

N-Channel Enhancement Mode MOSFET

Description

The PECN2312MR 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

- ◆ $V_{DS} = 20V$, $I_D = 6A$
 $R_{DS(ON)}(Typ.) = 17m\Omega$ @ $V_{GS} = 2.5V$
 $R_{DS(ON)}(Typ.) = 13.5m\Omega$ @ $V_{GS} = 4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

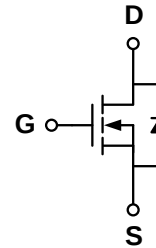
- ◆ PWM applications
- ◆ Load switch

Package

- ◆ SOT-23-3L

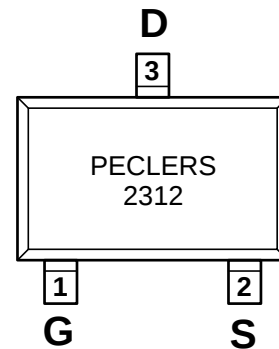


Schematic diagram



Marking and pin assignment

SOT-23-3L
(TOP VIEW)



Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
PECN2312MR	-55°C to +150°C	SOT-23-3L	3000

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

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	20	V
Gate-source voltage		V_{GS}	±12	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	6	A
	$T_C = 70^\circ C$		5	
Pulsed Drain Current ^C		I_{DP}	24	A
power dissipation ^B	$T_C = 25^\circ C$	P_D	1.4	W
	$T_C = 70^\circ C$		0.9	
Junction and Storage Temperature Range		T_J, T_{SGT}	-55—150	°C

Electrical Characteristics (TA=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	20	-	-	V
Zero gate voltage drain current	I _{DSS}	V _{DS} =20V, V _{GS} =0V	-	-	1	μA
Gate-body leakage	I _{GSS}	V _{DS} =0V, V _{GS} =±12V	-	-	±100	nA
ON Characteristics						
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.5	0.7	0.9	V
Drain-source on-state resistance	R _{DS(ON)}	V _{GS} =4.5V, I _D =6A	-	13.5	18	mΩ
		V _{GS} =2.5V, I _D =5.5A	-	17	24	
Forward transconductance	gfs	V _{GS} =5V, I _D =6A	-	10	-	S
Dynamic Characteristics						
Input capacitance	C _{ISS}	V _{DS} =10V ,V _{GS} =0V f=1.0MHz	-	900	-	pF
Output capacitance	C _{OSS}		-	220	-	
Reverse transfer capacitance	C _{RSS}		-	100	-	
Switching Characteristics						
Turn-on delay time	t _{D(ON)}	V _{DD} =10V I _D =6A V _{GEN} =4.5V R _{GEN} =6ohm	-	10	20	ns
Rise time	tr		-	11	25	
Turn-off delay time	t _{D(OFF)}		-	35	70	
Fall time	tf		-	30	60	
Total gate charge	Qg	V _{DS} =10V,I _D =6A V _{GS} =4.5V	-	12	15	nC
Gate-source charge	Qgs		-	2.3	-	
Gate-drain charge	Qgd		-	1	-	
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode forward voltage	V _{SD}	V _{GS} =0V,Is=6A	-	-	1.2	V

Thermal Characteristics

Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^A	$t \leq 10s$	$R_{\theta JA}$	70	90	°C/W
Maximum Junction-to-Ambient ^{A D}	Steady-State		100	125	
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	62	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 $T_A=25^\circ C$. The value in any given application depends on the user's specific board design.

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

C. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=150^\circ C$. Ratings are based on low frequency and duty

Typical Performance Characteristics

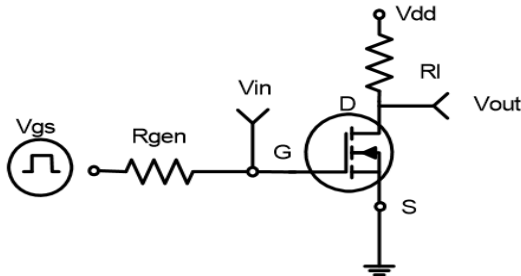


Figure 1: Switching Test Circuit

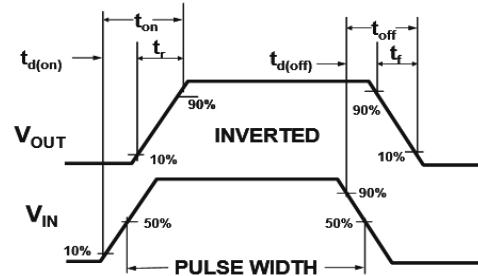


Figure 2: Switching Waveforms

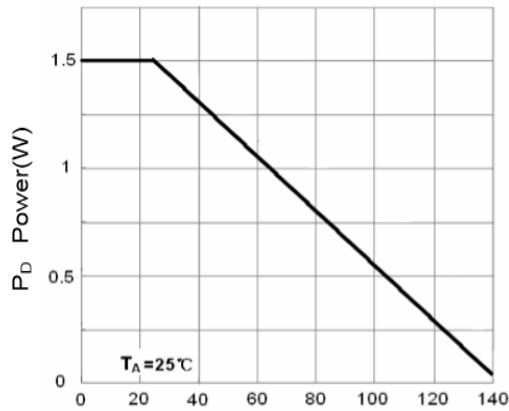


Figure 3 Power Dissipation

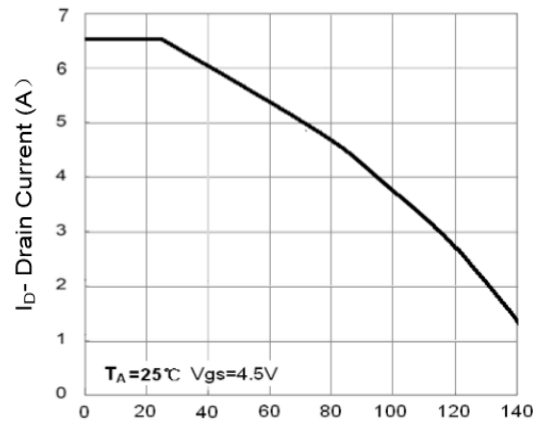


Figure 4 Drain Current

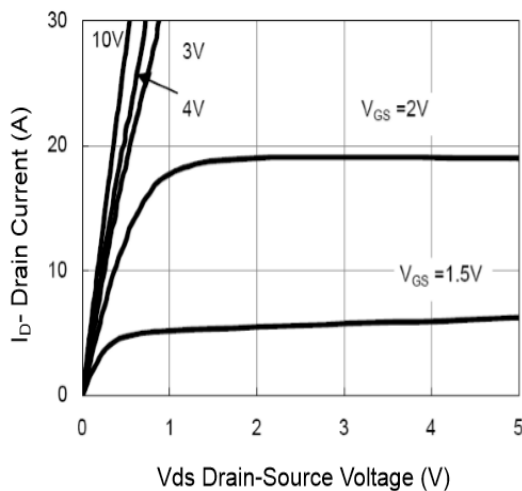


Figure 5 Output Characteristics

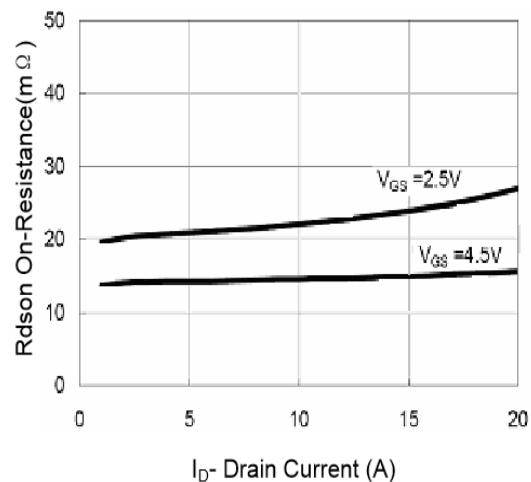


Figure 6 Drain-Source On-Resistance

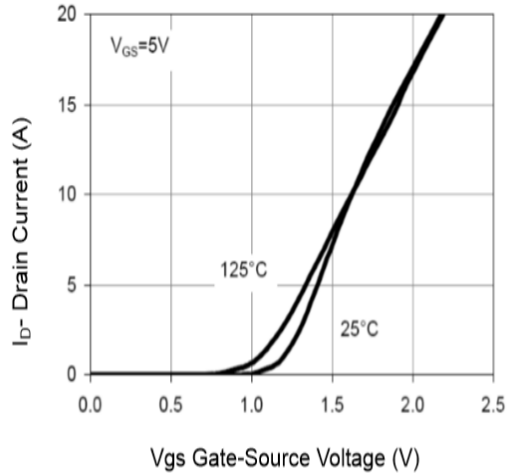


Figure 7 Transfer Characteristics

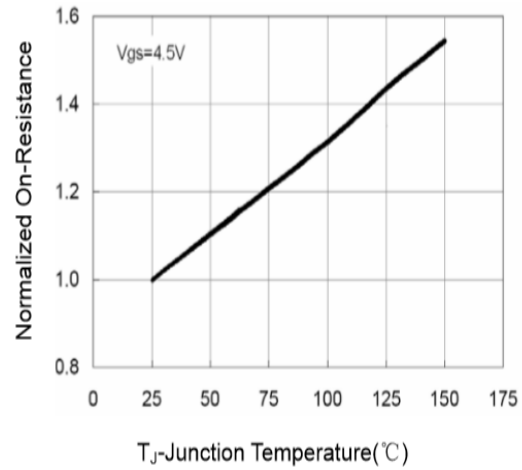


Figure 8 Drain-Source On-Resistance

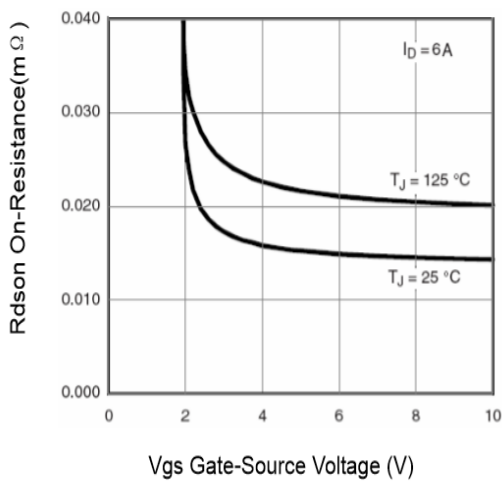


Figure 9 Rdson vs Vgs

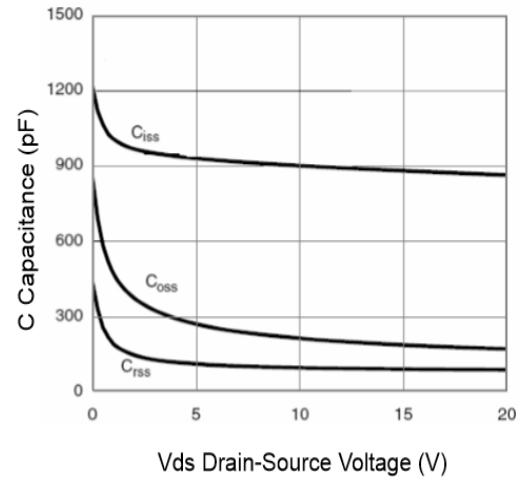


Figure 10 Capacitance vs Vds

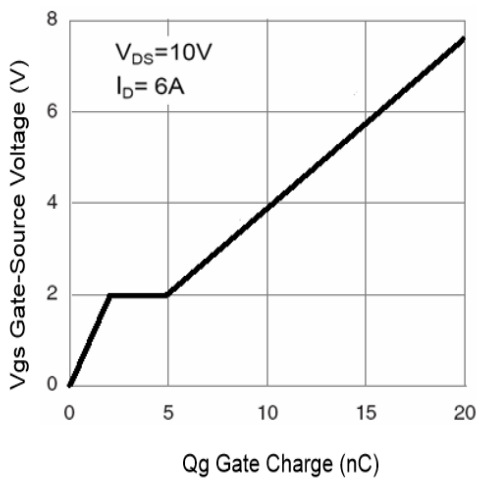


Figure 11 Gate Charge

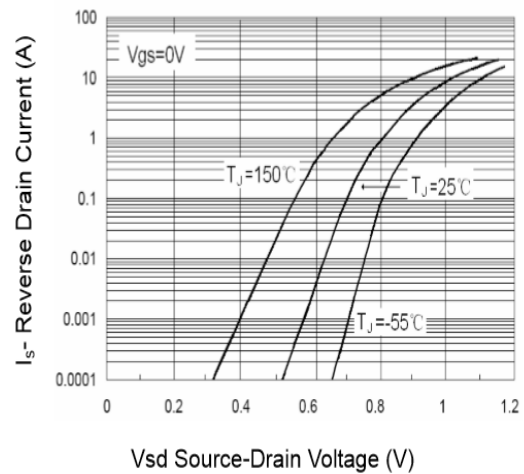


Figure 12 Source- Drain Diode Forward

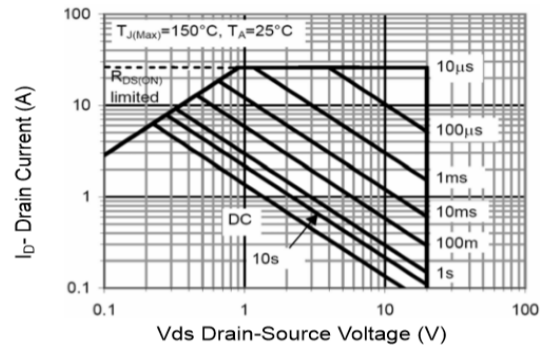


Figure 13 Safe Operation Area

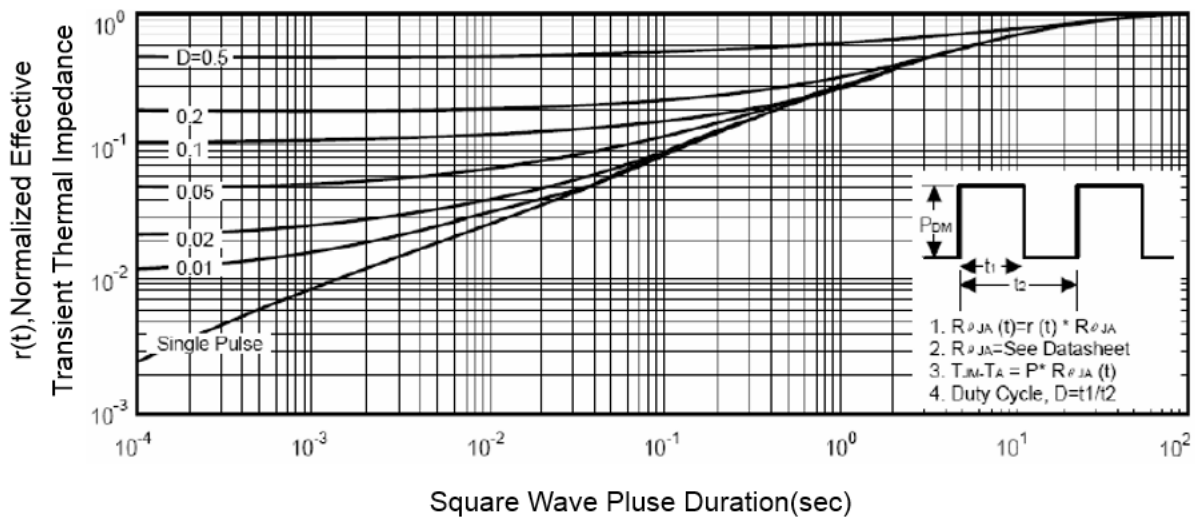
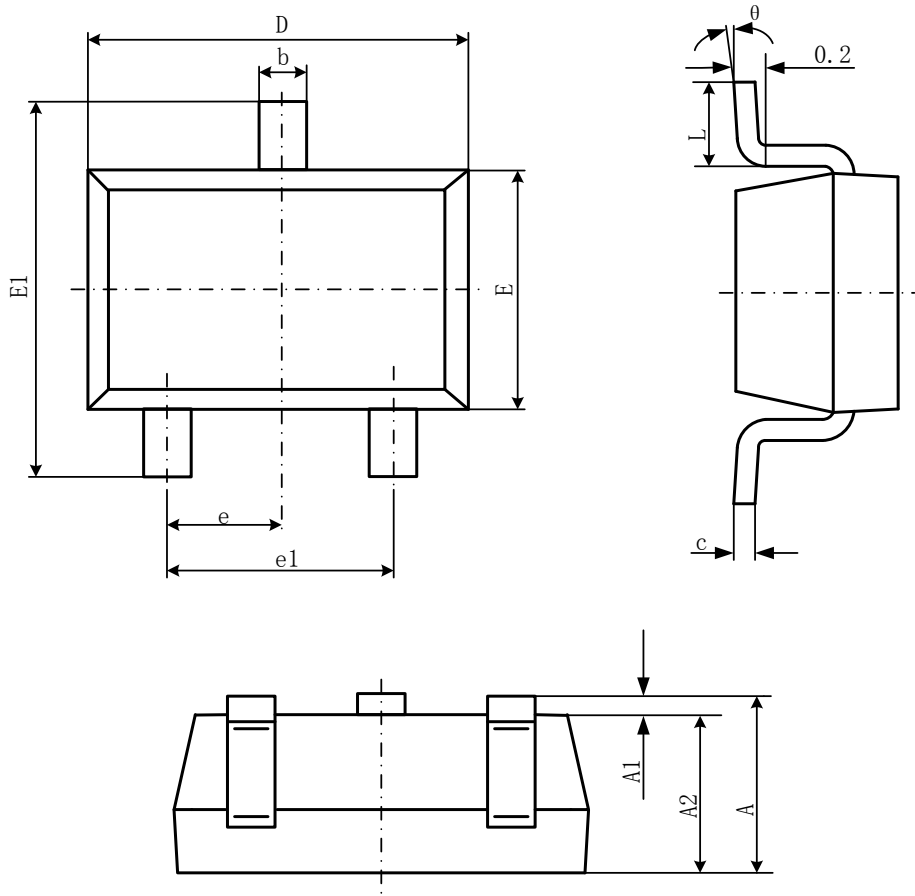


Figure 14 Normalized Maximum Transient Thermal Impedance

- SOT-23-3L



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°