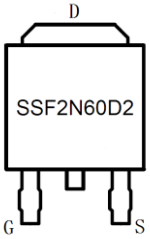
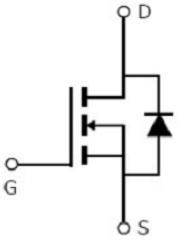
## Main Product Characteristics:

| | |
|---|---|
| $V_{DSS}$ | 600V |
| $R_{DS}$(on) | 3.7Ω (typ.) |
| $I_D$ | 2A |

TO-252




Marking and pin Assignment




Schematic diagram

## Features and Benefits:

- Advanced MOSFET process technology
- Special designed for PWM, 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 power switching application 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 | 2 | A |
| $I_D$ @ TC = 100°C | Continuous Drain Current, $V_{GS}$ @ 10V① | 1.3 | |
| $I_{DM}$ | Pulsed Drain Current② | 8 | |
| $P_D$ @TC = 25°C | Power Dissipation③ | 34 | W |
| | Linear Derating Factor | 0.27 | W/°C |
| $V_{DS}$ | Drain-Source Voltage | 600 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ± 30 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy @ L=30mH | 115 | mJ |
| $I_{AS}$ | Avalanche Current @ L=30mH | 2.52 | A |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to +150 | °C |

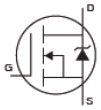
## Thermal Resistance

| Symbol | Characterizes | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JC}$ | Junction-to-case③ | — | 3.7 | ℃/W |
| $R_{\theta JA}$ | Junction-to-ambient (t ≤ 10s) ④ | — | 110 | ℃/W |

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

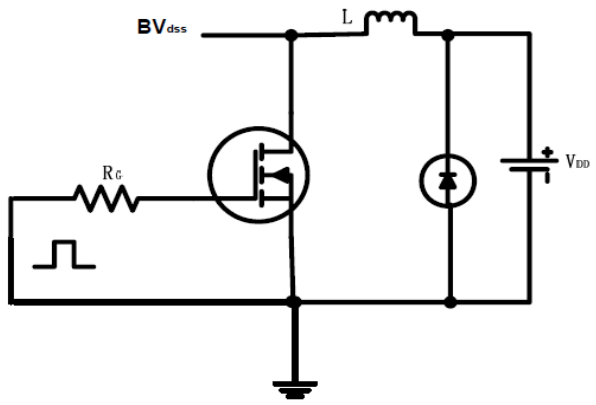
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | 600 | — | — | V | $V_{GS}$ = 0V, ID = 250μA |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 3.7 | 4.2 | Ω | $V_{GS}$=10V,$I_D$ = 1.0A |
| | | — | 8.2 | — | | $T_J$ = 125℃ |
| $V_{GS(th)}$ | Gate threshold voltage | 2 | — | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA |
| | | — | 2.2 | — | | $T_J$ = 125℃ |
| $I_{DSS}$ | Drain-to-Source leakage current | — | — | 1 | μA | $V_{DS}$ = 600V,$V_{GS}$ = 0V |
| | | — | — | 50 | | $T_J$ = 125℃ |
| $I_{GSS}$ | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS}$ =30V |
| | | — | — | -100 | | $V_{GS}$ = -30V |
| $Q_g$ | Total gate charge | — | 5.67 | — | nC | $I_D$ = 2.0A, |
| $Q_{gs}$ | Gate-to-Source charge | — | 1.74 | — | | $V_{DS}$=480V, |
| $Q_{gd}$ | Gate-to-Drain("Miller") charge | — | 1.99 | — | | $V_{GS}$ = 10V |
| $t_{d(on)}$ | Turn-on delay time | — | 9.2 | — | ns | $V_{GS}$=10V, VDS=300V, |
| $t_r$ | Rise time | — | 23.4 | — | | $R_{GEN}$=25Ω, ID=2.0A |
| $t_{d(off)}$ | Turn-Off delay time | — | 15.3 | — | | |
| $t_f$ | Fall time | — | 20.1 | — | | |
| $C_{iss}$ | Input capacitance | — | 250.1 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output capacitance | — | 35.7 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse transfer capacitance | — | 1.1 | — | | $f$ = 1MHz |

## Source-Drain Ratings and Characteristics

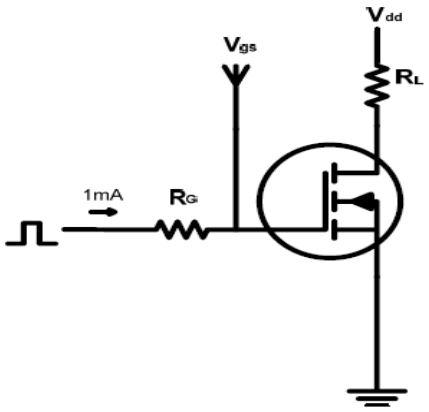
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 2 | A | MOSFET symbol showing the integral reverse p-n junction diode.  |
| $I_{SM}$ | Pulsed Source Current (Body Diode) | — | — | 8 | A | |
| $V_{sd}$ | Diode Forward Voltage | — | — | 1.4 | V | $I_S$=2.0A, $V_{GS}$=0V |
| $t_{rr}$ | Reverse Recovery Time | — | 356.8 | — | ns | $T_J$ = 25°C, $I_F$ =2A, |
| $Q_{rr}$ | Reverse Recovery Charge | — | 1030 | — | nC | di/dt = 100A/μs |

## Test circuits and Waveforms

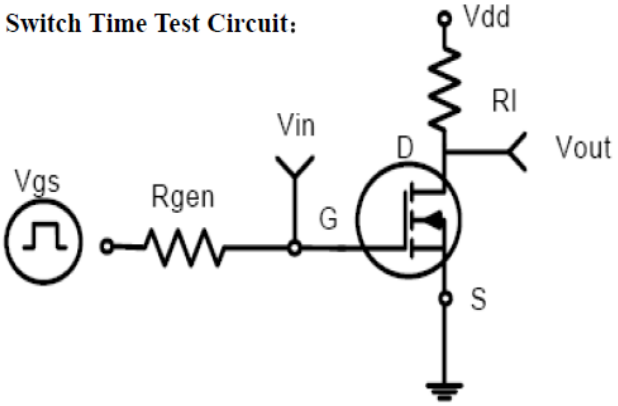
**EAS test circuits:**



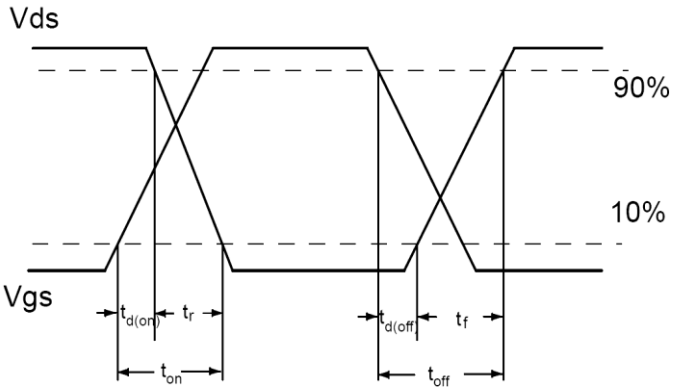

**Gate charge test circuit:**




**Switch Time Test Circuit:**




**Switch 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-case 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

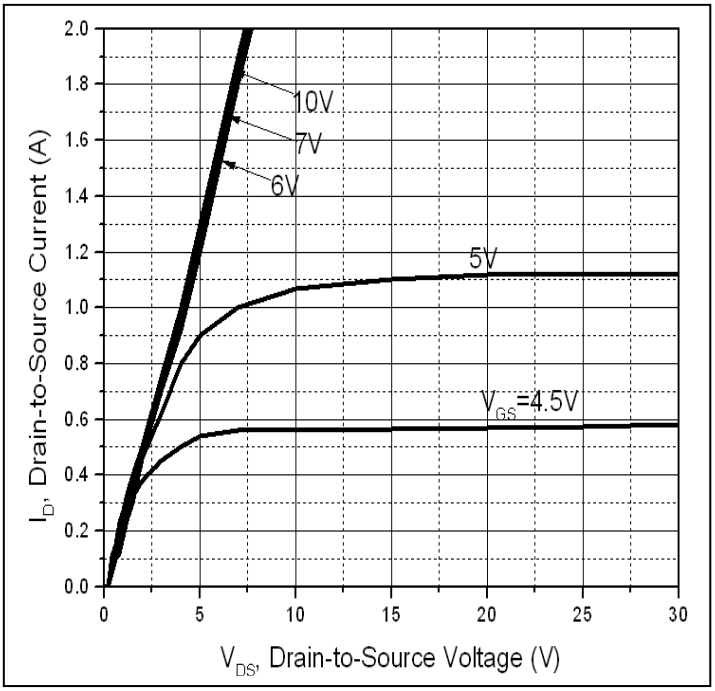



**Figure 1: Typical Output Characteristics**

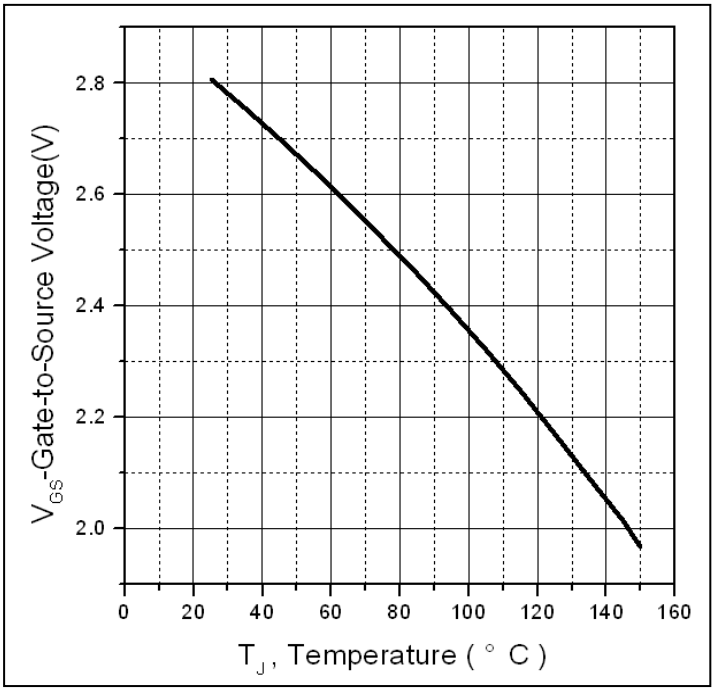



**Figure 2. Gate to source cut-off voltage**

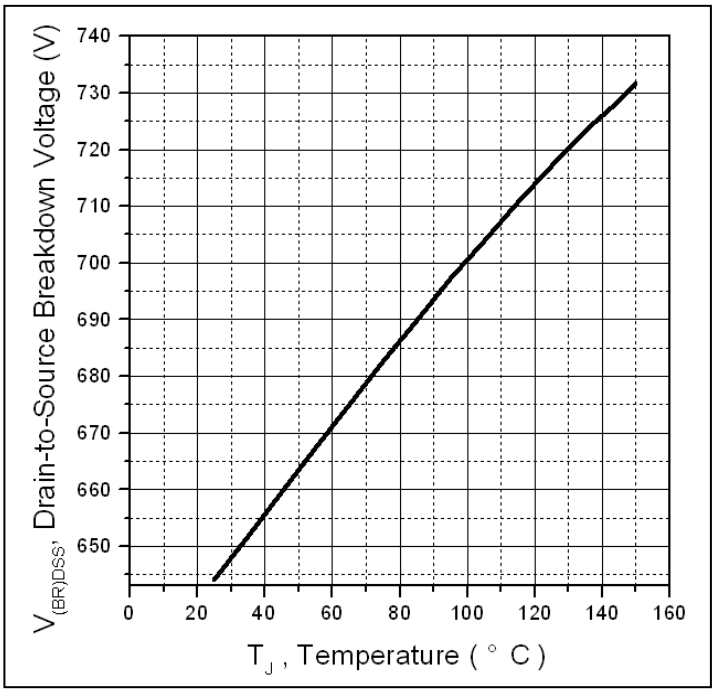



**Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature**

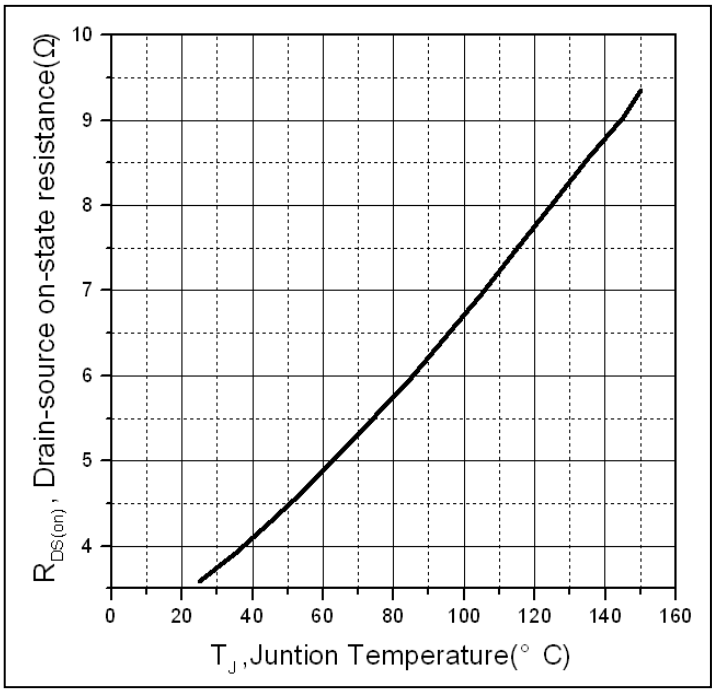



**Figure 4: Normalized On-Resistance Vs. Case Temperature**

## Typical electrical and thermal characteristics

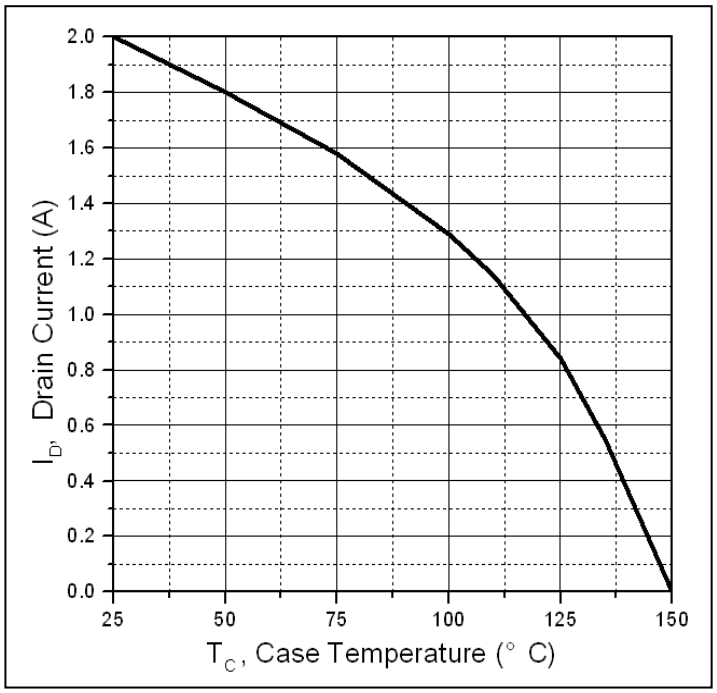



Figure 5. Maximum Drain Current Vs. Case Temperature

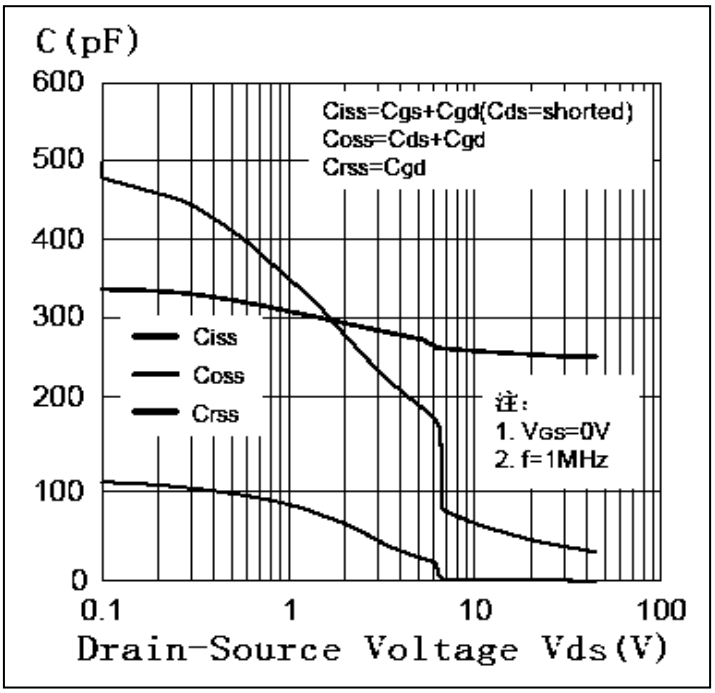
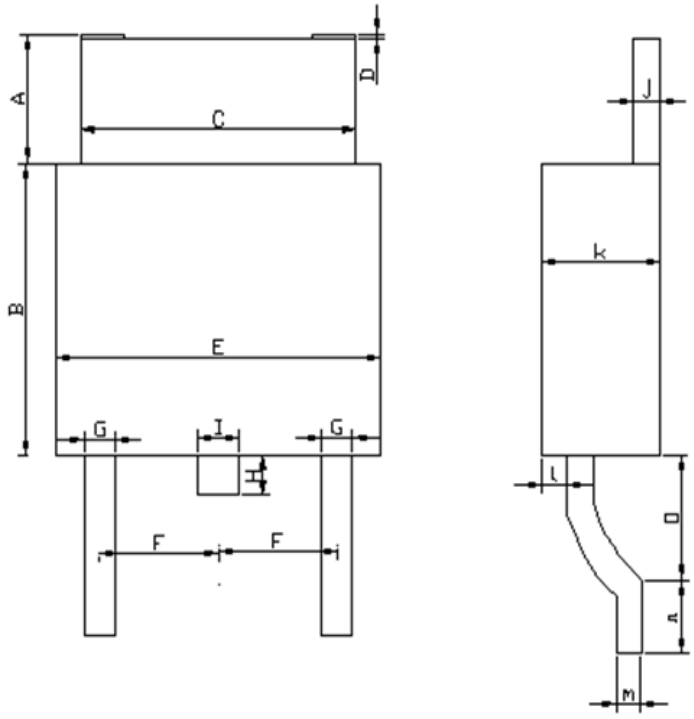



Figure 6.Typical Capacitance Vs. Drain-to-Source Voltage

## Mechanical Data：

**TO-252 PACKAGE OUTLINE DIMENSION**




| Symbol | Dimension In Millimeters | | | Dimension In Inches | | |
|---|---|---|---|---|---|---|
| | Min | Nom | Max | Min | Nom | Max |
| A | 0.400 | 0.900 | 1.400 | 0.016 | 0.035 | 0.055 |
| B | 5.350 | 5.850 | 6.350 | 0.211 | 0.230 | 0.250 |
| C | 4.800 | 5.300 | 5.800 | 0.189 | 0.209 | 0.228 |
| D | 0.980 | 0.100 | 1.020 | 0.039 | 0.004 | 0.040 |
| E | 5.800 | 6.300 | 6.800 | 0.228 | 0.248 | 0.268 |
| F | 2.200 | 2.300 | 2.400 | 0.087 | 0.091 | 0.094 |
| G | 0.600 | 0.700 | 0.800 | 0.024 | 0.028 | 0.031 |
| H | 0.200 | 0.700 | 1.200 | 0.008 | 0.028 | 0.047 |
| I | 0.700 | 0.800 | 0.900 | 0.028 | 0.031 | 0.035 |
| J | 0.408 | 0.508 | 0.608 | 0.016 | 0.020 | 0.024 |
| K | 2.050 | 2.300 | 2.550 | 0.081 | 0.091 | 0.100 |
| L | 0.550 | 0.800 | 1.050 | 0.022 | 0.031 | 0.041 |
| M | 0.408 | 0.508 | 0.608 | 0.016 | 0.020 | 0.024 |
| N | 1.050 | 1.300 | 1.550 | 0.041 | 0.051 | 0.061 |
| O | 1.250 | 1.500 | 1.750 | 0.049 | 0.059 | 0.069 |

## Ordering and Marking Information

**Device Marking: SSF2N60D2**

**Package (Available)**

**TO-252（DPAK）**

**Operating Temperature Range**

**C : -55 to 150 ºC**

## Devices per Unit

| Package Type | Units/ Tube | Tubes/Inner Box | Units/Inner Box | Inner Boxes/Carton Box | Units/Carton Box |
|---|---|---|---|---|---|
| TO-252 | 80 | 50 | 4000 | 10 | 40000 |

## Reliability Test Program

| Test Item | Conditions | Duration | Sample Size |
|---|---|---|---|
| High Temperature Reverse Bias(HTRB) | $T_j$=125℃ to 150℃ @ 80% of Max $V_{DSS}$/$V_{CES}$/VR | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |
| High Temperature Gate Bias(HTGB) | $T_j$=150℃ @ 100% of Max $V_{GSS}$ | 168 hours<br>500 hours<br>1000 hours | 3 lots x 77 devices |

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