



# 150N03NF

## N-Ch 30V Fast Switching MOSFETs

### Description

The 150N03NF is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 150N03NF meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

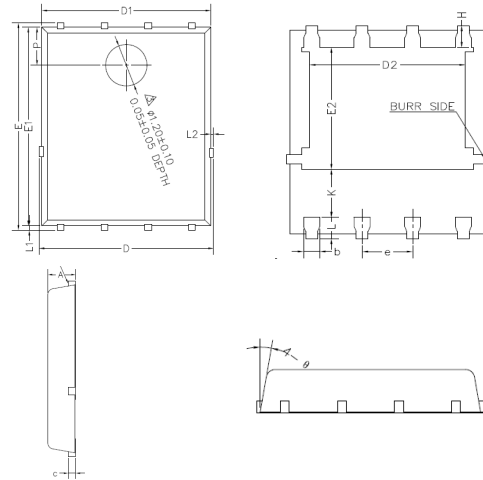
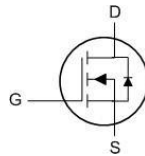
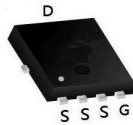
Super Low Gate Charge

100% EAS Guaranteed

Green Device Available

Excellent CdV/dt effect decline

Advanced high cell density Trench technology



PDFN5X6

Dimensions In Millimeters

SYMBOL	min	max	SYMBOL	min	max	SYMBOL	min	max
A	0.95	1.20	E	5.9	6.1	L2		0.2
b	0.25	0.40	E1	5.7	5.8	θ		13°
c	0.21	0.34	E2	3.34	3.54	P	1.0	1.2
D		5.1	H	0.51	0.71			
D1	4.8	5.0	K	1.1				
D2	3.91	4.20	L	0.51	0.71			
e	1.17	1.37	L1	0.06	0.2			

### Product Summary

BVDSS	RDSON	ID
30V	1.5mΩ	150A

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	150	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	80	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	450	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	580	mJ
I <sub>AS</sub>	Avalanche Current	60	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation <sup>4</sup>	87	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	2.1	°C/W

# 150N03NF

Electrical characteristic (  $T_J = 25^\circ\text{C}$  unless otherwise specified )

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
<b>Off characteristics</b>						
$BV_{DSS}$	Drain to source breakdown voltage	$V_{GS}=0V, I_D=250\mu A$	30			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown voltage temperature coefficient	$I_D=250\mu A$ , referenced to $25^\circ\text{C}$		0.02		V/ $^\circ\text{C}$
$I_{DSS}$	Drain to source leakage current	$V_{DS}=30V, V_{GS}=0V$			1	$\mu A$
		$V_{DS}=24V, T_J=125^\circ\text{C}$			50	$\mu A$
$I_{GSS}$	Gate to source leakage current, forward	$V_{GS}=20V, V_{DS}=0V$			100	nA
	Gate to source leakage current, reverse	$V_{GS}=-20V, V_{DS}=0V$			-100	nA
<b>On characteristics</b>						
$V_{GS(TH)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2		2.4	V
$R_{DS(ON)}$	Drain to source on state resistance	$V_{GS}=4.5V, I_D=30A, T_J=25^\circ\text{C}$		2.2	4.8	m $\Omega$
		$V_{GS}=10V, I_D=30A, T_J=25^\circ\text{C}$		1.5	2.9	m $\Omega$
		$V_{GS}=10V, I_D=30A, T_J=125^\circ\text{C}$		2.5		m $\Omega$
$G_{fs}$	Forward transconductance	$V_{DS}=5V, I_D=30A$		73		S
<b>Dynamic characteristics</b>						
$C_{iss}$	Input capacitance	$V_{GS}=0V, V_{DS}=15V, f=1\text{MHz}$		6272		pF
$C_{oss}$	Output capacitance			1022		
$C_{rss}$	Reverse transfer capacitance			718		
$t_{d(on)}$	Turn on delay time	$V_{DS}=15V, I_D=30A, R_G=4.7\Omega, V_{GS}=10V$ (note 4)		20		ns
$t_r$	Rising time			58		
$t_{d(off)}$	Turn off delay time			158		
$t_f$	Fall time			77		
$Q_g$	Total gate charge	$V_{DS}=24V, V_{GS}=10V, I_D=30A, I_G=5\text{mA}$ (note 4)		143		nC
$Q_{gs}$	Gate-source charge			17		
$Q_{gd}$	Gate-drain charge			43		
$R_g$	Gate resistance		$V_{DS}=0V, \text{Scan F mode}$		4.2	

## Source to drain diode ratings characteristics

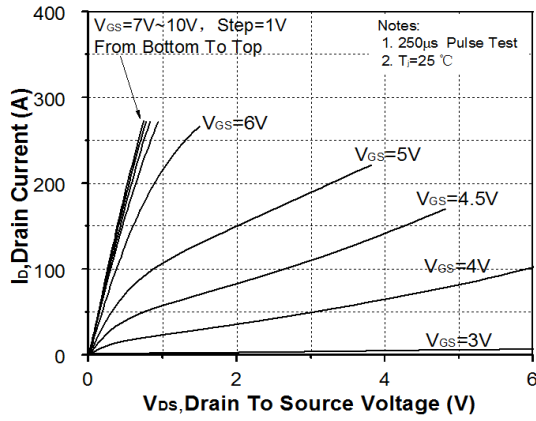
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous source current	Integral reverse p-n Junction diode in the MOSFET			110	A
$I_{SM}$	Pulsed source current				440	A
$V_{SD}$	Diode forward voltage drop.	$I_S=45A, V_{GS}=0V$			1.4	V
$t_{rr}$	Reverse recovery time	$I_S=30A, V_{GS}=0V,$		26		ns
$Q_{rr}$	Reverse recovery charge	$dI_F/dt=100A/\mu s$		10		nC

※. Notes

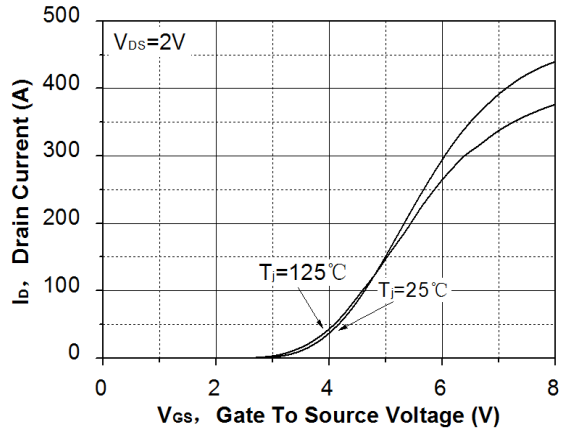
1. Repeattive rating : pulse width limited by junction temperature.
2.  $L=0.5\text{mH}, I_{AS}=48A, V_{DD}=30V, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
3.  $I_{SD} \leq 30A, di/dt = 100A/\mu s, V_{DD} \leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
4. Pulse Test : Pulse Width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

## RATING AND CHARACTERISTIC CURVES (150N03NF)

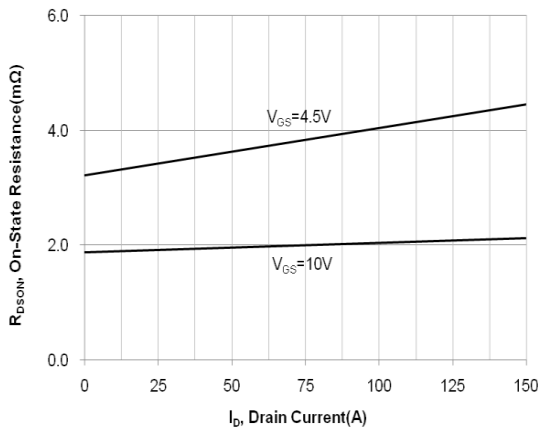
**Fig. 1. On-state characteristics**



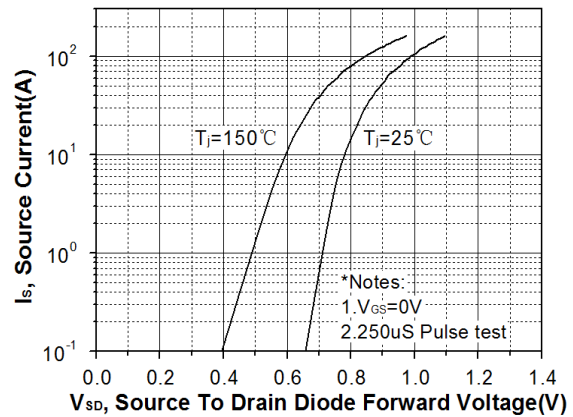
**Fig. 2. Transfer Characteristics**



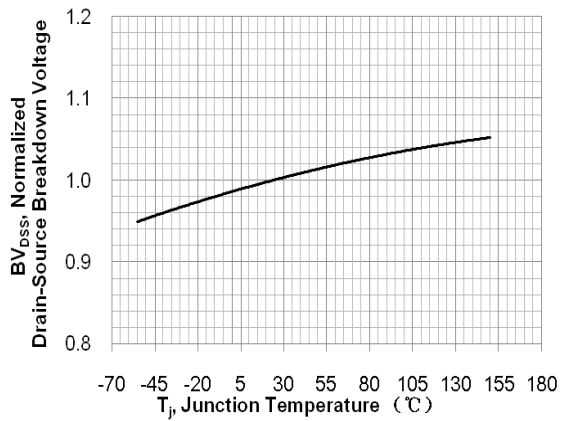
**Fig. 3. On-resistance variation vs. drain current and gate voltage**



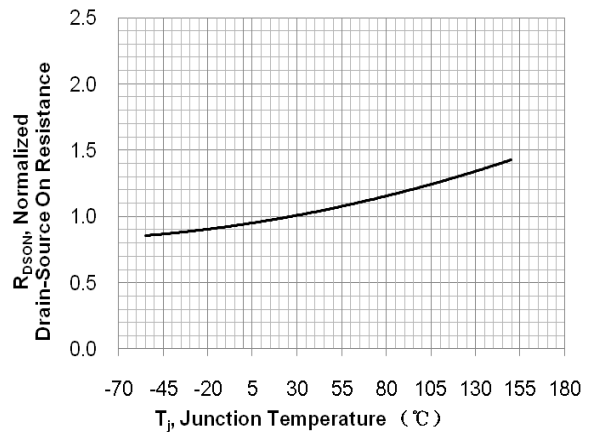
**Fig. 4. On-state current vs. diode forward voltage**



**Fig 5. Breakdown voltage variation vs. junction temperature**

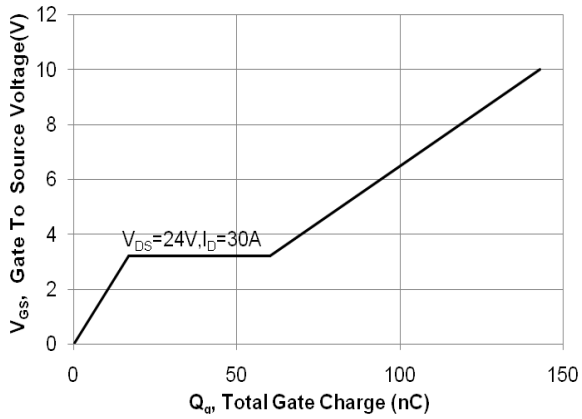


**Fig. 6. On-resistance variation vs. junction temperature**

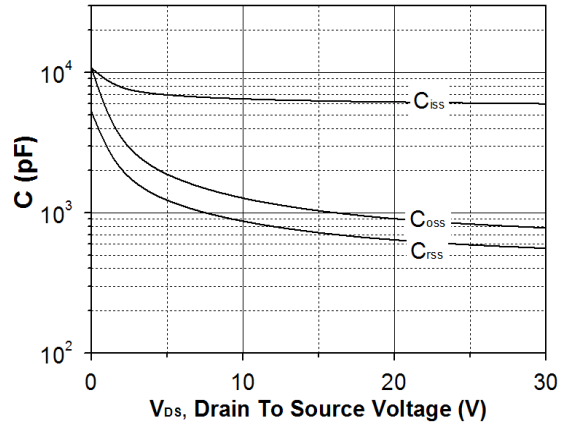


## RATING AND CHARACTERISTIC CURVES (150N03NF)

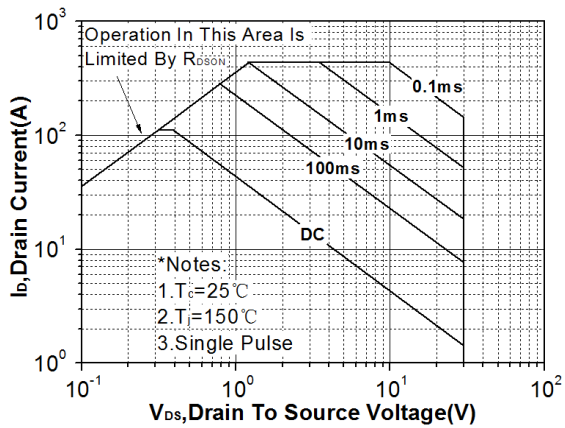
**Fig. 7. Gate charge characteristics**



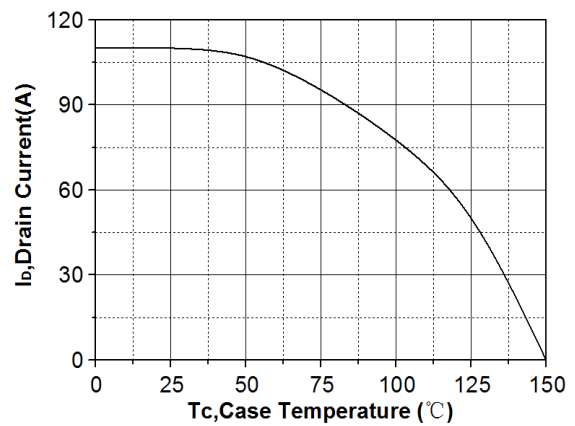
**Fig. 8. Capacitance Characteristics**



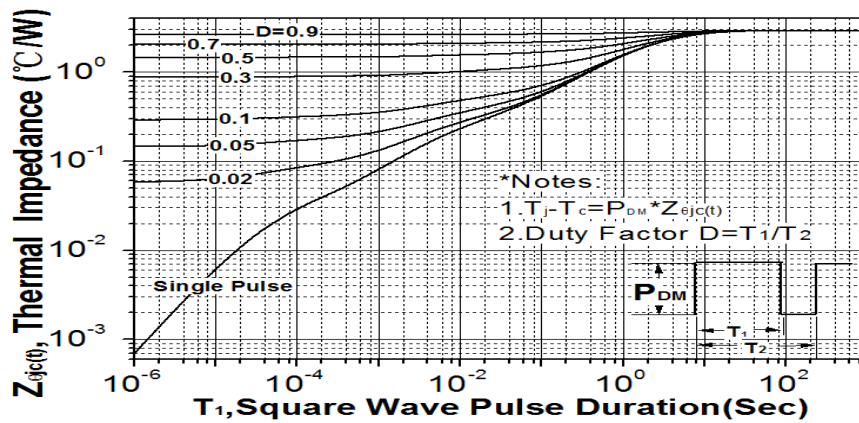
**Fig. 9. Maximum safe operating area**



**Fig. 10. Maximum drain current vs. case temperature**



**Fig. 11. Transient thermal response curve**



## Test Circuit

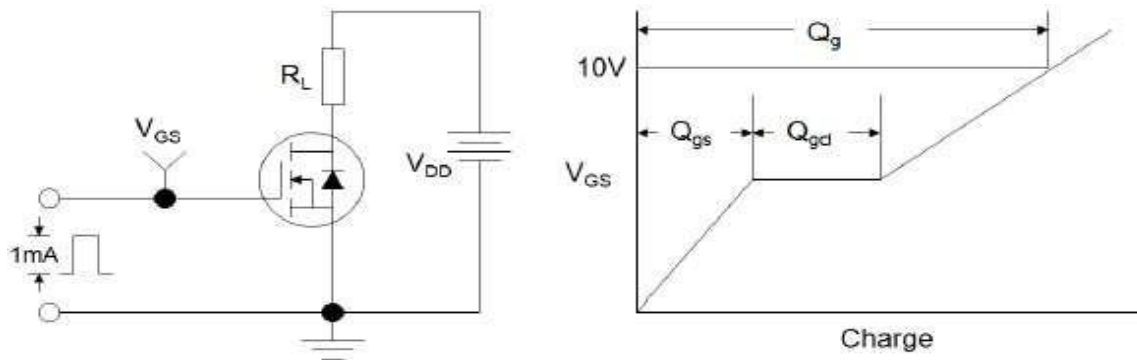


Figure1:Gate Charge Test Circuit & Waveform

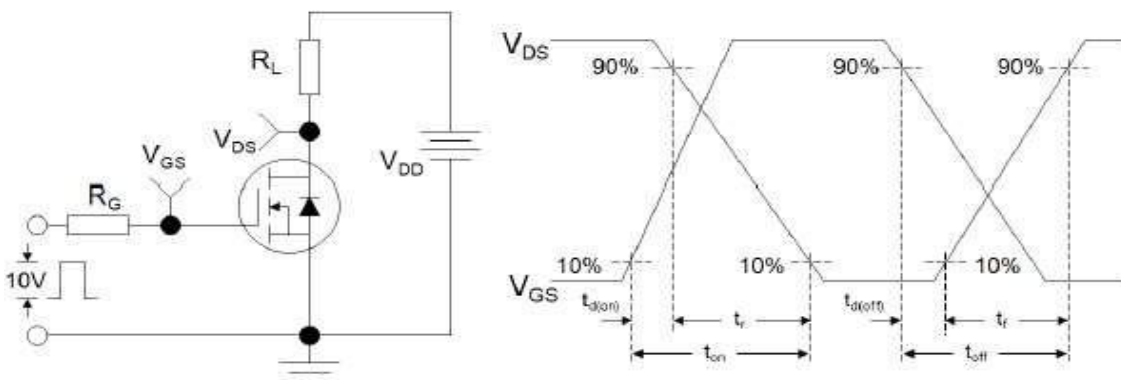


Figure 2: Resistive Switching Test Circuit & Waveforms

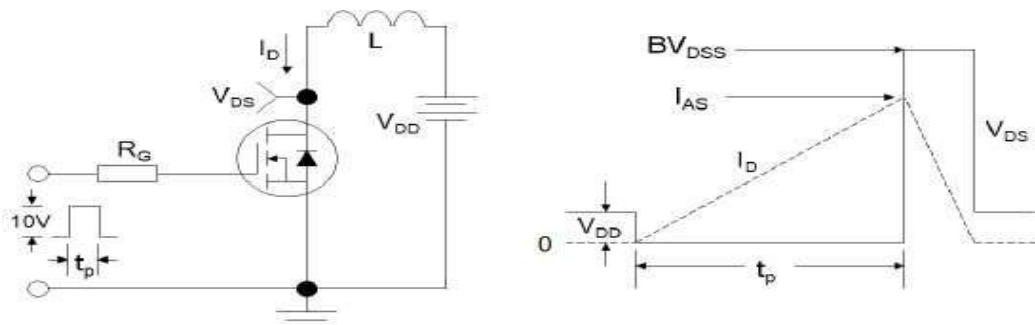


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms