



Date:	05/27/05
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*Lucent Technologies
Reliability Physics Group
Whippany, NJ*

**Work Order: MT-WO-5191
Customer PO: CC**

NON-Component Related Testing

The following is a summary of solderability tests performed for John Franey, of the Reliability Physics Group, Bell Labs, Lucent Technologies out of Whippany, NJ.

We received 8 test samples to test and evaluate their ability to solder under industry type end user conditions. All samples were bare copper bus bar type hardware. 7 samples were 1.75"x0.5"x0.125" standard bus bars, the 8th sample was 0.150" thick 6" length of bus plate.

The objective of the tests was to compare the solderability of each bar based on a variety of different packaging and storing conditions that each was subjected to. Lucent Static Intercept packaging was the primary packaging used.

We used the standard IPC J-STD-002B Component Solderability Test Method A, Dip method. This is the industry standard for measuring the solderability of leaded devices. The following conditions and materials were used:

- Flux Type: ROL 1 type
- Solder Type: Sn60/PB40
- Flux Time: 7 sec
- Flux Dry Time: 20 sec
- Solder Dip Time: 5 sec

Below lists the bus bar samples and the associated test numbers:

Sample #	Item	Package Condition	Test Report Number
1	Bus Bar, small	Un-opened Static Intercept Bag	MT5C00583
2	Bus Bar, small	Un-opened Static Intercept Bag	MT5C00584
3	Bus Bar, small	Un-opened Static Intercept Bag	MT5C00585
4	Bus Bar, small	Un-opened Static Intercept Bag	MT5C00586
5	Bus Bar, small	Torn Static Intercept Bag	MT5C00587
6	Bus Bar, small	Opened Bag	MT5C00588
7	Bus Bar, small	Opened Bag	MT5C00589
8	Bus Plate, large	Clear plastic bag	MT5C00594

The Sample # was primarily assigned to help identify samples, as that number is marked on all the bus bars. The Test Report Number refers to the actual Solderability Test Report, which documents each test on each item.

Material/Samples Review

As Received Condition

Each item was reviewed and pictures taken to document the as received condition. Lighting varies and in some cases makes it hard to make true comparisons, but are shown for reference.

Samples 1 through 7 all had very similar appearances in oxidation levels. These were all reported to have been initially placed in the bags and sealed in 1988. Slight deviations seemed to occur from sample to sample, but in magnitude all had a similar level. Samples 1-4 were all in un-opened bags. Sample 5 was in a bag that had been torn at some point previous to our inspection. Samples 6 & 7 were in bags that were opened some 4 years previous, ~2001 time period. Sample 8 was the larger bus plate that was in a standard clear bag. Heavy oxidation was noted and observed on this sample.

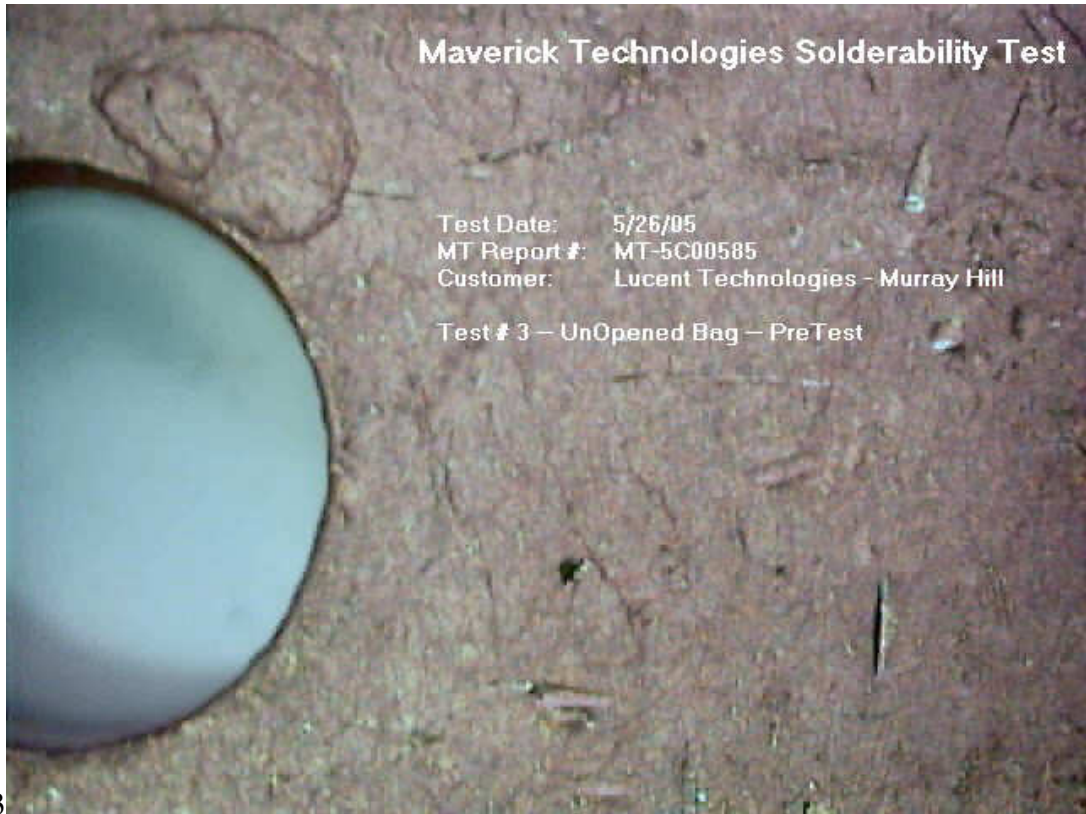
Sample 6 was etched with a light acid (acetic), to remove the any light oxidations that existed and would serve as the baseline control for comparing the levels of solderability. The following pics reflect those as received conditions, including Sample 6, after the etch process. Due to the size of each bus bar, only a portion of each was photographed, which correlates to the areas that were solder dipped. Due to the extreme large size of sample 8, we took a conventional photo of it for reference.



Sample 1



Sample 2



Sample 3



Sample 4



Sample 5



Sample 6



Sample 7

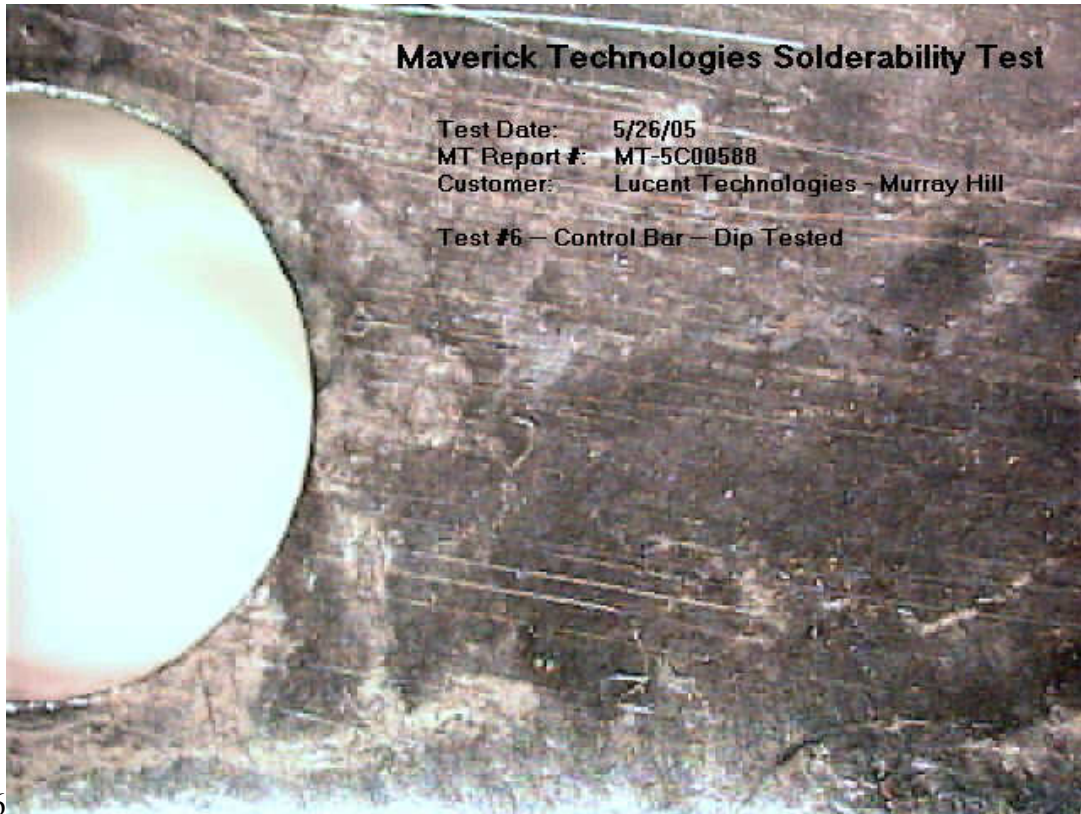
Sample 8



Material/Samples Review

After Solder Testing

Samples 1-7 were each tested in the same manner and same conditions. Sample 6, the control exhibited 100% wetting and coverage over the entire bar. No non-wetted areas were observed. The photo of that is below. Again, light levels do not properly show the complete 100% coverage, but excellent solderability was observed on this sample.



Sample 6

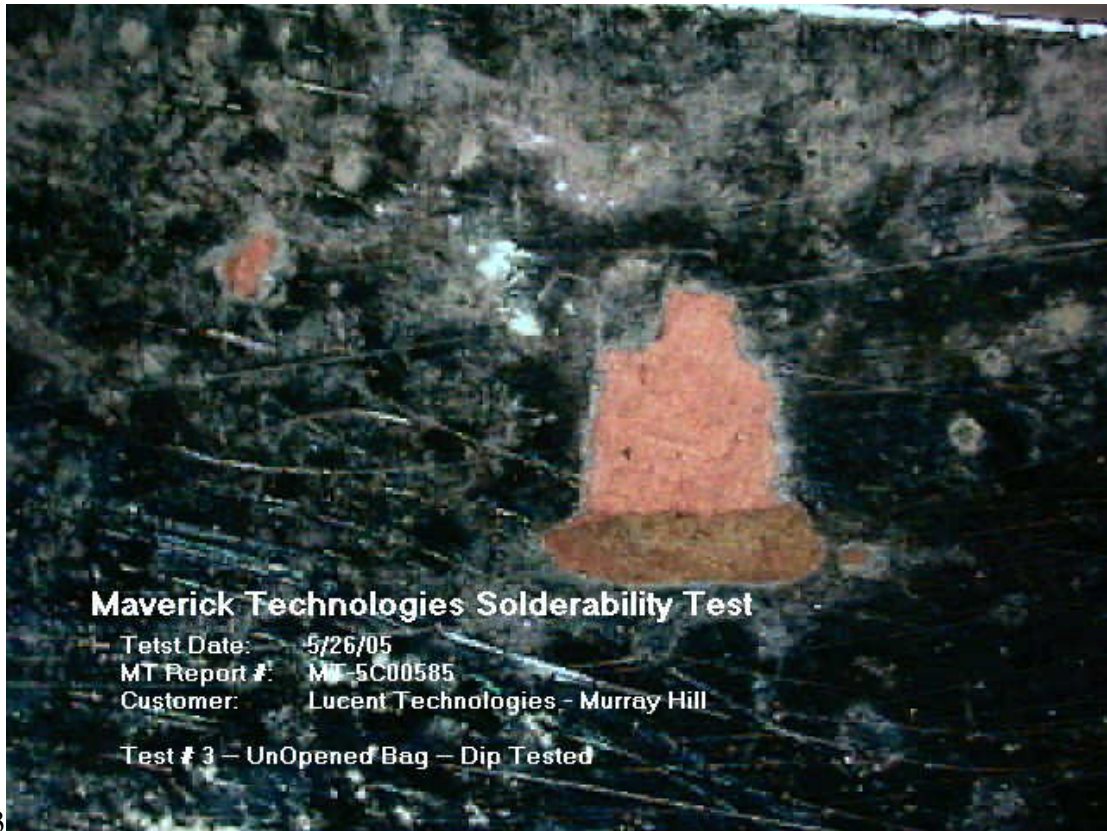
Samples 1-5 & 7 all exhibited the same level solderability, ~ 5% of surface area shown non-wetting conditions. Those pics are shown below.



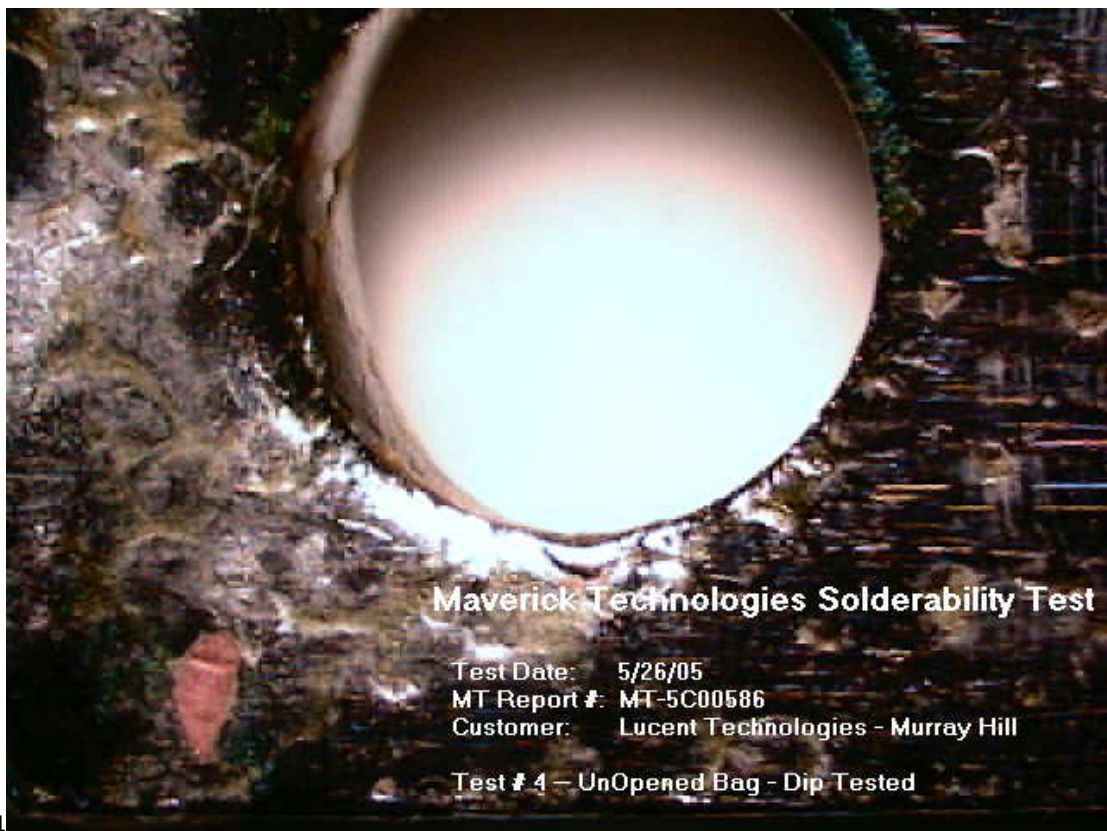
Sample 1



Sample 2



Sample 3



Sample 4

Maverick Technologies Solderability Test

Test Date: 5/26/05
MT Report: MT-5C00587
Customer: Lucent Technologies - Murray Hill

Test # 5 - Torn Bag - Dip Tested



Sample 5

Maverick Technologies Solderability Test

Test Date: 5/26/05
MT Report #: MT-5C00589
Customer: Lucent Technologies
Murray Hill

Test # 7 - Opened Bag - Dip Tested



Sample 7

Sample 8, was tested slightly different. As shown below, 3 areas were marked off.

Area A, is was solder tested as received. Almost 100% non-wetting condition. Non-solderable surface.

Area B, was the as received area, with no tests performed.

Area C, was acid etched prior to solder testing, similar to Sample 6. A slight improvement, but the heavy layer of oxidation was not fully removed with the light acid etching. Still a Non-solderable surface.

Sample 8



Conclusions & Summary

Based on the above tests, on the bus bars with a variety of packaging conditions the following conclusions are made:

- Samples 1-7 had ~ 95% solder coverage
- Sample 8 had ~0% solder coverage
- Sample 6 (control) had 100% solder coverage.

The bus bars that were packaged in the Static Intercept received packaging exhibited a slight surface solderability decay over the time since packaging. This is a 5-10% reduction in solderability as compared to a known good 100% solderable sample. The other open air/plastic bag packaged bus bar exhibited 100% non-wetting, and even with a light acid etching still exhibited poor solderability.

The samples (1-7) seem to have had a significant level of surface protection, against copper corrosion, over time, which correlates to the substantial improvement in solderability over a similar bar in a different packaging environment.

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