

flex
Cisco Proje

Product Failure Analysis Report

FA Report No.	:	N0200110
Product Model	:	BelAir
Part Number	:	IE-2000-16PTC-G-L 800-39201-01
S/N	:	FG: FDO2353J186 Affected PCA: FDO2352127A
Failure	:	Traf test fail
Department	:	Cisco project TE
Reporter	:	King Xu
Date	:	2020109

Background Information

● Reporter

Main Reporter: King Xu

Employee ID: 460093

● Product Failure Description

Subject:

Traf test fail

Phenomenon:

Failed in ORT test, after testing with about 170 Hours & 65°C chamber setting, the unit failed in Traf test. (Fiber test fail, occurred at Port 19 & Port 20)

Using Tools and Software

Multi-meter---Fluke 97

Scope- Tek TDS3052B

FLIR –E63900 (Thermal Imaging Camera)

● Received and Observed Data

(Happen date): 20200108

(Where): ORT (Ongoing Reliability Test) test station

How many units: 1Pcs

● Failure Detailed Description

The unit failed at ORT test which is setting with 65°C high temperature. After performed 170 hours looping testing, Traf fail on port 19 and Port 20 is observed.

Test failed log as below:

BelAir> gets

System Status = 0x16

LM75 Thermal (0x5300): +83.0C

Power Status is Good

DC_A Status is Off

DC_B Status is Good

Alarm 2 Off

Alarm 1 Off

BelAir> traf

System initializing...

SD card is not present.

Traf> confm bi ext

Traf> confconversation -stress -duplex:full -speed:AUTO -size:1518

Traf> showc

C#	Ports	Lpbk	Dir	Speed	Dpl	Crossover	FID	FrameSize	FrameCount	F	MaxIt	Log	Aneg	R	MACSec
01	01/02	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
02	03/04	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
03	05/06	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
04	07/08	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
05	09/10	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
06	11/12	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
07	13/14	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
08	15/16	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	
09	19/20	Ext	BiD	A/A	F/F	Auto/Auto	Def	1518/1518	S/S	B	1	F08	00/00	F	

Traf> start

Port 19: Fiber link is up.

Port 20: Fiber link is up.

Conversation 01 started

Conversation 02 started

Conversation 03 started

Conversation 04 started

Conversation 05 started

Conversation 06 started

Conversation 07 started

Conversation 08 started

Conversation 09 started

*** Press: ESC or Q to terminate and exit to CLI

*** Press: X to return to CLI

*** Press: Pnn to Print status of conversation (nn)

*** Press: Cnn to display Counters of conversation (nn)

*** Press: Lnn to display error Logs of conversation (nn)

*** Press: Snn to Start conversation (nn)

*** Press: Tnn to Terminate conversation (nn)

*** Press: Uxx to change Updates per second to (xx)

*** Press: SPACE to check status of all conversations

*** Press: = to display Counters of all conversations

*** Press: ? to show available commands

Monitor] ***ERR: Sas[0]Exception: frameError.

Traf Elapse Time: 000h:00m:03s:432100us

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Monitor] STATUS ALL:

| C# | Ports | Iter# | HHH:MM:SS | Status     | Error   | #Errs | Result |
|----|-------|-------|-----------|------------|---------|-------|--------|
| 01 | 01/02 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 01 | 02/01 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 02 | 03/04 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 02 | 04/03 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 03 | 05/06 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 03 | 06/05 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 04 | 07/08 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 04 | 08/07 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 05 | 09/10 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 05 | 10/09 | 001   | 000:00:16 | InProgress |         | 0     | Pass   |
| 06 | 11/12 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |
| 06 | 12/11 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |
| 07 | 13/14 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |
| 07 | 14/13 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |
| 08 | 15/16 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |
| 08 | 16/15 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |
| 09 | 19/20 | 001   | 000:00:17 | InProgress | Fcs,Err | 1     | FAIL** |
| 09 | 20/19 | 001   | 000:00:17 | InProgress |         | 0     | Pass   |

Monitor] TRAF QUIT:

Conversation 01 terminated

Conversation 02 terminated

Conversation 03 terminated

Conversation 04 terminated

Conversation 05 terminated

Conversation 06 terminated

Conversation 07 terminated

Conversation 08 terminated

Conversation 09 terminated

Traf> showresult

| C# | Ports | Iter# | HHH:MM:SS | Status     | Error   | #Errs | Result |
|----|-------|-------|-----------|------------|---------|-------|--------|
| 09 | 19/20 | 001   | 000:00:17 | InProgress | Fcs,Err | 1     | FAIL** |

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01	01/02	001	000:00:18	UserTerm		0	Pass
01	02/01	001	000:00:18	UserTerm		0	Pass
02	03/04	001	000:00:18	UserTerm		0	Pass
02	04/03	001	000:00:18	UserTerm		0	Pass
03	05/06	001	000:00:18	UserTerm		0	Pass
03	06/05	001	000:00:18	UserTerm		0	Pass
04	07/08	001	000:00:18	UserTerm		0	Pass
04	08/07	001	000:00:18	UserTerm		0	Pass
05	09/10	001	000:00:18	UserTerm		0	Pass
05	10/09	001	000:00:18	UserTerm		0	Pass
06	11/12	001	000:00:18	UserTerm		0	Pass
06	12/11	001	000:00:18	UserTerm		0	Pass
07	13/14	001	000:00:18	UserTerm		0	Pass
07	14/13	001	000:00:18	UserTerm		0	Pass
08	15/16	001	000:00:18	UserTerm		0	Pass
08	16/15	001	000:00:18	UserTerm		0	Pass
09	19/20	001	000:00:18	UserTerm	Fcs,Err	1	FAIL**
09	20/19	001	000:00:18	UserTerm		0	Pass

***ERR: Sas[0]Exception: frameError.

Traf>

● Failure Analysis

1. Exchange the network interface cables with known good ones, but the fail still exists. Reboot the unit, manual to test the unit in ORT test chamber, the fail still exists.
2. Take this failed unit to Debug for further FA. Below findings are observed during duplication of the symptom.
 - 1) According to fail log, Port 19/20 is with error(frameError). The ports are from the board (PN:73-13682-02 FDO2352127A) of the unit. After disassembling the unit, check the 73-13682-02 board, but not find cosmetic issue. Also checked its workflow history, the board has passed the previous all test stations without any rework action.
 - 2) Tested the unit at room temp, could not duplicate the fail with 5 loops Traf test.
 - 3) Since the board is failed at high temp working condition (tested in chamber of 65°C temperature setting), hence, we tried to use Hot Air Gun to re-heat

the components on the 73-13682-02 board. Per multiple tries and find the FPGA U38 is affected. When air hot winds onto the FPGA's surface, the traffic fail is easy to be come out. (Using FLIR-E63900 to monitor the FPGA's surface temp, when it exceeds 50°C). On the contrary, when cold spay on the FPGA, the fail goes away.

- 4) Try to execute looping Traf test on the board without re-heating operation. After finished about 30+ times Traffic test, the board will turn to fail on port19/20. But sometimes it can pass the test on the Port19&20, following findings are observed:
 - After reduplicating the fail, exit the traf> prompt and re-login traf> (system initialization etc. are executed) to test traffic test, the test on the Port 19&20 will turn to pass again.
 - Power cycle the board, perform the traffic test, sometimes the test on the Port19&20 will pass.
 - 5) Although the fail occurred on Fiber port, tried and found the copper ports test is also failed when speed & package size is configured to 1000/1024 or AUTO/1518.
3. Use DMM to measure the working conditions like voltages, controlling signals etc. for the U38 FPGA component, but did not find any anomalies.
 4. From on above analysis, we preliminary conclude that the fail is intermittent failure, it's easily to be duplicated when working at high temp condition. The failure is related to U38 FPGA device.

● Conclusion and Suggestion:

From on above analysis, we preliminary conclude that the failure is intermittent failure, it's easily to be duplicated when working at high temp condition. The failure is related to U38 FPGA device.

Detailed information as below:

PN: CISH-16-4088-01 DC: 1943

Description:

IC, PLD-FPGA, EP2AGX45CU17I3N, I-Temp, Lidless Package, Pb-free (ROHS5.5) EXEMPTION #15 FOR SnPb
SOLDER BUMPS WITH Pb-free SOLDER BALLS

Vendor: Altera