

SuperMOS – SOP8 ±40V Complementary MOSFET

1. Description

The AO4614B(ES) uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

2. Features

- N-channel
40V $R_{DS(ON)}=20m\Omega(Typ.) @V_{GS}=10V$
 $R_{DS(ON)}=28m\Omega(Typ.) @V_{GS}=4.5V$
 - P-channel
-40V $R_{DS(ON)}=38m\Omega(Typ.) @V_{GS}=-10V$
 $R_{DS(ON)}=48m\Omega(Typ.) @V_{GS}=-4.5V$
- Fast Switching
 - High density cell design for low $R_{DS(on)}$
 - Material: Halogen free
 - Reliable and rugged
 - Avalanche Rated
 - Low leakage current

3. Applications

- PWM applications
 - Load switch
 - Power management in portable/desktop PCs
 - DC/DC conversion
- 100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
AO4614B(ES)	SOP8	ES4614/LOT	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
2	Gate2		
1	Source2		
7/8	Drain2		
4	Gate1		
3	Source1		
5/6	Drain1		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit N-channel	Limit P-channel	Unit
Drain-Source Voltage		BV_{DSS}	40	-40	V
Gate-Source Voltage		V_{GS}	± 20	± 20	V
Continuous Drain Current	$T_A=25^{\circ}\text{C}$	I_D	6.8	-5.0	A
	$T_A=75^{\circ}\text{C}$		5.2	-3.9	
Maximum Power Dissipation	$T_A=25^{\circ}\text{C}$	P_D	2	2	W
	$T_A=75^{\circ}\text{C}$		1.2	1.2	
Pulsed Drain Current		I_{DM}	27.2	-20	A
Avalanche Current, Single Pulsed		I_{AS}	11 ^a	-16.5 ^b	A
Avalanche Energy, Single Pulsed		E_{AS}	18 ^a	40 ^b	mJ
Operating Junction Temperature		T_J	150		$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	-55 to +150		$^{\circ}\text{C}$

Thermal resistance ratings

Single Operation					
Parameter	Symbol	Device	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ($t \leq 10\text{s}$)	$R_{\theta JA}$	n-ch	48	62.5	$^{\circ}\text{C/W}$
Junction-to-Lead Thermal Resistance	$R_{\theta JL}$	n-ch	35	50	
Junction-to-Ambient Thermal Resistance ($t \leq 10\text{s}$)	$R_{\theta JA}$	p-ch	48	62.5	$^{\circ}\text{C/W}$
Junction-to-Lead Thermal Resistance	$R_{\theta JL}$	p-ch	35	50	

Note:

a: $T_J=25^{\circ}\text{C}$, $V_{DD}=40\text{V}$, $V_G=10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

b: $T_J=25^{\circ}\text{C}$, $V_{DD}=-40\text{V}$, $V_G=-10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

AO4614B(ES)

Rev-1.3

7. N-channel Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1.0	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =250uA	1.0	1.5	2.2	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =6A		20	25	mΩ
		V _{GS} =4.5V, I _D =5A		28	38	
Forward Trans conductance	g _{FS}	V _{DS} =5.0V, I _D =6A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =20V		410		pF
Output Capacitance	C _{OSS}			100		
Reverse Transfer Capacitance	C _{RSS}			35		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =10V, V _{DS} =20V, I _D =6A		8.5		nC
Gate-to-Source Charge	Q _{GS}			1.2		
Gate-to-Drain Charge	Q _{GD}			2.4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =10V, V _{DS} =20V, R _L =3.3Ω, R _{GEN} =3Ω		4.4		ns
Rise Time	t _r			3.3		
Turn-Off Delay Time	t _{d(OFF)}			15.8		
Fall Time	t _f			3.2		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.0A	0.45		1.5	V

8. N-channel Typical Characteristic

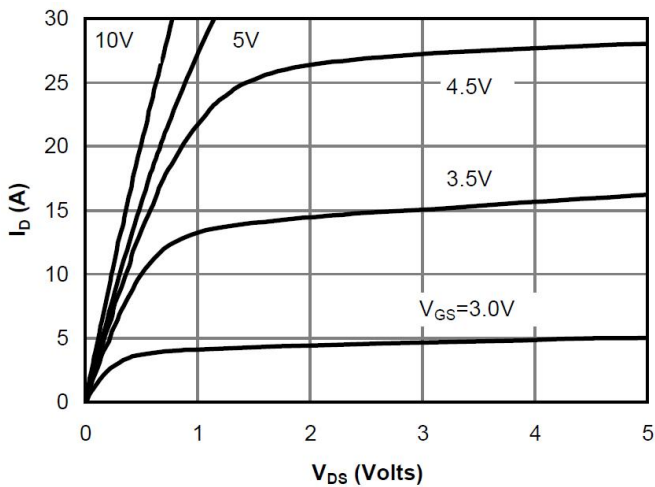


Fig 1: On-Region Characteristics

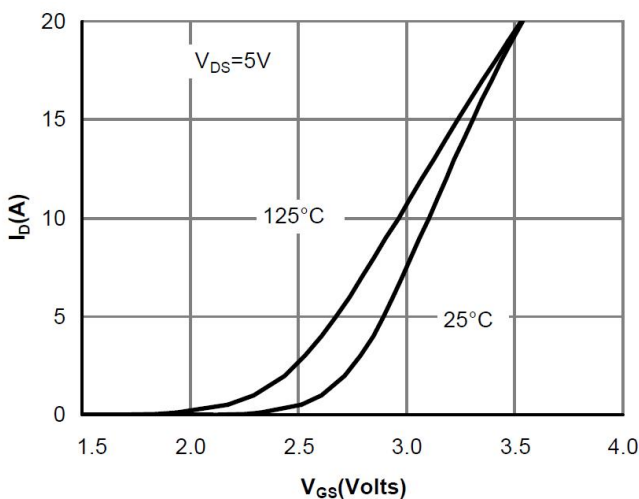


Figure 2: Transfer Characteristics

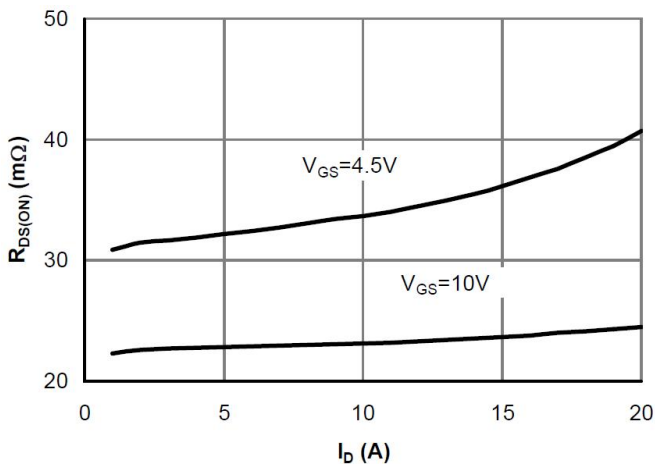


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

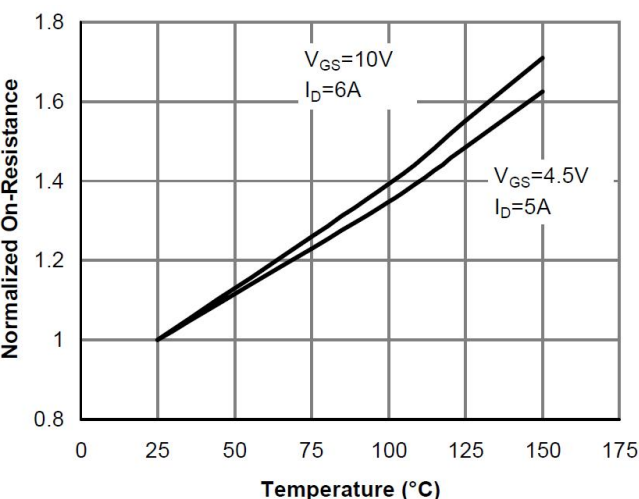


Figure 4: On-Resistance vs. Junction Temperature

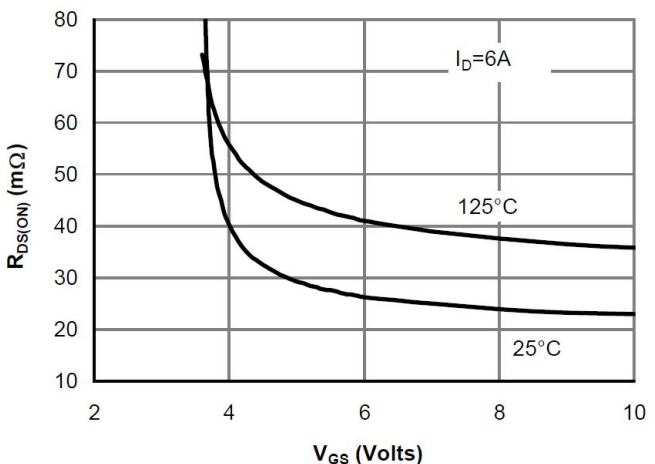


Figure 5: On-Resistance vs. Gate-Source Voltage

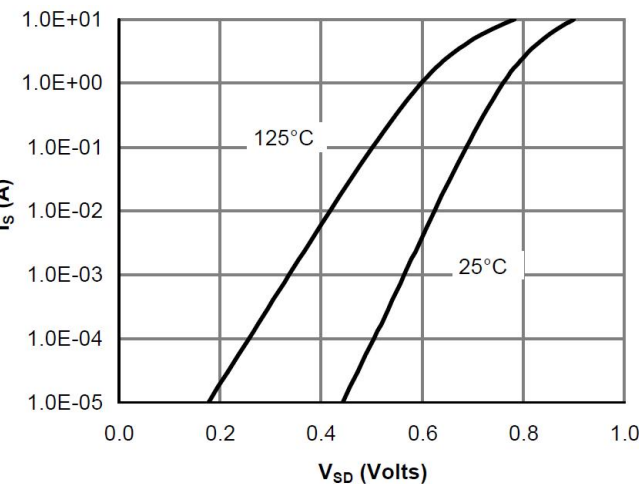


Figure 6: Body-Diode Characteristics

AO4614B(ES)

Rev-1.3

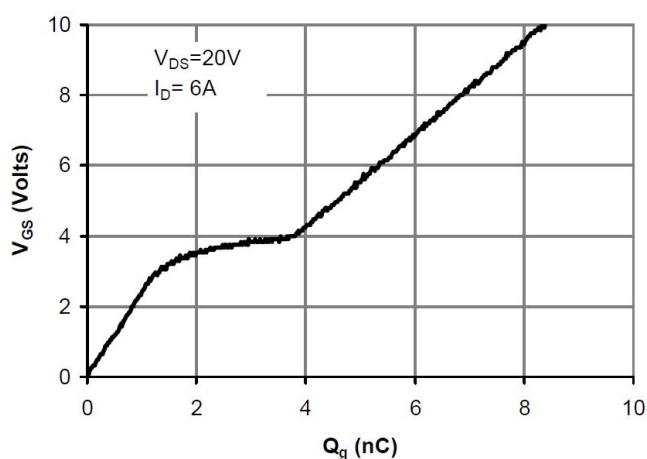


Figure 7: Gate-Charge Characteristics

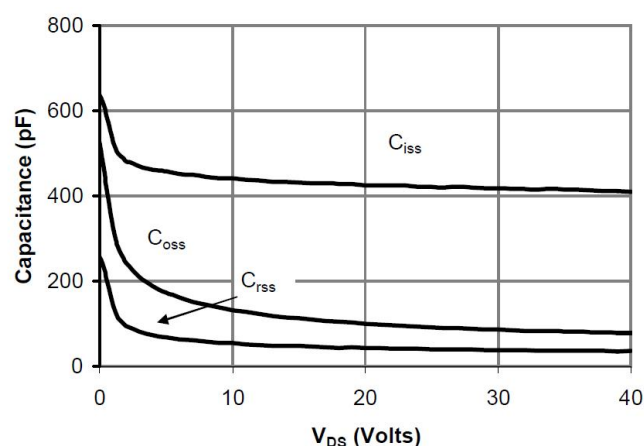


Figure 8: Capacitance Characteristics

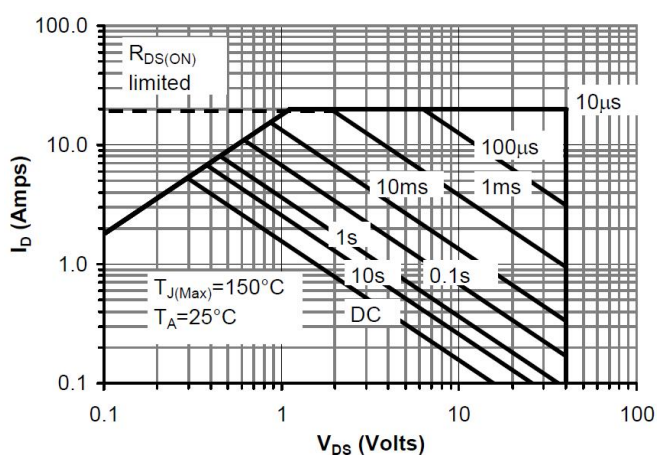


Figure 9: Maximum Forward Biased Safe Operating Area

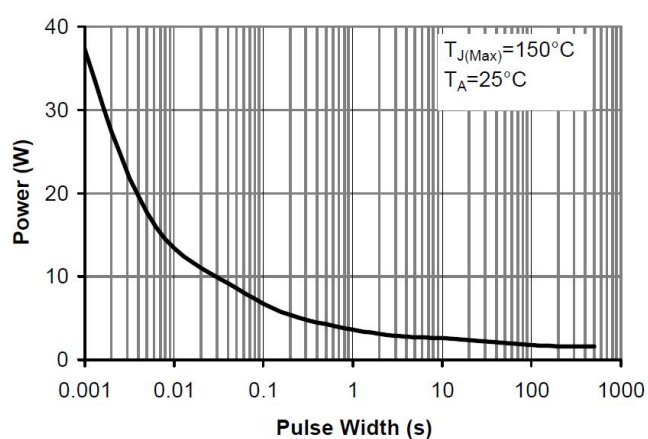


Figure 10: Single Pulse Power Rating Junction-to-Ambient

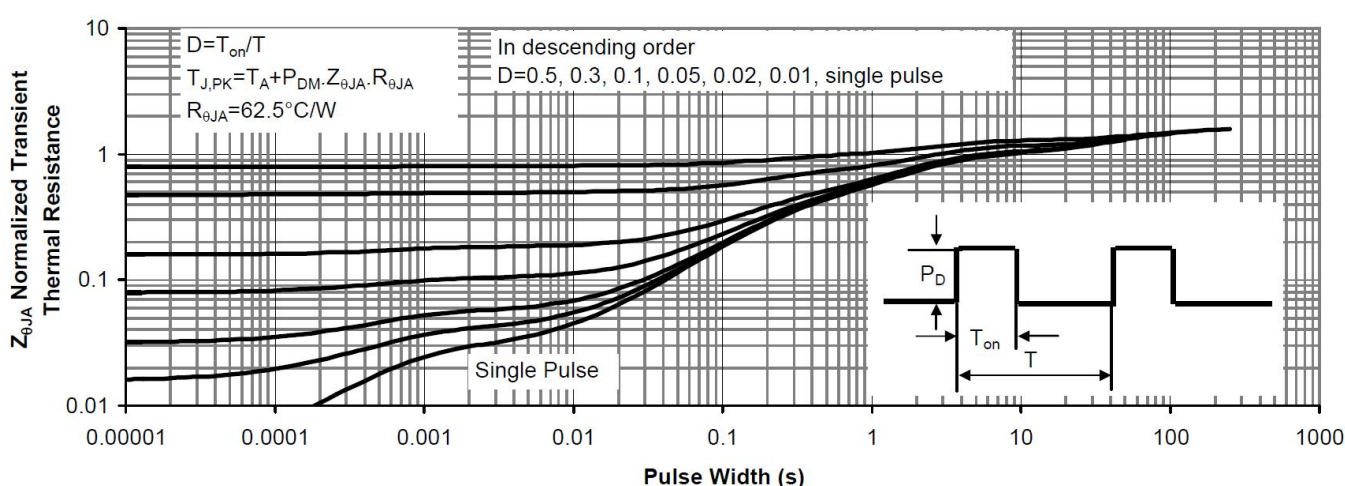


Figure 11: Normalized Maximum Transient Thermal Impedance

AO4614B(ES)

Rev-1.3

9. P-channel Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250uA	-40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} =0V, V _{DS} =-40V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±1	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.55	-2.5	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =10V, I _D =-5A		38	52	mΩ
		V _{GS} =-4.5V, I _D =-4A		48	64	
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-5A			40	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-20V f=1MHz		660		pF
Output Capacitance	C _{OSS}			140		
Reverse Transfer Capacitance	C _{RSS}			65		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-20V I _D =-5A		13.5		nC
Gate-to-Source Charge	Q _{GS}			2		
Gate-to-Drain Charge	Q _{GD}			4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-20V R _L =4Ω, R _G =3Ω		7.5		ns
Rise Time	t _r			6.6		
Turn-Off Delay Time	t _{d(OFF)}			26		
Fall Time	t _f			11.5		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _{SD} =-1.0A	-4.5		-1.5	V

10. Typical Characteristic

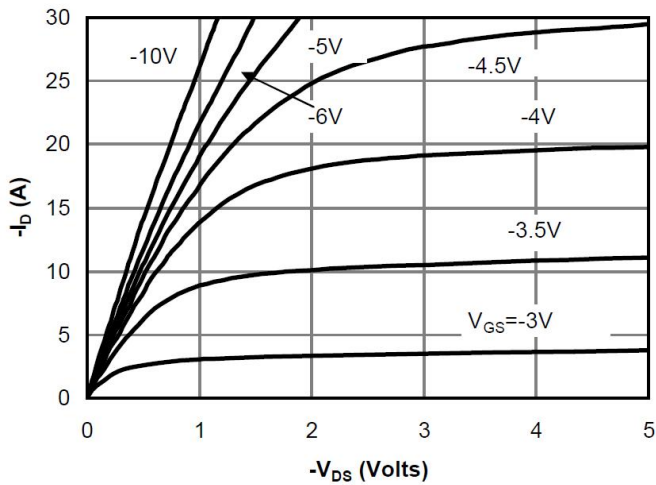


Fig 1: On-Region Characteristics

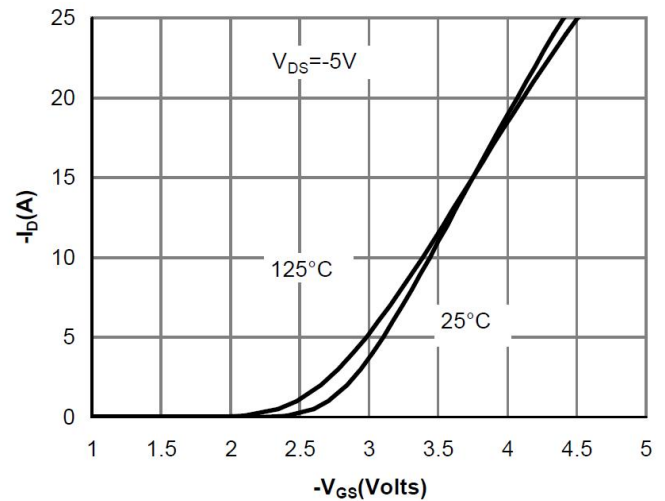


Figure 2: Transfer Characteristics

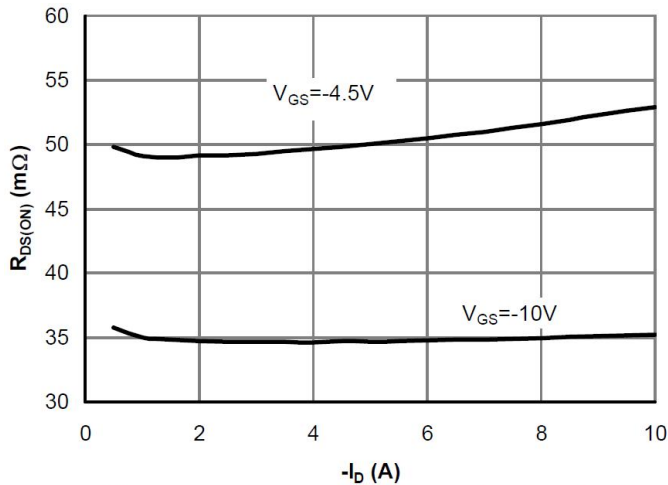


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

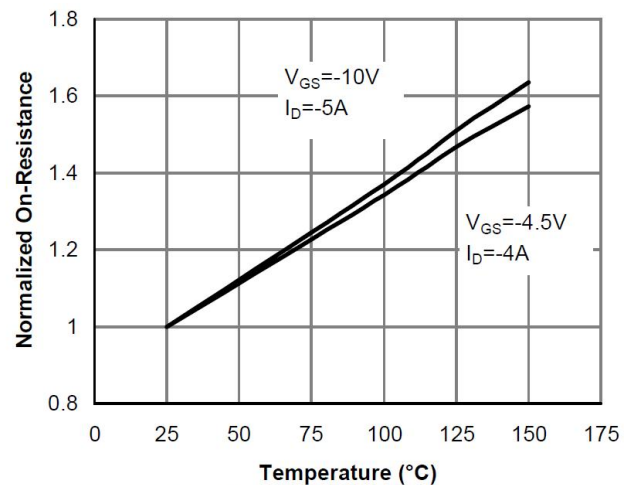


Figure 4: On-Resistance vs. Junction Temperature

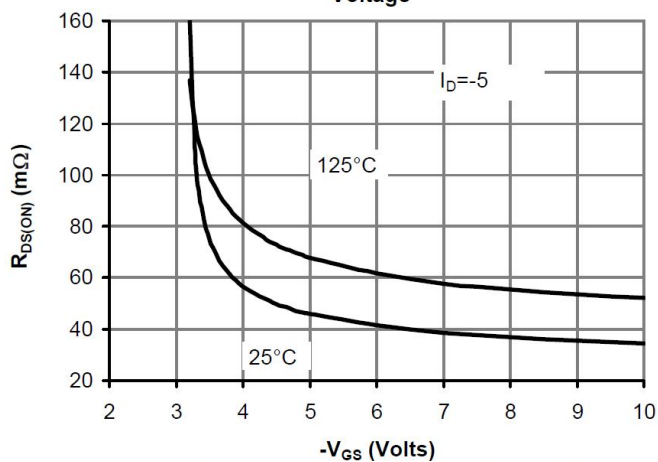


Figure 5: On-Resistance vs. Gate-Source Voltage

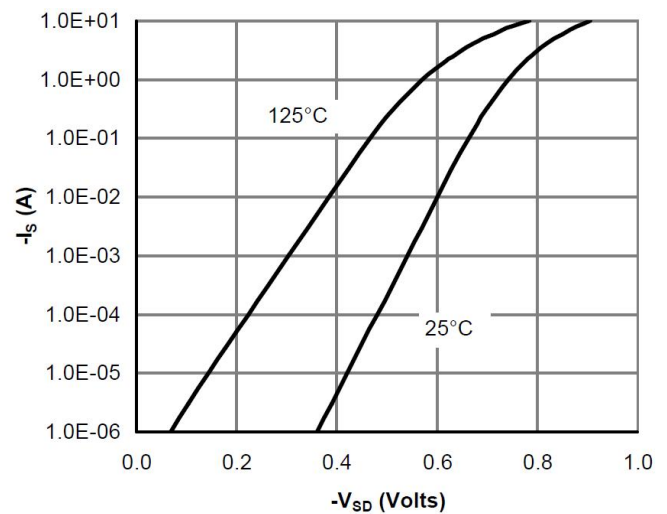


Figure 6: Body-Diode Characteristics

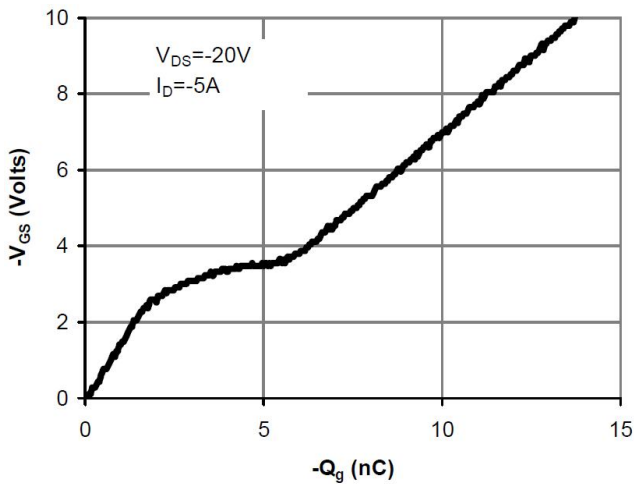


Figure 7: Gate-Charge Characteristics

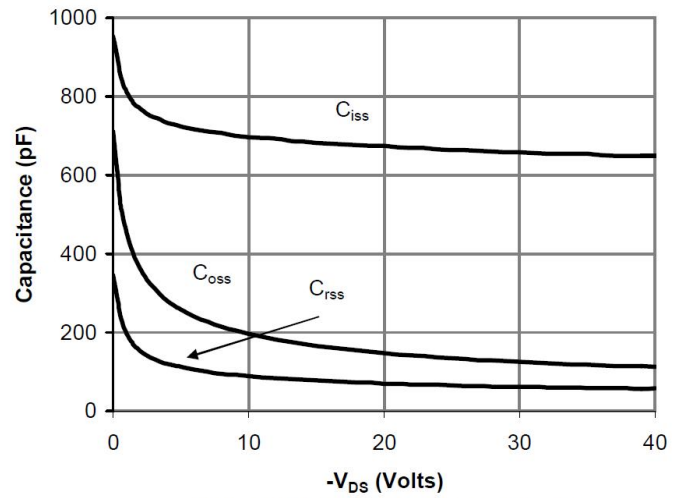


Figure 8: Capacitance Characteristics

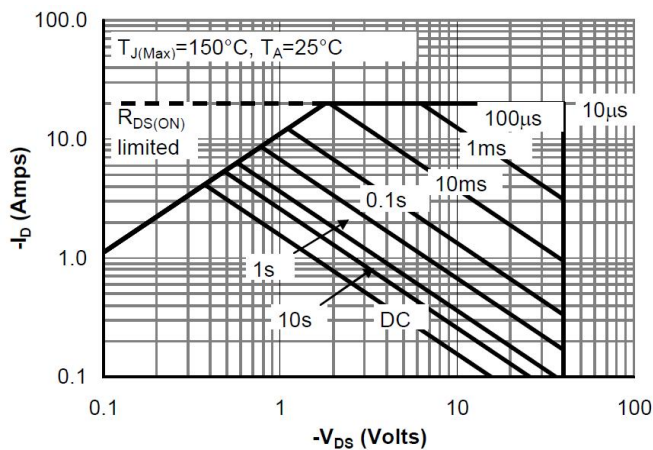


Figure 9: Maximum Forward Biased Safe Operating Area

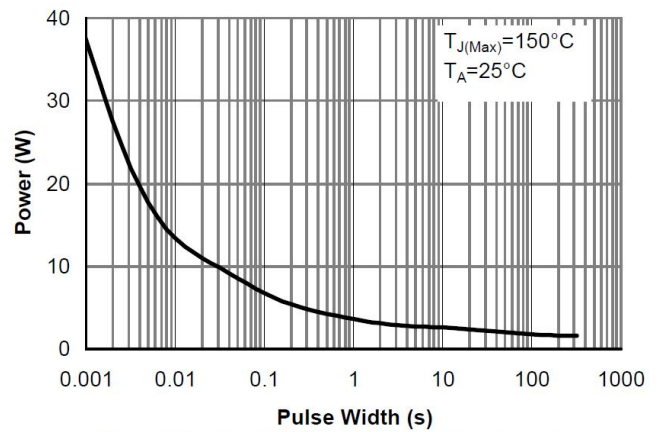


Figure 10: Single Pulse Power Rating Junction-to-Ambient

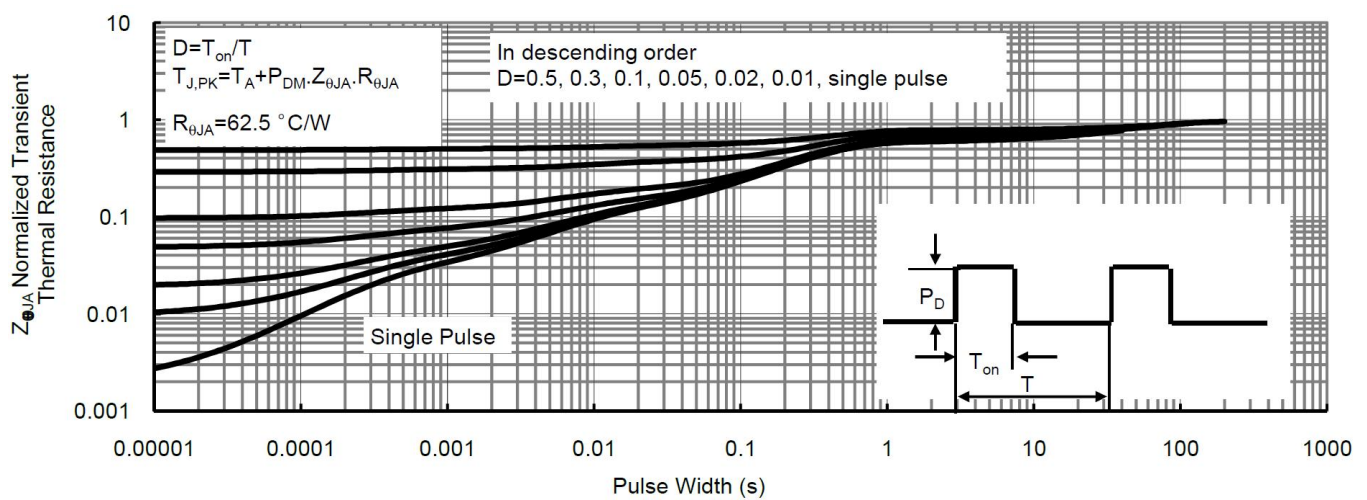
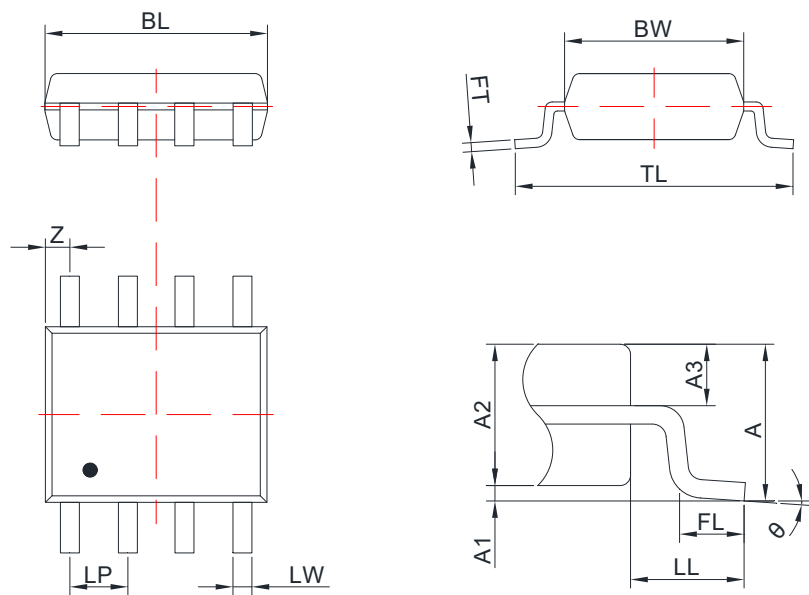


Figure 11: Normalized Maximum Transient Thermal Impedance

11. Dimension (SOP8)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	1.75		FL	0.50	0.80
A1	0.05	0.15	LP	1.25	1.30
A2	1.40	1.50	LL	1.1 BSC	
A3	0.623 BSC		LW	0.38	0.43
BL	4.80	5.00	TL	5.90	6.10
BW	3.70	4.10	Z	0.54	
FT	0.20	0.21	θ	0°	8°

DISCLAIMER

ELECSUPER PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with ElecSuper products. You are solely responsible for

(1) selecting the appropriate ElecSuper products for your application;

(2) designing, validating and testing your application;

(3) ensuring your application meets applicable standards, and any other safety, security, or other requirements.

These resources are subject to change without notice. ElecSuper grants you permission to use these resources only for development of an application that uses the ElecSuper products described in the resource. Other reproduction and display of these resources are prohibited. No license is granted to any other ElecSuper intellectual property right or to any third party intellectual property right. ElecSuper disclaims responsibility for, and you will fully indemnify ElecSuper and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources. ElecSuper's products are provided subject to ElecSuper's Terms of Sale or other applicable terms available either on www.elecsuper.com or provided in conjunction with such ElecSuper products. ElecSuper's provision of these resources does not expand or otherwise alter ElecSuper's applicable warranties or warranty disclaimers for ElecSuper products.