



# PRODUCT/PROCESS CHANGE NOTIFICATION

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PCN APG/07/2458  
Notification Date 04/26/2007

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**PQFP 28x28x3.4mm 144 & 208 Leads - LEADFRAME PAD & WIRE RATIONALIZATION**

**APG - APG**

**Table 1. Change Identification**

Product Identification (Product Family/Commercial Product)	PQFP 28x28x3.4 mm 144 & 208 Leads
Type of change	Package assembly material change
Reason for change	LEADFRAME PAD & WIRE DIAMETER STANDARDIZATION
Description of the change	We are going to rationalize the leadframe pad to 8x8mm and wire diameter to 0.9 mil
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	NO CHANGE
Manufacturing Location(s)	1]St Kirkop - Malta

**Table 2. Change Implementation Schedule**

Forecasted implementation date for change	01-Jul-2007
Forecasted availability date of samples for customer	15-May-2007
Forecasted date for <b>STMicroelectronics</b> change Qualification Plan results availability	26-Apr-2007
Estimated date of changed product first shipment	26-Jul-2007

**Table 3. List of Attachments**

Customer Part numbers list	
Qualification Plan results	



Customer Acknowledgement of Receipt		<b>PCN APG/07/2458</b>					
Please sign and return to STMicroelectronics Sales Office		<b>Notification Date 04/26/2007</b>					
<input type="checkbox"/> Qualification Plan Denied <input type="checkbox"/> Qualification Plan Approved  <input type="checkbox"/> Change Denied <input type="checkbox"/> Change Approved	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 2px;">Name:</td></tr> <tr><td style="padding: 2px;">Title:</td></tr> <tr><td style="padding: 2px;">Company:</td></tr> <tr><td style="padding: 2px;">Date:</td></tr> <tr><td style="padding: 2px;">Signature:</td></tr> </table>		Name:	Title:	Company:	Date:	Signature:
Name:							
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Company:							
Date:							
Signature:							
Remark ..... ..... ..... ..... ..... ..... ..... ..... ..... .....							

## DOCUMENT APPROVAL

Name	Function
Duncan, Martin Russell	Division Marketing Manager
Pengo, Tullio	Division Marketing Manager
Cassani, Fabrizio	Division Product Manager
Rivolta, Danilo	Division Product Manager
Amadeo, Matteo	Division Q.A. Manager
Mercandelli, Laura	Division Q.A. Manager



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# PQFP 28x28x3.4mm 144 & 208 Leads - LEADFRAME PAD & WIRE RATIONALIZATION

## WHAT:

In order to rationalize the different leadframe pad-sizes and wire diameters in the PQFP 28x28 assy lines of Malta, we are going to align the BOM (Bill of materials) to the following one:

Lead frame.....copper single Ag ring OLIN 194, pad 8X8 mm  
Wire.....gold 0.9 mil  
Molding compound ....Sumitomo G700L  
Die Attach Material ....Ablestik 3280T  
Lead finish.....pure tin - Jedec level 3 with a 260 °C peak reflow temperature

The products involved are the last ones with actual pad of 9x9 mm, wire 1 or 1.2 mils that will pass to 8x8, 0.9 mils. All recent products have been started in production directly with the new BOM.

## WHY:

Corporate Technology Roadmap & standardization.

## HOW:

See attached qualification report.

## WHEN:

We will implement the new BOM, for leadfree production, from end Q2/07. Samples available on customer's request through our Sales offices.

We invite all the customers that have not yet switched to leadfree to do it as soon as possible.

# Reliability Report for qualification of SUMITOMO ON PQFP 28X28 5FT55224

Daniel Azzopardi, ST Malta Central Engineering  
February 2007

## PACKAGE DETAILS

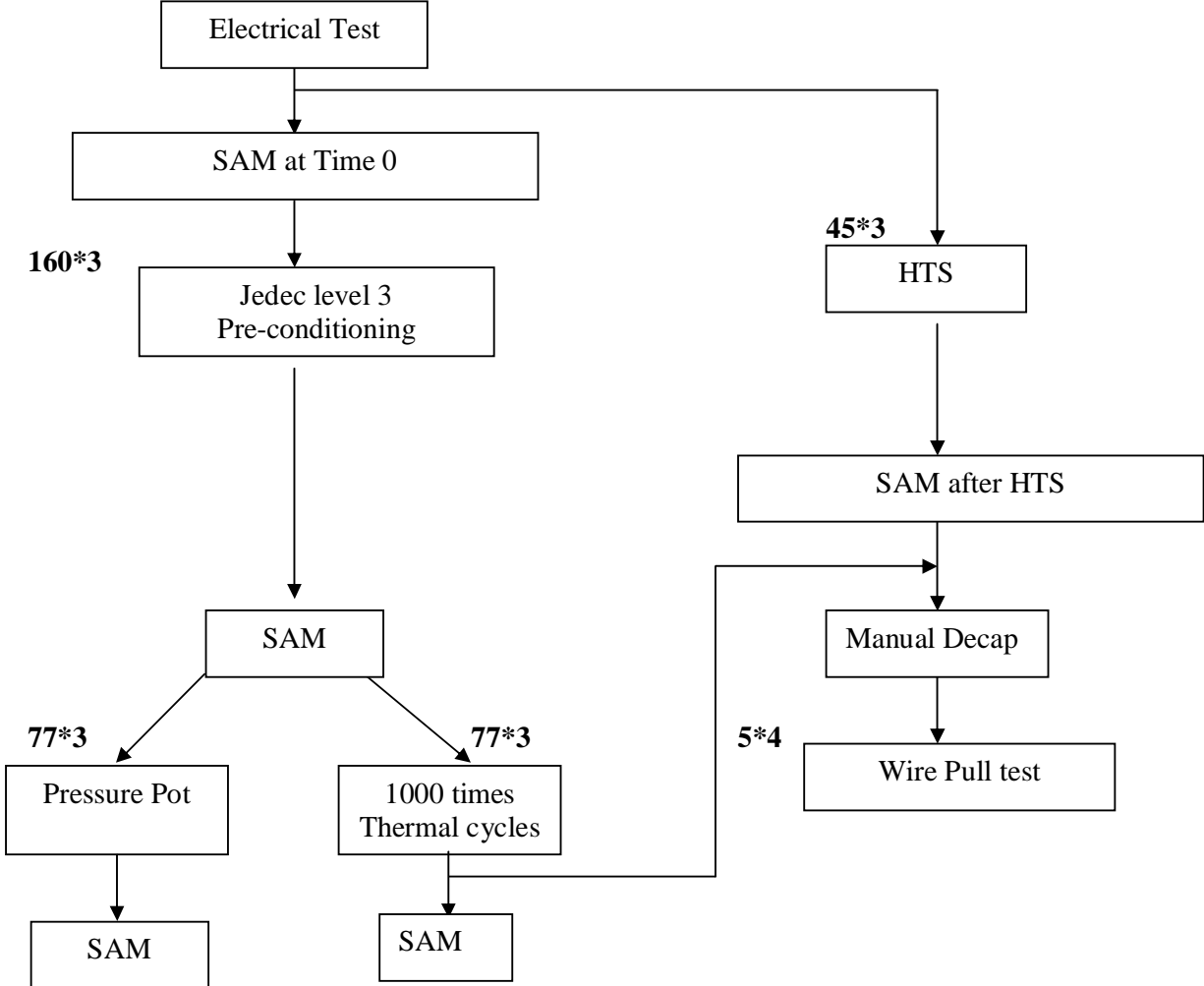
3 LOTS

<b>Lot No</b>	226450AK01	226450AK02	2264601S01
<b>Diffusion No</b>	VG615492	VG615492	VG431957
<b>Trace Code</b>	226450AK	226450AK	2264601S
<b>Technical code</b>	A65L*7269DBG	A65L*7269DBG	A65L*F276CEG

## BOM

**Frame**                **5FT55224**  
**Glue**                 **5ST34352**  
**Wire:**                **5XV55154**  
**Resin:**               **5ST24075**

**RELIABILITY TESTS FLOW CHART**



## **RELIABILITY TESTS DESCRIPTION**

### **JEDEC Level 3 Preconditioning**

Purpose of preconditioning is to simulate shipment, storage and soldering of surface mount devices before submitting them to reliability tests.

- 24hrs. Bake at 125°C
- 192hrs. Temperature humidity soak at 30°C/60%RH
- 3 cycles simulation of surface mounting by IR reflow at 245°C

### **Thermal Cycling**

The purpose of this test is to determine the resistance of devices to exposure to alternating temperature extremes. Temperature cycling failures are mainly caused by problems arising due to different thermal coefficients of expansion of the materials making up the package.

- 1000 air-to-air temperature cycles at -65°C to 150°C

### **Pressure Pot**

The purpose of this test is to point out critical water entry paths. The effects of humidity penetration are observed through electrical parameters degradation and functional failures mainly due to aluminum corrosion.

- 168hrs. at 121°C and 2.08 atm

### **Hot Storage**

The purpose of this test is to verify the resistance of these devices when exposed to an elevated temperature for a prolonged period of time

- 1000 hours at -50/150°C without preconditioning



**RELIABILITY RESULTS**

**LOT 226450AK01**

<b>TEST</b>	<b>Results and Comments</b>
<b>Qual lot assy</b>	No workability problems
<b>Electrical test</b>	96% yield (threshold yield is 95%)
<b>Reliability Jedec 3 245°C</b>	
<b>SONIX after Jedec 3</b>	
<b>1000 thermal cycles -65/150°C (77)</b>	
<b>SONIX after 1000 Thermal Cycles</b>	
<b>240hrs Pressure pot 2.08atm, 121°C, (77)</b>	
<b>SONIX after PPot</b>	
<b>High Temperature Storage (45)</b>	
<b>SONIX after HTS</b>	

Lot 226450AK02

TEST	Results and Comments
Qual lot assy	No workability problems
Electrical test	96% yield (threshold yield is 95%)
<b>Reliability Jedec 3 245°C</b>	
<b>SONIX after Jedec 3</b>	
<b>1000 thermal cycles -65/150°C (77)</b>	
<b>SONIX after 1000 Thermal Cycles</b>	
<b>240hrs Pressure pot 2.08atm, 121°C, (77)</b>	
<b>SONIX after PPot</b>	
<b>High Temperature Storage (45)</b>	
<b>SONIX after HTS</b>	

LOT 2264601S01

<b>TEST</b>	<b>Results and Comments</b>
Qual lot assy	No workability problems
Electrical test	97% yield (threshold yield is 95%)
<b>Reliability Jedec 3 245°C</b>	
<b>SONIX after Jedec 3</b>	
<b>1000 thermal cycles -65/150°C (77)</b>	
<b>SONIX after 1000 Thermal Cycles</b>	
<b>240hrs Pressure pot 2.08atm, 121°C, (77)</b>	
<b>SONIX after PPot</b>	
<b>High Temperature Storage (45)</b>	
<b>SONIX after HTS</b>	

**SAM RESULTS FOR LOT 226450AK01**

SAMPLE	TOP SCAN		BOTTOM SCAN	TRU' SCAN
	Resin/die	Resin/frame		Die attach area
Jedec 3	0/160	0/160	0/160	0/160
Jedec 3 + 1000 T.C	0/77	0/77	1/77	4/77 <30%

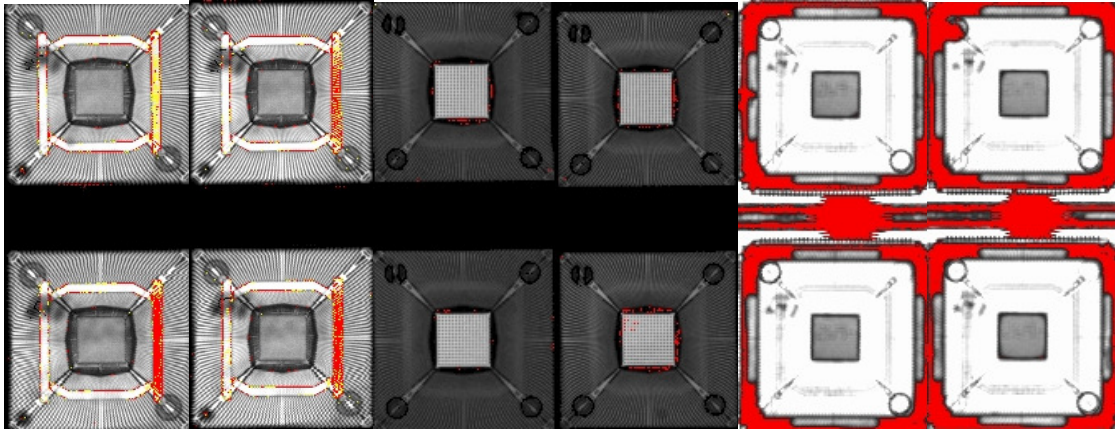
**SAM RESULTS FOR LOT 226450AK02**

SAMPLE	TOP SCAN		BOTTOM SCAN	TRU' SCAN
	Resin/die	Resin/frame		Die attach area
Jedec 3	0/160	0/160	0/160	0/160
Jedec 3 + 1000 T.C	0/77	0/77	0/77	0/77

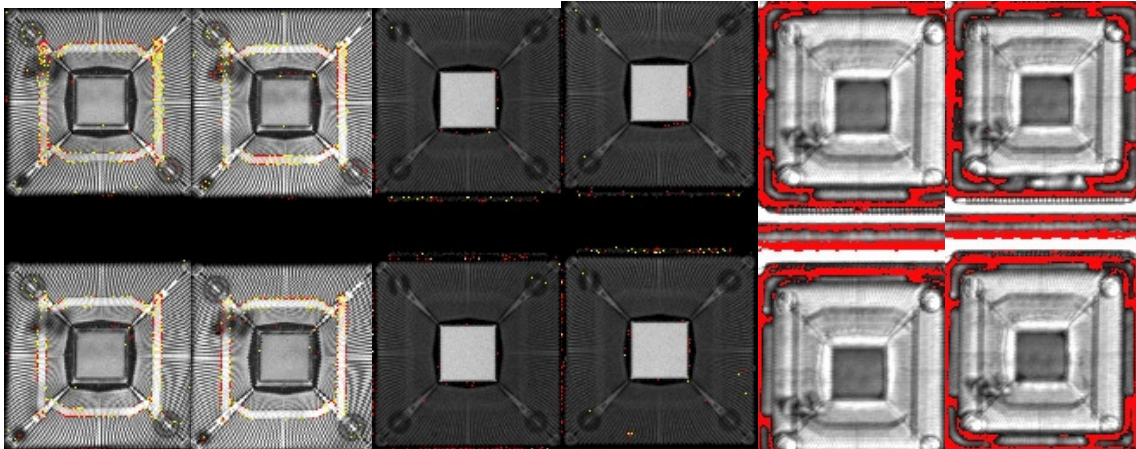
**SAM RESULTS FOR LOT 2264601S01**

SAMPLE	TOP SCAN		BOTTOM SCAN	TRU' SCAN
	Resin/die	Resin/frame		Die attach area
Jedec 3	0/160	0/160	0/160	5/160 <10%
Jedec 3 + 1000 T.C	0/77	0/77	0/77	0/77

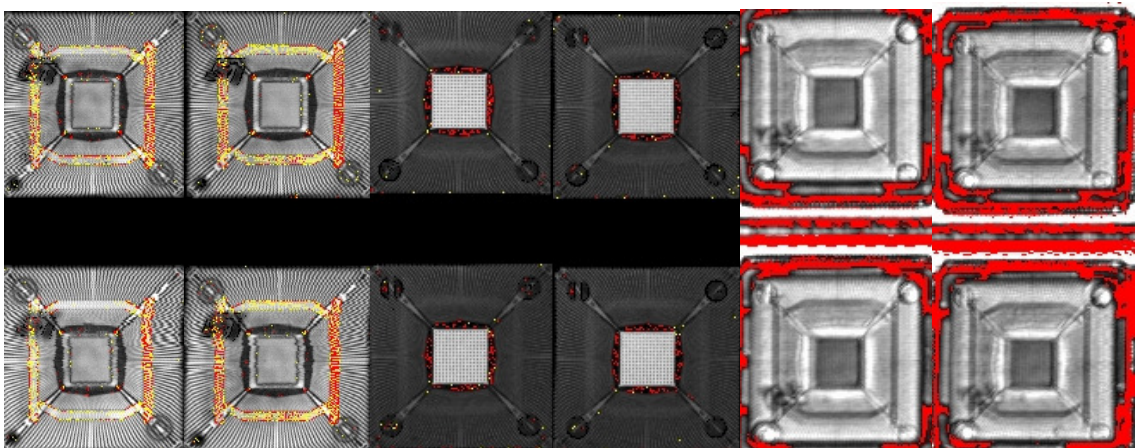
SONIX RESULTS TIME 0 LOT 226450AK01



SONIX RESULTS TIME 0 Lot 226450AK02

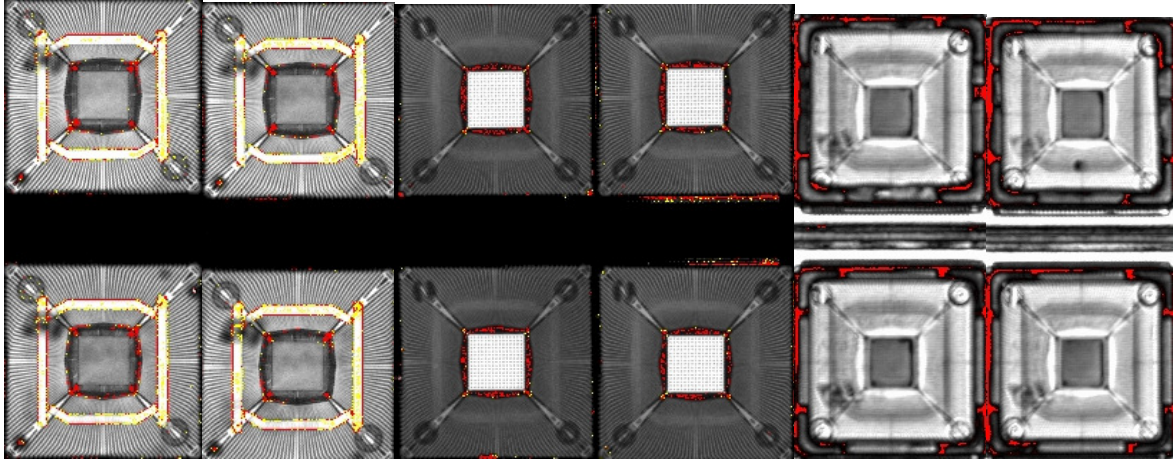


SONIX RESULTS TIME 0 LOT 2264601S01

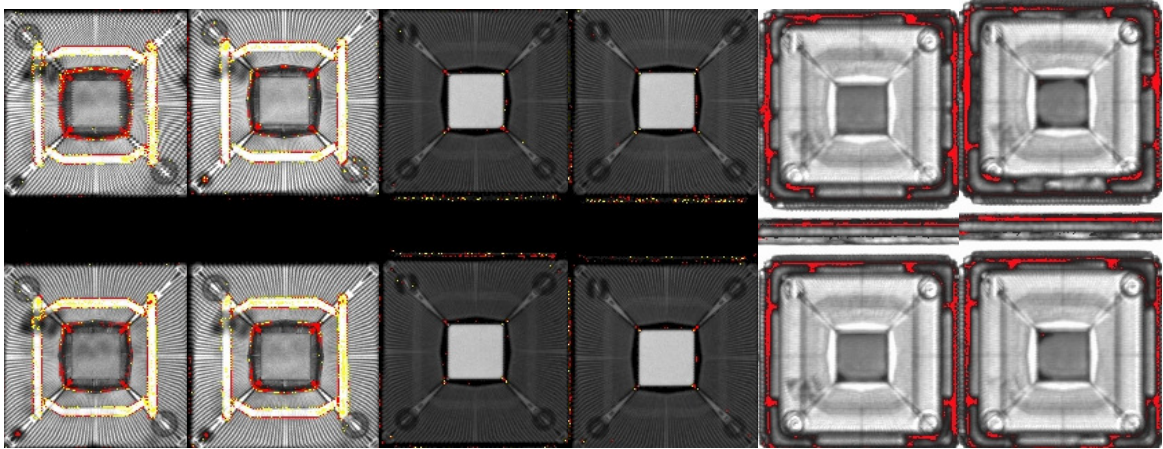




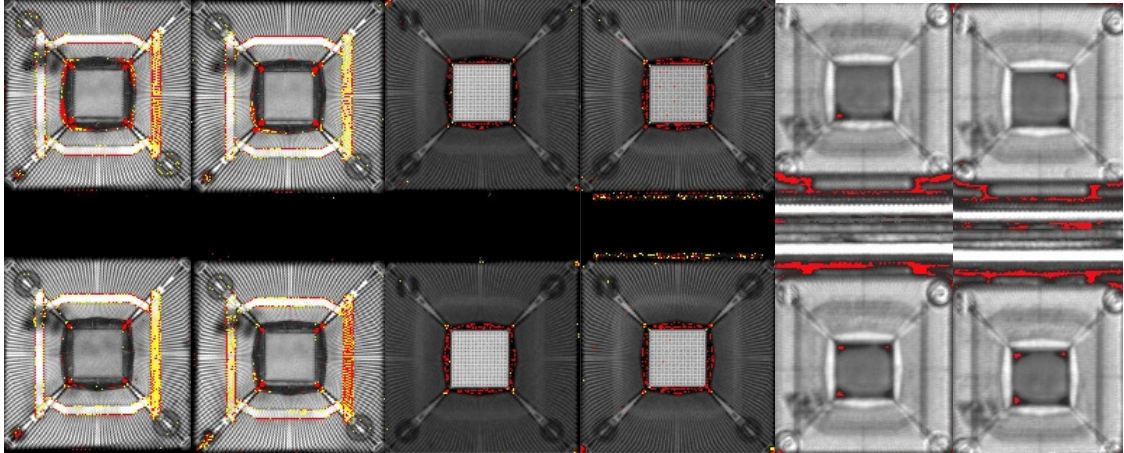
**SONIX RESULTS JEDEC LEVEL 3 LOT 226450AK01**



**SONIX RESULTS JEDEC LEVEL 3 Lot 226450AK02**

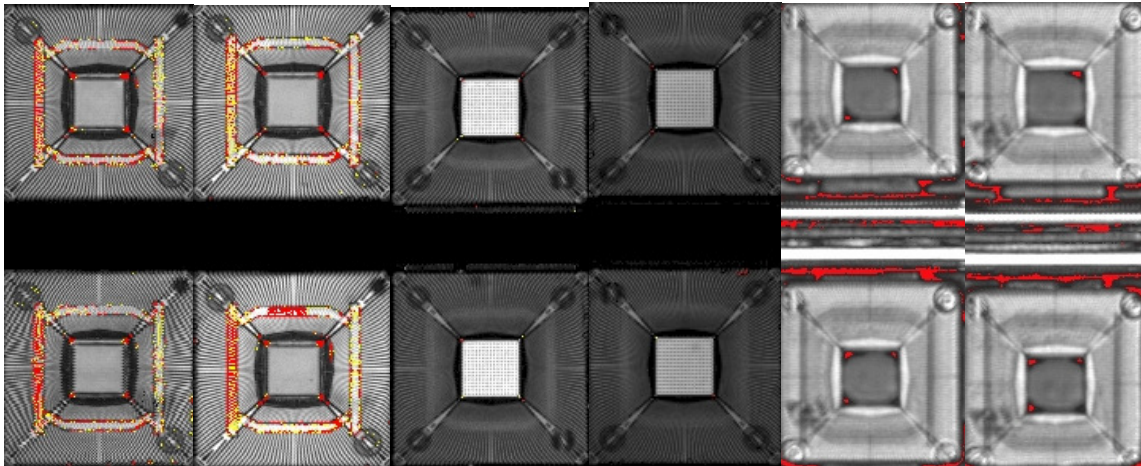


**SONIX RESULTS JEDEC LEVEL 3 LOT 2264601S01**

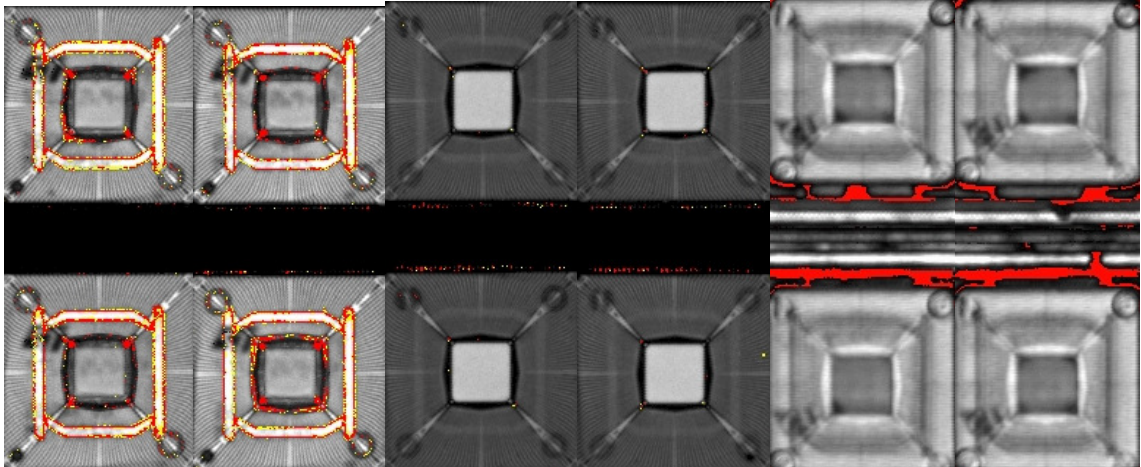




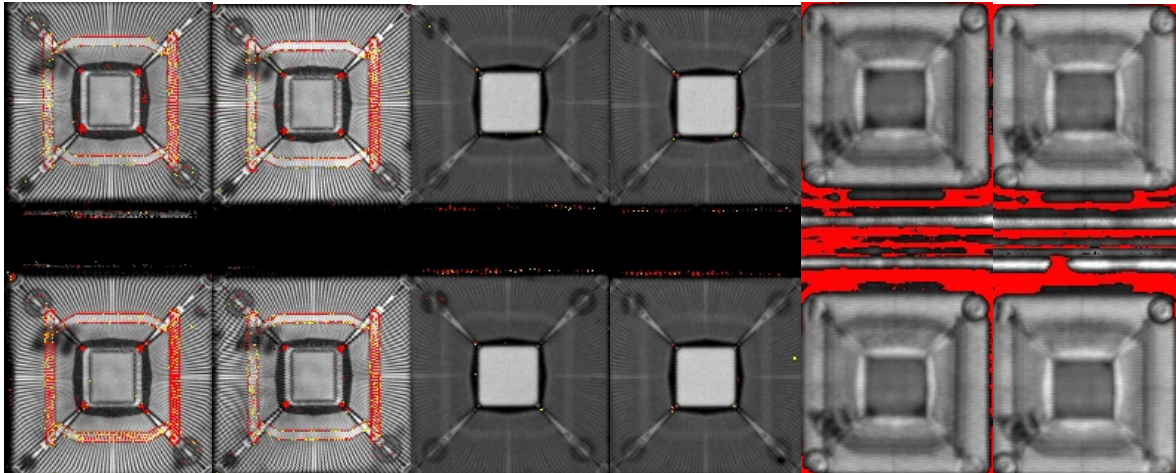
**SONIX RESULTS 1000 THERMAL CYCLES LOT 226450AK01**



**SONIX RESULTS 1000 THERMAL CYCLES Lot 226450AK02**

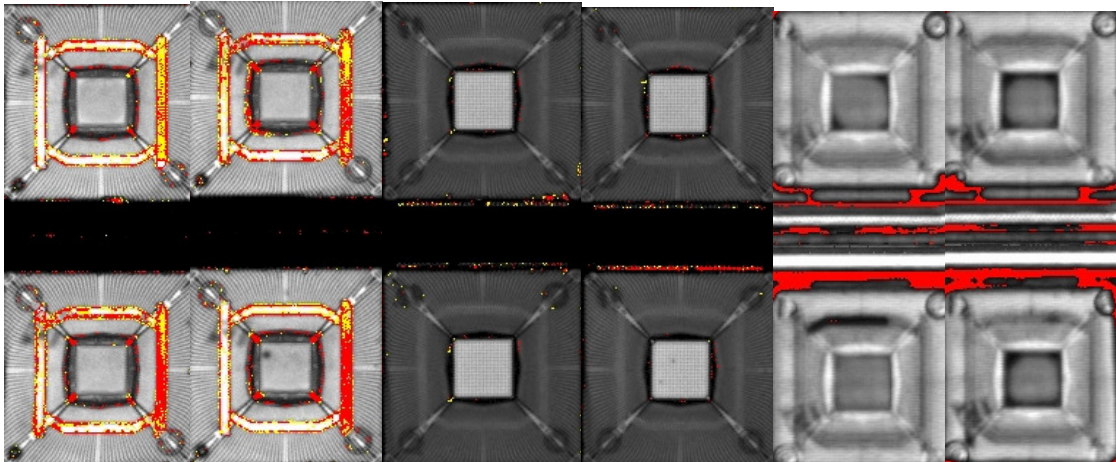


**SONIX RESULTS 1000 THERMAL CYCLES LOT 2264601S01**

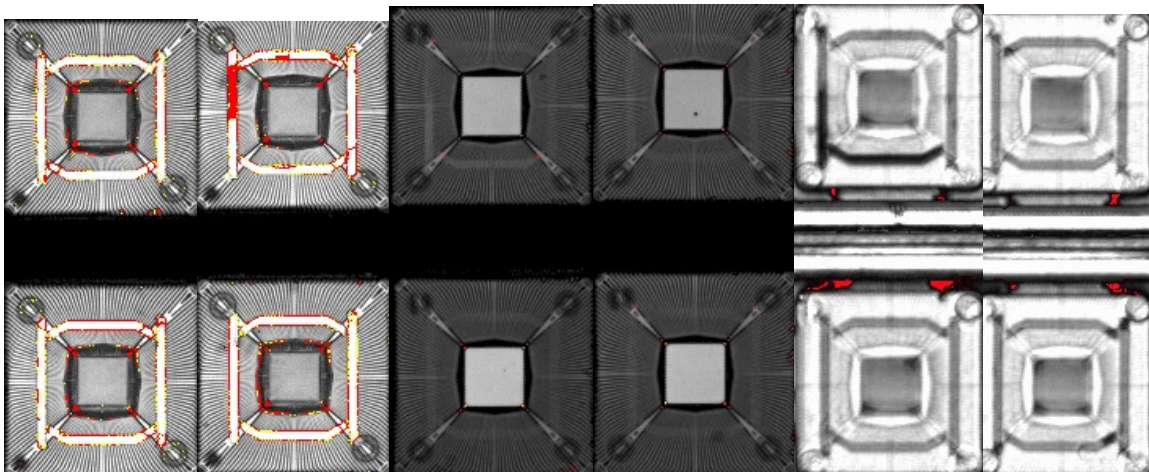




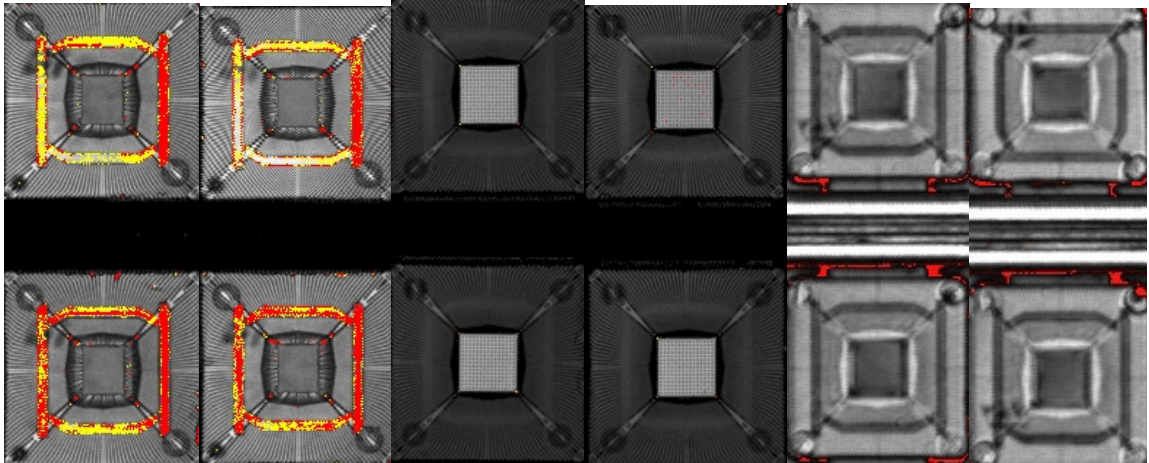
**SONIX RESULTS PPOT LOT 226450AK01**



**SONIX RESULTS PPOT Lot 226450AK02**

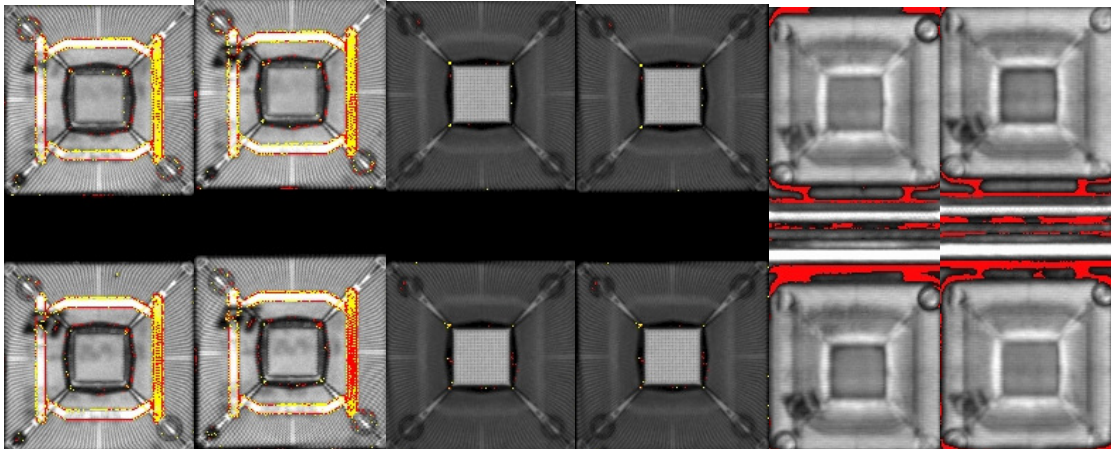


**SONIX RESULTS PPOT LOT 2264601S01**

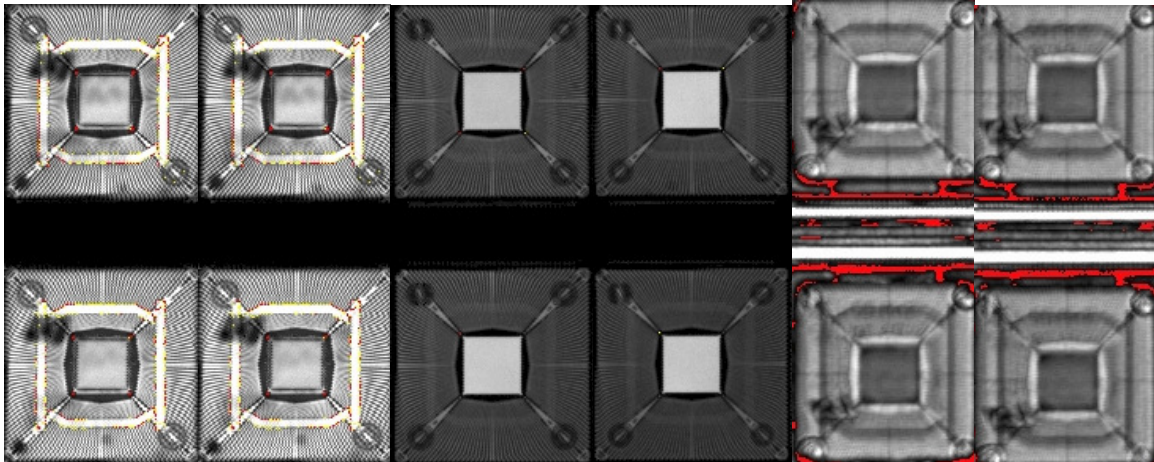




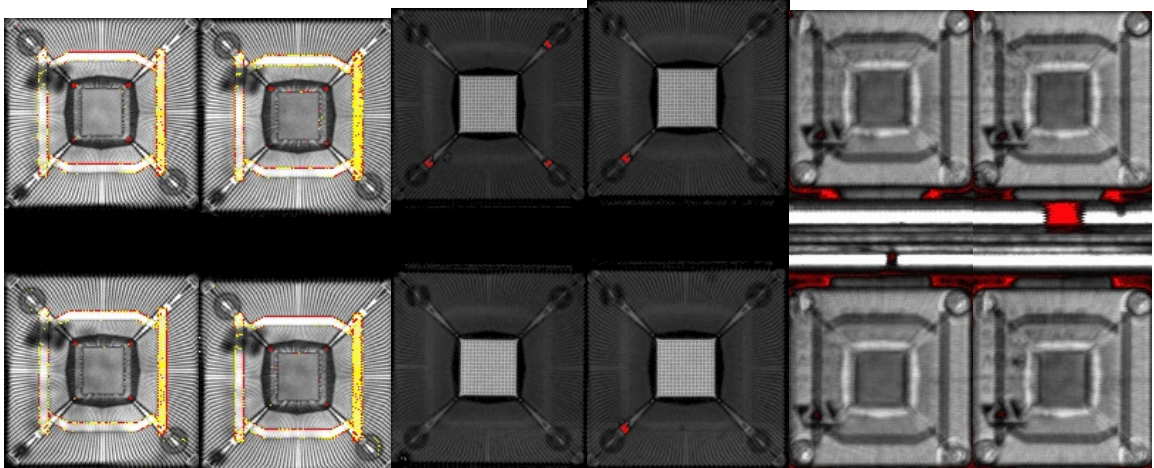
**SONIX RESULTS HTS LOT 226450AK01**



**SONIX RESULTS HTS Lot 226450AK02**



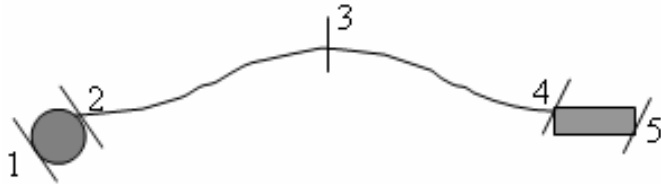
**SONIX RESULTS HTS LOT 2264601S01**



## WIRE PULL TEST RESULTS

Wire pull tests were made on 5 devices from each lot, for pieces subject to 1000 Thermal cycles and High Temperature Storage. Please note that the Threshold according to the AEC-Q100-REV F spec is 3 grams.

The Failure Mode for 2 devices from each lot from both HTS and Thermal Cycles is shown (shaded) in the table below; figures correspond to the below diagram where scores 1 and 5 represent bonds off and welds off respectively; the rest (2,3 and 4 are good failure modes):-



### PULL TEST RESULTS (F269 - LOT 226450AK01 – HTS)

DEVICE	1 (grams)	Failure Mode	2(grams)	3(grams)	4(grams)	Failure Mode	5(grams)
	8.00	2	9.30	10.5	9.80	2	9.00
	9.00	2	9.00	9.80	9.30	2	9.50
	9.30	2	10.0	10.0	10.8	2	11.5
	10.0	2	9.30	11.0	10.0	2	9.00
	10.5	2	9.00	10.0	9.00	2	9.50
	9.30	2	11.3	10.3	11.0	2	10.5
	8.50	3	9.50	9.00	9.00	2	9.50
	11.3	3	9.50	9.30	10.3	2	10.0
	8.30	2	9.30	10.0	9.00	3	9.50
	9.30	2	9.80	9.30	10.0	2	9.80
	10.3	3	10.5	9.00	7.80	2	9.80
	10.5	2	10.5	10.3	8.30	2	11.0

### PULL TEST RESULTS (F269 - LOT 226450AK02 – HTS)

DEVICE	1 (grams)	Failure Mode	2(grams)	3(grams)	4(grams)	5(grams)	Failure Mode
	10.5	2	11.3	10.5	11.5	10.5	2
	10.5	2	10.8	11.3	11.3	11.3	2
	11.8	2	11.5	10.8	10.5	11.0	2
	10.5	2	10.8	9.80	10.5	11.3	2
	10.8	2	10.0	9.50	11.5	11.5	2
	10.5	2	10.5	10.8	10.5	10.8	2
	10.3	2	11.5	11.5	12.5	10.3	2
	11.5	2	11.0	9.80	12.0	10.5	2
	10.8	2	11.0	10.5	10.8	10.8	3
	10.3	2	10.5	10.3	9.80	10.3	4
	11.0	2	10.3	10.5	12.5	11.5	2
	11.5	2	11.0	10.8	11.5	11.0	2

**PULL TEST RESULTS (F276 – LOT 2264601S01 – HTS)**

DEVICE	1 (grams)	Failure Mode	2(grams)	Failure Mode	3(grams)	4(grams)	5(grams)
	7.30	2	9.00	2	10.5	9.50	7.50
	7.80	2	9.50	2	9.30	8.50	7.30
	9.50	2	10.5	2	9.50	7.50	10.5
	9.00	2	10.0	2	10.5	10.5	8.30
	9.50	2	8.50	2	9.00	7.50	11.5
	10.0	2	8.30	2	9.80	7.30	9.50
	8.50	2	8.50	2	8.50	10.3	10.5
	10.5	2	10.0	2	11.3	8.30	12.0
	9.30	2	9.80	2	9.30	9.80	7.80
	10.5	2	9.00	2	9.30	6.80	7.80
	11.0	2	9.30	2	10.50	7.30	7.50
	9.30	2	10.0	2	10.3	10.0	10.5

**PULL TEST RESULTS (F269 - LOT 226450AK01 – 1000 Thermal Cycles)**

DEVICE	1 (grams)	Failure Mode	2(grams)	3(grams)	4(grams)	Failure Mode	5(grams)
	9.30	2	9.00	10.0	9.30	2	9.50
	9.00	4	9.30	10.3	9.00	2	10.3
	10.0	2	10.3	9.80	12.5	2	11.0
	10.3	4	9.80	9.30	9.50	4	12.3
	9.80	2	9.30	12.0	10.3	2	10.0
	10.3	2	11.0	9.80	11.8	2	10.0
	9.00	2	9.80	9.30	10.3	2	10.0
	9.50	2	10.0	8.50	10.8	2	9.80
	11.0	4	10.3	9.00	11.0	2	10.3
	9.30	2	9.00	10.0	10.3	3	10.0
	9.30	4	9.00	9.50	10.3	2	9.00
	10.3	4	10.3	10.8	12.3	2	12.3

**PULL TEST RESULTS (F269 - LOT 226450AK02 – 1000 Thermal Cycles)**

DEVICE	1 (grams)	Failure Mode	2(grams)	3(grams)	4(grams)	5(grams)	Failure Mode
	10.5	2	10.3	10.3	10.3	10.3	2
	11.0	2	11.0	10.5	10.5	11.0	2
	11.8	2	11.0	10.0	11.0	10.0	2
	10.3	2	12.0	10.3	9.80	10.0	2
	10.0	2	10.0	11.0	10.0	10.3	2
	10.3	2	10.0	9.80	10.5	10.5	2
	10.5	2	10.5	10.5	10.5	11.0	2
	10.5	2	10.5	10.5	11.0	10.5	2
	10.5	2	10.5	11.0	10.8	11.3	2
	10.0	2	11.0	10.3	10.3	10.5	2
	10.3	4	11.0	10.8	10.0	10.3	2
	11.0	2	10.3	10.5	10.5	11.0	2

**PULL TEST RESULTS (F276 - LOT 2264601S01 -1000 Thermal Cycles)**

<b>DEVICE</b>	<b>1 (grams)</b>	<b>Failure Mode</b>	<b>2(grams)</b>	<b>3(grams)</b>	<b>4(grams)</b>	<b>Failure Mode</b>	<b>5(grams)</b>
	7.80	2	8.30	8.50	8.00	2	8.50
	7.30	2	7.80	8.00	9.50	2	8.30
	7.00	2	10.00	10.3	8.30	2	10.5
	7.00	2	7.50	8.50	7.50	2	9.50
	9.80	2	9.30	8.00	9.50	2	7.80
	10.0	2	10.50	10.0	8.00	2	7.80
	7.80	2	7.80	9.30	8.50	2	8.50
	8.00	2	9.30	8.30	8.50	2	7.80
	8.30	2	9.50	10.5	9.50	2	10.5
	10.00	2	10.30	9.50	7.00	2	8.50
	8.00	2	8.00	8.50	7.30	2	9.00
	9.00	2	10.0	9.80	10.50	2	9.30

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