

N-Channel Enhancement Mode Power MOSFET

Description

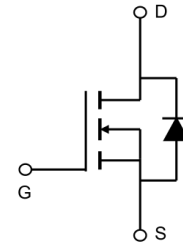
The PE83H5Q uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

General Features

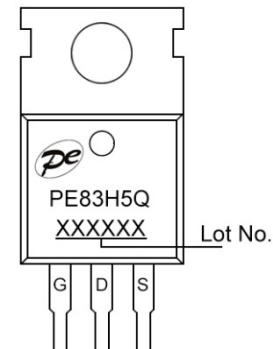
- $V_{DS} = 30V$, $I_D = 150A$
- $R_{DS(ON)} < 2.4m\Omega$ @ $V_{GS}=10V$
- $R_{DS(ON)} < 3.3m\Omega$ @ $V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired

Application

- PWM applications
- Load switch
- Power management
- DC/DC Converter



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}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	150	A
Drain Current-Continuous (TC=100°C)	I_D	105	A
Pulsed Drain Current (Note 1)	I_{DM}	600	A
Maximum Power Dissipation	P_D	176	W
Single Pulsed Avalanche Energy (L=0.5mH)	E_{AS}	600	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C

Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.85	°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}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=29V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.7	2.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	2	2.4	m Ω
		$V_{GS}=4.5V, I_D=15A$	-	2.6	3.3	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=10V, I_D=20A$	-	70	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	6100	-	pF
Output Capacitance	C_{oss}		-	650	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	530	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, R_L=1\Omega,$ $V_{GS}=10V, R_G=3\Omega$	-	26	-	nS
Turn-on Rise Time	t_r		-	24	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	91	-	nS
Turn-Off Fall Time	t_f		-	39	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=20A, V_{GS}=10V$	-	74	-	nC
Gate-Source Charge	Q_{gs}		-	21	-	nC
Gate-Drain Charge	Q_{gd}		-	27	-	nC
Body Diode Reverse Recovery Time	t_{rr}	$I_F=20A, di/dt=500A/\mu s$	-	21	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	58	-	nC
Drain-Source Diode Characteristics						
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

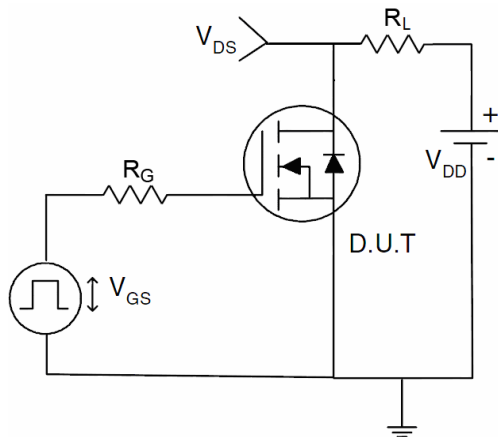


Figure 1 Switching Test Circuit

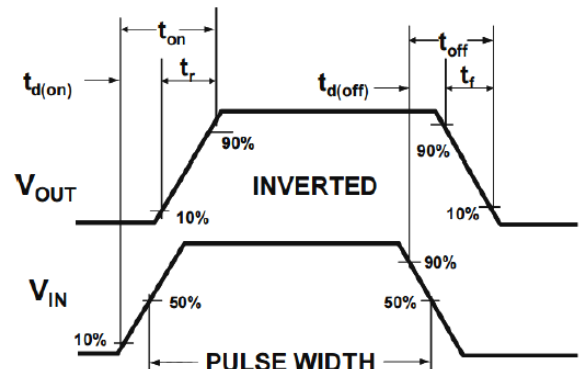
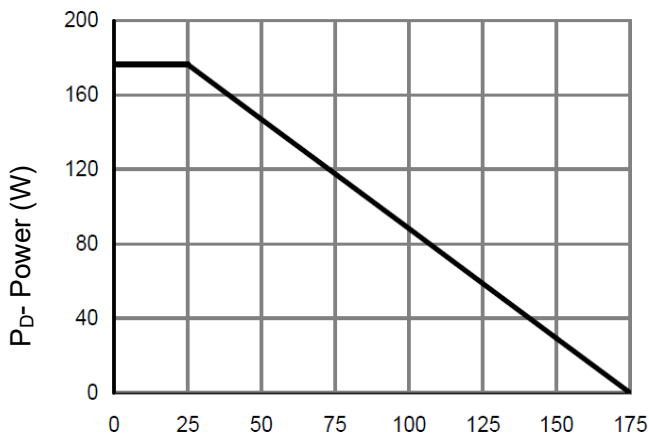
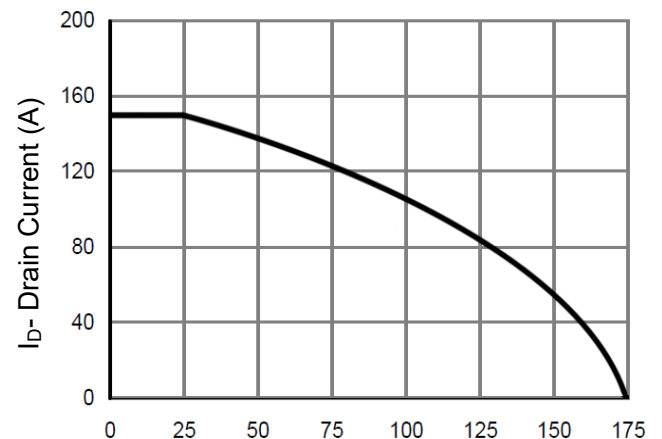


Figure 2 Switching Waveform



T_J-Junction Temperature (°C)

Figure 3 Power De-rating



T_J-Junction Temperature (°C)

Figure 4 Drain Current

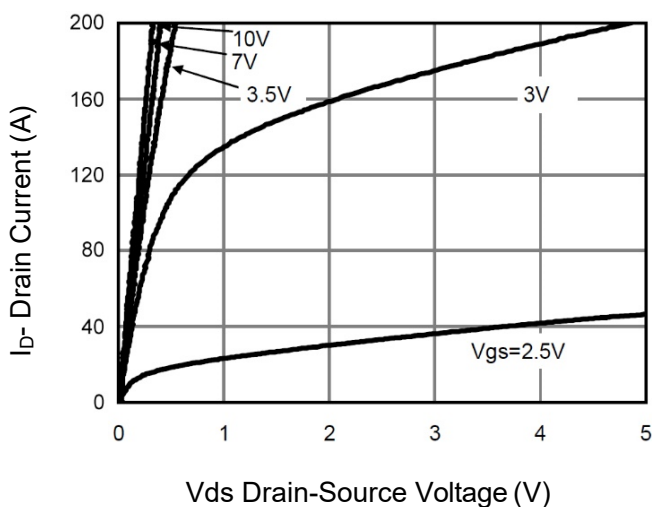


Figure 5 Output Characteristics

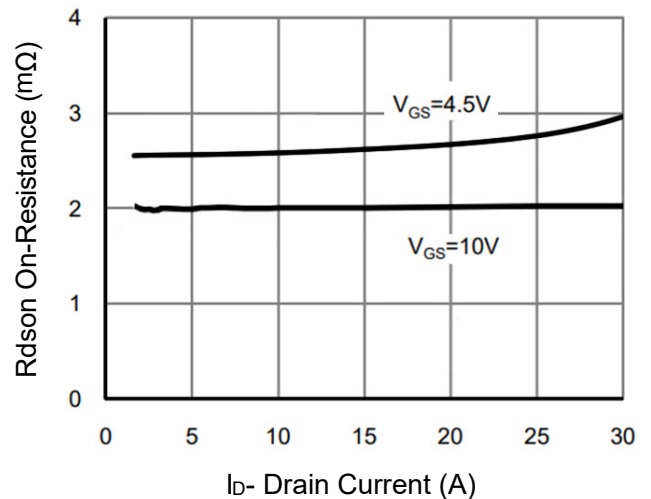


Figure 6 Rdson vs Drain Current

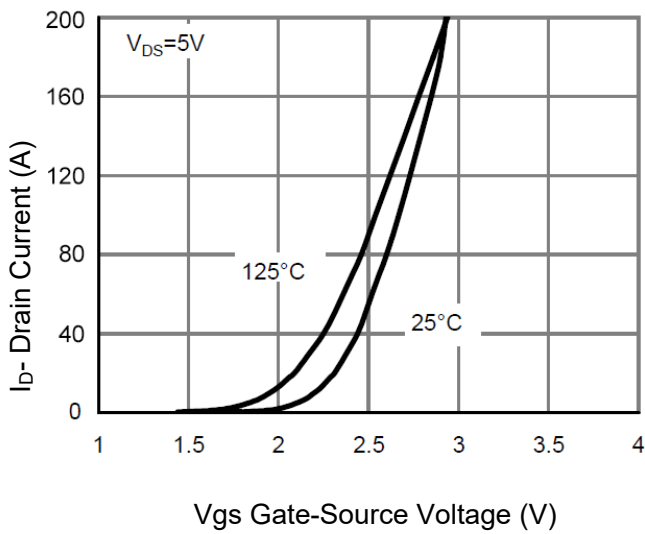


Figure 7 Transfer Characteristics

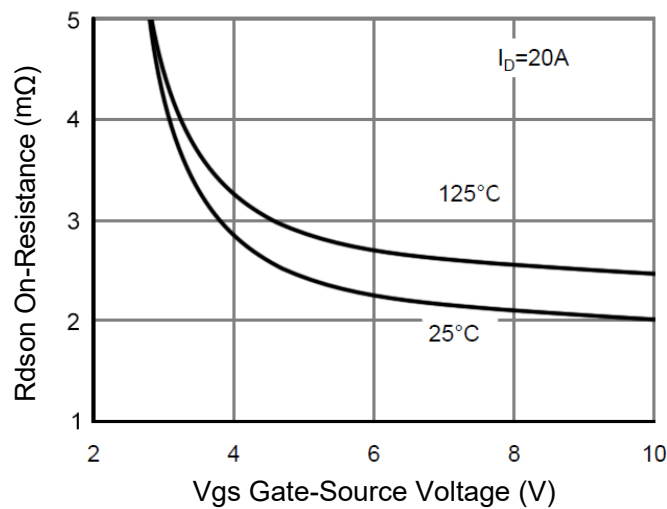


Figure 9 Rdson vs Vgs

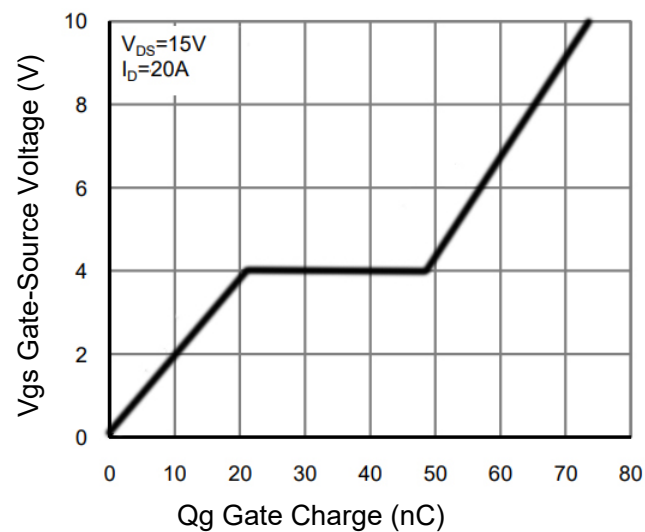


Figure 11 Gate Charge

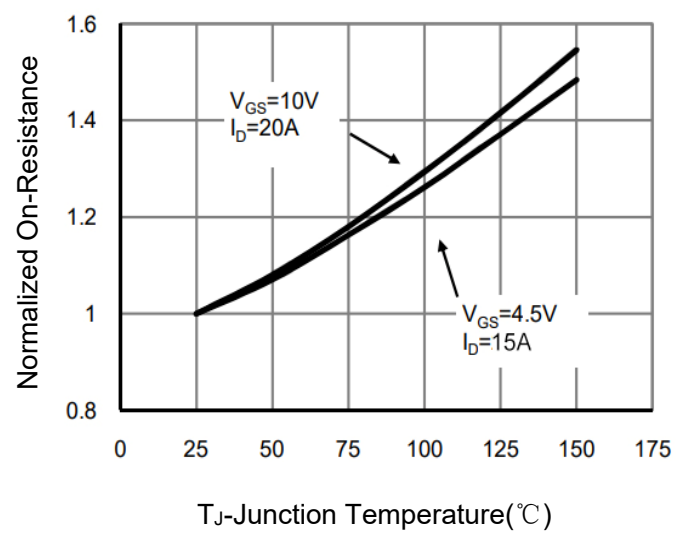


Figure 8 Rdson vs Junction Temperature

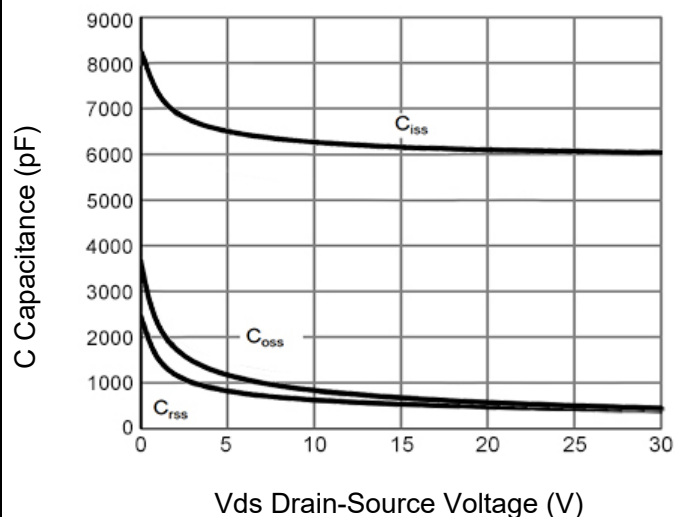


Figure 10 Capacitance vs Vds

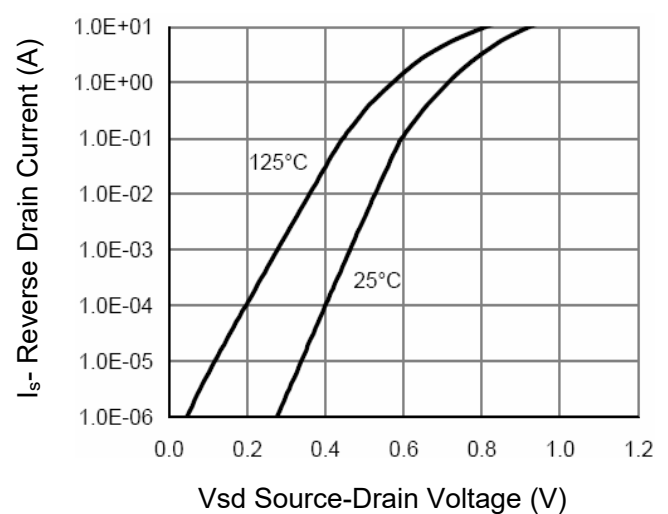


Figure 12 Source- Drain Diode Forward

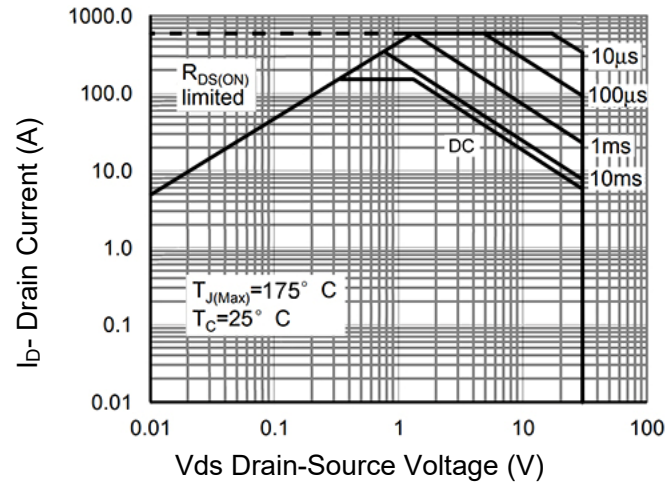


Figure 13 Safe Operation Area

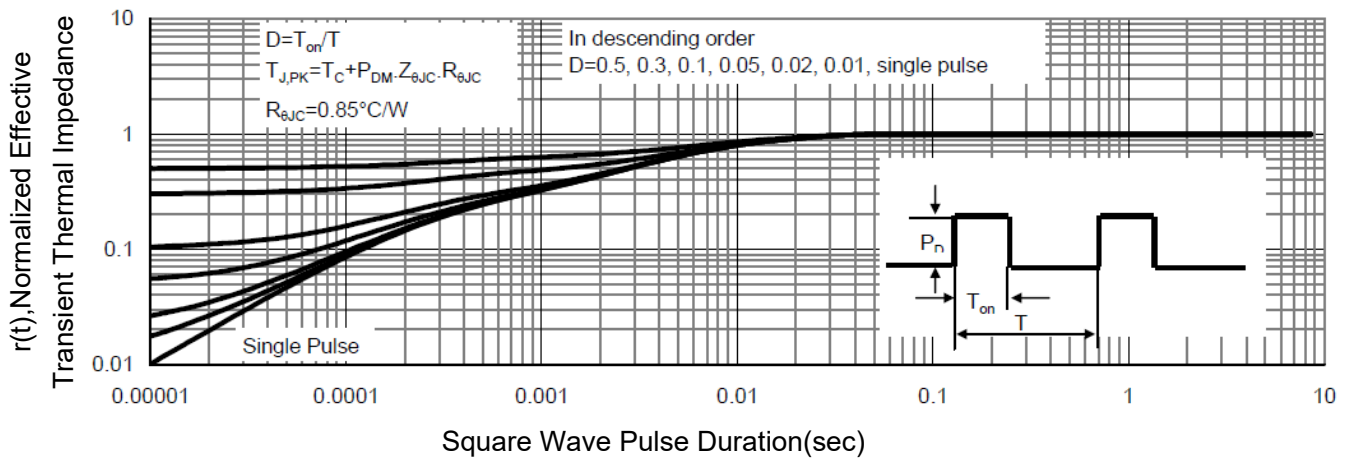
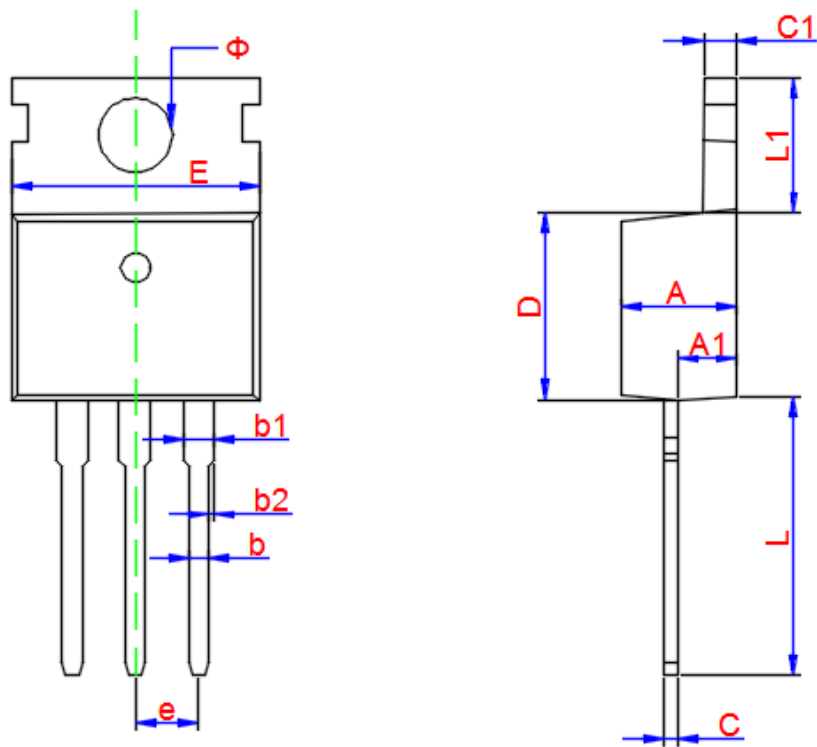


Figure 14 Normalized Maximum Transient Thermal Impedance

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.		