

## N-Channel Split-Gate Trench Enhancement Mode MOSFET

### Description

The PECN60N04 uses Split-Gate 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

- ◆  $V_{DS} = 40V, I_D = 60A$   
 $R_{DS(ON)} = 3.6m\Omega$  (typical) @  $V_{GS} = 10V$   
 $R_{DS(ON)} = 4.9m\Omega$  (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

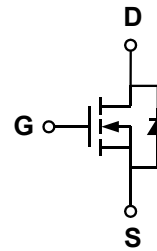
### Application

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

### Package

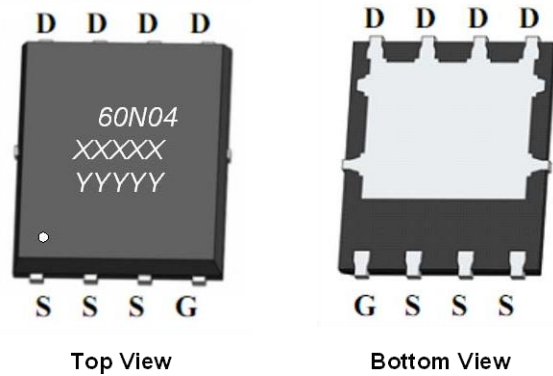
- ◆ DFN5\*6-8L *100% UIS TESTED!*  
*100%  $\Delta V_{ds}$  TESTED!*

### Schematic diagram



### Marking and pin assignment

DFN5×6-8L



Note: XXXXX is the date code, YYYYY is the Quality Code



### Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN60N04QR _G	-55°C to +150°C	DFN5×6-8L	3000

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

parameter	symbol	limit	unit
Drain-source voltage	$V_{DS}$	40	V
Gate-source voltage	$V_{GS}$	±20	V
Drain Current-Continuous (Silicon Limited)	$I_D$	60	A
Drain Current-Continuous( $T_C=100^\circ C$ )	$I_D (100^\circ C)$	40	A
Pulsed Drain Current (Package Limited)	$I_{DM}$	300	A

Single pulse avalanche energy	$E_{AS}$	350	mJ
Maximum power dissipation	$P_D$	65	W
Operating junction Temperature range	$T_j$	-55—150	°C

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

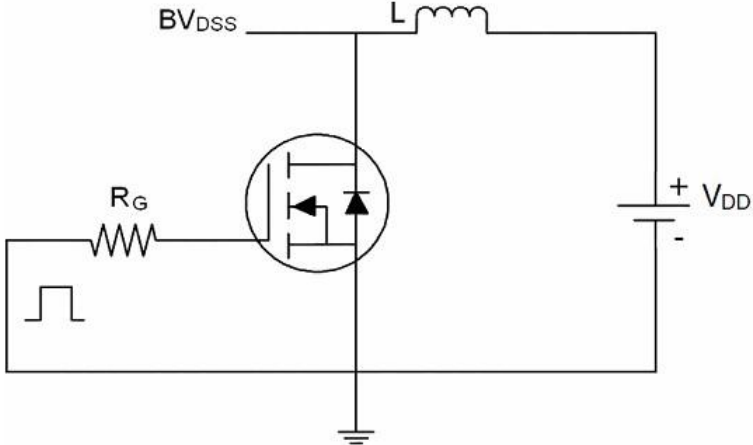
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Drain-source breakdown voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-body leakage	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	$\pm 10$	$\mu A$
<b>ON Characteristics</b>						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.84	2.8	V
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=40A$	-	3.6	5	m $\Omega$
		$V_{GS}=4.5V, I_D=40A$	-	4.9	7.9	
Forward transconductance	$g_{fs}$	$V_{DS}=5V, I_D=40A$	26	30	-	S
<b>Dynamic Characteristics</b>						
Input capacitance	$C_{ISS}$	$V_{DS}=-10V, V_{GS}=0V$ $f=1.0MHz$	-	5000	5400	pF
Output capacitance	$C_{OSS}$		-	890	975	
Reverse transfer capacitance	$C_{RSS}$		-	350	380	
<b>Switching Characteristics</b>						
Turn-on delay time	$t_{D(ON)}$	$V_{DD}=-10V$ $I_D=-2.8A$ $V_{GEN}=-4.5V$ $R_L=10ohm$ $R_{GEN}=-60ohm$	-	14	-	ns
Rise time	$t_r$		-	18	-	
Turn-off delay time	$t_{D(OFF)}$		-	50	-	
Fall time	$t_f$		-	21	-	
Total gate charge	$Q_g$	$V_{DS}=-10V, I_D=-3A$ $V_{GS}=-4.5V$	-	91	-	nC
Gate-source charge	$Q_{gs}$		-	14	-	
Gate-drain charge	$Q_{gd}$		-	22	-	

## Thermal Characteristics

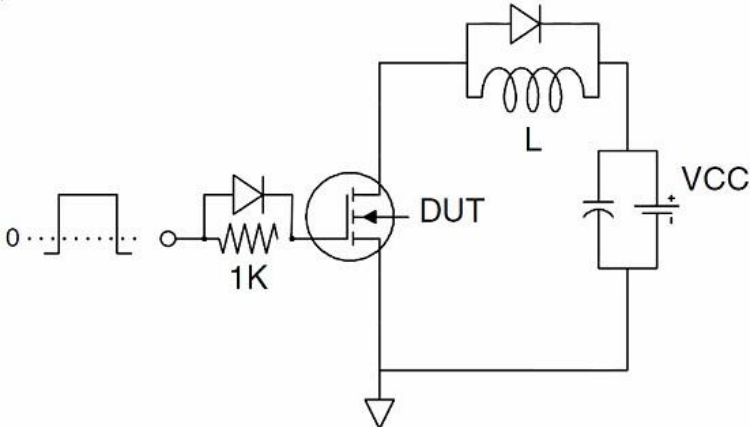
Thermal Resistance junction-to ambient	$R_{th JA}$	100	°C/W
--	-------------	-----	------

Test Circuit:

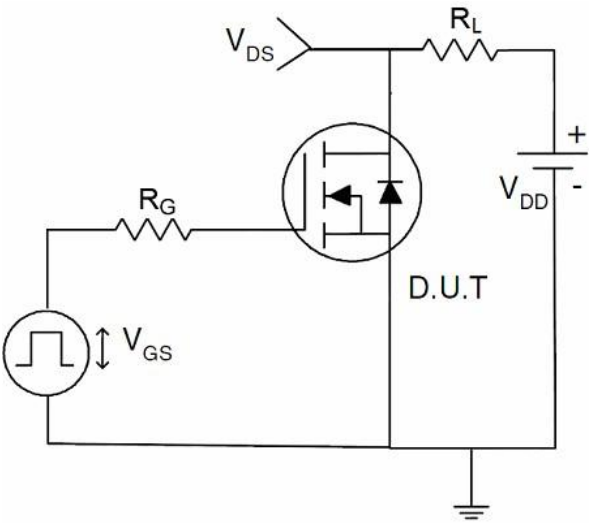
1 、 EAS Test Circuit



2 、 Gate Charge Test Circuit



3 、 Switch Time Test Circuit



## Typical Electrical and Thermal Characteristics (Curves)

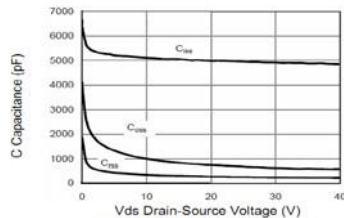
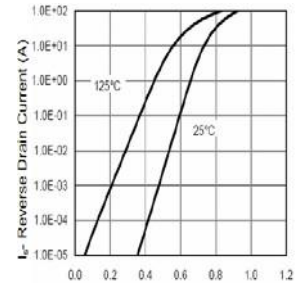
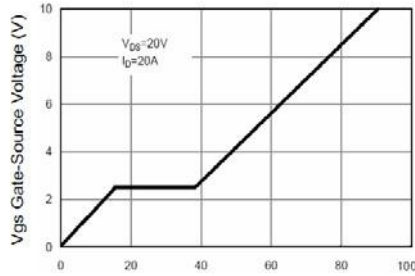
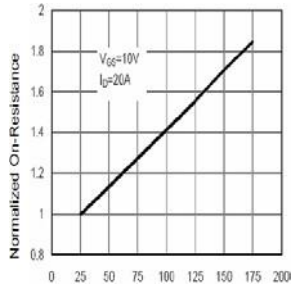
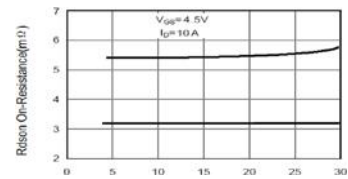
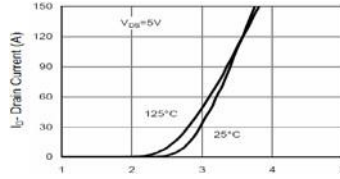
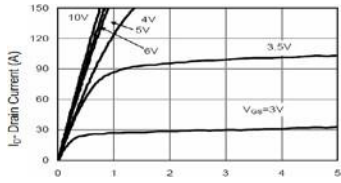


Figure 7 Capacitance vs Vds

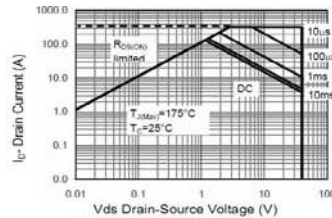


Figure 8 Safe Operation Area

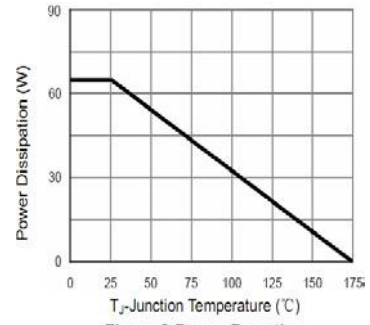


Figure 9 Power De-rating

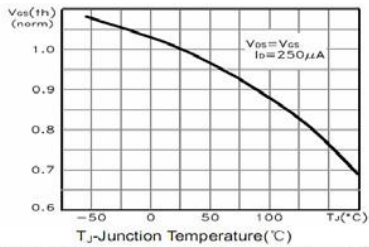


Figure 10  $V_{GS(th)}$  vs Junction Temperature

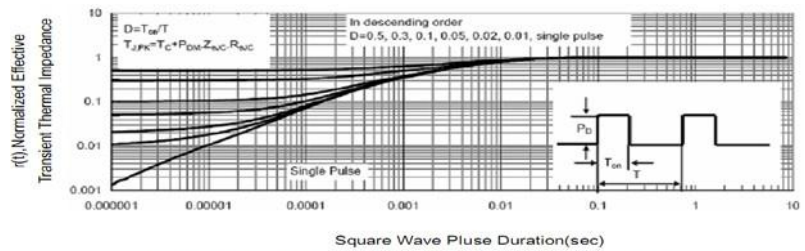
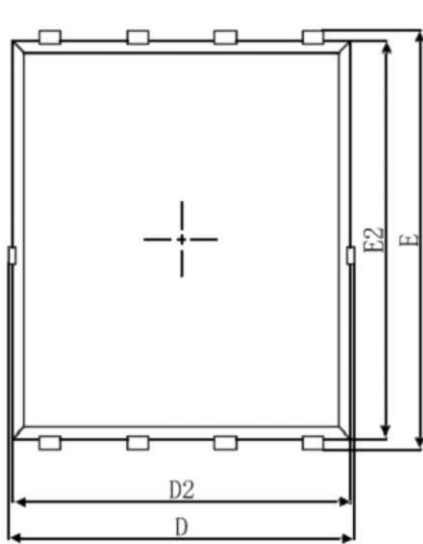


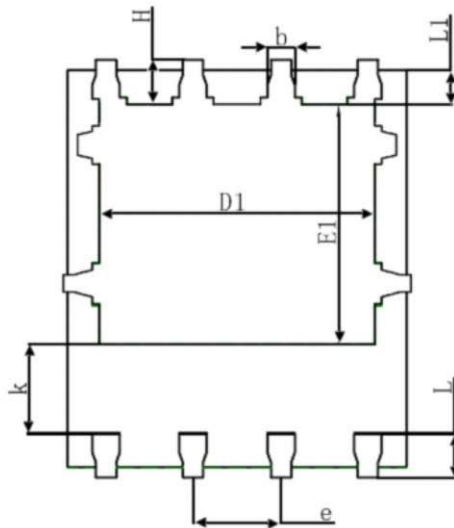
Figure 11 Normalized Maximum Transient Thermal Impedance

## Package Information

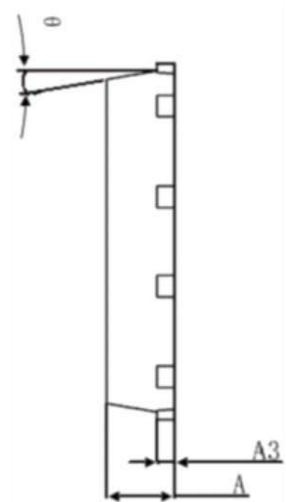
- DFN5×6-8L



Top View  
[顶视图]



Bottom View  
[背视图]



Side View  
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	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	8°	12°	8°	12°