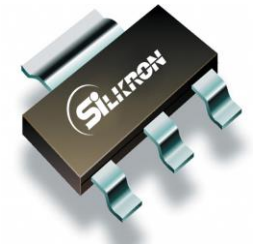
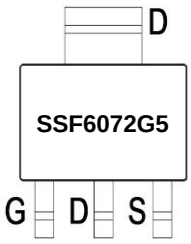
## Main Product Characteristics:

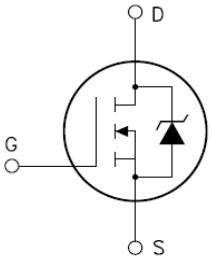
| | |
|---|---|
| $V_{DSS}$ | 60V |
| $R_{DS}$(on) | 67mΩ (typ.) |
| $I_D$ | 4A |



SOT-223




Marking and Pin Assignments




Schematic Diagram

## Features and Benefits:

- Advanced MOSFET process technology
- Special designed for DC-DC and DC-AC converters, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150℃ operating temperature

## Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in DC-DC and DC-AC converters and a wide variety of other applications.

## Absolute max Rating:

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ TC = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V① | 4 | A |
| $I_D$ @ TC = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V① | 3 | |
| $I_{DM}$ | Pulsed Drain Current② | 16 | |
| $P_D$ @TC = 25°C | Power Dissipation③ | 3.3 | W |
| $V_{DS}$ | Drain-Source Voltage | 60 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy @ L=0.3mH | 15 | mJ |
| $I_{AS}$ | Avalanche Current @ L=0.3mH | 10 | A |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to +150 | °C |

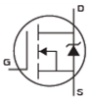
## Thermal Resistance

| Symbol | Characterizes | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JA}$ | Junction-to-ambient (t ≤ 10s) ④ | — | 38 | ℃/W |
| | Junction-to-Ambient (PCB mounted, steady-state) ④ | — | 35 | ℃/W |

## Electrical Characterizes @$T_A$=25℃ unless otherwise specified

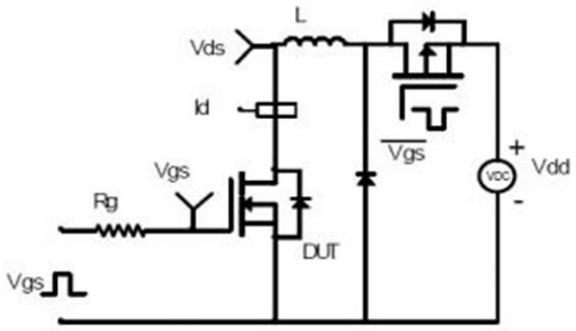
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 60 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250μA |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 67 | 100 | mΩ | $V_{GS}$=10V,$I_D$ = 1.5A |
| | | — | 76 | 115 | | $V_{GS}$=5V,$I_D$ = 1.5A |
| $V_{GS(th)}$ | Gate threshold voltage | 1 | — | 2.5 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| $I_{DSS}$ | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS}$ = 60V,$V_{GS}$ = 0V |
| | | — | — | 10 | | $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS}$ =20V |
| | | — | — | -100 | | $V_{GS}$ = -20V |
| gfs | Forward Transconductance | 1 | — | — | S | $V_{DS}$ = 15 V $I_D$ = 1.5A |
| $Q_g$ | Total gate charge | — | 12 | — | nC | $I_D$ = 4A, |
| $Q_{gs}$ | Gate-to-Source charge | — | 3.5 | — | | $V_{DS}$=40V, |
| $Q_{gd}$ | Gate-to-Drain("Miller") charge | — | 3.7 | — | | $V_{GS}$ =10V |
| $t_{d(on)}$ | Turn-on delay time | — | 9.2 | — | ns | $V_{GS}$=10V, VDS=25V, $R_{GEN}$=50Ω， $I_D$ = 1.2A, |
| $t_r$ | Rise time | — | 16.7 | — | | |
| $t_{d(off)}$ | Turn-Off delay time | — | 35.4 | — | | |
| $t_f$ | Fall time | — | 8.6 | — | | |
| $C_{iss}$ | Input capacitance | — | 582 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output capacitance | — | 49 | — | | $V_{DS}$ = 30V |
| $C_{rss}$ | Reverse transfer capacitance | — | 36 | — | | $f$ = 1MHz |

## Source-Drain Ratings and Characteristics

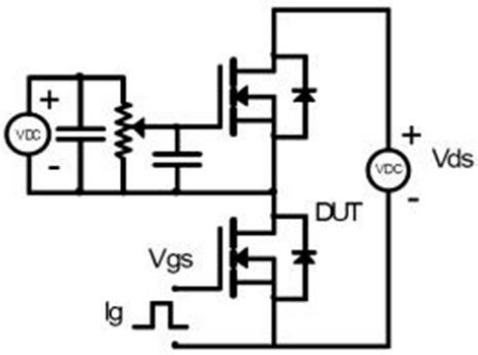
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 4 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) | — | — | 16 | A | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.5 | V | $I_S$=4A, $V_{GS}$=0V |

## Test circuits and Waveforms

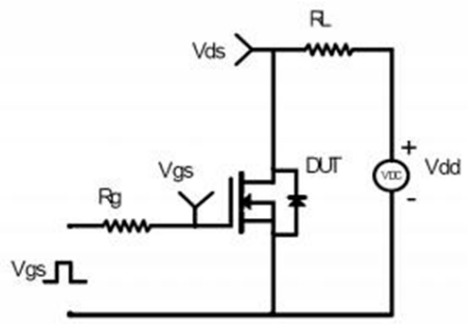
EAS Test Circuit:



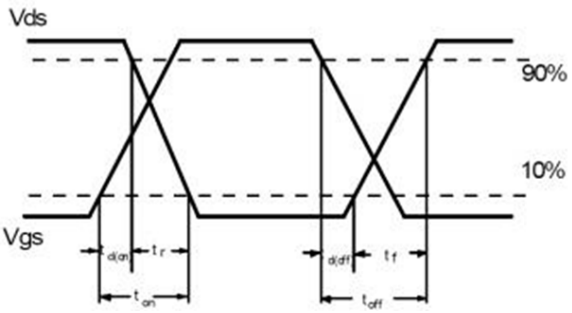

Gate Charge Test Circuit:




Switching Time Test Circuit:




Switching Waveforms:




## Notes:

①The maximum current rating is limited by bond-wires.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to- ambient thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

## Typical Electrical and Thermal Characteristics

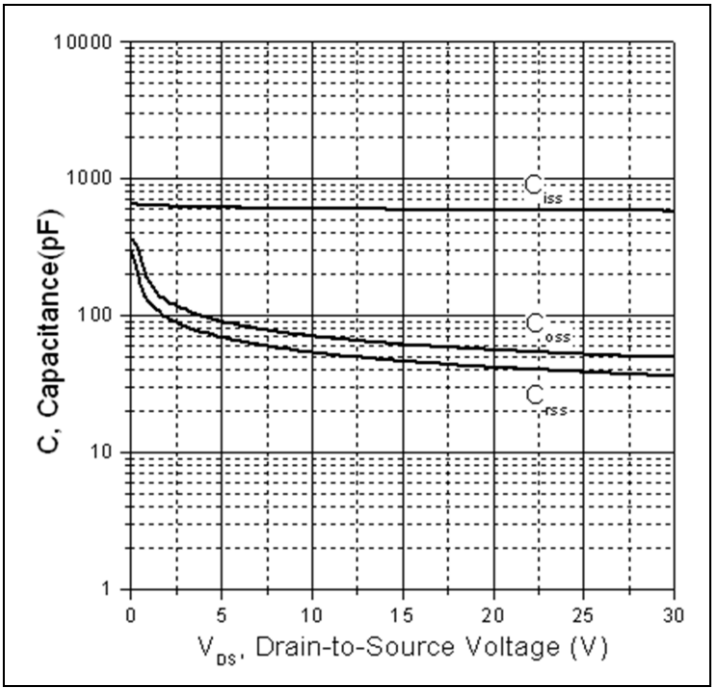



Figure 1. Typical Capacitance vs. Drain-to-Source Voltage

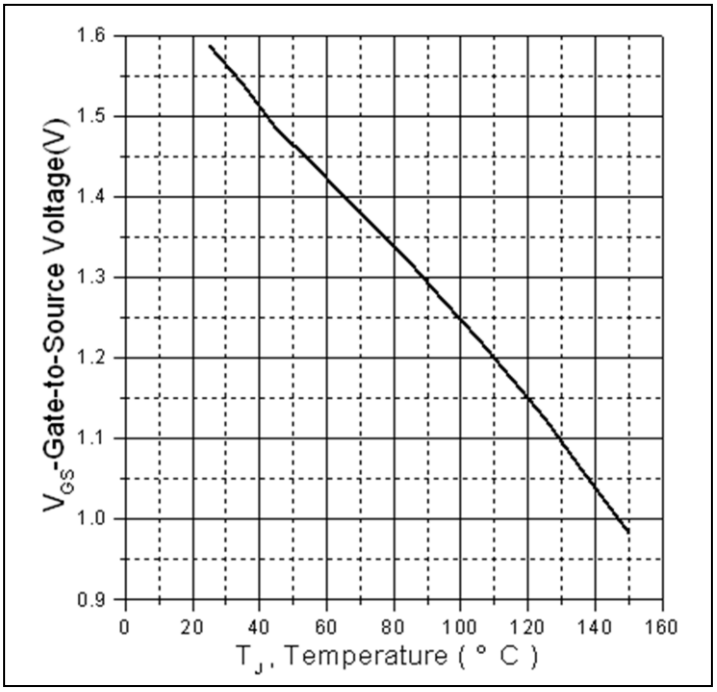



Figure 2. Gate to source cut-off voltage

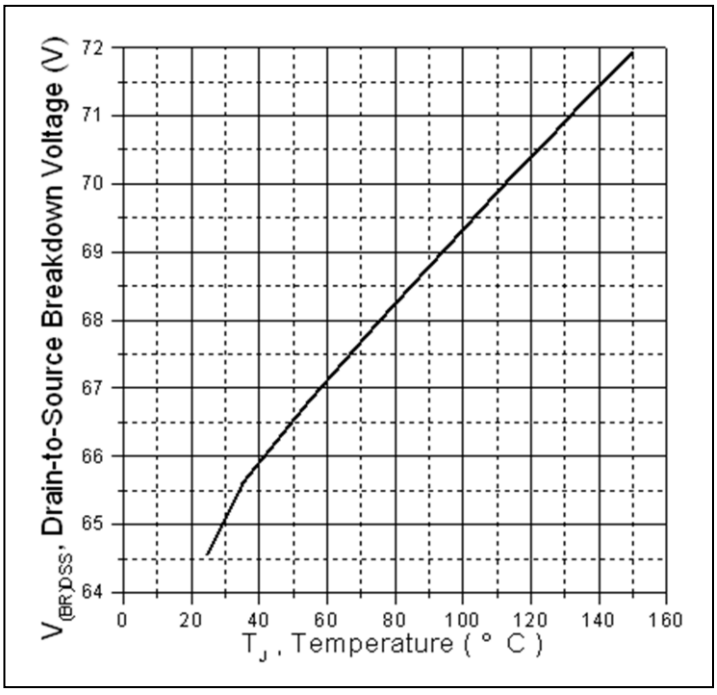



Figure 3. Drain-to-Source Breakdown Voltage vs. Junction Temperature

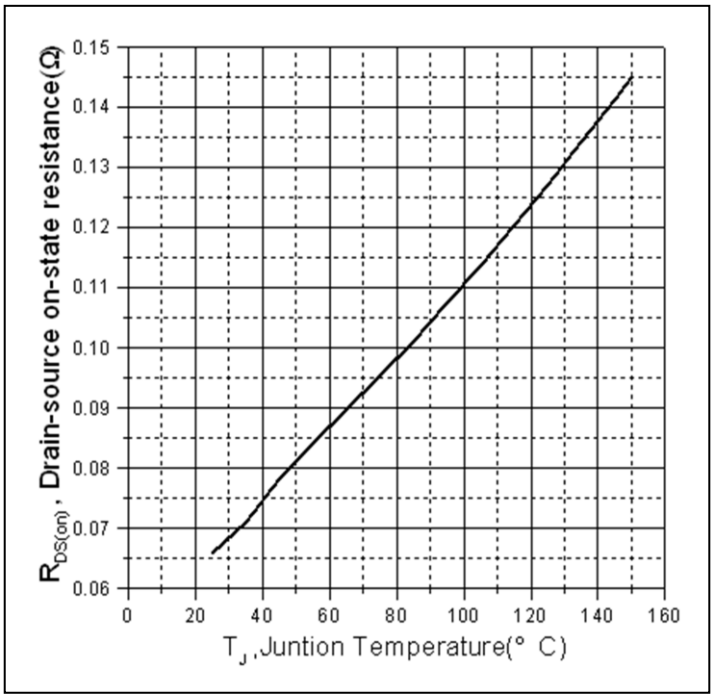



Figure 4. Normalized On-Resistance vs. Junction Temperature

## Typical Electrical and Thermal Characteristics

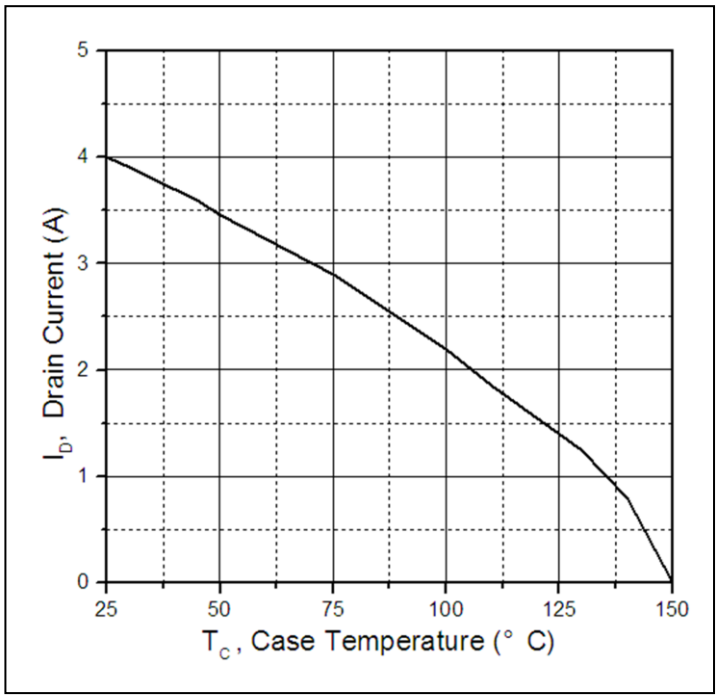



**Figure 5. Maximum Drain Current vs. Case Temperature**

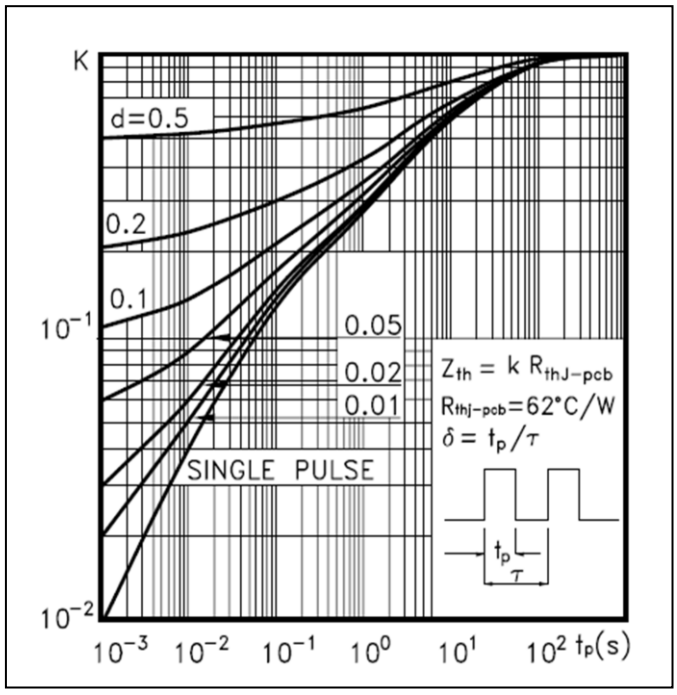
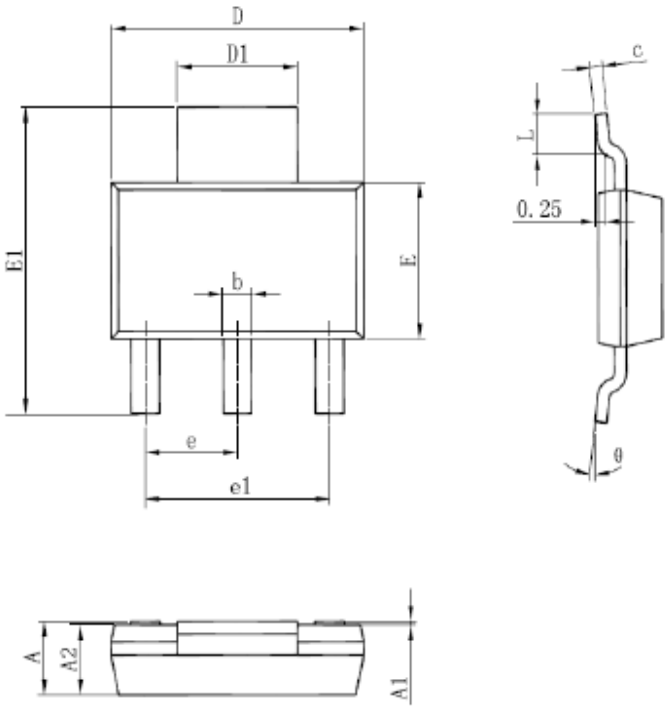



**Figure 6. Maximum Effective Transient Thermal Impedance, Junction-to-Case**

## Mechanical Data：

### Option 1：

**SOT-223 Dimensions (UNIT: mm)**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.520 | 1.800 | 0.060 | 0.071 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.500 | 1.700 | 0.059 | 0.067 |
| b | 0.660 | 0.820 | 0.026 | 0.032 |
| c | 0.250 | 0.350 | 0.010 | 0.014 |
| D | 6.200 | 6.400 | 0.244 | 0.252 |
| D1 | 2.900 | 3.100 | 0.114 | 0.122 |
| E | 3.300 | 3.700 | 0.130 | 0.146 |
| E1 | 6.830 | 7.070 | 0.269 | 0.278 |
| e | 2.300(BSC) | | 0.091(BSC) | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 0.900 | 1.150 | 0.035 | 0.045 |
| θ | 0° | 10° | 0° | 10° |

## Notes：

① Dimensions are inclusive of plating

② Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.

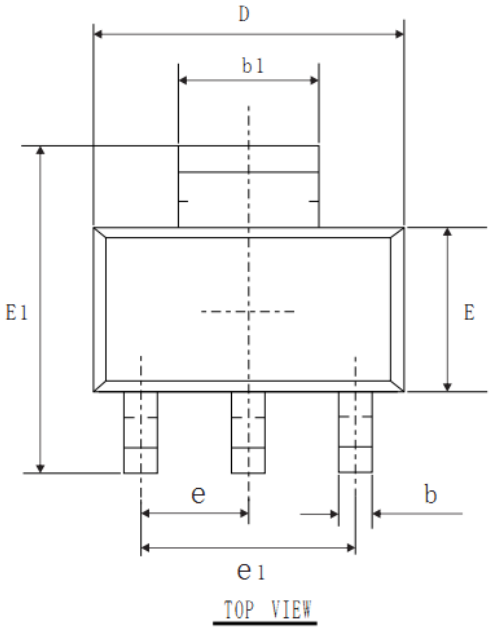
③ Dimension L is measured in gauge plane.

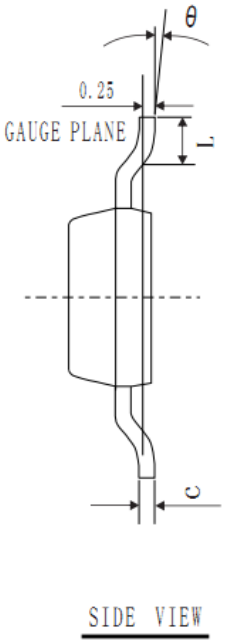
④ Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

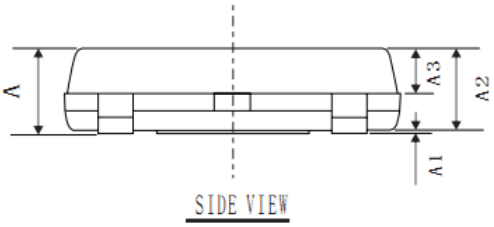
## Mechanical Data：

### Option 2：

**SOT-223 Dimensions (UNIT: mm)**




COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

| SYMBOL | MIN | NOM | MAX |
|---|---|---|---|
| A | —— | —— | 1.80 |
| A1 | 0.00 | 0.05 | 0.10 |
| A2 | 1.50 | 1.60 | 1.70 |
| A3 | 0.85 | 0.90 | 0.95 |
| b | 0.66 | 0.70 | 0.80 |
| b1 | 2.96 | 3.00 | 3.10 |
| c | 0.25 | 0.30 | 0.35 |
| D | 6.30 | 6.50 | 6.70 |
| E | 3.30 | 3.50 | 3.70 |
| E1 | 6.80 | 7.00 | 7.20 |
| e1 | 4.40 | 4.60 | 4.80 |
| L | 0.90 | —— | 1.15 |
| θ | 0° | 5° | 10° |
| e | 2.3 BSC | | |

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