

SE4610

**Complementary Enhancement-Mode MOSFET**

Revision: A

**General Description**

Advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and low operation voltage. This device is suitable for using as a load switch or in PWM applications.

- Low  $R_{DS(on)}$
- Small Package Outline
- ESD protected

**Features**

For N-Channel MOSFET

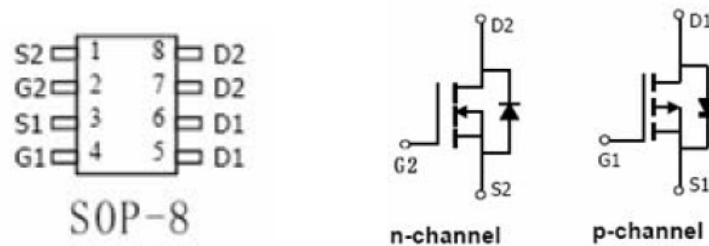
- $V_{DS} = 25V$
- $R_{DS(ON)} = 18m\Omega @ V_{GS}=4.5V$

For P-Channel MOSFET

- $V_{DS} = -40V$
- $R_{DS(ON)} = 18m\Omega @ V_{GS}=-4.5V$

**Pin configurations**

See Diagram below



**Absolute Maximum Ratings**

Parameter		Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage		$V_{DS}$	25	-40	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	$\pm 12$	V
Drain Current	Continuous	$I_D$	10	-10	A
	Pulsed		80	-80	
Total Power Dissipation	@TA=25°C	$P_D$	3	2	W
Operating Junction Temperature Range		$T_J$	-55 to 150		°C

**Thermal Resistance**

Parameter	Symbol	N-Channel		P-Channel		Units
		Typ	Max	Typ	Max	
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	55	62.5	53	62.5	°C/W

Electrical Characteristics (T <sub>J</sub> =25°C unless otherwise noted)							
Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
<b>OFF CHARACTERISTICS (Note 2)</b>							
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0 V	N-Ch	25			V
		I <sub>D</sub> =250μA, V <sub>GS</sub> =0 V	P-Ch	-40			
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> = 30V, V <sub>GS</sub> =0V	N-Ch			1	μA
		V <sub>DS</sub> = -20V, V <sub>GS</sub> =0V	P-Ch			-1	
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =12V, V <sub>DS</sub> =0V	N-Ch			1	nA
			P-Ch			-1	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA	N-Ch	0.5		1	V
		V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA	P-Ch	-0.6		-1.5	
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.5A	N-Ch		18	33	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-9A	P-Ch		18	28	
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =4.0A	N-Ch		21	40	
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-6A	P-Ch		23	38	
<b>SWITCHING PARAMETERS</b>							
C <sub>iss</sub>	Input Capacitance	N-Channel: V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1 MHz  P-Channel: V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1 MHz	N-Ch		680		pF
			P-Ch		670		
C <sub>oss</sub>	Output Capacitance		N-Ch		102		
			P-Ch		100		
C <sub>rss</sub>	Reverse Transfer Capacitance		N-Ch		77		
			P-Ch		75		
Q <sub>g</sub>	Total Gate Charge	N-Channel: V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>D</sub> =6.9A P-Channel: V <sub>DS</sub> =-12V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A	N-Ch		13.8		nC
Q <sub>gs</sub>	Gate Source Charge		P-Ch		10		
			N-Ch		1.8		
Q <sub>gd</sub>	Gate Drain Charge		P-Ch		3.3		
			N-Ch		3.3		
P-Ch			1.8				
t <sub>d(on)</sub>	Turn-On Delay Time	N-Channel: V <sub>DD</sub> =15V, R <sub>GEN</sub> =3Ω, R <sub>L</sub> =2.2Ω  P-Channel: V <sub>DD</sub> =-12V R <sub>GEN</sub> =3Ω, R <sub>L</sub> =2.7Ω	N-Ch		4.6		ns
			P-Ch		12		
t <sub>d(off)</sub>	Turn-Off Delay Time		N-Ch		20.6		
			P-Ch		22		
t <sub>d(r)</sub>	Turn-On Rise Time		N-Ch		4.1		
			P-Ch		3		
t <sub>d(f)</sub>	Turn-Off Fall Time		N-Ch		5.2		
			P-Ch		4		

Typical Characteristics(N-Channel)

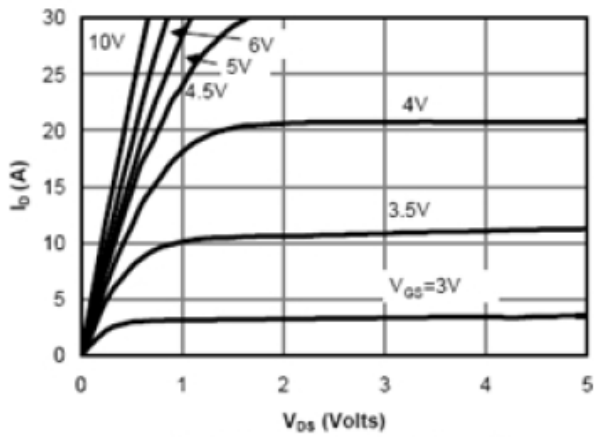


Fig 1: On-Region Characteristics

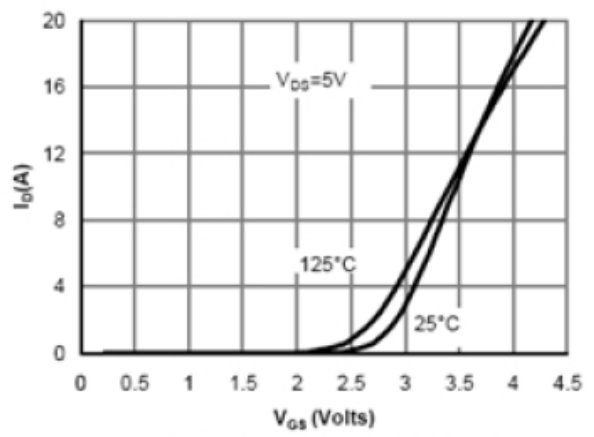


Figure 2: Transfer Characteristics

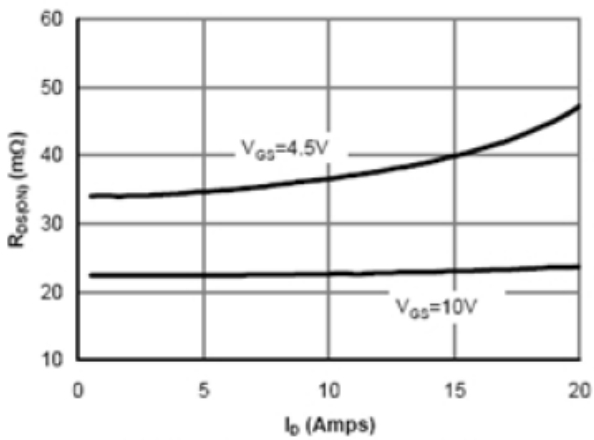


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

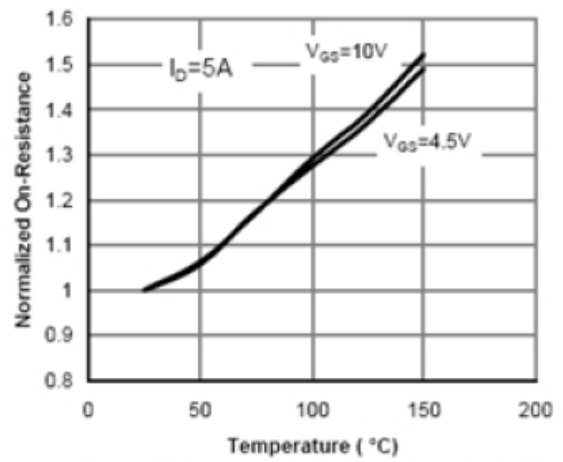


Figure 4: On-Resistance vs. Junction Temperature

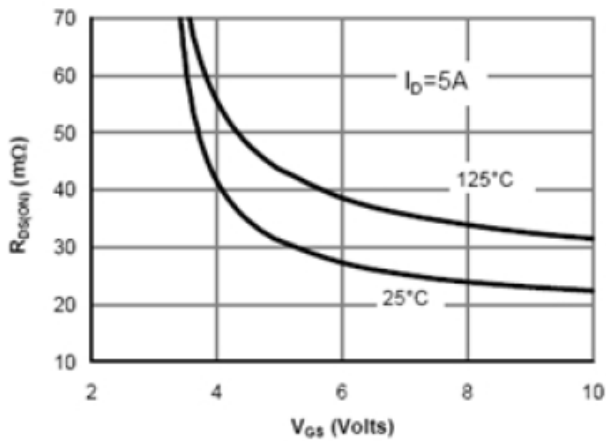


Figure 5: On-Resistance vs. Gate-Source Voltage

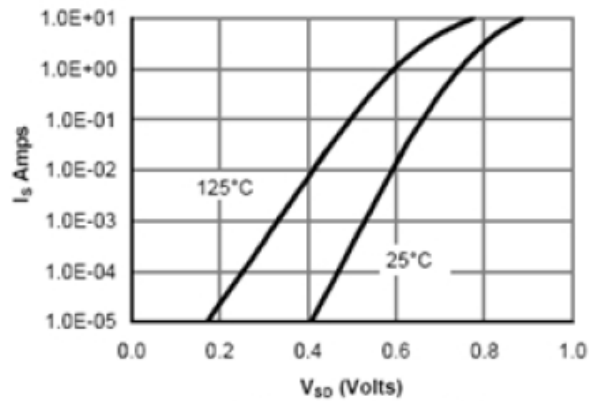


Figure 6: Body diode characteristics

Typical Characteristics(N-Channel)

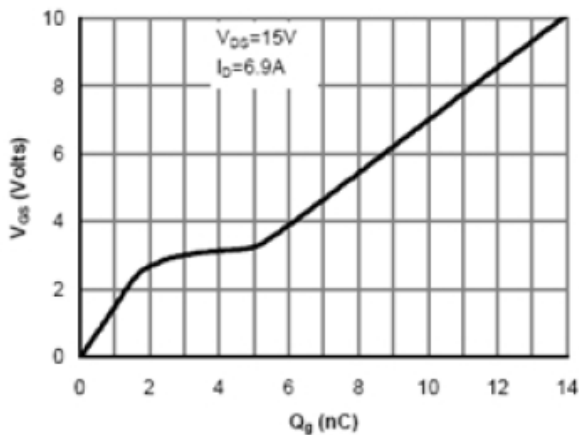


Figure 7: Gate-Charge characteristics

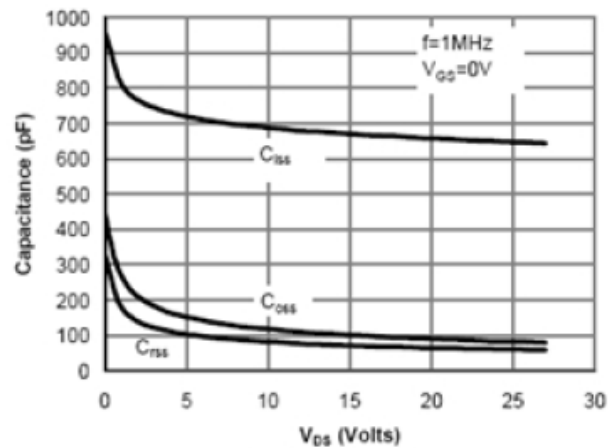


Figure 8: Capacitance Characteristics

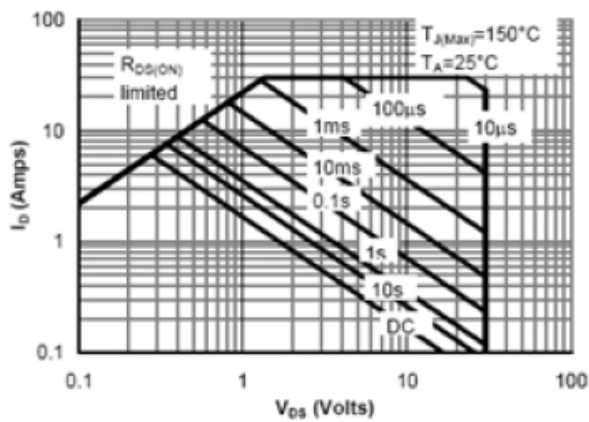


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

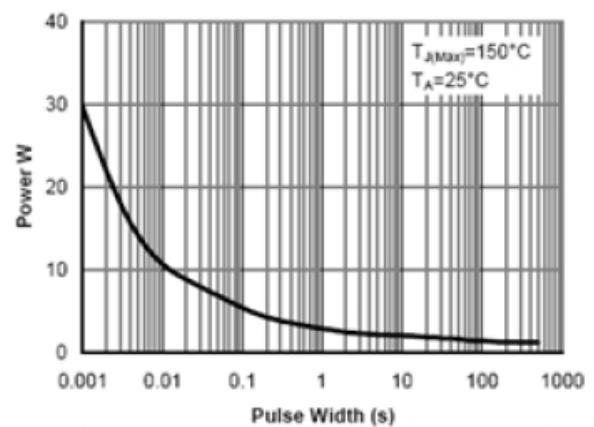


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

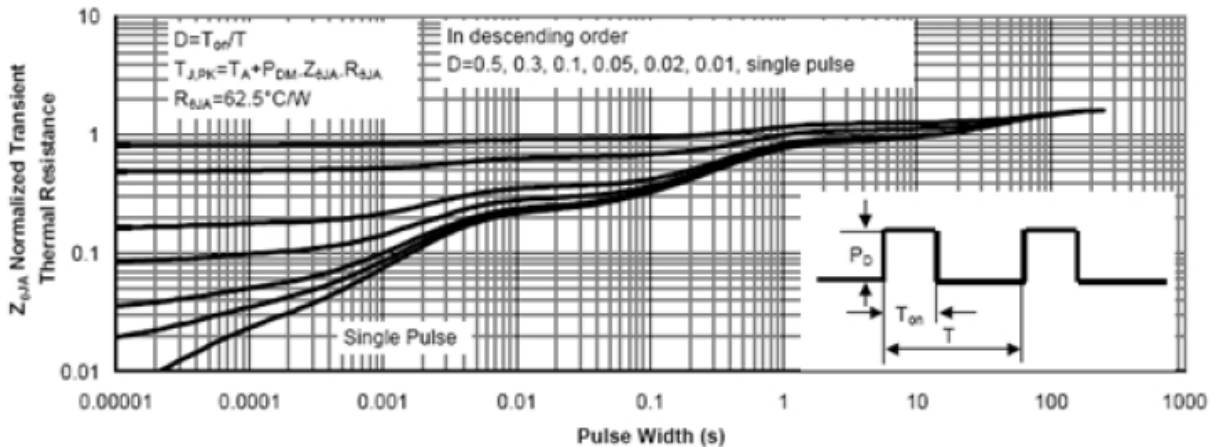


Figure 11: Normalized Maximum Transient Thermal Impedance

Typical Characteristics(P-Channel)

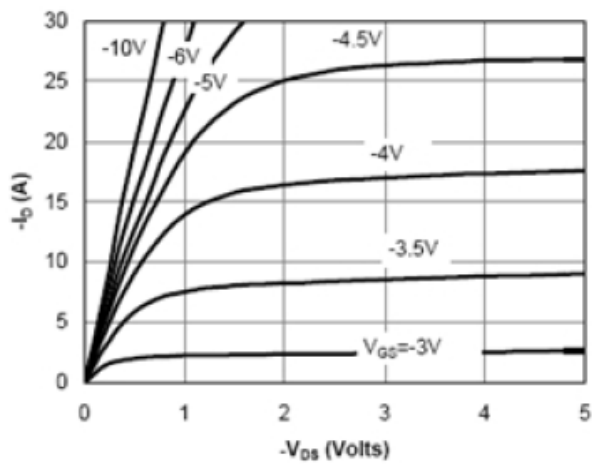


Fig 1: On-Region Characteristics

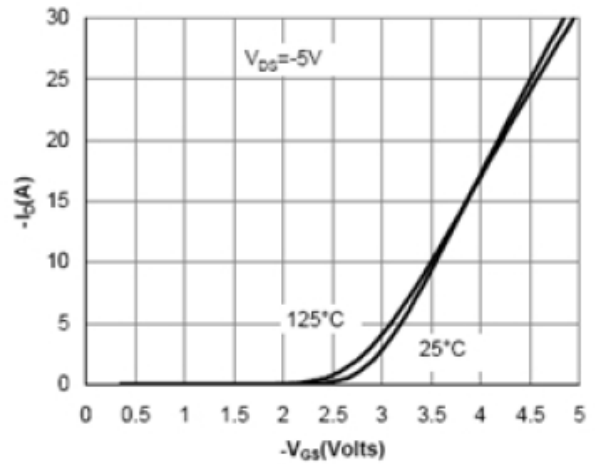


Figure 2: Transfer Characteristics

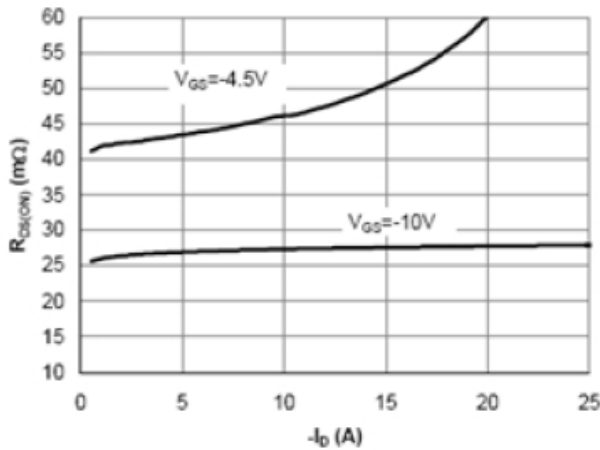


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

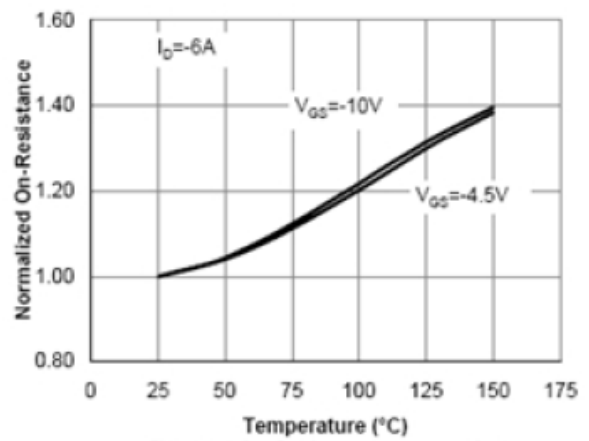


Figure 4: On-Resistance vs. Junction Temperature

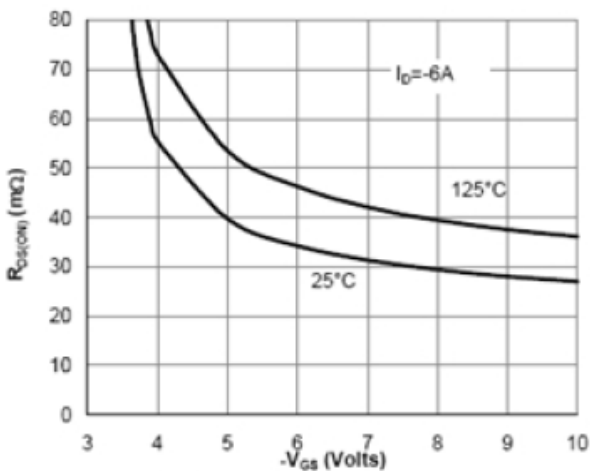


Figure 5: On-Resistance vs. Gate-Source Voltage

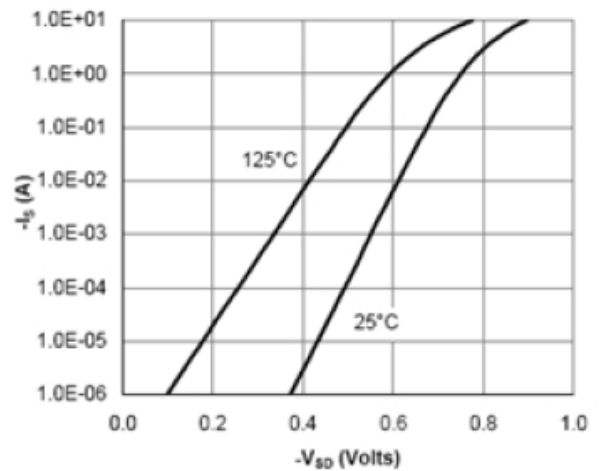


Figure 6: Body-Diode Characteristics

Typical Characteristics(P-Channel)

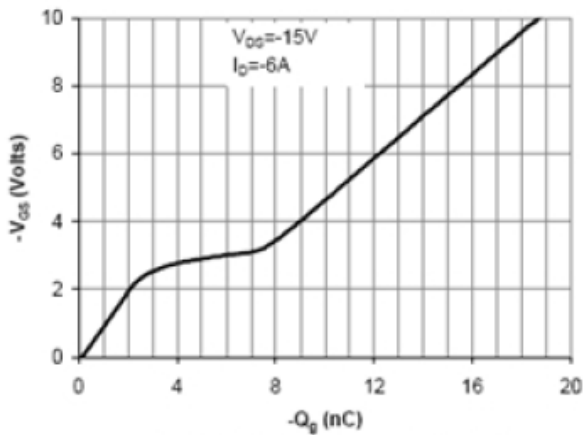


Figure 7: Gate-Charge Characteristics

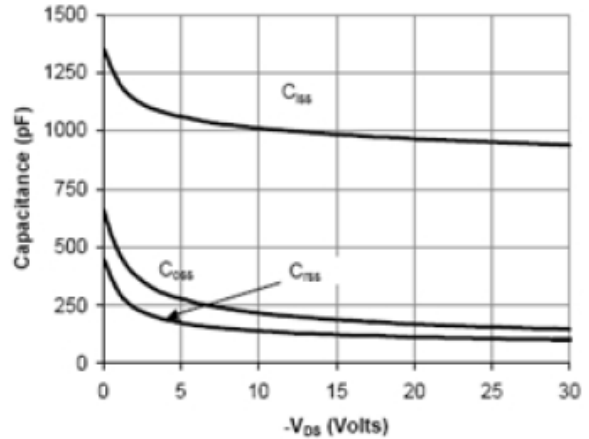


Figure 8: Capacitance Characteristics

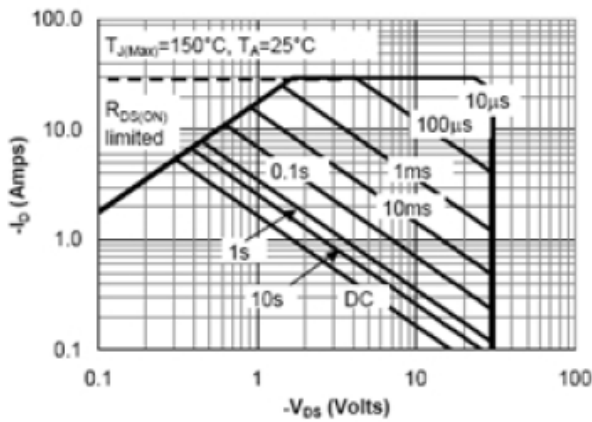


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

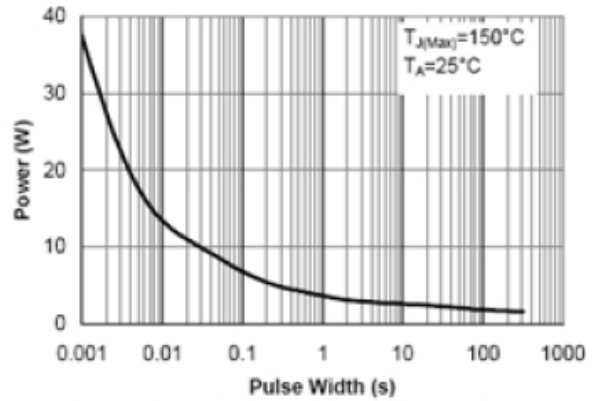


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

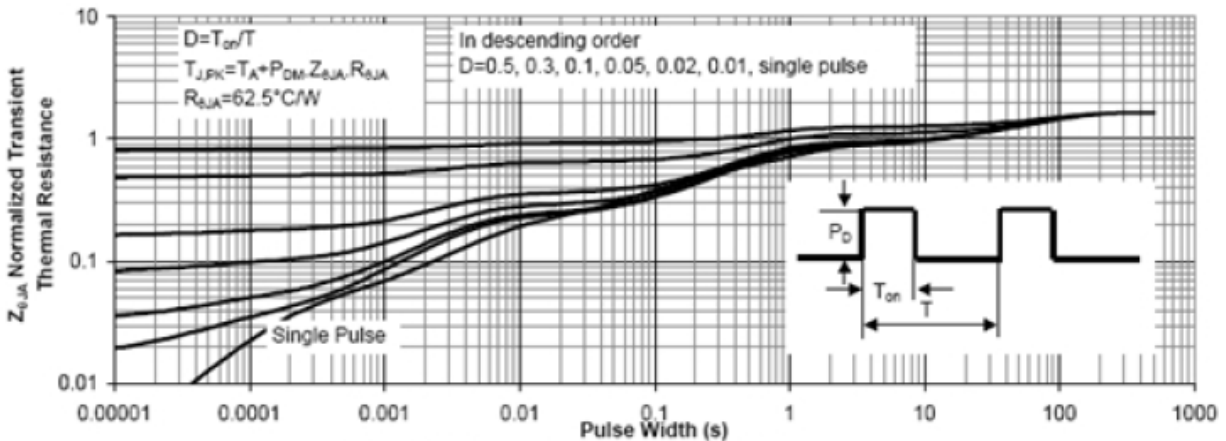
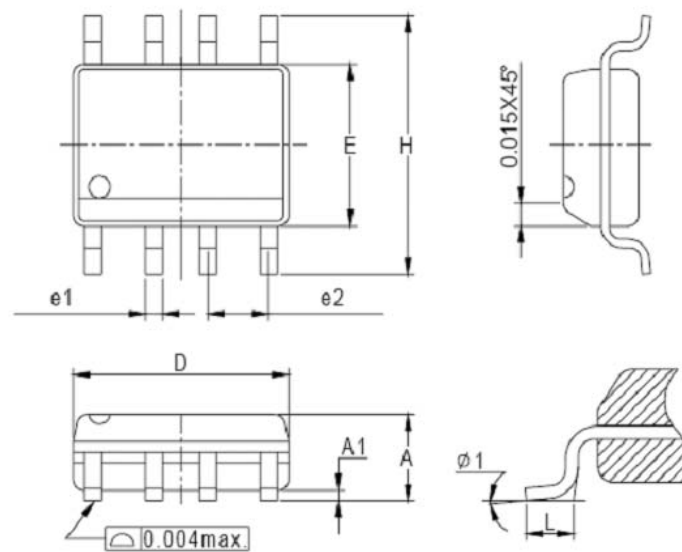


Figure 11: Normalized Maximum Transient Thermal Impedance

# SE4610

## Package Outline Dimension

### SOP-8



Dim	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.80	5.00	0.189	0.197
E	3.80	4.00	0.150	0.157
H	5.80	6.20	0.228	0.244
L	0.40	1.27	0.016	0.050
e1	0.33	0.51	0.013	0.020
e2	1.27BSC		0.50BSC	
φ 1	8°		8°	

The SINO-IC logo is a registered trademark of ShangHai Sino-IC Microelectronics Co., Ltd.

© 2005 SINO-IC - Printed in China - All rights reserved.

SHANGHAI SINO-IC MICROELECTRONICS CO., LTD

Add: Building 3, Room 3401-03, No.200 Zhangheng Road,  
ZhangJiang Hi-Tech Park, Pudong, Shanghai 201203, China

Phone: +86-21-33932402 33932403

33932405 33933508 33933608

Fax: +86-21-33932401

Email: [webmaster@sino-ic.com](mailto:webmaster@sino-ic.com)

Website: <http://www.sino-ic.net>