

65V N-Ch Power MOSFET
Feature

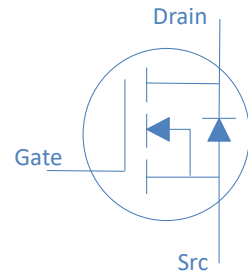
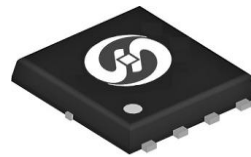
- ◇ High Speed Power Switching, Logic level
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free, Halogen Free

| | | | |
|-------------------------|---------------|-----|------------|
| V_{DS} | | 65 | V |
| $R_{DS(on),typ}$ | $V_{GS}=10V$ | 3.8 | m Ω |
| $R_{DS(on),typ}$ | $V_{GS}=4.5V$ | 5.6 | m Ω |
| I_D (Silicon Limited) | | 95 | A |
| I_D (Package Limited) | | 45 | A |

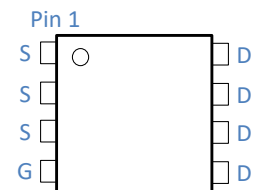
Application

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

DFN5*6



| Part Number | Package | Marking |
|-------------|---------|------------|
| HGN046NE6AL | DFN5*6 | GN046NE6AL |


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

| Parameter | Symbol | Conditions | Value | Unit |
|--|----------------|----------------------------|------------|-------------|
| Continuous Drain Current (Silicon Limited) | I_D | $T_C=25^{\circ}C$ | 95 | A |
| | | $T_C=100^{\circ}C$ | 60 | |
| | | $T_C=25^{\circ}C$ | 45 | |
| Continuous Drain Current (Package Limited) | | $T_C=25^{\circ}C$ | 45 | |
| Drain to Source Voltage | V_{DS} | - | 65 | V |
| Gate to Source Voltage | V_{GS} | - | ± 20 | V |
| Pulsed Drain Current | I_{DM} | - | 340 | A |
| Avalanche Energy, Single Pulse | E_{AS} | $L=0.1mH, T_C=25^{\circ}C$ | 31 | mJ |
| Power Dissipation | P_D | $T_C=25^{\circ}C$ | 74 | W |
| Operating and Storage Temperature | T_J, T_{stg} | - | -55 to 150 | $^{\circ}C$ |

Absolute Maximum Ratings

| Parameter | Symbol | Max | Unit |
|-------------------------------------|-----------------|-----|---------------|
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 50 | $^{\circ}C/W$ |
| Thermal Resistance Junction-Case | $R_{\theta JC}$ | 1.7 | $^{\circ}C/W$ |

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 | μA |
| | | $V_{GS}=0V, V_{DS}=60V, T_j=100^\circ\text{C}$ | - | - | 100 | |
| Gate to Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=20A$ | - | 3.8 | 4.6 | $m\Omega$ |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}=4.5V, I_D=10A$ | - | 5.6 | 7 | $m\Omega$ |
| Transconductance | g_{fs} | $V_{DS}=5V, I_D=20A$ | - | 60 | - | S |
| Gate Resistance | R_G | $V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$ | - | 1.3 | - | Ω |

Dynamic Characteristics

| | | | | | | |
|-------------------------------|--------------|---|---|------|---|------|
| Input Capacitance | C_{iss} | $V_{GS}=0V, V_{DS}=30V, f=1\text{MHz}$ | - | 1978 | - | pF |
| Output Capacitance | C_{oss} | | - | 870 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 56 | - | |
| Total Gate Charge | $Q_g(10V)$ | $V_{DD}=30V, I_D=20A, V_{GS}=10V$ | - | 41 | - | nC |
| Total Gate Charge | $Q_g(4.5V)$ | | - | 25 | - | |
| Gate to Source Charge | Q_{gs} | | - | 5 | - | |
| Gate to Drain (Miller) Charge | Q_{gd} | | - | 11 | - | |
| Turn on Delay Time | $t_{d(on)}$ | $V_{DD}=30V, I_D=20A, V_{GS}=10V,$ $R_G=10\Omega,$ | - | 10 | - | ns |
| Rise time | t_r | | - | 8 | - | |
| Turn off Delay Time | $t_{d(off)}$ | | - | 34 | - | |
| Fall Time | t_f | | - | 10 | - | |

Reverse Diode Characteristics

| | | | | | | |
|-------------------------|----------|--|---|-----|-----|----|
| Diode Forward Voltage | V_{SD} | $V_{GS}=0V, I_F=30A$ | - | 0.9 | 1.2 | V |
| Reverse Recovery Time | t_{rr} | $V_R=30V, I_F=20A, di_F/dt=400A/\mu s$ | - | 30 | - | ns |
| Reverse Recovery Charge | Q_{rr} | | - | 68 | - | nC |

Fig 1. Typical Output Characteristics

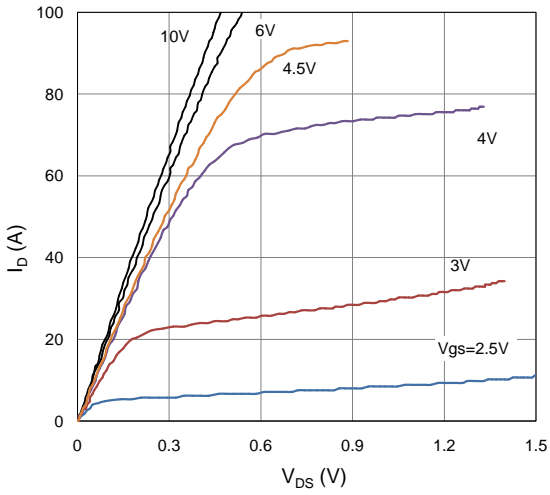


Figure 2. On-Resistance vs. Gate-Source Voltage

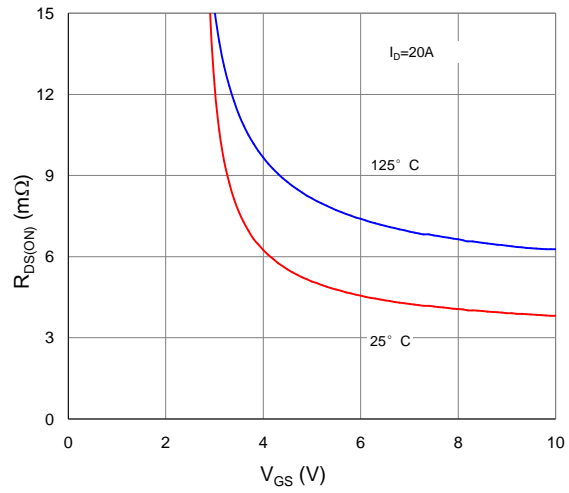


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

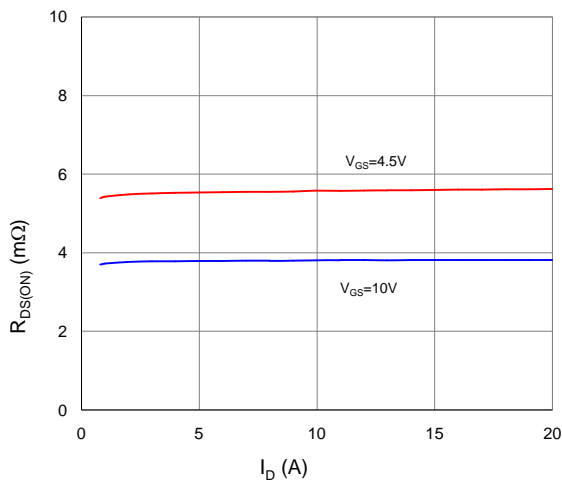


Figure 4. Normalized On-Resistance vs. Junction Temperature

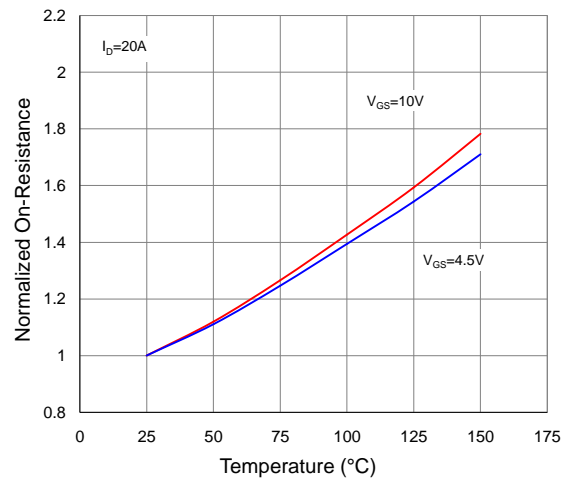


Figure 5. Typical Transfer Characteristics

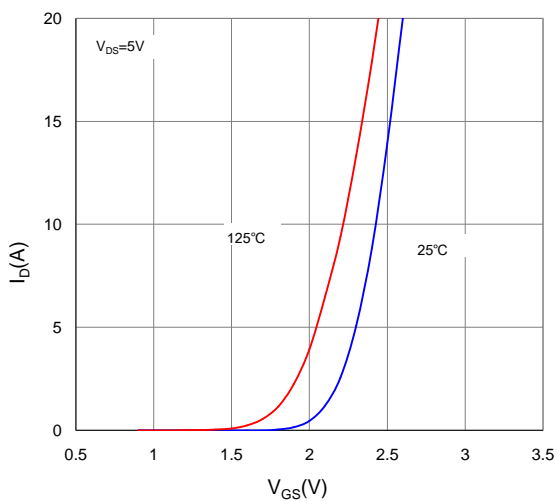


Figure 6. Typical Source-Drain Diode Forward Voltage

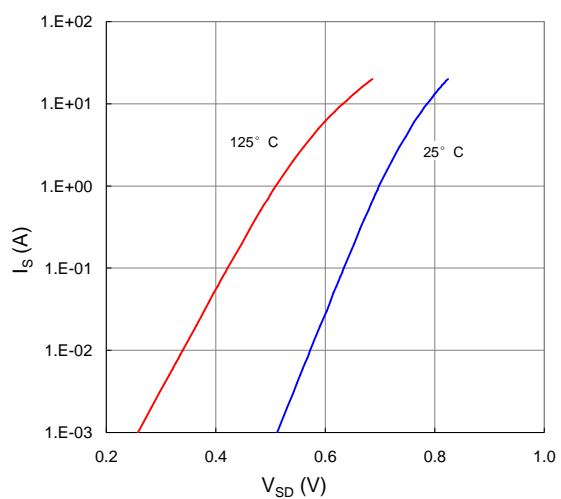


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

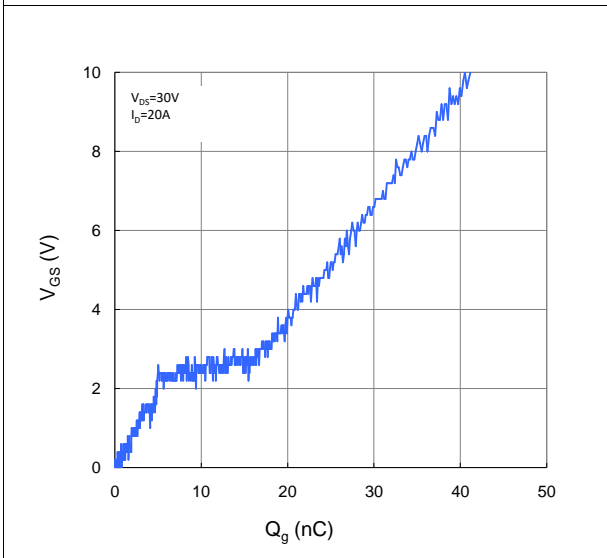


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

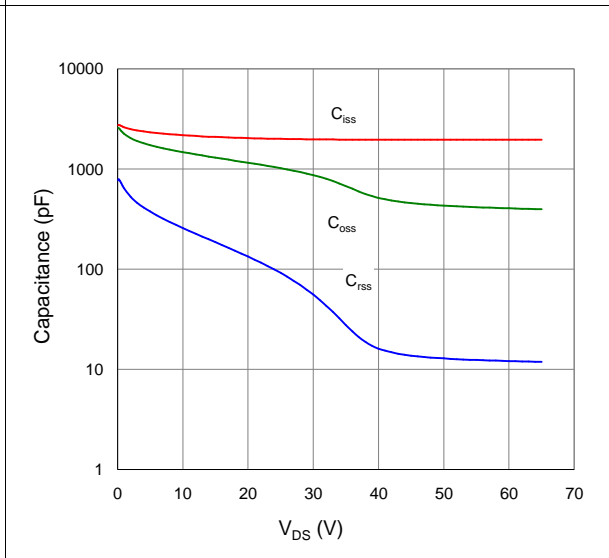


Figure 9. Maximum Safe Operating Area

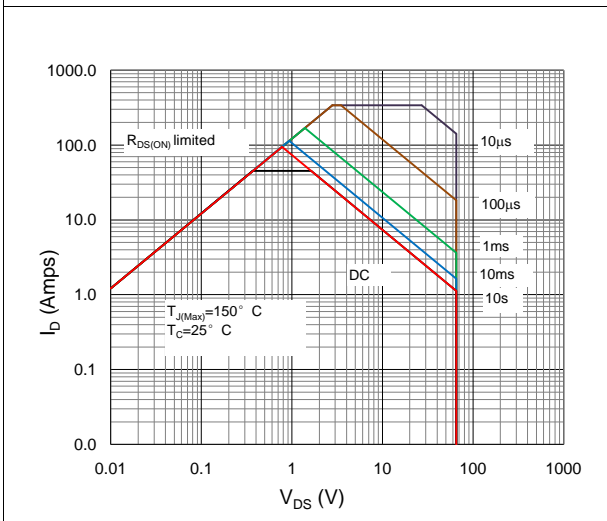


Figure 10. Maximum Drain Current vs. Case Temperature

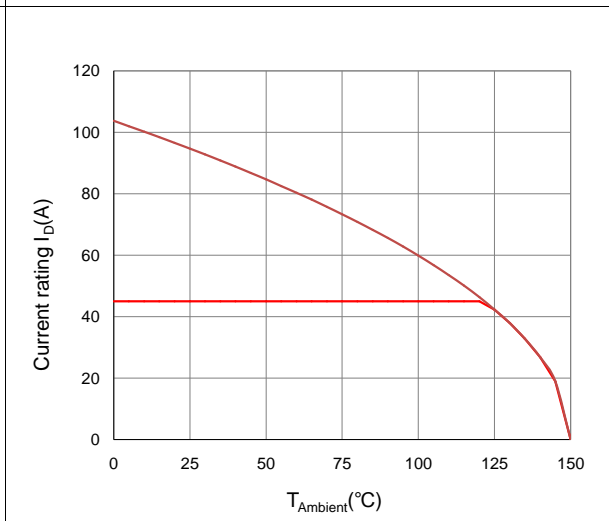
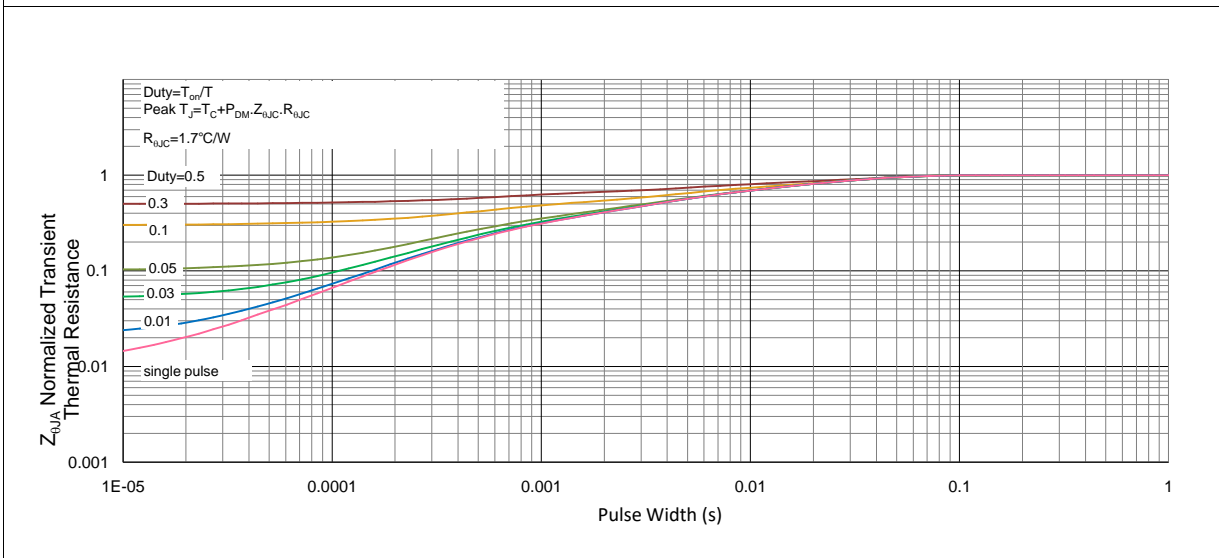
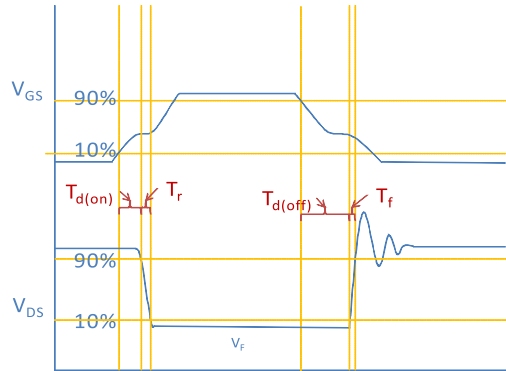
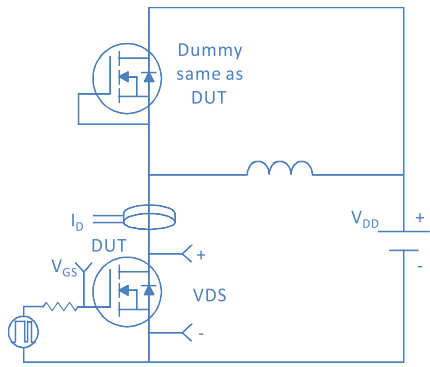


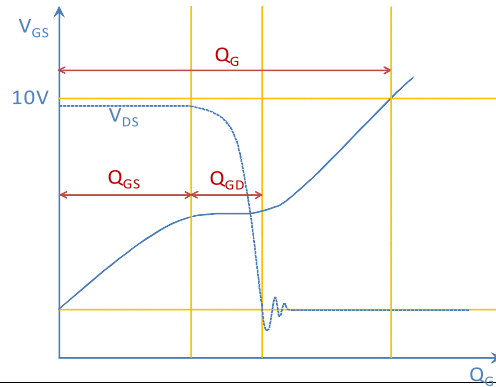
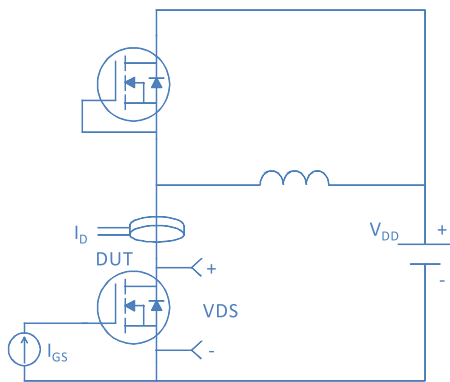
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient



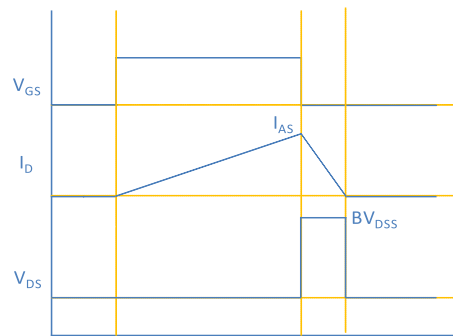
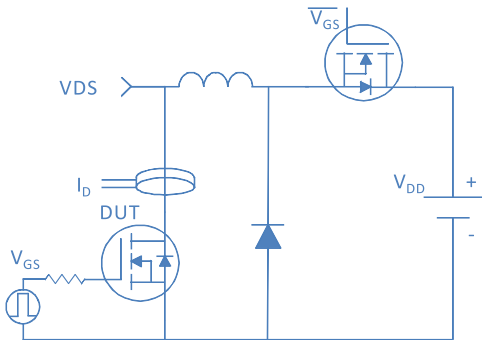
Inductive switching Test



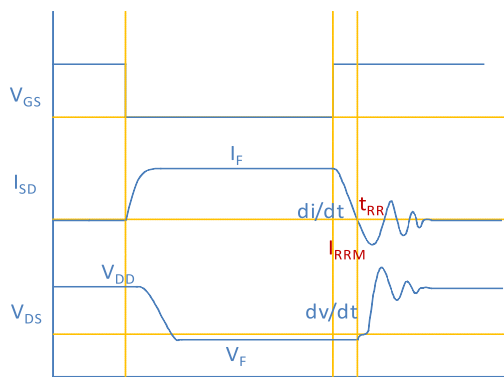
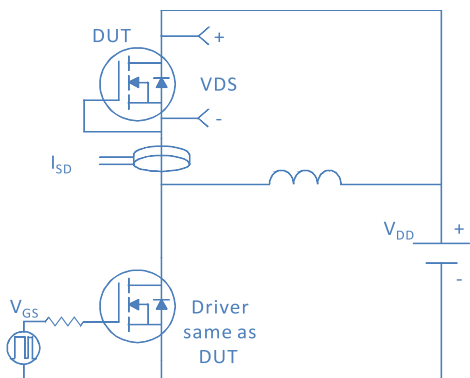
Gate Charge Test

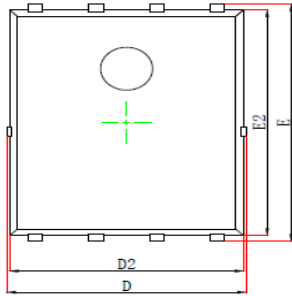
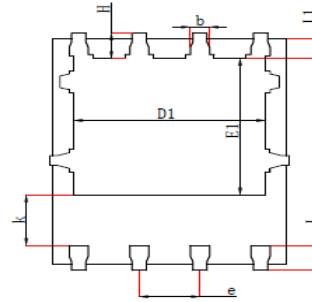
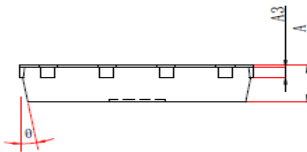


Uclamped Inductive Switching (UIS) Test



Diode Recovery Test



Package Outline
DFN5*6, 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 | | 0.010 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° |