ALPHA & OMEGA SEMICONDUCTOR, INC.

Failure Analysis Report

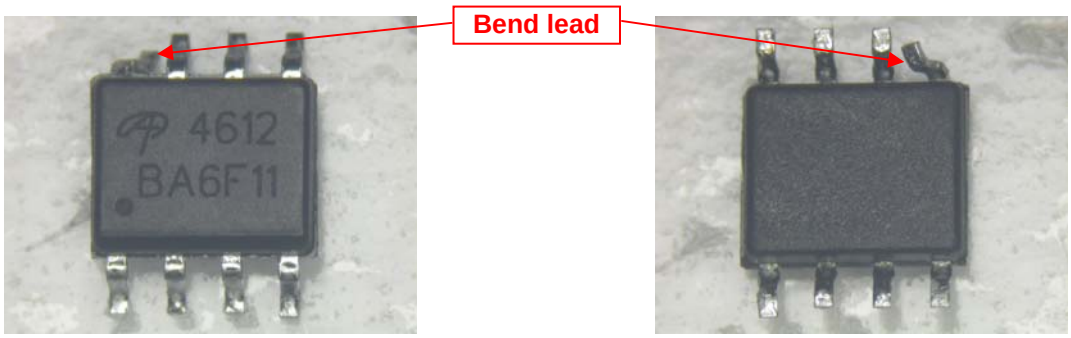
I. AOS Report	
FA No: **CR07A0012**	Report Date: **Jan 8, 2007**
Customer FA No: **VIT71010.50**	Manager: **Zhiqi Wang**
Requested By: **Chih Hung Yu**	FA Engineer: **Ni Di**
II. Product Information	
Part Number: **AO4612**	No. of Unit returned: **1**
Package Type: **SOP-8**	MOSFET Type:
III. Customer Information	
Customer: **Logah**	Customer Return Date: **Jan 8, 2007**
Reason(s) for return: **AO4612 GDS short**	
IV. Initial Observation	
Product Status: **Mass Production**	Application: **DC-AC**
Functional Failure Occur During: **StartUp**	Manufacture Failure Occur During: **Steady-State**
Failure Found At: **one-reel**	Total No. of units used: **32767**
Total No. of units failed: **1**	Failure Rate(%): **0.0031**
Same Date Code?: **Yes**	Did the circuit work again after replacing the failed unit with another part?: **Yes**
FAE Comments:	

Parts Detail				
#	Marking	Date Code	Failure Mode	Visible Damage
1	**BA6F11**	**6F**	**GDS**	**No**

V. Package Visual Inspection

One unit was returned for failure analysis.

SN1



Top view(BA6F11) Bottom view

Pin4 lead bend was observed.
Solder and flux were observed on the external leads.

VI. Testing and Failure Verification

ATE testing:

The unit was ATE tested and verified in curve tracer for device characteristic.

die1:

MOSFET N-channel	Igss A	Igssr A	Idss A	Bvdss V	Vgsth V	Confirm in curve tracer
Spec. max	8.00E-08		1.00E-07	90.0	2.7	
min		-8.00E-08		61.0	2.0	
SN1	1.00E-04	-1.00E-04	1.00E-03	3.4	0.0	GDS short

die2:

MOSFET P-channel	Igss A	Igssr A	Idss A	Bvdss V	Vgsth V	Confirm in curve tracer
Spec. max		8.00E-08		-61.0	-1.7	
min	-8.00E-08		-1.00E-07	-80.0	-2.3	
SN1	-1.00E-04	1.00E-04	-1.00E-03	0.0	0.0	GDS short

Note: * denote measurements at the compliance limits

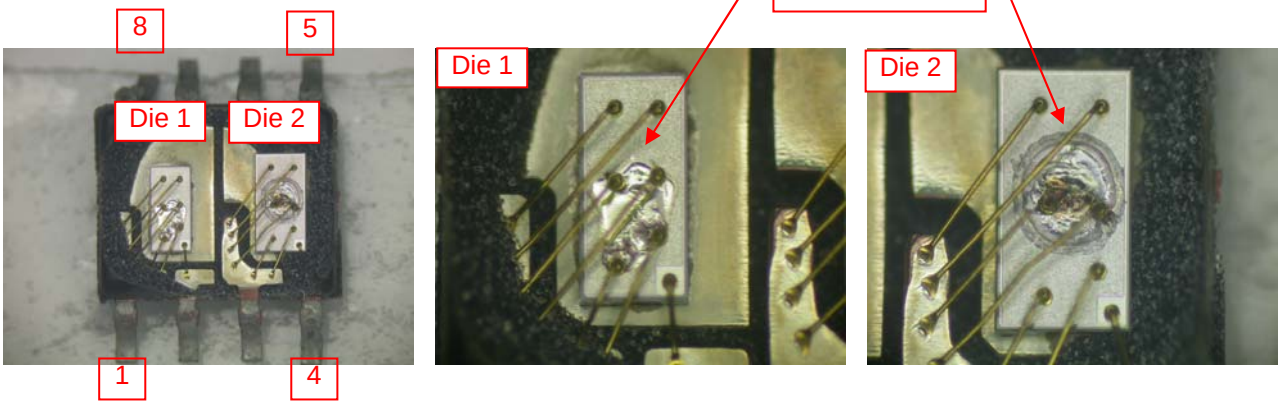
Results:

The unit failed due to GDS short on both die.

VII. Physical Analysis

The failed unit was decapped for further analysis.

SN1



Note: Melted metal & burn mark were found on source active region.

VIII. Discussion	
Summary of observations	
Observation: Identified failure mode: Decapsulation:	One unit was returned from Logah for failure analysis. Pin4 lead bend was observed. Solder and flux were observed on the external leads. The unit failed due to GDS short on both die. The failed unit was decapped for further analysis. Melted metal & burn mark were found on source active region.
Possible root causes	
EOS	The observed carbonized molding compound and alloyed / discolored metal on the active region are typical result of electrical overstress(EOS) due to high current flow and the associated high heat generation. This indicated that the device might operate out of safe-operating-area (SOA) which caused the electrical overstress damage. In general, the high heat that carbonization need is caused by high current flow in device and the over heat will drive the temperature up to the burning point of molding compound and make it carbonized or make metal on the device melted. Review of the wafer and final test yield summary showed that the shipped units with the yield above the average and passed both AOS outgoing final test and QA screen. AOS acknowledge the failure observed by the customer and appreciate the customer's time and effort to help AOS responding the suspected issue and correct some deficiency. However, the obvious symptom of root cause could be masked out by burnt mark/carbonized molding compound, AOS has recorded this reported failure using a tracking no. For just one failure was returned from customer, it also could be an infant mortality or random failure. Should the units continue to fail, Logah may consult with AOS application engineer for further assistance.
Corrective action	