Failure Analysis Test Engineering Report

Date:	2/25/2021
FA Num.	
Analysis By:	Josue Martinez Jacinto
Customer/Project:	Nokia

System information

This failure mode was registered in MES system?	**Yes**	**No**	**NA**
This failure mode was registered in customer system?	**Yes**	**No**	**NA**
Customer and Jabil MES System have the same information ?	**Yes**	**No**	**NA**

Product level Information:

		Test Area:	CPST
Assembly:	090147A.104	**CRD:**	D1400
Subassembly:	090052A.103	**Serial Number:**	BL2040M1AWF
Test loop:	1	**Schematic available**	YES

Component Level Information:

Device Marking:	***N/A***	**Vendor:**	INTEL
Jabil Part Number:	NGP452544	**Vendor Part Number:**	1SXLN2F43I2LGAA
Part Description:	IC FPGA Stratix10-280		
Date Code:	N/A	**Lote ID**	N/A

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Failure Mode Information:

Testing Conditions:

Temperature: ***N/A*** **Vcc:** 48 **Frequency:** N/A

Failure mode reported: InitSpineFpgaTempCore

Brief Failure Description:

This test consists of carrying out a measurement inside of the FPGA, this through the secure shell protocol in which an addressing register is managed to access each sensor measurement stage, as well as the reading of the same by data bus in Hexadecimal result.

Analysis: Include diagrams, include pictures of the component in case of FA_Defect, etc. If needed

During the failure analysis performed on the unit, it is found that for each addressing register there must be a measurement delivered by an internal sensor, in comparison with a good unit it is found that the result of an addressing register 0x82040010 corresponds to **0x00000000**, Therefore, as a result of the measurement delivered by the sensor, it is 0 degrees.

.log file resulting from bump test on failed drive.

```
2020-12-14 13:59:26.8284 Spine Board Temp:
2020-12-14 13:59:26.8284 Saving result Board_Temp_Sensor: 39.5
2020-12-14 13:59:26.8284 ==================================================
2020-12-14 13:59:26.8784 << ret /thBoard action terminate ==> done ok
2020-12-14 13:59:26.8784 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2020-12-14 13:59:29.8346 SSH Write: devmem 0x82040004 32 1;echo Exit Status for my own command:$?
2020-12-14 13:59:30.3346 SSH read: devmem 0x82040004 32 1;echo Exit Status for my own command:$?
2020-12-14 13:59:30.3346 SSH read: root@stratix10-aaib:~# devmem 0x82040004 32 1;echo Exit Status for my own command:$?
2020-12-14 13:59:30.3346 SSH read: Exit Status for my own command:0
2020-12-14 13:59:30.4226 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2020-12-14 13:59:33.2548 SSH Write: devmem 0x82040010;echo Exit Status for my own command:$?
2020-12-14 13:59:33.7548 SSH read: devmem 0x82040010;echo Exit Status for my own command:$?
2020-12-14 13:59:33.7548 SSH read: root@stratix10-aaib:~# devmem 0x82040010;echo Exit Status for my own command:$?
2020-12-14 13:59:33.7548 SSH read: 0x00000000
2020-12-14 13:59:33.7548 SSH read: Exit Status for my own command:0
2020-12-14 13:59:33.7938 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2020-12-14 13:59:37.0390 SSH Write: devmem 0x82040018;echo Exit Status for my own command:$?
2020-12-14 13:59:37.5390 SSH read: devmem 0x82040018;echo Exit Status for my own command:$?
2020-12-14 13:59:37.5390 SSH read: root@stratix10-aaib:~# devmem 0x82040018;echo Exit Status for my own command:$?
2020-12-14 13:59:37.5390 SSH read: 0x0000003A
2020-12-14 13:59:37.5390 SSH read: Exit Status for my own command:0
2020-12-14 13:59:37.5770 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2020-12-14 13:59:40.0511 SSH Write: devmem 0x82040028;echo Exit Status for my own command:$?
2020-12-14 13:59:40.5512 SSH read: devmem 0x82040028;echo Exit Status for my own command:$?
2020-12-14 13:59:40.5512 SSH read: root@stratix10-aaib:~# devmem 0x82040028;echo Exit Status for my own command:$?
2020-12-14 13:59:40.5512 SSH read: 0x0000003D
2020-12-14 13:59:40.5512 SSH read: Exit Status for my own command:0
2020-12-14 13:59:40.5902 ==================================================
2020-12-14 13:59:40.5902 FPGA Core Temp: 0
2020-12-14 13:59:40.5902 FPGA Lower Transciever Tile Temp: 58
2020-12-14 13:59:40.5902 FPGA Upper Transciever Tile Temp: 61
2020-12-14 13:59:40.5902 ==================================================
2020-12-14 13:59:40.5902 Saving result FPGA_Temp_Sensor: 61
2020-12-14 13:59:40.5902 ==================================================
```

address register

reading obtained

measurement result

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Measurements are made in unit without finding any defect in components, passives, active as well as pcb, so we proceed to change the IC FPGA Stratix10-280 with which the following result.

test result after changing the IC FPGA Stratix10-280

AFTER BGA REPLACEMENT

```
2021-02-12 21:06:59.6966 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2021-02-12 21:07:02.5588 SSH Write: devmem 0x82040004 32 1;echo Exit Status for my own command:$?
2021-02-12 21:07:03.0588 SSH read: devmem 0x82040004 32 1;echo Exit Status for my own command:$?
2021-02-12 21:07:03.0588 SSH read: root@stratix10-aaib:~# devmem 0x82040004 32 1;echo Exit Status for my own command:$?
2021-02-12 21:07:03.0588 SSH read: Exit Status for my own command:0
2021-02-12 21:07:03.1478 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2021-02-12 21:07:05.7490 SSH Write: devmem 0x82040010;echo Exit Status for my own command:$?
2021-02-12 21:07:06.2490 SSH read: devmem 0x82040010;echo Exit Status for my own command:$?
2021-02-12 21:07:06.2490 SSH read: root@stratix10-aaib:~# devmem 0x82040010;echo Exit Status for my own command:$?
2021-02-12 21:07:06.2490 SSH read: 0x0000004A
2021-02-12 21:07:06.2490 SSH read: Exit Status for my own command:0
2021-02-12 21:07:06.2880 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2021-02-12 21:07:08.9881 SSH Write: devmem 0x82040018;echo Exit Status for my own command:$?
2021-02-12 21:07:09.4882 SSH read: devmem 0x82040018;echo Exit Status for my own command:$?
2021-02-12 21:07:09.4882 SSH read: root@stratix10-aaib:~# devmem 0x82040018;echo Exit Status for my own command:$?
2021-02-12 21:07:09.4882 SSH read: 0x0000003E
2021-02-12 21:07:09.4882 SSH read: Exit Status for my own command:0
2021-02-12 21:07:09.5272 Creating SSH connection: IP: 192.168.100.1, UserName: toor4nsn, Password: ****
2021-02-12 21:07:11.8563 SSH Write: devmem 0x82040028;echo Exit Status for my own command:$?
2021-02-12 21:07:12.3573 SSH read: devmem 0x82040028;echo Exit Status for my own command:$?
2021-02-12 21:07:12.3573 SSH read: root@stratix10-aaib:~# devmem 0x82040028;echo Exit Status for my own command:$?
2021-02-12 21:07:12.3573 SSH read: 0x00000041
2021-02-12 21:07:12.3573 SSH read: Exit Status for my own command:0
2021-02-12 21:07:12.3903 ==================================================
2021-02-12 21:07:12.3903 FPGA Core Temp: 74
2021-02-12 21:07:12.3903 FPGA Lower Transciever Tile Temp: 62
2021-02-12 21:07:12.3903 FPGA Upper Transciever Tile Temp: 65
2021-02-12 21:07:12.3903 ==================================================
2021-02-12 21:07:12.3903 Saving result FPGA_Temp_Sensor: 74
2021-02-12 21:07:12.3903 ==================================================
```

address register

reading obtained

measurement result

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Please add the logs as an object in box below:

Conclusions:

A change is made to the IC FPGA Stratix10-280 and as a result, a correct reading was obtained from that register corresponding to the sensor.

Time Spent on analysis: 1 **Hrs**

Engineering Validation

According with the analysis, the recommended disposition for the component is:

RTV (Return to vendor)	X	**Rework**		**Scrap**	
Other					

According with the analysis, the possible root cause is:

Process		**Design**		**Vendor**	X
Other					

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