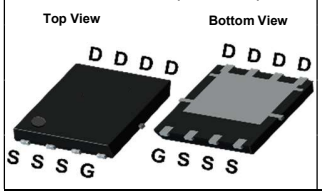
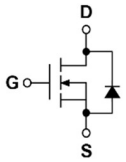
# N-Channel Enhancement Mode MOSFET

## Pin Description

PDFN5*6 (TOP view)




Symbol




## Product Summary

| Symbol | N-Channel | Unit |
|---|---|---|
| $V_{DSS}$ | 100 | V |
| $R_{DS(ON)-Max}$ | 8.6 | mΩ |
| ID | 87 | A |

## Feature

- Fast switching speed
- Reliable and Rugged
- ROHS Compliant & Halogen-Free
- 100% UIS and Rg Tested

## Applications

- Power Management in DC/DC Converters
- USB Power Delivery (USB PD)

## Ordering Information

| Orderable Part Number | Package Type | Form | Shipping | Marking |
|---|---|---|---|---|
| SL87N10Q | PDFN5*6 | Tape & Reel | 5000 / Tape & Reel | |

## Absolute Maximum Ratings ($T_J$=25°C Unless Otherwise Noted)

| Symbol | Parameter | | N-Channel | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | | 100 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±20 | |
| $T_J$ | Maximum Junction Temperature | | 150 | °C |
| $T_{STG}$ | Storage Temperature Range | | -55 to 150 | °C |
| $I_S$ | Diode Continuous Forward Current | $T_C$=25°C | 60 | A |
| $I_{DM}$① | Pulse Drain Current Tested | $T_C$=25°C | 218 | A |
| $I_D$ | Continuous Drain Current | $T_C$=25°C | 87 | A |
| | | $T_C$=100°C | 55 | |
| $P_D$ | Maximum Power Dissipation | $T_C$=25°C | 66 | W |
| | | $T_C$=100°C | 26 | |
| $I_D$ | Continuous Drain Current | $T_A$=25°C | 17 | A |
| | | $T_A$=70°C | 13.6 | |
| $P_D$ | Maximum Power Dissipation | $T_A$=25°C | 2.5 | W |
| | | $T_A$=70°C | 1.6 | |
| $I_{AS}$② | Avalanche Current, Single pulse | L=0.1mH | 30 | A |
| | | L=0.5mH | 18 | |
| $E_{AS}$② | Avalanche Energy, Single pulse | L=0.1mH | 45 | mJ |
| | | L=0.5mH | 81 | |

## Thermal Characteristics

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | Steady State | 1.9 | °C/W |
| $R_{\theta JA}$③ | Thermal Resistance-Junction to Ambient | Steady State | 50 | °C/W |

Note ① : Max. current is limited by junction temperature

Note ② : UIS tested and pulse width are limited by maximum junction temperature 150°C

Note ③ : Surface Mounted on 1in$^2$ FR-4 board with 1oz

## N-Channel Electrical Characteristics ($T_J$=25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Static Electrical Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_{DS}$=250uA | 100 | - | - | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=80V, $V_{GS}$=0V | - | - | 1 | uA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_{DS}$=250uA | 2 | 3 | 4 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| $R_{DS(ON)}$● | Drain-Source On-state Resistance | $V_{GS}$=10V, $I_{DS}$=20A | - | 7.2 | 8.6 | mΩ |
| gfs | Forward Transconductance | $V_{DS}$=5V, $I_{DS}$=10A | - | 15.6 | - | S |
| **Dynamic Characteristics** ● | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$=0V,$V_{DS}$=0V, Freq.=1MHz | - | 0.6 | - | Ω |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=50V, Freq.=1MHz | - | 2053 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 710 | - | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 45 | - | |
| $td_{(ON)}$ | Turn-on Delay Time | $V_{GS}$=10V,$V_{DS}$=50V, $I_D$=1A,$R_{GEN}$=1Ω | - | 12.7 | - | nS |
| $t_r$ | Turn-on Rise Time | | - | 7.3 | - | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | - | 29.6 | - | |
| $t_f$ | Turn-off Fall Time | | - | 84 | - | |
| $Q_g$ | Total Gate Charge | $V_{GS}$=6V,$V_{DS}$=50V $I_D$=20A | - | 23.4 | - | nC |
| $Q_g$ | Total Gate Charge | $V_{GS}$=10V,$V_{DS}$=50V, $I_D$=20A | - | 35.5 | - | |
| $Q_{gs}$ | Gate-Source Charge | | - | 10.7 | - | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 9.6 | - | |
| **Source-Drain Characteristics** | | | | | | |
| $V_{SD}$● | Diode Forward Voltage | $I_{SD}$=10A, $V_{GS}$=0V | - | 0.8 | 1.1 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=10A, $V_R$=50V dI$_F$/dt=100A/μs | - | 42.6 | - | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | - | 40.5 | - | nC |

Note ④ : Pulse test (pulse width≤300us, duty cycle≤2%).
Note ⑤ : Guaranteed by design, not subject to production testing.

## N-Channel Typical Characteristics

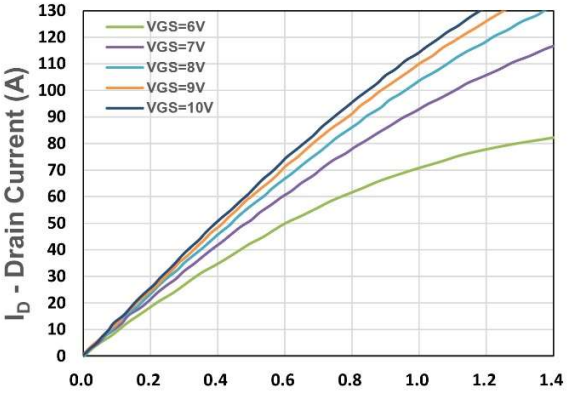



Figure 1. Output Characteristics

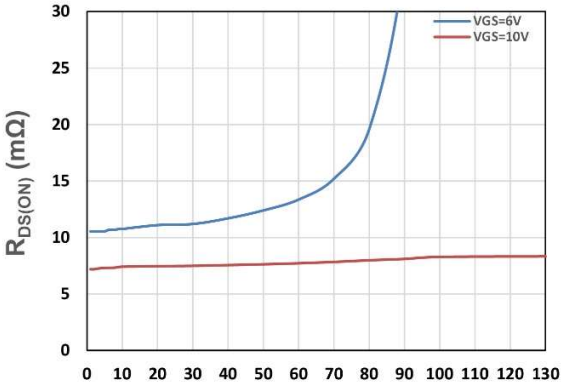



Figure 2. On-Resistance vs. ID

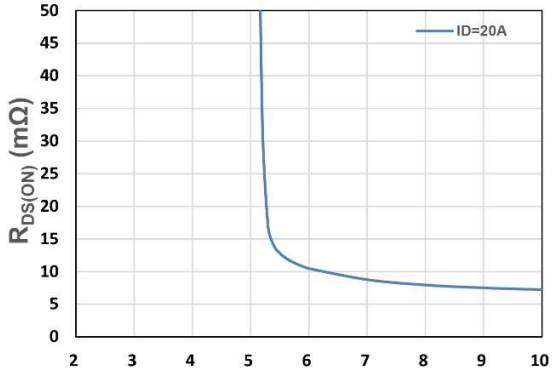



Figure 3. On-Resistance vs. VGS

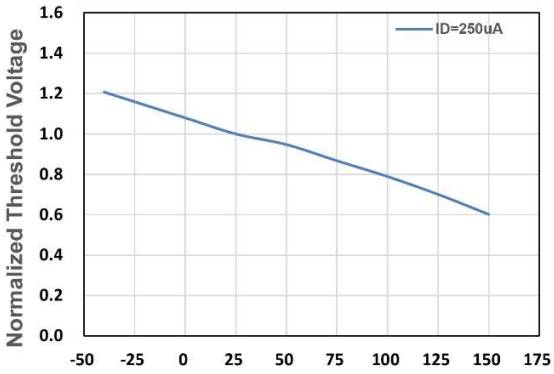



Figure 4. Gate Threshold Voltage

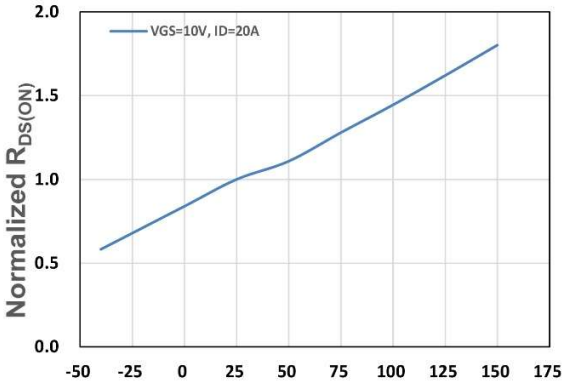



Figure 5. Drain-Source On Resistance

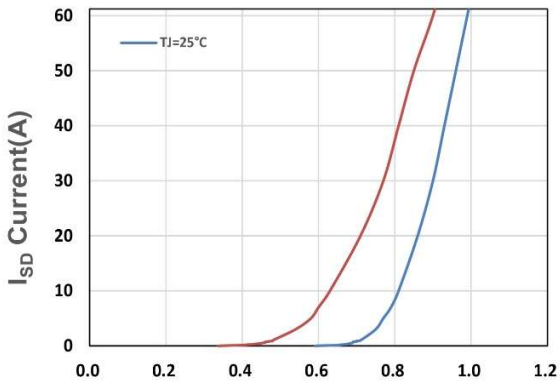
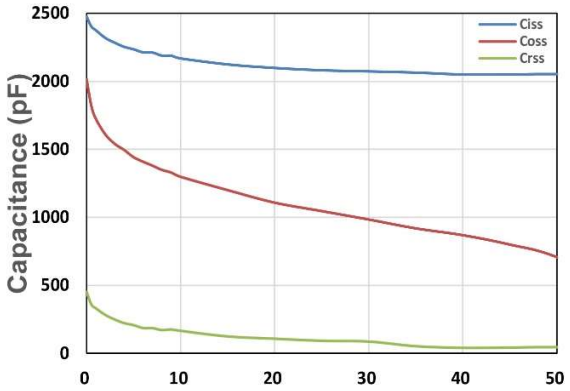
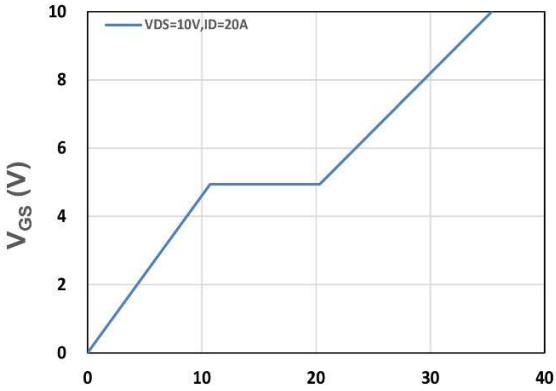



Figure 6. Source-Drain Diode Forward



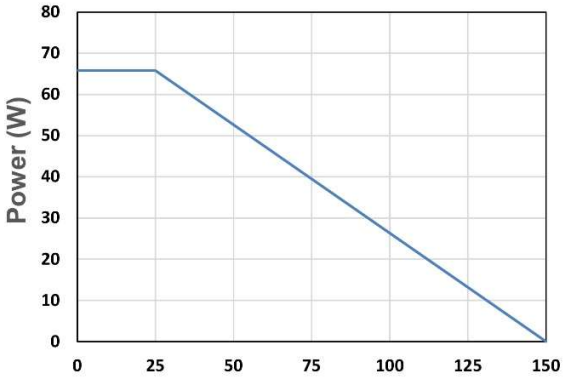

$V_{DS}$ - Drain - Source Voltage (V)

Figure 7. Capacitance



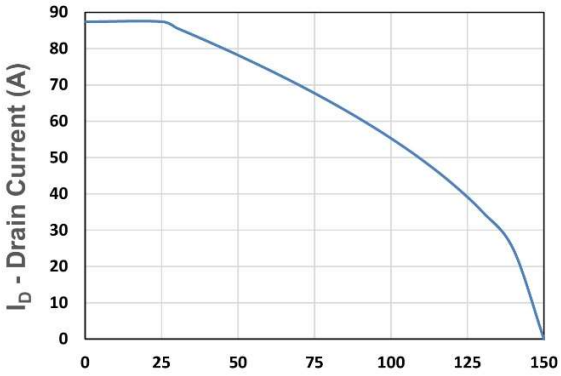

Qg, Total Gate Charge (nC)

Figure 8. Gate Charge Characteristics



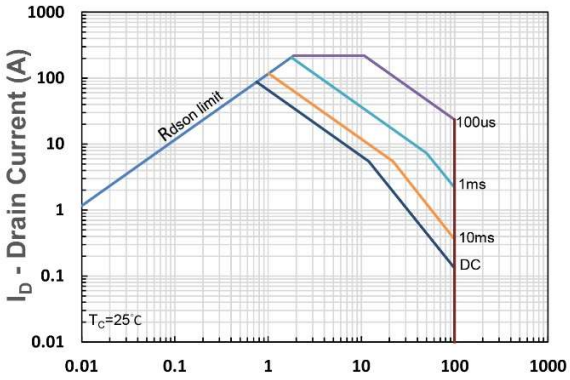

Tc - Case Temperature (°C)

Figure 9. Power Dissipation



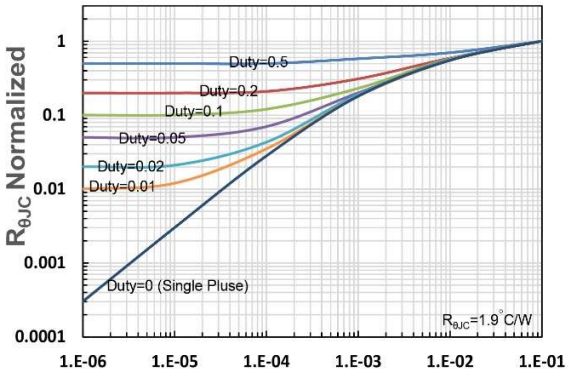

Tc - Case Temperature (°C)

Figure 10. Drain Current




$V_{DS}$ - Drain-Source Voltage (V)

Figure 11. Safe Operating Area




$t_1$,Square Wave Pulse Duration(s)

Figure 12. RθJC Transient Thermal Impedance