

AOU401

P-Channel Enhancement Mode Field Effect Transistor

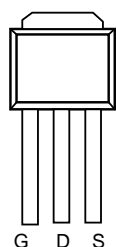
General Description

The AOU401 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 AOU401 is Pb-free (meets ROHS & Sony 259 specifications). AOU401L is a Green Product ordering option. AOU401 and AOU401L are electrically identical.*

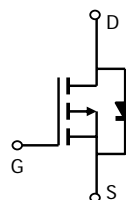
Features

$V_{DS} (V) = -60V$
 $I_D = -26 A (V_{GS} = -10V)$
 $R_{DS(ON)} < 40 m\Omega (V_{GS} = -10V) @ 20A$
 $R_{DS(ON)} < 55 m\Omega (V_{GS} = -4.5V)$

TO-251



Top View
 Drain Connected
 to Tab



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^G	I_D	$T_C=25^\circ C$	A
		$T_C=100^\circ C$	
Pulsed Drain Current ^C	I_{DM}	-60	
Avalanche Current ^C	I_{AR}	-26	A
Repetitive avalanche energy $L=0.1mH$ ^C	E_{AR}	134	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ C$	W
		$T_C=100^\circ C$	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	100	125	$^\circ C/W$
Maximum Junction-to-Case ^B	$R_{\theta JC}$	1.9	2.5	$^\circ C/W$

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 =-250uA, V _{GS} =0V	-60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-48V, V _{GS} =0V T _J =55°C		-0.003	-1	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	-1.9	-2.4	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-60			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-20A		32	40	mΩ
		T _J =125°C		53		
		V _{GS} =-4.5V, I _D =-20A		43	55	mΩ
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-20A		32		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.73	-1	V
I _S	Maximum Body-Diode Continuous Current				-30	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-30V, f=1MHz		2977	3600	pF
C _{oss}	Output Capacitance			241		pF
C _{rss}	Reverse Transfer Capacitance			153		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		2	2.4	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =-10V, V _{DS} =-30V, I _D =-20A		44	54	nC
Q _g (4.5V)	Total Gate Charge			22.2	28	nC
Q _{gs}	Gate Source Charge			9		nC
Q _{gd}	Gate Drain Charge			10		nC
t _{D(on)}	Turn-On DelayTime			12		ns
t _r	Turn-On Rise Time	V _{GS} =-10V, V _{DS} =-30V, R _L =1.5Ω, R _{GEN} =3Ω		14.5		ns
t _{D(off)}	Turn-Off DelayTime			38		ns
t _f	Turn-Off Fall Time			15		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-20A, di/dt=100A/μs		40	50	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-20A, di/dt=100A/μs		59		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.
- Rev3: August 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

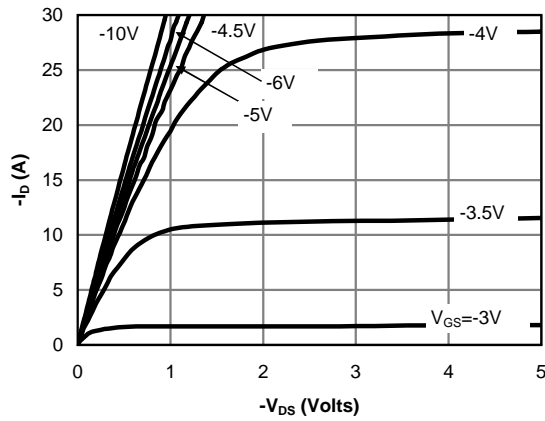


Fig 1: On-Region Characteristics

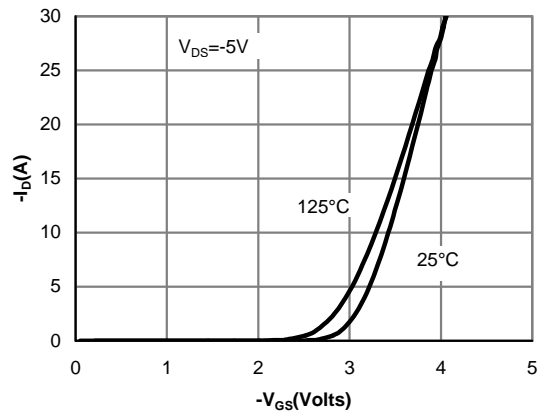


Figure 2: Transfer Characteristics

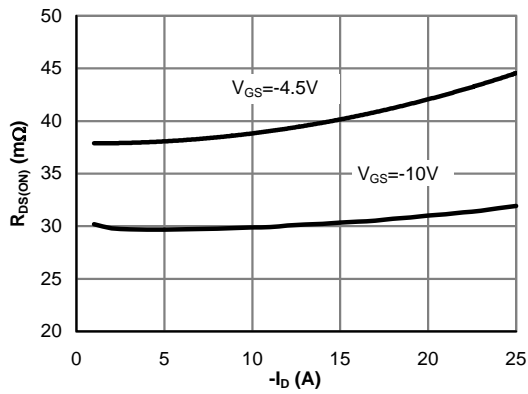


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

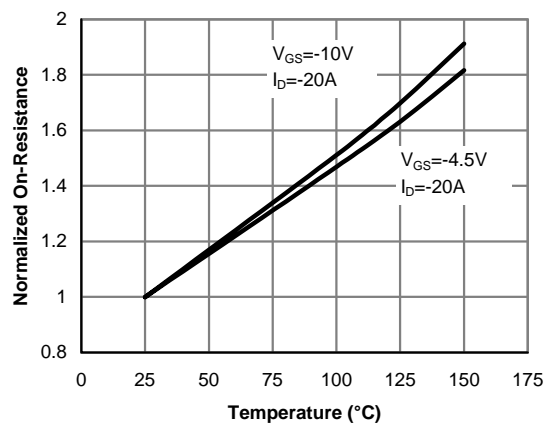


Figure 4: On-Resistance vs. Junction Temperature

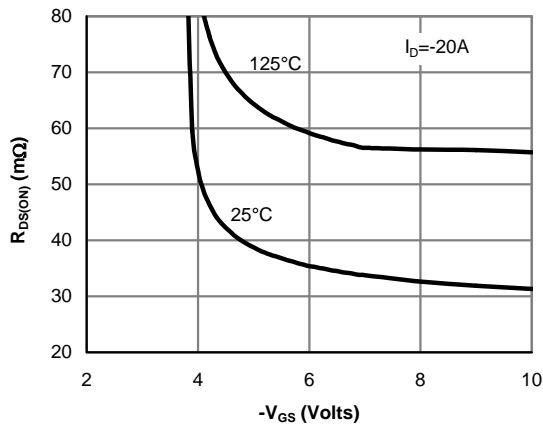


Figure 5: On-Resistance vs. Gate-Source Voltage

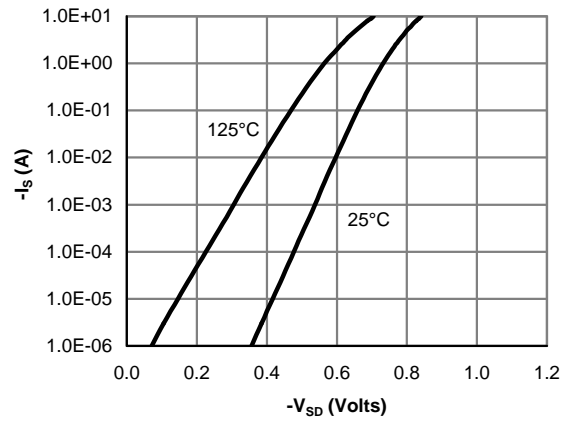


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

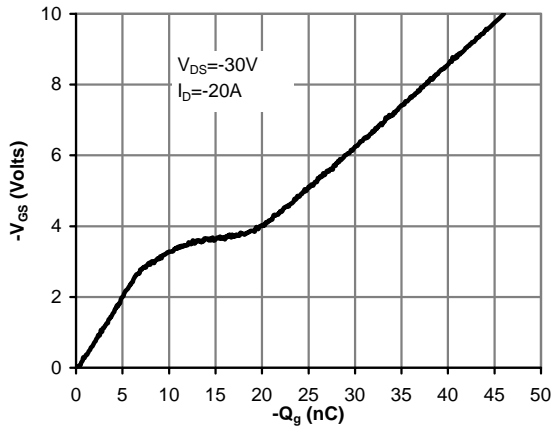


Figure 7: Gate-Charge Characteristics

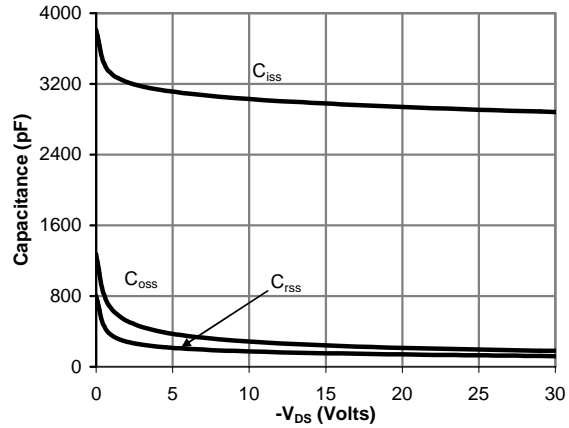


Figure 8: Capacitance Characteristics

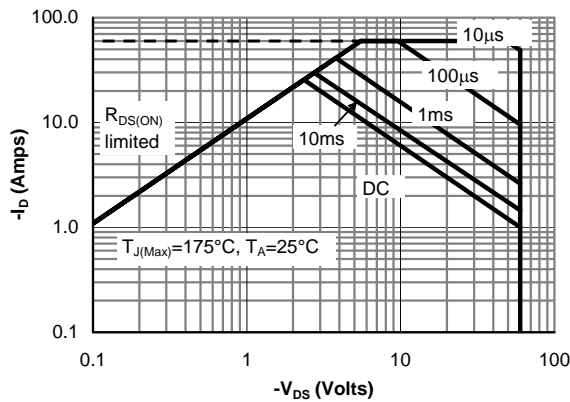


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

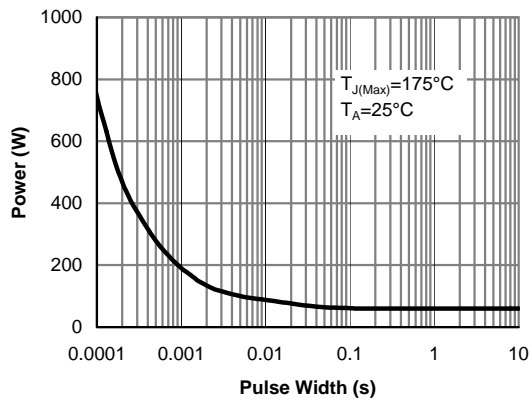


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

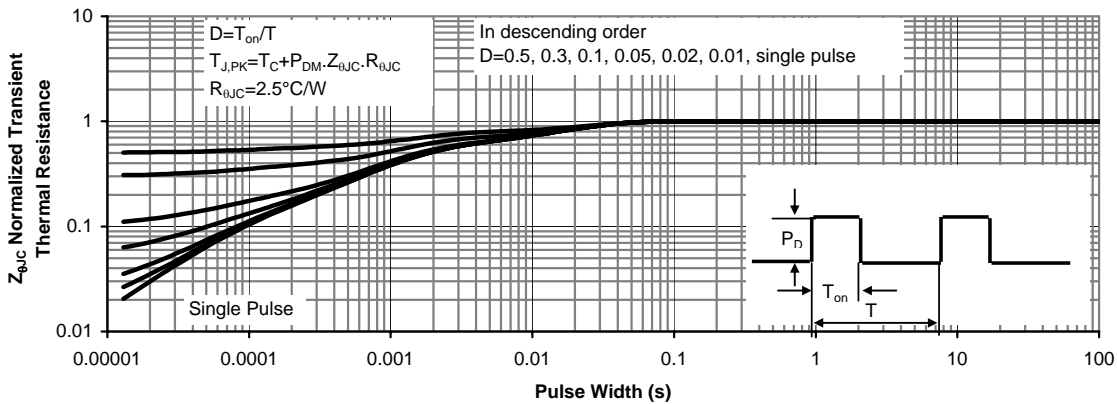


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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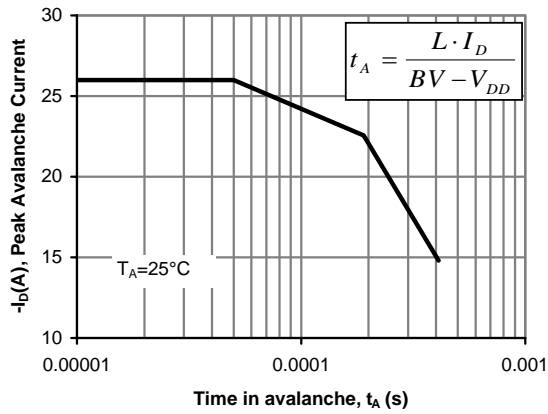


Figure 12: Single Pulse Avalanche capability

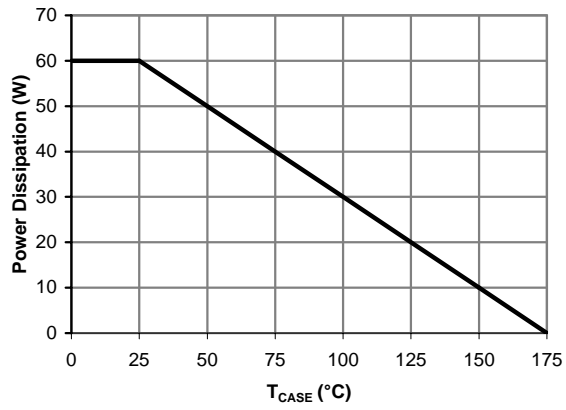


Figure 13: Power De-rating (Note B)

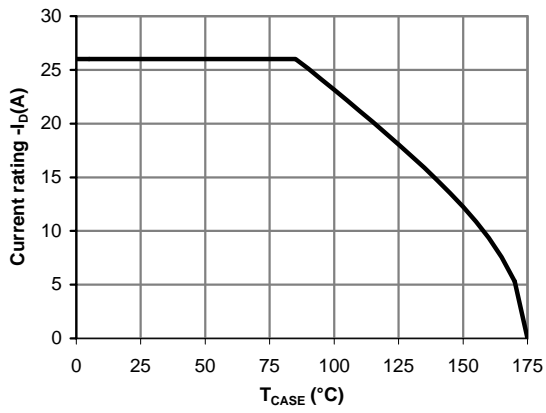


Figure 14: Current De-rating (Note B)