

20V N-Channel Enhancement Mode MOSFET

Description

The PECN2012 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

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

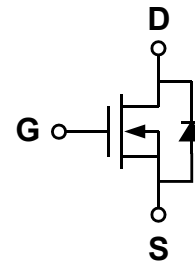
Application

- ◆ PWM applications
- ◆ Load switch

Package

- ◆ DFN2*2-6L-B

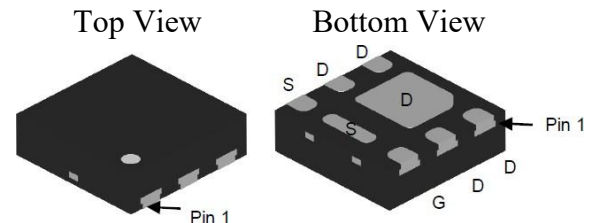
Schematic diagram



Marking and pin assignment

DFN2*2-6L-B

(Thickness 0.55mm)



PECN Natlinear Power
2012----NP2012



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN2012D R-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 ^a @Tj=125°C -pulse ^d	I_D	12	A
	I_{DM}	48	A
Drain-source Diode forward current	I_S	12	A
Maximum power dissipation	P_D	18	W
Operating junction Temperature range	T_j	-55—150	°C

Electrical Characteristics (TA=25°C 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	g _{fs}	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,I _S =12A	-	-	1.2	V

Notes:

- surface mounted on FR4 board, $t \leq 10\text{sec}$
- pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$
- guaranteed by design, not subject to production testing

Thermal Characteristics

Thermal Resistance junction-to ambient	$R_{th JA}$	100	$^{\circ}C/W$
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Typical Performance Characteristics

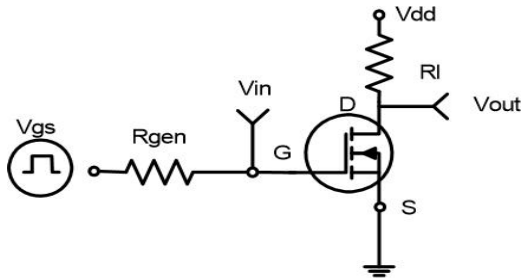


Figure 1: Switching Test Circuit

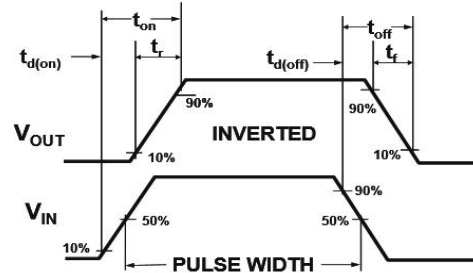


Figure 2: Switching Waveforms

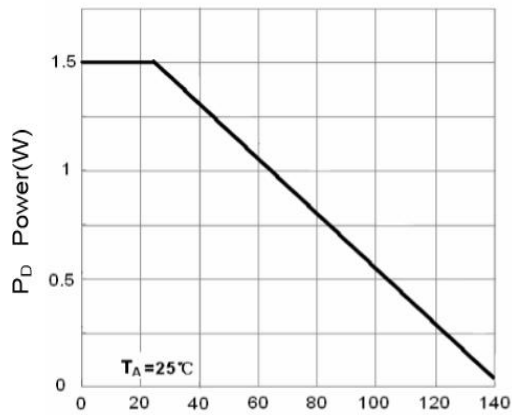


Figure 3 Power Dissipation

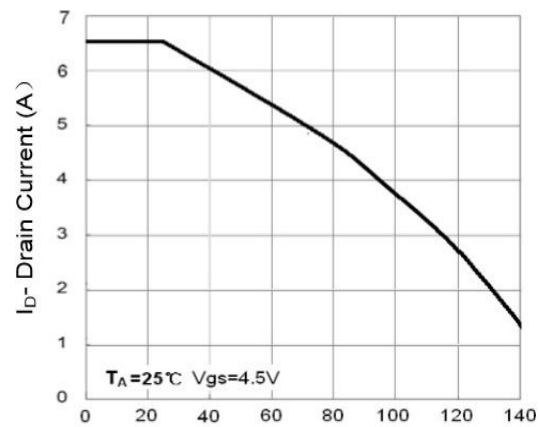


Figure 4 Drain Current

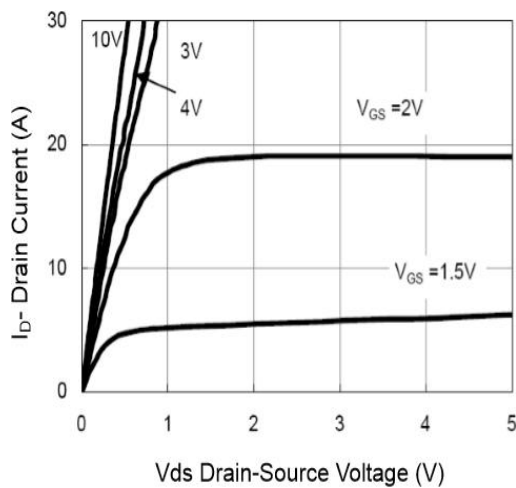


Figure 5 Output Characteristics

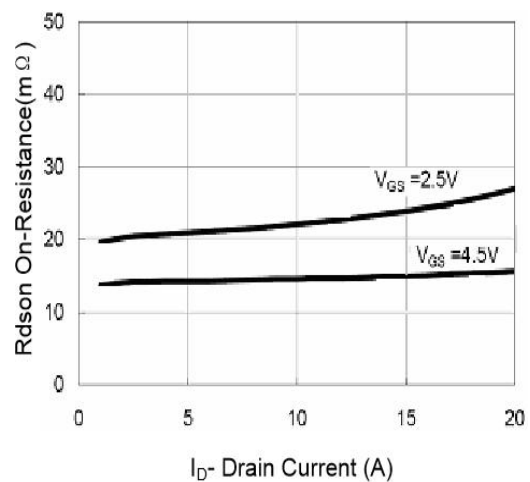


Figure 6 Drain-Source On-Resistance

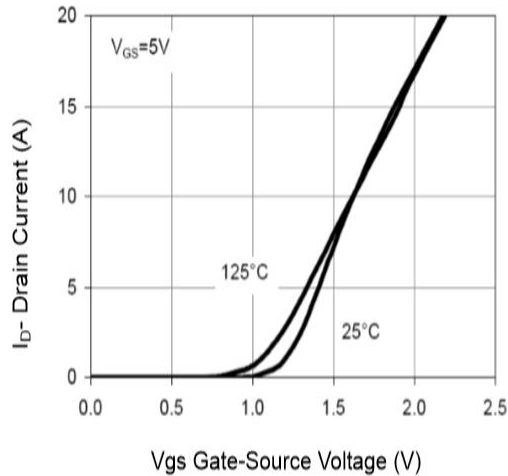


Figure 7 Transfer Characteristics

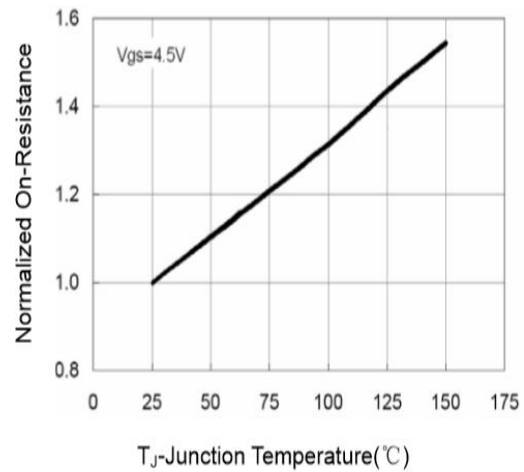


Figure 8 Drain-Source On-Resistance

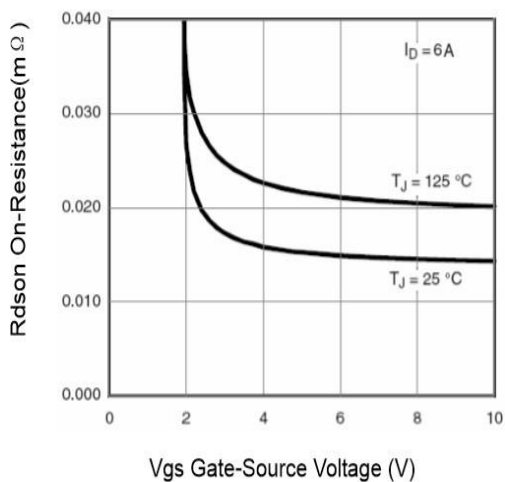


Figure 9 Rdson vs Vgs

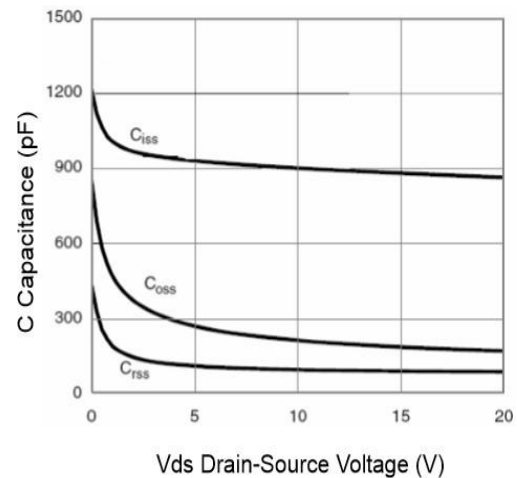


Figure 10 Capacitance vs Vds

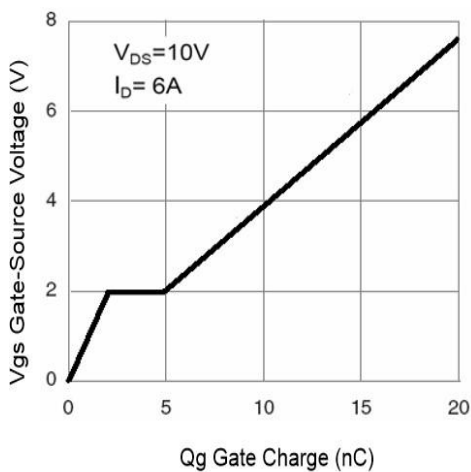


Figure 11 Gate Charge

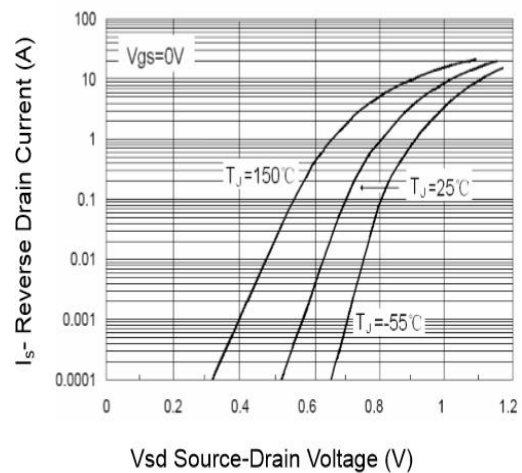


Figure 12 Source- Drain Diode Forward

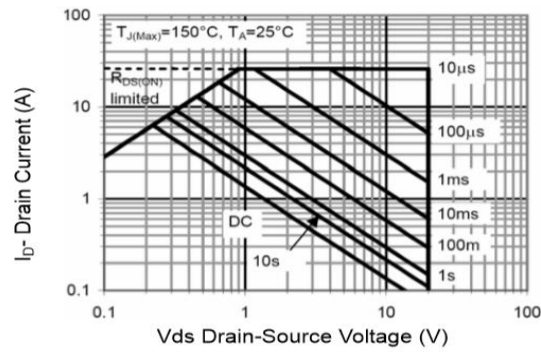


Figure 13 Safe Operation Area

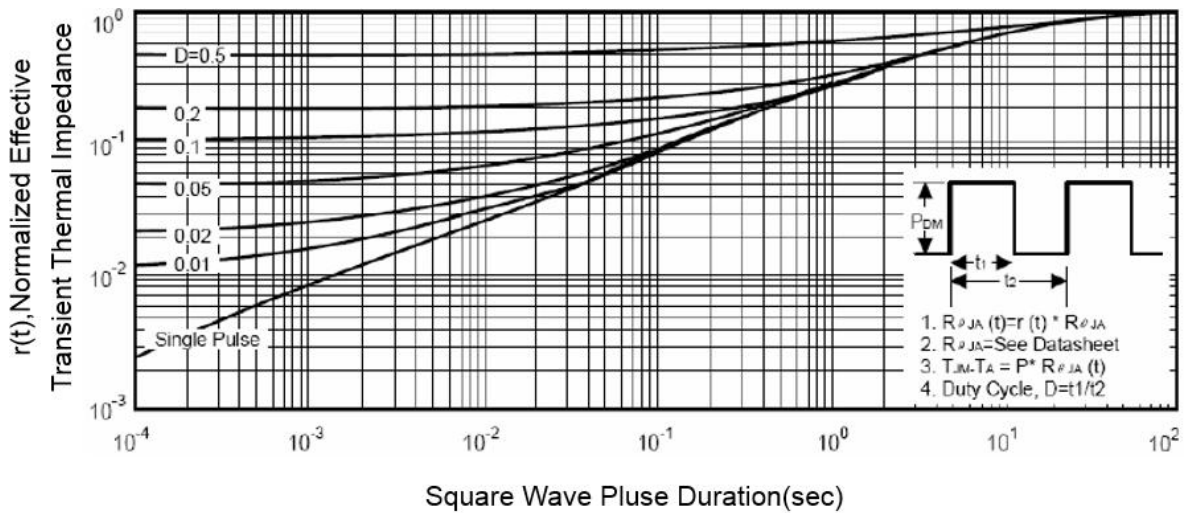
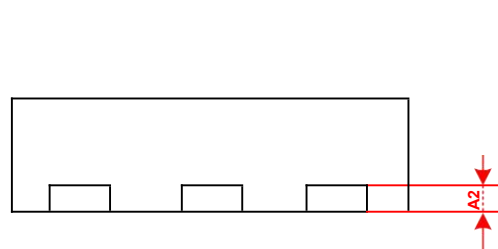


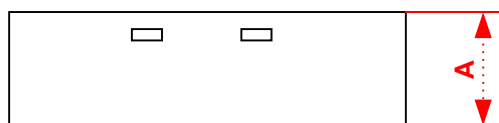
Figure 14 Normalized Maximum Transient Thermal Impedance

Package Information

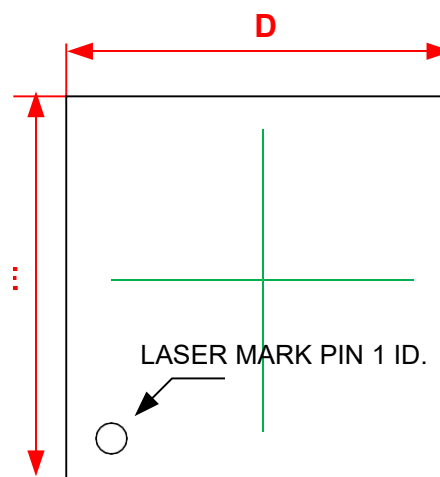
● DFN2*2-6L-B



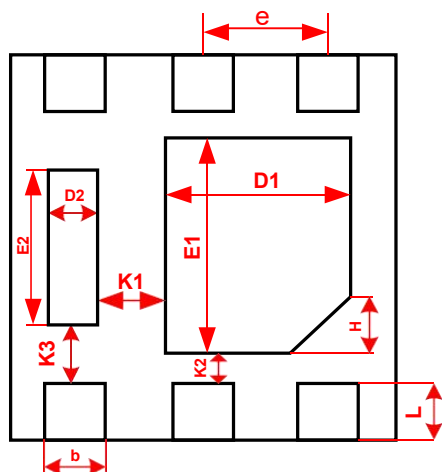
SIDE VIEW



SIDE VIEW



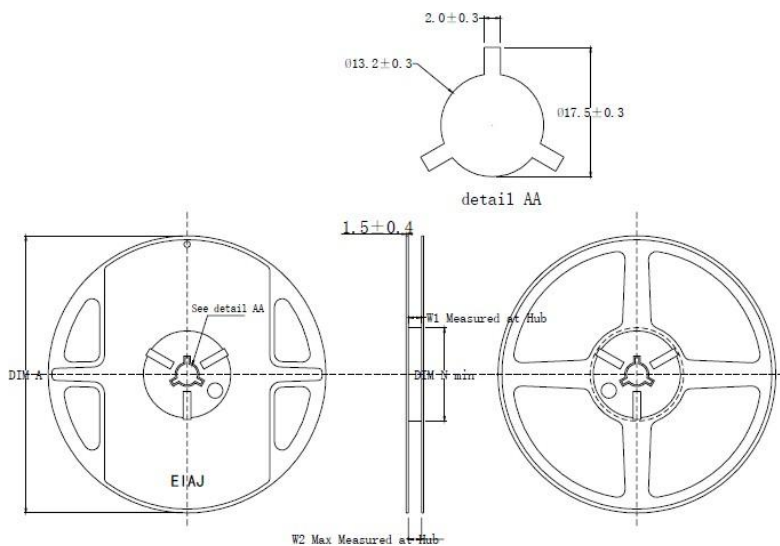
TOP VIEW



BOTTOM VIEW

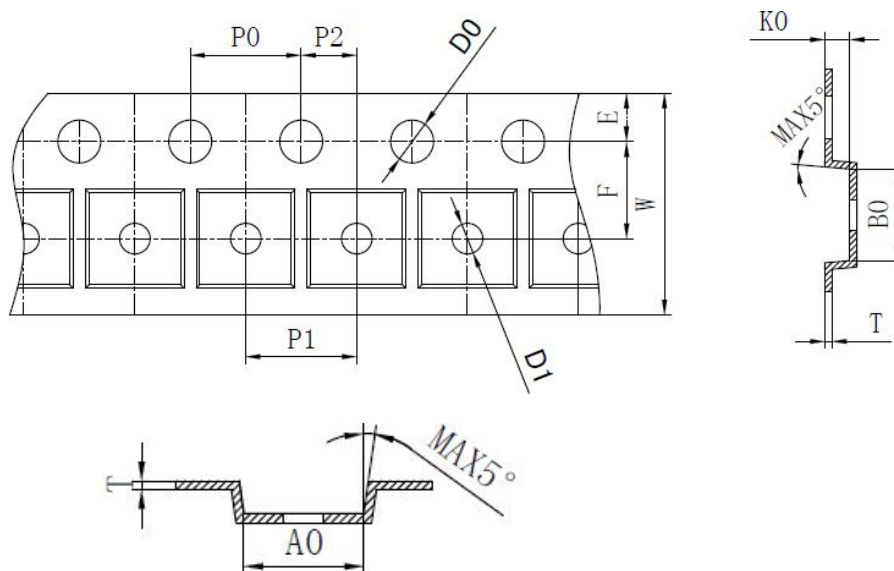
Common Dimension (mm)			
PKG	DFN2020-6L-B		
SYMBOL	MIN.	MON.	MAX.
A	0.527	0.552	0.577
A2		0.127REF	
b	0.25	0.30	0.35
D	1.90	2.00	2.10
E	1.90	2.00	2.10
D1	0.85	0.95	1.05
E1	1.05	1.15	1.25
D2	0.20	0.25	0.30
E2	0.69	0.79	0.89
e	0.55	0.65	0.75
H	0.25	0.30	0.35
K1	0.25MIN		
K2	0.15MIN		
K3	0.20MIN		
L	0.20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