

## SDM7002KS

### 60V N-Channel MOSFETs

Rev B.0

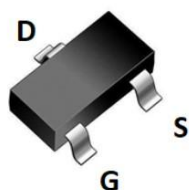
#### Feature

- ✧ Excellent  $R_{DS(ON)}$
- ✧ Low Gate Charge
- ✧ Advanced Trench Technology
- ✧ Green product (RoHS compliant), lead free
- ✧ ESD Protected: 2KV

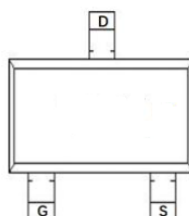
#### Product Summary

|                                         |      |          |
|-----------------------------------------|------|----------|
| $V_{DS}$                                | 60   | V        |
| $V_{GS(th)}_{Typ}$                      | 1.5  | V        |
| $R_{DS(ON)}_{Typ}$ (at $V_{GS} = 10V$ ) | 1.69 | $\Omega$ |
| $I_D$ (at $V_{GS} = 10V$ )              | 0.3  | A        |

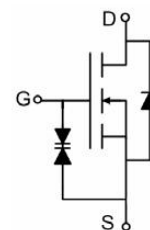
| Type      | Package | Marking | Outline | Media   | Quantity (pcs) |
|-----------|---------|---------|---------|---------|----------------|
| SDM7002KS | SOT-23  | 702K    | Tape    | 7" Reel | 3000           |



SOT-23 top view



Pin Assignment



Schematic diagram

#### Absolute Maximum Ratings (Rating at $T_A = 25^\circ C$ unless otherwise noted)

| Parameter                              |                     | Symbol         | Maximum     | Unit       |
|----------------------------------------|---------------------|----------------|-------------|------------|
| Drain-Source Voltage                   |                     | $V_{DS}$       | 60          | V          |
| Gate-Source Voltage                    |                     | $V_{GS}$       | $\pm 20$    | V          |
| Continuous Drain Current               | $T_A = 25^\circ C$  | $I_D$          | 0.3         | A          |
|                                        | $T_A = 100^\circ C$ |                | 0.2         |            |
| Pulsed Drain Current <sup>(1)</sup>    |                     | $I_{DM}$       | 1.2         | A          |
| Maximum Body-Diode Continuous Current  |                     | $I_S$          | 0.3         | A          |
| Power Dissipation                      | $T_A = 25^\circ C$  | $P_D$          | 0.35        | W          |
| Junction and Storage Temperature Range |                     | $T_J, T_{STG}$ | -55 to +150 | $^\circ C$ |

**Electrical Characteristics** (Rating at  $T_J=25^{\circ}\text{C}$  unless otherwise noted)

| Symbol               | Parameter                                        | Conditions                                                                              | Min | Typ  | Max  | Unit |
|----------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------|-----|------|------|------|
| STATIC PARAMETERS    |                                                  |                                                                                         |     |      |      |      |
| BV <sub>DSS</sub>    | Drain-Source Breakdown Voltage                   | I <sub>D</sub> =250μA, V <sub>GS</sub> =0V                                              | 60  | -    | -    | V    |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current                  | V <sub>DS</sub> =60V, V <sub>GS</sub> =0V                                               | -   | -    | 1    | μA   |
| I <sub>GSS</sub>     | Gate-Body Leakage Current                        | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                              | -   | -    | ±10  | uA   |
| V <sub>GS(th)</sub>  | Gate Threshold Voltage                           | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 1   | 1.5  | 2.5  | V    |
| R <sub>DS(ON)</sub>  | Static Drain-Source On-Resistance <sup>(2)</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =0.3A                                              | -   | 1.69 | 2.2  | Ω    |
|                      |                                                  | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.2A                                             | -   | 2.05 | 2.87 | Ω    |
| V <sub>SD</sub>      | Diode Forward Voltage                            | I <sub>S</sub> =0.3A, V <sub>GS</sub> =0V                                               | -   | -    | 1.2  | V    |
| DYNAMIC PARAMETERS   |                                                  |                                                                                         |     |      |      |      |
| C <sub>iss</sub>     | Input Capacitance                                | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz                                       | -   | 27   | -    | pF   |
| C <sub>oss</sub>     | Output Capacitance                               |                                                                                         | -   | 10.9 | -    | pF   |
| C <sub>rss</sub>     | Reverse Transfer Capacitance                     |                                                                                         | -   | 4.1  | -    | pF   |
| SWITCHING PARAMETERS |                                                  |                                                                                         |     |      |      |      |
| Q <sub>g</sub>       | Total Gate Charge                                | V <sub>GS</sub> =10V, V <sub>DS</sub> =4.5V, I <sub>D</sub> =0.3A                       | -   | 1.5  | -    | nC   |
| Q <sub>gs</sub>      | Gate Source Charge                               |                                                                                         | -   | 0.31 | -    | nC   |
| Q <sub>gd</sub>      | Gate Drain Charge                                |                                                                                         | -   | 0.59 | -    | nC   |
| t <sub>D(on)</sub>   | Turn-On Delay Time                               | V <sub>GS</sub> =10V, V <sub>DS</sub> =10V, I <sub>D</sub> =0.2A, R <sub>GEN</sub> =10Ω | -   | 2.1  | -    | ns   |
| t <sub>r</sub>       | Turn-On Rise Time                                |                                                                                         | -   | 13   | -    | ns   |
| t <sub>D(off)</sub>  | Turn-Off Delay Time                              |                                                                                         | -   | 6.9  | -    | ns   |
| t <sub>f</sub>       | Turn-Off Fall Time                               |                                                                                         | -   | 19   | -    | ns   |

**Thermal Resistances**

| Symbol          | Parameter                                   | Typ | Max | Unit                        |
|-----------------|---------------------------------------------|-----|-----|-----------------------------|
| $R_{\theta JA}$ | Thermal resistance from junction to Ambient | -   | 357 | $^{\circ}\text{C}/\text{W}$ |

**Notes:**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

## Typical Electrical and Thermal Characteristics

Figure 1: Saturation Characteristics

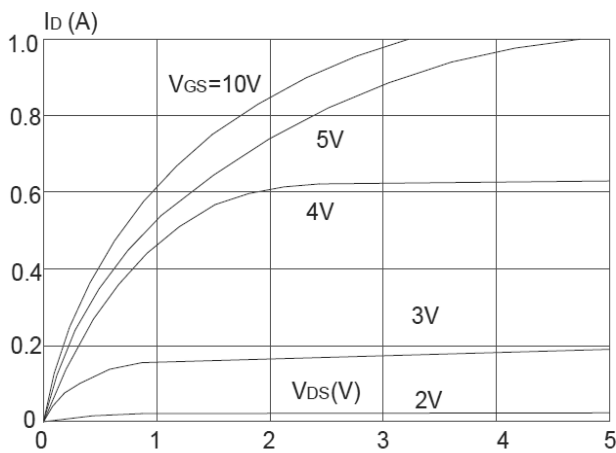


Figure 2: Transfer Characteristics

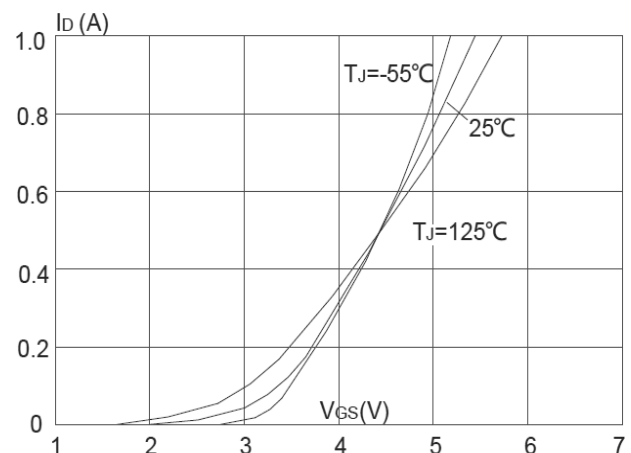
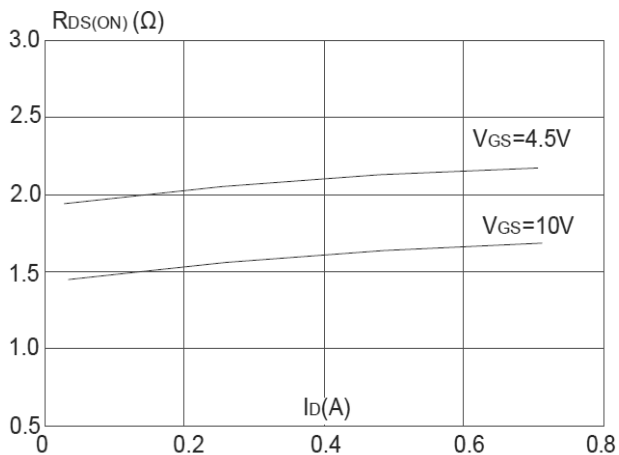
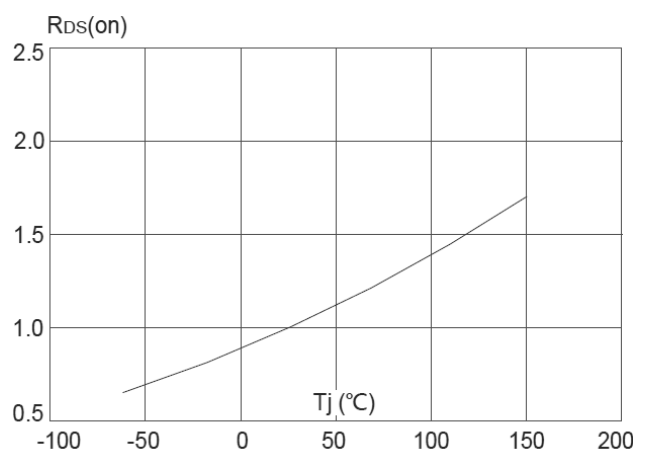
Figure 3:  $R_{DS(ON)}$  vs. Drain CurrentFigure 4:  $R_{DS(ON)}$  vs. Junction Temperature

Figure 5: BVDSS vs. Junction Temperature

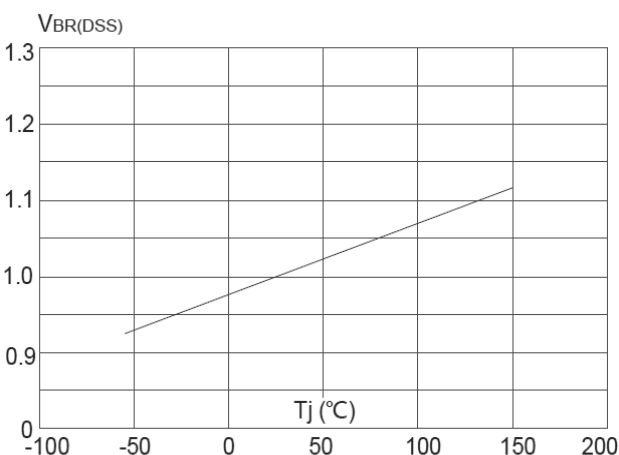
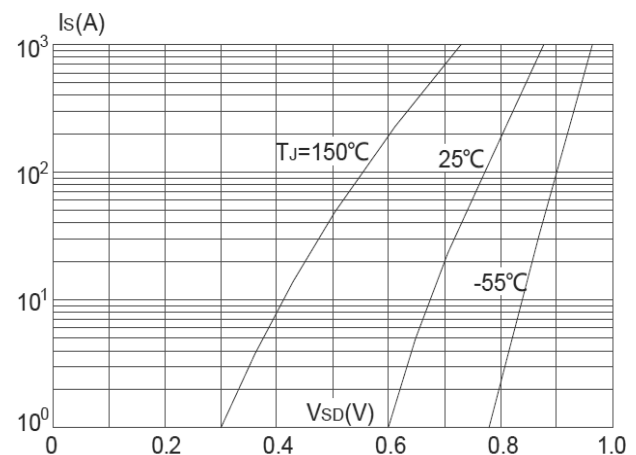


Figure 6: Body-Diode Characteristics



## Typical Electrical and Thermal Characteristics

Figure 7: Gate-Charge characteristics

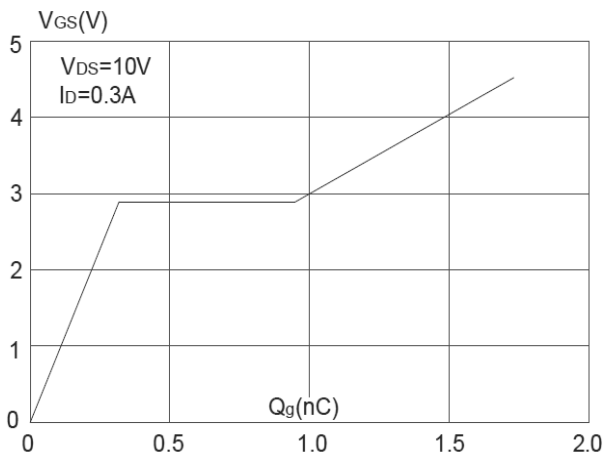


Figure 8: Capacitance characteristics

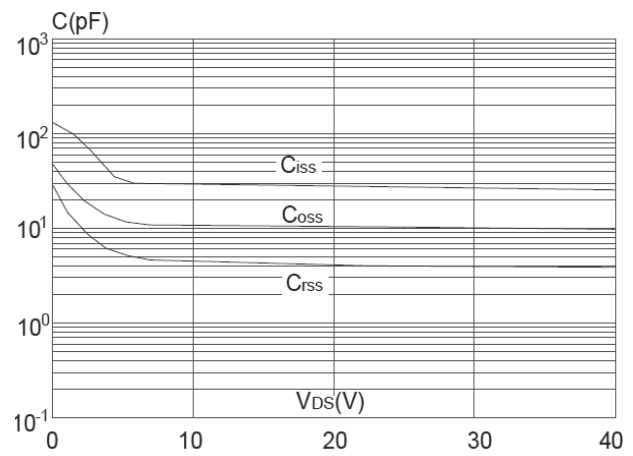


Figure 9: Current De-rating

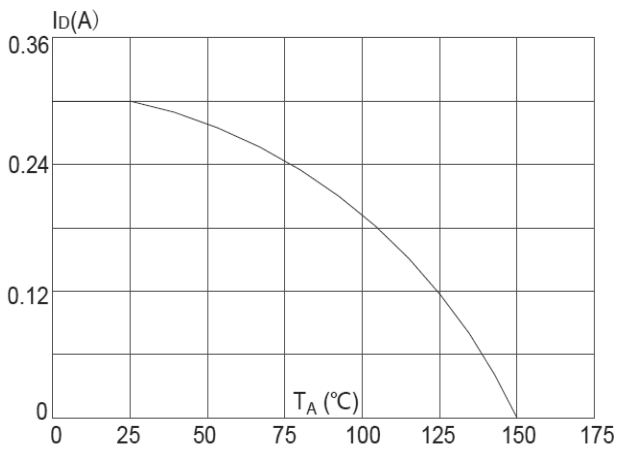


Figure 10: Maximum Safe Operating Area

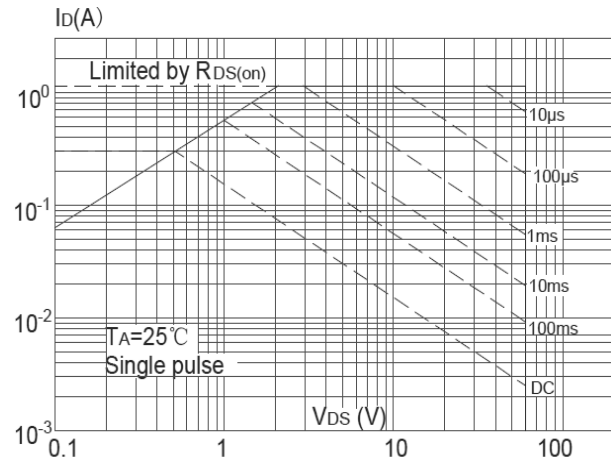
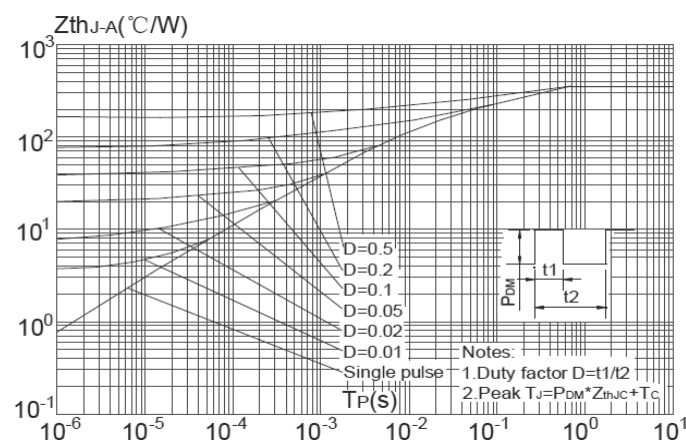


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



## Test Circuit

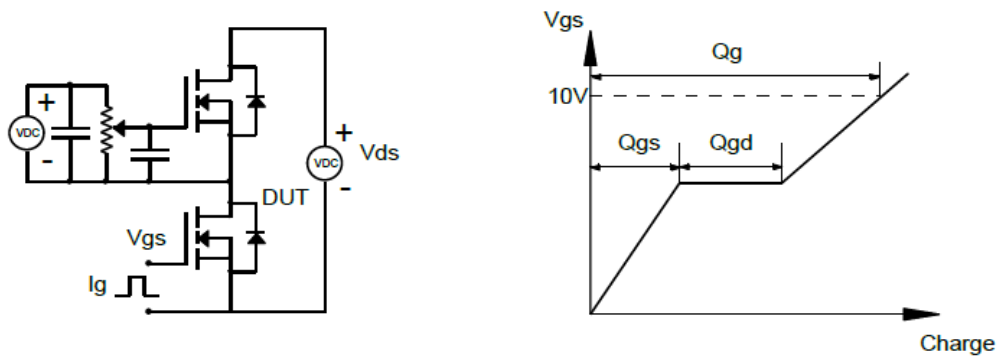


Figure1: Gate Charge Test Circuit &amp; Waveforms

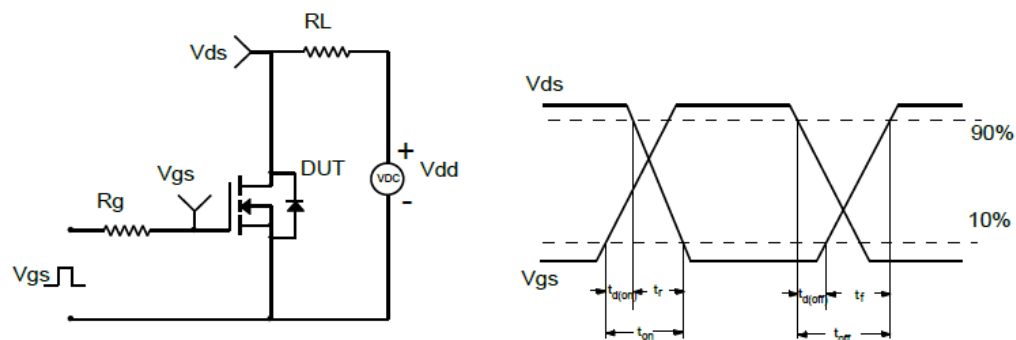


Figure2: Resistive Switching Test Circuit &amp; Waveforms

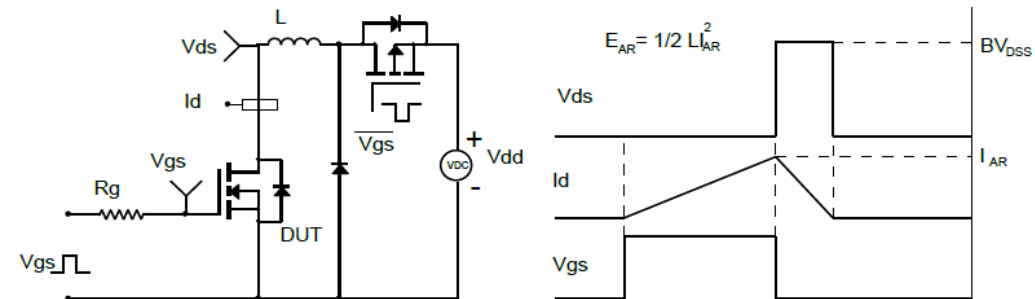


Figure3: Unclamped Inductive Switching (UIS) Test Circuit &amp; Waveforms

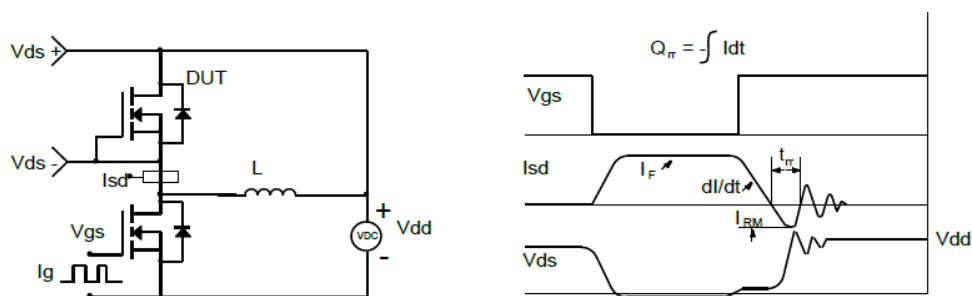
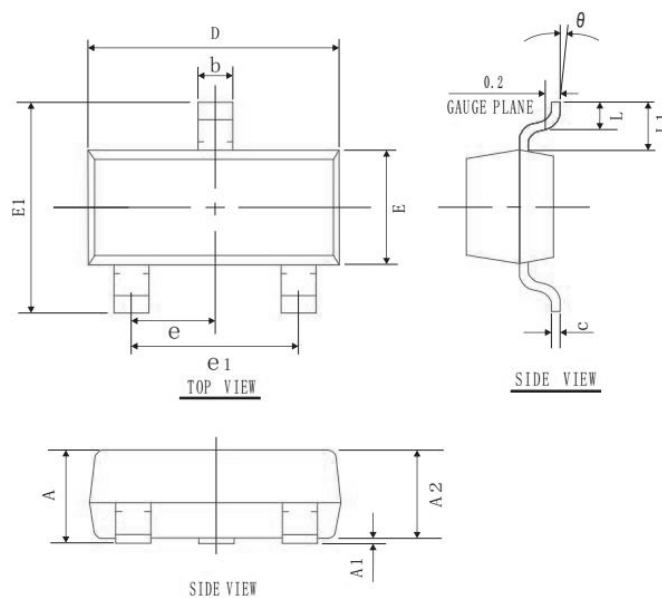


Figure4: Diode Recovery Test Circuit &amp; Waveforms

## SOT-23 Package Information



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

| SYMBOL | MIN      | NOM  | MAX  |
|--------|----------|------|------|
| A      | 0.90     | 1.05 | 1.20 |
| A1     | 0.00     | 0.05 | 0.10 |
| A2     | 0.90     | 1.00 | 1.10 |
| b      | 0.30     | 0.40 | 0.50 |
| c      | 0.08     | 0.10 | 0.15 |
| D      | 2.80     | 2.90 | 3.00 |
| E      | 1.20     | 1.30 | 1.40 |
| E1     | 2.30     | 2.40 | 2.50 |
| L      | 0.30     | 0.40 | 0.50 |
| θ      | 0°       | 5°   | 10°  |
| L1     | 0.55 REF |      |      |
| e      | 0.95 BSC |      |      |
| e1     | 1.90 REF |      |      |