



## Description

The NTMFS4C09NAT1G 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.

## General Features

$V_{DS} = 30V$   $I_D = 80A$

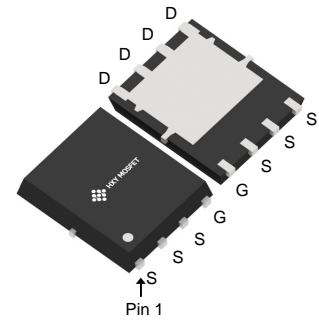
$R_{DS(ON)} < 6m\Omega$   $V_{GS}=10V$

## Application

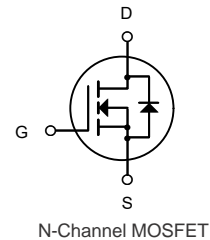
Battery protection

Load switch

Uninterruptible power supply



DFN5X6-8L  
(DFN-8(5x6))



## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
NTMFS4C09NAT1G	DFN5X6-8L(DFN-8(5x6))	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, $V_{GS} @ 10V$	80	A
$I_D@T_C=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	45	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	280	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	56	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	37	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	30	$^\circ C/W$



**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ <math>T_j=25^\circ\text{C}</math> (unless otherwise stated)</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$	--	--	0.1	$\mu A$
	Zero Gate Voltage Drain Current( $T_j=125^\circ\text{C}$ )	$V_{DS}=30V, V_{GS}=0V$	--	--	100	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	$\pm 100$	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance <sup>③</sup>	$V_{GS}=10V, I_D=20A$	--	4.7	6	m $\Omega$
$R_{DS(ON)}$	Drain-Source On-State Resistance <sup>③</sup>	$V_{GS}=4.5V, I_D=16A$	--	5.4	8	m $\Omega$
<b>Dynamic Electrical Characteristics @ <math>T_j = 25^\circ\text{C}</math> (unless otherwise stated)</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1\text{MHz}$	--	1930	--	pF
$C_{oss}$	Output Capacitance		--	310	--	pF
$C_{riss}$	Reverse Transfer Capacitance		--	260	--	pF
$R_g$	Gate Resistance	$f=1\text{MHz}$	--	0.85	--	
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$	--	38	--	nC
$Q_{gs}$	Gate-Source Charge		--	5.1	--	nC
$Q_{gd}$	Gate-Drain Charge		--	12	--	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=15V,$ $I_D=20A,$ $R_G=3,$ $V_{GS}=10V$	--	8.5	--	nS
$t_r$	Turn-on Rise Time		--	9	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	31	--	nS
$t_f$	Turn-Off Fall Time		--	9	--	nS
<b>Source- Drain Diode Characteristics @ <math>T_j = 25^\circ\text{C}</math> (unless otherwise stated)</b>						
$V_{SD}$	Forward on voltage	$I_{SD}=20A, V_{GS}=0V$	--	0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$T_j=25^\circ\text{C}, I_{sd}=20A,$ $V_{GS}=0V$	--	16	--	nS
$Q_{rr}$	Reverse Recovery Charge	$di/dt=500A/\mu s$		42		nC

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by  $T_{jmax}$ , starting  $T_j = 25^\circ\text{C}$ ,  $L = 0.5\text{mH}, R_G = 25, I_{AS} = 15A, V_{GS} = 10V$ . Part not recommended for use above this value
- ③ Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .



### Typical Characteristics

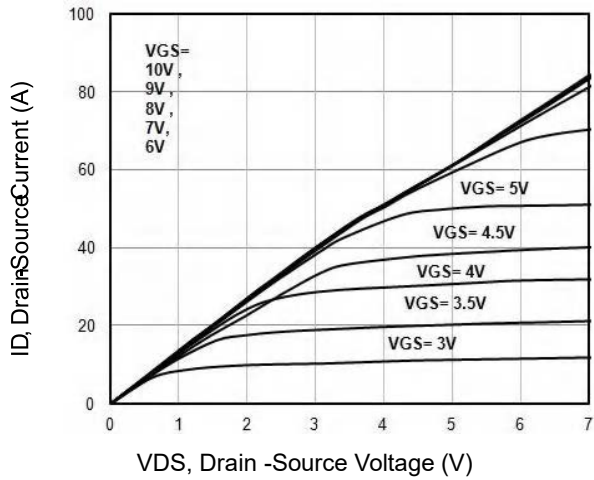


Fig1. Typical Output Characteristics

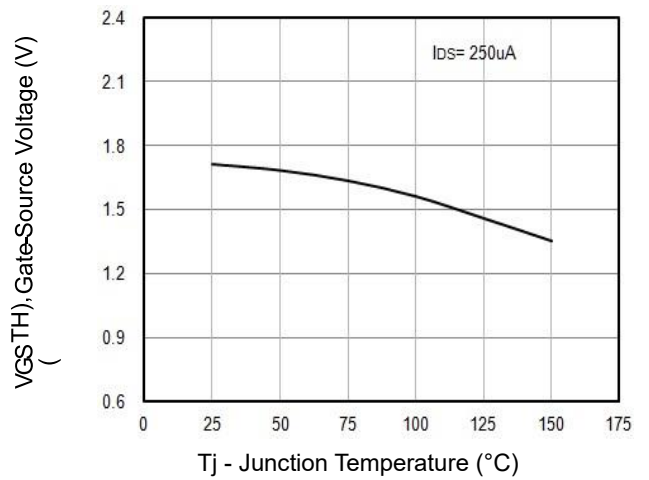


Fig2.  $V_{GS(TH)}$  Gate-Source Voltage Vs.  $T_j$

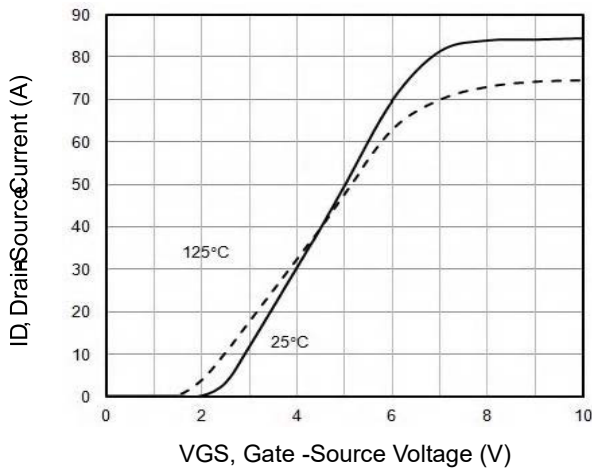


Fig3. Typical Transfer Characteristics

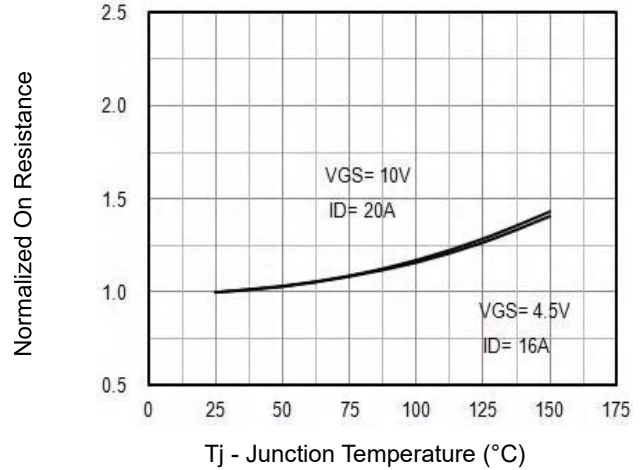


Fig4. Normalized On-Resistance Vs.  $T_j$

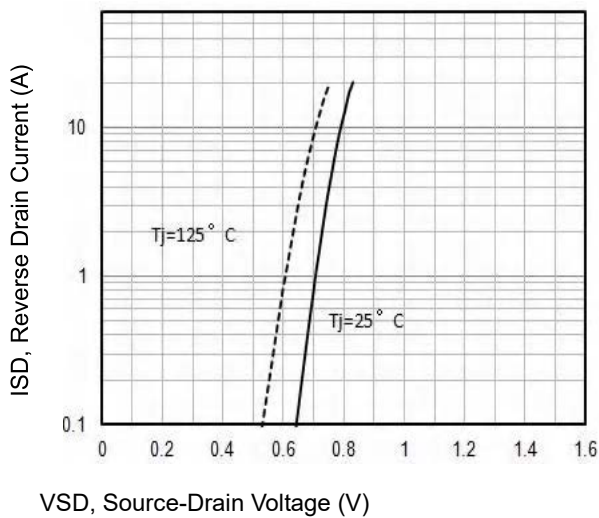


Fig6. Maximum Safe Operating Area Voltage

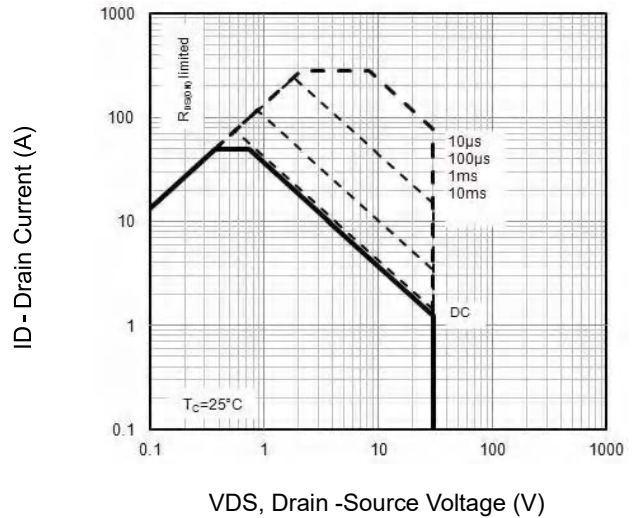


Fig5. Typical Source-Drain Diode Forward

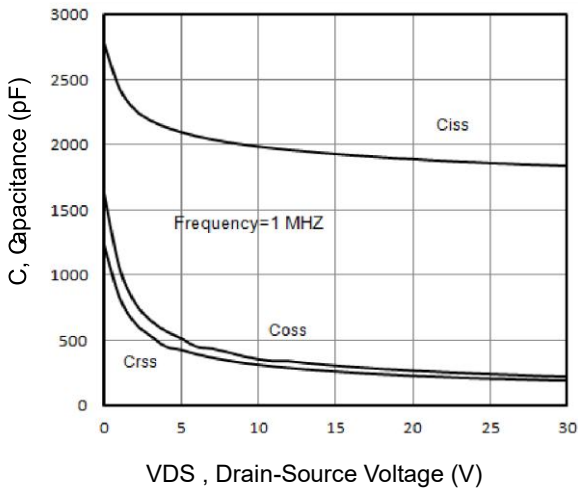


Fig7. Typical Capacitance Vs. Drain-Source Voltage

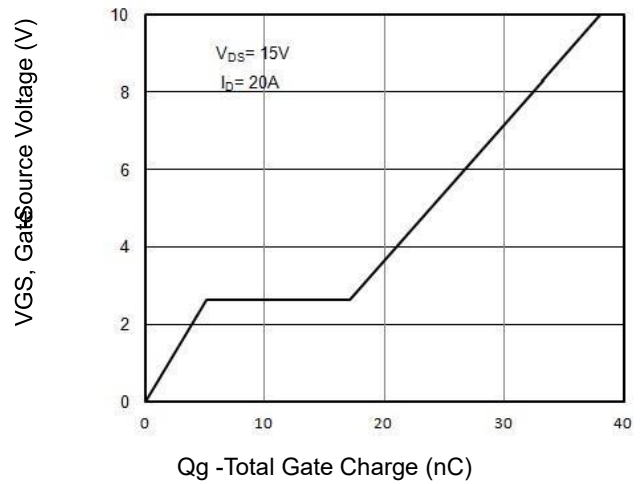


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

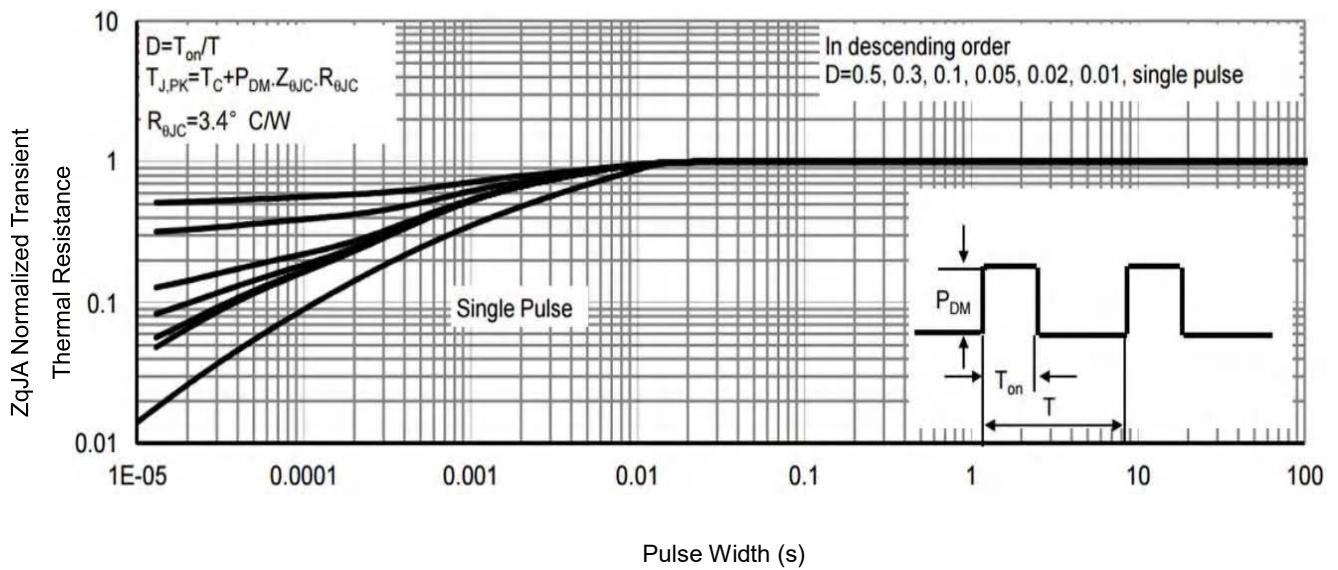


Fig9. Normalized Maximum Transient Thermal Impedance

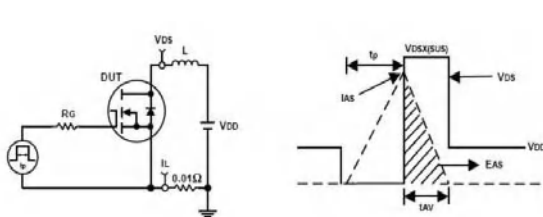


Fig10. Unclamped Inductive Test Circuit and waveforms

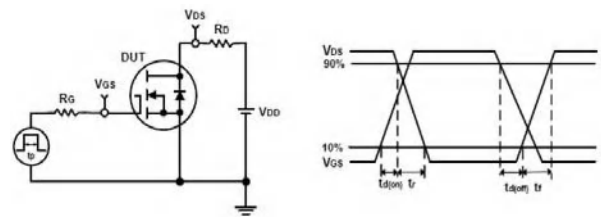


Fig11. Switching Time Test Circuit and waveforms



**DFN5X6-8L(DFN-8(5x6)) 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		
$\theta 1$	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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