

AOD442/AOI442

60V N-Channel MOSFET

General Description

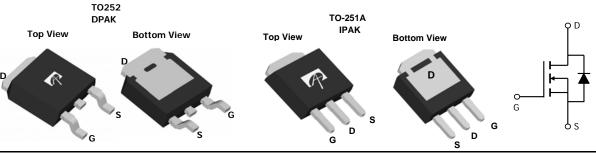
The AOD442/AOI442 used advanced trench technology to provide excellent $R_{\text{DS(ON)}}$ and low gate charge. Those devices are suitable for use as a load switch or in PWM applications.

Product Summary

 $\begin{array}{ll} V_{DS} & 60V \\ I_{D} \; (at \, V_{GS} \! = \! 10V) & 37A \\ R_{DS(ON)} \; (at \, V_{GS} \! = \! 10V) & < 20m\Omega \\ R_{DS(ON)} \; (at \, V_{GS} \! = \! 4.5V) & < 25m\Omega \end{array}$

100% UIS Tested 100% R_g Tested





Absolute Maximum	Ratings T _A =25°C unles	s otherwise noted			
		Symbol	Maximum	Units	
Drain-Source Voltage		V _{DS}	60	V	
Gate-Source Voltage		V_{GS}	±20	V	
Continuous Drain	T _C =25°C	1	37		
Current ^G	T _C =100°C	'D	26	А	
Pulsed Drain Current ^c		I _{DM}	60		
Continuous Drain Current	T _A =25°C	1	7	А	
	T _A =70°C	IDSM	5	^	
Avalanche Current ^C		I _{AS} , I _{AR}	30	A	
Avalanche energy L=0.1mH ^C		E _{AS} , E _{AR}	45	mJ	
	T _C =25°C	P _D	60	W	
Power Dissipation ^B	T _C =100°C	- D	30	VV	
	T _A =25°C	D	2.1	W	
Power Dissipation A	T _A =70°C	P _{DSM}	1.3	VV	
Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 175	°C	

Thermal Characteristics									
Parameter	Symbol	Тур	Max	Units					
Maximum Junction-to-Ambient A	t ≤ 10s	$R_{\scriptscriptstyle{ hetaJA}}$	17.4	25	°C/W				
Maximum Junction-to-Ambient AD	Steady-State	Т⊕ЈА	51	60	°C/W				
Maximum Junction-to-Case Steady-State		$R_{\theta JC}$	1.8	2.5	°C/W				



Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Parameter Conditions		Тур	Max	Units				
STATIC PARAMETERS										
BV _{DSS}	Drain-Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	60			V				
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =48V, V _{GS} =0V			1	μА				
	Zero Gate Voltage Brain Garrent	T _J =55°(5	μΑ				
I_{GSS}	Gate-Body leakage current	V_{DS} =0V, V_{GS} = ±20V			100	nA				
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS} I_{D}=250\mu A$	1.6	2.1	2.7	>				
$I_{D(ON)}$	On state drain current	V_{GS} =10V, V_{DS} =5V	60			Α				
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A		16	20	mΩ				
		T _J =125°0		31	37	11122				
		V_{GS} =4.5V, I_D =20A		20	25	mΩ				
g _{FS}	Forward Transconductance	V_{DS} =5V, I_D =20A		65		S				
V_{SD}	Diode Forward Voltage	I _S =1A,V _{GS} =0V		0.7	1	V				
I _S	Maximum Body-Diode Continuous Curre			32	Α					
DYNAMIC	PARAMETERS									
C _{iss}	Input Capacitance		1535	1920	2300	pF				
C _{oss}	Output Capacitance	V_{GS} =0V, V_{DS} =30V, f=1MHz	108	155	200	pF				
C_{rss}	Reverse Transfer Capacitance		70	116	165	pF				
R_g	Gate resistance	V_{GS} =0V, V_{DS} =0V, f=1MHz	0.3	0.65	0.8	Ω				
SWITCHIN	NG PARAMETERS									
Q _g (10V)	Total Gate Charge		38	47.6	68	nC				
Q _g (4.5V)	Total Gate Charge	V _{GS} =10V, V _{DS} =30V, I _D =20A	20	24.2	30	nC				
Q_{gs}	Gate Source Charge	V _{GS} -10V, V _{DS} -30V, I _D -20A	4.8	6	7	nC				
Q_{gd}	Gate Drain Charge	1	8.5	14.4	20	nC				
$t_{D(on)}$	Turn-On DelayTime			7.4		ns				
t _r	Turn-On Rise Time	V_{GS} =10V, V_{DS} =30V, R_L =1.5 Ω ,		5.1		ns				
$t_{D(off)}$	Turn-Off DelayTime	R_{GEN} =3 Ω		28.2		ns				
t _f	Turn-Off Fall Time			5.5		ns				
t _{rr}	Body Diode Reverse Recovery Time	I _F =20A, dI/dt=100A/μs		34	41	ns				
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =20A, dI/dt=100A/μs		46		nC				

A. The value of R_{0JA} is measured with the device mounted on 1in^2 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 $_{0JA}$ 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.

THIS PRODUCT HAS BEEN DESIGNED AND QUALIFIED FOR THE CONSUMER MARKET. APPLICATIONS OR USES AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS ARE NOT AUTHORIZED. AOS DOES NOT ASSUME ANY LIABILITY ARISING OUT OF SUCH APPLICATIONS OR USES OF ITS PRODUCTS. AOS RESERVES THE RIGHT TO IMPROVE PRODUCT DESIGN, FUNCTIONS AND RELIABILITY WITHOUT NOTICE.

Rev 0 : Aug 2009 www.aosmd.com Page 2 of 6

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. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.

D. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to case $R_{\theta JC}$ 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 curves are based on the junction-to-case thermal impedence which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$ =175°C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

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°C.



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

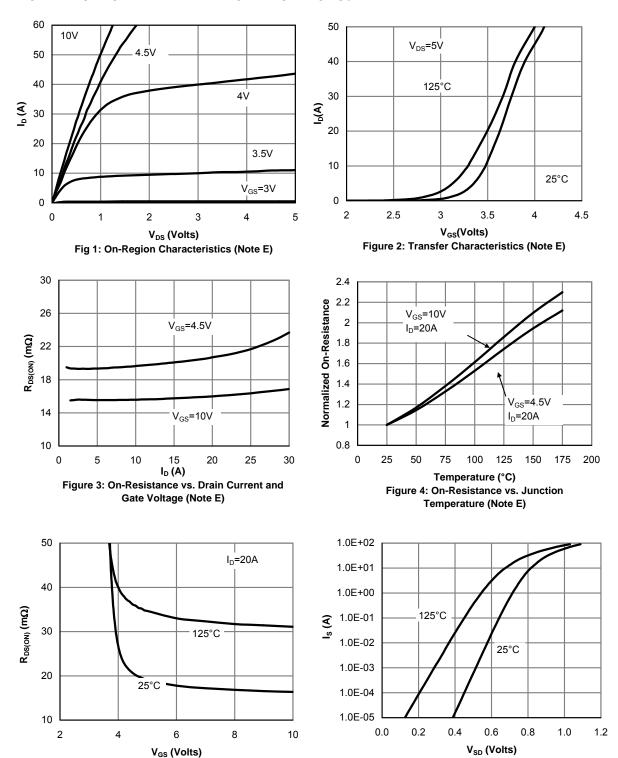


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

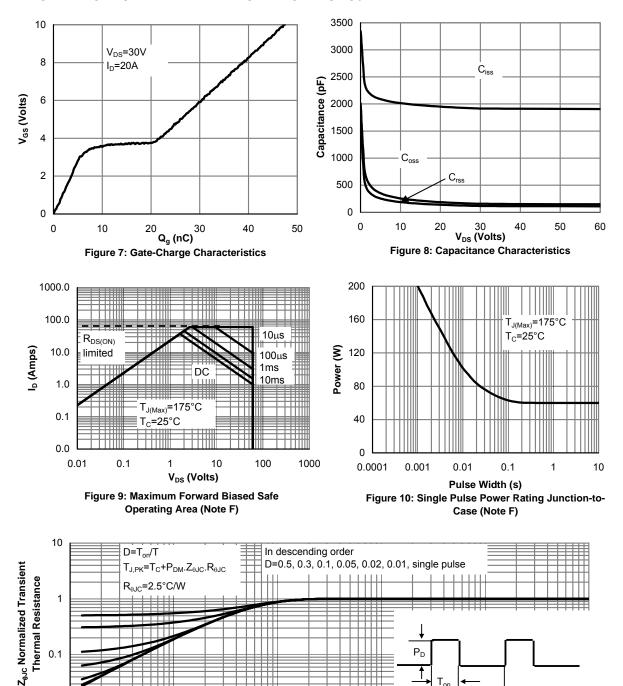


TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Single Pulse

0.0001

0.00001



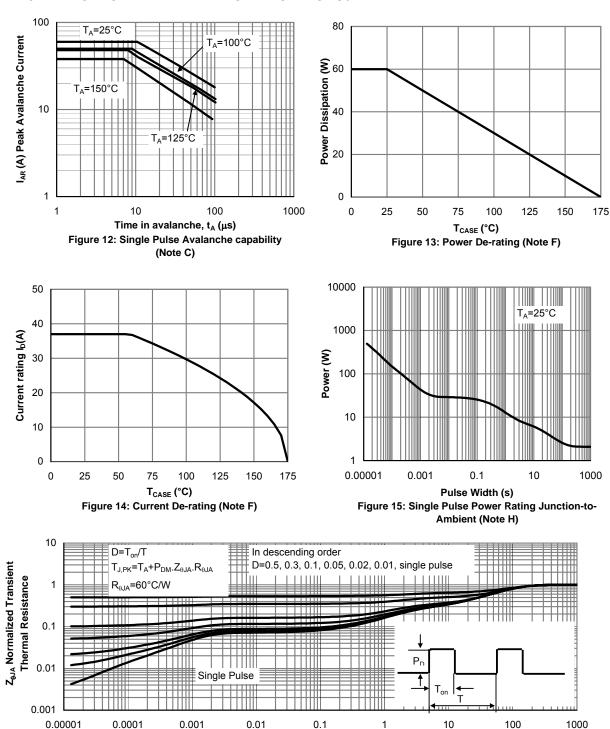
Pulse Width (s)
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

0.01

0.001



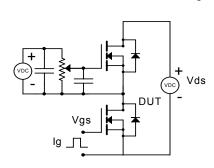
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

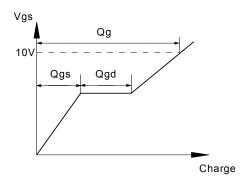


Pulse Width (s)
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

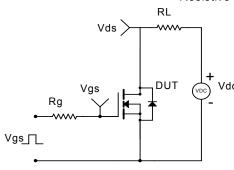


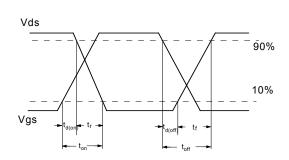
Gate Charge Test Circuit & Waveform



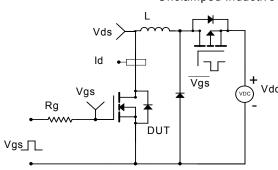


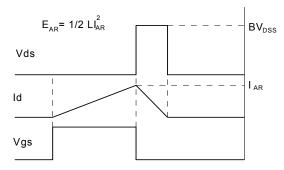
Resistive Switching Test Circuit & Waveforms





Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms

