## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ (MAX) | Package | $I_D$ (MAX) $T_A$ = +25°C |
|---|---|---|---|
| 30V | 220mΩ @ $V_{GS}$ = 4.5 V | SOT323 | 1.5A |
| | 300mΩ @ $V_{GS}$ = 2.5V | | 1A |

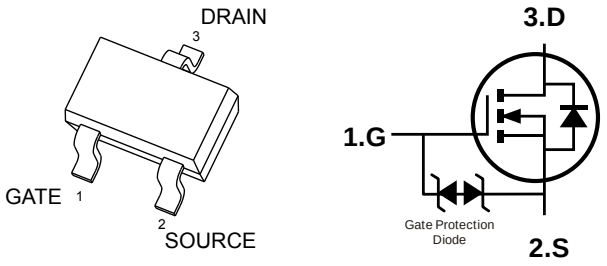
## Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(ON)}$)and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

## Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- ESD Protected Gate
- Totally Lead-Free & Fully RoHS Compliant (Notes 1)
- Halogen and Antimony Free. “Green” Device (Note 2)

## Package




**SOT-323**

## Applications

- Motor Control
- Power Management Functions
- Load Switch

## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | | $V_{DSS}$ | 30 | V |
| Gate-Source Voltage | | | $V_{GSS}$ | ±10 | V |
| Continuous Drain Current (Note 6) $V_{GS}$ = 10V | Steady State | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 1000<br>900 | mA |
| | t < 5s | $T_A$ = +25°C<br>$T_A$ = +70°C | $I_D$ | 1300<br>1000 | mA |
| Maximum Continuous Body Diode Forward Current (Note 5) | | | $I_S$ | 0.5 | A |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%) | | | $I_{DM}$ | 9.6 | A |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | | Symbol | Value | Unit |
|---|---|---|---|---|
| Total Power Dissipation (Note 5) | $T_A$ = +25°C | $P_D$ | 0.32 | W |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State | $R_{\theta JA}$ | 395 | °C/W |
| Total Power Dissipation (Note 6) | $T_A$ = +25°C | $P_D$ | 0.35 | W |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State | $R_{\theta JA}$ | 320 | °C/W |
| Thermal Resistance, Junction to Case | | $R_{\theta JC}$ | 143 | |
| Operating and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to +150 | °C |

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS (Note 7)** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 1mA |
| Zero Gate Voltage Drain Current @$T_C$ = +25°C | $I_{DSS}$ | — | — | 1 | μA | $V_{DS}$ = 18V, $V_{GS}$ = 0V |
| Gate-Source Leakage | $I_{GSS}$ | — | — | ±10 | μA | $V_{GS}$ = ±10V, $V_{DS}$ = 0V |
| **ON CHARACTERISTICS (Note 7)** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | 0.7 | — | 2.0 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | — | 160 | 220 | mΩ | $V_{GS}$ = 4.5V, $I_D$ = 1.5A |
| | | — | 240 | 300 | | $V_{GS}$ = 2.5V, $I_D$ = 1.0A |
| Diode Forward Voltage | $V_{SD}$ | — | — | 1.2 | V | $V_{GS}$ = 0V, $I_S$ = 250mA |
| **DYNAMIC CHARACTERISTICS (Note 8)** | | | | | | |
| Input Capacitance | $C_{iss}$ | — | 87 | — | pF | $V_{DS}$ = 20V, $V_{GS}$ = 0V, f = 1.0MHz |
| Output Capacitance | $C_{oss}$ | — | 17 | — | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | — | 12 | — | pF | |
| Gate Resistance | $R_g$ | — | 69.8 | — | Ω | f = 1MHz, $V_{GS}$ = 0V, $V_{DS}$ = 0V |
| Total Gate Charge ($V_{GS}$ = 4.5V) | $Q_g$ | — | 0.9 | — | nC | $V_{DS}$ = 10V, $I_D$ = 250mA |
| Total Gate Charge ($V_{GS}$ = 10V) | $Q_g$ | — | 2.0 | — | nC | |
| Gate-Source Charge | $Q_{gs}$ | — | 0.3 | — | nC | |
| Gate-Drain Charge | $Q_{gd}$ | — | 0.3 | — | nC | |
| Turn-On Delay Time | $t_{D(ON)}$ | — | 4.5 | — | ns | $V_{DD}$ = 30V, $V_{GS}$ = 10V, $R_G$ = 10Ω, $I_D$ = 100mA |
| Turn-On Rise Time | $t_R$ | — | 8.9 | — | ns | |
| Turn-Off Delay Time | $t_{D(OFF)}$ | — | 30.3 | — | ns | |
| Turn-Off Fall Time | $t_F$ | — | 15.6 | — | ns | |

Notes: 5. Device mounted on FR-4 PCB, with minimum recommended pad layout.
6. Device mounted on 1"×1" FR-4 PCB with high coverage 2oz. Copper, single sided.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to product testing.

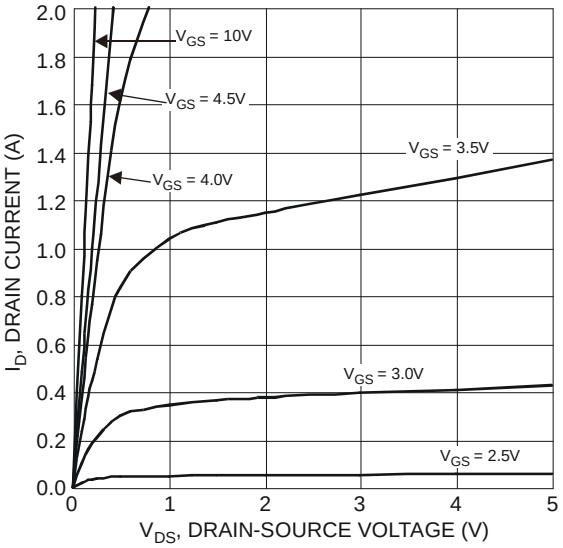


Figure 1 Typical Output Characteristic

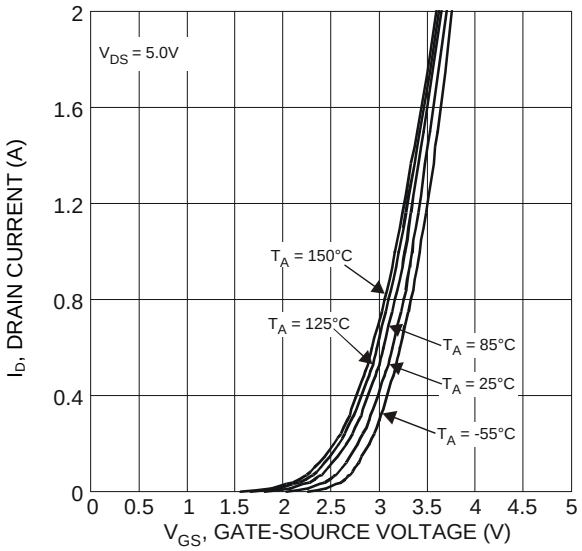


Figure 2 Typical Transfer Characteristics

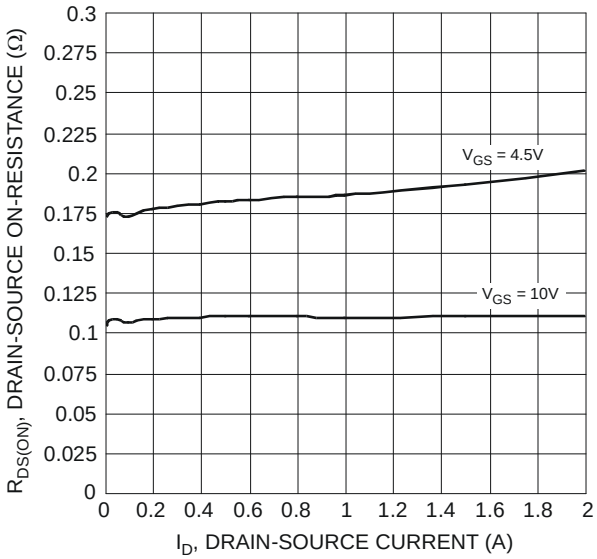


Figure 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

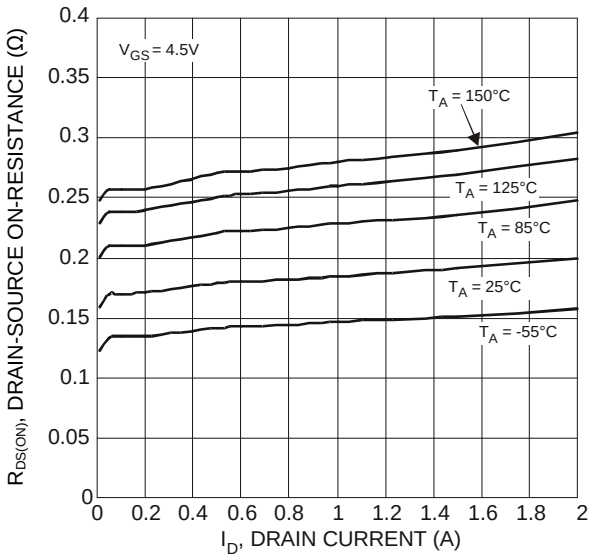


Figure 4 Typical On-Resistance vs.
Drain Current and Temperature

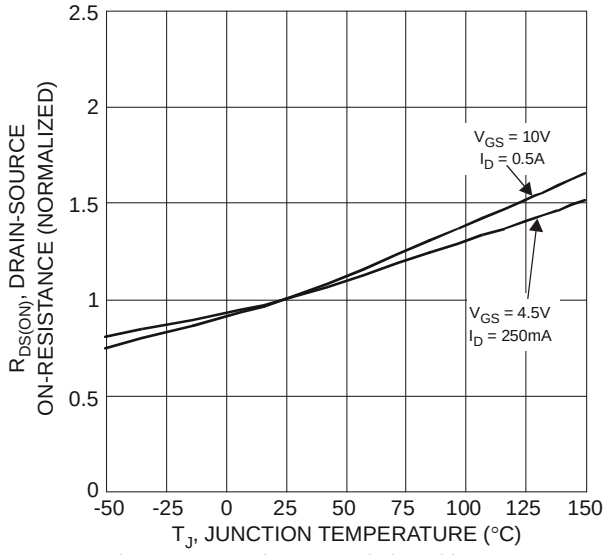


Figure 5 On-Resistance Variation with Temperature

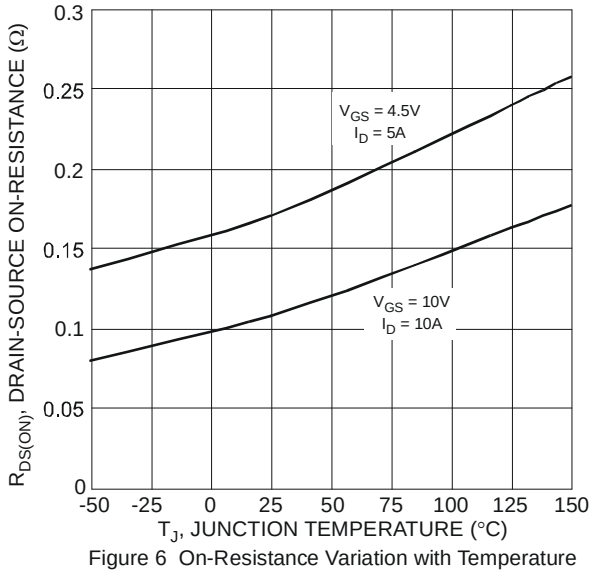


Figure 6 On-Resistance Variation with Temperature

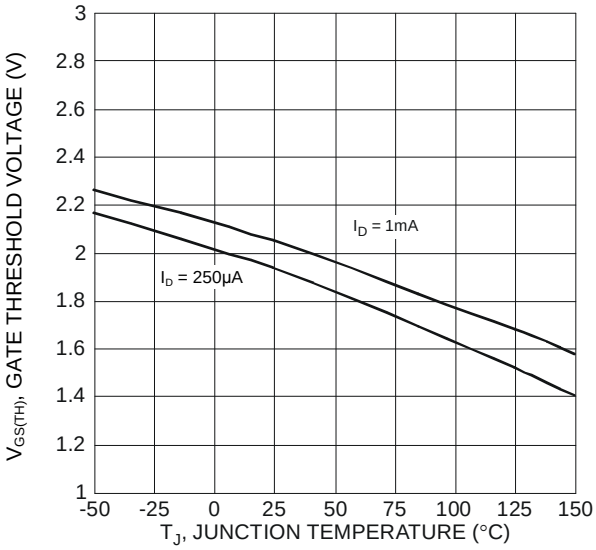



Figure 7 Gate Threshold Variation vs. Junction Temperature

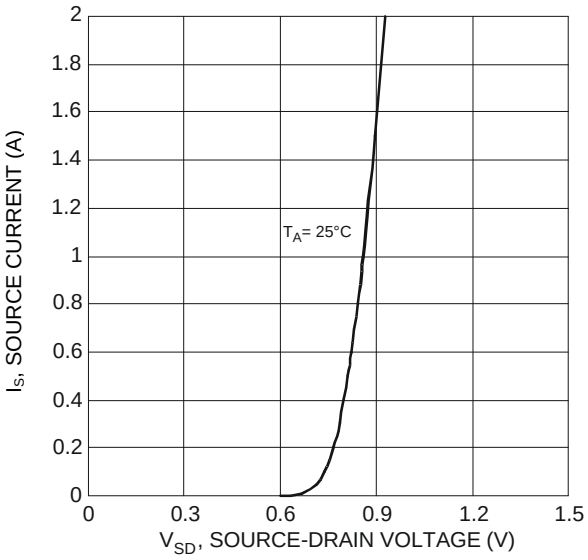



Figure 8 Diode Forward Voltage vs. Current

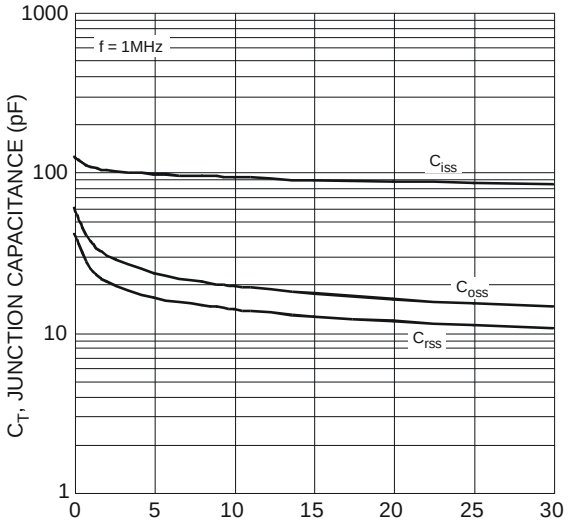



Figure 9 Typical Junction Capacitance

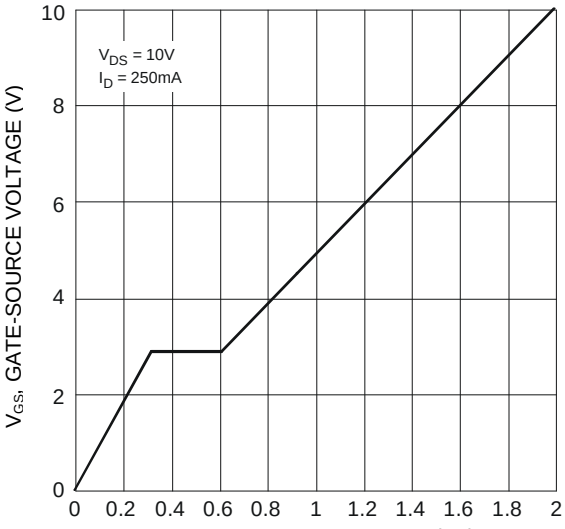



Figure 10 Gate Charge

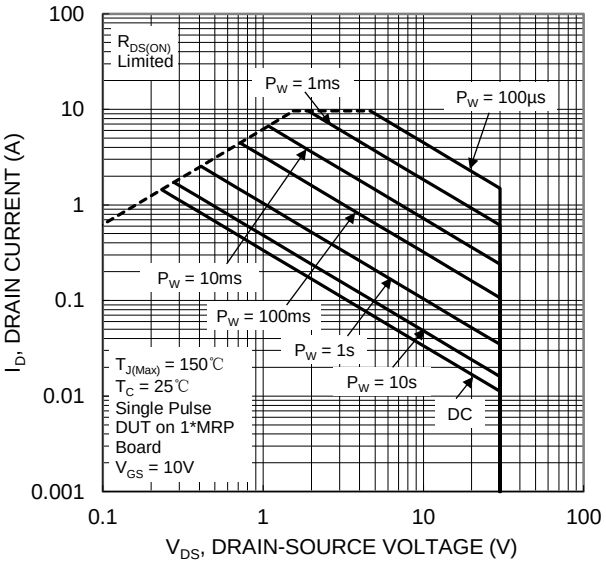
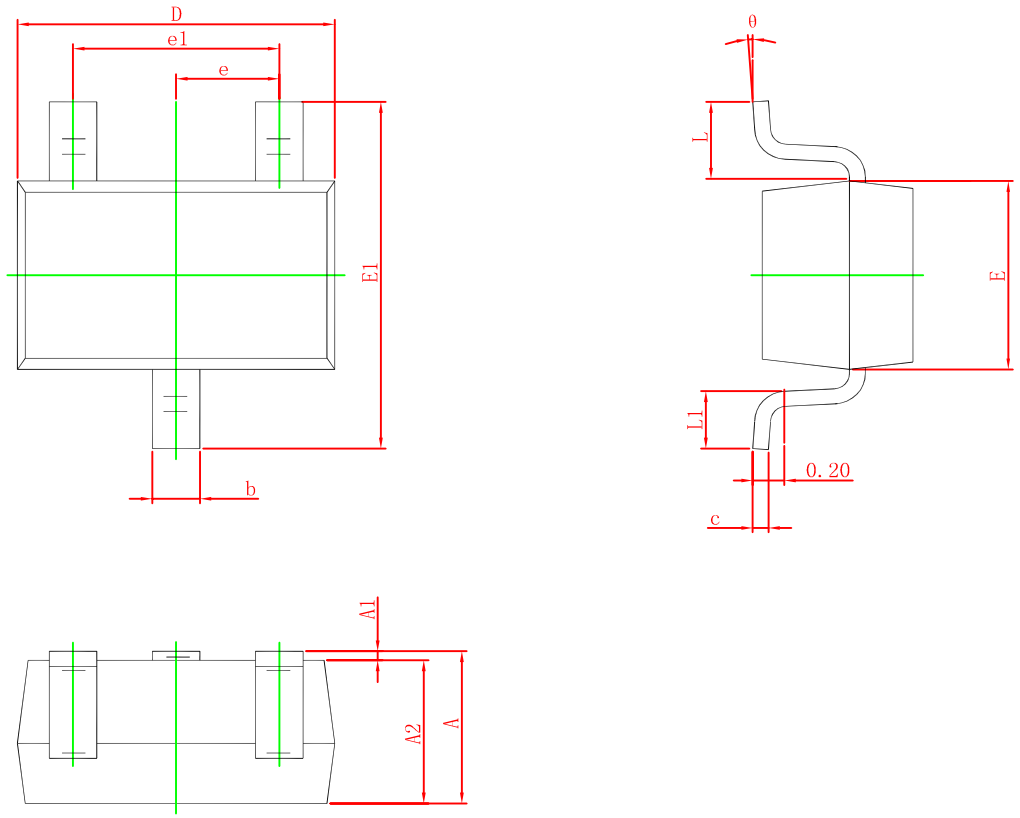



Figure 11 SOA, Safe Operation Area

## SOT-323 PACKAGE OUTLINE DIMENSIONS




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.100 | 0.035 | 0.043 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.000 | 0.035 | 0.039 |
| b | 0.200 | 0.400 | 0.008 | 0.016 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.000 | 2.200 | 0.079 | 0.087 |
| E | 1.150 | 1.350 | 0.045 | 0.053 |
| E1 | 2.150 | 2.450 | 0.085 | 0.096 |
| e | 0.650 TYP. | | 0.026 TYP. | |
| e1 | 1.200 | 1.400 | 0.047 | 0.055 |
| L | 0.525 REF. | | 0.021 REF. | |
| L1 | 0.260 | 0.460 | 0.010 | 0.018 |
| θ | 0° | 8° | 0° | 8° |