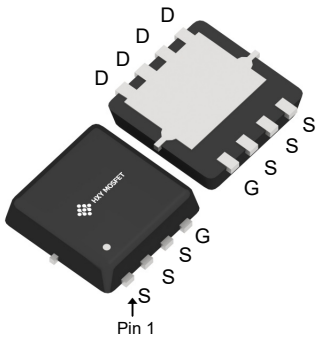
## Description

The TPN8R903NL,LQ 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.

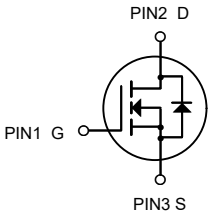



DFN3X3-8L

## General Features

$V_{DS}$ = 30V $I_D$ = 35A

$R_{DS(ON)}$ < 10mΩ @ $V_{GS}$=10V




N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| TPN8R903NL,LQ | DFN3X3-8L | HXY MOSFET | 5000 |

## Absolute Maximum Ratings ($T_C$=25°C unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 35 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 25 | A |
| $I_{DM}$ | Pulsed Drain Current | 112 | A |
| EAS | Single Pulse Avalanche Energy | 24.2 | mJ |
| $I_{AS}$ | Avalanche Current | 22 | A |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 37.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 175 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 175 | ℃ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | 62 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case | 4 | ℃/W |

## Electrical Characteristics ($T_J$=25°C, unless otherwise noted)

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V,$I_D$=250uA | 30 | --- | --- | V |
| $\triangle BV_{DSS}/\triangle T_J$ | BVDSS Temperature Coefficient | Reference to 25℃,$I_D$=1mA | --- | 0.0193 | --- | V/℃ |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance[2] | $V_{GS}$=10V,$I_D$=30A | --- | 7.5 | 10 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=15A | --- | 11 | 18 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$=$V_{DS}$,$I_D$ =250uA | 1.2 | --- | 2.5 | V |
| $\triangle V_{GS(th)}$ | $V_{GS(th)}$ Temperature Coefficient | | --- | -3.97 | --- | mV/℃ |
| $I_{DSS}$ | Drain-Source Leakage Current | $V_{DS}$=24V,$V_{GS}$=0V,$T_J$=25℃ | --- | --- | 1 | uA |
| | | $V_{DS}$=24V,$V_{GS}$=0V,$T_J$=55℃ | --- | --- | 5 | |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V , $V_{DS}$=0V | --- | --- | ±100 | nA |
| gfs | Forward Transconductance | $V_{DS}$=5V,$I_D$=30A | --- | 34 | --- | S |
| $R_g$ | Gate Resistance | $V_{DS}$=0V,$V_{GS}$=0V , f=1MHz | --- | 1.8 | --- | Ω |
| $Q_g$ | Total Gate Charge (4.5V) | $V_{DS}$=15V,$V_{GS}$=4.5V,$I_D$=15A | --- | 9.8 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 4.2 | --- | |
| $Q_{gd}$ | Gate-Drain Charge | | --- | 3.6 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=15V,$V_{GS}$=10V, $R_G$=3.3Ω $I_D$=15A | --- | 4 | --- | ns |
| $T_r$ | Rise Time | | --- | 8 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 31 | --- | |
| $T_f$ | Fall Time | | --- | 4 | --- | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V,$V_{GS}$=0V,f=1MHz | --- | 940 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 131 | --- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 109 | --- | |
| $I_S$ | Continuous Source Current[1,5] | $V_G$=$V_D$=0V,Force Current | --- | --- | 43 | A |
| $I_{SM}$ | Pulsed Source Current[2,5] | | --- | --- | 112 | A |
| $V_{SD}$ | Diode Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$=30A, dI/dt=100A/μs, $T_J$=25℃ | --- | 8.5 | --- | nS |
| $Q_{rr}$ | Reverse Recovery Charge | | --- | 2.2 | --- | nC |

Note :

1 .The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3 .The EAS data shows Max. rating . The test condition is $V_{DD}$=25V,$V_{GS}$=10V,L=0.1mH,$I_{AS}$=22A

4.The power dissipation is limited by 175℃ junction temperature

5.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

## Typical Characteristics

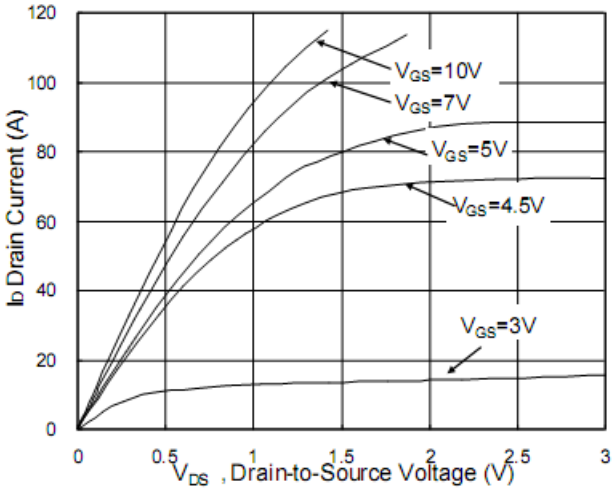



Fig.1 Typical Output Characteristics

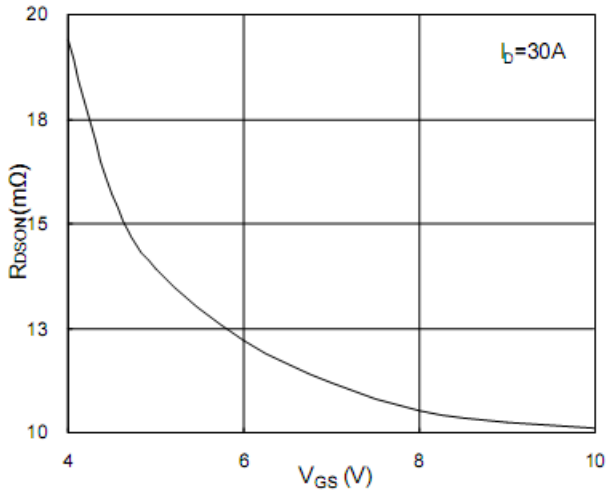



Fig.2 On-Resistance vs. G-S Voltage

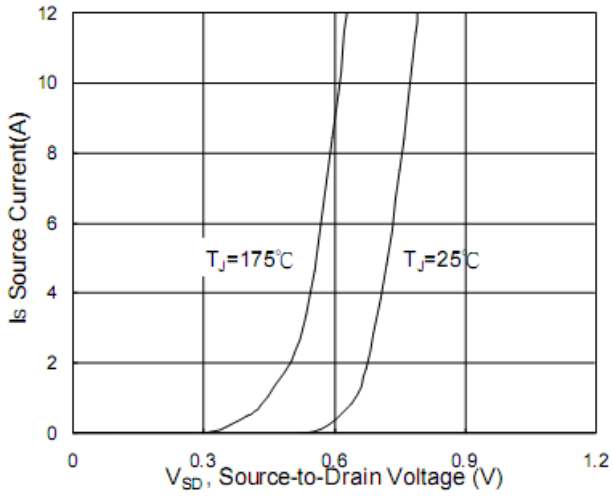



Fig.3 Forward Characteristics of Reverse

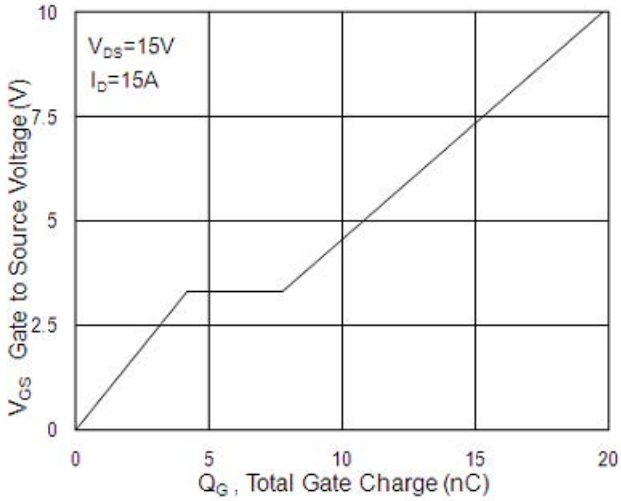



Fig.4 Gate-Charge Characteristics

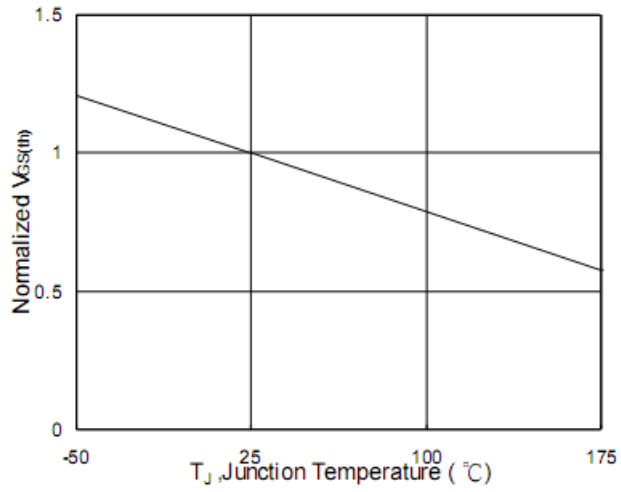



Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$

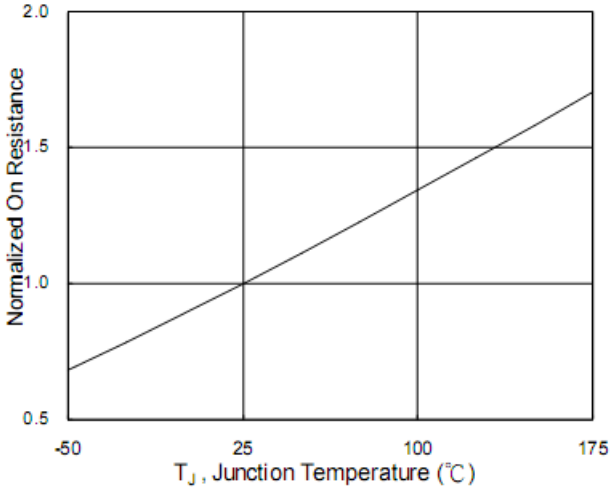



Fig.6 Normalized $R_{DSON}$ vs. $T_J$

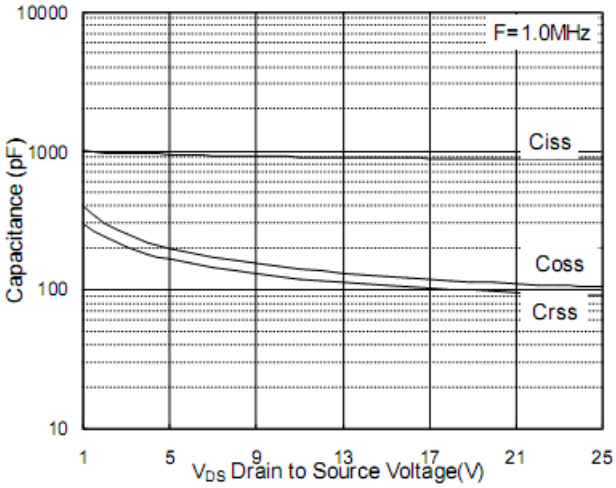



Fig.7 Capacitance

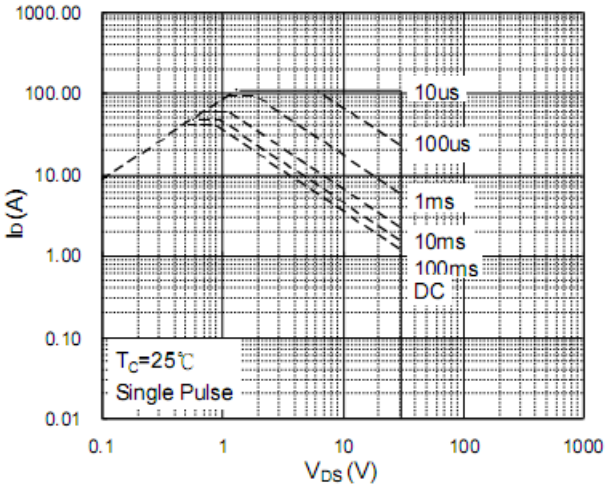



Fig.8 Safe Operating Area

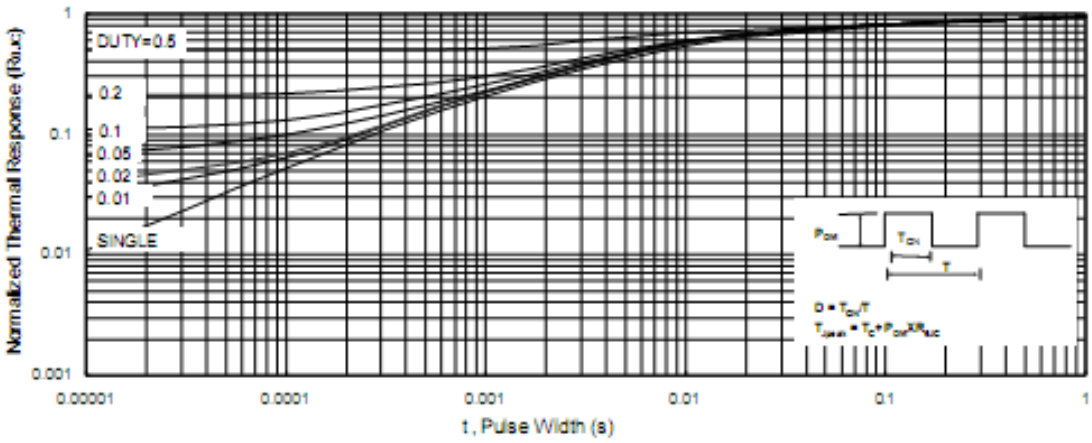



Fig.9 Normalized Maximum Transient Thermal Impedance

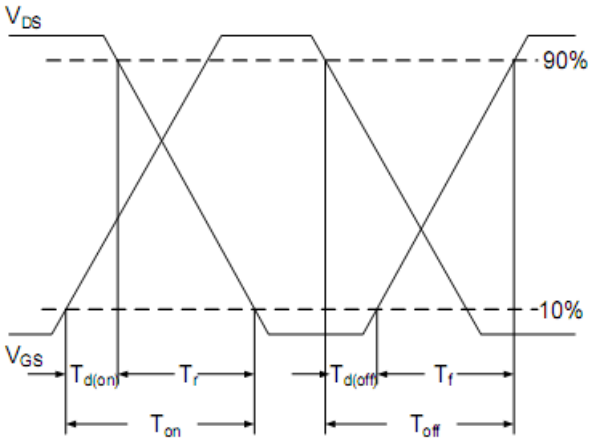



Fig.10 Switching Time Waveform

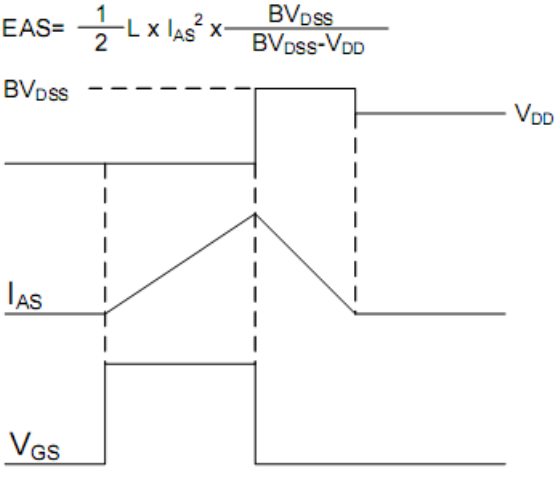
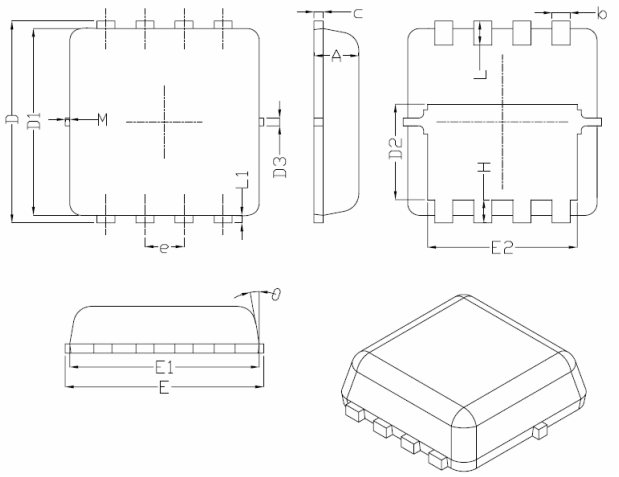



Fig.11 Unclamped Inductive Switching Waveform

## 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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