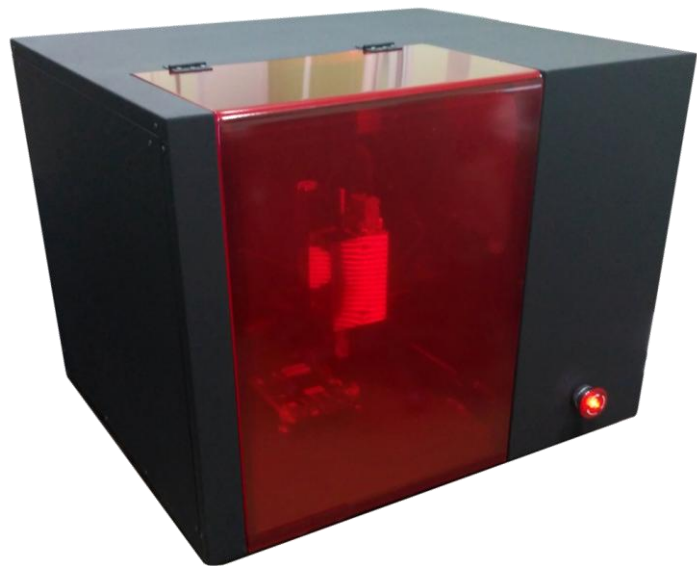


# EYEPOINT P10B



Fully automatic desktop system for detection of defective electronic components on printed circuit boards, counterfeit, re-marked or damaged electronic components in BGA packages



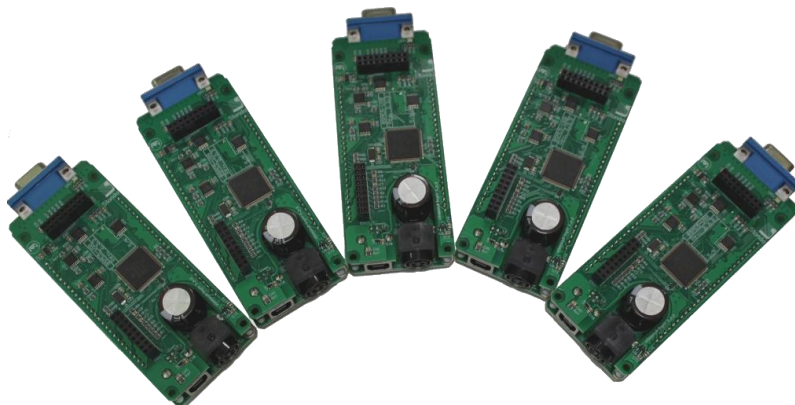
### DOES THIS SOUNDS FAMILIAR?

Does your company operate expensive and sophisticated electronic equipment, such as an electron microscope, a CNC machine, an industrial PLC, etc.? The failure of any printed circuit board (PCB) leads to a long downtime of both equipment and personnel, while the manufacturer's specialists carry out diagnostics and repairs. That's all about time and money. It seems unlikely that the manufacturer has a spare parts warehouse (SPTA) in every city. Storing the spare parts for all the boards yourself is very expensive and usually impractical. In case the device is under warranty repair costs will be paid by the manufacturer. But what if warranty has expired long ago? Complex expensive equipment can be used for 3, 5 or 10 years, and that is not the limit.

It is inevitable that after some time spare parts will no longer be manufactured or can only be fetched for exorbitant price. Manufacturers can simply refuse to supply the spares explaining this by obsolescence of equipment. Or suggest to throw it out and buy a new version. Familiar?

### WHAT TO DO IN SUCH A SITUATION?

The answer is well-known: to have the staff of highly qualified engineers who can maintain your equipment, diagnose and troubleshoot major malfunctions. It is not difficult to eliminate malfunctions because according to statistics more than 95% of PCB faults are caused by the failure of one or more electronic components in the power circuits or buffers of the power or logical interface part. The replacement of the component can be done by an electronics engineer of medium qualification for 1-4 hours. Finding of the malfunction is much more difficult though.



It is easier if the documentation for the device contains circuit and wiring diagrams of the boards, but usually it is not the case since manufacturers usually provide minimal set of documents required for operation and design documentation is not included in it anyway.

For the old equipment it is common that original documentation has been long lost. How to find a malfunction without it? An electronics engineer of the highest qualification, having enough time and all the necessary equipment can certainly do the job. But it will take a lot of time and a lot of money to keep such specialists on the payroll. You need a solution that does not require documentation or super specialists.

## FOR PCB

And here's another case: you are developing small series of expensive PCBs. You already have several early prototypes that your engineers are debugging. If one or several samples were damaged or changed during the debugging process, at least insignificantly, further work with them becomes meaningless because the experiments cease to be repeatable. How can you check that those boards are still electrically identical? Writing functional tests and testing all PCBs every day is too long. Assuming that there is no problem is also not a good course of action.

Yet another case: your company is making small batch of PCBs. Since there are only few of them manual or semi-automatic soldering is used. Usually there are several defects per 1000 points of soldering. You can give it to optical control to check but it can only find defects which are visible. You can check everything manually but it takes too long. You can purchase a "flying probe" type tester with 4-8 probes for the bargain price of 500.000 and dedicate an operator to run it (by the way it can take few weeks and additional money to train operator) but this solution is not always cost efficient or even possible.

Usually you do not want to do testing, you only want to deal with your product. Therefore, a solution is required that allows checking the electrical conformity reliable, fast and cost-efficient.



*The mobile probe type "Flying probe" in action, the image of the flowing head is blurred due to the high speed of the probe movement*

## SOLUTION

**EyePoint P10b** is a new approach to the search of faulty electronic components on printed circuit boards. A desktop sized, inexpensive, easy-to-use, and most importantly it doesn't require original documentation for PCB. All you need to find a malfunction on the board is the reference board and EyePoint P10b. Working principle is very simple. First system analyzes the reference board (the board which is known to be good) and then it compares boards under test with the reference board.

### WORKING PRINCIPLE

Place the reference board into EyePoint P10b, place the probe on the PCB's ground and press "Start". EyePoint P10b will do following actions automatically:

- 1) Take a composite high-resolution photo
- 2) Detect electronic components on PCB
- 3) Determine the pinout
- 4) Obtain the signature (unique volt-ampere characteristics) of each output of each electronic component with flying probe
- 5) Save the signature of the reference board into a file

Next place the board under test into EyePoint P10b. It may be a faulty sample from the same series as the reference PCB, or the board returned by your customer as defective or even the same board after few years of operation. Switch EyePoint P10b to the troubleshooting mode and hit "Start". After 5-30 minutes, depending on the size of the board, EyePoint P10b will give you an comprehensive report and pinpoint defective electronic components. All that remains is to replace the defective chips and to check repaired PCB on EyePoint P10b again. It is that simple.

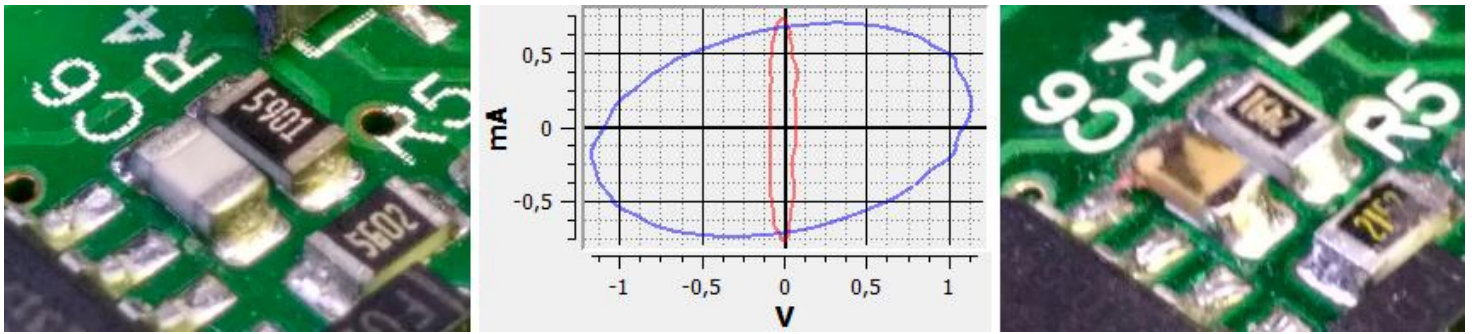
#### **No magic, only intellect**

The EyePoint P10b is based on the computer vision and artificial intelligence technologies. The EyePoint P10b system purchased by you, have been trained on thousands of images of chips and chip components and is able to find them on your boards without the operator's assistance. The list of supported components is constantly increasing. All database updates are free. At the heart of EyePoint P10b is the well developed technology of signature analysis - the comparison of the current-voltage characteristics of circuits on the board under test with the reference data. This is the safest (without feeding power to the board under study) and the quickest way to find differences between complex circuits. At the heart of the EyePoint P10b is the "flying probe" technology, which allows completely automatic testing without any operator's involvement and high precision mechanics which ensures the accuracy of the probing throughout the test.

#### **What is a signature analysis?**

EyePoint P10b uses a method of studying current-voltage characteristics, which allows to check electronic components on the board without power supply. It is an efficient and quick way to troubleshoot PCBs. All it takes is to compare the signatures of a faulty circuit and the circuit known to be good. This method is suitable for testing circuits with passive components, such as resistors, capacitors and other semiconductor elements. It is also applicable for testing the input and output of active devices, such as integrated circuits, programmable logic arrays, and so on. The method allows to identify malfunctions quickly, including the destruction of protective diodes from static electricity or damage to output / input transistors.

## FOR PCB

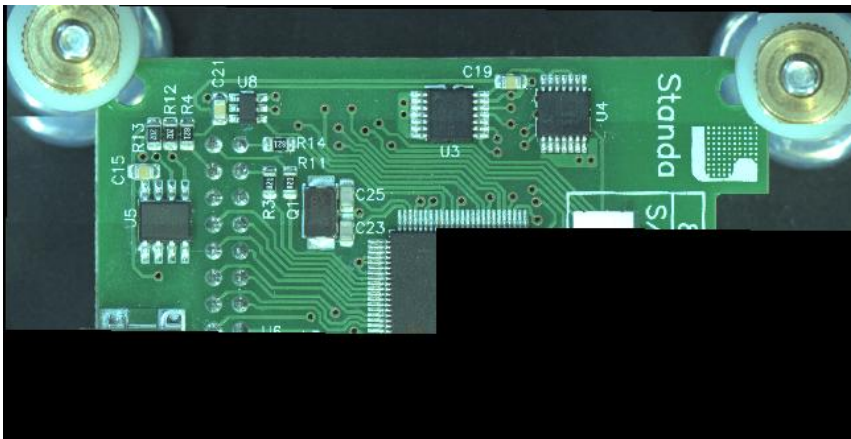


*Signature analysis of two boards. The left one - working capacitor, the right one - defective, which has an order of magnitude smaller capacity. The system detects a deviation that is clearly visible on the graph*

During the signature analysis test an AC signal is applied to the circuit. At the same time, the current and voltage in four quadrants are measured. The software automatically compares the received signature with the sample and, based on the user defined tolerance field, decides whether the circuit under test is good or bad. The software automatically selects the appropriate frequency and voltage for the circuit under test and conducts three measurements: the first one above the optimal parameters, the second one below and the third one precisely in the optimal values to ensure reliable and repeatable results.

## EYEPOINT P10B - REFERENCE MODE

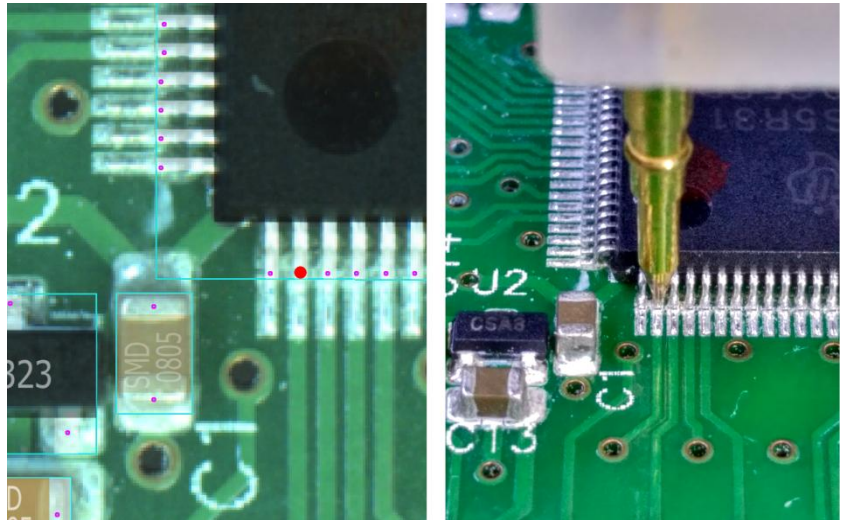
Place the reference board into the system and press "Start". EyePoint P10b moves camera over the board under test and takes a series of pictures combining them later into one high-resolution photo image. Precise positioner and intelligent algorithms for distortions elimination make it possible to achieve complete topological match of the physical board under test and its picture. (This way specifying the point on the image with the mouse, will move the probe needle to the corresponding point on the board precisely. The scanning is fully automatic and the progress of the test is displayed on screen in real time.



*Typical scanning process lasts from 3 to 25 minutes. Scanning progress is displayed in real time. In the picture, the printed circuit board is about 50% scanned. It is possible to start optical examination of the printed circuit board in detail, without waiting for the scan to finish*

### Chips' recognition

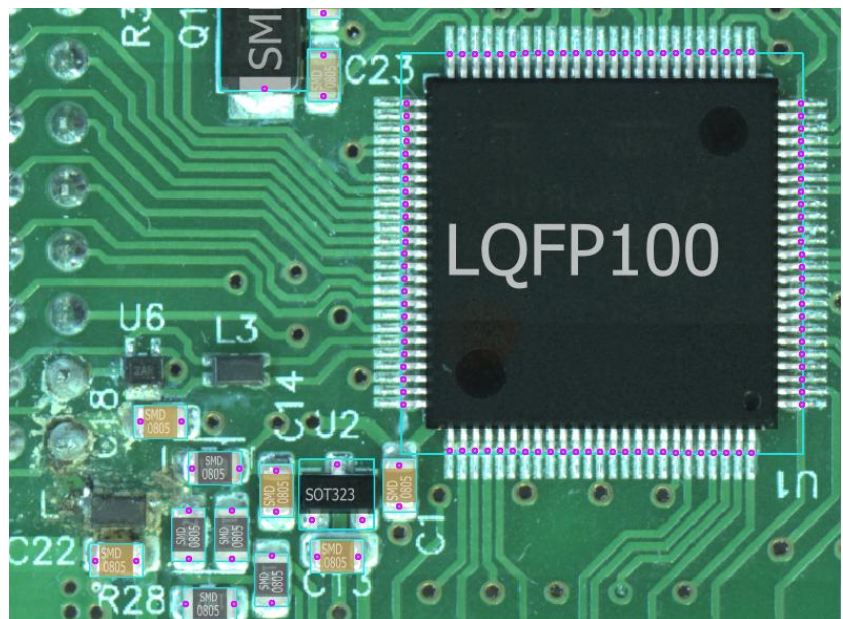
Using the previously obtained pictures, EyePoint P10b uses highly sophisticated software algorithms to recognize electronic components. Chip's type and arrangement of the pins are determined automatically for all the chips on the board. Obtained coordinates list (test map) will be used at the next step. If the component is missing in the library or not recognized correctly EyePoint P10b has a built-in tool for manually adding or removing components and / or test points.



*On the left side of the figure the investigated contact point of LQFP100 chip is marked. On the right side the exact contact point of the motorized probe is shown.*

### Signature analysis of the reference

EyePoint P10b flying probe measures the current-voltage characteristics in automatic mode at all points of the test card (the second contact of the built-in EyePoint P10b signature analyzer is connected to ground or the common output of the reference board). Obtained signature of the reference board is saved and used later for troubleshooting.



*Result of the automatic detection of contact areas of electronic components: the program accurately determines the boundaries of the cases and their types and marks the contact points on the chip for further testing.*

## FOR PCB

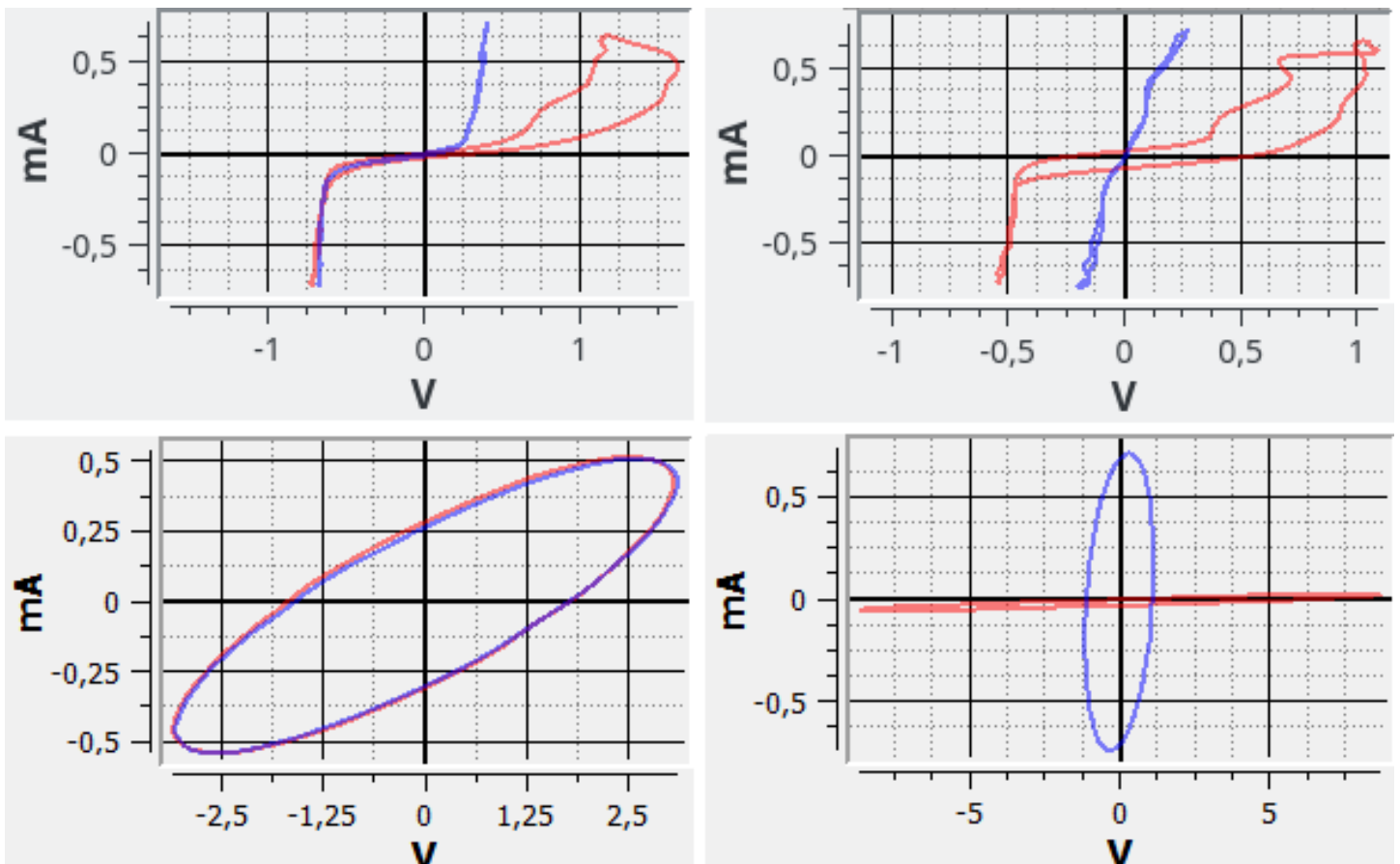
## EYEPOINT P10B - TEST MODE

**Loading board under test**

Load board under test into the EyePoint P10b and select it from the list of the reference boards. System works completely automatically after that. It doesn't matter how accurately board under test was loaded since EyePoint P10b will compensate for the loading offsets and start testing automatically.

**Testing**

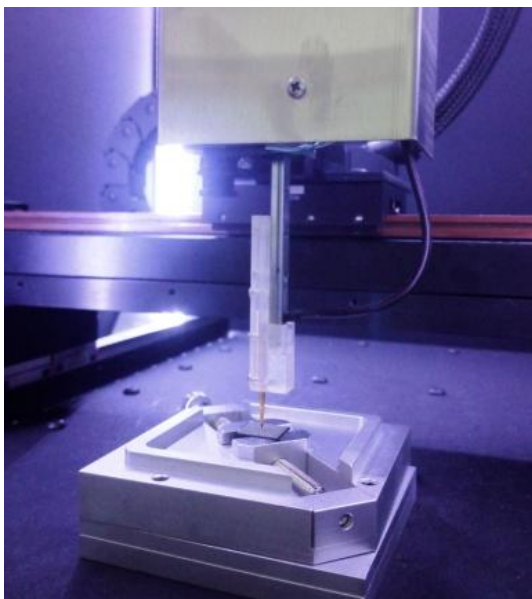
During test procedure, EyePoint P10b automatically compares the signatures of the reference and board under test. Defective outputs are marked in red in real time. Upon completion of the test procedure, the user will be given a complete report in HTML format, formatted for printing and subsequent analysis.



*Example of current-voltage signatures. The blue indicates the curve of the reference board, and the red indicates the test board. Non-matching curves will be included in the test report*

# EYEPOINT P10b

## FOR BGA



### A NEW APPROACH

EyePoint P10b is a new approach to the problem of counterfeit electronic component base for responsible applications. EyePoint P10b is a desktop automatic system for detecting counterfeit, re-marked or defective electronic components in BGA packages. EyePoint P10b compares the signatures (unique volt-ampere characteristics) of each output of the investigated chip with the original chip's stored reference data and determines not only about the serviceability of the checked chip, but also about its belonging to the specific series or revision of the original chip.

### DOES THIS SOUNDS FAMILIAR?

Have you ever purchased from an unscrupulous supplier exceptionally expensive FPGA which was not original, or re-marked, restored, killed by static or damaged by non-compliance with storage and transportation requirements?

Such defects are extremely difficult to diagnose by X-ray method, because the geometry of internal structures remains intact. In addition, X-rays are expensive and time-consuming. Culling can be done with a functional test, but such a test requires either sealing / soldering / reballing each component, or making an expensive residue and, in any case, developing software test code unique for each chip as well as using a specialized chip tester.

Optical inspection in many cases makes it possible to recognize a re-labeled or reconstructed BGA chip, but it is powerless in case of internal damage or degradation of the electrical characteristics of the chip.

With EyePoint P10b you will get the results quickly. For example all the pins of the component in the BGA484 package will be checked in less than five minutes. EyePoint P10b uses a flying probe and is able to work with BGA-cases with any existing location and lead pitch without the use of special equipment or manual adjustment.

EyePoint P10b does not need to be programmed: the location of all the pins of the BGA-chip under investigation will determine the built-in fully automatic optical scanner; comparison with the reference chip will produce built-in automatic signature analysis software.

### MINIMUM OF ACTIONS

You only need to place the chip in to the scanner and press the "Start" button. Everything else will be done automatically!



## FOR BGA

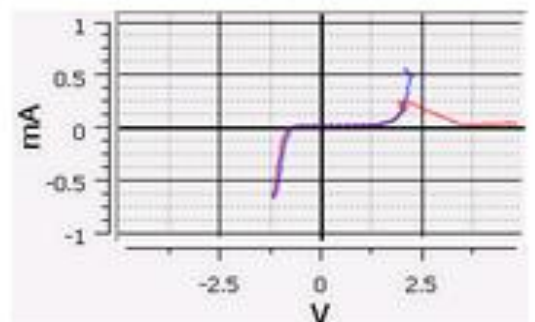
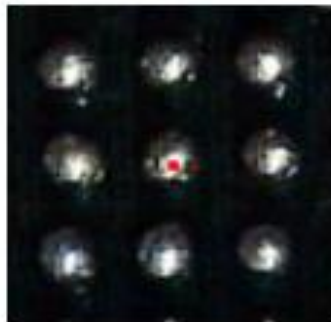
EyePoint P10b will be useful to an engineer involved in the development and / or repair of sophisticated electronic equipment for responsible applications:

For example it is good idea that the BGA component is workable and was not damaged during the reballing process before sealing it.

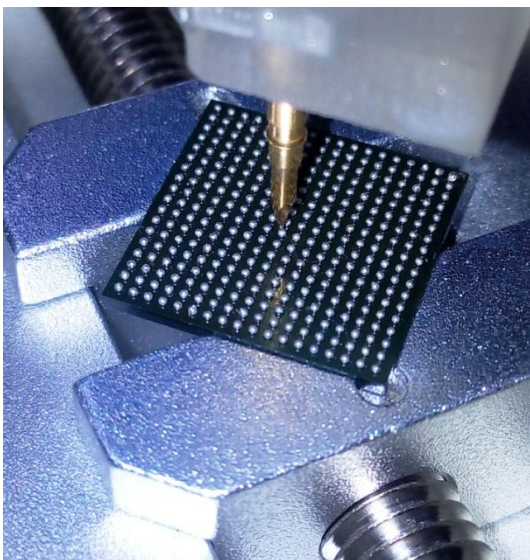
All you need to do is to place the suspicious component in EyePoint P10b, select the appropriate good component from the EyePoint P10b database and start the scan.

RESULTS WILL BE READY IN JUST FEW MINUTES LEAVING NO PLACE FOR DOUBTS  
ABOUT AUTHENTICITY OF THE COMPONENT IN QUESTION

BGA (pin 0)  
Score = 0.3812  
X = 11.52 mm, Y = 7.30  
mm



Detection of the defective output of the investigated microcircuit in the BGA package. The figure shows the difference in signatures for the output of the investigated chip and the original chip. Defect is marked in red



Determination of the pinout location of the BGA chip under investigation by the fully automatic optical scanner integrated into EyePoint P10b

EyePoint P10b is indispensable in the testing laboratory of any major supplier of modern microcircuits. If you have ever received a complaint from the customer about the malfunction of the delivered BGA components and they returned it simply check it on the EyePoint P10b.

Select the appropriate component from your warehouse or from the EyePoint P10b database and start the scan.

Have your customer ever burned the chip with a static and does not admit fault? In a few minutes you will know the answer.

EyePoint P10b is a non-destructive testing system. The methods used in EyePoint P10b do not lead to failure or degradation of the electrical parameters of the investigated chip.

# EYEPOINT P10B

## FEATURES

- Compact footprint (desktop sized)
- Cost effective
- Does not require documentation for the boards under test
- Does not require prior operators' training
- Easy to use
- Accurate diagnostics in automatic mode
- Powerful and simple software
- Minimal human participation - less than 15 minutes per PCB
- Real time progress monitoring
- Testing without applying power to the board
- Supports more than 50 component types
- Free database updates

## SPECIFICATIONS

- Maximum board size: 280x275 mm
- Scanning speed: 15 cm<sup>2</sup> / min
- Enclosure support: LQFP, SOIC, SMD, SOT, DIP, BGA, LGA, PGA, etc.
- Creating a test card.: up to 10 cm<sup>2</sup> / min
- Testing speed: 100 points per minute
- Accuracy of probe installation: 30 microns
- Time to change the card: 30 sec
- Test voltage: up to +/- 12 V
- Sensitivity to R: 2 Ohm - 450 kOhm
- Sensitivity to C: 300 pF - 100 uF
- Sensitivity to L: from 270 μH
- Dimensions and weight: 604x543x473 mm, 50 kg
- Managing PC: Intel i5 2.8 GHz, 16 GB RAM, 256 GB SSD
- Power supply: ~ 220V, 300W