## Features

- Low on-resistance
- N-Channel MOSFET
- Low input capacitance
- Fast switching speed
- ESD Protection

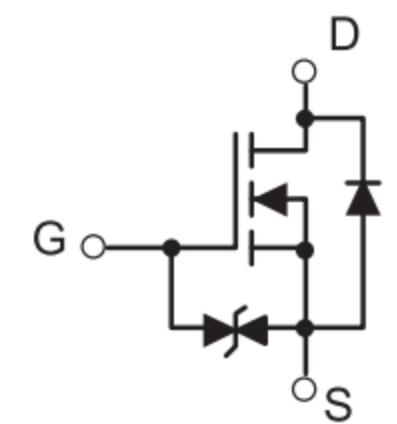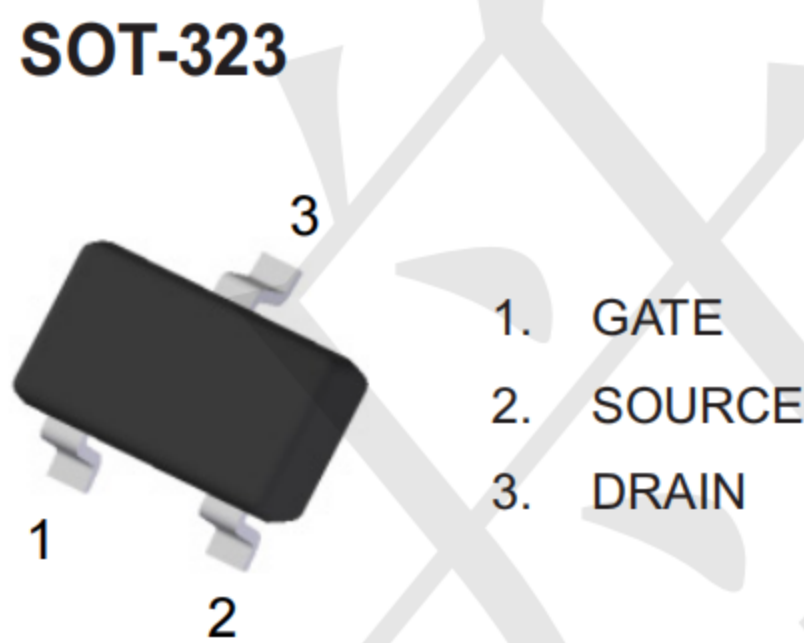## Shipping Quantity

- 3000pcs / Tape & Reel

## Typical Applications

- DC-DC converters
- Power management functions
- Battery operated systems and solid-state relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.

## Mechanical Data

- Case: SOT-323
- Molding Compound, UL Flammability Classification Rating 94V-0
- Terminals: Matte Tin Plated Leads, Solderable Per MIL-STD-202, Method 208

**SOT-323**

1. GATE
2. SOURCE
3. DRAIN

## Circuit Diagram

N-MOS

# Marking:SS

## Absolute Maximum Ratings (Tamb=25°C unless otherwise specified)

| Parameter | | Symbol | Value | Units |
|-----------|---|--------|-------|-------|
| Drain-Source Voltage | | $V_{DSS}$ | 50 | V |
| Gate -Source Voltage | | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current ($T_A$ = 25°C) [1] | | $I_D$ | 360 | mA |
| Pulsed Drain Current ($t_p$ = 10μs, $T_A$ = 25°C) | | $I_{DM}$ | 1500 | mA |
| Single Pulse Avalanche Energy [2] | | $E_{AS}$ | 0.2 | mJ |
| Power Dissipation | SOT-323 | $P_D$ | 0.26 | W |

## Thermal Characteristics

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Thermal Resistance Junction to Ambient Air | $R_{\theta JA}$ | 480 | °C/W |
| Thermal Resistance Junction to Lead | $R_{\theta JL}$ | 288 | |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | 242 | |
| Operating Junction Temperature Range | $T_J$ | -55 to +150 | °C |
| Storage Temperature Range | $T_{STG}$ | -55 to +150 | °C |

## Electrical Characteristics (TA=25°C unless otherwise specified)

| Symbol | Parameter | Test conditions | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF Characteristics** | | | | | | |
| $V_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS} = 0V$, $I_D = 250\mu A$ | 50 | - | - | V |
| $I_{DSS}$ | Drain to Source Leakage Current | $V_{DS} = 50V$, $V_{GS} = 0V$ | - | - | 1 | µA |
| $I_{GSS}$ | Gate-body Leakage | $V_{GS} = \pm20V$, $V_{DS} = 0V$ | - | - | ±10 | µA |
| **ON Characteristics** | | | | | | |
| $R_{DS(ON)}$ | Drain-Source On-resistance [*1] | $V_{GS} = 10V$, $I_D = 0.5A$ | - | 1.5 | 2.0 | Ω |
| | | $V_{GS} = 4.5V$, $I_D = 0.2A$ | - | 1.7 | 2.5 | |
| | | $V_{GS} = 2.5V$, $I_D = 0.1A$ | - | 2.0 | 4.5 | |
| $V_{GS(TH)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$, $I_D = 250\mu A$ | 0.8 | 1 | 1.5 | V |
| $R_G$ | Gate Resistance | $V_{GS} = 0V$, f = 1MHz | - | 48 | - | Ω |
| **Dynamic Characteristics** | | | | | | |
| $C_{ISS}$ | Input Capacitance | $V_{GS} = 0V$ | - | 32 | - | pF |
| $C_{OSS}$ | Output Capacitance | $V_{DS} = 25V$ | - | 6 | - | |
| $C_{RSS}$ | Reverse Transfer Capacitance | f = 1.0MHz | - | 3 | - | |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time [*3] | $V_{DD} = 25V$, $I_D = 0.36A$ $V_{GS} = 10V$, $R_G = 6\Omega$ | - | 2.2 | - | nS |
| $t_r$ | Turn-on Rise Time [*3] | | - | 19.2 | - | |
| $t_{d(off)}$ | Turn-Off Delay Time [*3] | | - | 6.2 | - | |
| $t_f$ | Turn-Off Fall Time [*3] | | - | 23 | - | |
| $Q_G$ | Total Gate-Charge | $V_{DS} = 25V$ | - | 4 | - | nC |
| $Q_{GS}$ | Gate to Source Charge | $V_{GS} = 10 V$ | - | 0.5 | - | nC |
| $Q_{GD}$ | Gate to Drain (Miller) Charge | $I_D = 0.2A$ | - | 0.4 | - | nC |
| **Source-Drain Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage [*2] | $I_S = 0.5A$, $V_{GS} = 0V$ | - | 0.89 | 1.4 | V |
| trr | Reverse Recovery Time | $I_F = 1A$, $V_{GS} = 0V$ | - | 15 | - | ns |
| Qrr | Reverse Recovery Charge | $d_{IF}/d_t = 100A/\mu s$ | - | 8 | - | nC |

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## Typical Performance Characteristics ($T_A$=25°C unless otherwise Specified)
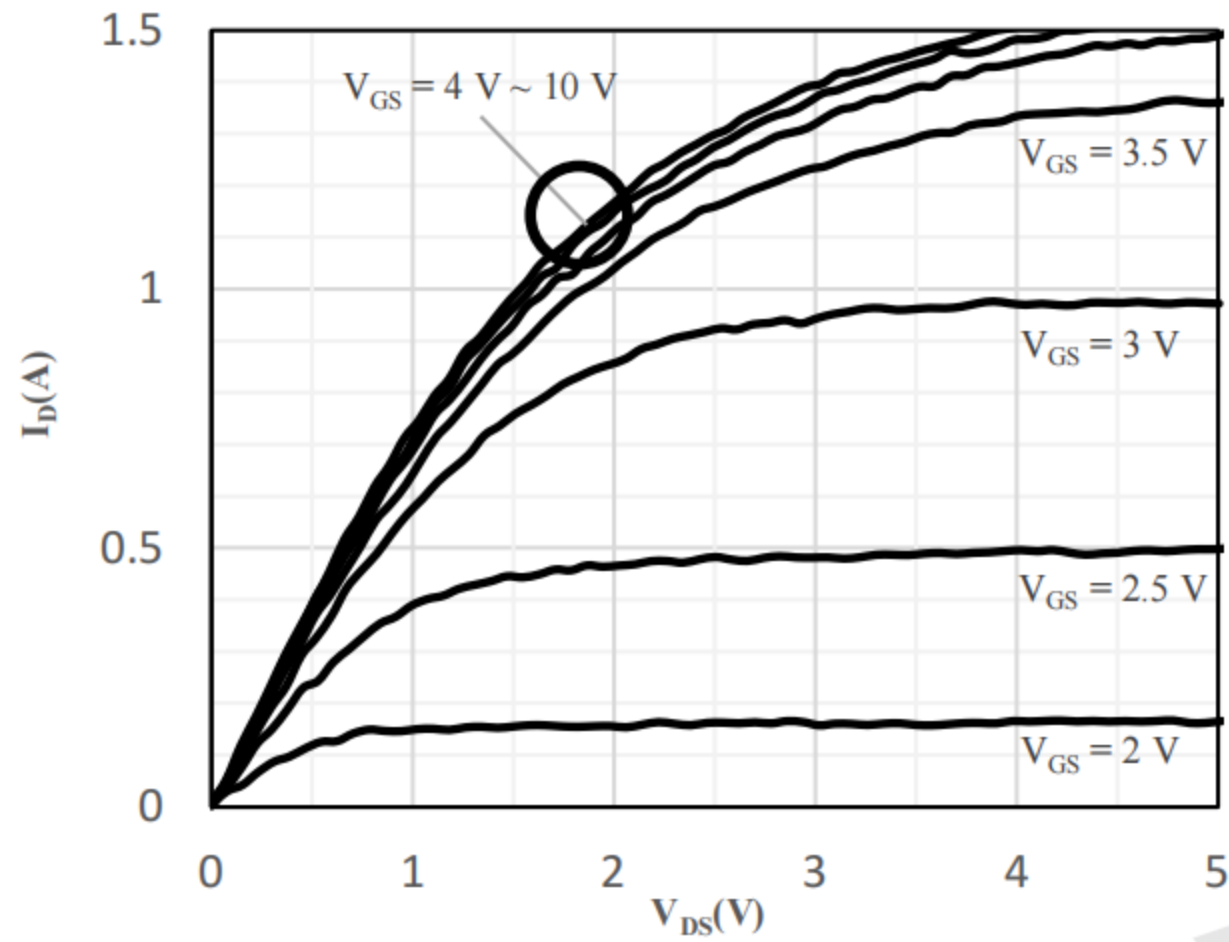
Fig 1    Typical Output Characteristics
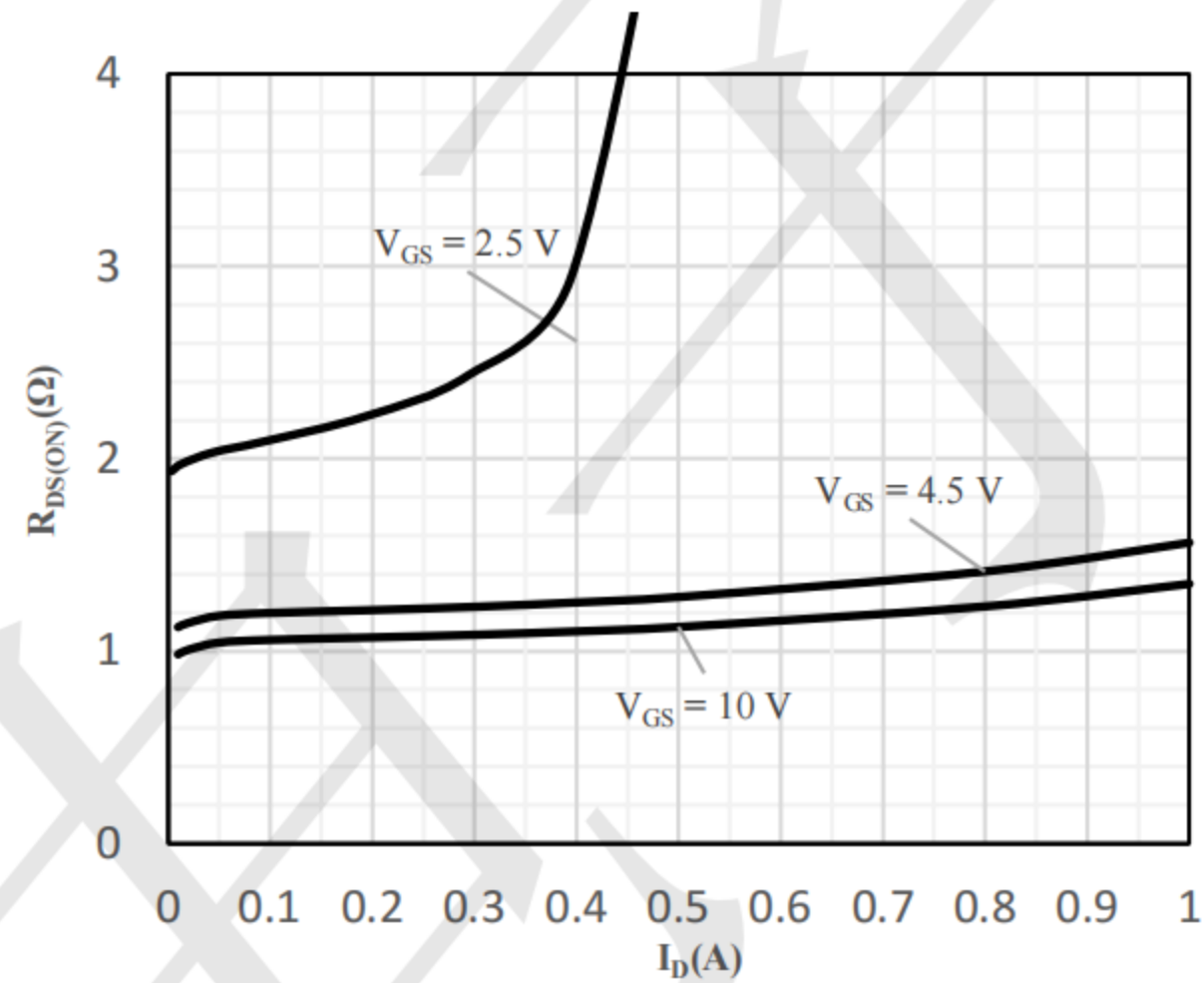
Fig 2    On-Resistance vs. Drain Current and Gate Voltage
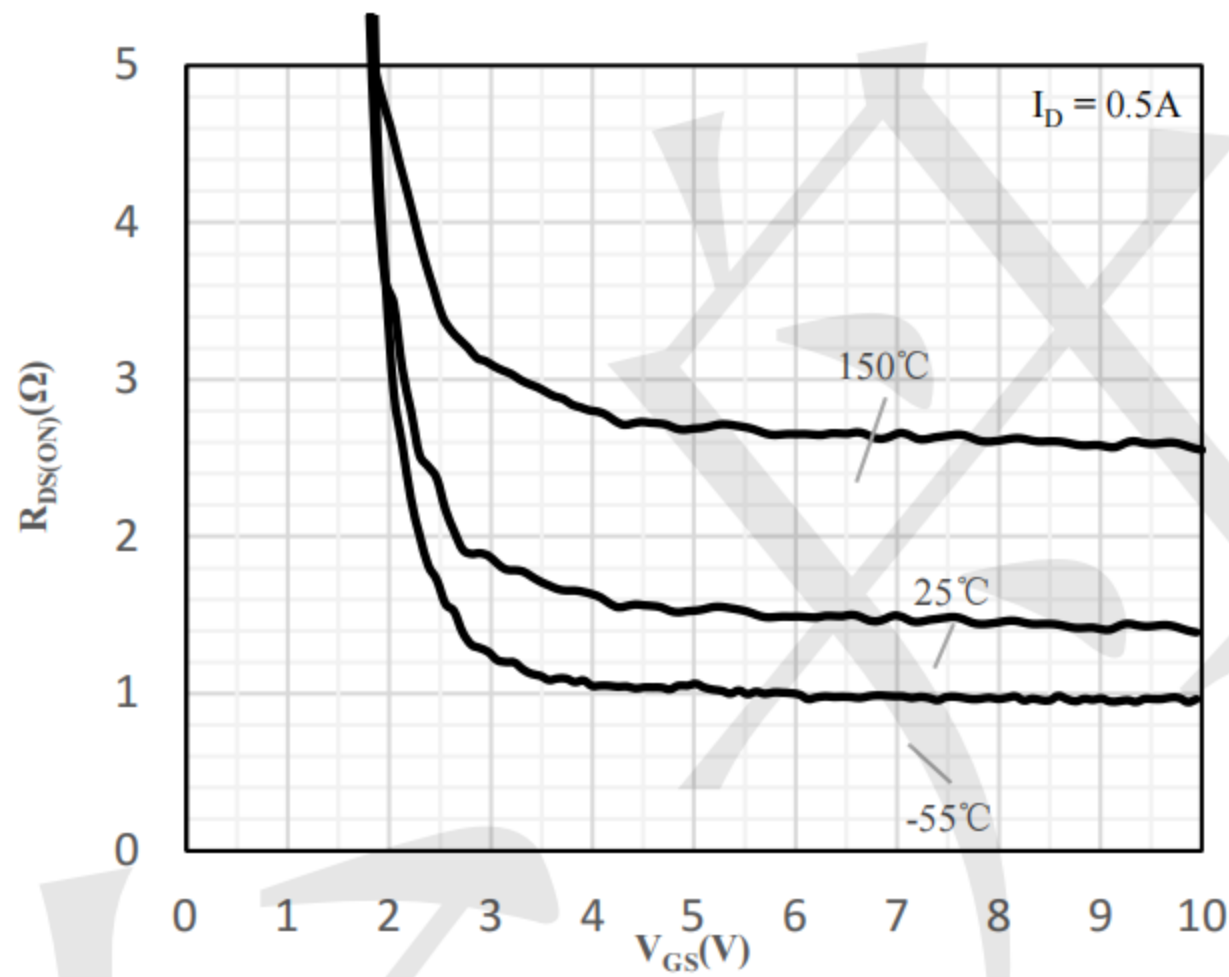
Fig 3    On-Resistance vs. Gate-Source Voltage
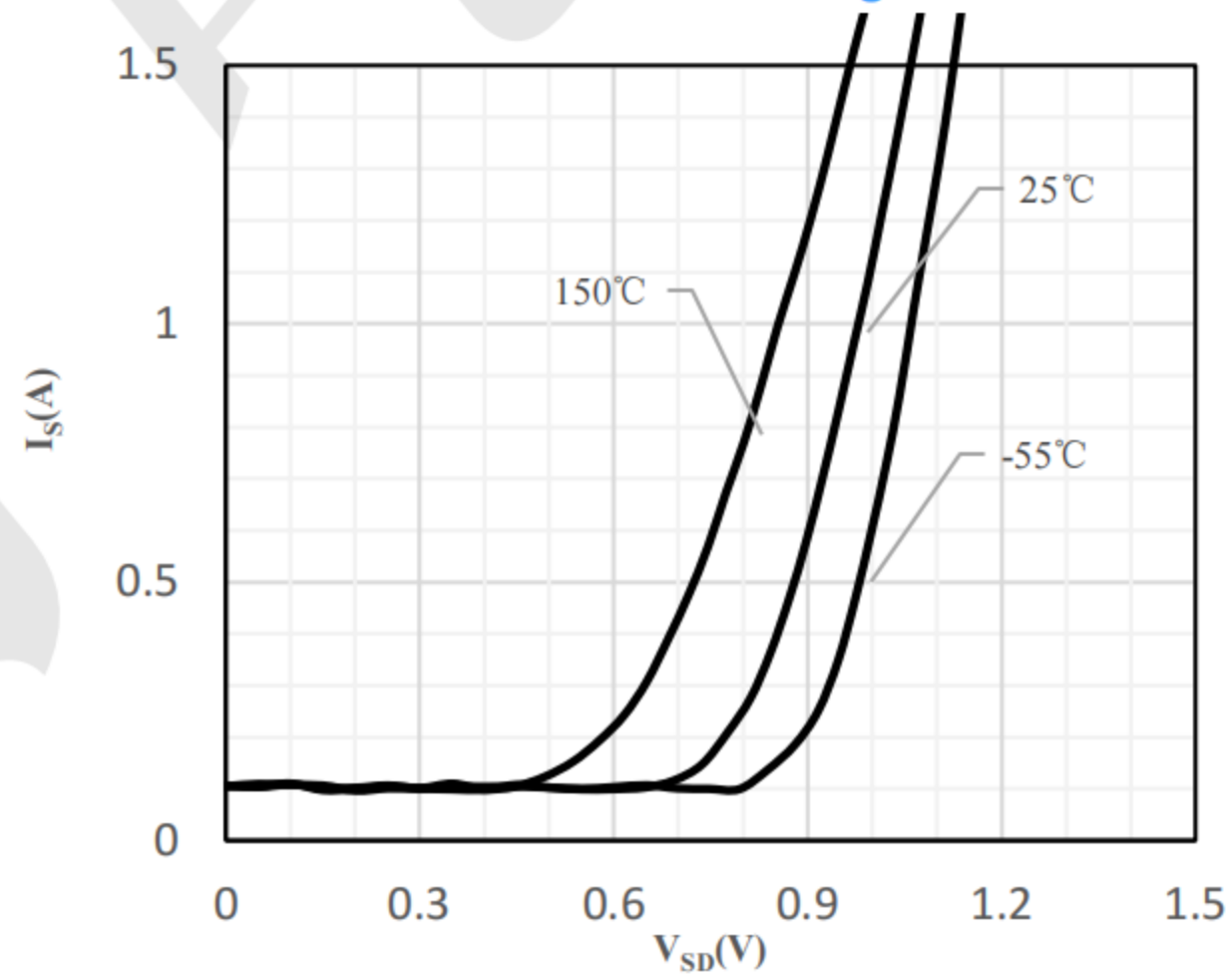
Fig 4    Body-Diode Characteristics

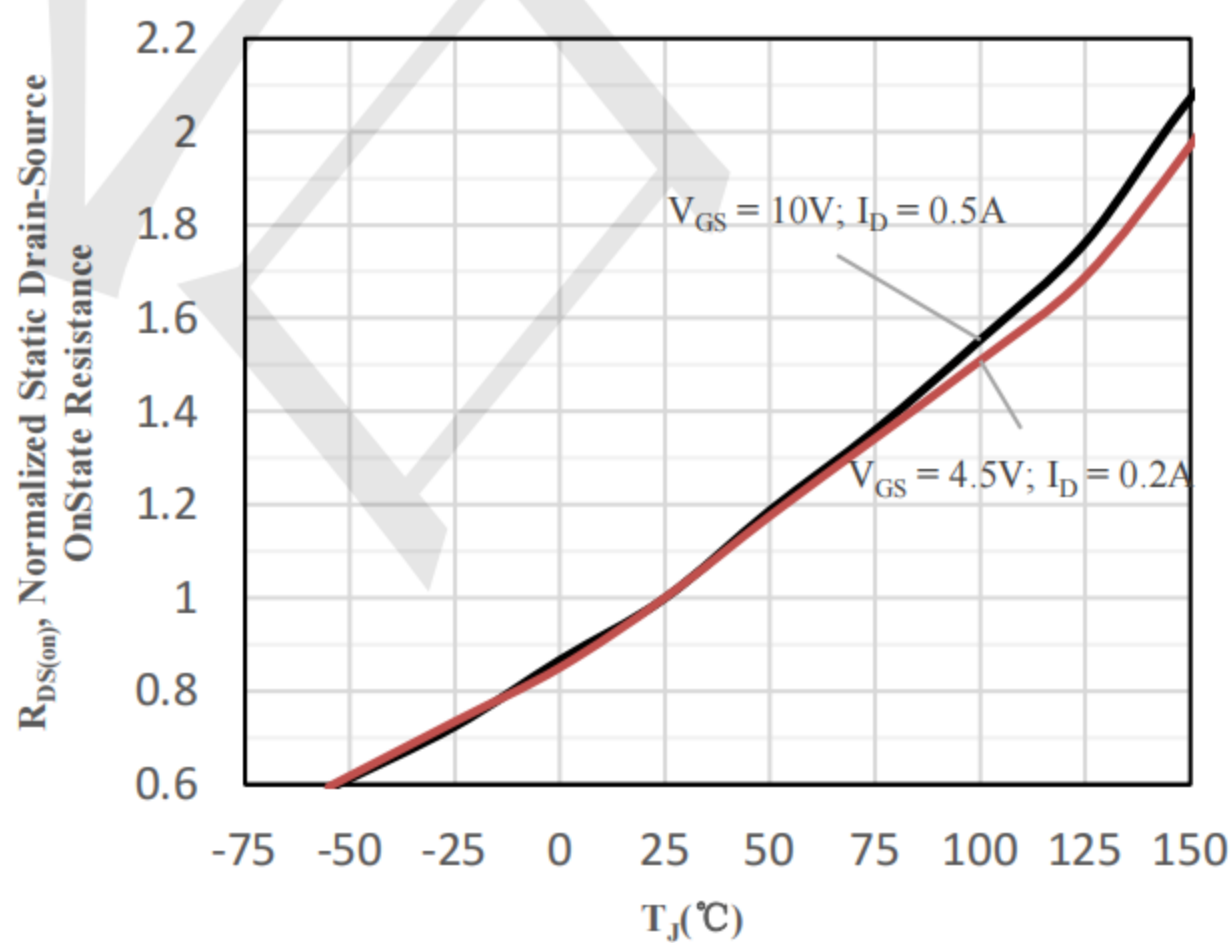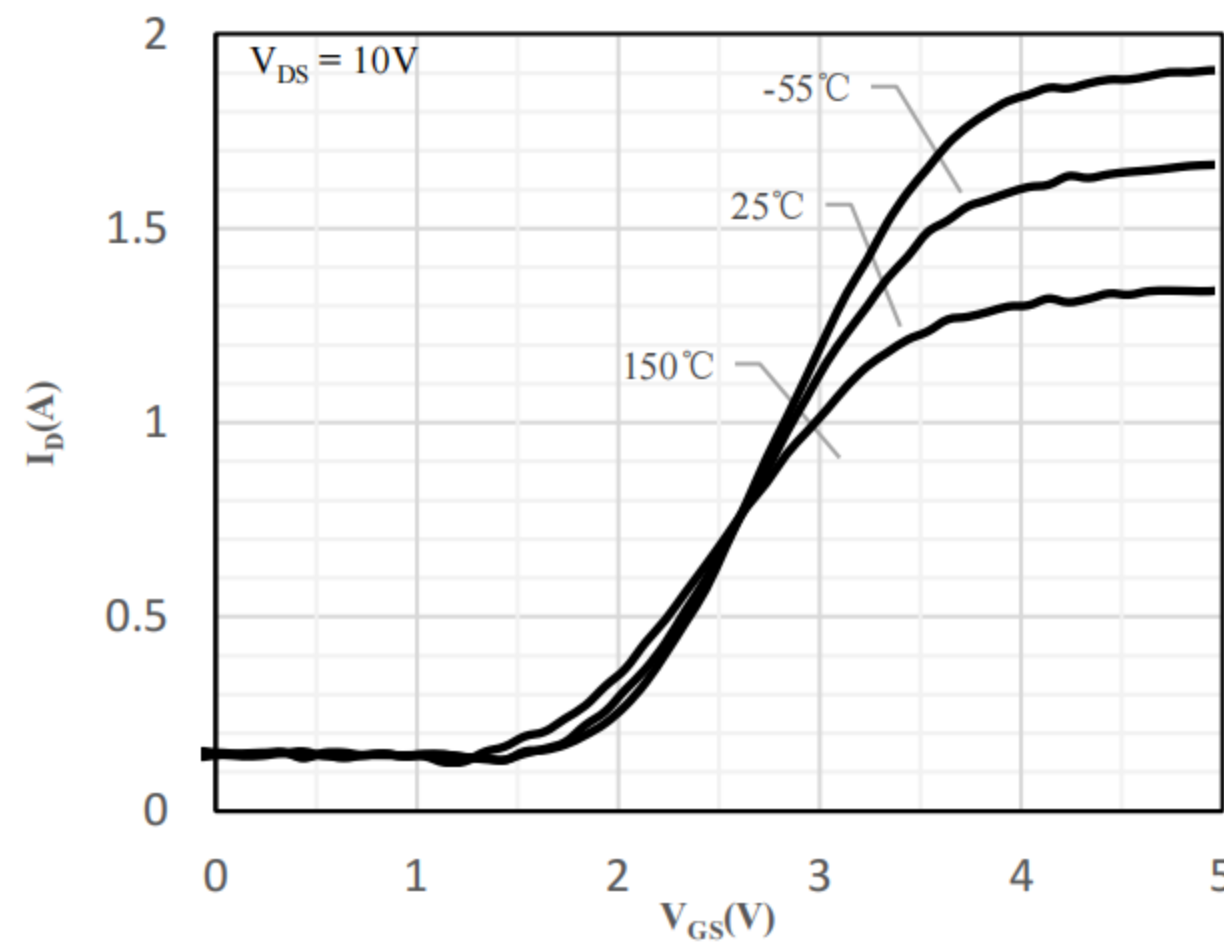Fig 5    Normalized On-Resistance vs. Junction

Fig 6    Transfer Characteristics

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## Typical Performance Characteristics ($T_A$=25°C unless otherwise Specified)



**Fig 7   Capacitance Characteristics**
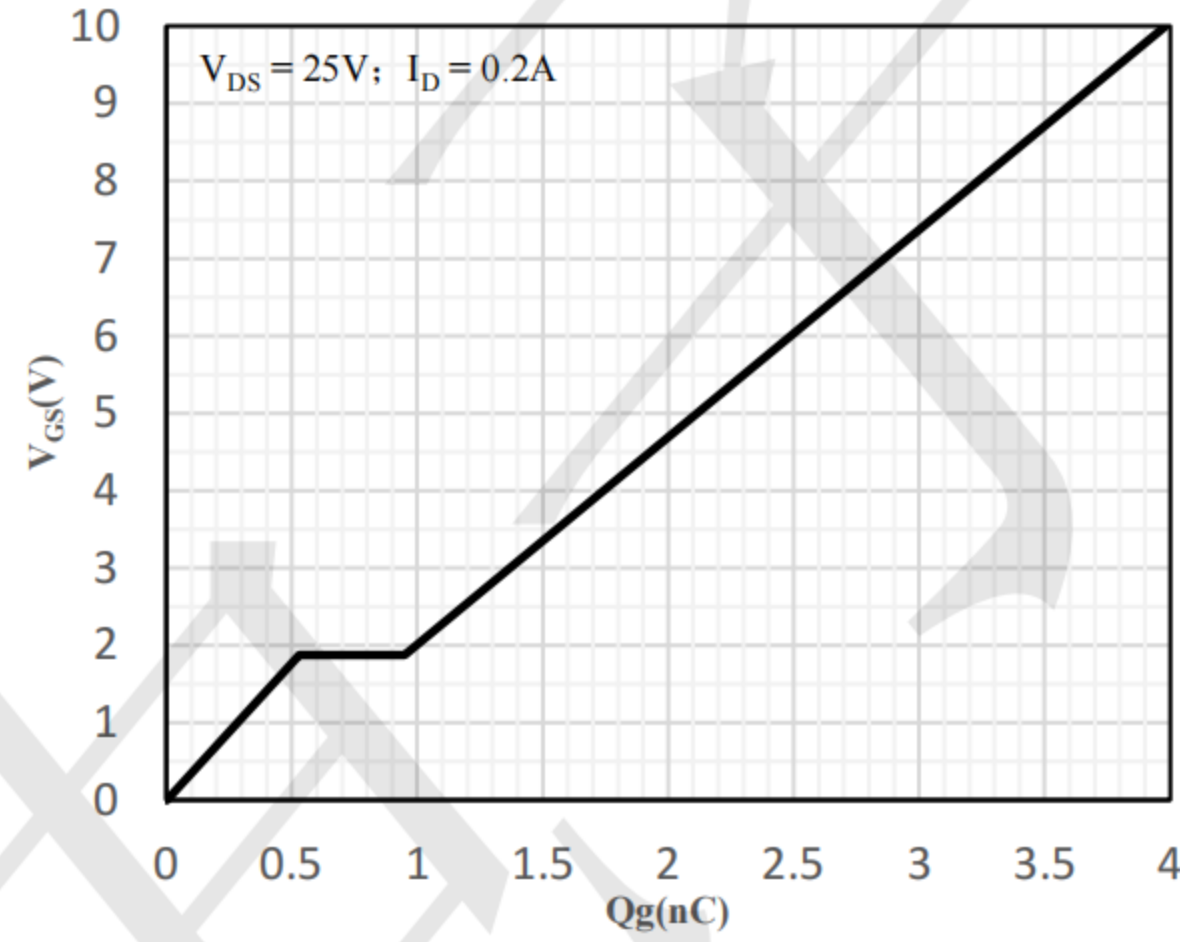


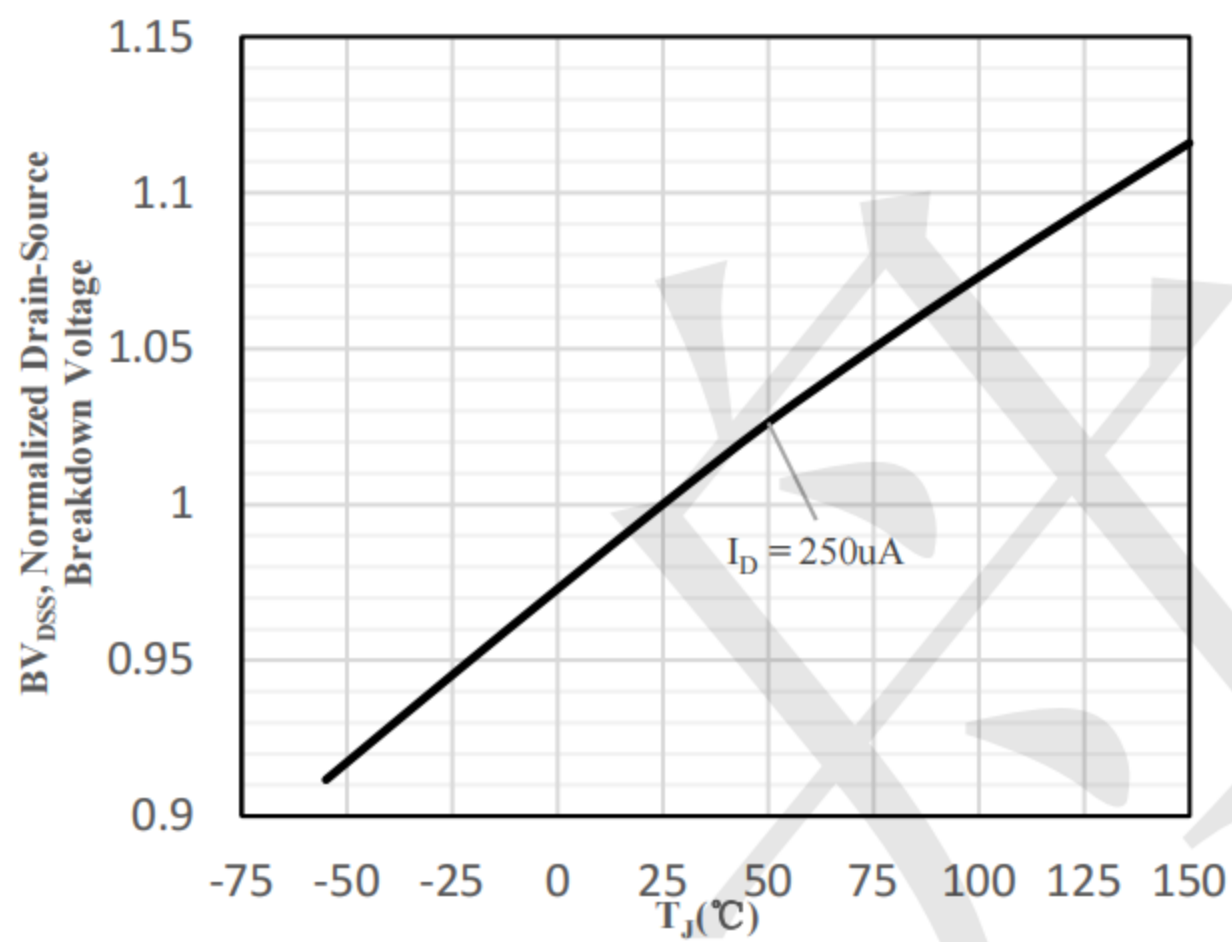**Fig 8   Gate-Charge Characteristics**



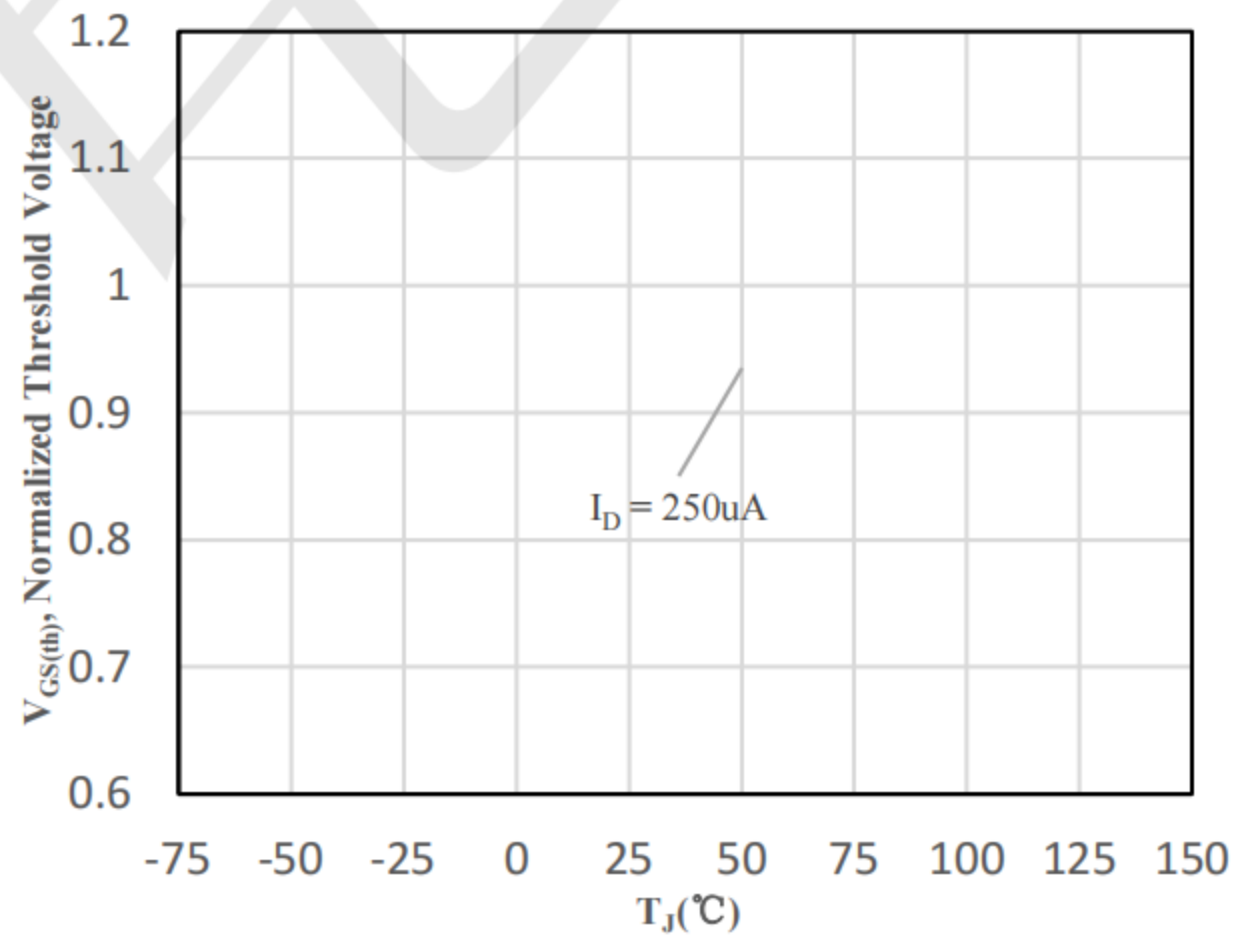**Fig 9   Normalized Breakdown Voltage vs. Junction Temperature**
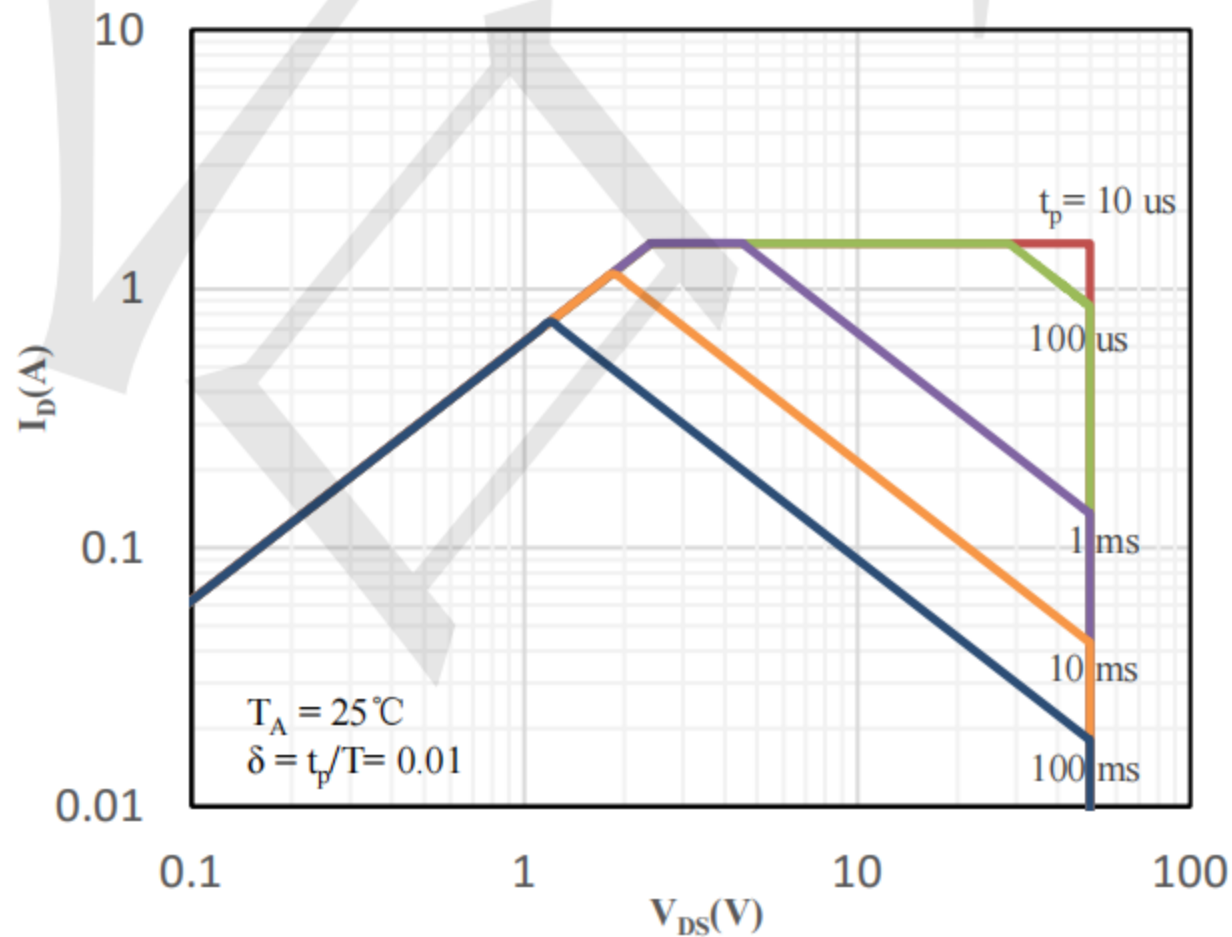


**Fig 10   Normalized $V_{GS(th)}$ vs. Junction Temperature**
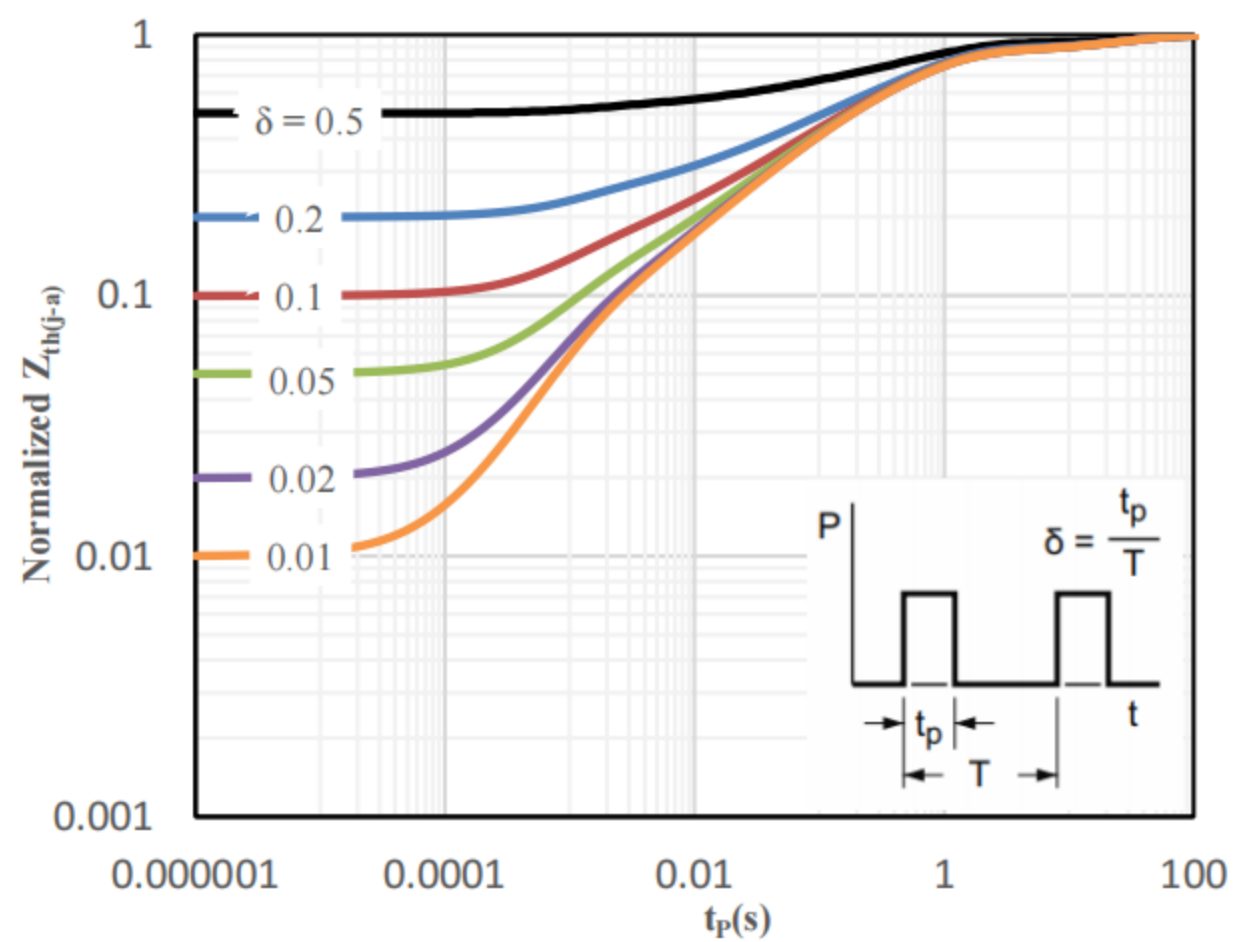


**Fig 11   Safe Operation Area**



**Fig 12   Normalized Maximum transient thermal impedance**

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## Outline Drawing - SOT323(unit: mm)

| SOT-323 | | |
|---|---|---|
| **Dimension** | **Min.** | **Max.** |
| A | 2.00 | 2.20 |
| B | 1.15 | 1.35 |
| C | 0.90 | 1.10 |
| D | 0.15 | 0.35 |
| E | 0.25 | 0.40 |
| G | 1.20 | 1.40 |
| H | 0.02 | 0.10 |
| J | 0.05 | 0.15 |
| K | 2.20 | 2.40 |

## Mounting Pad Layout-SOT323(unit: mm)

0.65  0.65

1.90

0.90

0.70