

## 150V N-Ch Power MOSFET

### Feature

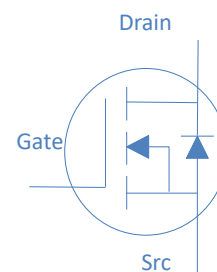
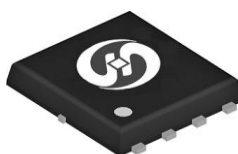
- ◇ High Speed Power Switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free, Halogen Free

|                               |     |            |
|-------------------------------|-----|------------|
| $V_{DS}$                      | 150 | V          |
| $R_{DS(on),typ}$ $V_{GS}=10V$ | 9.5 | m $\Omega$ |
| $I_D$ (Silicon Limited)       | 80  | A          |
| $I_D$ (Package Limited)       | 60  | A          |

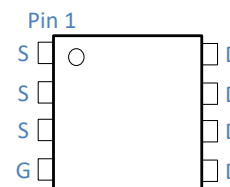
### Application

- ◇ Synchronous Rectification in SMPS
- ◇ Hard Switching and High Speed Circuit
- ◇ DC/DC in Telecoms and Industrial

DFN5x6



| Part Number | Package | Marking   |
|-------------|---------|-----------|
| HGN099N15S  | DFN5*6  | GN099N15S |



### Absolute Maximum Ratings at $T_J=25^{\circ}\text{C}$ (unless otherwise specified)

| Parameter                                  | Symbol            | Conditions                                  | Value      | Unit               |
|--------------------------------------------|-------------------|---------------------------------------------|------------|--------------------|
| Continuous Drain Current (Silicon Limited) | $I_D$             | $T_C=25^{\circ}\text{C}$                    | 80         | A                  |
|                                            |                   | $T_C=100^{\circ}\text{C}$                   | 50         |                    |
|                                            |                   | $T_C=25^{\circ}\text{C}$                    | 60         |                    |
| Continuous Drain Current (Package Limited) |                   |                                             |            |                    |
| Drain to Source Voltage                    | $V_{DS}$          | -                                           | 150        | V                  |
| Gate to Source Voltage                     | $V_{GS}$          | -                                           | $\pm 20$   | V                  |
| Pulsed Drain Current                       | $I_{DM}$          | -                                           | 350        | A                  |
| Avalanche Energy, Single Pulse             | $E_{AS}$          | $L=0.4\text{mH}$ , $T_C=25^{\circ}\text{C}$ | 320        | mJ                 |
| Power Dissipation                          | $P_D$             | $T_C=25^{\circ}\text{C}$                    | 139        | W                  |
| Operating and Storage Temperature          | $T_J$ , $T_{stg}$ | -                                           | -55 to 150 | $^{\circ}\text{C}$ |

### Absolute Maximum Ratings

| Parameter                           | Symbol          | Max | Unit                 |
|-------------------------------------|-----------------|-----|----------------------|
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 55  | $^{\circ}\text{C/W}$ |
| Thermal Resistance Junction-Case    | $R_{\theta JC}$ | 0.9 | $^{\circ}\text{C/W}$ |

**Electrical Characteristics at  $T_j=25^{\circ}\text{C}$  (unless otherwise specified)**
**Static Characteristics**

| Parameter                         | Symbol        | Conditions                                        | Value |      |           | Unit      |
|-----------------------------------|---------------|---------------------------------------------------|-------|------|-----------|-----------|
|                                   |               |                                                   | min   | typ  | max       |           |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                         | 150   | -    | -         | V         |
| Gate Threshold Voltage            | $V_{GS(th)}$  | $V_{GS}=V_{DS}, I_D=250\mu A$                     | 2     | 3    | 4         |           |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{GS}=0V, V_{DS}=150V, T_j=25^{\circ}\text{C}$  | -     | -    | 1         | $\mu A$   |
|                                   |               | $V_{GS}=0V, V_{DS}=150V, T_j=100^{\circ}\text{C}$ | -     | -    | 100       |           |
| Gate to Source Leakage Current    | $I_{GSS}$     | $V_{GS}=\pm 20V, V_{DS}=0V$                       | -     | -    | $\pm 100$ | nA        |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$                             | -     | 9.5  | 10.5      | $m\Omega$ |
| Transconductance                  | $g_{fs}$      | $V_{DS}=5V, I_D=20A$                              | -     | 50   | -         | S         |
| Gate Resistance                   | $R_G$         | $V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$         | -     | 1.55 | -         | $\Omega$  |

**Dynamic Characteristics**

|                               |              |                                                  |   |      |   |    |
|-------------------------------|--------------|--------------------------------------------------|---|------|---|----|
| Input Capacitance             | $C_{iss}$    | $V_{GS}=0V, V_{DS}=75V, f=1\text{MHz}$           | - | 2212 | - | pF |
| Output Capacitance            | $C_{oss}$    |                                                  | - | 330  | - |    |
| Reverse Transfer Capacitance  | $C_{rss}$    |                                                  | - | 9.5  | - |    |
| Total Gate Charge             | $Q_g(10V)$   | $V_{DD}=75V, I_D=20A, V_{GS}=10V$                | - | 26   | - | nC |
| Gate to Source Charge         | $Q_{gs}$     |                                                  | - | 9    | - |    |
| Gate to Drain (Miller) Charge | $Q_{gd}$     |                                                  | - | 3    | - |    |
| Turn on Delay Time            | $t_{d(on)}$  | $V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=10\Omega,$ | - | 11   | - | ns |
| Rise time                     | $t_r$        |                                                  | - | 9    | - |    |
| Turn off Delay Time           | $t_{d(off)}$ |                                                  | - | 16   | - |    |
| Fall Time                     | $t_f$        |                                                  | - | 8    | - |    |

**Reverse Diode Characteristics**

|                         |          |                                        |   |     |     |    |
|-------------------------|----------|----------------------------------------|---|-----|-----|----|
| Diode Forward Voltage   | $V_{SD}$ | $V_{GS}=0V, I_F=20A$                   | - | 0.9 | 1.2 | V  |
| Reverse Recovery Time   | $t_{rr}$ | $V_R=75V, I_F=20A, dI_F/dt=100A/\mu s$ | - | 80  | -   | ns |
| Reverse Recovery Charge | $Q_{rr}$ |                                        | - | 160 | -   | nC |

Fig 1. Typical Output Characteristics

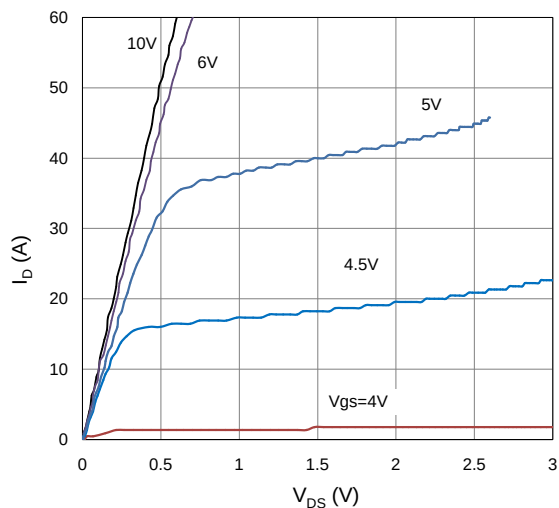


Figure 2. On-Resistance vs. Gate-Source Voltage

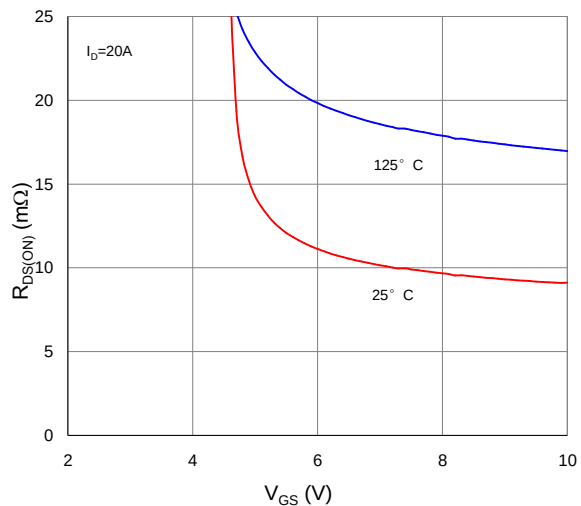


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

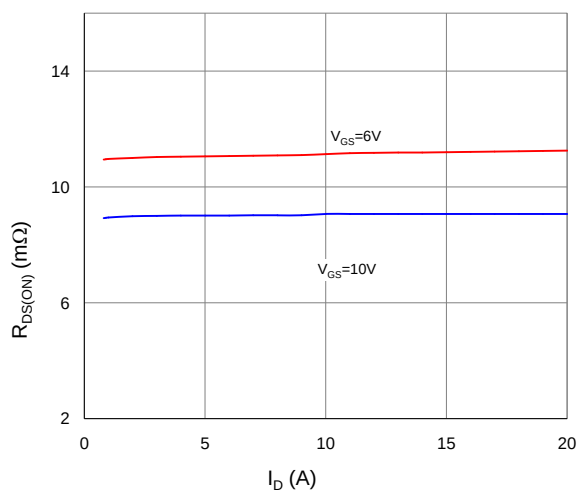


Figure 4. Normalized On-Resistance vs. Junction Temperature

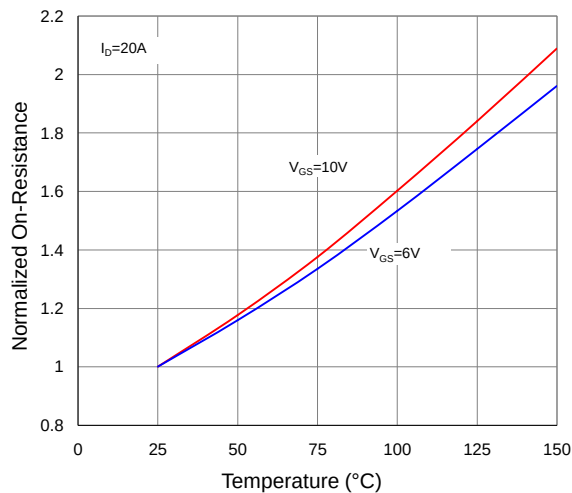


Figure 5. Typical Transfer Characteristics

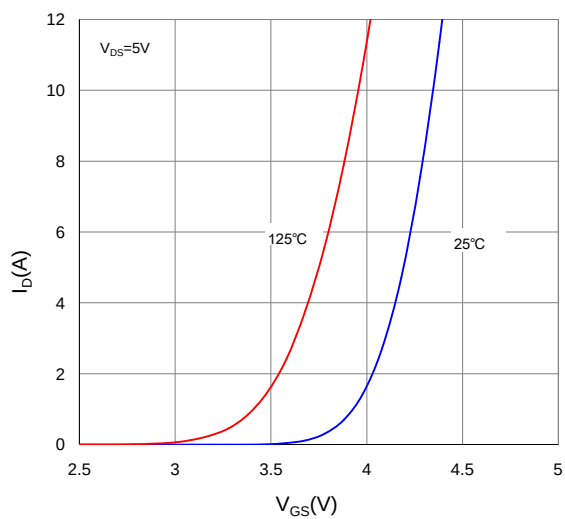


Figure 6. Typical Source-Drain Diode Forward Voltage

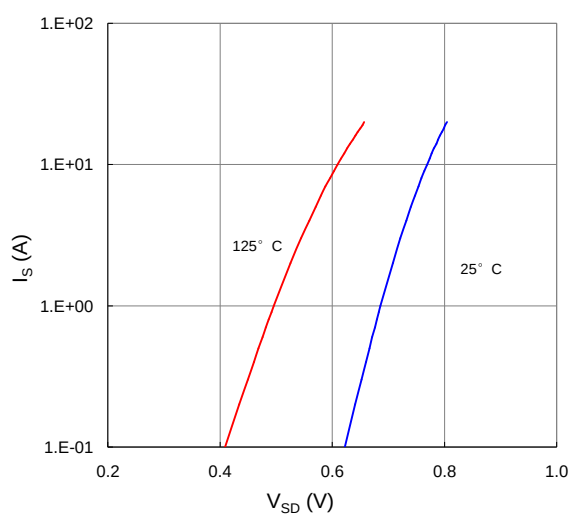


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

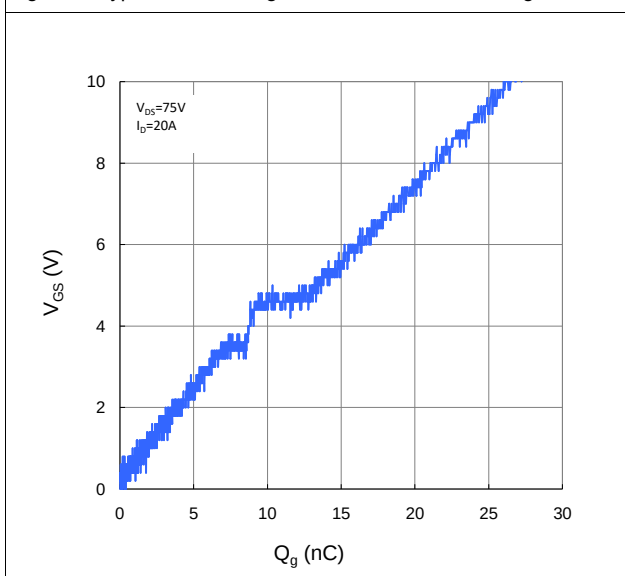


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

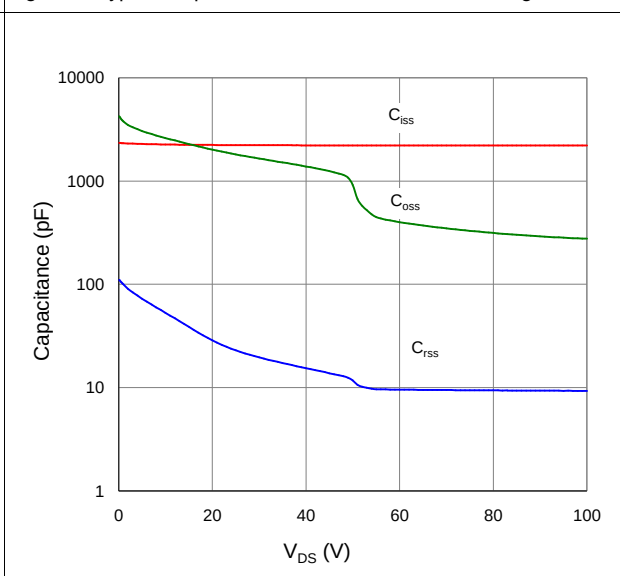


Figure 9. Maximum Safe Operating Area

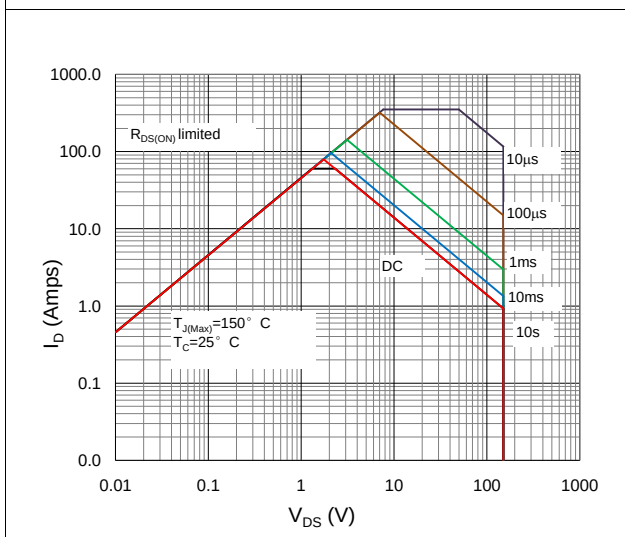


Figure 10. Maximum Drain Current vs. Case Temperature

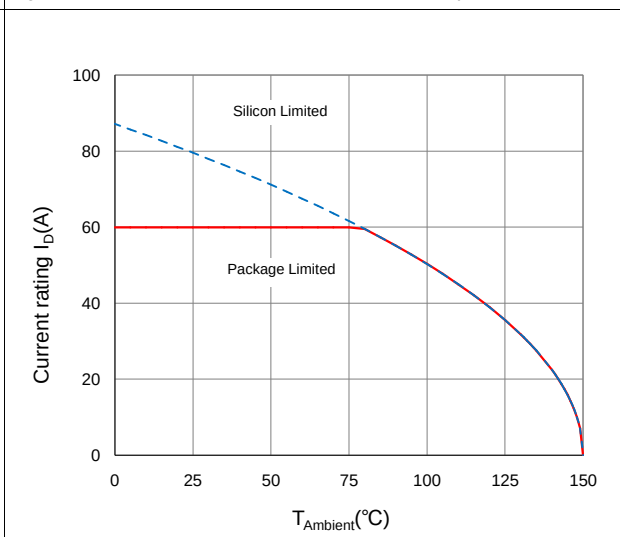
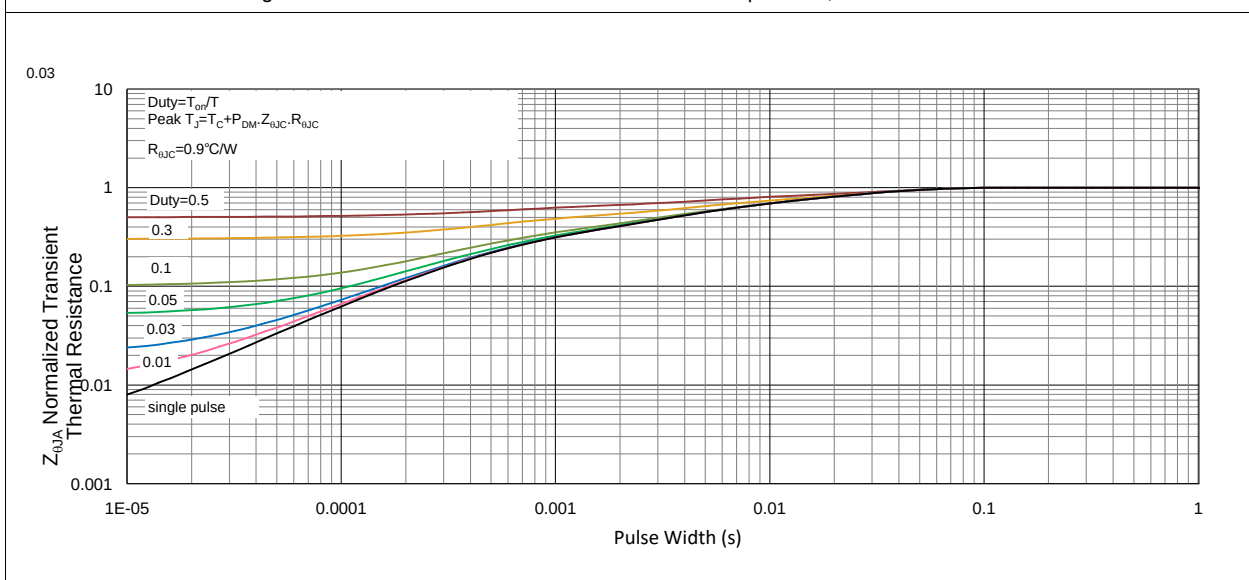
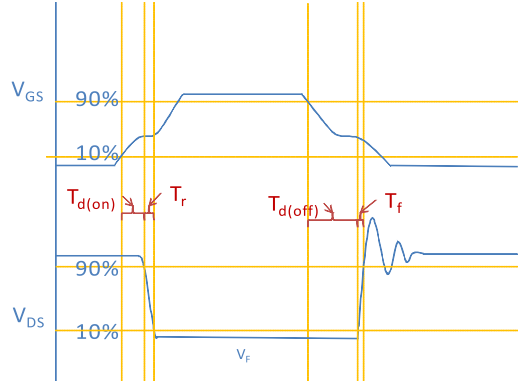
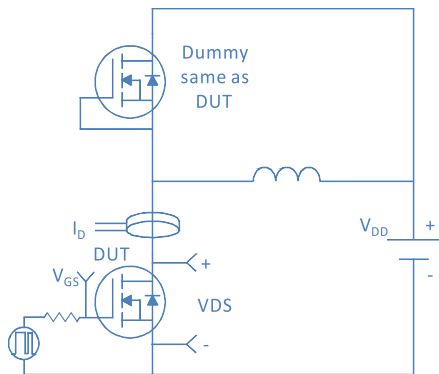


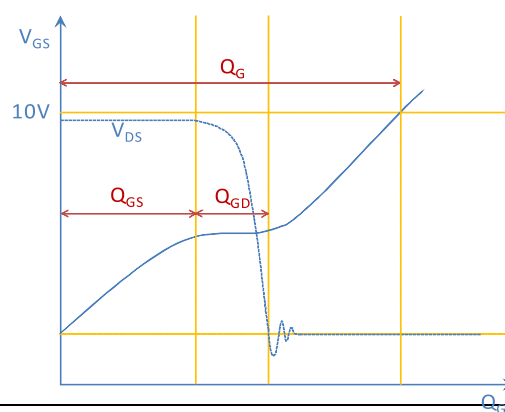
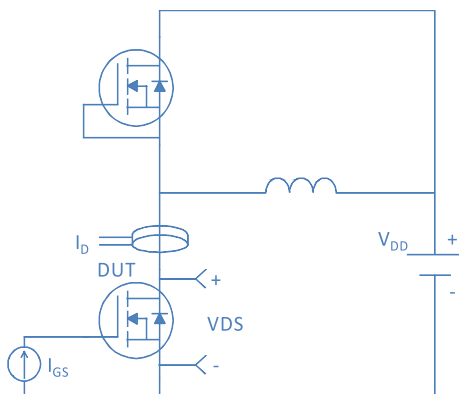
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient



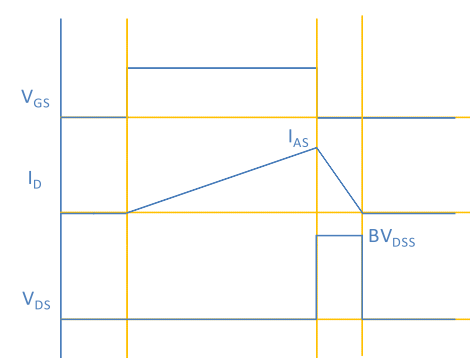
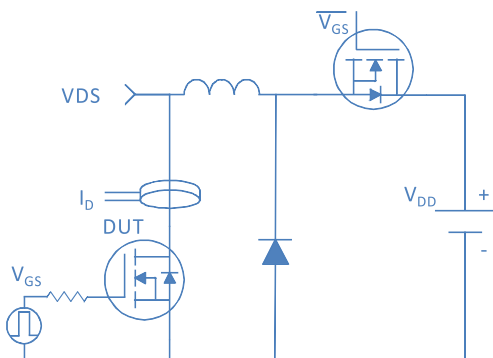
### Inductive switching Test



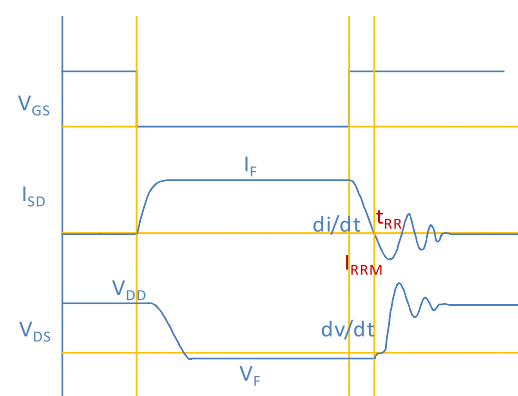
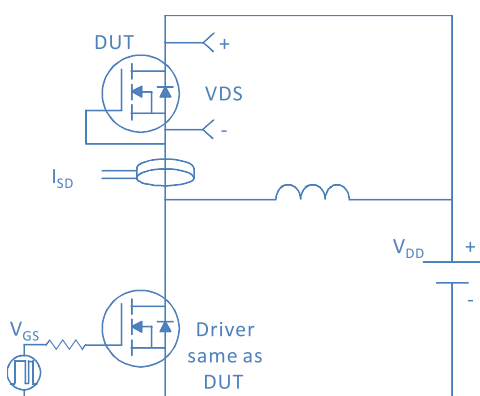
### Gate Charge Test



### Uclamped Inductive Switching (UIS) Test

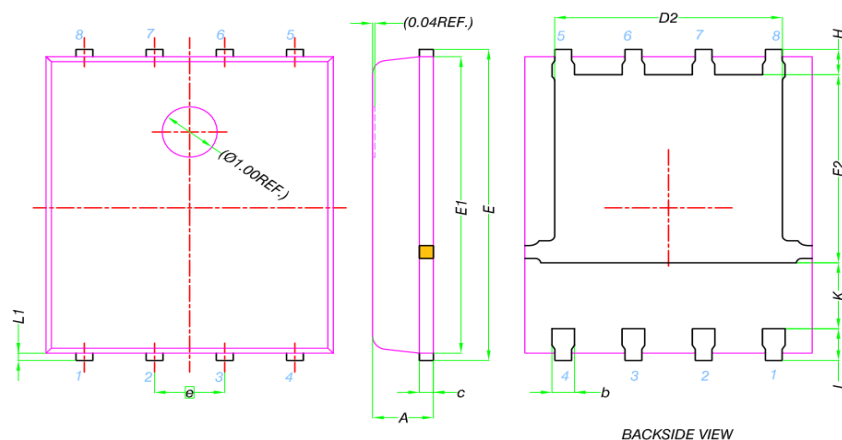


### Diode Recovery Test



## Package Outline

**DFN5x6\_P, 8 Leads**



| DIM. | MILLIMETERS |      |      |
|------|-------------|------|------|
|      | MIN.        | NOM. | MAX. |
| A    | 1.00        | 1.10 | 1.20 |
| A1   | 0           | ---  | 0.05 |
| b    | 0.33        | 0.40 | 0.50 |
| c    | 0.20        | 0.25 | 0.30 |
| D1   | 5.00        | 5.20 | 5.40 |
| D2   | 3.80        | 4.10 | 4.25 |
| E    | 6.00        | 6.15 | 6.30 |
| E1   | 5.76        | 5.86 | 5.96 |
| E2   | 3.52        | 3.72 | 3.92 |
| e    | 1.27 BSC    |      |      |
| H    | 0.40        | 0.50 | 0.60 |
| K    | 1.10        | ---  | ---  |
| L    | 0.50        | 0.60 | 0.70 |
| L1   | 0.08        | 0.15 | 0.22 |
| CE   | 0°          | ---  | 12°  |

