AOS Semiconductor
Product Reliability Report

AOD417 rev B

Plastic Encapsulated Device

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This AOS product reliability report summarizes the qualification result for AOD417. 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 AOD417 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.

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I. Product Description:

The AOD417 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and low gate resistance. With the excellent thermal resistance of the DPAK package, this device is well suited for high current load applications.

-RoHS Compliant
-Halogen Free

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}	±20	V
Continuous Drain Current [B,G]	T_A=25℃ [G]	I_D	-25	A
	T_A=100℃		-20	
Pulsed Drain Current [C]		I_{DM}	-60	
Avalanche Current [C]		I_{AR}	-14	A
Repetitive avalanche energy L=0.3mH [C]		E_{AR}	30	mJ
Power Dissipation [B]	T_C=25℃	P_D	50	W
	T_C=100℃		25	
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	$R_{\theta JA}$	16.7	25	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		40	50	℃/W
Maximum Junction-to-Case [D]	Steady-State	$R_{\theta JC}$	2.5	3	℃/W

II. Die / Package Information:

	AOD417
Process	Standard sub-micron Low voltage P channel process
Package Type	3 leads TO252
Lead Frame	Bare Cu
Die Attach	Soft solder
Bond wire	S: Al, 12mils; G: Au, 1.3mils
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 AOD417

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 1000 hrs	1 lot (Note A*)	82pcs 77+5 pcs / lot	0
HTRB	Temp = 150°c , Vds=80% of Vdsmax	168 / 500 hrs 1000 hrs	1 lot (Note A*)	82pcs 77+5 pcs / lot	0
HAST	130 +/- 2°c , 85%RH, 33.3 psi, Vgs = 80% of Vgs max	100 hrs	9 lots (Note B*)	495pcs 50+5 pcs / lot	0
Pressure Pot	121°c , 29.7psi, 100%RH	96 hrs	5 lots (Note B*)	275pcs 50+5 pcs / lot	0
Temperature Cycle	-65°c to 150°c , air to air,	250 / 500 cycles	8 lots (Note B*)	440pcs 50+5 pcs / lot	0

III. Result of Reliability Stress for AOD417

Continues

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

Note A: The HTGB and HTRB reliability data presents total of available AOD417 burn-in data up to the published date.
Note B: The pressure pot, temperature cycle, HAST and HTS reliability data for AOD417 comes from the AOS generic package qualification data.

IV. Reliability Evaluation

FIT rate (per billion): 128
MTTF = 891 years

The presentation of FIT rate for the individual product reliability is restricted by the actual burn-in sample size of the selected product (AOD417). Failure Rate Determination is based on JEDEC Standard JESD 85. FIT means one failure per billion device hours.

Failure Rate = $Chi^2 \times 10^9$ **/** **[**2 (N) (H) (Af)**]** = 1.83×10^9 / **[**2 (164) (168) (258)**]** = 128
MTTF = 10^9 / FIT =7.81×10^6hrs =891 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, 8.617164×10^{-5}eV / K