

Description

The 150N03NF is the high cell density trench 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.

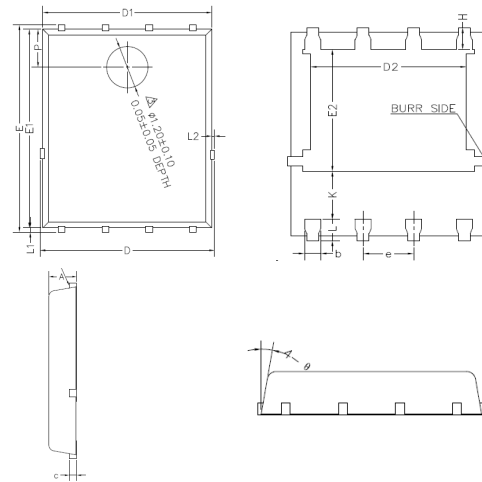
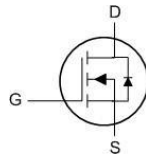
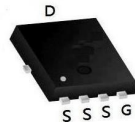
Super Low Gate Charge

100% EAS Guaranteed

Green Device Available

Excellent CdV/dt effect decline

Advanced high cell density Trench technology



PDFN5X6

Product Summary

BVDSS	RDSON	ID
30V	1.5mΩ	150A

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			

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	150	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	80	A
I_{DM}	Pulsed Drain Current ²	450	A
EAS	Single Pulse Avalanche Energy ³	580	mJ
I_{AS}	Avalanche Current	60	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	87	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	2.1	°C/W

150N03NF

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

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
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°C		0.02		V/ $^{\circ}\text{C}$
I_{DSS}	Drain to source leakage current	$V_{DS}=30V, V_{GS}=0V$			1	μA
		$V_{DS}=24V, T_J=125^{\circ}\text{C}$			50	μA
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
On characteristics						
$V_{GS(TH)}$	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 Ω
		$V_{GS}=10V, I_D=30A, T_J=25^{\circ}\text{C}$		1.5	2.9	m Ω
		$V_{GS}=10V, I_D=30A, T_J=125^{\circ}\text{C}$		2.5		m Ω
G_{fs}	Forward transconductance	$V_{DS}=5V, I_D=30A$		73		S
Dynamic characteristics						
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			4.2		Ω

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	$I_S=30A, V_{GS}=0V, dI_F/dt=100A/\mu s$		26		ns
Q_{rr}	Reverse recovery charge			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

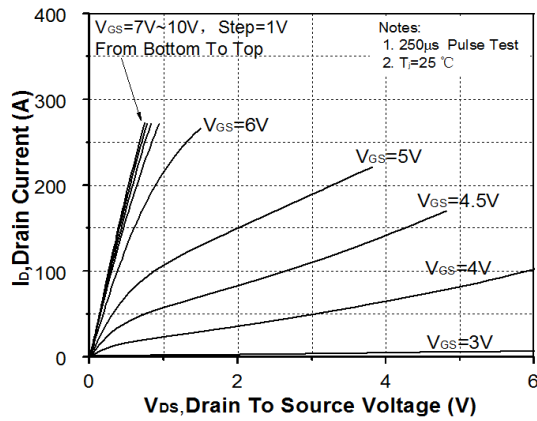


Fig. 2. Transfer Characteristics

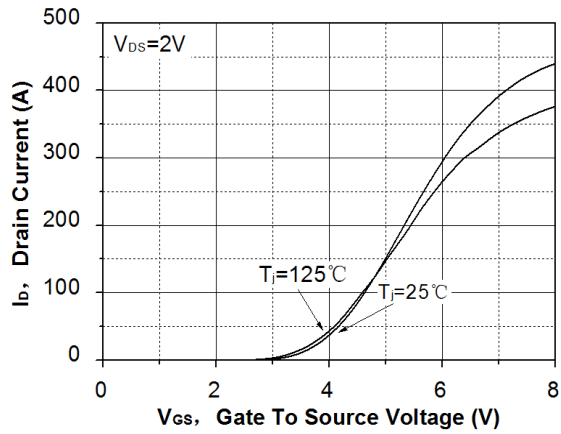


Fig. 3. On-resistance variation vs. drain current and gate voltage

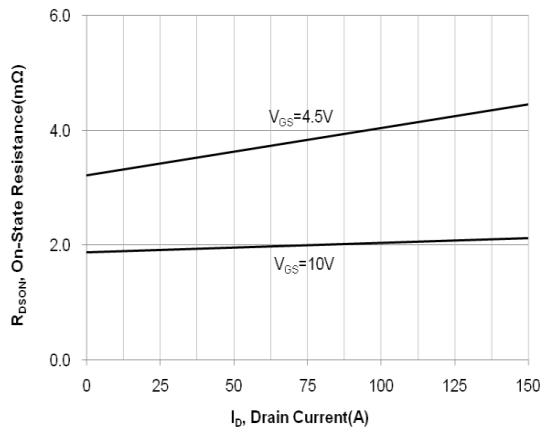


Fig. 4. On-state current vs. diode forward voltage

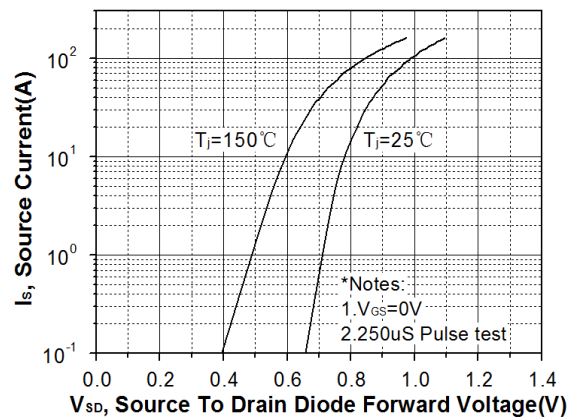


Fig 5. Breakdown voltage variation vs. junction temperature

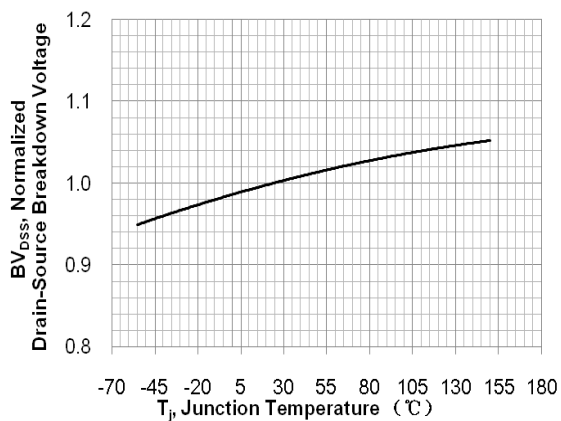
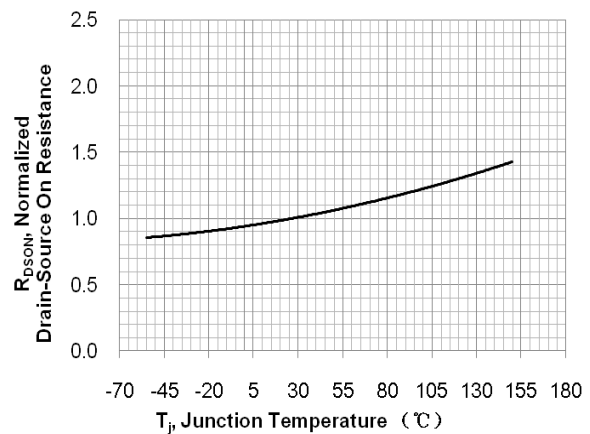


Fig. 6. On-resistance variation vs. junction temperature



RATING AND CHARACTERISTIC CURVES (150N03NF)

Fig. 7. Gate charge characteristics

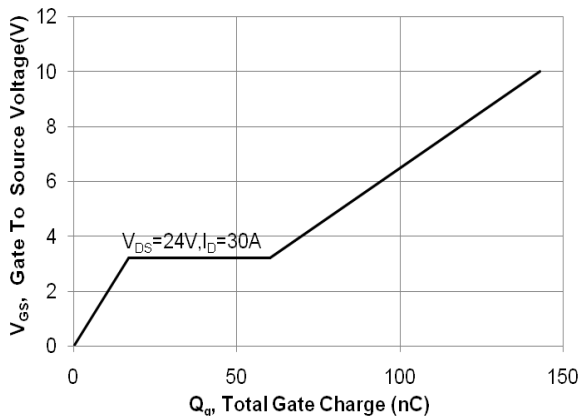


Fig. 8. Capacitance Characteristics

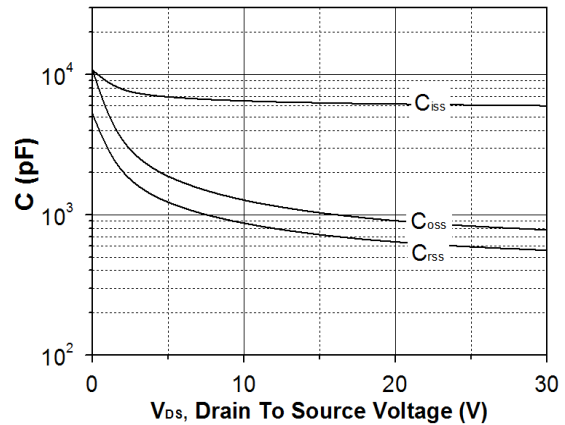


Fig. 9. Maximum safe operating area

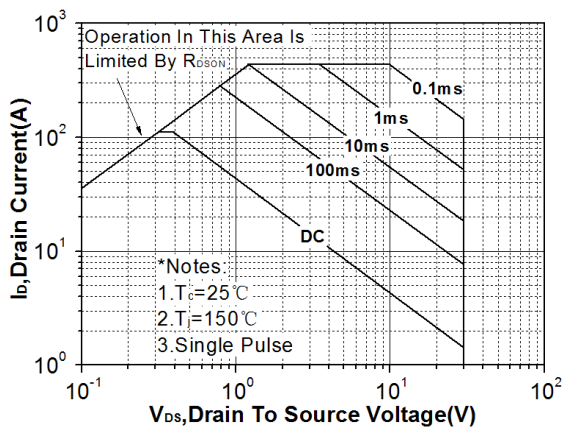


Fig. 10. Maximum drain current vs. case temperature

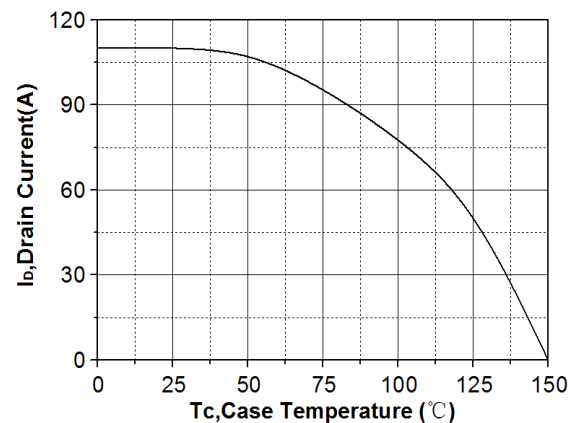
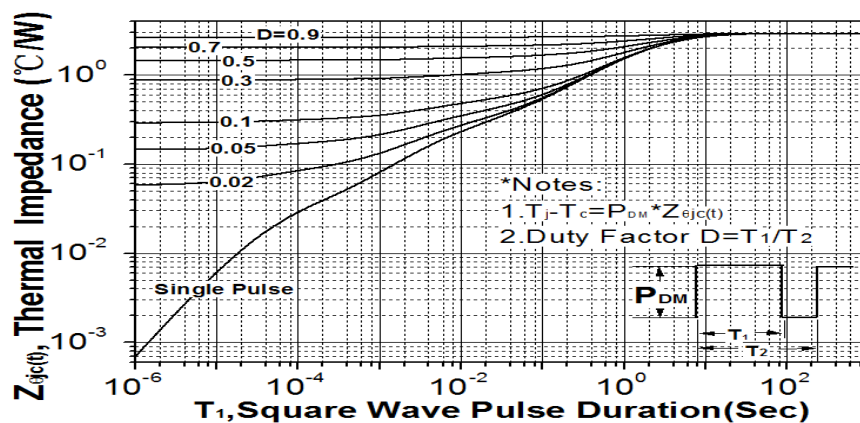


Fig. 11. Transient thermal response curve



Test Circuit

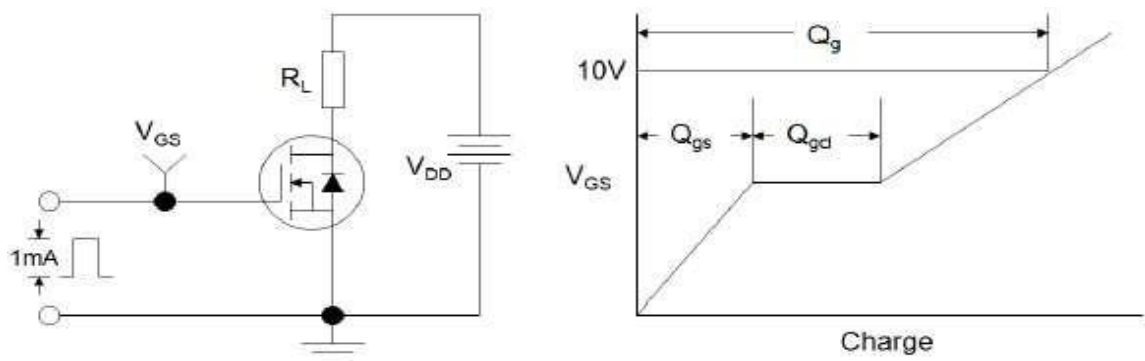


Figure1:Gate Charge Test Circuit & Waveform

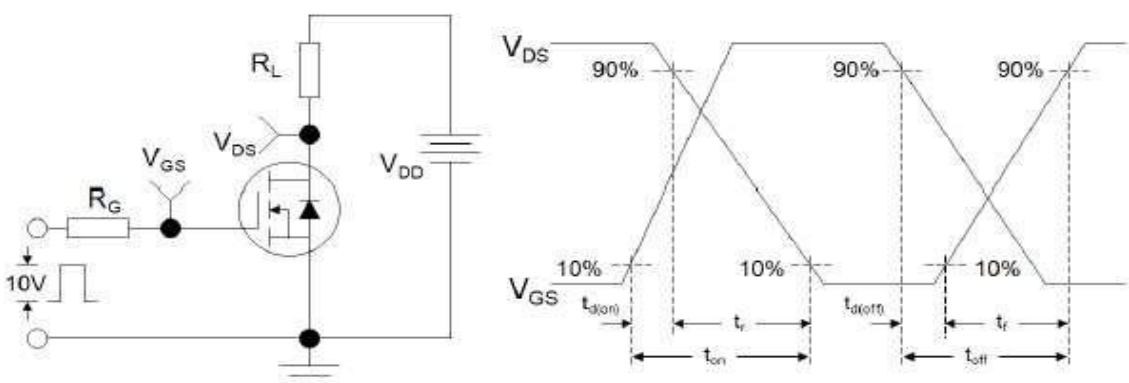


Figure 2: Resistive Switching Test Circuit & Waveforms

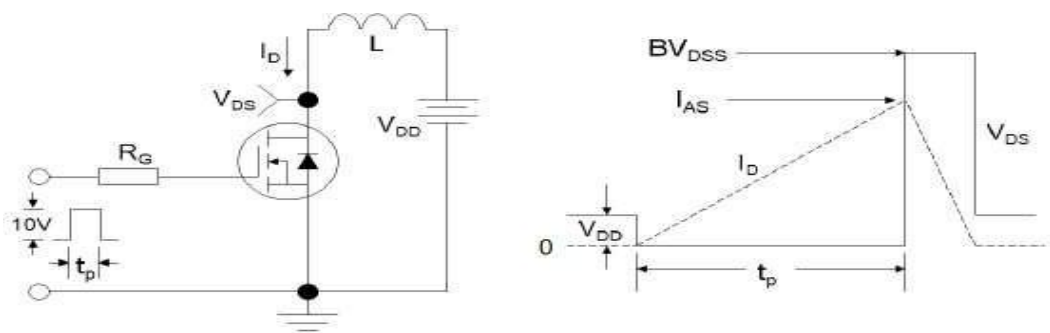


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms