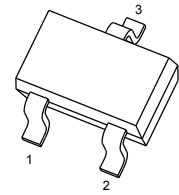


**N-Channel Enhancement Mode Power MOSFET**

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 60V           | 3Ω@10V          | 300mA |
|               | 4Ω@4.5V         |       |

**SOT-323**

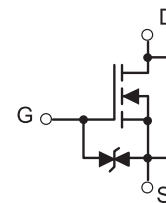
1. GATE
2. SOURCE
3. DRAIN

**FEATURE**

- High density cell design for Low  $R_{DS(on)}$
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- ESD protected

**APPLICATION**

- Load Switch for Portable Devices
- DC/DC Converter

**Equivalent Circuit****Order Information**

| Product  | Package | Marking | Packing      |
|----------|---------|---------|--------------|
| 2N7002KW | SOT-323 | 72K     | 3000PCS/Reel |

**MOSFET MAXIMUM RATINGS ( $T_a=25^{\circ}\text{C}$  unless otherwise noted)**

| Symbol          | Parameter                                        | Value    | Unit |
|-----------------|--------------------------------------------------|----------|------|
| $V_{DS}$        | Drain-Source Voltage                             | 60       | V    |
| $V_{GS}$        | Gate-Source Voltage                              | ±20      | V    |
| $I_D$           | Continuous Drain Current                         | 300      | mA   |
| $I_{DM}$        | Pulsed Drain Current(note1)                      | 800      | mA   |
| $P_D$           | Power Dissipation                                | 0.2      | W    |
| $T_J, T_{stg}$  | Operation Junction and Storage Temperature Range | -55~+150 | °C   |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient      | 625      | °C/W |



## N-Channel Enhancement Mode Power MOSFET

## MOSFET ELECTRICAL CHARACTERISTICS

 $T_a = 25^\circ\text{C}$  unless otherwise specified

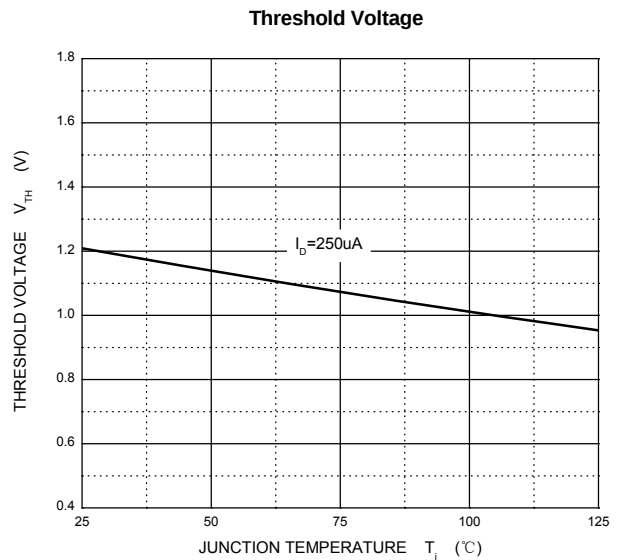
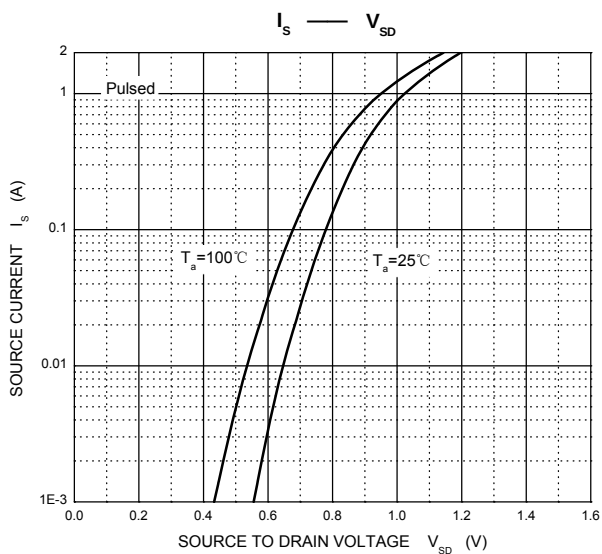
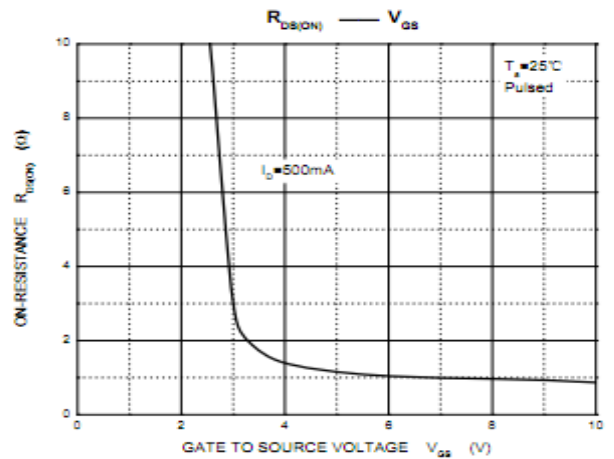
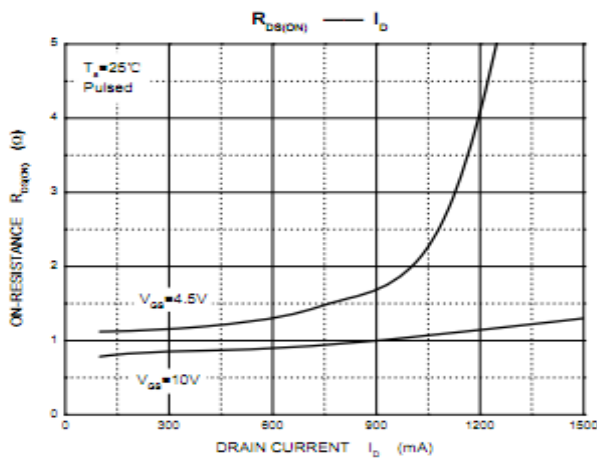
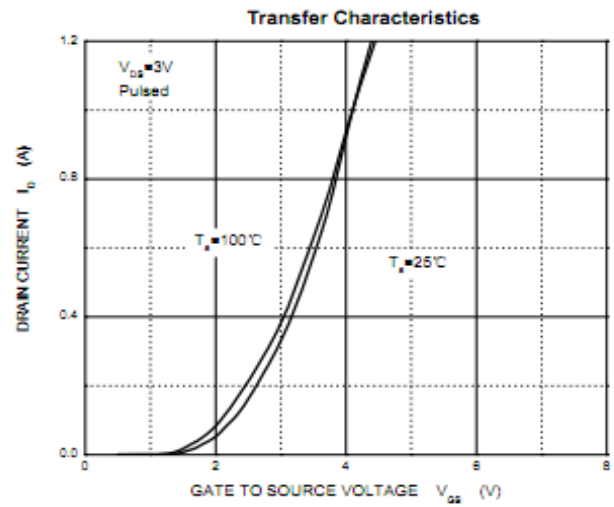
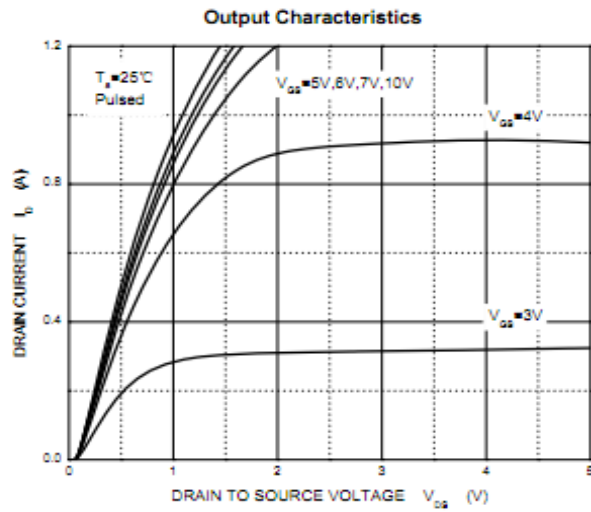
| Parameter                           | Symbol                | Test Condition                                                                                                | Min   | Typ | Max  | Unit |
|-------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------|-------|-----|------|------|
| STATIC PARAMETERS                   |                       |                                                                                                               |       |     |      |      |
| Drain-source Breakdown Voltage      | V <sub>(BR) DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                                                   | 60    |     |      | V    |
| GateThreshold Voltage (note 2)      | V <sub>GS(th)</sub>   | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA                                                        | 1     | 1.3 | 2.5  | V    |
| Zero Gate Voltage Drain Current     | I <sub>DSS</sub>      | V <sub>DS</sub> =48V, V <sub>GS</sub> = 0V                                                                    |       |     | 1    | μA   |
| Gate-Source Leakage Current         | I <sub>GSS</sub>      | V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V                                                                   |       |     | ±10  | μA   |
| Drain-Source On-Resistance (note 2) | R <sub>DS(on)</sub>   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =200mA                                                                  |       | 1.3 | 4    | Ω    |
|                                     |                       | V <sub>GS</sub> =10V, I <sub>D</sub> =500mA                                                                   |       | 1   | 3    | Ω    |
| DYNAMIC PARAMETERS (note 3)         |                       |                                                                                                               |       |     |      |      |
| Input Capacitance                   | C <sub>iss</sub>      | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f =1MHz                                                            |       |     | 40   | pF   |
| Output Capacitance                  | C <sub>oss</sub>      |                                                                                                               |       |     | 30   | pF   |
| Reverse Transfer Capacitance        | C <sub>rss</sub>      |                                                                                                               |       |     | 10   | pF   |
| SWITCHING PARAMETERS(note 3)        |                       |                                                                                                               |       |     |      |      |
| Turn-on Delay Time                  | t <sub>d(on)</sub>    | V <sub>GS</sub> =10V, V <sub>DD</sub> =50V, R <sub>G</sub> =50Ω<br>R <sub>GS</sub> =50Ω, R <sub>L</sub> =250Ω |       |     | 10   | ns   |
| Turn-off Delay Time                 | t <sub>d(off)</sub>   |                                                                                                               |       |     | 15   | ns   |
| Reverse Recovery Time               | t <sub>rr</sub>       | V <sub>GS</sub> =0V, I <sub>S</sub> =300mA, V <sub>R</sub> =25V,<br>dI <sub>S</sub> /dt=-100A/us              |       | 30  |      | ns   |
| Recovered Charge                    | Q <sub>r</sub>        | V <sub>GS</sub> =0V, I <sub>S</sub> =300mA, V <sub>R</sub> =25V<br>dI <sub>S</sub> /dt=-100A/us               |       | 30  |      | nC   |
| GATE-SOURCE ZENER DIODE             |                       |                                                                                                               |       |     |      |      |
| Gate-Source Breakdown Voltage       | BV <sub>GSO</sub>     | I <sub>gs</sub> =± 1mA(Open Drain)                                                                            | ±21.5 |     | ±30  | V    |
| DRAIN-SOURCE DIODE                  |                       |                                                                                                               |       |     |      |      |
| Diode Forward Voltage(note 2)       | V <sub>SD</sub>       | I <sub>S</sub> =300mA, V <sub>GS</sub> = 0V                                                                   |       |     | 1.5  | V    |
| Continuous Diode Forward Current    | I <sub>S</sub>        |                                                                                                               |       |     | 0.2  | A    |
| Pulsed Diode Forward Current(note1) | I <sub>SM</sub>       |                                                                                                               |       |     | 0.53 | A    |

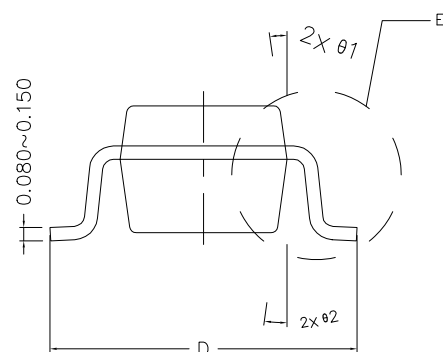
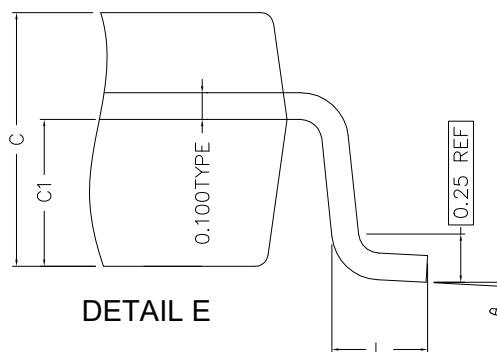
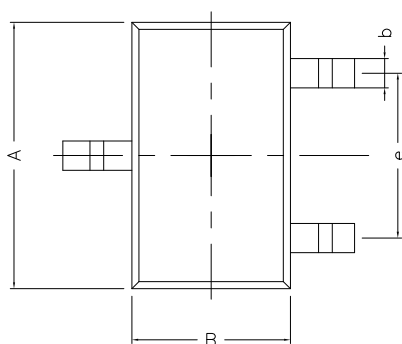
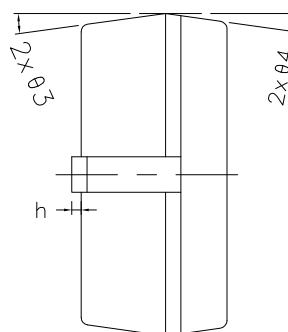
## Notes :

1. Repetitive rating: Pulse width limited by junction temperature.
2. Pulse Test : Pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
3. Guaranteed by design, not subject to production testing.

# N-Channel Enhancement Mode Power MOSFET

## Typical Characteristics



**SOT-323 Package Outline Dimensions (Units: mm)**

**SIDE VIEW**

**DETAIL E**

**TOP VIEW**

**SIDE VIEW**

| COMMON DIMENSIONS<br>(UNITS OF MEASURE IS mm) |           |        |       |
|-----------------------------------------------|-----------|--------|-------|
|                                               | MIN       | NORMAL | MAX   |
| A                                             | 2.000     | 2.100  | 2.200 |
| B                                             | 1.150     | 1.250  | 1.350 |
| C                                             | 0.900     | 0.950  | 1.000 |
| C1                                            | 0.500     | 0.550  | 0.600 |
| D                                             | 2.100     | 2.300  | 2.500 |
| L                                             | 0.220     | 0.360  | 0.500 |
| b                                             | 0.200     | 0.250  | 0.400 |
| h                                             | 0.020     | 0.050  | 0.100 |
| e                                             | 1.300TYPE |        |       |
| θ <sub>1</sub>                                | 8° TYPE   |        |       |
| θ <sub>2</sub>                                | 8° TYPE   |        |       |
| θ <sub>3</sub>                                | 8° TYPE   |        |       |
| θ <sub>4</sub>                                | 8° TYPE   |        |       |
| θ                                             | 0~8° TYPE |        |       |