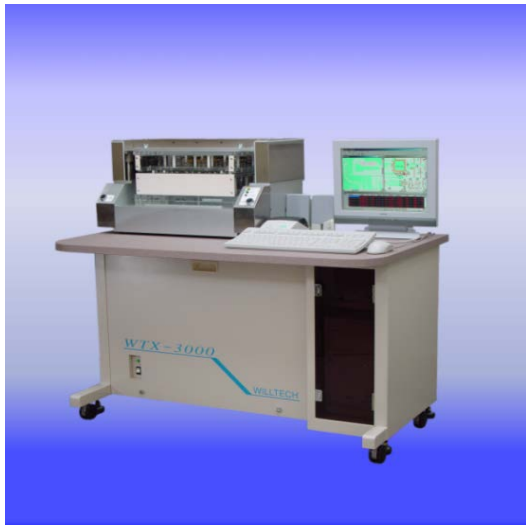
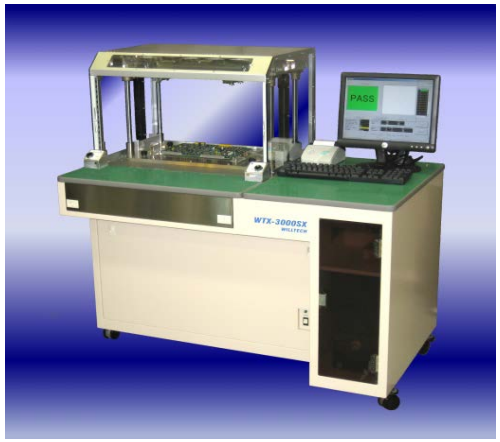
BGA-IC and Connector Lead Open detection
In-circuit tester *WTX-3000CN*





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 TV Main print board. Based on the proposal to WTX-3000CN of ICT made from WILLTECH were adopted, the High density PCB FIXTURE was manufactured, and evaluation of fault detection capability and inspection stability was performed in the factory. WILLTECH realized undetectable BGA-IC-Open by Bus DIFF Test. And Now, WILLTECH developed a MAP-CN method to detect Lead-Open of FPC connector as WTX-3000CN model.

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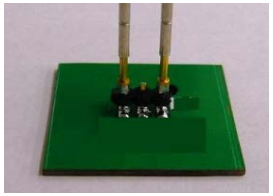
BGA-IC Open NG Detect MAP-CN

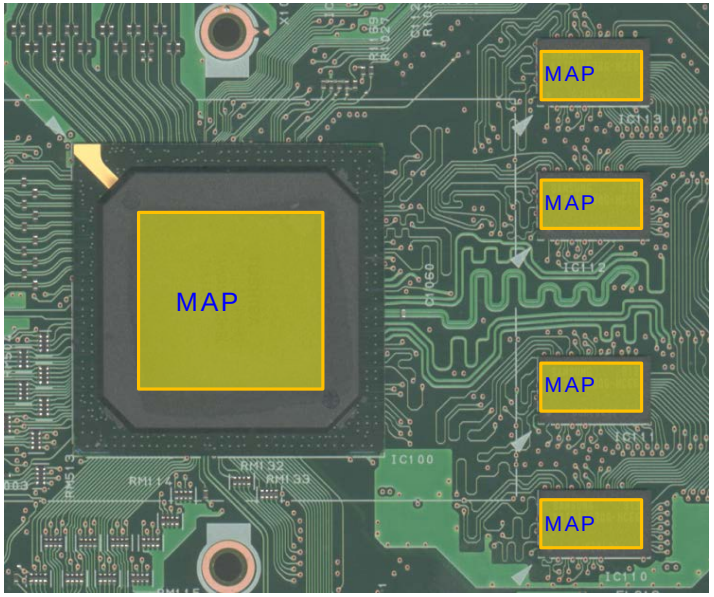
- Easy Program
- NG Lead output
- Low cost

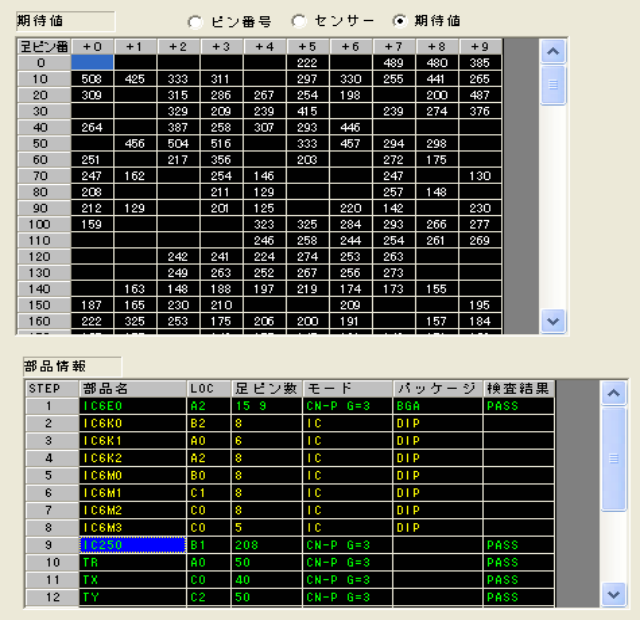
Lead Open detection of BGA-IC
In conventional In-circuit Tester, an automatic visual examination, and a visual check, the open fault of BGA-IC is undetectable. WTX-3000CN is the only equipment in which open detection of BGA-IC is possible. In addition to the conventional fixture, MAP-CN can be built by the cheap MAP sensor and an easy program.

- BGA-IC
- QFP-IC

MAPセンサ







期待値　ピン番号　センサー　期待値

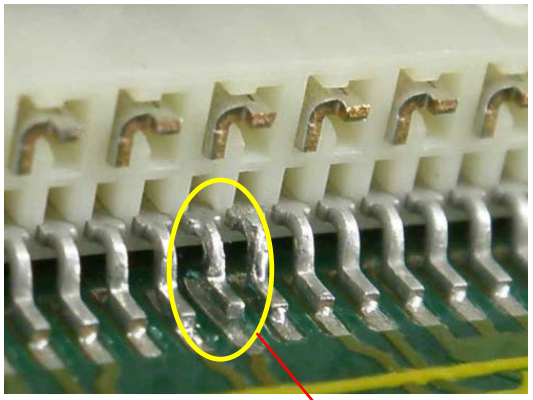
足ピン番	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
0						222		489	480	385
10	508	425	333	311		297	330	255	441	265
20	309		315	286	267	254	198		200	487
30			329	209	239	415		239	274	376
40	264		387	258	307	293	446			
50		456	504	516		333	457	294	298	
60	251		217	356		203		272	175	
70	247	162		254	146			247		130
80	208			211	129			257	148	
90	212	129		201	125		220	142		230
100	159				323	325	284	293	266	277
110					246	258	244	254	261	269
120			242	241	224	274	253	263		
130			249	263	252	267	256	273		
140		163	148	188	197	219	174	173	155	
150	187	165	230	210			209			195
160	222	325	253	175	206	200	191		157	184

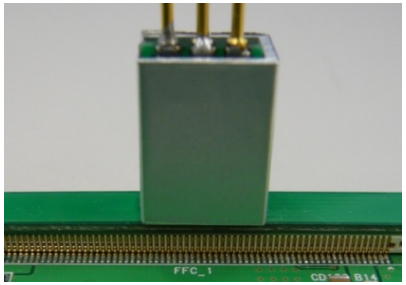
部品情報

STEP	部品名	LOC	足ピン数	モード	パッケージ	検査結果
1	IC6E0	A2	15 9	CN-P G=3	BGA	PASS
2	IC6K0	B2	8	IC	DIP	
3	IC6K1	A0	6	IC	DIP	
4	IC6K2	A2	8	IC	DIP	
5	IC6M0	B0	8	IC	DIP	
6	IC6M1	C1	8	IC	DIP	
7	IC6M2	C0	8	IC	DIP	
8	IC6M3	C0	5	IC	DIP	
9	IC250	B1	208	CN-P G=3		PASS
10	TR	A0	50	CN-P G=3		PASS
11	TX	C0	40	CN-P G=3		PASS
12	TY	C2	50	CN-P G=3		PASS

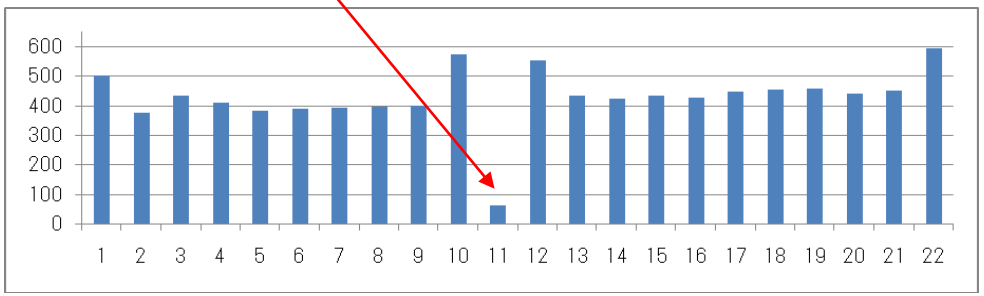
Connector Lead Open Detect MAP-CN

- FPC Connector
- HDMI Connector
- LVDS Connector
- DIP Lead Connector
- ROM Socket
- BGA IC terminal
- QFP IC Lead



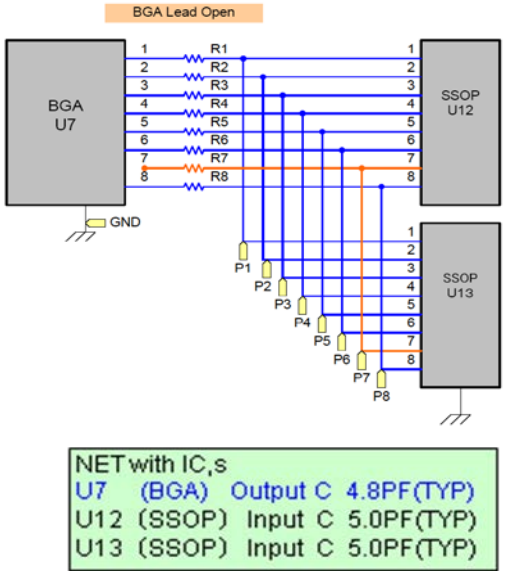


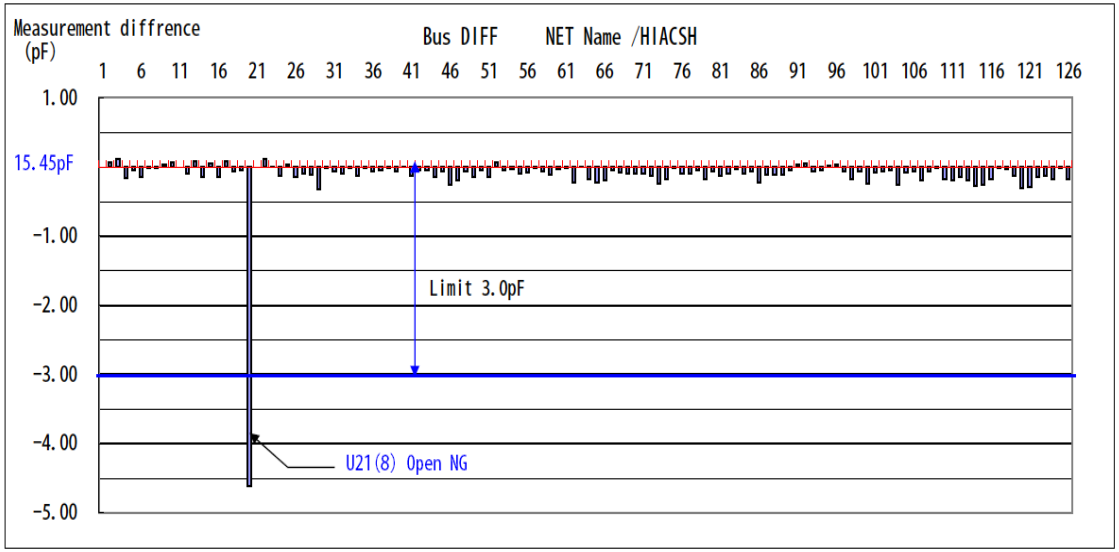
■Example of the lead terminal Open detection of FPC connector.
Lead pitch 0.5mm（Lead width 0.2mm）
Open GAP about 0.1mm



■Basic technology of MAP-CN
The high frequency signal is input into the test probe of a board pattern connected to the terminal lead of the connector. The DEF (Different Electric Field) sensor which it attached to a connector housing detects the minute electric field that occurred from a connector terminal frame. A minute electric field does not occur from a connector terminal in the case of Open the terminal lead of the connector.

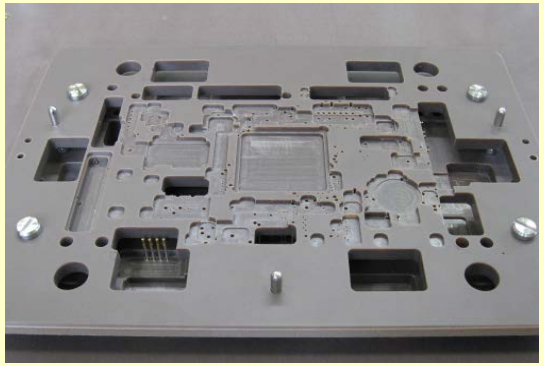
QFP and BGA-IC Lead Open detect

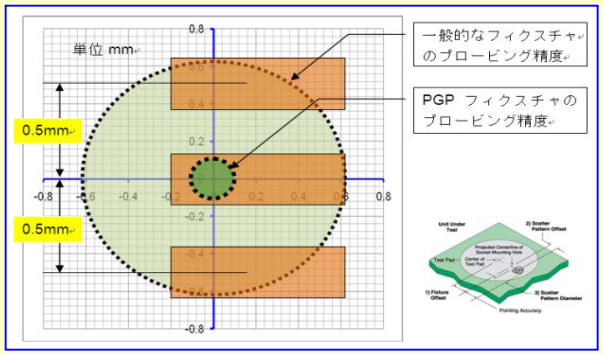




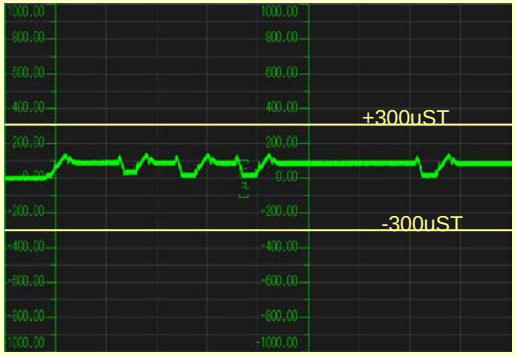
Bus DIFF Test function detects an IC open defect by detecting the little change of the capacity impedance of the print board NET pattern. The capacity of the NET pattern is decided by the capacity of the IC lead terminal connected with the pattern capacity of the print circuit board and the pattern. 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.

Very high accuracy PGP Fixture





Distortion of BGA Package



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.

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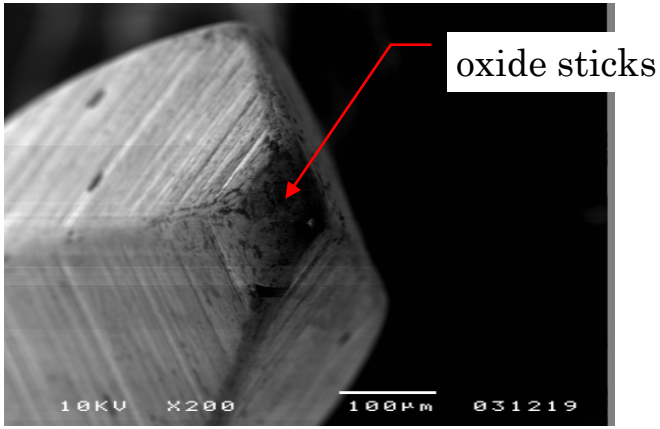
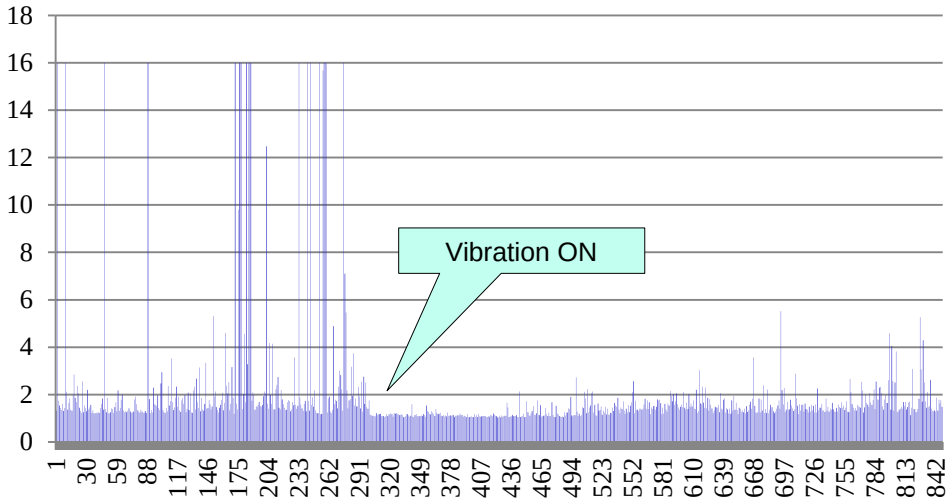
Recovery of the Contact fail probe



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.

Contact Recovery Function

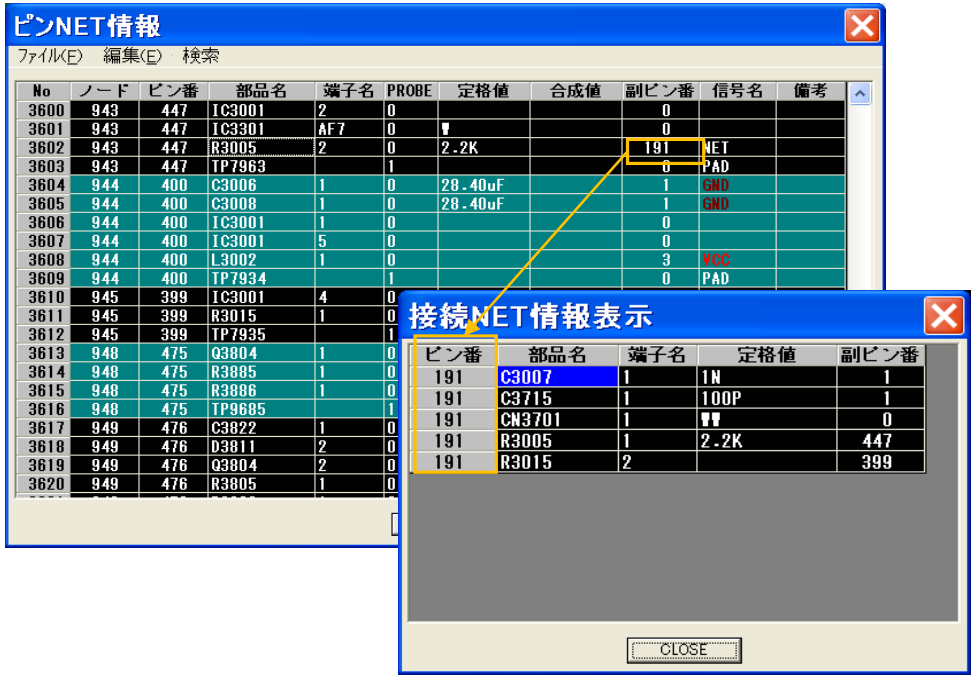
- Double Probe Technology
- PGP Fixture
- Probe Point Vibration
- Contact Fail pin detection
- Same probe continuous Fail detection



Operator Support Function

■Pin NET details display function

Pin NET details display function is a display and is provided in the object parts on the monitor screen all of be connected parts and the pin numbering.
The current state opens "Schematic diagram pin number" drawing information of the circuit in the surrounding can be instantaneously displayed from among the drawing though big time had been spent on the search for the object parts and the pin numbering.

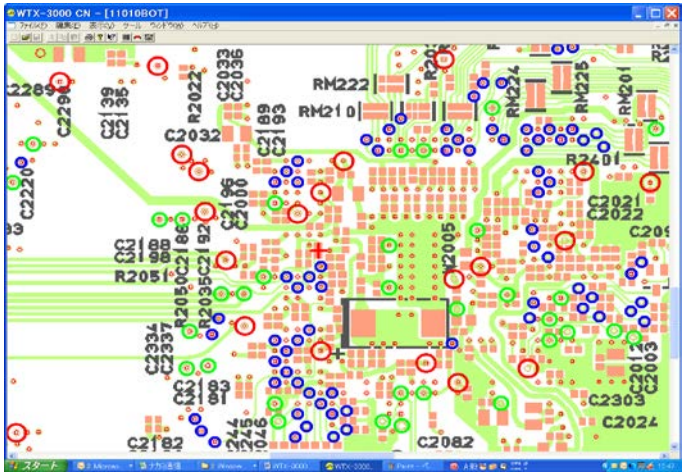


No	ノード	ピン番	部品名	端子名	PROBE	定格値	合成値	副ピン番	信号名	備考
3600	943	447	IC3001	2	0			0		
3601	943	447	IC3301	AF7	0			0		
3602	943	447	R3005	2	0	2.2K		191	NET	
3603	943	447	TP7963		1			0	PAD	
3604	944	400	C3006	1	0	28.40uF		1	GND	
3605	944	400	C3008	1	0	28.40uF		1	GND	
3606	944	400	IC3001	1	0			0		
3607	944	400	IC3001	5	0			0		
3608	944	400	L3002	1	0			3	VCC	
3609	944	400	TP7934		1			0	PAD	
3610	945	399	IC3001	4	0					
3611	945	399	R3015	1	0					
3612	945	399	TP7935		1					
3613	948	475	Q3804	1	0					
3614	948	475	R3885	1	0					
3615	948	475	R3886	1	0					
3616	948	475	TP9685		1					
3617	949	476	C3822	1	0					
3618	949	476	D3811	2	0					
3619	949	476	Q3804	2	0					
3620	949	476	R3805	1	0					

ピン番	部品名	端子名	定格値	副ピン番
191	C3007	1	1N	1
191	C3715	1	100P	1
191	CN3701	1		0
191	R3005	1	2.2K	447
191	R3015	2		399

■Probe Number display

The position, the pin numbering, and the pin model can be displayed from the pin numbering of the test program on the monitor screen.
Moreover, the positions of parts similarly defective distinguished can be displayed on the monitor screen.



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