



PE5078Q N-Channel Enhancement Mode Power MOSFET

PE5078Q Description

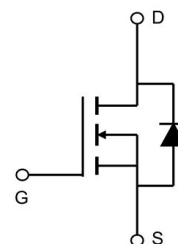
The PE5078Q uses deep trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE5078Q General Features

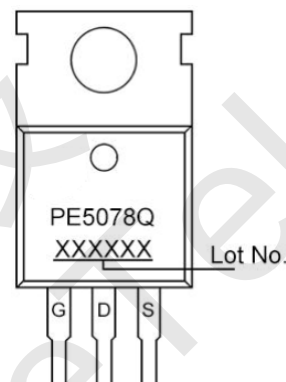
- $V_{DS} = 100V$, $I_D = 78A$
- $R_{DS(ON)} < 10m\Omega$ @ $V_{GS}=10V$
- $R_{DS(ON)} < 15m\Omega$ @ $V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired

PE5078Q Application

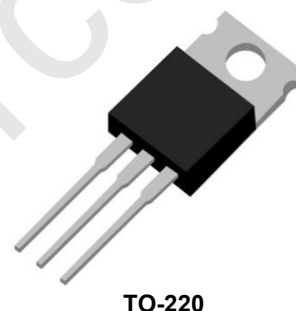
- PWM applications
- Load switch
- Power management



Schematic diagram



Marking and pin assignment



TO-220

PE5078Q Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	78	A
Drain Current-Continuous ($T_C=100^\circ C$)	$I_D(T_C=100^\circ C)$	55	A
Pulsed Drain Current (Note 1)	I_{DM}	310	A
Maximum Power Dissipation	P_D	107	W
Single Pulse Avalanche Energy ($L=0.1mH$)	E_{AS}	80	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ C$

PE5078Q Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	1.4	$^\circ C/W$
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PE5078Q Electrical Characteristics (TC=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=95V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=14A$	-	8	10	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	11	15	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=14A$	-	62	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0MHz$	-	2370	-	pF
Output Capacitance	C_{oss}		-	190	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	10	-	pF
Gate Resistance	R_g	$F=1.0MHz$	-	1.5	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=50V, I_D=14A,$ $V_{GS}=10V, R_G=10\Omega$	-	10	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	32	-	nS
Turn-Off Fall Time	t_f		-	6	-	nS
Total Gate Charge	Q_g	$V_{DS}=50V, I_D=14A,$ $V_{GS}=10V$	-	49	-	nC
Gate-Source Charge	Q_{gs}		-	8	-	nC
Gate-Drain Charge	Q_{gd}		-	7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=14A$	-	0.9	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F=14A, dI/dt=500A/\mu s$	-	47	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	226	-	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.



PE5078Q Typical Electrical and Thermal Characteristics

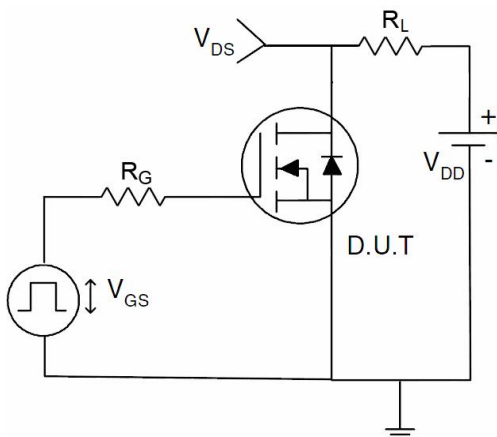


Figure 1 Switching Test Circuit

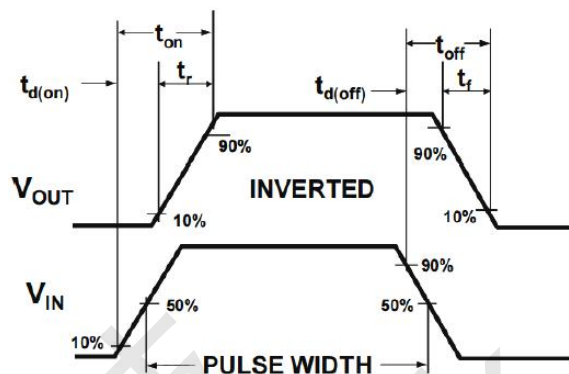


Figure 2 Switching Waveform

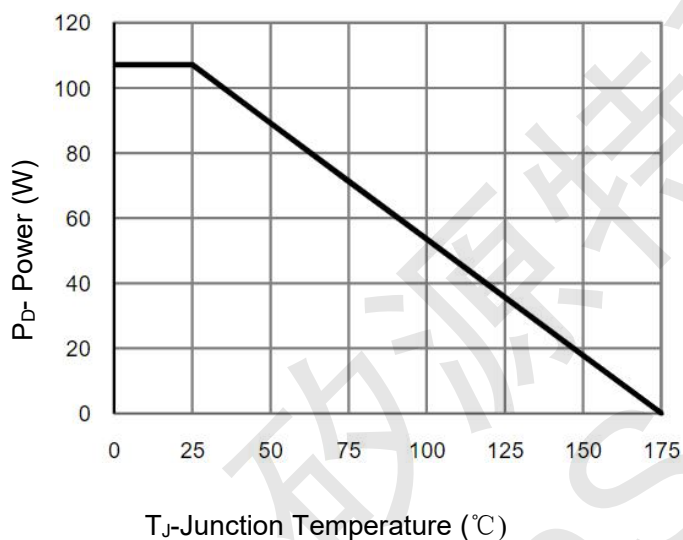


Figure 3 Power De-rating

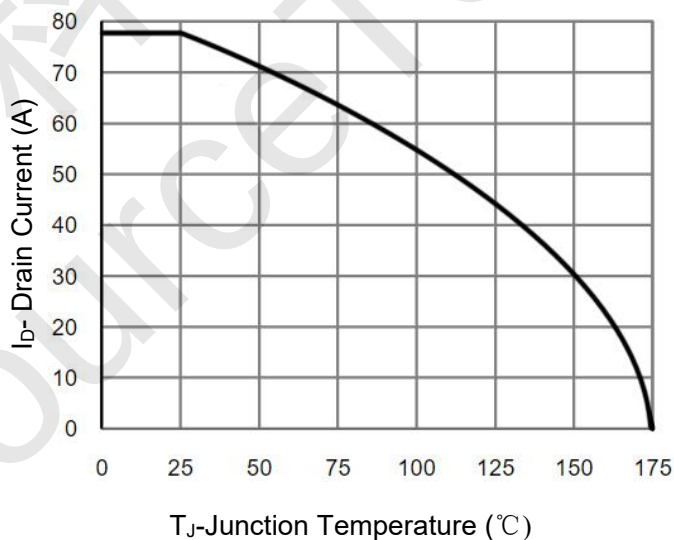


Figure 4 Drain Current

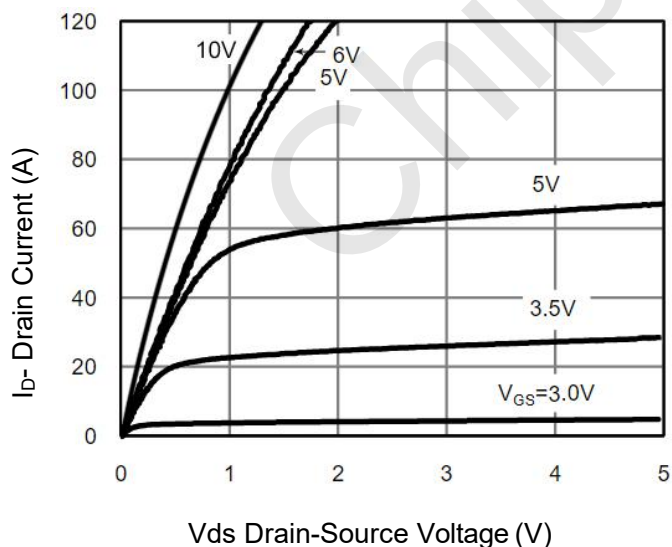


Figure 5 Output Characteristics

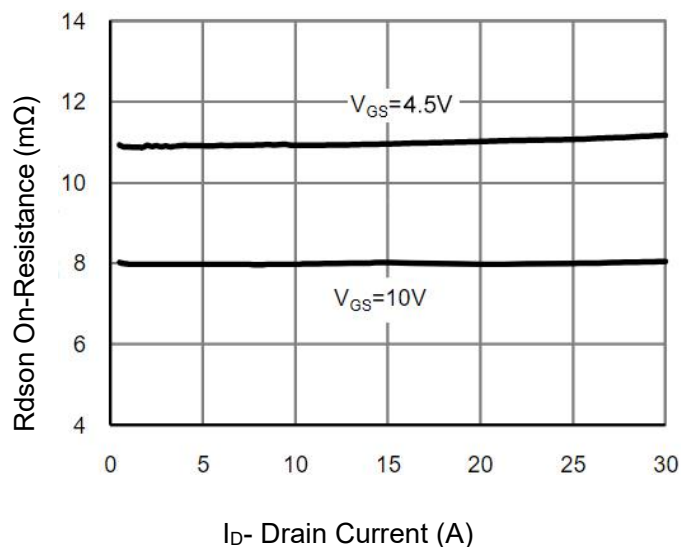


Figure 6 Rdson vs Drain Current

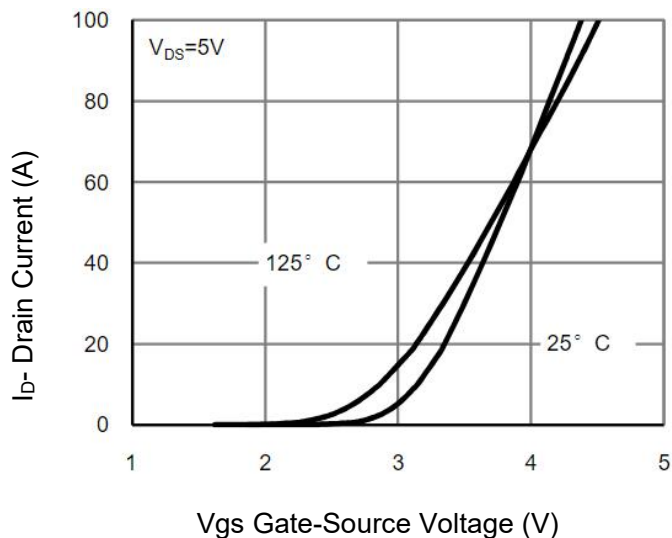


Figure 7 Transfer Characteristics

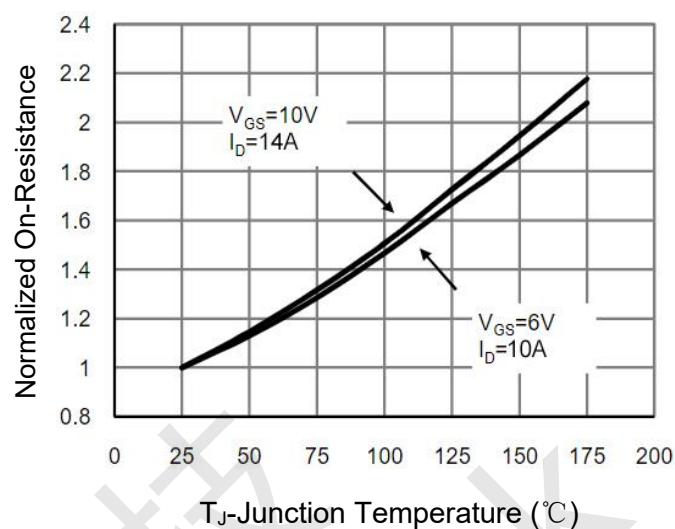


Figure 8 R_{dson} vs Junction Temperature

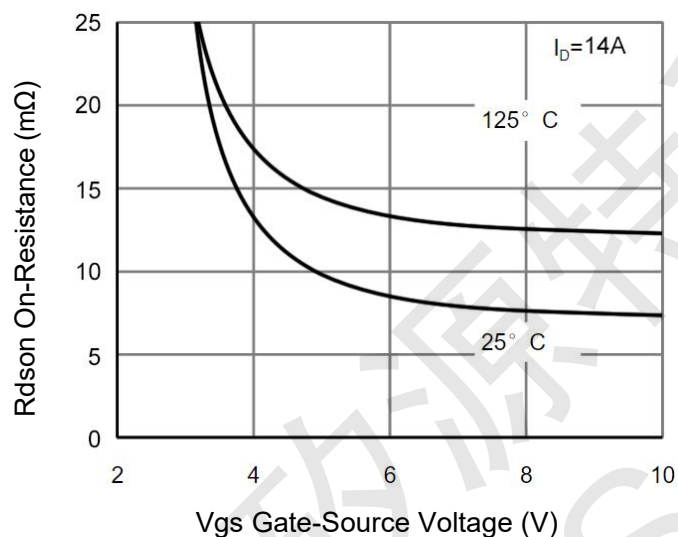


Figure 9 R_{dson} vs V_{GS}

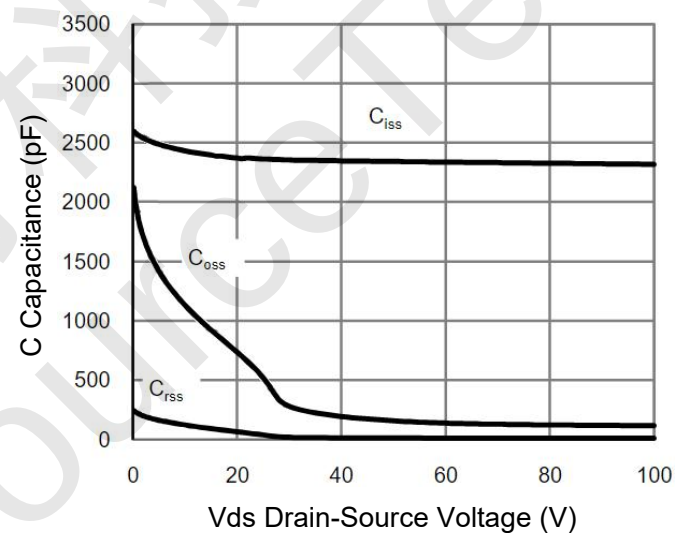


Figure 10 Capacitance vs V_{ds}

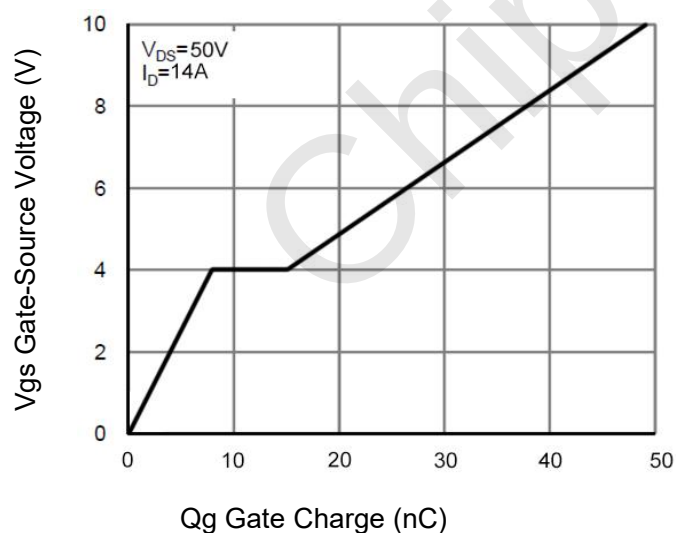


Figure 11 Gate Charge

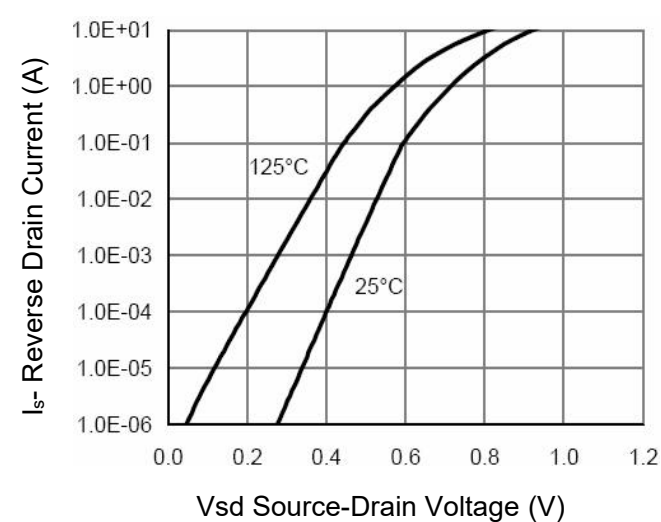


Figure 12 Source- Drain Diode Forward

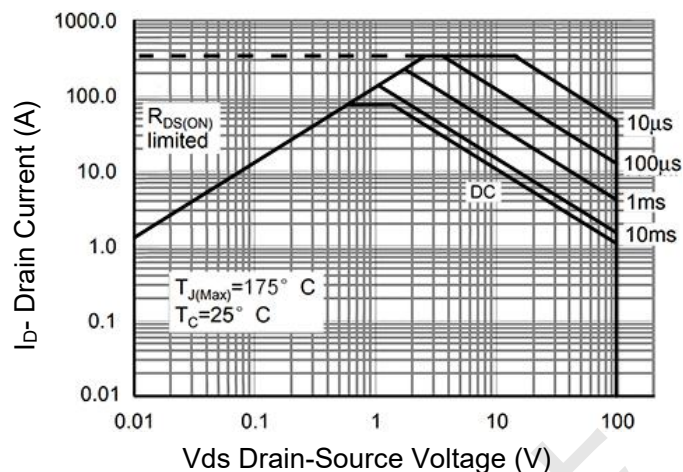


Figure 13 Safe Operation Area

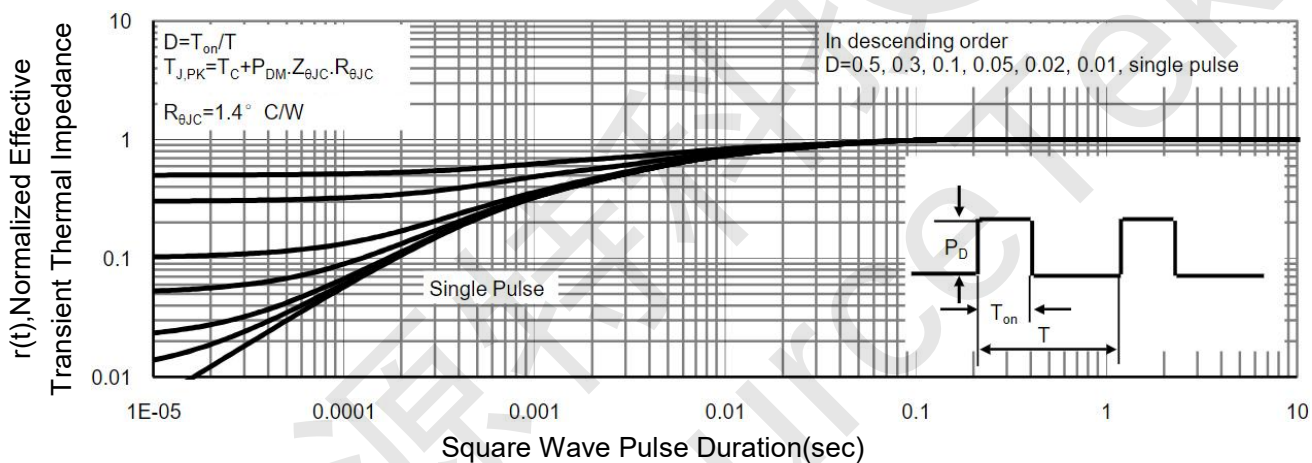
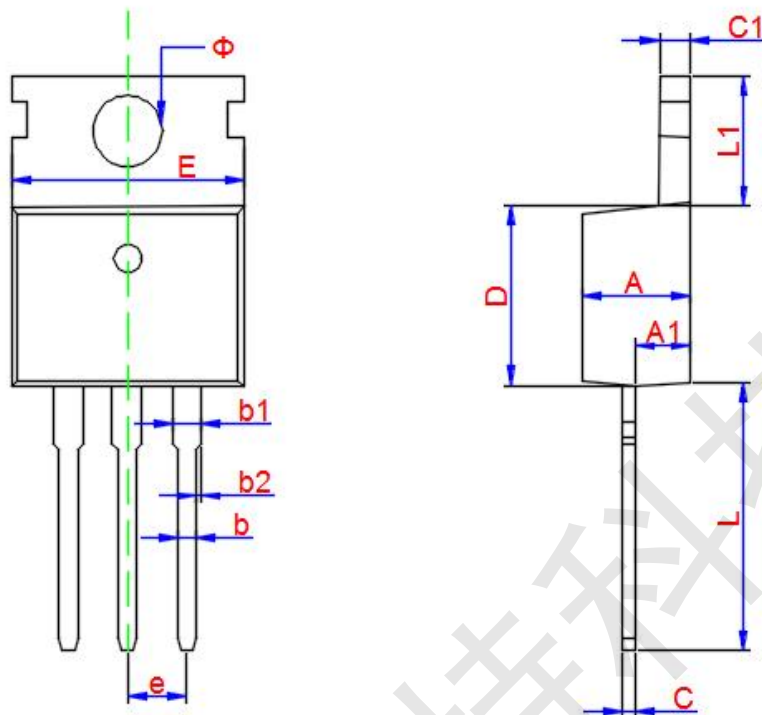


Figure 14 Normalized Maximum Transient Thermal Impedance



PE5078Q 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.		