



InPower Semiconductor Co., Ltd

No. 9, Dai Shun Street, Tai Po Industrial Estates, Tai Po, N.T., Hong Kong

FAILURE ANALYSIS REPORT

Customer: 晶门 (营格)
Evaluation Item: FTA06N65
FA No.: CP-12084 FA-12084
Requested by: Sales/IPS
Completed by: David
Completed Date: 11/2/2012

Background & Customer Request:

Customer part number:
IPS part number: FTA06N65
Date Code(s): YKE2/YLB2/YLG2/YLF2
Package Type: T0-220F
Quantity Received: 8 pcs
Date Received: 10/25/2012

Failure Condition:

Customer sent 8pcs FTA06N65 for analysis. Physically inspection had been performed; mechanical characteristics of the sample is good except solder residues indicating the sample was removed from systems.

Evaluation Methodology:

We sent these samples to do failure analysis. Three failure analysis steps were taken to identify the possible electrical failure mode by using TESEC test system、X-ray machine and optical microscope.

- (1). Devices were tested by TESEC test system for DC parameters.
- (2). Devices were inspected by X-ray machine .
- (3). Optical Microscope was used to inspect the parts for possible failure site.

Evaluation Results:



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1、 We sent 8pcs devices to do DC test by TESEC test system.

The test result as follow:

TEST#	1	2	3	4	5	6	7	8	9	10	11	12	13	
ITEM	CONT	ISGS	IDSS	IDSS	BVDSS	BVDSS	BVDSS	VTH	SAME	RDON	VFSD	ISGS	ISGS	
LIMIT	<0.000	<100nA	<16uA	<20uA	>658V	>658V	>658V	>2.05V	<3.95V	<1.22R	>500mV	<100nA	<100nA	
BIAS1		VSG	VDS	VDS	ID	ID	ID	IG	T#	ID	ID	VSG	VSG	
BIAS1	0.00	45V	520V	650V	250uA	1mA	10mA	250uA	8.0	3.6A	6A	30V	30V	
BIAS2		IMAX	IMAX	IMAX	VMAX	VMAX	VMAX			VG		IMAX	IMAX	
BIAS2	0.00	990uA	990uA	990uA	780V	780V	780V	0.00	0.00	10V	0.00	990uA	990uA	
SER#	BIN#													
1	6	PASS	1E-06	1E-04	0.02034	0	0	0	0	0	0.2763	0.815	1E-06	1E-06
2	6	PASS	1E-06	1E-04	0.0202	0	0	0	0	0	0.1952	0.791	1E-06	1E-06
3	6	PASS	1E-06	1E-04	0.02039	0	0	0	0	0	0.428	0.833	1E-06	1E-06
4	6	PASS	1E-06	1E-04	0.02039	0	0	0	0	0	0.1683	0.773	1E-06	1E-06
5	6	PASS	1E-06	1E-04	0.02042	0	0	0	0	0	0.3188	0.822	1E-06	1E-06
6	6	PASS	1E-06	1E-04	0.02038	0	0	0	0	0	0.1716	0.78	1E-06	1E-06
7	6	PASS	1E-06	1E-04	0.02036	0.1	0.5	1	0	0	1.523	0.851	1E-06	1E-06
8	6	PASS	1E-06	1E-04	0.02035	0.2	0.3	1.1	0	0	1.853	0.859	1E-06	1E-06

The devices are all failed in our FT test.

2、 We sent the samples to do X-ray Analysis. Take photos for devices with X-ray machine is showed as below.

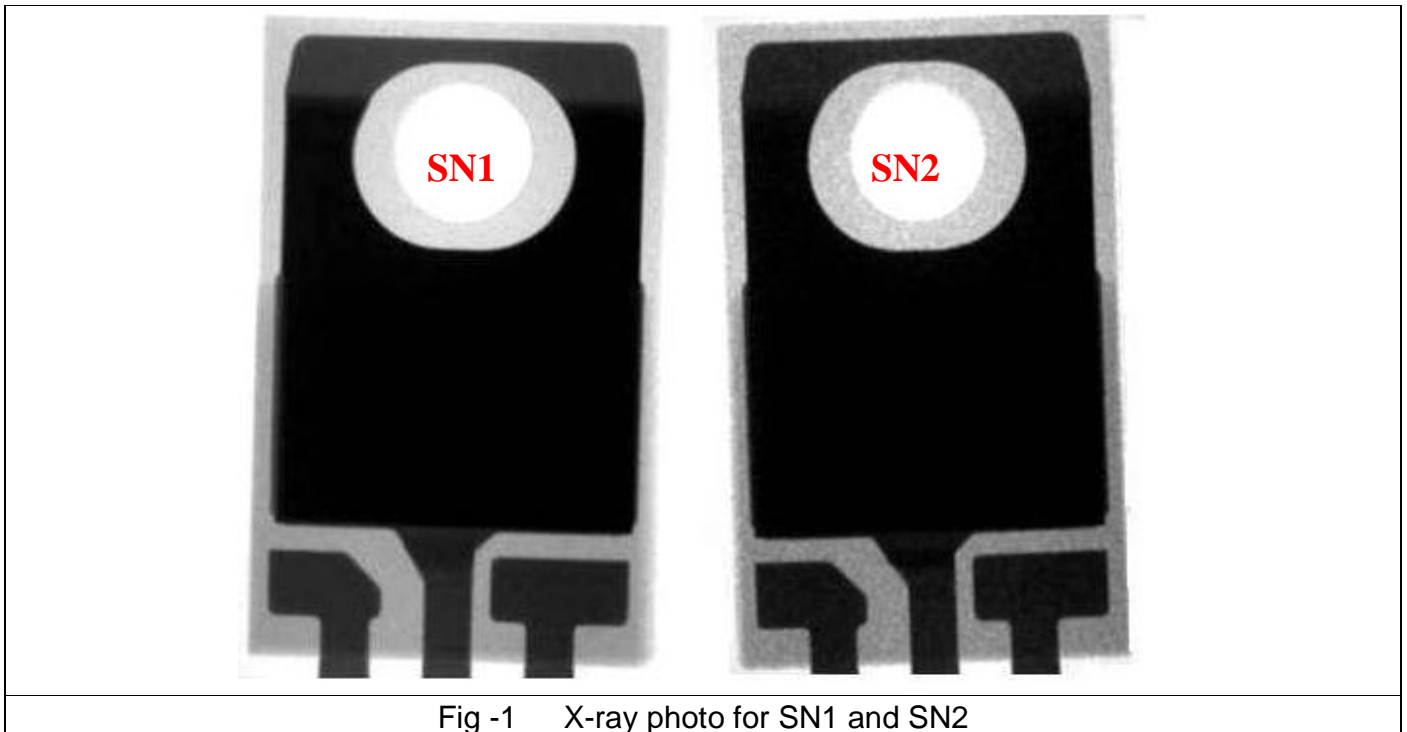


Fig -1 X-ray photo for SN1 and SN2

There's no assembly defect on the TO-220F packaged devices.

3、 De-capsulation and visual inspection .The typical photos are shown in Figure 2-7



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Fig-2 Top View Photo for SN1~SN8

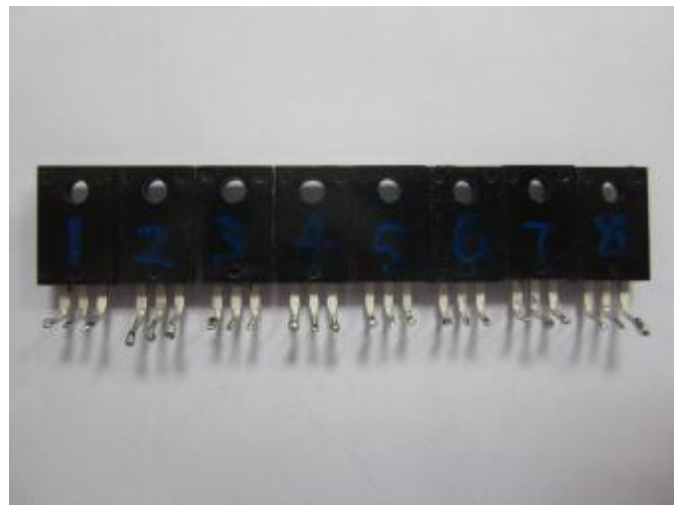


Fig-3 Back View Photo for SN1~SN8

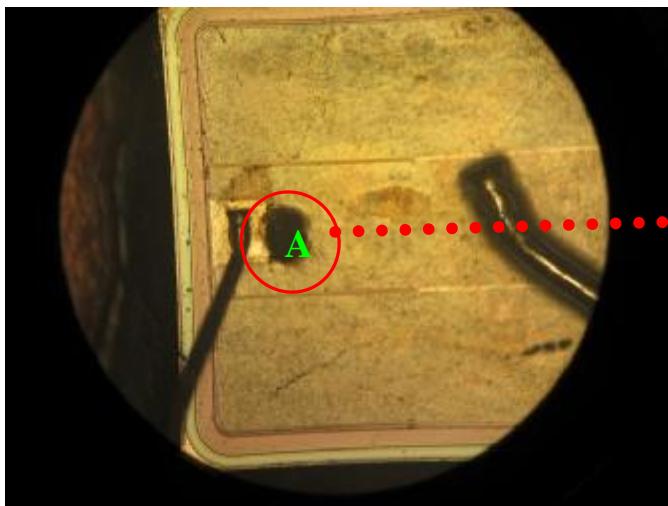


Fig-4 De-capsulation Photo for SN1

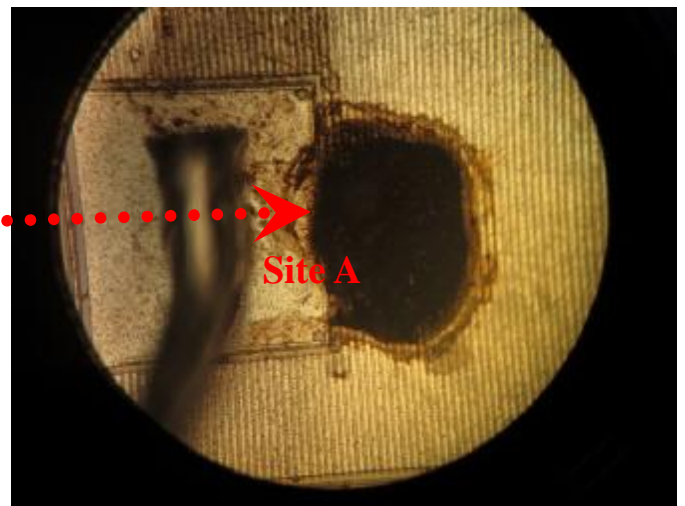


Fig-5 Closer view of Failure site A in SN1

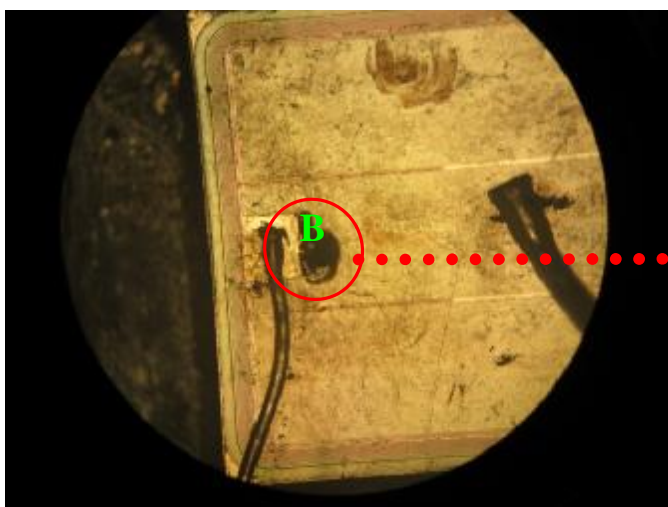


Fig-6 De-capsulation Photo for SN2

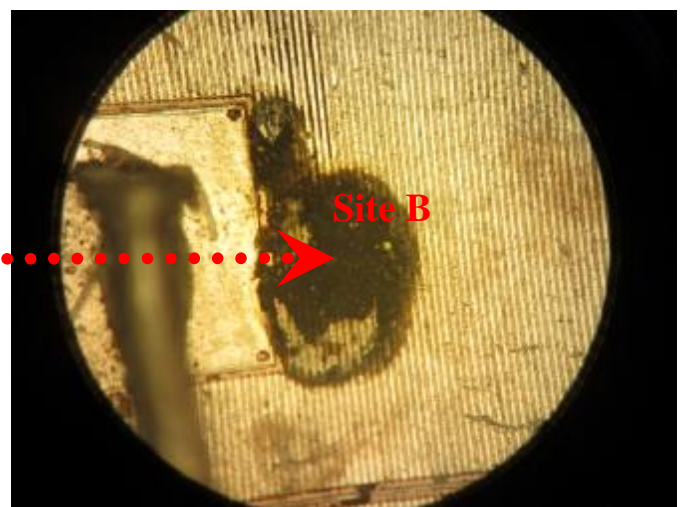


Fig-7 Closer view of Failure site B in SN2



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Summary & Recommendation:

1. The devices are shorted on gate and drain and source terminals which are failed in our FT test.
2. There's no assembly defect on this TO-220F packaged devices, as checked by X-ray machine and shown in Figure 1.
3. De-capsulation on SN1 and SN2 exhibit the burnt sites happened on the Gate and Source area. Electrical over stress (EOS), especially over Gate Voltage applied to MOSFET is the likely root cause. Special cares on the spike voltage is necessary to keep MOSFET from over -voltage failures.

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