

**Semiconductor devices - Part 16-10: Technology
Approval Schedule (TAS) for monolithic microwave
integrated circuits**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 60747-16-10:2004 sisaldab Euroopa standardi EN 60747-16-10:2004 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 16.11.2004 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 30.09.2004.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 60747-16-10:2004 consists of the English text of the European standard EN 60747-16-10:2004.

This standard is ratified with the order of Estonian Centre for Standardisation dated 16.11.2004 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 30.09.2004.

The standard is available from Estonian standardisation organisation.

ICS 31.200

Võtmesõnad:

Standardite reprodutseerimis- ja levitamiseõigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Semiconductor devices
Part 16-10: Technology Approval Schedule (TAS)
for monolithic microwave integrated circuits
(IEC 60747-16-10:2004)

Dispositifs à semiconducteurs
Partie 16-10: Format-cadre
pour agrément de technologie (TAS)
pour circuits intégrés monolithiques
hyperfréquences
(CEI 60747-16-10:2004)

Halbleiterbauelemente
Teil 16-10: Prüfplan für die
Technikanerkennung
(Technology Approval Schedule - TAS)
für monolithische integrierte
Mikrowellenschaltkreise
(IEC 60747-16-10:2004)

This European Standard was approved by CENELEC on 2004-09-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 34C/636/FDIS, future amendment 1 to IEC 61347-2-3:2000, prepared by SC 34C, Auxiliaries for lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 61347-2-3:2001 on 2004-09-01.

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) 2005-06-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2007-09-01

Endorsement notice

The text of amendment 1:2004 to the International Standard IEC 61347-2-3:2000 was approved by CENELEC as an amendment to the European Standard without any modification.

This document is a preview generated by EVS

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60027	Series	Letter symbols to be used in electrical technology	HD 245.4 S1 and HD 60027	1997 Series
IEC 60050	Series	International Electrotechnical Vocabulary (IEV)	-	-
IEC 60068	Series	Environmental testing	EN 60068	Series
IEC 60191-2	- ¹⁾	Mechanical standardization of semiconductor devices Part 2: Dimensions	-	-
IEC 60617	database	Graphical symbols for diagrams	-	-
IEC 60747-1	- ¹⁾	Semiconductor devices - Discrete devices Part 1: General	-	-
IEC 60747-16-1	- ¹⁾	Part 16-1: Microwave integrated circuits - Amplifiers	EN 60747-16-1	2002 ²⁾
IEC 60747-16-2	- ¹⁾	Part 16-2: Microwave integrated circuits - Frequency prescalers	-	-
IEC 60747-16-3	- ¹⁾	Part 16-3: Microwave integrated circuits - Frequency converters	EN 60747-16-3	2002 ²⁾
IEC 60747-16-4	- ¹⁾	Part 16-4: Microwave integrated circuits - Switches	EN 60747-16-4	2004 ²⁾
IEC 60748-1	- ¹⁾	Semiconductor devices - Integrated circuits Part 1: General	-	-
ISO 1000	- ¹⁾	SI units and recommendations for the use of their multiples and of certain other units	-	-

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

INTERNATIONAL STANDARD

IEC
60747-16-10

QC 210021

First edition
2004-07

Semiconductor devices –

Part 16-10:

**Technology Approval Schedule (TAS)
for monolithic microwave integrated circuits**

This document is a preview generated by EVS



Reference number
IEC 60747-16-10:2004(E)

Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** (www.iec.ch)

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site (www.iec.ch/searchpub) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications (www.iec.ch/online_news/justpub) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: custserv@iec.ch
Tel: +41 22 919 02 11
Fax: +41 22 919 03 00

INTERNATIONAL STANDARD

IEC
60747-16-10

QC 210021

First edition
2004-07

Semiconductor devices –

Part 16-10:

Technology Approval Schedule (TAS)

for monolithic microwave integrated circuits

© 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

XA

For price, see current catalogue

CONTENTS

FOREWORD.....	4
Foreword to this particular Technology Approval Schedule (TAS)	7
Organizations responsible for preparing the present TAS.....	7
Preface	7
INTRODUCTION	8
1 General	9
1.1 Scope.....	9
1.2 Normative documents.....	9
1.3 Units, symbols and terminology.....	10
1.4 Standard and preferred values	10
1.5 Definitions	10
2 Definition of the component technology	12
2.1 Scope.....	12
2.2 Description of activities and flow charts	13
2.3 Technical abstract	13
2.4 Requirements for control of subcontractors	16
3 Component design of MMICs.....	18
3.1 Scope.....	18
3.2 Description of activities and flow charts.....	18
3.3 Interfaces	19
3.4 Validations and control of the processes	21
4 Mask manufacture	23
4.1 Scope.....	23
4.2 Description of activities and flow charts	23
4.3 Validation and control of the processes	23
4.4 Subcontractors, vendors and internal suppliers	23
5 Wafer fabrication of MMICs	23
5.1 Scope.....	23
5.2 Description of activities and flow charts	24
5.3 Equipment.....	26
5.4 Materials	26
5.5 Re-work	26
5.6 Validation methods and control of the processes.....	27
5.7 Interrelationship	28
6 Wafer probing of MMICs	30
6.1 Scope.....	30
6.2 Description of activities and flow charts	30
6.3 Equipment.....	30
6.4 Test procedures	30
6.5 Interrelationship	30
7 Back-side process for bare chip delivery	32
7.1 Scope.....	32
7.2 Description of activity and flow charts.....	32
7.3 Equipment.....	33
7.4 Materials	33

7.5	Validation methods and control of the processes	33
7.6	Interrelationship	33
7.7	Validity of release.....	34
8	Assembly of MMICs.....	36
8.1	Scope.....	36
8.2	Description of activities and flow charts	36
8.3	Materials, inspection and handling.....	37
8.4	Equipment.....	37
8.5	Re-work	37
8.6	Validation and control of the processes	37
8.7	Interrelationships.....	38
9	Testing of MMICs	40
9.1	Scope.....	40
9.2	Description of activities and flow charts	40
9.3	Equipment.....	40
9.4	Test procedures	41
9.5	Interfaces	42
9.6	Validation and control of the processes	43
9.7	Process boundary verification.....	46
9.8	Product verification.....	50
10	Process characterization	50
10.1	Identification of process characteristics	50
10.2	Description of activities	51
10.3	Characterization procedures.....	52
11	Packaging and shipping.....	53
11.1	Description of activities and flow charts	53
11.2	Interfaces	54
11.3	Validity of release.....	54
12	Withdrawal of Technology Approval.....	56
Figure 1 – Example flow chart of design/manufacture/test.....		16
Figure 2 – Example flow chart of a design.....		21
Figure 3 – Technology flow chart of the process		29
Figure 4 – Example flow chart for a wafer probing.		30
Figure 5 – Example flow chart for a back-side process for bare chip delivery.....		34
Figure 6 – Example flow chart for an assembly		38
Figure 7 – Example flow char for a testing		44
Figure 8 – Typical flow chart for packaging and shipping		54

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES –

**Part 16-10: Technology Approval Schedule (TAS)
for monolithic microwave integrated circuits**

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 60747-16-10 has been prepared by subcommittee 47E: Discrete semiconductor devices, of IEC technical committee 47: Semiconductor devices.

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

FDIS	Report on voting
47E/257/FDIS	47E/262/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.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ-CECC).

This publication has been partially drafted in accordance with the ISO/IEC Directives, Part 2 (2001). It also follows the requirements given in IEC QC 210000:1995, Technology Approval Schedules – Requirements under the IEC Quality Assessment System for Electronic Components (IECQ-CECC).

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.

This document is a preview generated by EVS

Foreword to this particular Technology Approval Schedule (TAS)

The IEC Quality Assessment System for Electronic Components (IECQ) is composed of those member countries of the International Electrotechnical Commission (IEC) that 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 specifications and quality assessment procedures for electronic components and by the granting of an internationally recognized mark or certificate of conformity. The components produced under the System are acceptable in all member countries without further testing.

This TAS has been prepared for use by those countries taking part in the System who wish to issue national harmonized specifications for Technology Approval of manufacturers of monolithic microwave integrated circuits. It should be read in conjunction with the current regulations of the IECQ-CECC System.

At the date of printing of this schedule the member countries of IECQ-CECC are China, Denmark, France, Germany, India, Italy, Japan, Republic of Korea, Netherlands, Norway, Russian Federation, Switzerland, Thailand, Ukraine, United Kingdom, USA and Yugoslavia. Copies of this schedule can be obtained from their National Authorized Institutions, National Standards Organizations or, in case of difficulty, from the Central Office of IEC in Geneva, Switzerland (fax 41 22 9190300) as described in the Specifications List QC 001004 on www.iecq-cecc.org.

Organizations responsible for preparing the present TAS

IEC subcommittee 47E: Discrete semiconductor devices

Preface

This schedule was prepared by SC47E/WG2.

It is based, wherever possible, on the publications of the International Electrotechnical Commission (IEC) and the International Organization for Standardization (ISO) and in particular on:

- | | |
|-----------------|--|
| IEC 60747-16-1: | Semiconductor devices – Part 16-1: Microwave integrated circuits – Amplifiers, |
| IEC 60747-16-2: | Semiconductor devices – Part 16-2: Microwave integrated circuits – Frequency prescalers, |
| IEC 60747-16-3: | Semiconductor devices – Part 16-3: Microwave integrated circuits – Frequency converters, |
| IEC 60747-16-4: | Semiconductor devices – Part 16-4: Microwave integrated circuits – Switches. |

INTRODUCTION

The requirements for Technology Approval for manufacturers of electronic and electro-mechanical components are given in QC 001002-3, Clause 6. The procedures for approval defined in that clause require the manufacturer to have available an appropriate Technology Approval Schedule (TAS).

This schedule defines how the principles and requirements of QC 001002-3, Clause 6 are applied to monolithic microwave integrated circuits.

This document is a preview generated by EVS

SEMICONDUCTOR DEVICES –**Part 16-10: Technology Approval Schedule (TAS)
for monolithic microwave integrated circuits****1 General****1.1 Scope**

This TAS specifies the terms, definitions, symbols, quality system, test, assessment and verification methods and other requirements relevant to the design, manufacture and supply of monolithic microwave integrated circuits in compliance with the general requirements of the IECQ-CECC System for electronic components of assessed quality.

1.2 Normative documents

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: *International Electrotechnical Vocabulary*

IEC 60068 (all parts): *Environmental testing*

IEC 60191-2: *Mechanical standardisation of semiconductor devices – Part 2: Dimensions*

IEC 60617-DB¹ (all parts): *Graphical symbols for diagrams*

IEC 60747-1: *Semiconductor devices – Discrete devices and integrated circuits – Part 1: General*

IEC 60747-16-1: *Semiconductor devices – Part 16-1: Microwave integrated circuits – Amplifiers*

IEC 60747-16-2: *Semiconductor devices – Part 16-2: Microwave integrated circuits – Frequency prescalers*

IEC 60747-16-3: *Semiconductor devices – Part 16-3: Microwave integrated circuits – Frequency converters*

IEC 60747-16-4: *Semiconductor devices – Part 16-4: Microwave integrated circuits – Switches²*

IEC 60748-1: *Semiconductor devices – Integrated circuits – Part 1: General*

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

¹ "DB" refers to the IEC on-line database.

² To be published.