What are counterfeit components ?

Counterfeit [koun-ter-fit] Adj. : made in imitation so as to be passed off fraudulently or deceptively as genuine.

The manufacture of counterfeit (or fake) components is an illegal process that emerged due to the transferable value of electronics parts. Any company in the world requiring components to manufacture Printed Circuit Boards (PCBs) is at risk and many have already received batches of "bad" devices.

Counterfeiting is achieved through various processes. Devices known as "pulls" are removed from scrap boards (which have been discarded) in a process that is highly unsafe. Following superficial repairs, these devices are branded with (ir)relevant information - including a manufacturer's logo - and passed on to an unwary buyer as genuine. Another technique is to actually produce components using the normal manufacturing capabilities in "ghost shifts" which take place outside of standard hours. However, the chips created that way include many manufacturing faults and some may not even contain a silicon die.

Until now, it was not possible to differentiate counterfeit components until they were placed on a PCB and the production team ran the first tests on the complete assembly. This led to the costly process of identifying the component(s) at fault and then removing them from all boards in production. In some cases, complete batches of finished products needed to be recalled to the factory.

In the last five years, reports of counterfeit components have increased exponentially. In 2008, export of fake ICs accounted for more than 8% of global merchandise trade which is equivalent to lost sales of $6 billion.

SENTRY - a simple but powerful instrument

SENTRY Counterfeit IC Detector is a product designed to help electronics companies protect their production facilities from the infiltration of counterfeit components. It is an easy to use instrument with a dual purpose :

• To check components as they are received by the stores department and ensure that they are valid. Staff from a goods inwards department can use the system with no knowledge of electronics.

• To review potentially fake components and analyse the test data with suppliers. Advanced users can use the full report to determine the origin of failure.

SENTRY is designed to accommodate all types of components, from simple two-pin devices to more complex packages such as :

- Dual In-Line (DIL)
- Small Outline Integrated Component (SOIC)
- Small Outline Package (SSOP, TSOP)
- Plastic Leadless Chip Carrier (PLCC)
- Quad Flat Pack (TQFP, PQFP, LQFP)
- Ball Grid Array (BGA)

ABI Electronics offers a range of adapters for all packages, from standard sockets to customised solutions.

SENTRY Test Channels

As standard, the SENTRY unit offers up to 128 test channels which can be configured for various device packages.

For more advanced applications, SENTRY can be extended to 192 or 256 test channels using the upgrade modules available from ABI Electronics. It is also possible to test devices with more than 256 pins through a build-up process controlled by the software.

Scan Profiles and PinPrint Acquisition

SENTRY works by scanning the device under test to measure the electrical characteristics of its pins (or a subset of pins). These characteristics are called *PinPrints* and are used to compare a known genuine component with a suspect one.
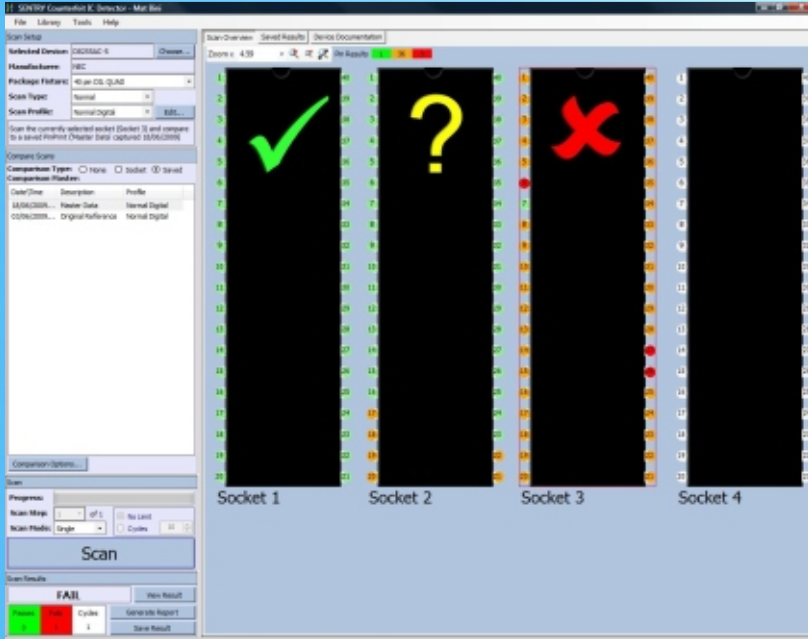
In order to acquire *PinPrints*, SENTRY applies electrical signals to the pins of the device. The hardware settings which control these electrical signals are known as scan profiles and can be modified by users. The parameters that can be set include the voltage range, the low and high peak voltage, the waveform, the source resistance and the frequency.

As well as changing the parameters of the scan profile, SENTRY can also scan components in two modes:

• **Normal mode**: the electrical signals are applied to the device under test with a fixed reference.

• **Matrix mode**: the reference of the electrical signals rotates around the device under test for a more detailed inspection.

Universal PLCC Adapter
(one adapter to cover PLCC packages from 20 to 84 pins)

Good device (✓)   Suspect device (?)   Bad device (✗)

Comparison Type

The detection of potentially counterfeit components is achieved by comparing the *PinPrints* of a known genuine device with the *PinPrints* of the device under test. SENTRY offers two mode of comparison :

• **Saved Comparison:** the *PinPrints* being acquired are automatically compared with previously saved ones.

• **Socket Comparison:** the *PinPrints* of multiple devices can be compared live.

With SENTRY, users can manage a wide range of information for each device. *PinPrints* of components can be saved within the software and recalled for a new comparison scan at any time.

For a more thorough traceability of devices, extra information can be added in the component folder including photos, PDF documents, weblinks or even text and spreadsheets.

Database

The data acquired by SENTRY is managed by the software through a database. This was designed to give users the freedom to save, backup and even exchange information, meaning that having a genuine device is not always required. Thanks to the import and export functions, master data can be shared between SENTRY users.
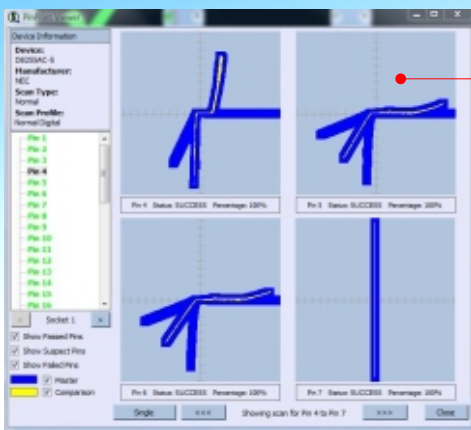
SENTRY Software - Flexibility

The ABI SENTRY software gives users the power to graphically modify or generate new packages in order to respond to the wide variety of components available on the market. It will also enable SENTRY to remain fully useable for bespoke or custom designs as well as future releases by semiconductor manufacturers.
The mapping between the standard ZIF sockets and the pins of the socket adapter is also set up in the software.

Report

After the detection of a potentially counterfeit device, the SENTRY software is able to produce a detailed report of the measurements and can also include photos of the device. This report can be used for an in-depth analysis of components with the original supplier.

PinPrint Viewer
Detailed analysis of pins

Customised Report
PinPrints can also be added

Test Summary

Device:	D8255AC-5
Package:	40 pin DIL wide
Scan Profile:	Normal Digital
Overall Result:	FAIL
Operator:	Mat Bini
Report Date:	19 June 2009

Test Device Information

Capture Date:	18 June 2009
Operator:	Mat Bini
Reference Picture:	

Comments:
Test Device

Pin Summary

FAIL Pins

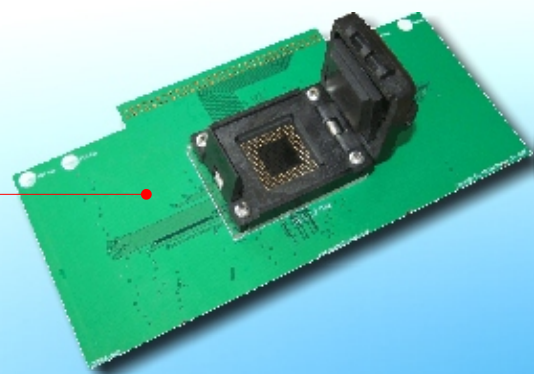|	
Pin 1:	26 % Match
Pin 4:	26 % Match
Pin 8:	26 % Match
Pin 9:	25 % Match
Pin 10:	22 % Match
Pin 11:	28 % Match
Pin 12:	22 % Match
Pin 13:	27 % Match
Pin 30:	30 % Match
Pin 35:	21 % Match
Pin 37:	30 % Match
Pin 39:	27 % Match

SENTRY Adapters

Universal PLCC Adapter
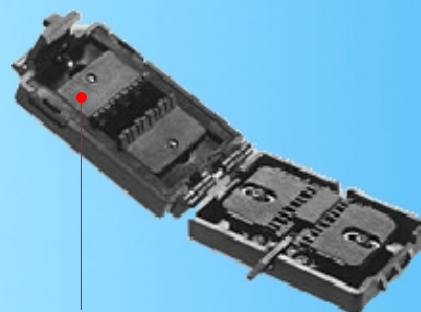One adapter to test devices with 20, 28, 32, 44, 52, 68 and 84 pins.
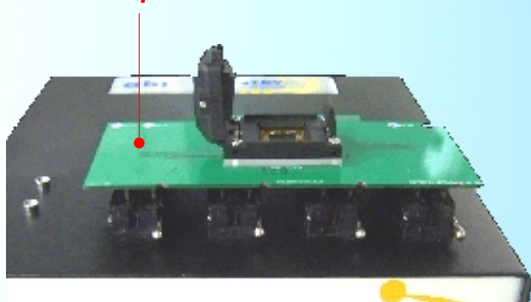
Custom Solutions
Available from ABI Electronics for all packages, including BGA and QFP.

Standard SOIC Adapter
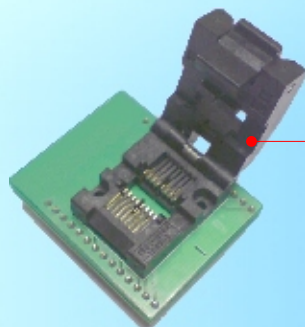
BGA Socket Adapter on SENTRY

Universal SOIC Adapter
One adapter to test devices up to 44 pins with body widths from 0.150" to 0.6".

Technical Specifications

Electrical Requirements

Operating voltage: 85 - 264 VAC
Operating frequency: 47 - 63 Hz
Power consumption: 150 VA max
CE approved & RoHS compliant

Environmental Requirements
Operating temperature: 10°C to 30°C
Humidity: 20 to 80%

Computer Requirements
Microsoft Windows XP™ or Vista™
Pentium 4 or above
Minimum RAM: 512 MB
Hard disk space: 200MB
USB 2.0 high speed port
Mouse, keyboard & monitor

Notes :

Physical Specifications
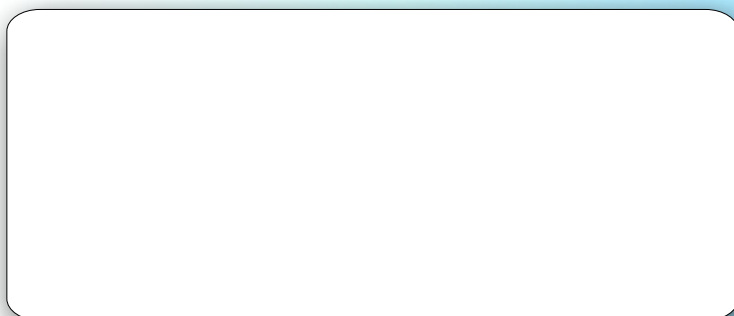Dimensions: 27 x 25 x 9 cm
Weight: 3.5 Kg

Specifications
128 test channels (standard)
Expandable to 256 test channels in steps of 64
20V pk-pk max test voltage
Sine, ramp and triangle waveform available

Accessories
User Manual
USB cable
Software CD (including drivers and manual)
Calibration kit (Optional)
Range of adapters available

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