20V P-Channel Enhancement Mode MOSFET

Description

The NP60P02D6 uses advanced trench technology to provide excellent $R_{DS(ON)}$, This device is suitable for use as a load switch or in PWM applications.

General Features

- V_{DS} =-20V I_D =-60A
  $R_{DS(ON)}$(Typ.)=3.8mΩ @V_{GS}=-4.5V
  $R_{DS(ON)}$(Typ.)=4.4mΩ @V_{GS}=-2.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package
- 150 °C operating temperature
- 100% UIS tested

Application

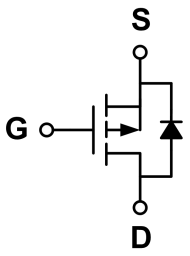
- PWM applications
- Load switch
- Uninterruptible power supply

Package

- PDFN5*6-8L-A

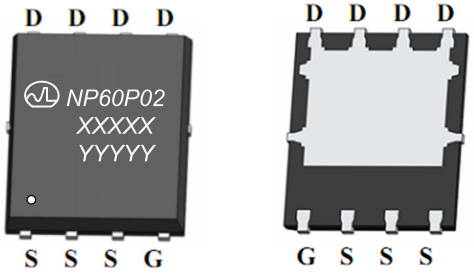
100% UIS TESTED!
100% ΔVds TESTED!

Schematic diagram



Marking and pin assignment

PDFN5×6-8L



Top View **Bottom View**

XXXX—Wafer Information
YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP60P02D6-G	-55°C to +150°C	PDFN5*6-8L-A	5000

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	-20	V
Gate-source voltage		V_{GS}	±12	V
Continuous Drain Current	TC=25°C	I_D	-60	A
	TC=70°C		-56	
Pulsed Drain Current		I_{DP}	-100	A
Avalanche energy(T_j=25℃ ,V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω)		E_{AS}	69.8	mJ
Power Dissipation	TC=25°C	P_D	104	W
	TC=70°C		100	
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.5	-0.6	-1.5	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-30A	-	3.8	5	mΩ
		V_{GS}=-2.5V, I_D=-30A	-	4.4	6	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=-10V, V_{GS}=-2.5V	66	-	-	A
Diode Characteristics						
Diode Forward Voltage[1]	V_{SD}	I_{SD}=-30A,V_{GS}=0V	-	-0.8	-1.3	V
Diode Continuous Forward Current	I_S		-	-60	-	A
Reverse Recovery Time	t_{rr}	I_F=-30A, dI/dt=-100A/us	-	24	-	ns
Reverse Recovery Charge	Q_{rr}		-	16	-	nC
Dynamic Characteristics[2]						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	4.2	-	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=-10V f=1.0MHz	-	8037	-	pF
Output capacitance	C_{OSS}		-	753	-	
Reverse transfer capacitance	C_{RSS}		-	665	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=-10V, V_{DD}=-20V, R_L=3Ω, I_D=30A, R_G=2.5Ω	-	14.2	-	ns
Turn-on Rise time	tr		-	35.4	-	
Turn-off delay time	$t_{D(OFF)}$		-	361	-	
Turn-off Fall time	tf		-	224	-	
Total gate charge	Q_g	V_{GS}=-2.5V,I_D=-30A V_{DS}=-10V	-	39.3		nC
Gate-source charge	Q_{gs}			9.93		
Gate-drain charge	Q_{gd}		-	17.9	-	

Thermal Characteristics

Parameter		Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient[A]	≤ 10s	$R_{θJA}$	20	34	℃/W
Maximum Junction-to-Ambient[A]	Steady-State		55	66	
Maximum Junction-to-Lead[B]	Steady-State	$R_{θJC}$	1.2	2.5	

A:The value of R qJA is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T A=25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

B: The R qJA is the sum of the thermal impedence from junction to lead R qJL and lead to ambient.

Typical Performance Characteristics

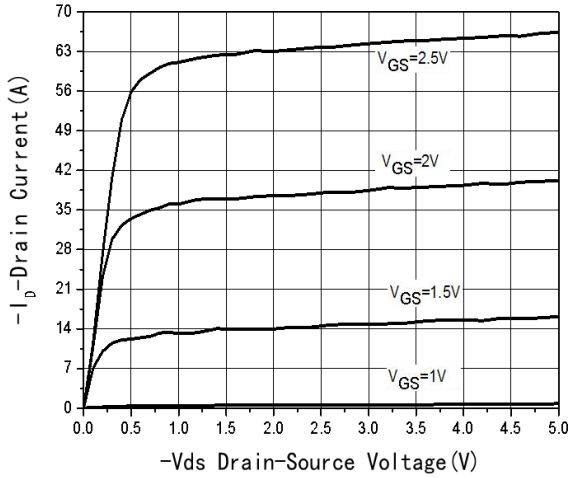


Fig1 Output Characteristics

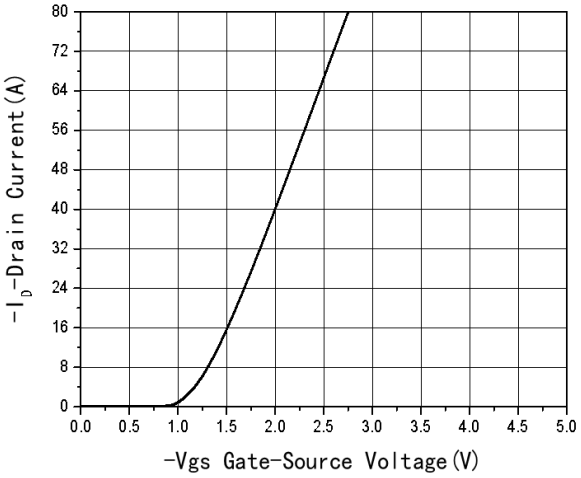


Fig2 Transfer Characteristics

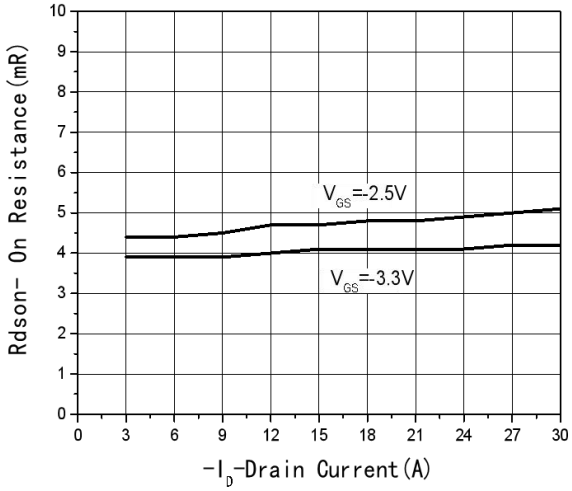


Fig3 Rdson-Drain current

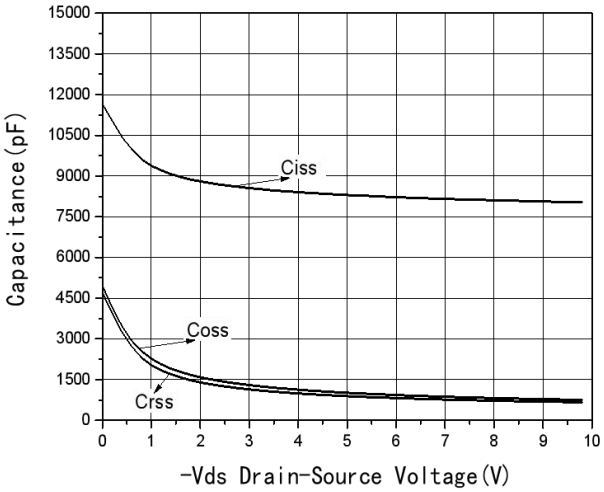


Fig4 Capacitance vs Vds

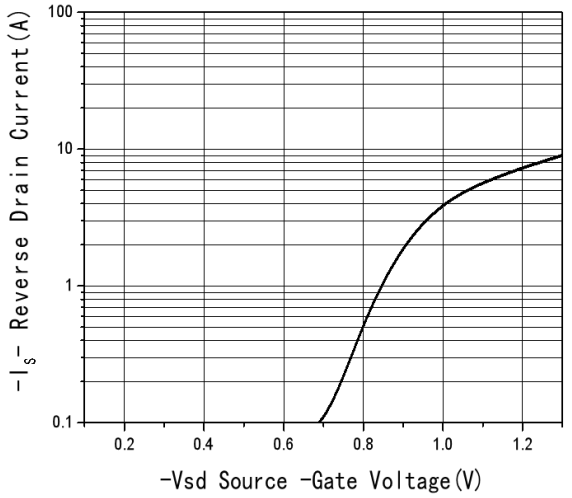


Fig5 Source-Drain Diode Forward

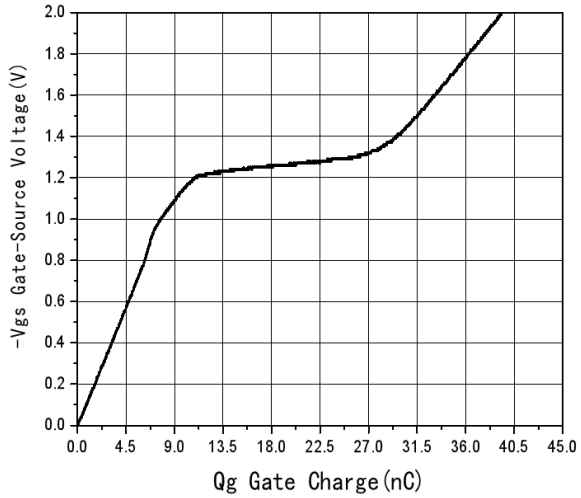


Fig6 Gate Charge

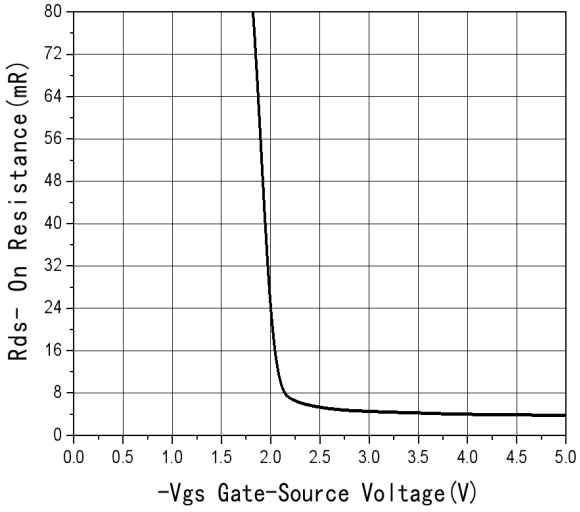


Fig7 Rdson-Gate Drain voltage

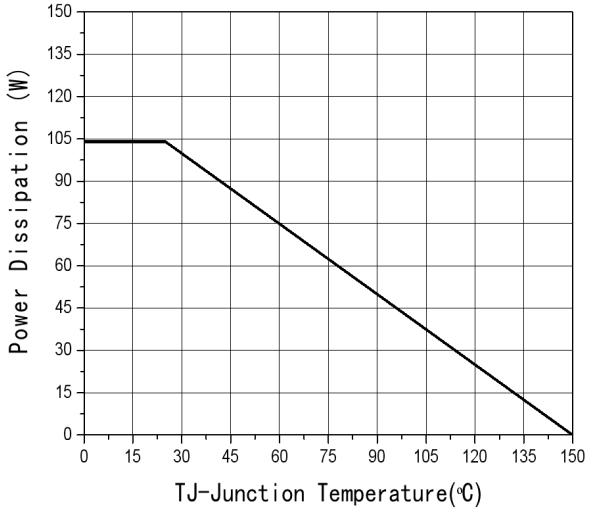
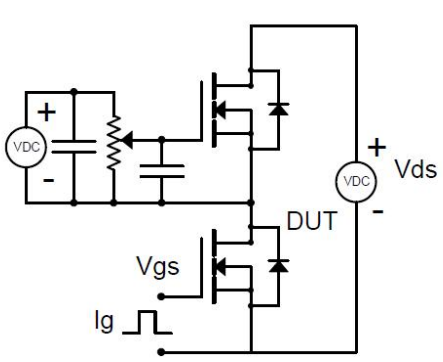


Fig8 Power De-rating

Figure A: Gate Charge Test Circuit & Waveforms



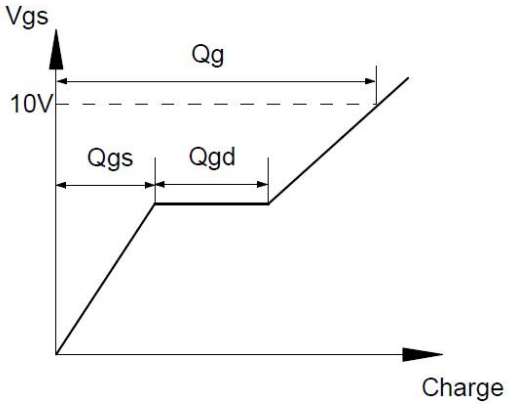
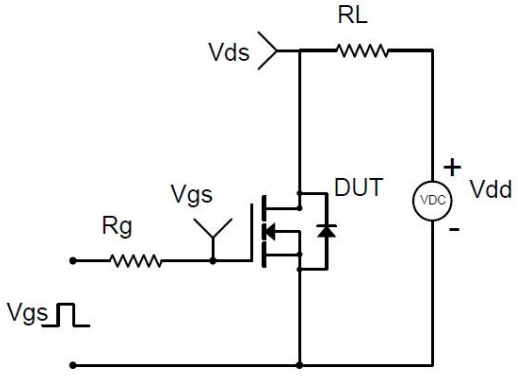


Figure B: Resistive Switching Test Circuit & Waveforms



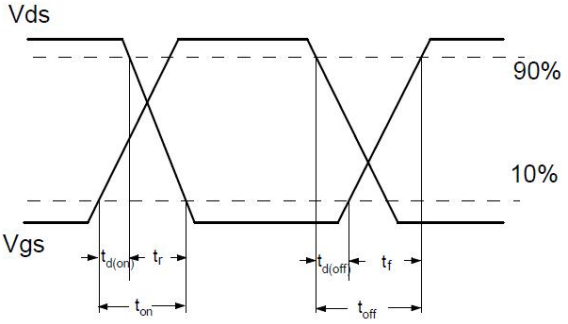


Figure C: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

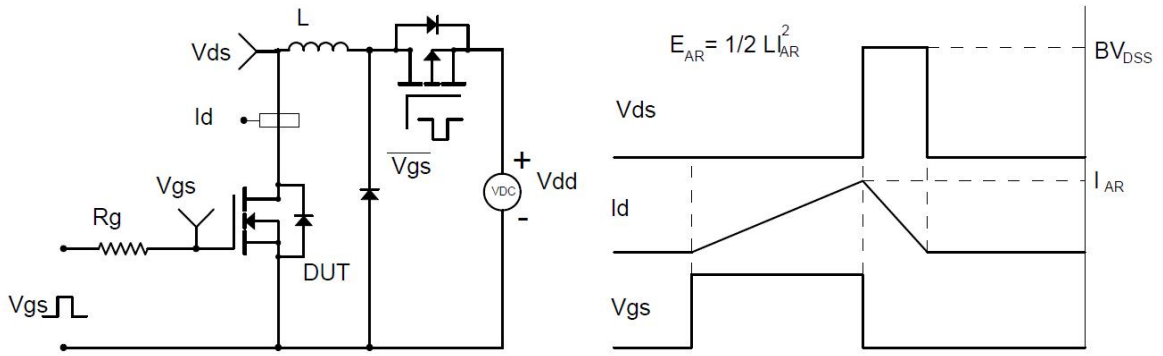
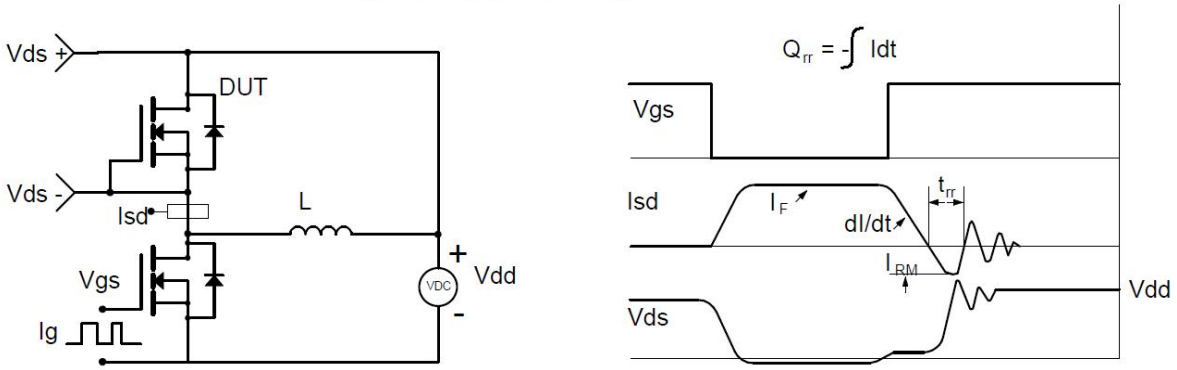


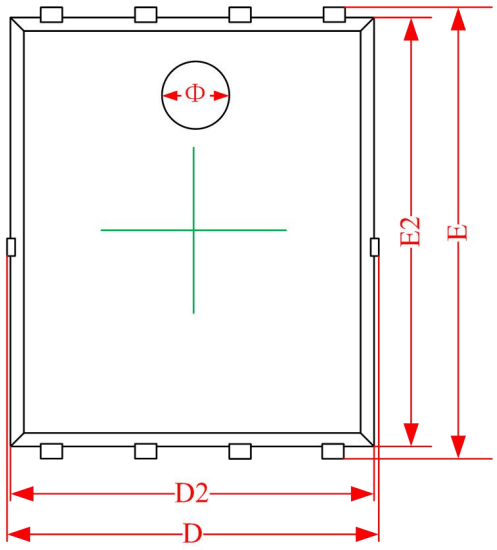
Figure D: Diode Recovery Test Circuit & Waveforms



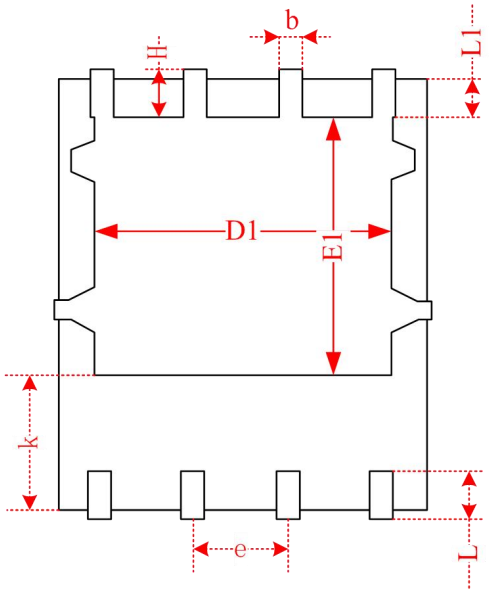
Package Information

- **PDFN5*6-8L-A**

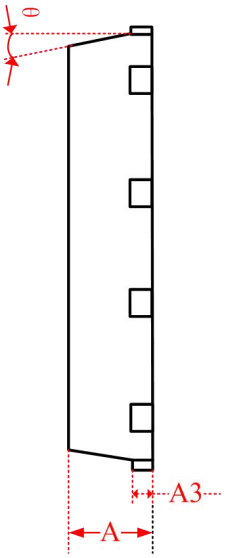
Top View



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