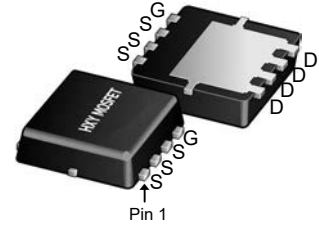




Description

The NVTF5C680NL uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

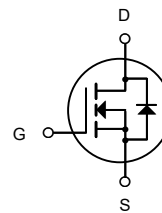


DFN3X3-8L

General Features

$V_{DS} = 60V$ $I_D = 30A$

$R_{DS(ON)} < 30m\Omega$ @ $V_{GS}=10V$



N-Channel MOSFET

Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|-------------|-----------|------------|----------|
| NVTF5C680NL | DFN3X3-8L | HXY MOSFET | 5000 |

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

| Symbol | Parameter | Rating | Units |
|-----------------------|--|------------|-------|
| V _{DS} | Drain-Source Voltage | 60 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| $I_D@T_C=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 30 | A |
| $I_D@T_C=100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 16 | A |
| IDM | Pulsed Drain Current ² | 90 | A |
| EAS | Single Pulse Avalanche Energy ³ | 42 | mJ |
| $P_D@T_C=25^\circ C$ | Total Power Dissipation ⁴ | 33 | W |
| TSTG | Storage Temperature Range | -55 to 150 | °C |
| T _J | Operating Junction Temperature Range | -55 to 150 | °C |
| R _{θJA} | Thermal Resistance Junction-ambient ¹ | 62 | °C/W |
| R _{θJC} | Thermal Resistance Junction-Case ¹ | 3.79 | °C/W |



Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---------------------------|---|--|-----|------|-----------|------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\ \mu A$ | 60 | --- | --- | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{GS}=0V, V_{DS}=60V$ | --- | --- | 1 | μA |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0A$ | --- | --- | ± 100 | nA |
| V_{GS(th)} | GATE-Source Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\ \mu A$ | 1.2 | 1.8 | 2.5 | V |
| R_{DS(on)} | Drain-Source On Resistance ³ | $V_{GS}=10V, I_D=20A$ | --- | 24 | 30 | m Ω |
| | | $V_{GS}=4.5V, I_D=20A$ | --- | 31 | 40 | |
| C_{iss} | Input Capacitance | $V_{DS}=30V, V_{GS}=0V, f=1MHz$ | --- | 1060 | --- | pF |
| C_{oss} | Output Capacitance | | --- | 64 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 54 | --- | |
| t_{d(on)} | Turn-On Delay Time | $V_{DD}=30V, V_{GS}=10V, I_D=20A, R_G=3\Omega$ | --- | 8.4 | --- | ns |
| t_r | Rise Time | | --- | 8.5 | --- | ns |
| t_{d(off)} | Turn-Off Delay Time | | --- | 36 | --- | ns |
| t_f | Fall Time | | --- | 5 | --- | ns |
| Q_g | Total Gate Charge | $V_{DS}=30V, V_{GS}=10V, I_D=20A$ | --- | 26 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 5.7 | --- | nC |
| Q_{gd} | Gate-Drain "Miller" Charge | | --- | 5.2 | --- | nC |
| I_S | Continuous Source Current | $V_G=V_D=0V$ | --- | --- | 20 | A |
| I_{SM} | Pulsed Source Current | $V_G=V_D=0V$ | --- | --- | 90 | A |
| V_{SD} | Forward on voltage | $I_S=20A, V_{GS}=0V$ | --- | --- | 1.2 | V |
| T_{rr} | Body Diode Reverse Recovery Time | $I_F=20A, di/dt=100A/\mu s$ | --- | 18 | --- | nS |
| Q_{rr} | Body Diode Reverse Recovery Charge | | --- | 13 | --- | nC |

Notes:

- 1) $L=0.5mH, V_{DD}=30V, \text{Start } T_J=25^\circ\text{C}$.
- 2) Limited by maximum junction temperature.
- 3) Repetitive Rating: Pulse width limited by maximum junction temperature



Typical Characteristics

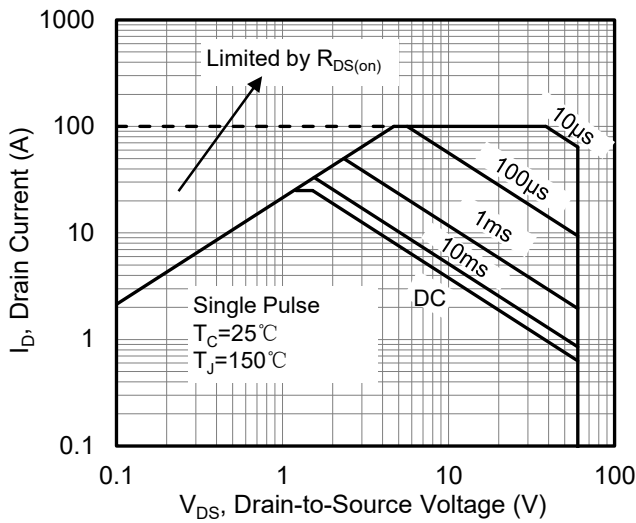


Figure 1. Maximum Safe Operating Area

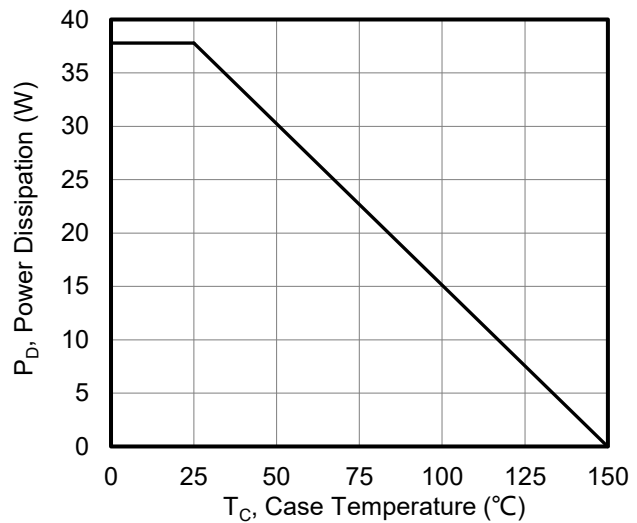


Figure 2. Maximum Power Dissipation vs. Case Temperature

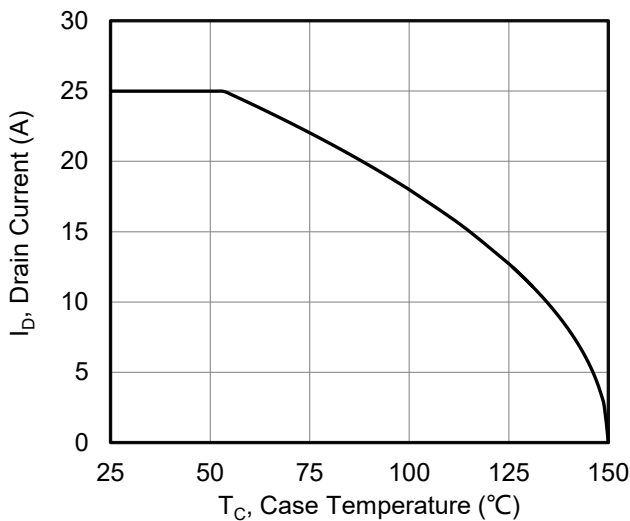


Figure 3. Maximum Continuous Drain Current vs. Case Temperature

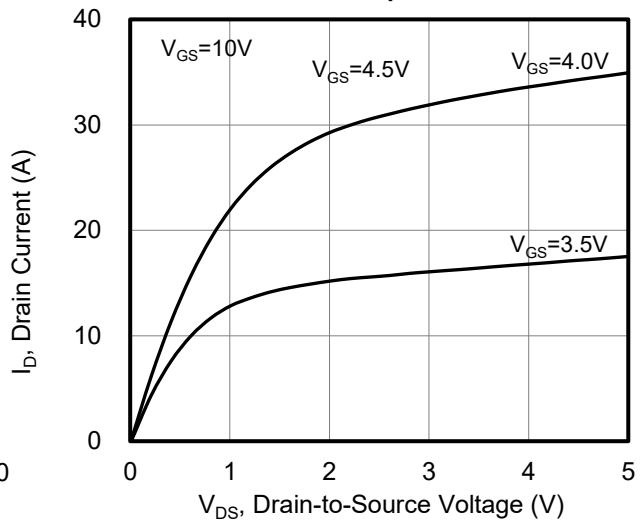


Figure 4. Typical output Characteristics

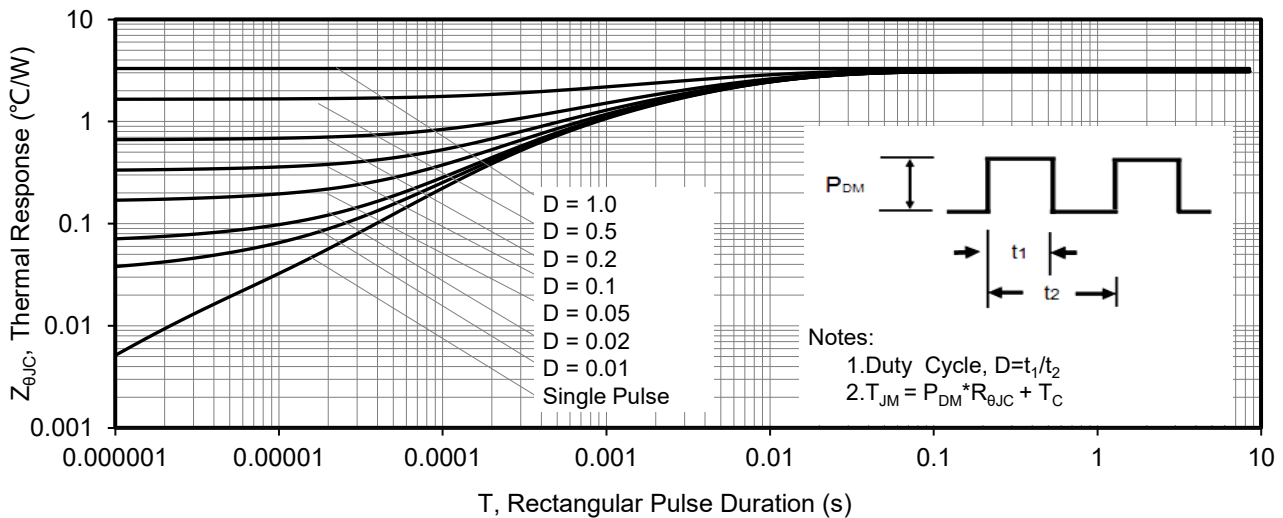


Figure 5. Maximum Effective Thermal Impedance, Junction to Case

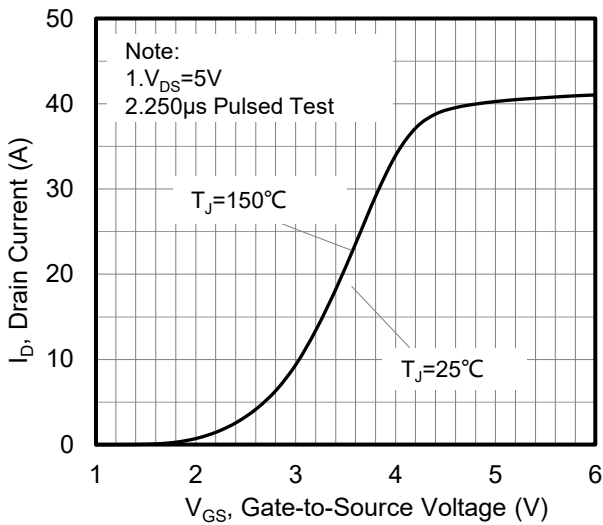


Figure 6. Typical Transfer Characteristics

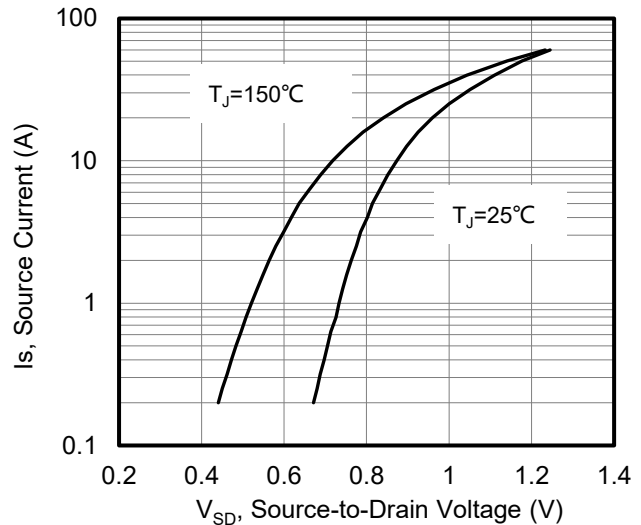


Figure 7. Typical Body Diode Transfer Characteristics

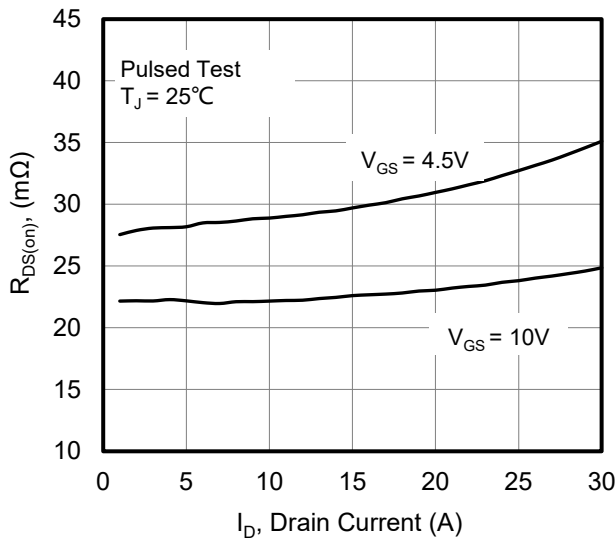


Figure 8. Drain-to-Source On Resistance vs Drain Current

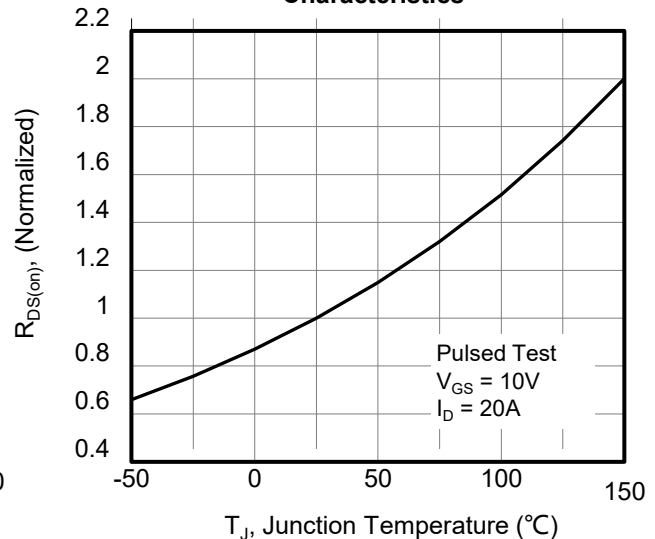


Figure 9. Normalized On Resistance vs Junction Temperature

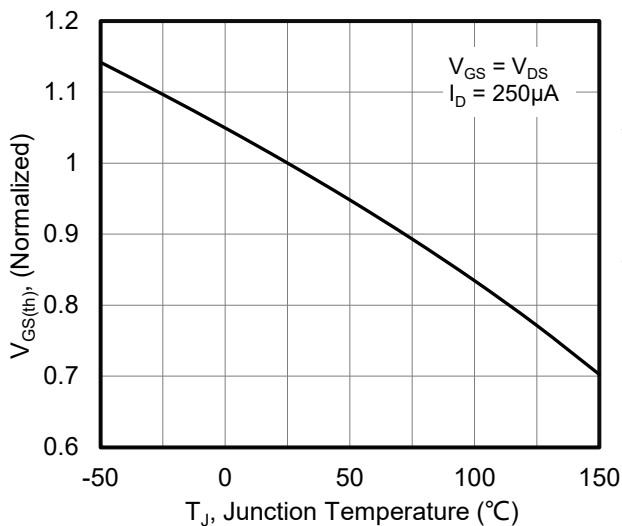


Figure 10. Normalized Threshold Voltage vs Junction Temperature

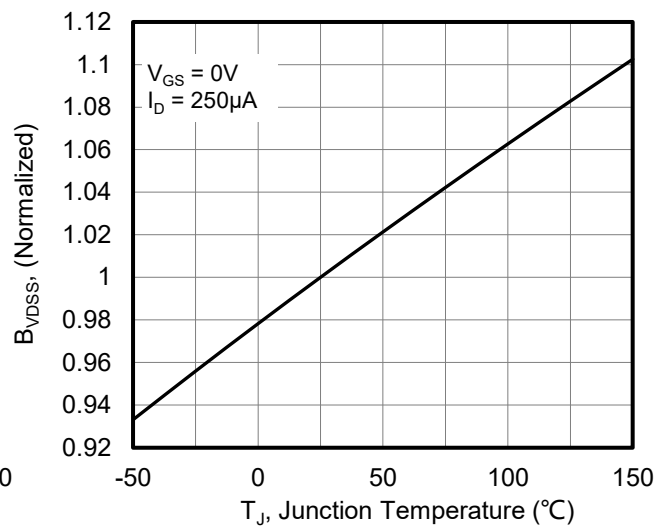


Figure 11. Normalized Breakdown Voltage vs Junction Temperature

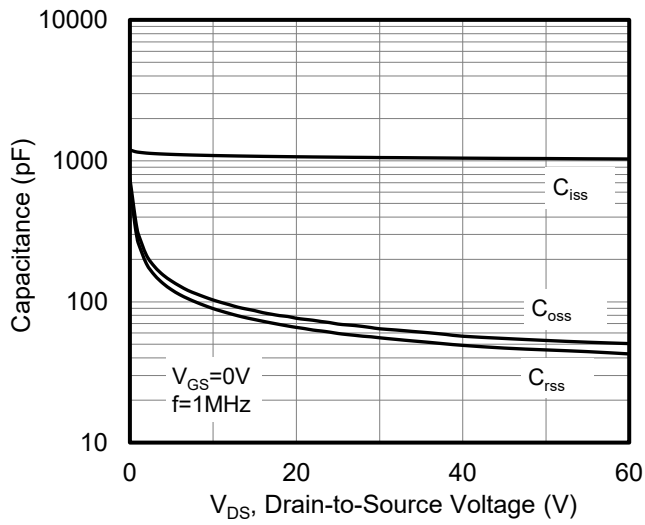


Figure 12. Capacitance Characteristics

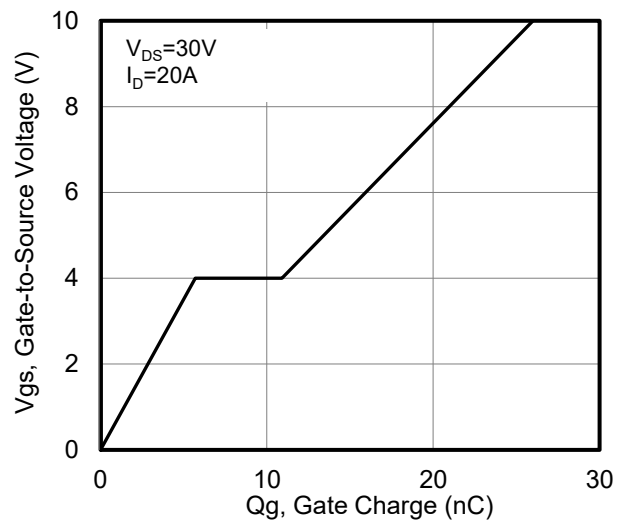
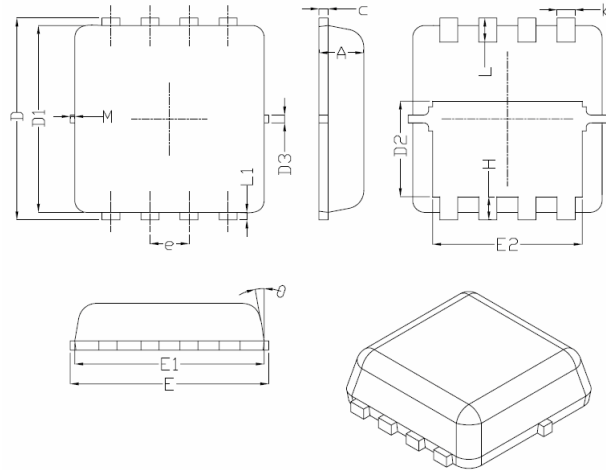


Figure 13. Typical Gate Charge vs. Gate to Source Voltage



DFN3X3-8L Package Information



| Symbol | Dimensions In Millimeters | | |
|----------|---------------------------|------|------|
| | Min. | Nom. | Max. |
| A | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.15 | 0.25 |
| D | 3.25 | 3.35 | 3.45 |
| D1 | 3.00 | 3.10 | 3.20 |
| D2 | 1.48 | 1.58 | 1.68 |
| D3 | - | 0.13 | - |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 3.00 | 3.15 | 3.20 |
| E2 | 2.39 | 2.49 | 2.59 |
| e | 0.65BSC | | |
| H | 0.30 | 0.39 | 0.50 |
| L | 0.30 | 0.40 | 0.50 |
| L1 | - | 0.13 | - |
| M | * | * | 0.15 |
| θ | | 10° | 12° |



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