

## 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:  $R_{DS(ON)}=18.7m\Omega(\text{Type})@V_{GS}=10V$

$R_{DS(ON)}=24.8m\Omega(\text{Type})@V_{GS}=4.5V$

P:  $R_{DS(ON)}=36m\Omega(\text{Type})@V_{GS}= -10V$

$R_{DS(ON)}=48m\Omega@(\text{Type})V_{GS}= -4.5V$

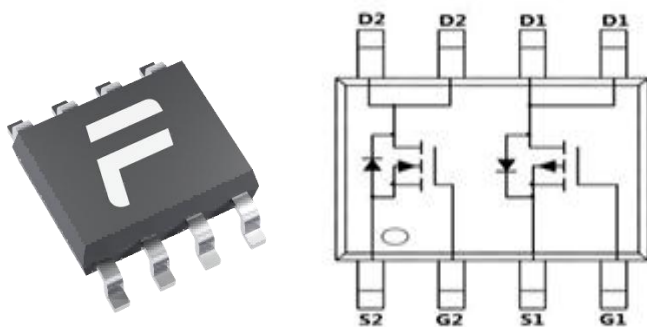
### ■Applications 应用

Motor Control 马达控制

Synchronous Rectification 同步整流

Fan Pre-drive H-bridge 风扇预驱动半桥

### ■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           | $BV_{DSS}$                                                      | 30         | -30          | V            |
| Gate- Source Voltage 栅极-源极电压           | $V_{GS}$                                                        | $\pm 20$   | $\pm 20$     | V            |
| Drain Current (continuous)漏极电流-连续      | $I_D$ (at $T_A = 25^\circ C$<br>at $T_A = 70^\circ C$ )         | 7.7<br>6.2 | -5.3<br>-4.5 | A            |
| Drain Current (pulsed)漏极电流-脉冲          | $I_{DM}$                                                        | 64         | -40          | A            |
| Total Device Dissipation 总耗散功率         | $P_{TOT}(\text{at } T_A = 25^\circ C$<br>at $T_A = 70^\circ C)$ | 2<br>1.44  |              | W            |
| Thermal Resistance Junction-Ambient 热阻 | $R_{\theta JA}$                                                 | 62.5       |              | $^\circ C/W$ |
| 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<sub>A</sub>=25℃ unless otherwise noted 如无特殊说明, 温度为 25℃)

| Characteristic<br>特性参数                                                                                                                         | Symbol<br>符号        | Min<br>最小值 | Typ<br>典型值   | Max<br>最大值 | Unit<br>单位 |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|--------------|------------|------------|
| Drain-Source Breakdown Voltage<br>漏极-源极击穿电压(I <sub>D</sub> =250uA, V <sub>GS</sub> =0V)                                                        | BV <sub>DSS</sub>   | 30         | —            | —          | V          |
| Gate Threshold Voltage<br>栅极开启电压(I <sub>D</sub> =250uA, V <sub>GS</sub> =V <sub>DS</sub> )                                                     | V <sub>GS(th)</sub> | 1.0        | 1.5          | 2.6        | V          |
| Zero Gate Voltage Drain Current<br>零栅压漏极电流(V <sub>GS</sub> =0V, V <sub>DS</sub> =30V)                                                          | I <sub>DSS</sub>    | —          | —            | 1          | uA         |
| Gate Body Leakage<br>栅极漏电流(V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V)                                                                         | I <sub>GSS</sub>    | —          | —            | ±100       | nA         |
| Static Drain-Source On-State Resistance<br>静态漏源导通电阻(I <sub>D</sub> =7.7A, V <sub>GS</sub> =10V)<br>(I <sub>D</sub> =5A, V <sub>GS</sub> =4.5V) | R <sub>DS(ON)</sub> | —          | 18.7<br>24.8 | 28<br>36   | mΩ         |
| Diode Forward Voltage Drop<br>内附二极管正向压降(I <sub>SD</sub> =2.5A, V <sub>GS</sub> =0V)                                                            | V <sub>SD</sub>     | —          | 0.74         | 1.0        | V          |
| Input Capacitance 输入电容<br>(V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz)                                                                  | C <sub>ISS</sub>    | —          | 373          | —          | pF         |
| Common Source Output Capacitance<br>共源输出电容(V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz)                                                  | C <sub>OSS</sub>    | —          | 67           | —          | pF         |
| Reverse Transfer Capacitance<br>反馈电容(V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz)                                                        | C <sub>RSS</sub>    | —          | 41           | —          | pF         |
| Total Gate Charge 栅极电荷密度<br>(V <sub>DS</sub> =15V, I <sub>D</sub> =7.2A, V <sub>GS</sub> =10V)                                                 | Q <sub>g</sub>      | —          | 7            | —          | nC         |
| Gate Source Charge 栅源电荷密度<br>(V <sub>DS</sub> =15V, I <sub>D</sub> =7.2A, V <sub>GS</sub> =10V)                                                | Q <sub>gs</sub>     | —          | 1            | —          | nC         |
| Gate Drain Charge 栅漏电荷密度<br>(V <sub>DS</sub> =15V, I <sub>D</sub> =7.2A, V <sub>GS</sub> =10V)                                                 | Q <sub>gd</sub>     | —          | 2            | —          | nC         |
| Turn-ON Delay Time 开启延迟时间<br>(V <sub>DS</sub> =15V I <sub>D</sub> =1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V)                             | t <sub>d(on)</sub>  | —          | 5            | —          | ns         |
| Turn-ON Rise Time 开启上升时间<br>(V <sub>DS</sub> =15V I <sub>D</sub> =1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V)                              | t <sub>r</sub>      | —          | 3            | —          | ns         |
| Turn-OFF Delay Time 关断延迟时间<br>(V <sub>DS</sub> =15V I <sub>D</sub> =1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V)                            | t <sub>d(off)</sub> | —          | 15           | —          | ns         |
| Turn-OFF Fall Time 关断下降时间<br>(V <sub>DS</sub> =15V I <sub>D</sub> =1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V)                             | t <sub>f</sub>      | —          | 3            | —          | ns         |

**■ P Electrical Characteristics 电特性**

 (T<sub>A</sub>=25℃ unless otherwise noted 如无特殊说明, 温度为 25℃)

| Characteristic<br>特性参数                                                                                                                                   | Symbol<br>符号        | Min<br>最小值 | Typ<br>典型值 | Max<br>最大值 | Unit<br>单位 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|------------|------------|------------|------------|
| Drain-Source Breakdown Voltage<br>漏极-源极击穿电压(I <sub>D</sub> = -250uA, V <sub>GS</sub> =0V)                                                                | BV <sub>DSS</sub>   | -30        | —          | —          | V          |
| Gate Threshold Voltage<br>栅极开启电压(I <sub>D</sub> = -250uA, V <sub>GS</sub> = V <sub>DS</sub> )                                                            | V <sub>GS(th)</sub> | -1.0       | -1.5       | -2.4       | V          |
| Zero Gate Voltage Drain Current<br>零栅压漏极电流(V <sub>GS</sub> =0V, V <sub>DS</sub> = -30V)                                                                  | I <sub>DSS</sub>    | —          | —          | -1         | uA         |
| Gate Body Leakage<br>栅极漏电流(V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V)                                                                                   | I <sub>GSS</sub>    | —          | —          | ±100       | nA         |
| Static Drain-Source On-State Resistance<br>静态漏源导通电阻(I <sub>D</sub> = -5.3A, V <sub>GS</sub> = -10V)<br>(I <sub>D</sub> = -4.5A, V <sub>GS</sub> = -4.5V) | R <sub>DS(ON)</sub> | —          | 36<br>48   | 48<br>58   | mΩ         |
| Diode Forward Voltage Drop<br>内附二极管正向压降(I <sub>SD</sub> = -3.5A, V <sub>GS</sub> =0V)                                                                    | V <sub>SD</sub>     | —          | -0.8       | -1.0       | V          |
| Input Capacitance 输入电容<br>(V <sub>GS</sub> =0V, V <sub>DS</sub> = -15V, f=1MHz)                                                                          | C <sub>ISS</sub>    | —          | 760        | —          | pF         |
| Common Source Output Capacitance<br>共源输出电容(V <sub>GS</sub> =0V, V <sub>DS</sub> = -15V, f=1MHz)                                                          | C <sub>OSS</sub>    | —          | 140        | —          | pF         |
| Reverse Transfer Capacitance 反馈电容<br>(V <sub>GS</sub> =0V, V <sub>DS</sub> = -15V, f=1MHz)                                                               | C <sub>RSS</sub>    | —          | 95         | —          | pF         |
| Total Gate Charge 栅极电荷密度<br>(V <sub>DS</sub> = -15V, I <sub>D</sub> = -5.3A, V <sub>GS</sub> = -10V)                                                     | Q <sub>g</sub>      | —          | 13         | —          | nC         |
| Gate Source Charge 栅源电荷密度<br>(V <sub>DS</sub> = -15V, I <sub>D</sub> = -5.3A, V <sub>GS</sub> = -10V)                                                    | Q <sub>gs</sub>     | —          | 3          | —          | nC         |
| Gate Drain Charge 栅漏电荷密度<br>(V <sub>DS</sub> = -15V, I <sub>D</sub> = -5.3A, V <sub>GS</sub> = -10V)                                                     | Q <sub>gd</sub>     | —          | 3          | —          | nC         |
| Turn-ON Delay Time 开启延迟时间<br>(V <sub>DS</sub> = -15V I <sub>D</sub> = -1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> = -10V)                                 | t <sub>d(on)</sub>  | —          | 8          | —          | ns         |
| Turn-ON Rise Time 开启上升时间<br>(V <sub>DS</sub> = -15V I <sub>D</sub> = -1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> = -10V)                                  | t <sub>r</sub>      | —          | 6          | —          | ns         |
| Turn-OFF Delay Time 关断延迟时间<br>(V <sub>DS</sub> = -15V I <sub>D</sub> = -1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> = -10V)                                | t <sub>d(off)</sub> | —          | 18         | —          | ns         |
| Turn-OFF Fall Time 关断下降时间<br>(V <sub>DS</sub> = -15V I <sub>D</sub> = -1A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> = -10V)                                 | t <sub>f</sub>      | —          | 5          | —          | ns         |

■ N Typical Characteristic Curve 典型特性曲线

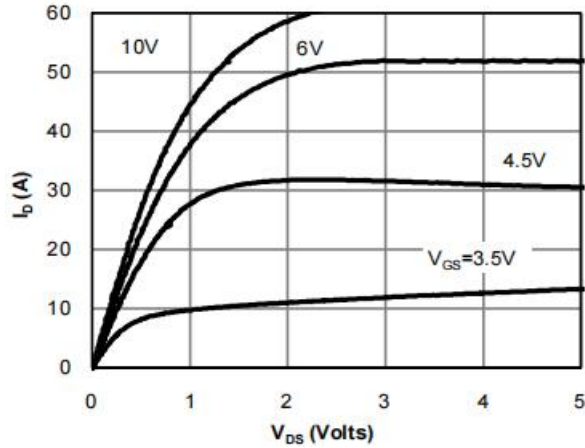


Figure 1: Output Characteristics

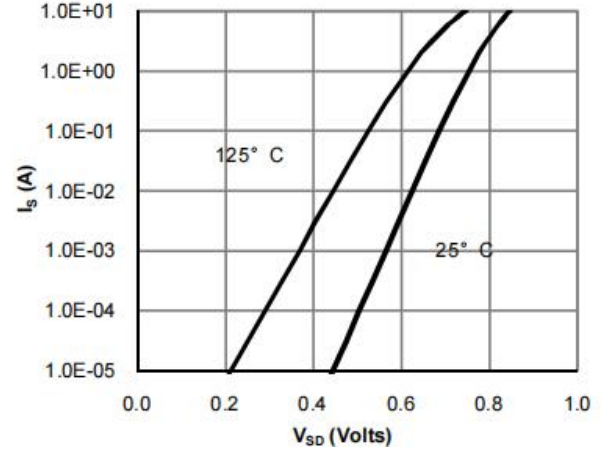


Figure 2: Diode Forward Characteristics

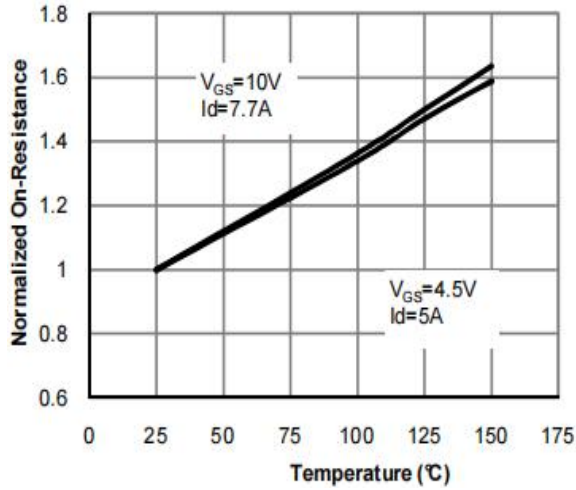


Figure 3: On-Resistance vs.  $T_J$

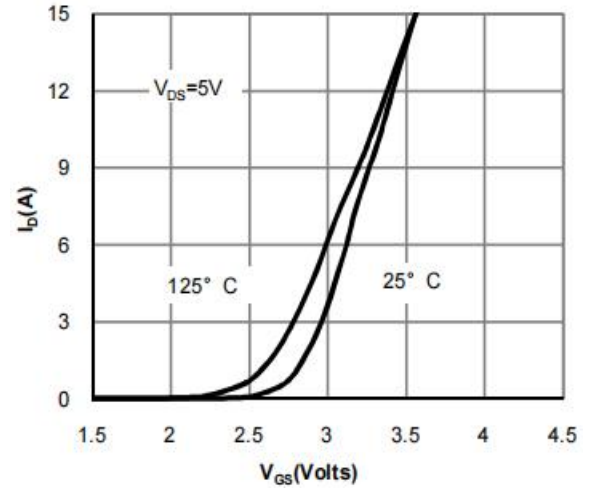


Figure 4: Transfer Characteristics

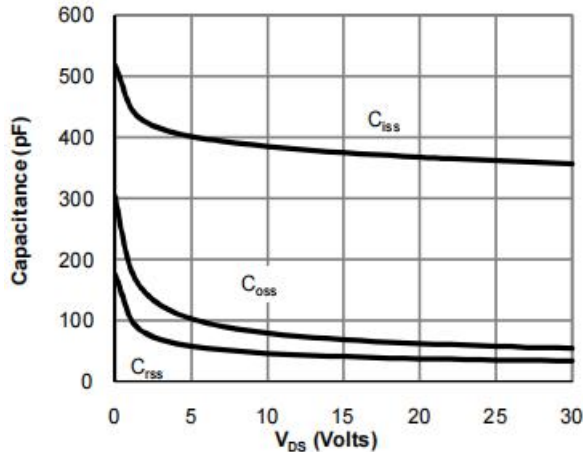


Figure 5: Capacitance Characteristics

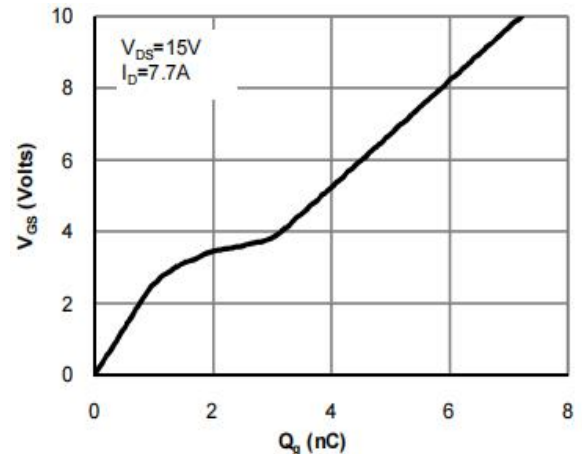


Figure 6: Gate-Charge Characteristics

■ N Typical Characteristic Curve 典型特性曲线

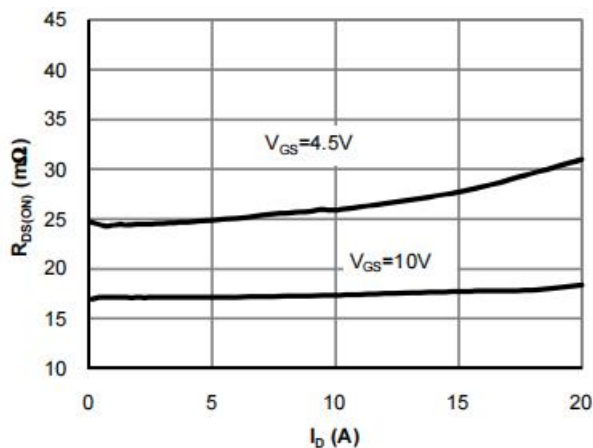


Figure 7: On-Resistance vs. Drain Current

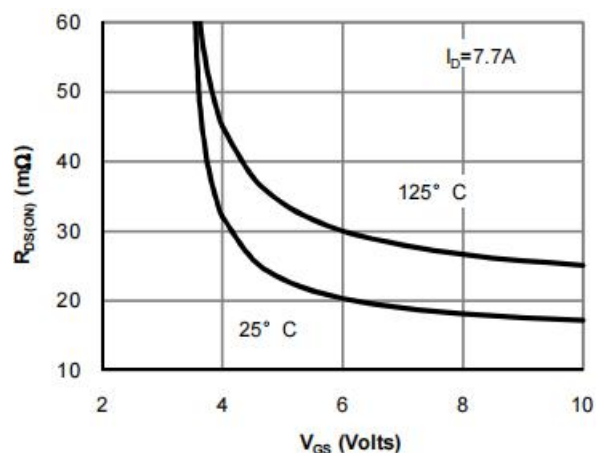


Figure 8: On-Resistance vs.  $V_{GS}$

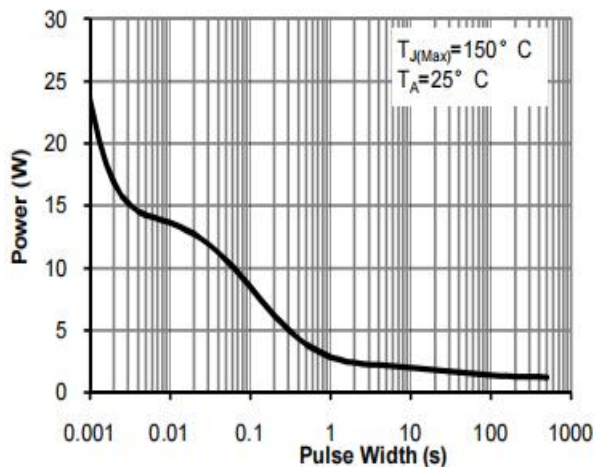


Figure 9: Power Rating Curve

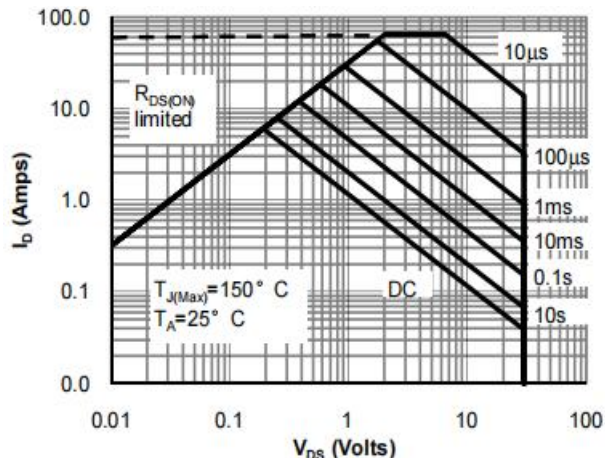


Figure 10: Safe Operating Area

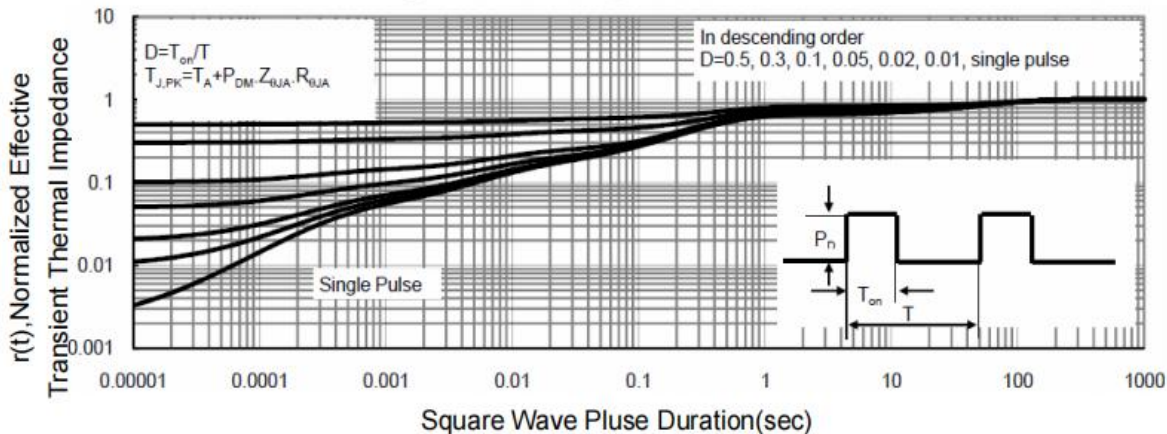


Figure 11: Transient Thermal Response Curve

■ P Typical Characteristic Curve 典型特性曲线

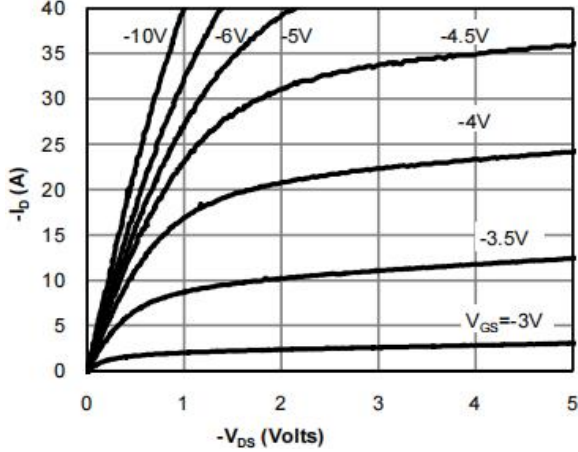


Figure 1: Output Characteristics

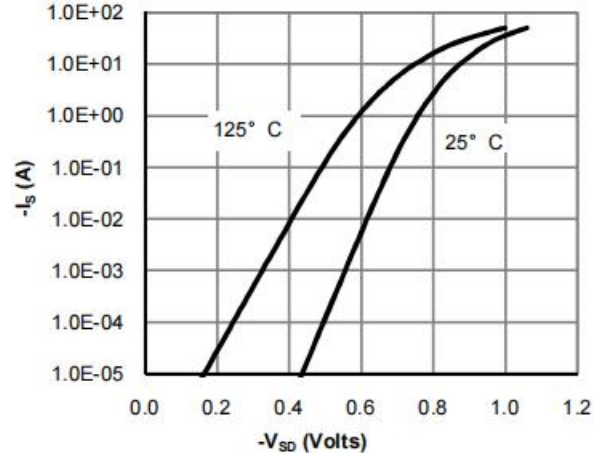


Figure 2: Diode Forward Characteristics

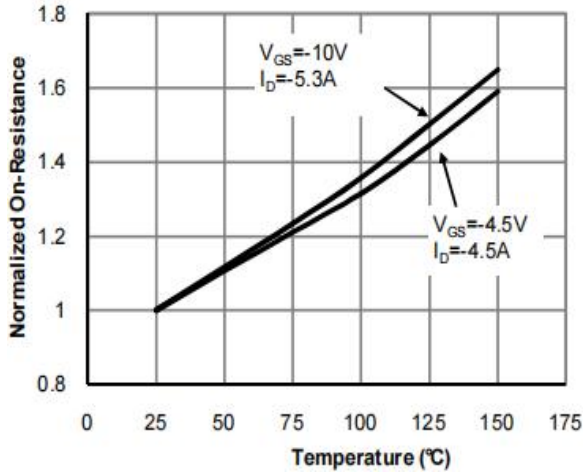


Figure 3: On-Resistance vs.  $T_J$

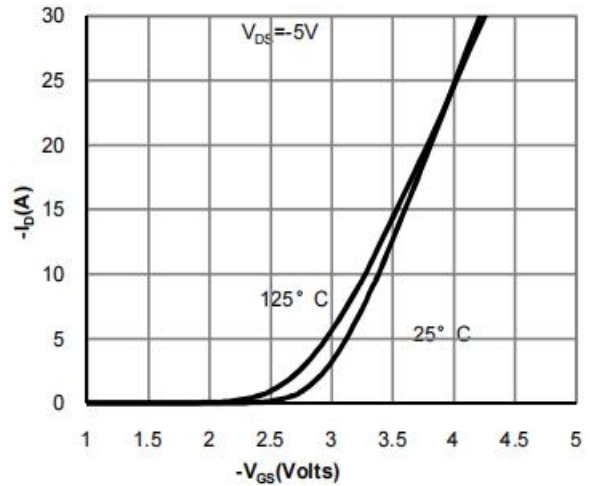


Figure 4: Gate Threshold Voltage

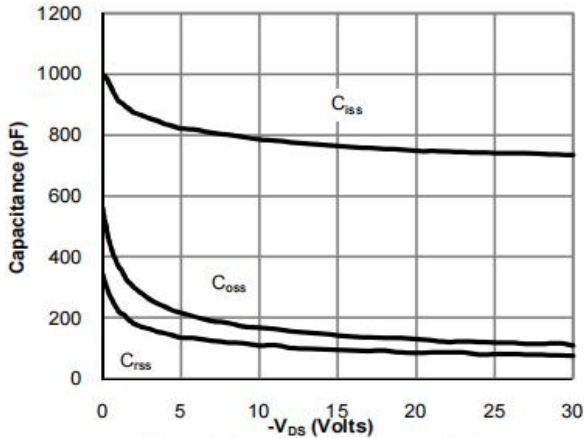


Figure 5: Capacitance Characteristics

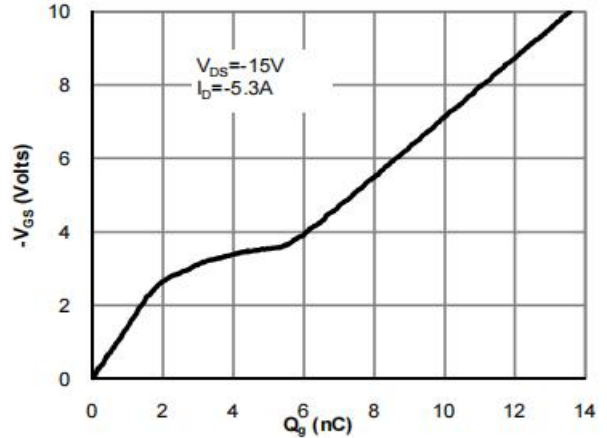


Figure 6: Gate-Charge Characteristics

■ P Typical Characteristic Curve 典型特性曲线

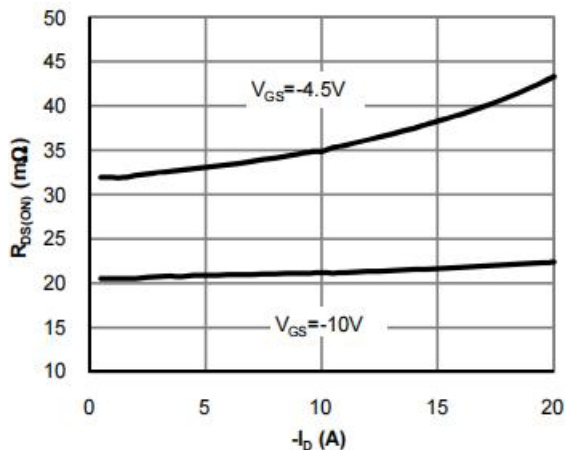


Figure 7: On-Resistance vs. Drain Current

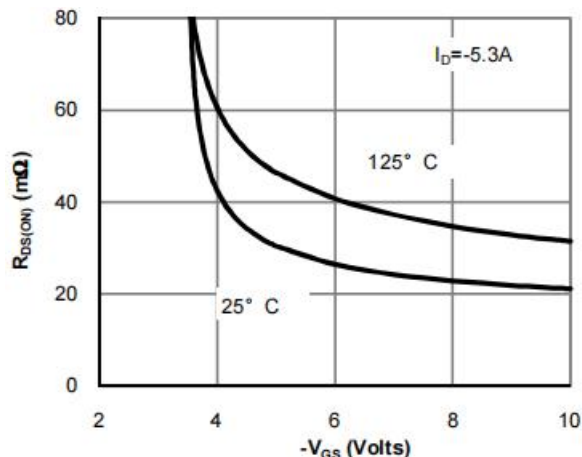


Figure 8: On-Resistance vs.  $V_{GS}$

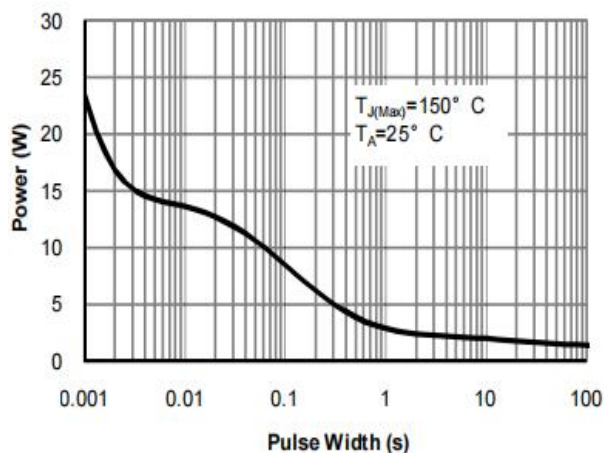


Figure 9: Power Rating Curve

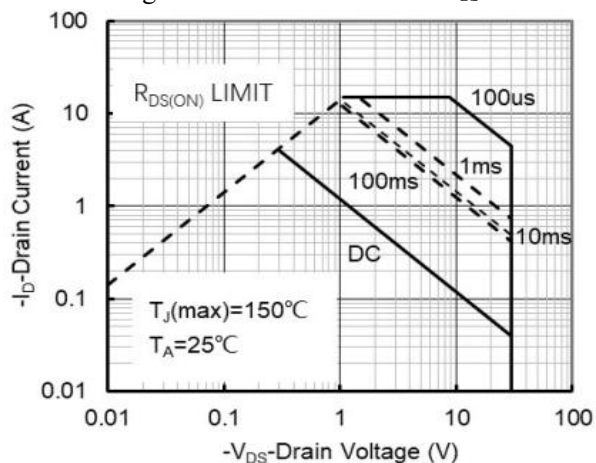


Figure 10: Safe Operating Area

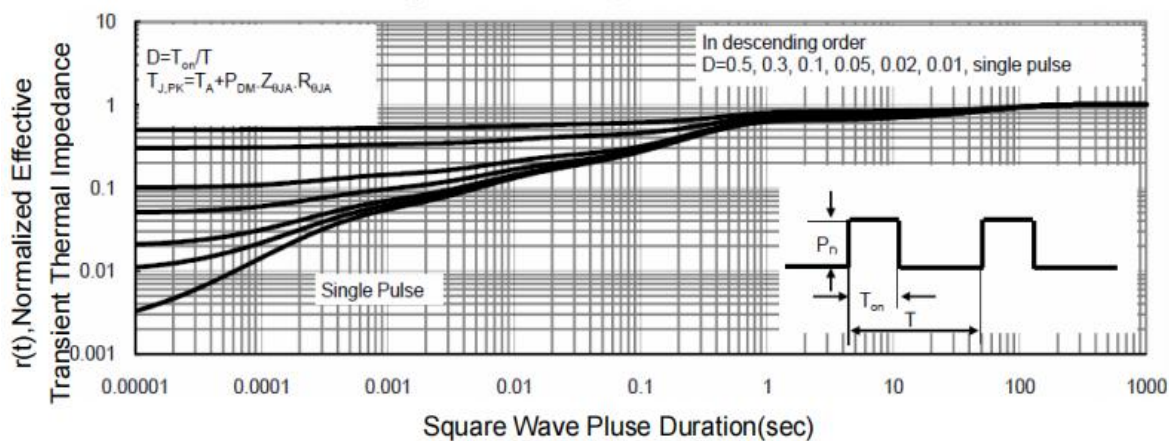
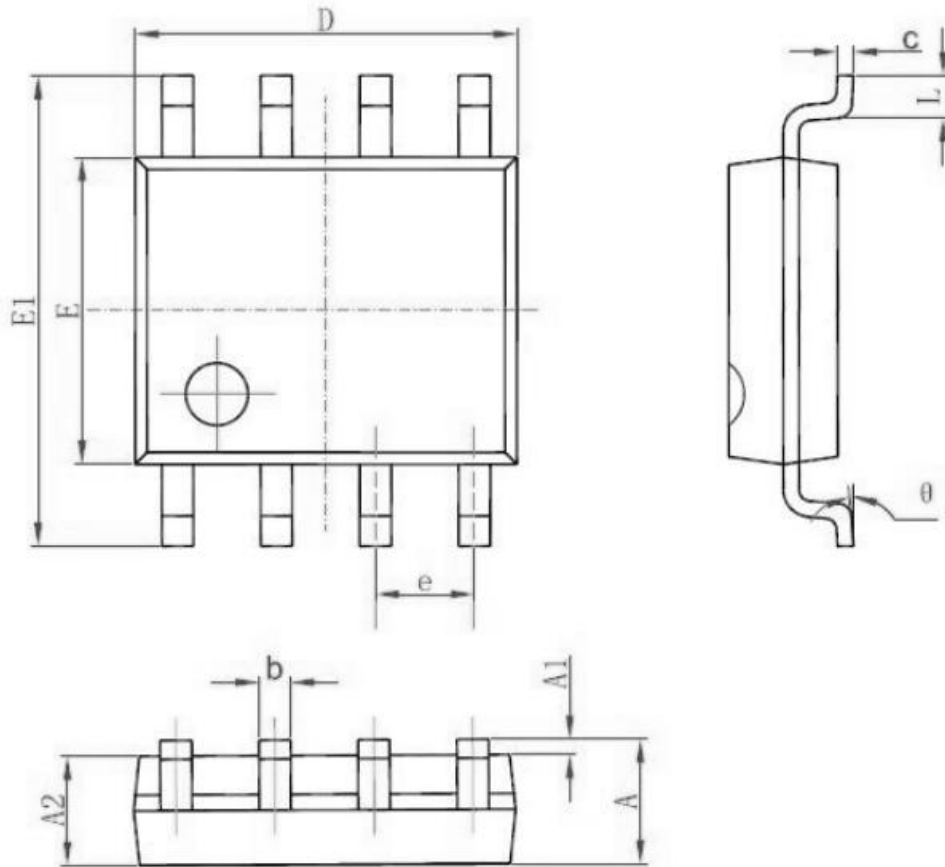


Figure 11: Transient Thermal Response Curve

■ **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°    |