Size: 4.69in x 2.49in x 0.53in
(119.1mm x 63.2mm x 13.5mm)

FEATURES

- Wide Input Voltage Range 400~800VDC
- Remote Control
- Remote Monitoring
- Parallel Operations Up to 4 Modules
- PMBus Communication Protocol
- High Reliability, High Efficiency, and High Power Density
- Low Ripple & Noise
- Synchronous Start
- Output Voltage Compensation
- Input Under Voltage & Over Voltage Protection
- Over Current, Over Voltage, Over Temperature, and Short Circuit Protection

APPLICATIONS

- Radar
- Defense
- Industrial

DESCRIPTION

The DCHD1800-540S28 model of DC/DC power modules offers 1800 watts of output power in a 4.69” x 2.49” x 0.53” full brick package. This is a 28VDC single output models with 400~800VDC wide input voltage range. Features of this model include high reliability, high efficiency, high power density, as well as low ripple and noise. This series is also protected against input over/under voltage conditions and over current, over voltage, over temperature, and short circuit conditions.

SPECIFICATIONS

All specifications are based on 25°C, Vin=540VDC, and Vout=28VDC unless otherwise noted.
We reserve the right to change specifications based on technological advances.

SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
INPUT SPECIFICATIONS						
Input Voltage Range	Vin≥400VDC, Output Power 1800W		400	540	800	VDC
Maximum Input Voltage	Absolute Maximum Rating, Less than 100ms				850	V
Maximum Input Current	Input 400V				6	A
Standby Current	540VDC				60	mA
Input Capacitance			80			μF
Input Under-Voltage Protection	Turn On				360	VDC
	Turn Off				350	
Input Over-Voltage Protection(1)	Turn On		800			VDC
	Turn Off		810			
OUTPUT SPECIFICATIONS						
Nominal Output Voltage			27.72	28	28.28	VDC
Output Voltage Trim Range			-20		+10	%Vo
Line Voltage Regulation					±1	%
Load Regulation					±1	%
Output Power					1800	W
Output Current	Pomax=1000W, See 10.5		0		35.7	A
Rated Current					64.5	A
Output Ripple and Noise	Peak-to-peak				240	mV
Output Capacitor	It is recommended to use high frequency low ESR capacitors		3000			μF
Capacitive Load	Test in CR mode				5000	μF
Temperature Coefficient	Available=-40°C~85°C				±0.02	%/°C
Switching Frequency				166		kHz
Power-On Transient	Output Voltage Rise Time	10%~90% Vout			100	mS
	Start Delay Time	From input undervoltage recovery point to 90% Vo			2000	mS
	Output Overshoot			0	5	%Vnor
Transient Response(1)	Overshoot				±5	%Vo
	Setting Time				≤300	μs
REMOTE ON/OFF CONTROL						
Remote ON/OFF (Positive Logic)	Shut-Down Voltage		0		0.8	V
	Turn-On Voltage		3		12	V
PROTECTION						
Short Circuit Protection			Yes			
Output Current Protection			110		140	%Io
Over Voltage Protection			110		140	%Vo
Over Temperature Protection	Self-Recovery		100			ºC
Over Temperature Protection Recovery			85			ºC

SPECIFICATIONS

All specifications are based on 25°C, Rated Input Voltage, Full Load and Rated Output unless otherwise noted.
We reserve the right to change specifications based on technological advances.

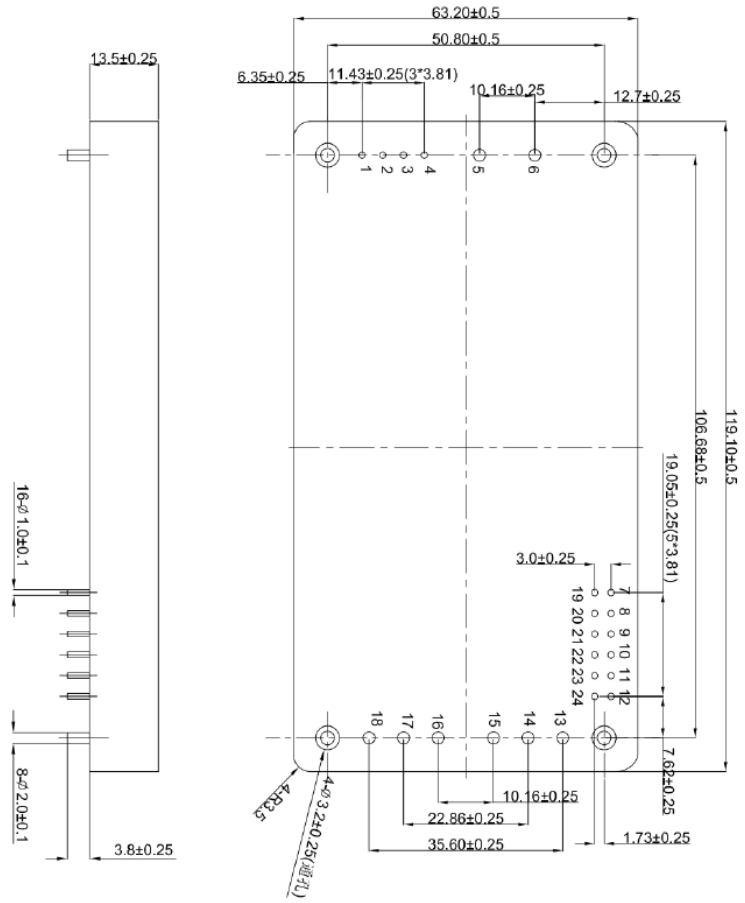
SPECIFICATION	TEST CONDITIONS		Min	Typ	Max	Unit
ENVIRONMENTAL SPECIFICATIONS						
Operating Temperature	Case Temperature		-40		100	ºC
	Baseplate Temperature, Absolute Maximum Rating		-40		100	ºC
Storage Temperature	Ambient Temperature, Absolute Maximum Rating		-55		+125	ºC
Relative Humidity	Non-Condensing		5		95	%
Storage Humidity	Non-Condensing		5		95	%
Pin Soldering Temperature	Wave Soldering, Time less than 10s				260	ºC
	Soldering station welding, time less than 5s				425	
Heat Dissipation Method			Conduction or Convention			
GENERAL SPECIFICATIONS						
Efficiency	100% Load, @540VDC		93	94.5	95	%
Switching Frequency				166		kHz
Isolation Voltage	1 minute ≤ 10mA	Input to Output		3000		VDC
		Input to Baseplate		3000		
		Output to Baseplate		700		
Isolation Resistance	Test Conditions: 500VDC		100			MΩ
PHYSICAL SPECIFICATIONS						
Weight			14.11oz (400g)			
Dimensions (L x W x H)			4.69in x 2.49in x 0.53in (119.1mm x 63.2mm x 13.5mm)			
SAFETY SPECIFICATIONS						
Standards and Specifications	MIL-STD-810F		Environmental Engineering Considerations and Laboratory Tests			
	MIL-STD-461E		Requirement for the control of electromagnetic interference characteristics of subsystems and equipment			
	MIL-STD-202		Test methods for electronic and electrical component parts			
	MIL-HDBK-217F		Reliability prediction of electronic equipment			
	MIL-M-28787		Modules, standard electronic general specification			

NOTES

1. 25%~50%~25%Io max, load step change di/dt=0.1A/μs, 75%~50%~75% Io max, load step change di/dt=0.1A/μs

**Due to advances in technology, specifications subject to change without notice.*

MECHANICAL DRAWINGS

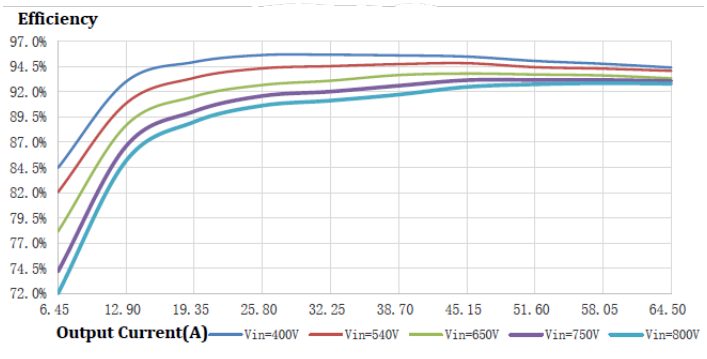


PIN ASSIGNMENT

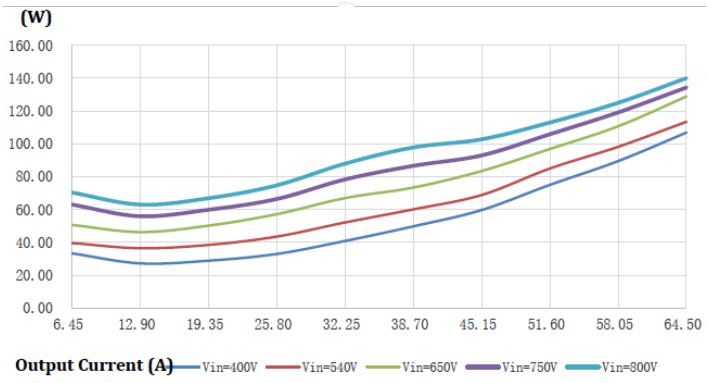
Pin No	Label	Function
1	NC	No Connection
2	NC	No Connection
3	ON/OFF (+)	Remote ON/OFF+
4	ON/OFF (-)	Remote ON/OFF-
5	Vin (+)	Input Voltage Positive Terminal
6	Vin (-)	Input Voltage Negative Terminal
7	Vaux	Auxiliary Power Supply
8	Sync	Boot Synchronization
9	Share	Parallel Current Sharing Terminal
10	Trim	Output Voltage Adjustment Terminal
11	Sense (+)	Remote Sense Positive Terminal
12	Sense (-)	Remote Sense Negative Terminal
13	Vout (-)	Output Voltage Negative Terminal
14	Vout (-)	Output Voltage Negative Terminal
15	Vout (-)	Output Voltage Negative Terminal
16	Vout (+)	Output Voltage Positive Terminal
17	Vout (+)	Output Voltage Positive Terminal
18	Vout (+)	Output Voltage Positive Terminal
19	PMBUS_Gnd	PMBus Reference Ground
20	Imonintor	Output Current Monitor
21	PMBUS_Addr0	PM Bus Address Setting Pin
22	PMBUS_Clock	PMBUS Clock
23	PMBUS_Data	PMBUS Data
24	IOG	Output Status Indication

CHARACTERISTIC CURVES

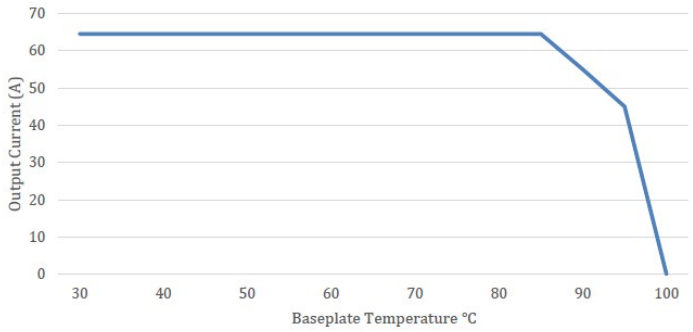
Efficiency vs Output Current Curve, Case Temperature 25ºC



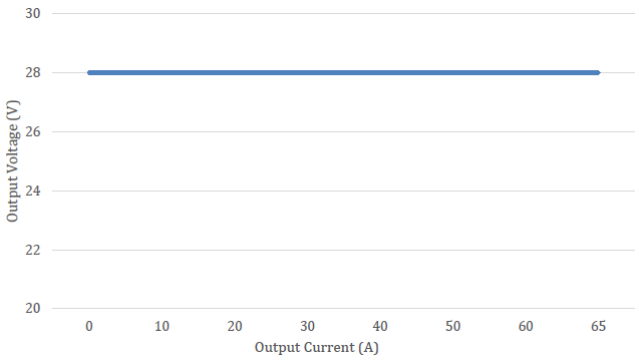
Power Dissipation vs. Output Current Curve, Case Temperature 25ºC



Output Current vs Baseplate Temperature Derating Curve Graph



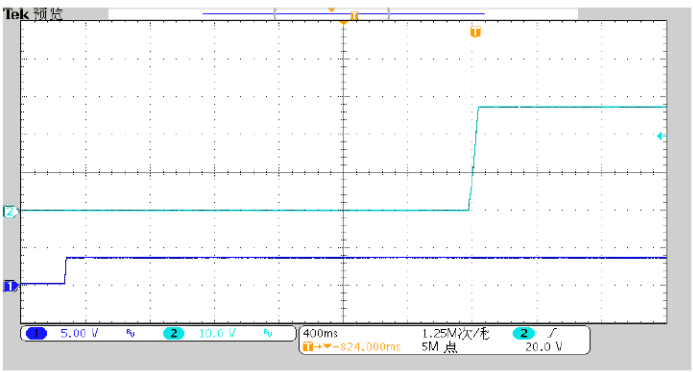
Output Voltage vs Output Current Curve



TYPICAL WAVEFORMS

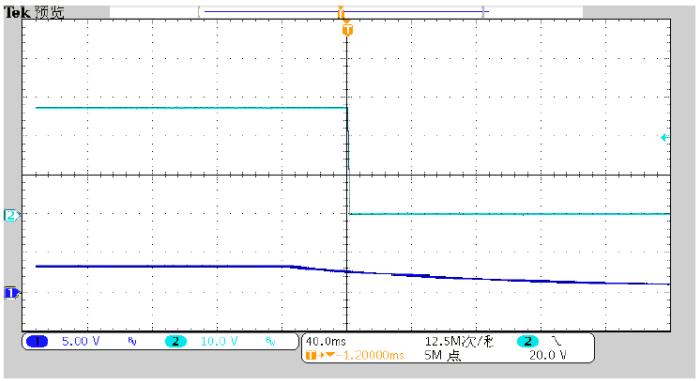
Test conditions: Inptu capacitance Cin=80μF, input voltage 540V, output capacitance Cout=3000μF, Ouput 28V/1800W, ambient temperature 25ºC

Remote Turn-On Waveform



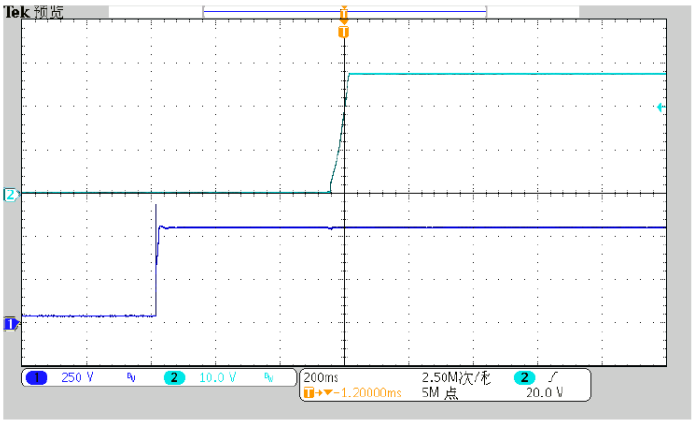
CH1: Enable Control Level
CH2: Voltage Rising Waveform

Remote Turn-Off Waveform



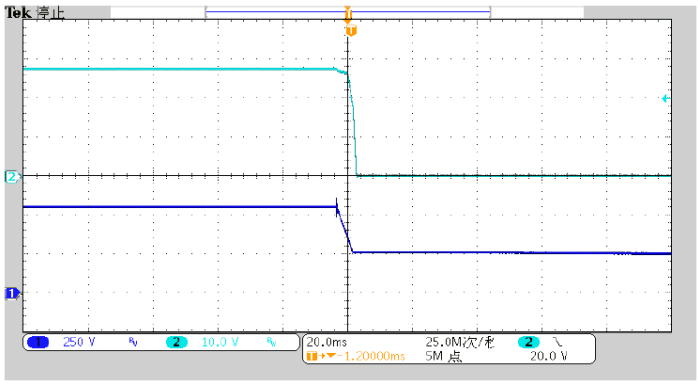
CH1: Enable Control Level
CH2: Output Voltage Drop Waveform

Input Voltage Startup Waveform



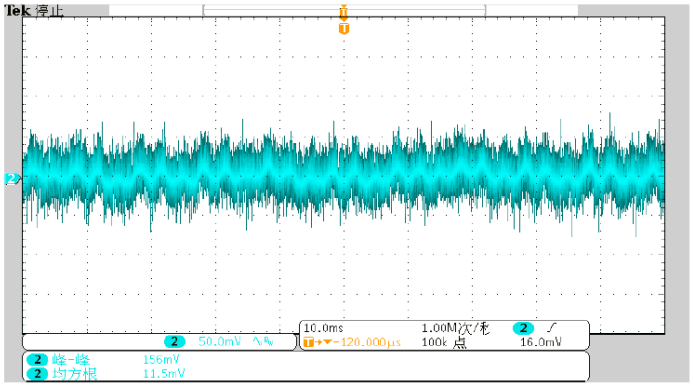
CH1: Input Voltage Rising Waveform
CH2: Output Voltage Waveform

Turn Off by ON/OFF



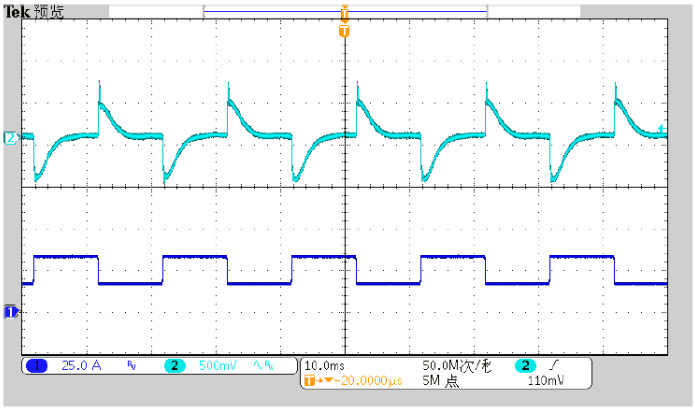
CH1: Input Voltag Drop Waveform
CH2: Output Voltage Drop Waveform

Output Voltage Ripple



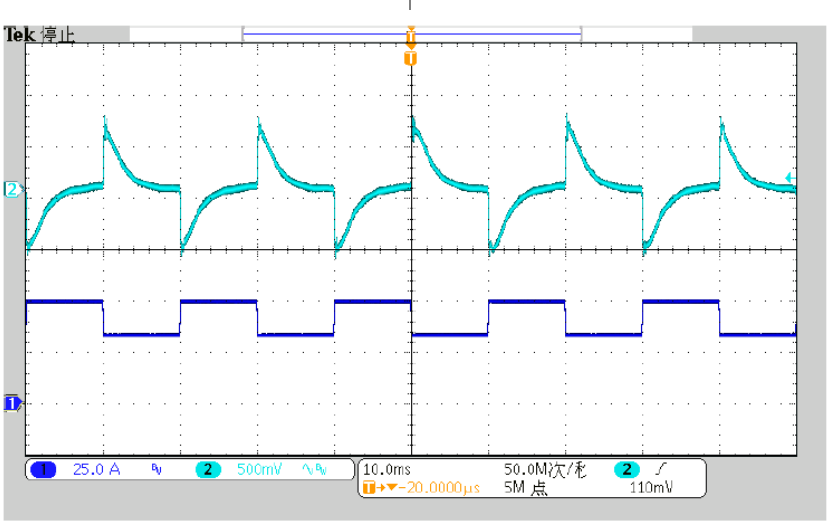
Input 540V, Output 28V/1800W, Output Capacitor Cout=10μF
The oscilloscope has a bandwidth of 20MHz, and the oscilloscope probe is connected to an external 0.1μF ceramic capacitor and a 10μF electrolytic capacitor

Output Voltage Dynamic Waveform



Output capacitance Cout=10μF, load 25%-50%-25% change, pulse load frequency 1KHz, di/dt=0.1A/μs

Output Voltage Dynamic Waveform



Output capacitance Cout=10μF, load 50%-75%-50% change, pulse load frequency 1KHz, di/dt=0.1A/μs

PACKAGING REQUIREMENTS

Packaging Requirements

- Packaging should be prevent the modules from corrosion, degradation and mechanical damage during transportation.
- Keep modules clean and dry.
- Packaging and shock absorbing materials should not generate static electricity and should be resistant to corrosion.
- Unless specified, number of modules in a package will be determined by the manufacturer
- There is standard shape and dimensions for the intermediate package which will minimize the weight and size.
- Labels are required at the outer package.

STORAGE REQUIREMENTS

Storage Requirements

- Unused modules should be kept in the packaging box. The storage environment should be free from corrosive gases, ventilated with relative humidity lower than 80% and storage temp. -10～40℃.
- Packaging boxes should be kept 20cm above ground level, at least 50cm from walls, heat sources, vents and windows.
- Under captioned conditions, storage period is 2 years. It is recommended to re-qualify the modules after 2 years storage.

TRANSPORT REQUIREMENTS

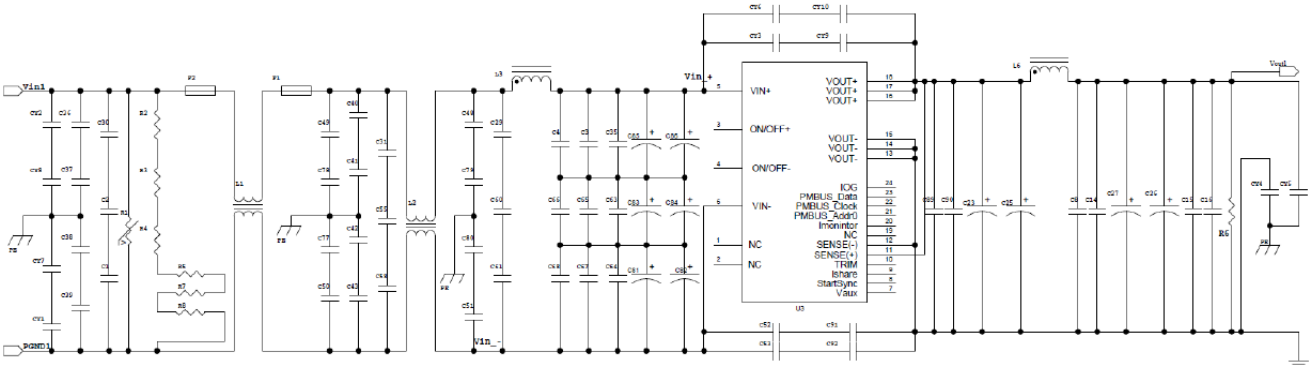
Transport Requirements

- Products should be packaged in a strong box during transportation.
- Outer box surface should meet relevant international standards with “Handle with care” mark and “Keep Dry” mark.
- The package should be made suitable for any common means of transportation. During transportation, the packages should avoid mechanical shocks and should avoid direct exposure to rain and snow.

APPLICATION NOTES

Typical Application Circuit

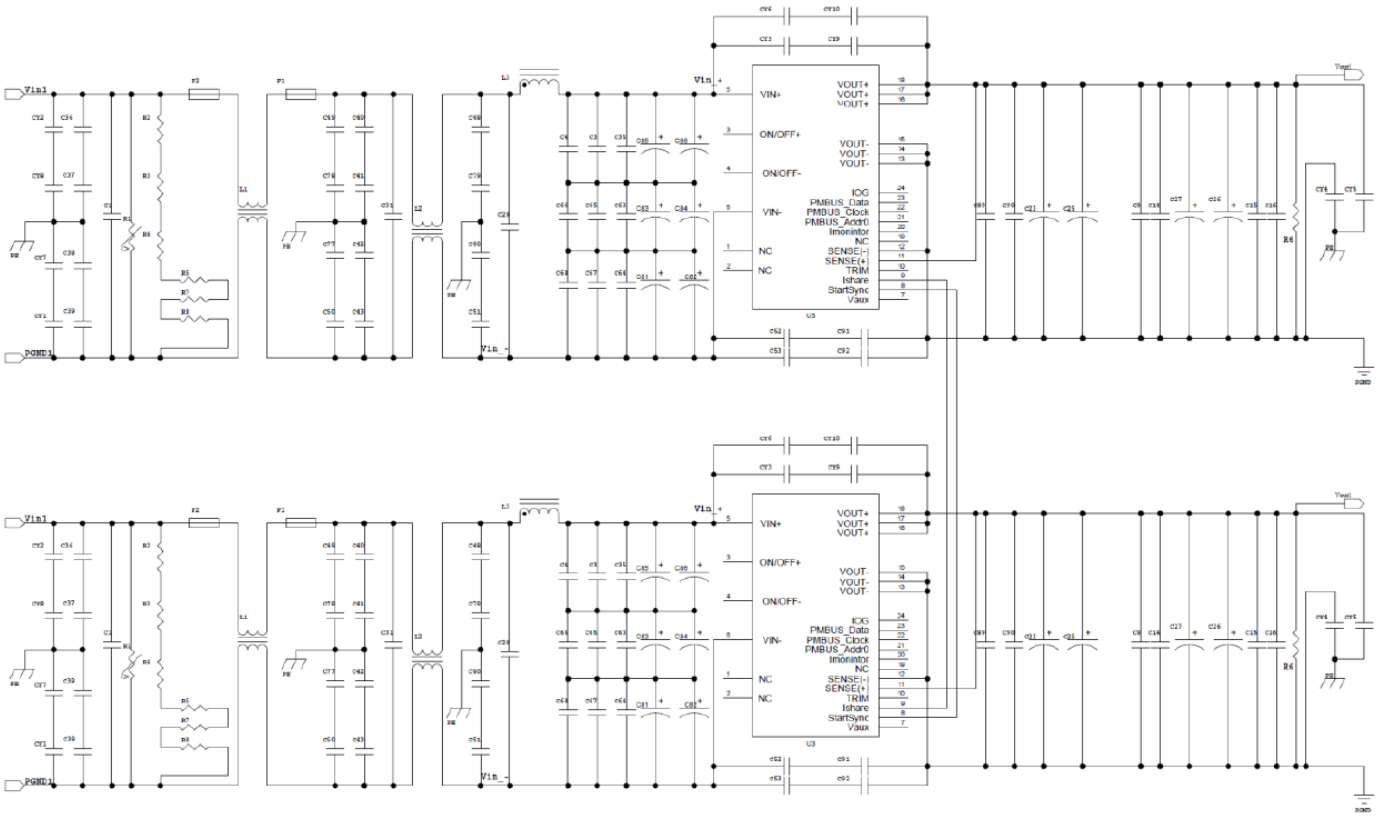
Single Module Application Circuit



Device Recommended Parameter Values

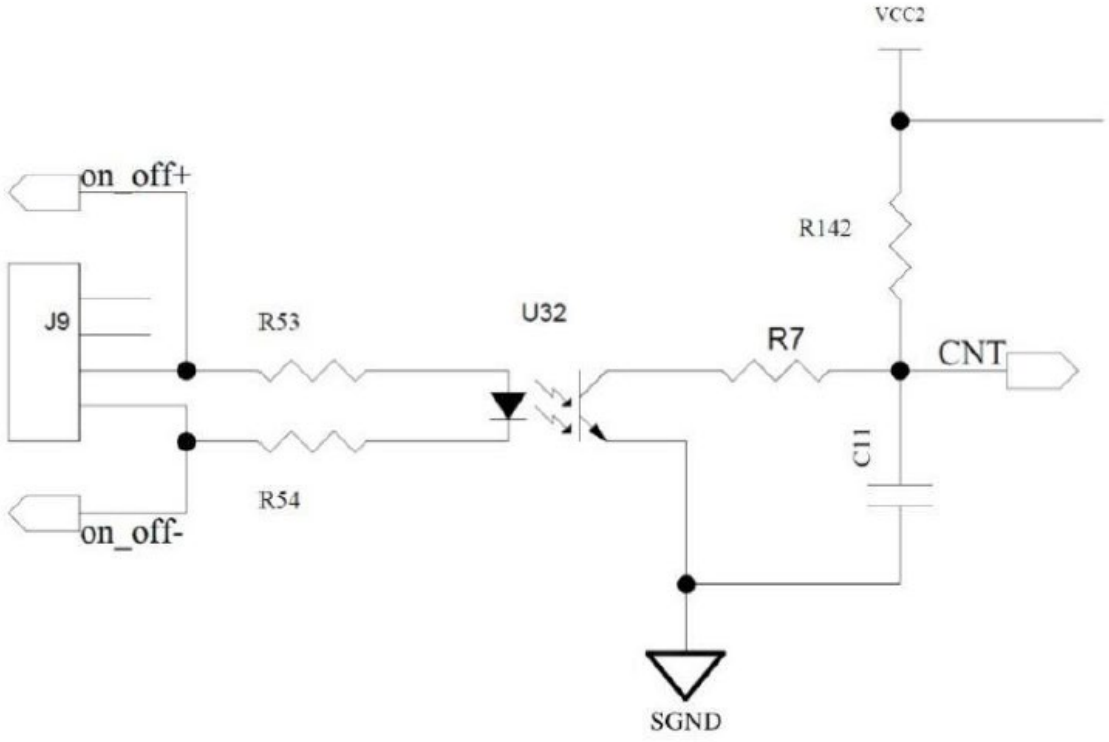
Designation	Description
CY1, CY2, CY7, CY8	AC 250V Y capacitor 2200pF
C1	1kVdc film capacitor 1mF
R1	Varistor, 900V/12kA
F1, F2	AC 250V, 10A slow-break type
L1, L2	Common mode inductor, 1mH
C49, C50, C77, C78	AC250V Y Capacitor 2200pF
C31	1kVdc film capacitor 1uF
C48, C51, C79, C80	AC 250V Y capacitor 2200pF
C29	1kVdc film capacitor 1mF
L3	Chip inductor 1.5mH
C3,C4, C35, C63, C64, C65, C66, C67, C68	1210/500V/X7R/100nF
C81, C82, C83, C84, C85, C86	120uF/450V electrolytic capacitor
C52, C53, C91, C92, CY4, CY5	AC 250V Y capacitor 2200pF
C8, C14, C15, C16, C89, C90	1210/50V/X7R/10mF
C23, C25, C26, C27	1000uF/35V electrolytic capacitor
CY4, CY5	AC 250V Y capacitor 2200pF
C36, C37, C38, C39	NC
R2, R3, R4, R5, R7, R8	NC
C40, C41, C42, C43	NC
CY3, CY6, CY9, CY10	NC
R6	NC

Parallel Application Circuit



Remote Control On/Off

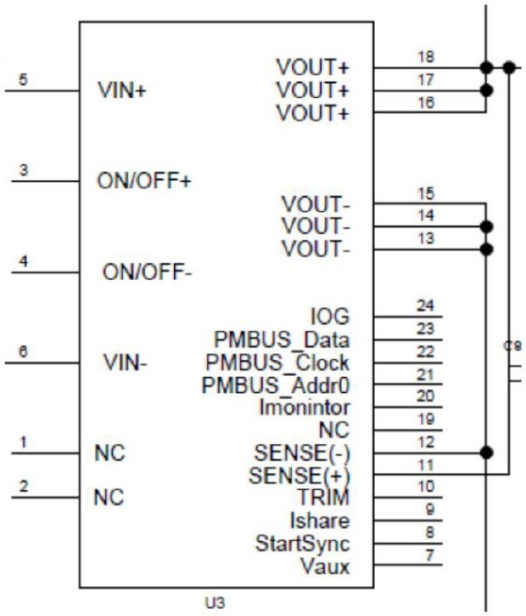
The module has built-in remote on/off function. This function can control the output on/off by applying voltage to the on_off+ and on_off- pins.



Remote Compensation Function

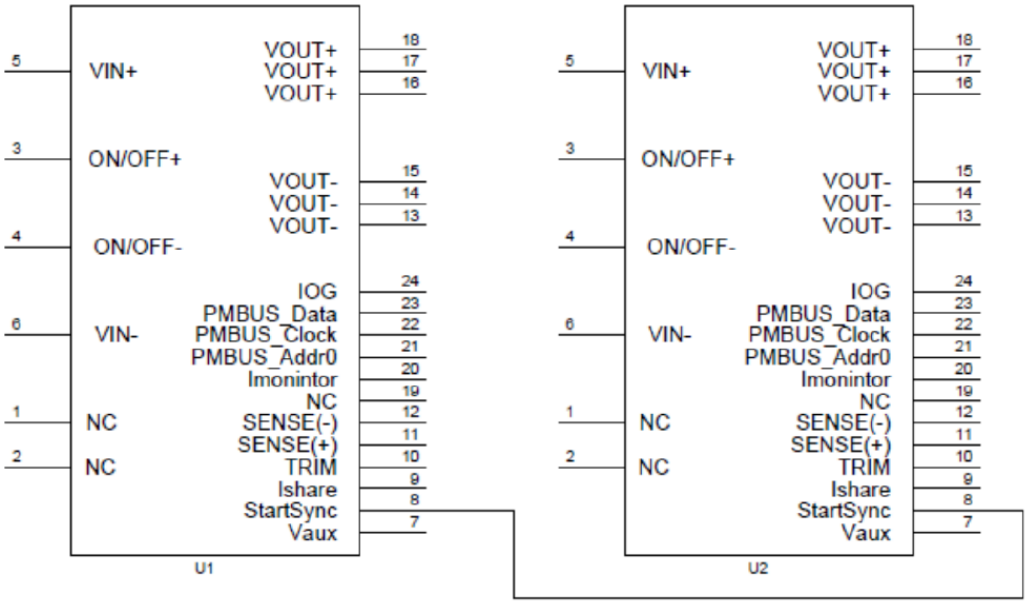
This module power supply has a remote compensation function, which can compensate for the voltage drop in the wiring and improve the voltage accuracy at the load point. Since the current in the remote compensation sampling line is very small, thick wiring is not required. However, the remote compensation line should be placed as close to the output ground wire or ground plane as possible to minimize the interference.

If the remote compensation function is not required, Sense+ should be connected Vout(+) and Sense- should be connected to Vout(-). When the module output is coupled with one or more levels of LC filter circuit, it is recommended to place the remote compensation sampling point between the LC filter and the power module output pin if the remote compensation function is required. Otherwise it may cause the power system operation unstable.



Synchronous Start

This module has synchronous start function. When multiple modules are used in parallel, the Start synchronization of each module is connected to each other so that all parallel modules can start synchronously.



Output Trim

Resistance is connected between the Trim and S (+) or the Trim and S (-), then the output voltage can be increased or decreased in the 25.2-30.8VDC range. When resistance is applied between the Trim and S (+), output voltage increases; when resistance is applied between the Trim and S (-), output voltage decreases. In the adjustment process, the resistance should be placed as close as possible to power module terminals; if it doesn't need this feature, trim should not be connected.

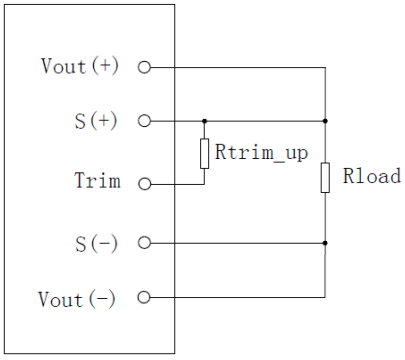


Fig. 17 Output Voltage Up-Regulation

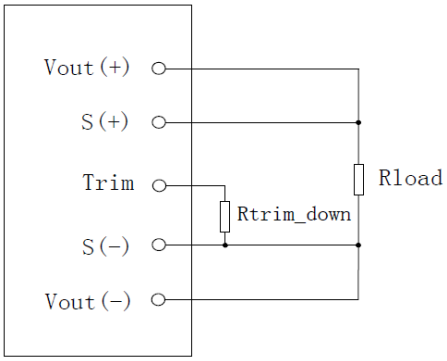


Fig. 18 Output Voltage Down-Regulation

Trim-Up Resistance Formula (KOhm)

$$\text{Rtrim}_{\text{up}} = \frac{\text{Vout}_{\text{norm}}\text{x}\,(100+\Delta)}{1.225\ \text{x}\ \Delta} - \frac{100}{\Delta} - 2$$

Trim-Down Resistance Formula (KOhm)

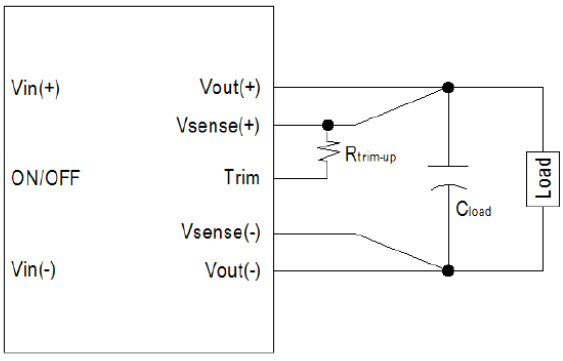
$$\text{Rtrim}_{\text{down}} = \frac{100}{\Delta} - 2$$

Module Current Sharing Signal

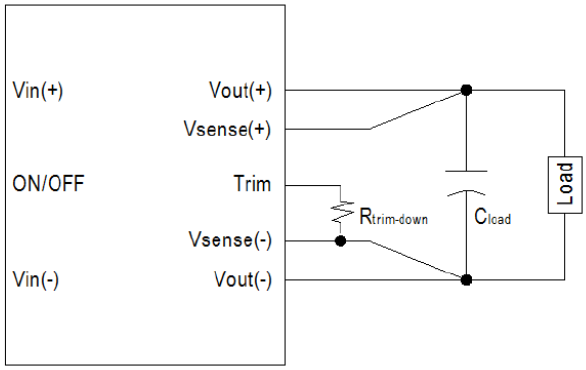
When the modules are operated in parallel mode to expand the output power, the Ishare pins of each module should be connected together to achieve output current sharing between modules. The Ishare signal current is very small and susceptible to interference. When wiring, the Ishare signal line must be kept away from interference sources and the wiring should be as close to the ground wire as possible. If the parallel function is not required, leave this pin floating.

Output Voltage Regulation

The output voltage of the module can be trimmed between 22.4~30.8Vdc by connecting an external resistor. To increase the output voltage, an external resistor needs to be connected between the TRIM terminal and +S. To reduce the output voltage, an external resistor needs to be connected between the TRIM terminal and -S, as shown in the figure below. When the output voltage is higher than the adjustable range, it may cause output overvoltage protection. When the output voltage is increased, the output current needs to be reduced to ensure that the maximum output power of the module remains within the specified range. When the output voltage decreases, the maximum output current remains unchanged.



Trim up the output voltage



Trim down the output voltage

$$Rtrim\text{-}up = \frac{25344 * V_{out}}{V_{out} - 28} - 3000(\Omega)$$

$$Rtrim\text{-}down = \frac{2000 * V_{out}}{28 - V_{out}} - 3000(\Omega)$$

Unit of Rtrim-up/Rtrim-down is Ω

USER INFORMATION

Please pay attention to the warnings and precautions before using the product. Improper operation may cause permanent damage to the power module or cause a fire. Please make sure that you have read the warnings and precautions before using the product.

Warning:

- When the module is powered up, please keep your body away from the module to avoid accidental injury.
- Please do not modify or disassemble the module. This may cause electric shock. If customer modifies or disassembles the module, we shall not be responsible for any consequences resulted.
- There are high voltage spots and high temperature spots inside the module. Please do not touch any internal component to avoid electric shock or burn.
- When the module is powered up, do not touch the module to avoid burnt.

Cautions:

- Make sure that the input/output terminals and signal pins of the module are connected appropriately according to the application note/datasheet. Do not apply power when wiring the pins.
- A fast blow 10A fuse or other over current protection device must be connected to the input terminal of the module.
- The schematics and parameters of the module are for reference only. Customers have to verify these schematics and the effective value of the parameters before they finish the circuit design.
- Please use the module within the indicated specifications. Stress above the specifications will cause permanent damages to the product.
- Users must consider the potential electrical hazards of the output terminals. They are responsible for the appropriate design to avoid accidental contact from people or objects during operation.
- This module is suitable for standard wave soldering technology and manual soldering methods. During wave soldering, the module pins must be preheated at 130˚C for 20 to 30 seconds and wave soldering at 260˚C for less than 10 seconds. When manual welding, for small-signal 10PIN pins, pay attention to the soldering iron setting temperature of about 350°C, and the welding time should not be too long. Long-term high-temperature welding can cause the pins inside the module to desolder or short-circuit.
- Wall Industries reserves the right for the interpretation of this document. Any redistribution or reproduction of part or all of the contents in any form is prohibited without the permissions from Wall Industries.

COMPANY INFORMATION

Wall Industries, Inc. has created custom and modified units for over 50 years. Our in-house research and development engineers will provide a solution that exceeds your performance requirements on-time and on budget. Our ISO9001 certification is just one example of our commitment to producing a high quality, well-documented product for our customers.

Our past projects demonstrate our commitment to you, our customer. Wall Industries, Inc. has a reputation for working closely with its customers to ensure each solution meets or exceeds form, fit and function requirements. We will continue to provide ongoing support for your project above and beyond the design and production phases. Give us a call today to discuss your future projects.

Contact **Wall Industries** for further information:

Phone: ☎(603)778-2300
Toll Free: ☎(888)597-9255
Fax: ☎(603)778-9797
E-mail: sales@wallindustries.com
Web: www.wallindustries.com
Address: 37 Industrial Drive
Exeter, NH 03833