

Hitest GmbH

Test House for Microelectronics
and
RF Components

Dr. Michael Zimmermann

September 2015

Test And Qualification of Microelectronics in Hanover



Founded 2008 by
Michael Zimmermann
und Dirk Pankrath

Active since 1989

Winner of the
Plug&Work Initiative of
the Region Hannover



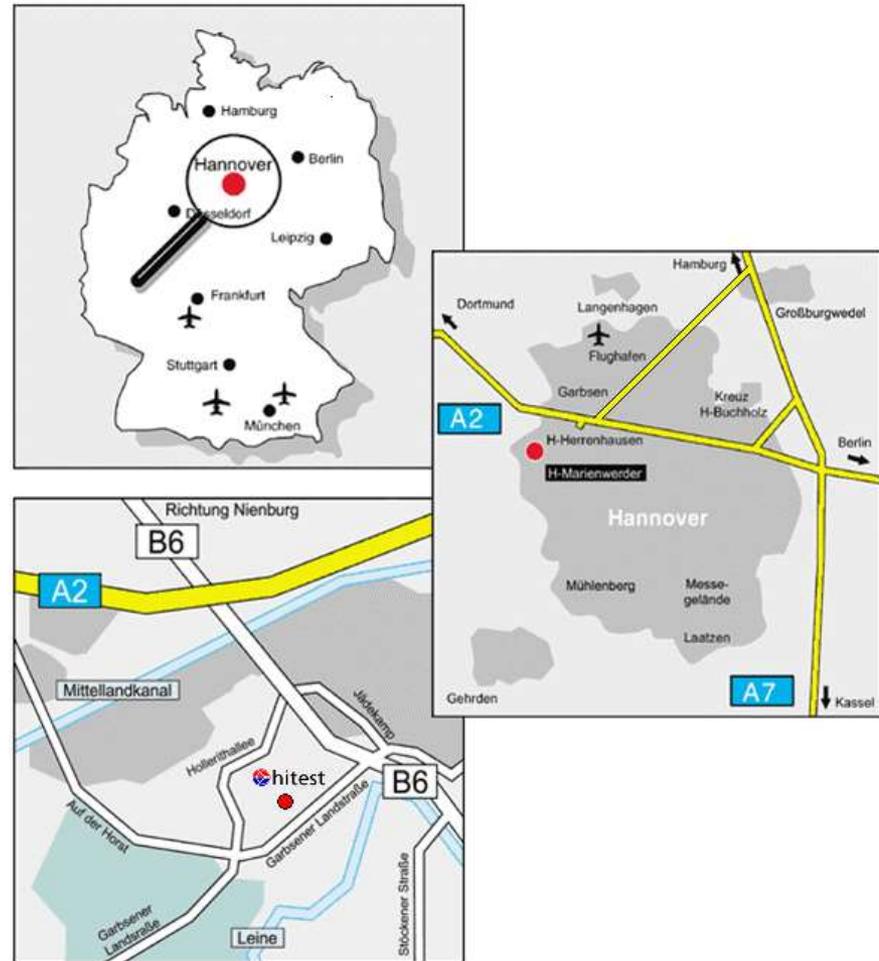
Test And Qualification of Microelectronics in Hanover

How to find us

- By railway and streetcar :
15 min from Main Station
- By plane and taxi:
15 min from Airport
- By car: 5 min from highway
A2 exit Herrenhausen

We are working according to quality standards

- ISO 9001:2000
- ISO TS16949:2002



Our Portfolio

Development of hardware and software for testing and Qualification of electronic components

Production tests of wafers and packaged components

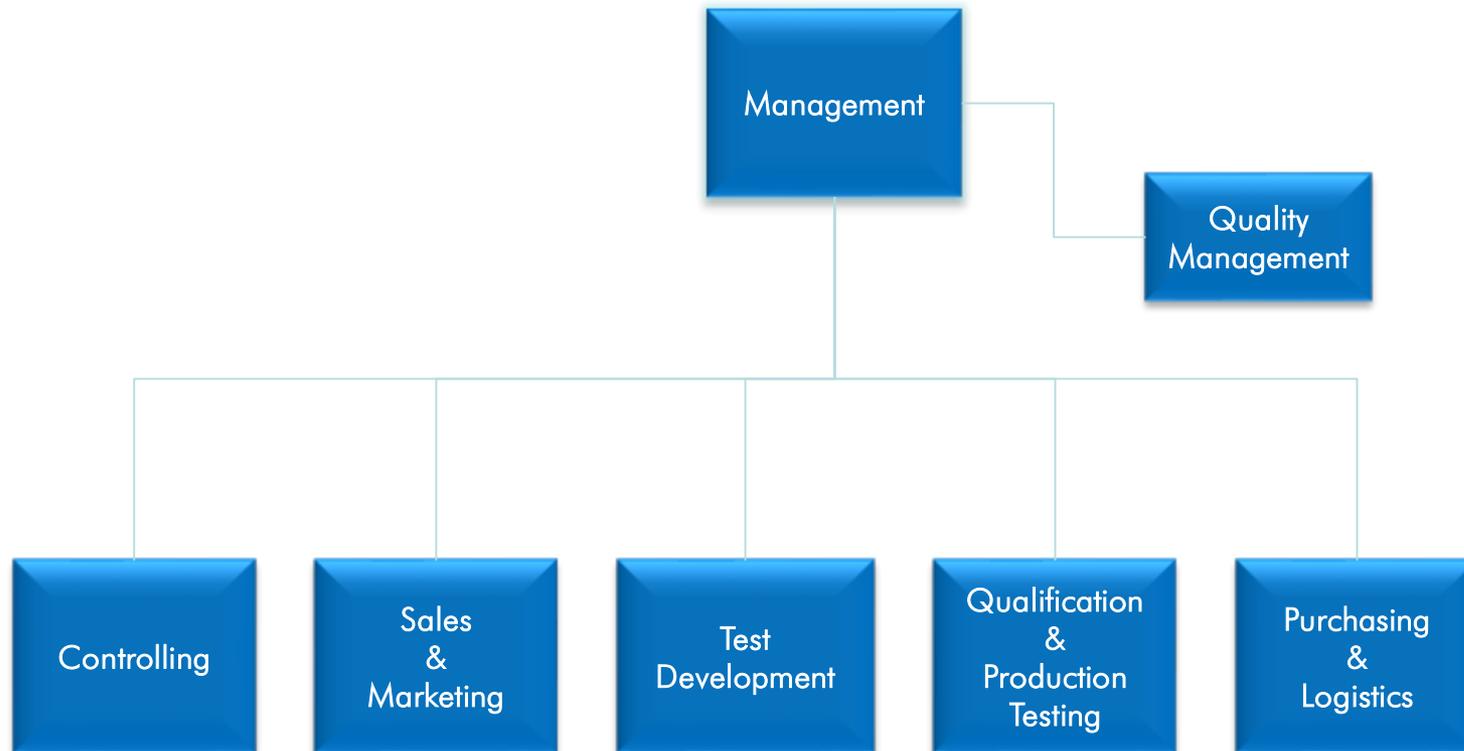
Qualifications according to standards like MIL-STD, AEC-Q, JEDEC, NASA-STD, Telcordia or customer specific

Development of customer specific test setups

Consulting

Development of electronic modules and systems

The Organisation



Our Markets

Customers

- System manufacturers
- Component manufacturers
- Test labs
- Component traders

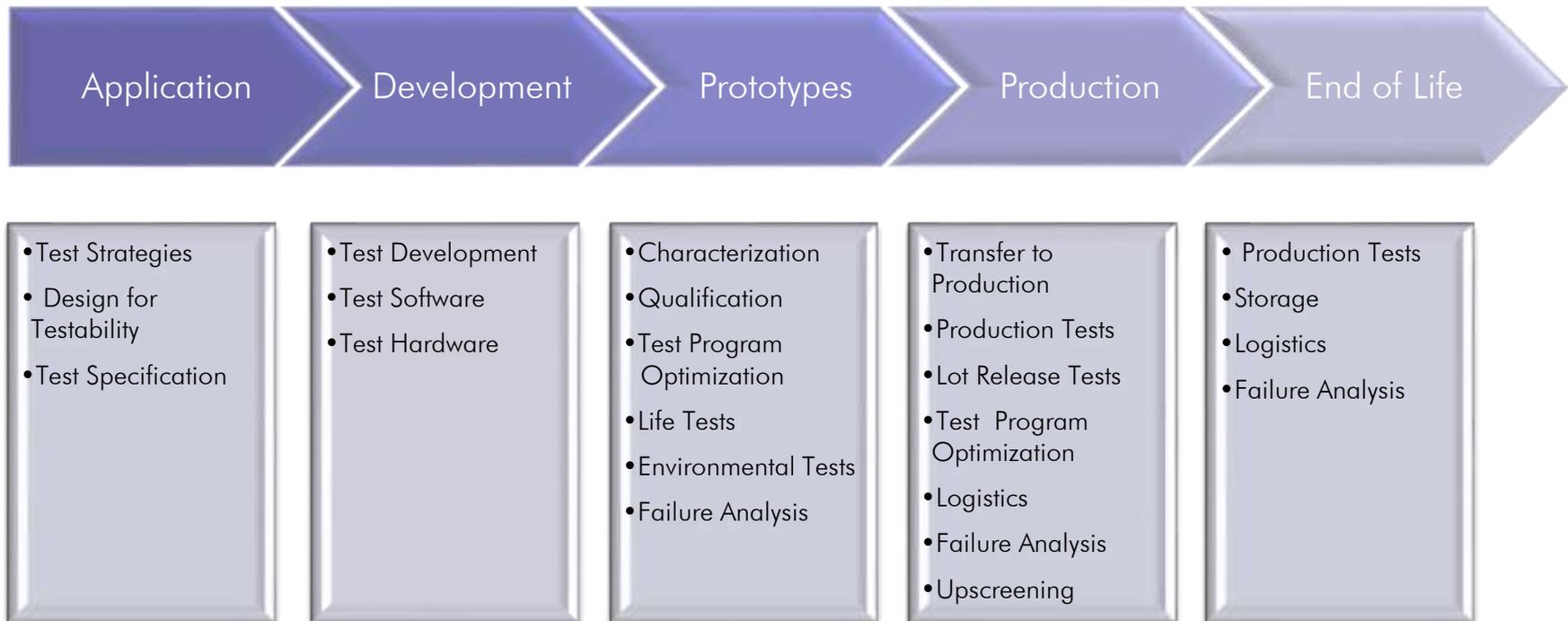
Application

- Aerospace and space
- Industrial
- Automotive
- Communications
- Semiconductors

Components

- Digital ASICs, Mixed Signal ASICs, Opto ICs
- μ Controllers, Standard ICs, Communication Ics, Data Akquisition ICs
- Discrete Semiconductors, RF Transistors, Opto-couplers, LED, Photodiodes
- Limiting Amplifiers, Multiplexers, De-Multiplexers, Filters, RF Filters
- Electro-Mechanical Relays, Semiconductor Switches

Our services during the product life cycle



Development and Optimization of Component Tests



Test concept development

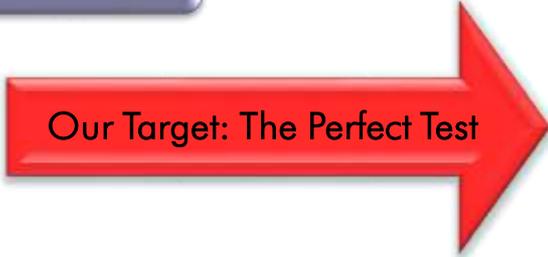
Software Development

Hardware Development

Test Verification

Transfer to Production

Test Optimization



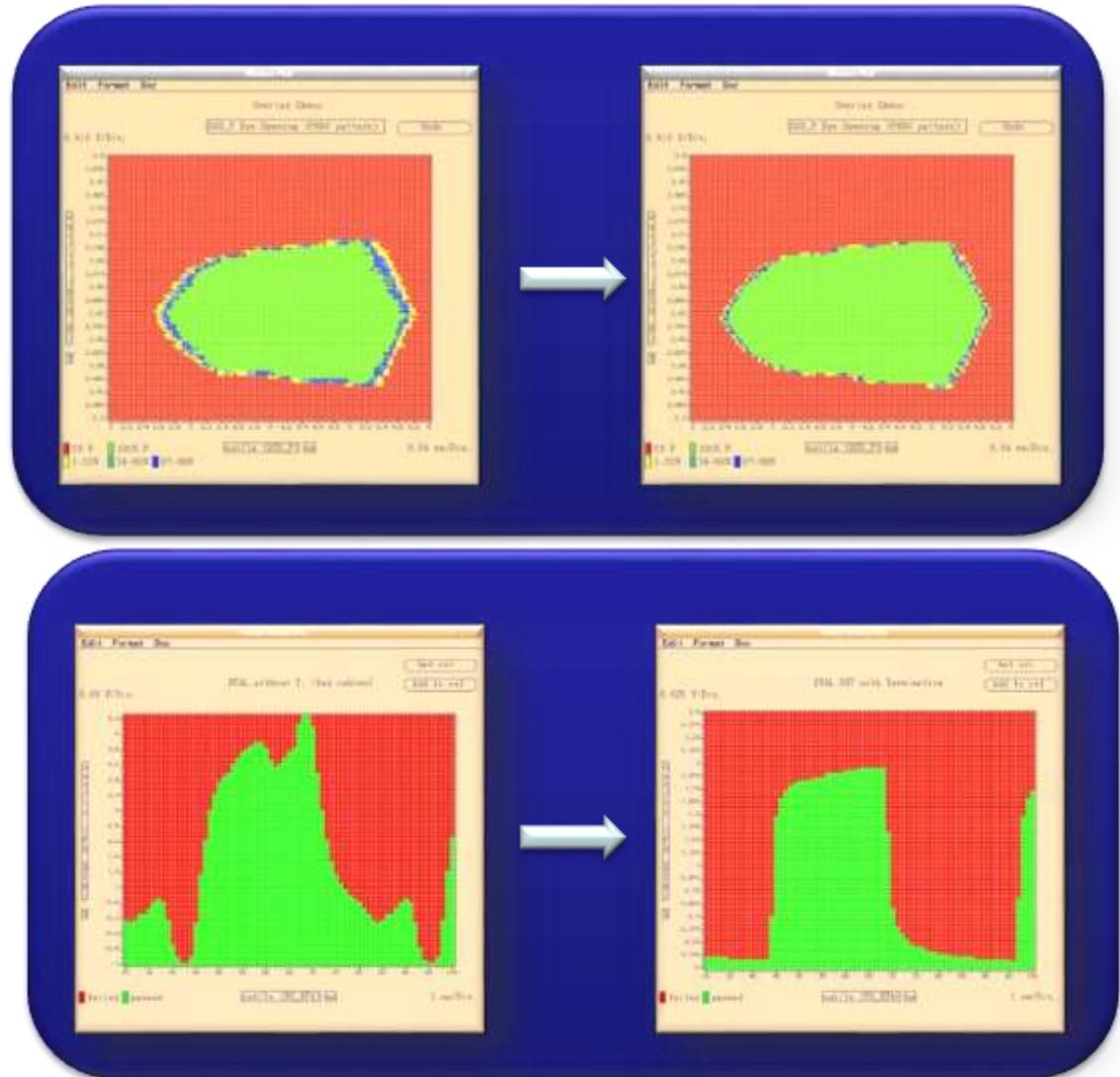
Our Target: The Perfect Test

Test Optimization

Optimization of

- Test Time
- Yield
- Stability
- Fault Coverage

Example:
Yield Enhancement through
improvement of signal quality



Development of Test Boards

DUT Boards

- HP83000 F660
- HP83000 F330
- V93000
- HP9494

Qualification Boards

- Burn In, ELFR
- HTOL, THB
- HAST
- Latch Up



Development of Probe Cards

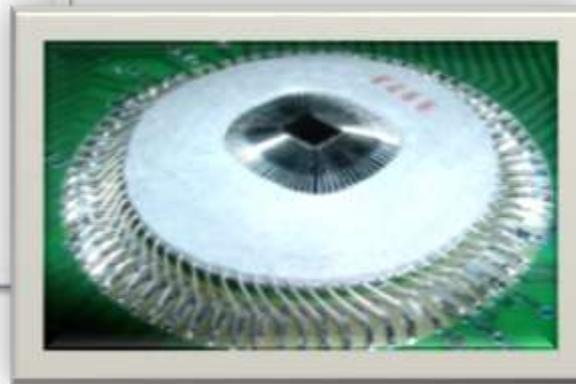
Load Boards

- Rectangular (HP83000)
- Circular (V93000)



Various Contact Technologies

- Standard Needles
- RF Needles
- Blades
- Vertical Probes
- Membrane Probes



Test of Microelectronics Components



Used for:

Circuit verification during development

Characterization

Qualification

Screening

Production Tests

Lot Acceptance Tests

Failure Analysis

Characterization of Microelectronics Components



Electrical Test for functional verification

Parameter Measurement

Corner Edge Measurements at different supply voltages and temperatures

ESD Tests

Stability Analysis

Burn In

Qualification of Microelectronics Components



Electrical Test at different temperatures

Preconditioning

Environmental Stress according to common standards(MIL-STD, JEDEC, DIN ISO, IEC, AEC-Q, ESCC, NASA-STD, Telcordia)

ESD Tests

Mechanical Tests

Documentation and certification

Up Screenings and Lot Release Tests



Electrical Test at different temperatures

Environmental Stress according to common standards(MIL-STD, JEDEC, DIN ISO, IEC, AEC-Q, ESCC, NASA-STD, Telcordia

ESD Tests

Mechanical Tests

Marking of Components

Documentation and Lot Release Protocols

Failure Analysis

Electrical Test at different temperatures

Environmental Stress according to common standards(MIL-STD, JEDEC, DIN ISO, IEC, AEC-Q, ESCC, NASA-STD

Microscopy with X-Rays, Ultrasonic, RE, Light Microscopes

Thermography

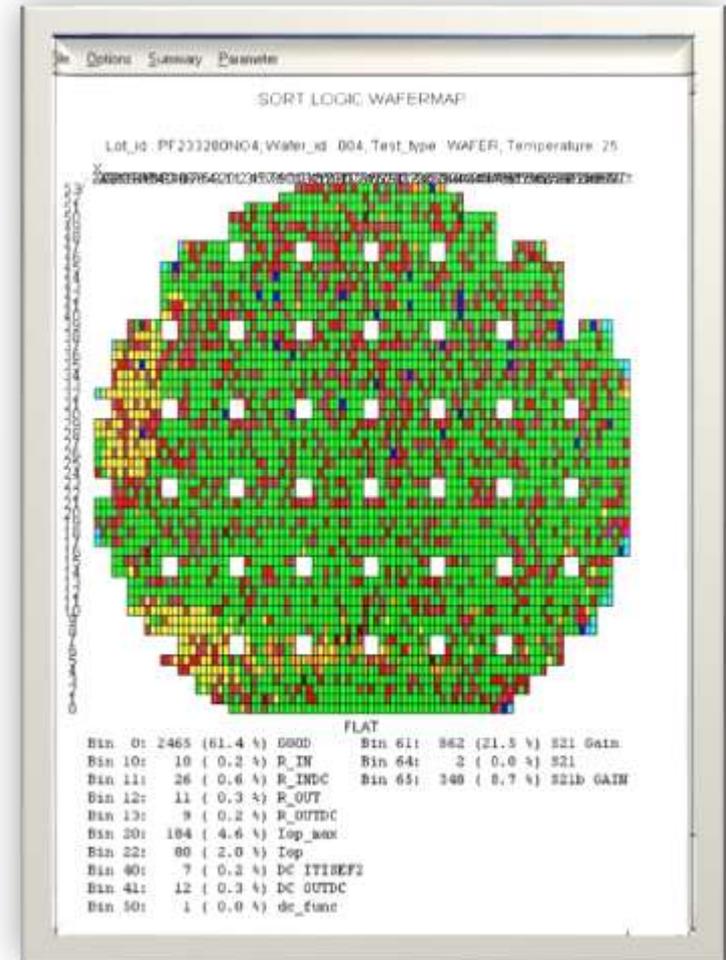
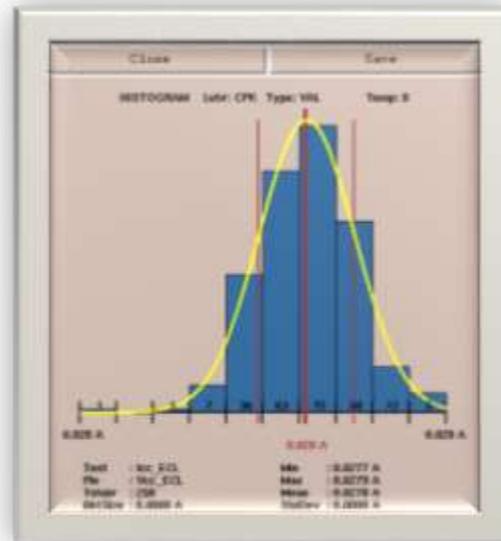
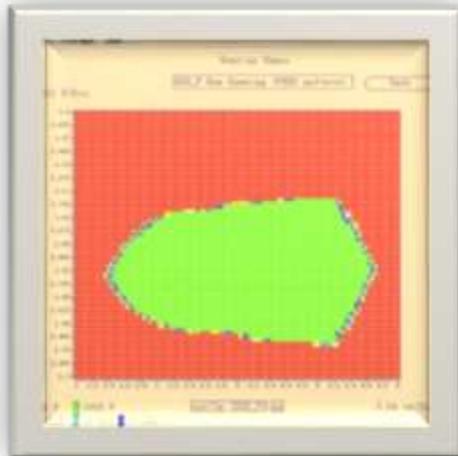
Opening of components, chemical and mechanical, Analysis of Materials

Documentation

Analysis of Test Results

Results

- Wafer Maps with Summary
- Histograms
- Shmoo Plots, Scatter Plots
- Data in customer specific formats
- Pass / Fail Data, Bin Data
- Delta Calculation
- PDA (Percentage Defective Allowable) Calculation



Infrastructure



Test of Radio Frequency / Optical Components



Test Systems

- HP83000F660i, 2 systems, up to 512 channels, up to 1.2 GHz
- HP83000F330t, 2 systems, up to 160 channels, up to 660 MHz

Additional Equipment

- Network Analyzers up to 50 GHz
- Spectrum Analyzers up to 20 GHz
- Vector Signal Analyzers up to 2.6 GHz
- Pattern Generator/Error Detector up to 2.6 Gbps
- Sampling Scopes
- Optical Spectrum Analyzers , 600 ... 1.600 nm

Typical Measurements

- Bandwidth of Amplifiers and Filters
- Noise Figures of Amplifiers
- S Parameter up to 50 GHz
- Time Domain Reflexiometry
- Signal converter characteristics
- Characteristics of Optical Networks
- Characteristics of LEDs
- Optical Stimulus Response
- Optical Source Characterization: DFB, Fabry-Perot Lasers, LEDs

Qualification Tests

Environmental Tests

- Climatic Chambers
- Temperature Shock Test Liquid / Liquid
- Temperature Change Air / Air
- Autoclave
- Bake
- Latch Up
- Gate Leakage
- ESD
- HAST
- Mechanical shock, vibration

Life Tests

- Burn In
- ELFR
- HTOL, LTOL
- HTSL
- THB

Production Tests

2 or 3 Shifts per day, 5 days per week

Fully Automatic Wafer Test up to 8", from single site to octal site

Manual or Automatic Final Test (single site or dual site)

Bake & Dry Pack

Wafer Stock

Packaged Parts Stock

Logistics

HP83000 F660i

High Speed VLSI Digital Test System

2 Systems

- 256 Digital Channels per system with a Data Rate of 660 MHz
- 50 ps Accuracy, 10 ps Resolution
- 8 Power Supplies (4 PDPS, 4 DPS)
- 16 Parametric Measurement Units
- Algorithmic Pattern Generator



HP83000 F330t

High Speed VLSI Digital /Mixed Signal Test System

2 Systems

- 160 Digital Channels with a Data Rate of 330 MHz
- 150 ps Accuracy
- 8 Power Supplies (PDPS)
- 10 Parametric Measurement Units
- Algorithmic Pattern Generator
- 2 AWGs with 16 Bit of Resolution
- 2 Digitizer with 16 Bit of Accuracy
- Digital Capture Memory with 16 Channels



Wafer Probers

- Fully automatic :
TSK for production tests up to 8"
KLA for RF production test up to 6"
- Semi automatic:
Wentworth for single wafers
- Manually:
Cascade Summit for single dies

Handling Systems

- Pick & Place Handler
Advantest for Single und Dual Site
Test of Components in trays (i.e.
QFP, QFN, DFN, BGA packages)
- Gravity Handler
Multitest for production testing of
components in tubes (i.e. SOP,
TSSOP, DIL packages)

Development of Burn In Boards

Burn In Boards

- Different formats
- For dedicated Burn In Systems and Standard ovens
- For different standard methods like ELFR, THB, HAST, HTOL, LTOL
- From simple Biased Burn In up to complex Smart Burn In

Our Offers

- Concept development
- Layout
- Production



Some Project Examples I

Component Testing

- Wafertest at 50 GHz
- Very Deep Temperature Volume Testing @ -196°C
- Very High Temperature Burn In @ 300°C in Nitrogen Atmosphere
- Burn In with on Board Clock Generation
- Opto Electrical Measurements of Optical Front End Components
- Screening as quad test at -55°C
- Automotive Final Test with 16.2 V Supply

Some Project Examples II

Development

- Remotely controlled power supply with Current and Voltage Control 0...30 V, 0...20 A
- Controlled Burn In Fixed Voltage Supplies, 250 channels, 0...10 V
- Controlled Burn In Fixed Current Sources, 250 channels , up to 3 A per channel
- Burn In Power Supplies, 80 channels, Voltage and Current independently controlled and adjusted
- Automatic Diode test system including current pulse up to 80 A

Contact



Hitest GmbH

Dr. Michael Zimmermann

Garbsener Landstrasse 10

D-30419 Hannover

Telephone +49 511 277 1453

Fax +49 511 277 2345

Email: michael.zimmermann@hitest.de

www.hitest.de