



Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
30V	7mΩ@10V	45A
	12mΩ@4.5V	
-30V	20mΩ@-10V	-24A
	32mΩ@-4.5V	

Feature

- Trench Technology Power MOSFET
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance

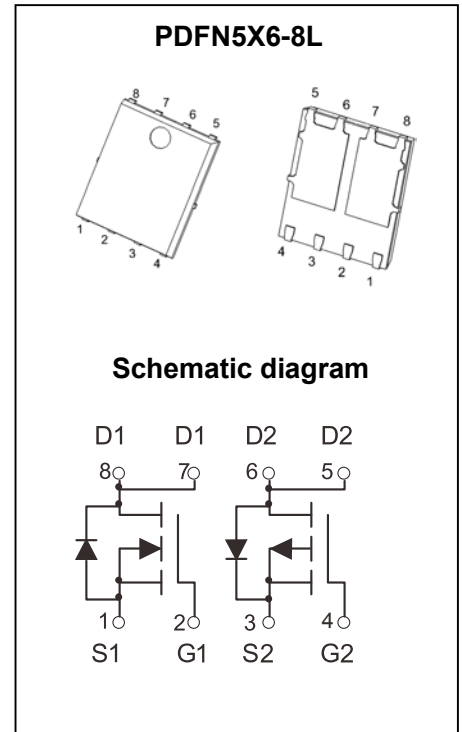
Application

- PWM Applications
- Loas Switch
- Power Management

MARKING:



M320NP03N = Device Code
XX = Data Code
Solid Dot = Green Device Indicator



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	NMOS	PMOS	Unit	
Drain - Source Voltage	V_{DS}	30	-30	V	
Gate - Source Voltage	V_{GS}	± 20	± 20	V	
Continuous Drain Current ¹	I_D	$T_C = 25^\circ\text{C}$	45	-24	A
		$T_C = 100^\circ\text{C}$	29	-16	
Pulsed Drain Current ²	I_{DM}	180	-96	A	
Single Pulsed Avalanche Current ^{3,4}	I_{AS}	19	-16	A	
Single Pulsed Avalanche Energy ^{3,4}	E_{AS}	82	55	mJ	
Power Dissipation ⁶	P_D	25	20.8	W	
Thermal Resistance from Junction to Ambient ⁷	$R_{\theta JA}$	50	65	$^\circ\text{C}/\text{W}$	
Thermal Resistance from Junction to Case	$R_{\theta JC}$	5	6	$^\circ\text{C}/\text{W}$	
Junction Temperature	T_J	150	150	$^\circ\text{C}$	
Storage Temperature	T_{STG}	-55~ +150	-55~ +150	$^\circ\text{C}$	

MOSFET ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

NMOS:

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain - Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30V, V_{GS} = 0V$			1	μA
Gate - Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.4	1.5	2.5	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 7A$		7	12	m Ω
		$V_{GS} = 4.5V, I_D = 6A$		12	20	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$		953		pF
Output Capacitance	C_{oss}			160		
Reverse Transfer Capacitance	C_{rss}			151		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		1.9		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 15V, V_{GS} = 10V, I_D = 7A$		23		nC
Gate-source Charge	Q_{gs}			2.6		
Gate-drain Charge	Q_{gd}			5.9		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 15V, V_{GS} = 10V, R_L = 1.25\Omega$ $R_G = 3\Omega$		4.4		ns
Turn-on Rise Time	t_r			9		
Turn-off Delay Time	$t_{d(off)}$			17		
Turn-off Fall Time	t_f			6		
Source - Drain Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS} = 0V, I_S = 10A$			1.2	V

PMOS:

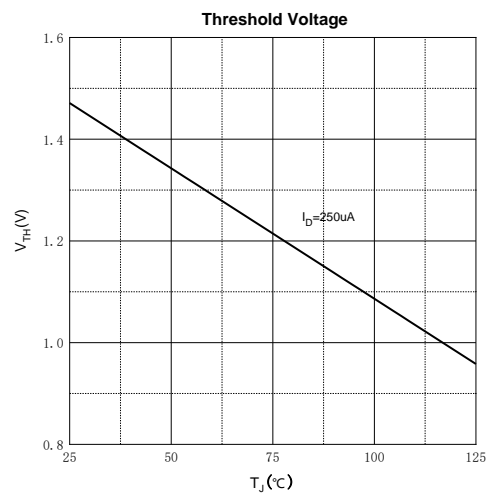
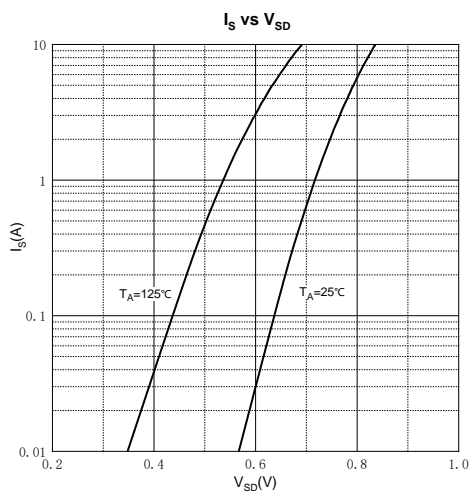
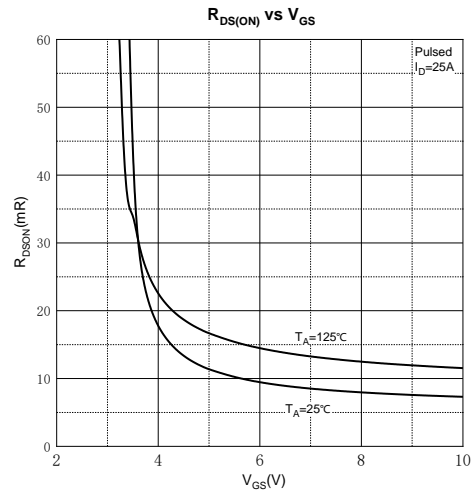
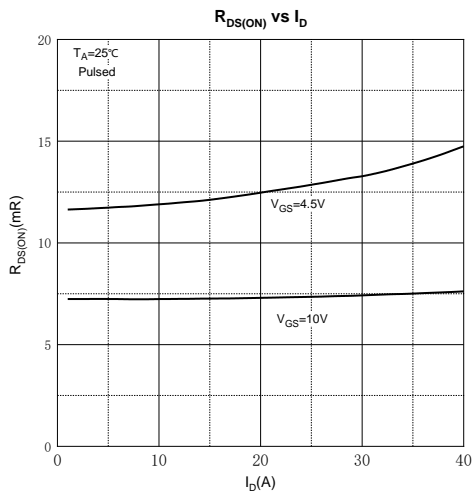
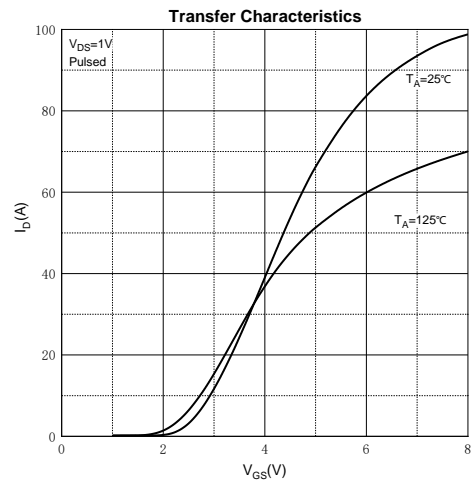
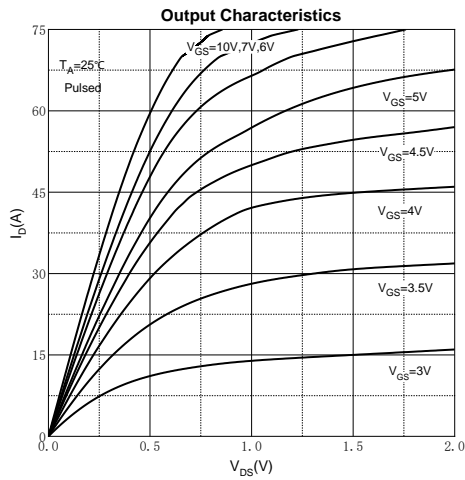
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain - Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -30V, V_{GS} = 0V$			-1	μA
Gate - Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics³						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.4	-1.7	-2.5	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -6.0A$		20	26	m Ω
		$V_{GS} = -4.5V, I_D = -5.0A$		32	48	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$		761		pF
Output Capacitance	C_{oss}			117		
Reverse Transfer Capacitance	C_{rss}			100		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		5		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = -15V, V_{GS} = -10V, I_D = -6A$		15.7		pC
Gate-source Charge	Q_{gs}			2.3		
Gate-drain Charge	Q_{gd}			3.5		
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = -15V, V_{GS} = -10V, R_L = 1.5\Omega$ $R_G = 3\Omega$		10		ns
Turn-on Rise Time	t_r			5.5		
Turn-off Delay Time	$t_{d(off)}$			26		
Turn-off Fall Time	t_f			9		
Source - Drain Diode Characteristics						
Diode Forward Voltage ³	V_{SD}	$V_{GS} = 0V, I_S = -5A$			-1.2	V

Notes :

- 1.The maximum current rating is limited by package.And device mounted on a large heatsink
- 2.Pulse Test : Pulse Width $\leq 10\mu s$, duty cycle $\leq 1\%$.
3. E_{AS} condition: $V_{DD} = 15V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
4. E_{AS} condition: $V_{DD} = -15V, V_{GS} = -10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.
- 5.Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 6.The power dissipation P_D is limited by $T_{J(MAX)} = 150^\circ C$.And device mounted on a large heatsink
- 7.Device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ C$.

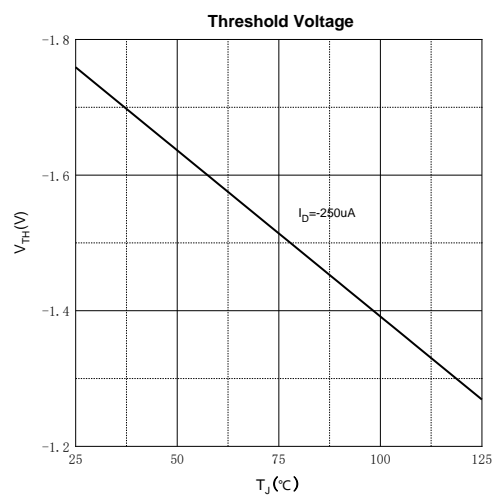
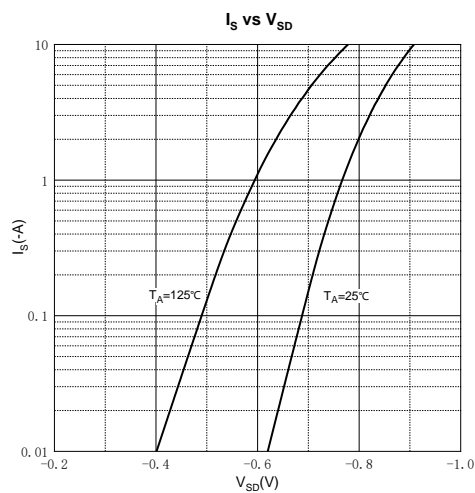
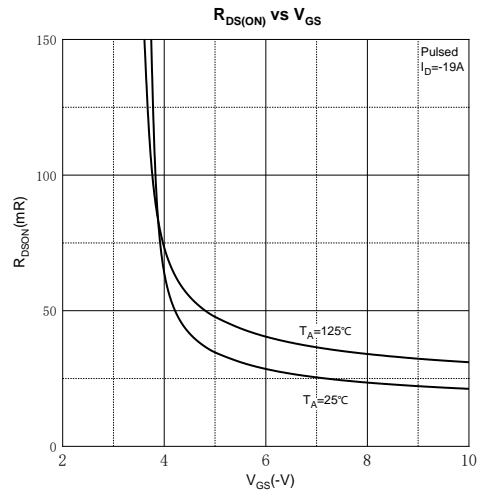
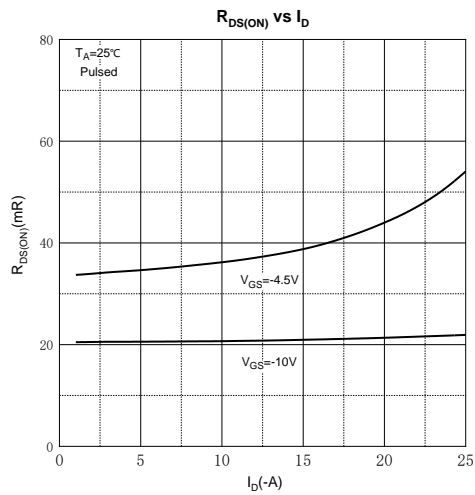
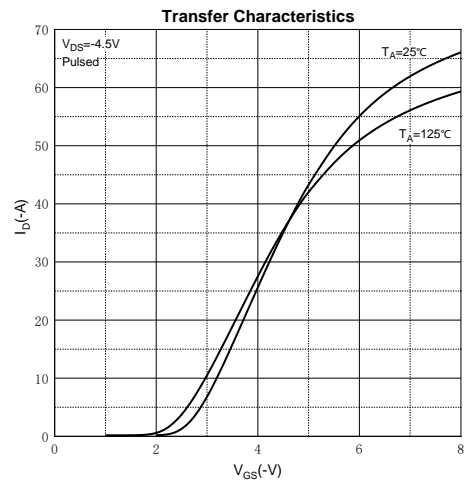
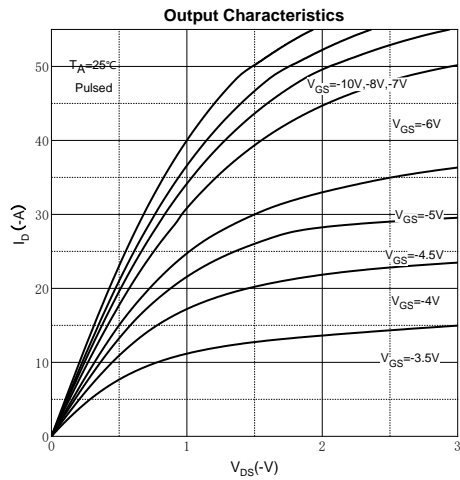
Typical Characteristics

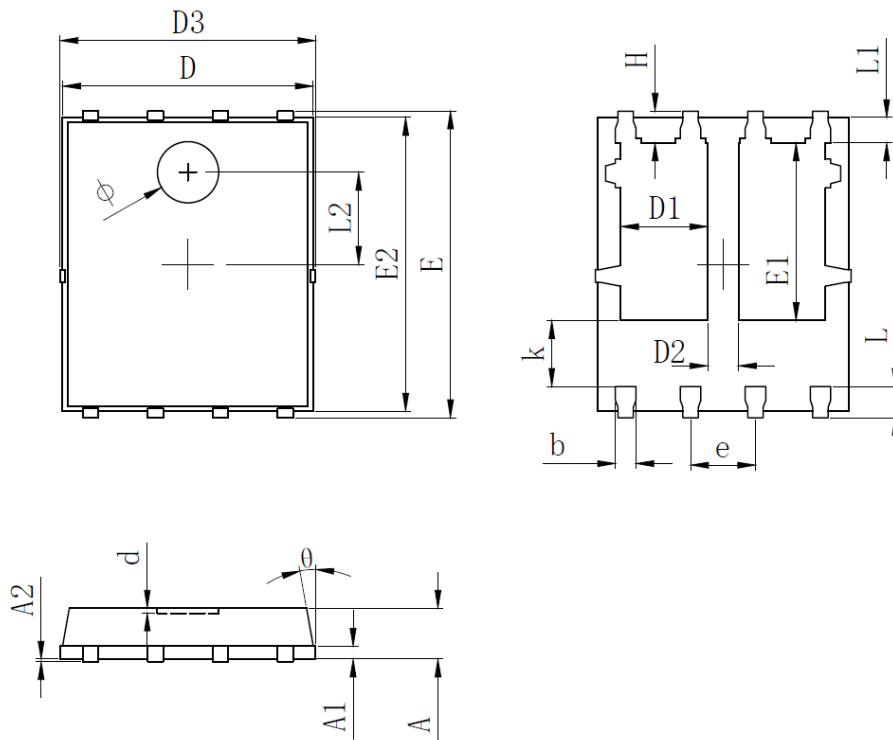
NMOS:



Typical Characteristics

PMOS:



PDFN5X6-8L Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.254REF		0.010REF	
A2	0.000	0.050	0.000	0.002
D	4.824	4.976	0.190	0.196
D1	1.605	1.805	0.063	0.071
D2	0.500	0.700	0.020	0.028
D3	4.924	5.076	0.194	0.200
E	5.924	6.076	0.233	0.239
E1	3.375	3.575	0.133	0.141
E2	5.674	5.826	0.223	0.229
b	0.350	0.450	0.014	0.018
e	1.270TYP		0.050TYP	
L	0.534	0.686	0.021	0.027
L1	0.424	0.576	0.017	0.023
L2	1.800REF		0.071REF	
k	1.190	1.390	0.047	0.055
H	0.549	0.701	0.022	0.028
θ	8°	12°	8°	12°
Φ	1.100	1.300	0.043	0.051
d	-	0.100	-	0.004