



## General Description

The NTMFS4C09NT3G use advanced SGT MOSFET technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is specially designed to get better ruggedness.

## General Features

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

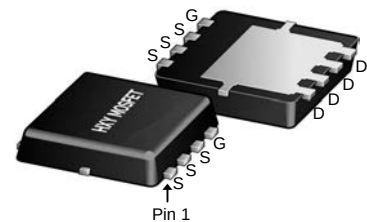
$R_{DS(ON)} < 5.8m\Omega @ V_{GS}=10V$

## Applications

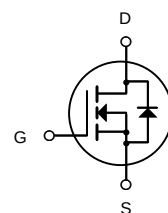
Consumer electronic power supply Motor control

Synchronous-rectification Isolated DC

Synchronous-rectification applications



DFN5X6-8L  
(SO-8-FL-5.9mm)



N-Channel MOSFET

## Package Marking and Ordering Information

| Product ID    | Pack                     | Brand      | Qty(PCS) |
|---------------|--------------------------|------------|----------|
| NTMFS4C09NT3G | DFN5X6-8L(SO-8-FL-5.9mm) | HXY MOSFET | 5000     |

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

| Symbol                   | Parameter                                                | Rating     | Units         |
|--------------------------|----------------------------------------------------------|------------|---------------|
| $V_{DS}$                 | Drain-Source Voltage                                     | 30         | V             |
| $V_{GS}$                 | Gate-Source Voltage                                      | $\pm 20$   | V             |
| $I_D @ T_c=25^{\circ}C$  | Continuous Drain Current, $V_{GS} @ 10V$                 | 60         | A             |
| $I_D @ T_c=100^{\circ}C$ | Continuous Drain Current, $V_{GS} @ 10V$                 | 38         | A             |
| $I_{DM}$                 | Pulsed Drain Current <sup>2</sup>                        | 135        | A             |
| EAS                      | Single Pulse Avalanche Energy <sup>3</sup>               | 29.8       | mJ            |
| $P_D @ T_c=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                     | 30         | W             |
| $T_{STG}$                | Storage Temperature Range                                | -55 to 150 | $^{\circ}C$   |
| $T_J$                    | Operating Junction Temperature Range                     | -55 to 150 | $^{\circ}C$   |
| $R_{\theta JC}$          | Thermal Resistance from Junction-to-Ambient <sup>3</sup> | 4.6        | $^{\circ}C/W$ |
| $R_{\theta JA}$          | Thermal Resistance Junction-Ambient <sup>1</sup>         | 50         | $^{\circ}C/W$ |



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

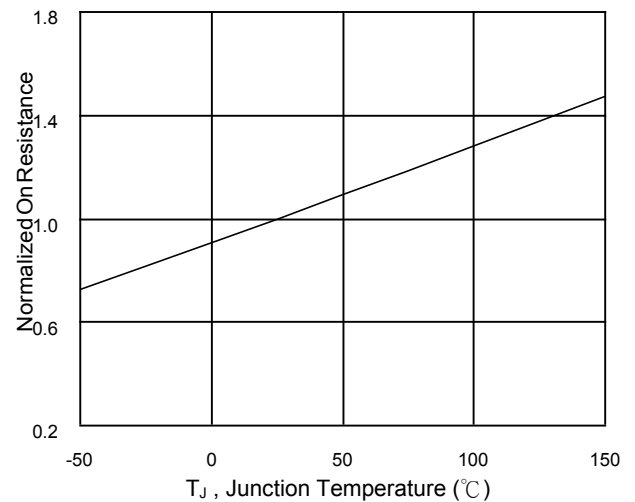
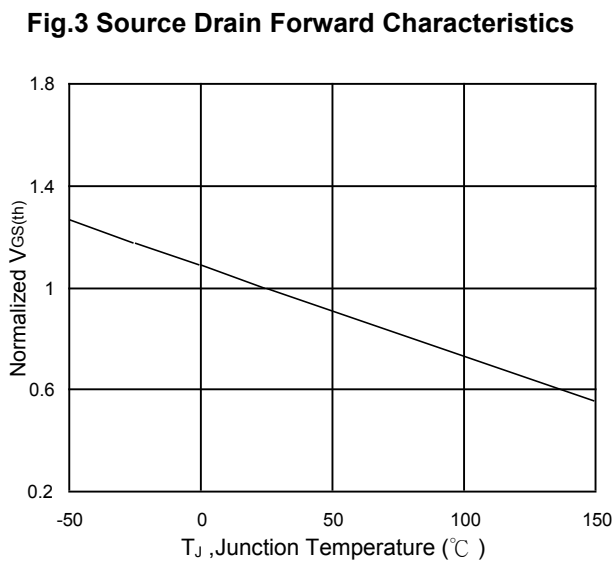
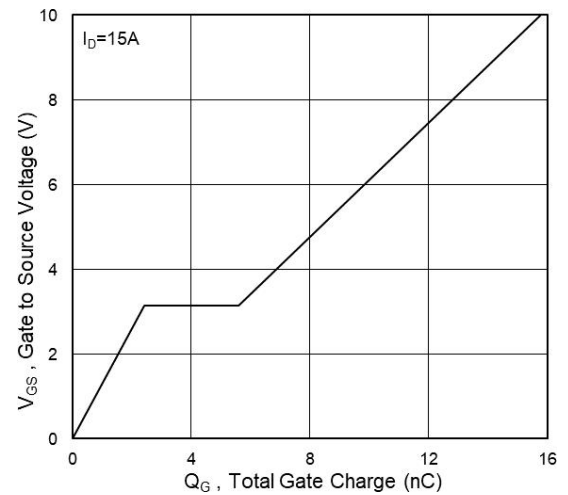
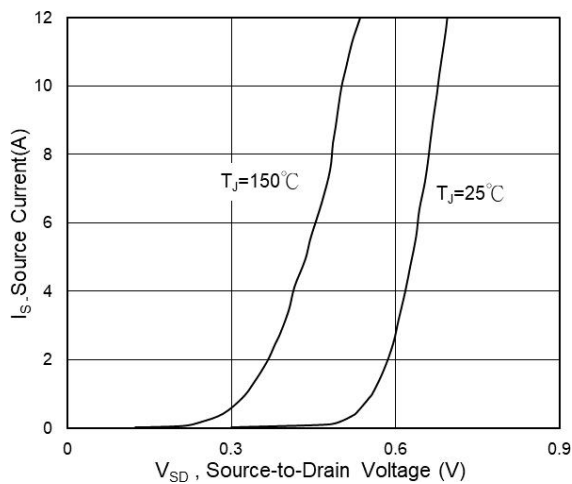
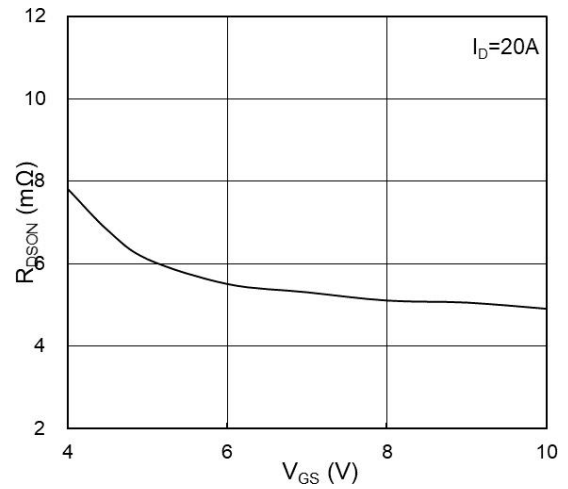
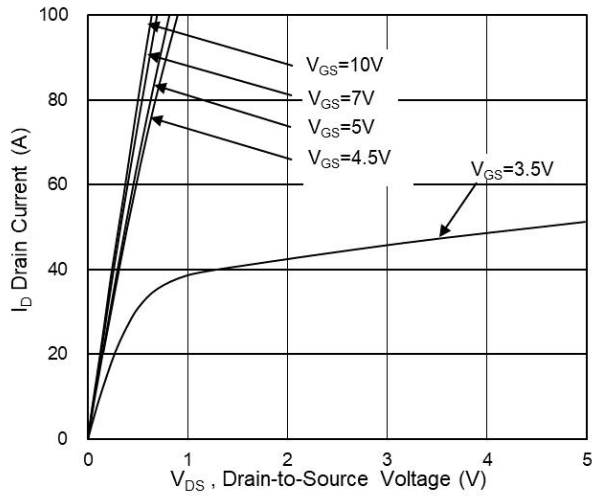
| Symbol       | Parameter                                      | Conditions                                           | Min. | Typ. | Max.      | Unit      |
|--------------|------------------------------------------------|------------------------------------------------------|------|------|-----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=250\mu A$                            | 30   | ---  | ---       | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V, I_D=20A$                                | ---  | 4.4  | 5.8       | $m\Omega$ |
|              |                                                | $V_{GS}=4.5V, I_D=15A$                               | ---  | 6.9  | 9         |           |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=250\mu A$                        | 1.2  | ---  | 2.5       | V         |
| $I_{DSS}$    | 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                       | $V_{DS}=5V, I_D=20A$                                 | ---  | 67   | ---       | S         |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$                | ---  | 1.7  | ---       | $\Omega$  |
| $Q_g$        | Total Gate Charge (4.5V)                       | $V_{DS}=15V, V_{GS}=4.5V, I_D=15A$                   | ---  | 8    | ---       | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                      | ---  | 2.4  | ---       |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                      | ---  | 3.2  | ---       |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega$<br>$I_D=15A$ | ---  | 7.1  | ---       | ns        |
| $T_r$        | Rise Time                                      |                                                      | ---  | 40   | ---       |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                      | ---  | 15   | ---       |           |
| $T_f$        | Fall Time                                      |                                                      | ---  | 6    | ---       |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$               | ---  | 814  | ---       | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                      | ---  | 498  | ---       |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                      | ---  | 41   | ---       |           |
| $I_S$        | Continuous Source Current <sup>1,6</sup>       | $V_G=V_D=0V, \text{Force Current}$                   | ---  | ---  | 60        | 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                          | $I_F=20A, di/dt=100A/\mu s,$                         | ---  | 15   | ---       | nS        |
| $Q_{rr}$     | Reverse Recovery Charge                        | $T_J=25^\circ\text{C}$                               | ---  | 25   | ---       | nC        |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> 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  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=24A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  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



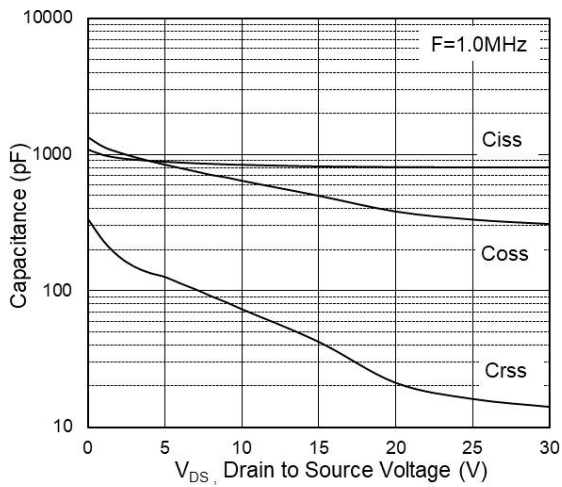


Fig.7 Capacitance

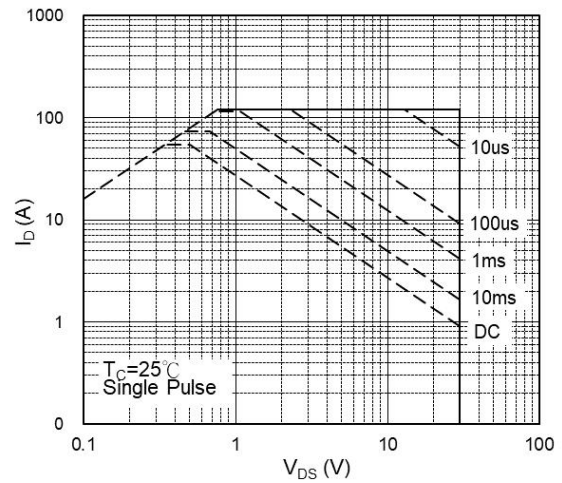


Fig.8 Safe Operating Area

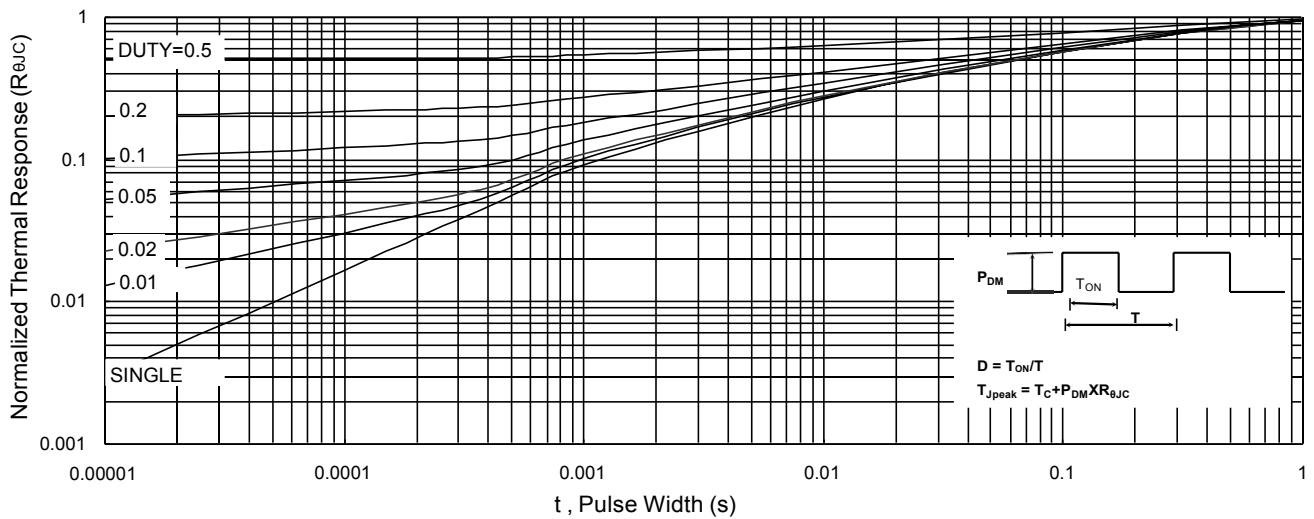


Fig.9 Normalized Maximum Transient Thermal Impedance

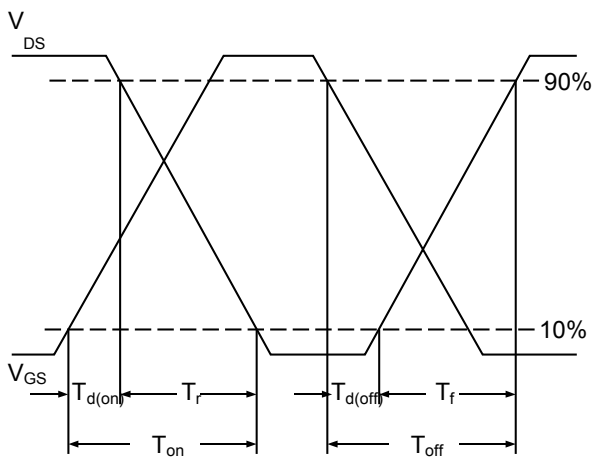


Fig.10 Switching Time Waveform

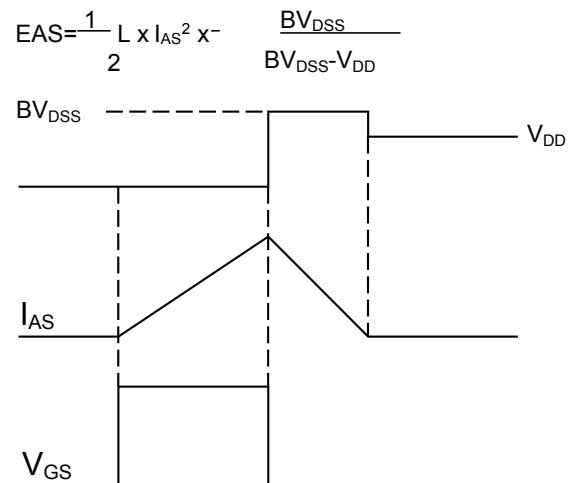
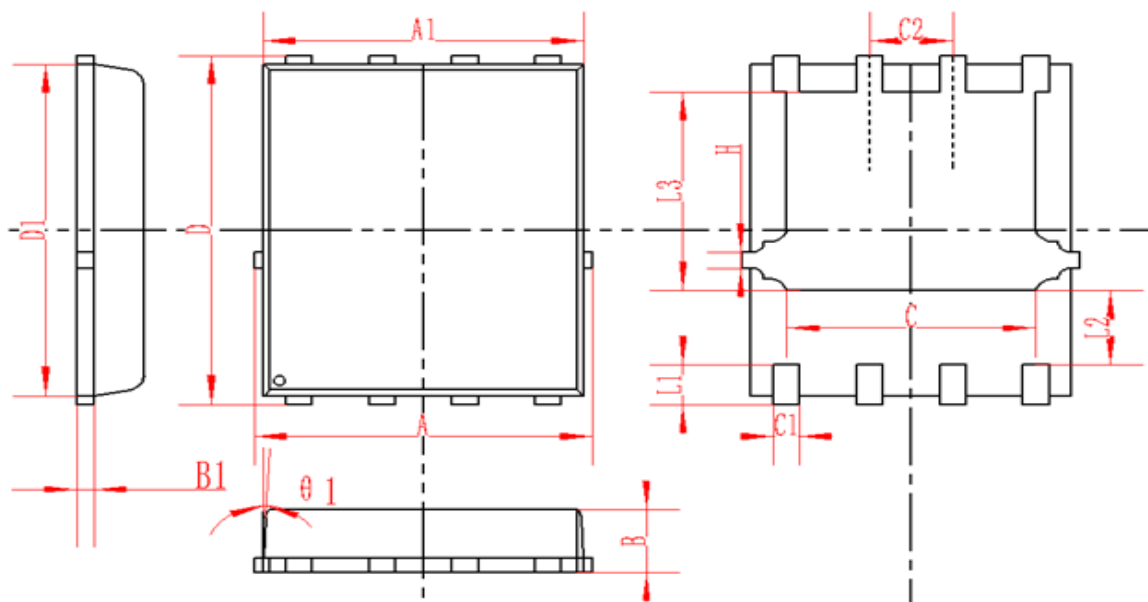


Fig.11 Unclamped Inductive Switching Waveform



## DFN5X6-8L(SO-8-FL-5.9mm)Package Information



| SYMBOL | MM       |      |       | INCH     |       |       |
|--------|----------|------|-------|----------|-------|-------|
|        | MIN      | NOM  | MAX   | MIN      | NOM   | MAX   |
| A      | 4.95     | 5    | 5.05  | 0.195    | 0.197 | 0.199 |
| A1     | 4.82     | 4.9  | 4.98  | 0.190    | 0.193 | 0.196 |
| D      | 5.98     | 6    | 6.02  | 0.235    | 0.236 | 0.237 |
| D1     | 5.67     | 5.75 | 5.83  | 0.223    | 0.226 | 0.230 |
| B      | 0.9      | 0.95 | 1     | 0.035    | 0.037 | 0.039 |
| B1     | 0.254REF |      |       | 0.010REF |       |       |
| C      | 3.95     | 4    | 4.05  | 0.156    | 0.157 | 0.159 |
| C1     | 0.35     | 0.4  | 0.45  | 0.014    | 0.016 | 0.018 |
| C2     | 1.27TYP  |      |       | 0.5TYP   |       |       |
| θ1     | 8°       | 10°  | 12°   | 8°       | 10°   | 12°   |
| L1     | 0.63     | 0.64 | 0.65  | 0.025    | 0.025 | 0.026 |
| L2     | 1.2      | 1.3  | 1.4   | 0.047    | 0.051 | 0.055 |
| L3     | 3.415    | 3.42 | 3.425 | 0.134    | 0.135 | 0.135 |
| H      | 0.24     | 0.25 | 0.26  | 0.009    | 0.010 | 0.010 |



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