

### General Description

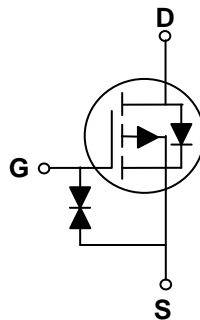
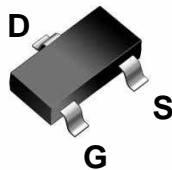
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

### Features

|                                   |            |
|-----------------------------------|------------|
| $V_{DS}$                          | -20V       |
| $I_D$ (at $V_{GS}=-4.5V$ )        | -0.5A      |
| $R_{DS(ON)}$ (at $V_{GS}=-4.5V$ ) | 580mΩ(Typ) |

ESD Protected Up to 2.0KV (HBM)

SOT523



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

| Parameter                              | Symbol         | Maximum    | Units |   |
|--|----------------|------------|-------|---|
| Drain-Source Voltage                   | $V_{DS}$       | -20        | V     |   |
| Gate-Source Voltage                    | $V_{GS}$       | $\pm 12$   | V     |   |
| Drain Current-Continuous               | TC=25°C        | $I_D$      | -0.5  | A |
|  | TC=100°C       | $I_D$      | -0.4  | A |
| Maximum Power Dissipation              | $P_D$          | 0.18       | W     |   |
| Drain Current – Pulsed1                | $I_{DM}$       | -2.6       | A     |   |
| Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 To 150 | °C    |   |

### Thermal Characteristics

| Parameter                                   | Symbol           | Typ | Max | Unit  |
|---|------------------|-----|-----|-------|
| Thermal Resistance junction-to-solder point | $R_{\theta JSP}$ |     | 40  | °C /W |
| Thermal Resistance junction-to-Ambient      | $R_{\theta JA}$  |     | 690 | °C /W |

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

| Symbol                      | Parameter                             | Condition   | Min  | Typ  | Max  | Unit |
|-----------------------------|---------------------------------------|---|------|------|------|------|
| <b>STATIC PARAMETERS</b>    |                                       |   |      |      |      |      |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage        | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA   | -20  |      |      | V    |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current       | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V  |      |      | 1    | μA   |
| I <sub>GSS</sub>            | Gate-Body Leakage Current             | V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V  |      |      | ±10  | μA   |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                       | -0.3 | -0.6 | -1.2 | V    |
| R <sub>DS(ON)</sub>         | Drain-Source On-State Resistance      | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.5A   |      | 580  | 850  | mΩ   |
|                             |                                       | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.3A   |      | 850  | 1200 | mΩ   |
|                             |                                       | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-0.2A   |      | 1350 | 2000 | mΩ   |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current |   |      |      | -0.5 | A    |
| <b>DYNAMIC PARAMETERS</b>   |                                       |   |      |      |      |      |
| C <sub>iss</sub>            | Input Capacitance                     | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V,<br>F=1.0MHz   |      | 71   |      | pF   |
| C <sub>oss</sub>            | Output Capacitance                    |   |      | 20   |      | pF   |
| C <sub>rss</sub>            | Reverse Transfer Capacitance          |   |      | 15   |      | pF   |
| <b>SWITCHING PARAMETERS</b> |                                       |   |      |      |      |      |
| t <sub>d(on)</sub>          | Turn-on Delay Time                    | V <sub>DD</sub> =-10V, I <sub>D</sub> =-0.2A,<br>V <sub>GS</sub> =-4.5V,<br>R <sub>G</sub> =10Ω |      | 4    |      | nS   |
| t <sub>r</sub>              | Turn-on Rise Time                     |   |      | 19   |      | nS   |
| t <sub>d(off)</sub>         | Turn-Off Delay Time                   |   |      | 16   |      | nS   |
| t <sub>f</sub>              | Turn-Off Fall Time                    |   |      | 25   |      | nS   |
| Q <sub>g</sub>              | Total Gate Charge                     | V <sub>DS</sub> =-10V, I <sub>D</sub> =-0.2A,<br>V <sub>GS</sub> =-4.5V                         |      | 1.2  |      | nC   |
| Q <sub>gs</sub>             | Gate-Source Charge                    |   |      | 0.37 |      | nC   |
| Q <sub>gd</sub>             | Gate-Drain Charge                     |   |      | 0.27 |      | nC   |
| V <sub>SD</sub>             | Diode Forward Voltage                 | V <sub>GS</sub> =0V, I <sub>SD</sub> =-1A   |      | 0.7  | 1.2  | V    |

Note:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

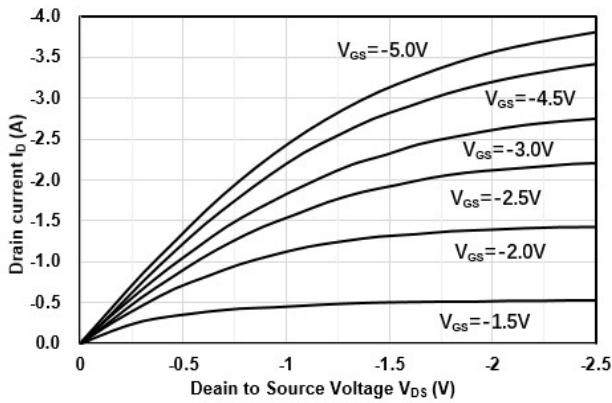


Figure1. Output Characteristics

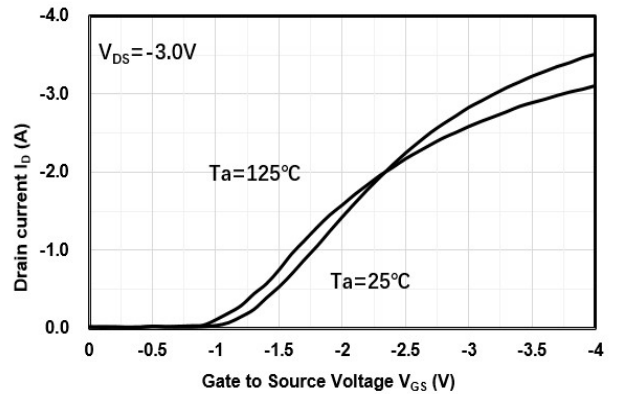


Figure2. Transfer Characteristics

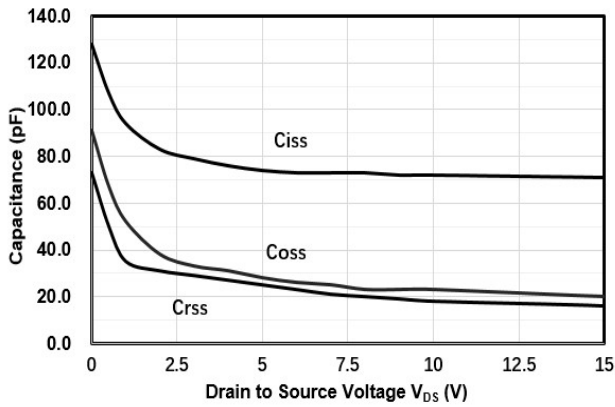


Figure3. Capacitance Characteristics

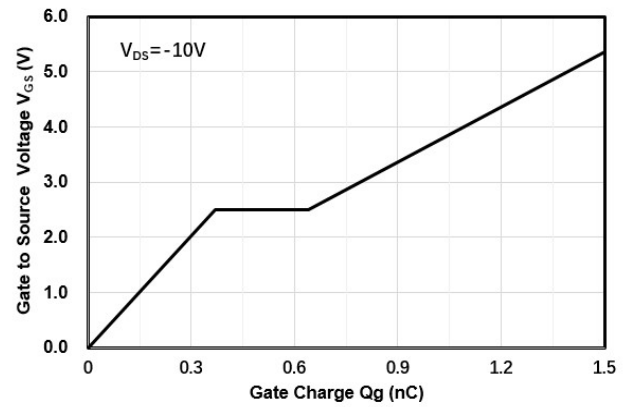


Figure4. Gate Charge

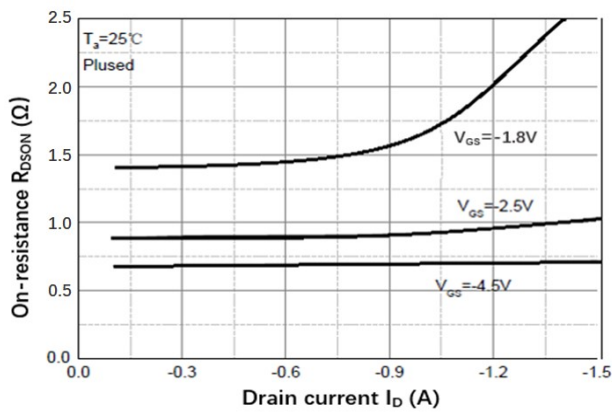


Figure5. Drain-Source on Resistance

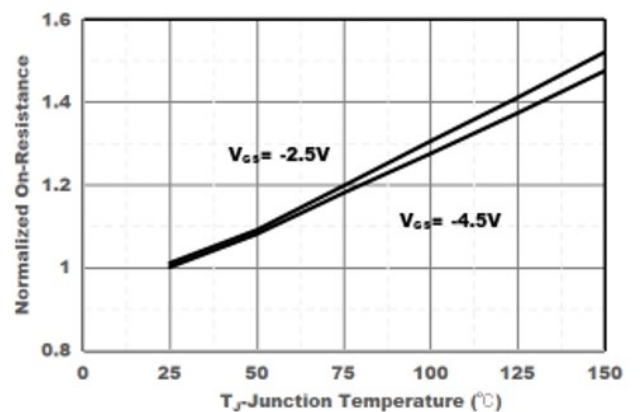


Figure6. Drain-Source on Resistance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

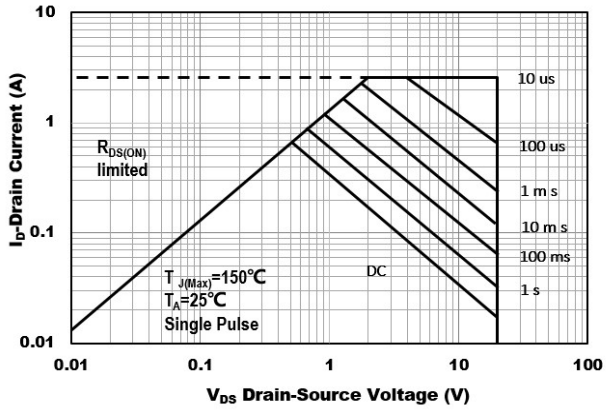


Figure7. Safe Operation Area

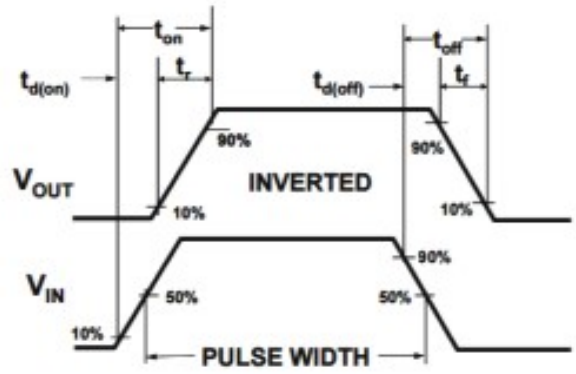
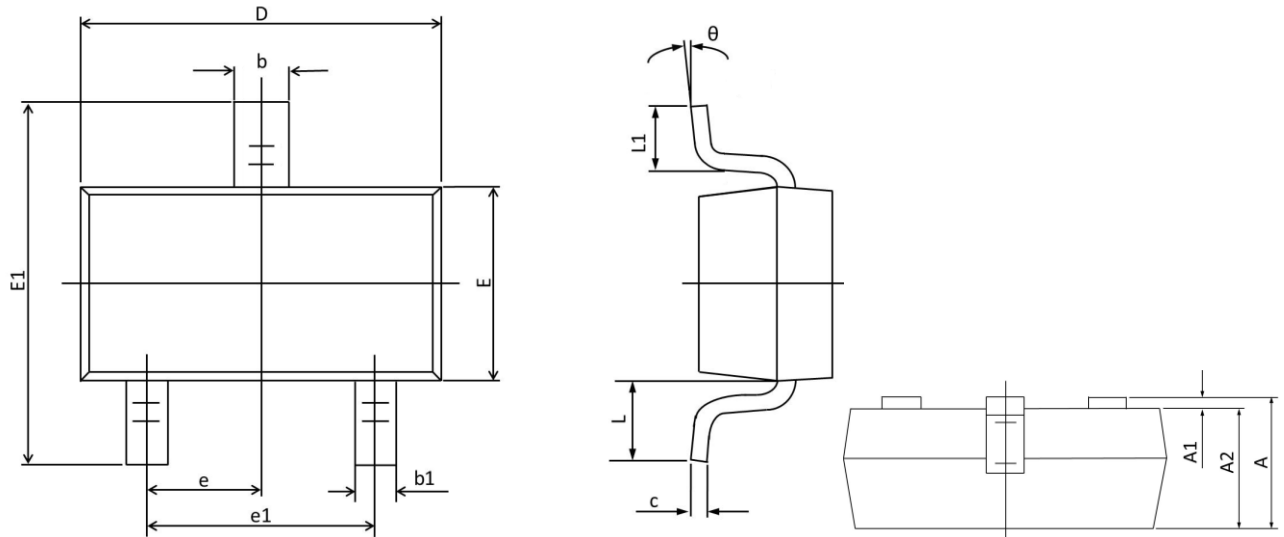


Figure8. Switching wave

SOT523 PACKAGE INFORMATION



| Symbol   | Dimensions In Millimeters |       | Dimensions In Inches |       |
|----------|---------------------------|-------|----------------------|-------|
|          | MAX                       | MIN   | MAX                  | MIN   |
| A        | 0.900                     | 0.700 | 0.035                | 0.028 |
| A1       | 0.100                     | 0.000 | 0.004                | 0.000 |
| A2       | 0.800                     | 0.700 | 0.031                | 0.028 |
| b        | 0.350                     | 0.250 | 0.014                | 0.010 |
| b1       | 0.250                     | 0.150 | 0.010                | 0.006 |
| c        | 0.200                     | 0.100 | 0.008                | 0.004 |
| D        | 1.750                     | 1.500 | 0.069                | 0.059 |
| E        | 0.900                     | 0.700 | 0.035                | 0.028 |
| E1       | 1.750                     | 1.400 | 0.069                | 0.055 |
| e        | 0.5TYP.                   |       | 0.02TYP.             |       |
| e1       |                           | 0.900 | 0.043                | 0.035 |
| L        | 0.460                     | 0.300 | 0.018                | 0.012 |
| L1       | 0.460                     | 0.260 | 0.018                | 0.010 |
| $\theta$ | 8°                        | 0°    | 8°                   | 0°    |