



ALPHA & OMEGA
SEMICONDUCTOR, LTD

AOD434

N-Channel Enhancement Mode Field Effect Transistor

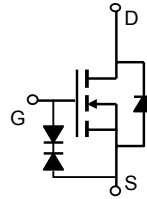
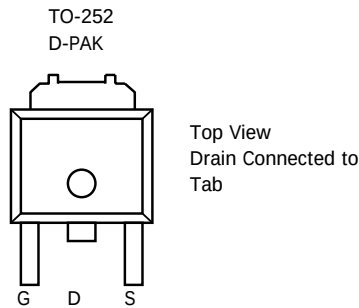


General Description

The AOD434 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V while retaining a 12V $V_{GS(MAX)}$ rating. It is ESD protected to a 2KV HBM rating. *Standard Product AOD434 is Pb-free (meets ROHS & Sony 259 specifications). AOD434L is a Green Product ordering option. AOD434 and AOD434L are electrically identical.*

Features

V_{DS} (V) = 20V
 I_D = 18A (V_{GS} = 10V)
 $R_{DS(ON)} < 14m\Omega$ (V_{GS} = 10V)
 $R_{DS(ON)} < 16m\Omega$ (V_{GS} = 4.5V)
 $R_{DS(ON)} < 21m\Omega$ (V_{GS} = 2.5V)
 $R_{DS(ON)} < 30m\Omega$ (V_{GS} = 1.8V)
ESD Rating: 2KV HBM



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

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current ^G	I_D	18	A
$T_C=25^\circ\text{C}$			
$T_C=100^\circ\text{C}$	I_D	18	A
Pulsed Drain Current ^C	I_{DM}	30	
Avalanche Current ^C	I_{AR}	18	A
Repetitive avalanche energy $L=0.1\text{mH}$ ^C	E_{AR}	37	mJ
Power Dissipation ^B	P_D	60	W
$T_C=25^\circ\text{C}$			
$T_C=100^\circ\text{C}$	P_D	30	W
Power Dissipation ^A	P_{DSM}	2.5	W
$T_A=25^\circ\text{C}$			
$T_A=70^\circ\text{C}$	P_{DSM}	1.6	W
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 ^A	$R_{\theta JA}$	16.7	25	$^\circ\text{C/W}$
$t \leq 10\text{s}$				
Maximum Junction-to-Ambient ^A		40	50	$^\circ\text{C/W}$
Steady-State				
Maximum Junction-to-Case ^B	$R_{\theta JC}$	1.9	2.5	$^\circ\text{C/W}$
Steady-State				

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	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =16V, V _{GS} =0V T _J =55°C			1 5	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±10V			10	μA
BV _{GSO}	Gate-Source Breakdown Voltage	V _{DS} =0V, I _G =±250μA	±12			V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.75	1	V
I _{D(ON)}	On state drain current	V _{GS} =4.5V, V _{DS} =5V	30			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =18A T _J =125°C		10.9 14.3	14 18	mΩ
		V _{GS} =4.5V, I _D =15A		12.6	16	mΩ
		V _{GS} =2.5V, I _D =10A		16.5	21	mΩ
		V _{GS} =1.8V, I _D =5A		23.2	30	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =18A		36		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.73	1	V
I _S	Maximum Body-Diode Continuous Current				18	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =10V, f=1MHz		1810		pF
C _{oss}	Output Capacitance			232		pF
C _{rss}	Reverse Transfer Capacitance			200		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.6		Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =10V, I _D =18A		40.1		nC
Q _g (4.5V)	Total Gate Charge			8.9		
Q _{gs}	Gate Source Charge			1.7		nC
Q _{gd}	Gate Drain Charge			6.2		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =10V, R _L =0.56Ω, R _{GEN} =3Ω		4		ns
t _r	Turn-On Rise Time			15		ns
t _{D(off)}	Turn-Off DelayTime			42.2		ns
t _f	Turn-Off Fall Time			18.2		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =18A, dI/dt=100A/μs		23.2		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =18A, dI/dt=100A/μs		4.9		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 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 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.

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

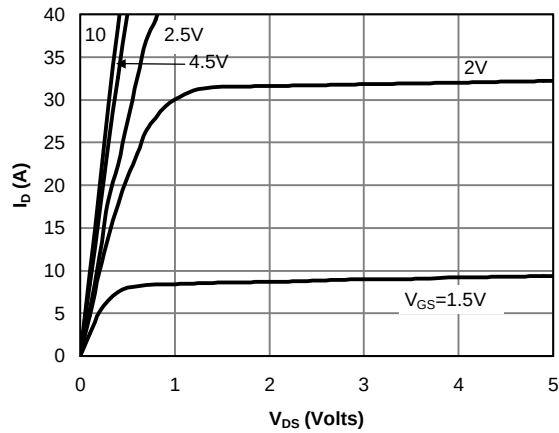


Fig 1: On-Region Characteristics

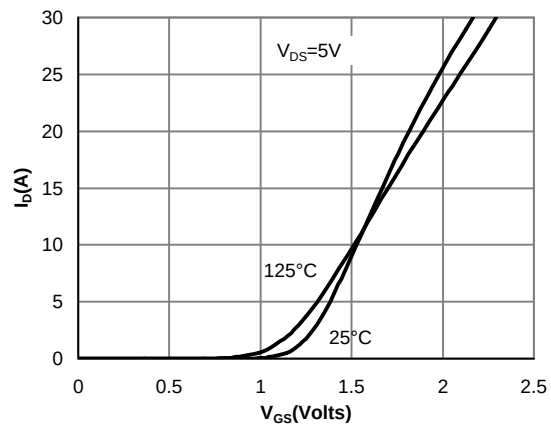


Figure 2: Transfer Characteristics

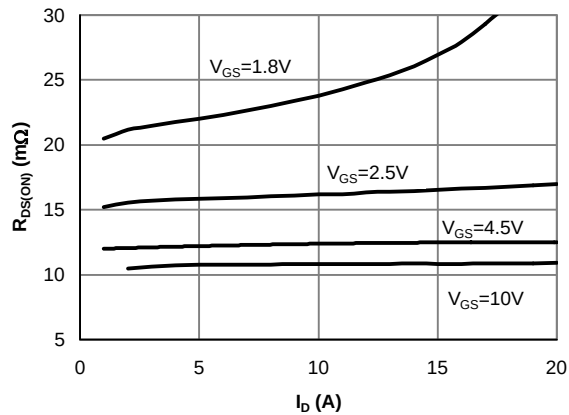


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

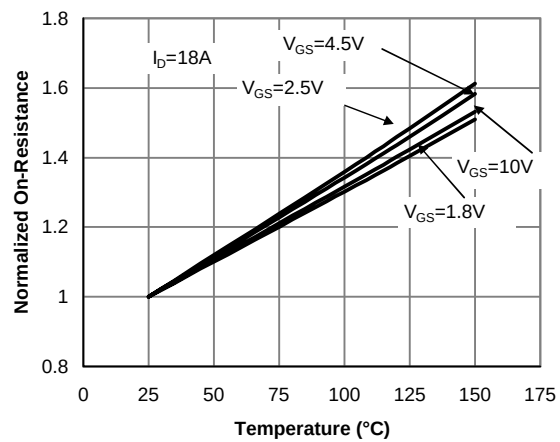


Figure 4: On-Resistance vs. Junction Temperature

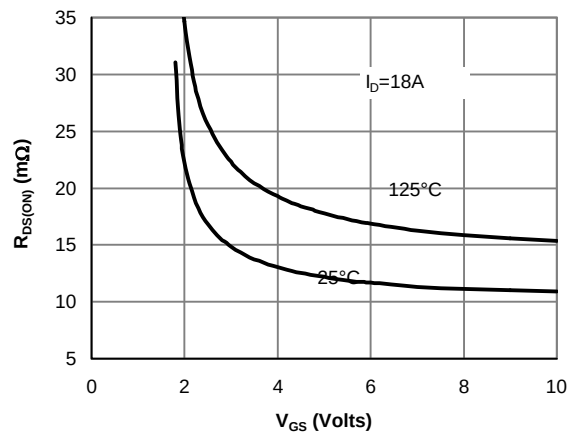


Figure 5: On-Resistance vs. Gate-Source Voltage

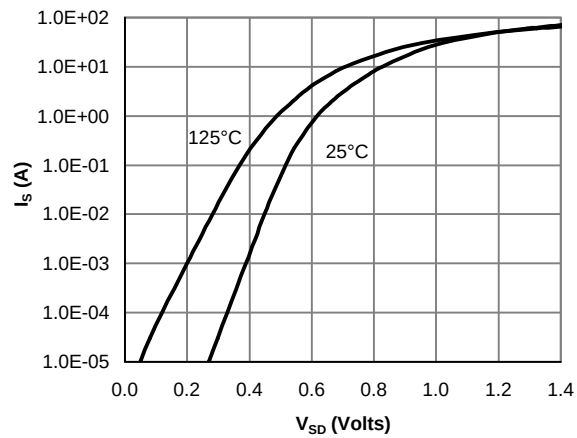


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

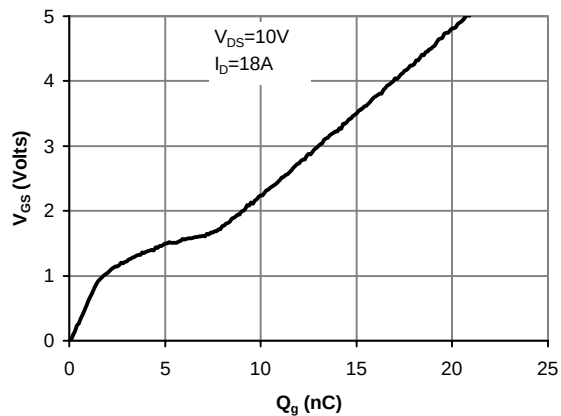


Figure 7: Gate-Charge Characteristics

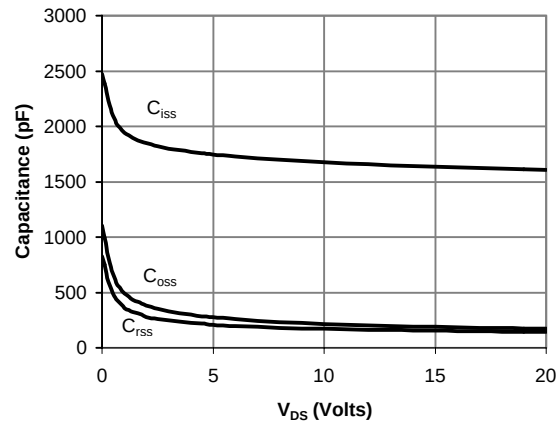


Figure 8: Capacitance Characteristics

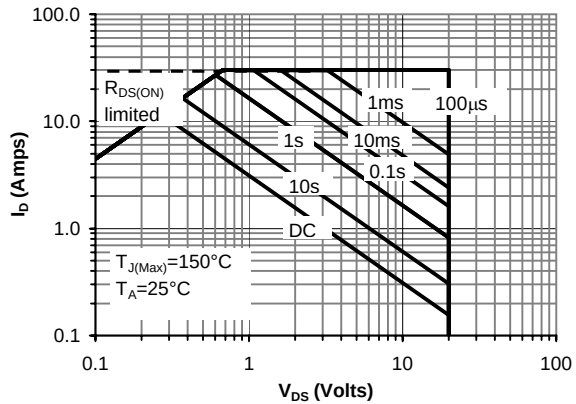


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

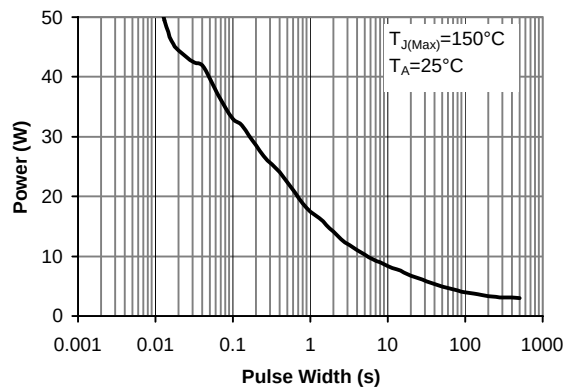


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

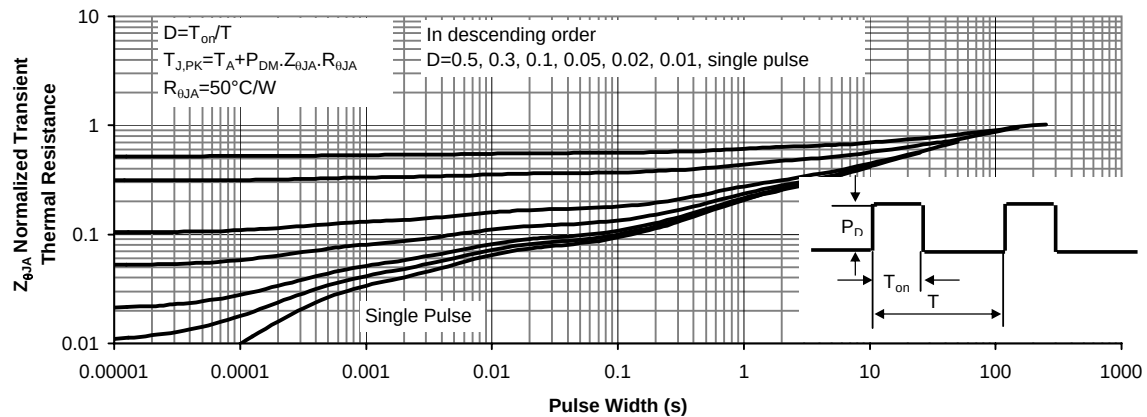


Figure 11: Normalized Maximum Transient Thermal Impedance