

NCE N-Channel Super Trench II Power MOSFET

Description

The NCEP025N60G uses **Super Trench II** 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.

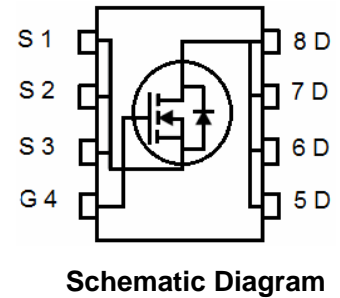
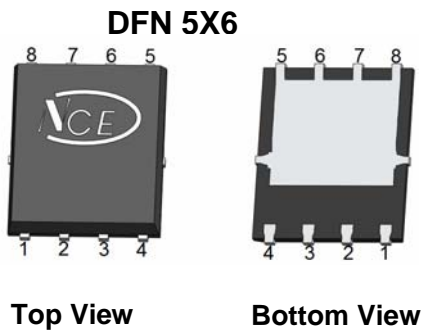
Application

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

General Features

- $V_{DS} = 60V, I_D = 165A$
 $R_{DS(ON)} = 2.2m\Omega$ (typical) @ $V_{GS} = 10V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔV_{ds} TESTED!



Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| P025N60G | NCEP025N60G | DFN5X6-8L | - | - | - |

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

| Parameter | Symbol | Limit | Unit |
|---|--------------------|------------|---------------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous (Silicon Limited) | I_D | 165 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 115 | A |
| Pulsed Drain Current | I_{DM} | 660 | A |
| Maximum Power Dissipation | P_D | 145 | W |
| Derating factor | | 1.16 | W/ $^\circ C$ |
| Single pulse avalanche energy ^(Note 5) | E_{AS} | 540 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Case ^(Note 2) | $R_{\theta JC}$ | 0.86 | $^\circ C/W$ |
|--|-----------------|------|--------------|

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

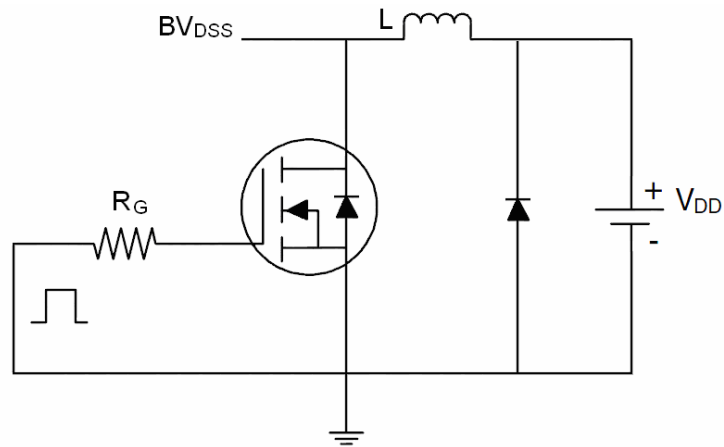
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 60 | | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=60V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 2.0 | 3.0 | 4.0 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=82.5A$ | - | 2.2 | 2.5 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=82.5A$ | 45 | - | - | S |
| Dynamic Characteristics (Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=30V, V_{GS}=0V,$ $F=1.0MHz$ | - | 4850 | - | PF |
| Output Capacitance | C_{oss} | | - | 850 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 65 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=30V, I_D=82.5A$ $V_{GS}=10V, R_G=4.7\Omega$ | - | 16 | - | nS |
| Turn-on Rise Time | t_r | | - | 9 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 58 | - | nS |
| Turn-Off Fall Time | t_f | | - | 12 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=30V, I_D=82.5A,$ $V_{GS}=10V$ | - | 75.5 | | nC |
| Gate-Source Charge | Q_{gs} | | - | 23 | | nC |
| Gate-Drain Charge | Q_{gd} | | - | 14.5 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage | V_{SD} | $V_{GS}=0V, I_S=82.5A$ | - | | 1.2 | V |
| Diode Forward Current | I_S | | - | - | 165 | A |
| Reverse Recovery Time | t_{rr} | $T_J = 25^\circ\text{C}, I_F = I_S$ | - | 56 | | nS |
| Reverse Recovery Charge | Q_{rr} | $di/dt = 100A/\mu s$ (Note 3) | - | 80 | | nC |

Notes:

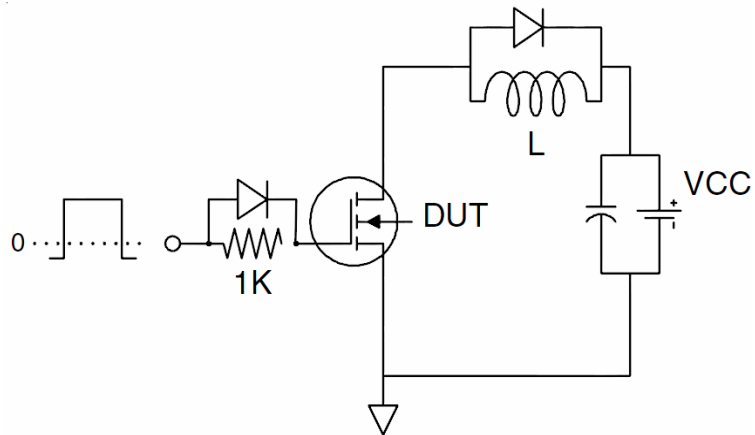
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test Circuit

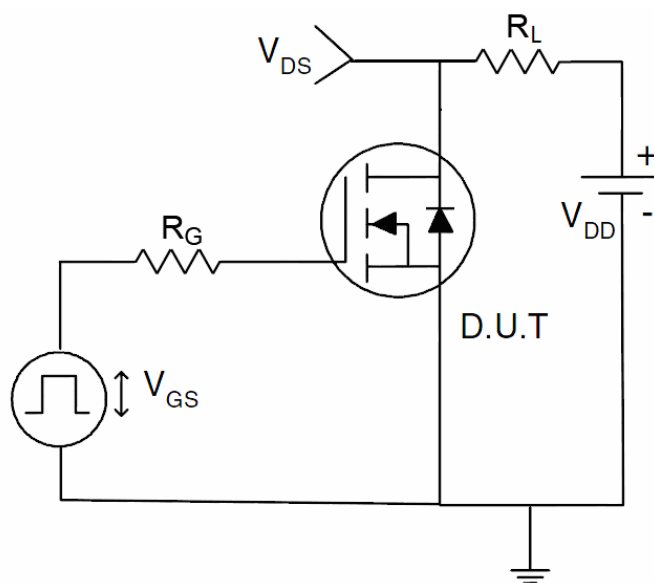
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics

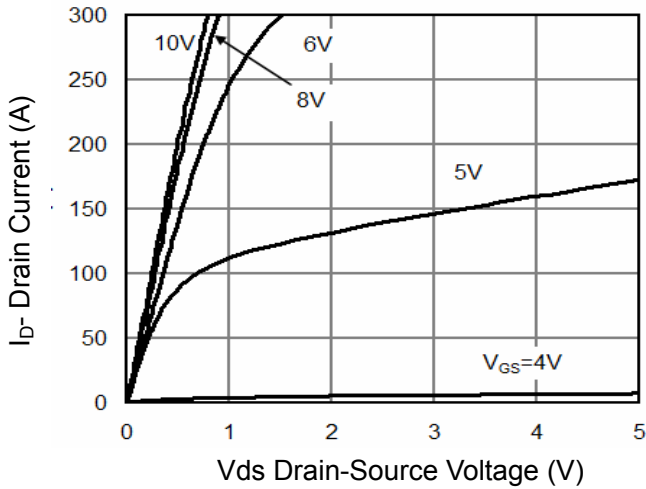


Figure 1 Output Characteristics

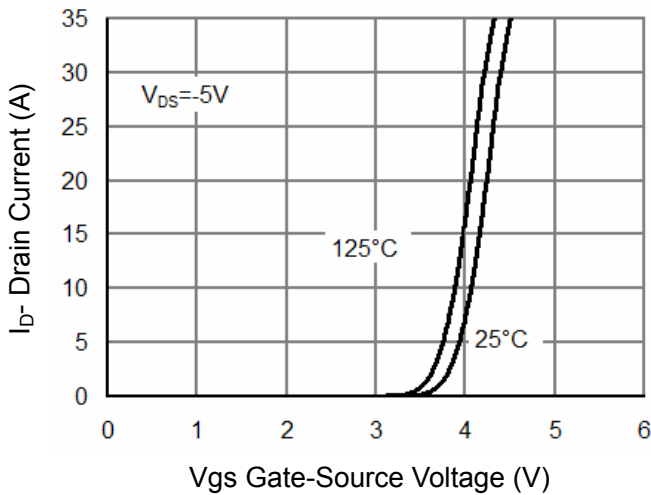


Figure 2 Transfer Characteristics

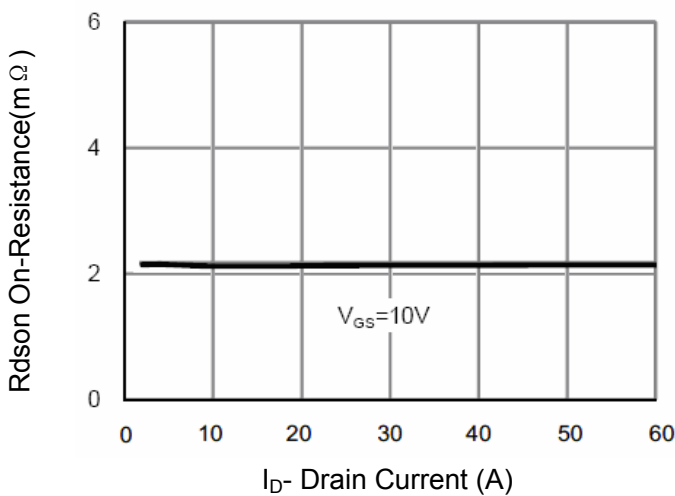


Figure 3 Rdson- Drain Current

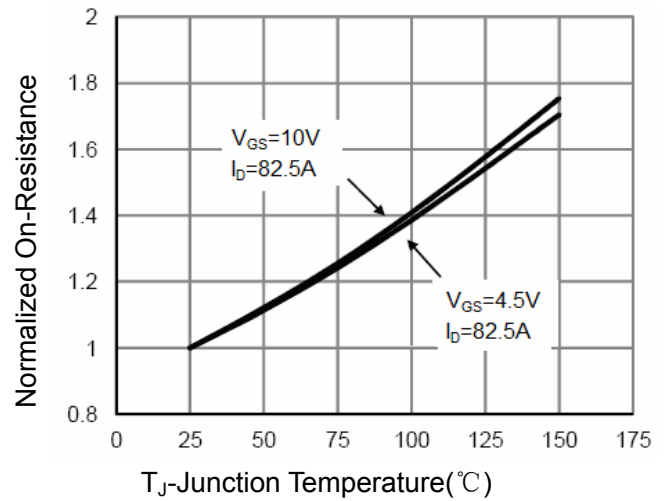


Figure 4 Rdson-Junction Temperature

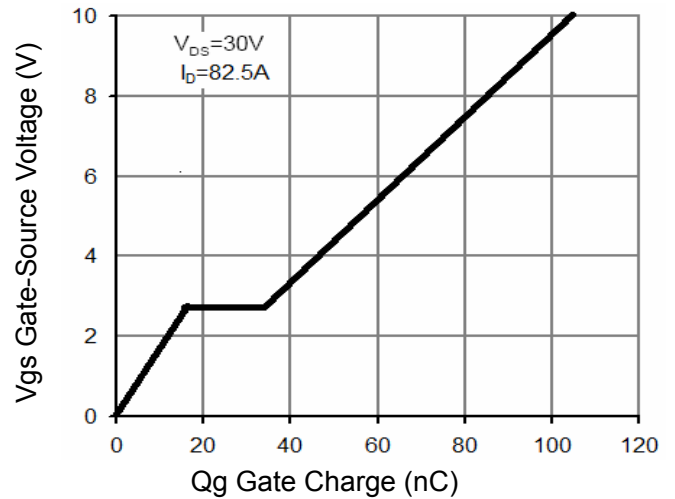


Figure 5 Gate Charge

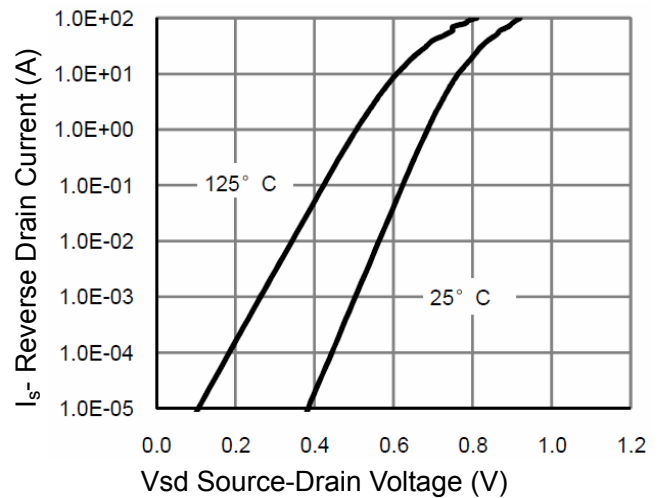


Figure 6 Source- Drain Diode Forward

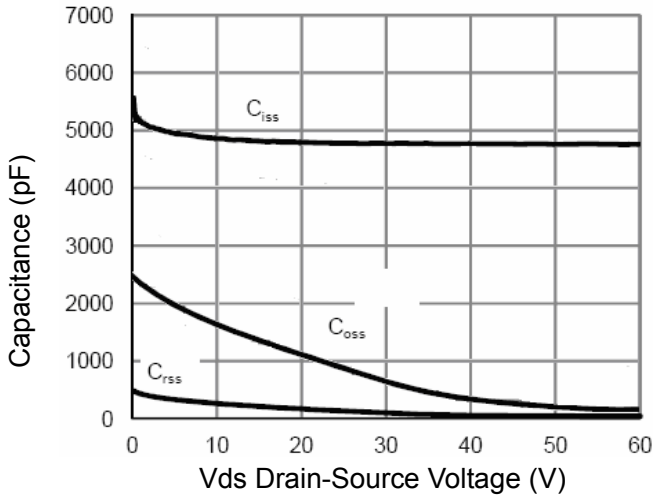


Figure 7 Capacitance vs Vds

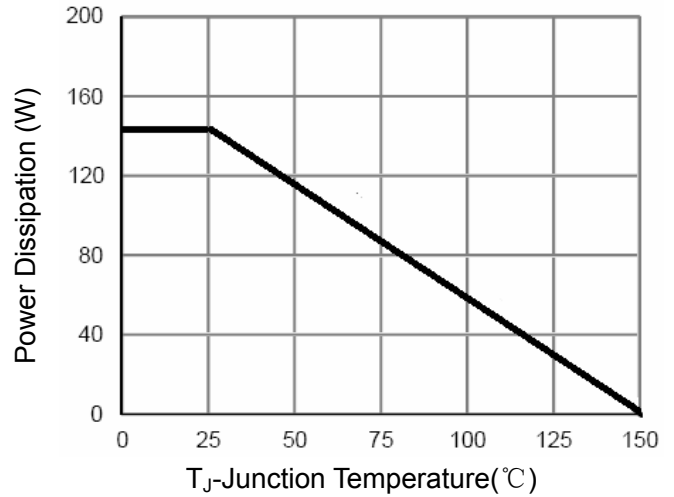


Figure 9 Power De-rating

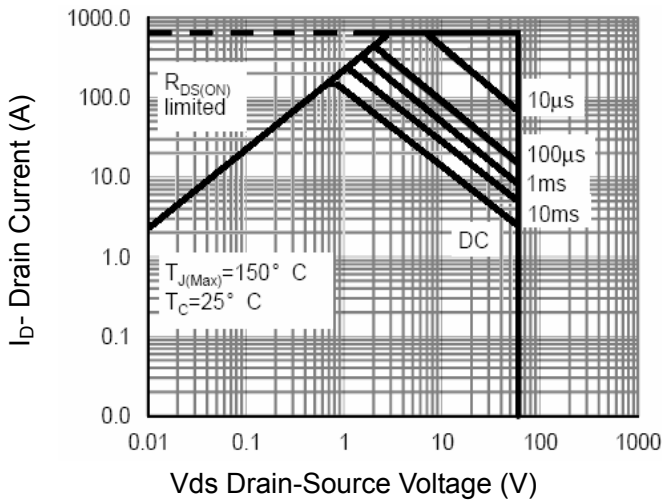


Figure 8 Safe Operation Area

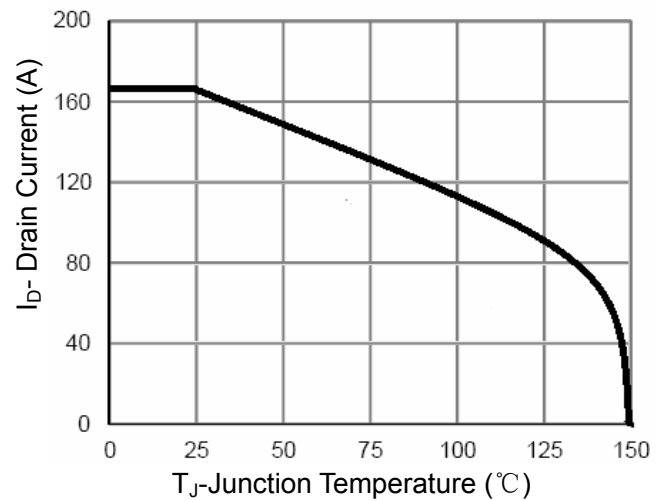


Figure 10 Current De-rating

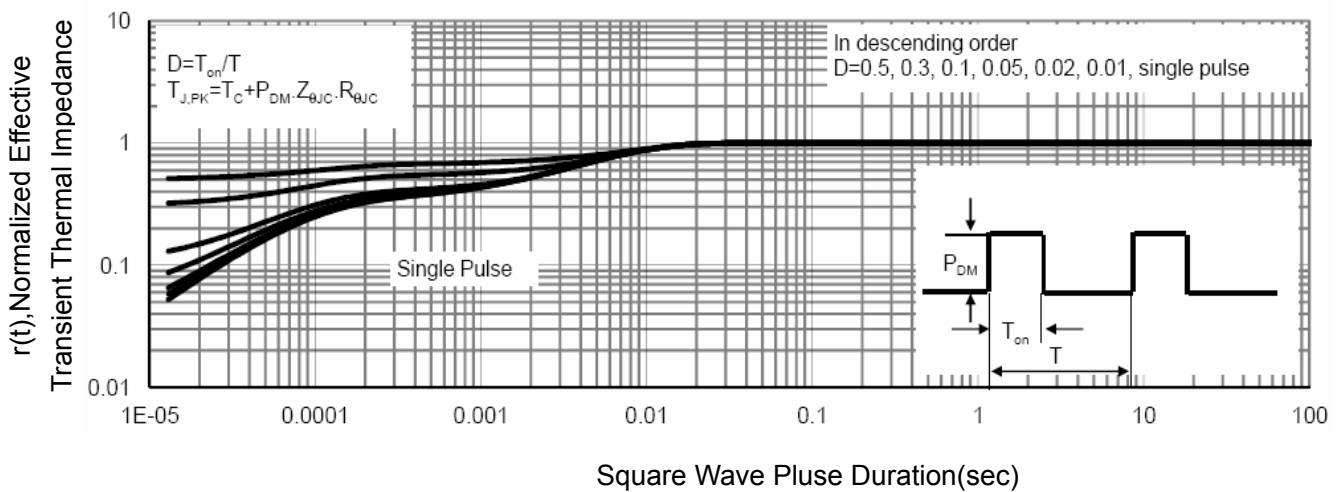
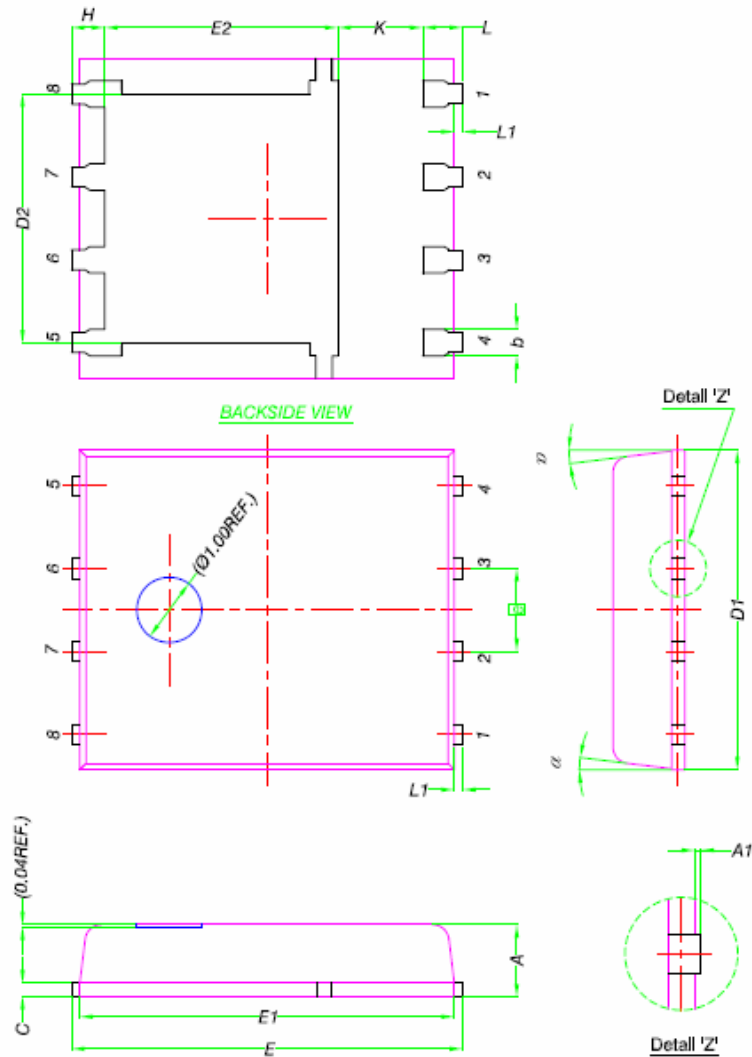
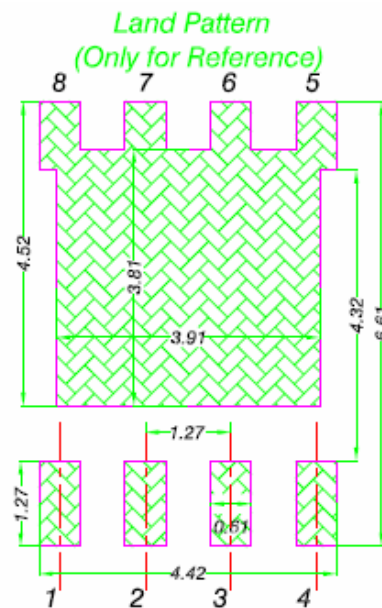


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



| DIM. | MILLIMETERS | | |
|-----------|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0 | - | 0.05 |
| b | 0.33 | 0.41 | 0.51 |
| C | 0.20 | 0.25 | 0.30 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 3.61 | 3.81 | 3.96 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 5.70 | 5.75 | 5.80 |
| E2 | 3.38 | 3.58 | 3.78 |
| \square | 1.27 BSC | | |
| H | 0.41 | 0.51 | 0.61 |
| K | 1.10 | - | - |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.06 | 0.13 | 0.20 |
| α | 0° | - | 12° |



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