Keysight Technologies

Modifying DDR Libraries for Silicon Nail Test Generation on the x1149 Boundary Scan Analyzer

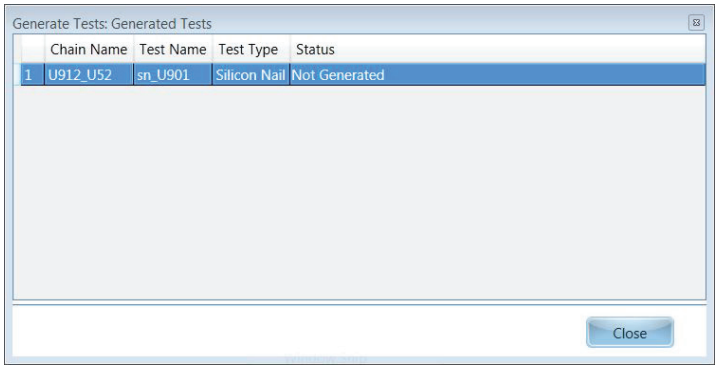
Application Note

KEYSIGHT TECHNOLOGIES

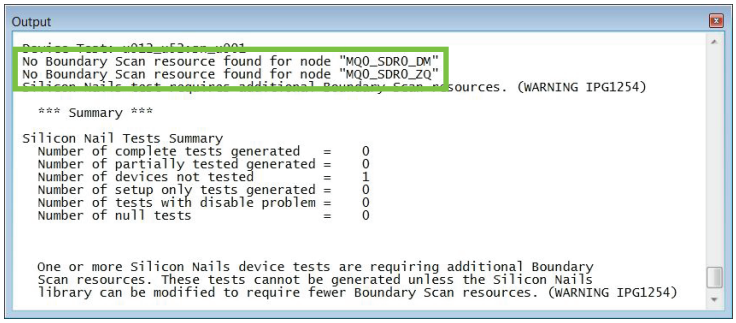
The DDR libraries available are written with the assumption that all the pins are connected to a boundary scan cell. In a real board application however, there are pins that are not connected to boundary scan cells, in which case we will need to modify the DDR library to generate the silicon nail test.

Here are the step-by-step procedures on DDR library modification and silicon nail test generation.

1. When silicon nail test is not generated during the Keysight Technologies, Inc. x1149 test:

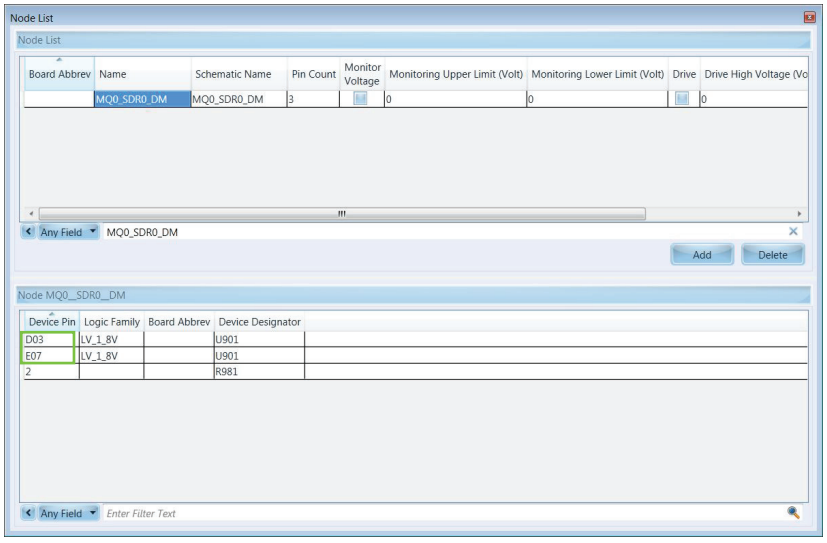


2. Check the output message:



The output message shows that the following nodes “MQ0_SDR0_DM” and “MQ0_SDR0_ZQ” are not connected to a boundary scan cell or resource.

3. Check the board details to find out if the “MQ0_SDR0_DM” and “MQ0_SDR0_ZQ” are connected to a DDR and the boundary scan device pins.



4. The node “MQ0_SDR0_DM” in the node list shows the DDR pins D03 and E07 are shorted and connected to resistor “R981” and the pull down is set to “GND”.

5. Do the same for the other node “MQ0_SDR0_ZQ”, which is connected to resistor “R971”, with the pull down set to “GND”.

6. The nodes “MQ0_SDR0_DM” and “MQ0_SDR0_ZQ” are not connected to any boundary scan cell or resource. This is the reason why the silicon nail test could not be generated.

7. In order to generate the silicon nail test for the u901 DDR3, the DDR3 library has to be modified as follows:

   7.1 Change the pin usage of the group DM (u901.E07 and u901.D03) and ZQ (U901.L08) from inputs to non-digital.

   7.2 Comment the vector where the DM and ZQ are declared.

```
assign CK          to pins "J07"
assign CK_         to pins "K07"
assign CKE         to pins "K09"
assign CLK         to pins "J07" ,"K07"

assign CS_         to pins "L02"
assign RAS_        to pins "J03"
assign CAS_        to pins "K03"
assign WE_         to pins "L03"
assign COMMAND     to pins "L02","J03","K03","L03"
assign DM          to pins "E07","D03"

assign BA2         to pins "M03"
assign BA1         to pins "N08"
assign BA0         to pins "M02"

assign Address     to pins "N07","R07","L07","R03","T08"
assign Address     to pins "R02","R08","P02","P08","N02","P03","P07","N03"

assign DQ          to pins "A03","B08","A02","A07","C02","C08","C03","D07"
assign DQ          to pins "H07","G02","H08","H03","F08","F02","F07","E03"

assign DQS         to pins "F03","G03","C07","B07"

assign VDD         to pins "B02","D09","G07","K02","K08","N01","N09","R01","R09"
assign VDDq        to pins "A01","A08","C01","C09","D02","E09","F01","H02","H09"
assign Vref        to pins "H01","M08"

assign VSS         to pins "A09","B03","E01","G08","J02","J08"
assign VSS         to pins "M01","M09","P01","P09","T01","T09"
assign VSSq        to pins "B01","B09","D01","D08","E02","E08","F09","G01","G09"

assign ODT         to pins "K01"
assign ZQ          to pins "L08"
assign RES         to pins "T02"
```

```
power VDD,VDDq,VSS,VSSq,Vref

inputs CK,CK_,CKE,CS_,RAS_,CAS_,WE_,BA0,BA1,BA2 !!!DM commented DM not connected to bscan cell
inputs COMMAND
inputs Address
inputs ODT,RES !!! ZQ commented ZQ not connected to bscan cell

bidirectional DQ, DQS

nondigital NC, DM,ZQ
```

```
vector Initialize_inputs
 drive DQ, DQS
 set Address to "0000000000000"
 set DQ  to "1111111111111111"
 set CK  to "1"
 set CK_ to "0"
 set CKE      to "0"
 set COMMAND  to "1zzz"
 !!set DM    to "00"
 set BA0  to "0"
 set BA1  to "0"
 set BA2  to "0"
 set DQS  to "0101"
 set RES  to "0"
end vector

vector Keep_Control
 drive DQ, DQS
 set Address to "kkkkkkkkkkkkk"
 set DQ to "kkkkkkkkkkkkkkkk"
 set CK      to "k"
 set CK_     to "k"
 set CKE      to "k"
 set COMMAND  to "kkkk"
 !!set DM    to "kk"
 set BA0  to "k"
 set BA1  to "k"
 set BA2  to "k"
 set DQS  to "kkkk"
 set RES  to "k"
end vector
```

8. Once the DDR3 library has been modified, regenerate the silicon nail test.

Generate Tests: Generated Tests

	Chain Name	Test Name	Test Type	Status
1	U912_U52	sn_U901	Silicon Nail	Generated

myKeysight

myKeysight

www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

www.keysight.com/find/x1149

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	0800 000154
Sweden	0200 882255
Switzerland	0800 805353 Opt. 1 (DE) Opt. 2 (FR) Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-07-10-14)

KEYSIGHT TECHNOLOGIES

Published in USA, August 3, 2014
5990-3586EN
www.keysight.com