PE4614S N and P Channel Enhancement Mode Power MOSFET

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PE4614S Description

The PE4614S uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

PE4614S General Features

- **N-Channel**
- V_{DS} = 40V, I_D =6A

  $R_{DS(ON)}$ < 30mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 38mΩ @V_{GS}=4.5V

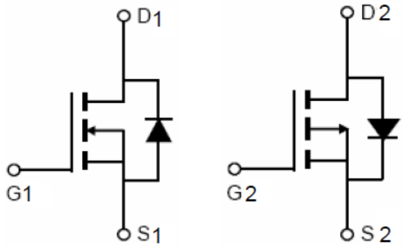
- **P-Channel**
- V_{DS} = -40V, I_D = -6A

  $R_{DS(ON)}$ < 60mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ < 85mΩ @V_{GS}=-4.5V

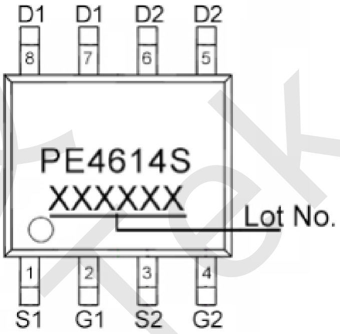
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

PE4614S Application

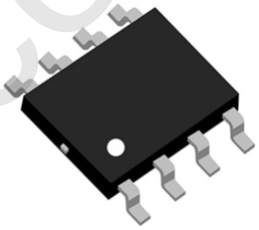
- Motor control
- Synchronous rectification
- Fan Pre-driver H-bridge



Schematic diagram



Marking and pin assignment



SOP-8

PE4614S Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Drain Current-Continuous	I_D	6	-6	A
Drain Current-Continuous (TA=70℃)	I_D	5.5	-5.5	A
Pulsed Drain Current $^{(Note\ 1)}$	I_{DM}	24	-24	A
Maximum Power Dissipation	P_D	2	2	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150		℃

PE4614S Thermal Characteristic

Parameter	Symbol	N-Channel	P-Channel	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	℃/W

PE4614S N-Channel 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	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,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	1.3	1.7	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V,I_D=6A	-	25	30	mΩ
		V_{GS}=4.5V,I_D=5A	-	30	38	mΩ
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	446	-	pF
Output Capacitance	C_{oss}		-	53	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	37	-	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V,F=1.0MHz	-	2.5	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V, R_L=3.3Ω, V_{GS}=10V, R_G=3Ω	-	7.8	-	nS
Turn-on Rise Time	t_r		-	6.9	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	22.4	-	nS
Turn-Off Fall Time	t_f		-	4.8	-	nS
Total Gate Charge	Q_g	V_{DS}=20V, I_D=6A, V_{GS}=10V	-	15.7	-	nC
Gate-Source Charge	Q_{gs}		-	3.2	-	nC
Gate-Drain Charge	Q_{gd}		-	2.8	-	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		-	-	2	A
Reverse Recovery Time	t_{rr}	I_F=6A, di/dt=100A/μs	-	13	-	nS
Reverse Recovery Charge	Q_{rr}		-	8.7	-	nC

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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.

PE4614S Typical Electrical and Thermal Characteristics

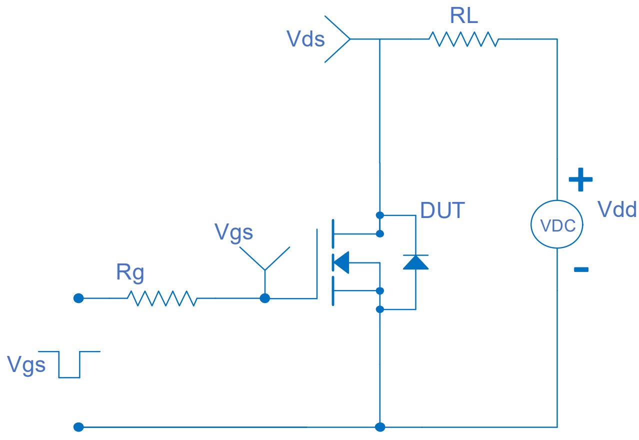

Figure 1 Switching Test Circuit

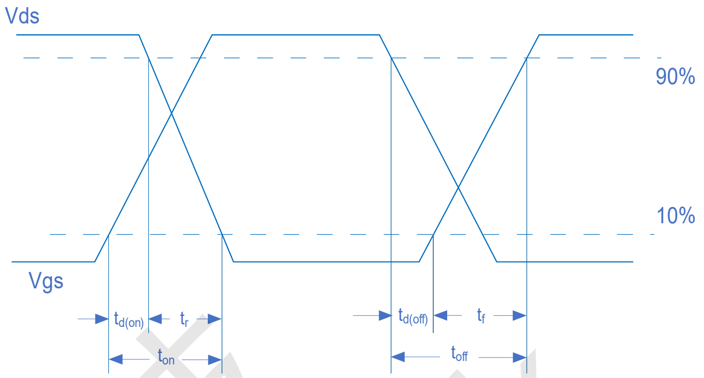

Figure 2 Switching Waveform

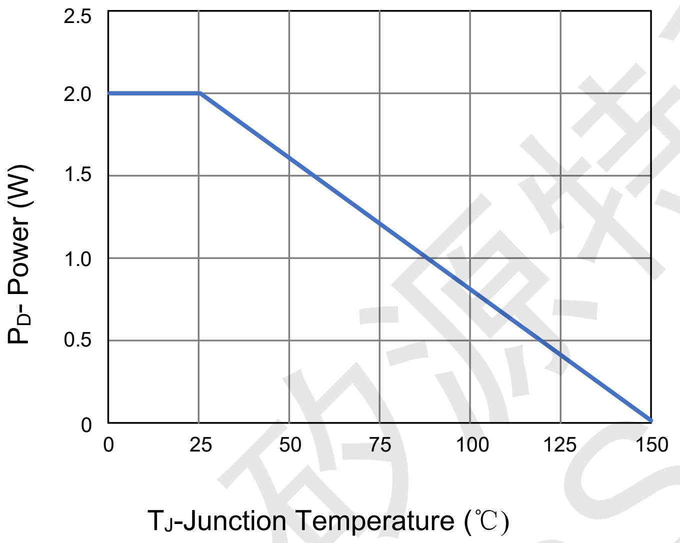

Figure 3 Power De-rating

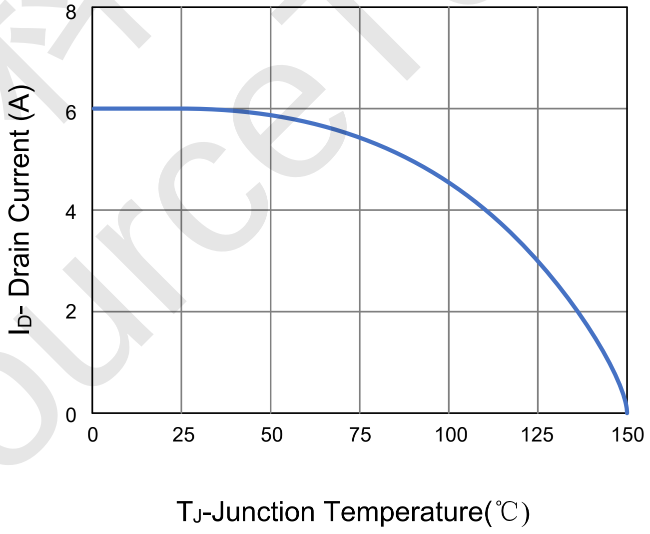

Figure 4 Drain Current

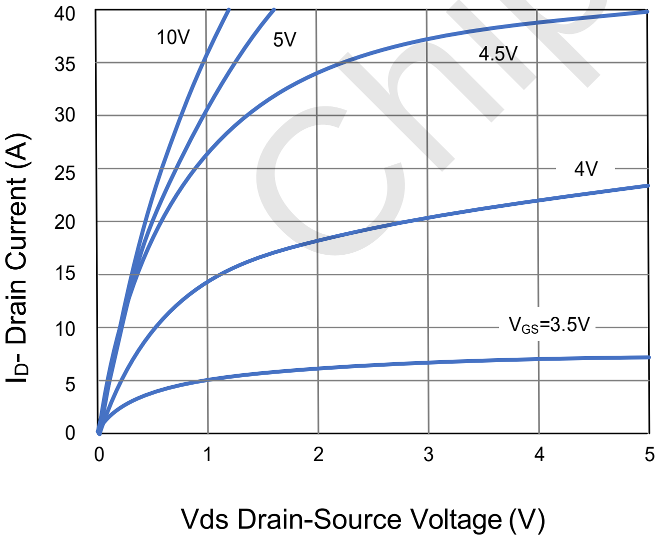

Figure 5 Output Characteristics

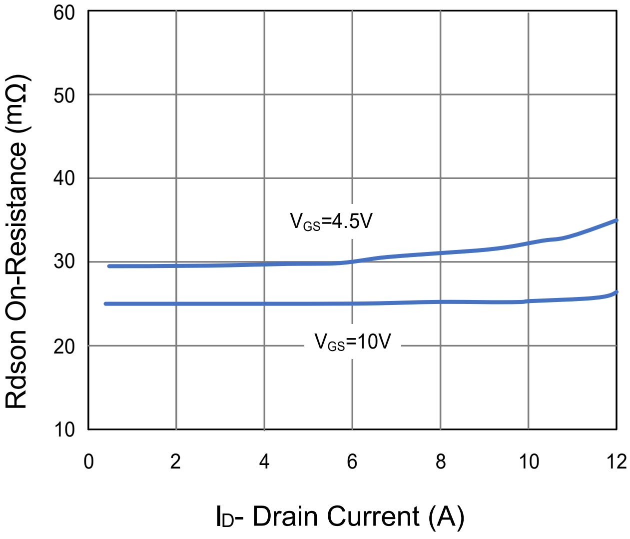

Figure 6 Rdson vs Drain Current

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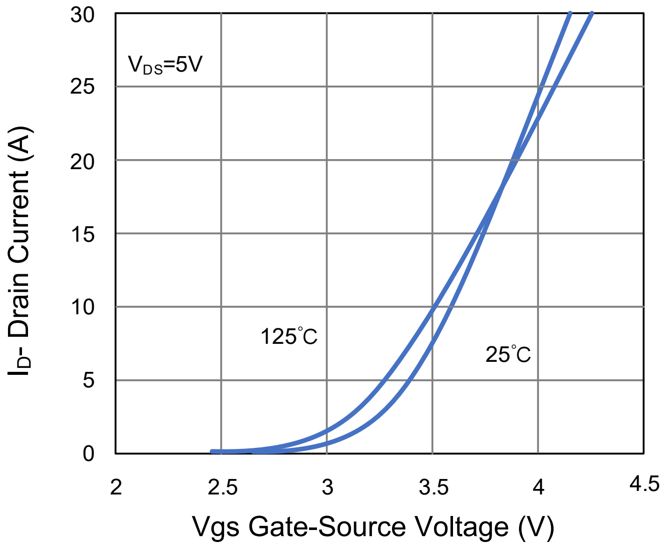

Figure 7 Transfer Characteristics

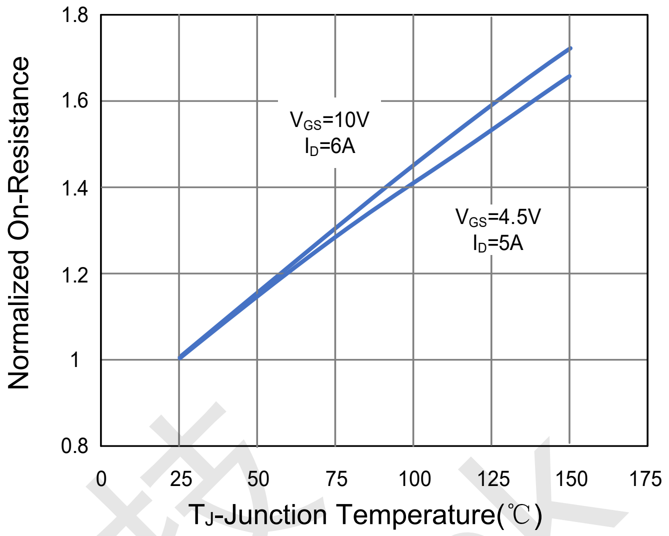

Figure 8 Rdson vs Junction Temperature

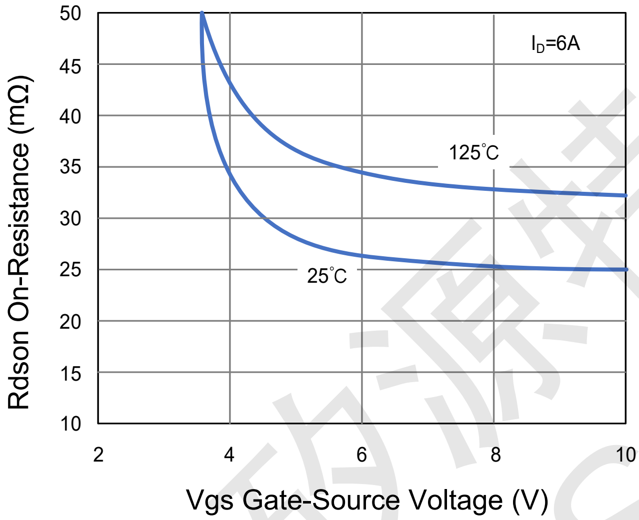

Figure 9 Rdson vs Vgs

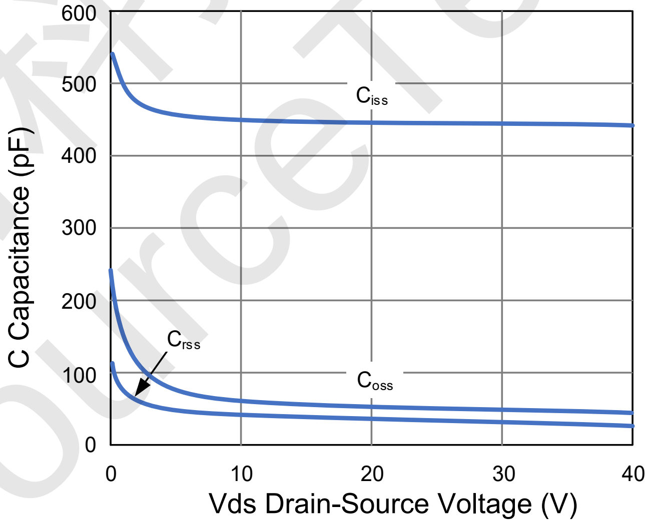

Figure 10 Capacitance vs Vds

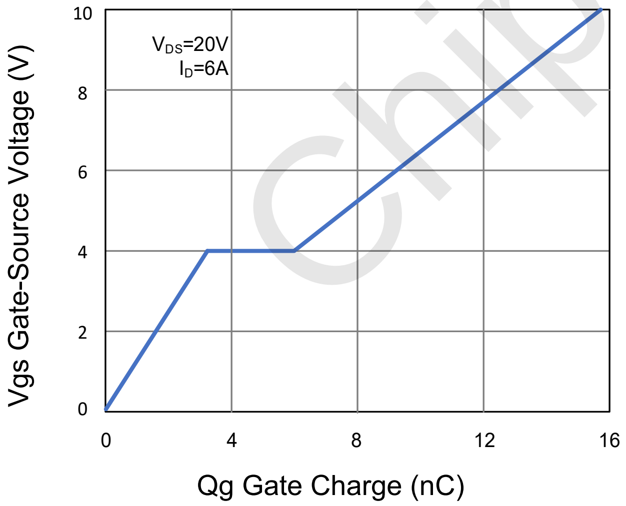

Figure 11 Gate Charge

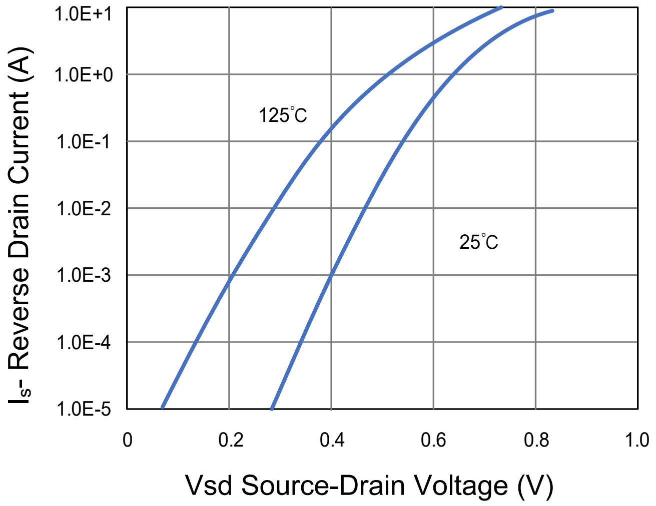

Figure 12 Source- Drain Diode Forward

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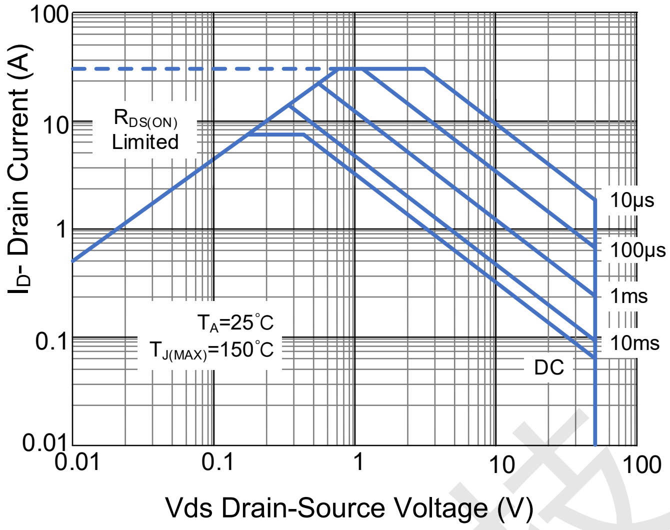

Figure 13 Safe Operation Area

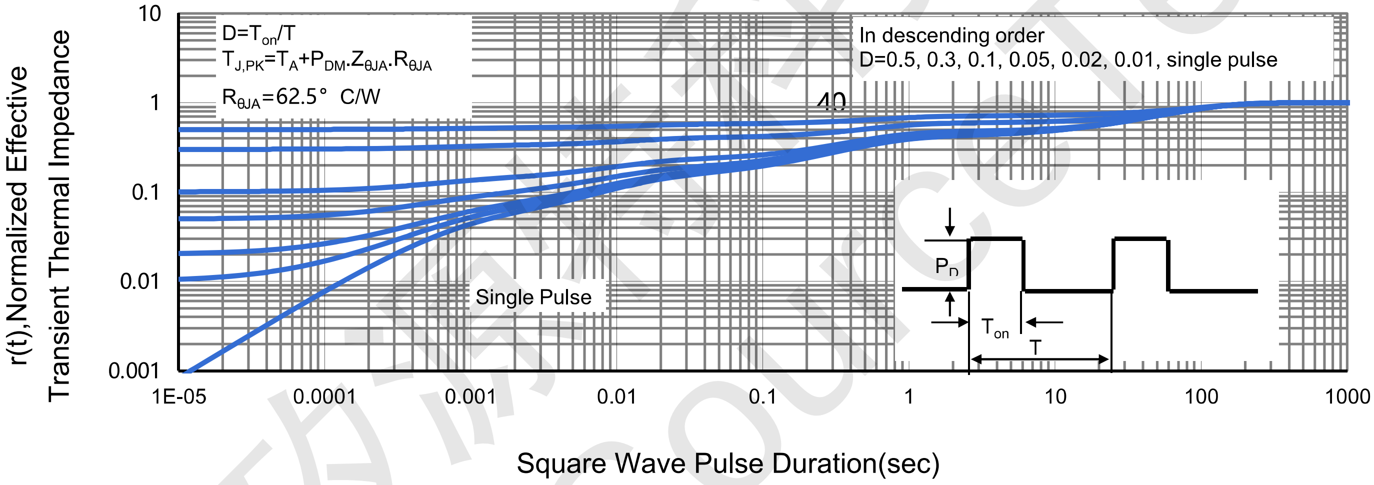

Figure 14 Normalized Maximum Transient Thermal Impedance

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PE4614S P-Channel 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	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-40V,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	-1.3	-1.7	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V,I_D=-6A	-	50	60	mΩ
		V_{GS}=-4.5V,I_D=-5A	-	62	85	mΩ
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	V_{DS}=-20V,V_{GS}=0V, F=1.0MHz	-	551	-	pF
Output Capacitance	C_{oss}		-	66	-	pF
Reverse Transfer Capacitance (Note 4)	C_{rss}		-	48	-	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V,F=1.0MHz	-	8	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-20V,R_L=1Ω, V_{GS}=-10V,R_G=3Ω	-	8.7	-	nS
Turn-on Rise Time	t_r		-	7	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	31	-	nS
Turn-Off Fall Time	t_f		-	17	-	nS
Total Gate Charge	Q_g	V_{DS}=-20V,I_D=-5.5A, V_{GS}=-10V	-	15	-	nC
Gate-Source Charge	Q_{gs}		-	2.4	-	nC
Gate-Drain Charge	Q_{gd}		-	3.5	-	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		-	-	-2	A
Reverse Recovery Time	t_{rr}	I_F=-5.5A, di/dt=100A/μs	-	15	-	nS
Reverse Recovery Charge	Q_{rr}		-	8	-	nC

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.

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PE4614S Typical Electrical and Thermal Characteristics

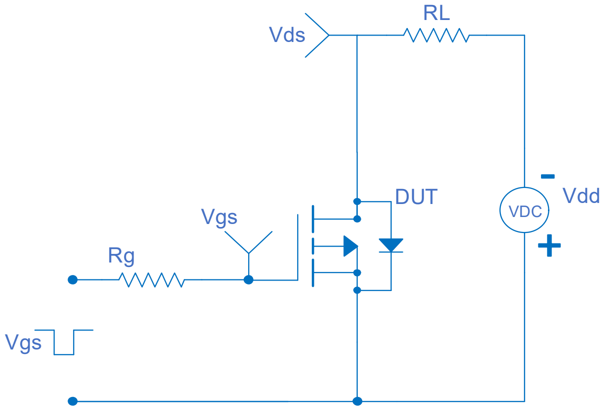

Figure 1 Switching Test Circuit

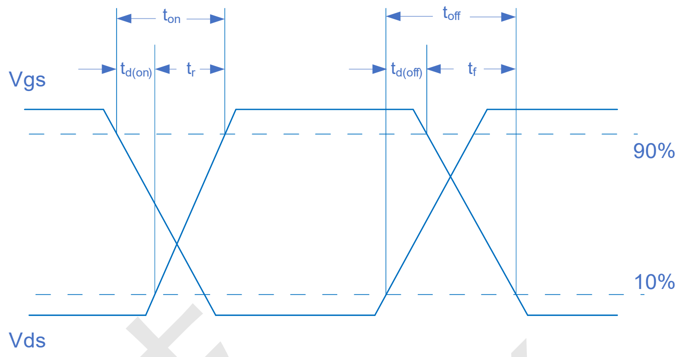

Figure 2 Switching Waveform

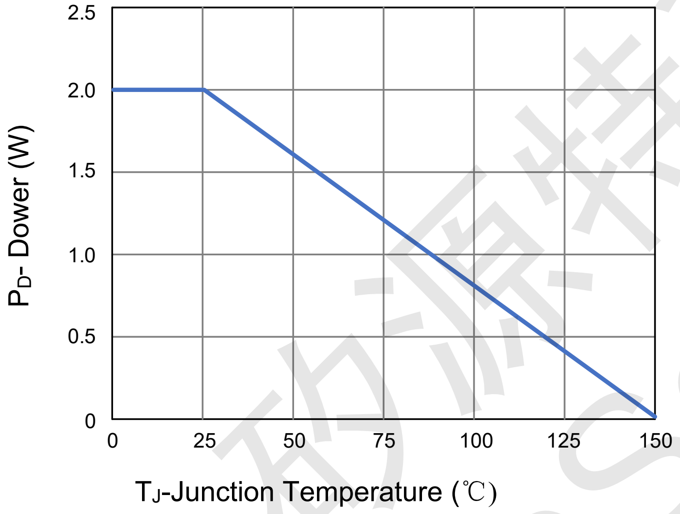

Figure 3 Power De-rating

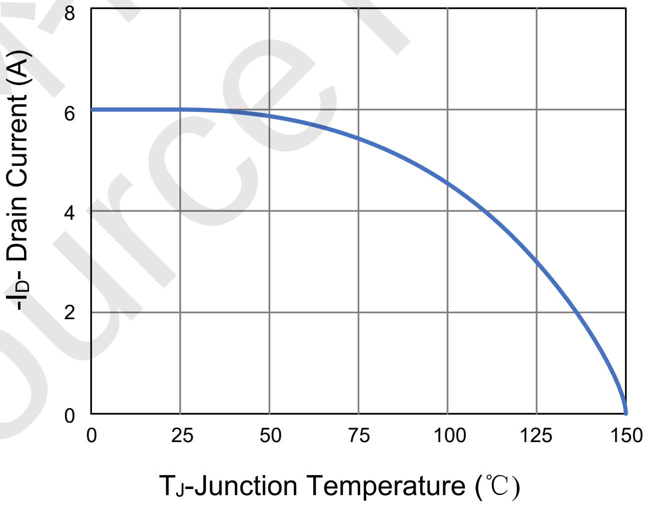

Figure 4 Drain Current

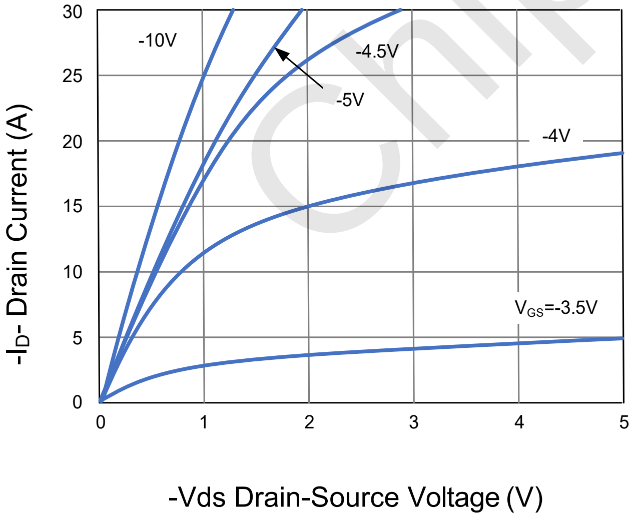

Figure 5 Output Characteristics

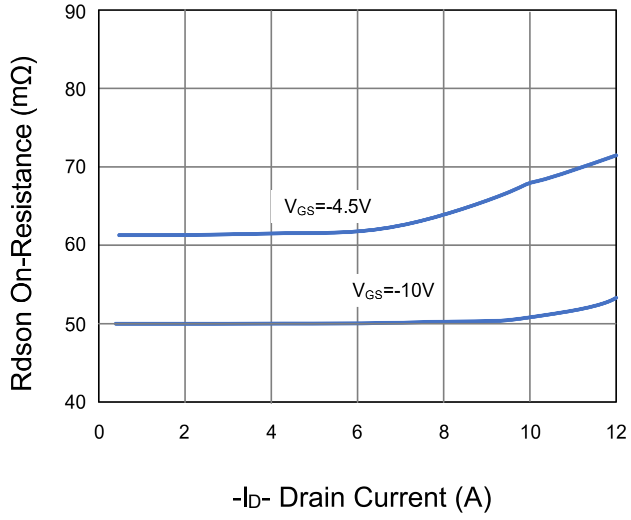

Figure 6 Rdson vs Drain Current

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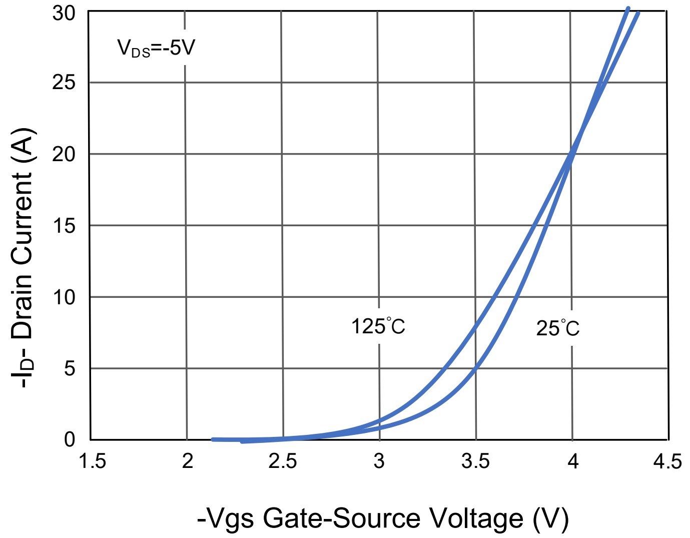

Figure 7 Transfer Characteristics

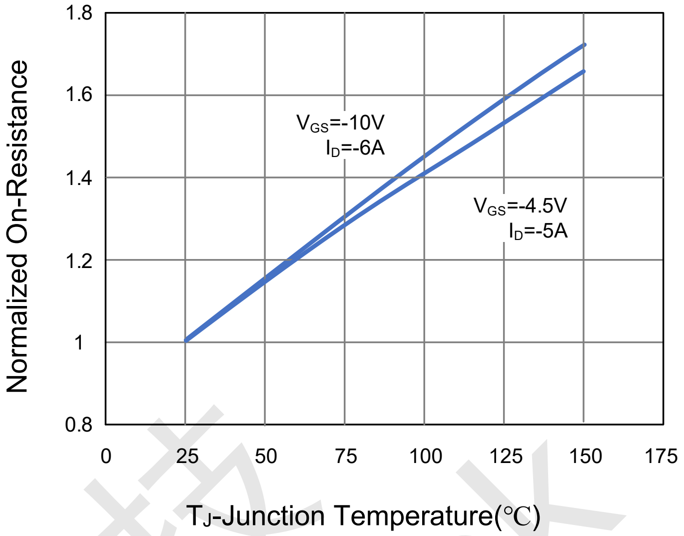

Figure 8 Rdson vs Junction Temperature

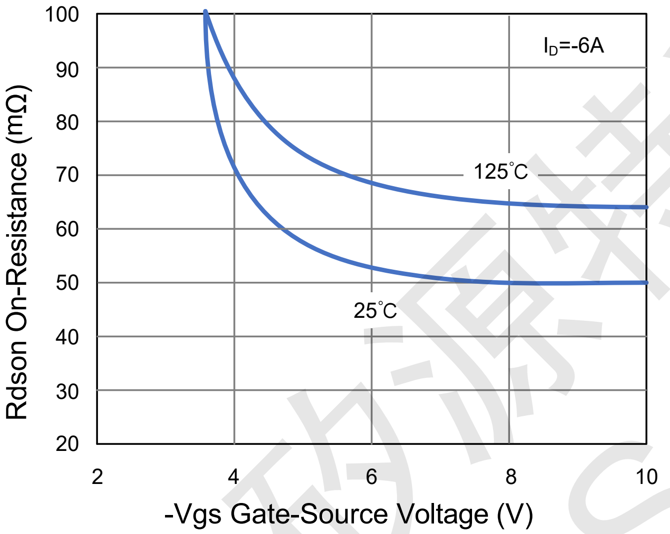

Figure 9 Rdson vs Vgs

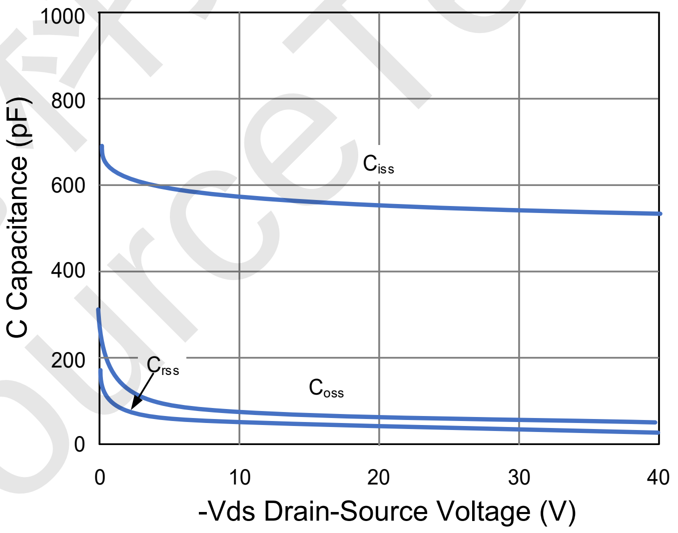

Figure 10 Capacitance vs Vds

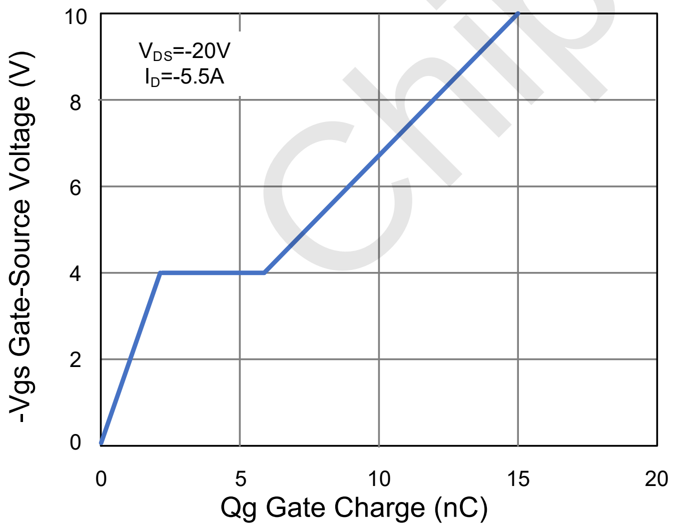

Figure 11 Gate Charge

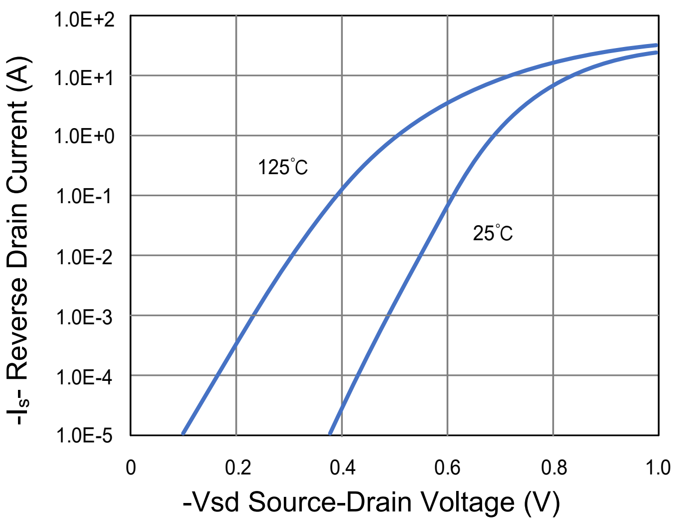

Figure 12 Source- Drain Diode Forward

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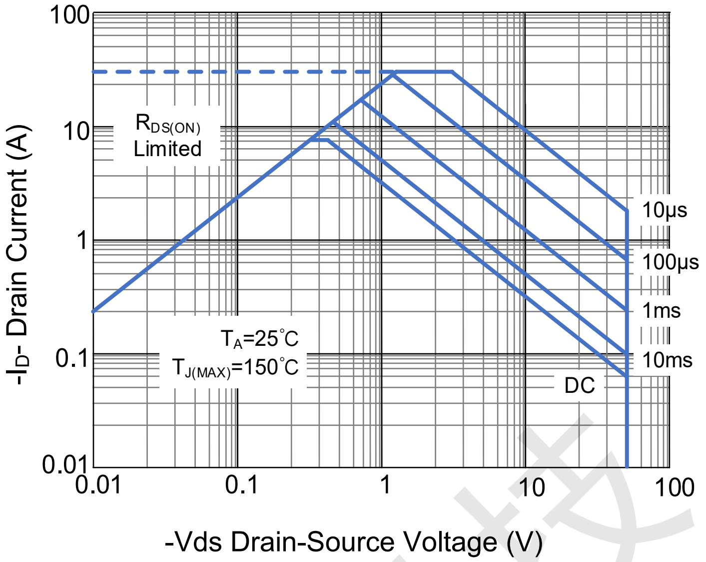

Figure 13 Safe Operation Area

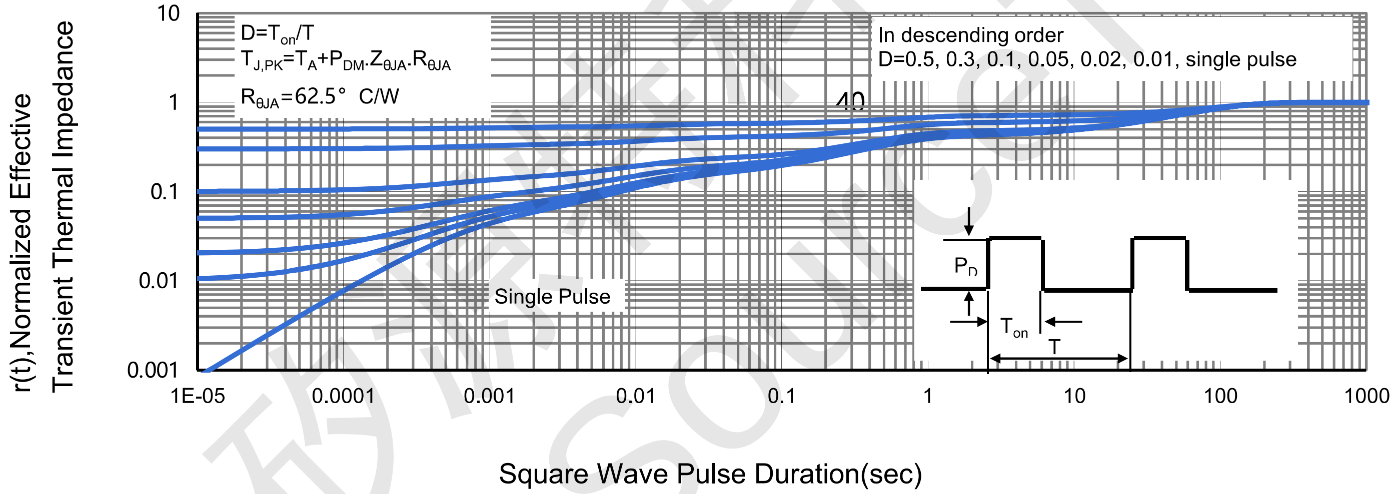

Figure 14 Normalized Maximum Transient Thermal Impedance

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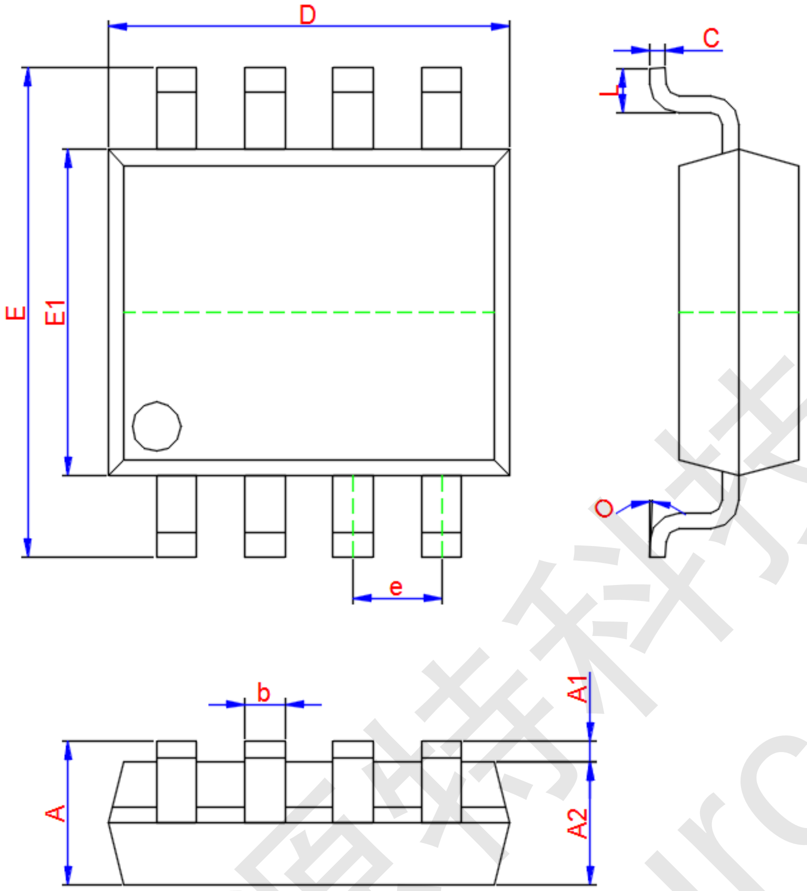
PE4614S SOP-8 Package Information



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Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.350	1.550	1.750
A1	0.100	0.175	0.250
A2	1.350	1.450	1.550
b	0.330	0.420	0.510
c	0.170	0.210	0.250
D	4.700	4.900	5.100
e	1.270 TYP.		
E	5.800	6.000	6.200
E1	3.750	3.900	4.050
L	0.400	0.835	1.270
O	0°	4°	8°