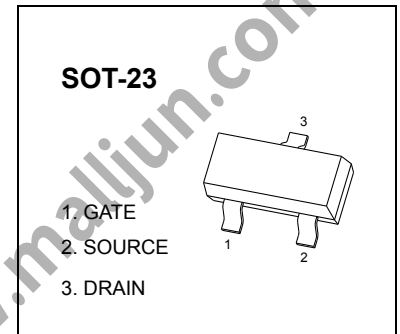


## SOT-23 Plastic-Encapsulate MOSFETs

### 2N7002K N-channel MOSFET

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 60V           | 5Ω@10V          | 340mA |
|               | 5.3Ω@4.5V       |       |



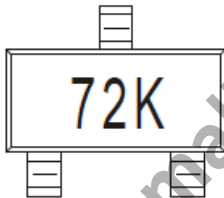
#### FEATURE

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

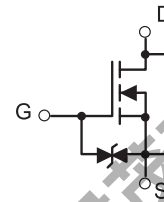
#### APPLICATION

- Load Switch for Portable Devices
- DC/DC Converter

#### MARKING



#### Equivalent circuit



#### 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     |
| $I_D$           | Drain Current                               | 340      | mA    |
| $P_D$           | Power Dissipation                           | 0.35     | W     |
| $T_J$           | Junction Temperature                        | 150      | °C    |
| $T_{stg}$       | Storage Temperature                         | -55~+150 | °C    |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | 357      | °C /W |

## MOSFET ELECTRICAL CHARACTERISTICS

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

| Parameter                       | Symbol              | Test Condition                                                                                               | Min   | Typ | Max  | Units |
|---------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------|-------|-----|------|-------|
| Static Characteristics          |                     |                                                                                                              |       |     |      |       |
| Drain-Source Breakdown Voltage  | V <sub>DS</sub>     | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                                                  | 60    |     |      | V     |
| Gate Threshold Voltage*         | 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>GSS1</sub>   | V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V                                                                  |       |     | ±10  | μA    |
|                                 | I <sub>GSS2</sub>   | V <sub>GS</sub> =±10V, V <sub>DS</sub> = 0V                                                                  |       |     | ±200 | nA    |
|                                 | I <sub>GSS3</sub>   | V <sub>GS</sub> =±5V, V <sub>DS</sub> = 0V                                                                   |       |     | ±100 | nA    |
| Drain-Source On-Resistance*     | R <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5V, I <sub>D</sub> =200mA                                                                |       | 1.1 | 5.3  | Ω     |
|                                 |                     | V <sub>GS</sub> =10V,I <sub>D</sub> =500mA                                                                   |       | 0.9 | 5    | Ω     |
| Diode Forward Voltage           | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =300mA                                                                   |       |     | 1.5  | V     |
| 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/μS               |       | 30  |      | nC    |
| Dynamic Characteristics**       |                     |                                                                                                              |       |     |      |       |
| 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 Characteristics**     |                     |                                                                                                              |       |     |      |       |
| 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/μS               |       | 30  |      | ns    |
| GATE-SOURCE ZENER DIODE         |                     |                                                                                                              |       |     |      |       |
| Gate-Source Breakdown Voltage   | BV <sub>GSO</sub>   | I <sub>gs</sub> =±1mA (Open Drain)                                                                           | ±21.5 |     | ±30  | V     |

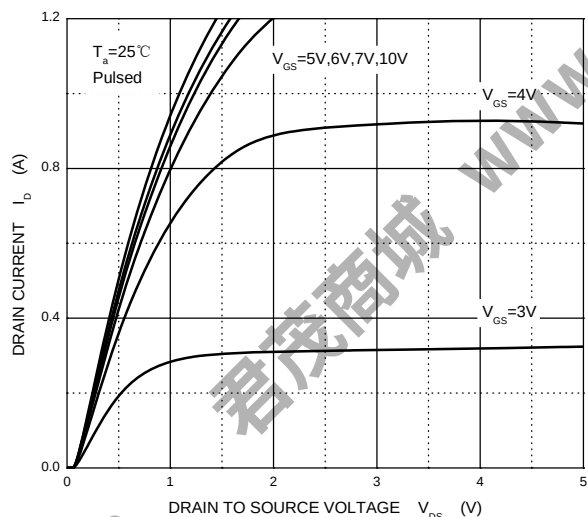
### Notes :

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

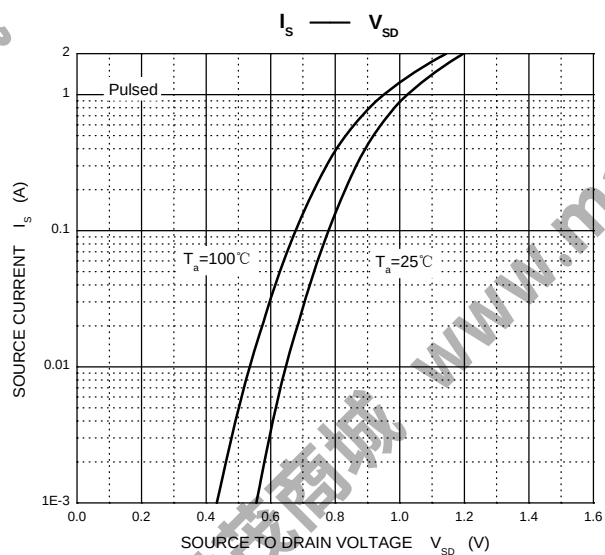
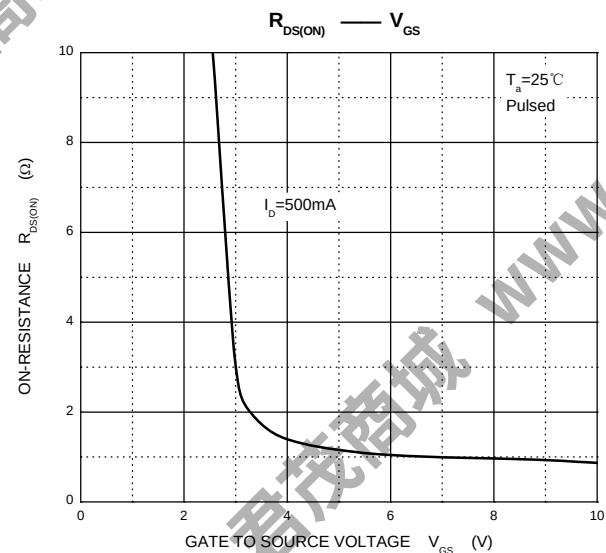
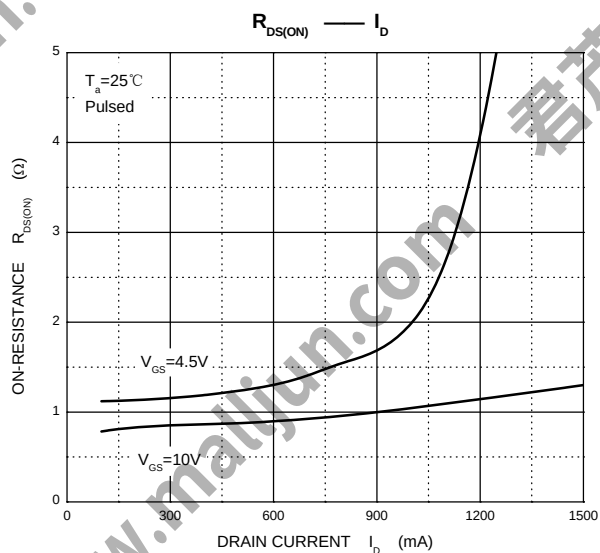
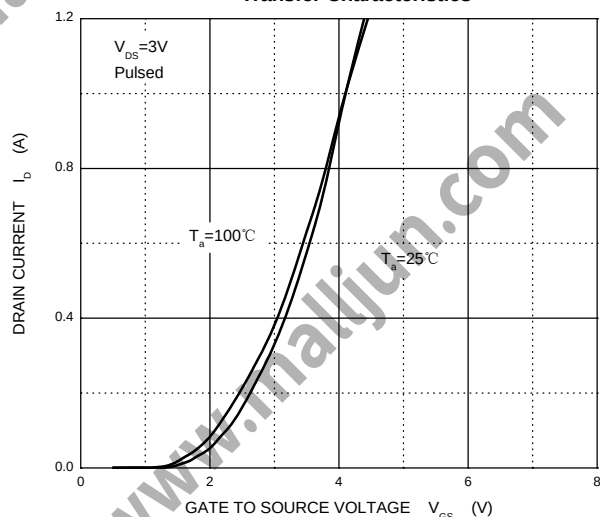
\*\*These parameters have no way to verify.

## Typical Characteristics

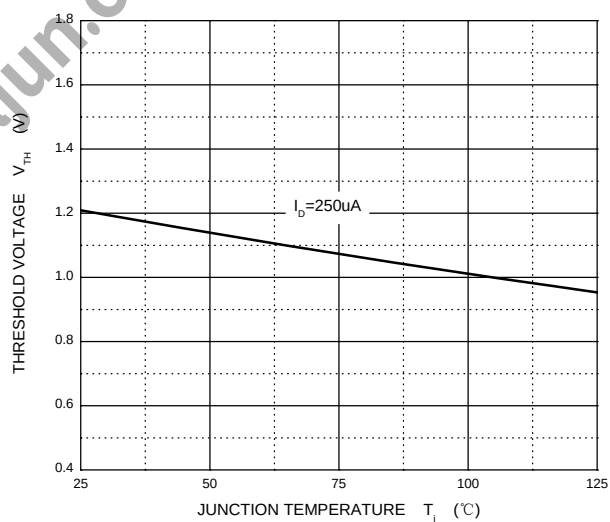
Output Characteristics



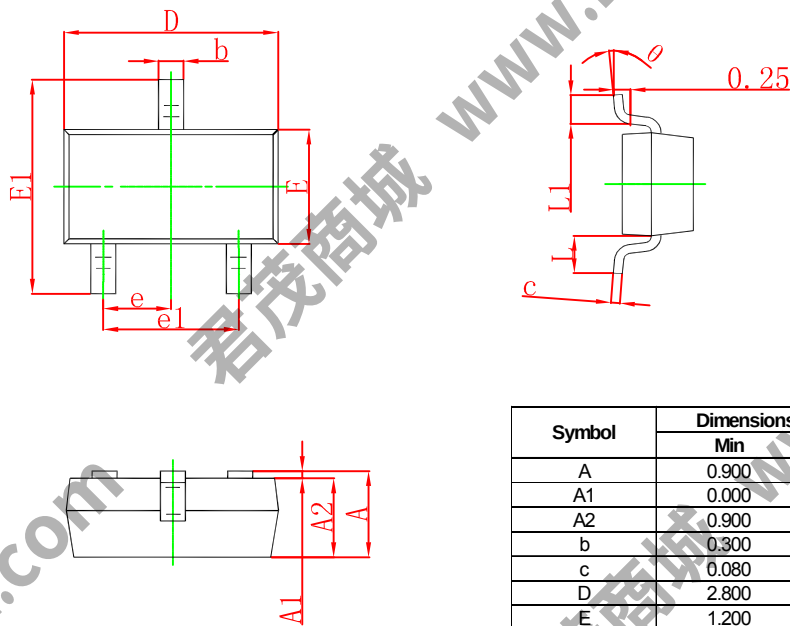
Transfer Characteristics



Threshold Voltage

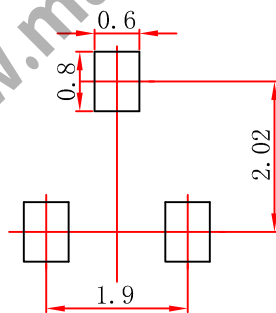


## SOT-23 Package Outline Dimensions



| Symbol | Dimensions in Millimeters |       | Dimensions in Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.050 | 0.035                | 0.041 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



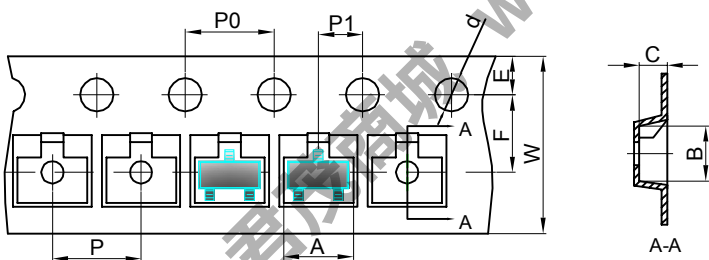
- Note:
1. Controlling dimension: in millimeters.
  2. General tolerance:  $\pm 0.05$  mm.
  3. The pad layout is for reference purposes only.

### NOTICE

JCET reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. JCET does not assume any liability arising out of the application or use of any product described herein.

SOT-23 Tape and reel

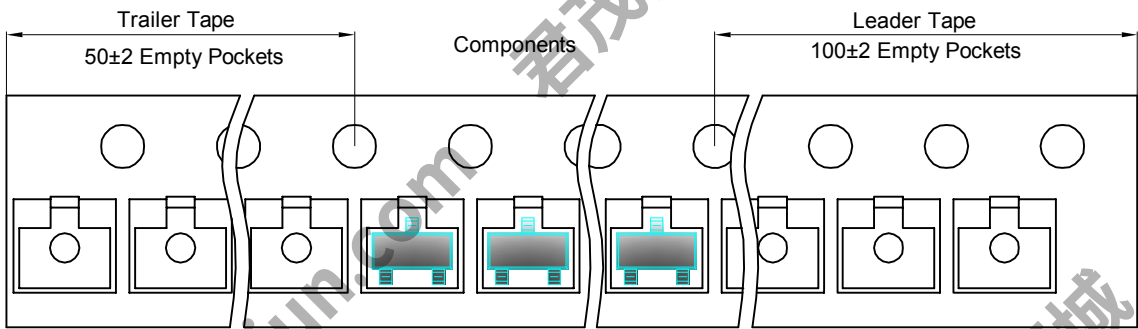
SOT-23 Embossed Carrier Tape



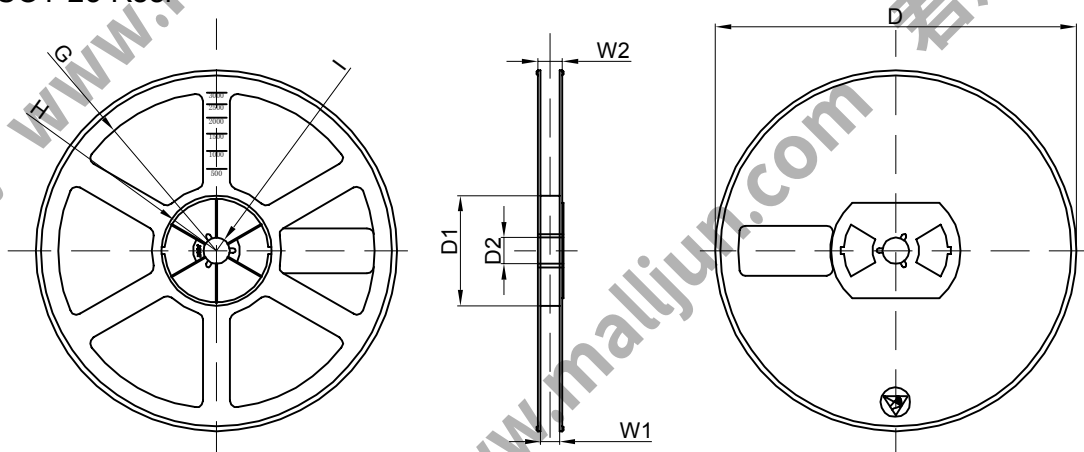
Packaging Description:  
SOT-23 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 3,000 units per 7" or 17.8cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |      |
|------------------------------|------|------|------|-------|------|------|------|------|------|------|
| Pkg type                     | A    | B    | C    | d     | E    | F    | P0   | P    | P1   | W    |
| SOT-23                       | 3.15 | 2.77 | 1.22 | Ø1.50 | 1.75 | 3.50 | 4.00 | 4.00 | 2.00 | 8.00 |

SOT-23 Tape Leader and Trailer



SOT-23 Reel



| Dimensions are in millimeter |         |       |       |        |        |       |      |       |
|------------------------------|---------|-------|-------|--------|--------|-------|------|-------|
| Reel Option                  | D       | D1    | D2    | G      | H      | I     | W1   | W2    |
| 7"Dia                        | Ø178.00 | 54.40 | 13.00 | R78.00 | R25.60 | R6.50 | 9.50 | 12.30 |

| REEL     | Reel Size | Box        | Box Size(mm) | Carton      | Carton Size(mm) | G.W.(kg) |
|----------|-----------|------------|--------------|-------------|-----------------|----------|
| 3000 pcs | 7 inch    | 30,000 pcs | 203×203×195  | 120,000 pcs | 438×438×220     |          |