

### Product Summary

- $V_{DS} = -20V, I_D = -4.1A$   
 $R_{DS(ON)} < 75m\Omega @ V_{GS} = -2.5V$   
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

### Application

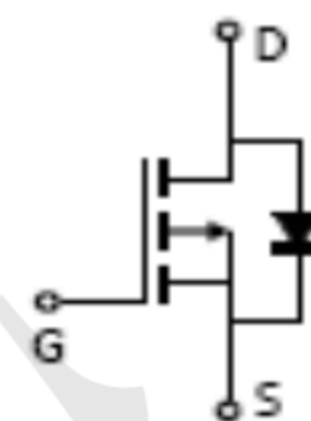
- Load/Power Switching
- Interfacing Switching
- Logic Level Shift

### Package and Pin Configuration

#### SOT-23



### Circuit diagram



### Marking:



“P” is TECH PUBLIC Logo

“5P” is Part Number, fixed

“xx” is internal Code

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

| Parameter                                        |                    | Symbol         | Limit      | Unit       |
|--------------------------------------------------|--------------------|----------------|------------|------------|
| Drain-Source Voltage                             |                    | $V_{DS}$       | -20        | V          |
| Gate-Source Voltage                              |                    | $V_{GS}$       | $\pm 12$   | V          |
| Continuous Drain Current                         | $T_C = 25^\circ C$ | $I_D$          | -4.1       | A          |
|                                                  | $T_C = 70^\circ C$ |                | -3.2       |            |
|                                                  | $T_A = 25^\circ C$ |                | -3         |            |
|                                                  | $T_A = 70^\circ C$ |                | -2.3       |            |
| Drain Current - Pulsed (Note 1)                  |                    | $I_{DM}$       | -15        | A          |
| Maximum Power Dissipation                        |                    | $P_D$          | 1.7        | W          |
| Operating Junction and Storage Temperature Range |                    | $T_J, T_{STG}$ | -55 To 150 | $^\circ C$ |

### Thermal Characteristic

|                                                  |                 |    |              |
|--------------------------------------------------|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 74 | $^\circ C/W$ |
|--------------------------------------------------|-----------------|----|--------------|

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

| Parameter                          | Symbol       | Condition                                                                | Min   | Typ  | Max       | Unit       |
|------------------------------------|--------------|--------------------------------------------------------------------------|-------|------|-----------|------------|
| Off Characteristics                |              |                                                                          |       |      |           |            |
| Drain-Source Breakdown Voltage     | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$                                               | -20   | -    | -         | V          |
| Zero Gate Voltage Drain Current    | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$                                                 | -     | -    | -1        | $\mu A$    |
| Gate-Body Leakage Current          | $I_{GSS}$    | $V_{GS}=\pm 12V, V_{DS}=0V$                                              | -     | -    | $\pm 100$ | nA         |
| On Characteristics (Note 3)        |              |                                                                          |       |      |           |            |
| Gate Threshold Voltage             | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                                           | -0.45 | -0.7 | -1.0      | V          |
| Drain-Source On-State Resistance   | $R_{DS(ON)}$ | $V_{GS}=-4.5V, I_D=-4.1A$                                                | -     | 39   | 52        | m $\Omega$ |
|                                    |              | $V_{GS}=-2.5V, I_D=-3A$                                                  | -     | 58   | 75        |            |
| Forward Transconductance           | $g_{FS}$     | $V_{DS}=-5V, I_D=-2A$                                                    | 6     | -    | -         | S          |
| Dynamic Characteristics (Note4)    |              |                                                                          |       |      |           |            |
| Input Capacitance                  | $C_{iss}$    | $V_{DS}=-4V, V_{GS}=0V,$<br>$F=1.0MHz$                                   | -     | 740  | -         | PF         |
| Output Capacitance                 | $C_{oss}$    |                                                                          | -     | 290  | -         | PF         |
| Reverse Transfer Capacitance       | $C_{rss}$    |                                                                          | -     | 190  | -         | PF         |
| Switching Characteristics (Note 4) |              |                                                                          |       |      |           |            |
| Turn-on Delay Time                 | $t_{d(on)}$  | $V_{DD}=-4V, I_D=-3.3A,$<br>$R_L=-1.2\Omega, V_{GEN}=-4.5V, R_g=1\Omega$ | -     | 12   | -         | nS         |
| Turn-on Rise Time                  | $t_r$        |                                                                          | -     | 35   | -         | nS         |
| Turn-Off Delay Time                | $t_{d(off)}$ |                                                                          | -     | 30   | -         | nS         |
| Turn-Off Fall Time                 | $t_f$        |                                                                          | -     | 10   | -         | nS         |
| Total Gate Charge                  | $Q_g$        | $V_{DS}=-4V, I_D=-4.1A, V_{GS}=-4.5V$                                    | -     | 7.8  | -         | nC         |
| Gate-Source Charge                 | $Q_{gs}$     |                                                                          | -     | 1.2  | -         | nC         |
| Gate-Drain Charge                  | $Q_{gd}$     |                                                                          | -     | 1.6  | -         | nC         |
| Drain-Source Diode Characteristics |              |                                                                          |       |      |           |            |
| Diode Forward Voltage (Note 3)     | $V_{SD}$     | $V_{GS}=0V, I_S=-1.6A$                                                   | -     | -    | -1.2      | V          |
| Diode Forward Current (Note 2)     | $I_S$        |                                                                          | -     | -    | 1.6       | A          |

### Typical Electrical and Thermal Characteristics

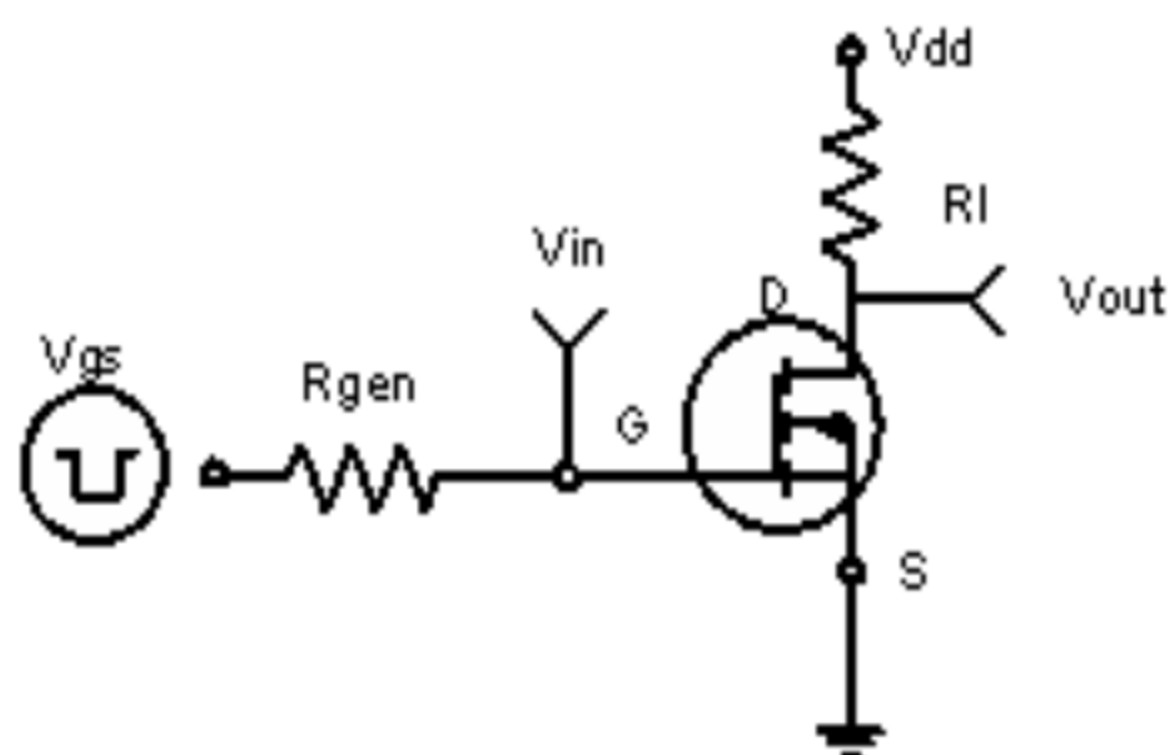


Figure 1: Switching Test Circuit

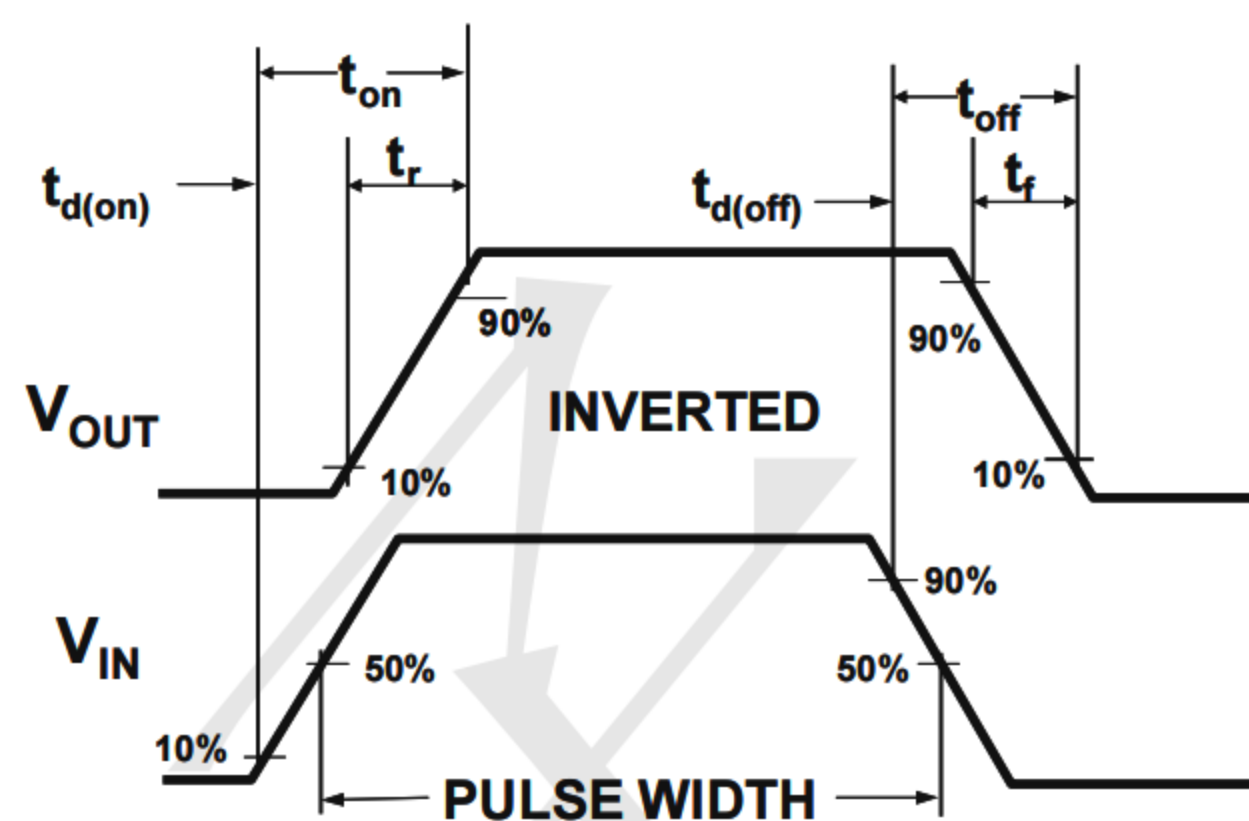
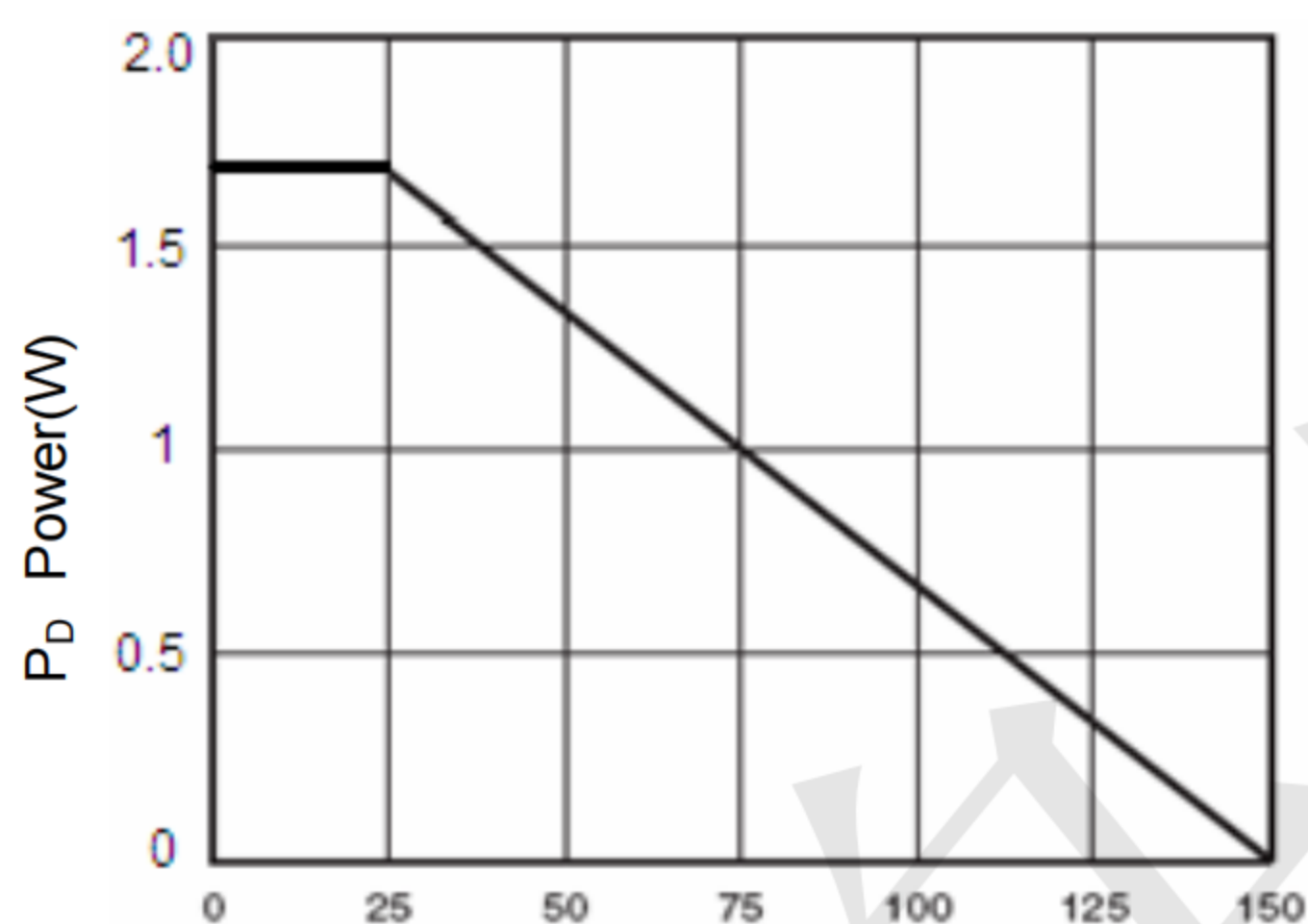
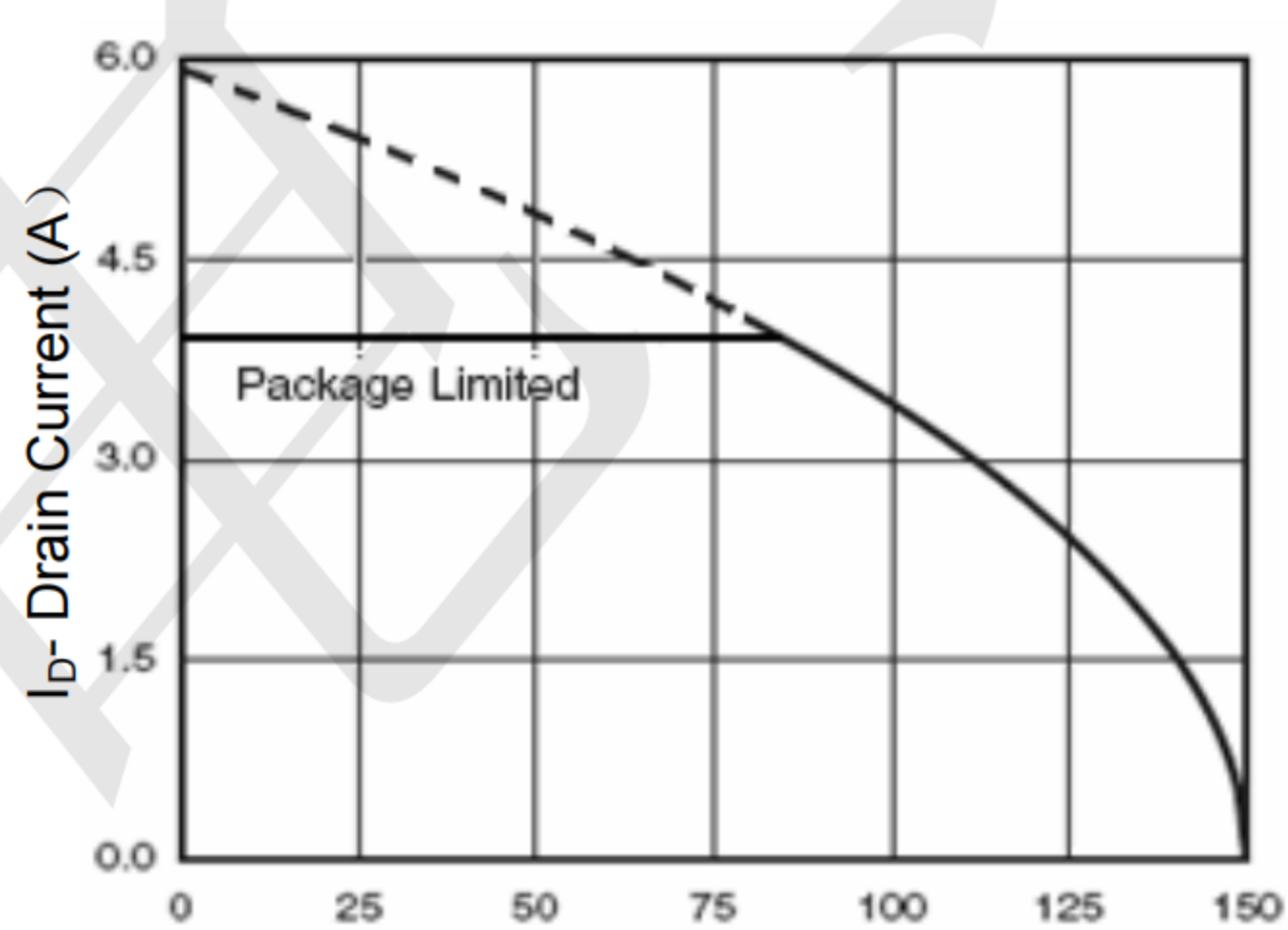


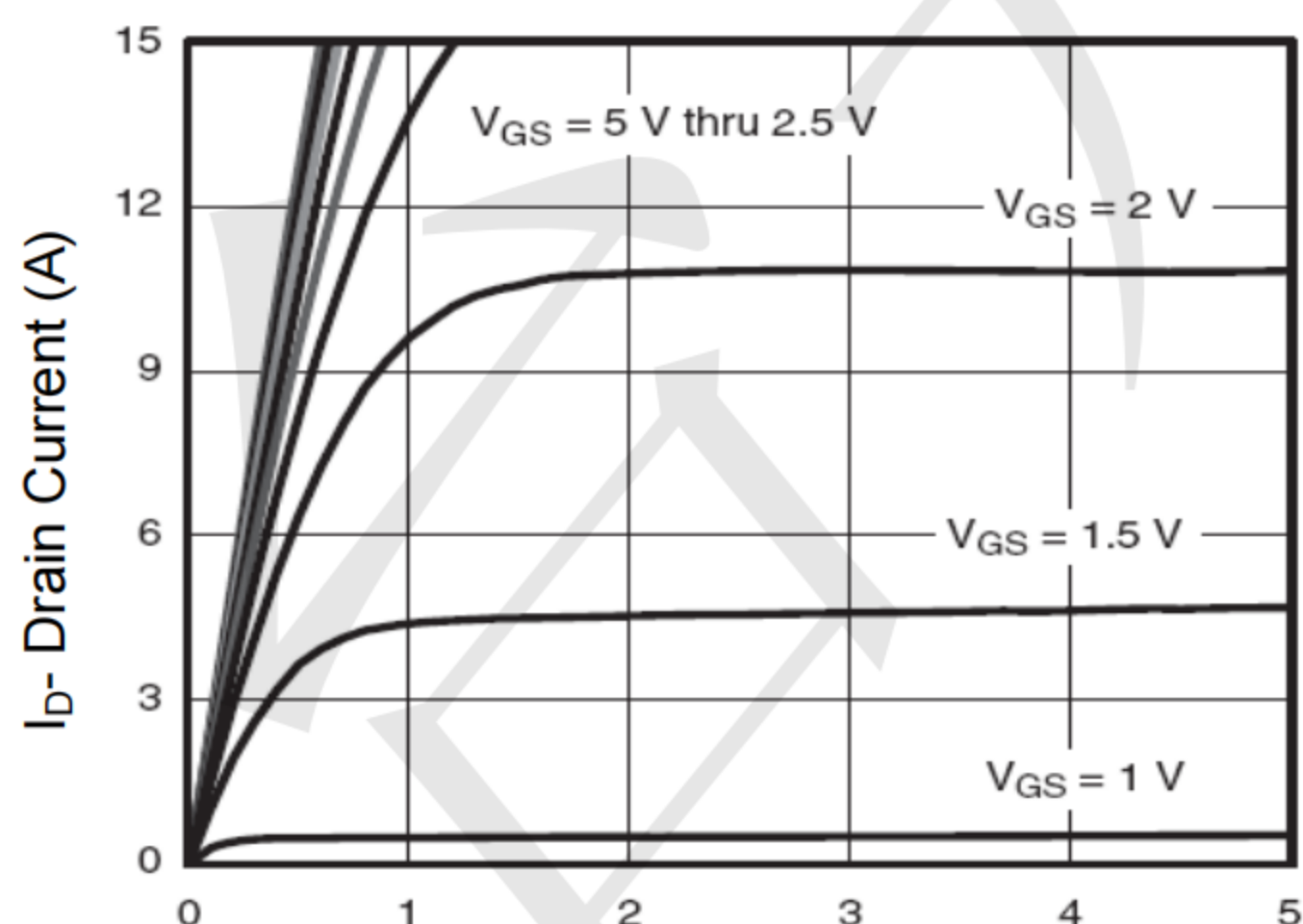
Figure 2: Switching Waveforms



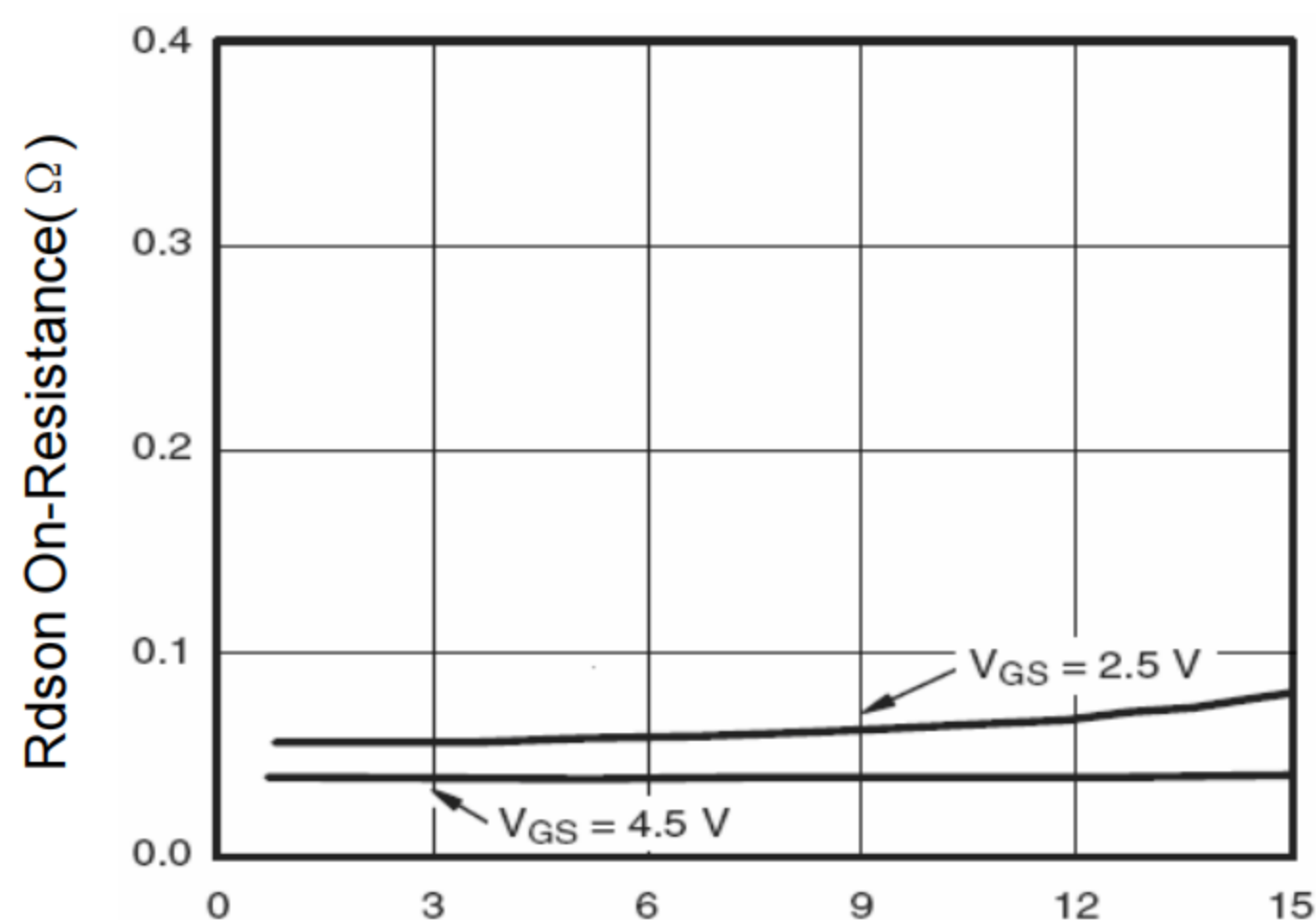
$T_J$ -Junction Temperature(°C)  
Figure 3 Power Dissipation



$T_J$ -Junction Temperature(°C)  
Figure 4 Drain Current



$V_{DS}$  Drain-Source Voltage (V)  
Figure 5 Output Characteristics



$I_D$ - Drain Current (A)  
Figure 6 Drain-Source On-Resistance



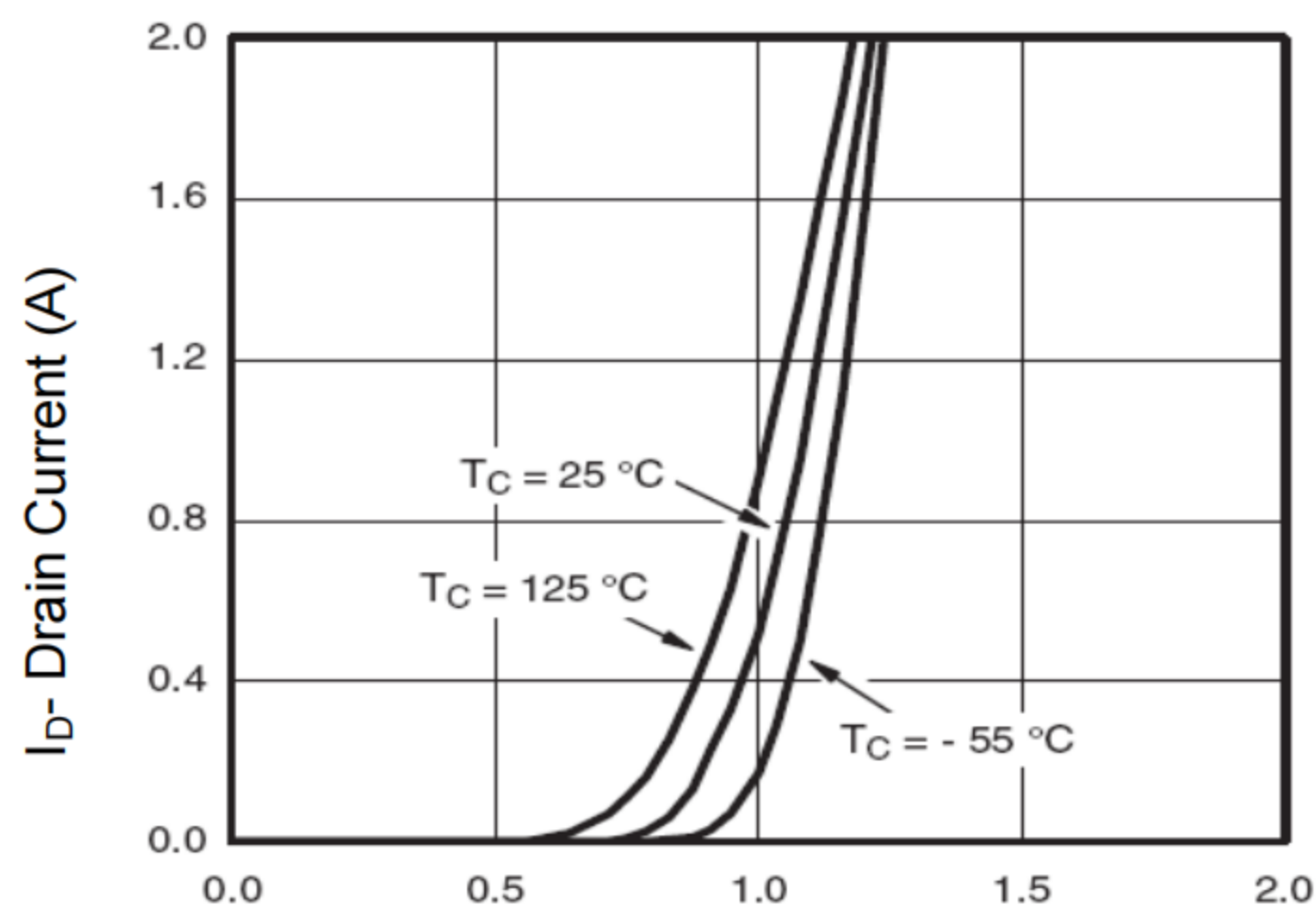
TECH PUBLIC

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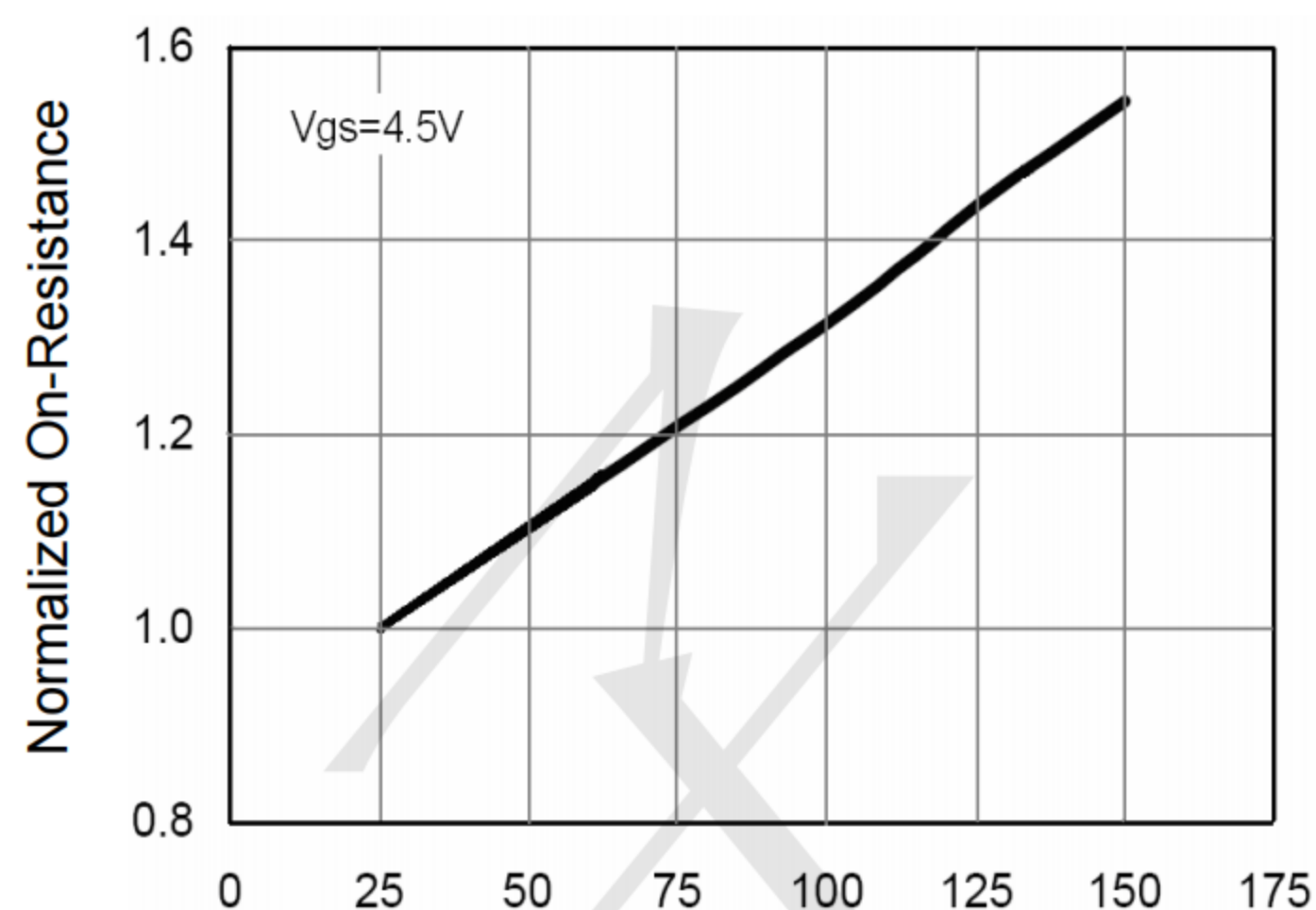
TPM9305PS3

P-Channel Mosfet

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Vgs Gate-Source Voltage (V)  
**Figure 7 Transfer Characteristics**



TJ-Junction Temperature(°C)  
**Figure 8 Drain-Source On-Resistance**

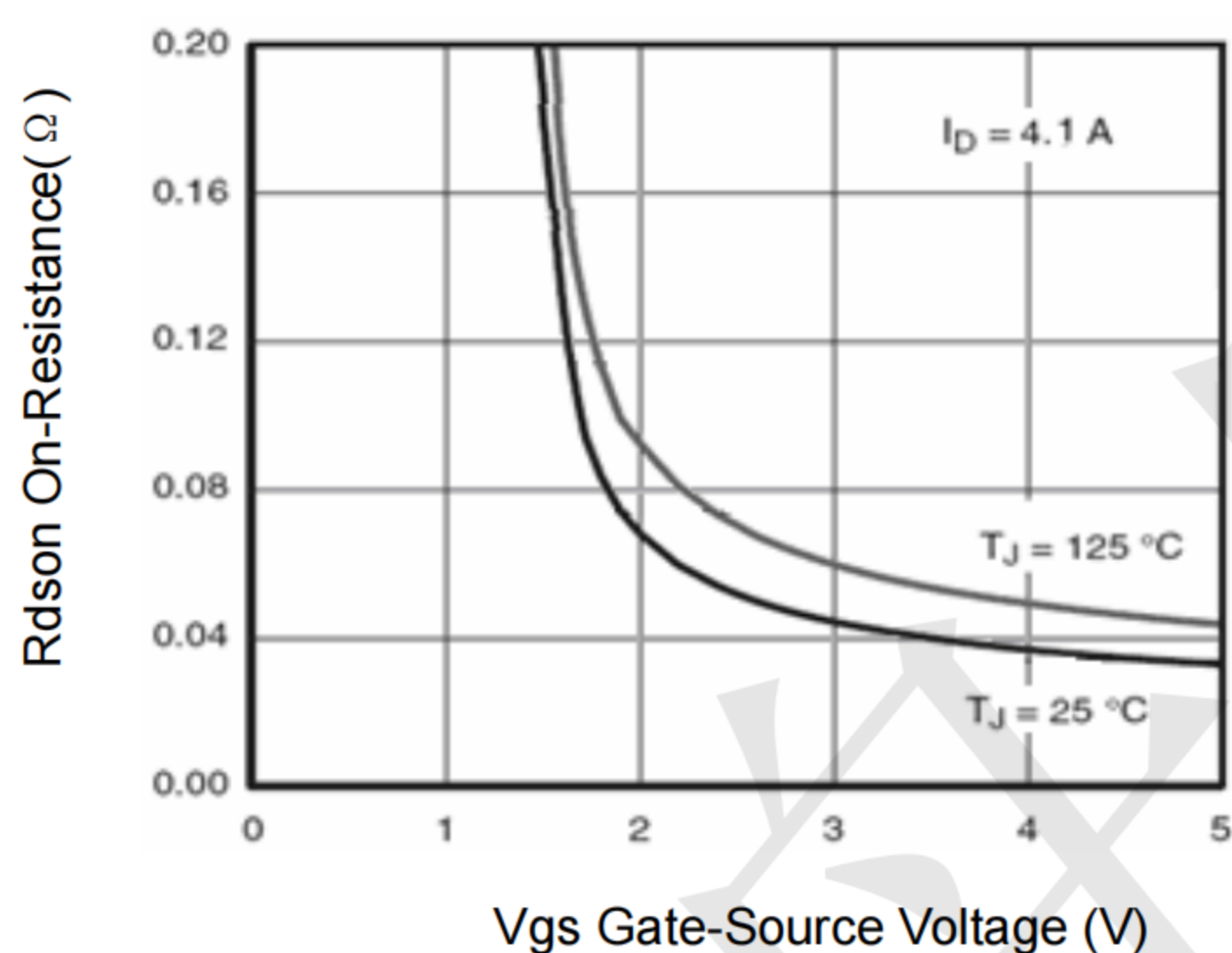


**Figure 9 Rdson vs Vgs**

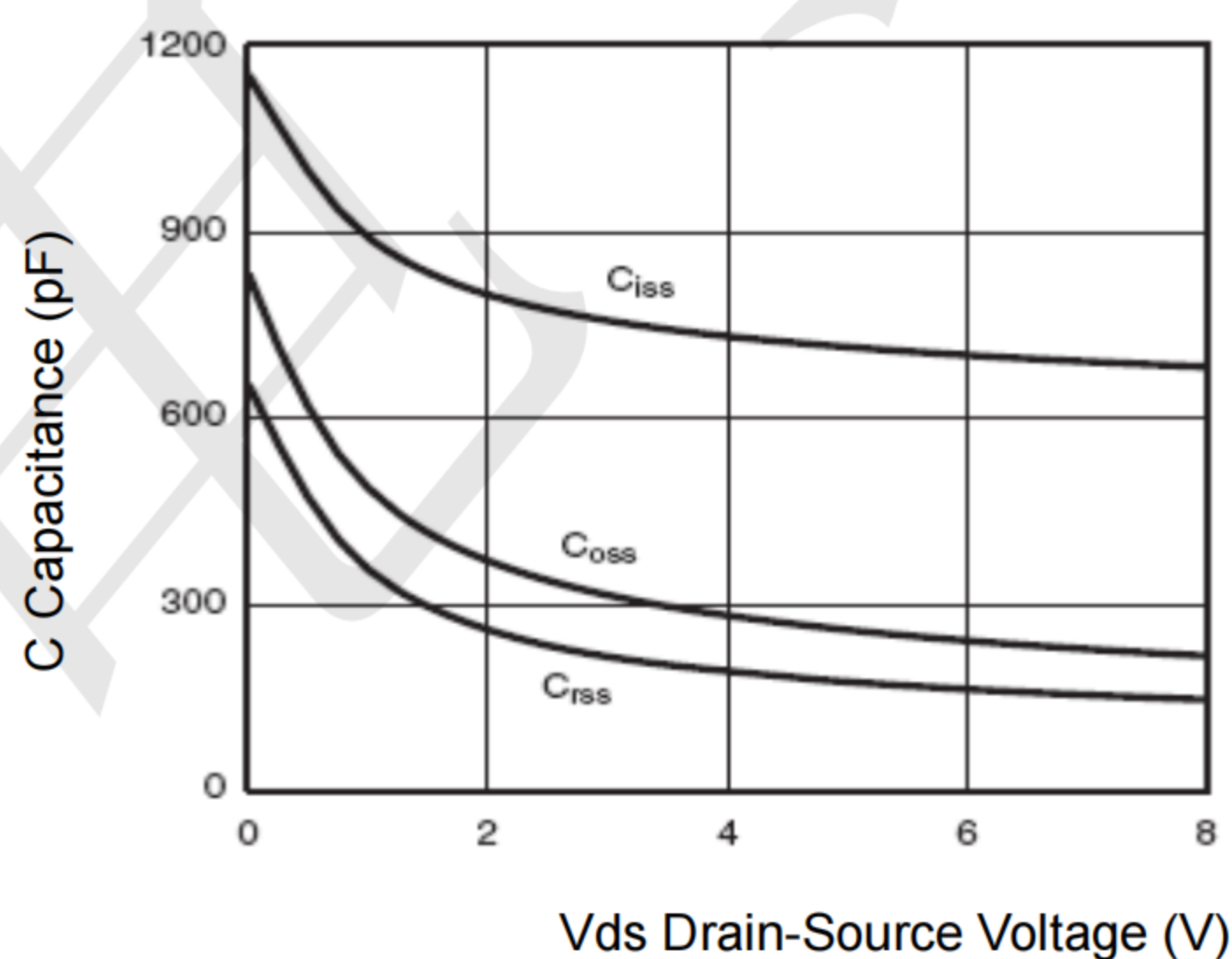


**Figure 10 Capacitance vs Vds**

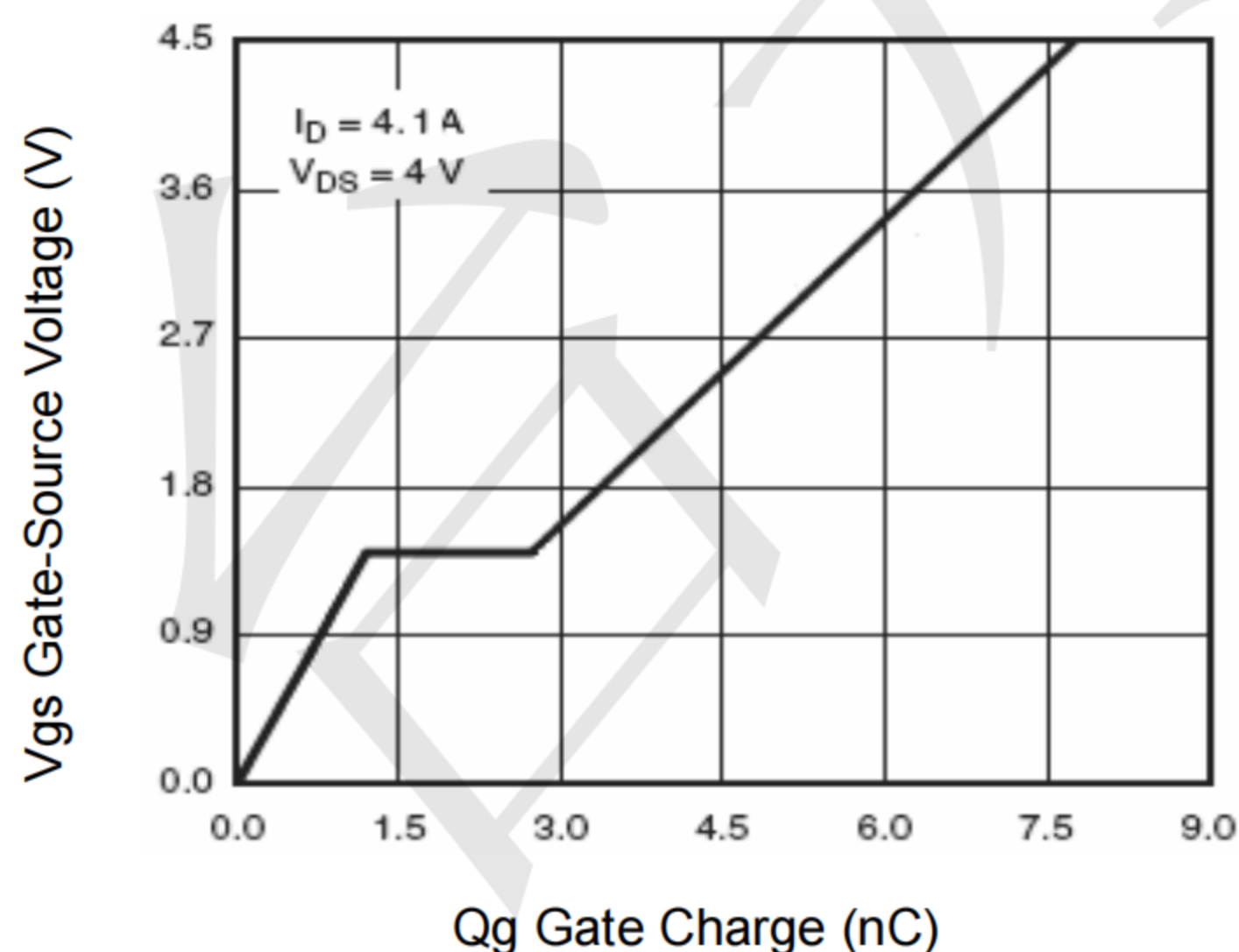


**Figure 11 Gate Charge**

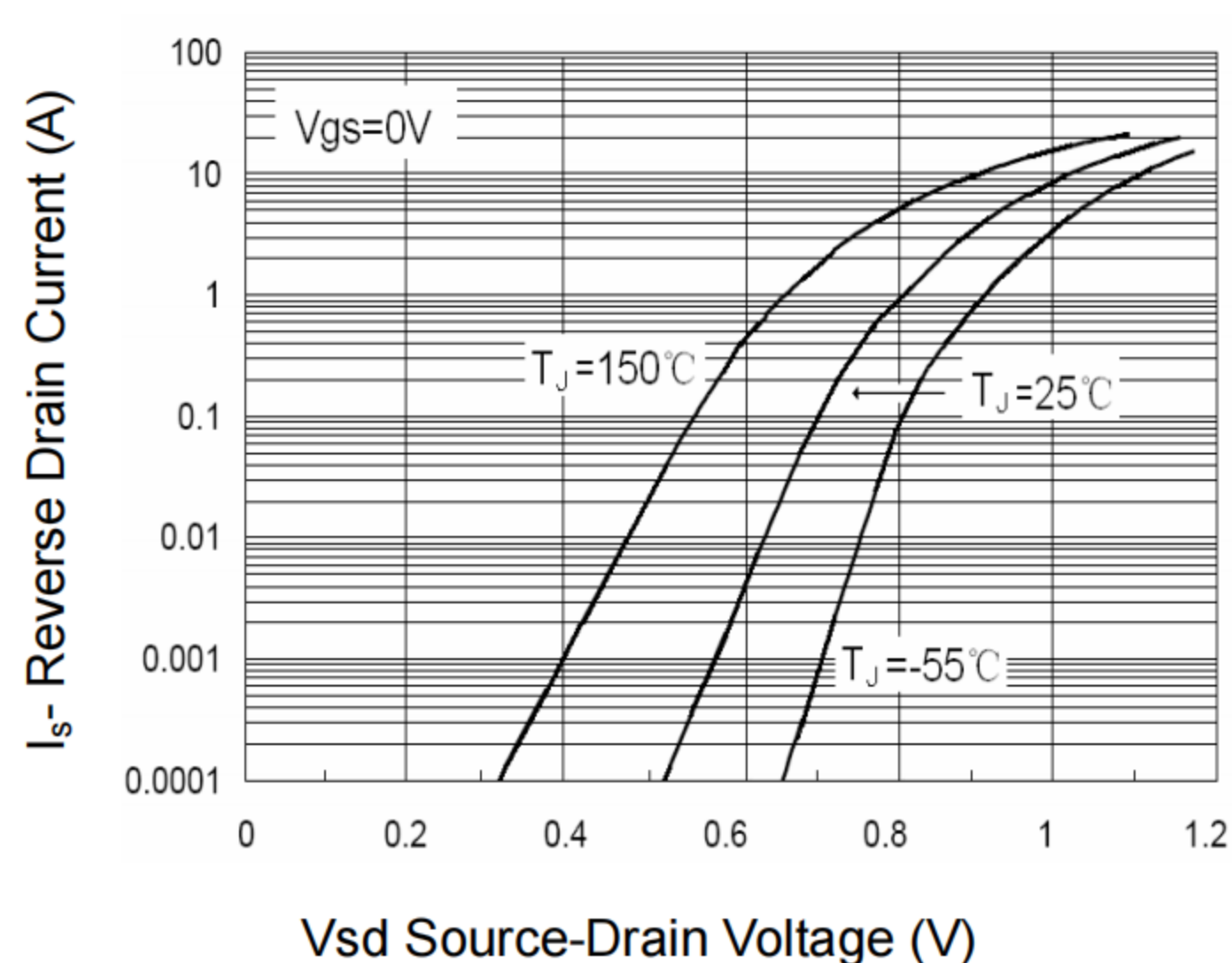


**Figure 12 Source- Drain Diode Forward**

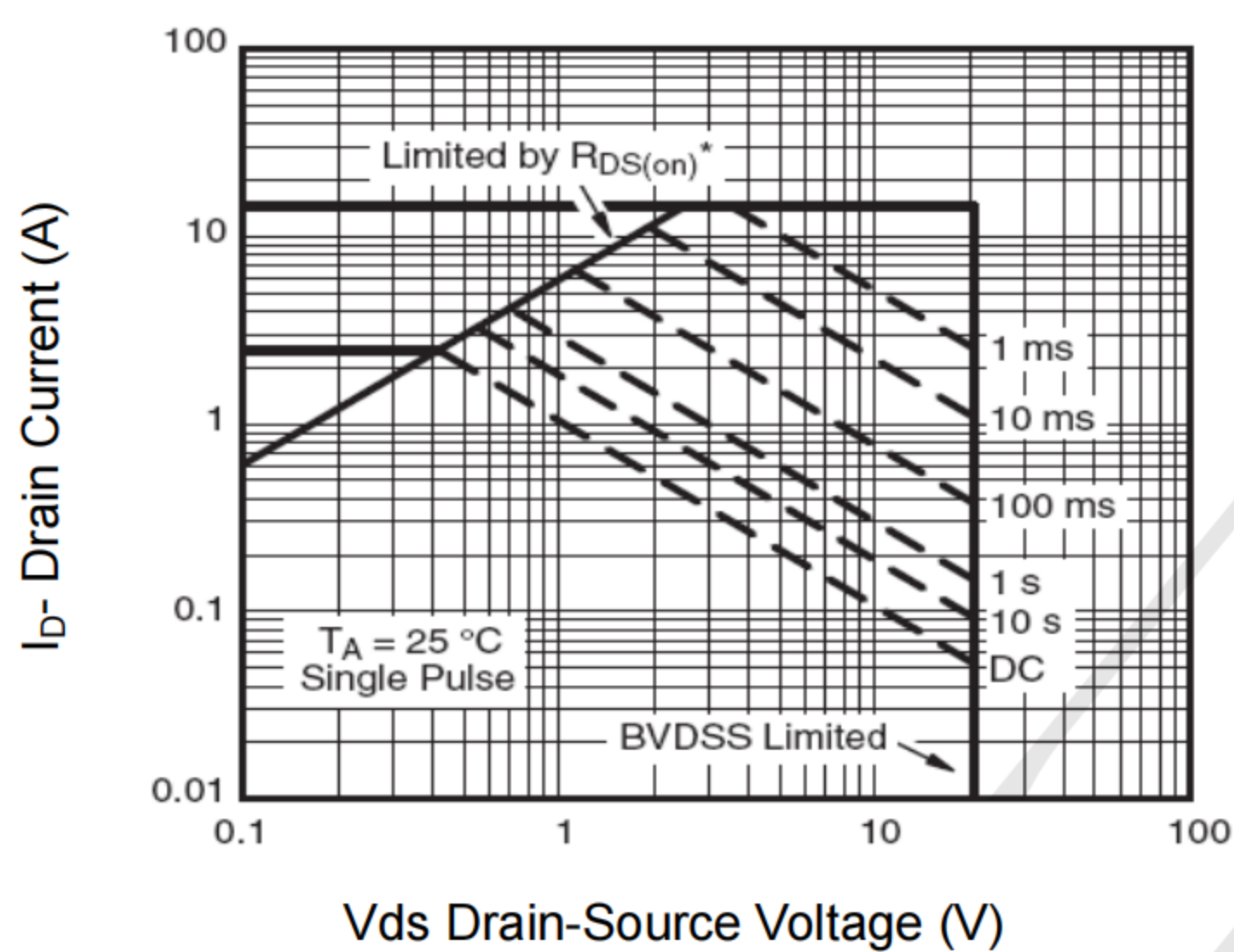


**Figure 13 Safe Operation Area**

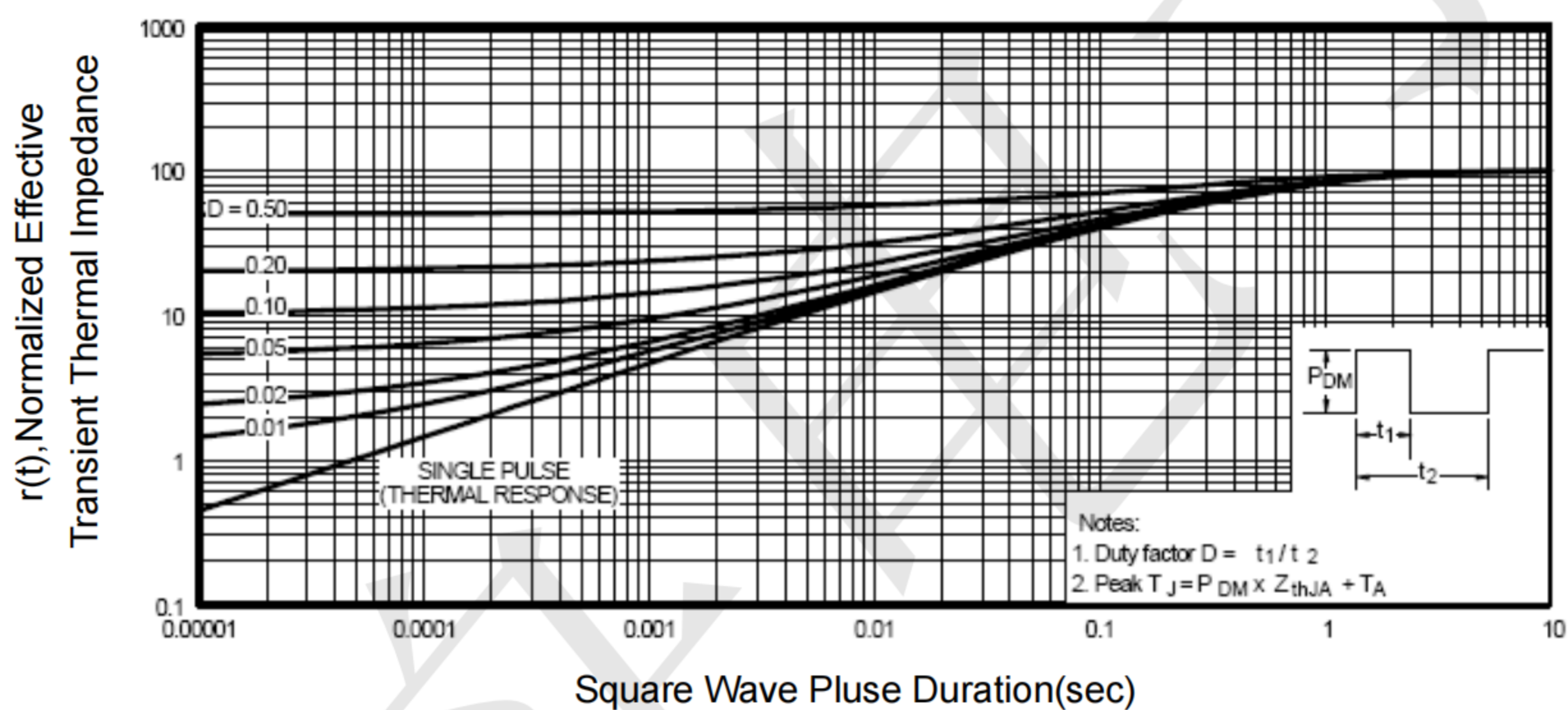
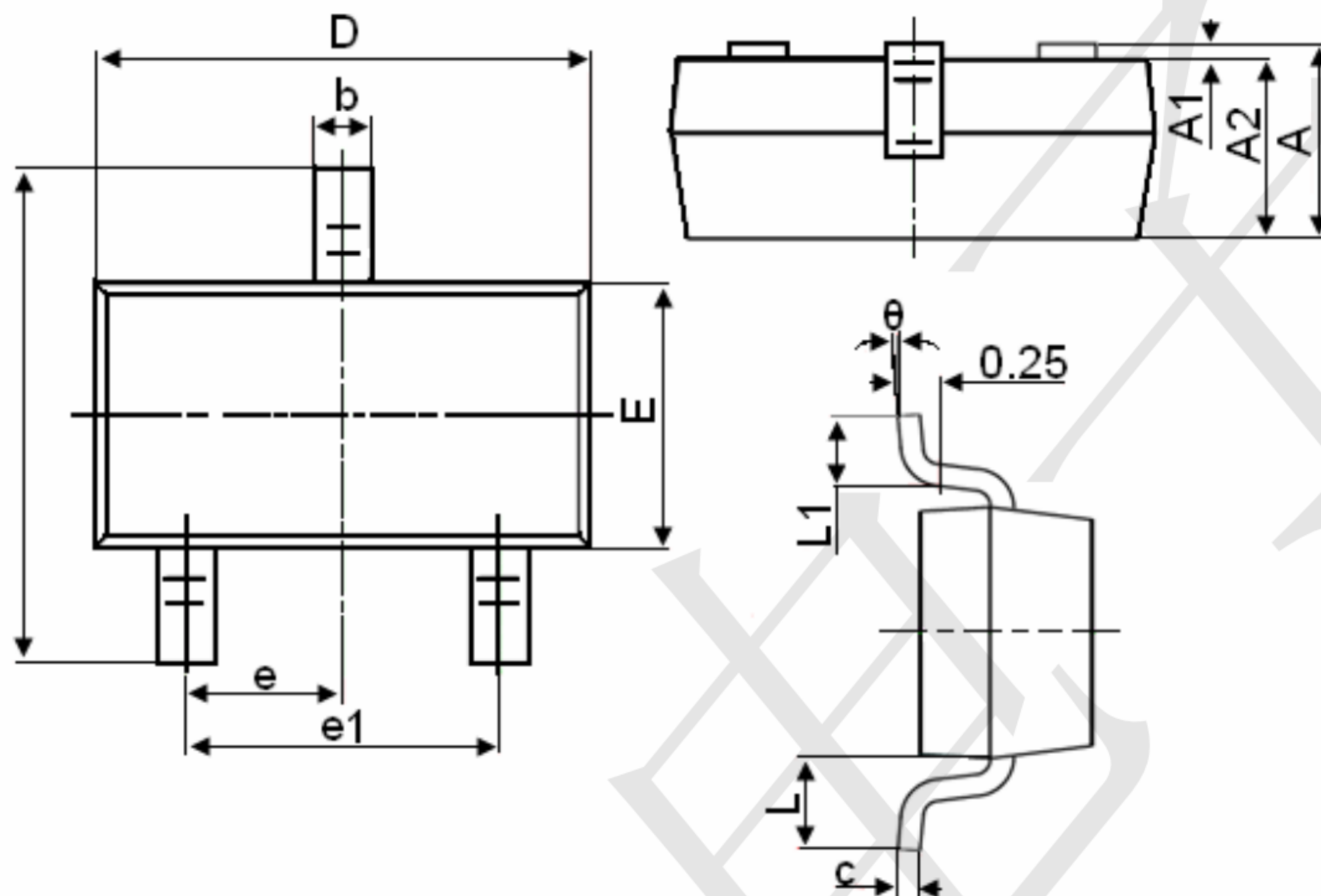


**Figure 14 Normalized Maximum Transient Thermal Impedance**

**SOT-23 Package Information**



| Symbol   | Dimensions in Millimeters |       |
|----------|---------------------------|-------|
|          | MIN.                      | MAX.  |
| A        | 0.900                     | 1.150 |
| A1       | 0.000                     | 0.100 |
| A2       | 0.900                     | 1.050 |
| b        | 0.300                     | 0.500 |
| c        | 0.080                     | 0.150 |
| D        | 2.800                     | 3.000 |
| E        | 1.200                     | 1.400 |
| E1       | 2.250                     | 2.550 |
| e        | 0.950TYP                  |       |
| e1       | 1.800                     | 2.000 |
| L        | 0.550REF                  |       |
| L1       | 0.300                     | 0.500 |
| $\theta$ | 0°                        | 8°    |