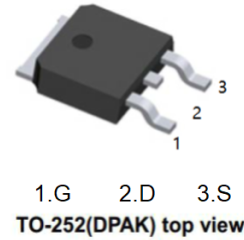


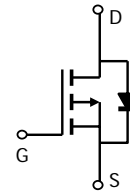
General Description

The AOD407 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.



Features

- V_{DS} (V) = -60V
- I_D = -12A (V_{GS} = -10V)
- $R_{DS(ON)}$ < 115m Ω (V_{GS} = -10V)
- $R_{DS(ON)}$ < 150m Ω (V_{GS} = -4.5V)



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

Parameter	Symbol	Maximum	Units		
Drain-Source Voltage	V_{DS}	-60	V		
Gate-Source Voltage	V_{GS}	± 20	V		
Continuous Drain Current ^G	I_D	$T_C = 25^\circ\text{C}$	-12		
		$T_C = 100^\circ\text{C}$	-10		
Pulsed Drain Current ^C	I_{DM}	-30	A		
Avalanche Current ^C	I_{AR}	-12	A		
Repetitive avalanche energy $L=0.1\text{mH}$ ^C	E_{AR}	23	mJ		
Power Dissipation ^B	P_D	$T_C = 25^\circ\text{C}$	50		
		$T_C = 100^\circ\text{C}$	25		
Power Dissipation ^A	P_{DSM}	$T_A = 25^\circ\text{C}$	2.5		
		$T_A = 70^\circ\text{C}$	1.6		
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ\text{C}$		
Thermal Characteristics					
Parameter	Symbol	Typ	Ma	Units	
Maximum Junction-to-Ambient	$R_{\theta JA}$	$t \leq 10\text{s}$	16.7	25	$^\circ\text{C}/\text{W}$
		Steady-State	40	50	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case ^B	$R_{\theta JC}$	2.5	3	$^\circ\text{C}/\text{W}$	

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	$I_D=-250\mu\text{A}, V_{GS}=0\text{V}$	-60			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-48\text{V}, V_{GS}=0\text{V}$		-0.003	-1	μA
		$T_J=55^\circ\text{C}$			-5	
I_{GSS}	Gate-Body leakage current	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu\text{A}$	-1.5	-2.1	-3	V
$I_{D(ON)}$	On state drain current	$V_{GS}=-10\text{V}, V_{DS}=-5\text{V}$	-30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10\text{V}, I_D=-12\text{A}$		91	115	$\text{m}\Omega$
		$V_{GS}=-4.5\text{V}, I_D=-8\text{A}$		114	150	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS}=-5\text{V}, I_D=-12\text{A}$		12.8		S
V_{SD}	Diode Forward Voltage	$I_S=-1\text{A}, V_{GS}=0\text{V}$		-0.76	-1	V
I_S	Maximum Body-Diode Continuous Current				-12	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	$V_{GS}=0\text{V}, V_{DS}=-30\text{V}, f=1\text{MHz}$		987	1185	pF
C_{oss}	Output Capacitance			114		pF
C_{rss}	Reverse Transfer Capacitance			46		pF
R_g	Gate resistance	$V_{GS}=0\text{V}, V_{DS}=0\text{V}, f=1\text{MHz}$		7	10	Ω
SWITCHING PARAMETERS						
$Q_g(10\text{V})$	Total Gate Charge (10V)	$V_{GS}=-10\text{V}, V_{DS}=-30\text{V}, I_D=-12\text{A}$		15.8	20	nC
$Q_g(4.5\text{V})$	Total Gate Charge (4.5V)			7.4	9	nC
Q_{gs}	Gate Source Charge			3		nC
Q_{gd}	Gate Drain Charge			3.5		nC
$t_{D(on)}$	Turn-On DelayTime	$V_{GS}=-10\text{V}, V_{DS}=-30\text{V}, R_L=2.5\Omega, R_{GEN}=3\Omega$		9		ns
t_r	Turn-On Rise Time			10		ns
$t_{D(off)}$	Turn-Off DelayTime			25		ns
t_f	Turn-Off Fall Time			11		ns
t_{rr}	Body Diode Reverse Recovery Time		$I_F=-12\text{A}, dI/dt=100\text{A}/\mu\text{s}$		27.5	35
Q_{rr}	Body Diode Reverse Recovery Charge	$I_F=-12\text{A}, dI/dt=100\text{A}/\mu\text{s}$		30		nC

- A: The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 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 in 2 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.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

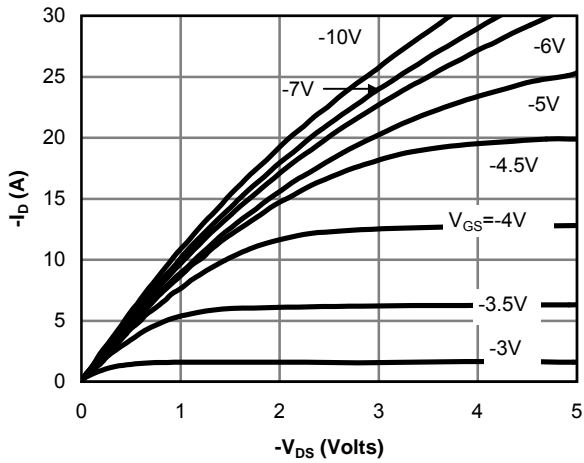


Fig 1: On-Region Characteristics

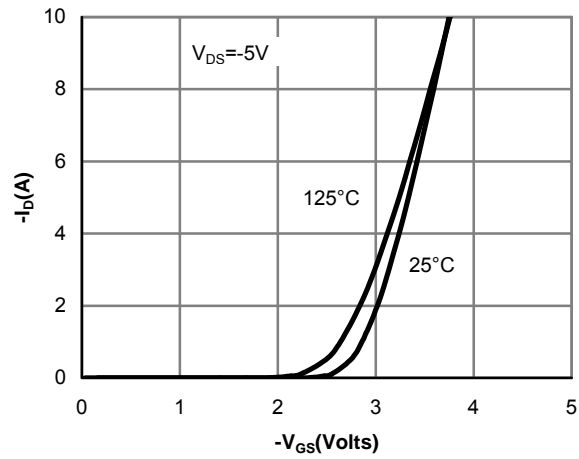


Figure 2: Transfer Characteristics

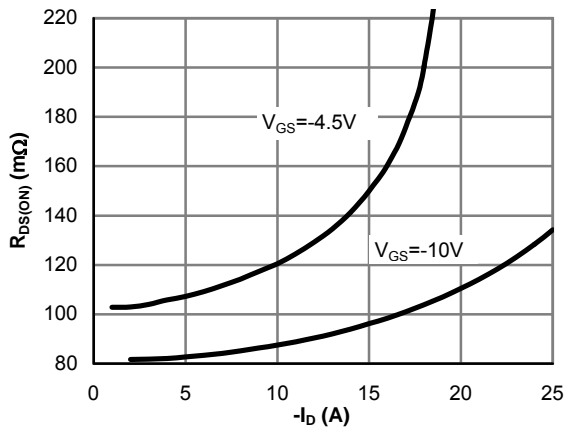


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

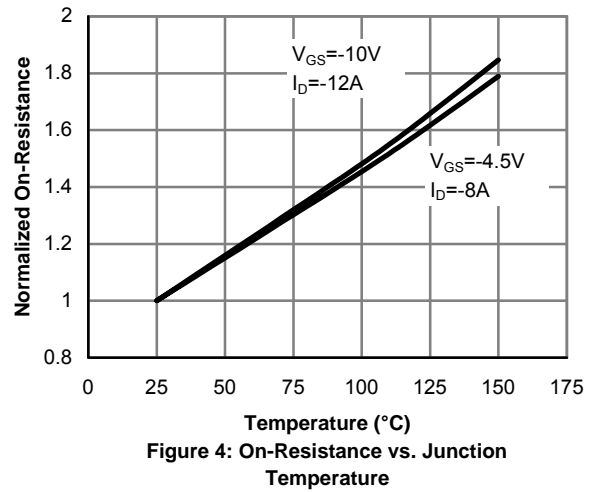


Figure 4: On-Resistance vs. Junction Temperature

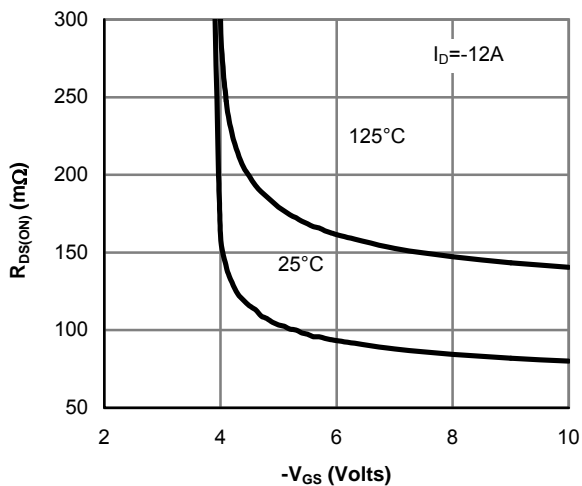


Figure 5: On-Resistance vs. Gate-Source Voltage

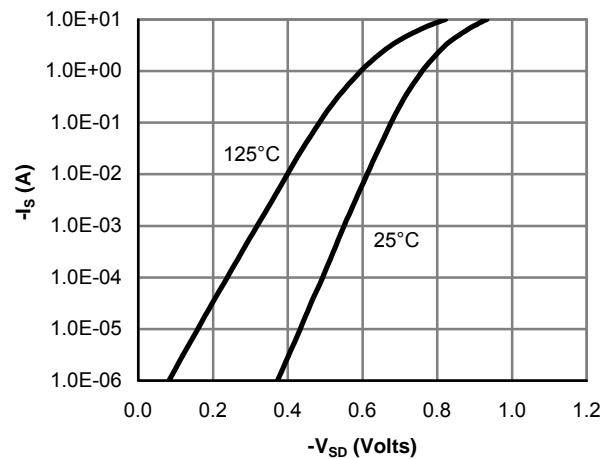


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

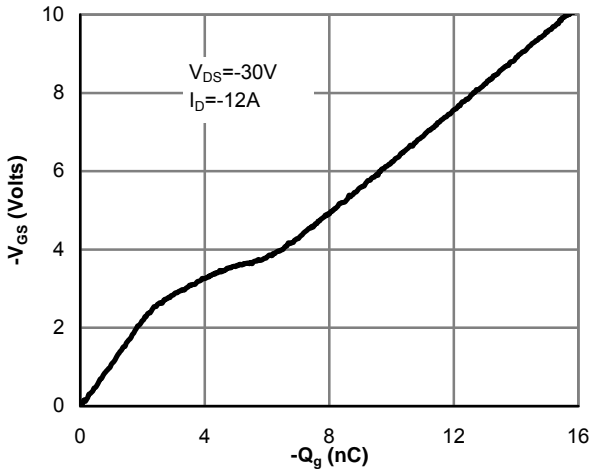


Figure 7: Gate-Charge Characteristics

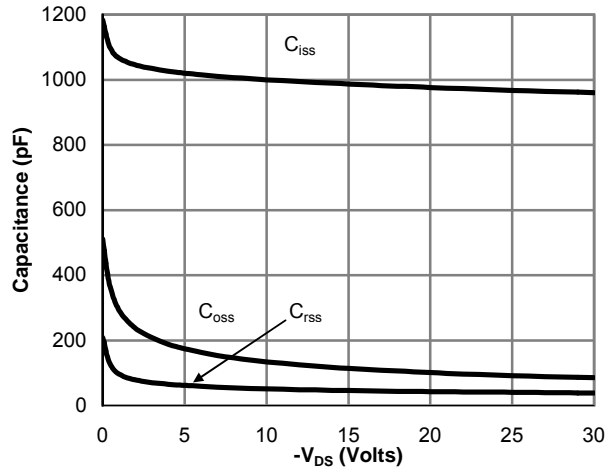


Figure 8: Capacitance Characteristics

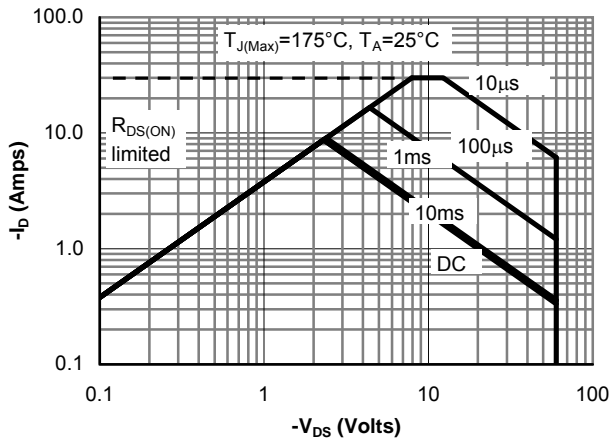


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

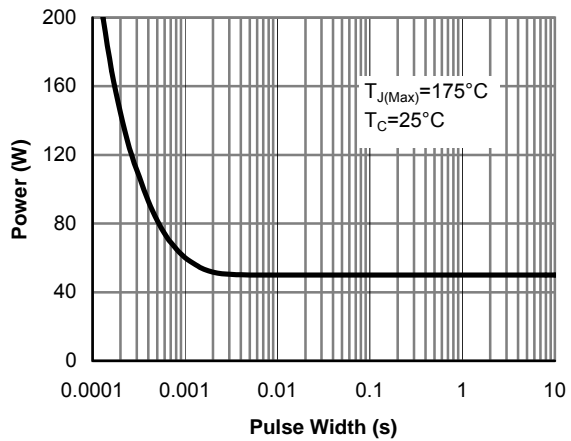


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

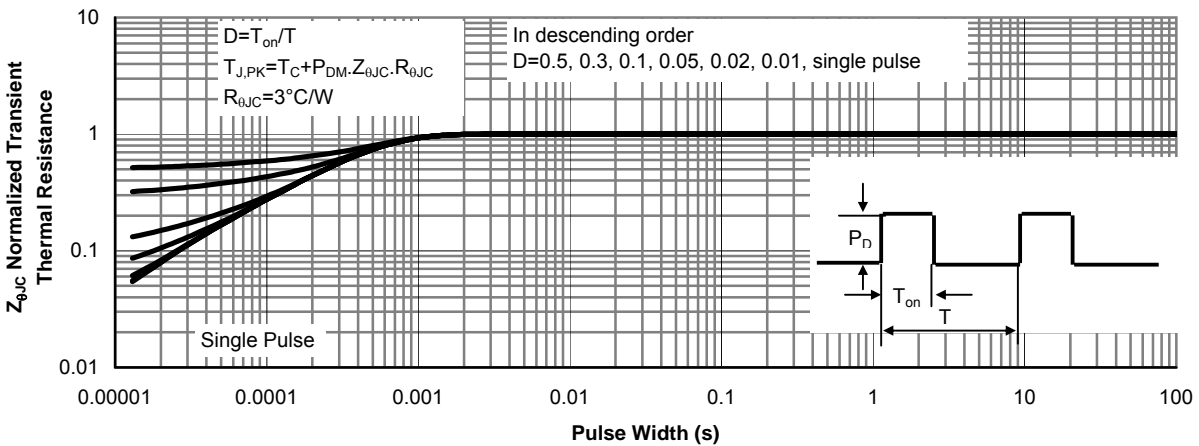


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

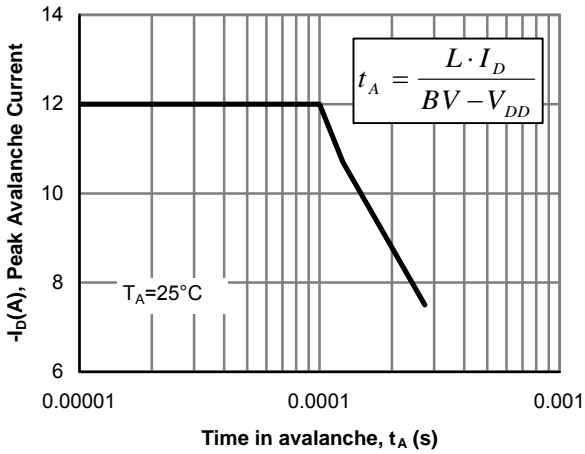


Figure 12: Single Pulse Avalanche capability

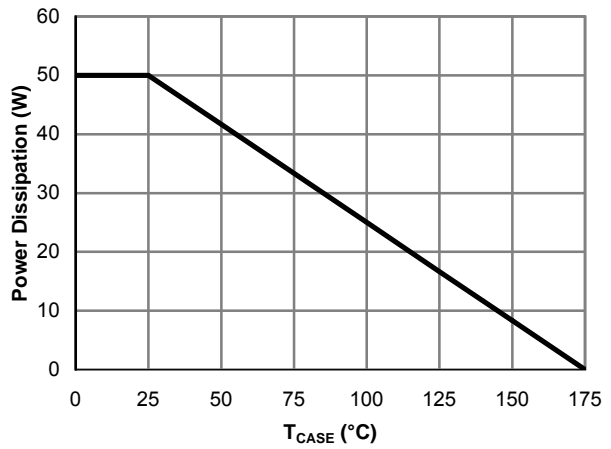


Figure 13: Power De-rating (Note B)

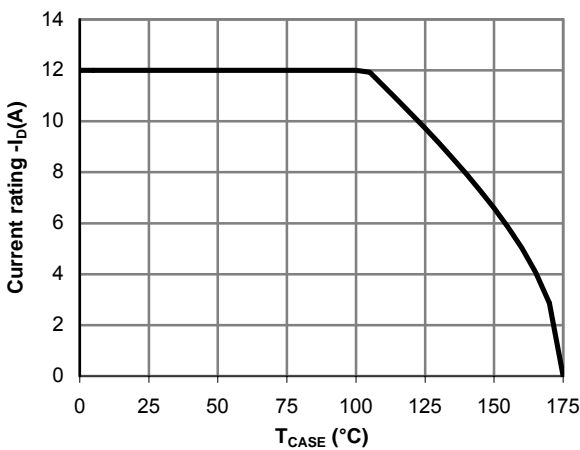


Figure 14: Current De-rating (Note B)

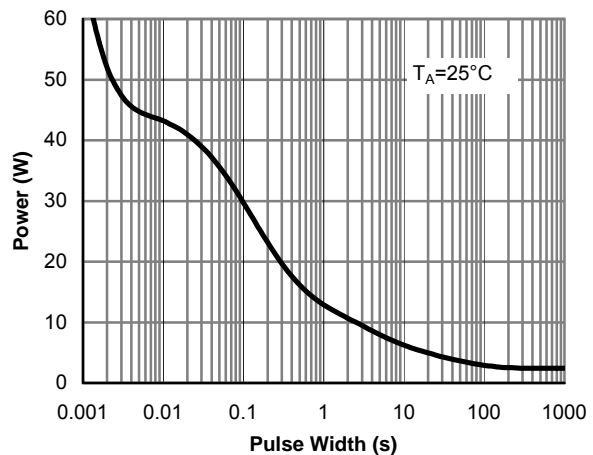


Figure 15: Single Pulse Power Rating Junction-to-Ambient (Note H)

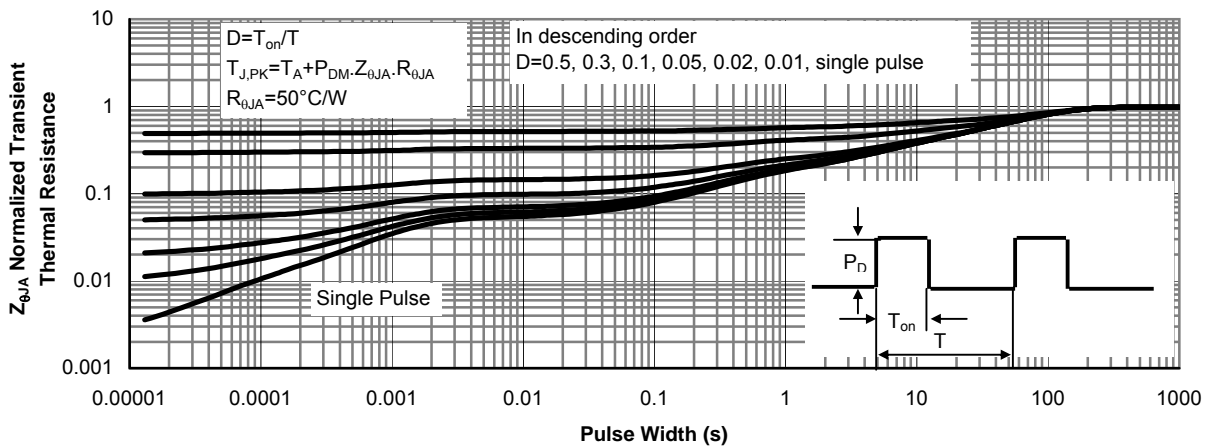
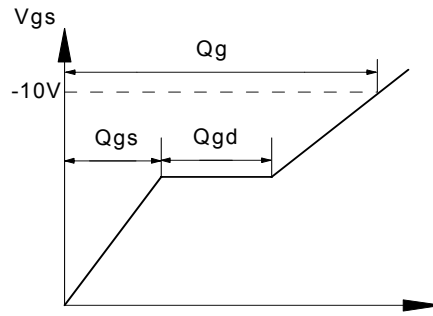
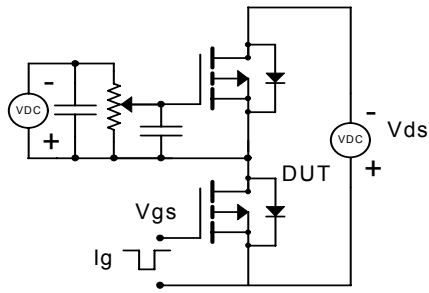
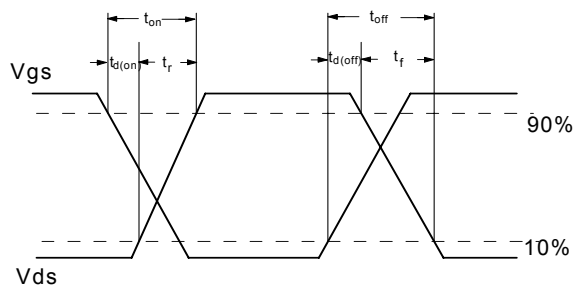
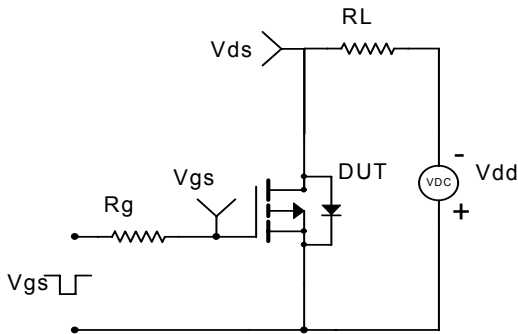


Figure 16: Normalized Maximum Transient Thermal Impedance (Note H)

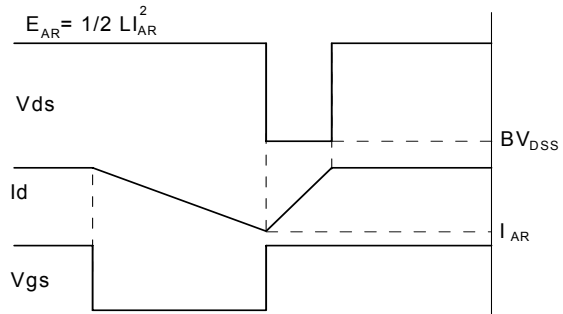
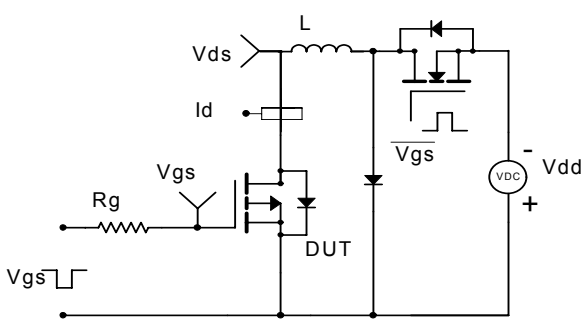
Gate Charge Test Circuit & Waveform



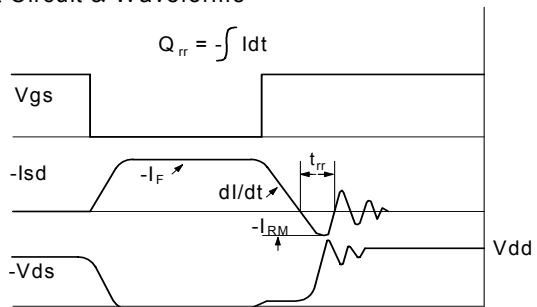
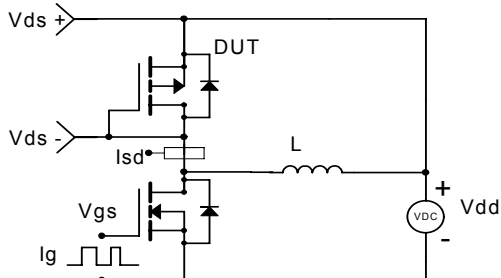
Resistive Switching Test Circuit & Waveforms



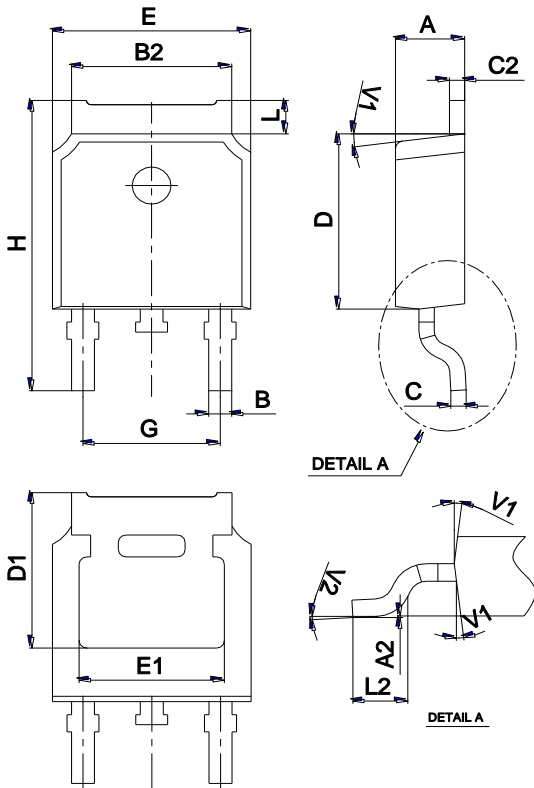
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

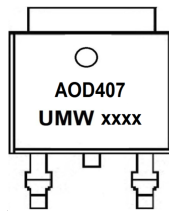


Package Mechanical Data TO-252



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
UMW AOD407	TO-252	2500	Tape and reel

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