SEMTECH
GENNUM PRODUCTS

4281 Harvester Road
Burlington, Ontario
L7L 5M4
CANADA

PROCESS/PRODUCT CHANGE NOTICE

Issuing Division:	Operations
Part Family Affected:	N/A
Part Numbers Affected:	GN4124-CBE3 and GN4121-CBE3
Date Code / Lot No.:	N/A
Type of Change:	_X_ Type 1: Process ___ Type 2: Product Features and/or Specifications ___ Type 3: Product Obsolete with/without replacement ___ Type 4: Recommended Applications Circuit Changes ___ Type 5: Datasheet Only ___ Type 6: Shipping/Packing Method
Title of Change:	**Bond wire material change from gold to copper**
Date of Issue:	July 15th 2013
Effective Date:	October 15th 2013
Authorized by:	Dwayne Johnson, Manager of Product Engineering, Operations
PCN Number:	PCN-000163
PCN Type:	___ Minor _X_ Major
Datasheet Revision:	N/A

DESCRIPTION OF CHANGE:

The GN4124-CBE3 and GN4121-CBE3 products are currently assembled using gold bond wires internal to the IC package. This bond wire material will be changed from gold to copper to be consistent with currently-common assembly processes and materials.

Devices with copper wire bonding will have the date code '1326' and forward.

Samples and reliability report are available upon request.

EFFECT OF CHANGE:

The customer will experience no change to the form, fit, or function of the final product. No critical parameters are affected by this change. There are no other changes included in this PCN besides the bond wire material change.

RECOMMENDED CUSTOMER ACTION(S):

No customer actions are required.

FOR FURTHER INFORMATION & WORLDWIDE SALES COVERAGE: http://www.semtech.com/contact/index.html#support

GIGOPTIX F2691G-01 LBGA 17X17 Cu Wire Bond Evaluation

Prepared by

ASE Group
Assembly Cu Wire CPE

Dec. 2012

ASE GROUP

Purpose

- Customer “GIGOPTIX” would like to do wire bond feasibility study in LBGA 17X17 256L package (Device: F2691G-01) with 18um Cu wire

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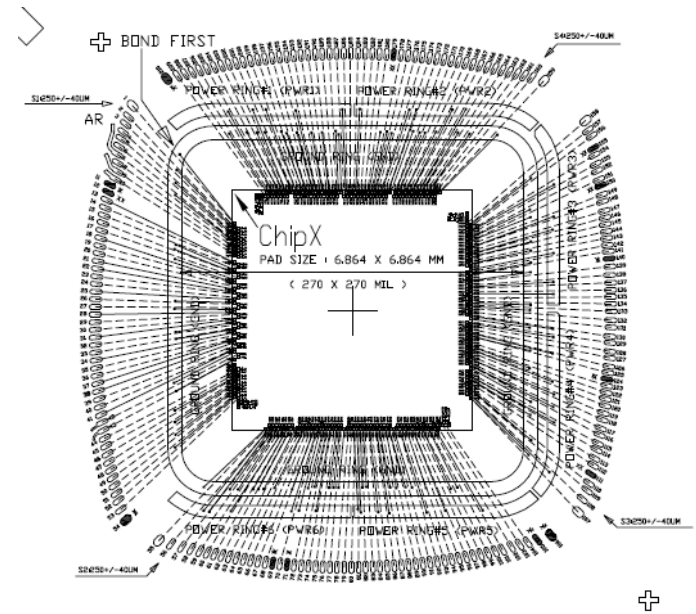
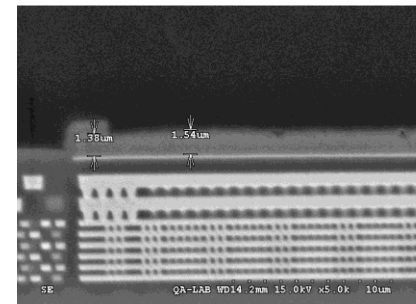
Package configuration and BOM

- Device information
  - PKG: LBGA 17X17
  - Device: F2691G-01
  - B.P.P: 60 um
  - B.P.O: 53x53 um
  - Bond pad Al thickness: 1.54um

- W/B material control
  - Cu Wire: 18um Pd coated



B/D layout



Al thickness

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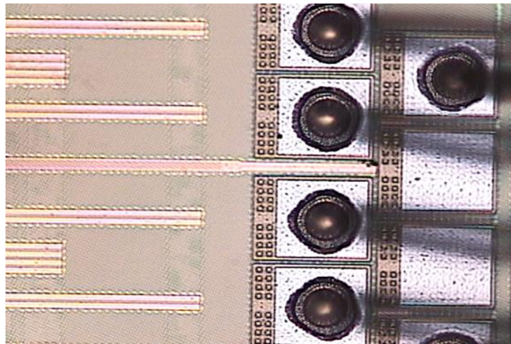
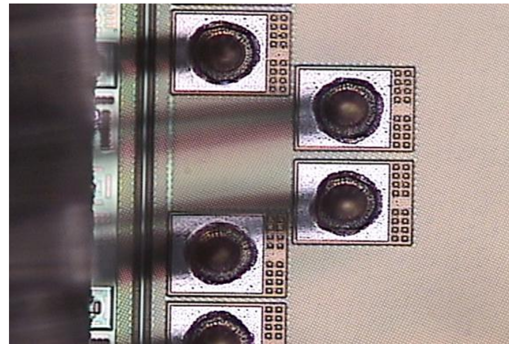
WB Response for Ball Size

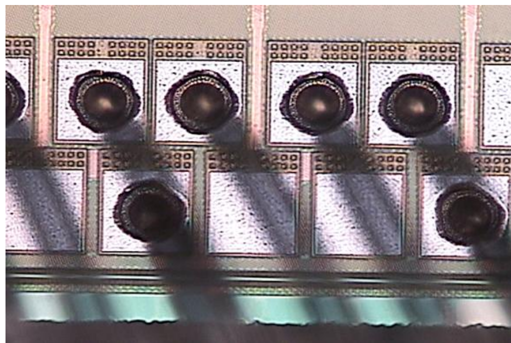
Ball Size



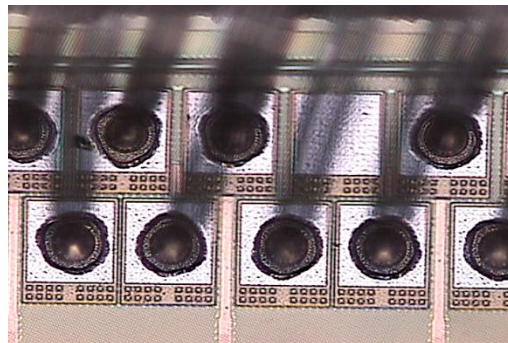
Left



Right



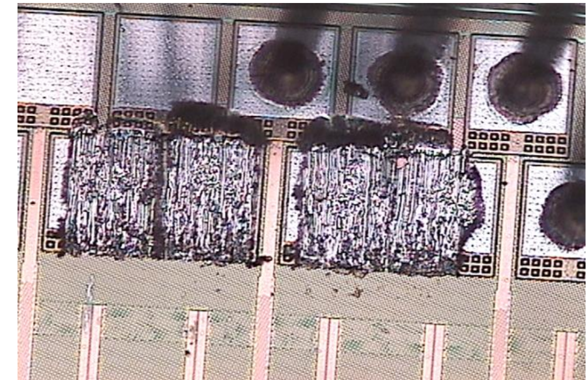
Down



Up

Ball Shear Data

Station	Value_item	Spec limit	SS	MAX	MIN	AVG	SIGMA	Cpk
WIRE BOND	BS_CU	5.000/	10	22.85	22.04	22.582	0.25	23.462



Ball size / ball height is controlled within avg. 37-42um and avg. 8-12um.

Ball Shear strength can pass test criteria

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Bond ability Evaluation

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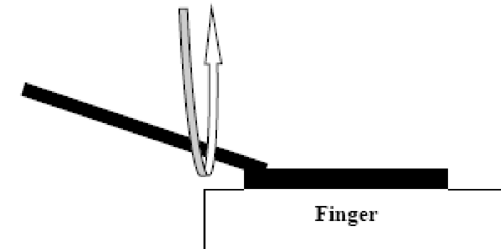
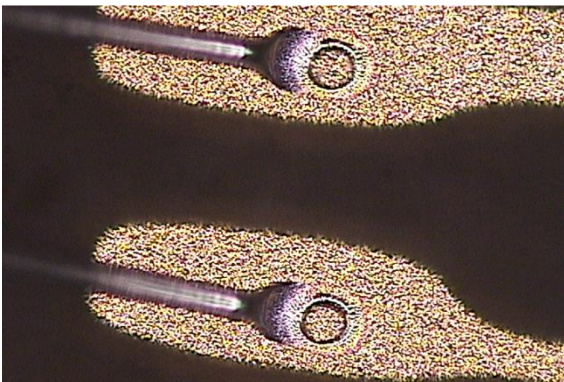
- Stitch pull test

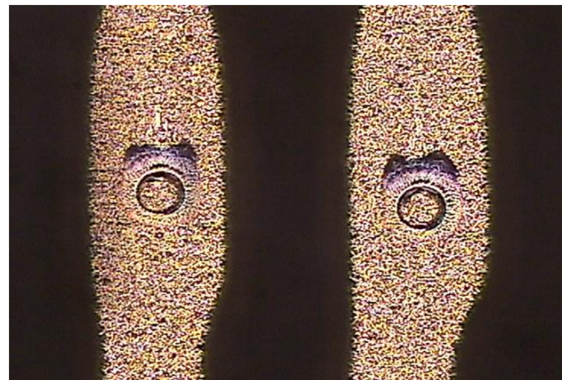
Station	DCOP	Value_item	Spec limit	SS	MAX	MIN	AVG	SIGMA	Cpk
WIRE BOND	WP_02	GROUND_CU	3.000/	10	7.99	6.62	7.349	0.351	4.134



Stitch pull strength can pass test criteria

Stitch pull break mode acceptable





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WB Response for De-layer & IMC Test

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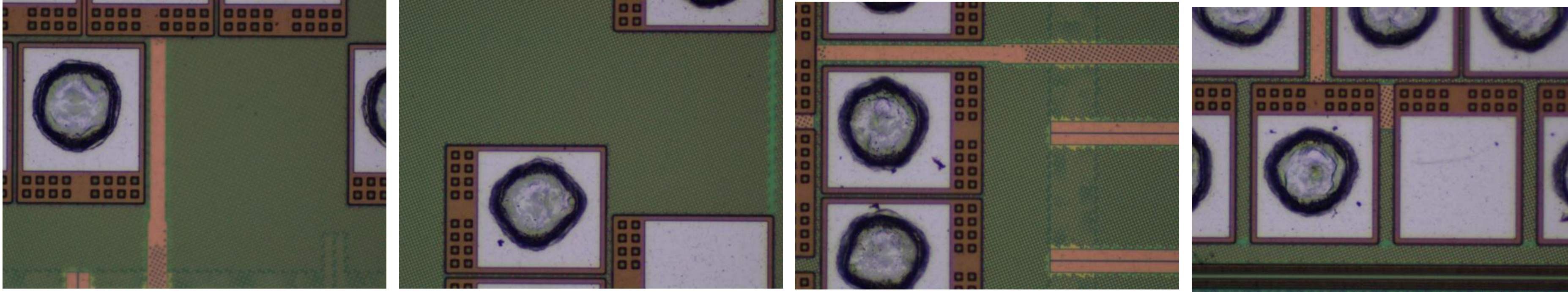
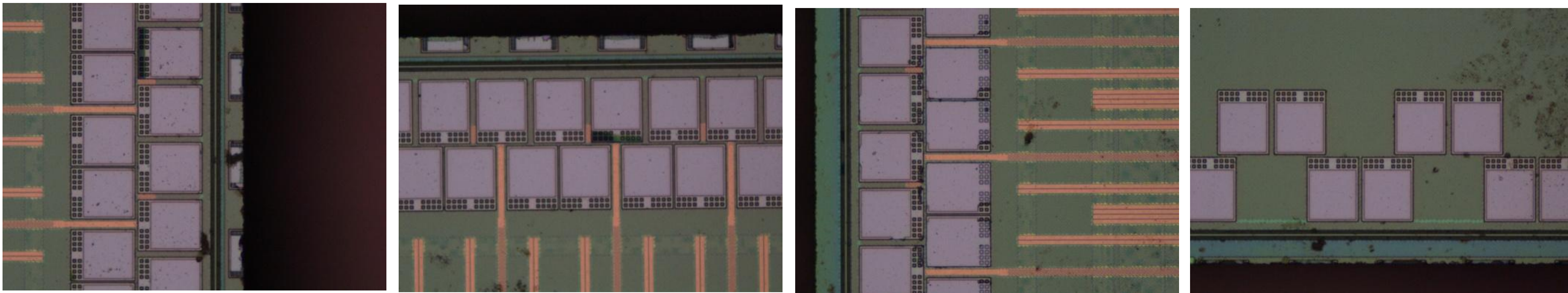
IMC



Delayer



IMC is passed ASEK spec(80%) and delayer test is found no any cratering.

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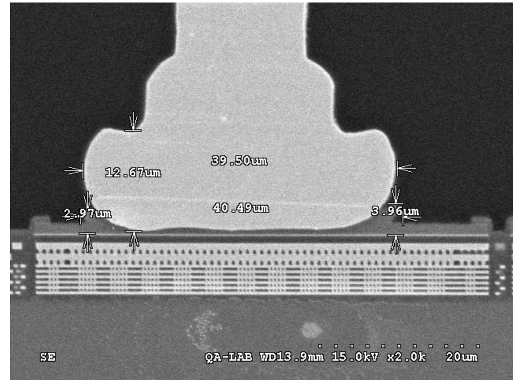
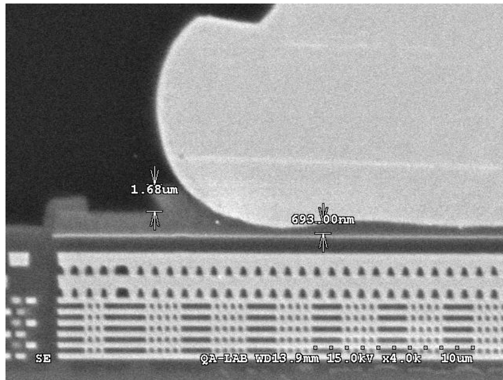
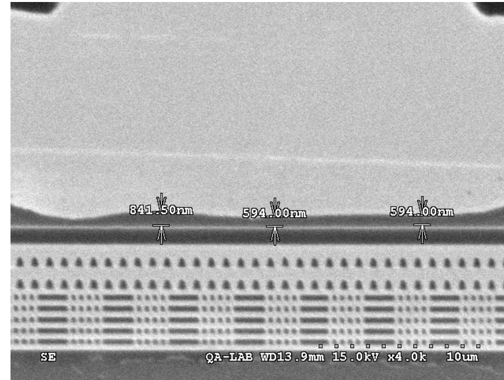
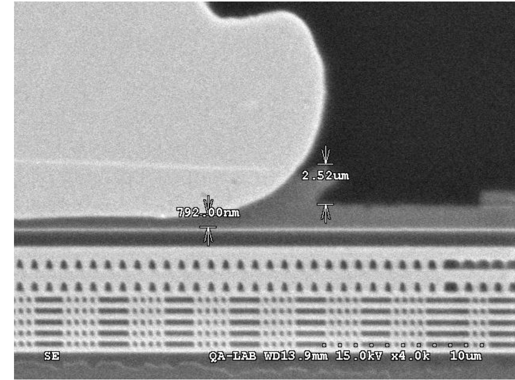
Wire Bond Buy Off - Cross-section Confirmation

☐ Ball bond confirmation









There is Al remaining under Cu bonding ball and no IMD crack issue be found.

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Conclusion

- Confirm run pass all bond-ability test

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QA LABORATORY

Date: 2013/05/29

RELIABILITY TEST REPORT

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CUSTOMER: GIGOPTIX

PACKAGE TYPE: LBGA (17x17) 256L

REPORT NO.: RT-130529-CR01

DISTRIBUTION:

REQUESTED BY: Luvill Villacin
MANAGER: Hsini Lee

Prepared By: ________ Checked By: ________ Approved By: ________

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I. Purpose

F2691G-01 - Cu Wire.

II. Conclusion

(1) No failure was found after reliability tests based on specified criteria.

(2) Based on above, the test result can be judged "PASS".

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III. Package Profile

ASE Schedule No.	03CC14
Device No.	F2691G-01
Lot No.	QL65L-CQ
Package Type	LBGA
Package Size	17x17 mm
Ball_Lead Count	256
Pad Size	6864x6864 mic
Ball_Lead Pitch	1 mm
Ball_Lead Width	0.5 mm
Solder Ball Composition	95.5Sn/4.0Ag/0.5Cu
Wire Type	Copper Wire
Wire Diameter	18_CU_PD
Epoxy Type (Die attach)	2100A
Compound Type	CEL-9750ZHF10AKLE
SUB_L/F Vendor	ASEE-SH
SUB_L/F Part No.	1207415111
SUB_L/F Layer	4
Case ID	133E88/133E89

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IV. Summary Data of Reliability Test

(1) Preconditioning

1-1 Convection reflow profiles are shown in figure 1.

1-2 SAT pictures are shown in figure 2.

1-3 SAT Criteria

Item	Before Precondition	After Precondition	Spec No.
Die Top	Reject, if > 0%	Reject, if > 0%	62-31-0000-0369
Epoxy	Reject, if > 0%	Reject, if > 0%	
Substrate Area	Reject, if > 0%	Reject, if > 0%	

1-4 F/T Parameters

Procedure	Condition/Criteria	Spec No.
Function Test	Program name : GN41242_FT_E	74-31-0050-0002

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1-5 Reflow Criteria

Spec No.	62-31-0000-0415
Peak temp	265℃(+0/-5℃)
Preheat	60~120sec(150~200'C)
Average Ramp-up Rate	≦3.0'C/sec (217'C~Peak)
Time Maintained Above	60~150sec(above 217'C)
Time Within 5℃ Of Actual Peak Temperature	＞30sec(above 255'C)
Ramp-down Rate	＜6'C/sec(Peak ~217'C)
Time 25℃ to Peak Temperature	8 minutes max.

1-6 Precondition Test

Test Condition		Visual Inspection	F/T Test	SAT Inspection
JEDEC 22-A113 Level 3 30℃/60%RH 192 HRS	Before Precondition	0/154	-	0/154
	After Precondition	0/154	0/154	0/154

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(2) Environmental Stress Test—Following Precondition

Test Item	Test Condition	Test Interval	Visual Inspection	F/T Test
Temperature Cycling Test	JEDEC 22-A104 -65℃~150℃	1000 Cycles	0/77	0/77
HAST Test (No Bias)	JEDEC 22-A118 130℃/85%RH 33.5PSIA	96 Hours	0/77	0/77

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(3) Environmental Stress Test--No Precondition

Test Item	Test Condition	Test Interval	Visual Inspection	F/T Test
High Temperature Storage Test	JEDEC 22-A103 150℃	1000 hours	0/77	0/77

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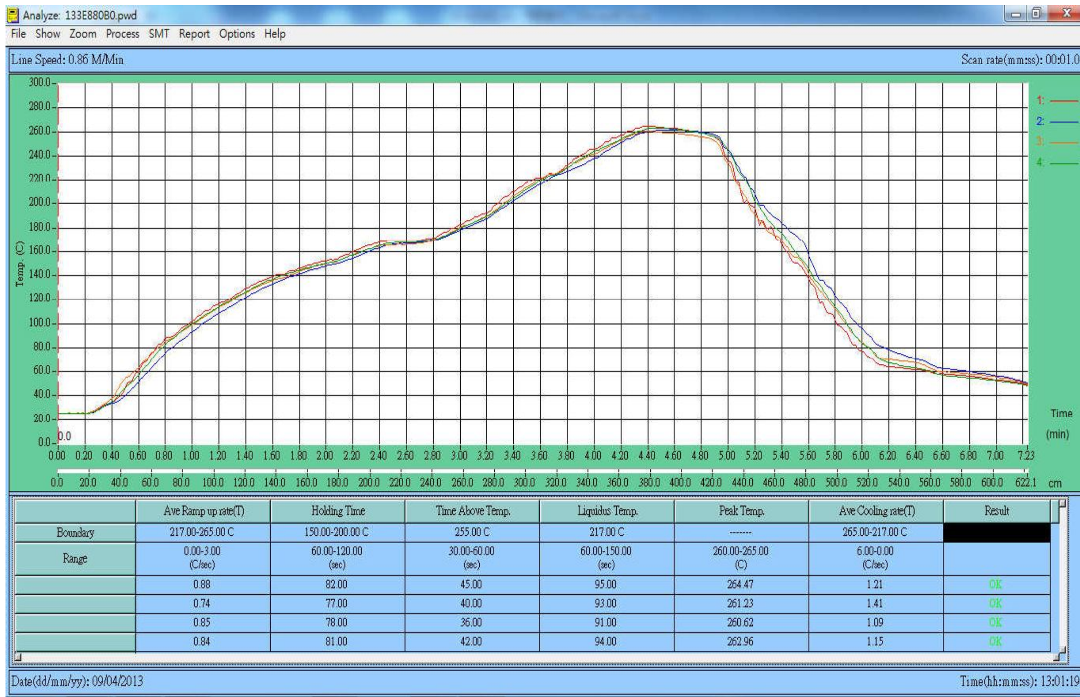
Figure 1. Reflow Profile



	Ave Ramp up rate(T)	Holding Time	Time Above Temp.	Liquidus Temp.	Peak Temp.	Ave Cooling rate(T)	Result
Boundary	217.00-265.00 C	150.00-200.00 C	255.00 C	217.00 C	-------	265.00-217.00 C	
Range	0.00-3.00 (C/sec)	60.00-120.00 (sec)	30.00-60.00 (sec)	60.00-150.00 (sec)	260.00-265.00 (C)	6.00-0.00 (C/sec)	
	0.88	82.00	45.00	95.00	264.47	1.21	OK
	0.74	77.00	40.00	93.00	261.23	1.41	OK
	0.85	78.00	36.00	91.00	260.62	1.09	OK
	0.84	81.00	42.00	94.00	262.96	1.15	OK

Date(dd/mm/yy): 09/04/2013　　Time(hh:mm:ss): 13:01:19

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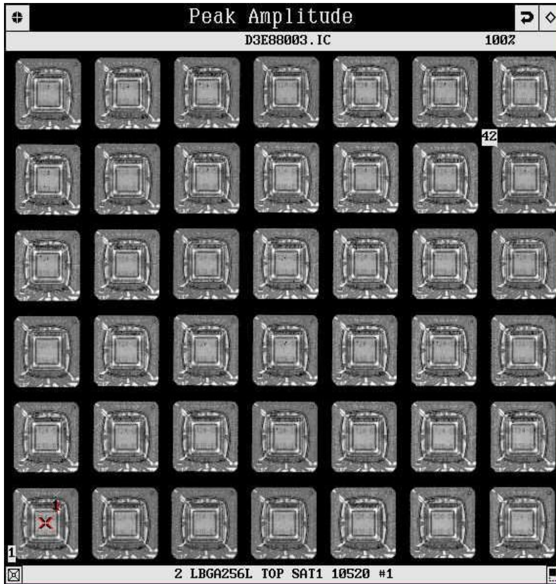
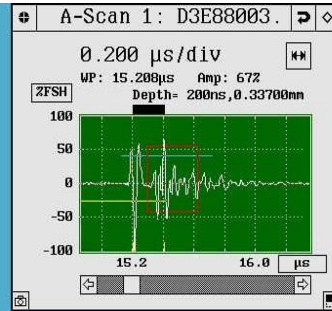
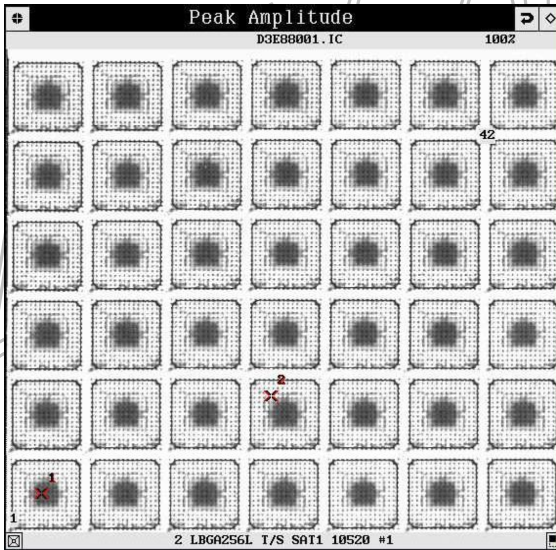
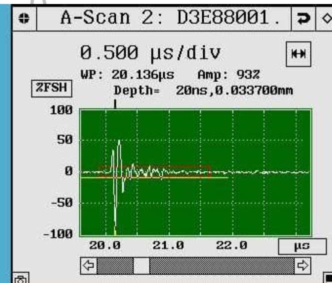
Figure 2. SAT Images

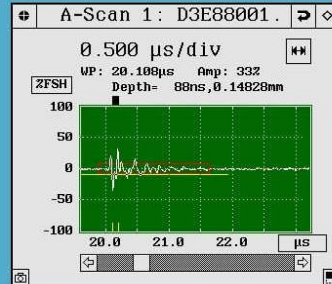
2-1. Befor Precondition











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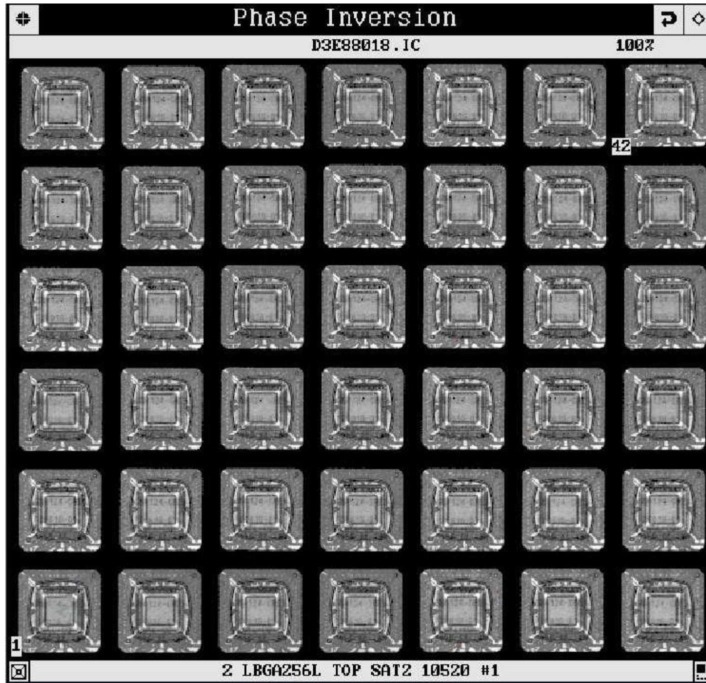
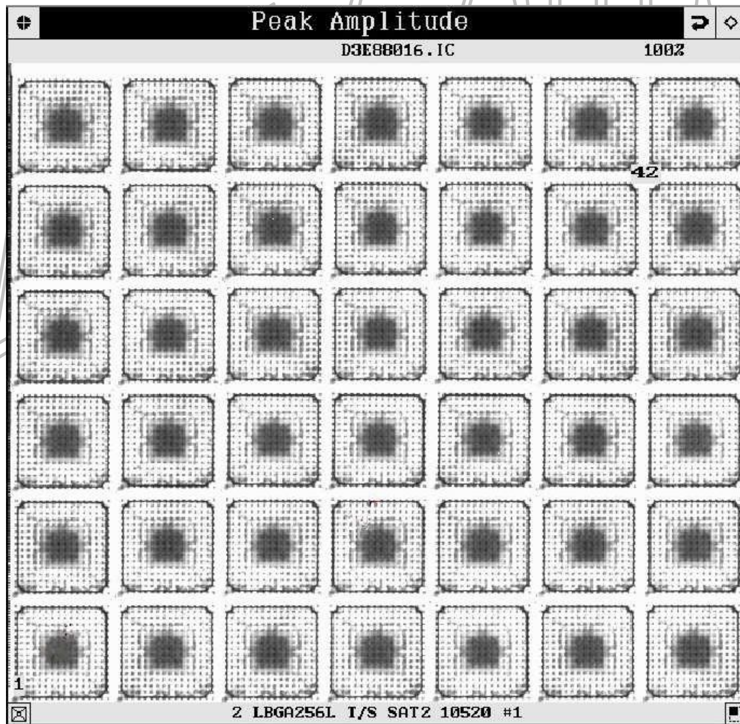
2-2. After Precondition





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GN41242.V1 / F2691G-01 Copper Qualification
Electrical Data Report

				Gold Wire Parts					Copper Wire Parts																		
Test	LSL	USL	Units	Gold wire Part# 1	Gold wire Part# 2	Gold wire Part# 3	Gold wire Part# 4	Average Gold Wire Parts	HAST Part #1	HAST Part #2	HAST Part #3	HAST Part #4	HAST Part #5	Average HAST Parts	HTS Part #1	HTS Part #2	HTS Part #3	HTS Part #4	HTS Part #5	Average HTS Parts	TCT Part #1	TCT Part #2	TCT Part #3	TCT Part #4	TCT Part #5	Average TCT Parts	Average Copper Wire Parts
Continuity	30 mV	800 mV		Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
ILEAK_v																											
EEPROM_EN	-1	5	uA	0.001	0.001	0.001	0.003	0.002	0.000	0.001	0.002	0.002	0.000	0.001	0.001	0.000	0.002	0.002	0.003	0.002	0.001	0.001	0.003	0.001	0.001	0.001	0.001
GPIO0	-1	5	uA	0.003	0.001	0.001	0.004	0.002	0.002	0.002	0.003	0.003	0.002	0.002	0.003	0.001	0.001	0.000	0.003	0.002	0.003	0.003	0.003	0.003	0.004	0.003	0.002
GPIO1	-1	5	uA	0.003	0.001	0.002	0.001	0.002	-0.001	-0.001	0.003	0.006	-0.001	0.001	0.001	0.004	0.000	0.001	0.000	0.001	0.001	0.001	-0.001	0.039	0.001	0.008	0.003
GPIO2	-1	5	uA	0.001	0.001	0.002	0.002	0.002	-0.001	0.000	0.001	0.000	0.006	0.001	0.002	0.003	0.004	0.003	0.003	0.003	0.000	0.001	-0.001	0.001	0.001	0.000	0.002
GPIO3	-1	5	uA	0.003	0.001	-0.001	-0.001	0.001	0.002	-0.002	-0.001	-0.001	0.001	0.000	-0.001	0.001	0.000	0.001	0.001	0.000	0.001	0.000	-0.002	0.000	0.002	0.000	0.000
GPIO4	-1	5	uA	-0.001	-0.001	0.000	-0.002	-0.001	0.002	0.001	0.001	0.001	-0.002	0.001	0.001	0.003	0.001	-0.001	0.001	0.001	-0.002	-0.001	0.001	0.001	0.000	0.000	0.001
GPIO5	-1	5	uA	-0.002	-0.002	-0.005	-0.001	-0.003	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.002	-0.001	-0.002	-0.001	-0.001	-0.005	-0.002	-0.003	-0.002	-0.003	-0.002
GPIO6	-1	5	uA	0.004	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.002	0.004	0.007	0.007	0.003	0.003	0.005	0.005	0.003	0.003	0.006	0.004	0.005	0.004	0.004
GPIO7	-1	5	uA	0.003	0.001	0.005	0.005	0.004	0.005	0.006	0.003	0.000	0.001	0.003	0.004	0.004	0.005	0.002	0.003	0.004	0.002	-0.001	0.002	0.001	0.001	0.001	0.003
GPIO8	-1	5	uA	0.002	0.003	0.000	0.002	0.002	0.000	0.000	-0.001	0.003	0.001	0.001	0.001	0.004	0.002	0.001	0.001	0.002	0.000	0.002	0.002	-0.001	0.002	0.001	0.001
GPIO9	-1	5	uA	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.000	-0.001	-0.001	0.000	0.000	-0.002	0.000	-0.001	0.001	-0.002	0.000	0.001	-0.002	0.000	-0.001
GPIO10	-1	5	uA	0.001	0.002	0.007	0.003	0.003	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.002	0.005	0.004	0.004	0.004	0.001	0.003	0.003	0.002	0.004	0.003	0.004
GPIO11	-1	5	uA	0.002	0.002	0.001	0.003	0.002	0.002	0.000	0.002	0.002	0.001	0.001	0.003	-0.001	0.002	0.001	-0.001	0.001	0.000	0.001	0.002	0.002	0.001	0.001	0.001
GPIO12	-1	5	uA	0.001	0.000	0.001	0.001	0.001	0.001	-0.001	0.000	-0.002	0.001	0.000	0.000	-0.001	-0.002	0.001	-0.001	-0.001	-0.001	0.002	0.000	0.000	-0.001	0.000	0.000
GPIO13	-1	5	uA	-0.001	0.002	0.000	0.000	0.000	0.001	0.003	0.000	0.001	-0.001	0.001	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001	0.001	-0.001	0.000	0.000	0.000
GPIO14	-1	5	uA	0.001	0.000	0.001	0.002	0.001	0.000	0.002	0.001	0.001	0.001	0.001	0.011	0.000	0.001	0.001	0.008	0.004	0.000	0.001	-0.001	0.002	0.001	0.001	0.002
GPIO15	-1	5	uA	0.001	0.001	0.003	0.003	0.002	0.001	0.001	0.001	0.000	-0.001	0.000	0.000	-0.001	0.001	0.001	0.000	0.000	-0.001	-0.001	0.000	-0.001	-0.001	-0.001	0.000
LB_REF_CLK_MI	-1	5	uA	0.005	0.005	0.004	0.001	0.004	0.003	0.002	0.006	0.001	0.004	0.003	0.005	0.003	0.004	0.002	0.004	0.004	0.006	0.002	0.000	0.004	0.004	0.003	0.003
RSTINn	-1	5	uA	0.005	0.000	0.002	0.000	0.002	0.000	0.002	0.000	0.001	0.001	0.001	-0.001	-0.001	0.000	0.000	0.001	0.000	0.001	-0.002	0.174	0.000	0.000	0.035	0.010
SCLK	-1	5	uA	0.003	0.000	0.001	0.002	0.002	0.000	0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.003	0.000	0.001	0.002	0.001	-0.001	0.002	0.000	0.001	0.001
SDATA	-1	5	uA	0.001	-0.001	-0.001	0.001	0.000	-0.004	-0.002	0.002	-0.002	0.000	-0.001	0.000	0.000	0.000	0.001	0.001	0.000	0.000	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001
SPRI_DONE	-1	5	uA	0.002	0.002	0.001	0.000	0.001	0.003	0.002	0.002	0.001	0.003	0.002	0.000	0.001	0.002	0.002	0.003	0.002	0.002	0.003	0.004	0.002	0.002	0.003	0.002
SPRI_STATUS	-1	5	uA	0.001	0.002	0.000	0.000	0.001	0.000	0.001	-0.001	0.000	-0.002	0.000	-0.001	0.001	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	0.000	0.000	0.000	0.000
TCK	-1	5	uA	0.003	0.001	0.000	0.002	0.002	0.001	0.002	0.001	0.001	0.000	0.001	0.001	0.000	0.002	0.003	0.001	0.001	-0.001	0.002	0.001	0.000	0.002	0.001	0.001
ILEAK_g																											
EEPROM_EN	-5	1	uA	-0.001	0.000	-0.001	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.003	-0.002	0.001	0.002	0.000	0.000	0.000	0.000	-0.001	-0.001	0.001	0.000	-0.001
GPIO0	-5	1	uA	0.002	0.002	0.001	0.002	0.002	0.001	0.001	0.002	0.004	0.002	0.002	0.003	0.001	0.001	0.000	0.001	0.001	0.001	0.002	0.002	0.000	0.002	0.001	0.002
GPIO1	-5	1	uA	-0.002	-0.003	-0.002	-0.001	-0.002	-0.001	-0.004	-0.002	-0.003	-0.002	-0.002	-0.002	-0.001	0.000	-0.004	-0.003	-0.002	-0.001	-0.002	-0.001	-0.002	-0.002	-0.002	-0.002
GPIO2	-5	1	uA	-0.004	0.000	0.001	0.002	0.000	-0.002	-0.001	0.001	-0.002	-0.002	-0.001	-0.002	0.001	0.002	0.000	-0.001	0.000	0.000	0.002	0.000	0.001	0.000	0.001	0.000
GPIO3	-5	1	uA	-0.002	0.001	-0.001	-0.002	-0.001	-0.001	-0.003	-0.001	0.000	-0.002	-0.001	0.001	-0.001	-0.001	-0.002	-0.002	-0.001	-0.001	-0.002	-0.001	-0.002	0.000	-0.001	-0.001
GPIO4	-5	1	uA	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.004	-0.003	-0.001	-0.001	-0.002	-0.002	-0.002	-0.001	-0.002	-0.003	-0.002	-0.002	-0.002	-0.001	-0.001	-0.001	-0.001	-0.002
GPIO5	-5	1	uA	-0.007	-0.005	-0.003	-0.004	-0.005	-0.004	-0.001	-0.002	-0.003	-0.001	-0.002	-0.004	-0.003	-0.002	-0.002	-0.004	-0.003	-0.005	-0.002	-0.004	-0.003	-0.003	-0.003	-0.003
GPIO6	-5	1	uA	0.001	0.003	0.002	0.002	0.002	0.003	0.001	0.002	0.002	0.000	0.002	0.003	0.001	0.002	0.001	0.004	0.002	0.002	0.002	0.002	0.004	0.001	0.002	0.002
GPIO7	-5	1	uA	0.001	-0.001	-0.003	-0.001	-0.001	-0.001	0.001	0.002	0.000	-0.001	0.000	0.001	0.001	0.001	0.000	0.003	0.001	-0.002	-0.001	-0.001	0.000	0.002	0.000	0.000
GPIO8	-5	1	uA	-0.001	-0.003	-0.001	-0.002	-0.002	0.002	-0.001	-0.001	0.000	-0.001	0.000	-0.001	0.002	0.000	-0.001	0.001	0.000	-0.001	0.000	0.001	-0.001	0.000	0.000	0.000
GPIO9	-5	1	uA	-0.002	-0.001	-0.001	-0.002	-0.002	-0.003	-0.003	-0.002	0.000	0.000	-0.002	-0.001	-0.001	-0.001	-0.003	-0.002	-0.002	0.000	-0.002	-0.001	-0.001	-0.002	-0.001	-0.001
GPIO10	-5	1	uA	0.001	0.002	0.002	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.002	0.003	0.002	0.002	-0.001	0.001	0.000	0.000	0.002	0.000	0.001
GPIO11	-5	1	uA	-0.001	-0.001	0.001	0.001	0.000	0.000	-0.002	0.000	0.000	0.000	0.000	0.001	-0.001	0.000	-0.003	-0.001	-0.001	0.000	-0.002	0.000	-0.002	0.000	-0.001	-0.001
GPIO12	-5	1	uA	-0.002	-0.003	-0.003	0.000	-0.002	-0.002	-0.002	-0.002	-0.002	-0.001	-0.002	-0.002	-0.002	-0.001	-0.002	-0.003	-0.002	-0.001	-0.003	-0.001	-0.002	-0.001	-0.002	-0.002
GPIO13	-5	1	uA	-0.002	-0.003	-0.002	-0.002	-0.002	-0.001	-0.002	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	-0.001
GPIO14	-5	1	uA	0.000	-0.001	0.000	0.000	0.000	-0.001	-0.001	-0.001	0.000	-0.001	-0.001	-0.001	0.000	-0.001	-0.002	-0.002	-0.001	-0.001	-0.001	0.000	0.000	-0.001	-0.001	-0.001
GPIO15	-5	1	uA	-0.001	-0.001	-0.002	-0.001	-0.001	-0.001	-0.003	-0.001	-0.001	-0.003	-0.002	-0.001	-0.002	0.000	-0.002	-0.001	-0.001	-0.002	-0.002	0.000	-0.002	0.000	-0.001	-0.001
LB_REF_CLK_MI	-5	1	uA	0.000	0.003	0.000	-0.002	0.000	0.004	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.000	0.003	0.001	0.001	0.004	0.001	0.002	0.002	-0.001	0.002	0.002
RSTINn	-5	1	uA	-0.001	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.002	0.000	-0.002	-0.001	-0.002	-0.002	0.000	-0.002	0.000	-0.001	-0.002	-0.002	0.001	-0.001	-0.001	-0.001	-0.001
SCLK	-5	1	uA	-0.001	0.000	-0.001	0.000	-0.001	0.001	-0.001	0.000	0.000	0.000	0.000	-0.001	0.001	0.002	-0.001	-0.001	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	0.000
SDATA	-5	1	uA	-0.002	-0.004	-0.003	-0.001	-0.003	-0.003	-0.004	-0.002	-0.003	0.000	-0.002	-0.001	-0.002	-0.004	-0.003	-0.001	-0.002	0.000	-0.005	-0.003	-0.003	-0.002	-0.003	-0.002
SPRI_DONE	-5	1	uA	-0.001	-0.001	0.001	0.001	0.000	0.002	0.001	-0.001	0.000	0.001	0.001	0.000	-0.001	0.000	0.001	0.001	0.000	0.002	0.002	0.002	0.003	0.002	0.002	0.001
SPRI_STATUS	-5	1	uA	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003	-0.004	-0.002	-0.003	-0.003	-0.004	-0.002	-0.003	-0.001	-0.002	-0.002	-0.002	-0.002	-0.004	-0.002	-0.002	-0.002	-0.003
TCK	-5	1	uA	0.000	0.000	-0.001	-0.001	-0.001	-0.002	-0.002	-0.003	-0.002	-0.001	-0.002	-0.001	-0.001	0.000	0.000	-0.002	-0.001	-0.001	0.000	-0.003	-0.001	-0.001	-0.001	-0.001
ILEAKv_pd																											
DBG7	21	83	uA	30.696	30.620	31.134	31.183	30.908	31.357	32.205	32.050	31.217	31.773	31.720	31.864	32.587	31.771	32.152	31.330	31.941	31.290	32.006	32.042	30.998	32.657	31.799	31.821
DBG6	21	83	uA	31.292	30.163	31.601	31.830	31.222	31.603	30.364	30.965	30.477	30.910	30.864	30.112	32.431	32.530	31.376	30.473	31.384	30.467	31.923	32.195	30.048	31.436	31.214	31.150
DBG5	21	83	uA	30.727	30.407	31.685	31.266	31.021	31.474	31.520	31.383	31.455	32.089	31.584	31.413	32.557	31.746	32.247	31.272	31.847	31.467	32.615	31.775	30.724	32.388	31.794	31.739
DBG4	21	83	uA	31.237	30.868	31.538	31.731	31.344	31.367	31.425	31.936	31.852	31.500	31.616	31.336	32.616	31.886	31.644	31.525	31.801	31.466	31.598	31.534	30.888	32.648	31.627	31.685
DBG3	21	83	uA	31.849	30.121	31.918	32.353	31.560	31.938	30.931	30.895	30.780	30.790	31.067	30.260	32.501	32.065	31.511	30.332	31.334	30.054	32.114	32.378	29.689	31.527	31.152	31.186
DBG2	21	83	uA	31.212	29.570	31.838	31.810	31.108	32.294	29.981	31.108	30.773	30.989	31.029	30.158	32.200	32.608	31.836	30.611	31.483	30.363	32.316	31.807	29.847	31.664	31.199	31.239
DBG1	21	83	uA	30.973	29.893	31.733	32.340	31.235	31.929	30.307	31.076	30.968	30.895	31.035	29.757	32.148	32.429	31.529	30.814	31.335	30.611	32.271	31.811	29.815	31.215	31.145	31.173
DBG0	21	83	uA	30.768	30.965	31.858	30.588	31.045	31.692	31.769	32.144	31.268	31.971	31.769	31.727	32.407	32.347	31.691	32.008	32.036	31.903	31.864	31.481	31.309	32.274	31.766	31.862
OCT_EN2	21	83	uA	30.494	30.451	31.503	30.878	30.832	31.444	31.991	31.734	31.061	31.223	31.491	31.733	32.145	31.840	31.904	31.611	31.847	31.289	31.756	31.881	30.672	32.153	31.550	31.634
OCT_EN1	21	83	uA	30.610	30.427	31.849	31.372	31.065	32.347	30.665	30.794	29.997	30.703	30.901	30.791	32.199	32.599	31.085	31.088	31.552	30.791	32.363	32.237	29.530	32.021	31.388	31.274
OCT_EN0	21	83	uA	30.406	29.631	30.784	31.343	30.541	31.584	30.025	30.413	30.266	30.292	30.516	30.358	30.915	31.171	30.709	30.341	30.699	30.462	31.955	31.142	29.554	30.859	30.794	30.662
PE_MODE	21	83	uA	30.232	29.762	31.301	31.341	30.659	31.598	30.870	30.350	30.124	30.739	30.736	30.258	30.828	31.529	30.699	31.551	30.973	30.220	31.857	31.343	29.638	31.198	30.851	30.854
LCLK_MODE2	21	83	uA	30.741	29.361	31.078	31.114	30.574	31.668	30.353	31.032	29.430	30.630	30.623	30.196	31.120	30.822	31.016	31.164	30.864	29.580	31.090	31.080	29.223	30.903	30.375	30.635
LCLK_MODE1	21	83	uA	30.694	30.079	31.350	31.579	30.926	32.732	31.232	31.495	29.879	31.239	31.315	31.213	32.868	32.212	31.558	31.272	31.825	30.195	31.816	31.815	29.986	31.340	31.030	31.411
LCLK_MODE0	21	83	uA	30.473	29.280	30.953	30.874	30.395	31.432	29.362	30.426	28.782	30.821	30.165	30.331	31.024	30.883	30.411	30.569	30.644	28.890	30.966	30.875	28.881	30.674	30.057	30.302
TEST_EN	21	83	uA	31.037	31.093	31.576	30.867	31.143	31.407	32.253	32.195	31.135	31.900	31.778	31.740	32.622	32.258	32.014	31.786	32.084	31.586	31.614	31.621	30.719	32.498	31.608	31.836
SCAN_EN	21	83	uA	31.211	29.919	32.123	32.274	31.382	32.416	30.273	31.239	31.130	31.148	31.241	30.466	32.382	32.305	31.234	30.736	31.425	30.286	32.398	31.975	30.128	31.946	31.347	31.337
ILEAKg_pu																											
TDI	-96	-24	uA	-47.746	-45.876	-46.400	-47.039	-46.765	-44.827	-44.784	-44.573	-45.412	-44.497	-44.819	-43.734	-45.369	-44.423	-43.945	-44.907	-44.476	-44.182	-44.890	-44.286	-42.630	-43.721	-43.942	-44.440
TMS	-96	-24	uA	-47.485	-45.402	-45.964	-46.507	-46.340	-45.302	-44.179	-44.032	-44.187	-44.459	-44.432	-43.172	-43.601	-43.825	-44.544	-43.254	-43.679	-44.651	-44.093	-44.873	-44.334	-43.854	-44.361	-44.145
TRST	-96	-24	uA	-46.782	-45.670	-46.286	-46.521	-46.315	-44.560	-43.734	-43.820	-44.590	-45.403	-44.421	-43.641	-44.280	-43.814	-44.167	-44.490	-44.078	-43.509	-44.731	-44.562	-44.859	-43.982	-44.329	-44.273
IDDQ	0.1	25000	uA	18912.572	17224.656	16867.262	18280.775	17821.316	15113.088	14110.511	12284.054	14038.229	12903.805	13689.937	14663.334	12941.284	14999.311	12931.914	12278.031	13562.775	15547.448	12338.935	16660.456	16530.616	13824.730	14980.437	14024.615

GN41242.V1 / F2691G-01 Copper Qualification
Electrical Data Report

PCIE_max				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
JTAG_max				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
MBIST_max				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
PLL_max				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
PCIE_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
JTAG_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
MBIST_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
PLL_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
SCAN_SR_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
SCAN_flush_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
SCAN_full_min				Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		Pass	Pass	Pass	Pass	Pass		
TEST RESULT				**PASSED**	**PASSED**	**PASSED**	**PASSED**		**PASSED**	**PASSED**	**PASSED**	**PASSED**	**PASSED**		**PASSED**	**PASSED**	**PASSED**	**PASSED**	**PASSED**		**PASSED**	**PASSED**	**PASSED**	**PASSED**	**PASSED**		