

**Harmonized system of quality
assessment for electronic components**

Generic specification: Quartz crystal controlled oscillators

The European Standard EN 169000:1992, with the incorporation of amendment A1:1998, has the status of a British Standard

ICS 29.300

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries:

Austria	Italy
Belgium	Luxembourg
Denmark	Netherlands
Finland	Norway
France	Portugal
Germany	Spain
Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

This British Standard, having been prepared under the direction of the Electronic Components Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 August 1993

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National foreword

This British Standard has been prepared under the direction of the Electronic Components Standards Policy Committee and is the English language version of EN 169000:1992 *Generic specification: Quartz crystal controlled oscillators*, including amendment A1:1998 published by the European Committee for Electrotechnical Standardization (CENELEC) Electronic Components Committee (CECC). BS EN 169000 supersedes BS 9620:1975, which is withdrawn.

The British Standard which implements the CECC Rules of Procedure is BS 9000-2:1991 *General requirements for a system for electronic components of assessed quality — Part 2 Specification for the national implementation of the CECC system*.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 64 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Generic Specification: Quartz crystal controlled oscillators

(includes amendment A1:1998)

Spécification Générique:
Oscillateurs pilotes par quartz
(inclut l'amendement A1:1998)

Fachgrundspezifikation:
Quarzoszillatoren
(enthält Änderung A1:1998)

This European Standard was approved by CENELEC Electronic Components Committee (CECC) on 3 December 1992. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CECC General Secretariat of the CECC or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CECC General Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom. The membership of the CECC is identical, with the exception of the national electrotechnical committees of Greece, Iceland and Luxembourg.

CECC

CENELEC Electronic Component Committee
Comité des Composants Electroniques du CENELEC
CENELEC Komitee für Bauelemente der Elektronik

General Secretariat: Gartenstr. 179, D-6000 Frankfurt/Main 70

Foreword

This specification was prepared by CECC WG 17 “Piezoelectric devices for frequency control and selection”.

It is based, wherever possible, on the Publications of the International Electrotechnical Commission (IEC) and in particular on IEC 679-1: *Quartz crystal controlled oscillators: Part 1: General information, test conditions and methods*.

The CECC voting procedure for the conversion of publication CECC 69000 Issue 1:1991 to EN has resulted in a positive vote.

The voting report [document CECC (Secretariat) 3253/11.92] has been submitted for formal approval and has been accepted. The reference document was approved by CECC as EN 169000:1992 on 3 December 1992.

The following dates were fixed:

- latest date of announcement of the EN at national level (doa) 1993-12-28
- latest date of publication of an identical national standard (dop) 1994-06-28
- latest date of declaration of national standards obsolescence 1994-06-28
- latest date of withdrawal of conflicting national standards (dow) 2003-12-28

Foreword to amendment A1

This amendment to the European Standard EN 169000:1992 was prepared by CLC/TC CECC/SC 49 (former WG 17).

The text of the draft based on document CECC (Secretariat) 3336 was submitted to the formal vote; together with the voting report, circulated as document CECC (Secretariat) 3454, it was approved as amendment A1 to EN 169000:1992 on 1993-11-02.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-08-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1999-08-01

Preface

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized specifications for Quartz crystal controlled oscillators. It should be read in conjunction with the current regulations for the CECC System.

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This specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized specifications for QUARTZ CRYSTAL CONTROLLED OSCILLATORS. It should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, the member countries of the CECC are, Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Preface

This specification was prepared by CECC WG 17: Piezoelectric devices for frequency control and selection.

It is based, wherever possible, on the Publications of the International Electrotechnical Commission and in particular on IEC 679-1: Quartz crystal controlled oscillators: Part 1: General information, test conditions and methods.

The text of this specification was circulated to the CECC for voting in the document(s) indicated (listed) below and was ratified by the President of the CECC for printing as a CECC Specification.

<u>Document</u>	<u>Date of Voting</u>	<u>Report on the Voting</u>
CECC (Secretariat) 2569	August 1990	CECC (Secretariat)2697
CECC (Secretariat) 2714	February 1991	CECC (Secretariat)2775

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Section 1. Scope

This document specifies the methods of test and general requirements for quartz crystal controlled oscillators of assessed quality using either capability approval or qualification approval procedures.

Section 2. General

2.1 Order of precedence

Where any discrepancies occur for any reason, documents shall rank in the following order of precedence:

- the detail specification
- the sectional specification
- the generic specification
- the FEN internal regulations
- any other international documents (for example, of the IEC) to which reference is made

The same order of precedence shall apply to equivalent national documents.

2.2 Related documents

ISO 1000:1973, *SI units and recommendations for use of their multiples and of certain other units*.

IEC 27-1:1971, *Letter symbols to be used in electrical technology: Part 1: General*.

IEC 27-2:1972, *Letter symbols to be used in electrical technology: Part 2: Telecommunications and electronics*.

IEC 50:—, *International Electrotechnical Vocabulary*.

IEC 50 561:—, *International Electrotechnical Vocabulary Chapter 561: Piezoelectric devices for frequency control and selection*.

IEC 68:—, *Basic environmental testing procedures*.

IEC 68-1:1988, *Part 1: General and guidance*.

IEC 68-2:—, *Part 2: Tests*.

IEC 68-2-1:1990, *Tests A: Cold*.

IEC 68-2-2:1974, *Test B: Dry heat*.

IEC 68-2-2:1976, *Supplement A*.

IEC 68-2-3:1969, *Test Ca: Damp heat, steady state*.

IEC 68-2-3:1984, *Amendment No. 1*.

IEC 68-2-6:1982, *Test F_c and guidance: Vibration (sinusoidal)*.

IEC 68-2-6:1983, *Amendment No. 1*.

IEC 68-2-6:1985, *Amendment No. 2*.

IEC 68-2-7:1983, *Test Ga: Acceleration, steady state*.

IEC 68-2-7:1986, *Amendment No. 1*.

IEC 68-2-10:1988, *Test J: Mould growth*.

IEC 68-2-13:1983, *Test M: Low air pressure*.

IEC 68-2-14:1984, *Test N: Change of temperature*.

IEC 68-2-14:1986, *Amendment No. 1*.

IEC 68-2-17:1978, *Test Q: Sealing*.

IEC 68-2-17:1989, *Amendment No. 1*.

IEC 68-2-20:1979, *Test T: Soldering*.

IEC 68-2-20:1986, *Amendment No. 1*.

IEC 68-2-21:1983, *Test U: Robustness of terminations*.

IEC 68-2-21:1985, *Amendment No. 1*.

IEC 68-2-27:1987, *Test Ea: Shock*.

IEC 68-2-29:1987, *Test Eb: Bump*.

IEC 68-2-30:1980, *Test Db: Damp heat cyclic.*

IEC 68-2-30:1985, Amendment No. 1.

IEC 68-2-32:1975, *Test Ed: Free fall.*

IEC 68-2-32:1990, Amendment No. 2.

IEC 68-2-36:1973, *Test Fdb: Random vibration wide band — reproducibility medium.*

IEC 68-2-36:1983, Amendment No. 1.

IEC 68-2-45:1980, *Test XA: Immersion in cleaning solvents.*

IEC 68-2-52:1984, *Test Kb: Salt mist, cyclic.*

IEC 122-1:1976, *Quartz crystal units for frequency control and selection — Part 1: Standard values and test conditions.*

IEC 122-1:1983, Amendment No. 1.

IEC 410:1973, *Sampling plans and procedures for inspection by attributes.*

IEC 617:—, *Graphical symbols for diagrams.*

IEC 679-1:1980, *Quartz crystal controlled oscillators — Part 1: General information, test conditions and methods.*

IEC 679-1:1985, Amendment No. 1.

IEC 679-2:1981, *Part 2: Guide to the use of quartz crystal controlled oscillators.*

IEC 695-2-2:1980, *Fire hazard testing — Part 2: Test methods Needle-flame test.*

IEC 695-2-2:1986, *FEN internal regulations.*

CECC 00 015/1:1991, *Basic specification: Protection of electrostatic sensitive devices — Part 1: General requirements.*

CECC 00 114/I Issue I:1990, *Quality assessment procedures — Part I: Approval of manufacturers and other organizations.*

CECC 00 114/II Issue I:1991, *Quality assessment procedures — Part II: Qualification approval of electronic components.*

CECC 00 114/III Issue I:1989, *Quality assessment procedures — Part III: Capability approval of an electronic component manufacturing activity.*

CECC 00 109:1974, *Certified test records.*

CECC 00 111:1991, *Specifications.*

CECC 00 802:1990, *CECC Standard method for specification of surface mounting components (SMDs) of assessed quality.*

2.3 Units, symbols and terminology

2.3.1 General

Units, graphical symbols, letter symbols and terminology shall, wherever possible, be taken from the following documents:

ISO 1000, *SI units and recommendations for the use of multiples and of certain other units.*

IEC 27, *Letter symbols to be used in electrical technology.*

IEC 50, *International Electrotechnical Vocabulary.*

IEC 50 (561), *International Electrotechnical Vocabulary Chapter 561: Piezoelectric devices for frequency control and selection.*

IEC 679, *Quartz crystal controlled oscillators.*

The following paragraphs contain additional terminology applicable to quartz crystal controlled oscillators and the latest IEC 561 definitions.

2.3.2 Simple packaged crystal oscillator (SPXO) (561-04-01)

A crystal controlled oscillator having no means of temperature control or compensation, exhibiting a frequency/temperature characteristic determined substantially by the resonator employed.

2.3.3 Overtone crystal oscillator (561-04-02)

An oscillator designed to operate with the controlling resonator functioning in a specified mechanical overtone mode of vibration.

2.3.4 Crystal cut (122-1)

The orientation of the crystal element with respect to the crystallographic axes of the crystal.

NOTE This definition is included, as it may be desirable to specify the cut (and hence the general form of the frequency-temperature performance) of a crystal unit used in an oscillator application. The choice of crystal cut will imply certain attributes of the oscillator which may not otherwise appear in the detail specification.

2.3.5 Voltage controlled crystal oscillator (VCXO) (561-04-03)

A crystal controlled oscillator, the frequency of which can be deviated or modulated according to a specified relation, by application of a control voltage.

2.3.6 Temperature compensated crystal oscillator (TCXO) (561-04-04)

A crystal controlled oscillator whose frequency deviation due to temperature is reduced by means of a compensation system, incorporated in the device.

2.3.7 Oven controlled crystal oscillator (OCXO) (561-04-05)

A crystal controlled oscillator in which at least the resonator is temperature controlled.

NOTE This mode of operation ensures that the oscillator frequency will remain sensibly constant over the operating temperature range of the OCXO, therefore independent of the frequency-temperature characteristic of the crystal unit.

2.3.8 Nominal frequency (561-04-06)

The frequency used to identify the crystal controlled oscillator.

2.3.9 Frequency tolerance (561-04-07)

The maximum permissible deviation of the oscillator frequency from a specified nominal value when operating under specified conditions.

NOTE Frequency tolerances are often assigned separately to specified ambient effects, both electrical and environmental. When this approach is used, it is necessary to define the values of other operating parameters, as well as the range of the specified variable, that is:

- Deviation from the frequency at the specified reference temperature due to operation over the specified temperature range, other conditions remaining constant
- Deviation from the frequency at specified supply voltage due to supply voltage changes over the specified range, other conditions remaining constant
- Deviation from the initial frequency due to ageing, other conditions remaining constant
- Deviation from the frequency with specified load conditions due to changes in load impedance over the specified range, other conditions remaining constant

In some cases, an overall frequency tolerance may be specified, due to any/all combinations of operating parameters, during a specified lifetime.

2.3.10 Frequency offset (561-04-08)

The frequency difference, positive or negative, which should be added to the specified nominal frequency of the oscillator, when adjusting the oscillator frequency under a particular set of operating conditions in order to minimize its deviation from nominal frequency over the specified range of operating conditions.

Example

In order to minimize the frequency deviation from nominal over the entire temperature range, a frequency offset may be specified for adjustment at the reference temperature (see Figure 1).

2.3.11 Adjustment frequency (561-04-09)

The frequency to which an oscillator must be adjusted, under a particular combination of operating conditions, in order to meet the frequency tolerance specification over the specified range of operating conditions (that is, adjustment frequency = nominal frequency + frequency offset).

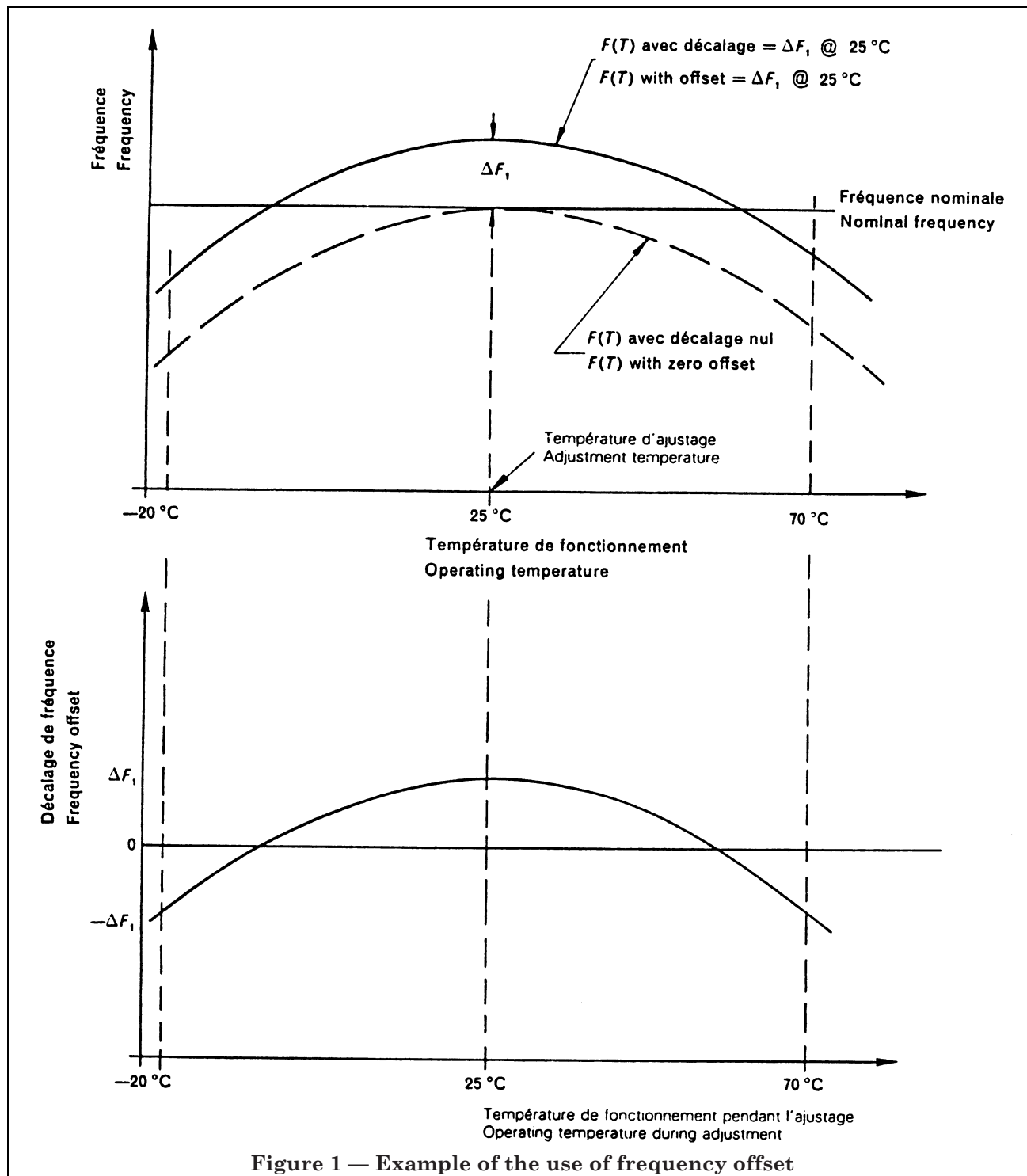
2.3.12 Frequency adjustment range (561-04-10)

The range over which the oscillator frequency may be varied by means of some variable element, for the purpose of

— setting the frequency to a particular value

or

— to correct the oscillator frequency to a prescribed value after deviation due to ageing, or other changed conditions.



2.3.13 Operating temperature range (561-04-11)

The range of temperature, over which the oscillator will function, maintaining frequency and other output signal characteristics within specified tolerances.

2.3.14 Operable temperature range (561-04-12)

The range of temperature, over which the oscillator shall continue to provide an output signal, though not necessarily within the specified tolerances of frequency, level, waveform, etc.

2.3.15 Reference temperature (679-1)

The temperature at which certain oscillator performance parameters are measured, normally $(25 \pm 2) ^\circ\text{C}$.

2.3.16 Reference point temperature (679-1)

The temperature measured at a specific reference point relative to the oscillator.

2.3.17 Stabilization time (561-04-13)

The time, measured from the initial application of power, required for a crystal controlled oscillator to stabilize its operation within specified limits.

2.3.18 Frequency/voltage coefficient (561-04-14)

The fractional change in output frequency resulting from an incremental change in supply voltage, other parameters remaining unchanged.

NOTE In the case of OCXO's, a considerable time may elapse before the full effect of a supply voltage change is observed, as the temperature of the oven may drift gradually to a new value following the voltage perturbation.

2.3.19 Frequency/load coefficient (561-04-15)

The fractional change in output frequency resulting from an incremental change in electrical load impedance, other parameters remaining unchanged.

2.3.20 Long-term frequency stability (Frequency ageing) (679-1)

The relationship between oscillator frequency and time. This long-term frequency drift is caused by secular changes in the crystal unit and/or other elements of the oscillator circuit, and should be expressed as fractional change in mean frequency per specified time interval.

2.3.21 Short-term frequency stability (561-04-16)

The random fluctuation of the frequency of an oscillator over short periods of time.

NOTE For an explanation of short-term frequency stability IEC 679-1 Appendix A should be consulted.

2.3.22 Allan variance of fractional frequency fluctuation (679-1)

The preferred definition in the time domain of the short-term stability characteristic of oscillator output frequency:

$$\sigma_y^2(M, 2, \tau, \tau) = \frac{1}{M-1} \sum_{k=1}^{M-1} \frac{(Y_{k+1} - Y_k)^2}{2}$$

where the Y_k above are the average instantaneous fractional frequency fluctuations obtained sequentially, with no systematic dead time between measurements; τ is the sample time over which measurement is averaged; M is the number of measurements.

This is a specific form of the general M -sample variance.

2.3.23 rms fractional frequency fluctuation (679-1)

A measure in the time domain of the short-term frequency stability of an oscillator, based on the statistical properties of a number of frequency measurements, each representing an average of the instantaneous frequency over the specified sampling interval. The preferred measure of fractional frequency fluctuation is

$$\frac{\Delta F}{F_0}(\tau)_{\text{eff}} = \left[\frac{1}{2(M-1)} \sum_{k=1}^{M-1} (Y_{k+1} - Y_k)^2 \right]^{1/2} = \left[\sigma_y^2(M, 2, \tau, \tau) \right]^{1/2}$$

2.3.24 Phase noise (phase jitter) (679-1)

A frequency-domain measure of the short-term frequency stability of an oscillator normally expressed as the power spectral density of the phase fluctuations, $S_\phi(f)$, where the phase fluctuation function is $\phi(t) = 2\pi F t - 2\pi F_0 t$. Spectral density of phase fluctuation can be directly related to the spectral density of frequency fluctuation by

$$S_\tau(f) = \left(\frac{F_0}{f}\right)^2 S_\phi(f) \text{ RAD}^2/\text{Hz}$$

where F = oscillator frequency

F_0 = average oscillator frequency

f = Fourier frequency

2.3.25 Spectral purity (679-1)

A measure of frequency stability in the frequency domain usually represented as the single side noise power spectrum expressed in decibels relative to total signal power, per hertz bandwidth. It includes non-deterministic noise power, harmonic distortion components, and spurious single frequency interferences.

2.3.26 Incidental frequency modulation (679-1)

An optional measure of frequency stability in the frequency domain. Incidental f.m. is best described in terms of the spectrum of the resultant base-band signal obtained by applying the oscillator signal to an ideal discriminator circuit of specified characteristics. If the detection bandwidth is adequately specified, the incidental f.m. may be expressed as a fractional proportion of the output frequency (for example 2×10^{-8} r.m.s. in a 10 kHz band).

2.3.27 Amplitude modulation distortion (679-1)

Non-linear distortion in which the relative magnitudes of spectral components of the modulating signal waveform are modified, also commonly known as frequency distortion, amplitude distortion, and amplitude-frequency distortion.

2.3.28 Linearity of frequency modulation deviation (679-1)

A measure of the transfer characteristic of a modulation system as compared to an ideal (straight line) function, usually expressed as an allowable non-linearity in per cent of specified full range deviation. Modulation linearity can also be expressed in terms of the permissible distortion of base-band signals produced by the modulation device (for example intermodulation and harmonic distortion products not to exceed -40 dB relative to the total modulating signal power).

Example:

Figure 2 is a plot of the output frequency of a typical modulated oscillator specified to have a modulation characteristic of 133.3 Hz/V over a range of ± 3 V, with an allowed non-linearity of $\pm 5\%$. Curve D is the actual characteristic compared with the ideal (curve A) and the limits (curves B and C).

2.3.29 Harmonic distortion (679-1)

A non-linear distortion characterized by the generation of undesired spectral components harmonically related to the desired signal frequency. Each harmonic component is usually expressed as a power ratio (in decibels) relative to the output power of the desired signal.

2.3.30 Spurious oscillations (679-1)

Discrete frequency spectral components, non-harmonically related to the desired output frequency, appearing at the output terminal of an oscillator. These components may appear as symmetrical sidebands, or as single spectral components, depending upon the mode of generation. Spurious components in the output spectrum are usually expressed as a power ratio (in decibels) with respect to the output signal power.

2.3.31 Pulse duration

The time interval between the points on the leading and trailing edge of a pulse waveform at which the function equals a specified value.

2.3.32 Rise time

The time interval required for the leading edge of a waveform to change between two defined levels. These levels may be two logic levels U_{IL} and U_{IH} or 10 % to 90 % of its maximum amplitude ($U_{HI} - U_{LO}$) or any other ratio defined in the detail specification (see Figure 3).

where U_{IL} = low level input voltage

U_{IH} = high level input voltage

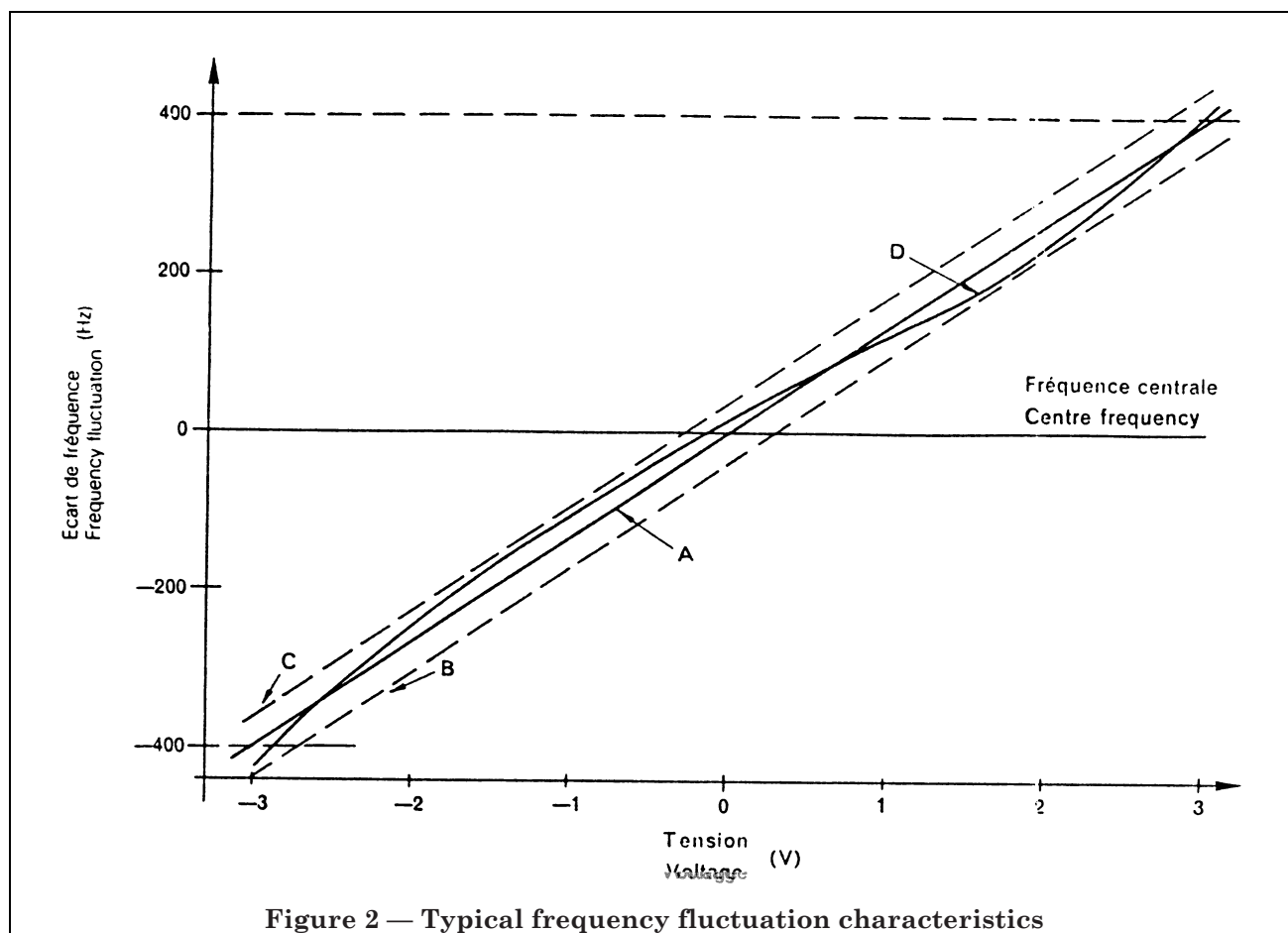
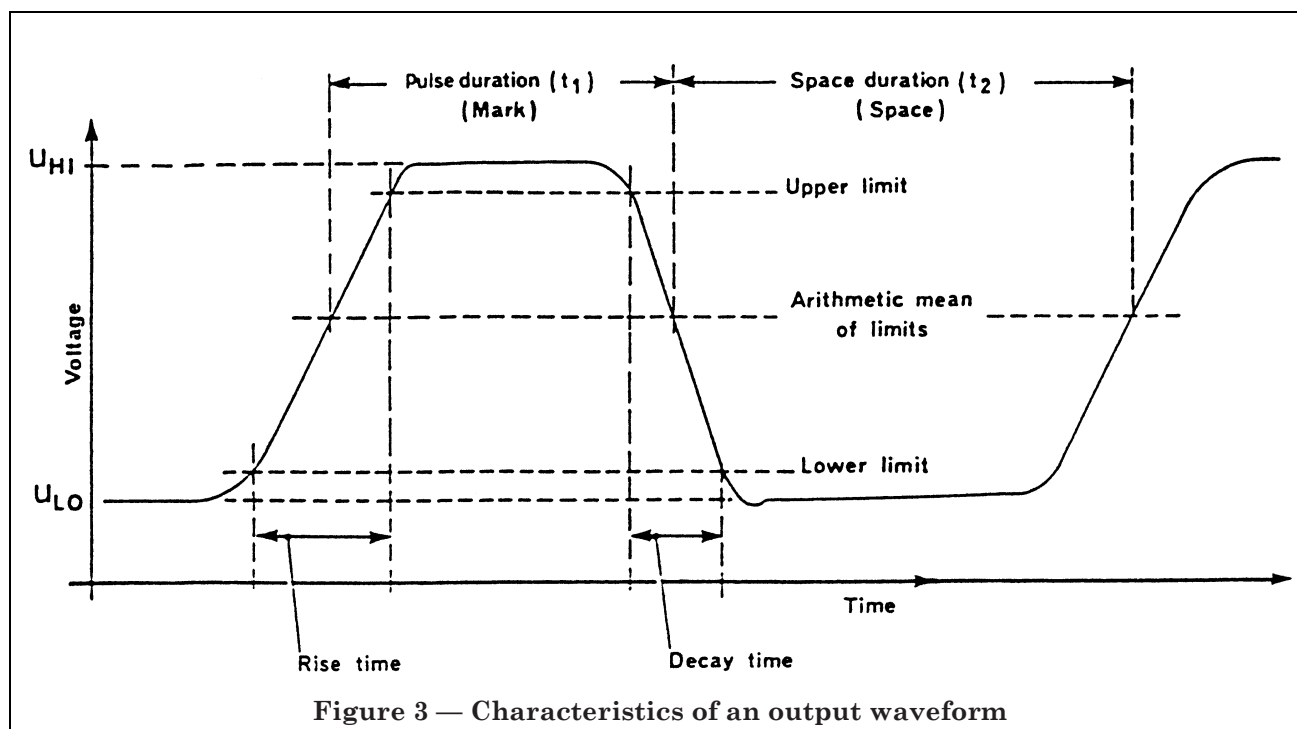


Figure 2 — Typical frequency fluctuation characteristics



2.3.33 Decay (or fall) time

The time interval required for the trailing edge of a waveform to change between two defined levels. These levels may be two logic levels U_{IH} and U_{IL} or 90 % to 10 % of its maximum amplitude ($U_{HI} - U_{LO}$) or any other ratio as defined in the detail specification (see Figure 3).

2.3.34 Symmetry (Mark/space ratio or duty cycle)

The ratio between the time (t_1), in which the output voltage is above a specified level, and the time (t_2), in which the output voltage is below the specified level, in percent of the duration of the full signal period. The specified level may be the arithmetic mean between U_{IL} and U_{IH} , or 50 % of the peak-to-peak amplitude (see Figure 3). The ratio being expressed as:

$$\frac{100t_1}{t_1 + t_2} : \frac{100t_2}{t_1 + t_2}$$

2.3.35 Startup time

1) Amplitude

The time taken after the application of power for the oscillator output to reach 90 % of the final amplitude.

2) Frequency

The time taken after the application of power for the oscillator output to attain the crystal controlled frequency.

2.3.36 Tri-state output

An output stage which may be enabled or disabled by the application of an input control signal. In the disable mode the output impedance of the gate is set to a high level permitting the application of test signals to following stages.

2.3.37 Storage temperature

The minimum and maximum temperature as measured on the enclosure at which the quartz crystal controlled oscillator may be stored without deterioration or damage to its performance.

2.3.38 Retrace characteristics

The ability of an oscillator to return to within specified limits of a previously stabilized frequency, following a storage period in the unenergized condition.

2.4 Preferred ratings and characteristics

2.4.1 Climatic category

40/085/56

For requirements where the operating temperature range of the quartz crystal controlled oscillator is greater than $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$, a climatic category consistent with the operating temperature range shall be specified.

2.4.2 Bump severity

$4\,000 \pm 10$ bumps at 400 m/s^2 peak acceleration in each direction along three mutually perpendicular axes (see 4.6.6) Pulse duration 6 ms.

2.4.3 Vibration severity

Sinusoidal

10 Hz to 55 Hz

0,75 mm displacement amplitude (peak value).

55 Hz to 500 Hz or 55 Hz to 2 000 Hz

100 m/s^2 acceleration amplitude (peak value).

30 minutes in each of 3 mutually perpendicular axes at 1 octave/minute. (See 4.6.7).

10 Hz to 55 Hz

1,5 mm displacement amplitude (peak value)

55 Hz to 2 000 Hz

200 m/s^2 acceleration amplitude (peak value)

30 minutes in each of 3 mutually perpendicular axes at 1 octave/minute. (See 4.6.7)

Random

$(19,2\text{ m/s}^2)^2/\text{Hz}$ between 20 Hz and 2 000 Hz

196 m/s^2 acceleration

or

$(48\text{ m/s}^2)^2/\text{Hz}$ between 20 Hz and 2 000 Hz

314 m/s^2 acceleration

30 minutes in each of 3 mutually perpendicular axes at 1 octave/minute. (See 4.6.7)

2.4.4 Shock severity

$1\,000\text{ m/s}^2$ peak acceleration for 6 ms duration; three shocks in each direction along three mutually perpendicular axes (See 4.6.8) half sine pulse, unless otherwise stated in the detail specification

2.4.5 Leak rate

$10^{-1}\text{ Pa. cm}^3/\text{s}$ (10^{-6} mbar. l/s)

$10^{-3}\text{ Pa. cm}^3/\text{s}$ (10^{-8} mbar. l/s)

2.5 Marking

2.5.1 The quartz crystal controlled oscillator shall be clearly and durably marked (see 4.6.21) with 1) to 7) in the order below and with as many possible of the remaining items as considered necessary.

- 1) Type designation as defined in the detail specification
- 2) Nominal frequency in kHz or MHz
- 3) Year and week of manufacture
- 4) Mark of conformity (unless a certificate of conformity is used).
- 5) Factory identification code
- 6) Manufacturer's name or trade mark

- 7) Terminal identification
- 8) Designation of electrical connections
- 9) Power supply voltage and polarity (if applicable)
- 10) Serial number (if applicable)
- 11) Surface mount device classification (if applicable) (see 6.2 of CECC 00 802)

Where the available surface area of miniature quartz crystal controlled oscillators imposes practical limits in the amount of marking, instructions on the marking to be applied shall be given in the detail specification.

2.5.2 The primary packaging containing the quartz crystal controlled oscillator(s) shall be clearly marked with the information listed in 2.5.1 except item (7) and Electrostatic Sensitive Device (ESD) identification where necessary.

Section 3. Quality assessment procedures

Two methods are available for the approval of quartz crystal controlled oscillators of assessed quality. They are qualification approval and capability approval.

3.1 Primary stage of manufacture

The primary stage of manufacture for a quartz crystal controlled oscillator in accordance with § 2.2.6 of CECC 00 111-III shall be as follows:

- 1) For oscillators incorporating a sealed crystal unit
 - the assembly of the quartz crystal controlled oscillator
- 2) For oscillators incorporating an unencapsulated crystal unit
 - the final surface finishing of the crystal element in addition to the assembly of the oscillator

NOTE The final surface finishing of the crystal element could be any of the following operations: lapping; polishing; etching; cleaning, in the case of polished plates.

3.2 Structurally similar components

The grouping of structurally similar crystal controlled oscillators for the purpose of qualification approval, capability approval and quality conformance inspection shall be prescribed in the relevant sectional specification.

3.3 Subcontracting

These procedures shall be in accordance with § 1.2 of CECC 00 114-II or § 2.2 of CECC 00 114-III.

There shall be no subcontracting after the assembly of the crystal to the electronic circuit except in the case of sealed crystal units where the sealing of the final enclosure of the oscillator may be permitted.

3.4 Incorporated components

Where incorporated components are used the requirements of § 2.3 of CECC 00 114-III shall apply.

3.5 Manufacturer's approval

To obtain manufacturer's approval the manufacturer shall meet the requirements of § 1 of CECC 00 114-I.

3.6 Approval procedures

3.6.1 General

To qualify a quartz crystal controlled oscillator, either capability approval or qualification approval procedures may be used. These procedures conform to those stated in CECC 00 114-III and CECC 00 114-II.

3.6.2 Capability approval

Capability approval is appropriate when structurally similar quartz crystal controlled oscillators based on common design rules, are fabricated, by a group of common processes.

Under capability approval detail specifications fall into the following three categories.

1) Capability qualifying components (CQCs)

A detail specification shall be prepared in accordance with § 4.2 of CECC 00 114-III for each CQC as agreed with the ONS. It shall identify the purpose of the CQC and include all relevant stress levels and test limits.

2) Standard catalogue items

When a component covered by the capability approval procedure is intended to be offered as a standard catalogue item and listed in CECC 00 200: Qualified Products List, the procedures of § 4.3 of CECC 00 114-III shall apply. The detail specification shall comply with the blank detail specification.

3) Custom built quartz crystal controlled oscillators

The content of the detail specification shall be by agreement between the manufacturer and the customer in accordance with § 4.2 of CECC 00 114-III.

Further information on detail specifications is contained in the sectional specification CECC 69 100.

The product and capability qualifying components (CQCs) are tested in combination and approval given to a manufacturing facility on the basis of validated design rules, processes and quality control procedures. Further information is given in 3.7 and in the sectional specification CECC 69 100.

3.6.3 Qualification approval

Qualification approval is appropriate for components manufactured to a standard design and established production process and conforming to a published detail specification.

The programme of tests defined in the detail specification for the appropriate assessment and severity level applies directly to the quartz crystal controlled oscillator to be qualified, as prescribed in 3.8 and the sectional specification CECC 69 200.

3.7 Procedures for capability approval

3.7.1 General

The procedures for capability approval shall be in accordance with CECC 00 114-III.

3.7.2 Eligibility for capability approval

The manufacturer shall comply with the requirements of § 2.1 of CECC 00 114-III and the primary stage of manufacture as defined in 3.1 of this generic specification.

3.7.3 Application for capability approval

In order to obtain capability approval the manufacturer shall apply the rules of procedure given in § 2.4 of CECC 00 114-III.

3.7.4 Granting of capability approval

Capability approval shall be granted when the procedures in accordance with § 2.7 of CECC 00 114-III have been successfully completed.

3.7.5 Description of capability

The contents of the description of capability shall be in accordance with the requirements of the sectional specification.

The ONS shall treat the description of capability as a confidential document. The manufacturer may, if he so wishes, disclose part or all of it to a third party.

3.8 Procedures for qualification approval

3.8.1 General

The procedures for qualification approval shall be in accordance with CECC 00 114-II.

3.8.2 Eligibility for qualification approval

The manufacturer shall comply with the requirements of § 1.1 of CECC 00 114-II and the primary stage of manufacture as defined in 3.1 of this generic specification.