C-MAC MicroTechnology

HIGH TEMPERATURE DC-DC CONVERTER

A GROUND BREAKING SOLUTION FOR OPERATION OVER 225°C/437°F (case)

The DC-DC Converter manufactured by C-MAC MicroTechnology is one of a family of high temperature hybrid modules specifically developed using CISSOID SOI (Silicon On Insulator) active devices. This leading edge product is designed for continuous operation up to 225°C/437°F and limited duration at 250°C/482°F. The implemented architecture is a voltage-mode 'Buck converter' that uses duty-ratio modulation at a constant frequency. Adaptive gate drive techniques ensure that maximum efficiency is achieved.

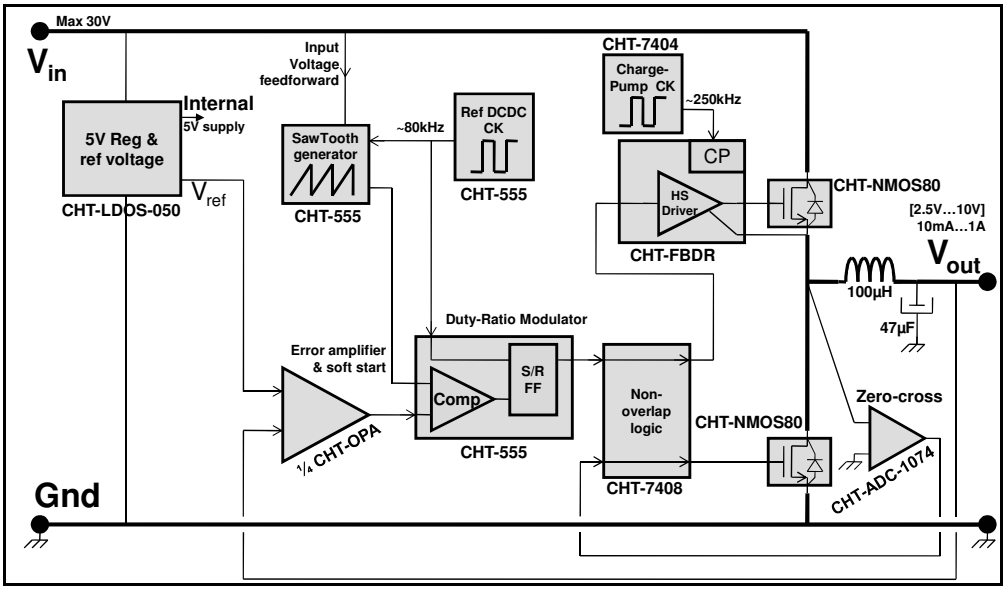
Can be packaged for oil & gas, industrial and aerospace applications.

Key features:

- Output voltage options from +2.5V to +10V
- Load current from 10mA to 1A
- Input voltage up to 30V
- Up to 85% efficient
- Fully characterised up to +225°C/437°F
- Operational up to +250°C/482°F

Package option

Functional Block Diagram



PROVISIONAL DATASHEET

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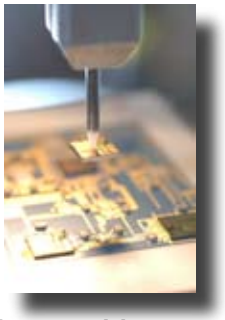
Developed in partnership with Cissoid

CISSOID

ABSOLUTE MAXIMUM RATINGS

Supply voltage to GND -0.5 to +35.0V.
ESD rating 1kV



Semiconductor die assembly on a C-MAC module

OPERATING CONDITIONS

Supply voltage to GND +6V to +30V

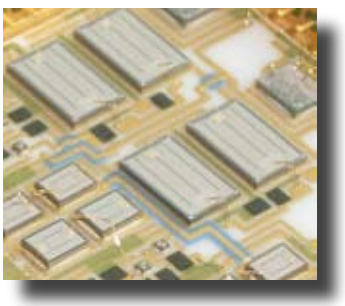
ELECTRICAL CHARACTERISTICS

The measurements have been made for an output voltage V_{out}=+5V

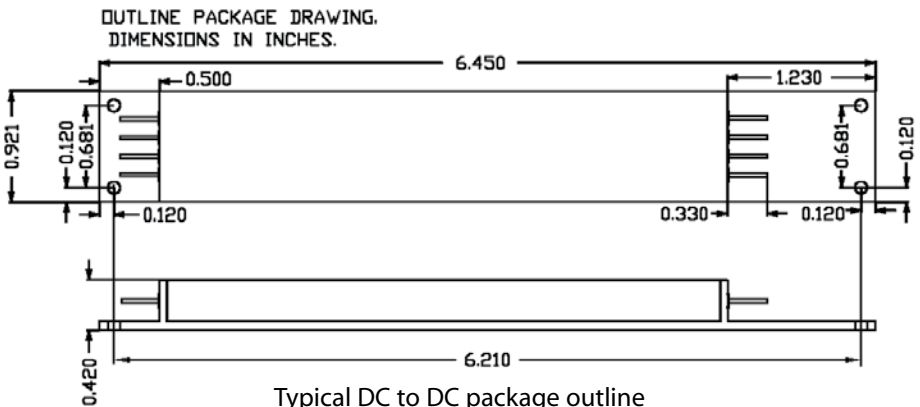
Parameter	Condition	Min	Typ	Max	Units
Supply voltage V_{in}		7 [1]		30	V
DC-DC Converter Output voltage[2] V_{out}	I_{load}=10mA to 1A	2.5	5	10	V
DC Line Regulation $\Delta V_{out}/\Delta V_{in}$			*-1*		mV/V
DC Load Regulation $\Delta V_{out}/\Delta I_{load}$			*+5*		mV/A
AC Load Regulation $\delta V_{out}/\delta I_{load}$	V_{in}=9V; V_{out}=5V; I_{load}=10mA to 1A; T_{amb}=200℃				
	10Hz		-60		dB
	100Hz		-40		dB
	1kHz		-26		dB
Output drift with Temperature $\Delta V_{out}/\Delta T$			*+0.25*		mV/K
Load current I_{load}		10m		1	A
Output ripple Vr	At worst case: Vin=30V				
	25℃/77℉			30	
	100℃/212℉			33	
	150℃/302℉			60	mVpk
	175℃/347℉			80	
	200℃/400℉			110	
	225℃/437℉			145	
Switching frequency		50	90	100	kHz
Efficiency P_{out}/P_{in}				85	%
Load capacitance C_L	Typical value at T_{amb}=25℃/77 ℉		47		µF
Inductor L (25℃/77℉)	Typical value at T_{amb}=25℃/77℉		100		µH
Transient load response	V_{out}=5V; $T_{ambient}$=200℃/400℉ Load current slew-rate=1mA/µs		ΔV_{out} [%] / Recovery Time [µs]		
	V_{in}=8V and I_{load}=100mA →1A		-6 / 600		
	V_{in}=8V and I_{load}=1A → 100mA		+8 / 750		
	V_{in}=15V and I_{load}=100mA → 1A		-7 / 750		
	V_{in}=15V and I_{load}=1A → 100mA		+7 / 750		
	V_{in}=30V and I_{load}=100mA → 1A		-7 / 500		
	V_{in}=30V and I_{load}=1A →100mA		+7 / 500		
Intrinsic current consumption		10		25	mA

[1] The minimum dropout voltage is 2V

[2] The nominal output voltage is preset by an internal resistive divider



C-MAC high-power chip and wire technology



Typical DC to DC package outline

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