

PIN CONNECTIONS	
PIN NUMBER	FUNCTION
1	-IN
2	No Pin (Case)
3	ON/OFF
4	+IN
5	TRIM1
6	-OP1
7	+OP1
8	TRIM2
9	-OP2
10	+OP2



The **CTH485033N20M-0606XWA** features low profile and high conversion efficiency that designed for Xinwei only is suitable for high temperature step load applications using a 48V (36~75V) input bus. The fully isolated two converters in single package design provide 50 watts power or 6A+6A current is able to replace two low current bricks that able to reduce the complexity of the system design.

- High efficiency 90%@5.0V-4.5A / 3.3V-4.5A
..... 90%@5.0V-6.0A / 3.3V-6.0A
- High useable current 5.0V-6A / 3.3V-6A at 80°C 100LFM
..... 5.0V-6A / 3.3V-6A at 86°C 200LFM
- High power density 25W/in³
- Low profile 0.36"(9.1mm)
- Operation temperature -40°C~105°C
- Module thermal resistance 3.46°C/W@200LFM
- Separated regulation and isolation at both outputs
- Open frame with Sink-Plate package option



Part Number *	Max. Input	Max. Output	Efficiency	Part Number *	Max. Input	Max. Output	Efficiency		
CTH48V1V2ABCD-EFGH	36V~75V	278W	25A/25A 250W	90%	CTH24V1V2ABCD-EFGH	18V~36V	278W	25A/25A 250W	90%

* Options for **CTH Series** are as follows (referring to module drawing):

V1 (Output voltage of **OP1**): "A5, A2, 50, 33, 25, 18 and 15" for 15V, 12V, 5.0V, 3.3V, 2.5V, 1.8V and 1.5V
V2 (Output voltage of **OP2**): "A5, A2, 50, 33, 25, 18 and 15" for 15V, 12V, 5.0V, 3.3V, 2.5V, 1.8V and 1.5V

A (Enable Logic): "P" for Positive "N" for Negative

B (Pin Length): "0" for 0.12" "4" for 0.16" "2" for 0.20" "3" for 0.24"
C (Total Height): "0" for 0.36" "4" for 0.40" "2" for 0.42" "3" for 0.50"

D (Base Plate): "M" 1.0mm Metal Plate "A" 3.0mm Sink-Plate "B" 5.0mm Sink-Plate

EF (V1 current): "00~99 for Output Current Rating

GH (V2 current): "00~99 for Output Current Rating

Example: **CTH485033N20M-0606** is a 48V to 5.0V-6A(OP1) / 3.3V-6A(OP2) dual output dc/dc converter with negative control logic 0.20" pin length, 0.36" total height and 1.0mm metal plate.

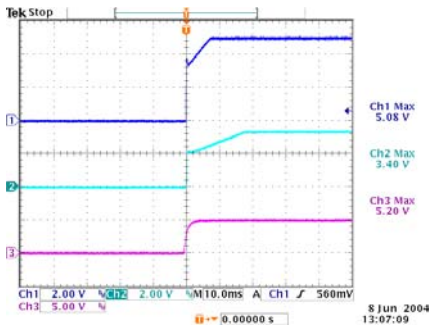
ABSOLUTE MAXIMUM RATINGS		
Temperature	Operation	-40°C to +105°C
	Storage	-55°C to +125°C
Input Voltage Range	Operation:	
	24V Models	-0.5V to +40Vdc
	48V Models	-0.5V to +80Vdc
Isolation Voltage	Transient (100mS):	
	24V Models	50V Maximum
	48V Models	100V Maximum
Remote Control Voltage	Input to Output	2.0KV Minimum
	Input to Case	1.0KV Minimum
	Output to Case	1.0KV Minimum

INPUT SPECIFICATIONS		
Operation Voltage Range	24V Models	+18V to +36Vdc
	48V Models	+36V to +75Vdc
Reflected Ripple Current	L _{EXT} = 10uH	20mA Max
Power ON Voltage Ranges	24V Models	+17.5V to +17.9Vdc
	48V Models	+35.0V to +35.8Vdc
Power OFF Voltage Ranges	24V Models	+16.1V to +16.5Vdc
	48V Models	+32.2V to +33.0Vdc
Off State Input Current	V _{NOM}	6mA Max
Latch-State Input Current	V _{NOM}	8mA Max
Input Capacitance	24V Models	33.0uF Max
	48V Models	6.8uF Max

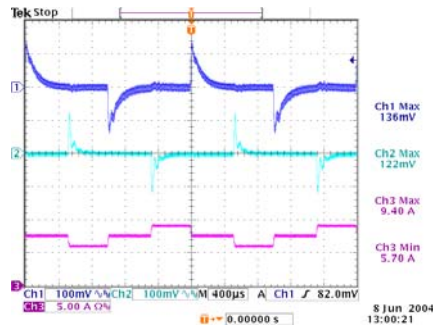
GENERAL SPECIFICATIONS		
Conversion Efficiency	Typical	See table
Switching Frequency	Typical	220KHz
MTBF	Bellcore	3.45×10 ⁶ hrs @40°C-GB.
OTP	Internal	120°C
Weight		1.9 oz
Size		2.30"×2.40"×0.36"

OUTPUT SPECIFICATIONS		
Voltage Accuracy	Typical	±1%
Line Regulation	Full Input Range	±0.2%
Load Regulation	10%~100%	±0.2%
Temperature Drift	-40°C ~100°C	±0.02%/°C
Output Tolerance Band	All Conditions	±3%
Ripple & Noise (20MHz)	Peak-Peak (RMS)	1% (0.3%) V _o
Over Voltage Protection	V _{NOM} , 10% Load	115~130 %Vo
Output Current Limits	V _{NOM}	110%~140%
Voltage Trim	V _{NOM} , 10% Load	+10%/-20%
Input Ripple Rejection (<1KHz)	V _{NOM} , Full Load	-50dB
Step Load (2.5A/uS)	50%~75% Load	300mV/300uS
Start-Up Delay Time	V _{NOM} , Full Load	20mS/250mS

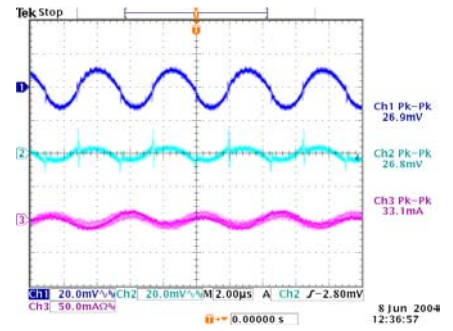
CONTROL FUNCTIONS		
Remote Control	Logic High	+3.0V to +6.5V
	Logic Low	0V to +1.0V
Input Current of Remote Control Pin		-0.5mA ~ +1.5mA



Simultaneously Start-Up for Both Outputs
(V_{IN} : 50V, Load: 6A+6A)



No Mutual-Interference Output Transients
(V_{IN} : 50V, Load: 4.5A/3.0A+ 4.5A/3.0A@2.5A/ μ S)

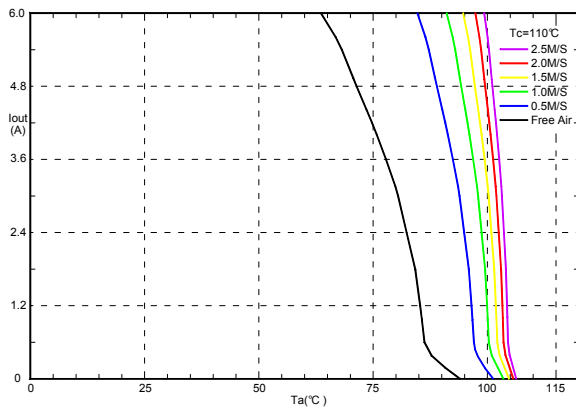


Synchronous Ripple/Noise for Input and Outputs
(V_{IN} : 50V, Load: 6A+6A, L_{IN} =10uH)

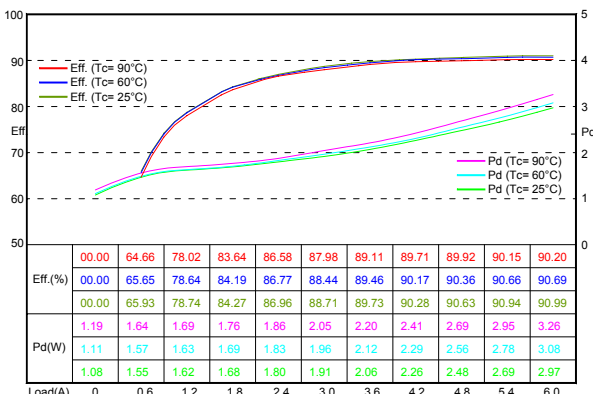
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Thermal Plot with 55°C-200LFM Airflow (Direction: N to S)



Balance Load Derating Plot of OP1/OP2 Without Heat Sink
(The cooling effect of test PCB was canceled)

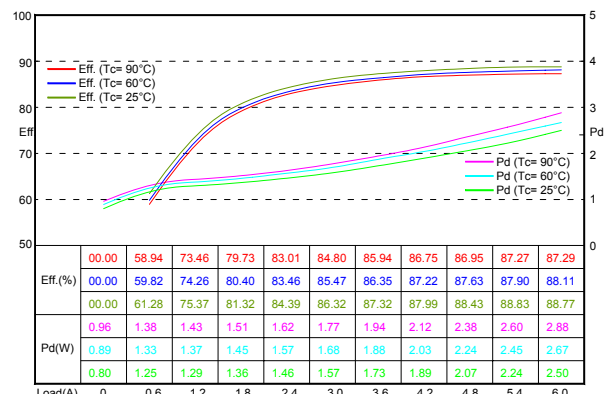


Efficiency and Power Loss of OP1 (5.0V)

Thermal Plot with 55°C-200LFM Airflow (Direction: E to W)

Not applied to this power range

Balance Load Derating Plot of OP1/OP2 With 3mm Heat Sink
(The cooling effect of test PCB was canceled)



Efficiency and Power Loss of OP2 (3.3V)

CTH Series Operating Information

General

Absolute Maximum Ratings

Some ratings, shown in SPECIFICATIONS, are the absolute maximum ratings referring to no destruction or design limits, normally tested with one parameter while exceeding the limits of absolute maximum ratings or electrical characteristics.

The stress exceeding the absolute maximum ratings may cause permanent damage, function and performance degraded. As far as design margin and enhancing system reliability are concerned, it is recommended that CTH series DC/DC converters operate below 90°C of case temperature. The over temperature protection set point is 100°C ~110°C base plate.

Safety

Standards

The CTH series DC/DC converters are UL approval pending and designed in accordance with EN60950 Safety of information technology equipment including electrical business equipment. The CTH series DC/DC converters are designed to meet the U.S. and Canadian Standard for Safety of Information Technology Equipment, Including Electrical Business Equipment applicable requirement in CSA/UL60950.

Isolation

The isolation is an basic insulation in accordance with EN60950. CTH series, built in DC-to-DC converter power supplies, should be installed in end-use equipment for printed wiring board or chassis mountable, and intended to be supply by an isolated secondary circuit. Consideration should be given to measure the case temperature to comply with maximum case temperature when operating.

When the supply to DC/DC converter meets all requirements for SELV, the output is considered to remain SELV limit. For supply voltage from 60V to 75V DC, reinforced insulation must be provided in the 75V power source that isolates the input from the mains. Single fault testing in the 75V supply circuit will be performed in combining with the CTH series DC/DC converter to demonstrate that the output meets the requirement for SELV. One pole of the input and the other one of the output are going to be grounded or both circuits are to be kept floated.

The isolation, withstanding 1500V DC between input and output, 1000V DC between input/output and case, is verified in an electrical strength test.

Flammability

The flammability ratings of plastic parts and PCBs meet UL-94V-0.

Fusing

A fuse should be used at the input of each converter to isolate the failed one from others, keeping the system continue to operate and prevent the damage of power distribution wiring from over heating. A fast blow fuse should be used with 10A rating or less, it is recommended using a fuse with the lowest current rating.

Input Side

Input (+IN, -IN)

Voltage Range

The range 36V~75V of input voltage meets the requirement of European Telecom Standard ETS 300 132-2 for normal input voltage range in -48V(-40.5V~ -57.0V) and -60V(-50.0V~ -72.0V) DC power systems. The absolute maximum continuous input voltage is 75V DC and withstands 100V DC/1sec maximum transient voltage. The range 18V~36V of 24V version is also available.

Input Capacitance

The input characteristic of a DC/DC converter may be looked as a negative impedance element in its input voltage range. Sometimes, oscillation will be occurred when high impedance power source is applied to supply power to a DC/DC converter. An external input capacitor is recommended to reduce the characteristic impedance and eliminate the oscillation between the DC/DC converter and the source.

Generally speaking, a 220uF~470uF capacitor across the input of CTH series DC/DC converter will help to insure stability.

Remote Control (ON/OFF)

The CTH series DC/DC converter has the ON/OFF control pin connecting to primary side control signal ON/OFF power converter. The control signal of ON/OFF pin is referred to the negative power input pin. Two control logic options are available.

Negative Logic

ON: Short to negative power input pin or apply voltage of logic low.

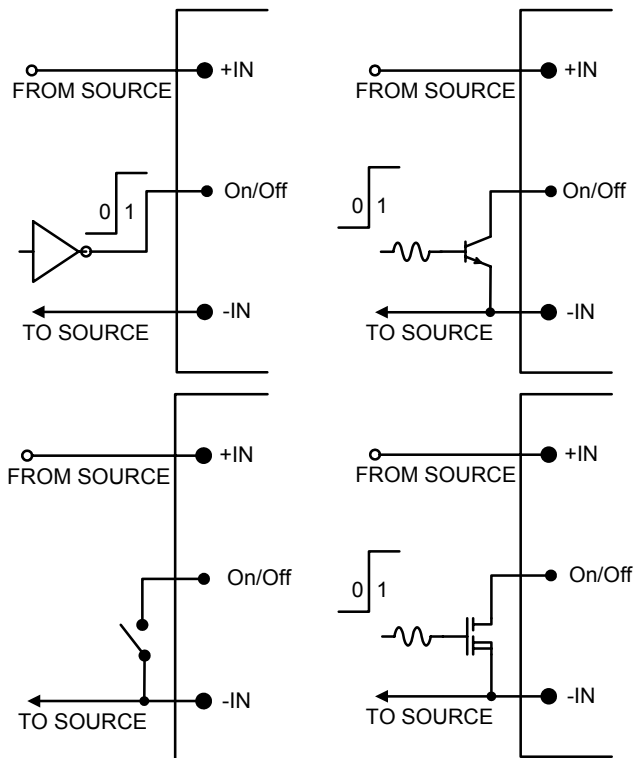
OFF: Opening circuit or apply the voltage of logic high.

Positive Logic

ON: Opening circuit or apply the voltage of logic high.

OFF: Short to negative power input pin or apply voltage of logic low.

A mechanical switch or an open collector NPN transistor (open drain N channel FET) can be used to drive the ON/OFF pin. The device must be capable of sinking 1mA minimum at a logic low voltage 1.0V and withstands 10V DC minimum.



Output Side

Output (+OUT, -OUT)

Ripple & Noise

The ripple of CTH series DC/DC converter is measured as peak-to-peak voltage from 0 to 20MHz, which includes the noise and fundamental ripple. The ripple and noise can be reduced significantly by paralleling a de-coupling capacitor to the output terminal.

Over Current Protection (OCP)

The CTH series DC/DC converter provides OCP function to withstand continuous overload or short circuit condition in the output. The converter will recover to normal operation after the overload is removed. The OCP set point of CTH series DC/DC converters is 105%~120% of rated output current.

Over Voltage Protection (OVP)

The CTH series DC/DC converter provides OVP lockout function to prevent the damage of load from over voltage condition on the output. The converter will restart after recycling the input power or control signal of primary control pin. The OVP set point of CTH series DC/DC converters is 125%~140% of rated output voltage.

Remote Sense (+S, -S)

The CTH series DC/DC converter has the remote sense used to compensate voltage drop due to resistance in the distribution system, it allows voltage regulation at the load or a selected point. It should be noted that the sense line must be located close to a ground trace or a ground panel to reduce noise, a twisted wire pair is recommended for discrete wiring. The sense will compensate 0.5V maximum of voltage drop between the sensed voltage and the voltage of output pins.

Voltage Adjust (Trim)

The CTH48D5033-2025 DC/DC converter has the independent TRIM pin used to adjust output voltage at both channel beyond or below nominal output voltage. It should be noted that trim up to be above OVP set point may cause a converter to enter the over voltage protection state. The trim function is the same as other major competitors' half brick DC/DC converters. The TRIM pin is noise sensitivity. External resistors should be located within 1cm of the converter. If not using the trim feature, leave the TRIM pin open.

TRIM UP:

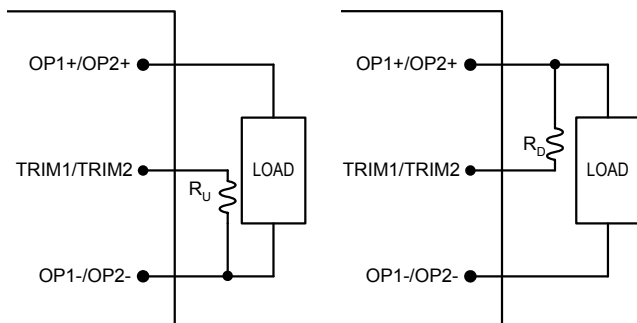
OP1: connect a trim resistor (R_U) between TRIM1 pin and OP1- pin.

OP2: connect a trim resistor (R_U) between TRIM2 pin and OP2- pin.

TRIM DOWN:

OP1: connect a trim resistor (R_D) between TRIM1 pin and OP1+ pin.

OP2: connect a trim resistor (R_D) between TRIM2 pin and OP2+ pin.



R (K Ω)	+1%	+2%	+3%	+4%	+5%	+6%	+7%	+8%	+9%	+10%
2.5V	22.3	10.0	6.40	4.70	3.80	3.10	2.70	2.30	2.00	1.80
3.3V	80.9	34.3	21.8	15.9	12.6	10.3	8.84	7.70	6.82	6.12
5.0V	127	41.1	24.5	17.5	13.6	11.1	9.40	8.10	7.20	6.40
	-1%	-2%	-3%	-4%	-5%	-6%	-7%	-8%	-9%	-10%
2.5V	1.46	0.71	0.42	0.27	0.18	0.12	0.08	0.04	0.02	0.00
3.3V	6.14	3.13	1.96	1.34	0.96	0.70	0.51	0.36	0.25	0.16
5.0V	4.34	2.35	1.49	1.01	0.70	0.49	0.34	0.22	0.12	0.00

Output Capacitance

The extra output capacitance is required to improve the voltage regulation when powering a load with significant dynamic current requirement. Putting a low ESR capacitor to the load as close as possible to handle the short duration high frequency component of dynamic load current and put the higher value of electrolytic capacitor to progress the mid-frequency component.

The capacitance, resistance and inductance of distribution system are used as feedback components resulted in affecting stability and dynamic response performance of power converter if the remote sense is used.

In generally, 100uF~150uF/A of output current can be used without additional analysis. For example, the CTH series 20A/25A DC/DC converter, a de-coupling capacitor up to 3300uF can be used on the premise of not affecting stability. Capacitor of higher value, as much capacitance as possible, should be outside of the feedback loop and closing the load will help insure stability. The absolute maximum value of output capacitance is 10,000uF; consult with Glary for higher value of output capacitance.

Quality

Reliability

The MTBF, calculated in accordance with MIL-HDBK-217F DECEMBER 1991 // Bellcore TR-332 issue 6, December 1997, are 263,100 hours // 3,451,308hours (+25°C), 166,043hours // 1,366,467hours (+50°C) and 112,640hours // 527,045hours (+70°C) for CTH series dc/dc converters. This represents an average failure rate of 3.800835 // 0.28975 (+25°C), 6.022527 // 0.73181 (+50°C) and 8.877810 // 1.89737 (+70°C) failures per million unit hours of operations. The assumptions are full load at +25°C, +50°C and +70°C case temperature under ground benign (GB) environment condition.

Warranty

Glary Power Technology warrants to the original purchaser or the end user that the products conform to this data sheet are free from material and workmanship defects for a period of two years since the date of manufacturing, when the product is used within specified condition and not opened.

Limitation of Liability

Glary Power Technology does not make any warranties, express or imply including any warranty of merchantability or fitness for a particular purpose (including, but not limited to use in life support applications, where malfunction of product can cause injury to a person's health or life).