



## 2N7002AK 0.3A 60V N-CHANNEL MOSFET

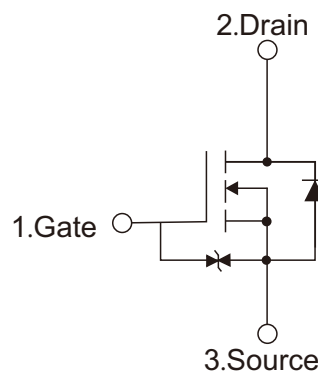
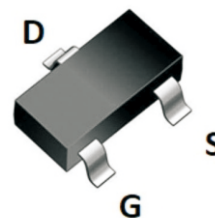
### Features

- Fast Switching Capability
- Avalanche Energy Tested
- Low On Resistance
- Low Input Capacitance
- Small Surface Mount Package

### Applications

- Motor Control
- Power Management Functions

SOT-23



### Absolute Maximum Ratings (TA=25°C, unless otherwise specified)

| Parameter  | Symbols        | Ratings    | Units       |
|--|----------------|------------|-------------|
| Drain-Source Voltage                                   | $V_{DSS}$      | 60         | V           |
| Gate-Source Voltage                                    | $V_{GSS}$      | $\pm 20$   | V           |
| Continuous Drain Current                               | $I_D$          | 0.3        | A           |
| Operation Junction Temperature And Storage Temperature | $T_j, T_{stg}$ | -55 ~ +150 | $^{\circ}C$ |

| Parameter                               | Symbols      | Test Conditions                   | Min | Typ | Units | Units    |
|---|--------------|-----------------------------------|-----|-----|-------|----------|
| <b>Off Characteristics</b>              |              |                                   |     |     |       |          |
| Drain-Source Breakdown Voltage          | $B_{VDSS}$   | $V_{GS} = 0V, I_D = 10\mu A$      | 60  |     |       | V        |
| Drain-Source Leakage Current            | $I_{DSS}$    | $V_{DS} = 60V, V_{GS} = 0V$       |     |     | 1     | $\mu A$  |
| Gate- Source Leakage Current            | $I_{GSS}$    | $V_{GS} = 20V, V_{DS} = 0V$       |     |     | 10    | $\mu A$  |
|   |              | $V_{GS} = -20V, V_{DS} = 0V$      |     |     | -10   |          |
| <b>On Characteristics</b>               |              |                                   |     |     |       |          |
| Gate Threshold Voltage                  | $V_{GS(TH)}$ | $V_{DS} = V_{GS}, I_D = 250\mu A$ | 1.0 | 1.5 | 2.5   | V        |
| Static Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 0.3A$        |     | 1.6 | 2.5   | $\Omega$ |
|   |              | $V_{GS} = 4.5V, I_D = 0.2A$       |     | 1.9 | 3.0   | $\Omega$ |
| HBM                                     | ESD          | $V_{DS} = 10V, I_D = 0.115A$      | 2.0 |     |       | KV       |



### Dynamic Characteristics

|                                  |              |   |     |    |
|----------------------------------|--------------|---|-----|----|
| Input Capacitance                | $C_{ISS}$    | $V_{DS} = 25V,$<br>$V_{GS} = 0V,$<br>$f = 1.0MHz$                               | 23  | pF |
| Output Capacitance               | $C_{OSS}$    |   | 3.4 | pF |
| Reverse Transfer Capacitance     | $C_{RSS}$    |   | 1.4 | pF |
| <b>Switching Characteristics</b> |              |   |     |    |
| Turn-On Delay Time               | $t_{D(ON)}$  | $V_{DD} = 30V, I_D = 3A, R_L = 150\Omega$<br>$V_{GEN} = 10, R_{GEN} = 25\Omega$ | 10  | ns |
| Turn-Off Delay Time              | $t_{D(OFF)}$ |   | 33  | ns |

### Typical Characteristics

Fig.1 Typical Output Characteristic

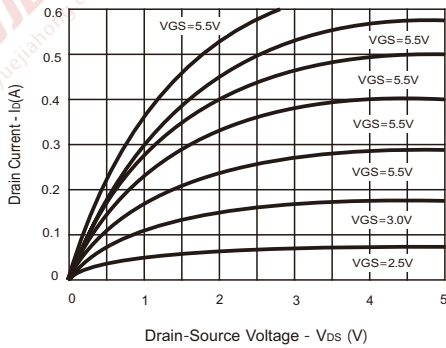


Fig.2 Typical Transfer Characteristics

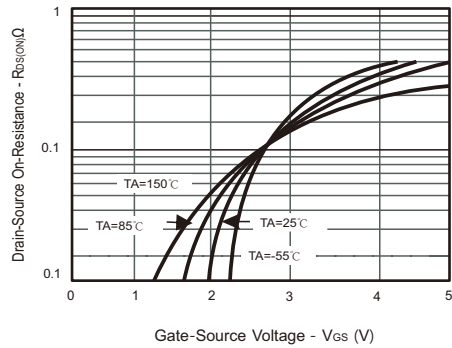


Fig.3 On-Resistance vs. Drain Current & Gate Voltage

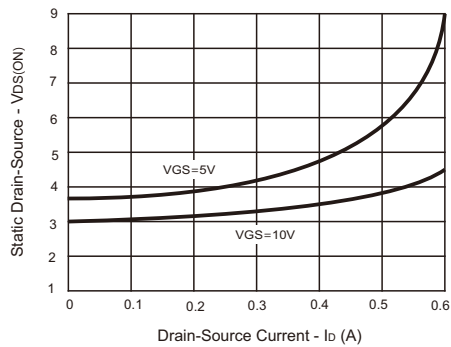


Fig.4 Normalized Static Drain-Source On-Resistance

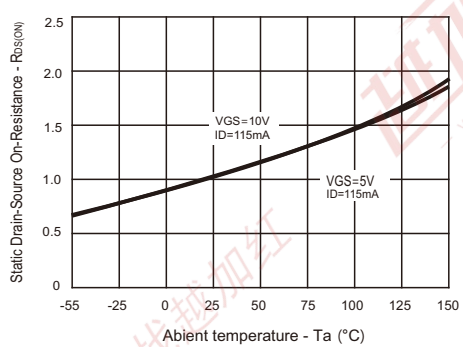




Fig.5 Gate Threshold Variation vs.Ambient Temperature

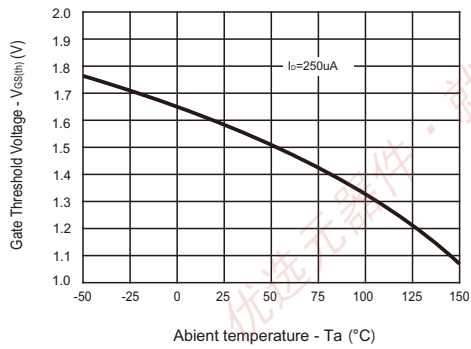


Fig.6 Typical Total Capacitance

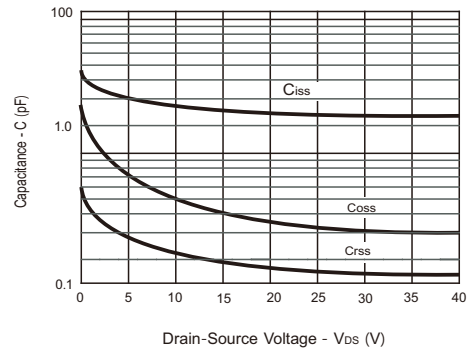
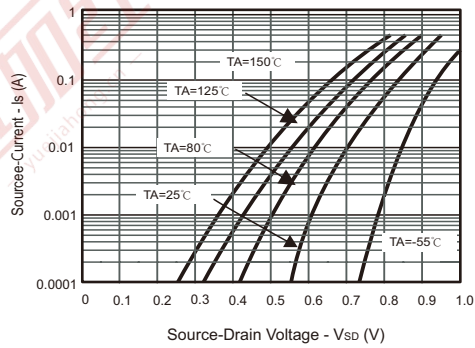
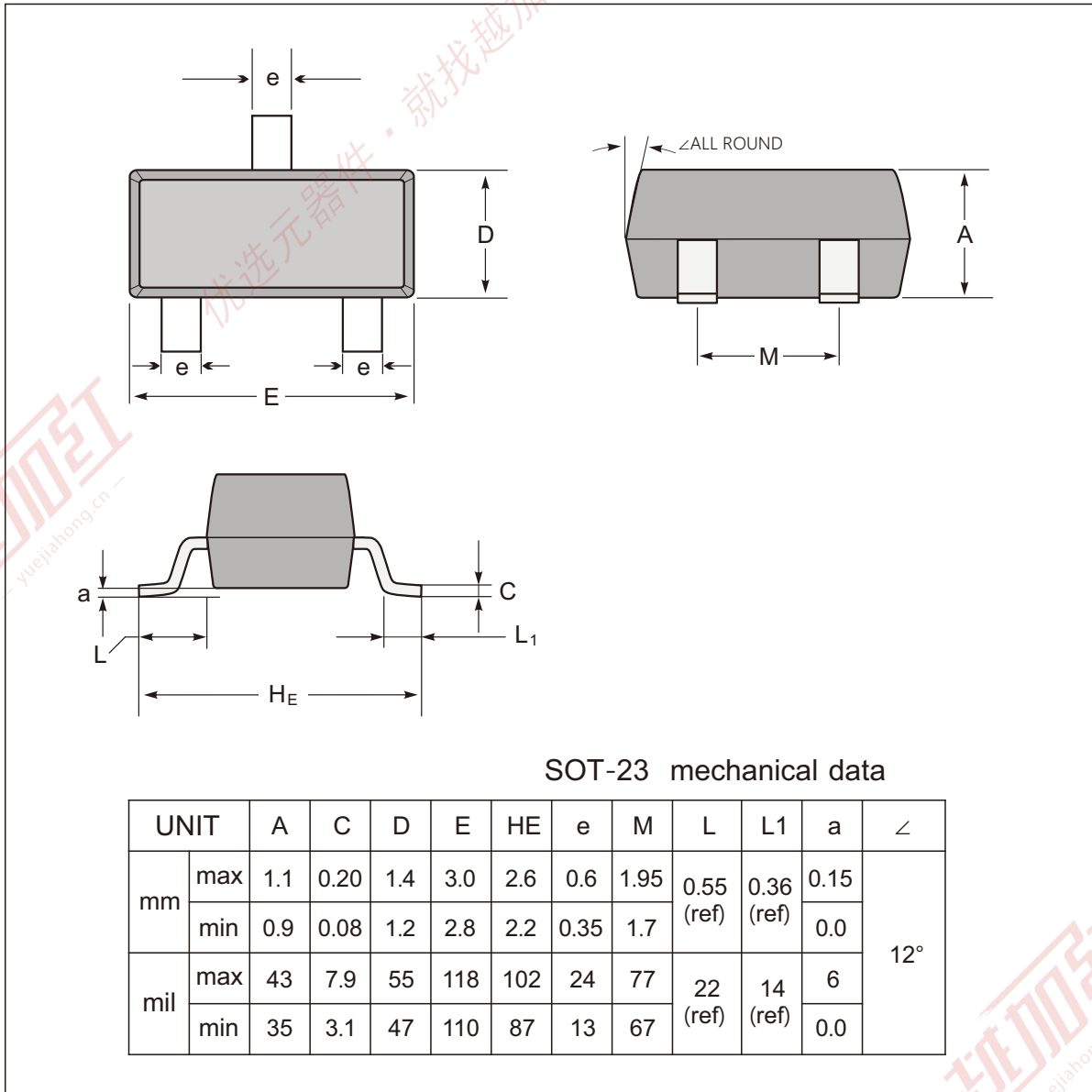


Fig.7 Reverse Dain Current vs.Source-Drain Voltage

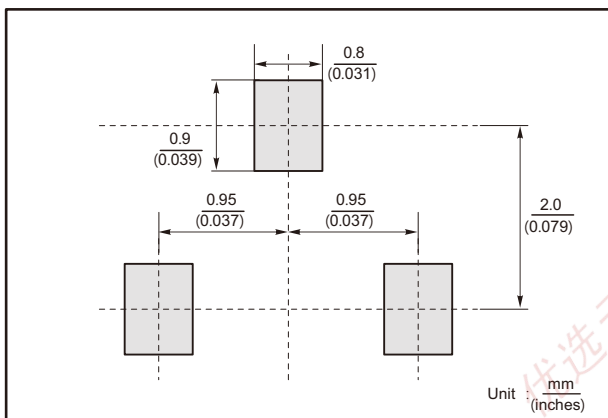




### SOT-23 Package Outline Dimensions



#### The recommended mounting pad size



#### Marking

| Type number | Marking code |
|-------------|--------------|
| 2N7002AK    | 72AK         |



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