

N-Channel Enhancement Mode Power MOSFET

Description

The PE592120Q uses deep trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

General Features

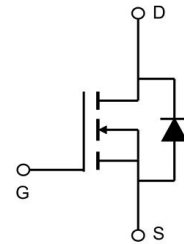
- $V_{DS} = 135V$, $I_D = 120A$

$$R_{DS(ON)} < 5.0m\Omega @ V_{GS}=10V$$

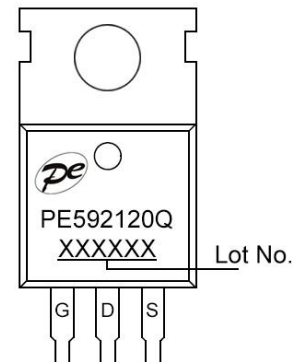
- High Power and current handling capability
- Lead free product is acquired

Application

- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



TO-220

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	135	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	120	A
Drain Current-Continuous ($T_C=100^\circ C$)	$I_D(T_C=100^\circ C)$	89	A
Pulsed Drain Current (Note 1)	I_{DM}	480	A
Maximum Power Dissipation	P_D	375	W
Avalanche Energy ($L=1.0mH$)	E_{AS}	2312	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	0.4	$^\circ C/W$
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Electrical Characteristics (TC=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	135	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=135V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.0	3.9	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=50A$	3.6	4.2	5.0	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=50A$	-	122	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=70V, V_{GS}=0V,$ $F=1.0MHz$	-	9267	-	pF
Output Capacitance	C_{oss}		-	923	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	27	-	pF
Gate Resistance	R_g	$F=1.0MHz$	-	3	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=70V, I_D=50A,$ $V_{GS}=10V, R_G=3\Omega$	-	36	-	nS
Turn-on Rise Time	t_r		-	21	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	83	-	nS
Turn-Off Fall Time	t_f		-	13	-	nS
Total Gate Charge	Q_g	$V_{DS}=70V, I_D=50A,$ $V_{GS}=10V$	-	123	-	nC
Gate-Source Charge	Q_{gs}		-	41	-	nC
Gate-Drain Charge	Q_{gd}		-	22	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=10A$	-	0.9	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=50A, di/dt=125A/\mu s$		177		ns
Body Diode Reverse Recovery Charge	Q_{rr}			538		nC

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

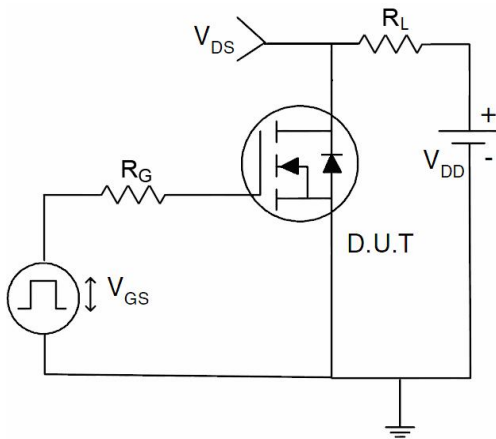


Figure 1 Switching Test Circuit

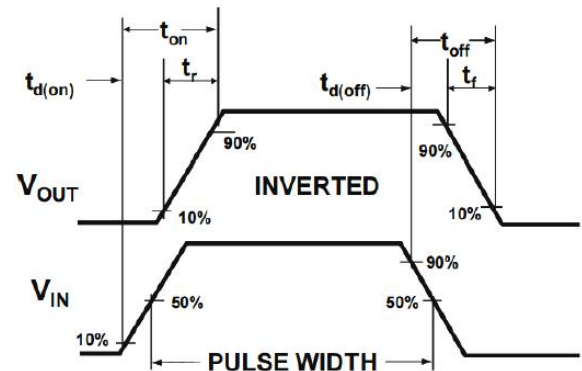


Figure 2 Switching Waveform

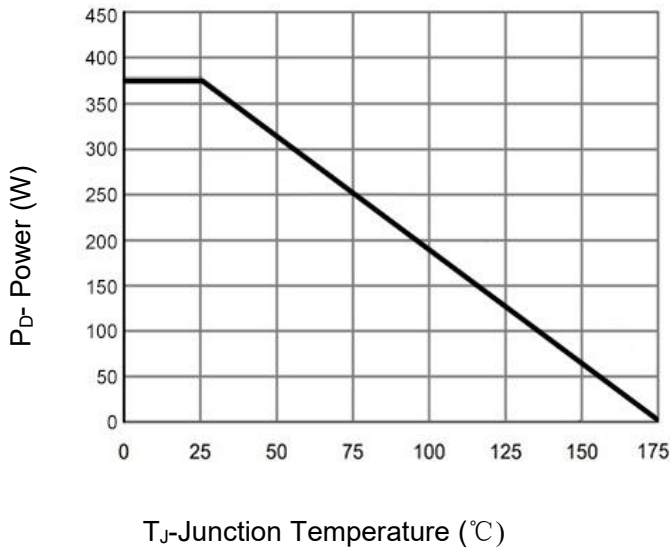


Figure 3 Power De-rating

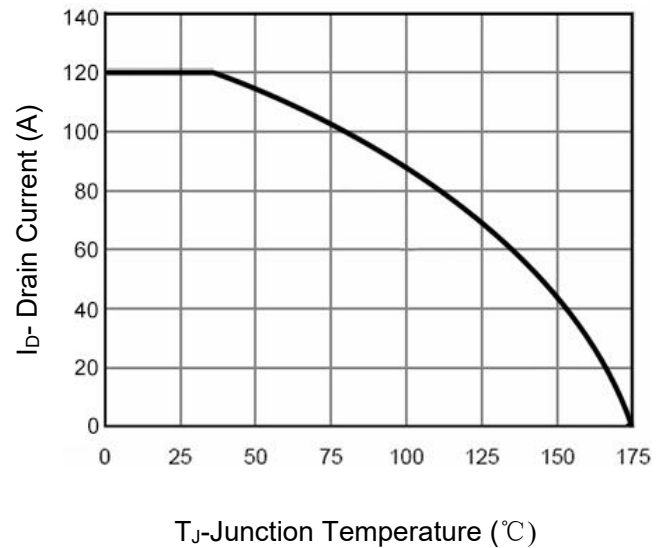


Figure 4 Drain Current

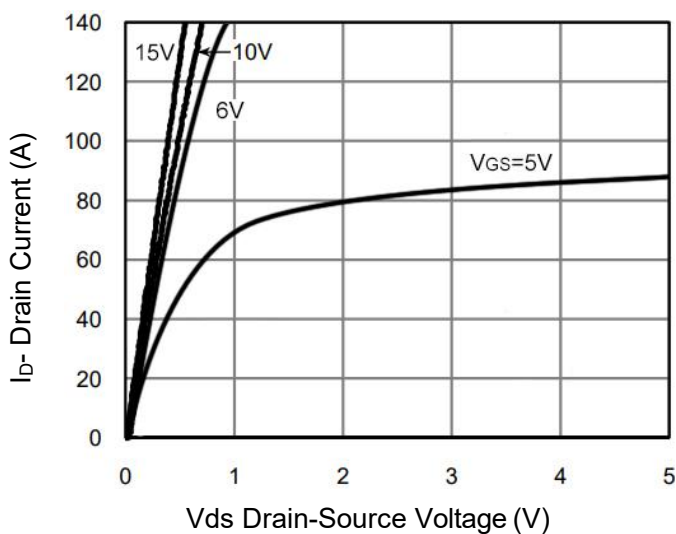


Figure 5 Output Characteristics

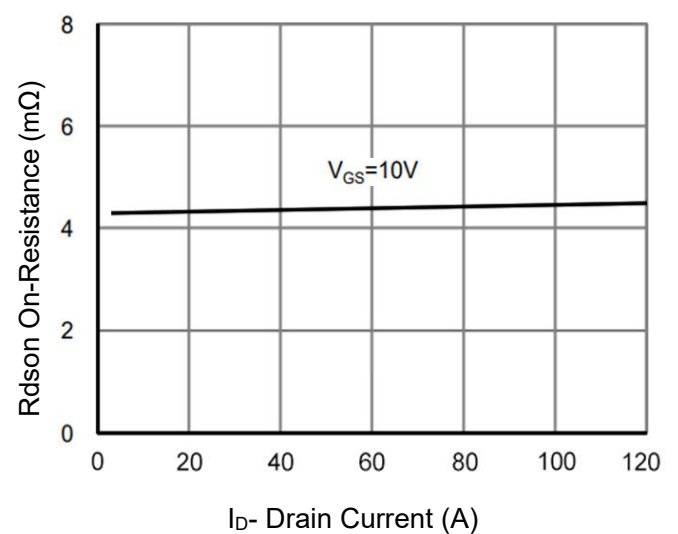


Figure 6 Rdson vs Drain Current

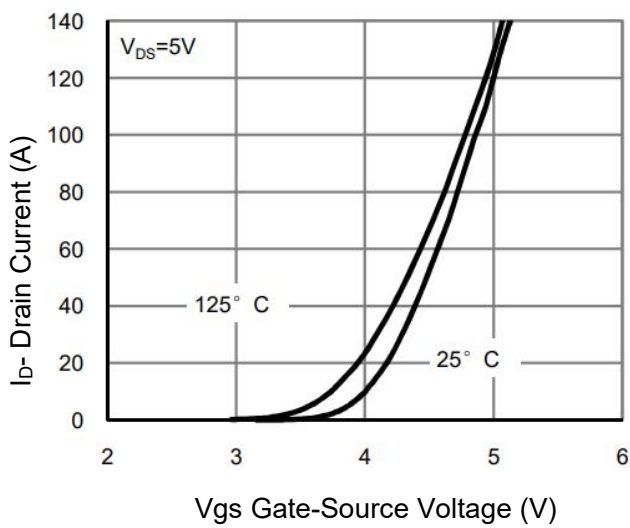


Figure 7 Transfer Characteristics

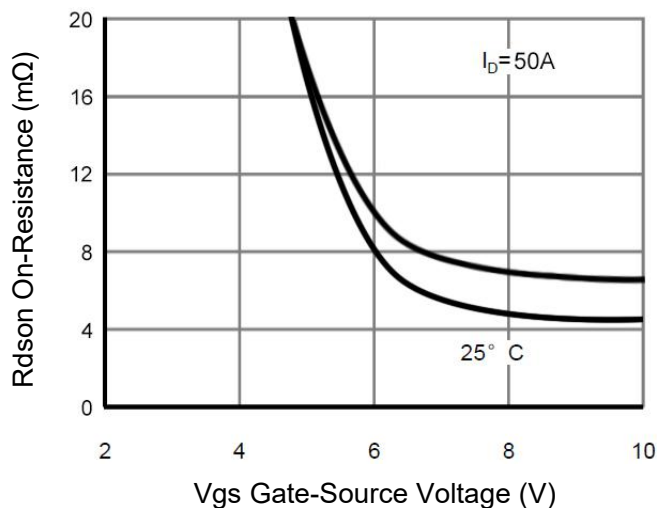


Figure 9 Rdson vs Vgs

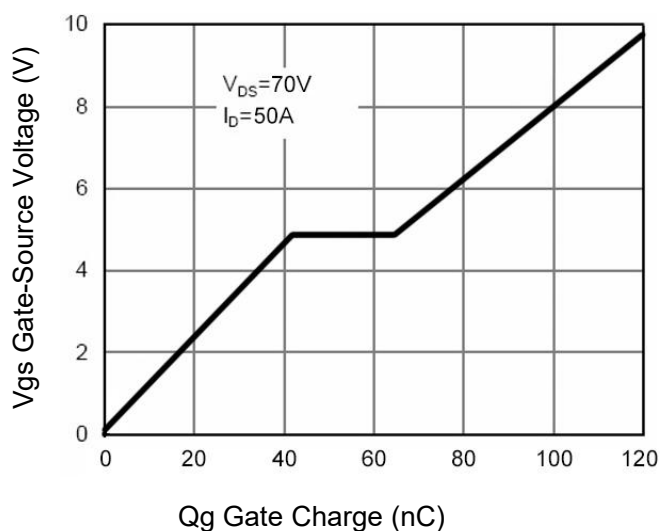


Figure 11 Gate Charge

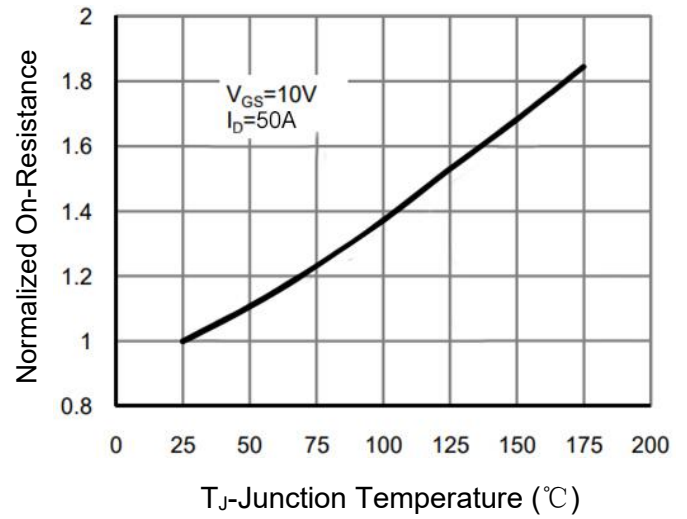


Figure 8 Rdson vs Junction Temperature

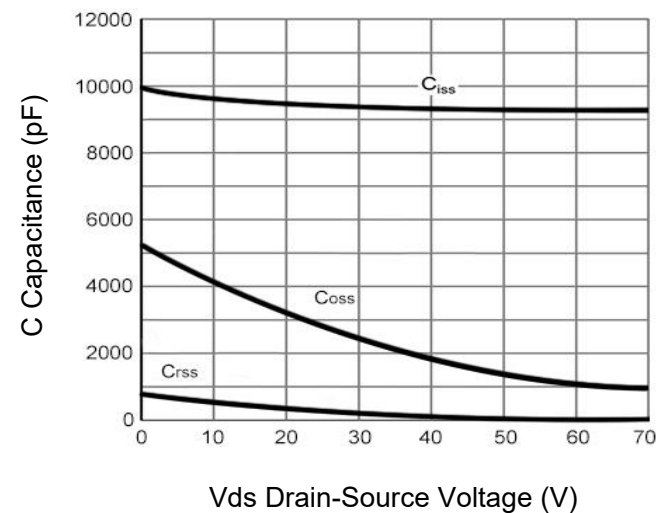


Figure 10 Capacitance vs Vds

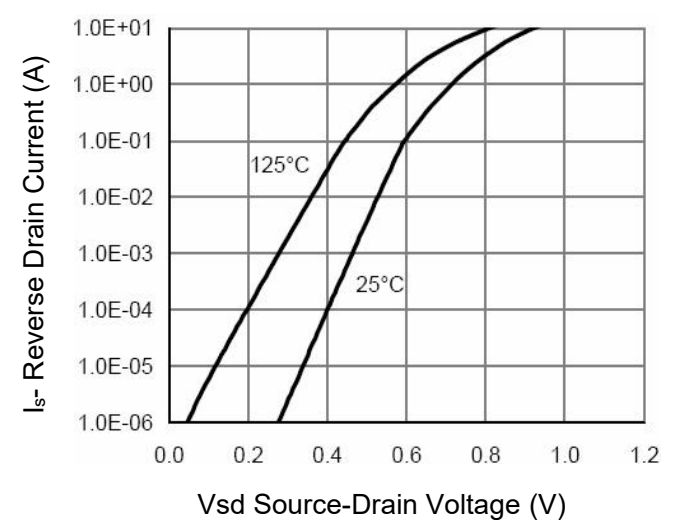


Figure 12 Source- Drain Diode Forward

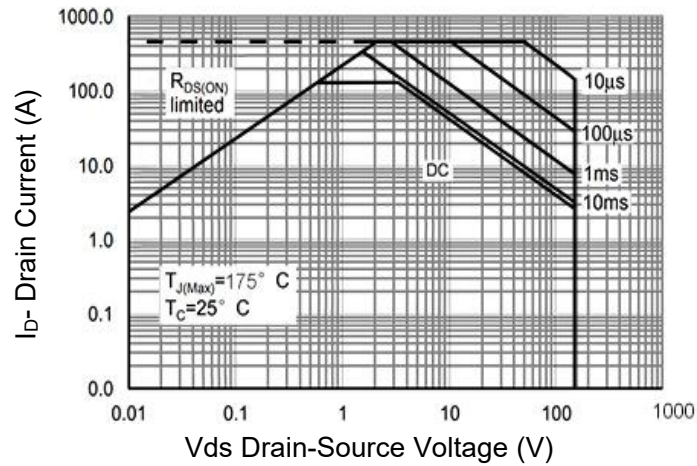


Figure 13 Safe Operation Area

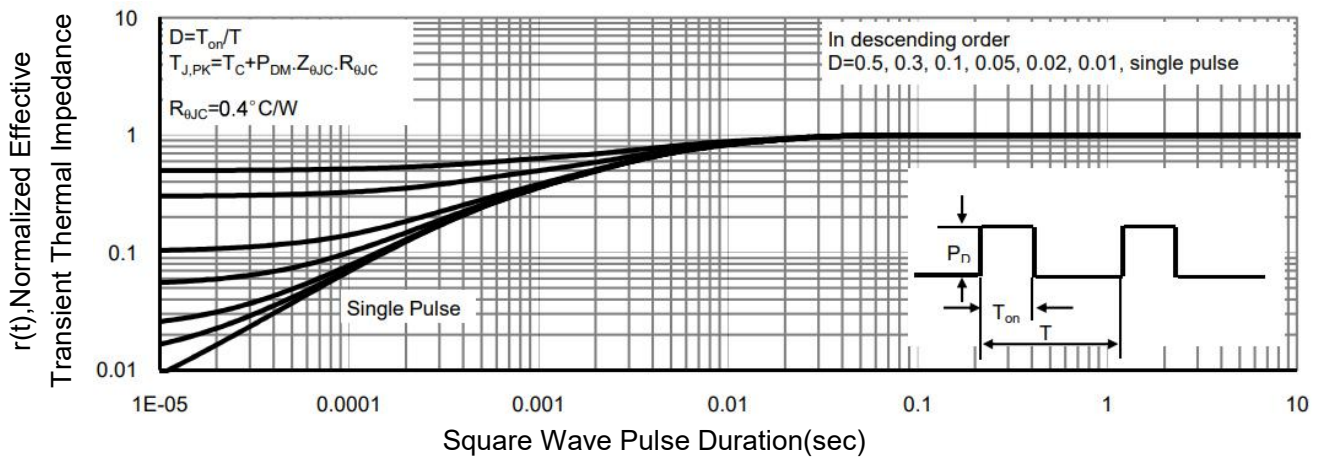
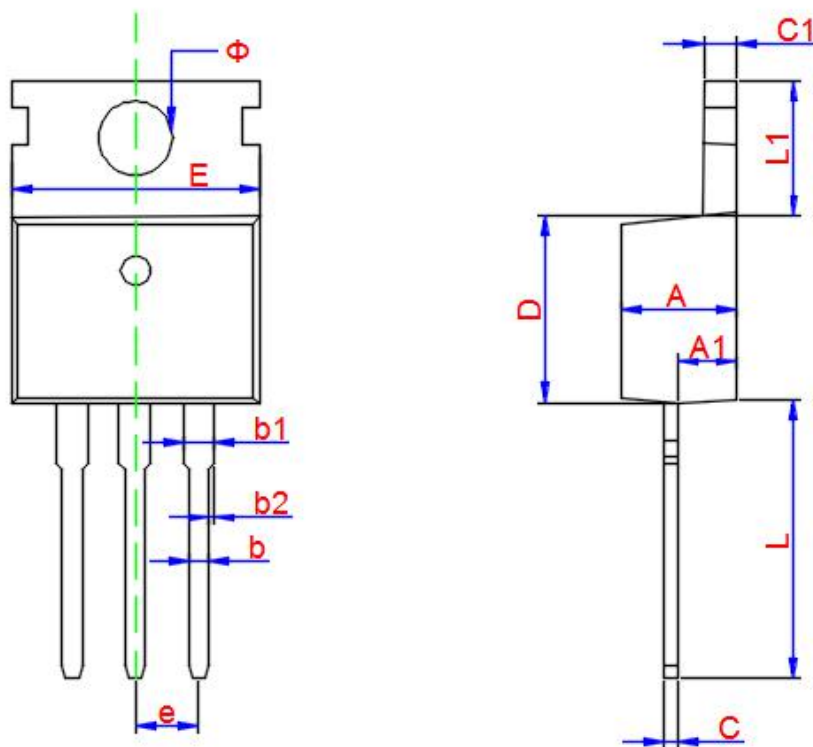


Figure 14 Normalized Maximum Transient Thermal Impedance

TO-220 Package Information


Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	4.520	4.570	4.620
A1	2.320	2.350	3.380
b	0.800 TYP.		
b1	1.270 TYP		
b2	0-0.076		
C	0.500 TYP.		
C1	1.300 TYP.		
D	9.050	9.100	9.150
E	9.880 TYP.		
e	2.540 TYP.		
L	13.160	13.260	13.360
L1	6.400	6.500	6.600
Φ	3.600 TYP.		