

## FEATURES

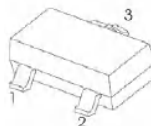
High density cell design for low  $R_{DS(ON)}$   
Voltage controlled small signal switch  
Rugged and reliable  
High saturation current capability

$V_{DSS}$  60 V  
 $I_D$  340 mA  
 $R_{DS(ON)}$  1.7  $\Omega$

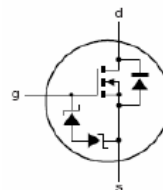
7002

## SOT-23

1. GATE
2. SOURCE
3. DRAIN



## Equivalent Circuit



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Maximum ratings (  $T_a=25^{\circ}\text{C}$  unless otherwise noted)

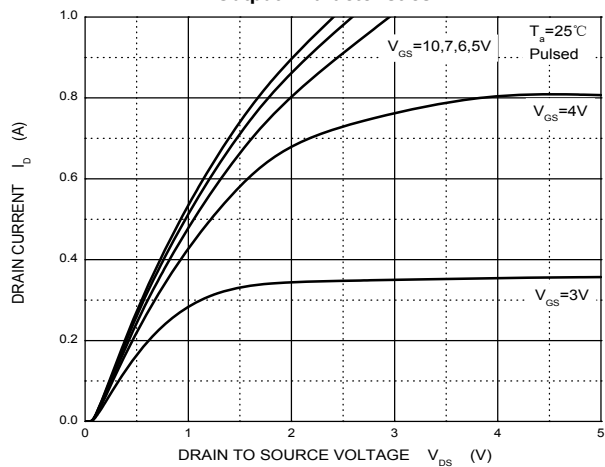
| Symbol          | Parameter                                   | Value   | Units                       |
|-----------------|---------------------------------------------|---------|-----------------------------|
| $V_{DS}$        | Drain-Source voltage                        | 60      | V                           |
| $V_{GS}$        | Gate-Source voltage                         | 20      | V                           |
| $I_D$           | Drain Current                               | 340     | mA                          |
| $P_D$           | Power Dissipation                           | 0.35    | W                           |
| $T_J$           | Junction Temperature                        | 150     | $^{\circ}\text{C}$          |
| $T_{stg}$       | Storage Temperature                         | -55-150 | $^{\circ}\text{C}$          |
| $R_{\theta JA}$ | Thermal Resistance from Junction to Ambient | 357     | $^{\circ}\text{C}/\text{W}$ |

## Electrical Characteristics

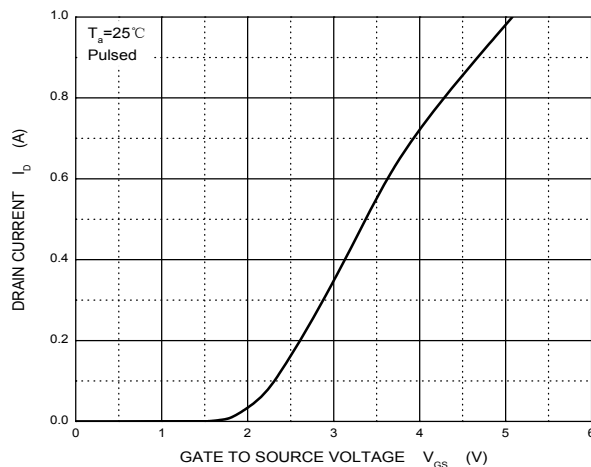
| Parameter                       | Symbol              | Test Condition                                                                                               | Min   | Typ | Max  | Units |
|---------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------|-------|-----|------|-------|
| 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     |     | 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                                                                |       | 1.7 | 5.3  | Ω     |
|                                 |                     | V <sub>GS</sub> =10V,I <sub>D</sub> =500mA                                                                   |       |     | 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     |

## RATING AND CHARACTERISTIC CURVES

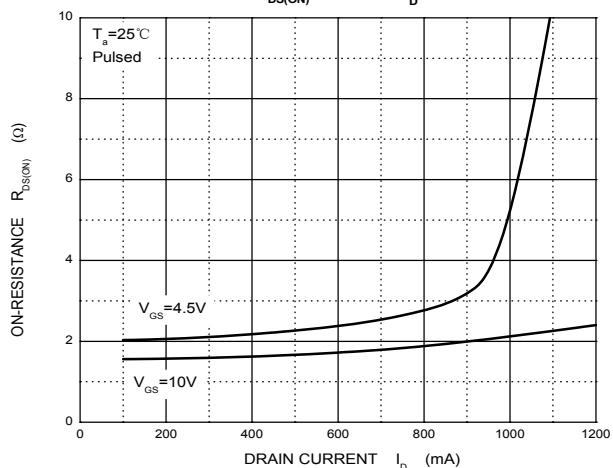
**Output Characteristics**



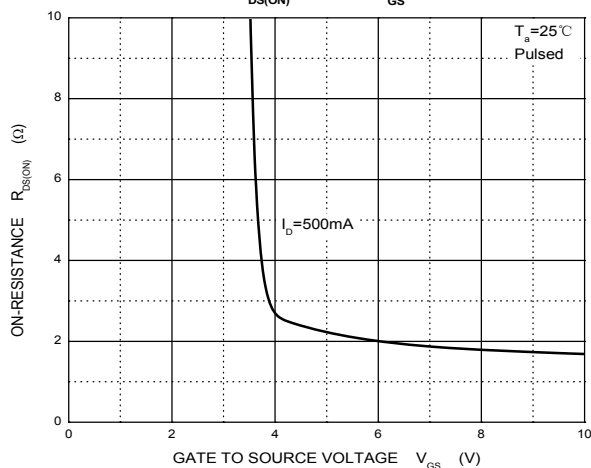
**Transfer Characteristics**



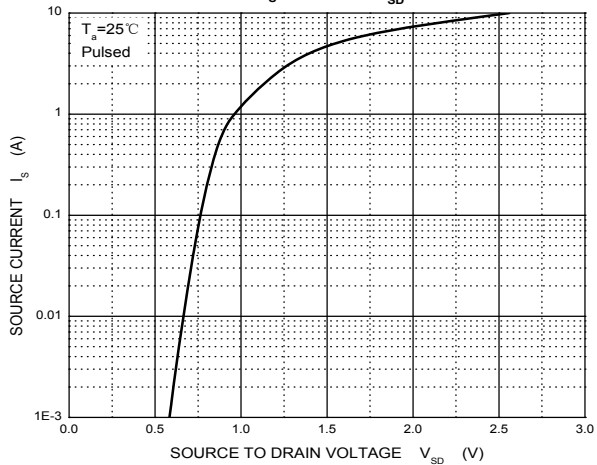
**$R_{DS(ON)}$  —  $I_D$**



**$R_{DS(ON)}$  —  $V_{GS}$**

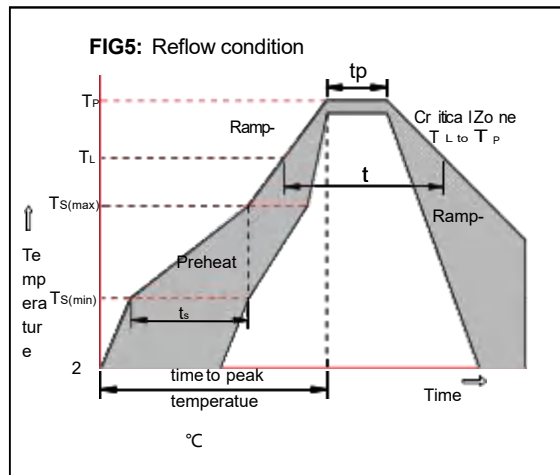


**$I_S$  —  $V_{SD}$**



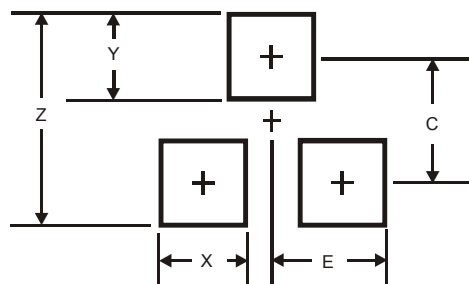
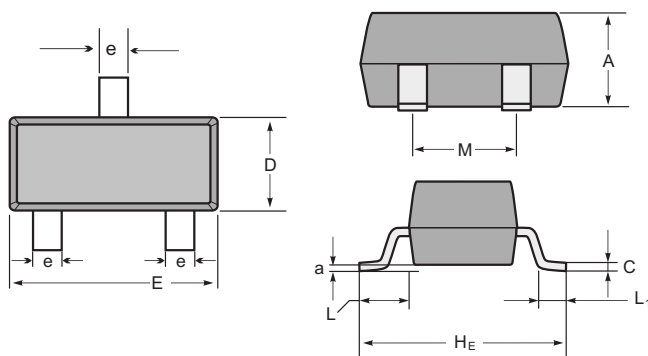
## Soldering parameters

| Reflow Condition                                        |                                   | Pb-Free assembly<br>(see as below) |
|---------------------------------------------------------|-----------------------------------|------------------------------------|
| Pre Heat                                                | -Temperature Min ( $T_{s(min)}$ ) | +150°C                             |
|                                                         | -Temperature Max( $T_{s(max)}$ )  | +200°C                             |
|                                                         | -Time (Min to Max) (ts)           | 60-180 secs.                       |
| Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak) |                                   | 3°C/sec. Max                       |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                    |                                   | 3°C/sec. Max                       |
| Reflow                                                  | -Temperature( $T_L$ )(Liquid us)  | +217°C                             |
|                                                         | -Temperature( $t_L$ )             | 60-150 secs.                       |
| Peak Temp ( $T_P$ )                                     |                                   | +260(+0/-5)°C                      |
| Time within 5°C of actual Peak Temp ( $t_P$ )           |                                   | 30 secs. Max                       |
| Ramp-down Rate                                          |                                   | 6°C/sec. Max                       |
| Time 25°C to Peak Temp ( $T_P$ )                        |                                   | 8 min. Max                         |
| Do not exceed                                           |                                   | +260°C                             |



## Package Dimensions & Suggested Pad Layout

### SOT23

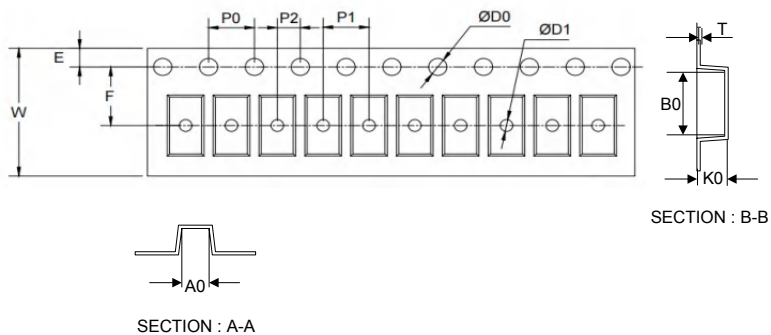


### SOT-23 mechanical data

| UNIT |     | A   | C    | D   | E   | H <sub>E</sub> | e   | M    | L          | L <sub>1</sub> | a    |
|------|-----|-----|------|-----|-----|----------------|-----|------|------------|----------------|------|
| mm   | max | 1.1 | 0.15 | 1.4 | 3.0 | 2.6            | 0.5 | 1.95 | 0.55 (ref) | 0.36 (ref)     | 0.0  |
|      | min | 0.9 | 0.08 | 1.2 | 2.8 | 2.2            | 0.3 | 1.7  |            |                | 0.15 |
| mil  | max | 43  | 6    | 55  | 118 | 102            | 20  | 77   | 22 (ref)   | 14 (ref)       | 0.0  |
|      | min | 35  | 3    | 47  | 110 | 87             | 12  | 67   |            |                | 6    |

| Dimensions | SOT23 |
|------------|-------|
| Z          | 2.9   |
| X          | 0.8   |
| Y          | 0.9   |
| C          | 2.0   |
| E          | 1.35  |

## Tape



| Symbol            | Dimension (mm) |
|-------------------|----------------|
| P0                | 4.00±0.10      |
| P1                | 4.00±0.10      |
| P2                | 2.00±0.10      |
| D0                | 1.55±0.10      |
| D1                | 1.05±0.10      |
| E                 | 1.55±0.10      |
| F                 | 3.60±0.10      |
| W                 | 8.00±0.10      |
| A0                | 3.80±0.20      |
| B0                | 3.25±0.20      |
| K0                | 1.45±0.10      |
| T                 | 0.25±0.05      |
| D2                | 178.0±3.0      |
| D3                | 55Min.         |
| D4                | R24.0±3.0      |
| G                 | R82.0±3.0      |
| I                 | 13.0±2.0       |
| W1                | 11.0±3.0       |
| Quantity: 3000PCS |                |