20V N-Channel Enhancement Mode MOSFET

Description

The NP2012 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

General Features

- V_{DS} =20V，I_D =12A
  $R_{DS(ON)}$(Typ.)=15mΩ @V_{GS}=2.5V
  $R_{DS(ON)}$(Typ.)=12mΩ @V_{GS}=4.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

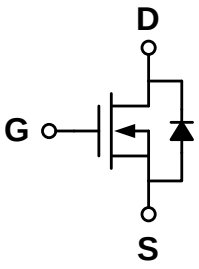
Application

- PWM applications
- Load switch

Package

- DFN2*2-6L-B

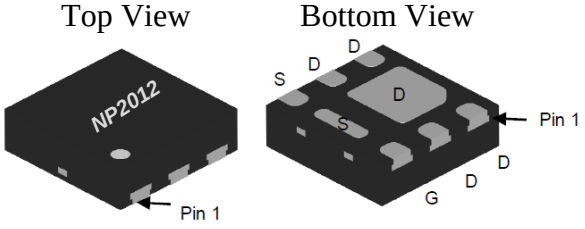
Schematic diagram



Marking and pin assignment

DFN2*2-6L-B

（Thickness 0.55mm）



NP----Natlinear Power

2012----NP2012

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP2012DR-G	-55°C to +150°C	DFN2*2-6L-B	4000

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
Drain current-continuous[a]@Tj=125℃	I_D	12	A
-pulse *d*[b]	I_{DM}	48	A
Drain-source Diode forward current	Is	12	A
Maximum power dissipation	P_D	18	W
Operating junction Temperature range	Tj	-55—150	℃

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF 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
Gate-body leakage	I_{GSS}	V_{DS}=0V, V_{GS}=±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.5	0.7	0.9	V
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=12A	-	12	15	mΩ
		V_{GS}=2.5V, I_D=8A	-	15	20	
Forward transconductance	gfs	V_{GS}=5V, I_D=12A	-	10	-	S
Dynamic Characteristics						
Input capacitance	C_{ISS}	V_{DS}=10V ,V_{GS}=0V f=1.0MHz	-	900	-	pF
Output capacitance	C_{OSS}		-	220	-	
Reverse transfer capacitance	C_{RSS}		-	100	-	
Switching Characteristics						
Turn-on delay time	$t_{D(ON)}$	V_{DD}=10V I_D=12A V_{GEN}=4.5V R_{GEN}=6ohm	-	10	20	ns
Rise time	tr		-	11	25	
Turn-off delay time	$t_{D(OFF)}$		-	35	70	
Fall time	tf		-	30	60	
Total gate charge	Qg	V_{DS}=10V,I_D=12A V_{GS}=4.5V	-	12	15	nC
Gate-source charge	Qgs		-	2.3	-	
Gate-drain charge	Qgd		-	1	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V_{SD}	V_{GS}=0V,Is=12A	-	-	1.2	V

Notes:

a. surface mounted on FR4 board,t≤10sec

b. pulse test: pulse width≤300μs,duty≤2%

c. guaranteed by design, not subject to production testing

Thermal Characteristics

Thermal Resistance junction-to ambient	Rth JA	100	℃/W

Typical Performance Characteristics

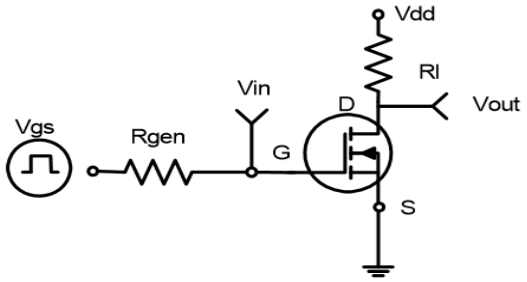


Figure 1:Switching Test Circuit

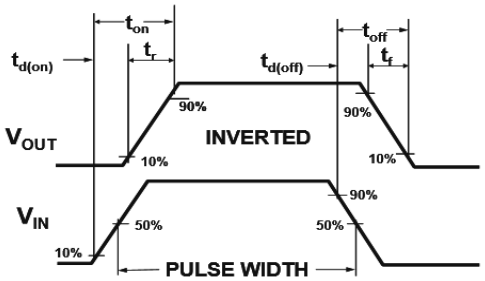


Figure 2:Switching Waveforms

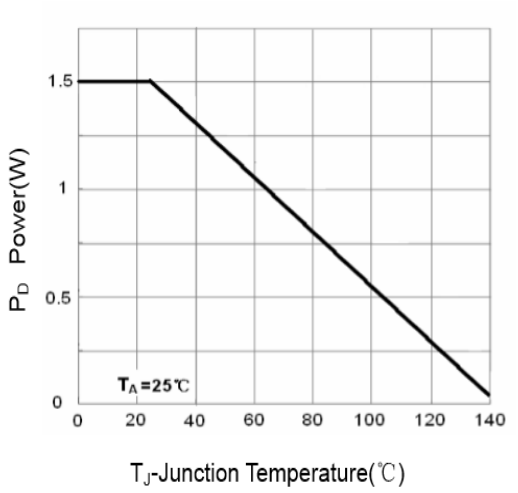


Figure 3 Power Dissipation

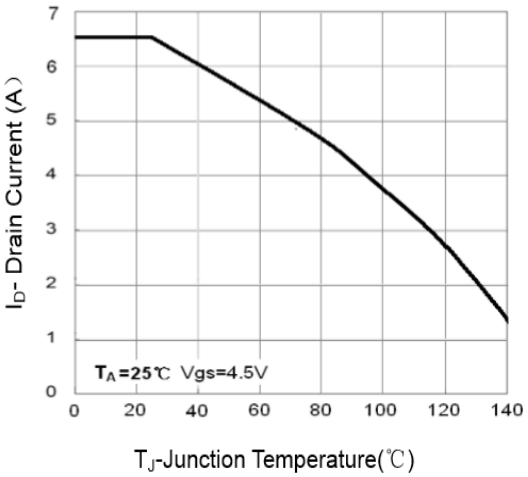


Figure 4 Drain Current

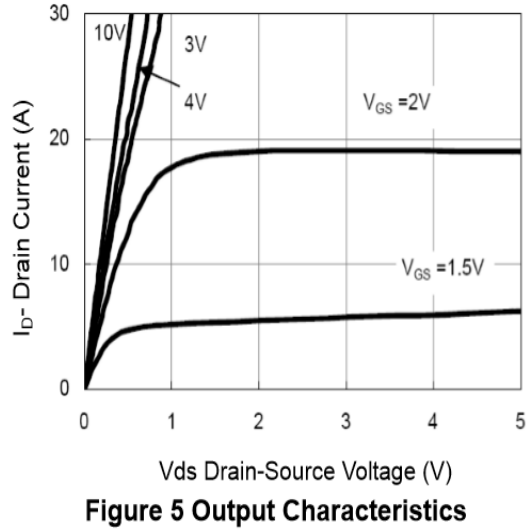


Figure 5 Output Characteristics

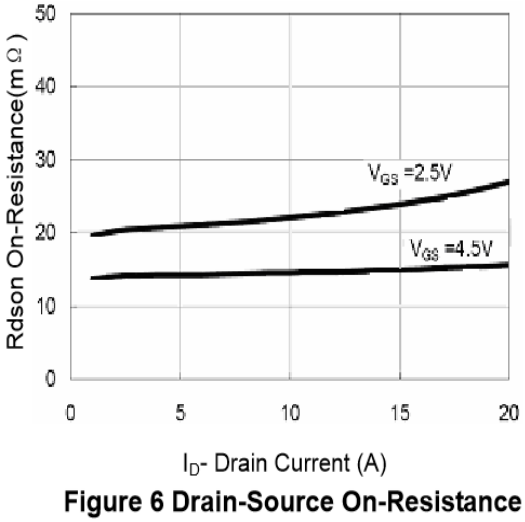


Figure 6 Drain-Source On-Resistance

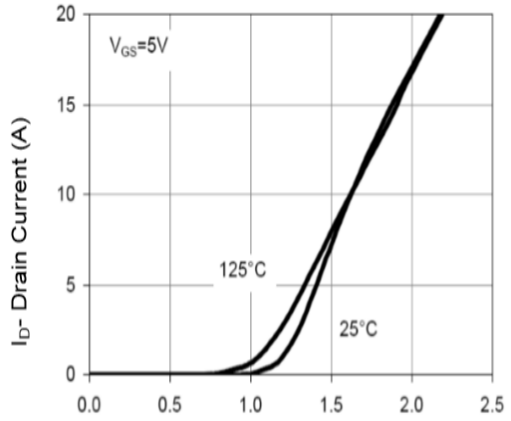


Figure 7 Transfer Characteristics

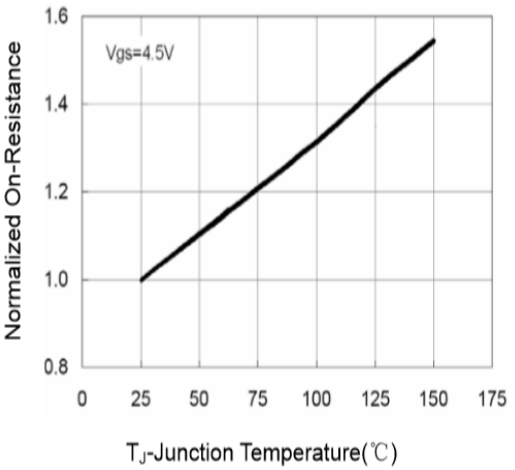


Figure 8 Drain-Source On-Resistance

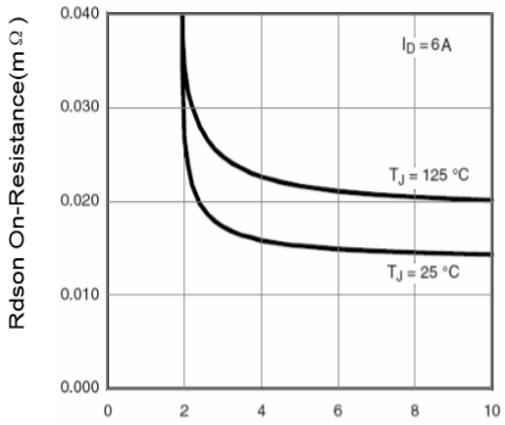


Figure 9 Rdson vs Vgs

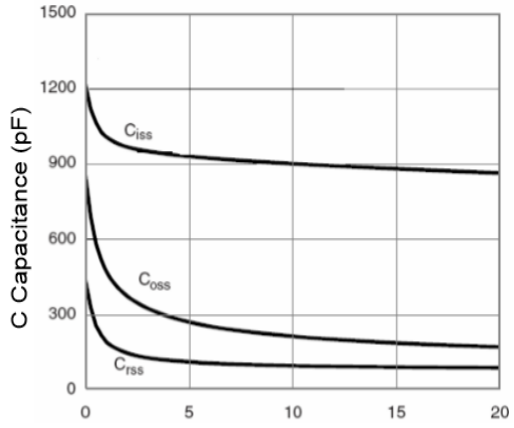


Figure 10 Capacitance vs Vds

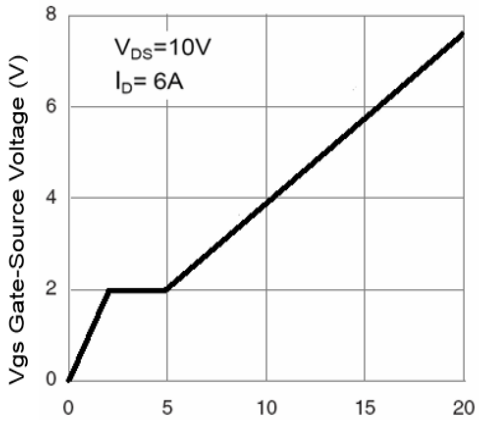


Figure 11 Gate Charge

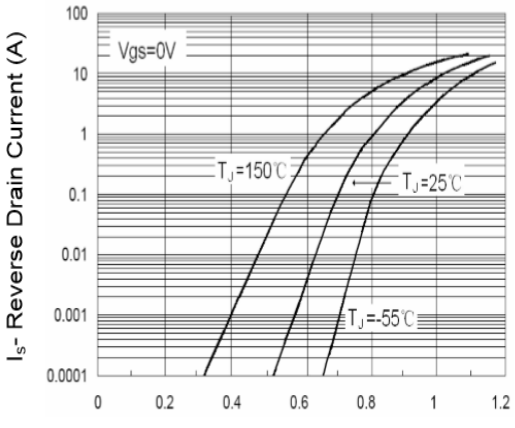


Figure 12 Source- Drain Diode Forward

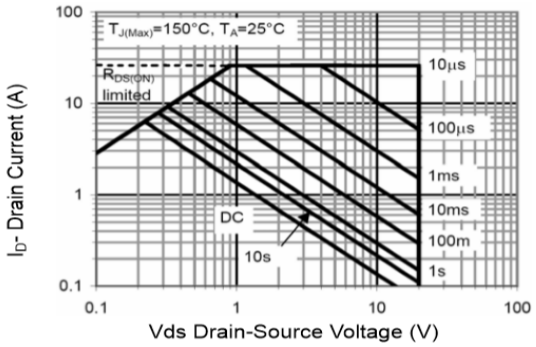


Figure 13 Safe Operation Area

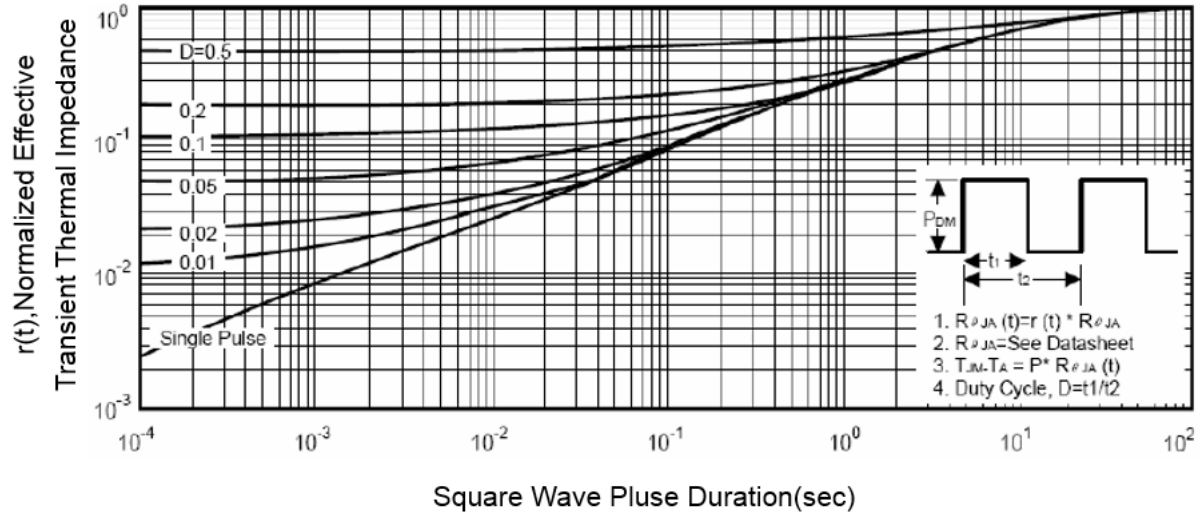
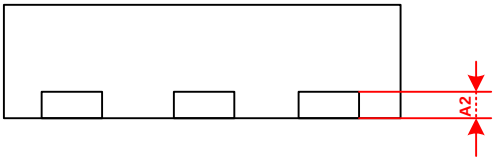


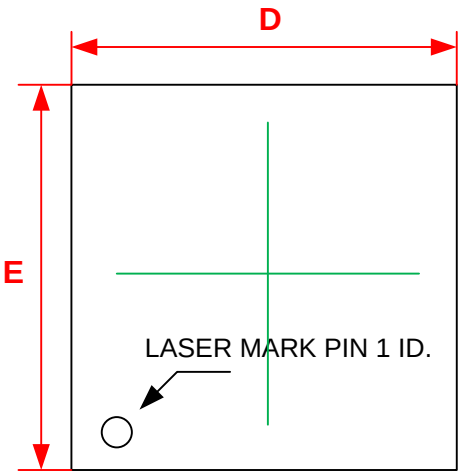
Figure 14 Normalized Maximum Transient Thermal Impedance

Package Information

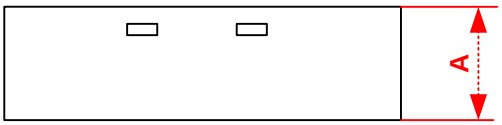
- **DFN2*2-6L-B**



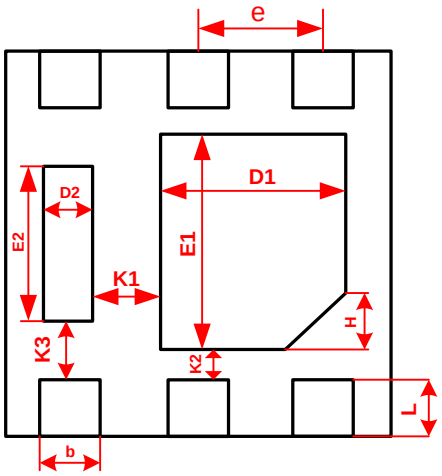
SIDE VIEW



TOP VIEW



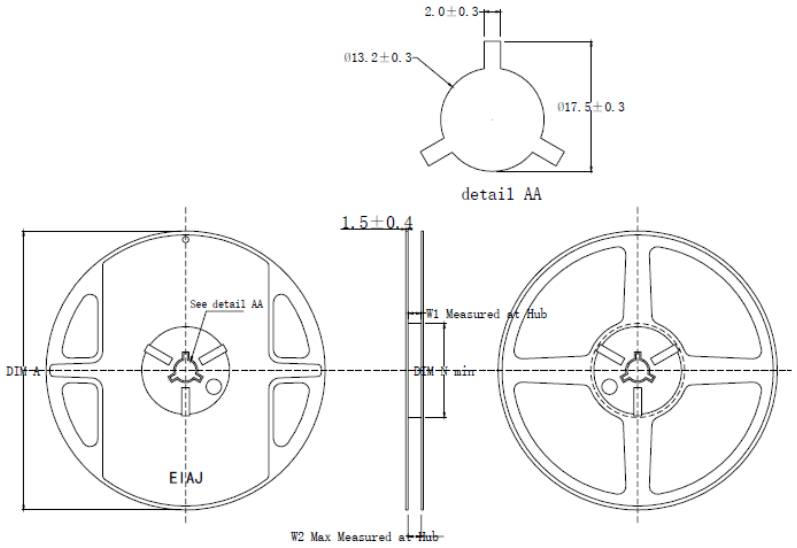
SIDE VIEW



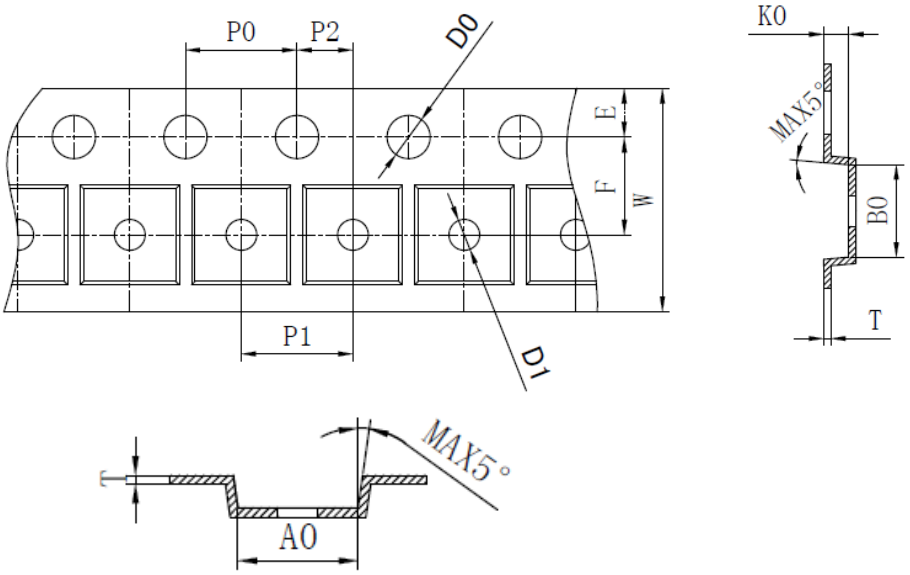
BOTTOM VIEW

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

Tape and Reel



PRODUCT SPECIFICATIONS				
TYPE WIDTH	ØA	ØN	W1 (Min)	W2 (Max)
8MM	178±2.0	60±1.0	8.4	11.4
12MM	178±2.0	60±1.0	12.4	15.4



SYMBOL	A0	B0	K0	P0	P1	P2
SPEC	2.20±0.05	2.20±0.05	0.75±0.10	4.00±0.10	4.00±0.10	2.00±0.05
SYMBOL	T	E	F	D0	D1	W
SPEC	0.20±0.03	1.75±0.10	3.50±0.05	1.55±0.05	$1.00^{+0.10}_{-0}$	$8.00^{+0.20}_{-0.10}$