

Features

- 10PIN SMD Package
- UL94V-0 Package Material
- Operating Temperature:-40°C TO +85°C
- Efficiency up to 93%
- Non isolated, no need for heatsinks
- Short circuit protection



**NON-ISOLATED
DC/DC Converter**

Input Specifications

| | |
|-----------------------|--|
| Input Voltage Range | :12~36Vdc |
| Input current no load | :3mA TYP |
| Input Filter | : Capacitor |
| Remote ON | : 3.2 ~ 5.5VDC or open circuit |
| Remote OFF | : 0 ~ 0.8VDC or short circuit pin 10 and 3/7 |
| OFF Idle Current | : 0.2mA typ. |

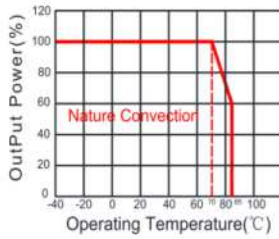
Output Specifications

| | | |
|-------------------------------------|-------------------|----------------------------------|
| Output Voltage | :9Vdc | |
| Output Voltage Accuracy | :±3% | @Vout=8.73~9.27Vdc @Vin=12~36Vdc |
| Output Voltage Adjustability (Trim) | :±10% max. | |
| Output Current | :500mA | |
| Efficiency | :93% TYP @Min Vin | |
| | :90% TYP @Max Vin | |
| Ripple / Noise | :75mVp-p MAX | @20MHz Bandwidth |
| Short Circuit Protection | :Continuous | @auto-recovery |
| Line Regulation | :±0.4% MAX | @ at Full Load |
| Load Regulation | :±0.6% MAX | @10% to 100% load |
| Capacitive load | :680uF MAX | |

General Specifications

| | | | |
|-----------------------------|--------------------------------|---|------------|
| Operating Temperature Range | :-40°C ~ +85°C (with derating) | | |
| Storage Temperature | :-55°C ~ +125°C | | |
| Switching Frequency | :440KHz TYP | | |
| Humidity | :95% MAX | | |
| Cooling | :Free air convection | @(20 LFM) | |
| MTBF | :>5000x10 ³ Hours | MIL-HDBK-217F@25°C,Ground Benign. | |
| Weight | :1.8g TYP | | |
| EMI | CE | CISPR32/EN55032 CLASS B (see Fig. 2 for recommended circuit) | |
| | RE | CISPR32/EN55032 CLASS B (see Fig. 2 for recommended circuit) | |
| | ESD | IEC/EN61000-4-2 Contact ±4kV perf. | Criteria B |
| | radiated immunity | IEC/EN61000-4-3, 10V/m | Criteria A |
| EMS | EFT/burst | IEC/EN61000-4-4, ± 1kV (see Fig. 2 for recommended circuit) | Criteria B |
| | surge | IEC/EN61000-4-5, line-line ± 1kV (see Fig. 2 for recommended circuit) | Criteria B |
| | conducted immunity | IEC/EN61000-4-6, 3 Vr.m.s | Criteria A |

Temperature Derating Graph



Part Number

13DS - 09 - 500

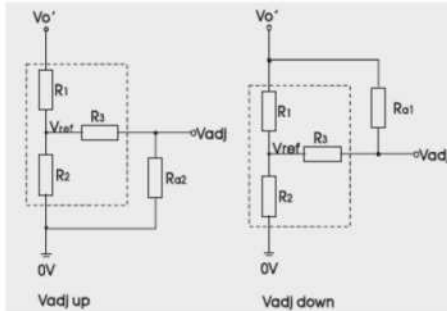
A B C

A:Series

B:Output Voltage

C:Output Current

Application of Vadj and calculation of Vadj resistance



Calculation formula of Vadj resistance:

$$\text{up: } R_{a2} = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_{a1} = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

Ra1, Ra2 is Vadj resistance, a is a self-defined parameter, with no real meaning. Vo' for the actual needs of the up or down regulated voltage

| R1/KΩ | R2/KΩ | R3/KΩ | Vref/V |
|-------|-------|-------|--------|
| 82 | 8.06 | 33 | 0.8 |

Typical Application Circuit

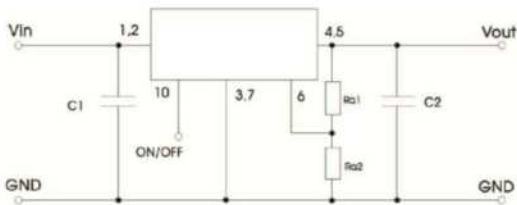
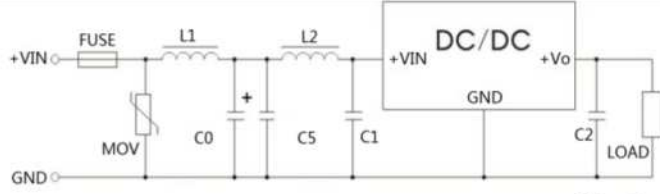


Fig.1

| Vin | C1 | SingleVout | C2 |
|-------|----------|------------|----------|
| 24Vdc | 10μF/50V | 9Vdc | 22μF/16V |

- C1 and C2 are required and should be connected close to the pin terminal of the module.
- For capacitance of C1 and C2 refer to table, it can be increased properly if required, and tantalum or low ESR electrolytic capacitors may also suffice.
- Cannot be used in parallel for output and hot swap.

EMC (CLASS B) compliance circuit

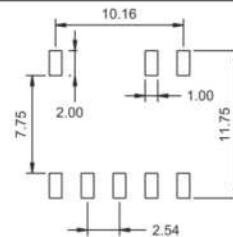
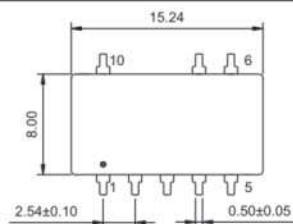


FUSE: choose according to actual input current

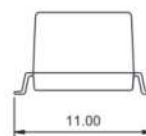
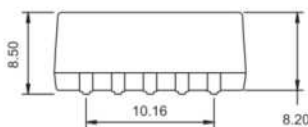
Fig.2

| Component | Value | Component | Value |
|-----------|--------|-----------|----------------|
| MOV | S20K30 | C0 | 680μF/50V |
| L1 | 82μH | C1,C2 | refer to Fig.1 |
| L2 | 68μH | C5 | 4.7μF/50V |

Outline Dimensions



SUGGESTED PAD LAYOUT



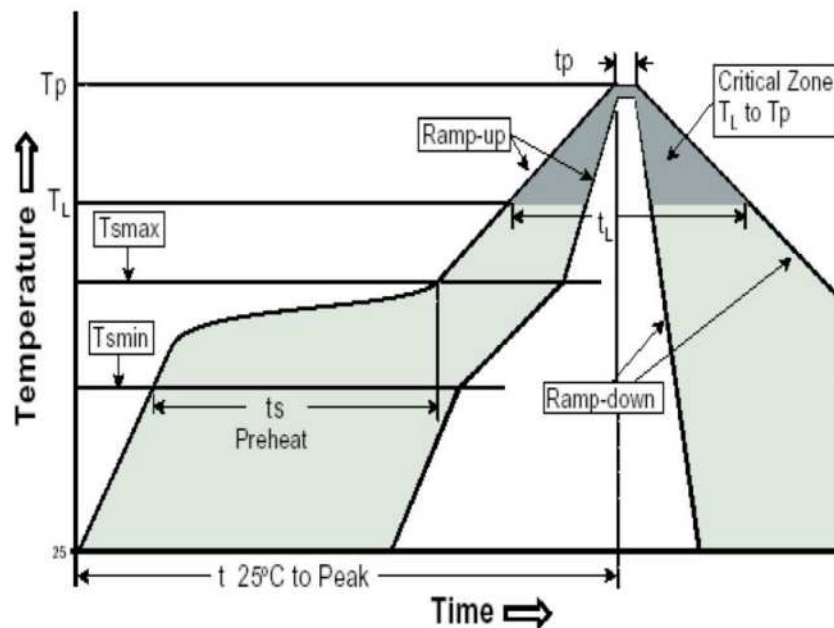
PIN Assignment

| PIN | 1.2 | 3.7 | 4.5 | 6 | 10 |
|----------|------|-----|-------|-------|---------------|
| FUNCTION | +Vin | GND | +Vout | V adj | Remote On/Off |

RoHS compliant type

Our RoHS parts just can withstand IR Reflow peak temperature: 240degC +/-5degC as the following profile:

| | |
|--|--|
| Profile Feature | Pb-Free Assembly |
| Average Ramp-Up Rate ($T_{s\ max}$ to T_p) | 3 ⁰ C /second max. |
| Preheat -Temperature Min ($T_{s\ min}$) -Temperature Max ($T_{s\ max}$) -Time ($t_{s\ min}$ to $t_{s\ max}$) | 150 ⁰ C 200 ⁰ C 60-180 seconds |
| Time maintained above: -Temperature (T_L) -Time (t_L) | 217 ⁰ C 60-150 seconds |
| Peak/Classification Temperature (T_p) | 240±5 ⁰ C |
| Time within 5 ⁰ C of actual Peak Temperature (t_p) | 20-40 seconds |
| Ramp-Down Rate | 6 ⁰ C/seconds max |
| Time 25 ⁰ C to Peak Temperature | 6 minutes max. |



Packing Information:

- 1.Weight-----1.8 grams/pcs
- 2.Tape & Reel----- 500 pcs
- 3. outer carton unit: 4000pcs/box
- 4. outer carton unit: 8T&R/box
- 5.Weight: 12.2kg per carton

