



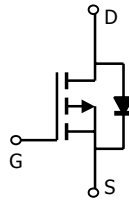
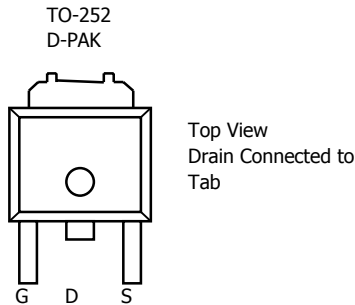
**AOD405, AOD405L (Green Product)**  
**P-Channel Enhancement Mode Field Effect Transistor**

**General Description**

The AOD405 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and low gate resistance. With the excellent thermal resistance of the DPAK package, this device is well suited for high current load applications. AOD405L (Green Product) is offered in a lead-free package.

**Features**

$V_{DS}$  (V) = -30V  
 $I_D$  = -18A  
 $R_{DS(ON)} < 32m\Omega$  ( $V_{GS} = -10V$ )  
 $R_{DS(ON)} < 60m\Omega$  ( $V_{GS} = -4.5V$ )



**Absolute Maximum Ratings  $T_A=25^\circ\text{C}$  unless otherwise noted**

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>B,G</sup>	$I_D$	$T_A=25^\circ\text{C}$ <sup>G</sup>	-18
		$T_A=100^\circ\text{C}$ <sup>G</sup>	-18
Pulsed Drain Current	$I_{DM}$	-40	A
Avalanche Current <sup>C</sup>	$I_{AR}$	-18	A
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	40	mJ
Power Dissipation <sup>B</sup>	$P_D$	$T_C=25^\circ\text{C}$	60
		$T_C=100^\circ\text{C}$	30
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ\text{C}$	2.5
		$T_A=70^\circ\text{C}$	1.6
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>	$R_{\theta JA}$	$t \leq 10\text{s}$	16.7	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	40	50
Maximum Junction-to-Case <sup>C</sup>	$R_{\theta JL}$	1.9	2.5	$^\circ\text{C/W}$

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	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, 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	-1.2	-2	-2.4	V
I <sub>D(ON)</sub>	On state drain current	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-5V	-40			A
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-18A T <sub>J</sub> =125°C		24.5	32	mΩ
				36	43	
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A		41	60	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-18A		17		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				-18	A
<b>DYNAMIC PARAMETERS</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz		920	1100	pF
C <sub>oss</sub>	Output Capacitance			190		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			122		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		3.6	4.5	Ω
<b>SWITCHING PARAMETERS</b>						
Q <sub>g</sub> (10V)	Total Gate Charge (10V)	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-18A		18.7	23	nC
Q <sub>g</sub> (4.5V)	Total Gate Charge (4.5V)			9.7	11.7	nC
Q <sub>gs</sub>	Gate Source Charge			2.54		nC
Q <sub>gd</sub>	Gate Drain Charge			5.4		nC
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, R <sub>L</sub> =0.82Ω, R <sub>GEN</sub> =3Ω		9	13	ns
t <sub>r</sub>	Turn-On Rise Time			25	35	ns
t <sub>D(off)</sub>	Turn-Off DelayTime			20	30	ns
t <sub>f</sub>	Turn-Off Fall Time			12	18	ns
t <sub>rr</sub>	Body Diode Reverse Recovery Time		I <sub>F</sub> =-18A, dI/dt=100A/μs		21.4	26
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =-18A, dI/dt=100A/μs		13	16	nC

A: The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The Power dissipation P<sub>DSM</sub> is based on steady-state R<sub>θJA</sub> and the maximum allowed junction temperature of 150°C. The value in any a given application depends on the user's specific board design, and the maximum temperature fo 175°C may be used if the PCB or heatsink allows it.

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. It is used to determine the current rating, when this rating falls below the package limit.

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 tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The SOA curve provides a single pulse rating.

G: The maximum current rating is limited by the package current capability.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

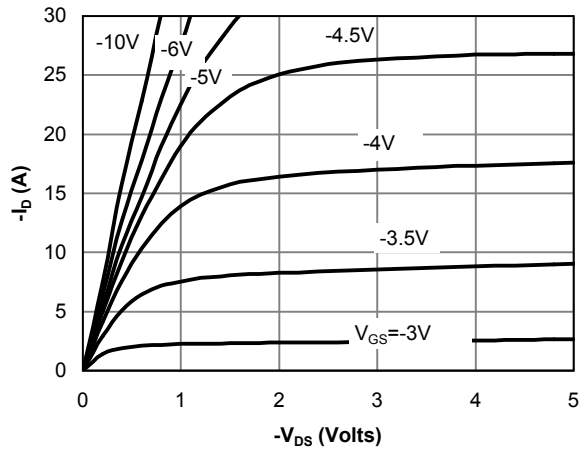


Fig 1: On-Region Characteristics

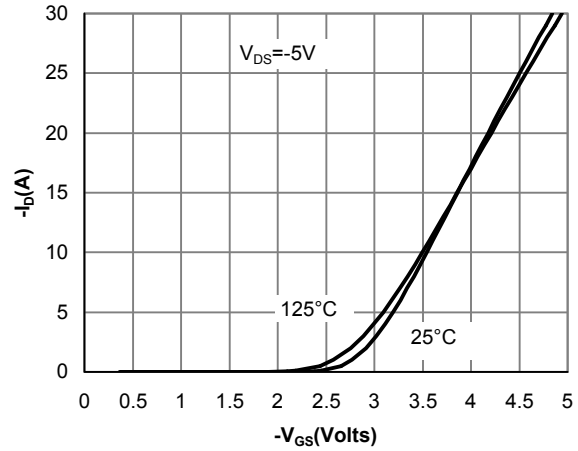


Figure 2: Transfer Characteristics

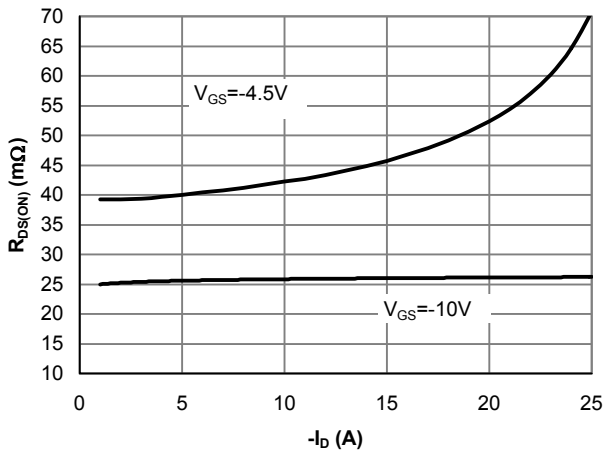


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

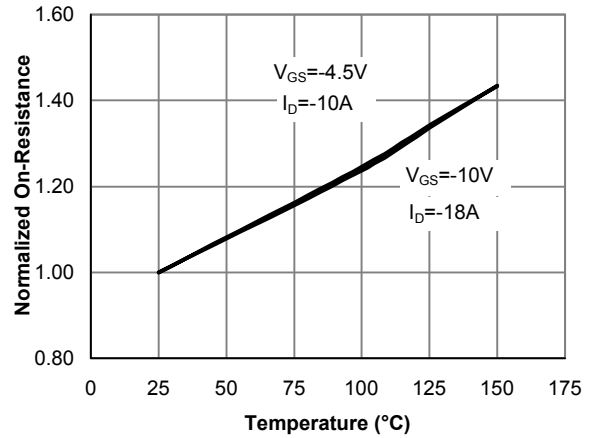


Figure 4: On-Resistance vs. Junction Temperature

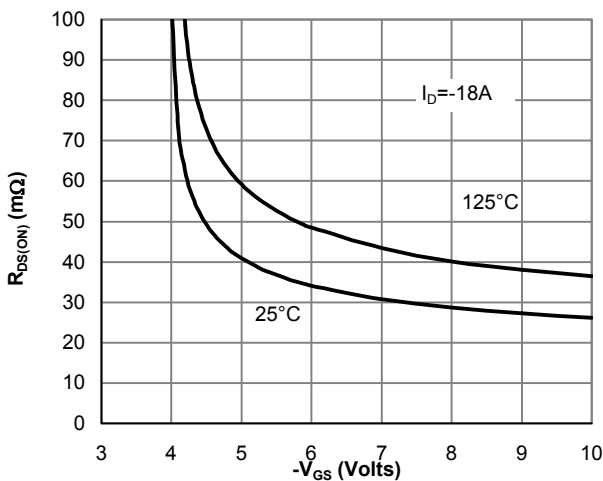


Figure 5: On-Resistance vs. Gate-Source Voltage

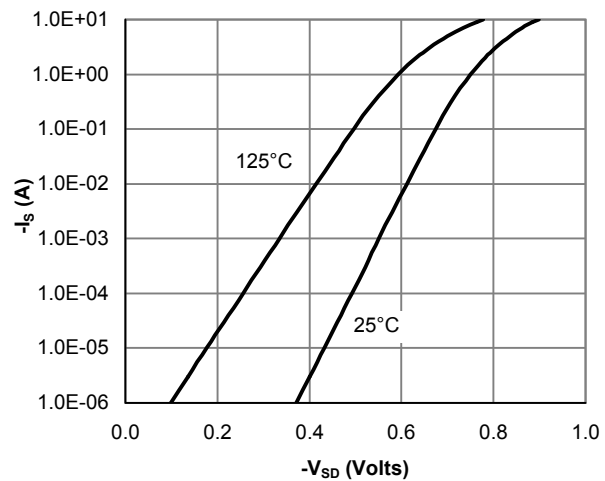


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

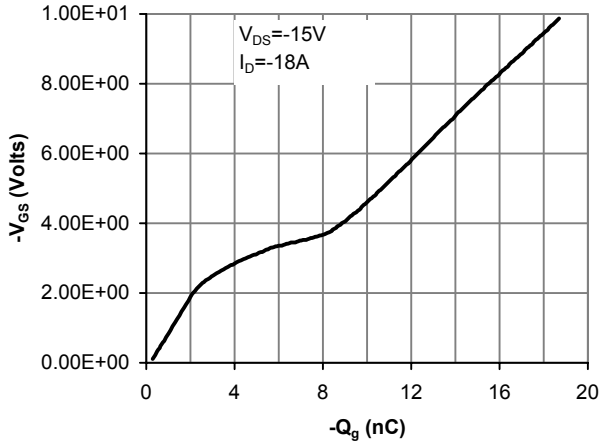


Figure 7: Gate-Charge Characteristics

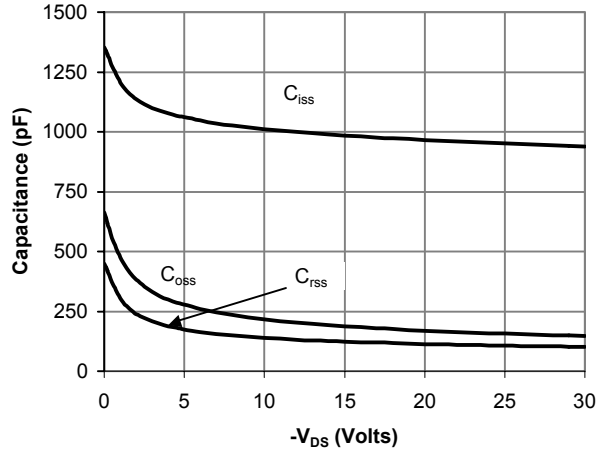


Figure 8: Capacitance Characteristics

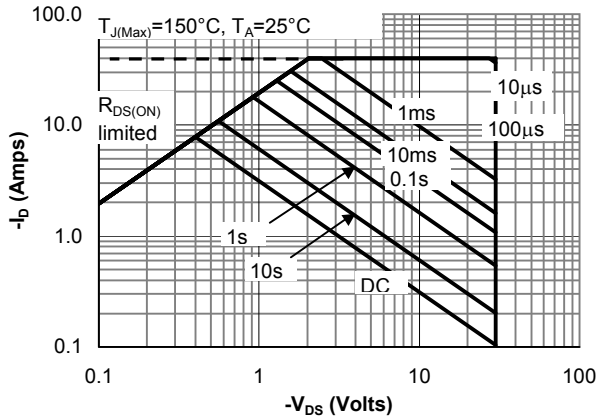


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

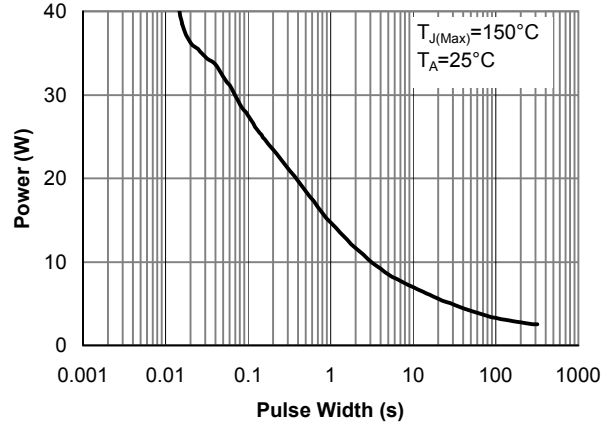


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

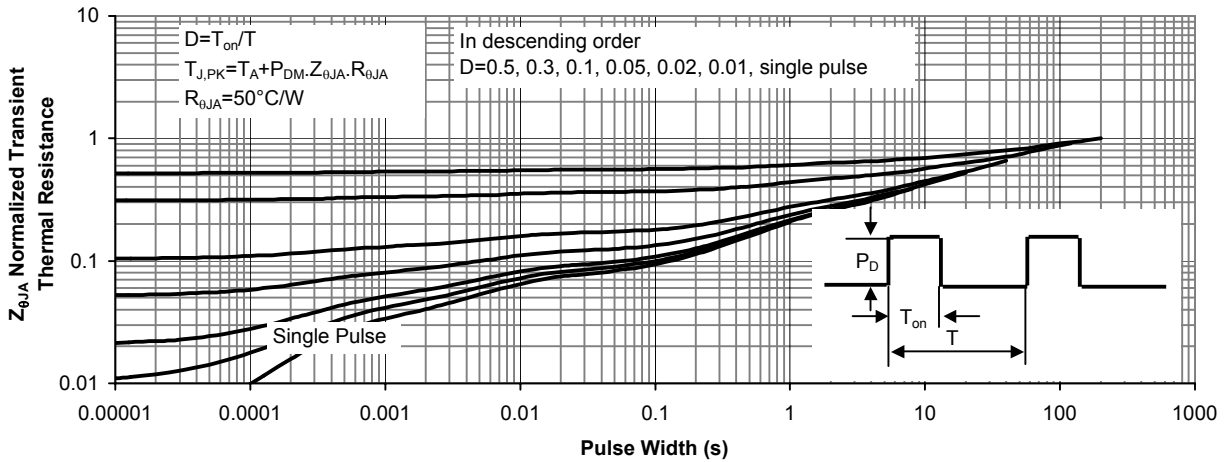


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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