



**THE DATASHEET OF
AO6411**



General Description

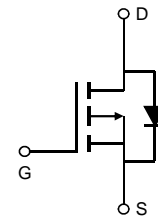
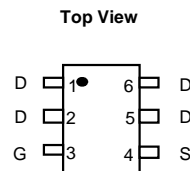
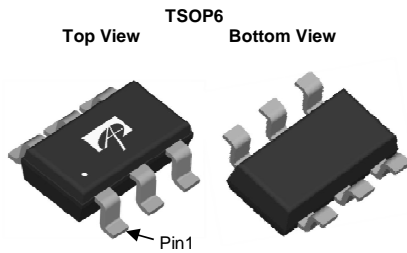
- Trench Power AlphaMOS (αMOS LV) technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- Battery protection

Product Summary

V_{DS}	-20V
I_D (at $V_{GS}=-4.5V$)	-7A
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$)	< 28.5mΩ
$R_{DS(ON)}$ (at $V_{GS}=-2.5V$)	< 36.5mΩ
$R_{DS(ON)}$ (at $V_{GS}=-1.8V$)	< 47 mΩ



Orderable Part Number	Package Type	Form	Minimum Order Quantity
AO6411	TSOP-6	Tape & Reel	3000

Absolute Maximum Ratings $T_A=25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 8	V
Continuous Drain Current	I_D	$T_A=25^\circ\text{C}$	-7
		$T_A=70^\circ\text{C}$	-5.5
Pulsed Drain Current ^C	I_{DM}	-28	A
Power Dissipation ^B	P_D	$T_A=25^\circ\text{C}$	2.7
		$T_A=70^\circ\text{C}$	1.7
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	35	45	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A D}		60	75	$^\circ\text{C/W}$
Maximum Junction-to-Lead	$R_{\theta JL}$	23	30	$^\circ\text{C/W}$

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	ID=-250μA, V _{GS} =0V	-20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-20V, V _{GS} =0V T _J =55°C			-1 -5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±8V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.3	-0.65	-0.9	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-4.5V, I _D =-7A T _J =125°C		23.5 34	28.5 41	mΩ
		V _{GS} =-2.5V, I _D =-3.5A		29	36.5	
		V _{GS} =-1.8V, I _D =-2.2A		36	47	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-7A		23		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.62	-1	V
I _S	Maximum Body-Diode Continuous Current				-3.5	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, f=1MHz		1025		pF
C _{oss}	Output Capacitance			167		pF
C _{rss}	Reverse Transfer Capacitance			119		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		11		Ω
SWITCHING PARAMETERS						
Q _g	Total Gate Charge	V _{GS} =-4.5V, V _{DS} =-10V, I _D =-7A		13	18	nC
Q _{gs}	Gate Source Charge			2		nC
Q _{gd}	Gate Drain Charge			3.4		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-4.5V, V _{DS} =-10V, R _L =1.43Ω, R _{GEN} =3Ω		10		ns
t _r	Turn-On Rise Time			15		ns
t _{D(off)}	Turn-Off DelayTime			85		ns
t _f	Turn-Off Fall Time			40		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-7A, di/dt=500A/μs		30		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-7A, di/dt=500A/μs		80		nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

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

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

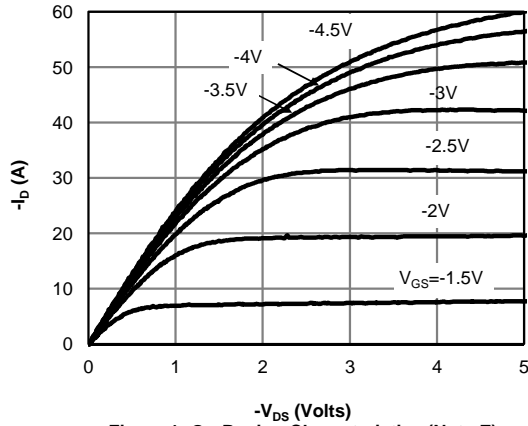


Figure 1: On-Region Characteristics (Note E)

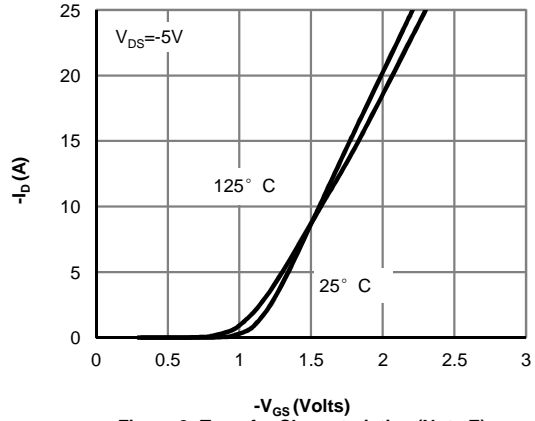


Figure 2: Transfer Characteristics (Note E)

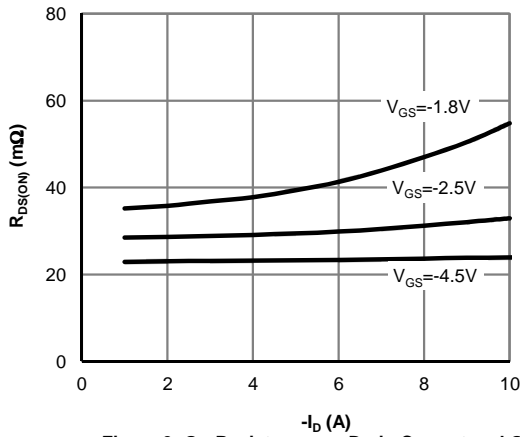


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

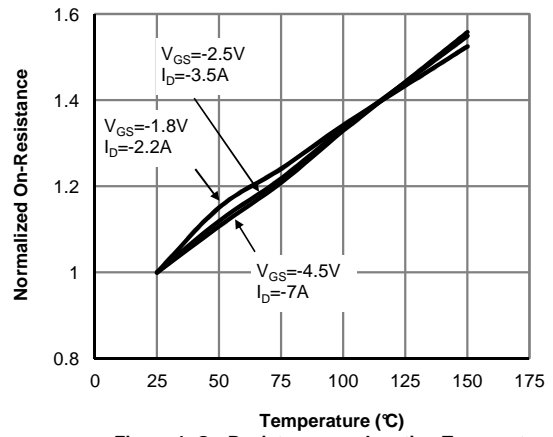


Figure 4: On-Resistance vs. Junction Temperature (Note E)

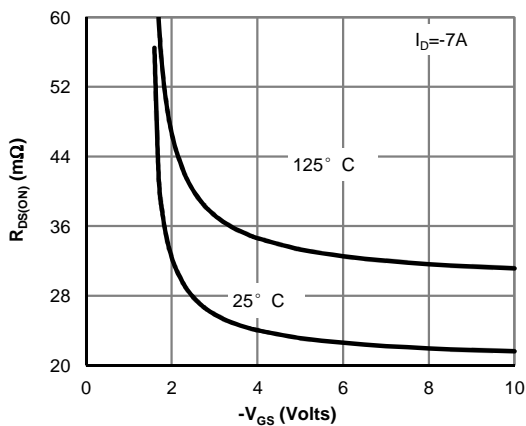


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

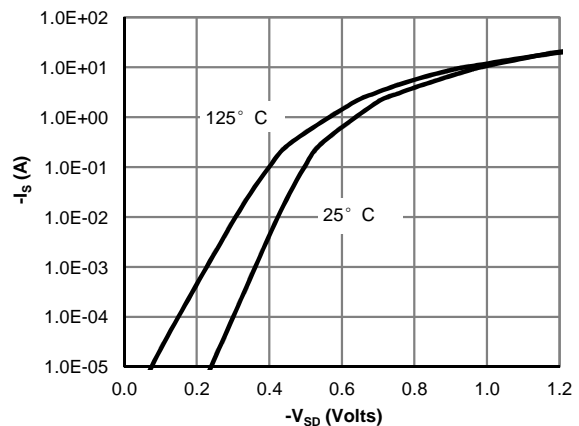


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

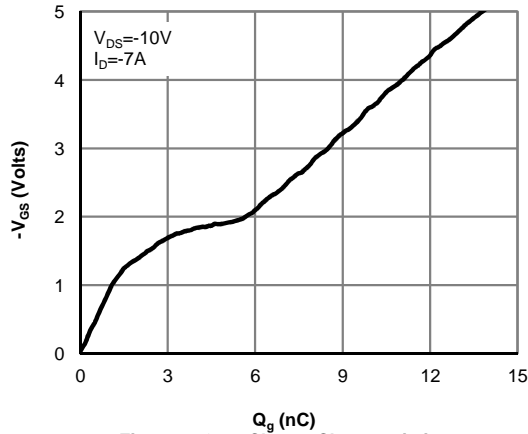


Figure 7: Gate-Charge Characteristics

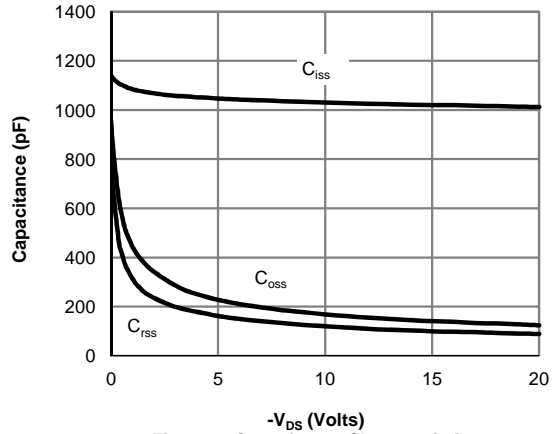


Figure 8: Capacitance Characteristics

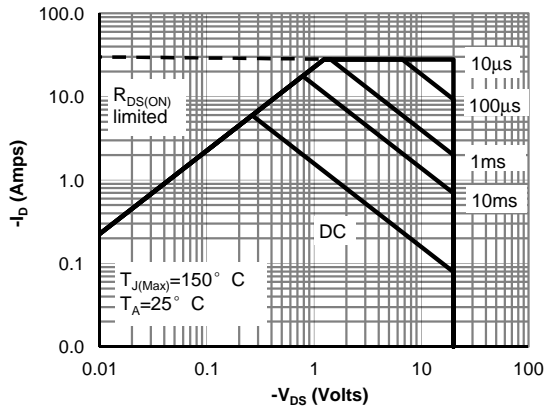


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

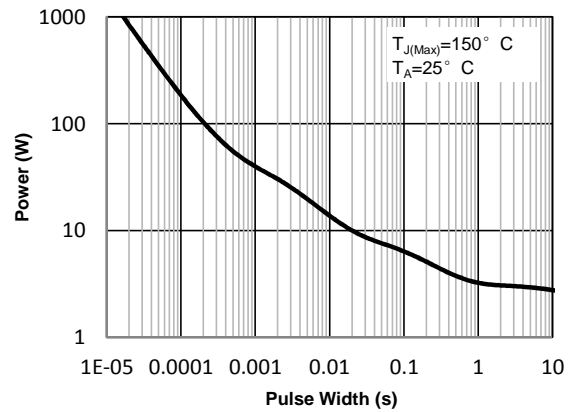


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

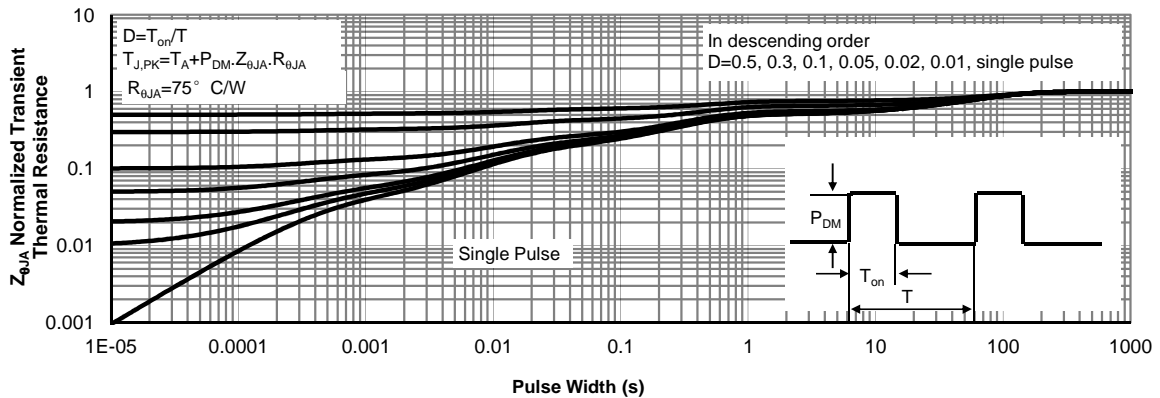
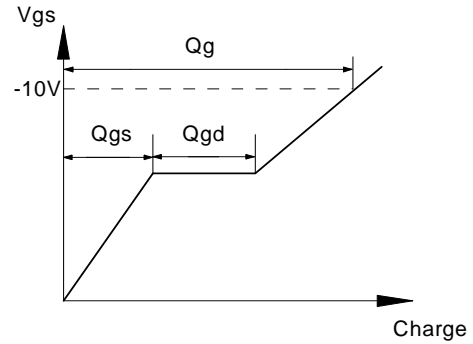
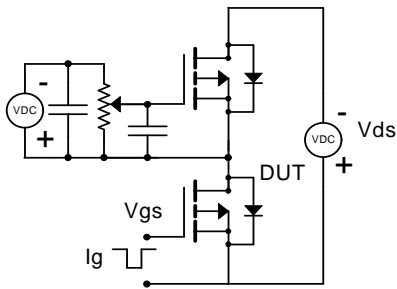
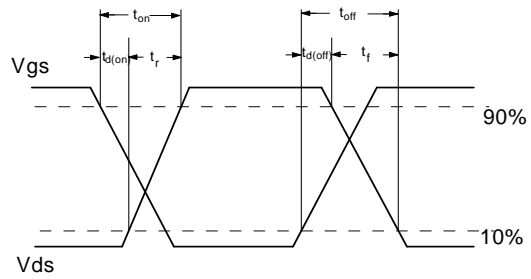
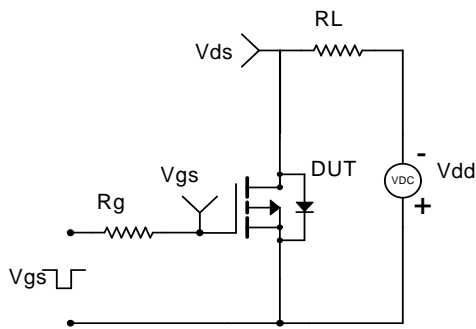


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

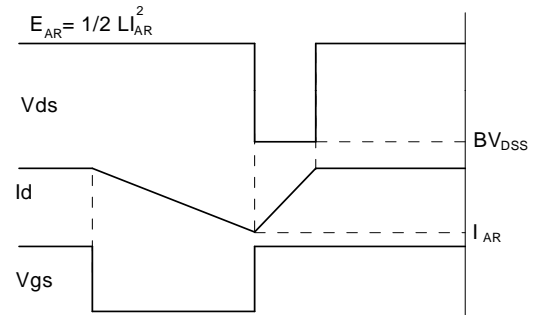
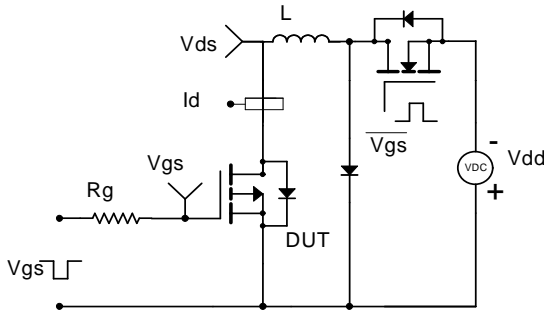
Gate Charge Test Circuit & Waveform



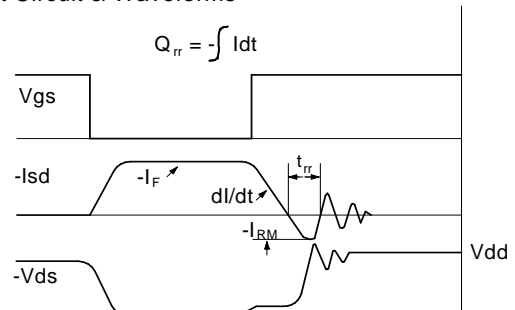
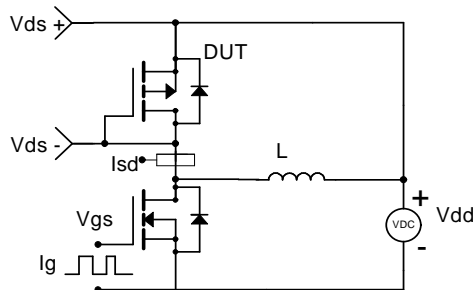
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms



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