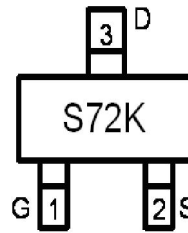


## Main Product Characteristics

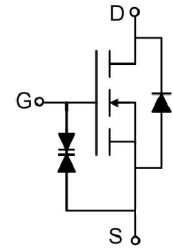
|              |          |
|--------------|----------|
| $V_{DSS}$    | 60V      |
| $R_{DS(on)}$ | 2Ω(max.) |
| $I_D$        | 0.3A     |



SOT-23



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
- ESD Rating: 1000V HBM
- 150°C operating temperature
- Lead free product



## 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        | 0.3         | A     |
| $I_{DM}$          | Pulsed Drain Current②                            | 1.2         |       |
| $P_D$ @ TC = 25°C | Power Dissipation③                               | 0.63        | W     |
| $V_{DS}$          | Drain-Source Voltage                             | 60          | V     |
| $V_{GS}$          | Gate-to-Source Voltage                           | ± 20        | V     |
| $T_J$ $T_{STG}$   | Operating Junction and Storage Temperature Range | -55 to +150 | °C    |

## Thermal Resistance

| Symbol          | Characteristics                 | Typ. | Max. | Units |
|-----------------|---------------------------------|------|------|-------|
| $R_{\theta JA}$ | Junction-to-ambient (t ≤ 10s) ④ | —    | 200  | °C/W  |

## Electrical Characteristics @T<sub>A</sub>=25°C unless otherwise specified

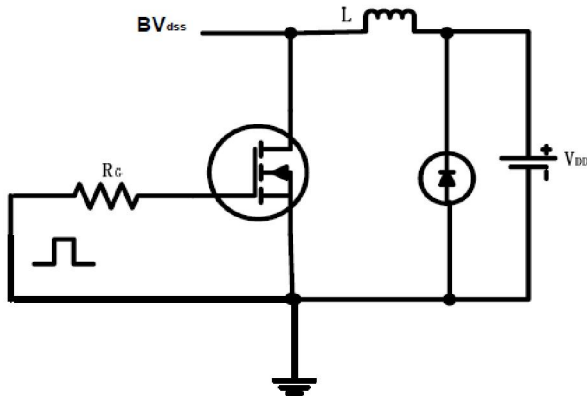
| Symbol               | Parameter                            | Min. | Typ. | Max. | Units | Conditions                                                                                 |
|----------------------|--------------------------------------|------|------|------|-------|--------------------------------------------------------------------------------------------|
| V <sub>(BR)DSS</sub> | Drain-to-Source breakdown voltage    | 60   | —    | —    | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                               |
| R <sub>DS(on)</sub>  | Static Drain-to-Source on-resistance | —    | 1.5  | 2    | Ω     | V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A                                                 |
|                      |                                      | —    | —    | 3    |       | V <sub>GS</sub> =5V, I <sub>D</sub> =0.05A                                                 |
| V <sub>GS(th)</sub>  | Gate threshold voltage               | 1    | —    | 2.5  | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                 |
| I <sub>DSS</sub>     | Drain-to-Source leakage current      | —    | —    | 1    | μA    | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V                                                |
| I <sub>GSS</sub>     | Gate-to-Source forward leakage       | —    | —    | ±100 | nA    | V <sub>GS</sub> =±5V, V <sub>DS</sub> =0V                                                  |
|                      |                                      | —    | —    | ±10  | uA    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                 |
| t <sub>d(on)</sub>   | Turn-on delay time                   | —    | —    | 25   | ns    | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V,<br>I <sub>D</sub> =0.2A, R <sub>GEN</sub> =10Ω |
| t <sub>d(off)</sub>  | Turn-Off delay time                  | —    | —    | 35   |       |                                                                                            |
| C <sub>iss</sub>     | Input capacitance                    | —    | 40   | —    | pF    | V <sub>GS</sub> = 0V                                                                       |
| C <sub>oss</sub>     | Output capacitance                   | —    | 16.6 | —    |       | V <sub>DS</sub> = 25V                                                                      |
| C <sub>rss</sub>     | Reverse transfer capacitance         | —    | 9.5  | —    |       | f = 1MHz                                                                                   |

## Source-Drain Ratings and Characteristics

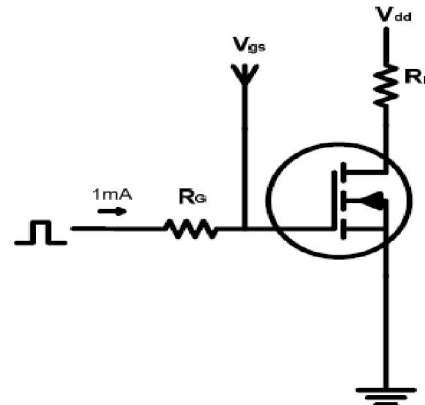
| Symbol          | Parameter                                 | Min. | Typ. | Max. | Units | Conditions                                                              |
|-----------------|-------------------------------------------|------|------|------|-------|-------------------------------------------------------------------------|
| I <sub>S</sub>  | Continuous Source Current<br>(Body Diode) | —    | —    | 0.3  | A     | MOSFET symbol<br>showing the<br>integral reverse<br>p-n junction diode. |
| I <sub>SM</sub> | Pulsed Source Current<br>(Body Diode)     | —    | —    | 1.2  | A     |                                                                         |
| V <sub>SD</sub> | Diode Forward Voltage                     | —    | —    | 1.3  | V     | I <sub>S</sub> =0.2A, V <sub>GS</sub> =0V                               |

## Test circuits and Waveforms

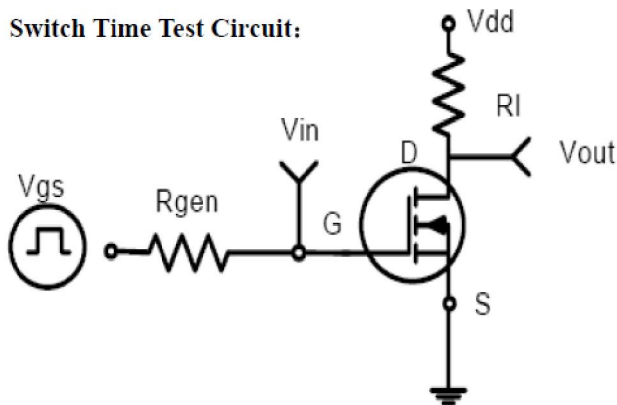
EAS test circuits:



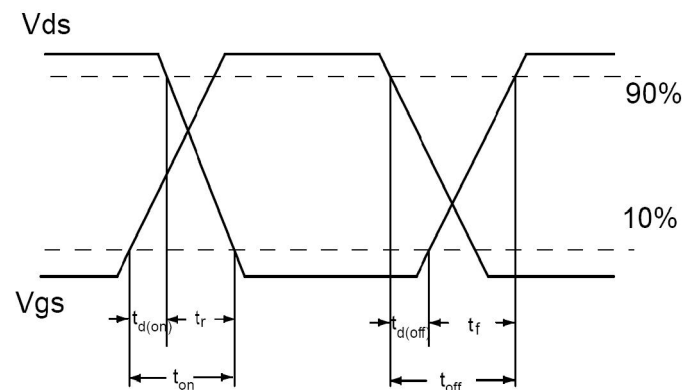
Gate charge test circuit:



Switch Time Test Circuit:



Waveforms:



## Notes:

- ① The maximum current rating is limited by bond-wires.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The 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  $T_A = 25^\circ\text{C}$
- ⑤ These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of  $T_{J(MAX)} = 150^\circ\text{C}$ .

## Typical Electrical and Thermal Characteristics

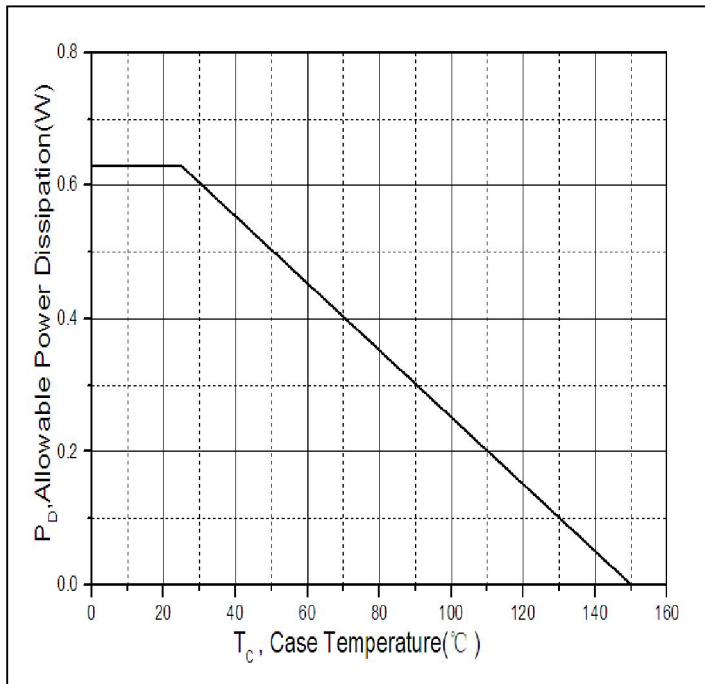


Figure 1. Power Dissipation Vs. Case Temperature

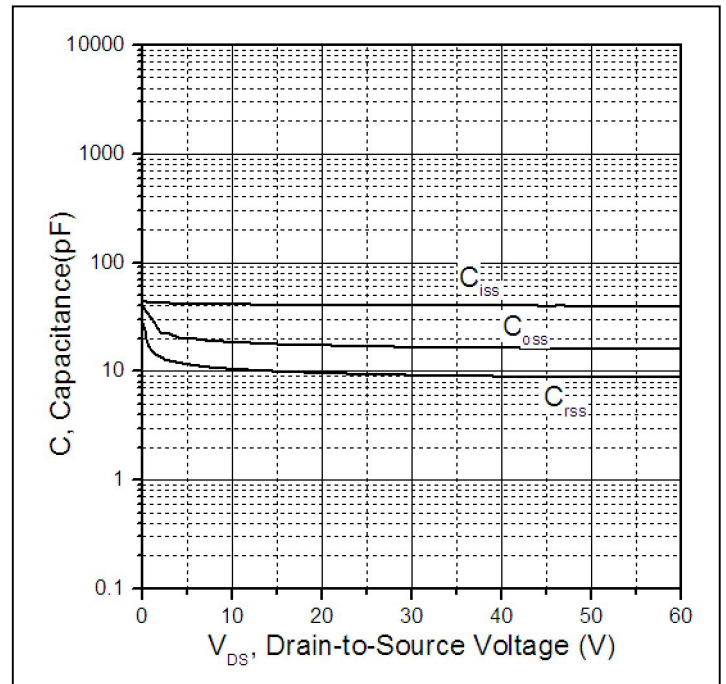


Figure 2. Typical Capacitance Vs. Drain-to-Source Voltage

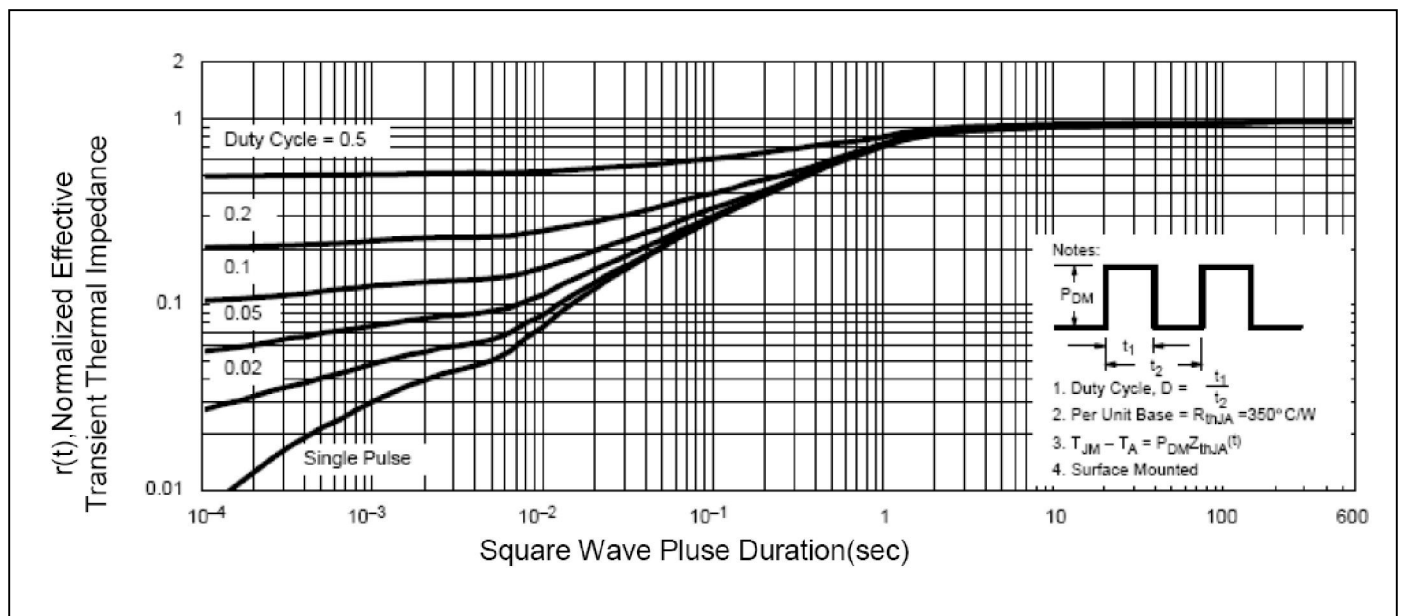
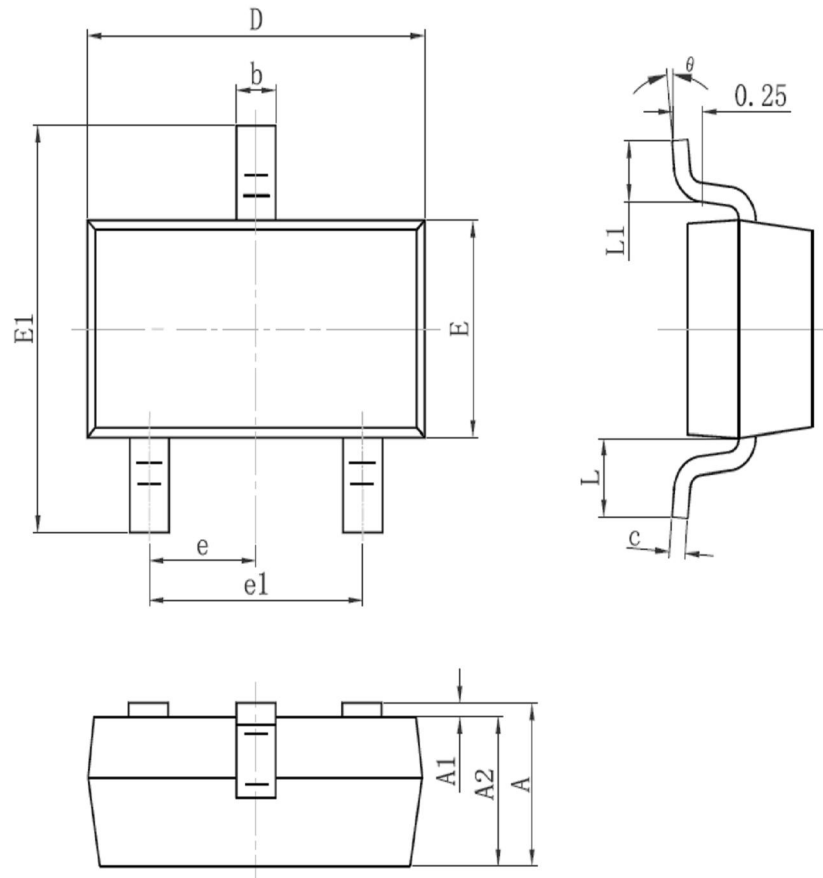


Figure3. Maximum Effective Transient Thermal Impedance, Junction-to-Case

## Mechanical Data



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## Ordering and Marking Information

**Device Marking: S72K**

Package (Available)

SOT-23

Operating Temperature Range

C : -55 to 150 °C

## Devices per Unit

| Package Type | Units/Tape | Tapes/Inner Box | Units/Inner Box | Inner Boxes/Carton Box | Units/Carton Box |
|--------------|------------|-----------------|-----------------|------------------------|------------------|
| SOT-23       | 3000       | 10              | 30000           | 4                      | 120000           |

## Reliability Test Program

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