

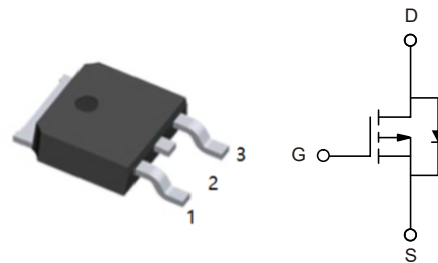
1.Description

The AOD4189 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. With the excellent thermal resistance of the TO-252 package, this device is well suited for high current load applications.

3.Pinning information

Pin	Symbol	Description
1	G	GATE
3	S	SOURCE
2	D	DRAIN

TO-252(DPAK)
top view



4.Absolute Maximum Ratings $T_A = 25^\circ\text{C}$

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ^{B,H}	$T_C = 25^\circ\text{C}$	I_D	-40	A
	$T_C = 100^\circ\text{C}$		-28	
Pulsed Drain Current ^C		I_{DM}	-50	
Avalanche Current ^C		I_{AR}	-35	
Repetitive avalanche energy $L = 0.1\text{mH}$ ^C		E_{AR}	61	mJ
Power Dissipation ^B	$T_C = 25^\circ\text{C}$	P_D	62.5	W
	$T_C = 100^\circ\text{C}$		31	
Power Dissipation ^A	$T_A = 25^\circ\text{C}$	P_{DSM}	2.5	
	$T_A = 70^\circ\text{C}$		1.6	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	$^\circ\text{C}$



5.Thermal Characteristics

Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{A,G}	t ≤ 10s	R _{θJA}	15	20	°C/W
Maximum Junction-to-Ambient ^{A,G}	Steady-State		41	50	°C/W
Maximum Junction-to-Case ^{D,F}	Steady-State	R _{θJC}	2	2.4	°C/W



6. Electrical Characteristic ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=-250\mu\text{A}$, $V_{GS}=0\text{V}$	-40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-40\text{V}$, $V_{GS}=0\text{V}$			-1	μA
		$T_J=55^{\circ}\text{C}$			-5	μA
Gate-Body leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=-250\mu\text{A}$	-1.7	-1.9	-3	V
On state drain current	$I_{D(ON)}$	$V_{GS}=-10\text{V}$, $V_{DS}=-5\text{V}$	-50			A
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=-10\text{V}$, $I_D=-12\text{A}$		18	22	m Ω
		$V_{GS}=-4.5\text{V}$, $I_D=-8\text{A}$		23	29	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5\text{V}$, $I_D=-12\text{A}$		35		S
Diode Forward Voltage	V_{SD}	$I_S=-1\text{A}$, $V_{GS}=0\text{V}$		-0.74	-1	V
Maximum Body-Diode Continuous Current ^G	I_S				-20	A
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=-20\text{V}$, $f=1\text{MHz}$		1870		pF
Output Capacitance	C_{oss}			185		pF
Reverse Transfer Capacitance	C_{rss}			155		pF
Gate resistance	R_g	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $f=1\text{MHz}$	2.5	4.5	6.5	Ω
Total Gate Charge	$Q_g(-10\text{V})$	$V_{GS}=-10\text{V}$, $V_{DS}=-20\text{V}$ $I_D=-12\text{A}$		31.4	41	nC
Total Gate Charge	$Q_g(-4.5\text{V})$			7.9	10	nC
Gate Source Charge	Q_{gs}			7.6		nC
Gate Drain Charge	Q_{gd}			6.2		nC
Turn-On DelayTime	$t_{D(on)}$	$V_{GS}=-10\text{V}$, $V_{DS}=-20\text{V}$ $R_L=1.6\Omega$, $R_{GEN}=3\Omega$		10		ns
Turn-On Rise Time	t_r			18		ns
Turn-Off DelayTime	$t_{D(off)}$			38		ns
Turn-Off Fall Time	t_f			24		ns
Body Diode Reverse Recovery Time	t_{rr}	$I_F=-12\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		32	42	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F=-12\text{A}$, $dI/dt=100\text{A}/\mu\text{s}$		30		nC



- A: The value of $R_{\theta JA}$ is measured with the device in a still air environment with $T_A = 25^\circ\text{C}$. The power dissipation P_{DSM} and current rating I_{DSM} are based on $T_{J(MAX)} = 150^\circ\text{C}$, using steady state junction-to-ambient thermal resistance.
- 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 $t \leq 300\mu\text{s}$ 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: These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$.
- H: The maximum current rating is limited by bond-wires.



7.1 Typical characteristic

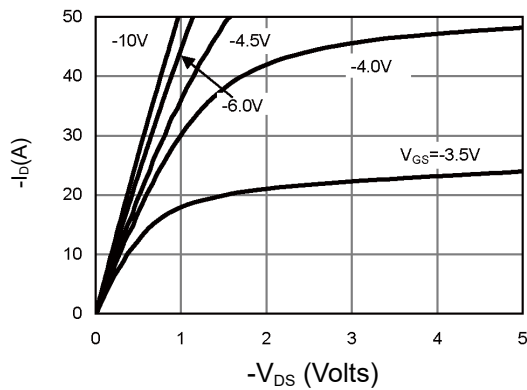


Fig 1: On-Region Characteristics

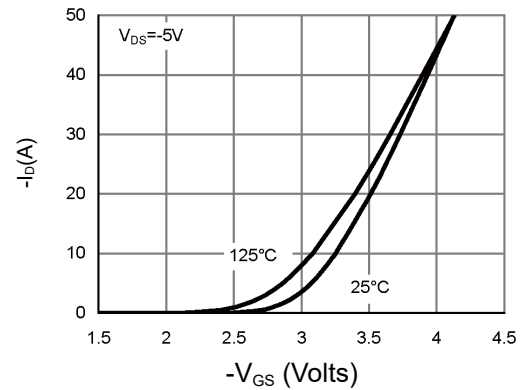


Figure 2: Transfer Characteristics

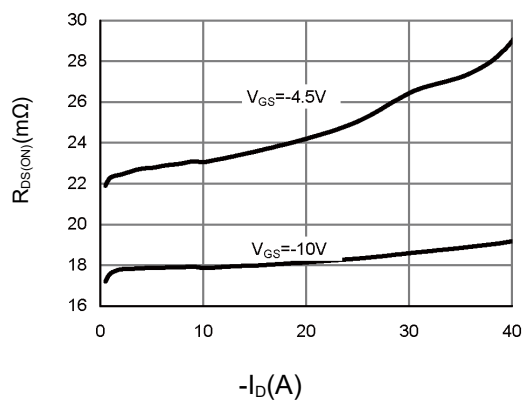


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

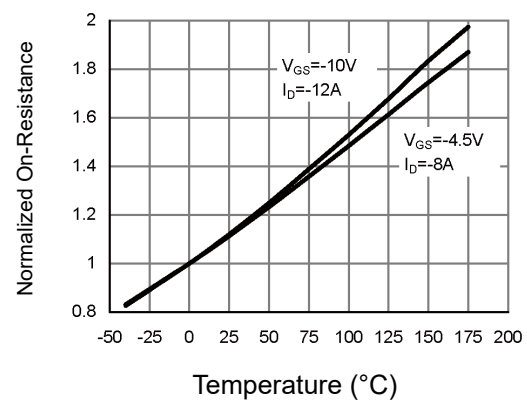


Figure 4: On-Resistance vs. Junction Temperature

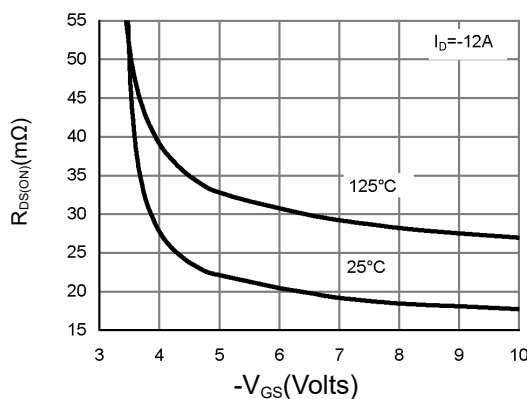


Figure 5: On-Resistance vs. Gate-Source Voltage

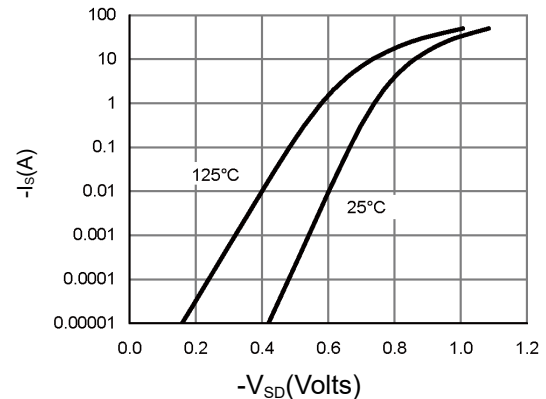


Figure 6: Body-Diode Characteristics



7.2 Typical characteristic

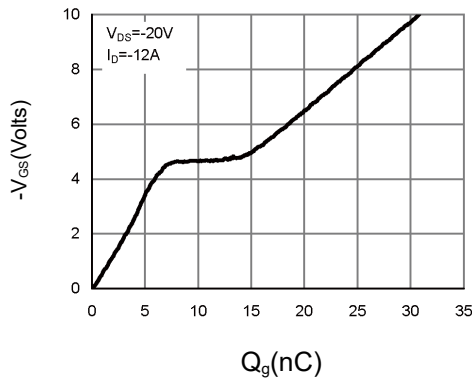


Figure 7: Gate-Charge Characteristics

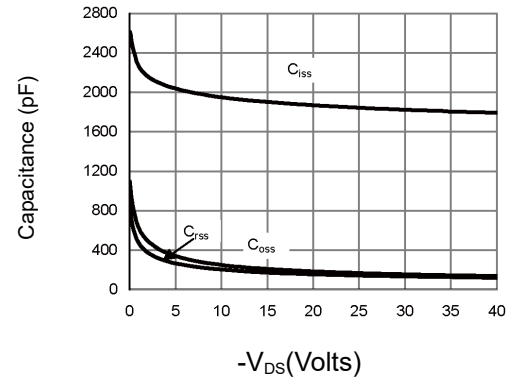


Figure 8: Capacitance Characteristics

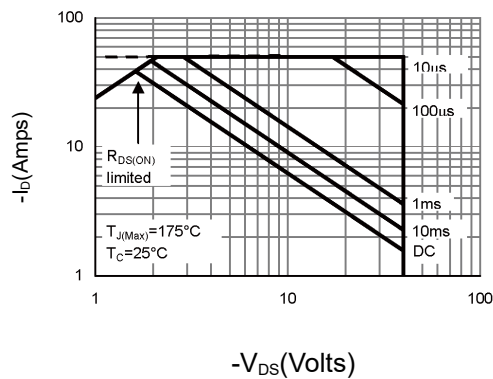


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

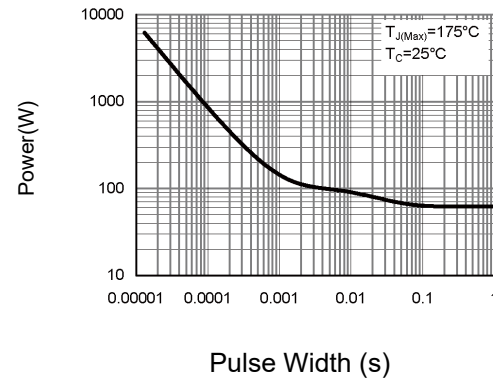


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

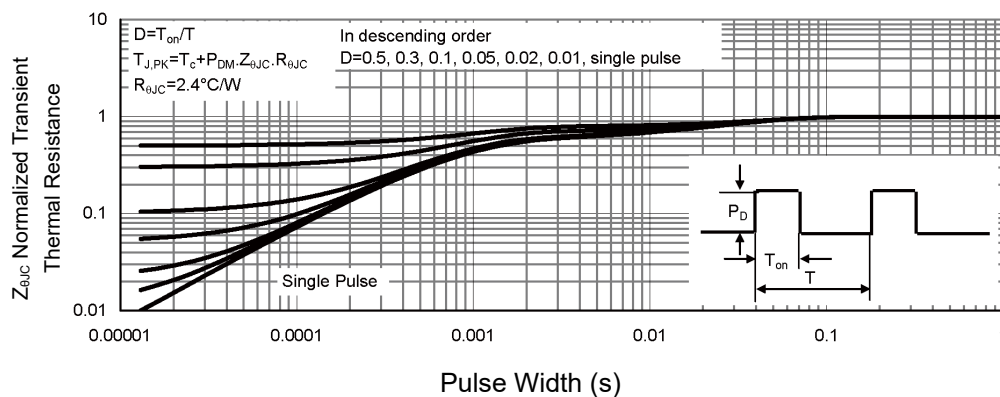
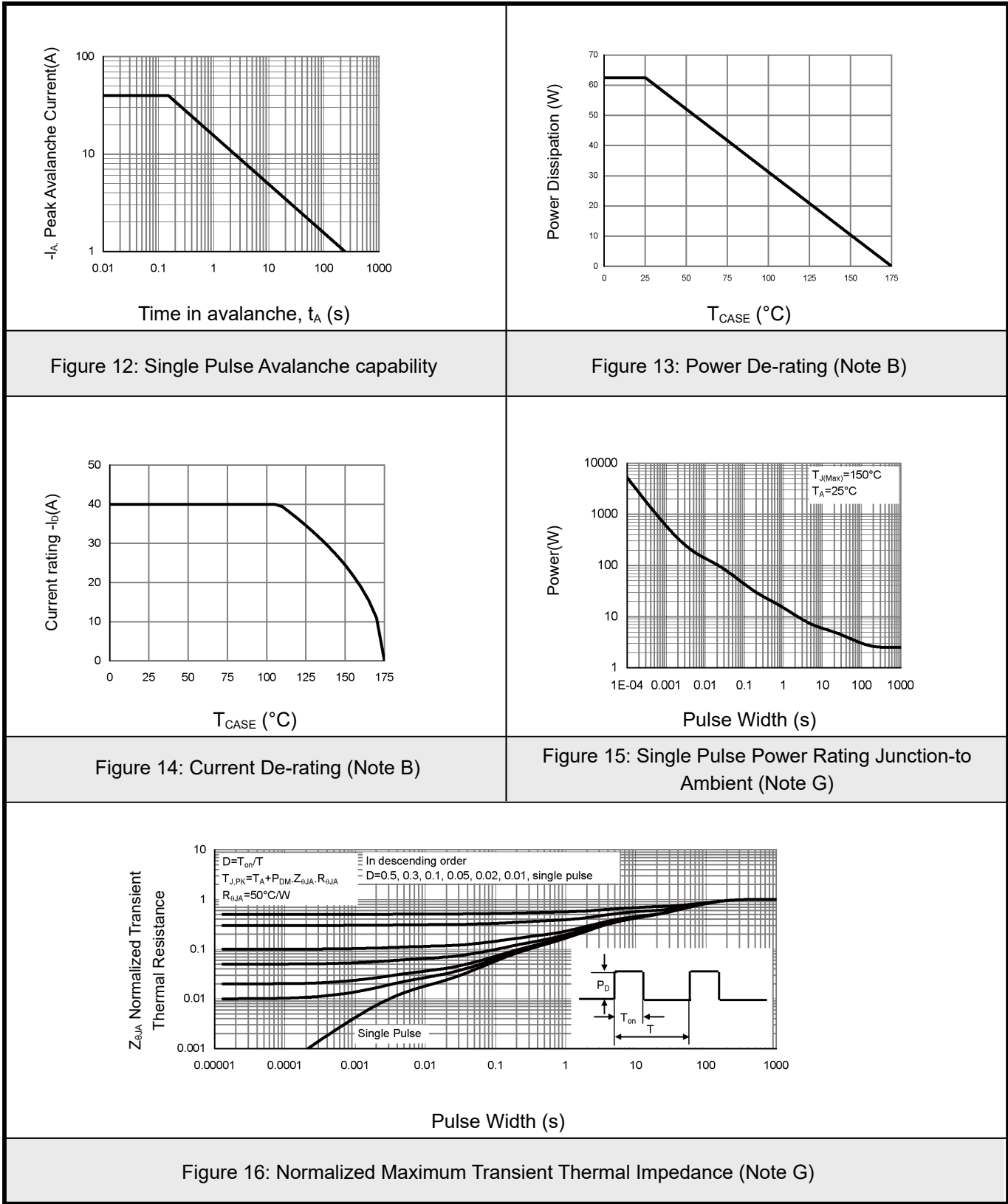


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

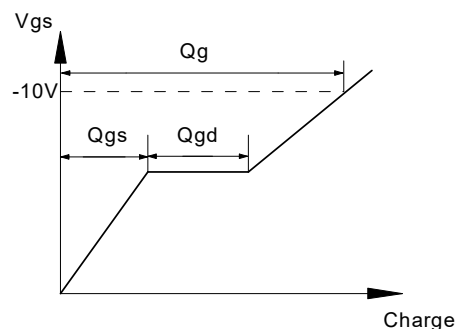
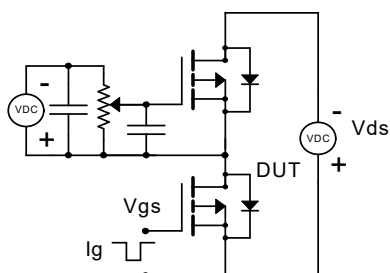


7.3Typical characteristic

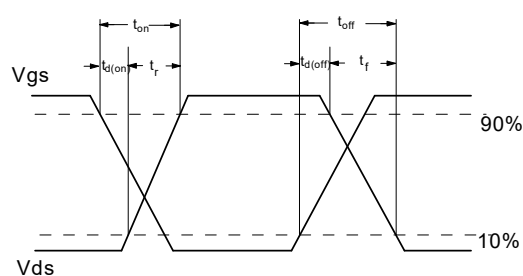
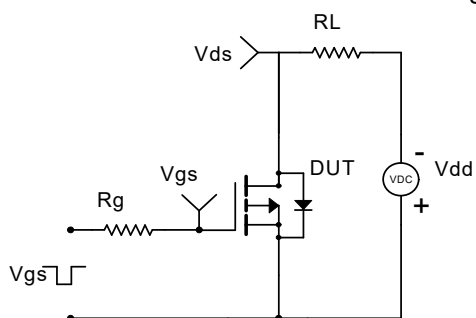


7.4 Typical characteristic

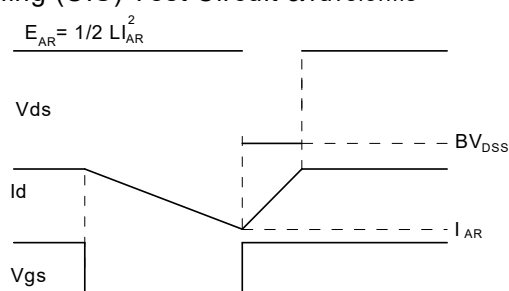
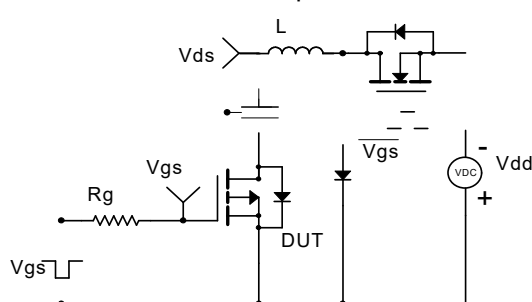
Gate Charge Test Circuit & Waveform



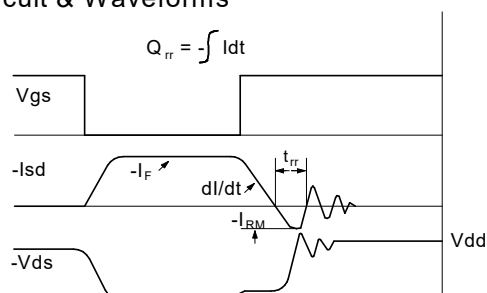
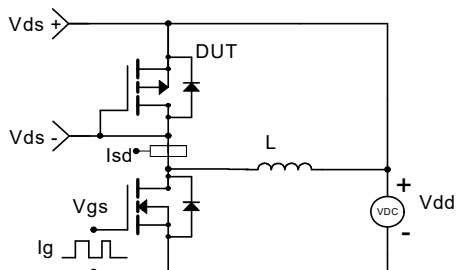
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

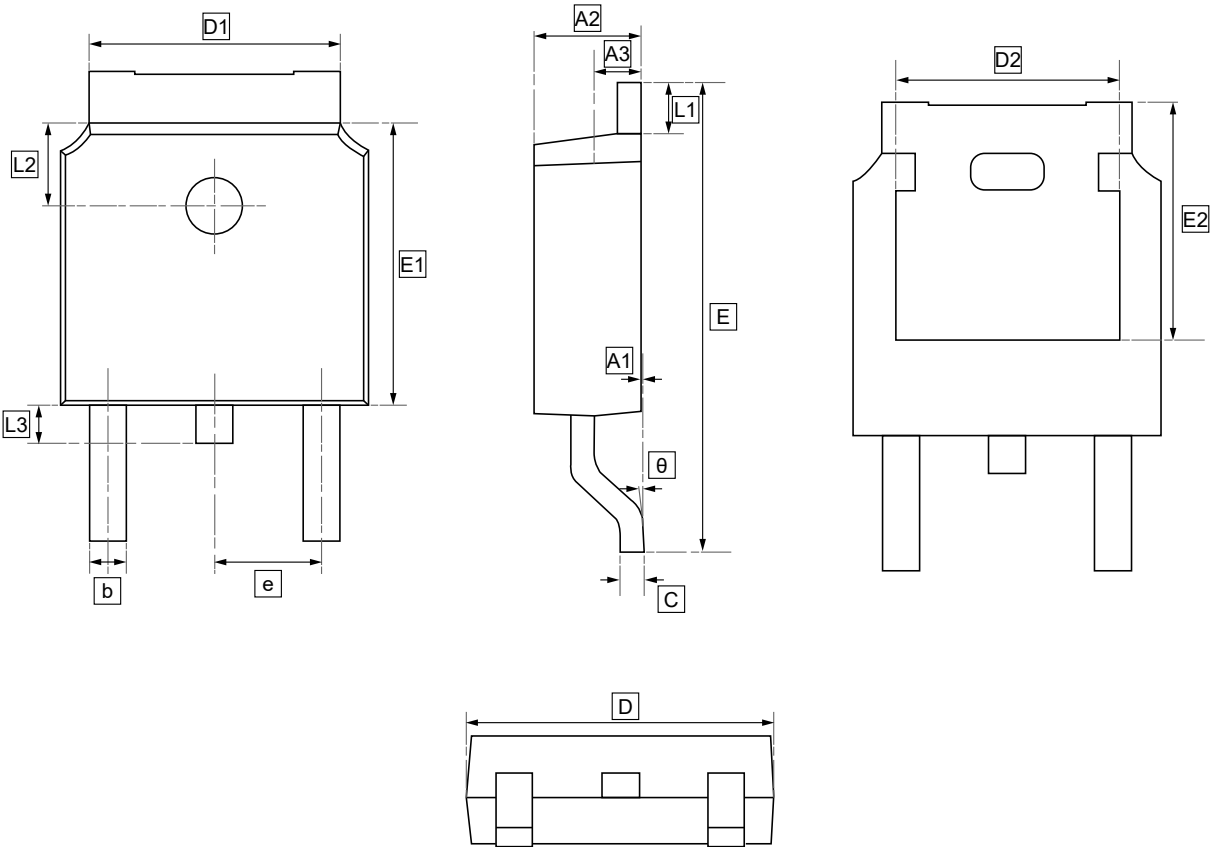


Diode Recovery Test Circuit & Waveforms





8.TO-252 Package Outline Dimensions

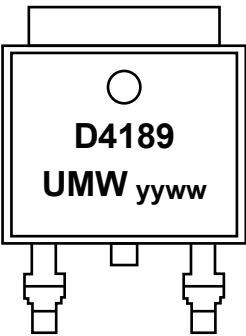


DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38		BSC	1.27	1.90	1.00



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW AOD4189	TO-252	2500	Tape and reel



10.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.