

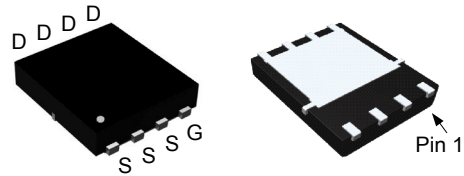
## Features

- 40V/150A,  
 $R_{DS(ON)} = 1.8m\Omega$  (typ.) @  $V_{GS}=10V$   
 $R_{DS(ON)} = 2.8m\Omega$  (typ.) @  $V_{GS}=4.5V$
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

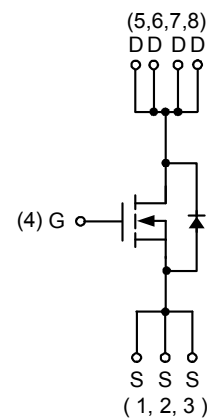
## Applications

- SMPS Synchronous Rectification
- DC-DC Conversion
- Or-ing

## Pin Description



DFN5x6-8



N-Channel MOSFET

## Absolute Maximum Ratings

| Symbol                                                                   | Parameter                                            | Rating                    | Unit                 |
|--------------------------------------------------------------------------|------------------------------------------------------|---------------------------|----------------------|
| <b>Common Ratings</b> ( $T_A=25^{\circ}\text{C}$ Unless Otherwise Noted) |                                                      |                           |                      |
| $V_{\text{DSS}}$                                                         | Drain-Source Voltage                                 | 40                        | V                    |
| $V_{\text{GSS}}$                                                         | Gate-Source Voltage                                  | $\pm 20$                  |                      |
| $T_J$                                                                    | Maximum Junction Temperature                         | 150                       | $^{\circ}\text{C}$   |
| $T_{\text{STG}}$                                                         | Storage Temperature Range                            | -55 to 150                |                      |
| $I_S$                                                                    | Diode Continuous Forward Current                     | $T_C=25^{\circ}\text{C}$  | A                    |
| $I_D$                                                                    | Continuous Drain Current                             | $T_C=25^{\circ}\text{C}$  |                      |
|                                                                          |                                                      | $T_C=100^{\circ}\text{C}$ |                      |
| $I_{\text{DM}}$                                                          | Pulsed Drain Current                                 | $T_C=25^{\circ}\text{C}$  |                      |
| $P_D$                                                                    | Maximum Power Dissipation                            | $T_C=25^{\circ}\text{C}$  | W                    |
|                                                                          |                                                      | $T_C=100^{\circ}\text{C}$ |                      |
| $R_{\theta\text{JC}}$                                                    | Thermal Resistance-Junction to Case                  | Steady State              | $^{\circ}\text{C/W}$ |
| $R_{\theta\text{JA}}$                                                    | Thermal Resistance-Junction to Ambient               | $t \leq 10\text{s}$       | $^{\circ}\text{C/W}$ |
|                                                                          |                                                      | Steady State              |                      |
| $I_{\text{AS}}^{\text{c}}$                                               | Avalanche Current, Single pulse ( $L=0.5\text{mH}$ ) | 31                        | A                    |
| $E_{\text{AS}}^{\text{c}}$                                               | Avalanche Energy, Single pulse ( $L=0.5\text{mH}$ )  | 240                       | mJ                   |

Note a : Package is limited to 100A.

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

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

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

| Symbol                         | Parameter                        | Test Conditions                                             | Min. | Typ. | Max.      | Unit          |
|--------------------------------|----------------------------------|-------------------------------------------------------------|------|------|-----------|---------------|
| <b>Static Characteristics</b>  |                                  |                                                             |      |      |           |               |
| $BV_{\text{DSS}}$              | Drain-Source Breakdown Voltage   | $V_{\text{GS}}=0\text{V}, I_{\text{DS}}=250\mu\text{A}$     | 40   | -    | -         | V             |
| $I_{\text{DSS}}$               | Zero Gate Voltage Drain Current  | $V_{\text{DS}}=32\text{V}, V_{\text{GS}}=0\text{V}$         | -    | -    | 1         | $\mu\text{A}$ |
|                                |                                  | $T_J=85^{\circ}\text{C}$                                    | -    | -    | 30        |               |
| $V_{\text{GS(th)}}$            | Gate Threshold Voltage           | $V_{\text{DS}}=V_{\text{GS}}, I_{\text{DS}}=250\mu\text{A}$ | 1.5  | 1.8  | 2.5       | V             |
| $I_{\text{GSS}}$               | Gate Leakage Current             | $V_{\text{GS}}=\pm 20\text{V}, V_{\text{DS}}=0\text{V}$     | -    | -    | $\pm 100$ | nA            |
| $R_{\text{DS(ON)}}^{\text{d}}$ | Drain-Source On-state Resistance | $V_{\text{GS}}=10\text{V}, I_{\text{DS}}=30\text{A}$        | -    | 1.8  | 2.4       | m $\Omega$    |
|                                |                                  | $T_J=125^{\circ}\text{C}$                                   | -    | 2.8  | -         |               |
|                                |                                  | $V_{\text{GS}}=4.5\text{V}, I_{\text{DS}}=20\text{A}$       | -    | 2.8  | 3.3       |               |
| Gfs                            | Forward Transconductance         | $V_{\text{DS}}=5\text{V}, I_{\text{DS}}=20\text{A}$         | -    | 55   | -         | S             |

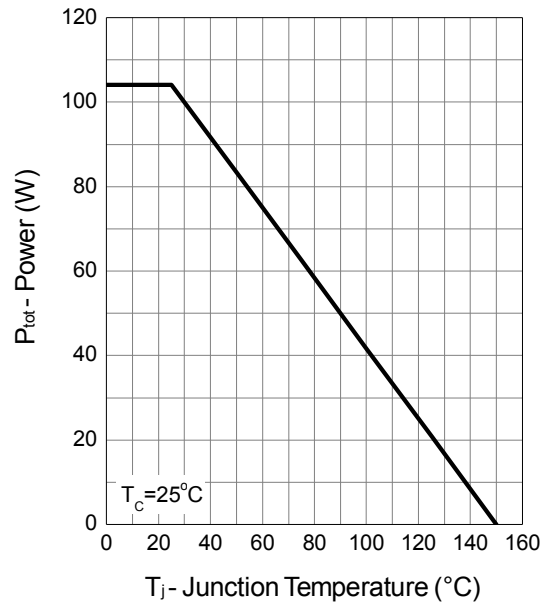
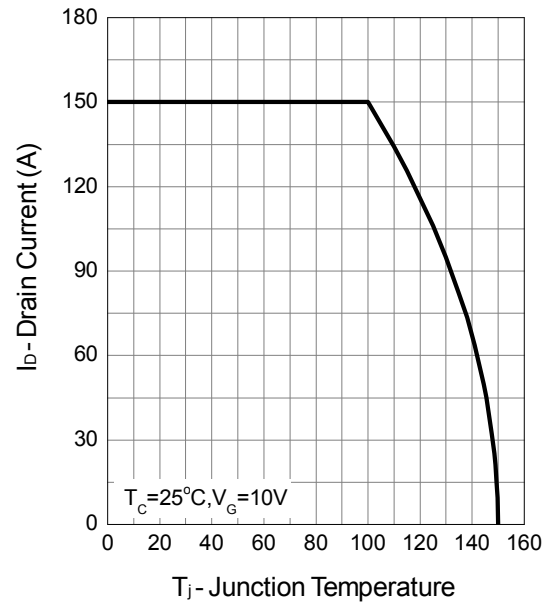
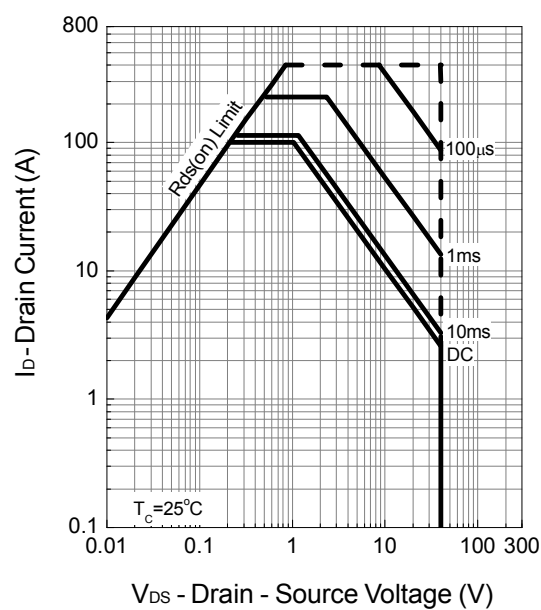
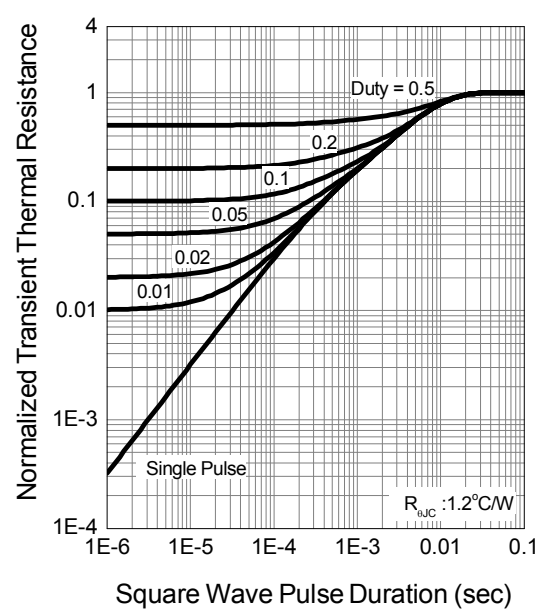
**Electrical Characteristics (Cont.)** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Symbol                                   | Parameter                    | Test Conditions                                                           | Min. | Typ. | Max. | Unit     |
|------------------------------------------|------------------------------|---------------------------------------------------------------------------|------|------|------|----------|
| Diode Characteristics                    |                              |                                                                           |      |      |      |          |
| $V_{SD}^d$                               | Diode Forward Voltage        | $I_{SD}=20A, V_{GS}=0V$                                                   | -    | 0.77 | 1.1  | V        |
| $t_{rr}$                                 | Reverse Recovery Time        | $I_{SD}=20A, V_{DD}=20V$<br>$di_{SD}/dt=100A/\mu s$                       | -    | 31   | -    | ns       |
| $t_a$                                    | Charge Time                  |                                                                           | -    | 18   | -    |          |
| $t_b$                                    | Discharge Time               |                                                                           | -    | 13   | -    |          |
| $Q_{rr}$                                 | Reverse Recovery Charge      |                                                                           | -    | 26   | -    | nC       |
| Dynamic Characteristics <sup>e</sup>     |                              |                                                                           |      |      |      |          |
| $R_G$                                    | Gate Resistance              | $V_{GS}=0V, V_{DS}=0V, F=1MHz$                                            | 0.7  | 1.1  | 2    | $\Omega$ |
| $C_{iss}$                                | Input Capacitance            | $V_{GS}=0V,$<br>$V_{DS}=20V,$<br>Frequency=1.0MHz                         | -    | 2550 | -    | pF       |
| $C_{oss}$                                | Output Capacitance           |                                                                           | -    | 1290 | -    |          |
| $C_{rss}$                                | Reverse Transfer Capacitance |                                                                           | -    | 110  | -    |          |
| $t_{d(ON)}$                              | Turn-on Delay Time           | $V_{DD}=20V, R_L=15\Omega,$<br>$I_{DS}=1A, V_{GEN}=10V,$<br>$R_G=1\Omega$ | -    | 20   | 24   | ns       |
| $t_r$                                    | Turn-on Rise Time            |                                                                           | -    | 10   | 12   |          |
| $t_{d(OFF)}$                             | Turn-off Delay Time          |                                                                           | -    | 58   | 69   |          |
| $t_f$                                    | Turn-off Fall Time           |                                                                           | -    | 34   | 40   |          |
| Gate Charge Characteristics <sup>e</sup> |                              |                                                                           |      |      |      |          |
| $Q_g$                                    | Total Gate Charge            | $V_{DS}=20V, V_{GS}=4.5V,$<br>$I_{DS}=40A$                                | -    | 35   | 42   | nC       |
| $Q_g$                                    | Total Gate Charge            | $V_{DS}=20V, V_{GS}=10V,$<br>$I_{DS}=40A$                                 | -    | 76   | 91   |          |
| $Q_{gth}$                                | Threshold Gate Charge        |                                                                           | -    | 5.2  | 6.2  |          |
| $Q_{gs}$                                 | Gate-Source Charge           |                                                                           | -    | 12   | 14.4 |          |
| $Q_{gd}$                                 | Gate-Drain Charge            |                                                                           | -    | 15.5 | 18.6 |          |

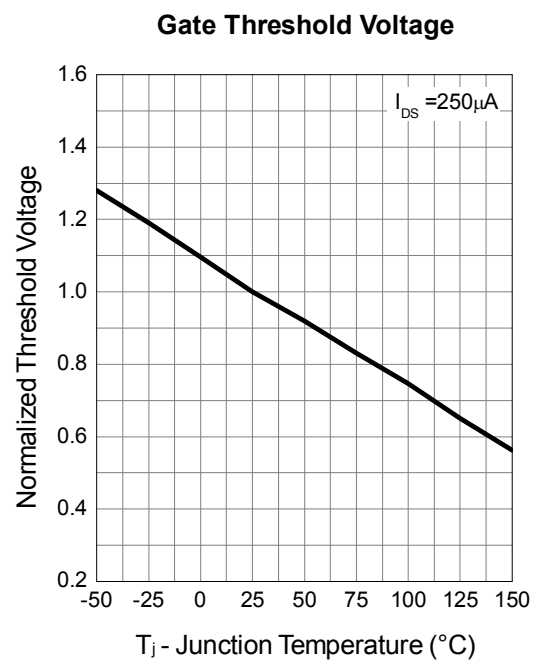
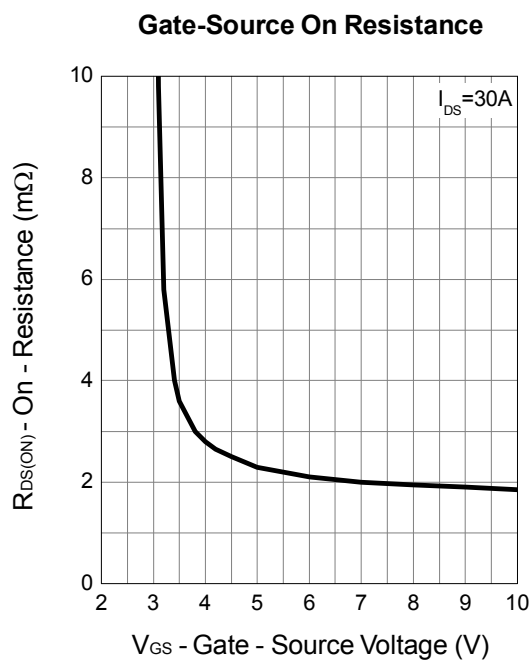
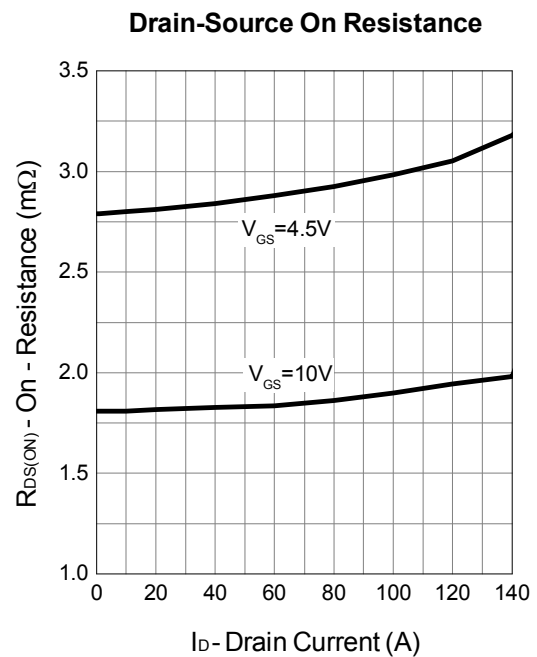
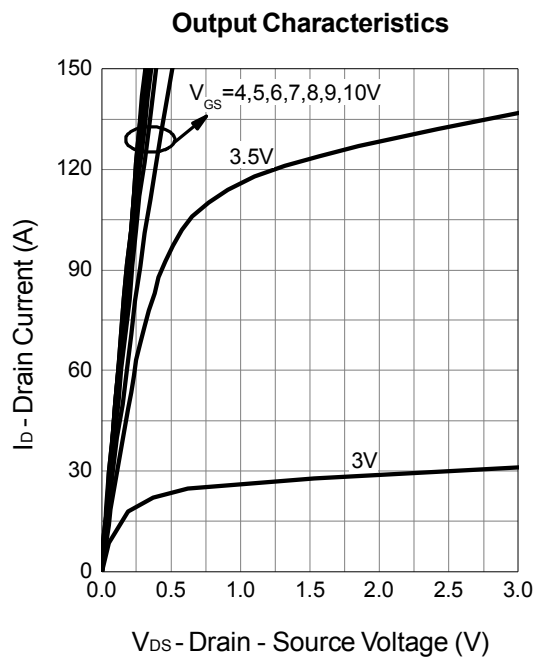
Note d : Pulse test ; pulse width $\leq 300\mu\text{s}$ , duty cycle $\leq 2\%$ .

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

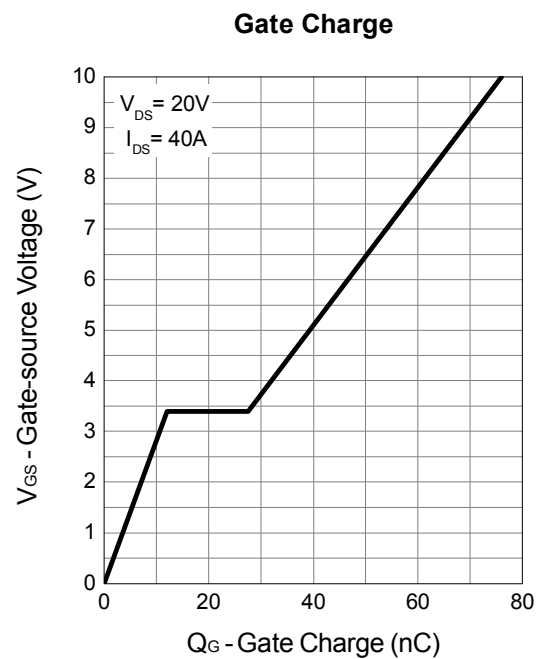
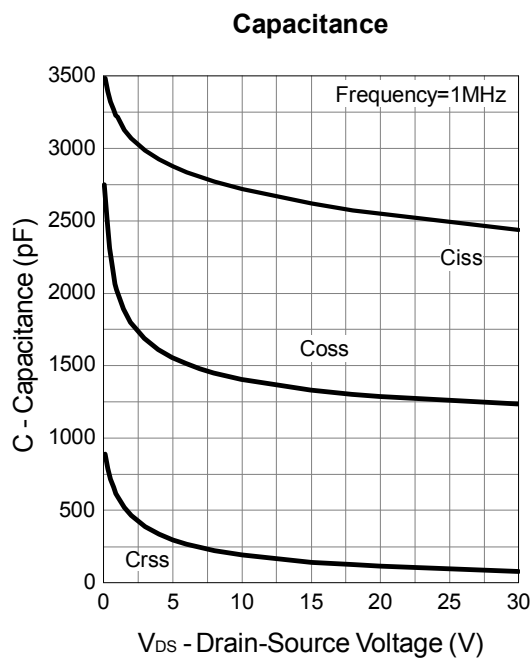
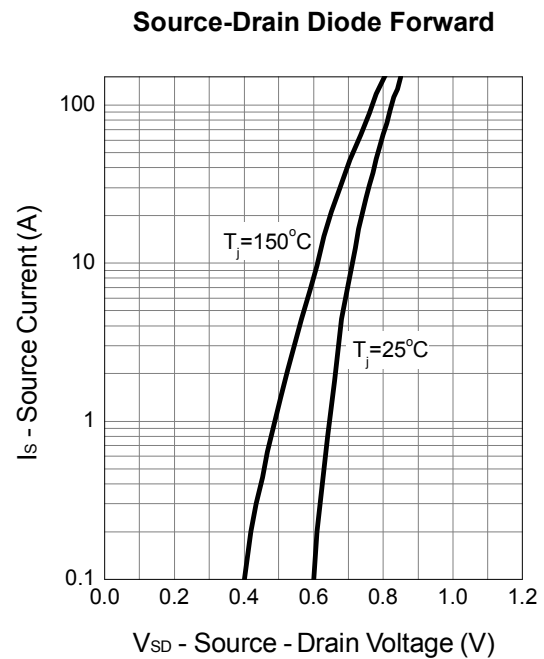
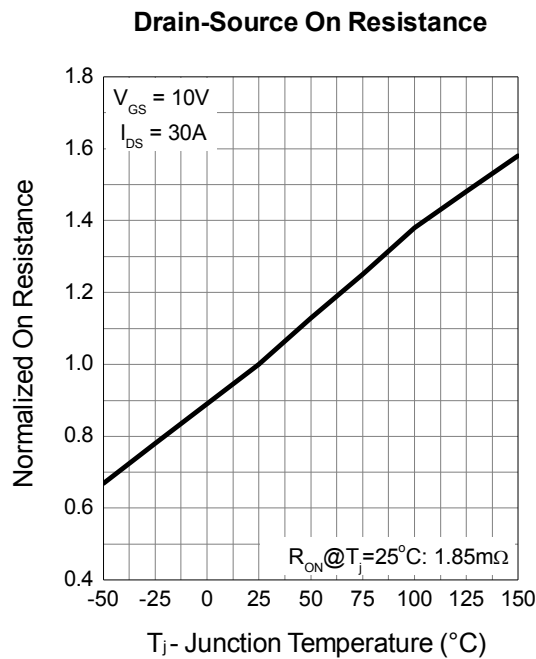
## Typical Operating Characteristics

**Power Dissipation**

**Drain Current**

**Safe Operation Area**

**Thermal Transient Impedance**


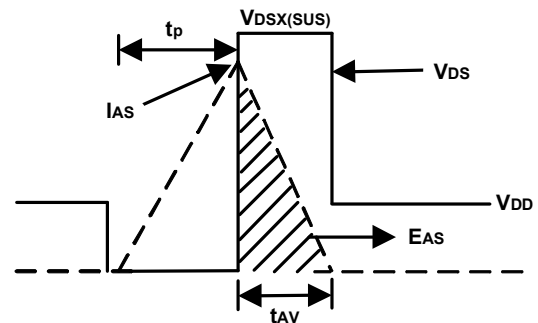
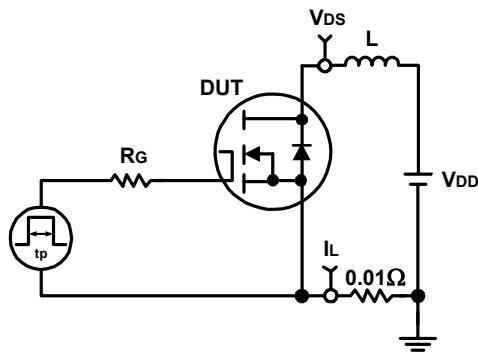
## Typical Operating Characteristics (Cont.)



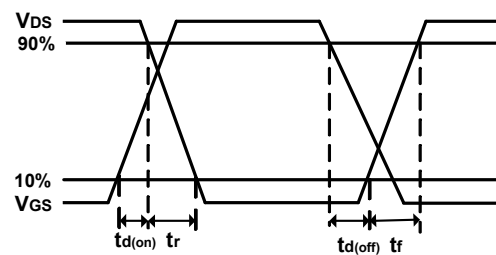
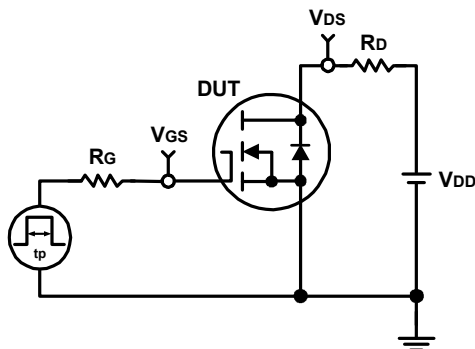
## Typical Operating Characteristics (Cont.)



## Avalanche Test Circuit and Waveforms

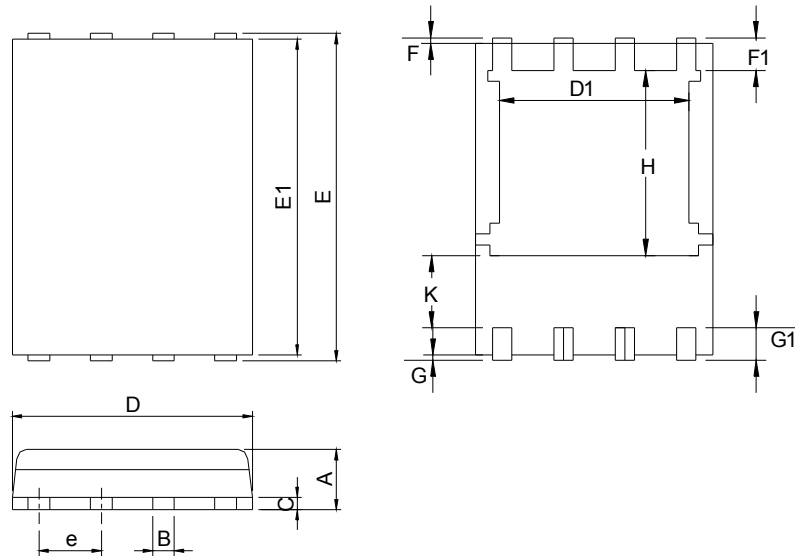


## Switching Time Test Circuit and Waveforms



## Package Information

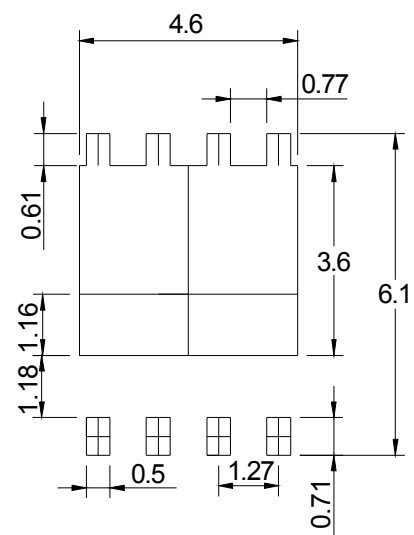
### DFN5x6-8



| 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