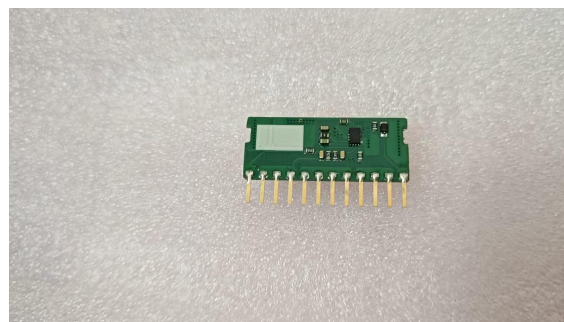


## FEATURES:

- Wide input range
- Continuous short-circuit protection
- Working temperature:  $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- No additional components required
- Stable performance and high reliability (MTBF $\geq$ 2000K hours)
- Industry standard pin-out
- SIP package
- No-load input current as low as 2mA



## Selection Guide

| Part No.    | INPUT           |                | OUTPUT           |                        | Full Load Efficiency<br>(%/Typ) Vin Min/Vin Max | Capacitive Load(μF) |
|-------------|-----------------|----------------|------------------|------------------------|-------------------------------------------------|---------------------|
|             | Normal<br>(Vdc) | Range<br>(Vdc) | Voltage<br>(Vdc) | Max<br>current<br>(mA) |                                                 |                     |
| K78L03-3AR3 | 24              | 8-32           | 3.3              | 3000                   | 90/83                                           | 1000                |
| K78L05-3AR3 | 24              | 8-32           | 5                | 3000                   | 93/89                                           | 680                 |
| K78LX6-3AR3 | 24              | 10-32          | 6.5              | 3000                   | 94/90                                           | 330                 |
| K78L09-3AR3 | 24              | 13-32          | 9                | 3000                   | 95/91                                           | 330                 |
| K78L12-3AR3 | 24              | 16-32          | 12               | 3000                   | 97/93                                           | 330                 |
| K78L15-3AR3 | 24              | 19-32          | 15               | 3000                   | 97/94                                           | 330                 |

\*\*customized accepted ,pls contact sales for details\*\*

## Input Specifications

|                       |                        |  |                                              |
|-----------------------|------------------------|--|----------------------------------------------|
| Input Filter          | Capacitive Filter      |  |                                              |
| No-load Input Current | 2mA(typ),4mA(max)      |  |                                              |
| Ctrl                  | Module on              |  | Ctrl pin open or pulled high (TTL 4.5-14VDC) |
|                       | Module off             |  | Ctrl pin pulled low to GND(0-0.8VDC)         |
|                       | Input current when off |  | 4mA(max)                                     |

## Output Specifications

| Item             | Typ         | Max       | Test Conditions                       |
|------------------|-------------|-----------|---------------------------------------|
| Voltage Accuracy | $\pm 2\%$   | $\pm 3\%$ | 0%-100% load, input voltage range     |
| Line Regulation  | $\pm 0.5\%$ | $\pm 1\%$ | Full load, input voltage range        |
| Load Regulation  | $\pm 0.5\%$ | $\pm 1\%$ | Nominal input voltage, 10% -100% load |
| Ripple&Noise     | 50mVp-p     | 100mVp-p  | 20MHz Bandwidth, full load            |

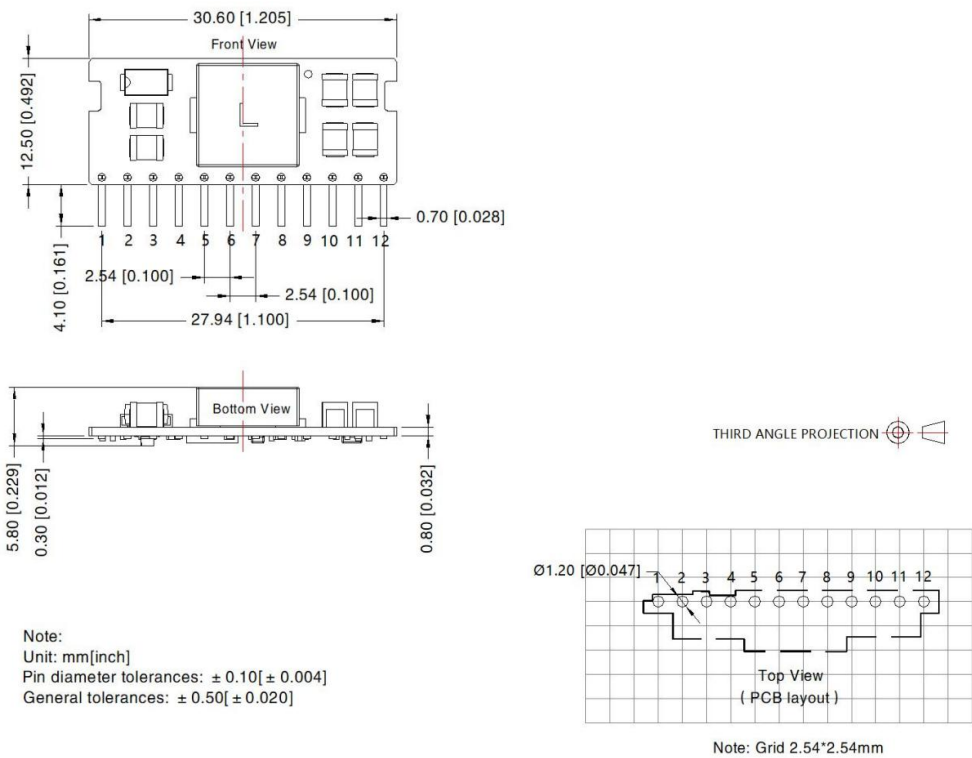
## General Specifications

|                                      |                               |                                                                              |
|--------------------------------------|-------------------------------|------------------------------------------------------------------------------|
| Switching Frequency                  | 250KHz(Typ)                   | PWM mode                                                                     |
| Short-Circuit Protection             | Continuous, self-recovery     |                                                                              |
| Temperature Coefficient              | $\pm 0.02\%/^{\circ}\text{C}$ | Operating ambient temperature $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ |
| Pin Soldering Resistance Temperature | 260 $^{\circ}\text{C}$        | Soldering spot is 1.5mm away from case for 10 seconds                        |

|                       |                     |                |
|-----------------------|---------------------|----------------|
| Operating Temperature | -40~+85℃            |                |
| Storage Temperature   | -55~+125℃           |                |
| Storage Humidity      | <95%RH              | Non-condensing |
| Cooling Method        | Free air convection |                |
| Weight                | 3.9g(Typ)           |                |

\*\*Unless specified, otherwise all other parameters are tested under the following conditions: nominal input voltage, pure resistive load, 25℃ room temperature environment.

Dimensions and Recommended Layout



Pins

| Pin-out | Mark |      |      |
|---------|------|------|------|
| 1       | CTRL | 9,10 | +Vo  |
| 2,3,4   | Vin  | 11   | +Vo  |
| 5,6,7,8 | GND  | 12   | TRIM |

Recommended Circuit

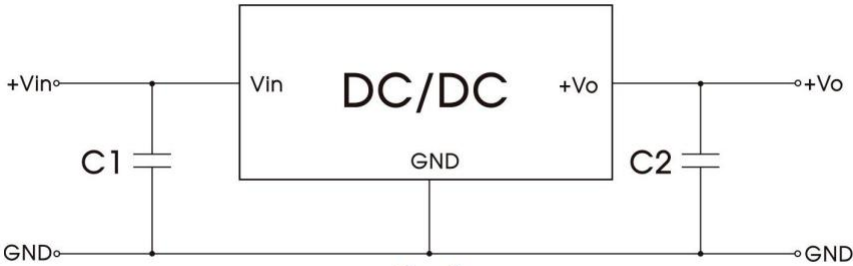


Fig. 2

| Part Number | C1<br>(Ceramic capacitor) | C2<br>(Ceramic capacitor) |
|-------------|---------------------------|---------------------------|
| K78L03-3AR3 | 10uF/50V                  | 22uF/10V                  |
| K78L05-3AR3 |                           | 22uF/10V                  |
| K78LX6-3AR3 |                           | 22uF/10V                  |
| K78L09-3AR3 |                           | 22uF/16V                  |
| K78L12-3AR3 |                           | 22uF/25V                  |
| K78L15-3AR3 |                           | 22uF/25V                  |

EMC

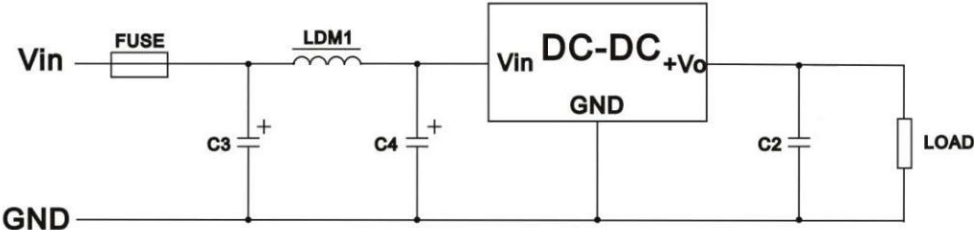
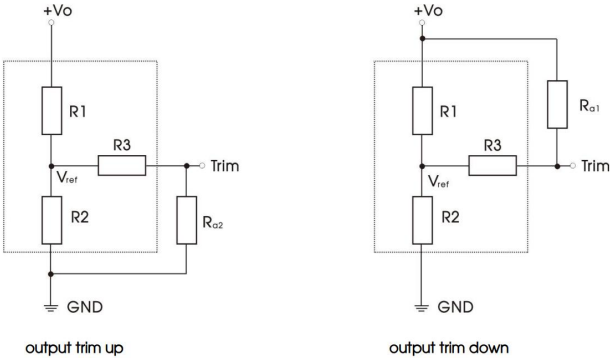


Fig.3 EMC compliance circuit

|           | FUSE                                                | C3         | LDM1 | C4         | C2                        |
|-----------|-----------------------------------------------------|------------|------|------------|---------------------------|
| Emissions | Select fuse value according to actual input current | 100μF /50V | 22μH | 100μF /50V | Refer to the C2 in Fig. 2 |
| Immunity  |                                                     |            |      | 680μF /50V |                           |

TRIM



$$\text{Trim up : } R_{a2} = \frac{aR_2}{R_2 - a} - R_3, \quad a = R_2 / (R_3 + R_{a2}) = \frac{V_{\text{ref}} - V_o}{V_o - V_{\text{ref}}} R_1$$

$$\text{Trim down : } R_{a1} = \frac{aR_1}{R_1 - a} - R_3, \quad a = R_1 / (R_3 + R_{a1}) = \frac{V_o - V_{\text{ref}}}{V_{\text{ref}}} R_2$$

| Output voltage(VDC) | R1(K) | R2(K) | R3(K) | Vref(V) |
|---------------------|-------|-------|-------|---------|
| 3.3                 | 47    | 10.5  | 7.5   | 0.6     |
| 5                   | 100   | 13.7  | 7.5   | 0.6     |
| 6.5                 | 118   | 12    | 7.5   | 0.6     |
| 9                   | 140   | 10    | 7.5   | 0.6     |
| 12                  | 200   | 10.5  | 7.5   | 0.6     |
| 15                  | 240   | 10    | 7.5   | 0.6     |

| Vout nom(Vo)  | 3.3VDC |       | 5VDC   |        | 6.5VDC  |        | 9VDC    |       | 12VDC   |        | 15VDC   |        |
|---------------|--------|-------|--------|--------|---------|--------|---------|-------|---------|--------|---------|--------|
| Vout adj(Vo') | Ra1    | Ra2   | Ra1    | Ra2    | Ra1     | Ra2    | Ra1     | Ra2   | Ra1     | Ra2    | Ra1     | Ra2    |
| 3             | 387.3K |       |        |        |         |        |         |       |         |        |         |        |
| 3.3           |        |       |        |        |         |        |         |       |         |        |         |        |
| 4             |        | 32.0K | 139.4K |        |         |        |         |       |         |        |         |        |
| 4.5           |        | 15.7K | 805.7K |        |         |        |         |       |         |        |         |        |
| 5             |        |       |        |        |         |        |         |       |         |        |         |        |
| 5.5           |        |       |        | 107.8K | 570.7K  |        |         |       |         |        |         |        |
| 6             |        |       |        | 51.3K  | 1266.9K |        |         |       |         |        |         |        |
| 6.5           |        |       |        |        |         |        |         |       |         |        |         |        |
| 7             |        |       |        |        |         | 134.1K | 440.5K  |       |         |        |         |        |
| 8             |        |       |        |        |         | 39.7K  | 1028.5K |       |         |        |         |        |
| 9             |        |       |        |        |         |        |         |       |         |        |         |        |
| 10            |        |       |        |        |         |        |         | 76.5K | 919.3K  |        |         |        |
| 11            |        |       |        |        |         |        |         | 34.5K | 2014.7K |        |         |        |
| 12            |        |       |        |        |         |        |         |       |         |        |         |        |
| 13            |        |       |        |        |         |        |         |       |         | 116.0K | 1480.5K |        |
| 14            |        |       |        |        |         |        |         |       |         | 53.4K  | 3208.5K |        |
| 15            |        |       |        |        |         |        |         |       |         |        |         |        |
| 16            |        |       |        |        |         |        |         |       |         |        |         | 136.5K |
| 17            |        |       |        |        |         |        |         |       |         |        |         | 64.5K  |

### Noted

1. Input current: Ensure that the output current of the power supply meets the instantaneous starting current of the power module (that is, twice the average input current of the power module).
2. Output load requirements: Avoid no-load use. When the actual power consumption of the load is less than 10% of the rated output power of the module or no load occurs, connect an external resistance to the output end (the sum of the external resistance and the load power is greater than or equal to 10% of the rated load) or select a module with a smaller rated power.
3. The external capacitance of the output end should not be too large; otherwise, the module may be overcurrent or poorly started. For details, see the external capacitance recommendation table.
4. External LC filter circuit can be connected for occasions with high ripple noise requirements.

\*The final interpretation right of the product belongs to ECCO ELECTRONICS.