



SOP-8 N+P Dual Enhancement 双沟道增强型 MOS Field Effect Transistor 场效应管

■ Features 特点

Low on-resistance 低导通电阻

N: $R_{DS(ON)}=37m\Omega(\text{Type})@V_{GS}=10V$

$R_{DS(ON)}=42m\Omega(\text{Type})@V_{GS}=4.5V$

P: $R_{DS(ON)}=70m\Omega(\text{Type})@V_{GS}= -10V$

$R_{DS(ON)}=93m\Omega(\text{Type})@V_{GS}= -4.5V$

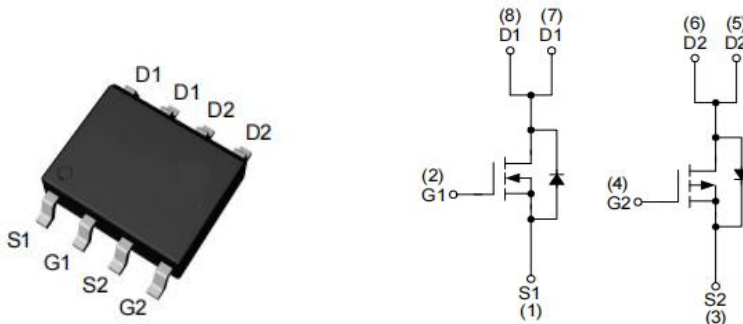
■ Applications 应用

Load Switch 负载开关

DC/DC Power System 电源升压系统

High Frequency Point-of-Load Synchronous Buck Convert 负载点高频同步整流

■ Internal Schematic Diagram 内部结构



■ Absolute Maximum Ratings 最大额定值

| Characteristic 特性参数 | Symbol 符号 | N | P | Unit 单位 |
|--|---|------------|--------------|--------------|
| Drain-Source Voltage 漏极-源极电压 | BV_{DSS} | 60 | -60 | V |
| Gate- Source Voltage 栅极-源极电压 | V_{GS} | ± 20 | ± 20 | V |
| Drain Current (continuous)漏极电流-连续 | I_D (at $T_A = 25^\circ C$ at $T_A = 70^\circ C$) | 4.5 3.6 | -3.2 -2.8 | A |
| Drain Current (pulsed)漏极电流-脉冲 | I_{DM} | 20 | -20 | A |
| Total Device Dissipation 总耗散功率 | P_{TOT} (at $T_A = 25^\circ C$ at $T_A = 70^\circ C$) | 1 0.7 | | W |
| Thermal Resistance Junction-Ambient 热阻 | $R_{\theta JA}$ | 125 | | $^\circ C/W$ |
| Avalanche Energy Single Pulse 雪崩能量 | E_{AS} | 25 | | mJ |
| Junction/Storage Temperature 结温/储存温度 | T_J, T_{stg} | -55~150 | | $^\circ C$ |



■ N Electrical Characteristics 电特性

($T_A=25^{\circ}\text{C}$ unless otherwise noted 如无特殊说明, 温度为 25°C)

| Characteristic 特性参数 | Symbol 符号 | Min 最小值 | Typ 典型值 | Max 最大值 | Unit 单位 |
|--|--------------|------------|------------|------------|------------------|
| Drain-Source Breakdown Voltage 漏极-源极击穿电压($I_D=250\mu\text{A}, V_{GS}=0\text{V}$) | BV_{DSS} | 60 | — | — | V |
| Gate Threshold Voltage 栅极开启电压($I_D=250\mu\text{A}, V_{GS}=V_{DS}$) | $V_{GS(th)}$ | 1.0 | 1.7 | 2.5 | V |
| Zero Gate Voltage Drain Current 零栅压漏极电流($V_{GS}=0\text{V}, V_{DS}=48\text{V}$) | I_{DSS} | — | — | 1 | μA |
| Gate Body Leakage 栅极漏电流($V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$) | I_{GSS} | — | — | ± 100 | nA |
| Static Drain-Source On-State Resistance 静态漏源导通电阻($I_D=4.5\text{A}, V_{GS}=10\text{V}$) ($I_D=3\text{A}, V_{GS}=4.5\text{V}$) | $R_{DS(ON)}$ | — | 37 42 | 58 60 | $\text{m}\Omega$ |
| Diode Forward Voltage Drop 内附二极管正向压降($I_{SD}=1\text{A}, V_{GS}=0\text{V}$) | V_{SD} | — | 0.76 | 1 | V |
| Input Capacitance 输入电容 ($V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$) | C_{ISS} | — | 450 | — | pF |
| Common Source Output Capacitance 共源输出电容($V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$) | C_{OSS} | — | 60 | — | pF |
| Reverse Transfer Capacitance 反馈电容 ($V_{GS}=0\text{V}, V_{DS}=30\text{V}, f=1\text{MHz}$) | C_{RSS} | — | 25 | — | pF |
| Total Gate Charge 栅极电荷密度 ($V_{DS}=30\text{V}, I_D=4.5\text{A}, V_{GS}=10\text{V}$) | Q_g | — | 9 | — | nC |
| Gate Source Charge 栅源电荷密度 ($V_{DS}=30\text{V}, I_D=4.5\text{A}, V_{GS}=10\text{V}$) | Q_{gs} | — | 2 | — | nC |
| Gate Drain Charge 栅漏电荷密度 ($V_{DS}=30\text{V}, I_D=4.5\text{A}, V_{GS}=10\text{V}$) | Q_{gd} | — | 2 | — | nC |
| Turn-ON Delay Time 开启延迟时间 ($V_{DS}=30\text{V}, I_D=1\text{A}, R_{GEN}=3\Omega, V_{GS}=10\text{V}$) | $t_{d(on)}$ | — | 5 | — | ns |
| Turn-ON Rise Time 开启上升时间 ($V_{DS}=30\text{V}, I_D=1\text{A}, R_{GEN}=3\Omega, V_{GS}=10\text{V}$) | t_r | — | 3 | — | ns |
| Turn-OFF Delay Time 关断延迟时间 ($V_{DS}=30\text{V}, I_D=1\text{A}, R_{GEN}=3\Omega, V_{GS}=10\text{V}$) | $t_{d(off)}$ | — | 16 | — | ns |
| Turn-OFF Fall Time 关断下降时间 ($V_{DS}=30\text{V}, I_D=1\text{A}, R_{GEN}=3\Omega, V_{GS}=10\text{V}$) | t_f | — | 2 | — | ns |



■ P Electrical Characteristics 电特性

($T_A=25^{\circ}\text{C}$ unless otherwise noted 如无特殊说明, 温度为 25°C)

| Characteristic 特性参数 | Symbol 符号 | Min 最小值 | Typ 典型值 | Max 最大值 | Unit 单位 |
|--|--------------|------------|------------|------------|------------------|
| Drain-Source Breakdown Voltage 漏极-源极击穿电压($I_D = -250\mu\text{A}, V_{GS}=0\text{V}$) | BV_{DSS} | -60 | — | — | V |
| Gate Threshold Voltage 栅极开启电压($I_D = -250\mu\text{A}, V_{GS} = V_{DS}$) | $V_{GS(th)}$ | -1.0 | -1.8 | -2.5 | V |
| Zero Gate Voltage Drain Current 零栅压漏极电流($V_{GS}=0\text{V}, V_{DS}= -48\text{V}$) | I_{DSS} | — | — | -1 | μA |
| Gate Body Leakage 栅极漏电流($V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$) | I_{GSS} | — | — | ± 100 | nA |
| Static Drain-Source On-State Resistance 静态漏源导通电阻($I_D = -3.2\text{A}, V_{GS} = -10\text{V}$) ($I_D = -2.8\text{A}, V_{GS} = -4.5\text{V}$) | $R_{DS(ON)}$ | — | 70 93 | 90 125 | $\text{m}\Omega$ |
| Diode Forward Voltage Drop 内附二极管正向压降($I_{SD} = -1\text{A}, V_{GS}=0\text{V}$) | V_{SD} | — | -0.77 | -1.0 | V |
| Input Capacitance 输入电容 ($V_{GS}=0\text{V}, V_{DS} = -30\text{V}, f=1\text{MHz}$) | C_{ISS} | — | 930 | — | pF |
| Common Source Output Capacitance 共源输出电容($V_{GS}=0\text{V}, V_{DS} = -30\text{V}, f=1\text{MHz}$) | C_{OSS} | — | 85 | — | pF |
| Reverse Transfer Capacitance 反馈电容 ($V_{GS}=0\text{V}, V_{DS} = -30\text{V}, f=1\text{MHz}$) | C_{RSS} | — | 35 | — | pF |
| Total Gate Charge 栅极电荷密度 ($V_{DS} = -30\text{V}, I_D = -3.2\text{A}, V_{GS} = -10\text{V}$) | Q_g | — | 16 | — | nC |
| Gate Source Charge 栅源电荷密度 ($V_{DS} = -30\text{V}, I_D = -3.2\text{A}, V_{GS} = -10\text{V}$) | Q_{gs} | — | 2 | — | nC |
| Gate Drain Charge 栅漏电荷密度 ($V_{DS} = -30\text{V}, I_D = -3.2\text{A}, V_{GS} = -10\text{V}$) | Q_{gd} | — | 3 | — | nC |
| Turn-ON Delay Time 开启延迟时间 ($V_{DS} = -30\text{V}, I_D = -1\text{A}, R_{GEN}=3\Omega, V_{GS} = -10\text{V}$) | $t_{d(on)}$ | — | 8 | — | ns |
| Turn-ON Rise Time 开启上升时间 ($V_{DS} = -30\text{V}, I_D = -1\text{A}, R_{GEN}=3\Omega, V_{GS} = -10\text{V}$) | t_r | — | 4 | — | ns |
| Turn-OFF Delay Time 关断延迟时间 ($V_{DS} = -30\text{V}, I_D = -1\text{A}, R_{GEN}=3\Omega, V_{GS} = -10\text{V}$) | $t_{d(off)}$ | — | 32 | — | ns |
| Turn-OFF Fall Time 关断下降时间 ($V_{DS} = -30\text{V}, I_D = -1\text{A}, R_{GEN}=3\Omega, V_{GS} = -10\text{V}$) | t_f | — | 8 | — | ns |

■N Typical Characteristic Curve 典型特性曲线

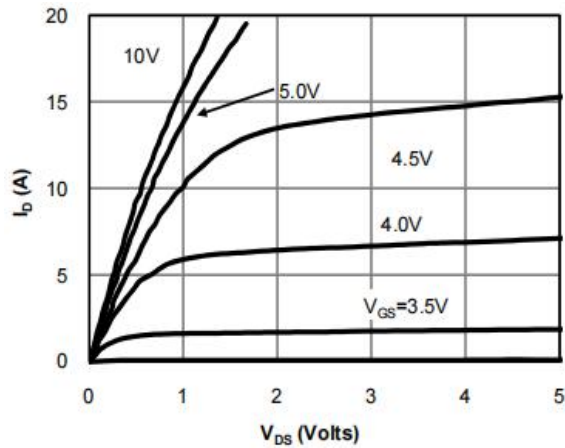


Figure 1: Output Characteristics

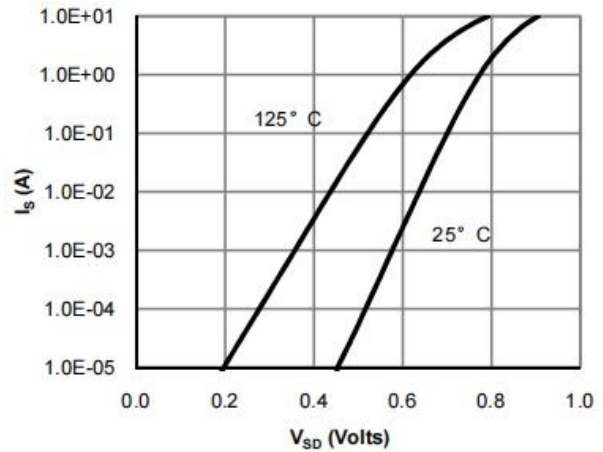


Figure 2: Diode Forward Characteristics

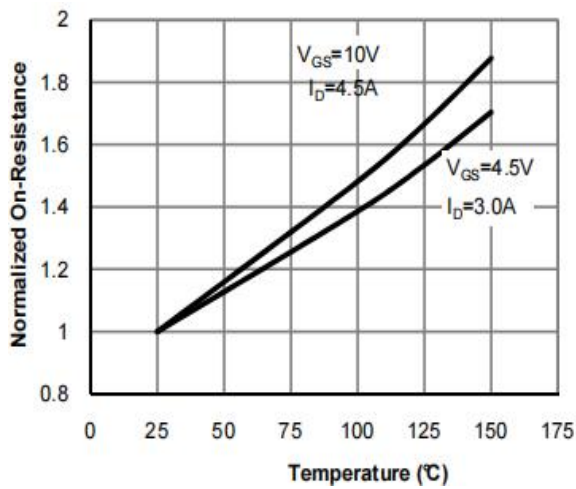


Figure 3: On-Resistance vs. T_J

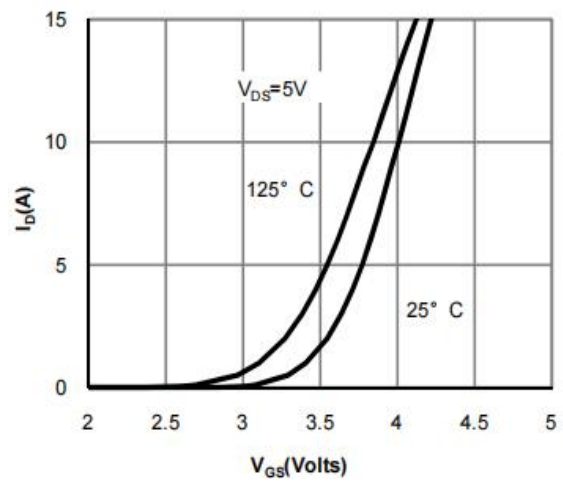


Figure 4: Transfer Characteristics

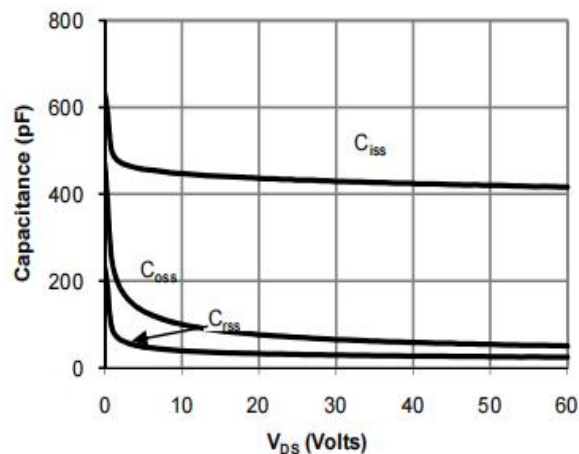


Figure 5: Capacitance Characteristics

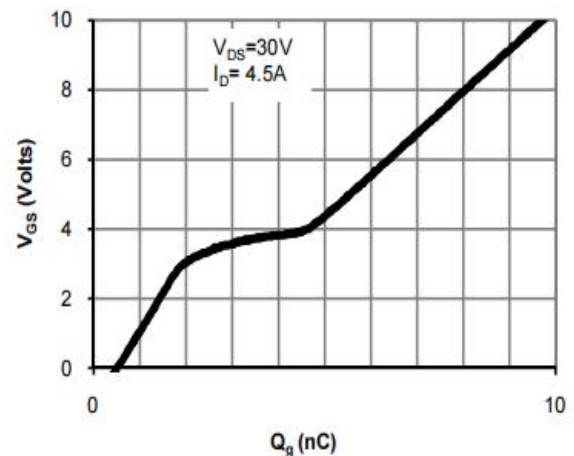


Figure 6: Gate-Charge Characteristics

■ N Typical Characteristic Curve 典型特性曲线

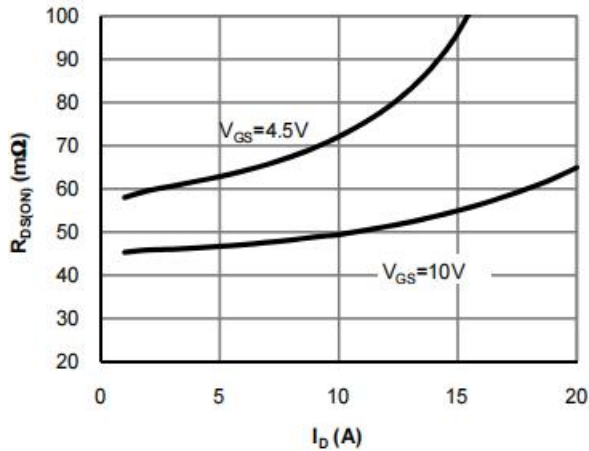


Figure 7: On-Resistance vs. Drain Current

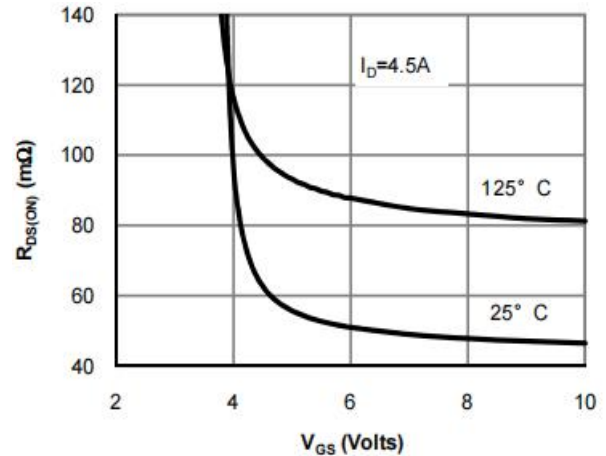


Figure 8: On-Resistance vs. V_{GS}

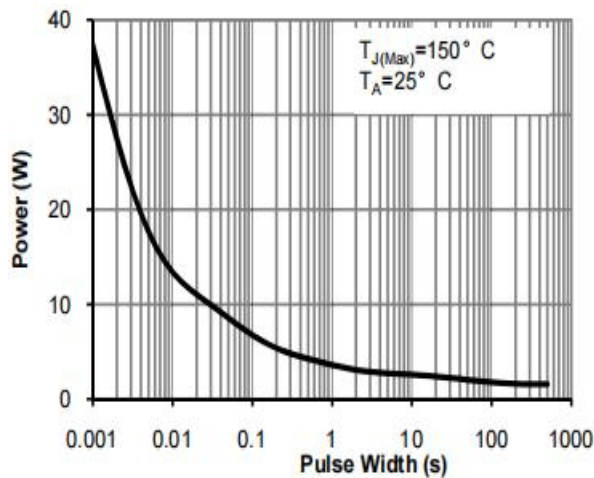


Figure 9: Power Rating Curve

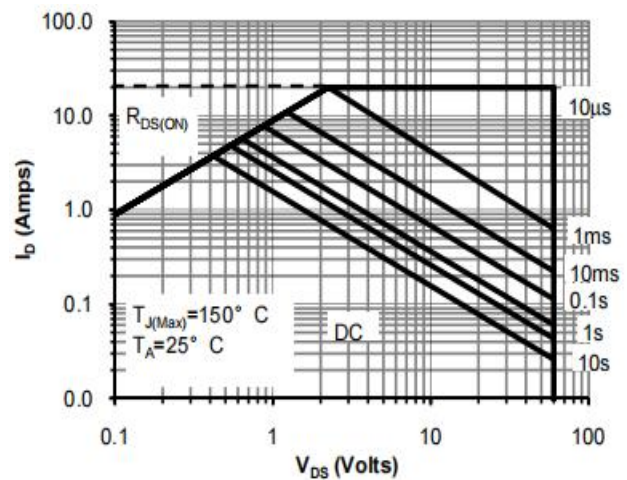


Figure 10: Safe Operating Area

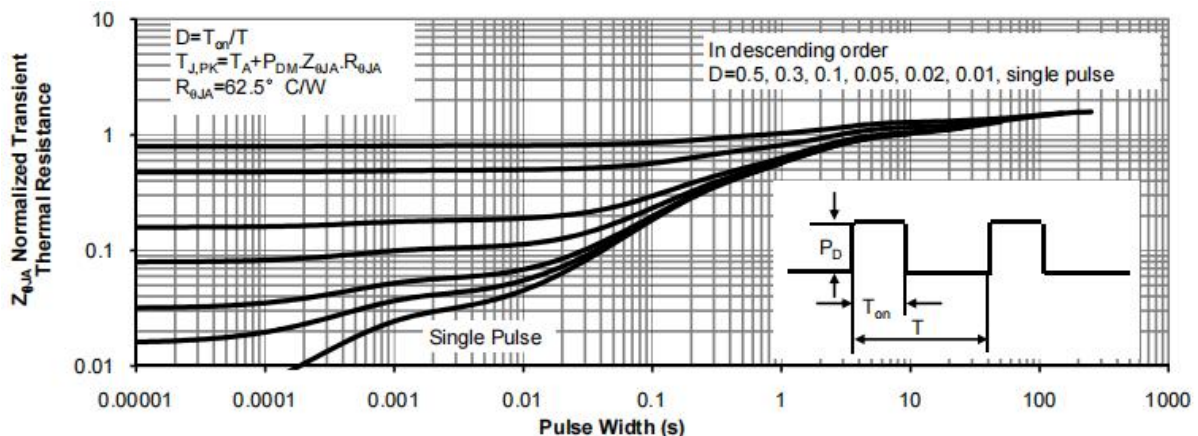


Figure 11: Transient Thermal Response Curve

■ P Typical Characteristic Curve 典型特性曲线

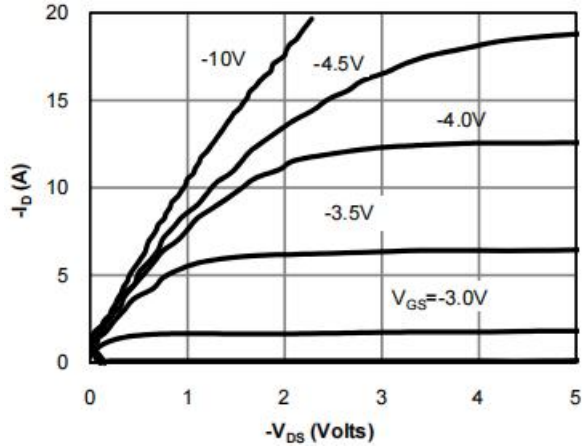


Figure 1: Output Characteristics

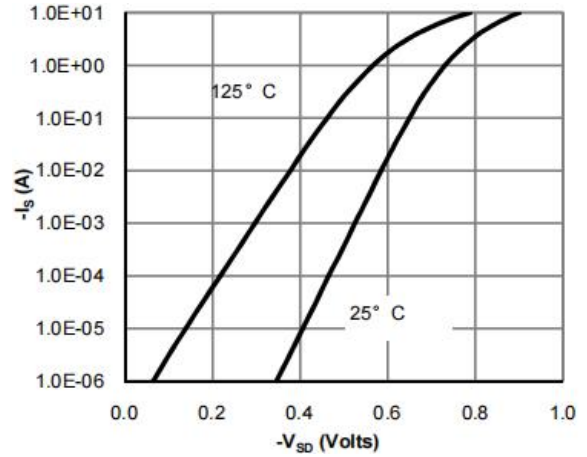


Figure 2: Diode Forward Characteristics

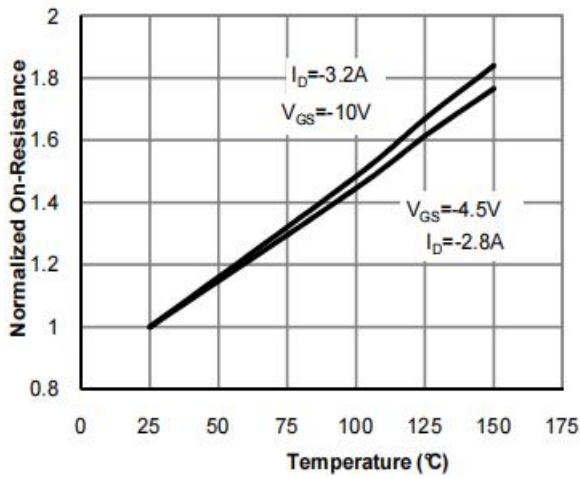


Figure 3: On-Resistance vs. T_J

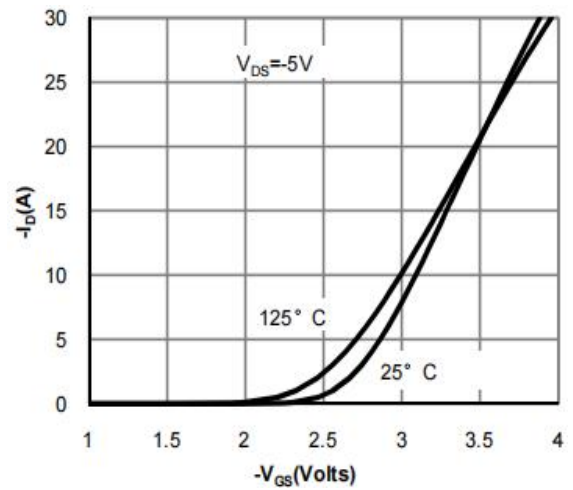


Figure 4: Transfer Characteristics

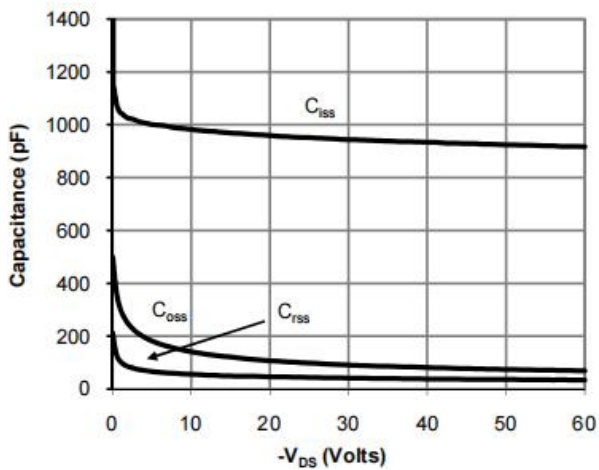


Figure 5: Capacitance Characteristics

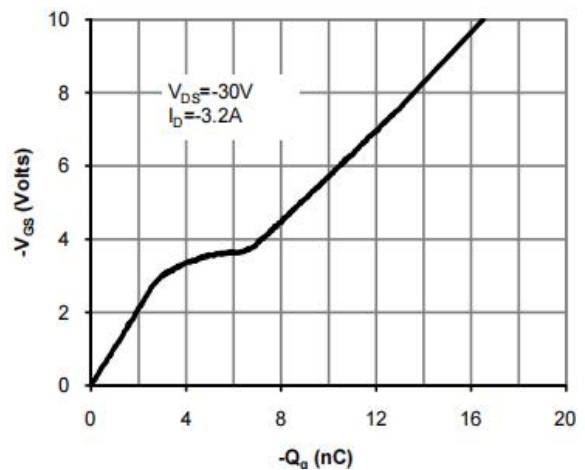


Figure 6: Gate-Charge Characteristics



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■ P Typical Characteristic Curve 典型特性曲线

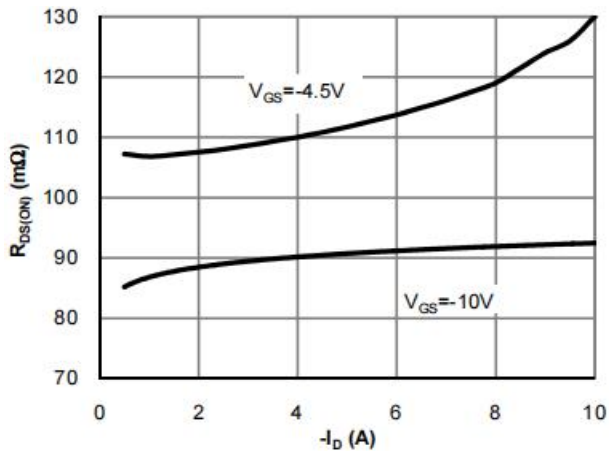


Figure 7: On-Resistance vs. Drain Current

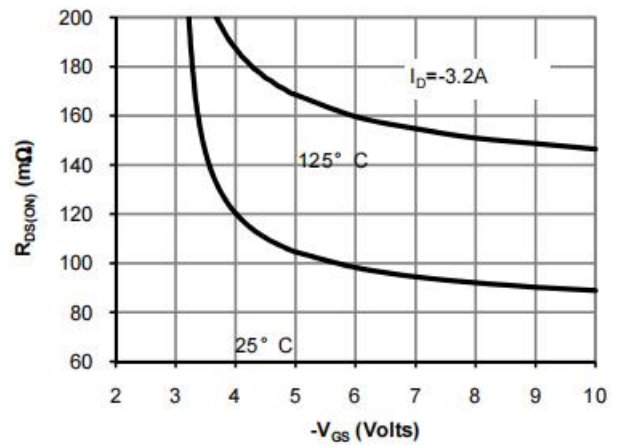


Figure 8: On-Resistance vs. V_{GS}

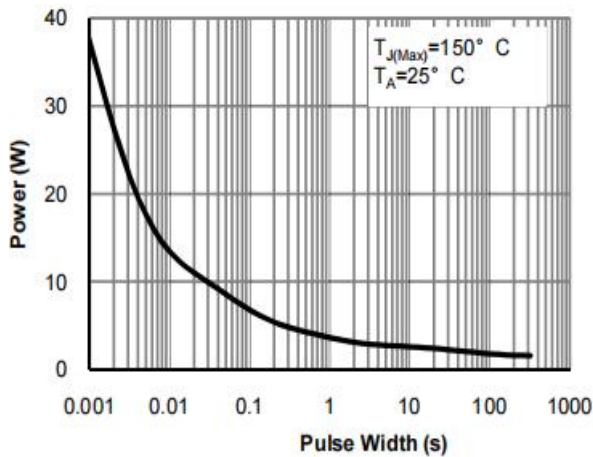


Figure 9: Power Rating Curve

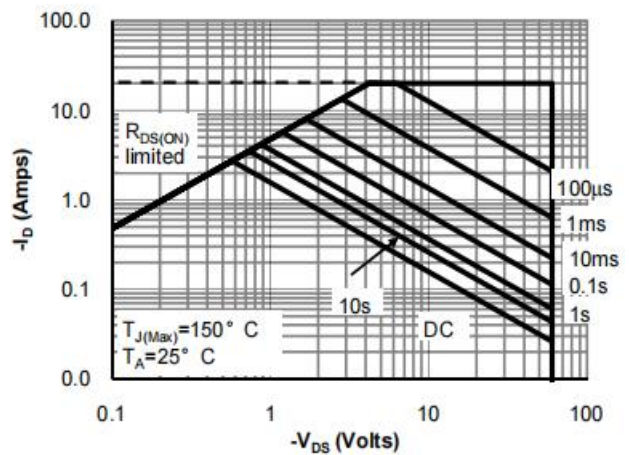


Figure 10: Safe Operating Area

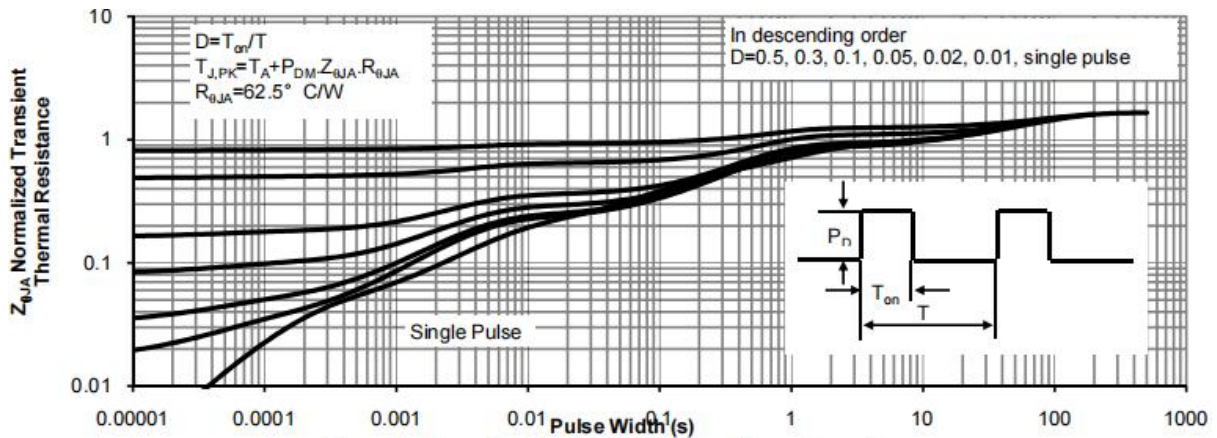
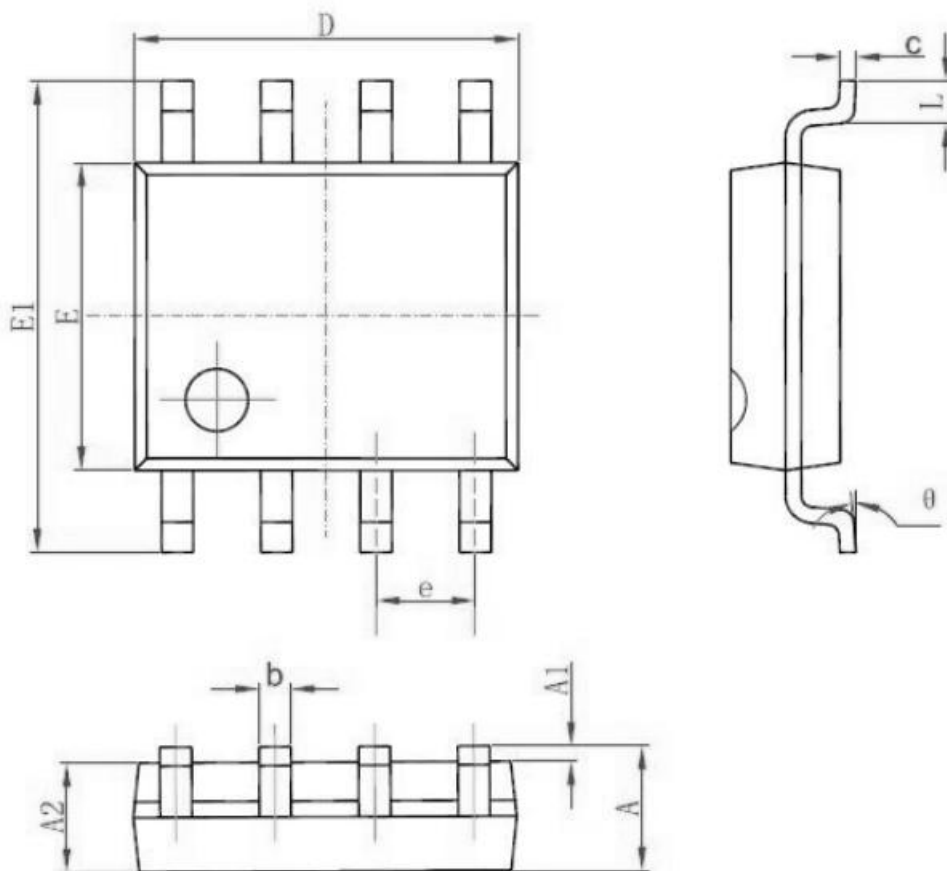


Figure 11: Transient Thermal Response Curve

■ Dimension 外形封装尺寸



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |