



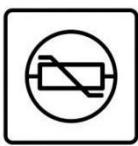
ESD



TVS



TSS



MOV



GDT



PLED

## **NTMFS4C290N-MS**

**Product specification**

## Description

The NTMFS4C290N-MS 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.

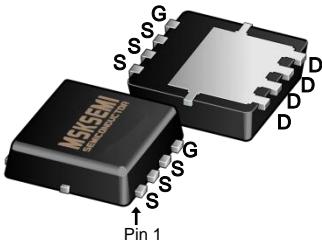
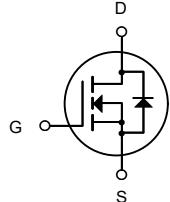
## Features

- $V_{DS} = 30V$   $I_D = 80A$
- $R_{DS(ON)} < 6m\Omega$   $V_{GS} = 10V$

## Application

- Battery protection
- Load switch
- Uninterruptible power supply

## Reference News

DFN5X6-8-L	N-Channel MOSFET	Marking
 Pin 1		

## 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	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
$R_{QJA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	30	°C/W

**Electrical Characteristics @  $T_j=25^\circ\text{C}$  (unless otherwise specified)**

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ <math>T_j=25^\circ\text{C}</math> (unless otherwise stated)</b>						
$V_{(\text{BR})\text{DSS}}$	Drain-Source Breakdown Voltage	$V_{\text{GS}}=0\text{V}$ $I_{\text{D}}=250\mu\text{A}$	30	--	--	V
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{\text{DS}}=30\text{V}$ , $V_{\text{GS}}=0\text{V}$	--	--	0.1	$\mu\text{A}$
	Zero Gate Voltage Drain Current( $T_j=125^\circ\text{C}$ )	$V_{\text{DS}}=30\text{V}$ , $V_{\text{GS}}=0\text{V}$	--	--	100	$\mu\text{A}$
$I_{\text{GSS}}$	Gate-Body Leakage Current	$V_{\text{GS}}=\pm 20\text{V}$ , $V_{\text{DS}}=0\text{V}$	--	--	$\pm 100$	nA
$V_{\text{GS}(\text{TH})}$	Gate Threshold Voltage	$V_{\text{DS}}=V_{\text{GS}}$ , $I_{\text{D}}=250\mu\text{A}$	1.0	1.7	2.5	V
$R_{\text{DS}(\text{ON})}$	Drain-Source On-State Resistance <sup>3</sup>	$V_{\text{GS}}=10\text{V}$ , $I_{\text{D}}=20\text{A}$	--	4.7	6	$\text{m}\Omega$
$R_{\text{DS}(\text{ON})}$	Drain-Source On-State Resistance <sup>3</sup>	$V_{\text{GS}}=4.5\text{V}$ , $I_{\text{D}}=16\text{A}$	--	5.4	8	$\text{m}\Omega$

**Dynamic Electrical Characteristics @  $T_j = 25^\circ\text{C}$  (unless otherwise stated)**

$C_{\text{iss}}$	Input Capacitance	$V_{\text{DS}}=15\text{V}$ , $V_{\text{GS}}=0\text{V}$ , $f=1\text{MHz}$	--	1930	--	pF
$C_{\text{oss}}$	Output Capacitance		--	310	--	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance		--	260	--	pF
$R_g$	Gate Resistance	$f=1\text{MHz}$	--	0.85	--	
$Q_g$	Total Gate Charge	$V_{\text{DS}}=15\text{V}$ , $I_{\text{D}}=20\text{A}$ , $V_{\text{GS}}=10\text{V}$	--	38	--	nC
$Q_{\text{gs}}$	Gate-Source Charge		--	5.1	--	nC
$Q_{\text{gd}}$	Gate-Drain Charge		--	12	--	nC

**Switching Characteristics**

$t_{\text{d}(\text{on})}$	Turn-on Delay Time	$V_{\text{DD}}=15\text{V}$ , $I_{\text{D}}=20\text{A}$ , $R_{\text{G}}=3$ , $V_{\text{GS}}=10\text{V}$	--	8.5	--	nS
$t_r$	Turn-on Rise Time		--	9	--	nS
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		--	31	--	nS
$t_f$	Turn-Off Fall Time		--	9	--	nS

**Source- Drain Diode Characteristics @  $T_j = 25^\circ\text{C}$  (unless otherwise stated)**

$V_{\text{SD}}$	Forward on voltage	$I_{\text{SD}}=20\text{A}$ , $V_{\text{GS}}=0\text{V}$	--	0.8	1.2	V
$t_{\text{rr}}$	Reverse Recovery Time	$T_j=25^\circ\text{C}$ , $I_{\text{SD}}=20\text{A}$ , $V_{\text{GS}}=0\text{V}$ , $\text{di}/\text{dt}=500\text{A}/\mu\text{s}$	--	16	--	nS
$Q_{\text{rr}}$	Reverse Recovery Charge		--	42	--	nC

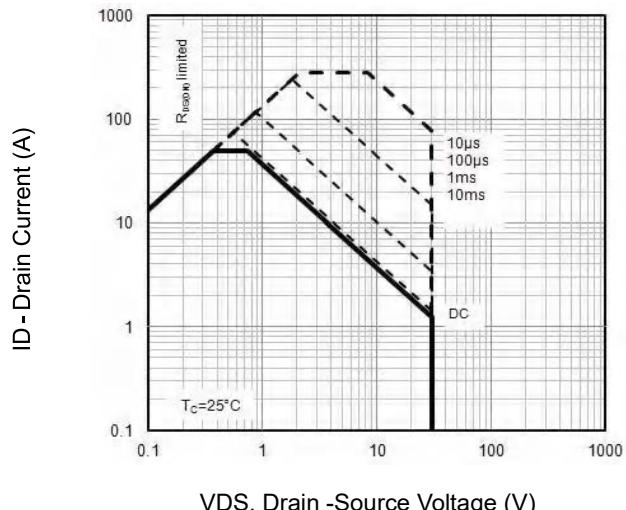
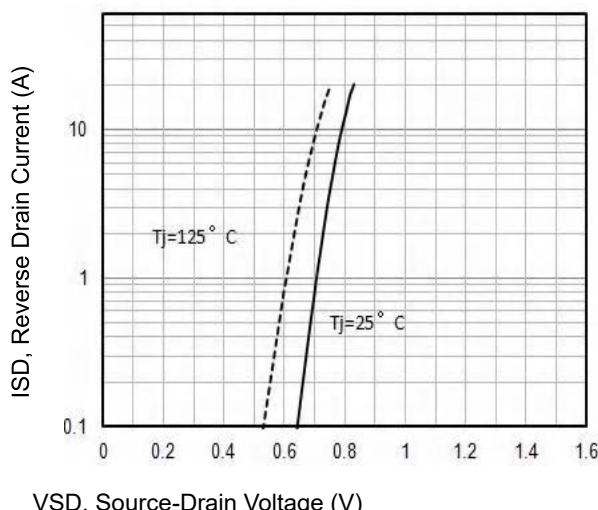
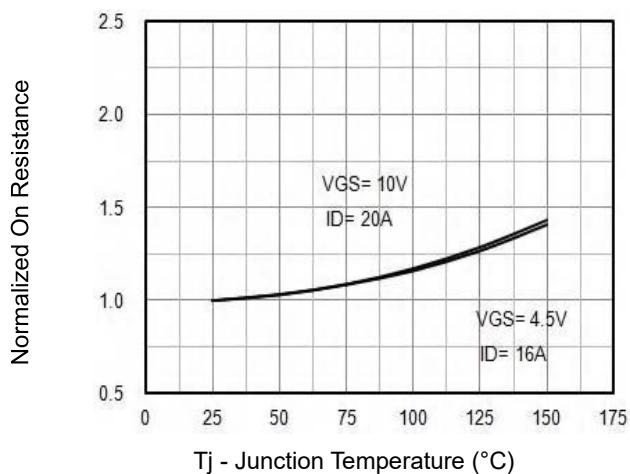
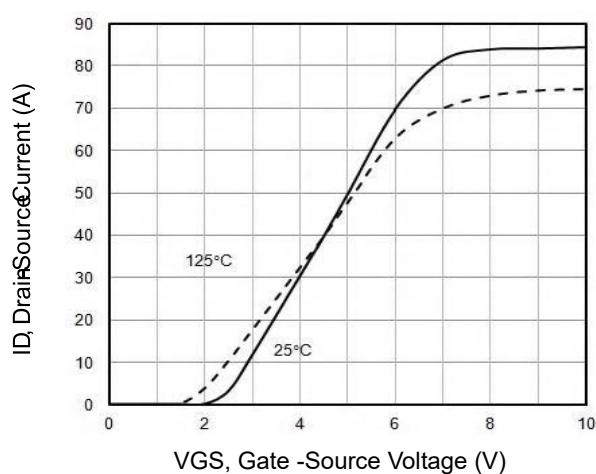
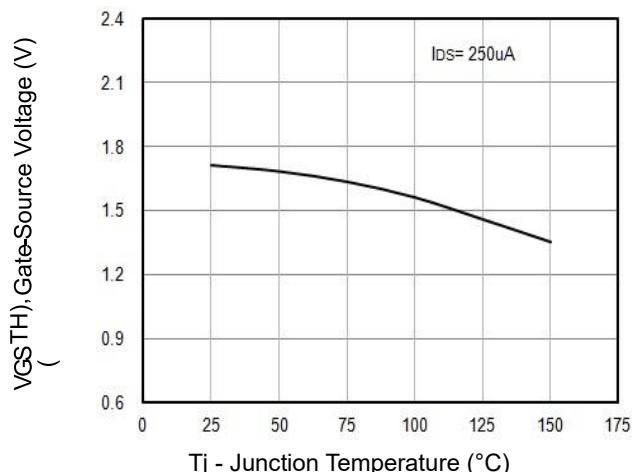
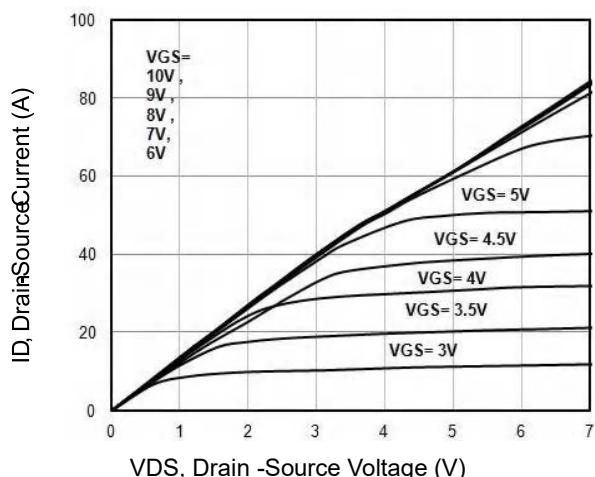
**NOTE:**

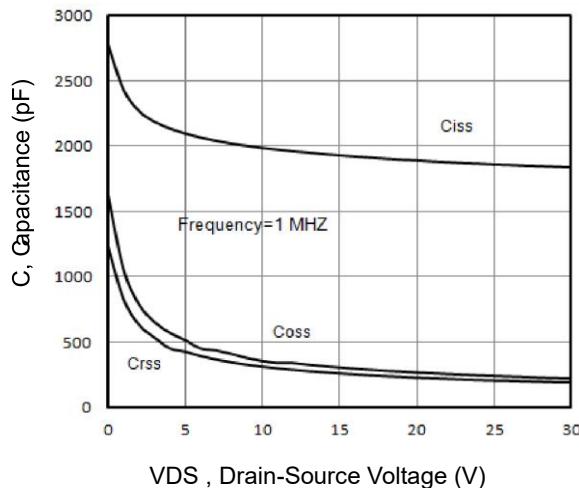
1.Repetitive rating; pulse width limited by max. junction temperature.

 2 Limited by  $T_{\text{Jmax}}$ , starting  $T_j = 25^\circ\text{C}$ ,  $L = 0.5\text{mH}$ ,  $R_g = 25$ ,  $I_{\text{AS}} = 15\text{A}$ ,  $V_{\text{GS}} = 10\text{V}$ . Part not recommended for use above this value

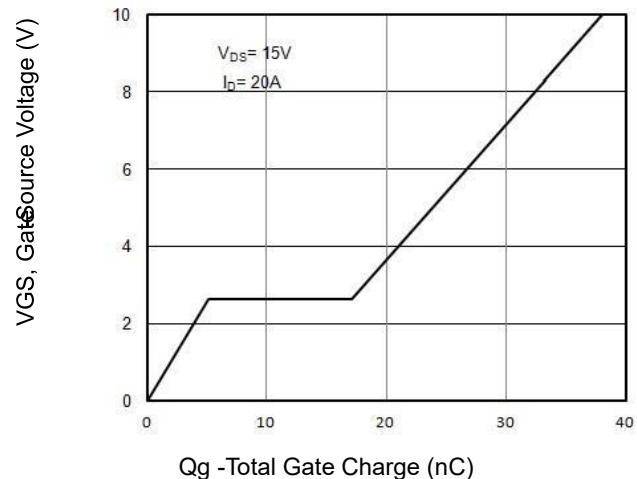
 3.Pulse width  $\leq 300\mu\text{s}$ ; duty cycle  $\leq 2\%$ .

## Typical Electrical and Thermal Characteristics (Curves)

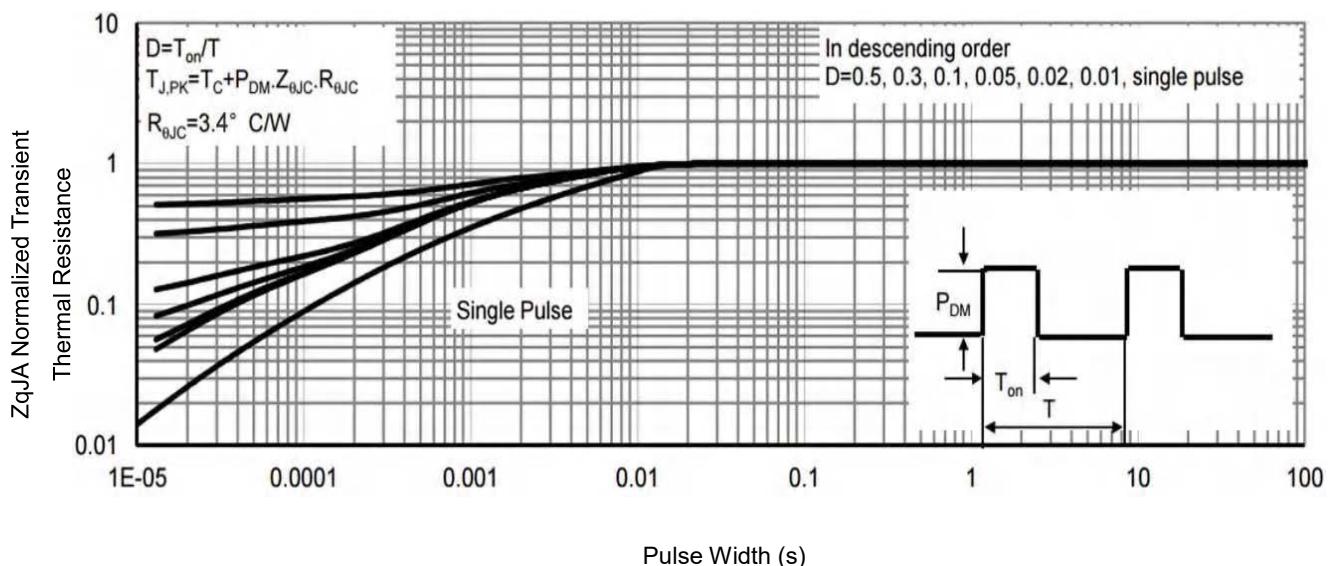




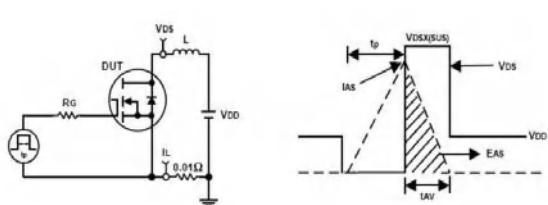
**Fig7.** Typical Capacitance Vs.Drain-Source Voltage



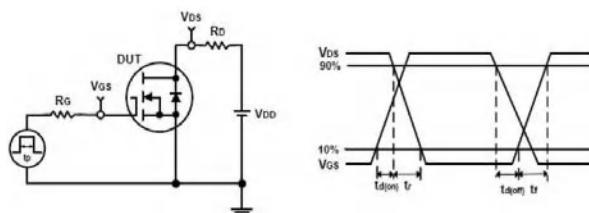
**Fig8.** Typical Gate Charge Vs.Gate-Source Voltage



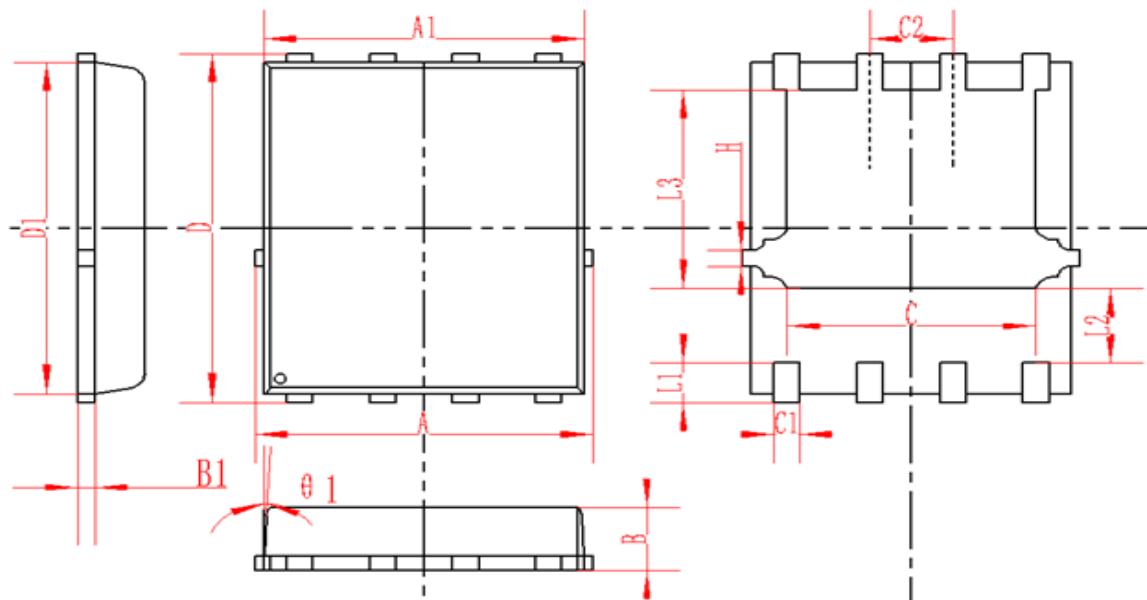
**Fig9.** Normalized Maximum Transient Thermal Impedance



**Fig10.** Unclamped Inductive Test Circuit and waveforms



**Fig11.** Switching Time Test Circuit and waveforms

**DFN5X6-8L 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

**REEL SPECIFICATION**

P/N	PKG	QTY
NTMFS4C290N-MS	DFN5X6-8L	5000

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