

## 60V N-Channel Enhancement Mode MOSFET

### Description

The PECN6009 uses advanced trench technology that is uniquely optimized to provide the most efficient high frequency switching performance. Both conduction and switching power losses are minimized due to an extremely low combination of  $R_{DS(ON)}$  and  $Q_g$ . This device is ideal for high-frequency switching and synchronous rectification.

### General Features

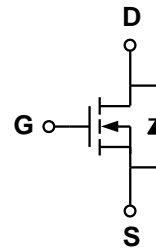
- ◆  $V_{DS} = 60V$   $I_D = 10A$   
 $R_{DS(ON)}(Typ.) = 11.5m\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)}(Typ.) = 12.5m\Omega$  @  $V_{GS} = 4.5V$
- ◆ Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- ◆ Very low on-resistance  $R_{DS(on)}$
- ◆ 150 °C operating temperature
- ◆ 100% UIS tested

*100% UIS TESTED!*  
*100%  $\Delta V_{ds}$  TESTED!*

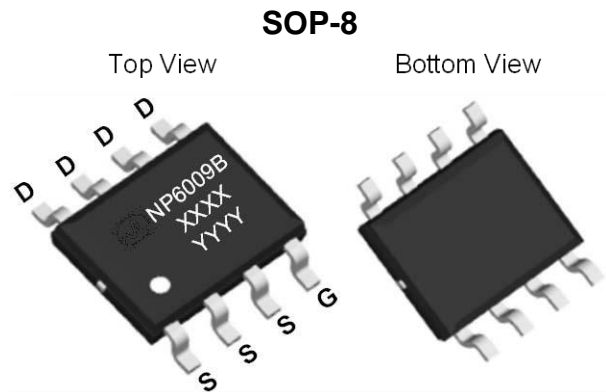
### Application

- ◆ Synchronous Rectification in DC/DC and AC/DC Converters
- ◆ Industrial and Motor Drive applications

### Schematic diagram



### Marking and pin assignment



XXXX—Date Code  
 YYYY—Quality Code



### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN6009BSR-G	-55°C to +150°C	SOP-8	4000

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

parameter	symbol	limit	unit
Drain-source voltage	$V_{DS}$	60	V
Gate-source voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	TC=25°C	10
		TC=70°C	8
Pulsed Drain Current	$I_{DP}$	52	A
Avalanche energy( $T_j=25^\circ C$ , $V_{DD}=30V$ , $V_G=10V$ , $L=0.3mH$ , $R_g=25\Omega$ )	$E_{AS}$	38	mJ
Power Dissipation	$P_D$	TC=25°C	3
		TC=70°C	2.1
Operating junction Temperature range	$T_j$	-55—150	°C

## Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_J=85^\circ C$	-	-	5	
Gate Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-source on-state resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$	-	11.5	14	m $\Omega$
		$V_{GS}=4.5V, I_D=8A$	-	12.5	16	
Forward Transconductance	$g_{FS}$	$V_{DS}=10V, I_D=10A$	-	45	-	S
<b>Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$I_{SD}=1A, V_{GS}=0V$	-	0.72	1.2	V
Diode Continuous Forward Current	$I_S$		-	-	13	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^\circ C, I_F = I_S, di/dt = 100A/\mu s$	-	19	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	60	-	nC
<b>Dynamic Characteristics</b>						
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	-	1.2	1.8	$\Omega$
Input capacitance	$C_{ISS}$	$V_{GS}=0V, V_{DS}=30V, f=1.0MHz$	-	1000	-	pF
Output capacitance	$C_{OSS}$		-	290	-	
Reverse transfer capacitance	$C_{RSS}$		-	24	-	
Turn-on delay time	$t_{D(ON)}$	$V_{GS}=10V, V_{DS}=30V, R_L=4.7\Omega, R_G=3\Omega$	-	6.4	-	ns
Turn-on Rise time	$t_r$		-	3.2	-	
Turn-off delay time	$t_{D(OFF)}$		-	22	-	
Turn-off Fall time	$t_f$		-	3	-	
Total gate charge	$Q_g$	$V_{GS}=10V, V_{DS}=30V, I_D=10A$	-	14	-	nC
Gate-source charge	$Q_{gs}$		-	2.5	-	
Gate-drain charge	$Q_{gd}$		3	3.3	-	

## Thermal Characteristics

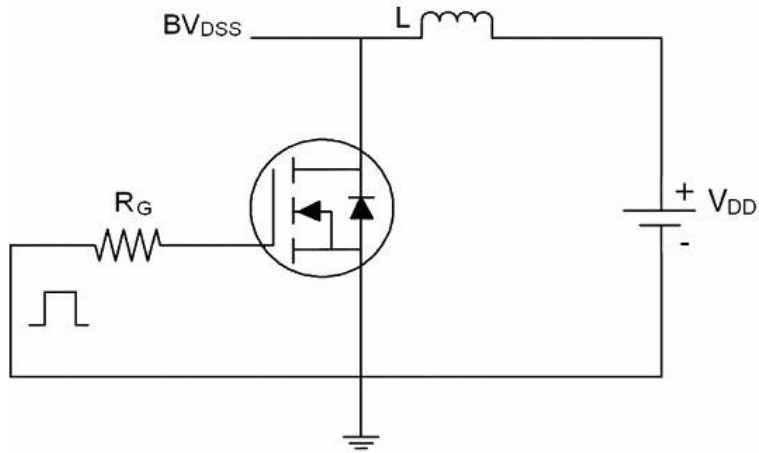
Parameter	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient <sup>A</sup>	$\leq 10s$	33	40	$^\circ C/W$
Maximum Junction-to-Ambient <sup>A</sup>	Steady-State			
Maximum Junction-to-Lead <sup>B</sup>	Steady-State	16	24	

A: The value of  $R_{qJA}$  is measured with the device mounted on 1 in 2 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. The current rating is based on the  $t \leq 10s$  thermal resistance rating.

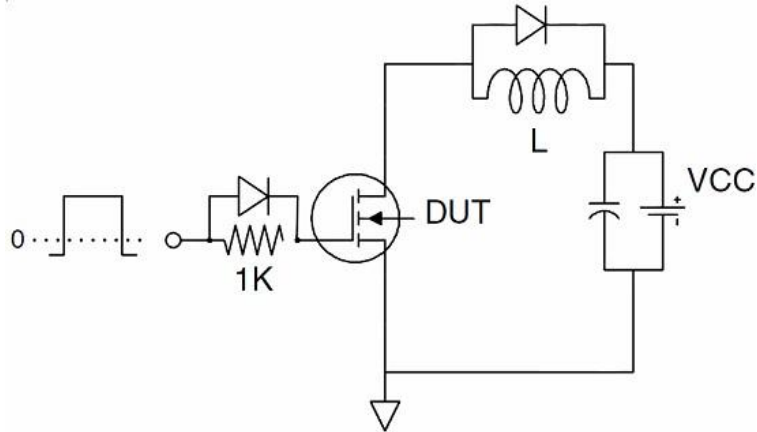
B: The  $R_{qJA}$  is the sum of the thermal impedance from junction to lead  $R_{qJL}$  and lead to ambient.

## Test Circuit:

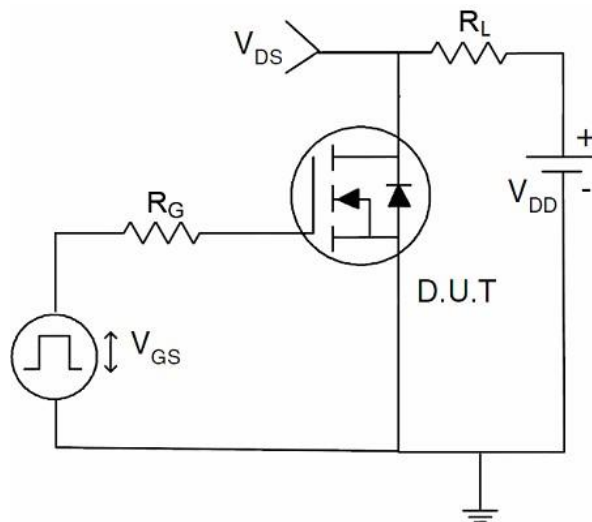
1 、 EAS Test Circuit



2 、 Gate Charge Test Circuit

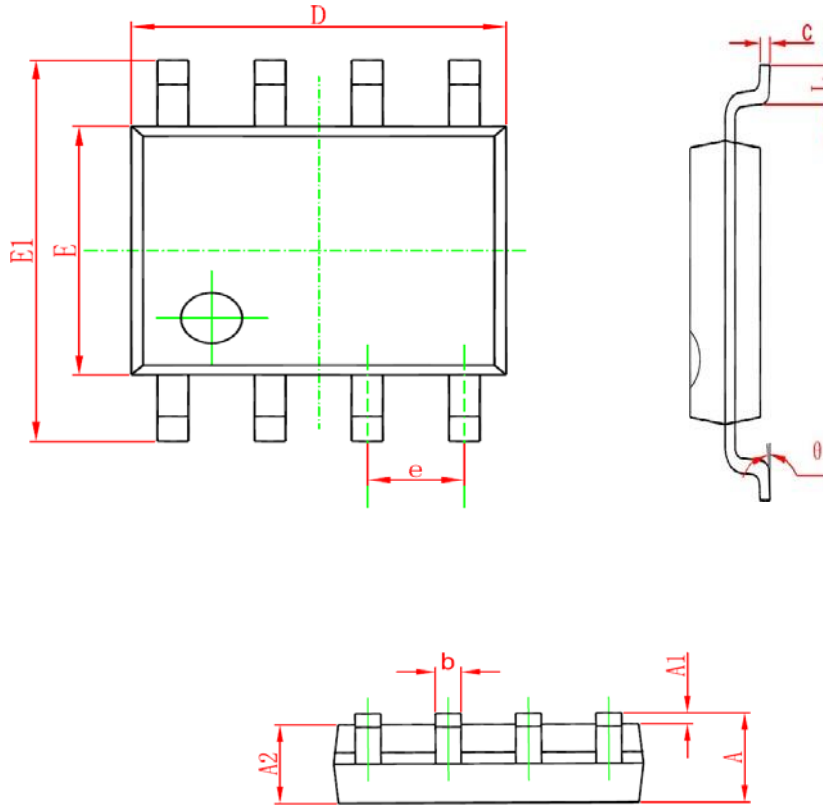


3 、 Switch Time Test Circuit



## Package Information

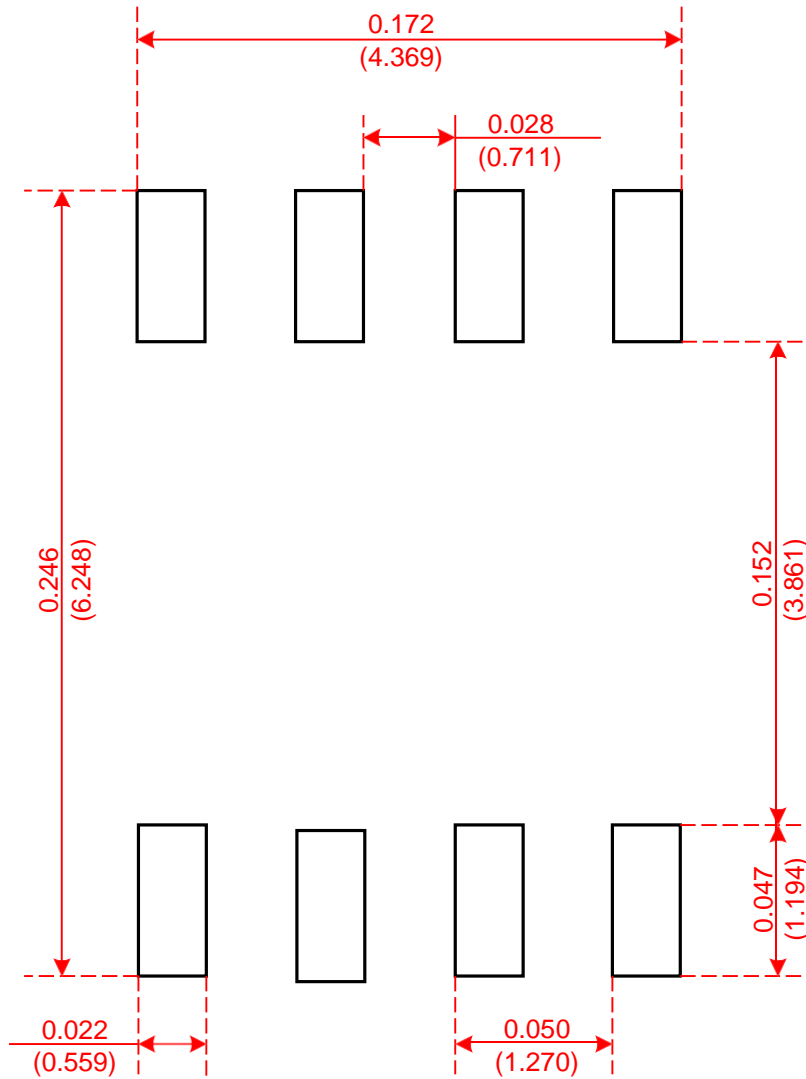
- SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

## Recommended Minimum Pads

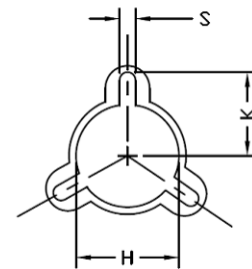
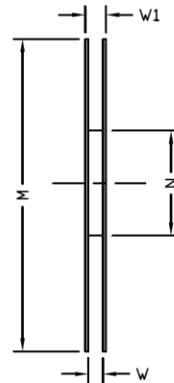
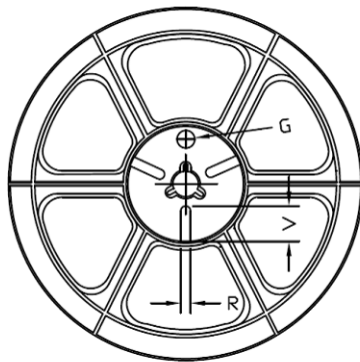
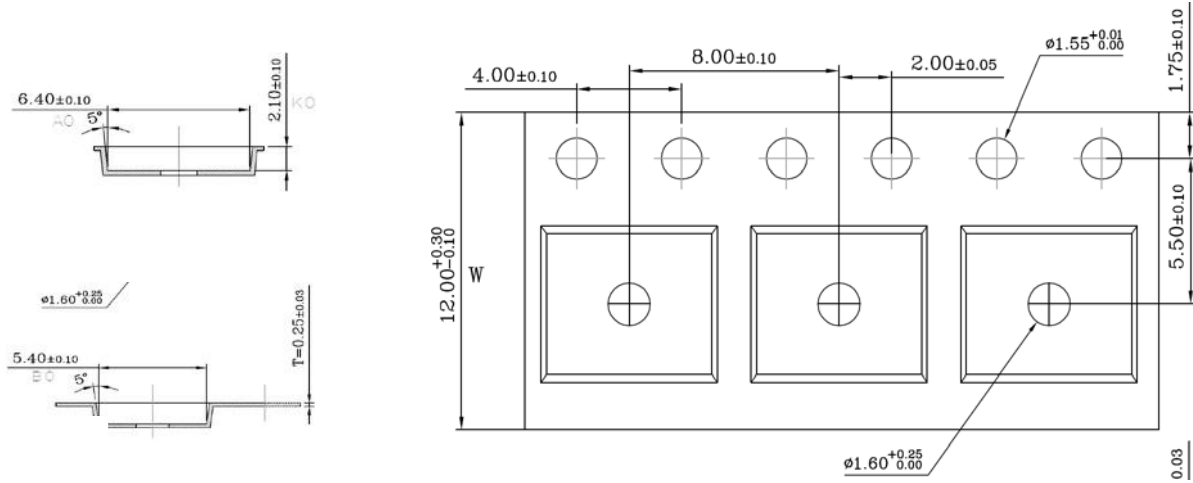
- SOP-8



Recommended Minimum Pads  
Dimensions in Inches/(mm)

## Tape and Reel

- SOP-8



Tape Size	Reel Size	M	N	W	W1	H	K	S	G	R	V
12mm	Φ330	Φ330.00 ±0.50	Φ97.00 ±0.30	13.00 ±0.30	17.40 ±1.00	Φ13.00 ±0.5	10.6	2.00 ±0.50	—	—	—

Unit Per Reel:  
4000pcs

