



PE4616E N and P Channel Enhancement Mode Power MOSFET

PE4616E Description

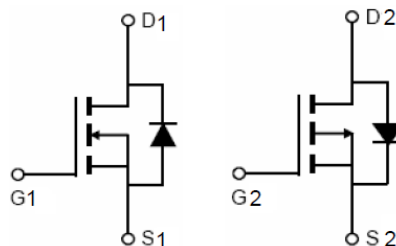
The PE4616E uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE4616E General Features

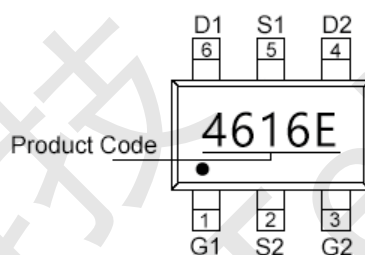
- **N-Channel**
- $V_{DS} = 30V$, $I_D = 4A$
 $R_{DS(ON)} < 26m\Omega$ @ $V_{GS}=10V$
 $R_{DS(ON)} < 40m\Omega$ @ $V_{GS}=4.5V$
- **P-Channel**
- $V_{DS} = -30V$, $I_D = -3.5A$
 $R_{DS(ON)} < 50m\Omega$ @ $V_{GS}=-10V$
 $R_{DS(ON)} < 80m\Omega$ @ $V_{GS}=-4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

PE4616E Application

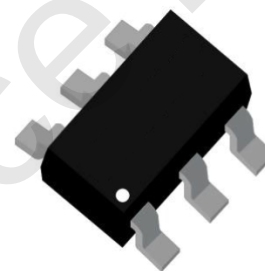
- PWM applications
- DC motor



Schematic diagram



Marking and pin assignment



SOT-23-6L

PE4616E Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Drain Current-Continuous	I_D	4	-3.5	A
Drain Current-Continuous(TA=70°C)	I_D	3.2	-2.8	A
Pulsed Drain Current (Note 1)	I_{DM}	16	-14	A
Maximum Power Dissipation	P_D	1.1	1.1	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150		°C

PE4616E Thermal Characteristic

Parameter	Symbol	N-Channel	P-Channel	Unit
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	110	110	°C/W



PE4616E N-Channel Electrical Characteristics (TA=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}	$V_{DS}=30V, V_{GS}=0V$	-	-	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	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=4A$	-	21	26	m Ω
		$V_{GS}=4.5V, I_D=2A$	-	31	40	m Ω
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	460	-	pF
Output Capacitance	C_{oss}		-	60	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	50	-	pF
Gate Resistance	R_g	$V_{DS}=V_{GS}=0V, F=1.0MHz$	-	2	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=15V, R_L=1\Omega,$ $V_{GS}=10V, R_G=3\Omega$	-	4.5	-	nS
Turn-on Rise Time	t_r		-	2.4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	14	-	nS
Turn-Off Fall Time	t_f		-	2.5	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=4A, V_{GS}=10V$	-	7.1	-	nC
Gate-Source Charge	Q_{gs}		-	1.4	-	nC
Gate-Drain Charge	Q_{gd}		-	2.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	4	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.



PE4616E Typical Electrical and Thermal Characteristics

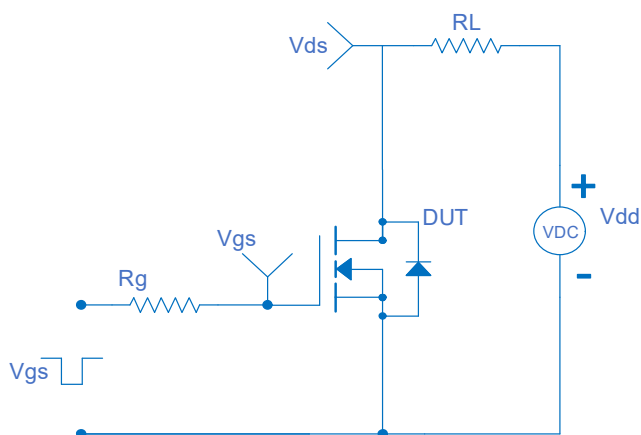


Figure 1 Switching Test Circuit

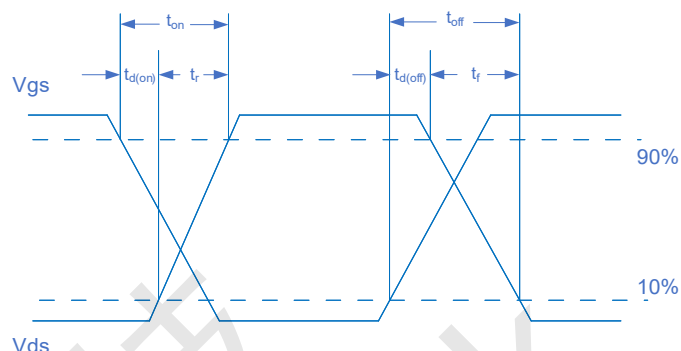


Figure 2 Switching Waveform

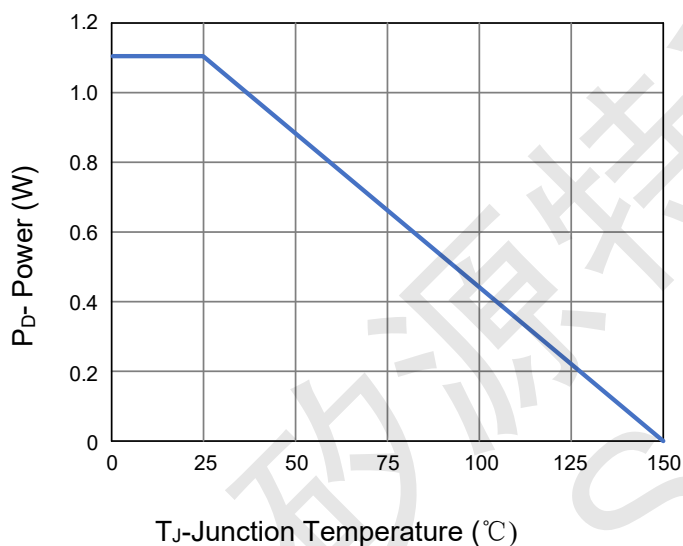


Figure 3 Power De-rating

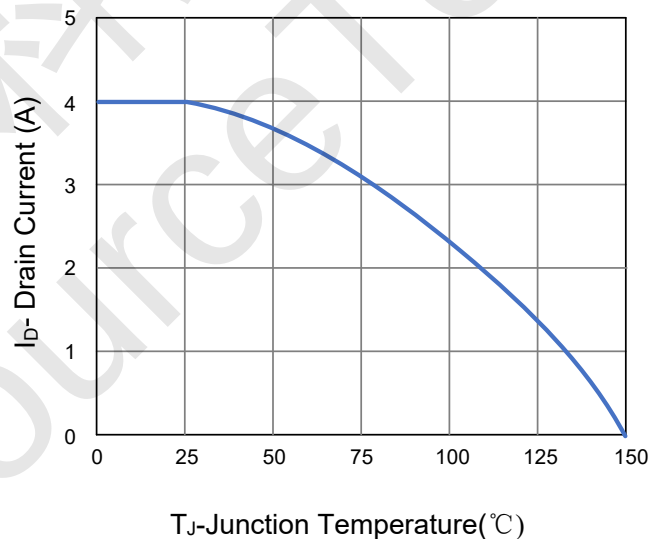


Figure 4 Drain Current

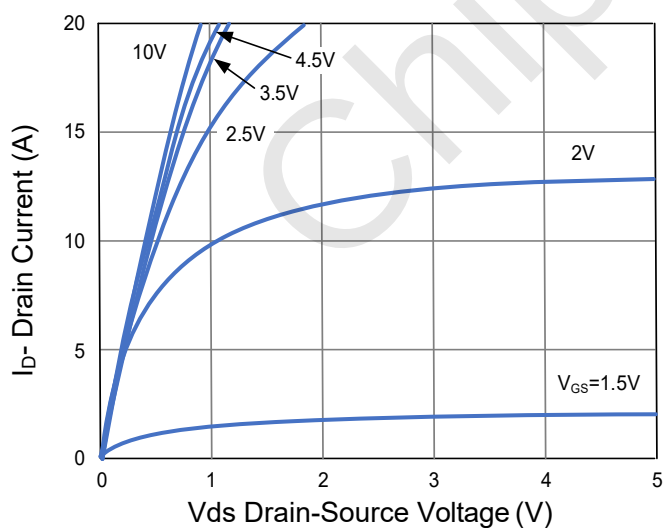


Figure 5 Output Characteristics

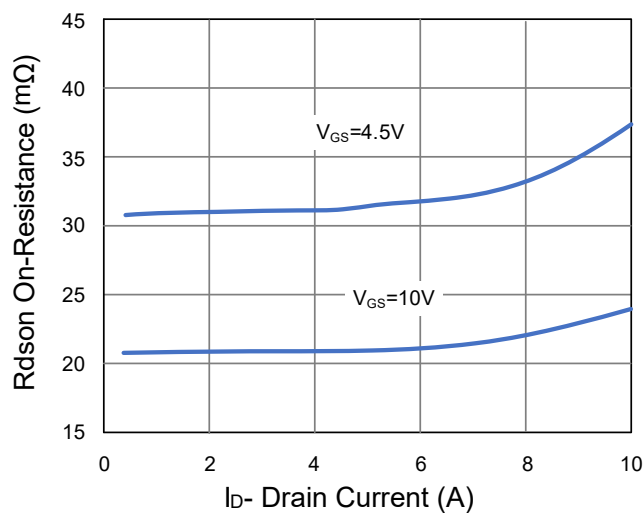


Figure 6 Rdson vs Drain Current

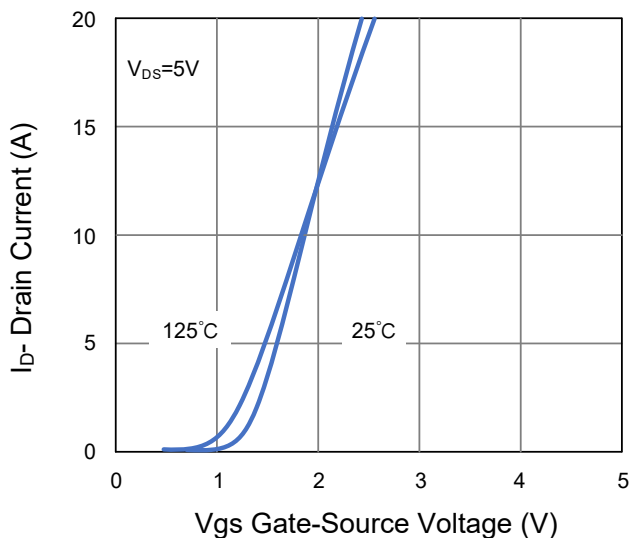


Figure 7 Transfer Characteristics

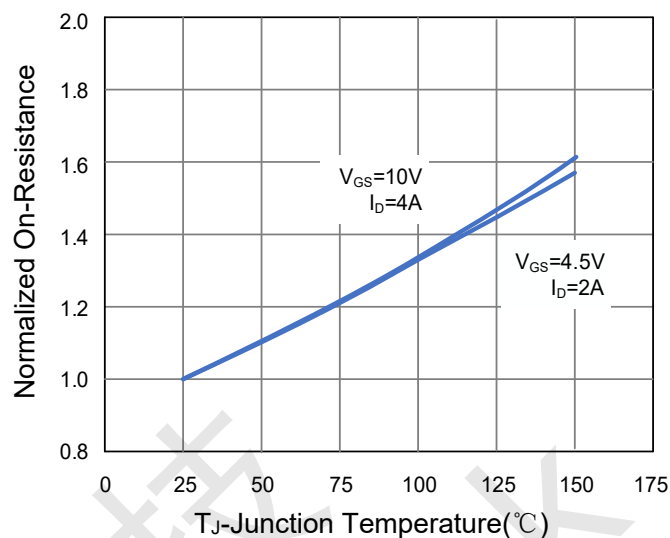


Figure 8 Rdson vs Junction Temperature

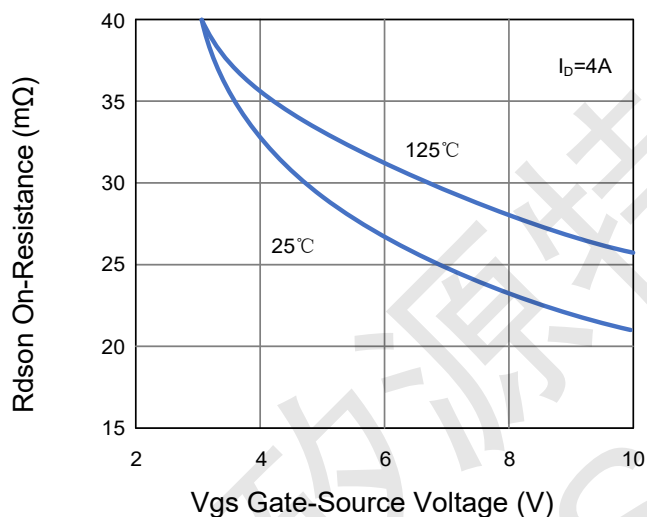


Figure 9 Rdson vs VGS

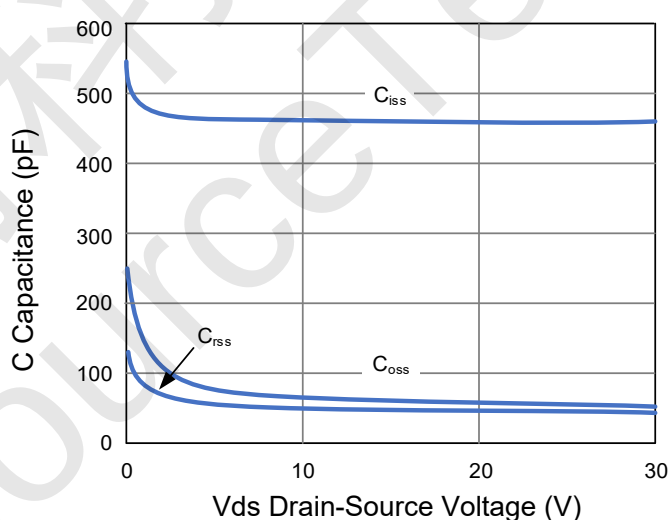


Figure 10 Capacitance vs Vds

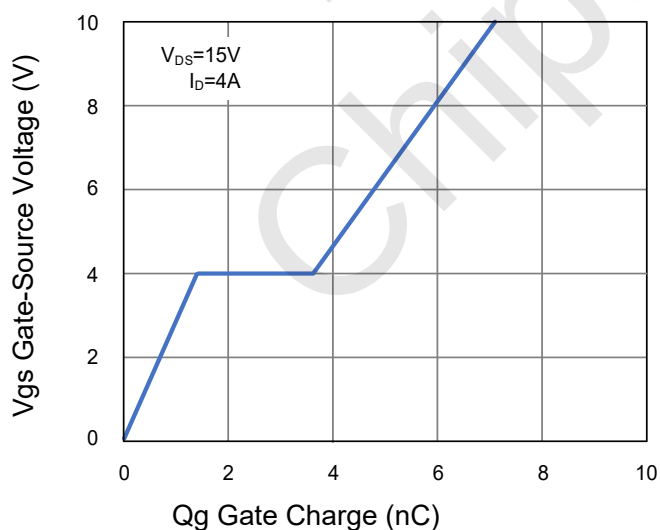


Figure 11 Gate Charge

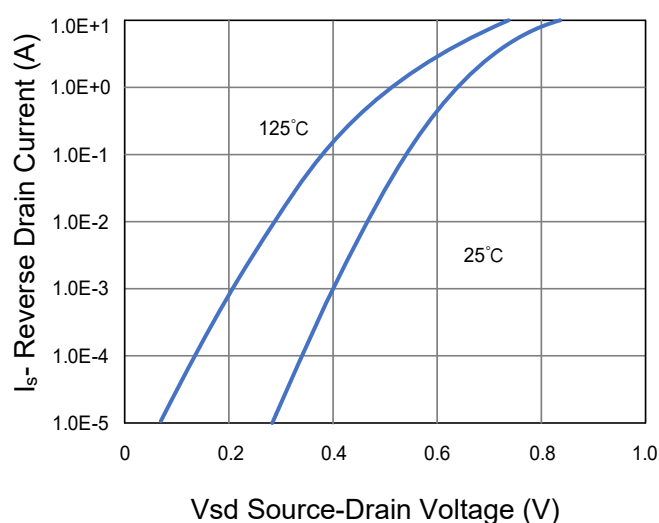


Figure 12 Source- Drain Diode Forward

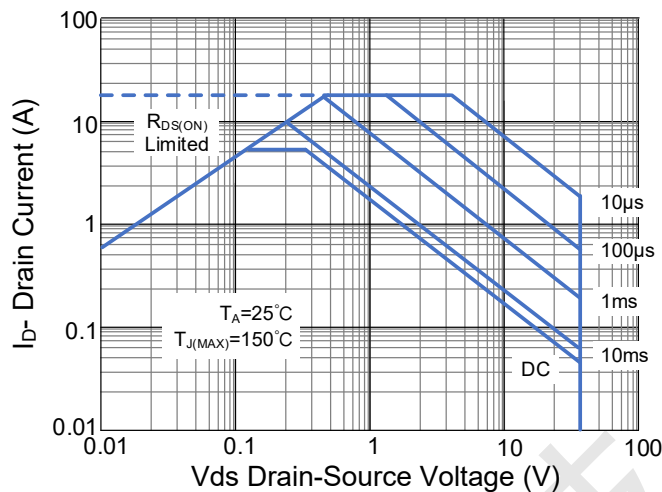


Figure 13 Safe Operation Area

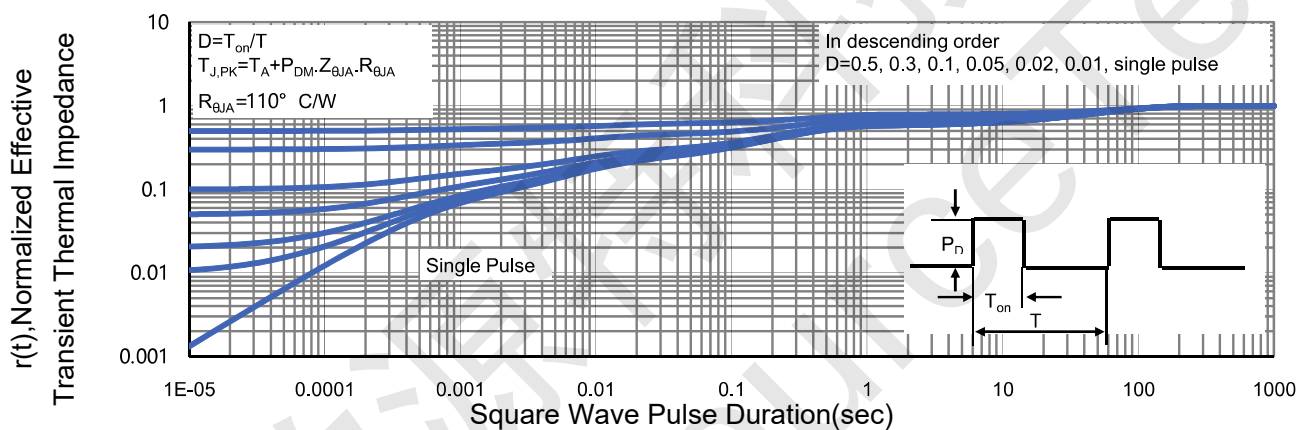


Figure 14 Normalized Maximum Transient Thermal Impedance



PE4616E P-Channel Electrical Characteristics (TA=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}	$V_{DS}=-30V, V_{GS}=0V$	-	-	-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	-2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-3A$	-	40	50	m Ω
		$V_{GS}=-4.5V, I_D=-2A$	-	58	80	m Ω
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0MHz$	-	400	-	pF
Output Capacitance	C_{oss}		-	70	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	60	-	pF
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, F=1.0MHz$	-	20	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, R_L=2.8\Omega,$ $V_{GS}=-10V, R_G=3\Omega$	-	7.5	-	nS
Turn-on Rise Time	t_r		-	5.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	19	-	nS
Turn-Off Fall Time	t_f		-	8	-	nS
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-3A, V_{GS}=-10V$	-	11	-	nC
Gate-Source Charge	Q_{gs}		-	1.3	-	nC
Gate-Drain Charge	Q_{gd}		-	2.2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-3	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.



PE4616E Typical Electrical and Thermal Characteristics

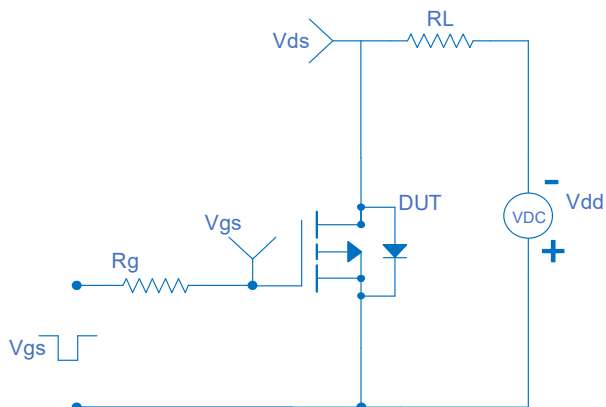


Figure 1 Switching Test Circuit

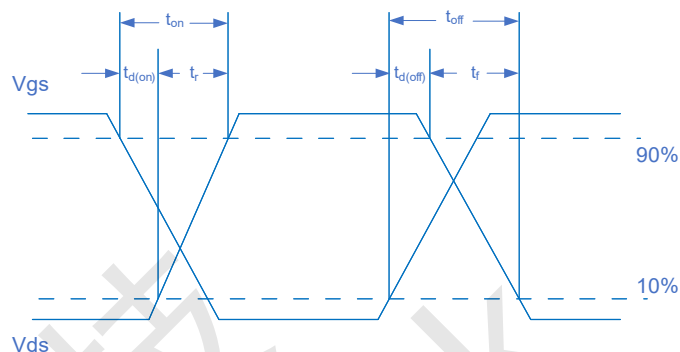


Figure 2 Switching Waveform

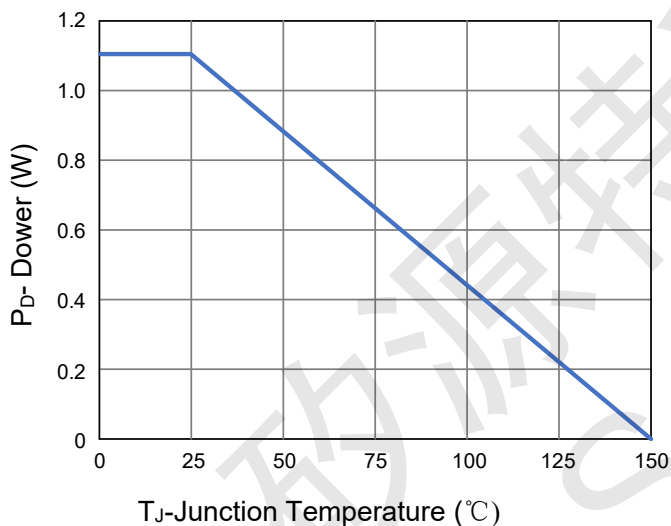


Figure 3 Power De-rating

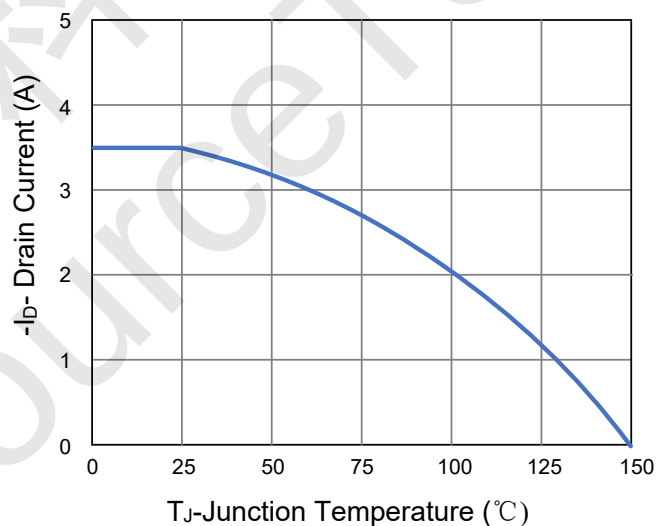


Figure 4 Drain Current

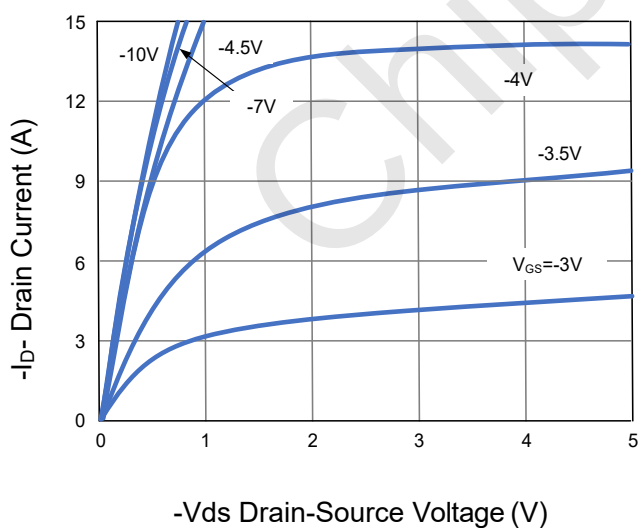


Figure 5 Output Characteristics

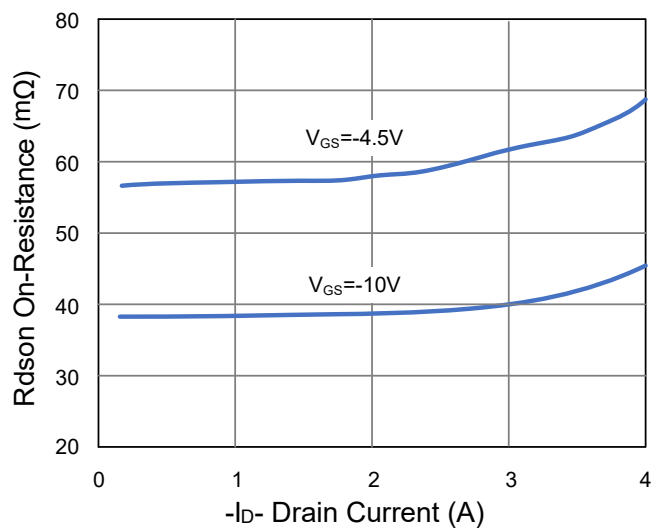


Figure 6 Rdson vs Drain Current

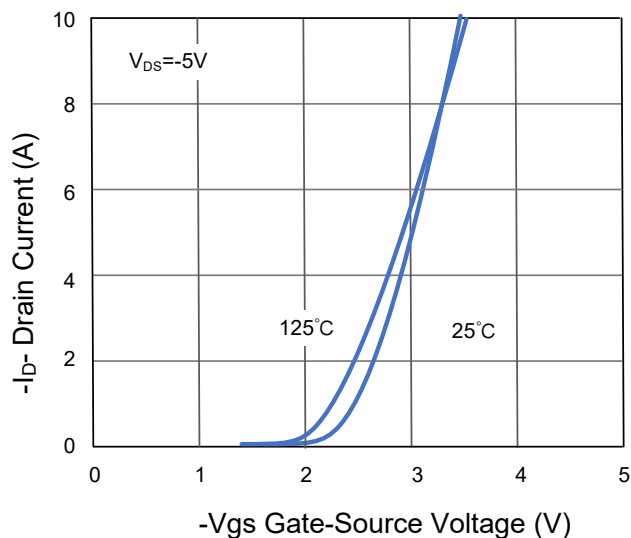


Figure 7 Transfer Characteristics

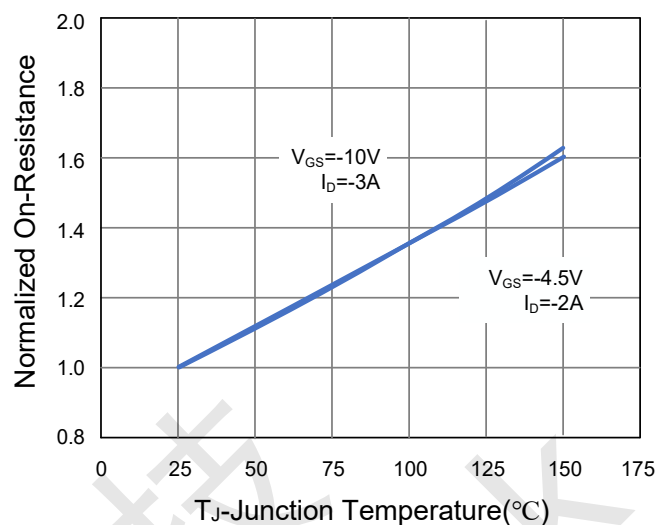


Figure 8 Rdson vs Junction Temperature

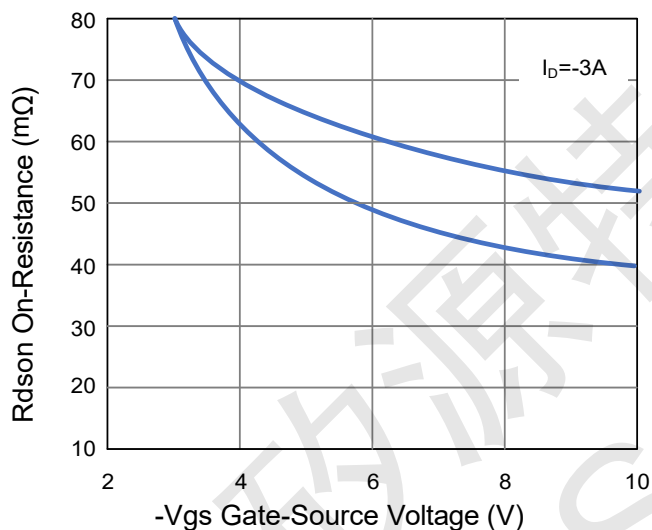


Figure 9 Rdson vs Vgs

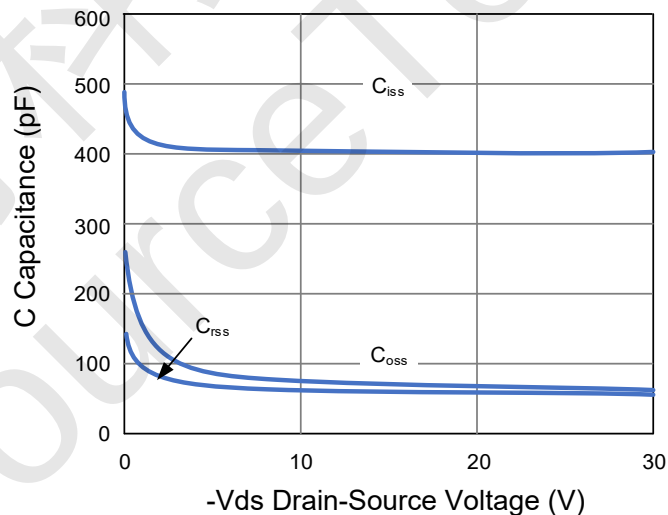


Figure 10 Capacitance vs Vds

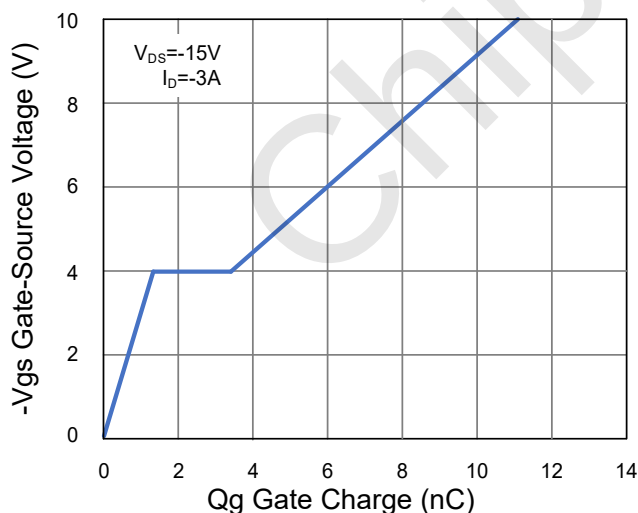


Figure 11 Gate Charge

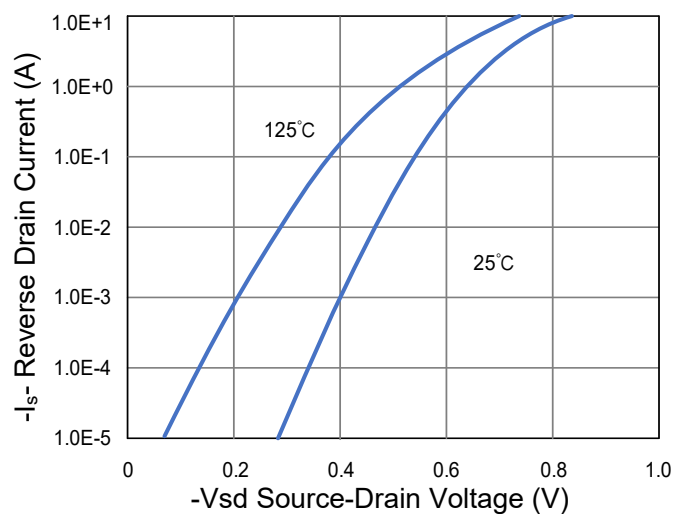


Figure 12 Source- Drain Diode Forward

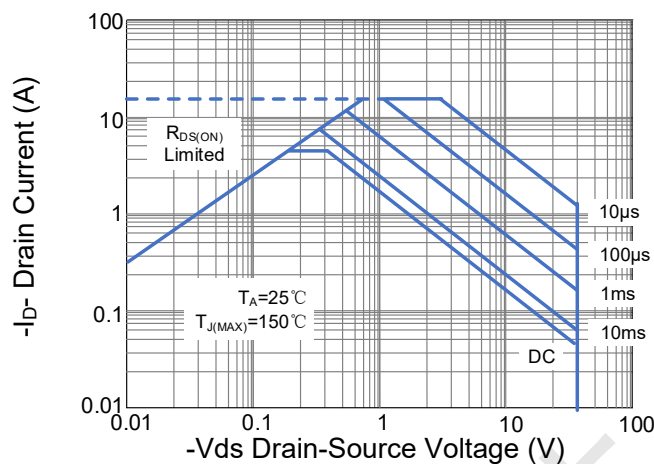


Figure 13 Safe Operation Area

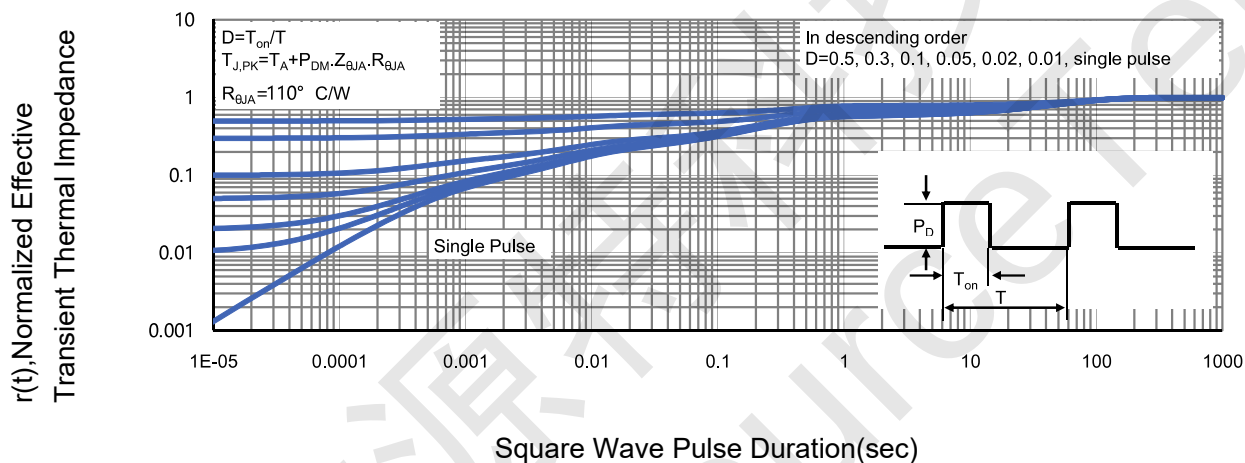
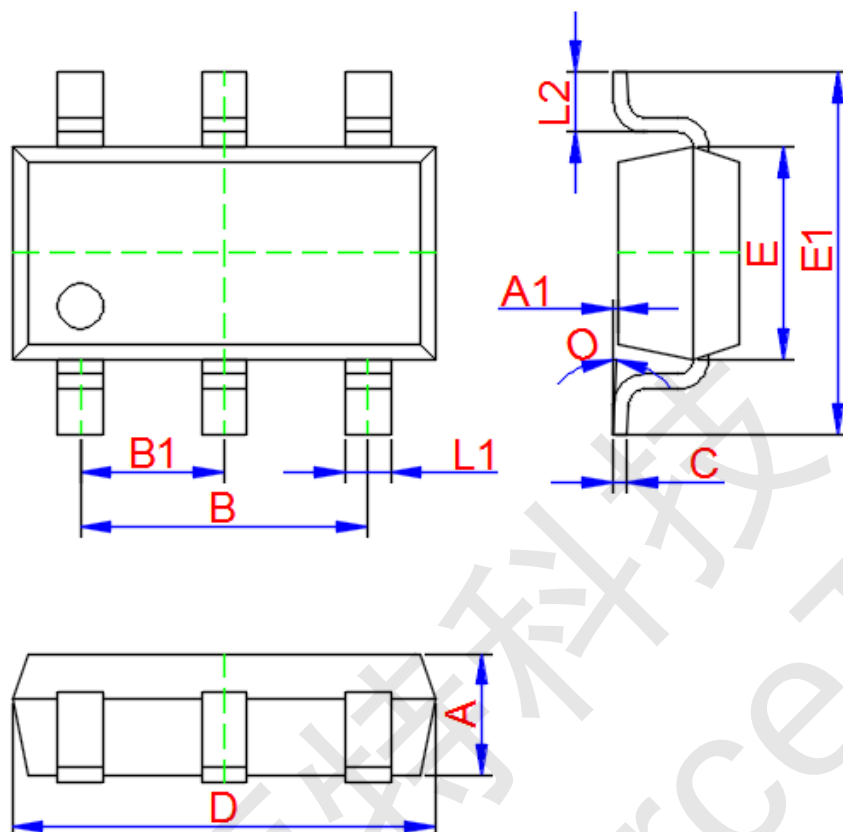


Figure 14 Normalized Maximum Transient Thermal Impedance



PE4616E SOT-23-6L Package Information



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.050	1.100	1.150
A1	0.000	0.050	0.100
L1	0.300	0.400	0.500
C	0.100	0.150	0.200
D	2.820	2.920	3.020
E	1.500	1.600	1.700
E1	2.650	2.800	2.950
B	1.800	1.900	2.000
B1	0.950 TYP.		
L2	0.300	0.450	0.600
O	0°	4°	8°