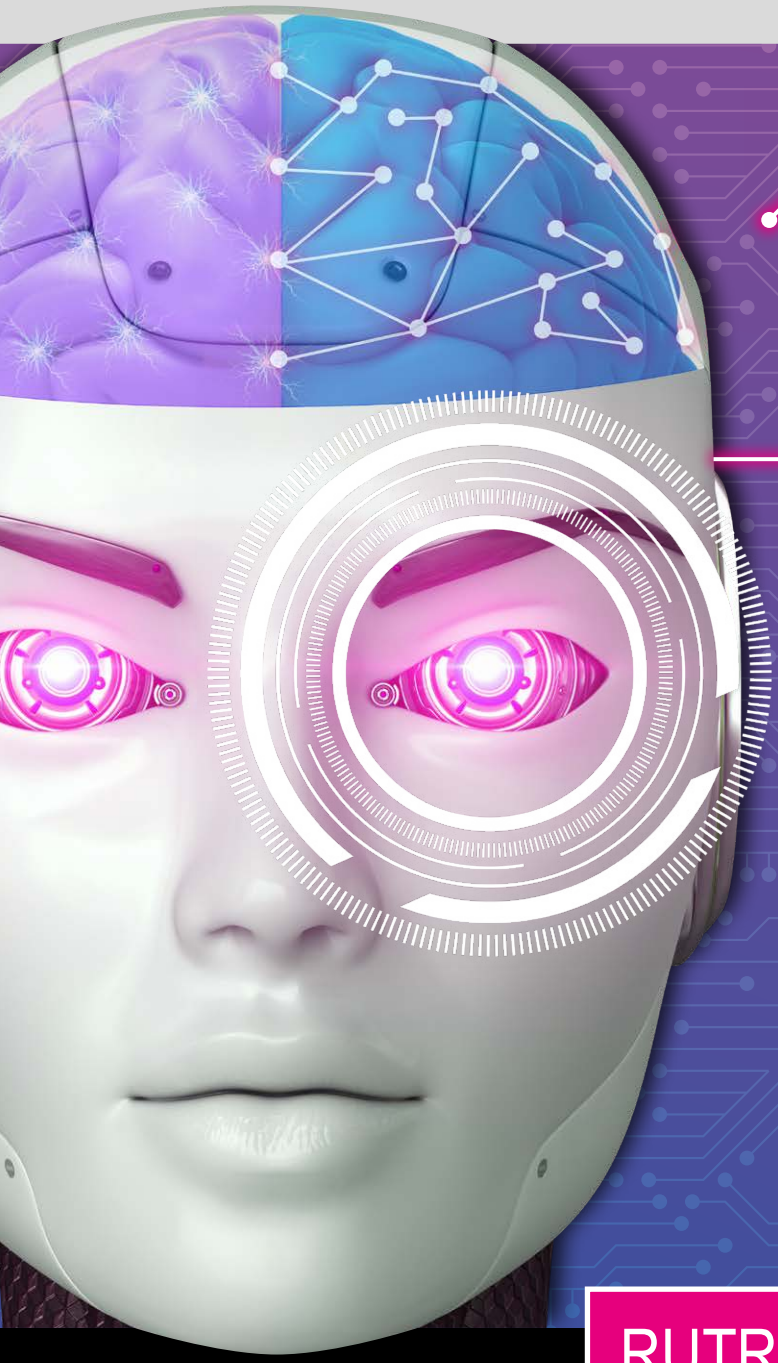
RUTRONIK
ELECTRONICS WORLDWIDE



AI³®

RUTRONIK **SYSTEM SOLUTIONS**

FROM SINGLE PRODUCT TO SOLUTION, FROM BASIC LEVEL TO RESEARCH LEVEL

V 2.2

Basic Level | Design Level | Adv. Design Level | Research Level

Content

Innovation and future DNA

Our Product Portfolio

- Semiconductors
- Passive Components
- Electromechanical Components
- Displays & Monitors
- Boards & Systems
- Storage Technologies
- Wireless Technologies

Our Initiatives

RUTRONIK AUTOMOTIVE | RUTRONIK EMBEDDED | RUTRONIK POWER | RUTRONIK SMART

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https://rutronik-tec.com
www.linkedin.com/company/rutronik

RUTRONIK 24 next generation e-commerce

Committed to excellence

Consult – Know-how. Built-in.

The Technical Competence from RUTRONIK

Worldwide and individual consulting on the spot by competent sales staff, application engineers & product specialists.

Components – Variety. Built-in.

The Product Portfolio from RUTRONIK

Wide product range of semiconductors, passive and electromechanical components, displays & monitors, boards & systems, storage and wireless technologies for optimum coverage of your needs.

Logistics – Reliability. Built-in.

The Delivery Service from RUTRONIK

Innovative and flexible solutions: from supply chain management to individual logistics systems.

Quality – Security. Built-in.

Quality without Compromise from RUTRONIK

The integrated management system (IMS) encompasses quality control, information security, environmental protection, occupational health and safety.

Introduction

RUTRONIK SOLUTIONS

Stephan Menze
Head of Global Innovation Management

How do we work?

- We combine the technical excellence of our departments to ignite 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 possible way

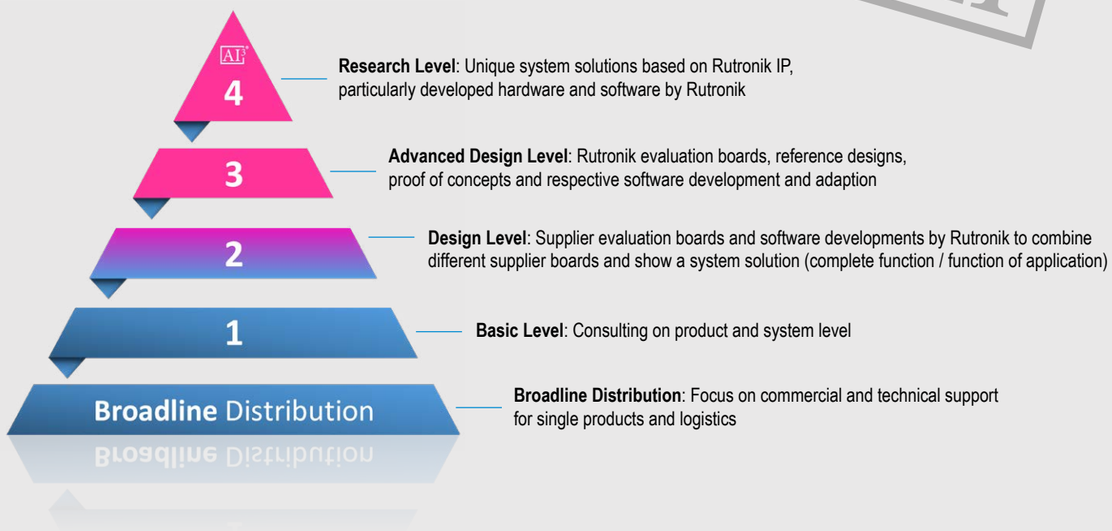
What are the main benefits?

- We receive the customer and market feedback for new solutions, markets or applications which we could investigate in
- Our sales team addresses as many sockets as possible at a customer from technical and commercial perspective
- Together we increase Rutroniks influence and standing in the market
- Together we find the best ways to address and support our customers and deepen our customer relations
- Together we address the complete solution from our linecard to our customers to support them in the best way and create the best proof of concept to reduce their time to market

From Basic Level to Research Level

Significant improvement of excellence – across all levels

AI3®

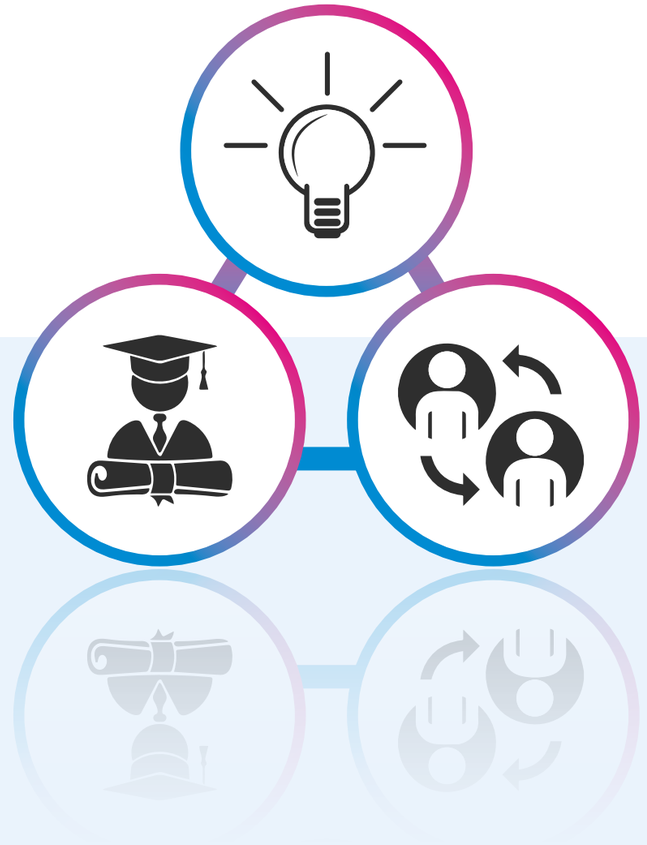


- Technical consulting on product and system level using diagrams, data sheets and training materials
- Technical consulting through product and application engineers
- Commercial consulting through sales regarding technologies, procurement and logitics

Customer advantage

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

Inspiration. Education. Exchange.



Our daily business is to support our customers by global supply and support for the full range of electronic components.

We rely on our core competencies and services - distribution in high scale and complexity.

Over the years, we accumulated many unique features that have only one purpose: to increase the competitiveness of our customers.

Due to our global presence and expert teams of sales staff, applications engineers and product specialists, we guarantee a high dynamic, highly professional assistance and support in all technical and commercial matters.

The unmatched breadth of our components range ensures that our customers‘ needs are optimally covered.

High availability combined with maximum safety and reliability based on our strong partnerships with leading manufacturers, external development partners or universities ensures that we maintain a technological edge.

The consistent focus on growth includes investments in our own research and development capacities.

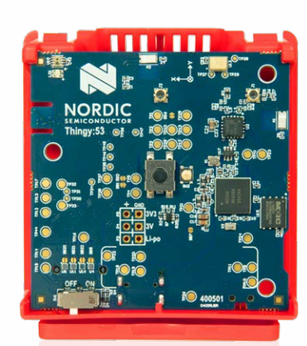
We are aiming at developing new technologies on the one hand and on the other hand at designing highly innovative solutions – precisely tailored to our customers’ needs and the expectations of their end users.

- Hardware platforms, evaluation kits and reference designs 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).

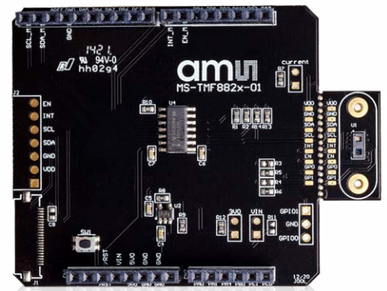
Customer advantage

- The Design Level System Solutions provide the quickest entry in standardised board level from suppliers and the corresponding software

Board - Overview



Nordic - Thingy:53



ams OSRAM - TMF882X

Nordic Thingy:53

Multi-protocol easy-to-use IoT prototyping platform

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 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

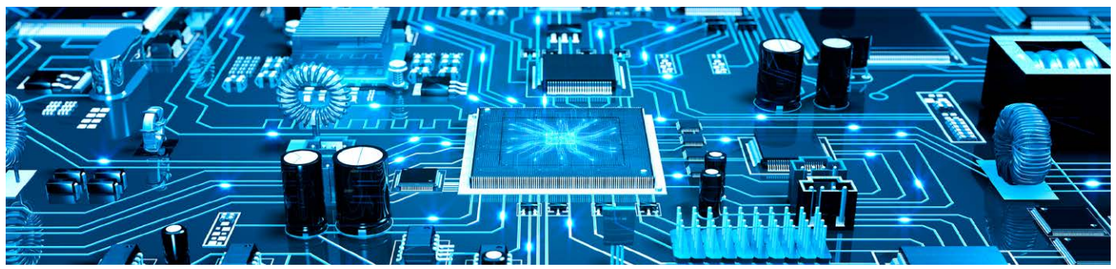
Key Features

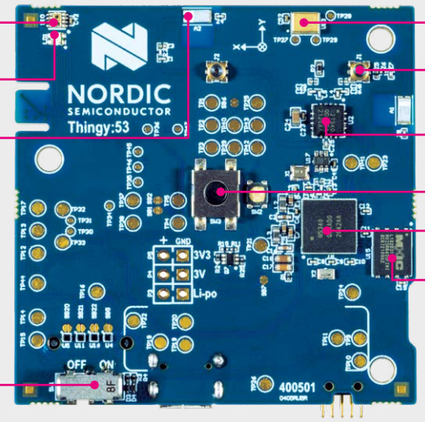
- Supports Bluetooth LE, Bluetooth mesh, Thread, Zigbee, Matter, proprietary 2.4 GHz, and NFC
- Enabled for embedded machine learning (ML)
- Environmental sensor for temperature, humidity, air quality and air pressure
- Color and light sensor
- Low-power accelerometer and inertial measurement unit (IMU)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

Markets & Applications

- Machine learning
- Smart home sensing
- Fast prototyping
- Proof-of-concept development

NORDIC SEMICONDUCTOR





Rohm | Color Sensor

Lite-On | RGB LED

Taoglas | 2.4 GHz Antenna

Power Switch
Alternative: **C&K** | AYZ0102AGRLC

Digital Microphone

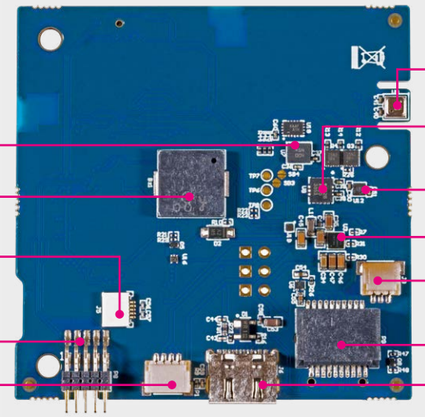
Murata | SWF RF port for direct RF measurements

Nordic | nRF21540 FEM

C&K | User programmable Buttons

Nordic | nRF5340 SoC

External Memory
Alternative: **ESMT** | EN25QH64A-104WIP



Bosch SE | Accelerometer and Gyroscope

Murata | Buzzer

NFC Antenna Connector

Programming & debugging Connector

External boards connector

Bosch SE | Humidity -/ Temperature -/ Pressure - and Gas Sensor

Low-power Accelerometer
Alternative: **Bosch SE** | BMA400

Bosch SE | Magnetometer

Nordic | nPM1100 PMIC

Battery Connector

Amphenol CS | Debug and current measurement Connector

JAE | USB-C Connector

Arduino shield adapter board for TMF882x

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

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- and firmware support from our product experts and development engineers

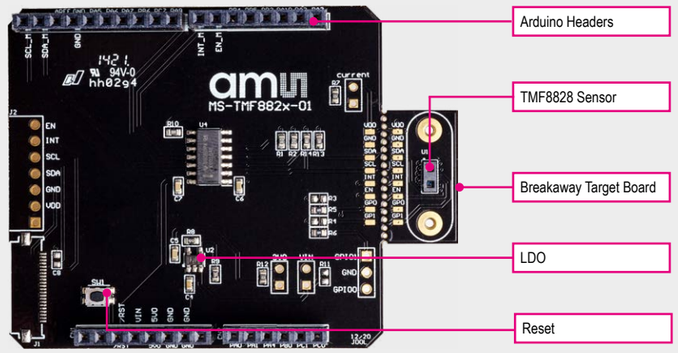
Key Features

- TMF8828 sensor mounted on breakaway board
- Cover glass samples included, 0.5mm / 0.6mm / 0.7mm/ 0.8mm thicknesses
- Air gap spacer samples included, 0.17mm / 0.25mm / 0.38mm / 0.5mm thicknesses
- Breakaway board Vdd current sense test point
- Reset button
- Onboard LDO and I²C level shifter

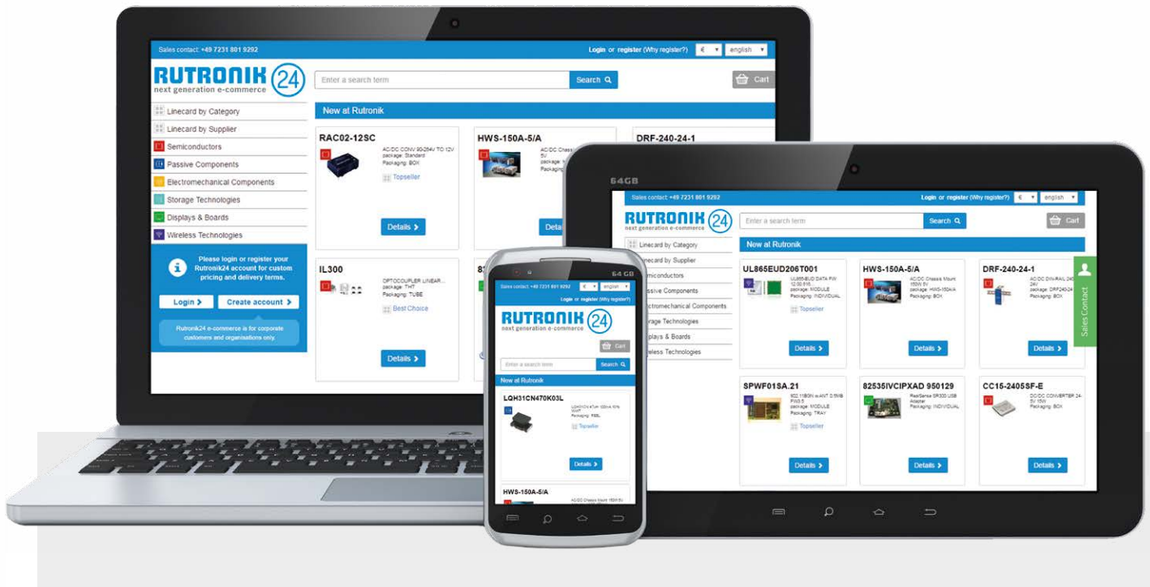
Markets & Applications

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

ams OSRAM



RUTRONIK 24
next generation e-commerce



e-commerce made easy

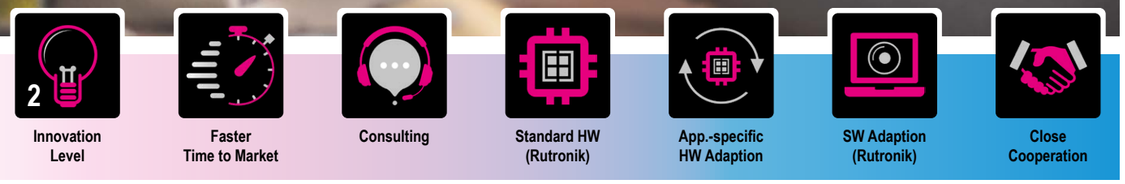
FASTER. EASIER.
JUST MORE PERSONAL.

rutronik24.com

- 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

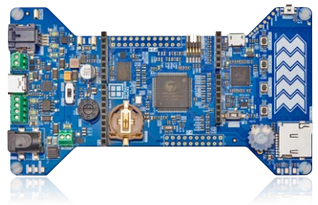
- Modular solution with the best fit combination of different suppliers and products
- Time to Market is reduced significantly
- Inspiration for best fit products



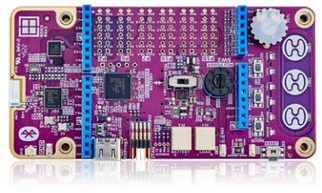
All components of the BOM can be found in the Rutronik portfolio!

Board - Overview

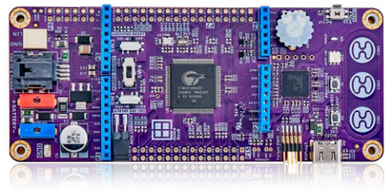
Rutronik Development Kits - RDK



RDK2



RDK3



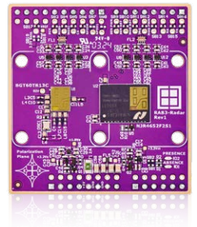
RDK4

Rutronik Adapter Boards - RAB

RAB - TTS

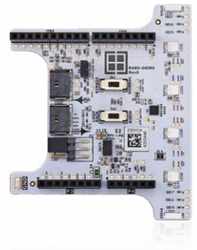
RAB1 – Sensorfusion

RAB2 – CO2



RAB3 - Radar

RAB4 - RTK



RAB5 - OSIRE

Rutronik Cooperation Boards

HMS Anybus

HV-Switch

RDK2 based on Infineon PSoC™ 62 MCU

Easy approach for firm- and hardware designers

Benefits

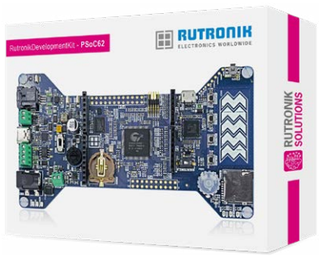
- Offers a complete solution for hard- and firmware development and for proof of concepts in a very short time
- No need of soldering and assembling own prototype builds for first testing and measurements
- Use all RDKs as a base board for all other Rutronik adapter boards
- Easy integration of all other 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

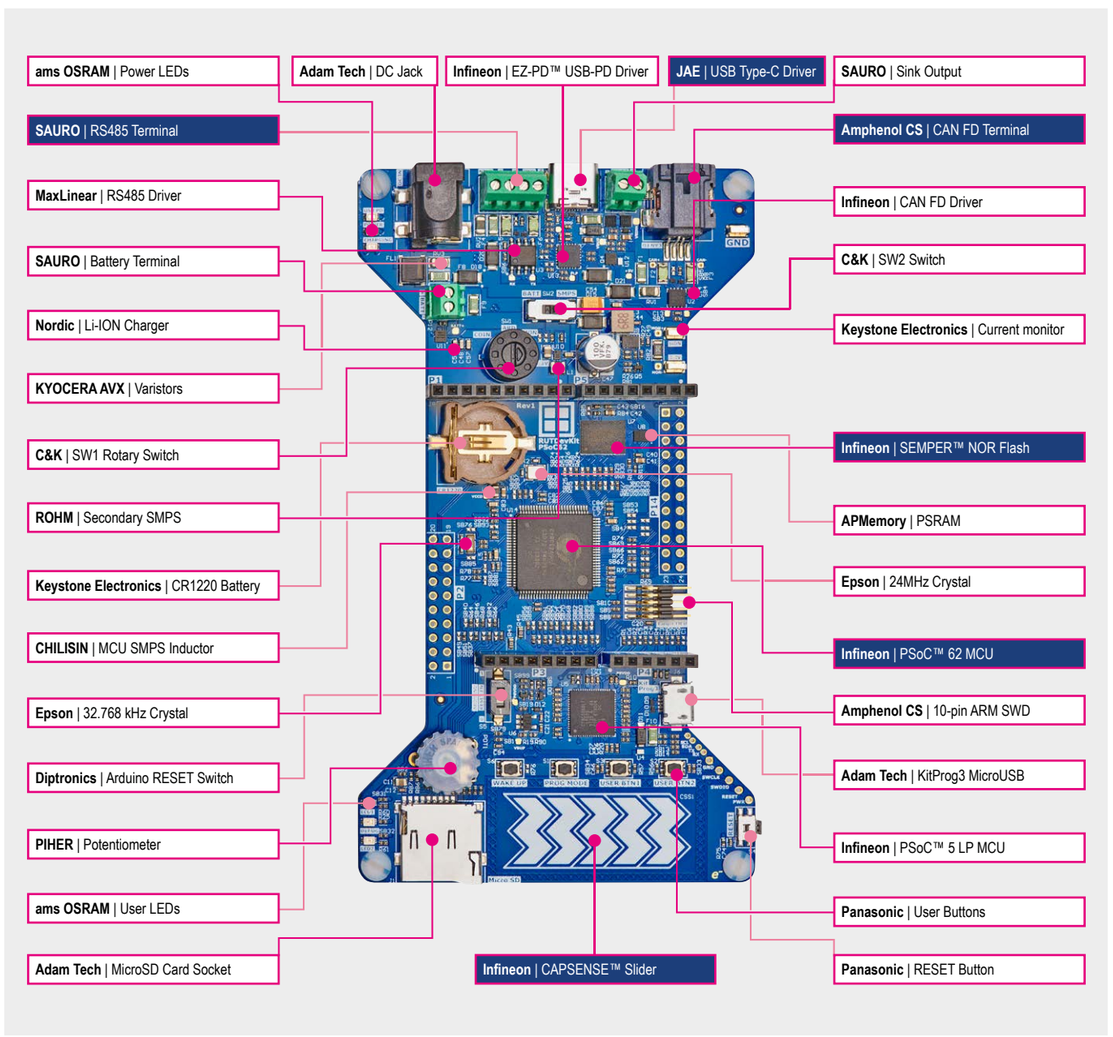
Key Features

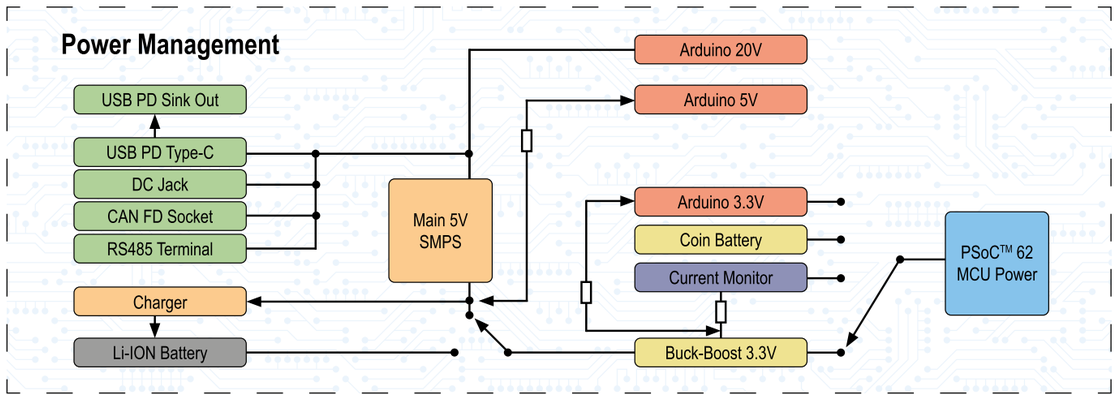
- Boards runs on the PSoC™ 62 MCU with a dual core ARM® Cortex®-M4 and ARM® Cortex®-M0+ architecture
- Includes an integrated power management IC which enables the board to be powered from the Li-ION battery. The high-efficiency buck controller allows having a high-power supply providing developers with 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 PSoC™ 62 MCU via supplied headers

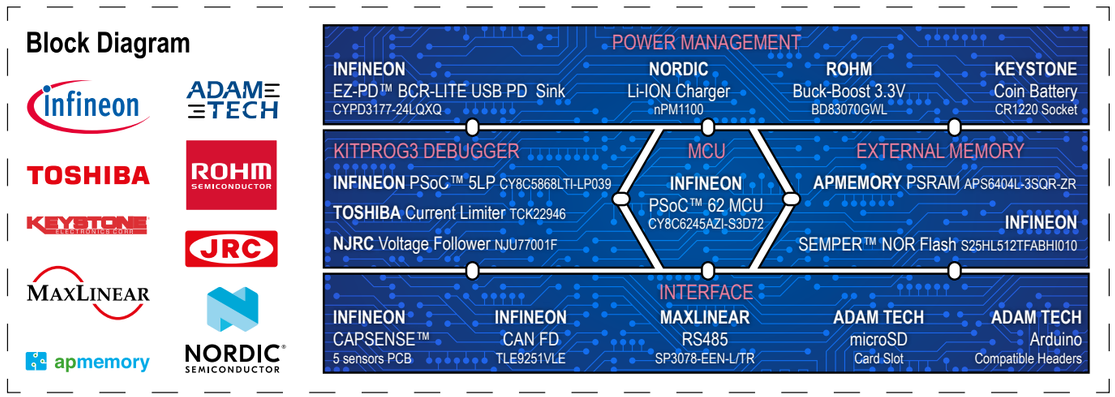
Markets & Applications

- Smart Wearables
- IoT & Industrial IoT
- Smart Home
- Robotics & Automation
- Touch & Gesture based applications









RDK3 based on Infineon PSoC™ 64 Secured MCU

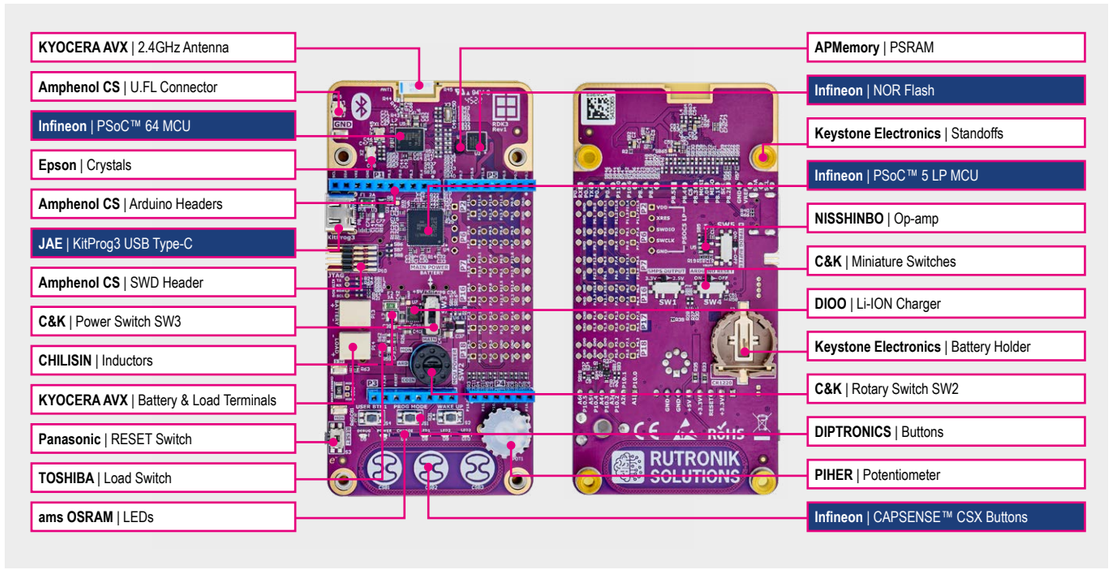
Wireless ultra-low power IoT Bluetooth board with state of the art hardware-based security features

Benefits & Key Features

- Offers a complete solution for hardware and firmware developers for proof of concepts in a very short time
- Board runs on the PSoC™ 64 Secured MCU from Infineon with PSA support
- The MCU offers three-levels of hardware- and firmware-based resource isolation
- The Arm® Cortex®-M4/M0+ dual core SOC offers a secured M0+ core, physically separated from an user application running on the other M4 core
- Offers secure element functionality that can be used to build authenticate secure applications
- Ultra low power MCU with Bluetooth® Low Energy

Markets & Applications

- Smart Building
- Robotics
- Smart Factory
- Healthcare



RDK4 based on Infineon PSoC™ 4100S Max

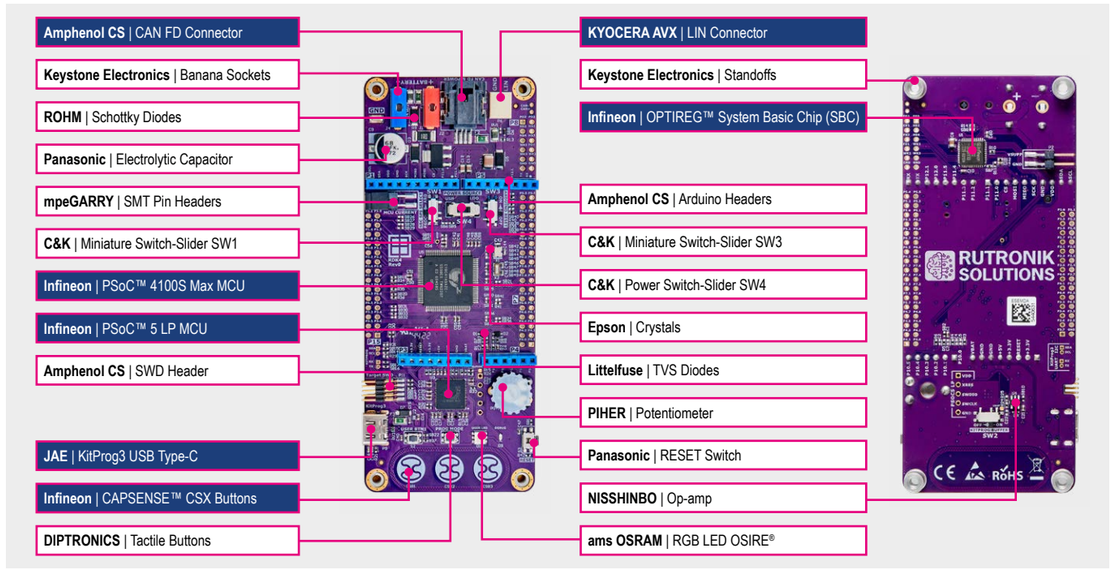
Small, compact automotive qualified controller with most important automotive interfaces like CAN-FD and LIN

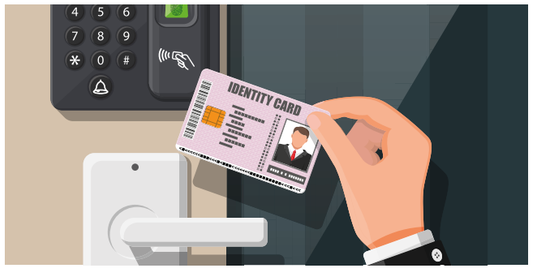
Benefits & Key Features

- Board runs on the PSoCTM 4100S Max with Arm Cortex M0+ MCU (48MHz)
  - CAN-FD (5Mbps) | LIN Interface | Audio I2S | 384/32 KB Flash/SRAM
  - Low-Power 1.71 V to 5.5 V | CAPSENSE™
- Possibility for an easy current measurement with Jumpers
- All Pins reachable for digital analyses like CAN TX RX
- SBC – OPTIREGTM Mid-Range+ with WTD / Voltage Monitoring for Functional Safety
- Perfect fit for development of e.g. various modules like trunk control, door control, seat heating, climate control and many more...

Markets & Applications

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





Adapter Board based on Epson Voice/Audio LSI S1V3G340

Easy approach for implementing voice guidance for a variety of HMI and IoT applications

Benefits

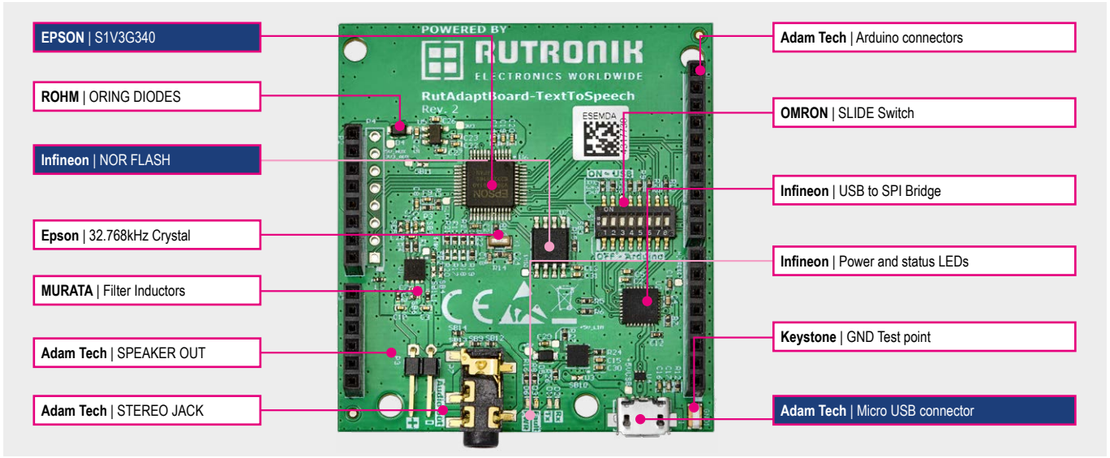
- Offers a complete solution for development of a voice guidance feature and for proof of concepts in a very short time
- No need of soldering and assembling own prototype builds for first testing and measurements
- You can use all RDKs as a base board for this and all other Rutronik adapter boards
- Easy integration of all other Rutronik adapter boards or other Arduino based evaluation boards via integrated Arduino headers
- Easy evaluation of the Epson Voice/Audio LSI S1V3G340 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

Key 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 Epson Voice/Audio LSI S1V3G340 via SPI enables large amounts of audio data to be stored
- Epson Voice/Audio solutions support both -existing concepts and new designs- by dedicated IC`s for a seamless platform transformation adding Voice Guidance function
- 3.5mm stereo jack for stereo speakers or headphones
- Supports up to 12 languages

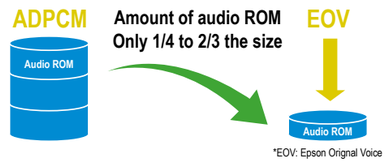
Markets & Applications

- Home Appliances
- Security/Alarms
- Door Locks/ Door Phones
- Healthcare
- Tracking Devices
- Goods for handicap/ Elder people

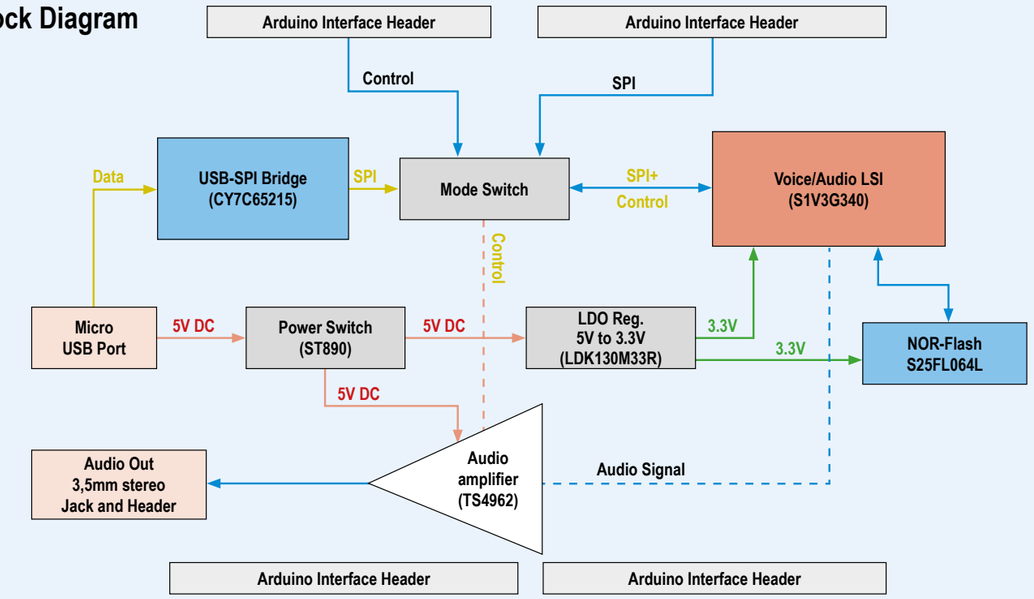


Small amount of ROM space to save space

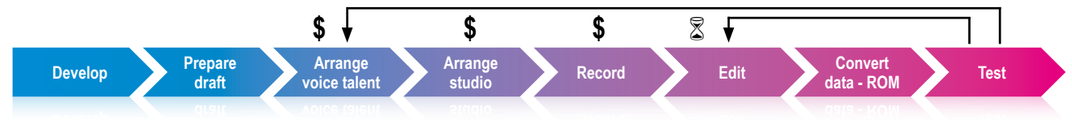
	Format	sampling rate (kHz)	ADPCM (bit)	bitrate (kbps)	Speech time					
					1 (min)	2 (min)	3 (min)	4 (min)	5 (min)	10 (min)
others	ADPCM	16	4	64	480 (kB)	960 (kB)	1.440 (kB)	1.920 (kB)	2.400 (kB)	4.800 (kB)
		8	4	32	240 (kB)	480 (kB)	720 (kB)	960 (kB)	1.200 (kB)	2.400 (kB)
		8	3	24	180 (kB)	360 (kB)	540 (kB)	720 (kB)	900 (kB)	1.800 (kB)
EPSON	EOV (original	16	-	16	120 (kB)	240 (kB)	360 (kB)	480 (kB)	600 (kB)	1.200 (kB)



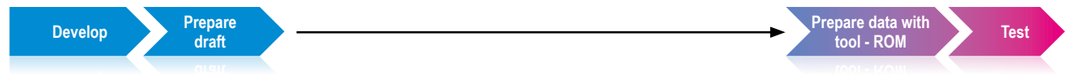
Block Diagram



Usual process of adding a voice function



Process with Text To Speech board



Adapter Board RAB1 – Sensorfusion

For intelligent sensor fusion

Benefits

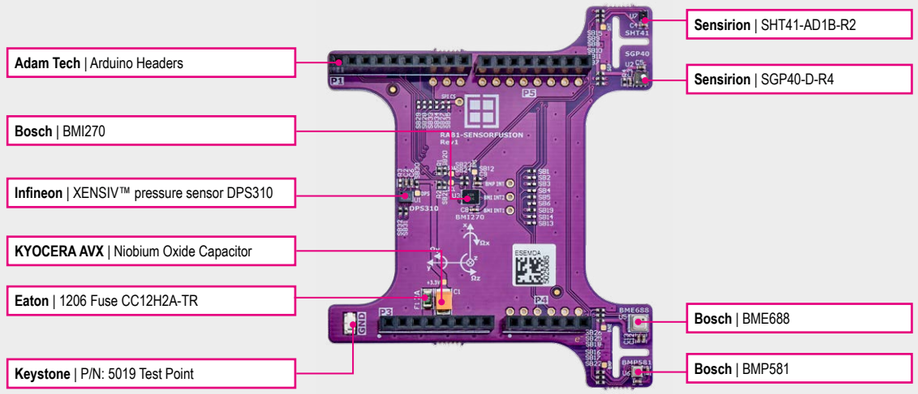
- With state of the art sensors for all sensorfusion applications
- User can access all pins via supplied headers
- Operates on any evaluation board with Arduino Interface and perfect fit for our RDKs
- Can be combined with all of our other boards
- Many firmware examples are available on our homepage

Key Features

- Additional interial MEMS sensor for manipulation detection or navigation function
- I2C and SPI interface via Arduino compatible connectors
- Test Point connector for ground signal

Markets & Applications

- Building Automation
- Professional Kitchen
- HVAC
- Smart Farming



Adapter Board RAB2 – CO2

For best in class CO2 sensing

Benefits

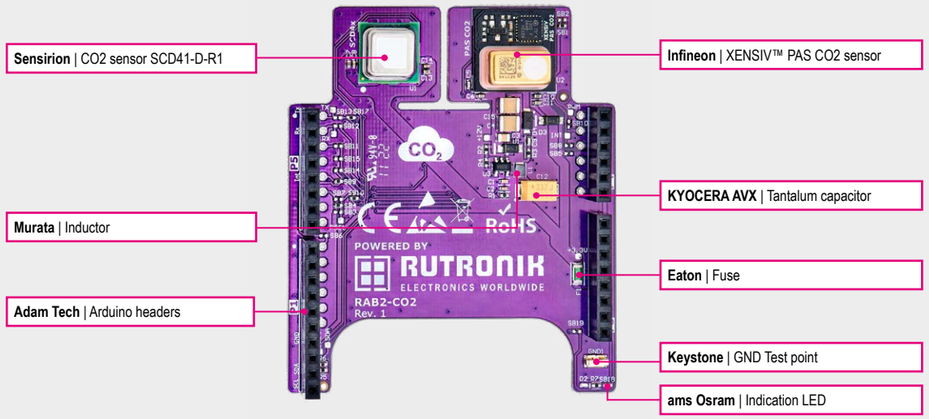
- Easy evaluation of CO2 sensing
- Customer can decide which sensor and which measurement method fits the most
- Demo will be available at our trade fairs
- Stackable on RDKs and combination with other adapter boards possible

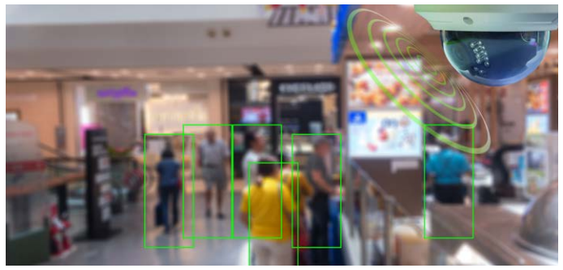
Key Features

- I2C and SPI interface via Arduino compatible connectors
- Test Point connector for ground signal

Markets & Applications

- Building Automation
- Professional Kitchen
- HVAC
- Smart City





Adapter Board RAB3 – Radar

For distance measurement, people or surface detection

Benefits

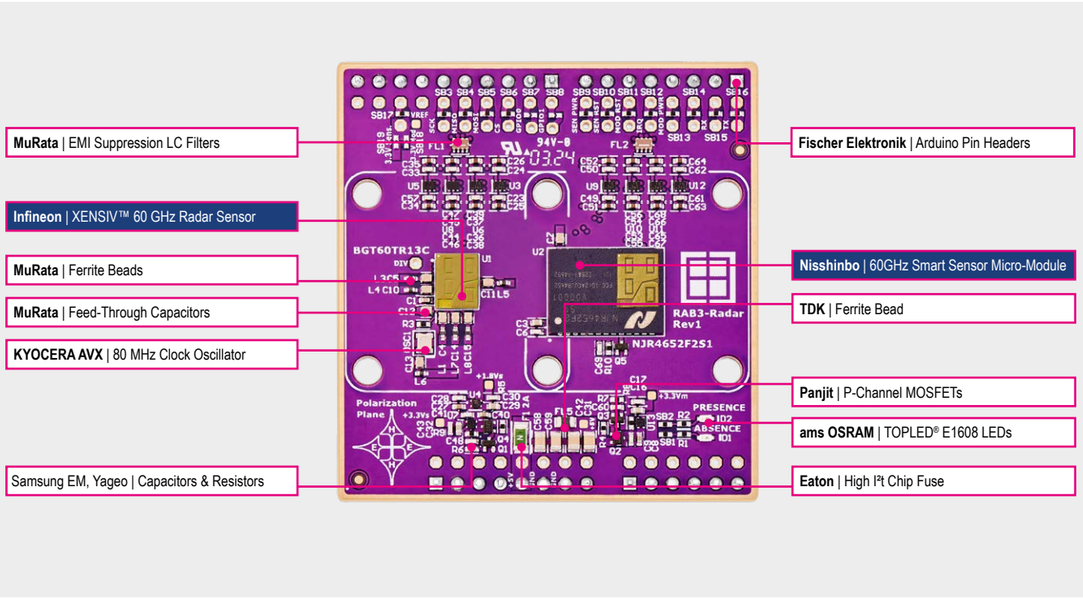
- Fully integrated radar solution (Nisshinbo) and a discrete radar IC (Infineon) on one board
- Operates on any evaluation board with Arduino interface
- Can be combined with all of our other boards
- Firmware examples for distance measurement, people and surface detection

Key Features

- One board to test the possibility of a discrete development or the use of a fullly integrated module
- Distance measurement and people detection with the use of our RSS smartphone App
- High stability against ambient noise
- Distance measurement up to 15m
- 3 Rx and 1 Tx antenna integrated

Markets & Applications

- Presence detection
- People counting
- Distance measurement



Adapter Board RAB4 – RTK

High precision outdoor navigation

Benefits

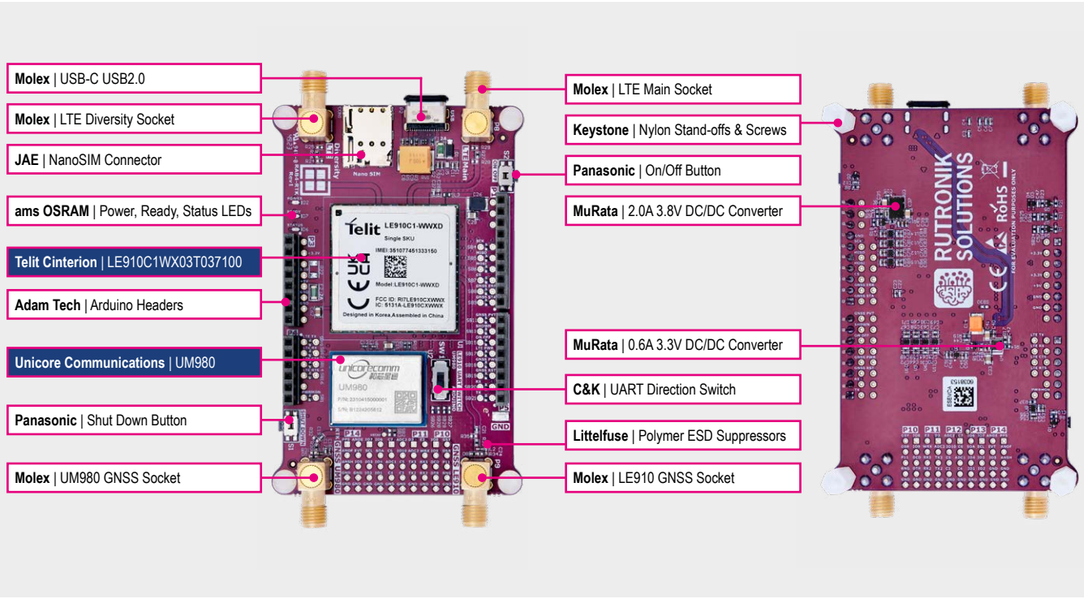
- Direct comparison of RTK and GPS possible because of Telit LE910 (with integrated standard GNSS)
- Operates on any evaluation board with Arduino interface
- Can be combined with all of our other boards

Key Features

- Up to 50 position measurements per second
- 1-2cm accuracy
- Absolut positioning thanks to Telit 4G module
- Relative positioning thanks to Unicore UM980 Module

Markets & Applications

- Agriculture equipment
- Self driving outdoor vehicles
- Robots
- Lawn mower
- Drones



Adapter Board RAB5 - OSIRE

Rutronik Adapter Board for High-performance LED Applications

Benefits

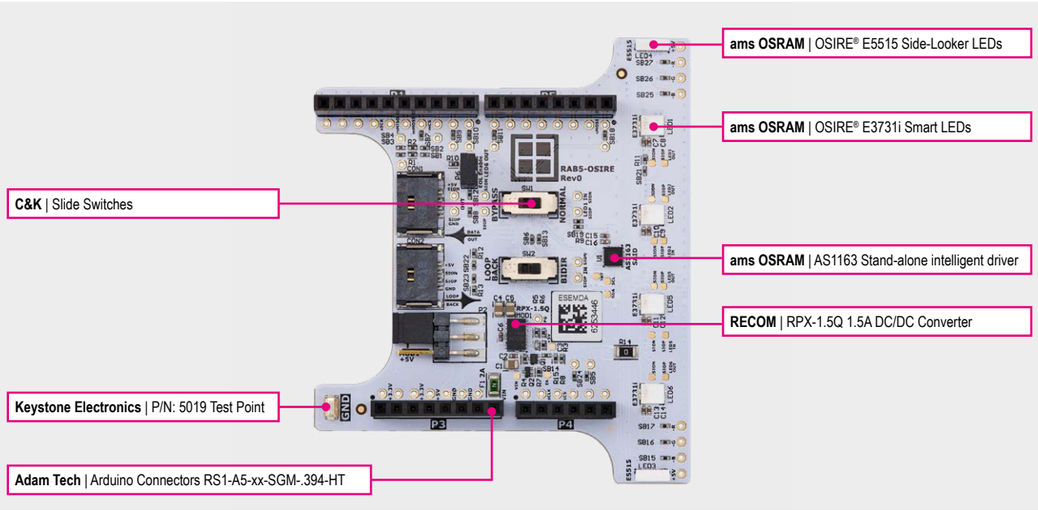
- Highly accurate optical calibration data for all LEDs included
- Dynamic color control and animations
- No flickering, up to 1kHz PWM
- AEC-Q qualified for automotive applications

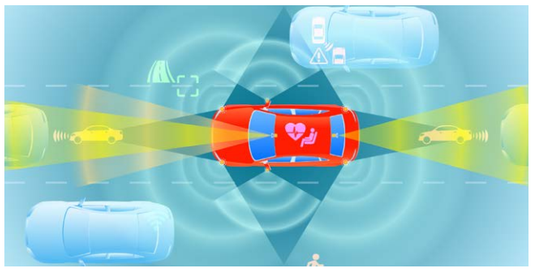
Key Features

- Temperature sensor for LEDs included for full compensation of all three colors
- Completely open protocol, no license costs
- Auto-addressing included
- Diagnostics and error detection included in IC
- Ultra-fast refresh rate for dynamic animations
- Ideal for systems requiring functional safety features

Markets & Applications

- Interior/ambient lighting (automotive, railway, home)
- Control elements with RGB (car, industrial, home)





Adapter Board in cooperation with HMS –

Communication via all common fieldbus and industrial ethernet networks

Benefits

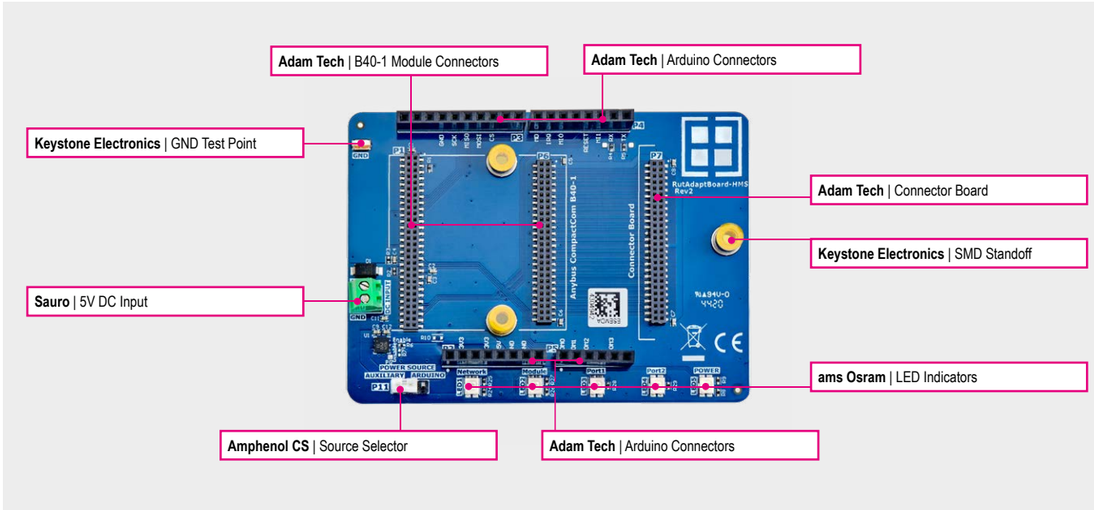
- Various Anybus connector boards can be attached via the board connector e.g. PROFIBUS, Ethernet, CANopen, CC-Link, DeviceNet, etc.
- Easy integration of all other Rutronik adapter boards (e.g. Sensorfusion, CO2, etc.) or other Arduino based evaluation boards via integrated Arduino headers
- Built-in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

Key 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

Markets & Applications

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



800 VDC Bi-Directional HV-Switch

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

Benefits

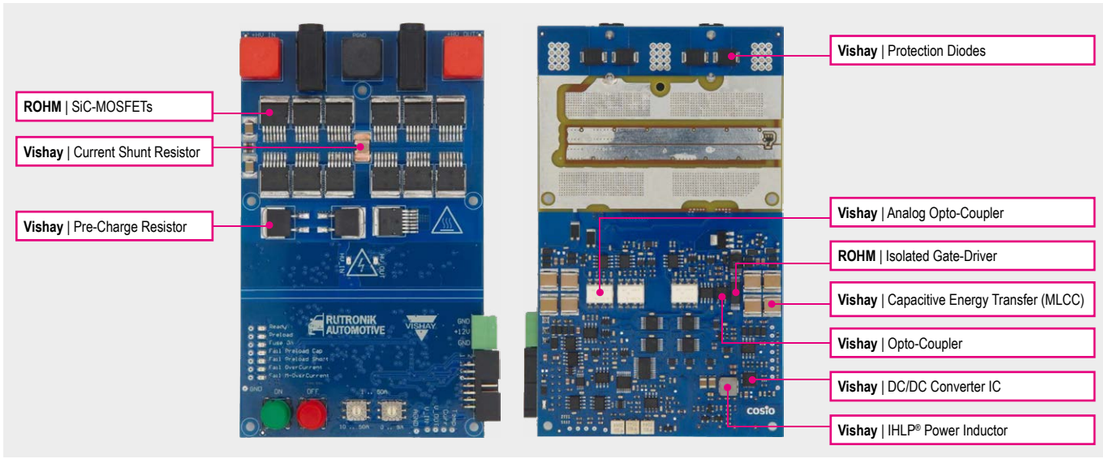
- Innovative new trend for protecting user and hardware in high power applications
- Operates at full power with less than 25W of losses without requiring active cooling
- Included preload function, continuous current monitoring and overcurrent protection
- Protects both power source, cabling and connected load
- Fast disconnect keeps rest of boardnet unaffected from short circuit in load
- Pre-charging enables loading of connected DC-Link capacitors
- Solid State Switch, no arcing, no contact wear
- Feedback of actual voltage and current values enables load monitoring from remote

Key Features

- SiC MOSFETs and a VOA300 optocoupler
- Designed to handle continuous power up to 40kW
- Shut down after a fault - 2.5µs
- Developed as reference design for continuous load power up to 40 kW
- Bidirectional capability handles both motor and regenerative loads
- Overcurrent protection, ultrafast switch-off (~2.5 µs)
- Protection against overtemperature
- Pre-charging of capacitive loads
- Solid State Switch with SiC-MOSFETs
- Operation via push-buttons or communication bus

Markets & Applications

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



Maintenance-free Ambient IoT Remote Control for RDK3

Control your RDK3 with a Battery-free Bluetooth Button

To control your development board remotely, you can use the Bluetooth interface of RDK3. To make this maintance-free and without the need of an battery, we used the EnOcean PTM216B Module, which contains the Bluetooth transmitter as well as an energy harvesting electronic to convert the kinematic power of pushing the button to generate enough electrical power to send the command to the RDK3.

The example source code is available on GitHub:

To quickstart your development, we also offer the EnOcean Easyfit EWSSB (single button) and EnOcean Easyfit EWSDB (double button) which is white label light switch (plastic housing) with PTM216B integrated.

EnOcean
Sustainable IoT

EWSSB / EWSDB –
Easyfit Single / Double Rocker Wall Switch for BLE

Self-powered wireless controls are simple to install. The Single / Double Rocker Wall Switch using the European 55 x 55 form factor uses energy harvesting technology to communicate wirelessly with other devices supporting the Bluetooth Low Energy (BLE) Advertising standard. They provide convenient control of lighting, temperature and miscellaneous electric loads.

The wall switches are self-powered and never require batteries because the simple act of pressing the rocker generates enough energy to send wireless Bluetooth Low Energy (BLE) Advertising telegrams to other devices. The Single and Double Rocker Pads can optionally be configured by means of an NFC (ISO 14443) interface.

The enclosed switch frame can be replaced by frames of the following design programs: BERKER S1, B1, B3, B7 Glas, or GIRA Standard55, E2, Event, Esprit or JUNG A500, Aplus or MERTEN M-Smart, M-Arc, M-Plan.

EnOcean
Sustainable IoT

BLE Pushbutton Transmitter Module
PTM 216B with NFC Interface

PTM 216B enables the realization of energy harvesting wireless switches for EnOcean systems communicating based on the BLE radio standard.

PTM 216B is mechanically compatible with the established PTM 21x form factor enabling quick integration into a wide range of designs.

Key applications are wall-mounted or portable switches either with up to two rockers or up to four push buttons.

PTM 216B provides an NFC interface according to ISO 14443 for configuration.

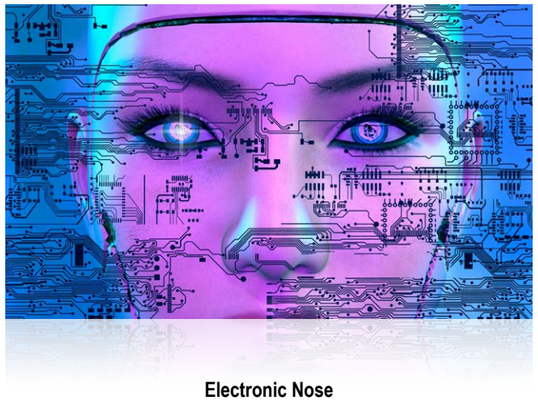
- Hardware developed by Rutronik serving as a proof of concept for system solutions in new markets and new technologies
- Partially based on Rutronik IP
- Development based on cooperations with leading universities and institutions
- Rutronik is following an IP protection program within the research 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

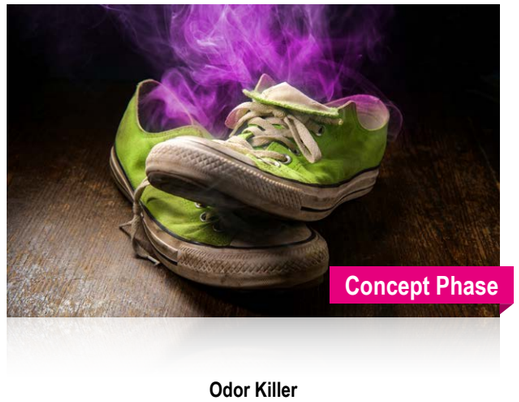
- Ready proof of concept on research level
- Combination of scientific know-how and newest products
- Therefore greater competitive advantage regarding know-how and time to market

Board - Overview

HESS



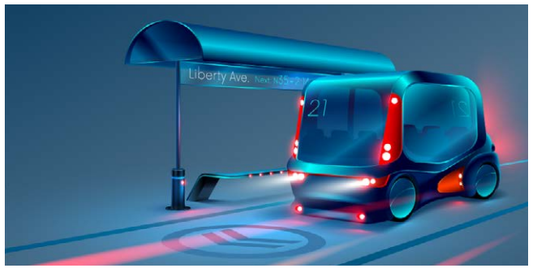
Electronic Nose



Odor Killer

Virus Killer

Insect Scare



HESS –

Hybrid Energy Storage System in cooperation with HS Zwickau

Benefits

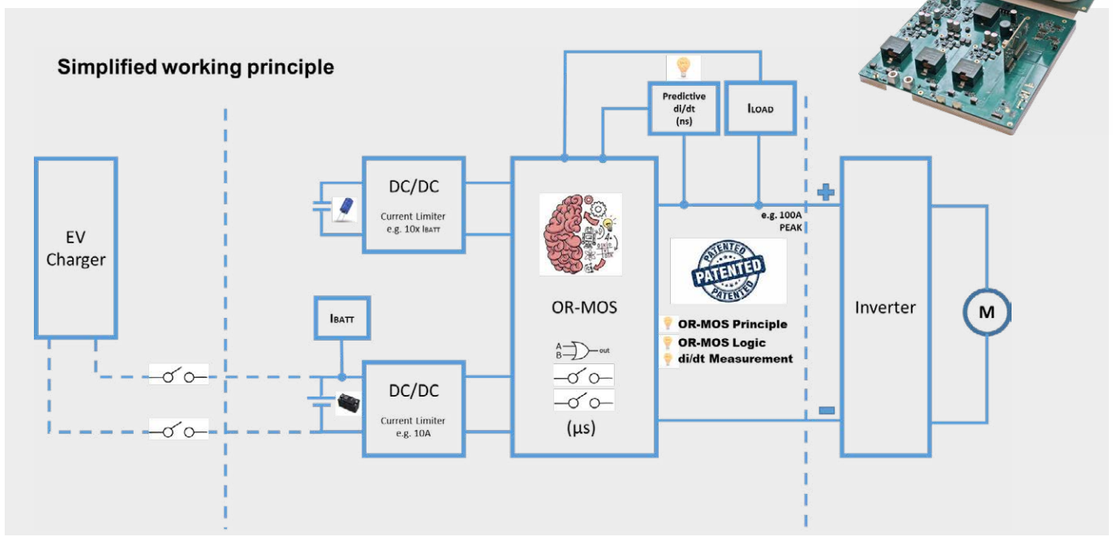
- Extended battery lifetime
- Ultra-fast detection and switching
- Combines the advantages of Li-Ion cells and super caps
- Adjustable battery current limiter
- Recuperation charging available
- High Power Scalable from 1KW to 10KW at 36V-72V

Key Features

- High speed analog/ mixed signal processing
- di/dt detection within ns
- Reverse current detection
- Recuperation current detection
- High speed control logic of a buck or MOS boost converter
- Anti-cross conduction drive control
- Ultra fast detection (ns) and switching (µs) algorithm
- Extremely high peak current performance
- Predicted battery lifetime and state-of-health (SoH)
- Best trade-off between energy density, power density, capacity, cost, weight and volume of the storage system

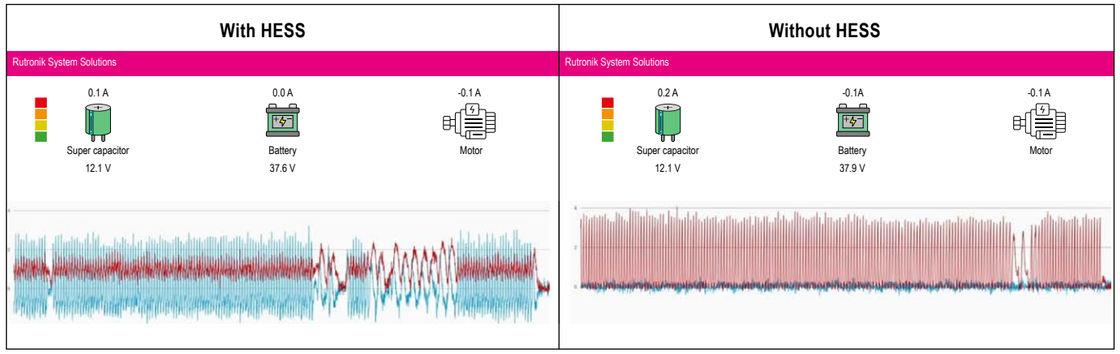
Markets & Applications

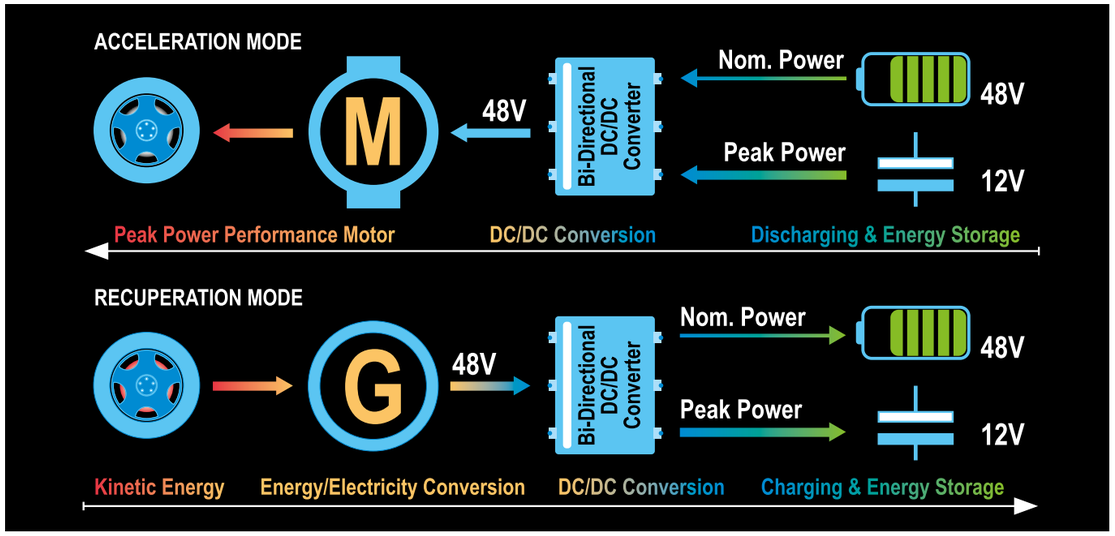
- LEV
- City busses
- Golf carts
- Material Handling
- Marine
- Gardening
- Industrial Vehicle
- Agriculture
- Aviation



	Li-Ion Cells	Super Cap	Combination Li-Ion Cell + Super-Cap
Power Capability (W/kg)	++	+++	+++
Energy Density (Wh/Dimensions)	++	-	++
Specific Energy(Wh/kg)	++	+	+
Cycle Life	0	+++	+++
Calendar Life	+	++	+++
Price	-	0	0
Self-Discharge	++	-	++
Temperature behavior	0	++	++
Reliability	0	++	++
Fast Charging	0	+++	+++

Scoring : +++ extremely good; ++, very good + good 0 neutral - disadvantage





Electronic Nose

Working like a human sensory organ

The electronic nose works like the human sensory organ. Like our nose the system detects volatile compounds and volatile organic compounds (VOC) that emit odors or can be harmful to ones health. This system selectively stimulates the compounds, analyses and characterizes the behavior of the compounds physically and biochemically. When observing volatile compounds in the air, the state is not stationary, it is a volatile state. The status depends on the chemical and physical parameters that are not constant. Thus, a volatile and multidimensional and ever changing system exists.

Markets & Applications

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

Odor Eliminator

Detect, analyze and eliminate smells for fresh air in every room

Concept Phase

The odor eliminator makes use of the odor destroying properties of UVA LEDs. Volatile compounds and volatile organic compounds (VOC) can cause odors and can be harmful in certain concentration. The state is not stationary, it is a volatile state. The status depends on the chemical and physical parameters that are not constant. Thus, a volatile and multidimensional and ever changing system exists. The odor eliminator is a system that selectively stimulates volatile compounds. The molecular composition of the VOCs can be changed, analyzed and destroyed with the help of UVA LEDs.

Markets & Applications

- White Goods
- Indoor Applications
- Air purifier

Virus Killer

Safe UVC-LED disinfection of viruses & bacteria

Concept Phase

The system solution virus eliminator makes use of the disinfecting effect of UVC LEDs. When observing volatile compounds and volatile organic compounds (VOC) in the air, the state is not stationary, it is a volatile state. The status depends on the chemical and physical parameters that are not constant. The virus eliminator is a safe and closed system, that precisely destroys the molecular and organic composition of viruses and bacteria in the air.

Markets & Applications

- Home Appliances
- Water taps
- Refrigerators & Freezers

Insect Scare

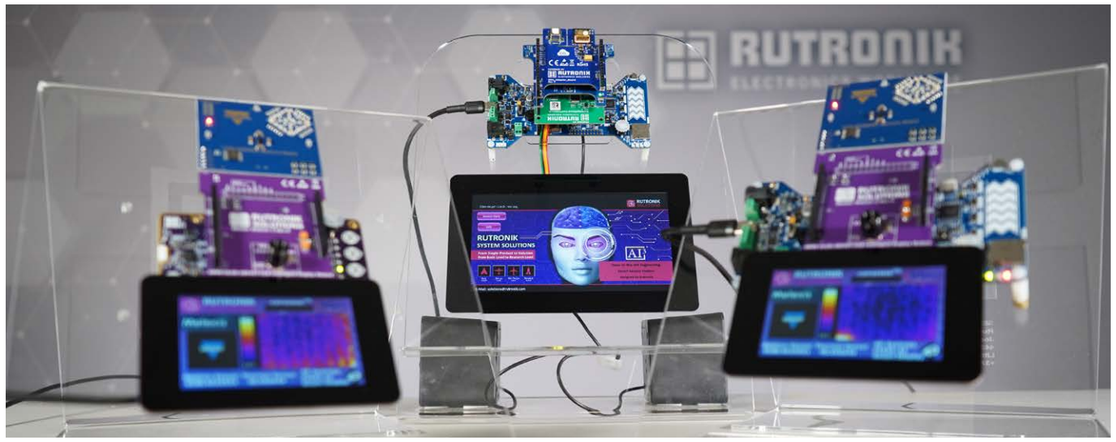
Unique technology to manipulate the sense of insects to keep them away

Concept Phase

The insect scare is a system solution that selectively influences the senses of insects. Depending on the insect either the odors need to be manipulated by ionization of the air, or the hairs of the insect by sending out specific signals to stimulate them. The influence of smells only occur within a defined radius. The sense of smell is being limited, so that the insects cannot sense stimuli within that radius. This can be for example the smell of fruit or meat. In general the technical solution can be adapted to a variety of insects.

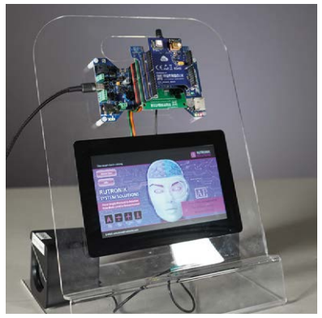
Markets & Applications

- Table devices
- Windows
- Outdoor devices



Smart Sensor Station – Intelligent Environment

The Smart Sensor Station - Intelligent Environment shows the concept with a perfect combination of our RDK2 with the adapter boards TextToSpeech, Sensorfusion and CO2 with an additional smart display to visualize the data.



- RDK2 ensures smooth communication of the boards
- TextToSpeech provides an acoustic data and alarm output
- RAB1 provides a large amount of available sensor data
- RAB2 provides a direct comparison of two CO2 sensors
- A smart display provides visual data output and easy navigation

Included boards: RDK2 | Adapter Board - TextToSpeech
RAB1 - Sensorfusion | RAB2 - CO2 | 4DSystems display

Smart Sensor Station – Gesture & Presence Control

The Smart Sensor Station – Gesture & Presence Control shows the concept with the usage of RDK3 and the adapter boards for a FIR thermal- ,an IR gesture detection as well as presence and gesture detection with the RAB3 for 60 GHz radar technology plus an additional smart touch display to visualize the data.

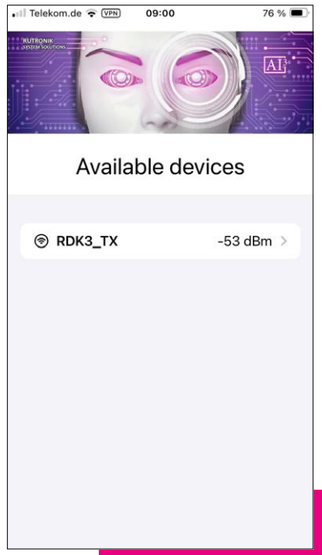
- RDK3 ensures smooth communication of the boards
- IR gesture detection board for low cost gesture control
- FIR thermal array sensor for people counting, presence detection or temp. measurement
- Gesture control & distance measurement with 60 GHz radar technology
- Smart touch display provides visual data output and easy navigation

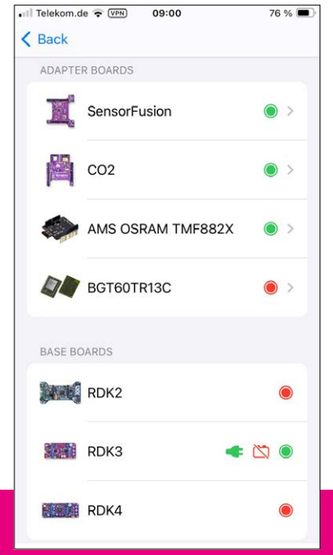
Included boards: RDK3 | Evaluation Board – FIR thermal sensor
Evaluation Board – VCNL4035X01 | RAB3 | 4DSystems Display

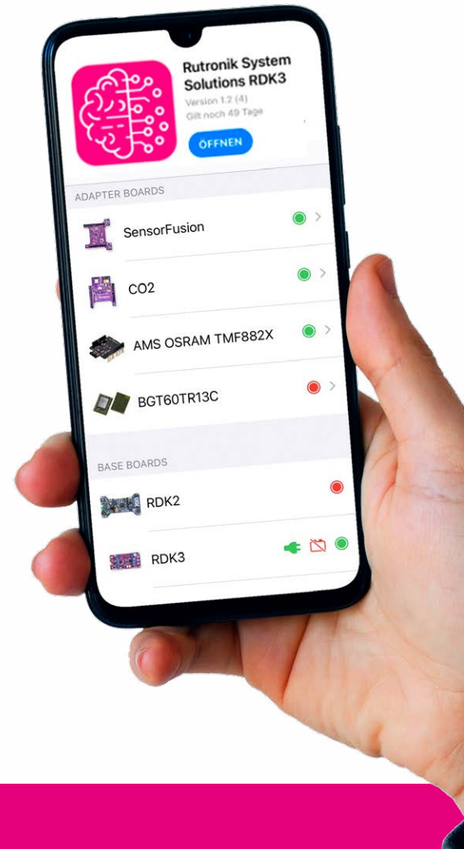
Rutronik System Solutions APP

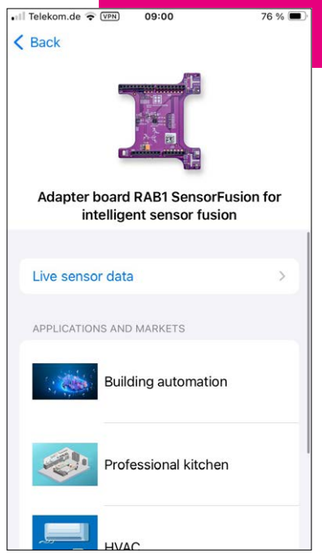
Utilize Rutronik System Solutions for iOS to:

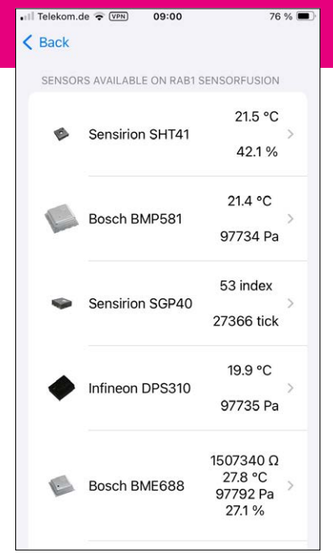
- Demonstrate Bluetooth functions.
- Test various Rutronik development boards.
- Retrieve live sensor data
  (including environmental, radar, real-time kinematic, CO_2, and time-of-flight sensors).
- Explore new and trending repositories

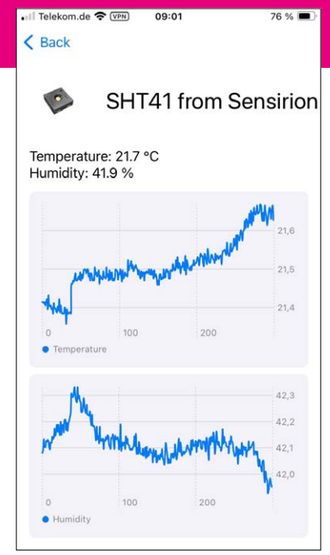






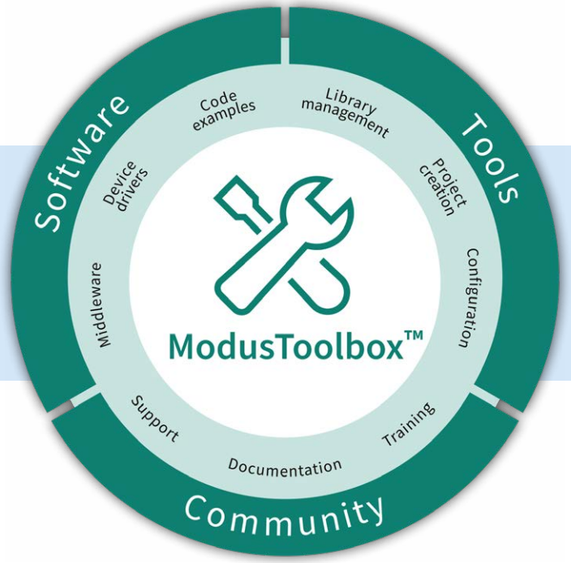






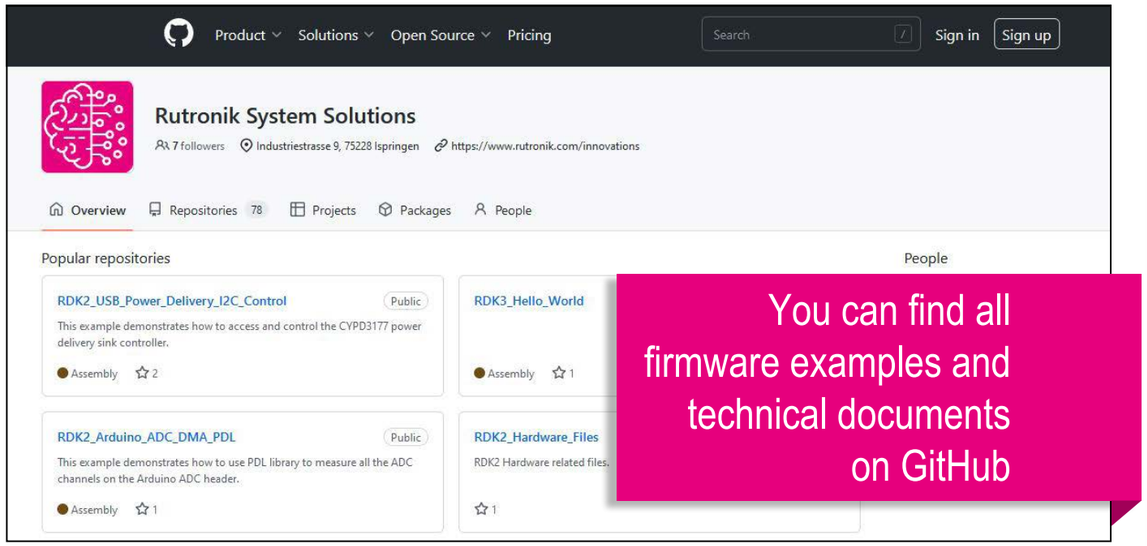
ModusToolbox™ & Friends program

As partner of the ModusToolbox™ & Friends program you can find all our RDKs in the ModusToolbox™ development environment



Quelle: Infineon

GitHub



You can find all firmware examples and technical documents on GitHub

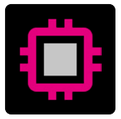
Find us on www.rutronik.com

- Information and descriptions about all available Rutronik boards
- Download section for all technical documents and other information material
- Contact form for customer requests and questions
- Information about Rutroniks future markets
- Direct link to our R24 shop to directly order the boards

Electronics for Future Markets

Consulting

The consulting regarding individual conditions is part of every system solution and rooted in the existing business as broadline distributor. At the forefront is the system thinking and the extensive know-how regarding the single products and the system of the Rutronik product and application engineers.



Standard HW (Supplier)

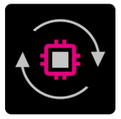
The standard hardware of our suppliers contain starter kits, evaluation boards or reference designs among others. These can be the basis for technical contexts in many use cases.

Standard HW (Rutronik)

The standard hardware by Rutronik comprises own developed reference designs which combine best fit products from our suppliers on one board. All products can be found in the Rutronik portfolio.

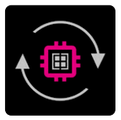
Special HW (Rutronik)

The special and dedicated hardware by Rutronik can only be found in the research level. For every IP protected proof of concept an own basis is developed. This happens in close cooperation with the suppliers and developement experts.



Standard HW Adaption

Besides the standard hadware, suppliers also offer hardware adaptions that are designed for specific functions. They are extensions of the standard hardware.



App.-specific HW Adaption

Within the Advanced Design Level System solutions Rutronik offers application specific hardware adaptions. They extend the functions of the hardware and represent application modules.

SW Adaption (Rutronik)

Rutronik offers software adaptions for a variety of hardware within the Design, Advanced Design and Research Level. They are based on Open Access Tools or own developed software.

Close Cooperation

Important for every level of system solutions is the close cooperation with our suppliers. It ranges from product trainings to development support for Research Level applications. They are the central partner for all developments by Rutronik.

RUT IP/ Partner IP

The Research Level System Solutions are based on research papers and cooperations with leading universites and institutions. An IP protection program is being followed. All Research Level System Solutions contain unique know-how with corresponding IP protection.

Innovation Level

The innovation level is different for every system solution. It is the highest for the Research Level because it represents a unique proof of concept with IP protection. Due to the novelty and specific adaptions of the boards a higher innovation level is also given on the other levels.

Faster Time to Market

The time to market refers to the advantages for the development departments of our customers. It is significantly reduced for system solutions in the Research Level because the functionality is already shown. Only adaptions regarding the suitability for series production have to be made by the customer. The other system solutions shorten the time to market as well because they show the challenges along the development stages and give solutions accordingly.

SYSTEM SOLUTION	STANDARD	BASIS				TECHNOLOGY ADAPTION				CUSTOMER ADVANTAGE	
	CONSUTLING	STANDARD HW (SUPPLIER)	STANDARD HW (RUTRONIK)	SPECIAL HW (SUPPLIER)	STANDARD HW ADAPTION (SUPPLIER)	APP.-SPECIFIC HW ADAPTION (RUTRONIK)	SW ADAPTION (RUTRONIK)	RUT IP/ PARTNER IP	CLOSE COOPERATION WITH SUPPLIERS	INNOVATION LEVEL	FASTER TIME TO MARKET
RESEARCH LEVEL	■			■			■	■	+++	4	3
ADVANCED DESIGN LEVEL	■		■			■	■		++	2	2
DESIGN LEVEL	■	■			■		■		+	2	2
BASIC LEVEL	■								+	1	1
BROADLINE DISTRIBUTION											

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