

## 30V N And P-Channel Enhancement Mode MOSFET

### Description

The PECN6601MR 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.

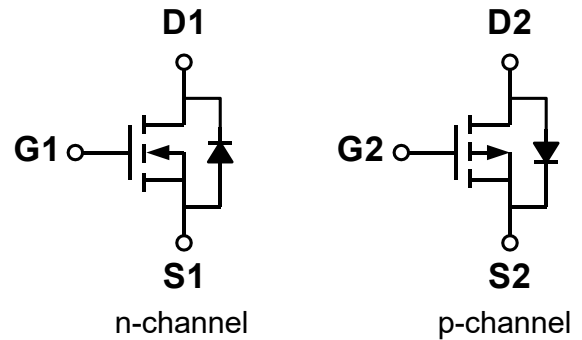
### General Features

- ◆ **N-channel:**
  - $V_{DS} = 30V, I_D = 4A$
  - $R_{DS(ON)} = 33m\Omega$  (typical) @  $V_{GS} = 4.5V$
  - $R_{DS(ON)} = 46m\Omega$  (typical) @  $V_{GS} = 2.5V$
- ◆ **P-Channel:**
  - $V_{DS} = -30V, I_D = -2.3A$
  - $R_{DS(ON)} = 85m\Omega$  (typical) @  $V_{GS} = -4.5V$
  - $R_{DS(ON)} = 105m\Omega$  (typical) @  $V_{GS} = -2.5V$
- ◆ 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

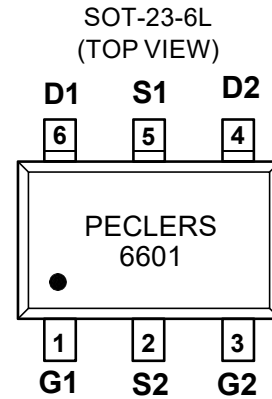
### Application

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

### Schematic diagram



### Marking and pin assignment



### Package

- ◆ SOT-23-6L



### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN6601MR	-55°C to +150°C	SOT-23-6L	3000

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

Parameter	Symbol	Limit		Unit
		N	P	
Drain-source voltage	$V_{DS}$	30	-30	V
Gate-source voltage	$V_{GS}$	±12	±12	V
Maximum power dissipation	$P_D$	1.1		W
Operating junction Temperature range	$T_j$	-55—150	-55—150	°C

Drain Current-Continuous (Silicon Limited)	$T_A=25^{\circ}\text{C}$	$I_D$	4	-2.3	A
	$T_A=75^{\circ}\text{C}$		3	-1.8	
Pulsed Drain Current (Package Limited) <sup>C</sup>		$I_{DM}$	16	-9	A
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55—150		$^{\circ}\text{C}$

### Thermal Characteristics

Parameter		Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient <sup>A</sup>	$\leq 10\text{s}$	$R_{\theta JA}$	70	90	$^{\circ}\text{C/W}$
Maximum Junction-to-Ambient <sup>A D</sup>	Steady-State		100	125	
Maximum Junction-to-Lead <sup>B</sup>	Steady-State	$R_{\theta JL}$	63	80	

**A.** The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 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.

**B.** The power dissipation  $P_D$  is based on  $T_{J(\text{MAX})}=150^{\circ}\text{C}$ , using  $\leq 10\text{s}$  junction-to-ambient thermal resistance.

**C.** Repetitive rating, pulse width limited by junction temperature  $T_{J(\text{MAX})}=150^{\circ}\text{C}$ . 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.

### N-Channel Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	30	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$	-	-	1	$\mu\text{A}$
Gate-body leakage	$I_{GSS}$	$V_{DS}=0\text{V}, V_{GS}=\pm 12\text{V}$	-	-	$\pm 100$	nA
<b>ON Characteristics</b>						
Gate threshold voltage	$V_{GS(\text{th})}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	0.6	0.9	1.3	V
Drain-source on-state resistance	$R_{DS(\text{ON})}$	$V_{GS}=4.5\text{V}, I_D=4\text{A}$	-	33	45	m $\Omega$
		$V_{GS}=2.5\text{V}, I_D=3\text{A}$	-	46	60	
Forward transconductance	$g_{fs}$	$V_{DS}=5\text{V}, I_D=4\text{A}$	-	5	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ISS}$	$V_{DS}=15\text{V}, V_{GS}=0\text{V}$ $f=1.0\text{MHz}$	-	822	-	pF
Output capacitance	$C_{OSS}$		-	98	-	
Reverse transfer capacitance	$C_{RSS}$		-	76	-	
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{D(\text{ON})}$	$V_{DD}=15\text{V}$ $R_L=3.3\text{ohm}$ $V_{GEN}=4.5\text{V}$ $R_{GEN}=6\text{ohm}$	-	3.3	-	ns
Rise time	$t_r$		-	4.8	-	
Turn-off delay time	$t_{D(\text{OFF})}$		-	25	-	
Fall time	$t_f$		-	4	-	
Total gate charge	$Q_g$	$V_{DS}=15\text{V}$ $I_D=4\text{A}$	-	9.5	-	nC
Gate-source charge	$Q_{gs}$		-	1.5	-	

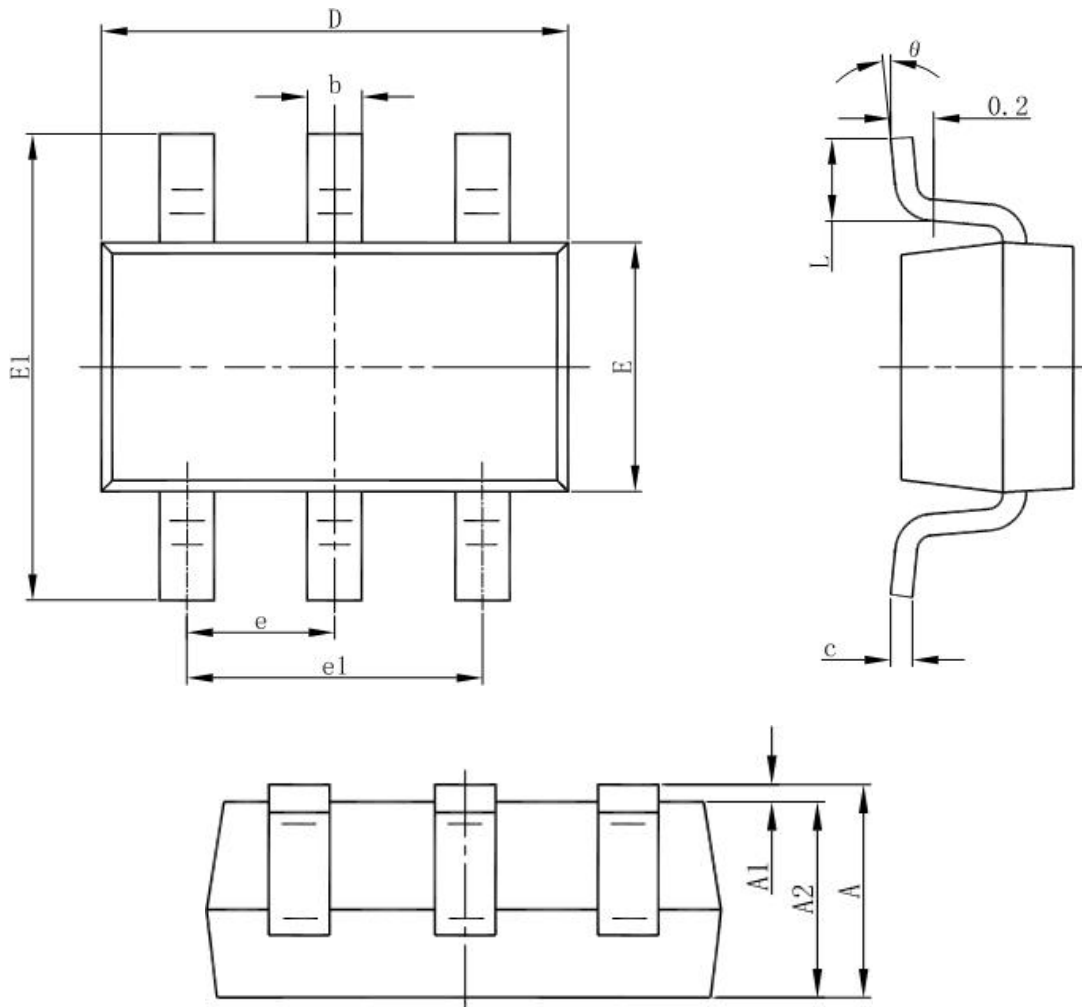
Gate-drain charge	Qgd	V <sub>GS</sub> =4.5V	-	3	-	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =3A	-	0.76	1.16	V

### P-Channel Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-30	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-body leakage	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±12V	-	-	±100	nA
<b>ON Characteristics</b>						
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-0.4	-0.65	-1.2	V
Drain-source on-state resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2.3A	-	85	120	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.5A	-	105	140	
Forward transconductance	g <sub>fs</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2A	-	3	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V f=1.0MHz	-	561	-	pF
Output capacitance	C <sub>OSS</sub>		-	61	-	
Reverse transfer capacitance	C <sub>RSS</sub>		-	52	-	
<b>Switching Characteristics</b>						
Turn-on delay time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-15V I <sub>D</sub> =-2.3A V <sub>GEN</sub> =-4.5V R <sub>L</sub> =10ohm R <sub>GEN</sub> =-60ohm	-	12.5	-	ns
Rise time	t <sub>r</sub>		-	6.6	-	
Turn-off delay time	t <sub>D(OFF)</sub>		-	113	-	
Fall time	t <sub>f</sub>		-	46.6	-	
Total gate charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-2.3A V <sub>GS</sub> =-4.5V	-	6.1	-	nC
Gate-source charge	Q <sub>gs</sub>		-	1.7	-	
Gate-drain charge	Q <sub>gd</sub>		-	1.2	-	
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1.25A	-	-0.81	-1.2	V

### Package Information

- SOT-23-6L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°