

E C M A

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-200

**IMMUNITY OF
INFORMATION TECHNOLOGY EQUIPMENT
TO LIGHTNING SURGES**

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Brief history

This Standard is one of a number of ECMA publications on the subject of immunity testing of Information Technology Equipment (ITE) with regard to electromagnetic phenomena.

This particular ECMA Standard defines the performance criteria and the procedure for testing the immunity of ITE to lightning surges on AC/DC power and telecommunication ports.

This Standard has been prepared by Technical Committee ECMA TC20, and is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of the International Electrotechnical Commission (IEC) and CENELEC, as well as other international and national standardization bodies. It represents a pragmatic and widely based consensus.

This ECMA Standard references the committee voting draft IEC CDV 1000-4-5 as a basic EMC publication (document IEC 65A/77B (Secretariat) 136/101).

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1 Scope

This Standard defines the performance criteria and the procedure for testing the immunity of Information Technology Equipment (ITE) to simulated lightning surges on AC/DC power and telecommunication ports intended for connection to outdoor cables.

NOTE 1

Any changes from the referenced IEC publication 1000-4-5, which currently has draft status, will be reflected in the future evolution of this Standard.

2 Conformance

A unit of ITE is in conformance with this Standard if it satisfies all requirements of this Standard.

3 Normative references

The documents indicated below contain provisions which, though referenced in the text, constitute provisions of this Standard. At the time of publication of this Standard, the editions indicated below were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the documents indicated below. The IEC maintains registers of currently valid publications.

IEC 50(161):

International Electrotechnical Vocabulary (1990) - chapter 161: Electromagnetic compatibility.

IEC 1000-4-5 (Draft):

Electromagnetic compatibility (EMC), part 4: Testing and measurement techniques - section 5: Surge immunity requirements (reference IEC 65A/77B (Secretariat) 136/101).

4 Definitions

The definitions of the referenced publications (see clause 3, normative references, above) are applicable to this Standard except where in conflict with those of this clause.

4.1 Damage

Failure of, or alteration in the characteristics of, any component which necessitates replacement of that component to restore proper functioning of the ITE. Excluded are components such as fuses, transient suppressors and circuit protectors which are intended to be replaced after functioning under surge conditions.

4.2 Decoupling device

Device used to prevent surge energy from being propagated to other equipment operating from the same power source during testing of the EUT.

4.3 Equipment Under Test (EUT)

A representative ITE or functionally interactive group of ITE (i.e. an ITE system) which is being evaluated.

4.4 Information Technology Equipment (ITE)

Any equipment:

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

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

Any equipment (or part of ITE equipment) which has a primary function of radio transmission and/or reception according to the ITU Radio Regulations are excluded from the scope of this Standard.

4.5 Telecommunication ports

Ports which are intended to exchange signals for extensive networks, like telephone networks (e.g. public switched telecommunication networks (PSTNs)), integrated services digital networks (ISDNs), local area networks (e.g. Ethernet, Token Ring) and similar networks.

5 General

ITE connected to outdoor cables may be exposed to surges which may damage components and circuits. In regions of exposure to lightning, primary lightning protection may be installed on lines which exit the building. Primary surge protection is usually provided by the use of solid state or gas tube arrestors located at the point where the cable enters the building. These can be supplemented by secondary protection devices located near or in the ITE.

Some types of outdoor cables are:

- coaxial cables, either single- or multi-coax;
- AC/DC power supply cables;
- shielded and unshielded multiconductor cables; conductors may be balanced pairs (e.g. twisted pairs and twinax), or unbalanced wires;

for:

- power;
- I/O (input/output);
- control;
- data transmission;
- telecommunication;
- communication.

Conformance to the requirements of this Standard is generally sufficient to protect against damage to circuits terminating outdoor lines which are protected at building entrances with primary protection in typical ITE environments and installations. The requirements of this Standard may not be sufficient to protect against damage in extreme environments and in cases such as very close or direct lightning strikes. The amplitude of the induced voltage depends upon the magnitude of the incident surge, cable length and height above ground.

The requirements of this Standard apply to ITE which is connected to outdoor cables, with the exception of ITE which is attached to an external communication cable via an external device (such as a modem or data coupler) if it provides electrical isolation from the external cable.

6 Limits

Limits are given in table 1 below for the immunity of ITE to conducted surges on outdoor cable interface ports.

The immunity of ITE which is connected to outdoor cables shall be equal to or better than the specified limits.

A minimum of 5 pulses of each polarity (positive and negative) shall be applied at each test point.

The indicated voltage is the open circuit voltage of the generator referred to in clause 7 below.

Table 1 - Limits

Type of line	Surge application	Limit	Test set-up
Telecommunication ports, unbalanced and AC/DC power ports	Line to line	500 V	Figure 1
Telecommunication ports, unbalanced and AC/DC power ports	Line to ground	1000 V	Figure 2
Telecommunication ports, balanced	Line to line	500 V	Figure 1
Telecommunication ports, balanced	Line to ground	500 V	Figure 3
Telecommunication ports, shielded/coax	Shield to ground	500 V	Figure 2

7 Test instrumentation

The combination wave test generator to be used for the performance of lightning surge testing of ITE shall be as defined in IEC 1000-4-5.

7.1 Characteristics and performance of the combination wave generator

The performance characteristics and verification requirements for the combination wave generator shall be as defined in IEC 1000-4-5.

7.2 Generator characteristics verification

In order to make it possible to compare the test results from different test generators, the test generator characteristics shall be verified in accordance with the method defined in IEC 1000-4-5.

7.3 Characteristics of coupling/decoupling devices

The characteristics of the coupling/decoupling devices shall be as defined in IEC 1000-4-5.

8 Test set-ups

8.1 Surges applied to unbalanced line ports

The test surge shall be applied to the line ports in accordance with figure 1 (line to line) and figure 2 (line to ground) via the resistive and capacitive coupling networks shown in these figures.

8.2 Surges applied to balanced line ports

The test surge shall be applied line port to ground, as shown in figure 3, in the following two arrangements:

- i) both lines of the balanced pair simultaneously to ground (switch position 1);
- ii) each line individually to ground, with the other line grounded (switch positions 2 and 3).

8.3 Surges applied to coax/shielded signal line ports

The test voltage/current shall be applied to the signal line shield connection point as shown in figure 2.

8.4 Surges applied to AC/DC power line ports

The test voltage/current shall be applied to the AC/DC power line ports according to figure 1 and figure 2.

9 Test procedure

The tests shall be conducted in accordance with the procedures defined in IEC 1000-4-5 and those defined in 9.1 below.

9.1 EUT operating conditions

During testing, all telecommunication and power ports except the one under test shall be connected and terminated via a decoupling device.

The EUT shall be operated in a functional mode.

The port under test shall be connected to the surge generator via a coupling device.

One of each type of port shall be tested.

10 Performance criteria

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

11 Test report

A test report shall be prepared to include sufficient information to allow the test to be replicated, in particular the following:

- location and date of test;
- name and signature of person performing the test;
- environmental conditions (temperature and relative humidity);
- supply voltage and frequency;
- EUT model and serial number;
- EUT configuration and physical arrangement;
- EUT operating mode;
- ports tested;
- details of any EUT errors or performance degradation with justification for any decision concerning the pass/fail status with respect to the performance criteria specified in clause 10.

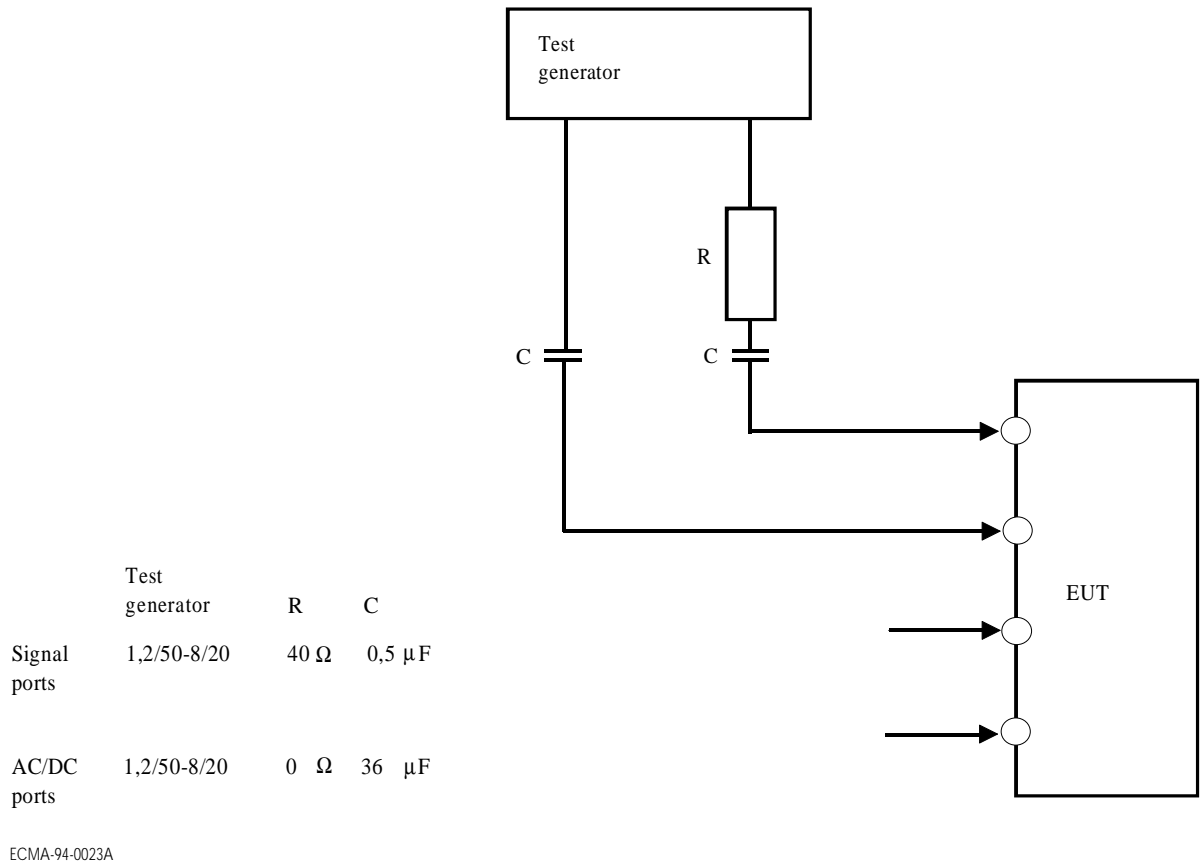
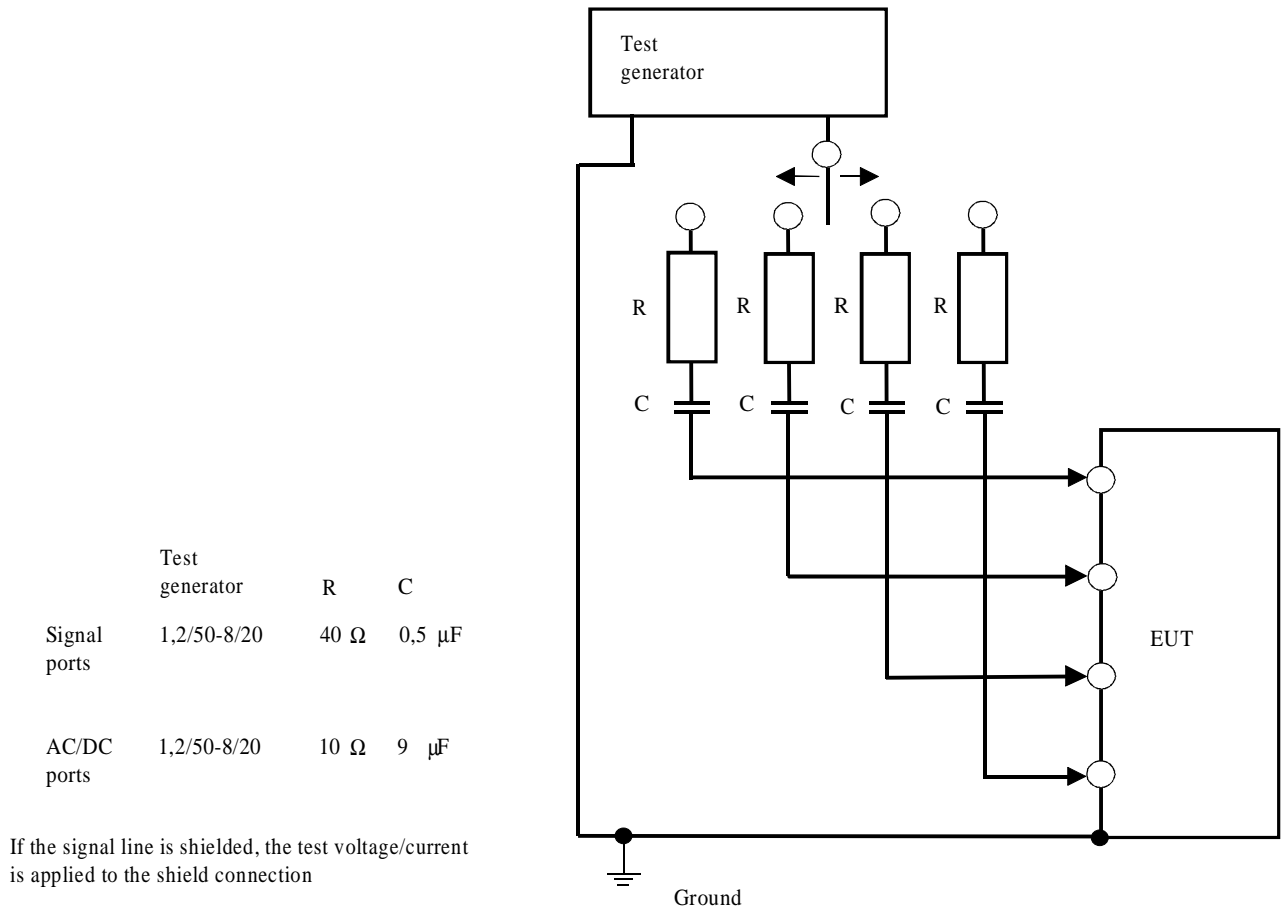


Figure 1 - Test set-up for balanced and unbalanced lines : line to line coupling



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Figure 2 - Test set-up for unbalanced lines : line to ground coupling

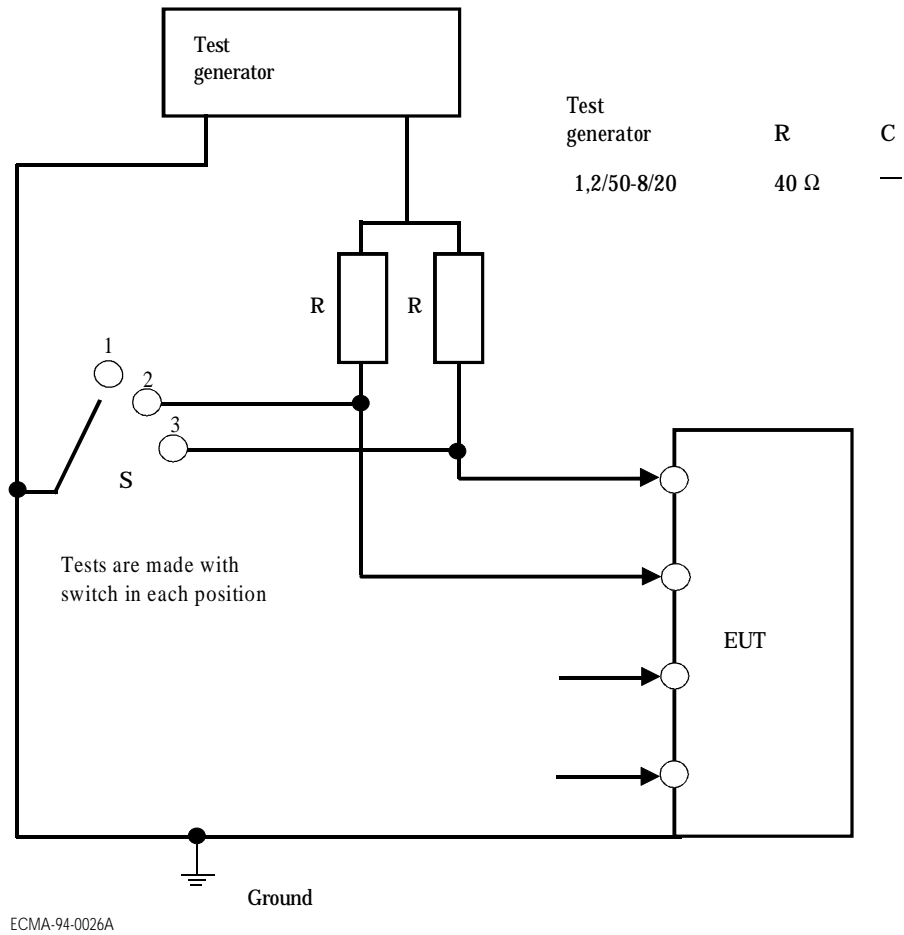


Figure 3 - Test set-up for balanced lines : line to ground coupling

Annex A

(informative)

Rationale for Product-specific Limits for ITE with regard to testing for immunity to lightning surges on AC/DC and telecommunication ports

The majority of Information Technology Equipment (ITE) is installed in large office buildings or other areas designed specifically to accommodate high technology equipment, or in small offices, or in the home. All these areas are characterized either by low levels of power fault and induced lightning current, or by a low impedance interconnected ground system. Consequently ITE is subject to relatively less severe common mode or earth potential transients than some other classes of product.

Furthermore, relatively few different types of data interfaces and transmission lines are used, and the member companies of ECMA have extensive field experience of the relation between design and test performance of these on the one hand and customer problem reports on the other. Analysis of such reports and appropriate action is a normal part of ECMA member companies' quality activities. Such analysis has aimed to establish the greatest value for the customer in the form of lowest cost over the working lives of products, and so suggests that more severe tests would cost more than the benefit would justify.

The above rationale and experience has confirmed that the range of physical and electrical environments in which ITE is used is in statistical terms distinctly more benign than those contemplated for each of the classes of installation listed in the IEC basic publication.

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A description of this Standard can be found on the ECMA web site, www.ecma.ch. From there, files E200-DOC.EXE (MSWord, self-expanding) and E200-PDF.PDF (Acrobat PDF) can be freely downloaded.

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