DC-DC Converters Input 10V-60V Output 5V/2A,±15V/±0.3A Industry Standard 2×1.6 in.

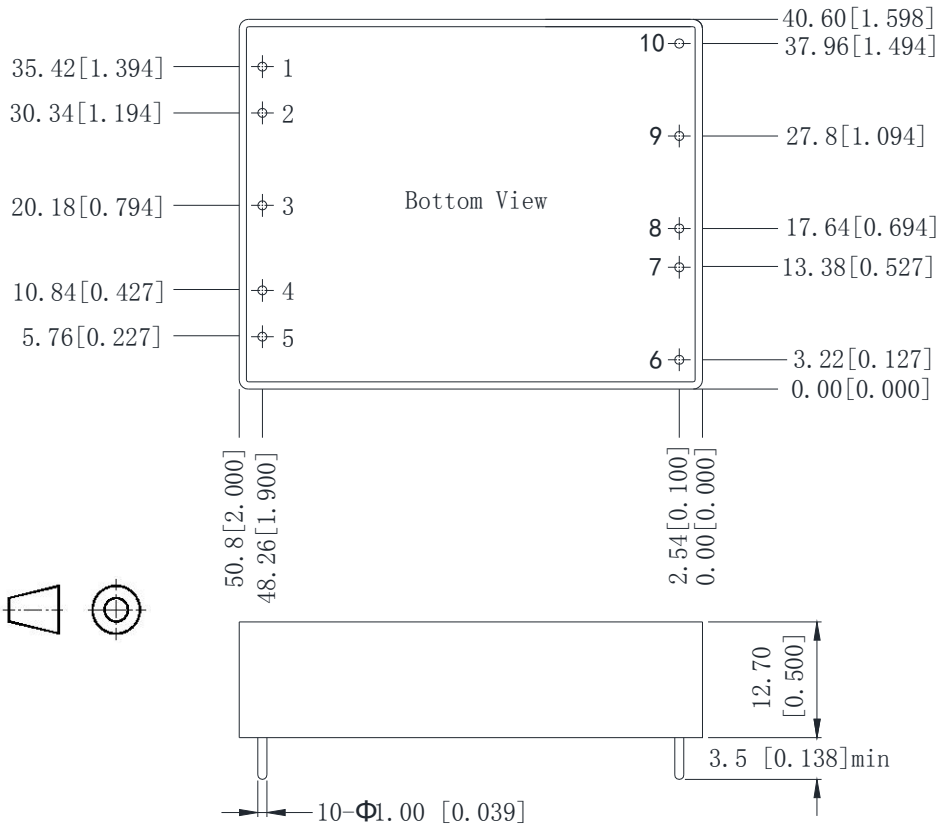
Features

- Industry Standard 2×1.6 in.
- Wide input voltage range (10V to 60V)
- Input Under Voltage Protection (7.0V to 10.0V Turn off)
- Output Over Current Protection
- Output Short-circuit Protection(Hiccup mode, automatic recovery)
- High Efficiency, typical 86%（24V, full load）
- 1500Vdc Min.Isolation Voltage
- Operating Case Temperature -40℃ to +100℃
- Applications：Vehicle power and control ,Industrial Electronics ,Communication equipments ,data exchange servers and distributed power etc.

RoHS 2002/95/EC

Contents

Outline Diagram



Pin	Symbol	Function
1	+Vin	Input voltage positive
2	-Vin	Input voltage negative
3	NP	No pin
4	+Vin	Input voltage positive
5	-Vin	Input voltage negative
6	-Vo1	5V output negative
7	+Vo1	5V output positive
8	-Vo2	-15V output
9	Com	Ground to -15V and +15V
10	+Vo3	15V output

Case material：Aluminium alloy and shielding board, black;

Pins material：Copper alloy with gold plating.

Note 1：1 and 4 pins, 2 and 5 pins are not connected in the module.

Note2：Units: mm(inches)

Defaule Tolerance：X.X±0.5(X.XX±0.02) X.XX±0.25(X.XXX±0.010)

Specification

Unless otherwise specified, all values are given at: 25℃, one standard atmosphere pressure, pure resistive load and basic connection.

Input	Symbol	Min	Typ	Max	Unit	Conditions
Input Voltage	V_{in}	10	24	60	V	—
Under Voltage Threshold	V_{UVLO}	7.0	–	10.0	V	50% load test

Continue

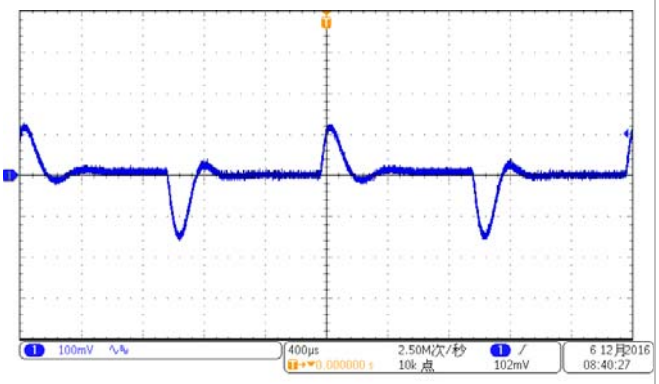
Input		Symbol	Min	Typ	Max	Unit	Conditions
Start-up Delay Time	5V	$T_{delay}1$	–	7	–	ms	—
	-15V	$T_{delay}2$	–	7	–	ms	—
	+15V	$T_{delay}3$	–	7	–	ms	—

Output		Symbol	Min	Typ	Max	Unit	Conditions
Output Voltage	5V	V_O1	4.95	5.00	5.05	V	—
	-15V	V_O2	-14.55	-15.00	-15.45	V	—
	+15V	V_O3	14.85	15.00	15.15	V	—
Output Current	5V	$I_O1_{,nom}$	–	2	–	A	—
	-15V	$I_O2_{,nom}$	–	-0.3	–	A	—
	+15V	$I_O3_{,nom}$	–	0.3	–	A	—
Line Regulation	5V	S_V1	–	–	±0.2	% V_O1	V_{in}：10V～60V, I_{O1}=2A，I_O2=-0.3A, I_O3=0.3A
	-15V	S_V2	–	–	±0.2	% V_O2	
	+15V	S_V3	–	–	±0.2	% V_O3	
Load Regulation	5V	S_I1	–	–	±0.5	% V_O1	V_{in}=24V, I_O1=10%$I_O1_{,nom}$～$I_O1_{,nom}$
	-15V	S_I2	–	–	±5	% V_O2	V_{in}=24V, Io2=10%$I_O2_{,nom}$～$I_O2_{,nom}$
	+15V	S_I3	–	–	±0.5	% V_O3	V_{in}=24V, I_O3=10%$I_O3_{,nom}$～$I_O3_{,nom}$
Output Over Current Protection Range	5V	$I_O1_{,lim}$	2.2	–	3.6	A	V_{in}=24V
	-15V	$I_O2_{,lim}$	0.33	–	0.78	A	V_{in}=24V, When test one output, another output full load
	+15V	$I_O3_{,lim}$	-0.33	–	-0.78	A	
Output Short-circuit Protection		Hiccup mode, automatic recovery					
Peak to Peak Ripple and Noise	5V	$\triangle V_{pp}1$	–	–	50	mV	20MHz bandwidth, Vin=24V, Io,nom, pure resistive load, Vo1 and Vo2, Vo3 have not common ground, Vo2, Vo3 have common ground
	-15V	$\triangle V_{pp}2$	–	–	120	mV	
	+15V	$\triangle V_{pp}3$	–	–	120	mV	
Rise Time	5V	$T_{rise}1$	–	8	–	ms	V_{in}=24V,$I_{O,nom}$, pure resistive load
	-15V	$T_{rise}2$	–	12	–	ms	
	+15V	$T_{rise}3$	–	12	–	ms	
Output Overshoot	5V	$V_{TO}1$	0	0.25	0.5	V	V_{in}=24V,$I_{O,nom}$, pure resistive load
	-15V	$V_{TO}2$	0	0.75	1.5	V	
	+15V	$V_{TO}3$	0	0.75	1.5	V	
Capacitive Load	5V	C_O1	0	–	1000	μF	V_{in}=24V,$I_{O,nom}$,pure resistive load
	-15V	C_O2	0	–	330	μF	
	+15V	C_O3	0	–	330	μF	
Load Transient — Recovery Time	5V	$t_{tr}1$	—	—	200	μs	25%～50%～25%Io,nom or 50%～75%～50%Io,nom; 0.1A/μs Vin=24V
	-15V	$t_{tr}2$	—	—	200	μs	
	+15V	$t_{tr}3$	—	—	200	μs	
Load Transient — Voltage Deviation	5V	$\triangle V_{tr}1$	—	—	±250	mV	
	-15V	$\triangle V_{tr}2$	—	—	±750	mV	
	+15V	$\triangle V_{tr}3$	—	—	±750	mV	
Cross Regulation		V_C	–	±3	±5	%V_O2	Io3＞0.03A，Vo2 to Vo3

General	Symbol	Min	Typ	Max	Unit	Conditions
Efficiency	η	84	86	–	%	V_{in}=24V，Io,nom
Switching Frequency	f_s	–	300	–	kHz	—
Isolation Resistance	R_{iso}	50	–	–	MΩ	500Vdc,90%RH
Isolation Voltage	V_{iso}	1500	–	–	Vdc	Input to output,1min/0.5mA
		1000	–	–	Vdc	Vo1-Vo2、Vo3,1min/0.5mA
MTBF	—	—	2×10^6	—	h	BELLCORE TR-332，25℃
Case Temperature	—	-40	–	+100	℃	See the derating curve
Storage Temperature	—	-55	–	+125	℃	—
Temperature Coefficient	S_T	—	—	±0.02	%/℃	—
Relative Humidity	—	10	—	90	%	No condensing，40℃±2℃
Hand Soldering	Maximum soldering Temperature < 425℃，and duration < 5s					
Wave Soldering	Maximum soldering Temperature < 255℃，and duration < 10s					
Weight	—	—	40	—	g	Single product

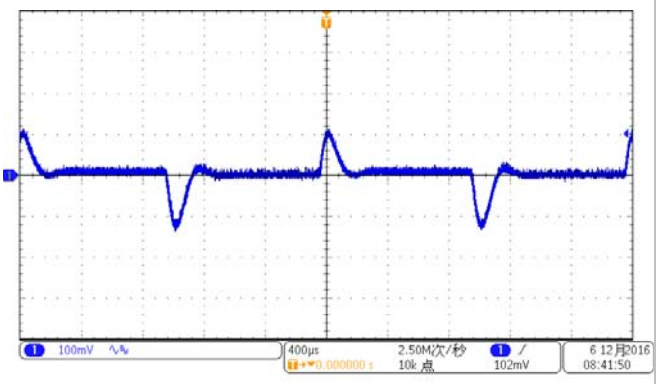
Characteristic Curves

5V Load Transient Response



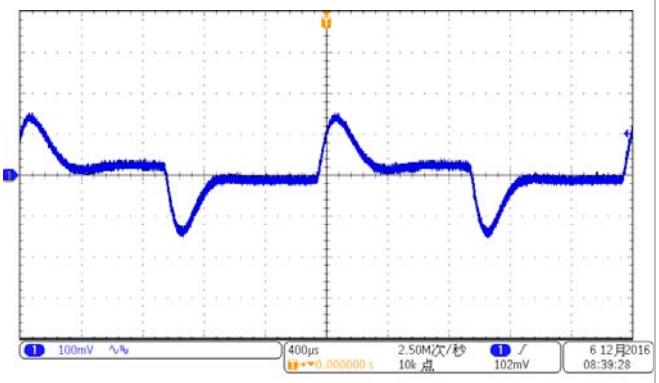
Load change:25%～50%～25% Io,nom, 0.1A/μs
Vin=24Vdc

5V Load Transient Response



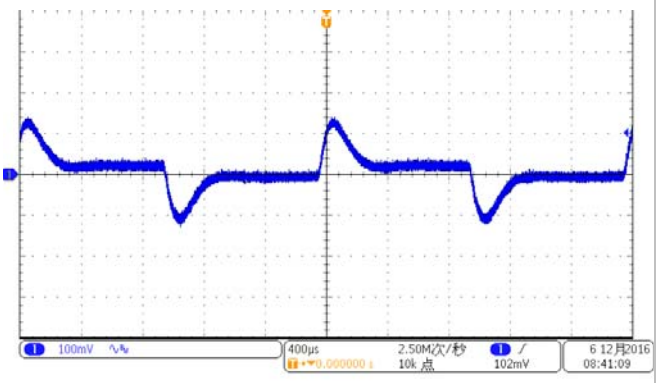
Load change: 50%~75%～50% Io,nom, 0.1A/μs
Vin=24Vdc

-15V Load Transient Response



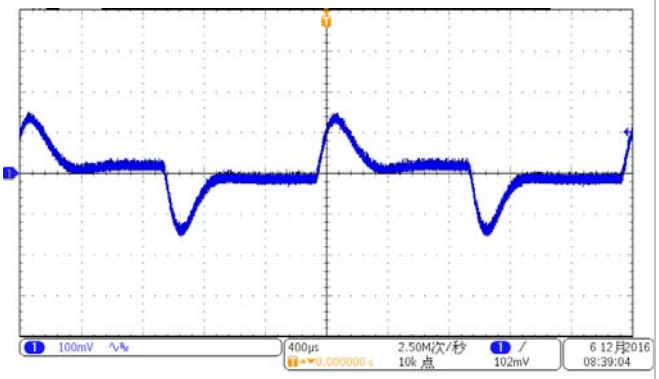
Load change:25%～50%～25% Io,nom, 0.1A/μs
Vin=24Vdc

-15V Load Transient Response



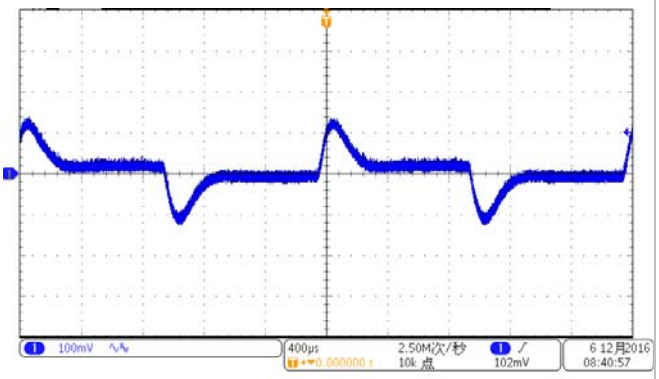
Load change:50%～75%～50% Io,nom, 0.1A/μs
Vin=24Vdc

+15V Load Transient Response



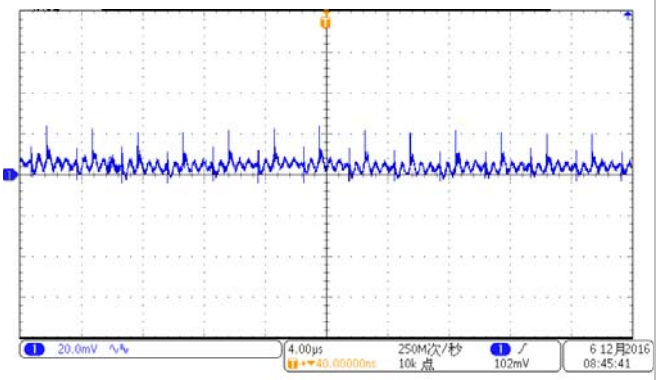
Load change:25%～50%～25% Io,nom, 0.1A/μs
Vin=24Vdc

+15V Load Transient Response



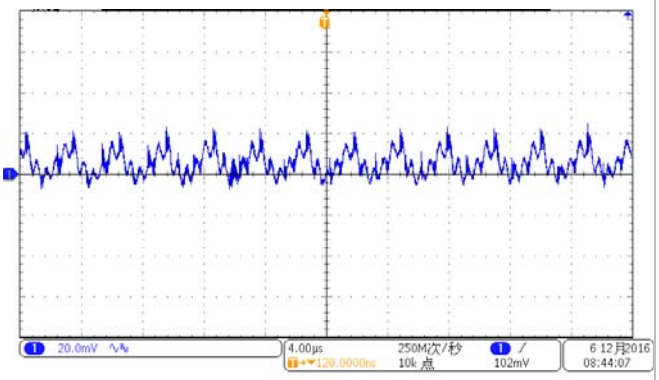
Load change:50%～75%～50% Io,nom, 0.1A/μs
Vin=24Vdc

5V Output Ripple and noise



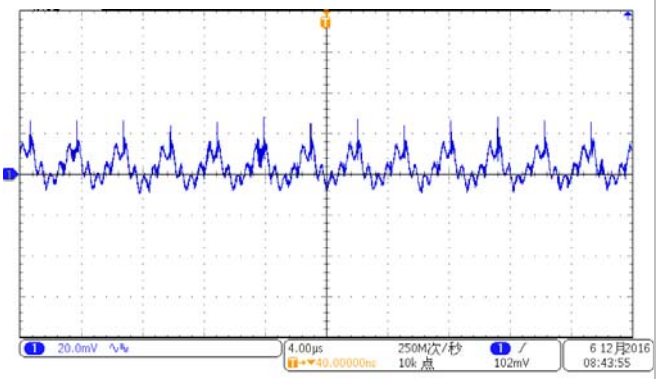
V_{in}=24Vdc，I_O1=2A

-15V Output Ripple and noise



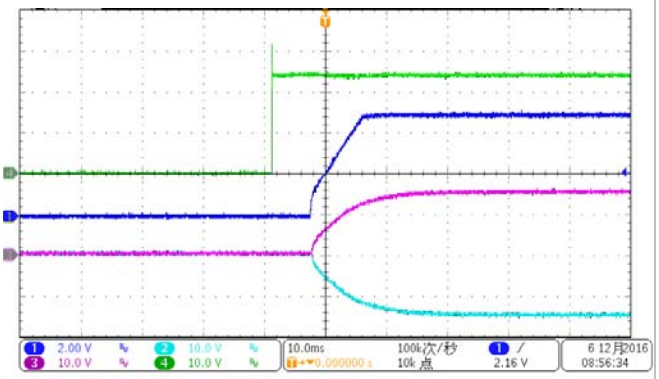
V_{in}=24Vdc，I_O2=-0.3A

+15V Output Ripple and noise



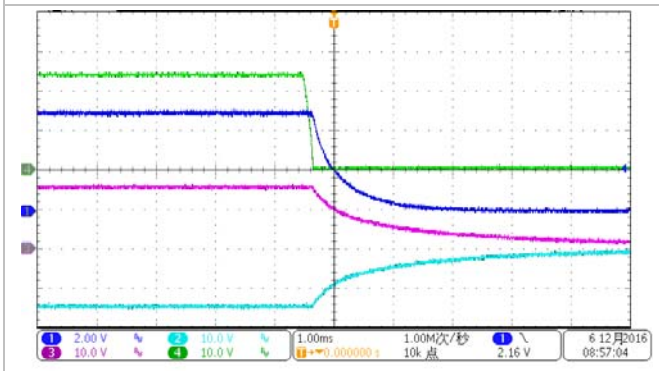
V_{in}=24Vdc，I_O3=0.3A

Start-up Delay Time



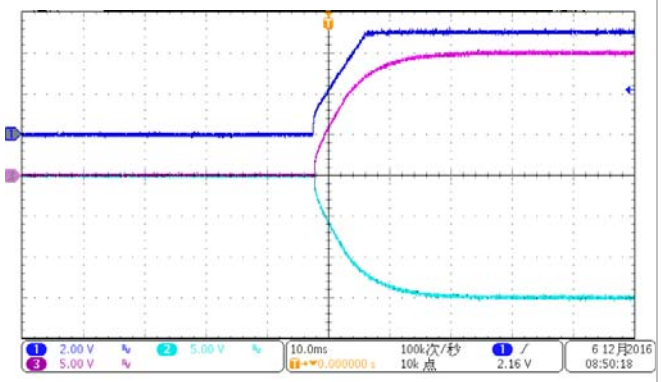
Channel 4 (green line): Input voltage
Channel 1 (deep blue line): 5V output voltage
Channel 2 (light blue line): -15v output voltage
Channel 3 (purple line): +15V output voltage
V_{in}=24Vdc,Io,nom

output hold-up time



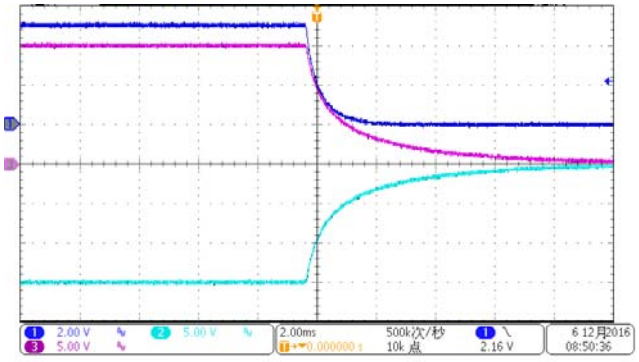
Channel 4 (green line): Input voltage
Channel 1 (deep blue line): 5V output voltage
Channel 2 (light blue line): -15v output voltage
Channel 3 (purple line): +15V output voltage
V_{in}=24Vdc,Io,nom

Rise Time



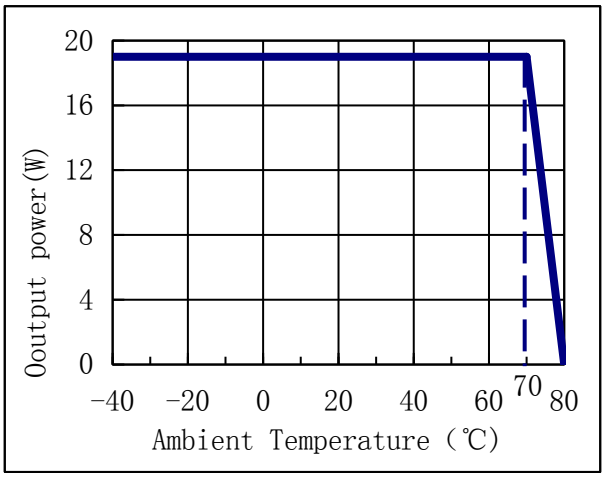
Channel 1 (deep blue line): 5V output voltage
Channel 2 (light blue line): -15v output voltage
Channel 3 (purple line): +15V output voltage
V_{in}=24Vdc,Io,nom

Turn-off

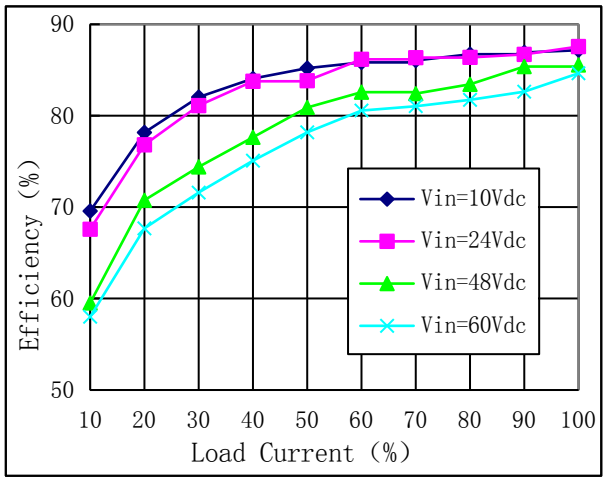


Channel 1 (deep blue line): 5V output voltage
Channel 2 (light blue line): -15v output voltage
Channel 3 (purple line): +15V output voltage
V_{in}=24Vdc,Io,nom

Derating（Vin=24V）

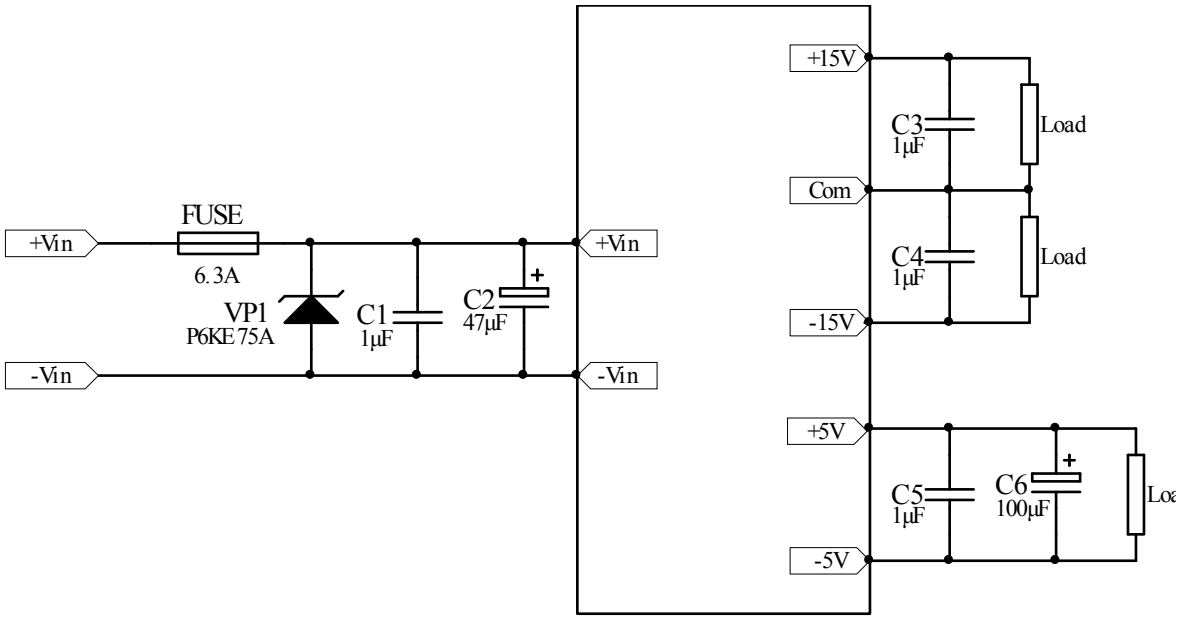


Efficiency vs Io & Vin



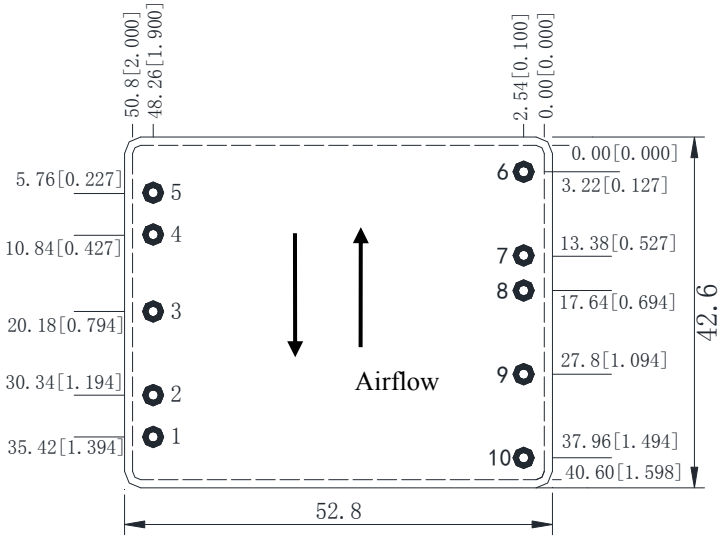
Design Considerations

Basic Connection



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

Recommended Layout



NO.	Recommendation & Notes
Pad Design	Pad hole: 1.3mm,pad diameter including hole: at least 2.6mm
Mounting Direction	Metal heat sink face up, avoid downward, in order to prevent the flow of hot air is blocked
Safety	Isolated Converters, care to the spacing between input and output
Electrical	The Vin(-) and Vo(-) planes should be placed under of the converter separately. Avoid routing sensitive signal or high disturbance AC signal under the converter.

Input Voltage Range

The input voltage range of the DC/DC converter is 10V to 60V。The input impedance of the converter looks like a negative resistor, which can interact with the reactance of the power bus (including any filter elements that have been added to the input of the converter), causes an unstable condition. Depending on the internal transformer's impedance, the external impedance usually should not exceed the 10% of the internal. So, the source impedance of the Power bus should be kept as low as possible.

External Capacitance

Unless special purpose (i.e. prolonging hold-up time, input impedance matching), the recommended input filter's capacitance ranges 47μF-220μF, which not only offers a stable system, and reduces the cost, but also lessens the inrush current when the power supplies.

When larger capacitance is required, a circuit of suppressing the inrush current is recommended when the regulator start-up and a discharge circuit is recommended when the output dropped, ensuring the reliability and safety of other equipments in the system.

Thermal Consideration

The converters operate in a variety of thermal environments; however, sufficient cooling should be provided to ensure reliable operation of the unit. Heat is removed by conduction, convection and radiation to the surrounding environment.

When ambient temperature is higher than the permitted operating, the derating curves should be referred or external heat dissipation measures. Forced air cooling or heatsink, should be used. The air tunnel should be considered for forced air cooling, to avoid heated air be hindered or forming swirl; when heatsink used, it should be attached the converter closely, through double-side thermal conductivity insulation adhesive or thermal conductivity silicone for heat exchange.

Safety Consideration

The converters, as one component for the end user, should be installed into the equipment, and all the safety considerations are achieved under certain condition. It is required to meet safety requirements in system design for the user. The converter output is considered SELV, and the expected input is considered TNV2, the primary to secondary is basic insulation to EN60950.The maximum operating temperature for PCB is 130 ℃.

To avoiding fire and be protected when short circuit occurred, it is recommended that a fast blow fuse with rating 2.5 to 3 times of converter's continuous input peak current is used in series at the input terminal.(Inrush current suppression circuit is required for greater filter capacitance at input terminal, or it will result in the misoperation of the fuse).

ESD Control

The converters are processed and manufactured in an ESD controlled environment and supplied in conductive packaging to prevent ESD damage from occurring before or during shipping. It is essential that they are unpacked and handled using an ESD control procedures. Failure to do so affects the lifetime of the converter.

Cleaning Notice

The converter case is not a hermetically-sealed construction, a sufficient drying process is required after the converter cleaning, make sure the liquid congregated is removed, or it will damage the converter or degradation of performance

After surface treatment, the appearance of the converter may be affected by the organic solvent, protection measures should be taken before cleaning when appearance is concerned.

Quality Statement

The converters are manufactured in accordance with ISO 9001 system requirements, and are monitored 100% by auto-testing system, 100% burn in.

The warranty for the converters is 5-year.

Contact Information

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