

QIAOXIN N-Channel SuperTrench II Power MOSFET

Description

The NCEP072N10A 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

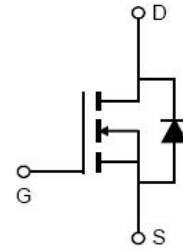
General Features

- $V_{DS} = 100V, I_D = 88A$
 $R_{DS(ON)} = 6.2m\Omega$ (typical) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 8.4m\Omega$ (typical) @ $V_{GS} = 4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 175°C operating temperature
- Pb-free lead plating

TO-220



Top View



Schematic Diagram

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| VCRR 072N10A | VCRR072N10A | TO-220-3L | - | - | - |

Absolute Maximum Ratings ($T_c=25^\circ C$ 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 | 88 | A |
| Drain Current-Continuous($T_c=100^\circ C$) | $I_D(100^\circ C)$ | 63 | A |
| Pulsed Drain Current | I_{DM} | 352 | A |
| Maximum Power Dissipation | P_D | 125 | W |
| Derating factor | | 0.83 | W/°C |
| Single pulse avalanche energy (Note 5) | E_{AS} | 387 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | °C |

Thermal Characteristic

| | | | |
|---|-----------------|-----|------|
| Thermal Resistance, Junction-to-Case (Note 2) | $R_{\theta JC}$ | 1.2 | °C/W |
|---|-----------------|-----|------|

Electrical Characteristics (T_c=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | 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) | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1.2 | 1.7 | 2.5 | V |
| Drain-Source On-State Resistance | R _{DS(on)} | V _{GS} =10V, I _D =44A | - | 6.2 | 7.2 | mΩ |
| | | V _{GS} =4.5V, I _D =44A | | 8.4 | 9.6 | |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =44A | | 60 | - | S |
| Dynamic Characteristics (Note4) | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =50V, V _{GS} =0V, F=1.0MHz | - | 4120 | - | PF |
| Output Capacitance | C _{oss} | | - | 322 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 12.5 | - | PF |
| Switching Characteristics (Note 4) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =50V, I _D =44A, V _{GS} =10V, R _G =3Ω | - | 17 | - | nS |
| Turn-on Rise Time | t _r | | - | 11 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 36 | - | nS |
| Turn-Off Fall Time | t _f | | - | 9 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =50V, I _D =44A, V _{GS} =10V | - | 81 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 13.9 | | nC |
| Gate-Drain Charge | Q _{gd} | | - | 21.3 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{SD} | V _{GS} =0V, I _S =44A | - | | 1.2 | V |
| Diode Forward Current (Note 2) | I _S | | - | - | 88 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F = 44A | - | 62 | - | nS |
| Reverse Recovery Charge | Q _{rr} | di/dt = 100A/μs (Note3) | - | 109 | - | nC |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, R_G=25Ω

Typical Electrical and Thermal Characteristics

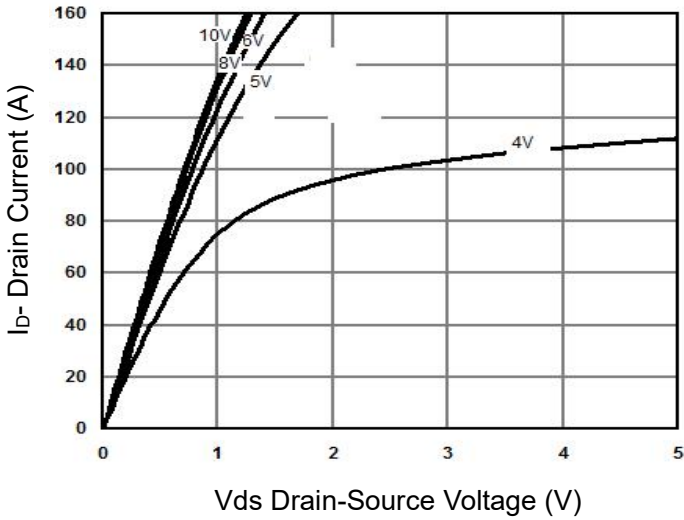


Figure 1 Output Characteristics

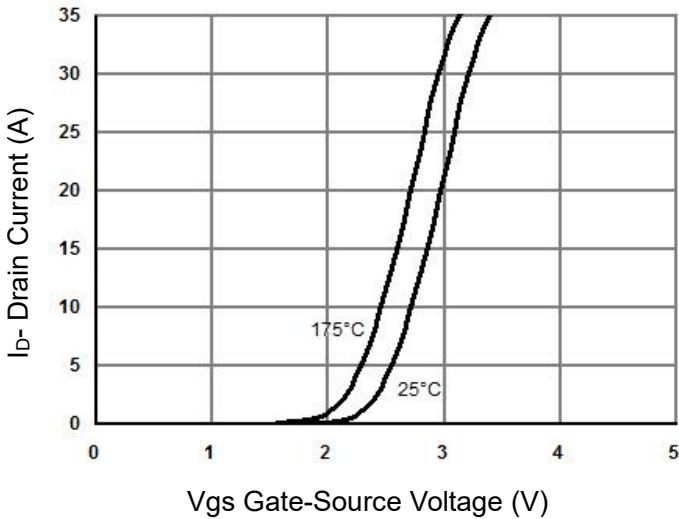


Figure 2 Transfer Characteristics

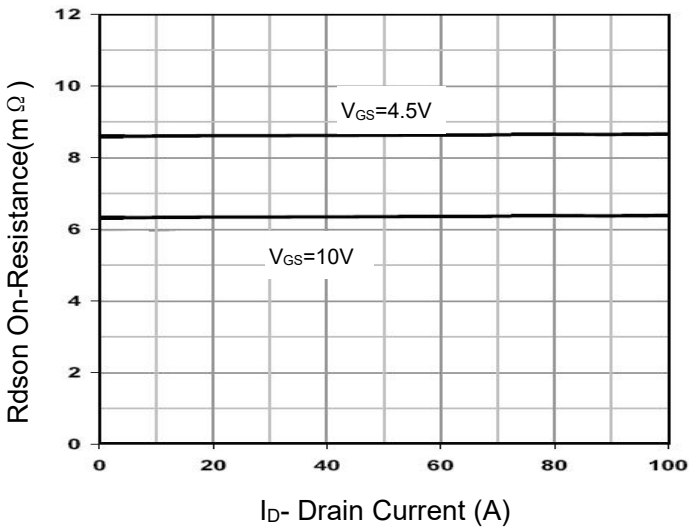


Figure 3 Rdson- Drain Current

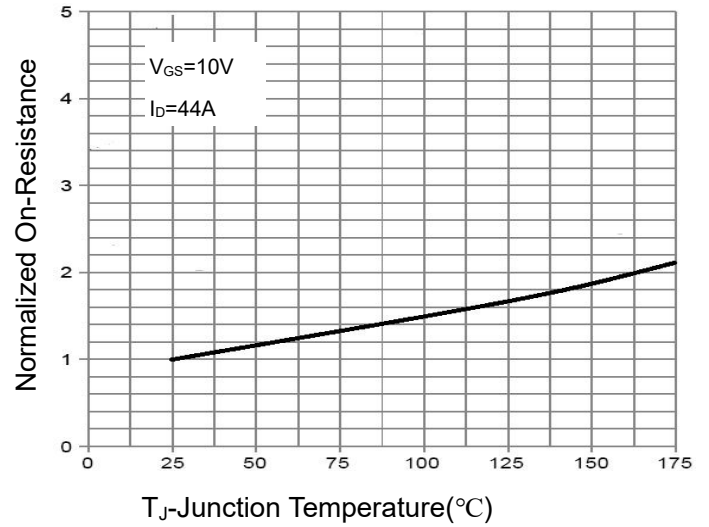


Figure 4 Rdson-Junction Temperature

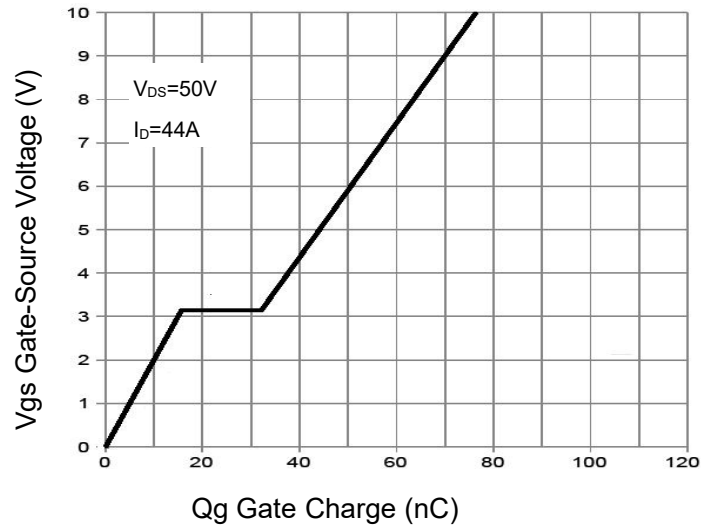


Figure 5 Gate Charge

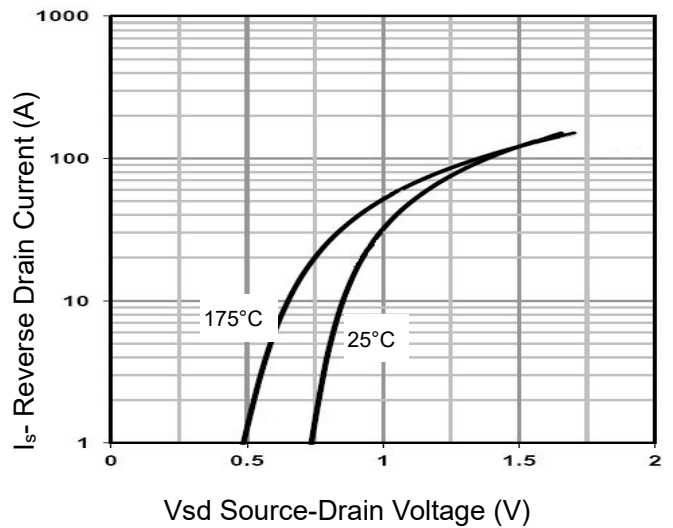
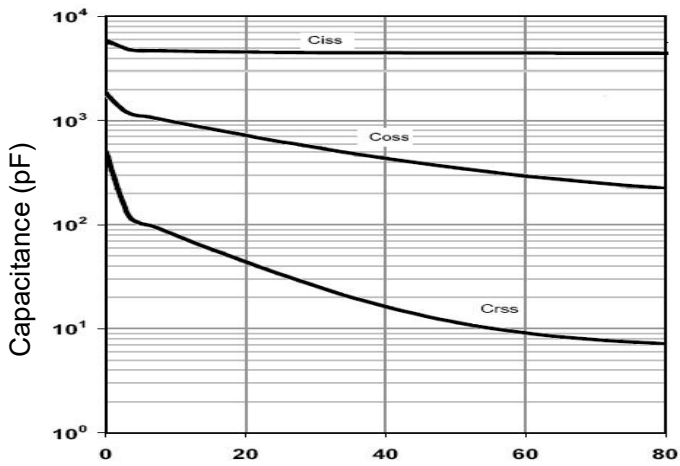
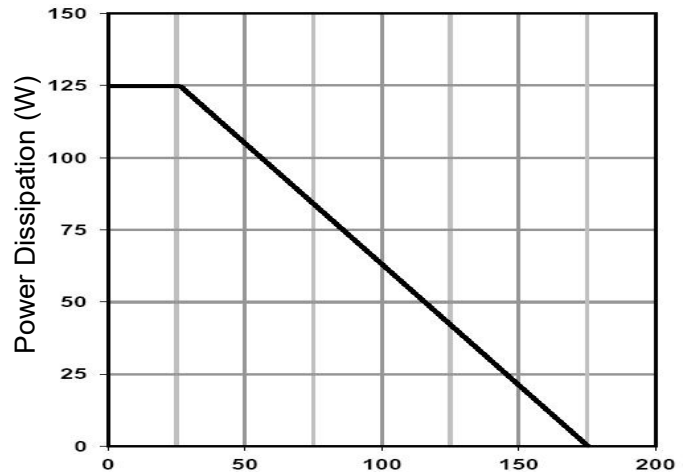


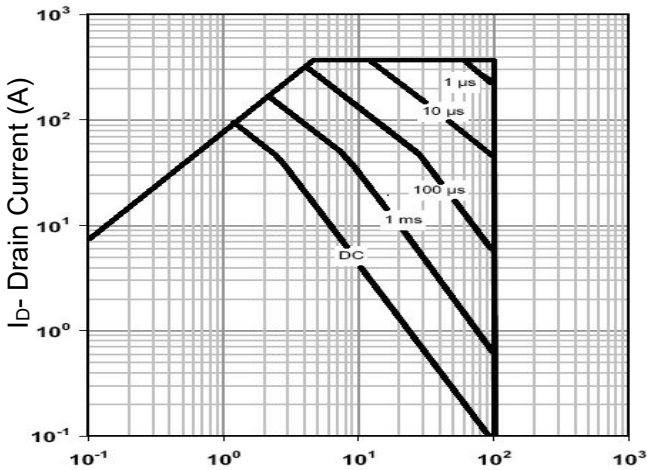
Figure 6 Source- Drain Diode Forward



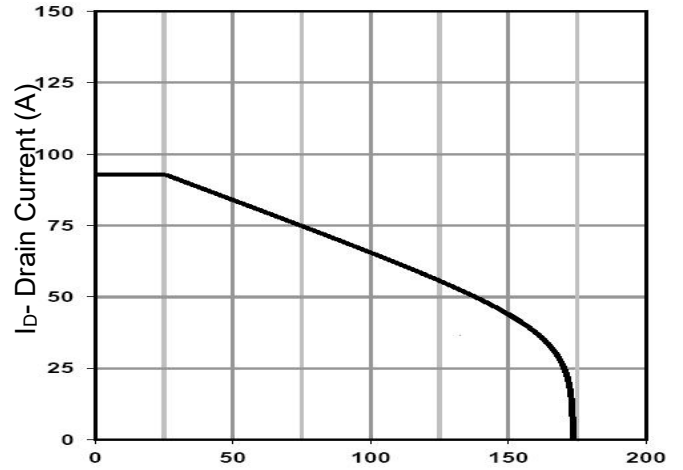
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



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



Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J-Junction Temperature (°C)
Figure 10 Current De-rating

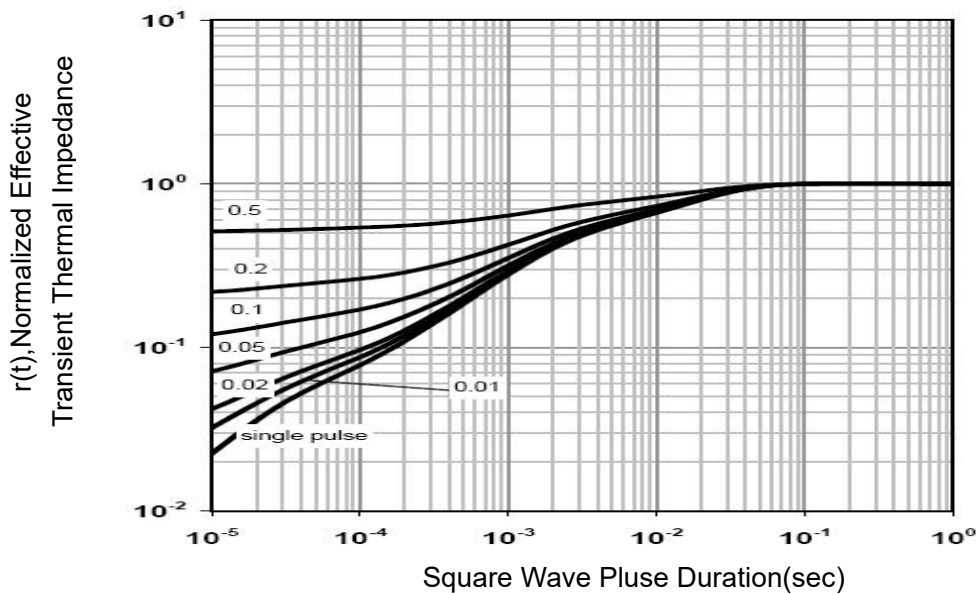
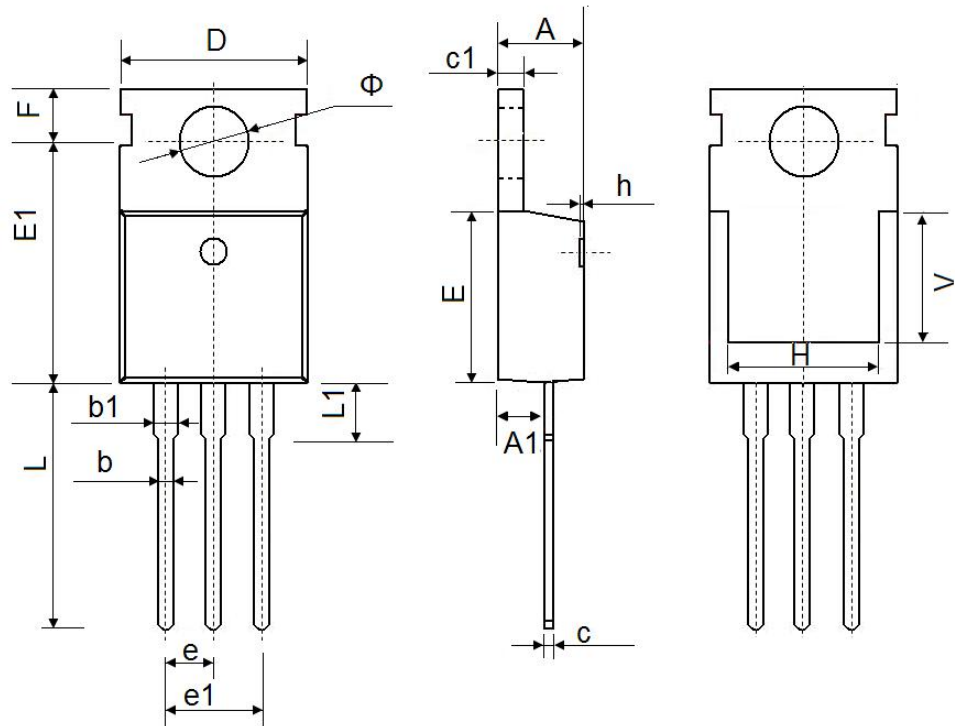


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.400 | 4.600 | 0.173 | 0.181 |
| A1 | 2.250 | 2.550 | 0.089 | 0.100 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.330 | 0.650 | 0.013 | 0.026 |
| c1 | 1.200 | 1.400 | 0.047 | 0.055 |
| D | 9.910 | 10.250 | 0.390 | 0.404 |
| E | 8.9500 | 9.750 | 0.352 | 0.384 |
| E1 | 12.650 | 12.950 | 0.498 | 0.510 |
| e | 2.540 TYP. | | 0.100 TYP. | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.650 | 2.950 | 0.104 | 0.116 |
| H | 7.900 | 8.100 | 0.311 | 0.319 |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 12.900 | 13.400 | 0.508 | 0.528 |
| L1 | 2.850 | 3.250 | 0.112 | 0.128 |
| V | 6.900 REF. | | 0.276 REF. | |
| Φ | 3.400 | 3.800 | 0.134 | 0.150 |

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