

## 65V N-Ch Power MOSFET

### Features:

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

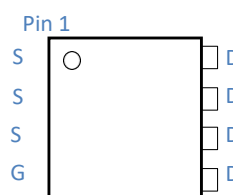
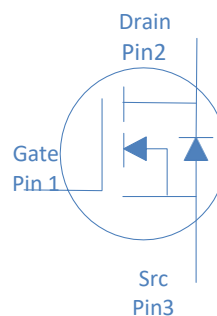
### Application:

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

| Part Number   | Package | Marking    |
|---------------|---------|------------|
| KPRGN090NE6AL | DFN5*6  | GN090NE6AL |

|                         |               |      |            |
|-------------------------|---------------|------|------------|
| $V_{DS}$                |               | 65   | V          |
| $R_{DS(on),typ}$        | $V_{GS}=10V$  | 7.5  | m $\Omega$ |
| $R_{DS(on),typ}$        | $V_{GS}=4.5V$ | 10.5 | m $\Omega$ |
| $I_D$ (Silicon Limited) |               | 55   | A          |
| $I_D$ (Package Limited) |               | 30   | A          |

DFN5\*6



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

| Parameter                                  | Symbol         | Conditions                               | Value      | Unit               |
|--------------------------------------------|----------------|------------------------------------------|------------|--------------------|
| Continuous Drain Current (Silicon Limited) | $I_D$          | $T_C=25^{\circ}\text{C}$                 | 55         | A                  |
|                                            |                | $T_C=100^{\circ}\text{C}$                | 35         |                    |
|                                            |                | $T_C=25^{\circ}\text{C}$                 | 30         |                    |
| Continuous Drain Current (Silicon Limited) |                | $T_C=25^{\circ}\text{C}$                 | 30         |                    |
| Drain to Source Voltage                    | $V_{DS}$       | -                                        | 65         | V                  |
| Gate to Source Voltage                     | $V_{GS}$       | -                                        | $\pm 20$   | V                  |
| Pulsed Drain Current                       | $I_{DM}$       | -                                        | 270        | A                  |
| Avalanche Energy, Single Pulse             | $E_{AS}$       | $L=0.4\text{mH}, T_C=25^{\circ}\text{C}$ | 45         | mJ                 |
| Power Dissipation                          | $P_D$          | $T_C=25^{\circ}\text{C}$                 | 50         | 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    | $R_{\theta JC}$ | 2.5 | $^{\circ}\text{C/W}$ |

**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 | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                        | 65    | -    | -         | V          |
| Gate Threshold Voltage            | $V_{GS(th)}$  | $V_{GS}=V_{DS}, I_D=250\mu A$                    | 1.0   | 1.6  | 2.4       |            |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{GS}=0V, V_{DS}=60V, T_j=25^{\circ}\text{C}$  | -     | -    | 1         | $\mu A$    |
|                                   |               | $V_{GS}=0V, V_{DS}=60V, T_j=100^{\circ}\text{C}$ | -     | -    | 100       |            |
| Gate to Source Leakage Current    | $I_{GSS}$     | $V_{GS}=\pm 20V, V_{DS}=0V$                      | -     | -    | $\pm 100$ | nA         |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=10V, I_D=10A$                            | -     | 7.5  | 9         | m $\Omega$ |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=4.5V, I_D=5A$                            | -     | 10.5 | 13        | m $\Omega$ |
| Transconductance                  | $g_{fs}$      | $V_{DS}=5V, I_D=10A$                             | -     | 29   | -         | S          |
| Gate Resistance                   | $R_G$         | $V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$        | -     | 1.4  | -         | $\Omega$   |

**Dynamic Characteristics**

|                               |              |                                                  |   |      |   |    |
|-------------------------------|--------------|--------------------------------------------------|---|------|---|----|
| Input Capacitance             | $C_{iss}$    | $V_{GS}=0V, V_{DS}=30V, f=1\text{MHz}$           | - | 1170 | - | pF |
| Output Capacitance            | $C_{oss}$    |                                                  | - | 518  | - |    |
| Reverse Transfer Capacitance  | $C_{rss}$    |                                                  | - | 31   | - |    |
| Total Gate Charge             | $Q_g(10V)$   | $V_{DD}=30V, I_D=10A, V_{GS}=10V$                | - | 20.5 | - | nC |
| Total Gate Charge             | $Q_g(4.5V)$  |                                                  | - | 10.5 | - |    |
| Gate to Source Charge         | $Q_{gs}$     |                                                  | - | 2.5  | - |    |
| Gate to Drain (Miller) Charge | $Q_{gd}$     |                                                  | - | 5.5  | - |    |
| Turn on Delay Time            | $t_{d(on)}$  | $V_{DD}=30V, I_D=10A, V_{GS}=10V, R_G=10\Omega,$ | - | 7    | - | ns |
| Rise time                     | $t_r$        |                                                  | - | 4    | - |    |
| Turn off Delay Time           | $t_{d(off)}$ |                                                  | - | 22   | - |    |
| Fall Time                     | $t_f$        |                                                  | - | 5    | - |    |

**Reverse Diode Characteristics**

|                         |          |                                        |   |     |     |    |
|-------------------------|----------|----------------------------------------|---|-----|-----|----|
| Diode Forward Voltage   | $V_{SD}$ | $V_{GS}=0V, I_F=20A$                   | - | 0.9 | 1.2 | V  |
| Reverse Recovery Time   | $t_{rr}$ | $V_R=30V, I_F=10A, dI_F/dt=100A/\mu s$ | - | 33  | -   | ns |
| Reverse Recovery Charge | $Q_{rr}$ |                                        | - | 24  | -   | nC |

Fig 1. Typical Output Characteristics

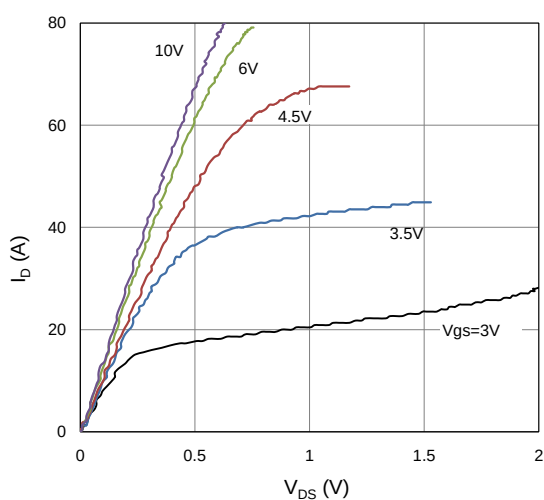


Figure 2. On-Resistance vs. Gate-Source Voltage

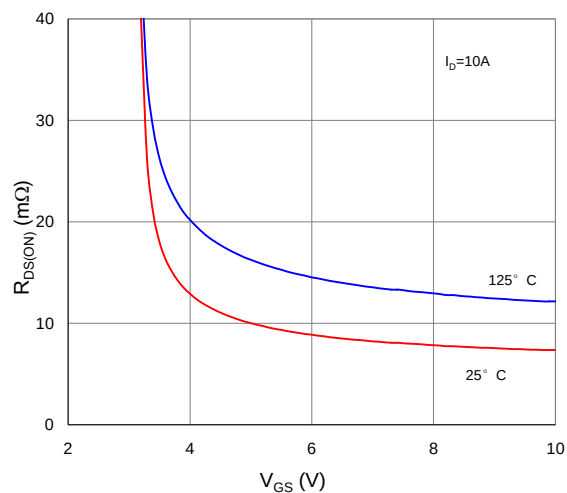


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

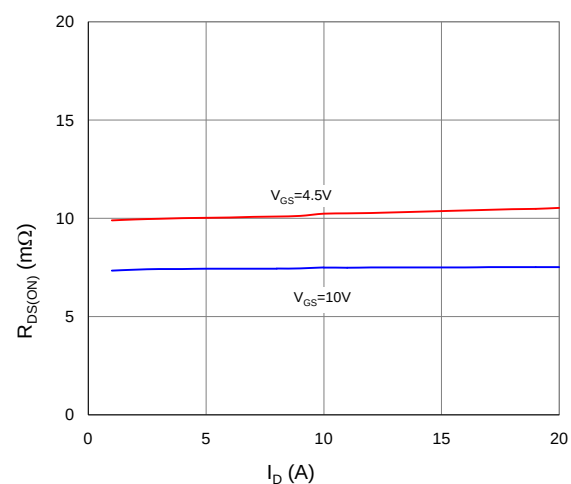


Figure 4. Normalized On-Resistance vs. Junction Temperature

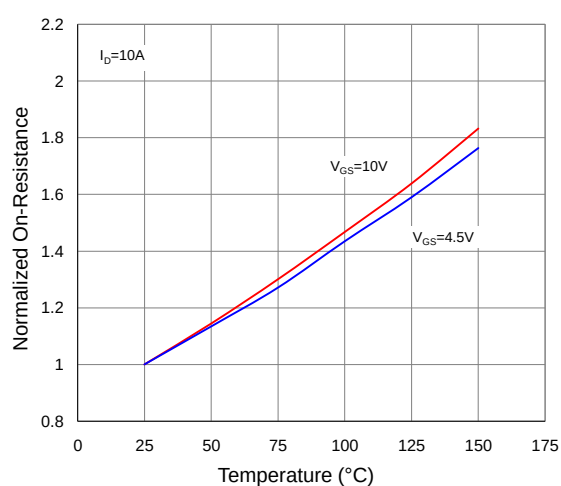


Figure 5. Typical Transfer Characteristics

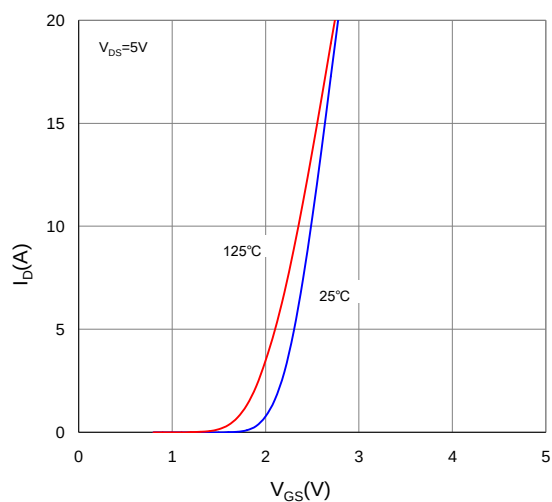


Figure 6. Typical Source-Drain Diode Forward Voltage

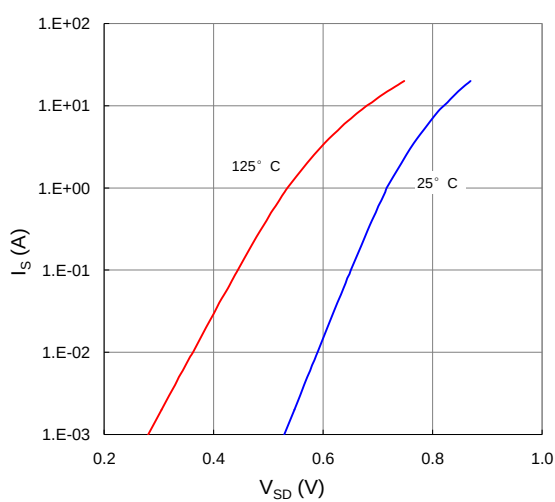


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

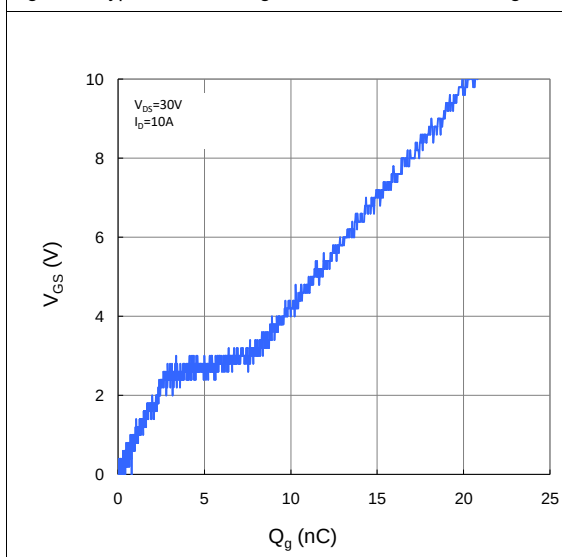


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

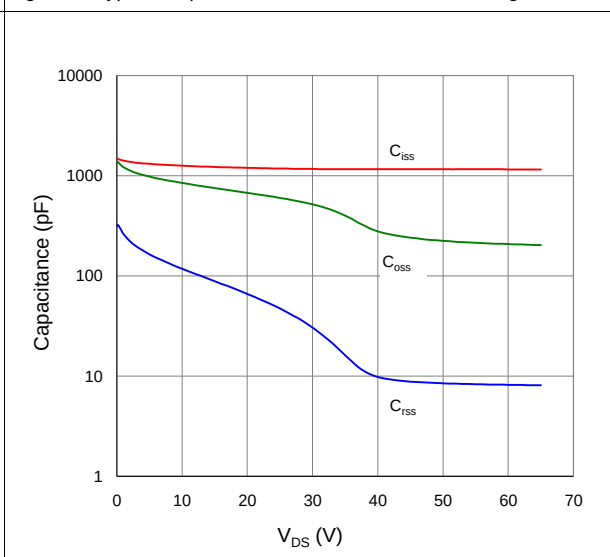


Figure 9. Maximum Safe Operating Area

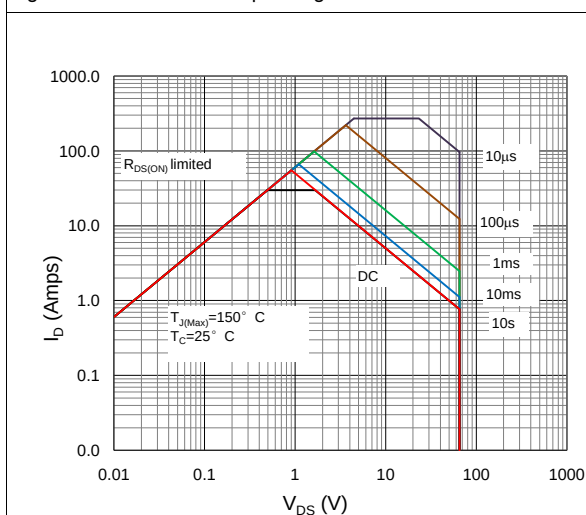


Figure 10. Maximum Drain Current vs. Case Temperature

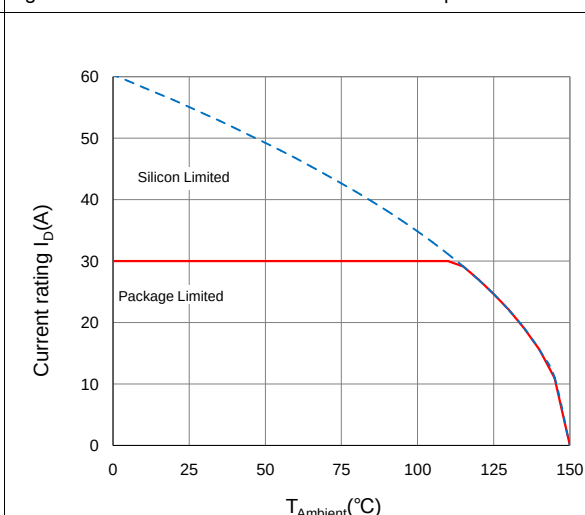
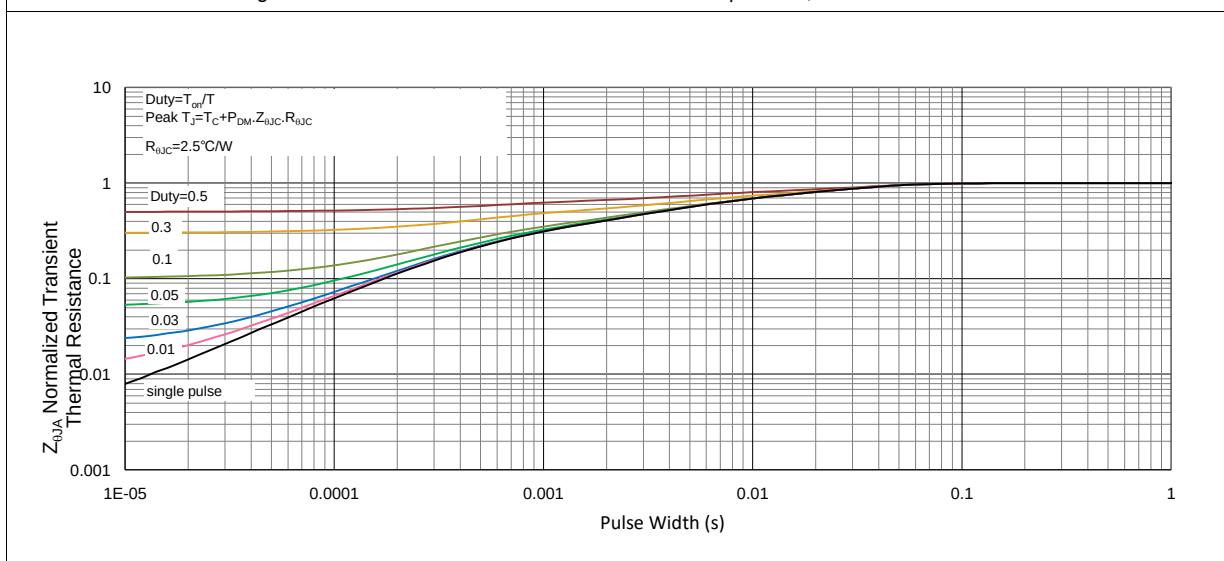
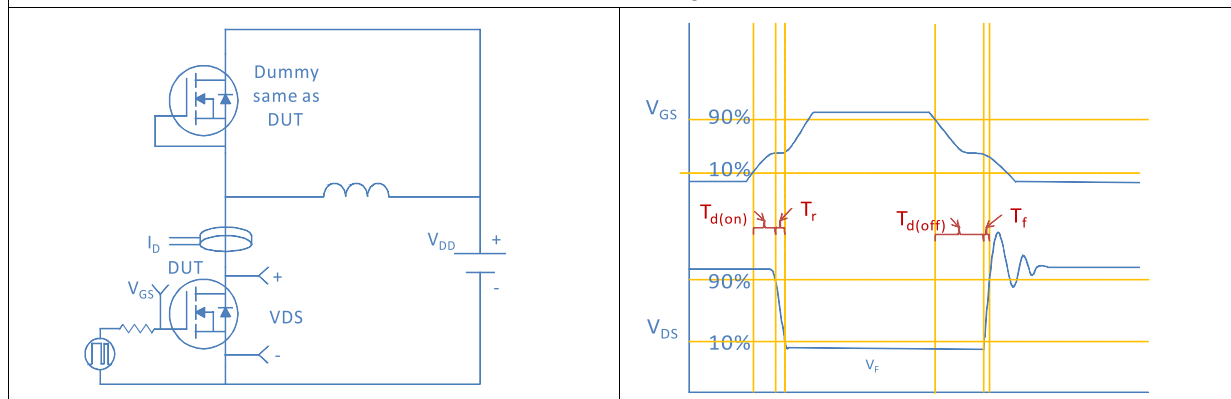


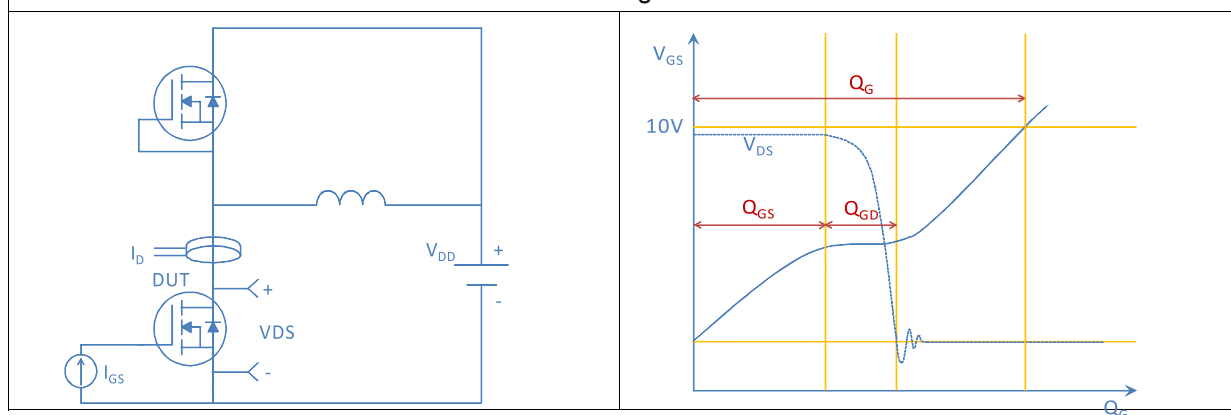
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient



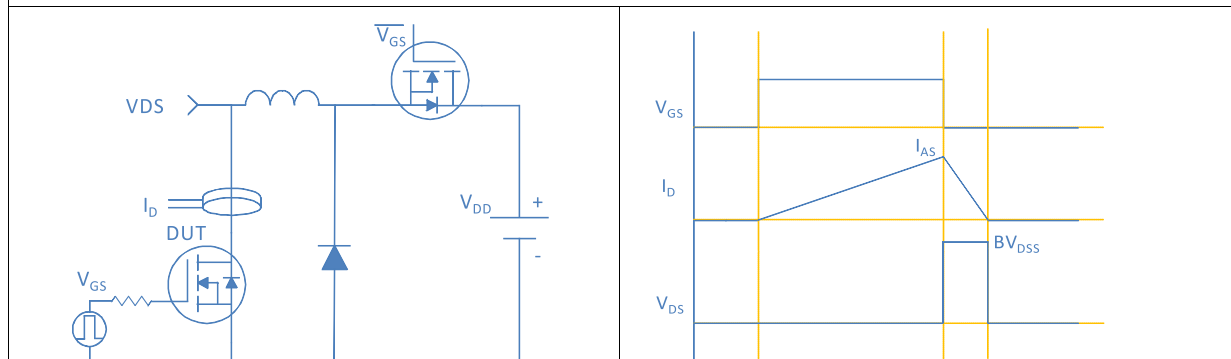
### Inductive switching Test



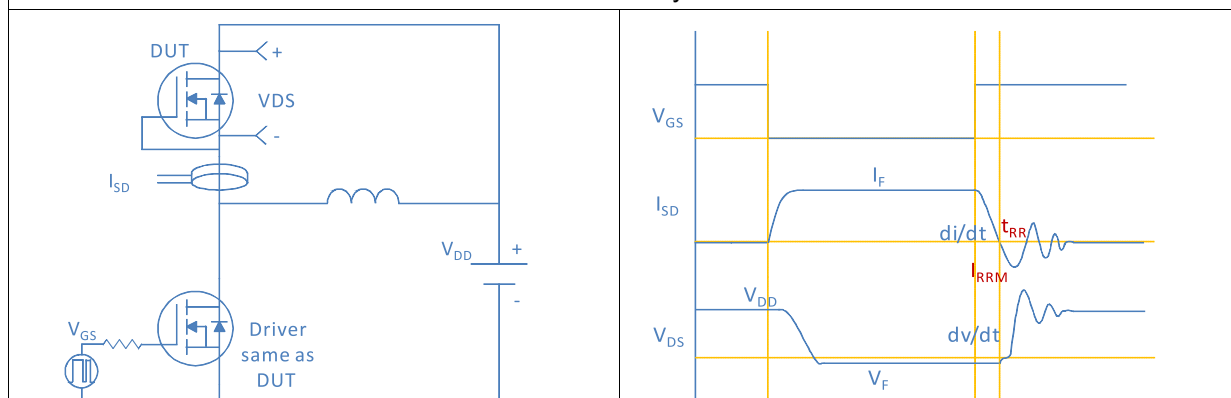
### Gate Charge Test



### Uclamped Inductive Switching (UIS) Test

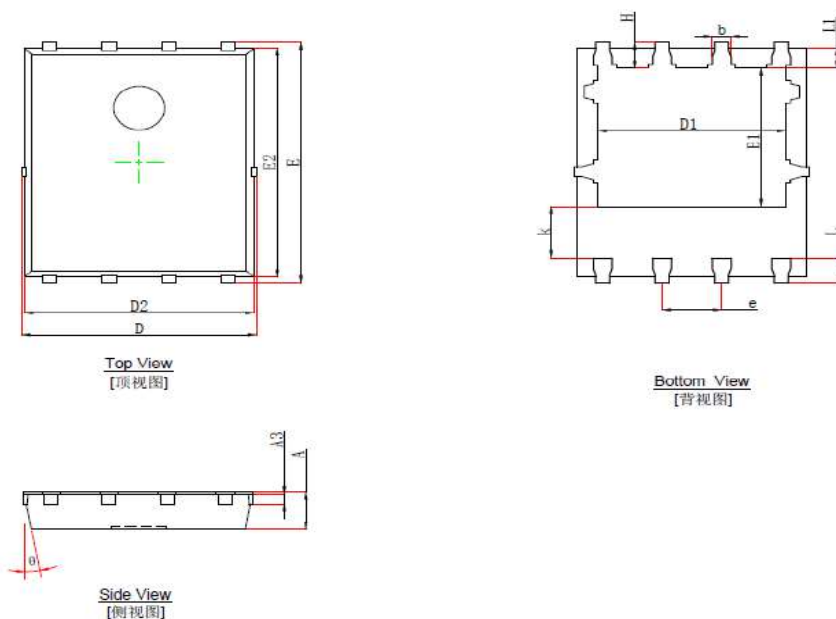


### Diode Recovery Test



## Package Outline

### DFN5x6\_P, 8 Leads



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.100 | 0.035                | 0.043 |
| A3     | 0.254 REF                 |       | 0.010 REF            |       |
| D      | 4.680                     | 5.120 | 0.184                | 0.202 |
| E      | 5.900                     | 6.126 | 0.232                | 0.241 |
| D1     | 3.610                     | 4.110 | 0.142                | 0.162 |
| E1     | 3.380                     | 3.780 | 0.133                | 0.149 |
| D2     | 4.800                     | 5.000 | 0.189                | 0.197 |
| E2     | 5.674                     | 5.826 | 0.223                | 0.229 |
| k      | 1.100                     | 1.390 | 0.043                | 0.055 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| e      | 1.270 TYP                 |       | 1.270 TYP            |       |
| L      | 0.510                     | 0.711 | 0.020                | 0.028 |
| L1     | 0.424                     | 0.576 | 0.017                | 0.023 |
| H      | 0.410                     | 0.726 | 0.016                | 0.029 |
| θ      | 0°                        | 12°   | 0°                   | 12°   |