



ALPHA & OMEGA
SEMICONDUCTOR



AOU404

N-Channel Enhancement Mode Field Effect Transistor

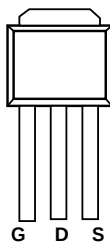
General Description

The AOU404 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. *Standard Product AOU404 is Pb-free (meets ROHS & Sony 259 specifications). AOU404L is a Green Product ordering option. AOU404 and AOU404L are electrically identical.*

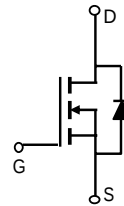
Features

V_{DS} (V) = 75V
 I_D = 10 A (V_{GS} = 20V)
 $R_{DS(ON)} < 130 \text{ m}\Omega$ (V_{GS} = 20V) @ 5A
 $R_{DS(ON)} < 140 \text{ m}\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 165 \text{ m}\Omega$ (V_{GS} = 4.5V)

TO-251



Top View
Drain Connected
to Tab



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	75	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^G	$T_C=25^\circ\text{C}$	10	A
	$T_C=100^\circ\text{C}$	10	
Pulsed Drain Current ^C	I_{DM}	20	
Avalanche Current ^C	I_{AR}	10	A
Repetitive avalanche energy $L=0.1\text{mH}$ ^C	E_{AR}	15	mJ
Power Dissipation ^B	$T_C=25^\circ\text{C}$	20	W
	$T_C=100^\circ\text{C}$	10	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	Steady-State	$R_{\theta JA}$	115	140	$^\circ\text{C/W}$
Maximum Junction-to-Case ^B	Steady-State	$R_{\theta JC}$	4.5	7.5	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =10mA, V _{GS} =0V	75			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =60V, V _{GS} =0V T _J =55°C			1 5	μA
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	2.4	3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	20			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =20V, I _D =5A		100	130	mΩ
		T _J =125°C		180	220	
		V _{GS} =10V, I _D =5A		105	140	mΩ
		V _{GS} =4.5V, I _D =2A		120	165	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =10A		9		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.79	1	V
I _S	Maximum Body-Diode Continuous Current				10	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =30V, f=1MHz		293	350	pF
C _{oss}	Output Capacitance			51		pF
C _{rss}	Reverse Transfer Capacitance			20		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		2.2	3	Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =37.5V, I _D =5A		5.2	6.5	nC
Q _{g(4.5V)}	Total Gate Charge			2.46	3.5	nC
Q _{gs}	Gate Source Charge			1		nC
Q _{gd}	Gate Drain Charge			1.34		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =37.5V, R _L =7.5Ω, R _{GEN} =3Ω		4.6		ns
t _r	Turn-On Rise Time			2.3		ns
t _{D(off)}	Turn-Off DelayTime			14.7		ns
t _f	Turn-Off Fall Time			1.7		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =5A, dI/dt=100A/μs		25	30	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =5A, dI/dt=100A/μs		27		nC

A: The value of R_{θJA} is measured with the device in a still air environment with T_A=25°C.

B: The power dissipation P_D is based on T_{J(MAX)}=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=175°C.

D: The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

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

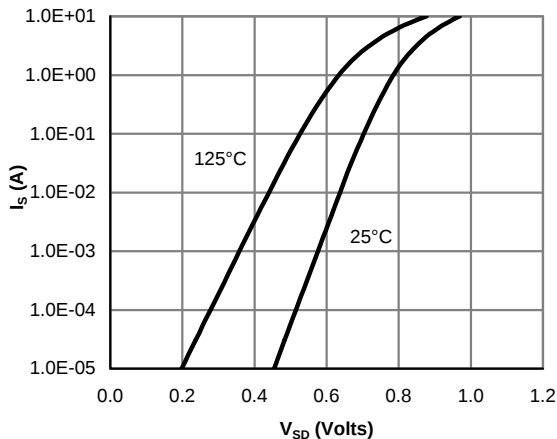
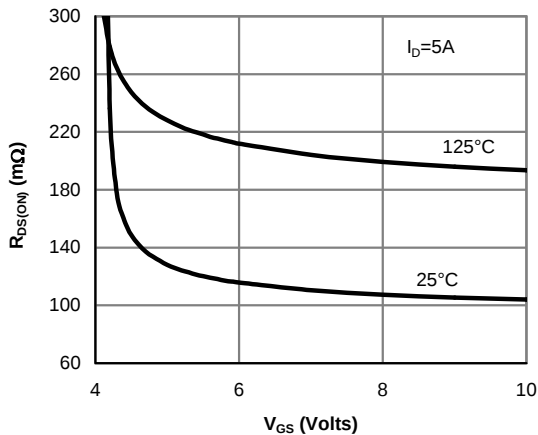
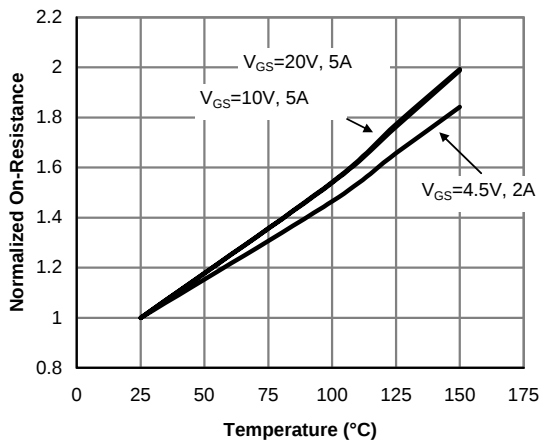
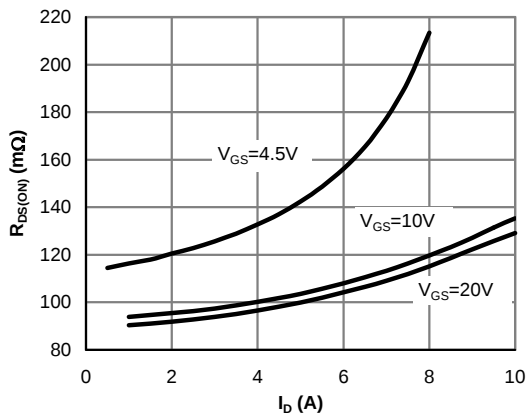
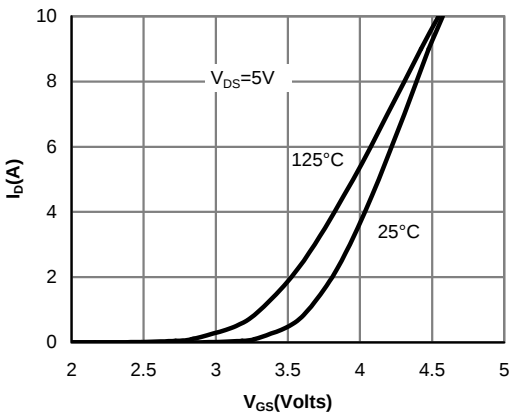
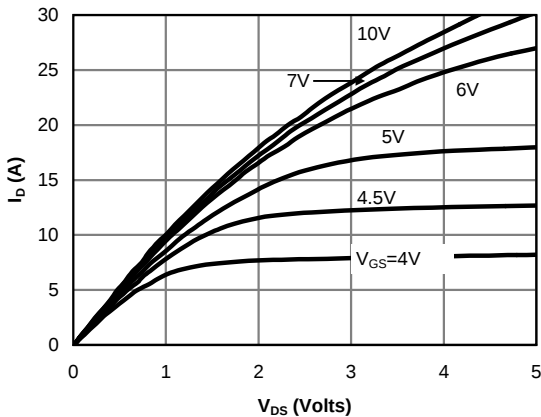
F: These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=175°C.

G: The maximum current rating is limited by bond-wires.

Rev2: August 2005

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

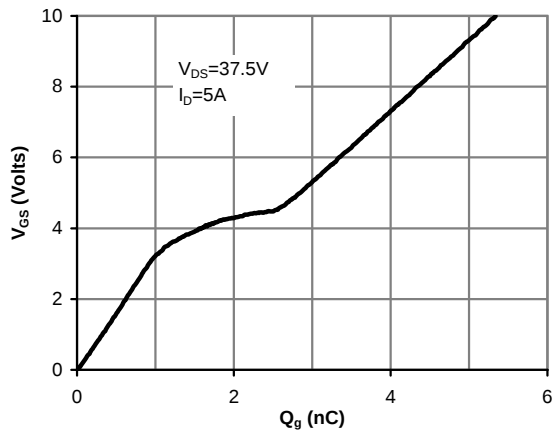


Figure 7: Gate-Charge Characteristics

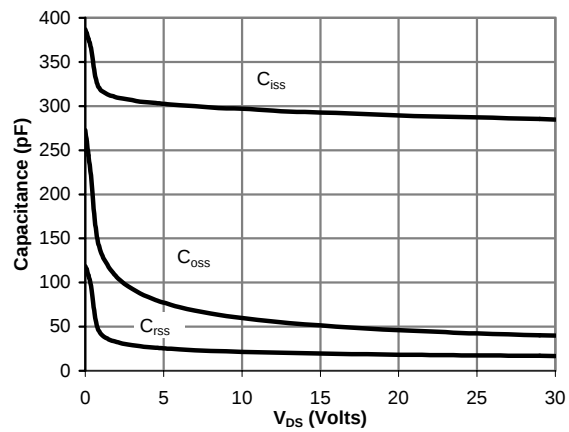


Figure 8: Capacitance Characteristics

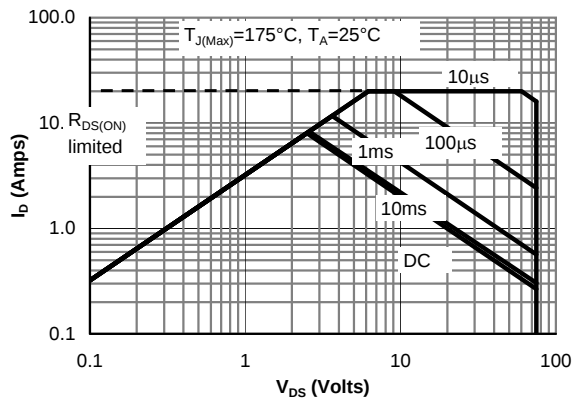


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

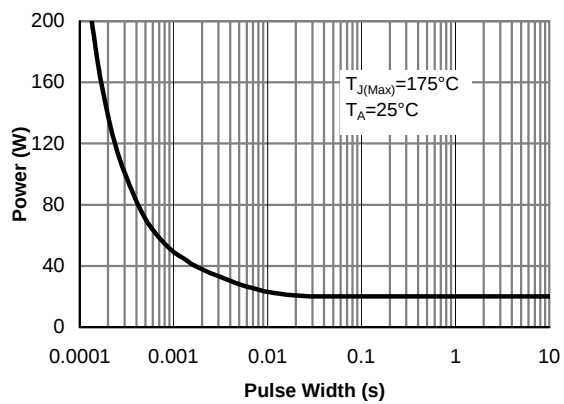


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

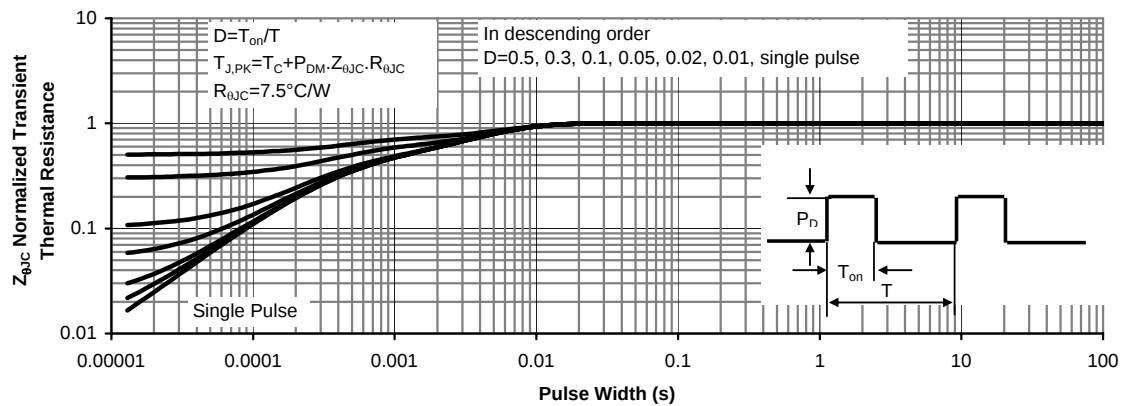


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

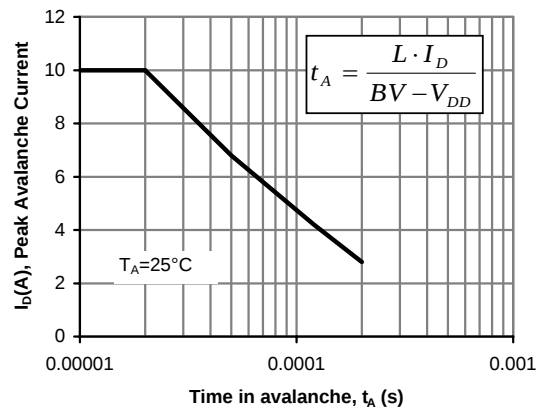


Figure 12: Single Pulse Avalanche capability

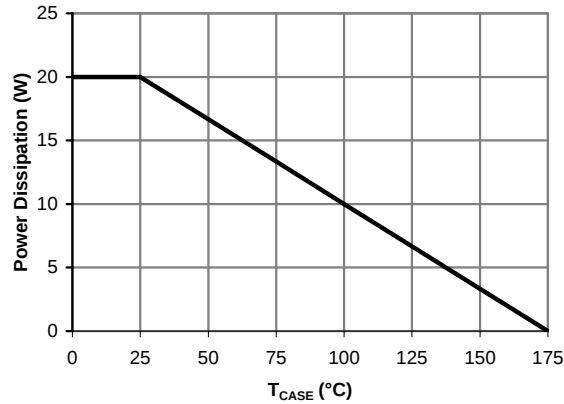


Figure 13: Power De-rating (Note B)

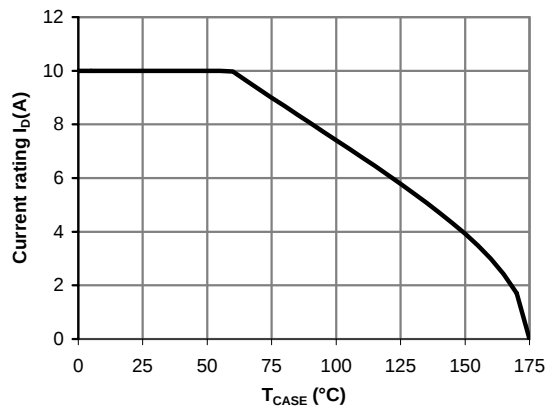


Figure 14: Current De-rating (Note B)