

NCE P-Channel Super Trench Power MOSFET

Description

The NCEP40P65GU 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

- $V_{DS} = -40V, I_D = -65A$
 $R_{DS(on)} = 7.8m\Omega$ (typical) @ $V_{GS} = -10V$
 $R_{DS(on)} = 11.5m\Omega$ (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

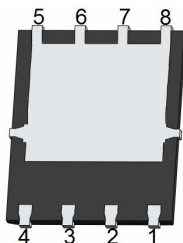
100% UIS TESTED!

100% ΔV_{ds} TESTED!

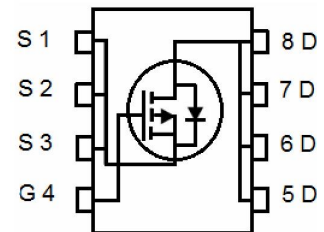
DFN 5X6



Top View



Bottom View



Schematic Diagram

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| P40P65GU | NCEP40P65GU | 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 | $I_D(T_c=25^\circ C)$ | -65 | A |
| Drain Current-Continuous($T_c=100^\circ C$) | $I_D(T_c=100^\circ C)$ | -46 | A |
| Pulsed Drain Current | I_{DM} | -260 | A |
| Maximum Power Dissipation($T_c=25^\circ C$) | $P_D(T_c=25^\circ C)$ | 85 | W |
| Pulsed Drain Current | I_{DM} | -260 | A |
| Derating factor | | 0.68 | W/ $^\circ C$ |
| Single pulse avalanche energy (Note 1) | E_{AS} | 423 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | $^\circ C$ |

Thermal Characteristic

| | | | |
|--------------------------------------|-----------------|------|--------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 1.47 | $^\circ C/W$ |
|--------------------------------------|-----------------|------|--------------|

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 | -1.7 | -2.5 | V |
| Drain-Source On-State Resistance | R _{DS(ON)} | V _{GS} =-10V, I _D =-20A | - | 7.8 | 10.0 | mΩ |
| | | V _{GS} =-4.5V, I _D =-20A | - | 11.5 | 16.0 | 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 | - | 2450 | - | PF |
| Output Capacitance | C _{oss} | | - | 660 | - | PF |
| Reverse Transfer Capacitance | C _{rss} | | - | 18 | - | 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 | - | 9 | - | nS |
| Turn-on Rise Time | t _r | | - | 4 | - | nS |
| Turn-Off Delay Time | t _{d(off)} | | - | 30 | - | nS |
| Turn-Off Fall Time | t _f | | - | 5 | - | nS |
| Total Gate Charge | Q _g | V _{DS} =-20V, I _D =-20A, V _{GS} =-10V | - | 39 | - | nC |
| Gate-Source Charge | Q _{gs} | | - | 7.8 | | nC |
| Gate-Drain Charge | Q _{gd} | | - | 5.3 | | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage | V _{SD} | V _{GS} =0V, I _S =-20A | - | | -1.2 | V |
| Diode Forward Current | I _S | | - | - | -65 | A |
| Reverse Recovery Time | t _{rr} | T _J = 25°C, I _F =-20A | - | 22 | | nS |
| Reverse Recovery Charge | Q _{rr} | di/dt = 100A/μs | - | 58 | | 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

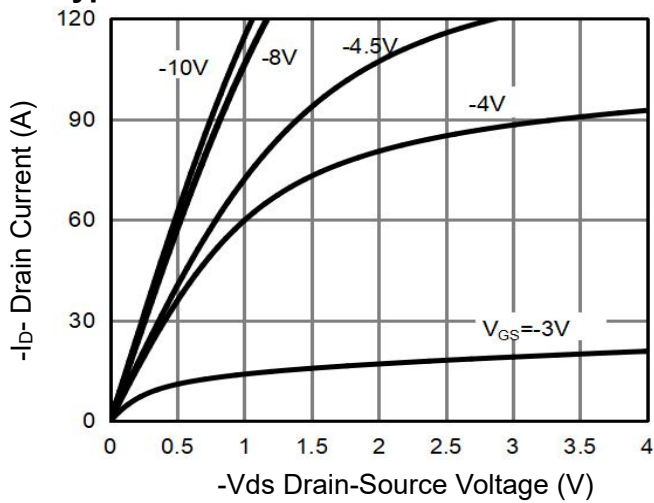


Figure 1 Output Characteristics

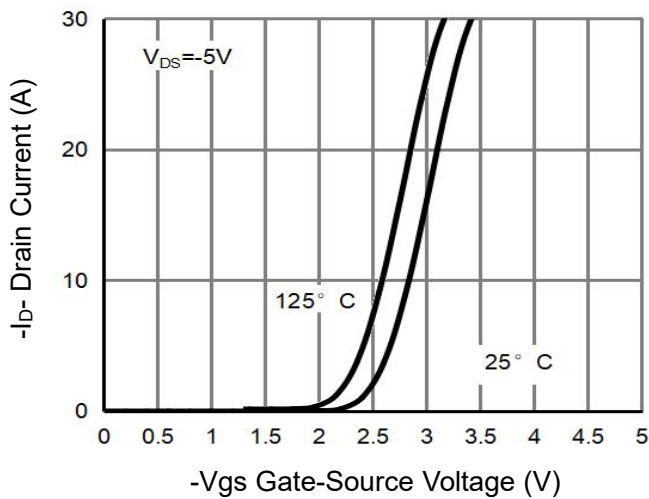


Figure 2 Transfer Characteristics

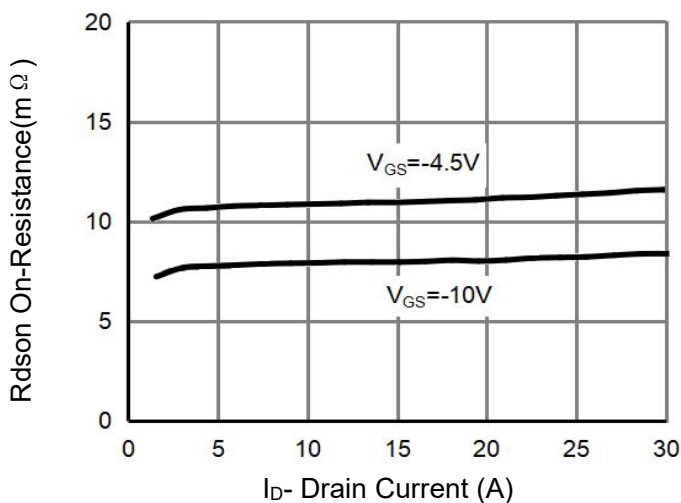


Figure 3 Rdson- Drain Current

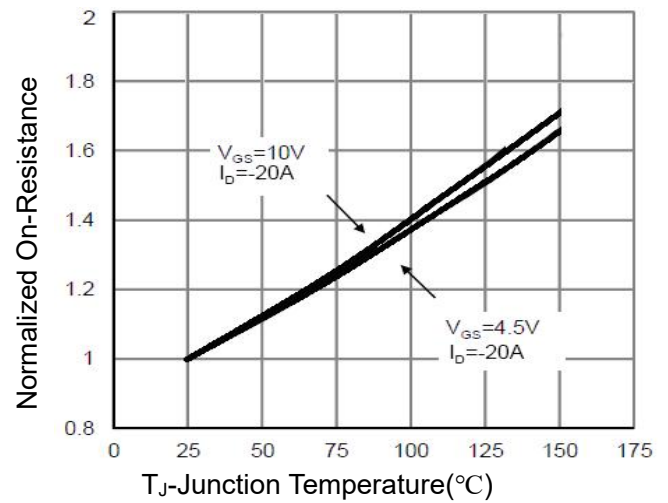


Figure 4 Rdson-Junction Temperature

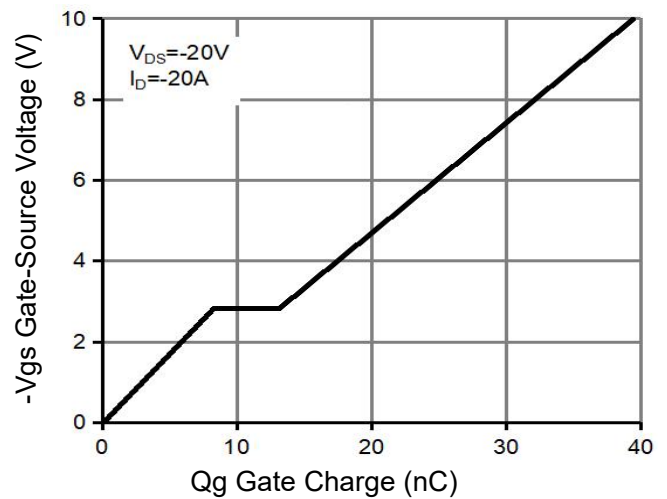


Figure 5 Gate Charge

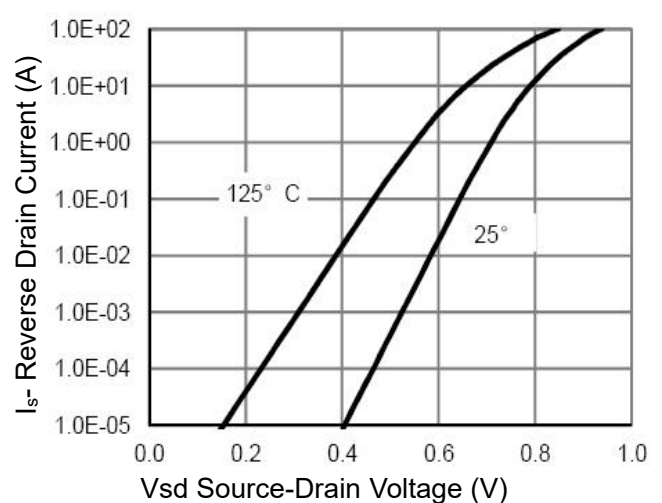


Figure 6 Source- Drain Diode Forward

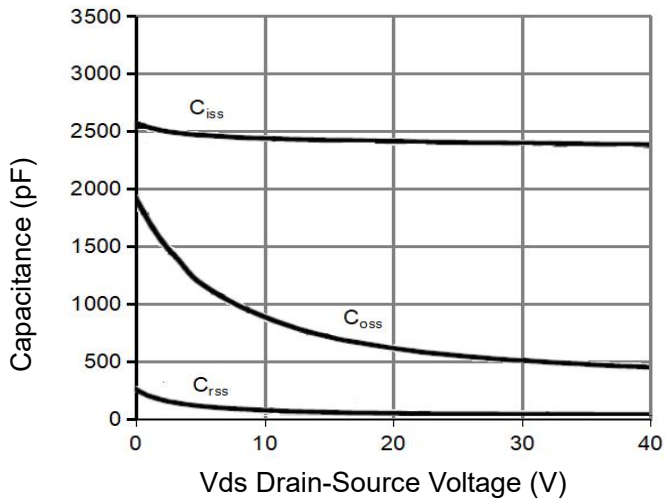


Figure 7 Capacitance vs Vds

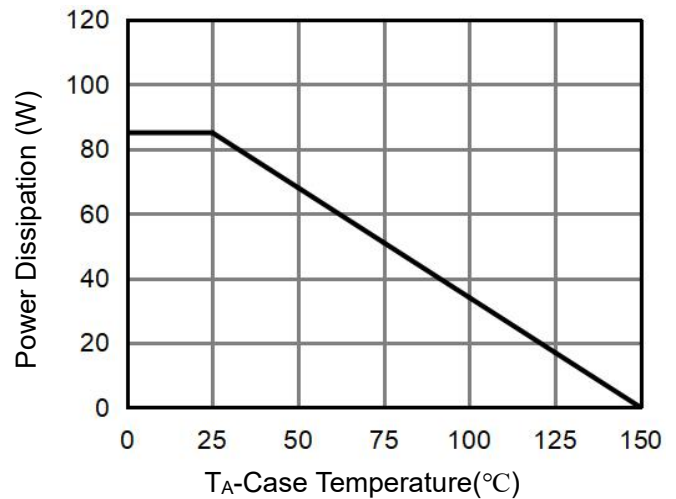


Figure 9 Power De-rating

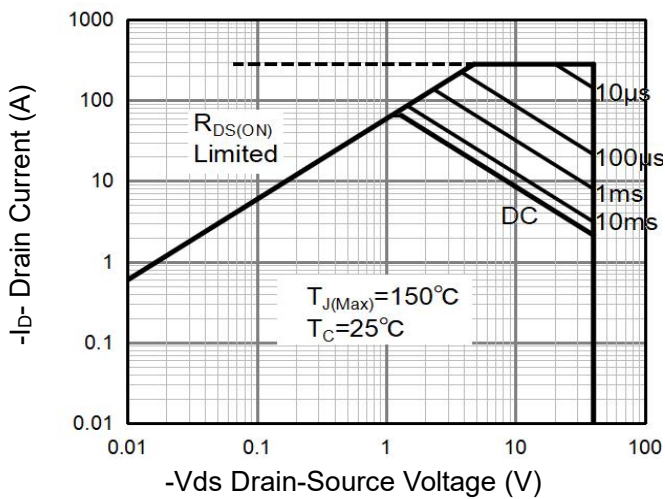


Figure 8 Safe Operation Area (Note3)

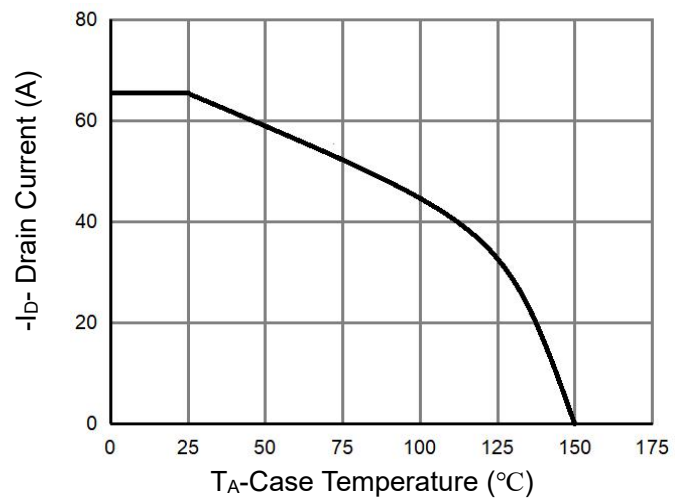


Figure 10 Current De-rating

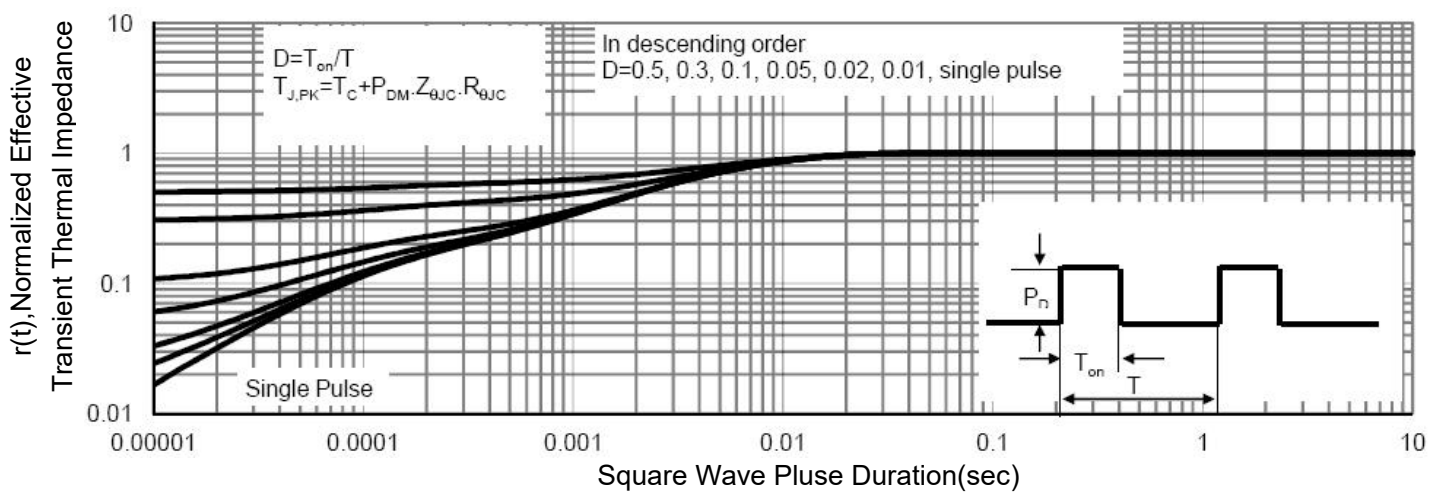
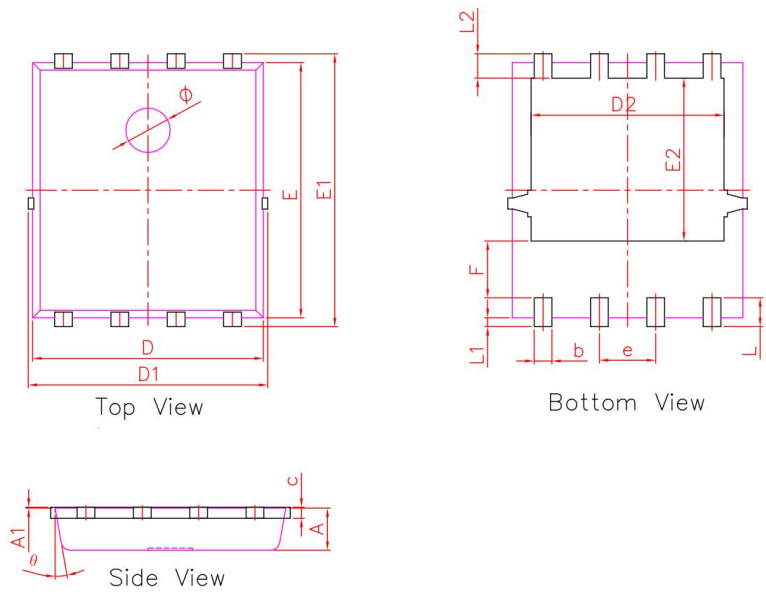


Figure 11 Normalized Maximum Transient Thermal Impedance

DFN5X6-8L Package Information



| PDFN5X6-8L | | | |
|-------------------------------|----------|------|------|
| DIM. | MIN. | NOM. | MAX. |
| A | 0.90 | 0.95 | 1.00 |
| A1 | 0.00 | 0.02 | 0.05 |
| b | 0.35 | 0.40 | 0.50 |
| c | 0.20 | 0.25 | 0.30 |
| D | 5.10 | 5.20 | 5.30 |
| D1 | 5.10 | 5.40 | 5.50 |
| D2 | 4.25 | 4.35 | 4.45 |
| e | 1.27 BSC | | |
| E | 5.70 | 5.75 | 5.80 |
| E1 | 6.00 | 6.15 | 6.30 |
| E2 | 3.57 | 3.67 | 3.77 |
| F | 1.18 | 1.28 | 1.38 |
| L | 0.55 | 0.65 | 0.75 |
| L1 | 0.15 | 0.20 | 0.25 |
| L2 | 0.45 | 0.55 | 0.65 |
| φ | 0.90 | 1.00 | 1.10 |
| Θ | 8° | 10° | 12° |
| All dimensions in millimeters | | | |

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