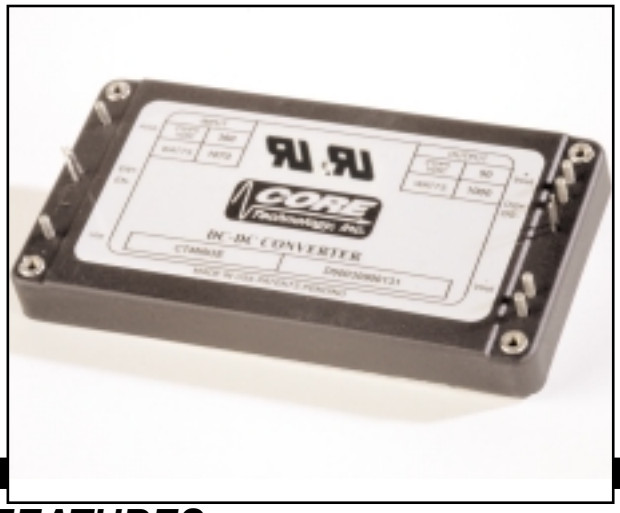


CORE Technology, Inc.

Distributed Power Modules

200 Vdc to 400 Vdc Input
From 350 Watts to 1000 Watt

FEATURES

- Small Size 2.4" x 4.6" x 0.5"
- Constant Frequency
- Efficiency Up to 93.5%
- Remote On/Off (Input Enable)
- Accurate Load Sharing (no interconnecting share signal required)
- Output Enable
- Over-Temp Shutdown (with Auto-Recovery)
- Overload Protection
- 100°C Base-Plate Operation
- UL & CSA Approval (pending) E186932

OPTIONS

- Special Output Voltages Available

APPLICATIONS

- Distributed power architecture
- Telecommunication
- Motor control
- Applications requiring high power in a compact space

DESCRIPTION

The CT4XXXEX DC to DC converters are part of Core Technology's family of high density power modules. These modules are unregulated, isolated, and have been targeted for distributed power and system level designs utilizing modular power converters.
These converters utilize "Down Slope" Load Sharing allowing them to accurately share the total output current without any interconnecting signal lines between them. In addition, they feature input and output enables, ultra high efficiency and 180 Watts per cubic inch power density. These modules have been developed as an interface from rectified "Off-line" or "PFC" output voltage to Core Technology's line of Post Regulating Synchronous Buck Converters. Distributed Power Modules can operate up to a base-plate temperature of 100°C and deliver up to 1000 Watts of output power in a 2.4" x 4.6" x 0.5" form factor.
The CT4XXXEX DC to DC converters are designed to reduce product development time while achieving maximum power performance.

33750 Lear Industrial Pkwy • Avon, Ohio 44011 • Ph (440) 937-9934 • Fax (440) 937-6638 • Website www.coretechnology.com

ELECTRICAL SPECIFICATIONS - OUTPUT

Parameter	Symbol	Units	CT4KXXE	CT4NXXE	CT4LXXE	Notes
Nominal Output Voltage*2	Vo	Volts	30	50	60	
Output Voltage Range *1	Vo	Volts	18-34	30-55	36-66	
Output Ripple and Noise *3	V_{RMS}	Volts	0.400	0.670	0.800	
Typical Efficiency	%	-	92.5	93..5	93.5	
Max Output Current	I_{MAX}	Amps	27	21.5	19.5	
Max Output Power	P	Watts	750	1000	1000	
Output Current Limit Inception	%	-	105 - 135	105-135	105 - 135	% of I_{Max}
Output Short Circuit Current	%	-	45-90	45-90	45-90	% of I_{Max}
Over-temp Shutdown (NOM)	%	-	105	105	105	
Over-temp Tolerance	°C	-	±5°C	±5°C	±5°C	
Over-temp Shutdown Hysterisis	°C	Celsius	10°C to 20°C	10°C to 20°C	10°C to 20°C	
Voltage Drop @ Max Load*3	Vd	Volts	1.70	3.00	3.40	Maximum
Power Sharing Accuracy	%	-	1 - 3	1 - 3	1 - 3	
Output Enable	V_{OE}	Volts	5.2	5.2	5.2	

ELECTRICAL SPECIFICATIONS - INPUT

Parameter	Symbol	Units	CT4KXXE	CT4NXXE	CT4LXXE	Notes
Input Voltage Range	V_I	Volts	200 - 400	200 - 400	200 - 400	
Maximum Input Current	I	Amps	3.0	3.5	3.5	
Input Reflected Ripple Current*4	I_{RR}	Amps	0.220	.280	0.325	@360Vin
Inrush Charge	Q_{IN}	Coulombs	186.0 E-6	186.0 E-6	186.0 E-6	@360Vin
Start-up Voltage	V_I	Volts	215 - 230	215 - 230	215 - 230	
Turn-off Voltage	V_I	Volts	190 - 215	190 - 215	190 - 215	
Module Enable	V_{IE}	Volts	<0.7	<0.7	<0.7	

ISOLATION SPECIFICATIONS

Parameter	Symbol	Units	CT4KXXE	CT4NXXE	CT4LXXE	Notes
Input to Output Isolation	-	Volts(rms)	3000	3000	3000	
Input to Base Plate Isolation	-	Volts(rms)	1500	1500	1500	
Output to Chassis Isolation	-	Volts(rms)	500	500	500	

*1 From 200-400 Vdc
*2 @ no Load
*3 With 360 Vdc PFC input
*4 @ 0.75% Load

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Units	CT4KXXE	CT4NXXE	CT4LXXE	Notes
Input Voltage	Vo	Volts	425	425	425	
Input Surge Withstand	Vdc	Volts	500	500	500	100ms
Maximum Output Current	I_{MAX}	Amps	30	23	22	
Max Operating Temperature	T_{BP}	Celsius	-30°C to 100°C	-30°C to 100°C	-30°C to 100°C	
Storage Temperature	T_{ST}	Celsius	-40°C to 110°C	-40°C to 110°C	-40°C to 110°C	

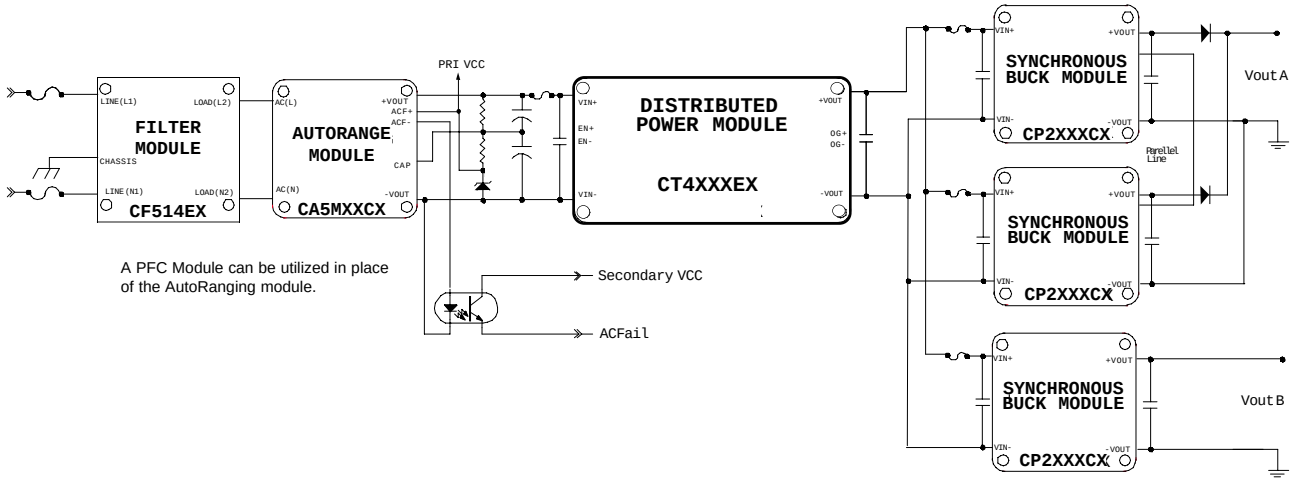
ENVIRONMENTAL SPECIFICATIONS

Parameter	Symbol	Units	CT4KXXE	CT4NXXE	CT4LXXE	Notes
Max Operating Altitude	ft	-	10,000			
Max Storage Altitude	ft	-	40,000			
Operating Humidity	RH%	-	5% to 95% RH(non-condensing)			
Vibration	-	-	Three Axis Orthogonal, Random Vibration 10min (2.4Grms 5hz-500hz)			
Reliability (Mil-HDBK-217E)	-	Hours	635,688			@40C
Temperature Coefficent	Tco	°C	0.02°C			
Cooling	-	-	Choose Heat Sink Based On Airflow			
Base Plate Thermal Resistance	R_{th}	-	0.08°C ± 0.02°C			
Flammability	-	-	Materials Meet UL94V-0			

MECHANICAL SPECIFICATIONS

Parameter	Symbol	Units	CT4KXXE	CT4NXXE	CT4LXXE	Notes
Weight	-	gr/oz/lb	195gr / 6.9oz / 0.430lb			
Dimension (L x W x D)	-	Inches	4.6” x 2.35” x 0.5”			
Volume	Vol	Cubic Inch	5.5			

TYPICAL APPLICATION



FUSING CONSIDERATIONS

In order to allow maximum flexibility when using these converter modules an internal fuse is not provided. For module and system protection always provide input fusing based on the particular application requirements.

SAFETY CONSIDERATIONS

In order to insure agency approval in which this power module is utilized, the unit must be used in compliance with the creapage, (spacing and separation) requirements with UL-1950, CSA22.2 - 950 and EN60950.

CHARACTERISTIC CURVES

FIGURE 1

NORMALIZED OUTPUT VOLTAGE VO(V) vs OUTPUT POWER DISTRIBUTED POWER MODULE

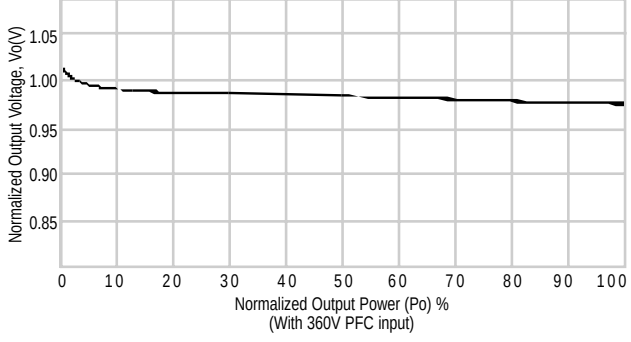


FIGURE 2

EFFICIENCY vs OUTPUT CURRENT DISTRIBUTED POWER MODULE

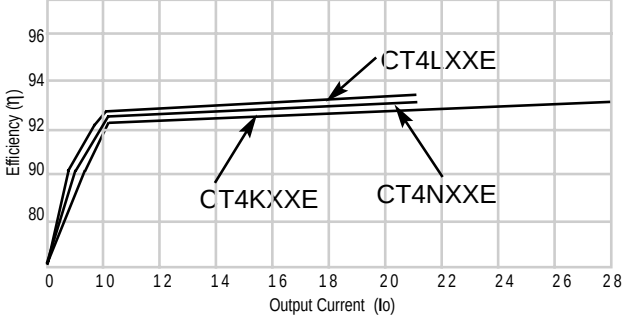


FIGURE 3

NORMALIZED OUTPUT VOLTAGE vs OUTPUT CURRENT DISTRIBUTED POWER MODULE

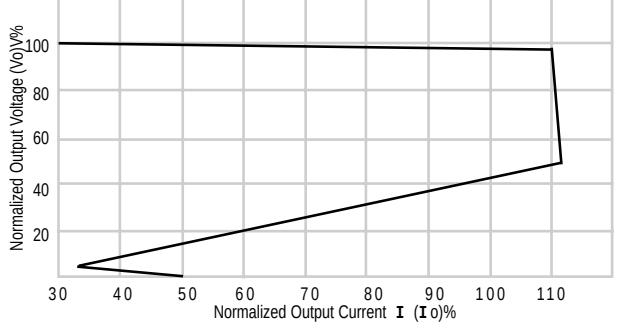
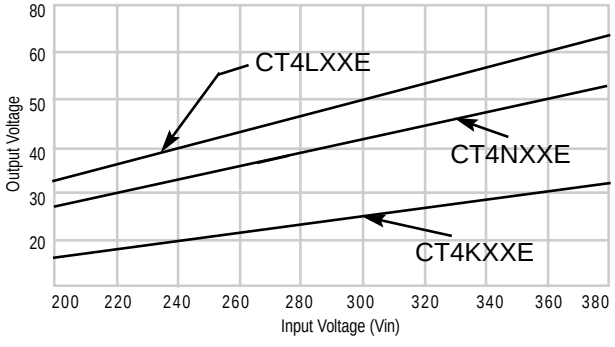


FIGURE 4

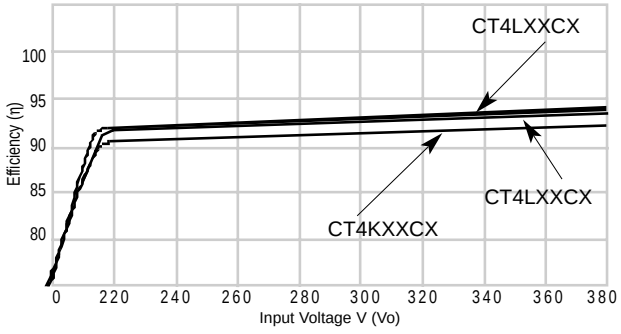
OUTPUT VOLTAGE vs INPUT VOLTAGE DISTRIBUTED POWER MODULE



CHARACTERISTIC CURVES CONTINUED

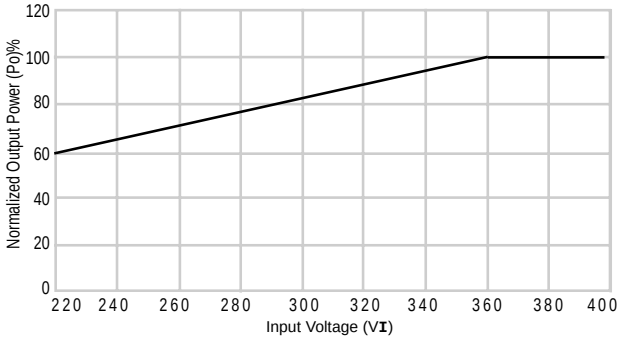
EFFICIENCY vs INPUT VOLTAGE
DISTRIBUTED POWER MODULE

FIGURE 5



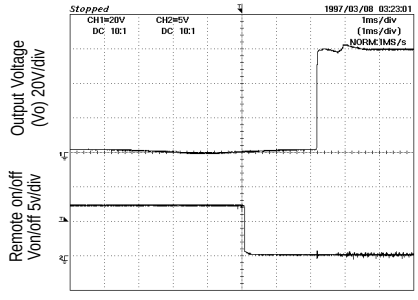
NORMALIZED OUTPUT POWER vs INPUT VOLTAGE
DISTRIBUTED POWER MODULE

FIGURE 6



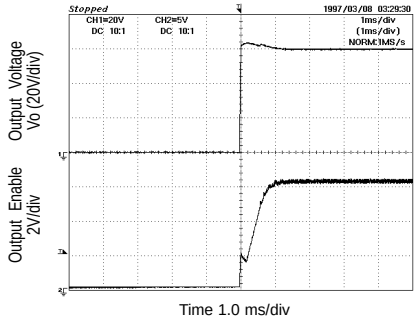
START - UP TRANSIENT (FROM ENABLE)
DISTRIBUTED POWER MODULE

FIGURE 7



OUTPUT ENABLE TIMING
DISTRIBUTED POWER MODULE

FIGURE 8



TEST CONFIGURATIONS

EFFICIENCY MEASUREMENT

NOTE: Measurement taken at terminals of module. All connection points must be tight to avoid erroneous readings.

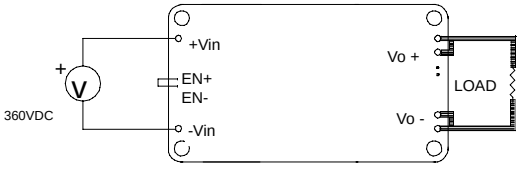


FIGURE 9

REFLECTED RIPPLE CURRENT MEASUREMENT

NOTE: Measurements of Reflected Ripple Currents are taken at input terminals with a simulated supply impedance of 10uH. A low ESR 220uF capacitor connected across the supply is used to suppress any supply impedance deficiencies. Measurements taken, are within 12" of module terminals. All connection points must be tight to avoid erroneous readings.

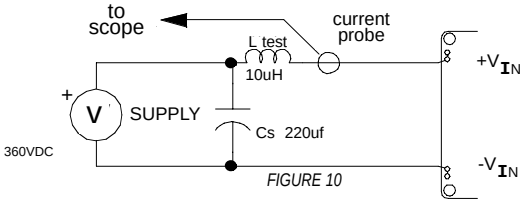


FIGURE 10

OUTPUT ENABLE/GOOD

Distributed Power converter modules are equipped with an Output Enable/ Good Logic signal. In the event that the output voltage falls below a pre-determined value, the Output Enable signal will be deasserted. A logic high (HH=6.1Vdc, HL=5.1Vdc) on the OG+ pin indicates that the output voltage is good. A logic low (LH=.87Vdc, LL=.47Vdc(sinking 50u AMPS)) on the OG+ pin indicates that a failure has occurred.

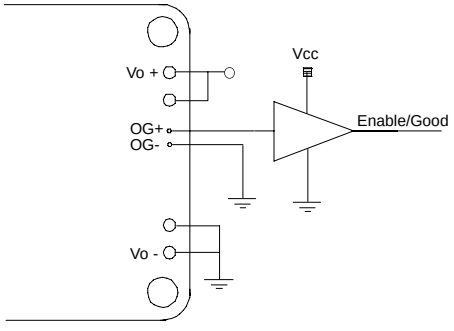


FIGURE 11

LOAD SHARING

Distributed Power converter modules are equipped with load sharing capability and can be combined or paralleled in order to improve reliability or increase the output power capability. These modules do not require any communication signal lines in order to load share. “Down-Slope” load sharing allows the module to accurately load share by connecting only the output power terminals. Output oring diodes should be utilized.

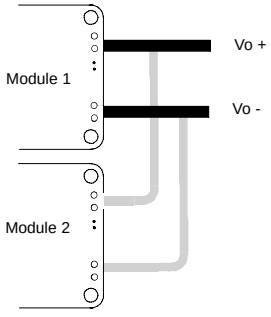


FIGURE 12

MODULE ENABLE/DISABLE

This converter module may be enabled by pulling the “EN+” pin below 0.7 Vdc with respect to input common.

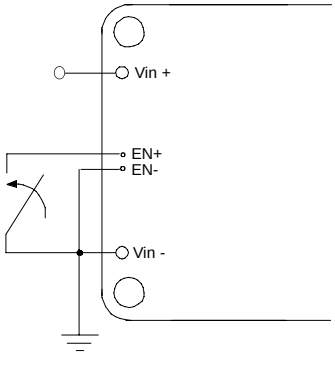


FIGURE 13

OVER-TEMPERATURE SHUTDOWN

Distributed Power modules are equipped with over-temperature protection circuitry so that the unit will not be damaged in an over-temperature condition. The converter will shut itself down above 100°C and will auto-restart once it is at a safe operating temperature.

OUTPUT POWER VS BASE PLATE-TEMPERATURE

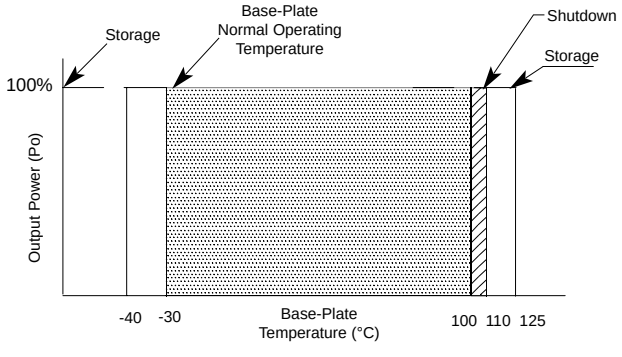
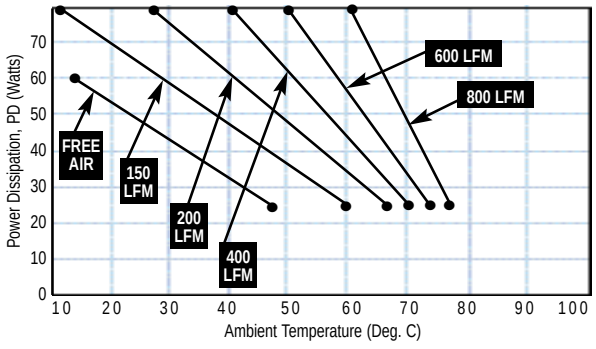
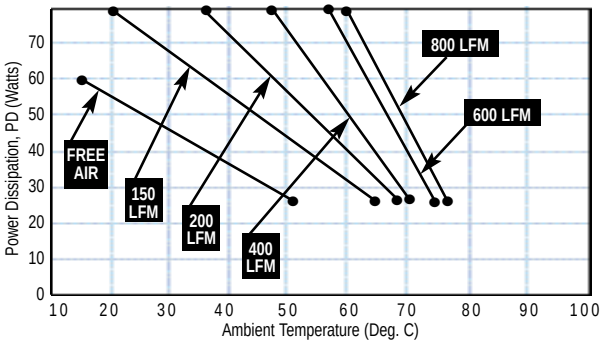


FIGURE 14

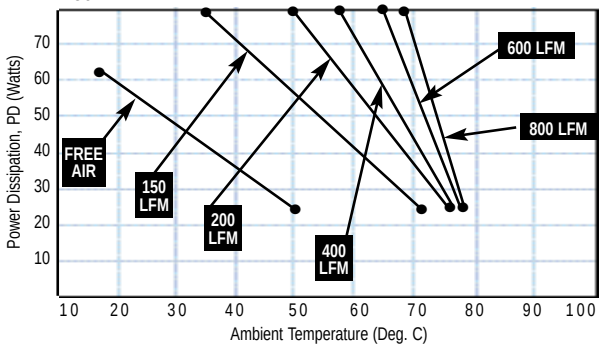
POWER DISSIPATION PD vs AMBIENT TEMPERATURE
DISTRIBUTED POWER MODULE
FIGURE 15 **NO HEAT SINK**



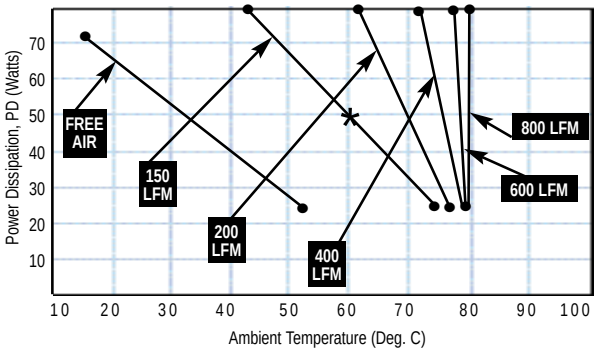
POWER DISSIPATION PD vs AMBIENT TEMPERATURE
DISTRIBUTED POWER MODULE
FIGURE 16 **1/4" HEAT SINK**



POWER DISSIPATION PD vs AMBIENT TEMPERATURE
DISTRIBUTED POWER MODULE
FIGURE 17 **1/2" HEAT SINK**



POWER DISSIPATION PD vs AMBIENT TEMPERATURE
DISTRIBUTED POWER MODULE
FIGURE 18 **1" HEAT SINK**



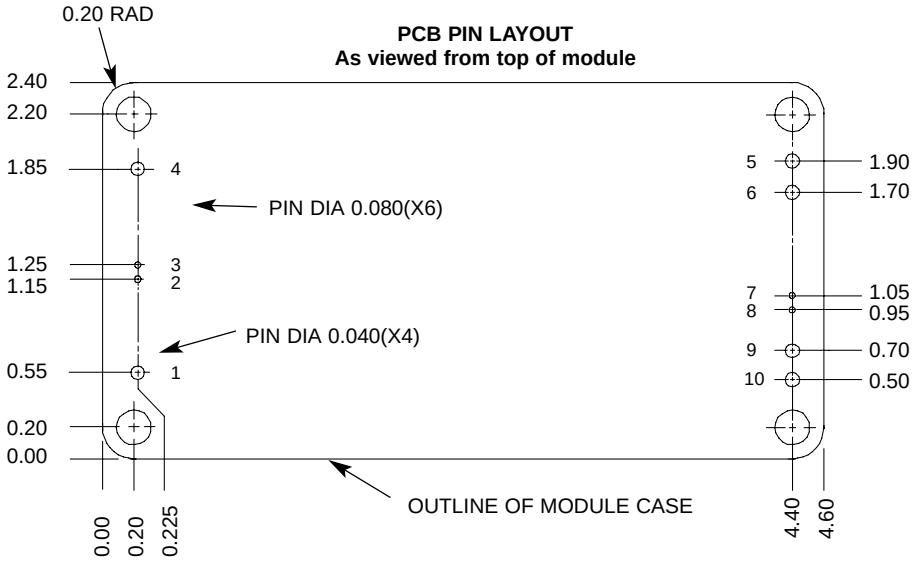
FORCED AIR CONVECTION COOLING

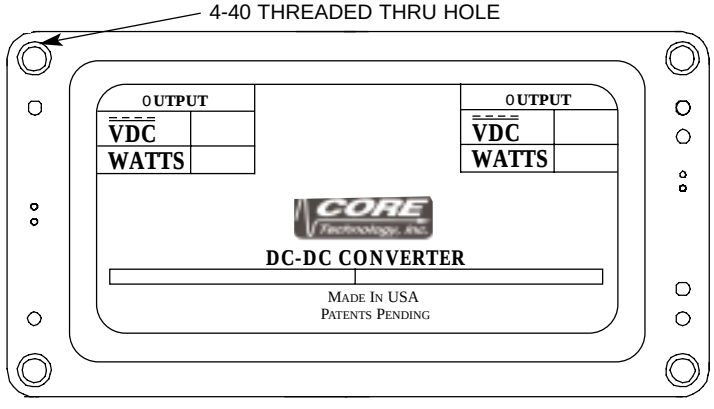
These figures can be utilized to determine if a heat sink and forced air convection cooling will be required in your particular application. Figures 15 through 18 show typical output power vs ambient temperature with various heat sink and air flow conditions. Utilize these curves to determined the proper cooling for your application.

Example: For your application you require a 60 volt output and 600 Watt capability. A CT4LM1EX unit will provide up to 750 Watts of output power when driven with a 360VDC PFC Front End. This module has an efficiency of 92.5%. Therefore maximum power dissipation from the module will be 49 Watts. By viewing "Figure 18" it can be determined in a 60°C environment, forced air cooling of 150LFM (Min) with a 1" heatsink will be required.

Note: By providing 150LFM with a 1" heatsink the base-plate of the module will not exceed 100°C in a 60°C environment.

Outline Drawing





BOTTOM VIEW

TOLERANCES: -0.000”
+0.030”

Connector Pin Assignment

1	+Vin
2	+EN
3	-EN
4	-Vin
5,6	-Vout
7	-OG
8	+OG
9,10	+Vout

Ordering Information

Part Numbering Scheme for CT4XXXEX Distributed Power Module

C	*TYPE*	*IN-VOLTS*	*OUT-VOLTS*	*POWER LEVEL*	*TEMPERATURE RANGE*	*PACKAGE SIZE*	*HEAT SINK TYPE*
C	***T=** Distributor Power Module*	***4 =*** 200-400VDC	***K =** 30 VDC* ***L =** 60 VDC* ***N =** 50VDC*	***H =*** 350 Watts ***K =*** 500 Watts ***M =*** 750 Watts ***N =*** 1000 Watts	***2 =*** -25 °C to +85 °C ***3 =*** -30 °C to +100 °C	***E =*** Full Size	***Blank*** = No Sink ***L02 =*** 0.25” Longitudinal ***L05 =*** 0.50” Longitudinal ***L10 =*** 1.0” Longitudinal ***T02 =*** 0.25” Transverse ***T05 =*** 0.50” Transverse ***T10 =***1.0” Transverse

C	T	4	L	N	2	E	L10

EXAMPLE - *To order a Distributed Power module with an output voltage of 60VDC, output power of 1000 watts, -25 to 85C operating temperature range and 1.0” longitudinal heatsink fins, use the following part number CT4LN2EL10;*