ALPHA & OMEGA SEMICONDUCTOR

AOU401
P-Channel Enhancement Mode Field Effect Transistor

General Description

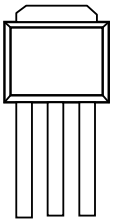
The AOU401 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications. *Standard Product AOU401 is Pb-free (meets ROHS & Sony 259 specifications).*

Features

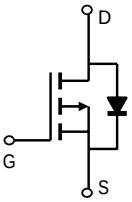
V_{DS} (V) = -60V
I_D = -26 A (V_{GS} = -10V)
$R_{DS(ON)}$ < 40 mΩ (V_{GS} = -10V) @ 20A
$R_{DS(ON)}$ < 55 mΩ (V_{GS} = -4.5V)

UIS TESTED!
Rg,Ciss,Coss,Crss Tested

TO-251



Top View
Drain Connected
to Tab



Absolute Maximum Ratings T_A=25°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]	T_C=25°C	I_D	-26	A
	T_C=100°C		-18	
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]	T_C=25°C	P_D	60	W
	T_C=100°C		30	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	Steady-State	$R_{\theta JA}$	100	125	°C/W
Maximum Junction-to-Case [B]	Steady-State	$R_{\theta JC}$	1.9	2.5	°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}=-60V, V_{GS}=0V			-1	µA
		T_J=55°C			-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	-1.2	-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
I_{SM}	Pulsed Body-Diode Current[B]				-60	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	1	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	V_{GS}=-10V, V_{DS}=-30V, R_L=1.5Ω, R_{GEN}=3Ω		12		ns
t_r	Turn-On Rise Time			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 $R_{\theta JA}$ 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 $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ 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 impedence 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

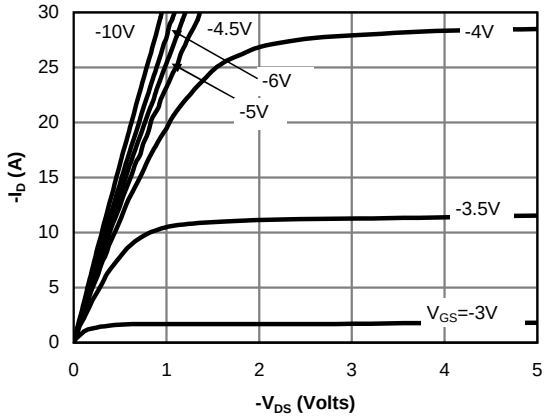

Fig 1: On-Region Characteristics

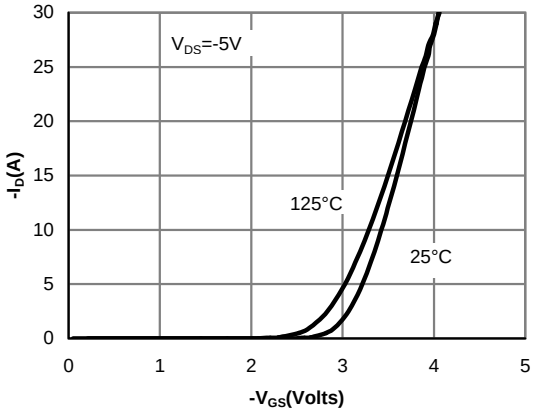

Figure 2: Transfer Characteristics

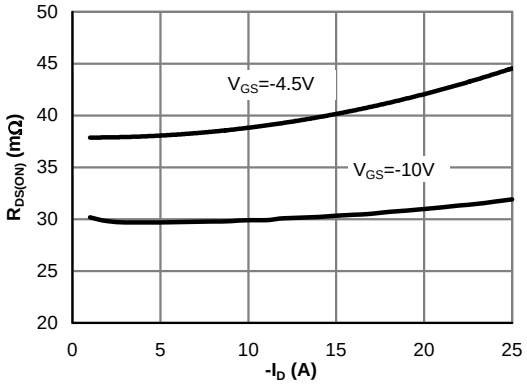

Figure 3: On-Resistance vs. Drain Current and Gate Voltage

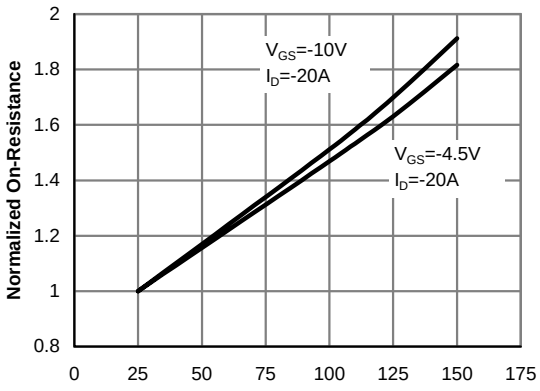

Figure 4: On-Resistance vs. Junction Temperature

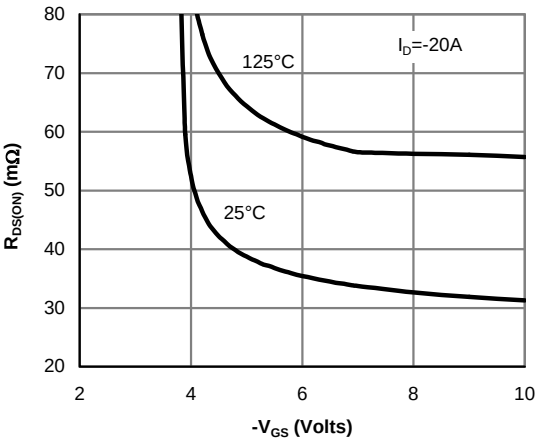

Figure 5: On-Resistance vs. Gate-Source Voltage

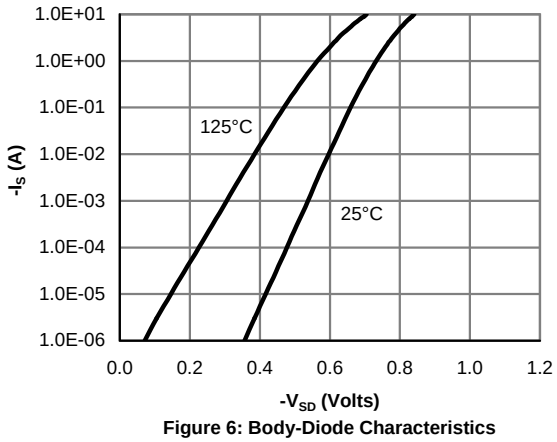

Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

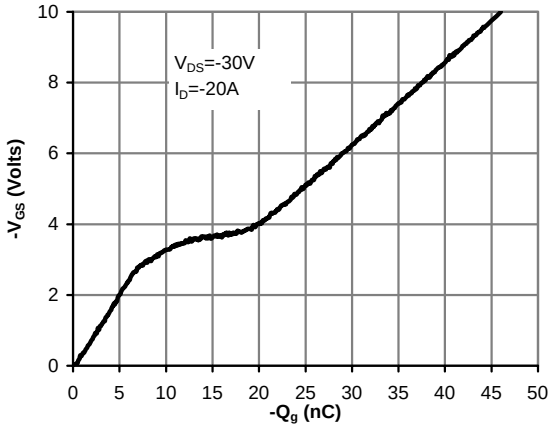

Figure 7: Gate-Charge Characteristics

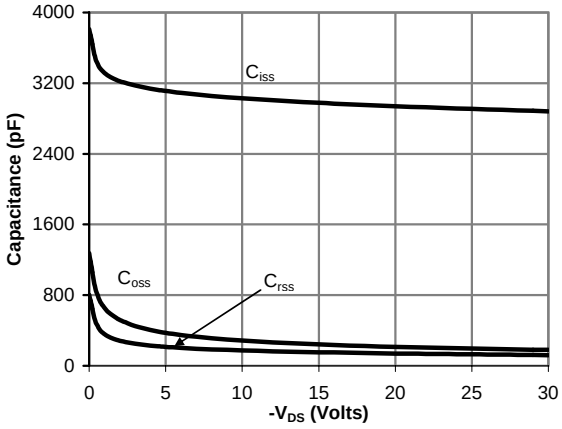

Figure 8: Capacitance Characteristics

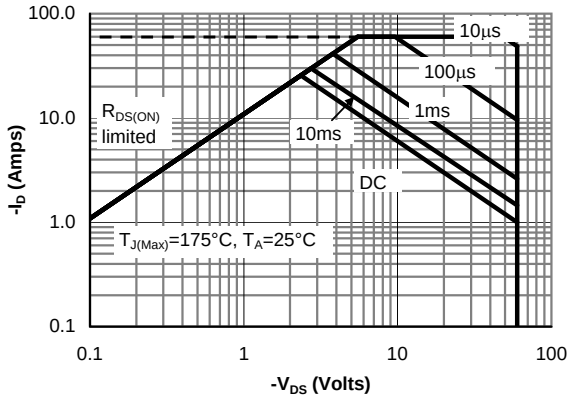

Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

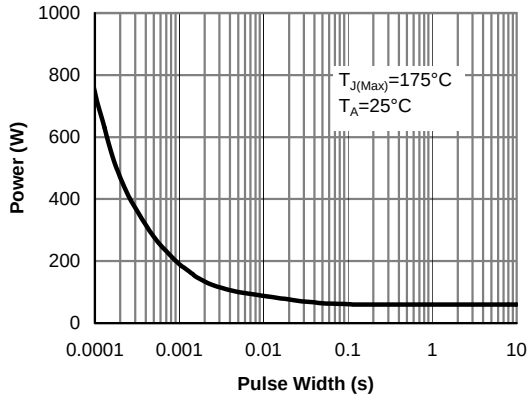

Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

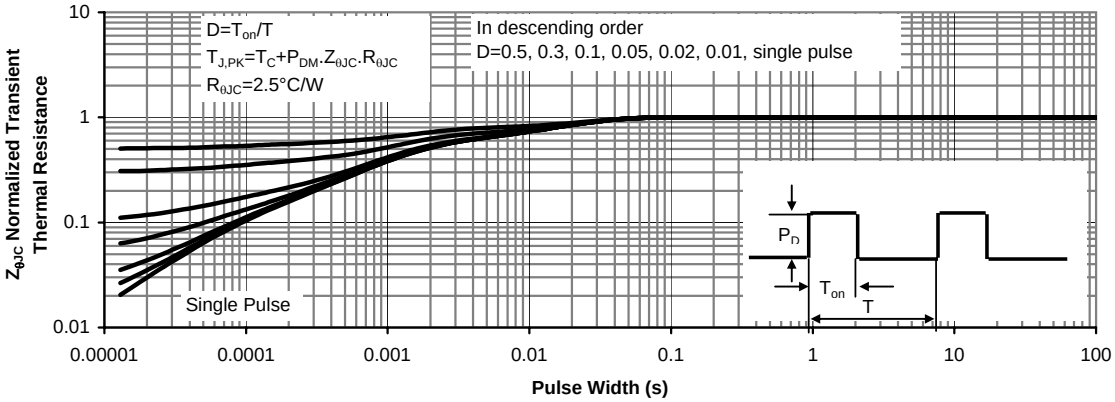

Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

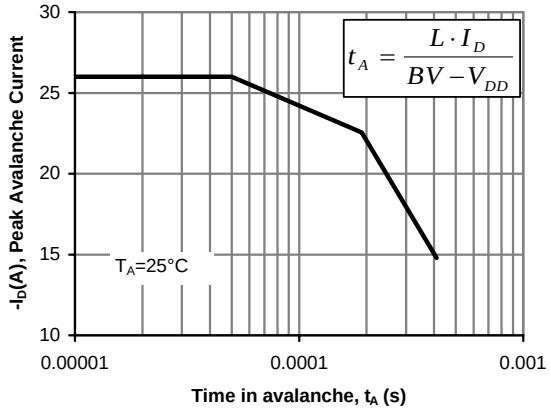

Figure 12: Single Pulse Avalanche capability

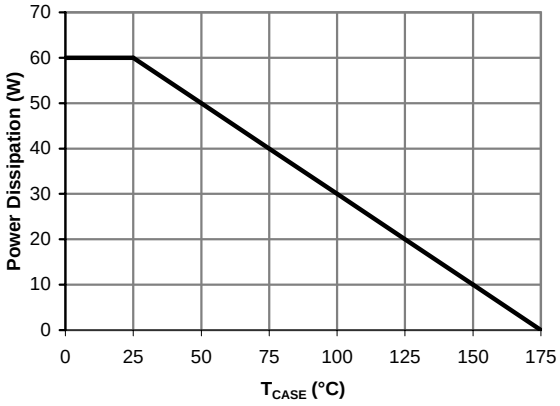

Figure 13: Power De-rating (Note B)

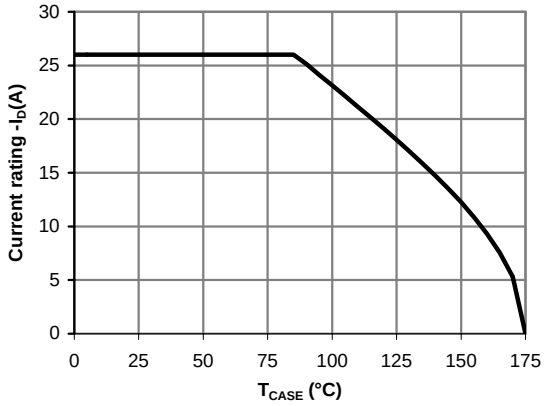

Figure 14: Current De-rating (Note B)