

NCE N-Channel Super Trench Power MOSFET

Description

The NCEP4075GU 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.

Application

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

General Features

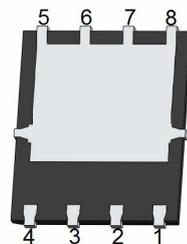
- $V_{DS} = 40V, I_D = 75A$
 $R_{DS(ON)} = 4.1m\Omega$ (typical) @ $V_{GS} = 10V$
 $R_{DS(ON)} = 6.1m\Omega$ (typical) @ $V_{GS} = 4.5V$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating

100% UIS TESTED!
100% ΔV_{ds} TESTED!

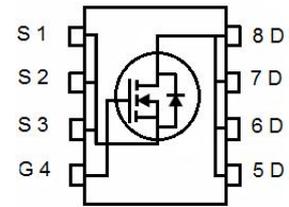
PDFN 5X6-8L



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|------------|----------------|-----------|------------|----------|
| P4075GU | NCEP4075GU | DFN5x6-8L | - | - | - |

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

| Parameter | Symbol | Limit | Unit |
|--|----------------|-------------------------|---------------|
| Drain-Source Voltage | V_{DS} | 40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | ($T_c = 25^\circ C$) | 75 |
| | | ($T_c = 100^\circ C$) | 53 |
| Maximum Power Dissipation | P_D | 55 | W |
| Pulsed Drain Current | I_{DM} | 300 | A |
| Derating factor | | 0.44 | W/ $^\circ C$ |
| Single pulse avalanche energy (Note 1) | E_{AS} | 144 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--------------------------------------|-----------------|-----|--------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 2.3 | $^\circ C/W$ |
|--------------------------------------|-----------------|-----|--------------|

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 | 40 | - | - | V |
| Zero Gate Voltage Drain Current | I _{DSS} | V _{DS} =40V, V _{GS} =0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I _{GSS} | V _{GS} =±20V, V _{DS} =0V | - | - | ±100 | nA |
| On Characteristics | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | V _{DS} =V _{GS} , I _D =250μA | 1.0 | 1.6 | 2.2 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =10V, I _D =20A | - | 4.1 | 4.6 | mΩ |
| | | V _{GS} =4.5V, I _D =20A | - | 6.1 | 6.7 | mΩ |
| Forward Transconductance | g _{FS} | V _{DS} =5V, I _D =20A | - | 30 | - | S |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C _{iss} | V _{DS} =20V, V _{GS} =0V, F=1.0MHz | - | 1190 | - | pF |
| Output Capacitance | C _{oss} | | - | 480 | - | pF |
| Reverse Transfer Capacitance | C _{rss} | | - | 30 | - | pF |
| Switching Characteristics (Note 2) | | | | | | |
| Turn-on Delay Time | t _{d(on)} | V _{DD} =20V, I _D =20A V _{GS} =10V, R _G =1.6Ω | - | 7 | - | nS |
| Turn-on Rise Time | t _r | | - | 30 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 25 | - | nS |
| Turn-Off Fall Time | t _f | | - | 8 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =20V, I _D =20A, V _{GS} =10V | - | 24 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 3.8 | - | nC |
| Gate-Drain Charge | Q _{gd} | | - | 4.5 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _S =20A | - | - | 1.2 | V |
| Diode Forward Current | I _S | | - | - | 75 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F = I _S | - | 14 | - | nS |
| Reverse Recovery Charge | Q _{rr} | di/dt = 100A/μs | - | 16 | - | nC |

Notes:

1. EAS condition : T_J=25°C, V_{DD}=20V, V_G=10V, L=0.5mH, R_G=25Ω
2. Guaranteed by design, not subject to production
3. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_J(MAX)=150°C. The SOA curve provides a single pulse rating.

Typical Electrical and Thermal Characteristics

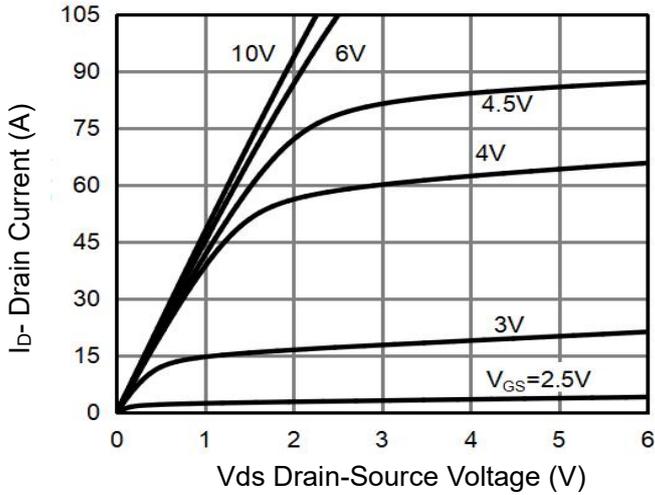


Figure 1 Output Characteristics

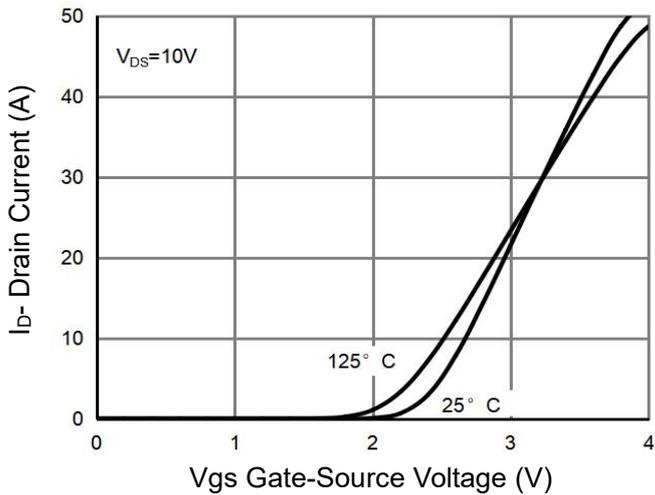


Figure 2 Transfer Characteristics

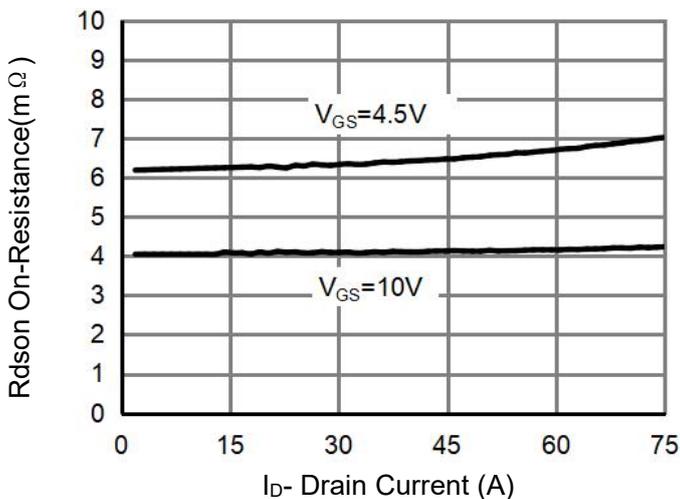


Figure 3 Rdson- Drain Current

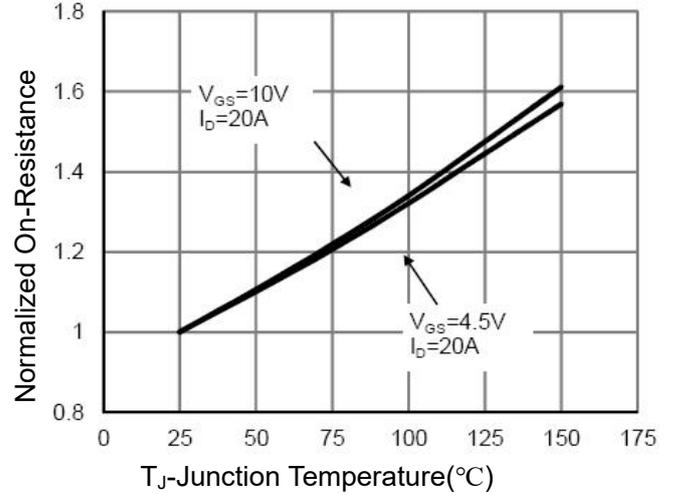


Figure 4 Rdson-Junction Temperature

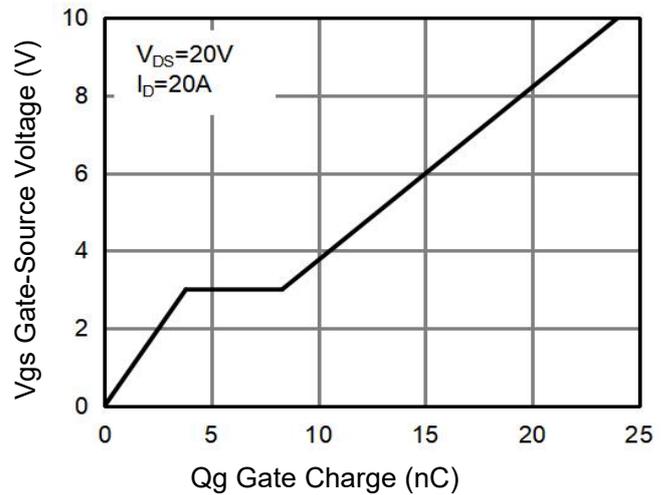


Figure 5 Gate Charge

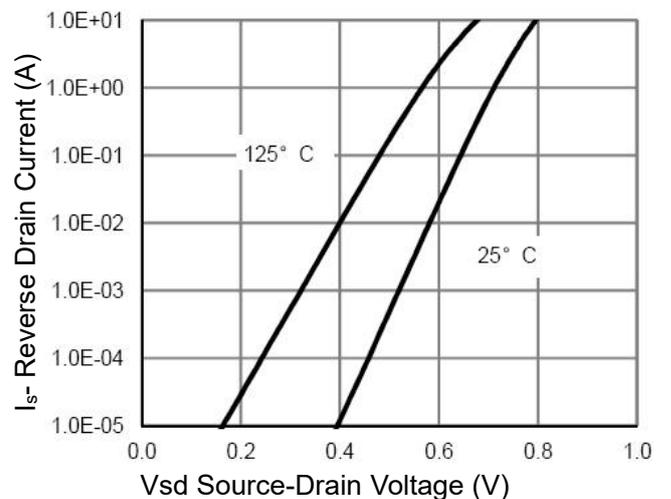


Figure 6 Source- Drain Diode Forward

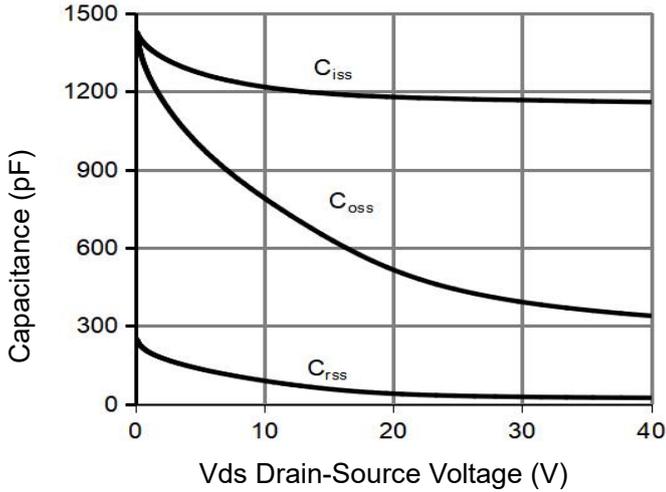


Figure 7 Capacitance vs Vds

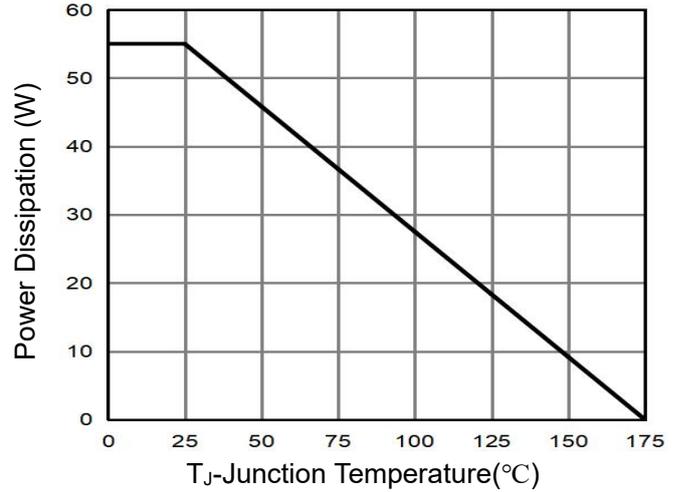


Figure 9 Power De-rating

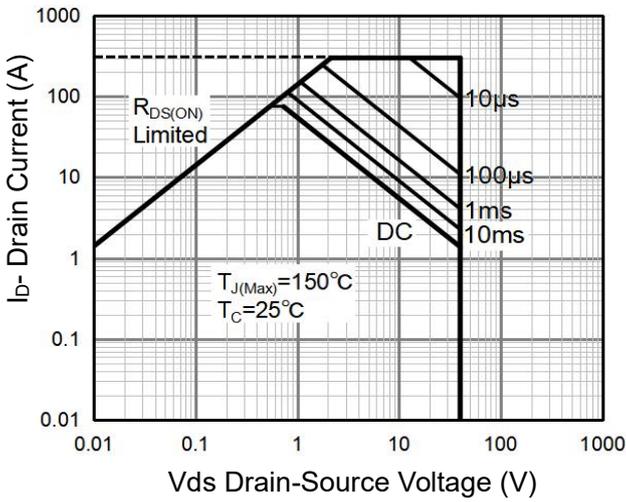


Figure 8 Safe Operation Area (Note3)

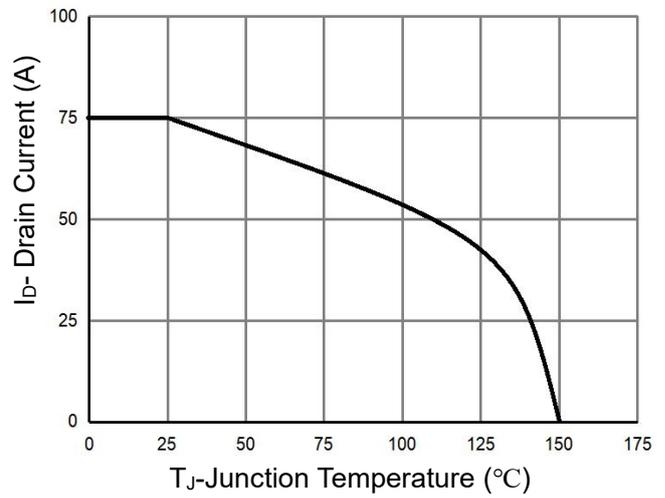


Figure 10 Current De-rating

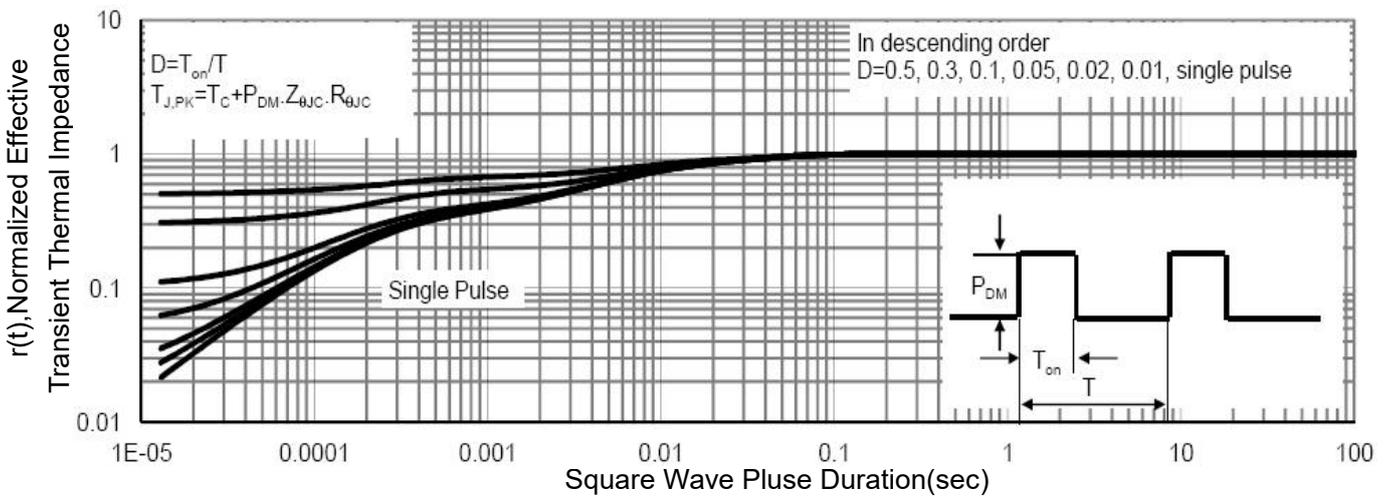
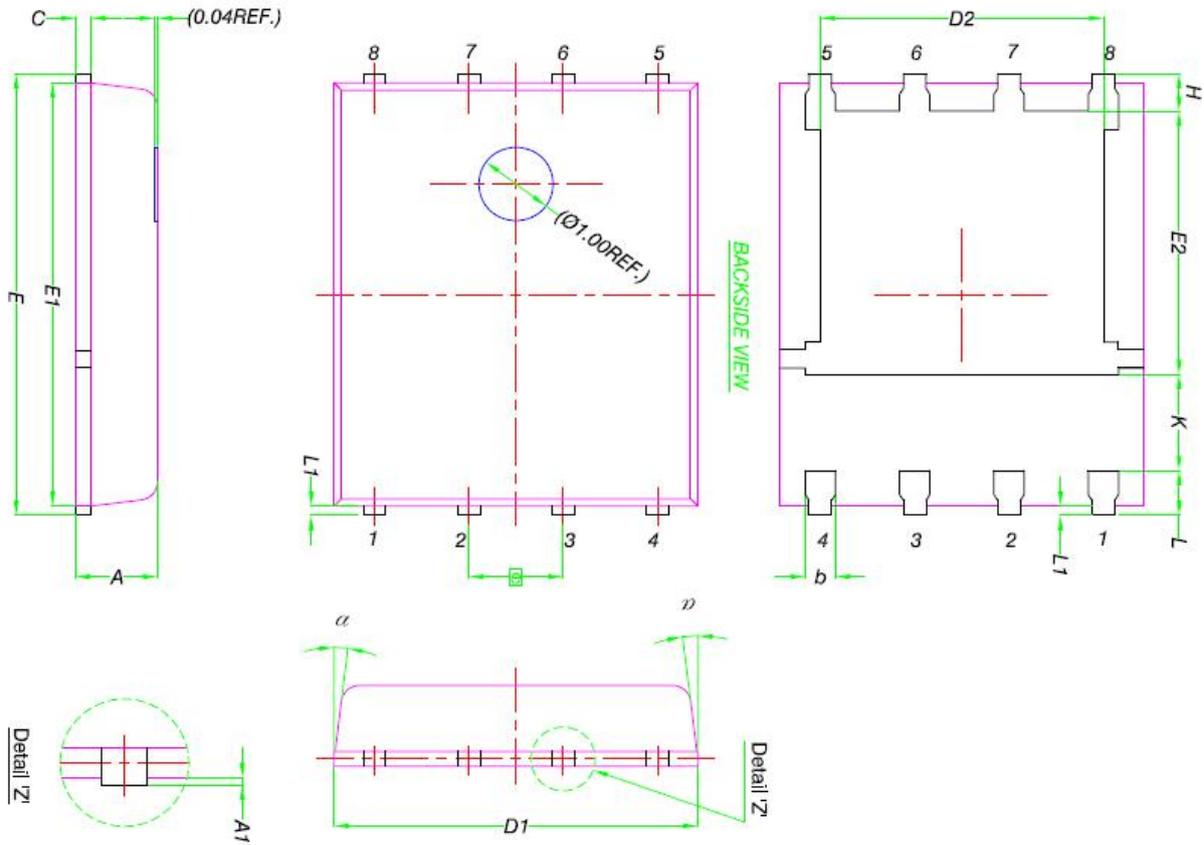
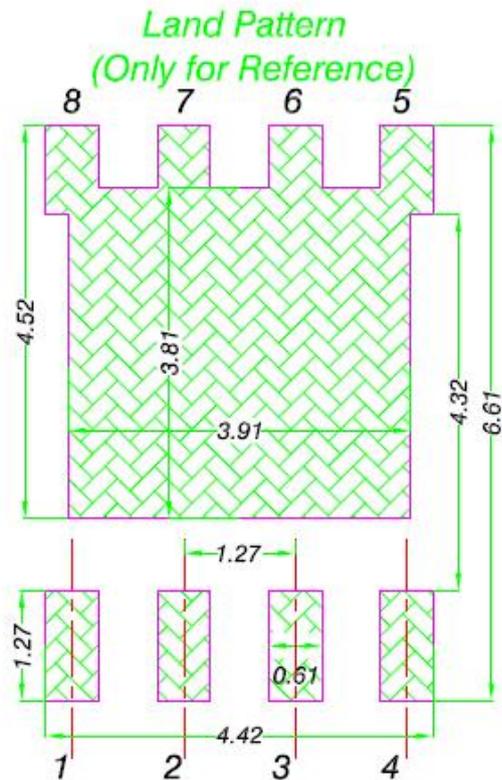


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



| DIM. | MILLIMETERS | | |
|------|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0 | - | 0.05 |
| b | 0.33 | 0.41 | 0.51 |
| C | 0.20 | 0.25 | 0.30 |
| D1 | 4.80 | 4.90 | 5.00 |
| D2 | 3.61 | 3.81 | 3.96 |
| E | 5.90 | 6.00 | 6.10 |
| E1 | 5.70 | 5.75 | 5.80 |
| E2 | 3.38 | 3.58 | 3.78 |
| e | 1.27 BSC | | |
| H | 0.41 | 0.51 | 0.61 |
| K | 1.10 | - | - |
| L | 0.51 | 0.61 | 0.71 |
| L1 | 0.06 | 0.13 | 0.20 |
| α | 0° | - | 12° |



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