



SLOVENSKI STANDARD SIST CECC 200 008:2002

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Process Assessment Schedule: GaAs MMIC process approval

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Förderverein für Electrotechnische Normung (FEN) e.V.

CECC 200 008

Cenelec Electronic Components Committee

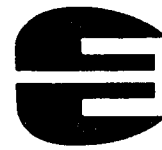
British Standards Institution
PO Box 375
Milton Keynes
MK14 6LL

Specification available
from: ONH, the CECC General
Secretariat, or as shown in
CECC 00 300.

Processes or Services for use in the manufacture of electronic
components of assessed quality

Systeme Harmonisé de la Qualité
des Composants Electroniques

PROGRAMME D'EVALUATION DU PROCEDE



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**Harmonised System of Quality
Assessment for Electronic Components**

PROCESS ASSESSMENT SCHEDULE

GaAs MMIC Process Approval

1 Edition
Issue
Ausgabe

Harmonisiertes Gütebestätigungssystem
für Bauelemente der Elektronik

ABLAUFPLAN FÜR DIE VERFAHRENSBEWERTUNG

CECC 200 008

1995

FOREWORD

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonised System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This specification should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

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PREFACE

This PAS 'GaAs MMIC Process Approval' was prepared by QARel Associates, 12 Favell Way, Northampton, NN3 3BZ, England. It complies with the requirements of CECC 200 000 (see CECC 00 111/VI, §2.10).

Supporting Organisations: DRA Professional Component Services (Aquila, UK), GEC-Marconi Materials Technology Ltd. (Caswell, UK), Siemens AG Semiconductor Group (Munich, Germany), Philips Microwave Limeil (France).

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INTRODUCTION

The production of an electronic component can be considered as a set of manufacturing processes. One or more of these processes can frequently be subcontracted to a specialist contractor either within the manufacturing company or to an external organisation.

Process Approval enables such processes, by any specialist contractor within a CECC member country, to be approved without requiring an actual electronic component to be manufactured.

A key element of Process Approval is the emphasis placed on the understanding of the technology concerned and on process control. In the absence of a component as a final product, this is often the only way to ensure a consistent and reliable service. It is also considered that such an emphasis may allow a reduction in conventional end-of-line sample testing and thus provides a cost effective approval scheme.

The Process Approval procedure acknowledges the wide range of customer needs that are likely to be required of a specialist contractor and emphasises the importance of good specialist contractor to customer liaison in satisfying such demands. The system is flexible, while maintaining the CECC policy of a minimum quality standard. This is achieved by including obligatory tests during the initial approval exercise. This testing establishes the minimum level of achievement and at the same time validates the specialist contractor's declared process control.

The key CECC document in Process Approval is the Process Assessment Schedule or PAS. For each process, a PAS is prepared that describes the requirements placed upon a specialist contractor seeking approval for a specialist activity in that technology. Process Approval enables a specialist contractor to offer CECC release of those items manufactured, or those services provided, wherever they fall within the declared scope of Process Approval. It will not allow CECC release of any other item or service. Process Assessment Schedules are the implementation of CECC 00 114 Part V (RP14 Part V) which gives the basic requirements for Process Approval of specialist contractors to the electronic components industry.

All organisations approved within CECC require approval to CECC 00 114 Part I which embraces the ISO 9000 series. With the growing world-wide awareness of ISO 9000 the opportunity has been taken, in developing Process Approval, to produce further harmonisation of CECC procedures to those of ISO 9000.

e.g. Each PAS may thus be considered as guidance on how a specialist contractor should apply ISO 9000 to the approval of a particular process.

The structure of the PAS, and the suggested structure of a specialist contractor's internal documentation mirrors that of ISO 9000 wherever possible.

The possibility of a single external audit, covering approval to ISO 9000 and the relevant PAS, is identified. A key element of Process Approval is the inclusion of standard audit check-lists to enable a specialist contractor to adequately prepare for an audit and to ensure consistency of auditing throughout CECC member countries.

Process Approval is intentionally flexible in approach to enable process specialists to determine the aspects they consider important.

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SECTION 1: GENERAL REQUIREMENTS

1.1 Scope

This PAS specifies the terms, definitions, symbols, quality system, test, assessment and verification methods and other requirements relevant to the manufacture and supply of GaAs MMIC wafers and/or chips in compliance with the general requirements of the CECC System for electronic components of assessed quality.

Requirements for design, assembly and other specialist semiconductor activities are given in other PASs in the CECC 200 000 series. The interrelation between these PASs is shown in Fig 1.

1.2 Related documents

1.2.1 Requirements

The specialist contractor shall list all documents referenced in his Process Manual under the following, or similar, headings:

- Documents referenced in the PAS (as below)
- Other National or International Standards
- Internal (i.e. specialist contractors own) issued documents

1.2.2 Directly referenced standards

The following documents are referenced in this specification:

IEC 68	Environmental Test Procedures
IEC 1160	Formal Design Reviews
ISO 9001 (1994)	Quality Systems - Specification for design / development, production, installation and servicing
EN 100 015	Protection of Electrostatic Sensitive Devices: Part 1 Minimum Requirements
CECC 00 016	Basic Requirements for the use of statistical process control (SPC) in the CECC System
<i>CECC 90 000 Annex A</i>	<i>Visual standards for Integrated Circuits</i>

IEC 747-11 /QC750 000	<i>Visual standards for discrete semiconductor devices</i>
CECC 00114 Part I	Rule of Procedure RP 14: Approval of Manufacturers and Other Organisations
Part V	Process Approval of Specialist Contractors within the Electronic Components Industry
CECC 00400	Handbook for the Production of CECC Documents
CECC 00 401	Glossary of Terms
CECC 00 804	<i>Interpretation of ISO 9001 for the Reliability of Electronic Components.</i>
CECC 200 000	Requirements for Process Assessment Schedules for Process Approval

1.3 Units, symbols and terminology

Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following documents:

- ISO 1000: SI units and recommendations for the use of their multiples and of certain other units
- IEC 27: Letter symbols to be used in electrical technology
- IEC 50: International electromechanical vocabulary
- IEC 617: Graphical symbols for diagrams.

Any other units, symbols and terminology peculiar to one of the processes or services covered by this PAS shall be taken from the relevant IEC or ISO documents, listed under 'Related documents'."

Where further units, symbols and terminology are required, these shall be derived in accordance with the principles of the relevant IEC or ISO documents.

Note. All terms and concepts specifically relating to Process Approval are explained in RP 14 Part V, in RP 14 Part 0 or in CECC 00 401. Specialist contractors who are unfamiliar with these documents are advised to study them.

1.4 Standard and preferred values

Not applicable to GaAs MMIC processes.

1.5 Definitions

Where terms other than those given below are used, such terms shall be defined in the process manual.

1.5.1 Assembly

The attachment of a MMIC or other dice into micro-electronic packages. This generic term includes die attach, termination bonding (e.g. wire bonding, flip-chip, TAB, etc.) and sealing.

Use of the term 'Assembly' as a noun, is deprecated.

1.5.2 GaAs MMIC

A monolithic microwave integrated circuit formed by lithography and metal/dielectric deposition on a Gallium Arsenide substrate. For the purposes of this PAS, the term includes single function elements produced by the same process.

1.5.3 Microelectronic Package

An item designed and manufactured for the purpose of providing an electrical interface between microelectronic die, either active or passive, and its surrounding circuitry. It may also provide mechanical and environmental protection, thermal and electrical matching, etc. to its surroundings.

Note. In this standard, the term 'package' is used to mean 'microelectronic package' as defined above, and includes non-encapsulated substrates. The concept of a 'standard package' is discussed in 1.5. Packages are not considered as electronic components.

1.5.4 Mounting

The attachment of semiconductor devices (in microelectronic packages) onto boards or substrates.

Note. The above definitions are used throughout this standard. Readers are warned that in the context of equipment manufacturers, 'assembly' may refer to the attachment of components onto boards.

1.5.5 Packaging

A general term used to describe any package, interconnect or encapsulation technique.

The use of packaging other than as a noun is deprecated, (e.g. "When packaging ICs into chip-carriers ...")

1.5.6 Primary Packaging (of delivery)

That material which is used to protect electronic items from mechanical, environmental and electrical damage during transportation and storage. It is discarded prior to the incorporation of the item into its end application. <https://standards.iteh.ai/catalog/standards/sist/94d3ac8d-d391-4520-8008-4f5d6a769e5f/sist-cecc-200-008-2002>

Note. When the possibility of confusion between these two definitions exists, the single word 'package' should not be used without clarification.

SECTION 2: QUALITY REQUIREMENTS OF THE PROCESS

2.1 Process description

The activity covered by this schedule is the design and manufacture of GaAs MMICs as defined in 1.5.2 above. The range of MMICs offered shall be declared. Suitable categories for such a declaration are:

- Analogue
- Digital
- HEMT
- Low noise
- Low power (i.e. < 250 mW/cm²)
- High power
- Multi-function chips
- Maximum chip size
- Bonding options (e.g. back-surface preparation, solder bump pads, etc.)
- Form and method of supply (e.g. single wafer, chips in wafer packs, etc.)

Only circuits manufactured by lithographic processes for use in RF applications are considered. Optoelectronic integrated circuits are excluded. This schedule is applicable to all essential stages of MMIC manufacture which are:

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- Implantation/Epitaxy
- Lithography
- Metal/Dielectric process
- Passivation/Glassivation
- Chemical etching
- Wafer sawing/Dicing/Thinning

The declared process and manufacturing facility shall include, as a minimum, the definition and deposition of metal and dielectric layers to form active electrical circuit elements accessible by wafer probing. The process approval shall cover all of the above activities as a minimum.

The extent of the process or service for which approval is sought shall be declared, indicating how this falls within the scope of this PAS.

2.2 Quality Factors

Quality factors are those aspects of the process and specialist contractors' organisation that significantly affect the quality and reliability of the component, process or service provided.

The following are examples of Quality Factors which may apply to this specialist activity:

- Material quality
- Process Control (Implant profile, layer composition and thickness, etch times and temperature, resist thickness, bake temperature and exposure)
- Environment (Particle count, temperature and humidity)
- Minimum line width
- Mask registration
- DC/RF test specifications
- Visual standards specifications

To obtain Process Approval, a specialist contractor shall demonstrate that he has adequate control of those Quality Factors that affect the declared process and include this list in his Process Manual.

Each quality factor shall form the basis of a section in a Process Specification which shall state how these quality factors are identified and monitored, and which shall explain how control of these quality factors ensures an acceptable end product or service.

The list of Quality factors may conveniently be combined with Process Specifications and Audit check lists in the form of a spreadsheet as described in Annex B.

2.3 Process Specifications

A Process Specification based on the recommendation of Annex B shall be prepared. Each process step included in the declared capability shall be included. This Process Specification may be issued separately by the specialist contractor or included within the specialist contractor's process manual.

2.4 Verification

The specialist contractor shall declare his means of ensuring that the Process Manual and Process Specification(s) adequately reflect his capability (this should include a reference list of devices). Aspects to consider should include but are not restricted to: agreement between process approval documentation and marketing/sales literature, customer feedback, range of internal departments consulted in their preparation. This responsibility may conveniently fall to a Technology Review Board.