

## 典型性能 Features

- ◆ 10-15 瓦功率输出 (10-15 Watts of Output Power)
- ◆ 超宽电压输入 (4: 1Wide Range Input)
- ◆ 长期短路保护, 自恢复 (Short Circuit Protection ,Automatic Recovery)
- ◆ 小型化封装 (Small Package)
- ◆ 通过 CE 认证 符合 EN50155\EN50121 铁路安规要求 (CE MARK)



## 电气特性 Electrical Specifications

| 输入特性 Input                                     | Min                                       | Type     | Max                                       | Notes  |
|--|---|----------|---|--|
| 输入电压范围<br>Input Voltage Range                  | 9V  | 24V      | 36V                                       |  |
|  | 40V                                       | 74V/110V | 160V                                      |  |
| 控制功能(限 C 尾缀)<br>ON/OFF Control                 |   | ON       |   | CNT 悬空或接TTL高电平<br>CNT pin left open or CNT pin connected to TTL logic high |
|  |   | OFF      |   | CNT 与-Vin 相连<br>CNT pin is at a logic low                                  |
| 逻辑低 Logic Low                                  |   |          | 1.2 V                                     |  |
| 输入欠压保护(限 C 尾缀)<br>Input. Under-voltage Lockout | 30V                                       |          | 40V                                       | 110V 输入  |
| 启动延时时间<br>Start-up Delay Time                  |   | 10mS     |   |  |
| 输出特性 Output                                    | Min                                       | Type     | Max                                       | Notes  |
| 输出电压精度<br>Set point Accuracy                   |   |          | ±1%                                       | 一路   |
|  |   |          | ±3%                                       | 二路   |
| 负载效应<br>Load Regulation                        |   |          | ±0.5%                                     | 一路   |
| 源效应<br>Line Regulation                         |   |          | ±0.2%                                     | 一路   |
| 输出电压调节<br>TRIM Range                           |   |          | ±10%                                      | (限C尾缀)   |
| 动态响应<br>Dynamic Response                       |   |          | 4% Vo Pk deviation<br>400µS settling time | 50~75% load 50~25% load  |
| 温度系数<br>Temperature Regulation                 |   | ±0.2%/°C |   |  |
| 输出过流保护<br>Current Limit Threshold              | 110%                                      |          | 160%                                      |  |
| 输出过压保护<br>Over-voltage Protection              | 110%                                      |          | 140%                                      | (限C尾缀)   |
| 短路保护<br>Short-Circuit Protection               | 长期短路自恢复<br>Continuous, Automatic Recovery |          |   |  |
| 综合特性 General                                   | Min                                       | Type     | Max                                       | Notes  |

|                                     |  |                    |                       |       |                       |
|-------------------------------------|--|--------------------|-----------------------|-------|-----------------------|
| 隔离电压<br>Isolation Voltage           | 标准型  | 2250Vdc<br>1500Vac |                       |       | Input to Output       |
|                                     | 加强型  | 3000Vdc<br>2000Vac |                       |       | Input to Output       |
|                                     | 加强型  | 3000Vdc<br>2000Vac |                       |       | Input to Case         |
|                                     | 加强型  | 1000Vdc<br>500Vac  |                       |       | Output to Case        |
| 绝缘电阻<br>Isolation Resistor (500VDC) |  | 100MΩ              |                       |       | Input to Output       |
| 开关频率<br>Switching Frequency         |  |                    | 300KHz                |       |                       |
| 平均故障间隔时间<br>MTBF                    |  |                    | 2×10 <sup>6</sup> Hrs |       | Mil HDBK 217F Tc=25℃  |
| 工作壳温<br>Case Temperature            |  | -40℃               |                       | +90℃  |                       |
| 储存温度<br>Storage Temperature         |  | -55℃               |                       | +125℃ |                       |
| 相对湿度<br>Relative Humidity           |  | 10%                |                       | 90%   |                       |
| 管脚焊接温度<br>Pin Solder Temperature    |  |                    |                       | 250℃  | Wave Solder <10S      |
| 手工焊接时间<br>Hand Soldering Time       |  |                    |                       | 5S    | Iron Temperature 425℃ |
| 传导<br>Conducted Emission            | GB9254/CISPR22/EN55022 Class A (推荐电路见图)                    |                    |                       |       |                       |
| 静电放电<br>Electrostatic Discharge     | GB17626/EN61000-4-2 Contact ±6KV air ±8KV perf. Criteria A |                    |                       |       |                       |
| 浪涌抗扰度<br>Surge Immunity             | GB17626/EN61000-4-5 ±2KV (推荐电路见图) perf. Criteria A         |                    |                       |       |                       |
| 脉冲群抗扰度<br>Electrical Fast Transient | GB17626/EN61000-4-4 ±2KV (推荐电路见图) perf. Criteria A         |                    |                       |       |                       |

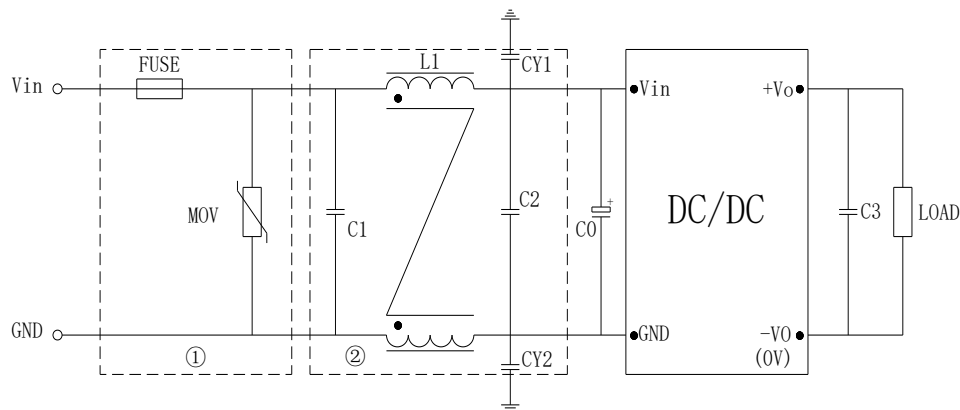
| 型号<br>Models | 输入电压范围<br>Input Voltage Range | 输出电压 (Vdc)<br>Output Voltage | 输出电流 (A)<br>Output current | 纹波噪声(mv)<br>Ripple and noise | 典型效率<br>Efficiency | 容性负载(μF)<br>Max.Capacitor Load |
|--------------|-------------------------------|------------------------------|----------------------------|------------------------------|--------------------|--------------------------------|
| WRD10-24S3V3 | 9-36V                         | 3.3                          | 2.5                        | 50                           | 76%                | 1000                           |
| WRD10-24S5   | 9-36V                         | 5.05                         | 2                          | 50                           | 81%                | 1000                           |
| WRD10-24S9   | 9-36V                         | 9                            | 1.11                       | 100                          | 83%                | 680                            |
| WRD10-24S12  | 9-36V                         | 12                           | 0.83                       | 100                          | 83%                | 470                            |
| WRD10-24S15  | 9-36V                         | 15                           | 0.67                       | 100                          | 84%                | 470                            |
| WRD10-24S24  | 9-36V                         | 24                           | 0.42                       | 100                          | 84%                | 220                            |
| WRD10-24S48  | 9-36V                         | 48                           | 0.21                       | 200                          | 82%                | 100                            |
| WRD12-24S3V3 | 9-36V                         | 3.3                          | 3                          | 50                           | 78%                | 1000                           |

|               |         |             |             |         |     |         |
|---------------|---------|-------------|-------------|---------|-----|---------|
| WRD12-24S5    | 9-36V   | 5.05        | 2.4         | 50      | 80% | 1000    |
| WRD12-24S9    | 9-36V   | 9           | 1.33        | 100     | 83% | 680     |
| WRD12-24S12   | 9-36V   | 12          | 1           | 100     | 83% | 470     |
| WRD12-24S15   | 9-36V   | 15          | 0.8         | 100     | 83% | 470     |
| WRD12-24S24   | 9-36V   | 24          | 0.5         | 100     | 83% | 220     |
| WRD12-24S48   | 9-36V   | 48          | 0.25        | 200     | 80% | 100     |
| WRD15-24S5    | 9-36V   | 5.05        | 3           | 50      | 83% | 1000    |
| WRD15-24S9    | 9-36V   | 9           | 1.67        | 100     | 83% | 680     |
| WRD15-24S12   | 9-36V   | 12          | 1.25        | 100     | 85% | 470     |
| WRD15-24S15   | 9-36V   | 15          | 1           | 100     | 85% | 470     |
| WRD15-24S24   | 9-36V   | 24          | 0.63        | 100     | 86% | 220     |
| WRD15-24S48   | 9-36V   | 48          | 0.31        | 200     | 80% | 100     |
| WRD10-24D5    | 9-36V   | +5.05/-5.05 | +1/-1       | 50/50   | 82% | 470/470 |
| WRD10-24D12   | 9-36V   | +12/-12     | +0.42/-0.42 | 100/100 | 83% | 220/220 |
| WRD10-24D15   | 9-36V   | +15/-15     | +0.33/-0.33 | 100/100 | 83% | 220/220 |
| WRD12-24D5    | 9-36V   | +5.05/-5.05 | +1.2/-1.2   | 50/50   | 83% | 470/470 |
| WRD12-24D12   | 9-36V   | +12/-12     | +0.5/-0.5   | 100/100 | 84% | 220/220 |
| WRD12-24D15   | 9-36V   | +15/-15     | +0.4/-0.4   | 100/100 | 84% | 220/220 |
| WRD15-24D5    | 9-36V   | +5.05/-5.05 | +1.5/-1.5   | 50/50   | 84% | 470/470 |
| WRD15-24D12   | 9-36V   | +12/-12     | +0.63/-0.63 | 100/100 | 85% | 220/220 |
| WRD15-24D15   | 9-36V   | +15/-15     | +0.5/-0.5   | 100/100 | 86% | 220/220 |
| WRD10-110S3V3 | 40-160V | 3.3         | 2.5         | 50      | 76% | 1000    |
| WRD10-110S5   | 40-160V | 5.05        | 2           | 50      | 81% | 1000    |
| WRD10-110S9   | 40-160V | 9           | 1.11        | 100     | 83% | 680     |
| WRD10-110S12  | 40-160V | 12          | 0.83        | 100     | 83% | 470     |
| WRD10-110S15  | 40-160V | 15          | 0.67        | 100     | 84% | 470     |
| WRD10-110S24  | 40-160V | 24          | 0.42        | 100     | 84% | 220     |
| WRD10-110S48  | 40-160V | 48          | 0.21        | 200     | 82% | 100     |
| WRD12-110S3V3 | 40-160V | 3.3         | 3           | 50      | 78% | 1000    |
| WRD12-110S5   | 40-160V | 5.05        | 2.4         | 50      | 80% | 1000    |

|              |         |             |             |         |     |         |
|--------------|---------|-------------|-------------|---------|-----|---------|
| WRD12-110S9  | 40-160V | 9           | 1.33        | 100     | 83% | 680     |
| WRD12-110S12 | 40-160V | 12          | 1           | 100     | 83% | 470     |
| WRD12-110S15 | 40-160V | 15          | 0.8         | 100     | 83% | 470     |
| WRD12-110S24 | 40-160V | 24          | 0.5         | 100     | 83% | 220     |
| WRD12-110S48 | 40-160V | 48          | 0.25        | 200     | 80% | 100     |
| WRD15-110S5  | 40-160V | 5.05        | 3           | 50      | 83% | 1000    |
| WRD15-110S9  | 40-160V | 9           | 1.67        | 100     | 83% | 680     |
| WRD15-110S12 | 40-160V | 12          | 1.25        | 100     | 85% | 470     |
| WRD15-110S15 | 40-160V | 15          | 1           | 100     | 85% | 470     |
| WRD15-110S24 | 40-160V | 24          | 0.63        | 100     | 86% | 220     |
| WRD15-110S48 | 40-160V | 48          | 0.31        | 200     | 80% | 100     |
| WRD10-110D5  | 40-160V | +5.05/-5.05 | +1/-1       | 50/50   | 82% | 470/470 |
| WRD10-110D12 | 40-160V | +12/-12     | +0.42/-0.42 | 100/100 | 83% | 220/220 |
| WRD10-110D15 | 40-160V | +15/-15     | +0.33/-0.33 | 100/100 | 83% | 220/220 |
| WRD12-110D5  | 40-160V | +5.05/-5.05 | +1.2/-1.2   | 50/50   | 83% | 470/470 |
| WRD12-110D12 | 40-160V | +12/-12     | +0.5/-0.5   | 100/100 | 84% | 220/220 |
| WRD12-110D15 | 40-160V | +15/-15     | +0.4/-0.4   | 100/100 | 84% | 220/220 |
| WRD15-110D5  | 40-160V | +5.05/-5.05 | +1.5/-1.5   | 50/50   | 84% | 470/470 |
| WRD15-110D12 | 40-160V | +12/-12     | +0.63/-0.63 | 100/100 | 85% | 220/220 |
| WRD15-110D15 | 40-160V | +15/-15     | +0.5/-0.5   | 100/100 | 86% | 220/220 |

■说明：仅列出典型型号，其它型号，请确定功率，输入电压及输出电压，致电我公司。

## 电磁兼容应用（EMC）



| 型号      | 110V          |
|---------|---------------|
| FUSE    | 2A 慢熔         |
| MOV     | 14D201K       |
| C0      | 100μF/200V    |
| C1、C2   | 1μF250V       |
| C3      | 100μF         |
| LCM     | 3mH           |
| CY1、CY2 | 2.2nF Y2 安规电容 |

**FUSE:**推荐采用慢熔型的产品，FUSE 电流选择要考虑高温降额和冲击电流的影响。

**MOV:**压敏电阻，MOV 可以和保险丝串联应用，防止 MOV 失效。也可以两只 MOV 串联，增加可靠性。

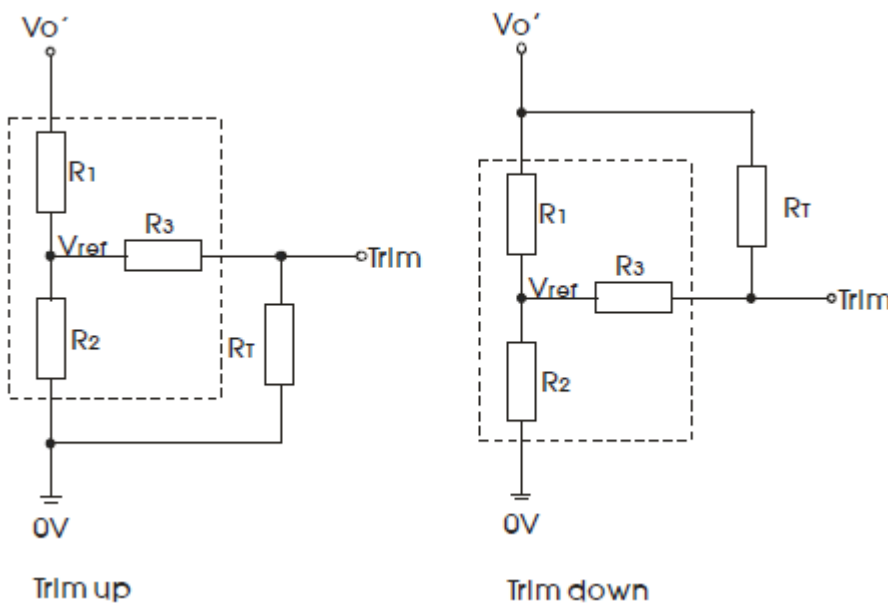
**C0 C3:**高频电解电容

**C1 C2:**高频独石电容或者薄膜电容。

**LCM:**共模电感。具体型号请咨询销售人员。

**CY1 CY2:**安规 Y2 电容

## 输出调节应用（TRIM Function）

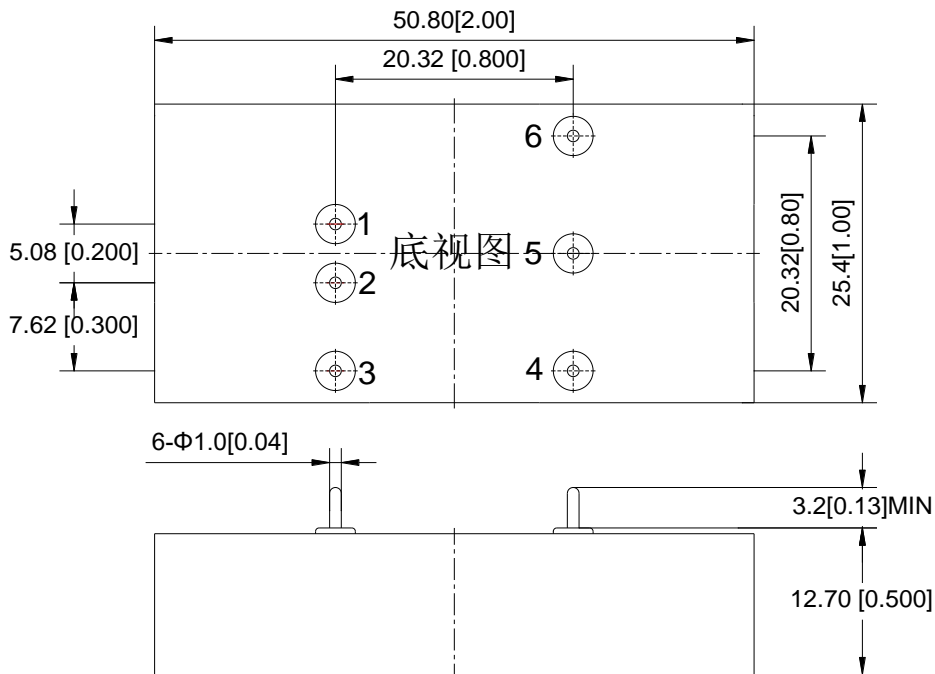


$$up: R_T = \frac{TR_2}{R_2 - T} - R_3 \quad T = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1 \text{ (调高电压)}$$

$$down: R_T = \frac{TR_1}{R_1 - T} - R_3 \quad T = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2 \text{ (调低电压)}$$

| Vout (V) | R1(KΩ) | R2(KΩ) | R3(KΩ) | Vref(V) |
|----------|--------|--------|--------|---------|
| 3.3      | 3.32   | 2.0    | 8.2    | 1.24    |
| 5        | 2.55   | 2.49   | 8.2    | 2.5     |
| 9        | 6.49   | 2.49   | 10     | 2.5     |
| 12       | 9.53   | 2.49   | 12     | 2.5     |
| 15       | 12.5   | 2.49   | 15     | 2.5     |
| 24       | 21.5   | 2.49   | 20     | 2.5     |
| 48       | 45.3   | 2.49   | 20     | 2.5     |

## 机械图及管脚说明 (Mechanical Chart、Pins) (Unit: mm/inch)



| 管脚 Pin    | 1    | 2    | 3   | 4    | 5    | 6    |
|-----------|------|------|-----|------|------|------|
| 单路 Single | +Vin | -Vin | NP  | -Vo  | NP   | +Vo  |
| 双路 Dual   | +Vin | -Vin | NP  | -Vo2 | COM  | +Vo1 |
| 单路 C 尾缀   | +Vin | -Vin | CNT | -Vo  | TRIM | +Vo  |
| 双路 C 尾缀   | +Vin | -Vin | CNT | -Vo2 | COM  | +Vo1 |

注: 安装定位尺寸公差按 GB/T1804-2000 F 级标准、外型尺寸公差按 GB/T1804-2000 C 级标准。