



## N-Channel Enhancement Mode Power MOSFET

### Description

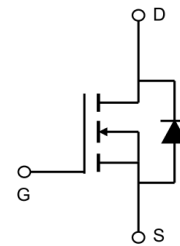
The PE8312F uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications.

### General Features

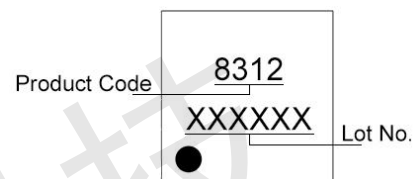
- $V_{DS} = 30V$ ,  $I_D = 12A$
- $R_{DS(ON)} < 7m\Omega$  @  $V_{GS}=10V$
- $R_{DS(ON)} < 14.5m\Omega$  @  $V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### Application

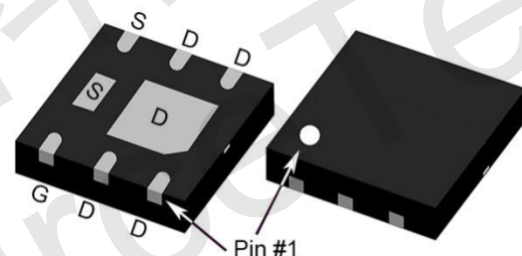
- PWM applications
- Load switch
- Power management
- Battery Protection



Schematic diagram



Marking and pin assignment



UDFN2x2-6L

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	12	A
Drain Current-Continuous (TA=70°C)	$I_D$	8	A
Pulsed Drain Current (Note 1)	$I_{DM}$	36	A
Maximum Power Dissipation	$P_D$	2.8	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	73	°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	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=12A$	-	5.5	7	m $\Omega$
		$V_{GS}=4.5V, I_D=8A$	-	11	14.5	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=10A$	-	42	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	$C_{ISS}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	1300	-	pF
Output Capacitance	$C_{OSS}$		-	175	-	pF
Reverse Transfer Capacitance (Note 4)	$C_{RSS}$		-	121	-	pF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, R_L=1\Omega,$ $V_{GS}=10V, R_G=3\Omega$	-	4.2	-	nS
Turn-on Rise Time	$t_r$		-	8.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	31	-	nS
Turn-Off Fall Time	$t_f$		-	4	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=10A,$ $V_{GS}=10V$	-	28	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	7	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	6	A

**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

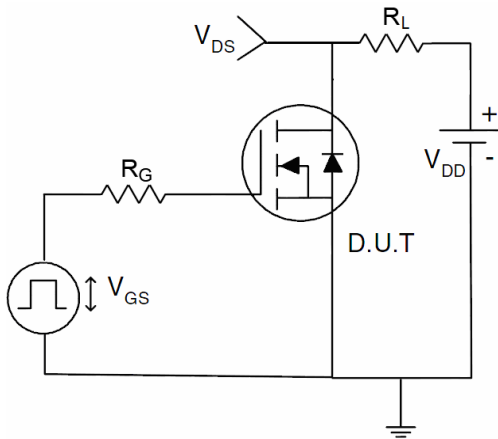


Figure 1 Switching Test Circuit

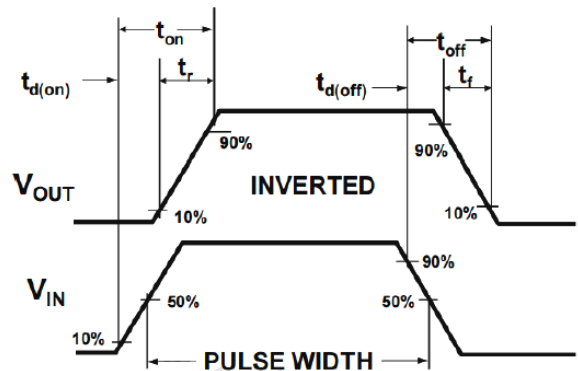


Figure 2 Switching Waveform

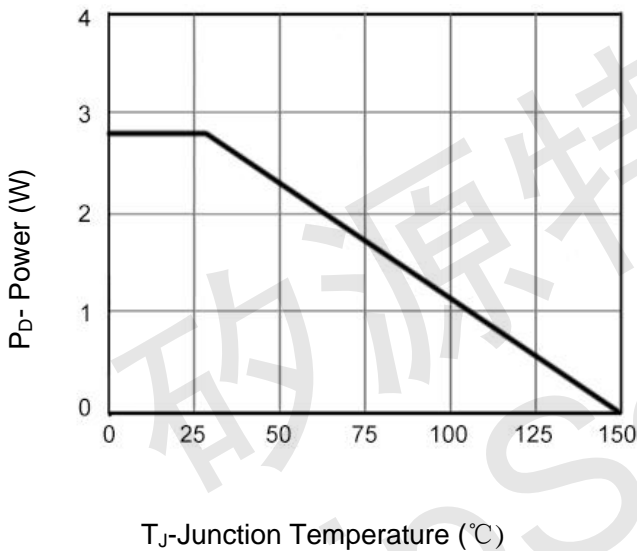


Figure 3 Power De-rating

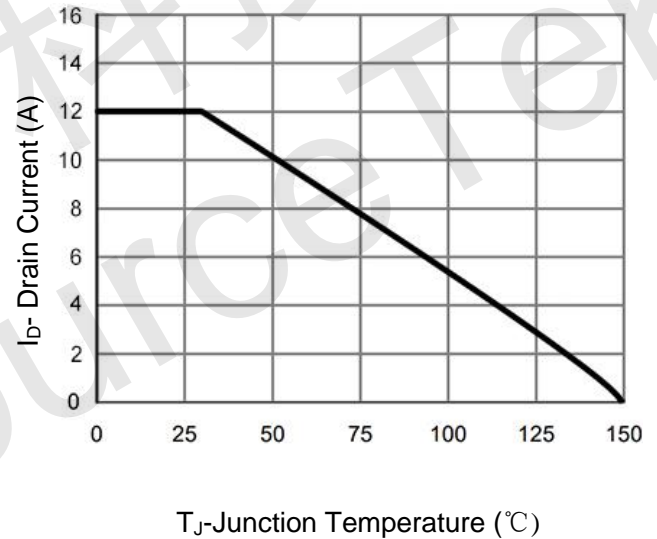


Figure 4 Drain Current

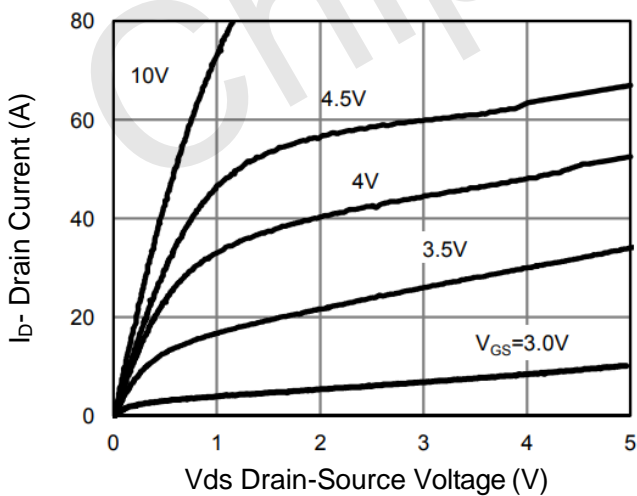


Figure 5 Output Characteristics

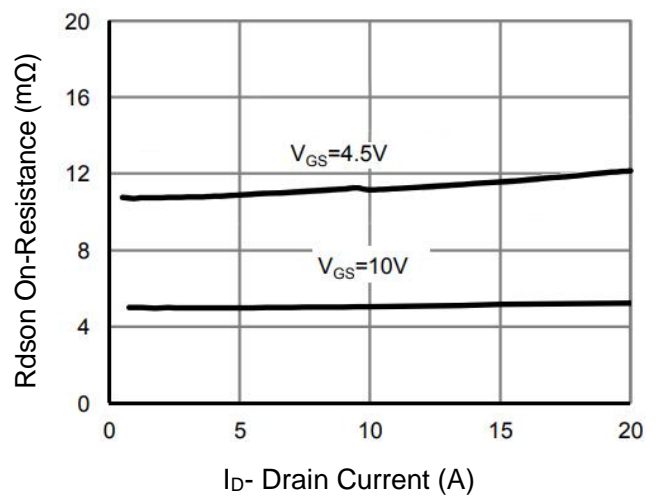


Figure 6 Rdson vs Drain Current

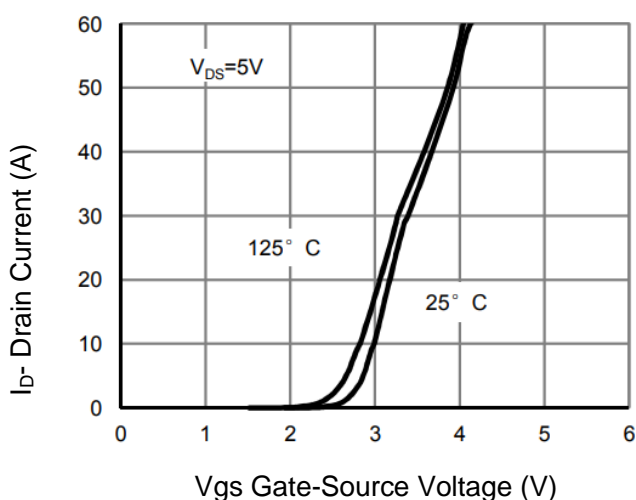


Figure 7 Transfer Characteristics

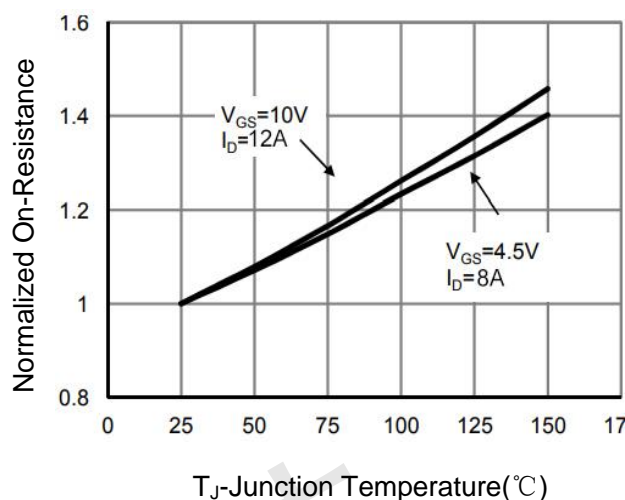


Figure 8 Rds(on) vs Junction Temperature

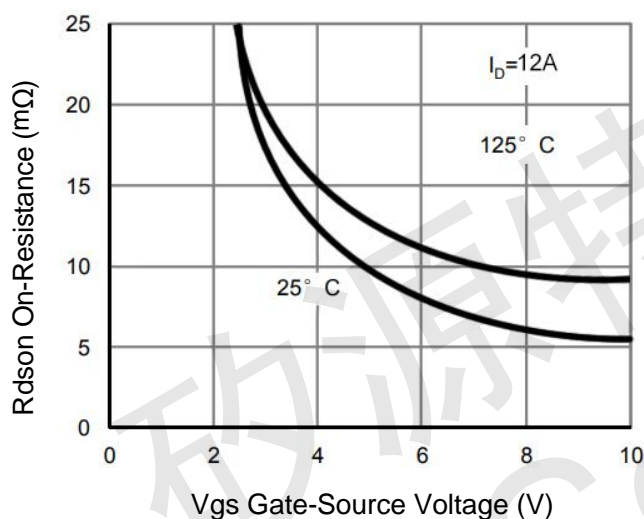


Figure 9 Rds(on) vs Vgs

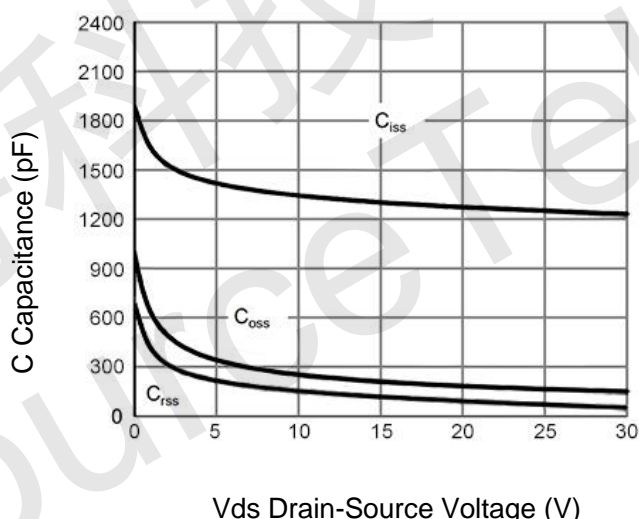


Figure 10 Capacitance vs Vds

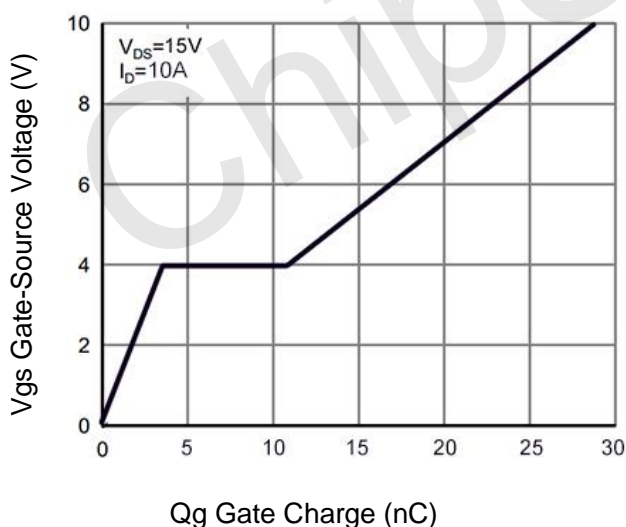


Figure 11 Gate Charge

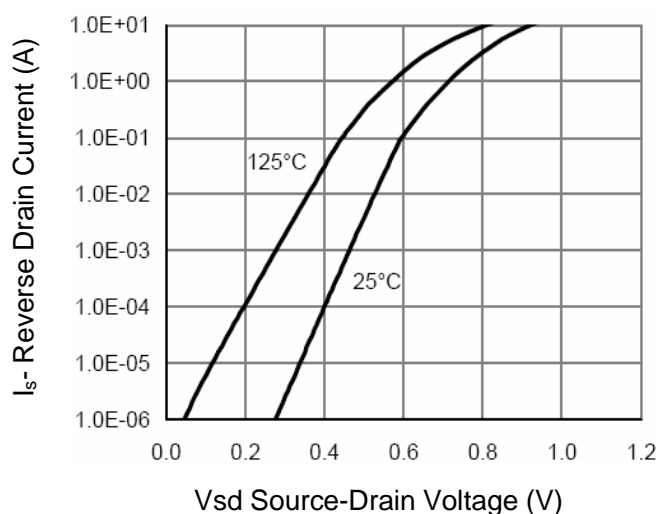


Figure 12 Source- Drain Diode Forward

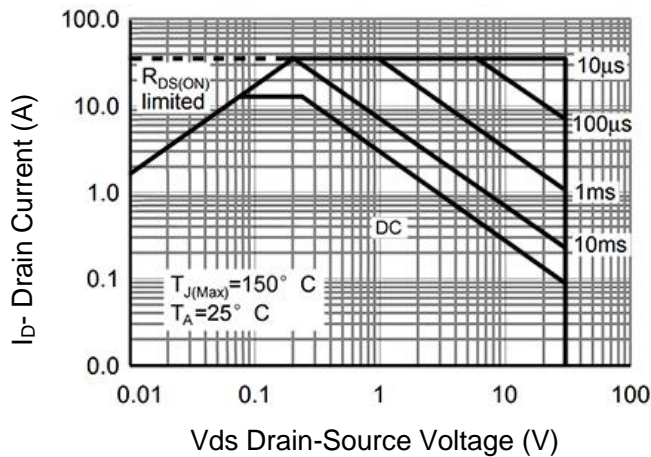


Figure 13 Safe Operation Area

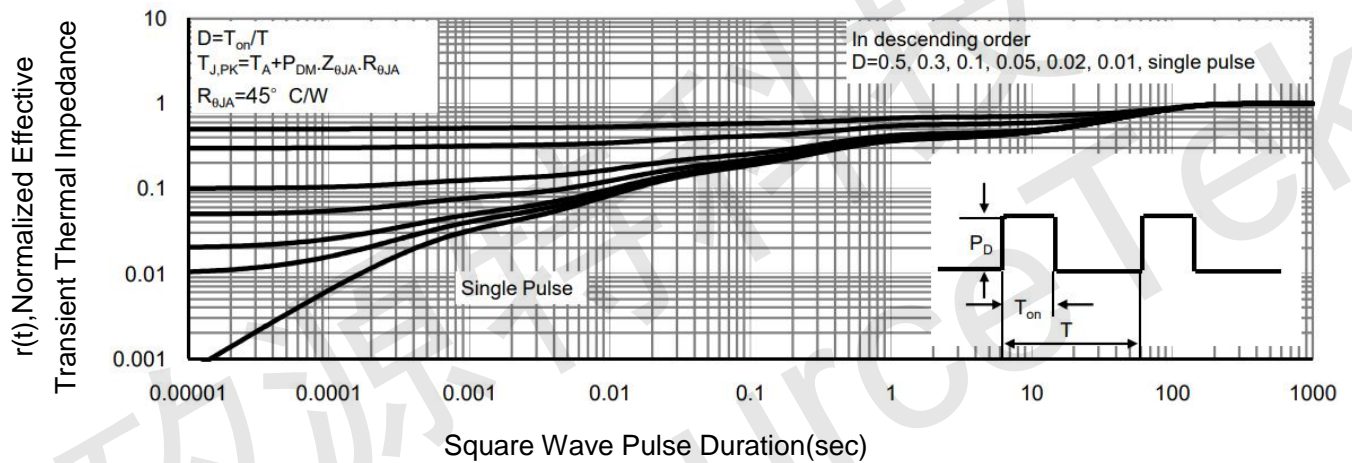
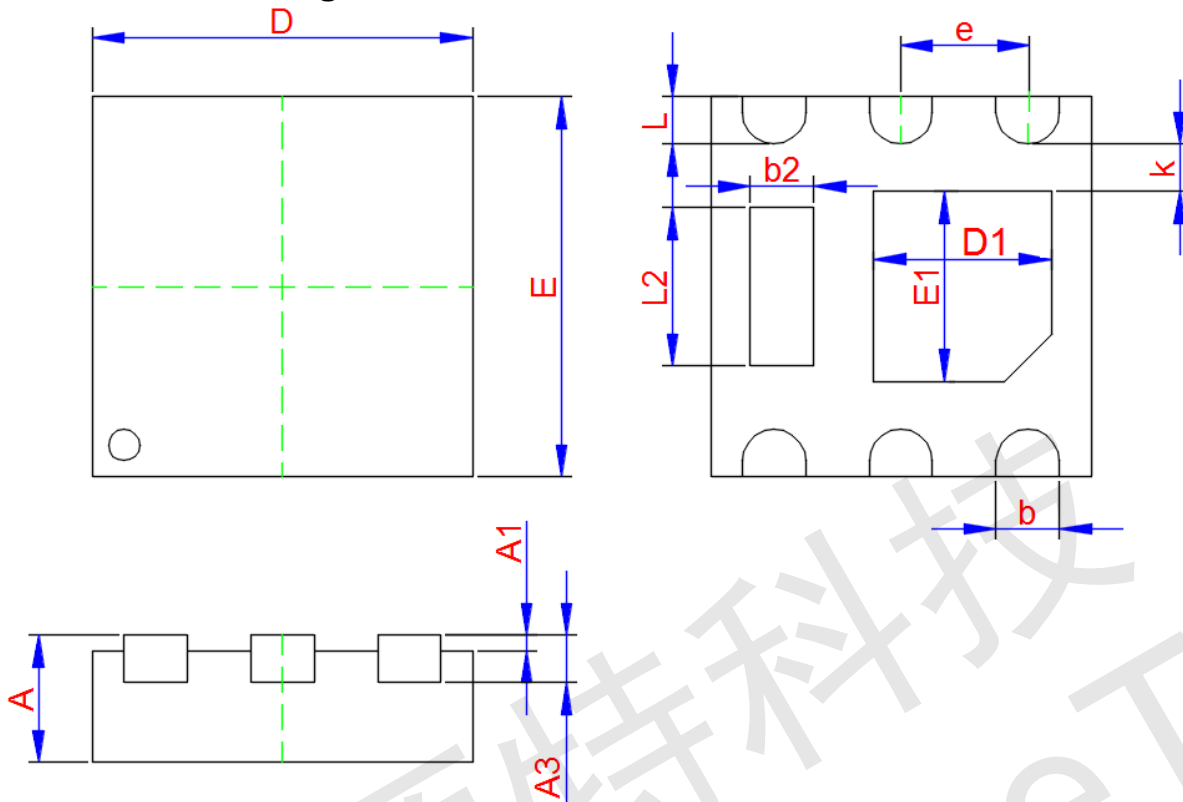


Figure 14 Normalized Maximum Transient Thermal Impedance



UDFN2x2-6L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.450	0.500	0.550
A1	0.000	-	0.050
A3	0.120	0.150	0.190
D	1.950	2.000	2.050
E	1.950	2.000	2.050
D1	0.970	1.000	1.030
E1	0.970	1.000	1.030
b	0.250	0.300	0.350
L	0.200	0.250	0.300
b2	0.250	0.300	0.350
L2	0.750	0.800	0.850
k	0.250MIN.		
e	0.650TYP.		