



**TM120P03NF**

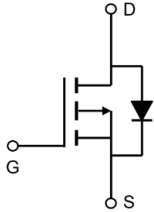
**P-Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = -30V</math> <math>I_D = -120A</math></p> <p><math>R_{DS(ON)} = 2.5m\Omega(\text{typ.}) @ V_{GS} = -10V</math></p> <p>100% UIS Tested                  100% <math>R_g</math> Tested</p> 
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NF:DFN5x6-8L



Marking: 120P03



**Absolute Maximum Ratings** ( $T_A = 25^\circ C$  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, $V_{GS} @ -10V^{1,6}$	-120	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^{1,6}$	-70	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-450	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	576	mJ
$I_{AS}$	Avalanche Current	-70	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation <sup>4</sup>	6.0	W
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup> ( $t \leq 10S$ )	---	20	$^\circ C/W$
	Thermal Resistance Junction-ambient <sup>1</sup> (Steady State)	---	50	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case <sup>1</sup>	---	3.6	$^\circ C/W$



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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-30V, V_{GS}=0V$			-1	$\mu A$
$I_{GSS}$	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	-1.5	-2.5	V
$g_{FS}$	Forward Transconductance	$V_{DS}=-5V, I_D=-20A$		65		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=-10V, I_D=-20A$		2.5	3.1	m $\Omega$
		$V_{GS}=-4.5V, I_D=-20A$		4	5.2	m $\Omega$
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1.0MHz$		6100		pF
$C_{oss}$	Output Capacitance			820		pF
$C_{rss}$	Reverse Transfer Capacitance			540		pF
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V, f=1.0MHz$		2.2		$\Omega$
<b>Switching Parameters</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{GS}=-10V, V_{DS}=-15V, R_L=0.75\Omega, R_{GEN}=3\Omega$		14		nS
$t_r$	Turn-on Rise Time			13		nS
$t_{d(off)}$	Turn-Off Delay Time			65		nS
$t_f$	Turn-Off Fall Time			37		nS
$Q_g$	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-15V, I_D=-20A$		130		nC
$Q_{gs}$	Gate-Source Charge			12		nC
$Q_{gd}$	Gate-Drain Charge			31		nC
<b>Source-Drain Diode Characteristics</b>						
$I_{SD}$	Source-Drain Current (Body Diode)				-120	A
$V_{SD}$	Forward on Voltage (Note 3)	$V_{GS}=0V, I_S=-20A$			-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=-20A, di/dt=100A/\mu s$		30		ns
$Q_{rr}$	Reverse Recovery Charge	$I_F=-20A, di/dt=100A/\mu s$		40		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2. $E_{AS}$  condition:  $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=-10V, R_g=25\Omega, L=0.5mH$ .

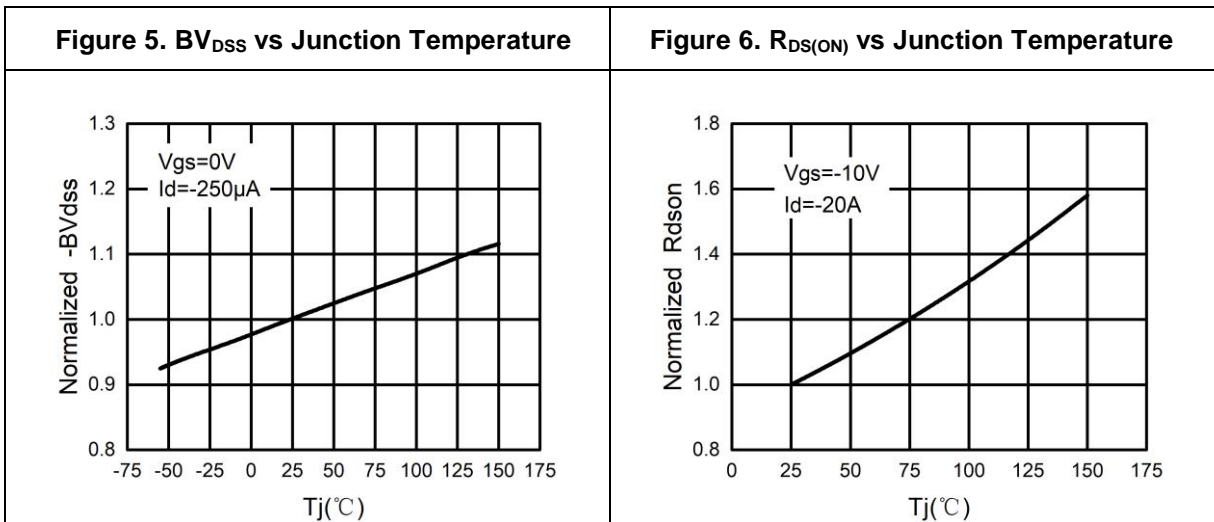
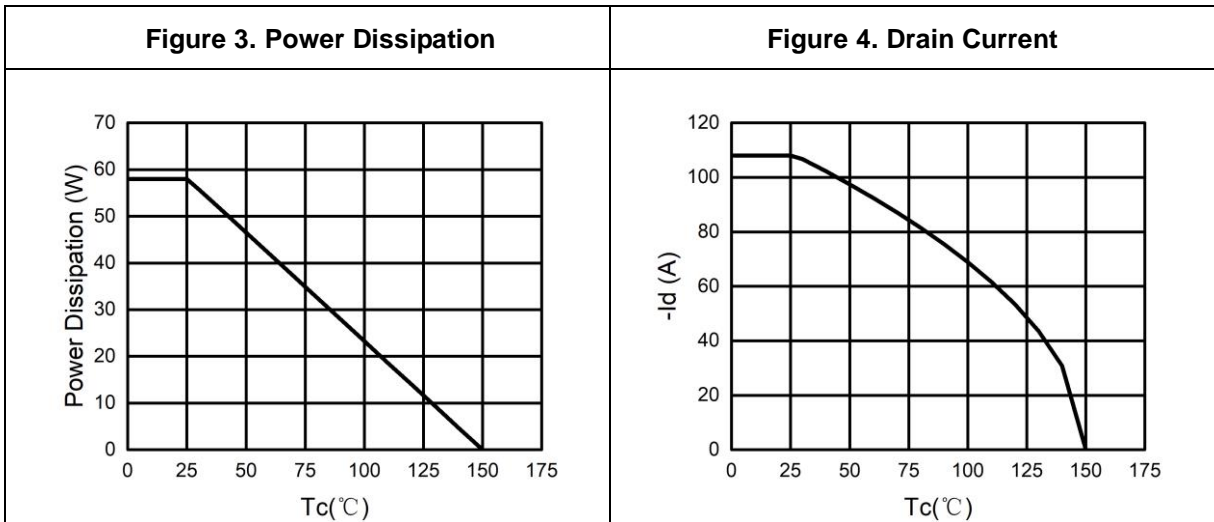
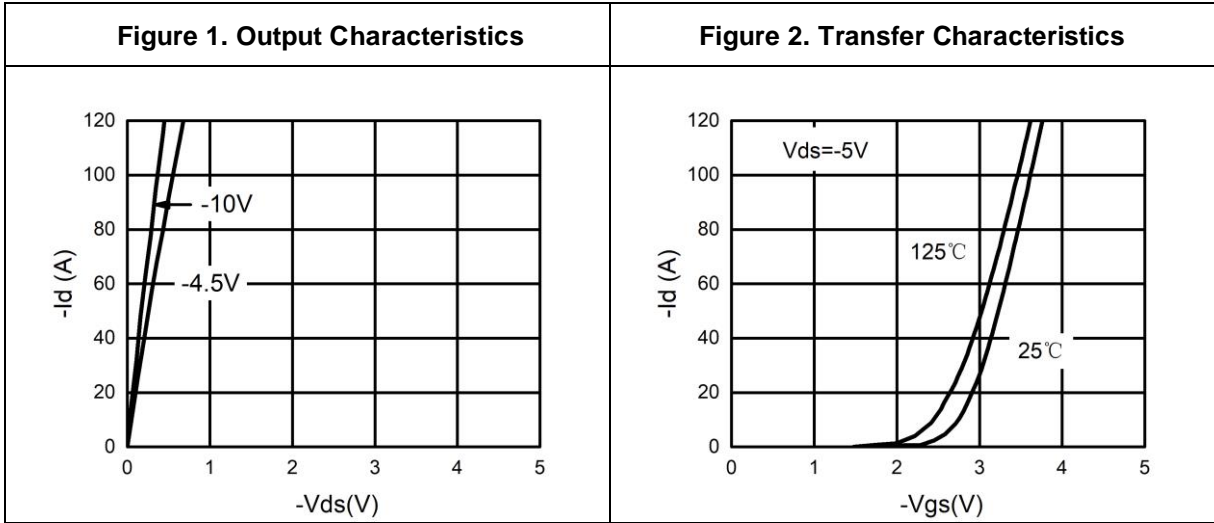
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.



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## Typical Electrical And Thermal Characteristics (Curves)





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Figure 7. Gate Charge Waveforms

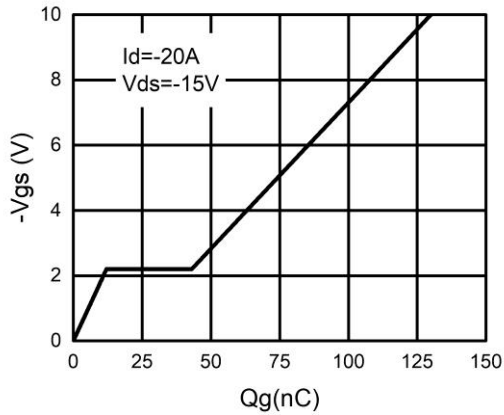


Figure 8. Capacitance

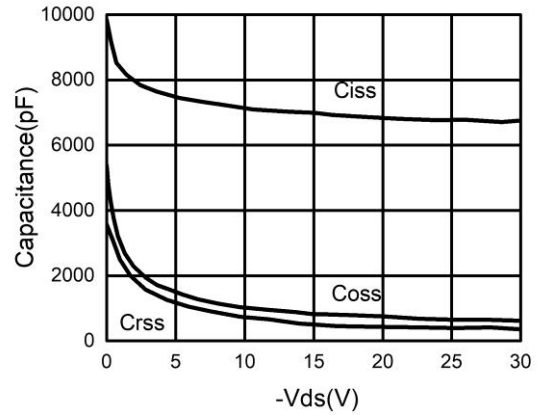


Figure 9. Body-Diode Characteristics

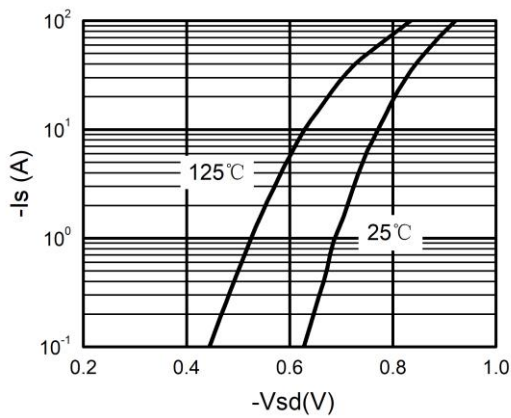
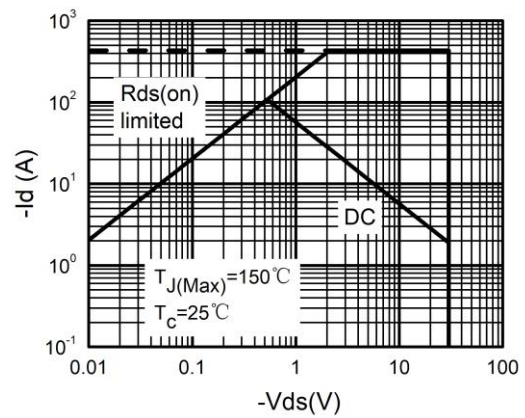
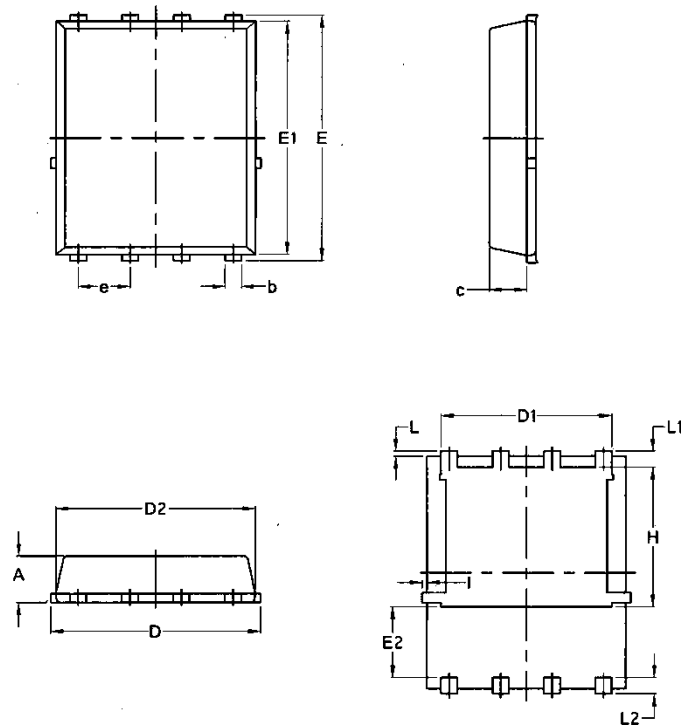


Figure 10. Maximum Safe Operating Area





## Package Mechanical Data: DFN5x6-8L



Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070