



ALPHA & OMEGA
SEMICONDUCTOR

AOB403

P-Channel Enhancement Mode Field Effect Transistor

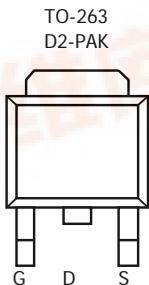


General Description

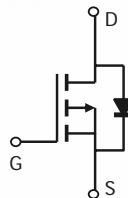
The AOB403 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and low gate resistance. With the excellent thermal resistance of the D2-PAK package, this device is well suited for high current load applications. Standard product AOB403 is Pb-free (meets ROHS & Sony 259 specifications). AOB403L is a Green Product ordering option. AOB403 and AOB403L are electrically identical.

Features

$V_{DS} (V) = -60V$
 $I_D = -30A$ ($V_{GS} = -10V$)
 $R_{DS(ON)} < 44m\Omega$ ($V_{GS} = -10V$) @ 30A
 $R_{DS(ON)} < 55m\Omega$ ($V_{GS} = -4.5V$) @ 20A



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	$T_C=25^\circ C$	-30	A
Current		-20	
Pulsed Drain Current	I_{DM}	-60	
Avalanche Current ^C	I_{AR}	-26	A
Repetitive avalanche energy $L=0.1mH$ ^C	E_{AR}	134	mJ
Power Dissipation ^B	$T_C=25^\circ C$	83	W
		42	
Power Dissipation ^A	$T_A=25^\circ C$	2.2	W
		1.45	
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	$t \leq 10s$	10	12	°C/W
Maximum Junction-to-Ambient ^A		45	55	°C/W
Maximum Junction-to-Case ^C	$R_{\theta JC}$	1.35	1.8	°C/W

AOB403
Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-60			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-48\text{V}, V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$		-0.003	-1	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm20\text{V}$			-5	nA
$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1	-1.9	-3	V
$I_{D(\text{ON})}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-60			A
$R_{DS(\text{ON})}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-30\text{A}$ $T_J=125^\circ\text{C}$	36	44		$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-20\text{A}$	51	62		$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-30\text{A}$		43	55	$\text{m}\Omega$
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.73	-1	V
I_S	Maximum Body-Diode Continuous Current				-30	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-30\text{V}, f=1\text{MHz}$		2977	3600	pF
C_{oss}	Output Capacitance			241		pF
C_{rss}	Reverse Transfer Capacitance			153		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		2	2.4	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}, V_{DS}=-30\text{V}, I_D=-30\text{A}$		44.6	54	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			20.8	25	nC
Q_{gs}	Gate Source Charge			9.9		nC
Q_{gd}	Gate Drain Charge			10		nC
$t_{D(\text{on})}$	Turn-On DelayTime	$V_{GS}=-10\text{V}, V_{DS}=-30\text{V}, R_L=1\Omega, R_{\text{GEN}}=3\Omega$		13.7		ns
t_r	Turn-On Rise Time			8.3		ns
$t_{D(\text{off})}$	Turn-Off DelayTime			37		ns
t_f	Turn-Off Fall Time			9.7		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-30\text{A}, dI/dt=100\text{A}/\mu\text{s}$		40	48	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-30\text{A}, dI/dt=100\text{A}/\mu\text{s}$		56		nC

A: The value of R_{qJA} is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The Power dissipation PSDM is based on R_{qJA} and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B. The power dissipation PD is based on $T_J(\text{MAX})=175^\circ\text{C}$, 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 $T_J(\text{MAX})=175^\circ\text{C}$.

D. The R_{qJA} is the sum of the thermal impedance from junction to case R_{qJC} 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 $T_J(\text{MAX})=175^\circ\text{C}$.

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

H. These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The SOA curve provides a single pulse rating.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

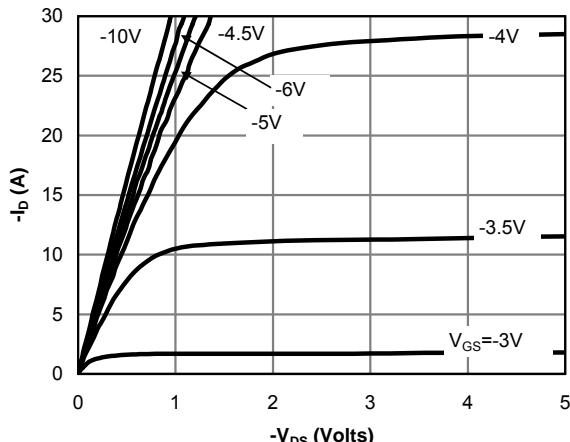


Fig 1: On-Region Characteristics

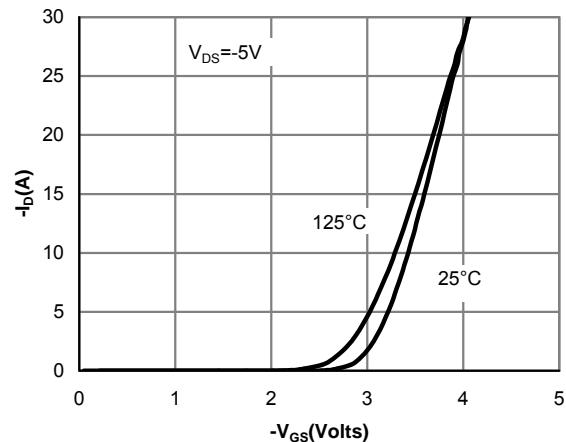


Figure 2: Transfer Characteristics

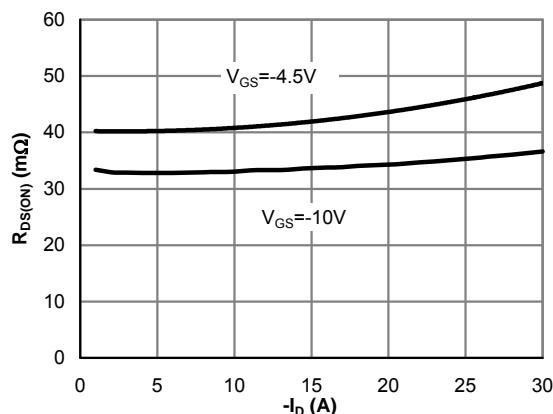


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

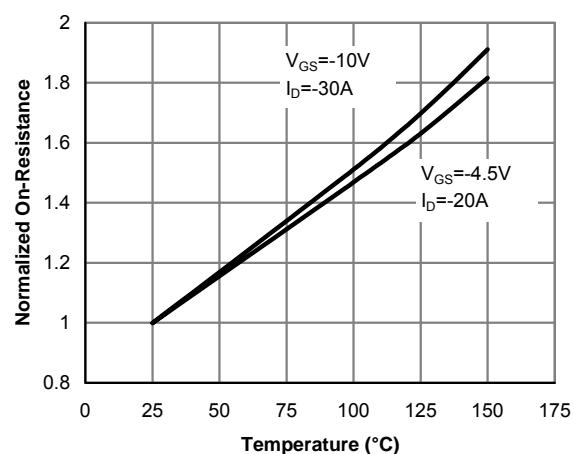


Figure 4: On-Resistance vs. Junction Temperature

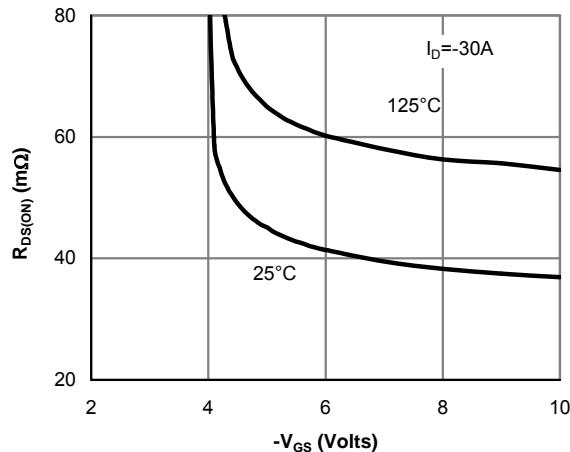


Figure 5: On-Resistance vs. Gate-Source Voltage

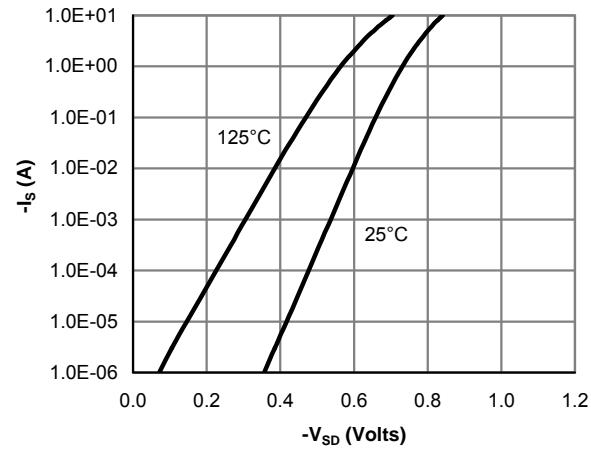
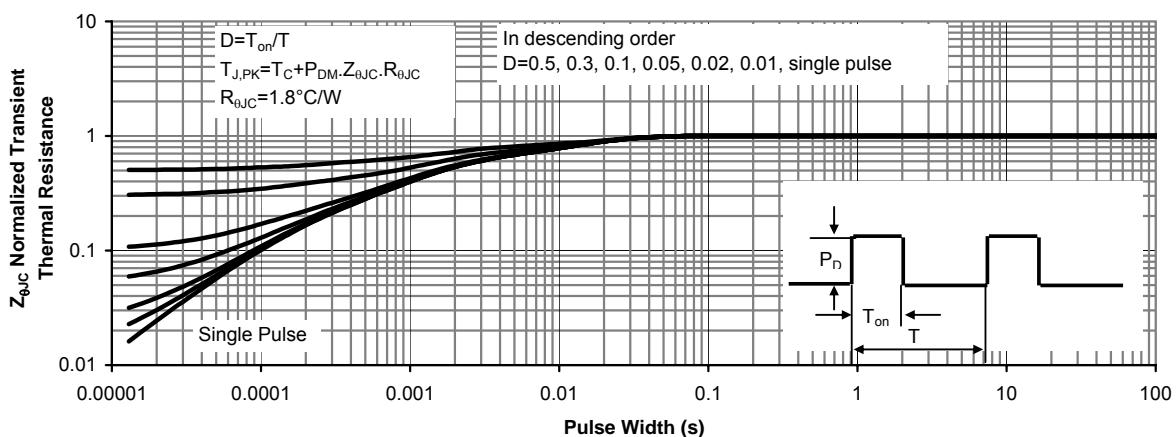
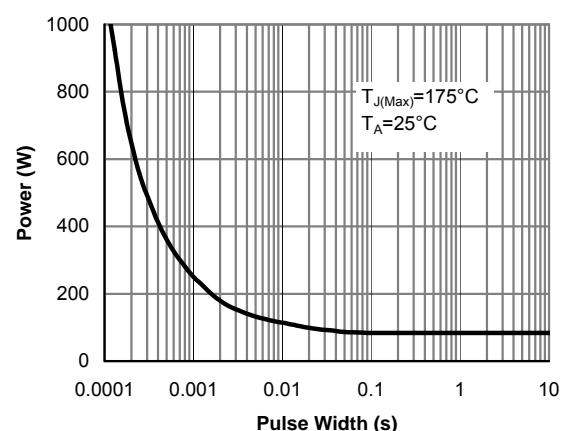
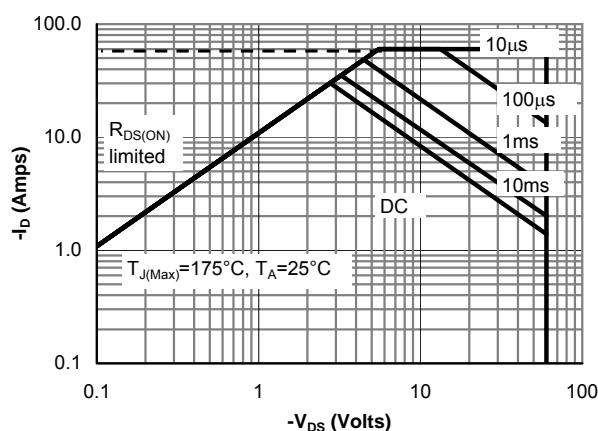
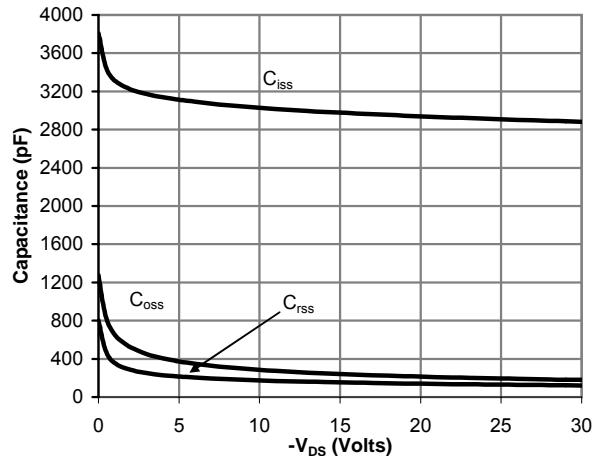
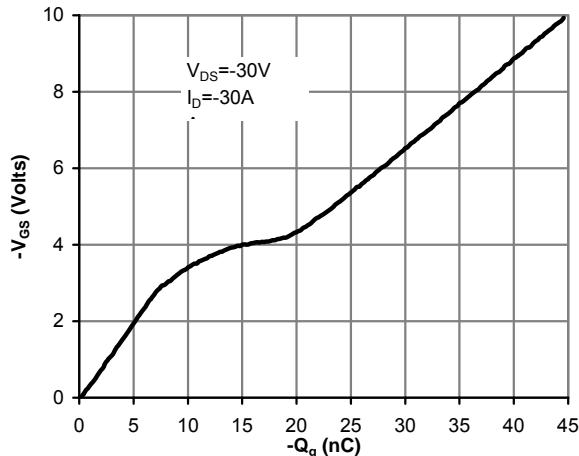


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



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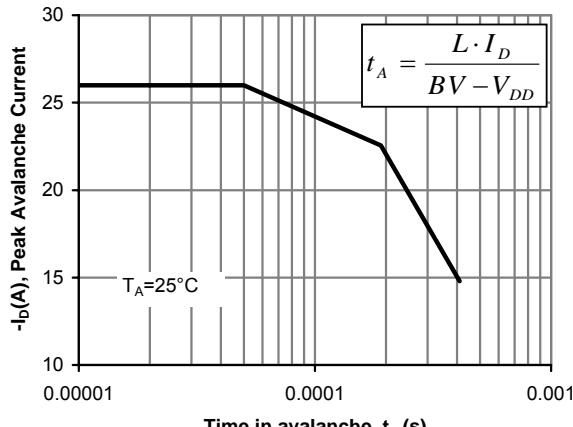


Figure 12: Single Pulse Avalanche capability

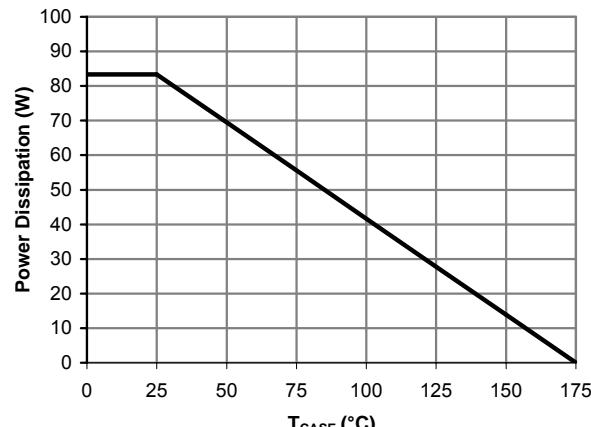


Figure 13: Power De-rating (Note B)

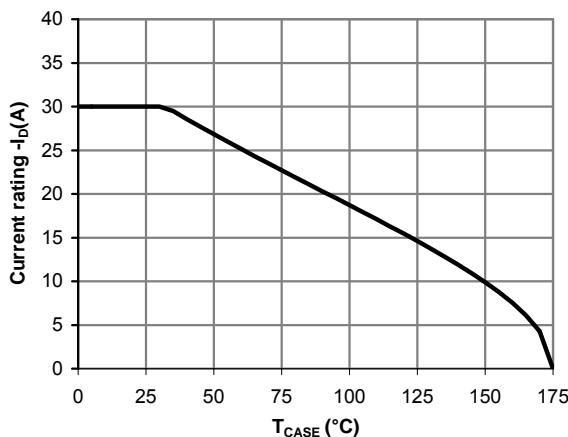


Figure 14: Current De-rating (Note B)

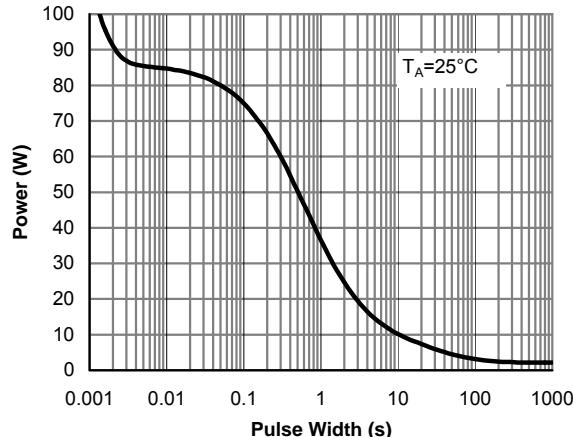


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

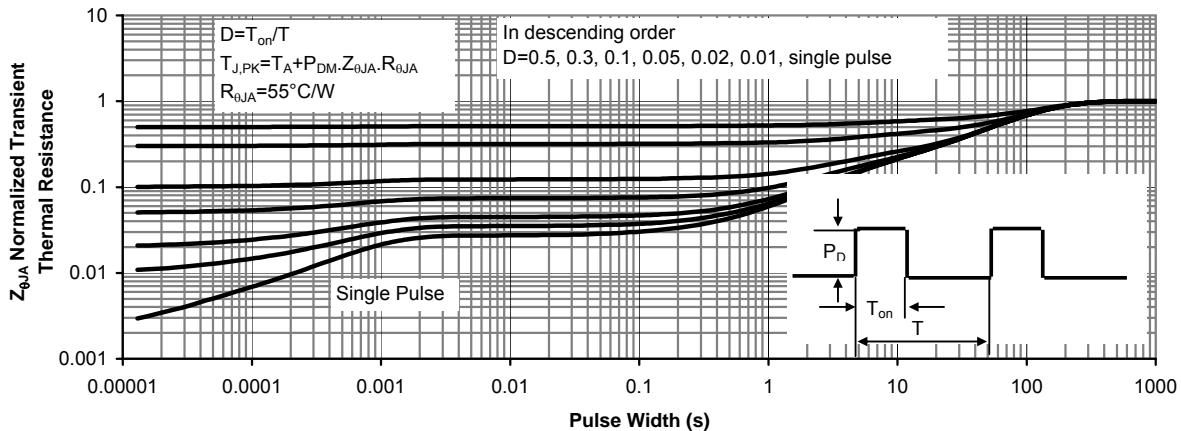


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)



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