

### Features

- 60V/200A\*  
 $R_{DS(ON)} = 1.2\text{m}\Omega(\text{typ.}) @ V_{GS} = 10\text{V}$   
 $R_{DS(ON)} = 1.6\text{m}\Omega(\text{typ.}) @ V_{GS} = 4.5\text{V}$
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available  
 (RoHS Compliant)
- Moisture Sensitivity Level MSL1  
 (per JEDEC J-STD-020D)

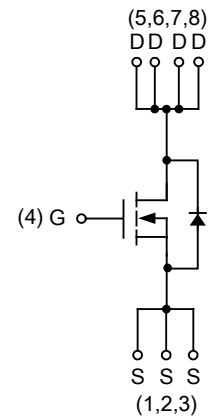
### Applications

- Secondary Side Synchronous Rectification.
- DC-DC Converter.
- Motor Control.
- Load Switching.

### Pin Description



DFN5x6A-8\_EP



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                   |                       | 60         | V    |
| V <sub>GSS</sub>              | Gate-Source Voltage                    |                       | ±20        |      |
| T <sub>J</sub>                | Maximum Junction Temperature           |                       | 150        | °C   |
| T <sub>STG</sub>              | Storage Temperature Range              |                       | -55 to 150 |      |
| I <sub>S</sub>                | Diode Continuous Forward Current       | T <sub>C</sub> =25°C  | 100*       | A    |
| I <sub>D</sub>                | Continuous Drain Current               | T <sub>C</sub> =25°C  | 200*       | A    |
|                               |                                        | T <sub>C</sub> =100°C | 120*       |      |
| I <sub>DM</sub> <sup>a</sup>  | Pulsed Drain Current                   | T <sub>C</sub> =25°C  | 800        |      |
| P <sub>D</sub>                | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 250        | W    |
|                               |                                        | T <sub>C</sub> =100°C | 100        |      |
| R <sub>θJC</sub>              | Thermal Resistance-Junction to Case    | Steady State          | 0.5        | °C/W |
| I <sub>D</sub>                | Continuous Drain Current               | T <sub>A</sub> =25°C  | 26.8       | A    |
|                               |                                        | T <sub>A</sub> =70°C  | 21.5       |      |
| P <sub>D</sub>                | Maximum Power Dissipation              | T <sub>A</sub> =25°C  | 2.27       | W    |
|                               |                                        | T <sub>A</sub> =70°C  | 1.45       |      |
| R <sub>θJA</sub> <sup>b</sup> | Thermal Resistance-Junction to Ambient | Steady State          | 55         | °C/W |
| I <sub>AS</sub> <sup>c</sup>  | Avalanche Current, Single pulse        | L=0.5mH               | 48         | A    |
| E <sub>AS</sub> <sup>c</sup>  | Avalanche Energy, Single pulse         | L=0.5mH               | 576        | mJ   |

Note \* : Current limited by bonding wire.

Note a : Pulse width limited by maximum junction temperature.

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

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

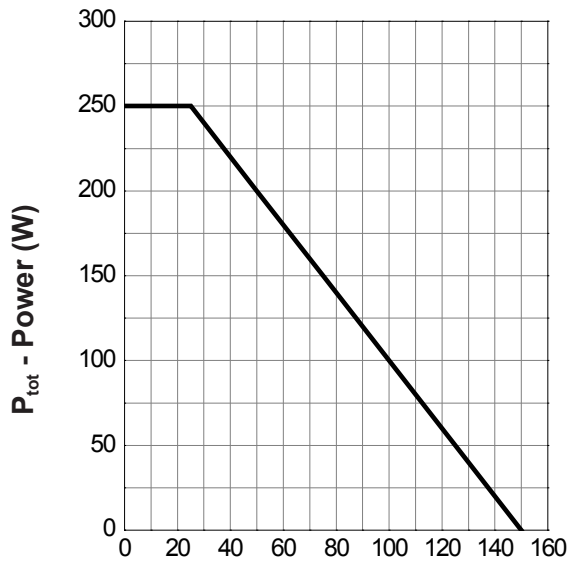
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

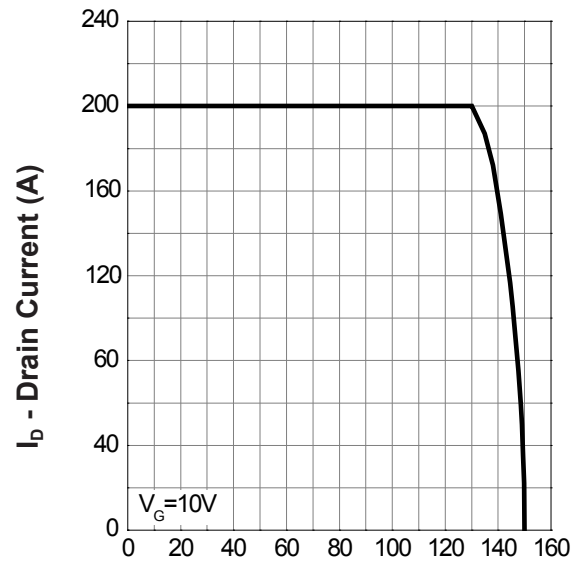
| Symbol                                   | Parameter                        | Test Conditions                                                                                                 | Min. | Typ.       | Max.       | Unit |
|------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------|------|------------|------------|------|
| Static Characteristics                   |                                  |                                                                                                                 |      |            |            |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                                                     | 60   | -          | -          | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =48V, 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    | 2          | 3          | 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> =10V, I <sub>DS</sub> =50A<br>V <sub>GS</sub> =4.5V, I <sub>DS</sub> =30A                       | -    | 1.2<br>1.8 | 1.6<br>2.5 | mΩ   |
| Diode Characteristics                    |                                  |                                                                                                                 |      |            |            |      |
| V <sub>SD</sub> <sup>d</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =50A, V <sub>GS</sub> =0V                                                                       | -    | 0.8        | 1.3        | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>SD</sub> =50A, dI <sub>SD</sub> /dt=100A/μs                                                              | -    | 54         | -          | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                 | -    | 67         | -          | nC   |
| Dynamic Characteristics <sup>e</sup>     |                                  |                                                                                                                 |      |            |            |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                | -    | 1          | -          | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =30V,<br>Frequency=1.0MHz                                               | -    | 5850       | 7605       | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                 | -    | 1190       | -          |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                 | -    | 65         | -          |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =30V, R <sub>L</sub> =30Ω,<br>I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V,<br>R <sub>G</sub> =6Ω | -    | 25         | 45         | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                 | -    | 13         | 23         |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                 | -    | 100        | 180        |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                 | -    | 27         | 49         |      |
| Gate Charge Characteristics <sup>e</sup> |                                  |                                                                                                                 |      |            |            |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =30V, V <sub>GS</sub> =4.5V,<br>I <sub>DS</sub> =50A                                            | -    | 38.5       | -          | nC   |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =30V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =50A                                             | -    | 88         | 123        |      |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                 | -    | 22.4       | -          |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                 | -    | 12.2       | -          |      |

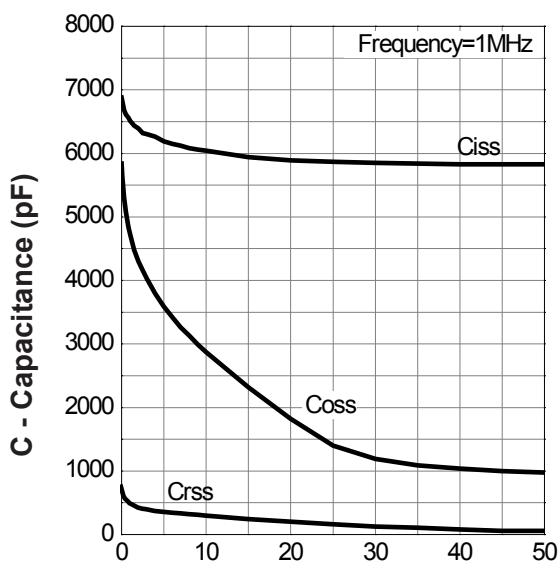
Note d : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

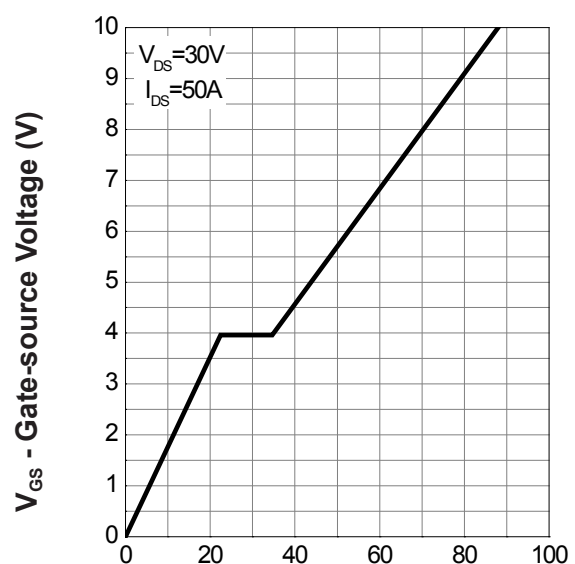
Note e : Guaranteed by design, not subject to production testing.

## Typical Operating Characteristics

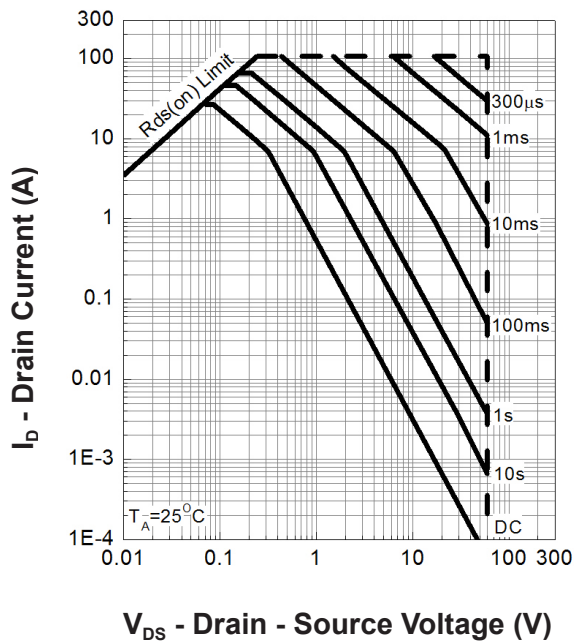
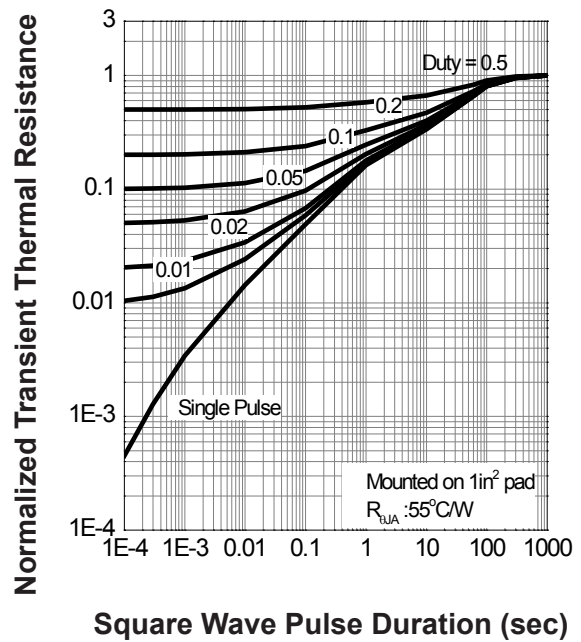
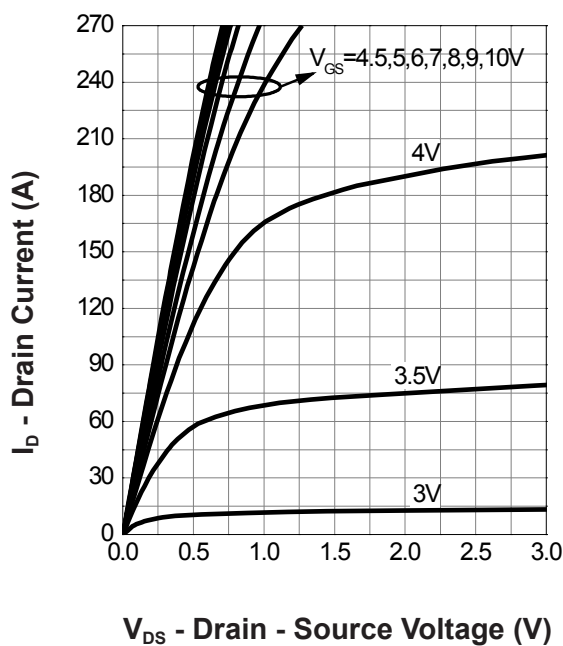
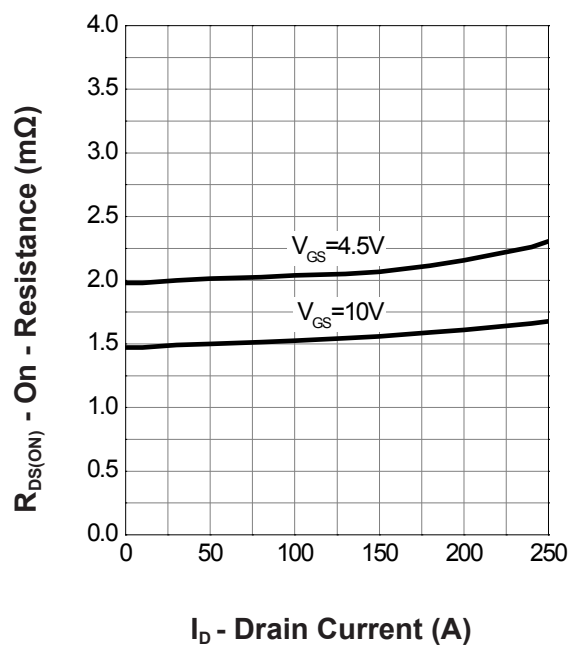
**Power Dissipation**

 $T_c$  - Case Temperature (°C)

**Drain Current**

 $T_c$  - Case Temperature (°C)

**Capacitance**

 $V_{DS}$  - Drain-Source Voltage (V)

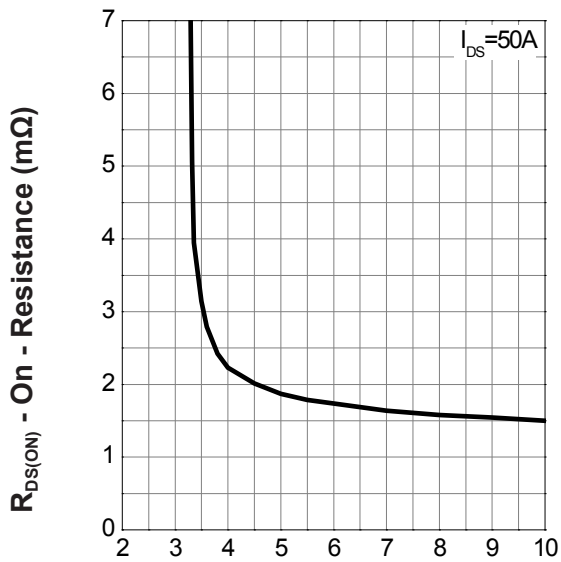
**Gate Charge**

 $Q_G$  - Gate Charge (nC)

## Typical Operating Characteristics(Cont.)

**Safe Operation Area**

**Thermal Transient Impedance**

**Output Characteristics**

**Drain-Source On Resistance**


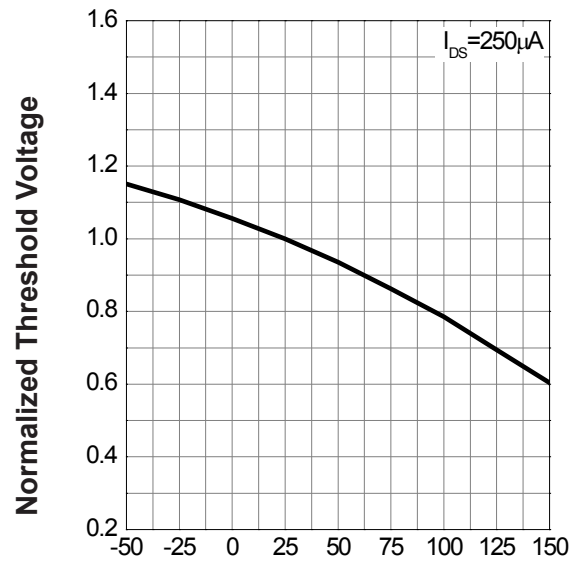
### Typical Operating Characteristics(Cont.)

Gate-Source On Resistance



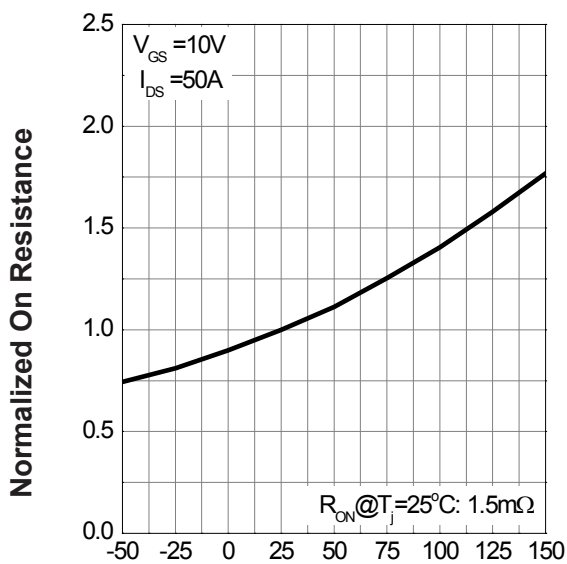
$V_{GS}$  - Gate - Source Voltage (V)

Gate Threshold Voltage



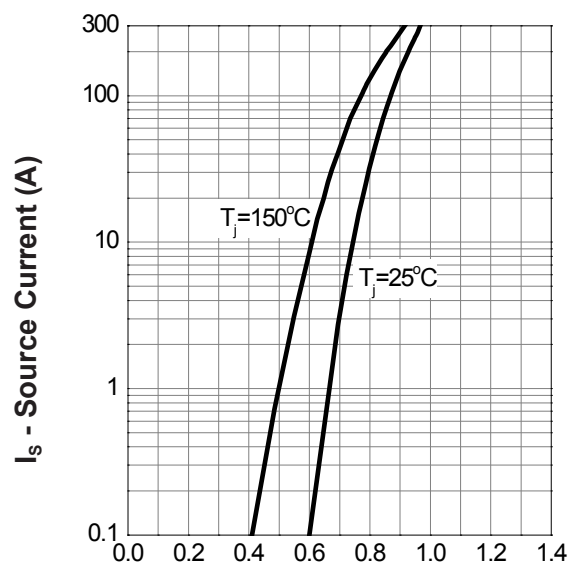
$T_j$  - Junction Temperature ( $^{\circ}C$ )

Drain-Source On Resistance



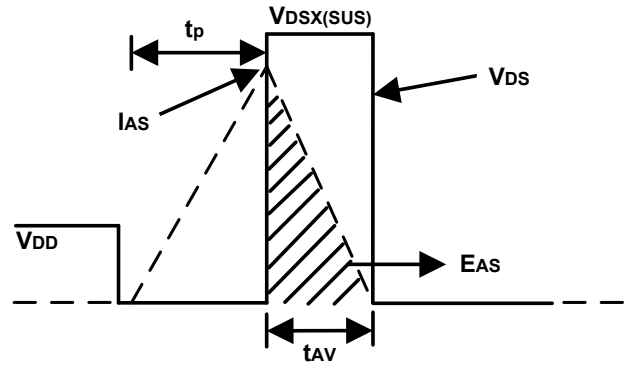
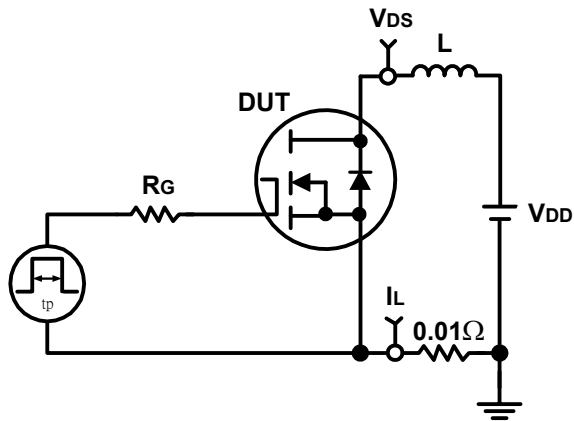
$T_j$  - Junction Temperature ( $^{\circ}C$ )

Source-Drain Diode Forward

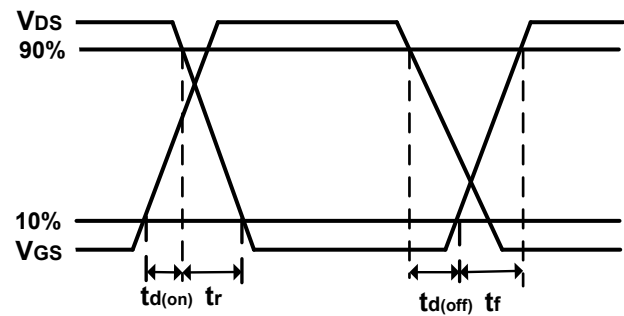
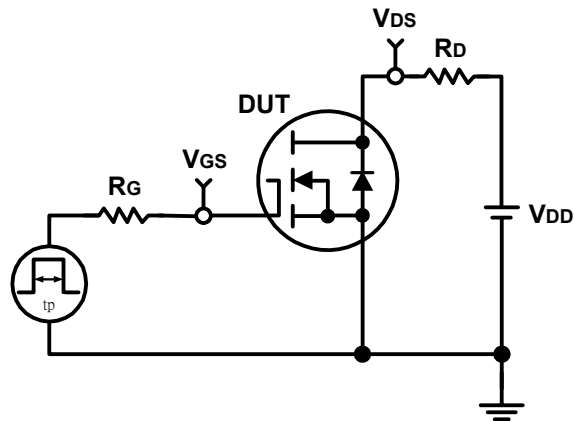


$V_{SD}$  - Source - Drain Voltage (V)

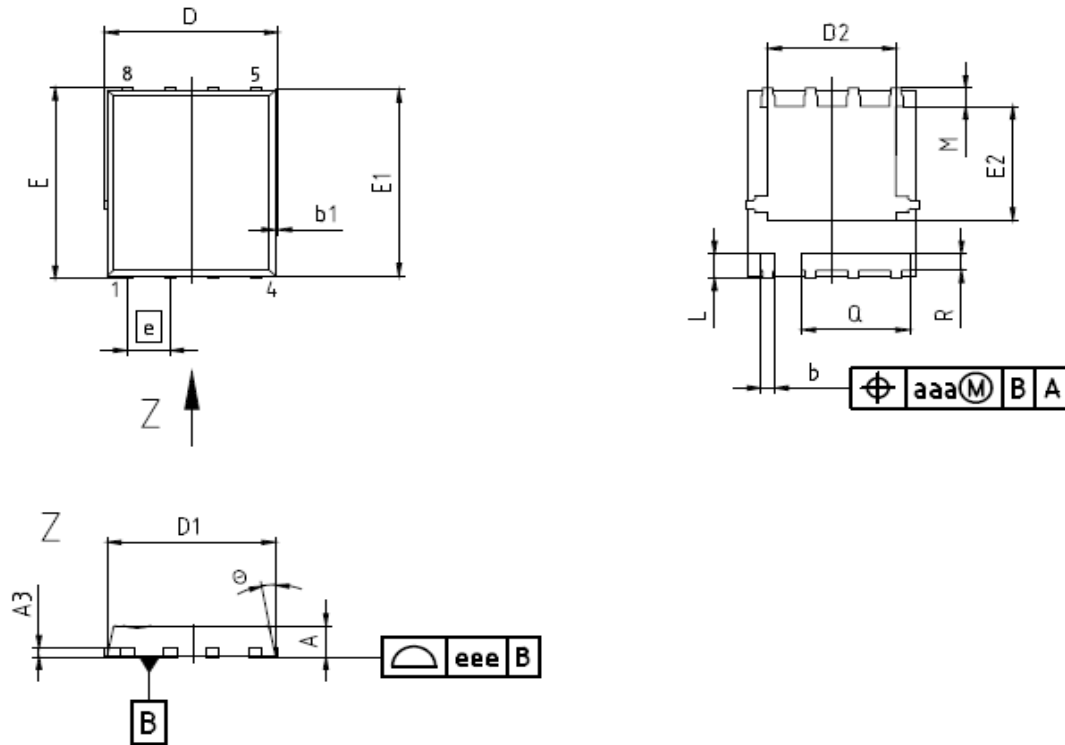
## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms



## PDFN5X6 package drawing



| DIM      | MILLIMETERS |      | INCHES      |       |
|----------|-------------|------|-------------|-------|
|          | MIN         | MAX  | MIN         | MAX   |
| A        | 0.90        | 1.10 | 0.035       | 0.043 |
| A3       | 0.25 (REF)  |      | 0.011 (REF) |       |
| b        | 0.34        | 0.54 | 0.013       | 0.021 |
| b1       | 0.02        | 0.22 | 0.001       | 0.009 |
| D        | 5.15 (BSC)  |      | 0.203 (BSC) |       |
| D1       | 5.00 (BSC)  |      | 0.197 (BSC) |       |
| D2       | 3.70        | 4.40 | 0.146       | 0.173 |
| E        | 6.15 (BSC)  |      | 0.242 (BSC) |       |
| E1       | 6.00 (BSC)  |      | 0.236 (BSC) |       |
| E2       | 3.40        | 3.80 | 0.134       | 0.150 |
| e        | 1.27 (BSC)  |      | 0.050 (BSC) |       |
| N        | 8           |      | 8           |       |
| L        | 0.74        | 0.84 | 0.029       | 0.033 |
| M        | 0.45        | 0.66 | 0.018       | 0.026 |
| $\theta$ | 8.5°        | 12°  | 8.5°        | 12°   |
| Q        | 3.15        | 3.25 | 0.124       | 0.128 |
| R        | 0.48        | 0.58 | 0.019       | 0.023 |
| aaa      | 0.25        |      | 0.010       |       |
| eee      | 0.08        |      | 0.003       |       |

|                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|
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