



## AOU400

### N-Channel Enhancement Mode Field Effect Transistor

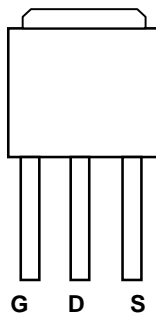
#### General Description

The AOU400 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This device is suitable for use as a load switch or in PWM applications. *Standard Product AOU400 is Pb-free (meets ROHS & Sony 259 specifications). AOU400L is a Green Product ordering option. AOU400 and AOU400L are electrically identical.*

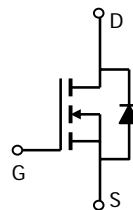
#### Features

$V_{DS} (V) = 60V$   
 $I_D = 38A (V_{GS} = 10V)$   
 $R_{DS(ON)} < 20m\Omega (V_{GS} = 10V)$   
 $R_{DS(ON)} < 25m\Omega (V_{GS} = 4.5V)$

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	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B</sup>	$I_D$	$T_C=25^\circ C^G$	38
		$T_C=100^\circ C^B$	27
Pulsed Drain Current	$I_{DM}$	60	A
Avalanche Current <sup>C</sup>	$I_{AR}$	30	A
Repetitive avalanche energy $L=0.1mH^C$	$E_{AR}$	140	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ C$	60
		$T_C=100^\circ C$	30
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 <sup>A</sup>	Steady-State	$R_{\theta JA}$	51	60	$^\circ C/W$
Maximum Junction-to-Case <sup>B</sup>	Steady-State	$R_{\theta JC}$	1.4	2.5	$^\circ C/W$

# AOU400

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	60			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C			1 5	μA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250μA	1	2.1	3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =10V, V <sub>DS</sub> =5V	60			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A T <sub>J</sub> =125°C		16 31	20	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		20	25	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		5.6		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =0V		0.74	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				4	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =30V, f=1MHz		1920	2300	pF
C <sub>oss</sub>	Output Capacitance			155		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			116		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		0.65	0.8	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g(10V)</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>D</sub> =20A		47.6	68	nC
Q <sub>g(4.5V)</sub>	Total Gate Charge			24.2	30	nC
Q <sub>gs</sub>	Gate Source Charge			6		nC
Q <sub>gd</sub>	Gate Drain Charge			14.4		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, R <sub>L</sub> =1.5Ω, R <sub>GEN</sub> =3Ω		7.4		ns
t <sub>r</sub>	Turn-On Rise Time			5.1		ns
t <sub>D(off)</sub>	Turn-Off DelayTime			28.2		ns
t <sub>f</sub>	Turn-Off Fall Time			5.5		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=100A/μs		34	41	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =20A, di/dt=100A/μs		46		nC

A: The value of R<sub>θJA</sub> is measured with the device in a still air environment with T<sub>A</sub>=25°C.

B: The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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<sub>J(MAX)</sub>=175°C.

D: The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> 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<sub>J(MAX)</sub>=175°C.

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

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

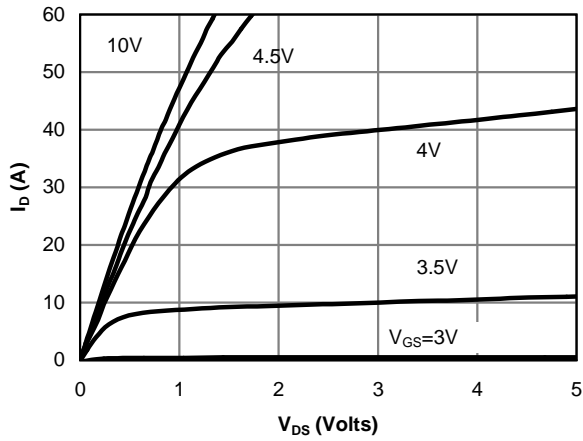


Fig 1: On-Region Characteristics

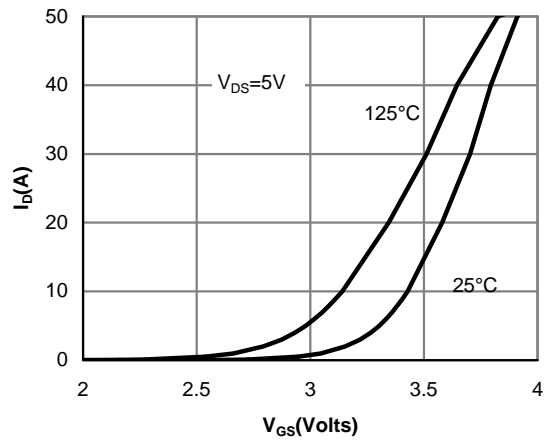


Figure 2: Transfer Characteristics

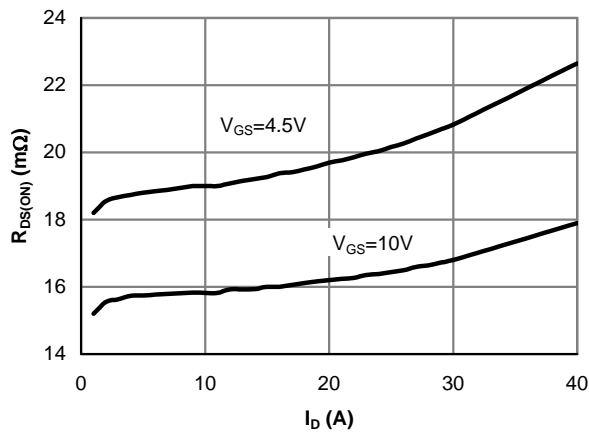


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

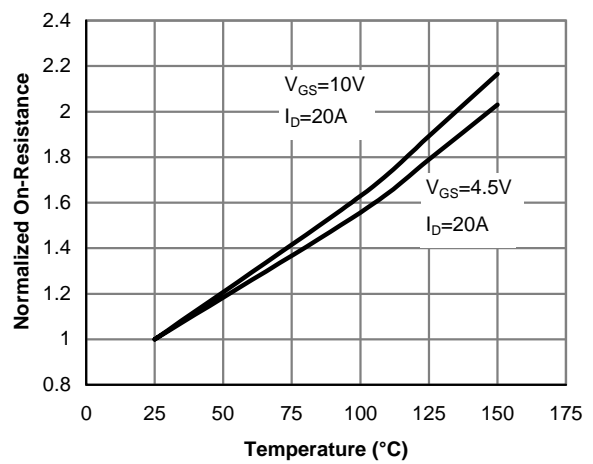


Figure 4: On-Resistance vs. Junction Temperature

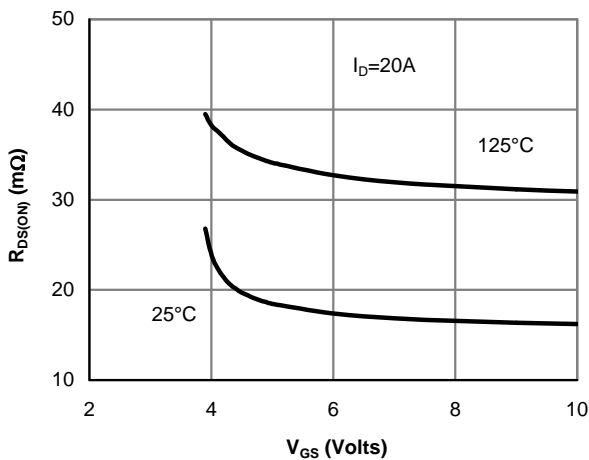


Figure 5: On-Resistance vs. Gate-Source Voltage

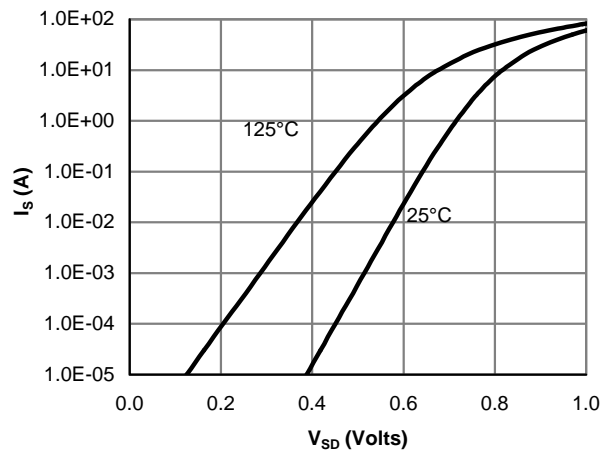


Figure 6: Body-Diode Characteristics

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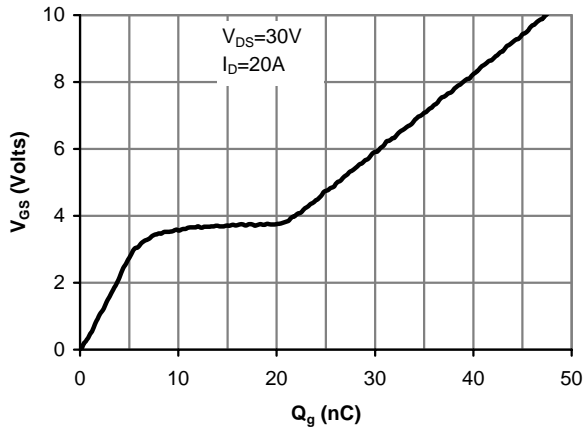


Figure 7: Gate-Charge Characteristics

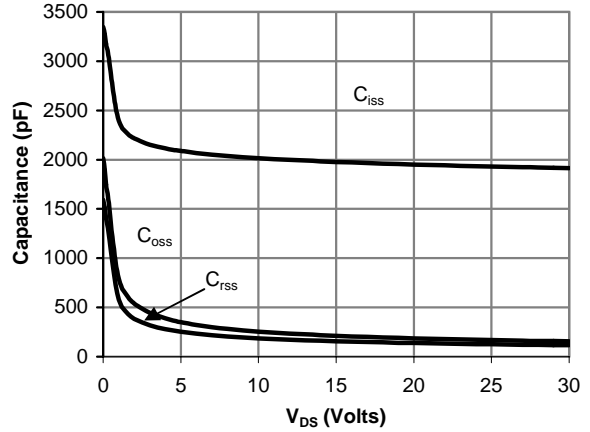


Figure 8: Capacitance Characteristics

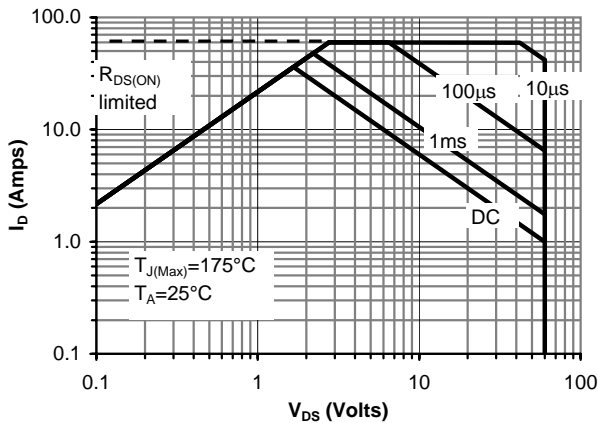


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

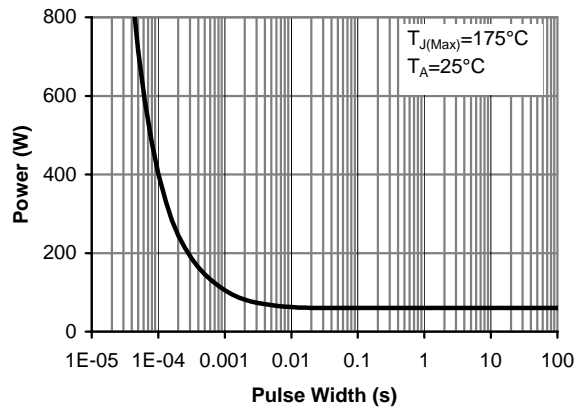


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

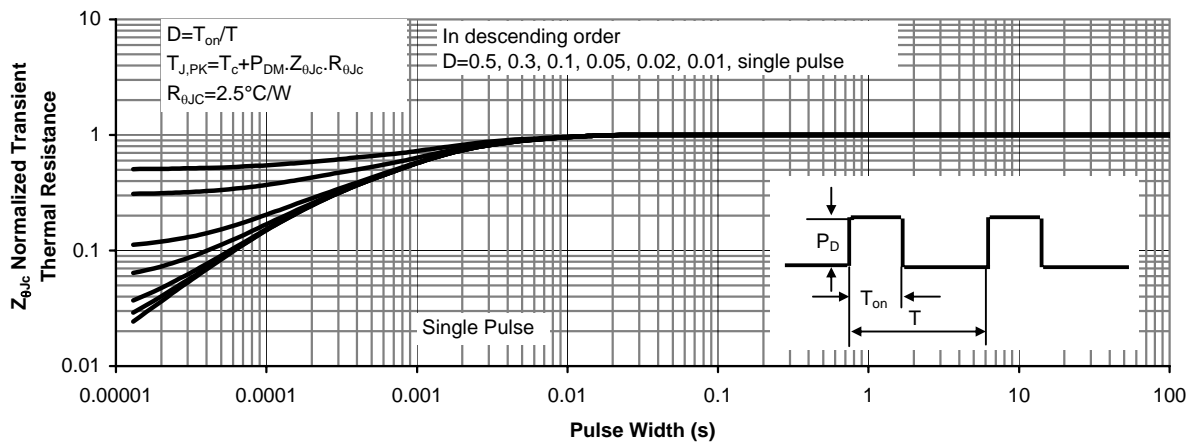


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

