

40V N And P-Channel Enhancement Mode MOSFET

Description

The PECN4614D6 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

◆ N-channel:

$V_{DS} = 40V, I_D = 16A$

$R_{DS(ON)} = 15m\Omega$ (typical) @ $V_{GS} = 10V$

$R_{DS(ON)} = 17m\Omega$ (typical) @ $V_{GS} = 4.5V$

P-Channel:

$V_{DS} = -40V, I_D = -16A$

$R_{DS(ON)} = 29m\Omega$ (typical) @ $V_{GS} = -10V$

$R_{DS(ON)} = 38.5m\Omega$ (typical) @ $V_{GS} = -4.5V$

- ◆ Excellent gate charge x $R_{DS(ON)}$ product(FOM)
- ◆ Very low on-resistance $R_{DS(ON)}$
- ◆ 150 °C operating temperature
- ◆ Pb-free lead plating
- ◆ 100% UIS tested

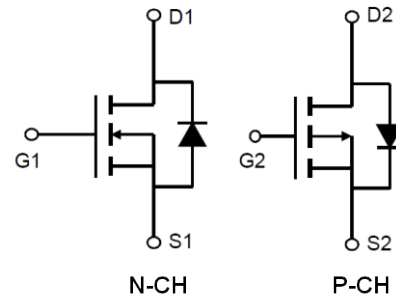
Application

- ◆ DC/DC Converter
- ◆ Ideal for high-frequency switching and synchronous rectification

100% UIS TESTED!

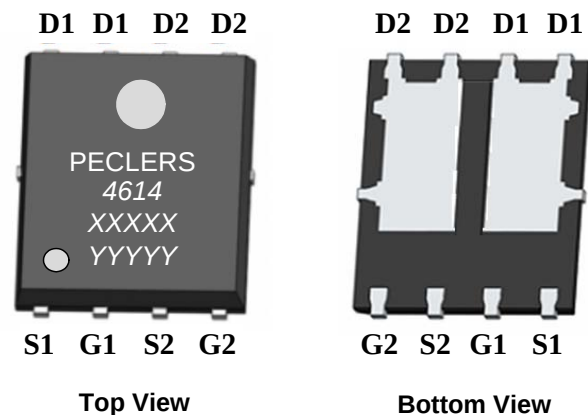
100% ΔV_{ds} TESTED!

Schematic diagram



Marking and pin assignment

PDFN5×6-8L-B



Note: XXXX is the Quality Code
YYYY is the date code



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN4614D6	-55°C to +150°C	PDFN5×6-8L-B	5000

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

Parameter	Symbol	Limit		Unit
		N	P	
Drain-source voltage	V_{DS}	40	-40	V
Gate-source voltage	V_{GS}	±20	±20	V
Operating junction Temperature range	T_j	-55—150	-55—150	°C
Drain Current-Continuous	I_D	16	-16	A

(Silicon Limited)	$T_A=70^{\circ}\text{C}$		10.5	-12.5	
Pulsed Drain Current (Package Limited)		I_{DM}	32	-24	A
Avalanche Current ^C		I_{AS}, I_{AR}	16	-20	A
Avalanche energy $L=0.1\text{mH}^C$		E_{AS}, E_{AR}	12	25	mJ
Power Dissipation ^B	$T_A=25^{\circ}\text{C}$	P_D	10	20	W
	$T_A=100^{\circ}\text{C}$		4	8	
Junction and Storage Temperature Range		T_J, T_{STG}	-55—150		$^{\circ}\text{C}$

Thermal Characteristics

Parameter		Symbol	Device	Typ	Max	Unit
Maximum Junction-to-Ambient ^A	$\leq 10\text{s}$	$R_{\theta JA}$	n-ch	30	40	$^{\circ}\text{C/W}$
Maximum Junction-to-Ambient ^A	Steady-State		n-ch	55	70	
Maximum Junction-to-Lead ^B	Steady-State	$R_{\theta JC}$	n-ch	9	12	
Maximum Junction-to-Ambient ^A	$\leq 10\text{s}$	$R_{\theta JA}$	p-ch	20	30	
Maximum Junction-to-Ambient ^A	Steady-State		p-ch	48	65	
Maximum Junction-to-Lead ^B	Steady-State	$R_{\theta JC}$	p-ch	5	6	

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The value in any given application depends on the user's specific board design. The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.

B: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to lead $R_{\theta JL}$ and lead to ambient.

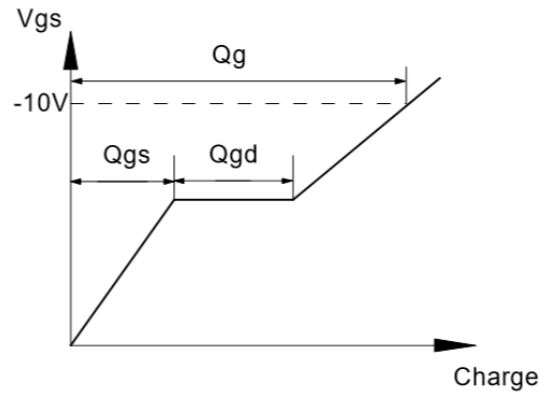
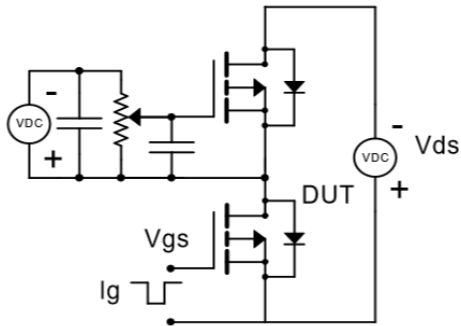
N-Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	-	-	1	μA
Gate-body leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.35	2.0	V
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10V, I _D =16A	-	15	20	mΩ
		V _{GS} =4.5V, I _D =10A	-	17	23	
Forward transconductance	g _{fs}	V _{DS} =5V, I _D =8A	-	15	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =20V, V _{GS} =0V f=1.0MHz	-	415	-	pF
Output capacitance	C _{OSS}		-	112	-	
Reverse transfer capacitance	C _{RSS}		-	11	-	
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1.0MHz	-	1.1	-	Ω
Switching Characteristics						
Turn-on delay time	t _{D(on)}	V _{DS} =20V V _{GS} =10V R _L =1.8Ω R _{GEN} =3Ω	-	4	-	ns
Rise time	t _r		-	3	-	
Turn-off delay time	t _{D(off)}		-	15	-	
Fall time	t _f		-	2	-	
Total gate charge	Q _g	V _{DS} =20V, I _D =8A V _{GS} =10V	-	6.5	-	nC
Gate-source charge	Q _{gs}		-	1.2	-	
Gate-drain charge	Q _{gd}		-	1.1	-	

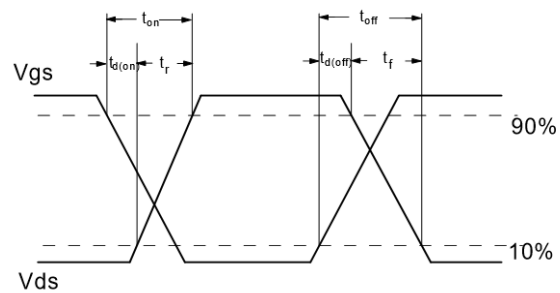
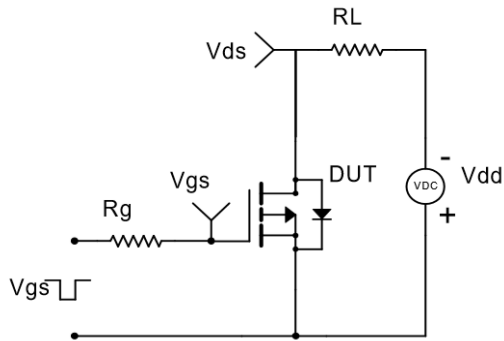
P-Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF Characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA	-40	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V	-	-	-1	μA
Gate-body leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.35	-2.0	V
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-6A	-	29	35	mΩ
		V _{GS} =-4.5V, I _D =-5A	-	38.5	46	
Forward transconductance	gfs	V _{DS} =-5V, I _D =-6A	-	18	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =-20V, V _{GS} =0V f=1.0MHz	-	1040	-	pF
Output capacitance	C _{OSS}		-	180	-	
Reverse transfer capacitance	C _{RSS}		-	125	-	
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1.0MHz	-	4	-	Ω
Switching Characteristics						
Turn-on delay time	t _{D(on)}	V _{DS} =-20V V _{GS} =-10V R _L =2.3Ω R _{GEN} =3Ω	-	10	-	ns
Rise time	t _r		-	5.5	-	
Turn-off delay time	t _{D(off)}		-	3.6	-	
Fall time	t _f		-	4.6	-	
Total gate charge	Q _g	V _{DS} =-20V, I _D =-6A V _{GS} =-10V	-	19	-	nC
Gate-source charge	Q _{gs}		-	3.6	-	
Gate-drain charge	Q _{gd}		-	4.6	-	

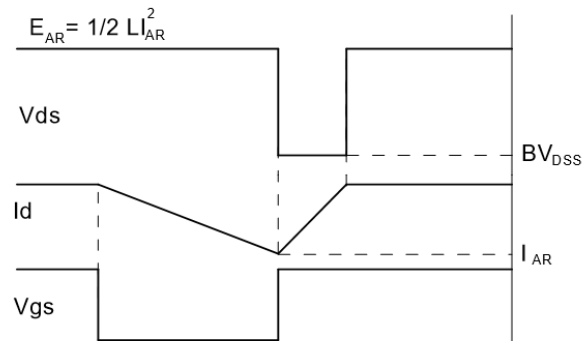
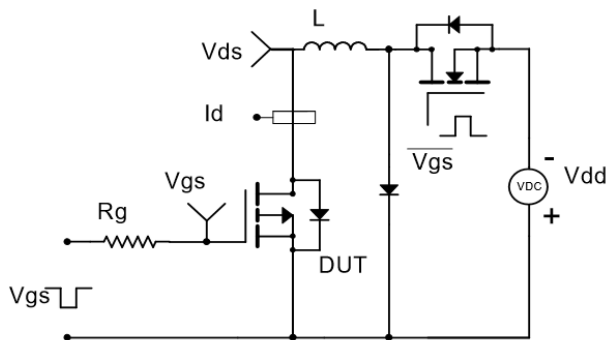
Gate Charge Test Circuit & Waveform



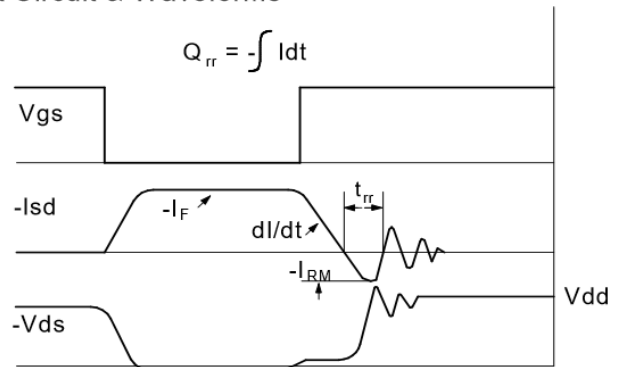
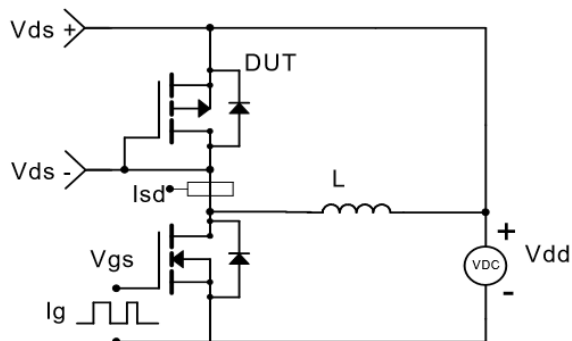
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

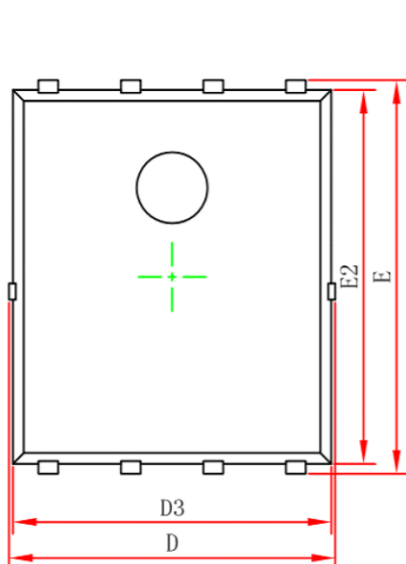


Diode Recovery Test Circuit & Waveforms

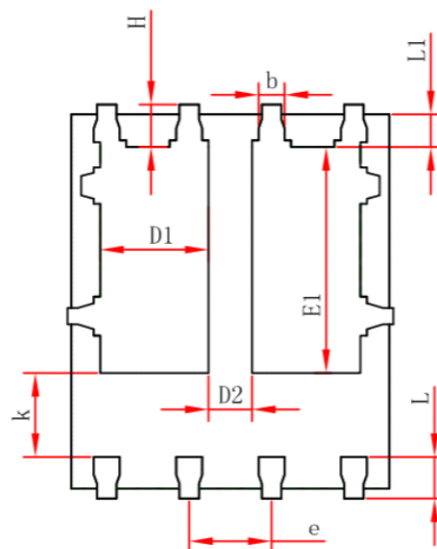


Package Information

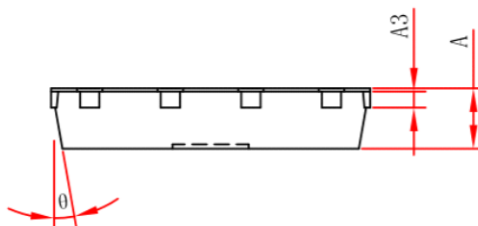
- PDFN5*6-8L-B



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°