

CNTH1220CP Series Non-isolated DC-DC Converters

Input 4.5V~14V Output 0.75V~ 5V/20A Single-in-line Package



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POL converters
CNTH1220CP Series

Ordering Information

The basic model has optional suffix shown in the table below. Unless otherwise specified, the basic model and the one with suffix have the same characteristics, excluded the additional feature denoting by the suffix.

Suffix	Meaning	Ordering Model
--	Basic Model	CNTH1220CP
V	Denoting the specific output voltage, i.e CNTH1220CP1V2 means output voltage is 1.2V _o .	CNTH1220CP*V*

Features

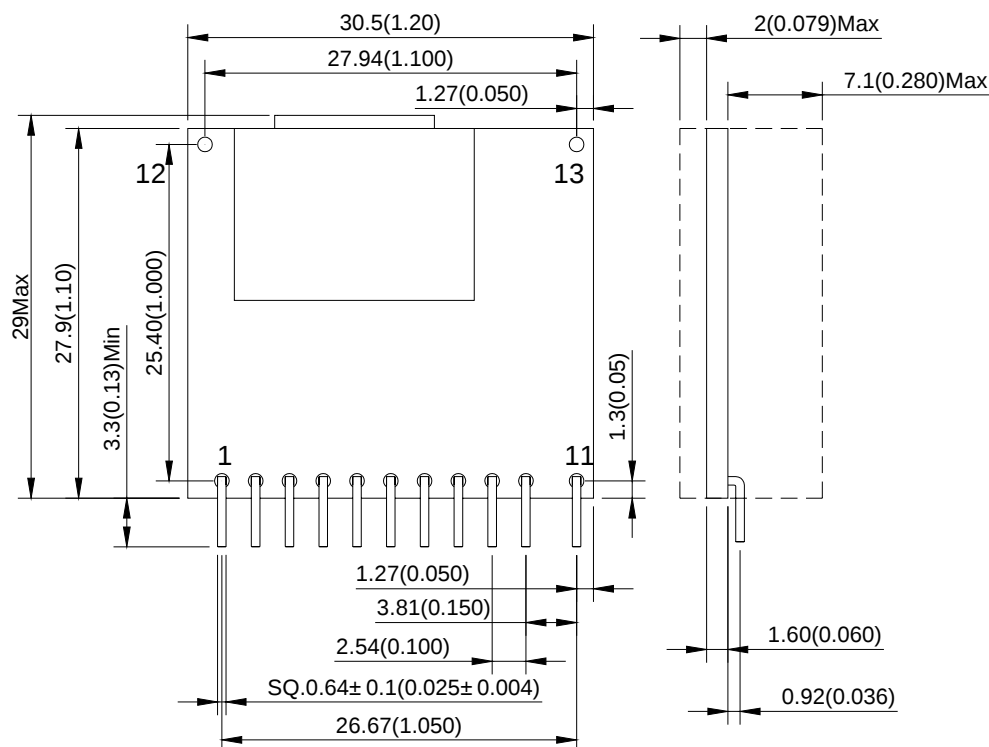
- Size (30.5mm×29.0mm×10.7mm)
- Remote On/Off (Positive Logic Control)
- Input Under Voltage Protection
- Output Voltage Range : 0.75V ~ 5.0V
- High Efficiency, 93% typ.
(Input: 12.0V,output:5.0V)
- Operating Temperature:-40 ~ +80
- Max Load Current: 20A
- Main application:Telecommunication equipments,
data exchange servers and distributed power
architectures.

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Outline Diagram



PCB Material: Multilayer PCB , Pin: copper with tin-cerium plating.

Notes: all dimensions in mm(inch)

Tolerances : X.X ± 0.5mm (X.XX ± 0.02inch) X.XX ± 0.25mm (X.XXX ± 0.010inch)

Pin	Symbol	Function
1、 2、 3	Vo	Positive output
4	TRIM	Output voltage adjust pin, the output voltage can be programmed by adding external resistor between this pin and GND
5	CNT	Remote Control Pin
6	Power Good	Open drain power good output. This is an open drain signal and pulls low when any condition exists that would indicate that the output of the supply might be out of regulation.
7、 8	GND	Common ground for input and output
9	NC	No Connection
10、 11	Vin	Positive input pins, forming input circuit with GND
12、 13	NP	No Pin

Specifications

Unless otherwise specified, all values are given at: 25 °C, one standard atmosphere pressure, pure resistive load, and Sense is connected to Vo. When testing, ceramic capacitor with 270μF and tantalum capacitor with 680μF are required to connected to input and output pins separately.

Input	Symbol	Min	Typ	Max	Unit	Conditions
Input Voltage	V _{in}	4.5	12	14	V	V _O ≤ 3.3V
		7	12	14	V	V _O > 3.3V

Continue

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Input		Symbol	Min	Typ	Max	Unit	Conditions
CNT Positive Logic	On Level	-	2.5	-	5.5	V	Relative to GND; CNT floating, the model also on
	Output current	-	-	-	0.5	mA	CNT sink current when turn on
	Off Level	-	0	-	1.0	V	Relative to GND
	Input current	-	-	-	20	mA	CNT source current when turn off
Under Voltage Threshold	Turn On	-	3.7	-	4.3	V	—
	Turn Off	-	3.9	-	4.5	V	—

Output		Symbol	Min	Typ	Max	Unit	Conditions
Output Voltage		V _O	0.75	—	5.0	V	See Input Voltage
Output Current		I _{O,nom}	0	—	20	A	—
Line Regulation		S _V	-	-	±0.5	%V _O	—
Load Regulation		S _I	-	-	±1	%V _O	—
Output Over Current Protection Range		I _{O,lim}	22	-	34	A	—
Peak to Peak Ripple and Noise		V _{pp}	-	-	50	mV	20MHz bandwidth
Rise Time		T _{rise}	-	5	20	ms	I _{O,nom} , pure resistive load
Start-up Delay Time		T _{delay}	-	2	20	ms	I _{O,nom} , pure resistive load
Capacitive Load Range		C _O	0	-	10000	μF	—
Load Transient	Recovery Time	V _{tr}	-	-	200	μs	Load change:50%-100% I _{O,nom} ; current change: 25A/μs
	Voltage Deviation	t _{tr}	-	-	±100	mV	
Output Short-circuit Protection		2 hours short-circuit , undamage , automatic recovery					

General	Symbol	Min	Typ	Max	Unit	Conditions
Efficiency	η	-	93	-	%	$V_{in}=12V$, 20A , $V_o=5.0V$
		-	91	-	%	$V_{in}=12V$, 20A , $V_o=3.3V$
		-	90	-	%	$V_{in}=12V$, 20A , $V_o=2.5V$
		-	87	-	%	$V_{in}=12V$, 20A , $V_o=1.8V$
		-	83	-	%	$V_{in}=12V$, 20A , $V_o=1.2V$
		-	81	-	%	$V_{in}=12V$, 20A , $V_o=1.0V$
		-	76	-	%	$V_{in}=12V$, 20A , $V_o=0.75V$
Switching Frequency	f_s	-	600	-	kHz	—
MTBF	—	-	5×10^6	-	h	BELLCORE TR-332,
Operating Temperature	—	-40	-	+80		—
Storage Temperature	—	-55	-	+125		—
Relative Humidity	—	10	-	90	%	40 ± 2 , No cooling
Temperature Coefficient	S_T	—	-	± 0.02	%/	—
Hand Soldering	Maximum soldering Temperature < 425 , and duration < 5s					
Wave Soldering	Maximum soldering Temperature < 255 , and duration < 10s					
Weight	-	-	15	-	g	—

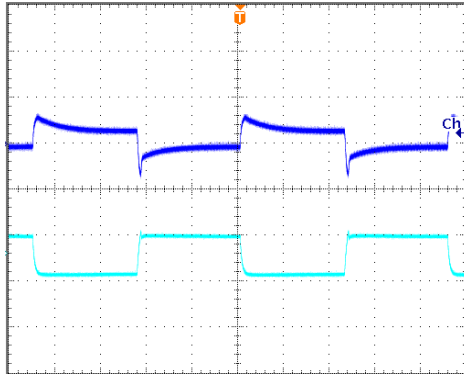
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Characteristic Curves (Vo=0.75V)

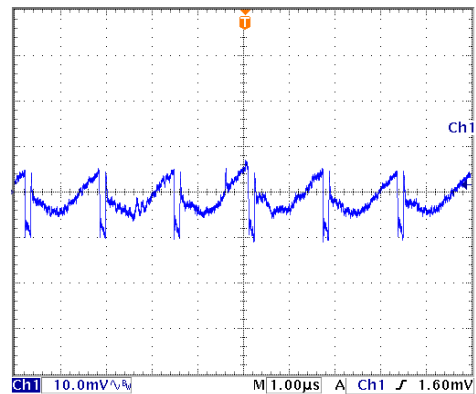
Load Transient Response



Load change:50% ~ 100%
 $I_{o,nom}$, 2.5A/ μ s
 V_{in} =12Vdc

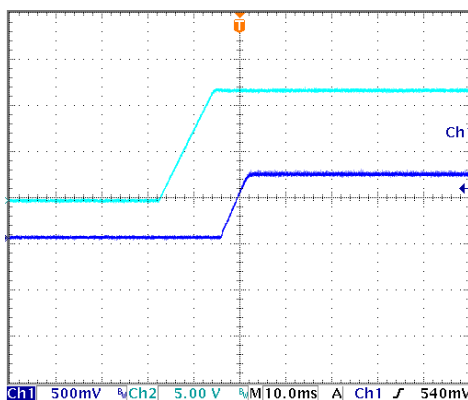
Trace1:0.1V/div
Trace:12A/div
Time scale:0.4ms/div

Typ Output Ripple

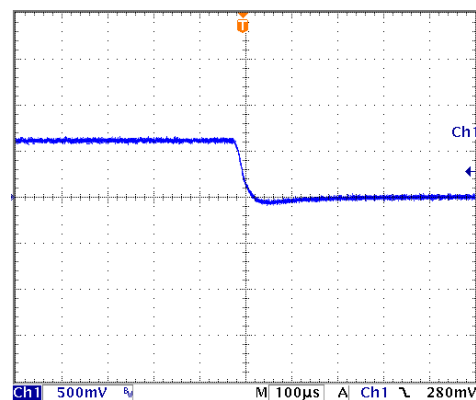


V_{in} =12Vdc

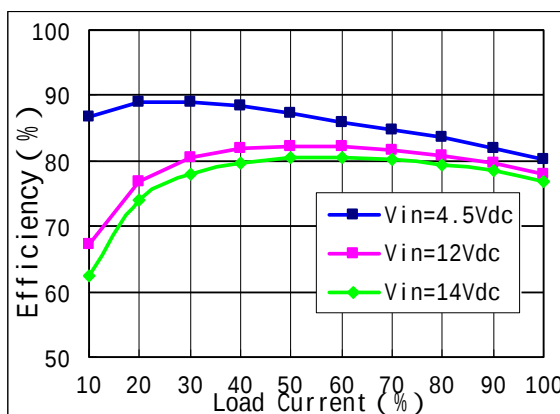
Typ Start-up Delay Time



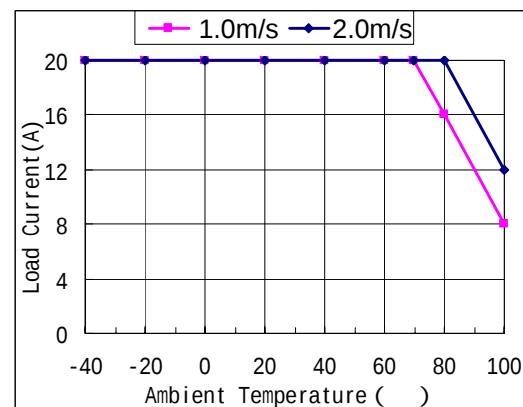
Turn-off



Typ Efficiency Curves



Derating Curves (V_{in} =12Vdc)



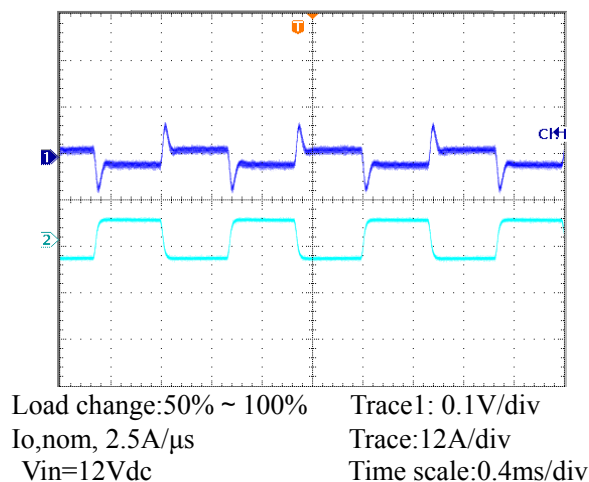
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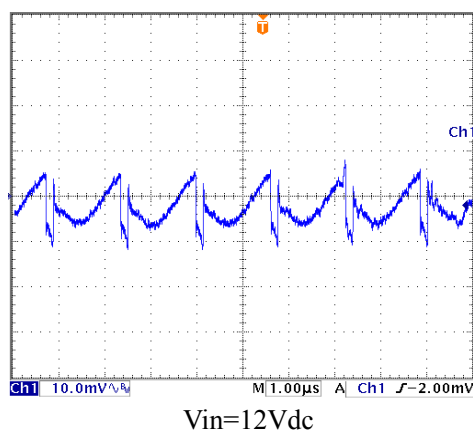


Characteristic Curves ($V_o=1.0V$)

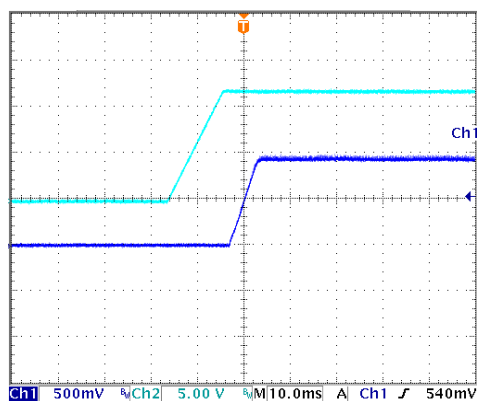
Load Transient Response



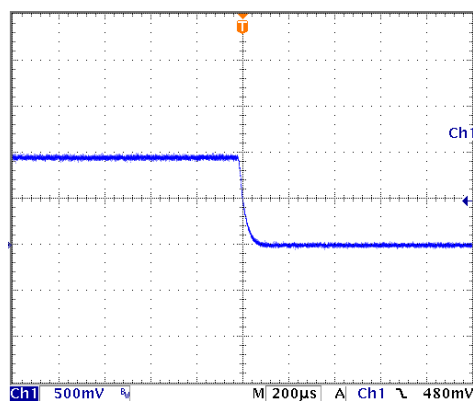
Typ Output Ripple



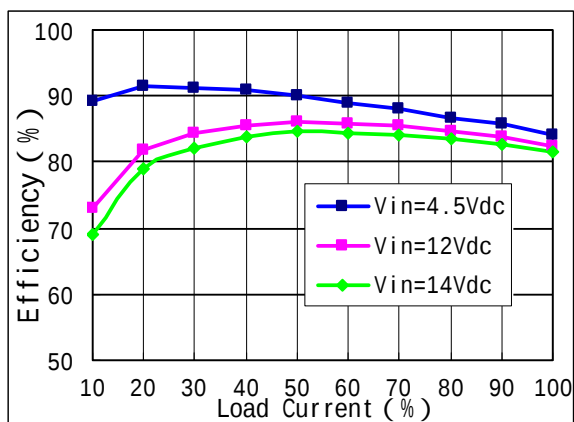
Typ Start-up Delay Time



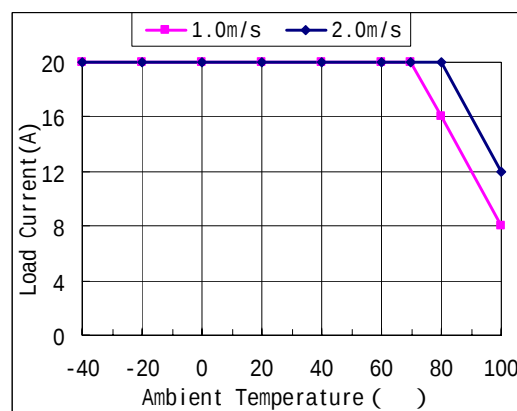
Turn-off



Typ Efficiency Curves



Derating Curves ($V_{in}=12V_{dc}$)



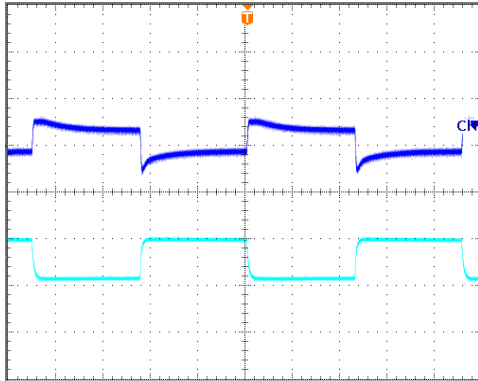
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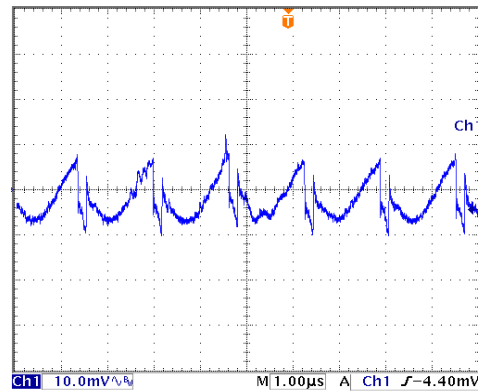
Characteristic Curves ($V_o=1.2V$)

Load Transient Response



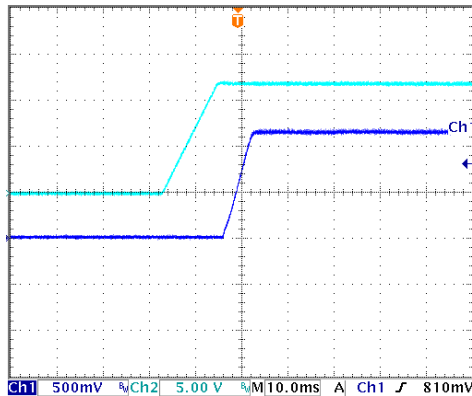
Load change:50% ~ 100% Trace1: 0.1V/div
 $I_{o,nom}$, 2.5A/ μ s Trace:12A/div
 $V_{in}=12Vdc$ Time scale:0.4ms/div

Typ Output Ripple

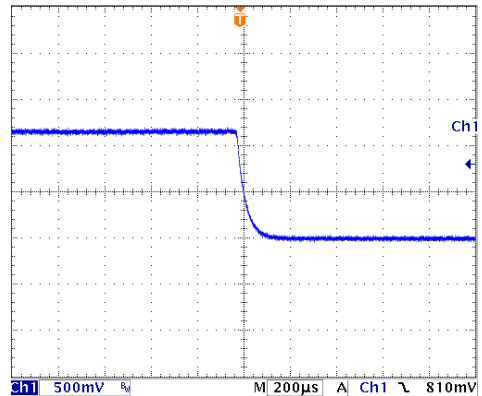


$V_{in}=12Vdc$

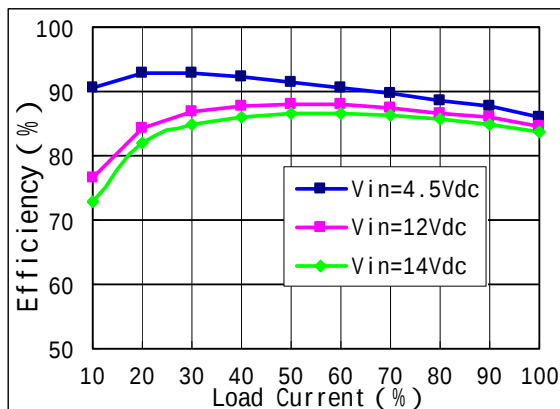
Typ Start-up Delay Time



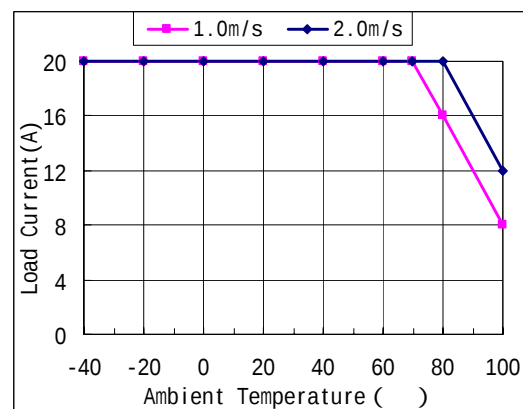
Turn-off



Typ Efficiency Curves



Derating Curves($V_{in}=12Vdc$)



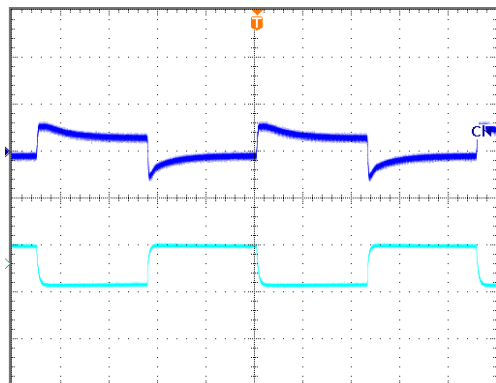
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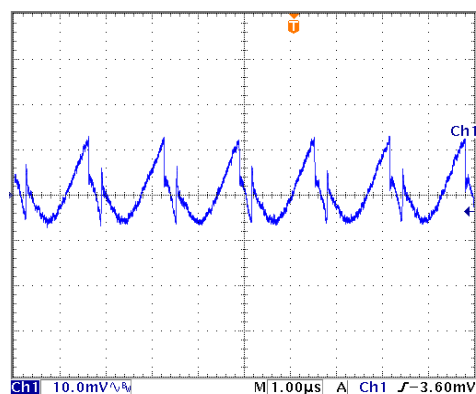
Characteristic Curves ($V_o=1.8V$)

Load Transient Response



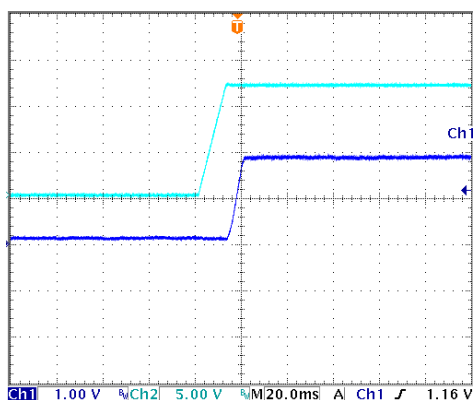
Load change:50% ~ 100% Trace1: 0.1V/div
 $I_{o,nom}$, 2.5A/ μ s Trace:12A/div
 $V_{in}=12Vdc$ Time scale:0.4ms/div

Typ Output Ripple

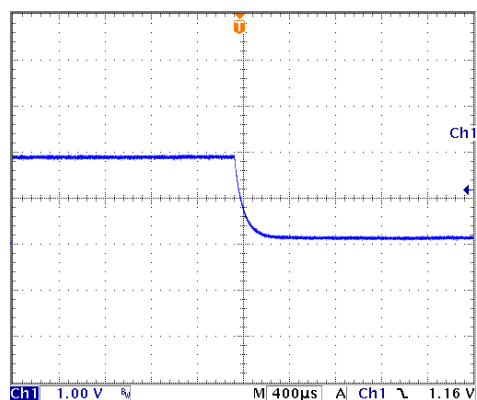


$V_{in}=12Vdc$

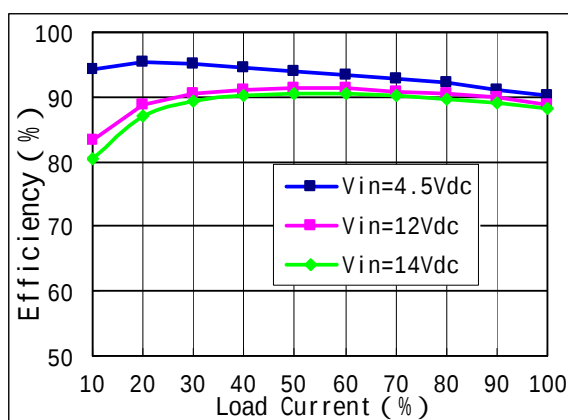
Typ Start-up Delay Time



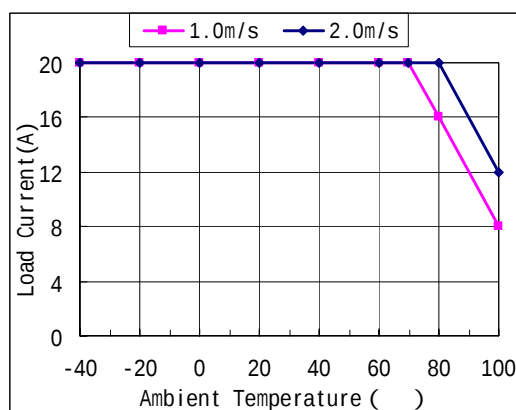
Turn-off



Typ Efficiency Curves



Derating Curves($V_{in}=12Vdc$)



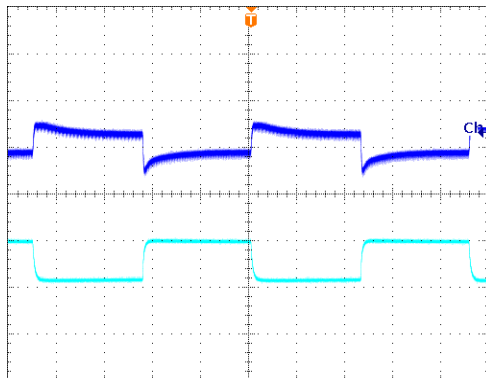
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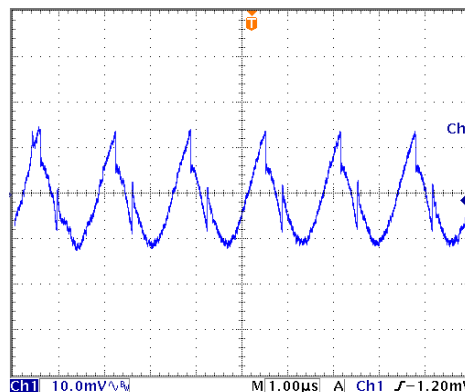
Characteristic Curves ($V_o=2.5V$)

Load Transient Response



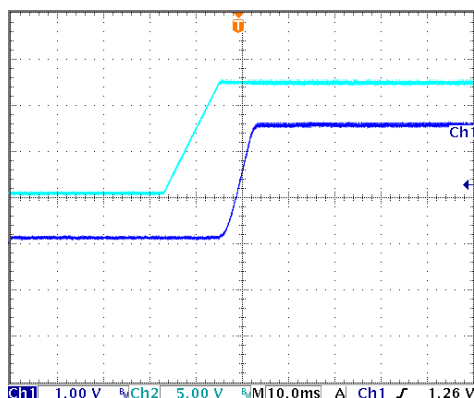
Load change:50% ~ 100% Trace1: 0.1V/div
 $I_{o,nom}$, 2.5A/ μs Trace:12A/div
 $V_{in}=12Vdc$ Time scale:0.4ms/div

Typ Output Ripple

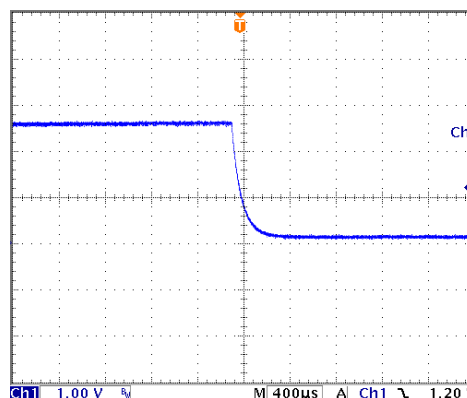


$V_{in}=12Vdc$

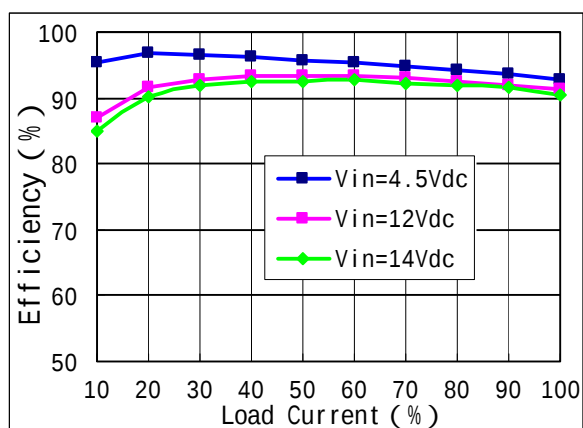
Typ Start-up Delay Time



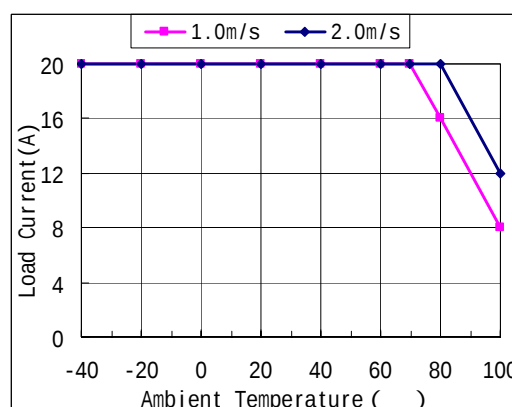
Turn-off



Typ Efficiency Curves

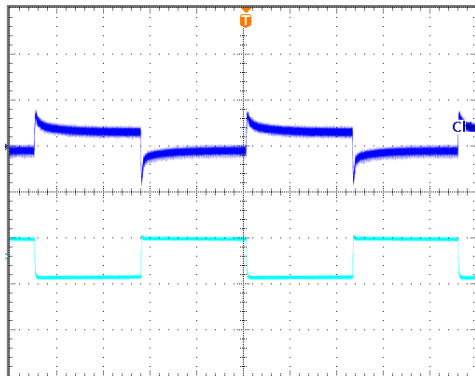


Derating Curves(12Vdc)



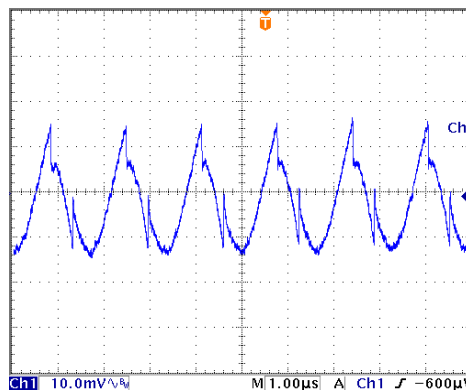
Characteristic Curves ($V_o=3.3V$)

Load Transient Response



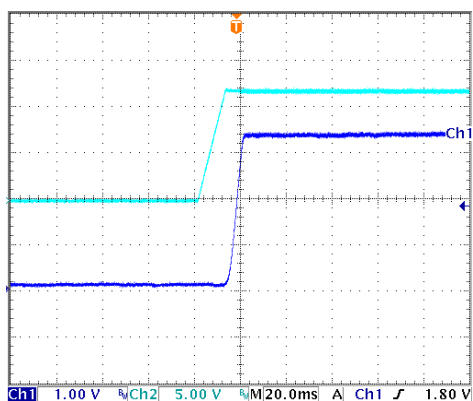
Load change: 50% ~ 100% Trace1: 0.2V/div
 $I_{o,nom}$, 2.5A/ μs Trace: 12A/div
 $V_{in}=12V_{dc}$ Time scale: 0.4ms/div

Typ Output Ripple

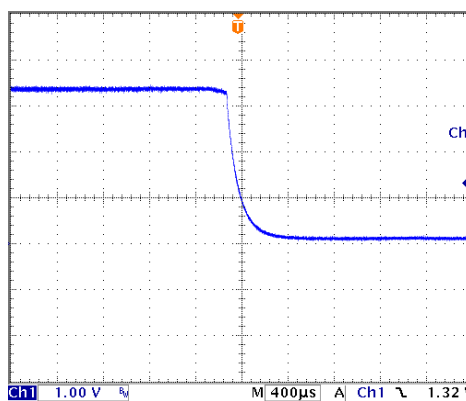


$V_{in}=12V_{dc}$

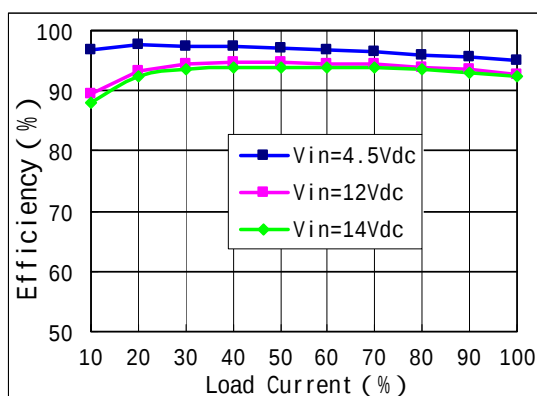
Typ Start-up Delay Time



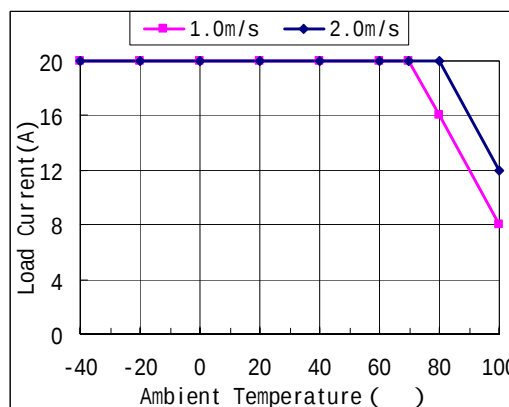
Turn-off



Typ Efficiency Curves

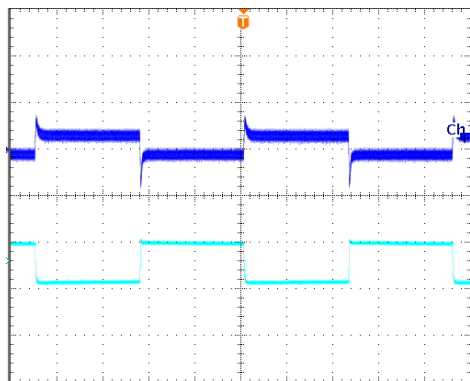


Derating Curves($V_{in}=12V_{dc}$)



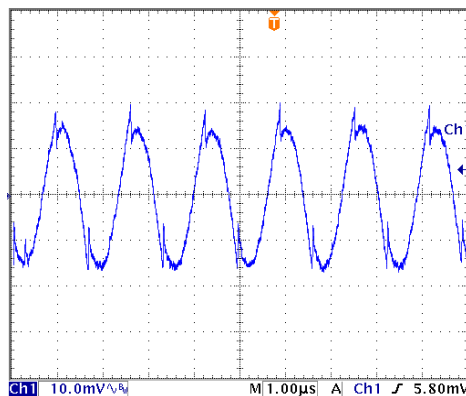
Characteristic Curves (Vo=5.0V)

Load Transient Response



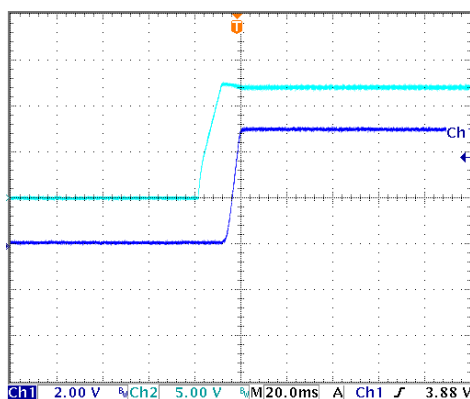
Load change:50% ~ 100% Trace1: 0.2V/div
 $I_{o,nom}$, 2.5A/ μ s Trace:12A/div
 V_{in} =12Vdc Time scale:0.4ms/div

Typ Output Ripple

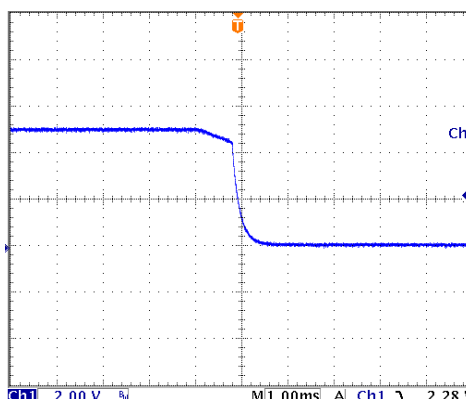


V_{in} =12Vdc

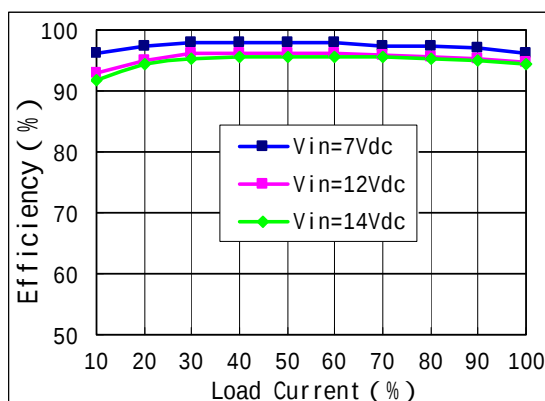
Typ Start-up Delay Time



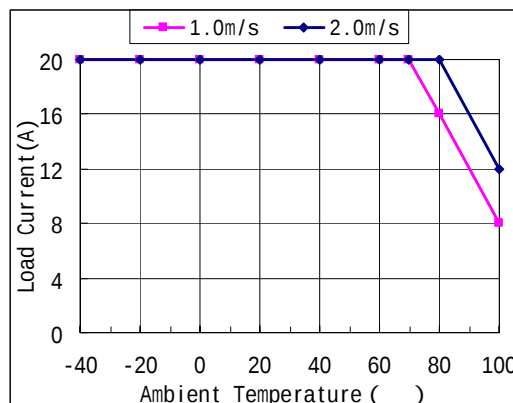
Turn-off



Typ Efficiency Curves

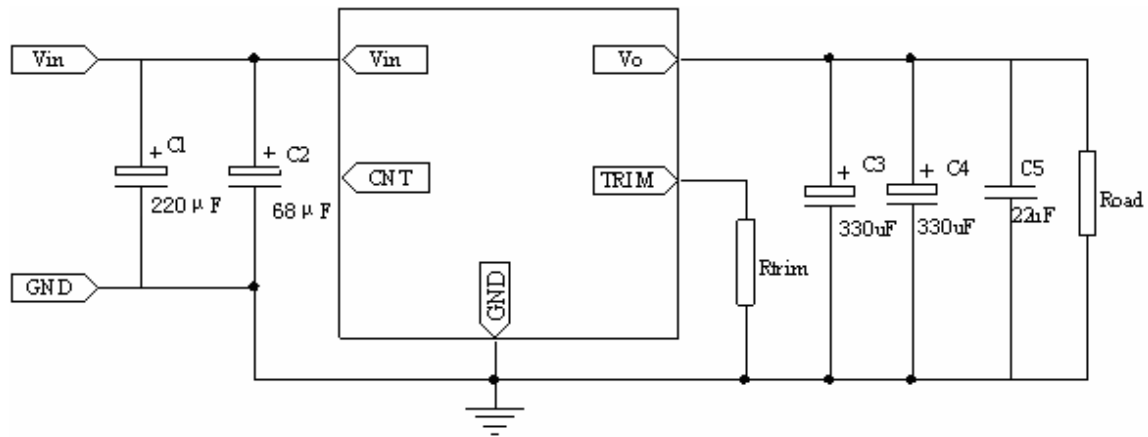


Derating Curves(V_{in} =12Vdc)



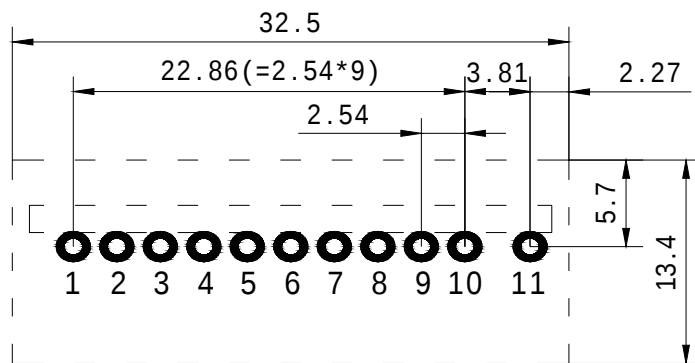
Design Considerations

Basic Connection



Notes: The basic connection indicates the basic requirements that the power module can provide rated output voltage and rated power only. Please see the application information followed for the further information.

Recommended Layout



NO.	Recommendation & Notes
Pad Design	1-11Pad hole: 1.0mm, ring belt: $\geq 2\text{mm}$ in X axis and $\geq 2.5\text{mm}$ in Y axis.
Airflow Direction	Shown as the figure
Electric	The area covered by the regulator is Recommended to place the input, negative output or DC electrical signal wire. Susceptivity signal wire and AC signal wire with higher disturbance are not recommended in the area.

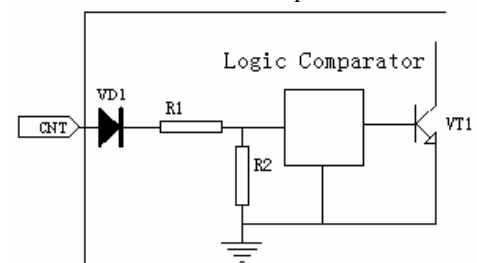
All dimensions are in mm. Recommended keep out the dashed lines's area for user PCB-layout.

Input Voltage Range

Input voltage range of the regulator is from 4.5V ~ 14V. Because they are switching power supply with negative impedance characteristic, The AC impedance of the POL regulator should be as low as possible to ensure stable operation. The input filter capacitors should be paralleled equidistantly and connected as close as possible to the input pins.

Remote Control

The function can be offered by setting right control level to CNT pin (or leaving it floating or high resistance). When the level is higher than 2.5V or floating, the output will turn on. When the level is less than 1.0V, the output will turn on. The internal circuit diagram is shown as "Remote Control Circuit Diagram".



Remote Control Circuit Diagram

External Capacitance

Unless it's has special purposes (i.e. prolonging old-up time, input impedance matching), the recommended input capacitance range is 270 ~ 1000µF, which not only provide a stable operation, and reduce the cost, but also lessen the inrush current when the power supply is on.

When the greater capacitance is required, A circuit of suppressing the inrush current is recommended when the

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regulator start-up and a discharge circuit is recommended when the output dropped, Which can ensure the reliability and safety of other equipments in the system.

Output Voltage Adjust

Resistor Adjust :

The output voltage can be set from 0.75 to 5.0 V by adjusting the resistance of Rtrim , the formula for the resistacne as follows: $R_{trim} = \frac{1530}{(V_{O-REG} - 75)} - 1$.For the resistance listed in Table 1, the resistors with 1% or

0.5% accuracy are recommended.

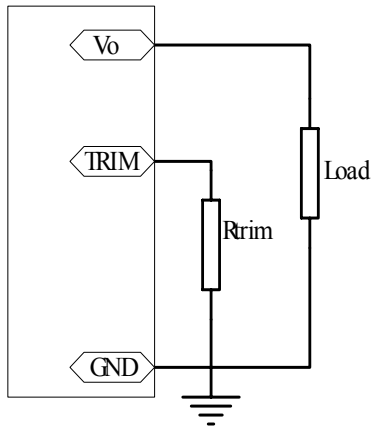


Table 1 The external Resistance		
Output voltage(V)	Caculation (kΩ)	Standard Resistance (kΩ)
0.75	open	—
1.0	60.40	60.4
1.2	33	33
1.8	13.57	13.575
2.5	7.74	7.742
3.3	5.00	5.00
5.0	2.60	2.60

Thermal Consideration

The converters are designed to operate between -40 ~ +80°C, and sufficient cooling must be provided to ensure reliable operation. The relationship between regulations mounting direction and airflow direction should be cared in PCB design for users (please refer the airflow direction shown as recommended layout),and make sure the highest heating components (the inductor) is apart from the other parts more than 1mm , in order to ensure good heat dissipation of the power components, The airflow speed choice refers to derating curves at different output voltage.

Delivery Package Information

Package material is multiple wall corrugated fiberboard, surface resistance less than $10^9\Omega$; internal material is anti-static foam, surface resistance less than $10^5\Omega\sim 10^{12}$.Tray capacity: 50×2=100 PCS/box, Tray weight: 1.6kg; Carton capacity:100×4=400PCS, Carton weight:6.4kg.

Quality Statement

The products are designed and manufactured under quality systems ISO 9001, in compliant with YD/T1376-2005,and are monitored 100% by auto-testing system and screened out by intelligence ageing system.. The warranty for the module is 5-years.