

# Future Space, New Tools and PA services. ALTER perspective

Trilateral Safety and Mission Assurance Conference (TRISMAC 2024)

ESA –ESRIN. Frascati (Rome) 24-26 June 2024

Manuel Morales

# Agenda

1. Presentation of ALTER Technology / TÜV NORD
2. New Projects, new Product Assurance
3. Same (old problems), new solutions
4. doEEEt
5. PRECEDER
6. VirtualLab™
7. RAD-E4SPACE



**ALTER**

**TRISMAC**  
Trilateral Safety and Mission  
Assurance Conference 2024

# ALTER TECHNOLOGY

**Inspired by Knowledge**

TRISMAC (Frascati) 24-26 June 2024

# TÜV NORD GROUP

**We create trust in technology –below  
ground, on ground, in space.**

TRISMAC (Frascati) 24-26 June 2024

# Figures, data, facts

The TÜV NORD GROUP at a glance (2022's figures)



**1,451.8**

Million Euro sales



**12.238**

Employees worldwide



**TÜVNORDGROUP**  
TÜVNORD · DMT · ALTER · TÜVIT

**4**

**Core Brands**

in the Industrial Services, Mobility, Training,  
Engineering and Natural Resources, Aerospace  
and IT business units



**100**

Active in 100 countries



**82**

Group Companies

# The TÜV NORD GROUP

Taken together, this is our expertise for your success.

Below ground



On ground



In space



With our knowledge, we stand for safety, independence and quality – everywhere and at all times. We look to the future and dedicate ourselves to making our clients even more successful in the connected world.

We protect lives, goods and natural resources. We achieve this by offering services in testing, inspection, certification, engineering and training.

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# ALTER TECHNOLOGY

**Inspired by Knowledge**

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# The Company

ALTER is a leading engineering company which provides reliable and agile solutions in engineering, procurement, assembly, and test to many of the world's most innovative technologies, such as semiconductors, electronic equipment and geospatial intelligence.

Our company is present in [space](#), aeronautics, nuclear, automotive, medical and defence among many others.



# Figures, data, facts

ALTER at a glance (2022's figures)



82

Million Euros Revenues



470

Employees



36

Years in the market



7

sites

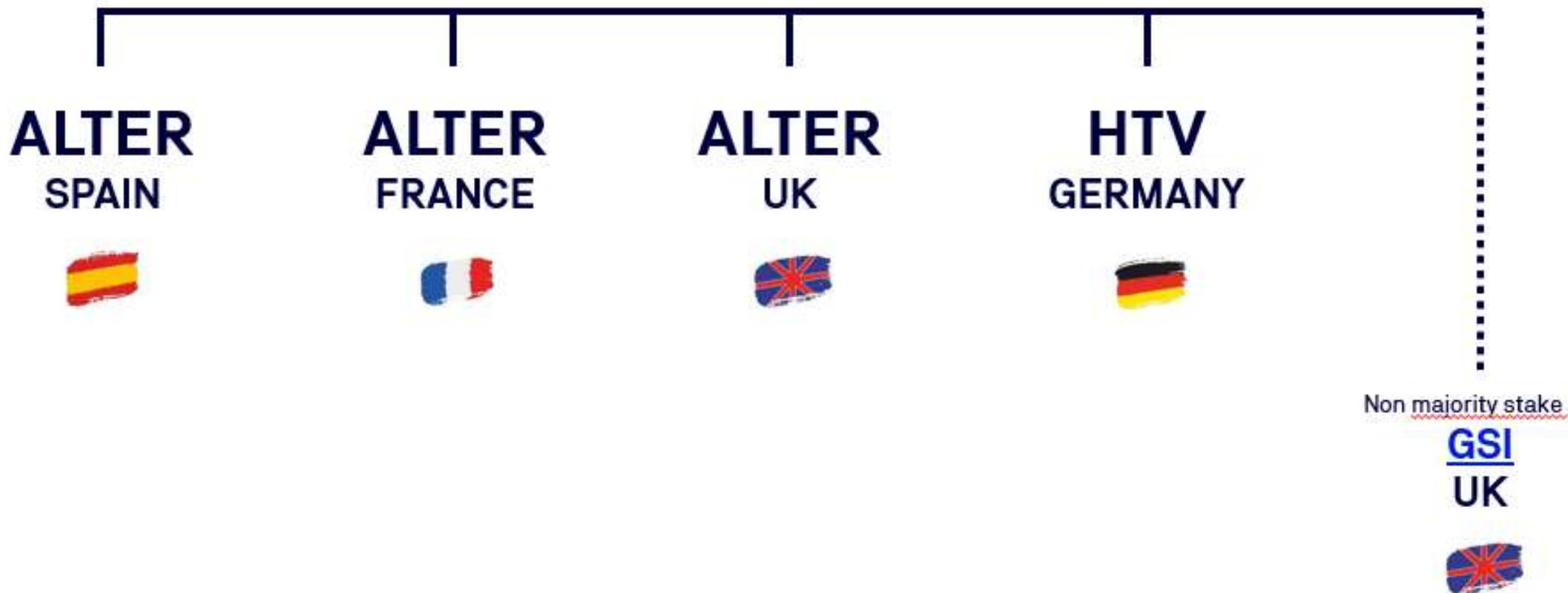


>8500

M2 laboratories

# Business Unit Aerospace

## ALTER



**ALTER**

# Objective of Product Assurance

Basic definition from ECSS-Q-ST-10C Rev1 (March 2016):

*“The prime objective of Product Assurance is to ensure that space products **accomplish** their defined mission objectives in a **safe, available and reliable way**“*

Although this definition is independent on the type of mission or mission classification (from IOD cubesat to top-class), the Product Assurance (PA) activities need to be tailored accordingly and following specific standards.

However, the rapid growth of NewSpace and the emergence of new players in the space industry necessitate innovative thinking, advanced tools, and associated PA services.

# New projects, new Product Assurance

- Develop and stabilizing of **Testing capabilities for small sat up to 500kg**, getting compliance against ECSS-Q-ST-20-07 tailored by ESA-TECQQQ-TN-024614.
- Leading the ESA project 4000134569/21/NL/KMLHALT: “**Highly Accelerated Life Test Pilot Supporting Agile Space Engineering**”, assessing a methodology to validate commercial electronic boards for space.
- Participation in **ATCOS project: “Alternative Test Methods for COTS”**, with the main objective to gather information on the performance and reliability of commercial parts, including automotive components, investigating, and comparing the effectiveness and suitability of a typical board/unit test in comparison with the classic test at component level.
- Development of **PRECEDER** (Prediction of the Electrical Behaviour of Electronic Devices under Radiation, Spanish acronym) methodology, as a new concept to get confidence on device radiation hardness based on previous data.
- Design of a **radiation test process at unit / system even satellite level**, considering classic and mixed-field radiation environments.
- Adapted PA services for **NewSpace companies and universities**, adjusting requirements related to EEE components, materials, processes, and testing.
- Development of a low cost tool for analysis of the radiation environment for COTS (**RAD-E4SPACE**).

# New projects, new Product Assurance

Traditional space and new missions need more agile methodology, taking advantage of four pillars:

- **Digitization**, which involves converting physical or analog objects (such as documents, images, or records) into digital formats
- **Digitalization**, using digital technologies to transform business processes including automating manual tasks and embracing digital strategies.
- **Machine Learning and IA**, applied to prospective results for testing and processes.
- Direct **contact** with PA engineers, system engineers and technicians performing test, speaking the same 'space' language
- **PA mission tailoring**. No two missions are the same!

# Same (old problems), new solutions

Some examples of processes addressed

- Search for EEE parts
- Approval process PAD approval process
- Prediction of radiation performance for EEE
- Radiation modelling
- PCB Soldering
- Online Audit/review



# You need something (1)



I need to  
find a EEE component  
for my application

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# doEEEt

**EEE parts database for Space**

TRISMAC (Frascati) 24-26 June 2024

# doEEEt.com EEE parts database for Space

The screenshot shows the doEEEt.com website interface. At the top is a dark blue navigation bar with the logo 'DOEEET 2.0' on the left and menu items: 'Resources', 'Electronic Design', 'Laboratory Services', 'Tools', 'About Us', and a user profile 'Manuel Morales'. Below the navigation bar is a light blue header area with the text 'Your place for EEE parts in space'. A search bar with the placeholder 'Search for components or documents' and a blue 'SEARCH' button is positioned below the header. Underneath the search bar, the text 'OR BROWSE PARTS BY CATEGORY' is displayed. A grid of 17 circular icons represents different component categories: Capacitors, Crystals and Oscillators, Filters, Fuses and Fuseholders, Microcircuits, Relays, Resistors, Discretes, Wires and Cables, Inductors, Transformers, Switches, Heaters, Thermistors, RF Passive Components, Cable Assemblies, and Connectors. A large, bright green starburst graphic on the right side of the page contains the text 'Freely available!'. In the bottom right corner of the website screenshot, there is a dark blue button with a play icon and the text 'View demo'.

Freely available!

 View demo

# doEEEt.com EEE parts database for Space

**DOEEET 2.0** Resources Electronic Design Laboratory Services Tools About Us Manuel Morales

COMPONENTS (6) DOCUMENTS (11) CATEGORIES adc128s102 SEARCH

Applications expected requirements

TID RADIATION LEVEL (RADS) SEE LETTH (MEV CM2/MG) APPLICATION ORBIT EEE PARTS PROCUREMENTS REQUIREMENTS ACCORDING TO APPLICATION LIFETIME (YEARS)

Select TID radiation level Not known Select application orbit Select EEE part procurement requirements Not known APPLY REQUIREMENTS

SHOW FILTERS CATEGORY Microcircuits / Signal Acquisition-Conditioning / Data Converter / Analog to Digital Converters HIREL ENHANCED COTS & AUTOMOTIVE \*INCLUDING

PART REFERENCE	Stock	Unit Price & Lead Time	Quality level / QPL	Package	Temp	#Channels	RES [Min]	Sample Rate	Reference Mode	TID (krads)	SEE (MeV/mg/cm2)
<b>ADC128S102CIM...</b> ADC128S102CIMT/N... Texas Instruments MFR DS SNAS298 <input type="checkbox"/> Compare <b>ACTIVE</b> + DCL / BOM CART	STOCK	VIEW	COMMERCIAL NOT QUALIFIED NOT LISTED IN QPL <b>GOLD</b>	Surface Mount TSSOP-16	-40°C to +105°C	8	12-Bits	1MSPS	External		
<b>5962R0722701VFA</b> ADC128S102WRQV Texas Instruments 5962-07227 <input type="checkbox"/> Compare <b>ACTIVE</b> + DCL / BOM CART	STOCK	VIEW	QML V <b>QUALIFIED</b> QPDSIS-38535	Surface Mount CFP-16	-55°C to +125°C	8	12-Bits	1MSPS	Supply	TID (HDR): 100	SEL (Let): 120
<b>5962R0722701VZA</b> ADC128S102WGRQV Texas Instruments 5962-07227 <input type="checkbox"/> Compare <b>ACTIVE</b> + DCL / BOM CART	STOCK	VIEW	QML V <b>QUALIFIED</b> QPDSIS-38535	Surface Mount CFP-16 (Gull Wing)	-55°C to +125°C	8	12-Bits	1MSPS	Supply	TID (HDR): 100	SEL (Let): 120
<b>5962R0722701V9A</b> ADC128S102 MDR Texas Instruments 5962-07227 <input type="checkbox"/> Compare <b>ACTIVE</b> + DCL / BOM CART	STOCK	VIEW	QML V <b>QUALIFIED</b> QPDSIS-38535	DIE DIE	-55°C to +125°C	8	12-Bits	1MSPS	Supply	TID (HDR): 100	SEL (Let): 120
<b>V62/22608-01XE</b> ADC128S102PWTSEP Texas Instruments MFR DS SNAS825 <input type="checkbox"/> Compare <b>ACTIVE</b>	STOCK	VIEW	SPACE EP NOT QUALIFIED NOT LISTED IN QPL	Surface Mount TSSOP-16	-55°C to +125°C	8	12-Bits	1MSPS	External	TID (HDR): 30	SEL (Let): 43



# doEEEt.com EEE parts database for Space

DOEEET 2.0

[Resources](#)
[Electronic Design](#)
[Laboratory Services](#)
[Tools](#)
[About Us](#)
Manuel Morales

← BACK TO SEARCH

CATEGORIES

SEARCH

5962R0722701VFA  
ADC128S102WRQV - Texas Instruments

[ACTIVE](#)
[CART](#)
[DCL / BOM](#)
[COMPARE](#)

ESCC Family 08 - 61 MICROCIRCUITS > SIGNAL ACQUISITION-CONDITIONING > DATA CONVERTER > ANALOG TO DIGITAL CONVERTERS

### GENERAL DATA

Microcircuit, Digital-Linear, CMOS, 8 Channel, 50 KSPS to 1 MSPS, 12 Bit Analog to Digital Converter, Monolithic Silicon

PART NUMBER: 5962R0722701VFA  
PART TYPE: ADC128S102WRQV  
MANUFACTURER: Texas Instruments  
QUALITY LEVEL: QML V  
QUALIFICATION STATUS: Qualified  
CERTIFICATION NUMBER: QPD/SIS-38535 06-May-2024  
EPPL:  
PACKAGE: CFP-16

### EEE PARTS VALIDATION ACCORDING TO QUALITY PROJECT REQUIREMENTS

1. Select a project requirement to check the suitability of this component and delta activities needed if applicable:

ECSS-Q-ST-60C CLASS 1

ECSS-Q-ST-60C CLASS 2

ECSS-Q-ST-60C CLASS 3

ATN PROPOSAL FOR LEO CONSTELLATIONS

### ESTIMATED PRICES, LEAD TIMES AND STOCK AVAILABILITY

STOCK

CLICK TO SEE ESTIMATED PRICE AND MANUFACTURER LEAD TIME FOR THIS REFERENCE

### ALTER TECHNOLOGY LABORATORY SERVICES

2. Breakdown of proposed activities and estimated cost per selected procurement policy.

### DOCUMENTATION

TYPE	REFERENCE	TITLE	
Generic spec.	ML-PRF-38535	Integrated Circuits (Microcircuits) Manufacturing, General Specification For	📄 ⬇
Detailed spec.	5962-07227	Microcircuit, Digital-Linear, CMOS, 8 Channel, 50 KSPS to 1 MSPS, 12 Bit Analog to Digital Converter, Monolithic Silicon	📄 ⬇
QPL/QML	QPD/SIS-38535	Advanced Microcircuits	📄 ⬇

### ADDITIONAL INFO

- Alerts & Product change >
- Heritage >
- Previous test >

### PARAMETERS

#### Specific Functional & Electrical

ENOB (EFFECTIVE NUMBER OF BITS):	11,1bits
SINAD [MIN] (SIGNAL TO NOISE AND DISTORSION [MIN]):	68dB
INL [MAX] (INTEGRAL NON-LINEARITY [MAX]):	1,4LSB
RES [MIN] (RESOLUTION [MIN]):	12-Bits
INPUT TYPE:	Single ended
SNR [MIN] (SIGNAL TO NOISE RATIO [MIN]):	68,5dB
#CHANNELS (NUMBER OF CHANNELS):	8
SAMPLE RATE:	1MSPS
DNL [MAX] (DIFFERENTIAL NON-LINEARITY [MAX]):	1,5LSB
OUTPUT TYPE:	Serial

#### Mechanical Data

#### Radiation: Potential Sensitivity

#### Radiation Features: SEE

#### Generic Functional & Electrical

# doEEEt.com platform

## Our capabilities

Only **database** for the **space market** with more than 22 million of Hi-Rel EEE parts and COTS.

Designed to **support** any kind of user (designers, engineers, manufacturers, commercial) through the **component selection process**.

Gain **efficiency** in the component selection and information searching, improve **competitiveness** and **time** to market.

## Technical information



Different ways to search components and documents



All technical information in one place



Laboratory services consultant

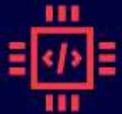
## doEEEt Tools



Comparator



DCL/BOM



Stockplace

## User area



My doEEEt



Proposal next

# EEE parts database for Space

Help users to succeed

Supporting the user throughout the component selection process

Different ways to search components and documents



- Global and family search
- Search suggestions
- Adaptive parametric filter
- Load DCL/BOM

All technical information in one place



- Technical parameters and documentation
- Radiation information
- Alerts notificacions
- CAD models

Check alternatives



- New Space and COTS
- Comparator tool
- Fine tuning

Laboratory services consultant



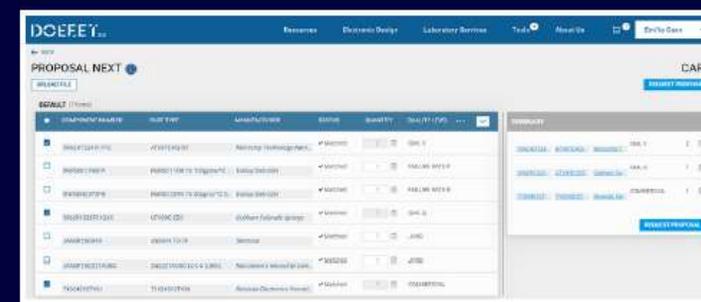
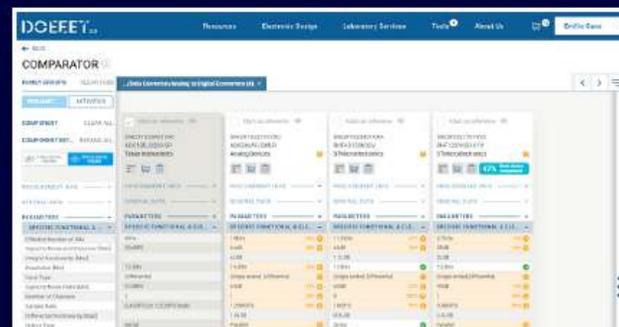
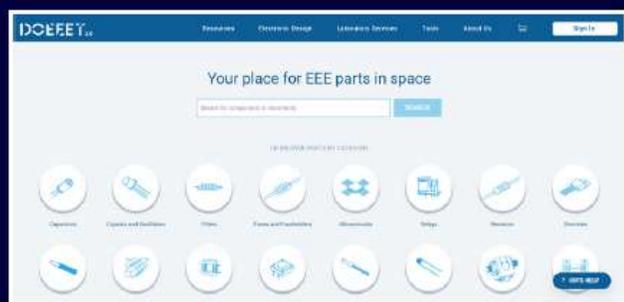
- Recommended test activities according to your project requirements

Stock and price



- Real time stock availability
- Instant price

PROPOSAL NEXT



# doEEEt.com database

Three grades of products for the Space and New Space markets

## Space products



Devices designed for Space applications and with quality and/or reliability confident enough for use in Space projects

## Enhanced devices



Plastic devices with enhanced properties designed for NewSpace applications

## COTS & Automotive



Devices designed for Commercial or Automotive applications. Can be used in space applications provided specific controls are implemented depending on mission profile

## You need something (2)



I need to  
know whether I  
should test my device  
for radiation

(but have limited budget...as  
usual)

# PRECEDER

**Prediction of radiation performance for  
EEE components**

TRISMAC (Frascati) 24-26 June 2024

# Prediction of radiation performance for EEE

**PRECEDER** (Prediction of the Electrical Behavior of Electronic Devices under Radiation, Spanish acronym)

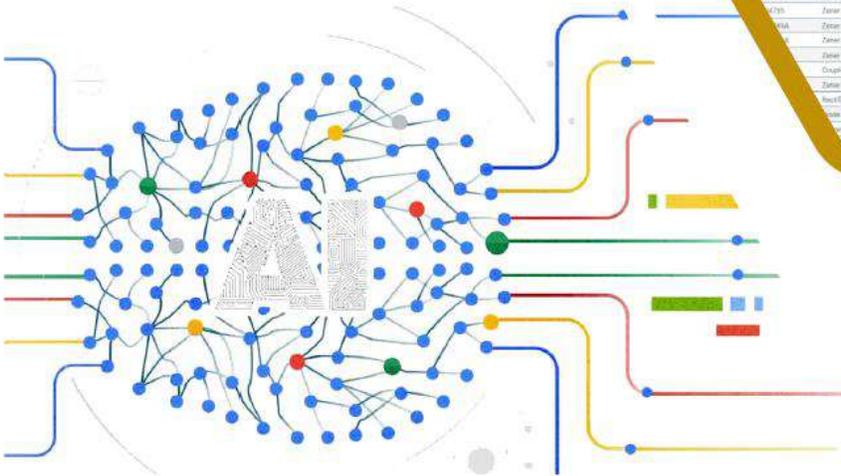
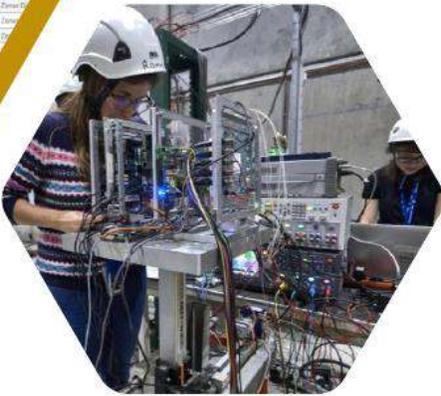
## PRECEDER in a nutshell



### The strategy

**PRECEDER extracts information from experimental data and predict** what will be the **behavior** of similar **components** without the need to test them under radiation.

ENTRYS	FUNCTION	
	Microcontrol, Linear, Current Mode Pulse Width Modulator Controller, MOSFET/SiCmos	
	Microcontrol, Memory, Digital, CMOS, Full Programmable Gate Array, 2000 Gates, Monolithic Silicon	
	Microcontrol, Memory, Digital, CMOS, Full Programmable Gate Array, 2000 Gates, Monolithic Silicon	
19C2	Microcontrol, Memory, Digital, CMOS, Full Programmable Gate Array, 6000 Gates, Monolithic Silicon	CMOS
19D4	Microcontrol, Memory, Digital, CMOS, Full Programmable Gate Array, 6000 Gates, Monolithic Silicon	CMOS
TR0565	Diode, Line Voltage, Controlled/Forward	Diode
TR0605	Diode Switching	Diode
TR4059	Diapier, Optoelectronic, Semiconductor Device Solid State	Diode
TR4129-1	Diapier, Optoelectronic, Semiconductor Device Solid State	Diode
TR4522A-1	Capacitor, Optoelectronic, Semiconductor Device Solid State	Diode
TR4573	Semiconductor Device, Diode, Silicon, Low Level Voltage Reference	Diode
TR4574A-1	Diapier, Optoelectronic, Semiconductor Device Solid State	Diode
TR4619-1	Diapier, Optoelectronic, Semiconductor Device Solid State	Diode
TR4619-5	Diapier, Optoelectronic, Semiconductor Device Solid State	Diode
TR46220R-1	Semiconductor Device, Diode, Silicon Low Noise Voltage Regulator	Diode
TR4720A	Zener Diode	Zener
TR4725	Zener Diode	Zener
TR4730A	Zener Diode	Zener
TR4735	Zener Diode	Zener
	Diapier, Optoelectronic, Semiconductor Device Solid State	
	Zener Diode	Zener
	Rectifier Diode	
	Diode Silicon, Bipolar Transient Voltage Suppressor	
	Diapier, Optoelectronic, Semiconductor Device Solid State	



# PRECEDER

## PRECEDER in a nutshell



### The problem solved



MACHINE LEARNING		
<b>Linear Regression</b> 	<b>Logistic Regression</b> 	<b>Decision Tree</b> 
<b>SVM</b> 	<b>KNN</b> 	<b>Dimensionality Reduction</b> 
<b>Random Forest</b> 	<b>K-means</b> 	<b>Naive Bayes</b> 

**PREDICTIONS** ←

# PRECEDER

## PRECEDER preview



INSPECTION LOT	2570000048
CUSTOMER	
PLAN REFERENCE	rv2
MARKING	2N2907A#MFR#31712A

PROJECT	
PART TYPE	2N2907A
MANUFACTURER	
DATE CODE	31712A

**RVT TESTING RESULTS**

**Comparison between real behavior and simulations**

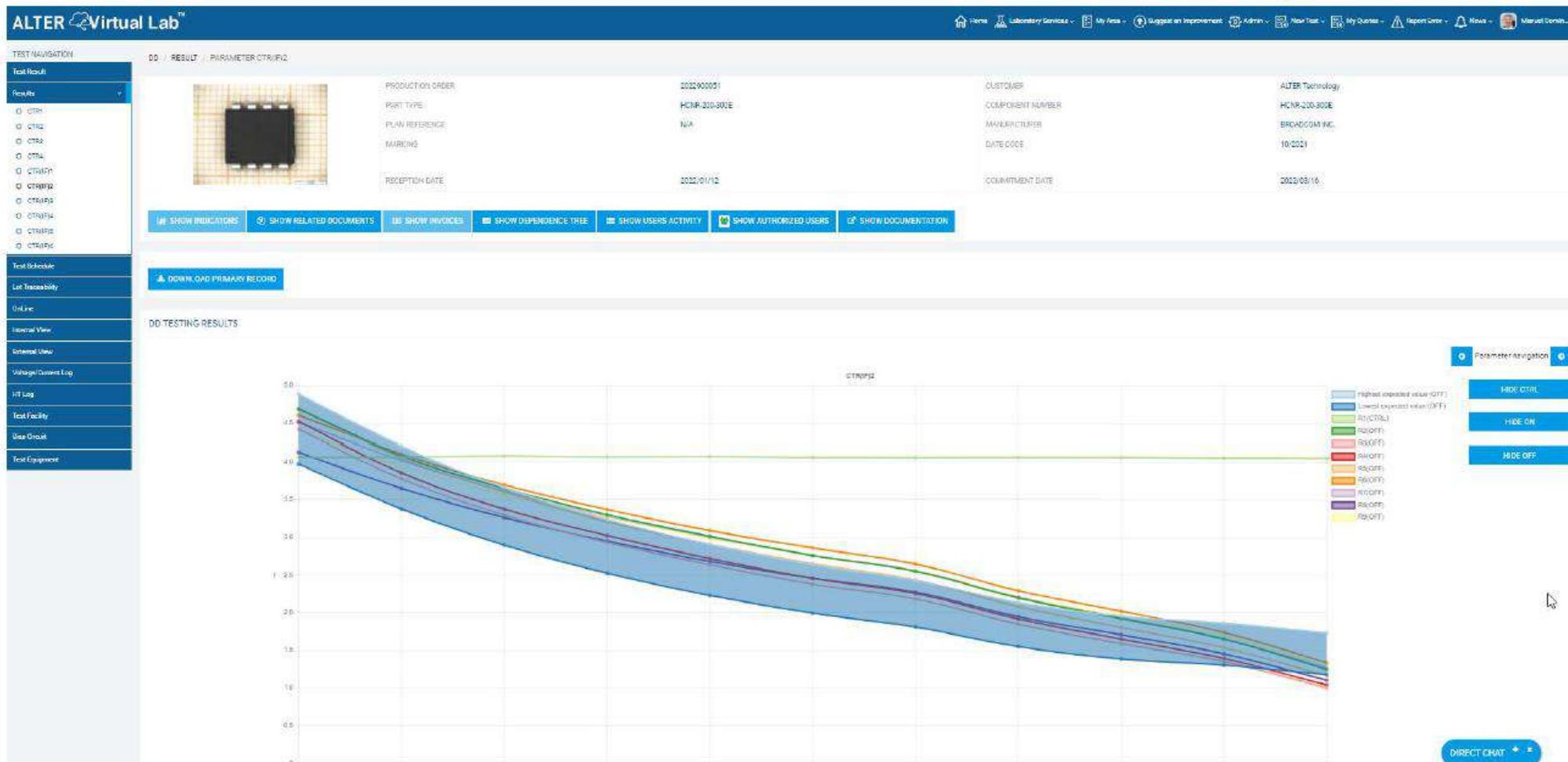
Parameter navigation

V(BR)CBO

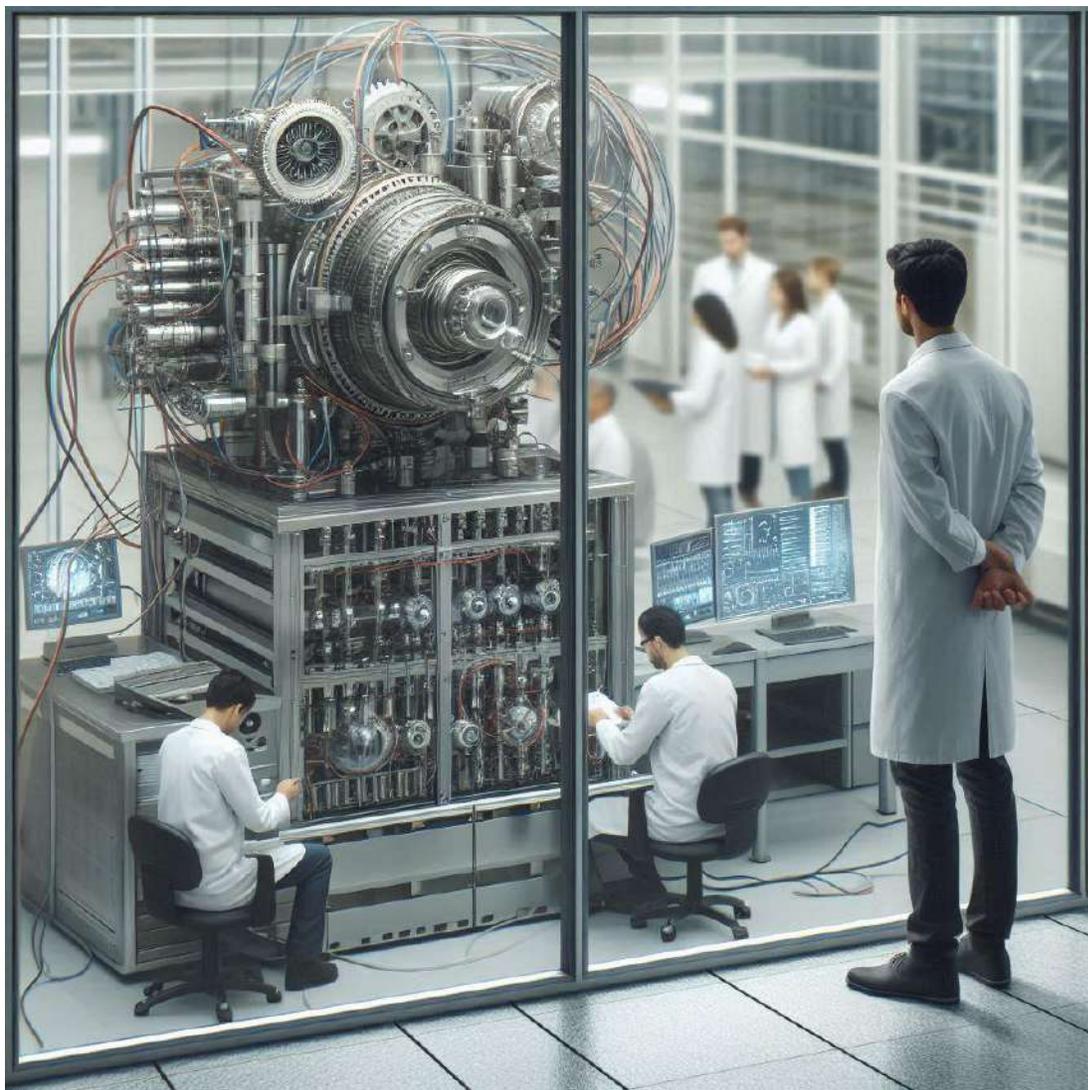
V(BR)CBO    0krad    10krad    20krad    30krad    50krad    70krad    100krad    24HAnn    168HAnn

# PRECEDER

## Predictions – Opto DDD example



## You need something (3)



I need to  
follow/witness the  
test someone is doing  
on my

- Board
- EEE part
- Inspection
- Audit
- ....

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Trilateral Safety and Mission  
Assurance Conference 2024

# VirtualLab

**Our Lab and Knowledge at your fingertips**

TRISMAC (Frascati) 24-26 June 2024

# Virtual Lab™

Online platform to provide full visibility of your test and communications with technicians

- Real time status of test performed
- Immediate communications with technicians in charge of your test
- Analytical results, showing parameter trends
- Implementation of Machine learning and prediction tools
- Implementing management of Parts Approval Documents and visualization of Project records



ALTER TECHNOLOGY is an expert, trusted supplier in engineering and testing of EEE components, systems and equipment, within the space and other technology markets. We offer a wide range of services, from radiation testing, screening, failure analysis, destructive physical analysis, qualification, environmental testing and many more.

### Laboratory Services.

Non-Destructive Techniques

Destructive Techniques

Environmental Testing

Material & Processes Testing

Microwave Testing

Electrical Measurement Testing

Radiation Verification

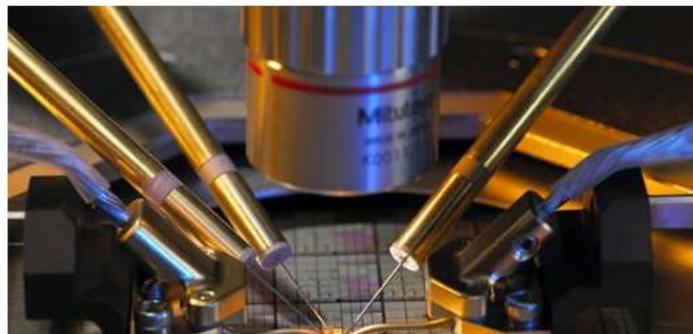
Mechanical Testing

Acoustic Microscopy Inspections

Innovation Solutions

### Main Testing Activities and Processes.

- Screening, plan preparation and engineering support.
- DPA (Destructive Physical Analysis).
- Constructional analysis, reverse engineering.
- Failure analysis investigation.
- LAT (Lot Acceptance Test), QCI (Qualification Conformance Inspection).
- Initial and Final Customer Source Inspections (Pre-cap and Buy-Off inspections with worldwide presence: anytime, anywhere).
- Relifing Inspection.
- Evaluation analysis on commercial parts for space suitability.
- Thermal characterization.
- Authenticity test; Counterfeit investigation.
- Element evaluation (on hybrid add-on parts).
- Storage with special conditions (hot & cold, dry atmosphere with nitrogen, etc).
- Dice managing, inspection and storage.



### Virtual Lab Capabilities.

- Full access in real time to the output of the on-going test.
- Direct link to the analysts performing the tests.
- Permanent access to historical results.
- Full access to the biggest picture bank available in the market.
- Training material.
- Documentation management.
- Push Notifications.



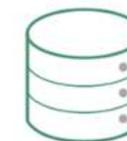
1 DESIGN

Design your tests over the web



2 CONDUCT

Virtual Lab conducts your tests



3 EXPLORE

Virtual Lab organizes your data into a smart data base

### Industry.

- Home
- Laboratory Services
- My Test !
- Our Customers
- Application Users
- Application Activity
- New Test
- Suggests an Improvement
- Report Error
- Test Navigation
  - Related Photos
  - Test Result
  - Components tree
- Filter
- BD Sensors Assembled PCB
- D1

Section

Location

Related photos

Remark:  
Crack in die.

100 µm

6 Area under inspection: Detailed cross sectioning view.

Direct Chat

2019/12/10 10:48:14

Thank you. The diode is JANTXV1N5822US. The datasheet cloud be downloaded from manufacturer here:  
<https://www.onsemi.com/~/media/pdf/datasheets/1n5822us.pdf>

2019/12/13 10:06:46

Mari Carmen Lopez Lopez

The V-A measurements of the Diode D2 have been performed and the results

Type Message ... Send

Example of microsectioning and communication with technician

The screenshot displays the ALTER Virtual Lab interface. At the top, there is a navigation bar with icons for Home, Crew, Laboratory Services, My Area, Suggest an Improvement, Admin, New Test, My Quotes, Report Error, News, and a user profile for Manuel Domín. On the left, a 'TEST NAVIGATION' sidebar lists 19 sub-tests, with '7 - RGA' selected and highlighted in red. The main area shows a close-up image of a dark component with 'MACOM' and '2112' printed on it. A blue arrow points from the '7 - RGA' menu item to the image. Below the image, the text 'Figure RGA - 2' and 'General external top view after RGA test.' is visible. A 'DIRECT CHAT' window is open in the bottom right, showing a message from a user stating that a test failed and will continue with constructional analysis. A response from Pedro Jesus Garcia Arribas is also visible.

Example RGA data and interaction

ALTER Virtual Lab™

Home Crew Laboratory Services My Area Suggest an Improvement Admin New Test My Quotes Report Error News Manuel Domin...

TEST NAVIGATION

- Test Result
- Test Summary Result
- OnLine
- EVI Photos
- RX Photos
- Summary Anom. S/N's

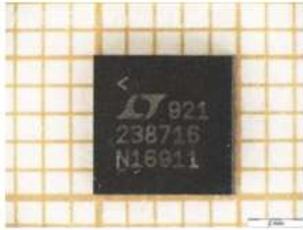
Page 1  
 S/N: 11, 12, 13, 14, 15  
 Page 3  
 Page 5  
 Page 6  
 Page 7  
 Page 8  
 Page 9  
 Page 10  
 Page 11  
 Page 12  
 Page 13  
 Page 14  
 Page 15  
 Page 16  
 Page 17  
 Page 18  
 Page 19  
 Page 20  
 Page 21  
 Page 22  
 Page 23  
 Page 24

	S/N: 11	S/N: 12	S/N: 13	S/N: 14	S/N: 15
Circuit Side General Internal parts					
Not-Circuit Side General Internal parts					
Transmission					
	<p>NOT COMPLIANT</p> <p>Scanning acoustic microscopy reveals major deviations in the inspected parts. These are rejectable as per the used inspection methods. The detected anomalies are:</p> <p>DL01: Delamination of the lead-frame/moulding interface on a bonding area (rejectable as per J-</p>	<p>COMPLIANT (minor anomalies observed)</p> <p>Acoustic inspection does not reveal any deviations leading to rejection. Nevertheless, some minor and acceptable anomalies were detected. All of them comply with this used inspection method. These are:</p> <p>DL02A: Partial delamination of a surface-breaking</p>	<p>COMPLIANT (minor anomalies observed)</p> <p>Acoustic inspection does not reveal any deviations leading to rejection. Nevertheless, some minor and acceptable anomalies were detected. All of them comply with this used inspection method. These are:</p> <p>DL02A: Partial delamination of a surface-breaking</p>	<p>COMPLIANT (minor anomalies observed)</p> <p>Acoustic inspection does not reveal any deviations leading to rejection. Nevertheless, some minor and acceptable anomalies were detected. All of them comply with this used inspection method. These are:</p> <p>DP02: Delamination of the top-paddle/moulding</p>	<p>NOT COMPLIANT</p> <p>Scanning acoustic microscopy reveals major deviations in the inspected parts. These are rejectable as per the used inspection methods. The detected anomalies are:</p> <p>DL01: Delamination of the lead-frame/moulding interface on a b</p>

Example of CSAM results

- TEST NAVIGATION
- Test Result
- Results
- Test Schedule
- Lot Traceability
- OnLine
- Internal View
- External View
- Voltage/Current Log
- HT Log
- Test Facility
- Bias Circuit
- Test Equipment
- Go to Preceder

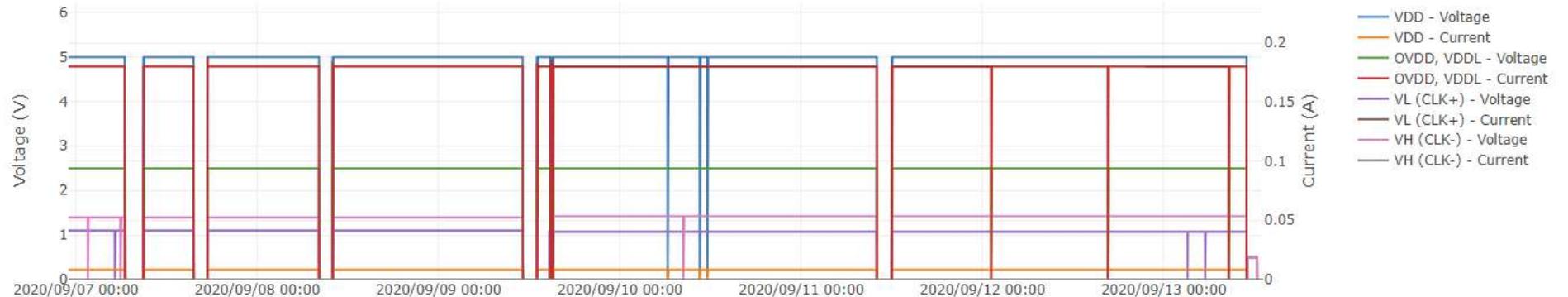
TID / VOLTAGE/CURRENT LOG



PRODUCTION ORDER	2019014012	CUSTOMER	OHB System AG
PART TYPE	LTC2387IUH-16#PBF	COMPONENT NUMBER	LTC2387IUH-16#PBF
PLAN REFERENCE	ATN-RP-349, Issue 2	MANUFACTURER	ANALOG DEVICES
MARKING	PINID#MFR921#238716#N16911	DATE CODE	1921
WAFER LOT	KBS533.1	COMMITMENT DATE	2022/07/08
RECEPTION DATE	2019/09/17		

- SHOW INDICATORS
- SHOW RELATED DOCUMENTS
- SHOW INVOICES
- SHOW CONTACT CALENDAR
- SHOW DEPENDENCE TREE
- SHOW USERS ACTIVITY
- SHOW AUTHORIZED USERS

### Voltage & Current

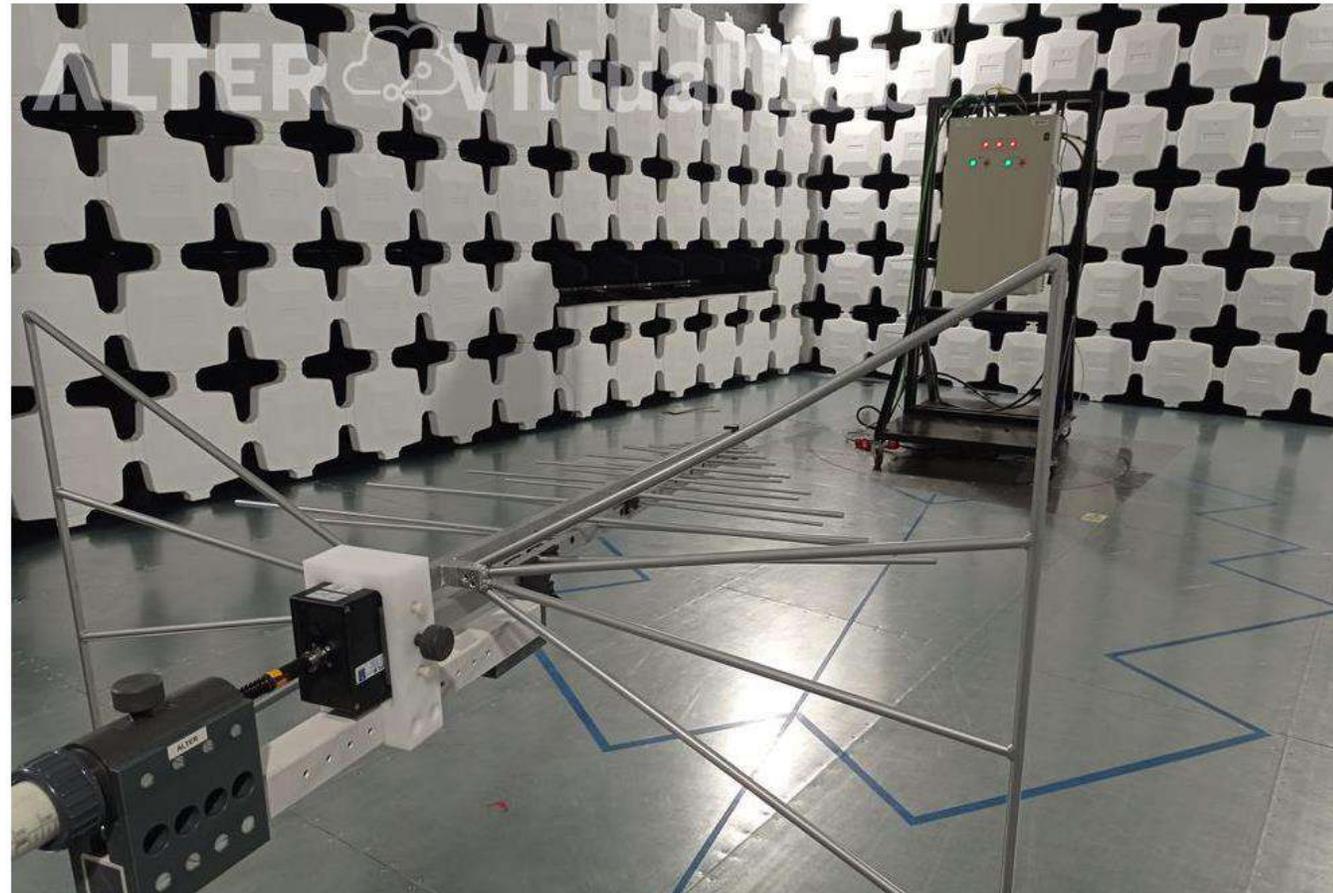


Example of TID test on COTS parts

TEST NAVIGATION

Radiated Emission setup. 30 MHz - 1 GHz

- Summary
- OnLine
- EUT Identification
- EUT ports
- Sub Tests
  - RADIATED EMISSION**
    - Conditions & acceptance
    - Set-Up
    - Results
    - Uncertainties
  - RADIATED EMISSION - ...
  - RADIATED EMISSION - ...
  - CONDUCTED EMISSION
  - ELECTROSTATIC DISCHA...
  - RADIATED IMMUNITY
  - ELECTRICAL FAST TRAN...
  - SURGE IMMUNITY
  - CONDUCTED IMMUNITY
  - POWER FREQUENCY MAGN...
  - VOLTAGE DIPS, SHORT ...
  - VOLTAGE DIPS, SHORT ...
- Test Equipment
- Functional Setup



Tests on equipments - example

TEST NAVIGATION

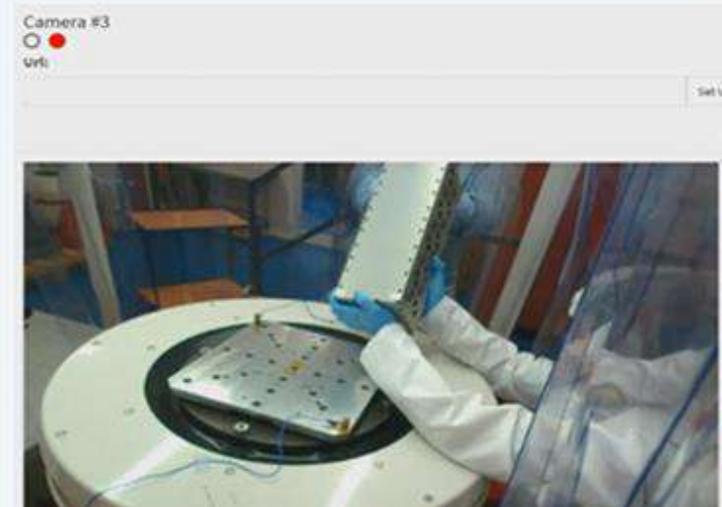
- Summary
- OnLine
- EUT Identification
- Sub Tests
- Test Equipment
- Functional Setup
- Environmental conditions
- Lot Traceability

CLIMATIC // SUMMARY



PRODUCT		MODEL	
CUSTOMER		CUSTOMER PO REF	
PRODUCTION ORDER		COMMITMENT DATE	
RECEPTION DATE			

SHOW INDICATORS | SHOW RELATED DOCUMENTS | SHOW INVOICES | SHOW CONTACT CALENDAR | SHOW DEPENDENCE TREE | SHOW USERS ACTIVITY | SHOW AUTHORIZED USERS





Vibration – Realtime monitoring

## Thermal Vacuum Cycling



# Virtual Lab™

For coordinated procurements (and now extended for any mission type), review and approval of documentation is not an easy task:

- EEE Parts Approval Documents (PAD)
- Non-conformance overview and quality records

Additional features:

- Follow-up of orders and delivery
- Access to laboratory reports from VirtualLab
- Customised Dashboard for each user, including actions and new information

# Virtual Lab™. PAD manager

- PROJECTS
- MY PROJECTS
- ARL - ARL - Ariel
  - JUI - JUICE
  - LPF - LISA Pathfinder
  - PTO - PLATO
  - RD6 - LISA
  - SOL - SOLAR ORBITER

MY PROJECT PADS - PROJECT: RD6 - LISA [✎](#) Multiple filtering criteria

MANUFACTURER	FAMILY	GROUP	PAD STATUS
PART TYPE	COMPONENT NUMBER	MULTIFILTER PADS:	PAD REFERENCE
SYSTEM	INSTRUMENT	EQUIPMENT	UNIT
USER			

CLEAR EXPORT FILTER

Different projects available, including LISA

- Approval of PAD online
- PAD documentation
- Direct comm/chat

Basic information: PAD number, Partnumber, PartType, Specification, Manufacturer and basic comments

SHOW 25 ENTRIES SEARCH:

PAD REFERENCE	PAD DATE	PAD STATUS	APPROVAL STATUS	FAMILY GROUP
00001_1	2024/04/25	Approved	All: ✓	[08] - [2]
00002_1	2024/04/25	Approved	All: ✓	[01] - [0]
00003_1	2024/04/25	Approved	All: ✓	[08] - [3]

PAD Reference: LISA-ATN-PAD-00001 PAD Issue: 1 for Part Type 3D2D4G72UB3652-SS from 3D-PLUS

Preview of PAD

**ALTER** PROJECT LISA Doc n°: LISA-ATN-PAD-00001 Date: 2024/04/10 Issue: 1 Prepared by: M. Sanchez

Approval requested by: ALTER TECHNOLOGY TVD Line-Item-No: C9XQ000000015R  
 Family: MICROCIRCUITS Feeder: [08] Group: MEMORY SRAM Grade: [20]

Component number: 3D2D4G72UB3652-SS  
 Commercial equivalent designation: 3D2D4G72UB3652  
 Manufacturer's Country: 3D-PLUS / France  
 Technology Characteristics (value or range of values with tolerance, voltage, package, etc.): MEMORY MODULE DDR2 SDRAM 64Mx2-BGA

Part in free (Y/N) [Y] Package: BGA 191 Issue: Rev: 1  
 Generic specification: ESCC-Q-ST-60-13C Issue: 1 Rev: Variant:  
 Detail specification: 3DPA-8201 Issue: Rev: Variant:  
 Specification amendment: Issue: Rev: Variant:  
 Quality level: SPACE Procurement by: ALTER TECHNOLOGY TVD NORD  
 Remark:

**APPROVAL STATUS**  
 EPPL Part 1/2 listed (1/2/N) [N]  
 ESCC QPL or EQML listed (Y/N) [N]  
 MIL QPL or QML listed (Y/N) [N] QPL/QML reference:  
 Other approvals/former usage:  
 Evaluation programme required (Y/N) [N] Evaluation programme reference:  
 Remark: Covered by 3D-plus Hybrid Line Capability Approval (ESA PID 3300-0546). Buy-off to be substituted by I1 at CPPA.

**PROCUREMENT INSPECTIONS AND TESTS**  
 Precep (Y/N) [N]  
 Lot acceptance:  
 ESCC LAT/LVT LAT level or subgroup [ ]  
 Other LAT (Y/N) [Y] MIL\_QC/TCI group:  
 Buy-off (Y/N) [ ]  
 BPA (Y/N) [ ] Sample size:  
 Complementary tests: EXTENDED TSOP LAT BASED ON ECSS-Q-ST-60-13C. MODULE LAT.  
 Remark: 1 additional sample to be procured as Golden Stock. RECEPTION IN DRY PACK, TO BE STORED UNDER DRY ATMOSPHERE

**RADIATION HARDNESS DATA**  
 Radiation hardness assurance plan applicable (Y/N) [N]  
 Doc. Ref:

Approval Status

- ALTER approval date 2024/05/01 by: Manuel Sánchez Ruiz  
Comments:
- ESA approval date 2024/05/01 by: Silvia Massetti Approval of PAD online!  
Comments:

Related Documents Download documentation

ENTITY TYPE	ENTITY IDENTIFICATION	DOCUMENT TYPE	TITLE	FILE	DESCRIPTION	DOWNLOAD
PAD	PAD	PAD	LISA-ATN-PAD-00001_1.pdf	LISA-ATN-PAD-00001_1	LISA-ATN-PAD-00001_1	
Project General Documentation	Project General Documentation	Project General Documentation	LISA-presentation.pdf	LISA-presentation	LISA-presentation	

PAD Ref: LISA-ATN-PAD-00001 Issue: 1

2024/04/26 08:48:22 Manuel Morales

LISA-PCB needs to discuss about SS1 option, including LAT at TSOP level following ECSS-Q-ST-60-13C or just SS based on ECSS-Q-ST-60-05

Select files...  Direct chat for LISA-PCB

Type Message...

## You need something (4)



I need to  
have a quick  
estimation in terms of  
radiation for my unit

**ALTER**

**TRISMAC**  
Trilateral Safety and Mission  
Assurance Conference 2024

# RAD-E4SPACE

**Our Lab and Knowledge at your fingertips**

TRISMAC (Frascati) 24-26 June 2024

# RAD-E4SPACE

The screenshot displays the RAD-E4SPACE web application interface. At the top, there is a navigation bar with links for Pricing, About us, Tools, and Documentation. Below this, a breadcrumb trail shows 'LEO' and 'Polar'. The main content area is titled 'Polar' and includes an 'Edit' link. A table displays mission parameters: Altitude (700 km), Inclination (90 deg), and Lifetime (3). A sidebar on the left contains a 'SELECT TOOL' section with 'TID' and 'SEU RATE' options, and a 'PROVIDED BY ALTER TECHNOLOGY' logo. The 'Cubes' section features two cube configuration panels. The first panel, 'new cube', shows dimensions of 2,5 mm for x, y, and z axes, with a total TID level of 5.51e+0 krad(si) and directional TID values of 9.18e-1. The second panel, 'copy of new cube', shows dimensions of 5 mm for x, y, and z axes, with a total TID level of 1.57e+0 krad(si) and directional TID values of 2.62e-1. To the right of these panels is an 'Add Cube' section with buttons for 'Copy Last', 'Load Cube', and 'Create New'.

# Conclusion

- New Projects require new Product Assurance approach, co-existing with the traditional Space.
- Problems and questions are always the same. From IOD cubesat to class 1 mission
- Don not re-invent the wheel!, just think on a different way to solve same question considering your mission boundary condition
- Take benefit of the new tools and technology!

PA people are friendly (most cases...). Do not be scared to ask your PA engineer

# Thank you for your attention!

Contact details:

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EEE Parts Engineer and Product Assurance

[manuel.morales@altertechnology.com](mailto:manuel.morales@altertechnology.com)



Trilateral Safety and Mission Assurance Conference (TRISMAC 2024)

ESA –ESRIN. Frascati (Rome) 24-26 June 2024

Manuel Morales