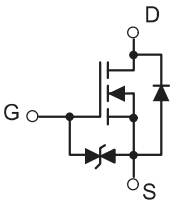
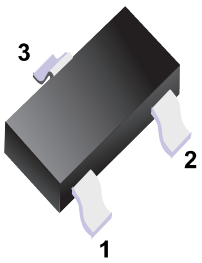
**60V N-Channel Enhancement Mode Power MOSFET**

## MAIN CHARACTERISTICS

| | |
|---|---|
| $I_D$ | 340mA |
| $V_{DSS}$ | 60V |
| $R_{DSON}$-typ(@$V_{GS}$=10V) | ＜5Ω(Typ:0.9Ω) |
| $R_{DSON}$-typ(@$V_{GS}$=4.5V) | ＜5.3Ω(Typ:1.1Ω) |




1.Gate
2.Source
3.Drain

SOT-323

## FEATURE

- High density cell design for Low RDS(on)
- Voltage controlled small signal switch
- Rugged and reliable
- High saturation current capability
- ESD protected

## APPLICATION

- Load Switch for Portable Devices
- DC/DC Converter

| Marking Code | |
|---|---|
| 2N7002KW | 72K |

## Maximum Ratings at Tc=25°C unless otherwise specified

| Characteristics | Symbols | Value | Units |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 60 | V |
| Gate - Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current | $I_D$ | 340 | mA |
| Pulsed Drain Current(note1) | $I_{DM}$ | 800 | mA |
| Power Dissipation | $P_D$ | 0.2 | W |
| Operating Junction Temperature Range | $T_J$ | 150 | °C |
| Storage Temperature Range | $T_{STG}$ | -55 to +150 | °C |
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 625 | °C/W |

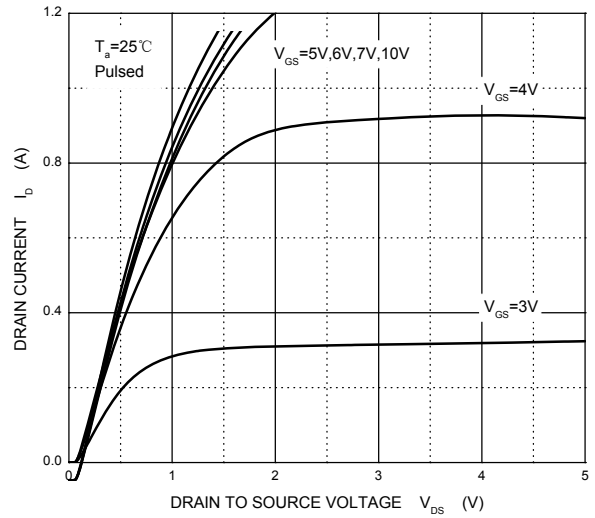
## Maximum Ratings at Ta=25°C unless otherwise specified

| Characteristics | Test Condition | Symbols | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_D$=250uA | $V_{(BR)DSS}$ | 60 | - | - | V |
| GateThreshold Voltage (note 2) | $V_{DS}$ =$V_{GS}$, $I_D$ =1mA | $V_{GS(th)}$ | 1 | 1.3 | 2.5 | V |
| Zero Gate Voltage Drain Current | $V_{DS}$ =48V,$V_{GS}$ = 0V | $I_{DSS}$ | - | - | 1 | μA |
| Gate-Source Leakage Current | $V_{GS}$ =±20V, $V_{DS}$ = 0V | $I_{GSS}$ | - | - | ±10 | μA |
| Drain-Source On-Resistance (note 2) | $V_{GS}$ =4.5V, $I_D$ =200mA | $R_{DS(ON)}$ | - | 1.1 | 5.3 | Ω |
| | $V_{GS}$ =10V, $I_D$ =500mA | | - | 0.9 | 5 | Ω |
| Input Capacitance | $V_{DS}$ =10V<br>$V_{GS}$ =0V<br>f =1MHz | $C_{iss}$ | - | - | 40 | pF |
| Output Capacitance | | $C_{oss}$ | - | - | 30 | |
| Reverse Transfer Capacitance | | $C_{rss}$ | - | - | 10 | |
| Turn-on Delay Time | $V_{GS}$=10V,$V_{DD}$=50V,<br>$R_G$=50Ω<br>$R_{GS}$=50Ω , $R_L$=250Ω | $t_{d(on)}$ | - | - | 10 | ns |
| Turn-off Delay Time | | $t_{d(off)}$ | - | - | 15 | |
| Reverse Recovery Time | $V_{GS}$=0V,$I_S$=300mA,$V_R$=25V,<br>dIs/dt=-100A/us | $t_{rr}$ | - | 30 | - | |
| Recovered Charge | $V_{GS}$=0V,$I_S$=300mA,$V_R$=25V<br>dIs/dt=-100A/us | $Q_r$ | - | 30 | - | nC |
| Gate-Source Breakdown Voltage | Igs=±1mA(Open Drain) | $BV_{GSO}$ | ±21.5 | - | ±30 | V |
| Diode Forward Voltage(note 2) | $I_S$=300mA, $V_{GS}$ = 0V | $V_{SD}$ | - | - | 1.5 | V |
| Continuous Diode Forward Current | | $I_S$ | - | - | 0.2 | A |
| Pulsed Diode Forward Current(note1) | | $I_{SM}$ | - | - | 0.53 | A |

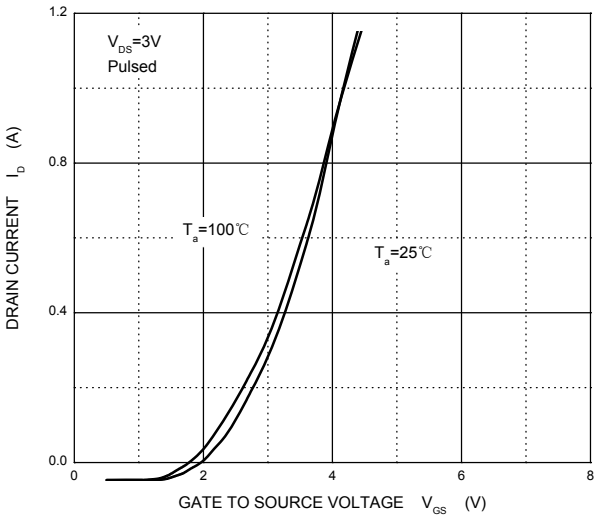
**Notes :**
1. Repetitive rating:Pluse width limited by junction temperature.
2. Pulse Test : Pulse width ≤300μs, duty cycle≤2%.
3. Guaranteed by design, not subject to production testing.

## Typical Characteristics

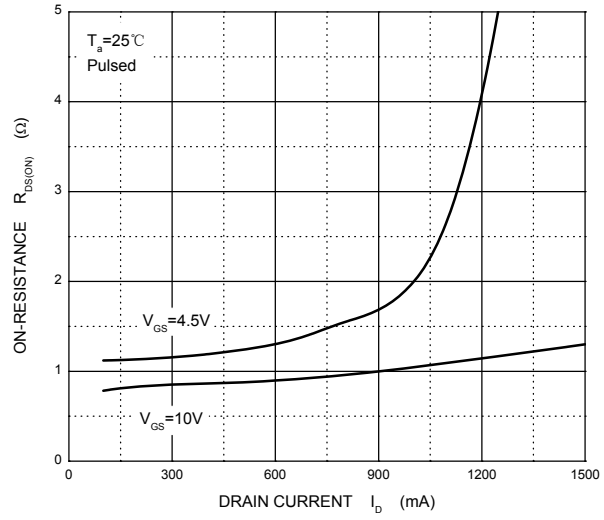
**Output Characteristics**



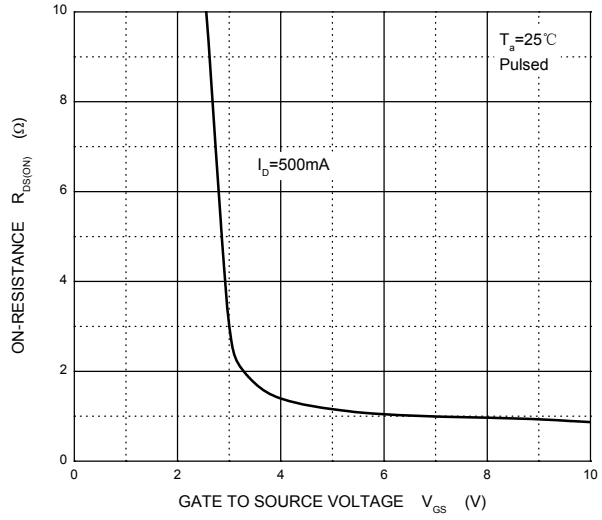

**Transfer Characteristics**



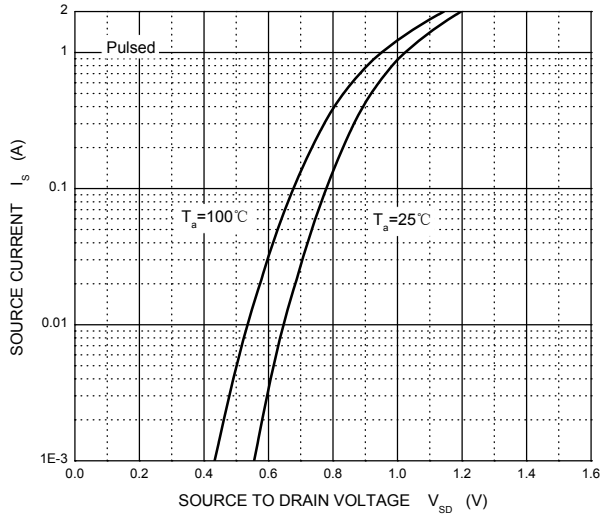

**$R_{DS(ON)}$ —— $I_D$**



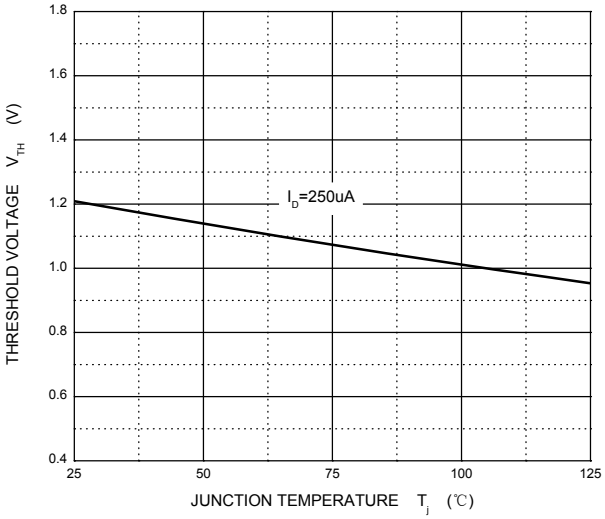

**$R_{DS(ON)}$ —— $V_{GS}$**




**$I_S$ —— $V_{SD}$**




**Threshold Voltage**

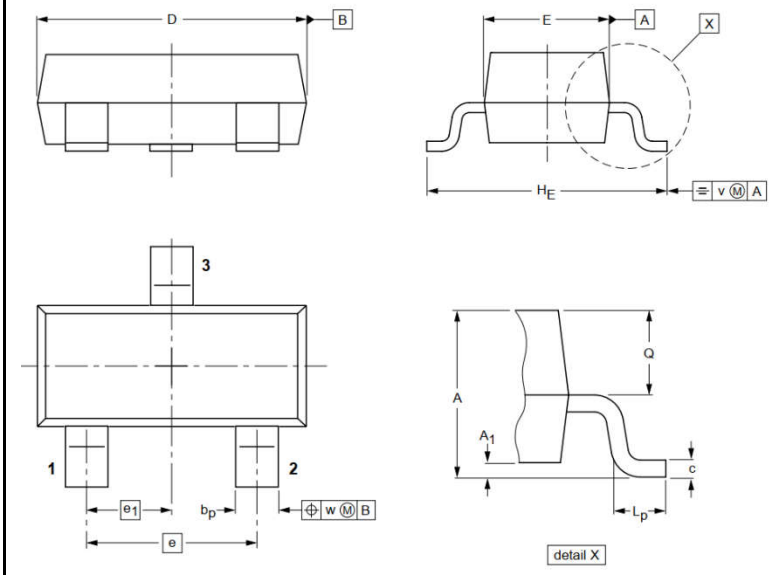


## Ordering information

| Package | Packing Description | Base Quantity | Packing Quantity |
|---|---|---|---|
| SOT-323 | Tape/Reel,7"reel | 3000pcs/Reel | 24000PCS/Box 120000PCS/Carton |

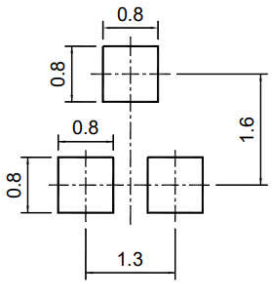
## Package Dimensions

**SOT-323**




| Dim. | Millimeter (mm) | | mil | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.8 | 1.1 | 32 | 43 |
| A1 | 0.1 | | 4 | |
| bp | 0.3 | 0.4 | 12 | 16 |
| C | 0.10 | 0.25 | 4 | 10 |
| D | 1.8 | 2.2 | 71 | 87 |
| E | 1.15 | 1.35 | 45 | 53 |
| e | 1.3 | | 51 | |
| e1 | 0.65 | | 26 | |
| HE | 2.0 | 2.2 | 79 | 87 |
| Lp | 0.15 | 0.45 | 6 | 18 |
| Q | 0.13 | 0.23 | 5.1 | 9 |
| v | 0.2 | | 8 | |
| W | 0.2 | | 8 | |

## The recommended mounting pad size



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