

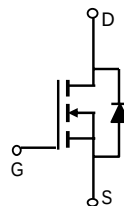
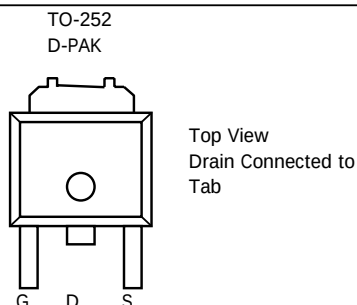
AOD458
N-Channel Enhancement Mode Field Effect Transistor

General Description

The AOD458 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 AOD458 is Pb-free (meets ROHS & Sony 259 specifications). AOD458L is a Green Product ordering option. AOD458 and AOD458L are electrically identical.

Features

$V_{DS} (V) = 30V$
 $I_D = 85A (V_{GS} = 10V)$
 $R_{DS(ON)} < 4m\Omega (V_{GS} = 10V)$
 $R_{DS(ON)} < 5m\Omega (V_{GS} = 4.5V)$


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}	±12	V
Continuous Drain Current	T _C =25°C ^G	I _D	85	A
	T _C =100°C		60	
Pulsed Drain Current ^C		I _{DM}	200	
Avalanche Current ^C		I _{AR}	45	A
Repetitive avalanche energy L=0.3mH ^C		E _{AR}	330	mJ
Power Dissipation ^B	T _C =25°C	P _D	50	W
	T _C =100°C		25	
Power Dissipation ^A	T _A =25°C	P _{DSM}	2.7	W
	T _A =70°C		1.9	
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	$R_{\theta JA}$	15	20	$^\circ C/W$
$t \leq 10s$				
Maximum Junction-to-Ambient ^A		44	55	$^\circ C/W$
Steady-State				
Maximum Junction-to-Case ^B	$R_{\theta JC}$	1.8	3	$^\circ C/W$
Steady-State				

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	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$		0.002	1 5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 12\text{V}$			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	1.7	3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=10\text{V}$, $V_{DS}=5\text{V}$	100			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$, $I_D=20\text{A}$		3.2	4	m Ω
		$T_J=125^{\circ}\text{C}$		5	6	
		$V_{GS}=4.5\text{V}$, $I_D=20\text{A}$		3.8	5	
g_{FS}	Forward Transconductance	$V_{DS}=5\text{V}$, $I_D=20\text{A}$		107		S
V_{SD}	Diode Forward Voltage	$I_S=1\text{A}$, $V_{GS}=0\text{V}$		0.72	1	V
I_S	Maximum Body-Diode Continuous Current				50	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=15\text{V}$, $f=1\text{MHz}$		5750	7500	pF
C_{oss}	Output Capacitance			640		pF
C_{rss}	Reverse Transfer Capacitance			370		pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$		0.4	1	Ω
SWITCHING PARAMETERS						
$Q_g(4.5\text{V})$	Total Gate Charge	$V_{GS}=4.5\text{V}$, $V_{DS}=15\text{V}$, $I_D=20\text{A}$		41		nC
Q_{gs}	Gate Source Charge			18		nC
Q_{gd}	Gate Drain Charge			10		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=10\text{V}$, $V_{DS}=15\text{V}$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$		13.5	19	ns
t_r	Turn-On Rise Time			14	20	ns
$t_{D(off)}$	Turn-Off DelayTime			58	80	ns
t_f	Turn-Off Fall Time			13.5	19	ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		39	55	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		39		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ 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 $T_{J(MAX)}=175^{\circ}\text{C}$, 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 $T_{J(MAX)}=175^{\circ}\text{C}$.

D: The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

E: The static characteristics in Figures 1 to 6 are obtained using $<300 \mu\text{s}$ 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 $T_{J(MAX)}=175^{\circ}\text{C}$.

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

H: These tests are performed with the device mounted on 1 in² 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.

Rev0:Nov 2005

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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

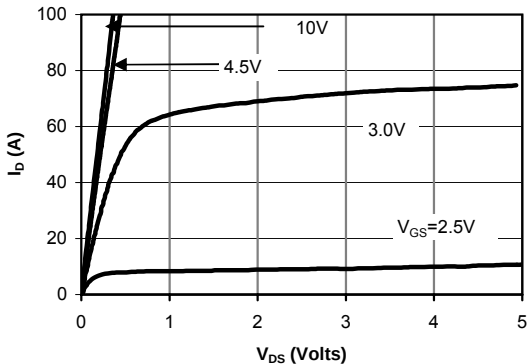


Fig 1: On-Region Characteristics

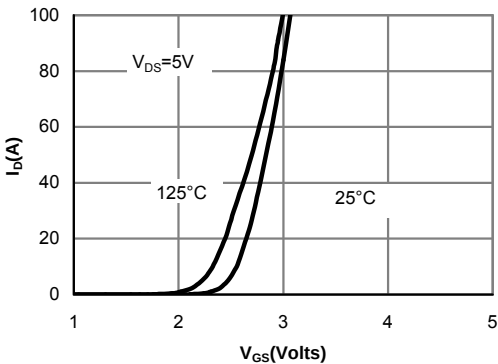


Figure 2: Transfer Characteristics

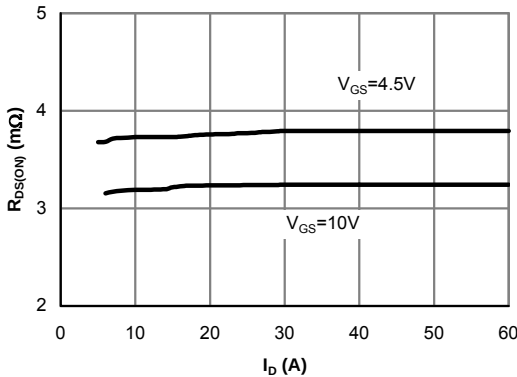


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

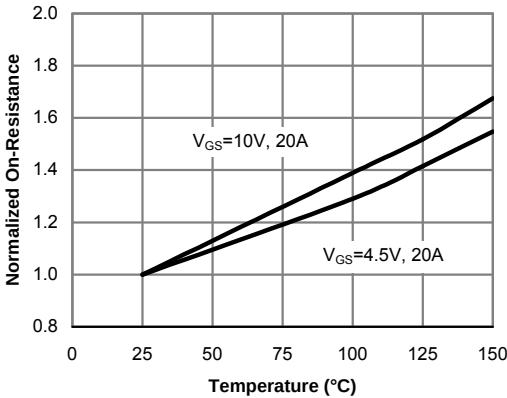


Figure 4: On-Resistance vs. Junction Temperature

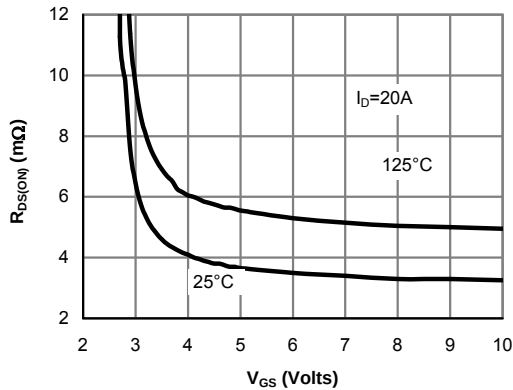


Figure 5: On-Resistance vs. Gate-Source Voltage

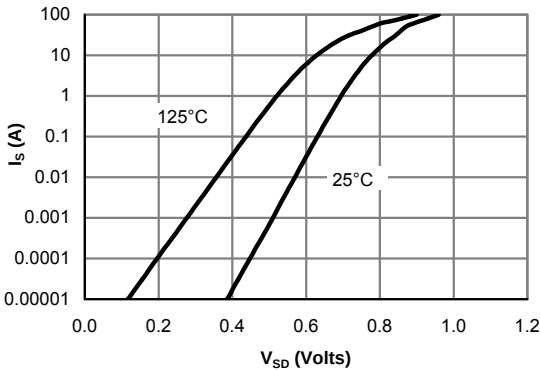


Figure 6: Body-Diode Characteristics

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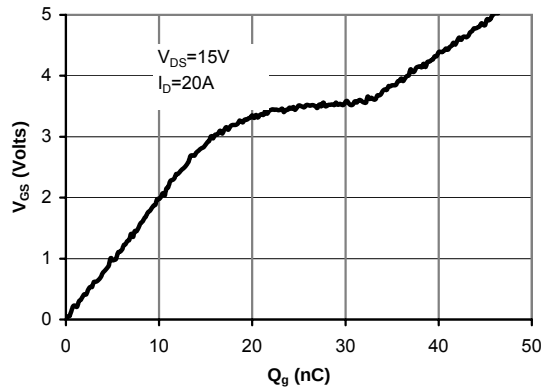


Figure 7: Gate-Charge Characteristics

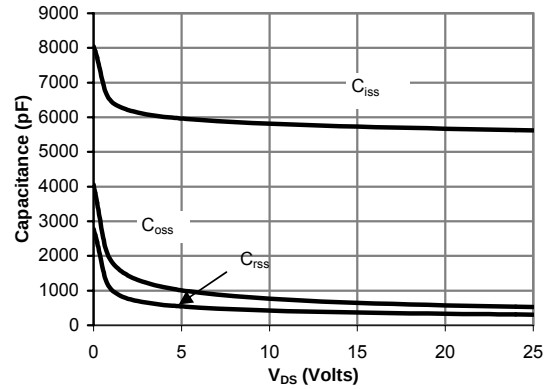


Figure 8: Capacitance Characteristics

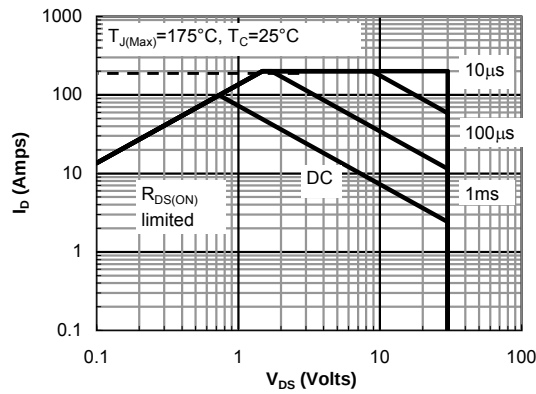


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

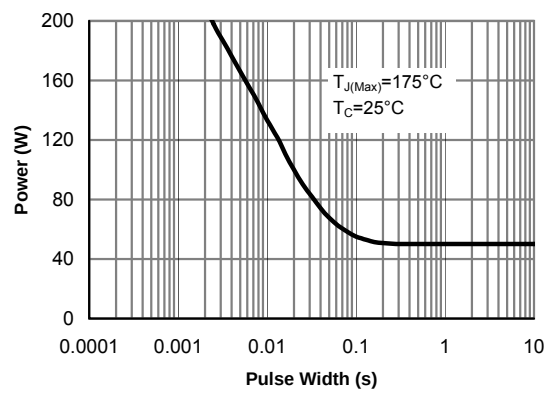


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

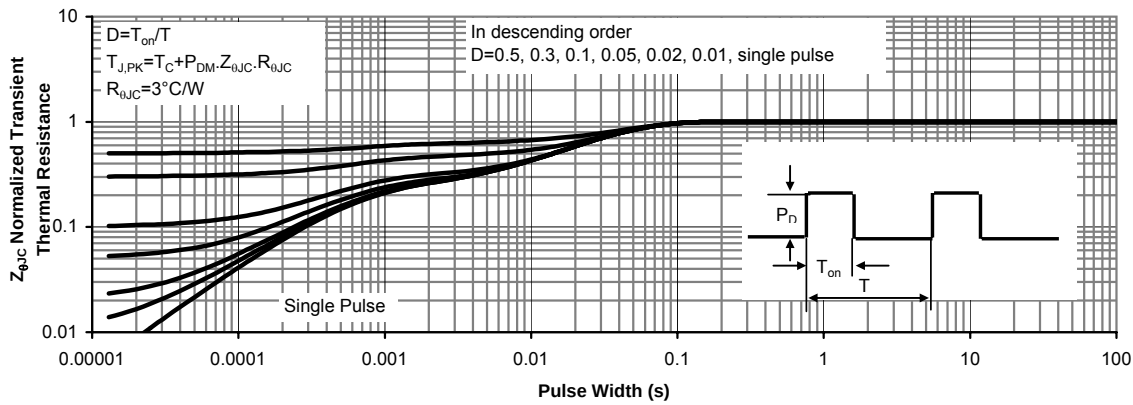


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

