20V N-Channel Enhancement Mode MOSFET

Description

The NP2040D3 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge.It can be used in a wide variety of applications.

General Features

- V_{DS} =20V，I_D =40A
  $R_{DS(ON)}$(Typ.)=4.5 mΩ @V_{GS}=4.5V
  $R_{DS(ON)}$(Typ.)=5.8mΩ @V_{GS}=2.5V
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability
- 100% UIS tested

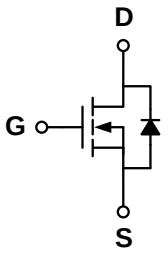
Application

- Automotive applications
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package

- PDFN3.3*3.3-8L

Schematic diagram

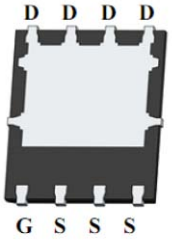


Marking and pin assignment

PDFN3.3*3.3-8L

（Top View）

Top View



Bottom View

XXXX—Wafer Information

YYYY—Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2040D3-G	-55°C to +150°C	PDFN3.3*3.3-8L	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	40	A
	TC=100°C		32	
Pulsed Drain Current		I_{DP}	160	A
Avalanche energy(L=0.5mH) (note1)		E_{AS}	200	mJ
Maximum power dissipation	TC=25°C	P_D	28	W
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	T_J=25°C	-	-	1	μA
			T_J=85°C	-	-	5	
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	0.75	1.2	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=20A		-	4.5	5.5	mΩ
		V_{GS}=2.5V, I_D=20A		-	5.8	7	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=20V, V_{GS}=4.5V		40	-	-	A
Diode Characteristics							
Diode Continuous Forward Current	I_S			-	-	12	A
Reverse Recovery Time	t_{rr}	I_F=20A, dI/dt=20A/us		-	25	-	ns
Reverse Recovery Charge	Q_{rr}			-	24	-	nC
Dynamic Characteristics[2]							
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=10V f=1.0MHz		-	2470	-	pF
Output capacitance	C_{OSS}			-	355	-	
Reverse transfer capacitance	C_{RSS}			-	41	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=4.5V, V_{DD}=10V, I_D=2A		-	6.5	-	ns
Turn-on Rise time	tr			-	17	-	
Turn-off delay time	$t_{D(OFF)}$			-	29.5	-	
Turn-off Fall time	tf			-	17	-	
Total gate charge	Q_g	V_{GS}=4.5V,I_D=20A V_{DS}=10V		-	69	-	nC
Gate-source charge	Q_{gs}			-	3.4	-	
Gate-drain charge	Q_{gd}			-	12.2	-	
Drain-Source Diode Characteristics							
Diode forward voltage	V_{SD}	I_{SD}=10A,V_{GS}=0V		-	0.8	1.2	V

Note: 1：Eas test：VDD=10V，RG=25ohm，L=500uH

2：Pulse test; pulse width ≦ 300ns, duty cycle ≦ 2%.

3：Guaranteed by design, not subject to production testing.

Typical Performance Characteristics

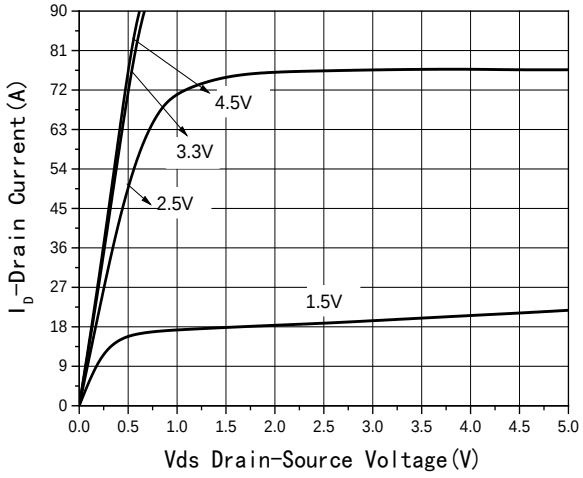


Fig1 Output Characteristics

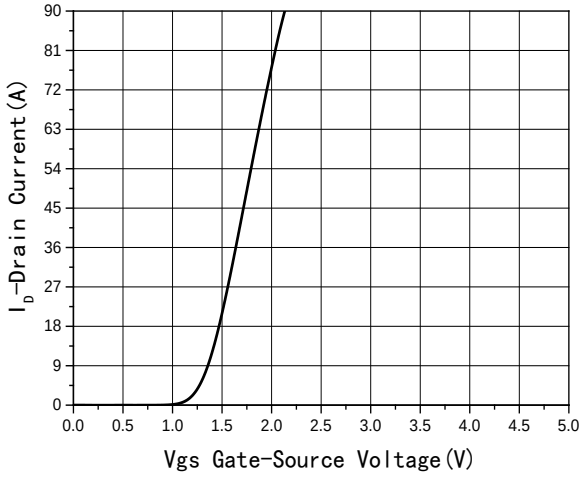


Fig2 Transfer Characteristics

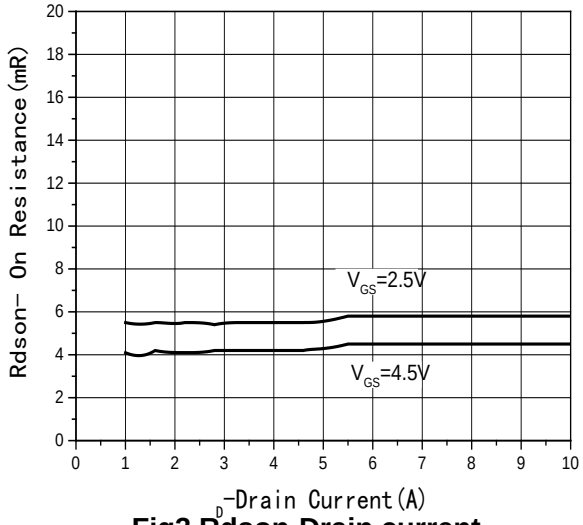


Fig3 Rdson-Drain current

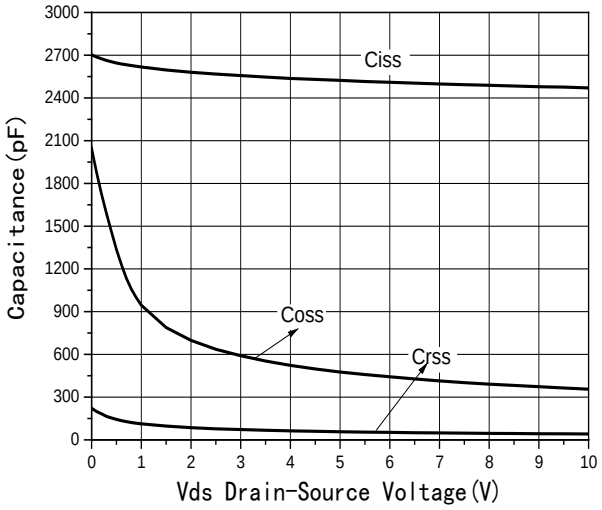


Fig4 Capacitance vs Vds

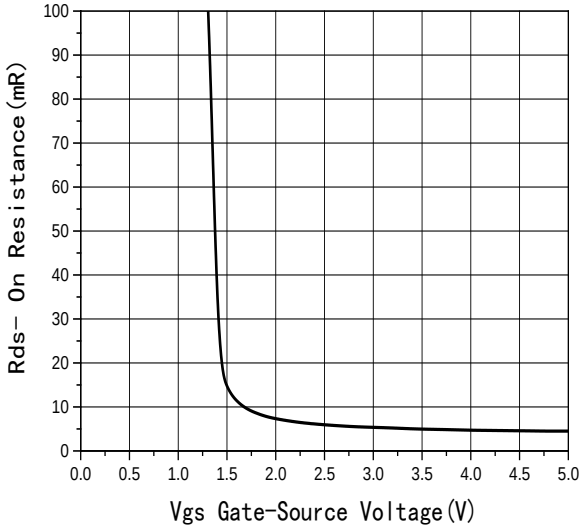


Fig5 Rdson-Gate Drain voltage

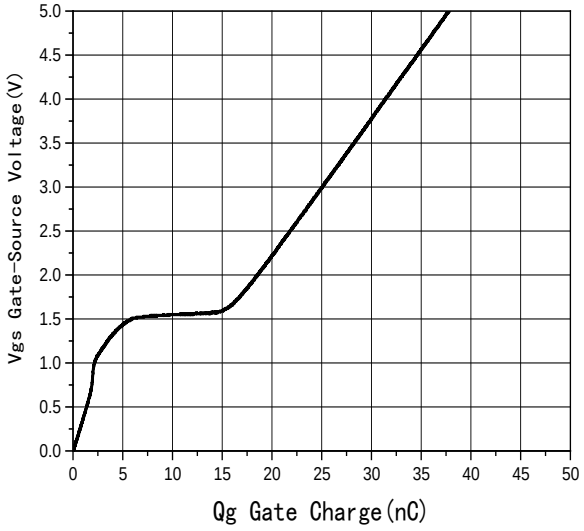


Fig6 Gate Charge

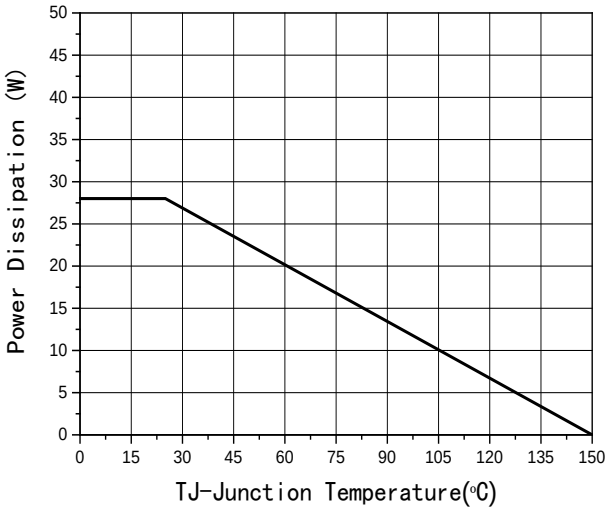


Fig7 Power De-rating

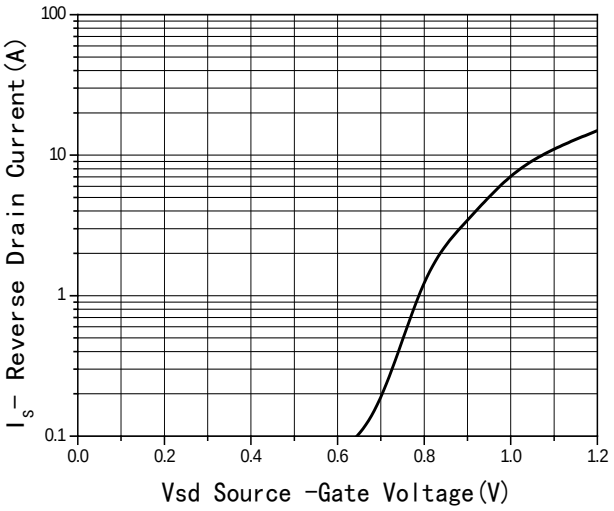
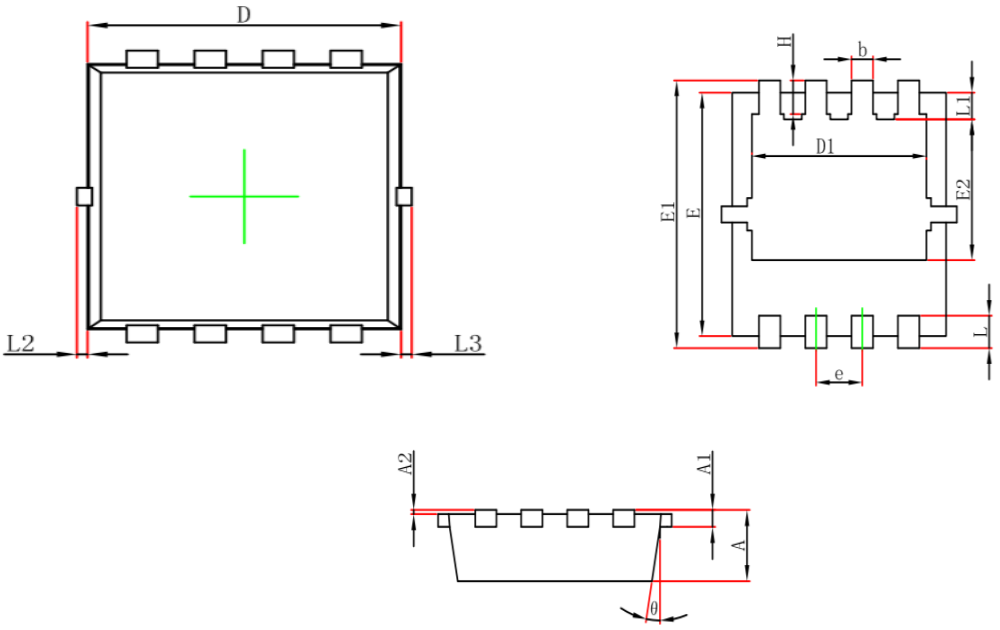


Fig8 Source-Drain Diode Forward

Package Information

- **PDFN3.3*3.3-8L**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033
A1	0.152 REF.		0.006 REF.	
A2	0~0.05		0~0.002	
D	2.900	3.100	0.114	0.122
D1	2.300	2.600	0.091	0.102
E	2.900	3.100	0.114	0.122
E1	3.150	3.450	0.124	0.136
E2	1.535	1.935	0.060	0.076
b	0.200	0.400	0.008	0.016
e	0.550	0.750	0.022	0.030
L	0.300	0.500	0.012	0.020
L1	0.180	0.480	0.007	0.019
L2	0~0.100		0~0.004	
L3	0~0.100		0~0.004	
H	0.315	0.515	0.012	0.020
θ	9°	13°	9°	13°