INTERNATIONAL STANDARD

IEC 60748-23-3

QC 165000-3

First edition
2002-05

Semiconductor devices – Integrated circuits –

Part 23-3: Hybrid integrated circuits and film structures – Manufacturing line certification – Manufacturers' self-audit checklist and report

Dispositifs à semiconducteurs –
Circuits intégrés –

Partie 23-3:
Circuits intégrés hybrides et structures par films –
Certification de la ligne de fabrication –
Liste de contrôle et rapport d'évaluation interne pour fabricants

© IEC 2002 — 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 XC

For price, see current catalogue

CONTENTS

FOREWORD 4
INTRODUCTION 5

1 Scope 6
2 Document information 6
2.1 General 6
2.2 Normative references 6
3 Definitions 7
4 General requirements 7
4.1 Self-audit checklist and report for thick and thin film hybrid integrated circuit manufacturers 8
4.2 Description of report/company structure 9
4.3 Approval information 10
4.4 Summary of testing 12
4.5 Analytical methods 14
4.6 Control of procurement sources and incoming material 15
4.7 Control of procurement sources and incoming material, continued 15
4.8 Environmental control and static handling 16
4.9 Change notification requirements 17
4.10 Hybrid design 17
5 Thick film processing 19
5.1 Artwork and screen fabrication 19
5.2 Substrates 20
5.3 Substrate saw or scribe and break and substrate hole drilling 21
5.4 Thick film pastes and printing 22
5.5 Drying and firing 26
5.6 Resistor trimming 27
5.7 Inspection and test of processing 28
5.8 Rework 29
6 Thin film processing 30
6.1 Artwork and mask fabrication 30
6.2 Substrates 31
6.3 Substrate saw or scribe and break and substrate hole drilling 33
6.4 Thin film processing materials and pattern forming 33
6.5 Drying and stabilization 35
6.6 Resistor trimming 36
6.7 Rework 37
7 Hybrid assembly 38
7.1 Solder assembly 39
7.2 Chip and wire assembly 46
8 Test and dispatch 57
8.1 Electrical tests 58
8.2 Burn-in 59
8.3 Endurance 61
8.4 Dry heat (stabilization bake) 62
8.5 Change of temperature 63

8.6 Damp heat testing 64
8.7 Particle impact noise detection. 65
8.8 Fine leak test 66
8.9 Gross leak test 67
8.10 Resistance to soldering heat 68
8.11 Termination robustness 68
8.12 Acceleration 69
8.13 Vibration 69
8.14 Shock 70
8.15 Dimensions 70
8.16 Bond-pull testing 71
8.17 Salt mist 72
8.18 Flammability 73
8.19 Solderability 73
8.20 Resistance to solvents 75
8.21 Internal visual inspection 76
8.22 External visual inspection 77
8.23 Radiographic inspection 77
8.24 Acceptance to dispatch 78

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

SEMICONDUCTOR DEVICES – INTEGRATED CIRCUITS –

Part 23-3: Hybrid integrated circuits and film structures – Manufacturing line certification – Manufacturers' self-audit checklist and report

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60748-23-3 has been prepared by subcommittee 47A: Integrated circuits, of IEC technical committee 47: Semiconductor devices.

The text of this standard is based on the European standard EN 165000-3 and the following documents:

FDIS	Report on voting
47A/640/FDIS	47A/651/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.

IEC 60748-23-3 should be read in conjunction with Parts 23-1, 23-2 and 23-4.

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).

The committee has decided that the contents of this publication will remain unchanged until 2006. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

This set of specifications prescribes a set of procedures to be used by users and manufacturers for the production and delivery of high-quality, special requirement hybrid integrated circuits and film structures with a specified level of quality and reliability.

This set of specifications prescribes reference criteria for the establishment, control, maintenance and development of a certified manufacturing line and represents a manufacturing line certification methodology.

The targeted level of quality and reliability is to be achieved by using best design and manufacturing practices. Examples of quality and reliability best practices for elimination of potential failure mechanisms and achievement of a targeted quality and reliability level include: material characterization for derivation of process design rules, in-process control, continuous improvement, etc.

Assessment (estimation) of the targeted quality and reliability level may be accomplished by:

a) using data obtained from the material characterization, design and process control and improvement activities; or

b) through the use of product assessment level schedule (PALS) tests.

Part 23-1 of this set of specifications provides general information.

Part 23-2 of this set of specifications provides guidance to 'users' of hybrids in terms of the 'visual inspection standards' to be expected.

Part 23-4 of this set of specifications provides a blank detail specification, which provides guidance to 'users' of hybrids for procurement purposes.

Part 23-5 of this set of specifications provides a means of quality assessment on the basis of qualification approval.

SEMICONDUCTOR DEVICES – INTEGRATED CIRCUITS –

Part 23-3: Hybrid integrated circuits and film structures – Manufacturing line certification – Manufacturers' self-audit checklist and report

1 Scope

This part of IEC 60748 applies to a high quality approval system for hybrid integrated circuits and film structures.

This checklist is intended for the use of a hybrid microcircuit manufacturer's internal assessment team.

It will provide the hybrid manufacturer and the National Supervising Inspectorate (NSI) with ongoing information on process control demonstrating compliance with IEC 60748-23-1. It is not intended to include quality system requirements.

2 Document information

2.1 General

The checklist and subsequent report is for submission to the NSI in support of an application for approval to IEC 60748-23-1, or as a demonstration of continuing compliance at intervals not exceeding 1 year. Each item in clauses 3 to 7 shall be completed or marked “not applicable”; items which invoke mandatory process or inspection requirements are shown in ***bold italics***.

It should be noted that it is not the requirement or the intention that each item has to be answered with an affirmative, excepting mandatory requirements. The objective of the report is for the manufacturer to demonstrate that all manufacturing processes are under control by whatever means this is achieved.

Where supporting evidence is included, for example engineering reports, statistical process control (SPC) data, etc., it should be appended to the report.

The manufacturer may use his own style of typeface to reproduce this document and produce his report.

The NSI may subsequently validate any part of the submission as a process assessment.

2.2 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 60050 (all parts), *International Electrotechnical Vocabulary*

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

IEC 60695-2-2:1991, *Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test*
Amendment 1 (1994)

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

IEC 60748-23-1:2002, *Semiconductor devices – Integrated circuits – Part 23-1: Hybrid integrated circuits and film structures – Manufacturing line certification – Generic specification*

IEC 60748-23-2:2002, *Semiconductor devices – Integrated circuits – Part 23-2: Hybrid integrated circuits and film structures – Manufacturing line certification – Internal visual inspection and special tests*

IEC 60748-23-4:2002, *Semiconductor devices – Integrated circuits – Part 23-4: Hybrid integrated circuits and film structures – Manufacturing line certification – Blank detail specification*

IEC 61340-5-1:1998, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*

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