



**AOU403**

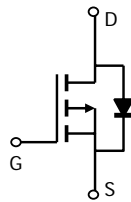
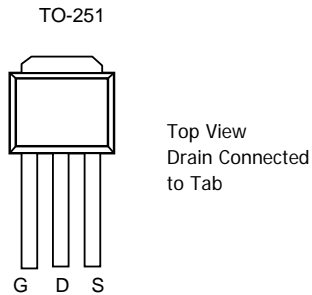
**P-Channel Enhancement Mode Field Effect Transistor**

**General Description**

The AOU403 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 AOU403 is Pb-free (meets ROHS & Sony 259 specifications). AOU403L is a Green Product ordering option. AOU403 and AOU403L are electrically identical.*

**Features**

- $V_{DS}$  (V) = -60V
- $I_D$  = -12A ( $V_{GS}$  = -10V)
- $R_{DS(ON)} < 115m\Omega$  ( $V_{GS}$  = -10V)
- $R_{DS(ON)} < 150m\Omega$  ( $V_{GS}$  = -4.5V)



**Absolute Maximum Ratings  $T_A=25^\circ\text{C}$  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>G</sup>	$I_D$	$T_C=25^\circ\text{C}$	-12
		$T_C=100^\circ\text{C}$	-10
Pulsed Drain Current <sup>C</sup>	$I_{DM}$	-30	A
Avalanche Current <sup>C</sup>	$I_{AR}$	-12	A
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	23	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	50
		$T_C=100^\circ\text{C}$	25
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 <sup>A</sup>	$R_{\theta JA}$	105	125	$^\circ\text{C/W}$
Maximum Junction-to-Case <sup>B</sup>	$R_{\theta JC}$	2.5	3	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
BV <sub>DSS</sub>	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		-0.003	-1	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	-1.5	-2.1	-3	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-30			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-12A T <sub>J</sub> =125°C		91	115	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-8A		114	150	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-12A		12.8		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =-1A, V <sub>GS</sub> =0V		-0.76	-1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				-12	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance			987	1185	pF
C <sub>oss</sub>	Output Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-30V, f=1MHz		114		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			46		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		7	10	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge (10V)			15.8	20	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge (4.5V)	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-12A		7.4	9	nC
Q <sub>gs</sub>	Gate Source Charge			3		nC
Q <sub>gd</sub>	Gate Drain Charge			3.5		nC
t <sub>D(on)</sub>	Turn-On Delay Time			9		ns
t <sub>r</sub>	Turn-On Rise Time	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, R <sub>L</sub> =2.5Ω,		10		ns
t <sub>D(off)</sub>	Turn-Off Delay Time	R <sub>GEN</sub> =3Ω		25		ns
t <sub>f</sub>	Turn-Off Fall Time			11		ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-12A, di/dt=100A/μs		27.5	35	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-12A, di/dt=100A/μs		30		nC

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

B: The power dissipation PD 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>qJA</sub> is the sum of the thermal impedance from junction to case R<sub>qJC</sub> and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300 ms 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

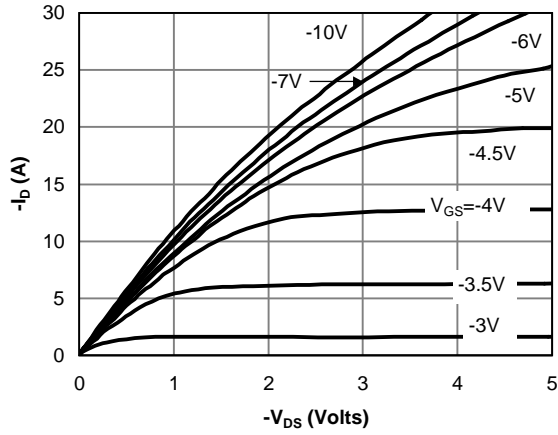


Fig 1: On-Region Characteristics

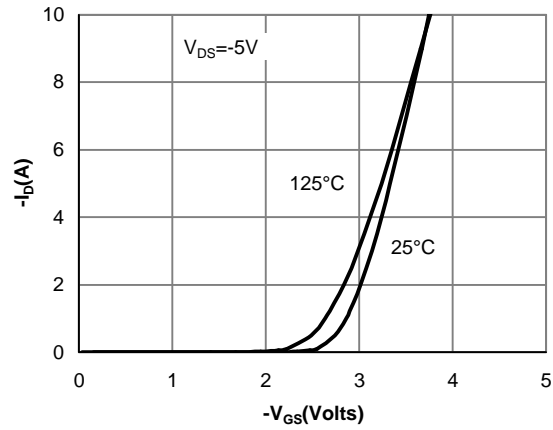


Figure 2: Transfer Characteristics

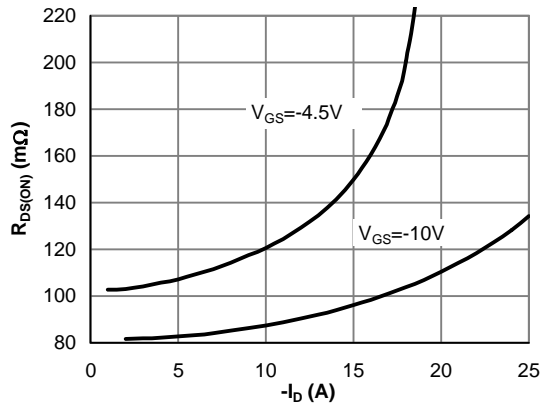


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

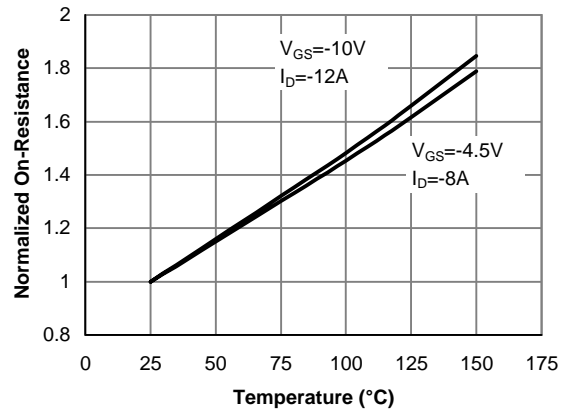


Figure 4: On-Resistance vs. Junction Temperature

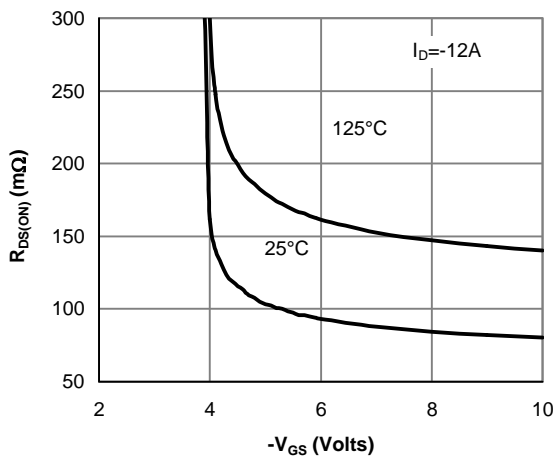


Figure 5: On-Resistance vs. Gate-Source Voltage

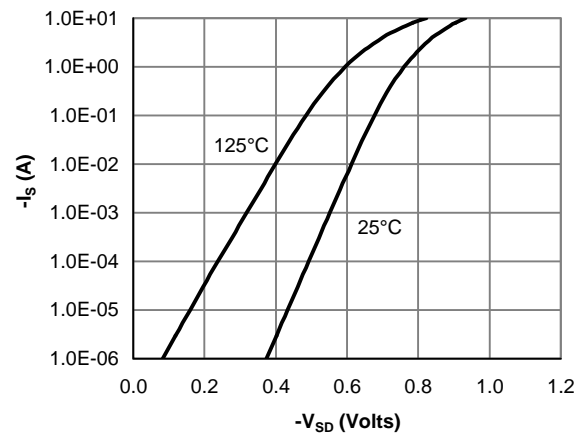


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

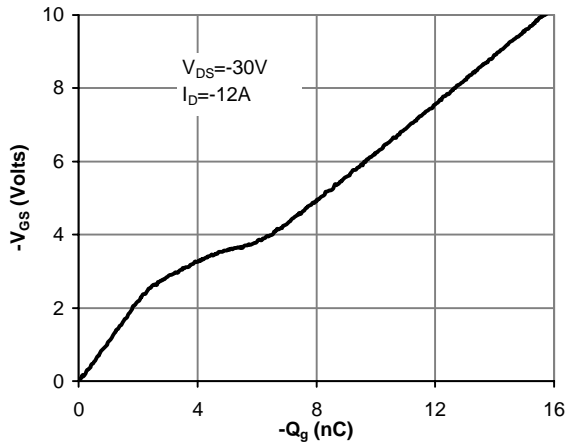


Figure 7: Gate-Charge Characteristics

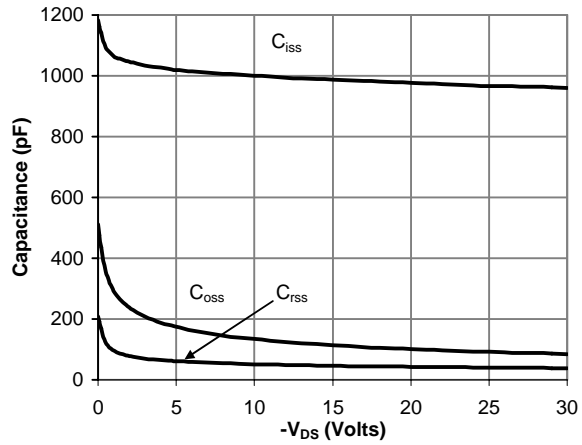


Figure 8: Capacitance Characteristics

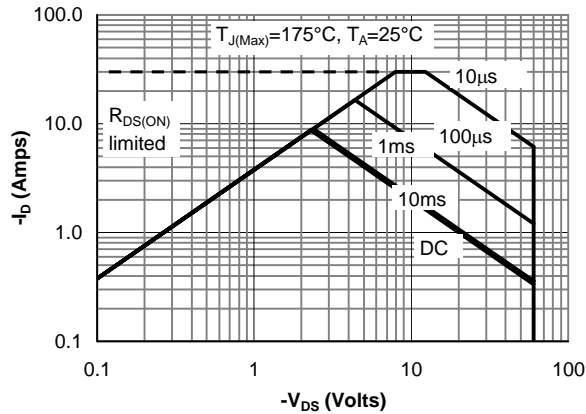


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

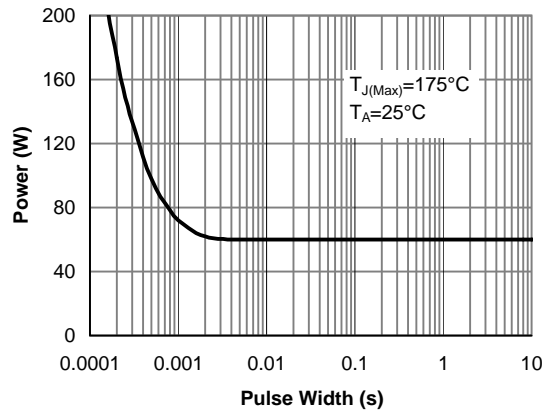


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

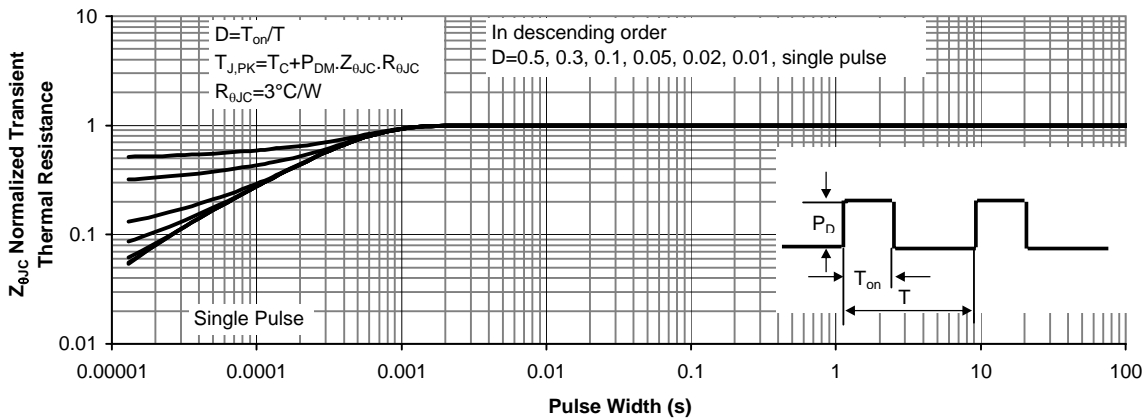


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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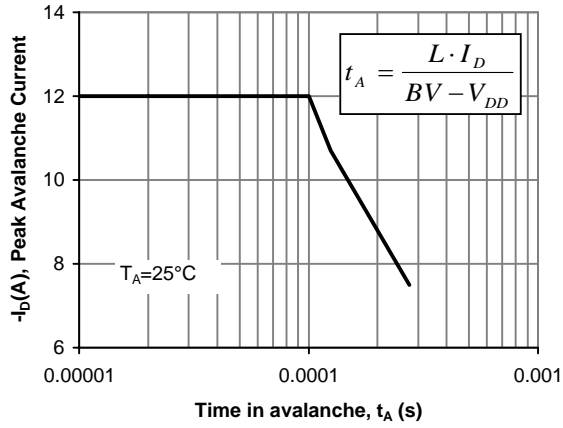


Figure 12: Single Pulse Avalanche capability

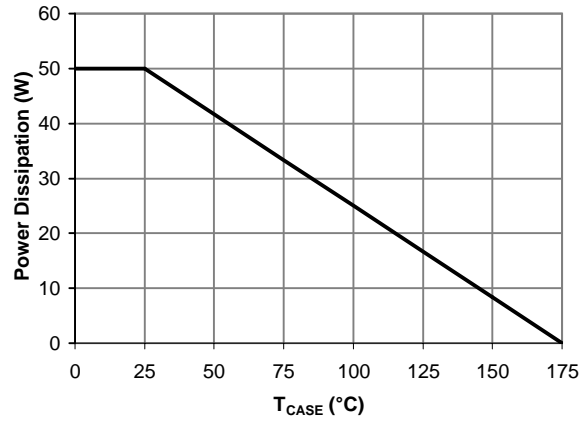


Figure 13: Power De-rating (Note B)

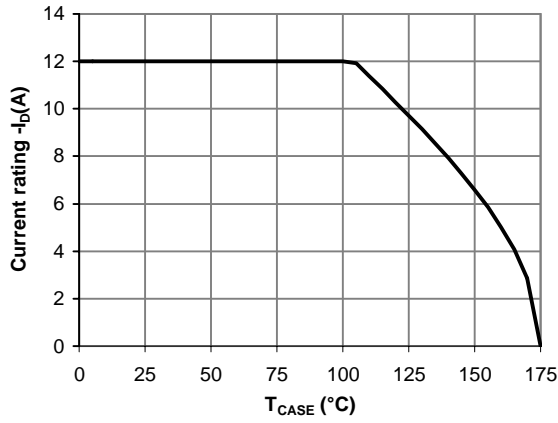


Figure 14: Current De-rating (Note B)