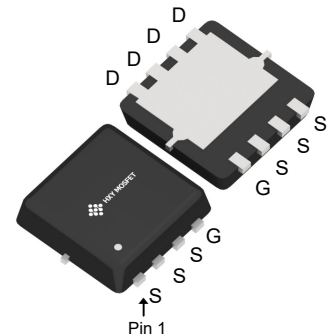


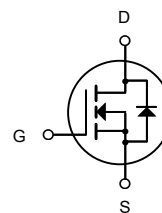


## Description

The NVTFS4C08NWFTWG 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



N-Channel MOSFET

## General Features

$V_{DS} = 30V$   $I_D = 55A$

$R_{DS(ON)} < 6\text{ m}\Omega$  @  $V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply

## Ordering Information

| Product ID      | Pack      | Brand      | Qty(PCS) |
|-----------------|-----------|------------|----------|
| NVTFS4C08NWFTWG | DFN3X3-8L | HXY MOSFET | 5000     |

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

| Symbol                      | Parameter                                        | Rating     | Units              |
|-----------------------------|--------------------------------------------------|------------|--------------------|
| $V_{DS}$                    | Drain-Source Voltage                             | 30         | V                  |
| $V_{GS}$                    | Gate-Source Voltage                              | $\pm 20$   | V                  |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current, $V_{GS} @ 10V^1$       | 55         | A                  |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current, $V_{GS} @ 10V^1$       | 40         | A                  |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>                | 162        | A                  |
| $E_{AS}$                    | Single Pulse Avalanche Energy <sup>3</sup>       | 144.7      | mJ                 |
| $I_{AS}$                    | Avalanche Current                                | 53.8       | A                  |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>             | 62.5       | W                  |
| $T_{STG}$                   | Storage Temperature Range                        | -55 to 150 | $^\circ\text{C}$   |
| $T_J$                       | Operating Junction Temperature Range             | -55 to 150 | $^\circ\text{C}$   |
| $R_{\theta JA}$             | Thermal Resistance Junction-ambient <sup>1</sup> | 62         | $^\circ\text{C/W}$ |
| $R_{\theta JC}$             | Thermal Resistance Junction-Case <sup>1</sup>    | 2.4        | $^\circ\text{C/W}$ |



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

| Symbol                       | Parameter                                      | Conditions                                                 | Min. | Typ.   | Max.      | Unit                  |
|------------------------------|------------------------------------------------|------------------------------------------------------------|------|--------|-----------|-----------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V$ , $I_D=250\mu A$                               | 30   | ---    | ---       | V                     |
| $\Delta BV_{DSS}/\Delta T_J$ | BVDSS Temperature Coefficient                  | Reference to $25^{\circ}\text{C}$ , $I_D=1mA$              | ---  | 0.0213 | ---       | $V/^{\circ}\text{C}$  |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V$ , $I_D=30A$                                   | ---  | 4.7    | 6         | $m\Omega$             |
|                              |                                                | $V_{GS}=4.5V$ , $I_D=15A$                                  | ---  | 5.9    | 8         |                       |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}$ , $I_D=250\mu A$                           | 1.0  | 1.5    | 2.5       | V                     |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |                                                            | ---  | -5.73  | ---       | $mV/^{\circ}\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current                   | $V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$      | ---  | ---    | 1         | $\mu A$               |
|                              |                                                | $V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=55^{\circ}\text{C}$      | ---  | ---    | 5         |                       |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V$ , $V_{DS}=0V$                             | ---  | ---    | $\pm 100$ | nA                    |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=5V$ , $I_D=30A$                                    | ---  | 26.5   | ---       | S                     |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$                       | ---  | 1.4    | 2.8       | $\Omega$              |
| $Q_g$                        | Total Gate Charge (4.5V)                       | $V_{DS}=15V$ , $V_{GS}=4.5V$ , $I_D=15A$                   | ---  | 31.6   | ---       | nC                    |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                            | ---  | 8.6    | ---       |                       |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                            | ---  | 11.7   | ---       |                       |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=15V$ , $V_{GS}=10V$ , $R_G=3.3\Omega$<br>$I_D=15A$ | ---  | 9      | ---       | ns                    |
| $T_r$                        | Rise Time                                      |                                                            | ---  | 19     | ---       |                       |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                            | ---  | 58     | ---       |                       |
| $T_f$                        | Fall Time                                      |                                                            | ---  | 15.2   | ---       |                       |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=15V$ , $V_{GS}=0V$ , $f=1MHz$                      | ---  | 3075   | 4000      | pF                    |
| $C_{oss}$                    | Output Capacitance                             |                                                            | ---  | 400    | 530       |                       |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                            | ---  | 315    | ---       |                       |

### Diode Characteristics

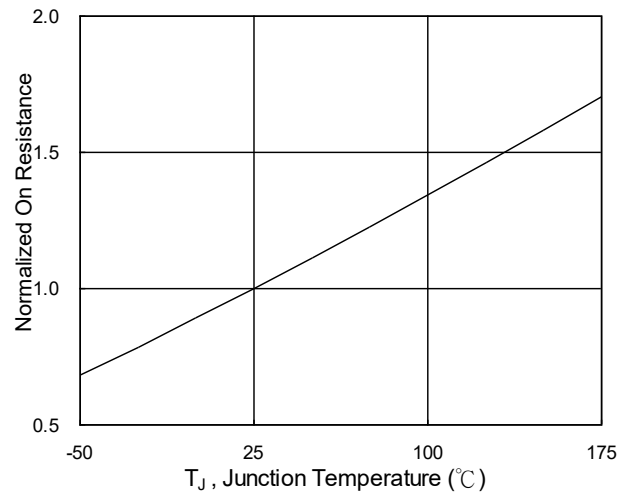
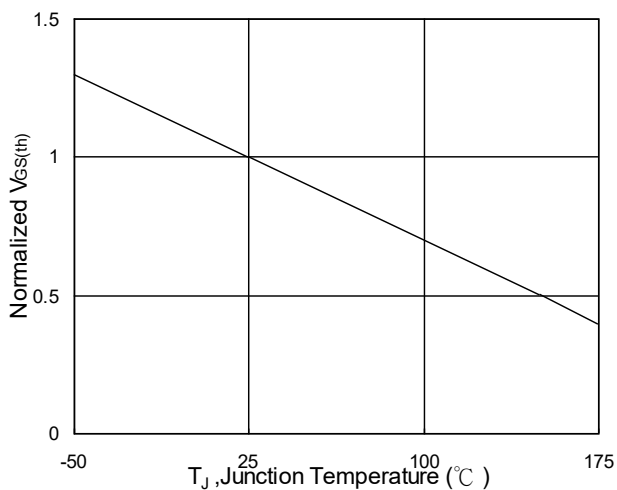
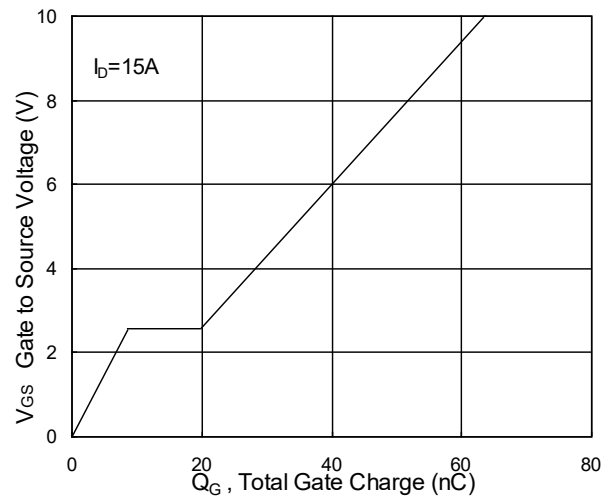
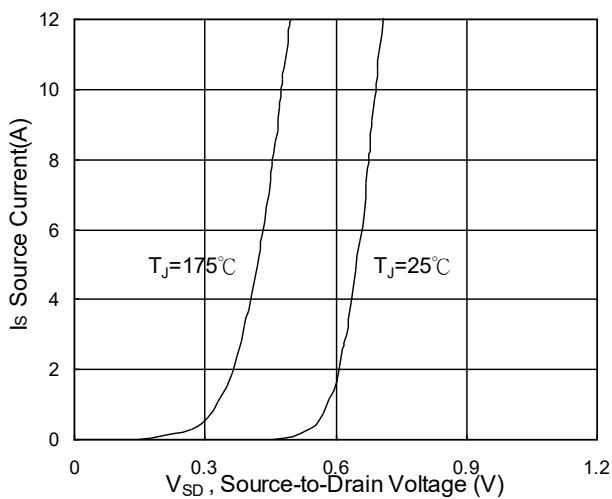
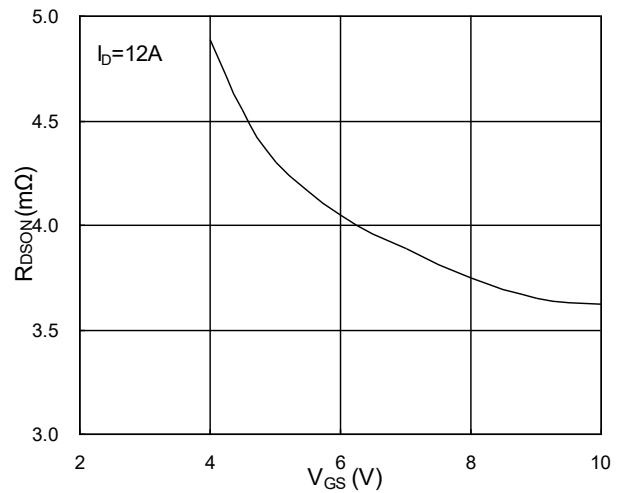
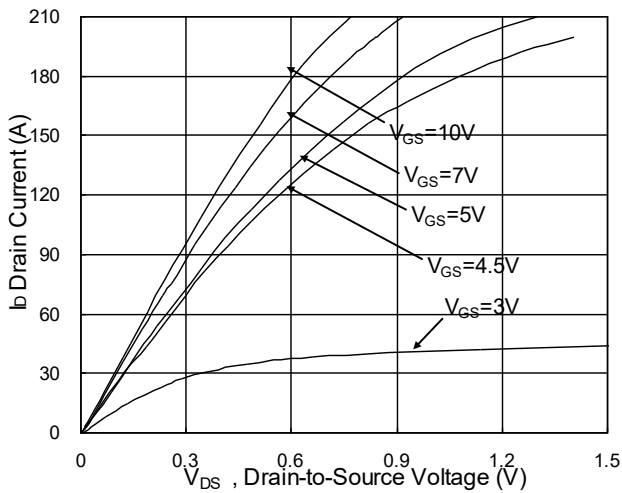
| Symbol   | Parameter                                | Conditions                                                   | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|--------------------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                                 | ---  | ---  | 55   | A    |
| $I_{SM}$ | Pulsed Source Current <sup>2,5</sup>     |                                                              | ---  | ---  | 162  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V$ , $I_S=1A$ , $T_J=25^{\circ}\text{C}$            | ---  | ---  | 1    | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=30A$ , $dI/dt=100A/\mu s$ ,<br>$T_J=25^{\circ}\text{C}$ | ---  | 18   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                              | ---  | 8    | ---  | nC   |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=25V$ ,  $V_{GS}=10V$ ,  $L=0.1mH$ ,  $I_{AS}=53.8A$
- 4.The power dissipation is limited by  $175^{\circ}\text{C}$  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



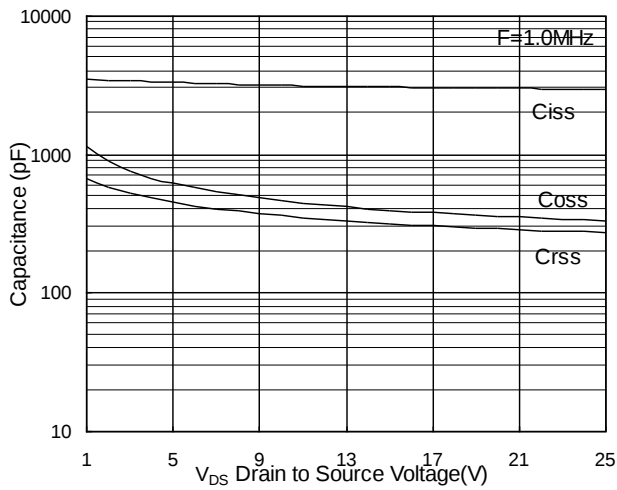


Fig.7 Capacitance

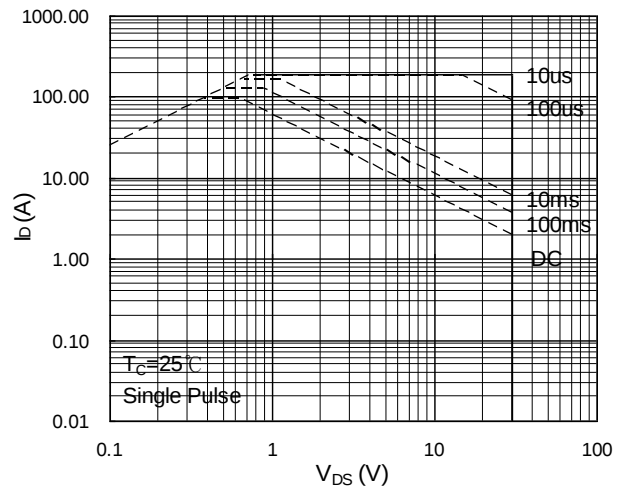


Fig.8 Safe Operating Area

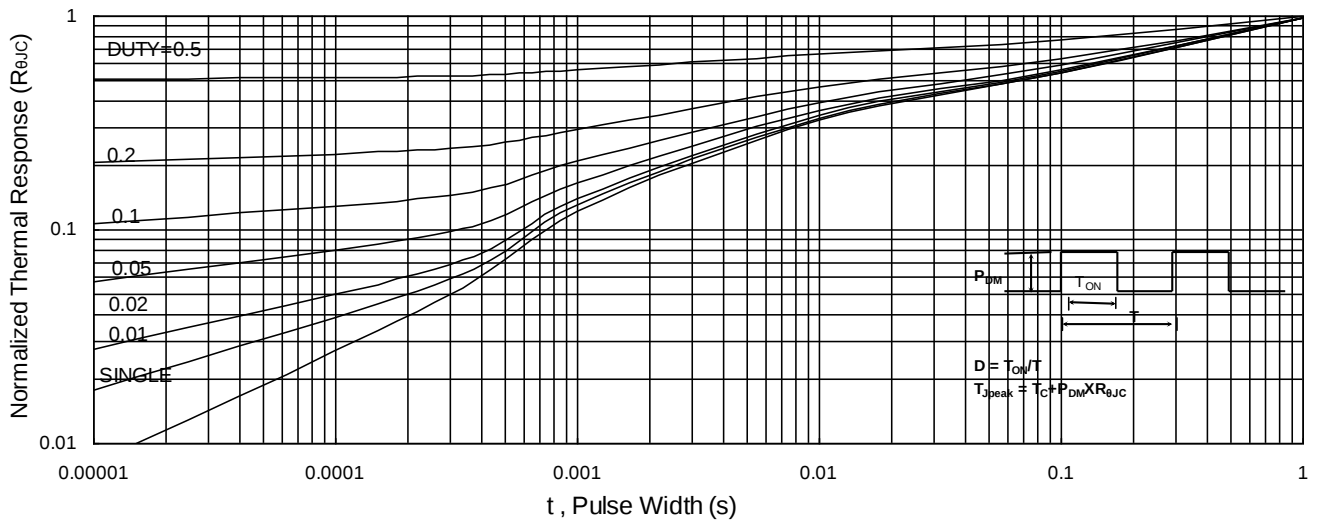


Fig.9 Normalized Maximum Transient Thermal Impedance

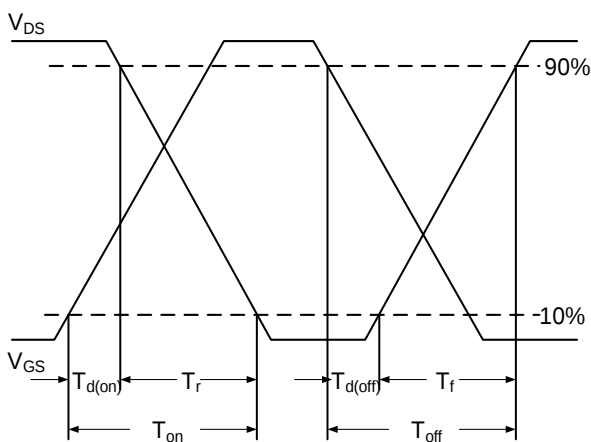


Fig.10 Switching Time Waveform

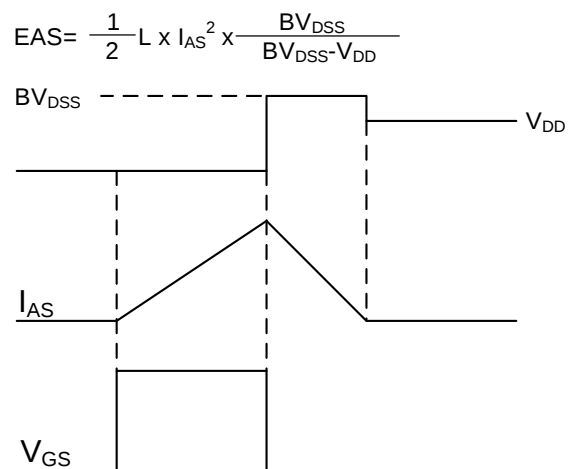
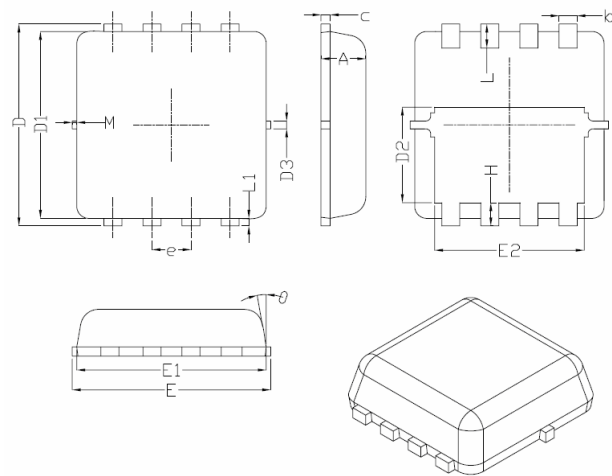


Fig.11 Unclamped Inductive Switching Waveform



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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