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Quartz crystal units of assessed quality – Part 2: Guidelines for the use

Résonateurs à quartz sous assurance de la qualité – Partie 2: Lignes directrices pour l'utilisation

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Quartz crystal units of assessed quality - Part 2: Guidelines for the use

FOREWORD

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IEC 60122-2 has been prepared by IEC technical committee 49: Piezoelectric, dielectric and electrostatic devices and associated materials for frequency control, selection and detection. It is an International Standard.

This third edition cancels and replaces the second edition published in 1983. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of SC cut type and related requirements;
b) addition of ageing calculation and low level of drive requirements according to the general specification,
c) update of the frequency temperature curve according to the common cut requirements;
d) removal of infrequently used product types.

The text of this International Standard is based on the following documents:

Draft	Report on voting
49/1506/FDIS	49/1513/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60122 series, published under the general title *Quartz crystal units of assessed quality*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

1 Scope

This part of IEC 60122 has been compiled in response to a generally expressed desire on the part of both users and manufacturers for guidelines to the use of quartz crystal units for filters and oscillators so that the crystal units may be used to their best advantage.

It draws attention to some of the more fundamental questions which will be considered by the user before it places its order for a unit for a new application, and in so doing will, it is hoped, help ensure against unsatisfactory performance, unfavourable cost and non-availability. It is not the function of this document to explain theory, nor to attempt to cover all the eventualities that can arise in practical circumstances. Lastly, it it is not considered as a substitute for close liaison between manufacturer and user.

Standard specifications, such as those of the IEC of which these guidelines form a part, and national specifications or detail specifications issued by manufacturers, will define the available combinations of the resonant characteristics and the temperature characteristic. These specifications are compiled to include a wide range of quartz crystal units with standardized performances. It cannot be over-emphasized that it is the responsibility of the user , wherever possible, to select the quartz crystal units from these specifications, when available, even if it can lead to making small modifications to the circuit to enable the use of standard resonators. This applies particularly to the selection of the nominal frequency.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60122-1:2002, *Quartz crystal units of assessed quality – Part 1: Generic specification*
IEC 60122-1:2002/AMD1:2017

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60122-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

4 Quartz crystal unit as an electronic component

4.1 General

The quartz crystal element is a vibrating resonant structure whose orientation and dimensions determine its frequency for a given mode of vibration and which relies on the piezoelectric effect to couple it to an electrical circuit. The intrinsic properties of quartz make it a unique device for highly accurate and stable frequency control and selection because of its high "quality factor" Q. Crystal units are not a primary frequency standard, but when precisely defined, can provide stabilization far in excess of most requirements in the electronic industry.

The crystal element is cut from monocrystal quartz with precise orientation to the crystallographic axes as shown in Figure 1, which shows only generalized examples of the most commonly used crystal cuts.