

60V N-Channel Enhancement Mode MOSFET

Description

The NP6020D6-Sn uses advanced trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of $R_{DS(ON)}$ and Q_g . This device is ideal for high-frequency switching and synchronous rectification.

General Features

- ◆ $V_{DS} = 60V$, $I_D = 20A$
 $R_{DS(ON)}(Typ.) = 18.5m\Omega$ @ $V_{GS} = 10V$
 $R_{DS(ON)}(Typ.) = 22m\Omega$ @ $V_{GS} = 4.5V$
- ◆ Excellent gate charge x $R_{DS(on)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(on)}$
- ◆ 150 °C operating temperature

Application

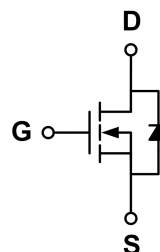
- ◆ Synchronous Rectification in DC/DC Converters
- ◆ Industrial and Motor Drive applications

Package

- ◆ PDFN5*6-8L-A



Schematic diagram



Marking and pin assignment

PDFN5*6-8L-A



Top View



Bottom View

XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6020D6-Sn-G	-55°C to +150°C	PDFN5*6-8L-A	5000

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TA=25°C	I_D	20	A
	TA=70°C		16	
Pulsed Drain Current		I_{DM}	80	A
Avalanche energy ($V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$)		E_{AS}	108	mJ
Power Dissipation	TA=25°C	P_D	37.5	W
	TA=70°C		24	
Operating junction Temperature range		T_j	-55—150	°C

Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	60	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
Gate Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	2.0	3.0	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	18.5	20	mΩ
		V _{GS} =4.5V, I _D =15A		22	29.5	
Forward Trans-conductance	g _{FS}	V _{DS} =5V, I _D =20A	-	55	-	S
Diode Characteristics						
Diode Forward Voltage	V _{SD}	I _{SD} =1A, V _{GS} =0V	-	0.7	1.2	V
Diode Continuous Forward Current	I _S		-	-	20	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = I _S di/dt = 100A/μs	-	22	-	ns
Reverse Recovery Charge	Q _{rr}		-	76	-	nC
Dynamic Characteristics						
Gate Resistance	R _G	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	3.6	5.4	Ω
Input capacitance	C _{ISS}	V _{GS} =0V ,V _{DS} =30V f=1.0MHz	-	1911	-	pF
Output capacitance	C _{OSS}		-	97	-	
Reverse transfer capacitance	C _{RSS}		-	82	-	
Turn-on delay time	t _{D(ON)}	V _{GS} =10V, V _{DS} =30V, R _L =1.5Ω, R _G =3Ω	-	7.5	-	ns
Turn-on Rise time	tr		-	6.5	-	
Turn-off delay time	t _{D(OFF)}		-	33	-	
Turn-off Fall time	t _f		-	7.5	-	
Total gate charge	Q _g	V _{GS} =10V, V _{DS} =30V, I _D =20A	-	41.5	-	nC
Gate-source charge	Q _{gs}		-	7.2	-	
Gate-drain charge	Q _{gd}		3	7.9	-	

Thermal Characteristics

Thermal Resistance junction-to ambient	R _{thJA}	3.4	°C/W
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Typical Performance Characteristics

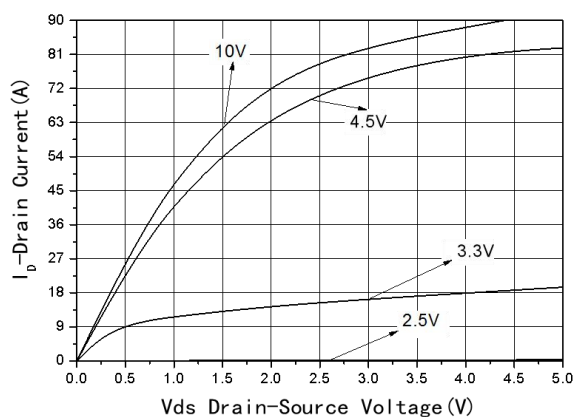


Fig1 Output Characteristics

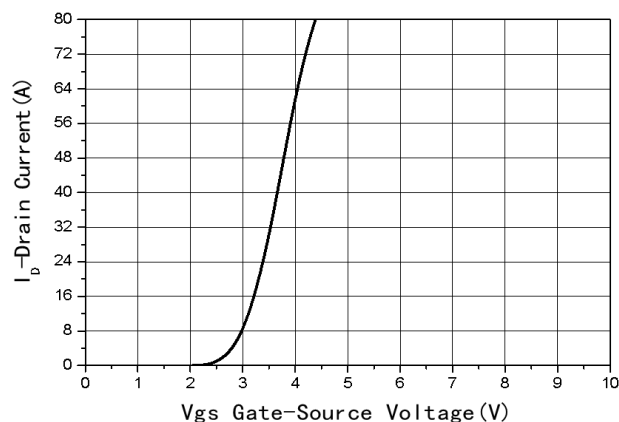


Fig2 Transfer Characteristics

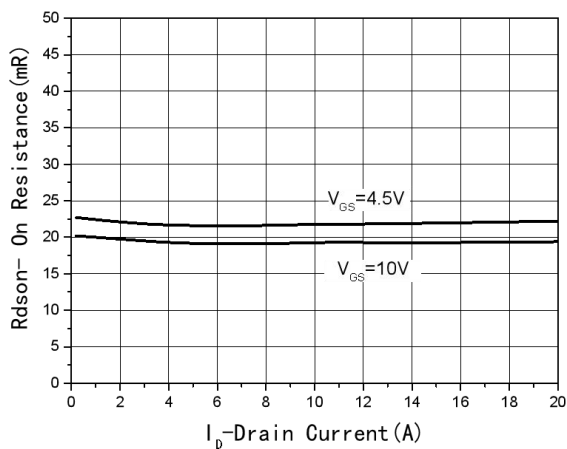


Fig3 Rdson-Drain current

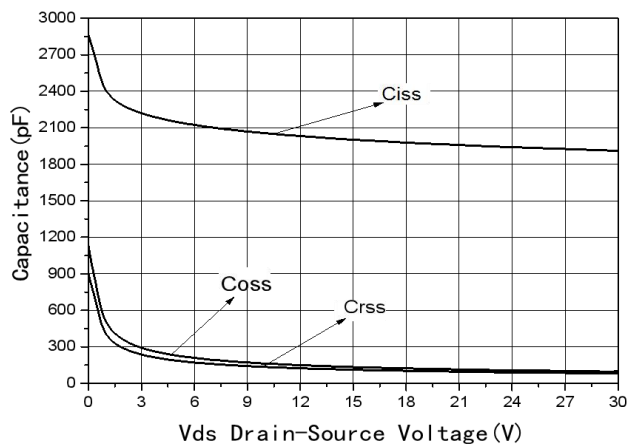


Fig4 Capacitance vs V_{DS}

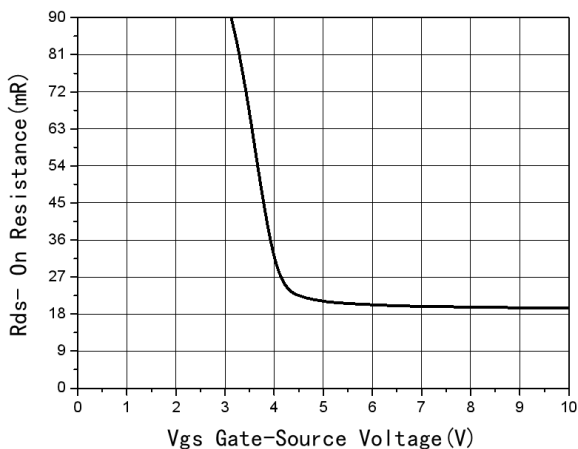


Fig5 Rdson-Gate Drain voltage

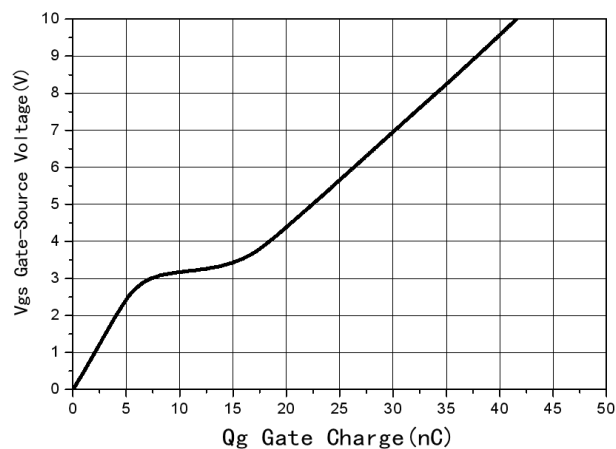


Fig6 Gate Charge

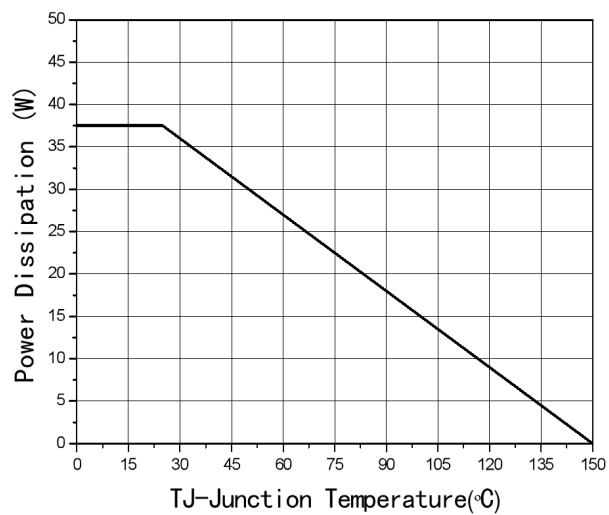


Fig7 Power De-rating

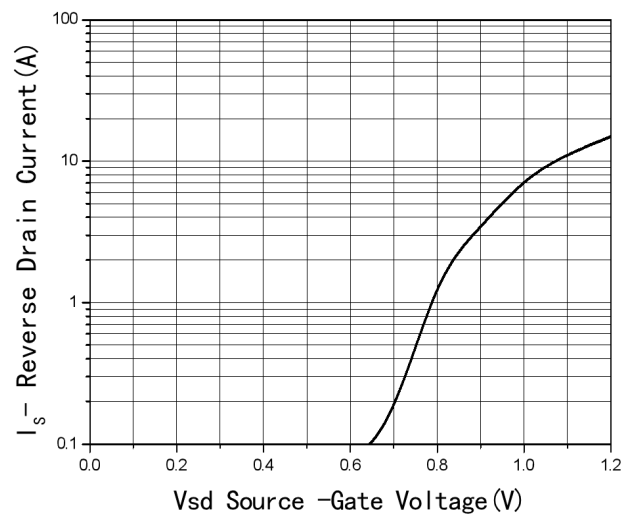
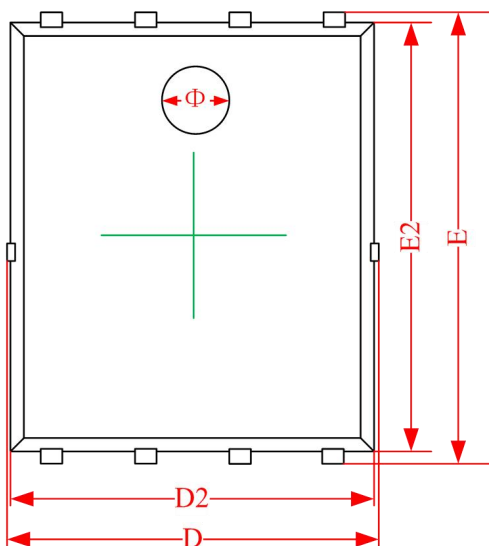


Fig8 Source-Drain Diode Forward

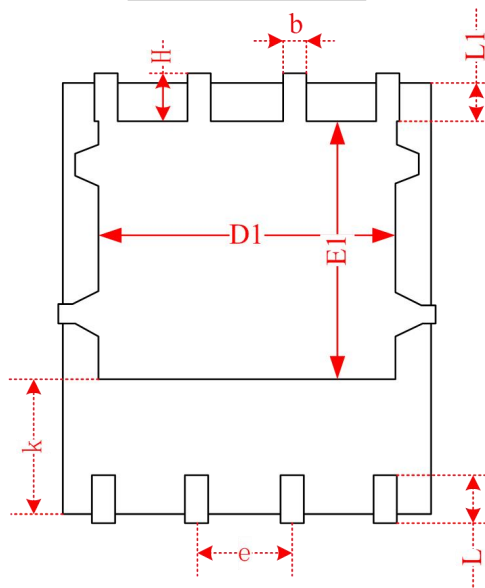
Package Information

- PDFN5*6-8L-A

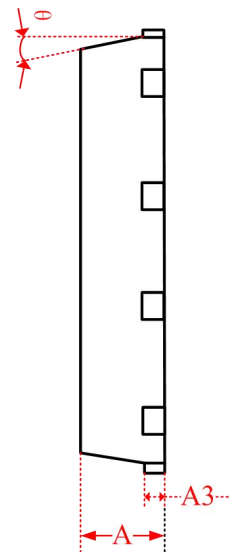
Top View



Bottom View



Side View



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.870	0.900	0.930	0.034	0.035	0.036
A3	0.203REF.			0.008REF.		
D	4.944	5.020	5.096	0.195	0.198	0.201
E	5.974	6.050	6.126	0.235	0.238	0.241
D1	3.910	4.010	4.110	0.154	0.158	0.162
E1	3.375	3.475	3.575	0.133	0.137	0.141
D2	4.870	4.900	4.930	0.192	0.193	0.194
E2	5.720	5.750	5.780	0.226	0.227	0.228
k	1.190	1.290	1.390	0.047	0.051	0.055
b	0.350	0.380	0.410	0.014	0.015	0.016
e	1.270TYP.			0.050TYP.		
L	0.559	0.635	0.711	0.022	0.025	0.028
L1	0.424	0.500	0.576	0.017	0.020	0.023
H	0.574	0.650	0.726	0.023	0.026	0.029
θ	10°	11°	12°	10°	11°	12°
Φ	1.150	1.200	1.250	0.045	0.047	0.049