

20V P-Channel Enhancement Mode MOSFET

Description

The NP2307DR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = -20V$, $I_D = -8A$
 $R_{DS(ON)}(Typ.) = 15.6m\Omega$ @ $V_{GS} = -4.5V$
 $R_{DS(ON)}(Typ.) = 20m\Omega$ @ $V_{GS} = -2.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

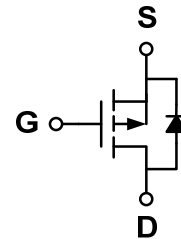
- ◆ PWM applications
- ◆ Load switch

Package

- ◆ DFN2*2-6L-B



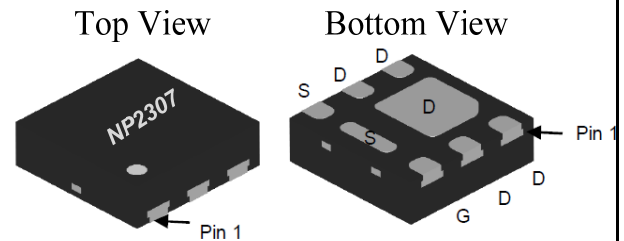
Schematic diagram



Marking and pin assignment

DFN2*2-6L-B

(Thickness 0.55mm)



NP----Natlinear Power
2307----NP2307

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2307DR-G	-55°C to +150°C	DFN2*2-6L-B	4000

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

parameter	symbol	limit	unit	
Drain-source voltage	V_{DS}	-20	V	
Gate-source voltage	V_{GS}	±12	V	
Drain current-continuous	I_D	$T_C = 25^\circ C$	-8 ^a	A
		$T_C = 70^\circ C$	-8 ^a	
		$T_A = 25^\circ C$	-8 ^{a,b,c}	
		$T_A = 70^\circ C$	-6 ^{b,c}	
Drain-source Diode forward current	I_S	$T_C = 25^\circ C$	-8 ^a	A
		$T_A = 25^\circ C$	-2.9 ^{b,c}	
Maximum power dissipation	P_D	18	W	

	$T_C=70^{\circ}\text{C}$		12	
	$T_A=25^{\circ}\text{C}$		3.5 ^{b,c}	
	$T_A=70^{\circ}\text{C}$		2.2 ^{b,c}	
Operating junction Temperature range		T_j	-55—150	$^{\circ}\text{C}$

Thermal Resistance Ratings

Parameter		Symbol	Typ.	Max.	Unit
Maximum junction-to-ambient ^{b,d}	$t \leq 5 \text{ s}$	R_{thJA}	28	36	$^{\circ}\text{C}/\text{W}$
Maximum junction-to-case (drain)	Steady state	R_{thJC}	5.3	6.5	

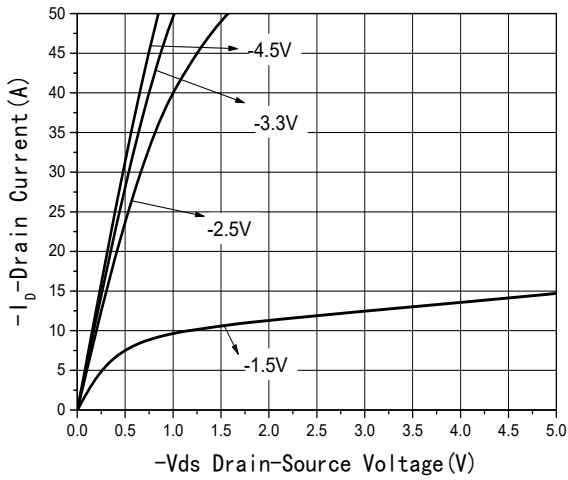
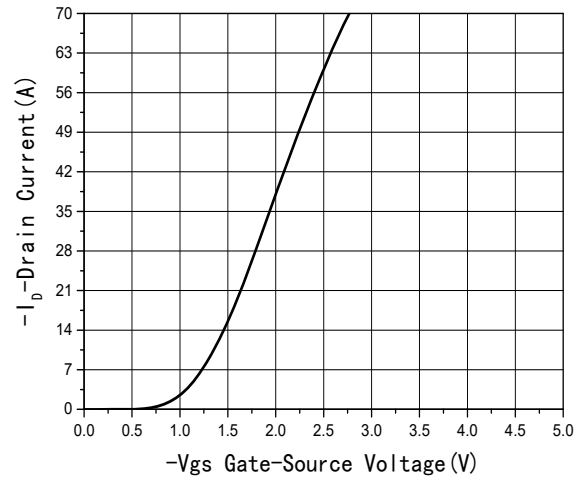
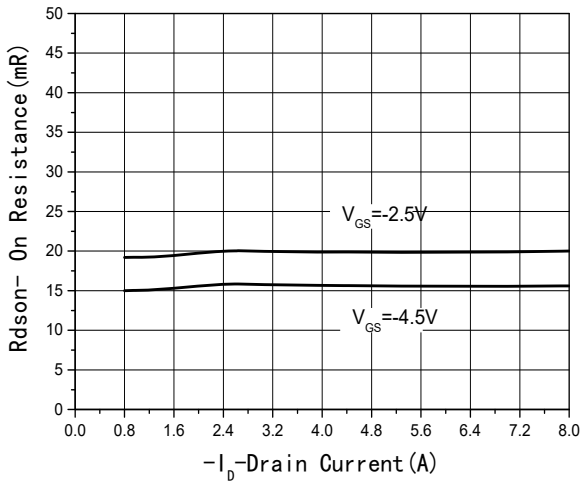
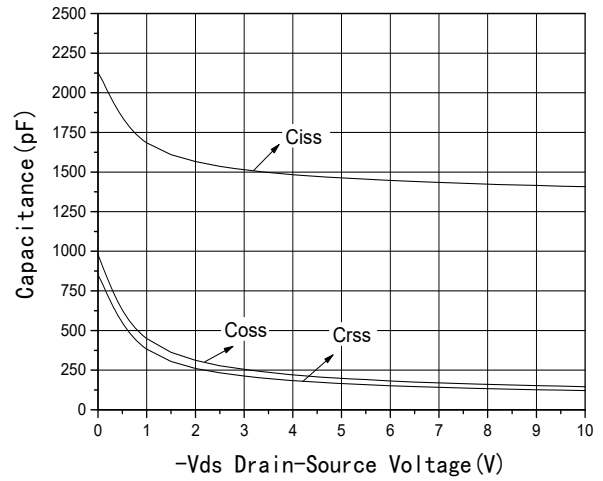
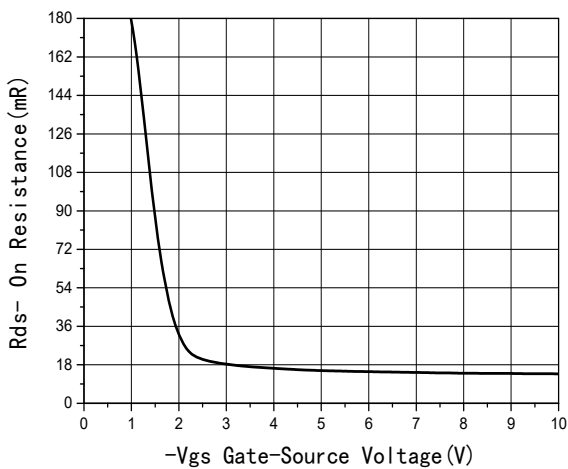
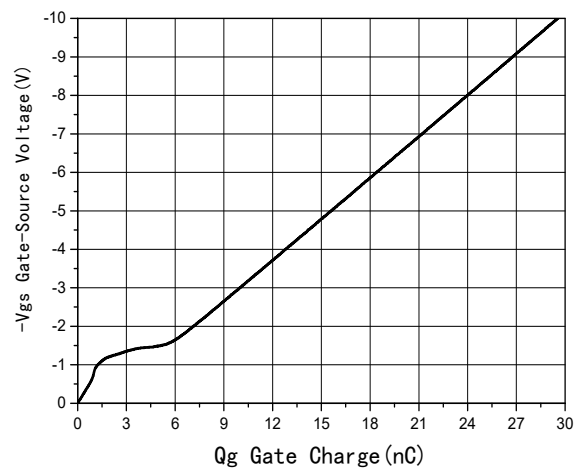
Notes:

- a. Package limited b. Surface mounted on 1" x 1" FR4 board
 c. $t = 5 \text{ s}$ d. Maximum under steady state conditions is $80^{\circ}\text{C}/\text{W}$

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS}=0\text{V}, I_D=-250\mu\text{A}$	-20	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-20\text{V}, V_{GS}=0\text{V}$	-	-	-1	μA
Gate-body leakage	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$	-	-	± 100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-0.4	-0.7	-1.0	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5\text{V}, I_D=-8\text{A}$	-	15.6	24	m Ω
		$V_{GS}=-2.5\text{V}, I_D=-8\text{A}$	-	20	29	
Forward transconductance	g_{fs}	$V_{DS}=-10\text{V}, I_D=-8\text{A}$	-	32	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	$V_{DS}=-10\text{V}, V_{GS}=0\text{V}$ $f=1.0\text{MHz}$	-	1407	-	pF
Output capacitance	C_{OSS}		-	145	-	
Reverse transfer capacitance	C_{RSS}		-	121	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	$V_{DD}=-10\text{V}$ $I_D=-5\text{A}$ $V_{GEN}=-4.5\text{V}$ $R_L=1.2\text{ohm}$ $R_{GEN}=1\text{ohm}$	-	11	-	ns
Rise time	t_r		-	35	-	
Turn-off delay time	$t_{D(OFF)}$		-	30	-	
Fall time	t_f		-	10	-	
Total gate charge	Q_g	$V_{DS}=-10\text{V}, I_D=-8\text{A}$ $V_{GS}=-4.5\text{V}$	-	30	-	nC
Gate-source charge	Q_{gs}		-	1.8	-	
Gate-drain charge	Q_{gd}		-	3.8	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	$V_{GS}=0\text{V}, I_S=-1.25\text{A}$	-	-0.7	-1.2	V

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

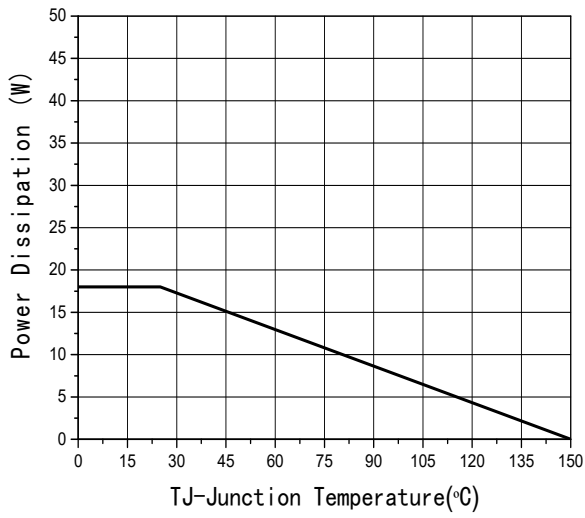


Fig7 Power De-rating

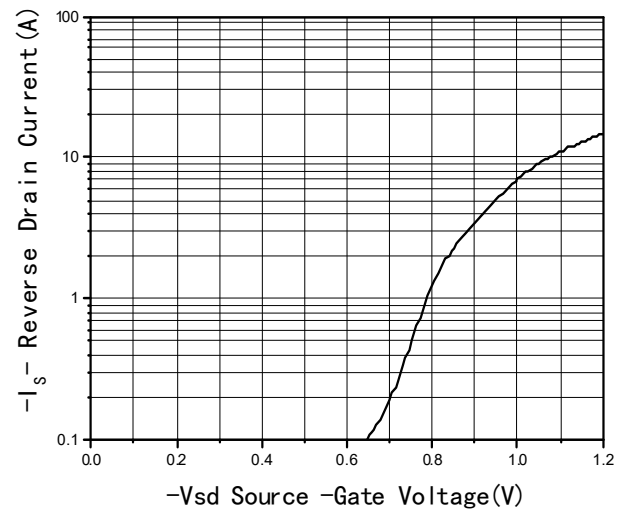
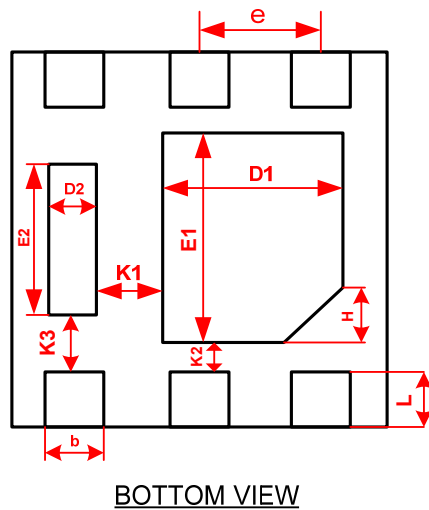
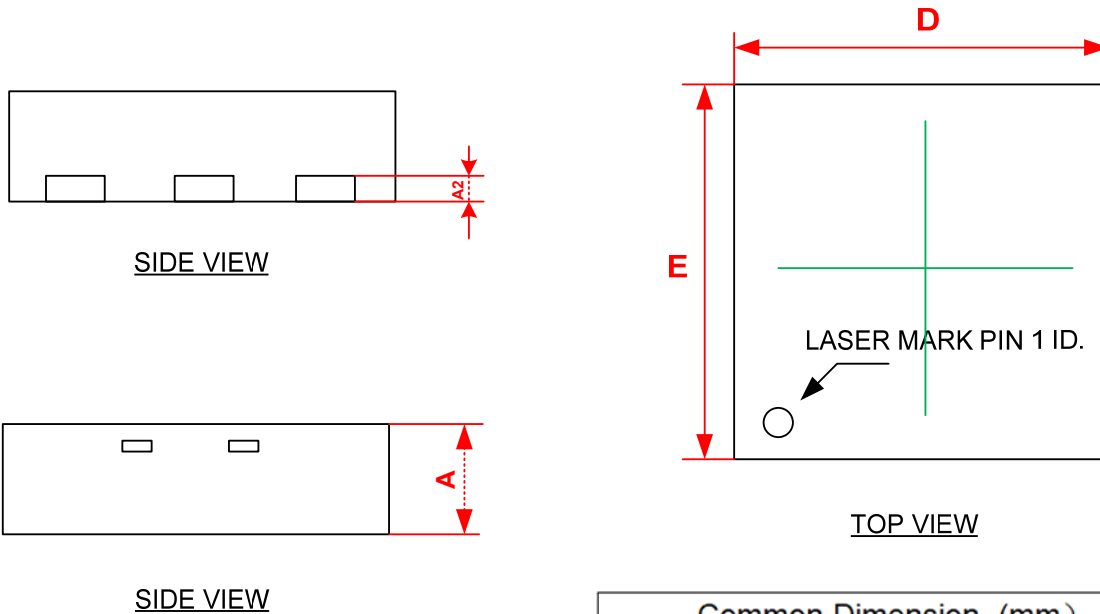


Fig8 Source-Drain Diode Forward

Package Information

● DFN2*2-6L-B



Common Dimension (mm)			
PKG	DFN2020-6L-B		
SYMBOL	MIN.	MON.	MAX.
A	0.527	0.552	0.577
A2		0.127REF	
b	0.25	0.30	0.35
D	1.90	2.00	2.10
E	1.90	2.00	2.10
D1	0.85	0.95	1.05
E1	1.05	1.15	1.25
D2	0.20	0.25	0.30
E2	0.69	0.79	0.89
e	0.55	0.65	0.75
H	0.25	0.30	0.35
K1	0.25MIN		
K2	0.15MIN		
K3	0.20MIN		
L	0.20	0.25	0.30