2024 Manufacturing Quality Annual Audit Report

Texas Instruments

Table of Contents

A letter from VP of Quality

Dear customer,

I am proud to report that Texas Instruments (TI) remains committed to delivering high-quality integrated circuit products that meet and exceed our customers' expectations. Our dedicated Quality organization includes customer Quality representatives in each TI business segment, working closely with our customers to resolve quality issues quickly and effectively through coordination and communication with TI business segments, sales, and manufacturing teams. We understand the importance of meeting our customers' quality data requirements and have recently updated our Quality and Reliability website (ti.com/quality) to provide valuable information on TI's Quality Policies and Procedures, Environmental Policies and Statements, Product Shelf Life, Reliability, Certifications, and Industry Standards.

At TI, we are dedicated to providing quality products that meet applicable requirements and satisfy our customers around the world. We encourage and expect the creative involvement of every TI employee to continuously improve and innovate our products, processes, and services. As we strive for excellence, we also acknowledge the stringent quality requirements necessary to supply products into the automotive market. As a result, we maintain an active continual improvement program focused on achieving 100% On Time Delivery with zero defects.

Since 1996, Texas Instruments' world-wide manufacturing sites have achieved the International Organization for Standardization's (ISO) Quality Management System (ISO 9001) and Environmental Management System (ISO 14001) Certifications, maintaining compliance with the ISO requirements since that time. Additionally, we are proud to be IATF 16949 (formerly ISO/TS 16949) certified since 2005, meeting the global automotive industry's quality requirements, and ISO 45001:2018 certified since 2019, meeting occupational health and safety management systems requirements with guidance for use.

At TI, we remain committed to providing high-quality integrated circuit products and maintaining compliance with the highest standards for quality and environmental management. Thank you for your continued support.

Sincerely,

Heather Hendershot
Vice President of Quality
Texas Instruments

Executive Summary

Texas Instruments (TI) is dedicated to designing, manufacturing, and marketing high-quality integrated circuit products that meet our customers' needs. Our Quality organization collaborates closely with customers to promptly and efficiently address quality-related issues by coordinating efforts and communicating with TI business segments, sales, and manufacturing teams. Our customer quality representatives also provide support for product containment, corrective action, and quality improvement programs.

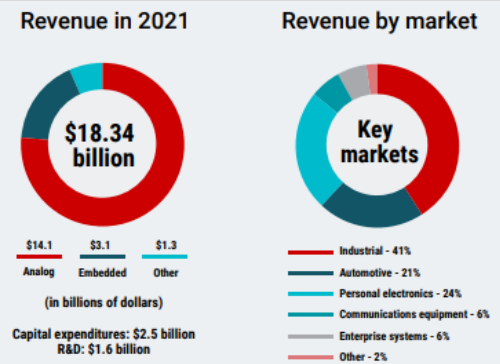
To meet the strict quality requirements of automotive and industrial markets, TI maintains an active continual improvement program aimed at achieving 100% On Time Delivery with zero defects. TI employs audit processes to ensure compliance with industry standards, device specifications, and customer requirements. TI's Quality Management System undergoes annual external and internal audits to ensure its effectiveness. TI also conducts annual Factory Product and Process Self-Audits to assess compliance. We conduct a limited number of customer audits as needed to allow clients to evaluate the effectiveness of TI's compliance infrastructure while minimizing disruption to TI operations.

TI's sites were first certified for the International Organization for Standardization's (ISO) Quality Management System (ISO 9001) and Environmental Management System (ISO 14001) in 1996 and have since maintained compliance with ISO requirements. TI is also certified to IATF 16949 (Global automotive industry) and ISO 45001:2018 (Occupational health and safety management systems). Links to TI certificates for these standards are available in Appendix B.

Our quality policy reflects TI's commitment to meeting applicable requirements and providing quality products to customers around the world by encouraging and expecting the creative involvement of every TI'er, listening to our customers, and continuously improving and innovating our products, processes, and services

TI at a glance

- Founded in 1930.
- Headquartered in Dallas, Texas.
- Publicly traded (Nasdaq: TXN).
- Richard K. Templeton is chairman, president and CEO.
- About 31,000 employees.
- ~13,000 in the Americas.
- ~16,000 in Asia-Pacific.
- ~2,000 in Europe.
- 15 manufacturing sites worldwide, producing tens of billions of chips each year.
- ~ 80,000 products for over 100,000 customers.
- Industrial and automotive made up 62% of 2021 revenue



Worldwide manufacturing locations[1]

Design sites
Bangalore, India
Dallas, Texas
New Taipei City, Taiwan
Santa Clara, California
Shanghai, China
Shenzhen, China
Sugar Land, Texas
Tucson, Arizona

Manufacturing sites
Aizuwakamatsu, Japan
Aguascalientes, Mexico
Baguio, Philippines
Chengdu, China
Dallas, Texas
Freising, Germany
Kuala Lumpur, Malaysia
Lehi, Utah
Melaka, Malaysia
Miho, Japan
New Taipei City, Taiwan
Pampanga, Philippines
Richardson, Texas
Sherman, Texas
South Portland, Maine

Richardson, Texas

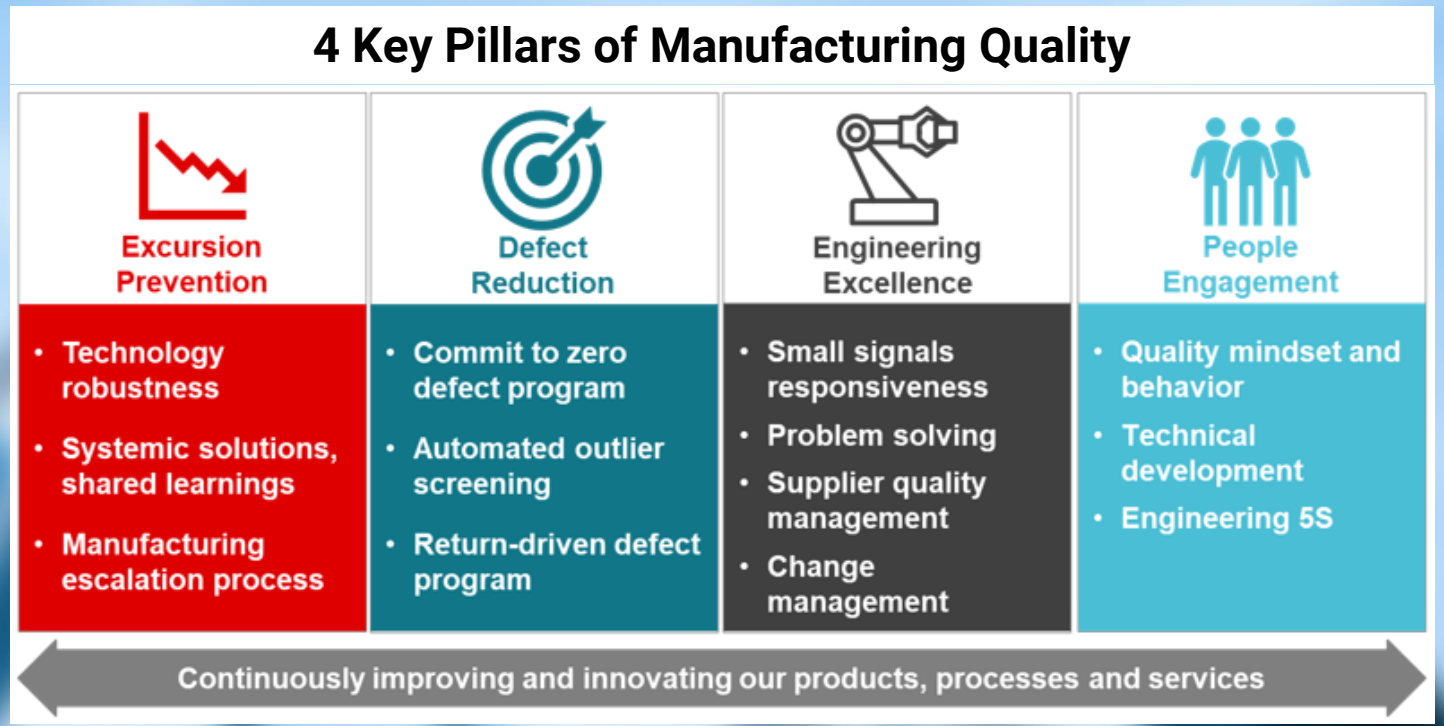
Our commitment to Manufacturing Quality

TI Manufacturing has consistently focused on building robust quality programs to meet the increasing demands of automotive & industrial markets. Results of this work have recently been demonstrated through steady reduction in the rate of customer incidents and customer returns, and an increase in the level of best practices shared across the sites.

There are 4 key pillars of manufacturing quality and provided examples of how each are applied to deliver positive results across Fab, Assembly & Test, and External Manufacturing.

Report overview

Starting in 2023, TI is publishing public information regarding the audit actions that Texas Instruments takes annually. To strengthen our reporting, we solicit input and anonymized audit results from our customers with their provided permission. It is our objective to learn continuously from our customers and suppliers to work together to improve our processes and operations for best practices. We then compare these inputs to our company priorities to determine what topics and disclosures to include in our annual Manufacturing Quality Audit Report.



Our holistic approach to quality

Quality **permeates every corner of TI**, with focused efforts throughout our supply chain, from product development, manufacturing, and assembly, to product testing, and customer support.

TI has achieved a number of industry certifications including ISO 9001, ISO14001, IATF16949, ISO45001 and the Underwriters Laboratories (UL) rating.

*Information regarding TI certifications can be found at **ti.com/certifications**.*

Our global manufacturing strategy enables continuity of quality

The Technology & Manufacturing Group (TMG) takes a holistic approach to Quality, covering every aspect of our supply chain from product development, manufacturing, and assembly, to product testing and customer support. As any breakdown at any step in this flow can lead to device failure, focus must be on each aspect of the process to assure that reliable products are delivered on-time and at competitive cost.

With the advantage of multiple manufacturing sites worldwide, including wafer fabs, assembly and test factories, and bump and probe facilities working together, we can leverage shared learnings to escalate the rate of improvement from one generation to the next.

Technology & Manufacturing Group at a glance

About TMG

TI's Technology & Manufacturing Group is a global organization dedicated to developing, manufacturing, packaging, assembling and testing TI's broad portfolio of semiconductor products and providing sustainable advantages for our customers.

Technology groups:
- Analog Technology Development
- Semiconductor Packaging
- Test Technology Group

Manufacturing groups:
- Wafer Fab Manufacturing Operations
- Assembly/Test Operations & Product Distribution
- External Manufacturing

Other TMG groups:
- Semiconductor Quality
- Analog Foundry Services

Mission

Develop innovative technologies for differentiated products	Ship on time, every time	Ensure quality of products throughout their life-time	Deliver cost competitiveness

Quality Management

General Quality Guidelines

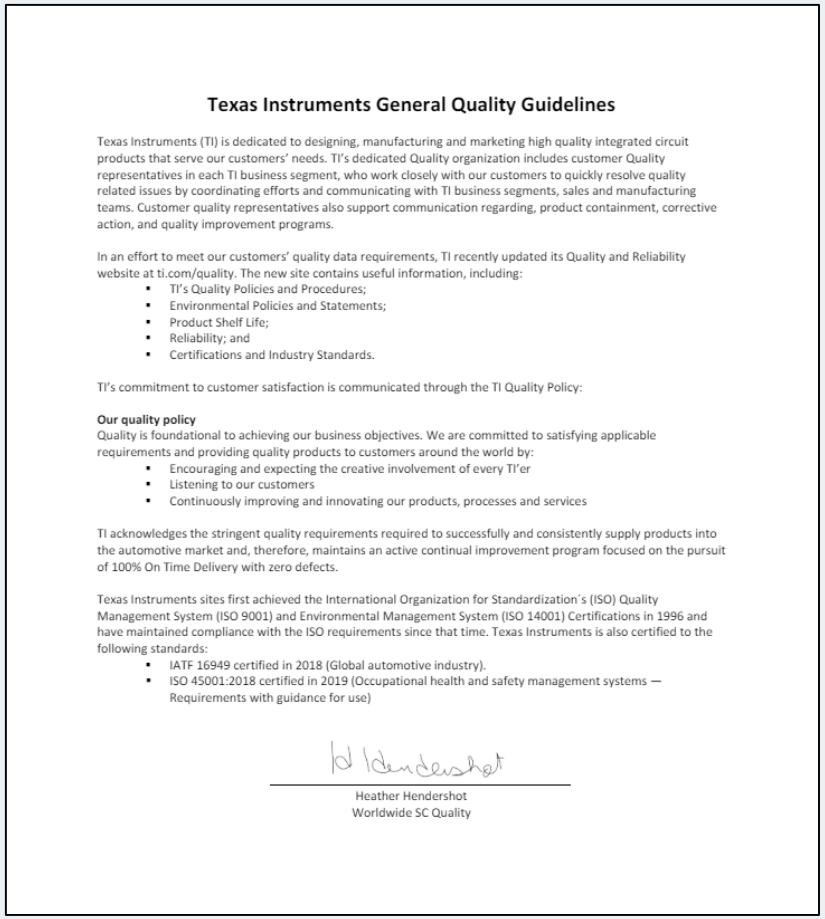
Texas Instruments General Quality Guidelines

These guidelines outline assurance measures to ensure compliance of our components with a variety of quality specifications.

Aerospace and Defense Supplement to the Texas Instruments General Quality Guidelines

These guidelines address additional component quality-related requests from our Aerospace and Defense customers.

The updated GQG is available on ti.com.



Texas Instruments General Quality Guidelines

Texas Instruments (TI) is dedicated to designing, manufacturing and marketing high quality integrated circuit products that serve our customers' needs. TI's dedicated Quality organization includes customer Quality representatives in each TI business segment, who work closely with our customers to quickly resolve quality related issues by coordinating efforts and communicating with TI business segments, sales and manufacturing teams. Customer quality representatives also support communication regarding, product containment, corrective action, and quality improvement programs.

In an effort to meet our customers' quality data requirements, TI recently updated its Quality and Reliability website at ti.com/quality. The new site contains useful information, including:

- TI's Quality Policies and Procedures;
- Environmental Policies and Statements;
- Product Shelf Life;
- Reliability; and
- Certifications and Industry Standards.

TI's commitment to customer satisfaction is communicated through the TI Quality Policy:

Our quality policy
Quality is foundational to achieving our business objectives. We are committed to satisfying applicable requirements and providing quality products to customers around the world by:

- Encouraging and expecting the creative involvement of every TI'er
- Listening to our customers
- Continuously improving and innovating our products, processes and services

TI acknowledges the stringent quality requirements required to successfully and consistently supply products into the automotive market and, therefore, maintains an active continual improvement program focused on the pursuit of 100% On Time Delivery with zero defects.

Texas Instruments sites first achieved the International Organization for Standardization´s (ISO) Quality Management System (ISO 9001) and Environmental Management System (ISO 14001) Certifications in 1996 and have maintained compliance with the ISO requirements since that time. Texas Instruments is also certified to the following standards:

- IATF 16949 certified in 2018 (Global automotive industry).
- ISO 45001:2018 certified in 2019 (Occupational health and safety management systems — Requirements with guidance for use)

Heather Hendershot
Worldwide SC Quality

Quality focus throughout our supply chain

Zero defects goal; focused on growth in broad automotive and industrial markets

TI quality teams proactively assess and apply lessons learned throughout the product lifecycle, from development to manufacturing to customer support.

Quality focus in manufacturing

Quality management system

Management review Compliance to key performance indicators (KPIs) improves effectiveness and efficiency.

Continuous improvement Cross functional teams focus on process and tool improvements.

Error proofing mindset

Risk mitigation
Process failure mode and effects analysis (FMEA) tools.

Defect reduction
Targeted improvements based on return and inline pareto.

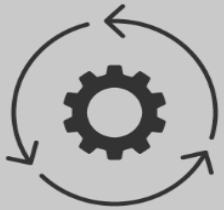
Commit 2 zero
Drive critical factory defects to zero through innovation and/or investment.

Abnormality control

Comprehensive inline controls and monitoring
Inline metrology, statistical process control and tool interdiction monitoring system.

Early excursion detection Risk assessment through cross-functional Material Review Board.

Lessons learned & standardization

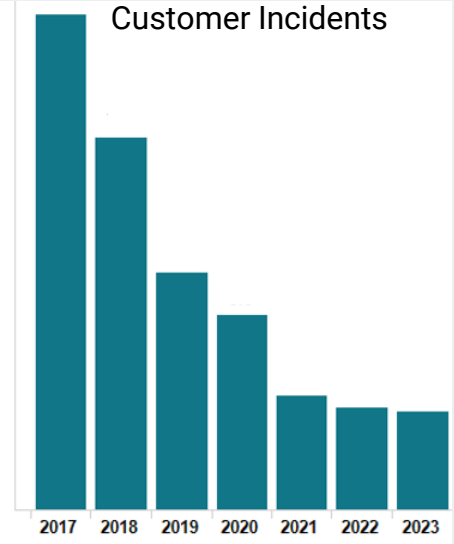


Structured fan in/fan out process
Critical learnings institutionalized through FMEA.

One MAKE concept
Leverage expertise across factories for best practice sharing.

Continuous improvement in quality performance

Customer return performance is essential to improving the quality and reliability of our products.
To drive continuous improvement, returns are aggregated to identify systemic improvement opportunities.

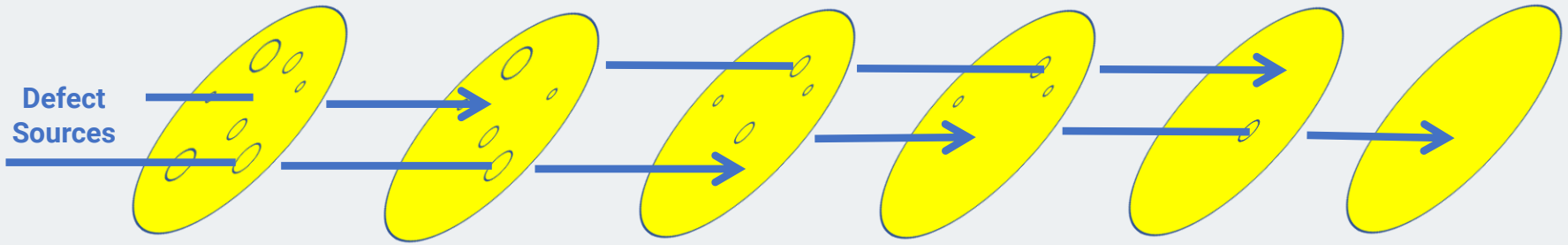


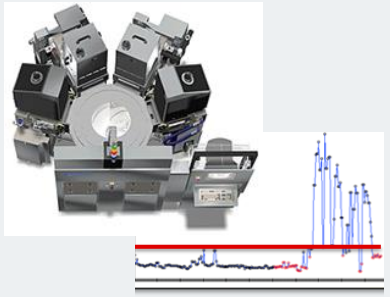
Strong quality foundation drives year-over-year quality return improvements with significant shipment volume increases.

Texas Instruments' incident rate continues to improve within the past 5 years as continuous improvement is reflected in our quality performance.

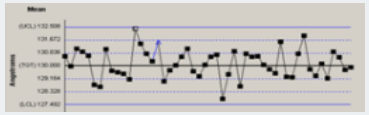
TI Wafer Fab Zero Defect Model

Leveraging Small Signals for Continuous Improvement



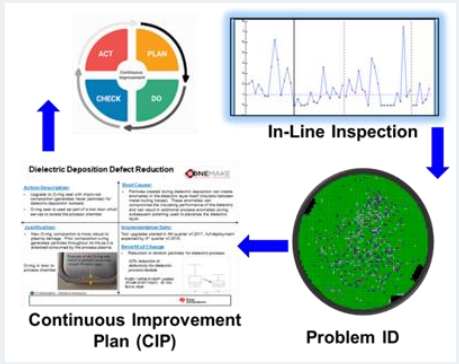


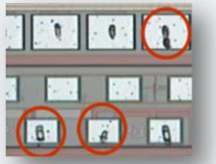
Advance Equipment Monitoring
Integrated sensors (flow, power, pressure, vibration, sound, etc)



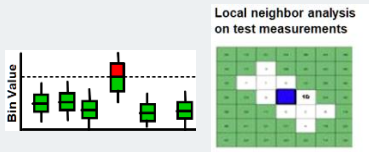
Statistical Factory Control (SFC)
Early & accurate interdiction with continuous off-line monitoring

In-Line Defect Reduction

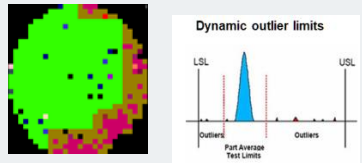




Automated Outgoing Inspection



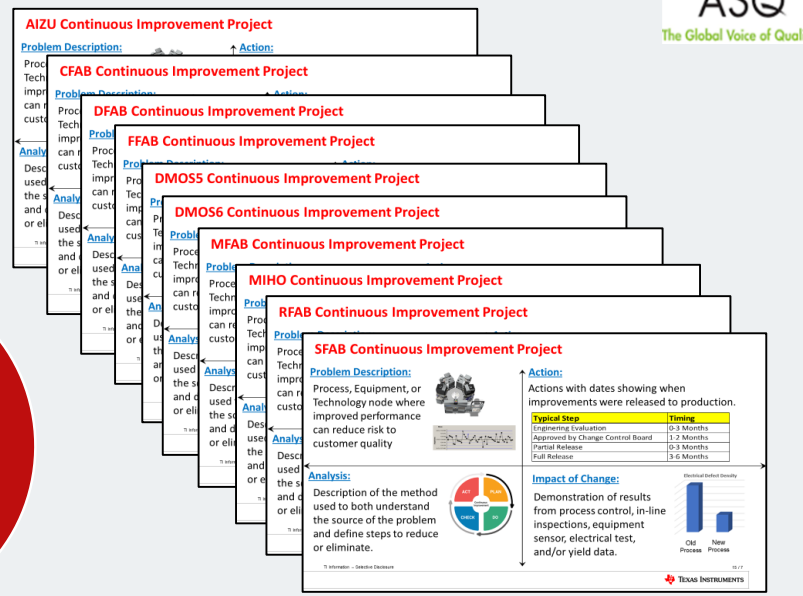
Parametric & Geographic Outlier Screening



TI Wafer Fab Continuous Improvement Program (CIP)

1. Projects identified based on risk to customer quality.
2. Integrated with TI Quality Event Manager & Change Control Board.
3. Shared learnings across all sites.
4. Similar program at Foundry Fabs on TI technologies.

TI-CIP = Reverse FMEA: *A structured process of Continuous Improvement conducted at the tool level by a multifunctional team.*



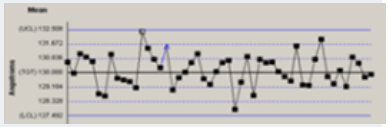
**Signals can come from Equipment Sensors, Process Measurements, Defect Inspection, Yield Loss, or Fan-In.*

TI FAB Continuous Improvement Project

Ref: QEM-CIPFAB-YYMM-###

Problem Description:

Process, Equipment, or Technology node where improved performance can reduce risk to customer quality



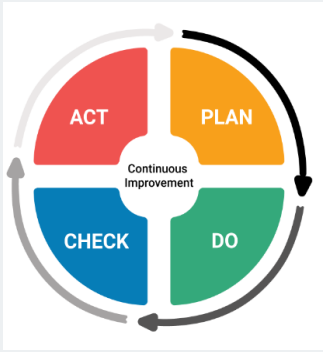
Action:

Actions with dates showing when improvements were released to production.

Typical Step	Timing
Enginering Evaluation	0-3 Months
Approved by Change Control Board	1-2 Months
Partial Release	0-3 Months
Full Release	3-6 Months

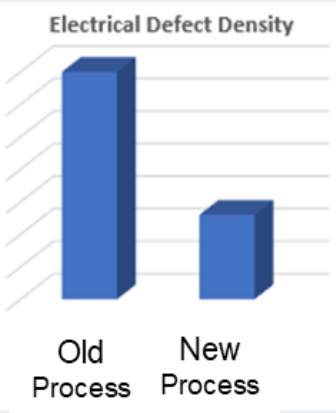
Analysis:

Description of the method used to both understand the source of the problem and define steps to reduce or eliminate.



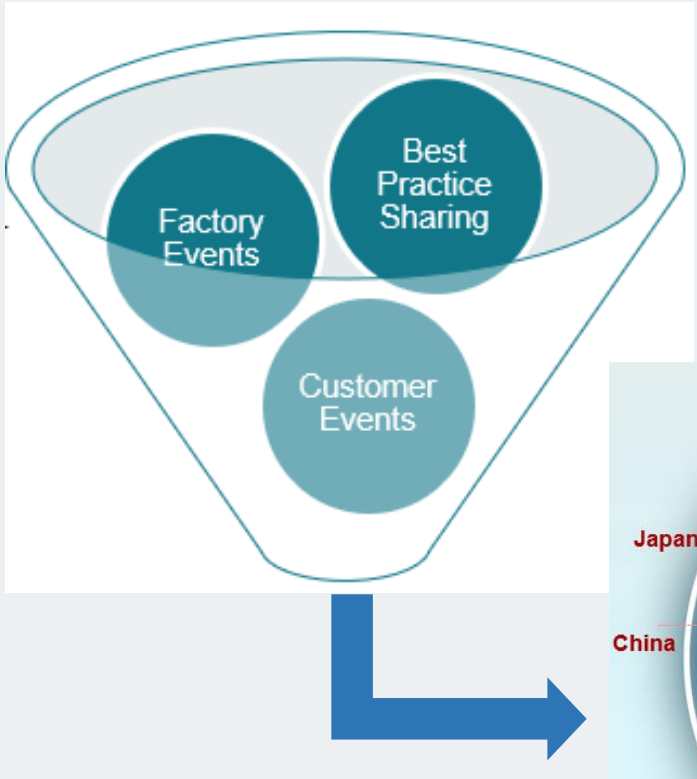
Impact of Change:

Demonstration of results from process control, in-line inspections, equipment sensor, electrical test, and/or yield data.



TI Wafer Fab Shared Learnings

1. **Topics identified based on best practices for Customer quality**
2. **Integrated with TI Quality Event Manager System (QEM)**
3. **Engagement with subject matter experts at all Fabs**
4. **Closed loop system ensures lessons learned are implemented**

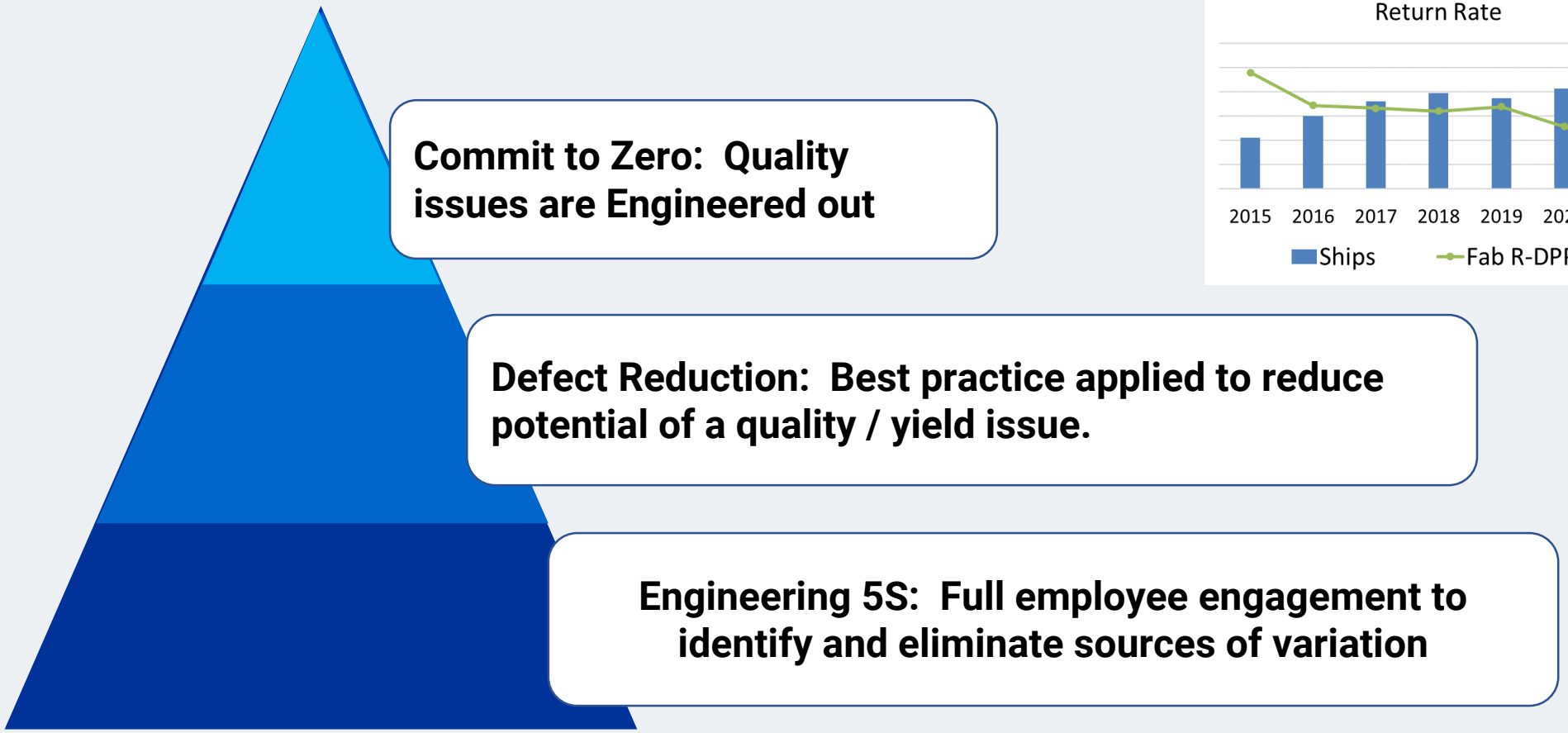


TI shared learnings: *Structured process across TI of fanning in and fanning out best practices and lessons learned at the process and equipment level by a multifunctional team.*

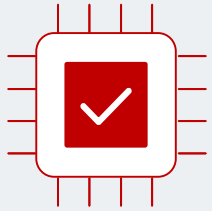
>100 Shared Learnings per year across all TI Fabs

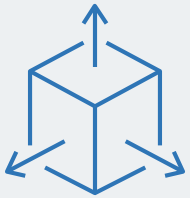
Summary - TI Wafer Fab Customer Quality

Continuous Improvement Hierarchy

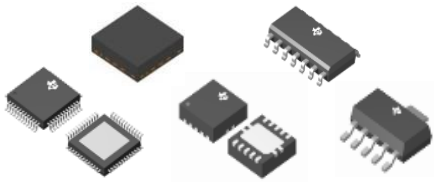


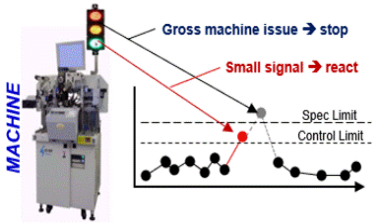
Assembly & Test Manufacturing Quality Strategy

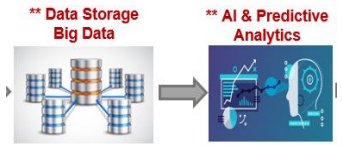


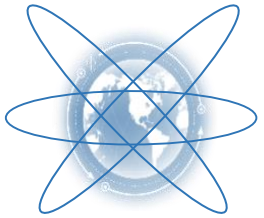


New Products, Safe Launch	Abnormal Lot Control, Machine & Tools	Automation, Small Signals	Leveraging Scale
➲ Controls on Safe Launch : Detect Early Ramp Fails	➲ Detect issues inhouse : Upstream Controls	➲ Small Signals : Building a Quality Culture	➲ Lessons Learned, Collaboration
• Risk Assessment Focus, Safe Launch & Ramp Quality • NPI & MFG Collaboration	• Tool Stability, Machine Sameness • Automation, harness machine signals • Technical Intervention, OCAP • Manufacturing Escalation	• Big data, Small signals : Utilize machine signals to detect abnormality, Auto-disposition • Zero Defect Program, Top Defects • Proactive, move to Predictive	• Fan-In, Fan-Out : Systemic Solutions, drive standardization • Engineering & Manufacturing Council : Innovate Once, Implement all









Assembly & Test Manufacturing Quality Initiatives

New Products, Safe Launch

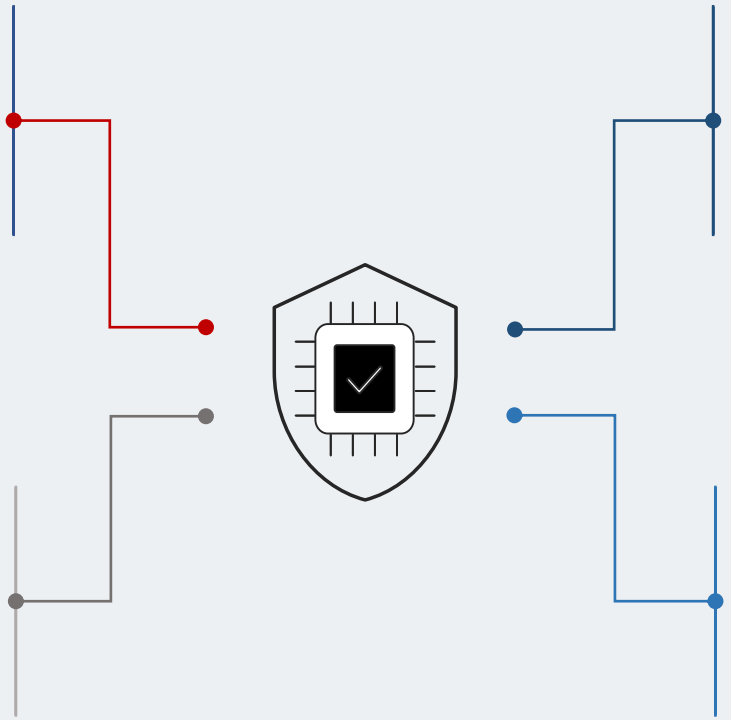
➲ Controls on Safe Launch : Detect Early Ramp Fails

- NPI & MFG collaborations for Ramp quality
- Utilize Process 9-Steps
- Utilize Equipment 7-Steps

Automation, Small Signals

➲ Small Signals : Building a Quality Culture

- Reduce human intervention thru small signals driven inspection, Auto-Hold, Auto-Disposition
- Automated system based controls –MTVS, SPC, OSS, COMS, DS, etc.
- Zero Defect Program – 2 programs per sites
- Top Defect Reduction – Continuous improvement programs
- Discovering Predictive Signals via AI



Abnormal Lot Control, Machine & Tools

➲ Detect Issues Inhouse : Upstream Controls

- MFG Escalation with proactive containment
- Recipe Management
- Machine sameness – Preventive Maintenance
- Machine connectivity & sensing – harnessing abnormal machine signals (TIMS)
- Control Plan Sameness

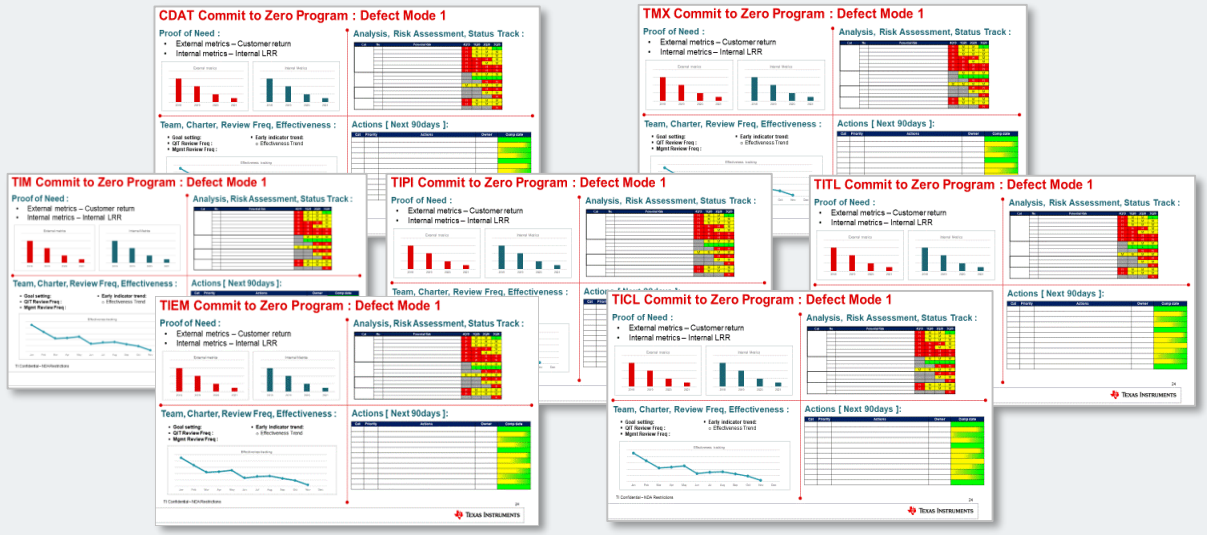
Leveraging Scale

➲ Lessons Learned, Collaboration

- Fan-In & Fan-Out lessons learned from internal & external events.
- Incident heatmaps - drive systemic solutions across processes and across AT sites
- Engagement with Engineering & Manufacturing Council for innovate once, implement all.

Assembly & Test Manufacturing Zero Defect Program

- Zero Defect Program identified within AT sites based on top ranked customer quality impact & risk.
- Integrated with TI AT Quality management team
- External & internal metrics, identify improvement actions & effectiveness tracking
- Risk mitigation to drive defect to ZERO.
- Management Review on periodic basis

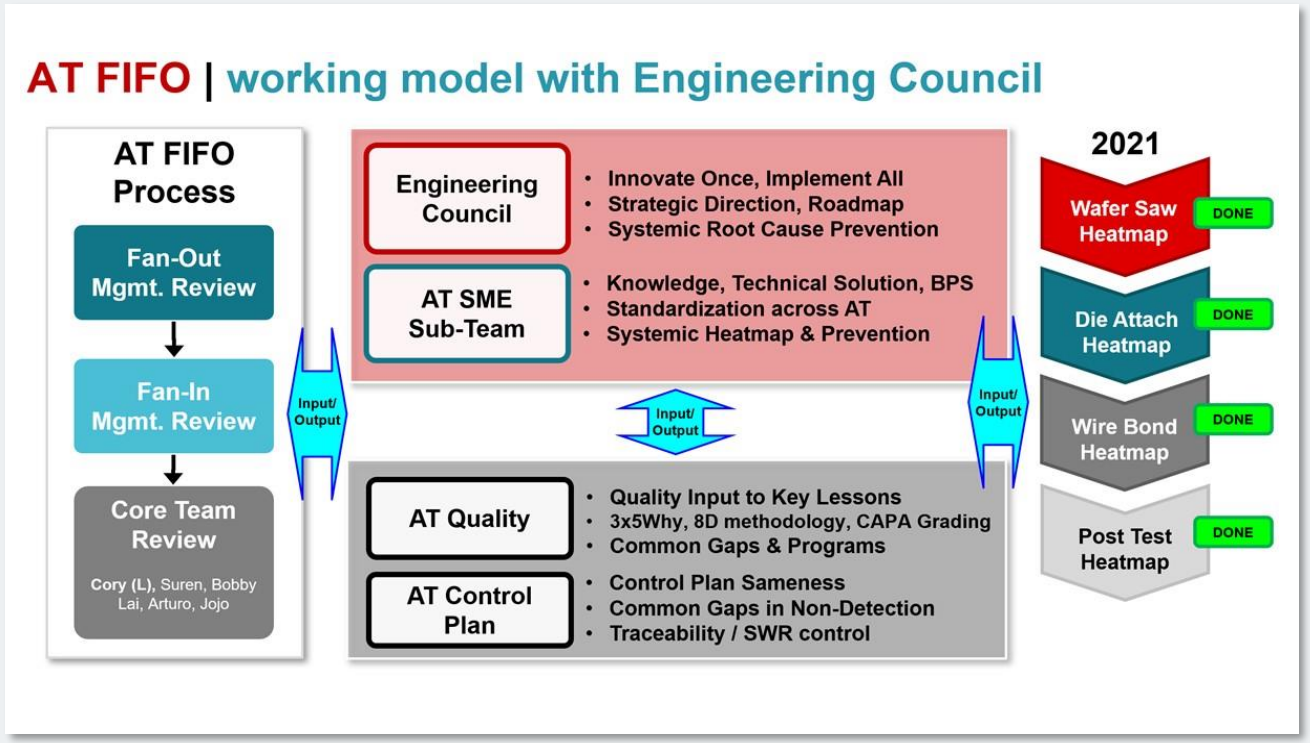


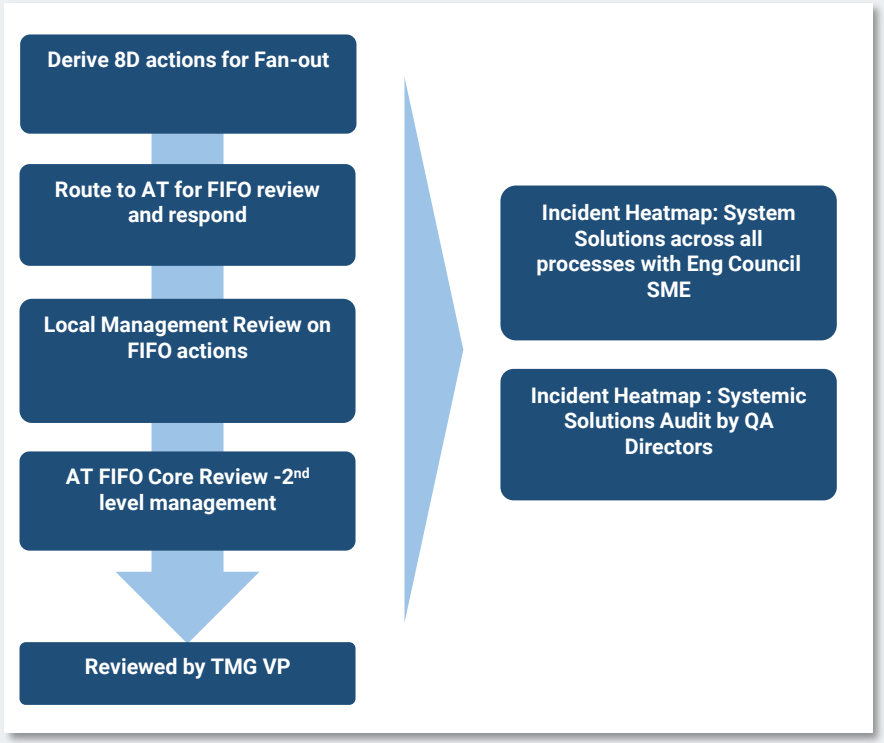
AT Commit to Zero | 2018 ~ 2022

New | Continue | Expanded | Graduated

Year	2018	2019	2020	2021	2022
TIPI	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2		Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2
TICL	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2
	Zero Defect Mode 3	Zero Defect Mode 3			
TIM	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2
TIEM	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2
	Zero Defect Mode 3	Zero QFN Lead Burr			
TITL	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2
		Zero PO scratch			
CDAT	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2		Zero Defect Mode 2	Zero Defect Mode 2	Zero Defect Mode 2
TMX	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1	Zero Defect Mode 1
	Zero Defect Mode 2				

Summary - Assembly & Test Manufacturing Fan-In, Fan-Out





2020, 2021
Focus Customer Returns & Quality Events

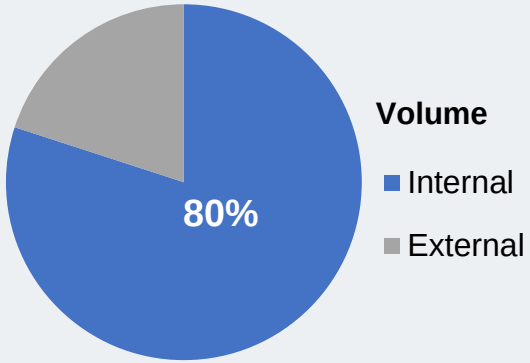
132 FIFO Actions
Actions applicable ~96%

45 system solutions derived & mapped to all process

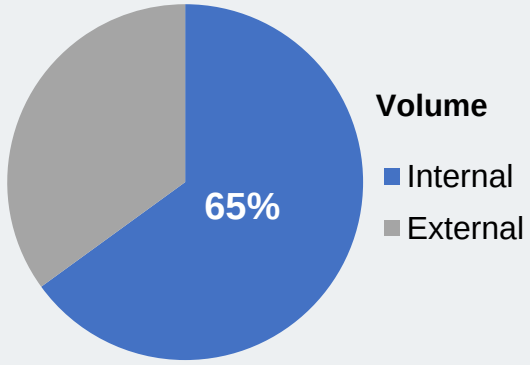
18 Solutions > Long range plan, Strategic Roadmap. Track Effectiveness

Flexibility of supply through strong external partners

Wafer fabrication



Assembly



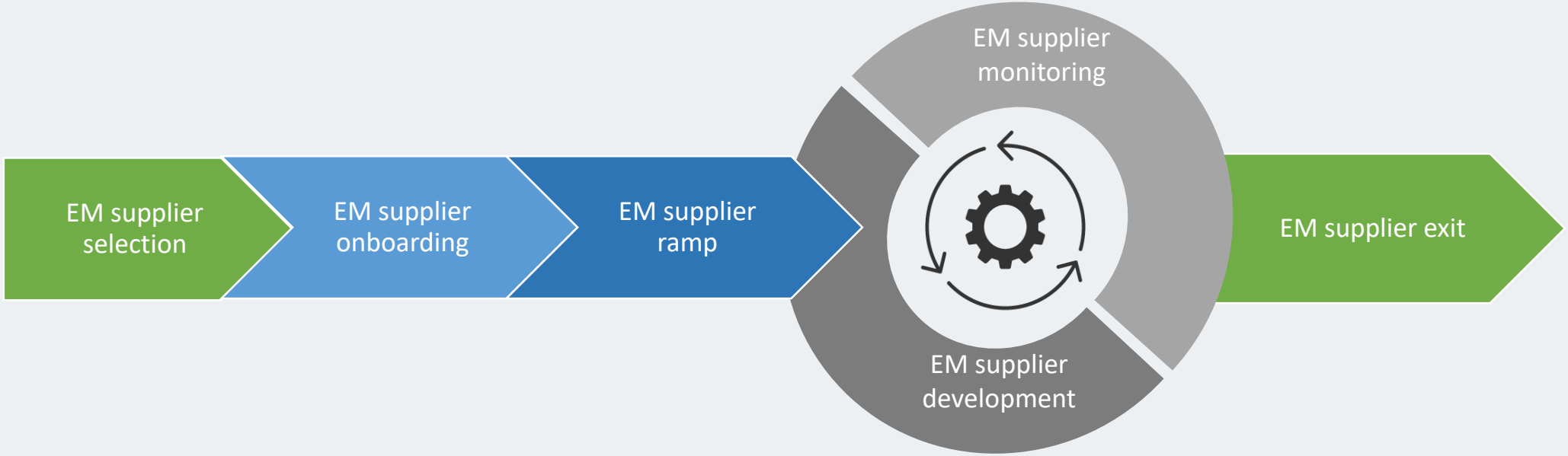
External manufacturing model:

In addition to our internal capacity, we use foundry and subcontractor partners to offer flexible capacity and continuity of supply.

We source technologies that provide performance and cost leadership in targeted markets.

We manage supplier relationships to ensure great quality and support.

External Manufacturing (EM) Supplier Management Lifecycle



EM supplier selection	EM supplier onboarding	EM supplier ramp	EM supplier monitoring	EM supplier development	EM supplier exit
Quality, capacity, cost, technology Strategic selection	Integration into TI systems Driver product qualification	Increased loading, stress test Incremental technology expansion	Quality control Continuous feedback	TI quality initiatives Continuous improvement plan	Structured exit process

Supplier Management Quality Strategy

Strategic supplier selection
Comprehensive assessment of overall cost of partnership (quality, cost, capacity and technology capability)

Safe launch
Risk-based ramp of new sites and technologies with enhanced TI oversight

Change control
Systematic review, assessment and approval of all supplier changes

Monitor & measure
Layered touch points for early detection of supplier quality challenges

Risk-based audits
Focused tool set of audit types aimed at identifying systemic gaps and supplier risk

Solve each problem once
Leverage TI's footprint to accelerate learnings across sites, ensure true root cause is found and validate corrective actions

External Manufacturing Quality Tools

Technology Development

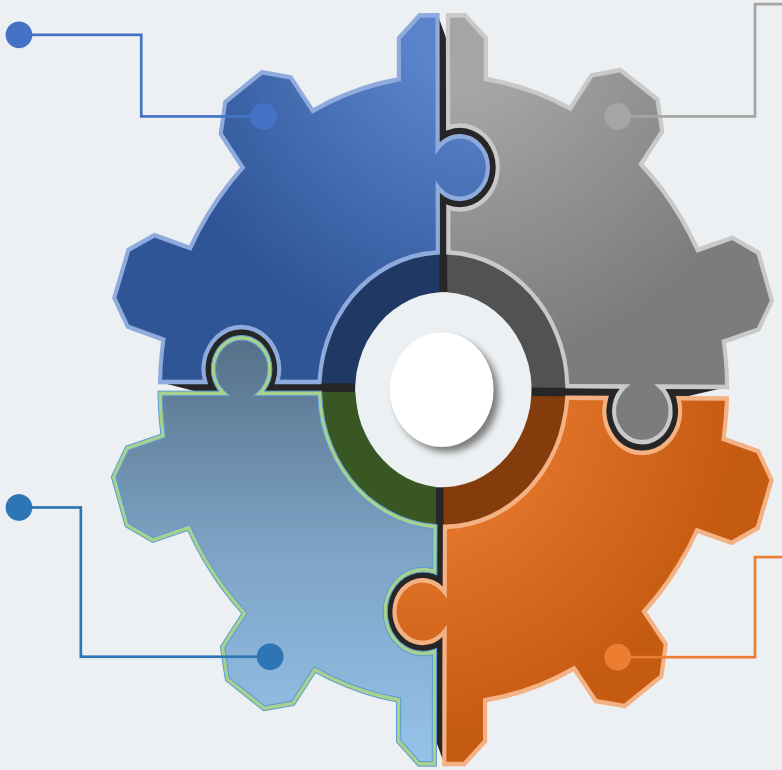
Quality in New Product Introduction (NPI)

Ensuring smooth ramp

Operational Quality

Daily touch points and data reviews

Early indicators & Small signals detected here



Sustained Quality

Methodical sharing of learnings

Continuous Improvements

TI Audit Toolbox

Multi-faceted audit approach

Risk based focal points and scope

Quality at your fingertips – online resources

TI's comprehensive semiconductor quality policies and procedures, from new product qualifications and process change notifications to timely resolution of customer cases,
can all be found at ***TI.com/quality***.

General quality guidelines

Highlighting our commitment to quality and how we meet various quality certifications.
TI.com/GQG

Product information

From datasheet and technical documentation to design and support training, product pages on **TI.com** contain important product quality information.

Product warranty

Our terms of sale offer a standard twelve-month warranty from the date TI or a TI-authorized distributor delivers the product to a customer. ***TI.com/warranty***

Product stewardship

Information on material content, environmental compliance, lead-free and conflict material information is available.
TI.com/environmental

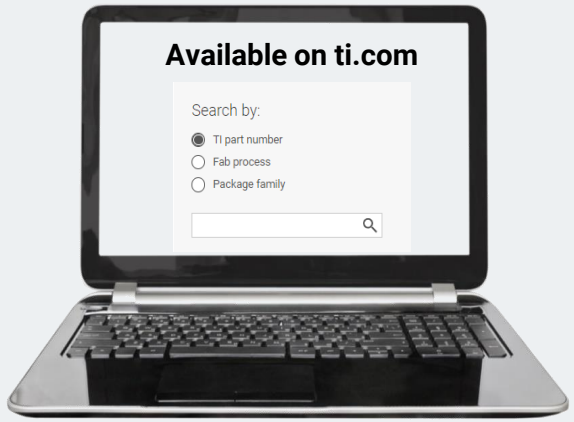
Ongoing Reliability Monitoring

Quality and reliability are built into the culture at Texas Instruments with the goal of providing high-quality products to customers. TI periodically monitors the reliability of its products, wafer fab processes, and package technologies, through its Ongoing Reliability Monitor (ORM) program. The ORM program involves collecting environmental reliability stress data on representative sets of devices, processes and packages. The results from the ORM program are updated quarterly in this report.

TI builds simulations, accelerated testing, and robustness evaluations into the product development process. During this process, TI carefully assesses silicon process and package reliability, and silicon/package interaction. TI also evaluates manufacturability of the device to verify a robust silicon and assembly flow to enable continuity of supply to customers.

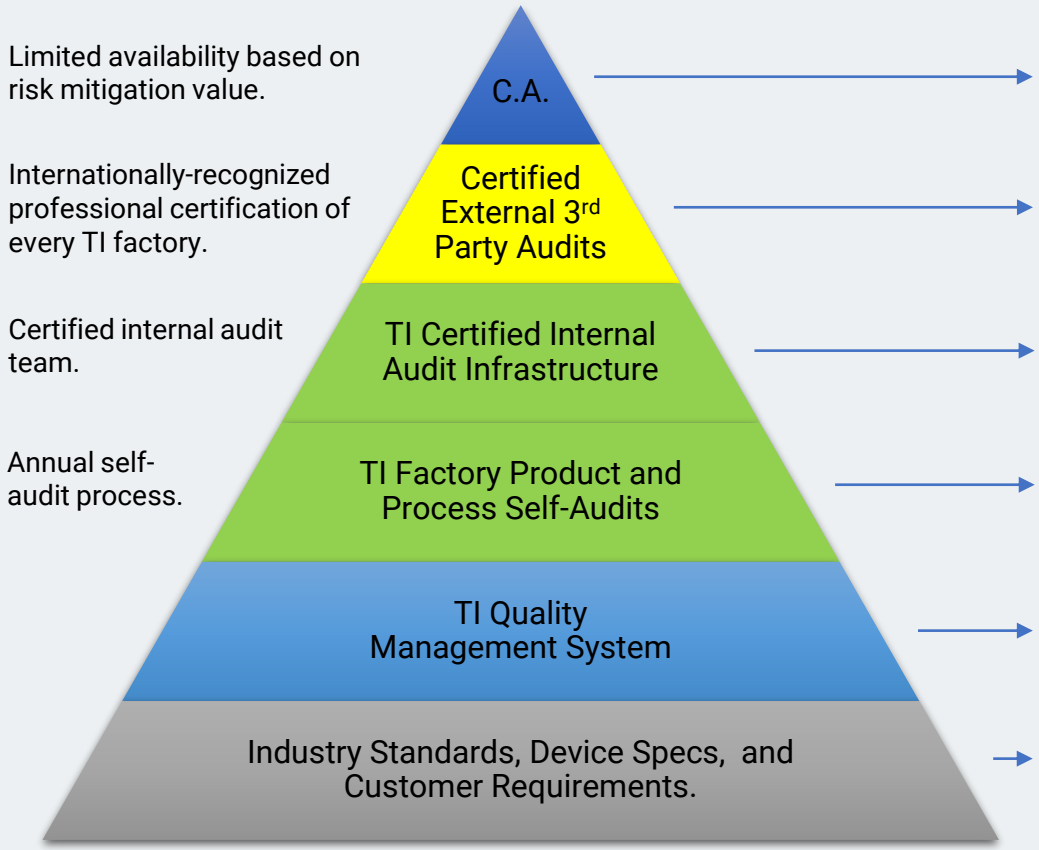
Non-automotive devices are qualified with Joint Electron Devices Engineering Council (JEDEC) industry standard test methodologies. TI qualifies new devices, significant changes and product families based on JEDEC JESD47. The data shown is representative of the material sets, processes and manufacturing sites used by the device family.

Texas Instruments Ongoing Reliability Monitoring Online Tool



Audit Process

TI Conformance and Compliance Infrastructure



- **Customer Audits** – A limited number of customer audits are made available as needed to help customers understand the efficacy of TI's compliance infrastructure while limiting disruption of TI operations.
- **External Audits** – Annual ISO and IATF external audits used to confirm the effectiveness of TI's Quality Management System.
- **Internal Audits** – Annual ISO and IATF internal audits used to confirm the effectiveness of TI's Quality Management System.
- **Factory Self-Audits** – Annual TI Factory Product and Process Self-Audits
- **TI QMS** – Operating instructions for all of TI that ensure compliance with Industry Standards, Device Specs, and Customer Requirements.
- **Industry Requirements** – TI has numerous subject matter experts focused on understanding Industry Standards, Device Specs and Customer Requirements

TI External Audits

Texas Instruments is responsible for establishing and maintaining a Quality Management System that is compliant to ISO 9001 and IATF 16949 requirements. In order to ensure compliance, the following audits processes are in place:

Quality Management System Audit:
External audits are conducted at every manufacturing location and support organization on an annual basis. Audits are conducted using the process approach to verify compliance. Integrated within these audits, the certification body samples customer-specific quality management system requirements for effective implementation.

Detailed Requirements

Standards:

- ISO 9001 Quality Management Systems - Requirements
- IATF 16949 Quality Management Systems – Particular requirements for the application of ISO 9001 for automotive production and relevant service part organizations

TI Internal Audits

Texas Instruments is responsible for establishing and maintaining an internal self audit program for the purposes of ensuring corporate compliance to applicable external standards, internal procedures and customer contracts.

Our internal audit program covers the entire quality management system including quality management system audits, manufacturing process audits, and product audits. The audit program is prioritized based upon risk, internal and external performance trends, and criticality of the process(es). For software development, the organization includes software development capability assessments in the internal audit program. The frequency of audits are reviewed and, where appropriate, adjusted based on occurrence of process changes, internal and external nonconformities, and/or customer complaints. The effectiveness of the audit program is reviewed as part of management review.

Quality Management System Audit:
Internal audits are conducted at every manufacturing location and support organization on an annual basis. Audits are conducted using the process approach to verify compliance. Integrated within these audits, the auditor samples customer-specific quality management system requirements for effective implementation.

Manufacturing Process Audit:
The organization audits all manufacturing processes over each three-year calendar period to determine their effectiveness and efficiency. Within each individual audit plan, each manufacturing process is audited on all shifts where it occurs, including the appropriate sampling of the shift handover. The manufacturing process audit includes an audit of the effective implementation of the process risk analysis (such as PFMEA), control plan, and associated documents.

Product Audit:
Factories perform product audits at appropriate stages of production and delivery to verify conformity to specified requirements. A product audit is a sampling-based activity with the objective of verifying conformance to all applicable requirements including customer requirements.

TI Customer Audit Approach

Balancing TI/Customer Concerns

- TI understands that some TI customers have internal and external supplier audit requirements.
- Customers ask for different types of audits for different reasons. Not all reasons for audit have equal technical or business justification.
- Customer Audits are costly and disruptive to TI factories and do not scale well (100K customers).
- Customer Audits have limited corrective value to TI (few examples of meaningful findings compared to external 3rd party audits).

Goal: Provide a customer audit request process that balances customer audit needs against impact to TI operations. It is TI's intention to meet most customer audit needs through 3rd party certifications.

TI Customer Factory Audits: Terms and Conditions

REQUEST PROCESS: All factory audit requests made to Texas Instruments Incorporated (TI) shall be routed through a designated representative from TI sales or the TI Quality Account Management team, and shall follow TI's standard customer audit approval. Any factory audit requests made through any other mechanism will not be approved. The customer audit request process includes the requirement for and assessment of clear documentation, provided by the customer, of the audit request scope and technical justification for the audit. Customers shall provide at least 60 days notice prior to the requested audit start date.

AUDIT SCOPE: The scope of the factory audit, delivered as part of a written audit agenda, shall be clearly defined by the customer during the audit request process, and full TI agreement regarding the audit scope is required as a condition of audit approval. Only factory-related topics shall be addressed during a factory audit. Examples of out of scope topics include "non-factory business issues“, processes owned by other business entities and items that are not addressed by the standard against which the audit is being performed. TI reserves the right to redirect auditors away from topics that are not in scope and to require that such items be redacted from final audit reports as a condition of audit closure.

APPROVAL PROCESS: Due to real and practical limits on factory resources and the disruptive nature of factory audits, the availability of TI factory audit support resources shall be prioritized based on the merit of the request. TI shall assess the potential impact of the audit on risk reduction and shall prioritize customer requests that are based on a thoughtful, risk-based audit approach, consistent with the second party audit requirements outlined in IATF 16949. Customer audits against industry wide certifications held by TI will not be approved (e.g. ISO 9001, IATF 16949.) As factory certification to the VDA 6.3 standard is not possible, TI will only permit one VDA 6.3 audit per factory per year. This allocation is shared across all customers.

AUDIT RESOURCES: TI shall allocate a dedicated but finite number of “audit days” for each factory every quarter. These audit days shall be assigned to customers as part of the TI audit approval process. Customer audits may only be scheduled during available audit days. If no audit days are available in the current quarter, the customer may request an audit date in a future quarter with available audit days. TI reserves the right to charge customers for the cost of any special equipment, supplies, or services required to facilitate the audit, provided that these costs are reasonable and necessary.

CUSTOMER ASSESSMENT: Customer shall provide written feedback to TI following the audit to help improve the audit process and address any areas of concern. Customers are required to grant TI the right and privilege to share any and all audit findings with other customers in an anonymous manner which protects the auditing customer’s identity. The customer shall sign a non-disclosure agreement prior to the audit to protect TI's confidential information, and shall comply with all TI factory safety and security policies and procedures during the audit. TI reserves the right to restrict access to certain areas of the factory during the audit if necessary to protect proprietary or confidential information or trade secrets.

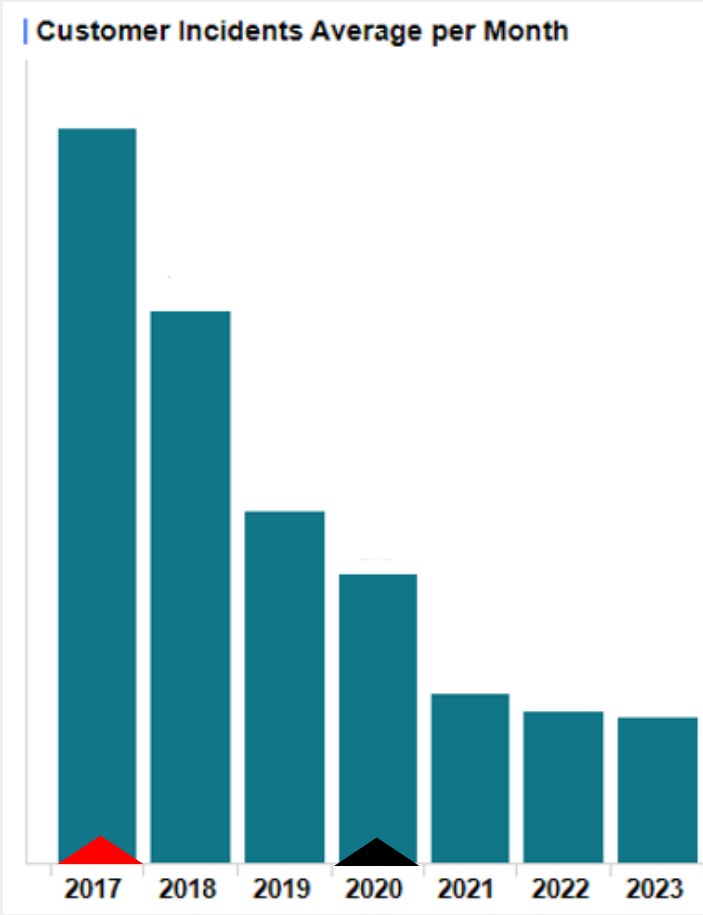
TI AUDIT RESPONSE: TI reserves the right to assess the appropriateness of findings prior to providing any required signatures or approval of the final audit report. TI agrees to provide an appropriate response, within a reasonable timeframe, to findings contained within the final audit report.

AUDITOR COMPETENCY: Customers shall ensure that their auditors are adequately trained and qualified to perform the audit and have relevant experience in the industry or technology being audited. Documentation supporting auditor competency shall be made available on request. Customers must provide TI with a detailed list of all audit team members prior to the audit. TI reserves the right to perform background checks on any auditors visiting TI factories.

Quality
Performance

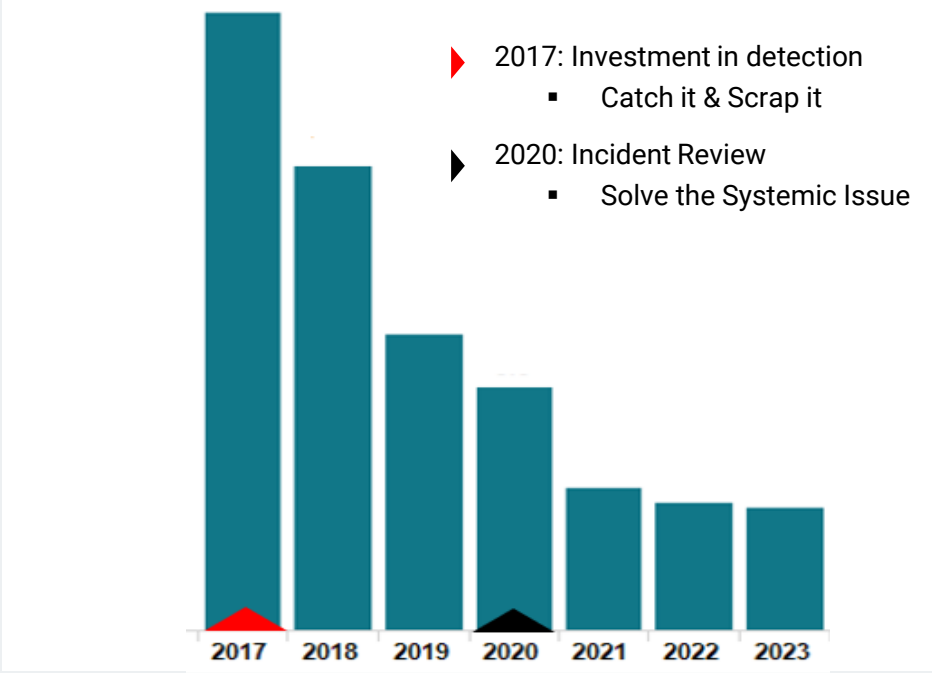
Incident trends: 2017 to 2023

- 2021 closed down 40% YoY in incidents
- Incident review process driving systemic improvement and organizational ownership
- Objective is to prevent reoccurrence by addressing the systemic issue
  - 2017: Investment in detection
    - Catch it & Scrap it
  - 2020: Incident Review
    - Solve the Systemic Issue

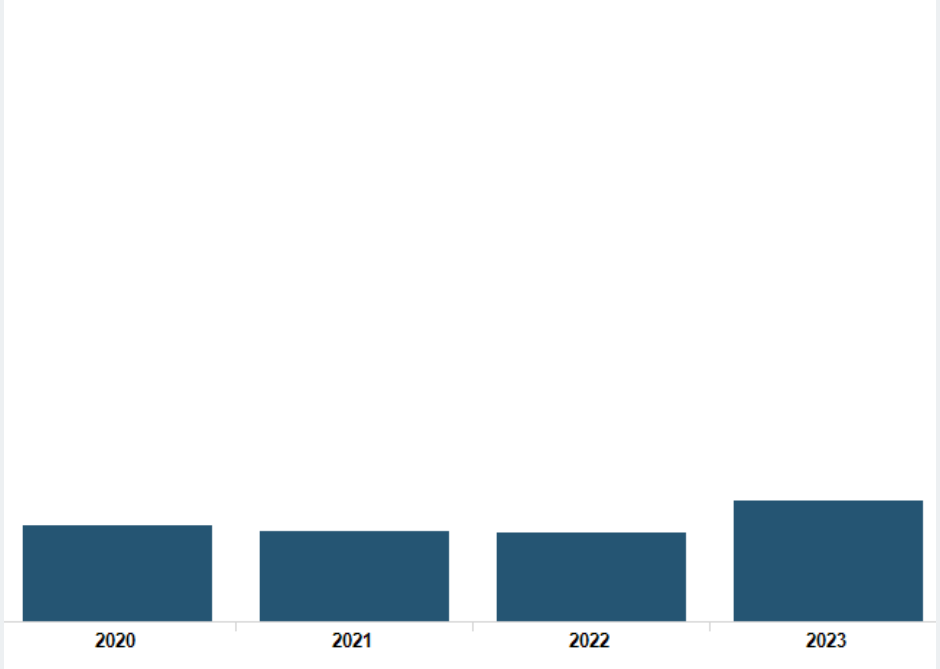


PPB Trends

With the advantage of 11 wafer Fabs, 7 assembly & test facilities, and multiple bump & probe facilities working together, we can leverage shared learnings to escalate the rate of improvement from one generation to the next. Figures below represent Texas Instrument's performance in key metrics of customer incidents and customer returns.



Customer Incident Rate per Year



Customer Return Rate per Year

TI Performance vs. Industry

Objective

The organization audits all quality management system processes over each three-year calendar period, using the process approach to verify compliance with the Automotive QMS Standard, IATF 16949.

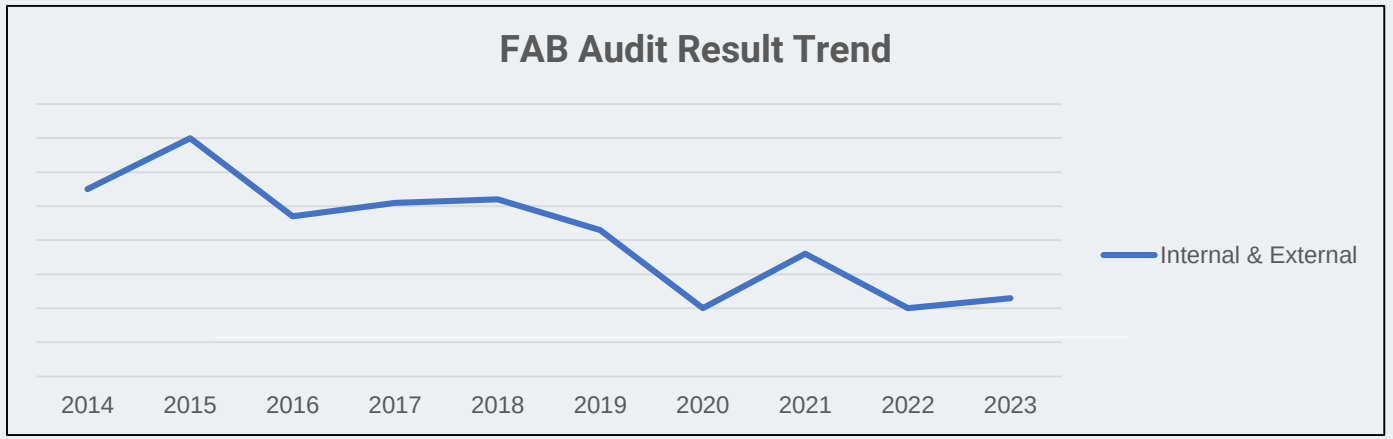
TI external audit results outperform the industry

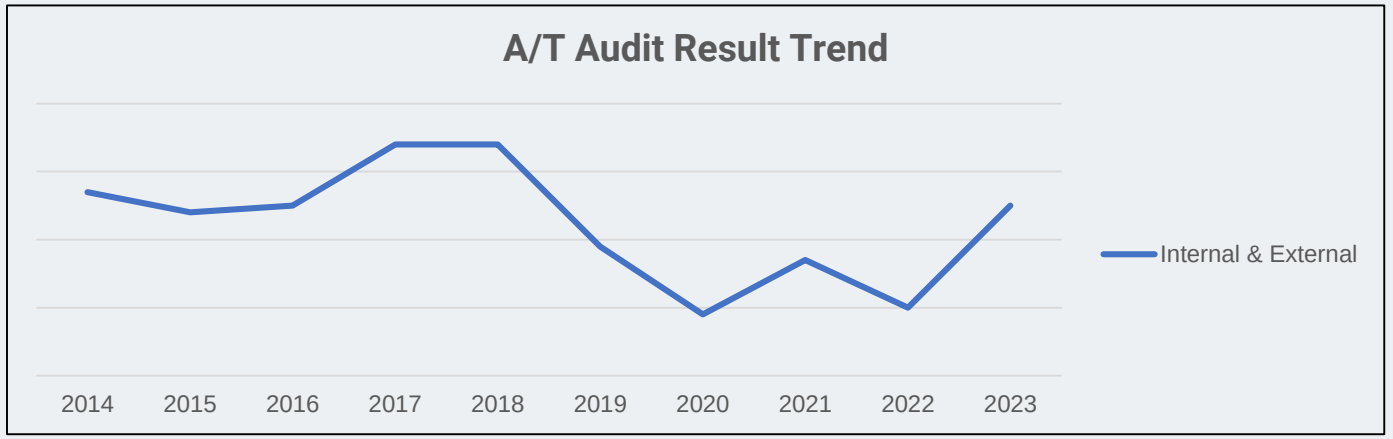
2023 Average Number of External Audit Findings in IATF16949 Audits

INDUSTRY	~4 findings per audit 0.3 major findings per audit
TI	<1 findings per audit ZERO major findings across all sites

Internal & External Audit Summary

TI Wafer Fab and A/T audit finding trends





Customer Audit Summary

Average scores from customer audit results over the past three years:

Results	2021	2022	2023
Letter Grade	A	A	A

Topics covered during these customer VDA 6.3 audits:

Appendix A

General Quality Guidelines

Updated on a regular basis, these guidelines apply to how we handle materials, manufacturing processes, tests, controls, handling, storage, transport and delivery of Texas Instruments products to our customers.

Texas Instruments General Quality Guidelines (Rev. O)

These guidelines outline assurance measures to ensure compliance of our components with a variety of quality specifications.

Aerospace and Defense Supplement to the Texas Instruments General Quality Guidelines (PDF, 176KB)

These guidelines address additional component quality-related requests from our Aerospace and Defense customers.

Appendix B

ISO 9001 Certification

TI has participated in the ISO 9001 certifications since 2004. The certificate issued by Bureau Veritas, is available here:

Texas Instruments Inc. Corporate ISO 9001:2015 Certificate – All sites included.

Bureau Veritas Certification

TEXAS INSTRUMENTS INC

12500 TI Blvd., Dallas, TX 75243 USA

This is a multi-site certificate, additional site(s) are listed on the next page(s)

Bureau Veritas Certification Holding SAS certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

Scope of certification

Design & manufacturing of Integrated Circuits

Original cycle start date: 12-August-1996
Expiry date of previous cycle: 14-October-2021
Certification / Recertification Audit date: 12-January-2021
Certification/Recertification Cycle Start Date: 09-March-2022
Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: 14-October-2024

Certificate No.: US016773 Version: 1 Issue Date: 09-March-2022

Brian Sanders

UKAS MANAGEMENT SYSTEMS 0008

Certification Body Address: 5th Floor, 66 Prescot Street, London, E18HG, United Kingdom
Local Office: 16800 Greenspoint Park Drive, Suite 300S, Houston, TX 77060, USA

Further clarifications regarding the scope and validity of this certificate, and the applicability of the management system requirements, please call: +(832) 827-4311

1/6

EMAS

The EU Eco-Management and Audit Scheme (EMAS) is a premium management instrument developed by the European Commission for companies and other organizations to evaluate, report, and improve their environmental performance. EMAS is open to every type of organization eager to improve its environmental performance. It spans all economic and service sectors and is applicable worldwide.

INTECHNICA CERT GmbH

VALIDATION OF THE ENVIRONMENTAL STATEMENT

for

Texas Instruments Deutschland Gm bH

at the site

Haggertystraße 1, 85356 Freising

The accredited environmental verifier has assessed the organization regarding compliance with all requirements of the Regulation (EC) No. 1221/2009 and confirms accordance of the environmental management system, the internal environmental audit such as the environmental statement with the requirements of the regulation.

Nürnberg, 2. October 2015

The next validation must be before 2. October 2018.

Dr. Norbert Meisl
Environmental Verifier
DE-V-0021

IATF 16949 Certifications

TI has participated in Automotive 16949 certifications since 2004. The scope of our IATF 16949 certificate is "the design and manufacture of integrated circuits." The certificates for participating manufacturing sites are available below:

- TMEX A/T, Aguascalientes, Mexico (PDF, 818 KB)
- FFAB, Freising, Germany (PDF, 853 KB)
- TIM A/T, Kuala Lumpur, Malaysia (PDF, 186 KB)
- Miho fab, Miho-Mura, Ibaraki, Japan (PDF,119 KB)
- SFAB, Sherman, Texas (PDF, 656 KB)
- TITL, New Taipei City, Taiwan (PDF, 837 KB)
- TIPI A/T, Baguio City, Philippines (PDF, 820 KB)
- TI Clark A/T, Pampanga, Angeles, Philippines (PDF, 813 KB)
- RFAB, Richardson, Texas (PDF, 840 KB)
- MaineFab, South Portland, Maine (PDF,795 KB)
- TIEM, Melaka, Malaysia (PDF, 854 KB)
- Aizu fab, Aizuwakamatsu-shi, Fukushima-ken, Japan (PDF, 198 KB)
- EBT, Dallas, Texas (PDF, 822 KB)
- DBUMP, Dallas, Texas (PDF, 543 KB)
- DFAB, Dallas, Texas (PDF, 803 KB)
- DMOS5, Dallas, Texas (PDF, 536 KB)
- DMOS6, Dallas, Texas (PDF, 543 KB)
- Chengdu, Sichuan Province, China (PDF, 1.33 MB)
- DHC, Dallas, Texas (PDF 1.11 MB)
- LFAB, Lehi, Utah (PDF 1.16 MB)

ISO 14001Certifications

All TI manufacturing sites worldwide have achieved enterprise certification to ISO 14001:2015 standard requirements, including the following sites; and note that the Chengdu, China site is on a separate certificate:

- TI North Campus (DMOS5, DMOS6, South Building, S/C Building), Dallas, TX, USA
- RFAB, Richardson, TX, USA
- SFAB, Sherman, TX, USA
- MFAB, South Portland, ME, USA
- TMEX A/T, Aguascalientes, CP, Mexico
- TITL A/T (Sites 1 & 2) New Taipei City, Taiwan
- TIPI A/T, Baguio, Philippines
- TI Clark A/T, Pampanga, Angeles, Philippines
- TIEM A/T, Melaka, Malaysia
- TIM A/T, Kuala Lumpur, Malaysia
- FFAB, Freising, Germany
- Aizu fab, Aizuwakamatsu-shi, Fukushima-ken, Japan
- Miho fab, Miho-Mura, Ibaraki, Japan
- CFAB, CDAT, Probe, Chengdu, China

- ISO 14001:2015 Certification, Enterprise by Bureau Veritas
- ISO 14001:2015 Certification, by Bureau Veritas (TI Chengdu, China)

ISO 45001Certifications

All TI manufacturing sites worldwide have achieved enterprise certification to ISO 45001:2018 standard requirements, including the following sites; and note that the Chengdu, China site is on a separate certificate:

- TI North Campus (DMOS5, DMOS6, South Building, S/C Building), Dallas, TX, USA
- RFAB Richardson, TX, USA
- SFAB Sherman, TX, USA
- MFAB, South Portland, ME, USA
- TMEX A/T, Aguascalientes, Mexico
- TITL A/T (Sites 1 & 2), New Taipei City, Taiwan
- TIPI A/T Baguio City, Philippines
- TI Clark A/T, Pampanga, Angeles, Philippines
- TIEM A/T, Melaka, Malaysia
- TIM A/T, Kuala Lumpur, Malaysia
- FFAB, Freising, Germany
- Aizu fab, Aizuwakamatsu-shi, Fukushima-ken, Japan
- Miho fab, Miho-Mura, Ibaraki, Japan
- CFAB, CDAT, Probe, Chengdu, China

- ISO 45001:2018 Certification, Enterprise by Bureau Veritas
- ISO 45001:2018 Certification, by Bureau Veritas (TI Chengdu, China)

Appendix C

AEC-Q100 Qualification

TI's position on product qualification

Quality and reliability are built into TI's culture, with the goal of providing customers high quality products. TI's semiconductor technologies are developed with a minimum goal of fewer than 50 Failures in Time (FIT) at 100,000 Power-On-Hours at 105C junction temperature. TI builds simulations, accelerated testing, and robustness evaluations into the product development process. During the product development process, TI carefully assesses silicon process reliability, package reliability, and silicon/package interaction.

Qualification for non-automotive products

Non-Automotive devices are qualified with industry standard test methodologies performed primarily to the intent of the Joint Electron Devices Engineering Council (JEDEC). TI qualifies new devices, significant changes, and product families based on JEDEC standard JESD47. TI evaluates manufacturability of devices to verify a robust silicon and assembly flow to enable continuity of supply to customer.

Qualification for automotive products

Automotive devices are qualified with industry standard test methodologies performed primarily to the intent of the Automotive Electronics Council (AEC) Q100 standard. AEC Q100 is an automotive industry standard that specifies the recommended new product and major change qualification requirements and procedures. See the Automotive Qualification section below for additional information about parts meeting the AEC-Q100 standard.

About AEC-Q100

The Q100 product is qualified based on the temperature grade. The stressing for Q100 product is pre and post tested at room and hot temperature per the grade pre and post reliability stress. The commercial product is tested at room temperature post reliability stress.

Qualification Online Resources

TI product qualification summaries

Qualification Summaries for TI Products can be found on TI.com. Please see the TI Qualification Summary Tool for further information

AEC Q100 Documentation

TI devices are qualified to the current version of AEC Q100 at the time the device was released. AEC documents can be found at http://www.aecouncil.com/

Reliability Calculators

The generic calculators are based on accepted industry and JEDEC (e.g. JEP122G, JESD47) formulas as noted and can be found at https://www.ti.com/support-quality/reliability/calculators.html

These calculators can be used to help model estimated product lifetimes under various reliability and/or use conditions, and are not intended to be used for detailed reliability analysis. TI does not certify or guarantee the accuracy of any calculation result, and TI does not provide any data for calculator input.

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