

### Product Summary

- $V_{DS} = -20V, I_D = -4A$
- $R_{DS(ON)} < 36m\Omega @ V_{GS} = -4.5V$
- $R_{DS(ON)} < 49m\Omega @ V_{GS} = -2.5V$
- ESD Rating: 2500V HBM

### Application

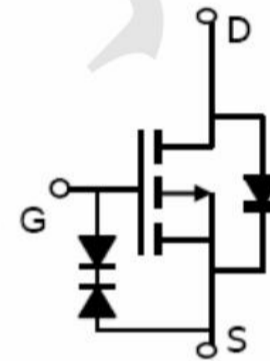
- Load/Power Switching
- Interfacing Switching
- Logic Level Shift

### Package and Pin Configuration

SOT-23



### Circuit diagram



### Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

| Parameter  | Symbol         | Limit      | Unit       |
|--|----------------|------------|------------|
| Drain-Source Voltage                             | $V_{DS}$       | -20        | V          |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 10$   | V          |
| Drain Current-Continuous                         | $I_D$          | -4         | A          |
| Drain Current-Pulsed (Note 1)                    | $I_{DM}$       | -30        | A          |
| Maximum Power Dissipation                        | $P_D$          | 1.4        | W          |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | $^\circ C$ |

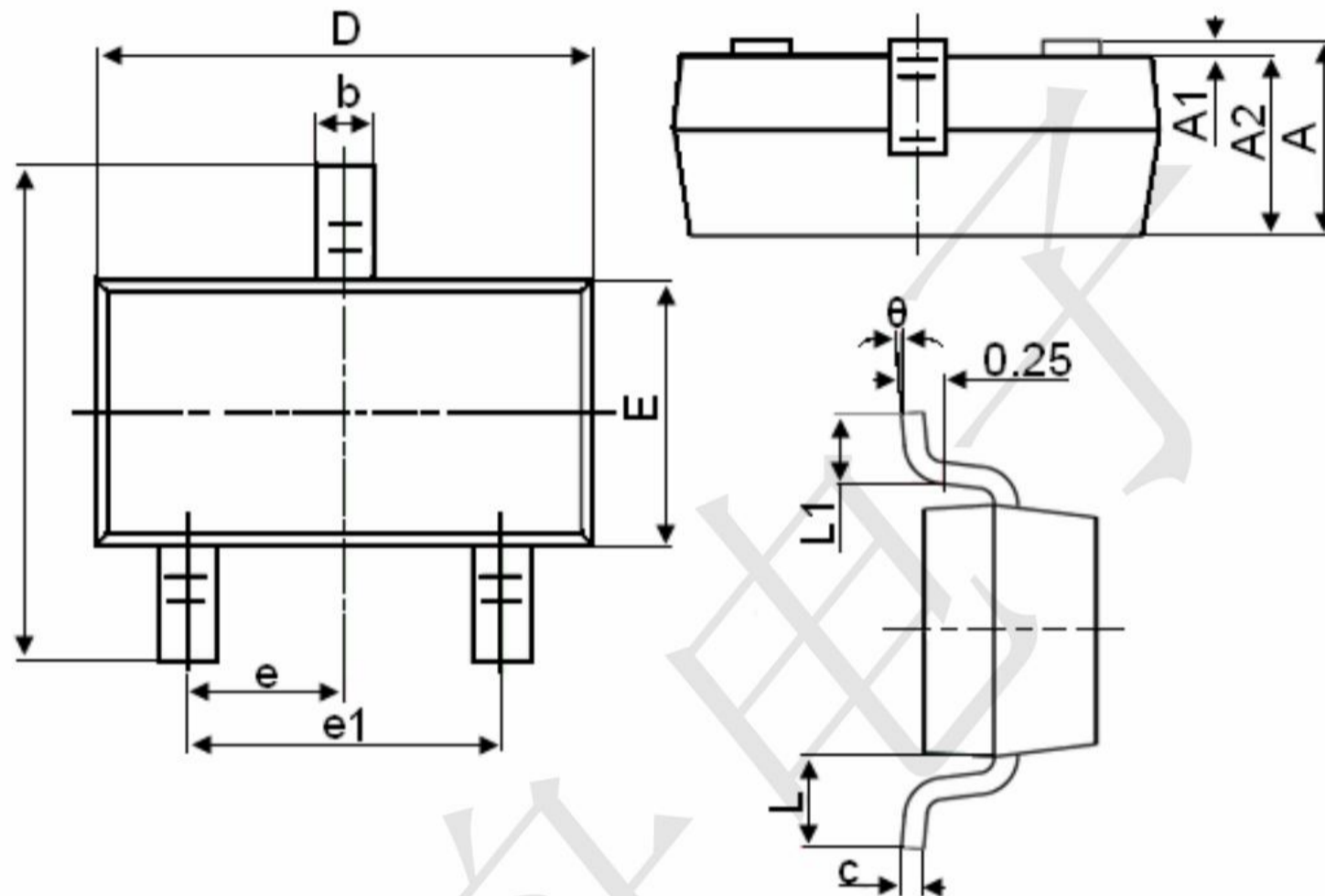
### Thermal Characteristic

|  |                 |      |              |
|--|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 89.3 | $^\circ C/W$ |
|--|-----------------|------|--------------|

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

| Parameter                                 | Symbol       | Condition   | Min   | Typ    | Max      | Unit      |
|---|--------------|---|-------|--------|----------|-----------|
| <b>Off Characteristics</b>                |              |   |       |        |          |           |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$                                      | -20   |        | -        | V         |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS}=-20V, V_{GS}=0V$  | -     | -      | 1        | $\mu A$   |
| Gate-Body Leakage Current                 | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                                     | -     | -      | $\pm 10$ | $\mu A$   |
| <b>On Characteristics (Note 3)</b>        |              |   |       |        |          |           |
| Gate Threshold Voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                                  | -0.35 | -0.65  | -0.9     | V         |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS}=-4.5V, I_D=-4A$   | -     | 29     | 36       | $m\Omega$ |
|   |              | $V_{GS}=-2.5V, I_D=-4A$   | -     | 37     | 49       | $m\Omega$ |
| Forward Transconductance                  | $g_{FS}$     | $V_{DS}=-5V, I_D=-4A$   | 8     | -      | -        | S         |
| <b>Dynamic Characteristics (Note4)</b>    |              |   |       |        |          |           |
| Input Capacitance                         | $C_{iss}$    | $V_{DS}=-10V, V_{GS}=0V,$<br>$F=1.0MHz$                         | -     | 1181.1 | -        | PF        |
| Output Capacitance                        | $C_{oss}$    |   | -     | 121.3  | -        | PF        |
| Reverse Transfer Capacitance              | $C_{rss}$    |   | -     | 114.8  | -        | PF        |
| <b>Switching Characteristics (Note 4)</b> |              |   |       |        |          |           |
| Turn-on Delay Time                        | $t_{d(on)}$  | $V_{DD}=-10V, R_L=2.5\Omega$<br>$V_{GS}=-4.5V, R_{GEN}=3\Omega$ | -     | 12     |          | nS        |
| Turn-on Rise Time                         | $t_r$        |   | -     | 10     |          | nS        |
| Turn-Off Delay Time                       | $t_{d(off)}$ |   | -     | 19     |          | nS        |
| Turn-Off Fall Time                        | $t_f$        |   | -     | 25     |          | nS        |
| Total Gate Charge                         | $Q_g$        | $V_{DS}=-10V, I_D=-4A,$<br>$V_{GS}=-4.5V$                       | -     | 10.2   |          | nC        |
| Gate-Source Charge                        | $Q_{gs}$     |   | -     | 1.3    | -        | nC        |
| Gate-Drain Charge                         | $Q_{gd}$     |   | -     | 2.4    | -        | nC        |
| <b>Drain-Source Diode Characteristics</b> |              |   |       |        |          |           |
| Diode Forward Voltage (Note 3)            | $V_{SD}$     | $V_{GS}=0V, I_S=-4A$  | -     | -      | -1.2     | V         |
| Diode Forward Current (Note 2)            | $I_S$        |   | -     | -      | -4       | A         |

**SOT-23 Package Information**



| Symbol | Dimensions in Millimeters |       |
|--------|---------------------------|-------|
|        | MIN.                      | MAX.  |
| A      | 0.900                     | 1.150 |
| A1     | 0.000                     | 0.100 |
| A2     | 0.900                     | 1.050 |
| b      | 0.300                     | 0.500 |
| c      | 0.080                     | 0.150 |
| D      | 2.800                     | 3.000 |
| E      | 1.200                     | 1.400 |
| E1     | 2.250                     | 2.550 |
| e      | 0.950TYP                  |       |
| e1     | 1.800                     | 2.000 |
| L      | 0.550REF                  |       |
| L1     | 0.300                     | 0.500 |
| θ      | 0°                        | 8°    |

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