
6	No Pin
7	No Pin
8	Common
9	+Output
10	Trim

* See note 3 on next page.

Optional Heat Sink (Part Number HS-23)



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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:	
"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)
Undervoltage Shutdown:	
"Q12" Models	9 Volts
"D24" Models	17 Volts
"Q48" Models	17 Volts
"D48" Models	34 Volts
Input Current	See Ordering Guide
Input Filter Type ②	Pi
Overvoltage Shutdown:	
"D24" and "Q12" Models	40 Volts
"D48" and "Q48" Models	80 Volts
Reverse-Polarity Protection	Yes (Instantaneous, 6A maximum)
On/Off Control (Pin 5) ③	TTL high (or open) = on, low = off
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	1500Vdc, minimum
Isolation Capacitance	130pF
Current Limiting	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	165kHz (±10%)
ENVIRONMENTAL	
Operating Temperature (Ambient):	
Without Derating	–40 to +50°C (Model dependent)
With Derating	to +100°C (See Derating Curves)
Maximum Case Temperature	+100°C
Storage Temperature	–40 to +105°C
PHYSICAL	
Dimensions	2.04 x 3.04 x 0.55" (51.8 x 77.2 x 14mm)
Shielding	5-sided
Case Connection	Pin 4
Case Material	Zinc with a non-conductive, epoxy-based black enamel finish and plastic baseplate
Pin Material	Brass, solder coated
Weight	6 ounces (170 grams)

① These converters require a minimum 10% output 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 recommended or perhaps added internally upon request. Contact DATEL Applications Engineering for details.

③ Applying voltage to the Control pin with no input power applied can damage the converter. The On/Off function can be replaced with a Sync function. See page 3-48 for more details.

④ Listed spec is for input-to-output. Input-to-case and output-to-case isolation is 1000Vdc min.

ABSOLUTE MAXIMUM RATINGS	
Input Voltage:	
"Q12/D24" Models	44 Volts
"Q48/D48" Models	88 Volts
Input Reverse-Polarity Protection	Current must be <6A. Brief duration only. Fusing recommended.
Output Overvoltage 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 +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.

TECHNICAL NOTES

Floating Outputs

Since these are isolated DC/DC converters, their outputs are "floating." Users may ground either the Common (pin 8) for normal usage or the positive side (+Output, pin 9) to effectively reverse the output polarity.

Filtering and Noise Reduction

All UMP 25-40 Watt DC/DC Converters achieve their rated ripple and noise specifications without the use of external input/output capacitors. In critical applications, input/output ripple and 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 in the tables below. In many applications, using values greater than those listed will yield better results.

To Reduce Input Ripple

"Q12/D24" Models	47µF, 50V
"Q48/D48" Models	10µF, 100V

To Reduce Output Ripple

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 devices 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 UMP DC/DC Converters, you should use slow-blow type fuses with values no greater than the following:

V_{IN} Range	Fuse Value
"Q12"	4A
"D24"	4A
"Q48"	3A
"D48"	2A

Temperature Derating and Electrical Performance Curves

Q12 Models (25 Watts)

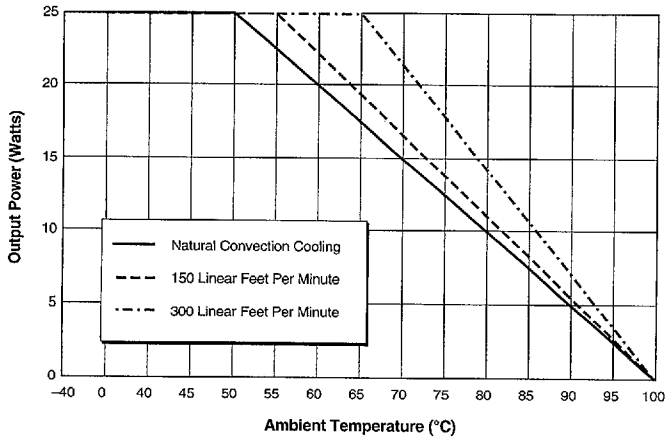


Figure 2a. Temperature Derating Without Heat Sink

Q48 Models (30 Watts)

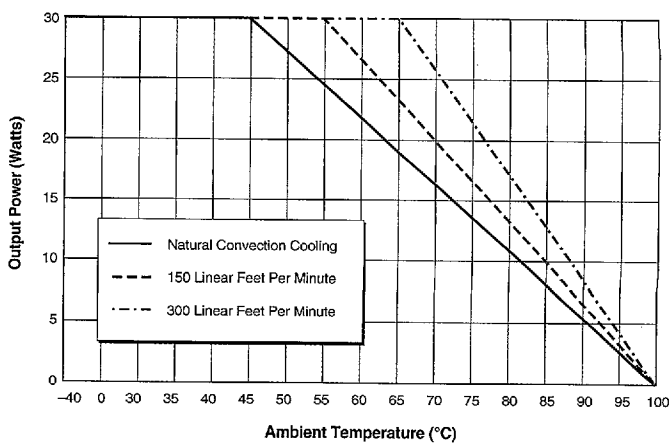


Figure 3a. Temperature Derating Without Heat Sink

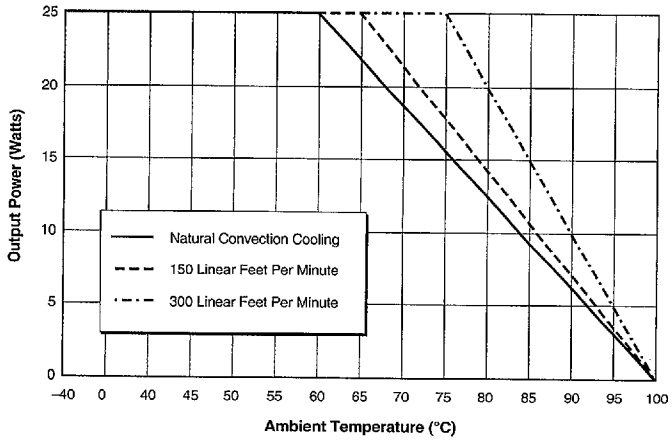


Figure 2b. Temperature Derating With Heat Sink

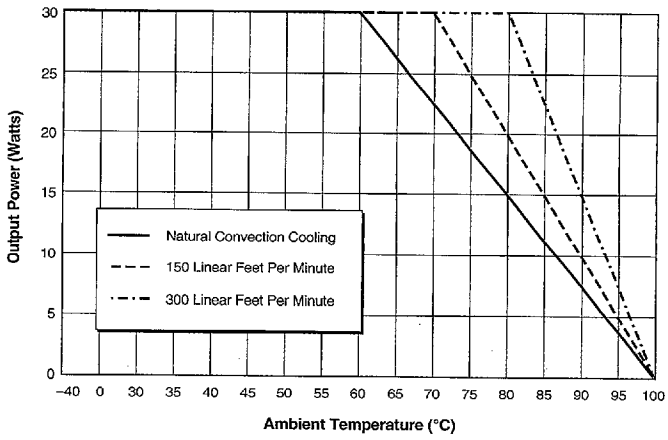


Figure 3b. Temperature Derating With Heat Sink

Model UMP-5/5-Q12

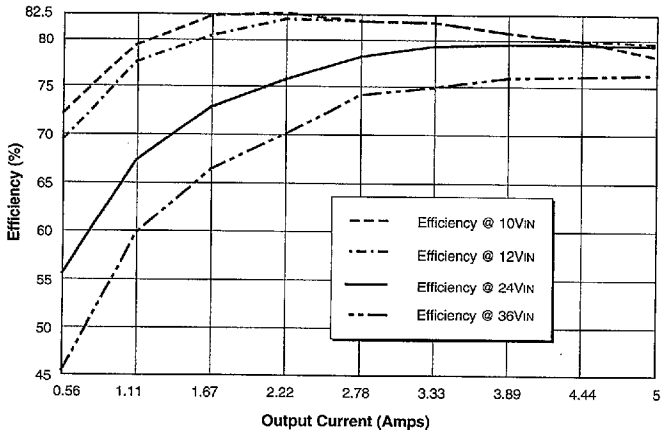


Figure 2c. Efficiency vs. Output Current and Input Voltage

Model UMP-5/6-Q48

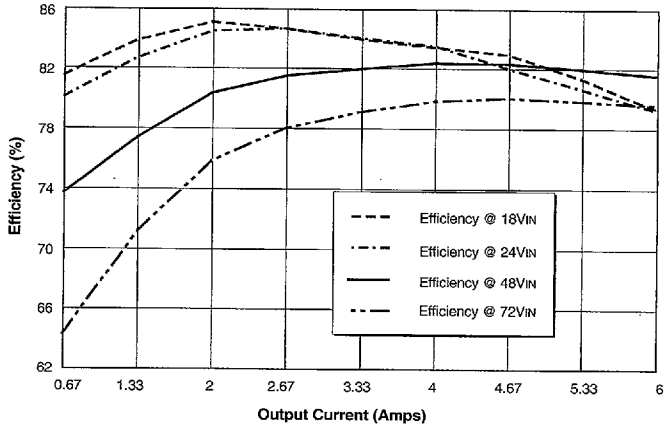


Figure 3c. Efficiency vs. Output Current and Input Voltage

Temperature Derating and Electrical Performance Curves

D24 Models (35 Watts)

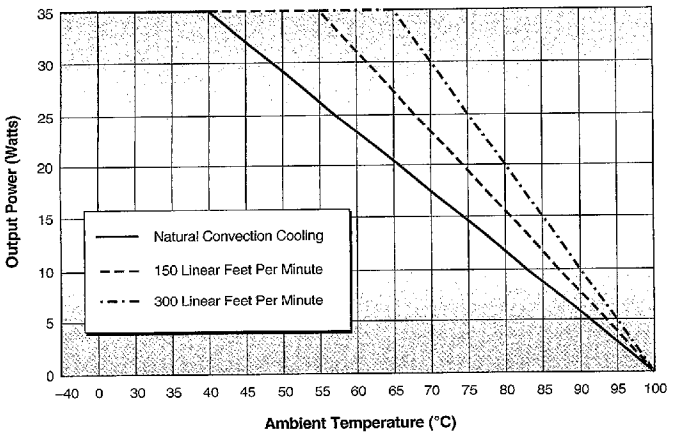


Figure 4a. Temperature Derating Without Heat Sink

D48 Models (40Watts)

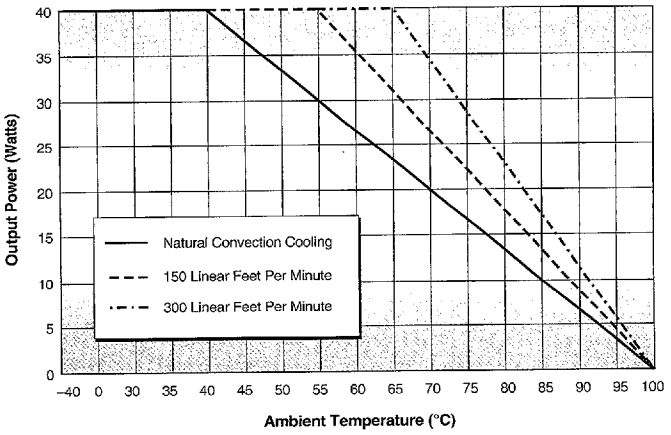


Figure 5a. Temperature Derating Without Heat Sink

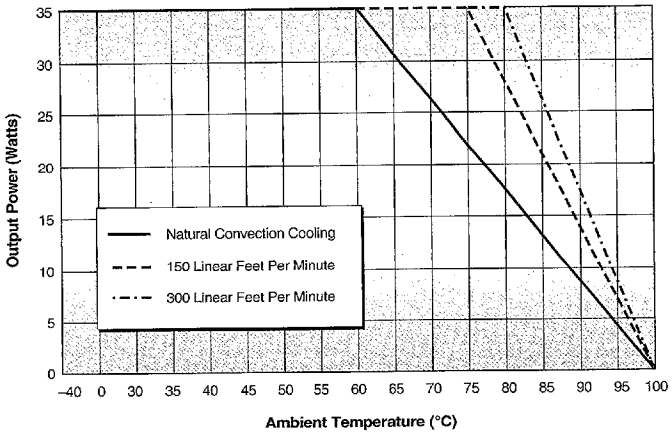


Figure 4b. Temperature Derating With Heat Sink

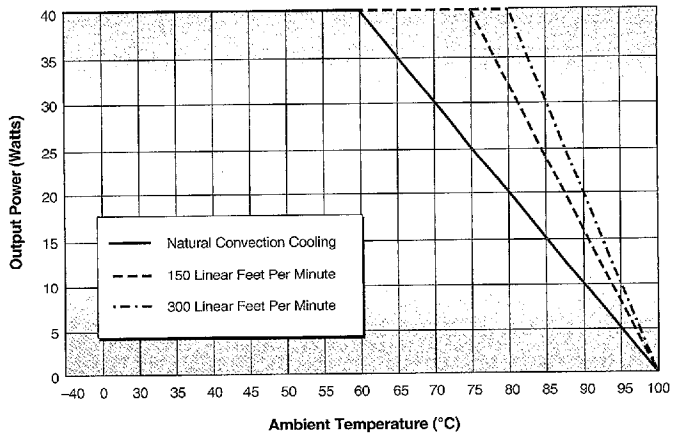


Figure 5b. Temperature Derating With Heat Sink

Model UMP-5/7-D24

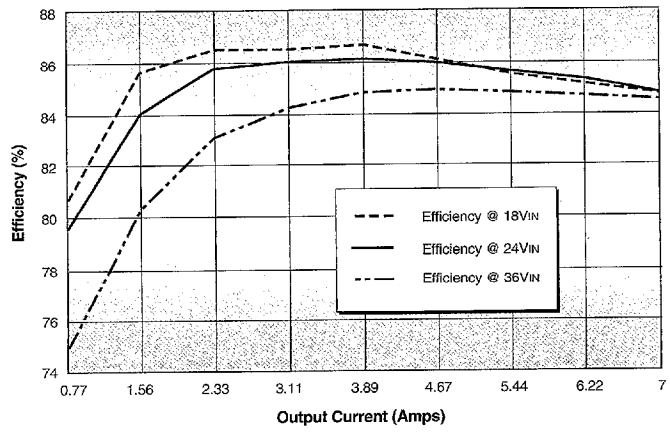


Figure 4c. Efficiency vs. Output Current and Input Voltage

Model UMP-5/8-D48

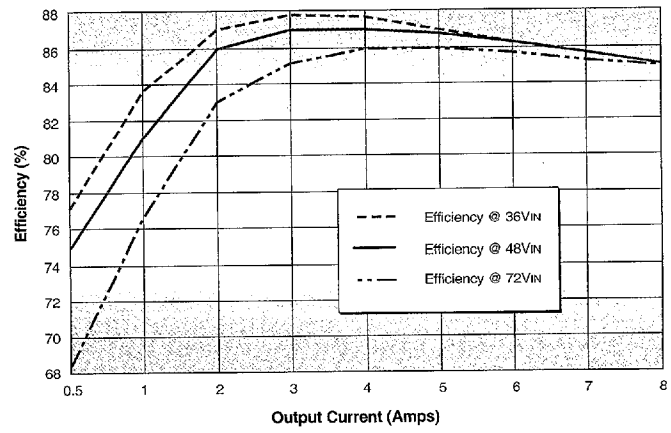


Figure 5c. Efficiency vs. Output Current and Input Voltage

On/Off Control (Standard)

The On/Off Control pin (pin 5) may be used for remote on/off operation. As shown in Figure 6, the control pin has an internal 10kΩ pull-up resistor to approximately 10V. The converter is designed so that it is enabled when the control pin is left open (normal mode) and disabled when the control pin is pulled low (to less than +0.8V relative to –Input, pin 2).

Dynamic control of the 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 obviously be able to sink approximately 1mA when activated and withstand more than 10 Volts when deactivated.

Applying an external voltage to pin 5 when no input power is applied to the converter can cause permanent damage to the converter. The on/off control function, however, is designed such that the converter can be disabled (pin 5 pulled low) while input power is ramping up and then "released" once the input has stabilized. Under these circumstances, it takes approximately 30ms for the output of the fully loaded DC/DC to ramp up and settle to within ±1% of its final value after the converter has been turned on.

Synchronization (Optional)

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). UMP DC/DC Converters have been designed so that the On/Off Control function on pin 5 can be replaced with a Sync function. This change has to be implemented by DATEL during the product assembly process. Contact our Applications Engineering Group for additional details.

To synchronize the switching of multiple UMP converters configured with the Sync function, an external clock can be applied to pin 5 of each converter. The clock should be a TTL square wave referenced to –Input (logic high = +2 to +5 Volts, 250µA max.; logic low = 0 to +0.8 Volts, 70µA max.) with a maximum 1µsec "high" duration. The frequency of the synchronizing clock should be higher than that of any individual converter. Therefore, it should be 185kHz ±5kHz.

Output Trimming

Vout may be trimmed ±5% via a single trimpot or fixed resistor. The trimpot should be connected between +Output (pin 9) and Common (pin 8) with its wiper connected to pin 10 (Trim). A trimpot can also be used to determine the value of a single fixed resistor which can be connected between pin 10 (Trim) and pin 9 (+Output) to trim "down" the output voltages, or between pins 10 (Trim) and 6 (–Output) to trim "up" the output voltages. Fixed resistors should be metal-film types with absolute TCR's less than 100ppm/°C to ensure stability.

Case Connection

Unlike most other DC/DC converters, UMP DC/DC's do not have their metal case connected to one of their input pins. The "uncommitted" case is connected to pin 4 which, depending on your system configuration, should be connected to either +Input (pin 3) or –Input (pin 2).

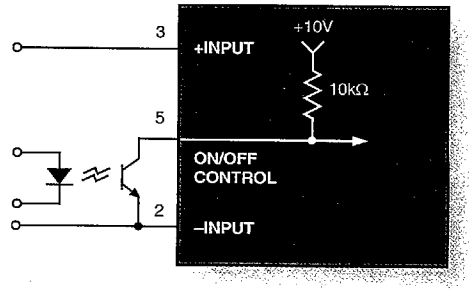
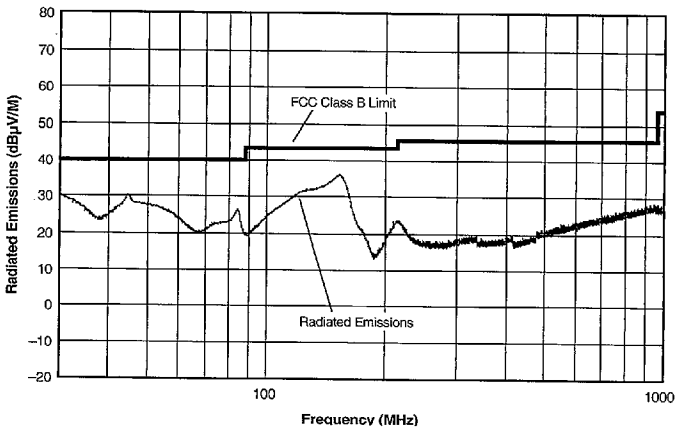


Figure 6. Driving the On/Off Control Pin

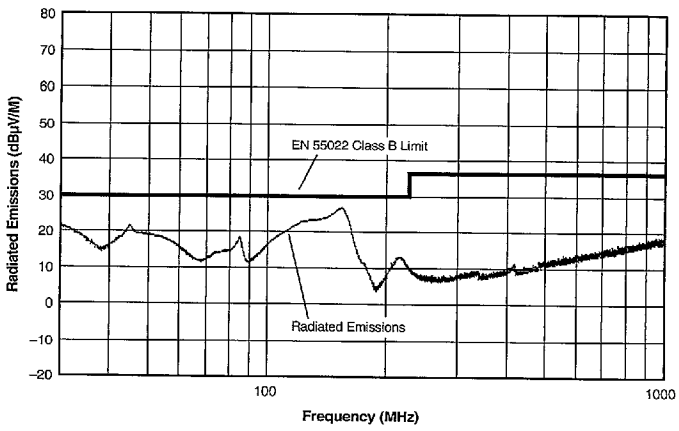
EMI RADIATED EMISSIONS

Radiated emissions plots to FCC and CISPR 22 for model UMP-5/8-D48 appear below. Published EMC test reports are available for each model. Contact DATEL's Applications Engineering Department for more details.

UMP-5/8-D48 Radiated Emissions
FCC Part 15 Class B, 3 Meters
Converter Output = +5Vdc @ +6.45 Amps



UMP-5/8-D48 Radiated Emissions
EN 55022 Class B, 10 Meters
Converter Output = +5Vdc @ +6.45 Amps



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