

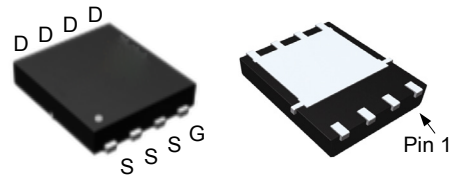
### Features

- 40V/180A  
 $R_{DS(ON)} = 1.4m\Omega (typ.) @ V_{GS} = 10V$
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available  
 (RoHS Compliant)
- Moisture Sensitivity Level MSL 1  
 (per JEDEC J-STD-020D)

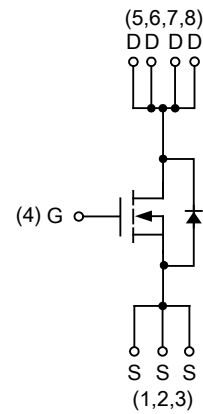
### Applications

- Power Management in Desktop Computer or DC/DC Converters.

### 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                   |                       | 40         | V    |
| V <sub>GSS</sub>              | Gate-Source Voltage                    |                       | ±20        |      |
| T <sub>J</sub>                | Maximum Junction Temperature           |                       | 175        | °C   |
| T <sub>STG</sub>              | Storage Temperature Range              |                       | -55 to 175 |      |
| I <sub>S</sub>                | Diode Continuous Forward Current       | T <sub>C</sub> =25°C  | 180        | A    |
| I <sub>D</sub>                | Continuous Drain Current               | T <sub>C</sub> =25°C  | 180        | A    |
|                               |                                        | T <sub>C</sub> =100°C | 135        |      |
| I <sub>DM</sub> <sup>a</sup>  | Pulsed Drain Current                   | T <sub>C</sub> =25°C  | 540        |      |
| P <sub>D</sub>                | Maximum Power Dissipation              | T <sub>C</sub> =25°C  | 115        | W    |
|                               |                                        | T <sub>C</sub> =100°C | 58         |      |
| R <sub>θJC</sub>              | Thermal Resistance-Junction to Case    | Steady State          | 1.3        | °C/W |
| R <sub>θJA</sub> <sup>b</sup> | Thermal Resistance-Junction to Ambient | t ≤ 10s               | 20         | °C/W |
|                               |                                        | Steady State          | 55         |      |
| I <sub>AS</sub> <sup>c</sup>  | Avalanche Current, Single pulse        | L=0.1mH               | 90         | A    |
| E <sub>AS</sub> <sup>c</sup>  | Avalanche Energy, Single pulse         | L=0.1mH               | 405        | mJ   |

Note \* : Maximum continuous current is limited by bonding wire.

Note a : Pulse width limited by maximum junction temperature.

Note b : Surface mounted on  $1\text{in}^2$  pad area, steady state  $t = 999\text{s}$ .

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)

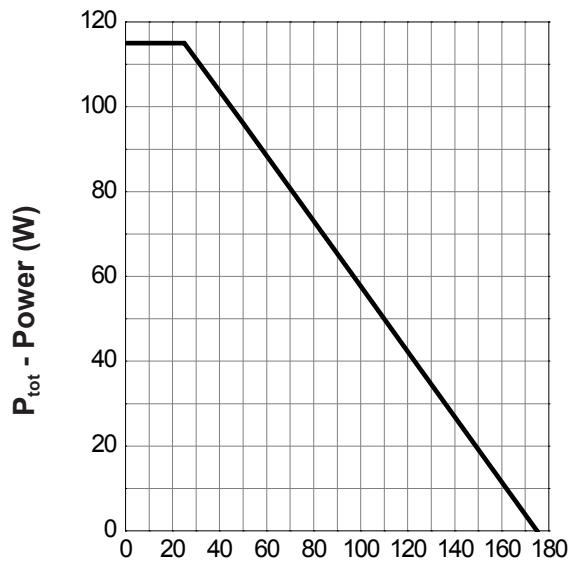
| Symbol                                   | Parameter                        | Test Conditions                                                                                                | Min. | Typ. | Max.    | Unit |
|------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------|------|------|---------|------|
| Static Characteristics                   |                                  |                                                                                                                |      |      |         |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                                                    | 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                                                      | 2    | 3    | 4       | 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> =20A                                                                     | -    | 1.4  | 1.9     | mΩ   |
| Gfs                                      | Forward Transconductance         | V <sub>DS</sub> =5V, I <sub>DS</sub> =15A                                                                      | -    | 38   | -       | S    |
| Diode Characteristics                    |                                  |                                                                                                                |      |      |         |      |
| V <sub>SD</sub> <sup>d</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =25A, 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                      |                                                                                                                | -    | 26   | -       |      |
| t <sub>b</sub>                           | Discharge Time                   |                                                                                                                | -    | 23   | -       |      |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                | -    | 54   | -       | 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    | 2       | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =20V,<br>Frequency=1.0MHz                                              | -    | 5220 | 5975    | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                | -    | 737  | -       |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                | -    | 582  | -       |      |
| 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> =6V,<br>R <sub>G</sub> =6Ω | -    | 30   | 54      | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                | -    | 12   | 22      |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                | -    | 55   | 99      |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                | -    | 78   | 141     |      |
| 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> =20A                                            | -    | 61   | -       | nC   |
| Q <sub>gth</sub>                         | Threshold Gate Charge            |                                                                                                                | -    | 14   | -       |      |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                | -    | 22   | -       |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                | -    | 8    | -       |      |

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

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

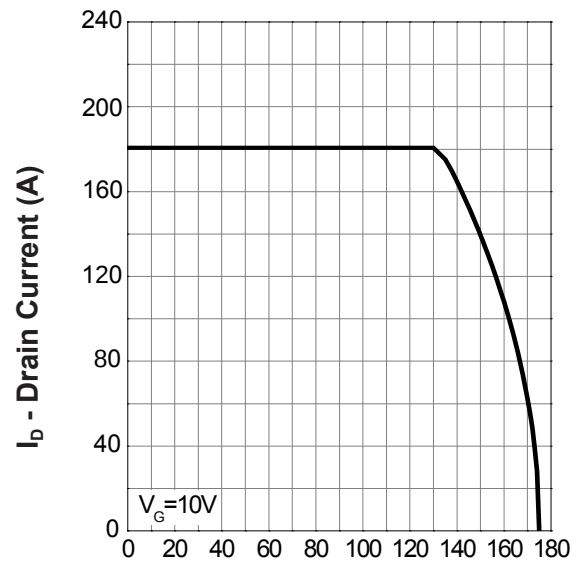
### Typical Operating Characteristics

Power Dissipation



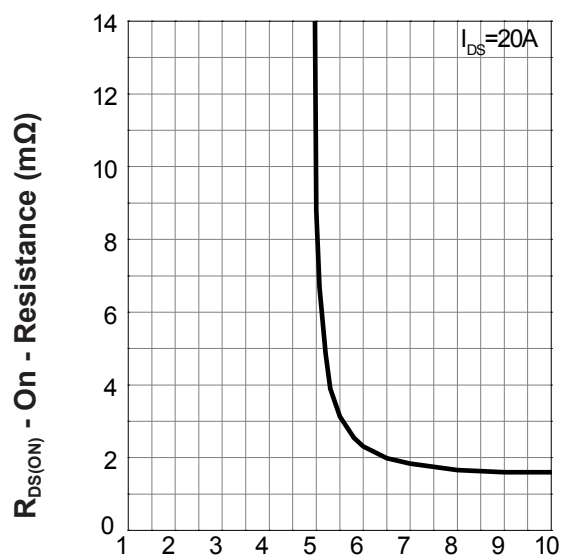
$T_c$  - Case Temperature (°C)

Drain Current



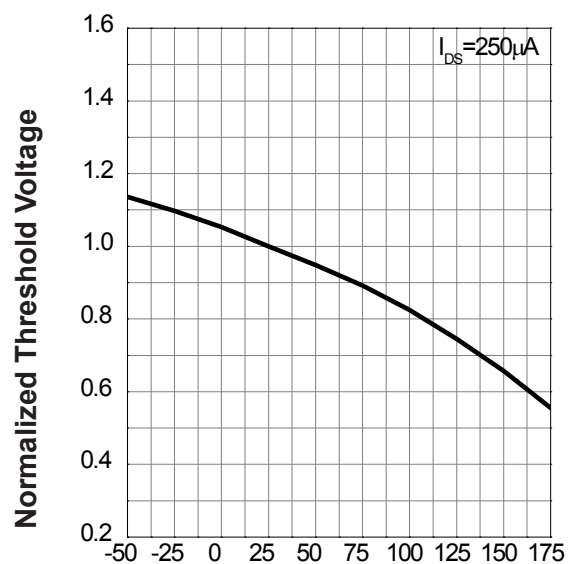
$T_c$  - Case Temperature (°C)

Gate-Source On Resistance



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

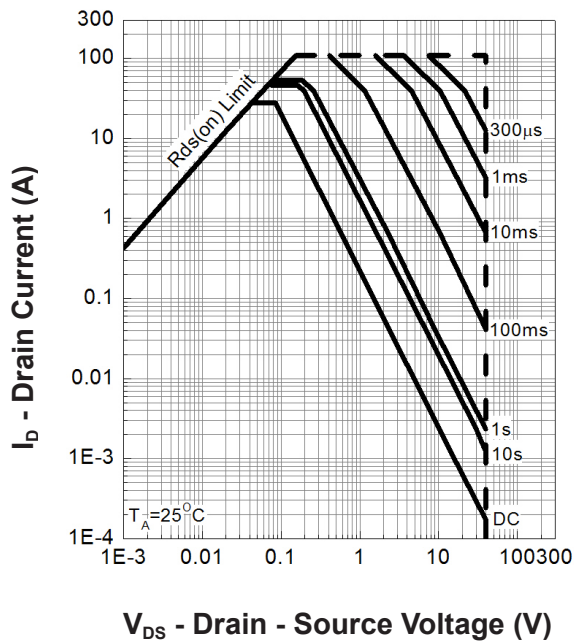
Gate Threshold Voltage



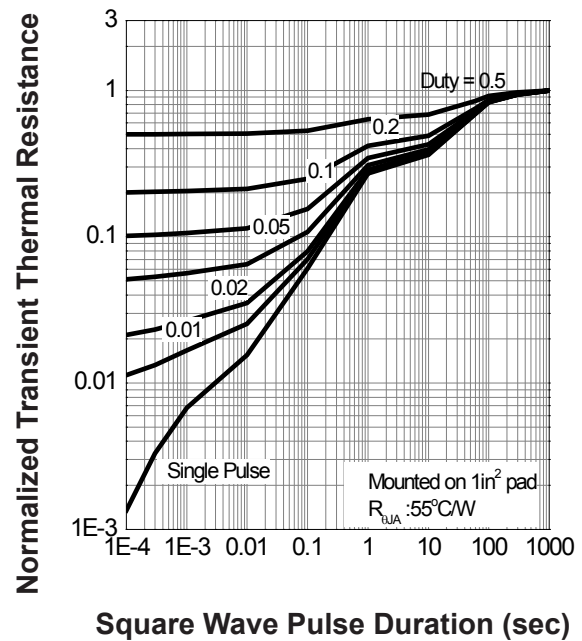
$T_j$  - Junction Temperature (°C)

### Typical Operating Characteristics(Cont.)

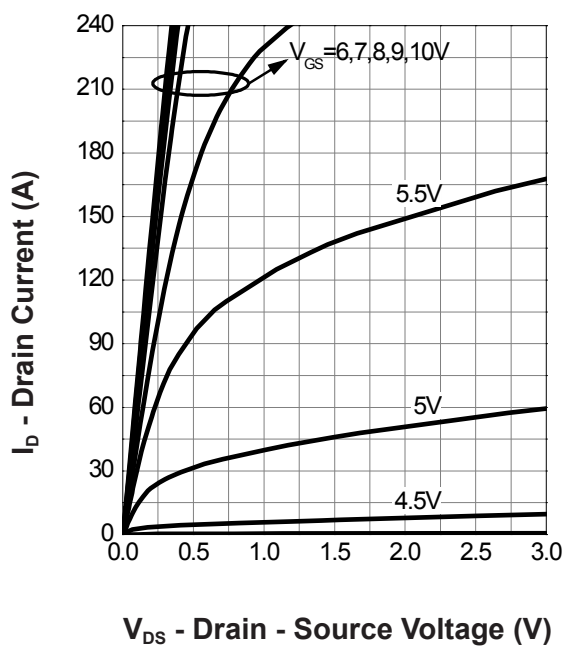
Safe Operation Area



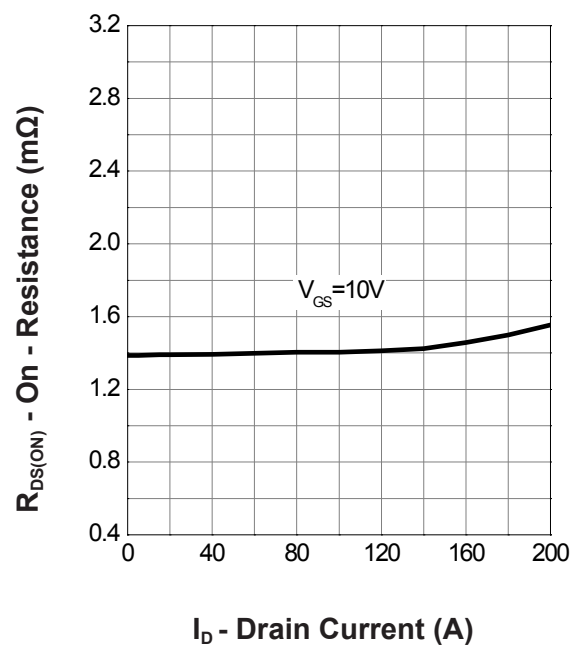
Thermal Transient Impedance



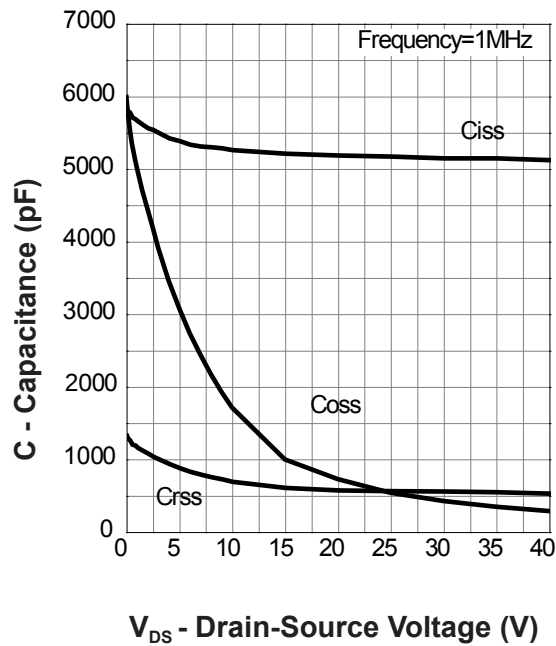
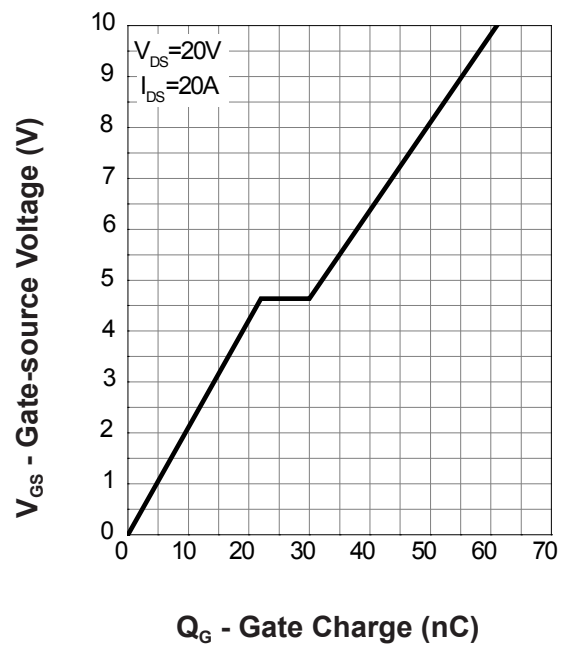
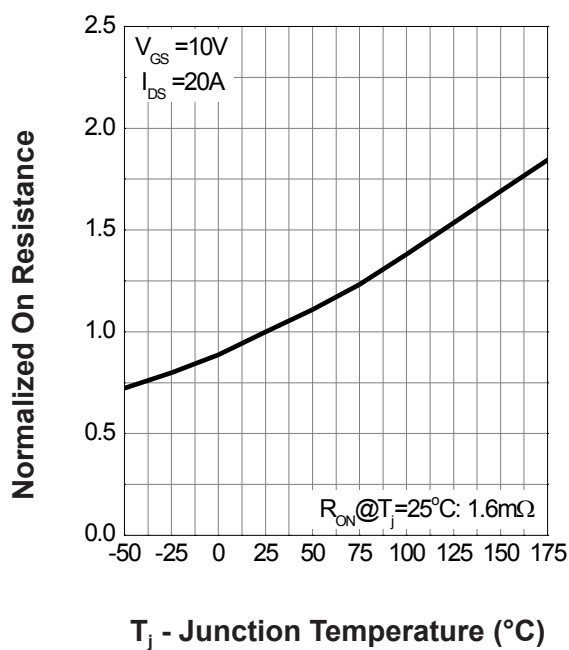
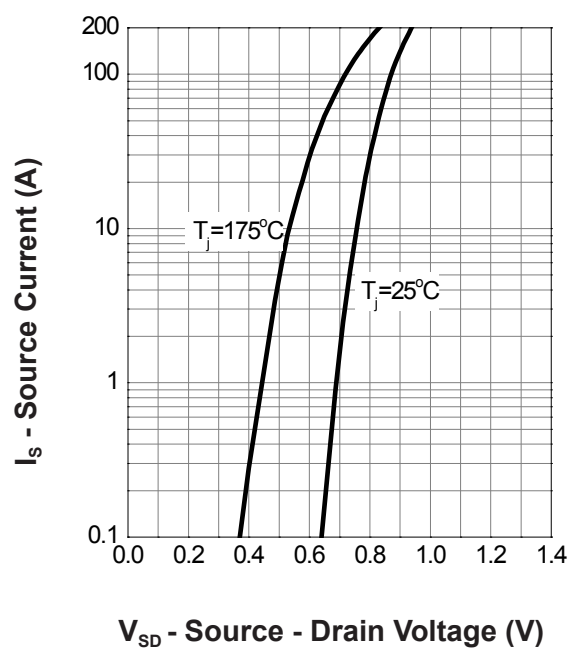
Output Characteristics



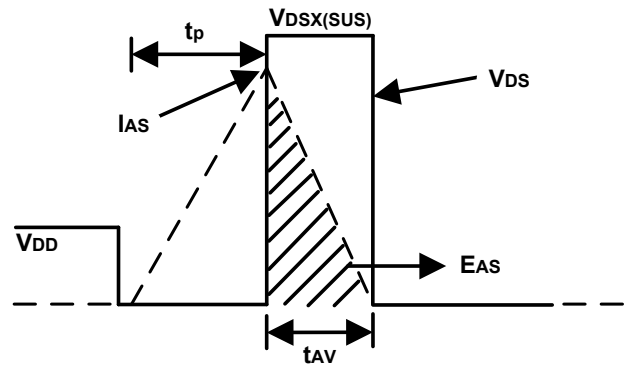
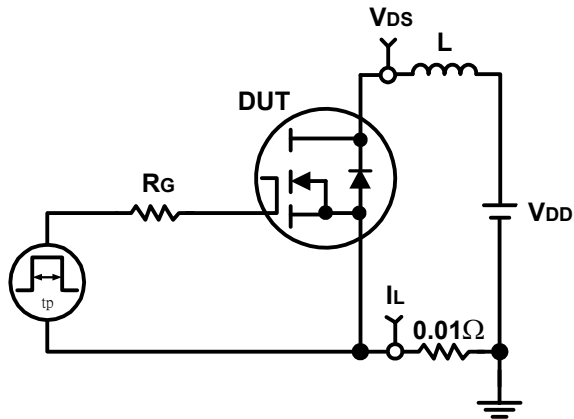
Drain-Source On Resistance



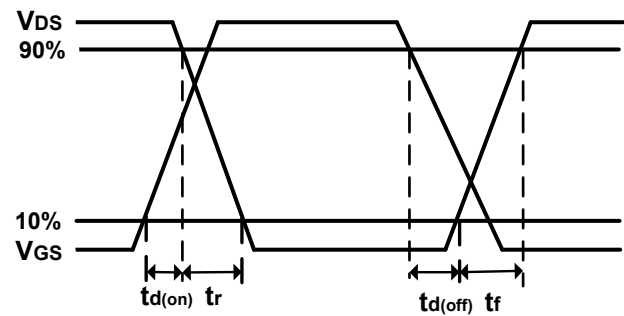
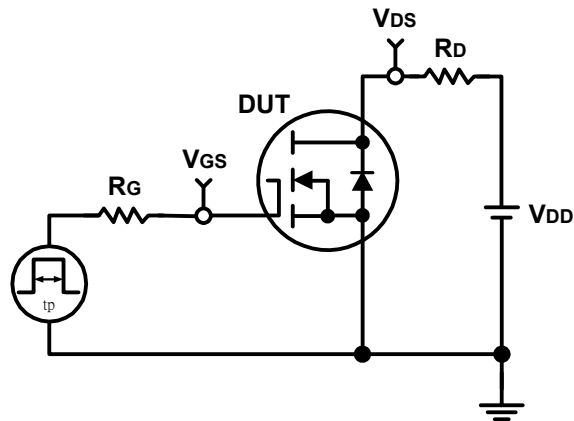
## Typical Operating Characteristics(Cont.)

**Capacitance**

**Gate Charge**

**Drain-Source On Resistance**

**Source-Drain Diode Forward**


## Avalanche Test Circuit and Waveforms

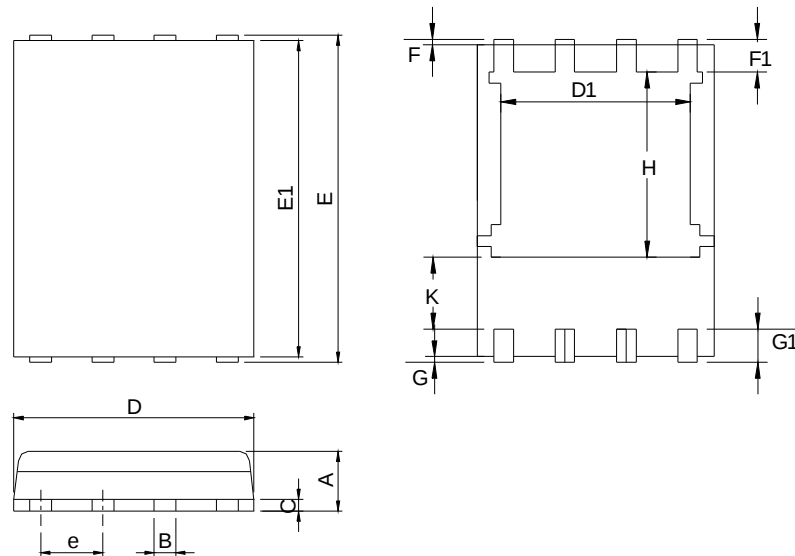


## Switching Time Test Circuit and Waveforms



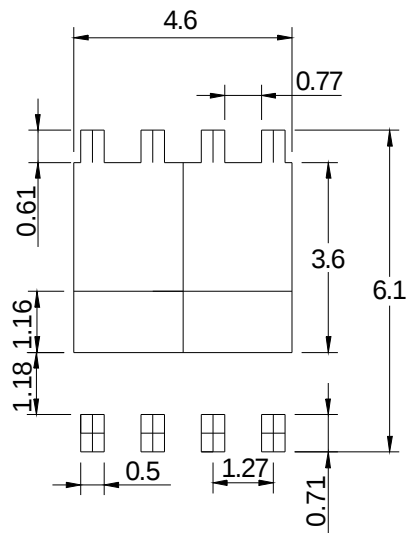
## Package Information

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      | -     |

### RECOMMENDED LAND PATTERN



UNIT: mm

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