



ALTER TECHNOLOGY ENGINEERING AND TEST SERVICES FOR THE AUTOMOTIVE INDUSTRY

SUMMARY

1. TÜV NORD Group Outline
2. ALTER Technology TÜV NORD Introduction
3. Added value services at component level:
4. Packaging design and assembly
5. Modules, system and equipment testing
6. Research and Development activities
7. Automotive trends versus ALTER services
8. Quality certifications and other nominations



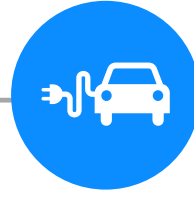
TÜV NORD GROUP MAIN FIELDS & DATA

Industry



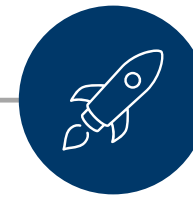
Natural
resources

Energy



Mobility

IT



Aerospace

Training



50

companies

100

countries
services are
carried out

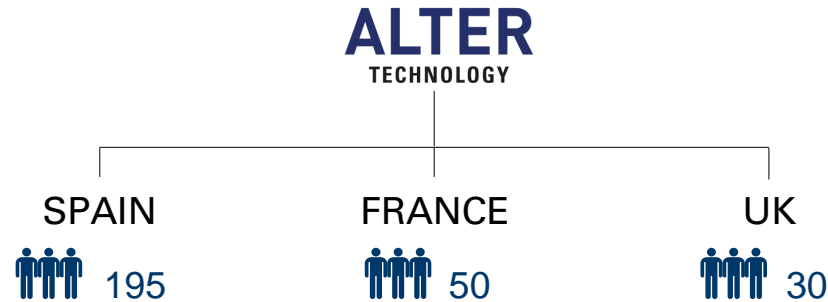
>10,000

employees

1,185

M€ revenues

ALTER TECHNOLOGY ORGANIZATION AND FIGURES




48
million
Revenues


4
years
growing


275
Staff


+30
experience


Internationally
focused


5
sites


+6000
m²
laboratories


+10
projects
per year

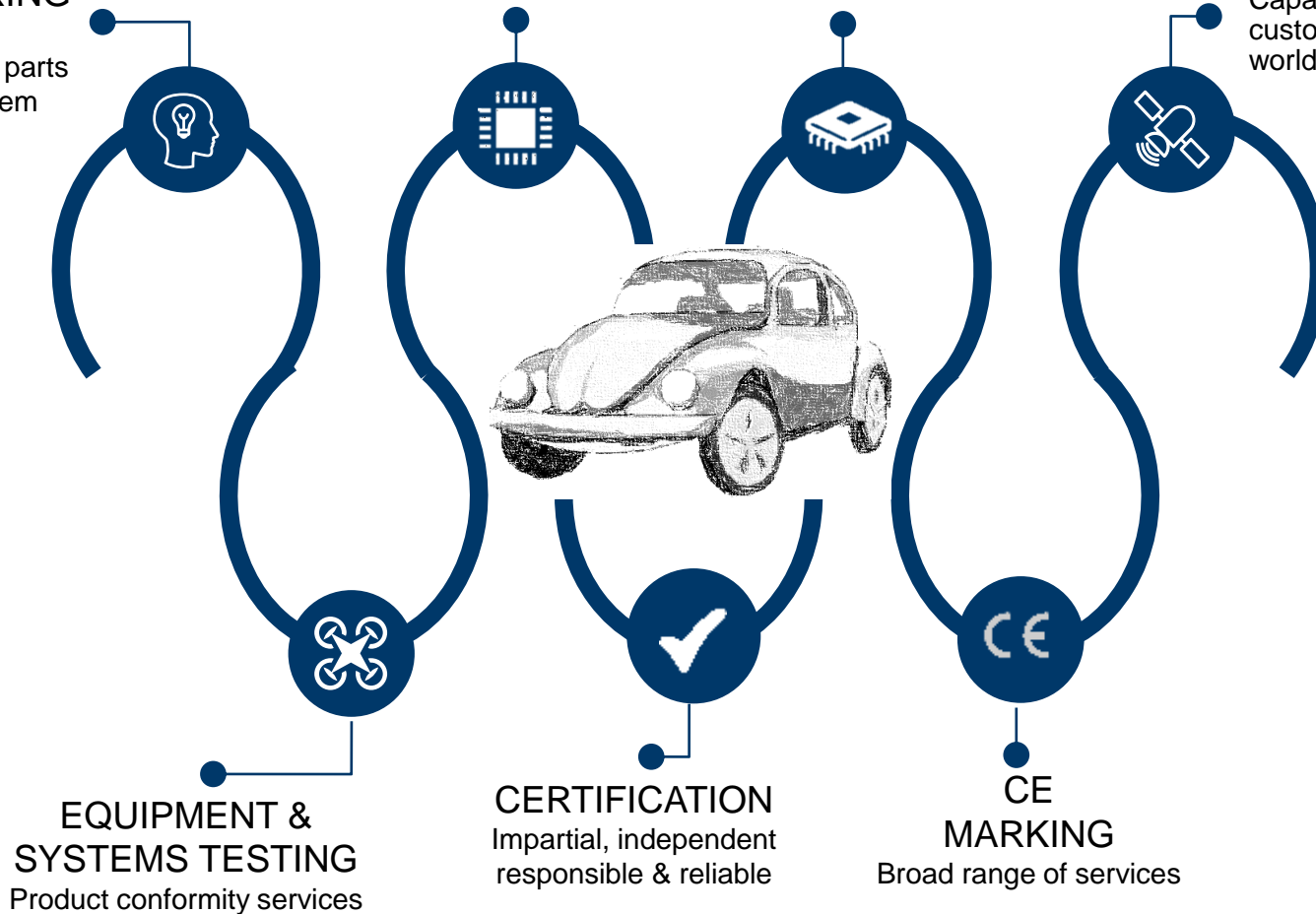
OUR SERVICES

**PARTS
ENGINEERING**
Skilled team.
DOEEET, eee parts
searching system

**COMPONENTS
TESTING**
Wider in-house capability.
Most of the technologies

**PACKAGING
DESIGN**
Providing contract package
design & assembly service

PROCUREMENT
Capable to support any
customer need
worldwide



OUR CURRENT VALUE PROPOSITION



More than 33 years experience in aerospace applications

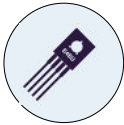
Experienced engineering team focused on mission requirements and associated risk analysis and mitigation

In-house complete test capabilities at components & system level covering the full of technologies

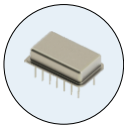


Company strategy to expand current services portfolio to others high reliability markets

COMPONENTS ENGINEERING



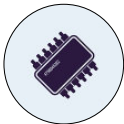
Support to designers and system engineers in the component selection task.



Technical analysis and qualification/ Validation Testing plans design.



Risk analysis and recovery plan definition.



Manufacturers surveys, audits, ..., etc.



Component technology evaluation and assessment



Component **obsolescence** management.



Product assurance services, alert tracking, NCR management,

DOEEET, what is? www.doeet.com



A place to provide support and technical services to the electronic components user industries.

All needed information available in a single place

GOALS

- Strenght ties with MFR and users
- Market visibility
- Own site within the platform

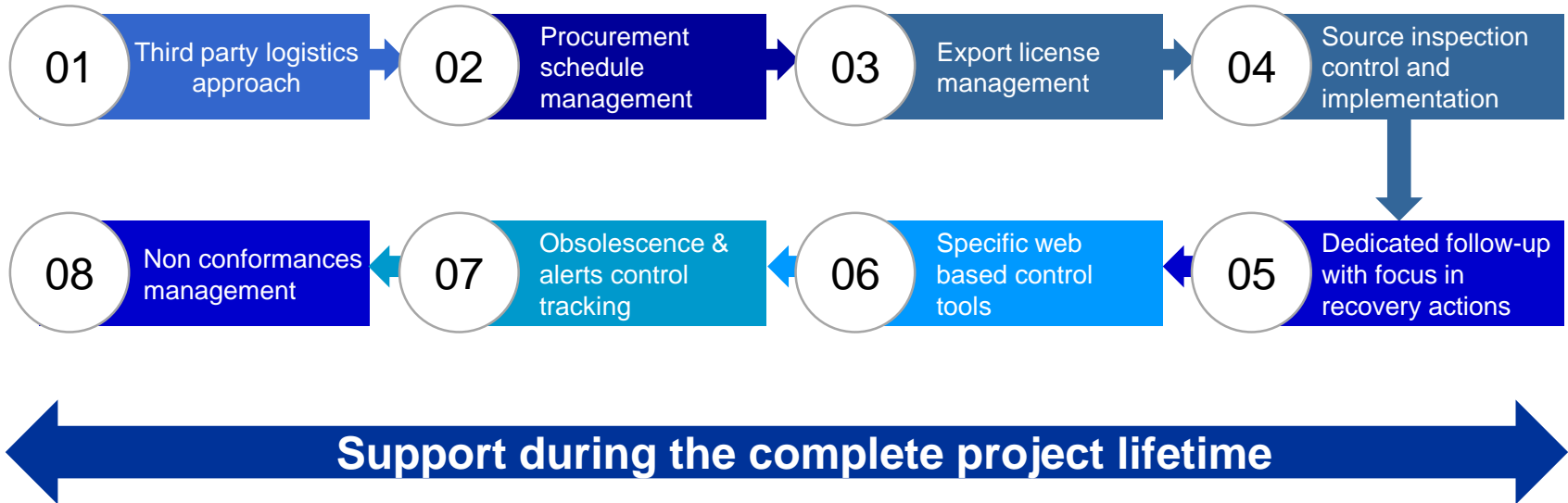
Main Features

- Global search tool of components
- Complete technical information in the same site: no redirections
- Interactive and social: promoting actively the community involvement
- Configure it yourself: your own admin panel.
- Statistics
- Big Data ecosystem

GOALS

- Users engagement
- Flexibility: continuous improvement to adapt to market demand

COMPONENT PROCUREMENT



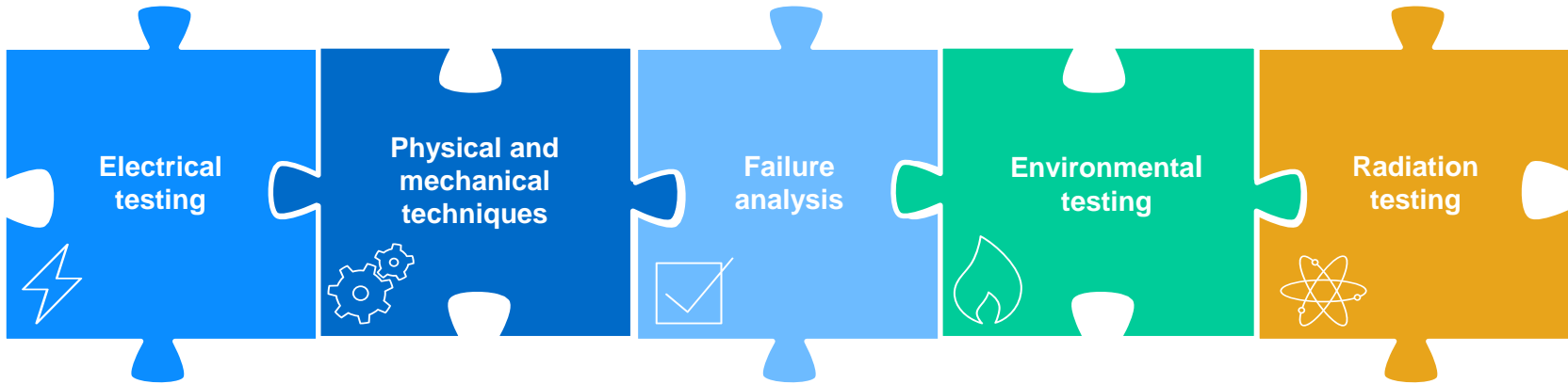
ATN can support you since a component need is identified to the component is providing its function at the final application. From the supplier selection, ordering, follow-up, to the occurrence of a field failures and its failure analysis and problem assessment.

Let discuss your needs.

COMPONENTS TESTING



ALTER
TECHNOLOGY



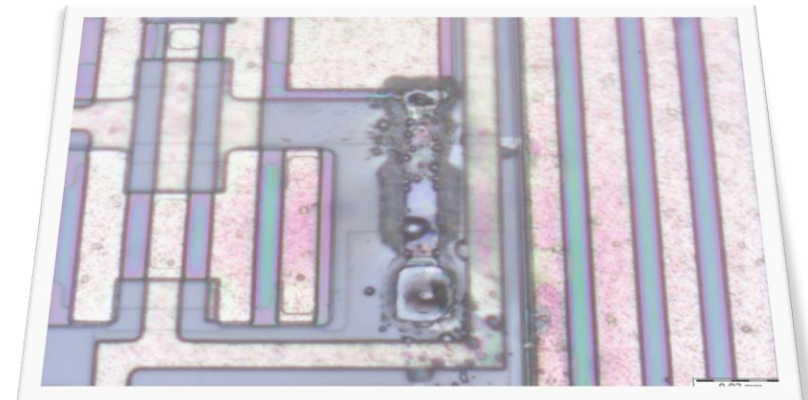
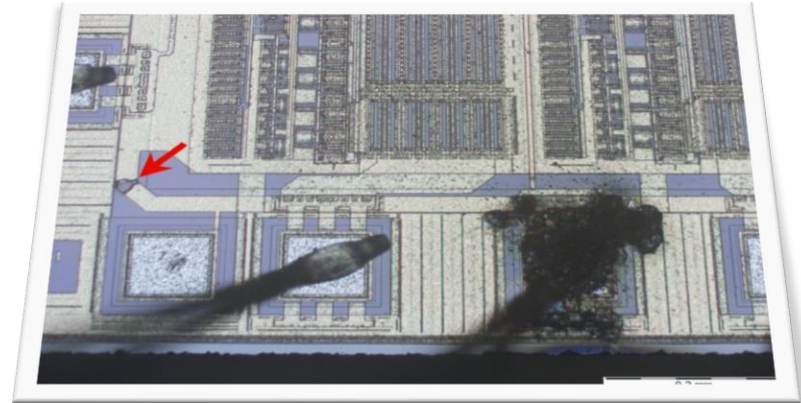
In-house capabilities



Support to application specific needs
(supply chain management)

COMPONENTS INSPECTION & TESTING

- Component Evaluation, Constructional Analysis and Failure Analysis.
- Electrical test and characterization in temperature.
- Source Inspection and supplier audits.
- Environmental test: thermal, mechanical & radiation.
- LAT (Lot Acceptance Test), QCI (Qualification Conformance Inspection).
- Authenticity Test, Counterfeit Investigation.
- Storage with special conditions (hot & cold, dry nitrogen atmosphere, etc.).
- Dice managing, inspection and storage.
- PCB Assembly verification, Crimping assessments,...., etc.



COMPONENTS ELECTRICAL TESTING I

Passive devices testing. A set of state of the art instruments allow us to characterize the electrical behavior of resistors, capacitors, coils, temperature sensors, relays, connectors, ..., etc., in a wide range of test conditions and according with their applicable specifications and project needs.

- Measurement and testing of high power devices
- Dielectric withstanding voltage up to 12 KV.
- Characterization on LCR devices up to 3 GHz.



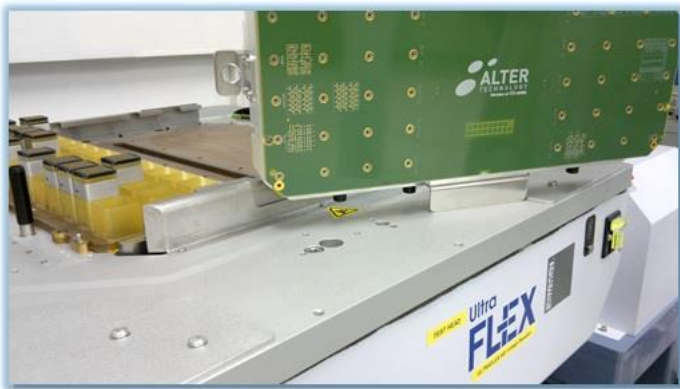
COMPONENTS ELECTRICAL TESTING II

- Active devices, from discrete (diodes and TRT) through standard linear and digital components till VLSI, can be tested.
- Semiconductor curve tracers: B1505, HP4156, HP4155, HP4145, etc.
- Source Meter Units: Keithley 2636, 2425, 2651, 2657, etc.
- SSA Signal Source Analyzer: E5052, etc.
- Oscilloscopes up to 12GHz and 40 GSa/s
- Mixed signal ATE: Ultraflex from Teradyne, ATX7006 from Applicos, etc.
- Extreme temperature testing capability (-200°C to +200°C)



COMPONENTS ELECTRICAL TESTING III

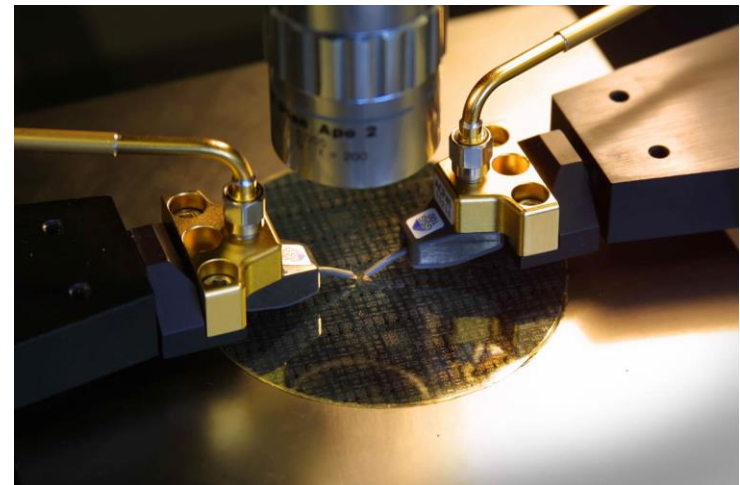
- Design and manufacturing of multilayer boards (up to 16 layers).
- Small bias current measurement (fA).
- Measurement of high speed and precision converters A/D & D/A up to 24 bits.
- Measurement of +1000 I/O digital devices.
- Mixed signal ASIC measurement.
- High precision oscillators with low phase noise measurement.
- Device testing up to 100 Vdc.
- Device testing up to 140 A.



MICROWAVE ELECTRICAL TESTING

A dedicated test group with highly skilled test engineers offers a wide range of microwave engineering and lab services:

- From passive devices to complex semiconductor products.
- Electrical Test Characterization of RF/MW multiport devices.
- Test fixture design and manufacturing for RF/MW devices up to 40 GHz.
- Design and manufacturing of RF boards with precise impedance adjusting.
- On-wafer measurements
- Over a wide temperature range.
- Measurements associated to: temperature cycling, Radiation Testing, Burn-in, life tests, ..., etc.



OPTOELECTRONICS CHARACTERIZATION

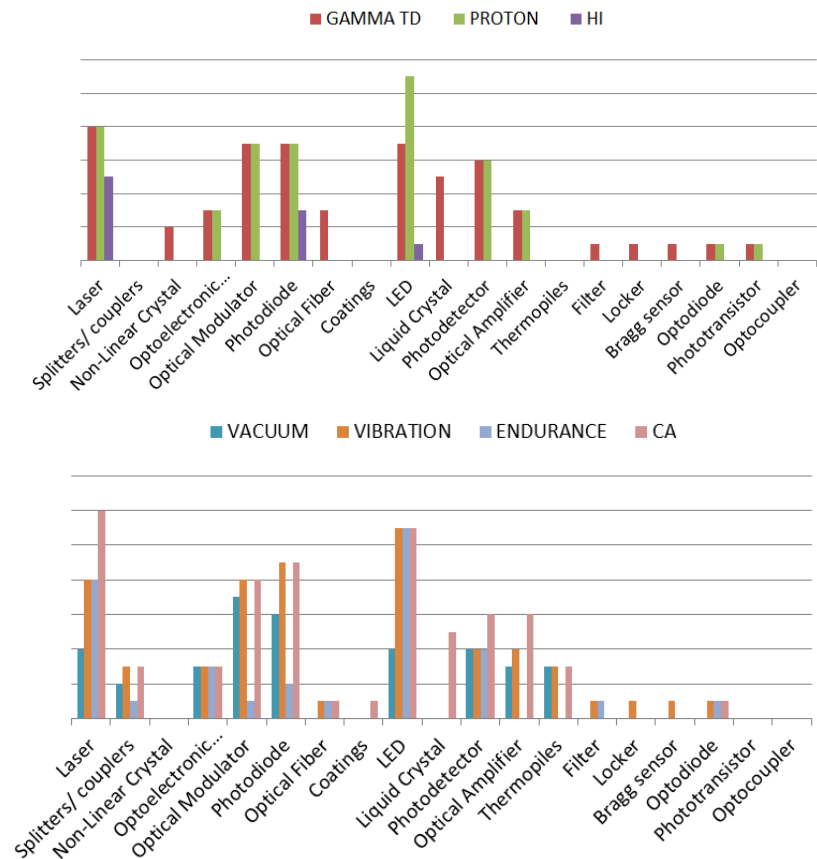
ALTER
TECHNOLOGY

ALTER TECHNOLOGY has gathered a large experience in optical measurements and related environmental & reliability testing on photonics devices parts covering a wide range of technologies.

A detailed data base is available showing reliability data of a large number of parts.

Complete range of optoelectronics and photonics parts:

- Laser & Leds characterization 250 to 5000 nm.
- Receivers modules (180 to 11000 nm).
- Optical Amplifiers & Optical modulators
- Switches and splitters.
- Optocouplers & Photodiodes
- Multimode and monomode Fibers
- Liquid Crystal Devices
- Image Sensors
- Optical Transceivers



A detailed data base is available.

PHYSICAL TESTING

- External Visual
- Dimension and weight check
- PIND Test
- Material Analysis
- Hermeticity and leak verifications
- Dynamic X-Ray Inspection 2D & 3D
- Internal Visual
- SEM
- Acoustic Microscopy and C-SAM
- Micromechanical testing: bond-pull, die shear,..
- Cross section and metallurgical analysis
- SMT & TH Solder Assembly Verification



PHYSICAL TESTING

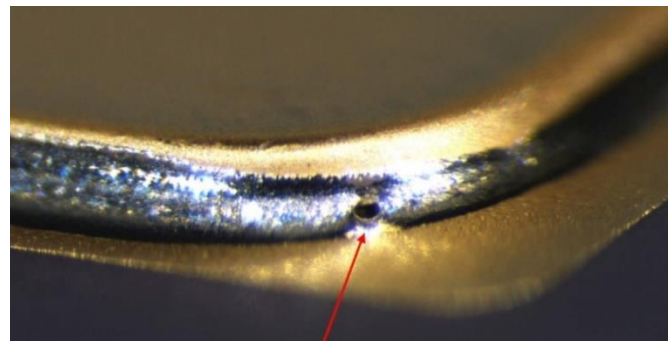
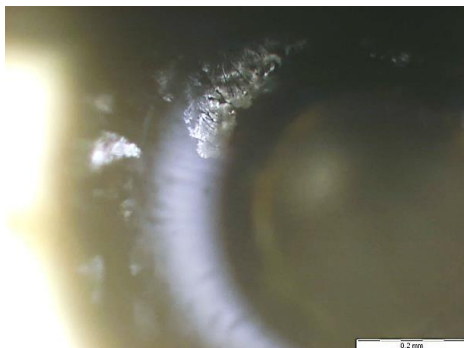
EXTERNAL VISUAL AND DIMENSION / WEIGHT CHECK

Optical - dimensions and weight check processes allow to verify conformity of the external appearance and correlate the actual dimensions and weight with those stated in the specifications.

We can detect defects at component level on:

- Marking
- Sealing
- Leads, contacts,...
- Feedthroughs
- Handling damages
- Deviations from MFR data, stc.

ALTER
TECHNOLOGY

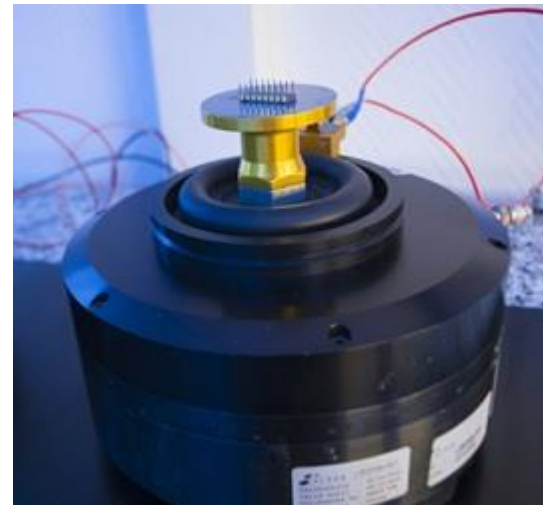


PHYSICAL TESTING

PARTICLE IMPACT NOISE DETECTION

Detection of free particles on cavity packages.

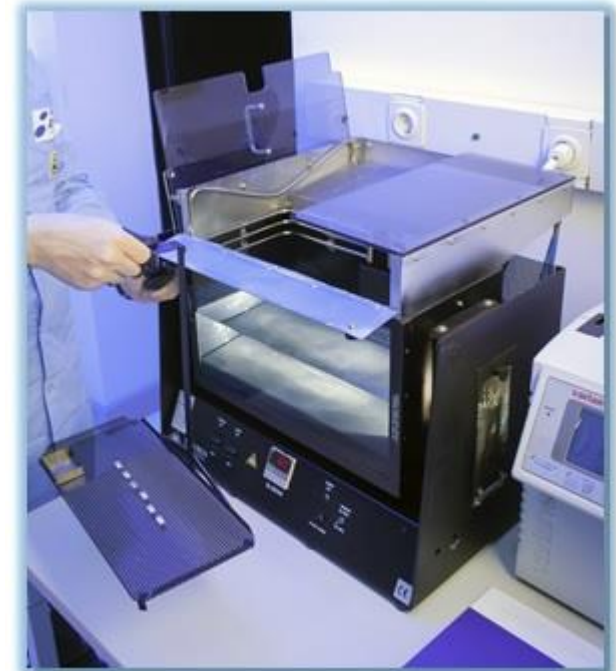
These particles could be the origin of an electrical anomaly or any other physical problem which could produce an abnormal functioning of the parts, affecting their reliability.



PHYSICAL TESTING

HERMETICITY TEST

- Fine leak testing (Helium detector)
- Gross leak (Bubble test)
- Dye penetrant

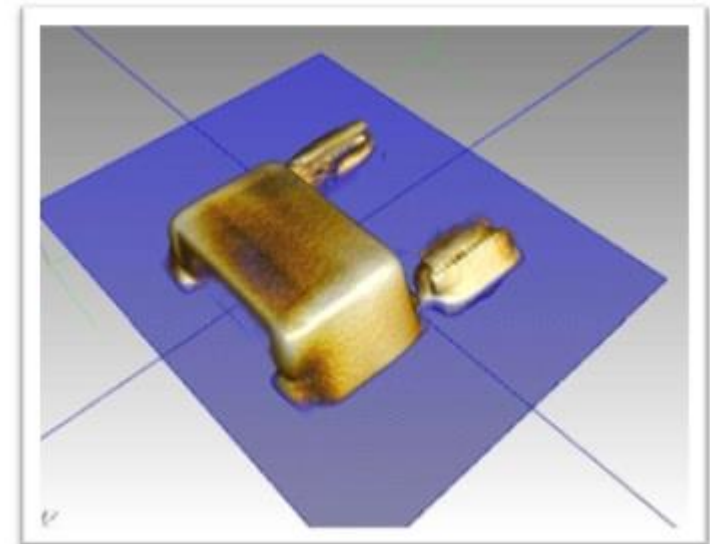
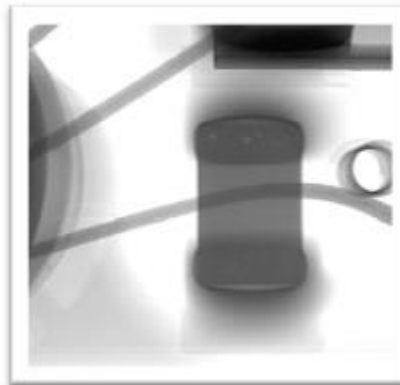
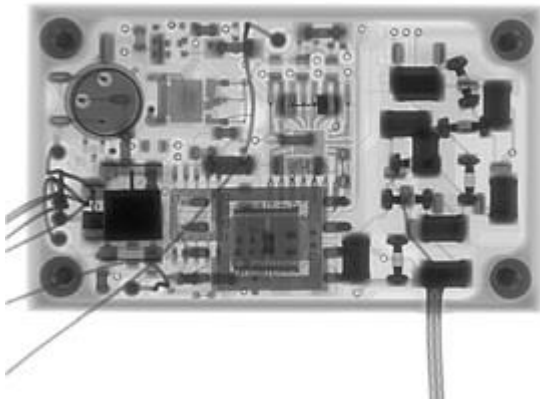
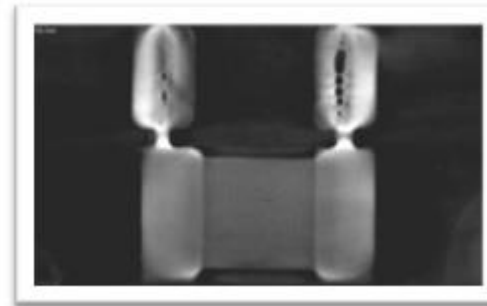


PHYSICAL TESTING

DYNAMIC X-RAY INSPECTION 2D-3D

Non destructive detection of internal defects (design, construction or handling)

- Foreign objects
- Improper interconnecting wires
- Voids in the die attach material
- Etc.



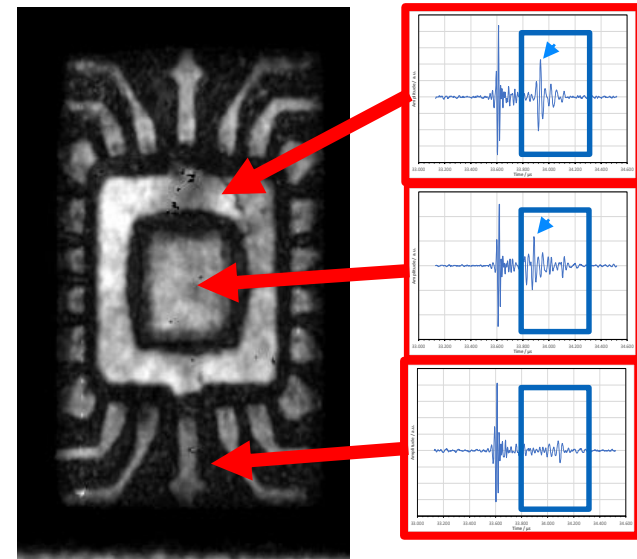
PHYSICAL TESTING

SCANNING ACOUSTIC MICROSCOPY – SAM

SAM, a Non-destructive technique complement to X-Ray which allows the inspection and failure analysis of electronic components and materials.

It is based on the reflection experienced by acoustic waves at the interface between different allowing to identify:

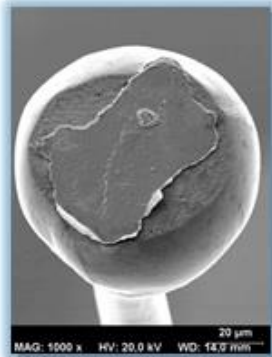
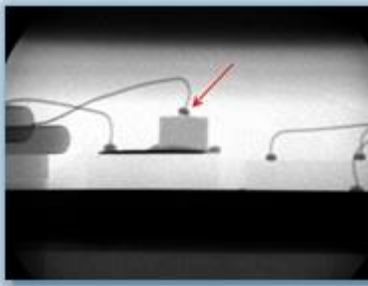
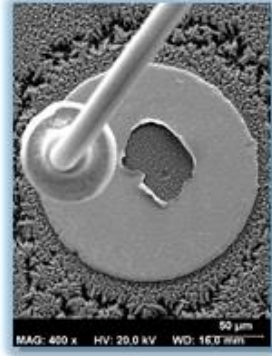
- Delaminations
- Voids, bubbles, porosity
- Cracks
- Particles, foreign materials, etc.



PHYSICAL TESTING

INTERNAL VISUAL INSPECTION

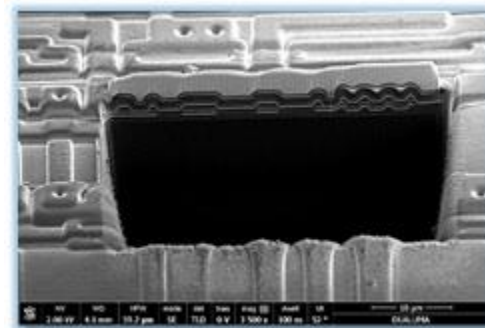
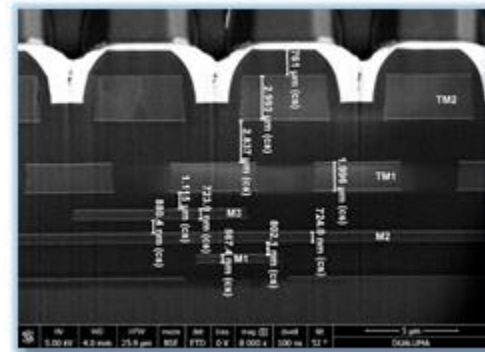
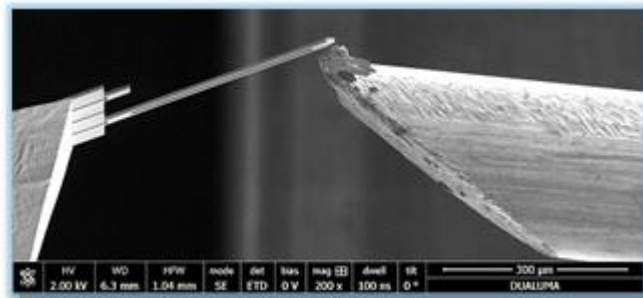
A wide range of optical instruments are available, with different illumination techniques, bright field / dark field, polarizer, analyser, differential interference contrast , etc.



PHYSICAL TESTING

SCANNING ELECTRONIC MICROSCOPES

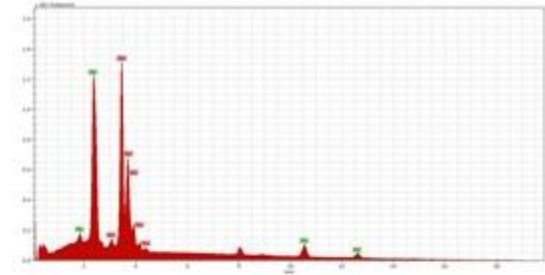
Several SEM available with high magnification range, depth field and various observation modes to analyze the design, construction or handling defects. It can be used to check the interconnect metallization on integrated circuit: metal step coverage, etc., or for performing an in-depth technology study: reverse engineering, die cross sectioning, failure analysis, etc.



PHYSICAL TESTING

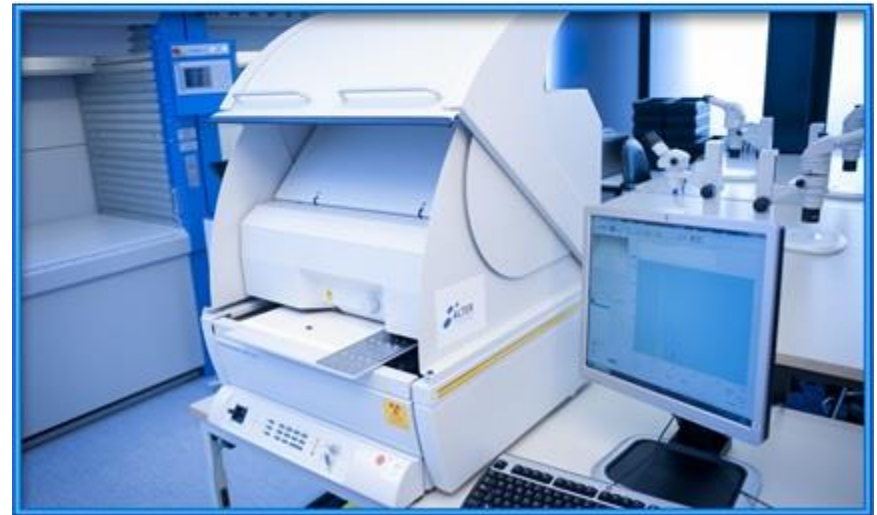
MATERIAL ANALYSIS

As an extension of the different SEM systems, other inspection techniques are available: Voltage contrast, EBIC, backscattering detectors and EDX microanalysis, which is a very useful tool to identify materials, contaminants, etc., during failure analysis and other investigations.



XRFA material analysis

Material analysis is required to ensure that forbidden materials were not used in the device construction, for example, the correct lead finish material, to avoid reliability issues like whisker growth and soldering process concerns (based on the application of a wrong soldering profile).

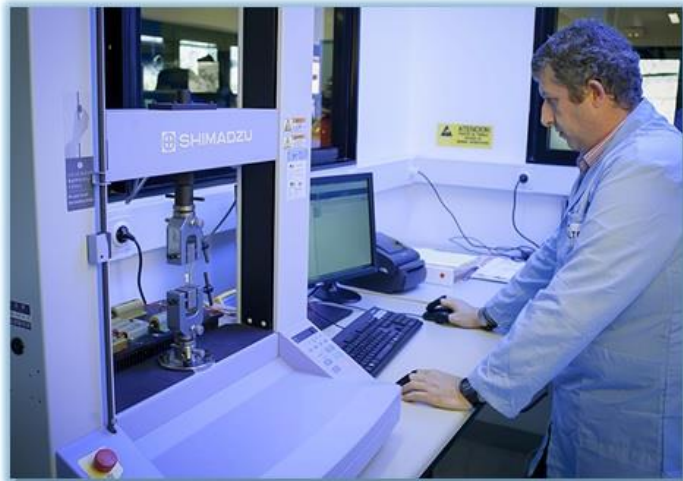


PHYSICAL TESTING

MECHANICAL ENDURANCE AND TEST



- Different techniques available: lead fatigue, pull test, torsion test, etc.
- Terminal strength up to 50 Kg.
- Material strength up to 2,000 Kg. (tensile and compressive)
- Mating and unmating force for connectors



- Endurance test for connectors, switches, relays
- Contact retention testing
- Contact engagement and separation forces

PHYSICAL TESTING

BOND PULL AND DIE SHEAR

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Verification of the mechanical integrity of some constructional elements: wire-bond strength, die attach, etc., detecting manufacture or handling defects. Other tests available: lid torque test, die pull, etc.



PHYSICAL TESTING

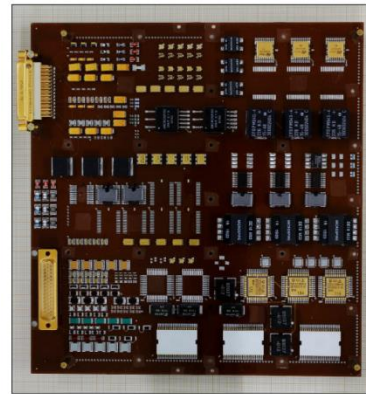
CROSS SECTIONING

Using metallurgical techniques, cross sectioning processes provide access to the internal material structures and device construction: design,...., etc. Components like diodes, capacitors, etc..., and silicon die are often tested detecting defects that are not visible using other techniques.



PHYSICAL TESTING

SMT & THT SOLDER ASSEMBLY VERIFICATION



The PCB or substrate is cut using disk or wire diamond saws. The operation is normally performed after its assembly and once has been submitted to certain mechanical / thermal stresses. The cut lines are designed to obtain samples with aprox 30 - 50 mm to be encapsulated.

A luminescent product is added to the resin to analyse defects of the connections using its fluorescence.

Then the sample is grinded and polished until reach the plane to be inspected



PHYSICAL TESTING

SMT & THT SOLDER ASSEMBLY VERIFICATION

Example:

Photography no: 11
Area under inspection:
General cross sectioning
view of the plane3.

Remarks:

Section plane 3.

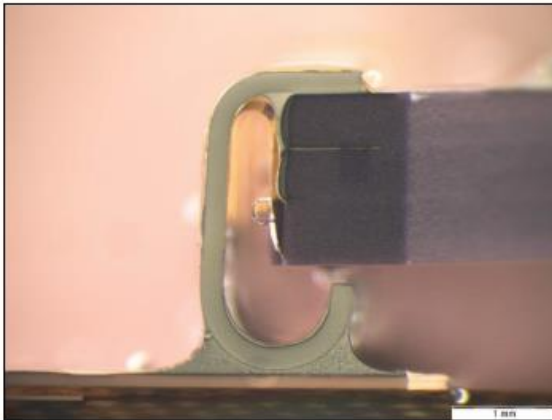


Photography no: 12
Area under inspection:
Detailed view onto one of
the leads.

Remarks: Voids on the
solder area. No rejection
criterion is defined in
ECSS-Q-ST-70-38C.



PART: U3



Photography no: 13
Area under inspection:
Detailed view onto the
solder joint.

Remarks:

Stand-off: 53 μ m

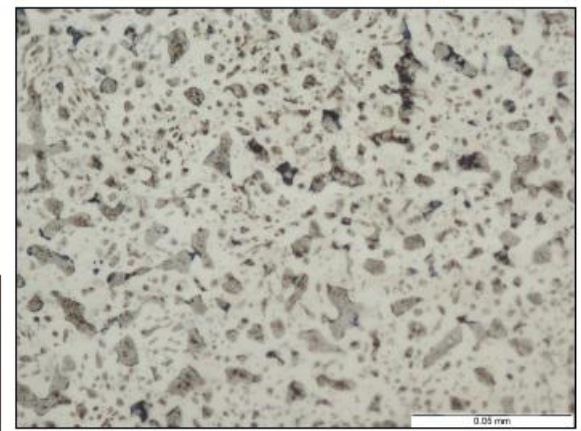
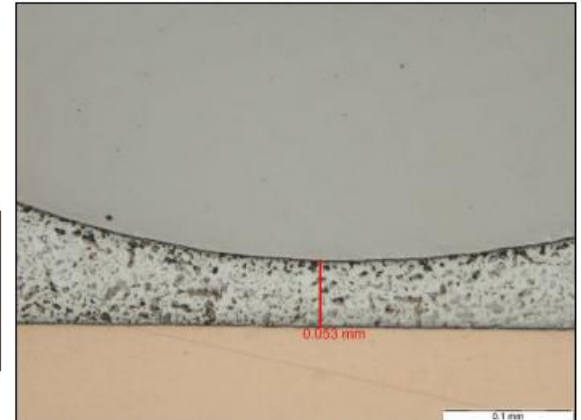


Photography no: 14
Area under inspection:
Detailed view onto the
solder.

Remarks:--



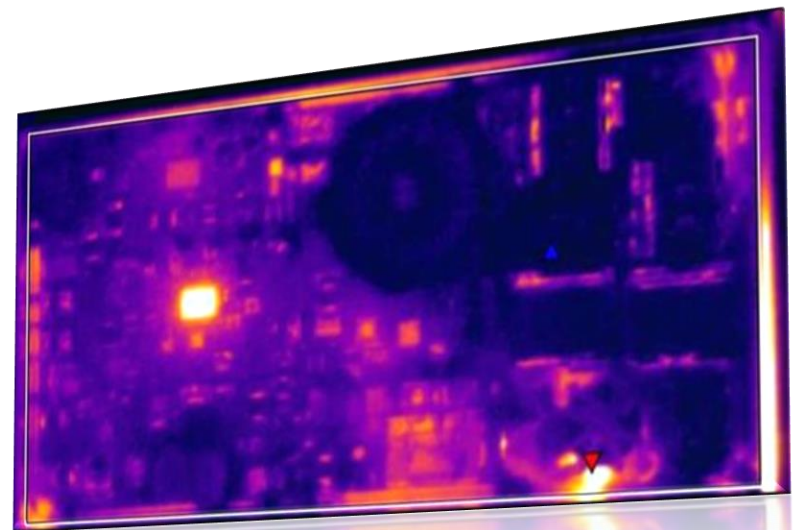
PART: U3



PHYSICAL TESTING

INFRARED THERMOGRAPHY

- The FLIR infrared camera with a thermal sensitivity < 50 mK is able to capture high quality thermal images with details on temperature difference information.
- This technique allows you to fine tune your development, prevents design errors, ensure product quality and increase its reliability.



THERMAL MECHANICAL AND ENDURANCE TESTING

- Thermal cycling and thermal shock
- Moisture / Humidity testing
- HAST
- Mechanical testing
- Thermal Vacuum
- Cryogenic and extreme temperature exposure



ENVIRONMENTAL TESTING

THERMAL CYCLING / SHOCK

Wide range of different chambers available to carry out thermal shock and thermal cycling testing to determine the ability of parts to withstand the expected application environment or to accelerate degradation mechanisms during product evaluation and qualification process.

Thermal shock single volume, two volumes air-to-air or liquid-to-liquid are frequently used to evaluate the CTE mismatch. The chambers are designed to meet the specified requirements in terms of temperature stability during and after each transition, and transfer temperature rates.



ENVIRONMENTAL TESTING

Cryogenic thermal chambers

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TECHNOLOGY

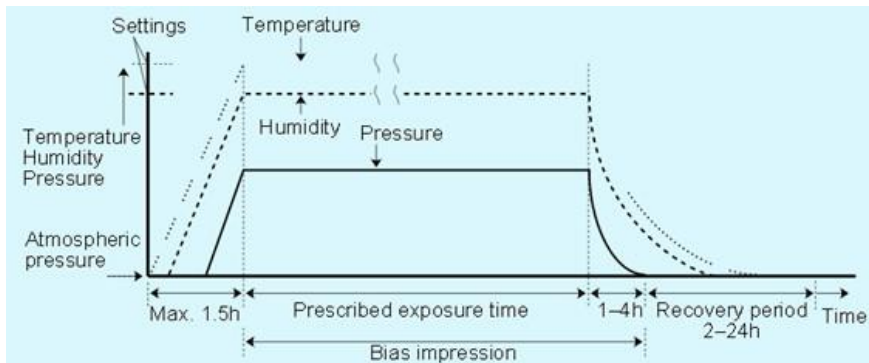
In the event you need to reach extreme temperature conditions as low as the liquid N₂ temperature or up to 300°C, or need to apply fast temperature change rates, we are your partner. A set of Cryogenic chambers are available in which we can accommodate your test conditions.



ENVIRONMENTAL TESTING

Highly-Accelerated Temperature and Humidity Stress Test (HAST)

This TEST is designed to evaluate the reliability of non-hermetic packaged that are likely to encounter humid environments during normal operation. Classically known as Pressure Cooker Test (PCT) or Unsaturated Pressure Cooker Test, the purpose of **HAST** is to accelerate moisture penetration into the internal parts. **HAST** test reduces the time it takes to complete the typical humidity 85 °C / 85% RH testing for semiconductors (96 **HAST** hours are equivalent to 1000 THB hours). By elevating temperatures above 100°C (usually up to 130°C) and increasing the pressure, simulation of normal humidity tests can be made while maintaining the same failure mechanisms.



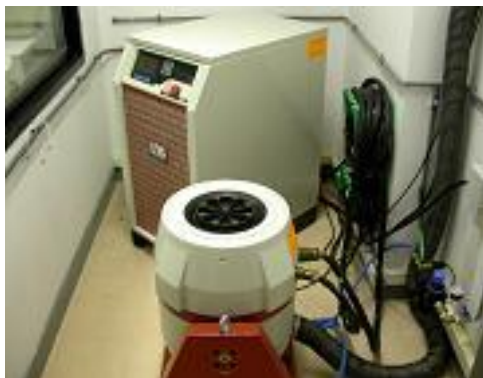


ENVIRONMENTAL TESTING

Mechanical test

Mechanical test capabilities, vibration: sinus and random, shock, constant acceleration test, drop test, etc., to simulate the mechanical environment during service. Proper tools and adaptors are available or can be designed for your specific application.

The test conditions are monitored and controlled during the test, and the device under test can be functionally monitored / checked while exposed to the mechanical test.



ENVIRONMENTAL TESTING

Burn-in, Life Test, Endurance test,...

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TECHNOLOGY

Extended conditions to screen infant mortality defects and assess lot reliability with a continuous test conditions monitoring: bias, temperature, humidity,..., etc. Nitrogen atmosphere (optional).

- Burn-in
- Life testing
- Hot and cold storage, etc.



ENVIRONMENTAL TESTING

THERMAL VACCUM

- Temperature range from -195°C to $+250^{\circ}\text{C}$
- Pressure better than 10^{-7} mbars)
- Large Capacity
- Optical and electrical measurements during thermal vacuum (test monitoring)



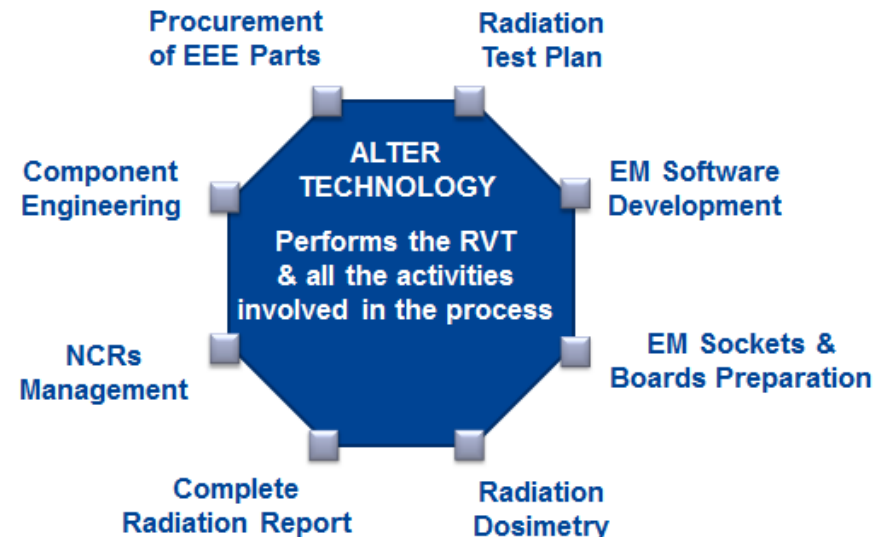
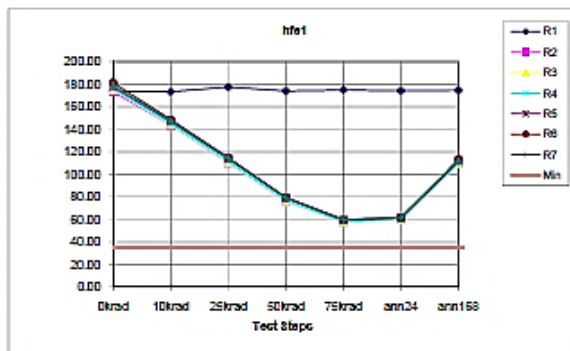
ENVIRONMENTAL TESTING

RADIATION TEST

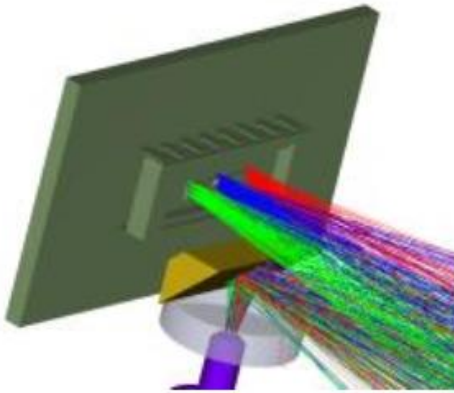
ALTER has extensive experience in component radiation characterization for different industrial applications, covering effects like:

- **T.I.D.** (Total Ionizing Dose)
- **S.E.E.** (Single Event Effects)
- **D.D.** (Displacement Damage)

The sensitivity to SEE is also becoming a concern for some ground application

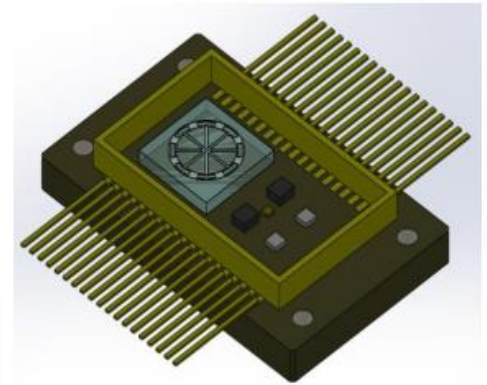
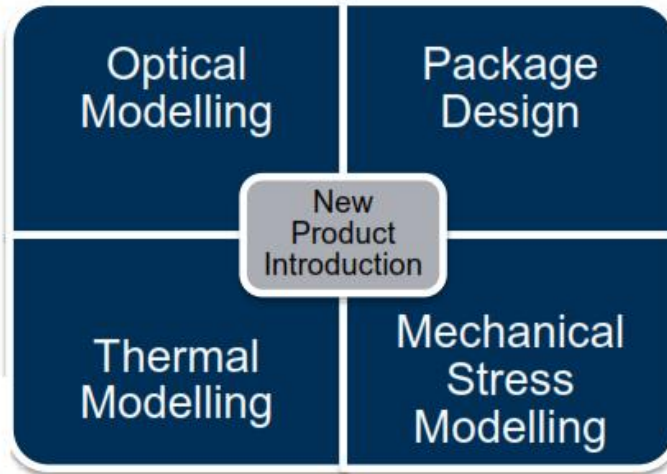


END-TO-END COMPONENT DESIGN AND ASSEMBLY

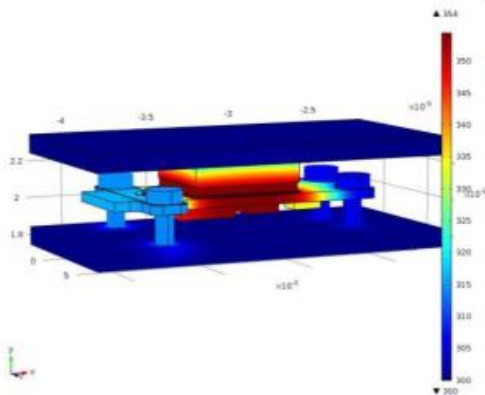


Hi-Reliability Packaging

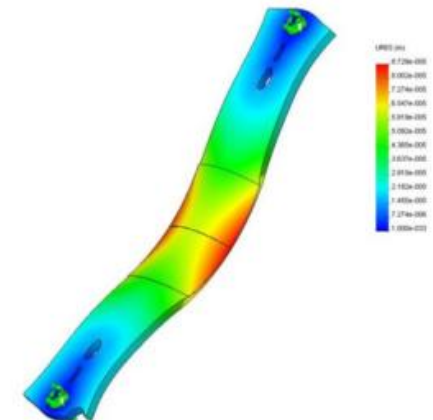
Optoelectronic & Optical Packaging



Design for Manufacture



Microelectronic & MEMS Packaging



END-TO-END COMPONENT DESIGN AND ASSEMBLY



Design Services

- Optical, mechanical & thermal modelling
- Advanced electro / optical package design

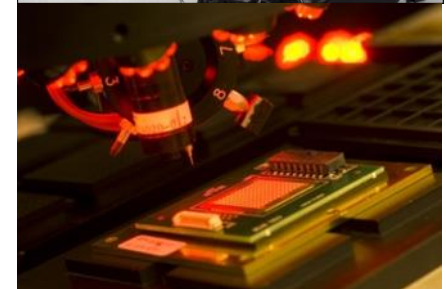
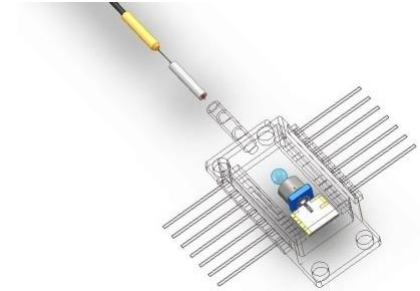


Assembly Services

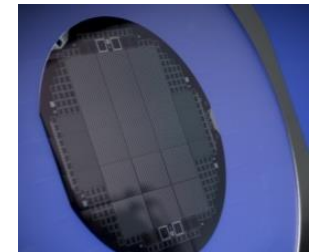
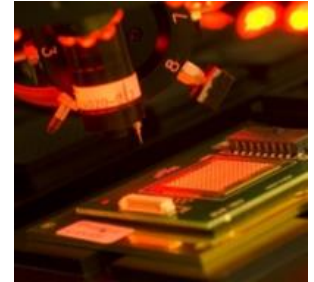
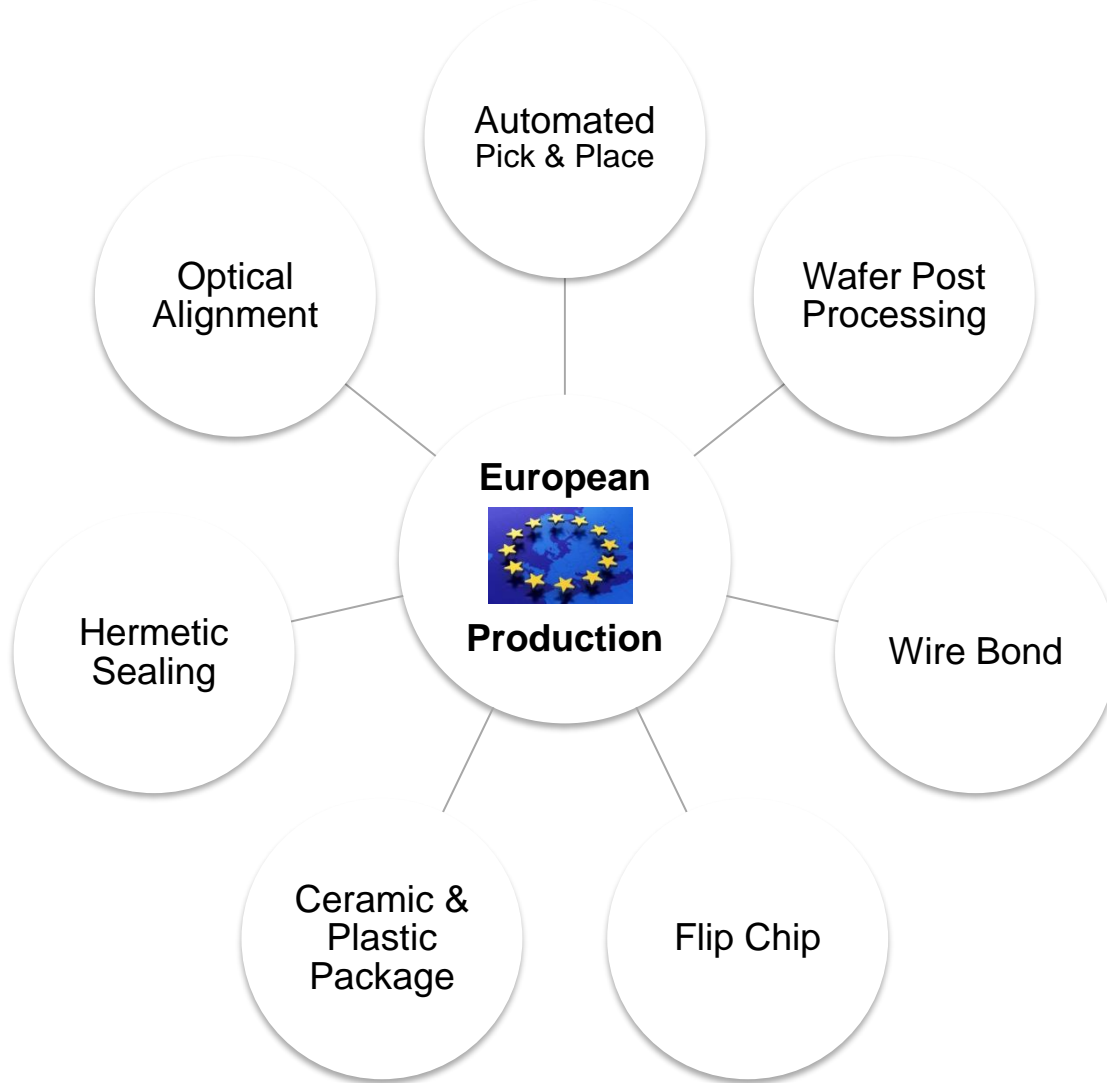
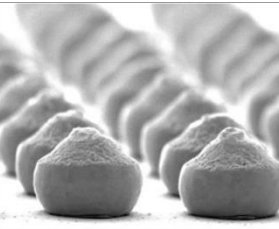
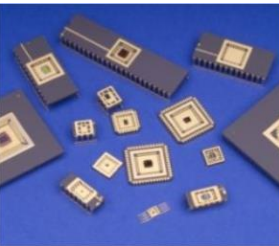
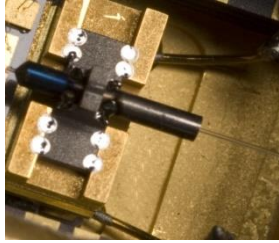
- Design for manufacture
- Optoelectronic & Optical Packaging
- Microelectronic & MEMS Packaging
- Wafer & die handling
- Die attach
- Wire bonding
- Optical alignment
- Hermetic sealing
- Electrical and optical test
- Fast-Turn, Prototype & Volume manufacturing
- ISO 9001:2015 certified manufacturing in accordance with MIL-STD-883 and ESCC standards

END-TO-END COMPONENT DESIGN AND ASSEMBLY

- Package Design, modelling and verification
- Prototype and Pilot assembly
- Automated volume manufacturing process development
- Volume sub-contract manufacturing
- Volume manufacturing process transfer
- Supply chain management

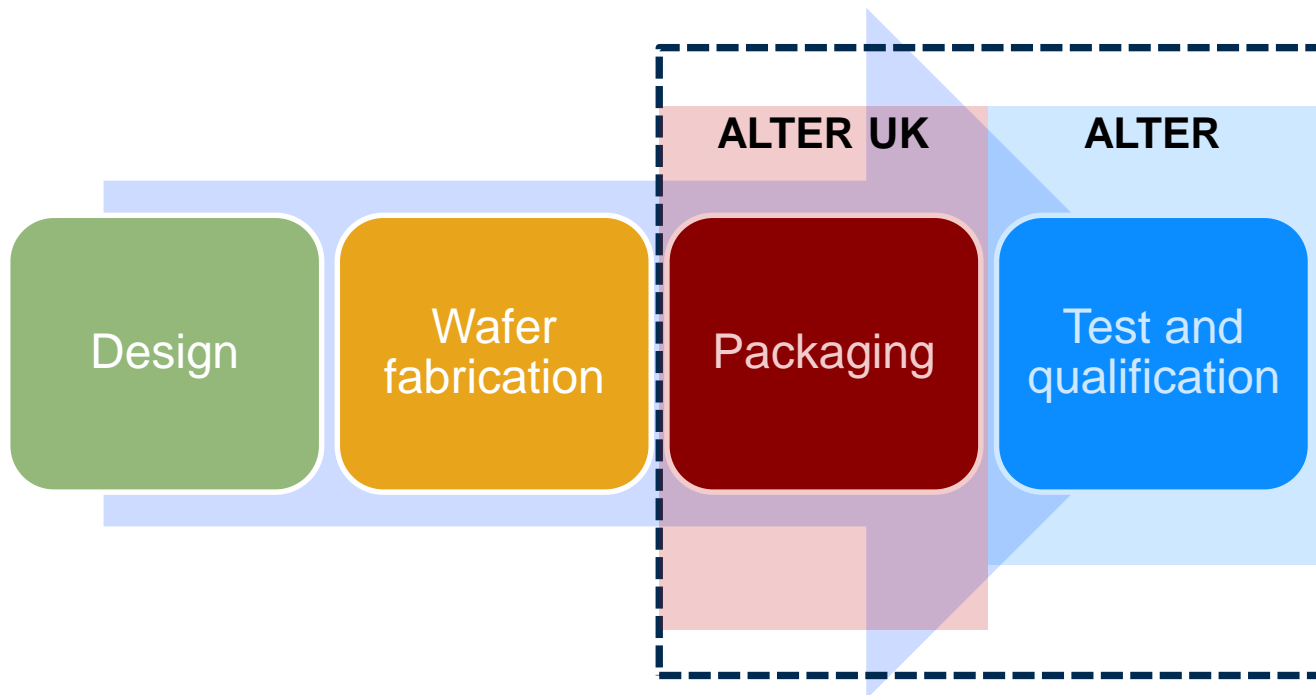


ASSEMBLY CAPABILITY

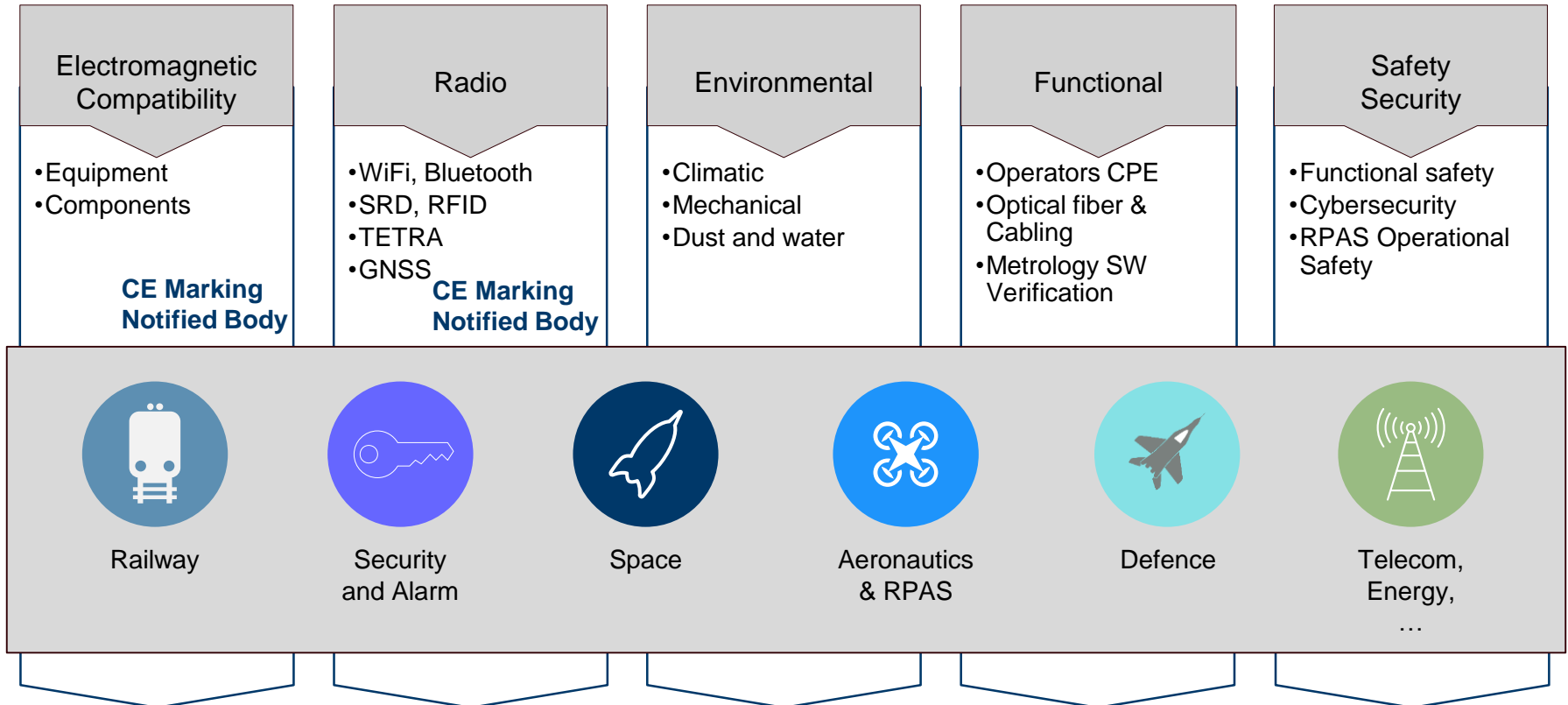


END-TO-END COMPONENT DESIGN AND ASSEMBLY

- ALTER UK and ALTER TECHNOLOGY's business model is fully complementary what allows maximizing benefits for the companies as well as for the customers.
- With a robust global network of world-class companies, partners, and practices, synergies created will allow to provide a much better service to the space and high reliability markets.



EQUIPMENT & SYSTEMS TESTING



In-house capabilities

CE MARKING SUPPORT



Examples

ATE Explosive Atmosphere
X Electromagnetic
EMC Compat.
LVD Low Voltage
MD Machinery
PED Pressure equipment
RED Radio equipment

CE MARKING



Regulatory
monitoring



CE marking

of complex systems
and installations



Radar
Antenna systems

- CE marking support
- Safety and EMC testing



Robotics

- CE marking Support
- Functional Safety
- Testing

RPAS

- EASA regulation
- Command and control,GNSS
- Operational & functional safety
- Testing



EEE
Equipment

- IT equipment
- EGSES
- Ticketing
- Telecom


CE MARKING SUPPORT – USE CASE

F4E-OMF-436 LOT5 Project Management Support Services

- Assembly, integration and verification compliance assessment
- CE marking directives and European harmonised standards
- Technical specifications and handbooks compliance verification
- Suppliers' strategy compliance evaluation
- Suppliers' declarations of conformity verification
- Test reports assessment




CERTIFICATION SERVICES

01 

Security products

- Alarm, intrusion and hold-up and control systems
- EA / ILAC accredited
- CERTALARM mark


Certification Body

02 

Fire detection and control

- Construction products Regulation (CPR)

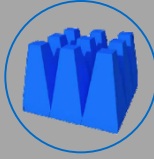
CE Marking Notified Body

03 

Radio Equipment

- RED directive
- EU type examination
- Air traffic management, Navigation, Satellite, Broadcasting, Intelligent transport systems, SRD, WLAN, Cellular, PMR

CE Marking Notified Body

04 

Electromagnetic Compatibility

- EMC directive
- EU type examination
- Telecom equipment

CE Marking Notified Body

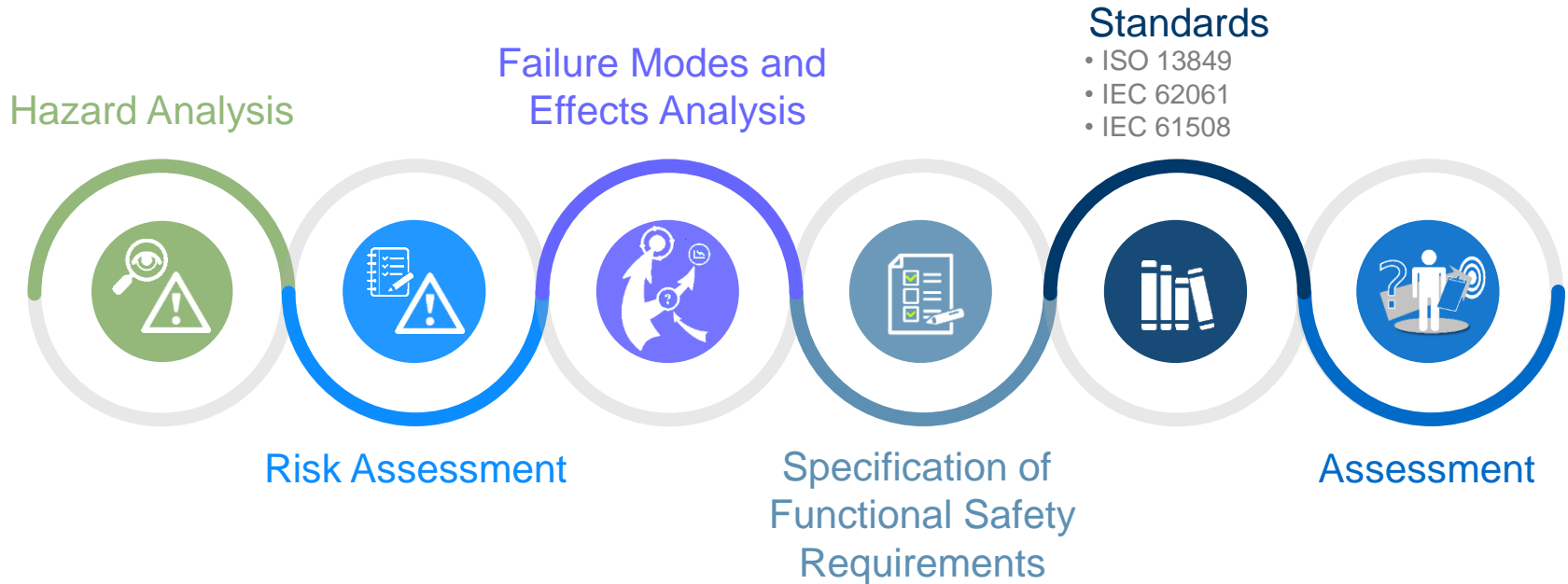


Broad scope of accreditations



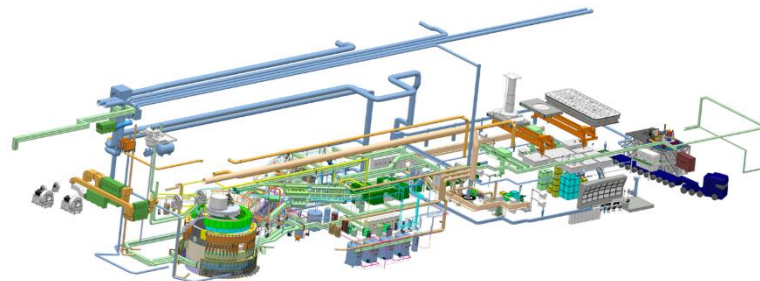
Witness testing programs

FUNCTIONAL SAFETY



OCT-2016-141000001-001 LOT5 Provision of Integration Services for European Spallation Source (ESS) Integrated Control System

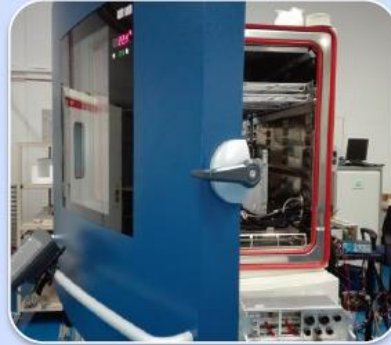
- Control systems safety related integration engineering services (IEC 61508).



TESTING CAPABILITIES AT EQUIPMENT LEVEL

Thermal & Mechanical tests

ALTER
TECHNOLOGY



Walk-in chamber
Temperature and humidity testing
-40 to +75°C
10% to 98%
Dimensions (mm): 2400 x 2900 x 2100

Climatic chambers
(5)
Temperature and humidity testing
-80°C to 125°C
(depending on the model)
1°C/min
10% to 98%
Dimensions: several from
650 x 650 x 700 to
1350 x 900 x 900

Cryogenic chambers
(7)
Temperature and thermal shock testing
-185°C to 315°C
(depending on the model)
50°C/min
(depending on the model)
Dimensions: several
245 x 305 x 260
305 x 508 x 914
850 x 1200 x 1200

Vibrator with slip table and expander head
Frequency: dc - 3kHz
Force: 35.6kN (sine pk and random rms)
Displacement : 76mm
Acceleration: 110g (sine pk), 75g (random rms)
Slip table working area:
900 x 900

TESTING CAPABILITIES AT EQUIPMENT LEVEL

Electromagnetic testing (EMC)



Semianechoic chambers
(2):

11m x 8.5m x 6m with
hybrid absorber

7.5 m x 4.5m x 4m

EMI /RF receivers up to 40
GHz

Radiated susceptibility
system up to 18GHz



Signal, spikes and ESD
generators; amplifiers,
oscilloscopes, probes,
LISN,...

for conducted emissions
(CE) conducted
susceptibility (CS) and ESD
testing



GTEM chamber
EMC testing of Integrated
Circuits

RESEARCH COLLABORATIONS EXAMPLES

Universities

-  University of BRISTOL England
-  Spain
-  Spain
-  Spain
-  Uppsala University Sweden
-  Prifysgol Cymru Wales
University of Wales
-  UCL
University College London Belgium

Research centres

-  CSIC Spain
-  DLR Germany
-  Fraunhofer FHR Germany
-  ICFO
The Institute of Photonic Sciences Spain
-  imec Belgium
-  IQI Austria
Institute for Quantum Optics and Quantum Information, Vienna
Austrian Academy of Sciences
-  CASC China
中国航天

Space exploration

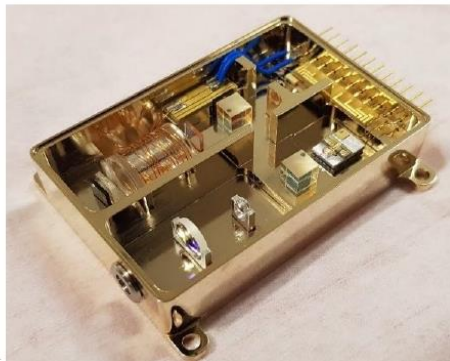
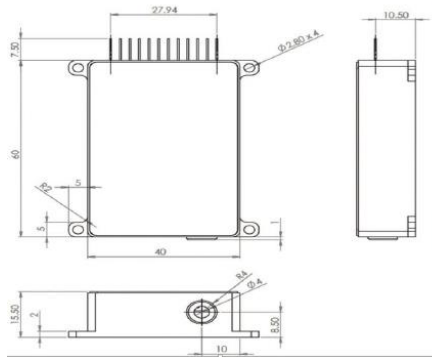
-  CONAE Argentina
-  esa
European Space Agency Europe
-  INPE Brazil
-  JAXA
Japan Aerospace Exploration Agency Japan
-  KARI
Korea Aerospace Research Institute South Korea
-  中国科学院
CHINESE ACADEMY OF SCIENCES China

RESEARCH ACTIVITIES

QUANTUM COMMUNICATIONS

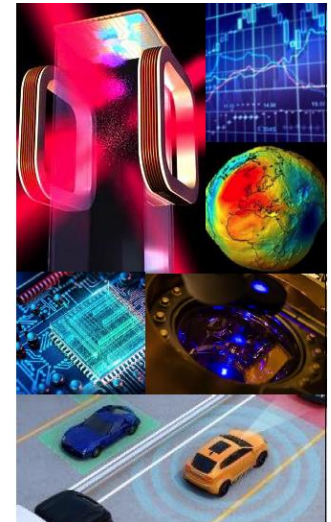
Development of specific technologies for **extreme precision laser adjustment** to ensure quantum measurements

FLAME



Quantum Applications

- Laser-cooled atoms
- Atom Interferometers
- Atomic Clocks
 - Timestamping: The "Flash Crash", GPS & Telecommunications
- Gravimeters
 - Geological surveying, Defence
- Quantum Computers
 - Drug discovery
- Photon-enhanced imaging / ranging / sensing
 - High-value autonomy



RESEARCH ACTIVITIES

SILICON CARBIDE AND GALIUM NITRIDE DEVICES

Development of specific solutions to cover very high temperature / very high voltage based on new semiconductors materials and packaging solutions



SiC Schottky Diode *Datasheet*

SiC5300280



Features

The CNM & ALTER Silicon Carbide (SiC) Schottky diodes exhibit low forward voltage and superb very high temperature performance. These diodes are suitable for high-frequency and / or hard switching power space applications. The radiation tolerance, both for protons and gamma, of these diodes has been proved. The package is a TO257 hermetic metallic case (the diodes are electrically isolated from the case).

Electrical Characteristics

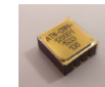
The main characteristics are summarized in the following table:

Characteristics	Symbols	Maximum ratings	Unit	Remarks
Continuous Forward Current over full temperature range	I_F	5	A	Note 1
Reverse Voltage over full temperature range	V_R	300	V	Note 2
Forward Surge Current	I_{FSM}	25	A	Note 3
Repetitive Forward Surge Current	I_{RFSM}	15	A	Note 4
Operating Temperature Range (case temperature)	T_{op}	-170 to +320	°C	
Junction Temperature	$T_{j(max)}$	+330	°C	
Storage Temperature Range	T_{stg}	-170 to +320	°C	
Thermal Resistance, Junction to Case	$R_{th(j-c)}$	2	°C/W	Note 5
Reverse current @ 300 V and 280°C.	I_R	< 600	uA	Screening to better values is possible
Maximum forward voltage drop at nominal current and 280°C.	V_F	1.7	V	
Packaged diode weight	W	< 5	g	



SiC JBS Diode *Datasheet*

ATN-CNM-1200D1



Features

The CNM & ALTER Silicon Carbide (SiC) Junction Barrier Schottky diodes exhibit low forward voltage and superb high temperature performance. These diodes are suitable for high-frequency and / or hard switching power space applications. The radiation tolerance, both for protons and gamma, of these diodes has been proved.

Electrical Characteristics

The main characteristics are summarized in the following table:

Characteristics	Symbols	Maximum Ratings	Unit	Remarks
Forward Current	I_F	2.0	A	Note 1
Reverse Voltage	V_R	1300	V	Note 2
Forward Surge Current	I_{FSM}	100	A	Note 3
Repetitive Forward Surge Current	I_{RFSM}	30	A	Note 4
Operating Temperature Range (case temperature)	T_{op}	-55 to +130	°C	
Junction Temperature	$T_{j(max)}$	+200	°C	
Storage Temperature Range	T_{stg}	-55 to +200	°C	
Thermal Resistance, Junction to Air	$R_{th(j-a)}$	85	°C/W	Note 5

NOTES:

1. Continuous constant current over full operating temperature range
2. Continuous constant bias over full operating temperature range. Devices have demonstrated withstanding increased reverse voltage up to 1600V at room temperature.
3. Single square 10us pulse
4. Square pulses. $T_{pulse}=50us$, 0.5% duty cycle, $T_{case}=150°C$
5. Measured with 40x40x40 cm³ air volume (no convection), copper dissipation pads of 1cm² and 70um thickness. $T_x=1000s$.

RESEARCH ACTIVITIES

DRONES AND PICOSATS

New inspection platforms (DRONES, PICOSATS) : Comprehensive service portfolio based on safety& risk management, inspections, testing, certification and quality assurance.

AIRWATCH

The objective of this project is to develop a RPAS (Remotely Piloted Aircraft System) for maritime save & rescue activities.

This development intends to complement the current resources and capabilities deployed by SASEMAR (maritime save & rescue body) in the Spanish Coast to mitigate the complexity of the operations usually conducted.

Start: 12/2016 – End T0 + 27 months



DREAM

DREAM's aim is to develop an inspection and maintenance system based on drone technology which will allow to cover the main needs in the civil engineering sector, electrical infrastructures and petrochemical infrastructures.

The DREAM project will focus on the development of new technologies to expand the field of application of drones in inspection and maintenance activities (tasks at very close range or requiring contact)

Start: 10/2018 – End T0 + 27 months

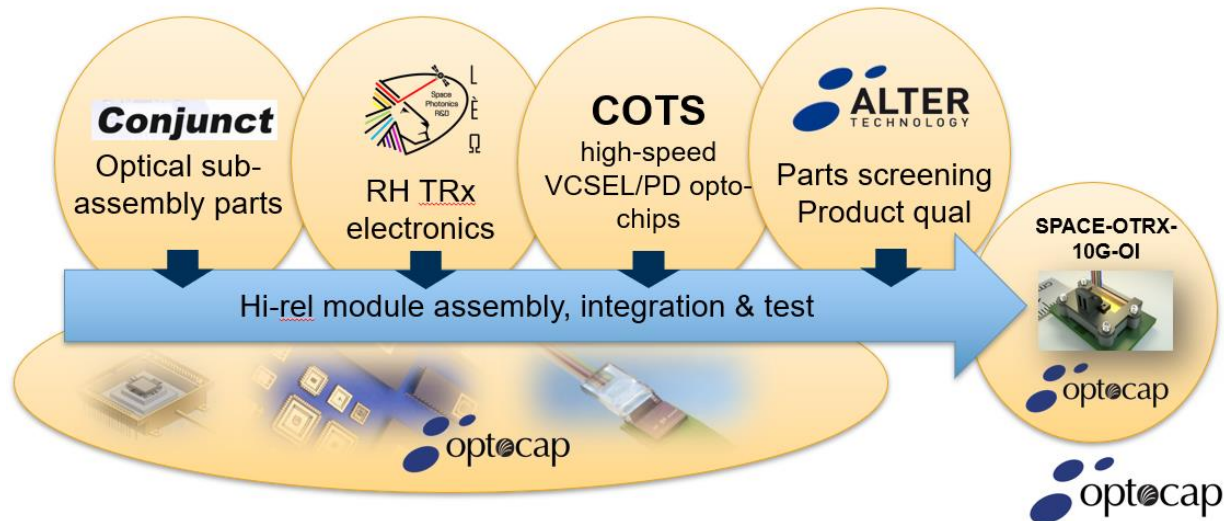


Total Project budget:	2.347.006	ATN Budget	291.648
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RESEARCH ACTIVITIES

HIREL DIGITAL OPTICAL TRASCEIVERS

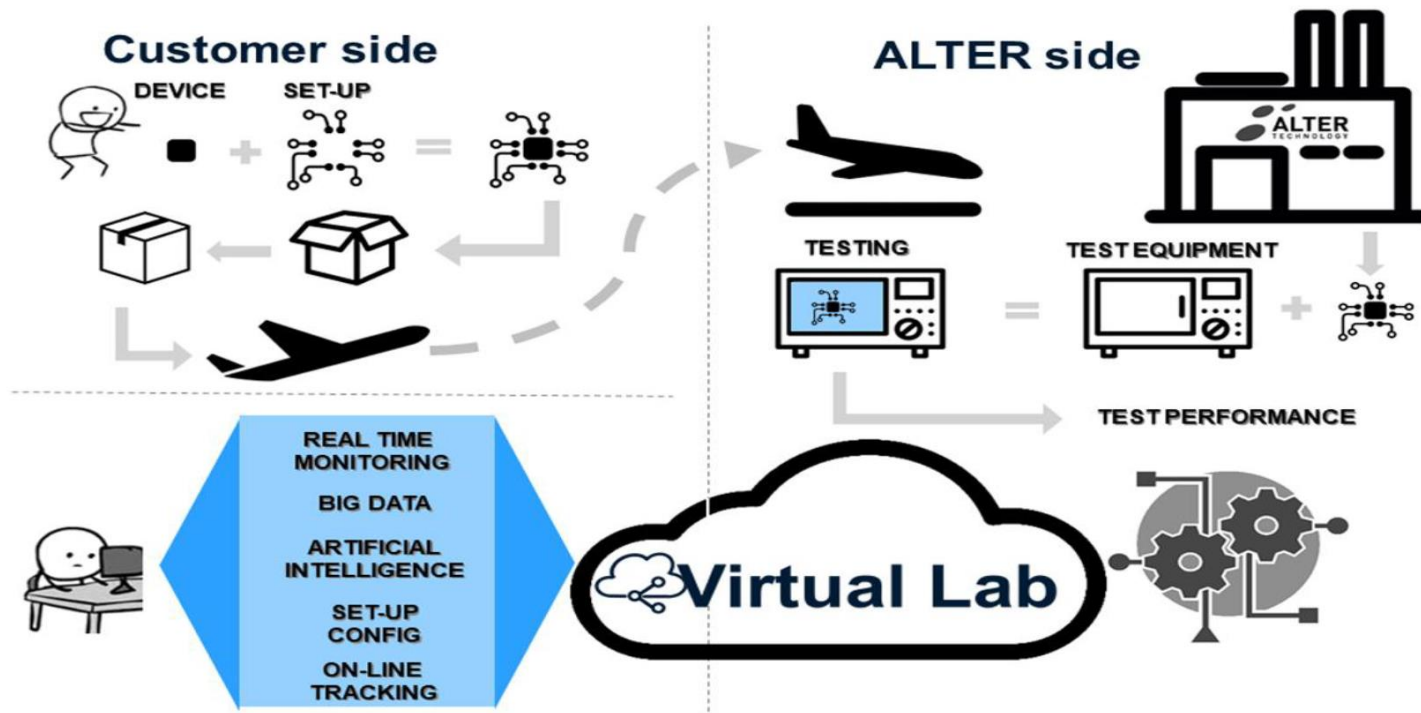
Hirel Digital Optical Transceivers. (High speed optical interconnection). Photonics is being pushed forward as the key enabling technology that will be used to deliver the interconnections (IntraSat and InterSat) within the space applications (Satcom, Earth Observation, etc.). This is the response to the Satellites operators for increased capacity, speed and flexibility.



RESEARCH ACTIVITIES

VIRTUAL LABORATORIES

To better support the market needs and allow our customers “on-line presence / influence” during the test execution, a Virtual Lab is under development working to establish the necessary technical means, adapted to each test activity.



Already available and in use for some test activities, PCB validation test,..etc.)

VEHICLES EVOLUTION AND THEIR IMPLICATIONS IN THE USED ELECTRONICS

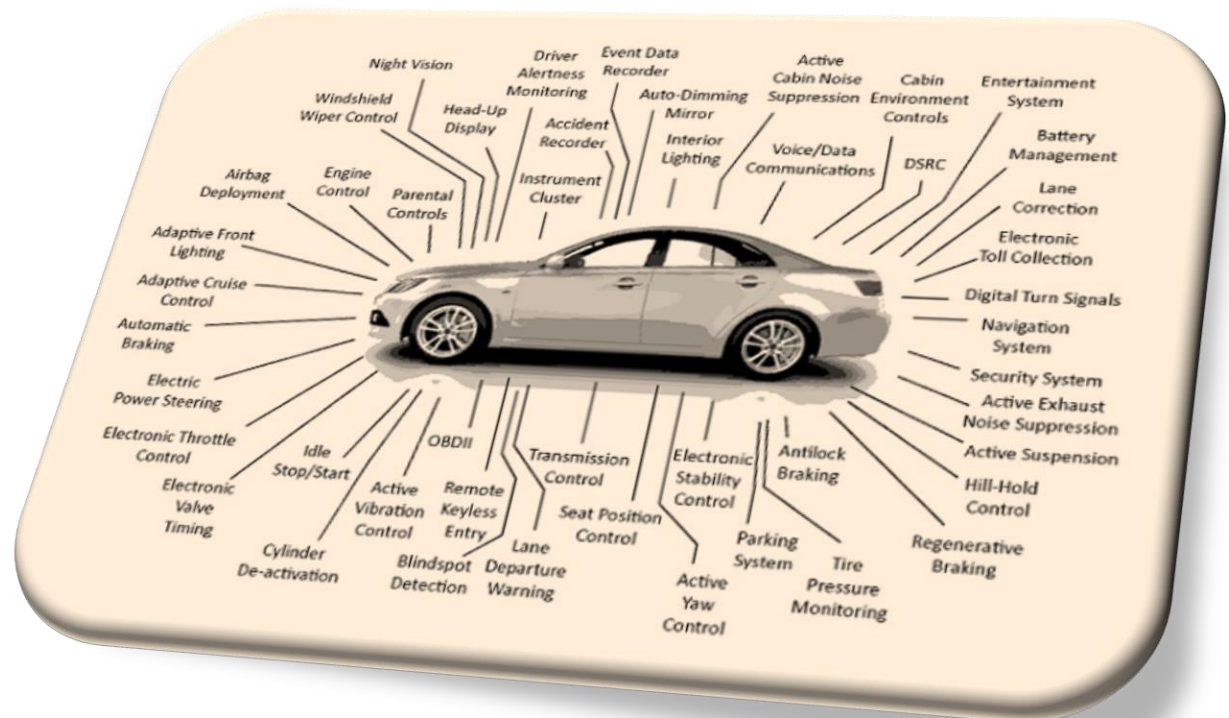
Since the old classic mechanical cars to the future electric vehicles, passing through the actual cars, a tremendous evolution and new challenges have been observed, and must be afforded, specially in the electronics field:

- Increase of electronics systems. They could represent up to 50% of the overall vehicle cost in 2030.
- New sensors and vision detectors covering a wide range of functions.
- Highest level of HW / SW complexity including sensing, control, signals analysis and data processing.
- Severe requirements on electronics systems due to new function: improved safety, predictive maintenance, advanced services for autonomous driving,....., connected vehicles (vehicle to cloud, vehicle to infrastructure, vehicle to vehicle),....., etc.

These facts have brought to the automotive sector the need of special electronic systems handling, including rules for parts selection, system design, validation and test protocols searching for high reliability and security requirements.

VEHICLES EVOLUTION AND THE IMPLICATIONS IN THE USED ELECTRONICS

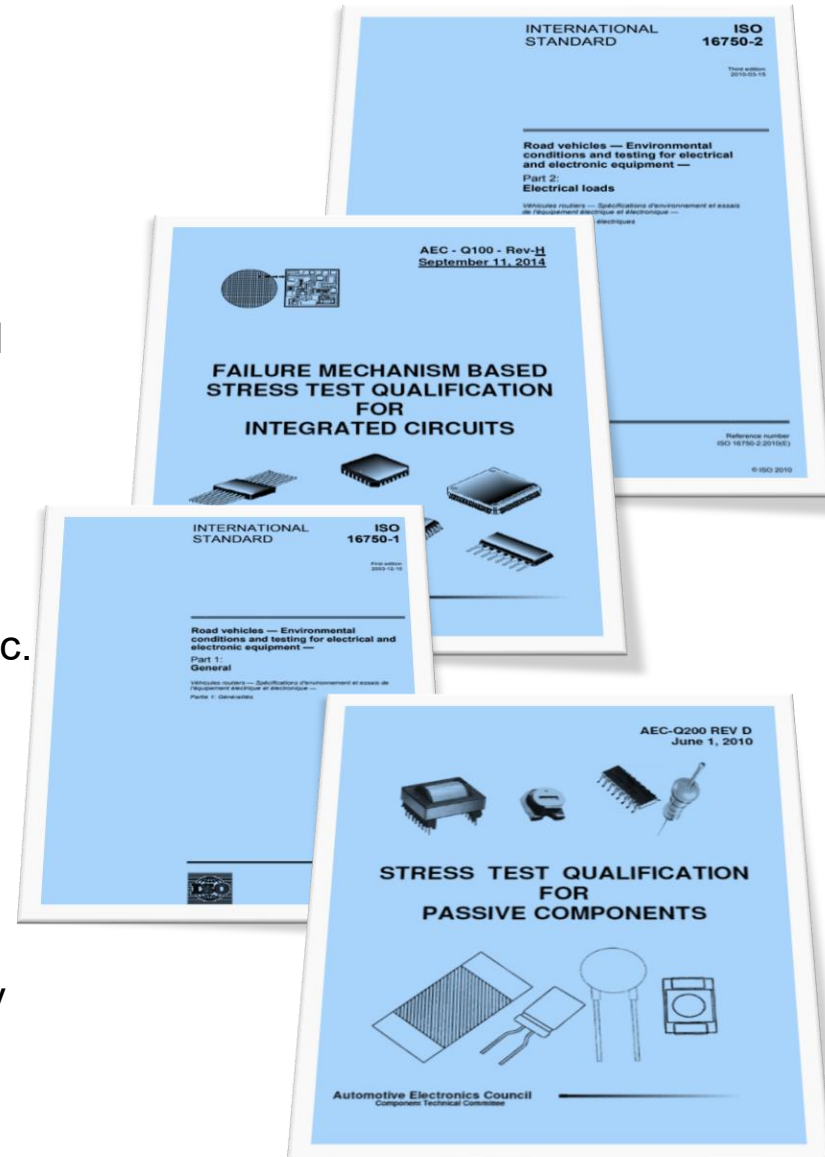
ALTER TECHNOLOGY is ready to provide you a comprehensive engineering and testing services to cover your actual and future needs on electronic systems on board of a car.



AUTOMOTIVE TEST STANDARDS

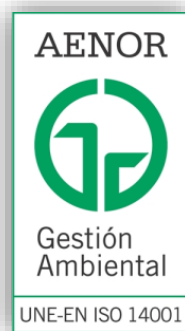
ALTER
TECHNOLOGY

- AEC-Council Standards for Automotive Electronic Components Stress Test Qualification
 - Q100 – For Integrated Circuits
 - Q200 – For Passive Components.
- ISO 16750 - Series. Road vehicles — Environmental conditions and testing for electrical and electronic equipment.
 - Part 1: General
 - Part 2: Electrical loads
 - Part 3: Mechanical loads
 - Part 4: Climatic loads
- End customer requirements: BMW, Renault, ..., etc.
- German consortium standard:
 - LV 124: Requirement for electric and electronic components for use in motor vehicles up to 3,5 t with a 12 V electric system.
 - LV 148: Requirement for electric and electronic components in motor vehicles 48V electrical system.



QUALITY SYSTEM AND CERTIFICATIONS

- UNE-EN 9100:2010 (QM for Aerospace & Defense).
- UNE-EN-ISO 9001:2008 (QM Requirements).
- UNE-EN-ISO/IEC 17025:2005 (General Requirements for Calibration & Testing).
- UNE-EN-ISO 14001 (Environment Management).
- UNE-EN ISO/IEC 17065:2012 (Product Conformance Evaluation).
- OHSAS 18001:2007 (Occupational health and safety Management Systems)
- DLA Laboratory Suitability.





THANK YOU!

www.altertechnology-group.com

gonzalo.fernandez@altertechnology.com

Senior Technical Advisor

Technology & New Business Development Division

+34 954467050 / +34 627471602

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TECHNOLOGY