

TECHNICAL REPORT

RAPPORT TECHNIQUE



**Integrated circuits – Measurement of electromagnetic emissions –
Part 1-1: General conditions and definitions – Near-field scan data exchange
format**

**Circuits intégrés – Mesure des émissions électromagnétiques –
Partie 1-1: Conditions générales et définitions – Format d'échange de données
de cartographie en champ proche**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTEGRATED CIRCUITS – MEASUREMENT OF ELECTROMAGNETIC EMISSIONS –

Part 1-1: General conditions and definitions – Near-field scan data exchange format

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IEC 61967-1-1, which is a technical report, has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
47A/827A/DTR	47A/833/RVC

Full information on the voting for the approval of this technical report can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61967 series under the general title *Integrated circuits – Measurement of electromagnetic emissions* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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INTRODUCTION

Near-field scan measurements, as described for example in IEC 61967-3, and simulations generate a large amount of data. Many different formats are used for storing the data, thereby rendering its exchange extremely difficult.

The proposed format is intended to facilitate exchange of near-field scan data between industrials, academics, EDA tool vendors and end customers. It is based on the well-known XML format, which is both machine and human readable. Its structure allows the files to be generated and processed on any operating system. In order to limit the file size, it is possible to store the information and data in a single file or multiple files. Moreover, the ASCII-based XML format allows the files to be compressed to a very high level with readily available compression software.

The three conventional coordinate systems (cartesian, cylindrical and spherical) are supported by the proposed exchange format. Information on the device under test, the test set-up, the probe, etc., is also included in the files. Notes and links to external documents allow complex test environments to be well described.

The version of the exchange format described in this technical report is 1.0. Future revisions will add items, such as new keywords and rules, considered to be "enhancements" to Version 1.0. Consequently, all future revisions will be considered supersets of Version 1.0, allowing backward compatibility.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

IEC TR 61967-1-1:2010

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Withhold

INTEGRATED CIRCUITS – MEASUREMENT OF ELECTROMAGNETIC EMISSIONS –

Part 1-1: General conditions and definitions – Near-field scan data exchange format

1 Scope

This part of IEC 61967 provides guidance for exchanging data generated by near-field scan measurements.

The described exchange format could also be used for near-field scan data generated by simulation software.

It should be noted that, although it has been developed for near-field scan, its use is not restricted to this application.

The exchange format can be applied to emission, immunity and impulse immunity near-field scan data in the frequency and time domains.

The scope of this technical report includes neither the methods used for the measurements or simulations, nor the software and algorithms used for generating the exchange file or for processing or viewing the data contained therein.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8879, *Information processing – Text and office systems – Standard Generalized Markup Language (SGML)*

ANSI INCITS 4:1986, *Information Systems – Coded Character Sets – 7-Bit American National Standard Code for Information Interchange (7-Bit ASCII)*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1.1 section

XML element placed one level below the root element or within another section; contains one or more XML elements, but no value

3.1.2 parent

keyword, one level above another keyword (child)

3.1.3

child

keyword, one level below another keyword (parent)

3.2 Abbreviations

- EDA** Electronic Design Automation
- NFS** Near-Field Scan
- XML** eXtensible Markup Language
- SGML** Standard Generalized Markup Language

4 General syntax rules and guidelines

4.1 General

The following rules and guidelines ensure that files intended for exchange will be correctly recognised and processed by viewers and processors. Examples of XML files conforming to the present exchange format are given in Annex A

4.2 XML requirements

4.2.1 General

This exchange format uses XML 1.0 fourth edition to structure the information. XML is derived from the standard generalized markup language (SGML) (ISO 8879).

The rules below ensure that the NFS files can be parsed correctly by an XML parser.

4.2.2 XML declaration

Although the XML declaration is optional in an XML file, the near-field scan file should include an XML declaration, dedicated to basic XML parsers. An NFS file parser does not interpret this header.

A file header example is given below:

```
<?xml version="1.0" encoding="UTF-8"?>
```

The XML declaration shall be the first line of the file.

4.2.3 XML elements

All information is saved in the form of XML elements. Each element starts with a start-tag and ends with an end-tag. The start-tag consists of a keyword enclosed in triangular brackets, "<Keyword>". The end-tag consists of the same keyword prefixed by the character "/" and enclosed in brackets, "</Keyword>". Content in the form of text is enclosed by a start-tag and an end-tag.

An example of an element is given below:

```

<Keyword>          <!-- start-tag -->
    text           <!-- content -->
</Keyword>        <!-- end-tag -->

```

It is also allowed to write an element on the same line, for example, to include short content.

```
<Keyword>text</Keyword>
```

The contents of an element may consist of one or more other elements or a value (numerical, or alphanumerical). For clarity, tab characters may be used for indenting. Except when used for surrounding keywords, triangular brackets "<" and ">" shall not be part of content.

An empty element may be included to indicate that a particular keyword exists, but has no content:

```
<empty_element/>
```

4.2.4 Root element

The XML file shall contain one, and only one, root element. It encloses all the other elements and is therefore the sole parent element to all the other elements. The start tag of the root element is placed at the beginning of the file or after the XML declaration when present. The end-tag of the root element is at the last entry of the file.

4.2.5 Comments

Comments may be inserted into the file between “<!--” and “-->”. An example is given below:

```
<!-- this line is a comment -->
```

Comments can be inserted anywhere in the file, except inside start- and end-tags, and written on a single line or on several lines. All text enclosed by comment brackets is considered as a comment and may be ignored.

4.2.6 Line terminations

In order to facilitate readability, it is usual to organise the file into lines. The line termination sequence shall be either a linefeed character or a carriage return character followed by a linefeed character.

4.2.7 Element hierarchy

The order of the elements is not important, but their hierarchy shall be respected.

example layout:

```
<Keyword1> ... </Keyword1>
<Keyword2>
  <Keyword21> ... </Keyword21>
  <Keyword22> ... </Keyword22>
</Keyword2>
<Keyword3> ... </Keyword3>
```

An acceptable equivalent layout of the example:

```
<Keyword3> ... </Keyword3>
<Keyword1> ... </Keyword1>
<Keyword2>
  <Keyword22> ... </Keyword22>
  <Keyword21> ... </Keyword21>
</Keyword2>
```

In this layout the order is changed, but the hierarchy is respected.

An unacceptable layout of the example:

```
<Keyword2> ... </Keyword2>
<Keyword22> ... </Keyword22>
```

```
<Keyword21> ... </Keyword21>
<Keyword3>
  <Keyword1> ... </Keyword1>
</Keyword3>
```

In this layout the hierarchy is not respected.

4.3 Keyword requirements

4.3.1 General

Keywords, placed in start- and end-tags, are used to introduce descriptions, values and sections that are specific to NFS measurements and simulations. A list of keywords is given in Annex B and a more detailed description of each keyword is given in Annex C. Some keywords, such as Frequencies, Unit, List, etc, may be present in several sections. A parent keyword is required when a child keyword is present. The rules below ensure that the file can be correctly parsed by an NFS parser.

4.3.2 Keyword characters

Only ASCII characters, as defined in ANSI Standard X3.4-1986, may be used in the files. The use of characters with codes greater than hexadecimal 07E is not allowed. Also, ASCII control characters (those numerically less than hexadecimal 20) are not allowed, except for tabs or in a line termination sequence. For example, the "" character (ASCII 176) is not permitted. Only alphabetical or numerical characters can be used to write keywords. Spaces are not permitted. If needed, the underscore "_" character can separate the parts of a multi-word keyword.

4.3.3 Keyword syntax

The content of the files is case sensitive. All keywords shall be written in lower case starting with an upper case letter.

4.3.4 Root element keywords

As described in 4.2.4, all elements of the file shall be enclosed within the root element. The following keywords are reserved for root elements and shall not be used for any other purposes in the file:

EmissionScan
ImmunityScan

If the proposed XML file format is used for other applications, other keywords may be used in the root element, but NFS parsers may not be able to parse the file.

4.4 File structure

4.4.1 General

The information to be exchanged may be stored in a single XML file or in several XML and data files. The following rules and guidelines ensure that the files can be correctly located by an NFS parser.

4.4.2 File names

To facilitate portability between operating systems, file names should have a base name of no more than forty characters followed by a period ".", followed by a filename extension of no more than three characters. The file name and extension shall use characters from the set (space, " ", 0 x 20 is not included):

a b c d e f g h i j k l m n o p q r s t u v w x y z
 0 1 2 3 4 5 6 7 8 9 _ ^ \$ % & - { }) (@ ' `

4.4.3 File paths

In order to ensure portability and compressibility, only relative paths can be used to define a path name. An absolute path is not exportable and is not permitted. The relative path shall start with "./" to indicate that the path name of the picture file will be appended to the path of the current XML file. It is not permitted to browse to a higher level from the current XML path (e.g. by using "../"). A file name without "." is assumed to be located in the same directory as the current XML file.

4.4.4 Single XML file

When the information is contained in a single XML file, it shall conform to the rules and guidelines applicable to XML files, as described in 4.2.

Data is included in the Data section of the file within the XML element using the keyword: List.

4.4.5 Multiple XML files

The XML document is divided into several sections having the root element as parent. Such a section contains information on a particular part of the NFS environment and is defined by keywords such as Component, Setup, Probe, Data, etc. Each XML file may contain one or more sections and shall conform to the rules and guidelines applicable to XML files as described in 4.2.

In order to ensure portability and compressibility, all the XML files shall be placed in the same directory, as shown in Figure 1. The NFS parser shall parse all the XML files that are in the main directory.

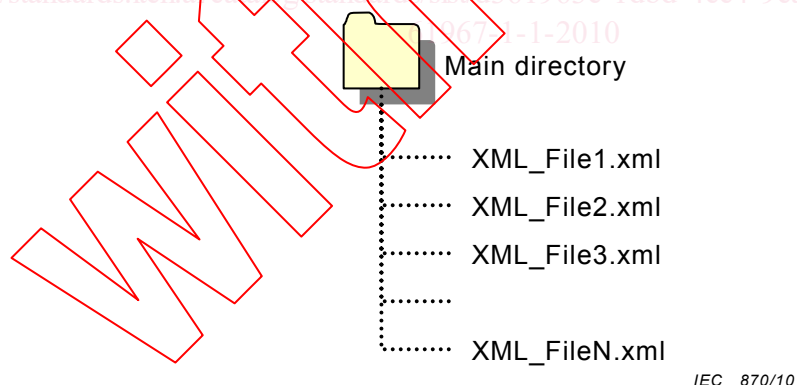


Figure 1 – Multiple XML files

4.4.6 Separate data files

Information may be contained in a single file or multiple XML files and the data contained in one or more additional data files. XML files shall conform to the rules and guidelines applicable to XML files, as described above and in 4.2. Data files shall contain only lines of data as described in 4.8. The names and paths of the data files are defined by the keyword: Data_files and shall conform to 4.4.2 and 4.4.3.

In order to ensure portability and compressibility, the data files shall be placed either in the same directory as the XML files or in a sub-directory located at the same level or a lower level as the XML files, as shown in Figure 2. It is not permitted to locate the additional files at a higher level than the XML files.

4.4.7 Additional files

An XML file may contain references to other files such as image files (Keyword: Image) and document files (Keyword: Documentation). In order to ensure portability and compressibility, these additional files shall be placed either in the same directory as the single XML file or in a sub-directory located at the same level or a lower level as the XML files, as shown in Figure 3. It is not permitted to locate the additional files at a higher level than the XML files.

4.4.8 File compression

When compressing the file system, care shall be taken to include the paths of the various XML and data files in the compressed file. This ensures that, when decompressed, the file structure is conserved. The paths are not required when all files are stored in the same directory.

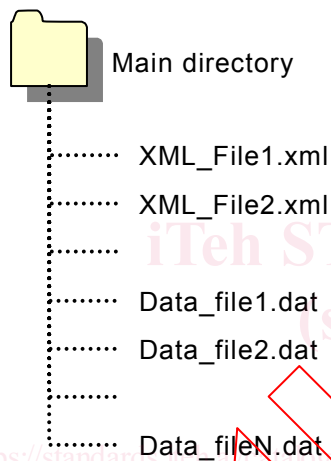


Figure 2a – Data files in the same directory

IEC 871/10

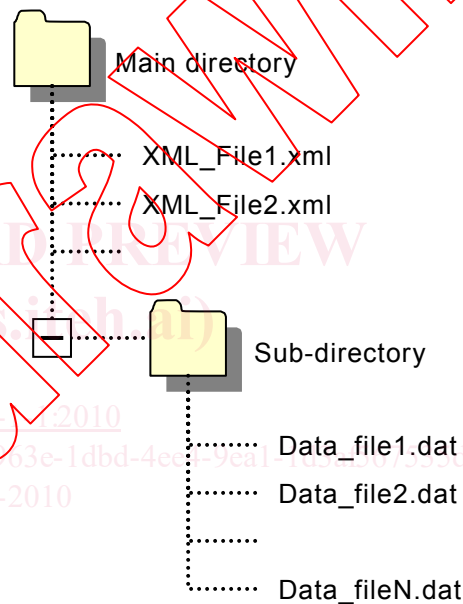
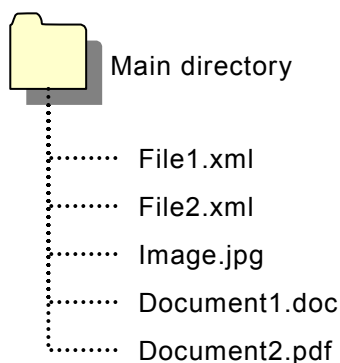


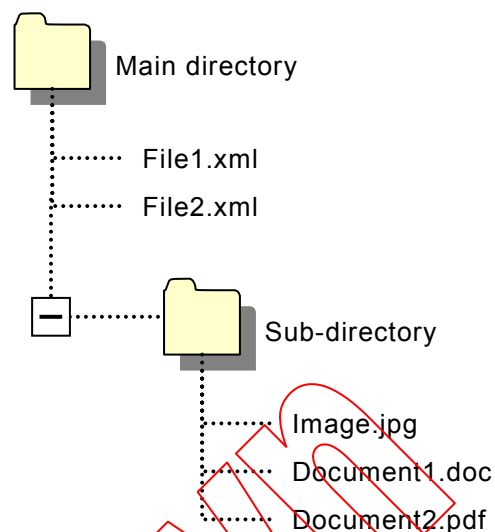
Figure 2b – Data files in a sub-directory

IEC 872/10

Figure 2 – XML files with data files



IEC 873/10



IEC 874/10

Figure 3a – Additional files in the same directory

Figure 3b – Additional files in a sub-directory

Figure 3 – Additional files

4.5 Values

4.5.1 General

When an element contains a value, this may be a numerical value (e.g. "123.45"), a numerical value with units (e.g. "123.45MHz") or a text string (e.g. "This is text string number 2").

4.5.2 Numerical value syntax

Numerical values may be expressed in decimal form with the period as the decimal separator (e.g. "123.45") or in scientific form (e.g. 1.2345e2). Spaces " " and commas ",", which are often used as thousand separators, and other characters, are not allowed.

In cases where several numerical values are required, they shall be separated by spaces " " or tab characters.

4.5.3 Numerical value with units syntax

The numerical value (see 4.5.2) is followed by valid units, as described in 4.5.5 (e.g. 123.45MHz). Spaces are not allowed between the numerical value and the units.

4.5.4 Text string

A text string may represent a word recognised by the NFS parser or it may be a file name, a description, etc. A text string may contain any of the alphanumeric characters given in 4.3.2.

4.5.5 Valid units

Units may be expressed as simple linear units or as logarithmic units (dB).

Although not strictly a near-field parameter, power flux density has also been included in the list of valid units for completeness.

Valid units are:

V = volt

A = ampere

W = watt

ohm