



Rutronik's New Embedded Suppliers: Introduction of Rutronik's New Partners and Suppliers on the Linecard to meet your Challenges of the Future

Bernd Hantsche

Cypress Semiconductor
is now part of Infineon





INTERNET OF THINGS (IoT) IS ENABLING EVERYDAY OBJECTS TO EXCHANGE DATA OVER NETWORKS, WITHOUT HUMAN INTERVENTION.

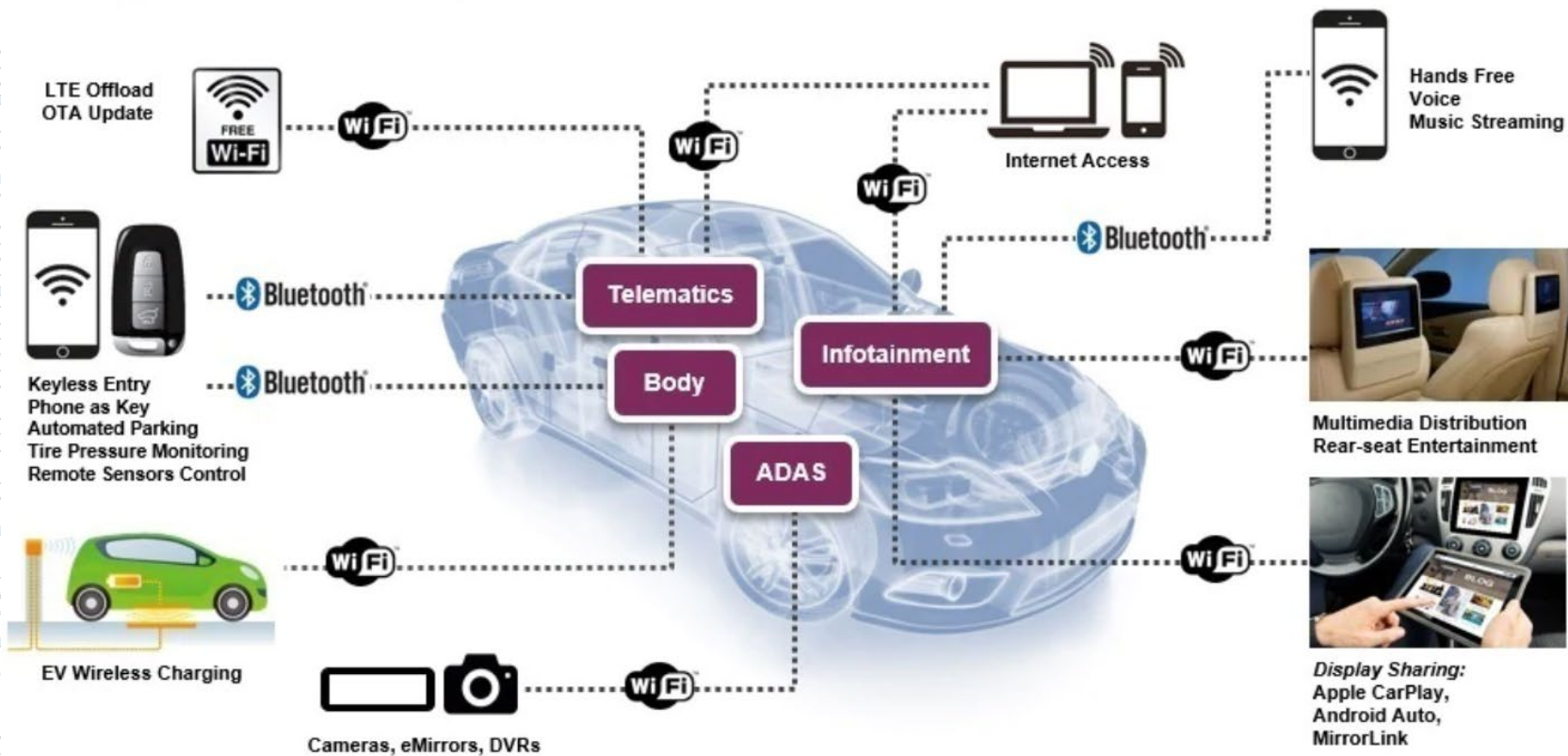


Infineon is now a Wireless supplier offering following solutions:

- Wireless System-on-Chip (Transceiver + Wireless-Stack + your application code, no further MCU required)
 - WiFi Dual-Band, 1x1 SISO or 2x2 MIMO
 - Bluetooth Basic Data Rate and Enhanced Data Rate (also known as „classic Bluetooth“)
 - Bluetooth Low Energy
 - Bluetooth Dual-Mode (BR/EDR + LE)
 - WiFi Dual-Band + Bluetooth Dual Mode combination (single chip design)
- Wireless Connectivity Chips (Transceiver + Wireless-Stack, external MCU for your application code required)
 - WiFi Dual-Band, 1x1 SISO or 2x2 MIMO
- automotive qualified wireless solutions

AWARD-WINNING
WIRELESS SOLUTIONS FOR THE
NEXT-GENERATION OF
CONNECTED CARS

AUTOTECH
BREAKTHROUGH
AWARD
2020



Rutronik offers corresponding Cypress based modules from MURATA

- ultra small
 - safe design cost
 - safe certification cost
 - faster time-to-market
 - less design and logistic complexity
-
- radio only
 - connectivity
 - System-on-Module
-
- Bluetooth Low Energy
 - Bluetooth Dual-Module
 - WiFi
 - WiFi + Bluetooth Dual Mode



Cypress shows further details immediately afterwards – stay here!

Do you want to learn more regarding Cypress / Infineon / Murata?

wireless@rutronik.com

Partner	Part Number	Wi-Fi/Bluetooth FW	Wi-Fi/Bluetooth Support	MCU	Area (mm2)	Regulatory	Interfaces	Highlights		
Murata	Type 1LV (LBEE59B1LV-278)	CYW43012	2.4 / 5GHz, 802.11a/b/g/n + ac-friendly, BLE 5.0	Radio Only	10.0 x 7.2	CE/FCC /IC/TELEC	WLAN: SDIO Bluetooth: UART	1x1 SISO 11ac solution		
Murata	Type 1DX (LBESK1DX-883)	CYW4343W	2.4GHz, 802.11b/g/n, BLE 5.1	Radio Only	6.95 x 5.15	CE/FCC /IC/TELEC	WLAN: SDIO Bluetooth: UART			
Murata	Type 1GR (LBCA1ZZ1GR-084)	CYW20736	Bluetooth LE	Arm Cortex-M3-Internal	24MHz	9.0 x 7.0 x 1.2	CE/FCC/IC	N	UART, SPI	Bluetooth 4.1, with Antenna
Murata	Type 1CD Imp003 (LBWA1ZV1CD-716)	CYW43362	2.4G, b/g/n	Arm Cortex-M4-STM32F405	168MHz	10 x 7.9	CE/FCC/IC	N	UART, SPI	Electric Imp Cloud support. Modular Cert., -20 to +70 deg. C
Murata	Type 1FX (LBWA1KL1FX-875)	CYW43364	2.4GHz, 802.11b/g/n	Radio Only	N/A	6.95 x 5.15	CE/FCC/IC	Y	SDIO, SPI	Pin to Pin compatible to 1DX. Diversity w/ SW control pins. Part of i.MX6 platform with Linux drivers integrated in NXP/Freescale Linux distribution, -20 °C to +75 °C. Reference Certified
Murata	Type 1LV (LBEE59B1LV-278)	CYW43012	2.4 / 5GHz, 802.11a/b/g/n + ac-friendly, Bluetooth/BLE	Radio Only	N/A	10.0 x 7.2 x 1.4	CE/FCC /IC/TELEC	Y	WLAN: SDIO Bluetooth: UART	1x1 SISO 11ac + Bluetooth solution with SDIO interface. -20 °C to +70 °C
Murata	Type 1XA	CYW54591	2.4 / 5GHz, 802.11a/b/g/n + ac MIMO/RSDB, BT/BLE	Radio Only	N/A	11.4 x 8.9	FCC/IC /ICE/TELEC	Y	WLAN: PCIe BT: UART	2x2 MIMO RSDB + Bluetooth solution with SDIO interface. -30 °C to +85 °C
Murata	Type 1MW (LBEE5HY1MW-230)	CYW43455	2.4 / 5GHz, 802.11a/b/g/n + ac, Bluetooth/BLE	Radio Only	N/A	7.9 x 7.3	CE/FCC /IC/TELEC	Y	WLAN: SDIO Bluetooth: UART	Part of i.MX6 platform with Linux drivers integrated in NXP/Freescale Linux distribution. High throughput on 11ac. -20 to +75° C
Murata	Type 1HD (LBWA1ZZ1HD-004)	CYW43438	2.4GHz, 802.11b/g/n	Arm Cortex-M4-STM32F412	100MHz	21 x 17.5	CE/FCC /IC/TELEC	N	UART, SPI	1024KB FLASH 256KB RAM WICED. Afero Security and Apple HomeKit support. Low current. Certified with embedded antenna. -20 °C to +75 °C
Murata	Type 1LD (LBEE5PA1LD-005)	CYW43438	2.4GHz, 802.11b/g/n, Bluetooth/BLE	Arm Cortex-M4-STM32F412	100MHz	8.9 x 7.8	CE/FCC /IC/TELEC	N	UART, SPI, I2C, I2S, GPIO	WICED. Afero Security and Apple HomeKit support. Low current. -20 °C to +75 °C
Murata	Type 1LD (LBEE5PA1LD-222)	CYW43438	2.4GHz, 802.11b/g/n, Bluetooth/BLE	Arm Cortex-M4-STM32F412	100MHz	8.9 x 7.8	CE/FCC /IC/TELEC	N	UART, SPI, I2C, I2S, GPIO	WICED. Apple HomeKit support. Low current. -20 °C to +75 °C
Murata	Type 1MD Imp004m (LBWA1ZZ1MD-011)	CYW43438	2.4GHz, 802.11b/g/n, Bluetooth/BLE	Arm Cortex-M4-STM32F412	100MHz	21 x 17.5	CE/FCC /IC/TELEC	N	UART, SPI, I2C, PWM, GPIO, ADC	1024KB FLASH 256KB RAM, Electric Imp imp004m. Certified with embedded antenna. -20 °C to +75 °C
Murata	Type 1DX (LBESK1DX-883)	CYW4343W	2.4GHz, 802.11b/g/n, Bluetooth/BLE	Radio Only	N/A	6.95 x 5.15	CE/FCC /IC/TELEC	Y	WLAN: SDIO Bluetooth: UART	Part of i.MX6 platform with Linux drivers integrated in NXP/Freescale Linux distribution, -20 °C to +75 °C. Reference Certified. Use Future Electronics Nebula kit for WICED support.
Murata	Type 1LN (LBESK1LN-081)	CYW4343W	2.4GHz, 802.11b/g/n, Bluetooth/BLE	Radio Only	N/A	6.95 x 5.15	CE/FCC /IC/TELEC	Y	WLAN: SDIO Bluetooth: UART	Part of i.MX6 platform with Linux drivers integrated in NXP/Freescale Linux distribution, -20 °C to +85 °C. Reference Certified. Supports 4wire coex(GPIO1-4)

4D Systems

Turning Technology into Art





Privately held, est. 1990

HQ, R&D and manufacturing in Australia, regional offices Austria, China, Philippines, Turkey

Global leader in intelligent graphic TFT & OLED display module solutions

- Smart displays (integrated graphic processor with graphic libraries)
- Non-touch devices, resistive or capacitive touches available, cover glasses
- Adaption to microcontrollers / single-board-computers possible
- Combined display solutions with WiFi and enclosures
- Round, bar-type and square shape display module solutions

Why does Rutronik recommend 4D SYSTEMS ?

- Smart Displays for a very fast time-to-market
- customers are able to focus on their application, not on graphic/display development
- with growing business/volumes customers are able to scale upcoming redesign using standard display solutions with 4D SYSTEMS graphic chip → scalable and future proofed, investment protection



0.96" up to 1.7" OLEDs
1.3" up to 9" TFTs

All display modules available as starter kit – software for programming is for free!

Super brightness displays available

Displays with FTDI chip

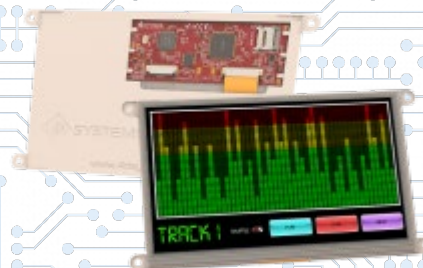
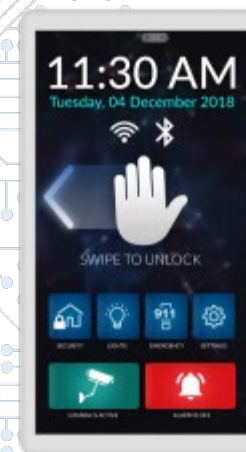
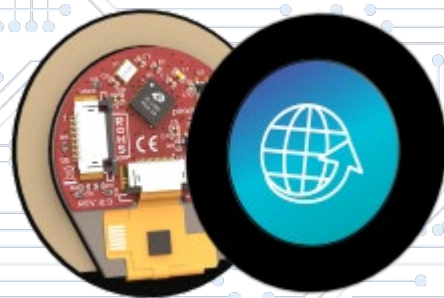
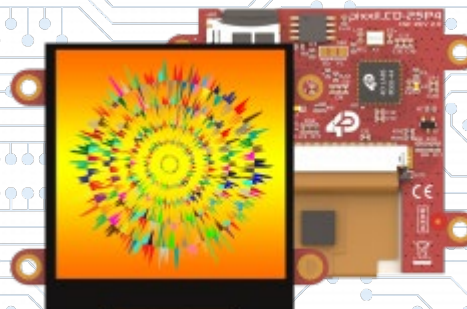
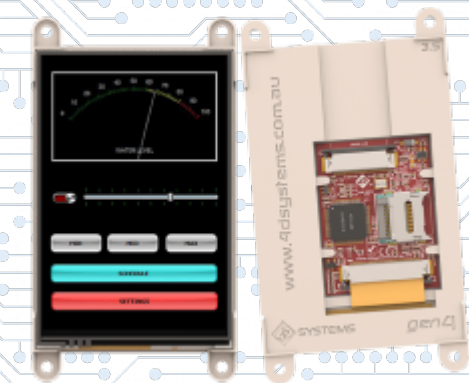
Primary displays for Arduino, Raspberry Pi and ASUS Tinker Board

TFT LCD panels without intelligence available (4DLCD)

own graphic processors as single component available → scale your solution with increasing business



Do you want to learn more or have further questions regarding 4D SYSTEMS?
monitors@rutronik.com



After the lunch break

at 1:00 pm

our technical product specialist will show a demonstration
how easy and fast you can create your application with a
4D System solution.

Please come back and get impressed

iVativ

Enabling IoT Innovations





iVativ is a Wireless supplier offering following solutions:

- Bluetooth Beacons (Eddystone and iBeacon)
- Wireless Sensors
- Wireless Gateways
- Wireless Cards (PCIe, M.2)
- Wireless Modules including follow technologies:
 - WiFi
 - Bluetooth
 - ZigBee
 - Thread
 - ANT
 - NFC
 - combination of multiple-protocols





- Headquarter in San Jose, USA
- Founded in 2017
- Worldwide Franchise for Rutronik

Why does Rutronik recommend iVativ ?

- young company, but experienced and well known people on board (e.g. some former Redpine Signals employees)
- Since 15 years Rutronik is the main European distribution partner of Bluetooth leading **chip and protocol** maker Nordic Semiconductor with a strong continuous growth, focusing on customers >100kpcs/a.
 - ➔ iVativ uses Nordic chips to make **modules and beacons**, focusing on customers <100kpcs/a
 - ➔ customers will save development cost, certification cost and time to market. Customers design will be less complex and the logistic claims for the whole application will be smaller
 - ➔ Rutronik has best experience to support these technologies and used software
- iVativ complements the Bluetooth portfolio with future proofed WiFi, NB-IoT, LTE-M and LoRa
- as a newcomer iVativ encounters the global market consolidation, which is happening since the last years

Modules

Ivativ supplies certified, secure and reliable wireless modules supporting IEEE 802.11 a/b/g/n/ac Wi-Fi, Bluetooth 5.0, ZigBee 3.0, Thread, ANT and NFC-A. These modules come supporting single or multi-protocol with best-in-class co-existence algorithms.

To address the requirements of diverse IoT markets, Ivativ offers modules in hosted architecture that are flexible with high performance and modules in standalone/embedded architecture that are plug-n-play with low power consumption.

These fine-tuned pieces of wireless hardware come with complete software stacks, development tools, and sample applications - all built to reduce development time and cost while accelerating your time-to-market.

Bluetooth/ZigBee/Thread/ANT Wi-Fi Multi Radio

<p>EVIA PCIe Wi-Fi module 802.11ac 11.8mm x 12mm x 1.6mm</p>	<p>EVIA SDIO Wi-Fi module 802.11ac 11.8mm x 12mm x 1.6mm</p>	<p>EVIA USB Wi-Fi module 802.11ac 11.8mm x 12mm x 1.6mm</p>	<p>EVIA M.2 PCIe Wi-Fi module 802.11ac 12mm x 16mm x 1.9mm</p>
<p>EVIA M.2 SDIO Wi-Fi module 802.11ac 12mm x 16mm x 1.9mm</p>	<p>EVIA M.2 USB Wi-Fi module 802.11ac 12mm x 16mm x 1.9mm</p>	<p>BALI PCIe Multi-radio module 802.11ac + BT 5.0 11.8mm x 12mm x 1.6mm</p>	<p>BALI SDIO Multi-radio module 802.11ac + BT 5.0 11.8mm x 12mm x 1.6mm</p>
<p>BALI USB Multi-radio module 802.11ac + BT 5.0 11.8mm x 12mm x 1.6mm</p>	<p>BALI M.2 PCIe Multi-radio module 802.11ac + BT 5.0 12mm x 16mm x 1.9mm</p>	<p>BALI M.2 SDIO Multi-radio module 802.11ac + BT 5.0 12mm x 16mm x 1.9mm</p>	<p>BALI M.2 USB Multi-radio module 802.11ac + BT 5.0 12mm x 16mm x 1.9mm</p>
<p>RILA Wi-Fi MCU module 802.11 b/g/n 16mm x 20mm x 2.1mm</p>	<p>AVIC Wi-Fi MCU module 802.11 b/g/n + BT 4.2 16mm x 20mm x 2.1mm</p>	<p>MIST Wi-Fi module 802.11 b/g/n 16mm x 20mm x 2.1mm</p>	<p>NILE BT 5.0/ZigBee/Thread/ANT MCU module 10mm x 15mm x 1.5mm</p>

PCIe Cards

These easy-to-use pluggable cards are offered by Ivativ in industry standard Mini PCIe and Half Mini PCIe form factors. In both form factors, PCI and USB host interfaces are supported, providing flexibility for the user to select the host. They can each be interfaced to a host microcontroller running Linux, Windows, or Android.

These cards come in industrial temperature grade. In addition, these cards support antenna diversity for high performance and reliability. They are certified for FCC, IC, and CE.

Wi-Fi MultiRadio

<p>EVIA hmPCIe Card Wi-Fi module 802.11ac</p>	<p>EVIA mPCIe Card Wi-Fi module 802.11ac</p>	<p>EVIA hmPCIe USB Card Wi-Fi module 802.11ac</p>	<p>EVIA mPCIe USB Card Wi-Fi module 802.11ac</p>
<p>BALI mPCIe Card Multi-radio module 802.11ac + BT 5.0</p>	<p>BALI hmPCIe Card Multi-radio module 802.11ac + BT 5.0</p>		

Development Kits

Ivativ offers development kits for all their module products. These development kits can be used to evaluate module performance, power and reliability. Alongside sample applications, these kits come with complete hardware and software stacks that help ease the development of applications. To further assist the developer, Ivativ supplies easy-to-use documentation for every single kit.

Bluetooth/ZigBee/Thread/ANT Wi-Fi MultiRadio

<p>AVIC DVK 2 x Micro-USB Cable FDI-042 Cable</p>	<p>BALI M.2 SDIO DVK</p>	<p>BALI M.2 PCIe DVK</p>	<p>BALI PCIe DVK</p>
<p>BALI SDIO DVK</p>	<p>BALI USB DVK</p>	<p>BALI M.2 USB DVK</p>	<p>MIST DVK</p>
<p>NILE DVK</p>	<p>RENO DVK</p>		

M.2 Cards

These next generation form-factor (NGFF) cards are offered in industry standard 1630 Key-E and 2230 Key-E form factors. For the ultimate flexibility, these cards are offered in PCIe, SDIO, and USB host interfaces. They can be used with host systems running Linux, Windows, or Android operating systems.

These cards come in industrial temperature grade. In addition, these cards support antenna diversity for high performance and reliability. They are certified for FCC, IC, and CE.

Wi-Fi MultiRadio

<p>EVIA M.2 1630 PCIe Wi-Fi module 802.11ac Size: 1630-S3 (Tmax 1.5mm)</p>	<p>EVIA M.2 1630 SDIO Wi-Fi module 802.11ac Size: 1630-S3 (Tmax 1.5mm)</p>	<p>EVIA M.2 1630 USB Wi-Fi module 802.11ac Size: 1630-S3 (Tmax 1.5mm)</p>	<p>EVIA M.2 2230 PCIe Wi-Fi module 802.11ac Size: 2230-S3 (Tmax 1.5mm)</p>
<p>EVIA M.2 2230 SDIO Wi-Fi module 802.11ac Size: 2230-S3 (Tmax 1.5mm)</p>	<p>EVIA M.2 2230 USB Wi-Fi module 802.11ac Size: 2230-S3 (Tmax 1.5mm)</p>	<p>BALI M.2 1630 PCIe Multi-radio module 802.11ac + BT 5.0 Size: 1630-S3 (Tmax 1.5mm)</p>	<p>BALI M.2 1630 SDIO Multi-radio module 802.11ac + BT 5.0 Size: 1630-S3 (Tmax 1.5mm)</p>
<p>BALI M.2 1630 USB Multi-radio module 802.11ac + BT 5.0 Size: 1630-S3 (Tmax 1.5mm)</p>	<p>BALI M.2 2230 PCIe Multi-radio module 802.11ac + BT 5.0 Size: 2230-S3 (Tmax 1.5mm)</p>	<p>BALI M.2 2230 SDIO Multi-radio module 802.11ac + BT 5.0 Size: 2230-S3 (Tmax 1.5mm)</p>	<p>BALI M.2 2230 USB Multi-radio module 802.11ac + BT 5.0 Size: 2230-S3 (Tmax 1.5mm)</p>



Besides the hardware, iVativ offers...

- wireless stacks
- integrated middleware
- reference application software
- cloud based device monitoring
- cloud based device management
- HW and SW customization
- device integration support
- client certification support
- schematic and layout review
- evaluationkits and developmentkits for a fast time to market

...further they show a promising roadmap for the next months and years – stay tuned.

Do you want to learn more or have further questions regarding iVativ?
wireless@rutronik.com

MIMO Monitors

Industrial Display Solutions



Privately held, est. 2008

HQ in Libertyville, Illinois, USA, support office in UK

industrial grade monitor solutions:

- harsh environment
- 24h/365d continuous operation
- water proofed
- vandalism proofed

USB-Monitors

Stretched Displays

Outdoor displays and monitors

Monitors with integrated BrightSign® multimedia player

Temperature measurement terminals

open frame displays





Open frame monitors from 7" up to 32"

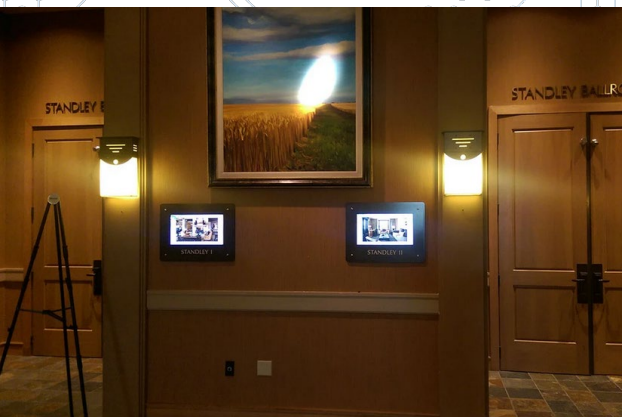
power + video signal + touch over USB only

industrial grade tablet computers from 7" up to 32" (Android and Windows)

Monitors with enclosure in 7" and 10.1" (with touch and haptic touch)

All-in-one devices with built-in BrightSign media players (also PoE versions)

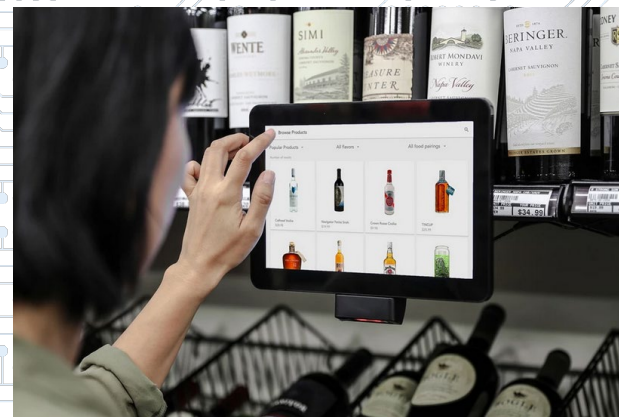




Hotels



Casino



Retail



POS

Do you want to learn more or have further questions regarding MIMO MONITORS?

monitors@rutronik.com

Kiosk



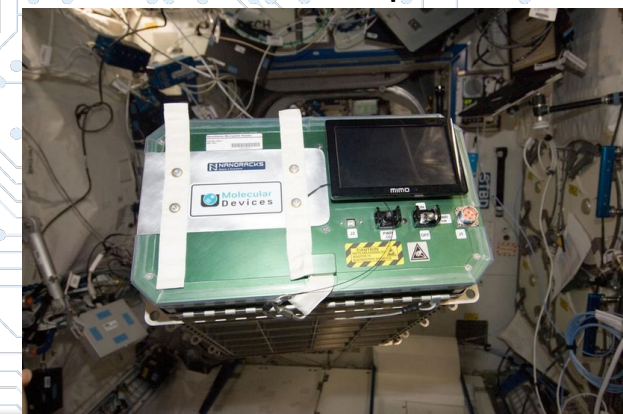
Public Transportation



Taxi



ISS - International Space Station



A T P

**DRAM withstand harsh operating
environments**



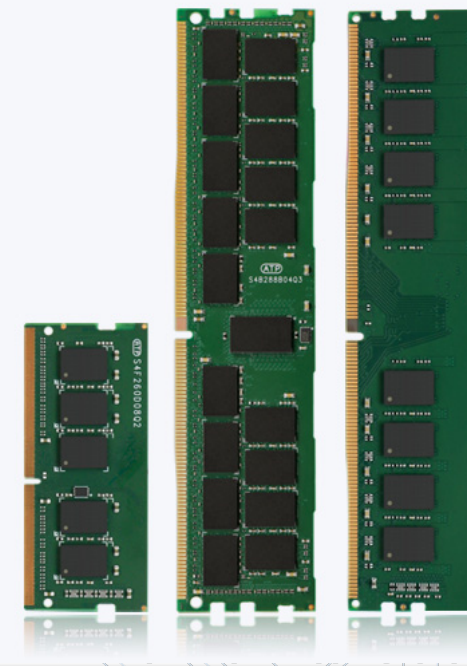


Headquarter: Taiwan
more than 25 years experience in making industrial grade RAM modules

Rutronik has access to the entire portfolio from ATP.
In particular the DDR modules have a very good
reputation in heavily loaded systems such as servers.

The memory products are the perfect addition to our existing
portfolio of high quality standard mainboards and Intel processors.

Rutronik is able to configure your computer both individually and completely.





Why does Rutronik offer ATP DRAM modules?

- ATP is one of the qualified DRAM vendors for server mainboards from our partners ASUS and Advantech, as well as other server board makers
 → you can find information on trouble-free operation in the QVL or AVL files of your board
- In general ATP has a very good reputation in the professional industry and server market

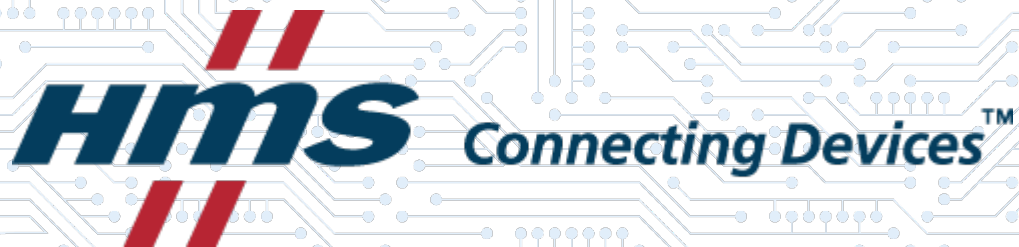
Do you want to learn more or have further questions regarding ATP memory ?

embedded@rutronik.com

HMS Networks

Hardware Meets Software™





HMS gets industrial devices connected. To surrounding systems and the Internet.

Brandnames: Anybus, Ewon, Intesis, Ixxat

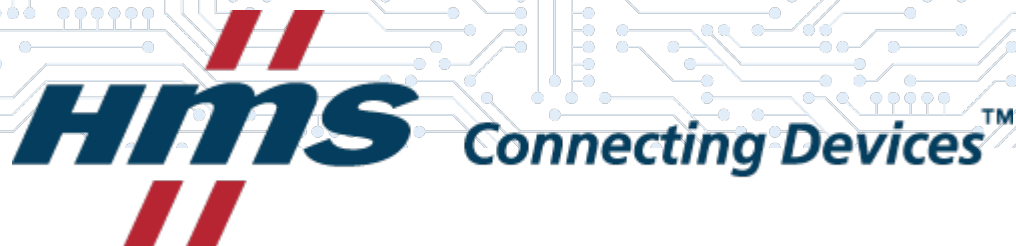
Headquarter: Sweden, EU

Founded 1988

Portfolio: chips, modules, devices

**Wired and wireless solutions
for industrial communication.**





Do you want to learn more or have further questions regarding HMS ?

embedded@rutronik.com



Did you know?

Most networks specifications are updated 1-2 times per year. With Anybus, you don't need to worry about this. You get free software updates whenever networks are revised.

INTE



Giantec

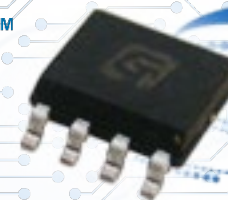
Near Field Communication



Headquarter in China
RFID & NFC chip manufacturer

- NFC Forum Type 2 Tag compliant IC
- NFC Forum Type 2 Tag compliant IC embedded with EEPROM Storage (Multi-Chip-Package)
- TSSOP packages, Wafer, Bumping, Module
- 64 Byte up to 2048 Byte
- ISO/IEC14443A, typical applied for
 - goods counterfeiting
 - Bluetooth simple pairing
 - WiFi pairing
 - smart label
 - electronic ticket

Do you want to learn more or have further questions regarding Giantec ?
wireless@rutronik.com



NEWS



Portfolio and Linecard

Embedded & Wireless



Updated
2021



Computer Boards



- SBC
- SSBC
- COM
- Mainboards
- Baseboards
- Blades

- SBC
- Mainboards

- SBC
- SSBC
- COM
- Mainboards
- Baseboards

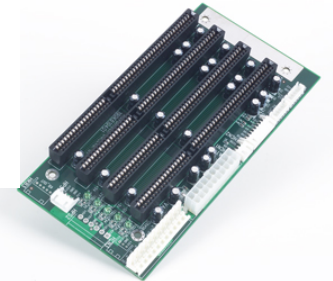
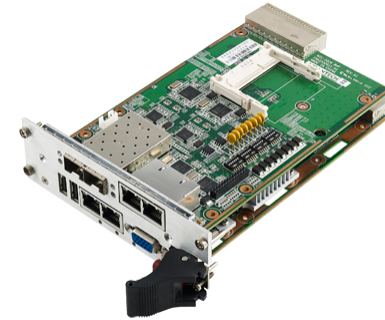
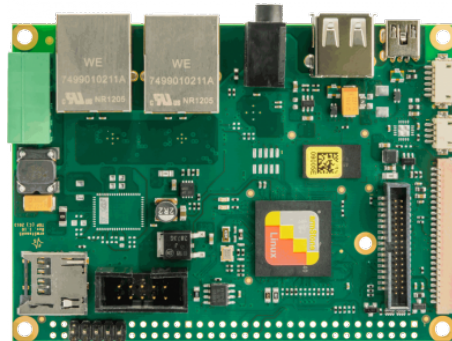
- SBC
- COM
- Baseboards

- Mainboards

- SBC
- SSBC
- COM
- Mainboards
- Baseboards

- SBC
- COM
- Baseboards

- COM
- Baseboards





Computer Systems



- Box-PC
- Panel-PC
- Server
- Monitors
- Security-Appliances
- Tablets
- PDAs

- Box-PC
- Panel-PC
- Server
- Office-PCs
- All-in-Ones
- Monitors

- Box-PC
- Medical-PC
- Panel-PC
- Assembling

- Customer specific Assembling

- Box-PCs
- Office-PCs
- Servers
- Panel-PCs
- Tablets

- NUCs
- Servers
- Notebooks

- Box-PC
- Panel-PC
- Server
- Monitors
- Security-Appliances

- Box-PC
- Panel-PC



Computer Extensions and Equipment



- AI accelerator

- Add-on cards
- Controller
- Cooler
- Cables
- Spare Parts
- AI accelerator

- Graphic cards
- AI accelerator
- Cooler
- Spare Parts

- Add-on cards
- Controller
- Cooler
- Cables
- Spare Parts

- TFT Scaler
- Cables



Computer Extensions and Equipment



- Cooler

- Adapter
- Ad-on cards
- Controller
- Cables

- AI accelerator

- Cameras
- Cooler
- AI accelerator
- Spare parts

- Add-on cards
- Controller
- Cooler
- Cables
- Spare Parts
- AI accelerator

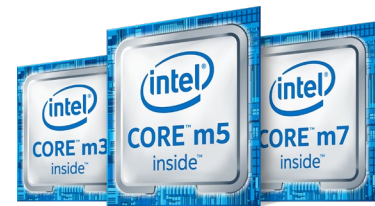
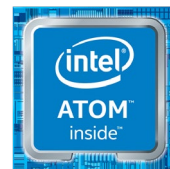
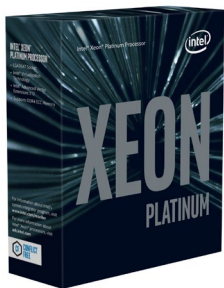




Processors



- Mobile Processors
- Desktop Processors
- Server Processors
- HPC Processors
- Chipsets



Power Supplies



- Server PSU
- Desktop PSU
- Wallmount PSU
- AC/DC Adapters
- Open Frame PSU

- Server PSU
- Desktop PSU
- Wallmount PSU
- AC/DC Adapters
- Open Frame PSU
- Medical PSU
- Uninterruptable Power Supply



Industrial Communication

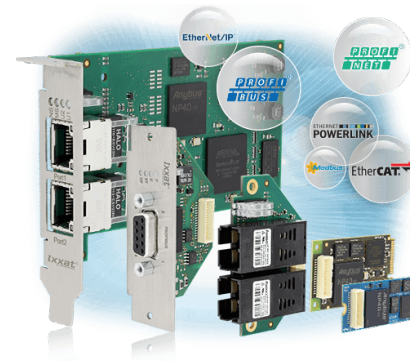


- Network Cards
- Industrial Protocol Cards
- Media Converters
- Controller Cards

- Network Cards
- Enterprise Switches

- Industrial Protocol Cards

- Industrial Switches





Linecard Board Department



Solid State Discs

swissbit®

Transcend®
good memories start here

Apacer
Access the best

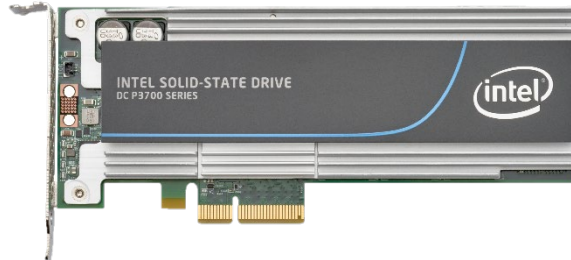
TOSHIBA

intel®

KIOXIA

GOOD
RAM
Industrial

- | | | | | | | |
|------------|------------|------------|---------------|---------------|---------------|------------|
| ▪ SSD 2,5" | ▪ SSD 2,5" | ▪ SSD 2,5" | ▪ SSD 2,5" | ▪ SSD 2,5" | ▪ SSD 2,5" | ▪ SSD 2,5" |
| ▪ M.2 | ▪ M.2 | ▪ M.2 | ▪ M.2 | ▪ M.2 | ▪ M.2 | ▪ M.2 |
| ▪ mSATA | ▪ mSATA | ▪ mSATA | ▪ mSATA | ▪ Add-in-card | ▪ Add-in-card | ▪ mSATA |
| | | | ▪ Add-in-card | ▪ EDSFF | | |



Flash Cards

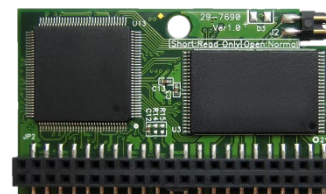
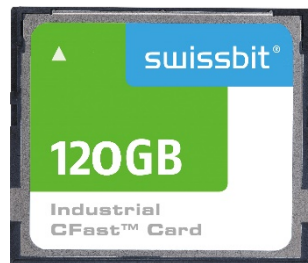
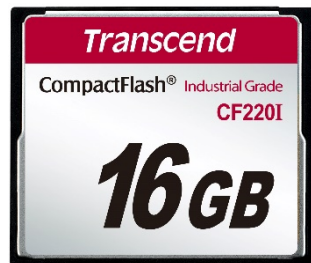


- CF-Card
- CFast
- SD-Card
- microSD
- USB-Dom
- USB-Stick

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- microSD
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- microSD
- USB-Dom
- USB-Stick



Hard Disc Drives

TOSHIBA

WD Western Digital®

 SEAGATE



2,5" HDD



3,5" HDD

SAS

SATA

Optical Disc Drives



CD



slimline
slot-load



DVD



half high
tray-load



BD



extern





DRAM Modules



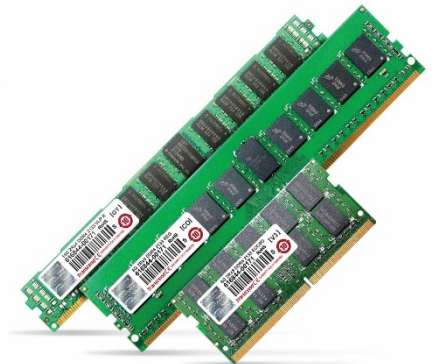
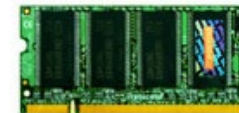
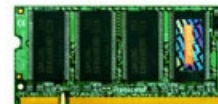
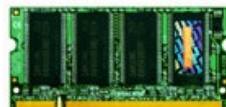
SDRAM

DDR 1

DDR 2

DDR 3

DDR 4





Linecard Storage Department





TFT Displays



- Sizes from 0,9inch to 30 inch
- Big choice of Standard TFT Modules
- Integrated TFT Modules from 1,8 inch to 7 inch
- Semi Adaptions possible on:
 - Flex Foils
 - Backlighting
 - Cover Glasses in different materials, thickness & individual Designs
 - Pcap Touches / Res. Touches
 - Bezels & Plastics
- HDMI Displays





Passive LCD & E-Paper Displays



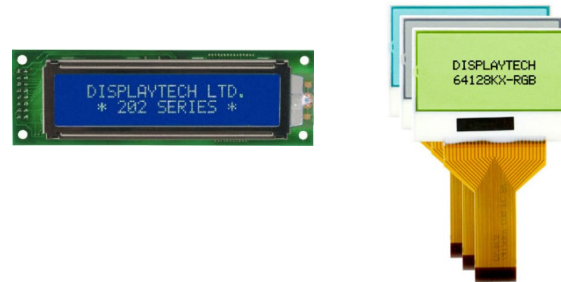
Full Custom Solutions

- Sizes: Free till ~8"
- Full custom
- All Technologies
- Plastics (Turnkey Solutions)
- Backlighting



Standard PLCDs

- Alphanumeric 8x1 - 40x4
- Graphics 32x122 – 240x320
- Different color modes
- Different Temperatur modes



E-papers

- Sizes: 1,5" – 42"
- Paperwhite/Black
- Paperwhite/B/Y/R/G
- Semi Adaptions
- LED implementation





OLED Displays



OLEDs

- Sizes: 0,49" – 5,5"
- Passiv Matrix OLEDs
- Alphanumeric OLEDs
- Black Background + one Color
- Semi Adaption e.g. Flex Foil → MOQ >6Kpcs
- No MoQ on Standards





MONITORS



- Big Pads
- Digital Signage Monitors (till 120 inch)
- Haptik Displays
- PC Consumer / Gaming Monitors
- Open Frames
- USB Monitors
- Touch Pads
- Bar Types TFTs





Smart TFT's



- Sizes: 0,9" – 9"
- Accessoires
- Different Kits
- Free Software
- No MOQ's

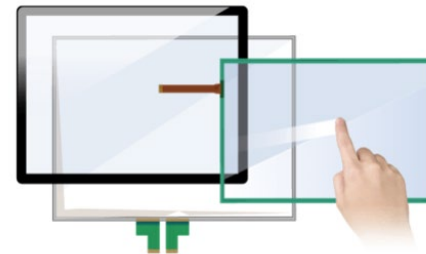
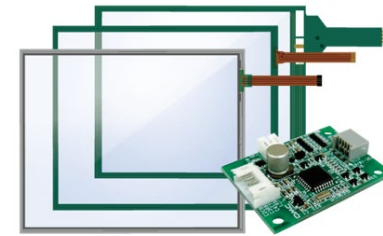




Touches



- PCAP & RTP
- Sizes: 2,9" -42"
- Custom Solutions
- Dual-/ Multi Touch





Display Accessories & Service Offering



- Mounting Systems
- Cap Touch Pen's
- Cables
 - USB Cables
 - HDMI Cables
 - Cable configurations
- Rubber Connections
- Trouble Shooting Service





Linecard Display Department



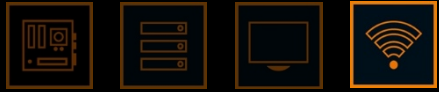


Cellular Wireless



- Terminals, MiniPCle- & M.2 Cards, Modules, SoC's
- Cellular Technologies: 2G, 3G, 4G, LTE Cat.M1 & NB1, 5G
- Optional with embedded GNSS Receiver
- Optional with SIM on Chip
- Firmware over the Air
- OMA LWM2M



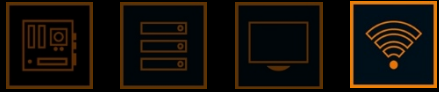


GNSS



- MiniPCIe- & M.2 Cards, Modules
- GPS, GLONASS, BeiDou, Galileo, QZSS and NavIC (IRNSS)
- GNSS module with integrated high performance antennas
- SBAS
- Automotive Dead Reckoning (ADR)
- Timing





WiFi



- MiniPCIe- & M.2 Cards, Modules, SoC's
- IEEE 802.11 a/b/g/n/ac Wi-Fi Modules, SubGHz Wi-Fi Modules, Wi-Fi 6
- Single- and dual-band Wi-Fi with BT/BLE combo modules (BT 5 compliant)
- Embedded & Hosted Modules
- Optional integrated PCB Antenna / U.FL connector
- Wi-Fi Access Point, Wi-Fi Direct
- SPI, SDIO



Bluetooth



- M.2 Cards, Modules, SoC's
- Bluetooth Version: Dual Mode, Bluetooth LE V.4.0, V4.1, V4.2, V5.0, V5.1, V5.2)
- Single Core Cortex M4 and Dual-core Cortex M33
- Advanced security with CryptoCell 312
- TrustZone and secure key storage
- IEEE 802.15.4 / ANT / Thread / ZigBee
- NFC
- Industrial-, extended- & Automotive Temperature Range





Proprietary & De-Facto Standards

EnOcean
Self-powered IoT

GARMIN

infineon

Insight SiP
It's all in the package

MINEW

NORDIC
SEMICONDUCTOR

Panasonic

- Receiver Chips
- Transceiver Modules
- Transceiver Chips
- Transmitter Chips
- Gateway Solution
- USB Sticks



LPWAN



- M.2 Cards, Modules, LoRa Gateways
- Dual Mode Combo Modules LoRa/SigFox & LoRa/BLE Modules
- Operating in 868MHz, 915MHz & 920 MHz
- Embedded end-to-end AES128 encryption
- NFC-Tag for OOB pairing
- Fully integrated LoRa&BLE matching and Antennas

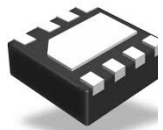




RFID / NFC



- Tags, Readers, Passive Transponders
- IC's, Modules, Ready to use Products
- 125 kHz, 13,56 MHz, 868-915 MHz
- ISO 11784/85, 14223, 15693, 18000-2, 18000-3, 18000-6
- NFC Forum Tag Type3 ,Type4A, Type 4B





High Security Chips



- Authentication
- Trusted Computing





Antennas & Accessories



- RFID/NFC, Cellular, GNSS, Bluetooth/WLAN/ ISM/ UWB Antennas
- Internal & External Antennas
- Ceramic, Helical, Adhesive, Flex Stamp, FPC /Adhesive Patch & PCB Antennas
- Micro-, Mini- & Nano SIM Card Holders
- Pigtail Cables





Linecard Wireless Department





**The worst question is the one that wasn't asked !
Always !**

Bernd Hantsche

Director Product Marketing Embedded & Wireless

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Bernd.Hantsche@rutronik.com