



QA Technology Company, Inc.

A p p l i c a t i o n s N o t e

100mil 81 Razor Tip Performance Qualification Study

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Objectives

1. To qualify the performance of QA Technology's 100mil 81 Razor tip probe design, fabricated using standard in-house tip cutting and manufacturing processes applied to Via type boards or "Test Vehicles" (TVs), pasted with Alpha OM338 and Alpha OM338-PT (Pin-Testable) Lead-free, No-Clean solder paste.
2. Perform life tests using boards with paste apertures of pad +3mils.
3. Determine difference between various Contract Manufacturers (CMs) processed Test Vehicles (TVs).
4. Determine difference between TVs reflowed in both Air and N2 (Nitrogen).
5. Determine difference between Double-sided, Double-reflow (DSDR) and Double-sided, Single-reflow (DSSR) processed TVs.
6. Compare the performance of QA Technology's 100mil 81 Razor probes to conventional 100mil tip styles on Via TVs.

Test Vehicle's Used

"Typical" Test Vehicles (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.

"Extreme case" Test Vehicles (TVs) used in testing were reflow processed in both Air and Nitrogen, using Alpha Metals OM338 Lead-free, No-Clean solder paste.

For more specific board design details, see page 7, Table 1.

For more specific board processing details, see page 8, Table 2.

Simple Test Criteria

Pass = Contact resistance \leq 500 milliohms

Fail = Contact resistance $>$ 500 milliohms

Test Result Summary

In Performance Testing "typical" TVs fabricated with Alpha OM338-PT Pin-Testable solder paste, the 100mil 81 Razor probe consistently and significantly outperformed conventional tip styles with a failure rate well under 0.5% with many at 0%. Conventional probes ranged from 4% to 45%.

Even when testing "difficult to probe" TVs fabricated with Alpha OM338 solder paste, the 100mil 81 Razor probes significantly outperformed conventional tip styles with a 1.5% to 8% failure rate. Conventional probes ranged from 22% to 70% failure rate.

In Life Cycle Testing, using "typical" TVs fabricated with Alpha OM338-PT Pin-Testable solder paste, the 100mil 81 Razor probe maintained a failure rate well under 0.5% with many at 0% after 54,000 hits.

General observations during testing indicated excellent performance of the 100mil 81 Razor probe not only when hitting a typical appropriately pasted and reflowed via on center, but when the 81 Razor probe hit off center on the solder pasted pad area, resistance was still many times at 0% failure rate.



Test Description

All testing was performed using QA Technology's designed and built vacuum test system, which included PCB indexing ability coupled with a resistance test measurement electrical interface.

For Performance Testing, each TV via was cycled one time only per probe, then indexed to a new position and cycled again taking a new resistance measurement each time. Each probe was cycled through 100 individual vias up to the 691 maximum vias per TV.

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, resulting in each probe cycling 6910 times per TV. Then a new TV was inserted using the same probes, the entire procedure was repeated until completing approximately 54,000 cycles per probe.

Probes Tested

All probes were 100 mil, 0.250" stroke, nickel silver tube with precious metal clad ID (QA Technology's 100-PRP probe tube). Specific part numbers included in the tests:

- 100-PRP2544Y-S, Steel 4 point headless crown, 8.1oz spring
- 100-PRP2561H-S, Steel 90° blade, 6.5oz spring
- 100-PRP2561Y-S, Steel 90° blade, 8.1oz spring
- 100-PRP2581H-S, Steel 150° razor, 6.5oz spring
- 100-PRP2581Y-S, Steel 150° blade, 8.1oz spring
- 100-PRP2584Y-S, Steel 4 point headless reduced crown, 8.1oz spring

Test Result Summary Charts

The following charts demonstrate the superior performance of the 100mil 81 Razor probe over conventional 100mil probes.

Note: In all charts, the TV used is followed by the QA Technology probe part number tested and is identified in the "X" axis as "Test Vehicle Build ID #/Probe Part Number".



Chart 1

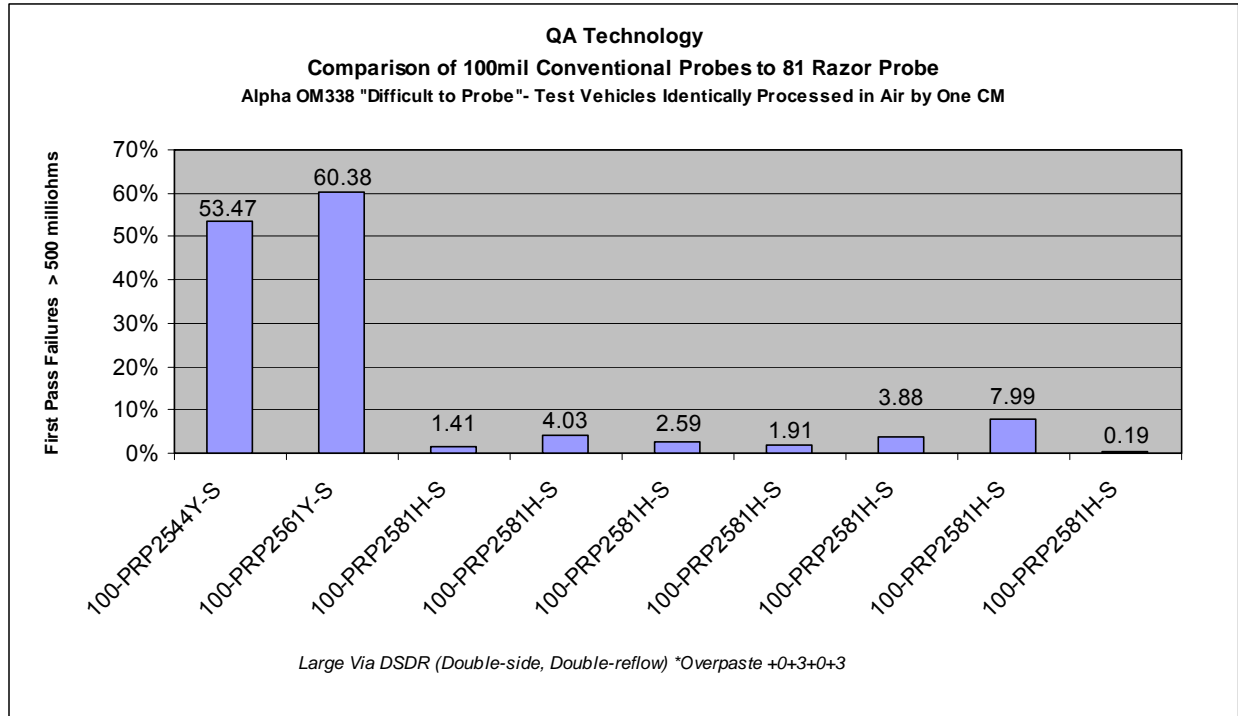


Chart 2

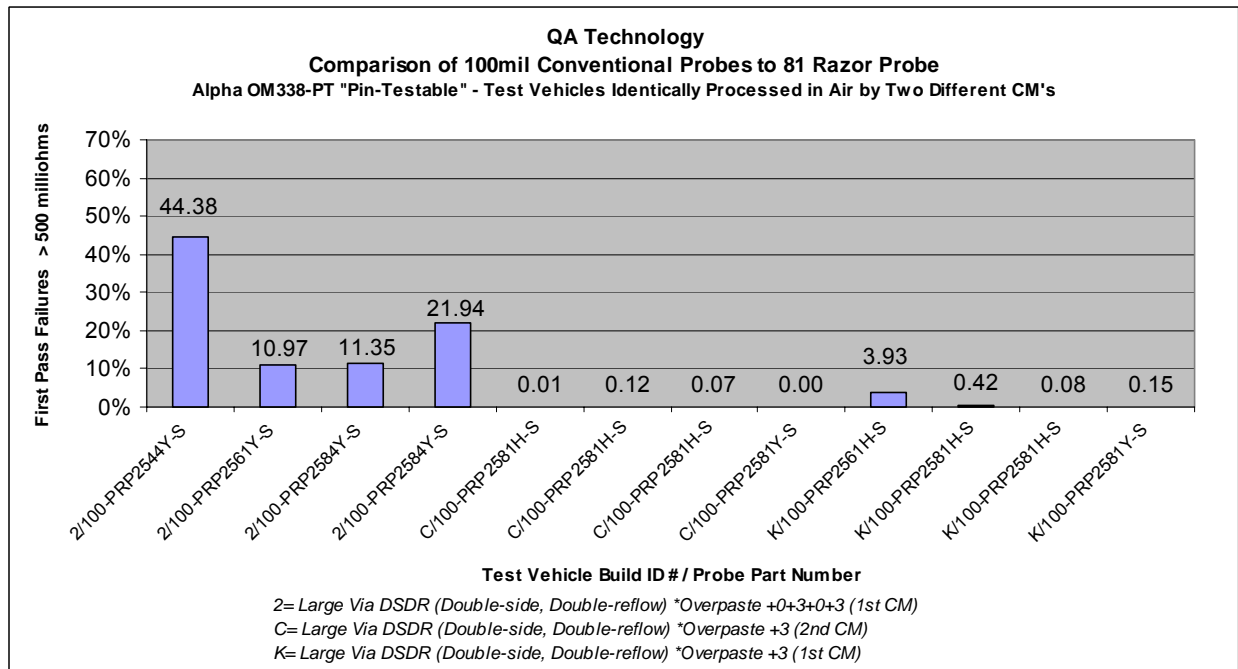




Chart 3

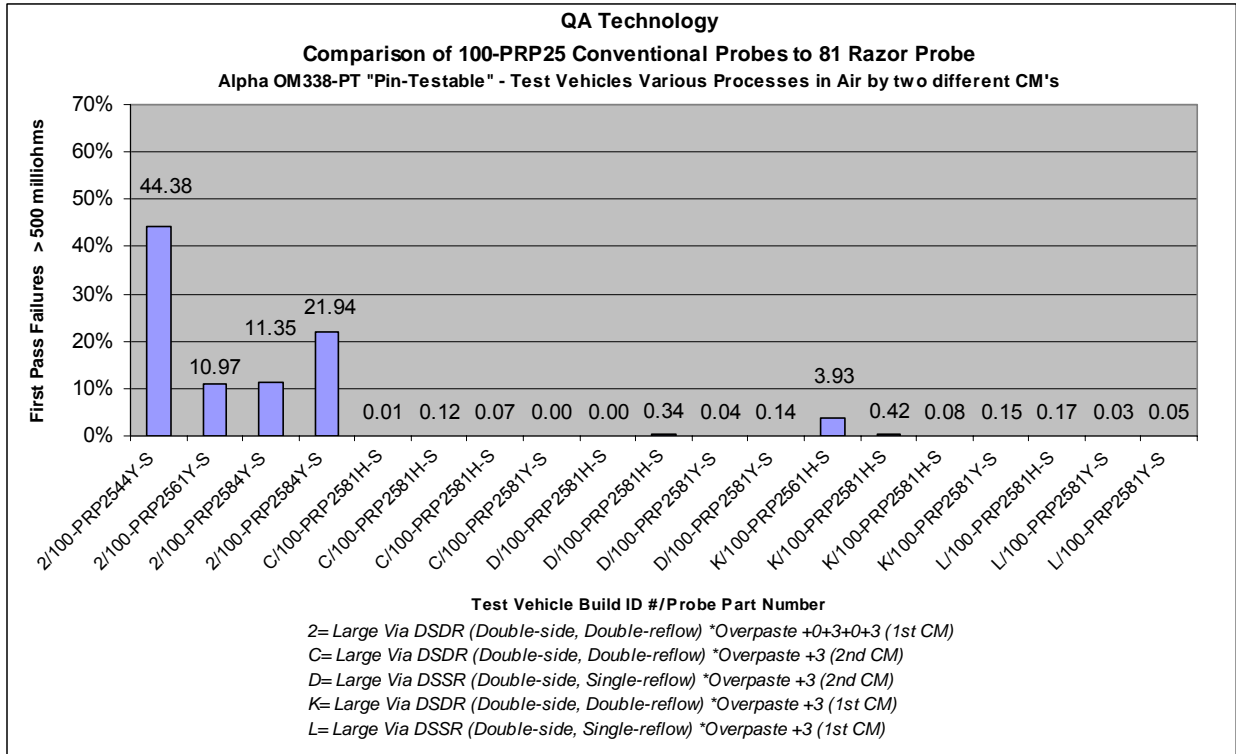


Chart 4

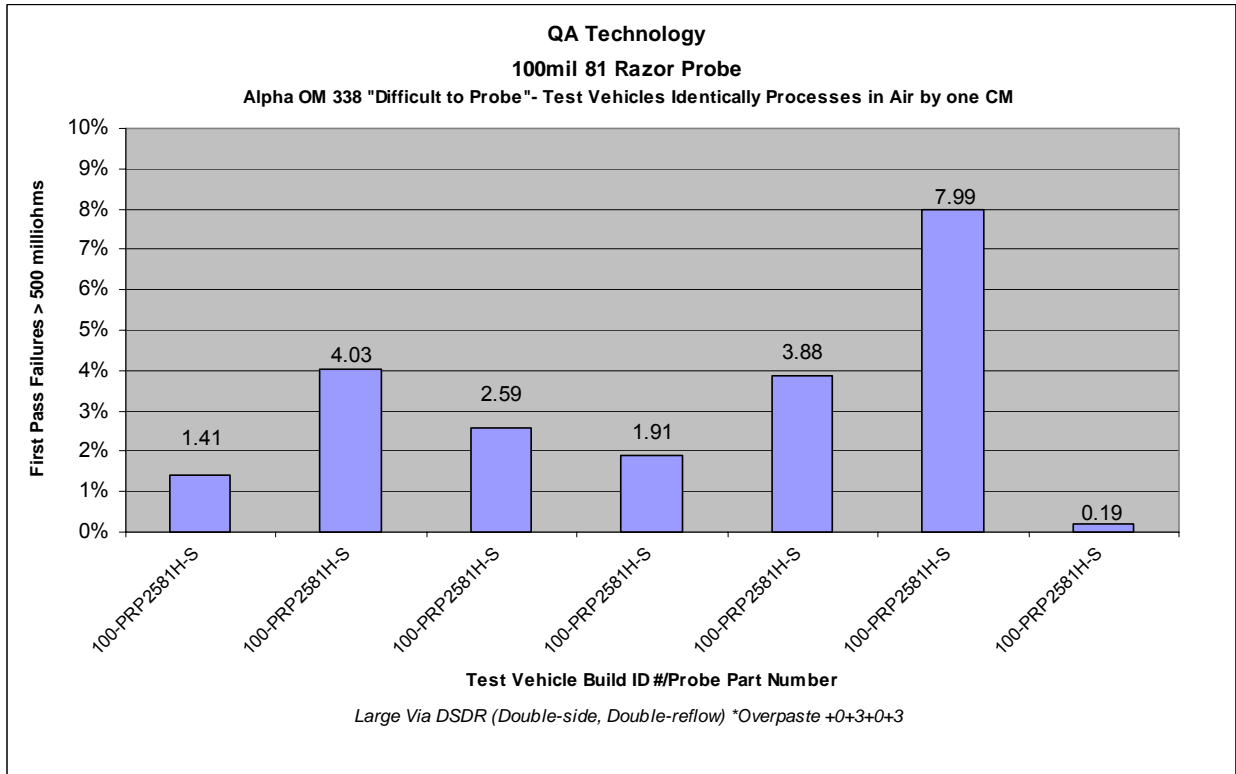




Chart 5

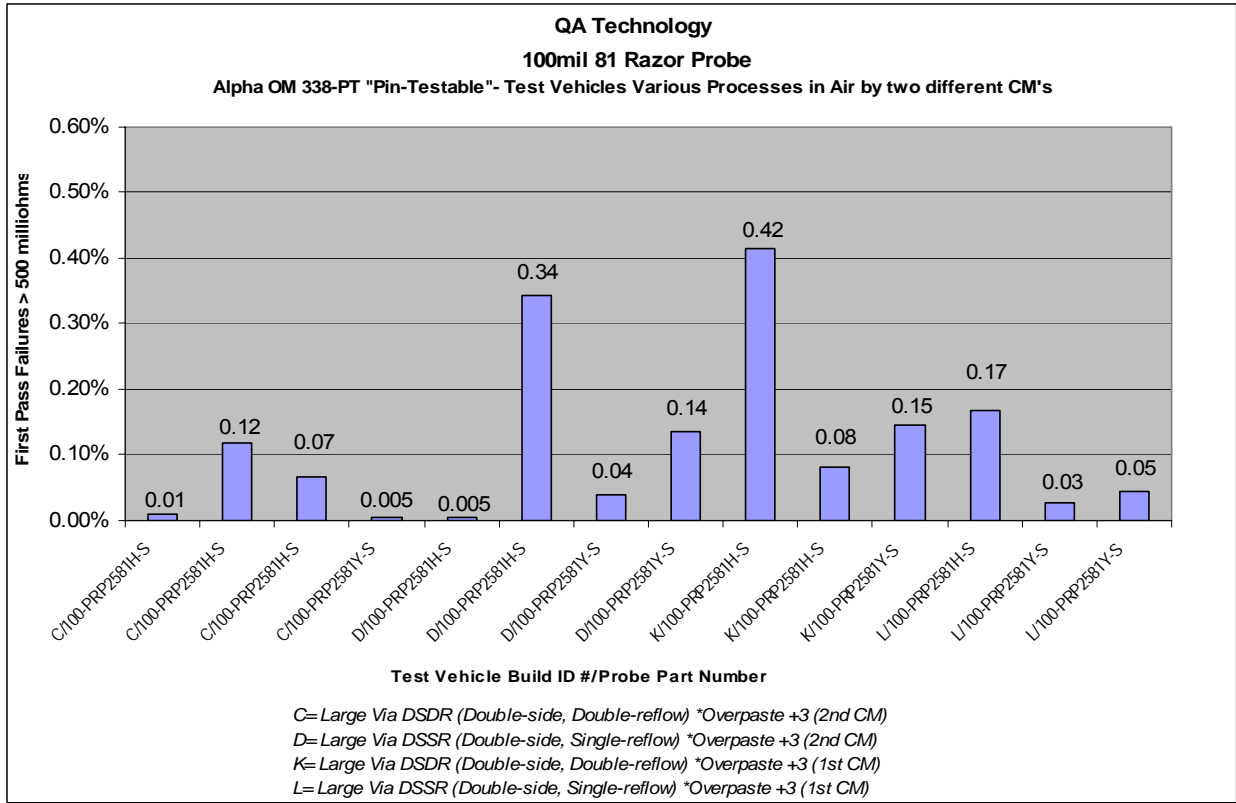


Chart 6

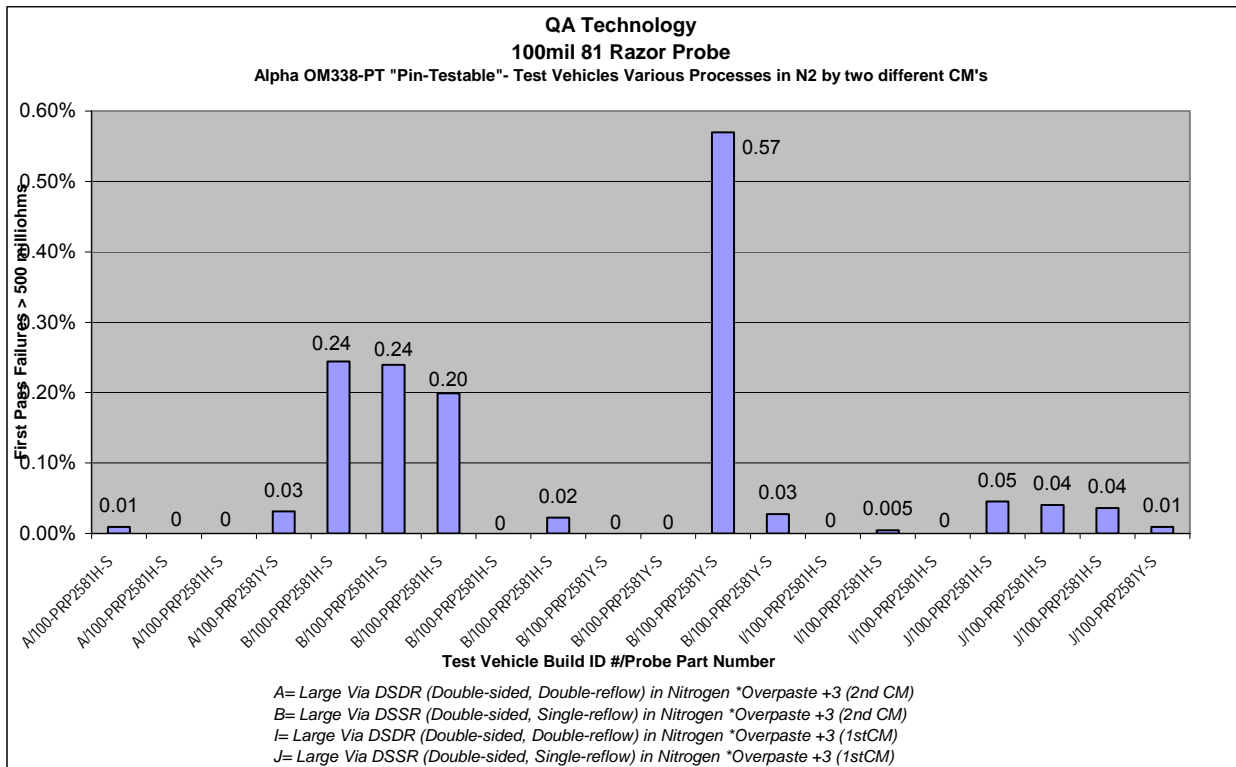


Table 1



Specific Test Vehicle Design Details

Board Dimensions:	4.995" x 22.0" x 0.062"
Board target area:	3.25" x 18.75"
Total number of channels:	32
Target rows per channel:	2
PCB layers:	2
Paste aperture:	Pad +3 mils; 44 mils
Number of targets per channel:	691
Number of targets per board:	22112
Via size for channels 1 thru 16:	30mil pad - 10mil hole diameter
Via size for channels 17 thru 32:	35mil pad - 12mil hole diameter
Paste aperture for channels 1 thru 16:	33mils
Paste aperture for channels 17 thru 32:	38mils
Quantity of via's for each size/aperture:	11056

Table 2

Specific Test Vehicle Processing Details

TV Build_ID	CM*	Type	Paste**	Overpaste	Process***
1	S	Large Via	Alpha OM338	+0+3+0+3	DSDR
2			Alpha OM338-PT	+0+3+0+3	DSDR
A	J		Alpha OM338-PT	+3	DSDR-N2
B			Alpha OM338-PT	+3	DSSR-N2
C			Alpha OM338-PT	+3	DSDR
D			Alpha OM338-PT	+3	DSSR
I			S	Alpha OM338-PT	+3
J	Alpha OM338-PT			+3	DSSR-N2
K	Alpha OM338-PT			+3	DSDR
L	Alpha OM338-PT			+3	DSSR

CM* - Contract Manufacturer ID

Paste** - Cookson Electronics assembly materials, Alpha Line, Lead Free – No-Clean Solder Paste

Process***		
DSDR	Double-sided Double-reflow	Paste bottom; reflow in air bottom face up; reflow bottom face down
DSSR	Double-sided Single-reflow	Paste bottom; reflow once in air bottom face down
DSDR-N2	DSDR in Nitrogen	Paste bottom; reflow in Nitrogen bottom face up; reflow bottom face down
DSSR-N2	Double-sided Single-reflow	Paste bottom; reflow once in Nitrogen bottom face down

Notes:

1. All boards were manufactured with OSP finish.
2. All paste stencils were 6 mils thick.
3. Overpaste +0+3+0+3 indicates tracks 1-8=+0, 9-16=+3, 17-24=+0, 25-32=+3mils
4. Overpaste +14+9 indicates tracks 1-16=+14, 17-32=+9mils
5. All boards were processed using Alpha RF-800 flux.