Keysight Technologies

EMI Compliance Test vs. EMI Pre-Compliance Test

Application Brief

KEYSIGHT TECHNOLOGIES

Why do we need to measure EMI emissions?

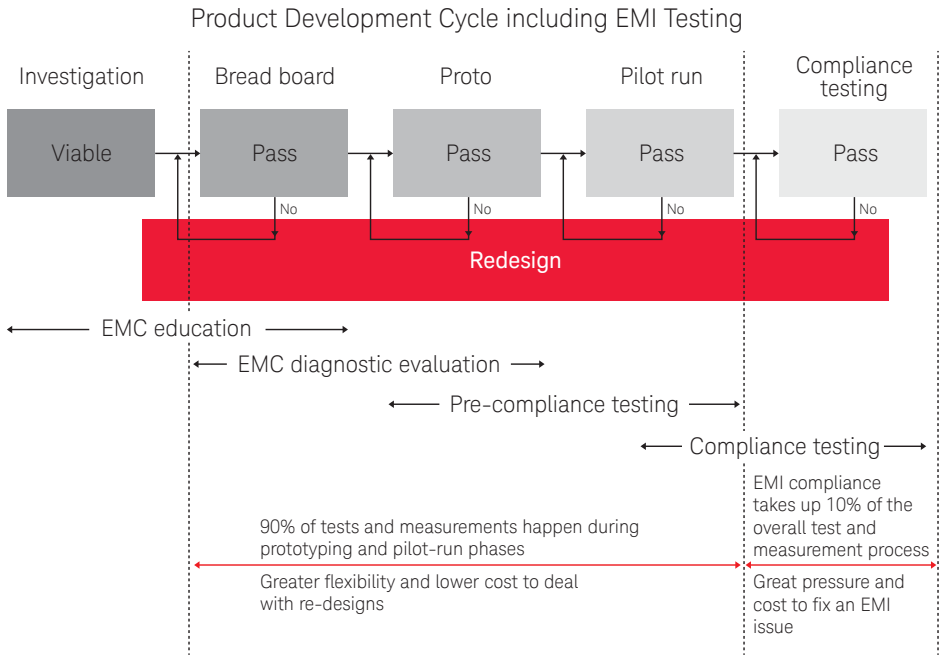
Electromagnetic interference (EMI) is caused by unintentional emissions of electrical signals from electronic equipment. Compared to natural sources of EMI, such as lightning, solar storms, we are more concerned about man-made, unintentional EMI emissions, for instance, modern cellular communication systems, broadcasting systems and a host of electrical components, which generate burst, pulse, CW or modulated signals.

To gain global market access, the manufacturers of electronic equipments must comply with region or country specific EMC directives and ensure that their products carry a corresponding mark of compliance.

The value of EMI pre-compliance test

1. **Reduce the risk of failing from EMI compliance at the end of a project**
   Depending on the level of EMI risk, manufacturers can self-declare their products as EMI compliant. However, most manufacturers prefer to have their products certified by an authorized third party service provider that is familiar with global standards and requirements. This type of EMI compliance test would ensure that the products are completely certified, ensuring minimal product recalls and penalties.

   However, the EMI compliance tests are usually conducted at the end of a project. Referring to the product development cycle chart below, you can see that 90% of tests and measurements (including EMI diagnostics test) happen from the bread board, thru proto to pilot run phases, while EMI compliance tests only comprise 10% of the process, and occur at the end of a project. The failure of EMI compliance tests can be costly for a project team. Therefore, you should take the opportunity during the early stages of product development cycle to minimize the risk of failing an EMI compliance test by conducting EMI diagnostic tests or pre-compliance tests.



2. **Greater efficiency and convenience for EMI troubleshooting in house, if you have a spectrum analyzer on your bench**
   EMI compliance tests will not tell you where failures are coming from. Radiated emissions may come from a USB, a LAN port, the seam of a shield, a cable, a buffer, a clock or even a power cord. You need to either troubleshoot by yourself or obtain troubleshooting services from the lab or a third party. In this situation, near-field test is the only way to locate such emission sources and is typically performed using a spectrum analyzer and a set of near-field probes.

Near-field probe and CXA signal analyzer test the emission of PC LAN port during design cycle before full compliance testing.

The differences between EMI compliance test and EMI pre-compliance test

	Compliance Test	Pre-Compliance Test
Purpose	To achieve certification (e.g. C-tick, CE, UL, KC, CCC, FCC)	To increase the confidence level at final compliance testing
Overall	Must follow the standard procedure	Not identical to, but able to follow the standard procedure as much as possible
Physical setup requirements	Must be done at a testing facility (for certification)	Can be done in-house, throughout the design process
	Must be in an anechoic chamber	Can be done in a shielded room, or an open room
	Must use an EMI receiver	EMI receiver or spectrum analyzer
	Must comply with test setup	Simplified test setup
Cost	Very costly and time consuming	Much lower cost incurred, quick turn-around
Result	Will report an EMI failure	Will report an EMI risk
	Unable to identify the cause of failure	Able to track to the interference source with a near-field probe

The differences between EMI receivers and general-purpose spectrum analyzers

The functionalities of an EMI receiver and a general-purpose spectrum analyzer optimized for EMI emissions measurement applications are almost similar.

EMI pre-compliance tests can be covered by either EMI receivers or spectrum analyzers with basic EMI features such as CISPR 16-1-1 compliant detectors and resolution bandwidth. Spectrum analyzers are usually less expensive but provides faster sweep speed than EMI receivers. EMI compliance test also requires conformance to a standard testing environment, which is hard for the majority of customers to achieve.

Summary

With a set of near field probes, the same spectrum analyzer used to verify RF products can be extended to evaluate your RF products' EMI performance during the product development cycle.

The advantage of running an EMI pre-compliance test with a spectrum analyzer is that – you can make a good estimation of the EMI performance of your new product, and further rely on the spectrum analyzer to diagnose unwanted emissions.

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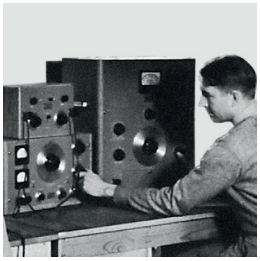

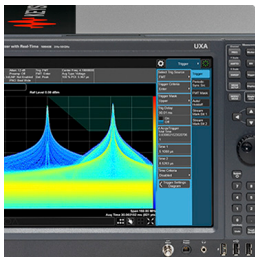

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