ALPHA & OMEGA SEMICONDUCTOR, LTD

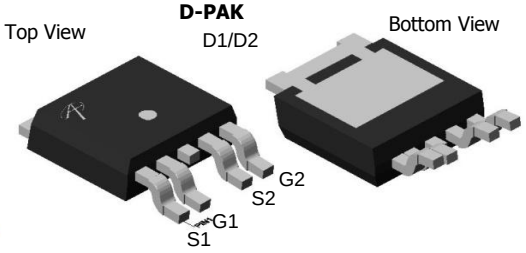
# AOD609
## Complementary Enhancement Mode Field Effect Transistor

### General Description
The AOD609 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications.

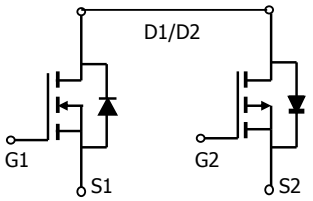
-RoHS Compliant
-Halogen Free*

### Features
**n-channel**
$V_{DS}$ (V) = 40V, $I_D$ = 12A ($V_{GS}$=10V)
$R_{DS(ON)}$< 30mΩ ($V_{GS}$=10V)
$R_{DS(ON)}$< 40mΩ ($V_{GS}$=4.5V)
**p-channel**
$V_{DS}$ (V) = -40V, $I_D$ = -12A ($V_{GS}$=-10V)
$R_{DS(ON)}$< 45mΩ (VGS= -10V)
$R_{DS(ON)}$< 66mΩ (VGS= -4.5V)
***100% UIS Tested!***
***100% Rg Tested!***

**TO-252-4L**
**D-PAK**




Top View
Drain Connected
to Tab




**n-channel** **p-channel**

**Absolute Maximum Ratings $T_A$=25°C unless otherwise noted**

| Parameter | | Symbol | Max n-channel | Max p-channel | Units |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 40 | -40 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | ±20 | V |
| Continuous Drain Current [B,H] | $T_C$=25°C | $I_D$ | 12 | -12 | A |
| | $T_C$=100°C | | 12 | -12 | |
| Pulsed Drain Current [B] | | $I_{DM}$ | 30 | -30 | |
| Avalanche Current [C] | | $I_{AR}$ | 14 | -20 | |
| Repetitive avalanche energy L=0.1mH [C] | | $E_{AR}$ | 9.8 | 20 | mJ |
| Power Dissipation | $T_C$=25°C | $P_D$ | 27 | 30 | W |
| | $T_C$=100°C | | 14 | 15 | |
| Power Dissipation | $T_A$=25°C | $P_{DSM}$ | 2 | 2 | W |
| | $T_A$=70°C | | 1.3 | 1.3 | |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 175 | -55 to 175 | °C |

**Thermal Characteristics: n-channel and p-channel**

| Parameter | | Symbol | Device | Typ | Max | Units |
|---|---|---|---|---|---|---|
| Maximum Junction-to-Ambient [A,D] | t ≤ 10s | $R_{\theta JA}$ | n-ch | 17.4 | 25 | °C/W |
| Maximum Junction-to-Ambient [A,D] | Steady-State | | n-ch | 50 | 60 | °C/W |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JC}$ | n-ch | 4 | 5.5 | °C/W |
| Maximum Junction-to-Ambient [A,D] | t ≤ 10s | $R_{\theta JA}$ | p-ch | 16.7 | 25 | °C/W |
| Maximum Junction-to-Ambient [A,D] | Steady-State | | p-ch | 50 | 60 | °C/W |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JC}$ | p-ch | 3.5 | 5 | °C/W |

**N Channel Electrical Characteristics ($T_J$=25°C unless otherwise noted)**

| 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 | | | 1 | µA |
| | | $T_J$=55°C | | | 5 | |
| $I_{GSS}$ | 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 | 2.5 | 3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$=10V, $V_{DS}$=5V | 30 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$=10V, $I_D$=12A | | 24 | 30 | mΩ |
| | | $T_J$=125°C | | 37 | 46 | |
| | | $V_{GS}$=4.5V, $I_D$=8A | | 31 | 40 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$=5V, $I_D$=12A | | 25 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$=1A,$V_{GS}$=0V | | 0.76 | 1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current [H] | | | | 12 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$=20V, f=1MHz | | 516 | 650 | pF |
| $C_{oss}$ | Output Capacitance | | | 82 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 43 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | | 4.6 | 6.9 | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ (10V) | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=20V, $I_D$=12A | | 8.3 | 10.8 | nC |
| $Q_{gs}$ | Gate Source Charge | | | 2.3 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 1.6 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$=10V, $V_{DS}$=20V, $R_L$=1.4Ω, $R_{GEN}$=3Ω | | 6.4 | | ns |
| $t_r$ | Turn-On Rise Time | | | 3.6 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 16.2 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 6.6 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$=12A, dI/dt=100A/µs | | 18 | 24 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$=12A, dI/dt=100A/µs | | 10 | | nC |

A: The value of $R_{\theta JA}$ 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 the 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 $R_{\theta JA}$ 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 <300 µs 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. 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.
H. The maximum current rating is limited by bond-wires.

**P-Channel Electrical Characteristics ($T_J$=25°C unless otherwise noted)**

| 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 | | | -1 | µA |
| | | $T_J$=55°C | | | -5 | |
| $I_{GSS}$ | 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 | -2 | -3 | V |
| $I_{D(ON)}$ | On state drain current | $V_{GS}$= -10V, $V_{DS}$= -5V | -30 | | | A |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance | $V_{GS}$= -10V, $I_D$= -12A | | 36 | 45 | mΩ |
| | | $T_J$=125°C | | 52 | 65 | |
| | | $V_{GS}$= -4.5V, $I_D$= -8A | | 51 | 66 | |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$= -5V, $I_D$= -12A | | 22 | | S |
| $V_{SD}$ | Diode Forward Voltage | $I_S$= -1A,$V_{GS}$=0V | | -0.76 | -1 | V |
| $I_S$ | Maximum Body-Diode Continuous Current [H] | | | | -12 | A |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V, $V_{DS}$= -20V, f=1MHz | | 900 | 1125 | pF |
| $C_{oss}$ | Output Capacitance | | | 97 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 68 | | pF |
| $R_g$ | Gate resistance | $V_{GS}$=0V, $V_{DS}$=0V, f=1MHz | | 14 | | Ω |
| **SWITCHING PARAMETERS** | | | | | | |
| $Q_g$ (-10V) | Total Gate Charge | $V_{GS}$= -10V, $V_{DS}$= -20V, $I_D$= -12A | | 16.2 | 21 | nC |
| $Q_g$ (-4.5V) | Total Gate Charge | | | 7.2 | 9.4 | nC |
| $Q_{gs}$ | Gate Source Charge | | | 3.8 | | nC |
| $Q_{gd}$ | Gate Drain Charge | | | 3.5 | | nC |
| $t_{D(on)}$ | Turn-On DelayTime | $V_{GS}$= -10V, $V_{DS}$= -20V, $R_L$=1.4Ω, $R_{GEN}$=3Ω | | 6.2 | | ns |
| $t_r$ | Turn-On Rise Time | | | 8.4 | | ns |
| $t_{D(off)}$ | Turn-Off DelayTime | | | 44.8 | | ns |
| $t_f$ | Turn-Off Fall Time | | | 41.2 | | ns |
| $t_{rr}$ | Body Diode Reverse Recovery Time | $I_F$= -12A, dI/dt=100A/µs | | 21 | 27 | ns |
| $Q_{rr}$ | Body Diode Reverse Recovery Charge | $I_F$= -12A, dI/dt=100A/µs | | 14 | | nC |

A: The value of $R_{\theta JA}$ 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 t ≤ 10s 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 $R_{\theta JA}$ 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 <300 µs 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. 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.
H. The maximum current rating is limited by bond-wires.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

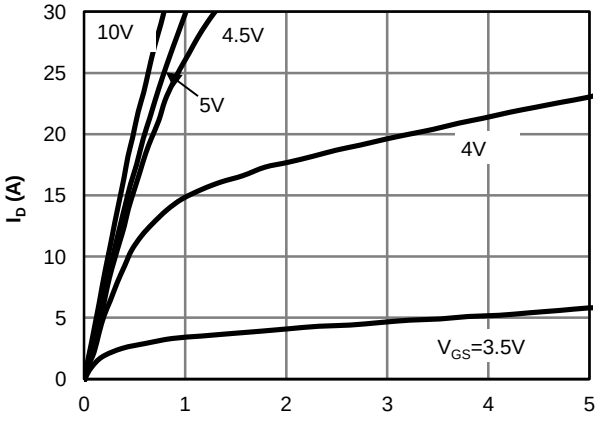



Fig 1: On-Region Characteristics

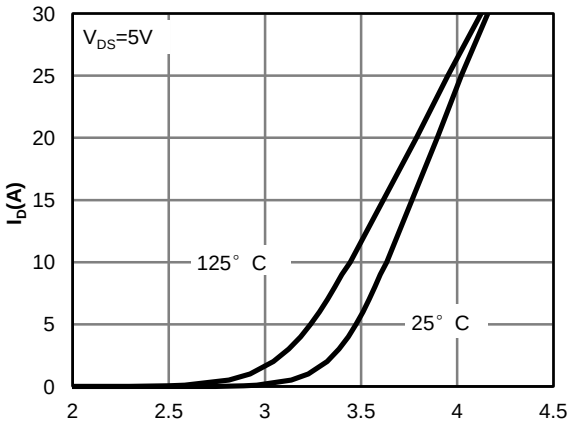



Figure 2: Transfer Characteristics

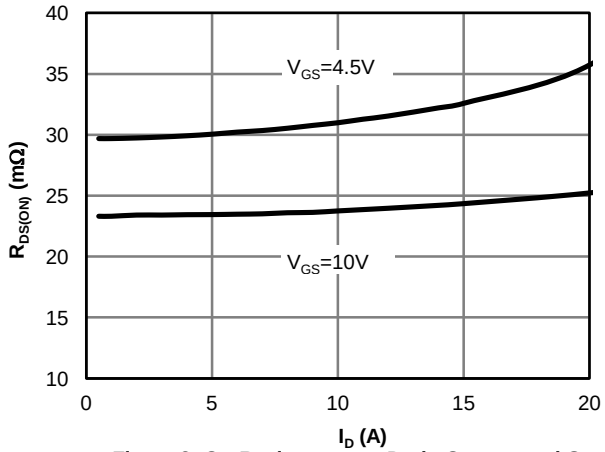



Figure 3: On-Resistance vs. Drain Current and Gate Voltage

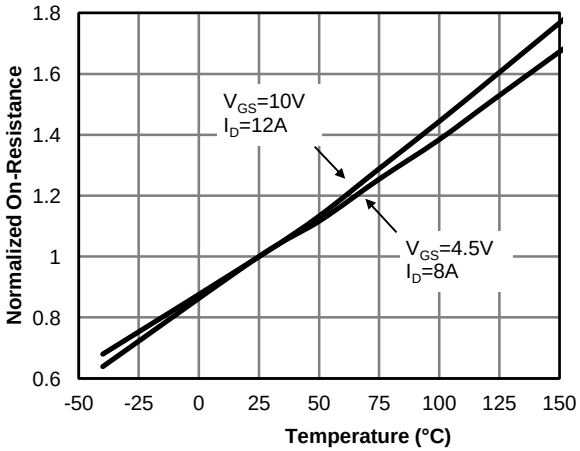



Figure 4: On-Resistance vs. Junction Temperature

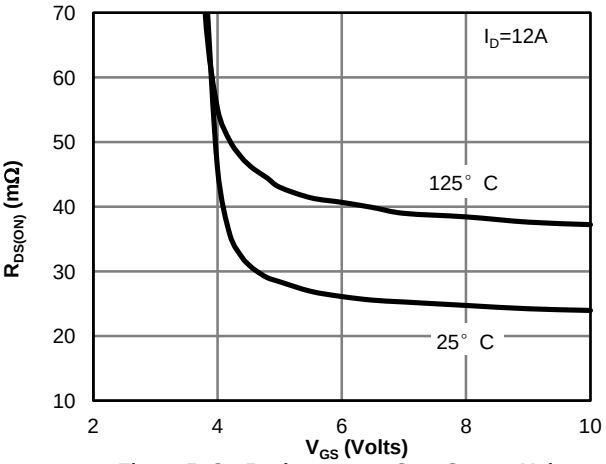



Figure 5: On-Resistance vs. Gate-Source Voltage

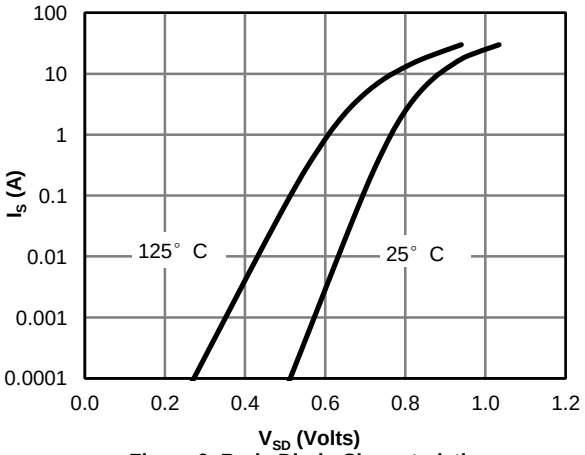



Figure 6: Body-Diode Characteristics

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: N-CHANNEL

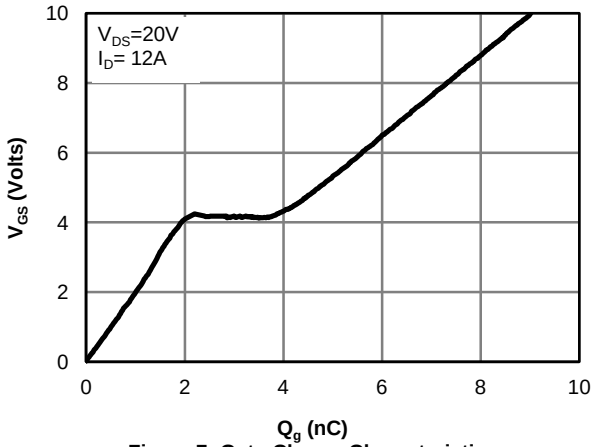



**Figure 7: Gate-Charge Characteristics**

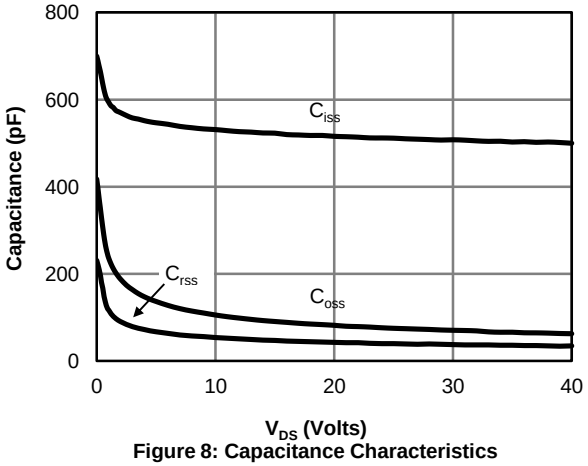



**Figure 8: Capacitance Characteristics**

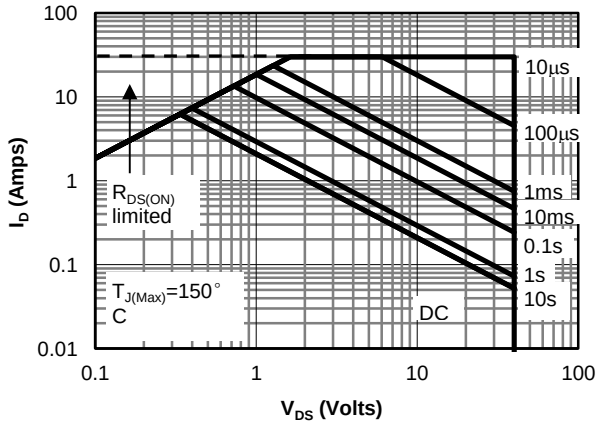



**Figure 9: Maximum Forward Biased Safe Operating Area (Note E)**

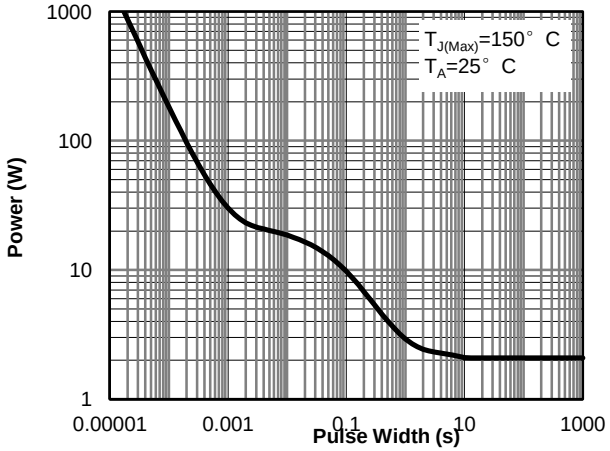



**Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)**

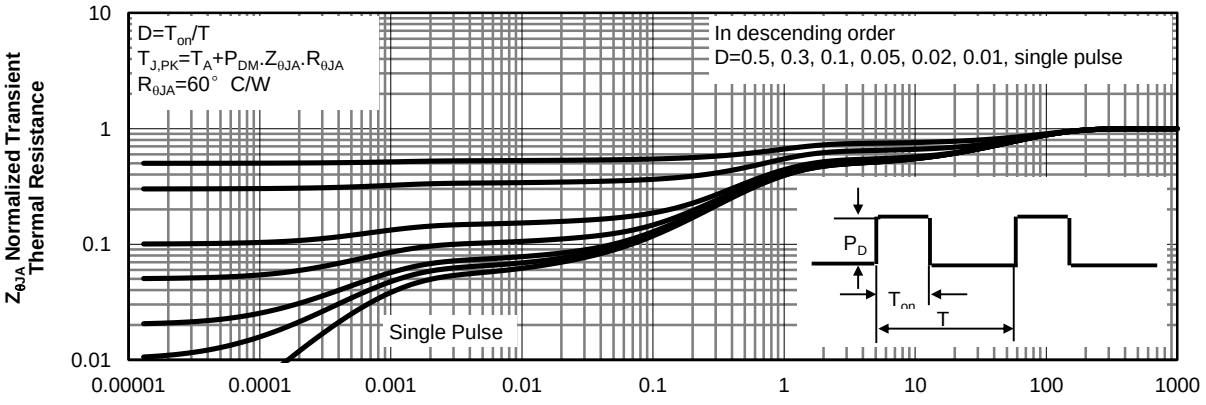
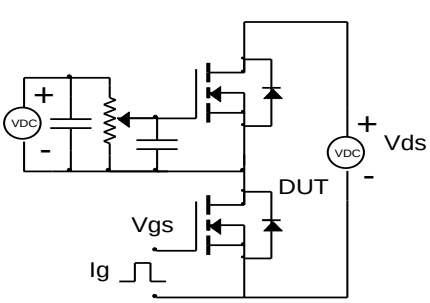
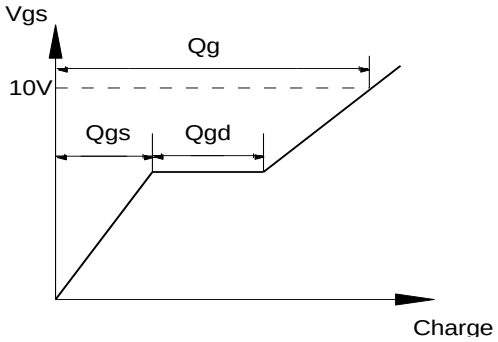


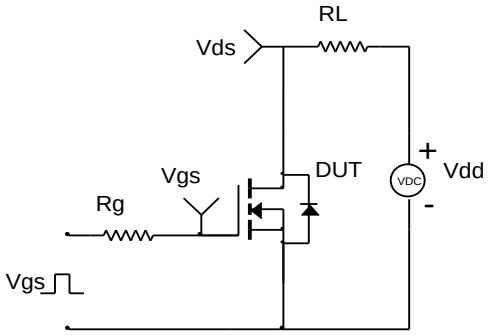

**Figure 11: Normalized Maximum Transient Thermal Impedance**

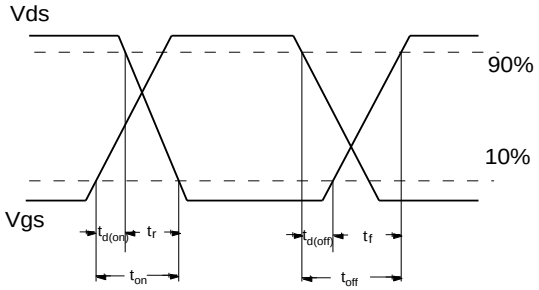
## Gate Charge Test Circuit & Waveform



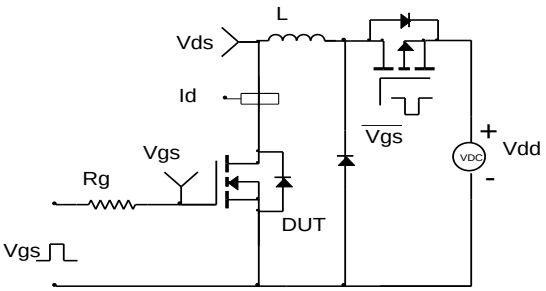



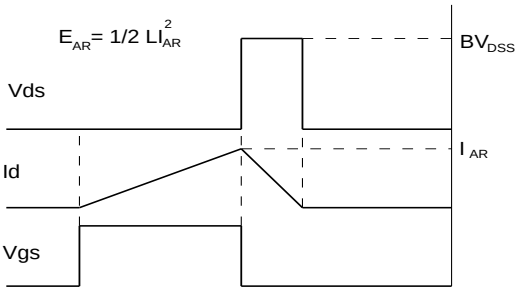

## Resistive Switching Test Circuit & Waveforms



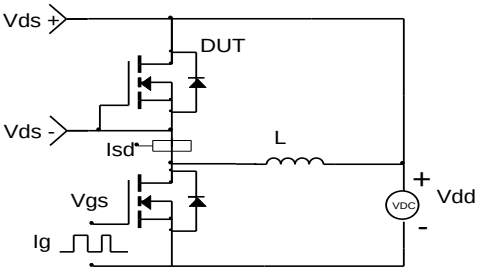



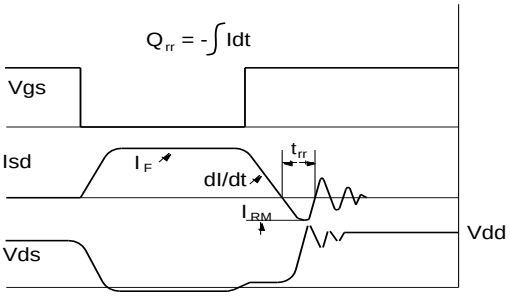

## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




## Diode Recovery Test Circuit & Waveforms



## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

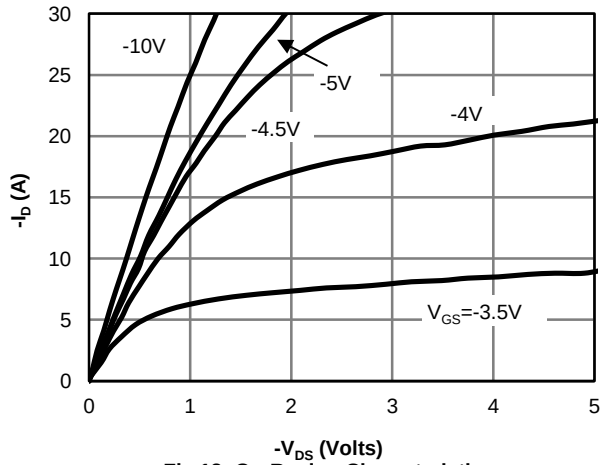



**Fig 12: On-Region Characteristics**

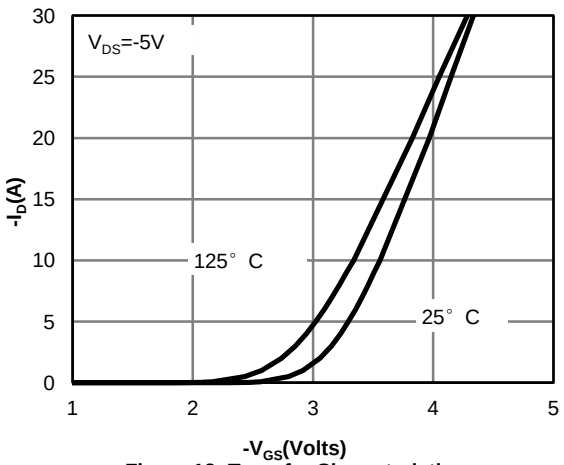



**Figure 13: Transfer Characteristics**

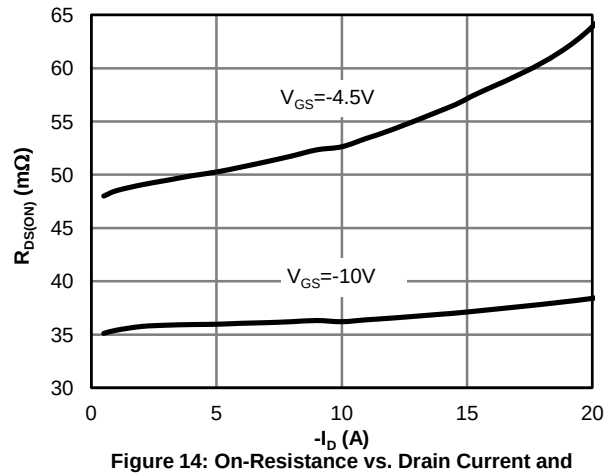



**Figure 14: On-Resistance vs. Drain Current and Gate Voltage**

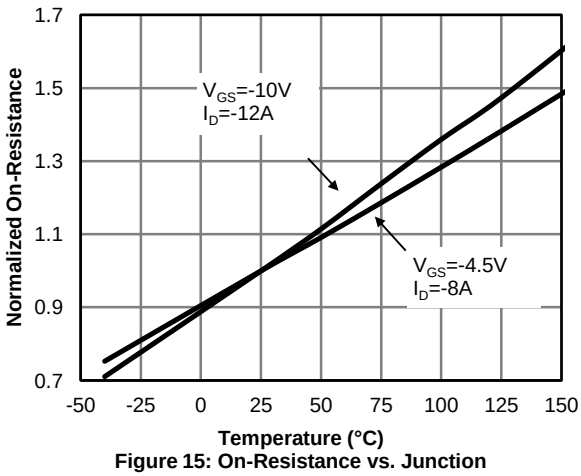



**Figure 15: On-Resistance vs. Junction Temperature**

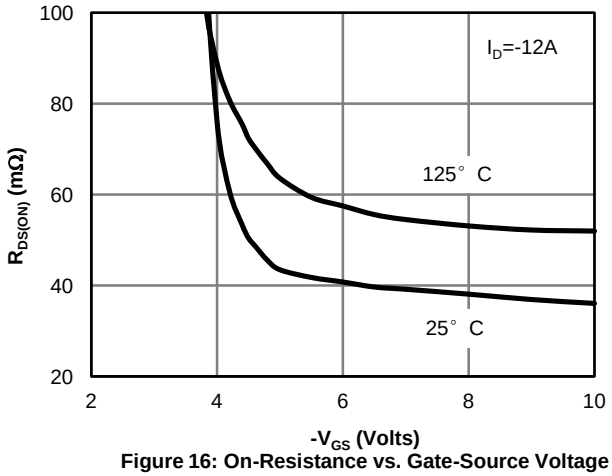



**Figure 16: On-Resistance vs. Gate-Source Voltage**

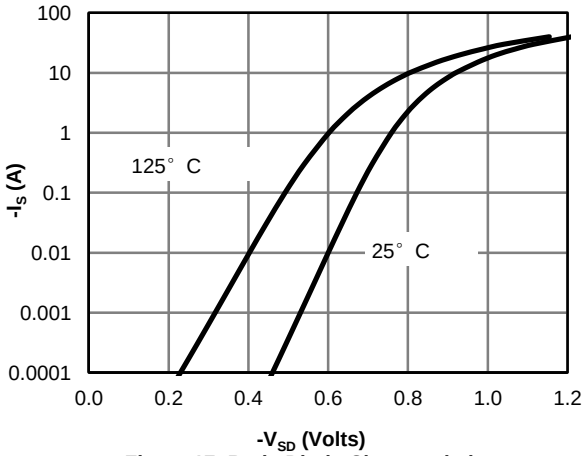



**Figure 17: Body-Diode Characteristics**

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

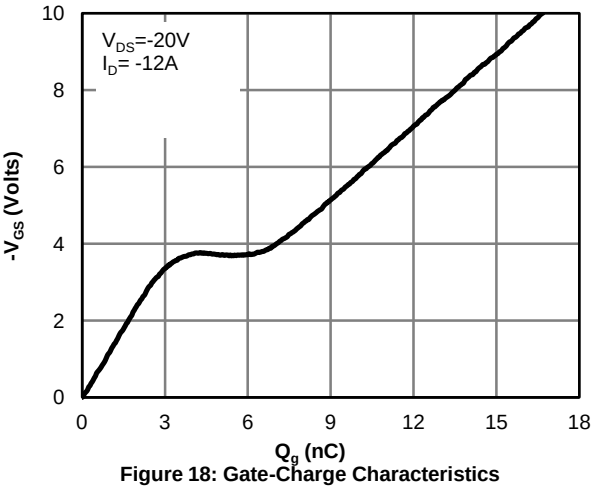



**Figure 18: Gate-Charge Characteristics**

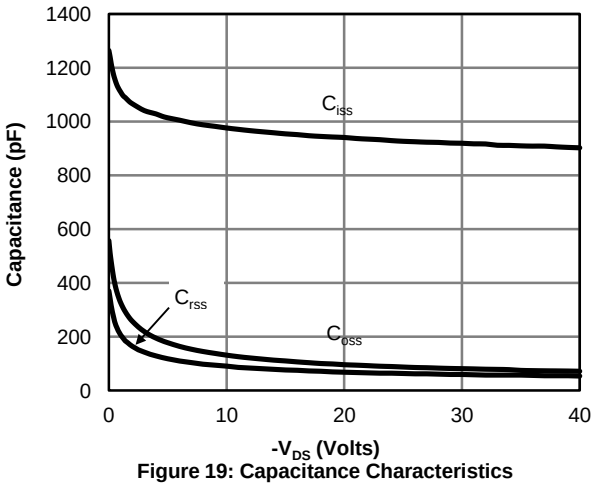



**Figure 19: Capacitance Characteristics**

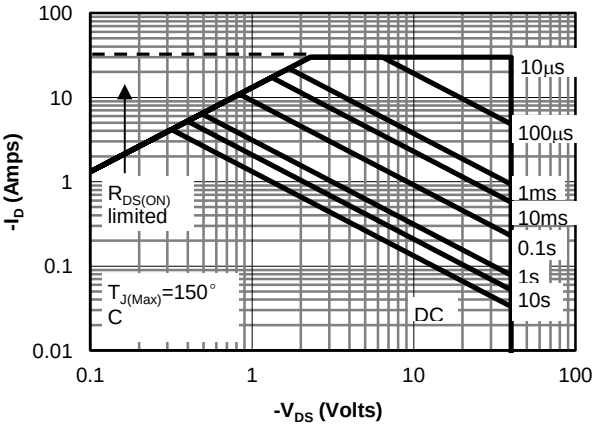



**Figure 20: Maximum Forward Biased Safe Operating Area (Note E)**

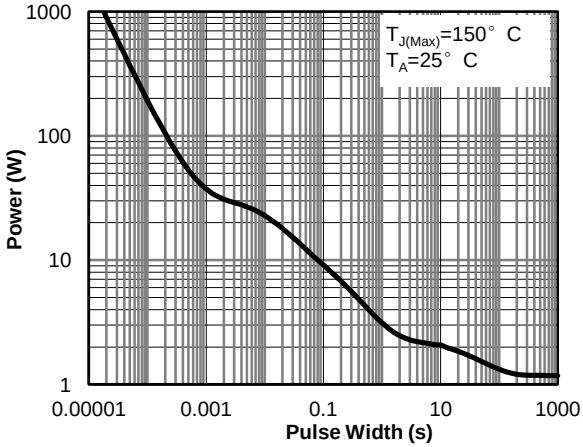



**Figure 21: Single Pulse Power Rating Junction-to-Ambient (Note E)**

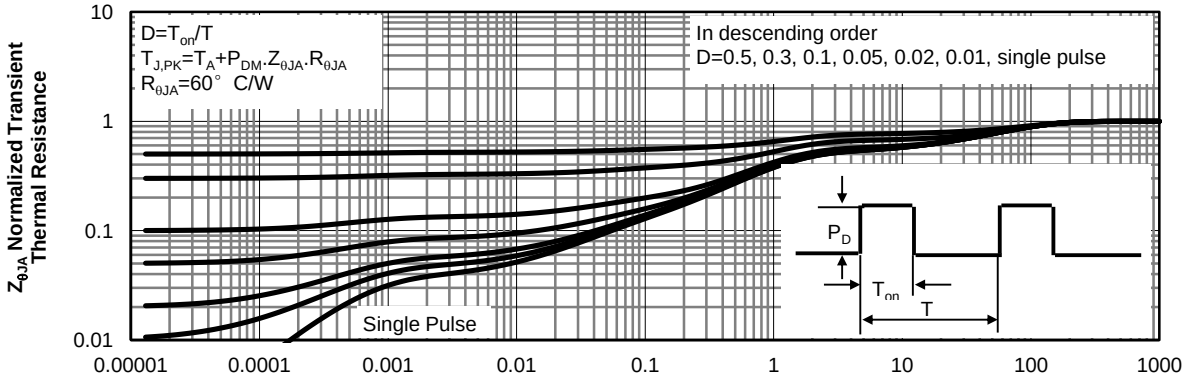
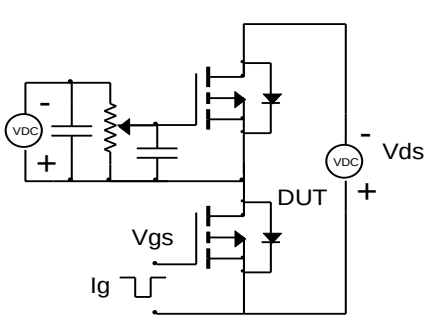
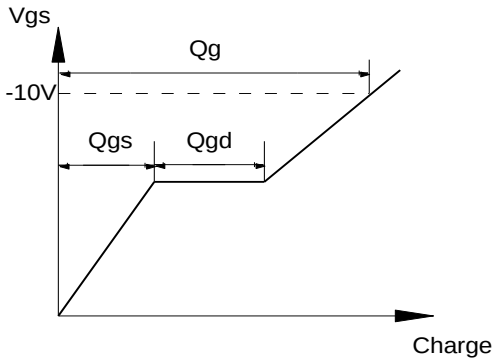


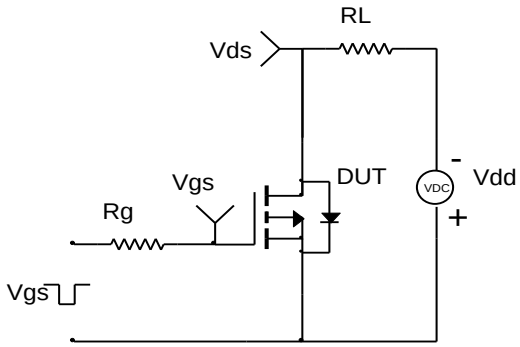

**Figure 22: Normalized Maximum Transient Thermal Impedance**

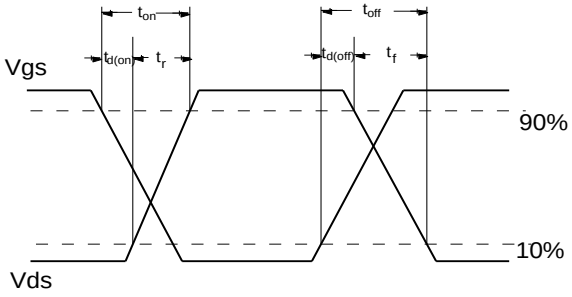
## Gate Charge Test Circuit & Waveform



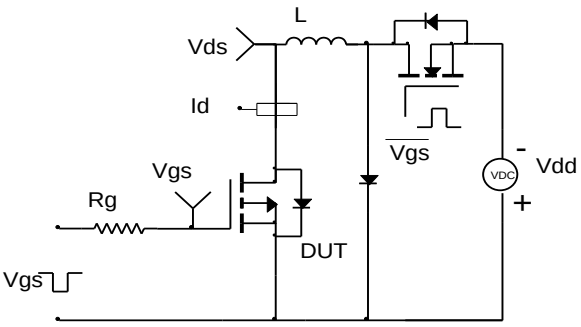



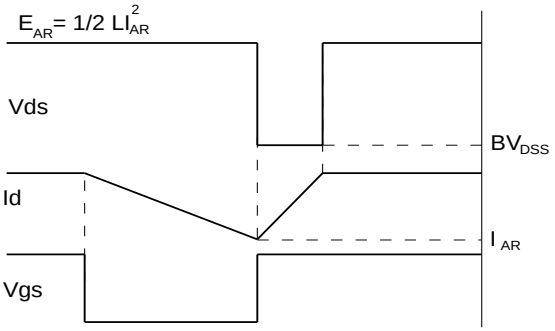

## Resistive Switching Test Circuit & Waveforms



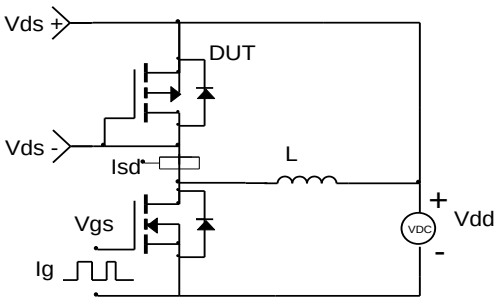



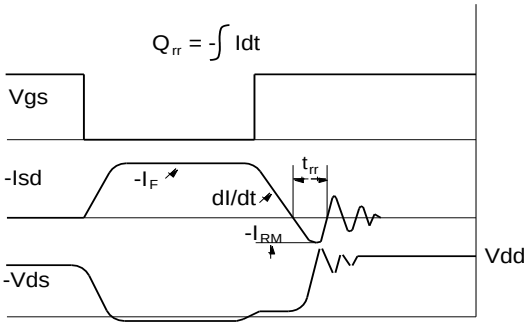

## Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




## Diode Recovery Test Circuit & Waveforms



# AOS Semiconductor
# Product Reliability Report

## AOD609, rev B

**Plastic Encapsulated Device**

**ALPHA & OMEGA Semiconductor, Inc**

**495 Mercury Drive**
**Sunnyvale, CA 94085**
**U.S.**

**Tel: (408) 830-9742** **www.aosmd.com**

ALPHA & OMEGA SEMICONDUCTOR

This AOS product reliability report summarizes the qualification result for AOD609. Accelerated environmental tests are performed on a specific sample size, and then followed by electrical test at end point. Review of final electrical test result confirms that AOD609 passes AOS quality and reliability requirements. The released product will be categorized by the process family and be monitored on a quarterly basis for continuously improving the product quality.

## Table of Contents:



## I. Product Description:

The AOD609 uses advanced trench technology MOSFETs to provide excellent $R_{DS(ON)}$ and low gate charge. The complementary MOSFETs may be used in H-bridge, Inverters and other applications.

-RoHS Compliant
-Halogen Free*

| Absolute Maximum Ratings $T_A$=25°C unless otherwise noted | | | | | |
|---|---|---|---|---|---|
| Parameter | | Symbol | Max n-channel | Max p-channel | Units |
| Drain-Source Voltage | | $V_{DS}$ | 40 | -40 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | ±20 | V |
| Continuous Drain Current [B,H] | $T_C$=25°C | $I_D$ | 23 | -20 | A |
| | $T_C$=100°C | | 17 | -14 | |
| Pulsed Drain Current [B] | | $I_{DM}$ | 30 | -30 | |
| Avalanche Current [C] | | $I_{AR}$ | 14 | -20 | |
| Repetitive avalanche energy L=0.1mH [C] | | $E_{AR}$ | 9.8 | 20 | mJ |
| Power Dissipation | $T_C$=25°C | $P_D$ | 27 | 30 | W |
| | $T_C$=100°C | | 14 | 15 | |
| Power Dissipation | $T_A$=25°C | $P_{DSM}$ | 2 | 2 | W |
| | $T_A$=70°C | | 1.3 | 1.3 | |
| Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | -55 to 175 | -55 to 175 | °C |

| Thermal Characteristics: n-channel and p-channel | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | | Symbol | Device | Typ | Max | Units |
| Maximum Junction-to-Ambient [A,D] | t ≤ 10s | $R_{\theta JA}$ | n-ch | 17.4 | 25 | °C/W |
| Maximum Junction-to-Ambient [A,D] | Steady-State | | n-ch | 50 | 60 | °C/W |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JC}$ | n-ch | 4 | 5.5 | °C/W |
| Maximum Junction-to-Ambient [A,D] | t ≤ 10s | $R_{\theta JA}$ | p-ch | 16.7 | 25 | °C/W |
| Maximum Junction-to-Ambient [A,D] | Steady-State | | p-ch | 50 | 60 | °C/W |
| Maximum Junction-to-Lead [C] | Steady-State | $R_{\theta JC}$ | p-ch | 3.5 | 5 | °C/W |

ALPHA & OMEGA SEMICONDUCTOR

## II. Die / Package Information:

| | AOD609 |
|---|---|
| **Process** | Standard sub-micron<br>Low voltage N+P channel process |
| **Package Type** | 3 leads TO252 |
| **Lead Frame** | Cu, S/pad, Ag spot |
| **Die Attach** | Ag epoxy |
| **Bond wire** | G:1.3 mils Au; S: 2mils Cu |
| **Mold Material** | Epoxy resin with silica filler |
| **Flammability Rating** | UL-94 V-0 |
| **Backside Metallization** | Ti / Ni / Ag |
| **Moisture Level** | Up to Level 1 * |

**Note *** based on info provided by assembler and mold compound supplier

## III. Result of Reliability Stress for AOD609

| Test Item | Test Condition | Time Point | Lot Attribution | Total Sample size | Number of Failures |
|---|---|---|---|---|---|
| **Solder Reflow Precondition** | **168hr 85°c /85%RH +3 cycle reflow@260°c** | **-** | **9 lots** | **1210pcs** | **0** |
| **HTGB** | **Temp = 150°c , Vgs=100% of Vgsmax** | **168 / 500 hrs**<br>**1000 hrs** | **1 lot**<br>**(Note A*)** | **82pcs**<br>**77+5 pcs / lot** | **0** |
| **HTRB** | **Temp = 150°c , Vds=80% of Vdsmax** | **168 / 500 hrs**<br>**1000 hrs** | **1 lot**<br>**(Note A*)** | **82pcs**<br>**77+5 pcs / lot** | **0** |
| **HAST** | **130 +/- 2°c , 85%RH, 33.3 psi, Vgs = 80% of Vgs max** | **100 hrs** | **9 lots**<br>**(Note B**)** | **495pcs**<br>**50+5 pcs / lot** | **0** |
| **Pressure Pot** | **121°c , 29.7psi, RH=100%** | **96 hrs** | **5 lots**<br>**(Note B**)** | **275pcs**<br>**50+5 pcs / lot** | **0** |
| **Temperature Cycle** | **-65°c to 150°c , air to air,** | **250 / 500 cycles** | **8 lots**<br>**(Note B**)** | **440pcs**<br>**50+5 pcs / lot** | **0** |

ALPHA & OMEGA SEMICONDUCTOR

## III. Result of Reliability Stress for AOD609

**Continues**

| | | | | | |
|---|---|---|---|---|---|
| **DPA** | **Internal Vision**<br>**Cross-section**<br>**X-ray** | **NA** | **5**<br>**5**<br>**5** | **5**<br>**5**<br>**5** | **0** |
| **CSAM** | | **NA** | **5** | **5** | **0** |
| **Bond Integrity** | **Room Temp**<br>**150°c bake**<br>**150°c bake** | **0hr**<br>**250hr**<br>**500hr** | **40**<br>**40**<br>**40** | **40 wires**<br>**40 wires**<br>**40 wires** | **0** |
| **Solderability** | **245°c** | **5 sec** | **15** | **15 leads** | **0** |
| **Solder dunk** | **260°c** | **10secs**<br>**3 cycles** | **1** | **30 units** | **0** |

**Note A:** The HTGB and HTRB reliability data presents total of available AOD609 burn-in data up to the published date.
**Note B:** The pressure pot, temperature cycle and HAST reliability data for AOD609 comes from the AOS generic package qualification data.

## IV. Reliability Evaluation

### FIT rate (per billion): 64
### MTTF = 1780 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOD609). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion hours.

**Failure Rate** = $Chi^2 \times 10^9$ **/ [**2 (N) (H) (Af)**]** = $1.83 \times 10^9$ / **[**2 (164) (500) (258)**]** = 64
**MTTF =** $10^9$ / FIT = $1.56 \times 10^7$hrs = 1780 years

**Chi²** = Chi Squared Distribution, determined by the number of failures and confidence interval
**N** = Total Number of units from HTRB and HTGB tests
**H** = Duration of HTRB/HTGB testing
**Af** = Acceleration Factor from Test to Use Conditions (Ea = 0.7eV and Tuse = 55°C)
Acceleration Factor [**Af**] = **Exp** [Ea / **k** (1/Tj u – 1/Tj s)]

**Acceleration Factor ratio list:**

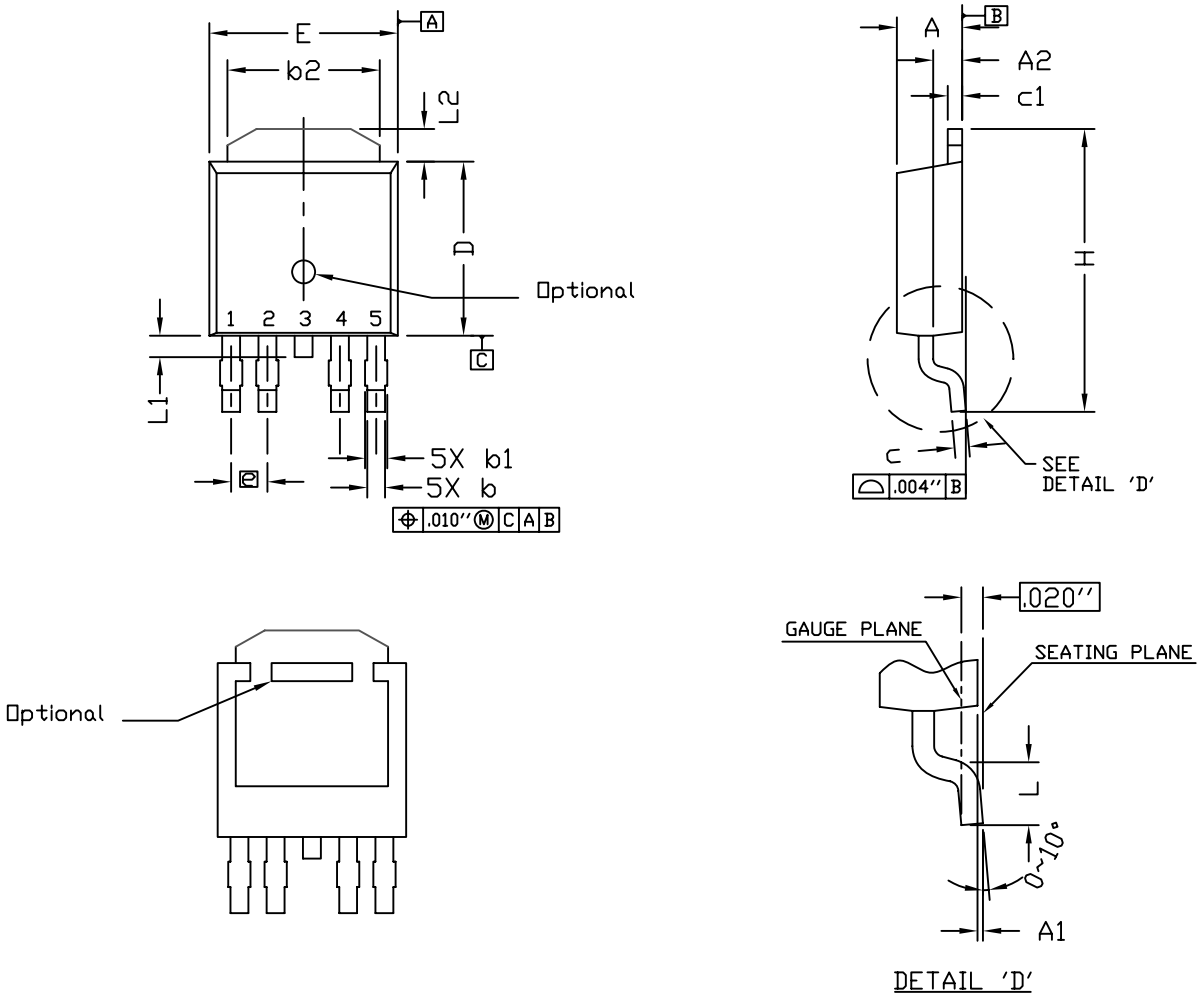
| | 55 deg C | 70 deg C | 85 deg C | 100 deg C | 115 deg C | 130 deg C | 150 deg C |
|---|---|---|---|---|---|---|---|
| **Af** | 258 | 87 | 32 | 13 | 5.64 | 2.59 | 1 |

**Tj s** = Stressed junction temperature in degree (Kelvin), K = C+273.16
**Tj u** =The use junction temperature in degree (Kelvin), K = C+273.16
**k =** Boltzmann's constant, $8.617164 \times 10^{-5}$eV / K

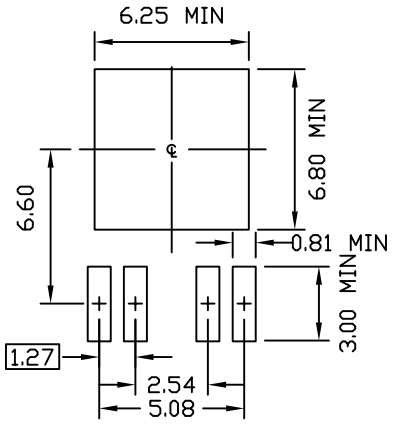
**ALPHA & OMEGA**
*SEMICONDUCTOR, LTD.*

| Document No. | PO-00033 |
|---|---|
| Version | rev E |

# TO252_4L PACKAGE OUTLINE




## RECOMMENDED LAND PATTERN




UNIT: mm

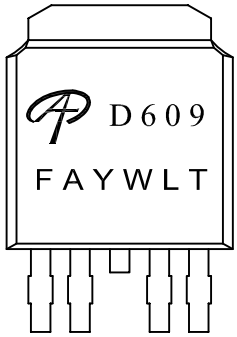
| SYMBOL | DIMENSION IN MILLIMETERS | | | DIMENSIONS IN INCHES | | |
|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | MIN. | NOM. | MAX. |
| A | 2.184 | 2.286 | 2.388 | 0.086 | 0.090 | 0.094 |
| A1 | 0.000 | ----- | 0.127 | 0.000 | ----- | 0.005 |
| A2 | 0.889 | ----- | 1.143 | 0.035 | ----- | 0.045 |
| b | 0.508 | ----- | 0.711 | 0.020 | ----- | 0.028 |
| b1 | 0.584 | ----- | 0.787 | 0.023 | ----- | 0.031 |
| b2 | 4.953 | ----- | 5.461 | 0.195 | ----- | 0.215 |
| c | 0.457 | 0.508 | 0.610 | 0.018 | 0.020 | 0.024 |
| c1 | 0.457 | ----- | 0.610 | 0.018 | ----- | 0.024 |
| D | 5.969 | 6.096 | 6.223 | 0.235 | 0.240 | 0.245 |
| E | 6.350 | 6.604 | 6.731 | 0.250 | 0.260 | 0.265 |
| e | 1.270 BSC. | | | 0.050 BSC. | | |
| H | 9.398 | ----- | 10.414 | 0.370 | ----- | 0.410 |
| L | 1.270 | ----- | 2.032 | 0.050 | ----- | 0.080 |
| L1 | ----- | ----- | 1.016 | ----- | ----- | 0.040 |
| L2 | 0.889 | ----- | 1.270 | 0.035 | ----- | 0.050 |

NOTE
1. PACKAGE BODY SIZES EXCLUDE MOLD FLASH AND GATE BURRS. MOLD FLASH SHOULD BE LESS THAN 6 MIL.
2. DIMENSION L IS MEASURED IN GAUGE PLANE.
3. TOLERANCE 0.10 mm UNLESS OTHERWISE SPECIFIED.
4. CONTROLLING DIMENSION IS MILLIMETER. CONVERTED INCH DIMENSIONS ARE NOT NECESSARILY EXACT.
5. REFER TO JEDEC TO-252 (AD).

ALPHA & OMEGA SEMICONDUCTOR

| Document No. | PD-00796 |
|---|---|
| Version | C |
| Title | AOD609 Marking Description |

# DPAK PACKAGE MARKING DESCRIPTION




Green product

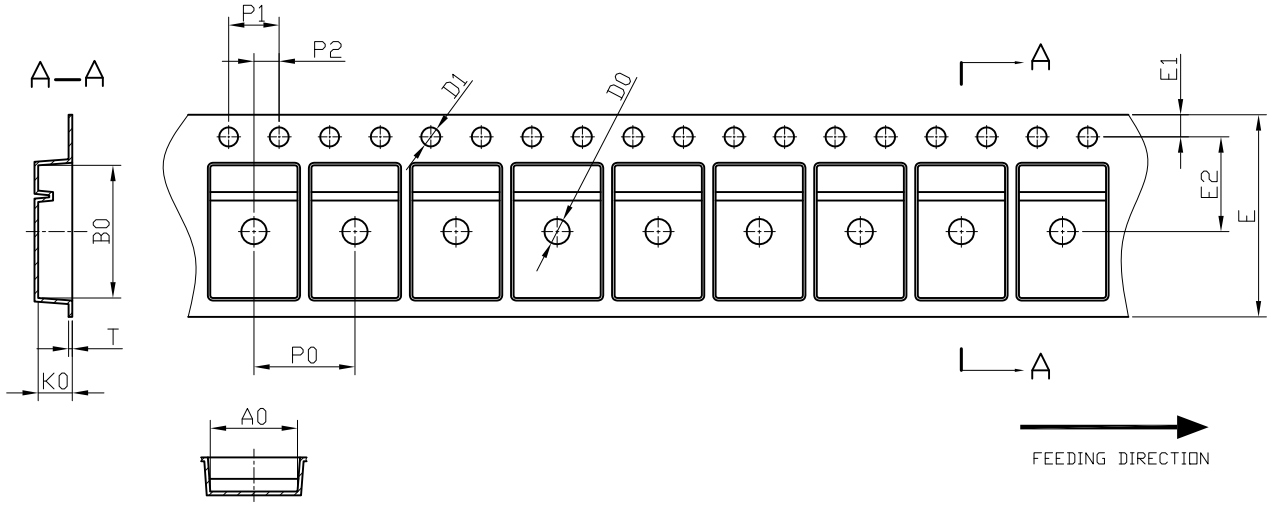
NOTE:
LOGO - AOS Logo
D609 - Part number code
F - Fab code
A - Assembly location code
Y - Year code
W - Week code
L&T - Assembly lot code

| PART NO. | DESCRIPTION | CODE |
|---|---|---|
| AOD609 | Green product | D609 |
| AOD609L | Green product | D609 |

**ALPHA & OMEGA SEMICONDUCTOR**

# TO-252-4L Tape and Reel Data

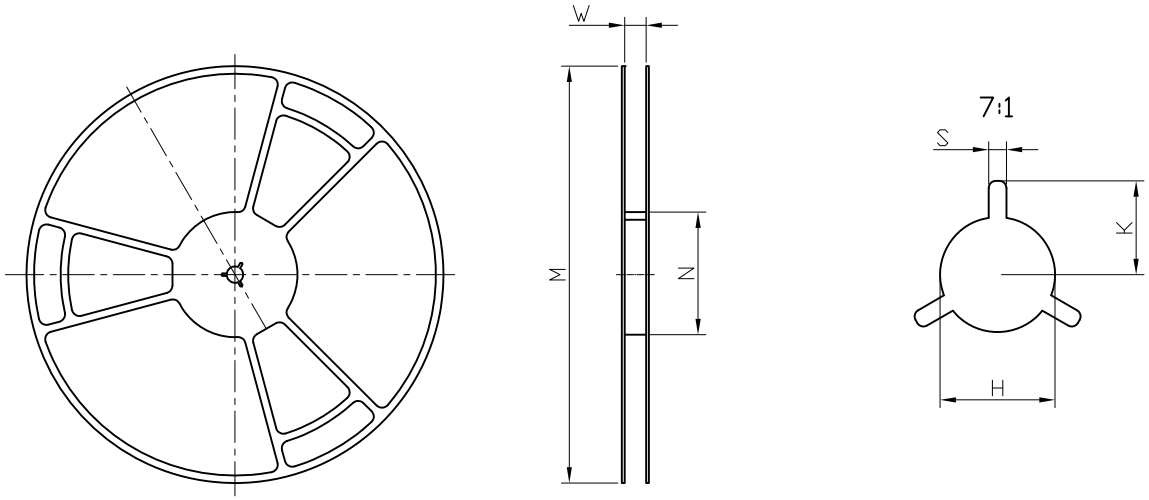
## TO-252-4L Carrier Tape




UNIT: MM

| PACKAGE | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TO-252-4L (16 mm) | 6.90 ±0.10 | 10.50 ±0.10 | 2.70 ±0.10 | 2.00 ±0.25 | 1.50 +0.1 −0 | 16.00 ±0.30 | 1.75 ±0.10 | 7.50 ±0.10 | 8.00 ±0.10 | 4.00 ±0.10 | 2.00 ±0.10 | 0.30 ±0.05 |

## TO-252-4L Reel




UNIT: MM

| TAPE SIZE | REEL SIZE | M | N | W | H | K | S |
|---|---|---|---|---|---|---|---|
| 16 mm | ø330 | ø330.00 ±0.5 | ø97.00 ±1.0 | 17.0 +1.5 −0 | ø13.00 +0.50 −0.20 | 10.6 ±0.25 | 2.0 ±0.5 |

## TO-252-4L Tape

Leader / Trailer & Orientation

Unit Per Reel: 2500pcs