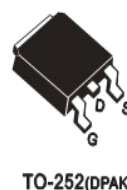
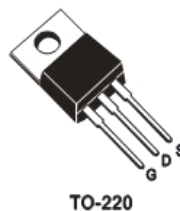


Features

- $V_{DS}(V)=650V$
- $I_D=4.0A$
- $R_{DS(ON)} \leq 2.7 \Omega$ ($V_{GS} = 10V$)



●最大额定值 (Tc=25°C)

●Absolute Maximum Ratings (Tc=25°C) TO-220/220F/TO-252

| 参数 PARAMETER | 符号 SYMBOL | 额定值 VALUE | 单位 UNIT |
|--|--------------|--------------|------------|
| 漏-源电压 Drain-source Voltage | V_{DS} | 650 | V |
| 栅-源电压 gate-source Voltage | V_{GS} | ± 30 | V |
| 漏极电流 Continuous Drain Current TC=25°C | I_D | 4.0 | A |
| 漏极电流 Continuous Drain Current TC=100°C | I_D | 2.5 | A |
| 最大脉冲电流 Drain Current — Pulsed ① | I_{DM} | 16 | A |
| 耗散功率 Power Dissipation | P_{tot} | TO-220:100 | W |
| | | TO-220F:33 | |
| 最高结温 Junction Temperature | T_j | 150 | °C |
| 存储温度 Storage Temperature | T_{STG} | -55-150 | °C |
| 单脉冲雪崩能量 Single Pulse Avalanche Energy ② | E_{AS} | 128 | mJ |

●电特性 (Tc=25 C)

●Electronic Characteristics (Tc=25°C)

| 参数 PARAMETER | 符号 SYMBOL | 测试条件 TEST CONDITION | 最小值 MIN | 典型值 TYP | 最大值 MAX | 单位 UNIT |
|---|---|--|------------|------------|------------|------------|
| 漏-源击穿电压 Drain-source Breakdown Voltage | BV _{DSS} | V _{GS} =0V, I _D =250μA | 650 | | | V |
| 击穿电压温度系数 Breakdown Voltage Temperature Coefficient | ΔBV _{DSS} / ΔT _j | I _D =250uA, Referenced to 25°C | | 0.6 | | V/°C |
| 栅极开启电压 Gate Threshold Voltage | V _{GS(TH)} | V _{GS} =V _{DS} , I _D =250μA | 2.0 | | 4.0 | V |
| 漏-源漏电流 Drain-source Leakage Current | I _{DSS} | V _{DS} =650V, V _{GS} =0V, T _j =25°C | | | 25 | μA |
| | | V _{DS} =520V, V _{GS} =0V, T _j =125°C | | | 250 | μA |
| 跨导 Forward Transconductance | g _{fs} | V _{DS} =40V, I _D =2.0A ③ | | 2.5 | | S |

| 参数 PARAMETER | 符号 SYMBOL | 测试条件 TEST CONDITION | 最小值 MIN | 典型值 TYP | 最大值 MAX | 单位 UNIT |
|---|--------------|---|------------|------------|------------|------------|
| 栅极漏电流 Gate-body Leakage Current ($V_{DS} = 0$) | I_{GSS} | $V_{GS} = \pm 30V$ | | | ± 100 | nA |
| 漏-源导通电阻 Static Drain-source On Resistance | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 2.0A$ ③ | | 2.3 | 2.7 | Ω |
| 输入电容 Input Capacitance | C_{iss} | $V_{GS} = 0V, V_{DS} = 25V$ $F = 1.0MHz$ | | 500 | | pF |
| 关断延迟 Turn -Off Delay Time | $T_d(off)$ | $V_{DD} = 325V, I_D = 4.0A$ $R_G = 25\Omega$ ③ | | 40 | | ns |
| 栅极电荷 Total Gate Charge | Q_g | $I_D = 4.0A, V_{DS} = 520V$ $V_{GS} = 10V$ ③ | | 15.8 | | nC |
| 栅源电荷 Gate-to-Source Charge | Q_{gs} | | | 3.5 | | nC |
| 栅漏电荷 Gate-to-Drain Charge | Q_{gd} | | | 6.0 | | nC |
| 二极管正向电流 Continuous Diode Forward Current | I_S | | | | 4.0 | A |
| 二极管正向压降 Diode Forward Voltage | V_{SD} | $T_j = 25^\circ C, I_S = 4.0A$ $V_{GS} = 0V$ ③ | | | 1.4 | V |
| 反向恢复时间 Reverse Recovery Time | t_{rr} | $T_j = 25^\circ C, I_f = 4.0A$ $di/dt = 100A/\mu s$ ③ | | 390 | | ns |
| 反向恢复电荷 Reverse Recovery Charge | Q_{rr} | | | 1.5 | | μC |

●热特性
●Thermal Characteristics

| 参数 PARAMETER | 符号 SYMBOL | 最大值 MAX | | | 单位 UNIT |
|---|--------------|------------|---------|--|--------------|
| | | TO-220 | TO-220F | | |
| 热阻结-壳 Thermal Resistance Junction-case | R_{thJC} | 1.25 | 3.79 | | $^\circ C/W$ |
| 热阻结-环境 Thermal Resistance Junction-ambient | R_{thJA} | 62.5 | 62.5 | | $^\circ C/W$ |

注释(Notes):

- ① 脉冲宽度：以最高结温为限制
Repetitive rating: Pulse width limited by maximum junction temperature
- ② 初始结温= $25^\circ C$, $V_{DD} = 50V$, $L = 25mH$, $R_G = 25\Omega$, $I_{AS} = 4.0A$
Starting $T_j = 25^\circ C$, $V_{DD} = 50V$, $L = 25mH$, $R_G = 25\Omega$, $I_{AS} = 4.0A$
- 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 $\leq 2\%$

● 特性曲线

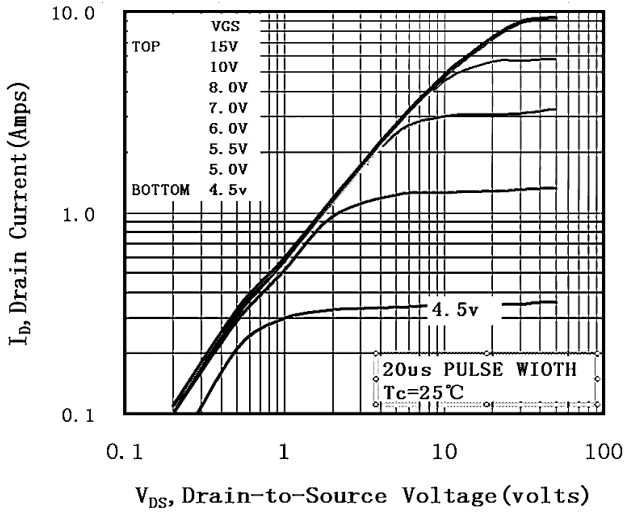


图1 输出特性曲线, Tc=25°C

Fig1 Typical Output Characteristics, Tc=25°C

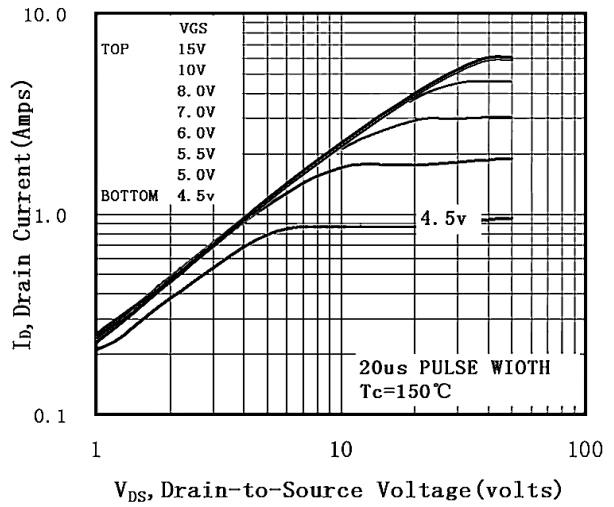


图2 输出特性曲线, Tc=150°C

Fig2 Typical Output Characteristics, Tc=150°C

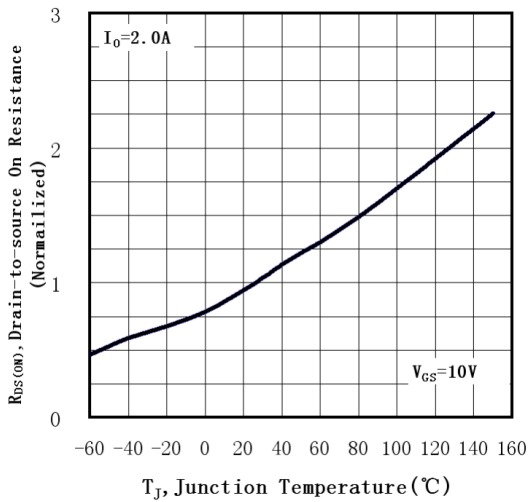


图3 导通电阻与温度曲线

Fig3 Normalized On-Resistance Vs. Temperature

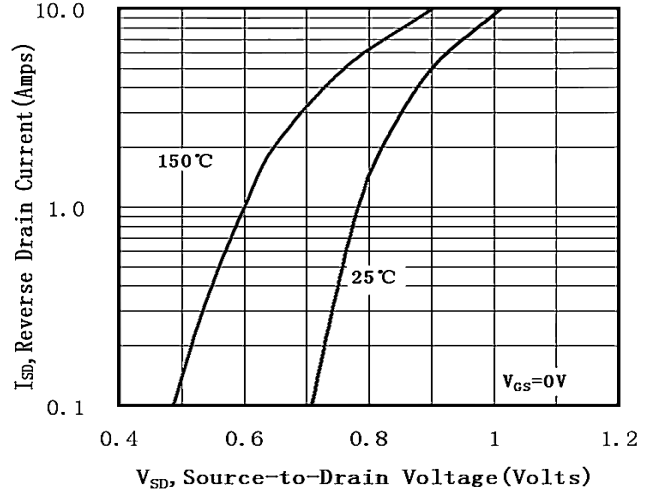


图4 二极管正向电压曲线

Fig4 Typical Source-Drain Diode Forward Voltage

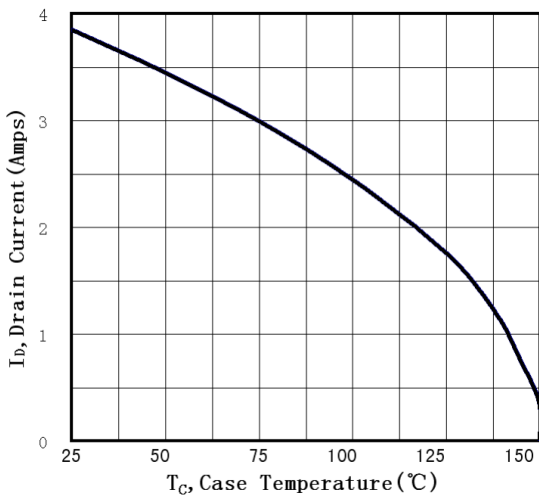


图5 最大漏极电流与壳温曲线

Fig5 Maximum Drain Current Vs. Case Temperature

● 特性曲线

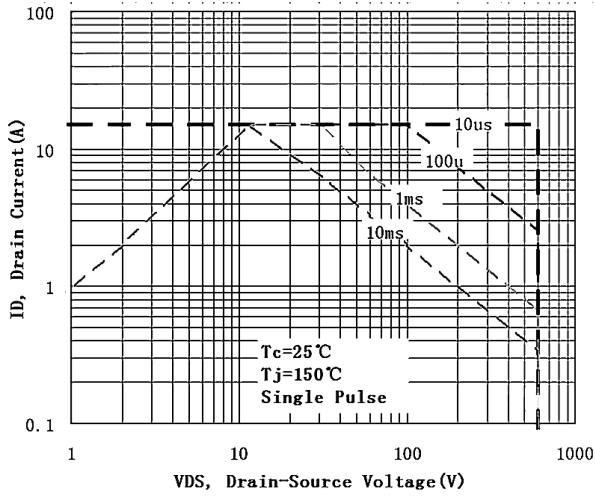


图 6-1 4N65(TO-220)
最大安全工作区曲线
Fig6-1 Maximum Safe Operating Area

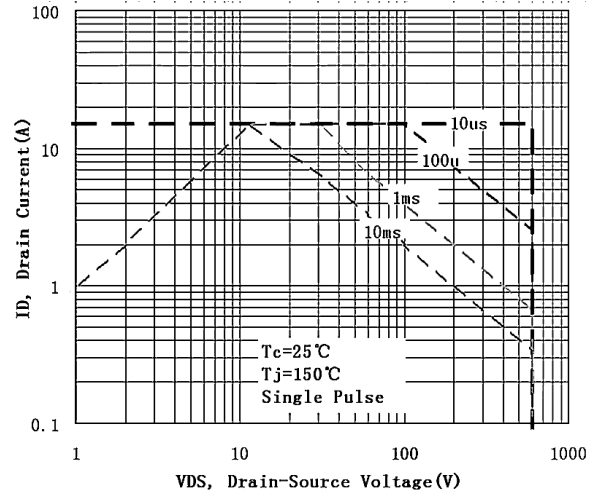
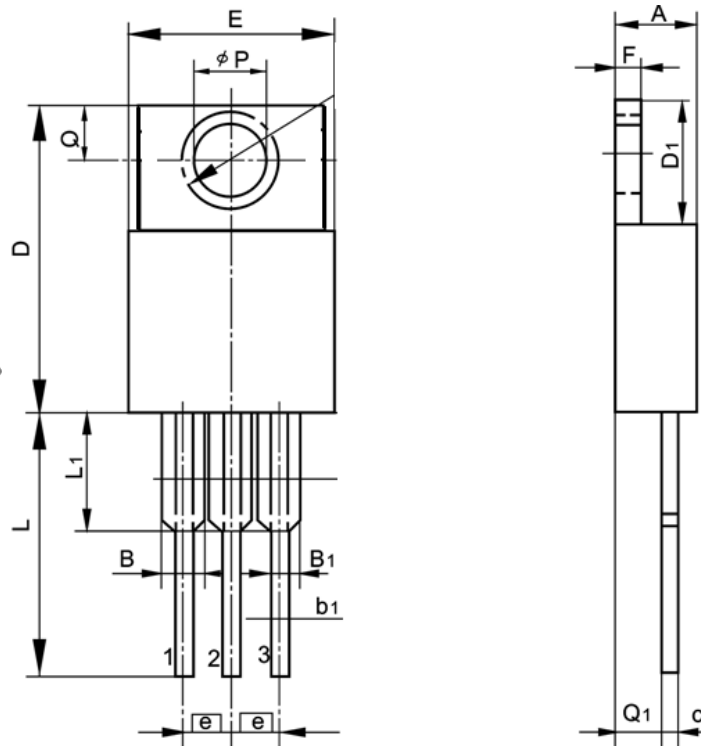


图 6-2 4N65(TO-220F)
最大安全工作区曲线
Fig6-2 Maximum Safe Operating Area

TO-220 封装

单位：毫米/UNIT: mm

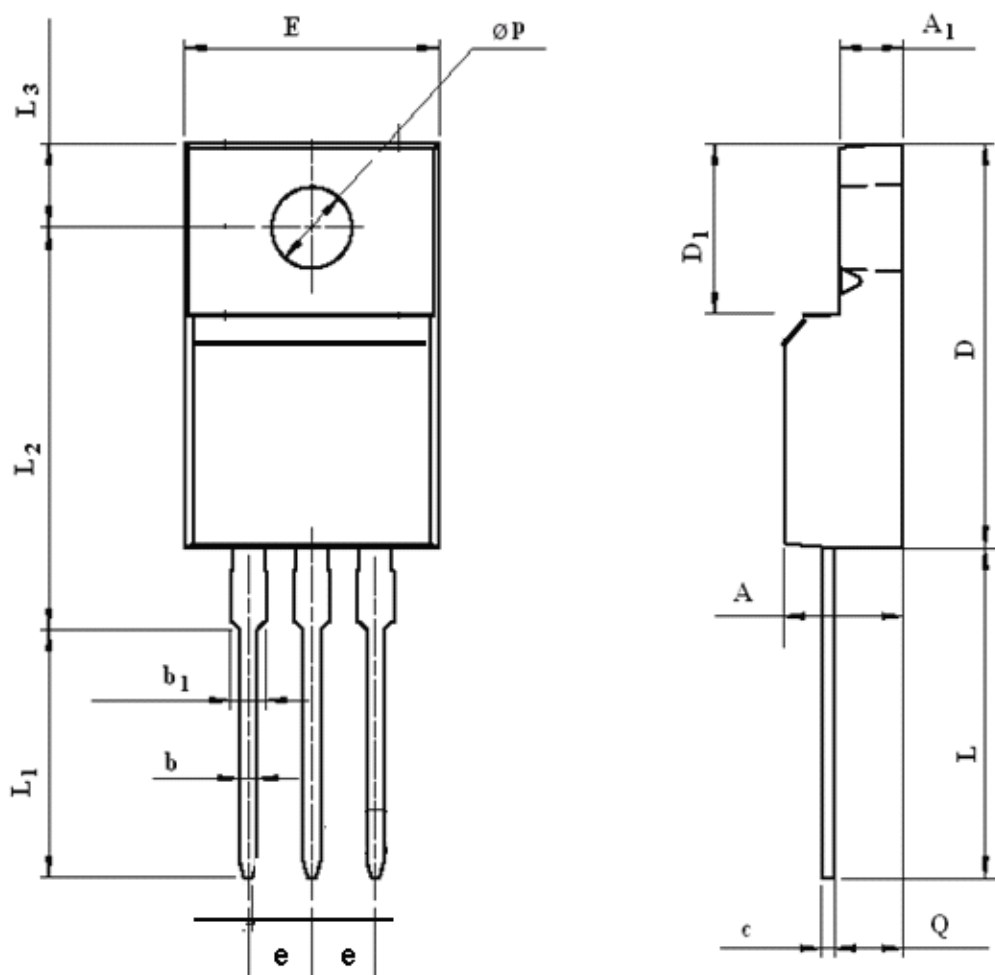
| 符号 SYMBOL | 最小值 min | 典型值 nom | 最大值 max | 符号 SYMBOL | 最小值 min | 典型值 nom | 最大值 max |
|--------------|------------|------------|------------|--------------|------------|------------|------------|
| A | 4.00 | | 4.80 | E | 9.90 | | 10.70 |
| B | 1.20 | | 1.50 | e | | 2.54 | |
| B1 | 1.00 | | 1.40 | F | 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 |
| | | | | φP | 3.60 | | 3.90 |



TO-220F 封装

单位:毫米/UNIT: mm

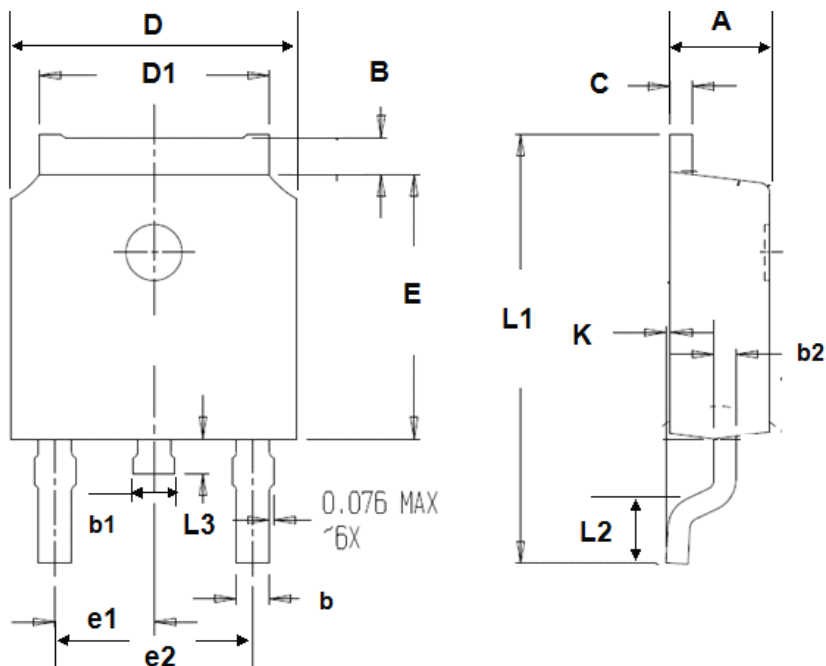
| 符号 SYMBOL | 最小值 min | 典型值 nom | 最大值 max | 符号 SYMBOL | 最小值 min | 典型值 nom | 最大值 max |
|----------------|-------------|------------|-------------|----------------|------------|------------|------------|
| A | 4.40 | | 4.95 | e | | 2.54 | |
| A ₁ | 2.30 | | 2.90 | L | 12.50 | | 14.30 |
| b | 0.45 | | 0.90 | L ₁ | 9.10 | | 10.05 |
| b ₁ | 1.10 | | 1.70 | L ₂ | 15.00 | | 16.00 |
| c | 0.35 | | 0.90 | L ₃ | 3.00 | | 4.00 |
| D | 14.50 | | 17.00 | øp | 3.00 | | 3.50 |
| D ₁ | 6.10 | | 9.00 | Q | 2.30 | | 2.80 |
| E | 9.60 | | 10.30 | | | | |



TO-252 封装机械尺寸
TO-252 MECHANICAL DATA

单位:毫米/UNIT: mm

| 符号 SYMBOL | 最小值 min | 最大值 max | 符号 SYMBOL | 最小值 min | 最大值 max |
|--------------|------------|------------|--------------|------------|------------|
| A | 2.10 | 2.50 | B | 0.85 | 1.25 |
| b | 0.50 | 0.80 | b1 | 0.50 | 0.90 |
| b2 | 0.45 | 0.70 | C | 0.45 | 0.70 |
| D | 6.30 | 6.75 | D1 | 5.10 | 5.50 |
| E | 5.30 | 6.30 | e1 | 2.25 | 2.35 |
| L1 | 9.20 | 10.60 | e2 | 4.45 | 4.75 |
| L2 | 0.90 | 1.75 | L3 | 0.60 | 1.10 |
| K | 0.00 | 0.23 | | | |



Ordering information

| Order code | Package | Baseqty | Deliverymode |
|------------|---------|---------|---------------|
| UMW 4N65L | TO-252 | 2500 | Tape and reel |
| UMW 4N65 | TO-220 | 1000 | Tube and box |
| UMW 4N65F | TO-220F | 1000 | Tube and box |

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