

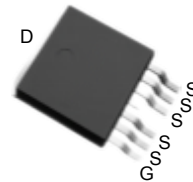
## Features

- 600V/40A,  
 $R_{DS(ON)} = 0.08\Omega(\text{typ.}) @ V_{GS} = 10V$
- Reliable and Rugged
- Avalanche Rated
- Lead Free and Green Devices Available  
(RoHS Compliant)
- 100% UIS +  $R_g$  Tested

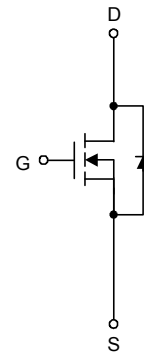
## Applications

- AC/DC Power Conversion in Switched Mode Power Supplies (SMPS).
- Uninterruptible Power Supply (UPS),
- Adapter.

## Pin Description



TO-263-6



N-Channel MOSFET

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

| Symbol                         | Parameter                              |                       | Rating     | Unit |
|--------------------------------|----------------------------------------|-----------------------|------------|------|
| Common Ratings                 |                                        |                       |            |      |
| V <sub>DSS</sub>               | Drain-Source Voltage                   |                       | 600        | V    |
| V <sub>GSS</sub>               | Gate-Source Voltage                    |                       | ±30        |      |
| T <sub>J</sub>                 | Maximum Junction Temperature           |                       | 150        | °C   |
| T <sub>STG</sub>               | Storage Temperature Range              |                       | -55 to 150 | °C   |
| I <sub>S</sub>                 | Diode Continuous Forward Current       |                       | 40         | A    |
| I <sub>DM</sub>                | Pulse Drain Current Tested             | T <sub>C</sub> =25°C  | 120        | A    |
| I <sub>D</sub>                 | Continuous Drain Current               | T <sub>C</sub> =25°C  | 40         | A    |
|                                |                                        | T <sub>C</sub> =100°C | 24         |      |
| P <sub>D</sub>                 | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 227        | W    |
|                                |                                        | T <sub>C</sub> =100°C | 90.8       |      |
| R <sub>θJC</sub>               | Thermal Resistance-Junction to Case    |                       | 0.55       | °C/W |
| R <sub>θJA</sub>               | Thermal Resistance-Junction to Ambient |                       | 62.5       |      |
| Drain-Source Avalanche Ratings |                                        |                       |            |      |
| dv/dt <sup>c</sup>             | MOSFET dv/dt ruggedness                |                       | 50         | V/ns |
| E <sub>AS</sub> <sup>d</sup>   | Avalanche Energy, Single Pulsed        |                       | 60         | mJ   |
| I <sub>AS</sub> <sup>d</sup>   | Avalanche Current                      |                       | 35         | A    |

Note a : Limited by maximum junction temperature.

Note b : Bond wire current limit.

Note c :  $V_{DS}=480\text{V}$ ,  $I_D=26\text{A}$ .

Note d :  $I_D=3.5\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $T_J=25^\circ\text{C}$ .

Note e : Repetitive Rating : Pulse width limited by maximum junction temperature.

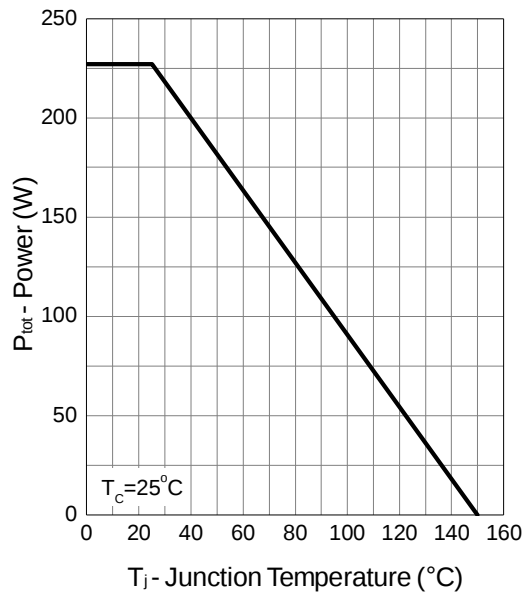
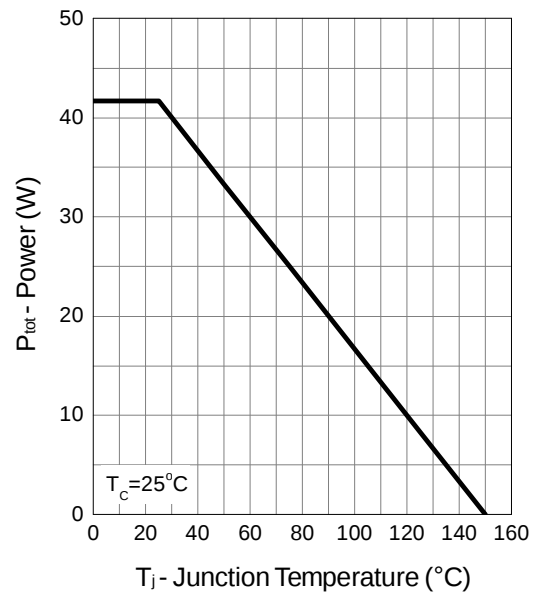
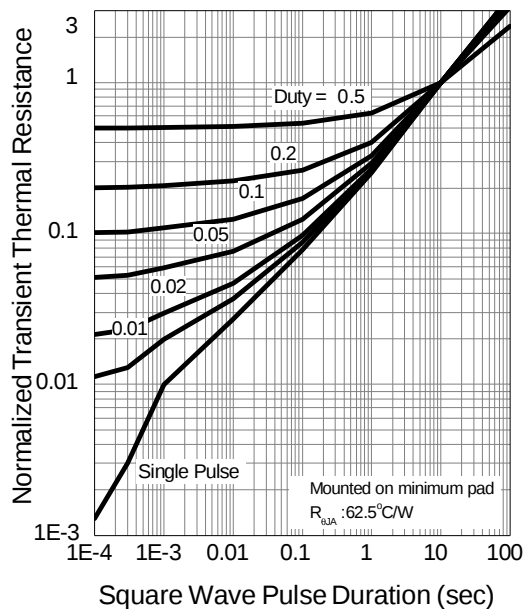
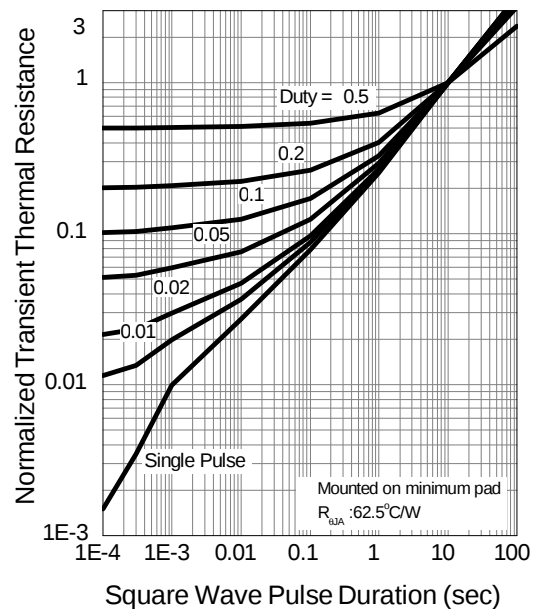
## Electrical Characteristics (T<sub>A</sub> = 25°C Unless Otherwise Noted)

| 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                                                                            | 600  | -    | -    | V    |
|                                          |                                  | T <sub>J</sub> =150°C                                                                                                  | -    | 700  | -    |      |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =480V, V <sub>GS</sub> =0V                                                                             | -    | -    | 1    | μA   |
|                                          |                                  | T <sub>J</sub> =150°C                                                                                                  | -    | -    | 300  |      |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA                                                              | 2.5  | 3.5  | 4.5  | V    |
| I <sub>GSS</sub>                         | Gate Leakage Current             | V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V                                                                             | -    | -    | ±100 | nA   |
| R <sub>DS(ON)</sub> <sup>f</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =10V, I <sub>DS</sub> =13A                                                                             | -    | 0.08 | 0.09 | Ω    |
| Diode Characteristics                    |                                  |                                                                                                                        |      |      |      |      |
| V <sub>SD</sub> <sup>f</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =26A, V <sub>GS</sub> =0V                                                                              | -    | 0.97 | 1.3  | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>SD</sub> =26A, V <sub>R</sub> =360V<br>dI <sub>SD</sub> /dt=100A/μs                                             | -    | 264  | -    | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                        | -    | 3.4  | -    | μC   |
| I <sub>rm</sub>                          | Peak Reverse Recovery Current    |                                                                                                                        | -    | 25   | -    | A    |
| Dynamic Characteristics <sup>g</sup>     |                                  |                                                                                                                        |      |      |      |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V,<br>F=1MHz                                                                    | -    | 1.8  | -    | Ω    |
| C <sub>iSS</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =25V,<br>Frequency=1.0MHz                                                      | -    | 2320 | 3240 | pF   |
| C <sub>oSS</sub>                         | Output Capacitance               |                                                                                                                        | -    | 1500 | -    |      |
| C <sub>rSS</sub>                         | Reverse Transfer Capacitance     |                                                                                                                        | -    | 34   | -    |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =400V,<br>R <sub>L</sub> =15.4Ω,<br>I <sub>DS</sub> =26A, V <sub>GEN</sub> =10V,<br>R <sub>G</sub> =6Ω | -    | 22   | -    | ns   |
| T <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                        | -    | 7    | -    |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                        | -    | 53   | -    |      |
| T <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                        | -    | 4.4  | -    |      |
| Gate Charge Characteristics <sup>g</sup> |                                  |                                                                                                                        |      |      |      |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =480V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =13A                                                   | -    | 64   | 83   | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                        | -    | 19   | -    |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                        | -    | 31   | -    |      |

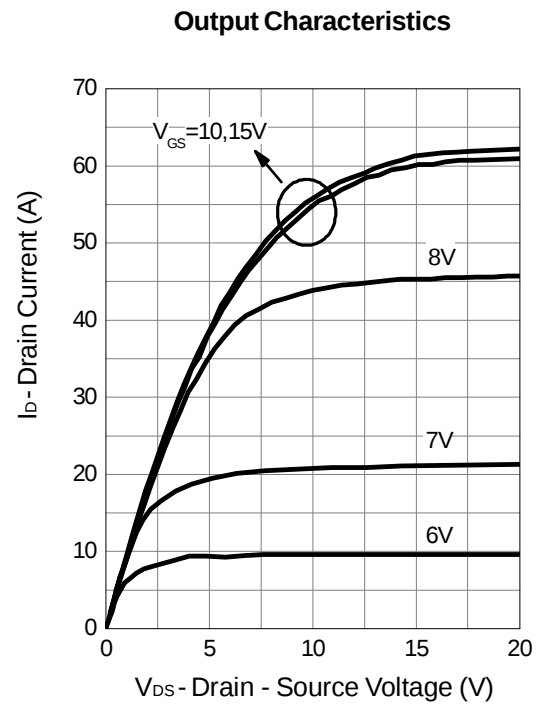
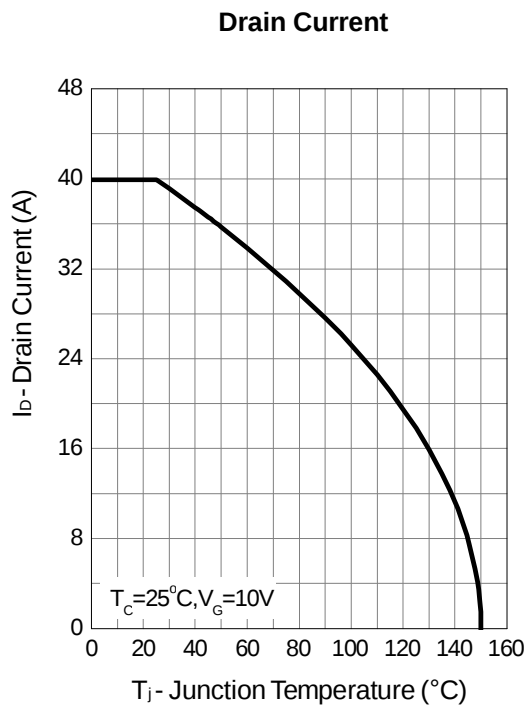
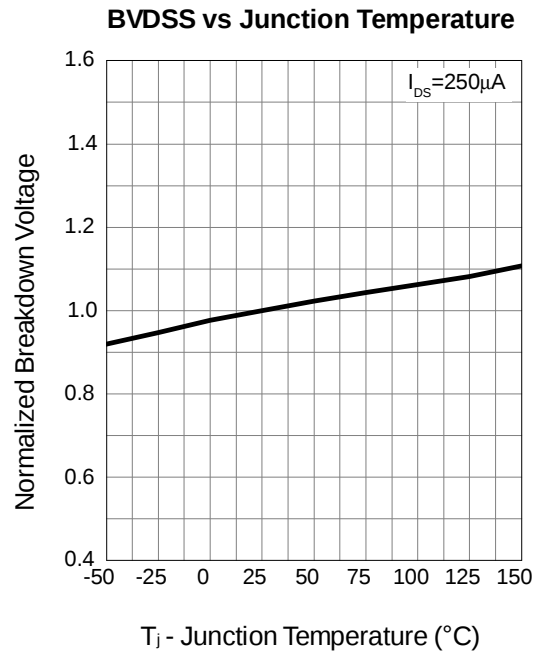
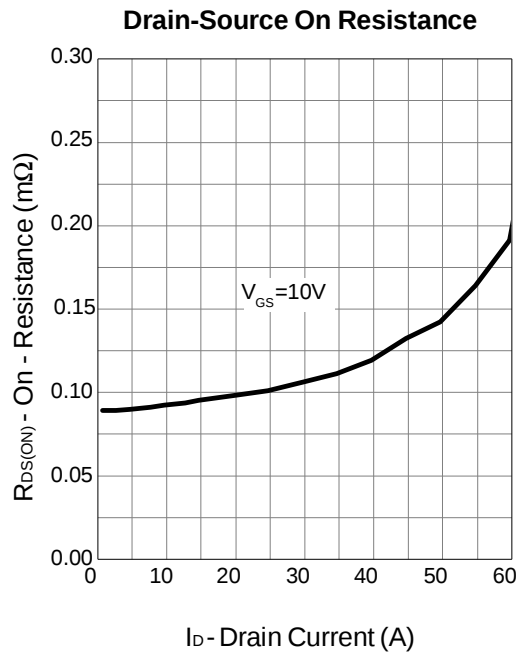
Note f : Pulse test ; pulse width≤300μs, duty cycle≤2%.

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

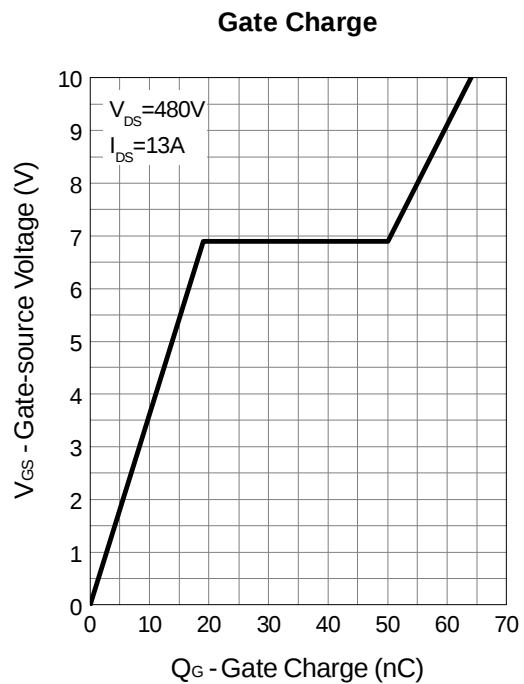
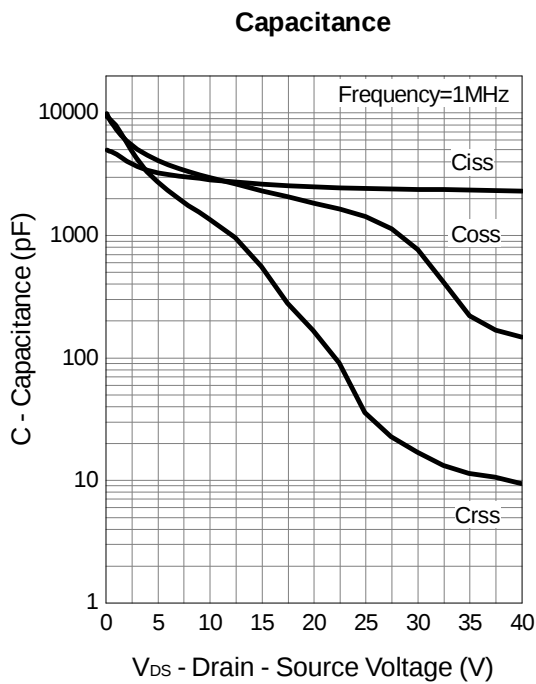
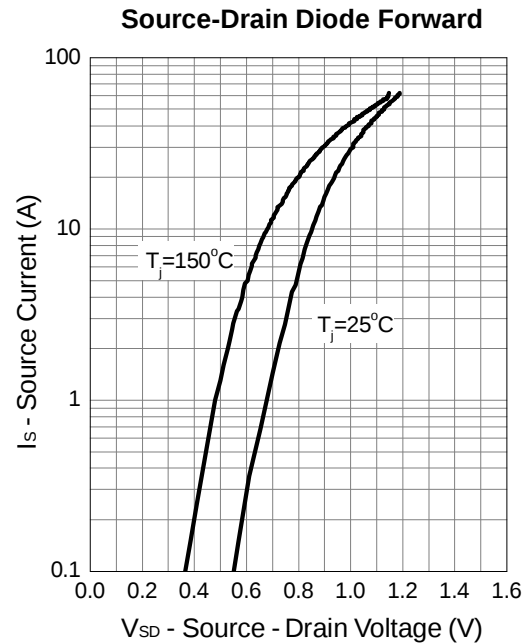
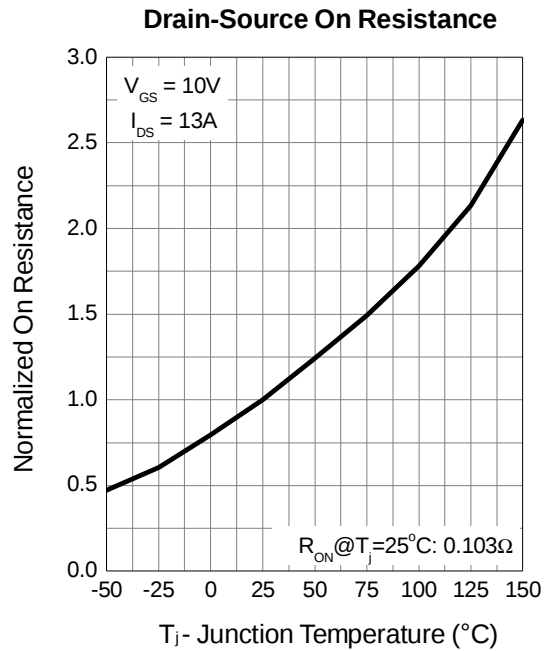
## Typical Operating Characteristics

**Power Dissipation**

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**Thermal Transient Impedance**

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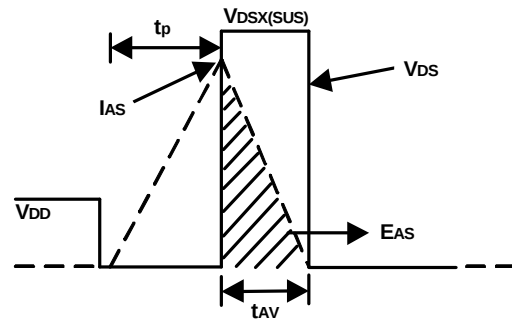
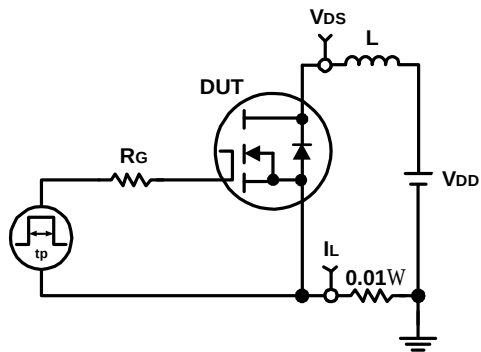
## Typical Operating Characteristics (Cont.)



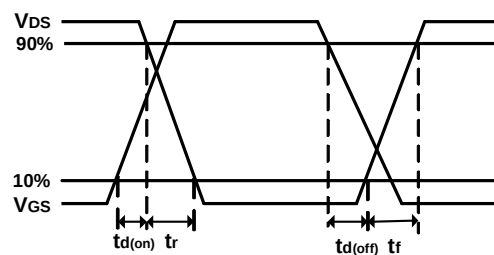
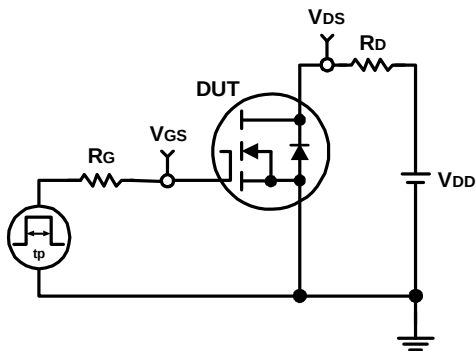
## Typical Operating Characteristics (Cont.)



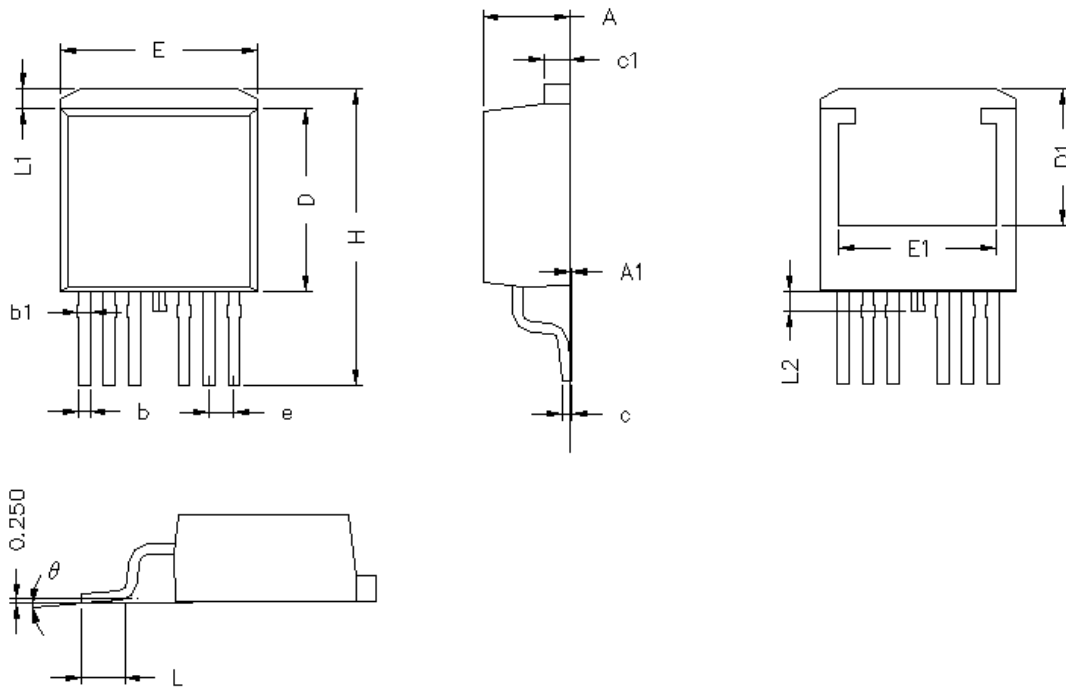
## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms

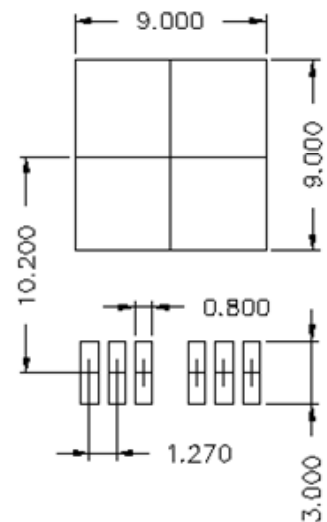


## Package Information

**TO-263-6**


| SYMBOLS  | TO-263-6    |       |          |       |
|----------|-------------|-------|----------|-------|
|          | MILLIMETERS |       | INCHES   |       |
|          | MIN.        | MAX.  | MIN.     | MAX.  |
| A        | 4.25        | 4.55  | 0.167    | 0.179 |
| A1       | 0.01        | 0.25  | 0.000    | 0.010 |
| b        | 0.50        | 0.70  | 0.020    | 0.028 |
| b1       | 0.60        | 0.84  | 0.024    | 0.033 |
| c        | 0.40        | 0.60  | 0.016    | 0.024 |
| c1       | 1.20        | 1.40  | 0.047    | 0.055 |
| D        | 9.05        | 9.45  | 0.356    | 0.372 |
| D1       | 6.90        | 9.00  | 0.272    | 0.354 |
| E        | 9.80        | 10.20 | 0.386    | 0.402 |
| E1       | 7.25        | 9.00  | 0.285    | 0.354 |
| e        | 1.27 BSC    |       | 0.05 BSC |       |
| H        | 14.65       | 15.35 | 0.577    | 0.604 |
| L        | 2.40        | 3.00  | 0.094    | 0.118 |
| L1       | 0.80        | 1.20  | 0.031    | 0.047 |
| L2       | 0.85        | 1.15  | 0.033    | 0.045 |
| $\theta$ | 2°          | 8°    | 2°       | 8°    |

### RECOMMENDED LAND PATTERN



UNIT: mm