High-density PCB with BGA-IC
In-circuit tester WTX-3000 （SX）

- **PGP-Fixture**
- **All nodes probing of very high accuracy**
- **QFP,BGA-IC Lead Open detect**
- **Low stress press**
- **Recovery of the Contact fail probe**
- **Traceability environment**
- **Re-work station construction**

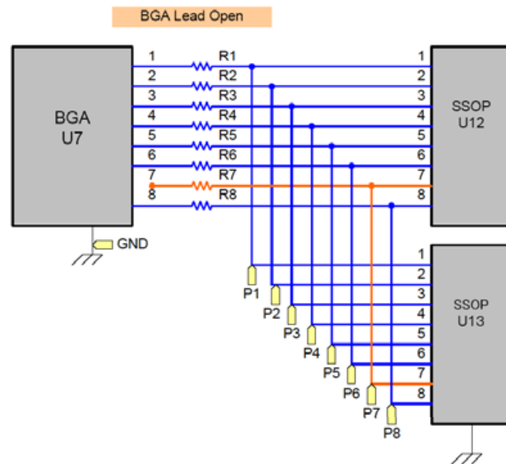
In the test process of High density print board by the conventional ICT, there was generating with mounting fault outflow and large false fault in the factory. As a result of our investigating a cause, in ICT present in use, it turns out in measurement functions, FIXTURE accuracy, and all the PRESS mechanisms that it cannot deal with high density like Digital equipment print board, and a high-speed print board. Based on the proposal of WILLTECH, WTX-3000 of ICT made from WILLTECH were adopted, the High density PCB correspondence FIXTURE was manufactured, and evaluation of fault detection capability and inspection stability was performed in the factory.

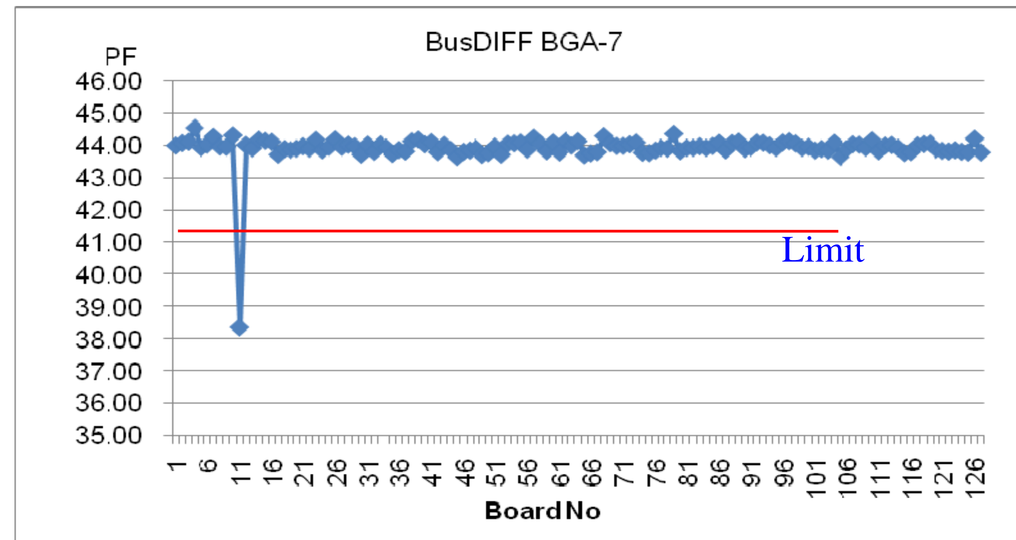
WILLTECH Co ., LTD

The generation change of the In-Circuit Tester

Section	Function	1st Generation Point-30GX Point-55MB	2nd Generation Point-88 TR-518F	3rd Generation WTX-3000 WILLTECH
detection of the mounting defect	Component	YES	YES	YES
	SOP-IC QFP-IC	NO	Test Jet(HP)	YES (Bus DIFF)
	BGA-IC CSP-IC	NO	NO	YES (Bus DIFF)
	Small Package IC	NO	NO	YES (Bus DIFF)
Complying with the quality control	Data Logging	NO	Poor	YES
	Remote control	NO	NO	YES
	Network function	NO	NO	YES
	Indication of NG parts	NO	NO	YES
Fixture Technology	Two(2) axes soft press	NO	NO	YES
	Low stress	NO	NO	YES
	Probe Gide Plate	NO	NO	YES
	All Node Probing	NO	NO	YES
	Recovery contact	NO	NO	YES

QFP,BGA-IC Lead Open detect





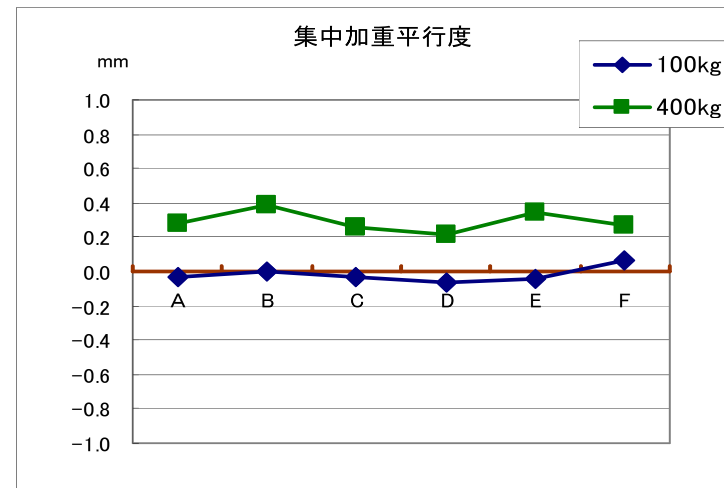
NET with IC,s
U7 (BGA) Output C 4.8PF(TYP)
U12 (SSOP) Input C 5.0PF(TYP)
U13 (SSOP) Input C 5.0PF(TYP)

Bus DIFF Test function detects an IC open defect by detecting the little change of the capacity impedance of the print board NET pattern. The capacity of the NET pattern is decided by the capacity of the IC lead terminal connected with the pattern capacity of the print circuit board and the pattern. When an IC lead terminal pin is a un-connection (an open defect), it is decided that the capacity that it is equivalent to the pin decreases, and it can be detected as an open defect.

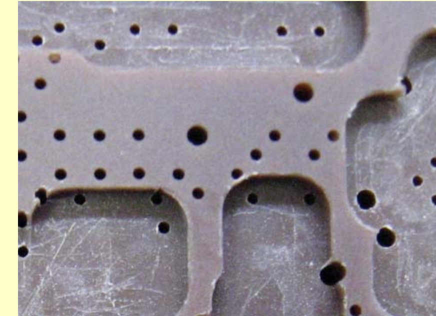
A high precision Two(2) axis Press unit

- AC motor soft press
- Non Pressure Air
- Two axis equality drive
- Press parallelism 0.3mm
- Low stress to Test PCB
- PGP Fixture

Two axis drive press of both sides was developed for the purpose of restraining stress to a board. And a guide plate prevents distorted of a board by probe density imbalance. In addition, a probe is protected in a board set with a guide plate. Because a board comes in contact with a probe at the final stage of press, it is not to be damaged with a board and a probe



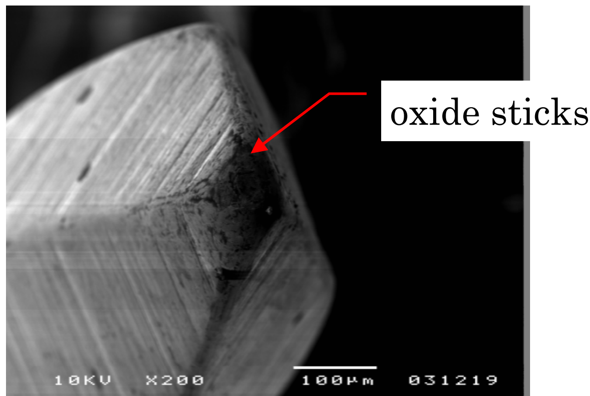
Very high accuracy PGP Fixture



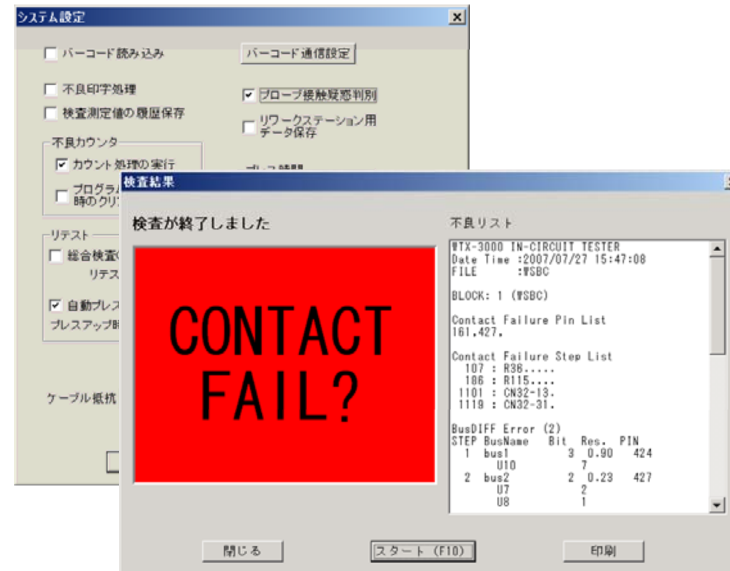
Division	Item	standard
Structure	Fixture Method	A probe guide plate (PGP)
	Materials	High hardness Engineering plastic
Probing performance	Accuracy of the probe tip	±0.1mm (max)
	Probing pitch (standard)	1.27mm (min) 1.00mm (Special order)
	Stress to a print board (maximum)	-250×10^{-6} (max) strain
Minimum probe point	QFP-IC	Lead pitch. 0.4mm (min) Pattern width. 0.2mm (min)
	VIA hole	Φ0.25 mm (min)
	TEST PAD	Φ0.3mm (min)
	SMD Chip	1005 (min)
	SMD Chip pattern	0.3×0.3mm (min)

A print board becomes high integration, and implementation technology advances. However, it is difficult to keep implementation reliability by production inspection and becomes a big problem. I developed the probe guide plate (PGP) method that was ICT Fixture corresponding to production inspection of high-density implementation board in the future in a will technical center. The PGP Fixture shows distinguished performance in a fail rate of detection, test probe contact stability, stress reduction to a high density of thin PCB and test probe protection.

Recovery of the Contact fail probe



We understood that test probe and poor contact of a Print board were caused by an alien substance (a dirt and an oxidation embrace) of the probe tip. It was admitted that occurred by 50 times of contact, and This Alien substance (a dirt and an oxidation membrane) became a factor to let you obstruct reliability of the In circuit tester..



As for the strong flux, outbreak of the poor probe contact is predicted.
The poor contact distinction function displays a connection part related to probe number that it seems that the contact of the probe is poor and it as contact defectiveness

Evaluation of NEW ICT in a mass production line

2007.Feb.26

■Summary

Introductory examination for ICT which can be adapted for many problems,
such as high-density and high-frequency PWB, micrifying of parts, and invisibility of a terminal pin

■Evaluation background

Company name	＊＊＊＊＊＊
Location of Factory	Mexico
Evaluation board	Digital TV Main Board
NEW ICT	WTX-3000 (Willtech)
Evaluation term	2007.Jan.25—2007.Feb.15

■Comparison evaluation

ITEM	Old Type ICT	AOI	NEW-ICT
No test point	×	✔	✔
BGA detective	×	×	✔
cold solder	×	×	✔
micro bridge	✔	×	✔
fixture necessity	×	✔	×
existence of parts	✔	✔	✔
value	✔	×	✔
accurate analysis	×	×	✔
weakpoint	it can not test without test point ,therefore not detects the BGA issues.	need that operator decide & works in automatical mode. It can not detect micro solder.	need a special guide plate & no flexibility for design change.

■Fanction NG Board→Test of NEW ICT

The inspected boards which leaked to Final Process area are inspected
the number of inspection : 123 pcs (BGA function-NG boards)
Judged to NG: 113 pcs (detective rate 92%)

detected issue		
IC8001(BGA)	25	BGA 79
IC7G01(BGA)	26	
IC8320(BGA)	28	
IC8401(0.4mm)	4	Non BGA 34
Coil open	3	
capacitor	6	
resister	7	
Several issues	14	
TOTAL	113	

■Conclusion:

We already found benefits to reduce leakage in current boards without test point.
This New ICT can detect BGA and 0.4mm-IC's issues.

■SMD Process internal test

We need to check mass production, operability,
and the life time of the contact probe is enough to use for our production.

No tested SMD Process board 298: 13 boards are detected

inspection Step	Tested	Fail
SMD processed boar	298	13

detected item

detected issue	
IC8001(BGA)	4
IC7G01(BGA)	0
IC8320(BGA)	0
IC8401(0.4mm)	4
capacitor	2
resistor	3
TOTAL	13

New ICT can detect true defects in SMD Process board.

■The new ICT test reliability .

After improvement, rate of passage is stable
(improvement : debug, clean up , vibration and the retry test).
Not a big issue by normal operator (during night shift and the wekend).
It's not necessary to change pin contact during 2000 pcb's inspection.

■Final conclusion

This new ICT can stop the leakage to reduce the problems and we can use for SMD Process of mass production or repair process.