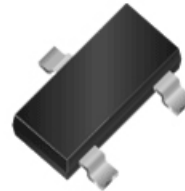


## WNM2306

N-Channel, 20V, 3.2A, Power MOSFET

[Http://www.willsemi.com](http://www.willsemi.com)

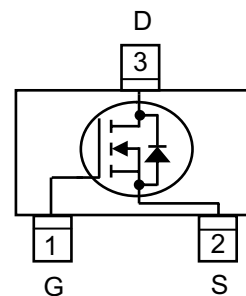
| $V_{(BR)DSS}$ | <b>R<sub>ds(on)</sub><br/>(Max. mΩ)</b> |
|---------------|-----------------------------------------|
| 20            | 45 @ 4.5V                               |
|               | 55 @ 2.5V                               |
|               | 66 @ 1.8V                               |



**SOT-23**

## Descriptions

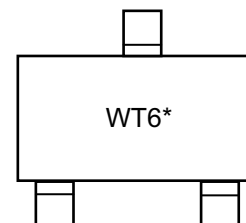
The WNM2306 is N-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in DC-DC conversion and power switch applications. Standard Product WNM2306 is Pb-free.



**Configuration (Top View)**

## Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package SOT-23



WT6 = Device Code  
\* = Month (A~Z)

### Marking

## Applications

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch

## Order Information

| Device       | Package | Shipping       |
|--------------|---------|----------------|
| WNM2306-3/TR | SOT-23  | 3000/Tape&Reel |

| ABSOLUTE MAXIMUM RATINGS TA = 25 °C, unless otherwise noted |         |          |            |              |      |
|-------------------------------------------------------------|---------|----------|------------|--------------|------|
| Parameter                                                   |         | Symbol   | 10 S       | Steady State | Unit |
| Drain-Source Voltage                                        |         | VDS      | 20         |              | V    |
| Gate-Source Voltage                                         |         | VGS      | ±8         |              |      |
| Continuous Drain Current (TJ = 150 °C) <sup>a</sup>         | TA=25°C | ID       | 3.2        | 2.9          | A    |
|                                                             | TA=70°C |          | 2.5        | 2.3          |      |
| Maximum Power Dissipation <sup>a</sup>                      | TA=25°C | PD       | 0.8        | 0.7          | W    |
|                                                             | TA=70°C |          | 0.5        | 0.4          |      |
| Continuous Drain Current (TJ = 150 °C) <sup>b</sup>         | TA=25°C | ID       | 2.9        | 2.7          | A    |
|                                                             | TA=70°C |          | 2.3        | 2.1          |      |
| Maximum Power Dissipation <sup>b</sup>                      | TA=25°C | PD       | 0.6        | 0.5          | W    |
|                                                             | TA=70°C |          | 0.4        | 0.3          |      |
| Pulsed Drain Current <sup>c</sup>                           |         | IDM      | 10         |              | A    |
| Operating Junction and Storage Temperature Range            |         | TJ, Tstg | -55 to 150 |              | °C   |

| <b>THERMAL RESISTANCE RATINGS</b>                   |                      |                 |         |         |                      |
|-----------------------------------------------------|----------------------|-----------------|---------|---------|----------------------|
| Parameter                                           |                      | Symbol          | Typical | Maximum | Unit                 |
| Junction-to-Ambient Thermal Resistance <sup>a</sup> | $t \leq 10\text{ s}$ | $R_{\theta JA}$ | 125     | 150     | $^{\circ}\text{C/W}$ |
|                                                     | Steady State         |                 | 140     | 175     |                      |
| Junction-to-Ambient Thermal Resistance <sup>b</sup> | $t \leq 10\text{ s}$ | $R_{\theta JA}$ | 150     | 180     |                      |
|                                                     | Steady State         |                 | 165     | 210     |                      |
| Junction-to-Case Thermal Resistance                 | Steady State         | $R_{\theta JC}$ | 60      | 76      |                      |

a Surface mounted on FR4 Board using 1 in sq pad size, 1oz Cu.

b Surface mounted on FR4 board using the minimum recommended pad size, 1oz Cu.

c Repetitive rating, pulse width limited by junction temperature,  $t_p = 10\mu\text{s}$ , Duty Cycle=1%

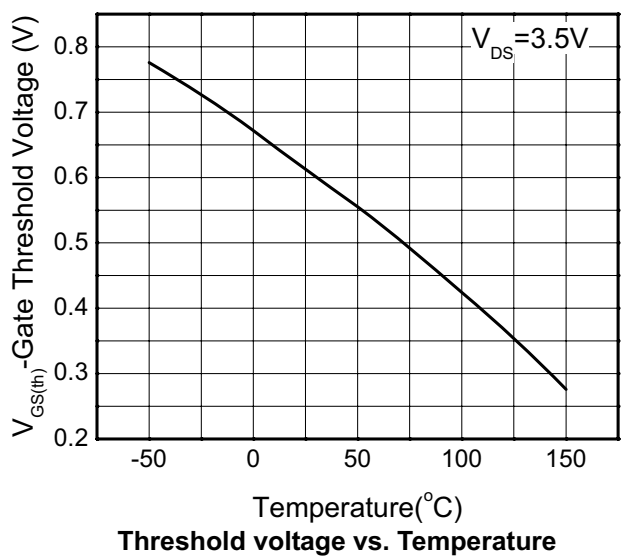
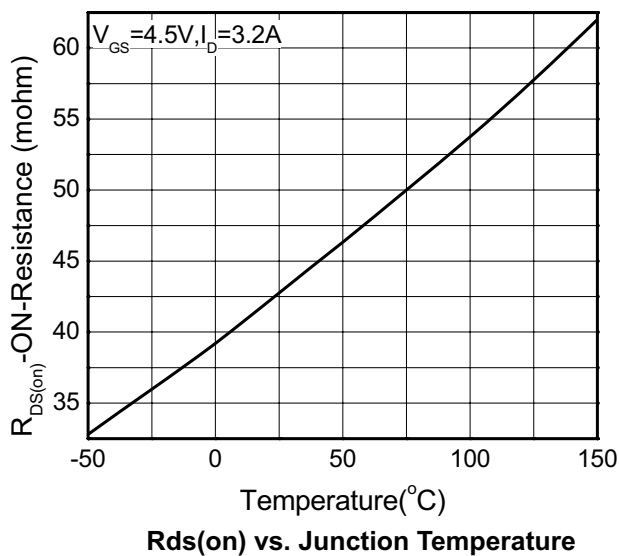
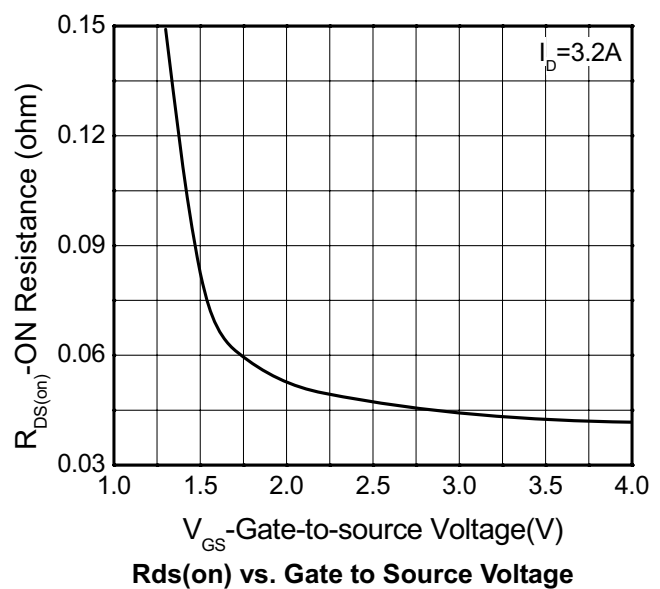
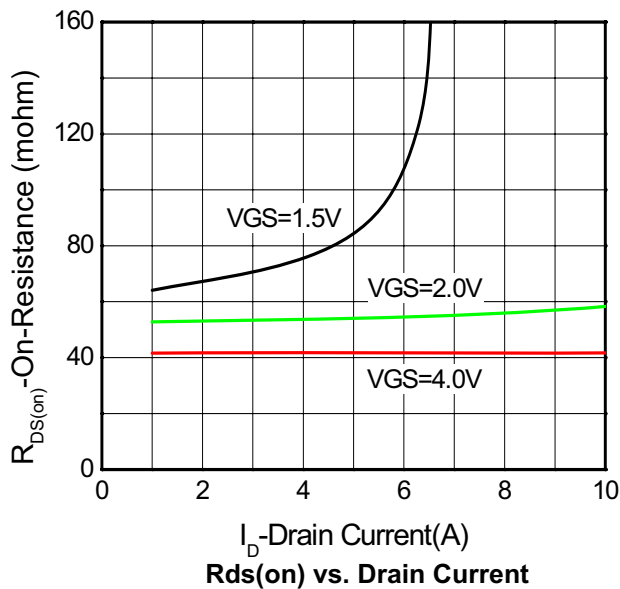
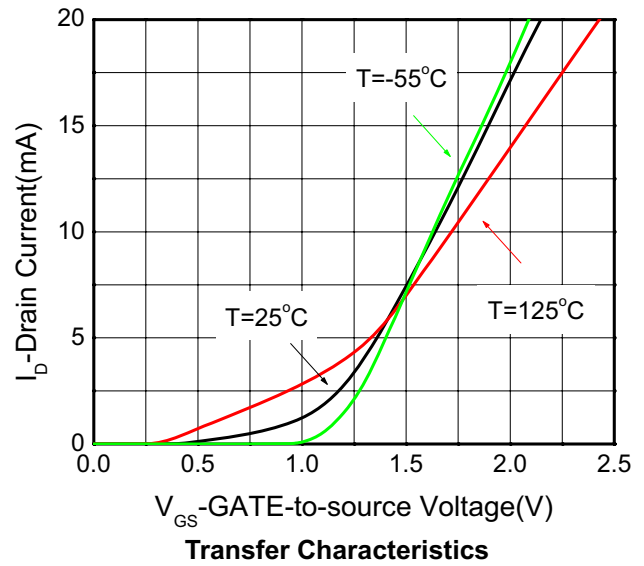
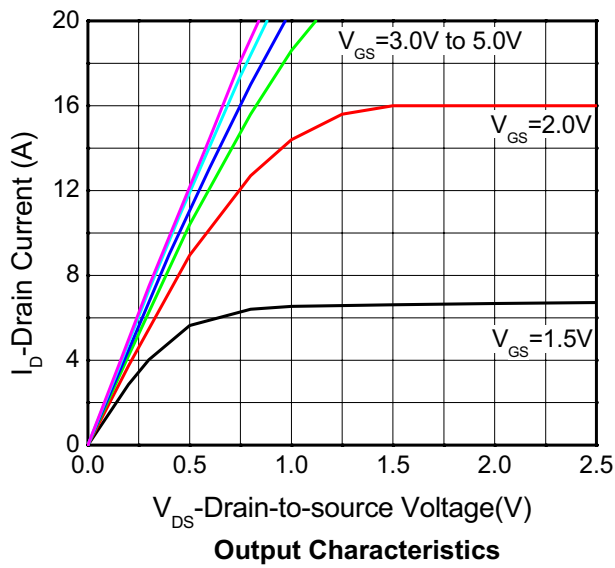
d Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150\text{ }^{\circ}\text{C}$ .

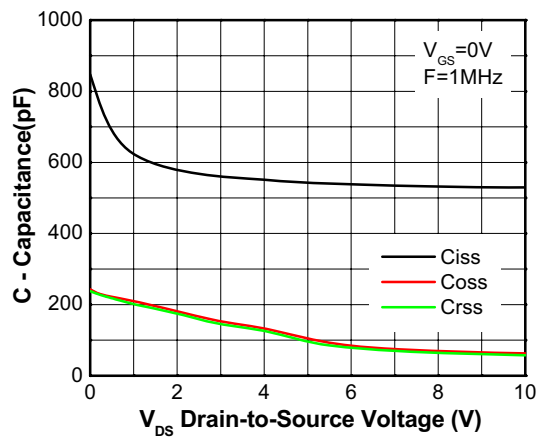
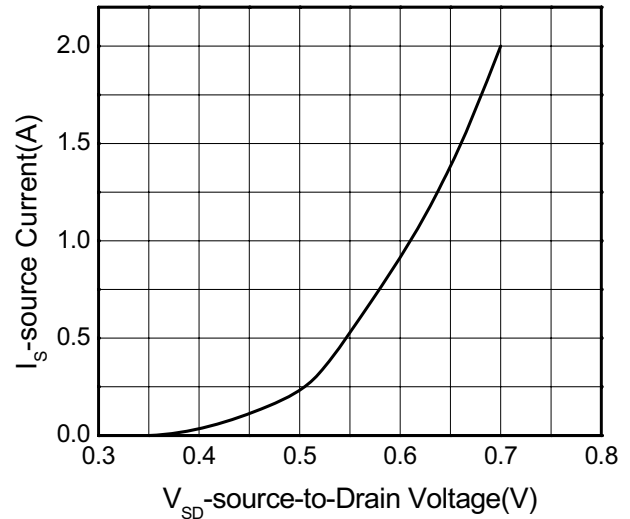
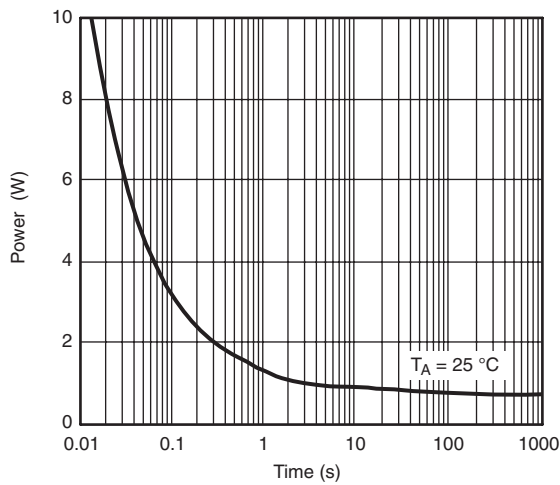
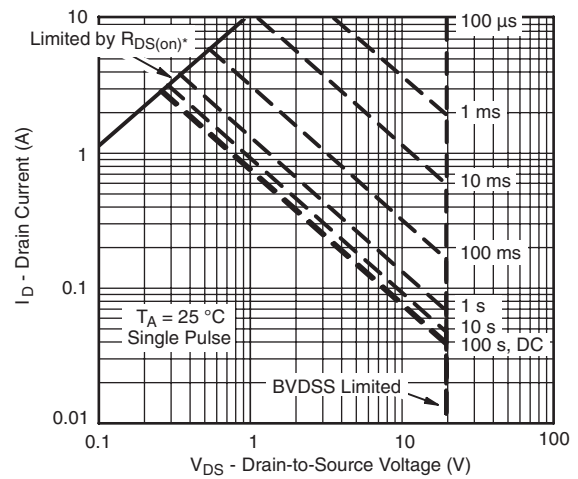
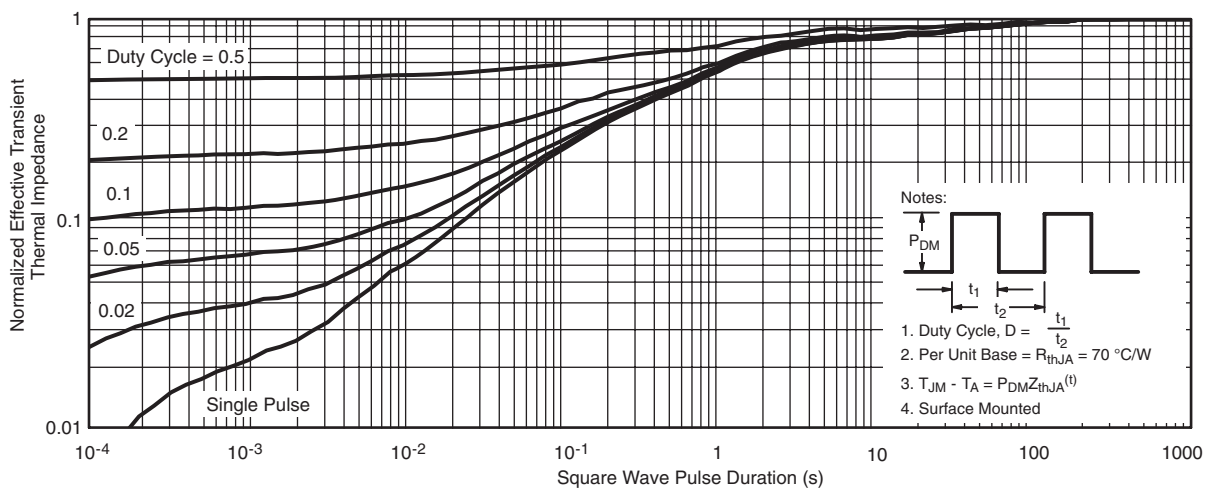
**Electronics Characteristics**

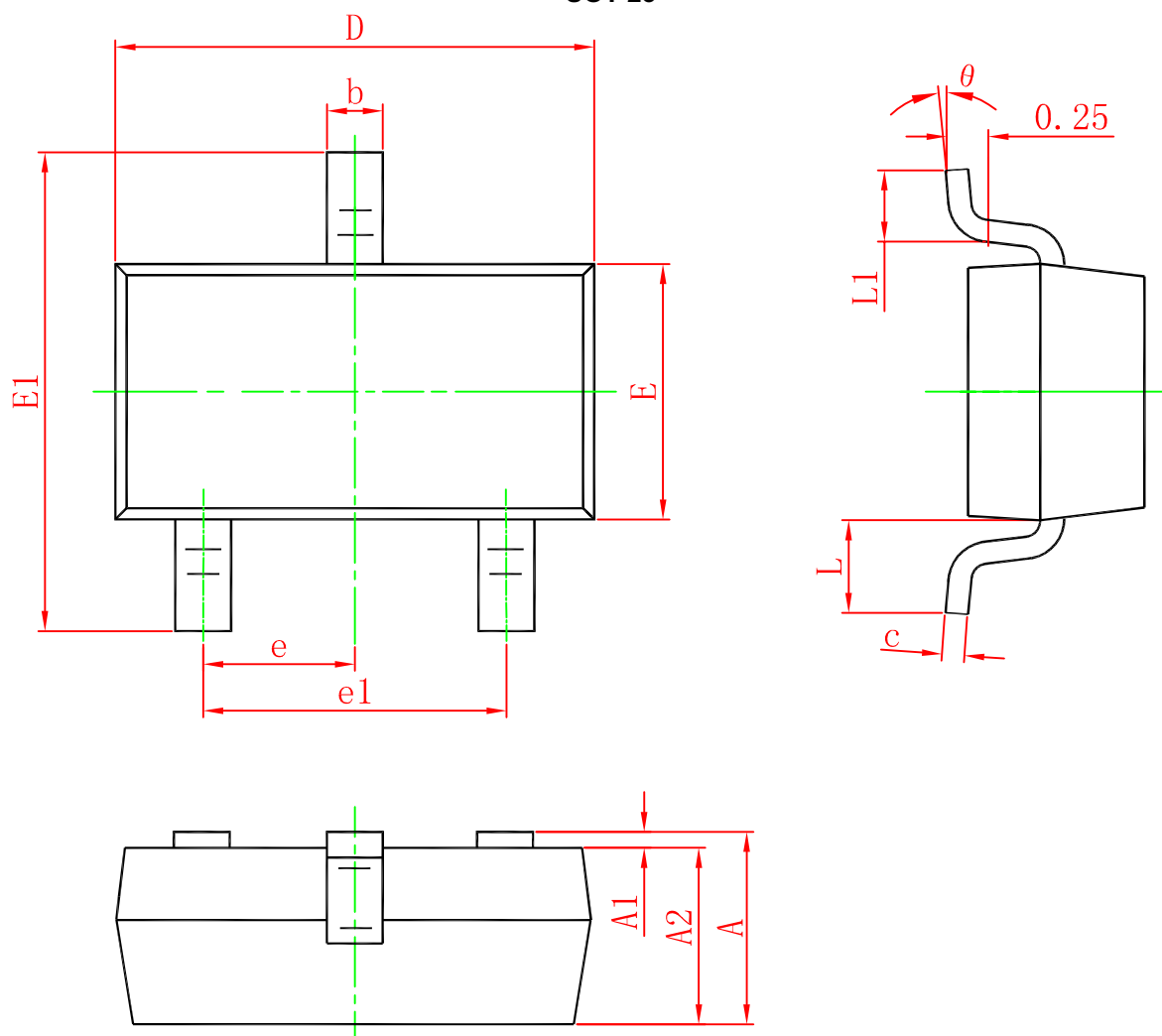
(Ta=25°C, unless otherwise noted)

| Parameter                                 | Symbol              | Test Conditions                                                                               | Min | Typ  | Max  | Unit |
|-------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|-----|------|------|------|
| OFF CHARACTERISTICS                       |                     |                                                                                               |     |      |      |      |
| Drain-to-Source Breakdown Voltage         | BV <sub>DSS</sub>   | V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250uA                                                 | 20  |      |      | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>    | V <sub>DS</sub> =16 V, V <sub>GS</sub> = 0V                                                   |     |      | 1    | uA   |
| Gate-to-source Leakage Current            | I <sub>GSS</sub>    | V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±8.0V                                                |     |      | ±100 | nA   |
| ON CHARACTERISTICS                        |                     |                                                                                               |     |      |      |      |
| Gate Threshold Voltage                    | V <sub>GS(TH)</sub> | V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250uA                                    | 0.4 | 0.6  | 1    | V    |
| Drain-to-source On-resistance             | R <sub>DS(on)</sub> | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 3.2A                                                 |     | 40   | 47   | mΩ   |
|                                           |                     | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3.1A                                                 |     | 47   | 55   |      |
|                                           |                     | V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 1.5A                                                 |     | 55   | 66   |      |
| Forward Transconductance                  | g <sub>FS</sub>     | V <sub>DS</sub> = 5 V, I <sub>D</sub> = 3.1A                                                  |     | 11   |      | S    |
|                                           |                     |                                                                                               |     |      |      |      |
| CHARGES, CAPACITANCES AND GATE RESISTANCE |                     |                                                                                               |     |      |      |      |
| Input Capacitance                         | C <sub>ISS</sub>    | V <sub>GS</sub> = 0 V, f = 1.0 MHz,<br>V <sub>DS</sub> = 10 V                                 |     | 500  |      | pF   |
| Output Capacitance                        | C <sub>OSS</sub>    |                                                                                               |     | 62   |      |      |
| Reverse Transfer Capacitance              | C <sub>RSS</sub>    |                                                                                               |     | 58   |      |      |
| Total Gate Charge                         | Q <sub>G(TOT)</sub> | V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 10 V,<br>I <sub>D</sub> = 3.1 A                    |     | 8.05 |      | nC   |
| Threshold Gate Charge                     | Q <sub>G(TH)</sub>  |                                                                                               |     | 0.45 |      |      |
| Gate-to-Source Charge                     | Q <sub>GS</sub>     |                                                                                               |     | 0.6  |      |      |
| Gate-to-Drain Charge                      | Q <sub>GD</sub>     |                                                                                               |     | 2.65 |      |      |
| SWITCHING CHARACTERISTICS                 |                     |                                                                                               |     |      |      |      |
| Turn-On Delay Time                        | td(ON)              | V <sub>GS</sub> =4.5 V, V <sub>DD</sub> = 10 V,<br>R <sub>L</sub> =3.5Ω , R <sub>G</sub> =3 Ω |     | 12   |      | ns   |
| Rise Time                                 | tr                  |                                                                                               |     | 20   |      |      |
| Turn-Off Delay Time                       | td(OFF)             |                                                                                               |     | 38   |      |      |
| Fall Time                                 | tf                  |                                                                                               |     | 10   |      |      |
| DRAIN-SOURCE DIODE CHARACTERISTICS        |                     |                                                                                               |     |      |      |      |
| Forward Recovery Voltage                  | V <sub>SD</sub>     | V <sub>GS</sub> = 0 V, I <sub>S</sub> = 1.0A                                                  | 0.5 | 0.62 | 1.5  | V    |

### Typical Performance Graph




**Capacitance**

**Source to Drain Diode Forward Voltage**

**Single Pulse Power**

**Safe Operating Area**

**Transient Thermal Response**

**Package Outline Dimension**
**SOT-23**


| Symbol                     | Dimensions In Millimeters |              |
|----------------------------|---------------------------|--------------|
|                            | Min.                      | Max.         |
| <b>A</b>                   | <b>0.900</b>              | <b>1.150</b> |
| <b>A1</b>                  | <b>0.000</b>              | <b>0.100</b> |
| <b>A2</b>                  | <b>0.900</b>              | <b>1.050</b> |
| <b>b</b>                   | <b>0.300</b>              | <b>0.500</b> |
| <b>c</b>                   | <b>0.080</b>              | <b>0.150</b> |
| <b>D</b>                   | <b>2.800</b>              | <b>3.000</b> |
| <b>E</b>                   | <b>1.200</b>              | <b>1.400</b> |
| <b>E1</b>                  | <b>2.250</b>              | <b>2.550</b> |
| <b>e</b>                   | <b>0.950 (Typ.)</b>       |              |
| <b>e1</b>                  | <b>1.800</b>              | <b>2.000</b> |
| <b>L</b>                   | <b>0.550 (Typ.)</b>       |              |
| <b>L1</b>                  | <b>0.300</b>              | <b>0.500</b> |
| <b><math>\theta</math></b> | <b>0°</b>                 | <b>8°</b>    |