

# Manufacturing Defect Detection – How SPEA Can Help

The SPEA 4040 Flying Probe Fixtureless In-circuit Test System is capable of detecting the majority of all manufacturing defect types whether “Component” or “Solder” related on a two pin as well as multi pin devices.

## • “Component” Related Mfg Defects:

- Verify the **Presence** or **Absence** of a Component “FP”
- Verify the Presence of the **Correct** Component “FP”
- Verify the Proper **Orientation** of a Component “FP”
  - ✓ Exercise and verify the **Specified Electrical Properties** of a Component “FP”
- *Verify the Component to PAD Placement Alignment Accuracy (IPC 610) “AOI”*

Sample Two Pin Components

## • “Solder” Related Mfg Defects:

- Detect Short Circuit “FP”
- Detect Open Circuit “FP”
- *Verify Solder Quality (IPC 610) “AOI”*

Sample Multi Pin Component



# Concentring on the essential thing: testing

The generation of a test program is completely automatic starting from CAD.

The **4040 Multimode** equipment allows the execution of parametric In-Circuit tests for all the components present on the board.

SHORT CIRCUITS

- Resistance measurement
- Nodal impedance measurement

RESISTORS

- Value from 1 mΩ to 100 MΩ

CAPACITORS

- Value from 1 pF to 1 F
- Polarity verification
- Operative voltage measurement
- Technology verification
- Leakage current

INDUCTORS

- Value from 10 μH to 10 H
- Resistive value from 1 mΩ to 100 MΩ

DIODES

- Direct voltage
- Polarity verification
- Leakage current

ZENER DIODES

- Polarity verification
- Type
- Leakage current

LED DIODES

- Direct voltage
- Polarity verification
- Type
- Leakage current

BIPOLAR TRANSISTORS

- Base - emitter voltage ( $V_{BE}$ )
- Base - collector voltage ( $V_{BC}$ )
- Saturation voltage ( $V_{CE\ sat}$ )
- Interdiction voltage ( $V_{CE0}$ )
- Gain (hfe)

MOSFET TRANSISTOR

- Drain-Source resistance ( $R_{DS(on)}$ )
- Drain-Source voltage ( $V_{DS(on)}$  e  $V_{DS(off)}$ )
- Polarity verification

TRASFORMERS

- Winding resistance from 1 mΩ to 100 MΩ
- Winding inductance from 10 μH to 10 H
- Winding polarity
- Percent ratio between winding

RELAY

- Coil resistance from 1 mΩ to 100 MΩ
- Coil inductance from 10 μH to 10 H
- Contact functional verification (ON-OFF)
- Contact actuation
- Open-close contact resistance measurement

FUSES

- Resistance value
- Type discrimination (normal or speed)

VOLTAGE REGULATORS

- Output voltage with nominal load
- Output voltage with maximum load
- Line regulation
- Load regulation

OPERATIONAL AMPLIFIERS

- Positive forcing
- Negative forcing
- Offset voltages
- Voltage Follower configuration
- Bias current
- Gain
- Frequency response
- Input impedance ( $Z_{IN}$ ) and output impedance ( $Z_{OUT}$ )
- Slew Rate

COMPARATORS

- Positive forcing
- Negative forcing
- Offset voltages
- Bias current
- Frequency response
- Input impedance ( $Z_{IN}$ ) and output impedance ( $Z_{OUT}$ )
- Slew Rate

DIGITAL IC

- True Table
- Electrical characteristics
- Integration level
- Family types
- Fan In and Fan Out