



# WHAT IS EMC TESTING

**NEWBURY ELECTRONICS LIMITED**  
50 YEARS OF MANUFACTURING QUALITY PRINTED CIRCUIT BOARDS\*

## What is EMC Testing?

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**“EMC stands for electromagnetic compatibility, which means a device’s ability to withstand without failure electromagnetic noise emitted by other devices.”**

Testing of products under EU guidelines to ensure they don’t either pollute the air waves or are susceptible to them is known as EMC testing. If a toaster either emits a lot of electromagnetic noise and upsets other electronic devices, e.g. your mobile phone, or it is unduly susceptible to noise emitted from another device, e.g. a call on your mobile phone causes the toast to ‘pop up’ when the bread is still white, the toaster is likely to fail EMC testing. To stop this sort of problem, the EU has issued a directive known as the EMC directive (89/336/EEC) that can be downloaded from the EU website, and any company putting an electronic device on the market must comply with these rules. The upshot of this is that devices are tested at specialist test houses to ensure they comply with the regulations.

### Correcting the Title

This testing has come to be known as ‘EMC testing’, but it is actually EMC and EMI testing. EMC stands for electromagnetic compatibility, which means a device’s ability to withstand without failure electromagnetic noise emitted by other devices;

EMI stands for electromagnetic interference, which means a device’s tendency to emit electromagnetic radiation that could disturb other devices. The title should read ‘EMC/EMI White Paper’, but it has come to be known as EMC in the vernacular.

### Is it an expensive black art set to suck up your resources?

Are you fearful that it is an arcane discipline, policed by ‘test house boffins’ who will take your money and tell you that your device fails? Does it make you feel out of control, or even stop you doing a product development?

It shouldn’t, but it is entirely understandable that it does. Field theory and testing is very complex and certainly an area requiring highly skilled people, but the directive de-skills the requirements and testing such that, with some guidance, anyone can feel in control.



## Who are you? What help might you need?

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A wide spectrum of people with differing skills attempt to get their products EMC tested. You may well be an entrepreneur with no knowledge of electronics. You may be an engineer, but have never dabbled in EMC and feel quite unsure of yourself, or you may be an EMC guru. The latter type will likely have seen many products to market and not be reading this article, but the other two cases will certainly get something from this paper.

### **Non-technical Entrepreneur:**

If you have no technical knowledge you will certainly have engaged an engineer/company to develop your product. It is very important that you establish that they have the skills to support you in obtaining EMC approval. It is not efficient to have a design house develop your product and someone else seeing it through EMC. Good design houses will have automatically included this in their original quotes for your product. In an ideal case the company will have given you a 'support contract' that stays with you until your product is in the market place.

This takes the sting out of this whole process for you because the development engineers, if competent, will know exactly how to meet the standards. [Newbury Electronics](#) can do this for you.

### **Engineer having in-depth knowledge of EMC:**

If you are an engineer you can follow the route in the previous paragraph. No shame in doing so, and it will free you to deal with other business activities that may be more suited to you. Alternatively, you may have designed the product yourself and wish to save some development funds and see it through EMC yourself. That is also fine.



## The EMC Bible

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**Golden Rule:**  
***There is a bible:  
 'EMC for  
 product  
 Designers,  
 Meeting the  
 European  
 Directive' by Tim  
 Williams***  
***(Currently in its  
 4<sup>th</sup> edition).***

The book 'EMC for Product Designers, Meeting the European Directive' is outstanding, and, if you study it and take a product/s through the system, you will become a guru. It only has just over 300 pages and is written in a style that is very digestible to someone with electronics knowledge. I don't really need to say any more for this category, because Mr Williams has it pegged, but there is a short cut; go to Appendix A and make sure you comply with the 'design checklist'.

It is easy to track the topics through the book. Everything is in this book. I will, however, go through the steps in the next section.

**Golden Rule:**  
***If you follow this  
 checklist you  
 reduce the  
 likelihood of an  
 EMC test failure  
 to a minimum.***



## Application Process

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**Golden Rule:**  
*Make yourself a supplier review checklist. Trust your gut when selecting test houses.*

- So, what is the process? It involves:
1. Select a test house
  2. Select product specific standards
  3. Testing of the prototype
  4. Review and re-design (if necessary)
  5. Re-testing and approval.

### Selecting a Test House:

If your test house is credible it will have UKAS approval. This is the thing to check if you want to make sure you are dealing with an organisation competent to test your product. You should visit several and benchmark them. If they are good they will talk through your product's features with you, help you decide which are the appropriate product standards, give you a tour of their site showing you how products are tested and commit to making a skilled technician available for you on the day who will help you detect problems, and, if possible, solve them (ferrites – ask them to explain these to you).

Make sure the supplier commits to having the first test set up when you arrive and equipment for subsequent tests available immediately. You pay approx. £1,000 a day (and it should all be possible in a day) and you don't want this money burned up whilst a technician is walking round trying to find equipment. This is more likely to be a problem in larger organisations where there is more than one test chamber and technicians competing for equipment. Remember you pay for every second of that day – make sure they earn it. There are a plethora of such test houses.



**Golden Rule:**

**You must have  
your  
development  
engineer with  
you, whether  
that is yourself  
or someone  
from design  
house.**

**Application Process (Cont.)****Selecting Product Standards:**

The EU EMC Directive gives overall guidelines, but the actual tests that will be in product specific standards. If you have a good test house they will have helped you select these. You would be well advised to have obtained a copy of the relevant one (use BSi Plus to purchase) and studied it prior to testing (if you are an engineer).

The best place to go looking for the standards is standards agency websites. For example,

[www.iec.ch/emc/emc\\_prod/prod\\_main.htm](http://www.iec.ch/emc/emc_prod/prod_main.htm). If you are using a design house make them walk you through this process and explain why they have picked whatever standards they have.

**Testing of the Prototype:**

This usually takes about a day of off-site testing.

The testing is done in a Faraday Cage. This is a room designed so that no ambient electromagnetic radiation can affect the results of your testing.

Don't panic if you get a test failure. If the problem is coming from noise conducted along cables, for example, ferrite beads can be put on cables which may remove the problem.

If the problem is not so straightforward the test house should give you advice about how the problem may be solved.

Basically, there are 2 types of assessment of EMC/EMI. Tests for radiated problems (in other words the noise is coming from the atmosphere) and those for conducted problems (it is coming through cables).

In order that they make money, test houses will usually be very strict about the time they start and finish. Be equally strict with them about continuous, uninterrupted work in between these times.



## Application Process (cont.)

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### Review and Re-design

It is possible you will leave the days testing with failures and have to face coming back for more. Make sure you are very clear about what needs to be done, which means grilling your design engineer and the test house. If you have followed Mr Williams guidelines (see ref above) and the right tests have been done there is a good likelihood this will not be necessary.

### Re-testing and Approval

Your test house will issue you with test results and a certificate. You need this for your CE technical construction file.

## About Newbury Electronics

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Newbury Electronics offers full printed circuit board (PCB) services, from design to manufacture, assembly and testing. The company's origins began in 1956 and every year we produce over 10,000 PCB designs for our clients.

For more information about Newbury electronics and the services we offer please visit

[www.newburyearound.co.uk](http://www.newburyearound.co.uk).

## Questions & Comments

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After downloading this white paper you can leave feedback and ask questions regarding EMC Testing [here](#).

