OFFSHORE ELECTRONICS

INFORMATION SHEET

THE IMPORTANCE OF PCBA TESTING

From small consumer electronics such as a lamp controller to large-scale industrial equipment in the power generation sector, printed circuit board assemblies (PCBA) are central to the operation of virtually all electronic devices.

Reliability of PCBAs is a prerequisite and depends on a number of factors, all of which are important. These include the original board design, the specification and quality of the components and materials used, the care with which each assembly is manufactured, the production conditions and skills of machine operators, and the subsequent handling and assembly into the finished products. Reliability also depends on the manner in which assemblies are tested during and after the manufacturing process, as an incorrect test procedure may fail to detect production or component faults.

There are various test methods to prove the integrity of PCBAs, of which the two most commonly used are functional testing and in-circuit testing. Although, each has its place during the manufacturing process it is important to understand the differences between them if effective quality control procedures are to be implemented.

Continue reading overleaf >>>

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Functional testing vs. in-circuit testing

Put simply, a functional test does what it says: it checks that a device functions as it should. By comparison, in-circuit testing looks at each individual component on a PCBA to prove that it is the correct component, has been fitted to the board in the manner specified, and that it works. Exploring these two approaches further, highlights significant differences.

Functional testing looks at the complete, finished assembly and applies inputs and power to ensure the assembly performs its desired function to a certain specification.
The test does, however, require each assembly to be able to function independently; you cannot, for example, test an interface assembly if it requires a separate control or power assembly to function unless you test both assemblies simultaneously, or construct a suitable test rig. The test may also depend on additional data regarding the specification of associated boards or of the finished device.

Normally, a functional test only proves that the assembly basically operates. It does not usually detect the presence of faults in parts used as protection elements, which are inactive under normal operating conditions. Furthermore an assembly failing functional test will often need very skilled analysis to identify and rectify the root cause of failure.

Although in-circuit testing can include a degree of functional testing, its primary purpose is to validate each component. In some respects, it is a far more comprehensive process as components are tested independently against a program model containing parameters specific to the component and its functionality. This is performed in a structured manner, unpowered initially, to test for short or open circuits, followed by test of passive components and simple semiconductors. After this power is applied to facilitate test on the more complex semiconductors. The strength of this approach is that the faulty or missing component is automatically located without needing skilled engineering analysis.

In-circuit testing is performed using automatic test equipment (ATE). This requires a "bed of nails" fixture to be built for each project, which adds additional cost to the test process. Providing that the product volumes are high enough this is seldom a problem. The test program is written by our engineers, designed around the specification for the board design. In circuit testing is also generally very fast, typically just a few seconds for even a complex PCBA, which results in a lower cost per PCBA tested.

Both in-circuit tests and functional have their place. Ideally, both are used to confirm the complete integrity and functionality of each PCBA produced.
This may not always be cost effective and a decision then has to be made as to which method is most appropriate.

At Offshore Electronics, our preferred option is usually in-circuit testing since it offers a shorter test time and better faulty part diagnosis. If a fault is detected the ATE quickly identifies the exact problem and the fault can easily be repaired – but for functional test failures, faults need to be diagnosed using engineering resources.

In practice, we offer both options. Our production and test engineers work closely with all our customers to determine the most efficient and cost effective methods of validating and testing their PCBAs to their required specification backed by a detailed traceability system.

About Offshore Electronics

Offshore Electronics is a leading CEM company providing complete and cost effective contract electronics engineering solutions for any outsourced electronic manufacturing requirements. Offshore Electronics works in partnership with customers in a broad range of industries, ranging in size from SMEs to major corporates. The company provides a complete service, from design for manufacture to prototypes, through to electronics and electro-mechanical production and assembly, test and quality control, to customised packaging and delivery.

FOR FURTHER INFORMATION PLEASE CONTACT:

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