

INTERNATIONAL STANDARD

IEC 61019-1

First edition
2004-11

Surface acoustic wave (SAW) resonators – Part 1: Generic specification

© IEC 2004 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

W

For price, see current catalogue

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Order of precedence.....	8
4 Terms and definitions	8
4.1 General terms	8
4.2 Operational properties.....	11
5 Preferred values for ratings and characteristics	19
5.1 Standard nominal frequency values in megahertz (MHz)	19
5.2 Standard operating temperature ranges in degrees Celsius (°C)	19
5.3 Standard values of load capacitance in picofarads (pF).....	19
5.4 Standard levels of drive in milliwatts (mW)	19
5.5 Standard values of minimum insertion attenuation in decibels (dB).....	19
5.6 Standard climatic category	20
5.7 Bump severity	20
5.8 Vibration severity	20
5.9 Shock severity.....	20
5.10 Fine leak rate	21
6 Marking	21
6.1 Resonator marking	21
6.2 Package marking.....	21
7 Quality assessment procedures.....	21
7.1 Primary stage of manufacture.....	21
7.2 Structurally similar components	21
7.3 Subcontracting	22
7.4 Incorporated components	22
7.5 Manufacturer's approval	22
7.6 Approval procedures	22
7.7 Procedures for capability approval	23
7.8 Procedures for qualification approval.....	23
7.9 Test procedures	24
7.10 Screening requirements	24
7.11 Rework and repair work.....	24
7.12 Certified records of released lots.....	24
7.13 Validity of release.....	24
7.14 Release for delivery	24
7.15 Unchecked parameters.....	24
8 Test and measurement procedures.....	24
8.1 General	24
8.2 Test and measurement conditions	25
8.3 Visual inspection	26

8.4	Dimensions and gauging procedures	26
8.5	Measurement method of one-port resonator	26
8.6	Measurement method of two-port resonator.....	28
8.7	Mechanical and environmental test procedures	32
8.8	Endurance test procedure	37
Figure 1	– Basic configurations of SAW resonators.....	9
Figure 2	– One-port resonator equivalent circuit	12
Figure 3	– Vector admittance diagram of a one-port SAW resonator	14
Figure 4	– Typical frequency characteristics of a one-port SAW resonator inserted into a transmission line in series (see 4.2.10.2.1 and 4.2.10.3.1).....	14
Figure 5	– Resonance and anti-resonance frequencies.....	15
Figure 6	– Two-port resonator equivalent circuits.....	17
Figure 7	– Typical frequency characteristics of a two-port resonator	18
Figure 8	– Reflection measurement	27
Figure 9	– Transmission measurement	29

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SURFACE ACOUSTIC WAVE (SAW) RESONATORS –

Part 1: Generic specification

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61019-1 has been prepared by IEC technical committee 49: Piezoelectric and dielectric devices for frequency control and selection.

This first edition of IEC 61019-1 cancels and replaces the first edition of IEC 61019-1-1 published in 1990 and the first edition of IEC 61019-1-2 published in 1993. It constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
49/689FDIS	49/698/RVD

Full information on the voting for the approval of this standard 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.

IEC 61019 consists of the following parts under the general title *Surface acoustic wave (SAW) resonators*:

Part 1: Generic specification

Part 2: Guide to the use (at present under revision)

Part 3: Standard outlines and lead connections

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

A bilingual version of this publication may be issued at a later date.

SURFACE ACOUSTIC WAVE (SAW) RESONATORS –

Part 1: Generic specification

1 Scope

This part of IEC 61019 specifies the methods of test and general requirements for SAW resonators using either capability approval or qualification approval procedures of the IECQ system.

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 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050-561:1991, *International Electrotechnical Vocabulary (IEC) – Chapter 561: Piezo-electric devices for frequency control and selection*

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60068-2-1:1990, *Environmental testing – Part 2: Tests – Tests A: Cold*

IEC 60068-2-2:1974, *Environmental testing – Part 2: Tests – Tests B: Dry heat*

IEC 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-7:1983, *Environmental testing – Part 2: Tests – Test Ga and guidance: Acceleration, steady state*

IEC 60068-2-13:1983, *Environmental testing – Part 2: Tests – Test M: Low air pressure*

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests – Test N: Change of temperature*

IEC 60068-2-17:1994, *Environmental testing – Part 2: Tests – Test Q: Sealing*

IEC 60068-2-20:1979, *Environmental testing – Part 2: Tests – Test T: Soldering*

IEC 60068-2-21:1999, *Environmental testing – Part 2-21: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 60068-2-27:1987, *Environmental testing – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60068-2-29:1987, *Environmental testing – Part 2: Tests – Test Eb and guidance: Bump*

IEC 60068-2-30:1980, *Environmental testing – Part 2: Tests – Test Db and guidance: Damp heat, cyclic (12 + 12-hour cycle)*

IEC 60068-2-32:1975, *Environmental testing – Part 2: Tests – Test Ed: Free fall*

IEC 60068-2-45:1980, *Environmental testing – Part 2: Tests – Test XA and guidance: Immersion in cleaning solvents*

IEC 60068-2-52:1996, *Environmental testing – Part 2: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)*

IEC 60068-2-58:1999, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-64:1993, *Environmental testing – Part 2: Tests – Test Fh: Vibration, broad-band random (digital control) and guidance*

IEC 60068-2-78:2001, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60617 – DB:2001¹ *Graphical symbols for diagrams*

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

IEC 60444 (all parts), *Measurement of quartz crystal unit parameters*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 2: Electrostatic discharge immunity test*. Basic EMC Publication

IEC 61019-2:1995, *Surface acoustic wave (SAW) resonators – Part 2: Guide to the use*

IEC 61019-3:1991, *Surface acoustic wave (SAW) resonators – Part 3: Standard outlines and lead connections*

QC 001001:2002, *IEC Quality Assessment System for Electronic Components (IECQ) – Basic Rules*

QC 001002-2:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure – Part 2: Documentation*

QC 001002-3:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure – Part 3: Approval procedures*

QC 001005:2003, *IEC Quality Assessment System for Electronic Components (IECQ) – Register of Firms, Products and Services approved under the IECQ System, including ISO 9000*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*

¹ DB refers to the IEC on-line database.