

AOD402

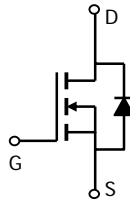
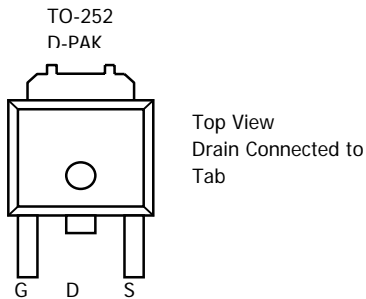
N-Channel Enhancement Mode Field Effect Transistor

General Description

The AOD402 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 AOD402 is Pb-free (meets ROHS & Sony 259 specifications). AOD402L is a Green Product ordering option. AOD402 and AOD402L are electrically identical.*

Features

$V_{DS} (V) = 30V$
 $I_D = 18 A (V_{GS} = 20V)$
 $R_{DS(ON)} < 15 m\Omega (V_{GS} = 20V)$
 $R_{DS(ON)} < 18 m\Omega (V_{GS} = 10V)$
 $R_{DS(ON)} < 44 m\Omega (V_{GS} = 4.5V)$



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 25	V
Continuous Drain Current ^G	I_D	$T_C=25^\circ C$	18
		$T_C=100^\circ C$	12
Pulsed Drain Current ^C	I_{DM}	40	A
Avalanche Current ^C	I_{AR}	18	A
Repetitive avalanche energy $L=0.1mH$ ^C	E_{AR}	40	mJ
Power Dissipation ^B	P_D	$T_C=25^\circ C$	60
		$T_C=100^\circ C$	30
Power Dissipation ^A	P_{DSM}	$T_A=25^\circ C$	2.5
		$T_A=70^\circ C$	1.6
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 ^A	$R_{\theta JA}$	$t \leq 10s$	16.7	$^\circ C/W$
Maximum Junction-to-Ambient ^A		Steady-State	40	$^\circ C/W$
Maximum Junction-to-Case ^B	$R_{\theta JC}$	1.9	2.5	$^\circ C/W$

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 =250μA, V _{GS} =0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =24V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±25V			100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1	2.4	3	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	40			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =20V, I _D =18A T _J =125°C		12 17.4	15 21	mΩ
		V _{GS} =10V, I _D =18A		15	18	
		V _{GS} =4.5V, I _D =6A		36	44	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =18A		24		S
V _{SD}	Diode Forward Voltage	I _S =18A, V _{GS} =0V		0.8	1	V
I _S	Maximum Body-Diode Continuous Current				18	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		769		pF
C _{oss}	Output Capacitance			185		pF
C _{rss}	Reverse Transfer Capacitance			131		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		0.7		Ω
SWITCHING PARAMETERS						
Q _{g(10V)}	Total Gate Charge	V _{GS} =10V, V _{DS} =10V, I _D =18A		15.9		nC
Q _{gs}	Gate Source Charge			2.44		nC
Q _{gd}	Gate Drain Charge			4.92		nC
t _{D(on)}	Turn-On Delay Time	V _{GS} =10V, V _{DS} =15V, I _D =18A, R _L =0.82Ω, R _{GEN} =3Ω		6.2		ns
t _r	Turn-On Rise Time			10.9		ns
t _{D(off)}	Turn-Off Delay Time			16		ns
t _f	Turn-Off Fall Time			4.8		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =18A, dI/dt=100A/μs		18		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =18A, dI/dt=100A/μs		8.1		nC

A: The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150°C. The value in any given application depend 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 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_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

G: The maximum current rating is limited by bond-wires. Rev3: August 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

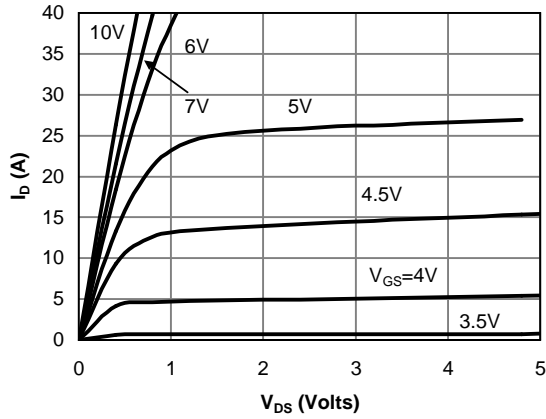


Fig 1: On-Region Characteristics

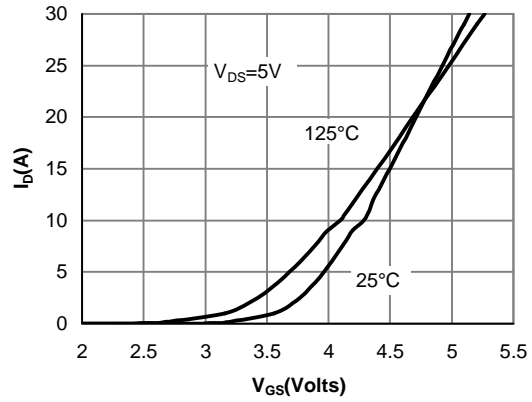


Figure 2: Transfer Characteristics

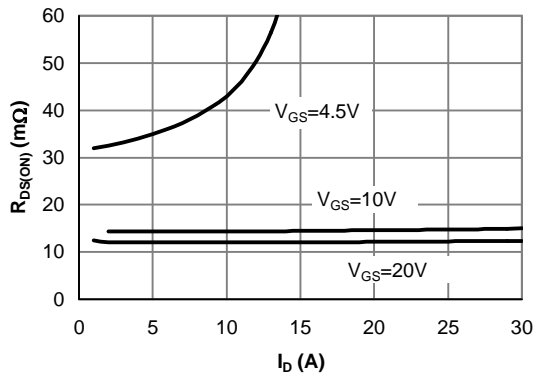


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

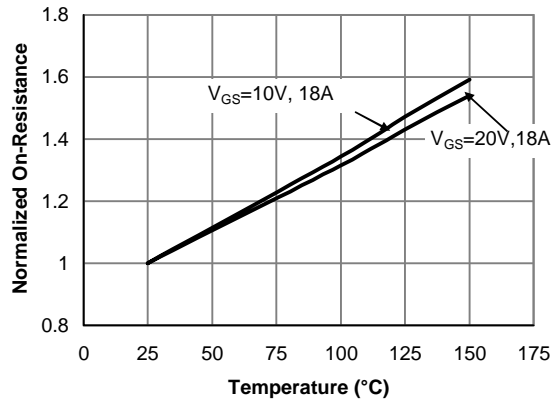


Figure 4: On-Resistance vs. Junction Temperature

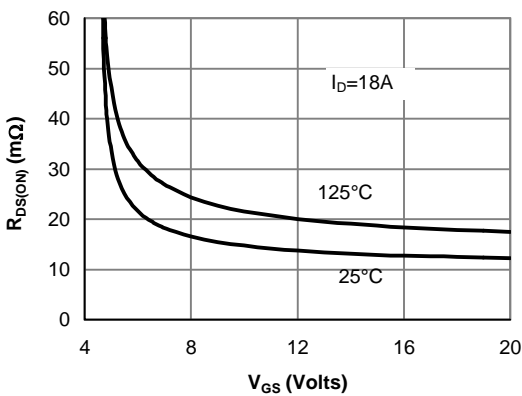


Figure 5: On-Resistance vs. Gate-Source Voltage

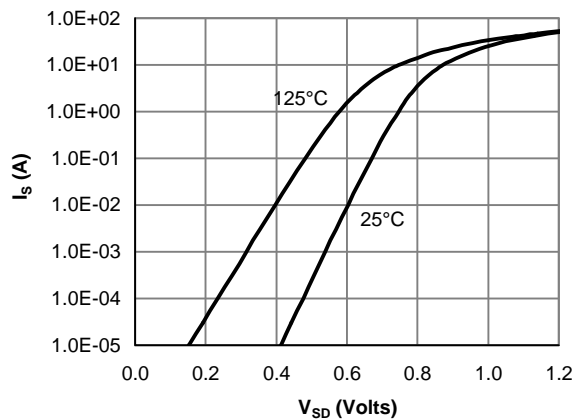


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

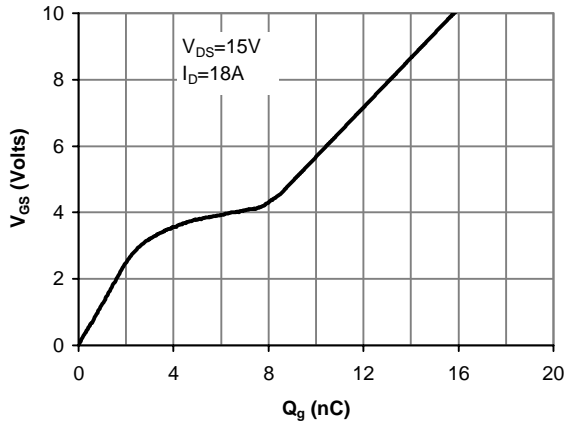


Figure 7: Gate-Charge Characteristics

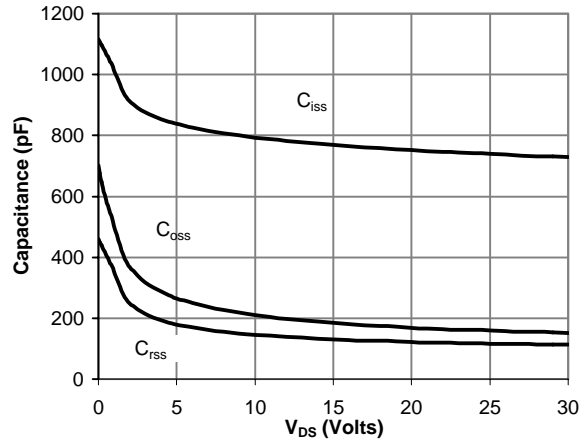


Figure 8: Capacitance Characteristics

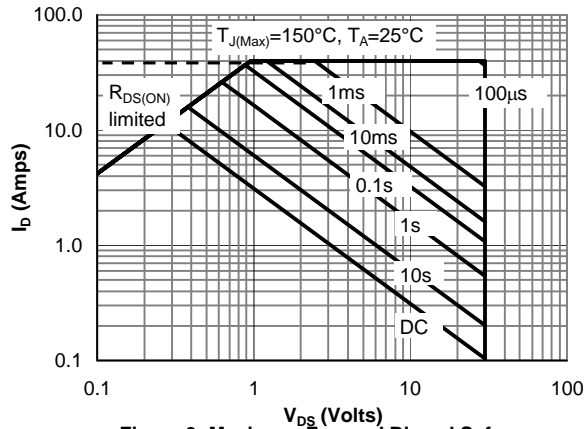


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

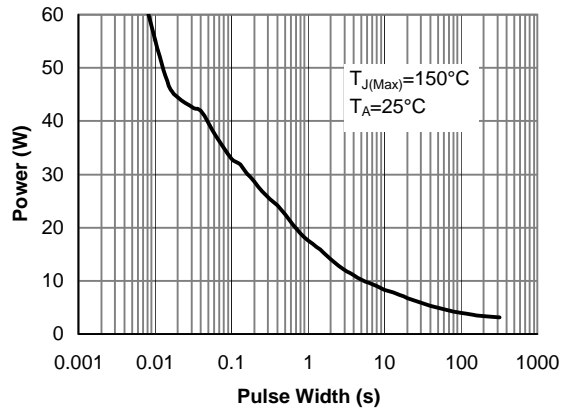


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

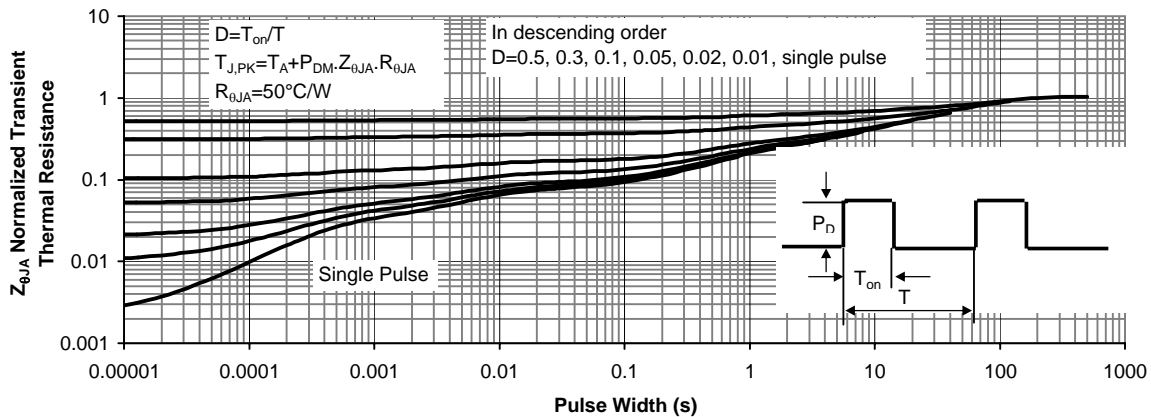


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)