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AO4611

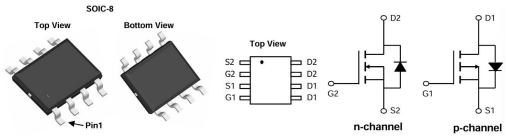
60V Dual P + N-Channel MOSFET

General Description

The AO4611 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.

Product Summary

N-Channel	P-Channel
V_{DS} (V) = 60V	-60V
I_D = 6.3A (V_{GS}=10V)	-4.9A
$R_{DS(ON)}$	
< 25mΩ (V_{GS}=10V)	< 42mΩ (V_{GS} = -10V)
< 30mΩ (V_{GS}=4.5V)	< 52mΩ (V_{GS} = -4.5V)
100% UIS Tested	100% UIS Tested
100% Rg Tested	100% Rg Tested



Orderable Part Number	Package Type	Form	Minimum Order Quantity
	SO-8	Tape & Reel	3000

Absolute Maximum Ratings T_A=25℃ unless otherwise noted

Parameter		Symbol	Max n-channel	Max p-channel	Units
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current [A]	T_A=25℃	I_D	6.3	-4.9	A
	T_A=70℃		5	-3.9	
Pulsed Drain Current [B]		I_{DM}	40	-30	
Power Dissipation	T_A=25℃	P_D	2	2	W
	T_A=70℃		1.28	1.28	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	-55 to 150	℃

Thermal Characteristics: n-channel and p-channel

Parameter		Symbol	Device	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	n-ch	48	62.5	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		n-ch	74	110	℃/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	n-ch	35	60	℃/W
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	p-ch	48	62.5	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		p-ch	74	110	℃/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	p-ch	35	40	℃/W

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N Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0V	60			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=48V, V_{GS}=0V			1	μA
		T_J=55℃			5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}= ±20V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250μA	1.5	2.1	3	V
$I_{D(ON)}$	On state drain current	V_{GS}=10V, V_{DS}=5V	40			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=6.3A		20	25	mΩ
		T_J=125℃		34	42	
		V_{GS}=4.5V, I_D=5.7A		22	30	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=6.3A		27		S
V_{SD}	Diode Forward Voltage	I_S=1A,V_{GS}=0V		0.74	1	V
I_S	Maximum Body-Diode Continuous Current				3	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=30V, f=1MHz		1920	2300	pF
C_{oss}	Output Capacitance			155		pF
C_{rss}	Reverse Transfer Capacitance			116		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		0.65	0.8	Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge	V_{GS}=10V, V_{DS}=30V, I_D=6.3A		47.6	58	nC
Q_g(4.5V)	Total Gate Charge			24.2	30	nC
Q_{gs}	Gate Source Charge			6		nC
Q_{gd}	Gate Drain Charge			14.4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=30V, R_L=4.7Ω, R_{GEN}=3Ω		7.6		ns
t_r	Turn-On Rise Time			5		ns
$t_{D(off)}$	Turn-Off DelayTime			28.9		ns
t_f	Turn-Off Fall Time			5.5		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=6.3A, dI/dt=100A/μs		33.2	40	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=6.3A, dI/dt=100A/μs		43		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in ^{2} FR-4 board with 2oz. Copper, in a still air environment with T_A=25℃. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6 are obtained using <300 μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in ^{2} FR-4 board with 2oz. Copper, in a still air environment with T_A=25℃. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

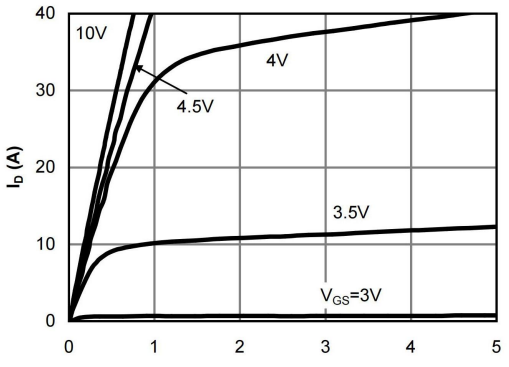


Fig 1: On-Region Characteristics

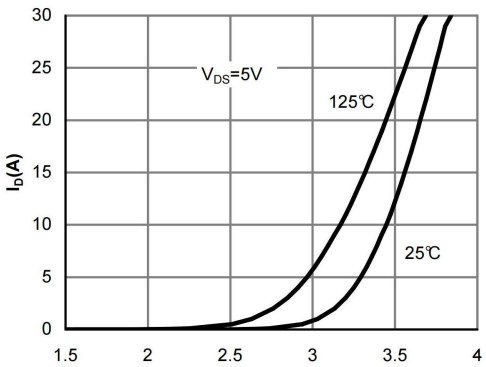


Figure 2: Transfer Characteristics

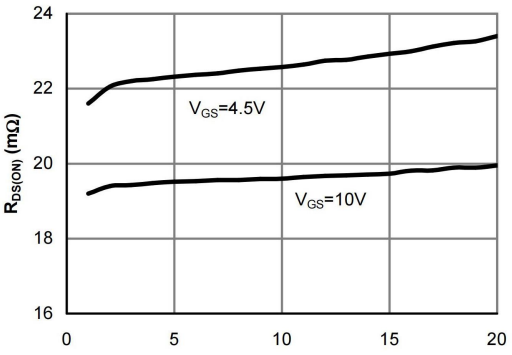


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

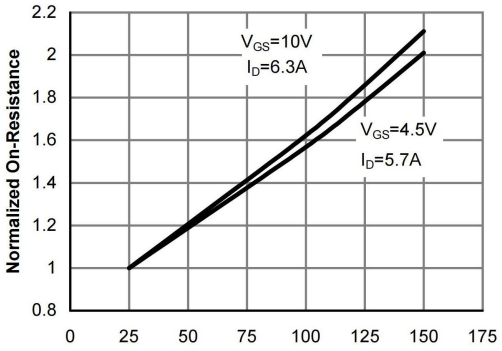


Figure 4: On-Resistance vs. Junction Temperature

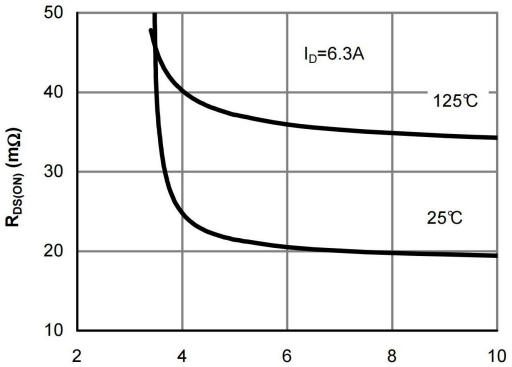


Figure 5: On-Resistance vs. Gate-Source Voltage

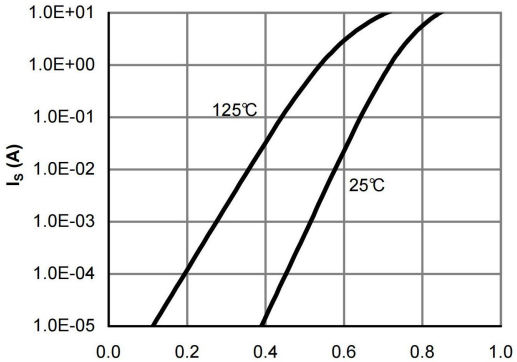


Figure 6: Body-Diode Characteristics

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

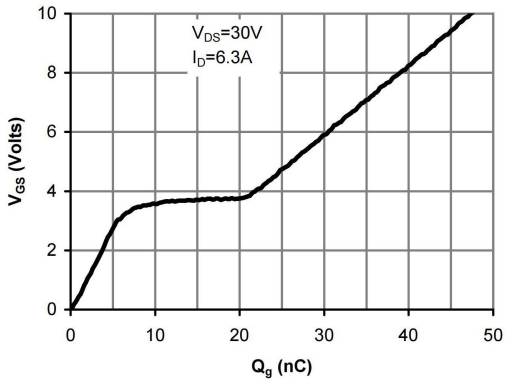


Figure 7: Gate-Charge Characteristics

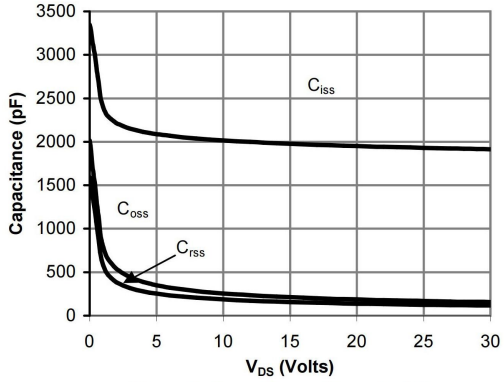


Figure 8: Capacitance Characteristics

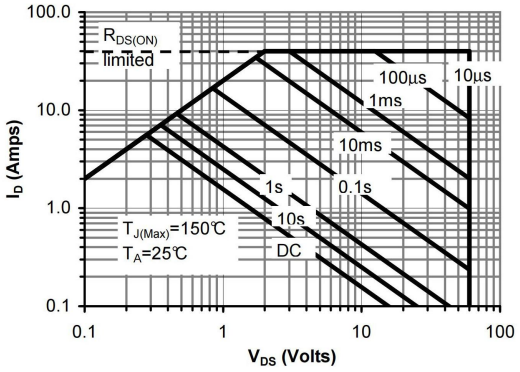


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

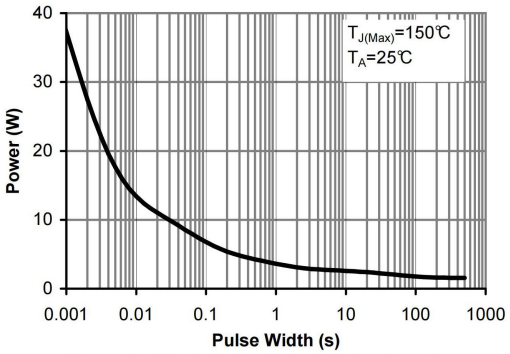


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

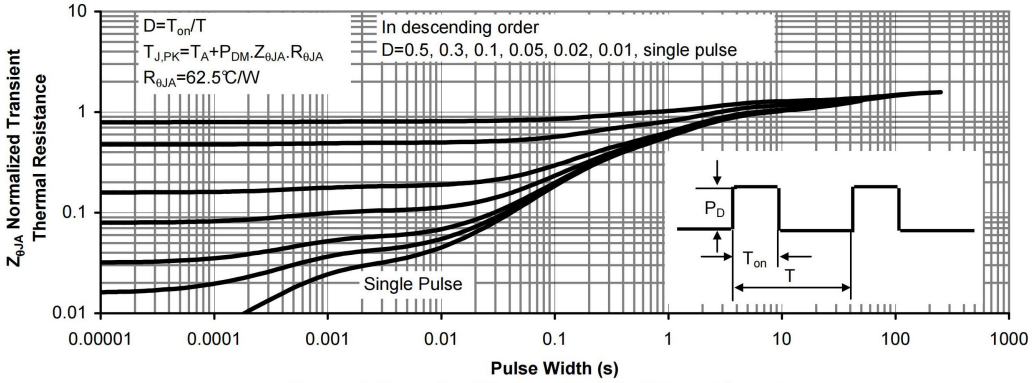
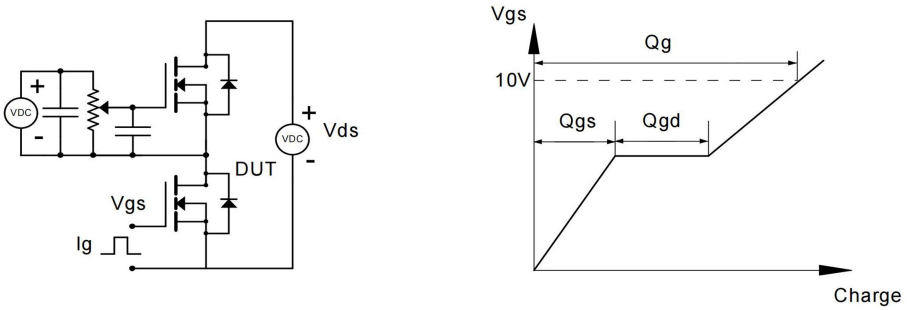


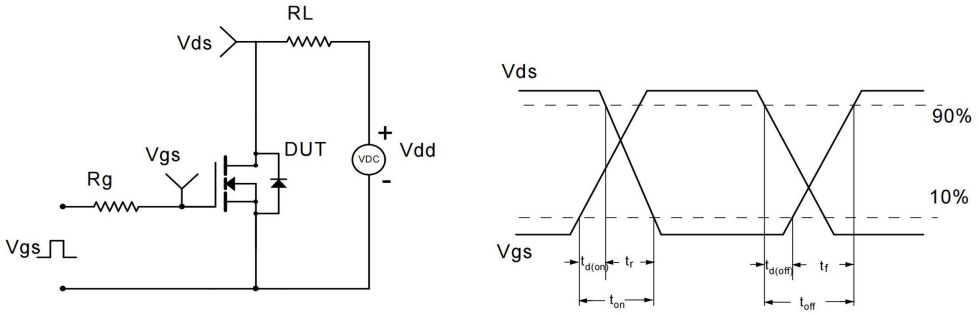
Figure 11: Normalized Maximum Transient Thermal Impedance

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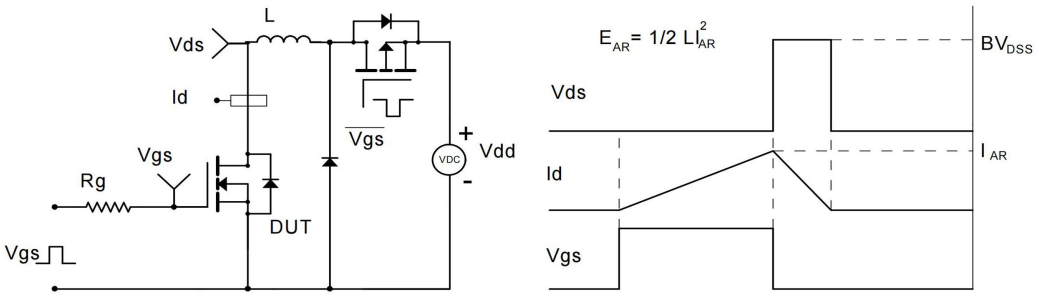
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

