

### Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)MAX}$ | $I_D$ |
|---------------|-----------------|-------|
| 20V           | 50mΩ@4.5V       | 3A    |
|               | 70mΩ@2.5V       |       |

### Feature

- Advanced trench technology
- Excellent  $R_{DS(on)}$
- Low gate charge

### Application

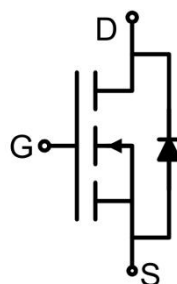
- Battery protection
- Load Switch
- Uninterruptible power supply

### Package

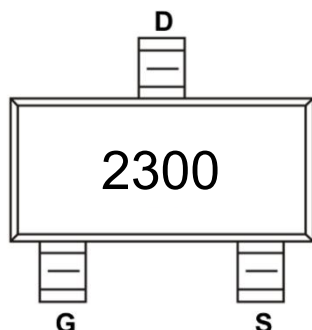


SOT-23

### Circuit diagram



### Marking



### Absolute maximum ratings ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                                                                               | Symbol          | Value      | Unit                        |
|-----------------------------------------------------------------------------------------|-----------------|------------|-----------------------------|
| Drain-Source Voltage                                                                    | $V_{DS}$        | 20         | V                           |
| Gate-Source Voltage                                                                     | $V_{GS}$        | $\pm 12$   | V                           |
| Continuous Drain Current <sup>1)</sup> ( $V_{GS}=4.5\text{V}, T_A=25^{\circ}\text{C}$ ) | $I_D$           | 3          | A                           |
| Pulsed Drain Current <sup>2)</sup>                                                      | $I_{DM}$        | 7.4        | A                           |
| Power Dissipation <sup>3)</sup> ( $T_A=25^{\circ}\text{C}$ )                            | $P_D$           | 0.9        | W                           |
| Thermal Resistance from Junction to Ambient <sup>1)</sup>                               | $R_{\theta JA}$ | 125        | $^{\circ}\text{C}/\text{W}$ |
| Junction Temperature                                                                    | $T_J$           | 150        | $^{\circ}\text{C}$          |
| Storage Temperature                                                                     | $T_{STG}$       | -55 ~ +150 | $^{\circ}\text{C}$          |

### Electrical characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)

| Parameter                                | Symbol        | Test Condition                                             | Min. | Typ. | Max.      | Unit       |
|------------------------------------------|---------------|------------------------------------------------------------|------|------|-----------|------------|
| Static Characteristics                   |               |                                                            |      |      |           |            |
| Drain-source breakdown voltage           | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 250\mu A$                              | 20   |      |           | V          |
| Zero gate voltage drain current          | $I_{DSS}$     | $V_{DS} = 20V, V_{GS} = 0V$                                |      |      | 1         | $\mu A$    |
| Gate-body leakage current                | $I_{GSS}$     | $V_{GS} = \pm 12V, V_{DS} = 0V$                            |      |      | $\pm 100$ | nA         |
| Gate threshold voltage                   | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\mu A$                          | 0.4  | 0.6  | 1.2       | V          |
| Drain-source on-resistance <sup>2)</sup> | $R_{DS(on)}$  | $V_{GS} = 4.5V, I_D = 2A$                                  |      | 42   | 50        | m $\Omega$ |
|                                          |               | $V_{GS} = 2.5V, I_D = 1.5A$                                |      | 54   | 70        |            |
| Dynamic characteristics <sup>4)</sup>    |               |                                                            |      |      |           |            |
| Input Capacitance                        | $C_{iss}$     | $V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$                      |      | 184  |           | pF         |
| Output Capacitance                       | $C_{oss}$     |                                                            |      | 38   |           |            |
| Reverse Transfer Capacitance             | $C_{rss}$     |                                                            |      | 28   |           |            |
| Total Gate Charge                        | $Q_g$         | $V_{DS} = 10V, V_{GS} = 4.5V, I_D = 3A$                    |      | 2.7  |           | nC         |
| Gate-Source Charge                       | $Q_{gs}$      |                                                            |      | 0.4  |           |            |
| Gate-Drain Charge                        | $Q_{gd}$      |                                                            |      | 0.5  |           |            |
| Turn-on delay time                       | $t_{d(on)}$   | $V_{DS} = 10V, V_{GS} = 4.5V, R_{GEN} = 3\Omega, I_D = 3A$ |      | 2.3  |           | nS         |
| Turn-on rise time                        | $t_r$         |                                                            |      | 3.1  |           |            |
| Turn-off delay time                      | $t_{d(off)}$  |                                                            |      | 9.2  |           |            |
| Turn-off fall time                       | $t_f$         |                                                            |      | 2.5  |           |            |
| Source-Drain Diode characteristics       |               |                                                            |      |      |           |            |
| Diode Forward Current                    | $I_S$         |                                                            |      |      | 3         | A          |
| Diode Forward voltage                    | $V_{SD}$      | $V_{GS} = 0V, I_S = 3A$                                    |      |      | 1.2       | V          |

Notes:

- 1) The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2) The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- 3) The power dissipation is limited by 150 $^{\circ}\text{C}$  junction temperature.
- 4) Guaranteed by design, not subject to production testing.

## Typical Characteristics

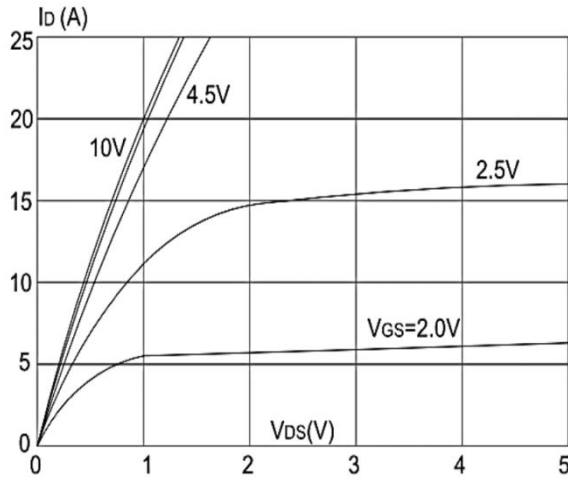


Figure1: Output Characteristics

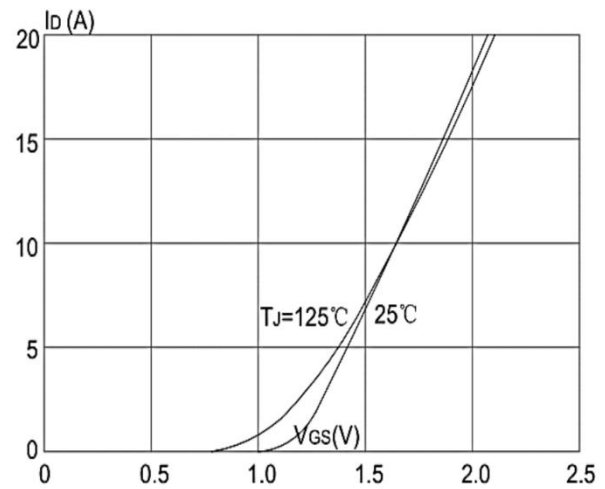


Figure 2: Typical Transfer Characteristics

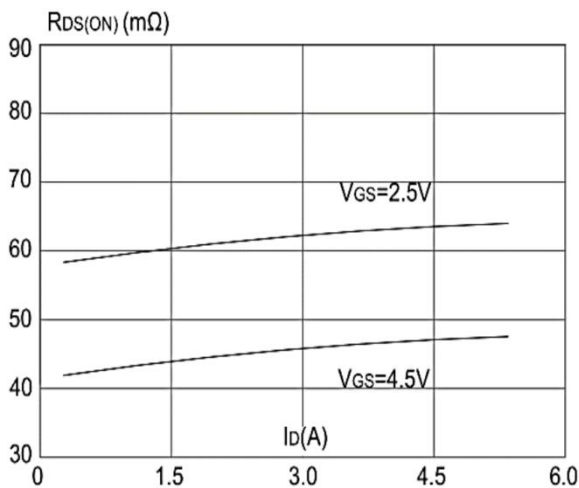


Figure 3: On-resistance vs. Drain Current

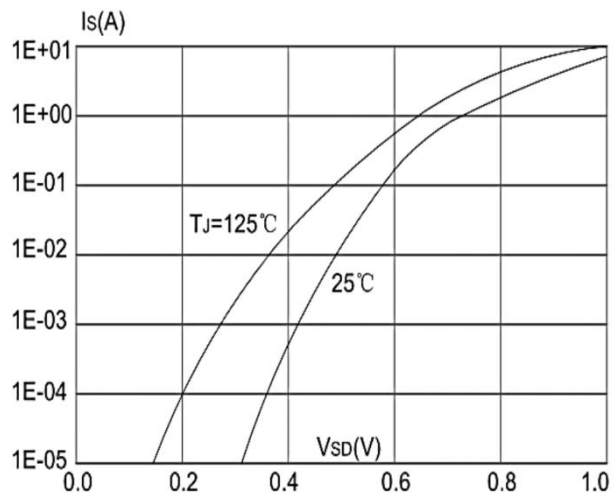


Figure 4: Body Diode Characteristics

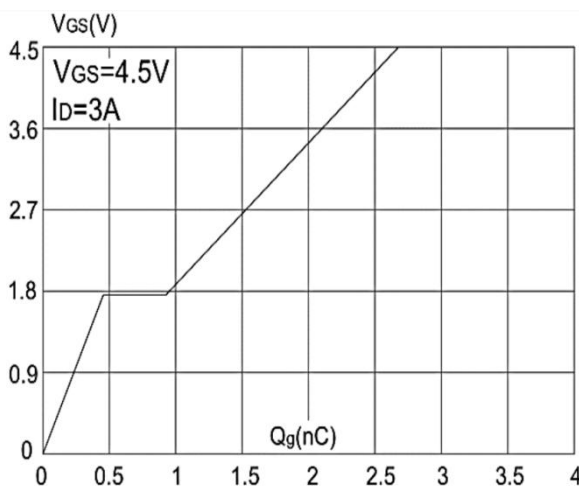


Figure 5: Gate Charge Characteristics

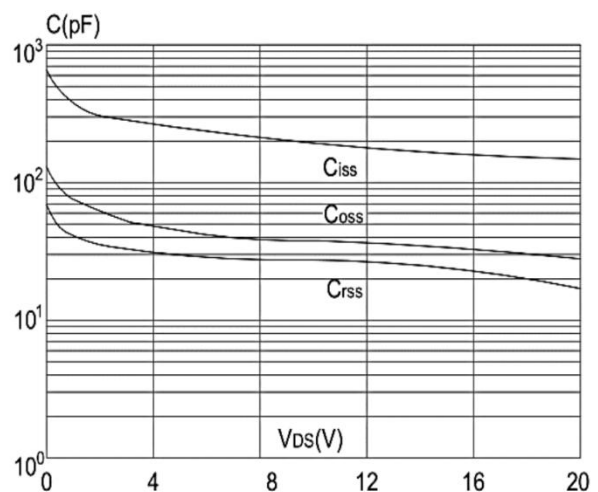


Figure 6: Capacitance Characteristics

## Typical Characteristics

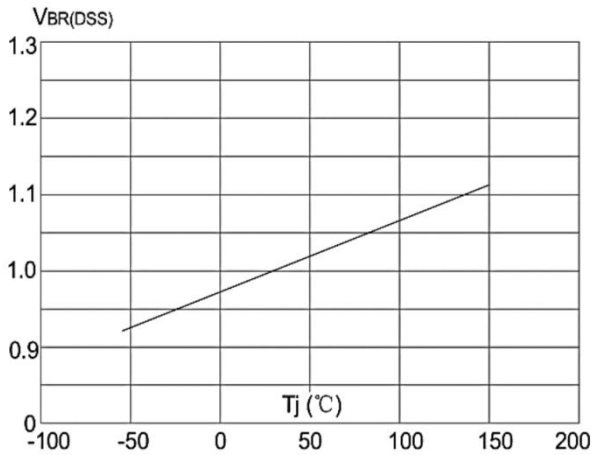


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

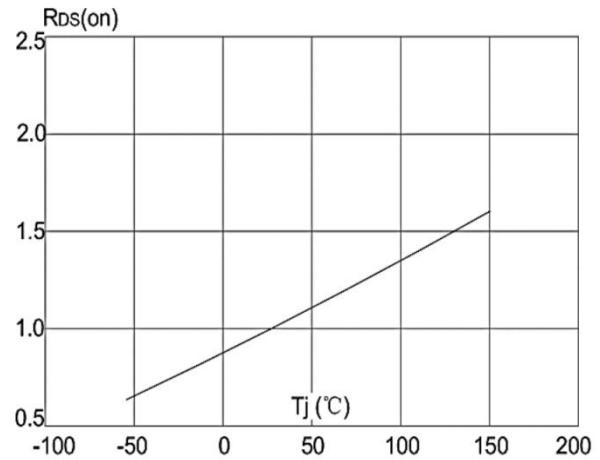


Figure 8: Normalized on Resistance vs. Junction Temperature

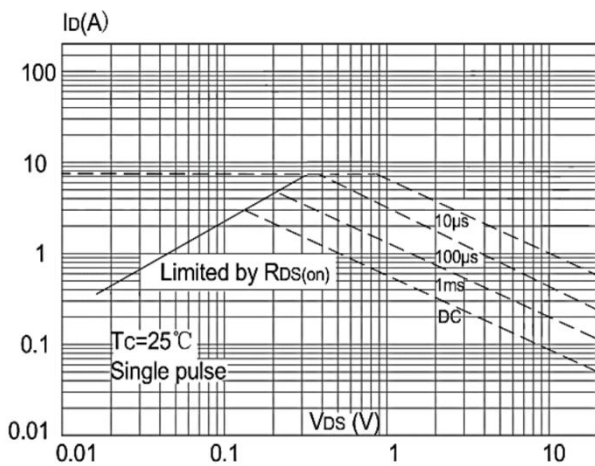


Figure 9: Maximum Safe Operating Area

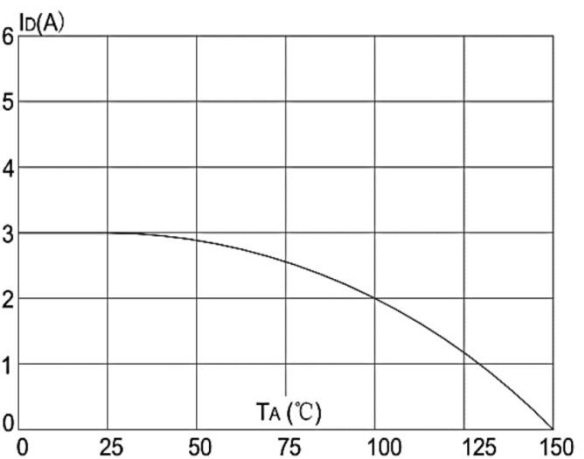


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

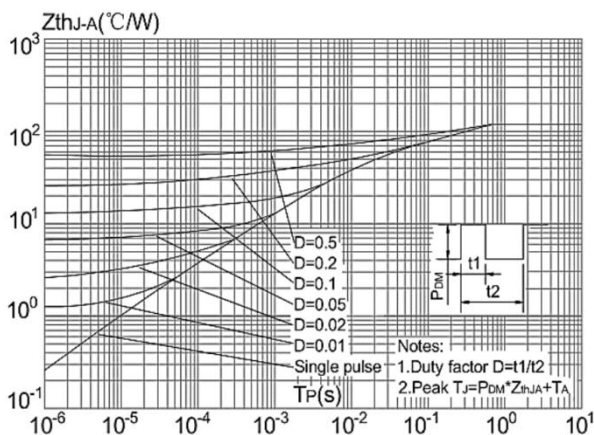
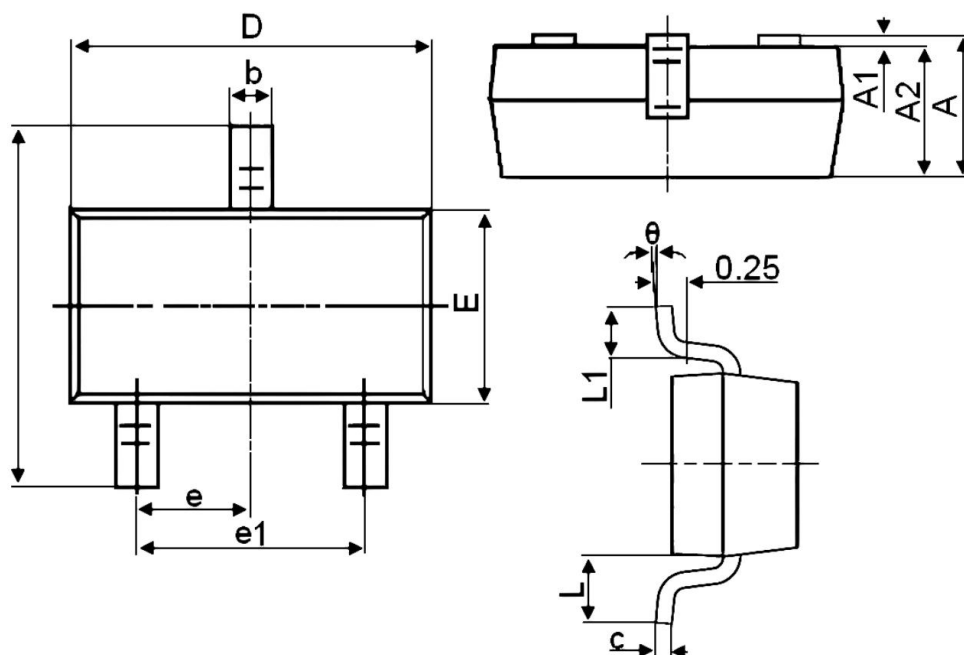


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

### SOT-23 Package Information



| 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 REF.                |       | 0.037 REF.           |       |
| 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°    |