Quality Beyond the Standards
With a Zero Defect Mindset
Our competitive advantage: Differentiating as quality leader

Our path
We do what we promise.
That's quality made by Infineon.

Our aspiration
Zero defect regarding the committed
› functionality
› reliability
› time
› volume & cost

Our foundation
International standards such as ISO 9001, IATF 16949, AS 9100, IEC 17025
Infineon Standards

We go **Beyond the Standards**
to better fit the real application requirements
AEC Q100/101
Necessary but sufficient for your system?

Infant mortality
Defects
AEC Q100/101
Product Qualification
Customer needs low
dpm rates / low risk
of failure

Steady state
Random failures

Wear-out
Materials failure
Customer might
need to cover more
extreme mission
profiles

Typ. Application lifetime
Appl. with longer lifetime requirements

AEC Q100/101
Are you aware:

- A disaster check only
- No indication of expected dpm
- No indication of process stability
- No method to understand limits
  of technology

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Models to validate product design and intensive screening methods to detect production defects

Extended Screening Test are done to screen out production defects (infant mortality) before shipment to customer.

Extended AEC Q100/101 tests when needed - based on target applications.

Sub 1ppm validation (intrinsics) Assessment of the capability of the technology / Margin assessment.
We go beyond the industry standard

AEC Q100/101
Mission profile based Product Qualification exceeding the standard

10,000 dpm

Additional Screening Test
Statistical methods, advanced test and screenings

Additional measures for low production / 0km / early field failures / spills

Fulfillment of the industry standard

Technology Reliability Assessment & Qualification
Models based on physical understanding of degradation mechanisms

The capability of the technology is the basis for the right product design to achieve low dpm rates

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Consistent achievement of sub 1dpm over time and through different market cycles

**QUALIFICATION**

<table>
<thead>
<tr>
<th>Sense</th>
<th>Interpret &amp; Decide</th>
<th>Act</th>
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</thead>
<tbody>
<tr>
<td>1ppm</td>
<td></td>
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<tr>
<td>5 years</td>
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**0km**

Low risk to fail product or system qualification and respective efforts, costs / project delay

**FIELD**

Low risk to fail product or system qualification and respective efforts, costs / project delay

Low risk of recall and loss of reputation for Infineon's customers

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Quality criteria encompass the product requirements, design, manufacturing and testing.
Meeting customers needs by best in class product requirements, design, manufacturing and testing

Product quality is MORE than:
- Temperature range
- Labelling based on demand
- Qualifying to automotive standards: AEC-Q100/101
- ...

It's meeting real customer expectations through:
- Development processes (e.g. RDDF)
- Design rules (e.g. ADeGo)
- Materials
- Manufacturing processes and process controls
  the full production chain must be automotive (stability, traceability and deviation management, …)
- Failure mechanism based validation & mission profile based qualification
- Screening, statistical methods and firewalls

AEC-Q100 (= disaster check):
3 lots à 77 pcs in qualification → 10.000 dpm

Up to 100 additional specific measures

Automotive target: <1 dpm
over e.g. 30000h lifetime
Our RDDF* implementation ensures a systematic handling of requirements reflected into the V-model

We increase quality, reduce risk and in the end save time and effort in our developments by:

› understanding what the customer wants and needs
› and ensuring correct and complete implementation through verification and testing

Systematic handling of requirements along with technology (wafer and package) and product development cycle: from definition to implementation until verification of evidence and testing (both in development and production)

* Requirement Driven Development Flow
To ensure a proper RDDF workflow, Infineon RDDF is supported by Requirements Management tooling integrated within the product development environment.
ADeGo
Automotive Development Goals for molded packages

ADeGo to be followed during development, production, testing and shipment

ADeGo requirements

› for Package External Properties
› for Package Internal Properties (e.g. delamination)
› after individual Processes
› at 0hr and after stress test

Clear and quantifiable packaging development goals and practices, which reflect customer requirements of performance, quality and reliability to reduce the risk for failure.
Infineon's Automotive Manufacturing Rules ensuring Highest Quality

AUTOMOTIVE manufacturing

Examples for rules/measures applied for semiconductor manufacturing; different criteria applying depending on segment

Examples for additional automotive rules/measures applied for semiconductor manufacturing, tighter criteria
Reduced failure rates by unique and proprietary testing and screening methodologies

Infineon-owned research center KAI* is developing screening and testing methods beyond the standard PAT (Part Average Testing) and NNY (Nearest Neighbor Yield) screening procedures by transforming data.

Example:
With the additional data transformation method, additional fails are detected at only 0.25% scrap of good devices.

With the standard PAT, only a limited number of failures are detected and almost 1% of good dies are scrapped.

Benefit:
› increase the reliability of Infineon's semiconductor products
› reduce the failure rate at 0km and in the fields
Customer Service
Our automotive quality includes the **highest** customer service level
We offer complementary know-how to our customers worldwide to enable fast and reliable problem solving

› Global infrastructure for applications and failure analysis
› Localized support close to customers R&D and manufacturing sites

› Fast and reliable root cause analysis and problem solving
› Most quality issues closed in less than 14 days
› Saves customers reputation and minimizes financial risk
Regional quality analysis lab capabilities with state of the art failure analysis equipment and competence

With state of the art analysis competence, methods and tools, we provide customers in their region with the best in class services

› SEM (Scanning Electron Microscopy)
› X-Ray
› Surface/material analysis
› Electrical verification -55°C/175°C
› ...
We offer technical trainings to our customers to support their business

- Our trainings support our customers in their discussion with their customers

- The technical trainings on automotive semiconductor technology include:
  - Technology
  - Manufacturing
  - Failure Analysis
  - EIPD/EOS reduction
High Quality Achievements

We have a proven track record of high quality achievements.
We have a proven track record of high quality achievements

Our customers can rely on a partner that has consistently achieved outstanding quality targets and received many awards in the automotive industry.

Examples

**TOYOTA**
Honor Quality Award
March 2020

**Continental**
Supplier of the Year
July 2019

**UAES**
Best Corporation Supplier
January 2020

**Hyundai**
Supplier of the Year
January 2019
Continuous Improvement
We strive for continuous improvement & we invest in quality
Next Level of Zero Defect (NLoZD) – A company wide integrated continuous quality improvement program

Continuous quality improvement
NLoZD links managerial units (business & R&D), production and design

Zero Defect Culture & Quality Leadership
Problem Solving Excellence & Continuous Improvement
Regular Reporting and Reviews
Long term reliable partner committed to permanent improvement (with NLoZD)

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<thead>
<tr>
<th>Customer Focus</th>
<th>Lifecycle Stability</th>
<th>Deviation Culture</th>
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<tbody>
<tr>
<td><strong>Customer Satisfaction</strong>&lt;br&gt;(regular reviews of ratings to address weaknesses)</td>
<td><strong>High robustness for Products in Production</strong>&lt;br&gt;Avoidance of quality incidences by advanced R&amp;D and test development methodologies</td>
<td><strong>Consequent implementation</strong> of firewalls in R&amp;D, test and manufacturing&lt;br&gt;Development of advanced outlier screening technologies</td>
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<td><strong>Customer Incident Reduction</strong>&lt;br&gt;Focus to avoid single incidents, not only keep ppm level</td>
<td><strong>Characterization and stabilization</strong>&lt;br&gt;of manufacturing processes</td>
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<tr>
<td><em><em>EIPD</em>/EOS Reduction</em>*&lt;br&gt;at Infineon and customer production</td>
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*Electrical Induced Physical Damage

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Infineon Zero Defect Mentality
We Do what we promise

We reduced our ppm rate significantly to sub ppm levels

We produce 24/7/365 and deliver Zero Defect for all but the last 3 seconds of a year

Most of our 8Ds are closed in less than 14 days

Regional network of failure analysis labs and strong localized competencies

Zero delamination approach

90% of our products are already Zero Defect
As our customer, you can rely on a partner that has continuously achieved and proved outstanding quality targets in the automotive industry.
For more information click on the respective image below