

## N-Channel Enhancement Mode MOSFET

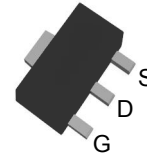
### Features

- 100V/15A,  
 $R_{DS(ON)} = 100\text{m}\Omega(\text{max.}) @ V_{GS} = 10\text{V}$   
 $R_{DS(ON)} = 110\text{m}\Omega(\text{max.}) @ V_{GS} = 4.5\text{V}$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

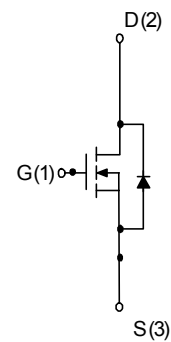
### Applications

- Power Management in DC/DC Converter.
- Load Switching.

### Pin Description



Top View SOT-89



N-Channel MOSFET

**Absolute Maximum Ratings** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Noted)

| Symbol                | Parameter                                 | Rating                 | Unit             |                    |
|-----------------------|---|------------------------|------------------|--------------------|
| <b>Common Ratings</b> |   |                        |                  |                    |
| $V_{DSS}$             | Drain-Source Voltage                      | 100                    | V                |                    |
| $V_{GSS}$             | Gate-Source Voltage                       | $\pm 20$               |                  |                    |
| $T_J$                 | Maximum Junction Temperature              | 150                    | $^\circ\text{C}$ |                    |
| $T_{STG}$             | Storage Temperature Range                 | -55 to 150             |                  |                    |
| $I_S$                 | Diode Continuous Forward Current          | $T_A=25^\circ$         | 3                | A                  |
| $I_D$                 | Continuous Drain Current                  | $T_C=25^\circ\text{C}$ | 15               | A                  |
|                       |   | $T_C=70^\circ\text{C}$ | 13               |                    |
| $I_{DM}^a$            | Pulsed Drain Current                      | $T_C=25^\circ\text{C}$ | 26               | A                  |
| $P_D$                 | Maximum Power Dissipation                 | $T_A=25^\circ\text{C}$ | 3.5              | W                  |
|                       |   | $T_A=70^\circ\text{C}$ | 2.2              |                    |
| $R_{\theta JA}^c$     | Thermal Resistance-Junction to Ambient    | $t \leq 10\text{s}$    | 35               | $^\circ\text{C/W}$ |
|                       |   | Steady State           | 70               | $^\circ\text{C/W}$ |
| $I_{AS}^b$            | Avalanche Current, Single pulse (L=0.5mH) |                        | 7                | A                  |
| $E_{AS}^b$            | Avalanche Energy, Single pulse (L=0.5mH)  |                        | 12               | mJ                 |

Note a : Pulse width limited by max. junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_J=25^\circ\text{C}$ ).

Note c : Surface Mounted on  $1\text{in}^2$  pad area.

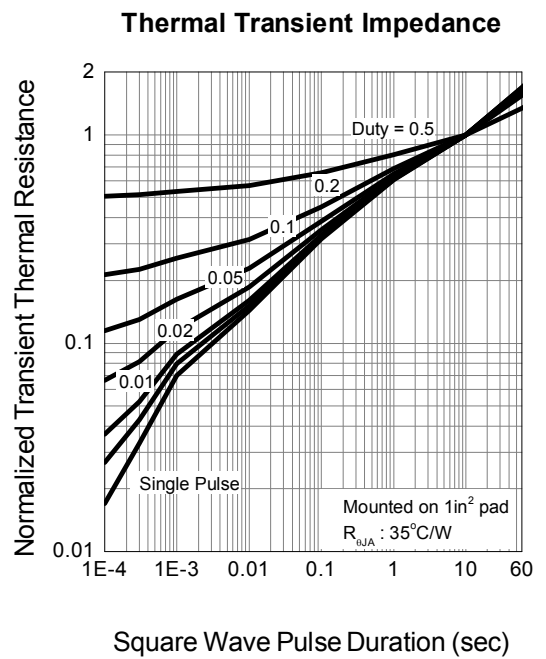
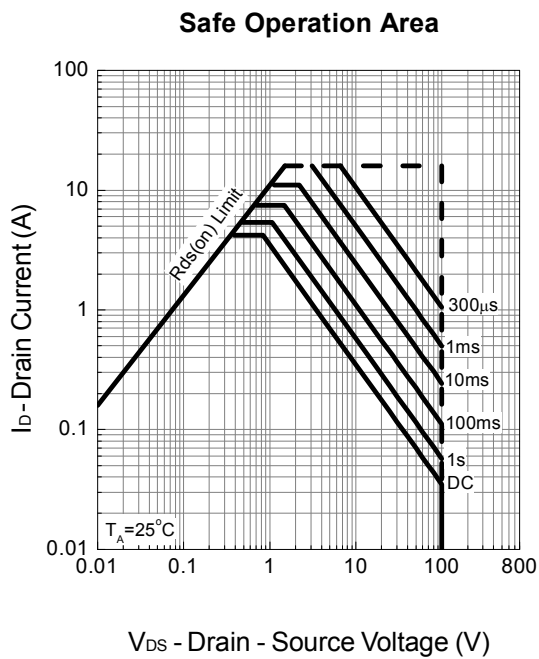
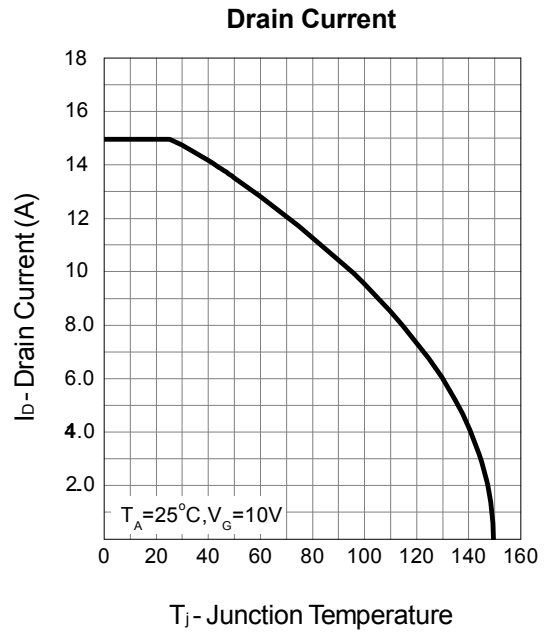
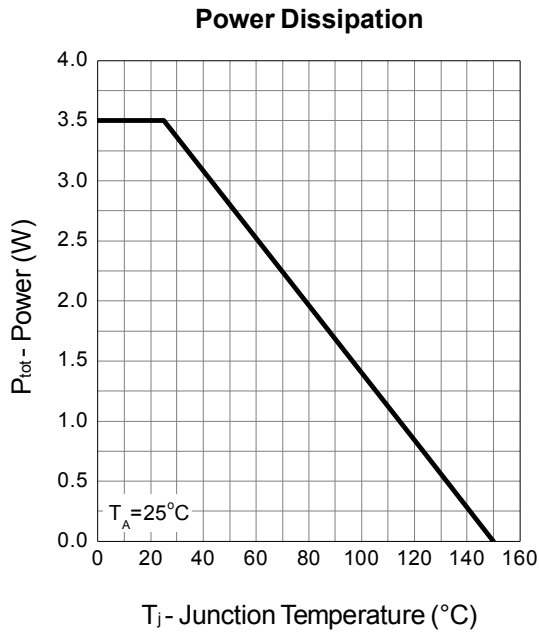
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  Unless Otherwise Noted)

| Symbol  | Parameter                        | Test Conditions   | Min. | Typ. | Max.      | Unit      |
|---|----------------------------------|---|------|------|-----------|-----------|
| <b>Static Characteristics</b>                   |                                  |   |      |      |           |           |
| $BV_{DSS}$                                      | Drain-Source Breakdown Voltage   | $V_{GS}=0V, I_{DS}=250\mu A$  | 100  | -    | -         | V         |
| $I_{DSS}$                                       | Zero Gate Voltage Drain Current  | $V_{DS}=80V, V_{GS}=0V$<br>$T_J=85^\circ\text{C}$                         | -    | -    | 1         | $\mu A$   |
|   |                                  |   | -    | -    | 30        |           |
| $V_{GS(th)}$                                    | Gate Threshold Voltage           | $V_{DS}=V_{GS}, I_{DS}=250\mu A$  | 1    | 2    | 3         | V         |
| $I_{GSS}$                                       | Gate Leakage Current             | $V_{GS}=\pm 20V, V_{DS}=0V$   | -    | -    | $\pm 100$ | nA        |
| $R_{DS(ON)}^d$                                  | Drain-Source On-state Resistance | $V_{GS}=10V, I_{DS}=4A$   | -    | 80   | 100       | $m\Omega$ |
|   |                                  | $V_{GS}=4.5V, I_{DS}=3.5A$  | -    | 85   | 110       | $m\Omega$ |
| <b>Diode Characteristics</b>                    |                                  |   |      |      |           |           |
| $V_{SD}^d$                                      | Diode Forward Voltage            | $I_{SD}=3A, V_{GS}=0V$  | -    | 0.8  | 1.3       | V         |
| $t_{rr}$  | Reverse Recovery Time            | $I_{SD}=3A, dI_{SD}/dt=100A/\mu s$  | -    | 27   | -         | ns        |
| $Q_{rr}$  | Reverse Recovery Charge          |   | -    | 36   | -         | nC        |
| <b>Dynamic Characteristics</b> <sup>e</sup>     |                                  |   |      |      |           |           |
| $R_G$   | Gate Resistance                  | $V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$                                     | -    | 2.5  | -         | $\Omega$  |
| $C_{iss}$                                       | Input Capacitance                | $V_{GS}=0V,$<br>$V_{DS}=30V,$<br>Frequency=1.0MHz                         | -    | 740  | 960       | $\mu F$   |
| $C_{oss}$                                       | Output Capacitance               |   | -    | 45   | -         |           |
| $C_{rss}$                                       | Reverse Transfer Capacitance     |   | -    | 24   | -         |           |
| $t_{d(ON)}$                                     | Turn-on Delay Time               | $V_{DD}=30V, R_L=30\Omega,$<br>$I_{DS}=1A, V_{GEN}=10V,$<br>$R_G=6\Omega$ | -    | 11   | 20        | ns        |
| $t_r$   | Turn-on Rise Time                |   | -    | 6    | 11        |           |
| $t_{d(OFF)}$                                    | Turn-off Delay Time              |   | -    | 27   | 49        |           |
| $t_f$   | Turn-off Fall Time               |   | -    | 5    | 10        |           |
| <b>Gate Charge Characteristics</b> <sup>e</sup> |                                  |   |      |      |           |           |
| $Q_g$   | Total Gate Charge                | $V_{DS}=30V, V_{GS}=4.5V,$<br>$I_{DS}=4A$                                 | -    | 7.7  | -         | nC        |
| $Q_g$   | Total Gate Charge                | $V_{DS}=30V, V_{GS}=10V,$<br>$I_{DS}=4A$                                  | -    | 16   | 23        |           |
| $Q_{gs}$  | Gate-Source Charge               |   | -    | 2.5  | -         |           |
| $Q_{gd}$  | Gate-Drain Charge                |   | -    | 3    | -         |           |

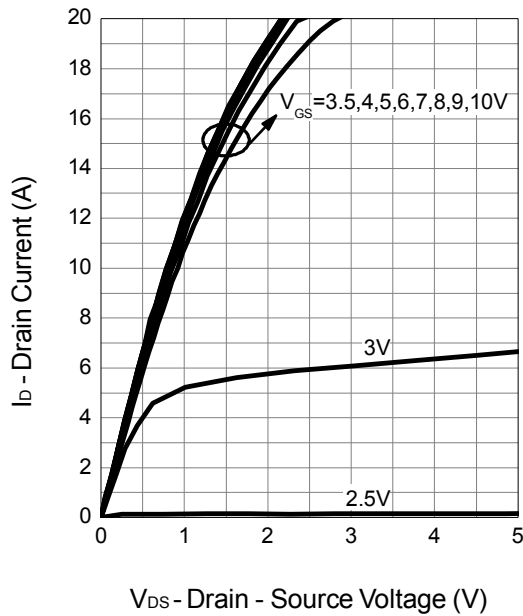
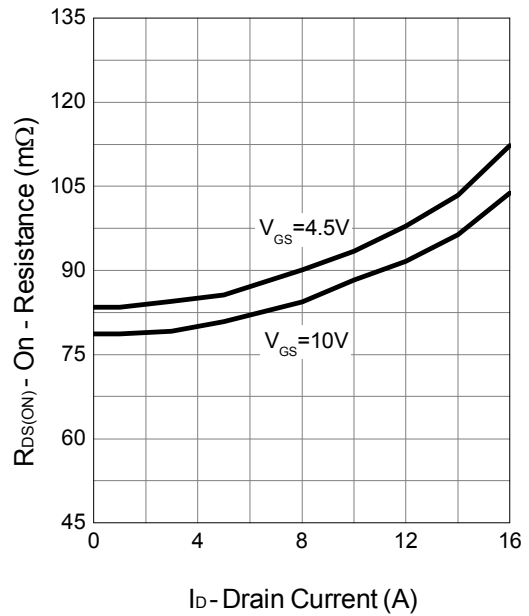
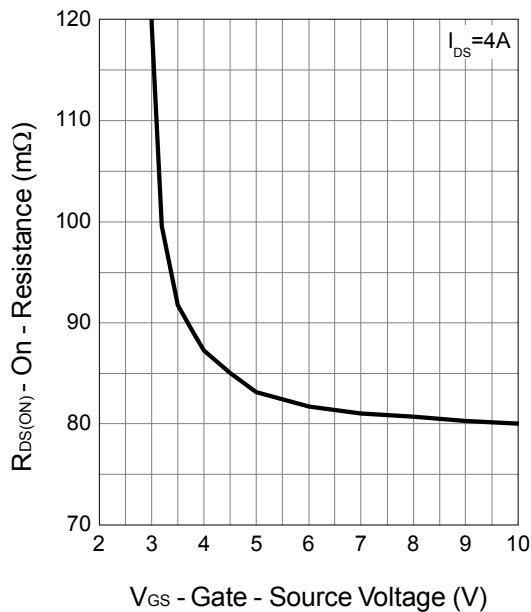
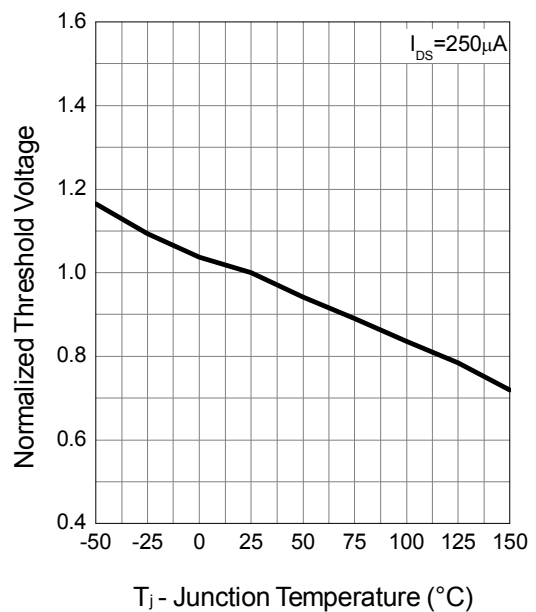
Note d : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

Note e : Guaranteed by design, not subject to production testing.

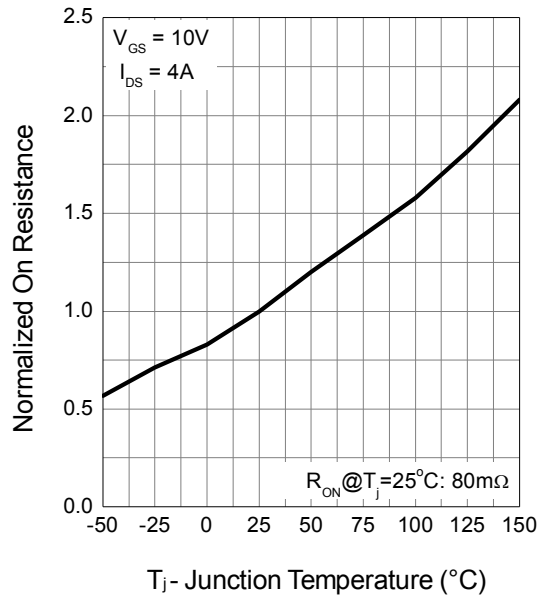
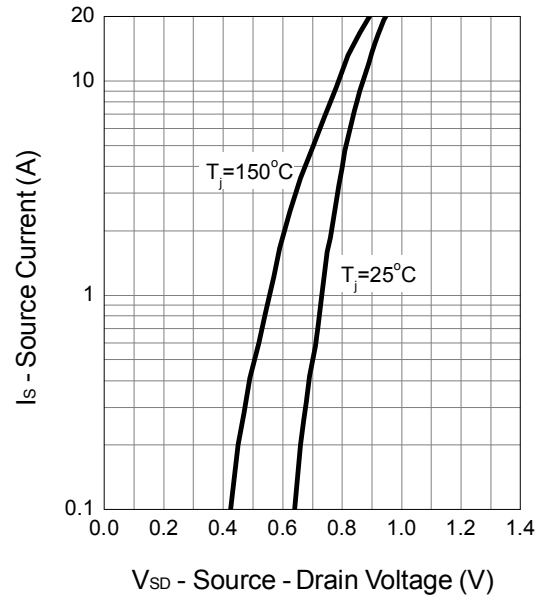
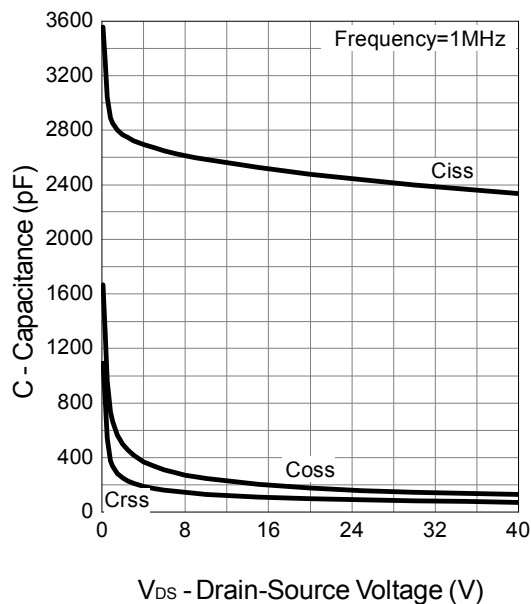
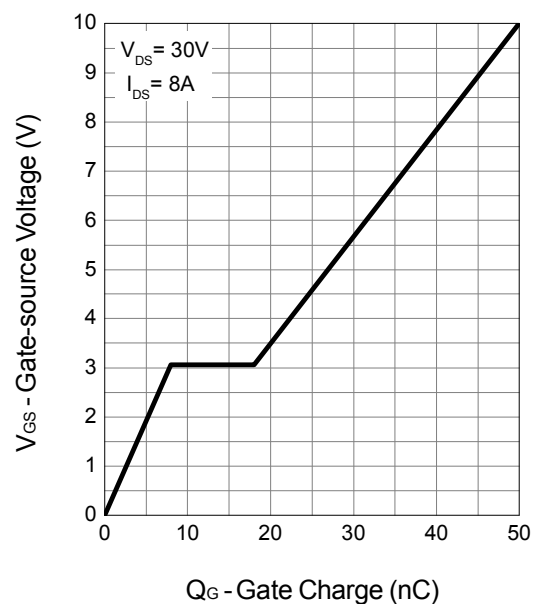
## Typical Operating Characteristics



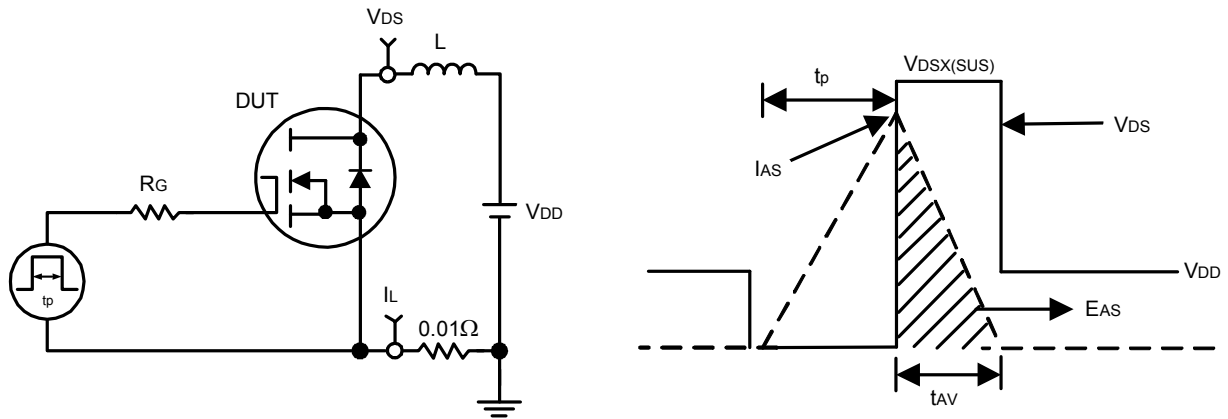
## Typical Operating Characteristics (Cont.)

**Output Characteristics**

**Drain-Source On Resistance**

**Gate-Source On Resistance**

**Gate Threshold Voltage**


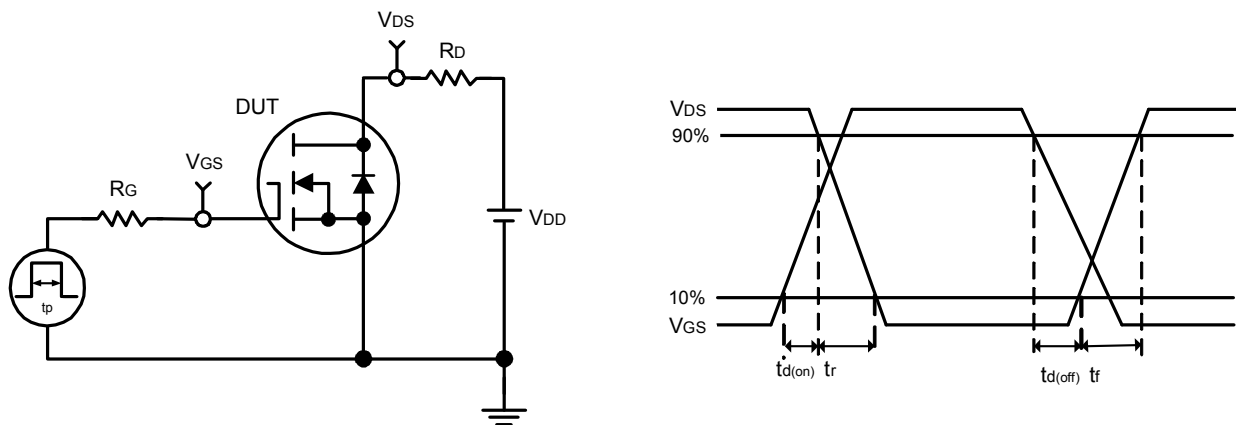
## Typical Operating Characteristics (Cont.)

**Drain-Source On Resistance**

**Source-Drain Diode Forward**

**Capacitance**

**Gate Charge**


## Avalanche Test Circuit and Waveforms

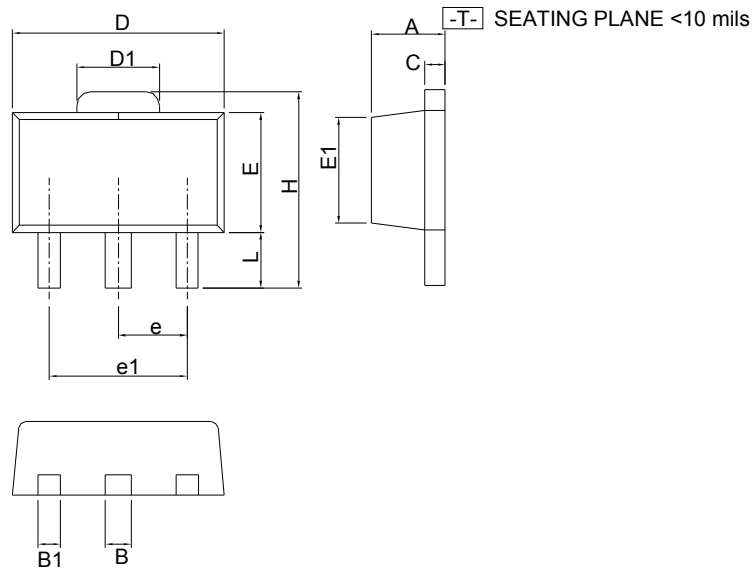


## Switching Time Test Circuit and Waveforms



## Package Information

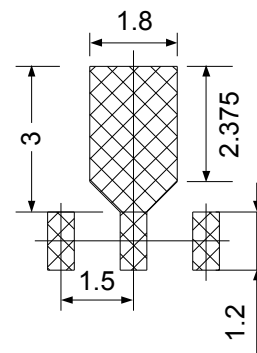
SOT-89



| SYMBOL | SOT-89      |      |           |       |
|--------|-------------|------|-----------|-------|
|        | MILLIMETERS |      | INCHES    |       |
|        | MIN.        | MAX. | MIN.      | MAX.  |
| A      | 1.40        | 1.60 | 0.055     | 0.063 |
| B      | 0.44        | 0.56 | 0.017     | 0.022 |
| B1     | 0.36        | 0.48 | 0.014     | 0.019 |
| C      | 0.35        | 0.44 | 0.014     | 0.017 |
| D      | 4.40        | 4.60 | 0.173     | 0.181 |
| D1     | 1.62        | 1.83 | 0.064     | 0.072 |
| E      | 2.29        | 2.60 | 0.090     | 0.102 |
| E1     | 2.13        | 2.29 | 0.084     | 0.090 |
| e      | 1.50 BSC    |      | 0.059 BSC |       |
| e1     | 3.00 BSC    |      | 0.118 BSC |       |
| H      | 3.94        | 4.25 | 0.155     | 0.167 |
| L      | 0.89        | 1.20 | 0.035     | 0.047 |

Note : Follow JEDEC TO-243 AA.

### RECOMMENDED LAND PATTERN



UNIT: mm