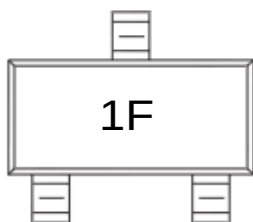


## P-Channel Enhancement MOSFET

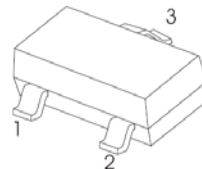
### ■ Features

- Ultra low on-resistance.
- P-Channel MOSFET.
- Fast switching.

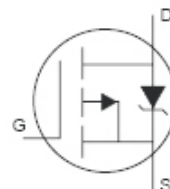
### MARKING



### SOT - 23



1. BASE
2. EMITTER
3. COLLECTOR



### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

| Parameter                                                     | Symbol     | Rating     | Unit                      |
|---------------------------------------------------------------|------------|------------|---------------------------|
| Drain-Source Voltage                                          | $V_{DS}$   | -12        | V                         |
| Gate-Source Voltage                                           | $V_{GS}$   | $\pm 8$    |                           |
| Continuous Drain Current $V_{GS}=4.5V @ T_A=25^\circ\text{C}$ | $I_D$      | -4.3       | A                         |
| Continuous Drain Current $V_{GS}=4.5V @ T_A=70^\circ\text{C}$ |            | -3.4       |                           |
| Pulsed Drain Current $a$                                      | $I_{DM}$   | -34        |                           |
| Power Dissipation $@ T_A=25^\circ\text{C}$                    | $P_D$      | 1.3        | W                         |
| Power Dissipation $@ T_A=70^\circ\text{C}$                    |            | 0.8        |                           |
| Single Pulse Avalanche Energy $b$                             | $E_{AS}$   | 33         | mJ                        |
| Thermal Resistance.Junction- to-Ambient                       | $R_{thJA}$ | 100        | $^\circ\text{C}/\text{W}$ |
| Linear Derating Factor                                        |            | 0.01       | $\text{W}/^\circ\text{C}$ |
| Junction Temperature                                          | $T_J$      | 150        | $^\circ\text{C}$          |
| Junction and Storage Temperature Range                        | $T_{stg}$  | -55 to 150 |                           |

Notes:

a.Repetitive Rating :Pulse width limited by maximum junction temperature

b.Starting  $T_J=25^\circ\text{C}$ ,  $L=3.5\text{mH}$ ,  $R_G=25\Omega$ ,  $I_{AS}=-4.3\text{A}$

# P-Channel Enhancement MOSFET

## ■ Electrical Characteristics Ta = 25°C

| Parameter                             | Symbol              | Test Conditions                                                                           | Min  | Typ   | Max   | Unit |
|---------------------------------------|---------------------|-------------------------------------------------------------------------------------------|------|-------|-------|------|
| Drain-Source Breakdown Voltage        | V <sub>DSS</sub>    | I <sub>D</sub> =-250 μA, V <sub>GS</sub> =0V                                              | -12  |       |       | V    |
| Zero Gate Voltage Drain Current       | I <sub>DSS</sub>    | V <sub>D</sub> =-12V, V <sub>GS</sub> =0V                                                 |      |       | -1    | μA   |
|                                       |                     | V <sub>D</sub> =-9.6V, V <sub>GS</sub> =0V, T <sub>J</sub> = 55°C                         |      |       | -25   |      |
| Gate-Body leakage current             | I <sub>GSS</sub>    | V <sub>D</sub> =0V, V <sub>GS</sub> =±8V                                                  |      |       | ±100  | nA   |
| Gate Threshold Voltage                | V <sub>GS(th)</sub> | V <sub>D</sub> =V <sub>GS</sub> I <sub>D</sub> =-250 μA                                   | -0.4 | -0.55 | -0.95 | V    |
| Static Drain-Source On-Resistance     | R <sub>DS(on)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4.3A                                             |      |       | 50    | mΩ   |
|                                       |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-2.5A                                             |      |       | 85    |      |
|                                       |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2A                                               |      |       | 125   |      |
| Forward Transconductance              | g <sub>FS</sub>     | V <sub>D</sub> =-10V, I <sub>D</sub> =-4.3A                                               | 8.6  |       |       | S    |
| Input Capacitance                     | C <sub>iss</sub>    | V <sub>GS</sub> =0V, V <sub>D</sub> =-10V, f=1MHz                                         |      | 830   |       | pF   |
| Output Capacitance                    | C <sub>oss</sub>    |                                                                                           |      | 180   |       |      |
| Reverse Transfer Capacitance          | C <sub>rss</sub>    |                                                                                           |      | 125   |       |      |
| Total Gate Charge                     | Q <sub>g</sub>      | V <sub>GS</sub> =-5.0V, V <sub>D</sub> =-10V, I <sub>D</sub> =-4.3A                       |      | 10    | 15    | nC   |
| Gate Source Charge                    | Q <sub>gs</sub>     |                                                                                           |      | 1.4   | 2.1   |      |
| Gate Drain Charge                     | Q <sub>gd</sub>     |                                                                                           |      | 2.6   | 3.9   |      |
| Turn-On DelayTime                     | t <sub>d(on)</sub>  | I <sub>D</sub> =-1.0A, V <sub>D</sub> =-6.0V, R <sub>L</sub> =6 Ω, R <sub>GEN</sub> =89 Ω |      | 11    |       | ns   |
| Turn-On Rise Time                     | t <sub>r</sub>      |                                                                                           |      | 32    |       |      |
| Turn-Off DelayTime                    | t <sub>d(off)</sub> |                                                                                           |      | 250   |       |      |
| Turn-Off Fall Time                    | t <sub>f</sub>      |                                                                                           |      | 210   |       |      |
| Body Diode Reverse Recovery Time      | t <sub>rr</sub>     | I <sub>F</sub> =-1.3A, di/dt=-100A/ μs                                                    |      | 22    | 33    |      |
| Body Diode Reverse Recovery Charge    | Q <sub>rr</sub>     | I <sub>F</sub> =-1.3A, di/dt=-100A/ μs                                                    |      | 8     | 12    | Nc   |
| Maximum Body-Diode Continuous Current | I <sub>S</sub>      |                                                                                           |      |       | 1.3   | A    |
| Diode Forward Voltage                 | V <sub>SD</sub>     | I <sub>S</sub> =-1.3A, V <sub>GS</sub> =0V                                                |      |       | -1.2  | V    |

## P-Channel Enhancement MOSFET

### ■ Typical Characteristics

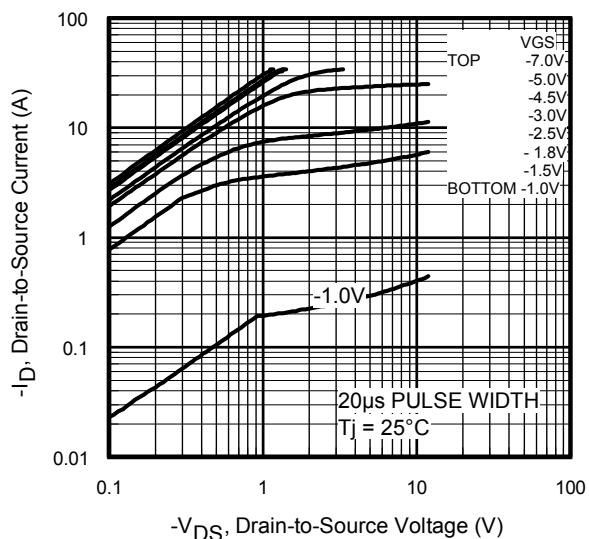


Fig 1. Typical Output Characteristics

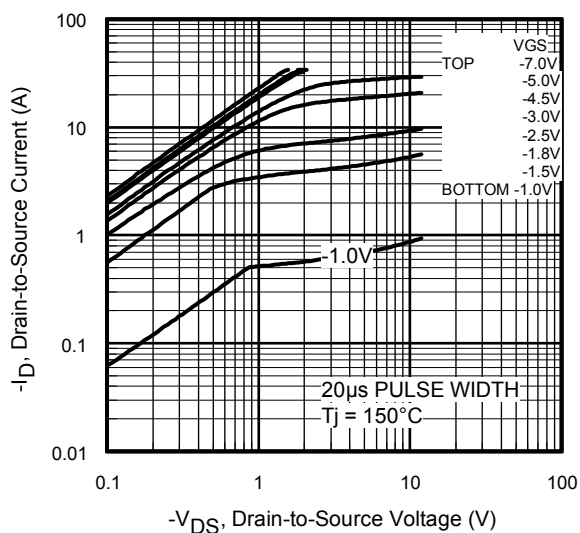


Fig 2. Typical Output Characteristics

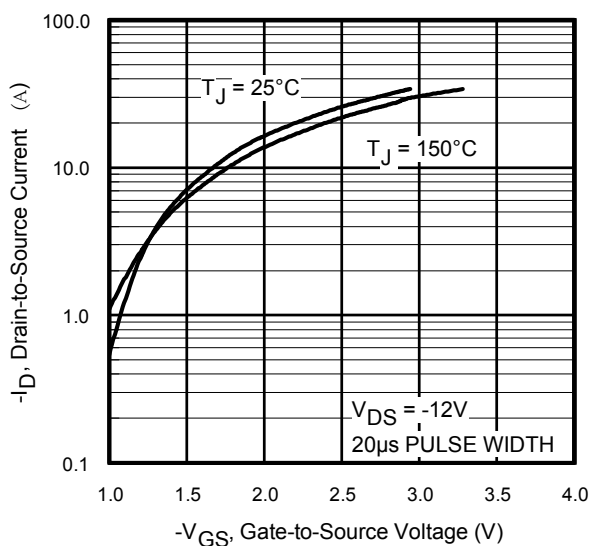


Fig 3. Typical Transfer Characteristics

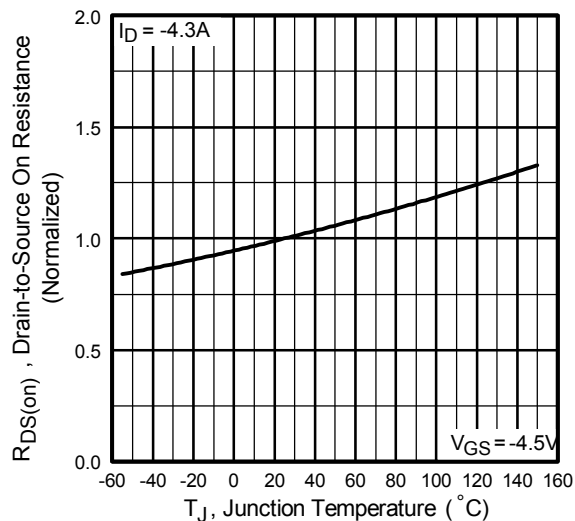
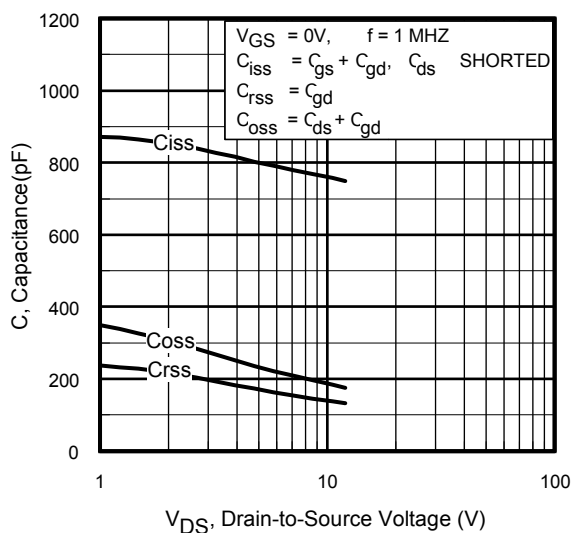


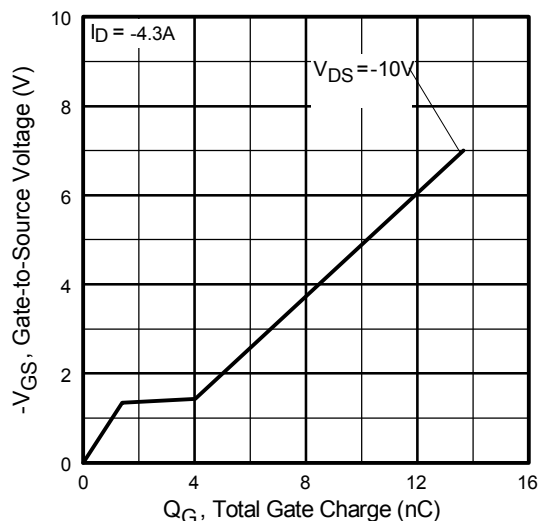
Fig 4. Normalized On-Resistance Vs. Temperature

# P-Channel Enhancement MOSFET

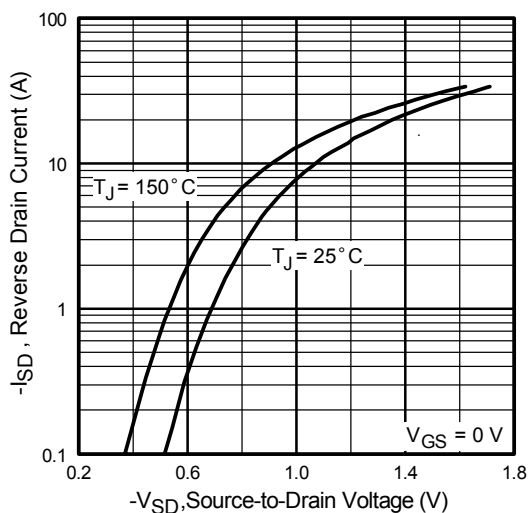
## ■ Typical Characteristics



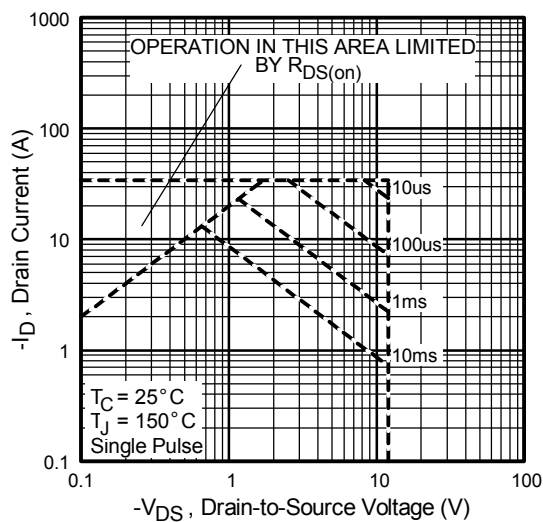
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



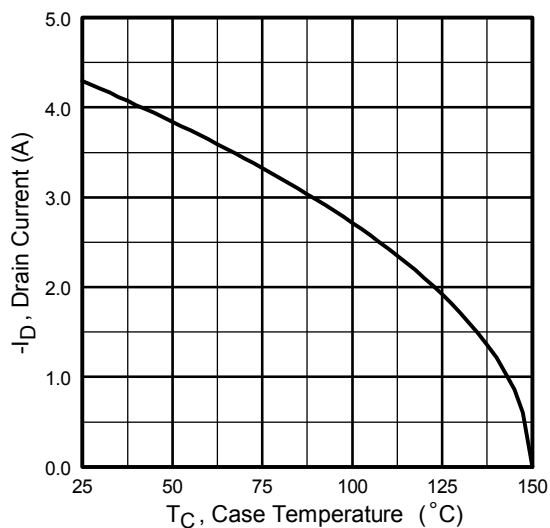
**Fig 7.** Typical Source-Drain Diode Forward Voltage



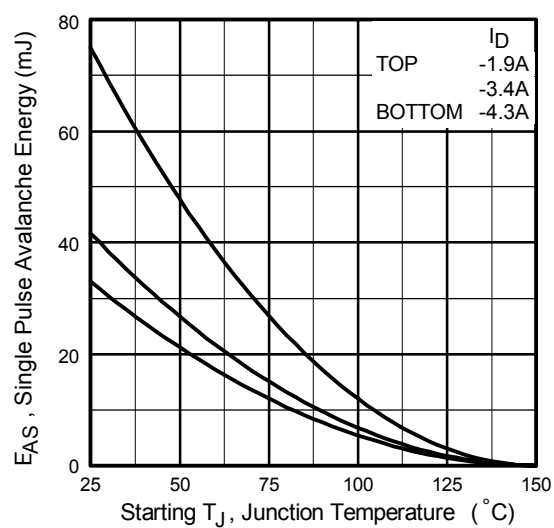
**Fig 8.** Maximum Safe Operating Area

# P-Channel Enhancement MOSFET

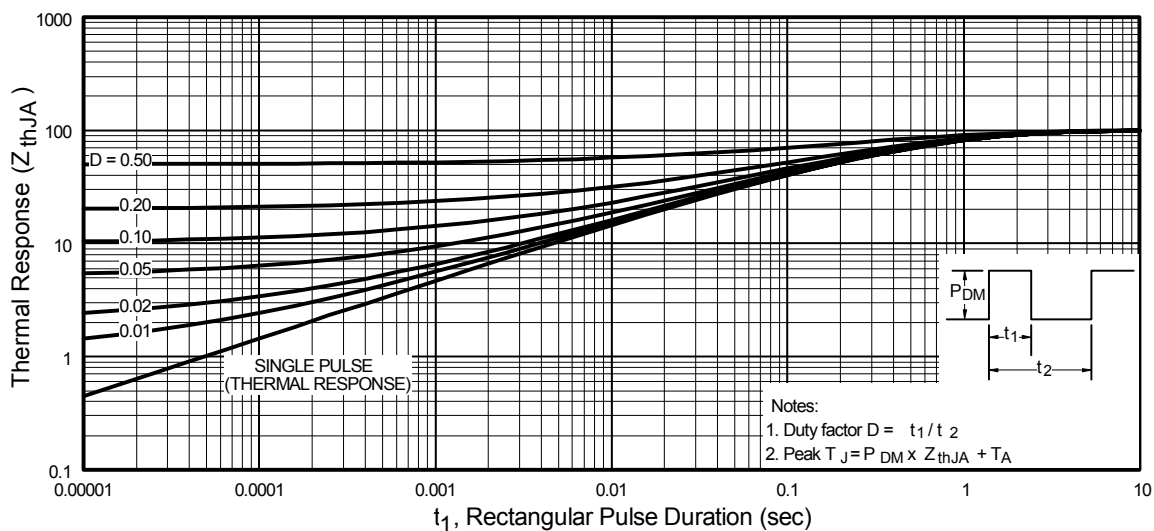
## ■ Typical Characteristics



**Fig 9.** Maximum Drain Current Vs. Case Temperature



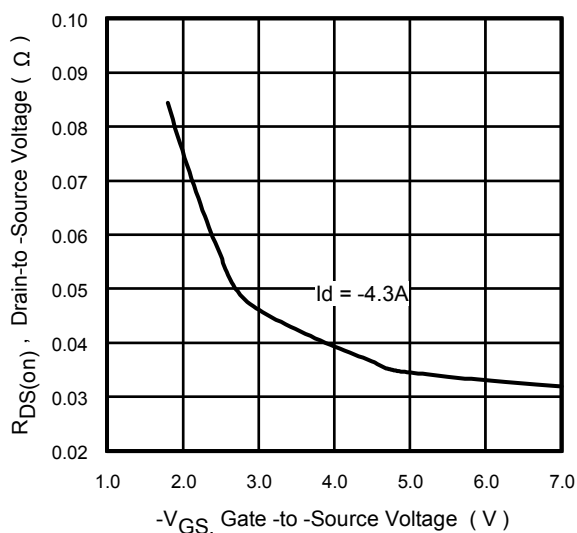
**Fig 10.** Maximum Avalanche Energy Vs. Drain Current



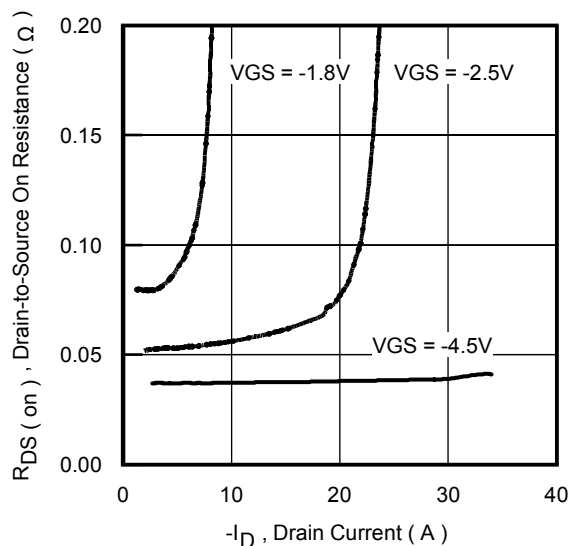
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## P-Channel Enhancement MOSFET

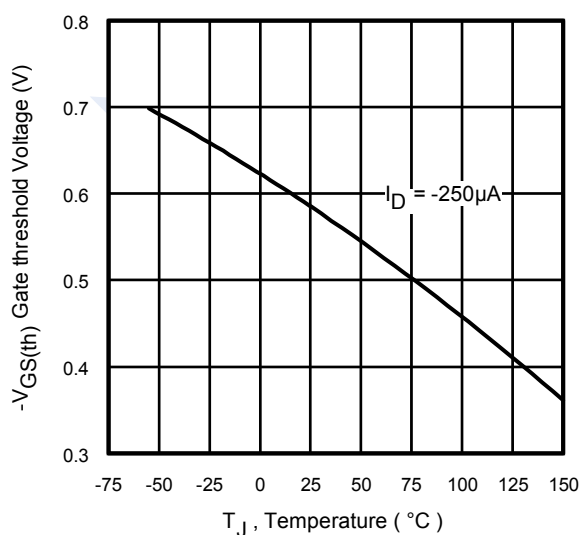
### ■ Typical Characteristics



**Fig 12.** Typical On-Resistance Vs. Gate Voltage



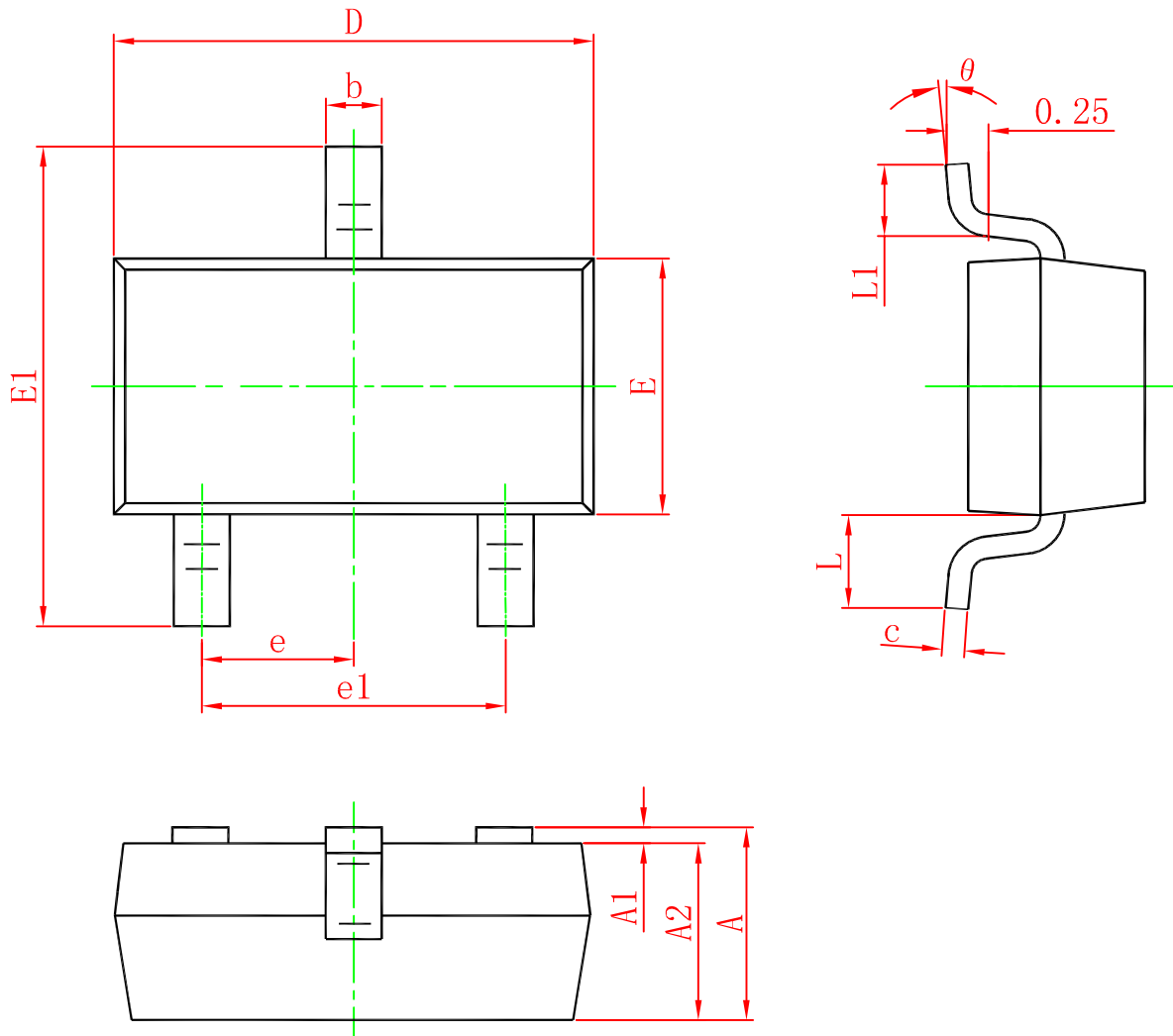
**Fig 13.** Typical On-Resistance Vs. Drain Current



**Fig 14.** Typical Threshold Voltage Vs. Junction Temperature

# P-Channel Enhancement MOSFET

## SOT-23 PACKAGE OUTLINE DIMENSIONS



| 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 TYP.                |       | 0.037 TYP.           |       |
| 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°    |