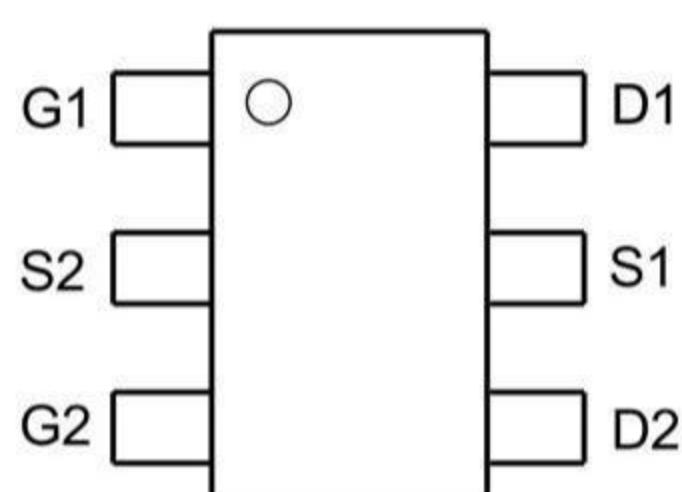


### Product Summary

- **N-Channel**
- $V_{DS} = 30V, I_D = 4A$   
 $R_{DS(ON)} 30m\Omega @ V_{GS}=10V (Typ)$   
 $R_{DS(ON)} 50m\Omega @ V_{GS}=-4.5V (Typ)$
- **P-Channel**
- $V_{DS} = -30V, I_D = 3A$   
 $R_{DS(ON)} 45m\Omega @ V_{GS}=-10V (Typ)$   
 $R_{DS(ON)} 85m\Omega @ V_{GS}=-4.5V (Typ)$

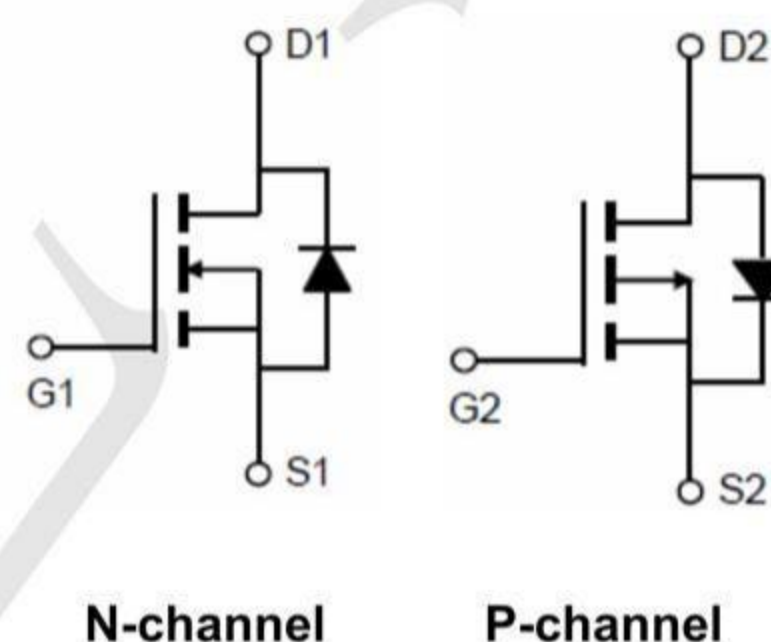
### Package and Pin Configuration



### Application

- DC-DC Converters.
- Load Switch.
- Power Management.

### Circuit diagram



Marking:66G

### Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

| Parameter                                        |                  | Symbol         | N-Channel  | P-Channel  | Unit       |
|--------------------------------------------------|------------------|----------------|------------|------------|------------|
| Drain-Source Voltage                             |                  | $V_{DS}$       | 30         | -30        | V          |
| Gate-Source Voltage                              |                  | $V_{GS}$       | $\pm 20$   | $\pm 20$   | V          |
| Continuous Drain Current                         | $T_A=25^\circ C$ | $I_D$          | 4.0        | -3.0       | A          |
|                                                  | $T_A=70^\circ C$ |                | 3          | -2.1       |            |
| Pulsed Drain Current <sup>(Note 1)</sup>         |                  | $I_{DM}$       | 20         | -15        | A          |
| Maximum Power Dissipation                        | $T_A=25^\circ C$ | $P_D$          | 1.2        |            | W          |
| Operating Junction and Storage Temperature Range |                  | $T_J, T_{STG}$ | -55 To 150 | -55 To 150 | $^\circ C$ |

### Thermal Characteristic

|                                                            |                 |      |     |              |
|------------------------------------------------------------|-----------------|------|-----|--------------|
| Thermal Resistance, Junction-to-Ambient <sup>(Note2)</sup> | $R_{\theta JA}$ | N-Ch | 104 | $^\circ C/W$ |
| Thermal Resistance, Junction-to-Ambient <sup>(Note2)</sup> | $R_{\theta JA}$ | P-Ch | 104 | $^\circ C/W$ |

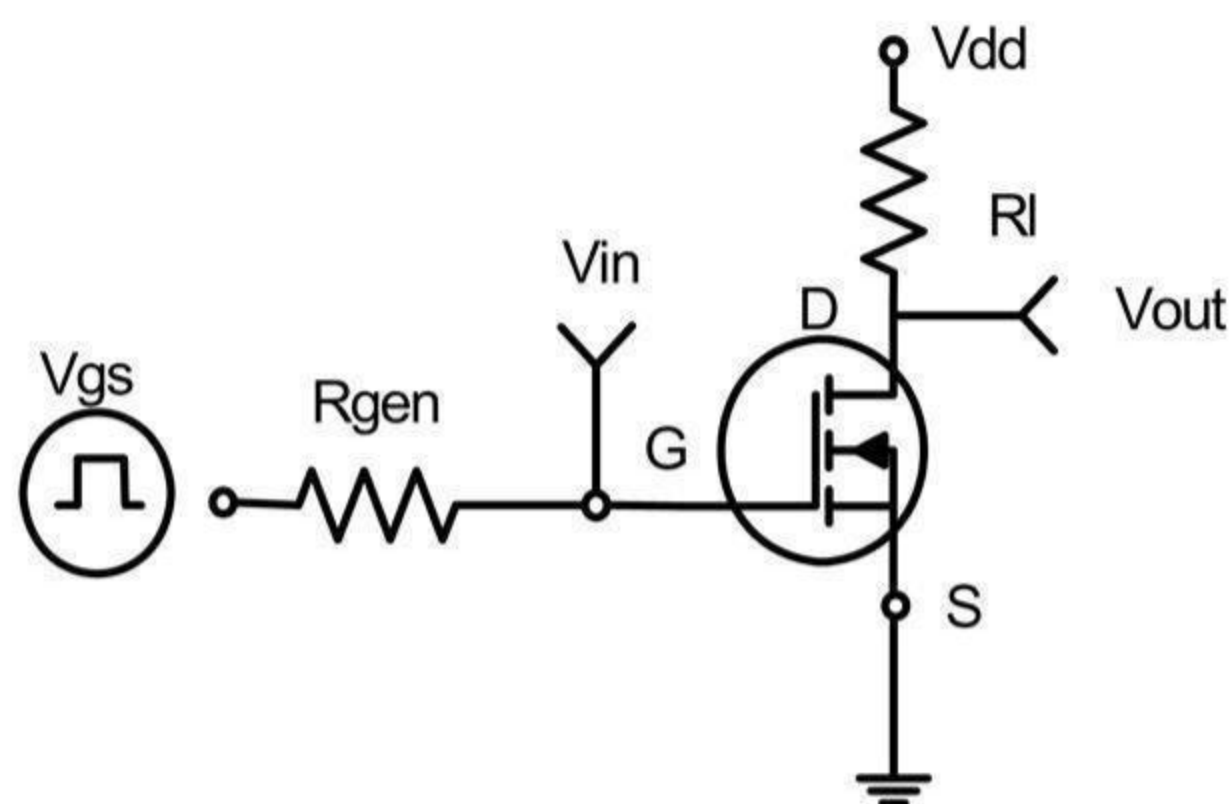
**N-CH Electrical Characteristics ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                          | Symbol       | Condition                                                  | Min | Typ  | Max       | Unit       |
|------------------------------------|--------------|------------------------------------------------------------|-----|------|-----------|------------|
| Off Characteristics                |              |                                                            |     |      |           |            |
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                                  | 30  |      | -         | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$                                    | -   | -    | 1         | $\mu A$    |
| Gate-Body Leakage Current          | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                | -   | -    | $\pm 100$ | nA         |
| On Characteristics (Note 3)        |              |                                                            |     |      |           |            |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                              | 1.2 | 1.5  | 2.2       | V          |
| Drain-Source On-State Resistance   | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=4A$                                       |     | 30   | 48        | m $\Omega$ |
|                                    |              | $V_{GS}=4.5V, I_D=2A$                                      |     | 50   | 90        | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=5V, I_D=3.1A$                                      | -   | 4    | -         | S          |
| Dynamic Characteristics (Note4)    |              |                                                            |     |      |           |            |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V,$<br>$F=1.0MHz$                     | -   | 210  | -         | PF         |
| Output Capacitance                 | $C_{oss}$    |                                                            | -   | 35   | -         | PF         |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                            | -   | 23   | -         | PF         |
| Switching Characteristics (Note 4) |              |                                                            |     |      |           |            |
| Turn-on Delay Time                 | $t_{d(on)}$  | $V_{DD}=15V, R_L=3\Omega$<br>$V_{GS}=10V, R_{GEN}=6\Omega$ | -   | 4.5  | -         | nS         |
| Turn-on Rise Time                  | $t_r$        |                                                            | -   | 1.5  | -         | nS         |
| Turn-Off Delay Time                | $t_{d(off)}$ |                                                            | -   | 18.5 | -         | nS         |
| Turn-Off Fall Time                 | $t_f$        |                                                            | -   | 15.5 | -         | nS         |
| Total Gate Charge                  | $Q_g$        | $V_{DS}=15V, I_D=3.5A,$<br>$V_{GS}=10V$                    | -   | 5    | -         | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |                                                            | -   | 0.55 | -         | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                            | -   | 1    | -         | nC         |
| Drain-Source Diode Characteristics |              |                                                            |     |      |           |            |
| Diode Forward Voltage (Note 3)     | $V_{SD}$     | $V_{GS}=0V, I_S=3.5A$                                      | -   | 0.8  | 1.2       | V          |
| Diode Forward Current (Note 2)     | $I_S$        |                                                            | -   | -    | 4         | A          |

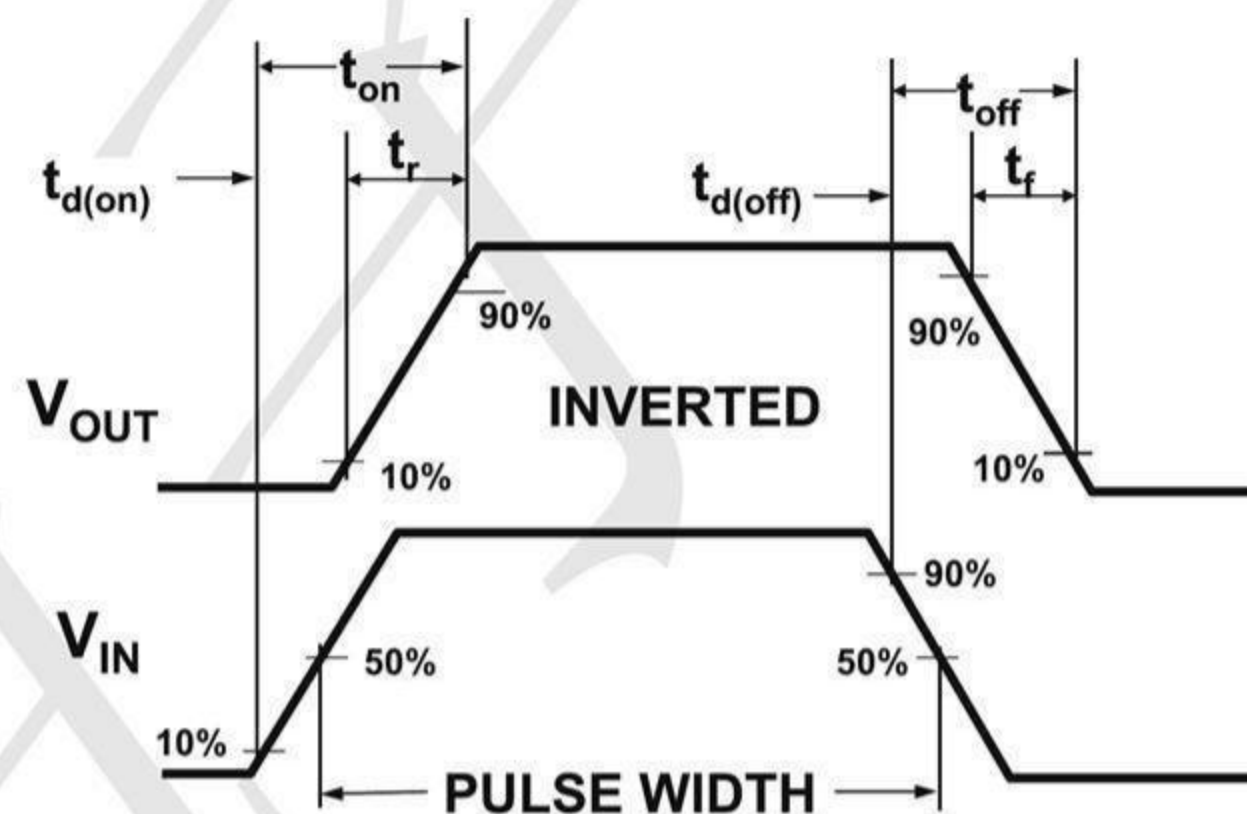
**P-CH Electrical Characteristics ( $T_A=25^\circ\text{C}$  unless otherwise noted)**

| Parameter                          | Symbol       | Condition                                                     | Min | Typ  | Max       | Unit       |
|------------------------------------|--------------|---------------------------------------------------------------|-----|------|-----------|------------|
| Off Characteristics                |              |                                                               |     |      |           |            |
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$                                    | -30 | -33  | -         | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=-30V, V_{GS}=0V$                                      | -   | -    | -1        | $\mu A$    |
| Gate-Body Leakage Current          | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                                   | -   | -    | $\pm 100$ | nA         |
| On Characteristics (Note 3)        |              |                                                               |     |      |           |            |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                                | -1  | -1.6 | -2.5      | V          |
| Drain-Source On-State Resistance   | $R_{DS(ON)}$ | $V_{GS}=-10V, I_D=-2.7A$                                      | -   | 45   | 65        | m $\Omega$ |
|                                    |              | $V_{GS}=-4.5V, I_D=-2A$                                       | -   | 85   | 100       | m $\Omega$ |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=-10V, I_D=-2.7A$                                      |     | 2    | -         | S          |
| Dynamic Characteristics (Note4)    |              |                                                               |     |      |           |            |
| Input Capacitance                  | $C_{ISS}$    | $V_{DS}=-15V, V_{GS}=0V,$<br>$F=1.0MHz$                       | -   | 199  | -         | PF         |
| Output Capacitance                 | $C_{OSS}$    |                                                               | -   | 47   | -         | PF         |
| Reverse Transfer Capacitance       | $C_{RSS}$    |                                                               | -   | 28   | -         | PF         |
| Switching Characteristics (Note 4) |              |                                                               |     |      |           |            |
| Turn-on Delay Time                 | $t_{d(on)}$  | $V_{DD}=-15V, R_L=15\Omega$<br>$V_{GS}=-10V, R_{GEN}=6\Omega$ | -   | 8    | -         | nS         |
| Turn-on Rise Time                  | $t_r$        |                                                               | -   | 5    | -         | nS         |
| Turn-Off Delay Time                | $t_{d(off)}$ |                                                               | -   | 12   | -         | nS         |
| Turn-Off Fall Time                 | $t_f$        |                                                               | -   | 4    | -         | nS         |
| Total Gate Charge                  | $Q_g$        | $V_{DS}=-15V, I_D=-2.7A, V_{GS}=-10V$                         | -   | 5    | -         | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |                                                               | -   | 0.7  | -         | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                               | -   | 1.1  | -         | nC         |
| Drain-Source Diode Characteristics |              |                                                               |     |      |           |            |
| Diode Forward Voltage (Note 3)     | $V_{SD}$     | $V_{GS}=0V, I_S=-2.7A$                                        | -   | -    | -1.2      | V          |

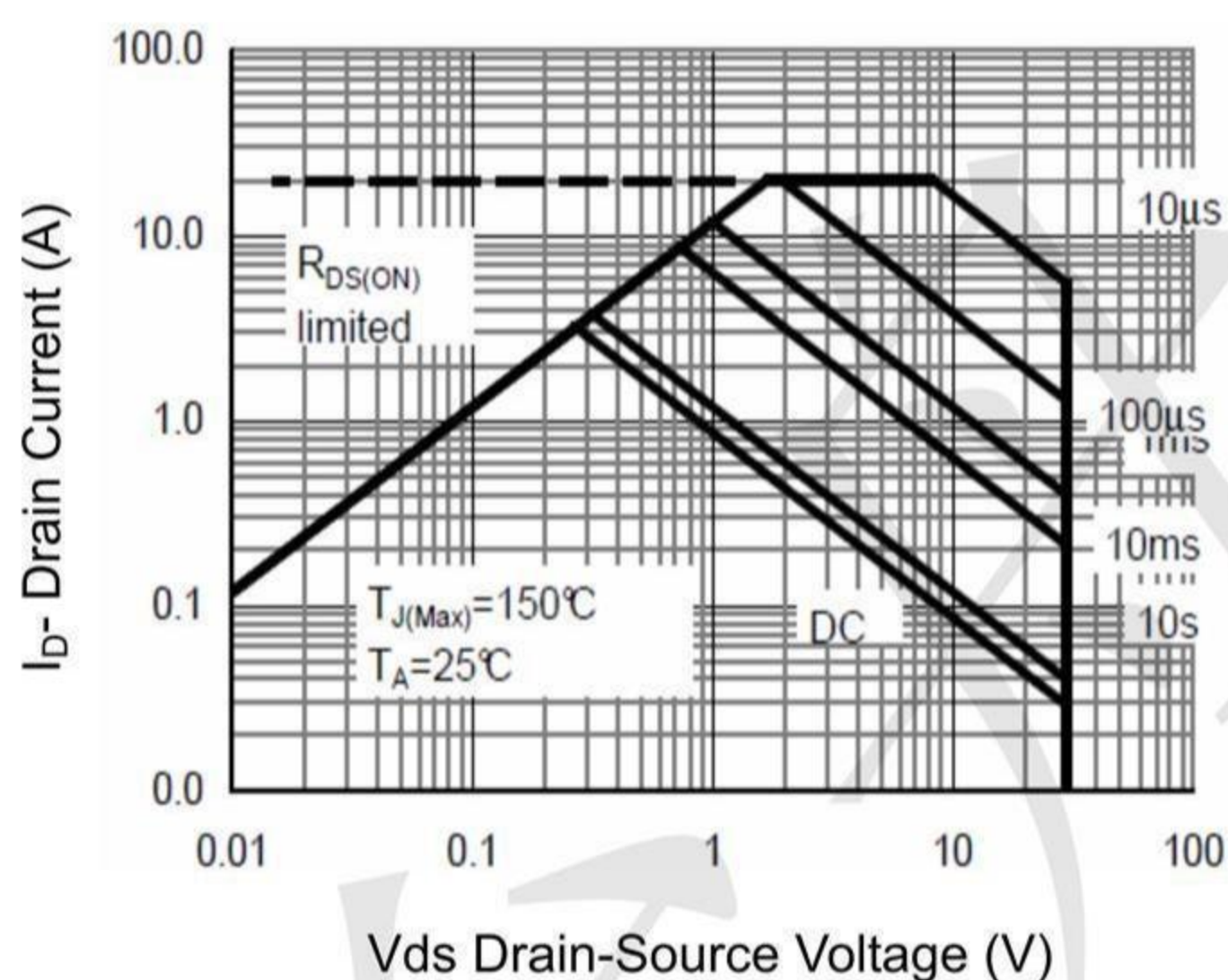
## N- Channel Typical Electrical and Thermal Characteristics



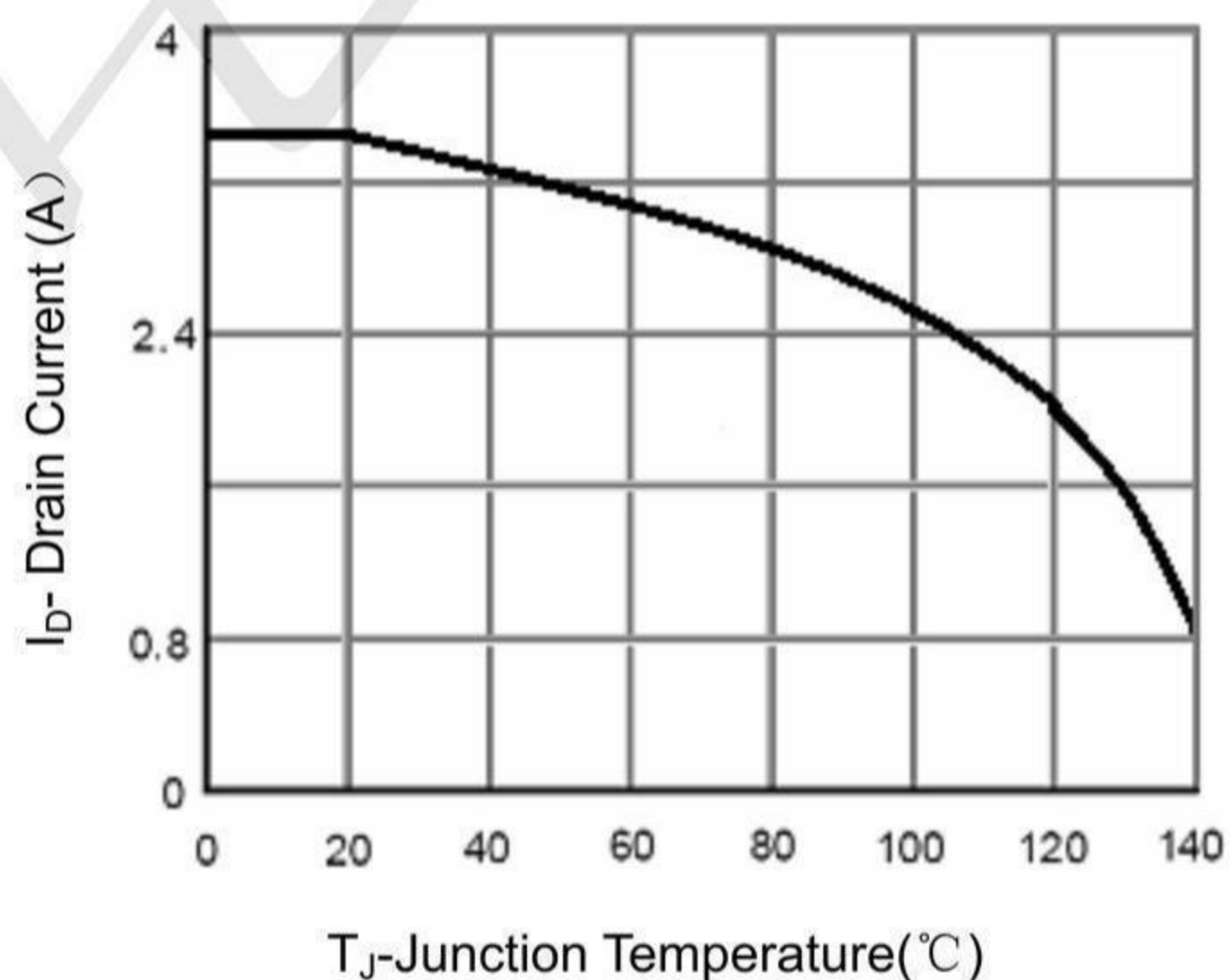
**Figure 1: Switching Test Circuit**



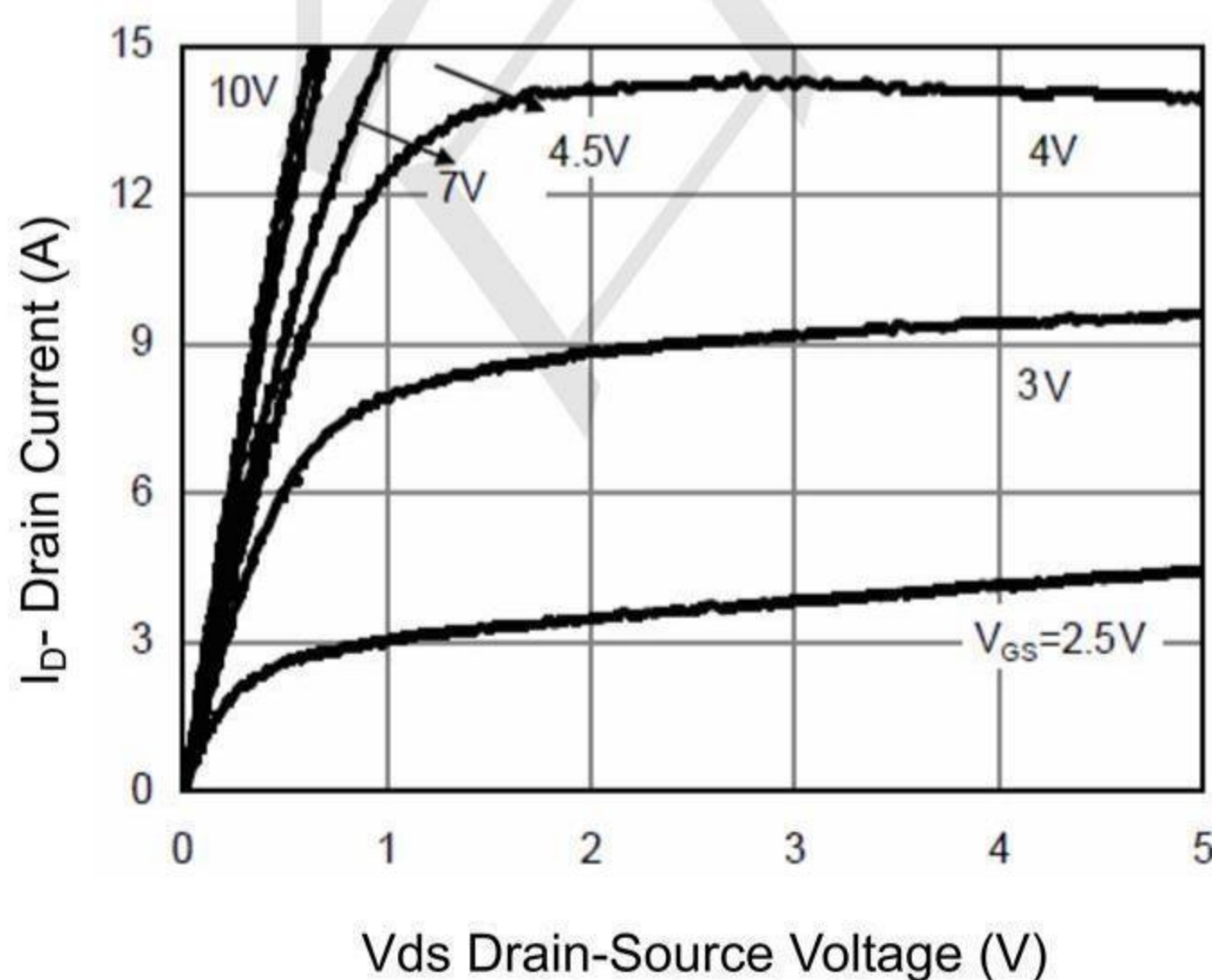
**Figure 2: Switching Waveforms**



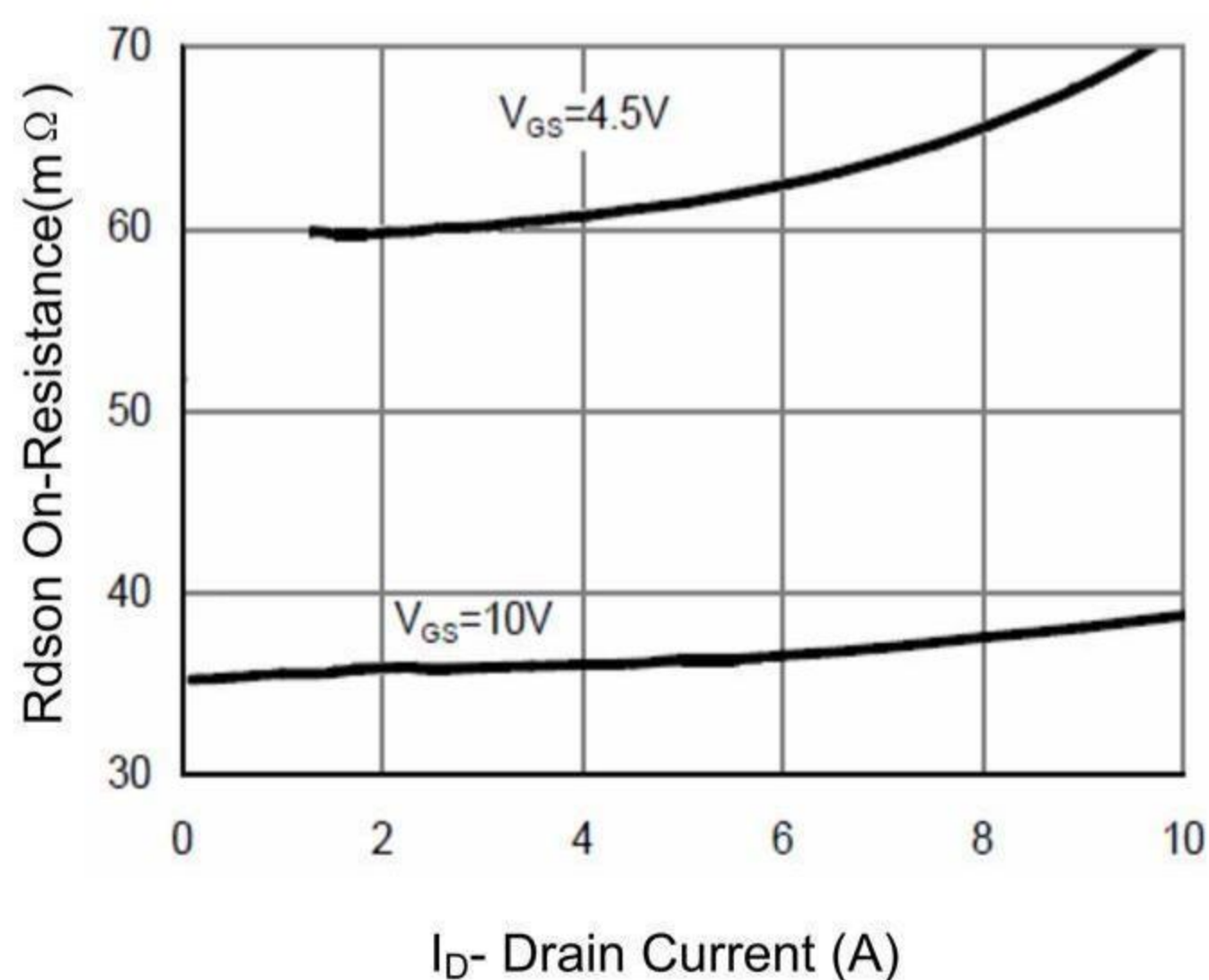
**Figure 3 Safe Operation Area**



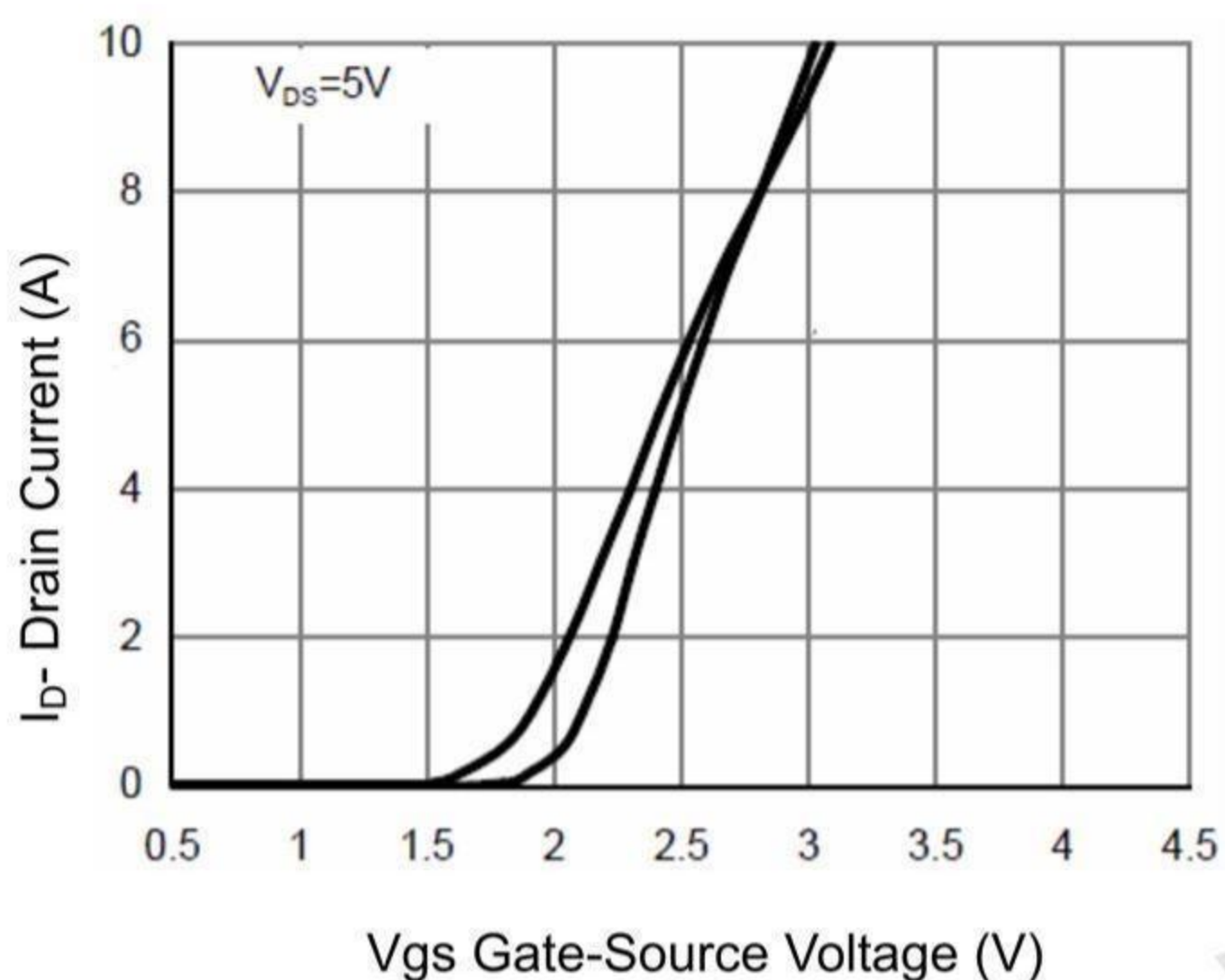
**Figure 4 Drain Current**



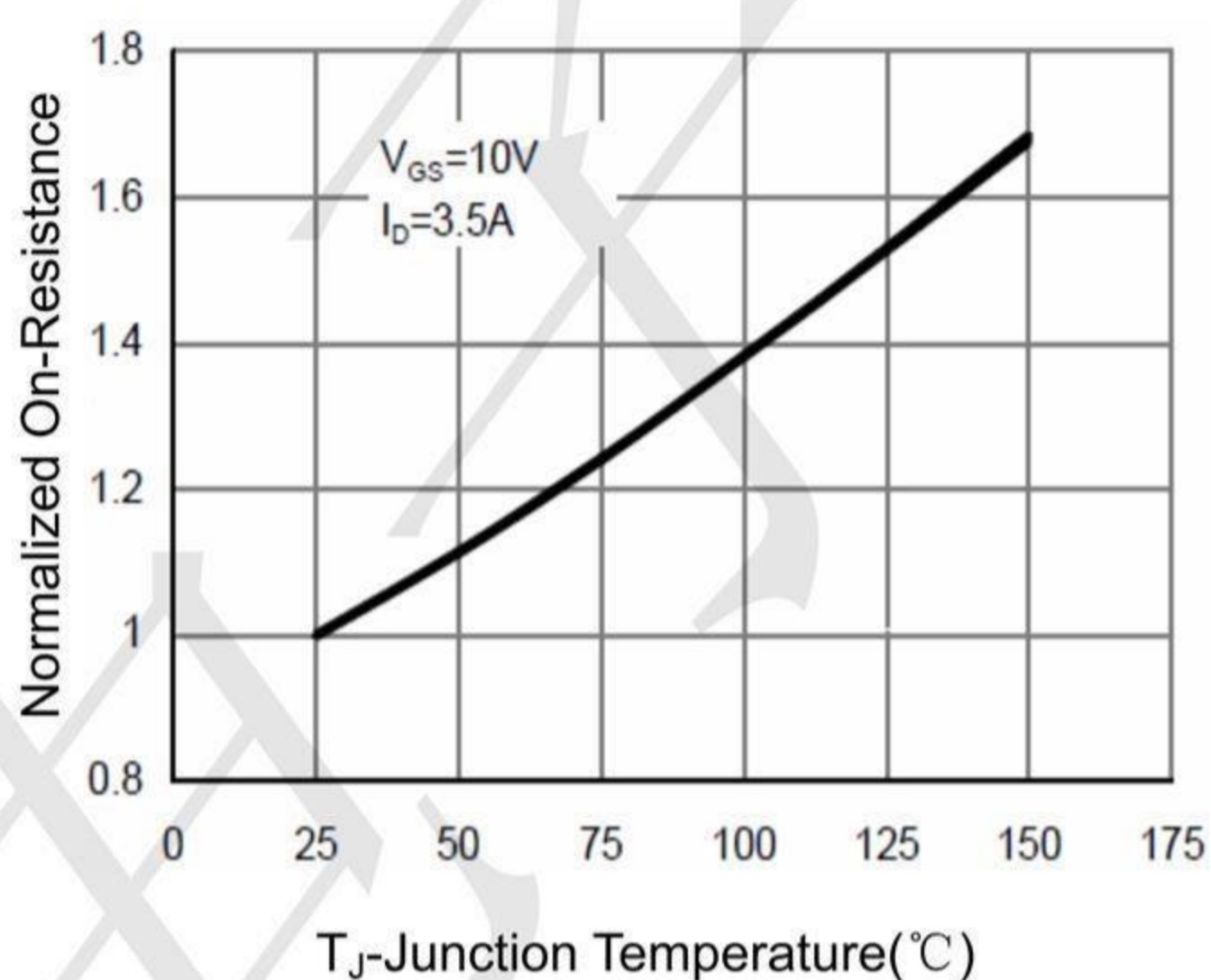
**Figure 5 Output Characteristics**



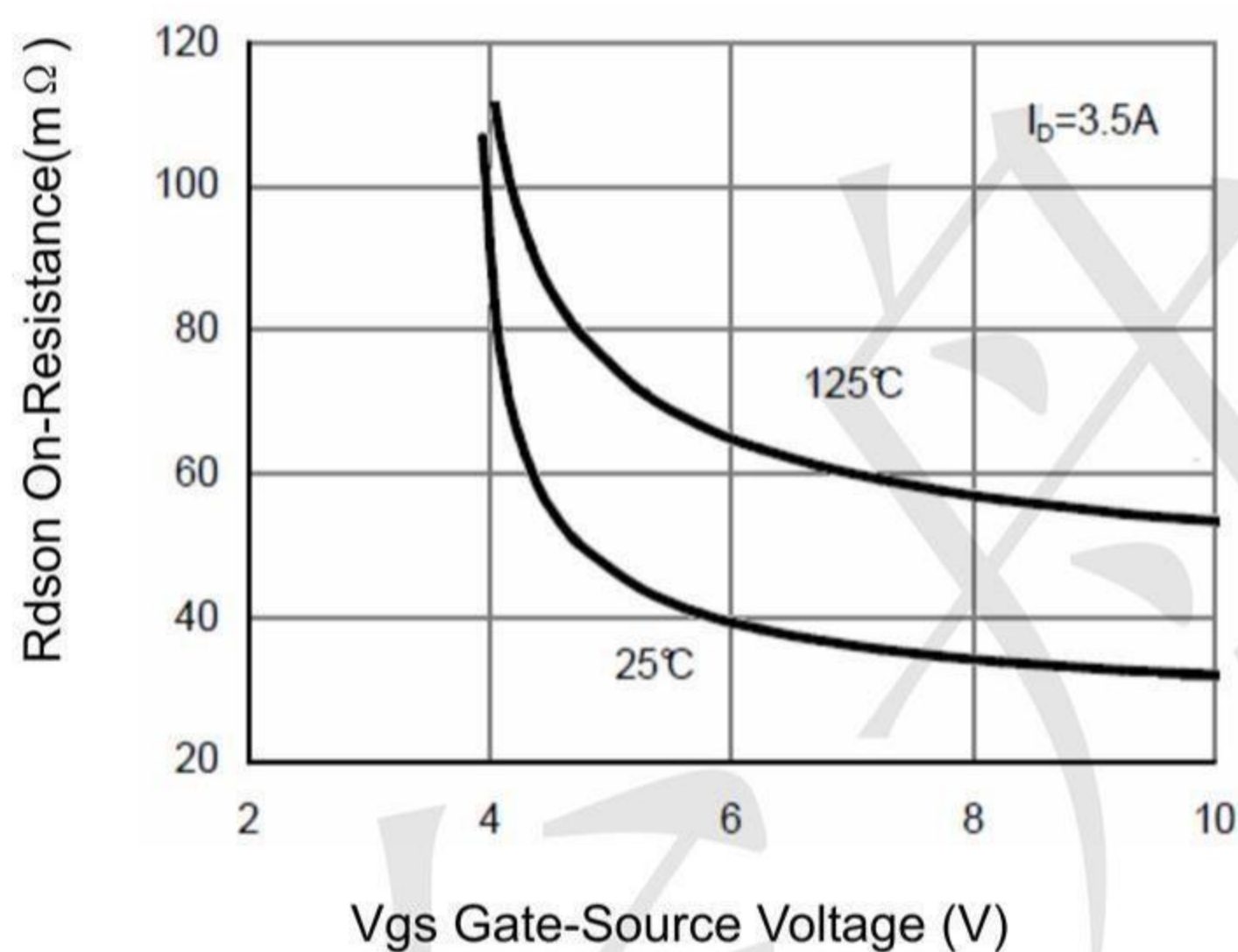
**Figure 6 Drain-Source On-Resistance**



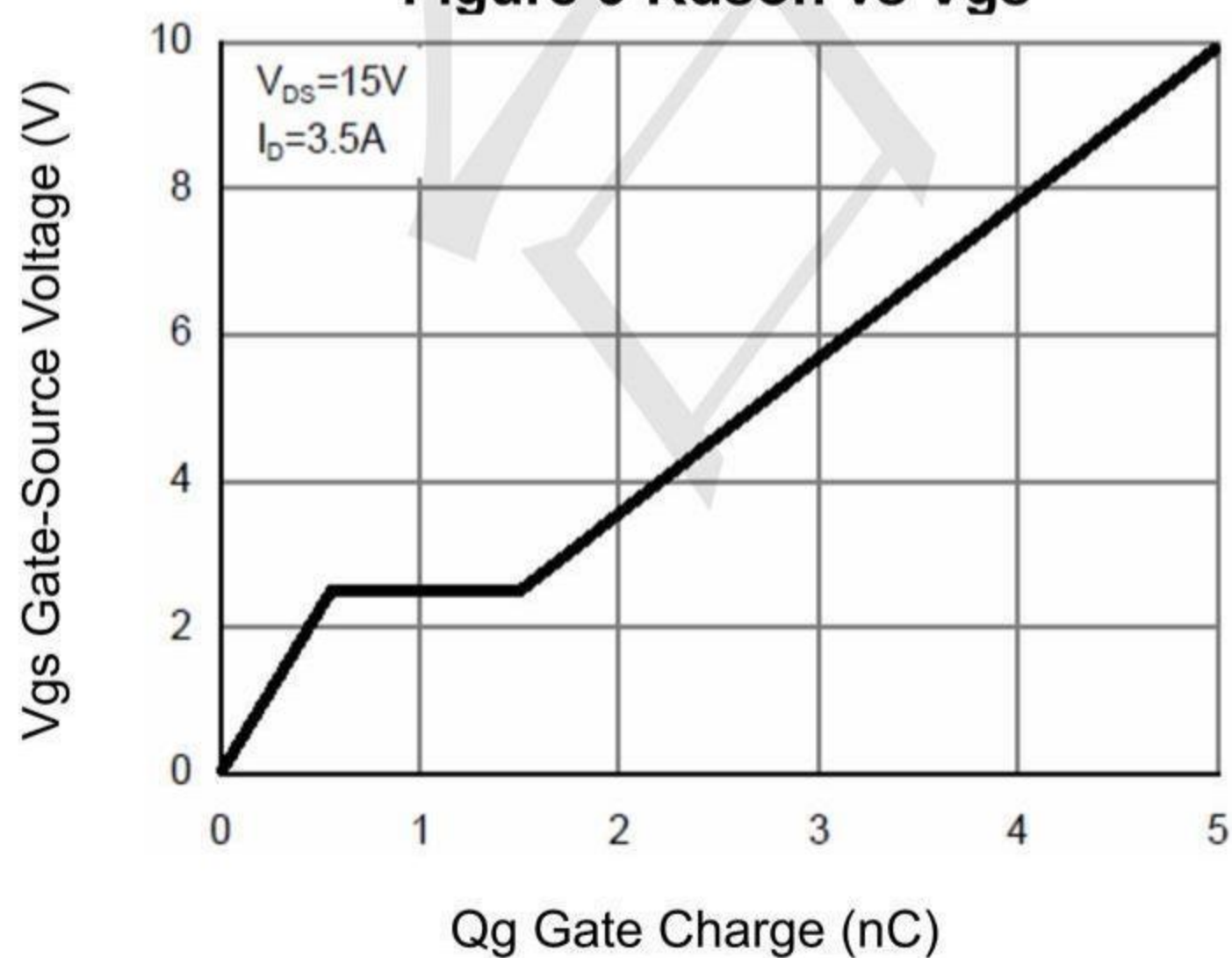
**Figure 7 Transfer Characteristics**



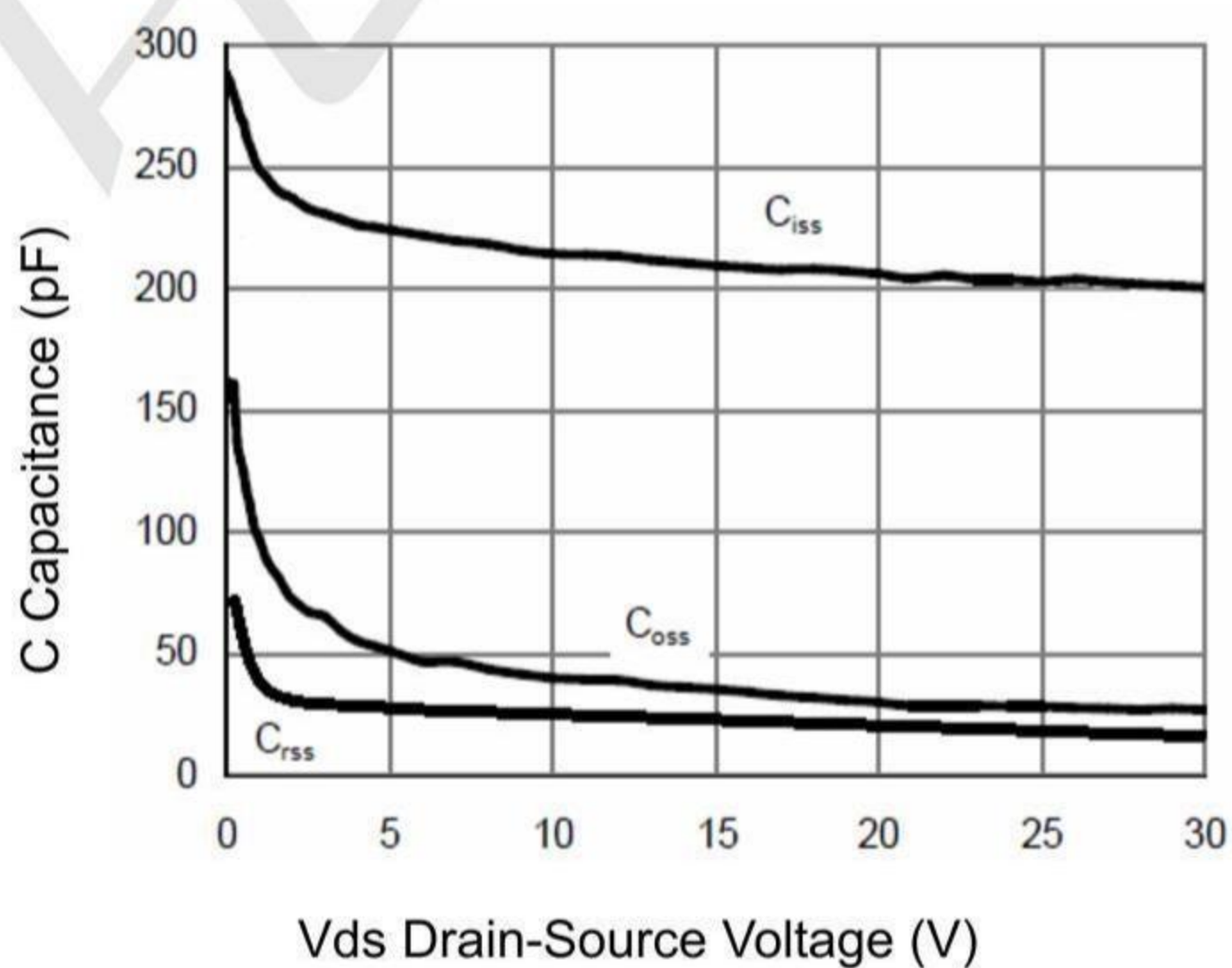
**Figure 8 Drain-Source On-Resistance**



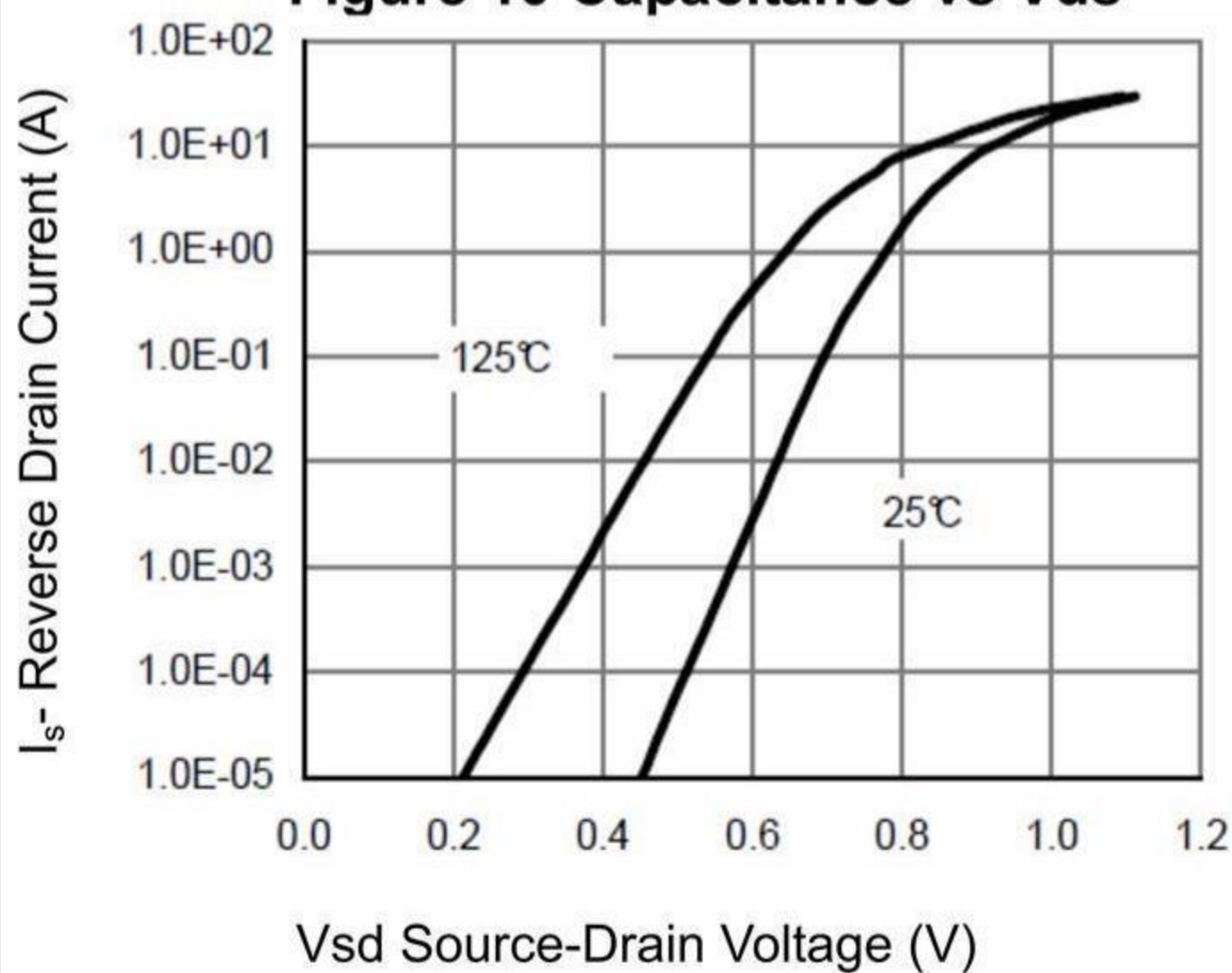
**Figure 9  $R_{DS(on)}$  vs  $V_{GS}$**



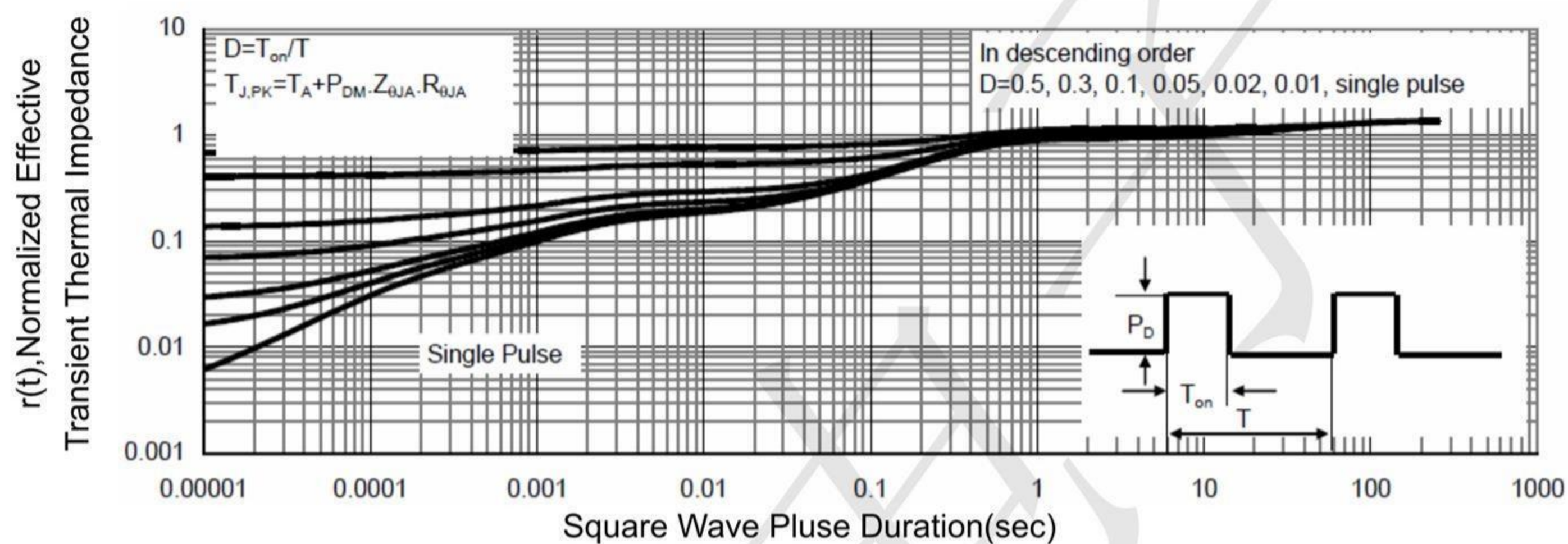
**Figure 11 Gate Charge**



**Figure 10 Capacitance vs  $V_{DS}$**



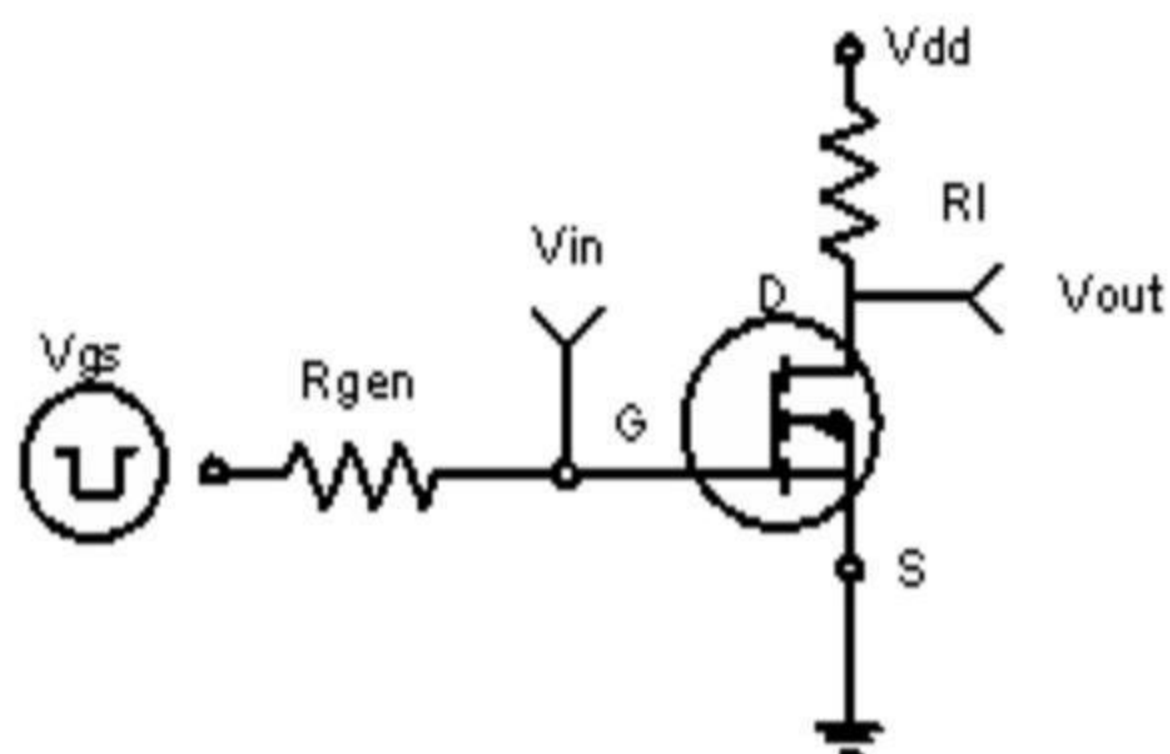
**Figure 12 Source- Drain Diode Forward**



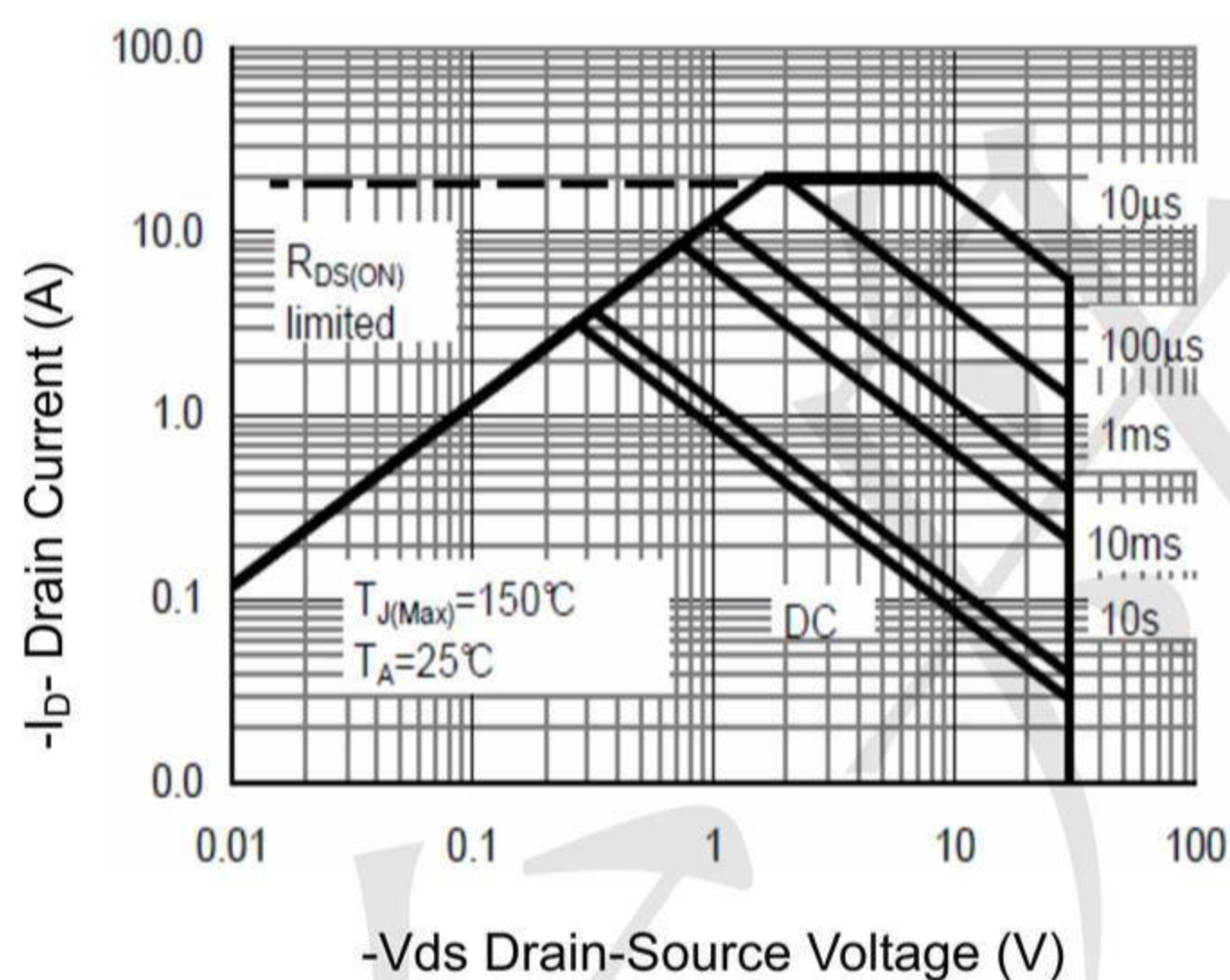
**Figure 13 Normalized Maximum Transient Thermal Impedance**

**P- Channel Typical Electrical and Thermal Characteristics**

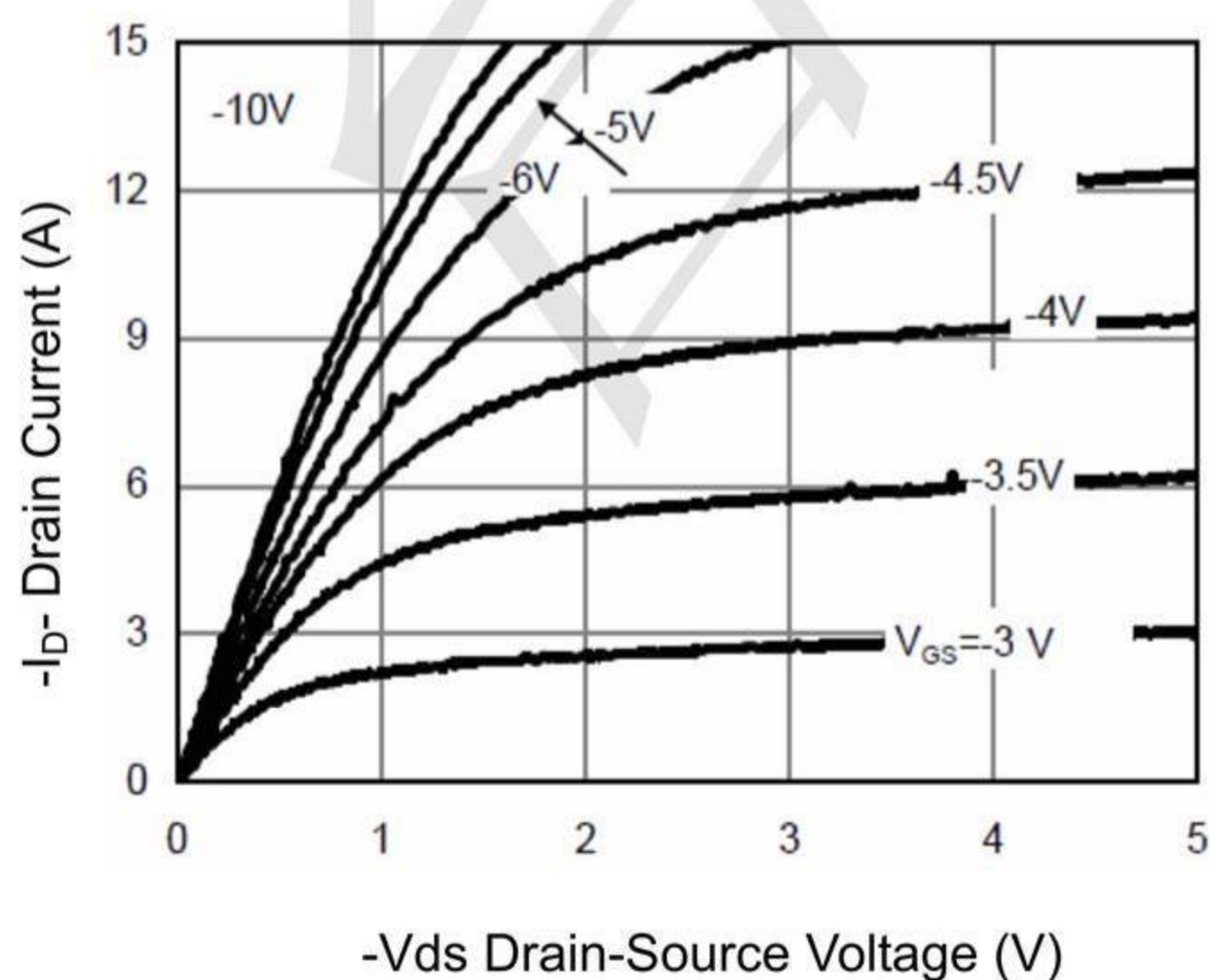
[www.sot23.com.tw](http://www.sot23.com.tw)



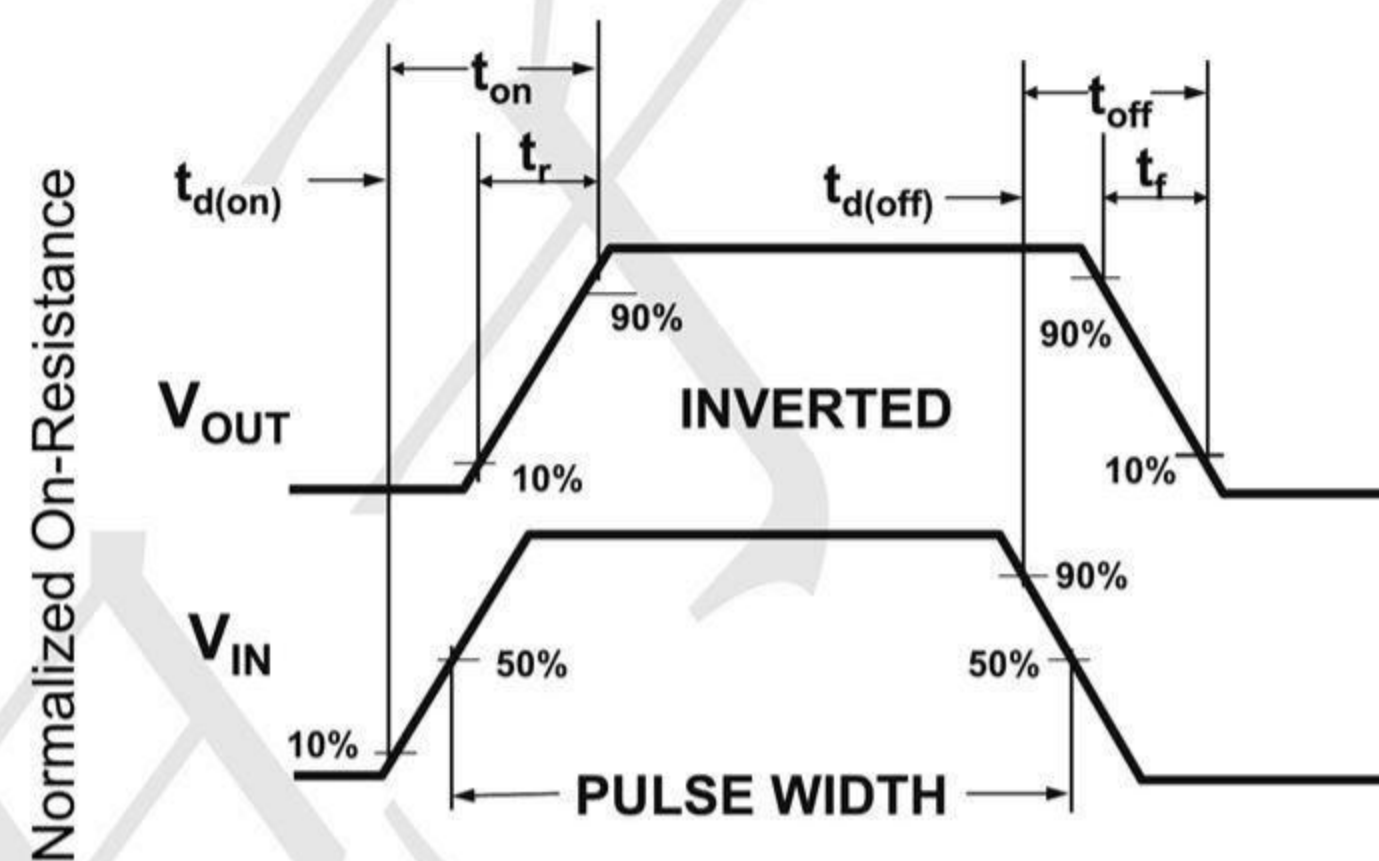
**Figure 1: Switching Test Circuit**



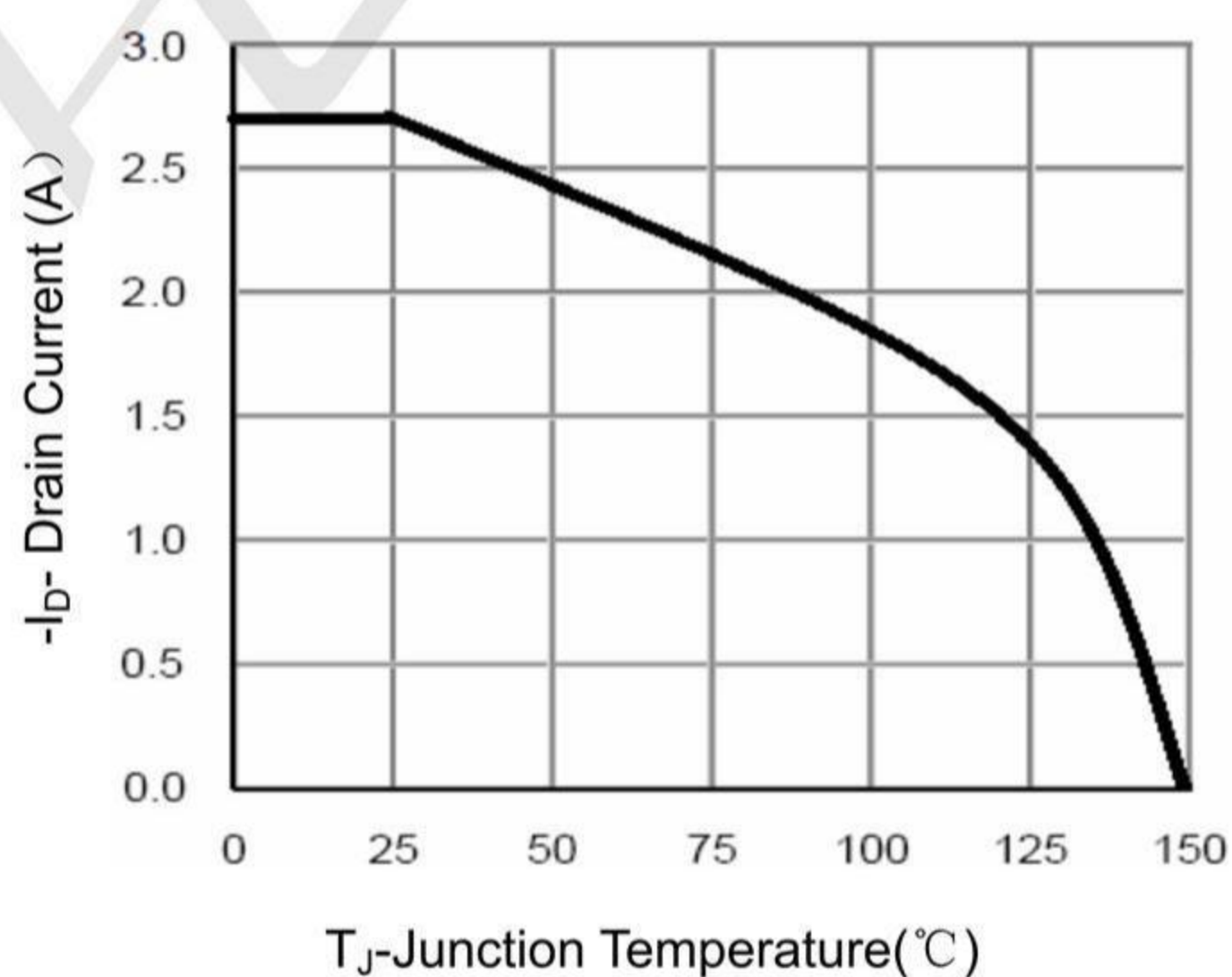
**Figure 3 Safe Operation Area**



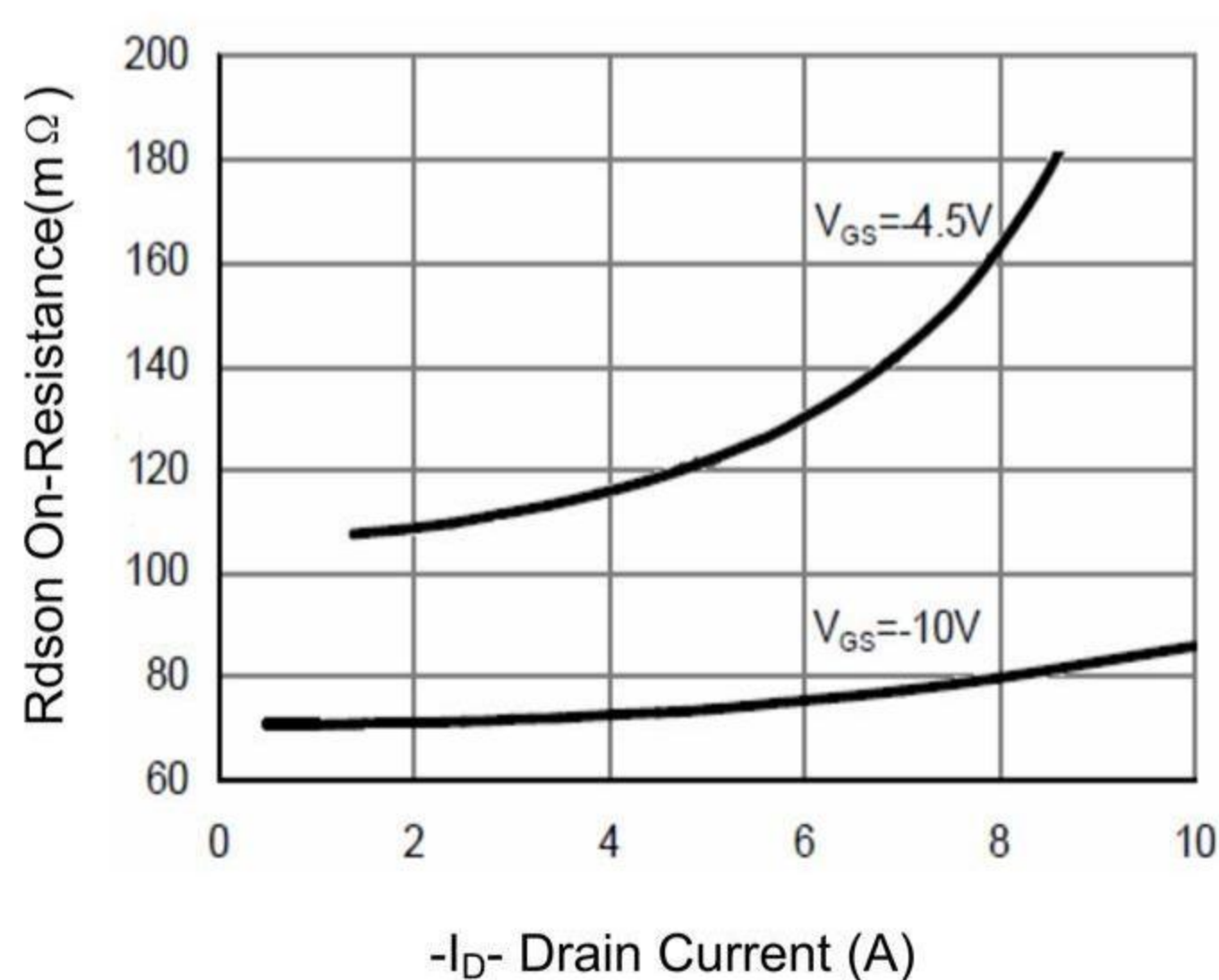
**Figure 5 Output Characteristics**



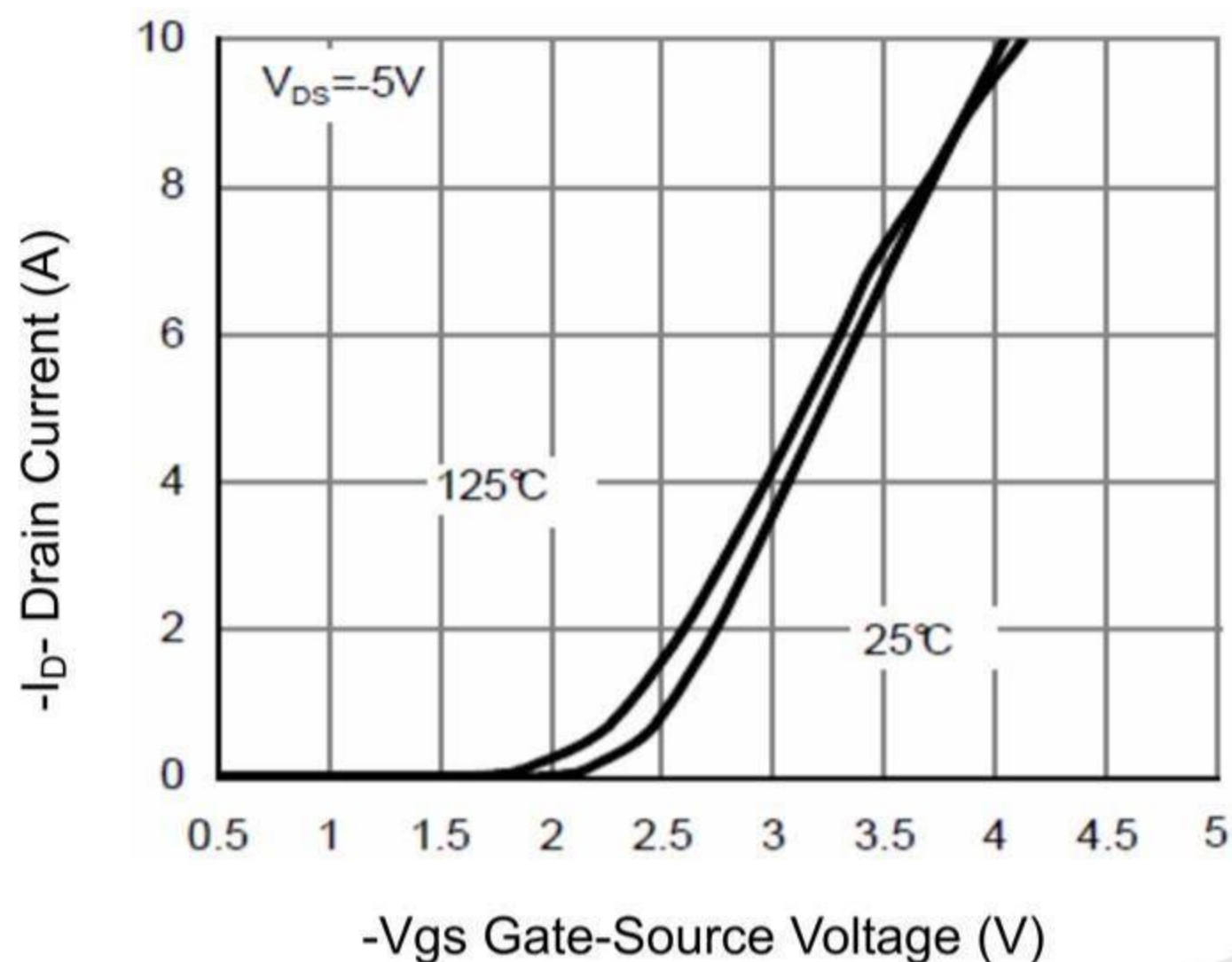
**Figure 2: Switching Waveforms**



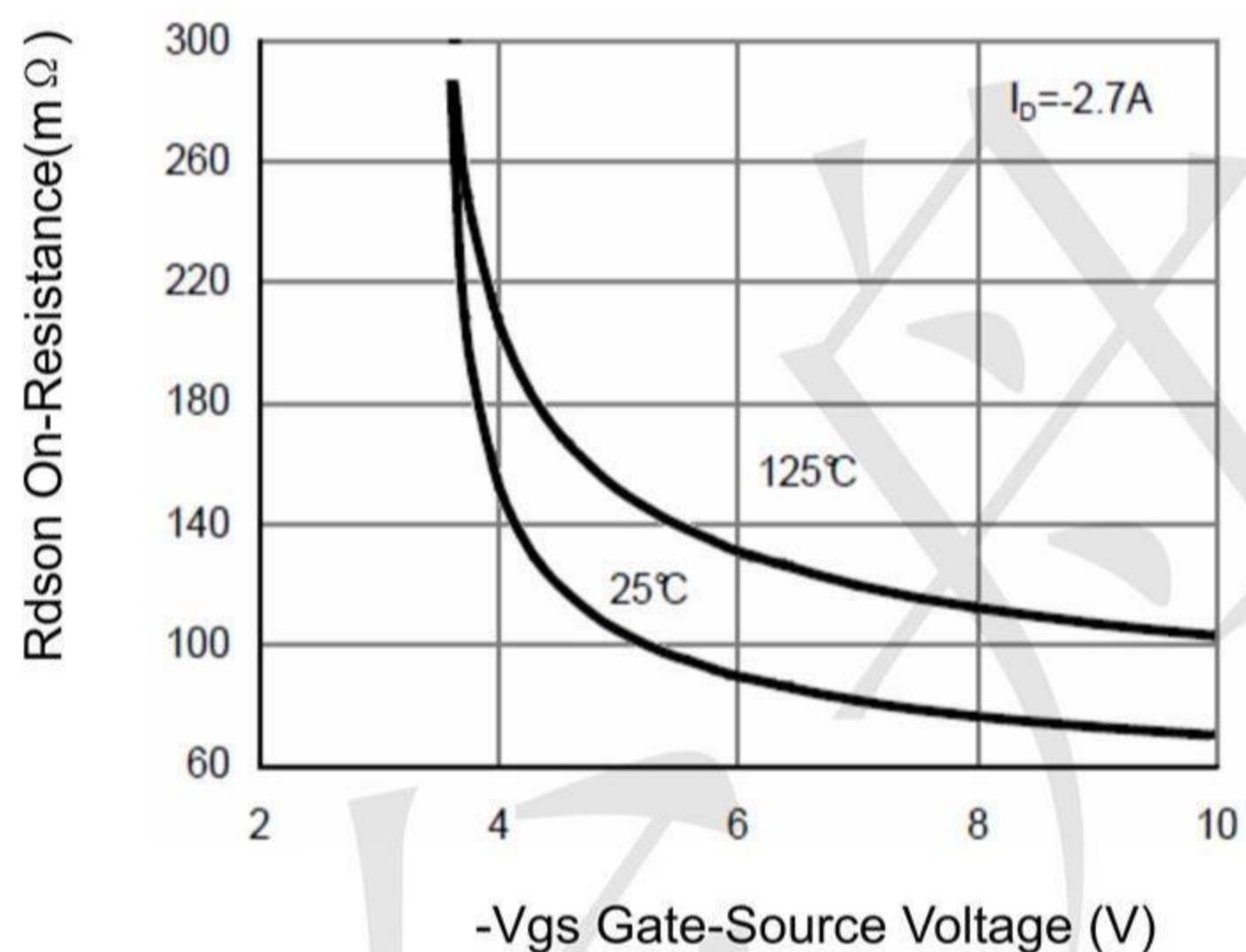
**Figure 4 Drain Current**



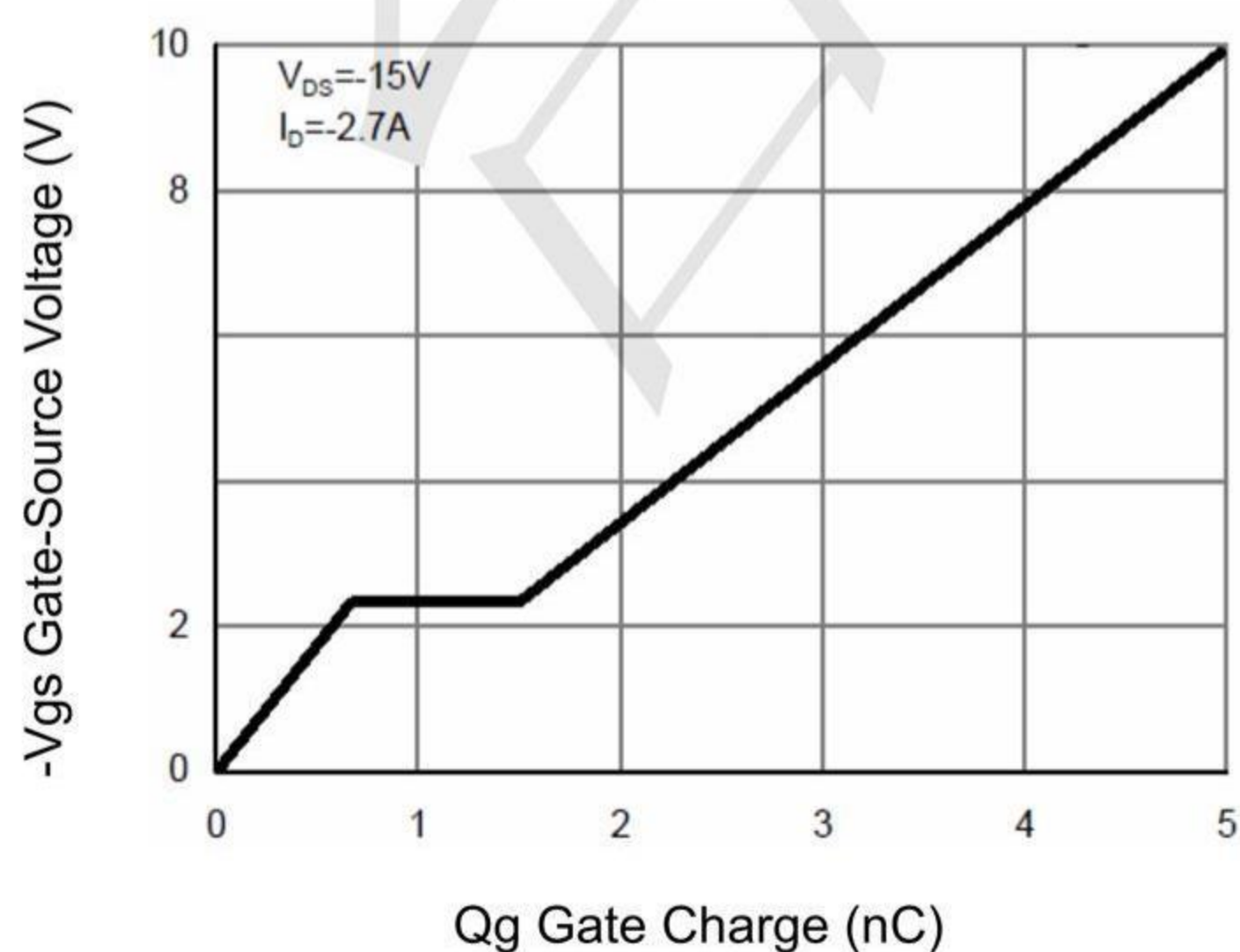
**Figure 6 Drain-Source On-Resistance**



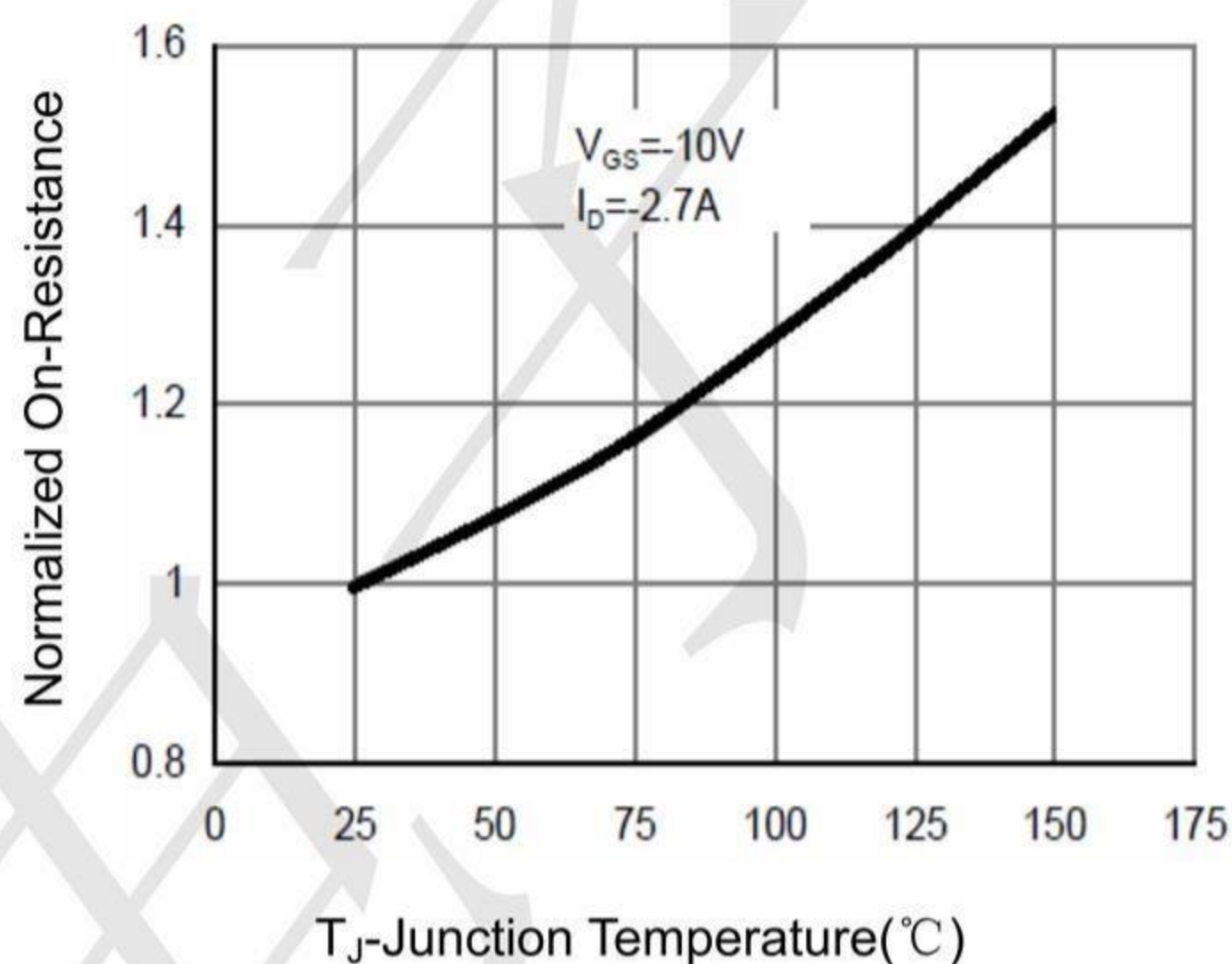
**Figure 7 Transfer Characteristics**



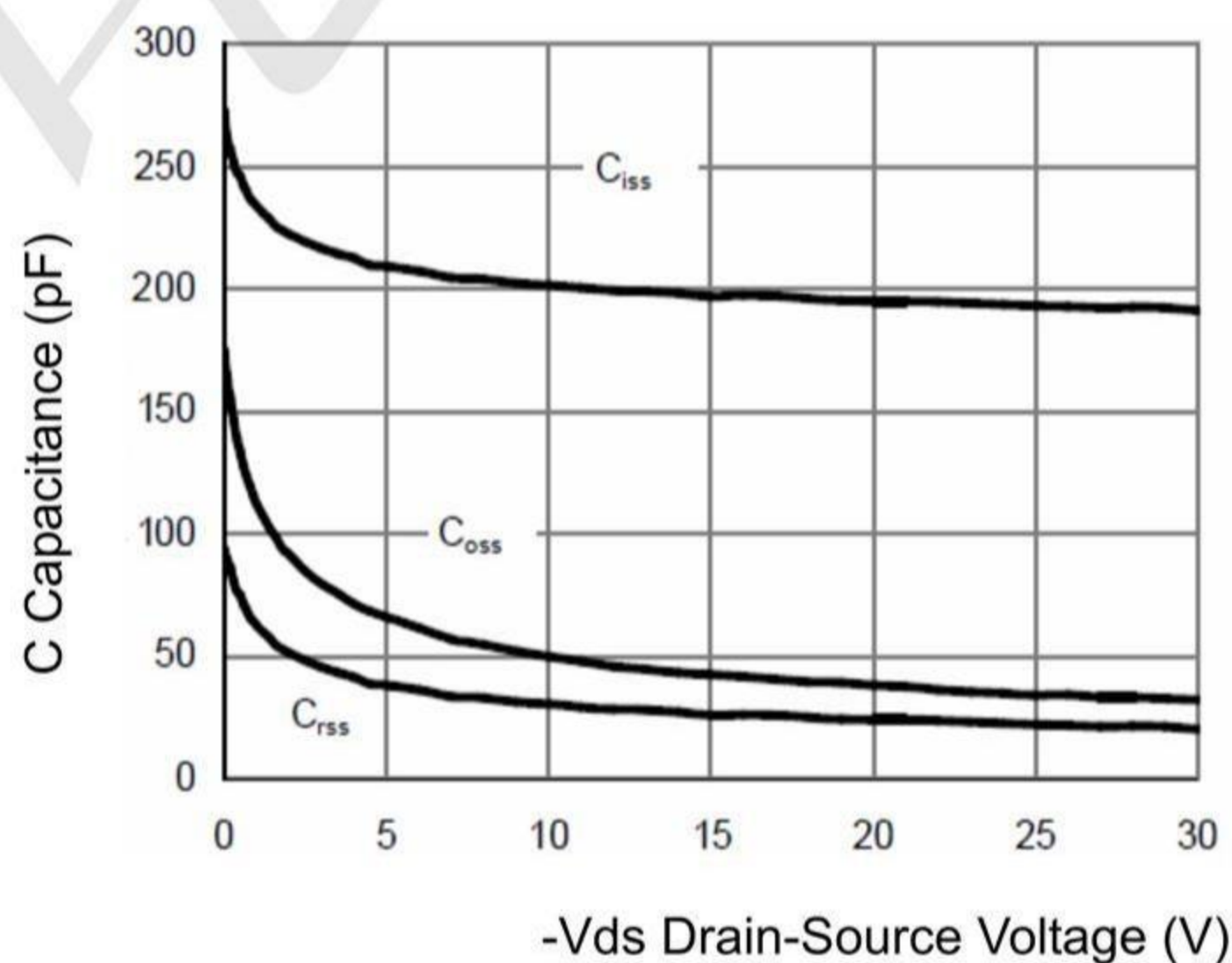
**Figure 9 Rdson vs Vgs**



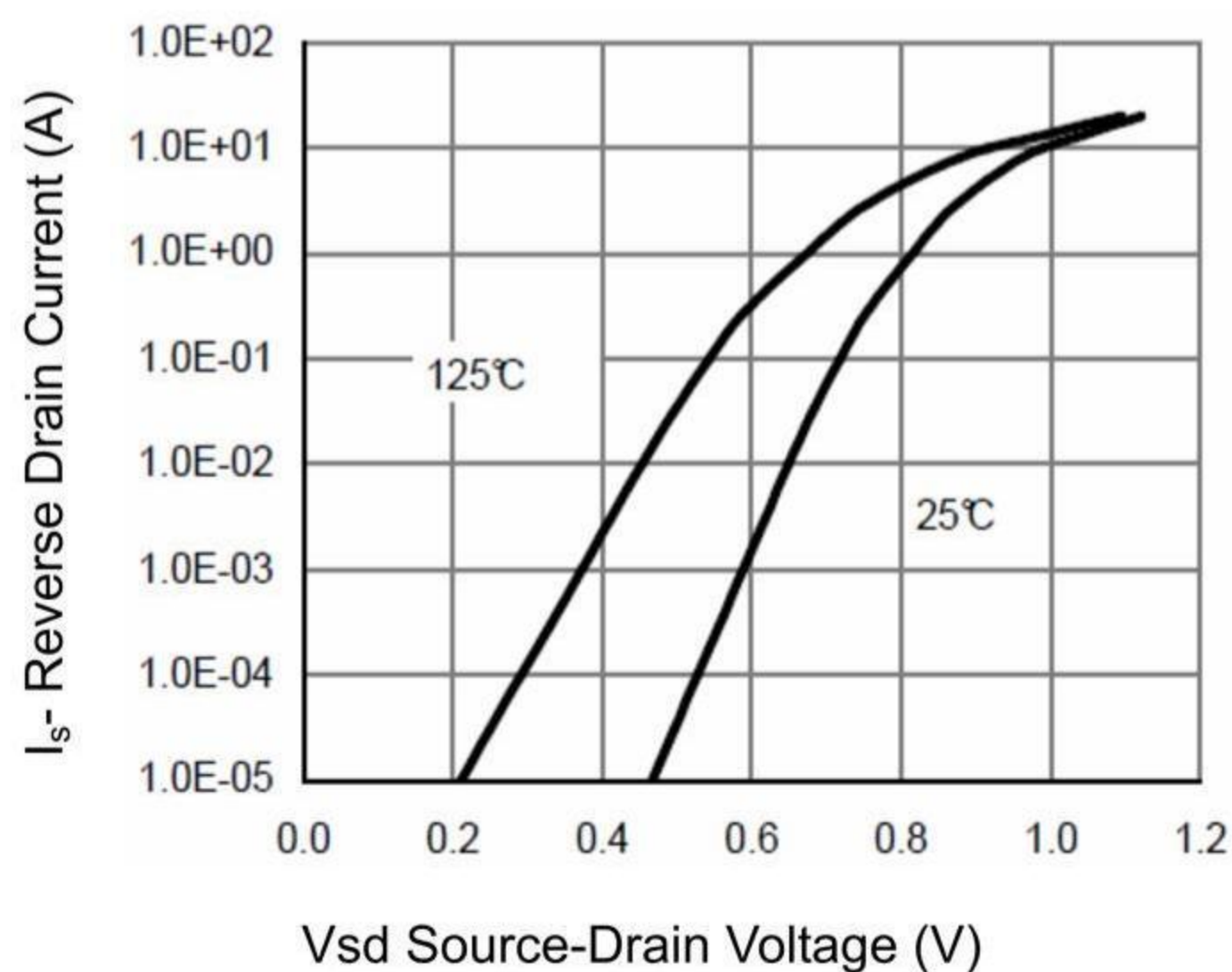
**Figure 11 Gate Charge**



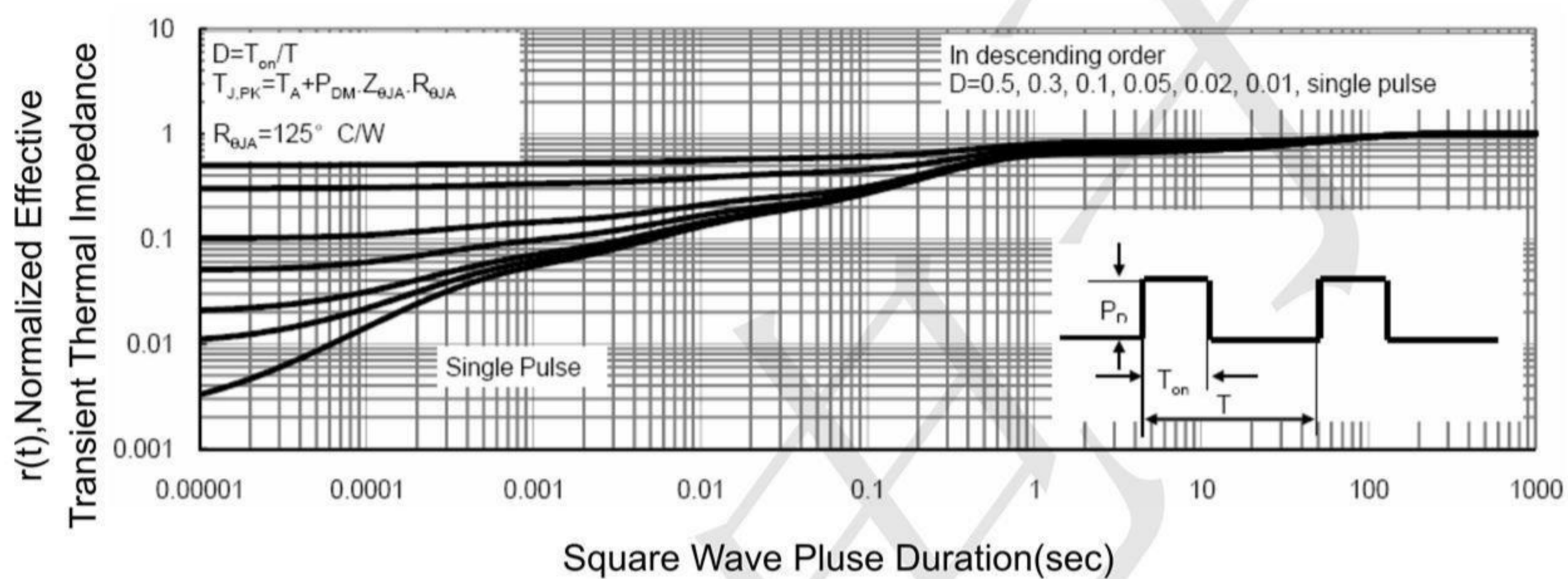
**Figure 8 Drain-Source On-Resistance**



**Figure 10 Capacitance vs Vds**

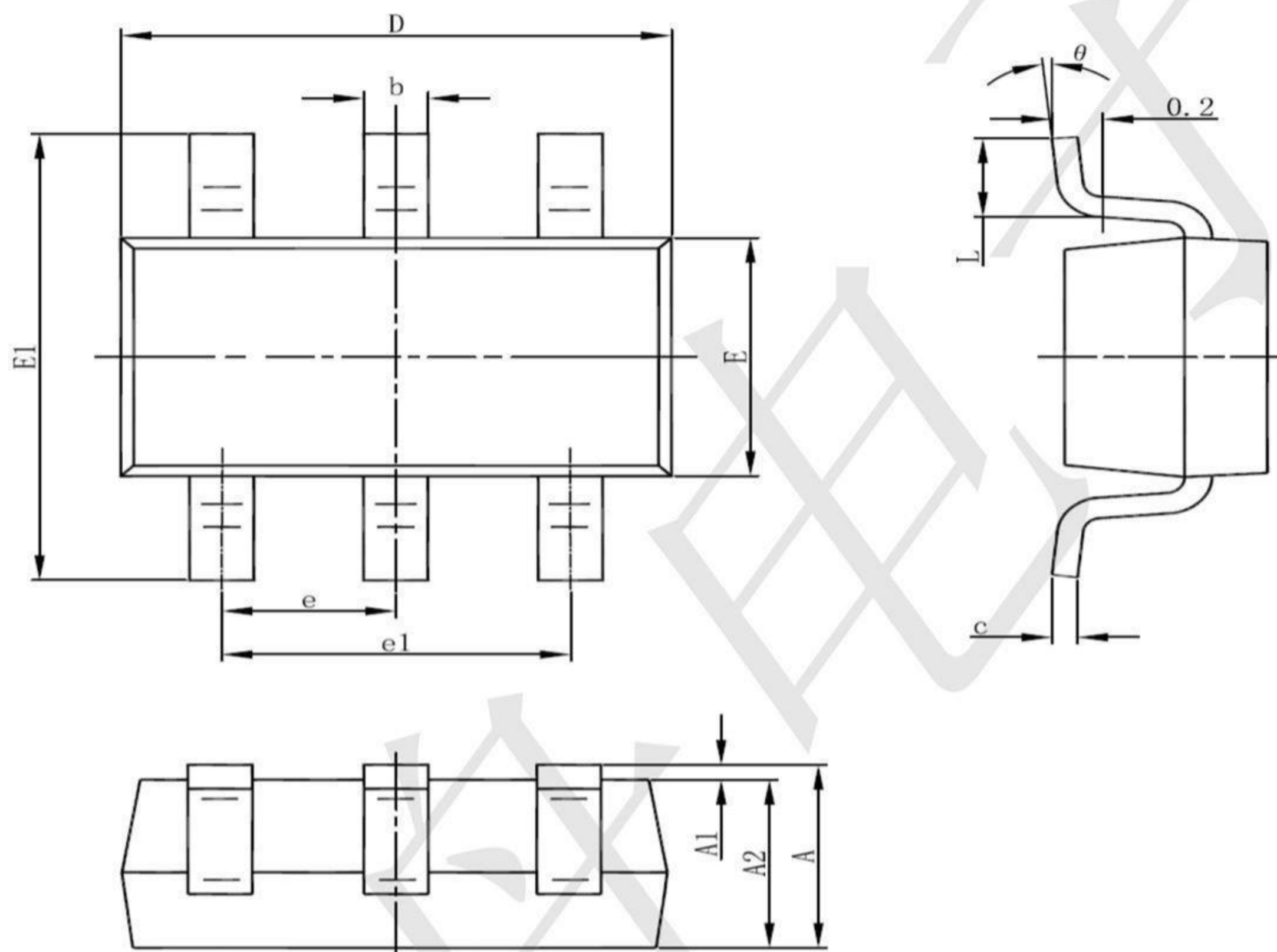


**Figure 12 Source- Drain Diode Forward**



**Figure 13 Normalized Maximum Transient Thermal Impedance**

**SOT23-6 Package Information**



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | Min                       | Max   | Min                  | Max   |
| A        | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1       | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2       | 1.050                     | 1.150 | 0.041                | 0.045 |
| b        | 0.300                     | 0.500 | 0.012                | 0.020 |
| c        | 0.100                     | 0.200 | 0.004                | 0.008 |
| D        | 2.820                     | 3.020 | 0.111                | 0.119 |
| E        | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1       | 2.650                     | 2.950 | 0.104                | 0.116 |
| e        | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1       | 1.800                     | 2.000 | 0.071                | 0.079 |
| L        | 0.300                     | 0.600 | 0.012                | 0.024 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |