



# TEST SUMMARY

## SMALL FORM –FACTOR PLUGGABLE CONNECTOR THERMAL AGE TEST FOR LUBRICATION

### I. PURPOSE

To perform a lubricant comparison on the SFP connector. Molex’s proprietary EB lube will be compared along with samples containing no lubricant.

### II. SUMMARY

SFP - No Lube Samples						
	Initial	1 <sup>st</sup> Cycle	T. Age 150 hrs.	2 <sup>nd</sup> Cycle	T. Age 300 hrs.	3 <sup>rd</sup> Cycle
	mW	DmW	DmW	DmW	DmW	DmW
Minimum	13.09	-3.78	-12.34	-9.02	-9.99	-8.42
Maximum	38.57	1.49	4.80	4.08	4.76	5.20
Average	22.95	-0.27	-0.66	-0.23	-0.25	-0.10
St. Dev	4.02	0.74	1.80	1.35	1.53	1.46
n	95	95	95	95	95	95
n > 10 DmW	n/a	0	1	0	0	0
Open	n/a	0	0	0	0	0

SFP - Lube A Samples						
	Initial	1 <sup>st</sup> Cycle	T. Age 150 hrs.	2 <sup>nd</sup> Cycle	T. Age 300 hrs.	3 <sup>rd</sup> Cycle
	mW	DmW	DmW	DmW	DmW	DmW
Minimum	17.64	-7.23	-9.85	-9.09	-9.96	-9.57
Maximum	36.46	0.77	0.13	3.75	0.06	3.91
Average	24.77	-0.32	-0.98	-0.27	-1.05	-0.44
St. Dev	3.04	1.10	1.57	1.68	1.64	1.82
n	96	96	96	96	96	96
n > 10 DmW	n/a	0	0	0	0	0
Open	n/a	0	0	0	0	0

### III. CONCLUSION

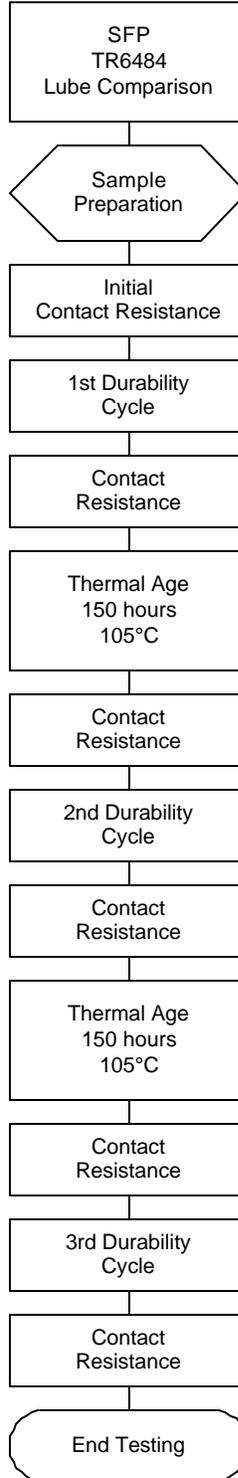
All of the samples performed similarly throughout testing. There was no apparent difference between the lubed and unlubed connectors. Based on this testing, there is no degradation to the EB-1 lubrication after it sees reflow temperatures.

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DOCUMENT NUMBER: <b>TS-74441-004</b>	CREATED / REVISED BY: <b>SWEENEY</b>	CHECKED BY: <b>BANAKIS</b>	APPROVED BY: <b>BANAKIS</b>



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## IV. TEST SEQUENCE



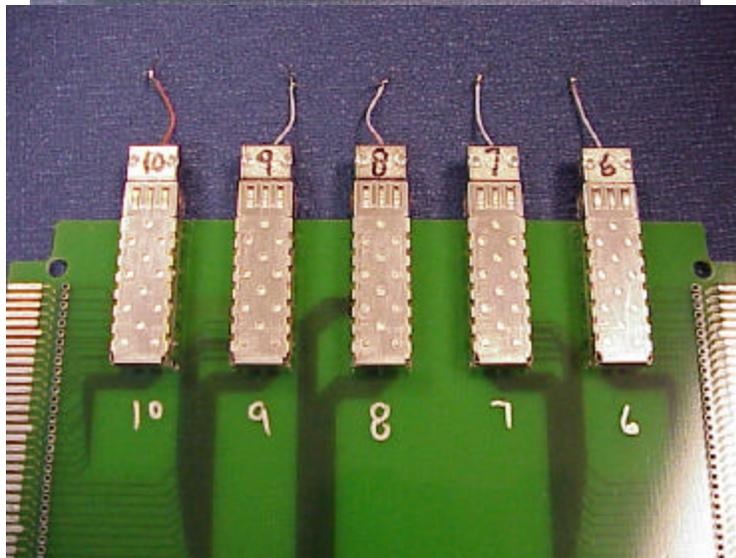
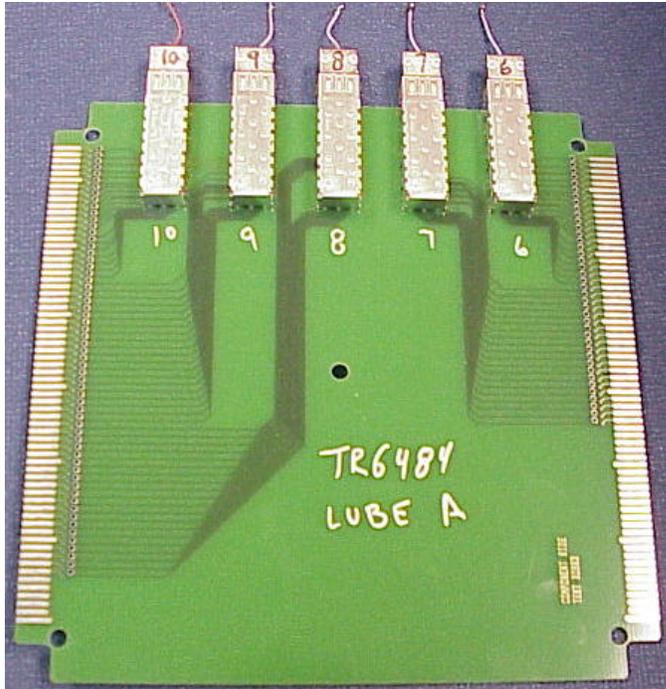
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## V. SAMPLE PREPARATION

The SFP connectors were soldered to the PC boards using the convection oven profile provided by Engineering. The lubricant was applied after the reflow process then dried in an oven for 1/2 hour at 80°C. After the samples were dried they were run through the reflow process again. The plugs were common bussed by Engineering in order for the LLCR measurements to be made. The plugs were ultrasonically cleaned in isopropyl alcohol before being mated to the SFP connectors. No lubricants were applied to the plugs. See photo below for setup.



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## VI. TEST PROCEDURES

### **CONTACT RESISTANCE**

Following sample preparation, low-level contact resistance measurements were made using a 4-Point Dry Circuit Method. The test current was equal to or less than 100 milliamps and the open circuit voltage did not exceed 20 millivolts. Initial measurements were made and used as a basis for the change in resistance analysis (Delta-R).

EQUIPMENT: Molex Contact Resistance Data Acquisition System Keithly Micro-ohmmeter Tag # 430

### **DURABILITY**

One durability cycle was done after each treatment. All of the durability cycling was done by hand.

EQUIPMENT: None

### **THERMAL AGING**

The test samples were placed in the air circulating oven. The exposure temperature was 105°Celsius and the exposure time was 150 hours. A total of 300 hours of thermal aging was completed. Upon completion of exposure, the samples were allowed to return to room ambient conditions prior to further measurements/tests.

EQUIPMENT: Thermotron Air Circulating Oven, Model 5.5, Tag # 528

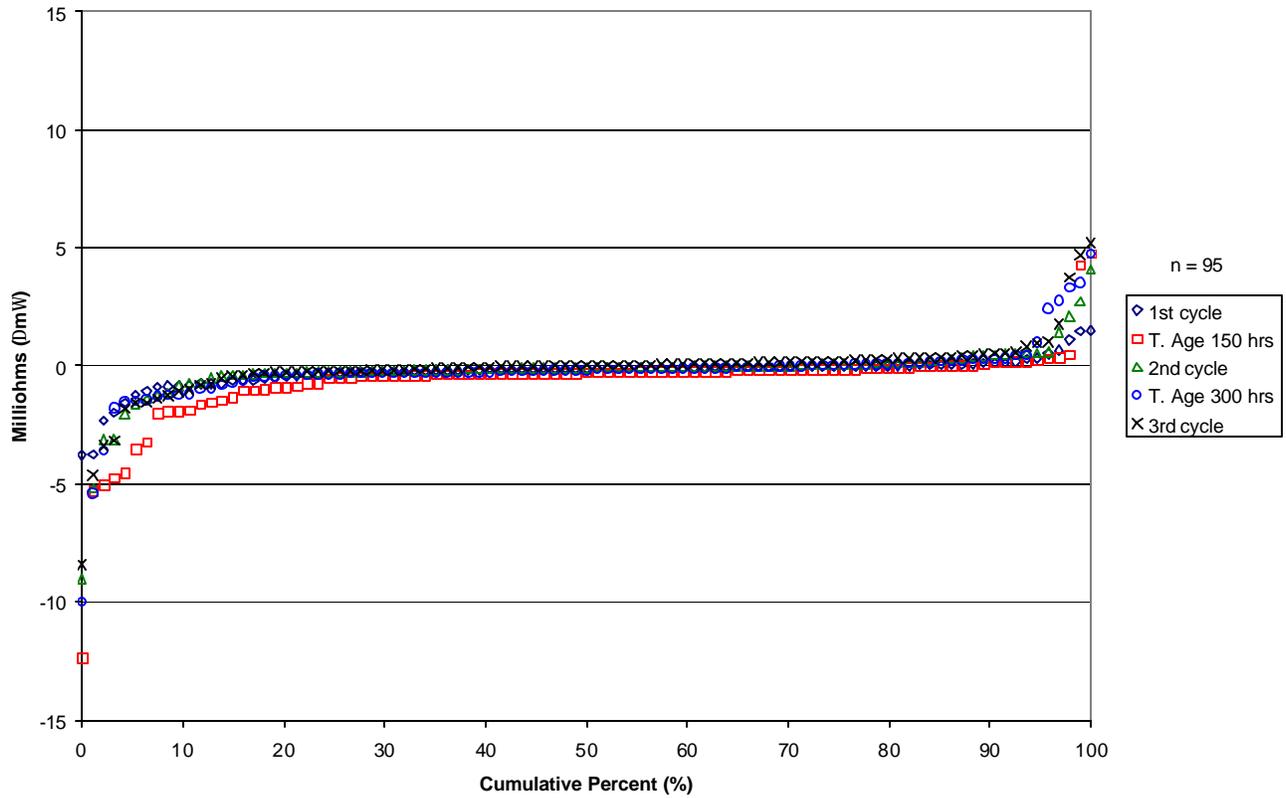
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## VII. DATA

SFP - No Lube Samples



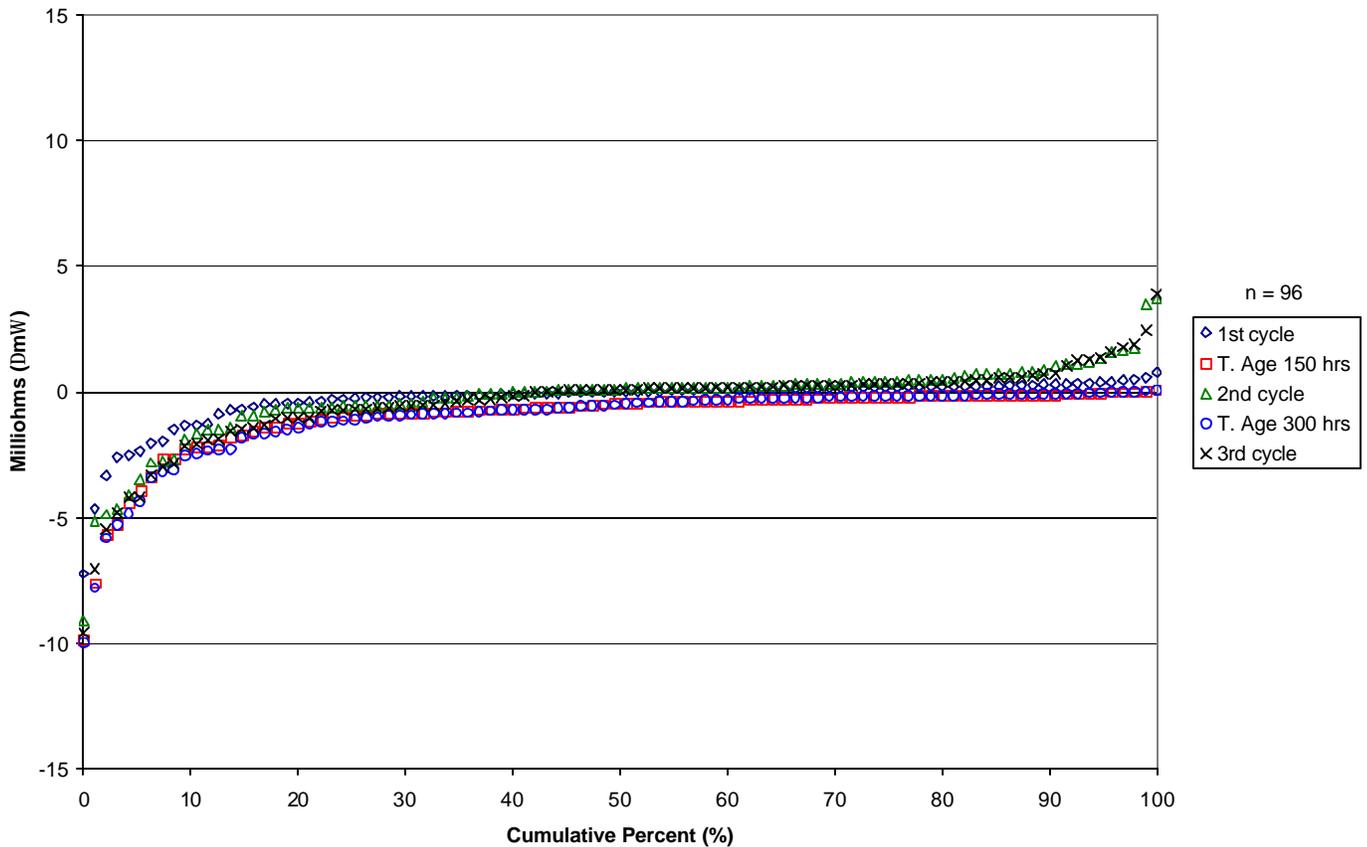
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## VII. DATA (continued)

SFP - Lube A Samples



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## VIII. SAMPLE DESCRIPTION DETAIL

1.           PART NO.: 74441-0031  
               DESCRIPTION: SFP circuit assembly  
                           SIZE: 20 circuit  
               U.L. RATING: V-0  
               PLATING SPECS.: 0.76µin hard Au over 2.54µin Ni in contact area  
                           COLOR: Black  
               TOOLING TYPE: Production
  
2.           PART NO.: 74441-0021  
               DESCRIPTION: SFP circuit assembly  
                           SIZE: 20 circuit  
               U.L. RATING: V-0  
               PLATING SPECS.: 0.76µin hard Au over 2.54µin Ni in contact area  
   Lubricated with EB-1  
                           COLOR: Black  
               TOOLING TYPE: Production

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