

9A 900V N-channel Enhancement Mode Power MOSFET

1 Description

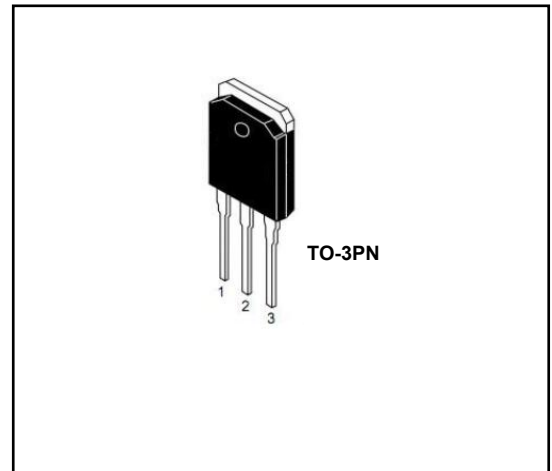
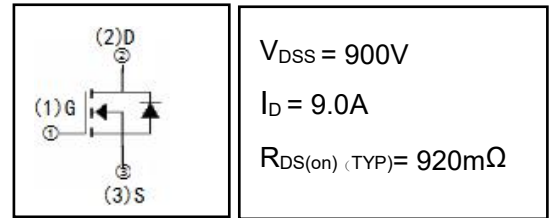
These N-channel enhanced vdmofets, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard.

2 Features

- Fast switching
- ESD improved capability
- Low on resistance($R_{dson} \leq 1.3\Omega$)
- 100% single pulse avalanche energy test
- 100% ΔV_{DS} test

3 Applications

- Used in various power switching circuit for system miniaturization and higher efficiency.
- Power switch circuit of electron ballast and adaptor.



4 Electrical Characteristics

4.1 Absolute Maximum Ratings ($T_c=25^\circ C$, unless otherwise noted)

| PARAMETER | SYMBOL | VALUE | UNIT | |
|--|------------------|-----------|------------|---|
| Drain-Source Voltage | V_{DS} | 900 | V | |
| Gate-Source Voltage | V_{GS} | ± 30 | V | |
| Drain Current(continuous) ^(Note 3) | I_D | 9 | A | |
| Drain Current(continuous)($T=100^\circ C$) ^(Note 3) | I_D | 5.7 | A | |
| Drain Current(Pulsed) | I_{DM} | 36 | A | |
| Single Pulse Avalanche Energy ^(Note 4) | E_{AS} | 980 | mJ | |
| Maximum Power Dissipation | $T_a=25^\circ C$ | P_{tot} | 0.54 | W |
| | $T_c=25^\circ C$ | P_{tot} | 70 | W |
| Operating Junction Temperature Range | T_j | -55~150 | $^\circ C$ | |
| Storage Temperature Range | T_{stg} | -55~150 | $^\circ C$ | |
| High Temperature(tin solder) | T_L | 300 | $^\circ C$ | |

4.2 Thermal Characteristics

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|------------|-------|--------------|
| Thermal Resistance, Junction to Case-sink | R_{thJC} | 0.5 | $^\circ C/W$ |
| Thermal Resistance, Junction to Ambient | R_{thJA} | 40 | $^\circ C/W$ |

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

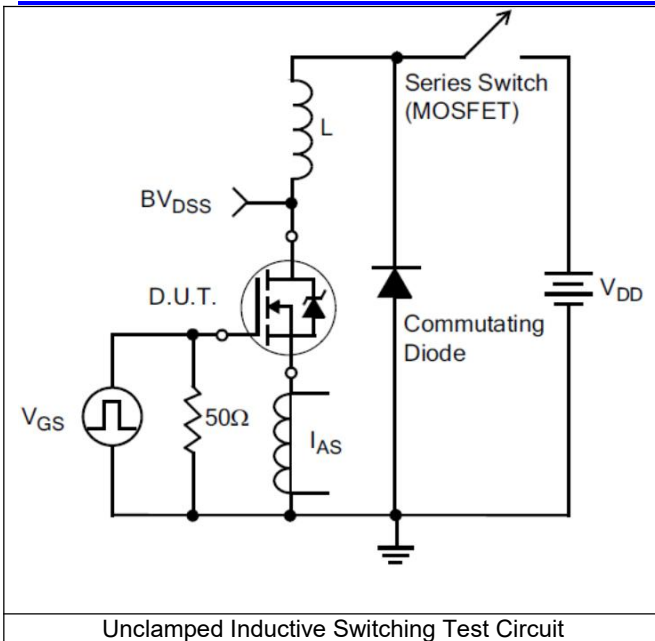
| PARAMETER | SYMBOL | Test Condition | VALUE | | | UNIT |
|--|---------------------|--|-------|------|------|------|
| | | | MIN | TYP | MAX | |
| Off Characteristics | | | | | | |
| Drain-source Breakdown Voltage | BV _{DSS} | I _D =250μA, V _{GS} =0V | 900 | 960 | -- | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =900V, V _{GS} =0V, T _C =25°C | -- | -- | 1.0 | μA |
| | | V _{DS} =720V, V _{GS} =0V, T _C =125°C | -- | -- | 250 | μA |
| Gate-to-Body Leakage Current | I _{GSS} | V _{GS} =±30V, V _{DS} =0V | -- | -- | ±100 | nA |
| On Characteristics (Note 3) | | | | | | |
| Gate threshold voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 2.0 | -- | 4.0 | V |
| Drain-source on Resistance | R _{DS(on)} | V _{GS} =10V, I _D =4.5A | -- | 0.92 | 1.3 | Ω |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{GS} =0V, V _{DS} =25V, f=1.0MHz | -- | 4100 | -- | pF |
| Output Capacitance | C _{oss} | | -- | 185 | -- | |
| Reverse Transfer Capacitance | C _{rss} | | -- | 13 | -- | |
| Turn-on Delay Time | T _{d(on)} | I _D =4A, V _{DD} =450V, V _{GS} =10V, R _G =4.7Ω | -- | 22 | -- | ns |
| Turn-on Rise Time | t _r | | -- | 9.0 | -- | |
| Turn-off Delay Time | T _{d(off)} | | -- | 62 | -- | |
| Turn-off Fall | t _f | | -- | 23 | -- | |
| Total Gate Charge | Q _g | I _D =9A, V _{DD} =450V, V _{GS} =10V | -- | 65 | -- | nC |
| Gate-to-Source Charge | Q _{gs} | | -- | 22 | -- | |
| Gate-to-Drain("Miller")C harge | Q _{gd} | | -- | 18 | -- | |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage (Note 3) | V _{FSD} | V _{GS} =0V, I _S =9A | -- | -- | 1.5 | V |
| Continuous Source Current (BodyDiode) (Note 3) | I _S | | -- | -- | 9 | A |
| Reverse Recovery Time | trr | T _J =25°C, I _F =9A, | -- | 1.2 | -- | us |
| Reverse Recovery Charge | Q _{rr} | dI _F /dt=100A/μS, V _{GS} =0V | -- | 9.4 | -- | uc |

Notes:

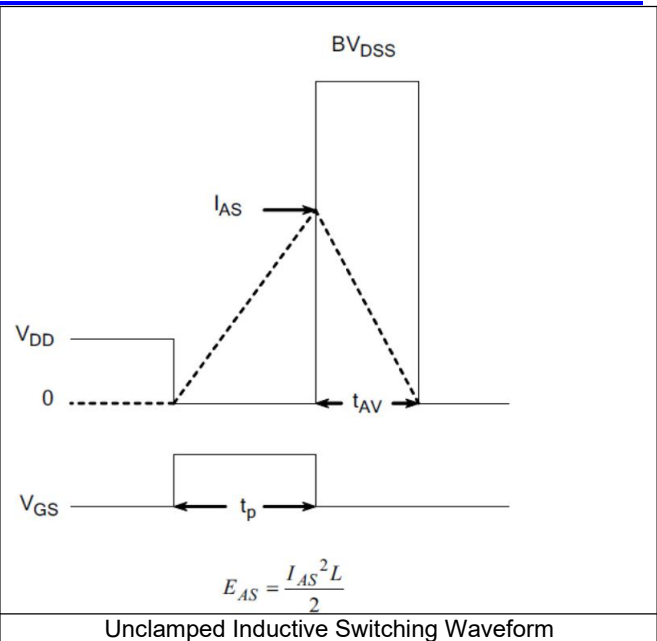
- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t_s≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: L=10 mH, I_D=14.0A, V_{DD}=50V,, Start T_J=25°C.

5 Typical Test Circuit and Waveform

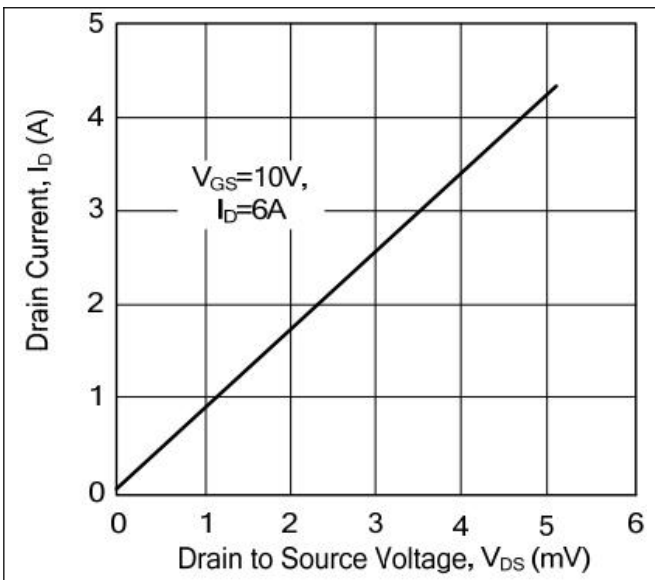
| | |
|--|--|
| | |
| <p style="text-align: center;">Gate Charge Test Circuit</p> | <p style="text-align: center;">Gate Charge Waveforms</p> |
| <p style="text-align: center;">Resistive Switching Test Circuit</p> | <p style="text-align: center;">Resistive Switching Waveforms</p> |
| <p style="text-align: center;">Diode Reverse Recovery Test Circuit</p> | <p style="text-align: center;">Diode Reverse Recovery Waveform</p> |



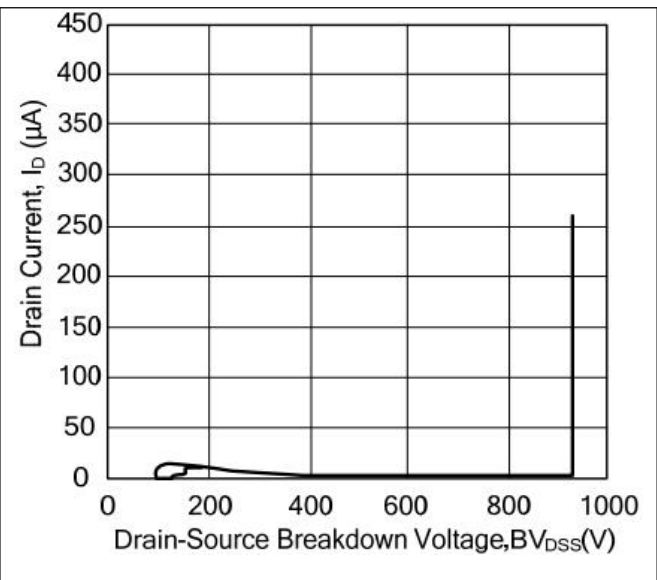
Unclamped Inductive Switching Test Circuit



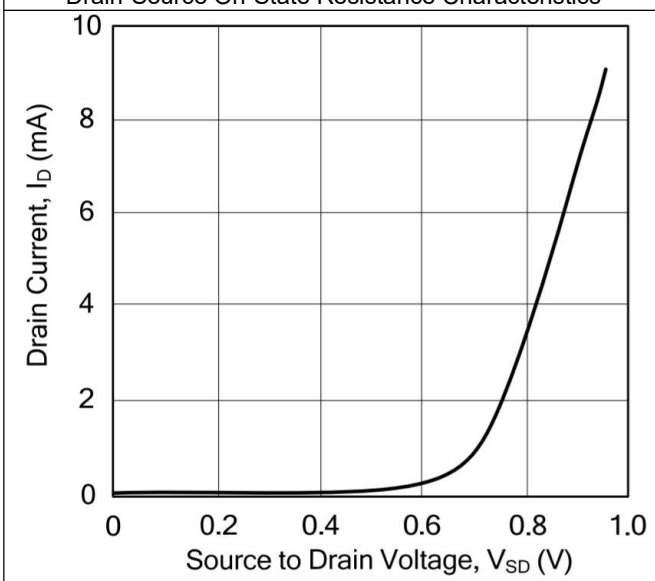
Unclamped Inductive Switching Waveform



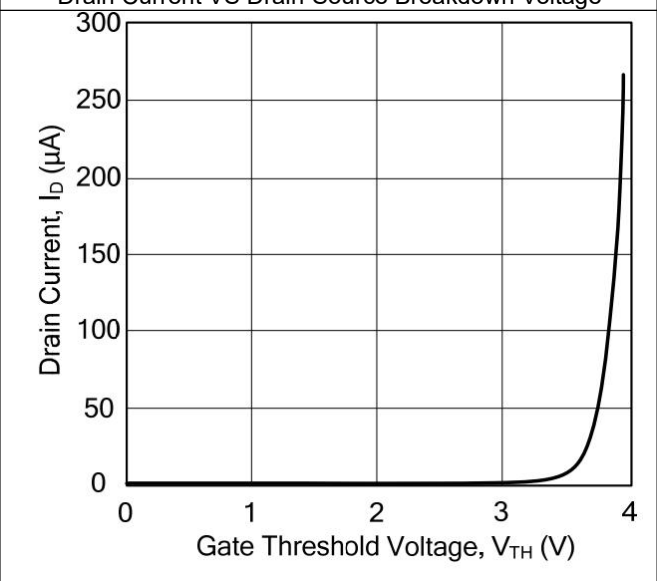
Drain-Source On-State Resistance Characteristics



Drain Current VS Drain-Source Breakdown Voltage

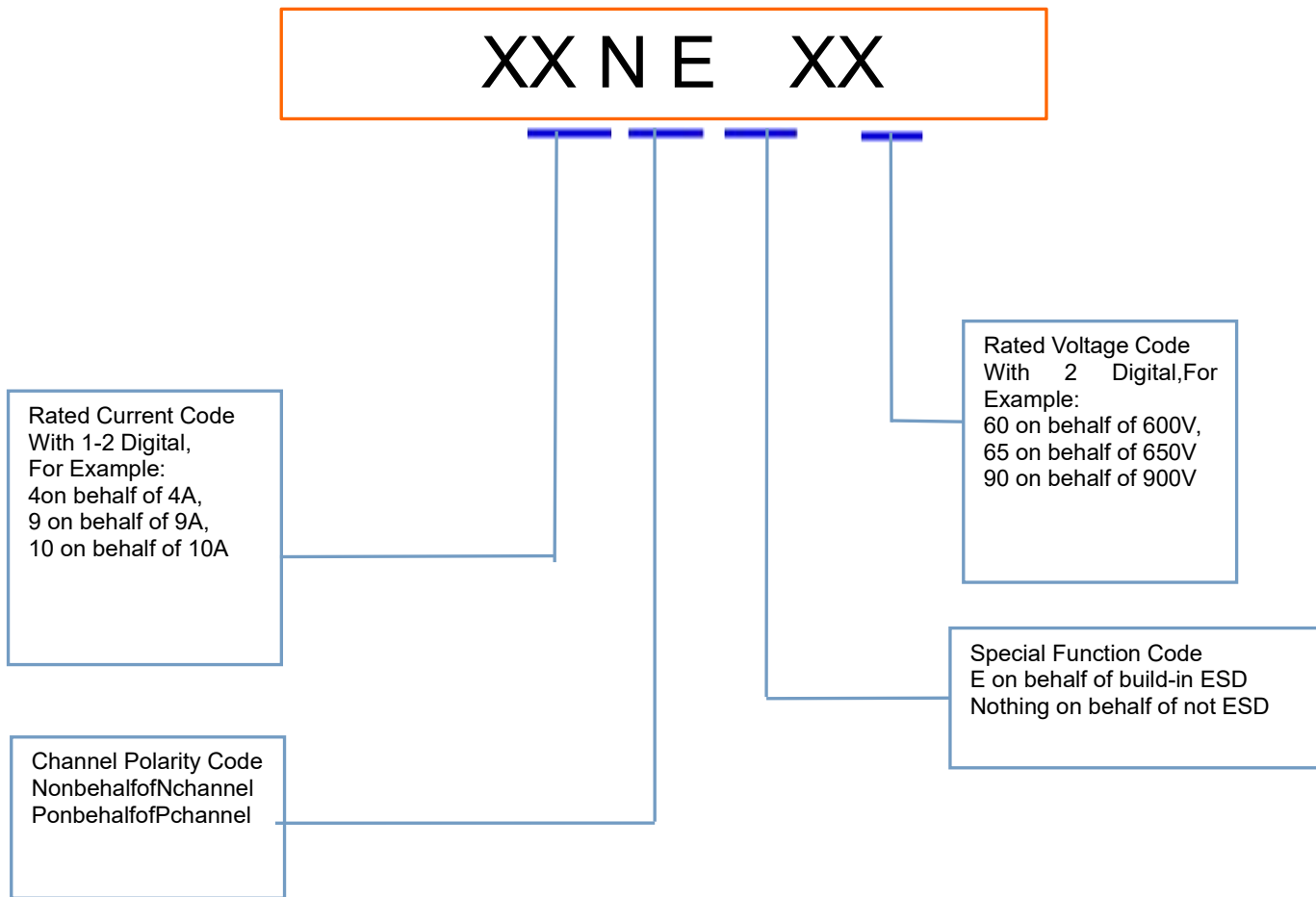


Drain Current VS Source to Drain Voltage



Drain Current VS Gate Threshold Voltage

7 Product Names Rules

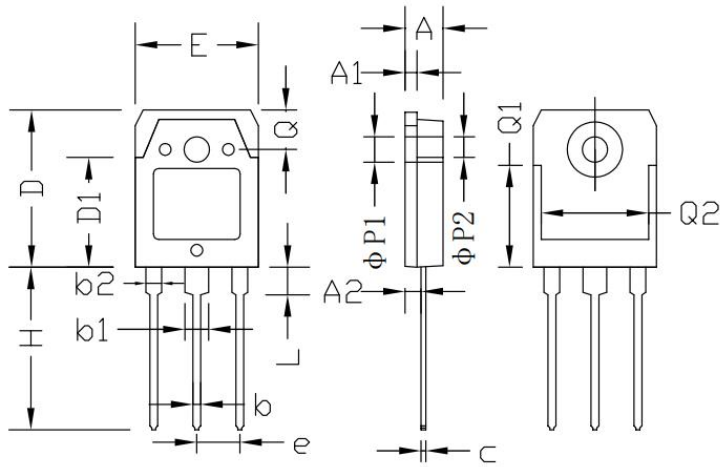


8 Product Specifications and Packaging Models

| Product Model | Package Type | Mark Name | RoHS | Package | Quantity |
|---------------|--------------|-----------|---------|---------|----------|
| 9N90 | TO-3PN | 9N90 | Pb-free | Tube | 300/box |

9 Dimensions

TO-3PN PACKAGE OUTLINE DIMENSIONS



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | min. | max. | min. | max. |
| A | 4.60 | 5.00 | 0.181 | 0.197 |
| A1 | 1.45 | 1.65 | 0.057 | 0.065 |
| A2 | 2.20 | 2.60 | 0.087 | 0.102 |
| b | 0.80 | 1.20 | 0.032 | 0.047 |
| b1 | 2.80 | 3.20 | 0.110 | 0.126 |
| b2 | 1.80 | 2.20 | 0.071 | 0.087 |
| C | 0.55 | 0.75 | 0.022 | 0.030 |
| D | 19.20 | 19.80 | 0.756 | 0.780 |
| D1 | 13.10 | 14.70 | 0.516 | 0.578 |
| E | 15.40 | 15.80 | 0.607 | 0.623 |
| e | 5.45 TYP | | 0.215 TYP | |
| H | 19.80 | 20.50 | 0.780 | 0.807 |
| L | 3.20 | 3.70 | 0.126 | 0.146 |
| ΦP1 | 3.20 TYP | | 0.126 TYP | |
| ΦP2 | 3.50 TYP | | 0.138 TYP | |
| Q | 5.00 TYP | | 0.197 TYP | |
| Q1 | 12.40 TYP | | 0.488 TYP | |
| Q2 | 12.6 | - | 0.496 | - |

10 Attentions

- Jiangsu Donghai Semiconductor Technology Co., Ltd. reserves the right to change the specification without prior notice! The customer should obtain the latest version of the information before making the order and verify that the information is complete and up to date.
- It is the responsibility of the purchaser for any failure or failure of any semiconductor product under certain conditions. It is the responsibility of the purchaser to comply with safety standards and to take safety measures in the system design and machine manufacturing of WXdH products in order to avoid potential risk of failure. Injury or property damage.
- Product promotion is endless, our company will be dedicated to provide customers with better products.

11 Appendix

Revision history:

| Date | REV. | Description | Page |
|------------|------|-------------|------|
| 2020.11.12 | 1.0 | Original | |