

NCE N-Channel Super Trench Power MOSFET

Description

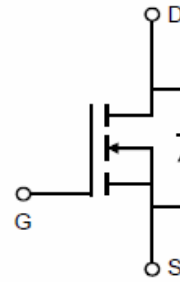
The NCEP30T21GU uses **Super Trench** technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

- $V_{DS} = 30V, I_D = 210A$
 $R_{DS(ON)} = 1m\Omega$ (typical) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 1.25m\Omega$ (typical) @ $V_{GS} = 4.5V$
- 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

Application

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



Schematic Diagram



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 |
|----------------|-------------|----------------|-----------|------------|----------|
| NCEP30T21GU | NCEP30T21GU | DFN5X6-8L | - | - | - |

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

| Parameter | Symbol | Limit | Unit |
|---|--------------------|------------|---------------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous (Silicon Limited) | I_D | 210 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 160 | A |
| Pulsed Drain Current (Package Limited) | I_{DM} | 450 | A |
| Maximum Power Dissipation | P_D | 100 | W |
| Derating factor | | 0.80 | W/ $^\circ C$ |
| Single pulse avalanche energy ^(Note 5) | E_{AS} | 1800 | 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) | $R_{\theta JC}$ | 1.25 | $^{\circ}C/W$ |
|--|-----------------|------|---------------|

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|--|--------------|--|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 30 | | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=30V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics ^(Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.0 | 1.5 | 2.0 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=100A$ | - | 1.0 | 1.15 | m Ω |
| | | $V_{GS}=4.5V, I_D=100A$ | - | 1.25 | 1.5 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=100A$ | | 90 | - | S |
| Dynamic Characteristics ^(Note 4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$ | - | 7150 | - | PF |
| Output Capacitance | C_{oss} | | - | 2400 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 119 | - | PF |
| Switching Characteristics ^(Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=15V, I_D=100A$ $V_{GS}=10V, R_G=1.6\Omega$ | - | 13 | - | nS |
| Turn-on Rise Time | t_r | | - | 8 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 55 | - | nS |
| Turn-Off Fall Time | t_f | | - | 10 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=15V, I_D=100A,$ $V_{GS}=10V$ | - | 109 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 19.1 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 11.4 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage ^(Note 3) | V_{SD} | $V_{GS}=0V, I_S=100A$ | - | | 1.2 | V |
| Diode Forward Current ^(Note 2) | I_S | | - | - | 210 | A |
| Reverse Recovery Time | t_{rr} | $T_J = 25^{\circ}C, I_F = I_S$ $di/dt = 100A/\mu s$ ^(Note 3) | - | 35 | - | nS |
| Reverse Recovery Charge | Q_{rr} | | - | 120 | - | 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 : $T_J=25^{\circ}C, V_{DD}=20V, V_G=10V, L=0.5mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristics

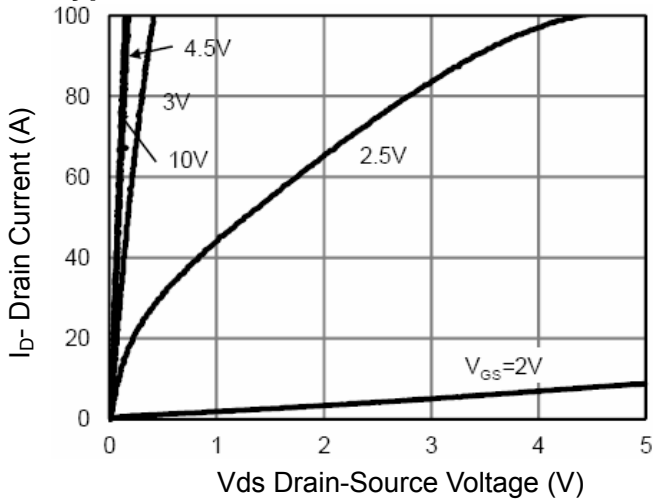


Figure 1 Output Characteristics

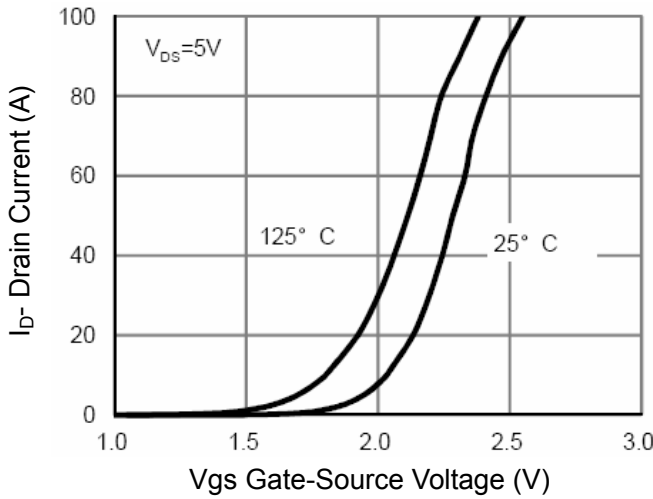


Figure 2 Transfer Characteristics

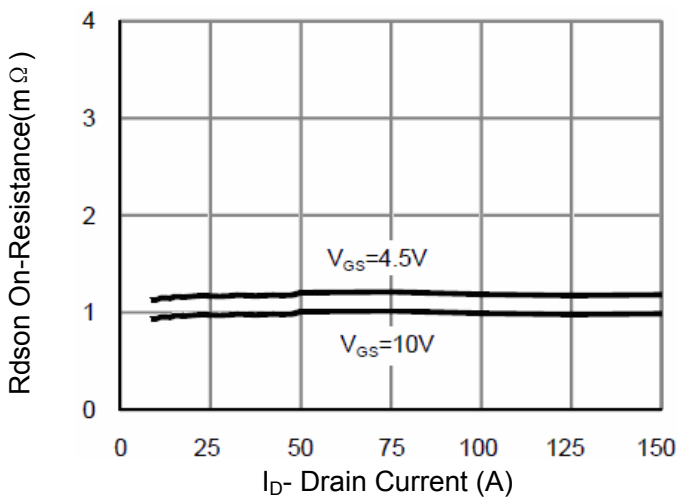


Figure 3 $R_{ds(on)}$ - Drain Current

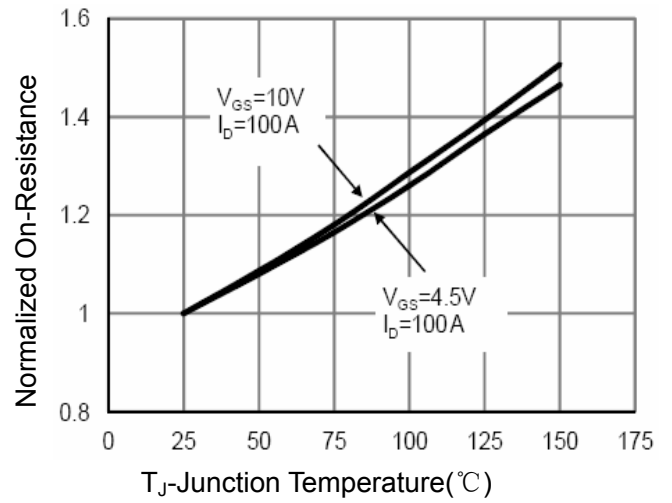


Figure 4 $R_{ds(on)}$ -Junction Temperature

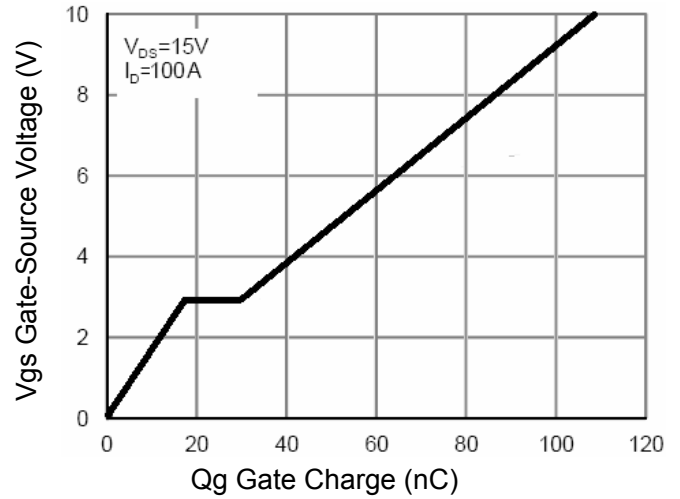


Figure 5 Gate Charge

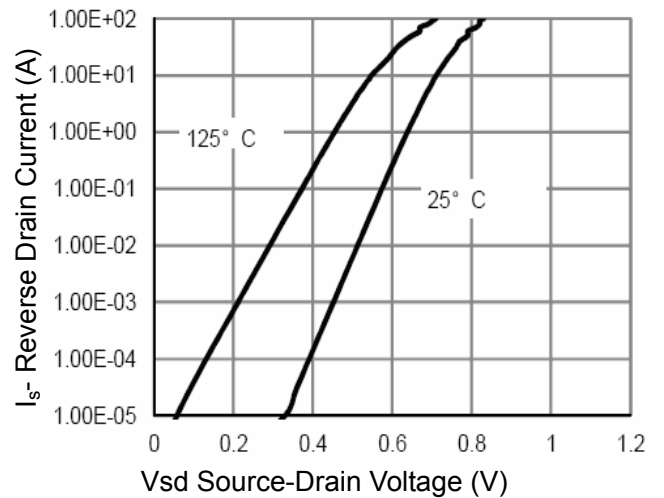


Figure 6 Source- Drain Diode Forward

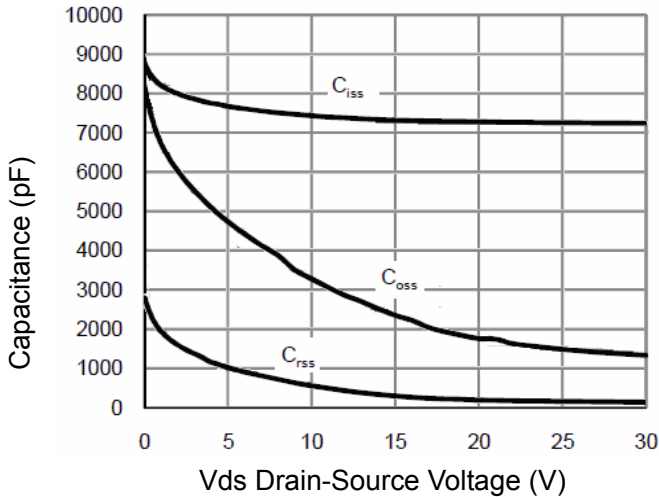


Figure 7 Capacitance vs Vds

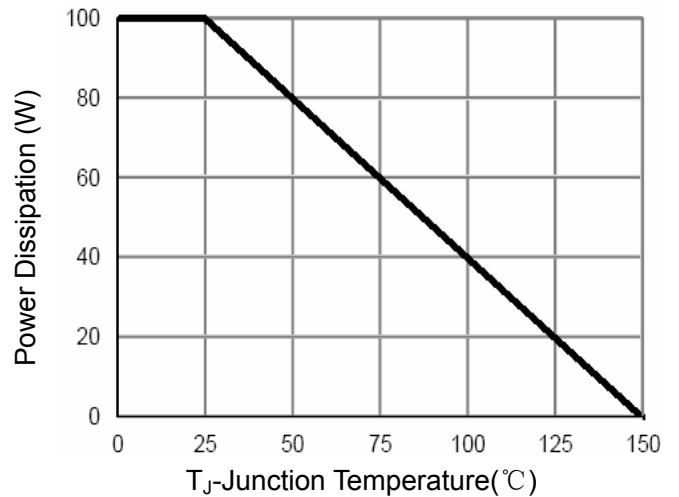


Figure 9 Power De-rating

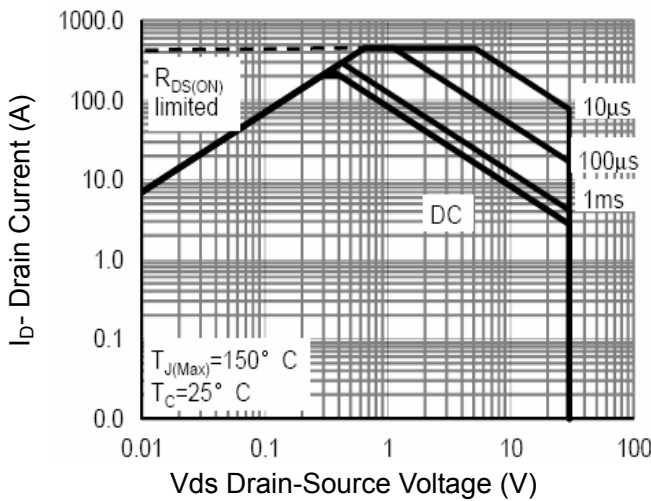


Figure 8 Safe Operation Area

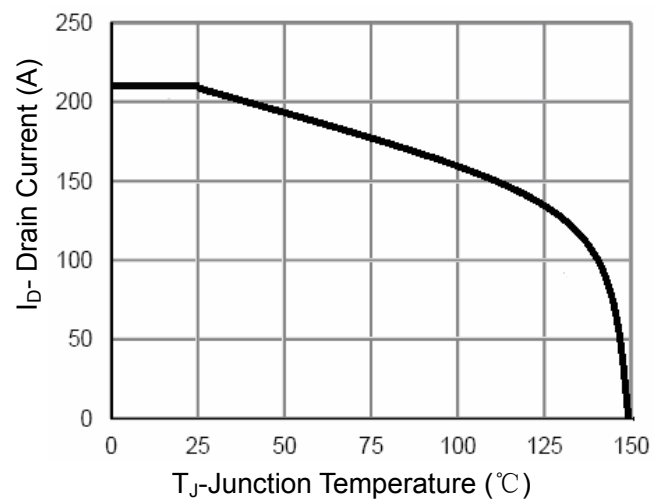


Figure 10 Current De-rating

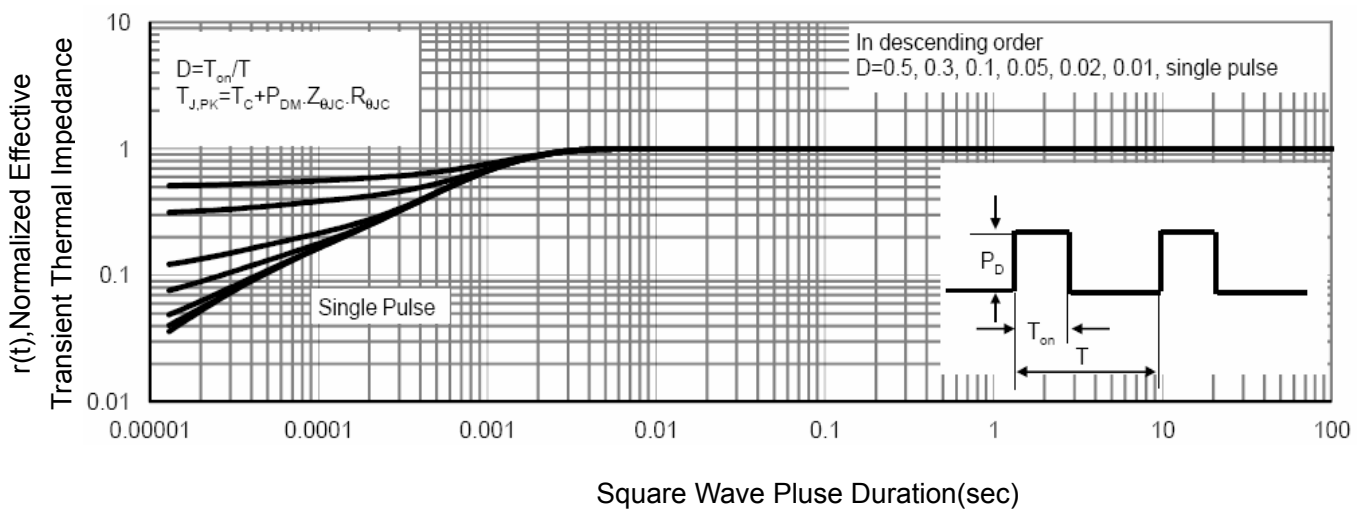
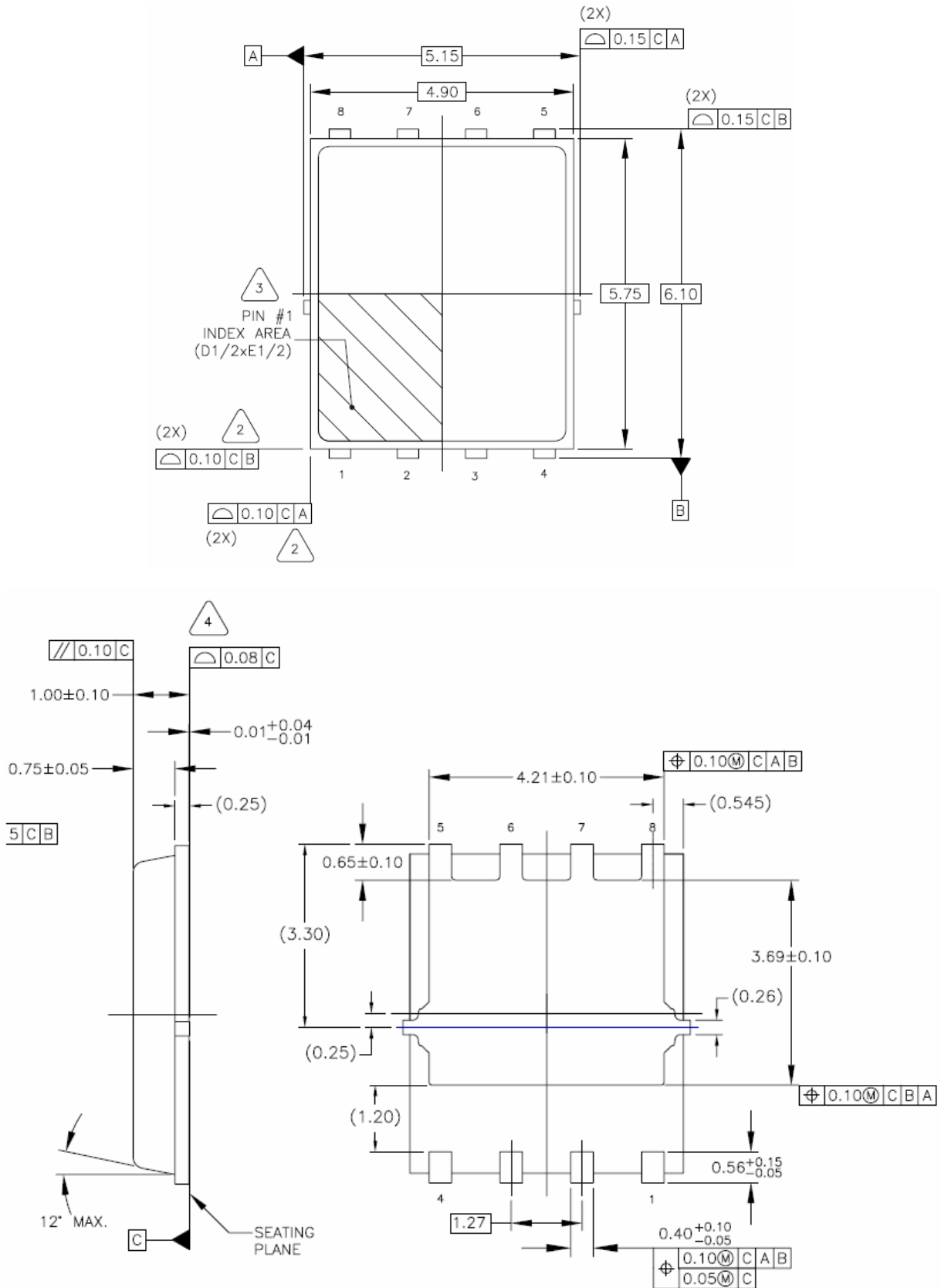


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



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