PE5003A N-Channel Enhancement Mode Power MOSFET

PE5003A Description

The PE5003A uses deep trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE5003A General Features

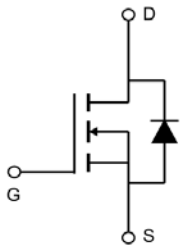
- V_{DS} = 100V, I_D =3.3A

  $R_{DS(ON)}$ < 130mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 160mΩ @ V_{GS}=6V
  $R_{DS(ON)}$ < 190mΩ @ V_{GS}=4.5V

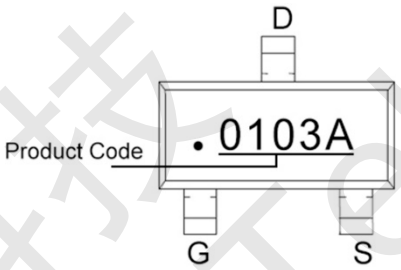
- Lead free product is acquired
- Surface Mount Package

PE5003A Application

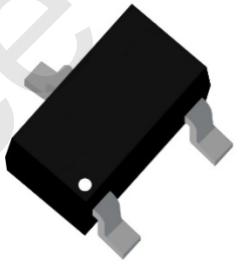
- PWM applications
- Load switch



Schematic diagram



Marking and pin assignment



SOT-23

PE5003A Absolute Maximum Ratings (TA=25℃ 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	3.3	A
Drain Current-Continuous (T_A=100℃)	I_D(T_A=100℃)	2.3	A
Pulsed Drain Current (Note 1)	I_{DM}	13.2	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

PE5003A Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	83.3	℃/W

PE5003A Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=250μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1.0	1.65	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=3A	-	95	130	mΩ
		V_{GS}=6V,I_D=2A	-	113	160	mΩ
		V_{GS}=4.5V,I_D=1A	-	135	190	mΩ
Forward Transconductance	g_{FS}	VDS=5V,ID=2A	-	8	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=50V,V_{GS}=0V, F=1.0MHz	-	200	-	pF
Output Capacitance	C_{oss}		-	30	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	2	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=50V,I_D=3A, V_{GS}=10V,R_G=3Ω	-	12.5	-	nS
Turn-on Rise Time	t_r		-	19.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	20	-	nS
Turn-Off Fall Time	t_f		-	29	-	nS
Total Gate Charge	Q_g	V_{DS}=50V,I_D=3A, V_{GS}=10V	-	4	-	nC
Gate-Source Charge	Q_{gs}		-	0.6	-	nC
Gate-Drain Charge	Q_{gd}		-	1.4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=3A	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	3.3	A

Notes:

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

PE5003A Typical Electrical and Thermal Characteristics

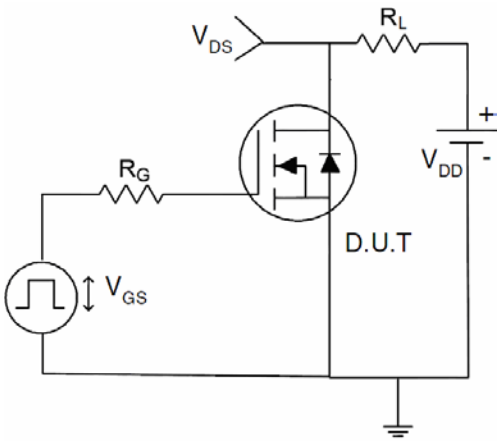


Figure 1 Switching Test Circuit

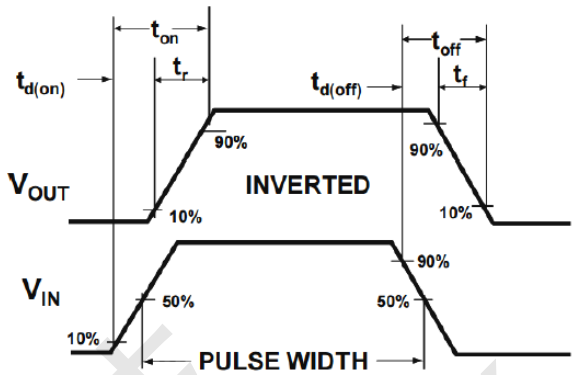


Figure 2 Switching Waveform

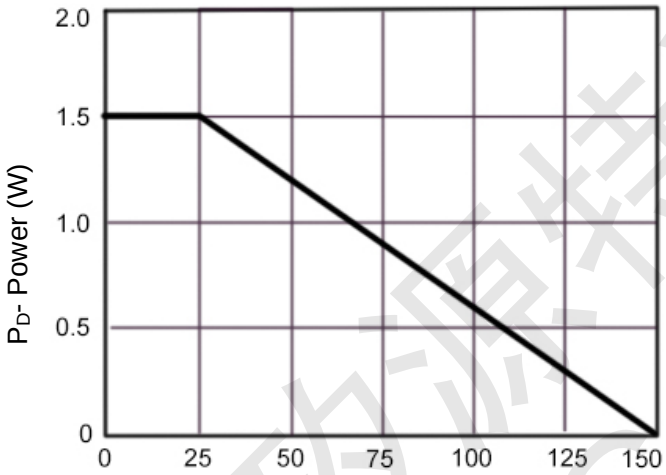


Figure 3 Power De-rating

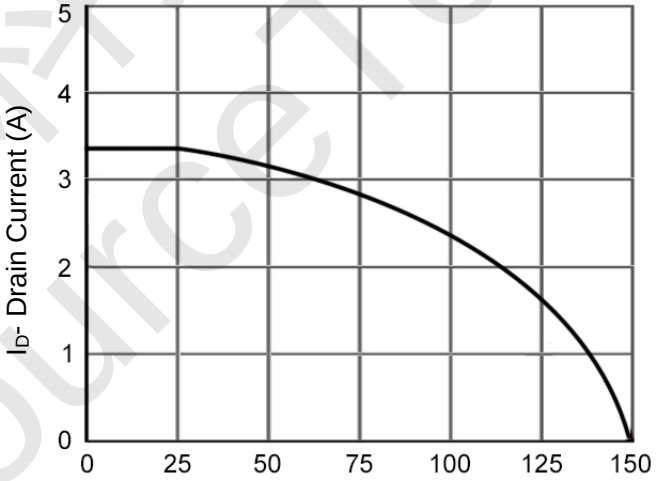


Figure 4 Drain Current

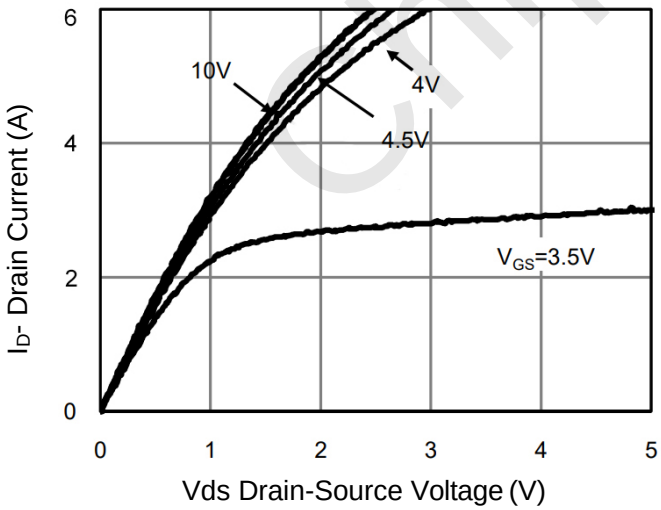


Figure 5 Output Characteristics

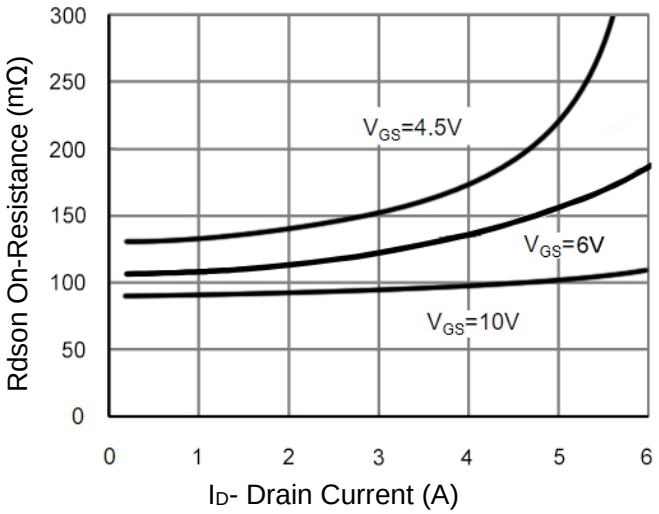


Figure 6 Rdson vs Drain Current

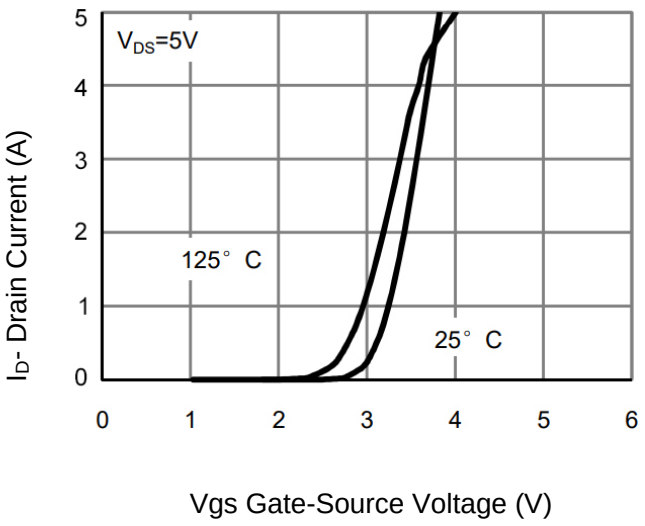


Figure 7 Transfer Characteristics

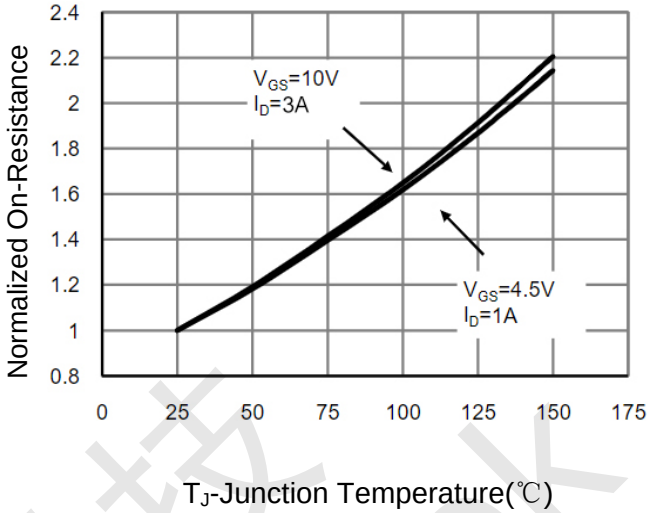


Figure 8 Rdson vs Junction Temperature

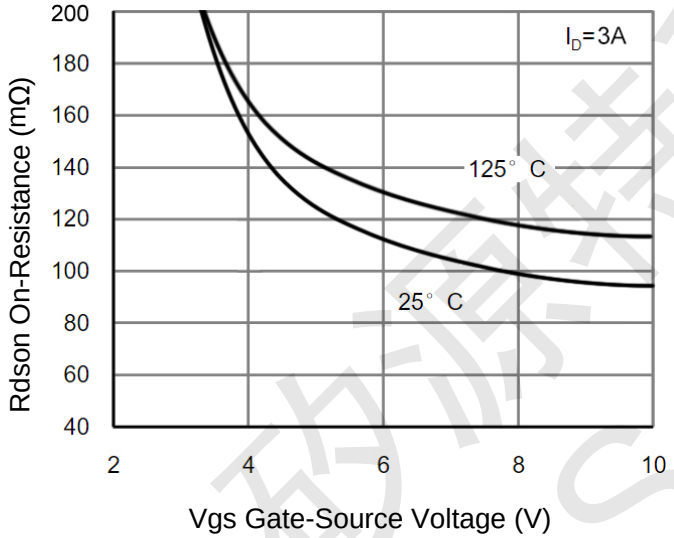


Figure 9 Rdson vs Vgs

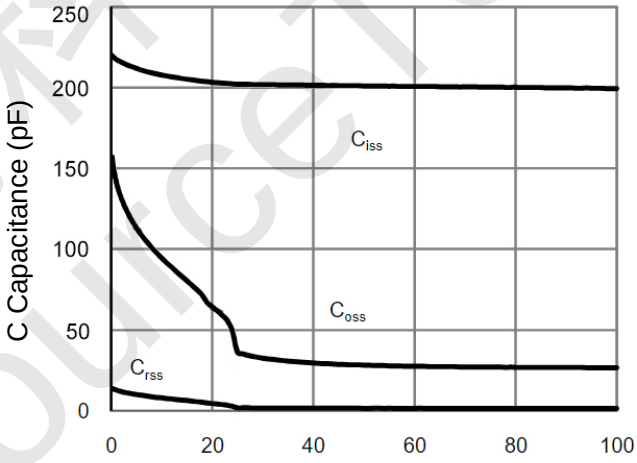


Figure 10 Capacitance vs Vds

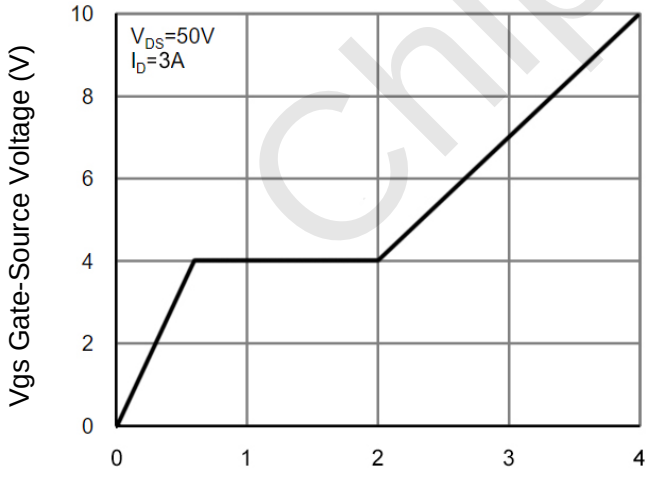


Figure 11 Gate Charge

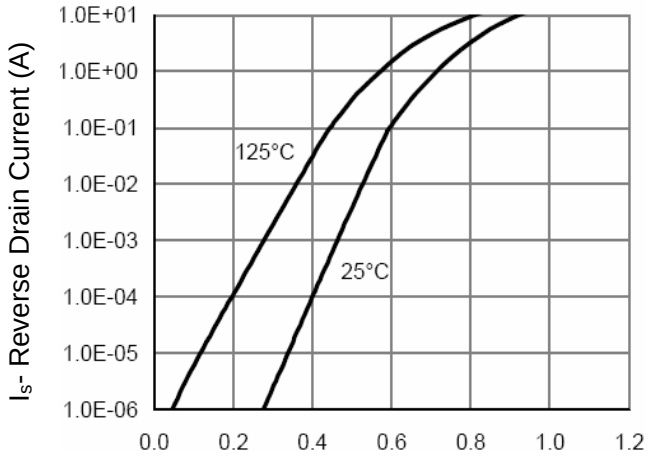


Figure 12 Source- Drain Diode Forward

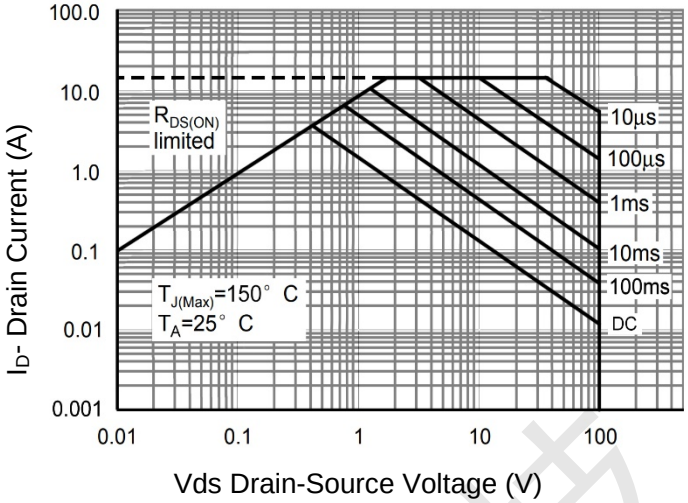


Figure 13 Safe Operation Area

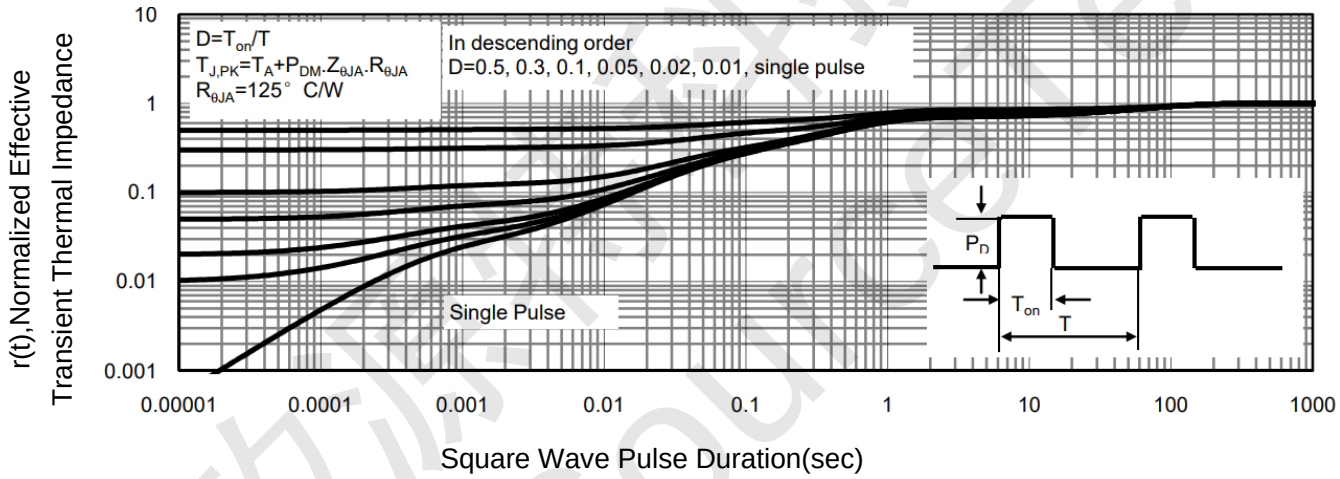
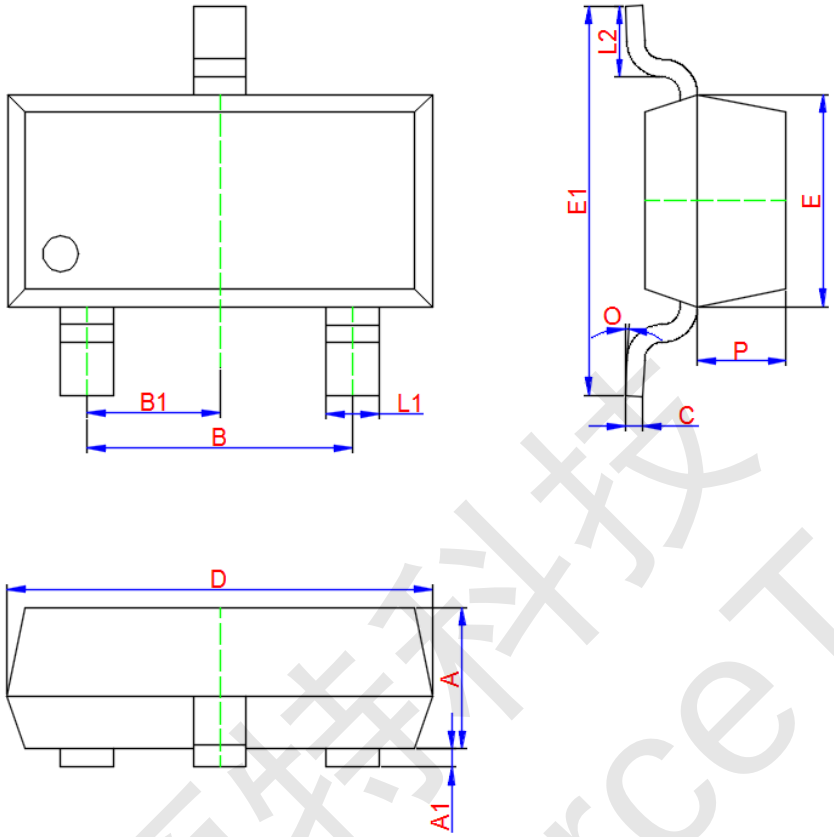


Figure 14 Normalized Maximum Transient Thermal Impedance

PE5003A SOT-23 Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.900	1.000	1.100
A1	0.000	0.050	0.100
L1	0.300	0.400	0.500
C	0.100	0.110	0.120
D	2.800	2.900	3.000
E	1.250	1.300	1.350
E1	2.250	2.400	2.550
B	1.800	1.900	2.000
B1	0.950 TYP.		
L2	0.200	0.350	0.450
P	0.550	0.575	0.600
O	0°	4°	8°