



# **NTC Thermistors**

Quality and environment

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EPCOS AG is a TDK Group Company.

### Corporate goals

Our aim is to play a leading role among the world's most competitive companies in the sector of electronic components. This aim is shared by the EPCOS quality and environment management system:

#### 1 EPCOS quality system

##### 1.1 Our commitment to quality

The quality of our products and services is an essential part of our corporate strategy with the main objective of customer satisfaction. For us, quality means providing products and services that offer maximum benefit to our customers worldwide as well as to understand the needs and expectations of all our interested parties. Quality also means ensuring competitiveness and thus securing our future, by continuous maintenance of our growing organizational knowledge.

Consistent application of a quality management system results in flawless products and a high level of user benefit from our components. It creates excellent quality of logistics and services and guarantees attractive price/ performance ratios.

Our quality management system is always in line with the most stringent international standards.

##### 1.2 Quality management system

The quality management system to ISO/TS 16949 is applied throughout the company and is used to implement the EPCOS quality policy. The implications include:

- As a rule, product and process developments follow the rules of APQP<sup>1)</sup>,
- Quality tools such as FMEA<sup>2)</sup>, DoE<sup>3)</sup> and SPC<sup>4)</sup> minimize risks and ensure continuous improvements in conjunction with regular internal audits and QM reviews.

##### 1.3 Certification

The EPCOS quality management system forms the basis for the certification to ISO 9001 and ISO/TS 16949 that comprises the EPCOS plants and sales organizations. The company certificates are posted on the EPCOS Internet ([www.epcos.com/quality](http://www.epcos.com/quality)).

##### 1.4 Production sequence and quality assurance

The business groups implement the corporate specifications for quality management in procedural and work instructions referred to products and processes.

The following example shows quality assurance applied to the production sequence of SMD NTC thermistors and NTC leaded disks.

Please note that due to the variety of NTC thermistor designs the current production flow chart can differ.

1) APQP= Advanced Product Quality Planning

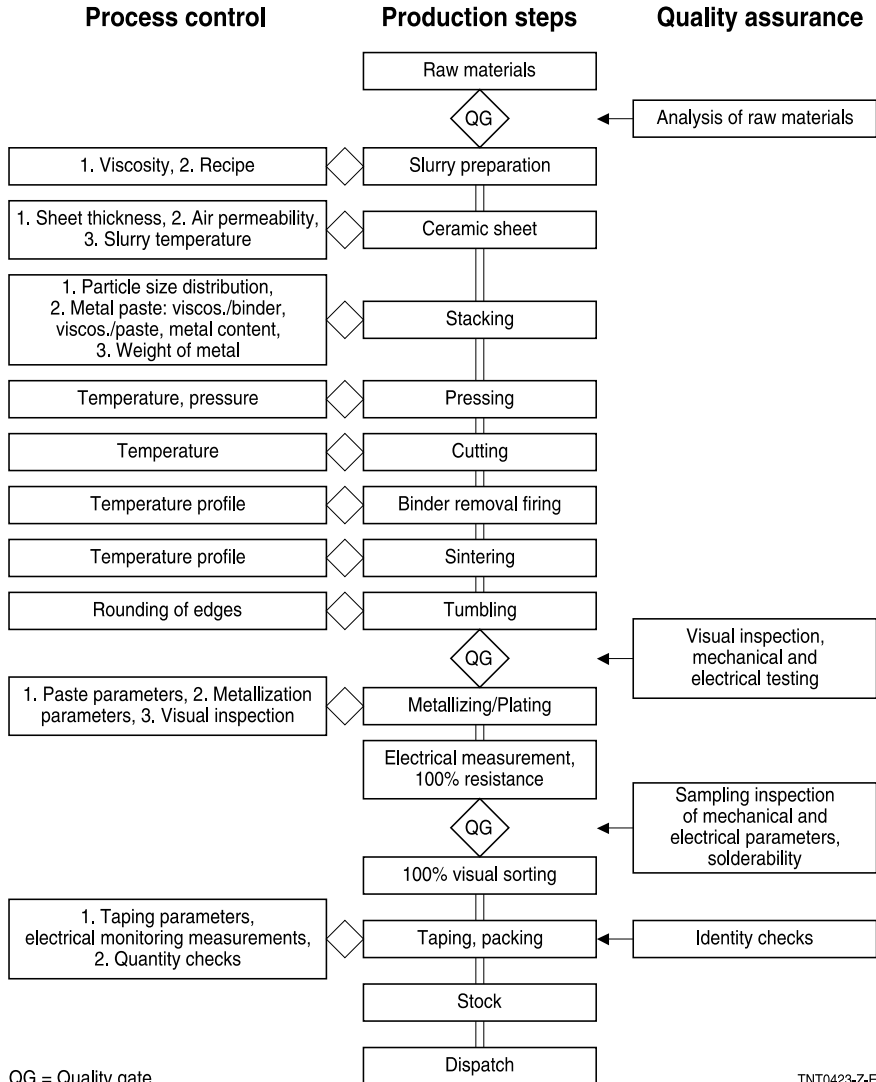
2) FMEA= Failure Modes and Effects Analysis

3) DoE= Design of Experiments

4) SPC= Statistical Process Control

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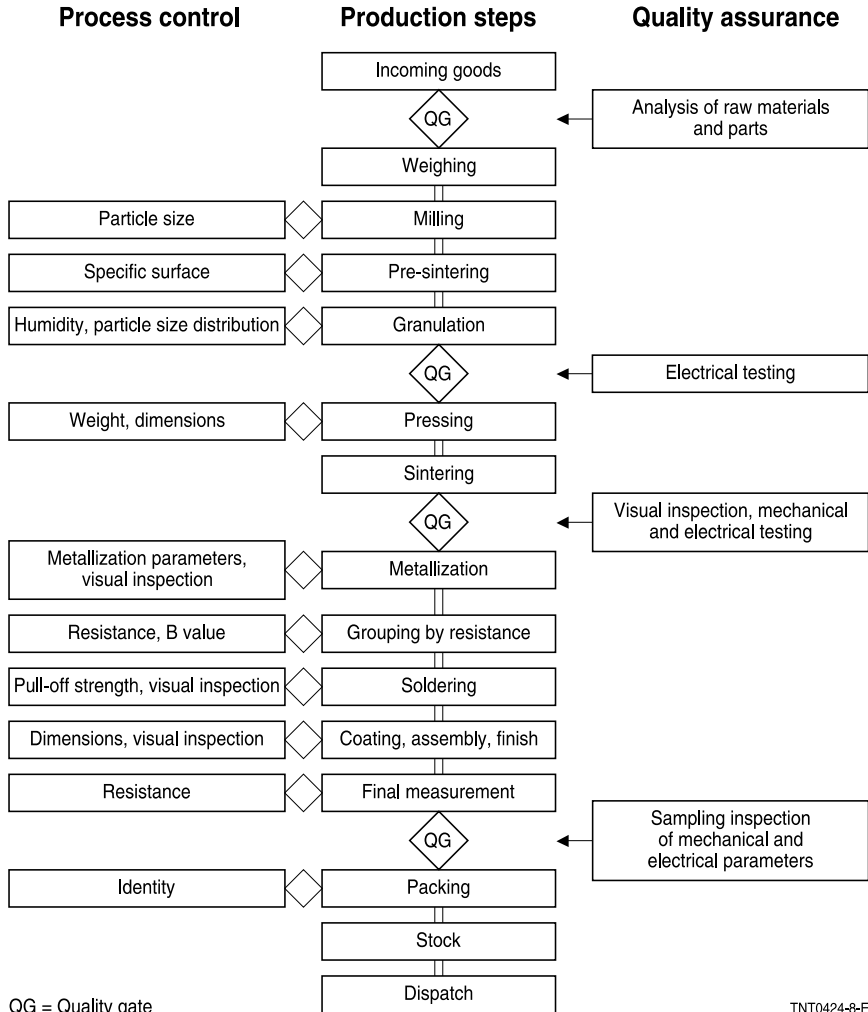
**Production process and quality assurance for SMD NTC thermistors**



QG = Quality gate

TNT0423-Z-E

**Production process and quality assurance for leaded NTC thermistors**



### **1.5 Delivery quality**

“Delivery quality” means compliance with the agreed data at the time of delivery.

### **1.6 Failure criteria**

A component is defective if one of its features does not correspond to the specification of the data sheet or an agreed delivery specification.

### **1.7 Incoming goods inspection at the customer**

For the incoming inspection, we recommend the use of a random sampling plan to DIN ISO 2859 Part 1 (contents compliant with MIL STD 105 D or IEC 410).

The test methods used and the AQL must be coordinated between the customer and suppliers.

### **1.8 Final inspection/approval for shipment**

Final inspection verifies the major properties of the end products batch by batch, usually by means of fully automated selection tests.

Approval for shipment helps certify that products shipped comply with specifications. It includes:

- testing of principal parameters,
- identification check and visual assessment,
- examination of papers accompanying the batch.

### **1.9 Duration of use**

The duration of use in terms of reliability is the time period during which random failures occur, i.e. the range in the product operating life in which the failure rate remains largely constant (early failures and end of operating life excepted). The value depends strongly on conditions of use.

### **1.10 Reliability**

A variety of endurance tests and environmental tests are conducted to assure the reliability of NTC thermistors. These tests are derived from the extremes of expected application conditions, with test conditions intensified to obtain authoritative results within a reasonable period.

The reliability testing programs of EPCOS are based on the test plans of international standards and customer requirements.

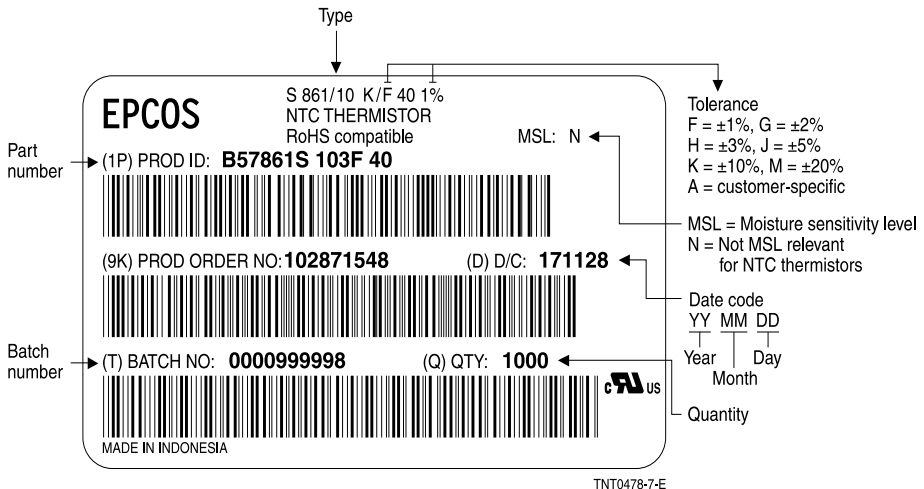
EPCOS performs reliability tests to qualify new component families and for periodic requalification.

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### 1.11 Bar code label

The packing of all EPCOS components bears a bar code label stating the type, ordering code, quantity, date of manufacture and batch number. This enables a component to be traced back through the production process, together with its batch and test report.

The basic structure of the barcode label is pictured below. Actual barcode labels can vary slightly from type to type depending on e.g. certifications and manufacturing location.



### 1.12 Conditions of use

EPCOS products may only be used in line with the technical specifications and installation instructions and must comply with the state of the art. Non-observance of limits, operating conditions or handling guidelines can lead to disturbances in the circuit and other undesirable consequences such as a higher failure rate.

In this connection, please note the “Important notes” on page 2.

Should you have any application-referred questions, please contact our experts, who will be pleased to advise you.

### 1.13 Customer complaints

If a fault occurs in a product despite careful manufacture and testing, please contact your local sales organization. They will register your complaint and forward it to the relevant technical departments for rapid handling.

EPCOS treats technical complaints according to the 8D<sup>5)</sup> methodology; i.e. with the use of interdisciplinary teams who aim to implement rapid countermeasures and sustained corrections and answer all complaints with an 8D report.

In order to be able to deal quickly and smoothly with complaints, the following data are helpful:

- Number of components subject to complaint or returned
- Fault description (with photos if applicable)
- How and when was the fault detected?
- Logistics data (delivery note no., batch no., date code)
- Operating conditions
- Operating duration up to occurrence of the fault
- Measurement parameters in the case of divergent technical data

In the event of transport damage, we would ask you to describe this in more detail and if required to mark it so that it can be distinguished from any further damage sustained during the return shipment. The original package should also be checked and any damage to be described. In order to avoid further damage, the original packaging should also be used for the return shipment.

In case of receiving a damaged delivery, please document this damage with a signature of the forwarding company on the delivery papers.

5) 8D = 8 disciplines

## **2 Environmental management**

### **2.1 Environmental, energy and occupational health and safety policy**

Our fundamental commitment to environmental protection, lowering of energy usage and preventions of accidents and occupational health improvement is laid down in the EPCOS policy:

1. We work continuously toward reducing the burden on the environment, toward minimizing associated risks and toward lowering the use of energy and resources, above and beyond the legal requirements.
2. We take appropriate precautions to avoid environmental hazards and to prevent damage to the environment.
3. Potential impact on the environment is assessed and incorporated in process and product planning at the earliest possible stage.
4. By applying environmental, energy and occupational safety management, we ensure that this policy is implemented effectively. The technical and organizational procedures required to do this are monitored regularly and constantly further developed.
5. Each employee is required to act in an environmentally conscious manner. It is the constant duty of management to increase and encourage awareness of responsibility for environment, energy consumption and occupational safety at all levels.
6. We work with our business partners to promote conformity with similar objectives. We supply our customers with information on ways to minimize any potentially adverse environmental impacts of our products.
7. We work in a spirit of cooperation with the relevant authorities.
8. We inform the public of the impact on the environment caused by the company and our activities related to the environment and occupational health and safety.
9. We consider ensuring a safe, healthy and comfortable work environment as first priority. To regard the rules of labor safety is the task of each employee. We comply with all applicable legal requirements and with all requirements that relate to OH&S hazards.
10. We take preventive measures to avoid work-related injury and ill health and strive for continual improvement of our OH&S management system and the OH&S performance.
11. We support purchase of energy efficient products, machines and services, which will improve our energy related performance.

### **2.2 Environmental management system**

The EPCOS ISO 14001 based environmental management system is applied company wide for implementing the EPCOS environmental policy. It is posted on the EPCOS Intranet and is thus accessible to all employees.

### **2.3 Certification**

The EPCOS Group operates an environmental management system that conforms to the requirements of ISO 14001 and is mandatory for all plants. The company certificate is posted on the EPCOS Internet:

([www.epcos.com/environmental\\_management](http://www.epcos.com/environmental_management)).



## 2.4 RoHS

The term “RoHS-compatible” shall mean the following:

Components defined as “RoHS-compatible” are compatible with the requirements of Art. 4 of Directive 2011/65/EU (“RoHS II”) of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment of 8 June 2011 and with the requirements of the provisions which will result from transposition of RoHS II into national law to the extent such provisions reflect the directive.

“RoHS - compatible” components do not contain any of the following substances at a content exceeding the maximum concentration limits of 0.1% for lead, mercury, hexavalent chromium, PBB, PBDE, DEHP, BBP; DBP, DIBP and 0.01% for cadmium at a homogeneous material level, except the application is exempted by Annex III of “RoHS II”.

## 2.5 REACH

According to Art. 33 we are obliged to inform our customers immediately or on request a consumer within 45 days if we get knowledge that a Substance of Very High Concern (SVHC) is contained in a product or it's packaging with more than 0.1%w/w. Provided this substance is published by the European Chemical Agency via the candidates list. Respective information is provided via [www.epcos.com/reach](http://www.epcos.com/reach) (Link: REACH Candidates List and Information according REACH Art. 33, concerning EPCOS Products)

## 2.6 Banned and hazardous substances in components

As a manufacturer of passive components, we develop our products on the basis of sustainability.

In order to establish a standardized procedure for EPCOS worldwide, a material compliance management and a mandatory list of banned and declarable substances and substances of special interest (EPCOS BAD-SL) are part of our quality management system. The planning and development instructions include regulations and guidelines that aim to identify environmental aspects and to optimize products and processes with respect to material use and environmental compliance, to design them with sparing use of resources and to substitute hazardous substances as far as possible.

Consideration of the environmental aspects is checked and recorded in the design reviews: the environmental officer provides support in the assessment of the environmental impacts of a development project.

## 2.7 Material data sheets for product classes

EPCOS posts material data sheets on the Internet ([www.epcos.com/material](http://www.epcos.com/material)) that show typical compositions of product classes by selected representatives. The materials are listed with their percentage weight distribution referred to the respective component.

As per IEC/PAS 61906 (IEC 62474), all materials are listed, whose weight percentage exceeds 0.1% w/w or at least a given legal limit. All specifications are typical data and may vary slightly within a product class or production lot.

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The material data sheets do not represent guaranteed properties, but are merely given for purposes of information.

Please note in this connection the "Important notes" on page 2.

### **2.8 Disposal**

All NTC thermistors can be disposed of, reused or recycled. However as disposal is regulated by national law, the respective national provisions have to be observed.