Technical Datasheet CPT8A36

Features

- Industry-standard pinout
- Ultra-wide input voltage range: 18 – 75Vin
- Output: 5 V at 8 A, 40W max.
- No minimum load required
- ROHS Directive 2002/95/EC Compliant
- Low height - 0.374" (9.5mm) max.
- Basic Insulation
- Withstands 100 V input transients
- Fixed-frequency operation
- Industry standard 1/16th brick footprint
- Fully protection (OTP, OCP, OVP, UVLO – auto-restart)
- Remote ON/OFF - positive or negative enable logic options
- Remote sense
- Output voltage trim range: ±10% (industry-standard trim equations)
- Weight: 0.45 oz [12.8 g]
- On-board input differential LC-filter
- Meets UL94, V-0 flammability rating
- UL/CSA60950-1 recognized, TUV certified per IEC/EN60950-1
- Designed to meet Class B conducted emissions per FCC and EN55022 when used with external filter (see EMC Compliance page.)

Description

The CPT8A36 "Cool Power Technologies" DC-DC converter is an open frame sixteenth-brick DC-DC converter that conforms to industry standard specifications. The converter operates over an input voltage range of 18 to 75 VDC, and provides a tightly regulated output voltage with an output current rating of 8 A. The output is fully isolated from the input and the converter meets Basic Insulation requirements. The standard feature set includes remote On/Off (positive or negative enable), input undervoltage lockout, output overvoltage protection, overcurrent/short circuit protection, output voltage trim, remote sense and overtemperature shutdown with hysteresis. The high efficiency of the CPT8A36 allows operation over a wide ambient temperature range with minimal derating (full rated power @ 70°C & 100LFM (0.5 m/s) airflow @ 24Vin & 48Vin.)

ELECTRICAL SPECIFICATIONS

18–75Vin, 5V/8Aout

Conditions: T_A = 25 °C, Airflow = 300 LFM, Vin = 48 VDC, Cin = 33 µF, unless otherwise specified.

Input Characteristics					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Operating Input Voltage Range		18	36	75	VDC
Input Under-Voltage Lock-out Turn-on Threshold Turn-off Threshold		 17.2 15.8	 17.6 16.2	 18 16.6	VDC
Input Voltage Transient	100ms			100	VDC
Maximum Input Current	V_{IN} = 18VDC; I_{out} = 8A			2.75	A
Input Standby Current	Converter Disabled		2	5	mA
Input No-Load Current	Converter Enabled		50	100	mA
Input Reflected Ripple Current	5Hz to 50MHz		10	30	mA_{PK-PK}
Input Voltage Ripple Rejection	120Hz		50		dB
Inrush Current	All	-	-	1	A^2/s

Output Characteristics					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Output Voltage Set point	Sense pins connected to output pins	4.925	5	5.075	VDC
Output Current		0		8	A
Output Current Limit Inception		9	11	14	A
Peak Short-Circuit Current	10mΩ Short, Vin=18-75V			28	A
RMS Short-Circuit Current	10mΩ Short, Vin=18-75V		2.4	3.0	A_{RMS}
External Load Capacitance	Oscon Low ESR			4700	uF
Output Ripple and Noise	20 MHz bandwidth		50	100	mV_{PK-PK}
Output Regulation Line: Load: Overall Output Regulation:	 Over line, load & temp.	 4.85	 ±1 ±1	 ±5 ±5 5.15	 mV mV V

ELECTRICAL SPECIFICATIONS (continued) 18–75Vin, 5V/8Aout

Conditions: T_A = 25 ºC, Airflow = 300 LFM, Vin = 48 VDC, Cin = 33 µF, unless otherwise specified.

Efficiency					
Parameter	Conditions	Min	Typ	Max	Unit
Full Load	Vin = 24V	89	91		%
	Vin = 48V	88	90		%
50% Load	Vin = 24V	89	91		%
	Vin = 48V	85	87		%
Dynamic Response					
Parameter	Conditions	Min	Typ	Max	Unit
Load Change 50% - 75% or 25% to 50% of Iout Max, di/dt = 0.1 A/µs			100	150	mV
Settling Time to 1% of Vout	Co = 1 µF ceramic + 10 µF tantalum		50		µs
Load Change 50%-75% or 25% to 50% of Iout Max, di/dt = 1.0 A/µs	Co = 1 µF ceramic + 100 µF tantalum		100	150	mV
Settling Time to 1% of Vout			50		µs
Isolation Specifications					
Isolation Capacitance			1000		pF
Isolation Resistance		10			MΩ
Isolation Voltage – Input to Output				2250	V_{DC}
Reliability					
Per Telcordia SR-332, Issue 2: Method I, Case 3 (I_O=80% of I_O_max, T_A=40°C, airflow = 200 lfm, 90% confidence	MTFB	3,499,841			Hours
	FITs (failures in 10^9 hours)	286			/10^9 Hours

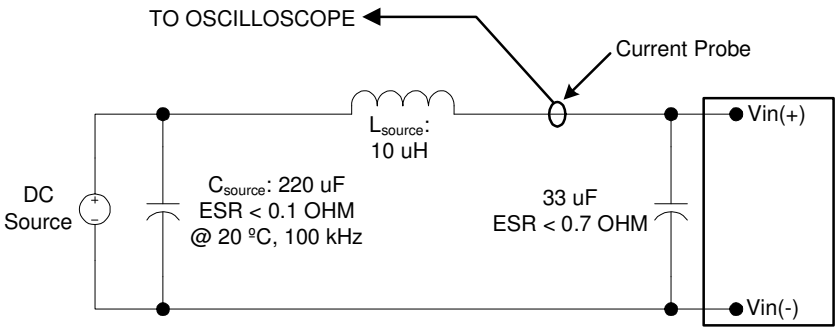
ELECTRICAL SPECIFICATIONS (continued) 18–75Vin, 5V/8Aout

Conditions: Ta = 25 °C, Airflow = 300 LFM, Vin = 48 VDC, Cin =33 µF, unless otherwise specified.

Absolute Maximum Ratings					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Input Voltage	Continuous Operation	0		75	VDC
Operating Ambient Temperature		-40		85	°C
Storage Temperature		-55		125	°C

Feature Characteristics					
Parameter	**Conditions**	**Min**	**Typ**	**Max**	**Unit**
Switching Frequency			430		kHz
Output Voltage Trim Range		-10		+10	%
Remote Sense Compensation				+10	%
Output Over-voltage Protection	Non-latching	118	124	130	%
Over-temperature Protection	Avg. PCB temp, non-latching		125		°C
Peak Backdrive Output Current during startup into prebiased output	Sinking current from external voltage source equal to V_{OUT} – 0.6V and connected to the output via 1Ω resistor. C_{OUT}=220µF, Aluminum		-	500	mA
Backdrive Output Current in OFF state	Converter disabled		0	5	mA
Enable to Output Turn-ON Time	V_{OUT} = 0.9*V_{OUT_NOM}		20		ms
Output Enable ON/OFF Negative Enable Converter ON Converter OFF Positive Enable Converter ON Converter OFF		 -0.5 2.4 2.4 -0.5		 0.8 20 20 0.8	 VDC VDC VDC VDC
Output Voltage Overshoot @ Startup			0	2	%Vo
Auto-Restart Period	(all protection features)		100		ms

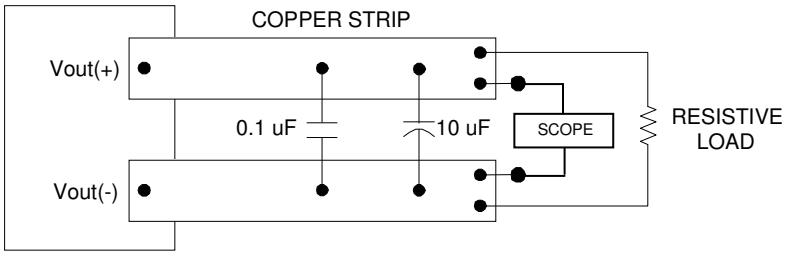
INPUT REFLECTED RIPPLE TEST SETUP:



Note: Measure input reflected-ripple current with a simulated source inductance (Ltest) of 10 uH. Capacitor C_S offsets possible source impedance.

Figure 1. Input Reflected-ripple Current Test Setup.

OUTPUT RIPPLE TEST SETUP:



Note: Use a 0.1μF X7R ceramic capacitor and a 10μF @ 25V tantalum capacitor. Scope measurement should be made using a BNC socket. Position the load 3 in. [76mm] from module.

Figure 2. Peak-to-Peak Output Noise Measurement Test Setup.

CHARACTERISTIC CURVES:

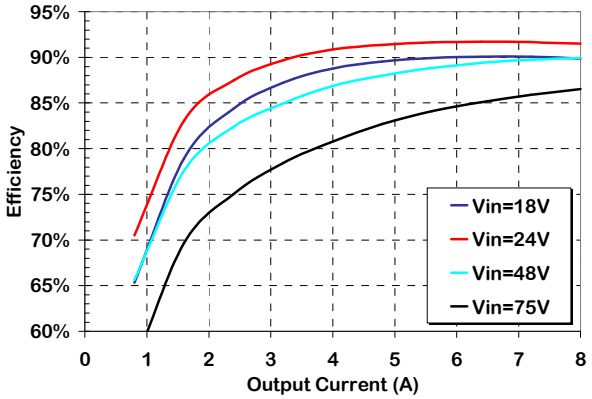


Figure 3. Efficiency vs Output Current, 300lfm airflow, 25℃ ambient.

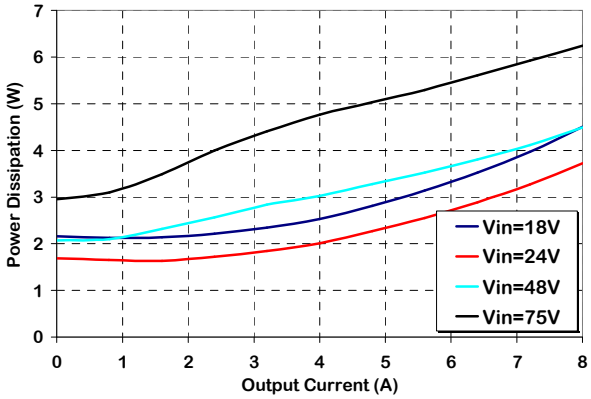


Figure 4. Power Dissipation vs. Load Current, 300lfm airflow, 25℃ ambient.

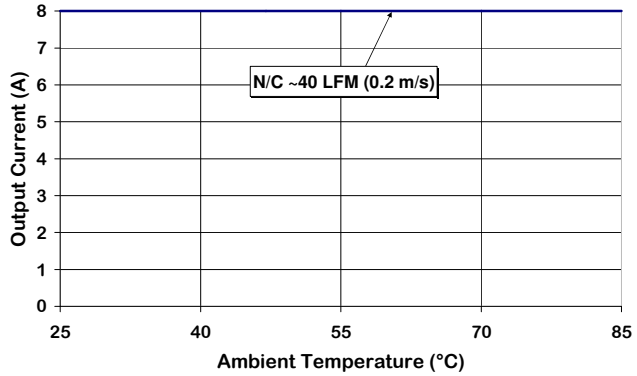


Figure 5. Output Current Derating vs Ambient Temperature & Airflow (converter mounted vertically with air flowing from pin 3 to pin 1, Vin = 36 V.)

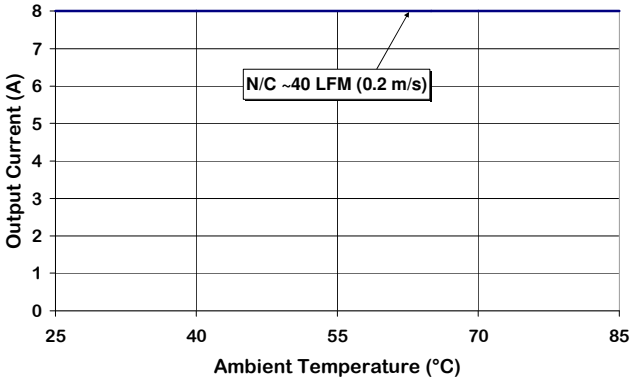


Figure 6. Output Current Derating vs Ambient Temperature & Airflow (converter mounted vertically with air flowing from pin 3 to pin 1, Vin = 24 V.)

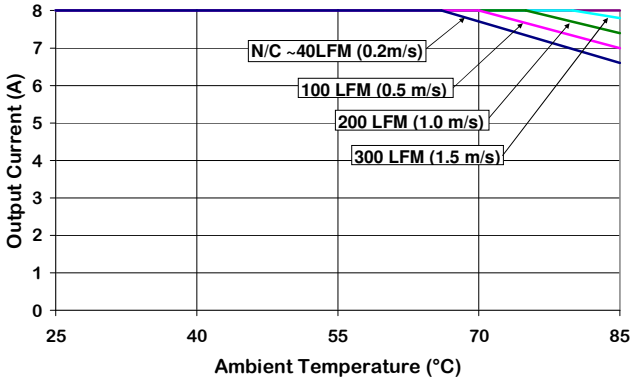


Figure 7. Output Current Derating vs Ambient Temperature & Airflow (converter mounted vertically with air flowing from pin 3 to pin 1, Vin = 48 V.)

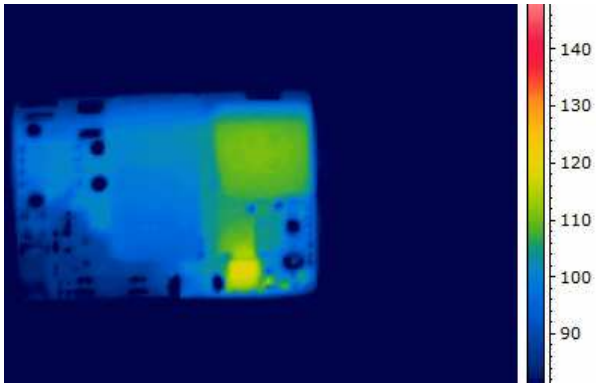


Figure 8. Thermal Image of CPT8A36N (8A output, 70C Ambient, 200lfm airflow, Vin = 48V, airflow from pin 3 to pin 1, T_{max} = 118℃)

CHARACTERISTIC WAVEFORMS:

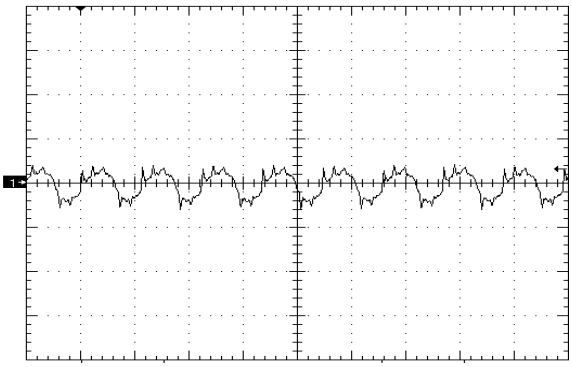


Figure 9. Output Voltage Ripple (50mV/div), time scale – 2uS/div. Vin=Vin_nom, full resistive

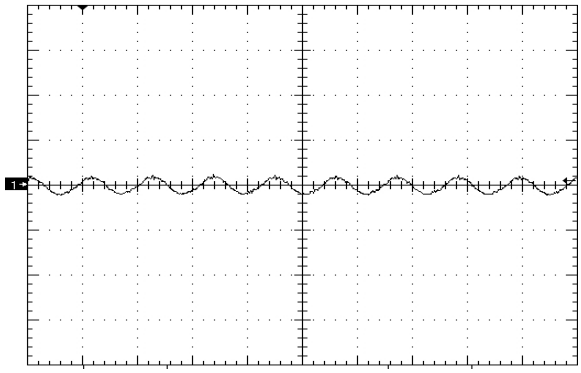


Figure 10. Input Reflected Ripple Current (10mA/div) time scale - 2uS/div. Vin=Vin_nom, full resistive

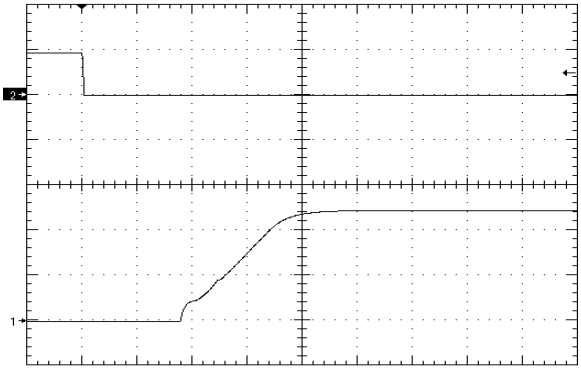


Figure 11. Startup Waveform (2V/div) via Enable Pin, time scale 4mS/div. Vin=Vin_nom, full resistive load (negative enable.)

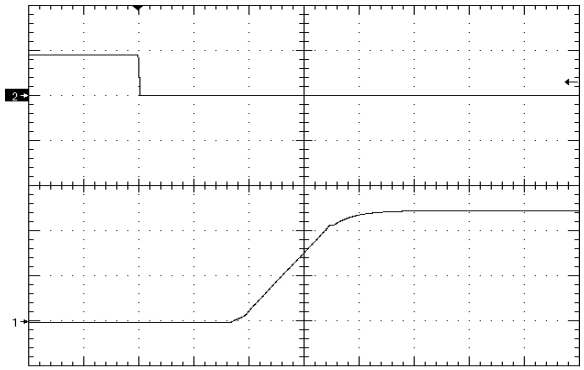


Figure 12. Startup Waveform (2V/div) via Enable Pin, time scale 4mS/div. Vin=Vin_nom, full resistive load + 4700uF (negative enable.)

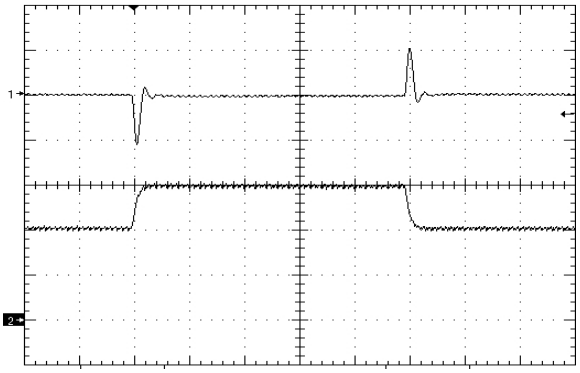


Figure 13. Load Transient Response (100mV/div), di/dt=0.1A/uS, 50% - 75% - 50% of full load, time scale: 200uS/div.

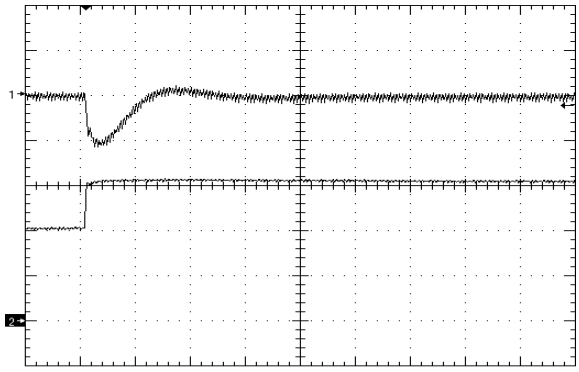


Figure 14. Load Transient Response (100mV/div), di/dt=2A/uS, 50% - 75% of full load, 330uF low ESR tantalum across output, time scale: 40uS/div.