



NCE N-Channel Super Trench Power MOSFET

Description

The NCEP01T13AD 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} =100V,I_D =130A
 R_{DS(ON)} <4.6mΩ @ V_{GS}=10V
- Excellent gate charge x R_{DS(on)} product
- 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

100% UIS TESTED!

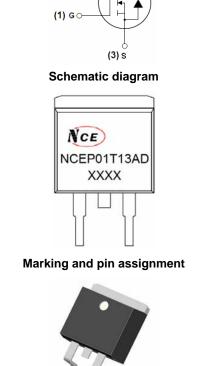
100% ΔVds TESTED!

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| NCEP01T13AD | NCEP01T13AD | TO-263-2L | - | - | - |

Absolute Maximum Ratings (T_c=25℃unless otherwise noted)

| Parameter | Symbol | Limit | Unit | |
|--|-----------------------|------------|------|--|
| Drain-Source Voltage | Vds | 100 | V | |
| Gate-Source Voltage | V _{GS} | ±20 | V | |
| Drain Current-Continuous (Silicon Limited) | Ι _D | 143 | А | |
| Drain Current-Continuous (Package Limited) | I _D | 135 | А | |
| Drain Current-Continuous(T _C =100 °C) | I _D (100℃) | 102 | А | |
| Pulsed Drain Current | I _{DM} | 500 | А | |
| Maximum Power Dissipation | P _D | 210 | W | |
| Derating factor | | 1.4 | W/℃ | |
| Single pulse avalanche energy (Note 5) | E _{AS} | 1050 | mJ | |
| Operating Junction and Storage Temperature Range | TJ,TSTG | -55 To 175 | °C | |



(2) D

TO-263-2L top view





NCEP01T13AD

Thermal Characteristic

| Thermal Resistance, Junction-to-Case ^(Note 2) | R _{θJC} | 0.71 | °C/W |
|--|------------------|------|------|
|--|------------------|------|------|

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

| Parameter | Symbol | Condition | Min | Тур | Max | Unit |
|------------------------------------|---------------------|---|-----|------|------|------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | V _{GS} =0V I _D =250µA | 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} =±20V, V_{DS} =0V | - | - | ±100 | nA |
| On Characteristics (Note 3) | I | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | $V_{DS}=V_{GS}$, $I_{D}=250\mu A$ | 2.5 | | 4.5 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =60A | - | 3.8 | 4.6 | mΩ |
| Forward Transconductance | g FS | V _{DS} =10V,I _D =60A | - | 60 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{lss} | | - | 6400 | - | PF |
| Output Capacitance | C _{oss} | V_{DS} =50V, V_{GS} =0V, | - | 731 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | F=1.0MHz | - | 35 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | | - | 19 | - | nS |
| Turn-on Rise Time | tr | V _{DD} =50V,I _D =60A | - | 76 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | V_{GS} =10V, R_{G} =4.7 Ω | - | 48 | - | nS |
| Turn-Off Fall Time | t _f | | - | 14 | - | nS |
| Total Gate Charge | Qg | N/ F0X/1 00A | - | 92 | | nC |
| Gate-Source Charge | Q _{gs} | V_{DS} =50V,I _D =60A, | - | 35.4 | | nC |
| Gate-Drain Charge | Q _{gd} | V _{GS} =10V | - | 18.8 | | nC |
| Drain-Source Diode Characteristics | J | | | | | • |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V,I _S =135A | - | | 1.2 | V |
| Diode Forward Current (Note 2) | Is | | - | - | 135 | Α |
| Reverse Recovery Time | t _{rr} | T_J = 25°C, I_F = I_S | _ | 63 | | nS |
| Reverse Recovery Charge | Qrr | di/dt = 100A/µs ^(Note3) | - | 142 | | nC |
| | | | | 1 | | |

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 ≤ 300µs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

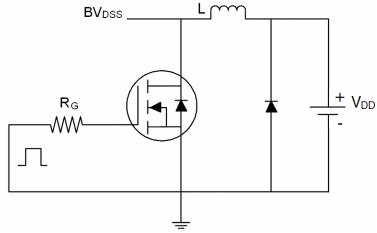
5. EAS condition : Tj=25 $^\circ \!\! C$,V_DD=50V,V_G=10V,L=0.5mH,Rg=25\Omega



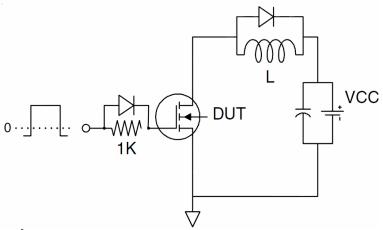
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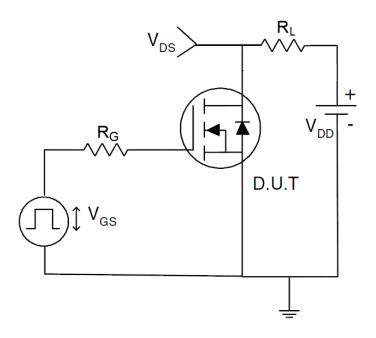
Test Circuit 1) E_{AS} test Circuit



2) Gate charge test Circuit



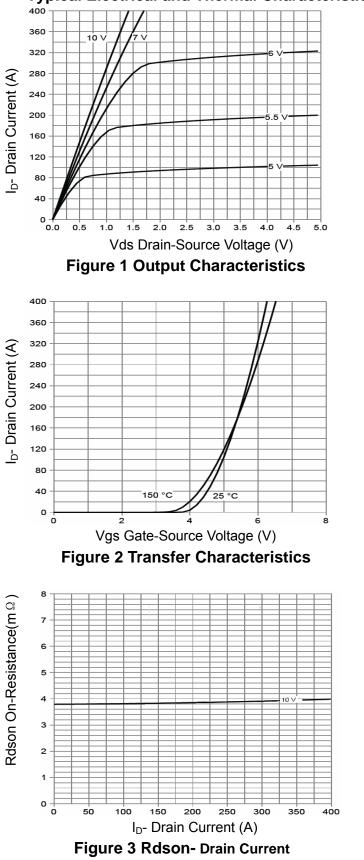
3) Switch Time Test Circuit







Typical Electrical and Thermal Characteristics



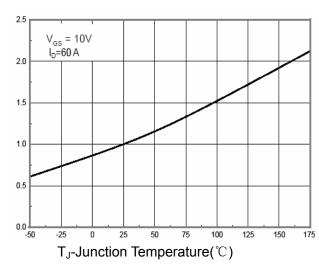


Figure 4 Rdson-JunctionTemperature

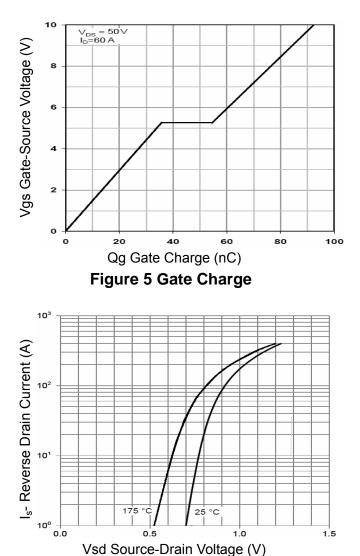
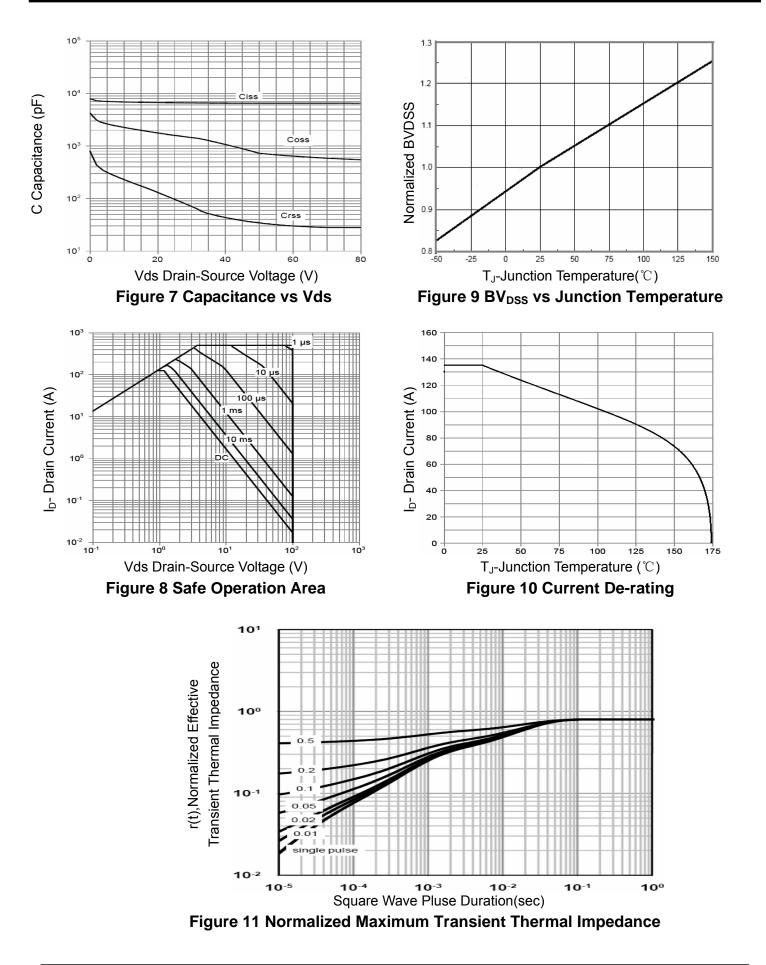


Figure 6 Source- Drain Diode Forward



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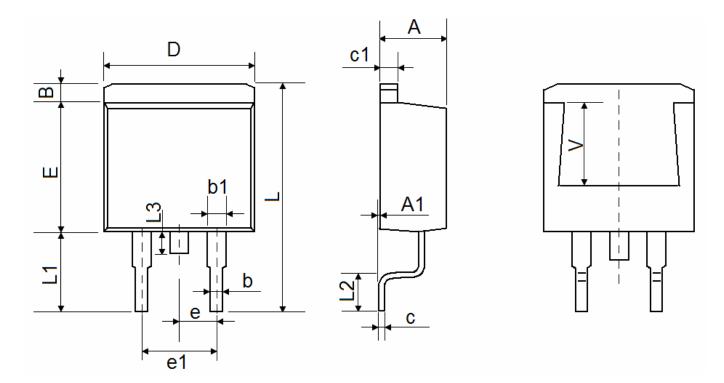




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TO-263-2L Package Information



| Symbol | Dimensions I | n Millimeters | Dimensions In Inches | | |
|--------|--------------|------------------|----------------------|-------|--|
| Symbol | Min. | Max. | Min. | Max. | |
| A | 4.470 | 4.670 | 0.176 | 0.184 | |
| A1 | 0.000 | 0.150 | 0.000 | 0.006 | |
| В | 1.170 | 1.370 | 0.046 | 0.054 | |
| b | 0.710 | 0.910 | 0.028 | 0.036 | |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 | |
| С | 0.310 | 0.530 | 0.012 | 0.021 | |
| c1 | 1.170 | 1.370 | 0.046 | 0.054 | |
| D | 10.010 | 10.310 | 0.394 | 0.406 | |
| E | 8.500 | 8.900 | 0.335 | 0.350 | |
| е | 2.540 | TYP. | 0.100 | TYP. | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 | |
| L | 15.050 | 15.450 | 0.593 | 0.608 | |
| L1 | 5.080 | 5.480 | 0.200 | 0.216 | |
| L2 | 2.340 | 2.740 | 0.092 | 0.108 | |
| L3 | 1.300 | 1.700 | 0.051 | 0.067 | |
| V | 5.600 | 00 REF 0.220 REF | | | |





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