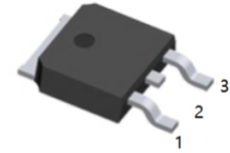


Features

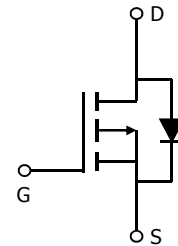
- $V_{DS} (V) = -40V$
- $I_D = -40A$
- $R_{DS(ON)} < 15m\Omega$ ($V_{GS} = -10V$)
- $R_{DS(ON)} < 20m\Omega$ ($V_{GS} = -4.5V$)



1.G 2.D 3.S
TO-252(DPAK) top view

General Description

The AOD4185 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. With the excellent thermal resistance of the DPAK/IPAK package, this device is well suited for high current applications.



Absolute Maximum Ratings $T_C=25^\circ C$ unless otherwise noted

| Parameter | Symbol | Maximum | Units |
|--|----------------|-------------------|------------|
| Drain-Source Voltage | V_{DS} | -40 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Continuous Drain Current ^{B,H} | I_D | $T_C=25^\circ C$ | -40 |
| | | $T_C=100^\circ C$ | -31 |
| Pulsed Drain Current ^C | I_{DM} | -115 | A |
| Avalanche Current ^C | I_{AR} | -42 | |
| Repetitive avalanche energy $L=0.1mH$ ^C | E_{AR} | 88 | mJ |
| Power Dissipation ^B | P_D | $T_C=25^\circ C$ | 62.5 |
| | | $T_C=100^\circ C$ | 31 |
| Power Dissipation ^A | P_{DSM} | $T_A=25^\circ C$ | 2.5 |
| | | $T_A=70^\circ C$ | 1.6 |
| Junction and Storage Temperature Range | T_J, T_{STG} | -55 to 175 | $^\circ C$ |

Thermal Characteristics

| Parameter | Symbol | Typ | Max | Units |
|--|-----------------|--------------|-----|--------------|
| Maximum Junction-to-Ambient ^{A,G} | $R_{\theta JA}$ | $t \leq 10s$ | 15 | $^\circ C/W$ |
| Maximum Junction-to-Ambient ^{A,G} | | Steady-State | 41 | $^\circ C/W$ |
| Maximum Junction-to-Case ^{D,F} | $R_{\theta JC}$ | 2 | 2.4 | $^\circ C/W$ |

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------------------------|---------------------------------------|---|------|------------|----------|-------|
| STATIC PARAMETERS | | | | | | |
| BV _{DSS} | Drain-Source Breakdown Voltage | I _D =-250μA, V _{GS} =0V | -40 | | | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} =-40V, V _{GS} =0V T _J =55°C | | | -1 -5 | μA |
| 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 =-250μA | -1.7 | -1.9 | -3 | V |
| I _{D(ON)} | On state drain current | V _{GS} =-10V, V _{DS} =-5V | -115 | | | A |
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =-10V, I _D =-20A V _{GS} =-4.5V, I _D =-15A | | 12.5 16 | 15 20 | mΩ |
| g _{FS} | Forward Transconductance | V _{DS} =-5V, I _D =-20A | | 50 | | S |
| V _{SD} | Diode Forward Voltage | I _S =-1A, V _{GS} =0V | | -0.72 | -1 | V |
| I _S | Maximum Body-Diode Continuous Current | | | | -20 | A |
| DYNAMIC PARAMETERS | | | | | | |
| C _{iss} | Input Capacitance | V _{GS} =0V, V _{DS} =-20V, f=1MHz | | 2550 | | pF |
| C _{oss} | Output Capacitance | | | 280 | | pF |
| C _{rss} | Reverse Transfer Capacitance | | | 190 | | pF |
| R _g | Gate resistance | V _{GS} =0V, V _{DS} =0V, f=1MHz | 2.5 | 4 | 6 | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Q _g (-10V) | Total Gate Charge | V _{GS} =-10V, V _{DS} =-20V, I _D =-20A | | 42 | 55 | nC |
| Q _g (-4.5V) | Total Gate Charge | | | 18.6 | | |
| Q _{gs} | Gate Source Charge | | | 7 | | nC |
| Q _{gd} | Gate Drain Charge | | | 8.6 | | nC |
| t _r | Turn-On Rise Time | V _{GS} =-10V, V _{DS} =-20V, R _L =1Ω, R _{GEN} =3Ω | | 20 | | ns |
| t _{D(off)} | Turn-Off DelayTime | | | 55 | | ns |
| t _f | Turn-Off Fall Time | | | 30 | | ns |
| t _{rr} | Body Diode Reverse Recovery Time | I _F =-20A, dI/dt=100A/μs | | 38 | 49 | ns |
| Q _{rr} | Body Diode Reverse Recovery Charge | I _F =-20A, dI/dt=100A/μs | | 47 | | nC |

A: The value of R_{θJA} is measured with the device in a still air environment with T_A=25° C. The power dissipation P_{DSM} and current rating I_{DSM} are based on T_{J(MAX)}=150° C, using steady state junction-to-ambient thermal resistance.

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.

D: The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} 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 impedance 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: 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.

H: The maximum current rating is limited by bond-wires.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

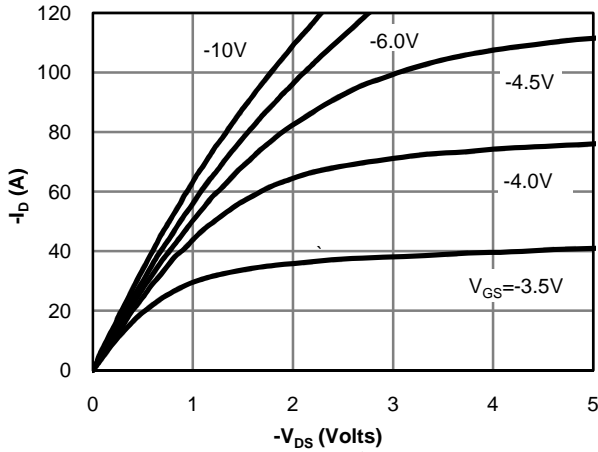


Figure 1: On-Region Characteristics

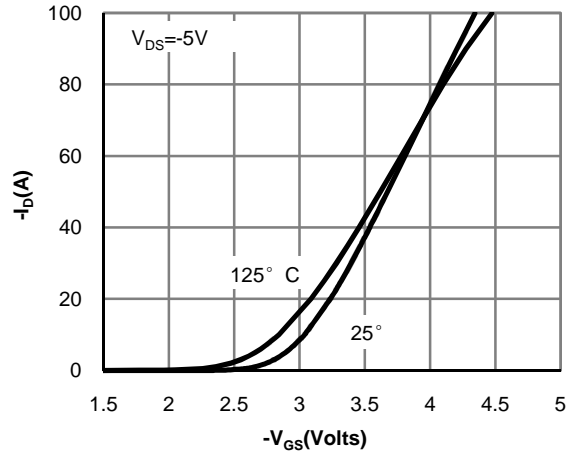


Figure 2: Transfer Characteristics

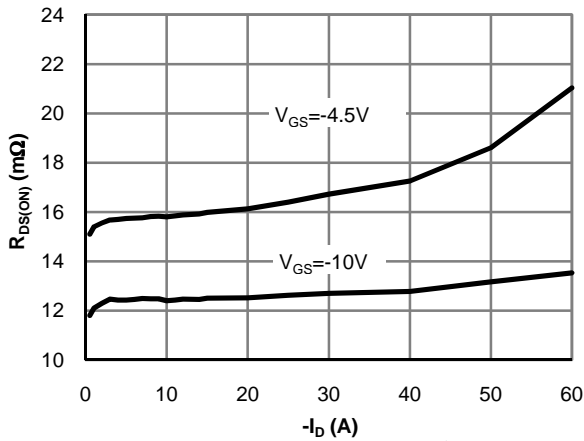


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

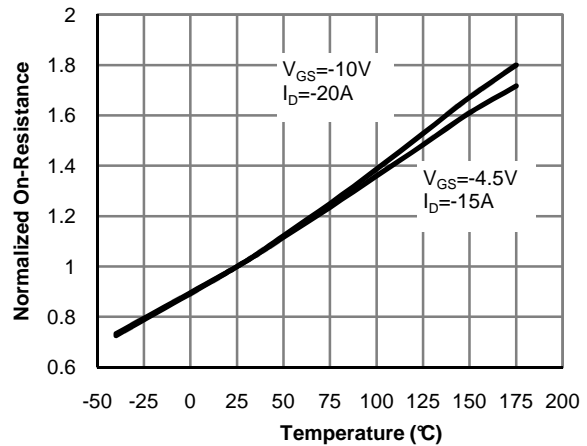


Figure 4: On-Resistance vs. Junction Temperature

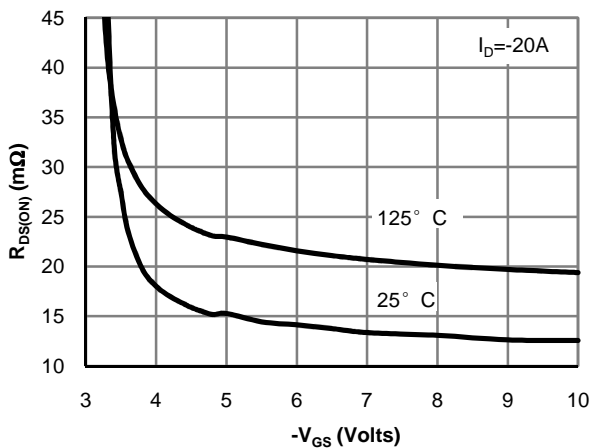


Figure 5: On-Resistance vs. Gate-Source Voltage

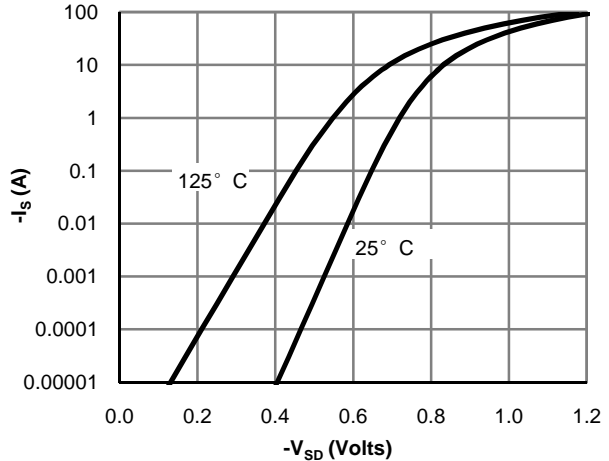


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

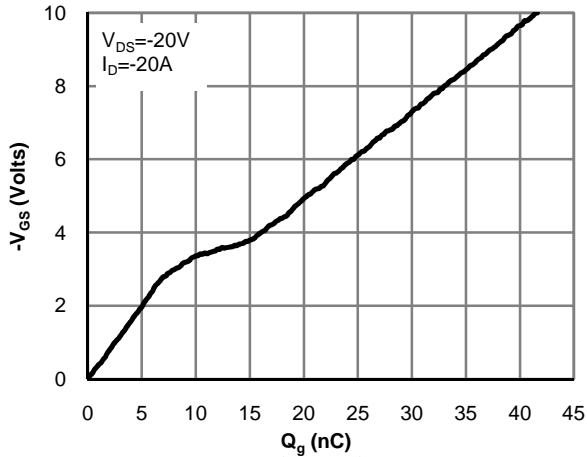


Figure 7: Gate-Charge Characteristics

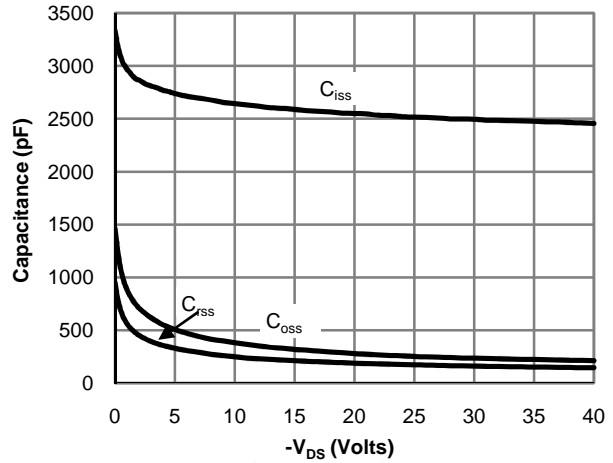


Figure 8: Capacitance Characteristics

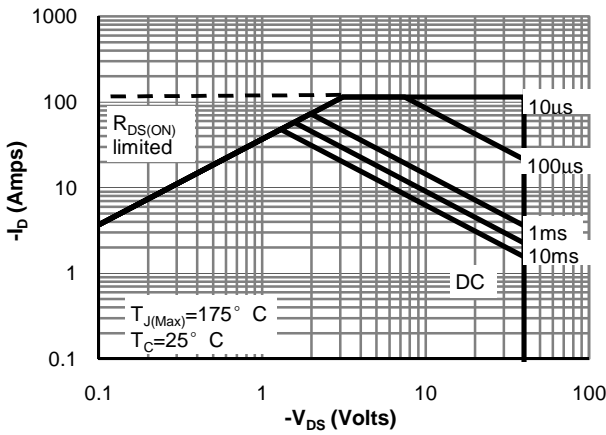


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

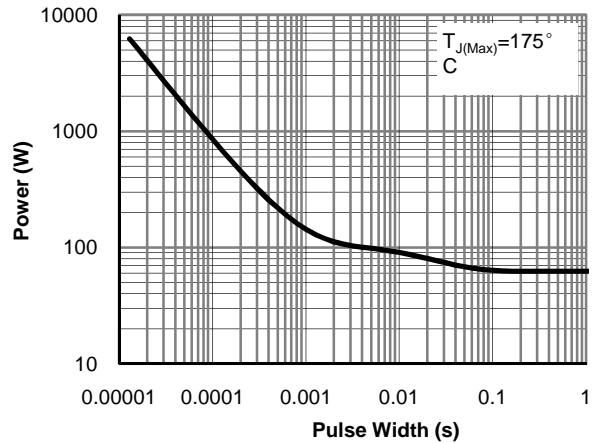


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

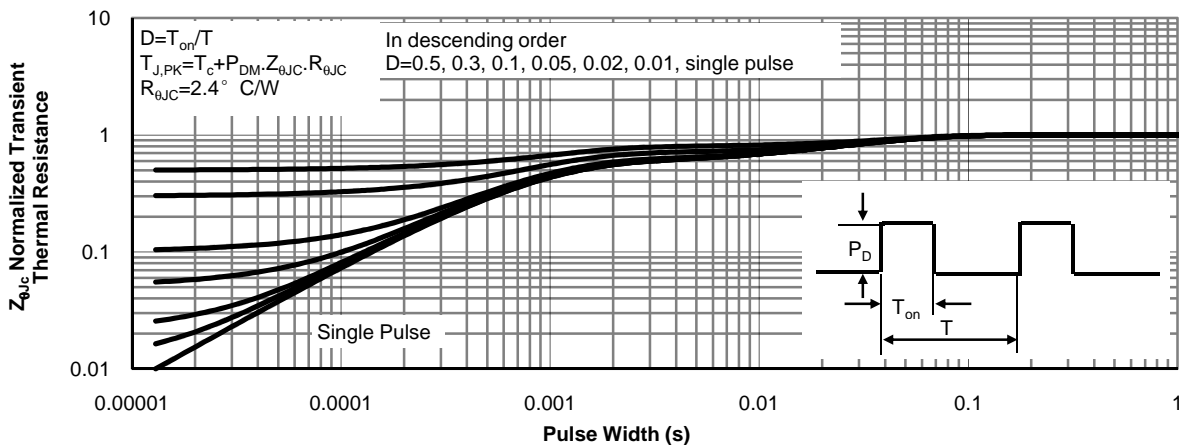


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

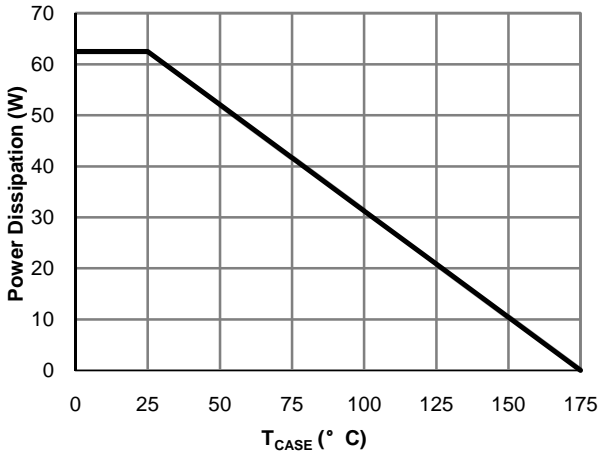


Figure 12: Power De-rating (Note B)

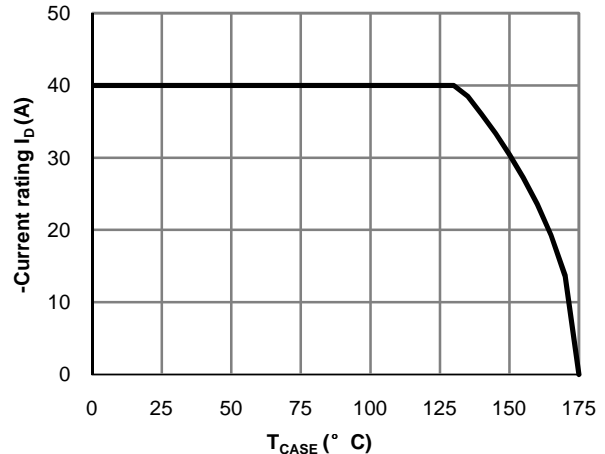


Figure 13: Current De-rating (Note B)

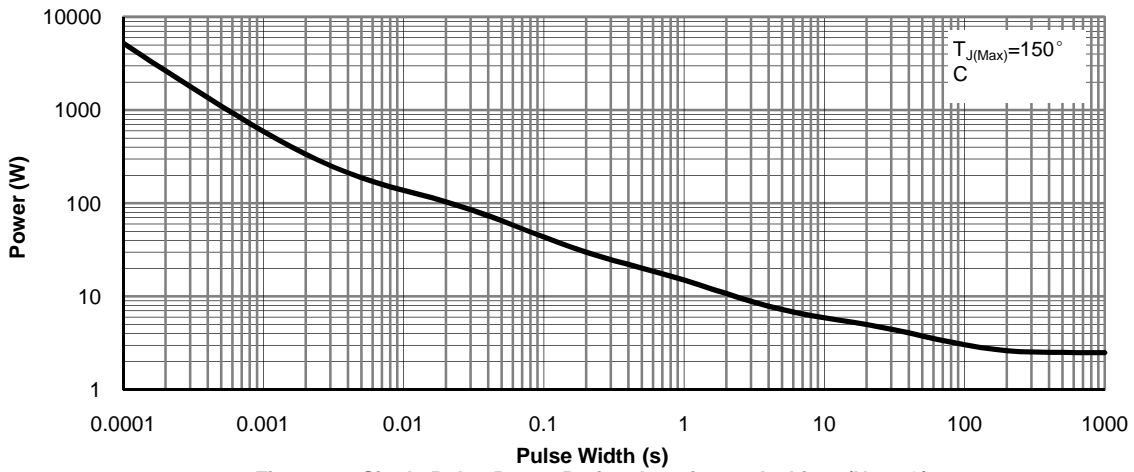


Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note G)

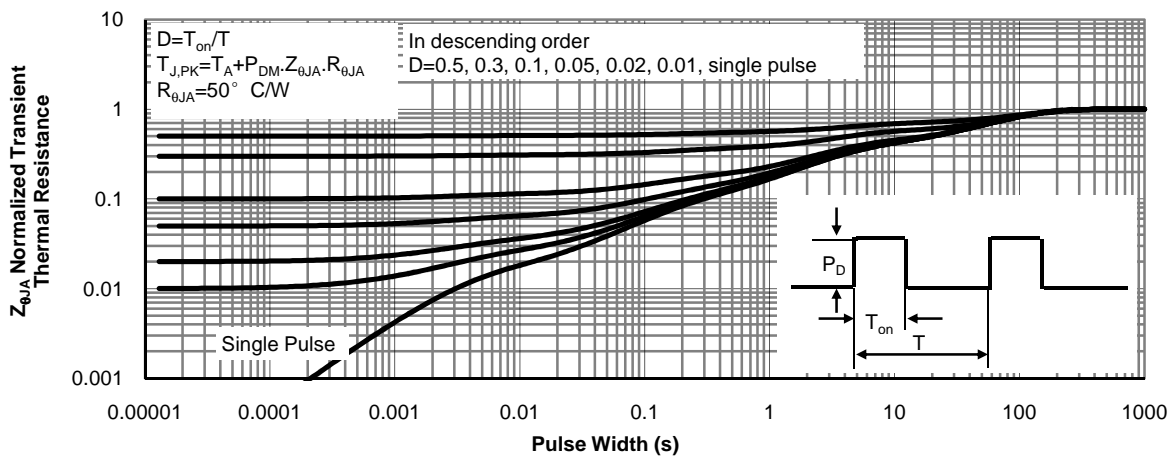
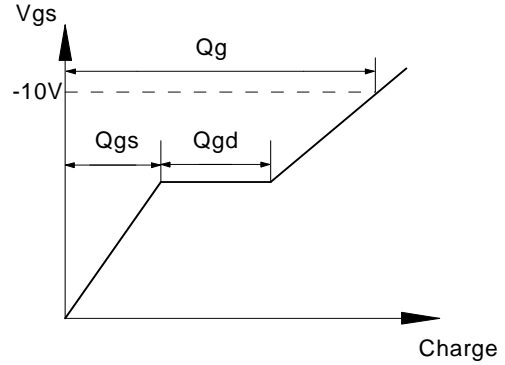
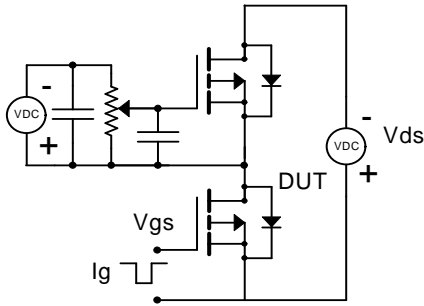
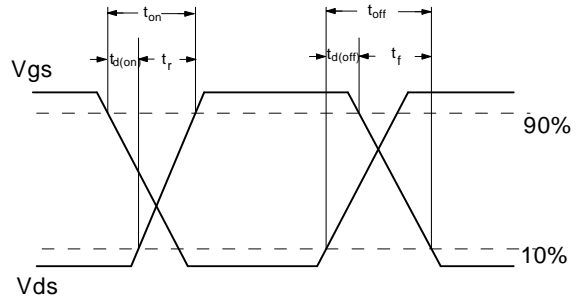
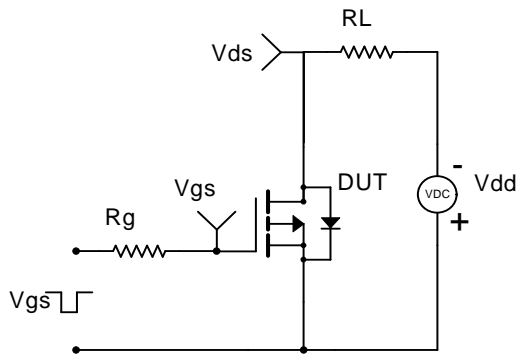


Figure 15: Normalized Maximum Transient Thermal Impedance (Note G)

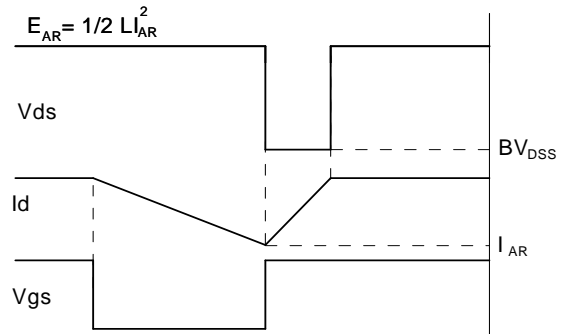
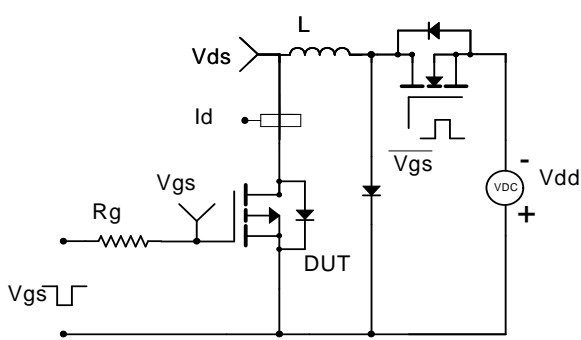
Gate Charge Test Circuit & Waveform



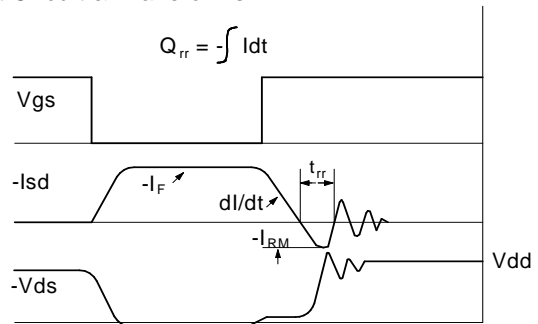
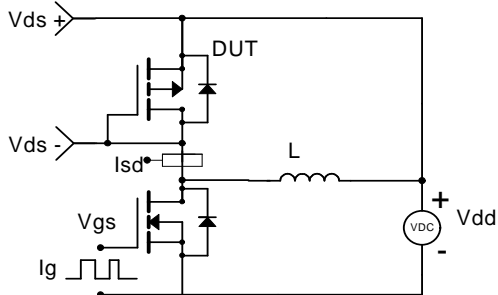
Resistive Switching Test Circuit & Waveforms



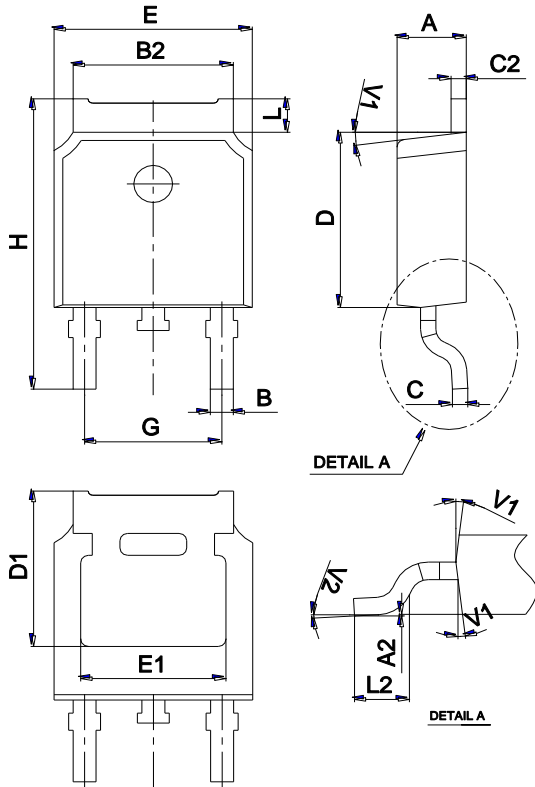
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

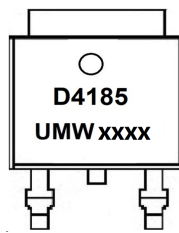


Package Mechanical Data TO-252



| 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 AOD4185 | TO-252 | 2500 | Tape and reel |