

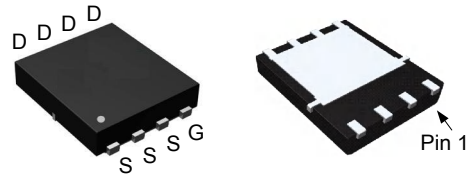
### Features

- 30V/160A,  
 $R_{DS(ON)} = 1.5m\Omega$  (typ.) @  $V_{GS}=10V$   
 $R_{DS(ON)} = 2.2m\Omega$  (typ.) @  $V_{GS}=4.5V$
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lower  $Q_g$  and  $Q_{gd}$  for high-speed switching
- Lower  $R_{DS(ON)}$  to Minimize Conduction Losses
- Lead Free and Green Devices Available  
 (RoHS Compliant)

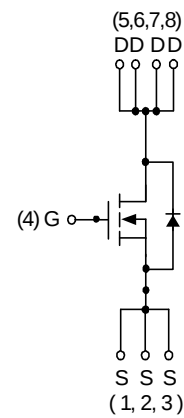
### Applications

- Power Management in Desktop Computer or DC/DC Converters.
- Power Load Switch.
- Notebook Battery Management.

### Pin Description



DFN5x6\_8L\_EP1\_P



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                   |                       | 30         | 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  | 160        | A    |
| I <sub>D</sub> <sup>a</sup>   | Continuous Drain Current               | T <sub>C</sub> =25°C  | 160        |      |
|                               |                                        | T <sub>C</sub> =100°C | 96         |      |
| I <sub>DM</sub> <sup>b</sup>  | Pulsed Drain Current                   | T <sub>C</sub> =25°C  | 552        |      |
| P <sub>D</sub>                | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 78         | W    |
|                               |                                        | T <sub>C</sub> =100°C | 31         |      |
| R <sub>θJC</sub>              | Thermal Resistance-Junction to Case    | Steady State          | 1.6        | °C/W |
| I <sub>D</sub> <sup>c</sup>   | Continuous Drain Current               | T <sub>A</sub> =25°C  | 28         | A    |
|                               |                                        | T <sub>A</sub> =70°C  | 22         |      |
| P <sub>D</sub> <sup>c</sup>   | Maximum Power Dissipation              | T <sub>A</sub> =25°C  | 2.3        | W    |
|                               |                                        | T <sub>A</sub> =70°C  | 1.5        |      |
| R <sub>θJA</sub> <sup>c</sup> | Thermal Resistance-Junction to Ambient | t ≤ 10s               | 20         | °C/W |
|                               |                                        | Steady State          | 55         |      |
| I <sub>AS</sub> <sup>d</sup>  | Avalanche Current, Single pulse        | L=0.1mH               | 131        | A    |
| E <sub>AS</sub> <sup>d</sup>  | Avalanche Energy, Single pulse         | L=0.1mH               | 858        | mJ   |

Note a,\* : Max. continue current is limited by bonding wire.

Note b : Pulse width is limited by max. junction temperature.

Note c :  $R_{\theta JA}$  steady state  $t=999\text{s}$ .

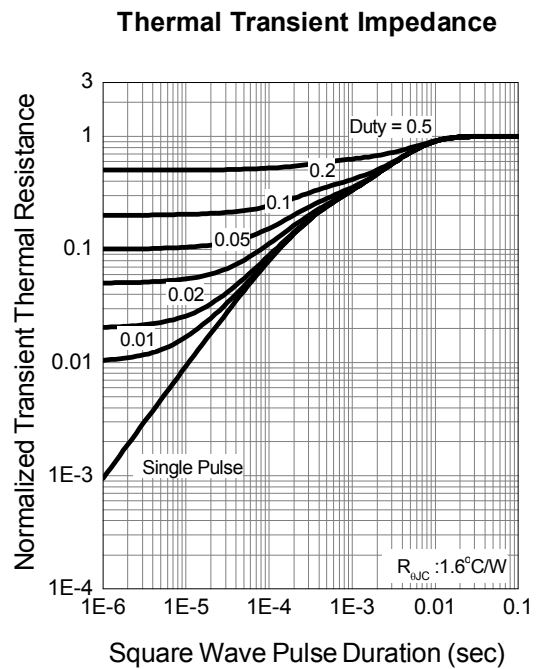
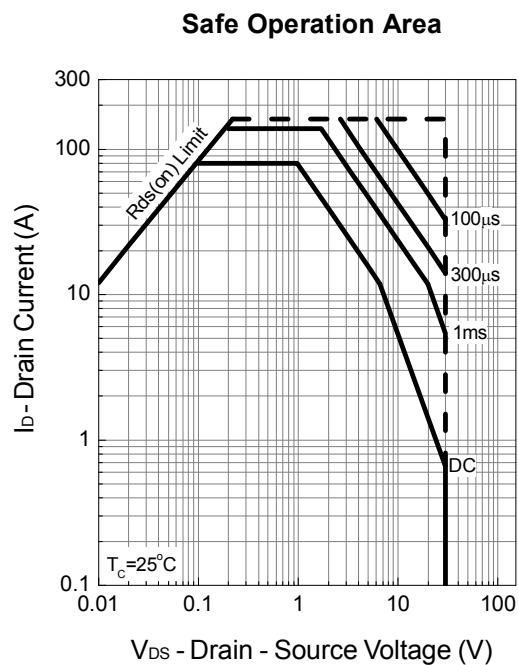
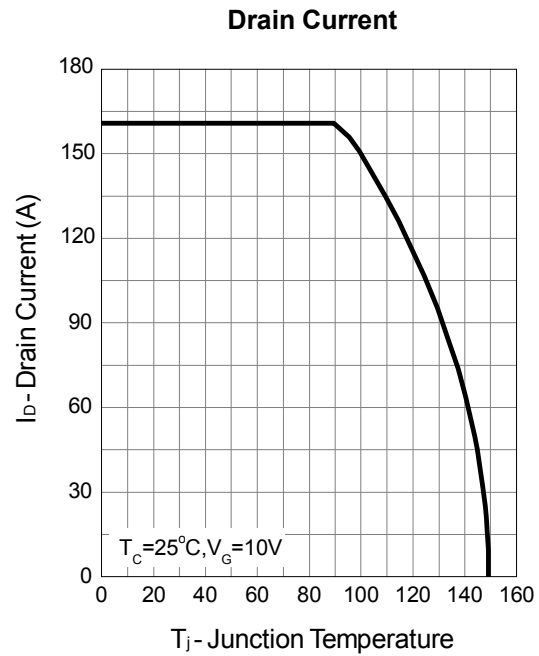
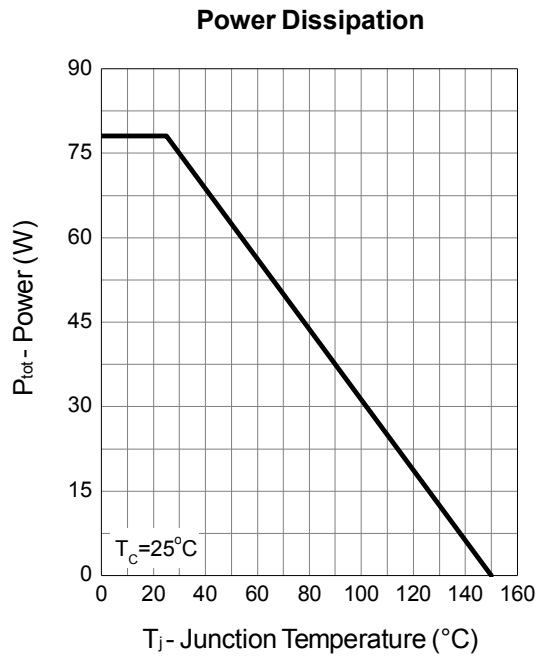
Note d : UIS tested and pulse width limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_J=25^\circ\text{C}$ ).

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

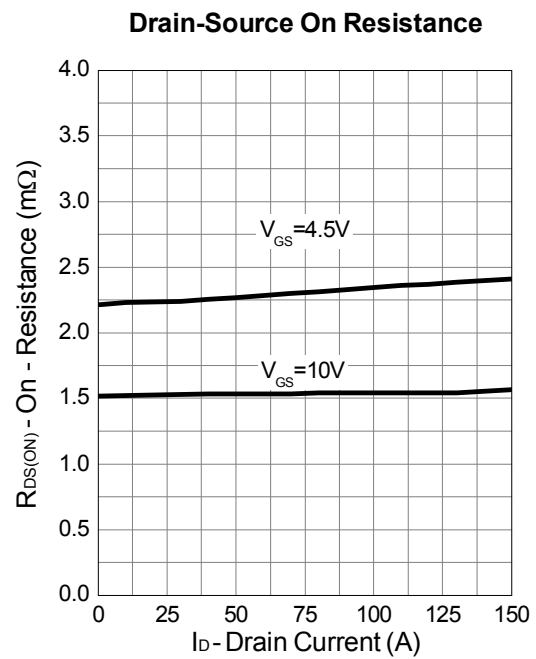
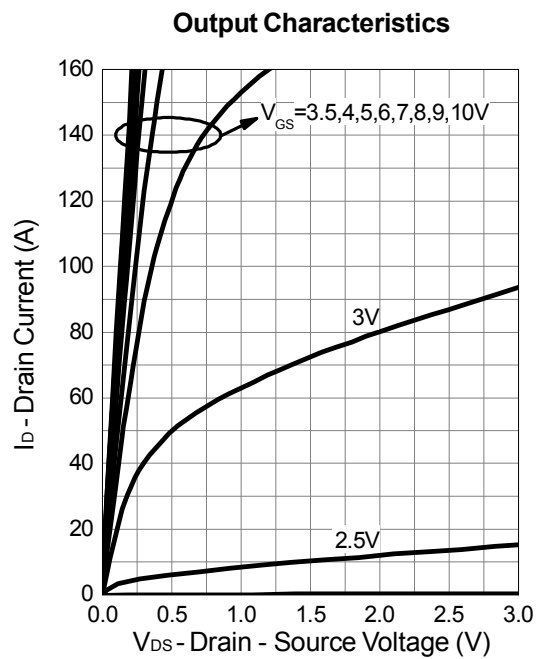
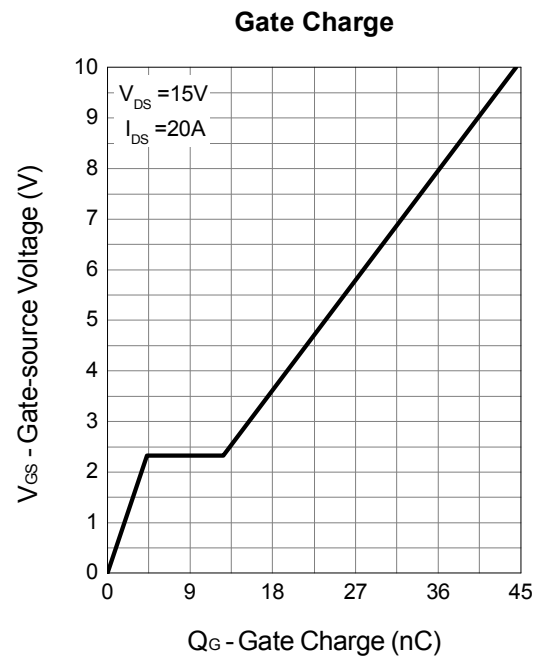
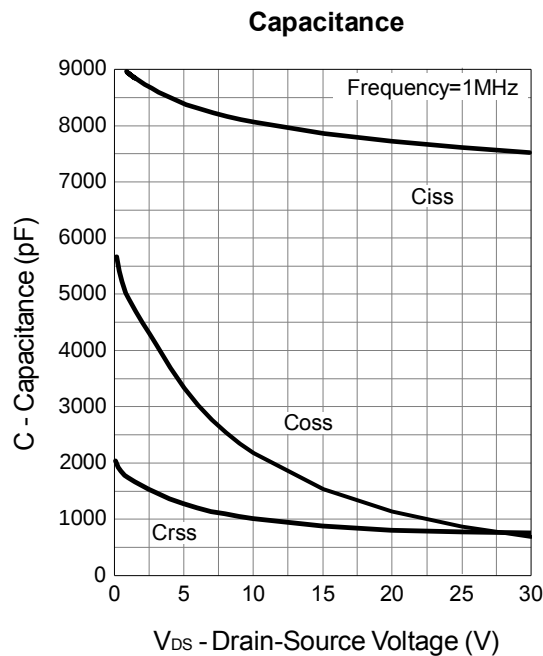
| Symbol                           | Parameter                                  | Test Conditions                                                                                                 | Min.   | Typ.       | Max.     | Unit |
|----------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------|------------|----------|------|
| Static Characteristics           |                                            |                                                                                                                 |        |            |          |      |
| BV <sub>DSS</sub>                | Drain-Source Breakdown Voltage             | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                                                     | 30     | -          | -        | V    |
| BV <sub>DSS</sub> t              | Drain-Source Breakdown Voltage (transient) | V <sub>GS</sub> =0V, I <sub>D(aval)</sub> =40A<br>T <sub>case</sub> =25°C, t <sub>transient</sub> =100ns        | 34     | -          | -        | V    |
| I <sub>DSS</sub>                 | Zero Gate Voltage Drain Current            | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =85°C                                               | -<br>- | -<br>-     | 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                                                       | 1.0    | 1.7        | 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>e</sup> | Drain-Source On-state Resistance           | V <sub>GS</sub> =10V, I <sub>DS</sub> =20A<br>T <sub>J</sub> =125°C                                             | -<br>- | 1.5<br>1.9 | 2.0<br>- | mΩ   |
|                                  |                                            | V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A                                                                     | -      | 2.2        | 3.0      |      |
| G <sub>fs</sub>                  | Forward Transconductance                   | V <sub>DS</sub> =5V, I <sub>DS</sub> =15A                                                                       | -      | 32         | -        | S    |
| Diode Characteristics            |                                            |                                                                                                                 |        |            |          |      |
| V <sub>SD</sub> <sup>e</sup>     | Diode Forward Voltage                      | I <sub>SD</sub> =20A, V <sub>GS</sub> =0V                                                                       | -      | 0.8        | 1.1      | V    |
| t <sub>rr</sub>                  | Reverse Recovery Time                      | I <sub>SD</sub> =20A, dI <sub>SD</sub> /dt=100A/μs                                                              | -      | 50         | -        | ns   |
| t <sub>a</sub>                   | Charge Time                                |                                                                                                                 | -      | 23.5       | -        |      |
| t <sub>b</sub>                   | Discharge Time                             |                                                                                                                 | -      | 27.5       | -        |      |
| Q <sub>rr</sub>                  | Reverse Recovery Charge                    |                                                                                                                 | -      | 45         | -        | nC   |
| Dynamic Characteristics          |                                            |                                                                                                                 |        |            |          |      |
| R <sub>G</sub>                   | Gate Resistance                            | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                | -      | 0.9        | 2        | Ω    |
| C <sub>iss</sub>                 | Input Capacitance                          | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =25V,<br>Frequency=1.0MHz                                               | -      | 7536       |          | pF   |
| C <sub>oss</sub>                 | Output Capacitance                         |                                                                                                                 | -      | 841        |          |      |
| C <sub>rss</sub>                 | Reverse Transfer Capacitance               |                                                                                                                 | -      | 821        |          |      |
| t <sub>d(ON)</sub>               | Turn-on Delay Time                         | V <sub>DD</sub> =15V, R <sub>L</sub> =15Ω,<br>I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V,<br>R <sub>G</sub> =6Ω | -      | 15.5       | -        | ns   |
| t <sub>r</sub>                   | Turn-on Rise Time                          |                                                                                                                 | -      | 11         | -        |      |
| t <sub>d(OFF)</sub>              | Turn-off Delay Time                        |                                                                                                                 | -      | 35         | -        |      |
| t <sub>f</sub>                   | Turn-off Fall Time                         |                                                                                                                 | -      | 40         | -        |      |
| Gate Charge Characteristics      |                                            |                                                                                                                 |        |            |          |      |
| Q <sub>g</sub>                   | Total Gate Charge                          | V <sub>DS</sub> =15V, V <sub>GS</sub> =10V,<br>I <sub>DS</sub> =20A                                             | -      | 115        | 57.8     | nC   |
| Q <sub>g</sub>                   | Total Gate Charge                          | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V,<br>I <sub>DS</sub> =20A                                            | -      | 15.4       | -        |      |
| Q <sub>gth</sub>                 | Threshold Gate Charge                      |                                                                                                                 | -      | 2.9        | -        |      |
| Q <sub>gs</sub>                  | Gate-Source Charge                         |                                                                                                                 | -      | 4.3        | -        |      |
| Q <sub>gd</sub>                  | Gate-Drain Charge                          |                                                                                                                 | -      | 27.2       | -        |      |

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

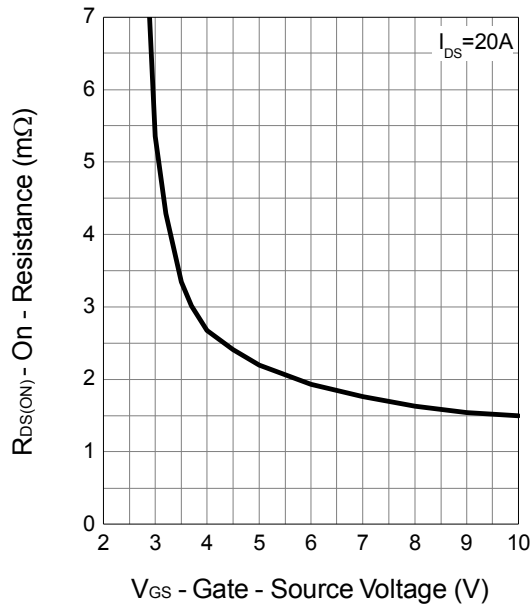
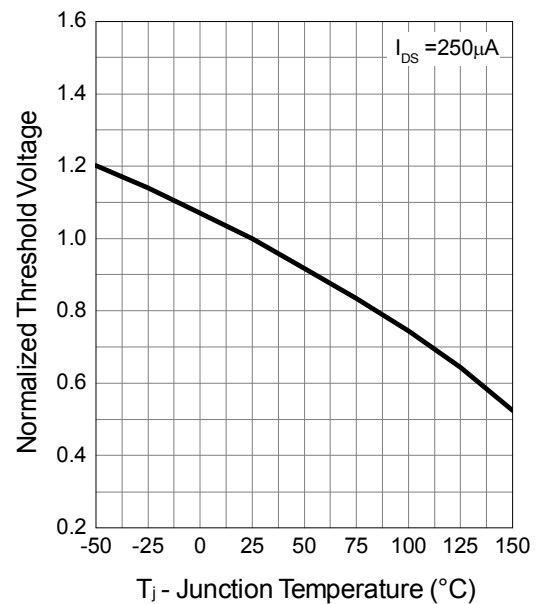
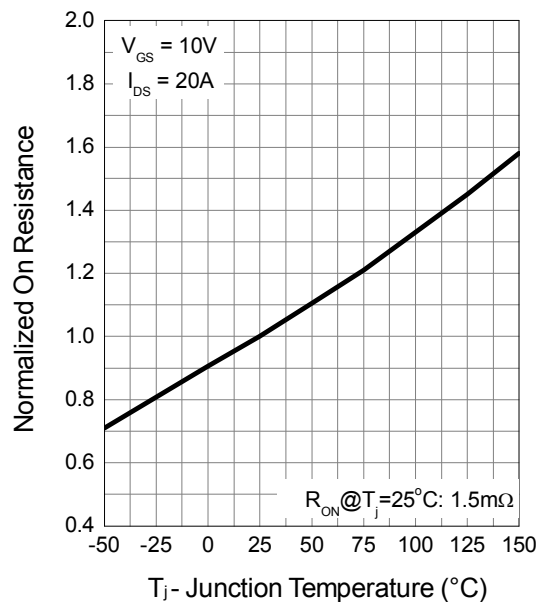
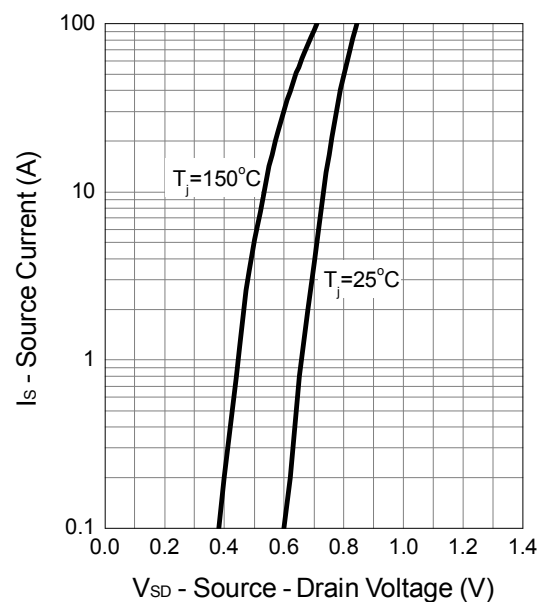
### Typical Operating Characteristics



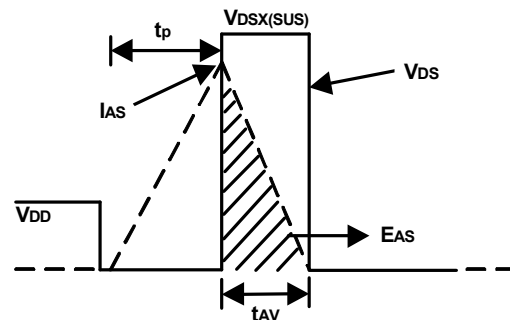
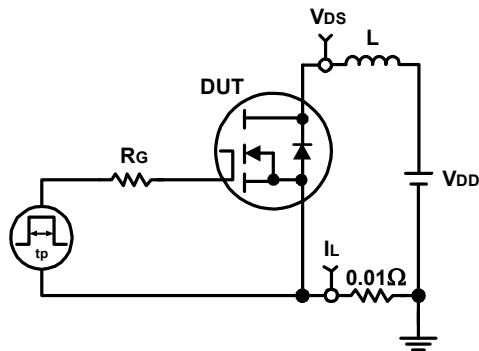
## Typical Operating Characteristics (Cont.)



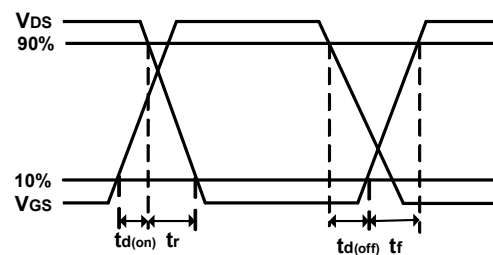
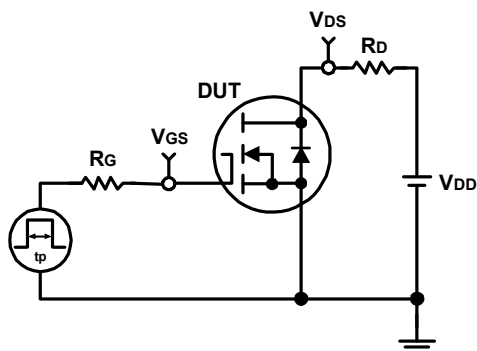
## Typical Operating Characteristics (Cont.)

**Gate-Source On Resistance**

**Gate Threshold Voltage**

**Drain-Source On Resistance**

**Source-Drain Diode Forward**


## Avalanche Test Circuit and Waveforms

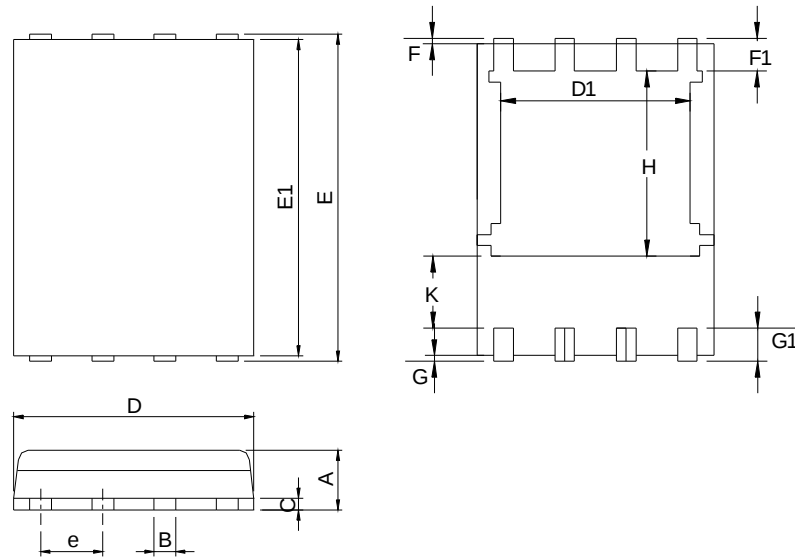


## Switching Time Test Circuit and Waveforms



## Package Information

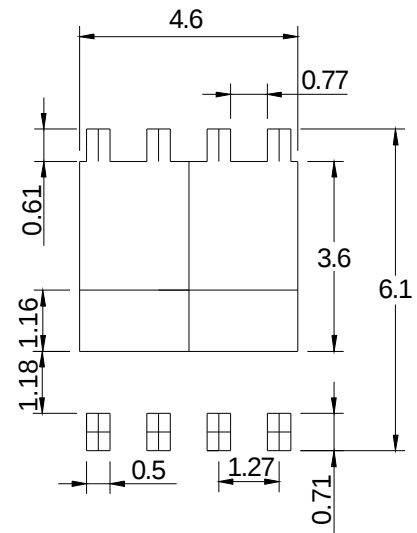
### DFN5x6-8



| SYMBOL | DFN5x6-8    |      |           |       |
|--------|-------------|------|-----------|-------|
|        | MILLIMETERS |      | INCHES    |       |
|        | MIN.        | MAX. | MIN.      | MAX.  |
| A      | 0.90        | 1.20 | 0.035     | 0.047 |
| B      | 0.3         | 0.51 | 0.012     | 0.020 |
| C      | 0.19        | 0.25 | 0.007     | 0.010 |
| D      | 4.80        | 5.30 | 0.189     | 0.209 |
| D1     | 4.00        | 4.40 | 0.157     | 0.173 |
| E      | 5.90        | 6.20 | 0.232     | 0.244 |
| E1     | 5.50        | 5.80 | 0.217     | 0.228 |
| e      | 1.27 BSC    |      | 0.050 BSC |       |
| F      | 0.05        | 0.30 | 0.002     | 0.012 |
| F1     | 0.35        | 0.75 | 0.014     | 0.030 |
| G      | 0.05        | 0.30 | 0.002     | 0.012 |
| G1     | 0.35        | 0.75 | 0.014     | 0.030 |
| H      | 3.34        | 3.9  | 0.131     | 0.154 |
| K      | 0.762       | -    | 0.03      | -     |

Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.  
Mold flash or protrusions shall not exceed 10 mil.

### RECOMMENDED LAND PATTERN



UNIT: mm