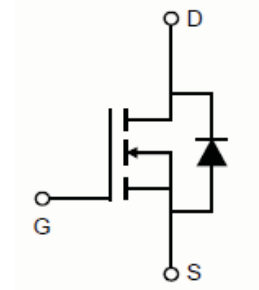


N-Channel Super Trench Power MOSFET

Description

The RM50N150DF uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(on)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.



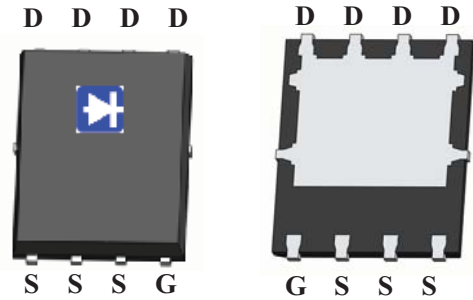
Schematic Diagram

General Features

- $V_{DS} = 150V, I_D = 50A$
 $R_{DS(on)} < 19m\Omega @ V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification



Top View

Bottom View

100% UIS TESTED!

100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|------------|----------------|-----------|------------|----------|
| 50N150 | RM50N150DF | DFN5X6-8L | - | - | - |

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|--------------------|------------|---------------|
| Drain-Source Voltage | V_{DS} | 150 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 50 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 35.4 | A |
| Pulsed Drain Current | I_{DM} | 200 | A |
| Maximum Power Dissipation | P_D | 100 | W |
| Derating factor | | 0.67 | W/ $^\circ C$ |
| Single pulse avalanche energy ^(Note 5) | E_{AS} | 210 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--|-----------------|-----|--------------|
| Thermal Resistance, Junction-to-Case ^(Note 2) | $R_{\theta JC}$ | 1.5 | $^\circ C/W$ |
|--|-----------------|-----|--------------|

Electrical Characteristics (T_C=25°C unless otherwise noted)

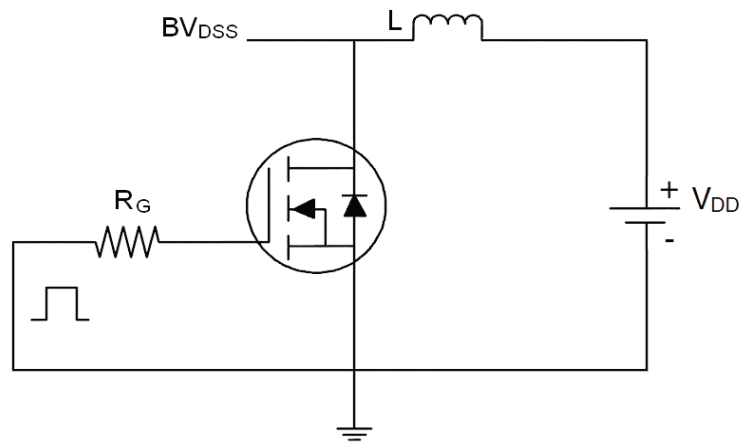
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------------|---|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =250μA | 150 | | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =150V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 2.5 | - | 4.5 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =30A | - | 14 | 19 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =10V, I _D =30A | - | 40 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V, V _{GS} =0V, F=1.0MHz | - | 5200 | - | PF |
| Output Capacitance | C _{oss} | | - | 600 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 29 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =75V, I _D =30A V _{GS} =10V, R _G =4.7Ω | - | 19 | - | nS |
| Turn-on Rise Time | t _r | | - | 45 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 31 | - | nS |
| Turn-Off Fall Time | t _f | | - | 10 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =75V, I _D =30A, V _{GS} =10V | - | 48 | | nC |
| Gate-Source Charge | Q _{gs} | | - | 15 | | nC |
| Gate-Drain Charge | Q _{gd} | | - | 8 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =30A | - | | 1.2 | V |
| Diode Forward Current (Note 2) | I _S | | - | - | 50 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F = I _S di/dt = 100A/μs (Note3) | - | 58 | | nS |
| Reverse Recovery Charge | Q _{rr} | | - | 135 | | nC |

Notes:

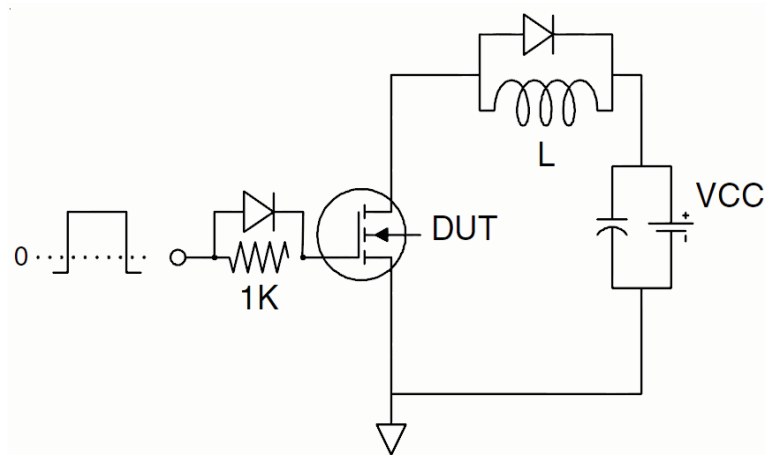
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=25Ω

Test Circuit

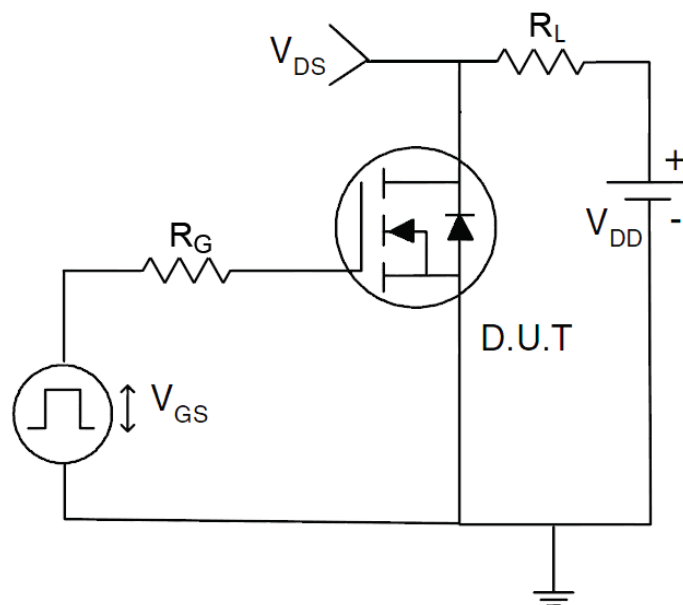
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



RATING AND CHARACTERISTICS CURVES (RM50N150DF)

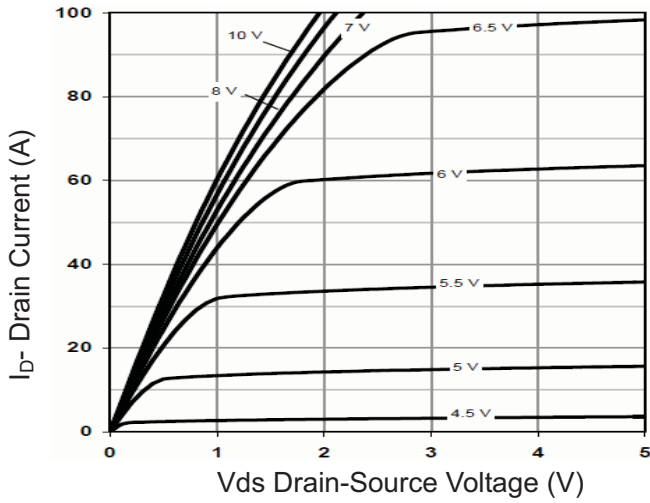


Figure 1 Output Characteristics

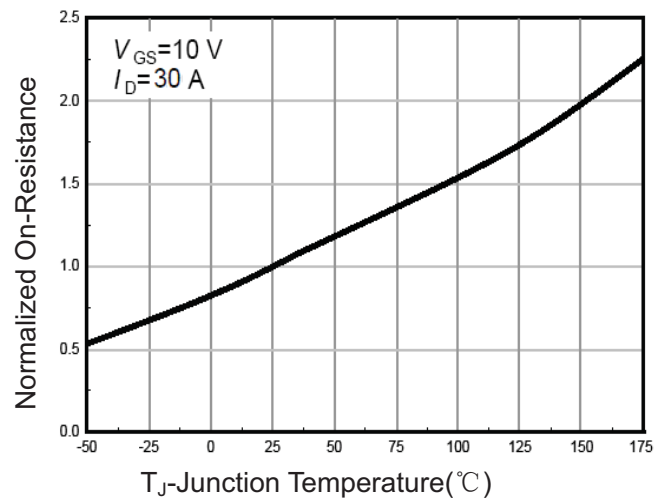


Figure 4 Rds(on)-Junction Temperature

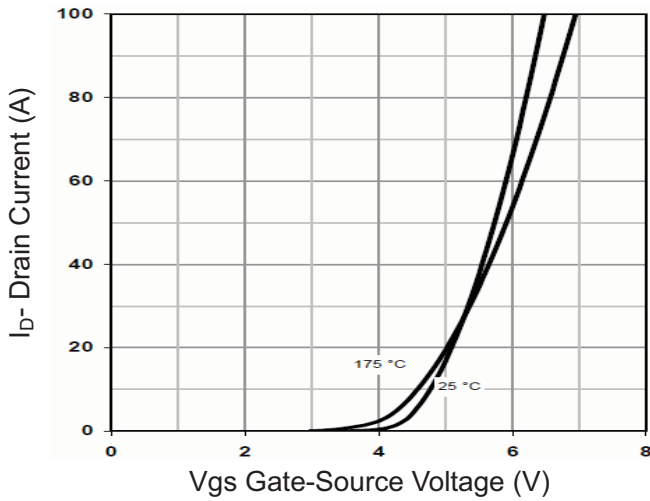


Figure 2 Transfer Characteristics

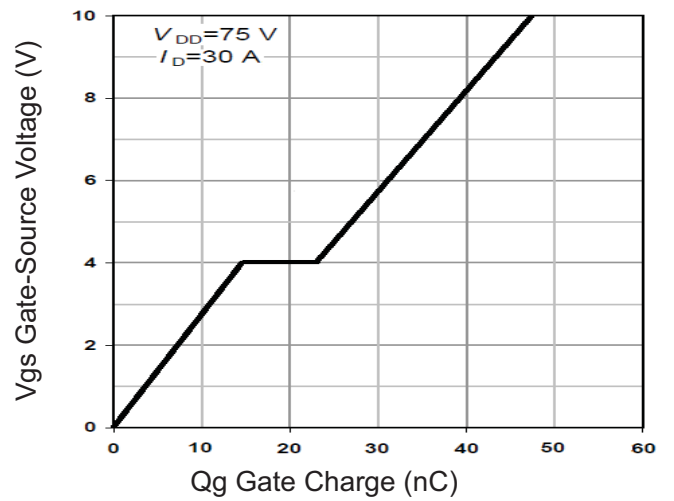


Figure 5 Gate Charge

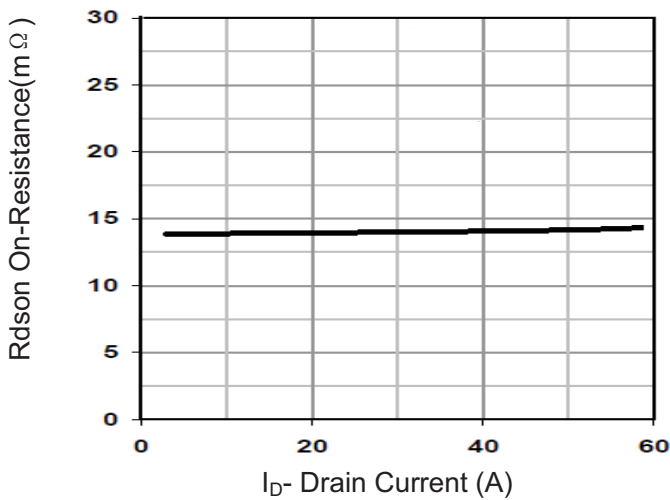


Figure 3 Rds(on)- Drain Current

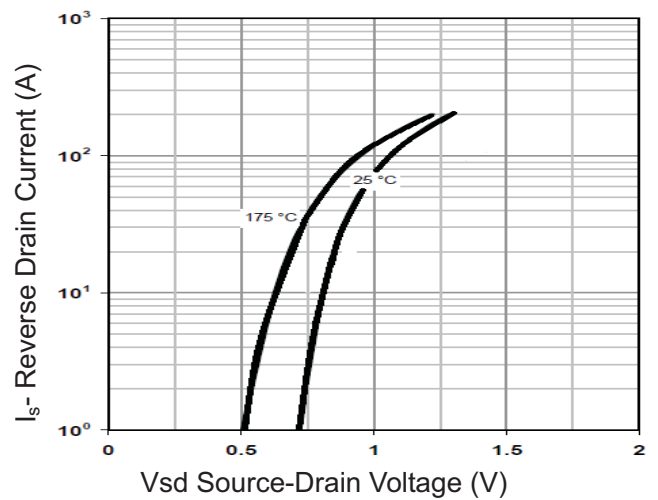


Figure 6 Source- Drain Diode Forward

RATING AND CHARACTERISTICS CURVES (RM50N150DF)

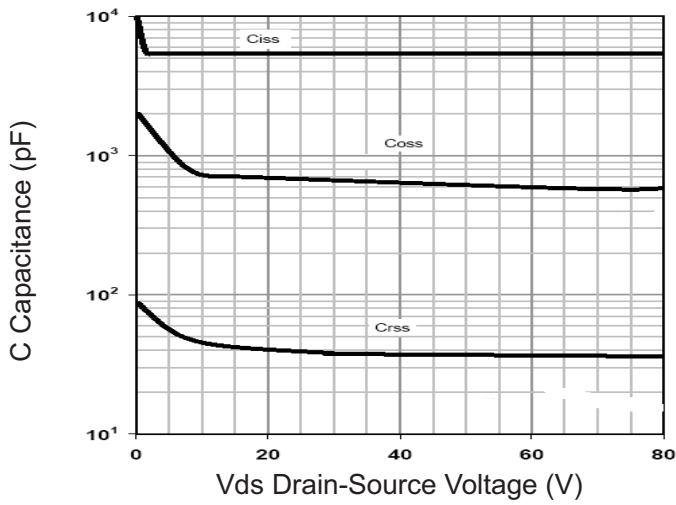


Figure 7 Capacitance vs V_{ds}

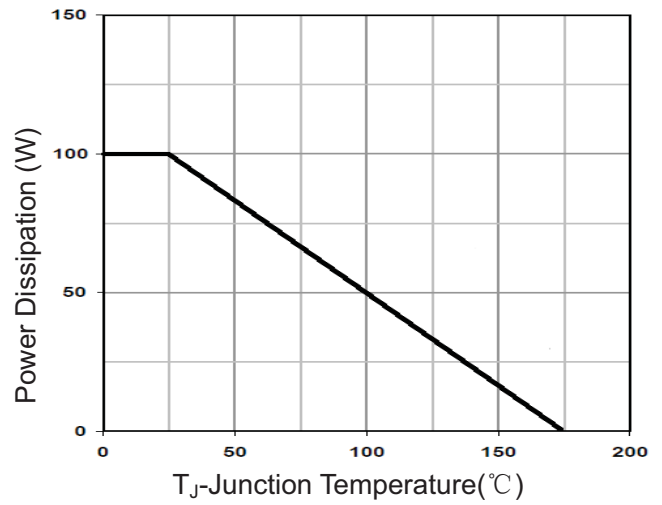


Figure 9 Power De-rating

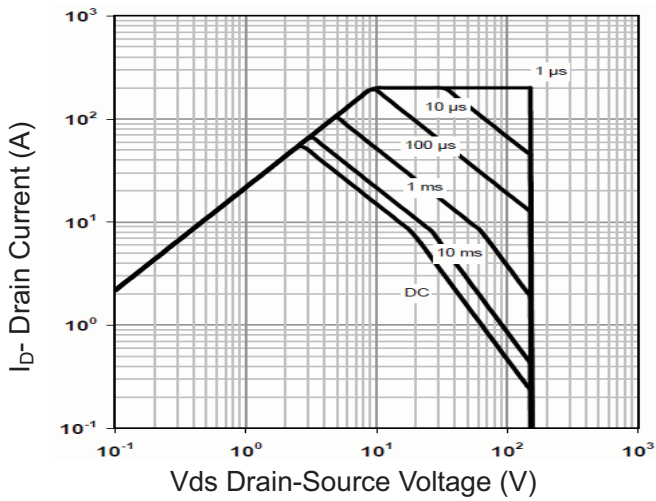


Figure 8 Safe Operation Area

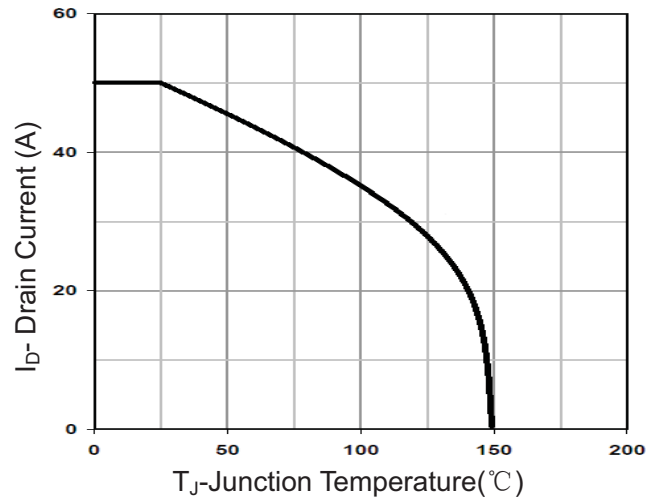


Figure 10 Current De-rating

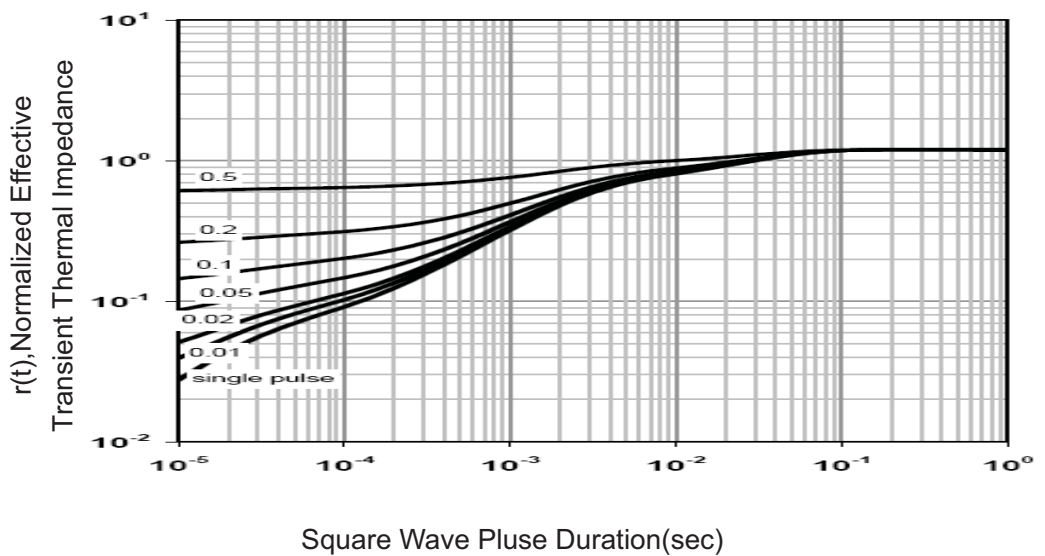
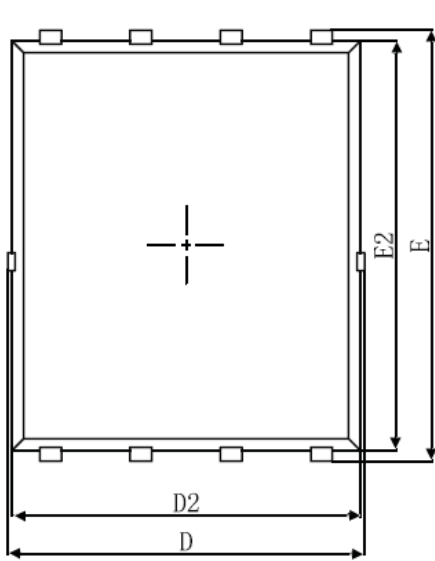
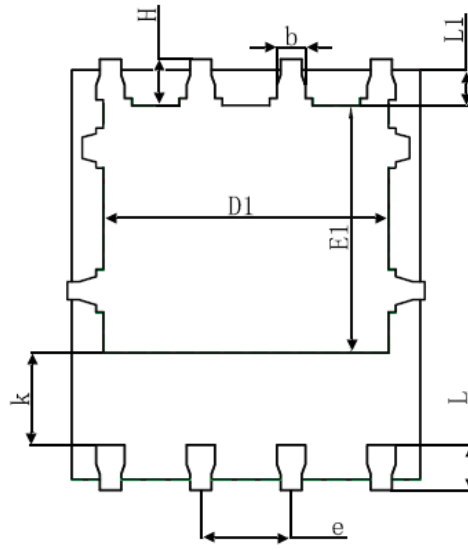


Figure 11 Normalized Maximum Transient Thermal Impedance

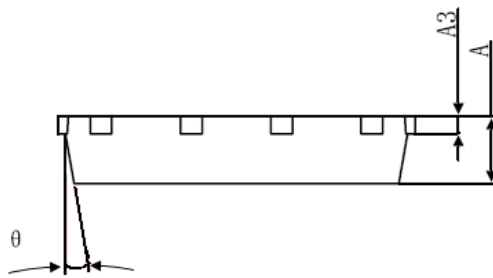
DFN5X6-8L Package Information



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 | 1.000 | 0.035 | 0.039 |
| A3 | 0.254REF. | | 0.010REF. | |
| D | 4.944 | 5.096 | 0.195 | 0.201 |
| E | 5.974 | 6.126 | 0.235 | 0.241 |
| D1 | 3.910 | 4.110 | 0.154 | 0.162 |
| E1 | 3.375 | 3.575 | 0.133 | 0.141 |
| D2 | 4.824 | 4.976 | 0.190 | 0.196 |
| E2 | 5.674 | 5.826 | 0.223 | 0.229 |
| k | 1.190 | 1.390 | 0.047 | 0.055 |
| b | 0.350 | 0.450 | 0.014 | 0.018 |
| e | 1.270TYP. | | 0.050TYP. | |
| L | 0.559 | 0.711 | 0.022 | 0.028 |
| L1 | 0.424 | 0.576 | 0.017 | 0.023 |
| H | 0.574 | 0.726 | 0.023 | 0.029 |
| θ | 8° | 12° | 8° | 12° |