

150V N-Ch Power MOSFET

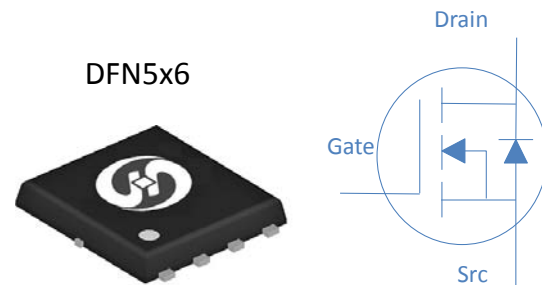
Feature

- ◇ Optimized for high speed smooth switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free, Halogen Free

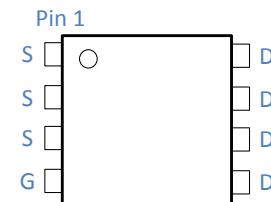
Application

- ◇ DC-DC Conversion
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ SSR

| | | |
|-------------------------|-----|----|
| V_{DS} | 150 | V |
| $R_{DS(on),typ}$ | 15 | mΩ |
| $R_{DS(on),max}$ | 19 | mΩ |
| I_D (Silicon Limited) | 60 | A |
| I_D (Package Limited) | 60 | A |



| Part Number | Package | Marking |
|-------------|---------|-----------|
| HGN190N15S | DFN5x6 | GN190N15S |



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 | $T_C=25^\circ\text{C}$ | 60 | A |
| | | $T_C=100^\circ\text{C}$ | 38 | |
| | | Continuous Drain Current (Package Limited) | $T_C=25^\circ\text{C}$ | |
| Drain to Source Voltage | V_{DS} | - | 150 | V |
| Gate to Source Voltage | V_{GS} | - | ± 20 | V |
| Pulsed Drain Current | I_{DM} | - | 120 | A |
| Avalanche Energy, Single Pulse | E_{AS} | $L=0.3\text{mH}, T_C=25^\circ\text{C}$ | 184 | mJ |
| Power Dissipation | P_D | $T_C=25^\circ\text{C}$ | 125 | 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-Case | $R_{\theta JC}$ | 1 | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 50 | $^\circ\text{C/W}$ |

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 | μA |
| | | $V_{GS}=0V, V_{DS}=150V, T_j=100^\circ\text{C}$ | - | - | 100 | |
| Gate to Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A$ | - | 15 | 19 | $m\Omega$ |
| Transconductance | g_{fs} | $V_{DS}=5V, I_D=20A$ | - | 50 | - | S |
| Gate Resistance | R_G | $V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$ | - | 3.5 | - | Ω |

Dynamic Characteristics

| | | | | | | |
|-------------------------------|--------------|--|---|------|---|---------|
| Input Capacitance | C_{iss} | $V_{GS}=0V, V_{DS}=75V, f=1\text{MHz}$ | - | 2275 | - | μF |
| Output Capacitance | C_{oss} | | - | 165 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 5.5 | - | |
| Total Gate Charge | Q_g | $V_{DD}=75V, I_D=20A, V_{GS}=10V$ | - | 27 | - | nC |
| Gate to Source Charge | Q_{gs} | | - | 9 | - | |
| Gate to Drain (Miller) Charge | Q_{gd} | | - | 2 | - | |
| Turn on Delay Time | $t_{d(on)}$ | $V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=10\Omega,$ | - | 12 | - | ns |
| Rise time | t_r | | - | 4 | - | |
| Turn off Delay Time | $t_{d(off)}$ | | - | 24 | - | |
| 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} | $V_R=75V, I_F=20A, dI_F/dt=100A/\mu s$ | - | 90 | - | ns |
| Reverse Recovery Charge | Q_{rr} | | - | 234 | - | nC |

Fig 1. Typical Output Characteristics

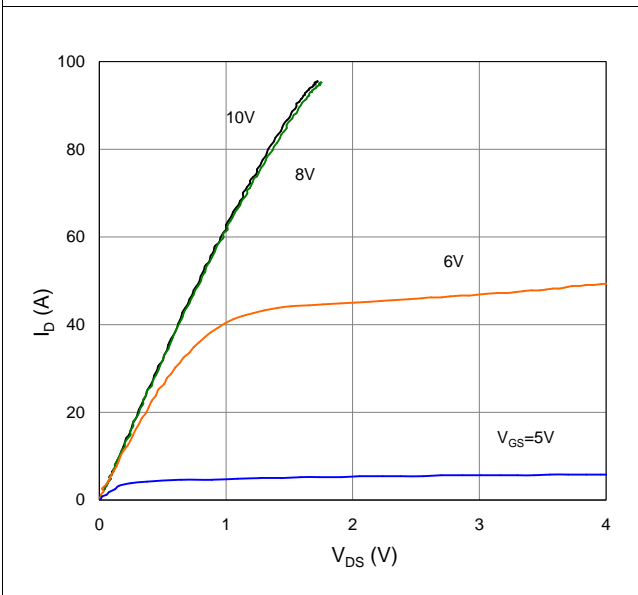


Figure 2. On-Resistance vs. Gate-Source Voltage

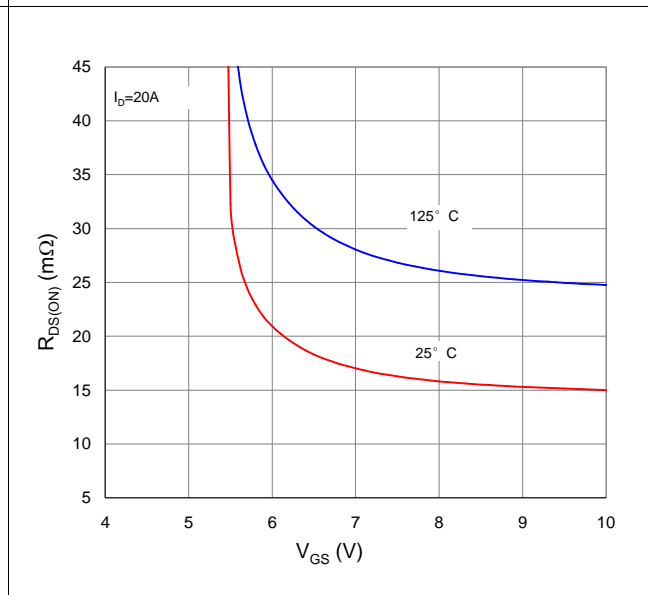


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

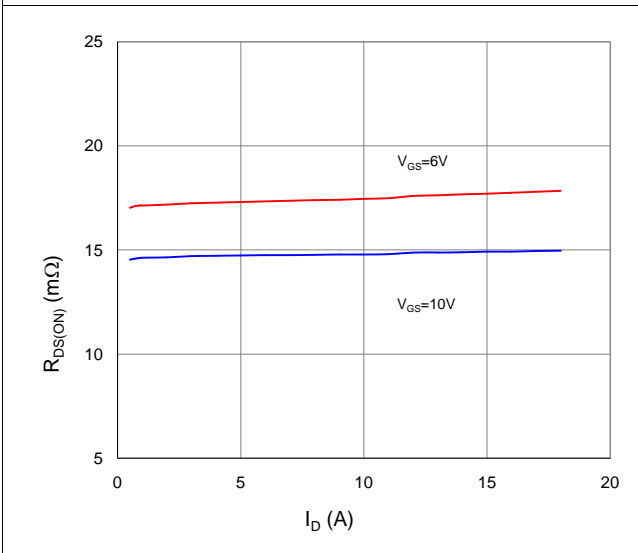


Figure 4. Normalized On-Resistance vs. Junction Temperature

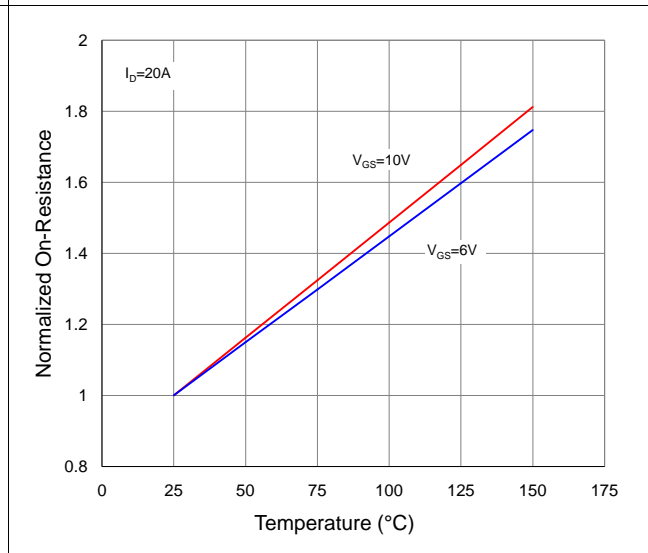


Figure 5. Typical Transfer Characteristics

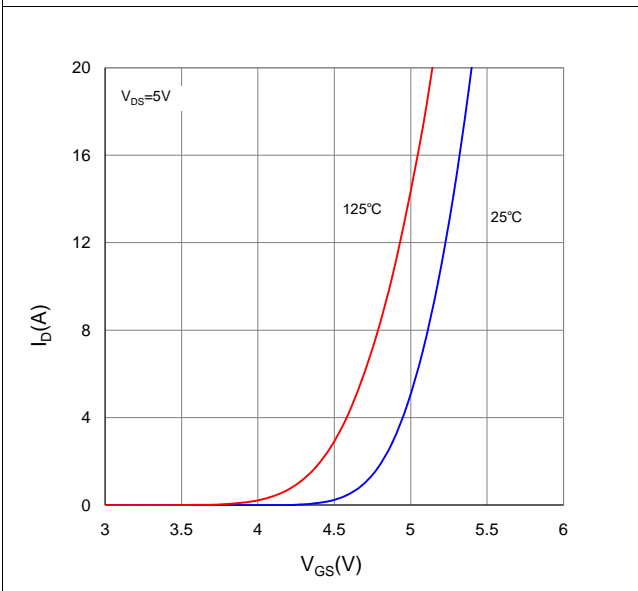


Figure 6. Typical Source-Drain Diode Forward Voltage

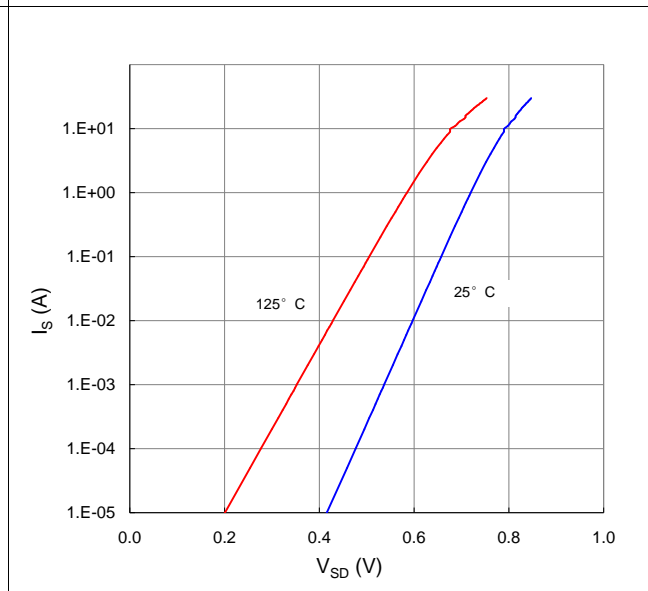


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

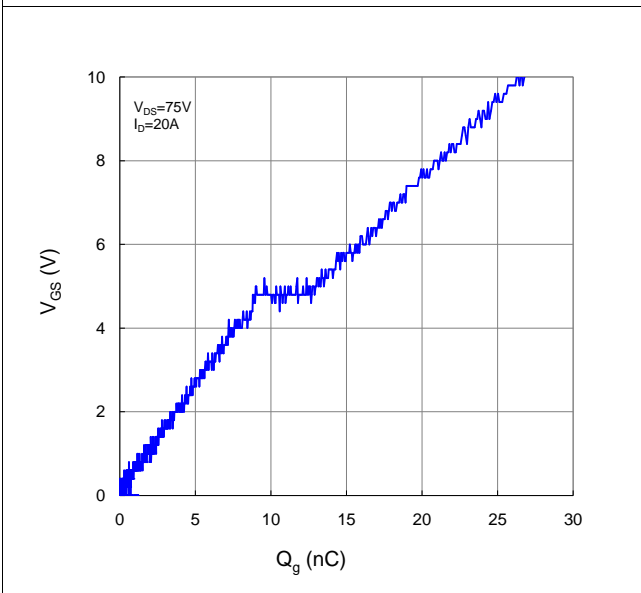


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

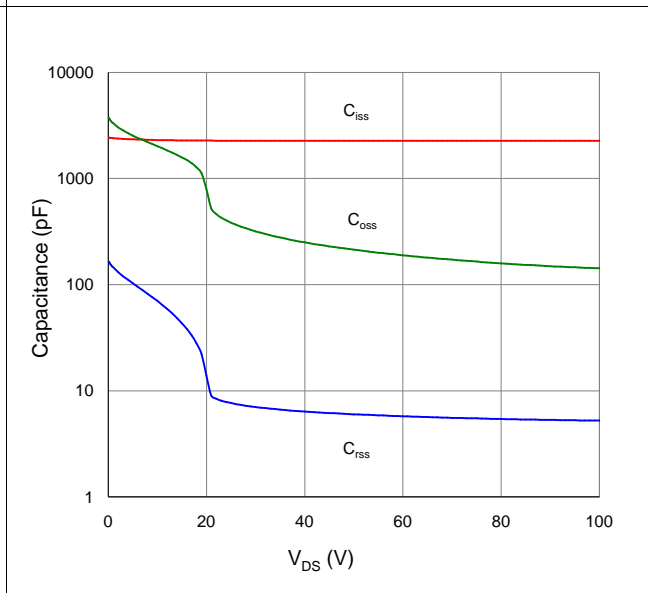


Figure 9. Maximum Safe Operating Area

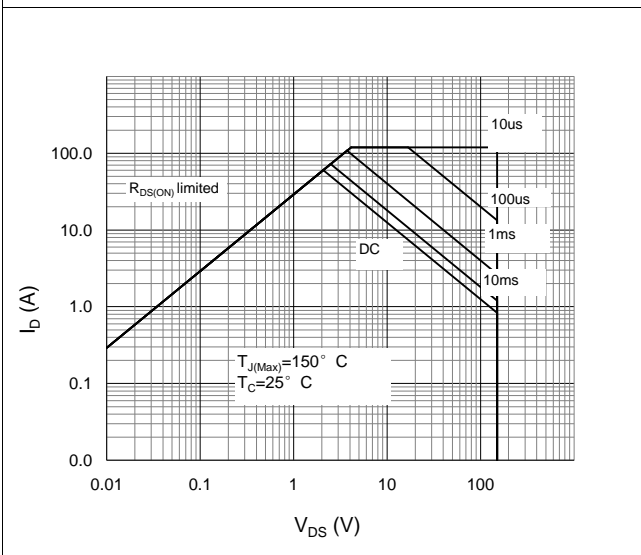


Figure 10. Maximum Drain Current vs. Case Temperature

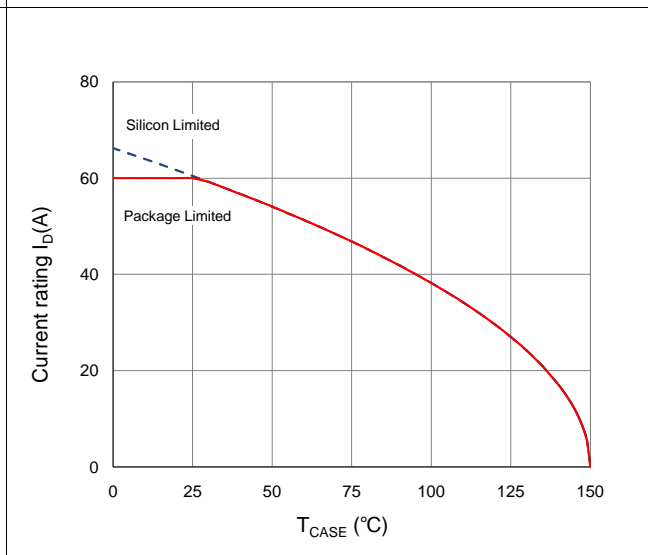
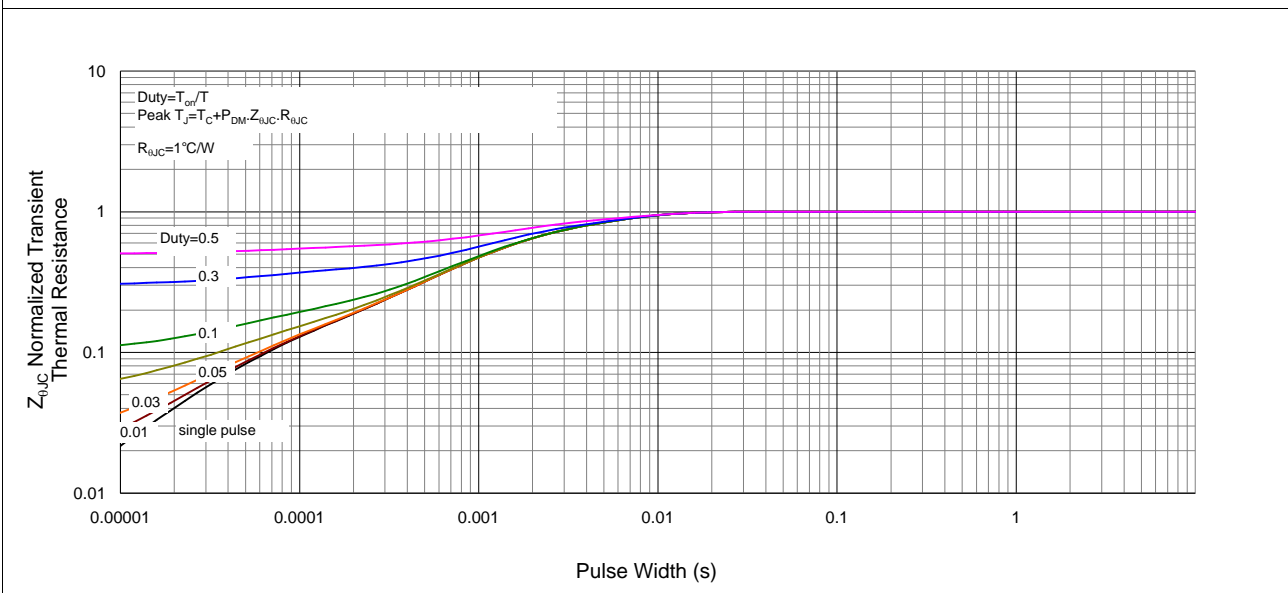
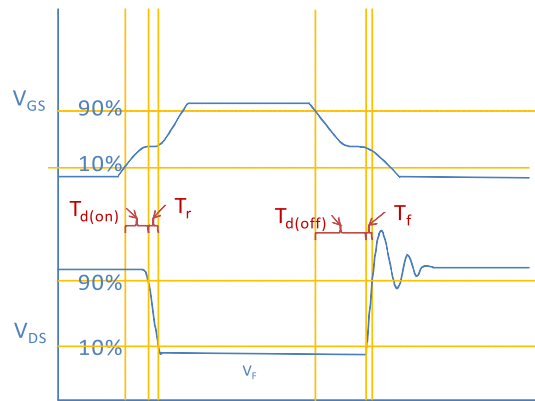
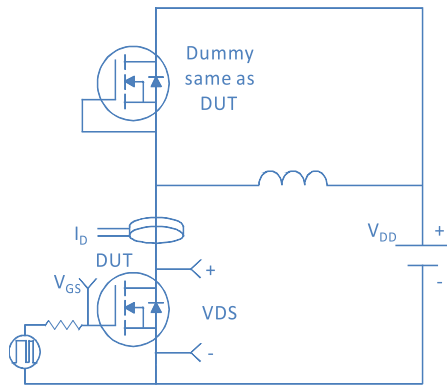


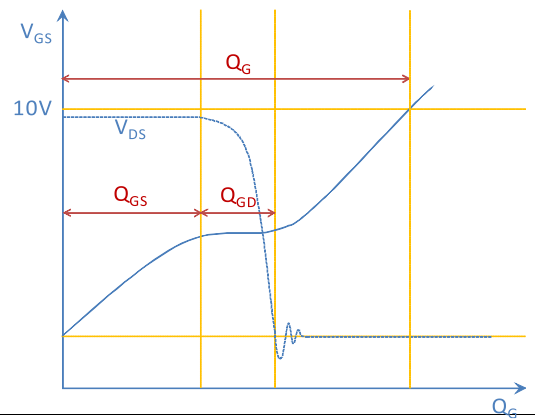
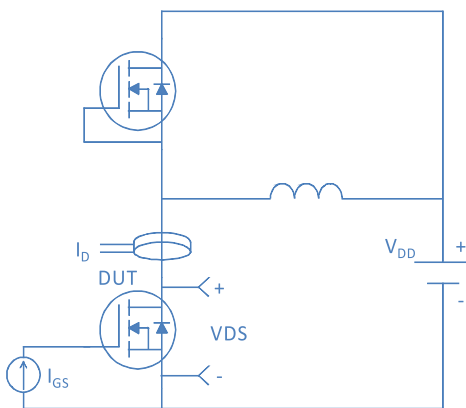
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



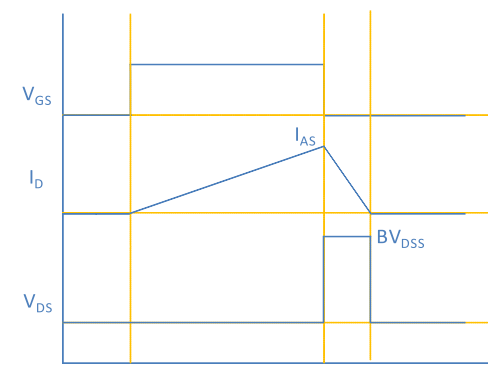
Inductive switching Test



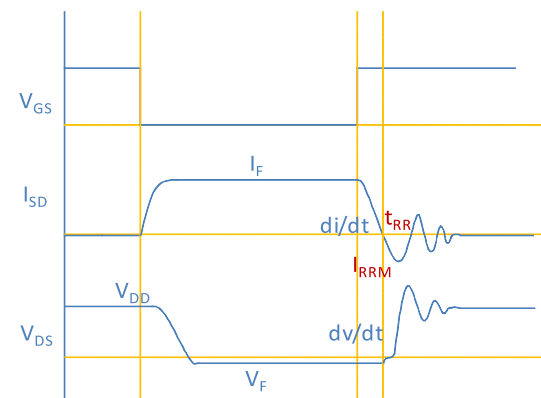
Gate Charge Test



Uclamped Inductive Switching (UIS) Test

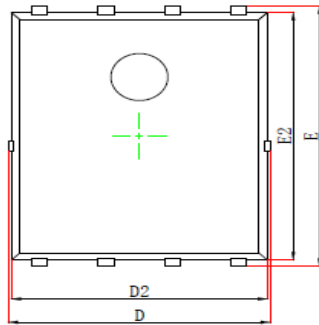


Diode Recovery Test

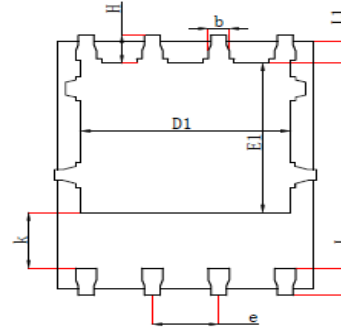


Package Outline

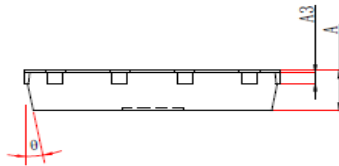
DFN5x6_P, 8 Leads



Top View
[顶视图]



Bottom View
[背视图]



Side View
[侧视图]

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 0.900 | 1.100 | 0.035 | 0.043 |
| A3 | 0.254 REF | | 0.010REF | |
| 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 | 1.270TYP | | 1.270TYP | |
| 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° |