

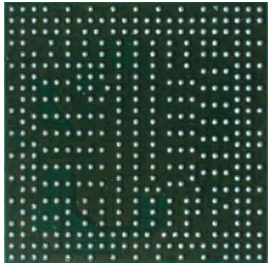
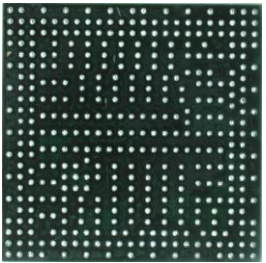
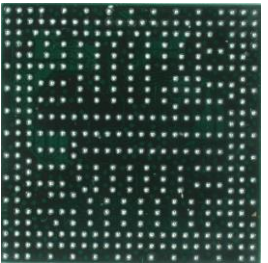
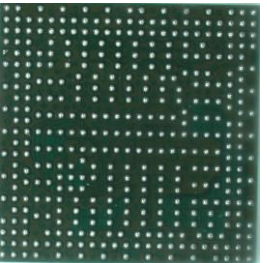
Failure Analysis Report

TO: FOXCONN		Due Date: 2023-12-12		
ATTN:		Open Date: 2023-11-29		
FROM: Amlogic		CC:		
☒ AMLOGIC FA NO. : FAZ231120				
SUBJECT: S905X2-B				
DISCIPLINE 1	INTERNAL MEMBER	EXTERNAL MEMBER		
USE TEAM APPROACH:	Member: CQE team, FAE team, test team, Sales team, Software team, etc.	Member: NA		
DISCIPLINE 2	ISSUE DESCRIPTION			
Customer: FOXCONN Device: S905X2-B Qty: 4ea				
Problem description: The customer returned 4pcs S905X2-B chips for failure analysis . Detail information of chip as following :				
No.	PN	Lot No.	Date Code	Defect symptom
#1	S905X2-B	PVY048.00	E2230909E267	Abnormal reboot after system hangup (Unstable)
#2	S905X2-B	P2XK63.0002	E22334D01104	Abnormal reboot (auto reboot before 2-5mins)./ bootup can not success
#3	S905X2-B	P2YB98.0007	E22334B82109	Abnormal reboot (auto reboot before 2-5mins)./ bootup can not success
#4	S905X2-B	PSY662.00	E22309041N31	UI screen is unstable (broken)
DISCIPLINE 3	Containment Action			
Perform analysis for suspect chips which were returned by customer to find root cause.				
DISCIPLINE 4	Issue Investigation			

FA analysis as following :

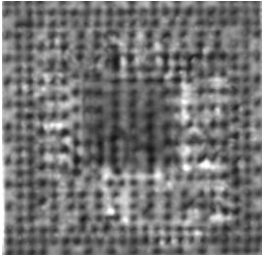
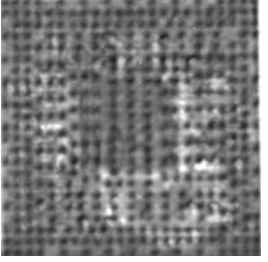
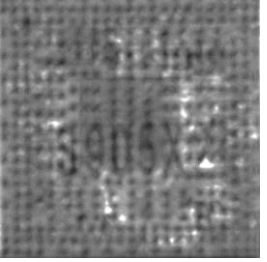
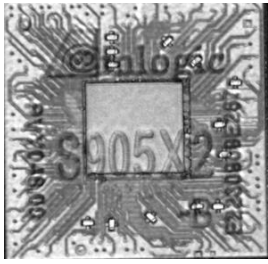
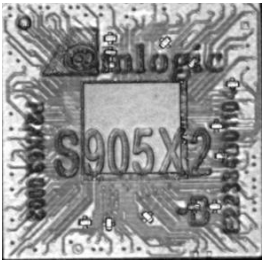
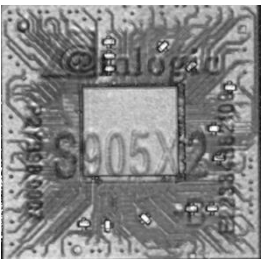
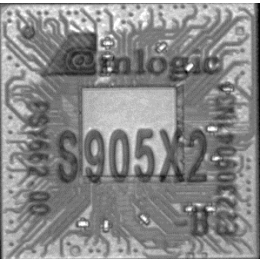
1. External Visual Examination

The external condition of the unit was inspected by stereo microscope.
No obvious crack or warpage etc was observed.

No.	#1	#2	#3	#4
Top				
Bottom				

2. Scanning Acoustic Microscopy Inspection

The internal condition of the unit was inspected by scanning acoustic microscopy.
The SAT result was normal.

No.	#1	#2	#3	#4
T-scan				
C-scan				

3. Socket Board Test(SKT)

The units were tested by socket board test, the test result was as follows:

NO.	Test result
#1	System could bootup normally and played 4K video normally when VDDEE voltage was 0.84V
#2	System reboot when chip enter kernel.
#3	System could bootup normally and played 4K video normally when VDDEE voltage was 0.84V
#4	System could bootup normally, but UI abnormal when using remote to adjust selection menu

NO.	4K normal
#1/#3	

NO.	Reboot
#2	<pre> 20.855087@1] 7c80: 00000000 00000002 00000000 00000000 eef9b080 ed9cf500 eeb2dd00 00000000 20.863407@1] 7ca0: c0f72410 c17067ac eddb3e00 ecaa7cdc ecaa7cd0 c0f775e8 c0f775ec 20.871723@1] 7cc0: 60030013 ffffffff 20.875368@1] [<c030ec4c>] (_irq_svc) from [<c0f775ec>] (_raw_spin_unlock_irq+0x38/0x6c) 20.883517@1] [<c0f775ec>] (_raw_spin_unlock_irq) from [<c03542b4>] (finish_task_switch+0x88/0x210) 20.892530@1] [<c03542b4>] (finish_task_switch) from [<c0f72410>] (_schedule+0x2d8/0x7fc) 20.900762@1] [<c0f72410>] (_schedule) from [<c0f7298c>] (schedule+0x58/0xb8) 20.907956@1] [<c0f7298c>] (schedule) from [<c03bf288>] (futex_wait_queue_me+0x108/0x1bc) 20.916103@1] [<c03bf288>] (futex_wait_queue_me) from [<c03bfca4>] (futex_wait+0xfc/0x218) 20.924336@1] [<c03bfca4>] (futex_wait) from [<c03c184c>] (do_futex+0x124/0xc94) 20.931703@1] [<c03c184c>] (do_futex) from [<c03c24c8>] (SyS_futex+0x10c/0x194) 20.938983@1] [<c03c24c8>] (SyS_futex) from [<c03085c0>] (ret_fast_syscall+0x0/0x48) 21.647707@3] SMP: failed to stop secondary CPUs 21.661827@3] Rebooting in 5 seconds.. </pre>

NO.	UI abnormal
#4	

4. Final test(FT)

The units were tested by automatic test equipment, the test result was as follows:

NO.	FT Test result
#1	Function failed caused by IC encryption, there was no observed Open/Short Pin
#2	CPU function failed
#3	Function failed caused by IC encryption, there was no observed Open/Short Pin
#4	Bist function failed

Partial data is as below:

#1/#3

```
Executed Testmethod G12A_tml.efuse.Efuse_Read_Check_Index_recheck on Site 6: FAILED
Site 6 has FAILED. Binned to bin 814(8)
----- Test Name: EDGE[1]: FAILED -----
EDGE[1]: FAILED                                     (null) FAILED 24998.000000
----- Test Name: SPI_limit[1]: FAILED -----
SPI_limit[1]: FAILED                               (null) FAILED 0.000000
Executed Testmethod G12A_tml.t580.Spi_Capture_V2 on Site 6: FAILED
----- Test Name: EDGE[1]: FAILED -----
EDGE[1]: FAILED                                     (null) FAILED 24998.000000
----- Test Name: SPI_limit[1]: FAILED -----
SPI_limit[1]: FAILED                               (null) FAILED 0.000000
Executed Testmethod G12A_tml.t580.Spi_Capture_V2 on Site 6: FAILED
Site 6 has FAILED. Binned to bin 806(8)
----- Test Name: EDGE[1]: FAILED -----
EDGE[1]: FAILED                                     (null) FAILED 24998.000000
----- Test Name: SPI_limit[1]: FAILED -----
SPI_limit[1]: FAILED                               (null) FAILED 0.000000
Executed Testmethod G12A_tml.t580.Spi_Capture_V2 on Site 6: FAILED
Site 6 has FAILED. Binned to bin 803(8)
```

#2

```
===== Started Testsuite a53_pwr_atspeed_comp_2 =====
***** Started Site : 4 *****
Port Timing Spec "a53_atspeed_multiport"; 1,1
Equation Set 2; Spec Set 13; Level Set 3
Startlabel: a53_atspeed_multi_port
test_number : 90
----- Test Name: Functional[1]: FAILED -----
Functional[1]: FAILED
Pass/Fail Limit: 1.000000 (Equal means passed)
----- Pin Results -----
Pin Results                                     (null) FAILED 0.000000
Executed Testmethod G12A_tml.Run_Functional_Test_with_volt_change on Site 4: FAILED
```

#4

```
===== Started Testsuite test547_BIST_M4_ROM_ONLY =====
***** Started Site : 8 *****
Equation Set 34; Spec Set 1; Timing Set 1
Equation Set 2; Spec Set 1; Level Set 1
Startlabel: G12A_test547_BIST_M4_ROM_ONLY_2018_03_21_RevB
test_number : 67
----- Test Name: Functional[1]: FAILED -----
Functional[1]: FAILED
Pass/Fail Limit: 1.000000 (Equal means passed)
----- Pin Results -----
Pin Results                                     (null) FAILED 0.000000
Executed Testmethod G12A_tml.Run_Functional_Test_with_volt_change on Site 8: FAILED
```

5. System level Test

The suspected chip need to be decrypted by customer if performing SLT

Failure Analysis Report

FA Summary:

No.	Issue description	Visual inspection	SAT	SKT	FT
#1	Reboot	Normal	Normal	Normal	Function failed
#2	Reboot	Normal	Normal	Rboot	CPU Function failed
#3	Reboot	Normal	Normal	Normal	Function failed
#4	UI screen abnormal	Normal	Normal	UI abnormal	Bist function failed

DISCIPLINE 5

Root Cause

As a result of FA summary:

1. All chips passed visual inspection and SAT.
2. The chip #1/#3 played 4K video over 12hours and all was norma without any issue on the socket board;
#1/#3 chip failed FT test with functional failure due to chip encryption. Recommended customer performing correlation.
3. The chip #2 failed FT test with CPU function failure and chip #4 failed FT test with BIST function failure.
All chips were not observed Pin Open/Short.

All the chips went 100% FT test before shipment and the failed chip could be filtered by FT test;

DISCIPLINE 6

Verification of Corrective Action

NA

DISCIPLINE 7

Preventive Action

NA

DISCIPLINE 8

Final Approval

Appreciated team members' cooperation.