

### Product Summary

#### NMOS

- $V_{DS}$  30V
- $I_D$  3A
- $R_{DS(ON)}$ ( at  $V_{GS}=10V$ ) <95mohm
- $R_{DS(ON)}$ ( at  $V_{GS}=4.5V$ ) <150mohm

#### PMOS

- $V_{DS}$  -30V
- $I_D$  -2.5A
- $R_{DS(ON)}$ ( at  $V_{GS}=-10V$ ) <130mohm
- $R_{DS(ON)}$ ( at  $V_{GS}=-4.5V$ ) <220mohm

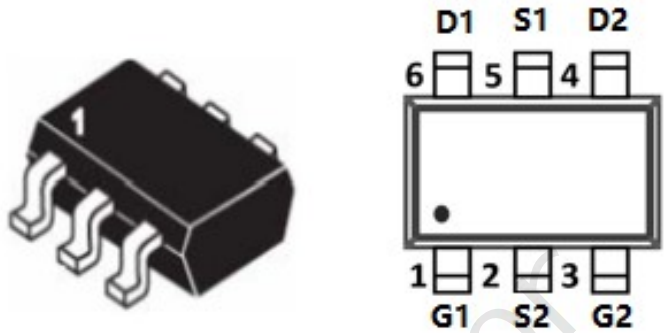
- 100%  $\nabla V_{DS}$  Tested

### General Description

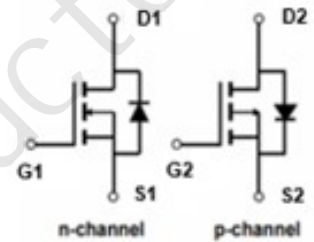
- Trench Power LV MOSFET technology
- High density cell design for low  $R_{DS(ON)}$
- High Speed switching

### Applications

- Wireless charger
- Load switch
- Power management



**SOT-23-6L**



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

| Parameter   | Symbol          | N-Channel | P-Channel | Unit          |
|---|-----------------|-----------|-----------|---------------|
| Drain-source Voltage                                | $V_{DS}$        | 30        | -30       | V             |
| Gate-source Voltage                                 | $V_{GS}$        | $\pm 20$  | $\pm 20$  | V             |
| Drain Current                                       | $I_D$           | 3         | -2.5      | A             |
| Pulsed Drain Current <sup>A</sup>                   | $I_{DM}$        | 8         | -8        | A             |
| Total Power Dissipation                             | $P_D$           | 0.95      | 0.95      | W             |
| Thermal Resistance Junction-to-Ambient <sup>B</sup> | $R_{\theta JA}$ | 62.5      | 62.5      | $^{\circ}C/W$ |
| Junction and Storage Temperature Range              | $T_J, T_{STG}$  | -55~+150  | -55~+150  | $^{\circ}C$   |

### ■ Ordering Information (Example)

| PREFERED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|--------------|--------------|---------|----------------------|-------------------------|----------------------------|---------------|
| JSM6333C     | F2           | .333    | 3000                 | 45000                   | 180000                     | 7" reel       |

**■ N-MOS Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

| Parameter                         | Symbol       | Conditions   | Min | Typ  | Max       | Units      |
|-----------------------------------|--------------|--|-----|------|-----------|------------|
| <b>Static Parameter</b>           |              |  |     |      |           |            |
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$                              | 30  |      |           | V          |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$                                |     |      | 1         | $\mu A$    |
| Gate-Body Leakage Current         | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$                            |     |      | $\pm 100$ | nA         |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                          | 1.0 | 1.5  | 3.0       | V          |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=2.5A$                                 |     | 52   | 95        | m $\Omega$ |
|                                   |              | $V_{GS}=4.5V, I_D=2.0A$                                |     | 73   | 150       |            |
| Diode Forward Voltage             | $V_{SD}$     | $I_S=1.0A, V_{GS}=0V$                                  |     |      | 1.2       | V          |
| <b>Dynamic Parameters</b>         |              |  |     |      |           |            |
| Input Capacitance                 | $C_{iss}$    | $V_{DS}=15V, V_{GS}=0V, f=1MHz$                        |     | 303  |           | pF         |
| Output Capacitance                | $C_{oss}$    |  |     | 53   |           |            |
| Reverse Transfer Capacitance      | $C_{rss}$    |  |     | 20   |           |            |
| <b>Switching Parameters</b>       |              |  |     |      |           |            |
| Total Gate Charge                 | $Q_g$        | $V_{GS}=10V, V_{DS}=15V, I_D=5.6A$                     |     | 5.2  |           | nC         |
| Gate-Source Charge                | $Q_{gs}$     |  |     | 0.9  |           |            |
| Gate-Drain Charge                 | $Q_{gd}$     |  |     | 1.2  |           |            |
| Reverse Recovery Charge           | $Q_{rr}$     | $I_F=5.6A, di/dt=100A/us$                              |     | 1.28 |           | ns         |
| Reverse Recovery Time             | $t_{rr}$     |  |     | 16.5 |           |            |
| Turn-on Delay Time                | $t_{D(on)}$  | $V_{GS}=4.5V, V_{DS}=15V, I_D=1A$<br>$R_{GEN}=3\Omega$ |     | 4.5  |           | ns         |
| Turn-on Rise Time                 | $t_r$        |  |     | 2.5  |           |            |
| Turn-off Delay Time               | $t_{D(off)}$ |  |     | 12.8 |           |            |
| Turn-off fall Time                | $t_f$        |  |     | 3.5  |           |            |

A. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

B.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design, while  $R_{\theta JA}$  is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

**■ P-MOS Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

| Parameter                         | Symbol       | Conditions   | Min  | Typ  | Max       | Units      |
|-----------------------------------|--------------|--|------|------|-----------|------------|
| <b>Static Parameter</b>           |              |  |      |      |           |            |
| Drain-Source Breakdown Voltage    | $BV_{DSS}$   | $V_{GS}=0V, I_D=-250\mu A$   | -30  |      |           | V          |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS}=-30V, V_{GS}=0V$   |      |      | -1        | $\mu A$    |
| Gate-Body Leakage Current         | $I_{GSS}$    | $V_{GS}=\pm 20V, V_{DS}=0V$  |      |      | $\pm 100$ | nA         |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$                                       | -1.0 | -1.5 | -3.0      | V          |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-2.0A$   |      | 65   | 130       | m $\Omega$ |
|                                   |              | $V_{GS}=-4.5V, I_D=-1.7A$  |      | 95   | 220       |            |
| Diode Forward Voltage             | $V_{SD}$     | $I_S=-4A, V_{GS}=0V$   |      |      | -1.2      | V          |
| <b>Dynamic Parameters</b>         |              |  |      |      |           |            |
| Input Capacitance                 | $C_{iss}$    | $V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$                              |      | 320  |           | pF         |
| Output Capacitance                | $C_{oss}$    |  |      | 55   |           |            |
| Reverse Transfer Capacitance      | $C_{rss}$    |  |      | 41   |           |            |
| <b>Switching Parameters</b>       |              |  |      |      |           |            |
| Total Gate Charge                 | $Q_g$        | $V_{GS}=-10V, V_{DS}=-15V, I_D=-3.0A$                                |      | 5.5  |           | nC         |
| Gate-Source Charge                | $Q_{gs}$     |  |      | 1.1  |           |            |
| Gate-Drain Charge                 | $Q_{gd}$     |  |      | 1.6  |           |            |
| Turn-on Delay Time                | $t_{D(on)}$  | $V_{GS}=-10V, V_{DD}=-15V, R_L=15\Omega, I_D=-1A, R_{GEN}=2.5\Omega$ |      | 14   |           | ns         |
| Turn-on Rise Time                 | $t_r$        |  |      | 61   |           |            |
| Turn-off Delay Time               | $t_{D(off)}$ |  |      | 19   |           |            |
| Turn-off fall Time                | $t_f$        |  |      | 10   |           |            |

C. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

D.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design, while  $R_{\theta JA}$  is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

■ N-MOS Typical Performance Characteristics

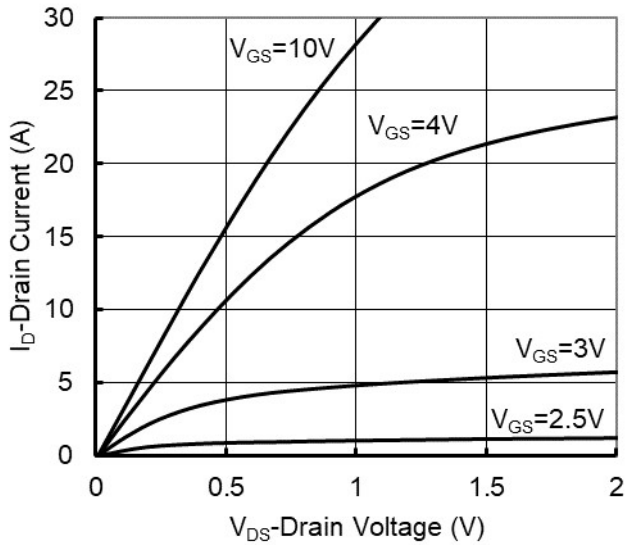


Figure1. Output Characteristics

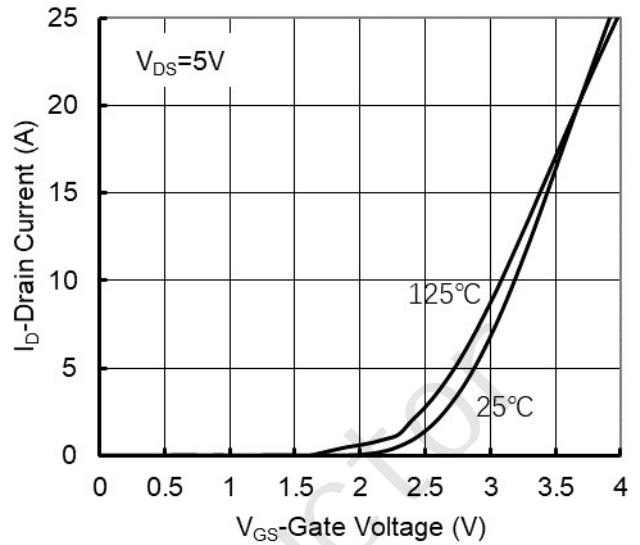


Figure2. Transfer Characteristics

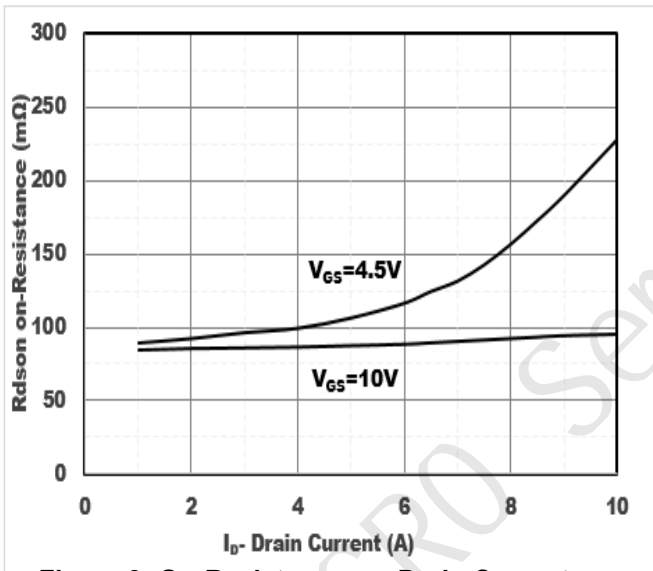


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

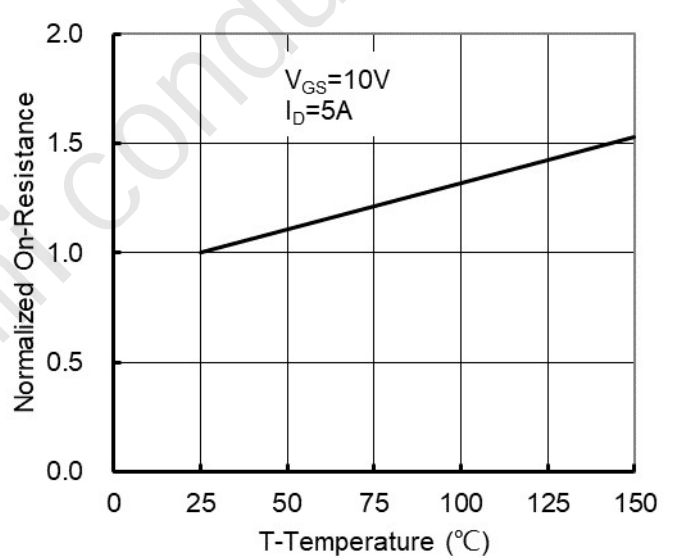


Figure 4: On-Resistance vs. Junction Temperature

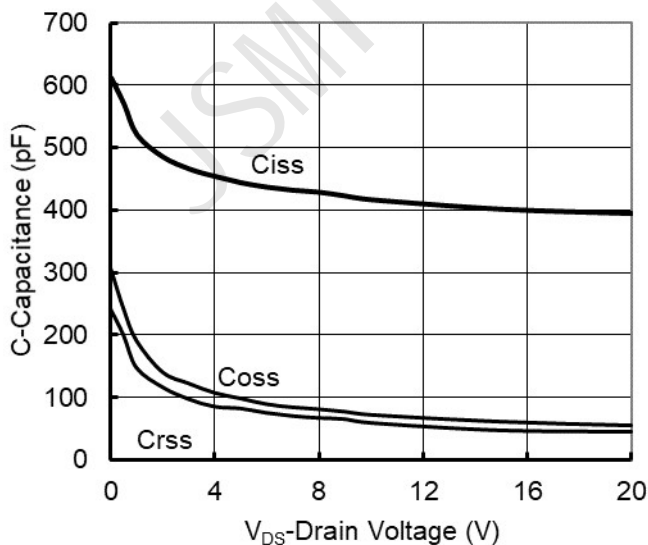


Figure5. Capacitance Characteristics

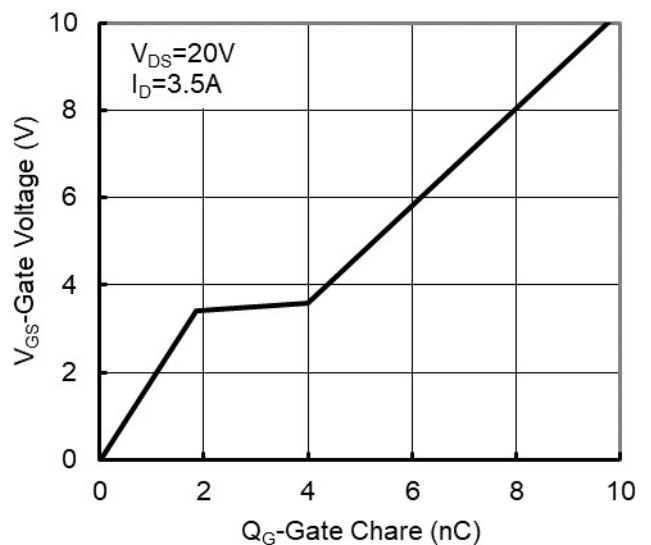


Figure6. Gate Charge

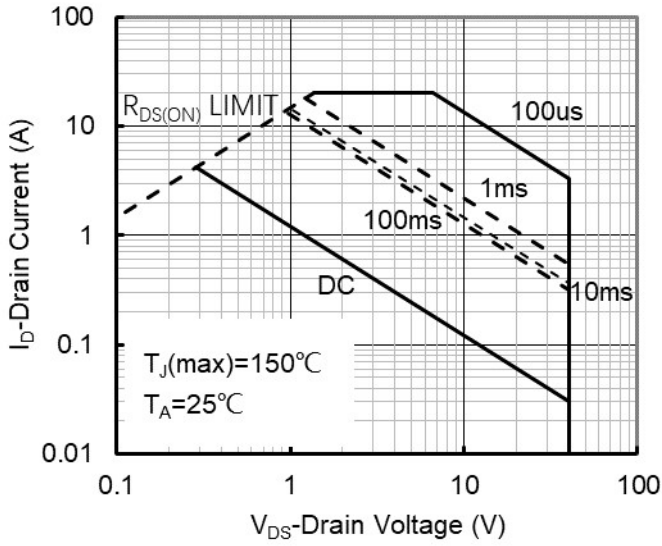


Figure7. Safe Operation Area

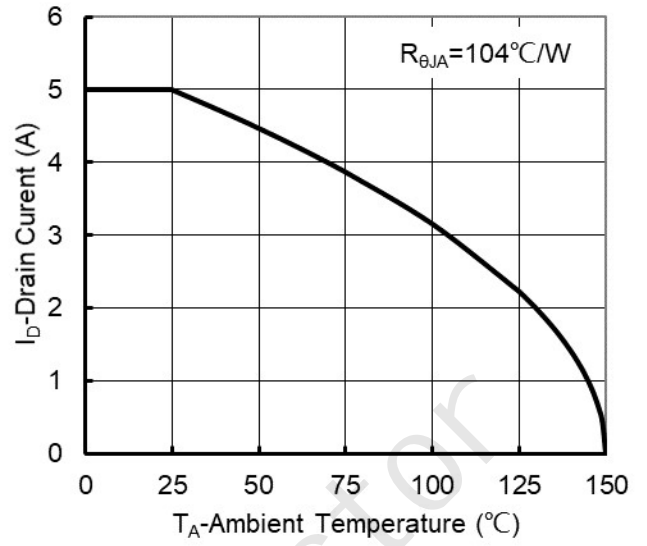


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

■ P-MOS Typical Performance Characteristics

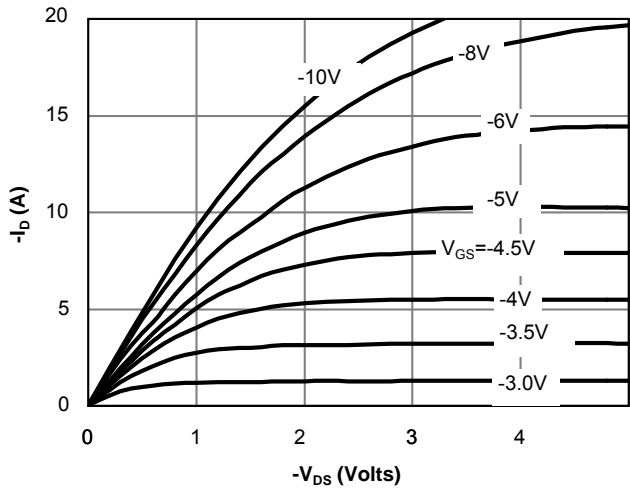


Fig 1: On-Region Characteristics

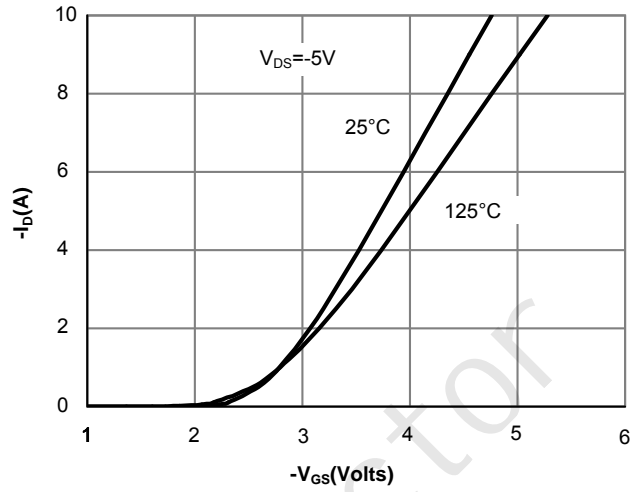


Figure 2: Transfer Characteristics

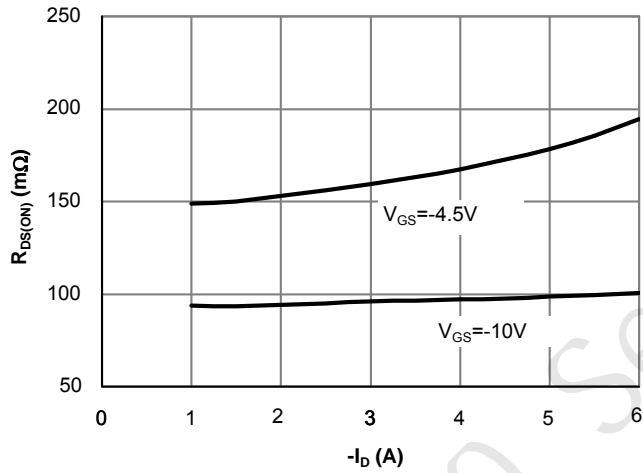


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

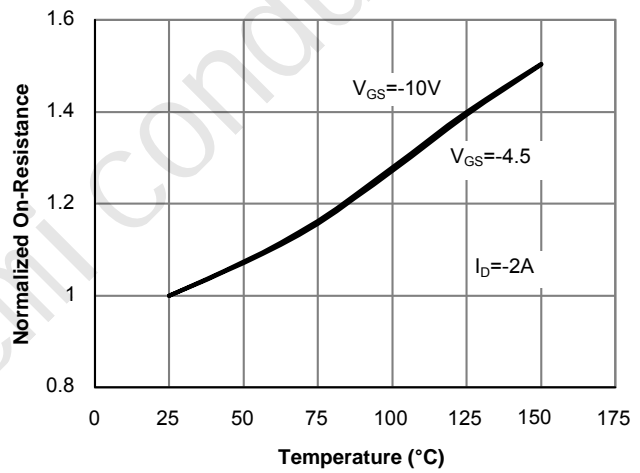


Figure 4: On-Resistance vs. Junction Temperature

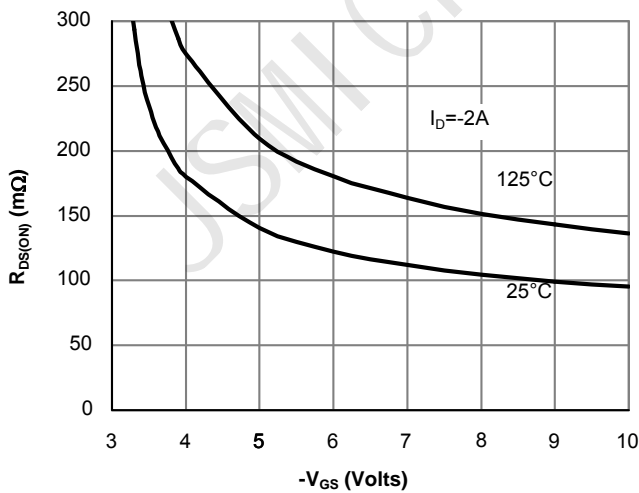


Figure 5: On-Resistance vs. Gate-Source Voltage

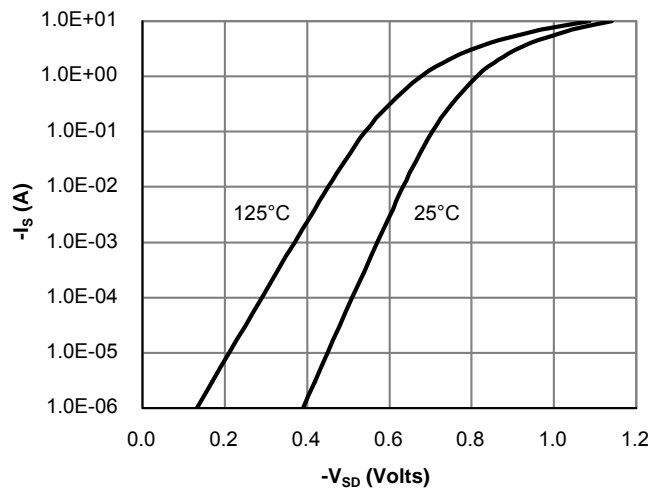


Figure 6: Body-Diode Characteristics

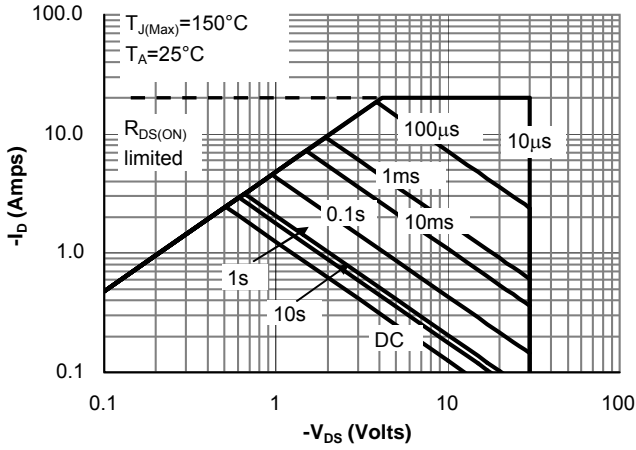


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

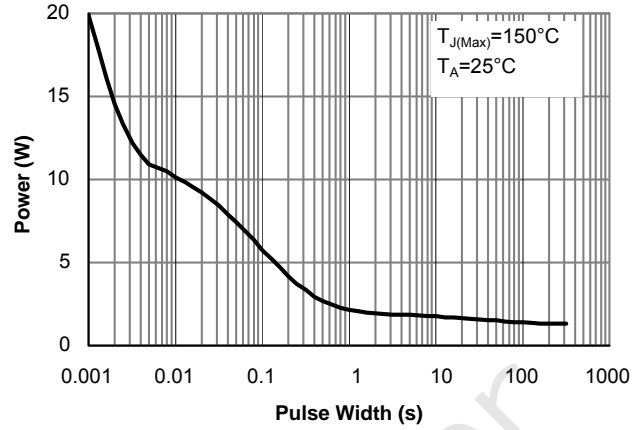
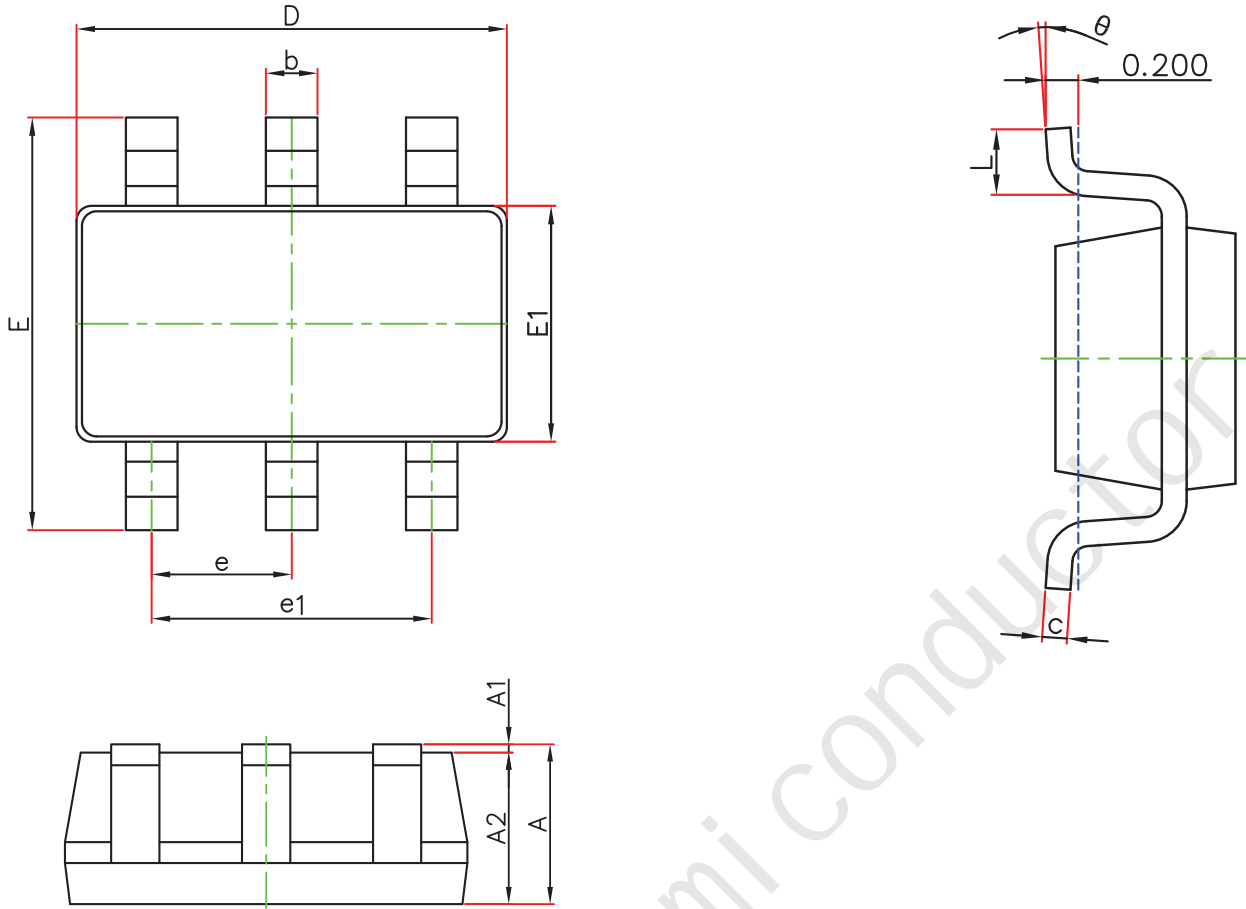


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

**■ SOT-23-6L Package information**


| Symbol | Dimensions In Millimeters |       |
|--------|---------------------------|-------|
|        | Min.                      | Max.  |
| A      | 1.050                     | 1.200 |
| A1     | 0.000                     | 0.100 |
| A2     | 1.000                     | 1.200 |
| b      | 0.300                     | 0.500 |
| c      | 0.100                     | 0.150 |
| D      | 2.800                     | 3.000 |
| E1     | 1.500                     | 1.700 |
| E      | 2.600                     | 3.000 |
| e      | 0.950(BSC)                |       |
| e1     | 1.800                     | 2.000 |
| L      | 0.300                     | 0.600 |
| K      | 0°                        | 8°    |