



## N-Channel Enhancement Mode Power MOSFET

### Description

The PE2012 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS} = 18V$ ,  $I_D = 12A$

$R_{DS(ON)} < 11m\Omega @ V_{GS}=4.5V$

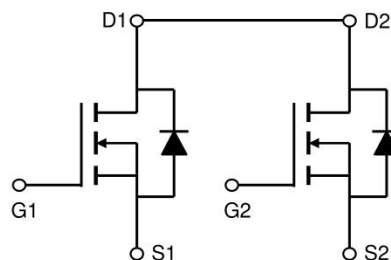
$R_{DS(ON)} < 12m\Omega @ V_{GS}=3.8V$

$R_{DS(ON)} < 13m\Omega @ V_{GS}=2.5V$

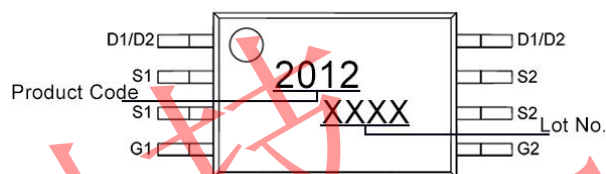
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

### Application

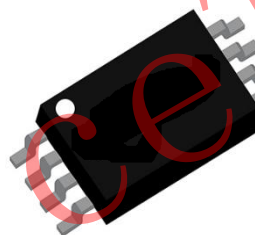
- Battery Protection
- Load switch



Schematic diagram



Marking and pin assignment



TSSOP-8

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	18	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	12	A
Pulsed Drain Current (Note 1)	$I_{DM}$	36	A
Maximum Power Dissipation	$P_D$	1.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	83	°C/W
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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	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	-	18	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=15V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.45	0.65	1.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=5A$	-	8.5	11	m $\Omega$
		$V_{GS}=3.8V, I_D=4A$	-	9	12	m $\Omega$
		$V_{GS}=2.5V, I_D=4A$	-	10	13	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=6A$	-	15	-	S
<b>Dynamic Characteristics (Note 4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$	-	1420	-	pF
Output Capacitance	$C_{oss}$		-	350	-	pF
Reverse Transfer Capacitance (Note 4)	$C_{rss}$		-	330	-	pF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L=1.2\Omega,$ $V_{GS}=10V, R_G=3\Omega$	-	2.5	-	nS
Turn-on Rise Time	$t_r$		-	7.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	49	-	nS
Turn-Off Fall Time	$t_f$		-	10.8	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=5A,$ $V_{GS}=4.5V$	-	18	-	nC
Gate-Source Charge	$Q_{gs}$		-	2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	4.7	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=1A$	-	-	1.2	V

**Notes:**

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to product.



Typical Electrical and Thermal Characteristics



Figure 1 Switching Test Circuit

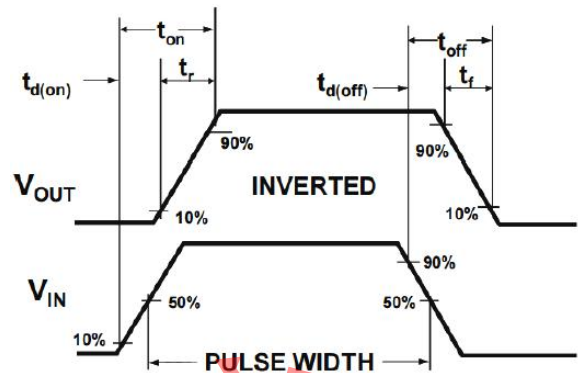


Figure 2 Switching Waveform

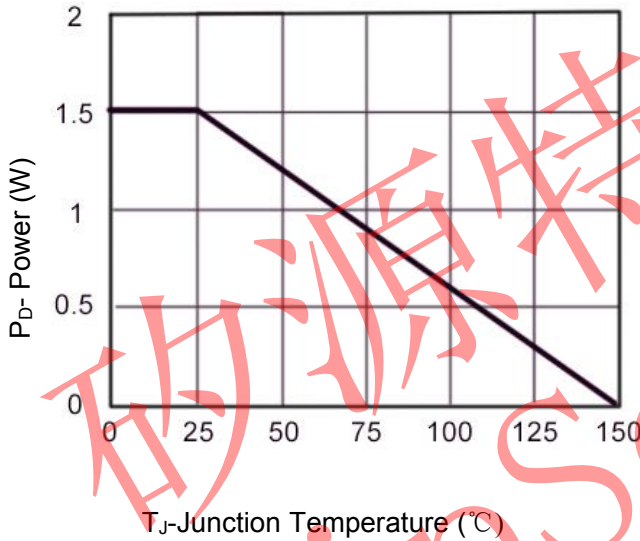


Figure 3 Power Dissipation

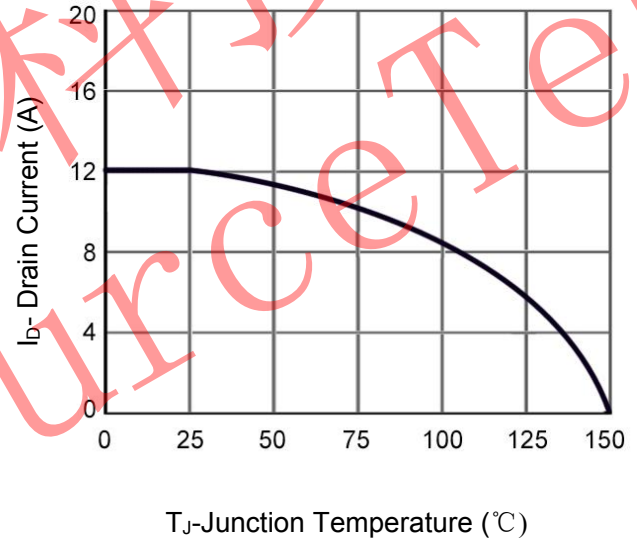


Figure 4 Drain Current

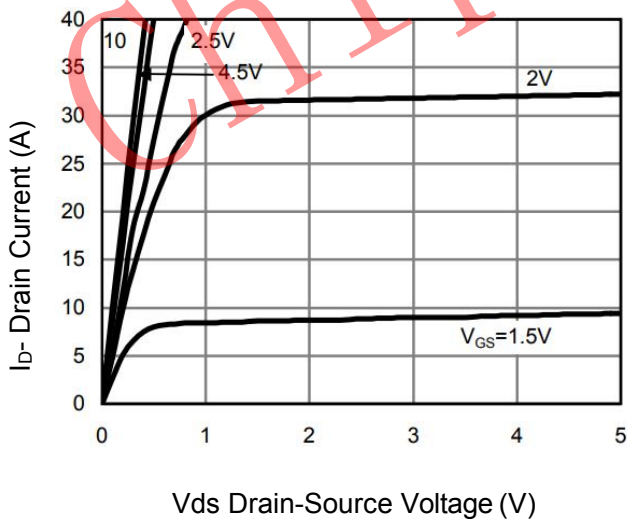


Figure 5 Output Characteristics

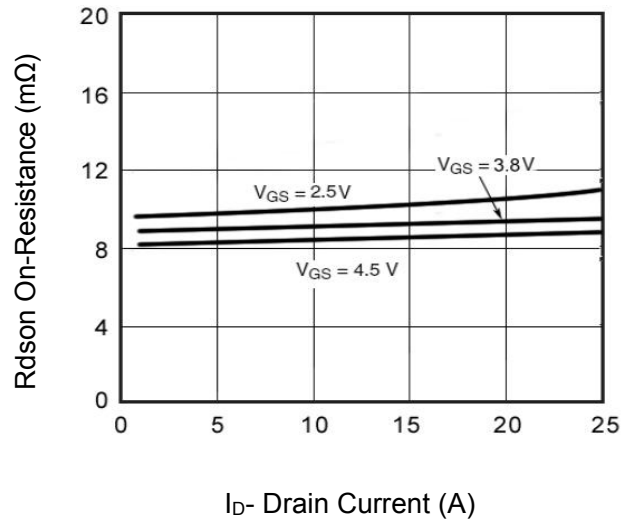


Figure 6 R\_dson vs Drain Current

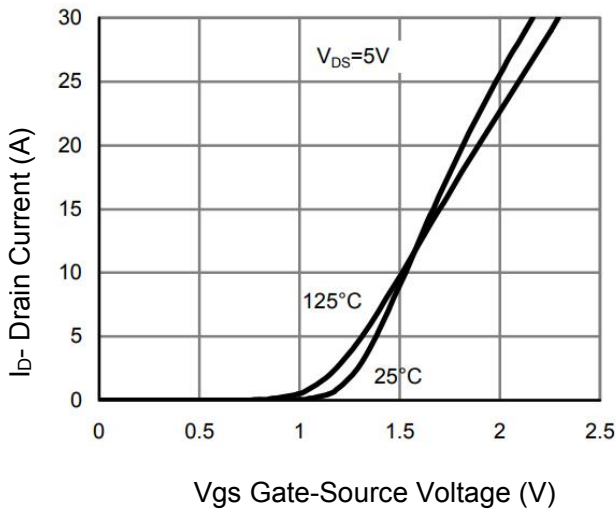


Figure 7 Transfer Characteristics

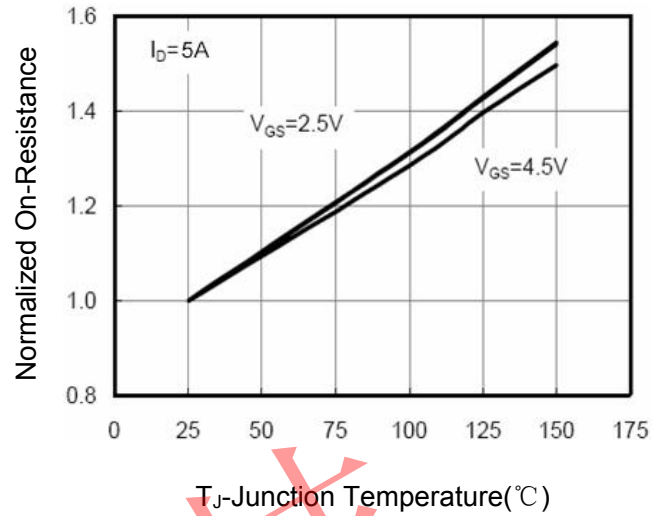


Figure 8  $R_{dson}$  vs Junction Temperature

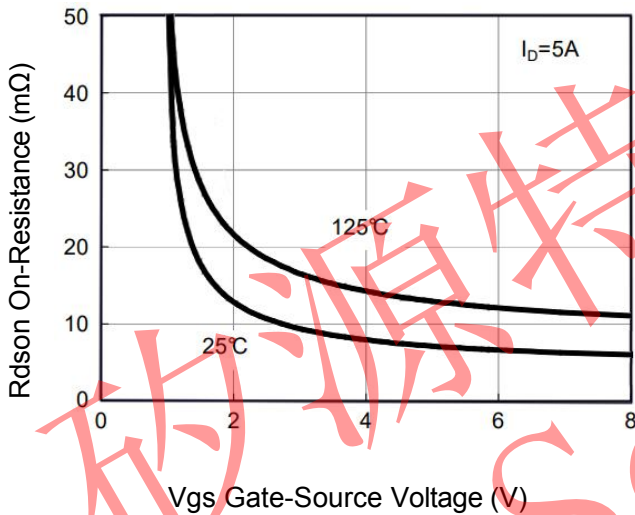


Figure 9  $R_{dson}$  vs  $V_{GS}$

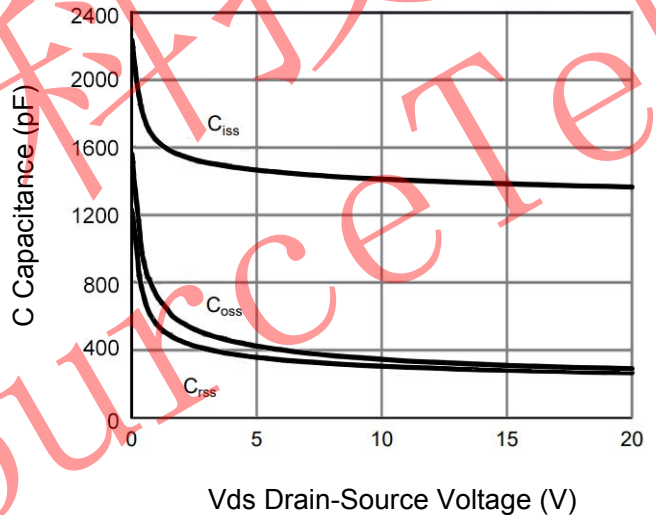


Figure 10 Capacitance vs  $V_{ds}$

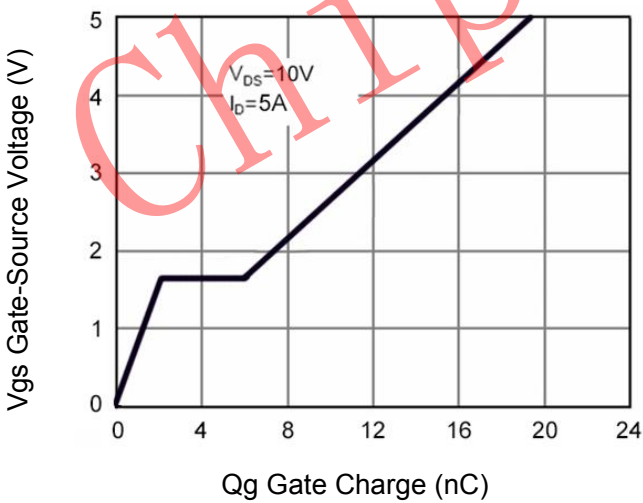


Figure 11 Gate Charge

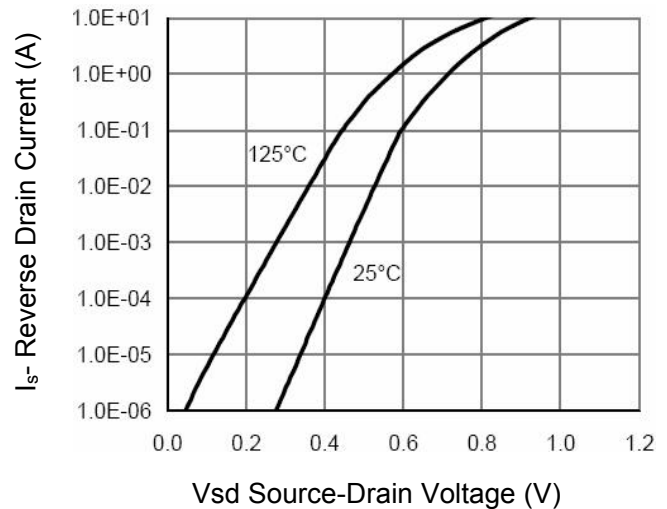


Figure 12 Source- Drain Diode Forward

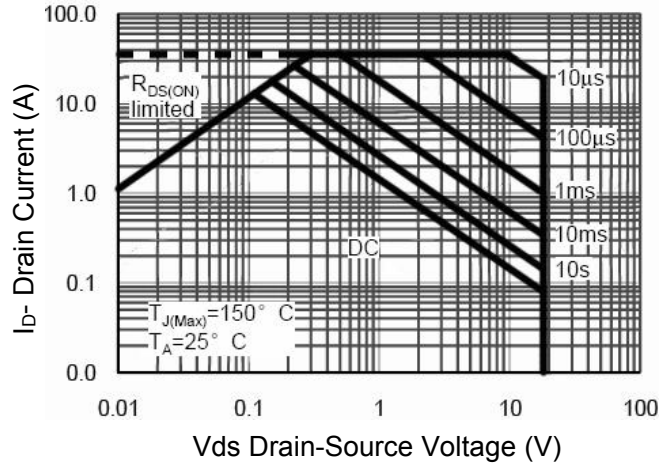


Figure 13 Safe Operation Area

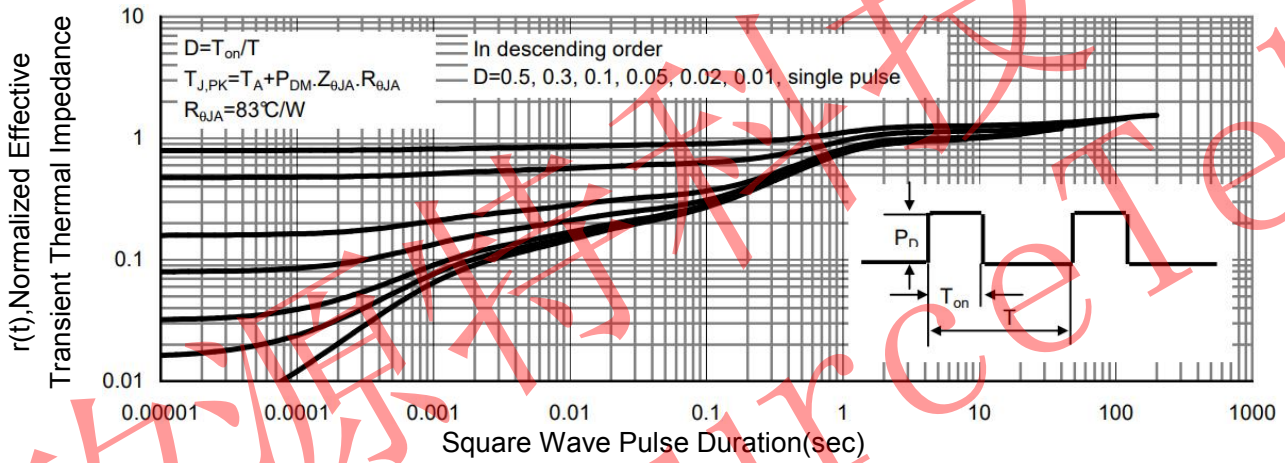
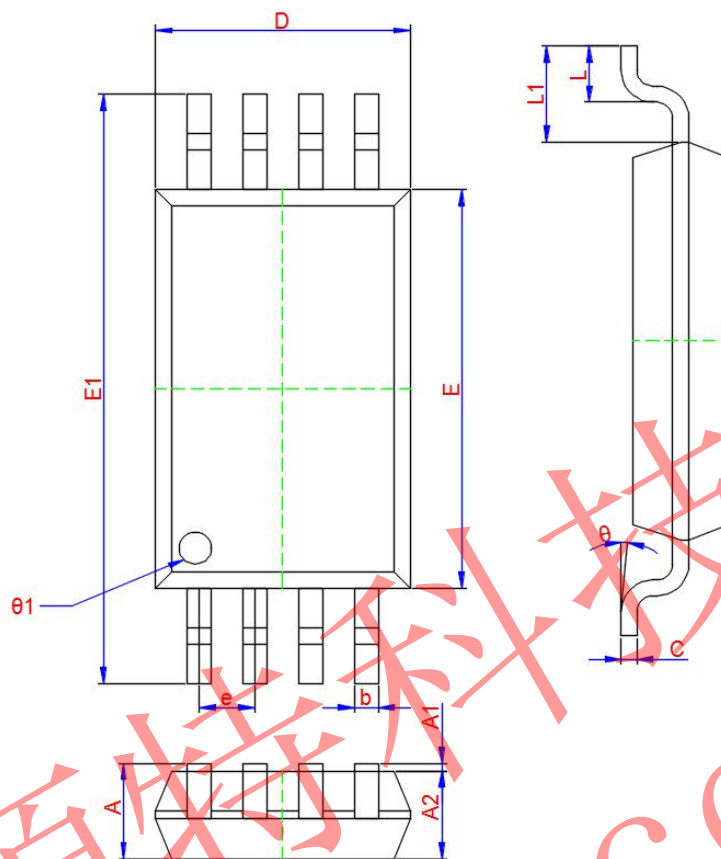


Figure 14 Normalized Maximum Transient Thermal Impedance



TSSOP-8 Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.000	1.150	1.200
A1	0.020	0.100	0.180
A2	0.900	1.000	1.100
b	0.170	0.220	0.270
c	0.122	0.127	0.132
L	0.400	0.600	0.800
D	2.870	2.970	3.070
E	4.300	4.400	4.500
E1	6.200	6.400	6.600
$\theta$	0°	5°	10°
L1	1.00TYP		
e	0.65TYP		