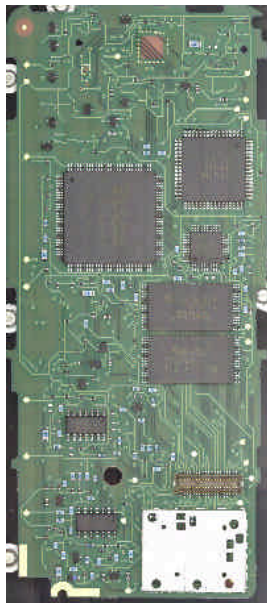




Loaded Board Assembly with 0201 placements



Inspection Capability Analysis of the Testronics Model 505 AOI System



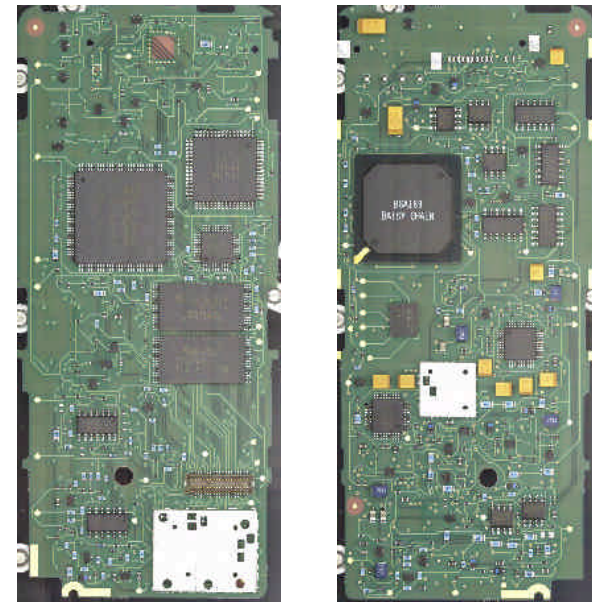


Testronics
a tester company with vision

6 assemblies were presented to Testronics for 0201 & fine pitch evaluation. One reference assembly (golden board) + 5 assemblies with known defects. Top and bottom were to be evaluated.

Evaluation points:

- Detection of faults
- Programming time
- False call rate (operator review)
- System cost





Inspection Results - Top

Serial Number

Faults

# 1_Top	R508 missing Part present in no load location U705 position / shift
# 2_Top	R337 position / shift R338 missing
# 3_Top	U705 reversed R294 tombstone
# 4_Top	C443 reversed
# 5_Top	R669 damaged R723 tombstone R328 missing R330 missing





Inspection Results - Bottom

Serial Number

Faults

1_Bottom

R604 missing
R389 missing
Part present in no load location

2_Bottom

R270 missing
U707 bridge pin 38 & 39 (also caused leads to fail)
U707 bridge pin 16 & 17 (also caused leads to fail)

3_Bottom

No errors

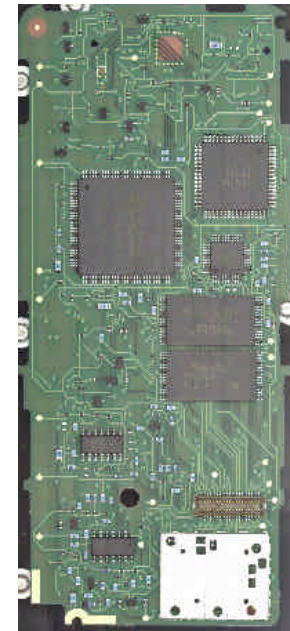
4_Bottom

CR460 reversed
U500 shifted (caused most leads to fail)
U701 skewed (caused most leads to fail)

5_Bottom

CR460 reversed
R389 missing
Part present in no load location
U500 shifted (caused most leads to fail)
U701 skewed (caused most leads to fail)
U701 bridge pin 113 & 114
U701 bridge pin 116 & 117

Note: Reference board had R646 skewed off pad





Inspection Results - Images

Operator Review -

Zoom:
 All
 9 Frames
 4 Frames
 1 Frame
EyeGlass

View:
 Cur Ref Flash

r376 - 1 (Pass)
r508 - 1 (Fail)
u705_position_a - 1
u705_position_b - 1

2 of 4

NetDes: r508 Pin: 1 Reason: Missing Part Frame: 257

ce_r0805

Print Current Exit/Report

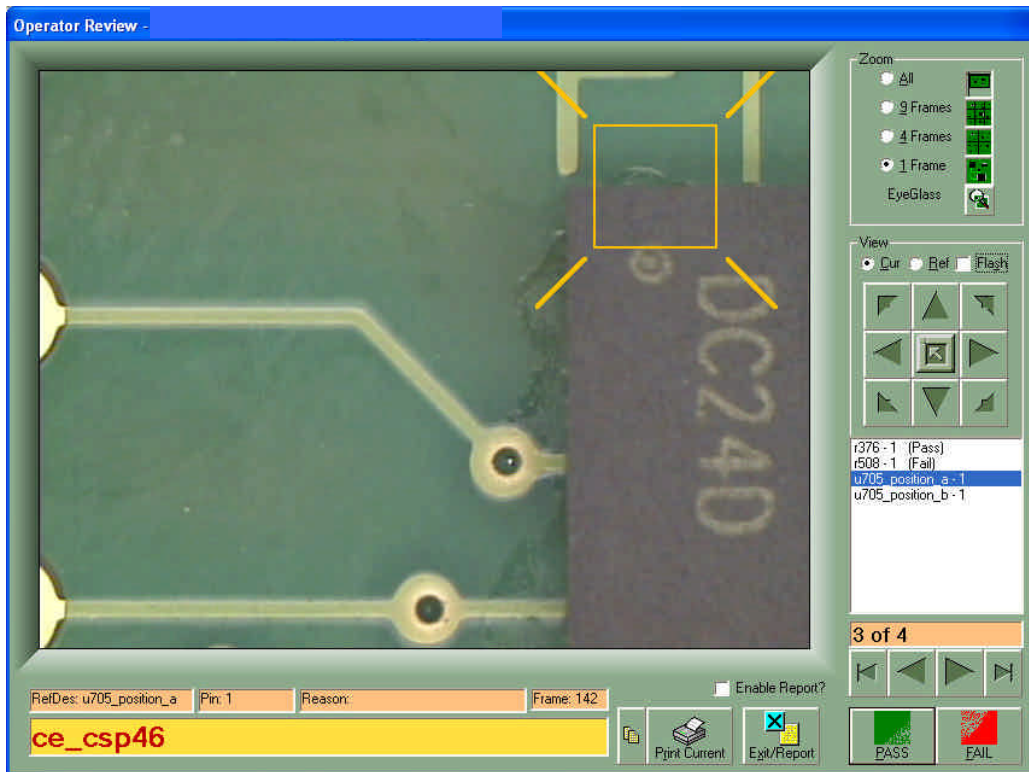
PASS FAIL

S/N# 1_Top:

R508 missing (0805)



Inspection Results - Images

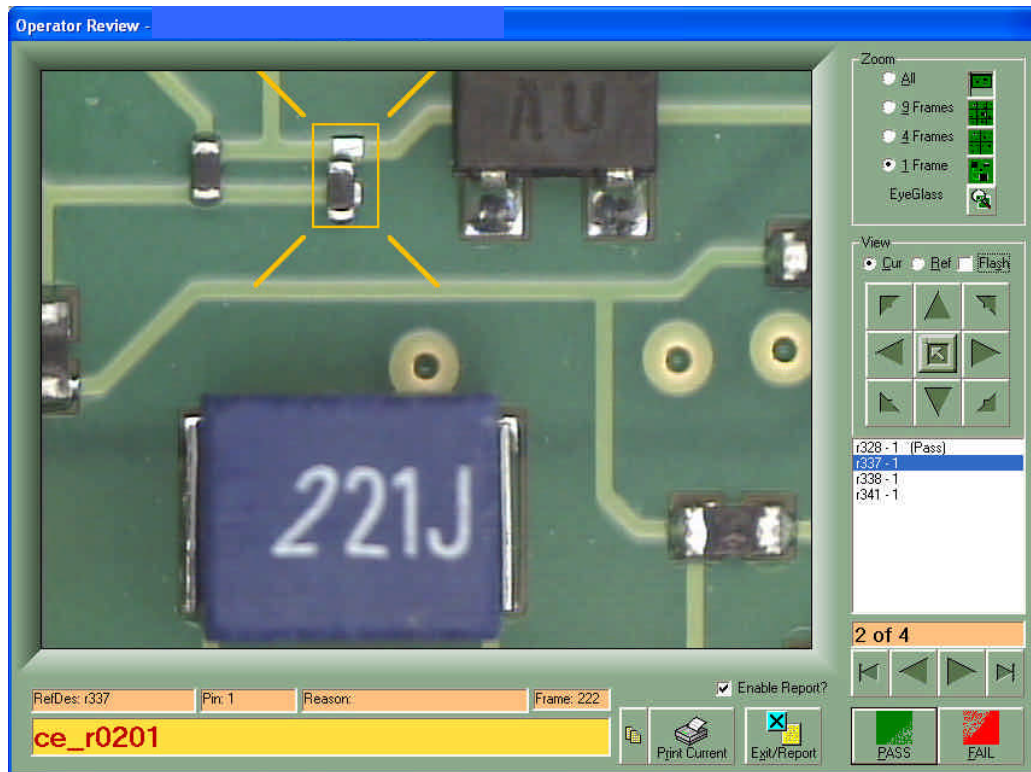


S/N# 1_Top:

U705 position / shift (BGA)



Inspection Results - Images

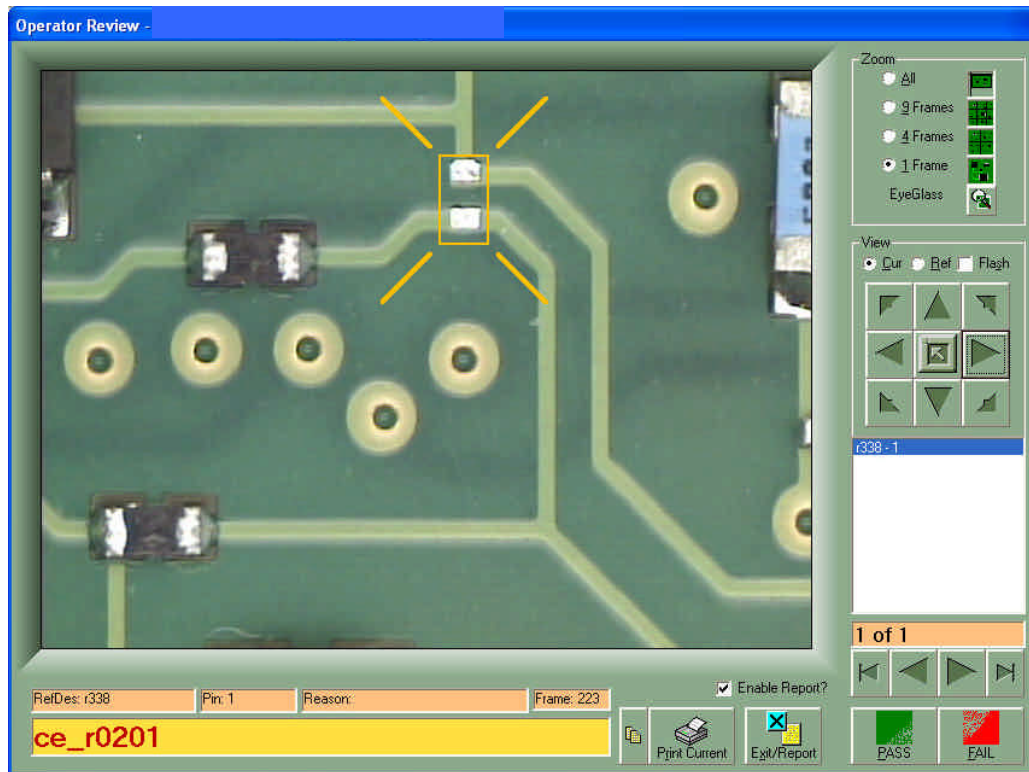


S/N# 2_Top:

R337 position / shift (0201)



Inspection Results - Images

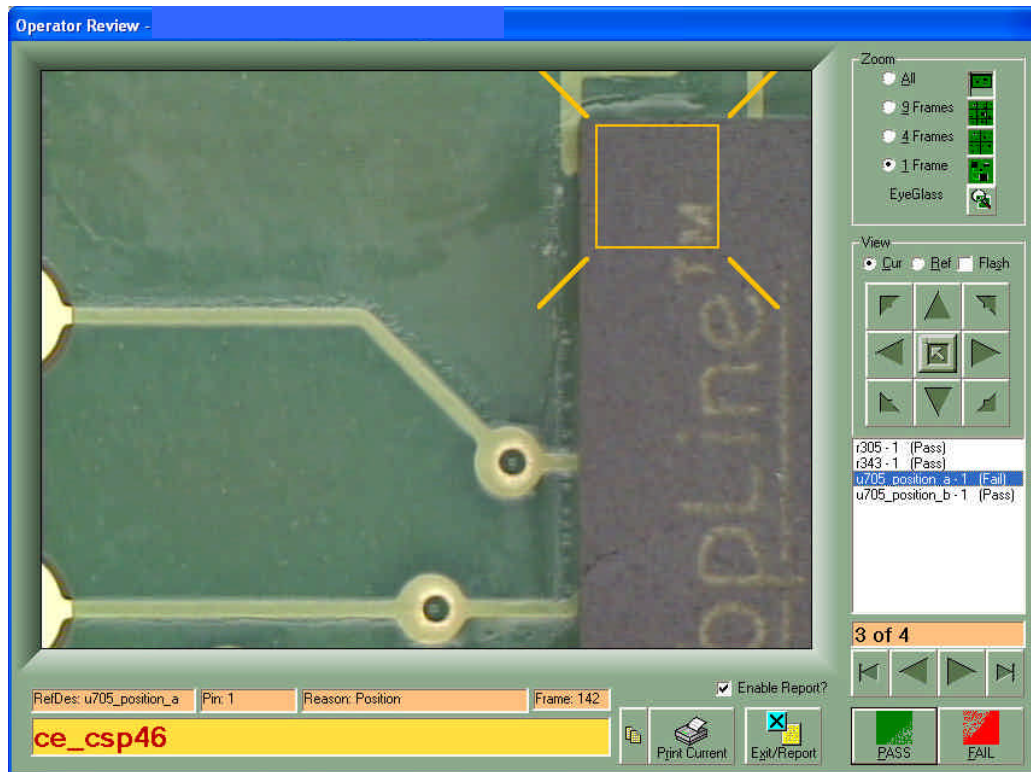


S/N# 2_Top:

R338 missing (0201)



Inspection Results - Images

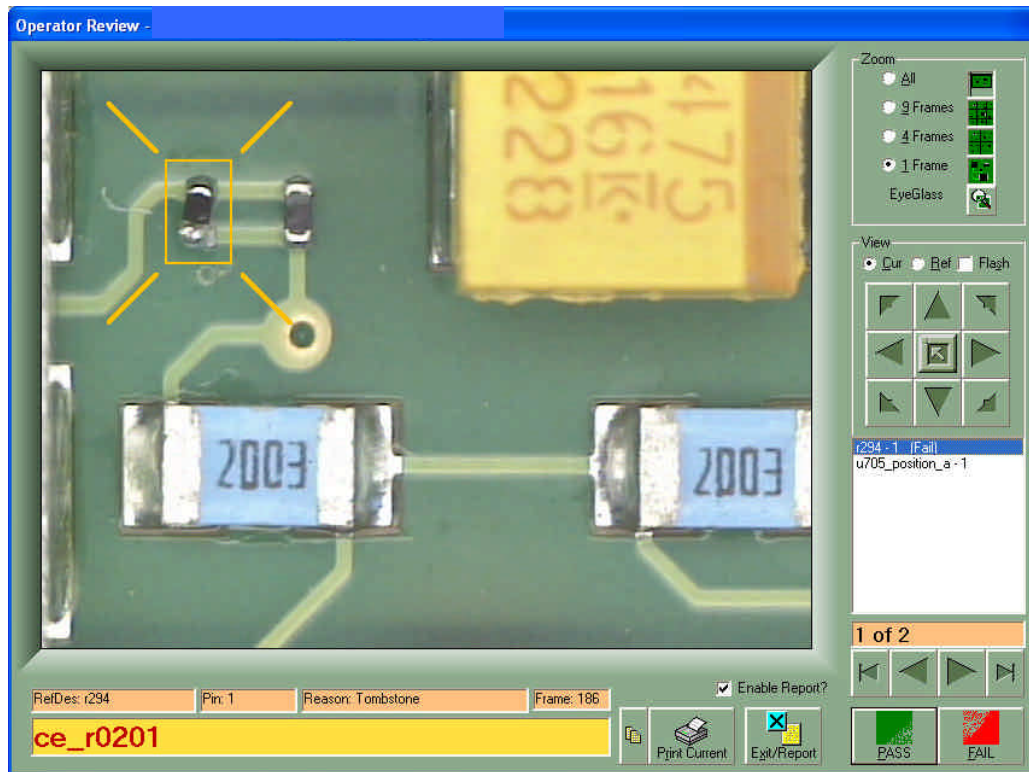


S/N# 3_Top:

U705 reversed (BGA)



Inspection Results - Images



S/N# 3_Top:

R294 tombstone (0201)



Inspection Results - Images

Operator Review -

Zoom
 All
 9 Frames
 4 Frames
 1 Frame
EyeGlass

View
 Cur Ref Flash

c443 - 1 (Fail)
r358 - 1 (Pass)

1 of 2

NetDes: c443 Pin: 1 Reason: Position Frame: 173

ce_ctantb

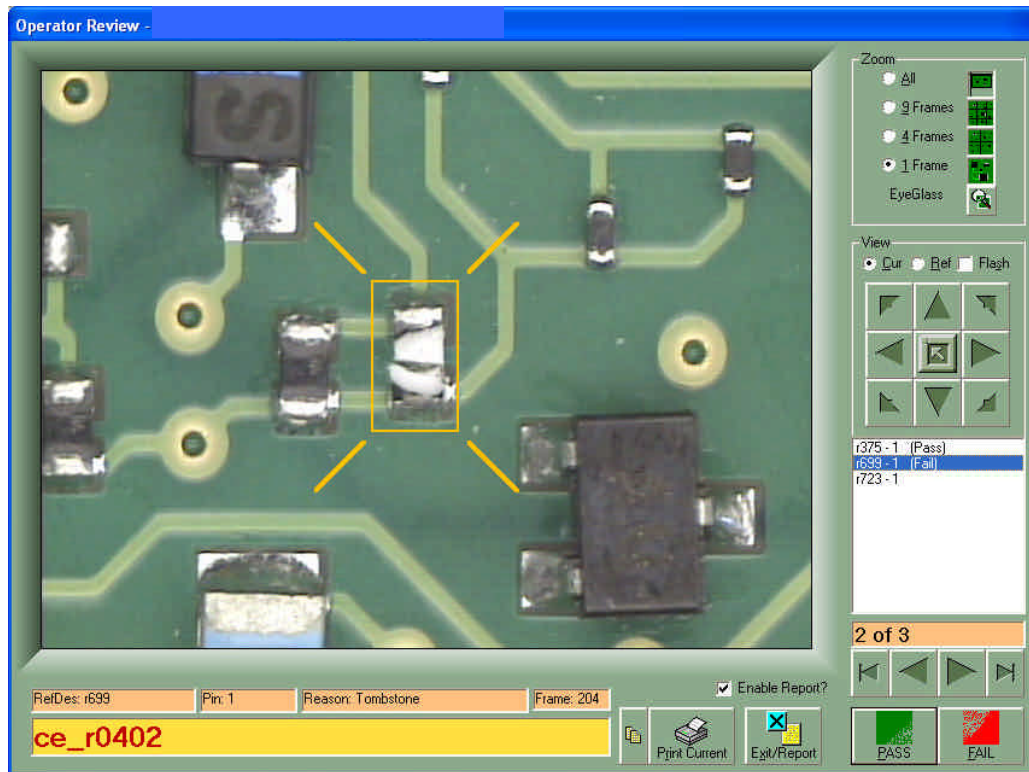
Print Current Exit/Report

PASS FAIL

S/N# 4_Top:
C443 reversed



Inspection Results - Images

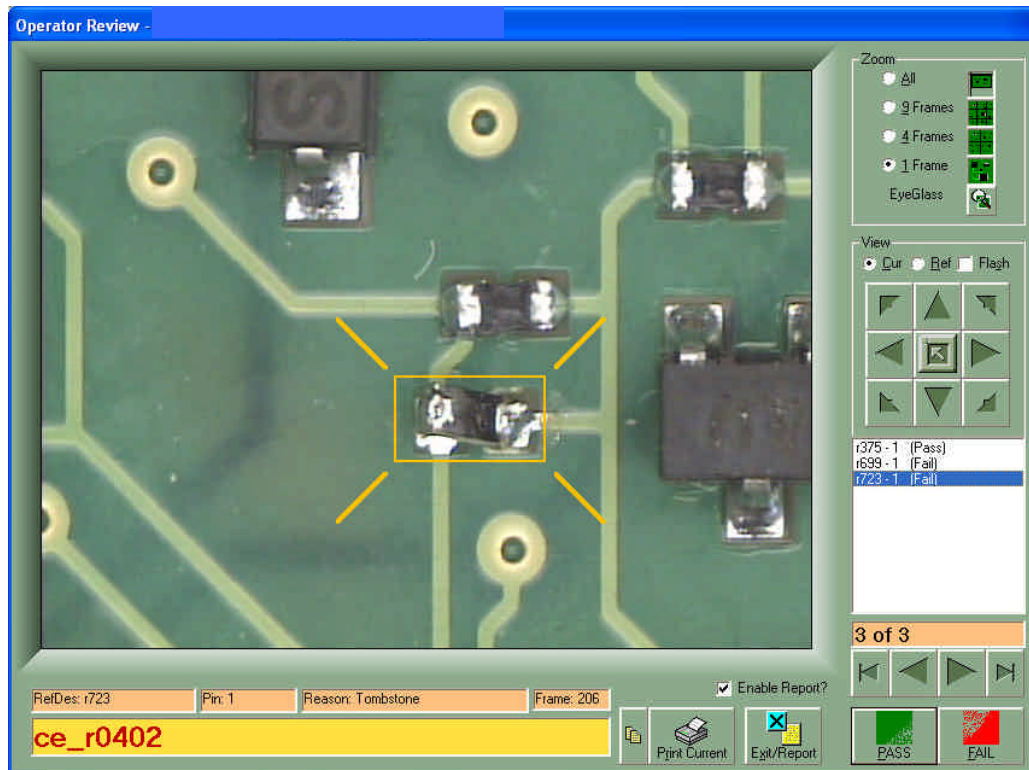


S/N# 5_Top:

R669 damaged (0402)



Inspection Results - Images

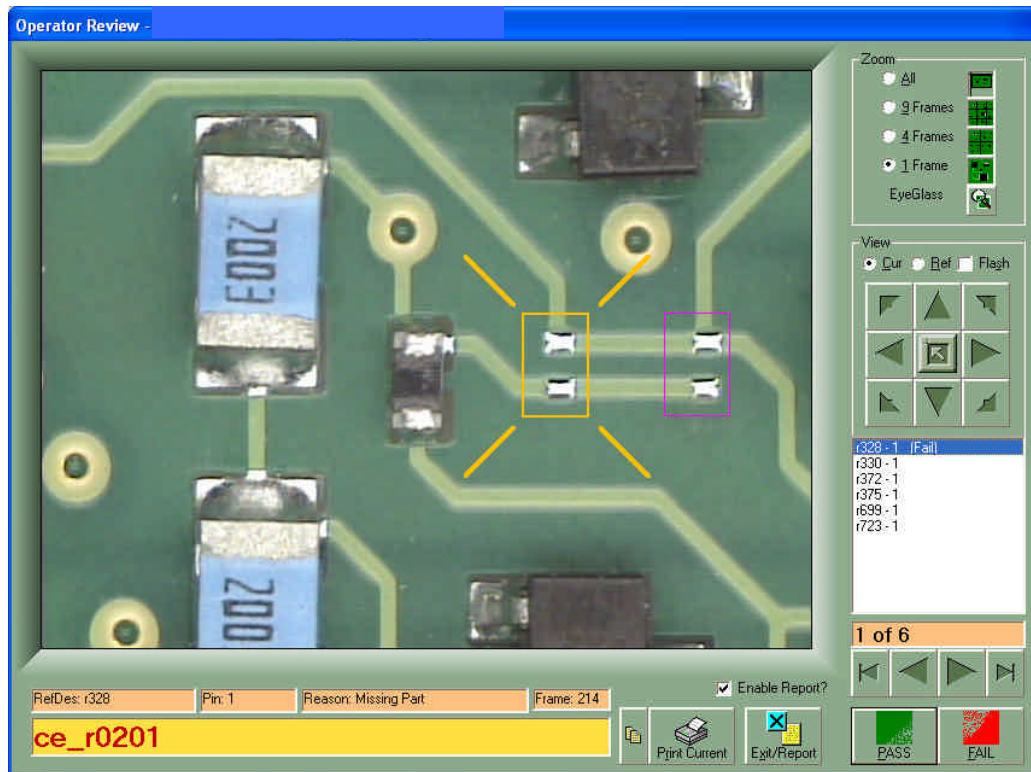


S/N# 5_Top:

R723 tombstone (0402)



Inspection Results - Images

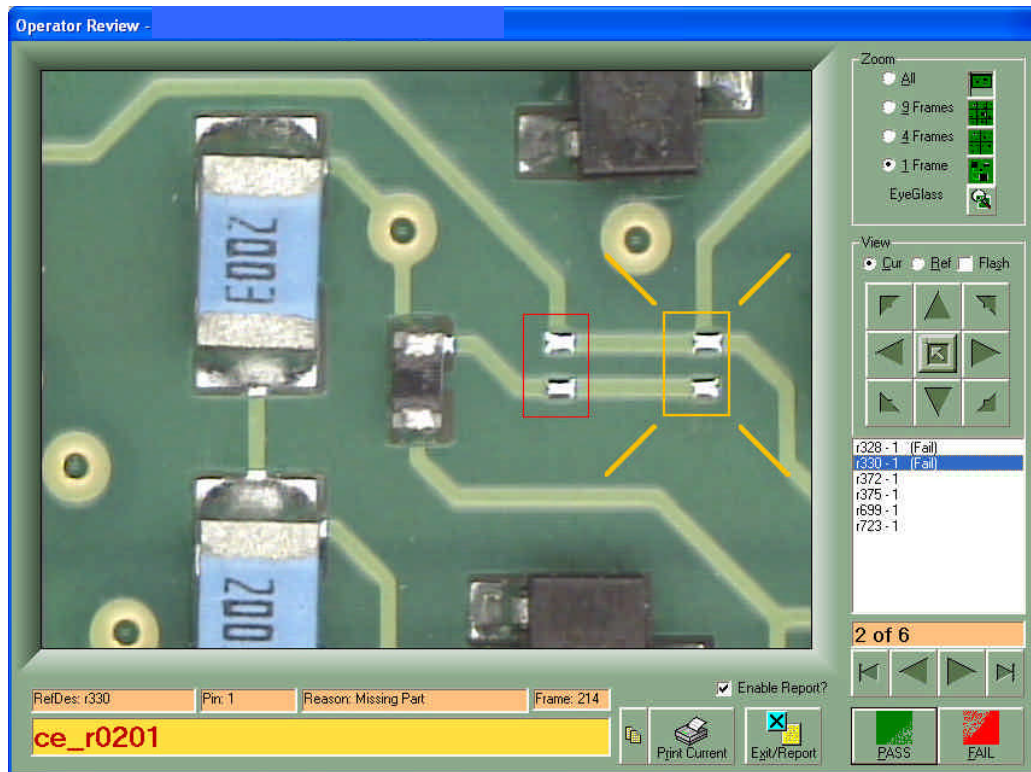


S/N# 5_Top:

R328 missing (0201)



Inspection Results - Images



S/N# 5_Top:

R330 missing (0201)



Inspection Results - Images

The screenshot shows the 'Operator Review' window. The main image displays a green PCB with a component labeled '104'. A yellow box highlights a defect on the component, with four yellow arrows pointing to its edges. The interface includes a 'Zoom' section with 'All', '9 Frames', '4 Frames', and '1 Frame' options, and an 'EyeGlass' icon. A 'View' section has 'Cur', 'Ref', and 'Flash' options. A list of test results is shown on the right, with 'r646 - 1' selected. The status bar at the bottom indicates '7 of 159' items, 'Print Current', 'Exit/Report', and 'PASS/FAIL' buttons. A yellow banner at the bottom left displays 'ce_r0402'.

Item	Status
ci460 - 1	(Fail)
no_load_b-7 - 1	(Fail)
no_load_b-8 - 1	(Fail)
r209 - 1	(Pass)
r316 - 1	(Pass)
r389 - 1	(Fail)
r646 - 1	(Fail)
u500_bridge-- 16	
u500_bridge-- 17	
u500_bridge-- 18	
u500_bridge-- 19	

S/N# Reference_Bottom:
R646 Skewed (0402)



Inspection Results - Images

Operator Review -

Zoom

- All
- 9 Frames
- 4 Frames
- 1 Frame
- EyeGlass

View

- Cur
- Ref
- Flash

no_load_b-7 - 1 (Fail)
no_load_b-8 - 1 (Fail)
r389 - 1 (Fail)
r604 - 1 (Fail)
r646 - 1 (Pass)

4 of 5

PartDes: r604 Pin: 1 Reason: Missing Part Frame: 71

ce_r0402

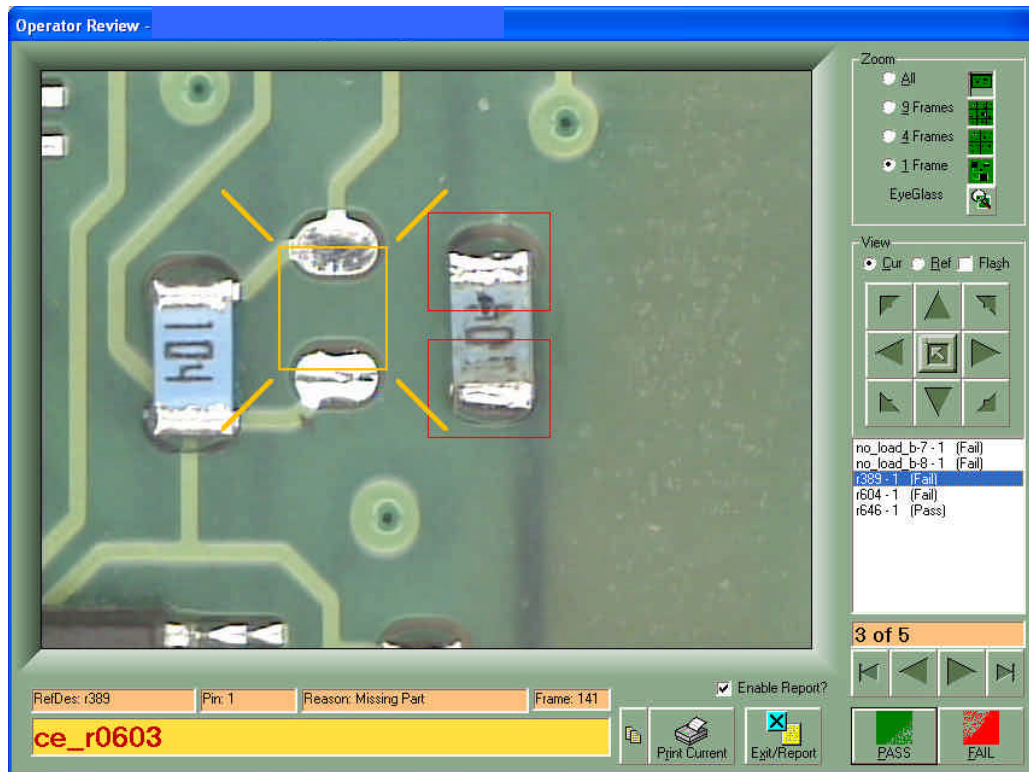
Print Current Exit/Report

PASS FAIL

S/N# 1_Bottom:
R604 Missing (0402)



Inspection Results - Images



S/N# 1_Bottom:

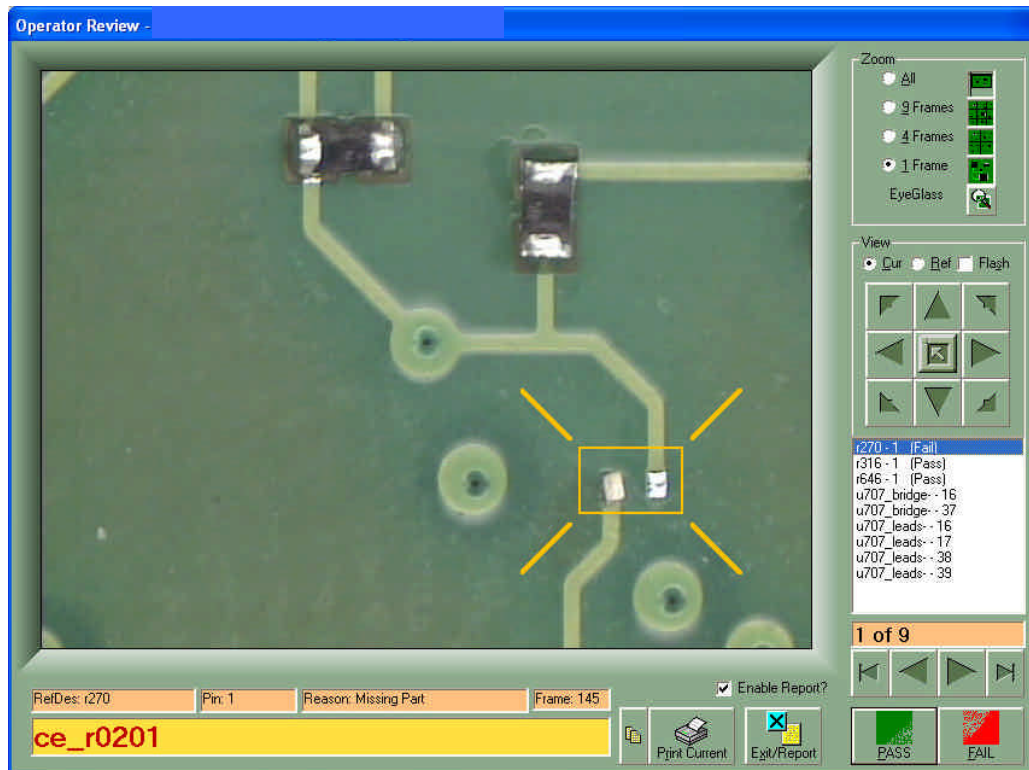
R389 missing (0603)

&

Component in no-load position



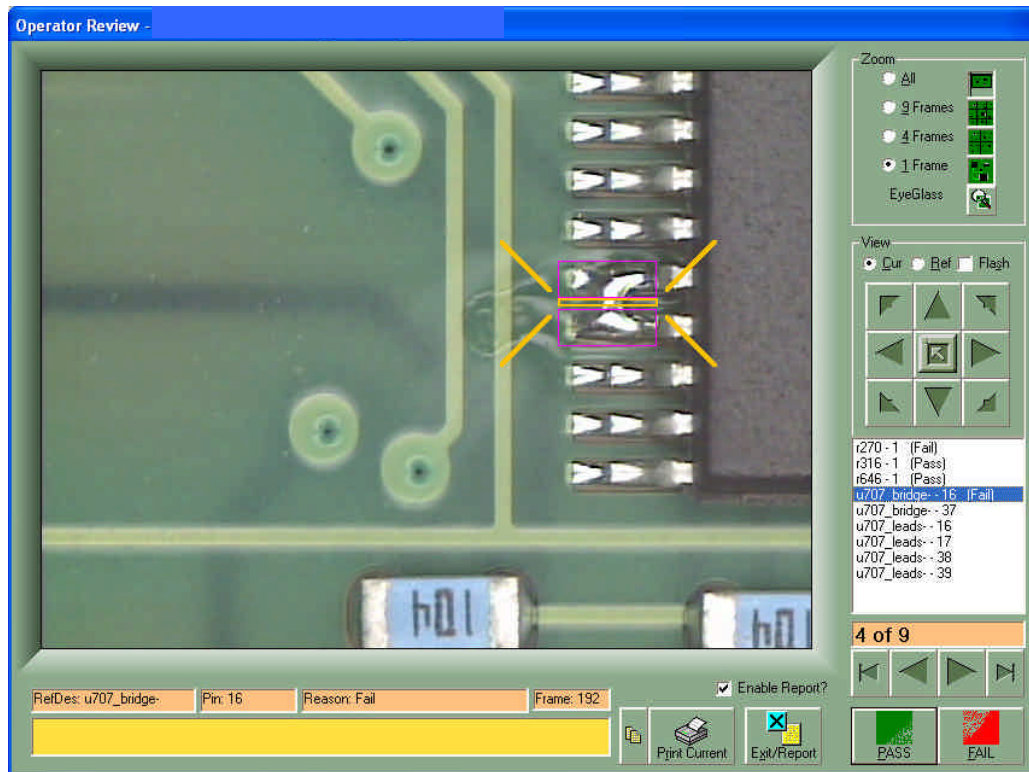
Inspection Results - Images



S/N# 2_Bottom:
R270 Missing (0201)



Inspection Results - Images



S/N# 2_Bottom:

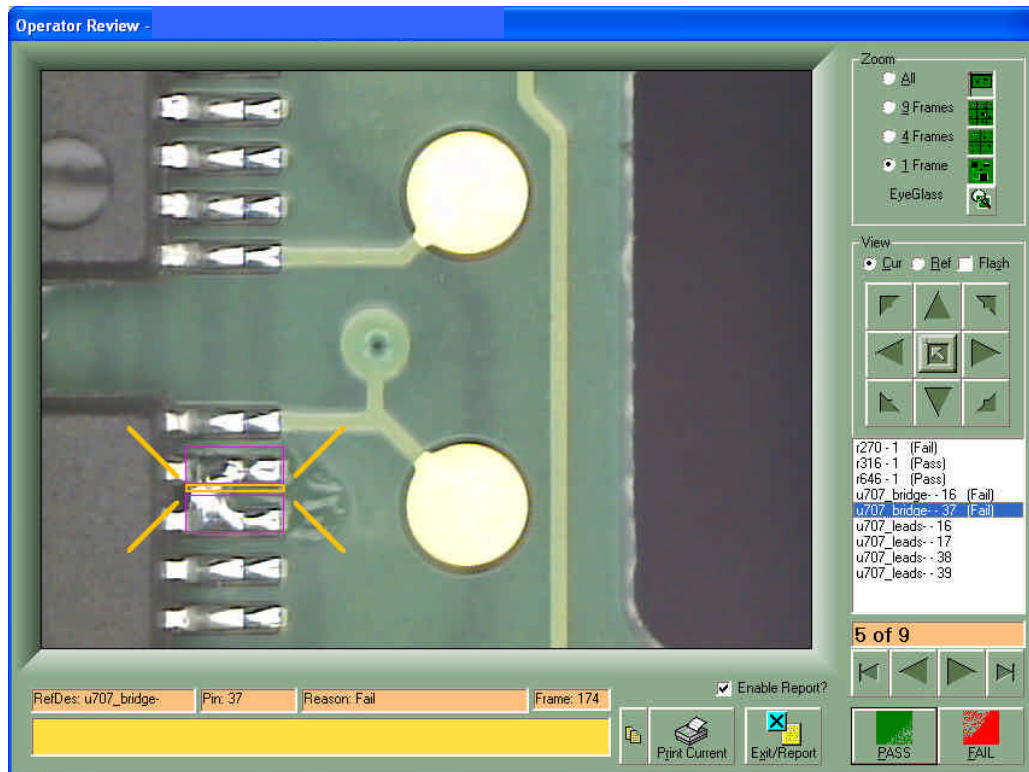
U707 bridge pins 16 & 17

U707 leads 16 & 17

(20 mil" package)



Inspection Results - Images



S/N# 2_Bottom:

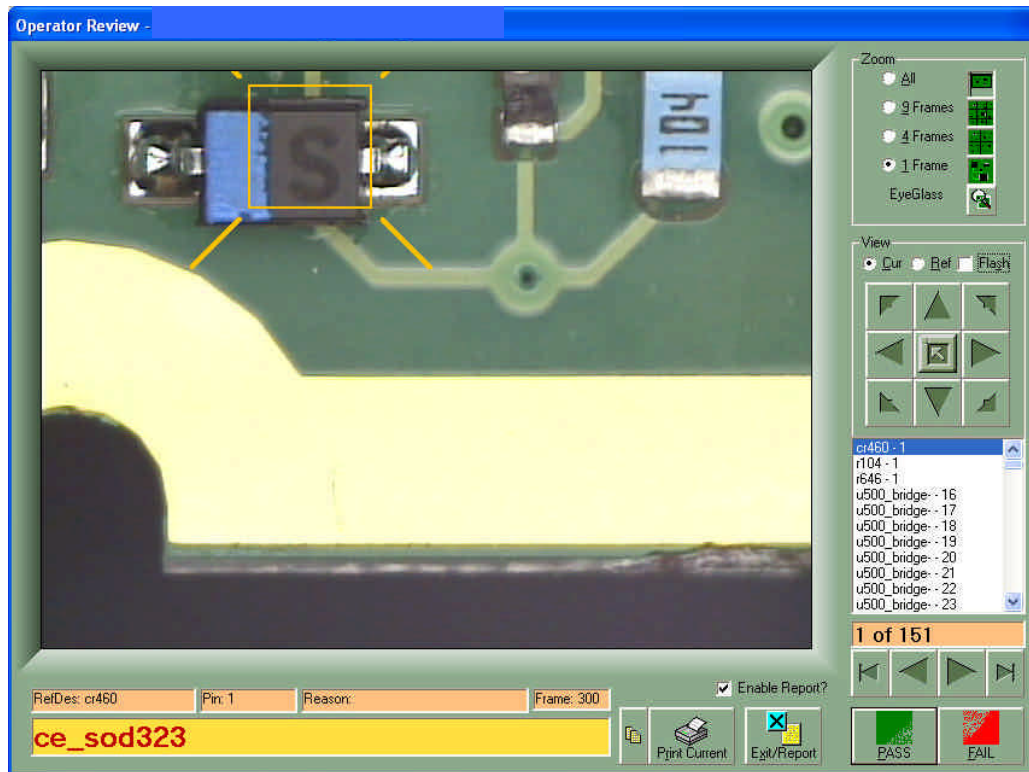
U707 bridge pins 38 & 39

U707 leads 38 & 39

(20 mil" package)



Inspection Results - Images



S/N# 4_Bottom:
CR460 reversed



Inspection Results - Images

Operator Review -

Zoom

- All
- 9 Frames
- 4 Frames
- 1 Frame

EyeGlass

View

- Cur
- Ref
- Flash

u500_bridge - 27 (Fail)

u500_bridge - 28 (Fail)

u500_bridge - 29 (Fail)

u500_bridge - 30 (Fail)

u500_bridge - 46 (Fail)

u500_bridge - 51 (Fail)

u500_bridge - 52 (Fail)

u500_bridge - 53 (Fail)

u500_bridge - 54 (Fail)

u500_bridge - 56 (Fail)

u500_lead - 1

25 of 151

RefDes: u500_lead Pin: 1 Reason: Frame: 75

Print Current Exit/Report

PASS FAIL

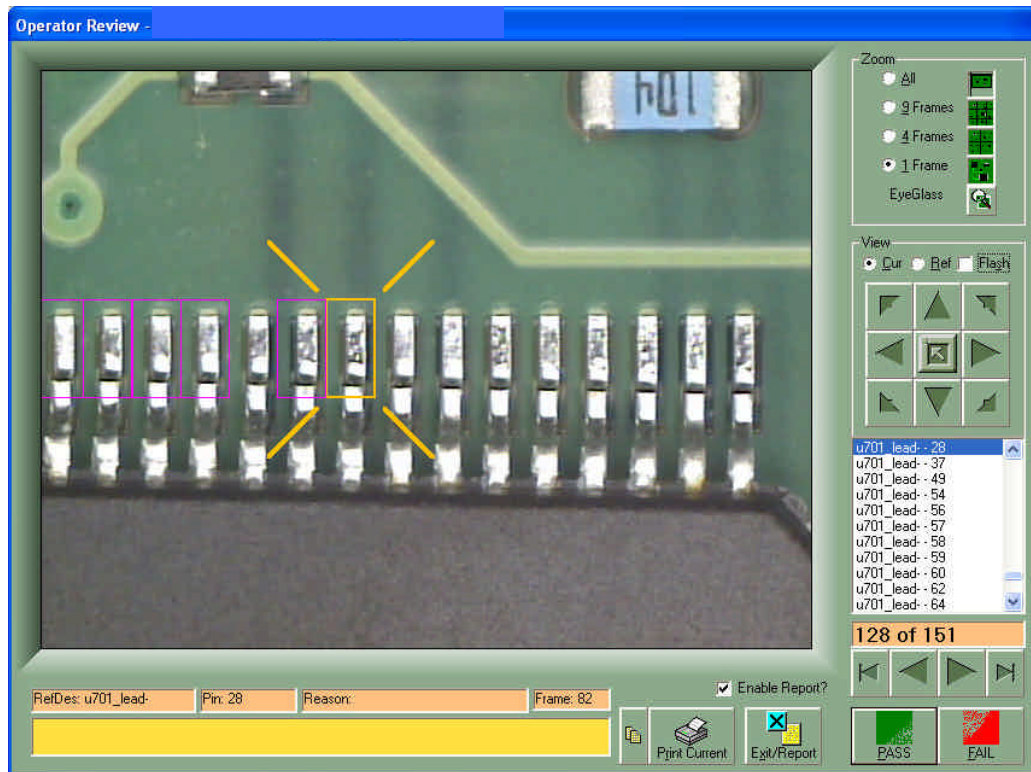
S/N# 4_Bottom:

U500 shifted

(32 mil" package)



Inspection Results - Images



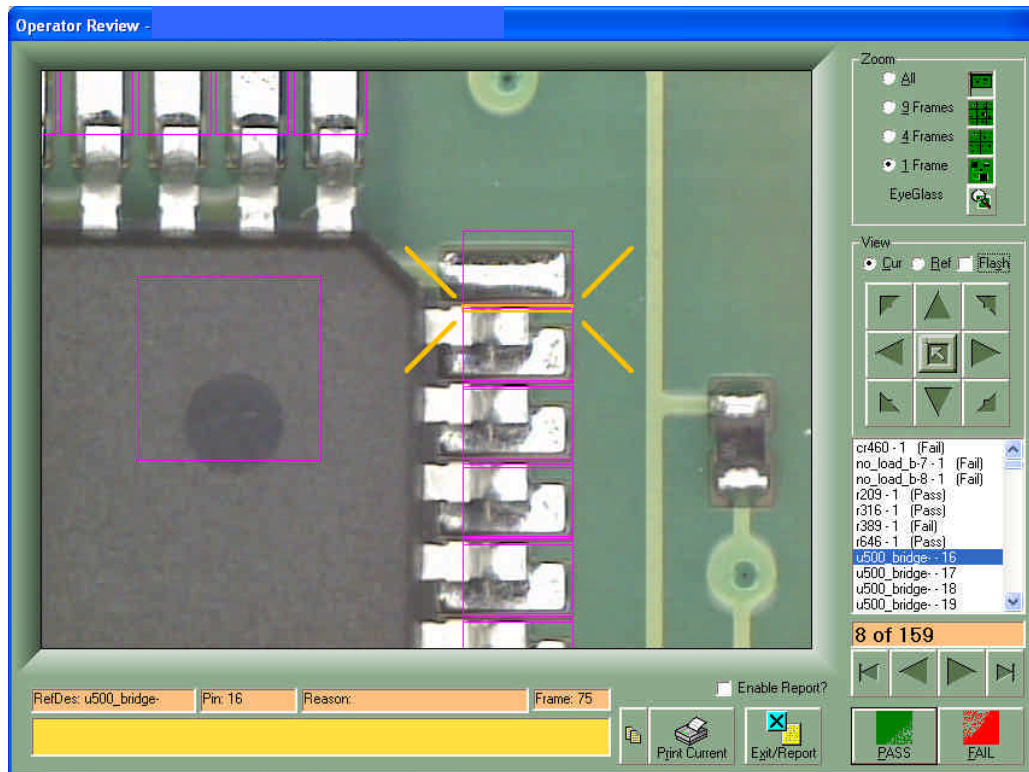
S/N# 4_Bottom:

U701 skewed

(20 mil" package)



Inspection Results - Images



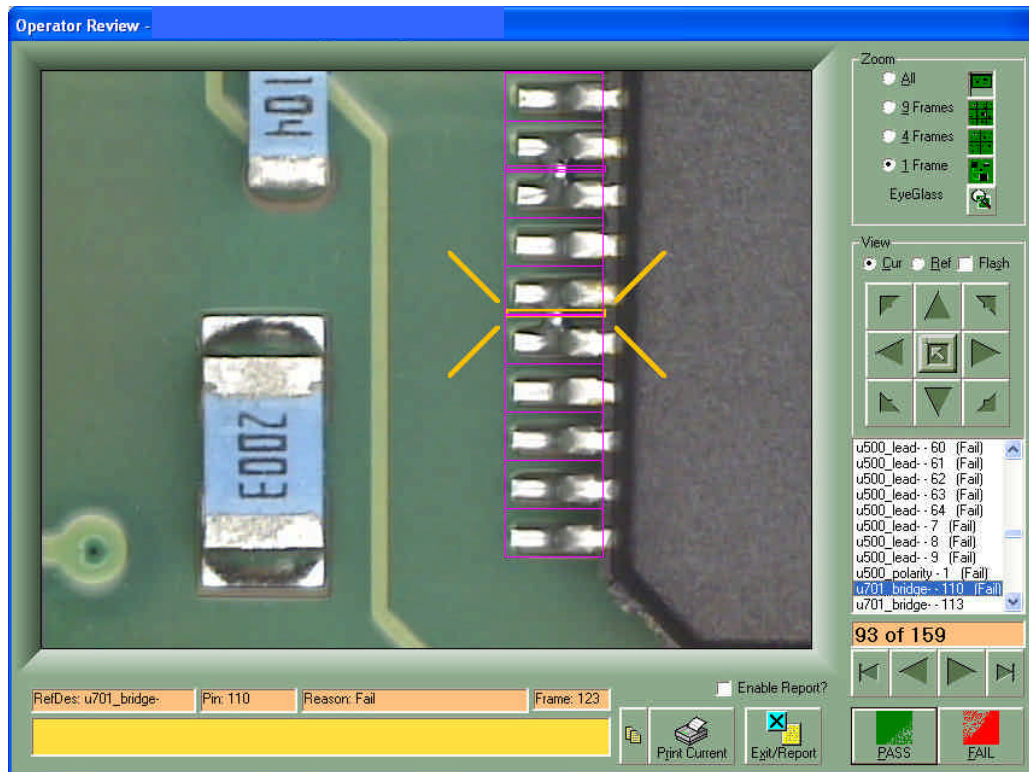
S/N# 5_Bottom:

U500 shifted

(32 mil" package)



Inspection Results - Images



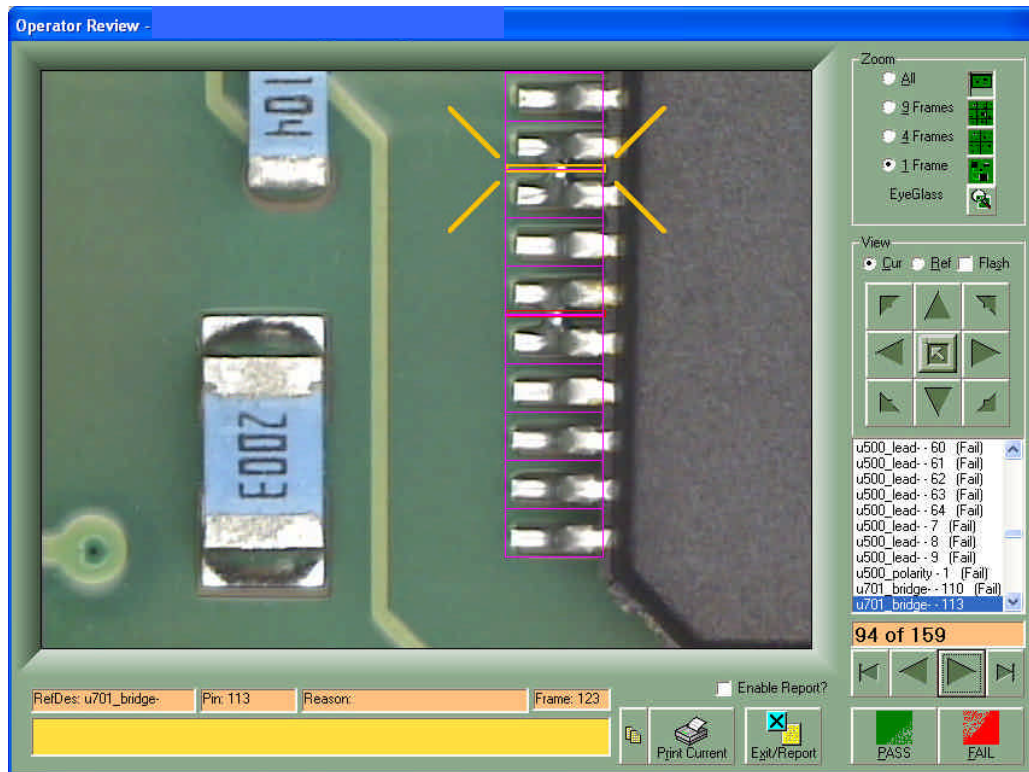
S/N# 5_Bottom:

U701 bridge pins 113 & 114

(20 mil" package)



Inspection Results - Images



S/N# 5_Bottom:

U701 bridge pins 116 & 117

U701 skewed

(20 mil" package)



Inspection Details - Top

Number of Inspections: 708 (regions of interest)

Serial Number	Operator Reviews (false calls)
# 1_Top	3
# 2_Top	2
# 3_Top	0
# 4_Top	1
# 5_Top	2

False call rate: 8 false calls / 3,540 inspections (708 * 5 boards) = 0.23%

Programming time (including building libraries): 4.5 hours





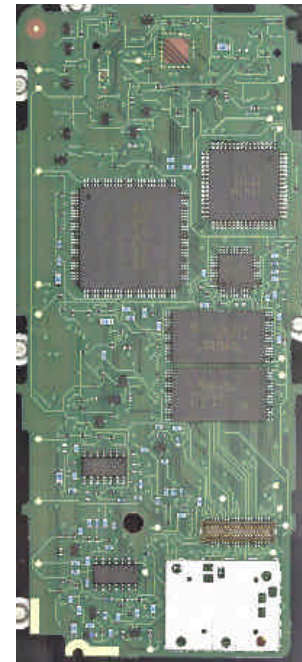
Inspection Results - Bottom

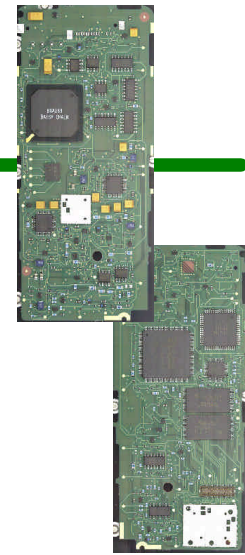
Number of Inspections: 1052 (regions of interest)

Serial Number	Operator Reviews (false calls)
# 1_Bottom	0
# 2_Bottom	1
# 3_Bottom	1
# 4_Bottom	1
# 5_Bottom	2

False call rate: 5 false calls / 5,260 inspections (1052 * 5 boards) = 0.095%

Programming time (including building libraries): 4.0 hours





Inspection Results - Summary

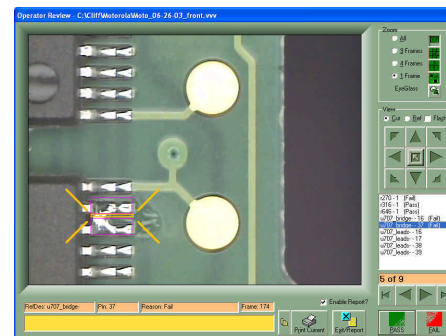
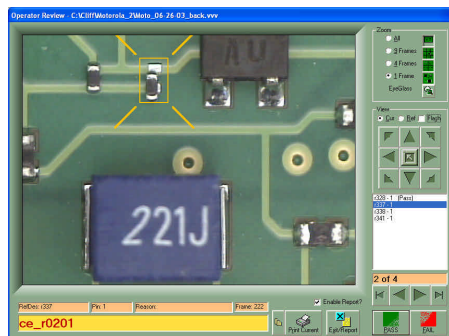
All failures were detected (0 false passes)

0201 & fine pitch posed no difficulty

Programming accomplished in 8.5 hours total (top & bottom)

8,800 inspections resulted in only 13 operator reviews (0.15%)

System cost as tested: \$ 53,875





Global Implementation

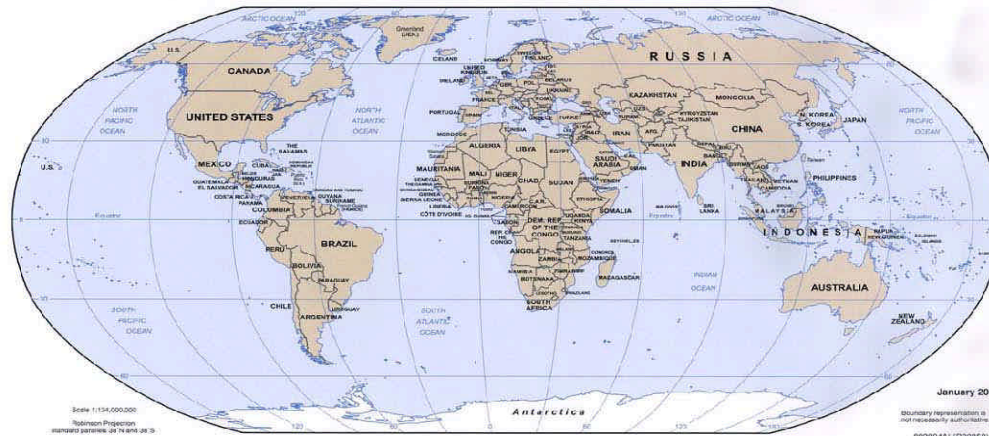
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