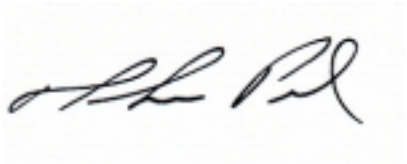
NOVEMBER 29, 2006

TEST REPORT #206282, REVISION 1.3

TIN WHISKER EVALUATION

SAMTEC, INC.



APPROVED BY: THOMAS PEEL
PRESIDENT AND
DIRECTOR OF TEST PROGRAM DEVELOPMENT
CONTECH RESEARCH, INC.

REVISION HISTORY

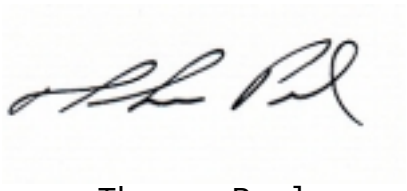
DATE	REV. NO.	DESCRIPTION	ENG.
11/22/2006	0.9	Rough Draft Release	TP
11/29/2006	1.0	Formal Release	TP
12/8/2006	1.1	Editorial Changes	TP
12/29/06	1.2	Reduced electronic size of photographs and placed multiple photographs on the same page at the request of the test sponsor.	TP
05/08/2007	1.3	Added SEM Photographs	TP

CERTIFICATION

This is to certify that the evaluation described herein was designed and executed by personnel of Contech Research, Inc. It was performed with the concurrence of Samtec, Inc., of New Albany, IN who was the test sponsor.

All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1 and MIL-STD-45662 as applicable.

All data, raw and summarized, analysis and conclusions presented herein are the property of the test sponsor. No copy of this report, except in full, shall be forwarded to any agency, customer, etc., without the written approval of the test sponsor and Contech Research.



Thomas Peel
President And
Director Of Test Program Development
Contech Research, Inc.

TP:cm/js

SCOPE

To perform Tin Whisker testing on contacts as manufactured and submitted by the test sponsor Samtec, Inc.

APPLICABLE DOCUMENTS

1. Unless otherwise specified, the following documents of issue in effect at the time of testing performed form a part of this report to the extent as specified herein. The requirements of sub-tier specifications and/or standards apply only when specifically referenced in this report.

2. Standards: a) EIA Publication 364
   b) INEMI Documents

TEST SAMPLES AND PREPARATION

1. The following test samples were submitted by the test sponsor, Samtec, Inc., for the evaluation to be performed by Contech Research, Inc.

   Part Numbers

   a) C-61-01-T-S
   b) T-1S15-03-T-S
   c) T-1S8-01-T-S
   d) C-119-01-T-S
   e) T-1S15-03-T-H
   f) C-136-01-T-S
   g) C-61-01-T-H
   h) T-1S8-01-T-H
   i) C-119-01-T-H

2. Unless otherwise indicated, all materials were certified by the manufacturer to be in accordance with the applicable product specification.

3. The test samples as submitted were certified by the manufacturer as being fabricated and assembled utilizing normal production techniques common for this type of product and inspected in accordance with the quality criteria as established for the product involved.

4. The test samples were tested in their ‘as received’ condition.

5. Unless otherwise specified in the test procedures used, no further preparation was used.

TEST SAMPLES AND PREPARATION -continued

6. All equipment and measuring instruments used during testing were calibrated and traceable to NIST according to ISO 10012-1 and ANSI/NCSL Z540-1, as applicable.

TEST SELECTION

1. All tests were performed in accordance with the applicable sequences and procedures as specified in JESD22A121 and by the test sponsor.

2. The following test environments were established:

   Group 1: Ambient Temperature/Humidity Storage
   30°C/60% (4000 Hours)
   Group 2: High Temperature/Humidity Storage
   60°C/87% (4000 Hours)
   Group 3: Thermal Cycle
   -40°C to +85°C (1500 Cycles)

3. Test set ups and/or procedures which are standard or common are not detailed or documented herein provided they are certified as being performed in accordance with the applicable (industry or military) test methods, standards and/or drawings as specified in the detail specification.

INITIAL EXAMINATION

1. A visual examination was performed on all samples prior to exposure to the specific environments under 60X magnification. The contacts so examined had no abnormalities beyond that expected for the products being evaluated.

2. See Figure # 1 for photographs of each typical contact part number.

APPENDEX A

See Appendex A for the plating test results.

EQUIPMENT LIST

ID#	Next Cal	Last Cal	Equipment Name	Manufacturer	Model #	Serial #	Accuracy	Freq.Cal
23			Steady State Hum.Cham	Blue M Co.	AC-7602TDA	A2-971	±1DEG C	Ea Test
129	11/15/2006	11/15/2005	Dial Indicator 0.010	Brown & Sharp	7035-2	B362366	±.0005in.	12 mon.
294			Steady State Chamber	Blue M Co.	AC7402HA-1	A-3933	See Cal Cert	Ea Test
568	6/19/2007	6/19/2006	Temp Humid Chamber	Cincinnati Sub-Zero	ZH-8-1-1 H	2F9522194	See Cal Cert	Ea Test
697	6/19/2007	6/19/2006	Temp.Humid.Chamber	Cincinnati Sub Zero	ZH-8-1-H/AC	Z9822875	See Cal.Cert.	Ea Test
1029			Digital Miocroscope Camera	Polaroid	DMC-1	N707001AV	See Manual	N/A
1030			Microscope	Nikon	SMZ-2T	QHI-85	N/A	N/A
1031			Computer	ARC	350-Mhz	CA70	N/A	N/A
1314	1/10/2007	1/10/2006	Multiplexer card	Keithley Co.	7708	0862544	See CERT	12mon
1315	1/10/2007	1/10/2006	Data Aquisition Multimeter	Keithley Co.	2700	0862680	See CERT	12mon
1361	1/10/2007	1/10/2006	Multiplexer Card	Keithley	7708	1067661	See Cal Cert	12mon
-----	N/A	N/A	SEM*	JEOL	JSM 5910LZ	N/A	N/A	N/A

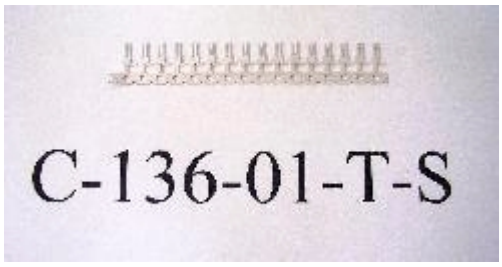
* Equipment owned and operated by the Thielsch Engineering of Cranston, RI

FIGURE #1


C-61-01-T-H


T-1S15-03-T-H


C-61-01-T-S


C-136-01-T-S


T-1S15-03-T-S


C-119-01-T-H


T-1S8-01-T-H


T-1S8-01-T-S


C-119-01-T-S

TEST RESULTS

GROUP 1

PROJECT NO.: 206282	SPECIFICATION: INEMI
PART NO.: See Page 4	PART DESCRIPTION: Contacts
SAMPLE SIZE: 6 Contacts/PN	TECHNICIAN: SR/TFP/MS
START DATE: 5/11/06	COMPLETE DATE: 3/20/07
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 37%

EQUIPMENT ID#: 23, 568, 697, 1029, 1030, 1031, 1314, 1315, 1361, JEOL JSM5910LZ (SEM)

AMBIENT TEMPERATURE/HUMIDITY STORAGE

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 31, with the following conditions:

2. Test Conditions:

   a) Relative Humidity : 60% ± 2%
   b) Temperature Conditions : 30°C ± 2°C
   c) Duration : 4000 hours

3. The samples were examined at 1000, 2000, 3000 and 4000 hours of exposure.

4. During the exposure, visual examination of the samples were made at specific intervals and in the following sequence.

   a) Place the test samples in the test chamber.

   b) At each designated measurement period, remove the test units from the test chamber when it is at 25°C. The test samples were exposed to room ambient for one to two hours prior to examination.

   c) Visually examine and photograph the samples.

   d) Upon completion of the examination, place the test samples back into the test chamber until the next measurement interval or until completion of the test duration.

REQUIREMENTS:

1. The contacts were examined using an stereo microscope at 60X magnification for the presence of whisker growth.

2. Typical photographs of the samples shall be taken during each examination interval.

3. There shall be no evidence of whisker growth that exceeds 10.0 micrometers (µm).

RESULTS:

1. There was no evidence of whisker growth that exceeded 10.0 micrometers.

2. See the following figures for photographs of samples at each examination interval:

Figure #	Examination Interval
2 through 3	1000 Hours
4 through 5	2000 Hours
6 through 8	3000 Hours
9 through 11	4000 Hours

3. At the request of the test sponsor, a SEM analysis was performed on the test samples after testing had been completed. A typical SEM photo is shown in Figure #11A. The SEM analysis was performed by Thielsch Engineering of Cranston, RI.

FIGURES #2 THROUGH 3

1000 HOURS

FIGURE #2

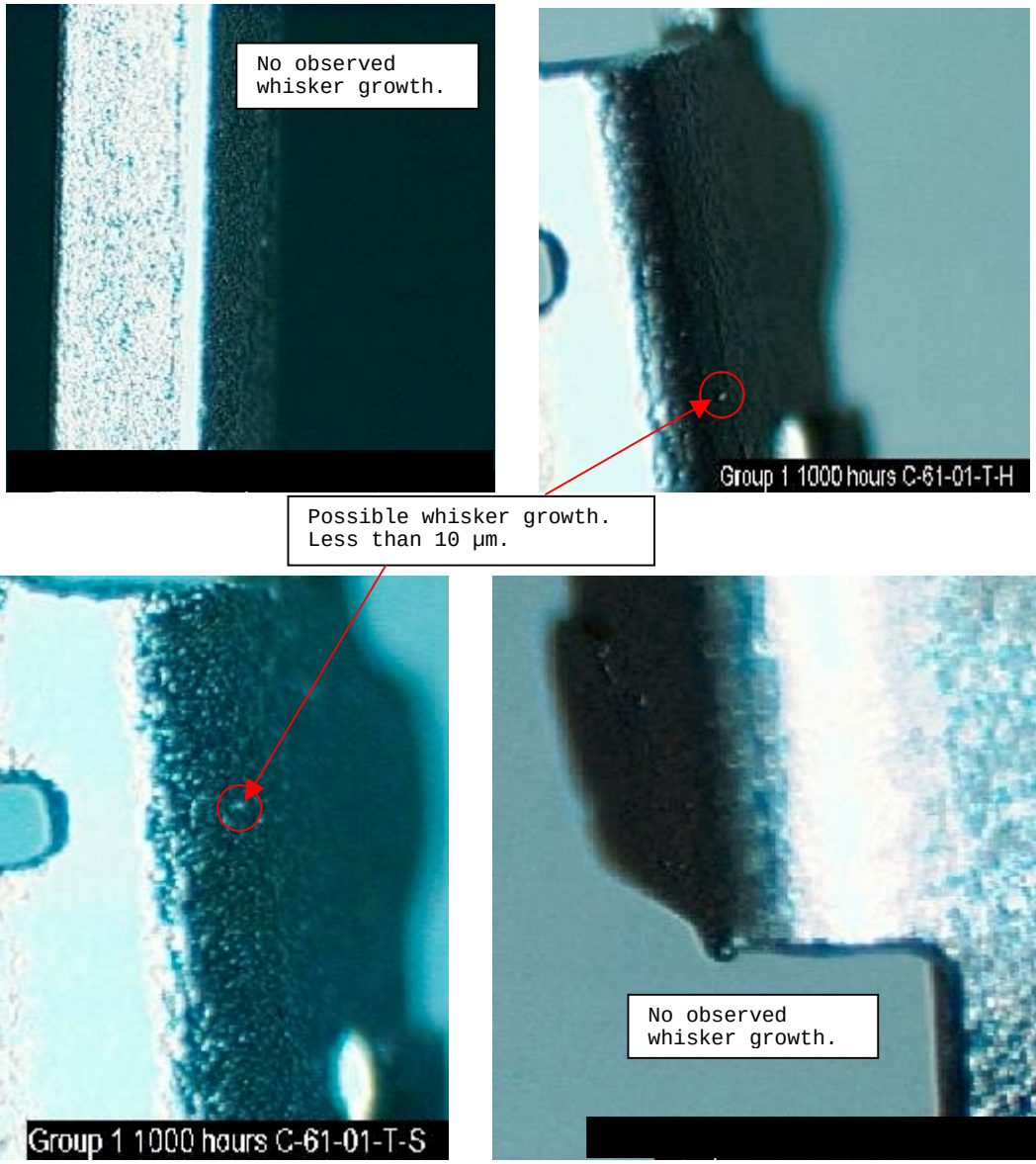
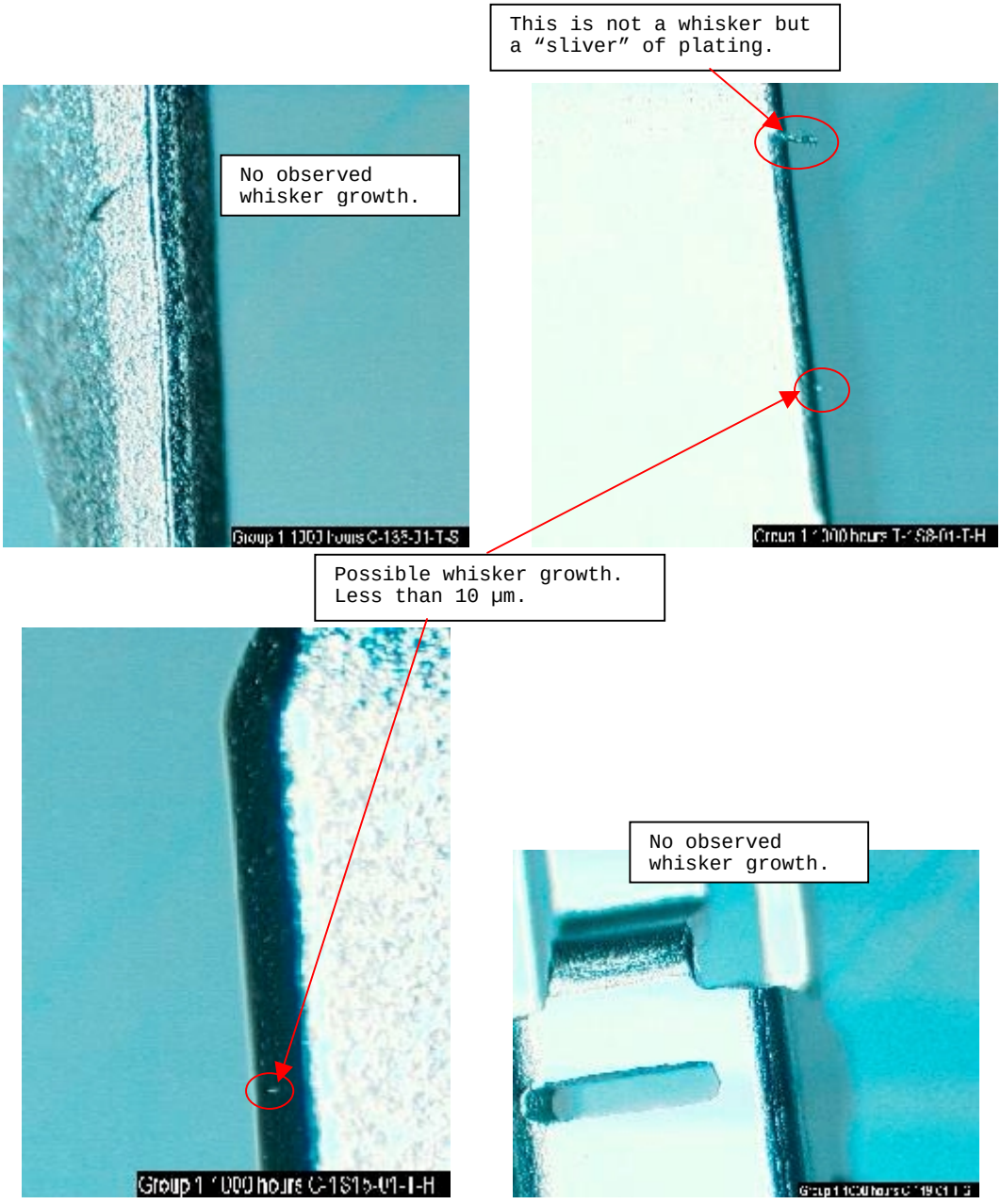

No observed whisker growth.
Group 1 1000 hours C-61-01-T-H
Possible whisker growth. Less than 10 µm.
Group 1 1000 hours C-61-01-T-S
No observed whisker growth.

FIGURE #3


This is not a whisker but a “sliver” of plating.
No observed whisker growth.
Possible whisker growth. Less than 10 µm.
No observed whisker growth.

FIGURES #4 THROUGH 5

2000 HOURS

FIGURE #4

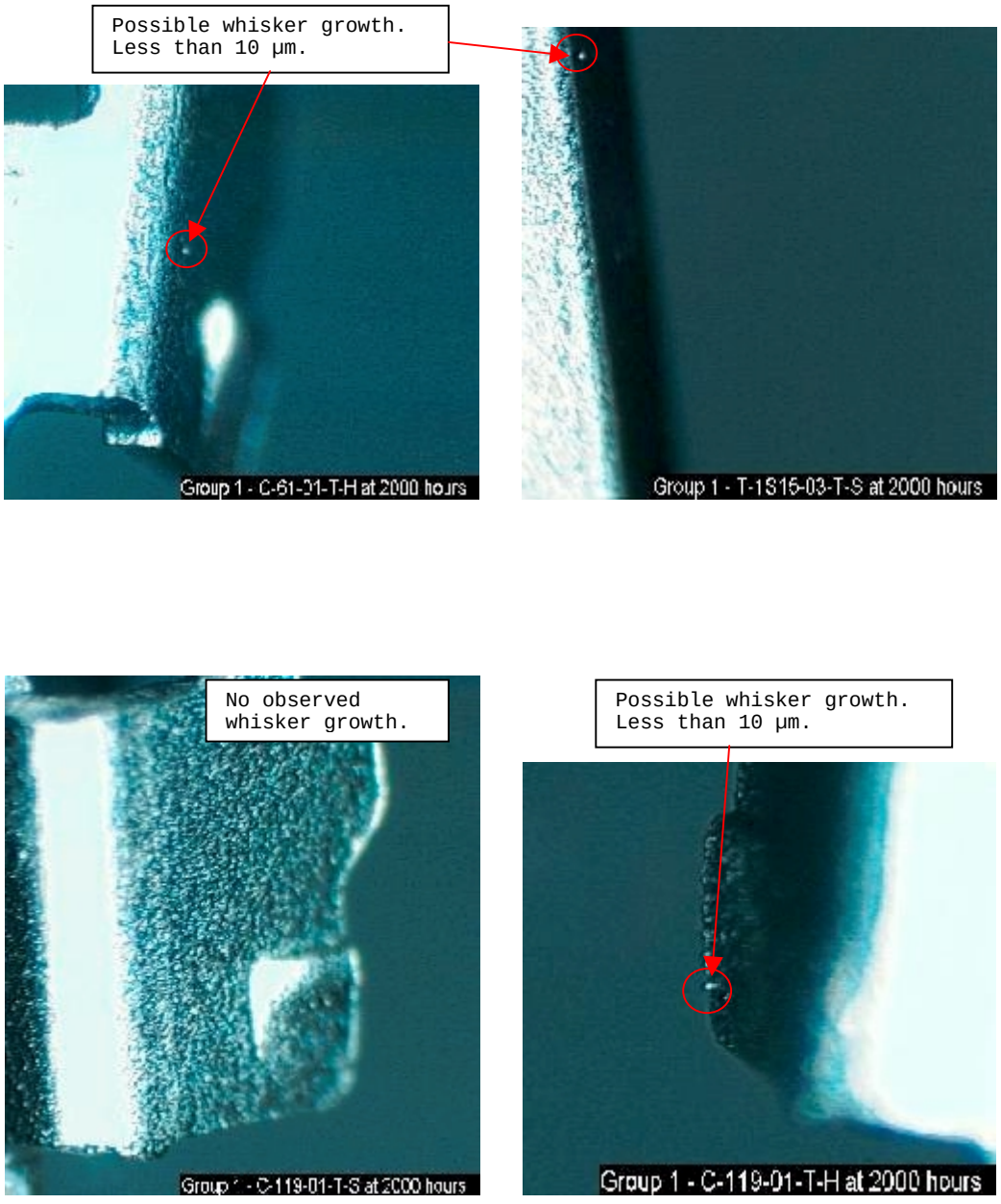
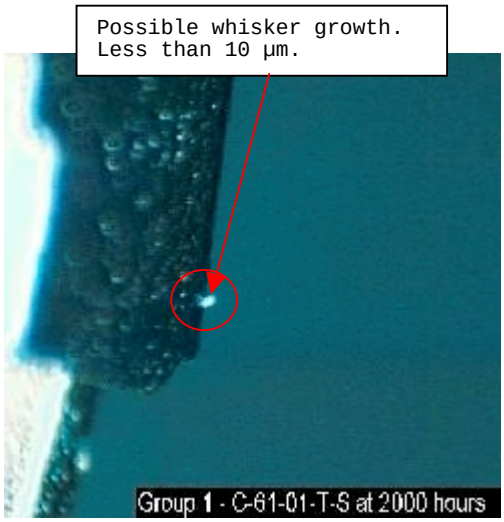
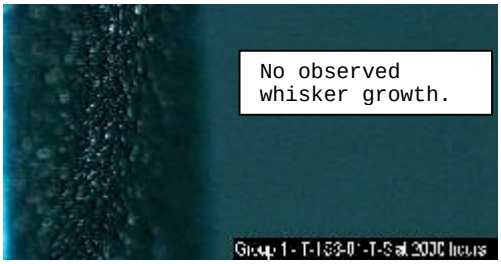
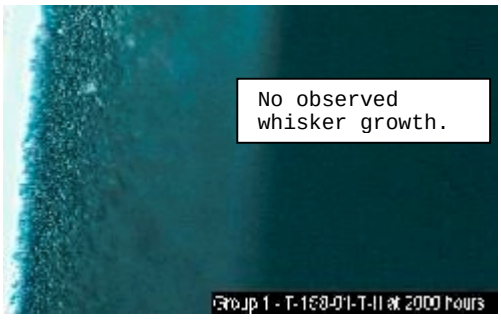

Possible whisker growth.
Less than 10 µm.
Group 1 - C-61-21-T-H at 2000 hours
Group 1 - T-1S15-03-T-S at 2000 hours
No observed
whisker growth.
Group ' - C-119-01-T-S at 2000 hours
Possible whisker growth.
Less than 10 µm.
Group 1 - C-119-01-T-H at 2000 hours

FIGURE #5


This is not a whisker but
a “sliver” of plating.
Group 1 - C-136-01-T-S at 2000 hours


Possible whisker growth.
Less than 10 µm.
Group 1 - C-61-01-T-S at 2000 hours


No observed
whisker growth.


No observed
whisker growth.

FIGURES #6 THROUGH 8

3000 HOURS

FIGURE #6


No observed whisker growth.
GROUP 1- 3000 HRS C-61-01T-S
GROUP 1- 3000 HRS T-1S8-01-T-H
Possible whisker growth. Less than 10 µm.
GROUP 1- 3000 HRS T-1S8-01-T-S

FIGURE #7

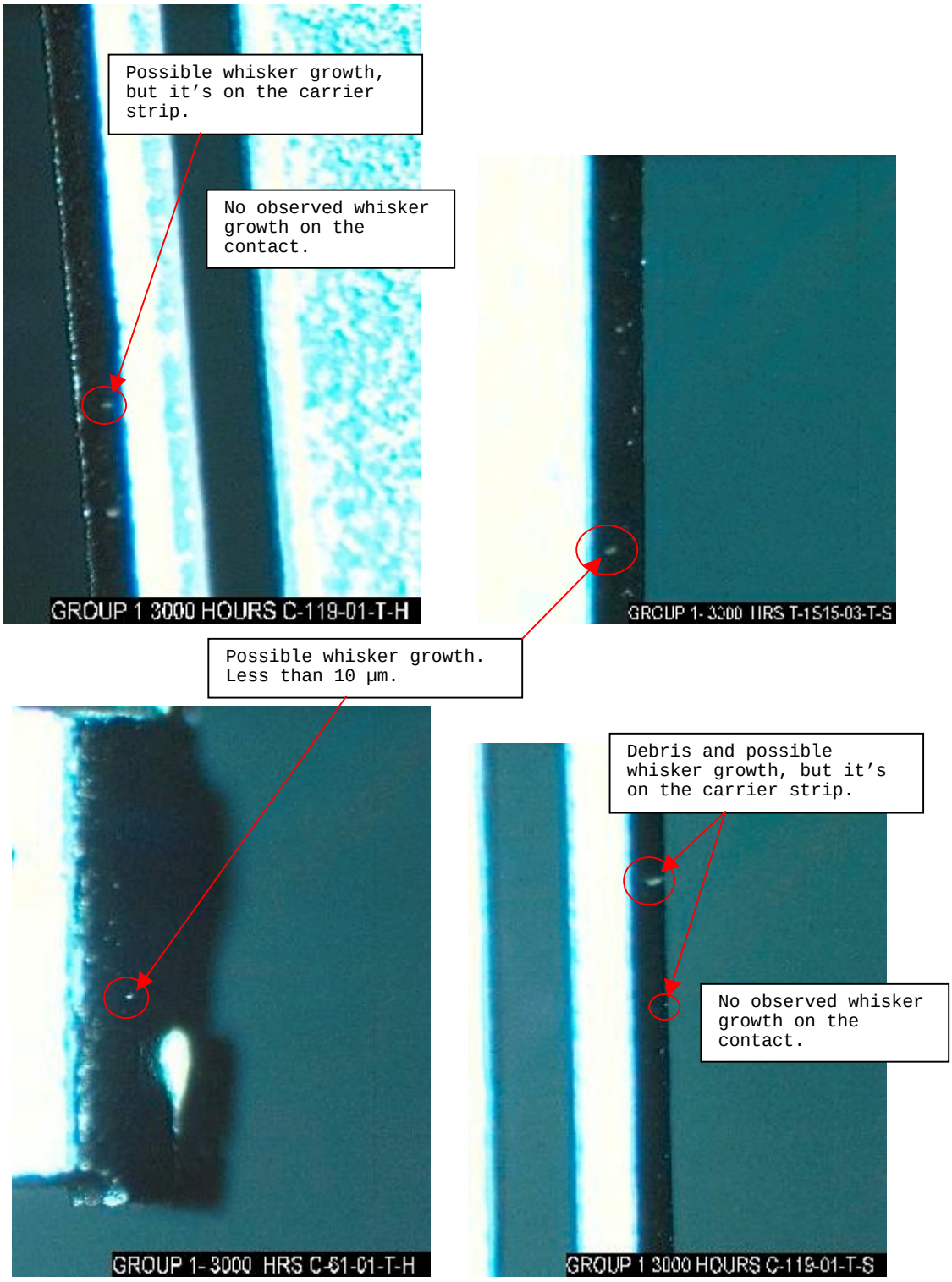

Possible whisker growth, but it's on the carrier strip.
No observed whisker growth on the contact.
GROUP 1 3000 HOURS C-119-01-T-H
GROUP 1- 3300 HRS T-1S15-03-T-S
Possible whisker growth. Less than 10 µm.
Debris and possible whisker growth, but it's on the carrier strip.
No observed whisker growth on the contact.
GROUP 1- 3000 HRS C-61-01-T-H
GROUP 1 3000 HOURS C-119-01-T-S

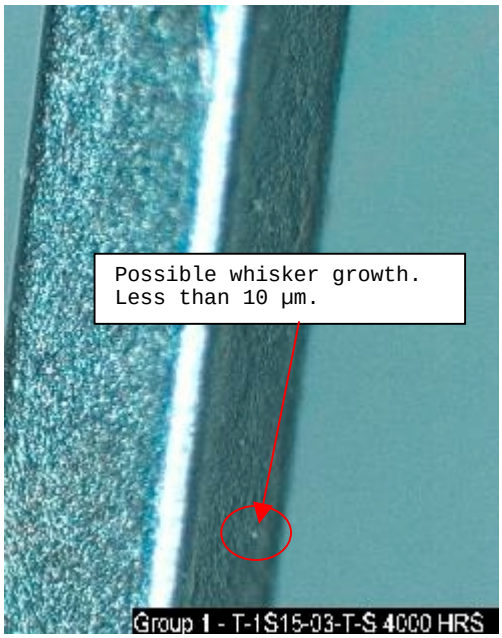
FIGURE #8


No observed whisker growth on the contact.
GROUP 1- 3000 HRS C-136-01-T-S

FIGURES #9 THROUGH 11A

4000 HOURS

FIGURE #9


Possible whisker growth.
Less than 10 µm.
Group 1 - T-1S15-03-T-S 4000 HRS


No evidence of whisker growth.


No evidence of whisker growth.

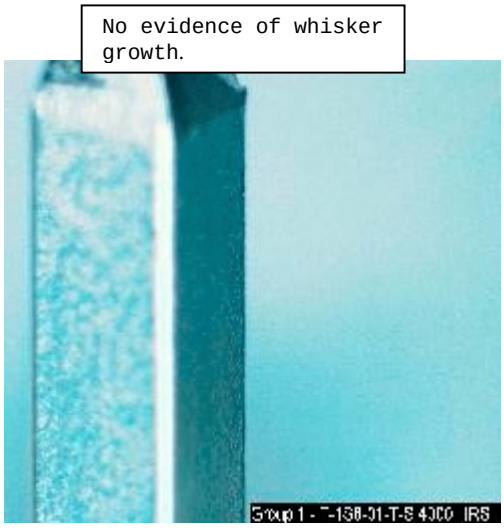
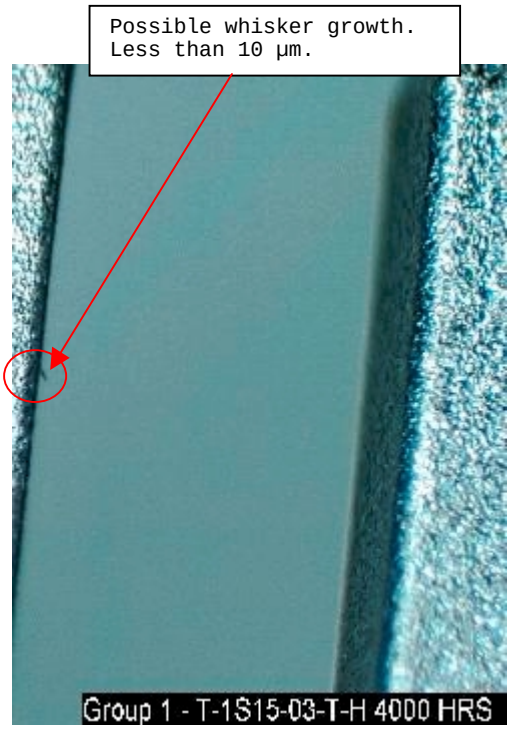
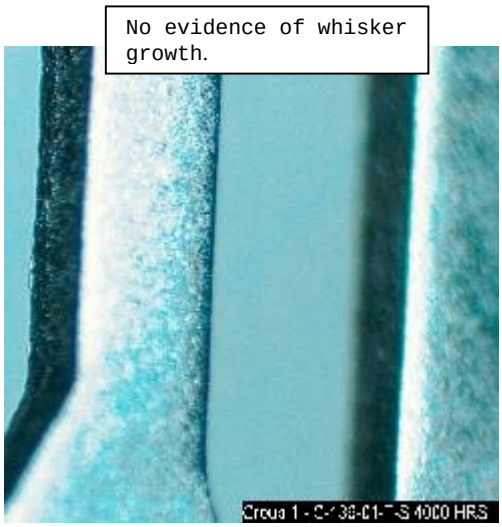
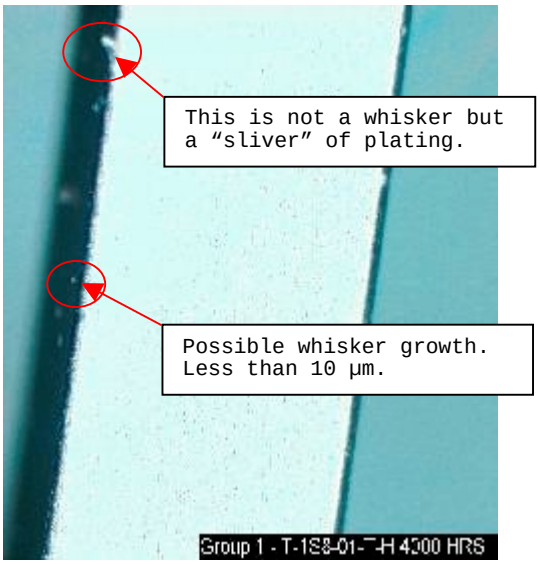

No evidence of whisker growth.

FIGURE #10


Possible whisker growth.
Less than 10 µm.
Group 1 - T-1S15-03-T-H 4000 HRS


No evidence of whisker growth.


This is not a whisker but a “sliver” of plating.
Possible whisker growth.
Less than 10 µm.

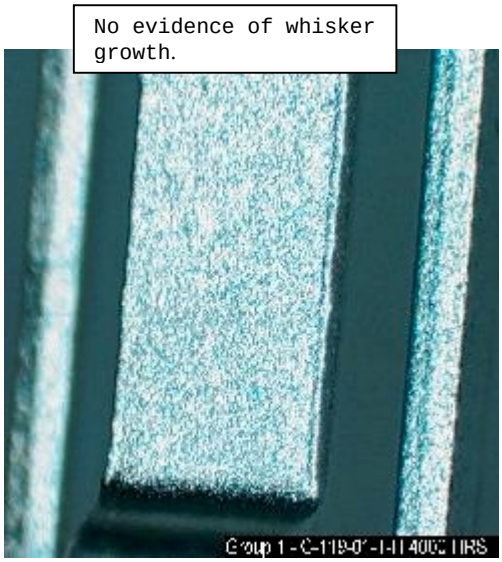

No evidence of whisker growth.

FIGURE #11

No evidence of whisker growth.

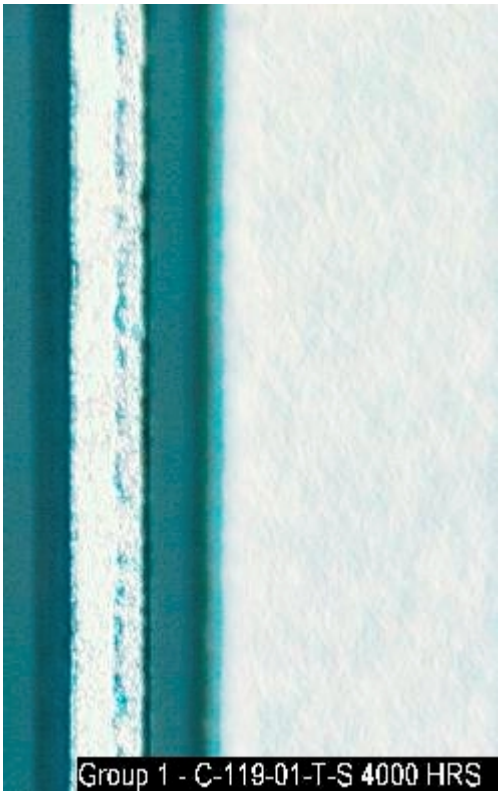
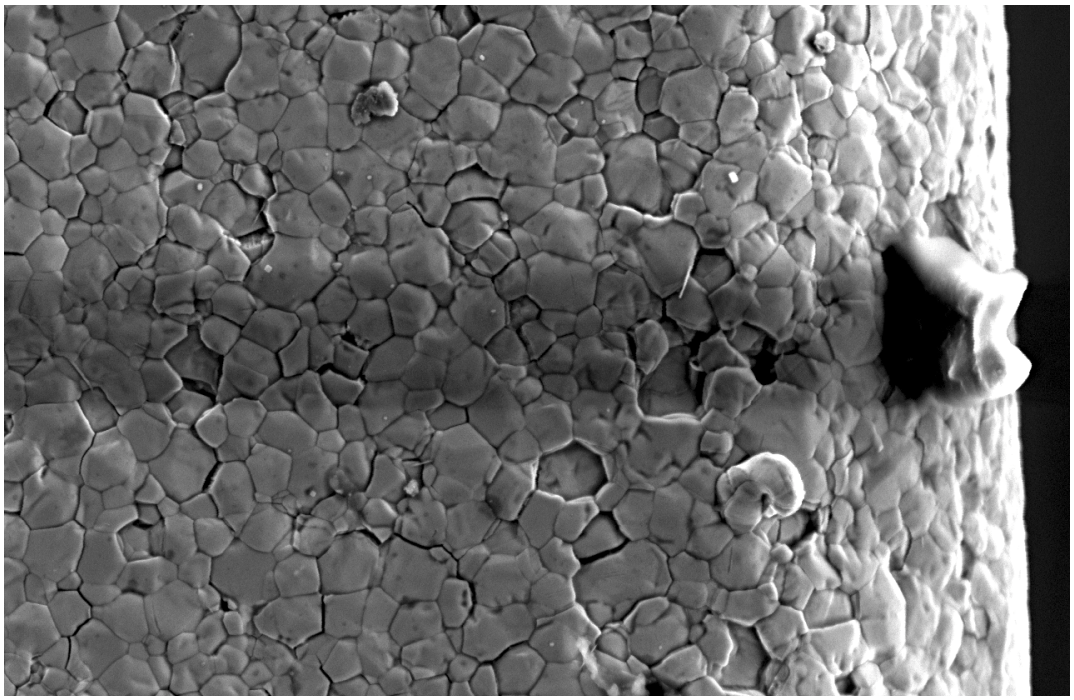


FIGURE #11A



TEST RESULTS

GROUP 2

PROJECT NO.: 206282	SPECIFICATION: INEMI
PART NO.: See Page 4	PART DESCRIPTION: Contacts
SAMPLE SIZE: 6 Contacts/PN	TECHNICIAN: SR/TFP/MS
START DATE: 5/11/06	COMPLETE DATE: 3/20/07
ROOM AMBIENT: 22°C	RELATIVE HUMIDITY: 37%
EQUIPMENT ID#: 294, 1029, 1030, 1031, 1314, 1315, 1361, JEOL JSM5910LZ (SEM)	

TEMPERATURE/HUMIDITY STORAGE

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, Test Procedure 31, with the following conditions:

2. Test Conditions:

   a) Relative Humidity : 87% ± 2%
   b) Temperature Conditions : 60°C ± 2°C
   c) Duration : 4000 hours

3. The samples were examined at 1000, 2000, 3000 and 4000 hours of exposure.

4. During the exposure, visual examination of the samples were made at specific intervals and in the following sequence.

   a) Place the test samples in the test chamber.

   b) At each designated measurement period, remove the test units from the test chamber when it is at 25°C. The test samples were exposed to room ambient for one to two hours prior to examination.

   c) Visually examine and photograph the samples.

   d) Upon completion of the examination, place the test samples back into the test chamber until the next measurement interval or until completion of the test duration.

REQUIREMENTS: See next page.

REQUIREMENTS:

1. The contacts were examined using an stereo microscope at 60X magnification for the presence of whisker growth.

2. Typical photographs of the samples shall be taken during each examination interval.

3. There shall be no evidence of whisker growth that exceeds 10.0 micrometers (µm).

RESULTS:

1. There was no evidence of whisker growth that exceeded 10.0 micrometers.

2. See the following Figures for photographs of samples at each examination interval:

Figure #	Examination Interval
11 through 12	1000 Hours
13 through 14	2000 Hours
15 through 17	3000 Hours
18 through 20	4000 Hours

3. At the request of the test sponsor, a SEM analysis was performed on the test samples after testing had been completed. A typical SEM photo is shown in Figure #20A. The SEM analysis was performed by Thielsch Engineering of Cranston, RI.

COMMENT

Evidence of a corrosion was observed on the following part numbers at the 2000 hour inspection interval:

C-61-01-T-H
C-61-01-T-S
C-119-01-T-H
C-119-01-T-S
C-136-01-T-S
T-1S8-01-T-H
T-1S15-03-T-S

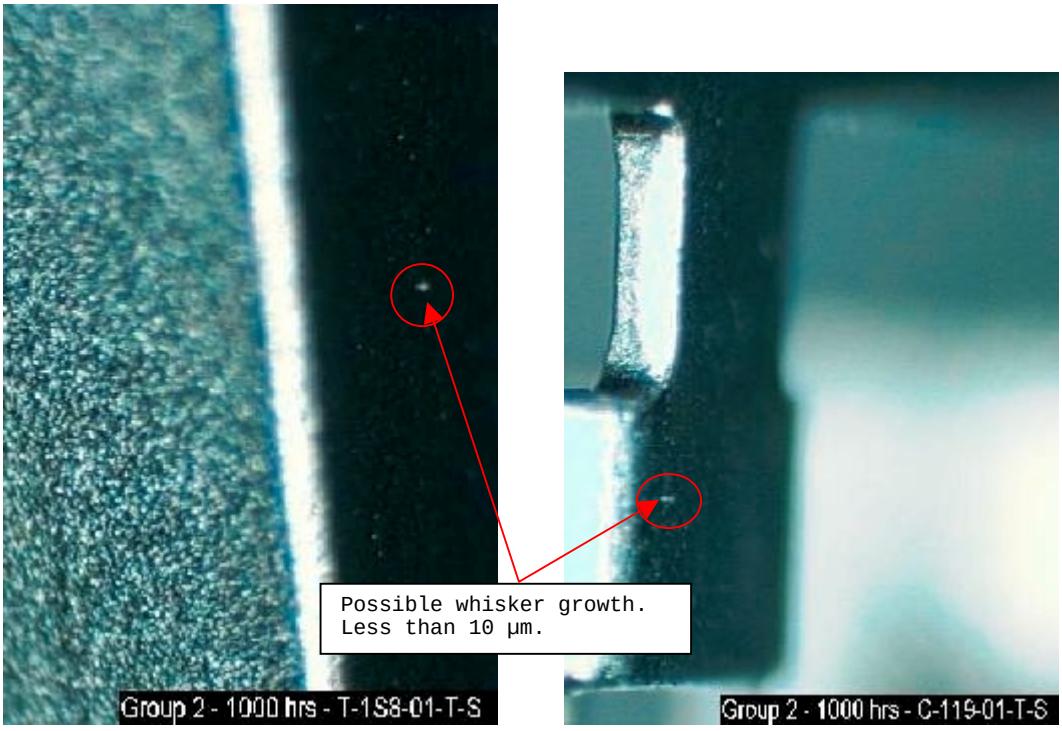
This condition is illustrated in the photograph on the following page.

CORROSION OBSERVED AT THE 2000 HOUR INSPECTION INTERVAL

FIGURES #11 THROUGH 12

1000 HOURS

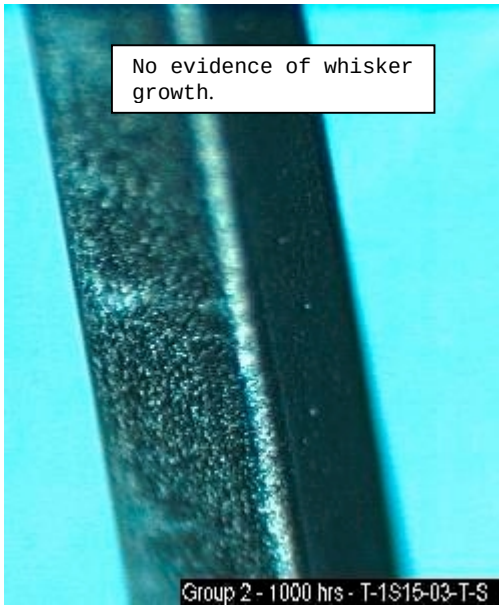
FIGURE #11

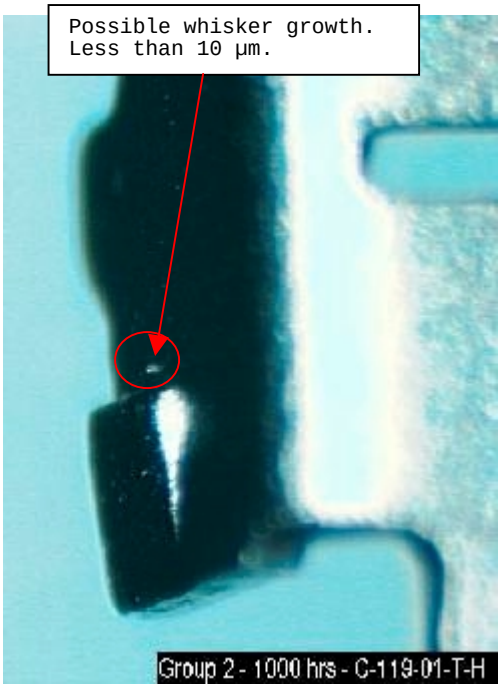

Possible whisker growth.
Less than 10 µm.
Group 2 - 1000 hrs - T-1S8-01-T-S
Group 2 - 1000 hrs - C-119-01-T-S

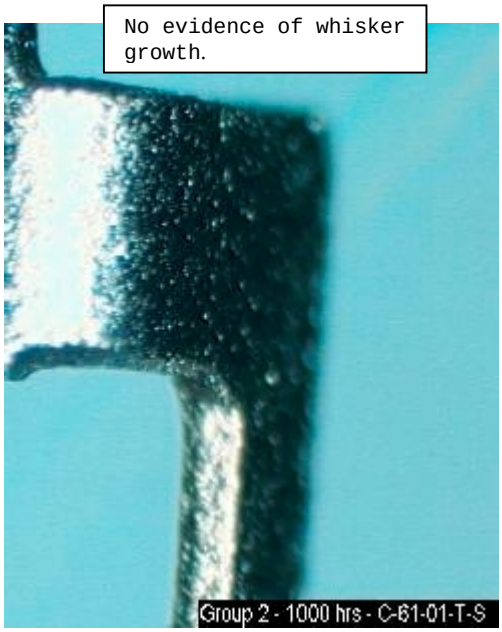

No evidence of whisker growth.
Group 2 - 1000 hrs - C-136-01-T-S
Group 2 - 1000 hrs - T-1S8-01-T-H

FIGURE #12


Possible whisker growth.
Less than 10 µm.


No evidence of whisker growth.
Group 2 - 1000 hrs - T-1S15-03-T-S

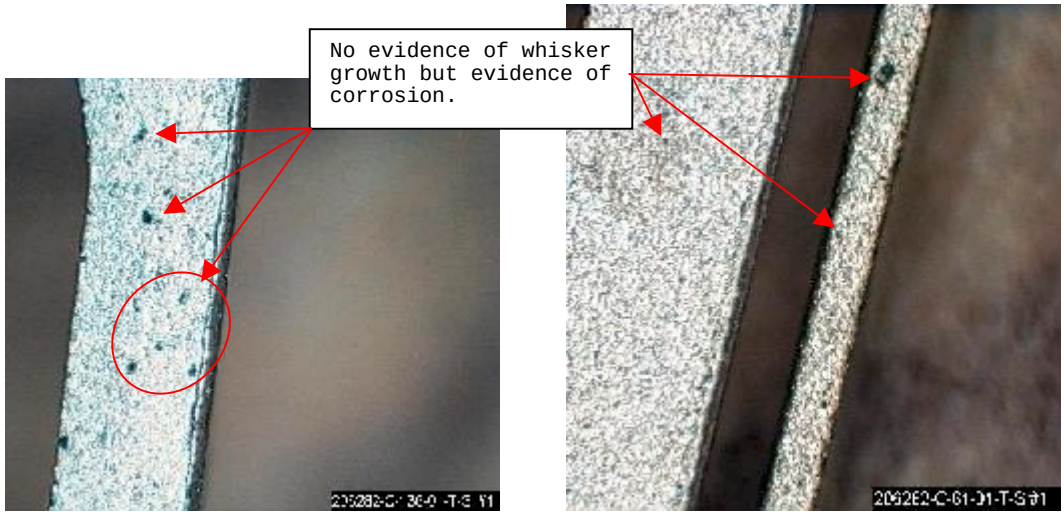

Possible whisker growth.
Less than 10 µm.
Group 2 - 1000 hrs - C-119-01-T-H


No evidence of whisker growth.
Group 2 - 1000 hrs - C-61-01-T-S

FIGURES #13 THROUGH 14

2000 HOURS

FIGURE #13


No evidence of whisker growth but evidence of corrosion.

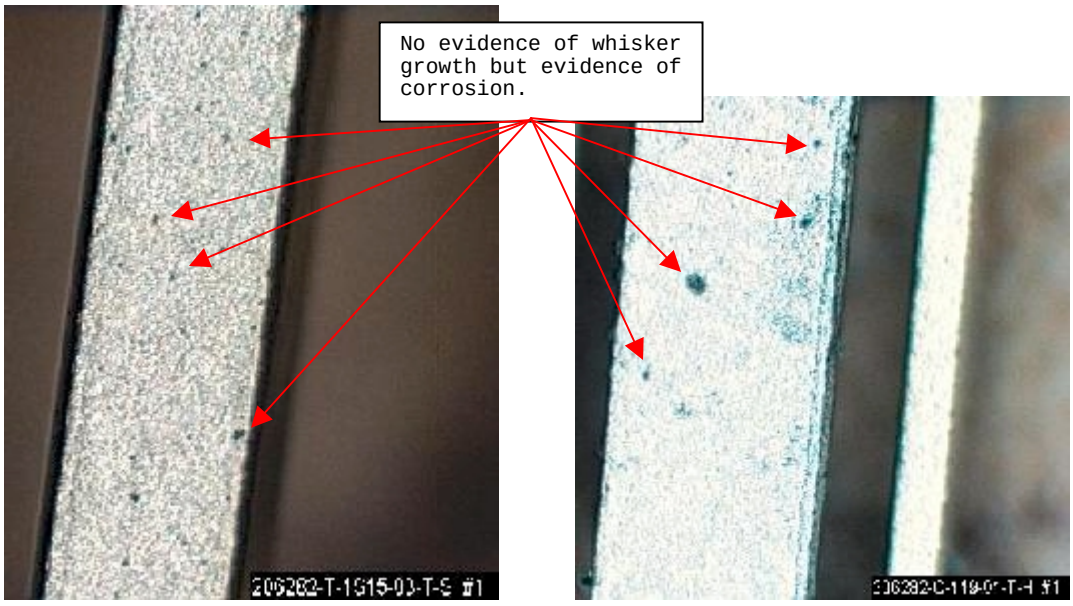
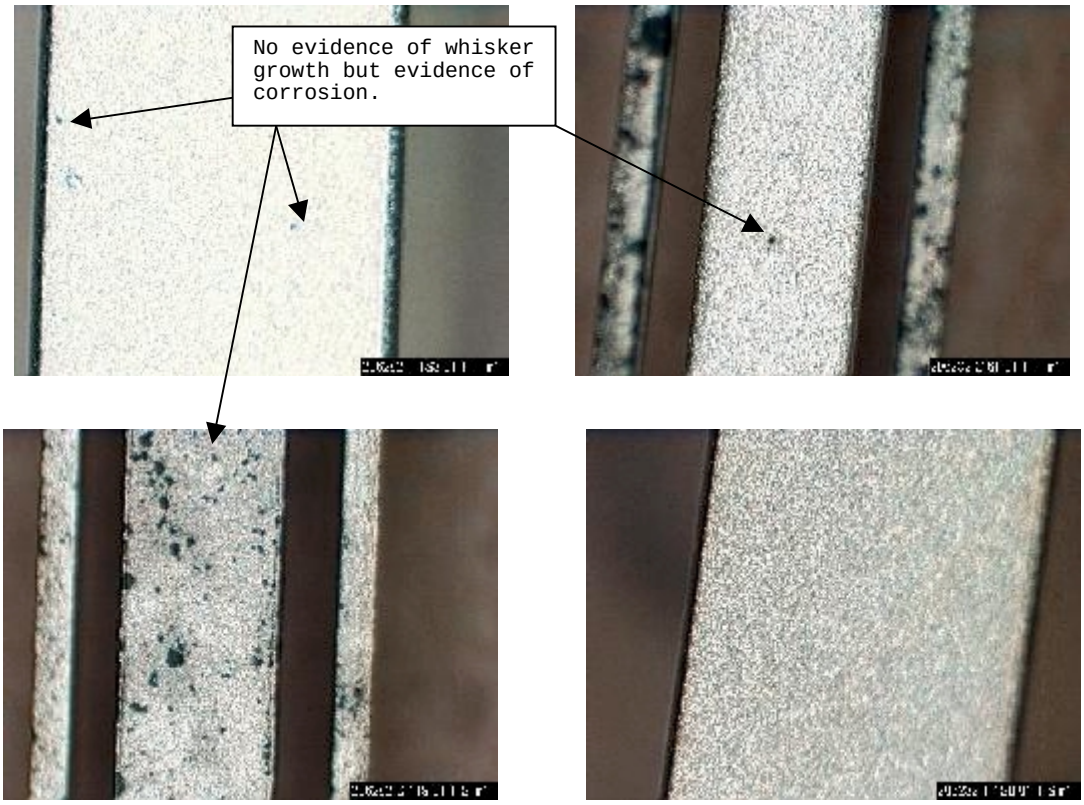
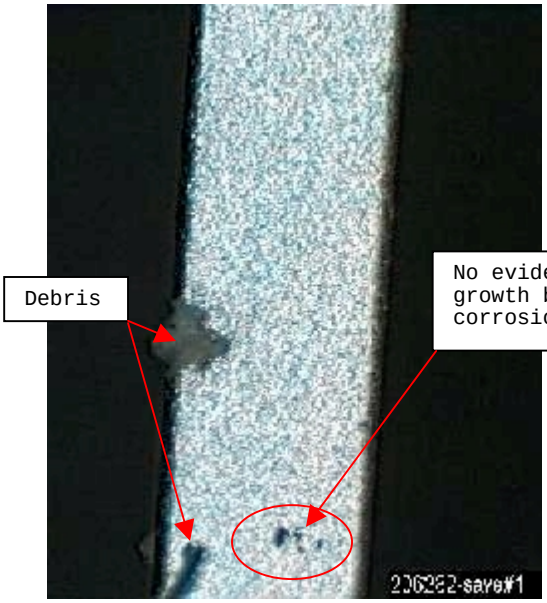

No evidence of whisker growth but evidence of corrosion.

FIGURE #14


No evidence of whisker growth but evidence of corrosion.


Debris
No evidence of whisker growth but evidence of corrosion.
206282-save#1

FIGURES #15 THROUGH #17

3000 HOURS

FIGURE #15

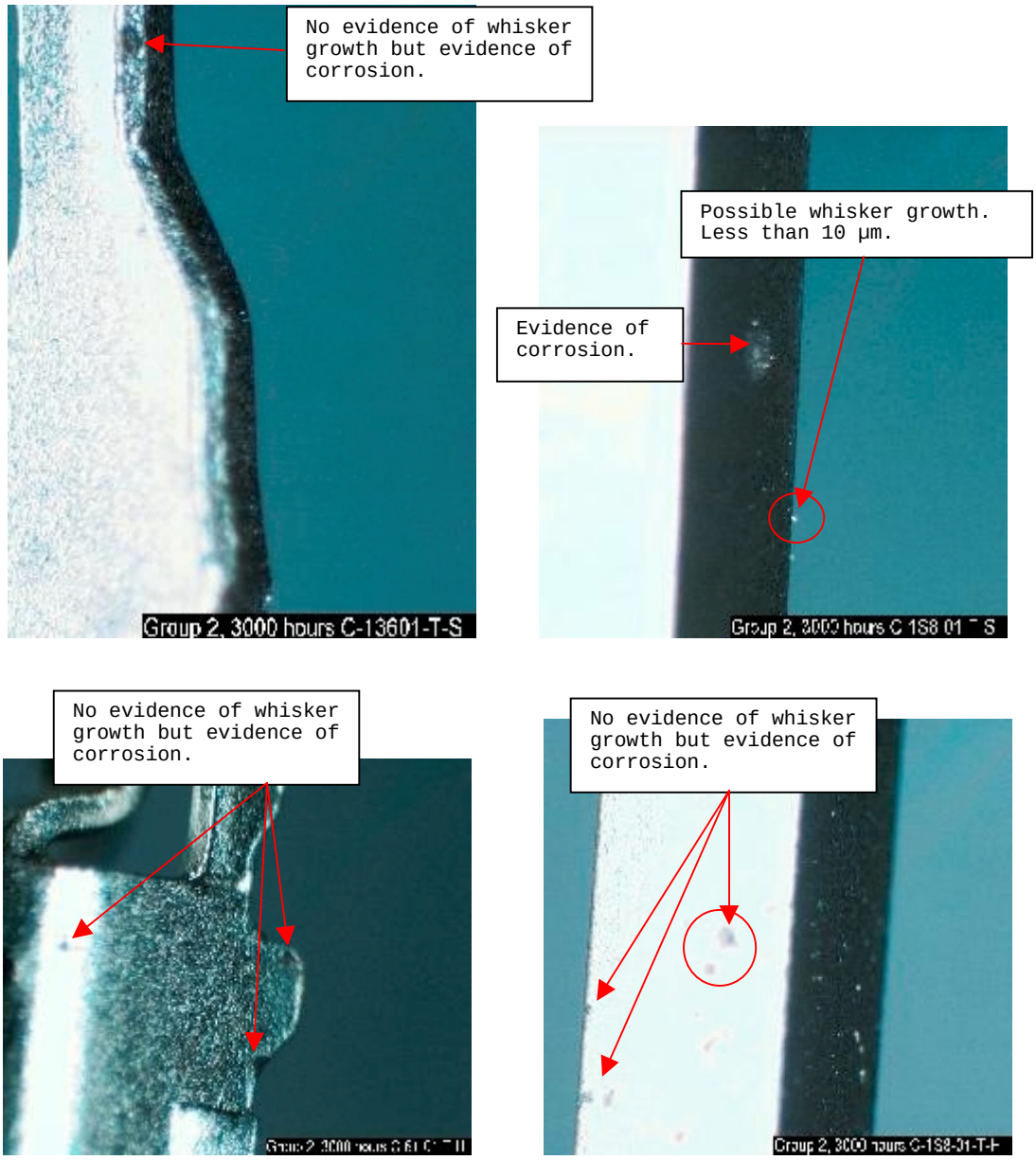
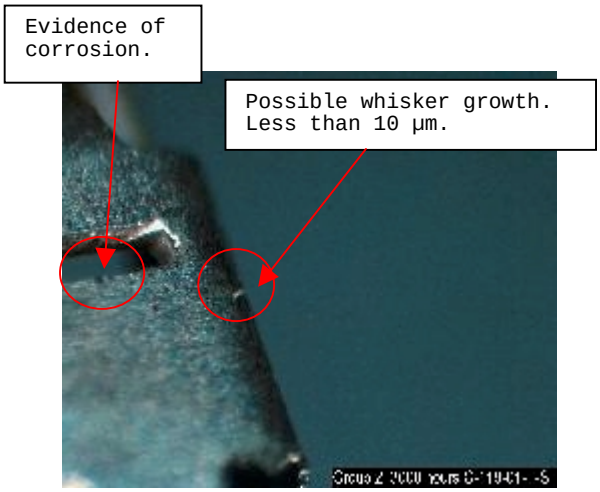
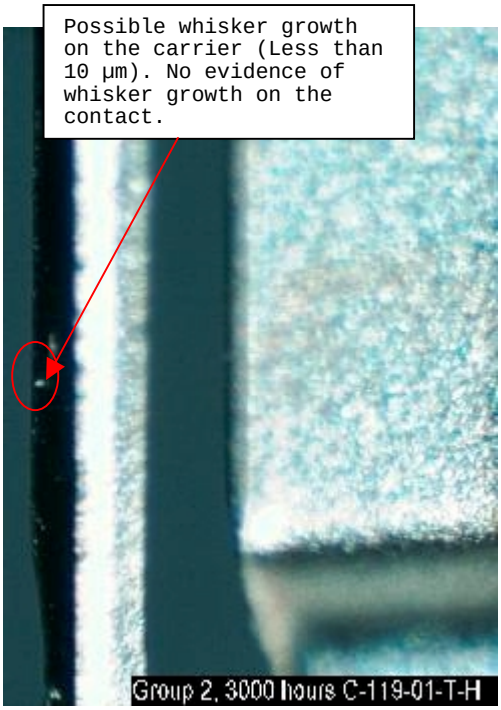

No evidence of whisker growth but evidence of corrosion.
Group 2, 3000 hours C-13601-T-S
Possible whisker growth. Less than 10 µm.
Evidence of corrosion.
No evidence of whisker growth but evidence of corrosion.
No evidence of whisker growth but evidence of corrosion.

FIGURE #16


No evidence of whisker growth.
Group 2, 3000 hours C-61-01-T-S


Evidence of corrosion.
Possible whisker growth. Less than 10 µm.


Possible whisker growth on the carrier (Less than 10 µm). No evidence of whisker growth on the contact.
Group 2, 3000 hours C-119-01-T-H

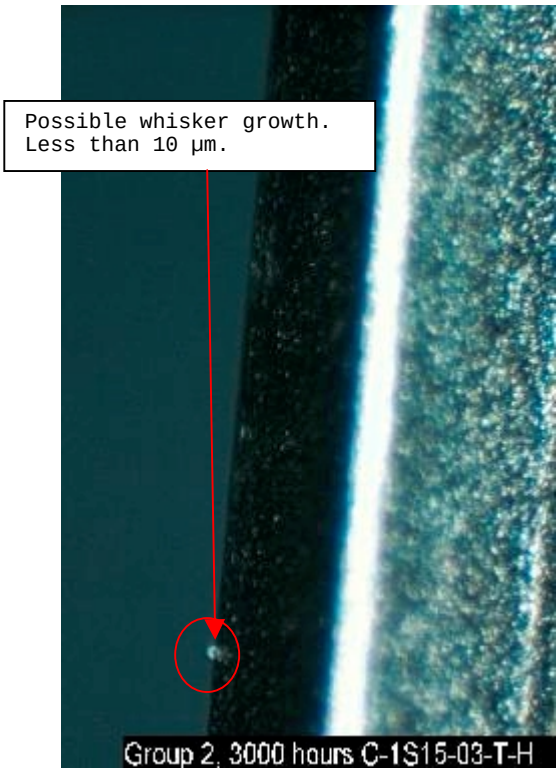
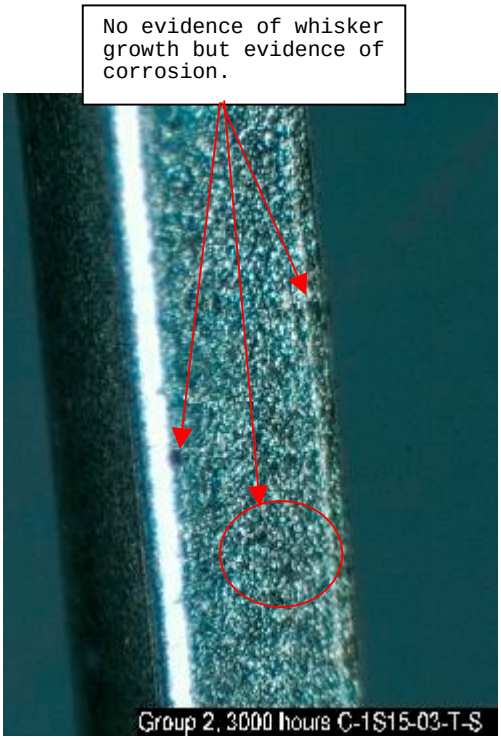

Possible whisker growth. Less than 10 µm.
Group 2, 3000 hours C-1S15-03-T-H

FIGURE #17

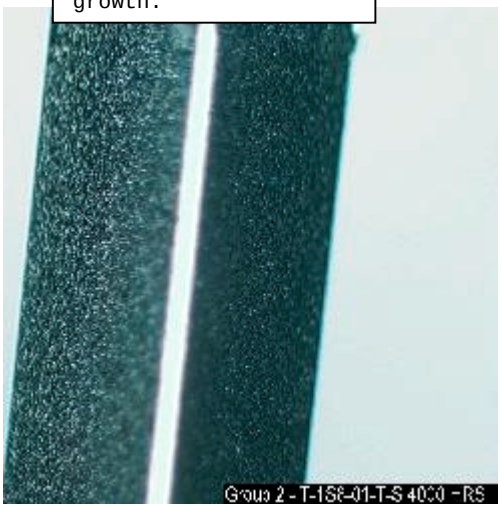

No evidence of whisker growth but evidence of corrosion.
Group 2, 3000 hours C-1S15-03-T-S

FIGURES #18 THROUGH #20A

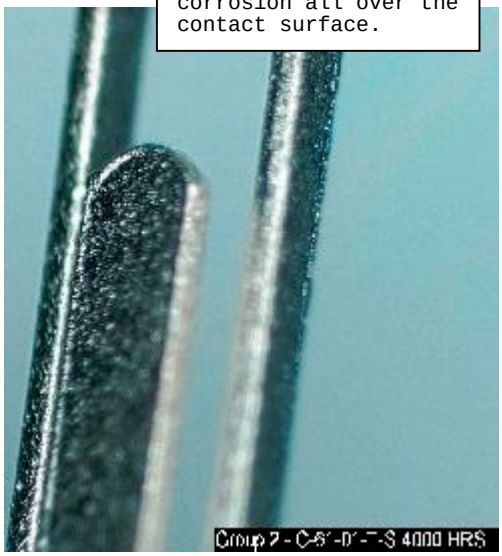
4000 HOURS

FIGURE #18

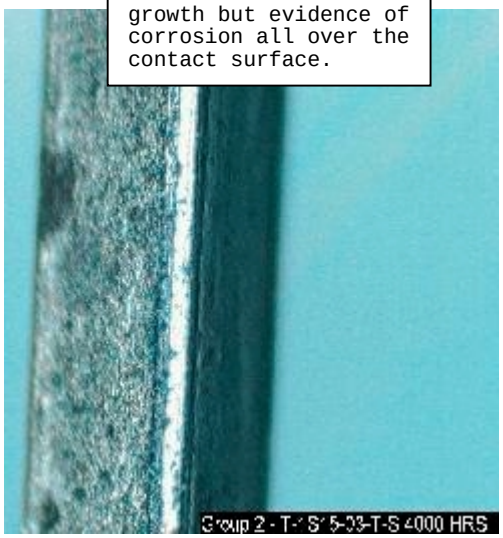
No evidence of whisker growth.



No evidence of whisker growth but evidence of corrosion all over the contact surface.



No evidence of whisker growth but evidence of corrosion all over the contact surface.



No evidence of whisker growth but evidence of corrosion.

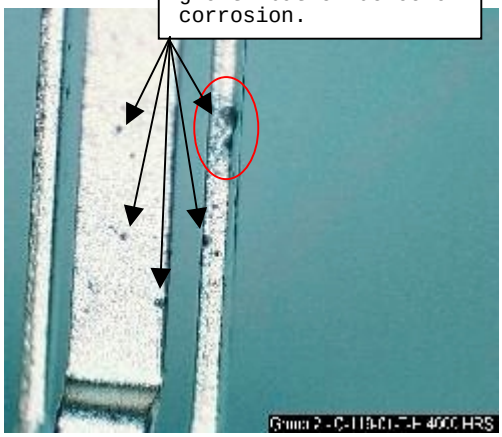
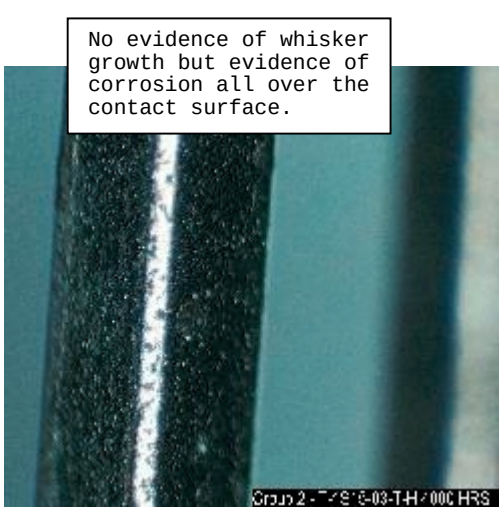
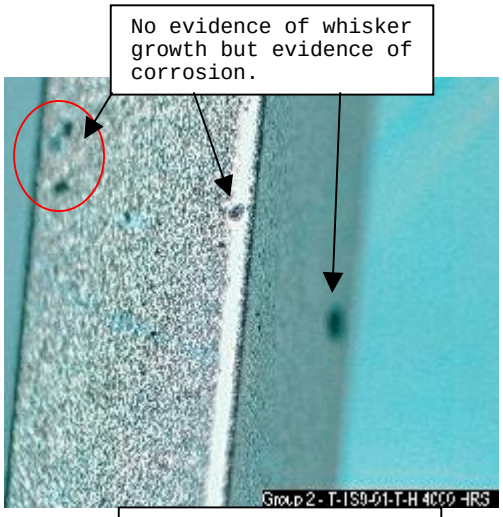
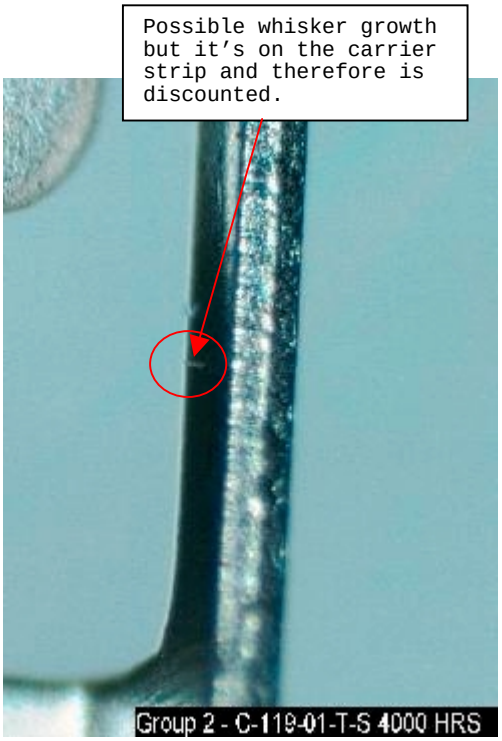


FIGURE #19


No evidence of whisker growth but evidence of corrosion all over the contact surface.


No evidence of whisker growth but evidence of corrosion.


Possible whisker growth but it's on the carrier strip and therefore is discounted.
Group 2 - C-119-01-T-S 4000 HRS

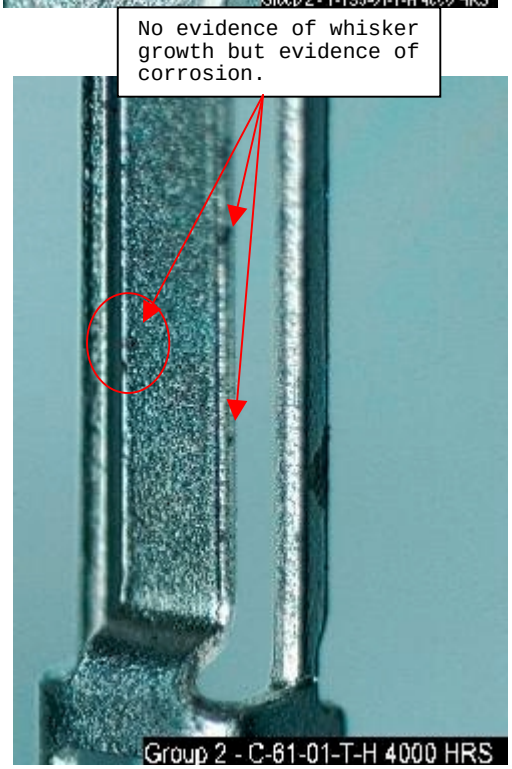

No evidence of whisker growth but evidence of corrosion.
Group 2 - C-61-01-T-H 4000 HRS

FIGURE #20

No evidence of whisker growth but evidence of corrosion all over the contact surface.

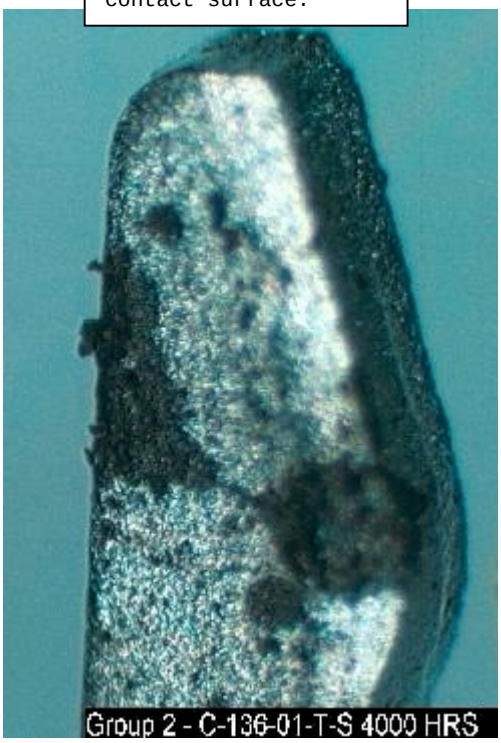
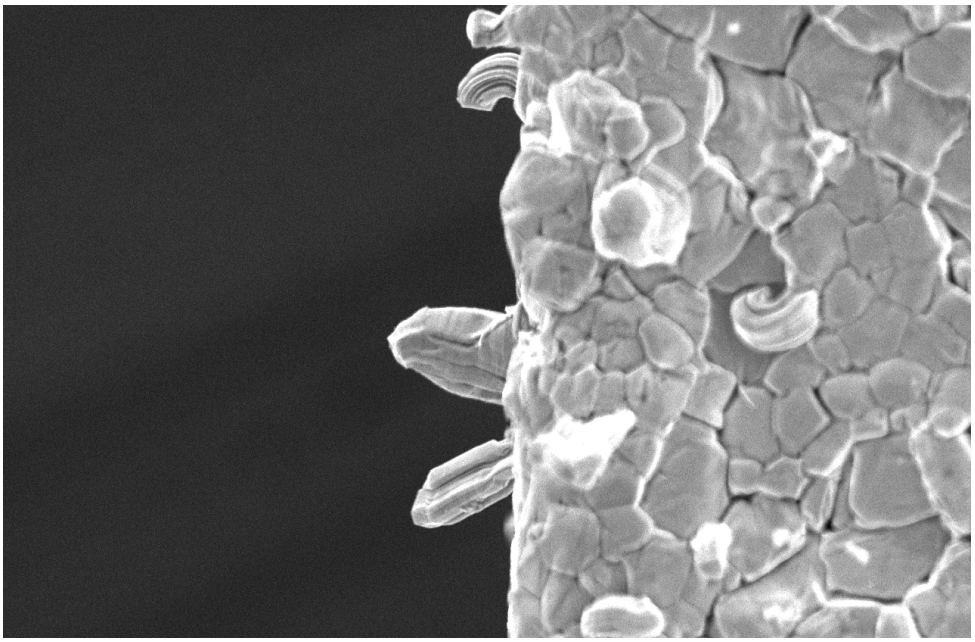


FIGURE #20A



TEST RESULTS

GROUP 3

PROJECT NO.: 206282	SPECIFICATION: INEMI
PART NO.: See Page 4	PART DESCRIPTION: Contacts
SAMPLE SIZE: 6 Contacts/PN	TECHNICIAN: SR/TFP
START DATE: 5/16/06	COMPLETE DATE: 3/20/07
ROOM AMBIENT: 23°C	RELATIVE HUMIDITY: 39%
EQUIPMENT ID#: 129, 1029, 1030, 1031, 1314, 1315, 1361, JEOL JSM5910LZ (SEM)	

THERMAL CYCLING

PROCEDURE:

1. The test environment was performed in accordance with EIA 364, test Procedure 32, with the following conditions:

2. Test Conditions:
   a) Number of Cycles : 1500 Cycles
   b) Hot Extreme : +85 +3°C/-0°C
   c) Cold Extreme : -40 +0°C/-3°C
   d) Time at Temperature : 8 Minutes
   e) Ramp Time Hot to Cold : 5 Minutes
   f) Ramp Time Cold to Hot : 5 Minutes

3. During the exposure, resistance measurements were taken at specific intervals and in the following sequence:
   a) Place the test samples in the test chamber.
   b) At each designated measurement period, remove the test units from the test chamber when it is at 25°C. The test samples were exposed to room ambient for one to two hours prior to examination.
   c) Visually examine and photograph the samples.
   d) Upon completion of the examination, place the test samples back into the test chamber until the next measurement interval or until completion of the test duration.

REQUIREMENTS: See next page.

REQUIREMENTS:

1. The contacts were examined using an Stereo Microscope at 60X magnification for the presence of whisker growth.

2. Typical photographs of the samples shall be taken during each examination interval.

3. There shall be no evidence of whisker growth that exceeds 10.0 micrometers (µm).

RESULTS:

1. There was no evidence of whisker growth that exceeded 10.0 micrometers.

2. See the following figures for photographs of samples at each examination interval:

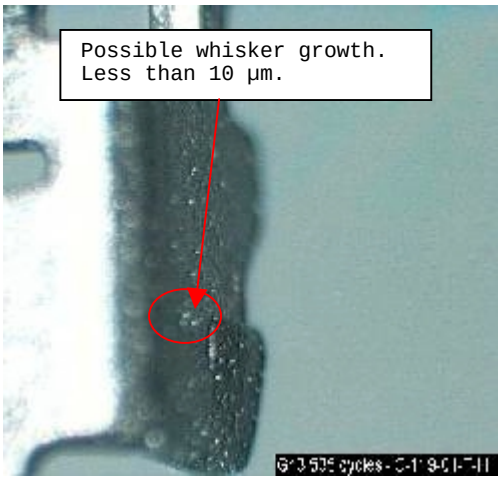
Figure #	Examination Interval
21 through 22	535 Cycles
23 through 24	1050 Cycles
25 through 26	1500 Cycles

3. At the request of the test sponsor, a SEM analysis was performed on the test samples after testing had been completed. A typical SEM photo is shown in Figure #26A. The SEM analysis was performed by Thielsch Engineering of Cranston, RI.

FIGURES #21 THROUGH 22

535 CYCLES

FIGURE #21


Possible whisker growth.
Less than 10 µm.


Possible whisker growth.
Less than 10 µm.


No evidence of whisker
growth.

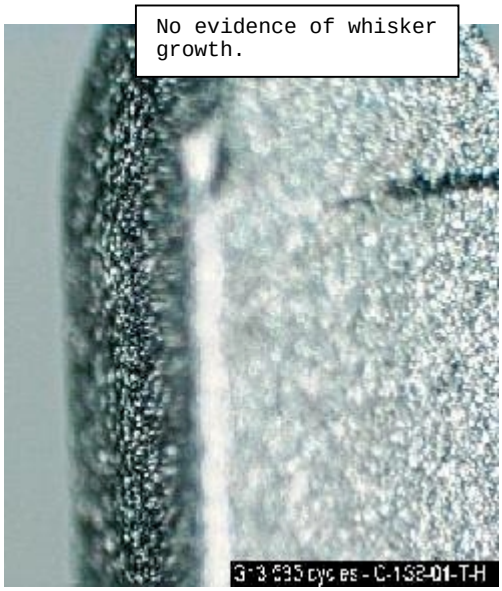
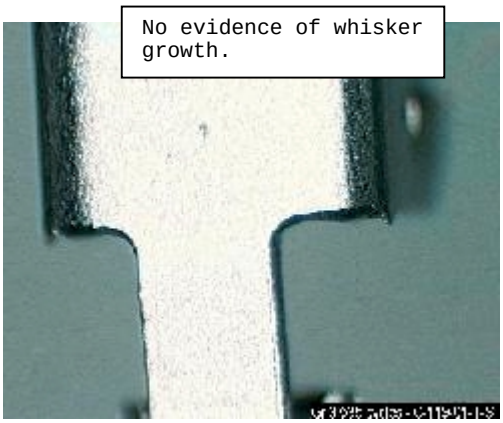
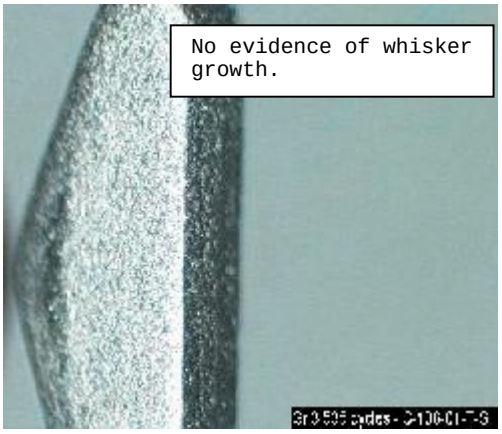

No evidence of whisker
growth.

FIGURE #22


No evidence of whisker growth.


Possible whisker growth.
Less than 10 µm.


No evidence of whisker growth.

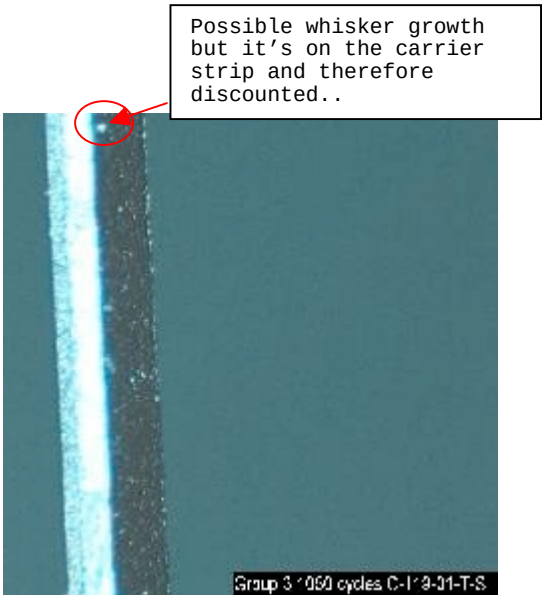

No evidence of whisker growth.


No evidence of whisker growth.

FIGURES #23 THROUGH 24

1050 CYCLES

FIGURE #23


Possible whisker growth but it's on the carrier strip and therefore discounted..


Possible whisker growth. Less than 10 µm.
Gr 3 1050 cycles - T1S15-03-T-H


Possible whisker growth. Less than 10 µm.

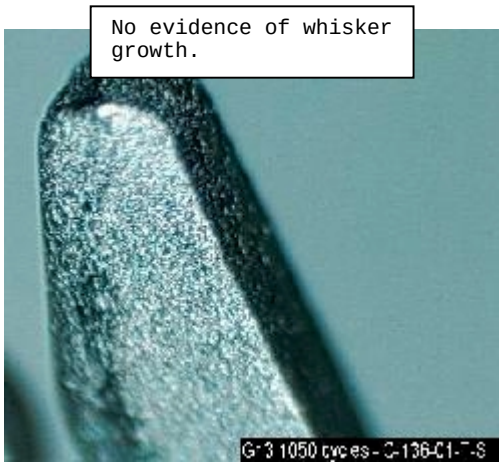
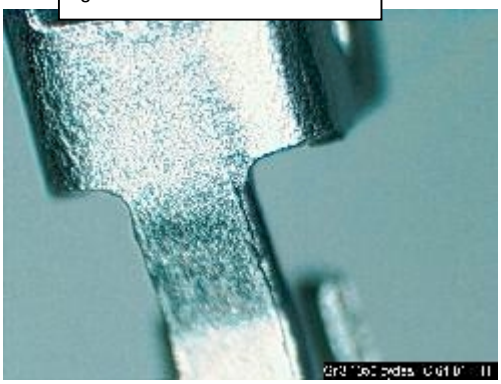

No evidence of whisker growth.

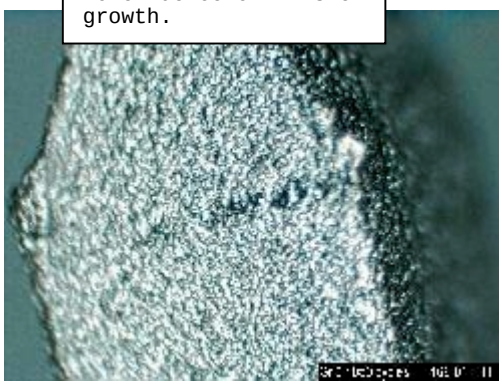
FIGURE #24

No evidence of whisker growth.

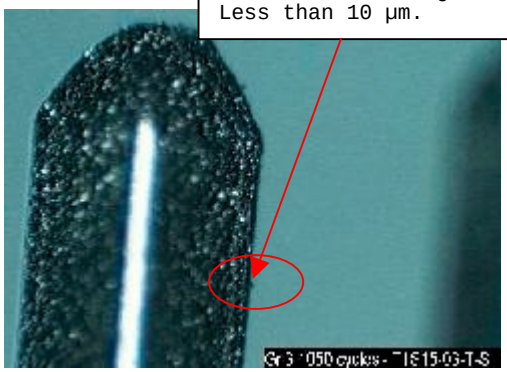


No evidence of whisker growth.

No evidence of whisker growth.



Possible whisker growth. Less than 10 µm.



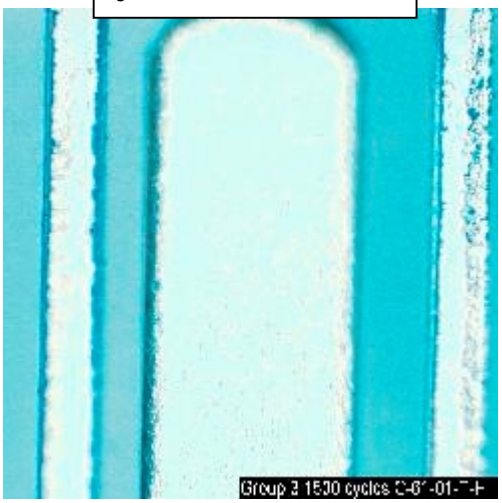
Possible whisker growth. Less than 10 µm.

FIGURES #25 THROUGH 26A

1500 CYCLES

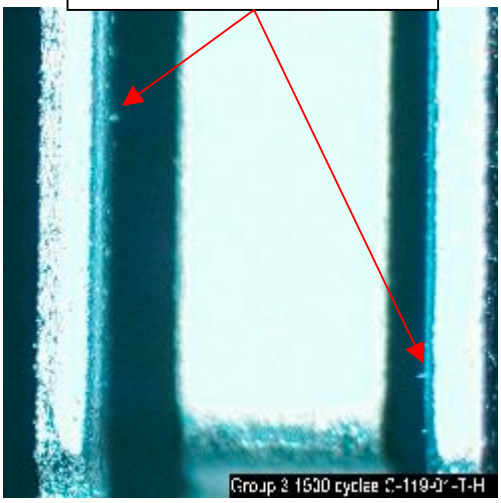
FIGURE #25

No evidence of whisker growth.



No evidence of whisker growth.

Possible whisker growth but it's on the carrier strip and therefore discounted..



Possible whisker growth. Less than 10 µm.

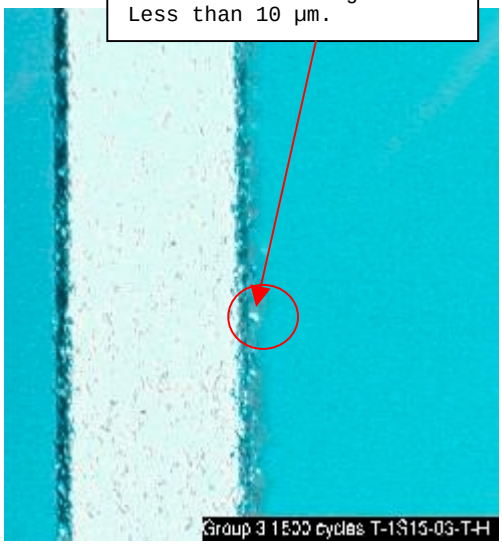
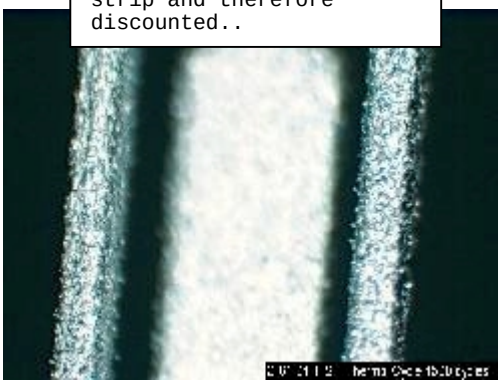
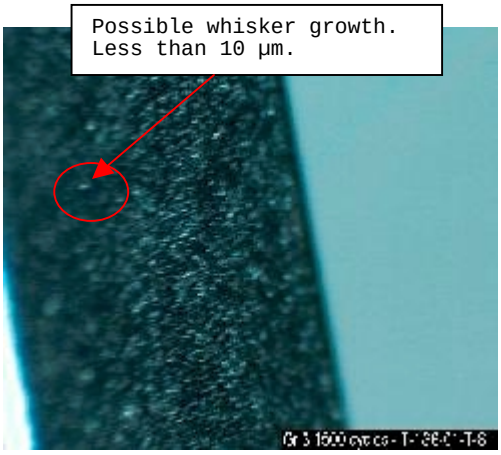


FIGURE #26

Possible whisker growth but it's on the carrier strip and therefore discounted..



Possible whisker growth. Less than 10 µm.



No evidence of whisker growth.

Possible whisker growth. Less than 10 µm.

No evidence of whisker growth.

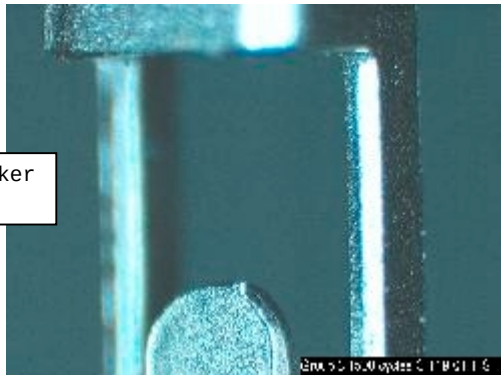
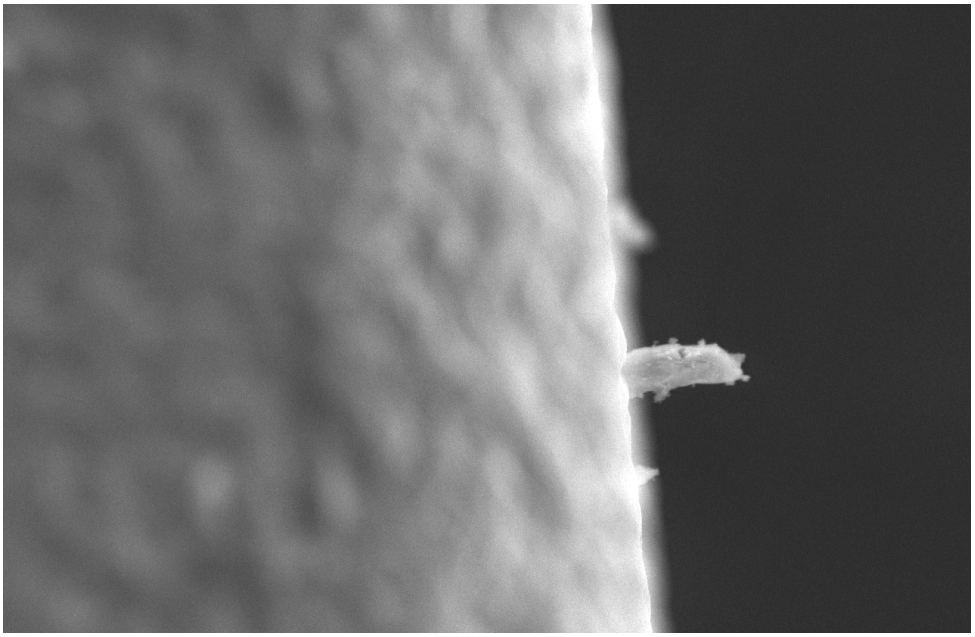


FIGURE #26A



APPENDEX A

Customer: ***SAMTEC***

Date: **4/12 - 4/13/2006**

Test Objective: **Plating test results for parts submitted to whisker testing**

Line 11 Sequence

1	Electro Clean (polarity varies as to base material)
2	Electro Clean (polarity varies as to base material)
3	Sulfuric Acid
4	Acid Copper
5	Nickel Plate
6	Tin Plate
7	Neutra Rinse 80
8	Rinse
9	Hot Rinse
10	Dry
11	
12	
13	
14	
15	

						Thickness (µ in)			
Test #:	**1**	**Nickel Plate**	**Amp/Volt**	**Sn Plate**	**Amp/Volt**	**Nickel Plate**	**Sn Plate**		**Additional Notes:**
Line Speed:	9.7 ft/min	R-1	18/5.2	R-1	15/3.6	55	120	contact	low end of spec
		R-2	20/5.5	R-2	14/3.0	70	146	tail	
Part #:	C-119-01-T	R-3	20/5.8	R-3	15/3.6				
Base Material:	Phos Bronze	R-4		R-4					
		Temp °F		Temp °F	120 F				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	**2**	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	4.1	R-1	19/5.2	R-1	15/3.5	126	266	contact	High end of spec
		R-2	22/5.5	R-2	15/3.0	166	306	tail	
Part #:	C-119-01-T	R-3	20/5.8	R-3	15/3.5				
Base Material:	Phos Bronze	R-4		R-4					
		Temp °F		Temp °F	119				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	**3**	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	4	R-1	25/5	R-1	18/3.5	145	219	contact	High end of spec
		R-2	28/5.2	R-2	18/3.0	230	303	tail	
Part #:	C-61-01-T	R-3	26/5.8	R-3	18/3.5				
Base Material:	BeCu	R-4		R-4					
		Temp °F		Temp °F	119				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	**4**	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	9	R-1	25/5	R-1	18/3.5	77	116	contact	Low end of spec
		R-2	28/5.2	R-2	18/3.0	110	185	tail	
Part #:	C-61-01-T	R-3	26/5.6	R-3	18/3.5				
Base Material:	BeCu	R-4		R-4					
		Temp °F		Temp °F	119				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	**5**	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	3.6	R-1	55/5.5	R-1	22/3.8	211	290		High end of spec
		R-2	55/5.4	R-2	20/4.2	209	400		
Part #:	T-1-S8-01-T	R-3	20/5.8	R-3	21/4.6				
Base Material:	Phos Bronze	R-4		R-4					
		Temp °F		Temp °F	119				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	**6**	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	4.2	R-1		R-1	16/3.6	60-90	170-240		Low end of spec
		R-2		R-2	16/3.4				
Part #:	T-1-S8-01-T	R-3		R-3	16/3.8				
Base Material:	Phos Bronze	R-4		R-4					
		Temp °F		Temp °F	120				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	***7***	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	4.3	R-1	5/1.6	R-1	10/3.0	52	100-200		Low end of spec
		R-2	9/3.0	R-2	10/2.8				
Part #:	T-1S1-15	R-3	9/3.0	R-3	10/3.4				
Base Material:	Phos Bronze	R-4		R-4					
		Temp °F		Temp °F	119				Sn deposit is uniform satin/matte

						Thickness (µ in)			
Test #:	***8***	**Nickel**	**Amp/Volt**	**Tin**	**Amp/Volt**	**Nickel**	**Tin**		**Additional Notes:**
Line Speed:	4.2	R-1	14/4.2	R-1	14/4.2	80-102	317-325		High end of spec
		R-2	13/4.0	R-2	14/3.6				
Part #:	T-1S1-15	R-3	13.5/4.8	R-3	13/4.0				
Base Material:	Phos Bronze	R-4		R-4					
		Temp °F		Temp °F	119				Sn deposit is uniform satin/matte