

### 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

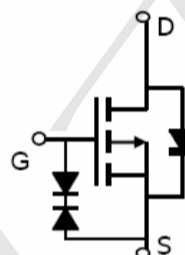
### Application

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

### Package and Pin Configuration SOT-23



### Circuit diagram



## Marking: 3415

### 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 | $^\circ C$ |

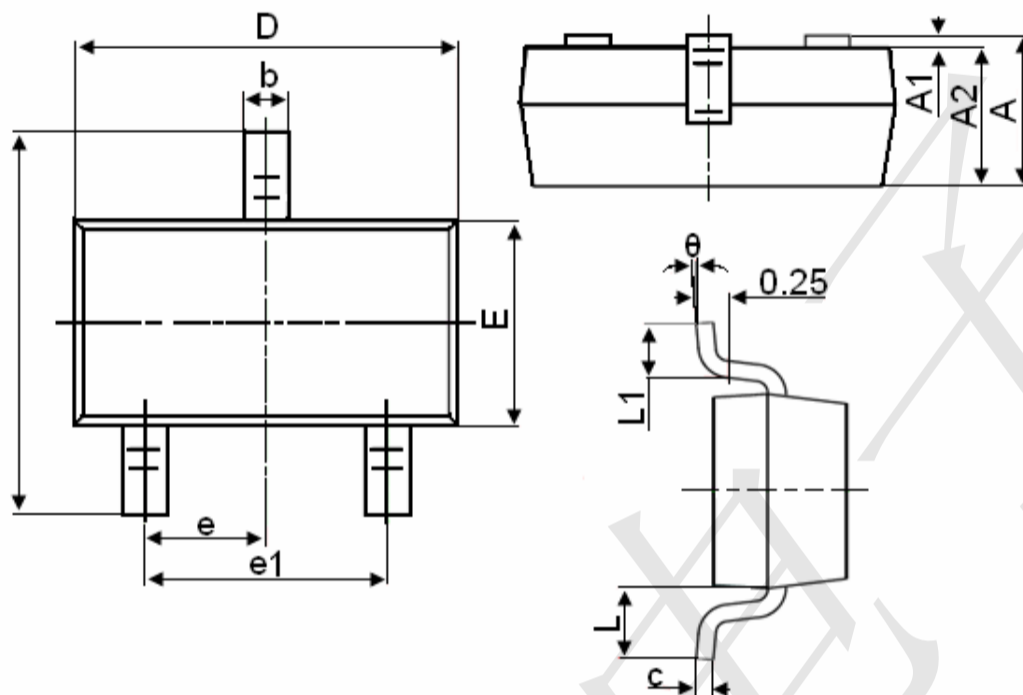
### Thermal Characteristic

|                                                  |                 |      |              |
|--------------------------------------------------|-----------------|------|--------------|
| 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       |
|------------------------------------|--------------|-----------------------------------------------------------------|-------|--------|----------|------------|
| Off Characteristics                |              |                                                                 |       |        |          |            |
| 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          | $I_{GSS}$    | $V_{GS}=\pm 10V, V_{DS}=0V$                                     | -     | -      | $\pm 10$ | $\mu A$    |
| On Characteristics (Note 3)        |              |                                                                 |       |        |          |            |
| 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          |
| Dynamic Characteristics (Note4)    |              |                                                                 |       |        |          |            |
| 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         |
| Switching Characteristics (Note 4) |              |                                                                 |       |        |          |            |
| 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         |
| Drain-Source Diode Characteristics |              |                                                                 |       |        |          |            |
| 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 |
| $\theta$ | 0°                        | 8°    |