

## 30V P-Channel Enhancement Mode MOSFET

### Description

The PECN3401HR 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

- ◆  $V_{DS} = -30V$ ,  $I_D = -4A$   
 $R_{DS(ON)}(Typ.) = 57m\Omega$  @  $V_{GS} = -4.5V$   
 $R_{DS(ON)}(Typ.) = 87m\Omega$  @  $V_{GS} = -2.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

### Application

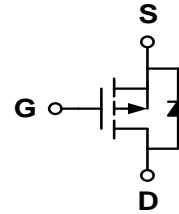
- ◆ PWM applications
- ◆ Load switch

### Package

- ◆ ESOT-23-3L

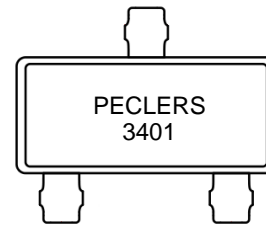


### Schematic diagram



### Marking and pin assignment

ESOT-23  
(TOP VIEW)



### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN3401HR	-55°C to +150°C	ESOT-23-3L	5000

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

parameter	symbol	limit	unit	
Drain-source voltage	$V_{DS}$	-30	V	
Gate-source voltage	$V_{GS}$	±12	V	
Continuous Drain Current	$I_D$	TC=25°C	-4	A
		TC=70°C	-3.0	
Pulsed Drain Current <sup>C</sup>	$I_{DP}$	-16	A	
power dissipation <sup>B</sup>	$P_D$	TC=25°C	1.4	W
		TC=70°C	0.9	

Junction and Storage Temperature Range	$T_J, T_{SGT}$	-55—150	°C
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### Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-body leakage	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
<b>ON Characteristics</b>						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.6	-0.8	-1.3	V
Drain-source on-state resistance	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-4A$	-	57	60	m $\Omega$
		$V_{GS}=-2.5V, I_D=-3A$	-	87	100	
Forward transconductance	$G_{FS}$	$V_{DS}=-5V, I_D=-4A$	-	5	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ISS}$	$V_{DS}=-15V, V_{GS}=0V$ $f=1.0MHz$	-	456	-	pF
Output capacitance	$C_{OSS}$		-	64	-	
Reverse transfer capacitance	$C_{RSS}$		-	57	-	
Gate resistance	$R_g$	$V_{DS}=15mV, f=1.0MHz$		10		$\Omega$
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{D(ON)}$	$V_{DS}=-15V$ $I_D=-4A$ $V_{GEN}=-10V$ $R_L=10ohm$ $R_{GEN}=60ohm$	-	3.0	3.5	ns
Rise time	$t_r$		-	31	35	
Turn-off delay time	$t_{D(OFF)}$		-	33	40	
Fall time	$t_f$		-	8	12	
Total gate charge	$Q_g$	$V_{DS}=-15V, I_D=-4A$ $V_{GS}=-4.5V$	-	13	-	nC
Gate-source charge	$Q_{gs}$		-	1	-	
Gate-drain charge	$Q_{gd}$		-	2.1	-	
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=-4A, di/dt=100A/ms$		24		nS
Body Diode Reverse Recovery Charge	$Q_{rr}$	$I_F=-4A, di/dt=100A/ms$		1.8		nC
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode forward voltage	$V_{SD}$	$V_{GS}=0V, I_S=-4A$	-	-0.81	-1.2	V

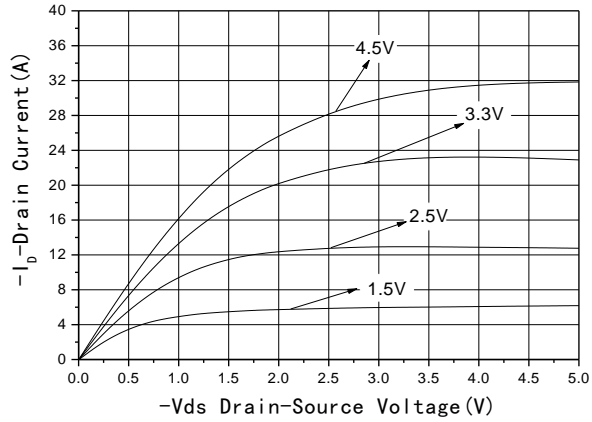
### Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient <sup>A</sup>	$t \leq 10s$	70	90	°C/W
Maximum Junction-to-Ambient <sup>A D</sup>	Steady-State			
Maximum Junction-to-Lead	Steady-State	62	80	

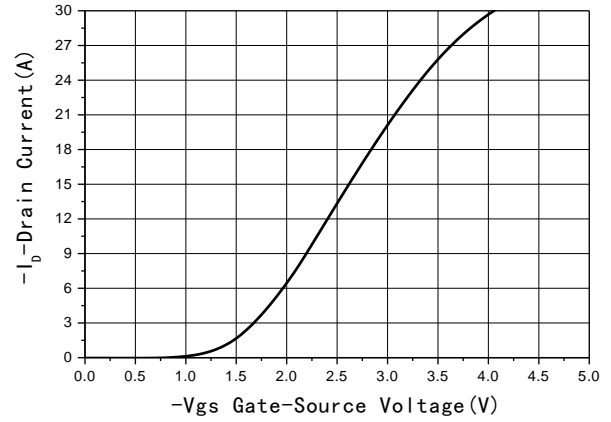
A. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The value in any given application depends on the user's specific board design.

- B. The power dissipation PD is based on  $T_{J(MAX)}=150^{\circ}\text{C}$ , using  $\leq 10\text{s}$  junction-to-ambient thermal resistance.
- C. Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^{\circ}\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^{\circ}\text{C}$ .
- D. The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

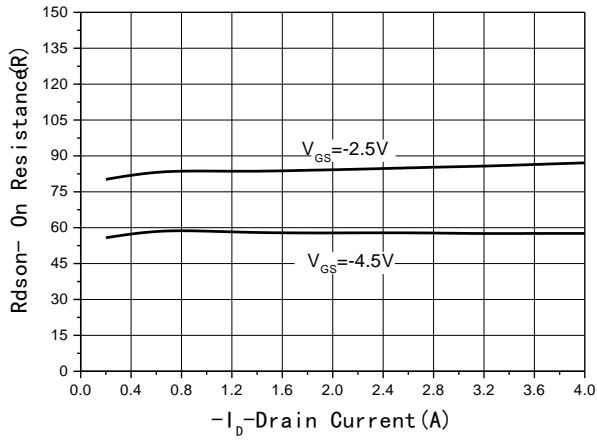
### Typical Performance Characteristics



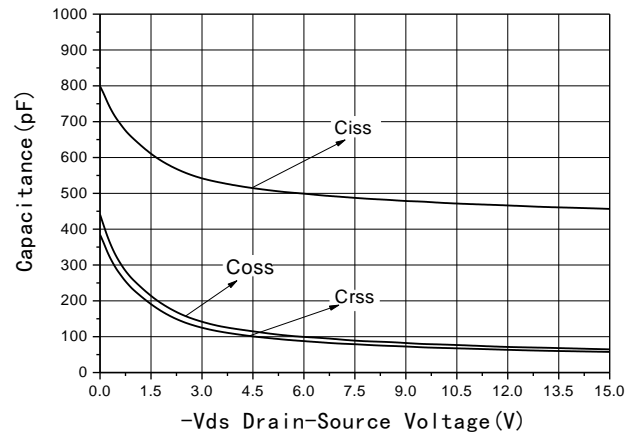
**Fig1 Output Characteristics**



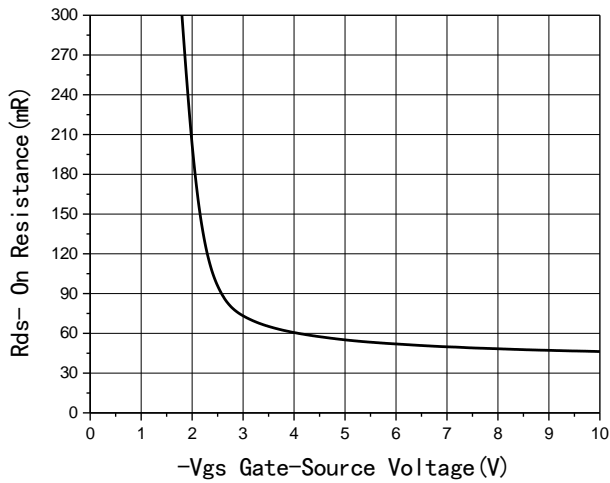
**Fig2 Transfer Characteristics**



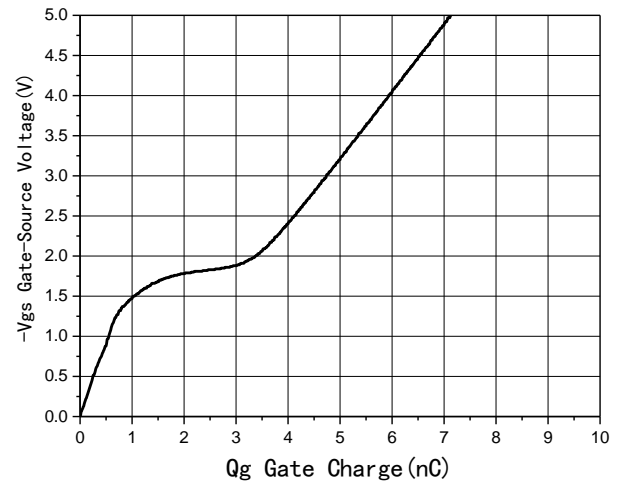
**Fig3 R<sub>DS(on)</sub>-Drain current**



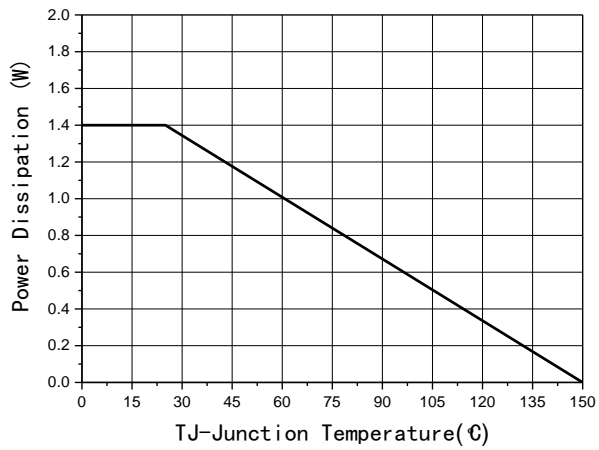
**Fig4 Capacitance vs V<sub>DS</sub>**



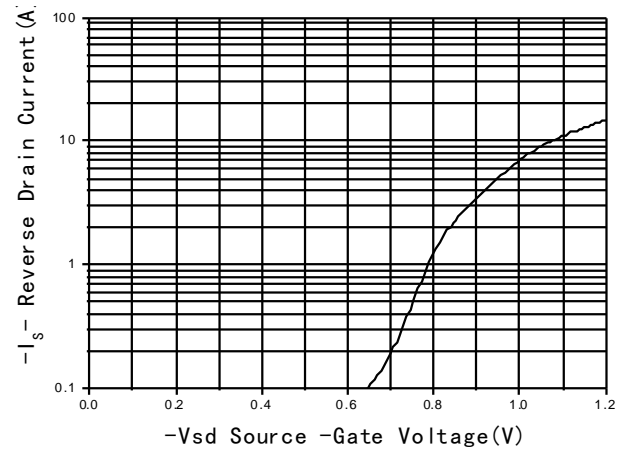
**Fig5 R<sub>DS(on)</sub>-Gate Drain voltage**



**Fig6 Gate Charge**



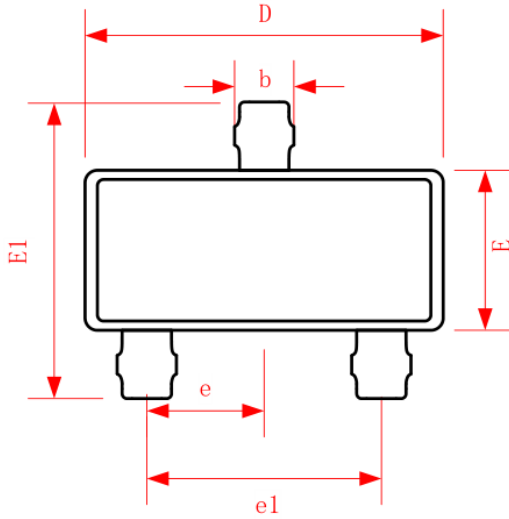
**Fig7 Power De-rating**



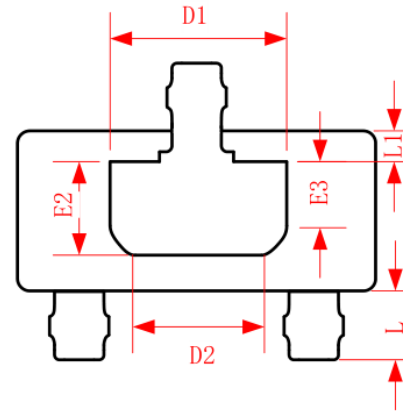
**Fig8 Source-Drain Diode Forward**

### Package Information

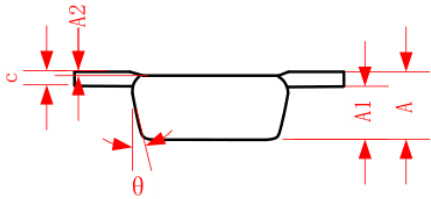
- ESOT-23



Top View  
【顶视图】



Bottom View  
【背视图】



Side View  
【侧视图】

Symbol	Dimensions In Millimeters		
	Min.	REF.	Max.
A	0.500	0.550	0.600
A1	0.368	0.398	0.428
A2	-0.030	0.000	0.030
c	0.152Ref		
D	2.850	2.900	2.950
E	1.250	1.300	1.350
E1	2.350	2.400	2.450
D1	1.405	1.430	1.455
D2	0.995	1.020	1.045
E2	0.735	0.760	0.785
E3	0.490	0.520	0.545
L	0.525	0.550	0.575
L1	0.235	0.260	0.285
e	0.950Ref		
e1	1.800	1.900	2.000
b	0.410	0.480	0.550
θ	14°	15°	16°