

ECMA

Standardizing Information and Communication Systems

**A Guide to the Application of
the EMC Directive to ITE**

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1 Summary

The EMC Directive^[1] and the European Commission Guidelines^[2] apply to a great diversity of equipment and are therefore written in general terms. Interpretation of how the requirements apply to ITE is often difficult and can lead to widely differing practices between manufacturers. This Guide is intended to supplement the European Commission Guidelines and clarify their application to ITE.

It represents the interpretations and recommendations agreed by the ECMA member companies, and is not intended in any way to be legal advice. ECMA accepts no responsibility for any consequences a manufacturer may face as a result of following these recommendations.

[1] Council Directive 89/336/EEC of 3rd May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (Official Journal of the European Communities, L139, 23rd May 1989).

[2] Electromagnetic Compatibility EMC – Guide to the application of Directive 89/336/EEC (Office for Official Publications of the European Communities, 1997 – ISBN 92-828-0762-2).

2 Objective

To clarify the scope of the EMC Directive in relation to ITE apparatus, components and systems, and to make recommendations on how to comply with its requirements for conformity assessment, the EC Declaration of Conformity (EC DOC) and the CE Mark.

NOTE

The CE Mark implies that the device complies with all applicable Directives; this Guide addresses only the requirements of the EMC Directive.

3 Scope of the Directive

The EMC Directive applies to "apparatus", defined as electrical equipment which is liable to generate electromagnetic disturbance or suffer degradation of performance as a result of electromagnetic disturbance, and which is "placed on the market" or "taken into service" as a single commercial unit. In reference to Articles 1 (1) and 2 (1) of the EMC Directive, and the European Commission Guidelines Chapter 5.1.

Apparatus includes the following;

3.1 Individual Finished Devices

Refer to European Commission Guidelines Chapters 6.3 and 6.3.1.

Individual finished devices that are not intended solely for incorporation into other apparatus are considered to be apparatus for the purposes of the EMC Directive. Examples are:

- Computers
- Computer peripherals
- External disk drives
- External power supplies
- Battery chargers
- AC/DC adapters
- Single line telephone / data terminal equipment

3.2 Systems

Refer to European Commission Guidelines Chapter 6.4.2.

"Systems", defined as combinations of separate devices intended to be placed on the market together as a single commercial unit, are considered to be apparatus for the purposes of the EMC Directive. A system fulfils one or more of the following criteria:

- (a) It is advertised in sales literature under a single product identity i.e. Product type number, model number, part number or stock number.

(b) The combination of devices is specified by the manufacturer but may be tailored to suit the needs of the user.

(c) Not all of the devices are available separately.

Examples are:

- Combination of PC and peripheral device(s) advertised for sale together under a single product identity.
- Computer with internal configuration specified by the user from a list of options specified by the manufacturer for that computer.
- "Modular" PC for which the internal configuration is specified by the system integrator, or by the user from a list of options specified by the integrator.
- Telecommunications / data switches and multiplexers.

3.3 Components with a Direct Function

Refer to European Commission Guidelines Chapter 6.2.3.

Components, subassemblies or other devices which are intended for incorporation into apparatus, and which have a "direct function" for the end user, are considered to be apparatus for the purposes of the EMC Directive. A "direct function" is any function performed directly for the user of the apparatus.

Examples of components with a direct function are:

- Adapter cards
- Cards or modules that expand or enhance the minimum level of function of the apparatus, e.g. memory expansion or processor enhancement / duplication
- Internal disk drives
- Telecommunications and data terminals which operate as an entirety with a single switch (system terminals)

In general, a component with a direct function and which is placed on the market as a spare part is considered to be apparatus. However, there is one exception to this rule; see Section 4.3.

3.4 Installations

Refer to European Commission Guidelines Chapter 6.5.

Fixed installations, defined as any combination of equipment, system, individual finished products and components, assembled or erected by an assembler / installer at a given place to operate together to perform a specific task, but not intended to be placed on the market and a single commercial unit, are considered to be "apparatus" for the purposes of the EMC Directive. In general, the user does not specify the combination of devices which constitutes the installation.

It is considered that no ITE falls under the definition of "installation".

4 Products outside the scope of the EMC Directive

"Apparatus" does not include the following:

4.1 Combinations of devices not placed on the market as a Single Commercial Unit

Refer to European Commission Guidelines Chapter 6.4.1.

Combinations of separate devices connected or installed together by or for the user, but not placed on the market together as a single commercial unit, are not considered to be apparatus for the purposes of the EMC Directive. Such a combination fulfils one or more of the following criteria:

- (a) The constituent units are placed on the market in separate sales transactions, and not advertised in sales literature under a single product identity.
- (b) The user specifies the combination of devices.

Examples are:

- PC, monitor, keyboard and printer etc. purchased together by the user but available individually from the manufacturer.
- Host CPU with terminals or workstations spread throughout a building, e.g. office building, factory, bank or supermarket

4.2 Components without a Direct Function

Refer to European Commission Guidelines Chapter 6.2.2.

Components, subassemblies or other units which are intended for incorporation into apparatus, but which have no "direct function" for the end user, are not considered to be apparatus for the purposes of the EMC Directive.

Examples are:

- Components forming parts of electrical circuits, e.g. Resistors, capacitors, coils, transformers, diodes, transistors.
- Cards or modules required for the minimum level of function of the apparatus, e.g. central processing, minimum memory.
- Internal power supplies, including batteries.
- Cathode ray tubes, light-emitting diodes (LED's), liquid crystal displays (LCD's).
- Private Telecommunications and Data Networks.

Apparatus in which such components are incorporated must conform to the requirements of the EMC Directive. It may therefore be necessary to perform EMC tests on the component when installed in a typical apparatus.

4.3 Spare parts for non-CE Mark Apparatus placed on the Market before 1st January 1996

Refer to European Commission Guidelines Chapter 7.4.

A component which is placed on the market as a spare part, even if it has a direct function as defined by Section 3.3 of this Guide, is considered to be outside the scope of the EMC Directive if it is EXCLUSIVELY intended for the replacement of an IDENTICAL part of a unit which does not comply with the EMC Directive because it was placed on the market before 1st January 1996 (the date at which the EMC Directive became mandatory).

4.4 Devices which are unable to cause electromagnetic disturbances

Refer to European Commission Guidelines Chapter 5.3.

Devices which are intrinsically unable to cause, or have their performance degraded by, electromagnetic disturbances are not considered to be apparatus for the purposes of the EMC Directive. This includes interface cables and connectors.

NOTE

Cables and connectors may propagate electromagnetic disturbances, but are not capable of causing or having their performance degraded by them.

5 Placing on the Market / Taking into Service

Refer to European Commission Guidelines Chapters 3.1 and 3.2.

"Apparatus" may only be "placed on the market" or "taken into service" in the EEA after it has undergone the conformity assessment procedures of Article 10 of the EMC Directive, and the CE Mark has been affixed.

"Placing on the market" for the purpose of the EMC Directive, means the first making available in the EEA, against payment or free of charge, of a unit of apparatus, for the purpose of distribution and/or use on EEA territory. It includes:

- (a) The passing of a unit newly-manufactured in the EEA from the manufacturing stage to the stage of distribution or use on EEA territory.

- (b) The passing of a unit newly-manufactured outside the EEA from the importing stage to the stage of distribution or use on EEA territory.
- (c) The re-sale of a unit to a party within the EEA from a party outside the EEA, having never before been placed on the market in the EEA.

It does not include:

- (a) The supply of a device EXCLUSIVELY for incorporation into apparatus, in a professional assembly operation.
- (b) The supply of an unfinished device to an assembler or integrator for further manufacture.
- (c) The re-sale of a unit to a party within the EEA from another party within the EEA.
- (d) The manufacture of a unit in the EEA for export to a non-EEA country.
- (e) The import of a unit into the EEA for the purpose of re-export to a non-EEA country, either with or without further manufacture.
- (f) The display of a unit at a trade show (see Note).
- (g) The temporary disposal of a unit from the manufacturer to another party for compliance testing or customer demonstration purposes (see Note).
- (h) The export or use of engineering prototypes.

"Taking into service", for the purpose of the EMC Directive, means the first use of a unit on EEA territory, by the end user. When a unit is manufactured in the EEA for sole use of the manufacturer, or imported into the EEA for the sole use of the importer, it is not placed on the market, but conformity with the Directive is nevertheless required before the unit can be taken into service.

"Taking into service" does not include;

- (a) Operation of an engineering prototype by the manufacturer.
- (b) Operation of a device at a trade show. (See Note)
- (c) Operation of a device by a party other than the manufacturer for the purpose of compliance testing, or by a prospective customer for "Beta" testing. (See Note)

NOTE

If apparatus is displayed at a trade show before conformity with the EMC Directive has been determined or achieved, then the following notice should be displayed along with it:

"Conformity of this apparatus with the requirements of European Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic compatibility has not yet been assessed and declared. This apparatus is exclusively for exhibition and is therefore not "placed on the market" within the meaning of the Directive. It will not be placed on the market until conformity has been verified and declared."

If the product is shipped into the EU or across internal borders for compliance testing or "beta" testing, it is recommended that the documentation accompanying the product includes a similar statement ("exhibition" in the text may be replaced by "testing" as appropriate).

6 Conformity Assessment and EC Doc

The following sections of this guide assume that the harmonised standards procedure of Article 10 (1) of the EMC Directive is used. The Technical Construction File (TCF) procedure of Article 10 (2) is not addressed in this Guide because the contents and use of the TCF depend very much in the individual case, making advice over and above that in the European Commission Guidelines impossible. However, what the following Sections say about the EC DOC is applicable to both the Article 10 (1) and 10 (2) procedures.

The procedures of Article 10 (5) for radiocommunications equipment are not addressed in this guide.

6.1 An Individual Finished Device

Generally, the manufacturer tests to the applicable harmonised standards and draws up an EC DOC. If the device is normally used in combination with other apparatus, then it should be tested in one or more typical combinations.

6.1.1 Variants of an Individual Finished Device

Refer to European Commission Guidelines Chapter 6.4.3.

If several variants of the device are marketed under the same product identifier, then only one EC DOC is necessary. If it is possible to identify the likely "worst-case" variant, then only this variant need be tested. If the variants are likely to have similar EMC characteristics, then only a typical variant need be tested.

If there are variants of an apparatus consisting of the same basic device with various internal "plug-in" options available in various combinations, then a number of typically-configured units should be tested to cover all the different options. Plug-ins which have already been tested in similar devices may be omitted unless their compliance was marginal.

In all cases, the manufacturer is responsible for the compliance of all variants.

If compliance with the applicable harmonised standards is claimed for all variants based on limited testing as above, it is not necessary to compile a TCF or use the services of a Competent Body. The harmonised standards have been applied, even if not all the possible variants have been tested. The EMC Directive does not explicitly require any testing at all, even under the Article 10 (1) procedure.

Some manufacturers nonetheless use a TCF in this situation, as a safeguard. But there is nothing in the EMC Directive which permits the use of Article 10 (2) as a "comfort" option when Article 10 (1) has been used. Articles 10 (1) and 10 (2) are mutually exclusive; either the harmonised standards have been applied in full, Article 10 (1), or they have not, Article 10 (2).

6.1.2 OEM Devices

For devices manufactured by one party ("Manufacturer") but marketed by another ("Marketer") under the latter's registered name, logo or mark, either party may assess the conformity of the device, and either party may make the EC DOC. For example, the "Marketer" may appoint the "Manufacturer" as his authorised representative (see European Commission Guidelines Chapter 3.4), conferring these responsibilities on him. In either case, the signatory of the EC DOC is legally responsible for the compliance of the device.

If the "Manufacturer" also markets the device under their own registered name, logo or mark and has an EC DOC for the device, it is still necessary for there to be an EC DOC showing the identity of the device as marketed by the "Marketer". The conformity of the device need only be assessed once, but if one party signs an EC DOC based on the other's conformity assessment, the signatory of the EC DOC is legally responsible for the compliance of the device.

The two parties may come to a contractual agreement which defines which party will undertake the conformity assessment and which will issue the EC DOC.

6.2 Devices undergoing further Manufacture or Modification

An unfinished device sold only to an assembler or integrator for further manufacture is exempt from the EMC Directive. The assembler or integrator who places the final apparatus on the market is responsible for its full compliance, including an EC DOC and CE Mark.

A finished device which complies with the EMC Directive may be sold to an assembler or integrator for modification or addition of extra features. The party who places the modified apparatus on the market is responsible for its compliance, including an EC DOC and CE Mark.

In either of the above cases, if the further manufacture or modification uses the same parts as those used by the original manufacturer and the final apparatus corresponds to one marketed by the original manufacturer, then under a contractual arrangement, the assembler or integrator may use the original manufacturer's test report and EC DOC to back up his own EC DOC.

If, in either of the above cases, the further manufacture or modification results in a product type which has never before been placed on the market, but the additional parts used in the further manufacture or

modification have themselves been tested in similar applications, then based on the consideration of pass margins, good engineering practice and adherence to any conditions / limitations attached to the used of the additional parts, it may be considered that testing of the product is unnecessary because the risk of non-compliance is low.

Generally, if the modification is simply the addition of a plug-in part (e.g. a PCB) which has already been tested in a similar product, then the EC DOC may be issued without further testing.

6.3 Modular Devices

The assembler who places a modular device on the market is responsible for its full compliance, including an EC DOC and CE Mark.

In general, there will be a number of variants of the device, e.g. different clock speeds or disk drive capacities, but all having the same mother board and chassis. If testing is performed, then it is sufficient to test what is considered to be the worst case, from the EMC viewpoint.

If, for example, a modular PC consists of components (e.g. power supply, CPU board, disk drive, memory cards, adapter cards, etc.) which have been tested in similar applications, then based on consideration of pass margins, good engineering practice and adherence to any conditions / limitations attached to the use of the component, it may be considered that testing of the modular PC is unnecessary because the risk on non-compliance is low.

This approach needs great caution. Both emissions and immunity depend a great deal on e.g. the type of enclosure in which the component was tested, the routing of the ground wires and the type of connection, and the type of cable connecting the power supply to the power distribution network. It may not be possible to obtain the test reports for various modules. The test results from non-accredited laboratories will not normally state the measurement uncertainty associated with emission measurements. Furthermore, test reports rarely show pass margins for immunity tests. For components not covered by the EMC Directive, despite what the European Commission Guidelines state, it cannot be mandatory for suppliers of such components to provide any advice regarding their use, however desirable that may be.

If no testing is performed, the assembler should record the rationale and keep it in a product file. He would still face the legal consequences if the apparatus were subsequently found not to comply; the authorities might possibly consider the above actions to mitigate the offence to some degree.

6.4 Systems placed on the market as a Single Commercial Unit

Refer to European Commission Guidelines Chapter 6.4.2.

The constituent units need not have EC Declarations of Conformity or have a CE Mark if they are not placed on the market separately or are not "apparatus" within the meaning of the EMC Directive.

The whole system may be manufactured and placed on the market by one manufacturer; or it may consist of devices from different manufacturers and be placed on the market by one of them; or it may be placed on the market by a professional assembler or integrator who did not manufacture any of the devices.

The system as a whole must comply with the essential requirements of the EMC Directive. The party placing the system on the market is responsible for compliance.

If the constituent parts of the system have been tested in similar applications, then based on consideration of pass margins, good engineering practice and adherence to any conditions / limitations attached to the use of the constituent parts, it may be considered that testing of the system as a whole is unnecessary because the risk of non-compliance is low. The immunity performance of a constituent part is not so dependent on the system configuration if the part performs the same or similar function as in the configuration in which it was tested. If no testing or only limited testing is performed, the responsible party should record the rationale and keep it in a product file. He would still face the legal consequences if the system were subsequently found not to comply; the authorities might possibly consider the above actions to mitigate the offence to some degree.

The responsible party must hold an EC DOC. The EC DOC must uniquely identify the system, either by reference to an identifier under which it is marketed, or by listing the part numbers of the "highest level" parts, i.e. there is no need to list the part numbers of the components of an assembly which itself has a part number.

The "main part" (e.g. processor) of the system must be CE Marked. If the main part is already CE Marked by virtue of being separately placed on the market, there is no need for an additional CE Mark. The CE Mark already present on any other constituents of the system may be retained.

The system must be accompanied by instructions for assembly / interconnection / installation, and these may contain limitations / conditions of use, e.g. they may specify the use in a particular environment.

The EMC characteristics of each individual unit must be suitable for the system to be used in its intended environment. For example, if a system intended for use in an industrial environment consists of a controller which has been tested to immunity levels appropriate to that environment, together with terminals or peripheral devices more usually used in a residential or commercial environment, these devices must nevertheless be tested to industrial immunity levels.

Refer to examples 1, 2, 4, 5 and 6 in annex A.

6.5 Combinations of devices not placed on the market as a Single Commercial Unit

Refer to European Commission Guidelines Chapter 6.4.1.

The constituent devices are placed on the market individually and therefore each has an EC DOC and is CE Marked. Each device type in the system generally has been tested in some representative configuration(s).

The combination may be placed on the market either by the manufacturer or by a third party, e.g. dealer.

The EMC Directive does not apply to such a combination. There is no need for any further testing, and no need for any EC DOC or CE Mark in addition to those which already exist for the individual units.

Each unit is accompanied by instructions for the end user for assembly / interconnection, and these may contain limitations / conditions of use, e.g. they may specify the use of particular cables / connectors and use in a particular environment.

Refer to examples 3 in annex A.

6.6 Component with a Direct Function

These are treated in the same way as an individual finished device, as above.

If the component is included in an individual finished device which is placed on the market and which has been tested, then this suffices to show compliance of the component. Details of the device in which the component was tested should be kept in a product file, preferably with a copy of the test report.

7 Applicable Harmonised Standards

Refer to EMC Directive, Article 7.

Harmonised standards which may be applied to demonstrate conformity with the EMC Directive are published by CENELEC (European Committee for Electrotechnical Standardisation) and ETSI (European Telecommunications Standards Institute), under mandates issued by the European Commission, and are listed in the "Official Journal of the European Communities" (OJEC).

Compliance with the applicable harmonised standards confers on an apparatus the "presumption of conformity with the essential requirements of the EMC Directive" in the words of the European Commission (see the European Commission Guidelines Chapter 14.1). This means that the apparatus is assumed to comply with the essential requirements until some evidence to the contrary is produced e.g. if it is found to cause interference.

The most recent list was published in OJEC C57 (27.02.99), and replaces all previous lists. For each standard in the list, the reference of the superseded standard is given, and also a "date of cessation of presumption of conformity of the superseded standard". This is the latest date for which the superseded standard may be used to demonstrate conformity. Between the date of listing of the new standard in the OJEC and the date of cessation of presumption of conformity, either the new standard or the superseded standard may be used. After that date, only the new standard may be used (even for continuing manufacturing of product types existing before that date).

NOTE

Where no standard is superseded, the appropriate generic standard may be used until the date of cessation of presumption of conformity specified with the new standard.

The list in OJEC C57 may be viewed on the European Commission web site at URL;
<http://europa.eu.int/comm/dg03/directs/dg3b/newapproa/eurstd/harmstds/reflist/emc.html>

CENELEC publish four types of EMC standard, as explained in the CENELEC Report R110-001 ("Guide on EMC standardisation for product committees").

A "basic" standard generally specifies test methods which are referenced in other types of standard, thus avoiding the need to reproduce the same test method in many different standards. The basic standards significant for testing to EMC Directive requirements are generally in the EN 61000-4-X series. They contain no performance criteria and therefore (as stated in the CENELEC Report), "conformity of products with basic standards has no significance and therefore they will not be included in the official list to be published in the OJEC". They should not, therefore, be referenced on an EC DOC. (Manufacturers might consider these facts when responding to customer queries about compliance with basic standards).

A "generic" standard applies to all apparatus likely to be used in an environment specified in its scope; at present there are two pairs of generic standards, one for the residential, commercial and light industrial environments (ENs 50081-1 and 50082-1), and one for the (heavy) industrial environment (ENs 50081-2 and 50082-2).

Generic standards specify performance requirements, but refer to basic standards when specifying test methods. Generic standards are listed in the OJEC.

A "product family" standard applies to a wide product sector (such as ITE) which may include various types of apparatus (e.g. PCs, printers, monitors etc.). For example, EN 55022 is the product family standard for RF emissions from ITE. Product family standards specify performance criteria, but generally refer to basic standards for test methods. Product family standards are listed in the OJEC.

A "dedicated product" standard applies to a particular product type, but is otherwise similar to a product family standard.

If a particular apparatus is within the scope of a generic, product family, and a dedicated product standard, it is only necessary to apply one of them. The aforementioned CENELEC Report states that dedicated product standards take precedence over product family standards, which in turn take precedence over generic standards.

The following sections identify the standards which are applicable.

7.1 RF emission standards

7.1.1 ITE

For ITE, EN 55022 applies. ITE is defined in EN 55022 as any equipment which has:

- a) a primary function of (individually or in any combination) entry, storage, display, retrieval, transmission, processing, switching, or control of data or of telecommunication messages, and may be equipped with one or more terminal ports typically operated for information transfer;
- b) a rated supply voltage not exceeding 600 V.

This definition includes, for example, data processing equipment, office machines, electronic business equipment and telecommunication equipment.

Any equipment (including that which is a part of ITE) which has a primary function of radio transmission and/or reception as defined in the ITU Radio Regulations, is excluded from the scope of EN 55022. Such equipment must comply with the national radio regulations in the country in which it is used. EN 55022 still applies to that part of the equipment which has no transmission or reception function.

There are various versions of EN 55022;

EN 55022 (1994) was published by CENELEC in August 1994. It is identical to CISPR 22, second edition (1993).

Amendment A1 was published by CENELEC in May 1995. It deals with the testing of printed wiring boards (in Clause 9.1) and is identical to Amendment A1 (1995) of CISPR 22 (1993).

Amendment A2 was published by CENELEC in August 1997. It adds more specific test set-ups and diagrams, and EUT operating conditions. It is a modified version of Amendment A2 (1996) of CISPR 22 (1993).

EN 55022 (1998) was published in September 1998. It is a modified version of CISPR 22, third edition (1997), incorporating EN 55022 (1994) and its Amendments A1 (1995) and A2 (1997), together with new limits and methods of measurement for conducted disturbances emanating from telecom ports.

EN 55022 (1987), EN 55022 (1994), and its Amendments A1 (1995) and A2 (1997) were listed in OJEC C57 (27th February 1999). The date of cessation of presumption of conformity of superseded standards for EN 55022 (1994) and for both its amendments has expired; for EN 55022 (1998), it is 1st August 2001.

This means that, until 1st August 2001, presumption of conformity is given by applying either of the following versions of the standard:

EN 55022 (1994) + A1 (1995) + A2 (1997).
EN 55022 (1998).

From 1st August 2001, EN 55022 (1998) must be applied.

Several further amendments are under consideration in CISPR.

7.1.2 Class A or Class B ?

The issue of whether ITE used in environments other than residential should comply with the Class B or the less stringent Class A limit, in order to satisfy the requirements of the EMC Directive, has caused much concern to manufacturers.

EN 50081-1 (1992) requires that equipment intended for use in the residential, commercial, and light industrial environments complies with the Class B limit of EN 55022, while EN 50081-2 (1993) allows equipment for use in the heavy industrial environment to comply with Class A limit. EN 55022 does not rigidly relate the A and B classification to particular environments but states that "Class B ITE is intended primarily for use in the domestic environment".

A product specific standard such as EN 55022 takes precedence over the corresponding generic standard(s) and confers on an apparatus the presumption of conformity with the requirements of the EMC Directive.

While EN 55022 does not generally preclude the use of Class A ITE in a residential environment, such use would give a higher probability of interference being caused than if Class B ITE were used. In the event of interference being caused, some countries have national EMC regulations which may be invoked to prohibit the user from operating the equipment and/or the manufacturer from manufacturing it. It is recommended that ITE likely to be used in a residential environment (e.g. a desktop PC) complies with the Class B limit.

ITE used in the office / light industrial environment may in general be Class A. It is less likely to be close enough to susceptible equipment to cause interference. It should be noted, however, that this is not always the case. For example, the office environment might be a high street bank with residential apartments above it. Again, national EMC regulations may be invoked if interference is caused.

EN 55022 requires Class A ITE to have a warning statement included in its instructions for use. The text of the warning is as follows:

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

A PC used in the office environment may contain an adapter which connects it to e.g. a local area network. When the adapter is active, the PC may comply with the Class A limit but not the Class B limit. With the adapter inactive, the PC may comply with the Class B limit. It may be disconnected from the local area network and taken home for use there with little risk of causing interference. In such a case, the instructions for use must make this distinction clear.

If the adapter is sold as an integral part of the PC (i.e. it is not possible to purchase the PC without the adapter), the EC DOC for the PC should indicate that it complies with the Class B limit of EN 55022 with the adapter inactive, and the Class A limit with the adapter active.

If the adapter is sold separately to the end user, then it should have its own EC DOC which indicates that it complies with Class A limits of EN 55022.

7.1.3 Non-ITE

If a product falls outside the above definition of ITE but is within the scope of another product (family) standard, then that standard applies; but note that the scopes of EN 55022, EN 55011 (RF industrial, scientific and medical equipment), EN 55013 (broadcast receivers and associated equipment) and EN 55014-1 (household appliances, electrical tools and similar apparatus), are stated in those standards to be mutually exclusive.

Products which do not fall within the scope of any product (family) standard must comply with either EN 50081-1 (1992) or EN 50081-2 (1993) (the latter only if their use is likely to be restricted to the heavy industrial environment).

7.2 LF emission standards

According to CENELEC Standing document CLC(PERM)009 ("Guidance on how to use the standards for the implementation of the EMC Directive") ITE likely to be used in the home should comply with EN 60555-2 (1987), which specifies harmonic current limits for household appliances and similar electrical equipment.

It does not require compliance with EN 60555-3 (voltage fluctuations and flicker), although the scopes of the two standards are nominally identical; presumably it is considered that the type of ITE used in the home is unlikely to cause voltage fluctuations (which are usually associated with the start-up of motors drawing large inrush currents).

EN 61000-3-2 (limits for harmonic current emissions for equipment with input current upto and including 16 A per phase) and EN 61000-3-3 (limits for voltage fluctuations and flicker for equipment with rated current upto and including 16 A) were listed in OJEC C101 with dates of cessation of presumption of conformity of 1st January 2001.

Note 4 following the list, and referenced in the list entry for EN 61000-3-2, states that:

"For products that are not in the scope of EN 60555-2:1987 the generic standards give presumption of conformity until 1st January 2001."

Note 5 is an equivalent statement concerning EN 60555-3 and EN 61000-3-3.

The "generic standards" are the generic emission standards EN 50081-1 (residential commercial and light industrial environments) and EN 50081-2 (industrial environment).

EN 50081-1 requires compliance with ENs 60555-2 and -3, but only for equipment within the scope of those standards. EN 50081-2 has no normative requirements for the limitation of harmonics and flicker; an informative annex states that limits are "under consideration by IEC SC77A". Therefore there are no limits for harmonics and flicker for products outside the scope of ENs 60555-2 and -3 until 1st January 2001.

After that date, all apparatus within the scopes of ENs 61000-3-2 and -3 must comply with those standards (including continuing production of apparatus types existing before that date).

Clause 7.4 of EN 61000-3-2 states that the Class D limits (which apply, for example, to most personal computers) apply only to equipment with an active input power exceeding 75 W, but will apply to equipment with active input power exceeding 50 W "four years from the date of implementation of the standard". ECMA interprets this to mean that the change in applicability will occur on 1st January 2005.

7.3 Immunity standards

At present, two versions of the generic immunity standard for the residential, commercial and light industrial environments are valid:

EN 50082-1 (1992), with requirements for immunity to three types of disturbance, and EN 50082-1 (1997), with requirements for immunity to seven types of disturbance. The date of cessation of presumption of conformity for EN 50082-1 (1992) has expired; for EN 50082-1 (1997) it is 1st July 2001.

EN 50082-2 (1995) is the generic immunity standard for the industrial environment. It specifies immunity to five types of disturbance, generally at higher test levels. The date of cessation of presumption of conformity for this standard has expired.

ITE which complies with the Class A limit of EN 55022 does not necessarily have to comply with EN 50082-2, the immunity requirements for apparatus used in the industrial environment. If a device is not intended for use in an industrial environment as defined in that standard, the residential, commercial and light industrial test levels of EN 50082-1 are sufficient to show conformity with the immunity requirements of the EMC Directive.

EN 55024 (1998), a product family immunity standard for ITE, was published in September 1998. It will be a modified version of the published CISPR 24:1997. It is listed in OJEC C57, with a date of cessation of presumption of conformity of 1st July 2001.

This means that, until 1st July 2001, ITE to be used in the residential, commercial and light industrial environments, presumption of conformity is given by applying either of the following standards:

EN 50082-1 (1992)
EN 50082-1 (1997)
EN 55024 (1998)

Until 1st July 2001, ITE likely to be used in the industrial environment, presumption of conformity is given by applying either of the following standards:

EN 50082-2 (1995)
EN 55024 (1998)

From 1st July 2001, EN 55024 (1998) must be applied.

7.4 Deviations from test methods in standards

A laboratory testing for compliance with a harmonised standard may, for a variety of reasons, choose not to perform the test precisely as specified in the standard (or as specified in the basic test method standard invoked by the harmonised standard).

If the test method used deviates from the standard, then provided that the test results, together with any other relevant information (e.g. characteristics of the equipment under test (EUT), results of previous testing on similar EUTs, etc.) can be used as the basis for concluding that there is a high probability that the EUT complies with the requirements of the harmonised standard, then the Article 10 (1) procedure is applicable and no Technical Construction File is necessary. This would be the case if, for example:

- test or measurement instrumentation or facilities not satisfying the specifications in the standard (in respect of, for example, receiver detector type and bandwidth, site attenuation, antenna characteristics, transducer factor, network impedance, disturbance generator waveform, etc.) were used, but it was possible to correlate the results with the prescribed instrumentation;
- it is clear from the characteristics of the EUT that it is intrinsically unable to generate disturbances which would exceed the applicable limits in particular frequency bands, and for that reason the disturbance level has not been measured in those frequency bands;
- it is clear from the characteristics of the EUT that the application of a test disturbance at a particular frequency, or to a particular test point or port would not degrade its performance, and for that reason the disturbance has not been applied at that frequency, or to that point or port.

EN 45001 (“General criteria for the operation of testing laboratories”) which is the basis for the accreditation of test laboratories requires the details of any deviation from the prescribed test method to be given in the test report. The rationale for the deviation, and for the conclusion that there is a high probability that the EUT complies with the standard, should also be given in the test report.

If, however, there is no basis for any conclusion regarding compliance of the EUT with the standard, then the Article 10 (2) procedure must be followed. A Technical Construction File must be compiled, showing that the testing performed, together with any other information which might be necessary, demonstrates that the EUT complies with the essential requirements of the EMC Directive. This would be the case, if for example:

- measuring instrumentation different from that specified in the standard were used, and it was not possible to correlate the measurements with those which would have been obtained with the prescribed instrumentation;
- some of the frequencies of test disturbances, or the application of test disturbances to some ports or test points which the standard requires to be tested, were omitted in order to reduce the test time.

In these cases, the test report should give only details of the testing which was performed and the results of that testing.

8 Limiting your risk

There are many matters concerning the assessment of conformity with the EMC Directive where it is impossible or impractical to perform exhaustive testing or for the test method to correspond exactly to that specified in the standard. Many of the standards are also open to different interpretations. There is often a risk, therefore, that an individual unit selected by a national enforcement authority for checking will fail to comply with the Directive. The following sections give advice on how this risk might be minimised.

8.1 Integrators

An integrator or assembler can limit their risk by applying the following measures;

- (a) File any documentation which supports the EC DOC.
- (b) Use CE Mark modules.
- (c) Obtain and file the module manufacturer's EC DOC for each module in the assembly.
- (d) Check that the EC DOCs for each module in the assembly state compliance with the EMC Directive.
- (e) Check that the correct standards have been applied, by reference to Section 7. If in doubt, seek advice from an EMC laboratory or an EMC expert.
- (f) Where possible, obtain the module manufacturer's test report for each module in the assembly. Provision of the report may be made a condition of the purchase agreement. If it is not possible to obtain the whole test report, then seek information on the "host" unit in which the module was tested.
- (g) Where possible, establish a contractual arrangement with the module supplier which requires the module to comply in your device.
- (h) For modules outside the scope of the EMC Directive, seek the manufacturer's advice on any conditions / limitations on their use. Provision of this advice may be made a condition of the purchase agreement.
- (i) Consider declaring the apparatus as a Class A for Electromagnetic Emissions. If applying Class A the applicable warning must be added to the customer documentation.
- (j) Document your worst case analysis.

8.2 EMC Test Laboratory Selection

The EMC test report is normally the basis of manufacturer's evidence that he has taken all reasonable steps to verify the conformity of the device before he places it on the market. In view of this, it must be possible to validate the report. Where the manufacturer uses an external test laboratory, to limit the risk he may consider using an accredited laboratory.

Warning:

EN 55022 specifies the Class A and Class B limits for a measurement distance of 10 m, but allows measurements at closer distances (such as 3 m) for Class B ITE. However, market checking of devices by product authorities will almost certainly involve measurements on a 10 m open area test site.

Annex A

Examples of System Apparatus and Test Requirements

The term “*manufacturer*” has been used to depict a manufacturer, integrator or assembler of a system apparatus.

Example 1

When it has been established that the “*manufacturer*” has the responsibility for market placement and thus for generating the required EU DOC, a system consisting of individual CE Marked elements may be placed on the market supported by Manufacturer’s EC DOC, WITHOUT ADDITIONAL TESTING, if the combinational effects of the system integration have been examined and approved by a competent EMC function.

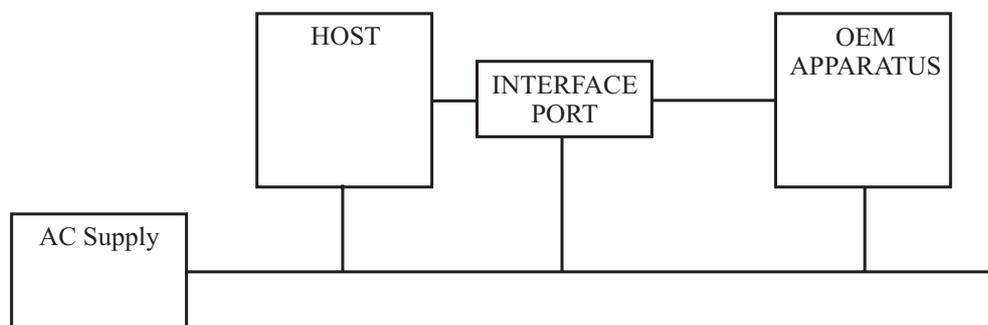
The “*manufacturer*” will require documentation which supports such approval, contains at least the original manufacturer’s EMC reports and a signed declaration from the responsible EMC function.

Example 2

A host with an interface port to which optional apparatus of OEM origin, but marketed by the “*manufacturer*”, may be connected.

NOTE

Such apparatus may be badged with the “*manufacturer’s*” name, mark or logo OR may be marked with the original supplier’s name, mark or logo.



99-0034-A

E.g. 1: The HOST may be a Photocopier with a Foreign INTERFACE PORT to connect to a Billing Coinop OEM DEVICE.

E.g. 2: The HOST may be a PC with a Parallel INTERFACE PORT to connect to a Printer OEM DEVICE.

Figure A.1 - Example 2

Test requirement

The “*manufacturer*” must establish that the host and all specified optional devices satisfy all provisions of the EMC Directive. Methods of establishing compliance are:

1. The host, the interface and all third party apparatus shall be tested by the “*manufacturer*” or by an approved test site. Reports and all Manufacturers EC DOC will be generated by the “*manufacturer*”.
2. The host and its interface may be tested as above using a typical third party apparatus to exercise and load the interface. This testing will establish compliance of the specific third party apparatus used and will also confirm that such devices will not impact the performance of the host machine and its interface.

Additional third party apparatus may be included on the following basis:

An apparatus which is CE Marked based on testing by the third party manufacturer provided that the manufacturer or his agent responsible for EC DOC is based in the EU. Such apparatus may be used without alternative testing by the “*manufacturer*”. To limit risk a dummy “*manufacturer*” EC DOC may be issued, stating that EMC is the responsibility of the third party supplier.

An apparatus which is not CE Marked but is tested to establish compliance by the manufacturer who may be based outside the EU. The apparatus or its configuration and use is unique the “*manufacturer*”. The third party manufacturer may test to a plan agreed with the “*manufacturer*”.

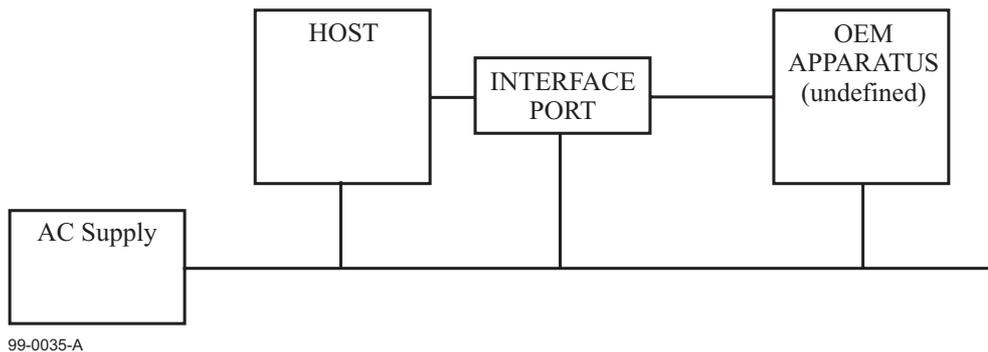
The supplier shall provide the “*manufacturer*” with reports which detail the results of all testing to establish compliance with applicable EMC standards. The “*manufacturer*” will review these reports and if satisfied generate a Manufacturers EC DOC and authorise application of the CE Mark to apparatus intended for the “*manufacturer*”. The CE Mark shall not be provided on the “*manufacturer*” apparatus until this action has been completed.

NOTE

*The same procedure may be adopted host apparatus supplied to the “*manufacturer*” by OEM manufacturers.*

Example 3

A host which is provided with a general purpose interface port for connection of non “*manufacturer*” devices.



- E.g. 1: The HOST may be a Printer with a RJ45 INTERFACE PORT to connect to a 10BaseT Hub OEM DEVICE.
- E.g. 2: The HOST may be a PC with a PCMCIA INTERFACE PORT to connect to a Mobile Phone OEM DEVICE.

Figure A.2 - Example 3

Test requirement

The “*manufacturer*” will establish that the host and a typical third party apparatus load are compliant with the provisions of the directive. This may be based on a single type test. The manufacturer of the host has to define the typical third party device load.

NOTE

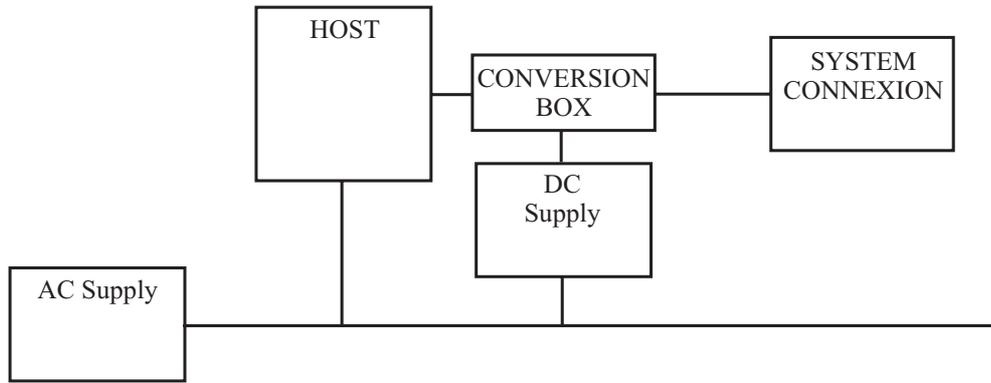
In this case the final user/customer would be responsible for compliance with the provisions of the directive when the selected third party device was connected to the machine. In practice this would require that the third party device was CE Marked.

Example 4

A host provided with protocol conversion boxes of non-“*manufacturer*” origin, which may have individual power supplies.

NOTE

*Such apparatus may be badged with the “*manufacturer’s*” name, mark or logo OR may be marked with the original suppliers name, mark or logo.*



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Figure A.3 - Example 4

Test Requirement

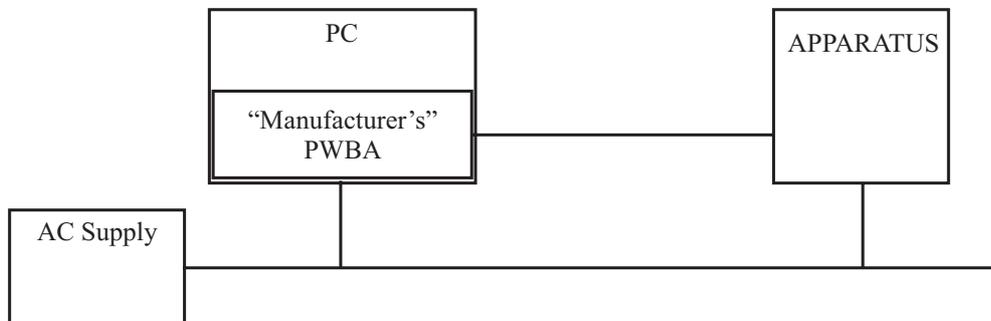
The nature of protocol conversion boxes and the resulting system level impact is variable and in general requires a more critical approach than that used for general third party devices.

It has to be established that the system consisting of the host, conversion box or boxes and the power supplies satisfies all provisions of the EMC Directive. Compliance is established based on either the “*manufacturer*” or supplier testing of the entire system. For supplier testing the third party manufacturer will test to a plan agreed with the “*manufacturer*”.

The supplier provides the “*manufacturer*” with reports which detail the results of all testing to establish compliance with applicable EMC standards. The “*manufacturer*” will review these reports and if satisfied generate a Manufacturers EC DOC and authorise application of the CE Mark or add the specific conversion boxes to the “*manufacturer*” system level declaration. System level apparatus which have not been subject to this action shall not be authorized for CE Marking and are therefore not permitted to be placed on the EU market.

Example 5

A apparatus provided with a PC or workstation interface provided a unique “*manufacturer*” PWBA for system functionality purposes. The PWBA is installed in the PC or workstation. The PC or workstation supplier is undefined.



99-0037-A

Figure A.4 - Example 5

Test Requirement

The “*manufacturer*” will establish that the system consisting of the device, a typical CE Marked PC or workstation and the “*manufacturer*” PWBA satisfy all provisions of the EMC Directive. This is based on testing completed by the “*manufacturer*” or a supplier of the elements of the system. The supplier will test to a plan agreed with the “*manufacturer*”.

The supplier will provide the “*manufacturer*” with reports which detail the results of all testing completed to establish compliance with applicable EMC standards. The “*manufacturer*” will review these reports and if satisfied generate a Manufacturers EC DOC or add the devices concerned to the system level EC DOC covering the apparatus.

Experience of PC and workstation performance at system level apparatus has established that the use of alternative CE Marked PC's or workstations does not result in EMC performance changes. In view of this alternative PC's or workstations may be used without test providing they are notified.

Example 6

An apparatus with an interface PWBA which provides functional connection to a third party apparatus or a system module.

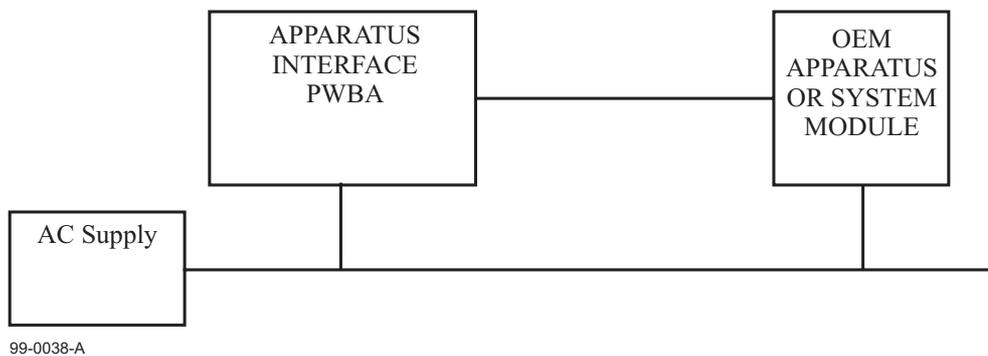


Figure A.5 - Example 6

Test Requirement

The “*manufacturer*” will establish that the system consisting of the device loaded with the interface PWBA connected to the system module or a typical third-party device satisfies all provisions of the EMC Directive.

Compliance of the system as tested will be considered and as such will be covered by a “*manufacturer*” EC DOC.

The interface PWBA is considered stand-alone which is also covered by a Manufacturer's EC DOC based on acceptance of test results in a typical system. On this basis, the interface PWBA may be used and marketed in other similar CE-marked systems without additional test.

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ECMA

114 Rue du Rhône

CH-1204 Geneva

Switzerland

Fax: +41 22 849.60.01

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