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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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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.

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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*

3 Definitions

For the purpose of this part of IEC 60748, the definitions given in IEC 60050, IEC 60748-1, IEC 60748-23-1 and IEC 60748-23-2 shall apply.

4 General requirements

The following subclauses contain:

4.1 Self-audit checklist and report for thick and thin film hybrid integrated circuit manufacturers

4.2 Description of report/company structure

4.3 Approval information

4.4 Summary of testing

4.5 Analytical methods

4.6 Control of procurement sources and incoming material

4.7 Control of procurement sources and incoming material, continued

4.8 Environmental control and static handling

4.9 Change notification requirements

4.10 Hybrid design

4.1 Self-audit checklist and report for thick and thin film hybrid integrated circuit manufacturers

Report No: Date:

Previous report No: Date:

Approval: application/periodic review/extension/major change *

Company name:

Address:

Postcode:

Telephone: Telex: Facsimile:

Company declaration

The information contained herein is a true and accurate record of appraisals carried out between / / and / / .

Report compiled by: Signed: Date: / /

Report approved by: Signed: Date: / /

NSI counter-signature

The information supplied in this report fully supports the application/periodic review/extension/major change as detailed.

The following items of this report have been subject to subsequent evaluation by the NSI:

For NSI: Signed: Date: / /

* Delete as appropriate.

4.2 Description of report/company structure

Provide a description for the purpose of this report.

a. For a new approval application – State the extent of the technology sought in terms of materials, complexity, packaging, etc. together with the maximum screening/test level applied for from IEC 60748-23-1, annex A.

b. For an extension/major change – Nature of technology extension required, or details of process/equipment change.

Senior management:

Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:
Name:	Position:	Location:

Quality department:

Name: Position: Quality Manager Reports to:

Name: Position: Deputy Quality Manager

Number of quality engineers:

Number of inspectors per shift:

Number of employees engaged in hybrid production:

Total:
Administration:
Production engineers:
Production operators:
Production inspection:
Design engineers:
Reliability engineers:
Supervisors:

Production:

Thick film substrate production:	YES/NO *	Number of shifts:
Thin film substrate production:	YES/NO *	Number of shifts:
Solder assembly:	YES/NO *	Number of shifts:
Chip and wire:	YES/NO *	Number of shifts:
Test and environmental:	YES/NO *	Number of shifts:
Quality engineering:	YES/NO *	Number of shifts:
Quality inspection:	YES/NO *	Number of shifts:
Production supervision:	YES/NO *	Number of shifts:

* Delete as appropriate.

Production line (space allocations):

Design: area in m^2
Development: area in m^2
Production: area in m^2
Test and environmental: area in m^2

Market:

Space: % Military: % Telecom: % Automotive: % Others: %

4.3 Approval information

Approved quality system to IEC QC 001002-3: YES/NO * Approval No: Assessed: / /
Approved to IEC 60748-23-1: YES/NO * Approval No: Assessed: / /

Other national/international approvals held:

Approval Type: Approval No: Assessed: / /
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Commercial approvals (e.g. Ford, IBM, etc.) held:

Approval Type: Approval No: Assessed: / /
Approval Type: Approval No: Assessed: / /
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Notes

* Delete as appropriate.

Example of abstract of capability approval

IEC 60748-23-1 approval number ABC123

Thick film technology:

General:

In 1937 Welwyn was set up to manufacture high grade resistors primarily for use by the telecommunications industries. During 1962 the company began production of custom electronic hybrid integrated circuits for industrial, telecommunications and military customers.

Today Welwyn uses the latest technology to design and produce high reliability hybrids conforming to the most exacting requirements of customer applications, for customers requiring a wide range of electronic circuit complexity/density and for quantities of hybrids ranging from small batch production to high volume production. In addition 100 % screening tests and customer design evaluation testing programmes are also available to provide the highest level of quality assurance required by any customer.

Current levels of release available:

	Maximum	IEC 60748-23-1, annex A
	Dimensions	Reference
Surface-mount, non-hermetic technology	50,8 mm × 25,4 mm	PALS 5
Surface-mount, hermetic technology	54,5 mm × 29,2 mm	PALS 8
Chip and wire, non-hermetic technology	50,8 mm × 25,4 mm	PALS 5
Chip and wire, hermetic technology	54,5 mm × 29,2 mm	PALS 8

Sub-contracted processes: None.

Address:

Welwyn Microcircuits
Factory D
BEDLINGTON
Northumberland
NE22 7AA
UNITED KINGDOM
Tel: +44 1670 822181
Fax: +44 1670 530123
Telex: 53514

Contacts:

Commercial Manager: Mr G Thompson, Ext. 421

Quality Manager: Mr D Oliver, Ext. 430

4.4 Summary of testing

The product testing record example shown below and overleaf is for guidance as to the required information. The manufacturer's own records may provide this information without amendment. Prior agreement should be reached with the NSI as to the form and content of supplied records.

PRODUCT TESTING RECORD				
MANUFACTURER'S NAME AND ADDRESS	Product type No: PALS release level: Package type: Technology description:			
DESIGN EVALUATION				
TEST	No. tested	No. failed	Date	Structural similarity claimed type No(s)
Endurance				
Damp heat				
Resistance to soldering heat				
Termination robustness				
Acceleration				
Vibration				
Shock				
Solderability				
Flammability				
Resistance to solvents				
Internal moisture content				
Radiographic inspection				
Salt mist				
Others				

Summary of testing *(continued)*

DEVICE SCREENING			
BATCH No.	BATCH SIZE	No. FAILED	TEST/FAILURE

DEVICE SAMPLE TESTING				
TEST	INSP. LOT	BATCH(es)	SAMPLE SIZE	FAILURE AND CAUSE