

TM2N7002K

N-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

General Features

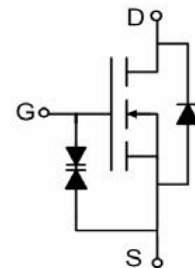
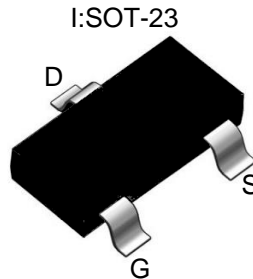
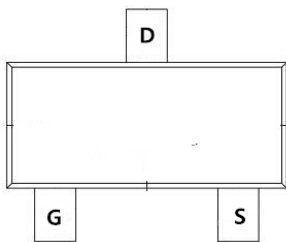
$V_{DS} = 60V$ $I_D = 0.3A$

$R_{DS(ON)} = 1900m\Omega$ (typ.) @ $V_{GS} = -10V$

ESD protection

100% UIS Tested

100% R_g Tested



Marking: 72K OR 7002K

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

| Symbol | Parameter | Max. | Units |
|-----------------|---|---------------------|--------------|
| V_{DSS} | Drain-Source Voltage | 60 | V |
| V_{GSS} | Gate-Source Voltage | ± 20 | V |
| I_D | Continuous Drain Current | $T_A = 25^\circ C$ | 0.3 |
| | | $T_A = 100^\circ C$ | 0.2 |
| I_{DM} | Pulsed Drain Current ^{note1} | 1.2 | A |
| P_D | Power Dissipation | $T_A = 25^\circ C$ | 0.35 |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 357 | $^\circ C/W$ |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ C$ |

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|--|------|------|----------|------------|
| Off Characteristic | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 60 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=60V, V_{GS}=0V,$ | - | - | 1 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | - | - | ± 10 | μA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1 | 1.5 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance <small>note2</small> | $V_{GS}=10V, I_D=0.3A$ | - | 1900 | 2000 | m Ω |
| | | $V_{GS}=4.5V, I_D=0.2A$ | - | 2000 | 2570 | |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$ | - | 28 | - | pF |
| C_{oss} | Output Capacitance | | - | 11 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 4 | - | pF |
| Q_g | Total Gate Charge | $V_{DS}=10V, I_D=0.3A,$ $V_{GS}=4.5V$ | - | 1.7 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 0.3 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 0.6 | - | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DD}=10V, I_D=0.2A,$ $R_{GEN}=10\Omega, V_{GS}=10V,$ | - | 2 | - | ns |
| t_r | Turn-on Rise Time | | - | 15 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 7 | - | ns |
| t_f | Turn-off Fall Time | | - | 20 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 0.3 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 1.2 | A |
| V_{SD} | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=0.3A$ | - | - | 1.2 | V |

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

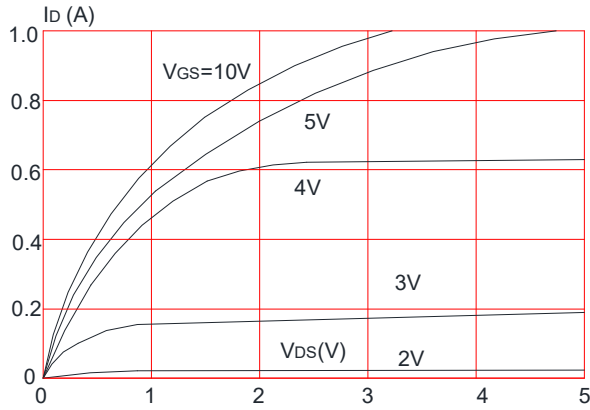


Figure 2: Typical Transfer Characteristics

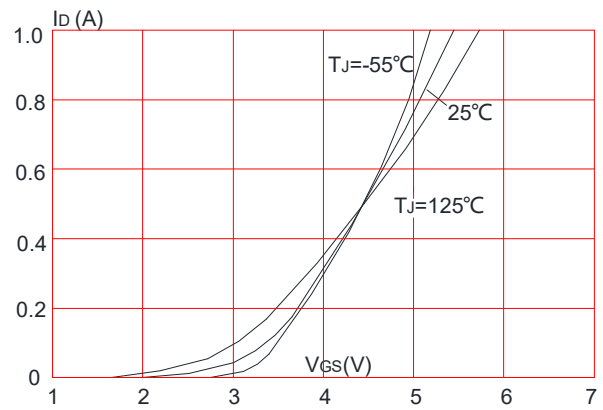


Figure 3: On-resistance vs. Drain Current

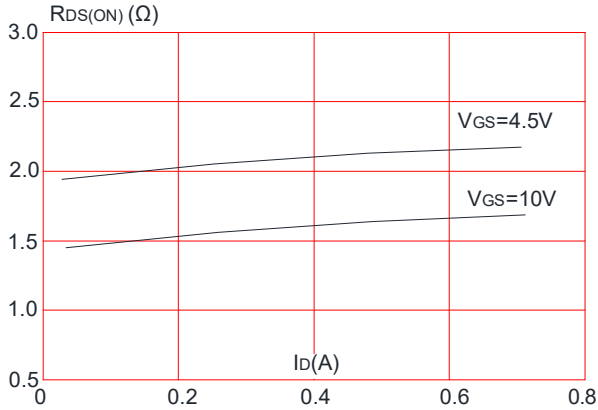


Figure 4: Body Diode Characteristics

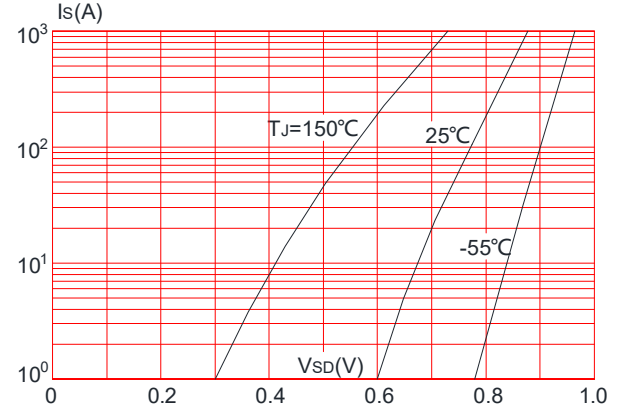


Figure 5: Gate Charge Characteristics

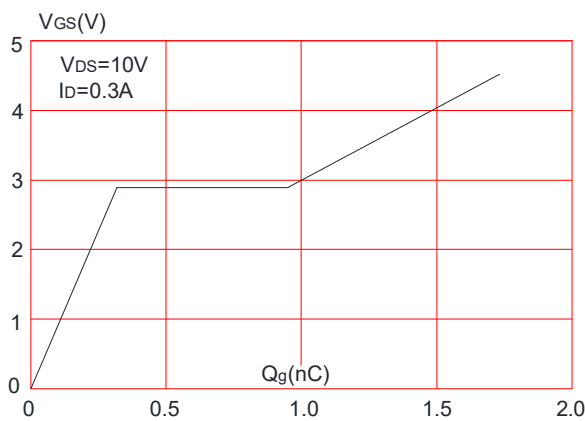
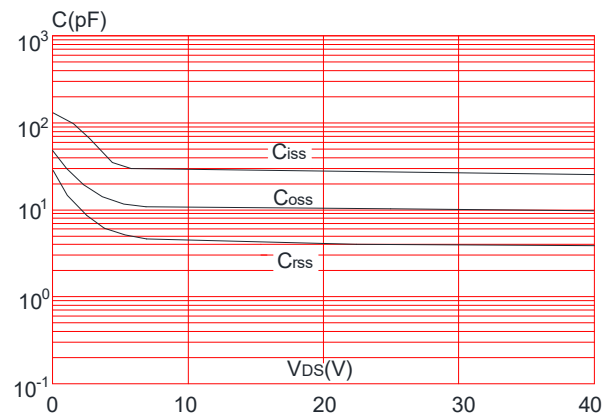


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

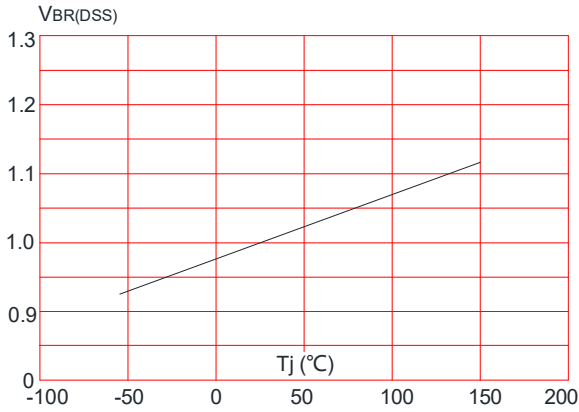


Figure 8: Normalized on Resistance vs. Junction Temperature

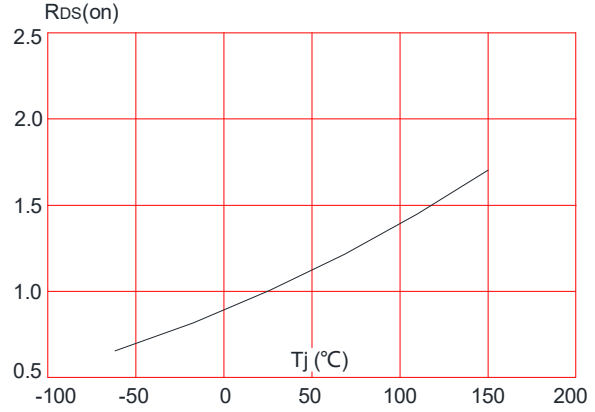


Figure 9: Maximum Safe Operating Area

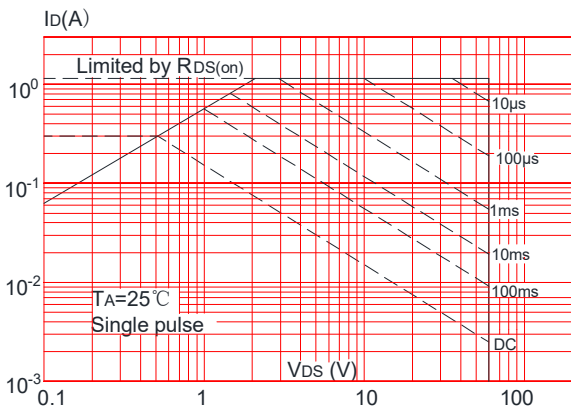


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

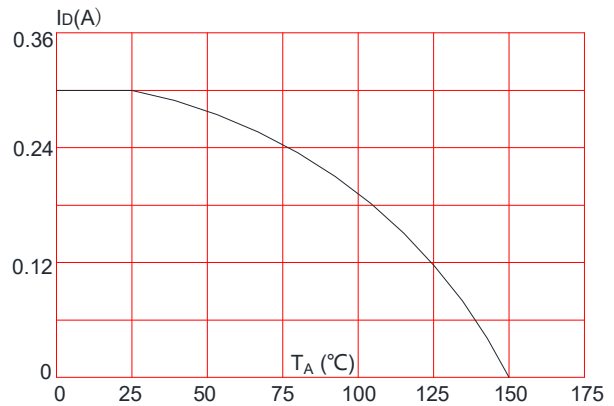
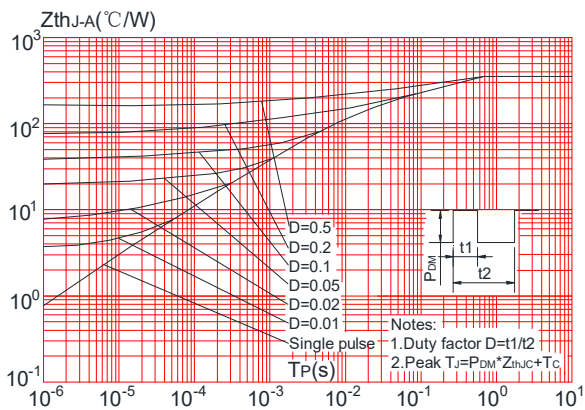
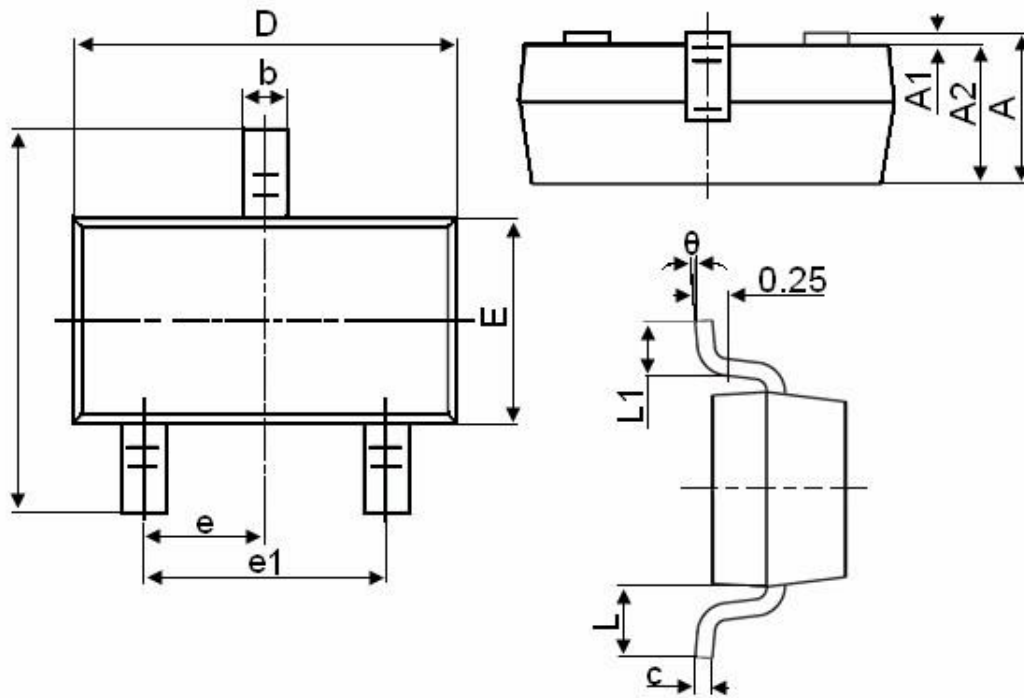


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Package Information: SOT-23



| Symbol | Dimensions in Millimeters | |
|----------|---------------------------|-------|
| | MIN. | MAX. |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |