KEYLABS

Enhancing your testing experience

Leading provider
of test solutions
for NFC

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Enhancing your testing experience

KEOLABS is a leading provider of test solutions for NFC (Near Field Communication) technology used in markets as diverse as payment, identity and transport. It is headquartered in the French Alps in the Grenoble metropolitan area.

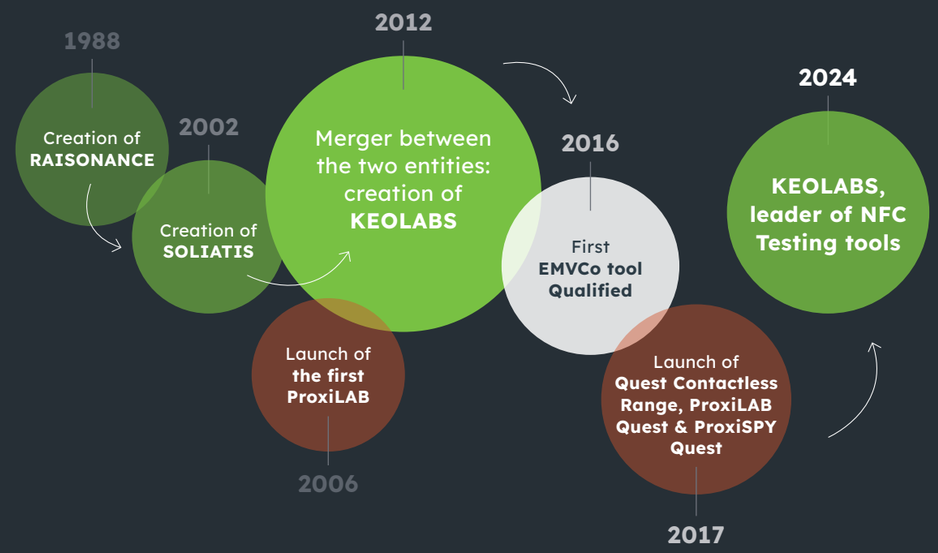
Company history

KEOLABS was created in 2012 following the merger of two companies specializing in test tools: RAISONANCE, which was a hardware supplier, and SOLIATIS, which developed test solutions based on RAISONANCE hardware. This connexion therefore made perfect sense.

Since then, KEOLABS has always been at the forefront of innovation, creating fully integrated testing solutions to improve the everyday user experience. “Enhancing your testing experience” is our tagline, and our entire team is focused on achieving this goal.

In 2019, the spin-off ICUBE Testing Center was created to separate the testing laboratory from KEOLABS’ core activities.

Today KEOLABS is still a private company mainly owned by its president and founder Michael Leplatois.



VISION

We want to give **to our customers the best testing experience**, leaving them free to focus on **what they do best**.

MISSION

our mission is to provide you with **high quality** smart-objects **testing tools**, at the **right time**, with all the **features you need**.

CORE VALUES

DEFINE US AS AN ORGANIZATION.
THEY REALLY ARE THE ESSENCE OF WHO WE ARE

TEAM ENGAGEMENT

We believe that happy employees make happy customers.

CUSTOMER CARE

We do everything we can to assist our customers.

QUALITY

We are committed to building reliable, and efficient tools.

EXPERTISE

We use our technical skills to respond effectively to market requirements.

ISO

9001:2015

Quality drives us to continually improve ourselves and provide our customers with the best testing experience.

KEOLABS has successfully complied with the ISO 9001 Standard requirements and **achieved its first ISO certification in 2019.** It undergoes annual audits done by an accredited third-party auditor.

By carrying out operations based on its **Quality Management System**, KEOLABS further improves the level of satisfaction it delivers to its customers. ISO 9001 certification serves as our hallmark of excellence, guaranteeing unparalleled quality and customer satisfaction in every product and service we provide.

Quality is not an act, it is a habit.

Aristotle

ISO 9001
EN 9100
BUREAU VERITAS
Certification

KEOLABS is engaged and follows

NFC Standards Evolutions

As a leading and trusted supplier of test equipment, KEOLABS actively collaborates with the technical community by taking part in the key standards committees that influence our industry.

EMVCo®

EMVCo conducts rigorous testing and certification to ensure that payment products comply with EMV Specifications for secure and interoperable transactions. EMVCo's testing ensures products from different manufacturers work seamlessly together, enhancing global payment security between various payment systems (including Visa, American Express, and Mastercard). Accredited laboratories worldwide perform these tests, maintaining high standards across the payment industry.

ICAO • OACI • ИКАО
国际民航组织 • الايكاو

ISO

KEOLABS is also deeply involved in the testing of Analog, Digital and Applicative layers of Machine Readable Travel Documents (eMRTDs), as defined by the International Civil Aviation Organization (ICAO). These standards ensure the security and interoperability of electronic passports and other travel documents. KEOLABS contributes to the development and refinement of test methodologies for eMRTDs, enhancing the security and efficiency of global travel document verification.

NFC FORUM

NFC Forum is dedicated to fostering the widespread adoption of NFC technology, striving to ensure seamless interoperability between NFC devices and tags. Additionally, it facilitates discussions regarding the alignment of NFC standards with other technologies, such as payment systems and contactless charging. KEOLABS' involvement in the NFC Forum is highly esteemed, particularly with our CEO Christophe Rabaud assuming the role of Vice Chair of Retail & Payment group.

We work together

Our Main References

US WEST COAST
Google | San Francisco
VISA | San Francisco
Amazon | Seattle
Microsoft | Seattle
Exponent | Los Angeles
Oura Ring | San Diego

US EAST COAST
Zebra | New York
Composecure | New York

CANADA
Canadian Bank Note | Ottawa
FIME | Montreal
THALES | Ottawa

SOUTH AMERICA
Telefonica | Mexico
Infineon | Brazil

EUROPE
Thales | France
STMicroElectronics | France
Continental | France

NXP | Austria
HID | Austria

Porsche | Germany
Scheidt & bachmann | Germany

LEGO | Denmark

IPZS
Istituto Poligrafico e Zecca dello Stato | Italy

FNMT
Fábrica Nacional de Moneda y Timbre | Spain

PWPW
Polish Security Printing Works | Poland

Saab | Sweden
Polisen | Sweden

HUF | Romania

Our Distributors

US - CANADA
New York
San Francisco
Montreal
San Diego

SOUTH AMERICA
Brazil

ASIA NORTH
Japan
South Korea
Taiwan
China

ASIA SOUTH
Singapore
India

AFRICA MIDDLE EAST
Toppan Gravity | United Arab Emirates
Tubitak | Turkey
HB Techno | Algeria

ASIA NORTH
Samsung | South Korea
Konai | South Korea
Sony | Japan
Panasonic | Japan
Cyient | India
Tata | India
Oppo | China
Alipay | China
Huawei | China
BCTC | China
Fudan | China

ASIA SOUTH
LTA Land transport Authority | Singapore
Idemia | Indonesia
Quest | Australia

Our platforms

KEOLABS provides a complete range of stand-alone platforms for contact and contactless technologies dedicated to EMV, ICAO, NFC FORUM, Mifare, Felica and ISO standards.

These platforms are totally open, and users can design their own proprietary tests using to documented APIs.

These tests can cover a wide variety of purposes: protocol analysis, analog characterization, conformity check, personalization, security attacks, etc.

In addition to openness, our platforms have been designed to offer high precision and reliability. We know how important repeatability is in the world of testing, and that's what makes our platforms so popular with by our customers.

A platform can, of course, be used to measure, but also to simulate or spy on a transaction. It is designed to accelerate time-to-market for smart card and reader developers, or for laboratories looking for powerful analysis tools.

Software Interface

Master instrumentation in a single click

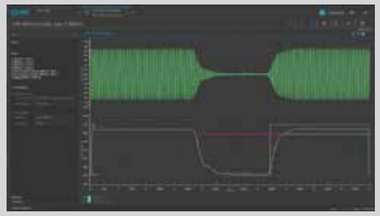
KEOLABS' QUEST LINE OF TESTING TOOLS DELIVERS STATE OF THE ART CHARACTERIZATION CAPABILITIES WITH UNPRECEDENTED EASE-OF-USE THROUGH THE NEW QUEST SOFTWARE ENVIRONMENT.

Quest provides characterization tests as preconfigured scenarios. These scenarios control the tester 's programmable features to enable single-click access to contactless tests such as waveform analysis and performance profiling.

Quest testing tools range dedicated for professionals to diagnose and analyse smart card systems. KEOLABS' new Quest line offers a broad array of testing tools to provide the most accurate performance insights and to help users clearly understand and overcome problems.

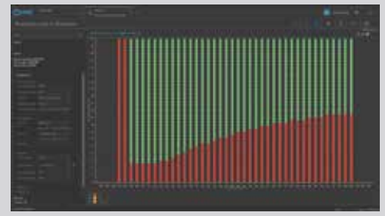
ProxiLAB Quest tools

PCD Waveforms Analyzer



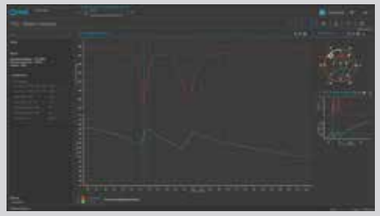
- Capture of a particular PCD frame
- ISO / EMVCo / NFC Forum parameter decoding

PICC Shmoo-plot



- Multiple parameters variation
- Support both Analog & Digital parameters
- Iteration for a same x-param / y-param test point

VNA



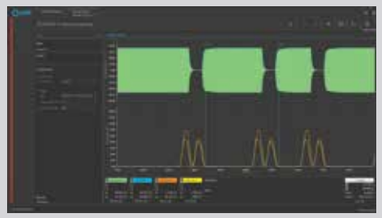
- Measure the resonance frequency
- Q factor
- Complex impedance
- -30dBm to +20dBm
- 8MHz to 80MHz

Script editor

- Python editor and debugger
- Auto-completion
- Syntax highlighting
- API explorer: Parameter helper, Drag and drop commands, Command documentation
- Examples explorer
- Logger

ProxiSPY Quest tools

Analog Viewer



- Oscilloscope-like display of easily captured analog frames
- Upper/lower side band analysis
- Hilbert envelop analysis

Digital Viewer

Advanced protocol analyzer enriched with dynamic protocol documentation:

- List and sequence view
- Statistical analysis
- Protocol warning/error easily identified
- Custom annotation
- Filtering and export features

NFC Contactless Tester

ProxiLAB Quest

Explore the power of your contactless technology

FULLY PROGRAMMABLE CARD (PICC), READER (PCD) AND NFC SIGNAL EMULATOR FOR DEVICE CHARACTERIZATION AND PROTOCOL CONFORMANCE VERIFICATION.

ProxiLAB Quest offers the performance and features required for full characterization and conformance validation of all 13.56 MHz contactless technologies, including the latest very high bit-rate evolutions. ProxiLAB Quest integrates with a variety of conformance certification solutions and test automation platforms.

"ProxiLAB Quest has been essential for our contactless technology testing. It enables efficient device characterization and conformance verification. We highly recommend ProxiLAB Quest to anyone focused on contactless technology validation."

Tom Tingxuan Zhang, Experienced NFC Expert / TMC

Technical characteristics

ProxiLAB Quests' redesigned architecture delivers new features to support device testing and characterization including:

- Accurate Arbitrary Waveform Generation (AWG)
- Advanced I/Q demodulation
- 20 dBm Vectorial Network Analysis (VNA)
- Pre-equalizer filtering

KEY FEATURES

ProxiLAB Quest emulates both card and reader signals at analog and digital levels and allows full control of all signal parameters to enable:

- Protocol conformance verification
- Characterization
- Card/Reader waveform analysis
- Card EMD profiling
- True-waveform signal replay
- Resonance frequency / Q factor

SUPPORTED PROTOCOLS

- ISO 14443 (A/B/B'), Mifare(TM)
- VHBR (ASK, to 8.6 Mbps)
- ISO 15693, 18000-3
- Felica (TM) (JISX 6319)
- NFC-IP1, -IP2 (ISO/IEC 18092, ECMA 340)

HARDWARE INTERFACES

- USB
- 3 General purpose I/O
- 1 Extension HDMI
- 2 Analog inputs
- 2 RF outputs

Contactless SPY

ProxiSPY Quest

Spying has never been so easy

TRACE AND DEBUG CONTACTLESS TECHNOLOGIES FOR SMARTCARDS, MOBILES, READERS, OTHER DEVICES...

ProxiSPY Quest is the most advanced laboratory tool to trace and analyze contactless communication and troubleshoot the interoperability issues in real-time. Thanks to its cutting-edge technology, ProxiSPY Quest provides an efficient and complete analysis, from the analog to the application layer. It can be used in transport, mobile, and contactless payment fields to analyze and debug new products and ensure inter-device compatibility.

ProxiSPY Quest includes a robust, reliable and non-intrusive probe that supports various standard-specific requirements (EMVCo, ISO, ICAO, NFC Forum, and more).

"We rely on the ProxiSPY Quest, and it's a crucial resource for our testing needs. We can trace and analyze contactless communication to help solve interoperability issues in real-time, providing a complete analysis from the analog to the application layer."

Philippe Alary / ST Micro

Technical characteristics

KEY FEATURES

- Non-intrusive probe
- Advanced I/Q demodulation
- Automatic decoding: no need to preselect the protocol
- Precise analog spy (25pts / per clock period)
- API for test bench usage
- Real-time triggers, 3 digital I/Os
- Transaction advanced analyzer (timing, application)
- Data logger
- Supports all protocols and speeds natively

SUPPORTED PROTOCOLS

- ISO 14443 A/B up to 6.8Mbps (VHBR ASK)
- ISO 15693 all modes
- ISO 18092 (Peer 2 Peer, Passive, and Active)
- Up to APDU Level
- JISX 6319 FeliCa
- NFC Forum (ECMA 340 NFC IP-1, ECMA 352 NFC IP-2)
- LLCP / SNEP
- NDEF
- V-card
- Topaz
- MIFARE
- B' (Calypso Innovatron)

HARDWARE INTERFACES

- USB
- 3 General purpose I/O
- 2 Analog inputs

Contact Tester & Spy

ContactLAB

Discover your contact technology

FULLY CONFIGURABLE READER, EMULATOR & PROTOCOL ANLYSER TO CHARACTERIZE, TEST, SPY AND CERTIFY CONTACT CARDS & READERS FOR ISO 7816 AND SWP (HCI,HDLC)

ContactLAB combines control of the full range of ISO 7816 and SWP parameters for comprehensive testing, with the added possibility of creating specific combinatorial situations for evaluation of behavior in out-of-norm conditions. Features include: control of all reader/card voltage, timing parameters, plug-and-play integration with external tools, triggering on combinations of events and patterns. Innovative and accurate, ContactLAB provides a detailed analysis of card/reader exchanges too. This is combined with single-click access to user-friendly interpretation of ISO 7816 and SWP smart card protocols (including EMV, GSM, HDLC and HCI).

In addition, **ContactLAB** is a Laboratory spy and protocol analyzer for easy, non-intrusive capture and analysis of communication between contact cards and readers using SWP, ISO 7816, SPI and I2C protocols.

"ContactLAB Quest is an invaluable asset for characterizing our contact cards at the electrical, protocol, and application levels. We can create customized test cases to thoroughly evaluate card behavior. Moreover, their support team is always on hand when we need them."

Xuefei Zhang, Test Lab Manager / HED

Technical characteristics

KEY FEATURES

- Contact reader ISO7816 & SWP
- Contact spy ISO7816 & SWP & I2C / SPI
- Contact Emulator ISO7816 & SWP
- Dedicated to Analog, Digital and Applicative tests
- Digital and analog trace
- Real-time triggers, 4 digital I/Os
- Python, C, C++, VB, Jscript, Windows
- Com Object

SUPPORTED PROTOCOLS

- ISO 7816
- HCI/SWP
- I2C/SPI

HARDWARE INTERFACES

- USB
- PC/SC
- 4 Digital I/O
- ID1 slot
- Probe slot
- General purpose I/O (AUX)

Portable Emulator & Spy

NomadLAB

Autonomous &
easy to use

NOMADLAB PROVIDES AUTONOMOUS COMMUNICATION SPY AND SIGNAL EMULATOR WITH TACTILE INTERFACE AND POWER FROM BATTERY OR USB.

It is equally adapted to application testing in a lab or field environment, providing communication spy and analysis for NFC, ISO/IEC 14443 A/B card signals, FeliCa, ISO/IEC 7816, SWP (HCI/SHDLC), emulation of ISO/IEC 7816, and ISO/IEC 14443 card signals for active testing of card readers.

This tool is ideal for Interoperabiliy troubleshooting in lab or field and can be used at application-level validation of contact and contactless readers.

"We use NomadLAB for card emulation, which has significantly enhanced the automation of our testing tool. Thanks to the KEOLABS support team, the integration has been seamless and meets all of Visa's requirements. We highly recommend their solutions!"

Paula Turner, CTO
ICC Solutions

Technical characteristics

- Emulate & analyze ISO 14443 (A, B) communications
- Emulate & analyze ISO 7816 communications
- Analysis & display of Protocol and Byte level information
- Control by Python, JScript, Java, C++, other language supporting Microsoft COM objects
- In emulation mode, layer 3 commands (ATQA, ATR, etc.) are automatically handled by the NomadLAB. Layer 4 commands received by NomadLAB are easily retrieved using its software API and can be treated by software, with responses then provided via the API.

KEY FEATURES

- Analyze ISO 14443 (A, B), NFC (IP1, IP2), FeliCa
- Analyze SWP and ISO7816 protocols
- Display of communication at Protocoland Byte levels
- Easy-to-use interface for standalone operation
- Battery operated with recharge from USB interface to PC
- NomadLAB operates both as a PC peripheral (USB 2.0) and in a fully autonomous standalone mode for field tests.

SUPPORTED PROTOCOLS

Accessories

Micro Nano Sim Flex KIT: 4 x 3FF Micro SIM probes (4 different models) and 4 x 4FF Nano SIM probes- (4 different models) + 1 Nano SIM R1 extra long version.

C-RF Probe 4: Specifically adapted for use with mobile phones and other non-standard form factors.

Our solutions

KEOLABS solutions can automate testing activities.

We provide off-the-shelf testing tools that run on top of our platforms, and additionally we supply libraries of test cases to perform automated compliance of any DUT (Device Under Test).

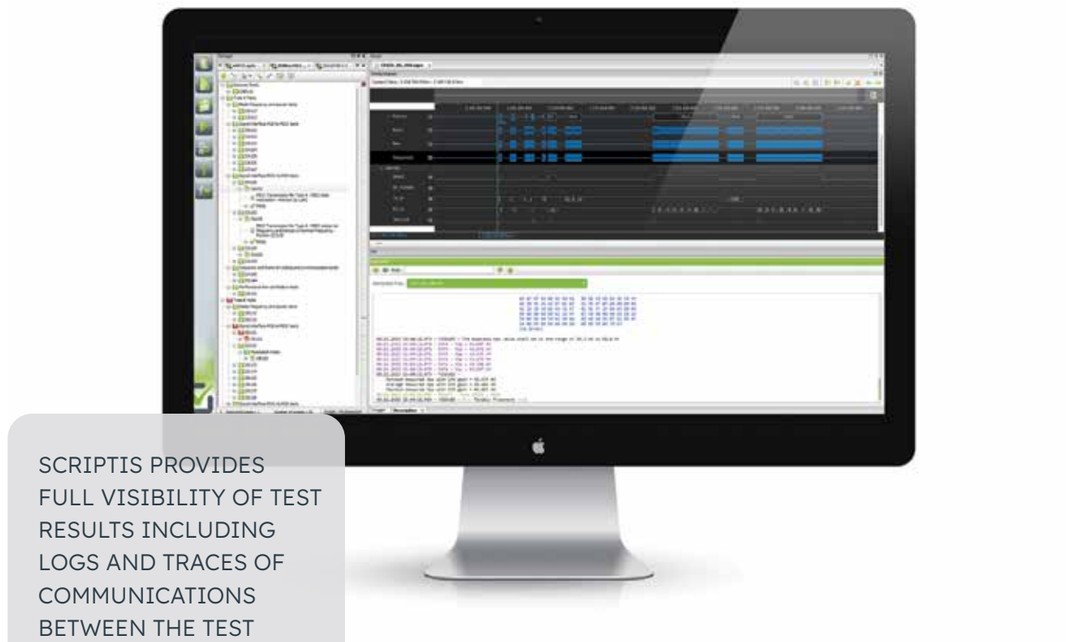
Our vision at KEOLABS is to give our customers the best testing experience, leaving them free to focus on what they do best. You don't need to worry about test specifications, we offer turnkey solutions.

Having a finalized, qualified solution is one thing, but if that solution is open, that's even better. At KEOLABS, we even believe that this is essential which means that thanks to our user-friendly scripting interface, users can modify, copy-paste, or duplicate test cases if necessary.

A key point to emphasize is that our solutions are deployed in the main official certification laboratories, so you can be sure that if your device passes the tests in your R&D department, it will also pass the laboratory certification.

SCRIPTIS

An Intuitive Testing Environment



SCRIPTIS PROVIDES FULL VISIBILITY OF TEST RESULTS INCLUDING LOGS AND TRACES OF COMMUNICATIONS BETWEEN THE TEST BENCH AND THE TESTED DEVICE.

KEOLABS' test suites are used in **SCRIPTIS** testing environment which facilitates testing with automation features such as visual cues and aids for manual testing, or robot integration for fully automated testing. The user controls all the characteristics of the tests such as data exchanged, timing, protocol errors, etc.

Testing parameters can also be modified from a configuration file including the power field, global variables such as CID, FSDI, as well as test command definitions. The scripts can be duplicated and modified, so that users can adapt them to their own in-house testing needs using **SCRIPTIS** editing and debugging features.

Common High-End hardware components for all RF solutions

OSCILLOSCOPE

> LECROY HDO6034 with 12-bit ADC and Xdev options is integrated into the SCRIPTIS™ based solutions to allow full control of the analog test benches for EMVCo analog-level testing.

ProxiLAB Quest

> Fully programmable card (PICC), reader (PCD) and NFC signal emulator for device characterization and protocol conformance verification.

RF AMPLIFIER

> Bowen 50W – 50 Ohms, 10-250 MHz, variable gain RF signal amplifier covers the power range required by EMVCo Standard.

5 OR 6 AXIS ROBOT

> Robotics allows the automation of certain tasks on your testing environment, increasing the speed of the tests, reducing the level of errors and allowing users to focus on the engineering.

Payment

Used By EMVCo Laboratories

Qualified solution to verify your payment applications

At KEOLABS, all our platforms and solutions are EMVCo qualified.

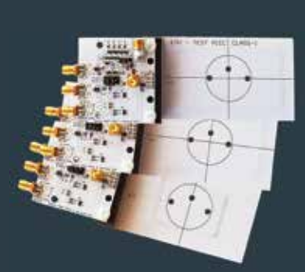
EMV™ is the global standard for payment cards and readers based on contact and contactless smart card technologies. The EMV specifications encompass test procedures and compliance processes managed by EMVCo, an organisation jointly owned and operated by American Express, Discover, JCB, MasterCard, UnionPay and Visa. KEOLABS provides complete testing solutions developed and qualified in accordance with EMVCo requirements.

"KEOLABS have been with us from the identification of our needs, to the on-site assembly, and the training of our teams on the new equipment. We are pleased to have chosen KEOLABS as our EMVCo partner."

Thomas Velhagen, Head of Smart Card Technologies / CETECOM

Hardware accessories

KEOLABS provides the following standard compliant probes and antennas for validation of the DUT: SC-Test PICCs and Test PCD EMVCo, 3 Test PICCs and 1 Test PCD are included in the kit, EMVCo BENCH, stand to mount the Test PCD and the stackers, CMR TEST to condition the signals and switching them between its inputs and outputs for test bench set-ups.



Technical characteristics

EMVCo® CONTACTLESS TERMINAL LEVEL 1

EMVCo PCD & MOBILE LEVEL 1, ANALOG TEST CASES.

Radio Frequency Power, PCD to PICC Signal Interface for Type A or Type B Communications, PICC to PCD Signal Interface for Type A or Type B Communications; Bit Level Coding Signal Interface for Type A & type B Communications; PCD IQ Demodulation for Type A & type B Communications.

EMVCo PCD LEVEL 1, DIGITAL TEST CASES.

Type A Tests, Basic Type A Exchange (single size UID) and timings measurement & Type B Tests with Basic Type B Exchange and timings measurement.

EMVCo® CONTACTLESS CARD LEVEL 1

EMVCo PICC & MOBILE LEVEL 1, ANALOG TEST CASES.

PICC Power Off and Power On States Field, PICC Behavior with Respect to the Radio Frequency Field, PICC Responsiveness of a Type A PICC, Verifying the PICC Transmission for Type A, Bit Level Coding for a Type A PICC; PICC Responsiveness of a Type B PICC, Verifying the PICC Transmission for Type B, Bit level Coding for a Type B PICC, Performance Pre-verification tests.

EMVCo PICC LEVEL 1, DIGITAL TEST CASES.

Basic Type A & B Exchanges and Timings Measurement, Basic Type A & B Exchanges with the minimum and longer Frame Delay Times PCD to PICC...
Block Protocol Executable Tests to support of the EMV CL Polling, Reception of chained I-Blocks from the PCD...

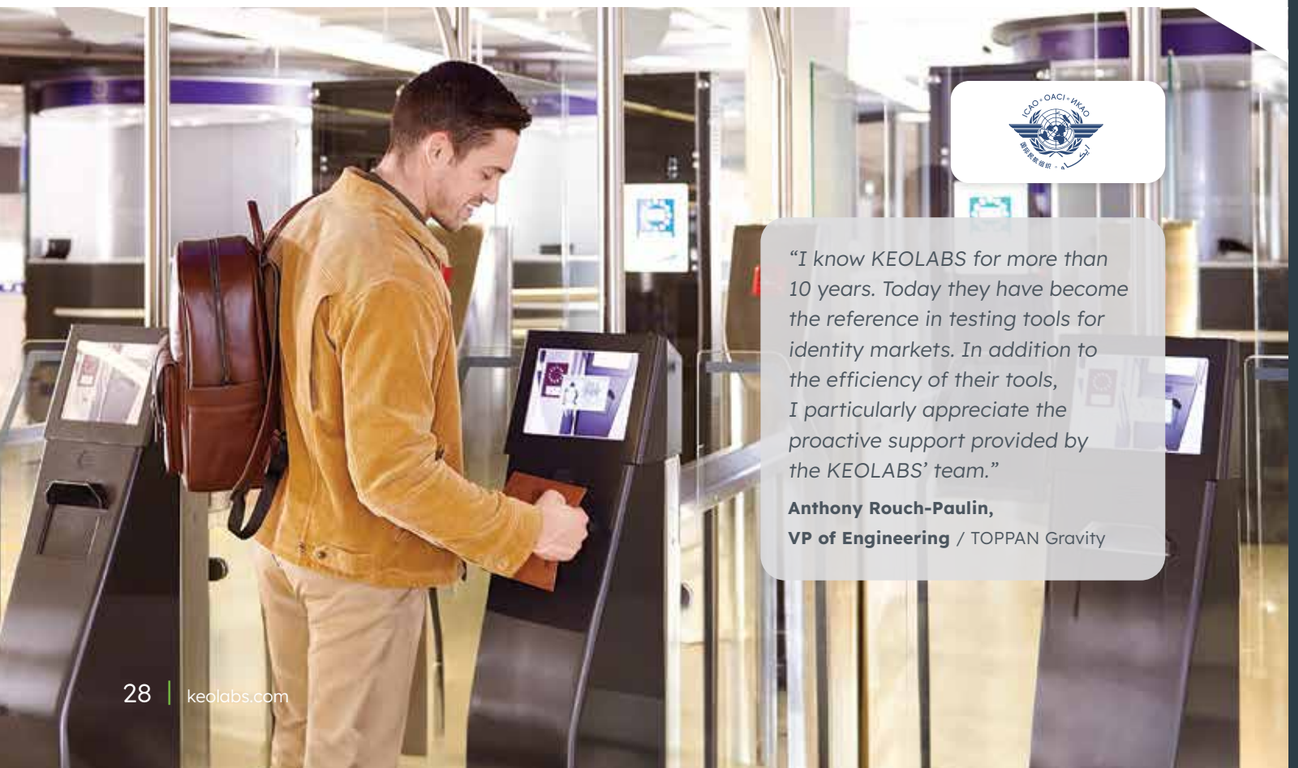
ePassport & eID Products

Used By National Printing Companies

Solution To Verify Your Identity Applications

KEOLABS provides off-the-shelf solutions to verify conformity of international electronic passport such as eDriving Licence or Identity cards, from the durability tests until the application part.

The International Civil Aviation Organization's (ICAO) standard is the international testing standard for validating electronic Machine Readable Travel Documents (eMRTD) implementing the ISO/IEC 18745-2 testing standard protocol in 13.56 MHz contactless communications. It is the foundation for ensuring the durability, reliability and interoperability between an epassport and a border control. KEOLABS' eMRTD Testing Solutions are SCRIPTIS-based solutions that are available to users for «in house» evaluation of their products during development before engaging in a formal certification. KEOLABS provide eDriving licence and Identity Card Testing solutions based on the latest ISO/IEC 10373-6 testing standard for the analog & digital tests and based on ISO/IEC 18013-4 and IAS ECC / EAC V2 test specifications.

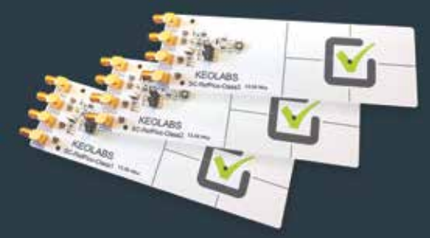


"I know KEOLABS for more than 10 years. Today they have become the reference in testing tools for identity markets. In addition to the efficiency of their tools, I particularly appreciate the proactive support provided by the KEOLABS' team."

Anthony Rouch-Paulin,
VP of Engineering / TOPPAN Gravity

Hardware accessories

KEOLABS provides the following standard compliant probes and antennas for validation of the DUT as part of the quoted validation solution as the ISO PCD Assembly 1 used to perform Layer 2 ISO 14443 tests or the Class ID1 PICC reference probe for Maximum Loading Effect testing.



Technical characteristics

PICC ANALOG & DIGITAL ISO 18745-2 + ISO 10373-6 TEST SUITES

> This Analog test suite is compatible with: ISO/IEC 18745-2 & ISO/IEC 10373-6: standards for Type A and Type B. Alternating magnetic field test, eMRTD transmission, Operating field strength, eMRTD reception, eMRTD maximum loading effect, eMRTD EMD level and low EMD time test.

> The Digital test suite is compliant with: ISO/IEC 18745-2 & ISO/IEC 10373-6 for Type A and Type B.
The test command sequences defined in ISO/IEC 18745-2 for "Plain", "BAC", "EAC", "PACE" with "AA-Active Authentication" options are supported.

ICC LEVEL 1 ISO 10373-3 TEST SUITE

> ISO 10373-3 defines tests for contact smart cards, checking protocol handling (T=0, T=1), APDU exchanges, and timing to ensure compliance with ISO 7816.

ePASSPORT – APPLICATION EMRTD TEST SUITE

THIS TEST SUITE COVERING ISO/IEC 7816 AND LOGICAL DATA STRUCTURE CONFORMS TO THE ICAO SPECIFICATION CALLED:
RF PROTOCOL AND APPLICATION TEST STANDARD FOR EMRTD, PART 3: TEST FOR APPLICATION PROTOCOL AND LOGICAL DATA STRUCTURE

> Layer 6 Security and Commands tests: Select Application command,Security conditions of BAC protected eMRTDs, Basic access control, Protected SelectFile command, etc...
> Layer 7 Logical Data Structure tests: Tests for the EF.COM LDS object, Tests for the Datagroup 1 LDS object, Tests for the datagroup 2 LDS object.
> Advanced security mechanisms for machine readable travel documents Extended Access Control (EAC) / Tests for security implementation

eID – APPLICATION EAC V2 & IAS ECC TEST SUITES

> BSI TR-03105 PART 3.3 Test plan for eID-Cards with Advanced Security Mechanisms

> IAS ECC Technical specification, formerly called IAS v2, is based on CEN TS 15480 mandatory features for application: prEN 14890-1:2006 and prEN 14890-2:2006, ISO 7816 series, EAC V1.11.

eDL – APPLICATION ISO 18013-4 TEST SUITE

ISO/IEC 18013-4:2019 – Personal Identification — ISO Compliant Driving License — Part 4: Test Methods
ISO/IEC DTR 19446 -ISO-Compliant Driving Licence – European driving license

Access Control, Transport & Smart Objects

Used by transport operators

Solution To Verify Your Transport or Acess control Applications

For cards and readers used in fare collection applications, KEOLABS provides off-the-shelf solutions to verify conformity to relevant transport standards.

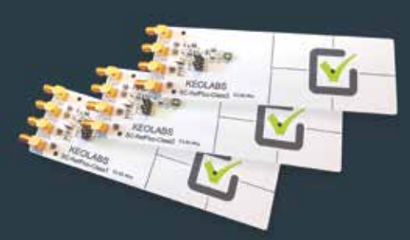
KEOLABS ISO 10373-6 Analog & Digital Testing Solutions are available to users for “in house” evaluation of their products during development before engaging in a formal certification, conformance verification standards ensure the ISO/IEC 14443 interoperability between a card/ticket/smart objects and a reader.

“At Smarting, we use KEOLABS testing solutions to ensure the interoperability of cards and readers for Barcelona’s transportation system. Their comprehensive tools streamline our testing processes and help us deliver reliable, seamless experiences for users. We highly recommend KEOLABS for robust testing solutions.”

Matias Santiago Diaz, CEO / Smarting

Hardware accessories

KEOLABS provides the following standard compliant probes and antennas for validation of the DUT as part of the quoted validation solution as the ISO PCD Assembly 1 used to perform Layer 2 ISO 14443 tests or the Class ID1 PICC reference probe for Maximum Loading Effect testing.



Technical characteristics

PICC ANALOG & DIGITAL ISO 10373-6 TEST SUITE

THIS PICC ANALOG TEST SUITE IS COMPATIBLE WITH ISO/IEC 10373-6 STANDARD FOR TYPE A AND TYPE B.

Alternating magnetic field test, eMRTD transmission (performed at 106 kbps to 6.8Mbps), Operating field strength (performed at 106kbps to 6.8Mbps), eMRTD reception (performed at 106kbps to 6.8Mbps), eMRTD maximum loading effect, eMRTD EMD level and low EMD time test (performed at 106kbps).

THIS PICC DIGITAL TEST SUITE IS COMPATIBLE WITH ISO/IEC 10373-6 STANDARD FOR TYPE A AND TYPE B

Type A and Type B initialization tests, Scenario G.1, Testing of the PICC state transitions, Handling of anti-collision, PICC reaction to ISO/IEC 14443-4 Scenarios...

VICC ANALOG ISO 10373-7 TEST SUITE

VICC load modulation and reception tests, including VCD 100% and 10% modulation with 1 out of 4 and 1 out of 256 subcarrier coding, as well as VICC low and high speed modulation using single and double subcarriers.

ICC LEVEL 1 ISO 10373-3 TEST SUITE

ISO 10373-3 defines tests for contact smart cards, checking protocol handling (T=0, T=1), APDU exchanges, and timing to ensure compliance with ISO 7816.

PCD ANALOG & DIGITAL ISO 10373-6 TEST SUITE

THIS PCD ANALOG TEST SUITE IS COMPATIBLE WITH ISO/IEC 10373-6 STANDARD FOR TYPE A AND TYPE B

ISO/IEC 14443-1 parameters tests: Alternating magnetic field test
ISO/IEC 14443-2 parameters tests PCD field strength, Modulation index and waveform, Load modulation reception, PCD EMD immunity test, PCD EMD recovery test.

THE PCD DIGITAL TEST SUITE IS COMPATIBLE WITH ISO/IEC 10373-6 STANDARD FOR TYPE A AND TYPE B

Type A specific tests: Frame Delay Time PICC to PCD ISO/IEC, Request Guard Time, Handling of bit collision during ATQA, Handling of anti-collision loop, Handling of RATS and ATS, Handling of PPS response.
Type B specific tests: I/O transmission timing, Frame size selection mechanism, Handling of the CID during activation by the PCD.

TERMINAL LEVEL 1 ISO 10373-3 TEST SUITE

ISO 10373-3 defines tests for readers, verifying power-up, reset, communication, and protocol compliance with ISO 7816 standards.

Mobile, Automotive & Retail

Used by Mobile or Automotive Makers

Qualified solution To Verify Your NFC Applications

KEOLABS offers off-the-shelf solutions to verify conformity of NFC enabled objects and systems to relevant standards including NFC forum.

The testing environment meets strict conformance requirements of NFC Forum standard for verifying analog, digital and application implementations in passive devices (cards, tags, mobiles, etc) and active systems (readers, mobiles).

The NFC Forum provides international test specifications for functional validation at the analog and protocol levels of phones, tags, devices and other systems implementing the NFC protocol in 13.56 MHz contactless communications. These specifications are the foundation for ensuring the reliability and interoperability of NFC systems and devices.

"We have both analog and digital test solutions from KEOLABS, and they provide flexibility and efficiency in our day-to-day characterization and NFC compliance test tasks. We appreciate the robustness of the solution and the support provided by KEOLABS' team."

Marek Trusinski, Solutions Architect and NFC Subject Matter Expert
ZEBRA Technologies

Hardware accessories

KEOLABS provides the following standard compliant probes and antennas for validation of the DUT:
Poller-Listener-kit: Poller and Listener reference antennas for testing of NFC objects and systems.
NFC Forum Kit: In addition to the poller/listener antennas, KEOLABS provides a "calibration test bench" to calibrate the NFC antennas + a KEOKLAMP to maintain the antenna & the device.

Technical characteristics

NFC FORUM ANALOG TEST SUITE (POLLER/LISTENER)

Listen Mode: Power Reception, Loading Effect Measurement, Carrier Frequency, Modulation reception at limit conditions,
Load Modulation Amplitude, Subcarrier Modulation

Poll Mode: Power Emission Measurement, Carrier Frequency, Reset Characteristics, Modulation Measurement, Load Modulation Amplitude Reception.

NFC FORUM DIGITAL TEST SUITE (POLLER/LISTENER)

Poll Mode: Group 1: Device with NFC-A, NFC-B, and NFC-F Technology and **Group 2**: Device with NFC-A, NFC-B and NFC-F Technology; Tags T1T, T2T, T3T, T4AT and T4BT; Peer–to-Peer with NFC-A and NFC-F. Tag Operation, Reading Tests, Writing Tests, Write on Read Only Tests.

Listen Mode: Group 3: Device with NFC-A, NFC-B and NFC-F Technology; Tags T3T, T4AT, T4BT, T5T; Peer–to-Peer with NFC-A and NFC-F, Tag Application, Reading Tests, Writing Tests, Locking Tests, Read Only Tests

NFC FORUM LLCP/SNEP TEST SUITE (INITIATOR/TARGET)

Group 1: MAC Link Layer: MAC Link Activation and Deactivation, LLC Activation, Normal Phase, LLC Deactivation, Symmetry Procedure

Group 2: Connectionless Transport Mode Tests, Information Transfer

Group 3: Connection-Oriented Mode Tests, Connection Establishment, Information Transfer, Receiver Busy Condition, Connection Termination

Group 4: Aggregation Tests

SNEP: Client Tests, Basic Interconnection Tests, Put NDEF Message, Get NDEF Message, Server Tests, Basic Interconnection Tests, Accept NDEF Message, Return NDEF Message

Our Services

Our aim at KEOLABS is not only to supply test tools but also to support our customers throughout their R&D projects.

- It starts with our support and maintenance contract, which is included by default for one year on all our products. We know how important it is to have access to responsive support and, in addition to our e-mail and telephone assistance, we don't hesitate to visit our customers at their premises, replacing equipment at our own expense whenever necessary.

- As a continuation of this support contract, we offer access to our technical expertise through dedicated training courses. Whatever your interest in contact or contactless technologies, whatever your knowledge level, KEOLABS will tailor its training to your needs.

- KEOLABS also provides technical consultancy for product design or to analyse the performance of your device. We integrate robots and specific antennas, so no matter what the issue you need to solve in the behaviour of your product, you can be sure that we will implement the right solutions and services to help you.

Support & Maintenance

Customer care & quality

This support and maintenance contract applies to all KEOLABS testing platforms and solutions including their hardware platforms and accessories, and software components, which have been purchased from KEOLABS by the customer.

All Products benefit from a twelve months support and maintenance service covering:

> Access to direct e-mail and telephone support.

> Access to any relevant software upgrades.

> Repair of physical defects or malfunctions in products that result from design or manufacturing errors, or are incurred under normal use conditions.

The main goal of KEOLABS is to provide the best support to our customers and to acknowledge any customer request within one business day. KEOLABS includes a calibration service too for the platforms and antennas to guarantee the best accuracy in long term use.

Product Design

Guidance on product design

It is important to improve the performance of a product in term of interoperability coverage, operating volume, power consumption, etc.

KEOLABS consulting services perform the following tasks: establish a diagnosis of the situation, analyze the needs, write recommendations with different scenarios and present them to the customer.

- **Advice for design of antenna and product integration**
- **Characterization of a prototype (card, tag, mobile, reader, DIP, board)**

Training

Understanding about standards and specifications

KEOLABS may help its customers increase their level of expertise by providing insightful knowledge about international standards and specifications. It is not just a theorical training, and participants can familiarize themselves with concrete and practical examples using characterization tools (platforms and software) developed by KEOLABS.

The trainings includes topics such as generic sessions about standards (ISO14443, EMVCo, ICAO, etc.), comparison and interoperability issues between these standards, foundations about card antenna design, analyzing a failed NFC transaction, and much more.

Consulting

Consulting adapted to customer’s need

KEOLABS’ experts use their extensive experience, gained from many projects, to help its customers select the best hardware configuration.

This configuration is tuned during the R&D phase using a detailed test plan prepared by KEOLABS, and these tests are then customized in a streamlined process for production.

- **Tests of several samples with a focus on specific performance criteria**
- **Characterization report including logs, measurements and detailed analysis**

Enhancing your testing experience

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