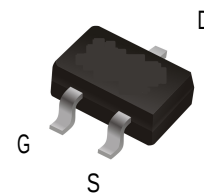


### Features

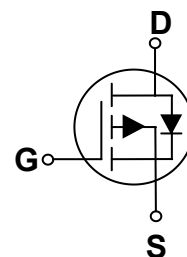
- -30V, -4.0A,  $R_{DS(ON)} = 51m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -2.5V Gate Drive Applications

### Applications

- Notebook
- Load Switch
- Battery Protection
- Hand-Held Instruments



SOT23



| BVDSS | RDSON | ID    |
|-------|-------|-------|
| -30V  | 51mΩ  | -4.0A |

### Absolute Maximum Ratings (Tamb=25°C unless otherwise specified)

| Symbol    | Parameter                                             | Rating     | Units |
|-----------|-------------------------------------------------------|------------|-------|
| $V_{DS}$  | Drain-Source Voltage                                  | -30        | V     |
| $V_{GS}$  | Gate-Source Voltage                                   | ±12        | V     |
| $I_D$     | Drain Current – Continuous ( $T_A=25^\circ\text{C}$ ) | -4.0       | A     |
|           | Drain Current – Continuous ( $T_A=70^\circ\text{C}$ ) | -3.0       | A     |
| $I_{DM}$  | Drain Current – Pulsed <sup>1</sup>                   | -15.4      | A     |
| $P_D$     | Power Dissipation ( $T_A=25^\circ\text{C}$ )          | 1.56       | W     |
|           | Power Dissipation – Derate above 25°C                 | 0.012      | W/°C  |
| $T_{STG}$ | Storage Temperature Range                             | -55 to 150 | °C    |
| $T_J$     | Operating Junction Temperature Range                  | -55 to 150 | °C    |

**Off Characteristics**

| Symbol                       | Parameter                          | Conditions                                | Min. | Typ.  | Max.      | Unit    |
|------------------------------|------------------------------------|-------------------------------------------|------|-------|-----------|---------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage     | $V_{GS}=0V, I_D=-250\mu A$                | -30  | ---   | ---       | V       |
| $\Delta BV_{DSS}/\Delta T_J$ | $BV_{DSS}$ Temperature Coefficient | Reference to 25°C, $I_D=-1mA$             | ---  | -0.03 | ---       | V/°C    |
| $I_{DSS}$                    | Drain-Source Leakage Current       | $V_{DS}=-30V, V_{GS}=0V, T_J=25^\circ C$  | ---  | ---   | -1        | $\mu A$ |
|                              |                                    | $V_{DS}=-24V, V_{GS}=0V, T_J=125^\circ C$ | ---  | ---   | -10       | $\mu A$ |
| $I_{GSS}$                    | Gate-Source Leakage Current        | $V_{GS}=\pm 12V, V_{DS}=0V$               | ---  | ---   | $\pm 100$ | nA      |

**On Characteristics**

|                     |                                      |                                |      |      |      |           |
|---------------------|--------------------------------------|--------------------------------|------|------|------|-----------|
| $R_{DS(ON)}$        | Static Drain-Source On-Resistance    | $V_{GS}=-10V, I_D=-4A$         | ---  | 51   | 65   | $m\Omega$ |
|                     |                                      | $V_{GS}=-4.5V, I_D=-3A$        | ---  | 65   | 80   | $m\Omega$ |
|                     |                                      | $V_{GS}=-2.5V, I_D=-2A$        | ---  | 85   | 100  | $m\Omega$ |
| $V_{GS(th)}$        | Gate Threshold Voltage               | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -0.4 | -0.9 | -1.3 | V         |
| $\Delta V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient |                                | ---  | 3    | ---  | mV/°C     |
| $g_{fs}$            | Forward Transconductance             |                                | ---  | 5.4  | ---  | S         |

**Dynamic and switching Characteristics**

|              |                                     |                                                  |     |      |     |    |
|--------------|-------------------------------------|--------------------------------------------------|-----|------|-----|----|
| $Q_g$        | Total Gate Charge <sup>2, 3</sup>   | $V_{DS}=-15V, V_{GS}=-4.5V, I_D=-4A$             | --- | 8    | --- | nC |
| $Q_{gs}$     | Gate-Source Charge <sup>2, 3</sup>  |                                                  | --- | 1.9  | --- |    |
| $Q_{gd}$     | Gate-Drain Charge <sup>2, 3</sup>   |                                                  | --- | 1.4  | --- |    |
| $T_{d(on)}$  | Turn-On Delay Time <sup>2, 3</sup>  | $V_{DD}=-15V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$ | --- | 5.4  | --- | ns |
| $T_r$        | Rise Time <sup>2, 3</sup>           |                                                  | --- | 19.4 | --- |    |
| $T_{d(off)}$ | Turn-Off Delay Time <sup>2, 3</sup> |                                                  | --- | 45.9 | --- |    |
| $T_f$        | Fall Time <sup>2, 3</sup>           | $V_{DS}=-15V, V_{GS}=0V, F=1MHz$                 | --- | 12.4 | --- | pF |
| $C_{iss}$    | Input Capacitance                   |                                                  | --- | 810  | --- |    |
| $C_{oss}$    | Output Capacitance                  |                                                  | --- | 85   | --- |    |
| $C_{rss}$    | Reverse Transfer Capacitance        |                                                  | --- | 50   | --- |    |

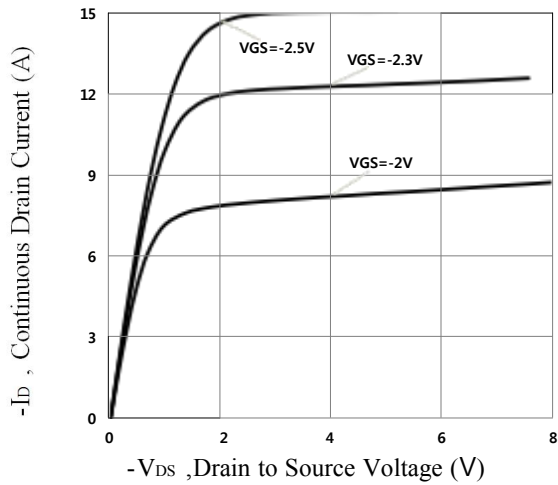
**Drain-Source Diode Characteristics and Maximum Ratings**

| Symbol   | Parameter                 | Conditions                           | Min. | Typ. | Max. | Unit |
|----------|---------------------------|--------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current | $V_G=V_D=0V, \text{Force Current}$   | ---  | ---  | -4.0 | A    |
| $I_{SM}$ | Pulsed Source Current     |                                      | ---  | ---  | -8.0 | A    |
| $V_{SD}$ | Diode Forward Voltage     | $V_{GS}=0V, I_S=-1A, T_J=25^\circ C$ | ---  | ---  | -1.5 | V    |

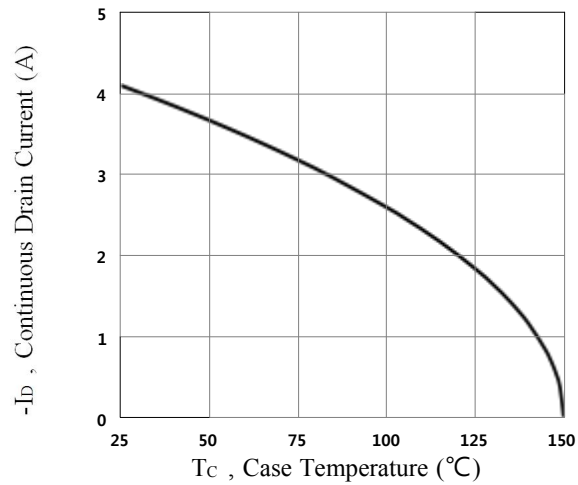
Note :

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

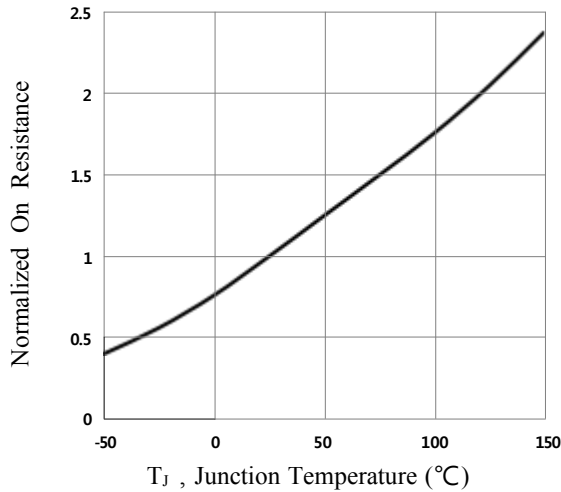
**Typical Performance Characteristics ( $T_A=25^\circ\text{C}$  unless otherwise Specified)**



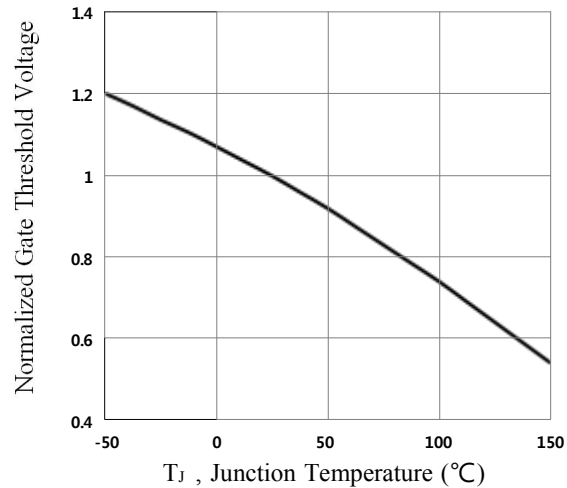
**Fig.1 Typical Output Characteristics**



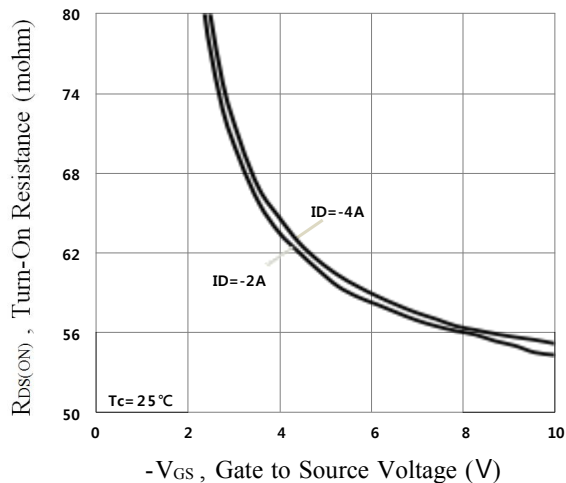
**Fig.2 Continuous Drain Current vs.  $T_C$**



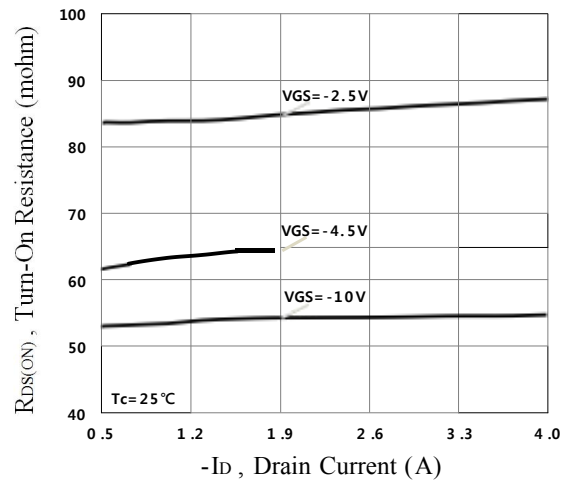
**Fig.3 Normalized  $R_{DS(on)}$  vs.  $T_J$**



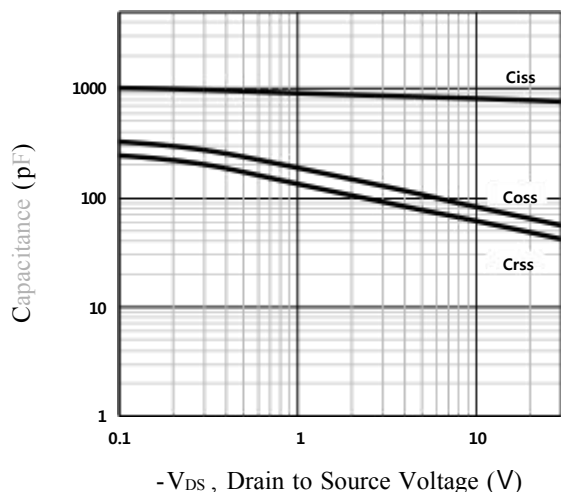
**Fig.4 Normalized  $V_{th}$  vs.  $T_J$**



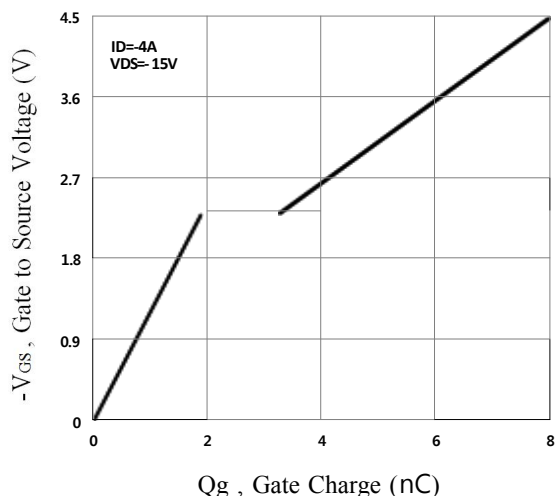
**Fig.5 Turn-On Resistance vs.  $V_{GS}$**



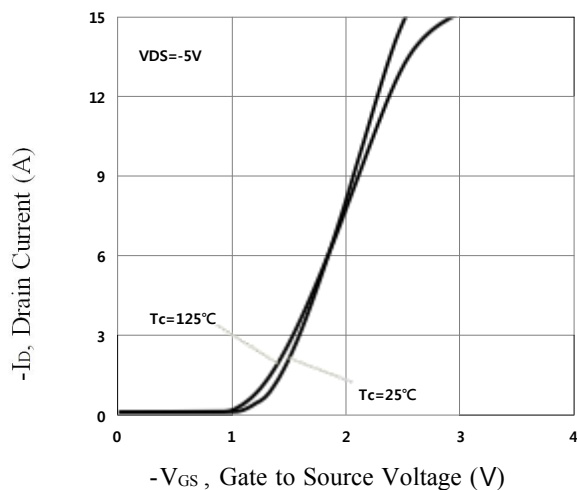
**Fig.6 Turn-On Resistance vs.  $I_D$**



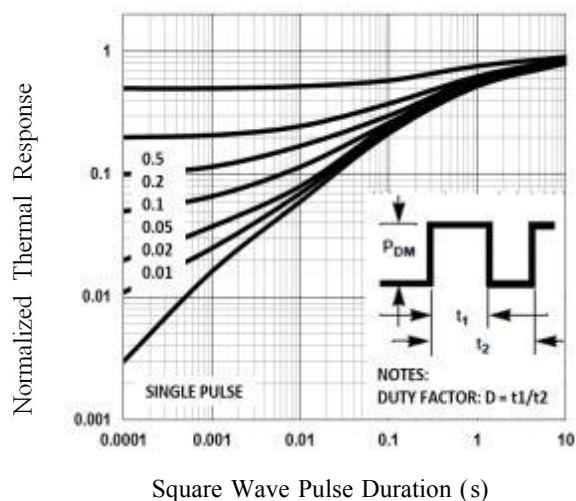
**Fig. 7 Capacitance Characteristics**



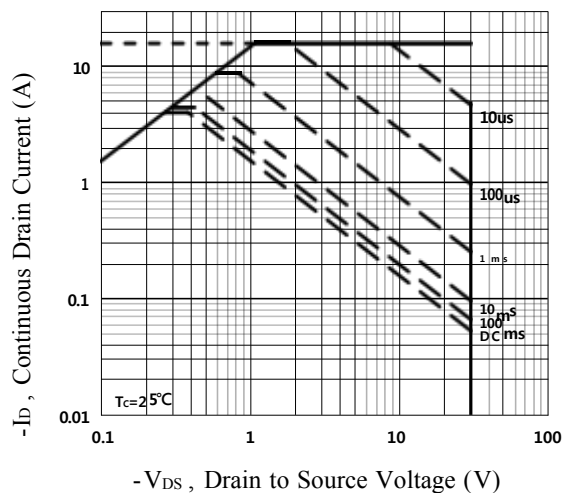
**Fig.8 Gate Charge Characteristics**



**Fig.9 Transfer Characteristics**



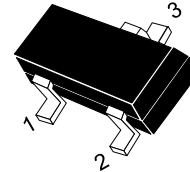
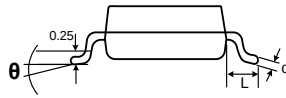
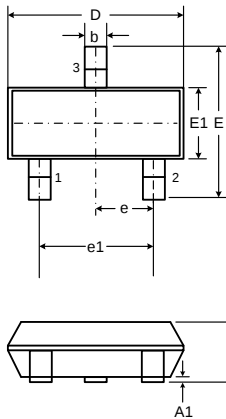
**Fig.10 Normalized Transient Impedance**



**Fig. 11 Maximum Safe Operation Area**

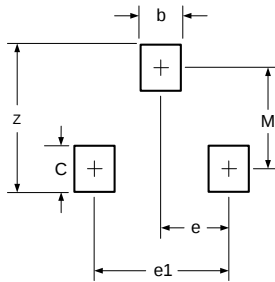
## Outline Drawing – SOT23

### PACKAGE OUTLINE



### DIMENSIONS

| SYMBOL   | MILLIMETER |      | INCHES     |       |
|----------|------------|------|------------|-------|
|          | MIN        | MAX  | MIN        | MAX   |
| A        | 0.90       | 1.15 | 0.035      | 0.045 |
| A1       | 0.00       | 0.10 | 0.000      | 0.004 |
| b        | 0.30       | 0.50 | 0.012      | 0.020 |
| c        | 0.08       | 0.15 | 0.003      | 0.006 |
| D        | 2.80       | 3.00 | 0.110      | 0.118 |
| E        | 2.25       | 2.55 | 0.089      | 0.100 |
| E1       | 1.20       | 1.40 | 0.047      | 0.055 |
| e        | 0.95 BSC   |      | 0.0374 BSC |       |
| e1       | 1.80       | 2.00 | 0.071      | 0.079 |
| L        | 0.45       | 0.65 | 0.018      | 0.026 |
| $\theta$ | 0          | 8°   | 0          | 8°    |



| DIMENSIONS |           |             |
|------------|-----------|-------------|
| DIM        | INCHES    | MILLIMETERS |
| M          | 0.080     | 2.02        |
| C          | 0.032     | 0.80        |
| Z          | 0.111     | 2.82        |
| e          | 0.037 BSC | 0.95 BSC    |
| e1         | 0.075 BSC | 1.90 BSC    |
| b          | 0.032     | 0.80        |

### Notes

1. Dimensioning and tolerances per ANSI Y14.5M, 1985.
2. Controlling Dimension: Inches
3. Pin 3 is the cathode (Unidirectional Only).
4. Dimensions are exclusive of mold flash and metal burrs.