

**N-沟道功率 MOS 管/ N-CHANNEL POWER MOSFET**

**SIF12N65F**

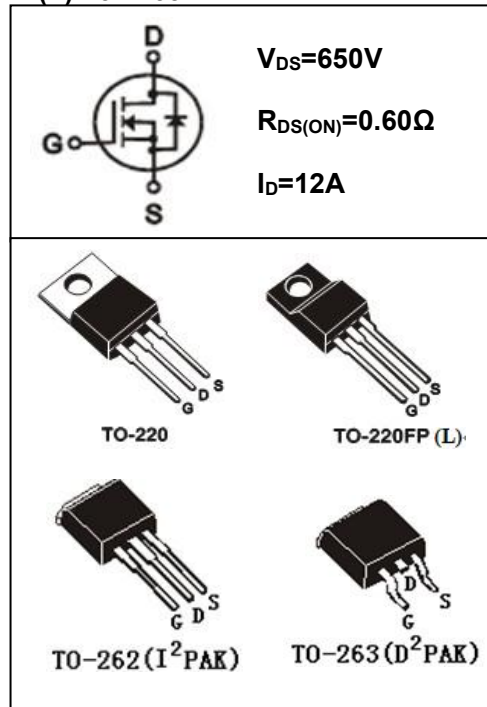
- 特点: 热阻低 开关速度快 输入阻抗高 符合RoHS规范
- FEATURES: ■LOW THERMAL RESISTANCE ■FAST SWITCHING ■HIGH INPUT RESISTANCE  
■RoHS COMPLIANT
- 应用: 电子镇流器 电子变压器 开关电源
- APPLICATION: ■ELECTRONIC BALLAST ■ELECTRONIC TRANSFORMER ■SWITCH MODE POWER SUPPLY

●最大额定值 (TC=25°C)

●Absolute Maximum Ratings (Tc=25°C)

TO-220/220FP(L)/262/263

| 参数<br>PARAMETER                              | 符号<br>SYMBOL     | 额定值<br>VALUE   | 单位<br>UNIT |
|----------------------------------------------|------------------|----------------|------------|
| 漏-源电压<br>Drain-source Voltage                | V <sub>DS</sub>  | 650            | V          |
| 栅-源电压<br>gate-source Voltage                 | V <sub>GS</sub>  | ±30            | V          |
| 漏极电流<br>Continuous Drain Current<br>TC=25°C  | I <sub>D</sub>   | 12             | A          |
| 漏极电流<br>Continuous Drain Current<br>TC=100°C | I <sub>D</sub>   | 7.5            | A          |
| 最大脉冲电流<br>Drain Current — Pulsed ①           | I <sub>DM</sub>  | 48             | A          |
| 耗散功率<br>Power Dissipation                    | P <sub>tot</sub> | TO-220:225     | W          |
|                                              |                  | TO-220FP(L):51 |            |
|                                              |                  | TO-262/263:156 |            |
| 最高结温<br>Junction Temperature                 | T <sub>J</sub>   | -55~150        | °C         |
| 存储温度<br>Storage Temperature                  | T <sub>STG</sub> | -55~150        | °C         |
| 单脉冲雪崩能量<br>Single Pulse Avalanche Energy②    | E <sub>AS</sub>  | 720            | mJ         |



●电特性 (Tc=25°C)

●Electronic Characteristics (Tc=25°C)

| 参数<br>PARAMETER                                       | 符号<br>SYMBOL                        | 测试条件<br>TEST CONDITION                                               | 最小值<br>MIN | 典型值<br>TYP | 最大值<br>MAX | 单位<br>UNIT |
|-------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------|------------|------------|------------|------------|
| 漏-源击穿电压<br>Drain-source Breakdown Voltage             | BV <sub>DSS</sub>                   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                           | 650        |            |            | V          |
| 击穿电压温度系数<br>Breakdown Voltage Temperature Coefficient | ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | I <sub>D</sub> =250uA, Referenced to 25°C                            |            | 0.65       |            | V/°C       |
| 栅极开启电压<br>Gate Threshold Voltage                      | V <sub>GS(TH)</sub>                 | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA             | 2.0        |            | 4.0        | V          |
| 漏-源漏电流<br>Drain-source Leakage Current                | I <sub>DSS</sub>                    | V <sub>DS</sub> =650V,<br>V <sub>GS</sub> =0V, T <sub>J</sub> =25°C  |            |            | 1          | μA         |
|                                                       |                                     | V <sub>DS</sub> =520V,<br>V <sub>GS</sub> =0V, T <sub>J</sub> =125°C |            |            | 10         | μA         |
| 跨导<br>Forward Transconductance                        | g <sub>fs</sub>                     | V <sub>DS</sub> =15V, I <sub>D</sub> =6.0A<br>③                      |            | 11         |            | S          |

●订单信息/ORDERING INFORMATION:

| 包装形式/PACKING                   | 订货编码/ORDERING CODE                           |                                                    |
|--------------------------------|----------------------------------------------|----------------------------------------------------|
|                                | 普通塑封料/ Normal Package Material               | 无卤塑封料/Halogen Free                                 |
| TO-220 条管装/TUBE PACKING        | SIF12N65F TO-220-TU                          | SIF12N65F TO-220-TU-HF                             |
| TO-220FP(L) 条管装/TUBE PACKING   | SIF12N65F TO-220FP(L)-TU                     | SIF12N65F TO-220FP(L)-TU-HF                        |
| TO-262 或 263 条管装/TUBE PACKING  | SIF12N65F TO-262-TU 或<br>SIF12N65F TO-263-TU | SIF12N65F TO-262-TU-HF 或<br>SIF12N65F TO-263-TU-HF |
| TO-263 编带装/TAPE & REEL PACKING | SIF12N65F TO-263-TR                          | SIF12N65F TO-263-TR-HF                             |

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| 参数<br>PARAMETER                                     | 符号<br>SYMBOL | 测试条件<br>TEST CONDITION                                     | 最小值<br>MIN | 典型值<br>TYP | 最大值<br>MAX | 单位<br>UNIT |
|-----------------------------------------------------|--------------|------------------------------------------------------------|------------|------------|------------|------------|
| 栅极漏电流<br>Gate-body Leakage Current ( $V_{DS} = 0$ ) | $I_{GSS}$    | $V_{GS} = \pm 30V$                                         |            |            | $\pm 100$  | nA         |
| 漏-源导通电阻<br>Static Drain-source On Resistance        | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 6.0A$<br>③                            |            | 0.60       | 0.70       | $\Omega$   |
| 输入电容<br>Input Capacitance                           | $C_{iss}$    | $V_{GS} = 0V, V_{DS} = 25V$<br>$F = 1.0MHz$                | 1000       | 1970       | 2400       | pF         |
| 输出电容<br>Output Capacitance                          | $C_{oss}$    |                                                            | 50         | 180        | 250        |            |
| 反向传输电容<br>Reverse transfer Capacitance              | $C_{rss}$    |                                                            | 5          | 16         | 30         |            |
| 关断延迟<br>Turn -Off Delay Time                        | $T_d(off)$   | $V_{DD} = 325V, I_D = 12A$<br>$R_G = 25\Omega$ ③           |            | 62         |            | ns         |
| 栅极电荷<br>Total Gate Charge                           | $Q_g$        | $I_D = 12A, V_{DS} = 520V$<br>$V_{GS} = 10V$<br>③          |            | 40         |            | nC         |
| 栅源电荷<br>Gate-to-Source Charge                       | $Q_{gs}$     |                                                            |            | 10.4       |            | nC         |
| 栅漏电荷<br>Gate-to-Drain Charge                        | $Q_{gd}$     |                                                            |            | 14         |            | nC         |
| 二极管正向电流<br>Continuous Diode Forward Current         | $I_S$        |                                                            |            |            | 12         | A          |
| 二极管正向压降<br>Diode Forward Voltage                    | $V_{SD}$     | $T_j = 25^\circ C, I_S = 12A$<br>$V_{GS} = 0V$ ③           |            |            | 1.4        | V          |
| 反向恢复时间<br>Reverse Recovery Time                     | $t_{rr}$     | $T_j = 25^\circ C, I_f = 12A$<br>$di/dt = 100A/\mu s$<br>③ |            | 650        |            | ns         |
| 反向恢复电荷<br>Reverse Recovery Charge                   | $Q_{rr}$     |                                                            |            | 4.2        |            | $\mu C$    |

●热特性

●Thermal Characteristics

| 参数<br>PARAMETER                               | 符号<br>SYMBOL | 最大值<br>MAX |             |            | 单位<br>UNIT   |
|-----------------------------------------------|--------------|------------|-------------|------------|--------------|
|                                               |              | TO-220     | TO-220FP(L) | TO-262/263 |              |
| 热阻结-壳<br>Thermal Resistance Junction-case     | $R_{thJC}$   | 0.56       | 2.50        | 0.80       | $^\circ C/W$ |
| 热阻结-环境<br>Thermal Resistance Junction-ambient | $R_{thJA}$   | 62.5       | 62.5        | 62.5       | $^\circ C/W$ |

注释(Notes):

- ① 脉冲宽度：以最高节温为限制  
Repetitive rating: Pulse width limited by maximum junction temperature
- ② 初始结温=25 $^\circ C$ ,  $V_{DD} = 50V$ ,  $L = 11mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 12A$   
Starting  $T_j = 25^\circ C$ ,  $V_{DD} = 50V$ ,  $L = 11mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 12A$
- ③ 脉冲测试：脉冲宽度 $\leq 300\mu s$ ，占空比 $\leq 2\%$   
Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

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● 特性曲线

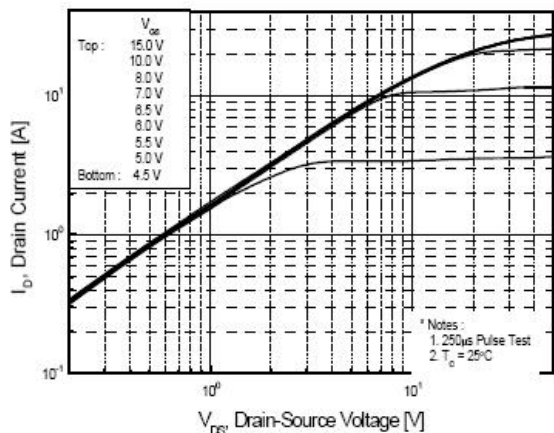


图 1 输出特性曲线, Tc=25°C

Fig1 Typical Output Characteristics, Tc=25°C

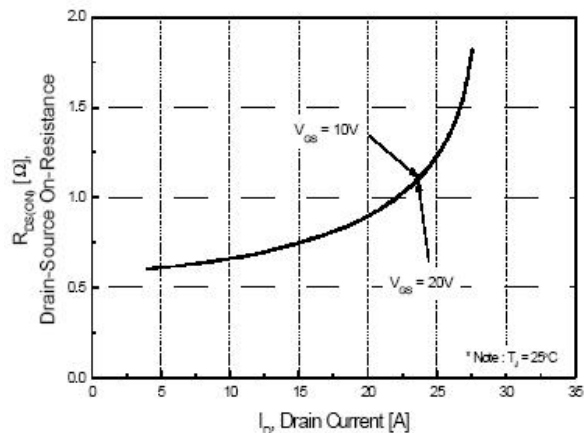


图 2 导通电阻与漏极电流和栅极电压曲线

Fig2 On-Resistance Vs.Drain Current and Gate Voltage

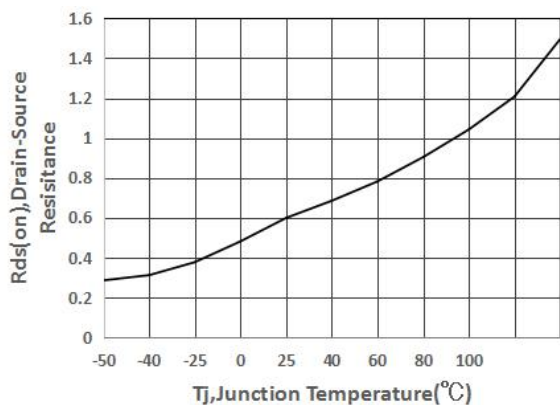


图 3 归一化导通电阻与温度曲线

Fig3 Normalized On-Resistance Vs. Temperature

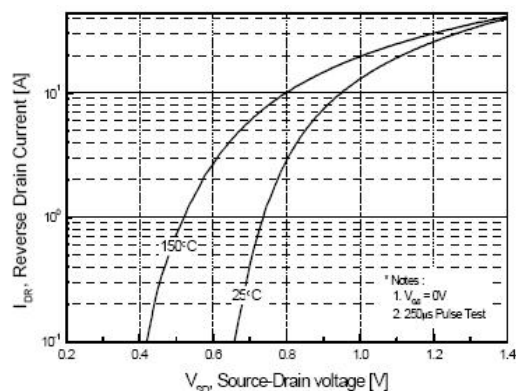


图 4 二极管正向电压曲线

Fig4 Typical Source-Drain Diode Forward Voltage

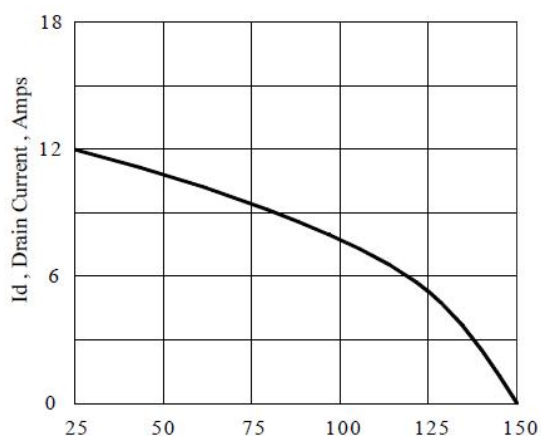


图 5 最大漏极电流与壳温曲线

Fig5 Maximum Drain Current Vs.Case Temperature

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● 特性曲线

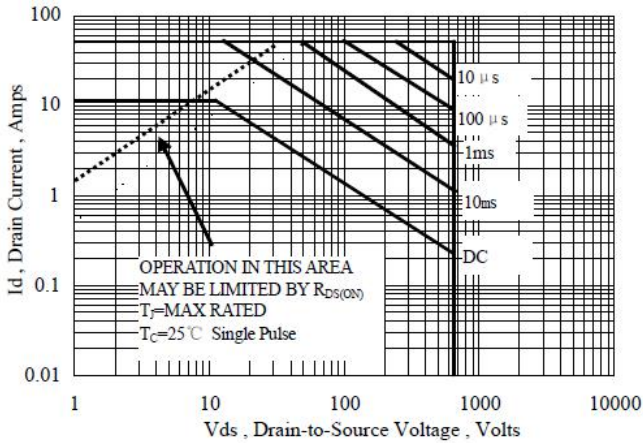


图 6-1 SIF12N65F(TO-220)

最大安全工作区曲线

Fig6-1 Maximum Safe Operating Area

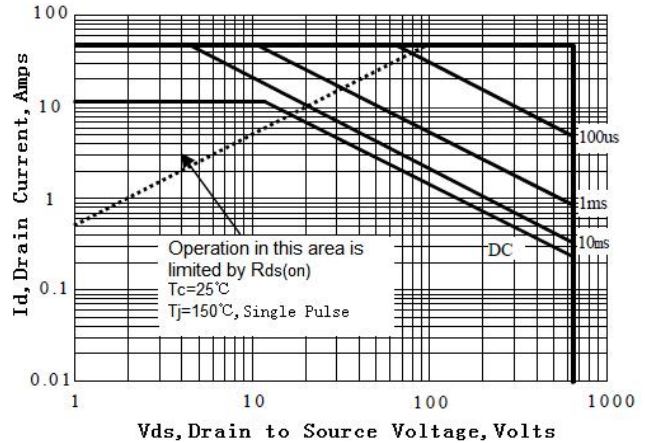


图 6-2 SIF12N65F(TO-220FP(L))

最大安全工作区曲线

Fig6 -2 Maximum Safe Operating Area

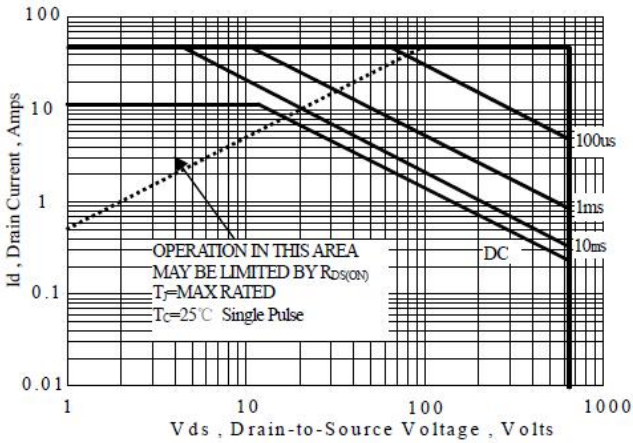


图 6-3 SIF12N65F(TO-262&263)

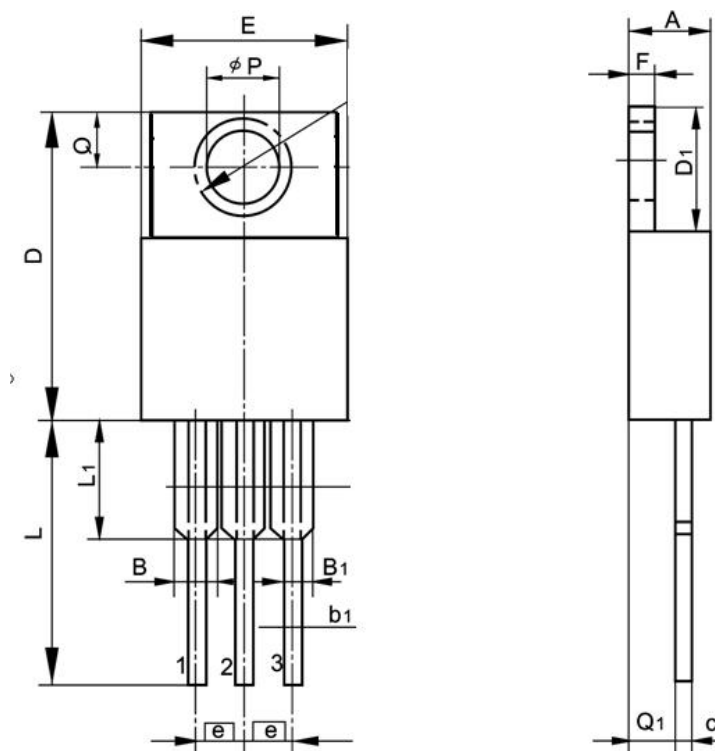
最大安全工作区曲线

Fig6-3 Maximum Safe Operating Area

## TO-220 封装机械尺寸 TO-220 MECHANICAL DATA

单位：毫米/UNIT: mm

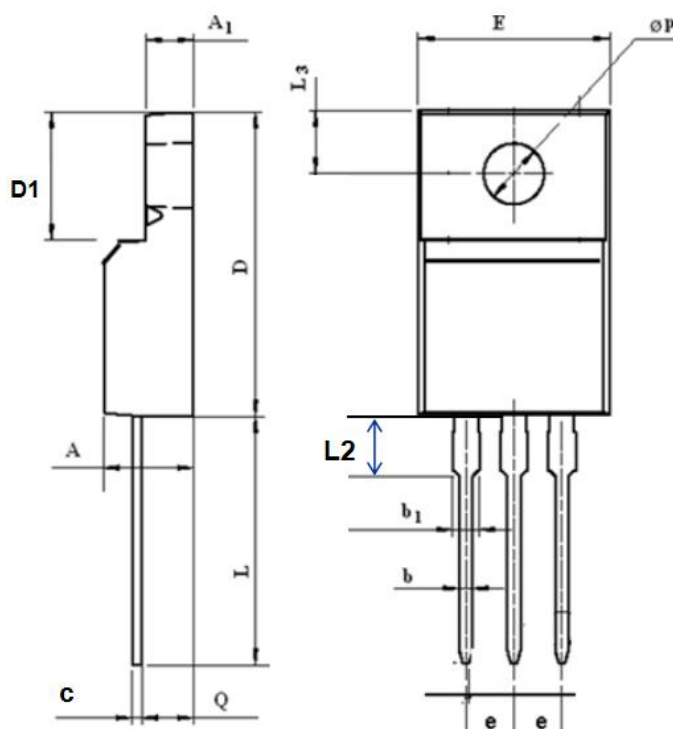
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|--------------|------------|------------|------------|--------------|------------|------------|------------|
| A            | 4.00       |            | 4.80       | E            | 9.90       |            | 10.70      |
| B            | 1.20       |            | 1.50       | e            |            | 2.54       |            |
| B1           | 1.00       |            | 1.40       | F            | 1.10       |            | 1.45       |
| b1           | 0.65       |            | 1.00       | L            | 12.50      |            | 14.50      |
| c            | 0.35       |            | 0.75       | L1           | 3.00       | 3.50       | 4.00       |
| D            | 15.00      |            | 16.50      | Q            | 2.50       |            | 3.00       |
| D1           | 5.90       |            | 6.90       | Q1           | 2.00       |            | 3.00       |
|              |            |            |            | $\phi P$     | 3.60       |            | 3.90       |



## TO-220FP 封装机械尺寸 TO-220FP MECHANICAL DATA

单位:毫米/UNIT: mm

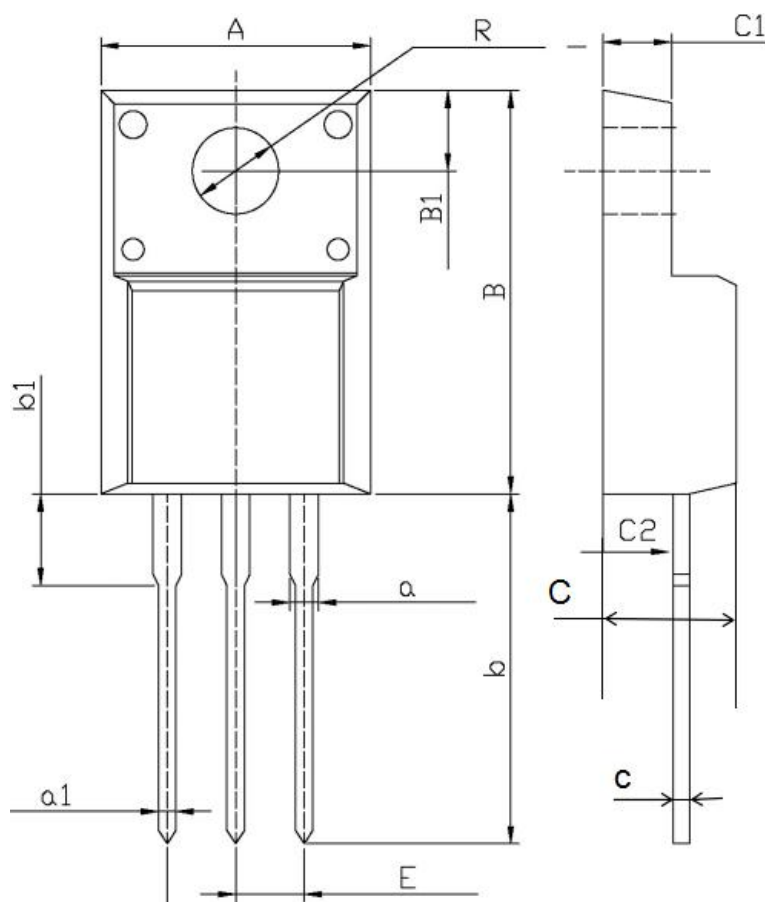
| 符号<br>SYMBOL   | 最小值<br>min  | 典型值<br>nom | 最大值<br>max  | 符号<br>SYMBOL   | 最小值<br>min   | 典型值<br>nom | 最大值<br>max   |
|----------------|-------------|------------|-------------|----------------|--------------|------------|--------------|
| A              | 4.40        |            | 4.95        | E              | 9.60         |            | 10.30        |
| A <sub>1</sub> | 2.30        |            | 2.90        | e              |              | 2.54       |              |
| b              | <b>0.70</b> |            | <b>0.90</b> | L              | <b>12.40</b> |            | <b>14.00</b> |
| b <sub>1</sub> | <b>1.18</b> |            | <b>1.45</b> | L <sub>2</sub> | <b>2.30</b>  |            | <b>2.60</b>  |
| c              | <b>0.40</b> |            | <b>0.70</b> | L <sub>3</sub> | 3.00         |            | 4.00         |
| D              | 14.50       |            | 17.00       | øp             | 3.00         |            | 3.50         |
| D1             | 6.10        |            | 9.00        | Q              | 2.30         |            | 2.80         |



TO-220FPL 封装机械尺寸  
TO-220FPL MECHANICAL DATA

单位:毫米/UNIT: mm

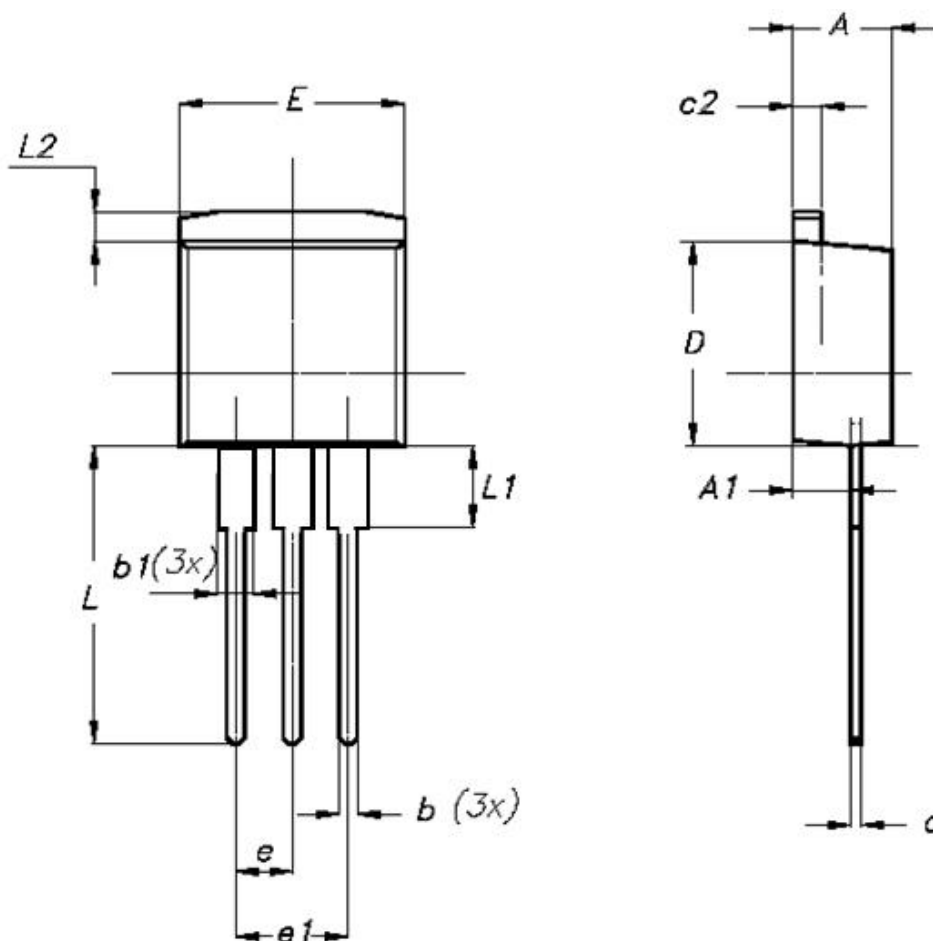
| 符号<br>SYMBOL | 最小值<br>min | 典型值<br>nom | 最大值<br>max | 符号<br>SYMBOL | 最小值<br>min | 典型值<br>nom | 最大值<br>max |
|--------------|------------|------------|------------|--------------|------------|------------|------------|
| A            | 9.90       |            | 10.36      | a            | 1.08       |            | 1.48       |
| B            | 15.40      |            | 16.40      | a1           | 0.70       |            | 0.90       |
| B1           | 3.05       |            | 3.55       | E            | 2.34       |            | 2.75       |
| C            | 4.40       |            | 5.00       | C1           | 2.25       |            | 2.85       |
| c            | 0.40       |            | 0.60       | C2           | 2.45       |            | 3.05       |
| b            | 12.40      |            | 13.50      | R            | 2.90       |            | 3.35       |
| b1           | 2.90       |            | 3.90       |              |            |            |            |



## TO-262 封装机械尺寸 TO-262 MECHANICAL DATA

单位：毫米/UNIT: mm

| 符号<br>SYMBOL | 最小值<br>min | 典型值<br>nom | 最大值<br>max | 符号<br>SYMBOL | 最小值<br>min | 典型值<br>nom | 最大值<br>max |
|--------------|------------|------------|------------|--------------|------------|------------|------------|
| A            | 3.80       |            | 4.80       | e            |            | 2.54       |            |
| A1           | 2.00       |            | 2.80       | e1           |            |            | 5.30       |
| b            | 0.60       |            | 1.00       | E            | 9.90       |            | 10.70      |
| b1           | 1.20       |            | 1.40       | L            | 12.50      |            | 14.50      |
| c            | 0.40       |            | 0.70       | L1           | 0.80       | 1.00       | 1.20       |
| c2           | 1.10       |            | 1.40       | L2           |            |            | 1.50       |
| D            |            |            | 9.60       |              |            |            |            |



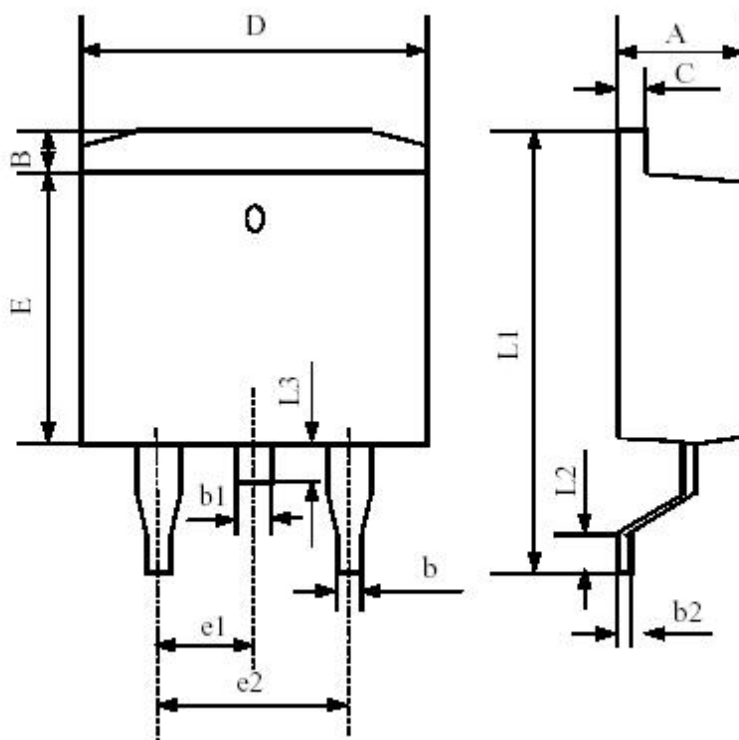


## TO-263 封装机械尺寸

### TO-263(D2PAK) MECHANICAL DATA

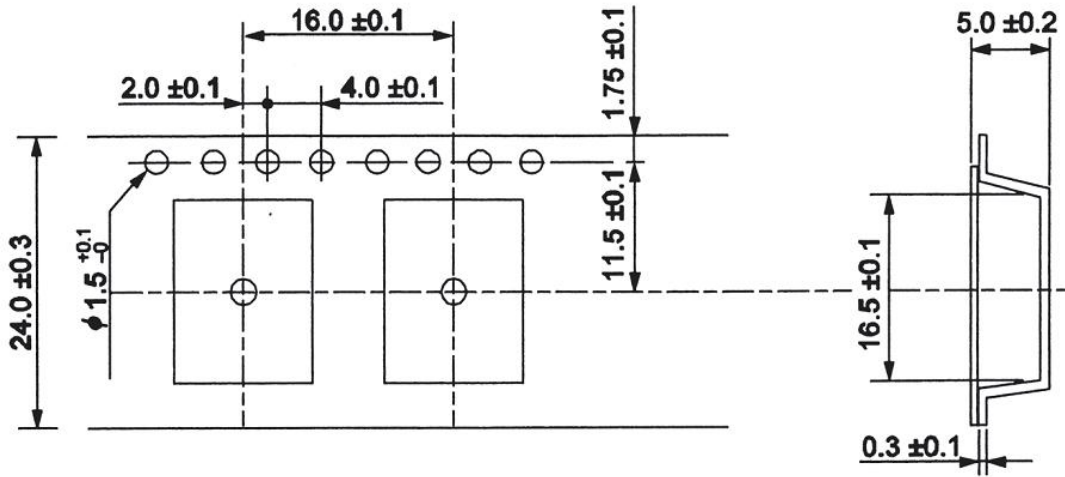
单位：毫米/UNIT: mm

| 符号<br>SYMBOL | 最小值<br>min | 典型值<br>nom | 最大值<br>max | 符号<br>SYMBOL | 最小值<br>min | 典型值<br>nom | 最大值<br>max |
|--------------|------------|------------|------------|--------------|------------|------------|------------|
| A            | 4.42       |            | 4.72       | E            | 8.99       |            | 9.29       |
| B            | 1.22       |            | 1.32       | e1           | 2.44       |            | 2.64       |
| b            | 0.76       |            | 0.86       | e2           | 4.98       |            | 5.18       |
| b1           | 1.22       |            | 1.32       | L1           | 15.19      |            | 15.79      |
| b2           | 0.33       |            | 0.43       | L2           | 2.29       |            | 2.79       |
| C            | 1.22       |            | 1.32       | L3           | 1.30       |            | 1.75       |
| D            | 9.95       |            | 10.25      |              |            |            |            |

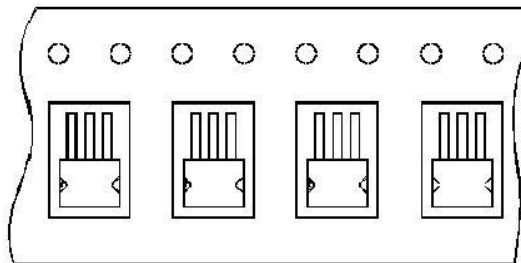


### TO-263 编带规格尺寸 TO-263 TAPE AND REEL DATA

单位:毫米/UNIT: mm



使用供带方向/USER DIRECTION OF FEED



编带器件定位示意图/UNIT ORIENTATION