



QA Technology Company, Inc.

A p p l i c a t i o n s N o t e
Life Test Performance Comparison
039 mil 8R-S Razor Probe With & Without Riser Block

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Rev B

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Objective

Compare Life Test performance of the 039mil "8R-S" Razor probe design, using a **039-PRP168RX-S** probe installed into sockets mounted into a test block, both with and without a riser plate installed; when probing OSP copper via type boards or Test Vehicles (TVs), pasted with Alpha Metals lead-free, no-clean solder paste.

Test Vehicle's Used

- Pad size for TV tracks utilized - 30mil pads with 10mil hole diameter and paste apertures of +3mils and +9mils.
- Typical TVs used in testing were reflow processed in both Air and Nitrogen, using Alpha Metals OM338-PT pin-testable lead-free, no-clean solder paste applied to OSP copper vias.
- Extreme Case TVs used in testing were reflow processed in both Air and Nitrogen, using Alpha Metals OM338 lead-free, no-clean solder paste applied to OSP copper via's.

Simple Test Criteria

Pass: Contact resistance at or below 500 milliohms

Fail: Contact resistance above 500 milliohms

Summary of Test Result

In Life Testing **with a riser plate (Photo 1)** probe performance was significantly better than without a riser plate, in both the life testing and post-life performance testing with % failures below 1% (**Chart 1-Table 1**).

In Life Testing **without a riser plate (Photo 2)** for the first 6 of the 16 tests, the probes performed well; until test 2401, where the overall performance degraded, with a marked increase of contact failures (**Chart 1-Table 2**). Most failures were attributed to the tip simply missing the via target - hitting off center into the flux filled valley at the edge of the via. For many of the TVs used in the Life Testing, solder paste quality was very poor with an excessive number of vias looking like raised domes (**Photo 3**) of solder instead of vias. Some probes, after striking these raised domes would be permanently biased off center, causing the probe to miss subsequent targets. The problem was probably exacerbated by the fragile nature of the 039mil probe and socket assembly coupled with a 270mil set height needed for this particular vacuum test setup. Upon a random inspection of targets, wherever the probe actually hit a via having good quality solder paste (**Photo 4**), resistance was acceptable. Clearly, a riser plate is needed.

Via Probing Life Test Design

For Life Cycle testing, each probe was cycled 691 times per TV, collecting resistance measurements at each new via location. The same board was then fed through the test apparatus again, cycling each position 10 times before indexing to the next via, where a resistance measurement was taken, continuing until each probe cycled about 6,900 times per TV. A new TV was then inserted and using the same probes, the entire procedure was repeated until completing about 60,000 cycles per probe. After completing 60,000 cycles in the Life Test the probes were used again in a Post Life Performance Test for both board types. For Performance testing, each TV via was hit (cycled) one time per probe, taking a resistance measurement, then indexing to a new position and cycling again, taking a new resistance measurement each time. Each probe was cycled thru 100 individual via's to the 691 maximum allowed per TV. Due to via size restrictions inherent to the TVs, each test consisted of only 16 probes, using TV traces 17 thru 32 only.

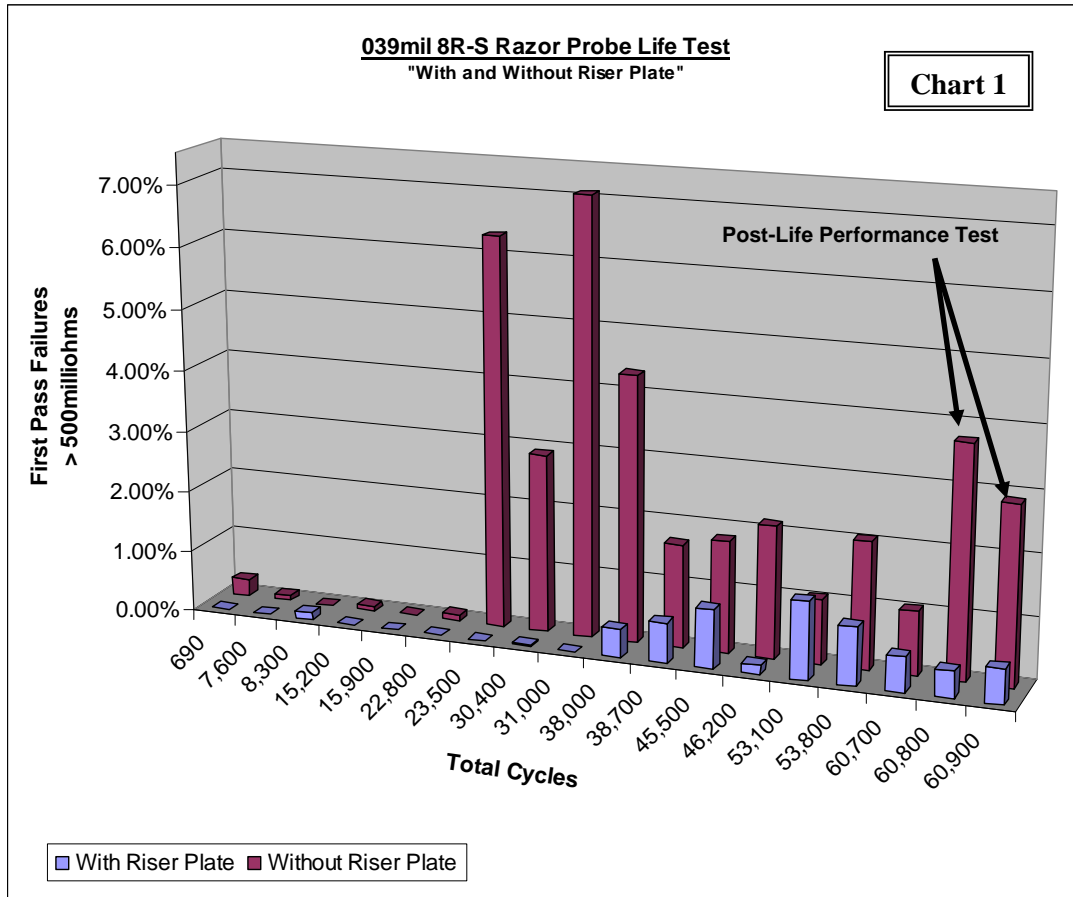


Table 1 - With Riser Plate

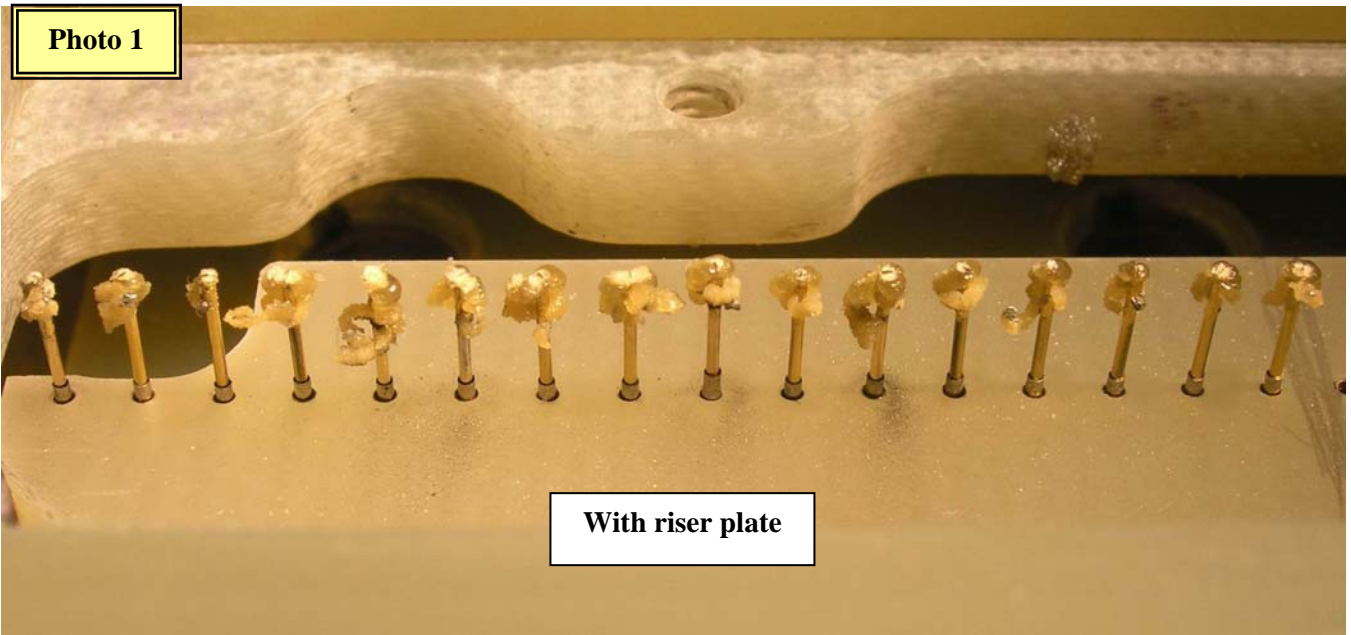
Life Test Data			
Test ID	Test Vehicle ID	Cycles	% Failures
2439	0E20Q20Q0169	691	0.000
2440	0E20Q20Q0169	6901	0.000
2441	0I20Q10S0191	691	0.118
2446	0I20Q10S0191	6901	0.000
2447	0F20Q20Q0177	691	0.000
2448	0F20Q20Q0177	6901	0.009
2449	0N20Q10S0244	691	0.000
2450	0N20Q10S0244	6901	0.027
2451	0C20Q20Q0152	691	0.000
2452	0C20Q20Q0152	6901	0.462
2453	0S20P20Q0277	691	0.651
2454	0S20P20Q0277	6866	0.959
2455	0D20Q20Q0166	691	0.154
2456	0D20Q20Q0166	6901	1.266
2457	0L20Q10S0235	691	0.950
2458	0L20Q10S0235	6883	0.570

Post-Life - Performance Test Data			
Test ID	Test Vehicle ID	Cycles	% Failures
2459	0110310B0021	100	0.438
2460	0210310B0042	100	0.563

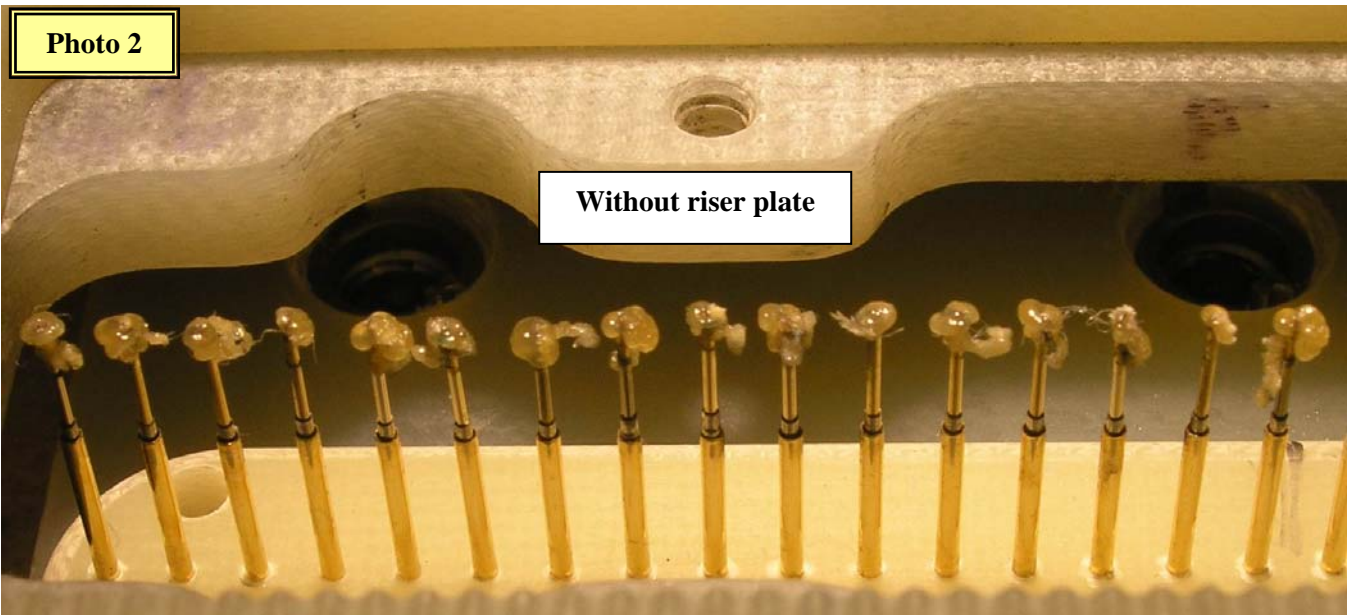
Table 2 - Without Riser Plate

Life Test Data			
Test ID	Test Vehicle ID	Cycles	% Failures
2393	0E20Q20Q0168	691	0.272
2394	0E20Q20Q0168	6901	0.081
2395	0I20Q10S0188	691	0.000
2396	0I20Q10S0188	6901	0.073
2399	0F20Q20Q0173	691	0.018
2400	0F20Q20Q0173	6901	0.100
2401	0N20Q10S0241	691	6.341
2402	0N20Q10S0241	6901	2.904
2403	0C20Q20Q0151	691	7.082
2404	0C20Q20Q0151	6901	4.333
2407	0K20Q10S0218	691	1.683
2408	0K20Q10S0218	6866	1.824
2409	0D20Q20Q0157	691	2.144
2411	0D20Q20Q0157	6901	1.049
2412	0L20Q10S0232	691	2.063
2413	0L20Q10S0232	6901	1.041

Post-Life - Performance Test Data			
Test ID	Test Vehicle ID	Cycles	% Failures
2414	0110310B0021	100	3.750
2416	0210310B0042	100	2.893



039-PRP168RX-S probes, Post Life Test, after 60,000 plus cycles



039-PRP168RX-S probes, Post Life Test, after 60,000 plus cycles

