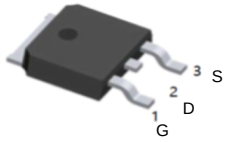
-30V P-Channel MOSFET

General Description

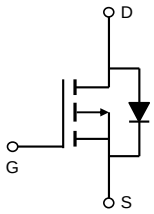
The AOD403 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and low gate resistance. With the excellent thermal resistance of the TO-252 package, this device is well suited for high current load applications.



TO-252

Features

V_{DS} (V) = -30V
$R_{DS(ON)}$ < 8mΩ (V_{GS} = -10V)
$R_{DS(ON)}$ < 6.2mΩ (V_{GS} = -20V)



Absolute Maximum Ratings T_A=25℃ 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]	t ≤ 10s	$R_{\theta JA}$	16	20	℃/W
Maximum Junction-to-Ambient [A D]	Steady-State		41	50	℃/W
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	0.9	1.6	℃/W

Electrical Characteristics (T_J=25℃ 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}=-30V, V_{GS}=0V			-1	μA
		T_J=55℃			-5	
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	-1.5	-2.5	-3.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V	-200			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-20V, I_D=-20A TO252		5.1	6.2	mΩ
		V_{GS}=-10V, I_D=-20A TO252		6.2	8	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-20A		42		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current				-70	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz	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}=0V, V_{DS}=0V, f=1MHz	1.9	3.8	5.7	Ω
SWITCHING PARAMETERS						
$_g$		V_{GS}=-10V, V_{DS}=-15V, I_D=-20A				
Q_{gs}	Gate Source Charge		10	12	14	nC
Q_{gd}	Gate Drain Charge		10	16	22	nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=0.75Ω, R_{GEN}=3Ω		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=-20A, dI/dt=100A/μs	14	18	22	ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-20A, dI/dt=100A/μs	9	11	13	nC

A. The value of $R_{\theta JA}$ 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 $R_{\theta JA}$ 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° 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 <300μs 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 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

Typical Characteristics

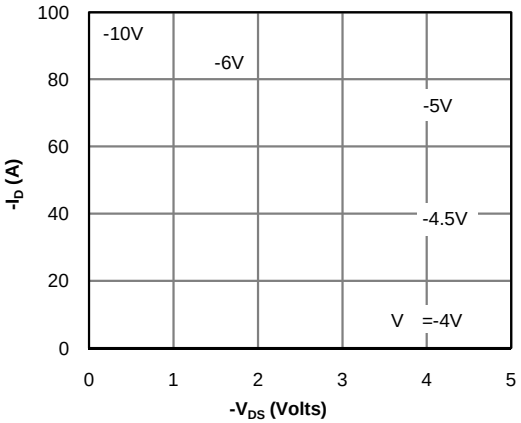


Fig 1: On-Region Characteristics (Note E)

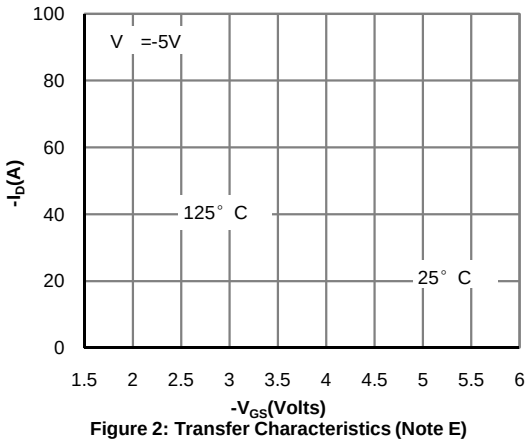


Figure 2: Transfer Characteristics (Note E)

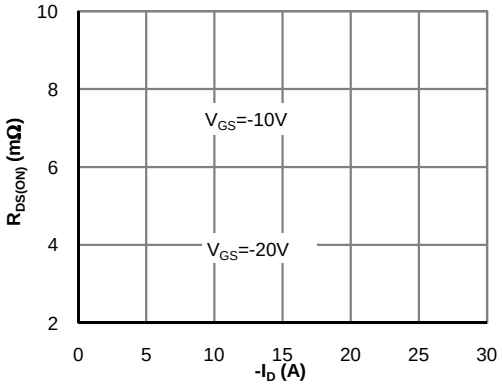


Figure 3: On-Resistance vs. Drain Current and

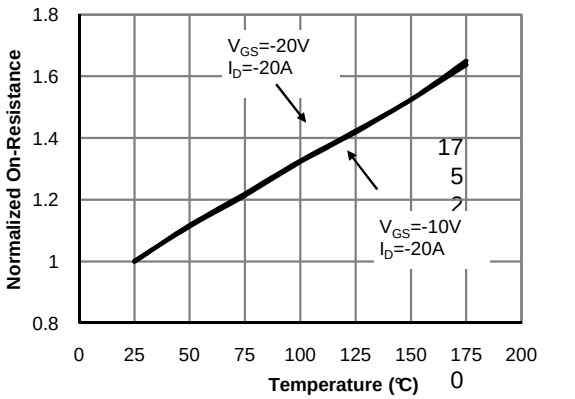


Figure 4: On-Resistance vs. Junction Temperature

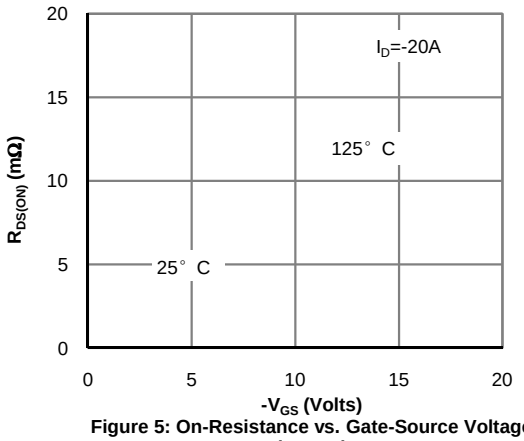


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

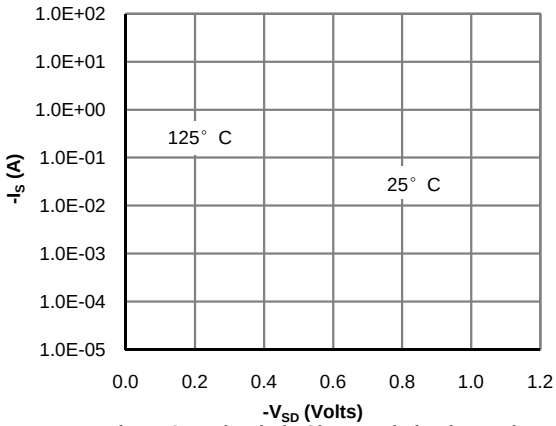


Figure 6: Body-Diode Characteristics (Note E)

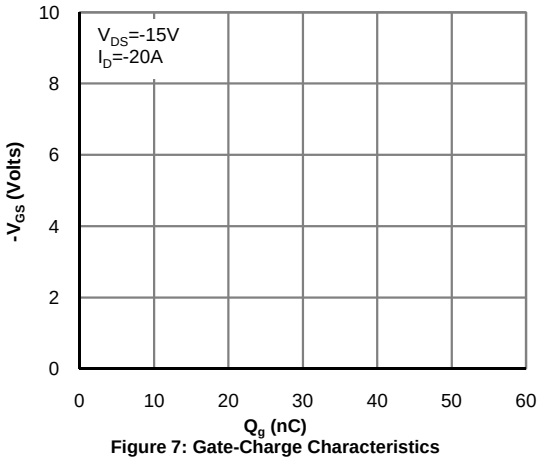


Figure 7: Gate-Charge Characteristics

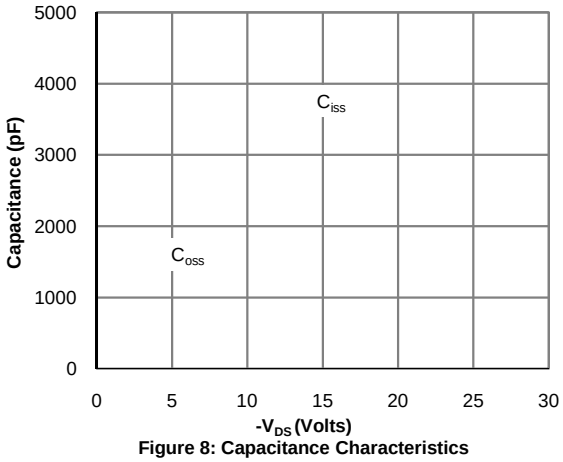
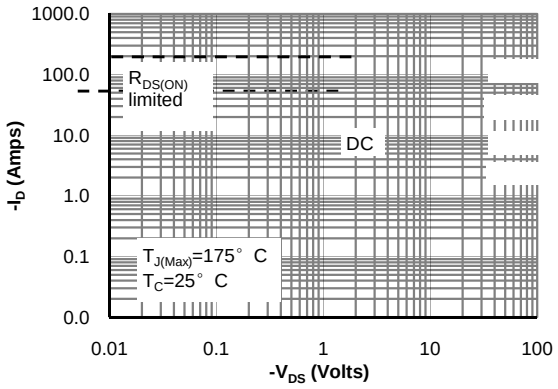
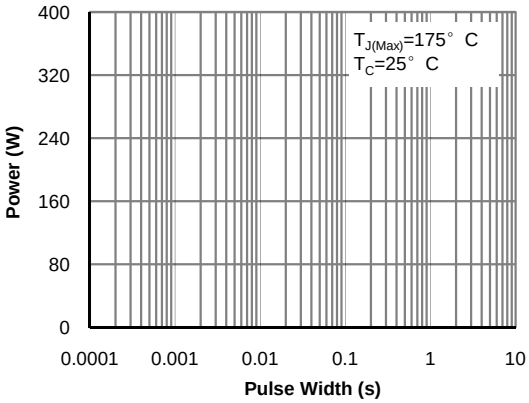


Figure 8: Capacitance Characteristics



Safe Operating Area (Note F)



Case (Note F)

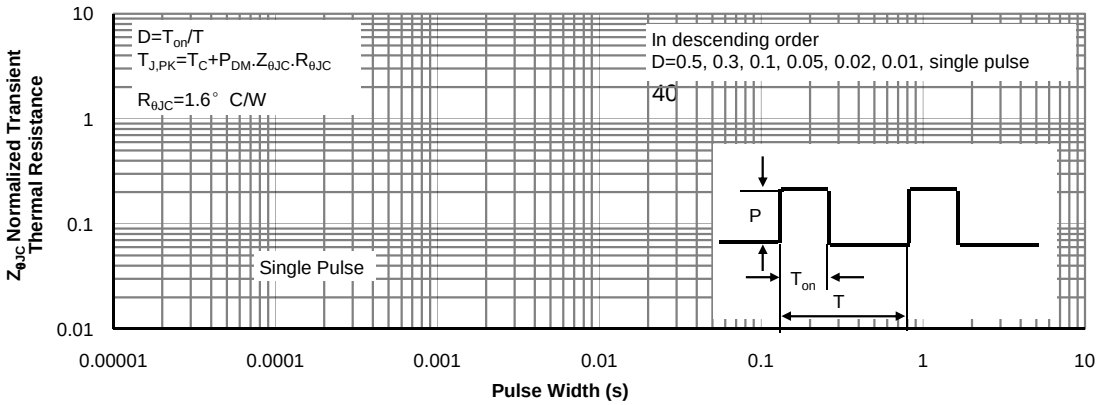
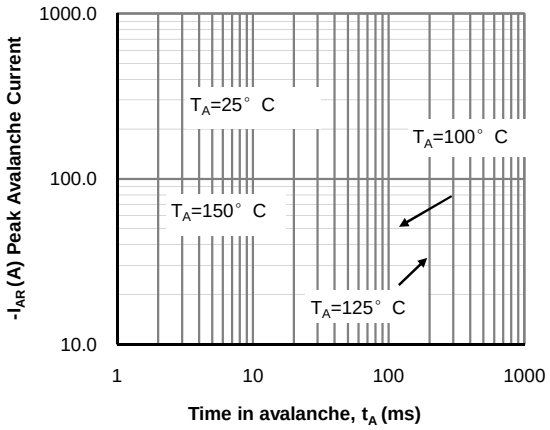


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



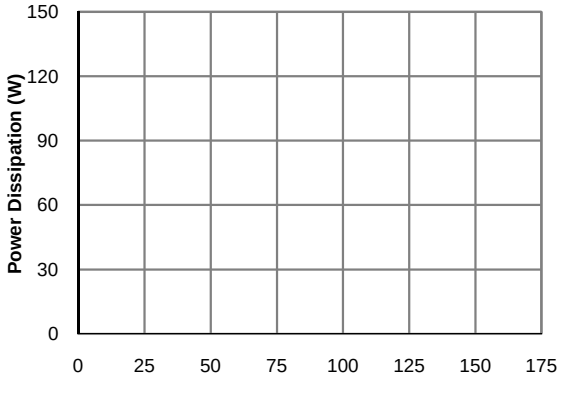


Figure 13: Power De-rating (Note F)

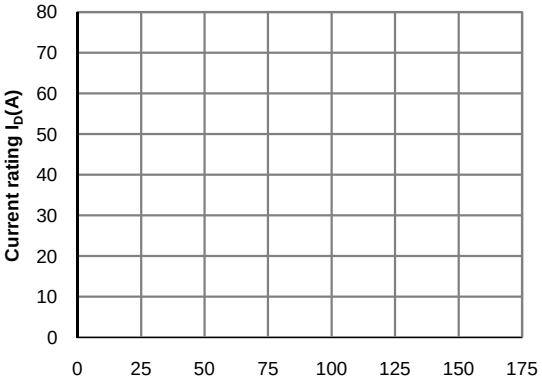
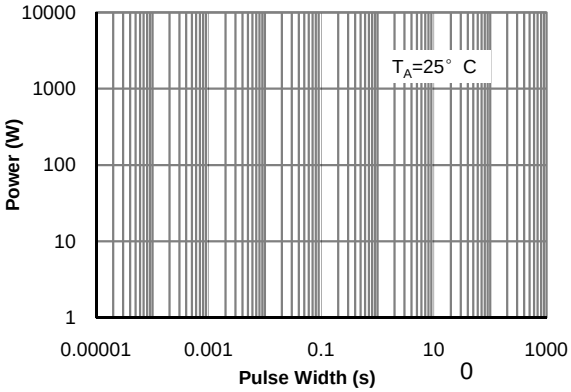


Figure 14: Current De-rating (Note F)



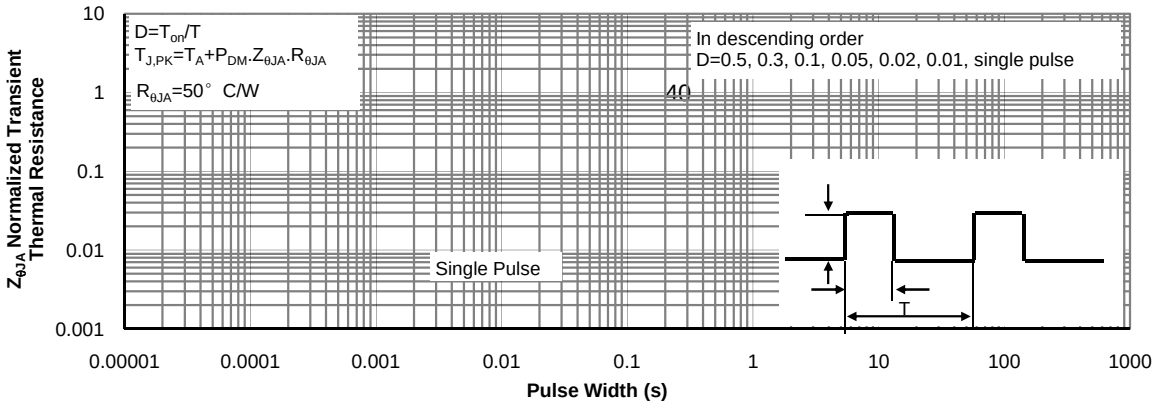
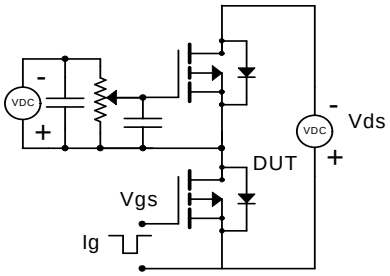
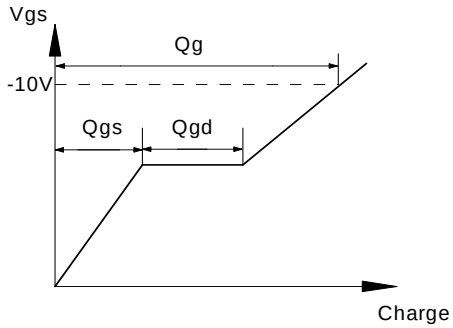


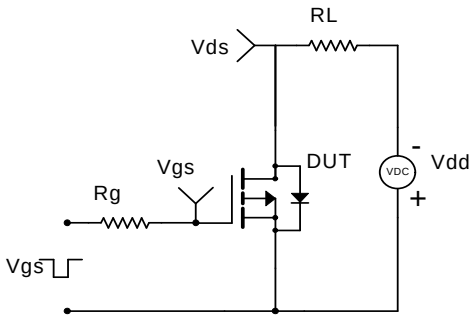
Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

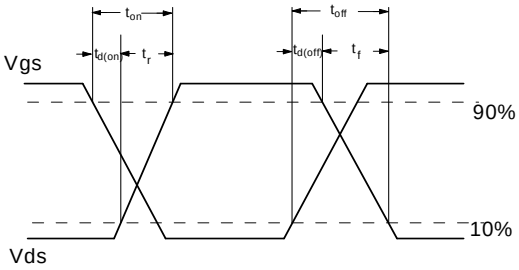
Gate Charge Test Circuit & Waveform



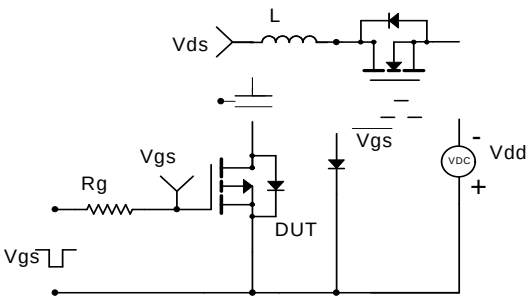


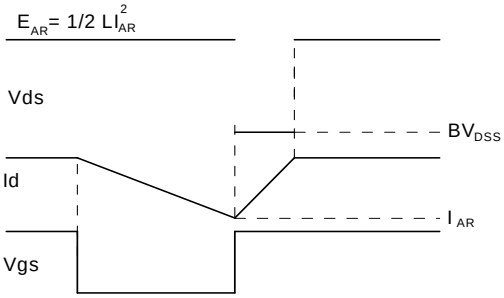
Resistive Switching Test Circuit & Waveforms



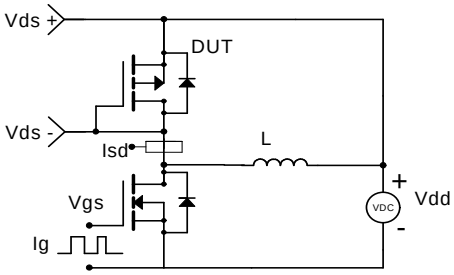


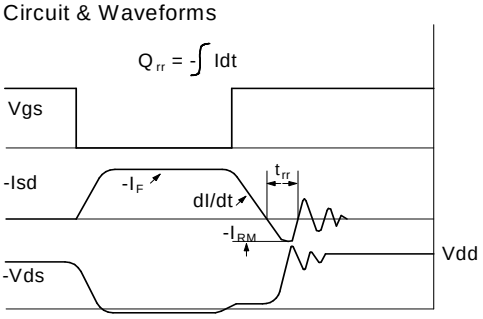
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



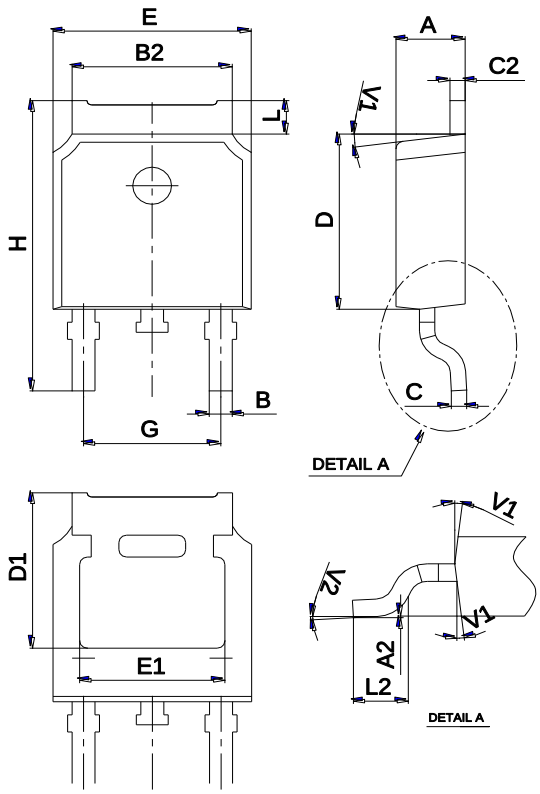


Diode Recovery Test Circuit & Waveforms



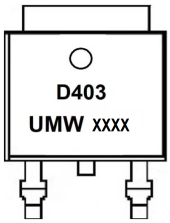


Package Mechanical Data TO-252



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
UMW AOD403	TO-252	2500	Tape and reel

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