12W Isolated DC-DC Converter

Wide input voltage and regulated single output

HanRun® Electronics Company Limited

HR837101

Features :

- ***HanRun*** transformer
- Ultra compact DIP package
- Wide 4:1 input voltage range
- Operating ambient temperature range: -40°C to+85°C
- I/O isolation test voltage: 1.5K VDC
- Low output ripple & noise
- Short circuit protection (self-recovery)
- Remote On/Off
- Low Stand-by Power Consumption
- Meets EN62368-1 standard
- RoHs Compliant

This model is a newly designed DIP 1X1 packed, 12W output power, ultra wide input range 4:1, low stand-by power consumption, isolated regulated output DC-DC converter, could be widely used for industrial control, instrument, communication, power electricity, internet of things field.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	DC Input	9	24	36	VDC
Input Current (no load)	nominal Input Voltage，no load	-	4.8	6	mA
Input Current	nominal Input Voltage，100% load	-	567	575	mA
Reflected Ripple Current	nominal Input Voltage，100% load	-	40	-	mA
Surge Voltage (1sec. max.)		-0.3	-	50	V
Input Under-voltage Protection		7.3	8.3		V
Start-up Voltage	nominal input voltage,100% load,	-	-	9	V
Start-up Time	nominal input voltage,100% load,	-	10	-	ms
Input Filter		π filter			
Hot Plug		Unavailable			
Ctrl	Module on	Ctrl pin open (high resistance)			
	Module off	Ctrl pin pulled low to Gnd			
	Input Current during module off	-	5	-	mA

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
DC Output Voltage		-	12	-	V
DC Output Current		0	-	1	A
Ouput Voltage Accuracy	5%-100% load, input voltage range	-	±3	-	%
Line Regulation	Input voltage variation from low to high at full load	-	±0.5	-	%
Load Regulation	nominal input voltage, 10%~100% load,	-	±1	-	%

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Item	Operating Conditions	Min.	Typ.	Max.	Unit
Transient Recovery Time	25% load step change	-	300	500	us
Transient Response Deviation	25% load step change	-	±3	±5	%
Turn-on delay time		-	150	-	ms
Output Voltage Regulation		not available			
Output Turn-on Overshoot Voltage		≤10%Vo			
Temperature Coefficient	Full load	-	±0.03	-	%/°C
Ripple & Noise *	20MHz bandwidth	-	50	100	mVp-p
Short-circuit Protection		Continuous, self-recovery			
Over-current Protection		110%~220% Io			
Over-voltage Protection		120%~200% Vo			
Note:* the twisted pair method is used for Ripple and Noise test.					

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input to output , 1 minute and 0.5mA max.	1500	-	-	VDC
Isolation Voltage	Input to case , 1 minute and 0.5mA max.	1000	-	-	VDC
Insulation Resistance	Input to output,at 500VDC	1000	-	-	MΩ
Isolation capacitance	Input to output,100KHz 0.1V	-	1000	-	pF
Capacitive Load	nominal input voltage, Full load	-	-	2000	uF
Efficiency	nominal input voltage,full load,	85	87	-	%
Storage Humidity	Non-condensing	5	-	95	%RH
Operating Temperature	(see Fig. 1)	-40	-	+85	°C
Storage Temperature		-55	-	+125	°C
Case Temperature	Within Operating Curve	-	-	105	°C
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10s seconds	-	-	300	°C
Switching Frequency	nominal input voltage,full load,	-	330	-	KHz
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Safety Standard		EN 62368-1			
MTBF	MIL-HDBK-217F@25℃	200	-	-	Khours

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Physical Specifications	
Casing Materia	Aluminum alloy and plastic (UL94V-0)
Dimensions	25.4*25.4*11.7mm,Horizontal package
Weight	12g (typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)			
EMI	CE	CISPR32/EN55032	CLASS A bare board
		CISPR32/EN55032	CLASS B (see Fig. 5-② for recommended circuit)
	RE	CISPR32/EN55032	CLASS A bare board
		CISPR32/EN55032	CLASS B (see Fig. 5-② for recommended circuit)
EMS	ESD	IEC/EN61000-4-2	±4kV Perf.Criteria B
	RS	IEC/EN61000-4-3	10V/m Perf.Criteria B (see Fig. 5-② recommended circuit)
	EFT	IEC/EN61000-4-4	±2kV Perf.Criteria B (see Fig. 5-① recommended circuit)
	Surge	IEC/EN61000-4-5	±2kV Perf.Criteria B (see Fig. 5-① recommended circuit)
	CS	IEC/EN61000-4-6	3 Vr.m.s Perf.Criteria B (see Fig. 5-② recommended circuit)
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11	0%~70% Perf.Criteria B

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Typical Characteristic Curve:

Temperature Derating Graph

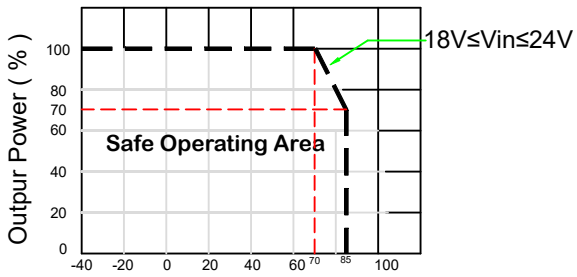

Fig. 1-1

Temperature Derating Graph

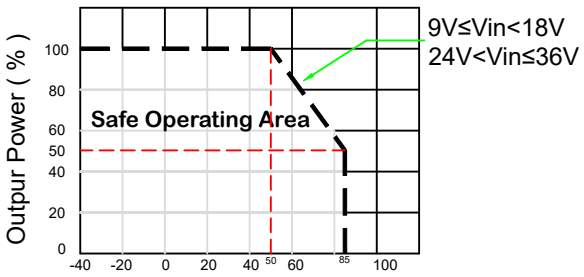

Fig. 1-2

Efficiency VS output current

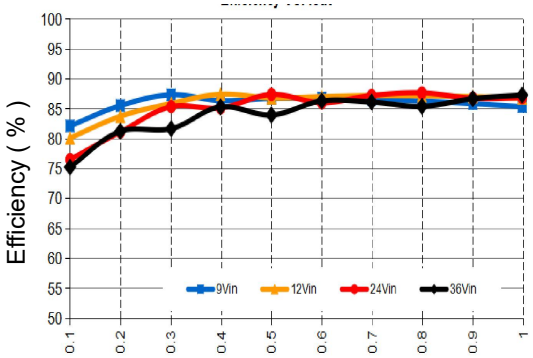

Fig. 2

Efficiency VS input Voltage (Full load)

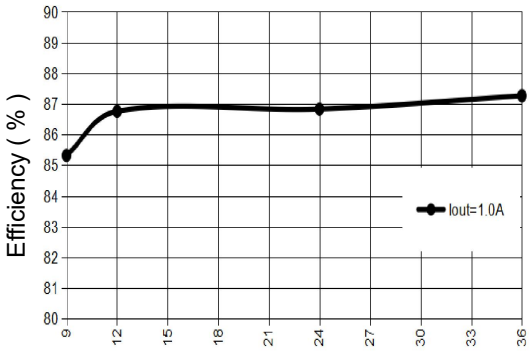

Fig. 3

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Design Reference:

1. Typical application

The part is tested before delivery using the recommended circuit shown in Fig. 4

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C0, C1, Appropriate filter capacitance shall be chosen, start-up problems may be caused if the capacitance is too large. For each output circuit, under the condition of safe and reliable operation, the max. capacity of its filter capacitor should be lower than the max. capacitive load.

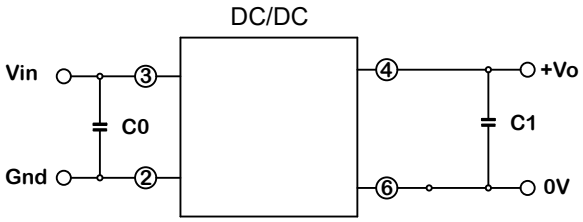

Fig. 4

Item	values
C0	47~ 100uF/100V
C1	470uF/50V

Table 1: Recommended input and output capacitor values

2. EMC typical recommended circuit

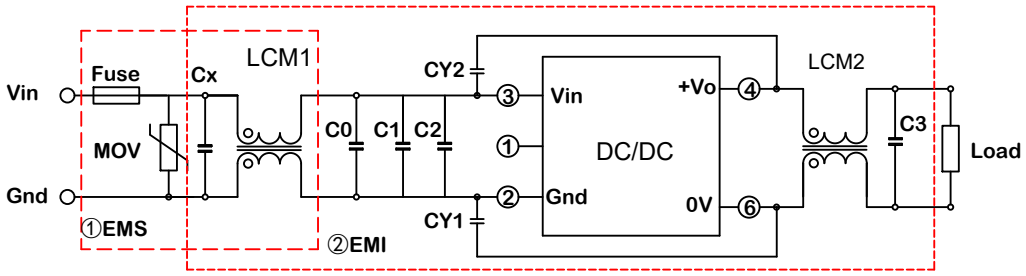

Fig. 5

Item	values
FUSE	Slow-blow, selecting based on needs
MOV	14D560K
Cx	0.47uF
LCM1	10mH
C0	0.1uF/250V
C1	220uF/100V
C2	0.1uF/250V
LCM2	30uH
C3	47uF/50V
Cy1/Cy2	2.2nF/2KV

Table 2: Recommended EMC filter values

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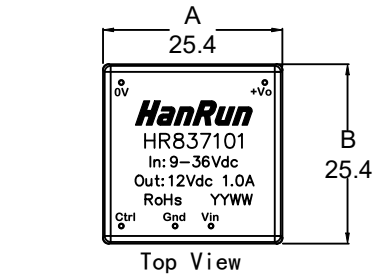
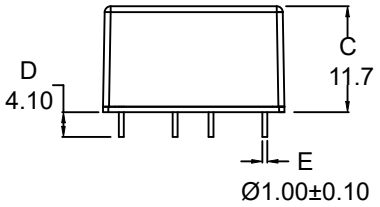
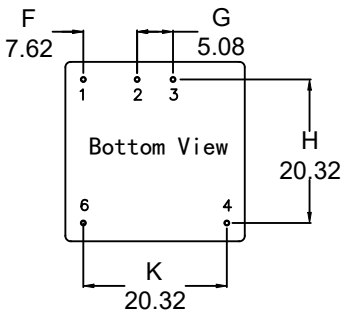
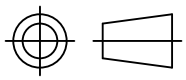
Dimensions and Recommended Layout:

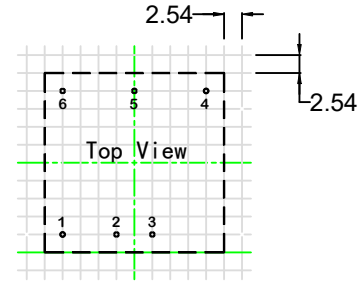








Pin-out	
Pin	Mark
1	Ctrl
2	Gnd
3	Vin
4	+Vo
5	no pin
6	0V



Recommended PCB layout

Unit : mm
Unless otherwise specified,
Pin section tolerance : ±0.15
General tolerance: .x ± 0.5 , .xx ± 0.25

Notes:

1. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. The product should be used under the specification range
5. All index testing methods in this datasheet are based on company corporate standards;

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