FAIRCHILD SEMICONDUCTOR™ Fairchild Semiconductor

8D Corrective Action Report

Device: FSD200B **PQA Number: 2007360025**

Final 8D

Date: 2007-09-09 **Author: LEE BYOUNGHYUN**

Failure analysis is performed as a technical service to the users of microcircuits manufactured by Fairchild Semiconductor Corporation (Fairchild). Failure Analysis Reports or PQA Reports are considered proprietary to Fairchild and are furnished by Fairchild on the sole condition that the user agrees not to disclose any contents of the Failure Analysis Report to a third party. Information conveyed in these reports in no way alters Fairchild's product warranty policy and under no circumstances can these reports be used as an authorization to return product to Fairchild.

Customer Information:

Name: WINTECH
Location: , ,HKG
Part Number:

Contacts:

Name	Phone	Fax	Email
Charlie,He			Charlie.He@wtmec.com

Reference Documents:

Reference Type	Reference Number

Summary/Abstract:

21pcs of FSD200B were returned from WanJi due to a function failure at the qualification stage.

18pcs(SN #1,2,3,4,5,6,7,8,9,11,13,14,15,16,18,19,20,21) out of 21pcs showed PKG burnt mark and fused wire at pin#7, and the rest 3pcs(SN#10,12,17) were normal in visual and x-ray inspection. Only 3pcs were subjected to ATM and they were sorted as the good through its production PGM. And the rest 18pcs could not be tested due to burnt and fused wire at pin#7. In V-I curve test, the failed 18pcs showed open or short failure among pins and the rest 3pcs(SN#10,12,17) were normal.

Some(1,5,9,15,19) of the failed samples were performed chemical de-capsulation using fuming nitric acid due to the same failure mode and then inspected with microscope. The samples showed huge damaged mark on the Power IC. FKS(Fairchild Korea Semiconductor Ltd.) could not define exact root cause due to severe burnt from this FA. Thus, FKS would like to present some possible causes to better understand this failure in customer side.

. If Vcc or Vfb of Control IC is slightly damaged by ESD or EOS, and then when set application is starting, the control IC is doing in malfunction. Then the Control IC opens fully MOSFET's Gate. So this wrong operating is able to result in PKG exploded or PKG burnt failure.
. If the Transformer was short circuit, it causes the device to be failure.

. If Transformer is designed tightly, the transformer could be saturated during set starting or operating under hot temp. If so it could occur severe burnt or PKG exploded failure. So we can calculate the Flux Density as below.

$$\frac{L_m \times I_{Lim}}{N_p \times A_e} = B$$

Proper value of flux density to avoid saturation is B=0.3~0.35T.
Also usually the core saturation point can be calculated by using below equation:

i_sat = (Np * B * Ae)/Lm

. If surge voltage or Noise is applied to Vcc or Vfb during the working or testing, it could make control IC wrong operating and then the Control IC opens fully MOSFET's Gate. So this wrong operating is able to result in severe burnt or PKG burnt failure.
. If the BVdss of SenseFET(guaranteed 700V) is under 300~400V by any reason , it could happen PKG exploded or PKG burnt during the starting or the working.
. If there is output diode short or output short condition, the PKG could be exploded or burnt for the drain of Power IC will be over 650V at that time. This abnormal condition happened and then an inrush current flowed through the component in too short time (under 700ns).

Team Members:

Name	Type	Phone
LEE BYOUNGHYUN	Primary contact for this file	
Xu Justin	CQE	
Park SeolHee		

Problem Description:

Customer Claim: after 3 hours aging, function fail. F/R is about 2%-3%.

Critical Comments :

Device Info:

Package	Leads	Stampoff
PDD STD_7DIP-300	0007	

Division: APG
Product Group: GREEN_FPS
Accounting Group: 0SG

Datecode	Die Run	Quantity	Top marking
0625		20	DVG25

Reported Fail Status: Burn-in
Reported Fail Temperature:
Reported Test Condition: Electrical

Attachment

Containment Actions:

Action	N/A
Assigned To	LEE BYOUNGHYUN
Actual Completion Date	2007-09-09

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Define Root Cause:

Findings During This Analysis:

Top Marking	Serial Number
DVG25	1
DVG25	10
DVG25	11
DVG25	12
DVG25	13
DVG25	14
DVG25	15
DVG25	16
DVG25	17
DVG25	18
DVG25	19
DVG25	2
DVG25	20
DVG25	3
DVG25	4
DVG25	5
DVG25	6
DVG25	7
DVG25	8
DVG25	9

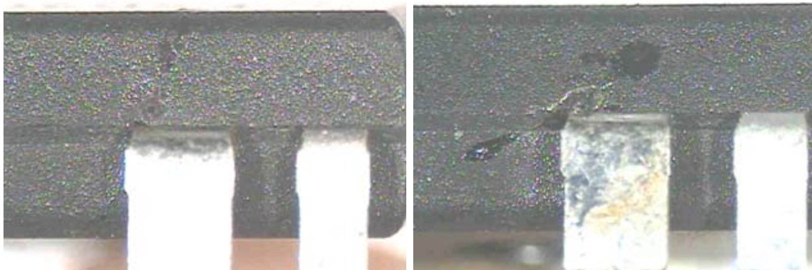
Process name: Initial Verification
Person responsible: LEE, BYOUNGHYUN
ATE Verification: only 3pcs were subjected to ATM and they were sorted as the good through its production PGM. And the rest 18pcs could not be tested due to burnt and fused wire at pin#7.
External Visual: 18pcs out of 21pcs showed PKG burnt mark and fused wire at pin#7, and the rest 3pcs(SN#10,12,17) were normal in visual and x-ray inspection.

Attachment

Process name: Failure Analysis 1
Person responsible: LEE BYOUNGHYUN
Results Comments:

Process name: Root Cause Analysis
Person responsible: LEE BYOUNGHYUN
Results Comments:

[Attachment]
1. The view of PKG outside and inside. (18pcs showed similar PKG burnt and fused wire at pin#7)



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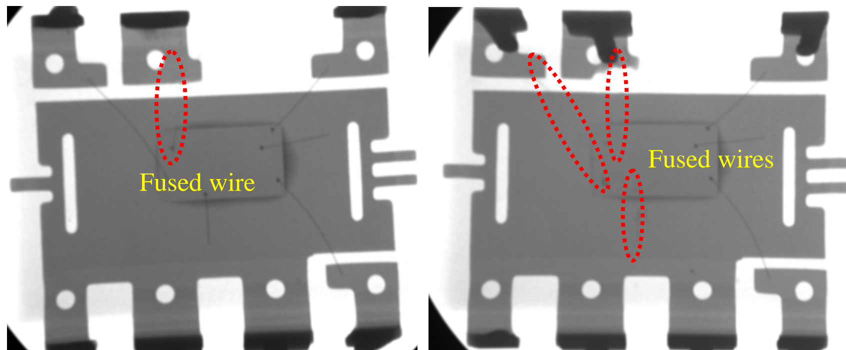
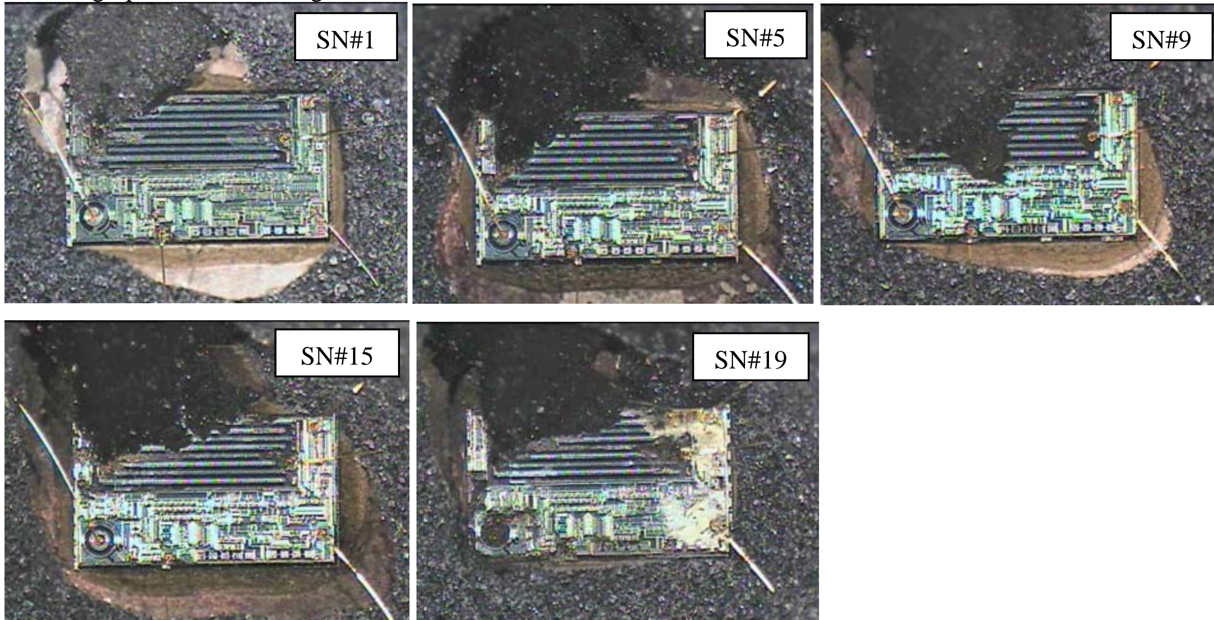


2. ATE data.

The samples(18pcs: #1,2,3,4,5,6,7,8,9,11,13,14,15,16,18,19,20,21) were not subjected to ATM in order to avoid additional electrical damage. Only rests 3pcs(SN#10,12,17) were sorted as the good through its production PGM with ATM.

C:₩Documents and Settings₩info

3. Photographs after removing EMC.



Verify Corrective Actions:

Action	N/A
Person Responsible	LEE BYOUNGHYUN
Estimated Completion Date	2007-09-09
Step Completed Date	2007-09-09
Implement	No

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Implement Corrective Actions:

Action
Person Responsible
Estimated Completion Date
Step Completed Date
Implement

Prevent Re-ocurrence:

Action
Person Responsible
Estimated Completion Date
Step Completed Date

Closure:

Disposition of units: the sample(s) is (are) kept in CQE.
If you have any questions about the result, please feel free to contact regional CQE.

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