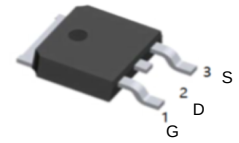


General Description

The AOD403 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and low gate resistance. With the excellent thermal resistance of the TO-252 package, this device is well suited for high current load applications.



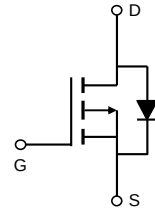
TO-252

Features

V_{DS} (V) = -30V

$R_{DS(ON)} < 8m\Omega$ ($V_{GS} = -10V$)

$R_{DS(ON)} < 6.2m\Omega$ ($V_{GS} = -20V$)



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}	±25	V
Continuous Drain Current ^G	T _C =25℃	I _D	-70	A
	T _C =100℃		-55	
Pulsed Drain Current ^C		I _{DM}	-200	
Continuous Drain Current	T _A =25℃	I _{DSM}	-15	A
	T _A =70℃		-12	
Avalanche Current ^C		I _{AS} , I _{AR}	-50	A
Avalanche energy L=0.1mH ^C		E _{AS} , E _{AR}	125	mJ
Power Dissipation ^B	T _C =25℃	P _D	90	W
	T _C =100℃		45	
Power Dissipation ^A	T _A =25℃	P _{DSM}	2.5	W
	T _A =70℃		1.6	
Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 175	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	16	20	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{A D}		41	50	$^\circ\text{C/W}$
Maximum Junction-to-Case	$R_{\theta JC}$	0.9	1.6	$^\circ\text{C/W}$

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	$V_{DS}=-30\text{V}$, $V_{GS}=0\text{V}$ $T_J=55^\circ\text{C}$			-1 -5	μA
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}$, $V_{GS}=\pm 25\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.5	-2.5	-3.5	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$	-200			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-20\text{V}$, $I_D=-20\text{A}$ TO252		5.1	6.2	$\text{m}\Omega$
		$V_{GS}=-10\text{V}$, $I_D=-20\text{A}$ TO252		6.2	8	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}$, $I_D=-20\text{A}$		42		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current				-70	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}$, $V_{DS}=-15\text{V}$, $f=1\text{MHz}$	2310	2890	3500	pF
C_{oss}	Output Capacitance		410	585	760	pF
C_{rss}	Reverse Transfer Capacitance		280	470	660	pF
R_g	Gate resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	1.9	3.8	5.7	Ω
SWITCHING PARAMETERS						
Q_{gs}	Gate Source Charge	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $I_D=-20\text{A}$	10	12	14	nC
Q_{gd}	Gate Drain Charge		10	16	22	nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}$, $V_{DS}=-15\text{V}$, $R_L=0.75\Omega$, $R_{GEN}=3\Omega$		16		ns
t_r	Turn-On Rise Time			12		ns
$t_{D(off)}$	Turn-Off DelayTime			45		ns
t_f	Turn-Off Fall Time			22		ns
t_{rr}	Body Diode Reverse Recovery Time	$I_F=-20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$	14	18	22	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-20\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$	9	11	13	nC

A. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² 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 impedance, 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 $T_{J(MAX)}=175^\circ\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^\circ\text{C}$.

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 $T_{J(MAX)}=175^\circ\text{C}$. 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 $T_A=25^\circ\text{C}$.

Typical Characteristics

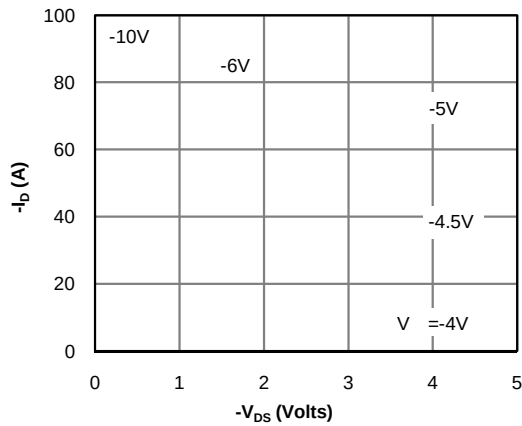


Fig 1: On-Region Characteristics (Note E)

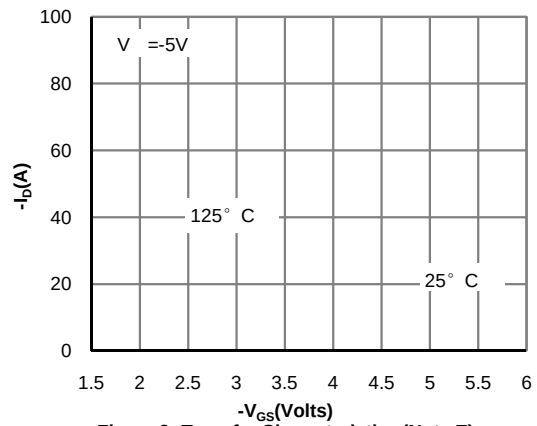


Figure 2: Transfer Characteristics (Note E)

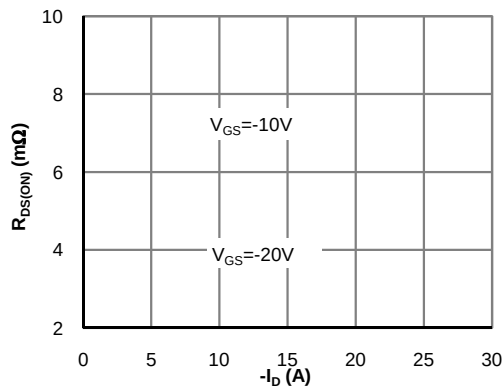


Figure 3: On-Resistance vs. Drain Current and

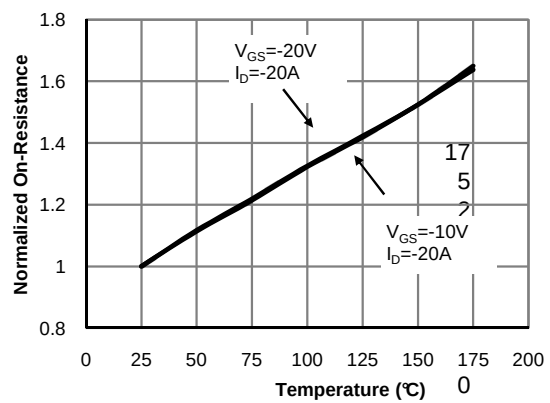


Figure 4: On-Resistance vs. Junction Temperature

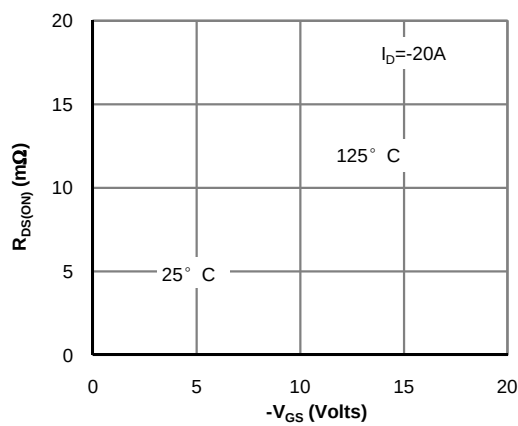


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

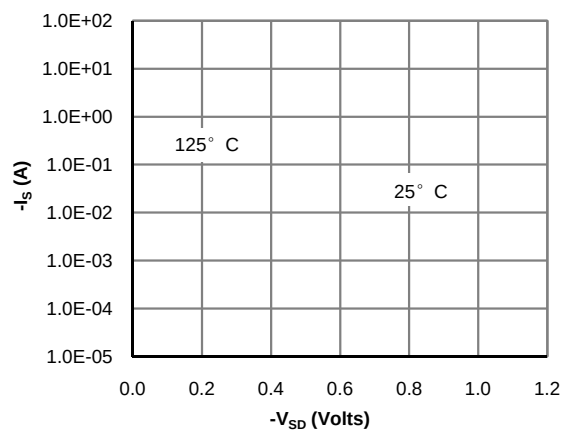


Figure 6: Body-Diode Characteristics (Note E)

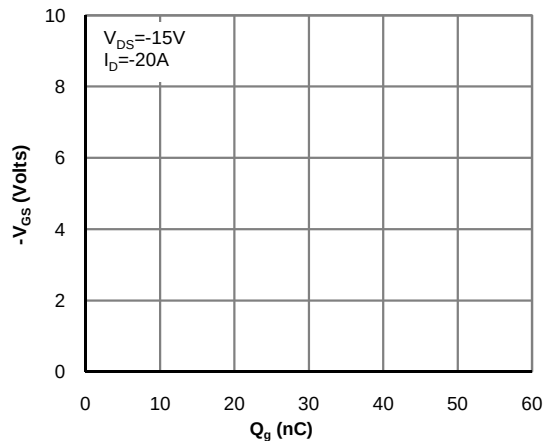


Figure 7: Gate-Charge Characteristics

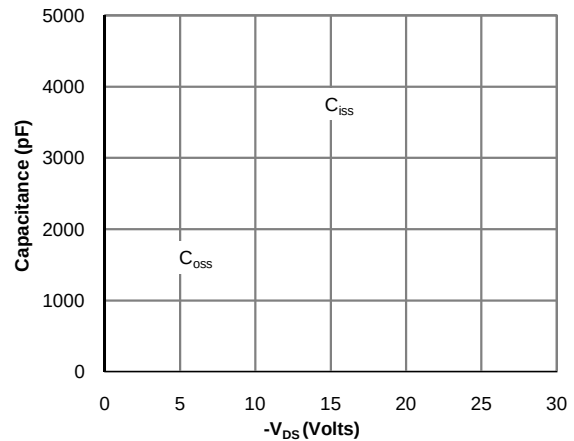
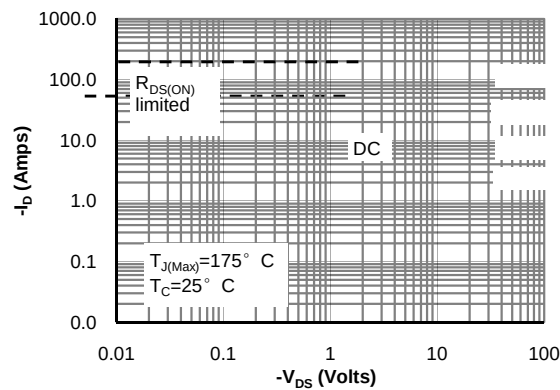
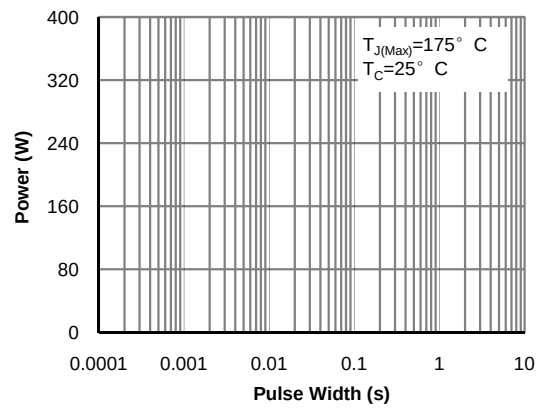


Figure 8: Capacitance Characteristics



Safe Operating Area (Note F)



Case (Note F)

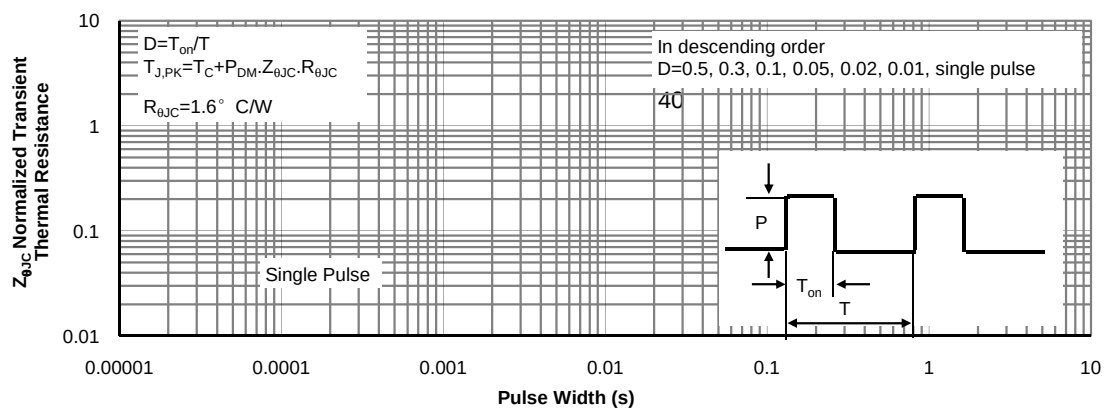
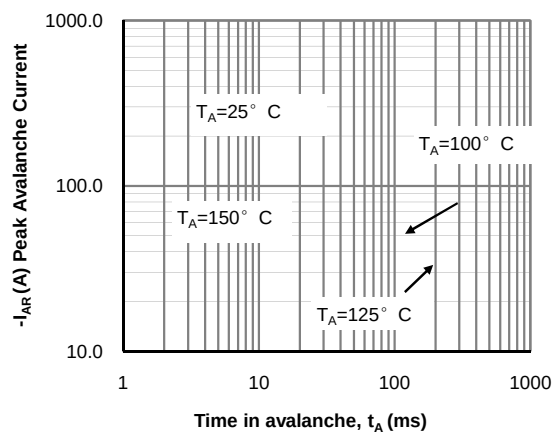


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



(Note C)

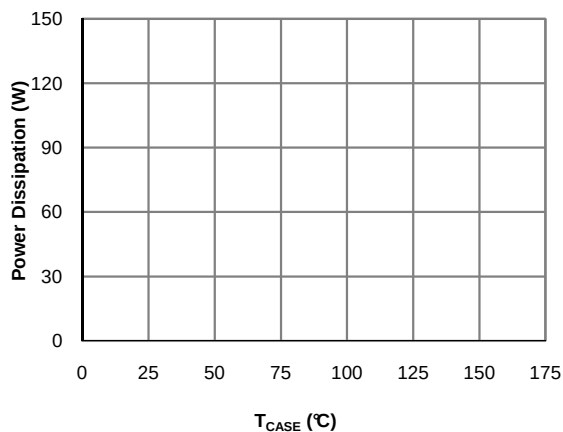


Figure 13: Power De-rating (Note F)

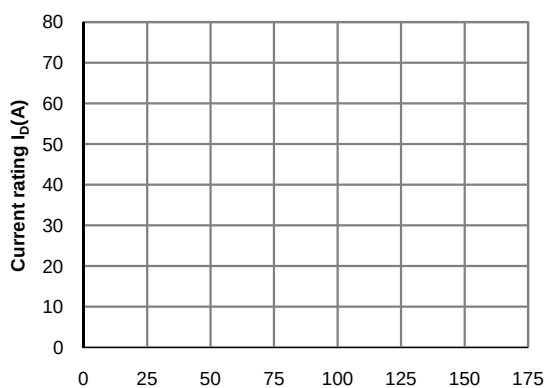
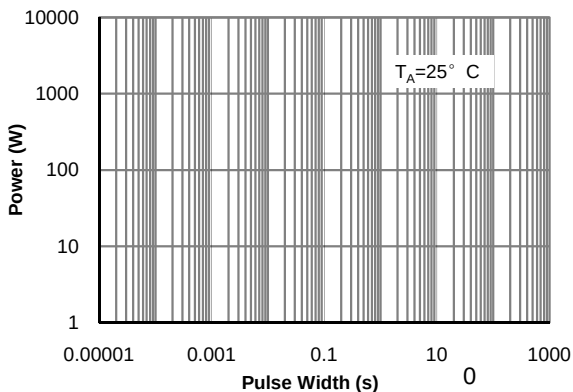


Figure 14: Current De-rating (Note F)



Ambient (Note H)

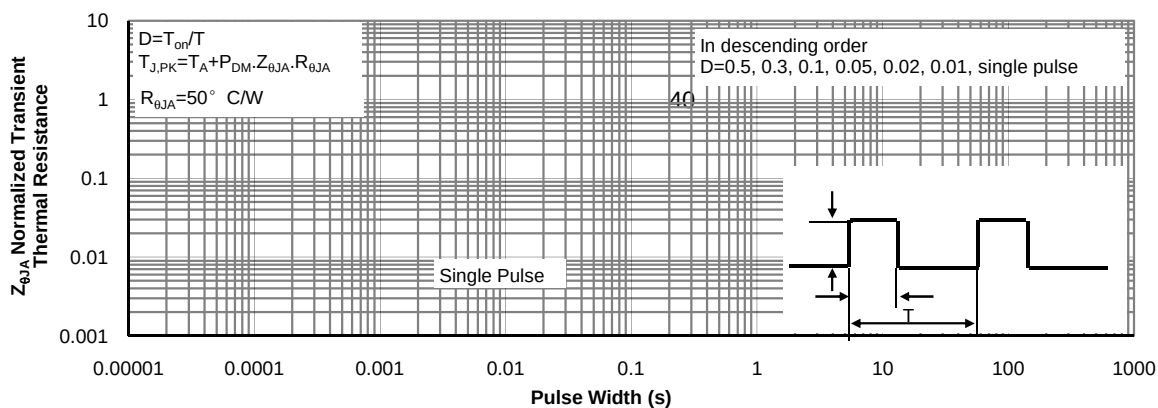
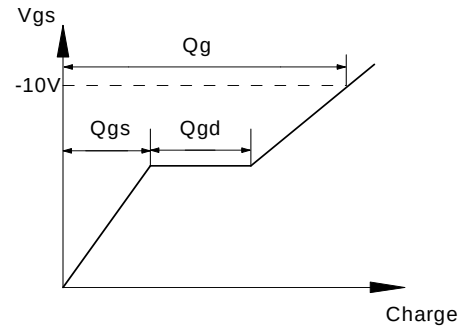
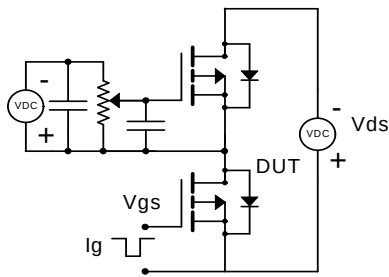
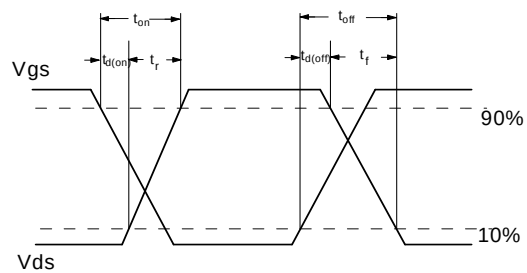
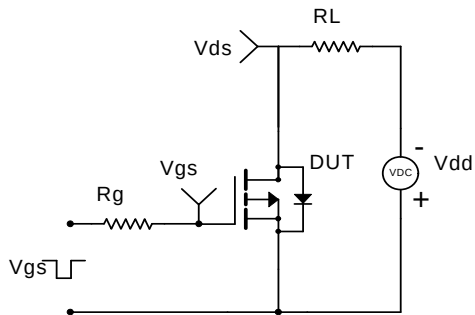


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

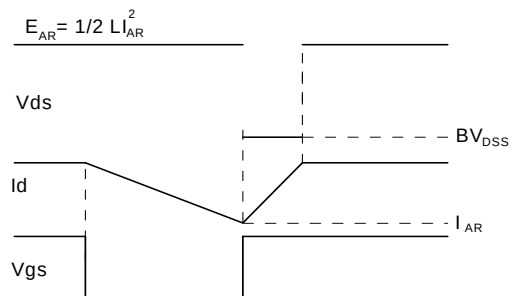
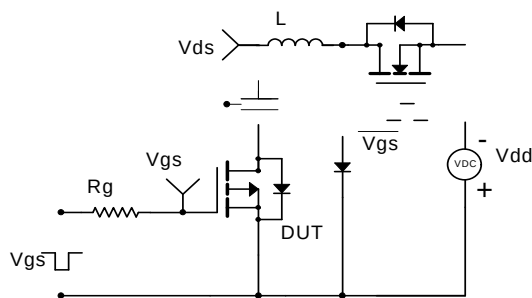
Gate Charge Test Circuit & Waveform



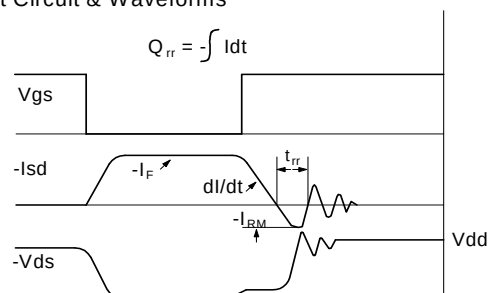
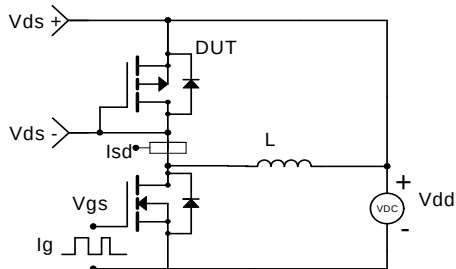
Resistive Switching Test Circuit & Waveforms



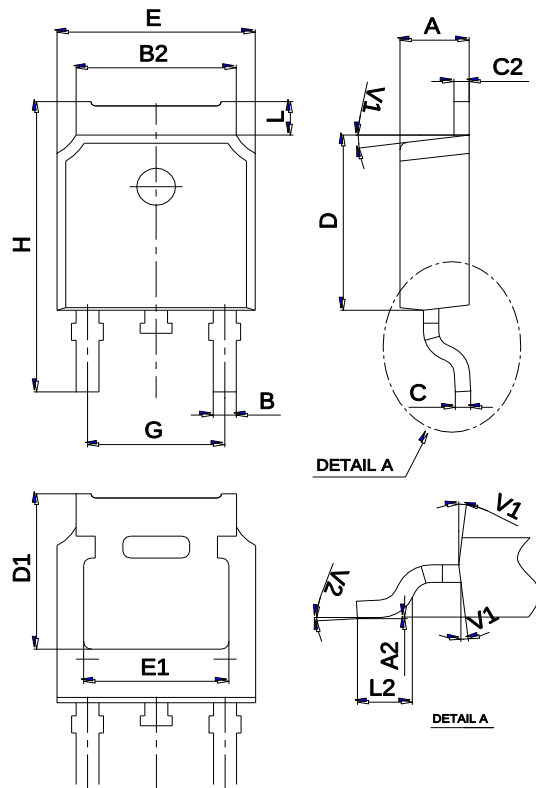
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

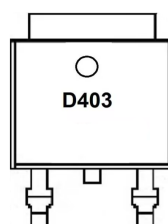


Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
AOD403	TO-252	2500	Tape and reel