Committed to excellence

RUTRONIK
ELECTRONICS WORLDWIDE

RUTRONIK
SYSTEM SOLUTIONS

From Single Product to Solution
from Basic Level to Research Level

AI³

Department Presentation

RUTRONIK
SOLUTIONS

CONFIDENTIAL

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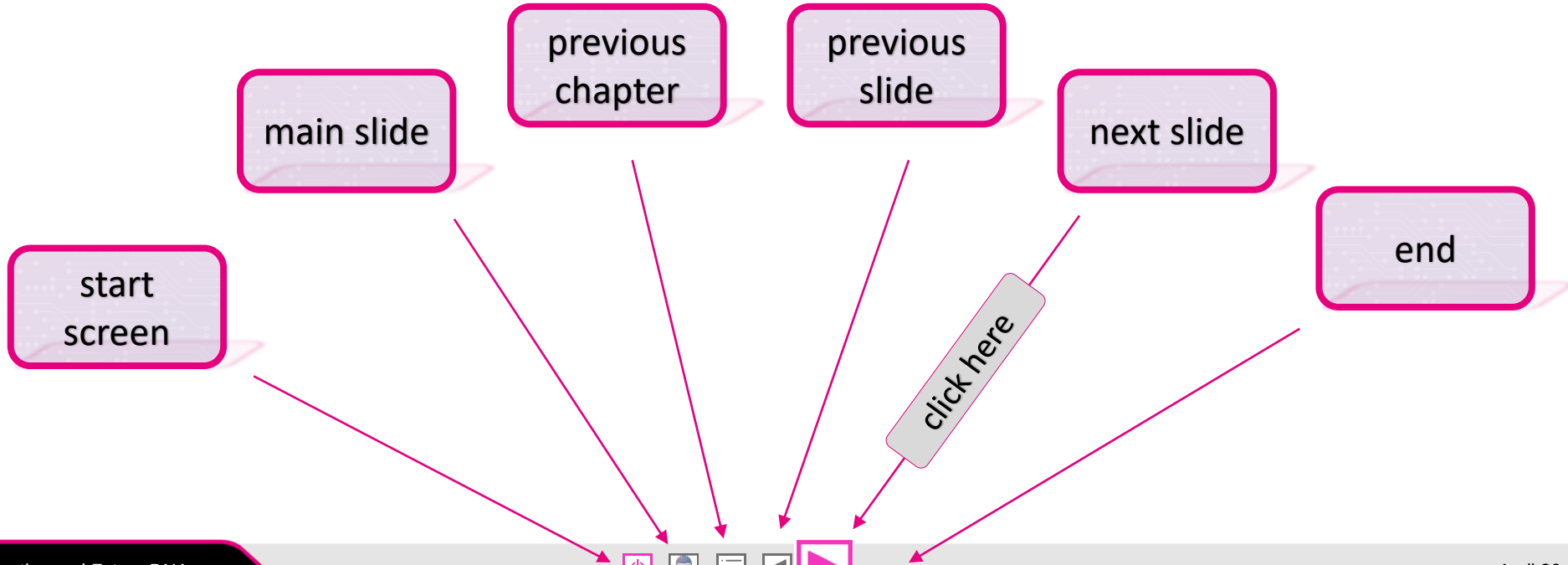
You can select the colored **buttons** or you can click on defined **text fields**



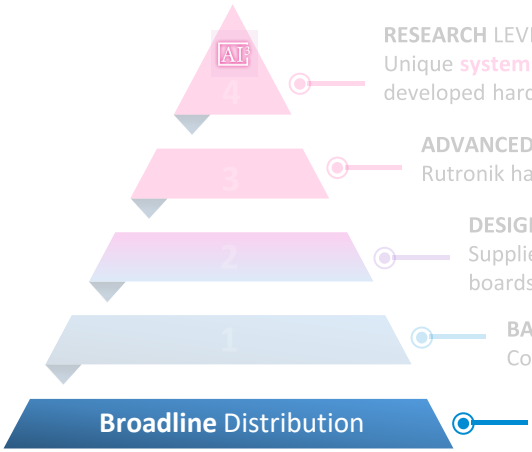
BROADLINE DISTRIBUTION

Consult.
- Worldwide and individual consulting for applications and commercials parameters.

Components.
- Component diversity regarding portfolio of semiconductors, passive components, electromechanical components, displays, boards and systems, storage and wireless technologies.

Logistics.
- Consulting for individualized logitics systems and modules as well as value added services.

Quality.
- Certified quality management system as well as continuous monitoring of processes. Additionally certified environment, health and security system.



RESEARCH LEVEL
Unique **system solution based on Rutronik IP**, particularly developed hardware and software by Rutronik

ADVANCED DESIGN LEVEL
Rutronik hardware and respective software development and adaption

DESIGN LEVEL
Supplier hardware and software development by Rutronik to combine different supplier boards and show a system solution (complete function / function of application)

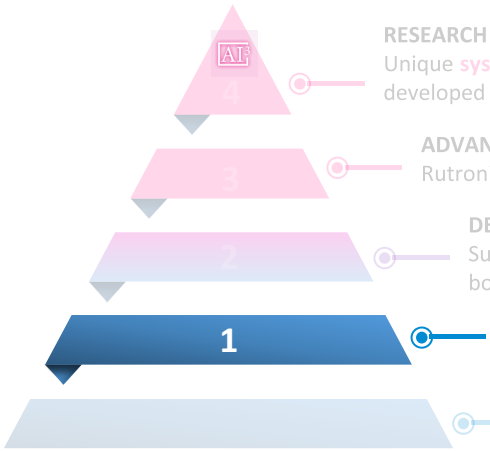
BASIC LEVEL
Consulting on product and system level

BROADLINE DISTRIBUTION
Focus on commercial and technical support for single products and logistics

BASIC LEVEL

Key facts
- Technical consulting on product and system level using diagrams, data sheets and training materials
- Technical consulting through product and application engineers
- Commercial consulting through sales regarding technologies, procurement and logitics

Customer advantage
- **Inspiration** system thinking, new technologies, new products
- **Education** training for new products
- **Exchange** with experts on application level



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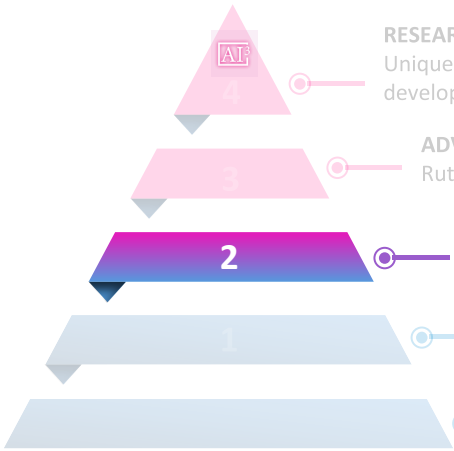
DESIGN Level

Key facts

- Hardware platforms, evaluation kits and reference design from suppliers as basis, optional combination of different boards
- Software adaption by Rutronik support engineers which connect different boards with each other to demonstrate the corresponding functions
- Support for implementing the respective software
- Consulting for the functions of the hardware/boards, functions of the products within the boards and system thinking combine different boards and eventually forming a system solution (overall function, application)



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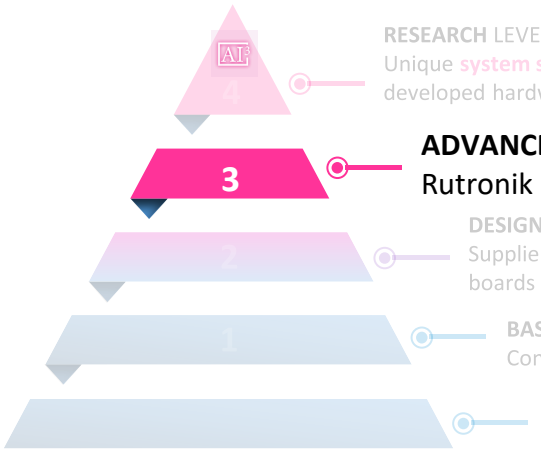
ADVANCED DESIGN LEVEL

Key facts

- Own Rutronik hardware (platform/boards) and corresponding software development
- Usage of application modules based on these platforms
- Development of software adaptions for different application modules with self developed software
- Close cooperation with multiple suppliers through the modular set up of the Advanced Design Level System Solutions
- All key components are based on the portfolio of our suppliers
- Fusion of the know-how of multiple suppliers and Rutronik

Customer advantage

- Modular solution with the best fit combination of different suppliers and products
- Time to Market is reduced significantly
- Inspiration for best fit products



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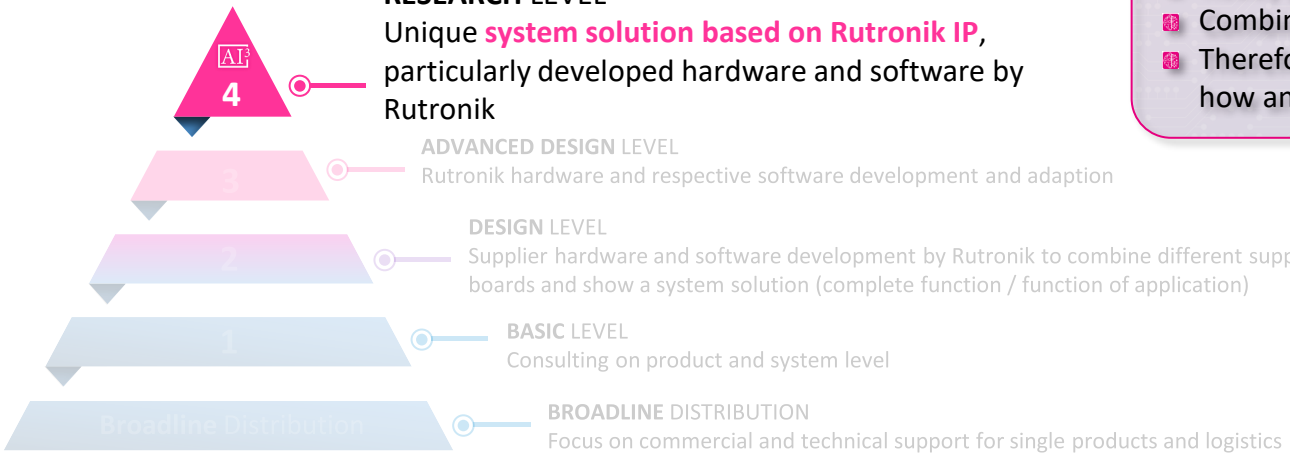
RESEARCH LEVEL AI³

Key facts

- Hardware developed by Rutronik serving as a proof of concept for system solutions in new markets and new technologies
- Based on Rutronik IP
- Development based on cooperations with leading universities and institutions
- Rutronik is following an IP protection program within the research programs
- Fusion of the know-how of suppliers on one board with the product know-how of Rutronik
- Fusion of the research know-how of Universities and Rutronik know-how

Customer advantage

- Ready proof of concept on research level
- Combination of scientific know-how and newest products
- Therefore greater competitive advantage regarding know-how and time to market



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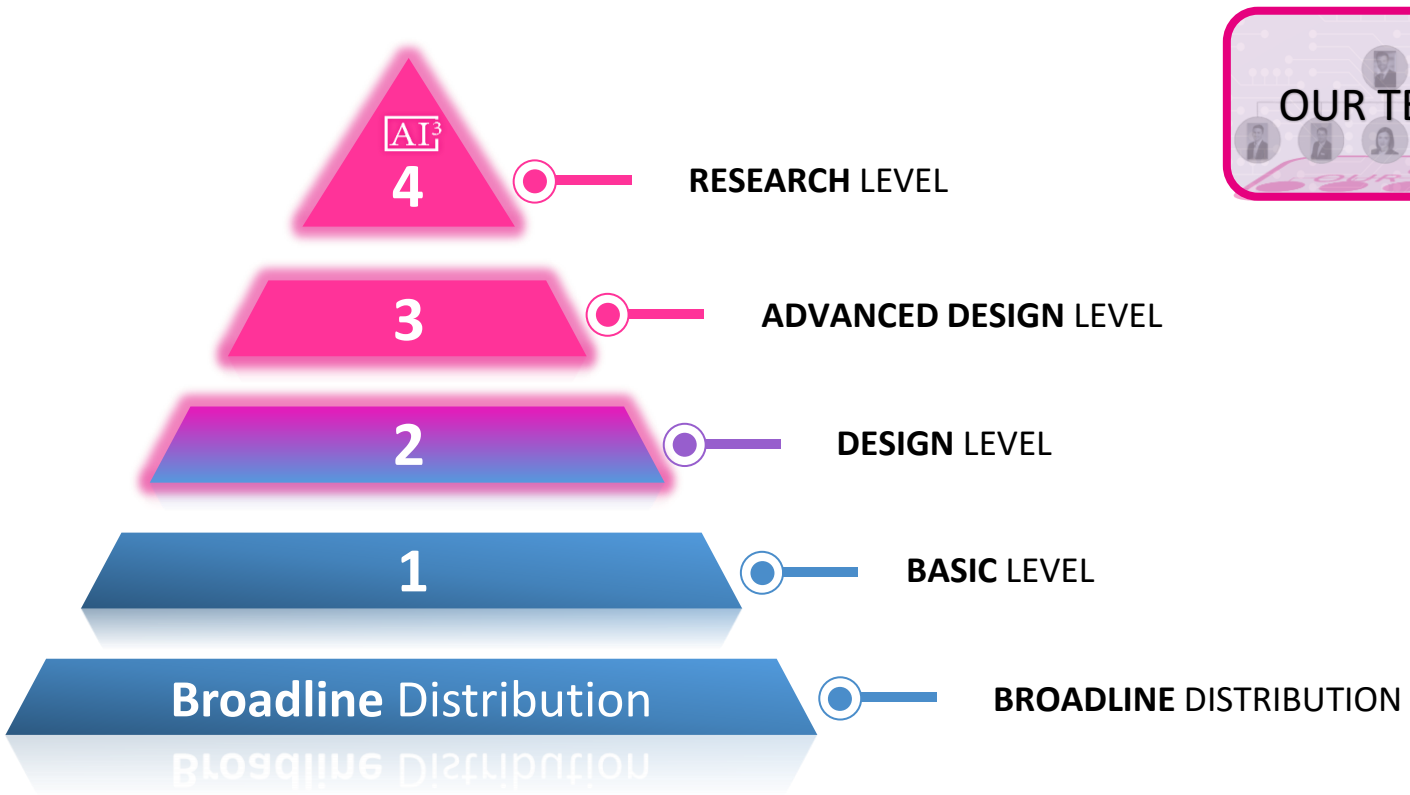
RUTRONIK SYSTEM SOLUTIONS



TEAM

Stephan Menze
Head of Global Innovation Management

Tim Roos
Solution Business Development Manager

Petar Grantcharov
Solution Business Development Manager

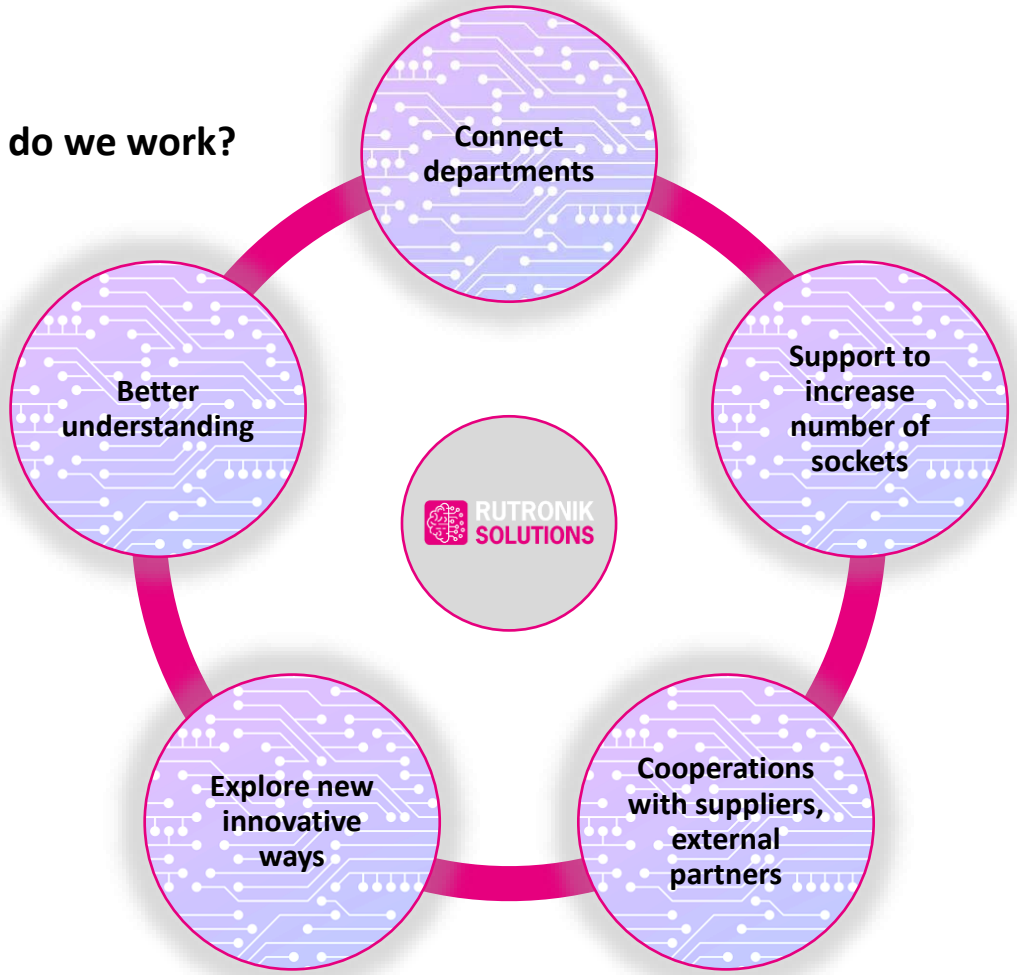
Anna Koltsova
Technical Editorial Engineer

Jordan Rose
Field Application Engineer

Gintaras Drukteinis
Technical Support Engineer

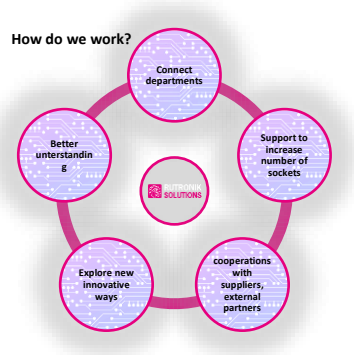
VISION

How do we work?



More details

VISION



What do we expect from our sales force?

More details

- Come to us with new ideas
- Adress as many sockets at a customer as possible
- Support in increasing Rutroniks turnover and standing
- Cooperation to find the best ways to address our customers
- Address the complete solution from our linecard
- Reduce customers time to market with our solutions

VISION

How do we work?

- **We connect** departments together to ingite Rutroniks full potential
- **We give support** to increase the number of sockets per application
- **We communicate** with suppliers or external partners like universities, engineering labs or patent holders to **create cooperations** on a technical or commercial level
- **We find new innovative ways** to address and support our customers and partners in the best way
- **We give a better understanding** of how many different sockets can be addressed in an application

What do we expect from our sales force?

- **Come to us with your ideas** for new solutions, markets or applications which we could investigate in
- **Address as many sockets at a customer as possible** from technical and commercial perspective
- Help to **increase** Rutroniks **turnover** and **standing** in the market
- Help us with your cooperation to **find the best ways to address our customers** and deepen our customer relations
- Always **address the complete solution from our linecard** to our customers to support them in the best way and create the best proof of concept and reduce their time to market

Embedded-KI-Trends 2023

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RUTRONIK SOLUTIONS

In the digital age, innovation cycles are short and reaction times are correspondingly short. In 2023, manufacturers, machine builders and companies from industry, manufacturing, electronics, automotive and medicine will continue to face new challenges in order to remain competitive and to remain innovative. Local AI (artificial intelligence) technologies continue to advance and will reach a new peak record in 2023. But what trends will be critical in 2023? Viacheslav Gromov, founder and CEO of AITAD, takes a look into the crystal ball.

Trend 1:	Dealing with the energy crisis remains an important item on the corporate agenda
Trend 2:	Delivery problems drive Predictive Maintenance
Trend 3:	Increasing computing power leads to deeper and more complex interaction with the user or operator
Trend 4:	Research and further development of embedded AI is experiencing a boom
Trend 5:	The shortage of skilled workers continues to worsen
Trend 6:	Hardware-as-a-Service (HaaS) becomes the norm

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Trend 1: Dealing with the energy crisis remains an important item on the corporate agenda

The energy crisis is already affecting companies in 2022 and will continue to cause many changes in 2023. Computing resources on servers and cloud costs will increase significantly because these systems are very energy-intensive. Even more product manufacturers will rely on decentralized systems with embedded AI. These run on inexpensive small semiconductors due to space constraints, are resource efficient, and act autonomously in the field. Pure cloud or intensive edge applications will get a damper.

Trend 2: Delivery problems drive Predictive Maintenance

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Trend 1: Dealing with the energy crisis remains an important item on the corporate agenda

Trend 2: Delivery problems drive Predictive Maintenance

Due to the acute and also persistent supply problems from electric drives to hoses in the mechanical engineering industry, agile and flexible manufacturers are using new products from new suppliers in shorter cycles. Predictive maintenance is becoming more important as the lack of experience of the newly deployed components in terms of their quality needs to be addressed. In this way, the end customer can be prevented from feeling the disadvantages of the compromise solutions, since failure cases can be remedied at an early stage and without downtime or even damage to the image. In addition, predictive maintenance is becoming increasingly in-depth and effective due to the further increase in computing power of smaller semiconductors (such as those with the latest NPUs (Neural Processing Units)), which requires immediate on-site processing in real time (embedded AI) due to high data volumes.

Trend 3: Increasing computing power leads to deeper and more complex interaction with the user or operator

Trend 4: Research and further development of embedded AI is experiencing a boom

Trend 5: The shortage of skilled workers continues to worsen

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Trend 3:	Increasing computing power leads to deeper and more complex interaction with the user or operator

The trend towards increasing computing power in the smallest and cheapest semiconductor computing units, accompanied by the advancement of algorithms in artificial neural networks (KNNs), leads to possibilities of deeper and more complex interaction with the user or operator. User interaction such as person-space recognition, occupant detection, or keyword spotting will begin to add value by responding to people's behavior and emotions.

Trend 4:	Research and further development of embedded AI is experiencing a boom
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What was previously only possible on larger systems is becoming feasible with inexpensive systems in the two- to three-digit euro range. Concrete consequences are technological leaps in incremental learning and speech separation. The former allows local machine learning models to be adapted to usage (e.g.: right-handed or left-handed?) or environment (e.g.: is the process plant in dry heat or in damp cold?), while the latter leads to better, local speech recognition of the operator's voice in noisy environments.

Trend 5:	The shortage of skilled workers continues to worsen
Trend 6:	Hardware-as-a-Service (HaaS) becomes the norm

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The need to make household and medical devices in particular smarter and thus more time-saving while reducing the need for care will grow exponentially. This could be, for example, a surgical laser device that, thanks to voice recognition, listens directly to the surgeon's instructions without an assistant nurse operator, or a toothbrush that monitors dental status at the ultrasound level, thus saving preventive visits to the doctor. Suction robots or room ventilators are also becoming more reliable thanks to local object and dust analyses, so that household chores take less time.

Trend 6:	Hardware-as-a-Service (HaaS) becomes the norm

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Global systems competition will become even more acute in the coming year. Western industry will no longer be able to prevail against Asia through classic product performance, such as sheet metal bending and process functions. Instead, the already emerging trend of hardware-as-a-service (HaaS), or the marketing of device and machine usage in place of unit sales, will become more commonplace. By using embedded AI for the purpose of wear detection and user behavior analysis, manufacturers will achieve optimal lifetimes and machine availability with decreasing maintenance costs. Service and customer orientation, but also sustainability, are consequently coming to the fore in such leasing, rental, subscription and service models.

Future markets & tomorrow's Business Models

Rutronik clearly aligns its activities with high-growth future markets as well as with their significant applications. We are focused on the identification of levers in the entire value chain to be shaping a sustainable future and competitiveness for its customers.

- Advanced Robotics
- Automation
- Biotechnology
- Energy & Power
- Future Mobility
- Industry 4.0
- Medical
- Transportation

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Advanced Robotics

The key to intelligent, self-controlled industrial and service processes is advanced robotics. Progress in this Future Market relies mainly on better performing electronic elements that make robots more adaptable, perceptive, communicative and mobile, and easier to integrate into processes.

More information

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- Automation

The world of automation at a glance - Encountering rapidly growing challenges of the industrial and building sector increase in quality, productivity, flexibility, accuracy and safety are the result of automation - characterized by a broad variety of technologies making human intervention in processes more convenient and efficient. Rutronik guides you through your options to find your best-fit setup.

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Biotechnology follows the principle of using biological processes to develop products, processes, and systems that improve our lives. In this context, biotechnology is one of the key technologies that can help us overcome challenges of our time. This results in breakthrough products and technologies that fight diseases, minimize the ecological footprint, improve food production and create more efficient manufacturing processes.

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Efficient, regenerative and innovative: future-oriented energy concepts have a consistently positive impact on climate change. They meet the needs of industry and society and are economically attractive at the same time. The central point for politics, industry and society is to combine advancing digitalization and automation with the awareness for urgently required ecological rethinking.

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- Future Mobility

Tomorrow's mobility is associated with the desire to achieve seamless integration of personal freedom of decision and movement into a growing traffic volume. Its complexity will grow. It will become more individualized and applications increasingly diversified. Only intelligent, networked, autonomous and shareable solutions will fulfill increasing requirements.

More information

- Industry 4.0
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- Advanced Robotics
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- Energy & Power
- Future Mobility
- Industry 4.0

Innovations, an optimized cost-benefit calculation and the shortest possible time-to-market are the decisive points for successful market participation. Industry 4.0 enables companies to implement more efficient and effective production processes and offers competitive advantages.

More information

- Medical
- Transportation

Future markets & tomorrow's Business Models

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We want to help you realizing your medical application. We got different solutions, from different suppliers, to find the perfect solution and we can provide logistic systems to make sure you get the parts on time and technical support by our Field Application engineers. What parts do you need for your application?

More information

- Transportation

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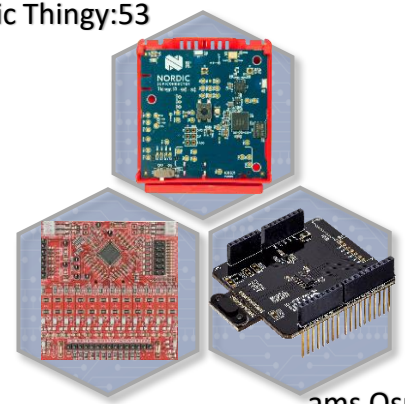
Seamless traceability, flexibility and efficiency are key capabilities for future logistics, transportation, and the entire supply chain. Delivery bottlenecks caused by global increase in goods flows and production downtime due to global incidents require even better plannability of the supply chain. Only data-based, digitized solutions and innovative mobility concepts enable smooth operations. Automated processes, the optimized software solution and networked, intelligent machines play a decisive role.

More information

PRODUCT PORTFOLIO

2 - DESIGN LEVEL

Nordic Thingy:53



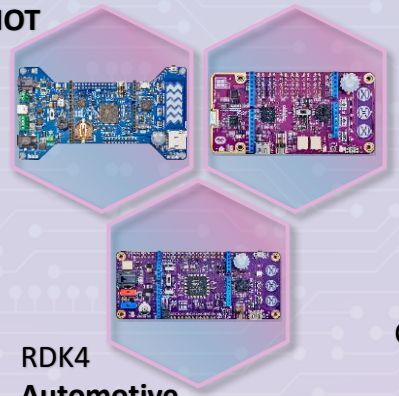
Infineon - BMS

ams Osram – Time of flight

3 - ADVANCED DESIGN LEVEL

RDK2
IOT/IIOT

RDK3
BLE & Wireless

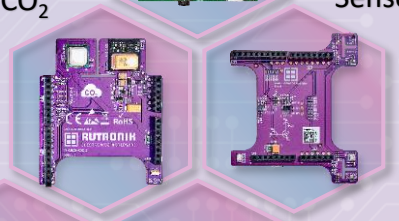


RDK4
Automotive

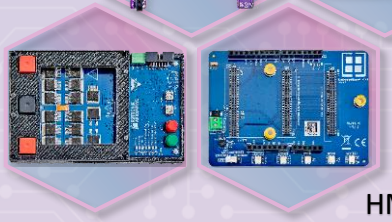
Text To Speech

CO_2

Sensorfusion



800 VDC BI-Directional HV-Switch



HMS Anybus

4 - RESEARCH LEVEL

Electronical Nose

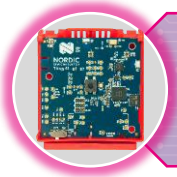
UVC Viruskiller

Insect Care

HESS

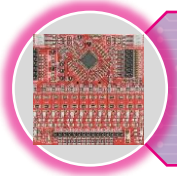
DESIGN LEVEL 2

Supplier hardware and **software development by Rutronik** to combine different supplier boards and show a system solution (complete function / function of application)



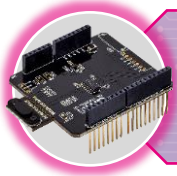
Nordic Thingy:53

Multi-protocol easy-to-use IoT prototyping platform



Infineon - BMS

Features the Li-Ion battery monitoring and sensing based on distributed architecture



ams Osram – Time of flight

Time of flight sensor by ams Osram – Designed to fit on our RDK baseboards

ADVANCED DESIGN LEVEL 3

Rutronik hardware and respective software development and adaption

Base Boards

RDK 2

The perfect solution for hard- & firmware developing

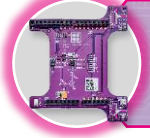
RDK 3

Wireless ultra-low power IoT Bluetooth board with state of the art hardware-based security features

RDK 4

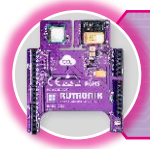
Small, compact Automotive qualified controller with most important Automotive interfaces like CAN-FD and LIN

Adapter Boards



Sensorfusion

Rutronik Adapter Board for intelligent sensorfusion



CO_2

Rutronik Adapter Board for best in class CO_2 sensing

Text to speech

Easy approach for implementing voice guidance

HMS Anybus

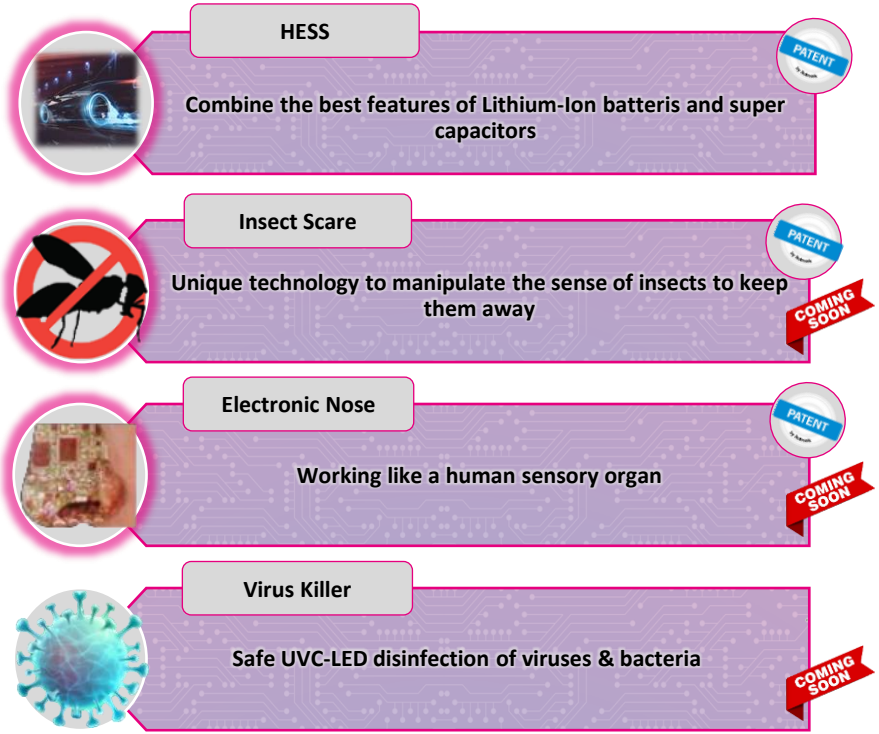
Communication via all common fieldbus and industrial ethernet networks

800 VDC BI-Directional HV-Switch

State-of-the-art innovative bi-directional 800 V eFuse

RESEARCH LEVEL 4

Unique **system solution based on Rutronik IP**, particularly developed hardware and software by Rutronik



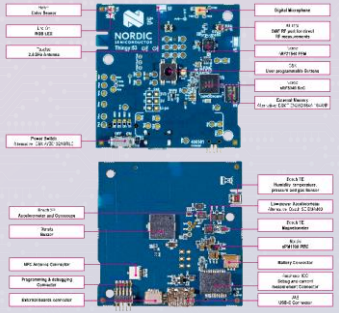
Nordic Thingy:53

Benefits

- Makes it possible to create prototypes and proof-of-concepts without building custom hardware
- Thingy:53 is built around the nRF5340 dual-core wireless SoC
- Processing power and memory size of its dual Arm Cortex-M33 processors enables it to run embedded machine learning models directly on the device
- The nRF Edge Impulse app enables users to connect their Nordic Thingy:53 to their Edge Impulse studio account through a mobile device
- Allows wireless transfer of sensor data over Bluetooth LE to the mobile device and upload it to the cloud for training and download trained ML models to the Thingy:53 for deployment and inferencing
- App acts as the GUI for viewing inferencing results from a running ML model

Over 90% of the BOM can be found in the Rutronik portfolio

Components



Applications & Markets

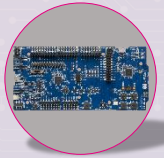

Machine learning

Smart home sensing


Fast prototyping

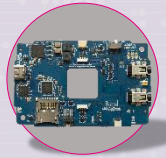

Proof of concept

Nordic - DevKits


nRF5340 DK

Power Profiler Kit II

nRF5340 Audio DK



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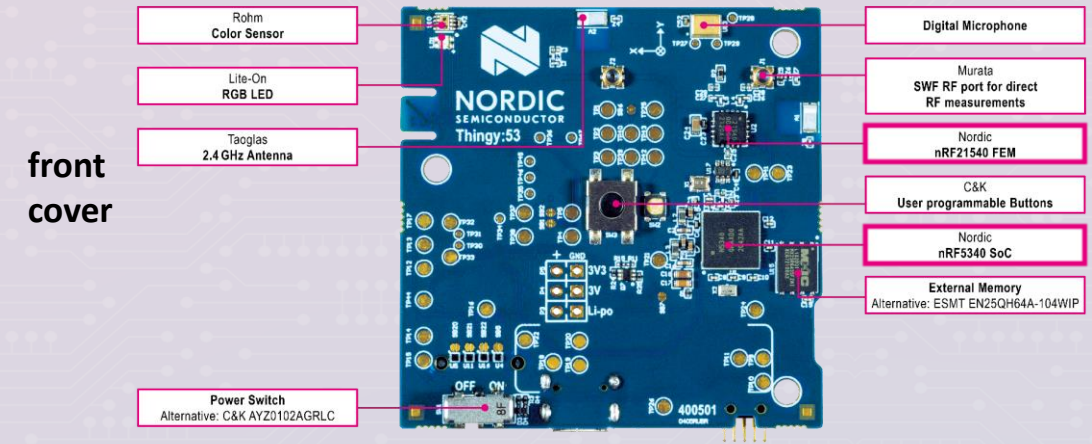
For more information please contact us

COMPONENTS – Nordic Thingy:53



HIGHLIGHTS

- nRF5340 SoC
- nRF21540 FEM
- nPM1100 PMIC

Features

- Supports Bluetooth LE, Bluetooth mesh, Thread, Zigbee, Matter, proprietary 2.4 GHz, and NFC
- Enabled for embedded machine learning (ML)
- Environmental sensor for temperature, humidity, air quality and air pressure
- Color and light sensor
- Low-power accelerometer and inertial measurement unit (IMU)
- High-quality MEMS microphone and buzzer
- User-programmable buttons and RGB LED
- Rechargeable Li-Po battery with 1350mAh capacity

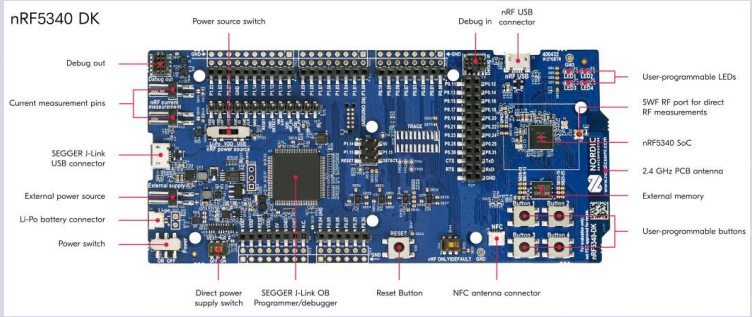
Nordic | nRF5340 DK

Applications

LE Audio, Professional lighting, Industrial, Advanced wearables, Medical, Smart Home

Features

- Versatile development kit for nRF5340 SoC
- Arduino Uno Rev3 compatible
- 2.4 GHz and NFC antennas
- SWF RF connector for direct RF measurements
- User-programmable LEDs(4) and buttons(4)
- SEGGER J-Link OB programmer/debugger
- Pins for measuring power consumption
- 1.7-5.0 V supply from USB, external, Li-Po battery or CR2032 coin cell battery



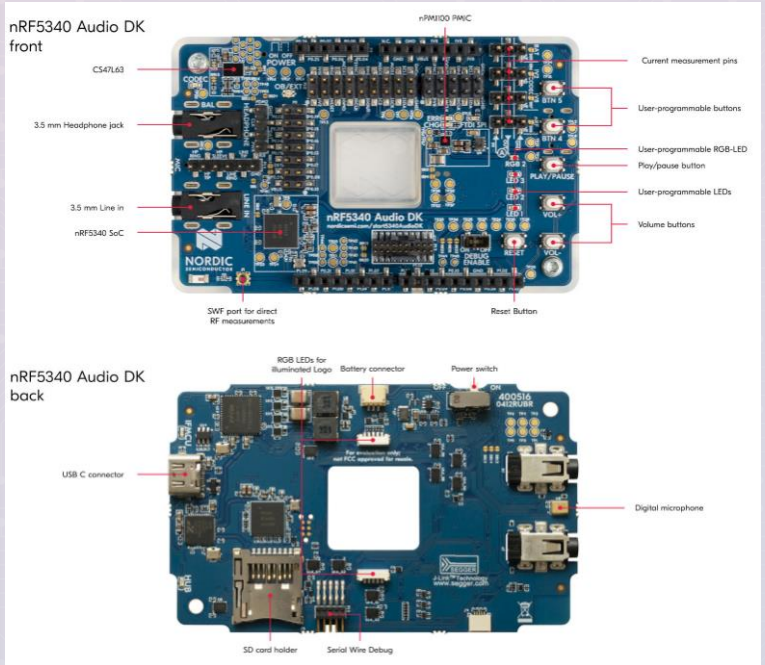
Nordic | nRF5340 Audio DK

Applications

LE Audio, Headphones, Hearing Aids, Audio Guidles, Office Headsets, Audio Broadcast Solutions, Conference Speakerphones

Features

- Bluetooth LE Audio support
- Based on our nRF5340 SoC
- 2.4 GHz antenna
- Two 3.5 mm audio jacks
- Cirrus Logic Audio DSP CS47L63
- SWF RF connector for direct RF measurements
- 5 user-programmable buttons
- 4 user-programmable LEDs
- SEGGER J-Link debugger on board
- Pins for measuring power consumption
- SD-Card holder for additional storage



Nordic | Power Profiler Kit II

Applications

Power debugging of embedded Applications, Estimate battery lifetime of completed solution

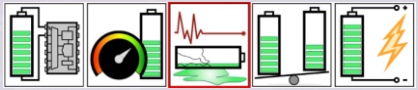
Features

- 200nA to 1A current measurement range with a resolution that varies between 100nA and 1mA
- Source mode and ampere meter mode
- Source mode includes built-in programmable regulator with a 0.8V to 5V output range and up to 1A current supply
- 100 ksps sampling rate (10 x greater than previous generation)
- Standalone unit
- 8 digital inputs for low-end logic analyzer support
- Measure instantaneous and average current on all Nordic DKs, in addition to custom boards
- Supported through nRF Connect for Desktop's Power Profiler app
- Export measurement data for post-processing

Infineon - BMS

Rutronik BMS Software for Infineon TLE9012AQU –
State of the art Battery Monitoring, Balancing, Impedance Measurement

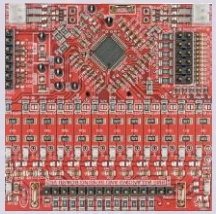
Rutronik Software



In cooperation with:

TECHNISCHE UNIVERSITÄT CHEMNITZ

Supplier Hardware



Facts

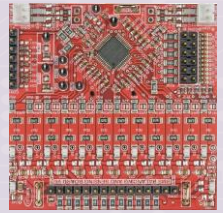
- Redundant and synchronous cell voltage measurement
- Realtime robust inter-block communication
- Unique active balancing methods
- Measurement of inner cell temperature, State-of-Health - SoH, State-of-Function – SoF
- Rich diagnosis features
- Possible to support ASIL-C systems
- Modeling for state estimation
- Usage for all cell chemistries

Applications & Markets

PDF

For more information please contact us

Applications & Markets - BMS Software – Infineon TLE9012AQU



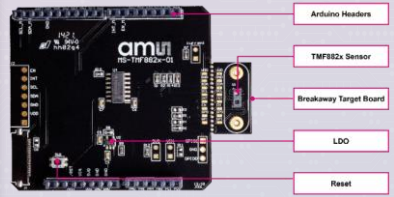
- Battery, Mild Hybrid, Hybrid and
- Plug-in Hybrid Electric Vehicle
- 12V Li-Ion battery systems
- Energy Storage System
- Home Energy Storage Systems
- eBike Battery Management Systems

ams OSRAM - Time of flight

Benefits

- Arduino form factor development board fits to all RDK baseboards
- Firmware examples available for an easy plug and play start
- You can use all RDKs as a base board for all other Rutronik adapter boards
- Easy integration of all other Rutronik adapter boards (e.g. Sensorfusion, CO2, T-t-S, etc.) or other Arduino based evaluation boards via integrated Arduino headers
- First class hard- & firmware support from our product experts and development engineers

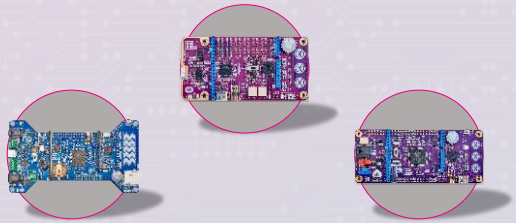
Components



Applications & Markets

- 3D Vision System
- 3D dToF for mobile AR
- Face Recognition
- Active Stereo Vision
- 2-Step Enrollment & Verification

Linked-projects



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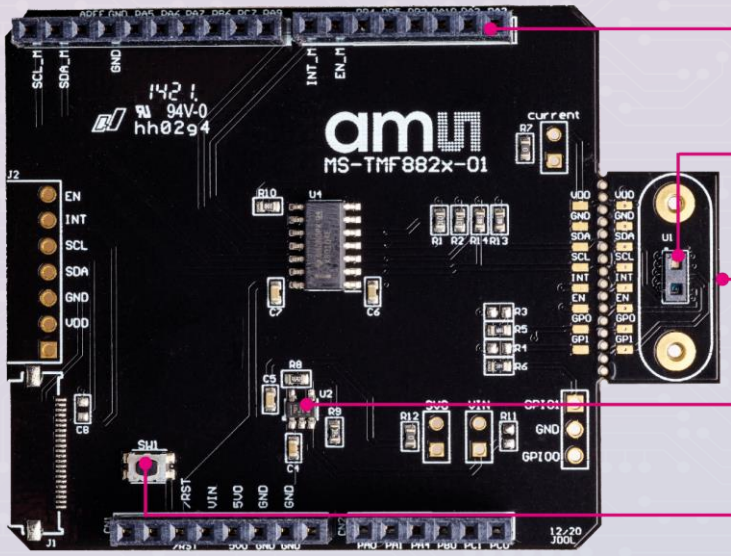
COMPONENTS – TMF882x



Arduino Headers

TMF882x Sensor

Breakaway Target Board

LDO

Reset

HIGHLIGHTS

TMF882x Sensor

Features

- TMF882x sensor mounted on breakaway board
- Cover glass samples included, 0.5 mm / 0.6 mm / 0.7 mm/ 0.8 mm – thicknesses
- Air gap spacer samples included, 0.17 mm / 0.25 mm / 0.38 mm / 0.5 mm – thicknesses
- Breakaway board Vdd current sense test point
- Reset button
- Onboard LDO and I²C level shifter

AMS-Osram | TMF8821

Applications

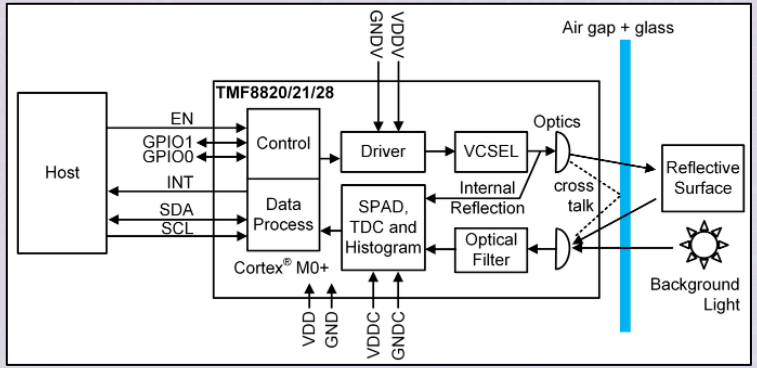
LDAF, presence & proximity detection, inventory management, people counting, object & collision avoidance

Features

- Configurable 4x4 multi-zone ToF sensor with multi-object detection
- Fast Time to Digital converter (TDC) architecture
- High performance on chip sunlight rejection filter and algorithm
- Sub-nanosecond light pulse
- Adjustable field of view(up to 63° diagonal)

Technical Specifications

- Package- 12 pin OLGA
- Distance sensing range – 10 – 5000mm @ 30Hz
- Supply voltage – 2.7 – 3.3V
- Temperature range - -30 - 70 °C
- Interface – I2C



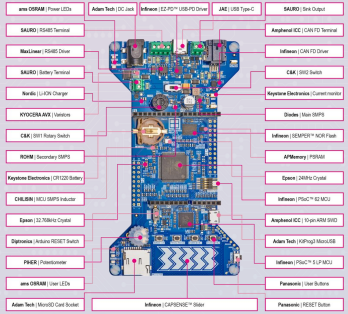
Rutronik Development Kit 2 – RDK2

Benefits

- Offers a complete solution for hardware and firmware developers for proof of concepts in a very short time
- Board runs on the PSoC62 MCU from Infineon Cypress (Modus Toolbox)
- No need of soldering and assembling own prototype builds for first testing & measurements
- You can use all RDKs as a base board for all other Rutronik adapter boards
- Easy integration of all other Rutronik adapter boards (e.g. Sensorfusion, CO2, Text - to - Speech, etc.) or other Arduino based evaluation boards via integrated Arduino headers
- Easy evaluation of all the available parts through provided state-of-the-art interfaces directly on the board
- First class hard- and firmware support from our product experts and development engineers

All components of the BOM can be found in the Rutronik portfolio!

Components



Applications & Markets

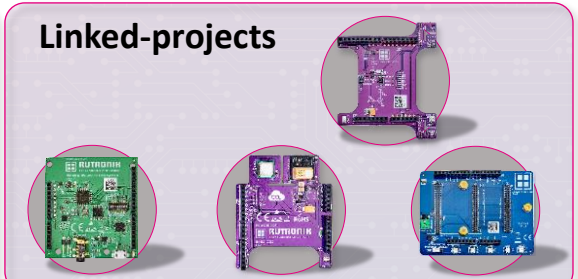
IoT / IIoT


Smart Wearables


Medical


Smart Home

Linked-projects



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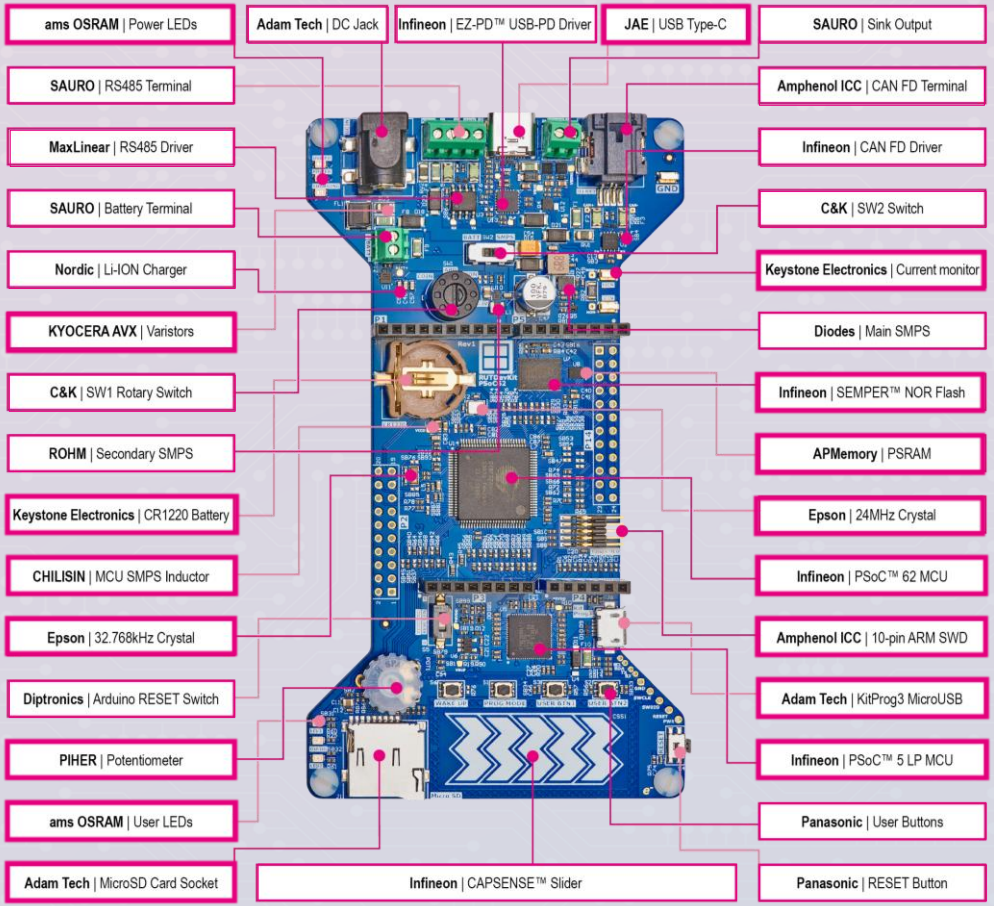
COMPONENTS – RDK2



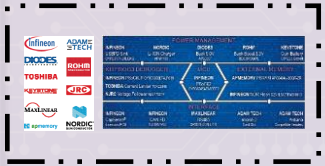
HIGHLIGHTS

CY8C6245AZI-S3D72

CAN FD Driver

NOR Flash

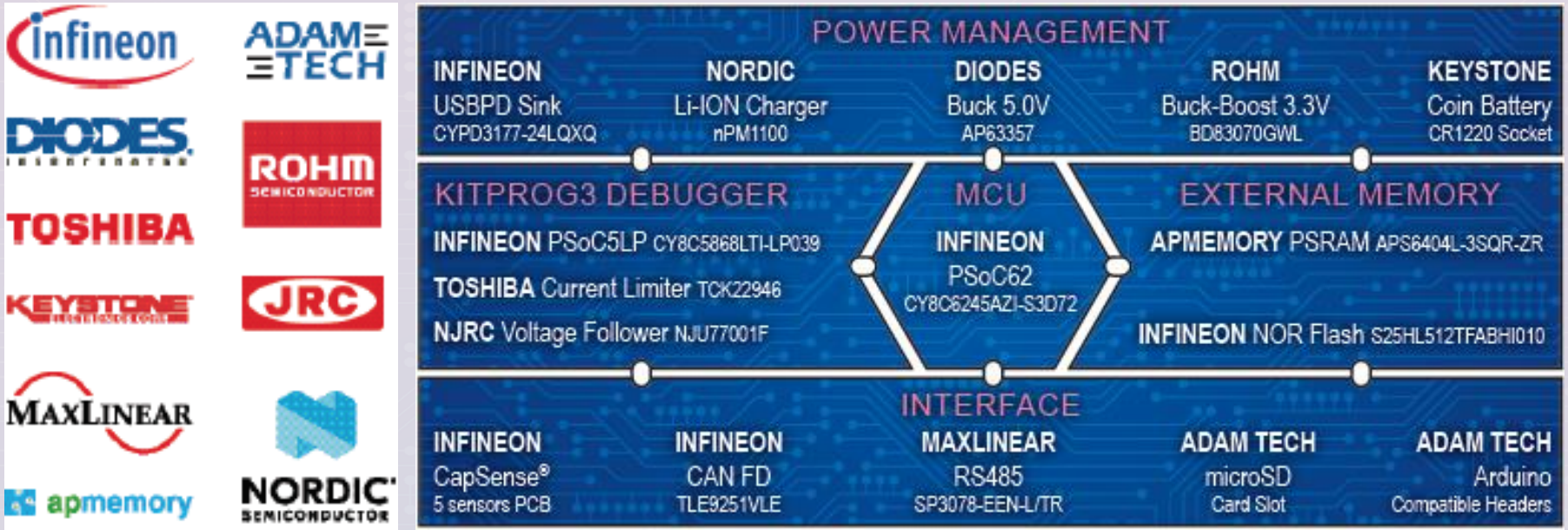
BLOCK DIAGRAM



Features

- Offers a complete solution for hard- and firmware developers for proof of concepts in a very short time
- Boards runs on the PSoC62 MCU with a dual core ARM Cortex-M4 and Cortex-M0+ architecture
- Includes an integrated power management IC which enables the board to be powered from the Li-ION battery. The high-efficiency buck controller allows having a high-power supply providing developers with up to 3.5A at 5V
- A 512MBit SEMPER NOR Flash connected with microcontroller QSPI can be used to store large amounts of data or even the firmware that may run directly from it
- User can access all pins of the PSoC62 via supplied headers

BLOCK DIAGRAM – RDK2



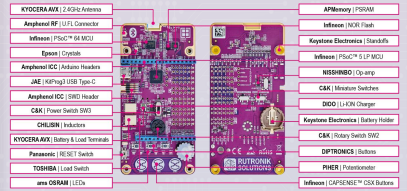
Rutronik Development Kit 3 – RDK3

Benefits

- Offers a complete solution for hardware and firmware developers for proof of concepts in a very short time
- Board runs on the PSoC64 Secure MCU from Infineon Cypress with PSA support
- The MCU offers three-levels of hardware- and firmware-based resource isolation
- The Arm Dual-Cortex – M-core SOC offers a secure M0+ core, physically separated from a user application running on the other M4 core
- Offers secure element functionality that can be used to build an authenticate secure applications
- Ultra low power with BLE

All components of the BOM can be found in the Rutronik portfolio

Components



Applications & Markets

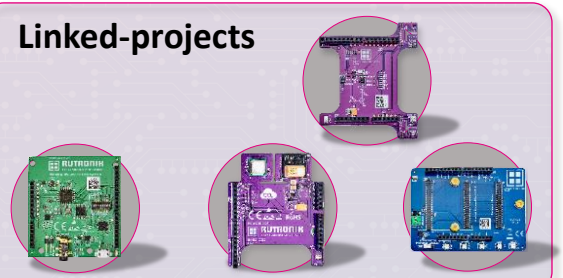

Health Care


Smart Factory


Robotics


Smart Building

Linked-projects



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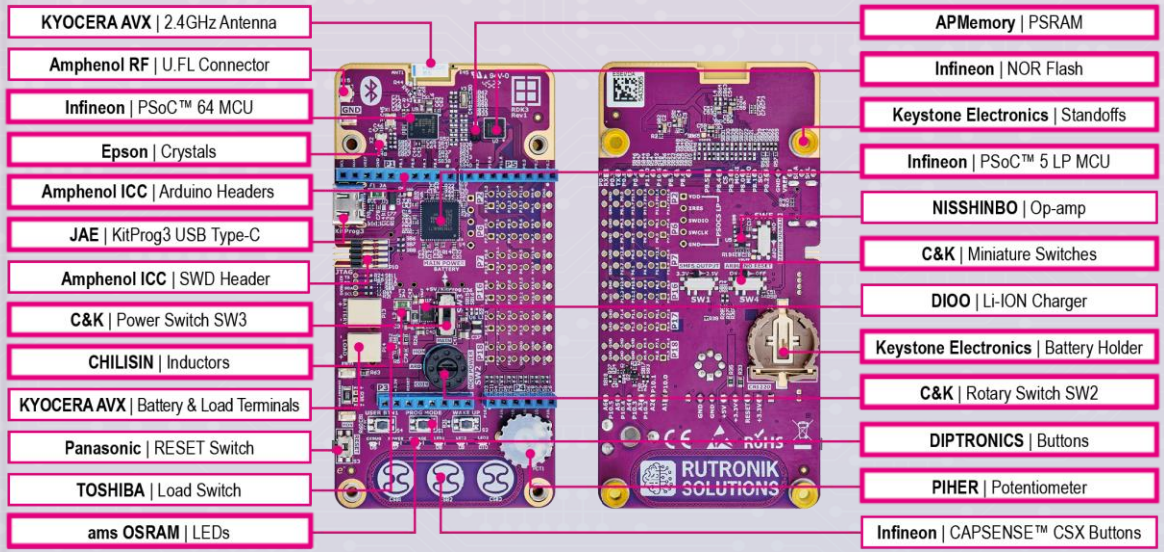
COMPONENTS – RDK3

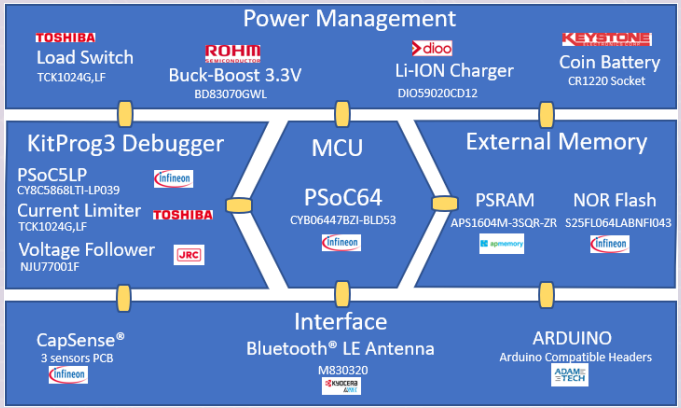


HIGHLIGHTS

CYB06447BZI-BLD53

NOR Flash

Block diagram



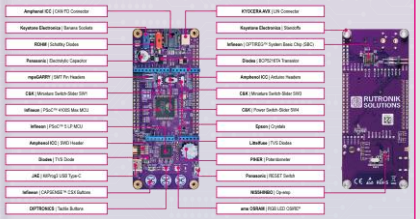
Rutronik Development Kit 4 – RDK4

Benefits

- Offers a complete solution for hardware and firmware developers for proof of concepts in a very short time
- Board runs on the PSoC4100S Max with CAN-FD and LIN interface
- Possibility for an easy current measurement with Jumpers
- Perfect fit for development of e.g. various modules like trunk control, door control, seat heating, climate control and many more …

All components of the BOM can be found in the Rutronik portfolio

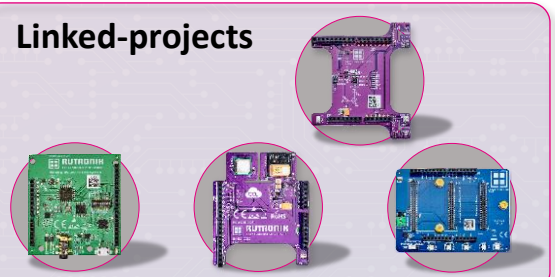
Components



Applications & Markets

- Automotive motor control modules
- Body & Convenience
- Powertrain
- Industrial HVAC
- Agriculture
- Factory Automation

Linked-projects



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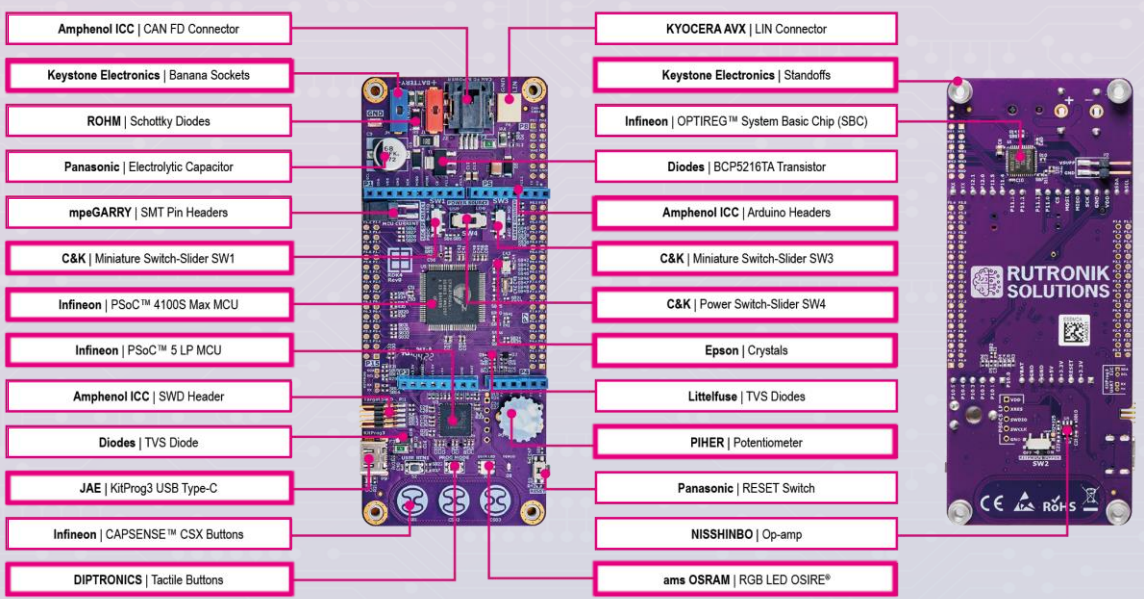
For more information please contact us

COMPONENTS – RDK4



HIGHLIGHTS

- CY8C4149AZE-S598
- TLE9262-3BQXV33
- CY8C5868LTI-LP039

Block diagram

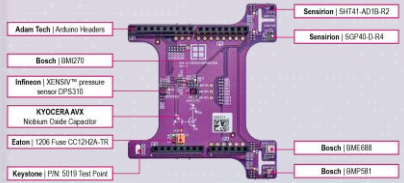
Sensorfusion – RAB1

Benefits

- With state of the art sensors for all sensorfusion applications
- User can access all pins via supplied headers
- Operates on any evaluation board with Arduino Interface and perfect fit for our RDK2
- Additional interial MEMS sensor for manipulation detection or navigation function
- Can be combined with all of our other boards
- Many firmware examples are available on our homepage

All components of the BOM can be found in the Rutronik portfolio

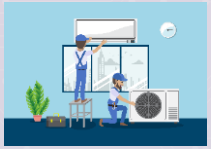
Components



Applications & Markets

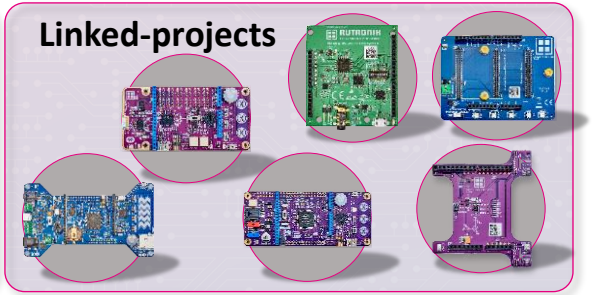

Building Automation


Professional Kitchen


HVAC


Smart Farming

Linked-projects



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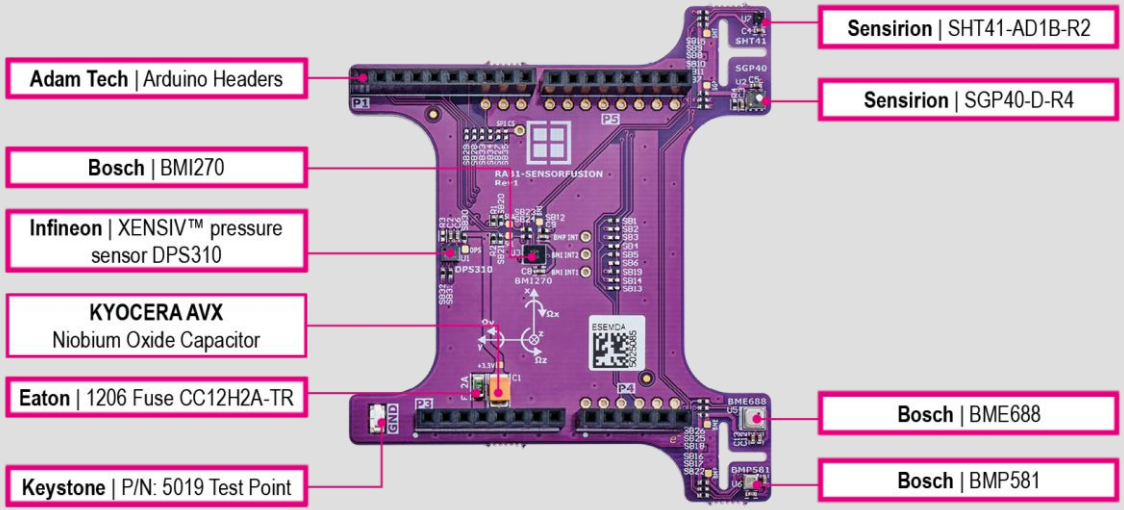
For more information please contact us

COMPONENTS – Sensorfusion



HIGHLIGHTS

- BME688
- DPS310
- SGP40-D-R4

Features

- DPS310 – Infineon's digital XENSIVTM barometric pressure sensor.
- BMP581 – Bosch's digital pressure sensor.
- SGP40 – Sensirion's indoor air quality sensor for VOC measurements.
- BME688 – Bosch's digital low power gas, pressure, temperature and humidity sensor with AI.
- SHT41 – Sensirion's high-accuracy and low power relative humidity and temperature sensor.
- BMI270 – Bosch's 6-axis, smart, low power inertial measurement unit.
- I2C and SPI interface via Arduino compatible ADAM-TECH connectors.
- A Keystone Electronics Test Point connector for a ground signal.

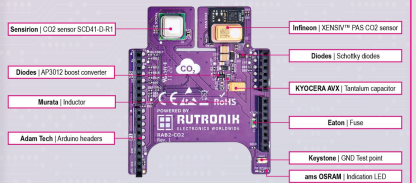
CO^2 – RAB2

Benefits

- Easy evaluation of CO2 sensing
- Customer can decide which sensor and which measurement method fits the most
- Demo will be available at our trade fairs
- Stackable on RDK2 and combination with other adapter boards possible

All components of the BOM can be found in the Rutronik portfolio

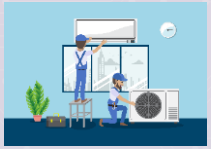
Components



Applications & Markets

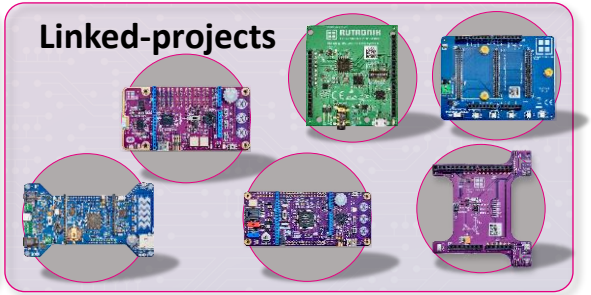

Building Automation


Professional Kitchen


HVAC


Smart Farming

Linked-projects



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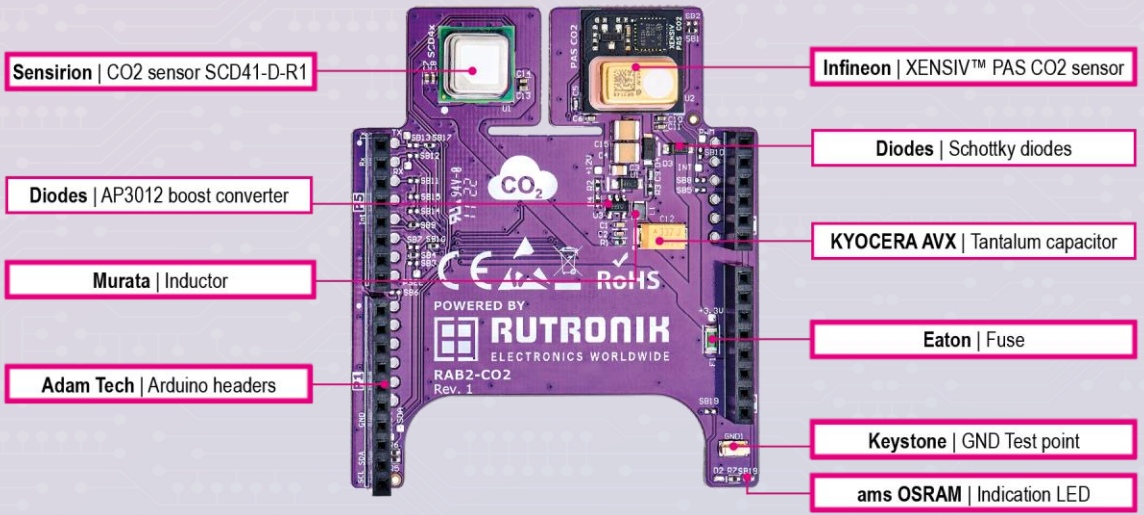
For more information please contact us

COMPONENTS – CO_2



HIGHLIGHTS

- Sensirion CO^2
- Infineon CO^2

Features

- Infineon CO_2 sensor.
- Sensirion CO_2 and RH/T sensor.
- Single supply 3.3V voltage.
- Adam-Tech Arduino compatible headers.
- Keystone test point.
- 12V integrated DC Boost converter for PAS CO2 sensor.
- Fuse protection.
- Indication LED.

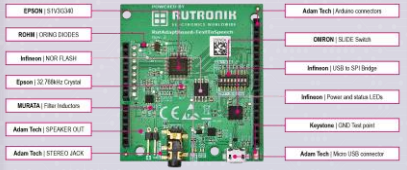
TextToSpeech

Benefits

- Offers you a complete solution for development of a voice guidance feature and for proof of concepts in a very short time
- No need of soldering and assembling own prototype builds for first testing & measurements
- You can use all RDKs as a base board for this and all other Rutronik adapter boards
- Easy integration of all other Rutronik adapter boards (e.g. Sensorfusion, CO2, etc.) or other Arduino based evaluation boards via integrated Arduino headers
- Easy evaluation of the Epson ASIC through provided GPIO pins directly on the board
- Available firmware examples for voice output of sensor data or alarm functions
- First class hard- and firmware support from our product experts and development engineers

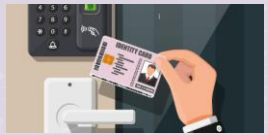
All components of the BOM can be found in the Rutronik portfolio (except STM)

Components

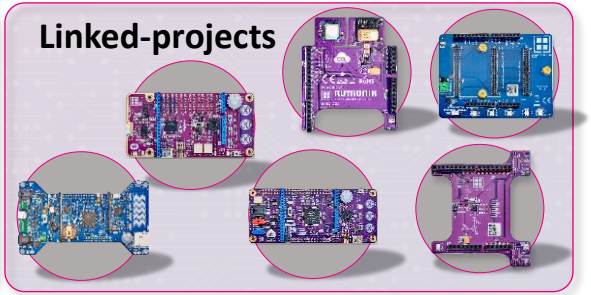


Applications & Markets

- White Goods
- Door Locks
- Vending/Ticket machines
- Toys
- Smoke/Gas detectors
- Hospital alarms



Linked-projects



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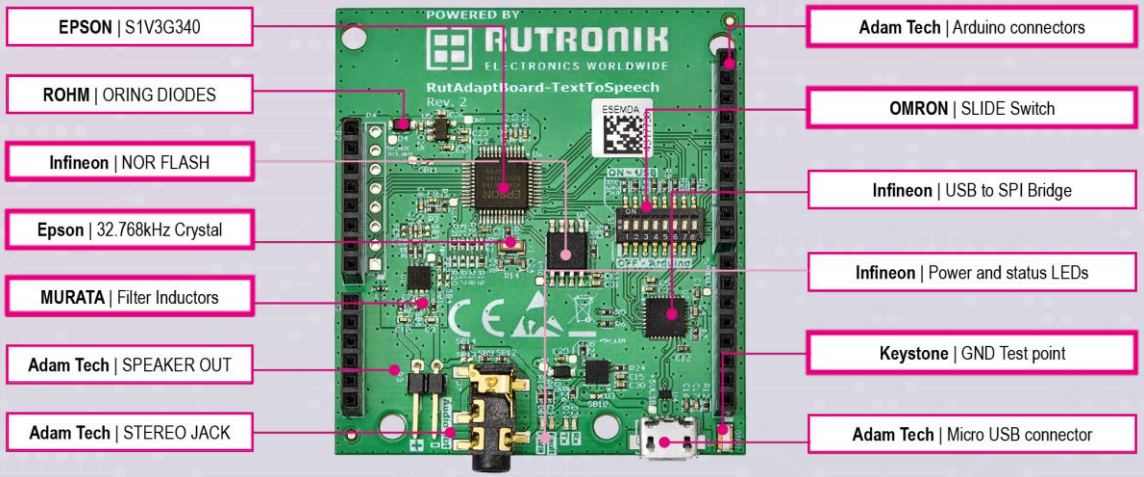
COMPONENTS – TextToSpeech



HIGHLIGHTS

EPSON
S1V3G340

Features

- Offers easy to use speech IC without traditional costly and time-consuming studio recordings by a person
- Generates high quality natural human voice with a high compression rate
- NOR Flash 64MBit memory interfaced with ASIC via SPI enables large amounts of audio data to be stored
- Epson Voice/Audio IC enables a seamless IC platform to transform almost any application into user-friendly voice prompted devices
- 3.5mm stereo jack for stereo speakers or headphones
- Supports up to 12 languages (e.g. English, German, French, Spanish, Italian, Russian, Chinese (Mandarin))

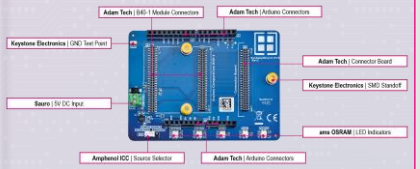
HMS Anybus

Benefits

- Various Anybus connector boards can be attached via the board connector e.g. PROFIBUS, Ethernet, CANopen, CC-Link, DeviceNet, etc.
- Easy integration of all other Rutronik adapter boards (e.g. Sensorfusion, CO2, etc.) or other Arduino based evaluation boards via integrated Arduino headers
- Built-in security features such as packet storm resistance, certificates, access control and more
- Free software updatess whenever networks are revised
- Independent from new networks, IIoT, network upgrades, maintenance and conformance issues

All components of the BOM can be found in the Rutronik portfolio!

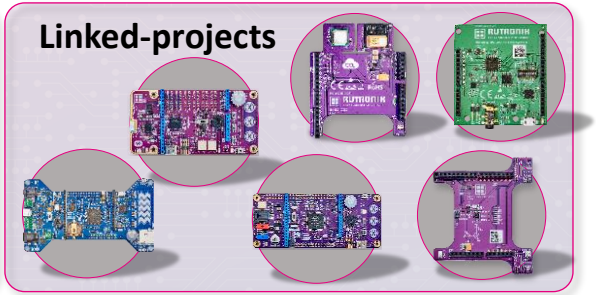
Components



Applications & Markets

- Realtime communication
- Functional safety
- Control and automation
- Security
- Industrial automation
- Medical
- HMI/Displays

Linked-projects



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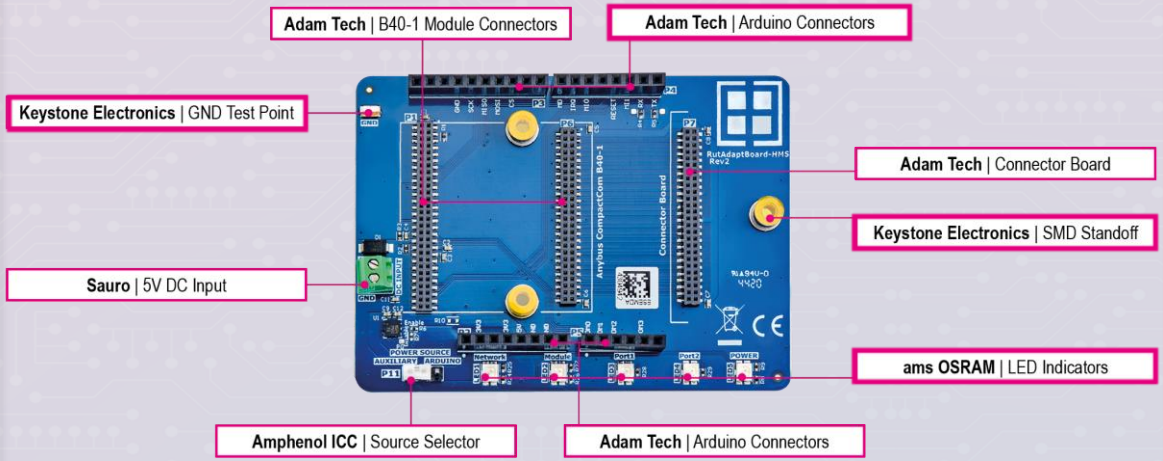
COMPONENTS – HMS Anybus



HIGHLIGHTS

B-40-1 module connectors

Source Selector

Features

- Anybus CompactCom B-40-1 module connectors
- Pin header selects the power source between Arduino and DC input
- UART or SPI interface via Arduino compatible connectors
- Auxiliary 5V power source terminal
- LED indicators for power, status and network activity indication
- Test point connector for ground signal
- SMD standoffs for M3 screws

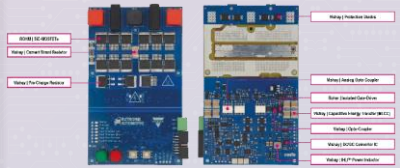
800 VDC BI-Directional HV-Switch

Benefits

- The eFuse is an innovative new trend for protecting both the user and the hardware in high power applications
- Featuring SiC MOSFETs and a VOA300 optocoupler
- Designed to handle continuous power up to 40kW
- Operates continuously at full power with less than 25W of losses without requiring active cooling
- Included preload function, continuous current monitoring and overcurrent protection
- Shut down after a fault takes only 2.5µs

Components of the BOM can be found in the Rutronik portfolio

Components



Applications & Markets

- Current sensing
- Power supply
- Galvanic isolation
- Protection & Discretes
- Automotive HV-switching
- Fuse & contactor replacement in HV-boardnet
- Switching of HV-DC-currents in Ex-protected areas
- Load control and monitoring

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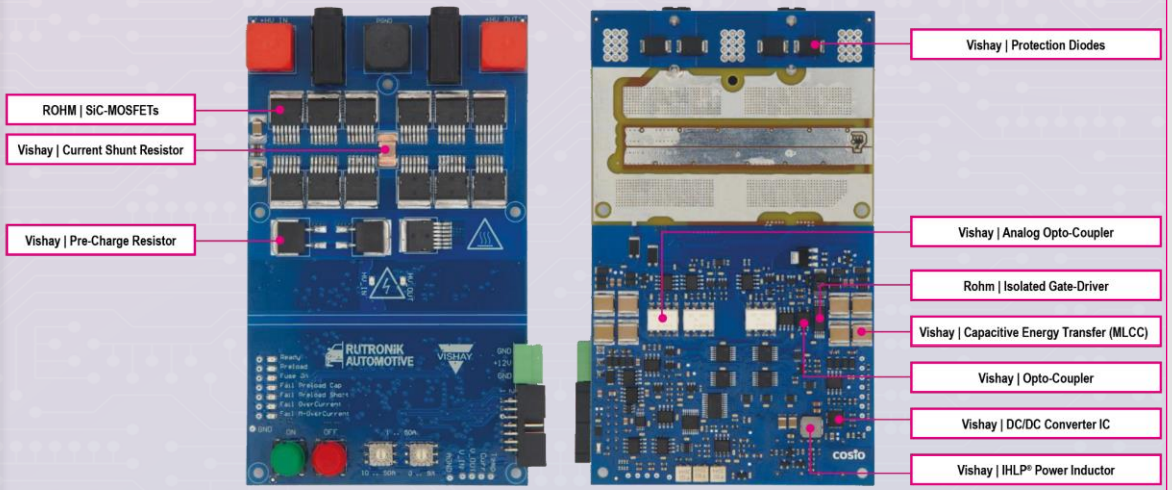
COMPONENTS – 800 VDC Bi-Directional HV-Switch



HIGHLIGHTS

Features

- ROHM, SiC MOSFETs, SCT4xxx
- ROHM, Gate Driver, BM61S41RFV
- Vishay, linear optocoupler, VOA300
- Vishay, digital optocoupler, VOMA617A
- Vishay, Power Metal Strip® Shunt Resistors
- Infineon, Microcontroller SAK-TC3xx

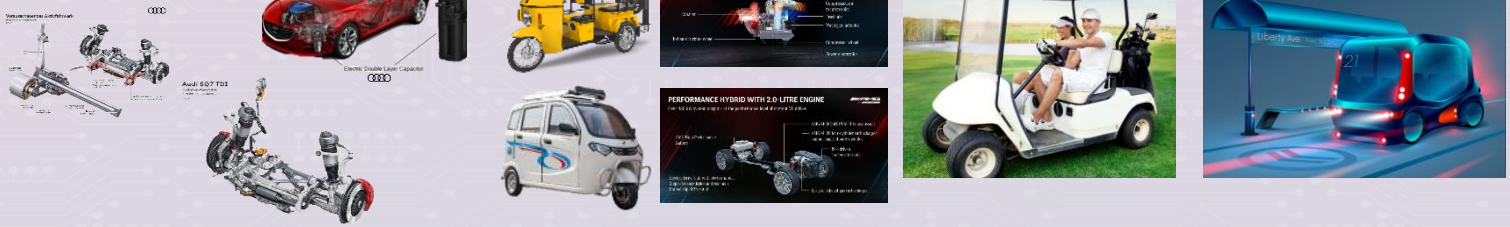
HESS – Hybrid Energy Storage System

Gives a standard 48V battery pack a best in class peak power performance
Limits the battery discharge current at peak power demand to its nominal current

Benefits

- Best combination of Li-ion cell + Super Cap
- Ultrafast bi-directional power switching in microseconds
- Improved battery lifetime by 1,5 to 2,0 times
- Generated energy recuperation from the motor by using electronic brakes

Applications



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Insect Scare - Sustainable Protection against Insects

Unique patent proofed technology to manipulate the sense of insects in order to keep them away

Key Features:

- Adjustable for different frequencies
- Influence the behavior and biting patterns
- Machine Learning ML

Markets & Applications

- Smart Watch
- Wearables
- Windows
- Outdoor devices

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For more information please contact us

Electronic Nose

Unique patent pending technology with VOC sensors to detect smells and odor
Volatile Organic Compounds such as hydrogen- oxide- and carbon hydrogen oxide compounds

- Machine Learning, Smell/Odor detection
- VOC formation and change process measurement
- Small low-cost embedded system
- Very high sensitivity
- Limited # of data sets for teaching (e.g. 10 data sets)

Markets & Applications

- Home Appliances
- Gas detection
- Liquid detection
- Perishable food evaluation

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