# Product Specification

## QNN100N077G

100V N-Channel SGT MOSFET

# FEATURES

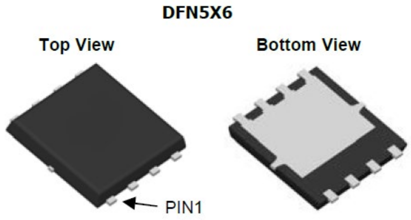
- 100V, 80A

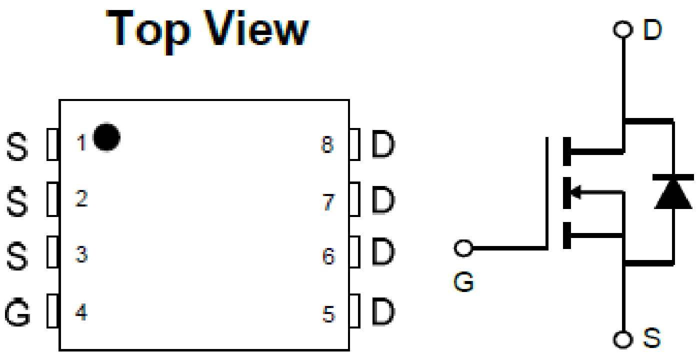
  $R_{DS(ON)}$ <7 .7mΩ @ $V_{GS}$ = 10V
- Advanced Split Gate Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge

# Applications

- Load Switch
- PWM Application
- Power Management

# Pin Description





| NO. | Symbol | Description |
|---|---|---|
| 1 | S | SOURCE |
| 2 | S | SOURCE |
| 3 | S | SOURCE |
| 4 | G | GATE |
| 5 | D | DRAIN |
| 6 | D | DRAIN |
| 7 | D | DRAIN |
| 8 | D | DRAIN |

# Absolute Maximum Ratings

(@ $T_C$ = 25℃ unless otherwise specified)

| Symbol | Parameter | Limit | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Drain Current-Continuous | 80 | A |
| $I_D$ (100℃) | Drain Current-Continuous($T_C$=100℃) | 63.5 | A |
| $I_{DM}$ | Pulsed Drain Current | 240 | A |
| $P_D$ | Power Dissipation | 52 | W |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 1.50 | W/℃ |
| $T_J$,$T_{STG}$ | Operating Junction and Storage Temperature Range | -55 To 175 | ℃ |

# Electrical Characteristics

($T_J$ = 25℃ unless otherwise specified)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V,$I_D$=250uA | 100 | | - | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=80V,$V_{GS}$=0V | - | - | 1 | uA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V,$V_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** (3) | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$,$I_D$=250uA | 1.2 | 1.5 | 2.2 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=20A | - | 6.9 | 7.7 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$=80V,$I_D$=20A | 26 | - | - | S |
| **Dynamic Characteristics** (4) | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=50V,$V_{GS}$=0V, F=1.0MHz | - | 1987 | - | PF |
| Output Capacitance | $C_{oss}$ | | - | 629 | - | PF |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 12 | - | PF |
| **Switching Characteristics** (4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$=50V,$I_D$=20A, $R_L$=1Ω<br>$V_{GS}$=10V,$R_G$=3Ω | - | 15 | - | nS |
| Turn-on Rise Time | $t_r$ | | - | 28 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 46 | - | nS |
| Turn-Off Fall Time | $t_f$ | | - | 42 | - | nS |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V,$I_D$=20A, $V_{GS}$=10V | - | 39 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 6.6 | - | nC |
| Gate-Drain Charge | $Q_{gd}$ | | - | 8.6 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage (3) | $V_{SD}$ | $V_{GS}$=0V,$I_S$=20A | - | 0.7 | 1.2 | V |
| Diode Forward Current (2) | $I_S$ | | - | - | 62 | A |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25℃, $I_F$=20A<br>di/dt=100A/us(3) | - | 177 | - | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 1290 | - | nC |
| Forward Turn-On Time | $t_{on}$ | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

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 ≤ 300us, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

# Electrical Characteristics Diagrams

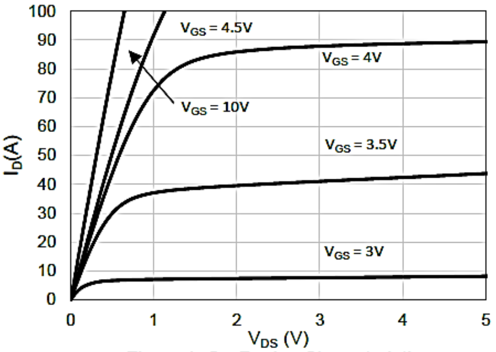


Figure 1: On-Region Characteristics

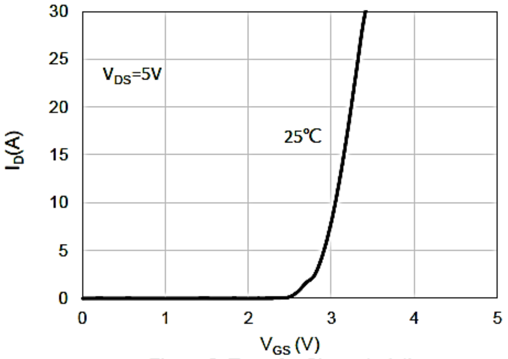


Figure 2: Transfer Characteristics

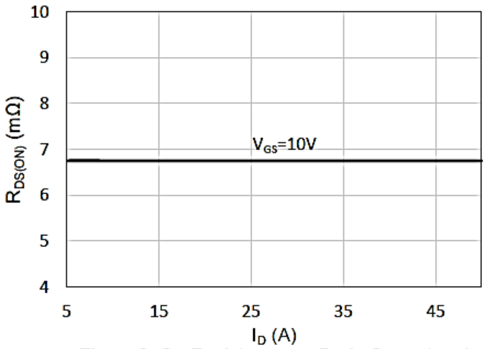


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

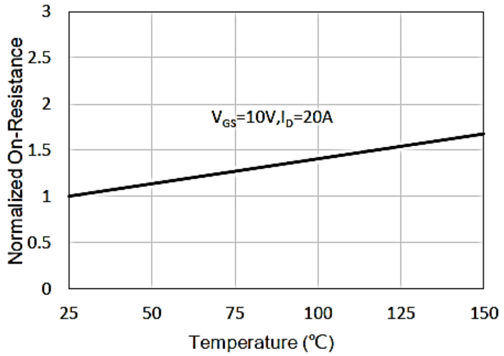


Figure 4: On-Resistance vs. Junction Temperature

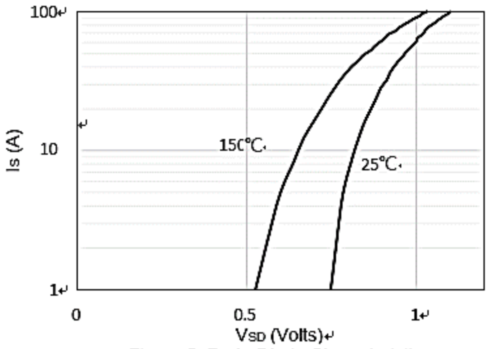


Figure 5: Body-Diode Characteristics

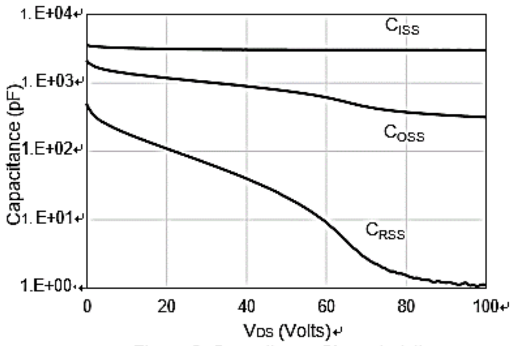


Figure 6: Capacitance Characteristics

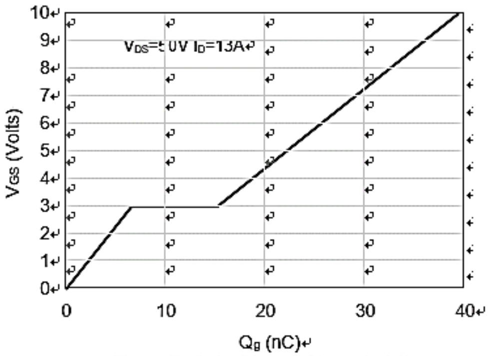


Figure 7: Gate-Charge Characteristics

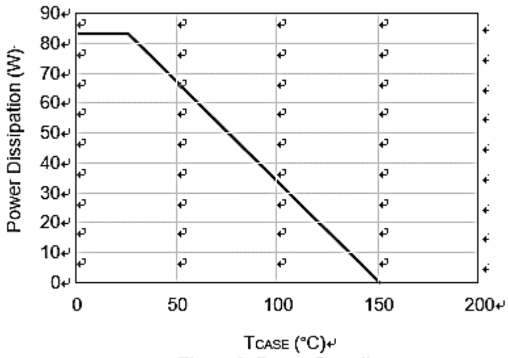


Figure 8: Power De-rating

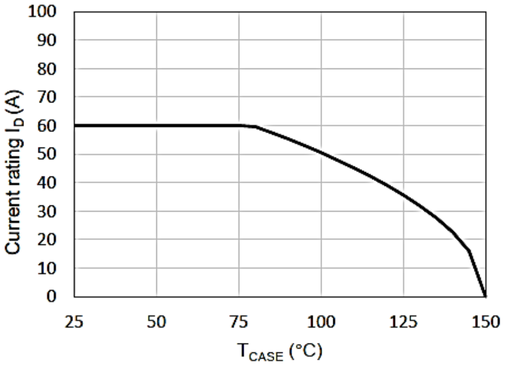


Figure 9: Current De-rating

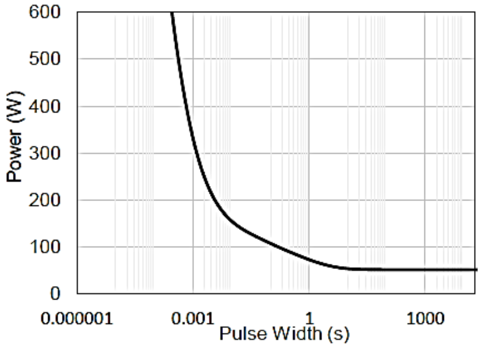


Figure 10: Single Pulse Power Rating Junction-to-Case

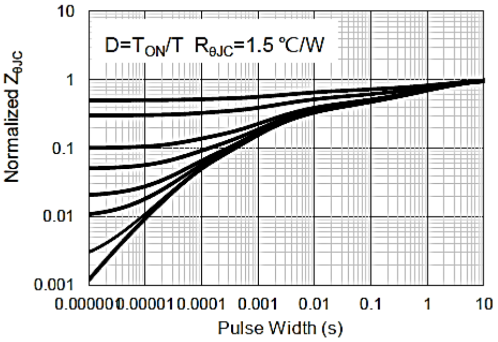


Figure 11: Normalized Maximum Transient Thermal Impedance

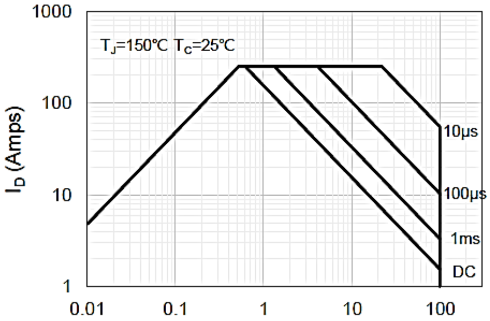
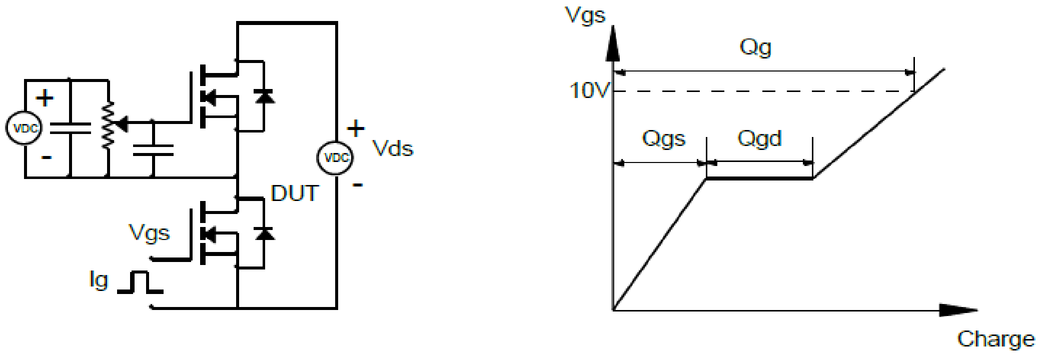


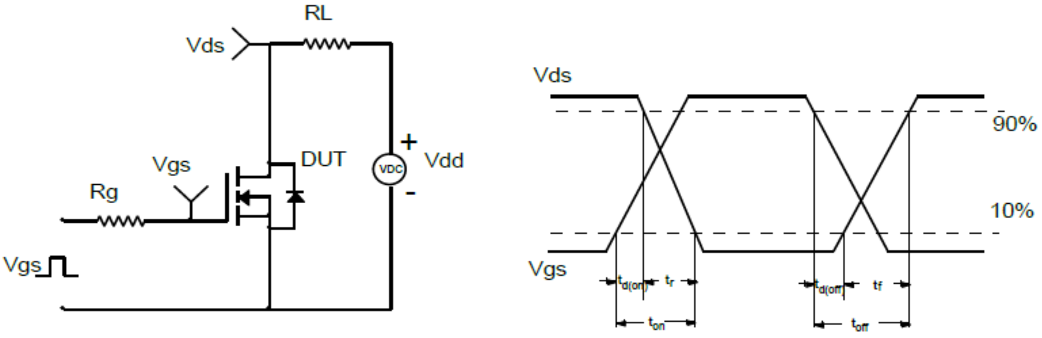
Figure 12: Maximum Forward Biased Safe Operating Area

# Test Circuit and Waveform

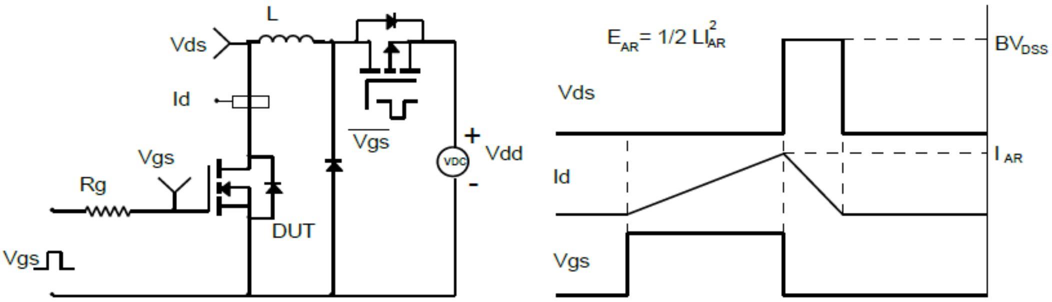
## Gate Charge Test Circuit & Waveform



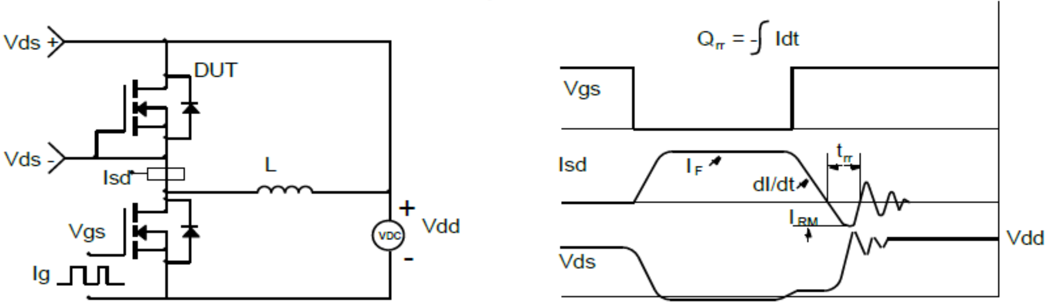
## Resistive Switching Test Circuit & Waveforms



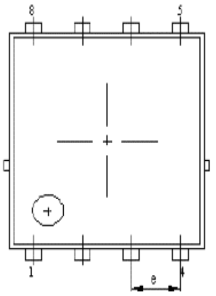
## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



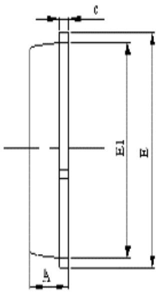
## Diode Recovery Test Circuit & Waveforms



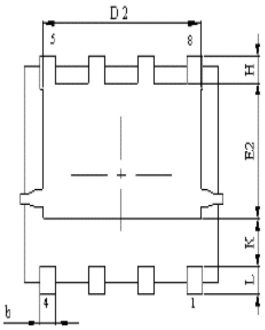
# Package Mechanical Data(PDFN 5x6-8L)



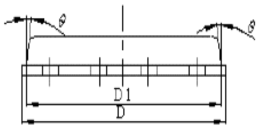
Top View



Side View

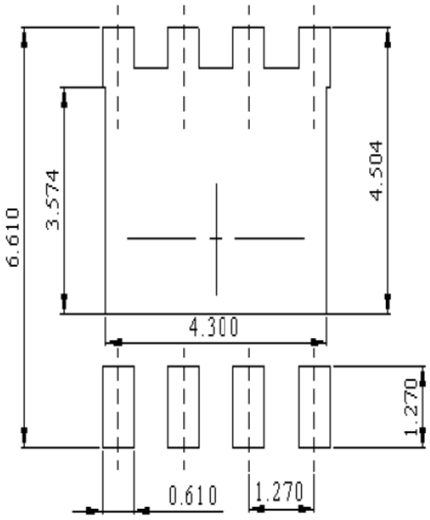


Bottom View



Front View

| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | Min. | NOM. | Max. |
| A | 0.9 | 1 | 1.15 |
| b | 0.31 | 0.41 | 0.51 |
| C | 0.24 | 0.32 | 0.4 |
| D | 5 | 5.2 | 5.4 |
| D1 | 4.95 | 5.05 | 5.15 |
| D2 | 4 | 4.1 | 4.2 |
| E | 6.05 | 6.15 | 6.25 |
| E1 | 5.5 | 5.6 | 5.7 |
| E2 | 3.42 | 3.53 | 3.63 |
| e | 1.27 BSC | | |
| H | 0.6 | 0.7 | 0.8 |
| L | 0.5 | 0.7 | 0.8 |
| K | 1.23 BEF | | |
| O | | | 10 |



DIMENSIONS:MILLIMETERS

# Ordering information

| Order Code | Package | $V_{DS}$(V) | $I_D$(A) | $R_{DS(ON)}$( mΩ ) | |
|---|---|---|---|---|---|
| QNN100N077G | PDFN 5x6-8 | 100 | 80 | $V_{GS}$=10V | ＜ 7.7 |