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# TPM2021NEC3

**N-Channel Enhancement Mode MOSFET**

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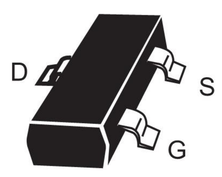
## Features

- Surface Mount Package
- N-Channel Switch with Low $R_{DS(on)}$
- Operated at Low Logic Level Gate Drive
- ESD Protected
-

## Application

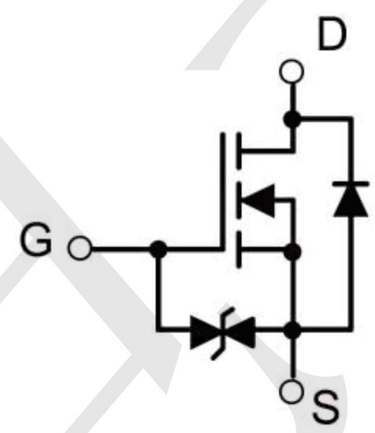
- Load/Power Switching
- Interfacing Switching
- Battery Management for Ultra Small Portable Electronics
- Logic Level Shift

## Package and Pin Configuration




SOT323

**Circuit diagram**




# Marking: 21P

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

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-Source Voltage | $V_{GS}$ | ±10 | V |
| Continuous Drain Current | $I_D$ | 0.7 | A |
| Pulsed Drain Current (t=300μs) (1) | $I_{DM}$ | 1.8 | A |
| Power Dissipation (2) | $P_D$ | 100 | mW |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 833 | ℃/W |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | ℃ |

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

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 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 | $I_{GSS}$ | $V_{GS}$ =±10V, $V_{DS}$ = 0V | | | ±10 | μA |
| Gate threshold voltage(3) | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =250μA | 0.35 | 0.75 | 1.1 | V |
| Drain-source on-resistance(3) | $R_{DS(on)}$ | $V_{GS}$ =4.5V, $I_D$ =650mA | | 130 | 250 | mΩ |
| | | $V_{GS}$ =2 5V $I_D$ =550mA | | 190 | 370 | |
| Forward tranconductance | $g_{FS}$ | $V_{DS}$ =10V, $I_D$ =500mA | | | 1.2 | S |
| **Dynamic characteristics**(4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =16V,$V_{GS}$ =0V,f =1MHz | | | 120 | pF |
| Output Capacitance | $C_{oss}$ | | | | 20 | |
| Reverse Transfer Capacitance | $C_{rss}$ | | | | 15 | |
| **Switching Characteristics**(4) | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=10V,$I_D$=500mA, $V_{GS}$=4.5V,$R_G$=10Ω | | 6.7 | | ns |
| Turn-on rise time | $t_r$ | | | 4.8 | | |
| Turn-off delay time | $t_{d(off)}$ | | | 17.3 | | |
| Turn-off fall time | $t_f$ | | | 7.4 | | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage(3) | $V_{DS}$ | $I_S$=0.15A, $V_{GS}$ = 0V | | | 1.2 | V |

## Characteristic Curves

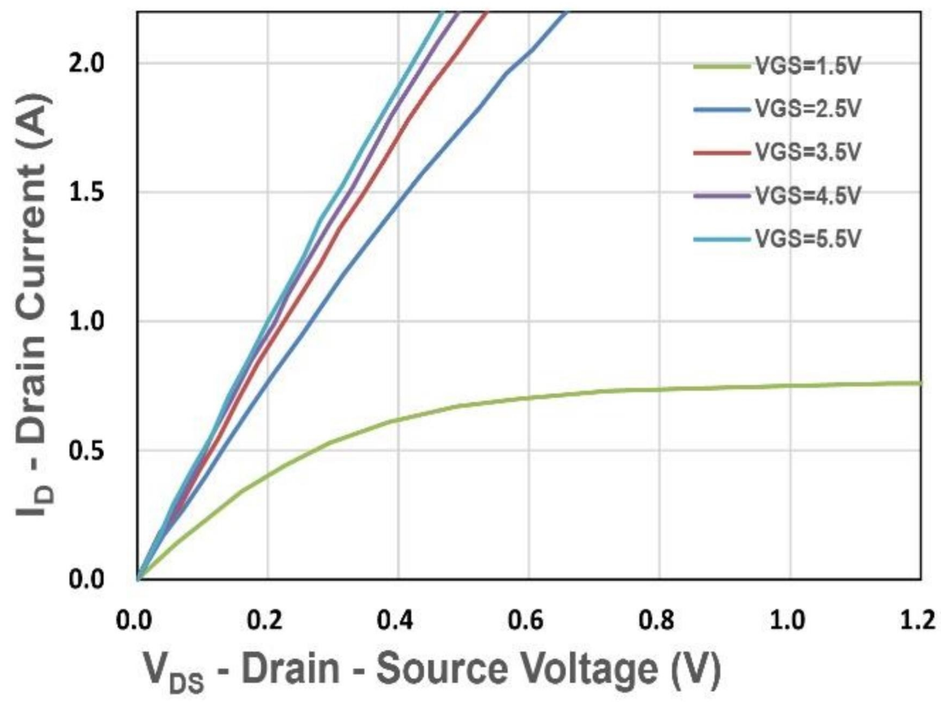



Figure 1. Output Characteristics

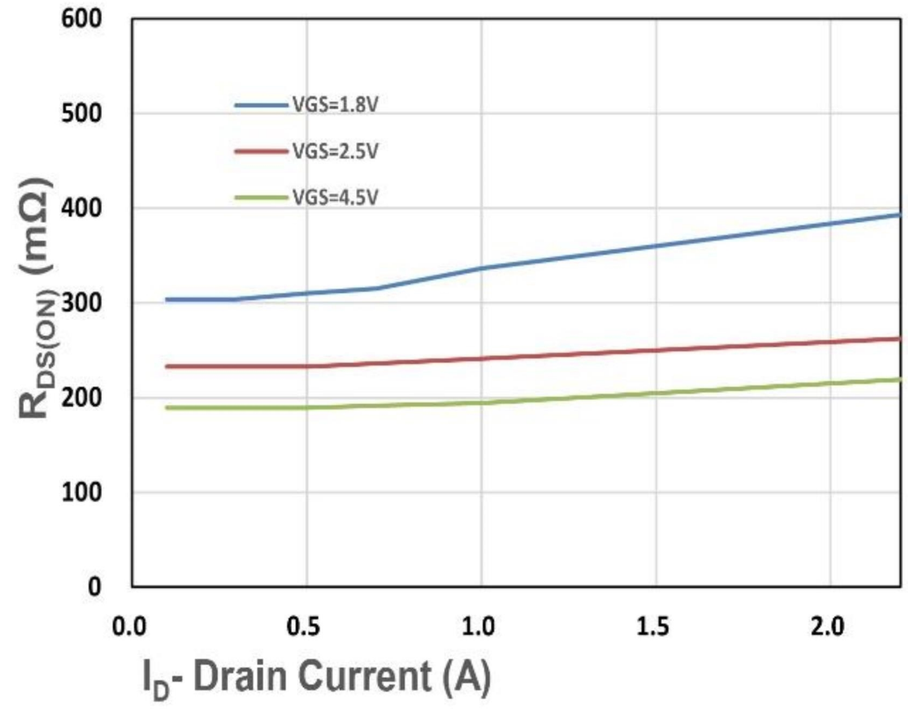



Figure 2. On-Resistance vs. ID

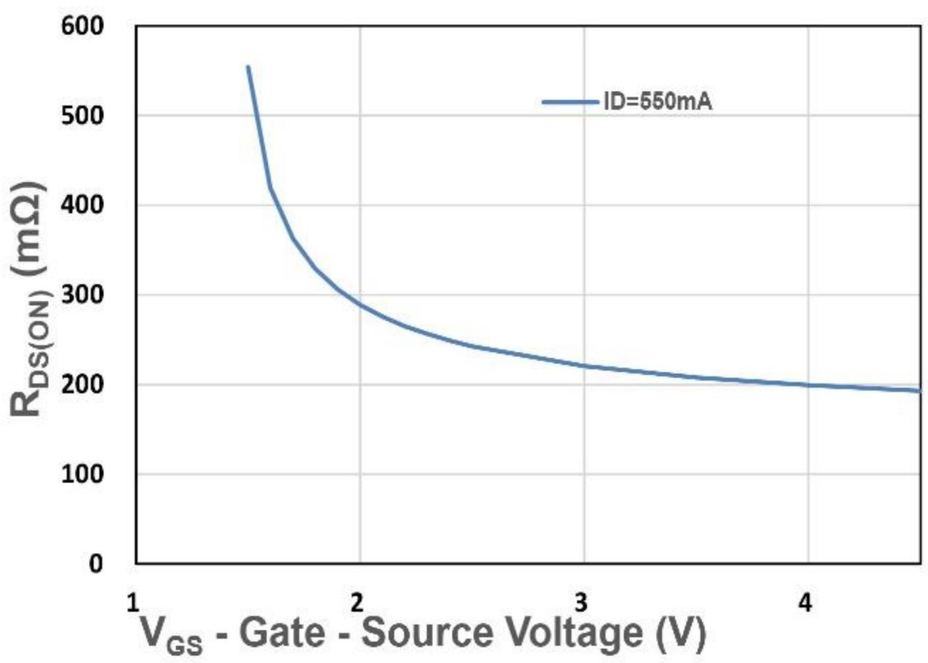



Figure 3. On-Resistance vs. VGS

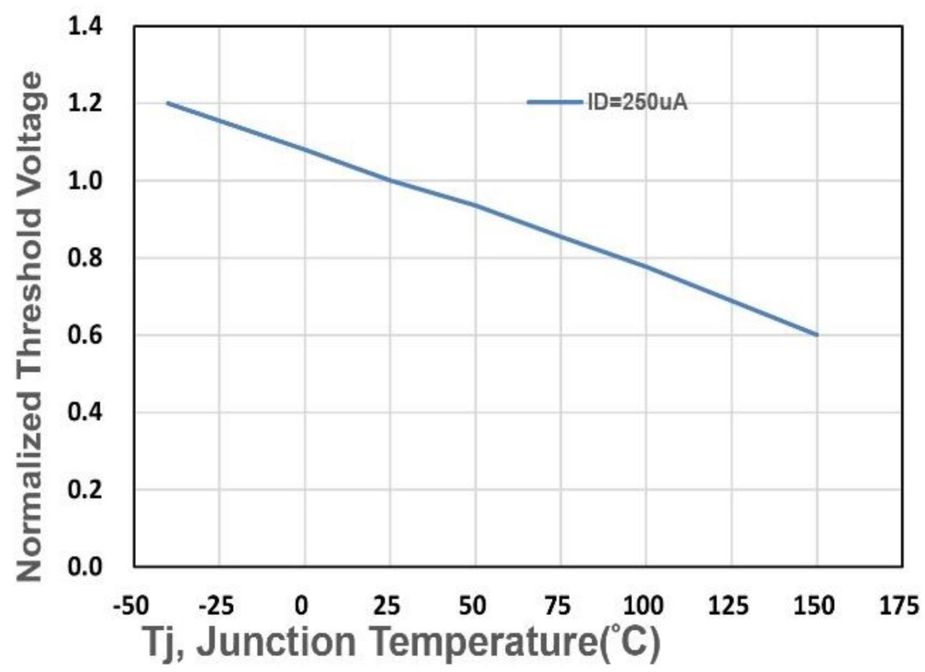



Figure 4. Gate Threshold Voltage

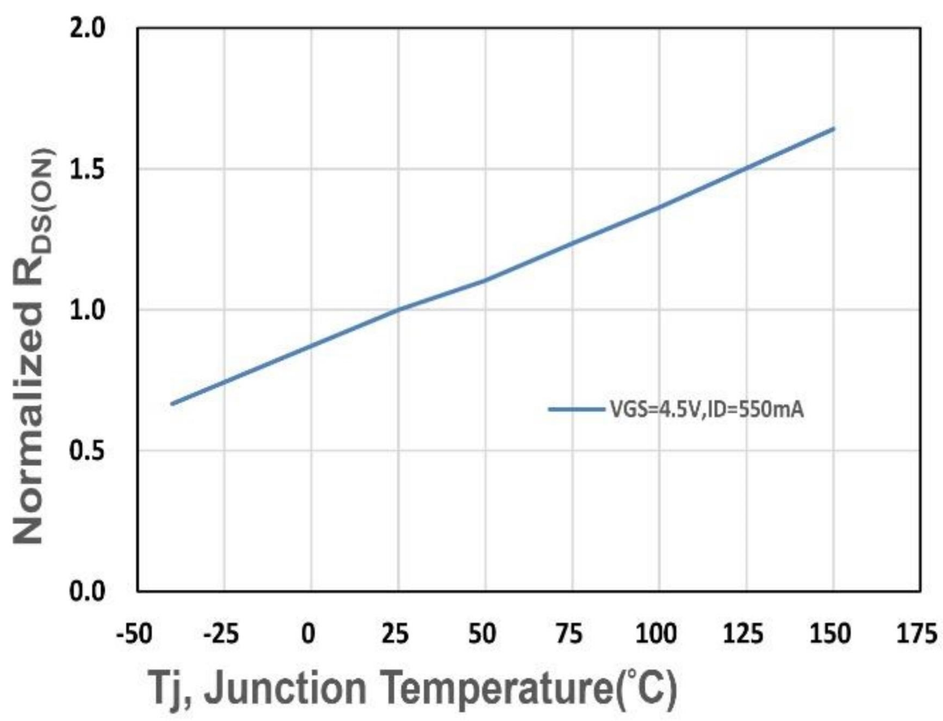



Figure 5. Drain-Source On Resistance

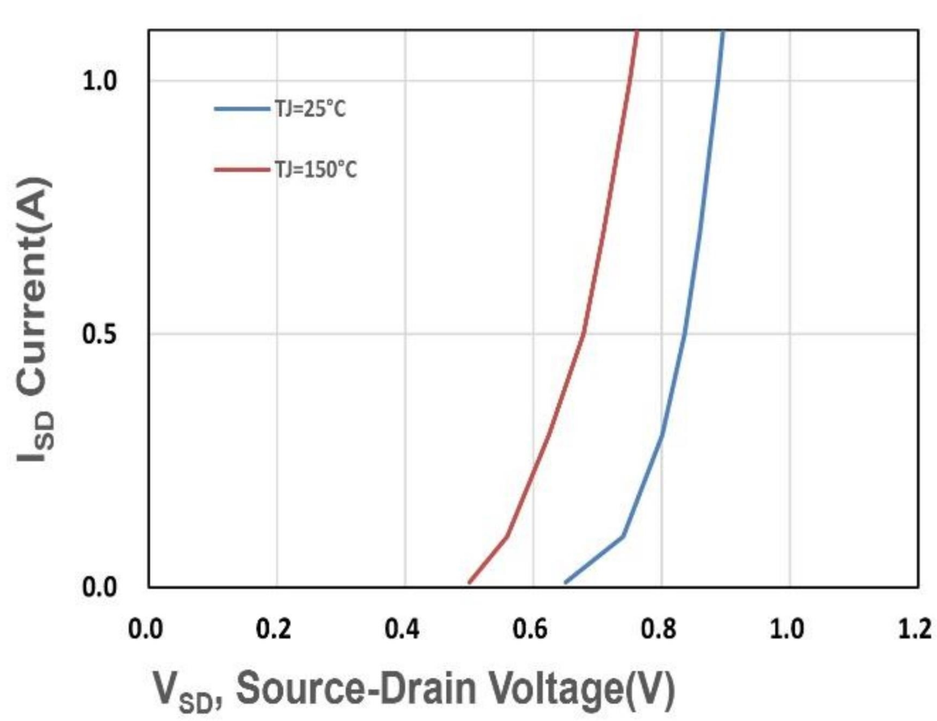



Figure 6. Source-Drain Diode Forward

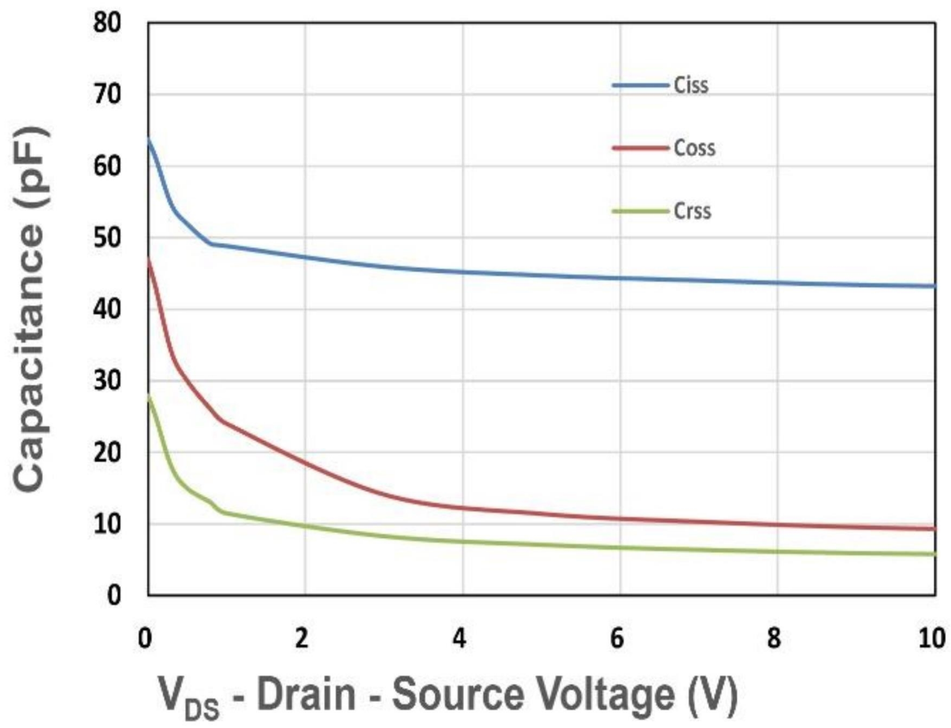



Figure 7. Capacitance

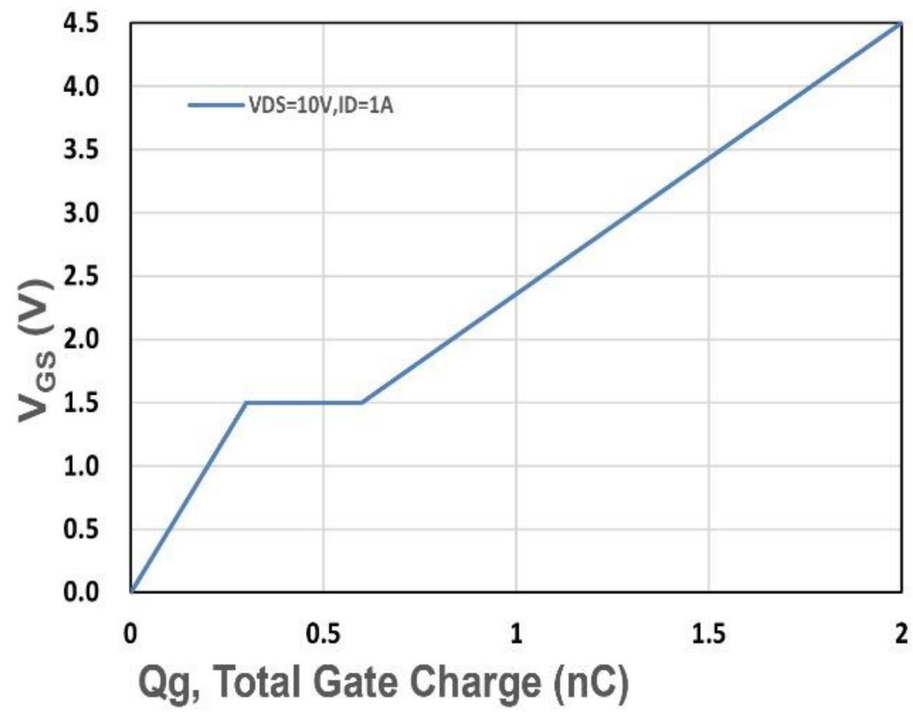



Figure 8. Gate Charge Characteristics

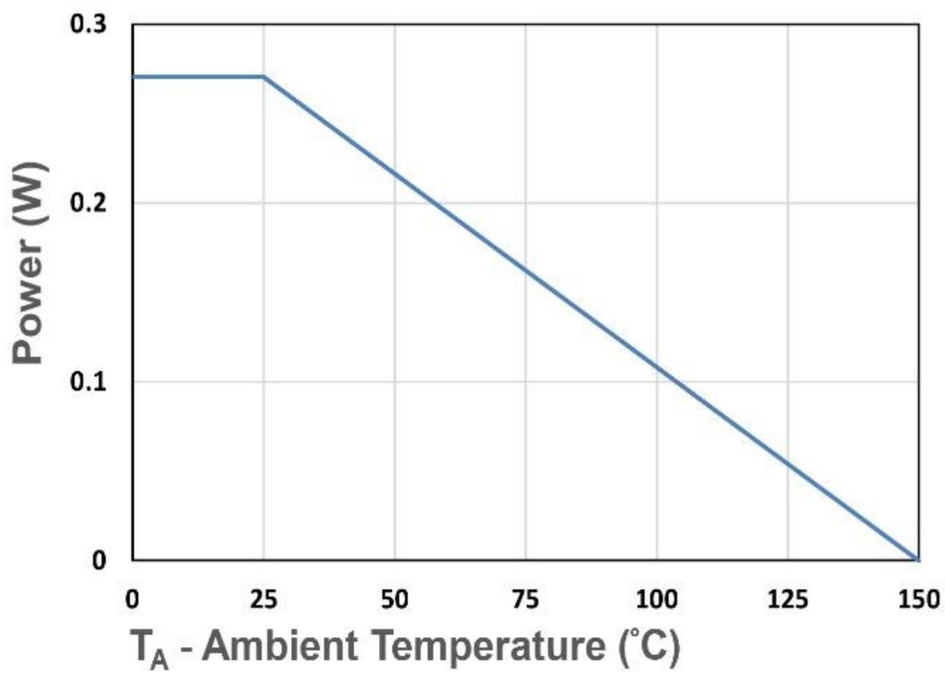



Figure 9. Power Dissipation

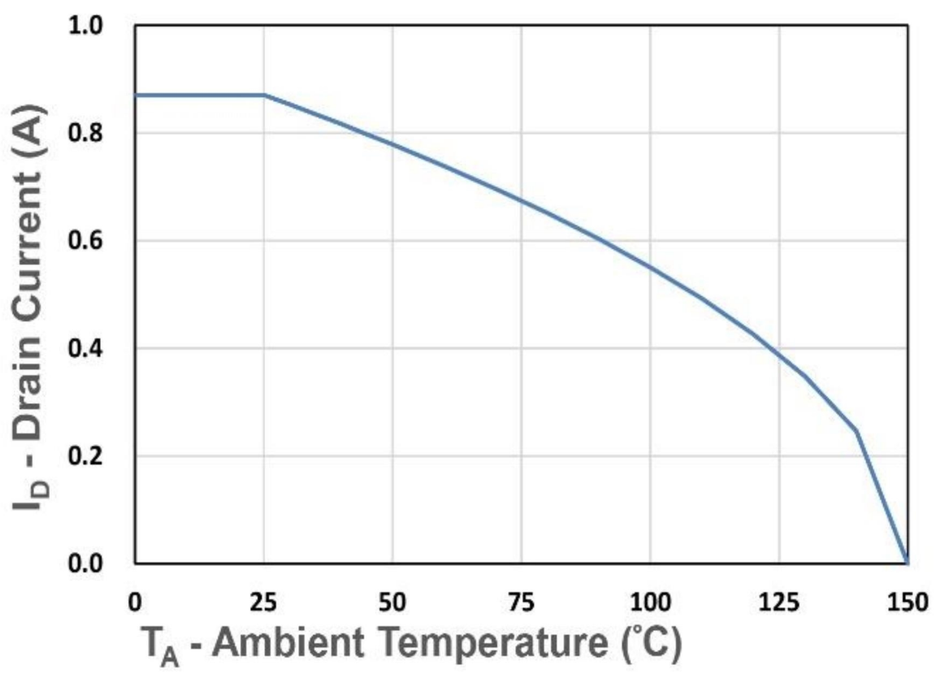



Figure 10. Drain Current

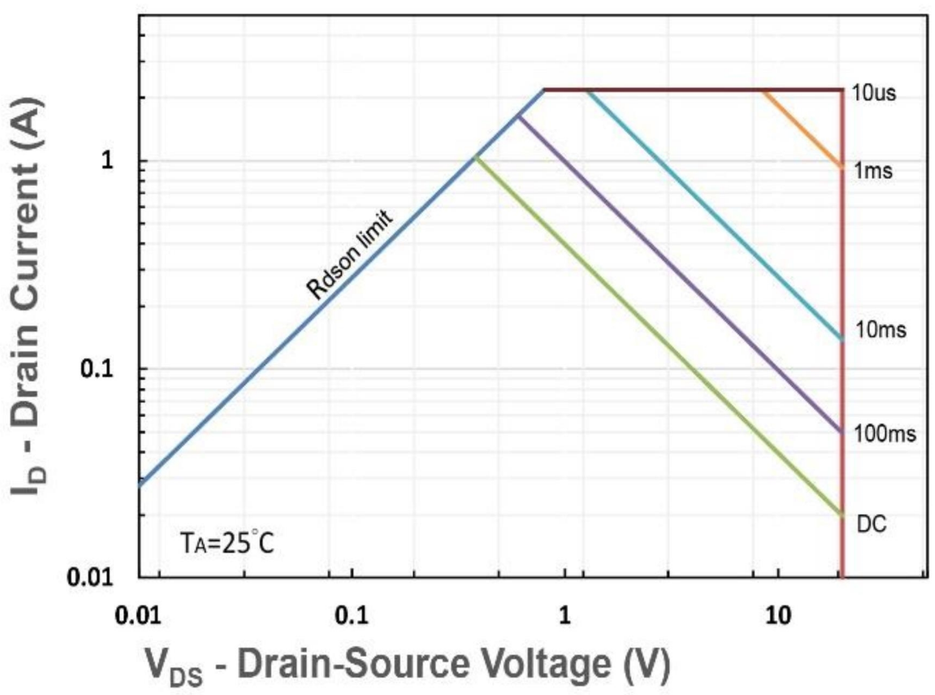



Figure 11. Safe Operating Area

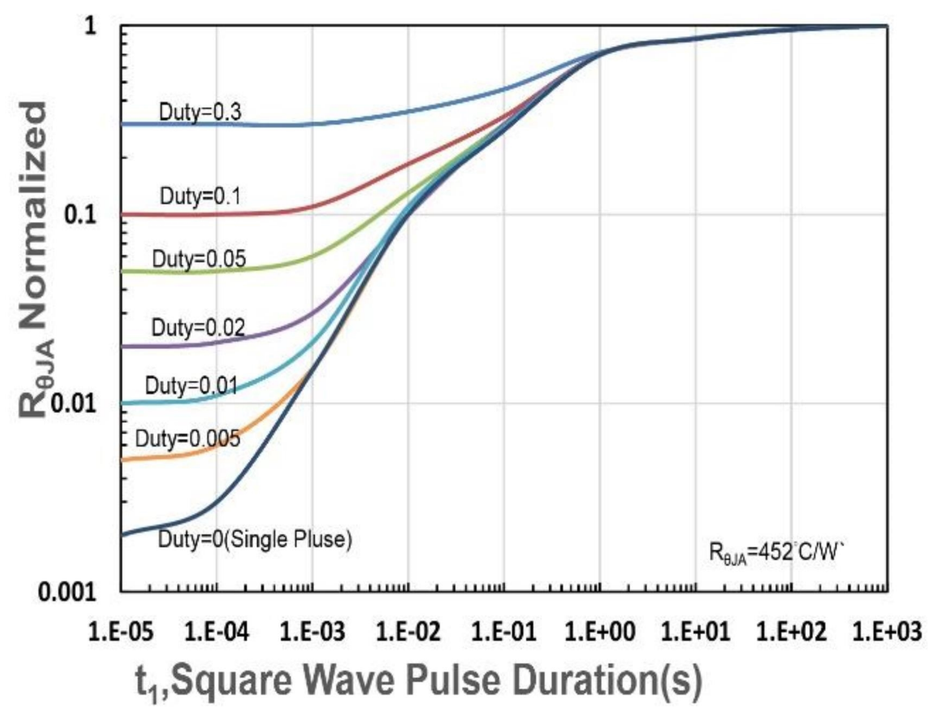
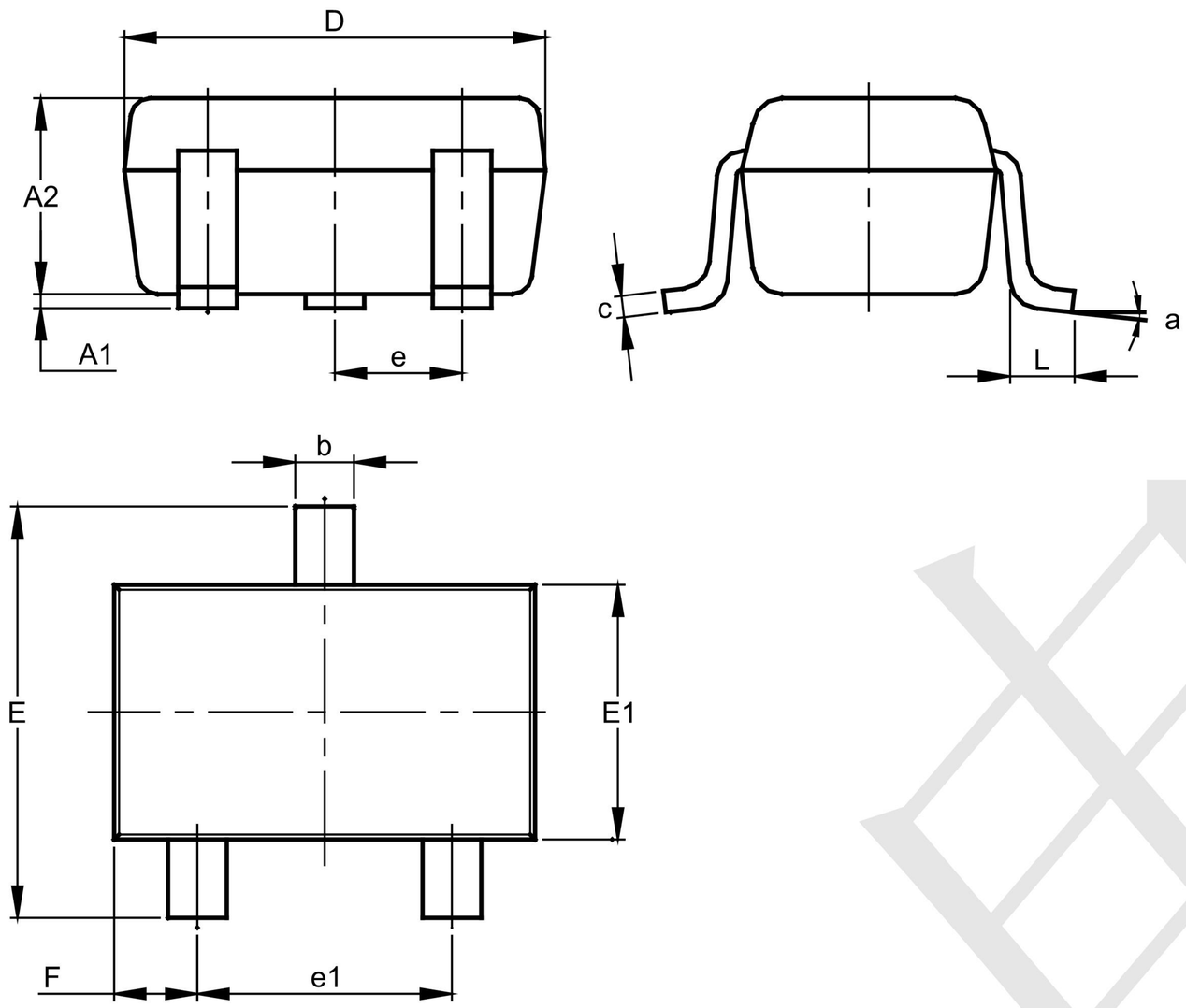


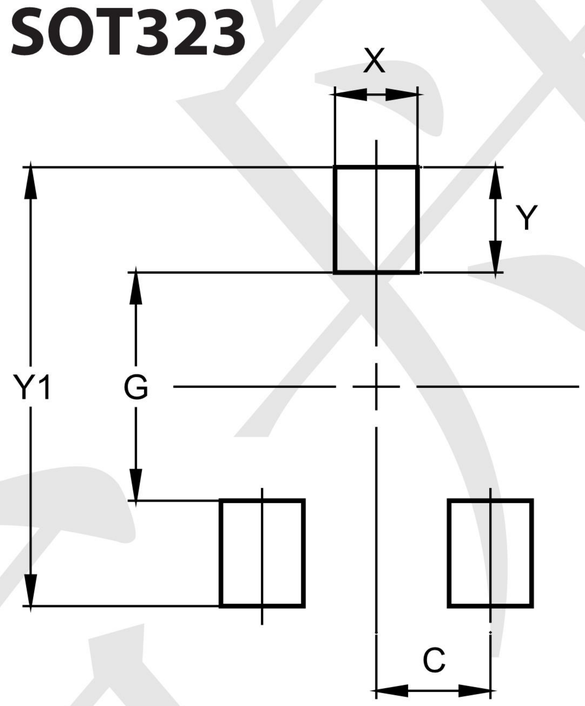

Figure 12. RθJA Transient Thermal Impedance

## Outline Drawing - SOT323(SC70-3)




| SOT323 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A1** | 0.00 | 0.10 | 0.05 |
| **A2** | 0.90 | 1.00 | 0.95 |
| **b** | 0.25 | 0.40 | 0.30 |
| **c** | 0.10 | 0.18 | 0.11 |
| **D** | 1.80 | 2.20 | 2.15 |
| **E** | 2.00 | 2.20 | 2.10 |
| **E1** | 1.15 | 1.35 | 1.30 |
| **e** | 0.650 BSC | | |
| **e1** | 1.20 | 1.40 | 1.30 |
| **F** | 0.375 | 0.475 | 0.425 |
| **L** | 0.25 | 0.40 | 0.30 |
| **a** | 0° | 8° | -- |
| **All Dimensions in mm** | | | |

## Land Pattern - SOT323




| Dimensions | Value (in mm) |
|---|---|
| **C** | 0.650 |
| **G** | 1.300 |
| **X** | 0.470 |
| **Y** | 0.600 |
| **Y1** | 2.500 |

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