



1108 West Evelyn Ave., Sunnyvale, CA 94086
 Cage Code: 0ZHS4
 (408) 735-7137
 files@protoexpress.com
 www.protoexpress.com

Need Ionic

Certificate of Compliance

Customer	The University of Arizona	Revision:	1.0
Address	1303 E University Blvd. Box 5 Tucson AZ 85719	Date Code	2039
Part Number	GUSTO-UA-DWG-00008	Base Material	Isola 370 HR
Purchase Order #	559272/line 3, COIN 24101	Work Order	422224-4.00
Sierra Tool Number	171617	Date Shipped	10/5/2020
Number of Layers	10		
Surface Finish	HAL		
Quantity of PCB Shipped:	3		

(Plus solder sample if required.)

Compliance to:

Master Drawing	None		
Specification / Rev / Amd	IPC-6012 Rev D Amd 1, Class 3	and IPC-1601, IPC-A-600 (latest revision)	
Lead Free	No	NASA Outgassing	No
RoHS / REACH *	Yes, with exception of Lead in surface finish.	Positive Etch Back	No
UL	---	Halogen Free	No
Special ID, marking, comments	None		

Specific paragraphs and inspection items:

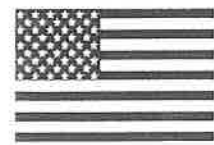
- | | |
|--|---|
| <p>3.2 Material
 Visual</p> <p>3.3.1 Edges of Printed Board</p> <p>3.3.2 Laminate Imperfections</p> <p>3.3.3 Plating and Coating Voids in the Hole</p> <p>3.3.4 Lifted Lands</p> <p>3.3.5 Marking and Traceability</p> <p>3.3.9 Workmanship</p> <p>Solderability</p> <p>3.3.6 Surface</p> <p>3.3.6 Plated Through Holes</p> <p>Dimensional</p> <p>3.4 Printed Board Dimensional</p> <p>3.4.1 Hole Size</p> <p>3.4.1 Hole Pattern Accuracy</p> <p>3.4.1 Pattern feature accuracy</p> <p>3.4.2 Annular ring (external)</p> <p>3.4.3 Bow and twist</p> <p>3.7 Solder Mask Coverage</p> <p>3.6.2.11 Plating / coating thickness</p> <p>Conductor Width & Spacing</p> <p>3.5.1 Internal and External Width</p> <p>2.5.2 Internal and External Spacing</p> | <p>IPC-6012</p> <p>Conductor Surfaces</p> <p>3.3.8 junction of gold plate to solder finish</p> <p>3.5.4.1 Nick, dents, pinholes</p> <p>3.4.4.5 - 7 Dewetting / nonwetting / final finish coverage</p> <p>3.5.4.4 Edge printed board connector</p> <p>3.5.4.2 Surface mount</p> <p>Physical</p> <p>3.3.7 Plating adhesion</p> <p>3.7.2 Solder mask cure and adhesion</p> <p>Structural Integrity After Thermal Stress</p> <p>3.6.2.1 Plating integrity</p> <p>3.6.2.3 Laminate voids</p> <p>3.6.2.6 & 8 Etchback / negative etchback</p> <p>3.6.2.9 Annular ring and Breakout (internal)</p> <p>3.6.2.10 Lifted Lands</p> <p>3.6.2.11 Hole plating thickness</p> <p>3.6.2.15 Surface plating and conductor thickness</p> <p>3.6.2.14 Copper foil thickness (internal)</p> <p>3.6.2.16 Metal core spacing</p> <p>3.6.2.17 Dielectric thickness</p> <p>3.6.2.18 Material fill of Blind and Buried Vias</p> <p>Cleanliness</p> <p>3.9.1 Cleanliness prior to solder mask application</p> <p>Foreign Object Debris (FOD)</p> |
|--|---|

The above order has been both visually inspected, microsection, tested, and conformed to the customer specification, customer's master drawings, and purchase order.

All material used in the manufacture of the above order meet the material and manufacturing specifications as specified on the customer's drawings and purchase order subject to subsequent communication / agreement. Sierra Circuits hereby certifies that the item was last substantially transformed ("Substantially Transformed") in the United States of America. Sierra hereby certifies that the information is accurate and TAA Compliant, which is defined to mean that the article is wholly the growth, product or manufacture of the U.S.A. or Substantially Transformed in the U.S.A.

"RoHS / REACH" Compliant Manufactured to the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) as regulated by the European Union dated 18 December 2006. Furthermore, they do not contain any of the 174 materials that are considered substance of very high concern (SVHC), updated on July 7, 2017 (refer to URL <http://ec.europa.eu/environment/>)

MADE IN



U. S. A.

Bhupinder Kaur

October 5, 2020

Inspector

Date

All measurement in inches

SIERRA CIRCUITS

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Electrical Test Certificate of Compliance

Customer	The University of Arizona	Revision	1.0
Address	1303 E University Blvd. Box 5 Tucson AZ 85719	Date Code	2039
Part Number	GUSTO-UA-DWG-00008	Base Material	Isola 370 HR
Purchase Order #	559272/line 3, COIN 24101	Work Order	422224 - 1.00
Sierra Tool Number	171617	Date Tested	10/2/2020
Number of boards Passed	17	Boards shipped might be less then the boards that passed electrical test.	

Compliance to:

Master Drawing None
Specification / Rev / Amd IPC-6012 Rev D Amd 1, Class 3
Test Level C
Test Method Resistive

Test Stamp:

Stamped on PCB

Resistive Test Parameters:

Isolation (Shorts/Leakage) Meg Ohms 10
Continuity (Open) 10
Voltage 40
Adjacency Used Yes
Horizontal Distance 0.05
Vertical Distance 0.05
Source Data Used Net List from Gerber Data
Additional Comments None



High Potential (Hi-Pot):

Voltage No Requirement

Comments or addition results: None

Sierra Circuits, Inc. certifies that this work order has been electrically tested in accordance with IPC-9252 "Guidelines and Requirements for Electrical Testing of Unpopulated Printed Boards"
The above order has been electrical tested, and conformed to the order specifications and the customer's drawings & purchase order.

T3-Jaswinder Kaur

October 2, 2020

Inspector

Date



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Certificate of Compliance - Dimension

Customer The University of Arizona
 Address 1303 E University Blvd. Box 5 Tucson AZ 85719
 Part Number GUSTO-UA-DWG-00008
 Purchase Order # 559272/line 3, COIN 24101
 PCB Type Type 3
 Sierra Tool Number 171617

Lot Conformance Inspection (LCI)

Revision 1.0
 Date Code 2039
 Manufactured Work Order 422224-4.00
 Number of Pnl in Work Order 4
 Number of Bds Released 24
 Boards per Panel 6
 Sample Size Required 1

Compliance to:

Master Drawing None

Specification / Rev / Amd IPC-6012 Rev D Amd 1, Class 3

Disposition: Accept Reject

Comments:

Bhupinder Kaur

October 5, 2020

Inspector

Date

Item	Nominal (Print Spec)	Tolerance		Measurement from Boards					Measurement Tool Serial Number & Calibration Date
		+	-	Board #1	Board #2	Board #3	Board #4	Board #5	
1	6.299	0.005	0.005	6.299					CALI
2	6.299	0.005	0.005	6.299					
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									



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Certificate of Compliance - Hole Size

Customer The University of Arizona
 Address 1303 E University Blvd. Box 5 Tucson AZ 85719
 Part Number GUSTO-UA-DWG-00008
 Purchase Order # 559272/line 3, COIN 24101
 PCB Type Type 3
 Sierra Tool Number 171617

Lot Conformance Inspection (LCI)

Revision 1.0
 Date Code 2039
 Manufactured Work Order 422224-4.00
 Number of Pnl in Work Order 4
 Number of Bds Released 24
 Boards per Panel 6
 Sample Size Required 1

Compliance to:

Master Drawing None

Specification / Rev / Amd IPC-6012 Rev D Amd 1, Class 3

All dimensions in inches.

Comments:

Disposition:

Accept

Reject

Bhupinder Kaur

October 5, 2020

Inspector

Date

Hole Symbol or Type	Nominal (Print Spec)	Tolerance		Measurement from Boards (Holes) & Serial Numbers					Measurement Tool Serial Number
		+	-	Board #1	Board #2	Board #3	Board #4	Board #5	
				003-005					
via	0.020	0.003	0.003	VIA					N/A
plated	0.021	0.003	0.003	0.021					PINGAGES
plated	0.022	0.003	0.003	0.022					PINGAGES
plated	0.024	0.003	0.003	0.024					PINGAGES
plated	0.035	0.003	0.003	0.035					PINGAGES
plated	0.039	0.003	0.003	0.039					PINGAGES
plated	0.045	0.003	0.003	0.045					PINGAGES
plated	0.051	0.003	0.003	0.051					PINGAGES
non_plated	0.067	0.003	0.003	0.067					PINGAGES
non_plated	0.093	0.003	0.003	0.093					PINGAGES
plated	0.098	0.003	0.003	0.098					PINGAGES
non_plated	0.125	0.003	0.003	0.125					PINGAGES



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Certificate of Compliance - Bow & Twist

Customer The University of Arizona
 Address 1303 E University Blvd, Box 5 Tucson AZ 85719
 Part Number GUSTO-UA-DWG-00008
 Purchase Order # 559272/line 3, COIN 24101

Lot Conformance Inspection (LCI)

Revision: 1.0
 Date Code 2039
 Work Order 42222-4.00

Board Length 6.30 inches
 Board Width 6.30 inches
 Panels in lot 4
 # of Samples 1

Sierra Tool Number 171617

Compliance to:

Master Drawing None
 Specification / Rev / Amd IPC-6012 Rev D Amd 1, Class 3
 Design Surface mount components

Specification 0.75%

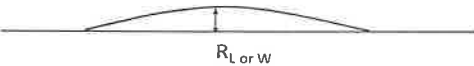
Bow									
Board #	S/N #	Length (L)	Width (W)	Go/No-Go gauge for sample length R_L	Go/No-Go gauge for sample width R_W	Max. height off table along Brd length (inches) R_L	Max. height off table along Brd width (inches) R_W	% Bow _L	% Bow _W
1	003-005	6.300	6.300	0.047	0.047	0.000	0.000	0.00%	0.00%
2									
3									
4									
5									

Calculations for Bow:

$R_L = L(B) / 100$ % Bow_W = $(R_W / W) \times 100$
 $R_W = W(B) / 100$ % Bow_L = $(R_L / L) \times 100$

Where:

R_L = Go/No-Go feeler / pin gage size for sample length
 R_W = Go/No-Go feeler / pin gage size for sample width
 L = Board Length measurement
 W = Board Width measurement
 B = Maximum allowable Bow %



Calculations for Twist:

% Twist = $(R / (2 \cdot D)) \times 100$

Where:

L = length of board (inches)
 W = width of board (inches)
 R_D = max. height off table along diagonal board length (inches)
 D = diagonal board length (inches)
 R = max. corner height above table (inches)



Note: Any R values of 10 mils or less are considered negligible and are listed as "0"

Twist						Overall Rating	
Board #	S/N #	Diagonal Length (D)	Go/No-Go gauge for sample length R_D	Max. corner height above table (inches) R	% Twist	Bow & Twist Pass / Fail	Remarks / Comments
1	003-005	8.910	0.134	0.000	0.00%	Pass	
2							
3							
4							
5							

Measurement Tool Used	GRANITE	Serial Number	AA0474	Calibration Date:	5/20/2021
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Comments: Any board rejection requires 100% sort and retest.

Bhupinder Kaur
 Inspector

October 5, 2020
 Date



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Micro Section Analysis Report

Customer	The University of Arizona		
Address	1303 E University Blvd. Box 5 Tucson AZ 85719		
Part Number	GUSTO-UA-DWG-00008	Revision	1 0
Purchase Order #	559272/line 3, COIN 24101	Date Code	2039
Sierra Tool Number	171617	Base Material	Isola 370 HR
		Work Order	422224 - 1.00

Surface Finish	HAL	Construction Type	Foil
Compliance to: Master Drawing	None	Number of Layers	10
Specification / Rev / Amd	IPC-6012 Rev D Amd 1, Class 3		

Construction		Serial Number Used		1
Layer	Specification		Actual Measurement	
	Copper Weight (oz)	Nominal		
Layer 1	0.250	0.00035	0.00035	
Dielectric		0.00780	0.00733	
Layer 2	1.000	0.00140	0.00139	
Dielectric		0.00800	0.00801	
Layer 3	1.000	0.00140	0.00138	
Dielectric		0.00470	0.00543	
Layer 4	1.000	0.00140	0.00137	
Dielectric		0.00800	0.00793	
Layer 5	1.000	0.00140	0.00139	
Dielectric		0.00480	0.00475	
Layer 6	1.000	0.00140	0.00138	
Dielectric		0.00800	0.00820	
Layer 7	1.000	0.00140	0.00137	
Dielectric		0.00480	0.00543	
Layer 8	1.000	0.00140	0.00137	
Dielectric		0.00800	0.00790	
Layer 9	1.000	0.00140	0.00138	
Dielectric		0.00790	0.00720	
Layer 10	0.250	0.00035	0.00035	
Dielectric				
Layer 11				
Dielectric				
Layer 12				
Dielectric				
Layer 13				
Dielectric				
Layer 14				
Dielectric				
Layer 15				
Dielectric				
Layer 16				
Dielectric				
Layer 17				
Dielectric				
Layer 18				
Dielectric				
Layer 19				
Dielectric				
Layer 20				
Dielectric				
Layer 21				

Compliance to the following requirements:

Structural integrity After Thermal Stress

- 3.6.2.1 Plating integrity
- 3.6.2.3 Laminate voids
- 3.6.2.6 & 8 Etchback / negative etchback
- 3.6.2.9 Annular ring and Breakout (internal)
- 3.6.2.10 Lifted Lands
- 3.6.2.11 Hole plating thickness
- 3.6.2.15 Surface plating and conductor thickness
- 3.6.2.14 Copper foil thickness (internal)
- 3.6.2.16 Metal core spacing
- 3.6.2.17 Dielectric thickness
- 3.6.2.18 Material fill of Blind and Buried Vias

Overall Thickness

Nominal	0.079
Minimum	0.071
Maximum	0.087
Measured	0.081
Pass/Fail	PASS

Measurement taken over ALL

Measurement Tool: Optical Microscope

Solderability Test Results

Use "S" Coupons if available

Serial Number	Results
1	PASS
2	PASS
3	PASS
	Not Evaluated

External Total Plated Conductor/Pad Thickness

Spec:	Maximum	Minimum
	None	0.0000
Layer 1		0.0028
Layer 10		0.0027

Coupon Hole Wall Thickness

A	Hole Size	Average =
Reading 1	0.00185	0.00167
Reading 2	0.00152	
Reading 3	0.00165	
B	Hole Size	Average =
Reading 1	0.00220	0.00219
Reading 2	0.00198	
Reading 3	0.00240	
B2	Hole Size	Average =
Reading 1	0.00212	0.00190
Reading 2	0.00169	
Reading 3	0.00189	

Comments:

Report Completed by: **Arthur Torres**

Date: **October 5, 2020**



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Customer Coupon Retention

Customer	The University of Arizona	Revision:	1.0
Address	1303 E University Blvd. Box 5 Tucson AZ 85719	Date Code	2039
Part Number	GUSTO-UA-DWG-00008	Base Material	Isola 370 HR
Purchase Order #	559272/line 3, COIN 24101	Work Order	422224 - 1.00
Sierra Tool Number	171617		
Number of Layers	10		
Surface Finish	HAL		

Coupon Shipped Number SN 4 X/Y

Date Shipped 10/5/2020

This coupon has been given to the customer upon their request. The customer is responsible for the retention of this coupon as required by all specifications and regulations. Sierra Circuits might not have any additional retention coupons.

Arthur Torres

October 5, 2020

Inspector

Date

Attach coupon below



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Micro Section Analysis Report

Customer	The University of Arizona	Revision	1.0
Address	1303 E University Blvd. Box 5 Tucson AZ 85719	Date Code	2039
Part Number	GUSTO-UA-DWG-00008	Base Material	Isola 370 HR
Purchase Order #	559272/line 3, COIN 24101	Work Order	422224 - 1.00

Sierra Tool Number	171617	Construction Type	Foil
Surface Finish	HAL	Number of Layers	10
Compliance to: Master Drawing	None		
Specification / Rev / Amd	IPC-6012 Rev D Amd 1, Class 3		

Construction		Serial Number Used: 1	
Layer	Specification		Actual Measurement
	Copper Weight (oz)	Nominal	
Layer 1	0.250	0.00035	0.00035
Dielectric		0.00780	0.00733
Layer 2	1.000	0.00140	0.00139
Dielectric		0.00800	0.00801
Layer 3	1.000	0.00140	0.00138
Dielectric		0.00470	0.00543
Layer 4	1.000	0.00140	0.00137
Dielectric		0.00800	0.00793
Layer 5	1.000	0.00140	0.00139
Dielectric		0.00480	0.00475
Layer 6	1.000	0.00140	0.00138
Dielectric		0.00800	0.00820
Layer 7	1.000	0.00140	0.00137
Dielectric		0.00480	0.00543
Layer 8	1.000	0.00140	0.00137
Dielectric		0.00800	0.00790
Layer 9	1.000	0.00140	0.00138
Dielectric		0.00790	0.00720
Layer 10	0.250	0.00035	0.00035
Dielectric			
Layer 11			
Dielectric			
Layer 12			
Dielectric			
Layer 13			
Dielectric			
Layer 14			
Dielectric			
Layer 15			
Dielectric			
Layer 16			
Dielectric			
Layer 17			
Dielectric			
Layer 18			
Dielectric			
Layer 19			
Dielectric			
Layer 20			
Dielectric			
Layer 21			

Compliance to the following requirements:

Structural Integrity After Thermal Stress

3.6.2.1 Plating integrity
 3.6.2.3 Laminate voids
 3.6.2.6 & 8 Etchback / negative etchback
 3.6.2.9 Annular ring and Breakout (internal)
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 3.6.2.16 Metal core spacing
 3.6.2.17 Dielectric thickness
 3.6.2.18 Material fill of Blind and Buried Vias

Overall Thickness

Nominal	0.079
Minimum	0.071
Maximum	0.087
Measured	0.081
Pass/Fail	PASS

Measurement taken over:
ALL

Measurement Tool:
Optical Microscope

Solderability Test Results

Use "S" Coupons if available

Serial Number	Results
1	PASS
2	PASS
3	PASS
	Not Evaluated

Report Completed by:
Date:

External Total Plated Conductor/Pad Thickness		
Spec:	Maximum	Minimum
		None
Layer 1		0.0028
Layer 10		0.0027

Coupon		Hole Wall Thickness	
A	Hole Size	0.04920	
Reading 1	0.00185	Average =	
Reading 2	0.00152		0.00167
Reading 3	0.00165		
B	Hole Size	0.02360	
Reading 1	0.00220	Average =	
Reading 2	0.00198		0.00219
Reading 3	0.00240		
B2	Hole Size	0.01380	
Reading 1	0.00212	Average =	
Reading 2	0.00169		0.00190
Reading 3	0.00189		

Comments:

Arthur Torres

October 3, 2020

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Customer Coupon Retention

Customer The University of Arizona
Address 1303 E University Blvd, Box 5 Tucson AZ 85719
Part Number GUSTO-UA-DWG-00008
Purchase Order # 559272/line 3, COIN 24101

Revision: 1.0
Date Code 2039
Base Material Isola 370 HR
Work Order 422224 - 1.00

Sierra Tool Number 171617
Number of Layers 10
Surface Finish HAL

Coupon Shipped Number SN 4 X/Y

Date Shipped 10/3/2020

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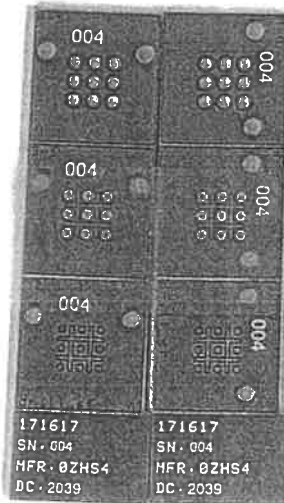
Arthur Torres

October 3, 2020

Inspector

Date

Attach coupon below



Micro Section Analysis Report

Customer	The University of Arizona	Revision	1.0
Address	1303 E University Blvd, Box 5 Tucson AZ 85719	Date Code	2039
Part Number	GUSTO-UA-DWG-00008	Base Material	Isola 370 HR
Purchase Order #	559272/line 3, COIN 24101	Work Order	422224 - 1.00

Sierra Tool Number	171617	Construction Type	Foil
Surface Finish	HAL	Number of Layers	10
Compliance to:	Master Drawing	None	
Specification / Rev / Amd	IPC-6012 Rev D Amd 1, Class 3		

Construction		Serial Number Used: 1	
Layer	Specification		Actual Measurement
	Copper Weight (oz)	Nominal	
Layer 1	0.250	0.00035	0.00035
Dielectric		0.00780	0.00733
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Dielectric		0.00800	0.00801
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Dielectric		0.00800	0.00793
Layer 5	1.000	0.00140	0.00139
Dielectric		0.00480	0.00475
Layer 6	1.000	0.00140	0.00138
Dielectric		0.00800	0.00820
Layer 7	1.000	0.00140	0.00137
Dielectric		0.00480	0.00543
Layer 8	1.000	0.00140	0.00137
Dielectric		0.00800	0.00790
Layer 9	1.000	0.00140	0.00138
Dielectric		0.00790	0.00720
Layer 10	0.250	0.00035	0.00035
Dielectric			
Layer 11			
Dielectric			
Layer 12			
Dielectric			
Layer 13			
Dielectric			
Layer 14			
Dielectric			
Layer 15			
Dielectric			
Layer 16			
Dielectric			
Layer 17			
Dielectric			
Layer 18			
Dielectric			
Layer 19			
Dielectric			
Layer 20			
Dielectric			
Layer 21			

Compliance to the following requirements:

Structural Integrity After Thermal Stress

3.6.2.1 Plating integrity
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 3.6.2.18 Material fill of Blind and Buried Vias

Overall Thickness

Nominal	0.079
Minimum	0.071
Maximum	0.087
Measured	0.081
Pass/Fail	PASS

Measurement taken over:
ALL

Measurement Tool:
Optical Microscope

Solderability Test Results

Use "S" Coupons if available

Serial Number	Results
1	PASS
2	PASS
3	PASS
	Not Evaluated

Report Completed by: Arthur Torres
 Date: October 3, 2020

External Total Plated Conductor/Pad Thickness

Spec:	Maximum	Minimum
	None	0.0000
Layer 1	0.0028	
Layer 10	0.0027	

Coupon Hole Wall Thickness

A	Hole Size	0.04920
Reading 1	0.00185	Average = 0.00167
Reading 2	0.00152	
Reading 3	0.00165	
B	Hole Size	0.02360
Reading 1	0.00220	Average = 0.00219
Reading 2	0.00198	
Reading 3	0.00240	
B2	Hole Size	0.01380
Reading 1	0.00212	Average = 0.00190
Reading 2	0.00169	
Reading 3	0.00189	

Comments:

Arthur Torres

October 3, 2020



Sierra Circuits Inc
 Certificate of Compliance - XRF

Analysis Report
 9/30/2020 9:13:40 PM

Analysis Title
 Hard Au-Ni-Cu(12mil)

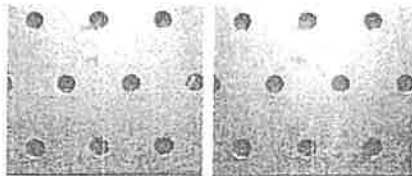
Analysis Device
 Bowman XRF
 S/N: P1819203

Customer	the university of arizona	Part Number	gusto-ua-dwg-00008 1.0
Work Order	422224 1.00	Tool Number	171617
Operator	raul Lemus	Number	5070

Analysis Results

		1	2
		μ in	μ in
	Result	Au	Ni
	1	55.3	262.0
	2	56.0	252.3
Mean		55.7	257.2
Min		55.3	252.3
Max		56.0	262.0
Range		0.7	9.7
StdDev		0.49	6.86
% StdDev		0.88	2.67
Cp		----	----
Cpk		----	----
Cg		0.0	0.0
Cgk		----	----

Sample Images



Sample 1

Sample 2

Date: _____

Sierra Circuits
1108 West Evelyn Avenue
Sunnyvale, CA 94086
Ionic Contamination Testing Report



Test Description:	Test Oct05,20_102448	
Name:	THE UNIVERSITY OF ARIZONA	
Status:	Passed	Nomenclature: 171617
Result:	8.6311 ug/Square	Part Number: GUSTO-UA-DWG-00008:1.0
Start Time:	10:24:48	Comment: FINAL
Total Run Time:	00:20:01	Length: 6.29
Test Type:	Dynamic Test	Width: 6.29
Test Date:	10/5/2020	Area: 79.1
Baseline Resistivity:	268.26 MΩ-cm	Termination: Automatic
Final Resistivity:	208.07 MΩ-cm	Duration: NA
Temperature:	45 Degree C	Sensitivity: 2
Lot / Part No:		%IPA: 76.6
User:	QC	Failpoint: 10.06 ug NaCl/sq

