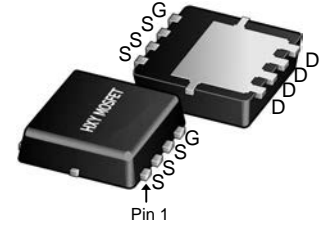




General Description

The NTTFS5C478NL use advanced SGT MOSFET technology to provide low RDS(ON), low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness and suitable.

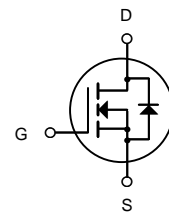


DFN3X3-8L

General Features

$V_{DS} = 40V$ $I_D = 60A$

$R_{DS(ON)} < 8.5m\Omega @ V_{GS} = 10V$



N-Channel MOSFET

Applications

Consumer electronic power supply Motor control
Synchronous-rectification Isolated DC
Synchronous-rectification applications

Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|--------------|-----------|------------|----------|
| NTTFS5C478NL | DFN3X3-8L | HXY MOSFET | 5000 |

Absolute Maximum Ratings at $T_j = 25^\circ C$ unless otherwise noted

| Parameter | Symbol | Value | Unit |
|--|---------------|------------|--------------|
| Drain source voltage | VDS | 40 | V |
| Gate source voltage | VGS | ± 20 | V |
| Continuous drain current ¹⁾ | ID | 60 | A |
| Pulsed drain current ²⁾ | ID, pulse | 130 | A |
| Power dissipation ³⁾ | PD | 39 | W |
| Single pulsed avalanche energy ⁵⁾ | EAS | 48 | mJ |
| Operation and storage temperature | Tstg, Tj | -55 to 150 | $^\circ C$ |
| Thermal resistance, junction-case | R θ JC | 3.2 | $^\circ C/W$ |
| Thermal resistance, junction-ambient ⁴⁾ | R θ JA | 60 | $^\circ C/W$ |



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

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------|--|---|------|------|-----------|------------|
| BV_{DSS} | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 40 | --- | --- | V |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance ² | $V_{GS}=10V, I_D=12A$ | --- | 6.9 | 8.5 | m Ω |
| | | $V_{GS}=4.5V, I_D=10A$ | --- | 10.0 | 15 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.35 | --- | 3 | V |
| I_{DSS} | Drain-Source Leakage Current | $V_{DS}=32V, V_{GS}=0V, T_J=25^\circ\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=32V, V_{GS}=0V, T_J=55^\circ\text{C}$ | --- | --- | 5 | |
| I_{GSS} | Gate-Source Leakage Current | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| R_g | Gate Resistance | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$ | --- | 1.7 | --- | Ω |
| Q_g | Total Gate Charge (4.5V) | $V_{DS}=20V, V_{GS}=4.5V, I_D=12A$ | --- | 5.8 | --- | nC |
| Q_{gs} | Gate-Source Charge | | --- | 3 | --- | |
| Q_{gd} | Gate-Drain Charge | | --- | 1.2 | --- | |
| $T_{d(on)}$ | Turn-On Delay Time | $V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega$ $I_D=1A$ | --- | 14.3 | --- | ns |
| T_r | Rise Time | | --- | 5.6 | --- | |
| $T_{d(off)}$ | Turn-Off Delay Time | | --- | 20 | --- | |
| T_f | Fall Time | | --- | 11 | --- | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$ | --- | 690 | --- | μF |
| C_{oss} | Output Capacitance | | --- | 193 | --- | |
| C_{rss} | Reverse Transfer Capacitance | | --- | 38 | --- | |
| I_S | Continuous Source Current ^{1,5} | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 60 | A |
| V_{SD} | Diode Forward Voltage ² | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$ | --- | --- | 1 | V |

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ 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 $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=31A$
- 4.The power dissipation is limited by 150°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

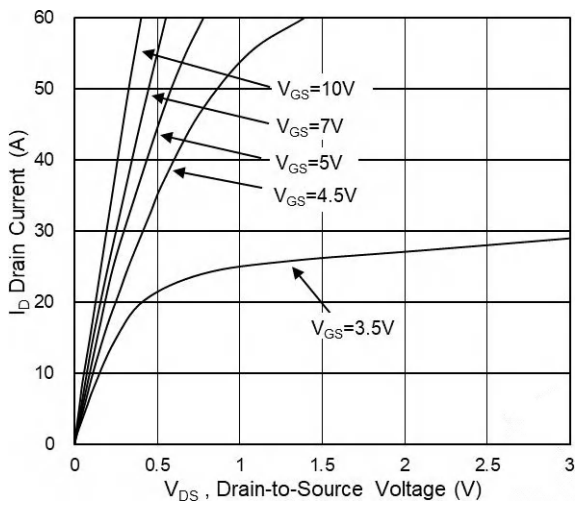


Fig.1 Typical Output Characteristics

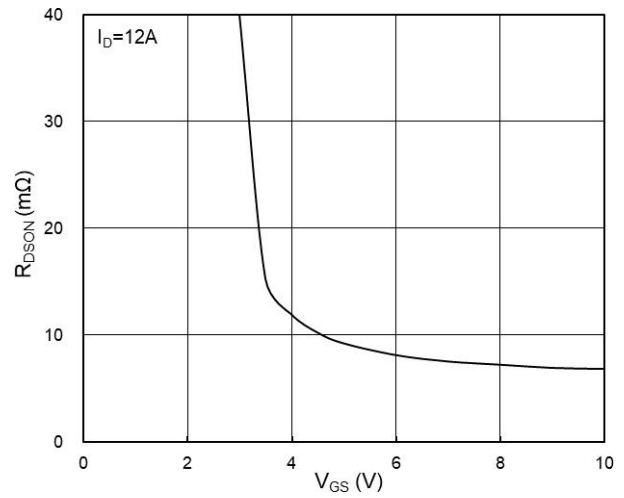


Fig.2 On-Resistance vs G-S Voltage

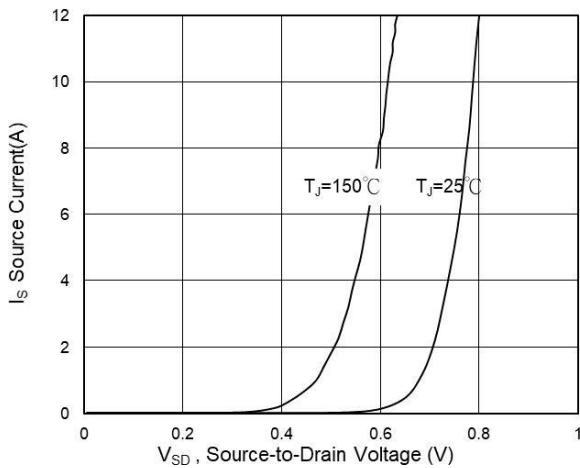


Fig.3 Source Drain Forward Characteristics

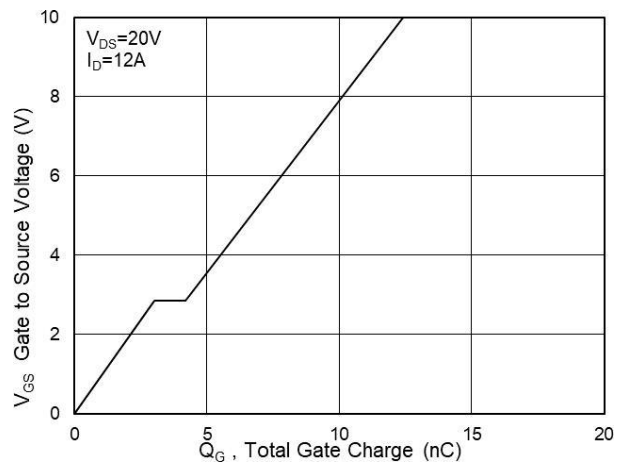


Fig.4 Gate-Charge Characteristics

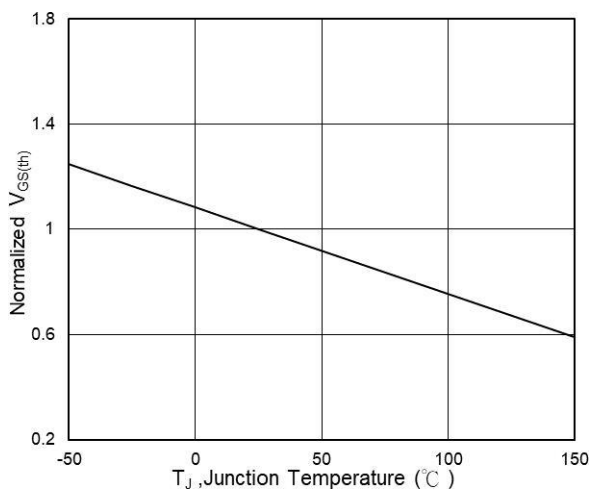


Fig.5 Normalized $V_{GS(th)}$ vs T_J

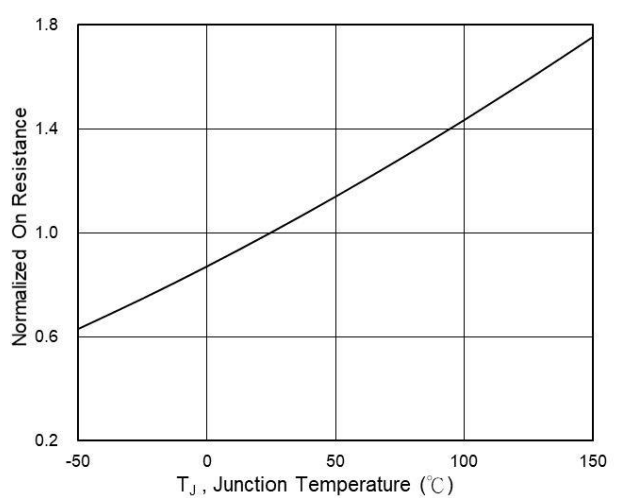


Fig.6 Normalized $R_{DS(on)}$ vs T_J

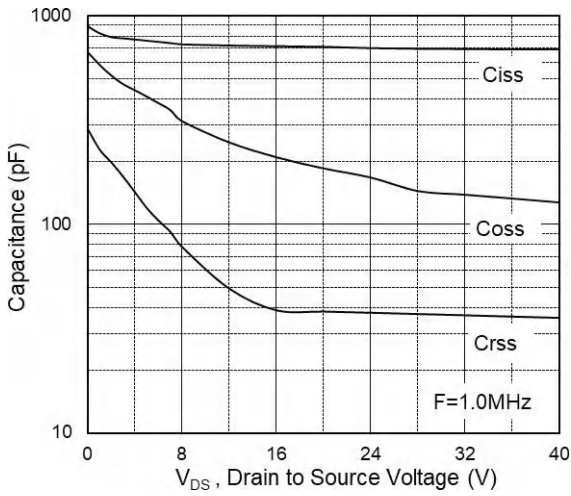


Fig.7 Capacitance

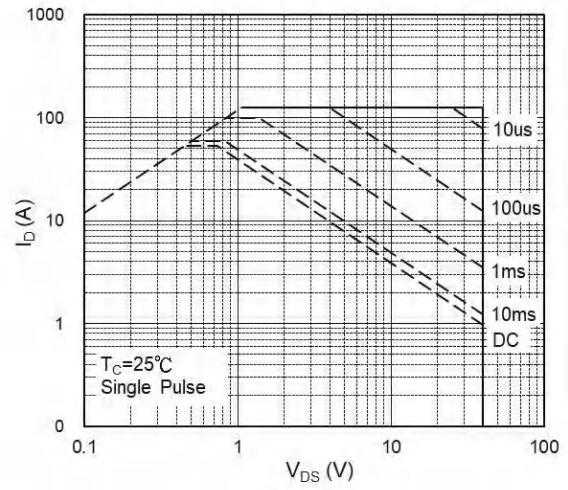


Fig.8 Safe Operating Area

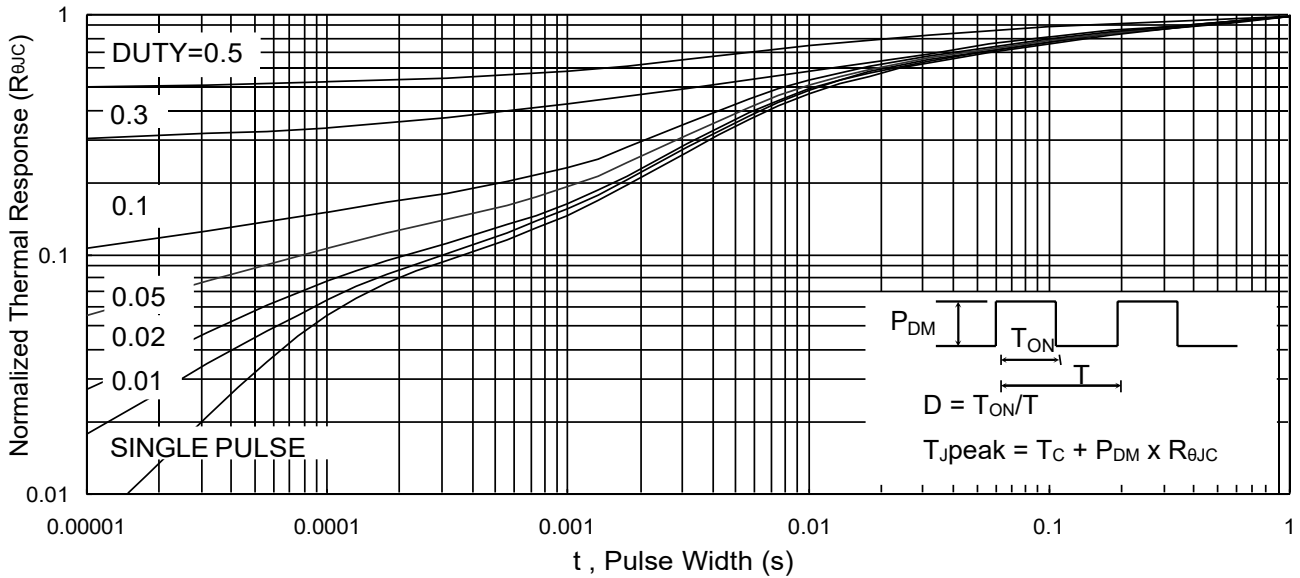


Fig.9 Normalized Maximum Transient Thermal Impedance

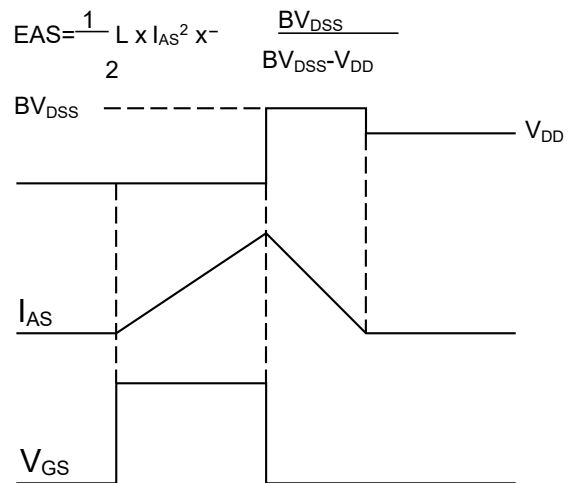
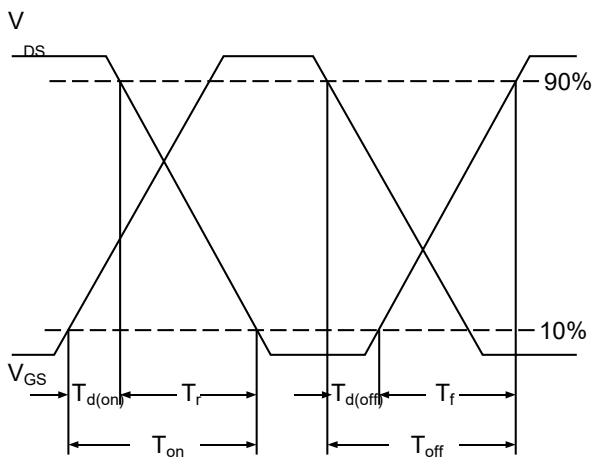
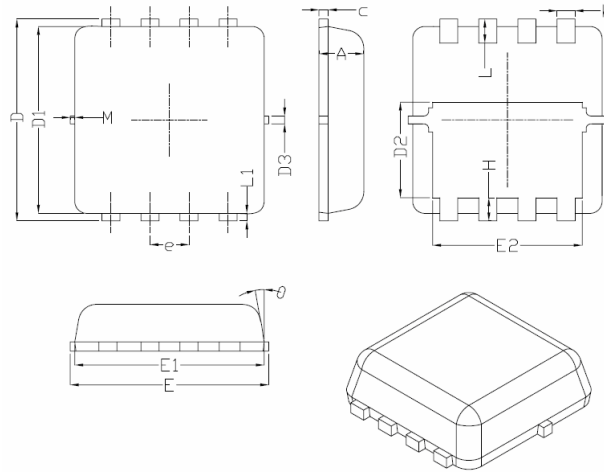


Fig.11 Unclamped Inductive Waveform



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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