

## Features

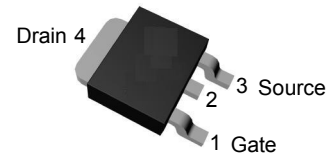
- -40V/-55A,  
 $R_{DS(ON)} = 7.5m\Omega$  (typ.) @  $V_{GS} = -10V$   
 $R_{DS(ON)} = 11m\Omega$  (typ.) @  $V_{GS} = -4.5V$
- HBM ESD capability level of 8KV typical
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

**Note :** The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

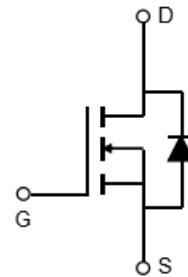
## Applications

- Power Management in LCD TV Inverter.

## Pin Description



Top View of TO-252-3



P-Channel MOSFET

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

| Symbol            | Parameter                                           |                           | Rating     | Unit               |
|-------------------|-----------------------------------------------------|---------------------------|------------|--------------------|
| $V_{DSS}$         | Drain-Source Voltage                                |                           | -40        | V                  |
| $V_{GSS}$         | Gate-Source Voltage                                 |                           | $\pm 25$   |                    |
| $I_D^a$           | Continuous Drain Current ( $V_{GS} = -10\text{V}$ ) | $T_A = 25^\circ\text{C}$  | -17        | A                  |
|                   |                                                     | $T_A = 70^\circ\text{C}$  | -14        |                    |
| $I_{DP}^a$        | 300 $\mu\text{s}$ Pulsed Drain Current Tested       | $T_A = 25^\circ\text{C}$  | -69        |                    |
| $I_D^c$           | Continuous Drain Current ( $V_{GS} = -10\text{V}$ ) | $T_C = 25^\circ\text{C}$  | -55        |                    |
|                   |                                                     | $T_C = 100^\circ\text{C}$ | -35        |                    |
| $I_{DP}^c$        | 300 $\mu\text{s}$ Pulsed Drain Current Tested       | $T_C = 25^\circ\text{C}$  | -222       |                    |
| $I_S^c$           | Diode Continuous Forward Current                    |                           | -27        | mJ                 |
| $I_{AS}^b$        | Avalanche Current, Single pulse                     | $L = 0.5\text{mH}$        | -21        |                    |
| $E_{AS}^b$        | Avalanche Energy, Single pulse                      | $L = 0.5\text{mH}$        | 110        | $^\circ\text{C}$   |
| $T_J$             | Maximum Junction Temperature                        |                           | 150        |                    |
| $T_{STG}$         | Storage Temperature Range                           |                           | -55 to 150 | W                  |
| $P_D^a$           | Maximum Power Dissipation                           | $T_A = 25^\circ\text{C}$  | 5          |                    |
|                   |                                                     | $T_A = 70^\circ\text{C}$  | 3.2        |                    |
| $P_D^c$           | Maximum Power Dissipation                           | $T_C = 25^\circ\text{C}$  | 52         |                    |
|                   |                                                     | $T_C = 100^\circ\text{C}$ | 20         |                    |
| $R_{\theta JA}^a$ | Thermal Resistance-Junction to Ambient              | $t \leq 10\text{s}$       | 25         | $^\circ\text{C/W}$ |
|                   |                                                     | Steady State              | 60         |                    |
| $R_{\theta JC}^c$ | Thermal Resistance-Junction to Case                 | Steady State              | 2.4        |                    |

Note a : Surface Mounted on 1in<sup>2</sup> pad area,  $t \leq 10\text{sec}$ .  $R_{\theta JA}$  steady state  $t = 999\text{s}$ .

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 : The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 150^\circ\text{C}$ , and it is useful for reducing junction-to-case thermal resistance ( $R_{\theta JC}$ ) when additional heat sink is used.

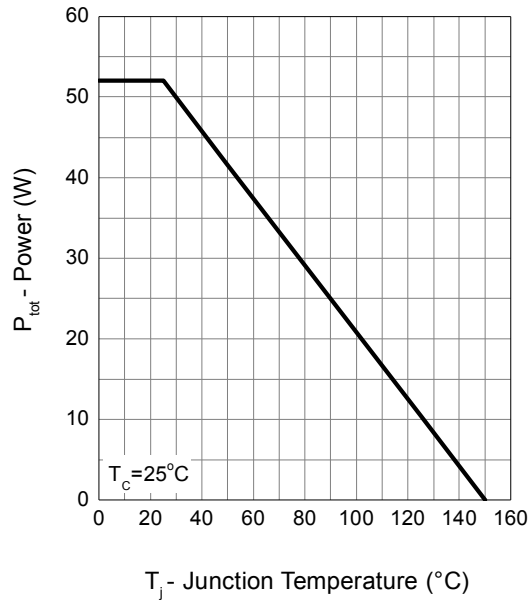
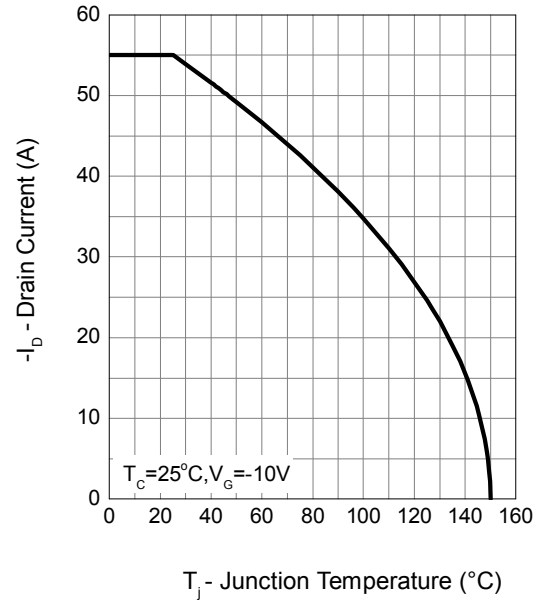
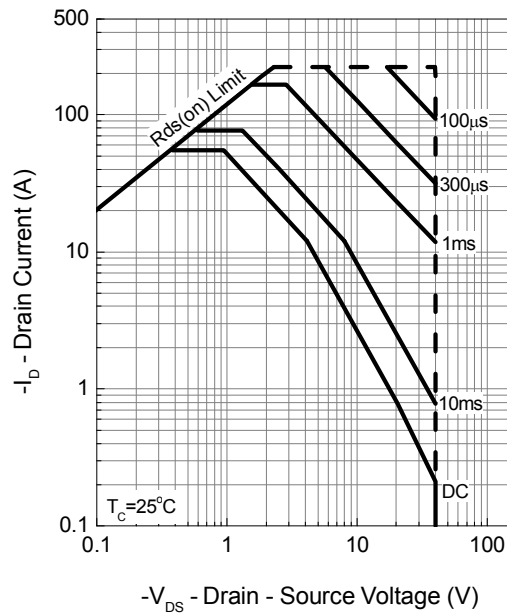
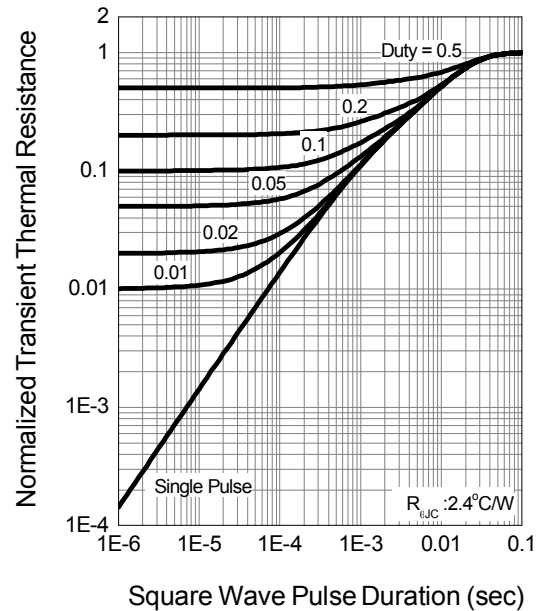
## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| Symbol                                   | Parameter                        | Test Conditions                                                                                                                               | Min.        | Typ.             | Max.           | Unit |
|------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|----------------|------|
| Static Characteristics                   |                                  |                                                                                                                                               |             |                  |                |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =-250μA                                                                                                  | -40         | -                | -              | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =85°C                                                                            | -           | -                | -1<br>-30      | μA   |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250μA                                                                                    | -1.5        | -2               | -2.5           | V    |
| I <sub>GSS</sub>                         | Gate Leakage Current             | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                                                    | -           | -                | ±100           | nA   |
| R <sub>DS(ON)</sub> <sup>d</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =-20V, I <sub>DS</sub> =-25A<br>V <sub>GS</sub> =-10V, I <sub>DS</sub> =-25A<br>V <sub>GS</sub> =-4.5V, I <sub>DS</sub> =-15A | -<br>-<br>- | 6.6<br>7.5<br>11 | 8<br>9.4<br>15 | mΩ   |
| Diode Characteristics                    |                                  |                                                                                                                                               |             |                  |                |      |
| V <sub>SD</sub> <sup>d</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =-1A, V <sub>GS</sub> =0V                                                                                                     | -           | -0.75            | -1             | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>SD</sub> =-25A, dI <sub>SD</sub> /dt=100A/μs                                                                                           | -           | 23               | -              | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                                               | -           | 10               | -              | nC   |
| Dynamic Characteristics <sup>e</sup>     |                                  |                                                                                                                                               |             |                  |                |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                                              | -           | 3.8              | 7.6            | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =-20V,<br>Frequency=1.0MHz                                                                            | -           | 2780             | 3614           | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                                               | -           | 426              | -              |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                                               | -           | 331              | -              |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =-20V, R <sub>L</sub> =20Ω,<br>I <sub>DS</sub> =-1A, V <sub>GEN</sub> =-10V,<br>R <sub>G</sub> =6Ω                            | -           | 17               | 31             | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                                               | -           | 14               | 25             |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                                               | -           | 59               | 106            |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                                               | -           | 22               | 40             |      |
| Gate Charge Characteristics <sup>e</sup> |                                  |                                                                                                                                               |             |                  |                |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V,<br>I <sub>DS</sub> =-25A                                                                        | -           | 59               | 83             | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                                               | -           | 8                | -              |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                                               | -           | 16               | -              |      |

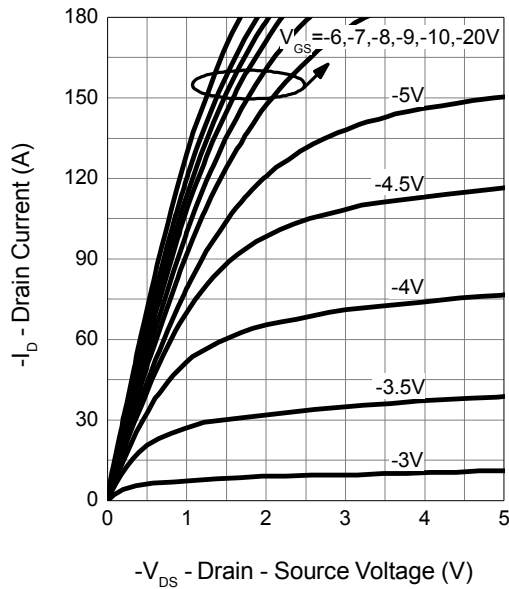
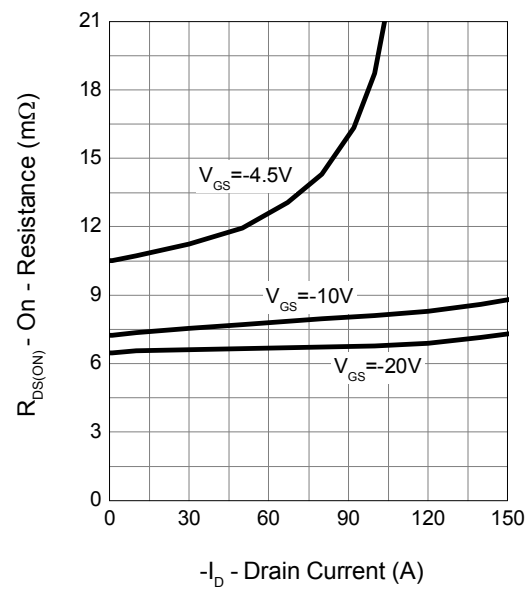
Note d : Pulse test; pulse width≤300μs, duty cycle≤2%.

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

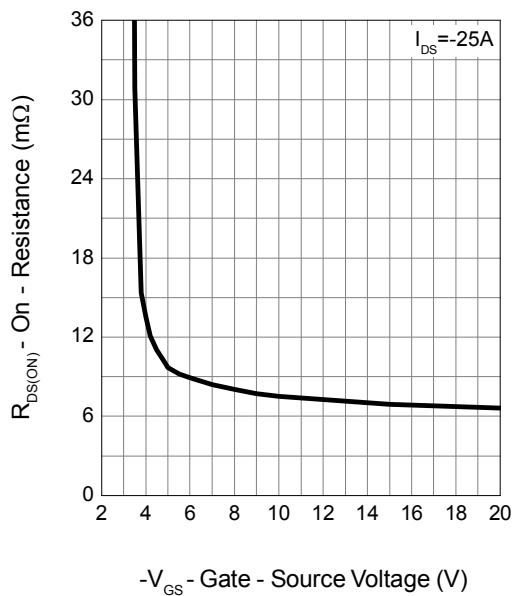
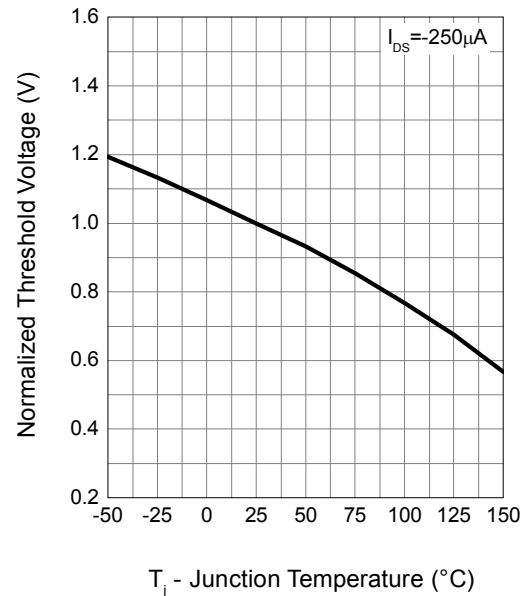
## Typical Operating Characteristics

**Power Dissipation**

**Drain Current**

**Safe Operation Area**

**Thermal Transient Impedance**


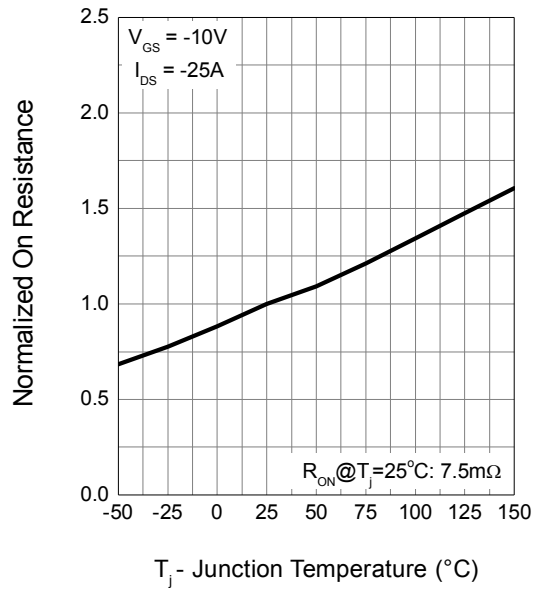
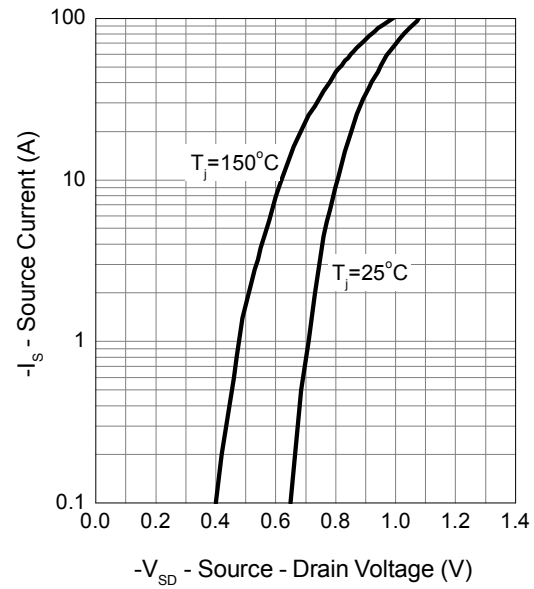
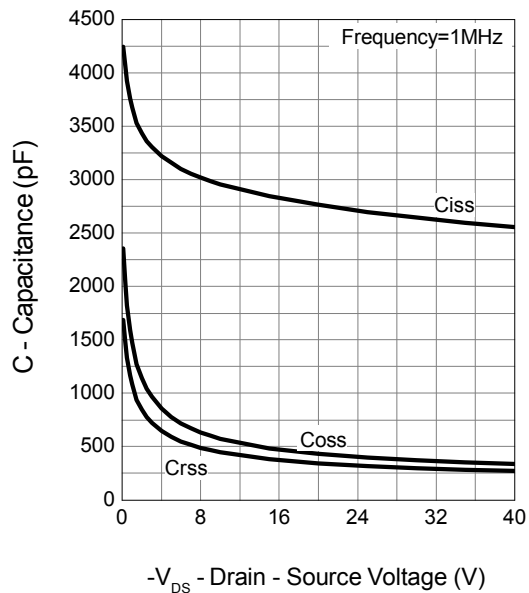
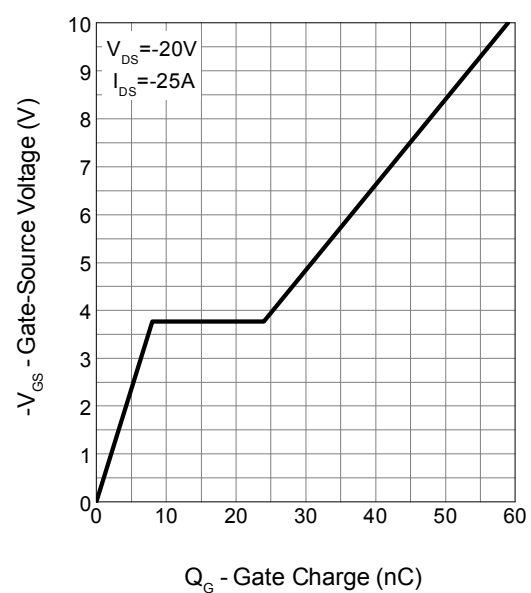
## Typical Operating Characteristics (Cont.)

**Output Characteristics**

**Drain-Source On Resistance**


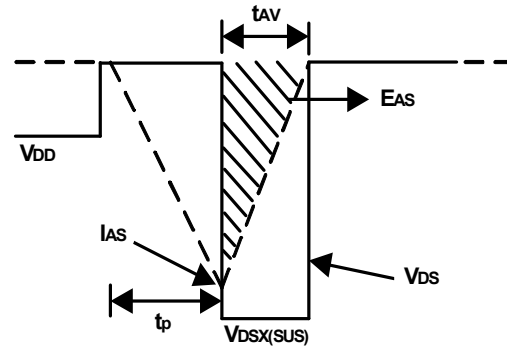
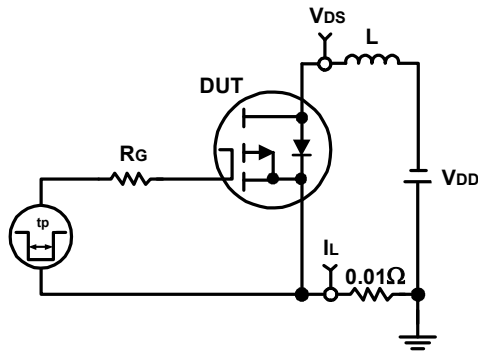
<http://www.xpelec.com/>

**Gate-Source On Resistance**

**Gate Threshold Voltage**


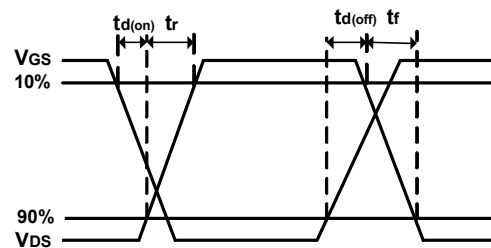
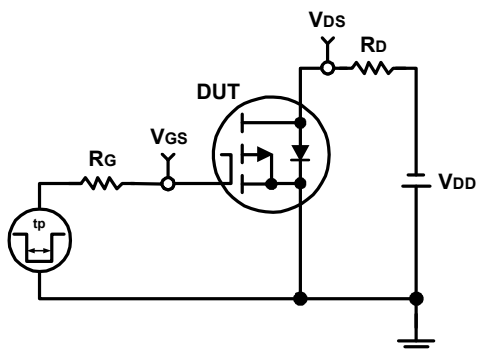
## Typical Operating Characteristics (Cont.)

**Drain-Source On Resistance**

**Source-Drain Diode Forward**

**Capacitance**

**Gate Charge**


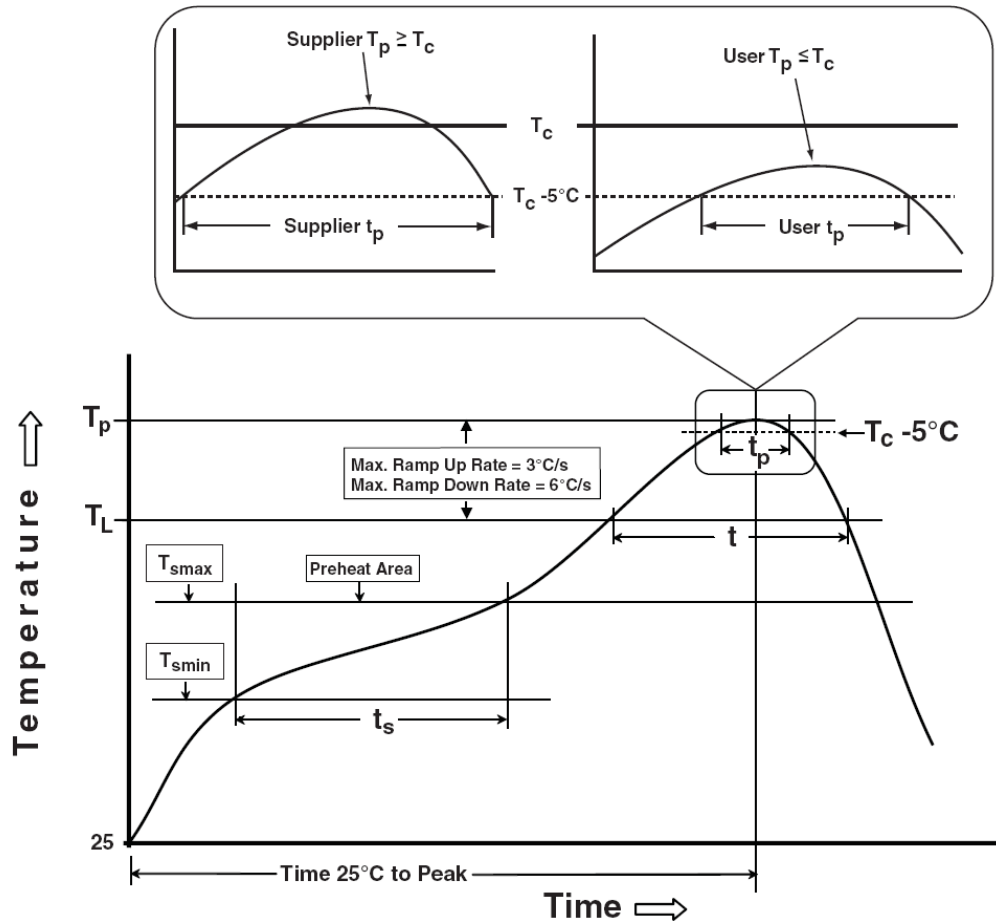
## Avalanche Test Circuit and Waveforms



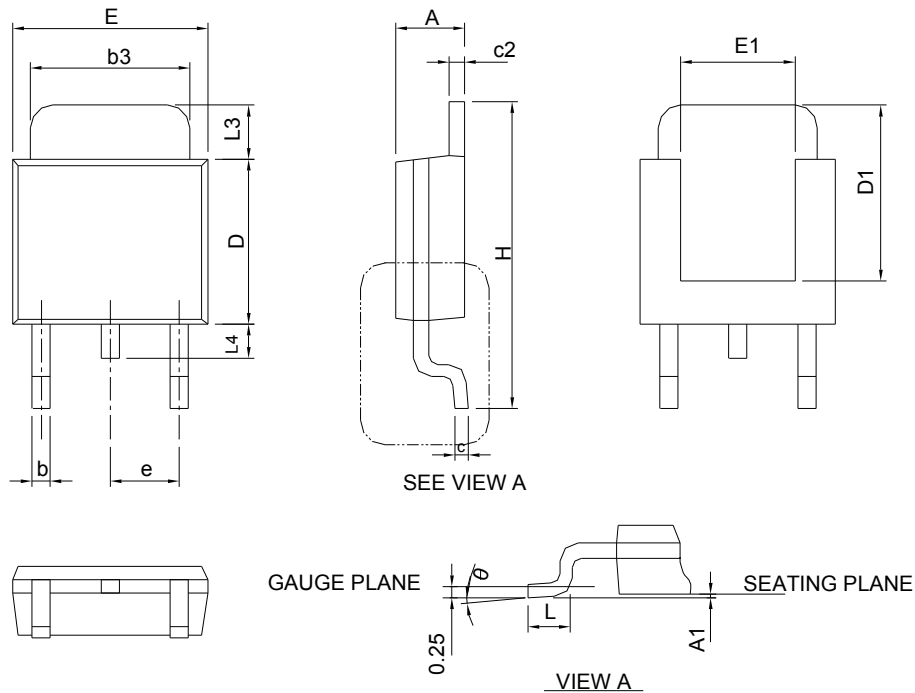
## Switching Time Test Circuit and Waveforms



## Classification Profile



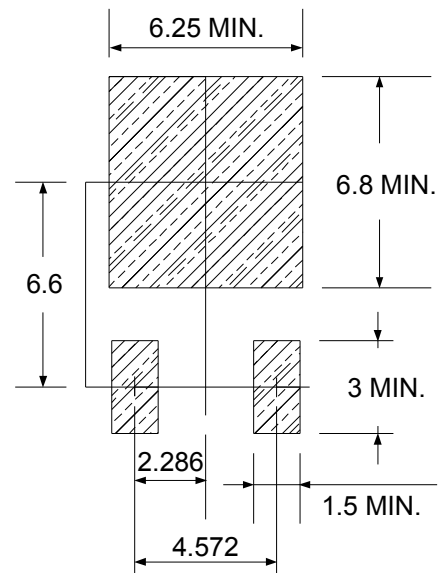
## Package Information

**TO-252-3**


|    | TO-252-3    |       |           |       |
|----|-------------|-------|-----------|-------|
|    | MILLIMETERS |       | INCHES    |       |
|    | MIN.        | MAX.  | MIN.      | MAX.  |
| A  | 2.18        | 2.39  | 0.086     | 0.094 |
| A1 | -           | 0.13  | -         | 0.005 |
| b  | 0.50        | 0.89  | 0.020     | 0.035 |
| b3 | 4.95        | 5.46  | 0.195     | 0.215 |
| c  | 0.46        | 0.61  | 0.018     | 0.024 |
| c2 | 0.46        | 0.89  | 0.018     | 0.035 |
| D  | 5.33        | 6.22  | 0.210     | 0.245 |
| D1 | 4.57        | 6.00  | 0.180     | 0.236 |
| E  | 6.35        | 6.73  | 0.250     | 0.265 |
| E1 | 3.81        | 6.00  | 0.150     | 0.236 |
| e  | 2.29 BSC    |       | 0.090 BSC |       |
| H  | 9.40        | 10.41 | 0.370     | 0.410 |
| L  | 0.90        | 1.78  | 0.035     | 0.070 |
| L3 | 0.89        | 2.03  | 0.035     | 0.080 |
| L4 | -           | 1.02  | -         | 0.040 |
| θ  | 0°          | 8°    | 0°        | 8°    |

Note : Follow JEDEC TO-252 .

### RECOMMENDED LAND PATTERN



UNIT: mm