N-Channel Super Junction Power MOSFET  

**General Description**  
The series of devices use advanced trench gate super junction technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.

**Features**  
- New technology for high voltage device  
- Low on-resistance and low conduction losses  
- Small package  
- Ultra Low Gate Charge cause lower driving requirements  
- 100% Avalanche Tested  
- ROHS compliant

**Application**  
- Power factor correction (PFC)  
- Switched mode power supplies (SMPS)  
- Uninterruptible Power Supply (UPS)

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<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
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<tr>
<td>Drain-Source Voltage ($V_{GS}$=0V)</td>
<td>$V_{DS}$</td>
<td>800</td>
<td>V</td>
</tr>
<tr>
<td>Gate-Source Voltage ($V_{DS}$=0V), AC (f&gt;1 Hz)</td>
<td>$V_{GS}$</td>
<td>$\pm$30</td>
<td>V</td>
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<tr>
<td>Continuous Drain Current at $T_{C}$=25°C</td>
<td>$I_{D(\text{DC})}$</td>
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<td>A</td>
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<tr>
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<tr>
<td>Pulsed drain current (Note 1)</td>
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<td>A</td>
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<tr>
<td>Maximum Power Dissipation ($T_{C}$=25°C)</td>
<td>$P_{D}$</td>
<td>98</td>
<td>W</td>
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<tr>
<td>Derate above 25°C</td>
<td>$0.78$</td>
<td>W/°C</td>
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<tr>
<td>Single pulse avalanche energy (Note 2)</td>
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<td>mJ</td>
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<td>Avalanche current (Note 1)</td>
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<td>mJ</td>
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**Schematic diagram**

**Package Marking And Ordering Information**

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<td>NCE80T900I</td>
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**Table 1. Absolute Maximum Ratings ($T_{C}$=25°C)**

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<td>V</td>
</tr>
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<td>$\pm$30</td>
<td>V</td>
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<tr>
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<td>A</td>
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<td>A</td>
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<tr>
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<td>$P_{D}$</td>
<td>98</td>
<td>W</td>
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<tr>
<td>Derate above 25°C</td>
<td>$0.78$</td>
<td>W/°C</td>
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<tr>
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<td>100</td>
<td>mJ</td>
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<tr>
<td>Drain Source voltage slope, $V_{DS} \leq 480 \text{ V}$</td>
<td>$dv/dt$</td>
<td>50</td>
<td>V/μs</td>
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<tr>
<td>Reverse diode $dv/dt$, $V_{DS} \leq 480 \text{ V}, I_{SD} &lt; I_D$</td>
<td>$dv/dt$</td>
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<td>V/μs</td>
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<td>Operating Junction and Storage Temperature Range</td>
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### Table 2. Thermal Characteristics

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<td>Thermal Resistance, Junction-to-Case (Maximum)</td>
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<td>Thermal Resistance, Junction-to-Ambient (Maximum)</td>
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### Table 3. Electrical Characteristics (TA=25°C unless otherwise noted)

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<td>Drain-Source Breakdown Voltage</td>
<td>$B V_{DS}$</td>
<td>$V_{GS}=0V, I_D=250\mu A$</td>
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<td></td>
<td>V</td>
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<tr>
<td>Zero Gate Voltage Drain Current (TC=25°C)</td>
<td>$I_{DSS}$</td>
<td>$V_{DS}=800V, V_{GS}=0V$</td>
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<td>μA</td>
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<td></td>
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<td>Zero Gate Voltage Drain Current (TC=125°C)</td>
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<td>$V_{DS}=800V, V_{GS}=0V$</td>
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<td>μA</td>
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<tr>
<td>Gate-Body Leakage Current</td>
<td>$I_{GSS}$</td>
<td>$V_{GS}=±20V, V_{DS}=0V$</td>
<td>±100</td>
<td>nA</td>
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<tr>
<td>Gate Threshold Voltage</td>
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<tr>
<td>Drain-Source On-State Resistance</td>
<td>$R_{DS(ON)}$</td>
<td>$V_{GS}=10V, I_D=4A$</td>
<td>750</td>
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### Dynamic Characteristics

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<tr>
<td>Forward Transconductance</td>
<td>$g_{FS}$</td>
<td>$V_{DS} = 20V, I_D = 4A$</td>
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<td>Input Capacitance</td>
<td>$C_{iss}$</td>
<td>$V_{DS}=50V, V_{GS}=0V$, $F=1.0MHz$</td>
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<td>Output Capacitance</td>
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<td>Reverse Transfer Capacitance</td>
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<tr>
<td>Total Gate Charge</td>
<td>$Q_g$</td>
<td>$V_{DS}=640V, I_D=6A$, $V_{GS}=10V$</td>
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<td>Gate-Source Charge</td>
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<td>Gate-Drain Charge</td>
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### Switching times

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<th>Max</th>
<th>Unit</th>
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<tbody>
<tr>
<td>Turn-on Delay Time</td>
<td>$t_{(on)}$</td>
<td>$V_{DD}=400V, I_D=3A$, $R_G=3Ω, V_{GS}=10V$</td>
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<td>Turn-on Rise Time</td>
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<td>Turn-Off Delay Time</td>
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<td>Turn-Off Fall Time</td>
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### Source-Drain Diode Characteristics

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<td>A</td>
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<td>Pulsed Source-drain current (Body Diode)</td>
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<tr>
<td>Forward on voltage</td>
<td>$V_{SD}$</td>
<td>$T_J=25^°C, I_{SD}=6A, V_{DS}=0V$</td>
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<td></td>
<td>V</td>
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<tr>
<td>Reverse Recovery Time</td>
<td>$t_{rr}$</td>
<td>$T_J=25^°C, I_D=3A$, $di/dt=100A/μs$</td>
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<td></td>
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<td>nS</td>
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<tr>
<td>Reverse Recovery Charge</td>
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<td>Peak Reverse Recovery Current</td>
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**Notes:**
1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $T_J=25^°C, V_{DD}=50V, V_{GS}=10V, R_G=25Ω$
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure 1. Safe operating area

Figure 2. Transient Thermal Impedance

Figure 3. Source-Drain Diode Forward Voltage

Figure 4. Output characteristics

Figure 5. Transfer characteristics

Figure 6. Static drain-source on resistance
Figure 7. $R_{DS(ON)}$ vs Junction Temperature

Figure 8. $BV_{DSS}$ vs Junction Temperature

Figure 9. Maximum $I_D$ vs Junction Temperature

Figure 10. Gate charge waveforms

Figure 11. Capacitance
Test circuit

1) Gate charge test circuit & Waveform

2) Switch Time Test Circuit:

3) Unclamped Inductive Switching Test Circuit & Waveforms
## TO-252-2 Package Information

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