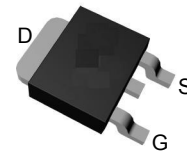


## Pin Configuration

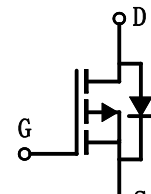
- -30V/-70A
- $R_{DS(ON)}=5.7m\Omega$  (typ) @ $V_{GS}=-10V$   
 $R_{DS(ON)}=8.3m\Omega$  (typ) @ $V_{GS}=-4.5V$
- 100% UIS & RG Tested
- Reliableand Rugged
- Lead Freeand Green Devices Available  
(RoHS Compliant)



Top View of TO-252-3

## Applications

- Power Management for Industrial DC/DC Converters



P-Channe mosfet

## Absolute Maximum Ratings ( $T_A=25^{\circ}C$ unless otherwise noted)

| Symbol                            | Parameter                                            |                       | Rating     | Unit |
|-----------------------------------|------------------------------------------------------|-----------------------|------------|------|
| Common Ratings                    |                                                      |                       |            |      |
| V <sub>DSS</sub>                  | Drain-Source Voltage                                 |                       | -30        | V    |
| V <sub>GSS</sub>                  | Gate-Source Voltage                                  |                       | ±25        |      |
| I <sub>D</sub>                    | Continuous Drain Current <sup>G</sup>                | T <sub>C</sub> =25°C  | -70        | A    |
|                                   |                                                      | T <sub>C</sub> =100°C | -55        |      |
| I <sub>DM</sub>                   | Pulsed Drain Current <sup>C</sup>                    | T <sub>C</sub> =25°C  | -200       |      |
| I <sub>DSM</sub>                  | Coutinuous Drain Current                             | T <sub>A</sub> =25°C  | -15        | A    |
|                                   |                                                      | T <sub>A</sub> =70°C  | -12        |      |
| P <sub>D</sub>                    | Power Dissipation <sup>B</sup>                       | T <sub>C</sub> =25°C  | 90         | W    |
|                                   |                                                      | T <sub>C</sub> =100°C | 45         |      |
| T <sub>STG</sub> , T <sub>J</sub> | Storage Temperature Range                            |                       | -55 to 175 | °C   |
| P <sub>DSM</sub>                  | POwer Dissipation <sup>A</sup>                       | T <sub>A</sub> =25°C  | 2.5        | W    |
|                                   |                                                      | T <sub>A</sub> =70°C  | 1.6        |      |
| I <sub>AS</sub>                   | Single pulsed avalanlce Current <sup>C</sup>         |                       | -50        | A    |
| E <sub>AS</sub>                   | Single pulsed avalanlce energy <sup>C</sup>          | L=0.1mH               | 125        | mJ   |
| R <sub>θJC</sub>                  | Thermal Resistance-Junction to Case                  | Staedy-State          | 1.6        | °C/W |
| R <sub>θJA</sub>                  | Thermal Resistance-Junction to Ambient <sup>AD</sup> | t ≤10S                | 20         |      |
|                                   |                                                      | Staedy-State          | 50         |      |

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

| Symbol                      | Parameter                                          | Conditions                                                                                   | Min  | Typ  | Max      | Units |
|-----------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------|------|------|----------|-------|
| <b>STATIC PARAMETERS</b>    |                                                    |                                                                                              |      |      |          |       |
| BV <sub>DSS</sub>           | Drain-Source Breakdown Voltage                     | I <sub>D</sub> =-250μA, V <sub>GS</sub> =0V                                                  | -30  |      |          | V     |
| I <sub>DSS</sub>            | Zero Gate Voltage Drain Current                    | V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =55°C                           |      |      | -1<br>-5 | μA    |
| I <sub>GSS</sub>            | Gate-Body leakage current                          | V <sub>DS</sub> =0V, V <sub>GS</sub> =±25V                                                   |      |      | ±100     | nA    |
| V <sub>GS(th)</sub>         | Gate Threshold Voltage                             | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                    | -1   | -1.7 | -2.5     | V     |
| I <sub>D(ON)</sub>          | On state drain current                             | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V                                                  | -200 |      |          | A     |
| R <sub>DS(ON)</sub>         | Static Drain-Source On-Resistance                  | V <sub>GS</sub> =-10V, I <sub>D</sub> =-18A<br>T <sub>J</sub> =125°C                         |      | 5.7  | 6.8      | mΩ    |
|                             |                                                    | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A                                                 |      | 8.3  | 8.6      | mΩ    |
| g <sub>FS</sub>             | Forward Transconductance                           | V <sub>DS</sub> =-5V, I <sub>D</sub> =-20A                                                   |      | 42   |          | S     |
| V <sub>SD</sub>             | Diode Forward Voltage                              | I <sub>S</sub> =-1A, V <sub>GS</sub> =0V                                                     |      | -0.7 | -1       | V     |
| I <sub>S</sub>              | Maximum Body-Diode Continuous Current <sup>G</sup> |                                                                                              |      |      | -70      | A     |
| <b>DYNAMIC PARAMETERS</b>   |                                                    |                                                                                              |      |      |          |       |
| C <sub>iss</sub>            | Input Capacitance                                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz                                           | 2310 | 2890 | 3500     | pF    |
| C <sub>oss</sub>            | Output Capacitance                                 |                                                                                              | 410  | 585  | 760      | pF    |
| C <sub>rss</sub>            | Reverse Transfer Capacitance                       |                                                                                              | 280  | 470  | 660      | pF    |
| R <sub>g</sub>              | Gate resistance                                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz                                             | 1.9  | 3.8  | 5.7      | Ω     |
| <b>SWITCHING PARAMETERS</b> |                                                    |                                                                                              |      |      |          |       |
| Q <sub>g</sub>              | Total Gate Charge                                  | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-20A                           | 40   | 51   | 61       | nC    |
| Q <sub>gs</sub>             | Gate Source Charge                                 |                                                                                              | 10   | 12   | 14       | nC    |
| Q <sub>gd</sub>             | Gate Drain Charge                                  |                                                                                              | 10   | 16   | 22       | nC    |
| t <sub>D(on)</sub>          | Turn-On DelayTime                                  | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =0.75Ω,<br>R <sub>GEN</sub> =3Ω |      | 16   |          | ns    |
| t <sub>r</sub>              | Turn-On Rise Time                                  |                                                                                              |      | 12   |          | ns    |
| t <sub>D(off)</sub>         | Turn-Off DelayTime                                 |                                                                                              |      | 45   |          | ns    |
| t <sub>f</sub>              | Turn-Off Fall Time                                 |                                                                                              |      | 22   |          | ns    |
| t <sub>rr</sub>             | Body Diode Reverse Recovery Time                   | I <sub>F</sub> =-20A, dI/dt=100A/μs                                                          | 14   | 18   | 22       | ns    |
| Q <sub>rr</sub>             | Body Diode Reverse Recovery Charge                 | I <sub>F</sub> =-20A, dI/dt=100A/μs                                                          | 9    | 11   | 13       | nC    |

A. The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175° C may be used if the PCB allows it.

B. The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=175° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature T<sub>J(MAX)</sub>=175° C. Ratings are based on low frequency and duty cycles to keep initial T<sub>J</sub>=25° C.

D. The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T<sub>J(MAX)</sub>=175° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

H. These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25° C.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

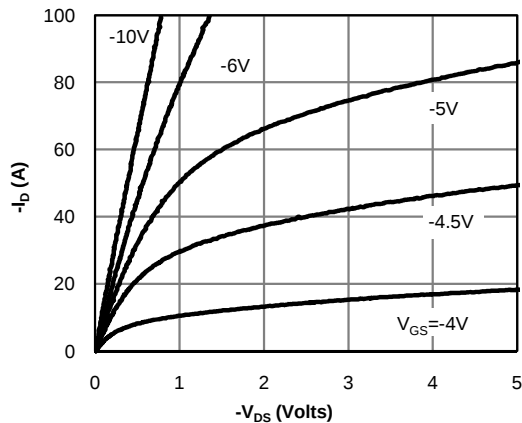


Fig 1: On-Region Characteristics (Note E)

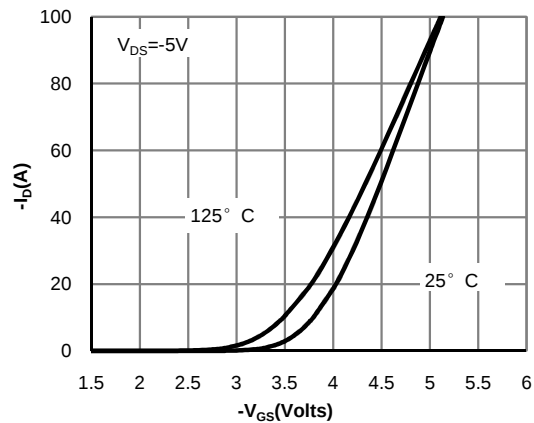


Figure 2: Transfer Characteristics (Note E)

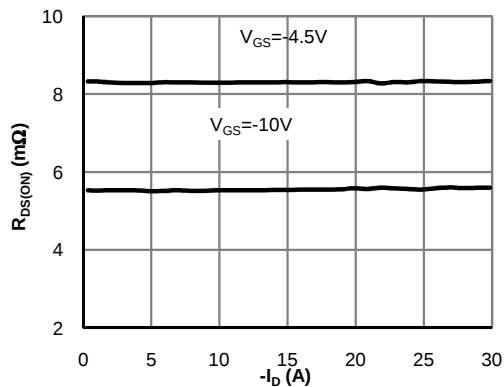


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

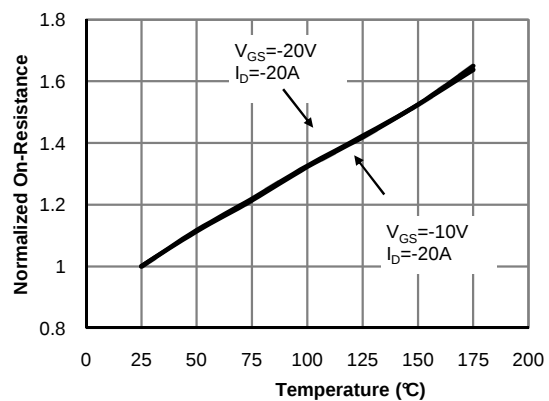


Figure 4: On-Resistance vs. Junction Temperature (Note E)

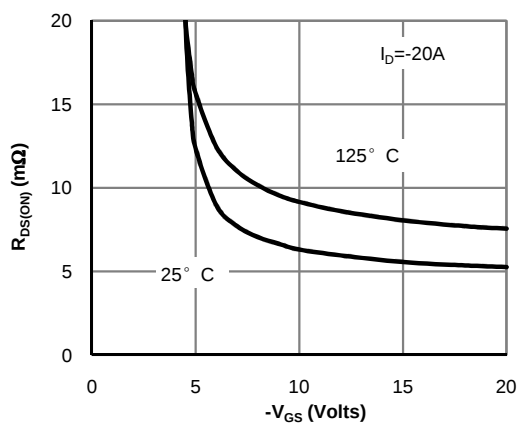


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

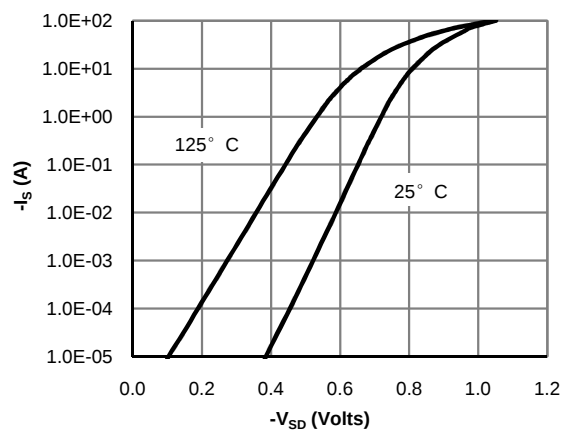


Figure 6: Body-Diode Characteristics (Note E)

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

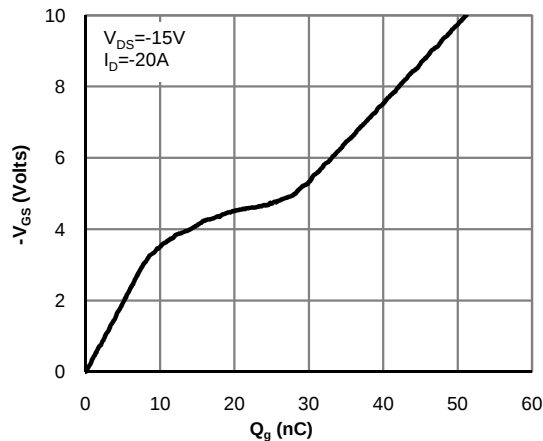


Figure 7: Gate-Charge Characteristics

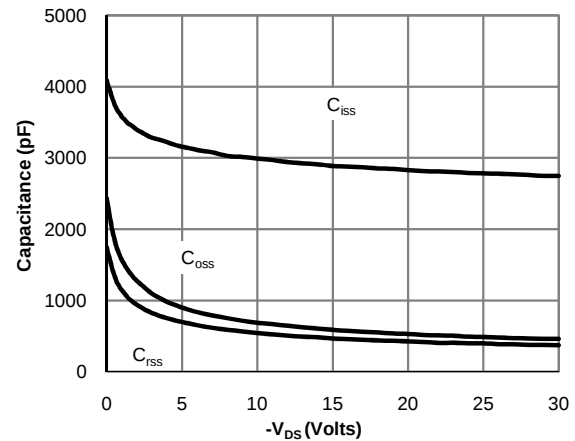


Figure 8: Capacitance Characteristics

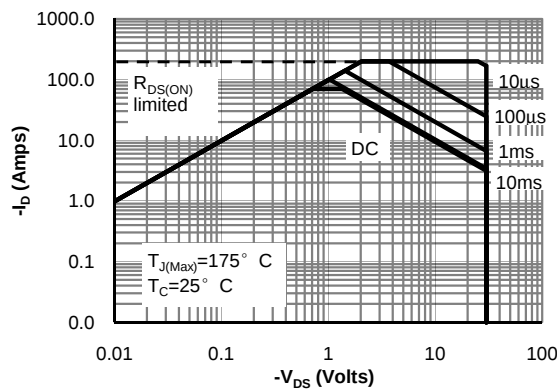


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

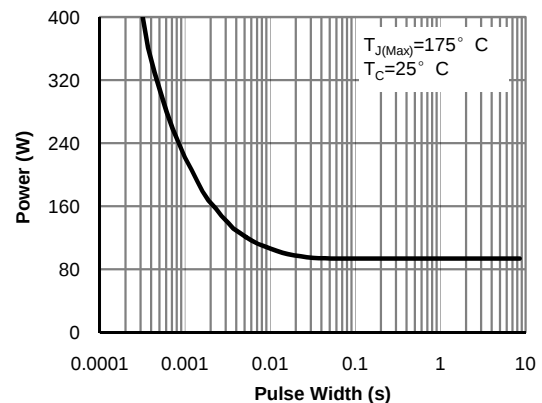


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

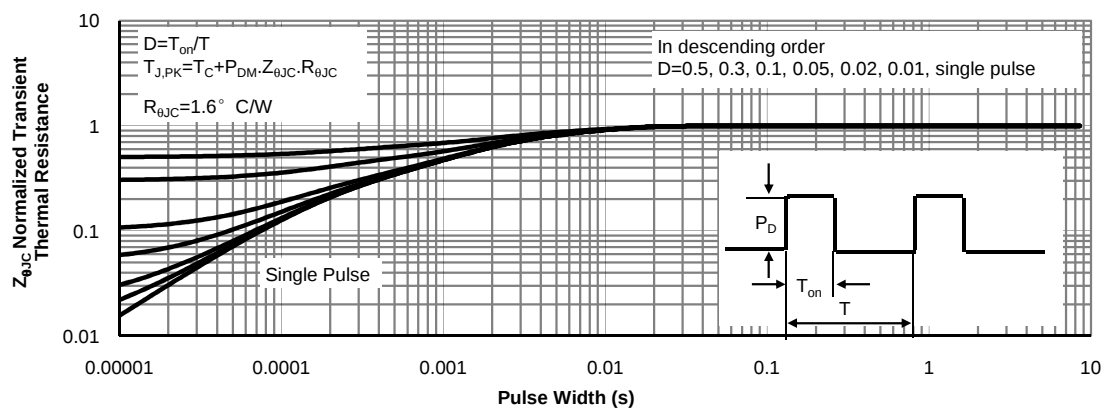


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

### TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

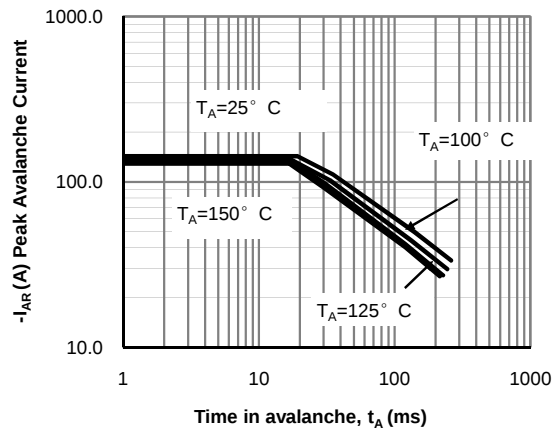


Figure 12: Single Pulse Avalanche capability (Note C)

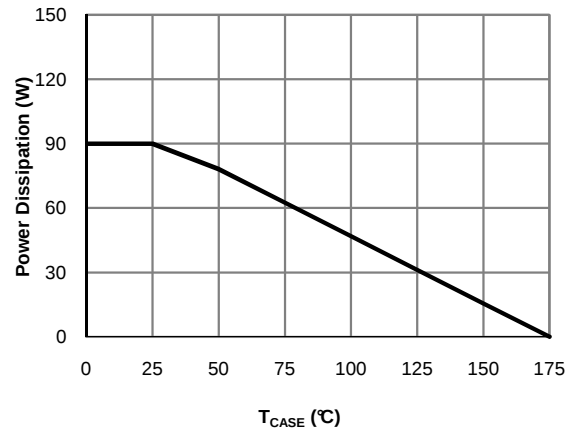


Figure 13: Power De-rating (Note F)

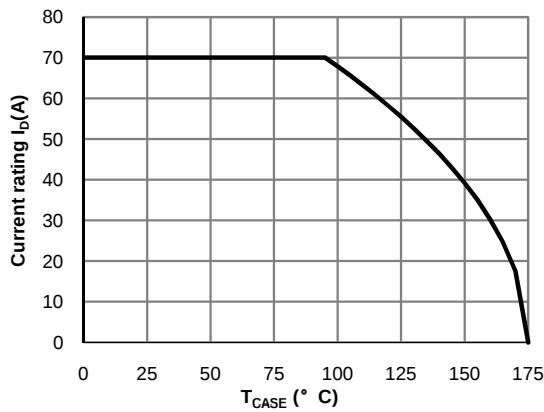


Figure 14: Current De-rating (Note F)

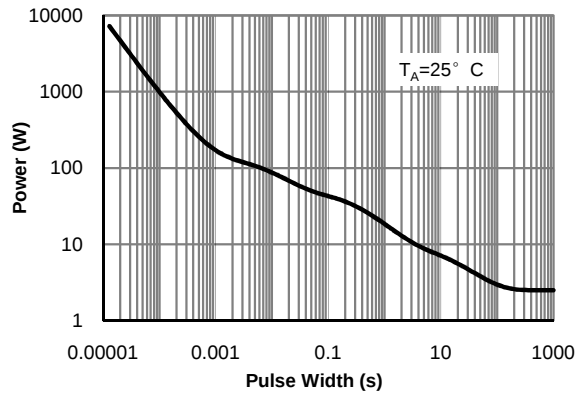


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

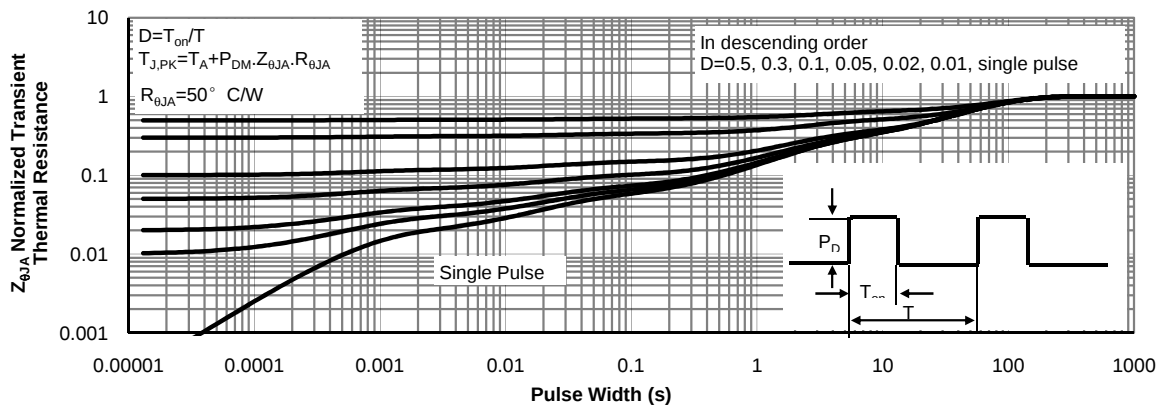
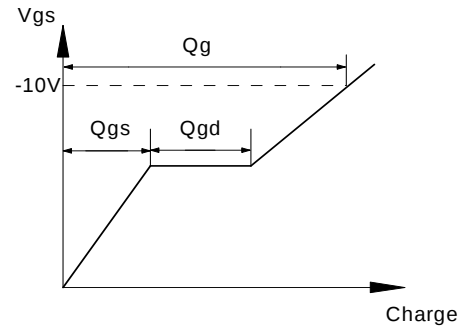
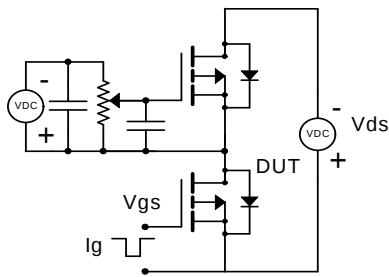
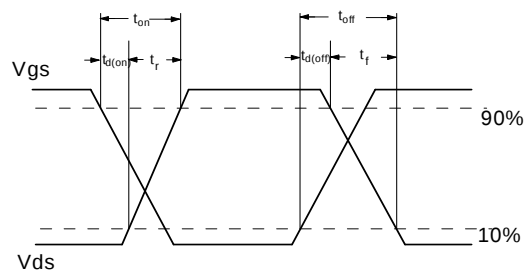
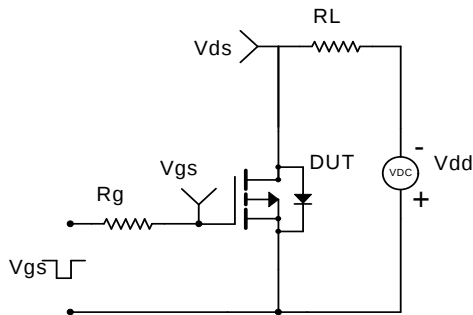


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

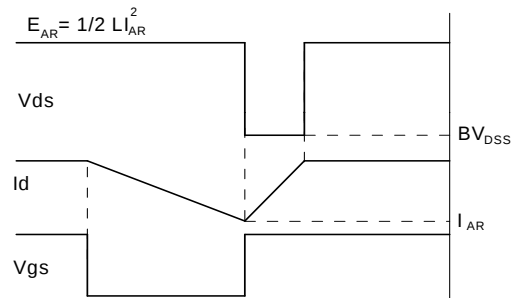
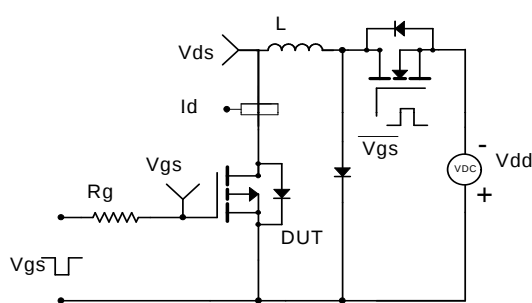
Gate Charge Test Circuit & Waveform



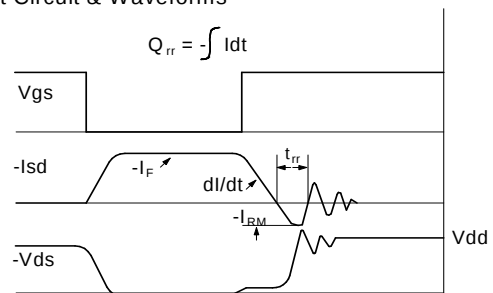
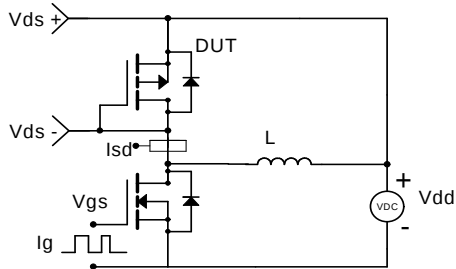
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

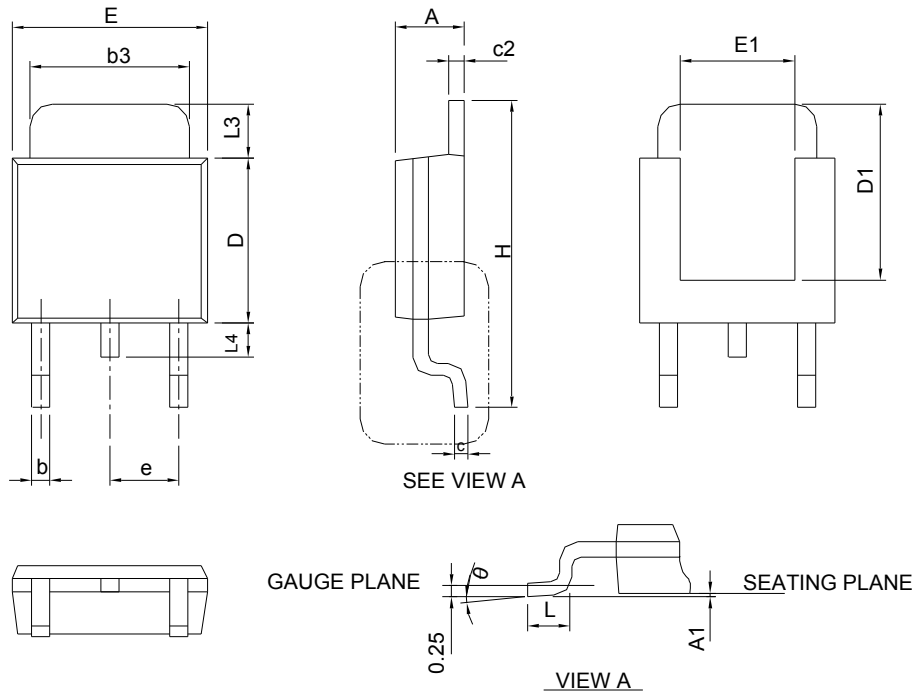


Diode Recovery Test Circuit & Waveforms



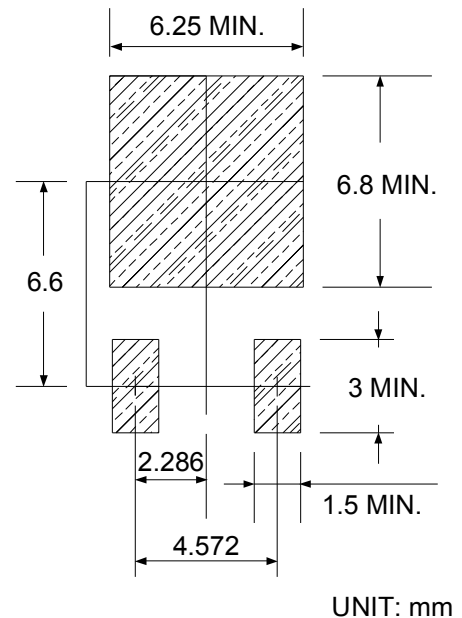
## Package Information

### TO-252-3



| SYMBOL | 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°    |

### RECOMMENDED LAND PATTERN



Note : Follow JEDEC TO-252 .