

NCE N-Channel Super Trench II Power MOSFET

Description

The series of devices 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

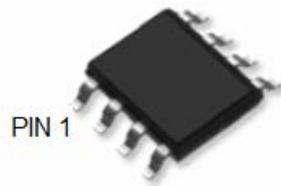
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

General Features

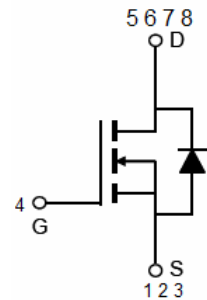
- $V_{DS} = 100V, I_D = 12A$
 $R_{DS(ON)} = 9.1m\Omega$, typical@ $V_{GS} = 10V$
 $R_{DS(ON)} = 12m\Omega$, typical@ $V_{GS} = 4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔV_{ds} TESTED!

SOP-8



Top View



Schematic Diagram

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| NCEP11N10AS | NCEP11N10AS | SOP-8 | - | - | - |

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

| Parameter | Symbol | Limit | Unit |
|---|--------------------|------------|------------|
| Drain-Source Voltage | V_{DS} | 100 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 12 | A |
| Drain Current-Continuous($T_C = 100^\circ C$) | $I_D(100^\circ C)$ | 8.5 | A |
| Pulsed Drain Current | I_{DM} | 48 | A |
| Maximum Power Dissipation | P_D | 3.4 | W |
| Single pulse avalanche energy ^(Note 4) | E_{AS} | 200 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|---|-----------------|----|--------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 37 | $^\circ C/W$ |
|---|-----------------|----|--------------|

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

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|--------------|--|-----|------|-----------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 100 | | - | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=100V, V_{GS}=0V$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.1 | 1.7 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=10V, I_D=12A$ | - | 9.1 | 11.0 | m Ω |
| | | $V_{GS}=4.5V, I_D=12A$ | - | 12.0 | 16.0 | |
| Forward Transconductance | g_{FS} | $V_{DS}=5V, I_D=12A$ | | 45 | - | S |
| Dynamic Characteristics (Note 3) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=50V, V_{GS}=0V,$ $F=1.0MHz$ | - | 2600 | - | pF |
| Output Capacitance | C_{oss} | | - | 230 | - | pF |
| Reverse Transfer Capacitance | C_{rss} | | - | 27 | - | pF |
| Switching Characteristics (Note 3) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=50V, I_D=12A$ $V_{GS}=10V, R_G=1.6\Omega$ | - | 13 | - | nS |
| Turn-on Rise Time | t_r | | - | 10 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 30 | - | nS |
| Turn-Off Fall Time | t_f | | - | 8 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=50V, I_D=12A,$ $V_{GS}=10V$ | - | 54 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 10 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 14 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 2) | V_{SD} | $V_{GS}=0V, I_S=12A$ | - | - | 1.2 | V |
| Diode Forward Current | I_S | | - | - | 12 | A |
| Reverse Recovery Time | t_{rr} | $T_J = 25^\circ\text{C}, I_F = 12A$ $di/dt = 100A/\mu s$ (Note 3) | - | 55 | - | nS |
| Reverse Recovery Charge | Q_{rr} | | - | 98 | - | nC |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
3. Guaranteed by design, not subject to production
4. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=50V, V_G=10V, L=0.25mH, R_G=25\Omega$

Typical Electrical and Thermal Characteristics

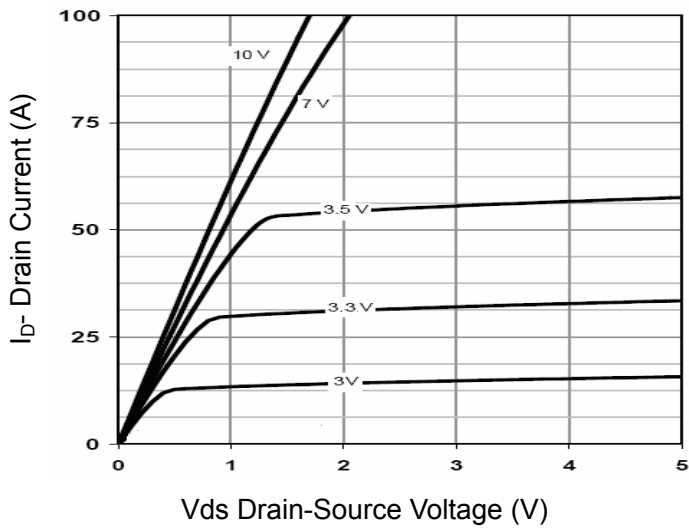


Figure 1 Output Characteristics

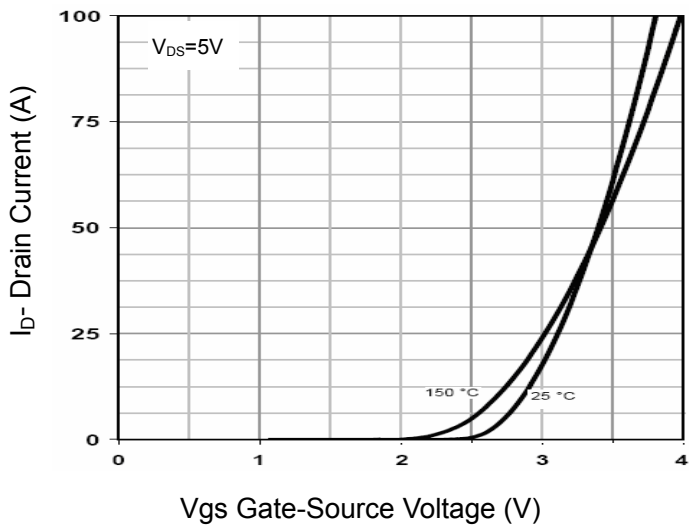


Figure 2 Transfer Characteristics

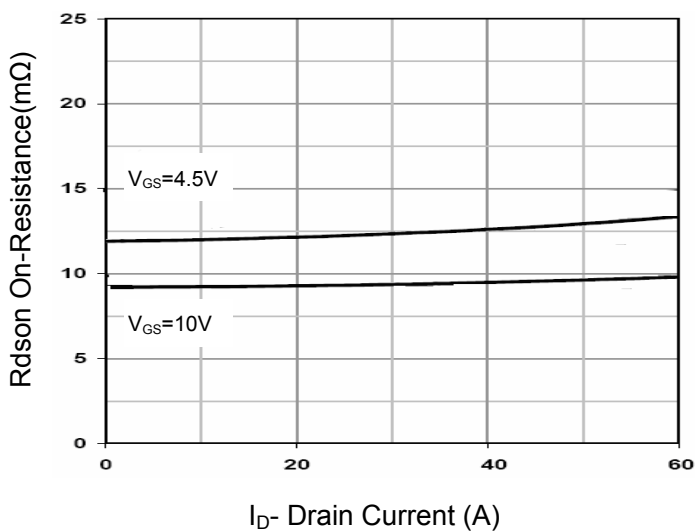


Figure 3 $R_{DS(on)}$ - Drain Current

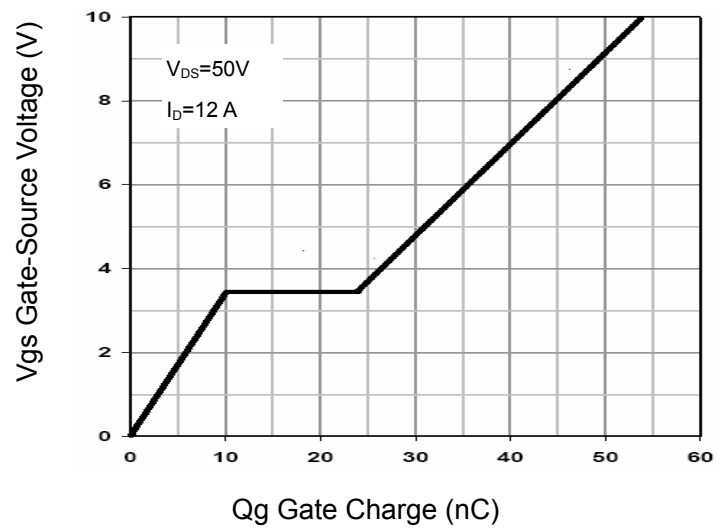


Figure 4 Gate Charge

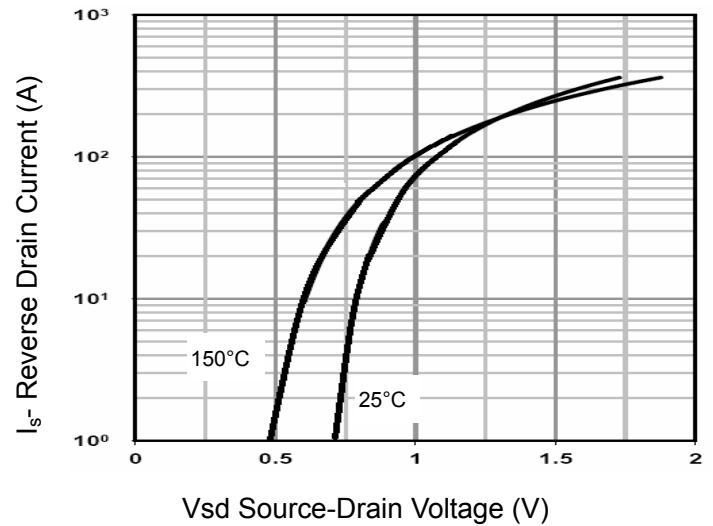


Figure 5 Source- Drain Diode Forward

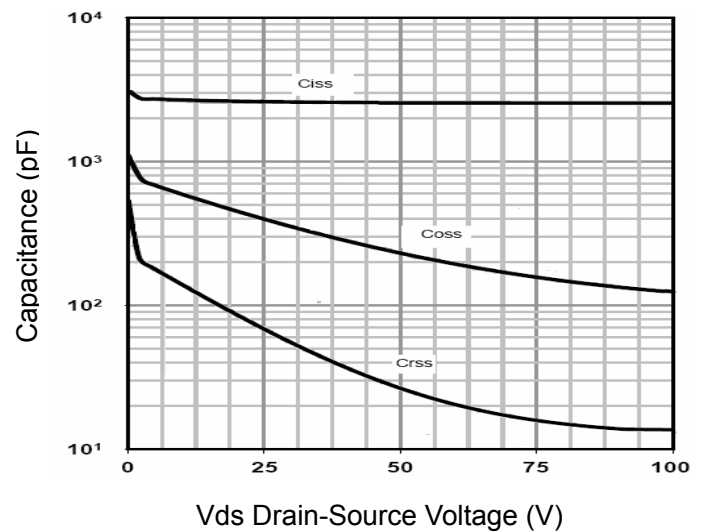
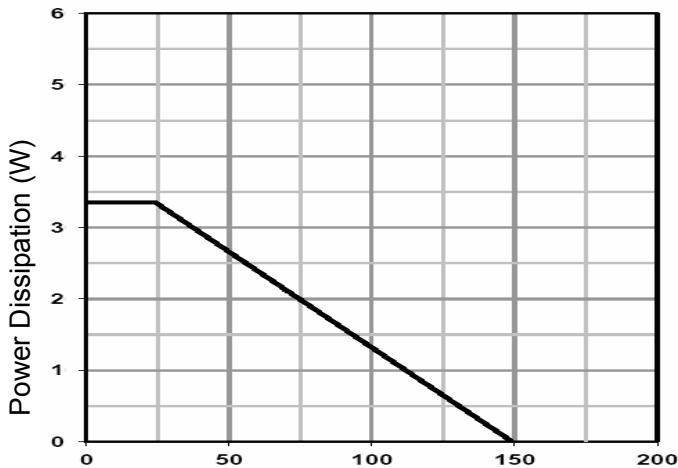
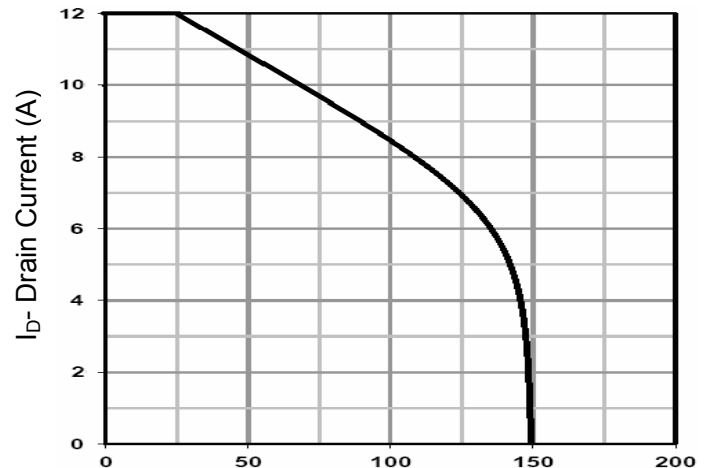


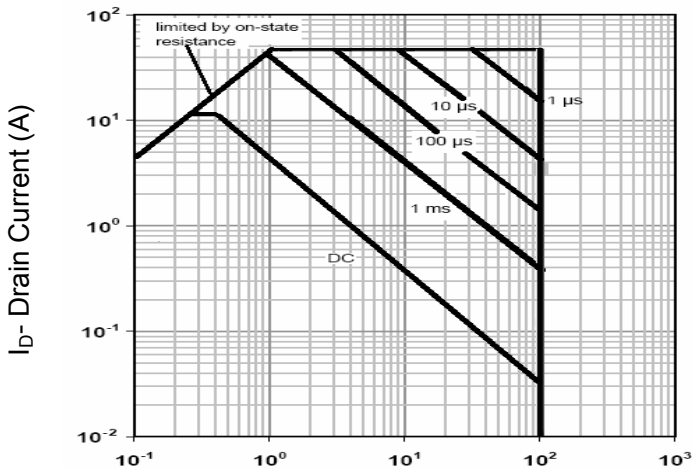
Figure 6 Capacitance vs V_{DS}



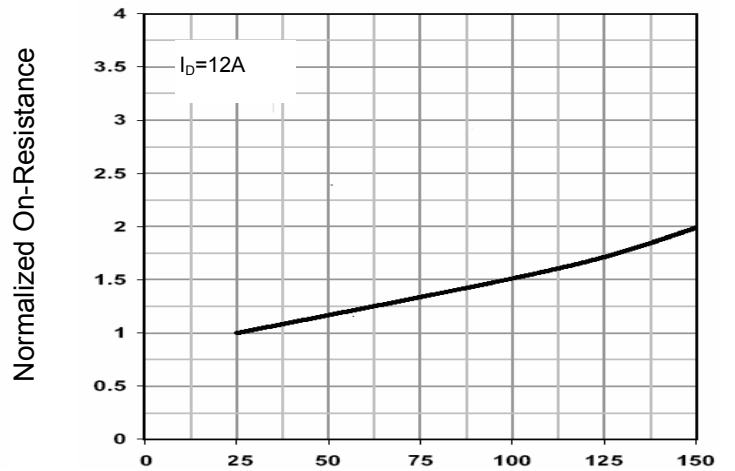
T_J-Junction Temperature(°C)
Figure 7 Power De-rating



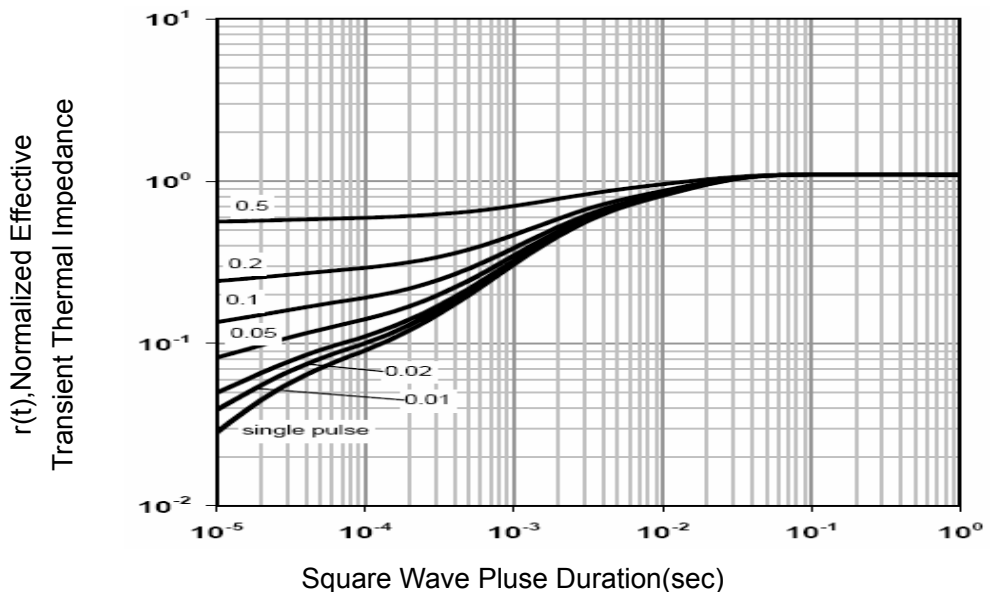
T_J-Junction Temperature (°C)
Figure 9 Current De-rating



V_{ds} Drain-Source Voltage (V)
Figure 8 Safe Operation Area

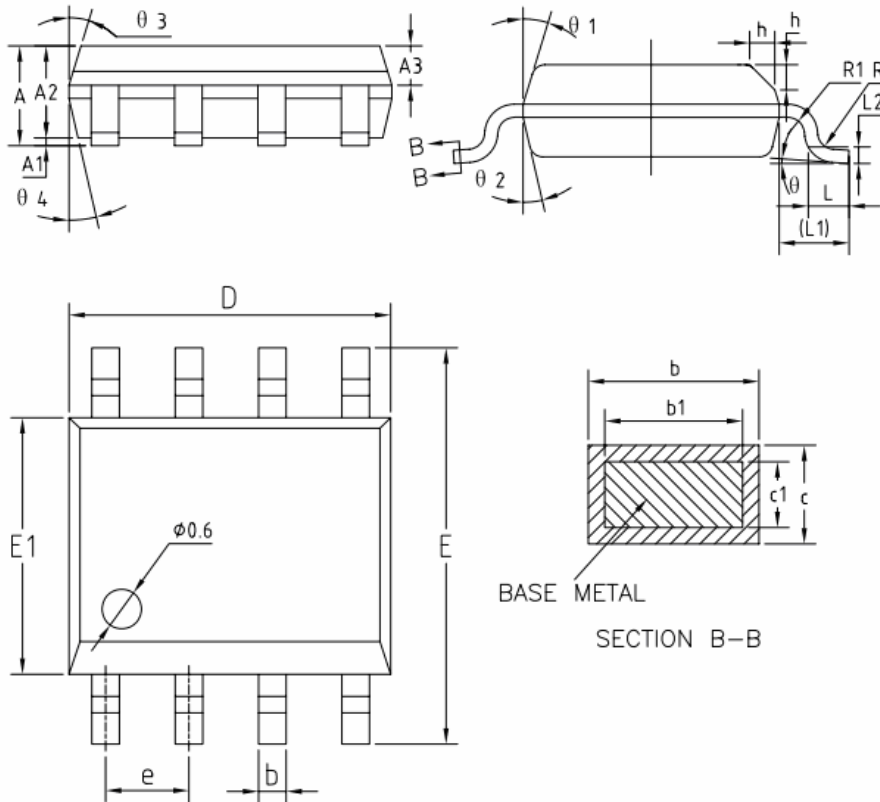


T_J-Junction Temperature(°C)
Figure 10 Rdson-Junction Temperature



Square Wave Pulse Duration(sec)
Figure 11 Normalized Maximum Transient Thermal Impedance

Sop-8 Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

| SYMBOL | MIN | NOM | MAX |
|--------|---------|------|------|
| A | 1.35 | 1.55 | 1.75 |
| A1 | 0.10 | 0.15 | 0.25 |
| A2 | 1.25 | 1.40 | 1.65 |
| A3 | 0.50 | 0.60 | 0.70 |
| b | 0.38 | — | 0.51 |
| b1 | 0.37 | 0.42 | 0.47 |
| c | 0.18 | — | 0.25 |
| c1 | 0.17 | 0.20 | 0.23 |
| D | 4.80 | 4.90 | 5.00 |
| E | 5.80 | 6.00 | 6.20 |
| E1 | 3.80 | 3.90 | 4.00 |
| e | 1.17 | 1.27 | 1.37 |
| L | 0.45 | 0.60 | 0.80 |
| L1 | 1.04REF | | |
| L2 | 0.25BSC | | |
| R | 0.07 | — | — |
| R1 | 0.07 | — | — |
| h | 0.30 | 0.40 | 0.50 |
| θ | 0° | — | 8° |
| θ 1 | 15° | 17° | 19° |
| θ 2 | 11° | 13° | 15° |
| θ 3 | 15° | 17° | 19° |
| θ 4 | 11° | 13° | 15° |

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