

## FEATURES

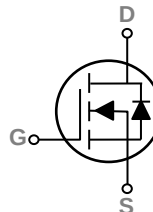
High density cell design for low  $R_{DS(ON)}$   
Voltage controlled small signal switch  
Rugged and reliable  
High saturation current capability

$V_{DSS}$  50 V  
 $I_D$  0.22 A  
 $R_{DS(ON)}$  1.7 m $\Omega$

M8W



Equivalent Circuit



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

| Parameter                                   | Symbol          | Value      | Unit                      |
|---------------------------------------------|-----------------|------------|---------------------------|
| Drain-Source Voltage                        | $V_{DS}$        | 50         | V                         |
| Continuous Gate-Source Voltage              | $V_{GSS}$       | $\pm 20$   |                           |
| Continuous Drain Current                    | $I_D$           | 0.22       | A                         |
| Power Dissipation                           | $P_D$           | 0.35       | W                         |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 357        | $^\circ\text{C}/\text{W}$ |
| Operating Temperature                       | $T_j$           | 150        | $^\circ\text{C}$          |
| Storage Temperature                         | $T_{stg}$       | -55 ~ +150 |                           |

**Electrical Characteristics**  $T_J=25^{\circ}\text{C}$  unless otherwise noted

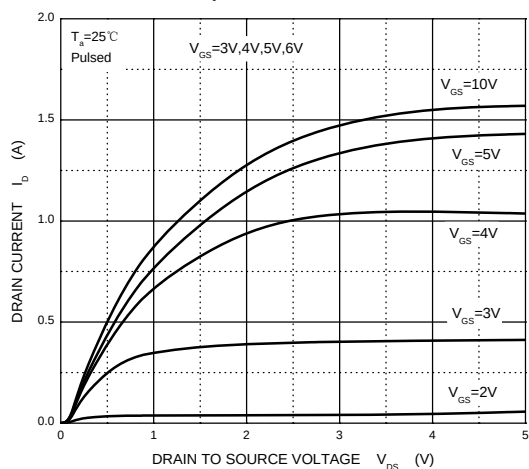
| Parameter                                  | Symbol               | Test Condition                                                                             | Min  | Typ | Max  | Units |
|--------------------------------------------|----------------------|--------------------------------------------------------------------------------------------|------|-----|------|-------|
| Off characteristics                        |                      |                                                                                            |      |     |      |       |
| Drain-source breakdown voltage             | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA                                                | 50   |     |      | V     |
| Gate-body leakage                          | I <sub>GSS</sub>     | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                 |      |     | ±10  | μA    |
| Zero gate voltage drain current            | I <sub>DSS</sub>     | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V                                                  |      |     | 0.5  | μA    |
|                                            |                      | V <sub>DS</sub> =30V, V <sub>GS</sub> =0V                                                  |      |     | 100  | nA    |
| On characteristics                         |                      |                                                                                            |      |     |      |       |
| Gate-threshold voltage (note 1)            | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA                                     | 0.80 |     | 1.50 | V     |
| Static drain-source on-resistance (note 1) | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =0.22A                                                |      | 1.7 | 3.50 | Ω     |
|                                            |                      | V <sub>GS</sub> =4.5V, I <sub>D</sub> =0.22A                                               |      |     | 6    |       |
| Forward transconductance (note 1)          | g <sub>FS</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =0.22A                                                | 0.12 |     |      | S     |
| Dynamic characteristics (note 2)           |                      |                                                                                            |      |     |      |       |
| Input capacitance                          | C <sub>iss</sub>     | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                                          |      | 27  |      | pF    |
| Output capacitance                         | C <sub>oss</sub>     |                                                                                            |      | 13  |      |       |
| Reverse transfer capacitance               | C <sub>rss</sub>     |                                                                                            |      | 6   |      |       |
| Switching characteristics                  |                      |                                                                                            |      |     |      |       |
| Turn-on delay time (note 1,2)              | t <sub>d(on)</sub>   | V <sub>DD</sub> =30V, V <sub>DS</sub> =10V,<br>I <sub>D</sub> =0.29A, R <sub>GEN</sub> =6Ω |      |     | 5    | ns    |
| Rise time (note 1,2)                       | t <sub>r</sub>       |                                                                                            |      |     | 18   |       |
| Turn-off delay time (note 1,2)             | t <sub>d(off)</sub>  |                                                                                            |      |     | 36   |       |
| Fall time (note 1,2)                       | t <sub>f</sub>       |                                                                                            |      |     | 14   |       |
| Drain-source body diode characteristics    |                      |                                                                                            |      |     |      |       |
| Body diode forward voltage (note 1)        | V <sub>SD</sub>      | I <sub>S</sub> =0.44A, V <sub>GS</sub> = 0V                                                |      |     | 1.4  | V     |

**Notes:**

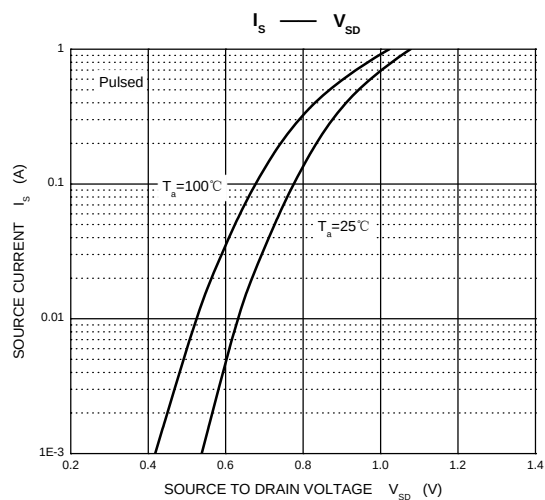
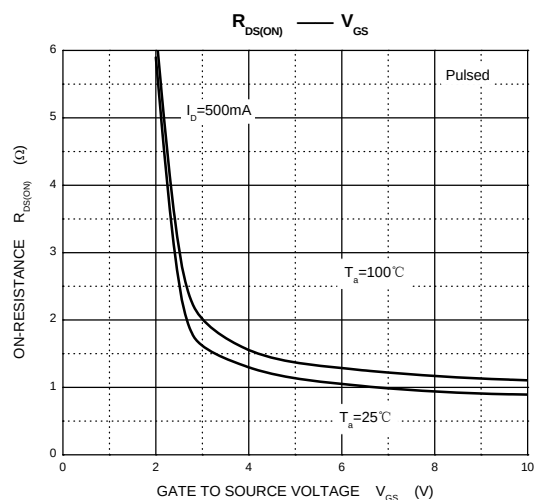
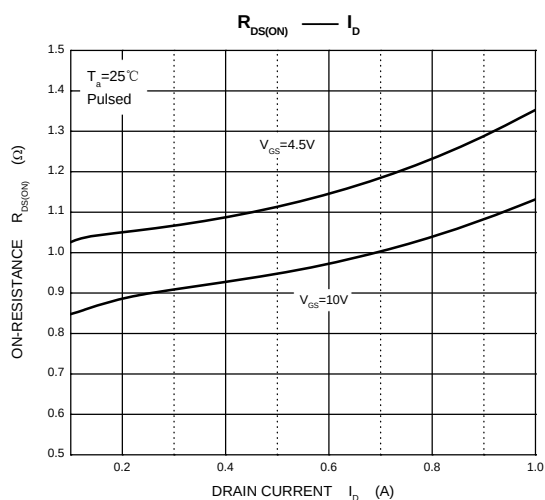
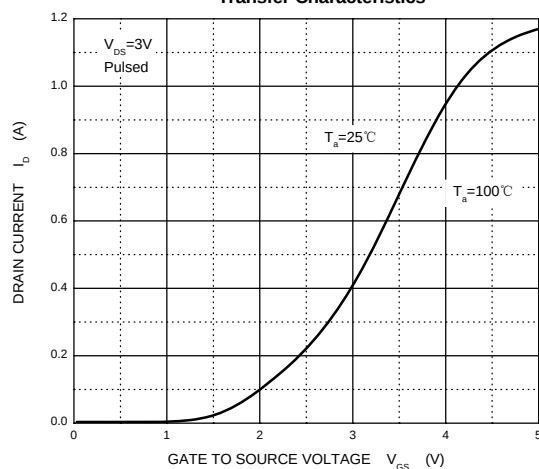
1. Pulse Test ; Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
2. These parameters have no way to verify.

## RATING AND CHARACTERISTIC CURVES

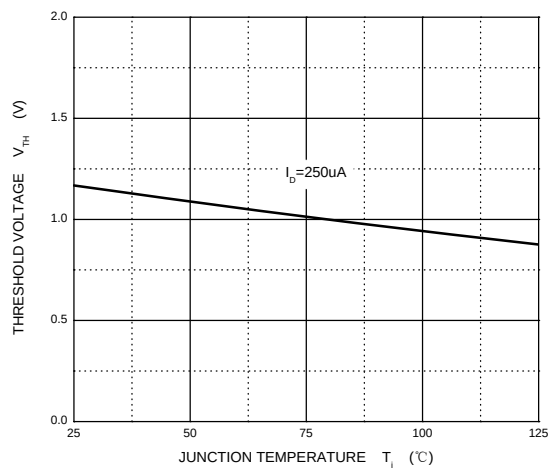
**Output Characteristics**



**Transfer Characteristics**

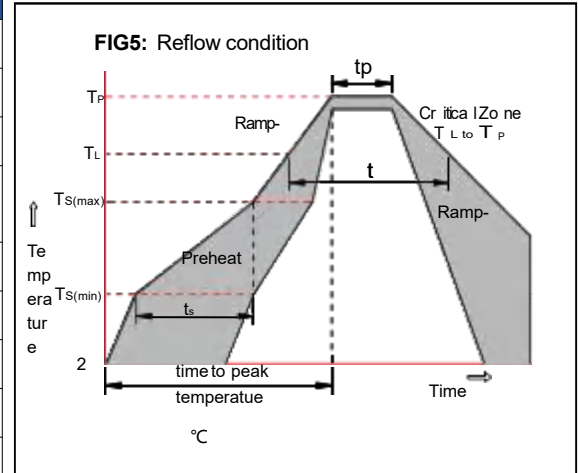


**Threshold Voltage**



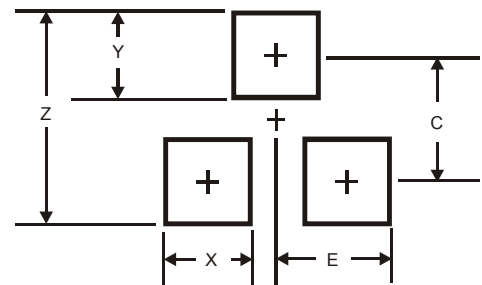
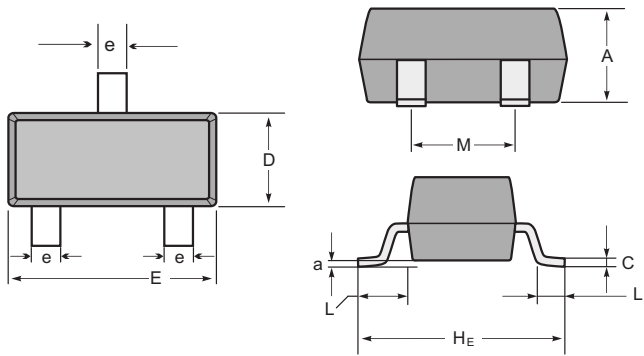
## Soldering parameters

| 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

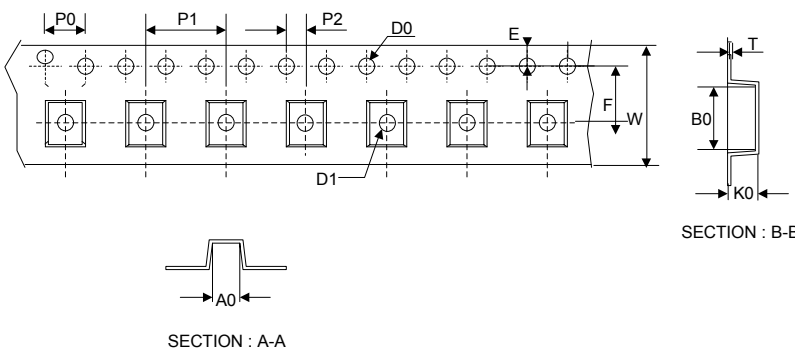
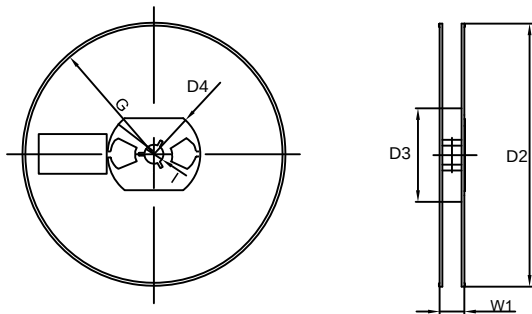


### SOT-23 mechanical data

| 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 & rell specification

| Tape                                                                                                                        |  | Symbol            | Dimension (mm) |
|-----------------------------------------------------------------------------------------------------------------------------|--|-------------------|----------------|
|  <p>SECTION : A-A</p> <p>SECTION : B-B</p> |  | 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      |
| 7" Reel                                                                                                                     |  | I                 | 13.0±2.0       |
|                                          |  | W1                | 11.0±3.0       |
|                                                                                                                             |  | Quantity: 3000PCS |                |