TECH PUBLIC
台舟电子

# TPNTR4101PT1G

## P-Channel Mosfet

www.sot23.com.tw

### Product Summary

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

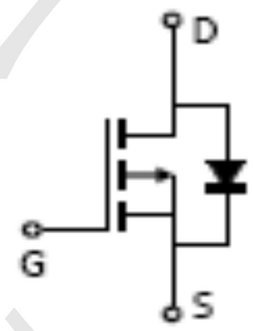
### Application

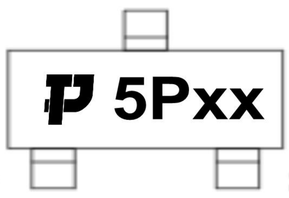
- Load/Power Switching
- Interfacing Switching
- Logic Level Shift

### Package and Pin Configuration

**SOT-23**

**Circuit diagram**




**Marking:** 


**"P" is TECHPUBLIC LOGO**
**"5P" is Part number,fixed**
**"xx" is internal code**

### Absolute Maximum Ratings ($T_A$=25℃unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -20 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | $T_C$ =25℃ | $I_D$ | -4.1 | A |
| | $T_C$ =70℃ | | -3.2 | |
| | $T_A$ =25℃ | | -3 | |
| | $T_A$ =70℃ | | -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 | ℃ |

### Thermal Characteristic

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

## Electrical Characteristics ($T_A$=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V $I_D$=-250μA | -20 | - | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=-20V,$V_{GS}$=0V | - | - | -1 | μA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±12V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics (Note 3)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | -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 | mΩ |
| | | $V_{GS}$=-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, 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 , $R_L$=-1.2Ω,$V_{GEN}$=-4.5V,$R_g$=1Ω | - | 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

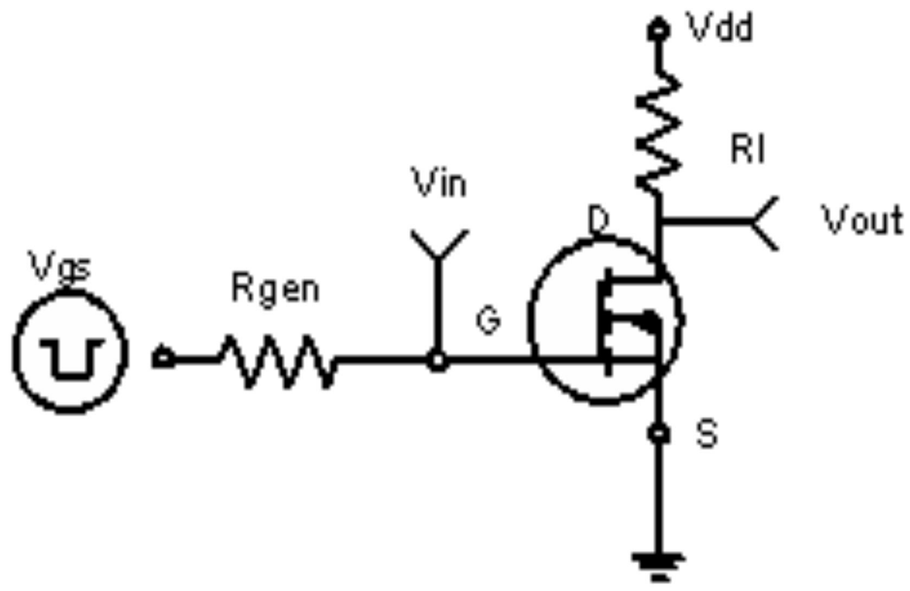



**Figure 1:Switching Test Circuit**

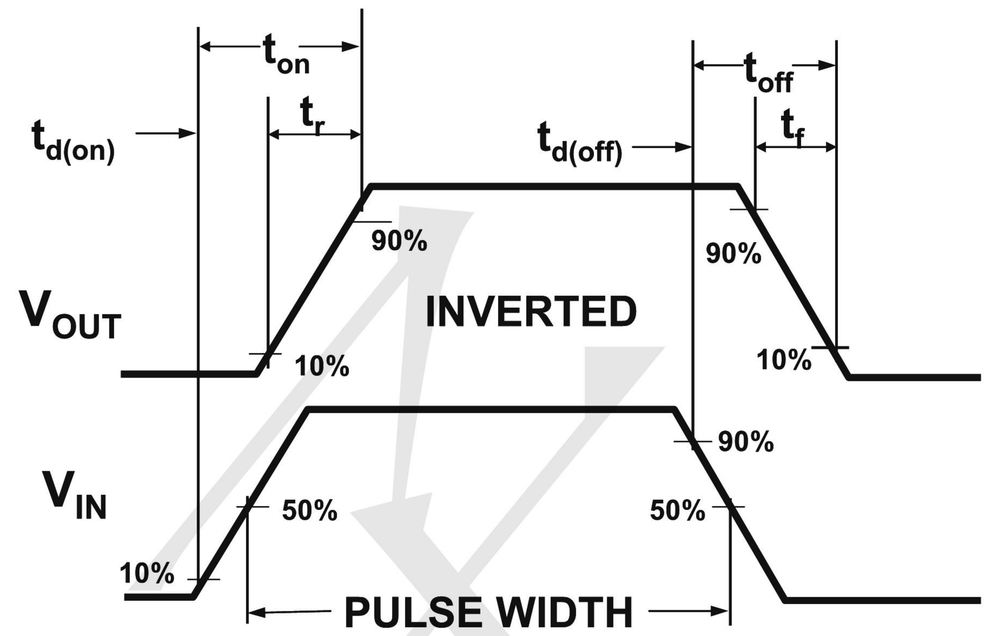



**Figure 2:Switching Waveforms**

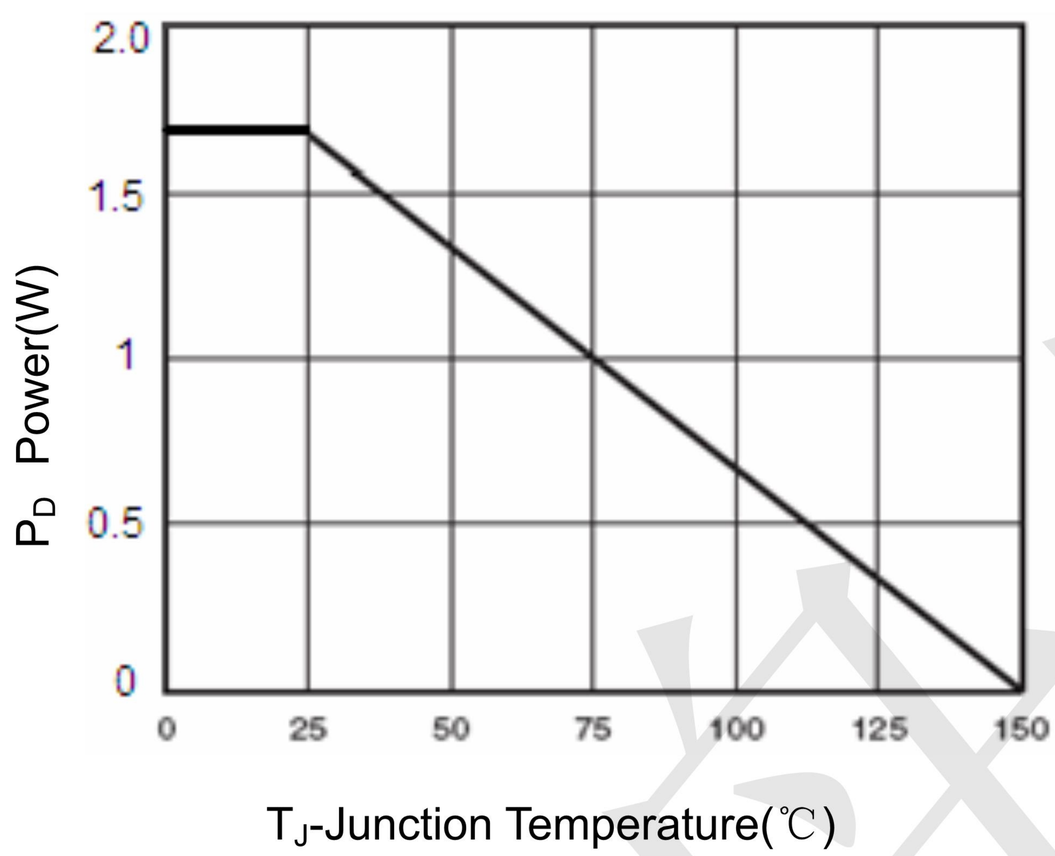



**Figure 3 Power Dissipation**

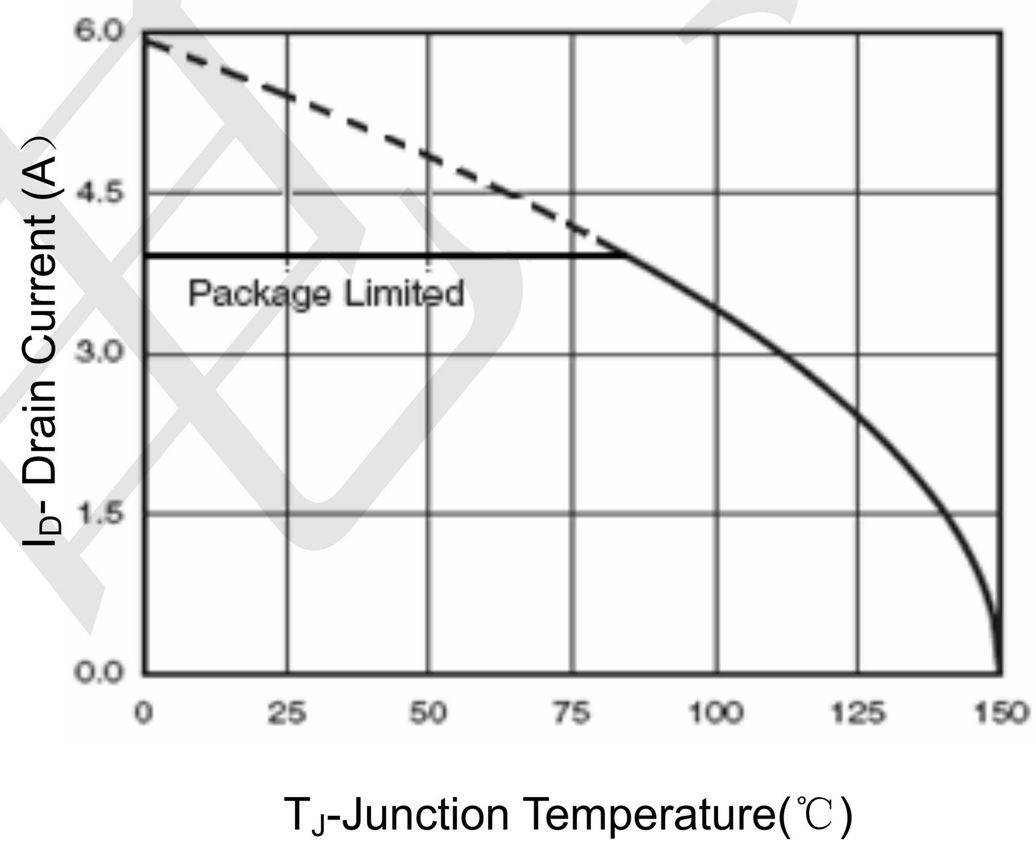



**Figure 4 Drain Current**

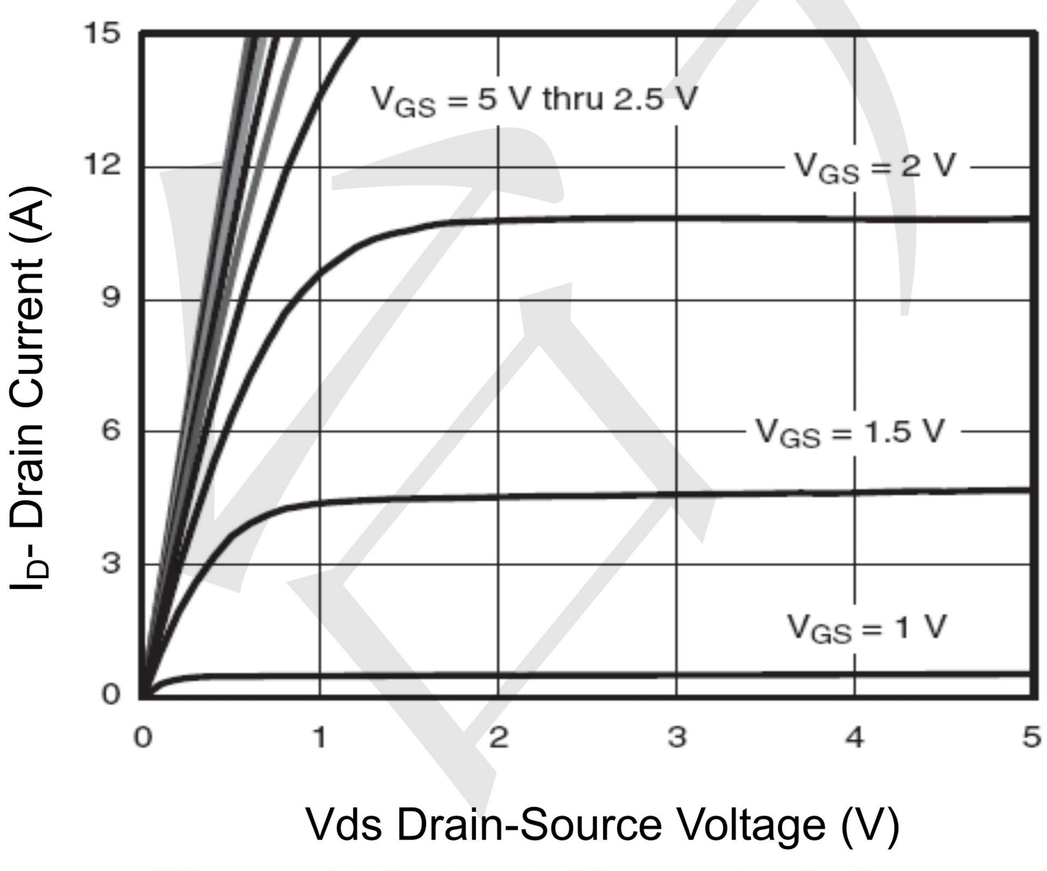



**Figure 5 Output Characteristics**

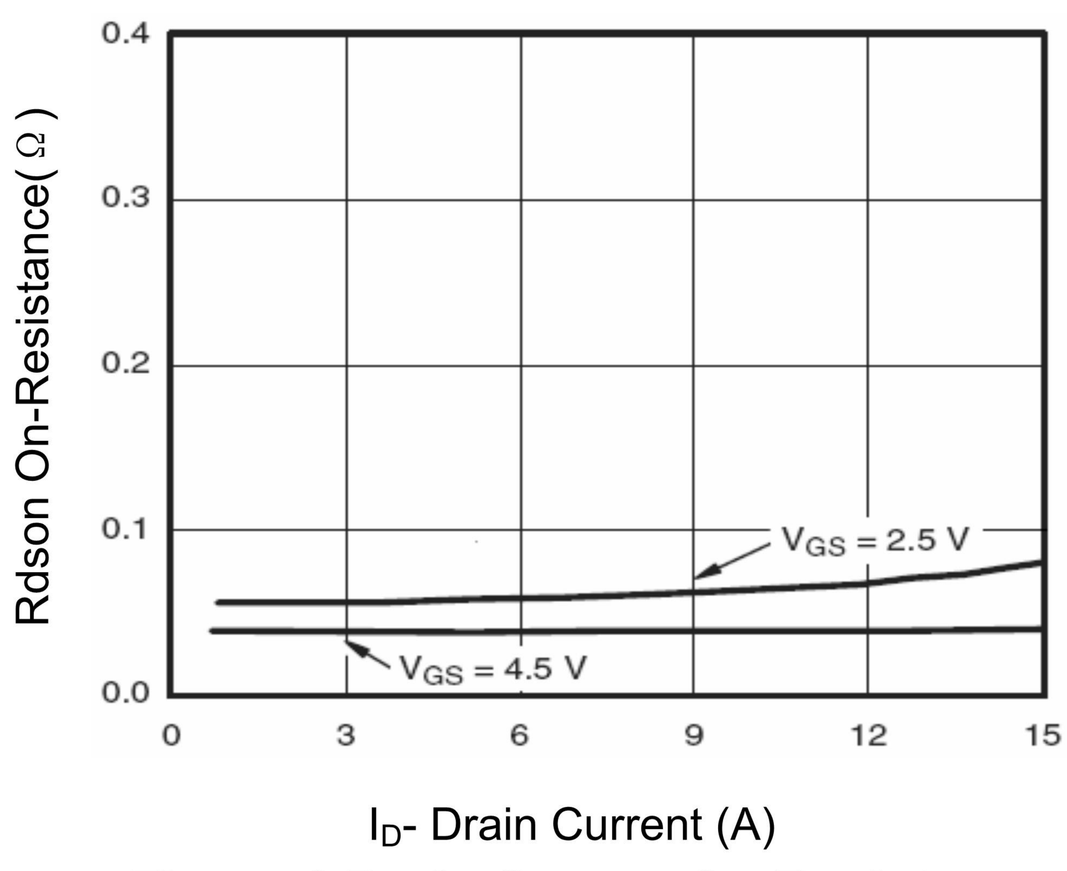



**Figure 6 Drain-Source On-Resistance**

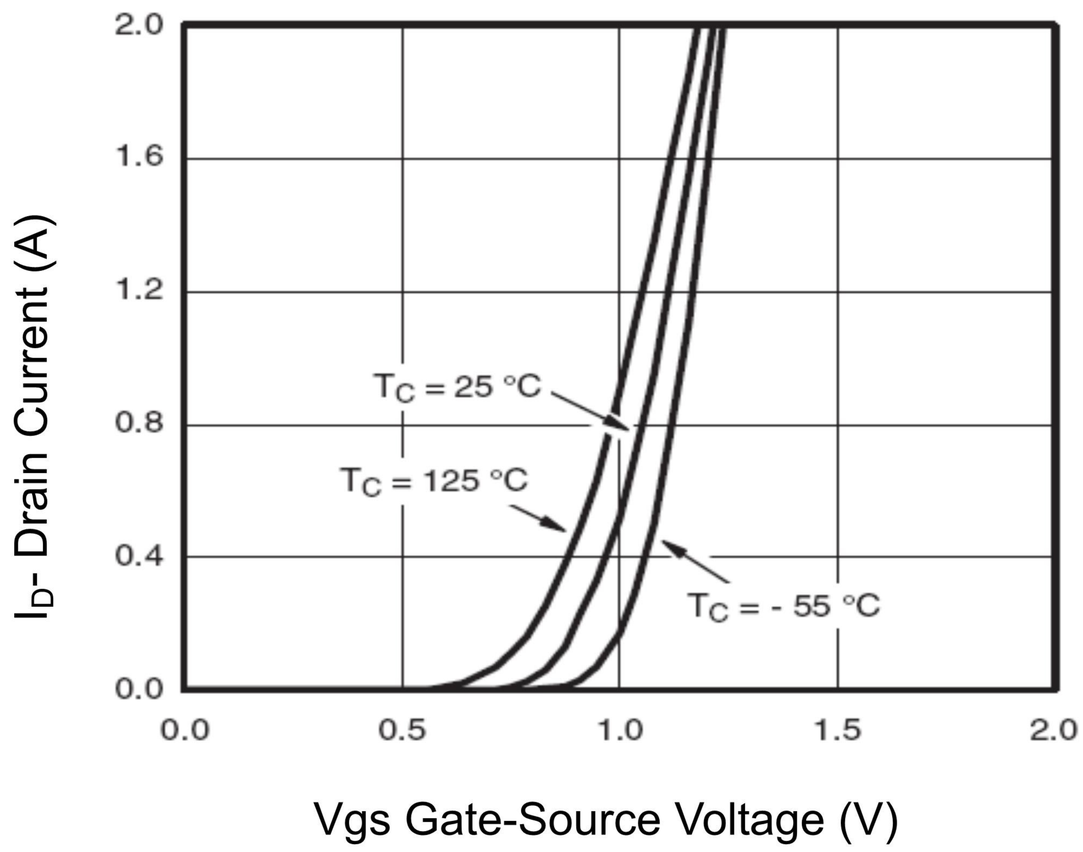



**Figure 7 Transfer Characteristics**

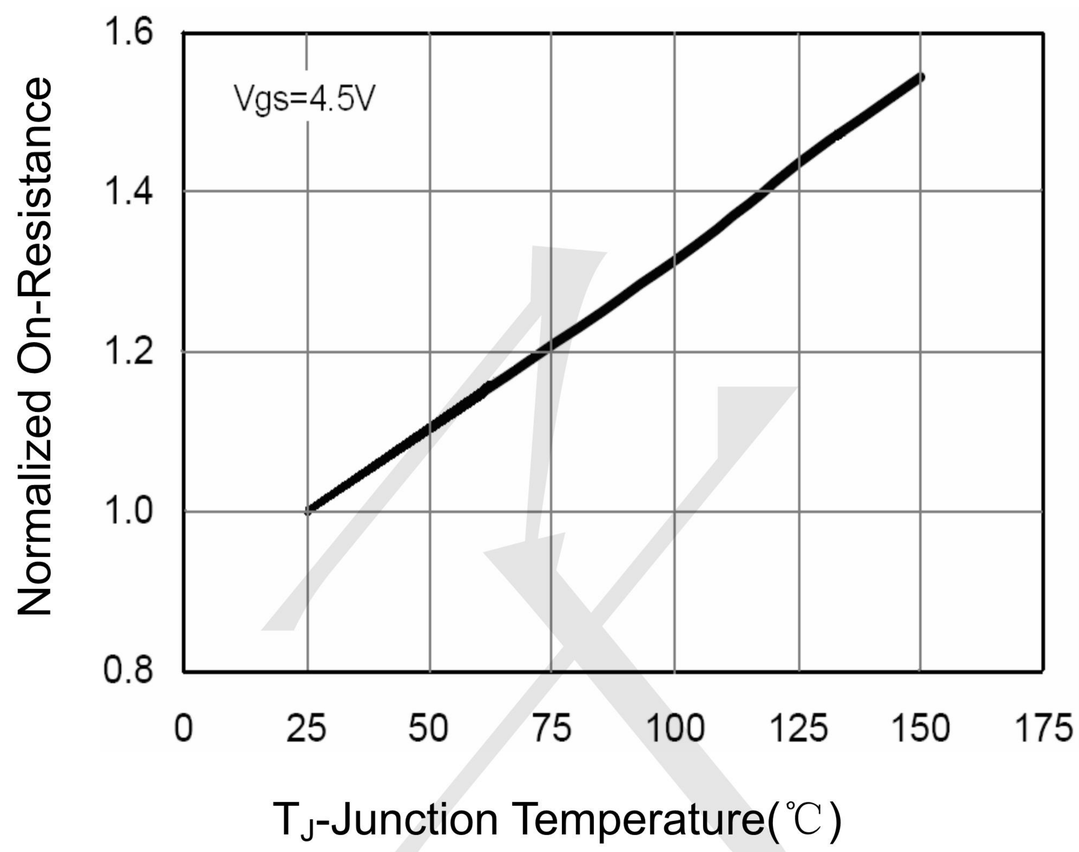



**Figure 8 Drain-Source On-Resistance**

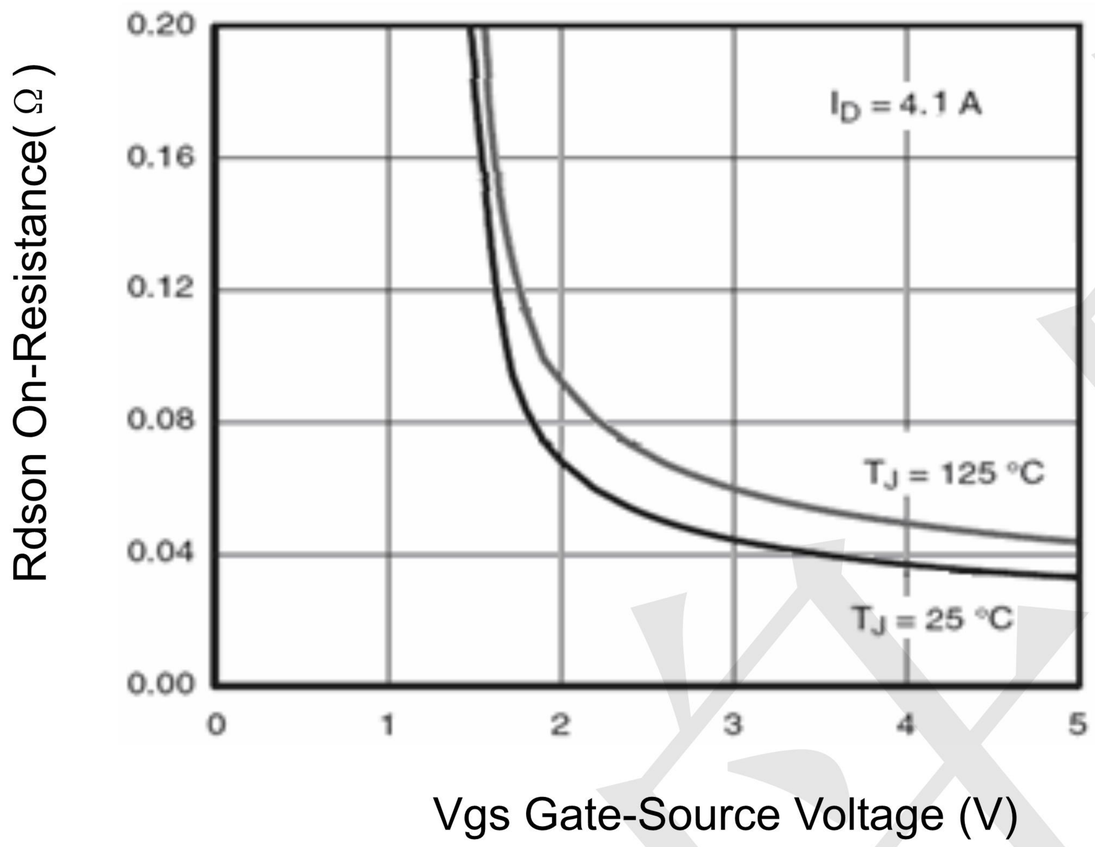



**Figure 9 Rdson vs Vgs**

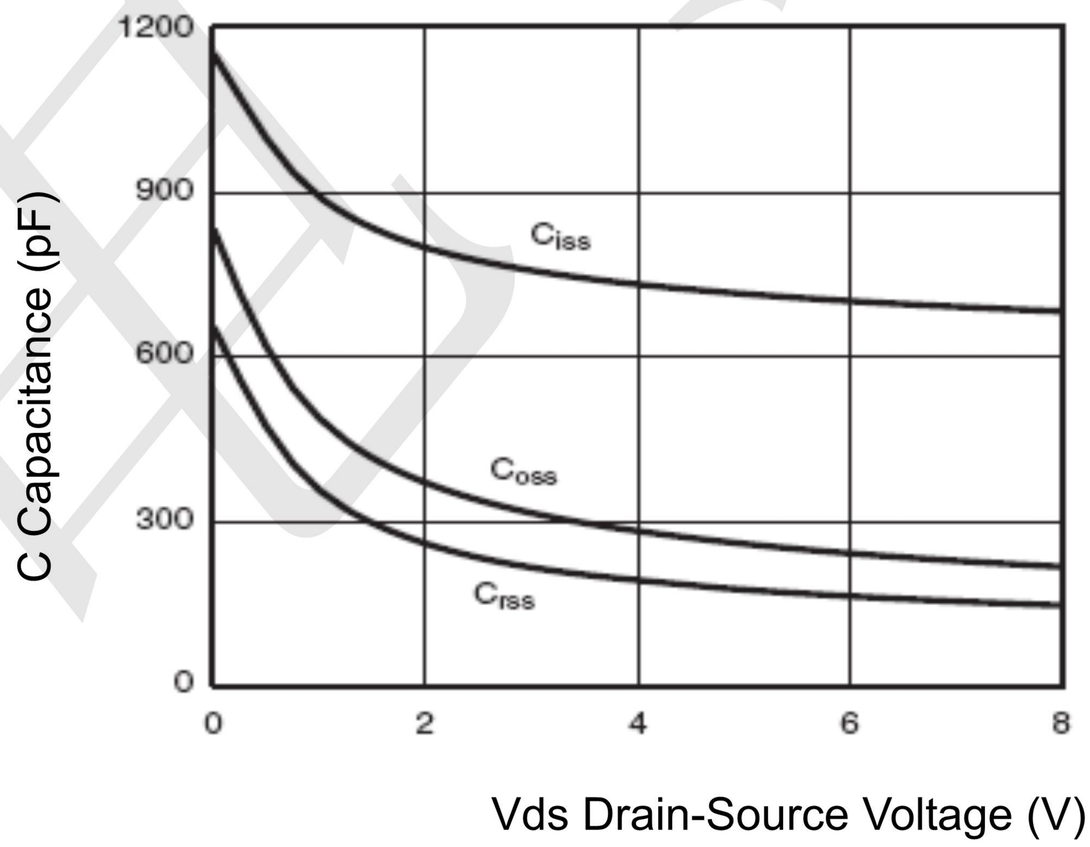



**Figure 10 Capacitance vs Vds**

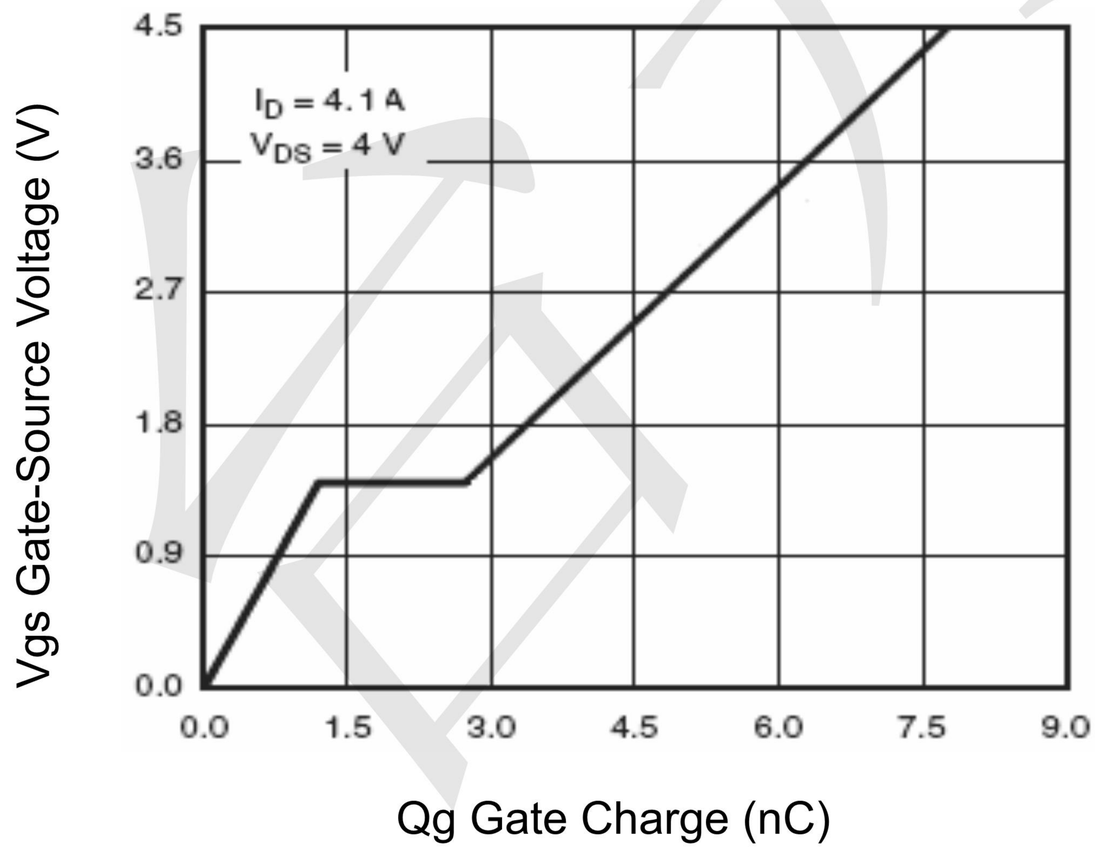



**Figure 11 Gate Charge**

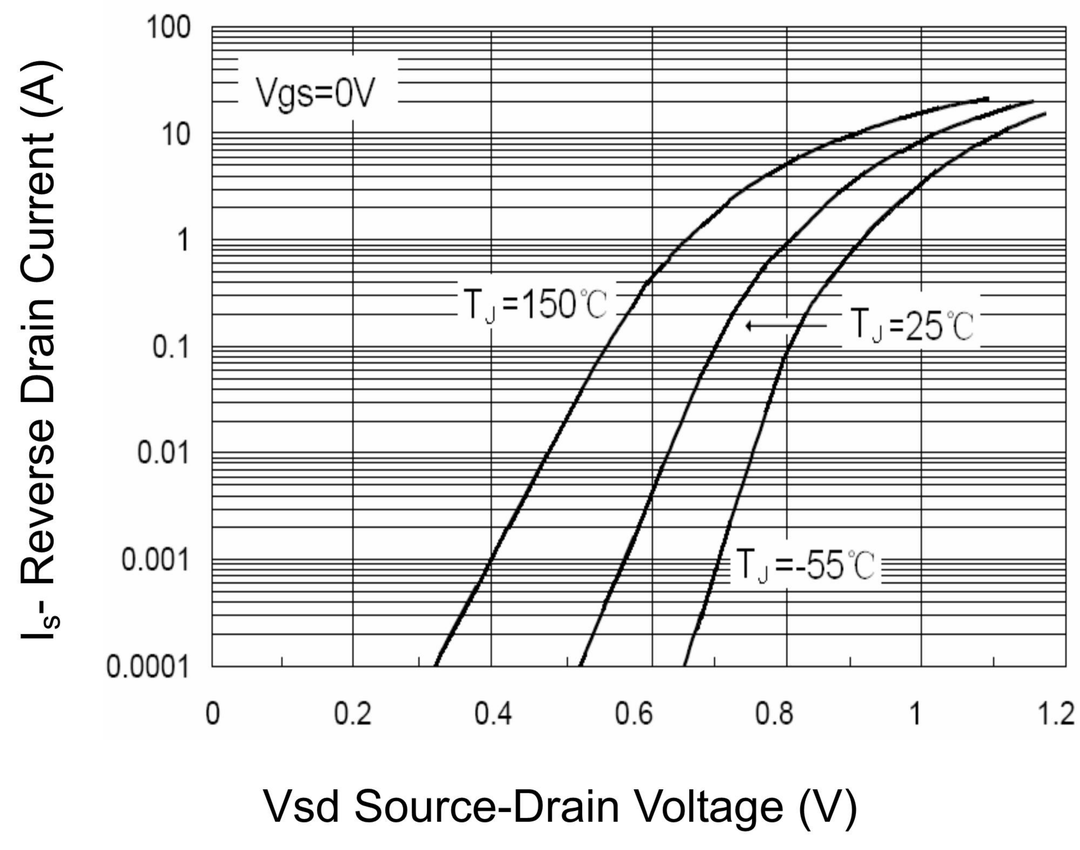



**Figure 12 Source- Drain Diode Forward**

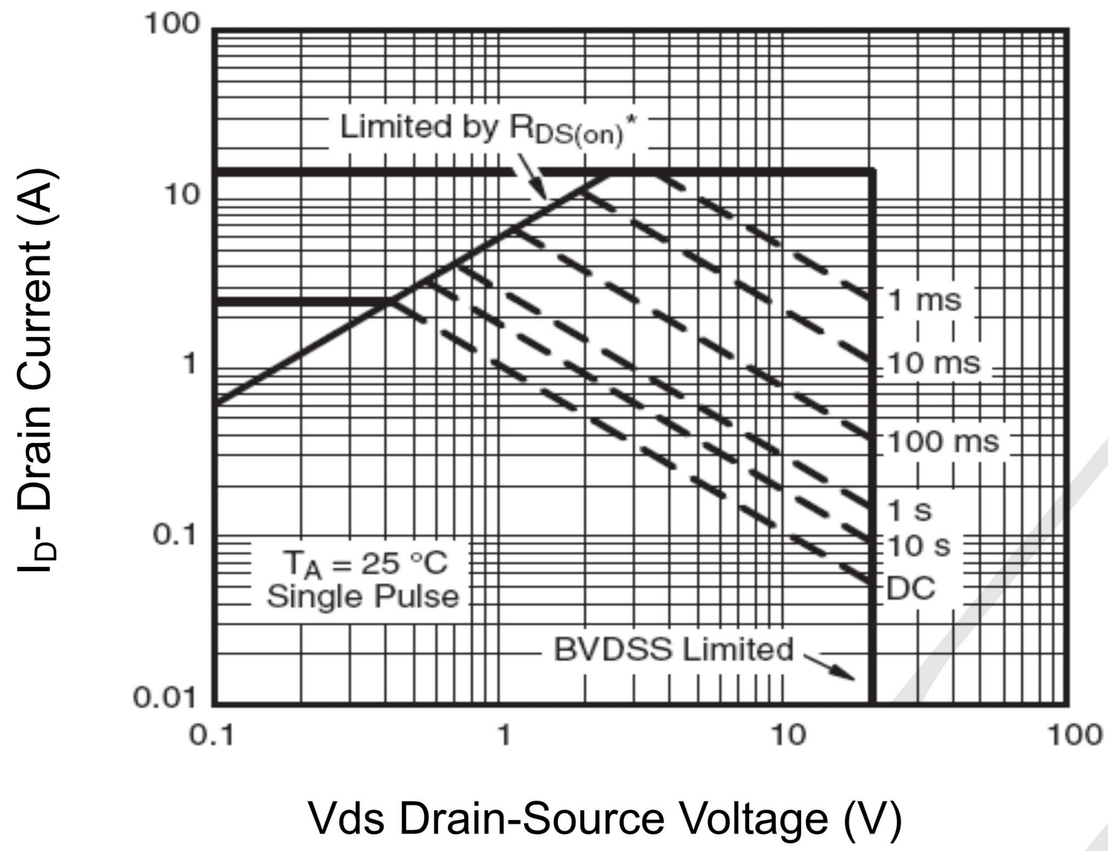



**Figure 13 Safe Operation Area**

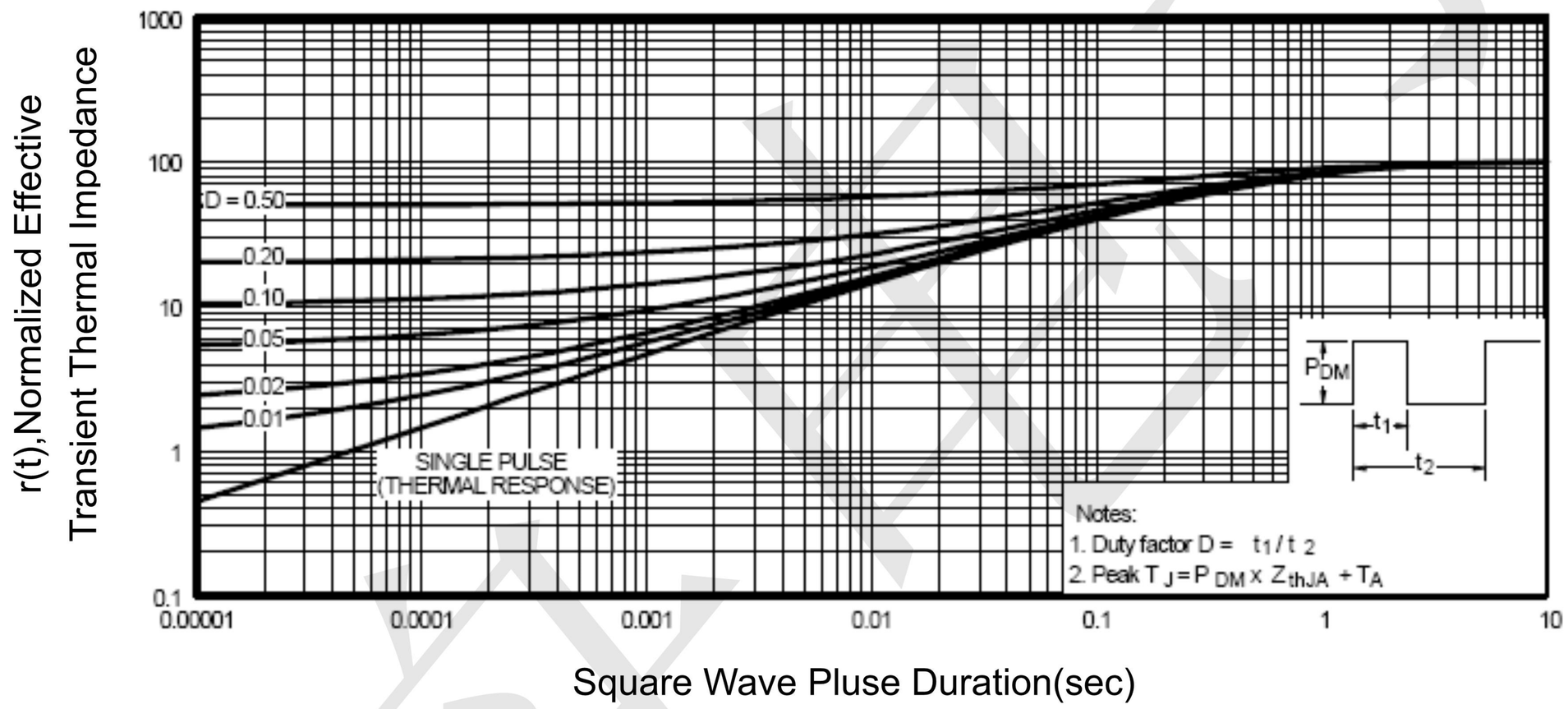
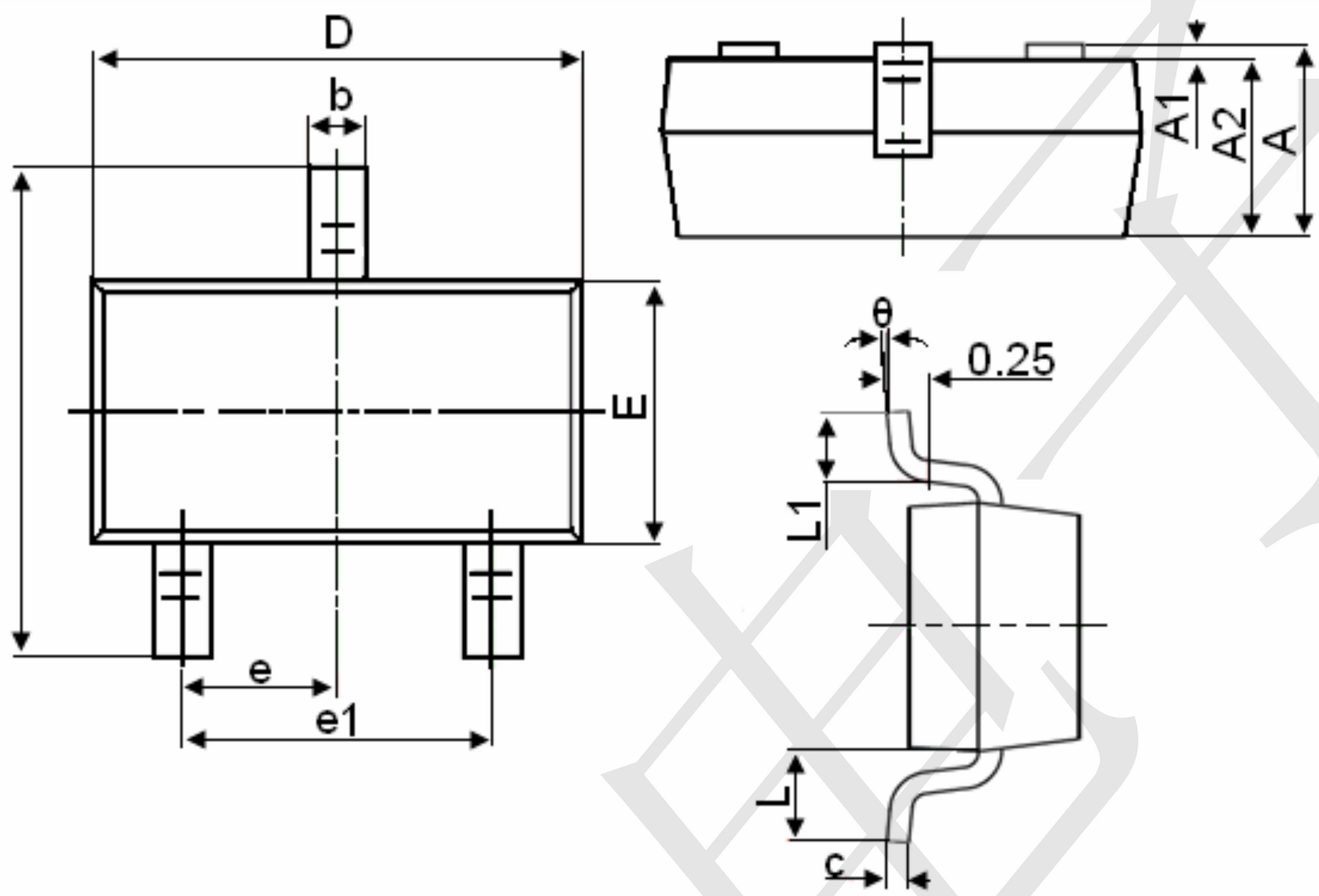



**Figure 14 Normalized Maximum Transient Thermal Impedance**

## 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 |
| θ | 0° | 8° |