

PUBLICLY AVAILABLE SPECIFICATION PRE-STANDARD

Quartz crystal controlled oscillators of assessed quality –

Part 6: Phase jitter measurement method for quartz crystal oscillators
and SAW oscillators – Application guide

IEC PAS 60679-6:2008

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**QUARTZ CRYSTAL CONTROLLED OSCILLATORS
OF ASSESSED QUALITY –**

**Part 6: Phase jitter measurement method for quartz crystal oscillators
and SAW oscillators – Application guide**

FOREWORD

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A PAS is a technical specification not fulfilling the requirements for a standard but made available to the public.

IEC-PAS 60679-6 was submitted by the Japanese Institute of Electronics, Information and Communication Engineers and has been processed by IEC technical committee 49: Piezoelectric and dielectric devices for frequency control and selection.

The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
49/784/NP	49/793A/RVN

Following publication of this PAS, which is a pre-standard publication, the technical committee or subcommittee concerned will transform it into an International Standard.

This PAS shall remain valid for an initial maximum period of three years starting from the publication date. The validity may be extended for a single three-year period, following which it shall be revised to become another type of normative document or shall be withdrawn.

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INTRODUCTION

With the advance of information and telecommunication technologies, such information and telecommunication devices as measuring instruments and computers have played important roles in society. Recently, these devices have been digitized and proliferated on a worldwide basis. For these devices, crystal oscillators with low phase noise are necessary. This standard deals with the phase jitter measurement method.

International standardization of industrial standards regarding electronic devices is conducted by many technical committees in the International Electrotechnical Commission (IEC), located in Geneva. TC 49 works on standardization of international trade regarding piezoelectric and dielectric devices for frequency control and selection. There are 10 working groups (WG) in TC49, and WG6 formulates and deliberates international standards regarding measurement methods.

The special committee for piezoelectric and dielectric devices for frequency control and selection in the standard investigatory panel of the electronic information communication society has been working as a domestic deliberative body of IEC/TC49. The activities of the domestic committee for TC49/WG6 are conducted in the measurement method committee of the technical committee in the Quartz Industry Association of Japan (QIAJ) which consists of crystal device manufacturers.

This PAS was formulated as QIAJ technical standard QIAJ-B-011. Phase jitter is a kind of electronic noise. Other major electronic noise is phase noise. Therefore, the IEC document should cover both phase jitter and phase noise. However, the phase noise measurement method has not yet been organized completely. Taking into account the fact that the phase jitter measurement method is increasingly important due to the advance in digitization, we considered that we should proceed with the standardization without waiting for the completion of the study of the phase noise measurement method so that the phase jitter measurement method can be used in as wide a range as possible. In this context, we requested the technical committee of the QIAJ to formulate a standard. As a result, the guideline for phase jitter measurement method of crystal oscillators and SAW oscillators was prepared and this will be issued as a standard of the Standard Investigatory Panel of the Electronic Information Communication Society.

This standard is the result of collected wisdom in the field of advanced technology in Japan, and it is open to the public as a standard of the Institute of Electronics, Information and Communication Engineers. It is expected that this standard will contribute to the development of technology in this fast-growing field.

QUARTZ CRYSTAL CONTROLLED OSCILLATORS OF ASSESSED QUALITY –

Part 6: Phase jitter measurement method for quartz crystal oscillators and SAW oscillators – Application guide

1 Scope

This PAS applies to the phase jitter measurement of quartz crystal oscillators and SAW oscillators used for electronic devices and gives guidance for phase jitter that allows the accurate measurement of r.m.s. jitter.

In the measurement method, phase noise measurement equipment or a phase noise measurement system is used.

The measuring frequency range is from 10 MHz to 700 MHz.

This PAS applies to quartz crystal oscillators and SAW oscillators used in electronic devices and modules that have the multiplication or division functions based on these oscillators. The type of phase jitter applied to these oscillators is the r.m.s. jitter. In the following text, these oscillators and modules will be referred to as “oscillator(s)” for simplicity.

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.

IEC 60679-1, *Quartz crystal controlled oscillators of assessed quality – Part 1: Generic specification*

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3 Terms, definitions, glossary and general terms

In the event of contradictory/inconsistent descriptions in the specification that arise due to certain reasons, the following priority applies.

- Specific standard
- IEC 60679-1
- General rule by product type
- General rule by item
- Other quoted international standard criteria (for example, IEC)

The same prioritization also applies to the equivalent domestic standard.

Annex A gives a description of the terms with regard to phase jitter.

Unit, drawing, codes, and characters are based on IEC 60679-1.

4 Measurement method

The measurement method applied to oscillators is based on the following.

4.1 Frequency range and the measurement method

The measurement range shall be 10 MHz to 700 MHz. As the measurement method, the phase noise measurement equipment (system) or the specially designed phase jitter measurement equipment shall be used.

4.2 Method of using the phase noise measurement value

The recommended method of measuring phase jitter using phase noise measurements is as given in 4.2.1 to 4.2.4.

4.2.1 Measurement equipment/system

The measurement equipment and system shall be the phase noise measurement equipment or the phase noise measurement system.

4.2.2 Measurement item

RMS jitter

NOTE Only random jitter. No period jitter.

4.2.3 Range of detuning frequency

The range of detuning frequency should be determined through a prearrangement and contract between a customer and a supplier. The formula to calculate phase jitter from the phase noise is described in Annex A.

4.2.4 Phase noise measurement method

The range of detuned frequency shall be determined by contracts between customers and suppliers after discussion between them. The formula for calculating the r.m.s. jitter from a phase noise is based on the calculation method for the amount of phase jitter shown in Annex A.

As the phase noise measurement method, an orthogonal phase detection method (referred to also as an orthogonal comparison method or a PLL method) shall be used, or the measurement equipment having built-in electronic circuits for cancelling a noise in the measurement system (for example, circuits adopting a cross-correlation method) shall be used.

4.3 Measurement method for the use of the specially designed measurement equipment

The specification of the method using the specially designed measurement equipment is based on the following.

4.3.1 Measurement equipment and system

The measurement equipment and system shall be the specially designed SONET/SDH measurement equipment using a time interval analyser.

4.3.2 Measurement items

The measurement items shall be the r.m.s jitter and the period (periodic) jitter.

4.3.3 Number of measurements

The measurement times shall be determined by contracts between customers and suppliers after discussion between them. The target measurement times shall be 20 000 times or more.