novitronic
powered by endrich

endrich
components of life

LINECARD



ENGLISH

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Design-In Concept

Our Service

- Solution-oriented, competent consulting by our technically experienced employees
- Personal and individual solutionoriented support
- Cross-product project management
- Implementation of customer-specific requirements
- Network of service providers

Our Claim

- Innovative products and customized solutions
- High quality standards
- Regular trend analysis
- Great flexibility in product development
- Long partnerships with suppliers

Your Advantages

- endrich as reliable partner
- Optimized product design
- R&D support in hardware and software
- Suitable product selection
- Focus on own core competence
- Reduced development times through endrich support





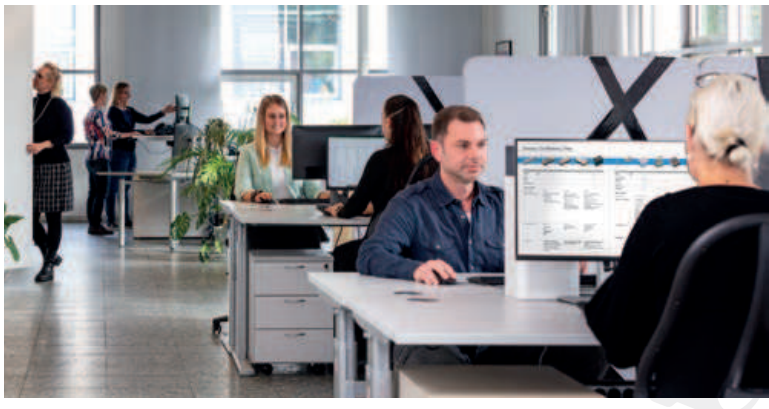
Dr. Christiane Endrich

„Where the Future of Electrical Engineering is at Home“



Quality and technical support Quality is not a question of being demanding, but a key for success. Who recommends quality, shows that he is an expert himself. Every good engineer is perfectly aware that he needs excellent instruments to be successful. Business relationships which last over 30 years have become rare in the struggle for orders and yield. And it is exactly for this reason why we focus on continuity and close cooperation, not only for what concerns the relationships towards our suppliers, but also with regard to our colleagues. Thus on one hand we can guarantee competitive advantages and a maximum of product availability, on the other hand a positive social environment generates a major efficiency and a higher motivation in the daily business. Together with Novitronic AG, we have excellent access to the market for electromechanical components, which we will further extend in the future.

Our colleague in Asia, who directly knows the problems on-site and the appropriate solutions and thus affords a smooth workflow, proves that closeness has nothing to do with distance. The marketing teams of endrich and their colleagues are sophisticated but not detached, because they possess excellent technical skills, which are completed by many years of professional experience in design. Surely at this point we can be a little bit proud of our uniqueness: all the product ranges are taken care of for you by **endrich** teams of experts and by professionals operating for our producers. In short, we are capable of exactly providing the technical support you desire. The figures but first and foremost the high level of customer satisfaction show that this strategy works.





Jens Mollitor

„This is how it should be, this is how it can stay' ... no longer works"



Markus Kummert

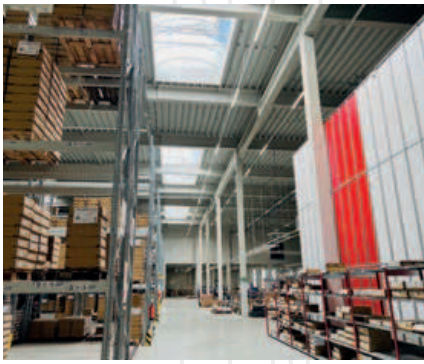
„We want to understand your need behind the need to offer the best solution for you"

One fourth of the yearly turnover of **endrich** is generated by its activities in the automotive supply industry, considered particularly delicate. This result is only feasible thanks to the permanent contact and the growing relationships with our partners. In this way we manage to operate successfully for our customers and to be profitable for ourselves. Medium-sized manufacturers as well as big enterprises in Asia, Europe and the USA form the basis for our design-in in the technically oriented distribution business.

„A Family with more than 10,000 Children"

Facts: From our central stock in Nagold we deliver to 50 countries worldwide with standards like "just in time", buffer stocks or consignment stock, 100% bar code labelled and therefore traceable. Our customised logistic strategies enable us to supply our products quickly wherever you need them. We remain in constant contact on-site with the supplier and are at the same time always close to you. We always act locally and think globally in the truest sense of the word.

Philosophy: In the procurement of true innovations from Asia we do not only see a challenge – it really is a central driving force for our company. Top service and highest quality are our gauge, in a sector known for its worldwide quality competition. When costs and product development spin like turbines we remain composed and keep thinking goal-oriented. We do not abandon our clients, but provide advice about the right products and their potentialities already in the forefront. The advantages of familiar thinking are possible only in a family enterprise. **endrich** stands for the dialogue from person to person drawn from long relationships with our customers and manufacturers and inspired by our claim **"endrich – components of life"**.



IoT Platform

Entering the Internet of Things with the endrich IoT Platform

The Internet of Things is growing continuously and the number of connected devices continues to rise. Today, approximately 30 billion are connected to the IoT, and research institutes expect 75 billion devices to be directly or indirectly connected by 2025. The introduction and installation of the 5G network will ensure that the data generated via edge computing is available and can be used everywhere quickly and without latency. The IoT offers many scenarios and possible applications that are still in the early stages of development today. Companies in the manufacturing industry in particular can and must consistently use modern technologies in order to remain competitive. In particular, control, measurement and regulation technology can be optimized through digitization. Embedded systems are increasingly finding their way into equipment and power engineering, machine and plant construction, the automotive sector and medical technology.

The digitization of processes ensures the competitiveness of a company. Existing business models can be shifted and new business models can be integrated. A fast and flexible reaction to the dynamic market and to individual customer requirements is ensured. The digitalization process creates very complex requirements that can only be solved by individual IoT developments. Holistic solution approaches consisting of hardware and software are increasingly important in order to keep the overall system as simple as possible. Sensors make it possible to monitor machines and devices and keep downtimes as low as possible (predictive maintenance).



Embedded systems are in many end devices today and the number will continue to grow. The goal is to make effective tracking of device usage visible through networking. Other benefits include possible predictions of errors in the system or retrieving information about other negative influences such as theft or vandalism from anywhere in the world. Lives can also be saved through fast and well-developed networks.

Industrial equipment, refrigerators, washing machines, vehicles – whether on the road, on the water or in the air – are or will become part of the IoT and the networking of devices will continue to advance. Companies must follow this development in order to remain competitive and secure the market share of their own products. endrich Bauelemente Vertriebs GmbH supports its customers in the technical development and implementation of systems and solutions.

The self-developed and modular endrich IoT platform is an affordable industrial single board computer for IoT applications and offers the three main functions acquisition via sensors, control and communication. Thus, the platform is the entry point into the world of IoT, but also serves as a development platform for experienced developers. The basis is the board v052 with a RISC-V microcontroller architecture and a wide area network using a NB-IoT/LTE-M/2G-GSM modem. Power is supplied via a separate battery and can be selected between 3.6 V or 5 V.

The v052 base board of the endrich IoT platform already integrates numerous sensors to detect various environmental parameters such as ambient light, magnetic fields, temperature, air pressure, vibration, noise, altitude and position. Adapter boards such as the CLS sensor board based on Everlight's RGBW colored light sensor can detect red, green, blue and white light as well as infrared. Another sensor board is based on Everlight's ALS-DPDIC17-78C/L749/TR8 digital light sensor and detects ambient light in the spectrum of the human eye. This allows light and dark conditions to be determined and the intensity of visible light to be measured. The temperature sensor board based on Everlight's EMT34-1220-A/L906/TR8 sensor provides an external thermometer. The VS1/2 vibration sensor detects vibrations to monitor a machine run or motor start. Rain or vandalism can also be detected via this. The air pressure sensor determines the air pressure, records the altitude or measures the fan speed. RPM and speed can also be measured, as can the localization and physical location of the device via GNSS coordinates. In this way, device tracking is also possible.

External cards based on various display standards such as pmOLED or TFT are available for visualization. These boards can be connected via standard interfaces either to the endrich IoT SBC board or to third-party MCU boards. The pmOLED display board with I2C and SPI interfaces provides basic visualization functions based on Raystar's 0.96-inch pmOLED display REX012864DWPP3N00F00 with a resolution of 128 x 64 pixels. The TFT expansion card with SPI interface is suitable for customized designs. It provides visualization functions based on Raystar's RFJ240I-AYW-DNN 2.4-inch color TFT with 320 x 24 pixel resolution.

All acquired sensor values are stored in the endrich cloud and retrieved or visualized via the endrich Visualization Database, a dedicated website for all endrich IoT SBC cards or customerspecific devices.

The platform is based exclusively on components from endrich Bauelemente Vertriebs GmbH and is built on the open source concept. It is flexible in design and allows own process design. It is completely independent of existing solutions. endrich guarantees full support during the entire development and design phase.

The target group is primarily customers from the industrial environment with a focus on IoT software, building management as well as smart and embedded systems. It does not matter whether the customers already have experience in research and development of IoT solutions or have RF knowledge. Due to the open source concept and the intensive exchange, all possibilities of development are open.



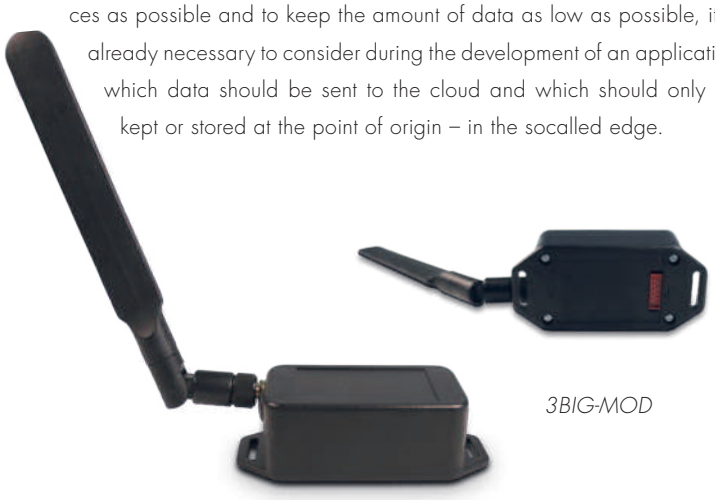
The endrich IoT Platform

3BIG-MOD

The IoT Module 3BIG-MOD from endrich

The Internet of Things networks physical and virtual objects globally. Many applications in the consumer and business sectors are based on IoT technology. Wearables such as smartwatches and fitness bracelets, smart home applications such as heating control and entertainment, connected cars or Industry 4.0 are based on data collection by sensors, data processing by means of controllers and the provision of the collected data material in the cloud. Almost every company, whether mediumsized or large, is now integrating this technology into its products. Digitization is increasing every day. Almost everyone owns a smartphone that has several sensors on its own, collects data and makes it available to its user or many users. The collected data is analyzed and offers potential for new business models and personalized information. Processes in factories and productions are recorded with sensors. The data is passed on and processed to make processes more efficient, detect machine failures in advance and monitor the quality of products. In this way, processes along the value chain are automated and continuously improved.

The mass of data obtained and sent to the cloud means that existing technologies are being replaced by new and even faster ones. One of the consequences of this increasing data traffic and the ever more extensive networking of „things" is the introduction of mMTC (Massive Machine Type Communication). The foundations were already laid in the fourth generation of mobile communications, i.e. 4G, and have since been integrated into the 5G network. In order to network as many devices as possible and to keep the amount of data as low as possible, it is already necessary to consider during the development of an application which data should be sent to the cloud and which should only be kept or stored at the point of origin – in the socalled edge.

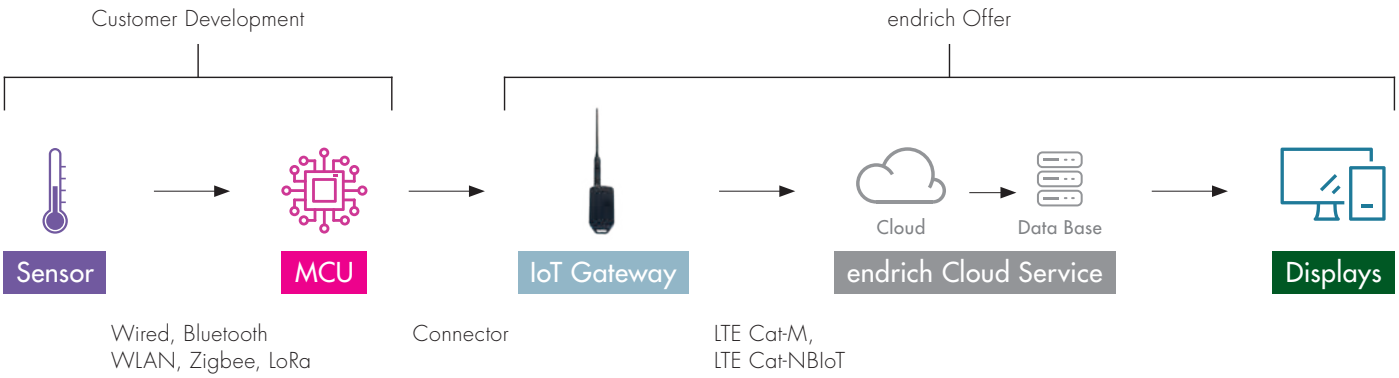


3BIG-MOD

endrich Bauelemente Vertriebs GmbH supports its customers in entering the complex topic environment of the Internet of Things. The self-developed and modular endrich IoT platform is an affordable industrial single board computer for IoT applications and offers the three main functions acquisition, control and communication. The platform is based almost exclusively on endrich components and is built on the open-source concept. Based on this „proof-of-concept", own developments can be built up, which involve higher labor and personnel costs at the start, but offer a price advantage from high volumes.

The alternative solution endrich offers its customers is the IoT module 3BIG-MOD. It is based on Fibocom's MA510-GL series. Based on the Qualcomm chip platform, the MA510 module is a high-performance IoT module that supports different technologies such as LTE Cat M1 or Cat NB2 and EGPRS. After starting in the 4G network, these technologies are now part of the Massive Machine Type Communication (mMTC) of the 5G network. In order to be able to guarantee the connection to the cloud in previously less developed regions, 2G fallback can be used. In addition, the MA510 also supports GNSS, so that tracking and time determination are also possible. With its small size and low power consumption, a variety of Internet protocols, industry standard interfaces and other features, the MA510 is suitable for IoT industrial applications such as smart metering, asset tracking, smart parking, smart home, wearable devices, wireless POS, etc. The Fibocom module itself is certified by FCC/ PTCRB/ CE-RED/ GCF/ IC/ RCM/ JATE/ TELEC/ Anatel/ NCC and received the certifications from telecom operators such as AT&T, Sprint, KDDI, Vodafone, Deutsche Telekom, etc. The 3BIG-MOD based on it is also certified according to CE-RED (Europe), FCC (USA), and IC (Canada). The certifications of mobile network operators are pending.

The 3BIG-MOD serves as a modem to send data from existing platforms over the LTE Cat-M1/Cat-NB2/EGPRS network to the endrich cloud. It can also provide data connections on the LTE FDD, GPRS and EGPRS networks and supports GNSS to acquire and transmit position data. The free selection of the communication protocol and the adaptation of the respective application are guaranteed by the protocol stacks PPP / TCP / UDP / SSL / TLS / FTP(S) / HTTP(S) / MQTT / CoAP / LWM2M. For development purposes, the endrich cloud is available. The direct communication to the 3BIG-MOD is done via the serial interface. The easy-to-use IoT modem is available from stock and ready for immediate use. So there are no additional costs and efforts for radio certification and development. As a result, the time-to-market factor is very short. Special RF knowledge is not required. During the development phase, a cloud database and various visualization tools are available free of charge. The user can use his own developed sensor or MCU platforms. endrich provides sample Python scripts and C code. This also includes detailed documentation on how to access endrich cloud services and all available sensor boards that can be connected to the 3BIG MOD. Technical support is provided by endrich or an external partner. The target group is industrial customers in the fields of energy management, smart building, smart factory and smart city as well as engineering companies. The module can also be used as a communication modem for diagnostics. The advantages of the solution are low development and production costs, no storage requirements or certification costs.



Features

- LTE CAT-M1 / CAT-NB2
- 2G/ EGPRS fallback
- Optional GNSS
- UART interface
- Integration support
- Supported protocol stacks: PPP / TCP / UDP / SSL / TLS / FTP(S) / HTTP(S) / MQTT / CoAP / LWM2M

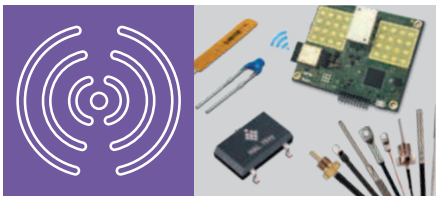
Applications

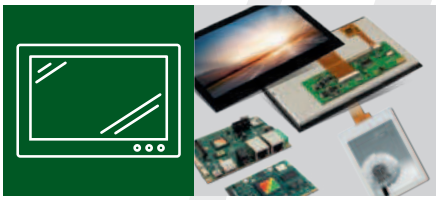
- Smart city
- Smart building
- Factory automation
- Energy management

Product Overview

Programm

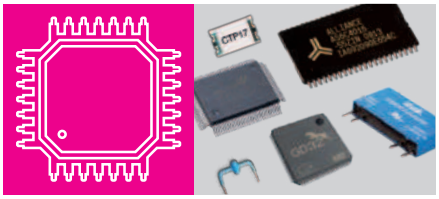
With the constantly expanding product portfolio in the areas of Displays + Embedded, Active, Passive, Radio, Sensors, Acoustics, Lighting Solutions, Power Supplies as well as Electromechanics, endrich always offers its customers the right product for the respective application. The quality of the products is not a question of pretension, but the key to success. Who recommends quality shows that he is an expert himself.

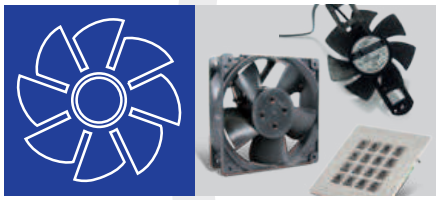

Sensors

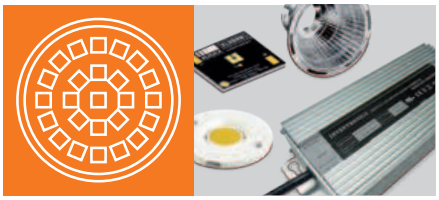

Displays & Embedded Systems

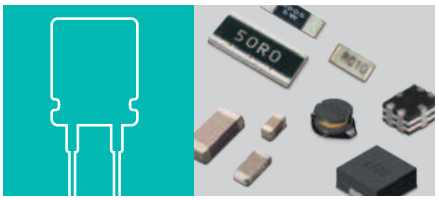


Wireless Connectivity & IoT Solutions


Active Components

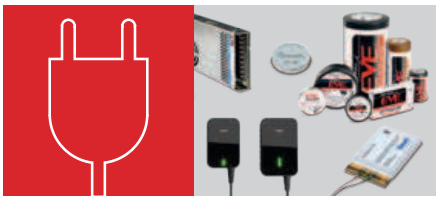

Electromechanics


Lighting Solutions



Passive Components


Acoustics


Power Supplies & Batteries Systems

Sensors



Manufacturer	Crocus Technology	Everlight	Micronas	Nicera	Panasonic
Grid Eye – Thermopile Array					■
Magnetic Field	■		■	■	
Infrared		■		■	
Solar Cells					■
Current Sensor	■		■	■	

Features

Certifications	ISO 9001 AECQ-100	ISO 9001 IATF 16949 partly	ISO 9001 IATF 16949	ISO 9001 IATF 16949 partly	ISO 9001
General Information	Innovative manufacturer of TMR-sensors with licensed XtremeSense®-technology Wide portfolio of current sensors, switches, linear and angle sensors	Famous Taiwanese manufacturer with a high production capability Large product range of IR sensors	Development and production with own chipfab in Germany Large portfolio of switches, linear and angle sensors Leading manufacturer of linear sensors in the automotive sector	Long standing partner for electronic components on ceramic basis: pyrosensors (PIR-sensors), fresnel lenses, hall sensors, current sensors	Global player with a wide product range Manufacturer of e.g. solar cells and thermopile sensors
Applications	Current Measurement Automotive Industrial Applications White Goods Metering Applications	Industrial White Goods Measurement Equipment Light Barriers	Automotive Industrial White Goods Medical Equipment	Home Automation Measurement Equipment White Goods Security (e.g. burglar alarm) Battery Management Industrial	Grid-Eye: Object & Person Recognition Non-contact Temperature Measurement Solar Cells: Watches Shutters & Lighting Control Home Automation
Specifics	CT4xx – high precision current sensor, with integrated current path down to 5 mA resolution CT813x – omnipolar switch with low current consumption between 200 nA and 1,6 mA	Ambient light sensors with digital output Ambient light sensors with proximity sensors	HAL39xy – real 3D sensor with internal strayfield compensation HAC – hallsensor with integrated capacitors HAR – hallsensor as dual-die version (redundancy)	Digital pyrosensor with I2C or UART interface Current sensors for automotive	Grid-Eye generation 2 with better accuracy and detection distance Foil cell with thickness 0.18 mm Energy harvesting applications

Sensors



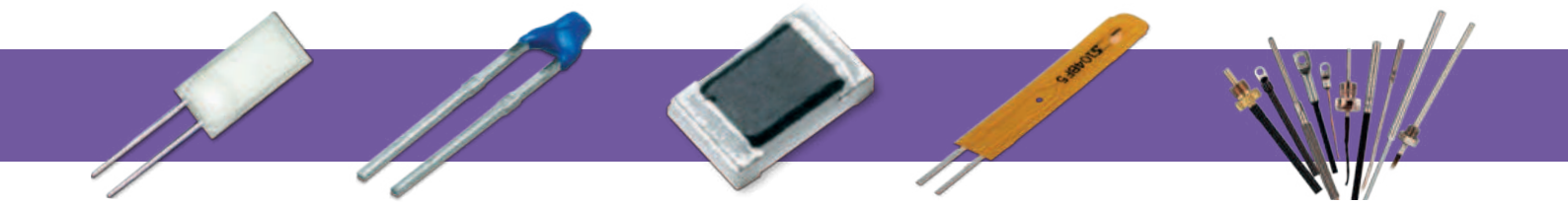
Manufacturer	Audiowell	Nisshinbo	Micro Sensor	RFbeam	OmniPreSense
Radar		■		■	■
Ultrasonic	■				
Pressure			■		

Features

Certifications	ISO 9001, ISO 45001, ISO 14001, QC 80000, CNAS, IATF 16949	ISO 14001 IATF 16949	ISO9001:2015, ISO14001, ISO18001	ISO 9001	AS9100D / ISO9001:2015
General Information	Established in 1999, Audiowell Electronics is a leading provider of position, distance and speed sensor components and sensing solutions	Japanese manufacturer for analog and microwave components	Since the 1970s, Microsensor is engaged in the research and development of pressure microsensors and transmitters designed around piezoresistive measurement principles.	Swiss company Specialist for consumer and special applications in the area of radar sensors Development of HF applications	OmniPreSense provides short range radar sensors for traffic monitoring, drones, robotics, and IoT systems.
Applications	Smart Home Smart Meter Sercurity Systems Medical	Movement Detector Door Opener People Counting	Process Control Smart Manufacturing Smart City Precision Control Specific Applications	Traffic Control Door Opener Movement Detector Lighting Control Speed Measurement	Traffic Monitoring (Vehicle, People) Robotics IoT Systems Drones
Specifics	Ultrasonic rangefinder UM0034-002	Detection of heart and breathing rate Low power module NJR4266F2A3 short range radar sensor for touchless applications	M20 M-series pressure transmitter for general industrial applications MPM3801 digital pressure sensor with I²C/SPI interface MPM280Au Pressure Sensor for hydrogen pressure measurement	Digital 3D radar	OPS243-C FMCW and doppler radar sensor with WiFi/Bluetooth interface

AUDIOWELL SENSOR TECHNOLOGY NISSHINBO MICROSENSOR RFbeam OmniPreSense Sensing a Safer World

Temperature Sensors / Thermistors



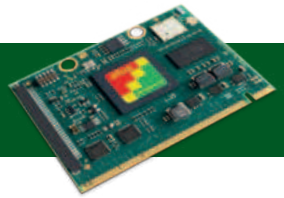
Hersteller	Semitec	Tateyama	Tewa
NTC SMD	■	■	■
NTC Leaded	■		■
PTC Leaded		■	
NTC Film Type	■		■
NTC Thermistor Probes	■	■	■
PTC Thermistor Probes			■
Assembled Sensors	■	■	■

Features

Certificates	IATF 16949 ISO 9001 ISO 14001 ISO 13485	IATF 16949 ISO 9001 ISO 14001	ISO 9001 ATEX
General Information	Semiconducting ceramic resistors Guaranteed long term stability of minimum 10 years High precision thermistors featuring extremely small B-value tolerance and resistance High quality with best price/performance ratio	Thick film thermistors based on Al_2O_3 substrate Tateyama patented core material technology Wide variety and customization of R/T curves Guaranteed long-term stability of minimum 10 years High quality with best price/performance ratio	Semiconductor based ceramic resistors Most responsive and flexible temperature sensor supplier in Europe Wide range of assembled NTC/PTC/PtRTD temperature probes Custom sensors on demand High quality with best price/performance ratio
Applications	Automotive Battery Management HVAC Electro Domestics Industrial Metering Medical	Automotive Battery Management HVAC Electro Domestics Industrial Metering Medical	Automotive Battery Management HVAC Electro Domestics Industrial Metering Medical
Specifics	Temperature sensors for e-mobility applications (HV/EV) µ-pressure and temperature sensor for medical applications	Temperature sensor with a fast thermal response for e-motor (Coil & Hairpin)	Assembled temperature sensors up to IP68 for refrigerators and freezers

Displays / Embedded Systems






Manufacturer	DLogic	Faytech	FS Elektronik Systeme	Logic Technologies
Touch PCs	■	■		
Touch Monitors	■	■		
Boxed Industrial PCs		■		
Embedded Boards			■	
TFT-Displays				■
Monochrome LC-Displays				■
Passive Matrix OLED-Displays				
E-Paper				

Features

Certifications	ISO9001, QS9000, ISO14000, ISO14001, OHSAS18000, UL, TUV, TS16949-1/2	ISO9001 EN 60601-1	ISO9001:2015 ISO13485:2016	ISO9001, ISO13485, ISO/TS16949, ISO14001, QC-080000
General Information	Headquarters in Switzerland, subsidiaries in Germany, Hongkong and China Established: 2008 Key products: Premium touch PCs; touch monitors up to 42" Deep in-house development Linux software support with local FAE	Headquarters in Germany with subsidiaries in Hongkong, China, USA, India and Japan Established: 2001 Key products: Touch PCs; touch monitors up to 84" Global market leader in large size optical bonding Microsoft Gold partner	Headquarters and production in Germany Established: 1990 Key products: Embedded boards Excellent hard- and software support Longterm availability up to 15 years guaranteed	Headquarters in Hongkong, subsidiaries in China and USA Established: 2008 Key products: TFT-displays with touch option; monochrome LC-modules Deep in-house development Partner for iSi30 / iSi50-TFT-display series
Applications	Industry, Marine, Medical	Industry, Telecommunication, Digital Signage	Medical, Industry, Building Automation	Industry, Medical, Marine
Specifics	Touch PCs 5.0" ... 12.1" NXP i.MX6 based UltraLite/ DualCore processing units NXP i.MX8 platform in development Touch monitors with LVDS or HDMI interface 7.0" ... 42" Aluminium, stainless steel and plastic housing 4mm safety glass cover lens (UL751 S46B) HTML5-web-terminals with gigabit Ethernet CODESYS TargetVisu option available Customizations upon request Development-kits available	Touch PCs 7.0" ... 55.0" ARM boards with Allwinner V40 QuadCore and Rockchip RK3399 processing units X86 boards with Intel® N3350/N4200 Dual-/Quad-Core as well as i3, i5 and i7 Kaby Lake processing units Touch monitors 7.0" ... 21.5" / 32" ... 84" Patented optical bonding process up to 104" diagonal Broad standard portfolio available in small batches	armStone Single-Board-Computer (SBC), ARM Cortex™-A5/A9/A9r2 efus Computer-on-Module (COM), ARM-Cortex™-A7/A9 PicoCore (CoM), ARM Cortex™-A7 / A53 Operating systems: Windows, Linux NXP i.MX6, i.MX7 and i.MX8 UltraLite/Single-/ Dual-/ Quad-Core processing units, Snapdragon QuadCore Modules with WiFi/Bluetooth 5.0 and camera Developmentkits available	endrich iSi30-displays with standard LVDS interface 7.0" ... 10.1" endrich iSi50-displays with standard TTL-RGB interface 4.3" ... 7.0" TFT-displays 2.4" ... 15.6" Customized monochrome LC-modules Customerspecific PCB and subassembly production





Manufacturer	Eagleeye Tech	Multi-Inno	Raystar	RiT	SGD
Touch PCs					
Touch Monitors					
Boxed Industrial PCs					
Embedded Boards					
TFT-Displays	■	■	■		■
Monochrome LC-Displays	■	■	■		■
Passive Matrix OLED-Displays		■	■	■	
E-Paper	■				

Features

Certifications	ISO9001 ISO14001	ISO9001 ISO14001	ISO9001 ISO14001	ISO9001 ISO14001 ISO45001	ISO9001 ISO14001 IATF46946
General Information	Headquarters in Hong Kong with subsidiaries in China Established: 2010 Key products: TFT-displays, OLED-displays, E-paperdisplays On-cell/In-cell bonding process, optical bonding and full assembly Touch panel full assembly	Headquarters in China with subsidiary in Hongkong Established: 2005 Key products: TFT-displays with touch option Broad portfolio of cost optimized modules Specialist for industrial displays	Headquarters in Taiwan with subsidiaries in China Established: 2007 Key products: passive matrix OLED-displays; TFT-displays; monochrome LC-modules Own OLED-glass production TFT-displays with innovative interfaces	Headquarters in Taiwan with subsidiaries in China Established: 1997 Key products: passive matrix OLED-displays Own OLED-glass production Global market leader for passive matrix OLED-displays	Headquarters in Taiwan with subsidiaries in Hongkong and China Established: 1989 Key products: TFT-displays with touch option; monochrome LC-modules Focused on extended requirements for material and lifetime of TFT-displays
Applications	Industry, Telecommunication, White Goods, Building Automation	Industry, Telecommunication, White Goods, Building Automation	Industry, Telecommunication, Medical	Wearables, Medical, Consumer, White Goods	Industry, Telecommunication, White Goods, Medical
Specifics	endrich iSi30+-Displays with standard MIPI and LVDS interface 7.0" TFT-Displays 1.3" ... 24.5" E-paper-displays 1.54" ... 8.0" Customizations of cover lens, backlight and interfaces Monochrome LC-modules	TFT-displays 1.45" ... 10.4" Special resolutions and sizes upon request PCAP touch sensors 2.8" ... 10.4" Customizations of cover lens, backlight and interfaces Monochrome LC-modules Passive matrix OLED-displays	Passive matrix OLED-displays 0.49" ... 5.5" TFT-displays with HDMI and RaspberryPi interface 5.0" ...10.1" TFT-displays with 36-pin MCU interface 3.5" ... 10.2" TFT-displays with PIC24-controller 3.5" ... 5.7" Monochrome STN/FSTN LC-modules, alphanumeric and graphic	Passive matrix OLED-displays 0.42" ... 3.2" Full-color OLED-displays 0.96" ... 1.8" OLED-displays with special shapes and materials upon request	TFT-displays 1.44" ... 21.5" Minimum backlight lifetime up to 50k hours Extended operating temperature -30°C ... +85°C Super high brightness up to 1.600 cd/m² Touch sensors for almost all displays Customized monochrome LC-modules

Quartz / Oscillators / Filters



Manufacturer		Citizen	Maruwa	SMI
Quartz Crystals	MHz	■		■
Clock Crystals	kHz	■		■
Oscillators		■	■	■
MCF Filter				■
SAW Filter				■
Dielectric Filters			■	

Features

Certificates	ISO 9001	ISO 9001	ISO 9001
General Information	Through-hole and SMD tuning fork crystals Smallest size: 1.6 x 1.0 mm Tight tolerances: up to ± 5 ppm Extended temperature range: - 40 ... + 85 °C (+125 °C)	Compact, high performance sub miniature VCOs and LTCC Operating frequency: 1 MHz ... 5 GHz Through-hole and SMD Small size: up to 3.2 x 4.5 mm Excellent tolerance over temperature range Custom made products	Crystals, clock OSC, TCXO, VCXO, MCF Frequencies: 16 kHz ... 300 MHz Wide range SMD and through-hole packages LVPECL, LVDS oscillators Tight tolerances and excellent temperature stability Package down to 1.2 x 1.0 mm RTC (real time clock)
Applications	Smart Metering GPS Home Automation BTM/IoT Industrial Controls Token Wrist Watch RFID	RF Audio Wireless Microphone Industrial RF Control Base Station Wi-Fi	Industry Electronics Medical Equipment Computer Gaming Reference Clock TV / Audio RFID
Specifics	Low ESR SMD tuning fork 3.2 x 1.5 mm SMD tuning fork 3.2 x 1.5 mm with parallelcontacts (better EMI performance) SMD 1.6 x 1.0 mm tuning fork SMD tuning fork 3.2 x 1.5 mm with tolerance of ±50 ppm incl. stability over temp. range CM315G)	Smallest size VCO Base station: Wireless microphone transceiver	SMD oscillator 32.768 kHz with extremely low current consumption High stability VC-TCXO, meets STRATUM3 TCXO with ±0.5 ppm tolerance HF-CMOS oscillator 55 ... 160 MHz with excellent temperature stability LVDS and LVPECL osc.

CITIZEN MARUWA SMI



Manufacturer		Chequers	SiTime	TST
Quartz Crystals	MHz	■		■
Clock Crystals	kHz	■		■
Ceramic Resonators		■		
Oscillators		■	■	■
MCF Filter		■		■
SAW Filter		■		■
Dielectric Filters		■		■
Ceramic Filters		■		

Features

Certificates	IATF 16949	IATF 16949 AEC-Q100	IATF 16949:2016 AEC-Q200 / AEC-Q100
General Information	Ceramic resonators: 1 ... 60 MHz, 2.5 x 2.0 mm or smaller Temp.: - 40 °C ... + 8 °C Ceramic filters: e.g. 455 kHz / 10.7 MHz / 27 / 45 MHz Dielectric filters: 433 MHz ... 5 GHz Temp: - 40 ... + 85 °C Quartz: up to 200 MHz, 1.6 x 1.2 mm, Temp.: - 40 ... + 125 °C Oscillators: up to 200 MHz, 2.5 x 2.0 mm, Temp.: - 40 ... + 125 °C	MEMS-based silicon timing solutions from 1 Hz ... 900 MHz Low power, ultra-performance oscillators Differential and high-temp. oscillators, Automotive Extended temperature: - 55 ... 125 °C Clock generators, VCXO, DCXO & VCTCXO (Stratum 3) / OCXO Spread spectrum and field prog. oscillators Size down to 1.5 x 0.8 CSP or SOT23	SAW & BAW filters: 200 MHz ... 3 GHz IF filter: 33 MHz ... 900 MHz Extended temp. range: -40 °C ... 125 °C Dielectric and Notch filter Duplexer and Diplexer Quartz and quartz-osc. for automotive use Extended temperature: - 40 ... + 125 °C Standard and customized size: 1.6 x 1.0 mm
Applications	Industry Electronics Consumers RF Modules Lighting White Goods	Automotive, Electric Vehicles Ethernet, DDR and PCI Applications Industrial controls Medical Wireless & Backhaul Fiber Optic, DSL	Vehicle Electronics, Digital Radio Cellular (GSM, LTE) GNSS, RF Modules Wi-Fi & Bluetooth® V2X Application
Specifics	Smallest 2.0 mm x 1.6 mm ceramic resonator for 20 ... 60 MHz SMD quartz down to 1.6 x 1.2 mm IF filter e.g 10.7 m 450/455 kHz	Elite Platform™ Super-TCXOs are tight stability (±0.1 ppm to ±2.5 ppm), replace legacy quartz OCXOs in emerging 5G and IEEE 1588 synchronization applications while reducing power consumption and size SiTime's automotive (AEC-Q100) deliver ±20 ppm frequency stability from -55 °C to 125 °C SiTime's EMI reduction oscillators (spread spectrum) ensure emissions compliance through spread spectrum clocking OCXO (±0.005 ~ 0.008 ppm)	FEM (Front End Module, Filter + LNA) for GNSS and WiFi Dual filter für RKE application Miniature VC-TCXO and TCXO Narrow band BAW, TC-SAW, SAW filters for mobile phone, IoT, GNSS LTE filter for world wide used bands

Chequers Electronic (China) Limited

SiTime

TST

RF Modules / Antennas



Manufacturer	Aurel	Fibocom	Panasonic	Feasycom
RF-Modules (315 MHz ... 2.4 GHz)	■			
Bluetooth®			■	■
WiFi™			■	■
GSM/GPRS/EDGE		■		
UMTS		■		
LTE		■		
LPWA (Cat NB1/NB2, Cat M1)		■		
5G		■		
LoRa™ Transceiver	■			

Features

Certificates	ISO 9001	ISO 9001, ISO 14001	ISO 9001, ISO 14001	ISO 9001, ISO 14001, IATF 16949
General Information	Radio modules for ISM bands 315, 433.92, 868, 915 MHz and 2.4 GHz Products conform to valid European standards (RED) Transmitters, receivers, transceivers and handheld transmitters AM & FM Transceiver/transmitter with antennas Receivers with extremely low power consumption for use in battery powered systems Customized developments and production Electronics with radio	2G/3G/4G/5G cellular modules LTE-Cat NB1/2/LTE-Cat M1 modules SoC (System on Chip) modules LGA, M.2 or MiniPCIe form factor Backward compatible global and regional modules Qualcomm, MediaTek & Intel based modules	Bluetooth® 4.2/5.0/5.1 Low Energy Module Supports IEEE® 802.15.4 Combo WiFi™ 2.4 GHz and 5 GHz 802.11 a/b/g/n/ac + Bluetooth® 5.0 (BR, DER, LE) Modules Modules with integrated antenna or U.FL Connector Solderable modules Industrial modules with extended temperature range	Bluetooth® 4.2/5.0/5.1/5.2 Low Energy Module Supports IEEE® 802.15.4 Combo WiFi™ 2.4 GHz and 5 GHz 802.11 a/b/g/n/ac + Bluetooth® 5.2 (BR, DER, LE) Modules Modules with integrated antenna or U.FL connector Solderable modules Industrial modules with extended temperature range
Applications	Door / gate opener access systems Home alarm systems / smoke detectors Home automation Measuring and dosing systems Telemetry / radio control IoT applications Long Range Communication	Remote control / Maintenance E-Call / Emergency call systems Smart Home Smart Metering Smart City Security monitoring POS/cash register systems	Diagnostic and maintenance systems Industrial IoT Telemetry / radio control Smart Home / Home Automation Medical Healthcare Sensor Applications	Consumer products Industrial IoT Telemetry / radio control Smart Home / Home automation Smart City Sensor Applications
Specifics	**Long Range Transceiver for ranges up to 12 km** SMD Transceiver 868 MHz Rain sensor for applications in weather stations Rolling code handheld transmitter in different variants	**5G MBB (Mobile Broadband) and mMTC (Massive Machine Type Communication) modules** - LGA and M.2 form factor - GNSS support - BT / WiFi scan (5G MBB) - LPWAN technology LTE-M/NB-IoT (mMTC)	**PAN1781 – Bluetooth® 5.1, IEEE® 802.15.4** Supports Bluetooth direction finding AoA & AoD **PAN9520 – Dual band 2.4 GHz and 5 GHz** 802.11 a/b/g/n/ac Wi-Fi + Bluetooth combo module	**FSC-BT690** Nano Sized Bluetooth 5.1 Module 5.4 x 5.8 x 1.2 mm **FSC-BW126** 2.4G&5G Wi-Fi 6 and Bluetooth 5.2 Combo Module **FSC-BT986** SPP BLE Bluetooth 5.2 UART Module



Manufacturer	2J antennas	Locosys	Inpaq
GPS/GNSS Receiver Modules		■	
GPS/GNSS Smart Antenna Modules		■	
Antennas f. ISM Band, Bluetooth®/WiFi™	■		■
Antennas f. GPS/GNSS	■		■
Antennas f. Cellular	■		■
Antennas f. Car2Car Communication			■
Antennas f. NFC (Near Field Communication)			■
WPC (Wireless Power Charging)			■

Features

Certificates	IATF 16949, ISO 9001, ISO 14001	IATF 16949, ISO 9001, ISO 16750, ISO 26262	IATF 16949, ISO 9001, ISO 14001, QS 9000
General Information	High product variety: PCB and flexible foil antennas, SMD/SMT antennas, omnidirectional antennas and patch antennas Standard and customized internal and external antennas with high efficiency for Cellular, GNSS, Bluetooth®/WiFi™ and ISM band Multi-band antennas Customized cables and connectors Custom colors of enclosures – logo printing possible Antennas certified according to IP67, IP69K, IK09	GNSS (GPS/GLONASS/BeiDou/Galileo) modules and GNSS-mouse GNSS RTD/RTK modules GNSS antenna modules ADR & UDR solutions RTK solutions Products comply with AEC Q100	High product variety: patch antennas, chip antennas, active antennas, dipole antennas, SMT antennas, LCT/LDS, NFC and WPC solutions Customized patch antennas with high gain for GPS, GLONASS, Galileo, BeiDou, SDARS, DAB, etc. Patch antennas with small sizes (to 6 x 6 mm) and low profiles (to 2 mm) Chip antennas for GNSS,cellular, Bluetooth®/WiFi™ and ISM band Multi-band antennas Customized solutions for WPC and NFC LDS (Laser Direct Structure) solutions
Applications	Tracking / Tracing Telematics / Navigation Automation M2M Telecommunications Smart City Smart Home Marine Applications	Tracking / Tracing Telematics / Navigation Car Infotainment E-Call Autonomous Driving Precision Agriculture Offshore / Marine Applications AGV Robotics	Tracking / Tracing Telematics / Navigation Car Infotainment V2X / V2V Communication Wireless Charging Applications Keyless Systems E-Call Autonomous Driving
Specifics	**5G NR antennas** High-performance antennas for 5G networks Ground plane independent and dependent antennas for internal and external use Antenna solutions up to 4 x 5G NR MIMO	**High-precision GNSS RTK solutions** for centimeter navigation – from modules to base stations RTK-1010 as GNSS-RTK module solution RTK-4057 as GNSS-RTK board solution RTK-Mx00 as a system solution suitable (rover or base station)	**L1/L2/L5/L6 antenna series** Stacked patch antennas with/without housing for the high accuracy navigation system with centimeter-level Narrow band and wideband antennas 2 pin or 4 pin solutions

Analog ICs








Manufacturer	Azoteq	Holtek	MPS	Nisshinbo	SG Micro Corp
Analog Switches			■	■	
Audio ICs		■	■	■	
Communication ICs		■		■	
Display Drivers		■		■	
GaAs MMICs				■	
LED Drivers		■	■	■	
Microcontroller		■			
Motor ICs		■	■	■	■
Operational Amplifiers		■	■	■	■
Power Supply ICs		■	■	■	■
Video ICs		■		■	■
Logik IC					■
Touch & Multisensor IC	■	■			

Features

Certificates	ISO 9001 / 14001	ISO 9001 ISO 14001	ISO 9001 / 14001 IATF 16949	ISO 9001 / 14001 IATF 16949	ISO 9001 / 14001
General Information	Azoteq is a South Afrika based company focussedon multi-sensor, single chip solution and LED power control device. The latest generations of sensors combine up to 6 different sensors in one IC, such as touch, proxy, inductive, Hall, ALS and temperature sensors.	Taiwanese company with product development focus in the area of microcontrollers and their peripheral products. The microcontroller range includes fully integrated digital and analog functions such as A/D converters, LCD drivers, PWM generators, high current LED drivers, touch switches, SPI/I2C interfaces, USB drivers, voice functions, RF functions, Telecom functions etc. Microcontroller devices meet with full industry specifications, and are as OTP and flash type available	Monolithic Power Systems (MPS) is a USA based high performance analog semiconductor company DC/DC converter ICs, LED driver ICs, Class D audio amplifier ICs that are wellsuited for small form factors Linear ICs including operational and current sense amplifiers Battery chargers and protection devices Power over Ethernet (PoE) Motor ICs	Nisshinbo Micro Devices Inc. is a Japanese company with its development focus in analog ICs Leading company for operational amplifiers (OPA) and LDO Beside this Nisshinbo Micro Devices Inc. offers a large diversity of ICs for communication, automotive, industrial and RF applications For automotive applications, special parts can be provided with AEC-Q qualification	SG Micro Corp is specialized in high performance, high quality analog IC design, marketing and sales. Experts for analog IC design with more than 20 years of experience in IC design, layout, process, assembly, test and quality control. Assurance of performance and quality of the products Leading supplier of analog ICs
Applications	Industrial and Communication Market White Goods Entertainment Medical	Industrial and Communication Market White Goods Entertainment	Sensors, TV, White Goods, Rooter, Navigation Systems, Mobile Applications, Automotive, General Lighting, Industrial Applications	Sensors, Head Sets, Automotive, Entertainment Equipment, TV, White Goods, PLC, Navigation Systems, Mobile Phones, RF-Applications, GPS	Industrial and Communication Market White Goods Entertainment Medical
Specifics	ProxFusion®	32-Bit MCU PIR sensor	Mini module Motordriver IC with intergreted Hall sensor	Special high- and low-side switches for sensors, high power OPA, GPS front-end-module	Levelshifter

Memory ICs









Manufacturer	Alliance	ESMT	Fidelix	GigaDevice
SRAM/pSRAM	■		■	
SDRAM/DDR/DDR2/DDR3/ DDR4	■	■	■	
Flash	■	■	■	■
MCP		■	■	
Audio IC		■		
Microcontroller				■
Power Supply ICs		■		

Features

Certificates	ISO 9001 ISO 14001	ISO 9001 ISO 14001	ISO 9001 ISO 14001	ISO 9001 ISO 14001
General Information	Alliance Memory Inc. is an American company manufacturing discontinued components to provide durable industrial and communications applications to support. Product extension to SDRAM and DDR1/2/3/4 and parallel flash	Elite Semiconductor Memory Technology Inc. („ESMT"), is a Taiwanese IC design house. Wide range of memory densities (1 Mb – 8 Gb) and various DRAM products (SDRAM, DDR, mobile SD/DDR1 to DDR4) 16 Mb – 4 Gb Selection of NOR and NAND flash 1 Mb – 8 Gb	Korean company without own production. Development of efficient and cost-effective storage solutions. PSRAMs 4 Mb - 32 Mb, Low power SDRAMs, Low power DDR1/2/3, SDRAMs 32 Mb – 2 Gb and memory for mobile applications	GigaDevice stands for advanced memory technology and microcontroller in China. No own production. Large product range of NOR flash and NAND flash The 32Bit MCU extends the product portfolio.
Applications	Industrial and Communication Market	PCs, Servers and Workstations PC Peripherals, Industrial Products, Consumer Products, Communication Devices	Low Power and Fast Speed Memory solutions for mobile communication and point-to-point applications	Industrial Medical and Consumer Area
Specifics	Psram: 8 Mb – 128 Mb 8 Gb DDR3 2 Gb DDR2 4 Gb DDR4 1 Gb-16 Mb Parallel NOR flash	8 Gb DDR3 4 Gb DDR4 SPI NAND Flash: 1 Gb – 4 Gb Parallel NAND flash: 1 Gb – 8 Gb	SPI Nand flash: 1 Gb – 8 G	1 Gb NAND parallel 1 Gb – 4 Gb NAND SPI Microcontroller Cortex M23 and Risc-V

Protection Devices



Manufacturer		cosmo	CT Micro	ECE	Semitec
Overcurrent	PPTC			■	
	Power Thermistor				■
	CRD				■
Coupler/SSR	Opto Coupler	■	■		
	MOS Relay	■	■	■	
	Solid State Relay	■		■	

Features

Certificates	ISO 9001 ISO 14001	ISO 9001 ISO 14001 IATF16969	ISO 9001 ISO 14001 IATF16969	ISO 9001 ISO 14001
General Information	DIL, SMD, mini-flat (SOP), LSOP and SSOP-housing Single- and multi-channel CTR 50 ... 2000% High-speed coupler up to 10 MBit Isolating voltage up to 5 KV UL, VDE and TÜV approved	DFN, DIL, SMD, mini-flat (SOP), LSOP, SSOP and new wide body-housing Single- and multi-channel CTR 50 ... 15000% High-speed coupler up to 10 MBit Isolating voltage up to 5 KV UL, VDE and TUV approved	DIL, SMD and mini-flat (SOP) housing Load current: 130 mA ... 40 A Load voltage: 60 ... 800 V On-resistance: 0.83 ... 28 Ohm Isolation voltage: up to 5 KV Trigger current: 10 ... 25 mA UL and TÜV approved	Unique current regulative characteristic Pinch off currents from 0.1 ... 22 mA Voltages up to 100 V High dynamic impedance Low temperature drift
Applications	Power Supply Home Appliances Industrial Telecommunication Network Point of Sales Testing Instruments	Power Supply Home Appliances Industrial Telecommunication Network Point of Sales Testing Instruments	Power Supply Home Appliances Industrial Telecommunication Network Point of Sales Testing Instruments	PLC (Programmable Logic Controller) Sensor Applications LED Control Circuits
Specifics		CTP17 – smallest and flat-test optocoupler worldwide CT816L low input current phototransistor optocou-pler with higher operating temperature of 110 °C CTH214 & CTH217 – new 4-pin half pitch mini-flat phototransistor optocoupler	High current MOS relays including the EPR311A038005 with a continuous peak load current of 6A	CRD S-223T ... 22 mA and 500 mW rated current regulative diode in compact SOD-123FL package



Manufacturer		Eris	Protek	Inpaq	SFI
Overvoltage Protection	TVS-Diode/Array	■	■		
	Multilayer Varistor			■	■
	CSPD				■
	ESD Suppressor			■	
	Protection Thyristor		■		
	Protection Module		■		

Features

Certificates	ISO 9001 / 14001 IATF 16949 AEC-Q101 (partly)	ISO 9001 AEC-Q101 (partly) IATF 16949 (partly)	ISO 9001 / 14001 IATF 16949 AEC-Q200	ISO 9001 / 14001 IATF 16949 AEC-Q200 (Teilbereiche)
General Information	Eris Technology Corporation, is a Taiwanese ODM providing a variety of support services to design, manufacturing and aftermarketing services for diode products. Eris business scope comprises Schottky diodes, TVS diodes, Zener diodes, bridge diodes, wafers, and much more.	Size: SMD 0201, modules and throughhole options Uni- and bi-directional Voltage: 1 ... 440 V High surge capability up to 2.2 MW Ultra low capacitances down to 0.15 pF High ESD handling ability (>30 kV Contact/Air) No ageing	Sizes: 0201 ... 1812 Voltage: 4 ... 42 VAC Extremely quick response time (< 1 ns) Extremely low capacitance (0.2 pF) Extremely low leakage current Zero signal distortion	Sizes: 0201 to 6420 Voltage: 3.3 to 385 VDC Up to 5.5 kA (8/20 µs) Special parts with 0.05 pF for RF-applications High ESD handling ability (ESD types >30 kV) CSPDs with superior high surge and high voltage protection capability
Applications	Automotive Telecommunication Consumer Computer + IT Industrial Electronics	Automotive Industrial Telecommunication Networking Medical Test + Measurement Security Point of Sales	Automotive RF Modules Antenna Circuits HDMI + USB Handheld Devices Set-top Boxes	Telecom + Networking: Ethernet Access Points IP Cameras Base Stations Security Systems Power Line Modems
Specifics	New CRD series in SMA & SMB package	SM3/5/10KW series – super flat DFN 2 package, high power surge protection AEC-Q101 qualified PAM8S series, pulse 5A/5B load dump suppression DFN8-36-T73 for I/O link protection	ESD Guard™ in miniature size 0201 AEC-Q200 specified MLVS AM & EGA AM series for automotive applications	SHV series, high voltage protection up to 385 V DC, from 1210 up to 3220 SHA series, load dump protection up to 80 joule From 1210 up to 3220

Thermal Management

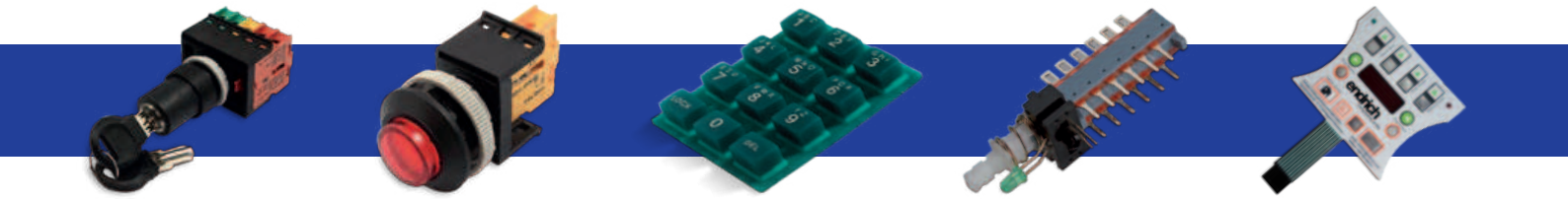


Manufacturer	ADDA	Sinwan	Ecofit	Fulltech	Minebea	QianYuang	Thoptec
Fan	■	■	■	■	■		
Heatsink	■						
Fan Accessories						■	■
Customized Complete Systems	■	■					

Features

Certificates	IECQ QC080000, ISO14064, ISO14001, ISO/IATF 16949, OHSAS18001, ISO9001	ISO9001 EN60529	ISO 9001	ISO9001	ISO 9001 ISO 14001	ISO9001	ISO9001
General Information	Adda, one of the largest major cooling fan manufacturers worldwide, was established in 1978, and has been specialized in cooling fans and modules. Adda provides intensive service and technical cooperation to the clients for more than 40 years.	Sinwan was founded in Taiwan in 1976. Design, production & assembly Hundreds of product combinations including: AC/DC axial, EC fans, all-metal, centrifugal and tangential fans, blower, motors, dust-proof / splash-proof, all IP protection classes	Ecofit was founded 1976 in Vendôme (Frankreich) and belongs since 1994 to the Rosenberg group. From standard products to made-to-measure developments, Ecofit has been offering all customers an invaluable expertise based on more than 40 years know-how.	Fulltech is one of the professional AC cooling fan manufacturers based in Taiwan and has been selling fans worldwide since 1990. Fulltech commits themselves to fan's design, development and manufacturing.	NMB was founded in 1951 in Tokyo. With 60% market share for ball bearings and extension in the product range, NMB is one of the global players worldwide.	Qianyuan was founded in 2003 The main products are such as wire form fan guards for cooling systems, grills, net racks for white goods (roaster, oven, etc.).	The Thoptec Entwicklungs & Vertriebs GmbH is not only a manufacturer of fasteners for electronic components, but also supports its customers with special solutions from product planning and construction to series production.
Applications	White Goods Cooling Technology (Automotive) Pico Projectors Drones Industrial PC Appliance Industrial Automation Medical Technology IT & Telecom etc.	Medical Industrial Drive Technology Air Purification Industrial Trucks Food Industry Home Appliances	Residential Ventilation Heating Railway Professional Dryers Filtration Refrigeration Wind Energy Industry Thermal Management of Electrical Cabinets HVAC (Heating, Ventilation, Air Conditioning)	Photography Lighting Device Control Panels Stage Lights Refrigerators Freezers LED Display Cooling Heat Exchangers Fog Machines Electricity Control Elevators Photovoltaic Industry Medical Equipment	Air Conditioning and Ventilation Industry Agricultural Industry Industrial Technology Heating and Burner Technology Household Appliances Compressors Railway Technology Food Industry Medical Technology Personal Protection etc.		
Specifics		IPRating + 30 days (GR-487) Salt spray certified fan (EN60529)	125D-A ETRI fans (higher airflow, w/o noise level increase; wider power range; 0 ... 10 V or PWM)	EC fans Cross flow fan with right sided motor			

Electromechanics



Manufacturer	Diptronics	ECE	knitter-switch	win
Tactile Switches	■		■	
Push-Button Switches	■		■	
Micro Switches	■	■	■	
Silicone Keypads & Membrane Keyboards			■	■
Relays		■		
Tilt Switches		■	■	
DIP-/Piano Switches	■	■		
Rotary DIP Switches	■	■	■	
Slide Switches	■	■	■	
Industiral Control Switches	■	■		
Detector-/Manipulation Switches		■	■	

Features

Certificates	IATF 16949, ISO 9001, ISO 14001	ISO 9001, ISO 14001, IATF 16949, OHSAS18001	ISO 9001/ISO 14001	ISO 9001/ISO 14001 TS 16949
General Information	Diptronics Manufacturing Inc., founded in 1985, specializing in tactile switches and DIP/ rotary DIP switches manufacturing. Complete production lines, in six large production facilities, enable a timely delivery of highest quality. Strength: integration of core competence, complete in-house manufacturing, in-house engineering team, in-house LED switch assembly line, support in production and design, flexible delivery.	In 1981, the Excel Cell Electronic Co., Ltd. was founded. While button cells were the original pillar, ECE has meanwhile expanded its portfolio with a wide range of switches, plugs and small stamping parts. ECE is characterized through vertical integration, production capability, strict quality assurance and in-house development.	Since its founding in 1966 knitter-switch has remained at the forefront of switch technology. The large selection of switches, supplemented by keyboards, is constantly being expanded using the latest technologies and materials, and shortest delivery times are achieved. The focus is on quality and service (support for customized solutions and in the design process).	Win Industry Company was founded in 1978 in Taipei as an original supplier of silicone rubberproducts. Meanwhile, Win producesat two locations on a total areaof approx. 90,000 m² and has steadily expanded its product range. In the meantime, toolingand mold making as well as the finishing treatment such as screen printing, spraying, laser etching takes places in-house.
Applications	3C Industry / IT Industry Medical Devices Cloud Devices Industrial Control Field Automobile Industry White Goods Automatic Home Appliances Security Smart Wearables etc.	Industrial Control Instrument Equipment Security Systems Consumer Electronics Household Appliance Power Energy Industry Optoelectronic Industry Automotive Electronic Industry Computer and Peripherals Network & Communication etc.	Home Appliances Building Automation Industry Mechanical Engineering Automotive Applications HVAC Medical Technology Safety Technology Ground Conveyor etc.	Human Machine Interface (HMI) Home Appliances Building Automation Industry Mechanical Engineering Automotive Applications HVAC Medical Technology Safety Technology Ground Conveyor etc.
Specifics	Diptronics continues to focus on the switch business, but is constantly developing new technologies (smartphone, automotive and illuminated switches) to meet rapidly changing market demands.		ICE series (Industrial Control Switches which are compliant to all relevant safety standards)	

LED



Manufacturer		Citizen	Everlight	Harvatek	Dominant	osa opto light	Audax	Ledil	Crystal IS
Low Power LEDs	SMD	■	■	■	■	■			
	THT		■	■	■	■			
	7-Segment Displays		■	■					
High Power LEDs	SMD		■						■
	COB	■							
Modules		■					■		
Optics								■	
Light Engines							■		

Features

Certifications	ISO 9001 ISO 14001	ISO 9001 ISO 14001	ISO 9001 IATF 16949 ISO 14001	ISO 9001 ISO 14001 IATF 16949	ISO 9001	ISO 9001	ISO 9001	ISO 9001
General Information	COB and SMD LEDs for general lighting, horticulture and industry with superior performance, efficiency and reliability.	Leading global optoelectronics manufacturer of low and high power VISIBLE LEDs, SMD and Thru-Hole LEDs, digital displays, INFRARED emitters, optical sensors, fiber optic and optocoupler components.	As one of the world leaders in SMD LED technology, Harvatek is proficient in the design and manufacture of SMD LEDs and offers excellent solutions for backlighting, displays and keyboard illumination.	Wide variety of automotive certified LEDs in different colors and package sizes. All automotive certifications available. Automotive interior and exterior lighting status LED.	OSA OPTO designs and manufactures special, custom and standard High Brightness & High Power LED chips, SMD LEDs.	Audax Electronics was founded in 2012 and has focused on the development of LED light engines. The product portfolio is continuously expanded with state-of-the-art LED solutions.	As an undisputed leader in the field of LED optics, LEDiL strongly believes in light that is right for increased well-being and safety, optimised functionality and improved sustainability with energy efficiency	Crystal IS' product line leverages the unique properties of Aluminum Nitride to provide superior UVC LED products
Applications	Spot Light Down Light High Bay Street Light Flood Light Horticulture UV Module	LED lighting UV Status LED for industry Horticulture	LED lighting UV Status LED for industry	Industry Status Automotive	LED Lighting UV Customized LED	LED lighting UV Horticulture Customized LED Modules	Interior lighting Outdoor lighting UV Horticulture Street and traffic lighting	Water Treatment Surface Treatment Air Treatment
Specifics	COB Gen 9 COB HI Intensity GEN 4 UV Module RGB SMD LED	Deep RED High Power and Royal Blue Horticulture LED 2835 Standard & High Efficiency Signage RGB LED 4 in 1 RGBW	IC RGB	SpicePlus Color / RGB Sideway LED Smart Embedded Digital Driver LED	LED for hyperspectral imaging and metrology	LED Boards UV Boards Horticulture LED Boards RGB/W LED Boards	New series DAISY, STRADELLA, LISA	Ultraviolet light in the wavelength range (260 nm to 270 nm)

CITIZEN EVERLIGHT HARVATEK DOMINANT Semiconductors osa opto light AUDAX ELECTRONICS LEDiL KLARAN by Crystal IS



Manufacturer		Inventronics	LiFud	ELT	Fulham	Bender+Wirth	TE Connectivity	cooliance
Accessories for High Power LEDs	Holder					■	■	
	Heat Sink							■
Power Supplies	Indoor	■	■	■	■			
	Outdoor	■	■	■				

Features

Certifications	ISO 9001	ISO 9001 / 14001	ISO 9001 ISO 14001	ISO 9001	ISO 9001 ISO 14001	ISO 9001 ISO 14001	
General Information	Established in 2007, Inventronics is one of the world's top LED driver manufacturers specializing in building innovative, highly reliable and long-life products that are certified compliant to all major international safety and performance standards	Lifud was founded in 2007. They are dedicated to technological innovation and the development of energy-saving, healthy and environmentally friendly LED drivers to achieve the mission of improving people's living environment and quality of life, as well as the long-term vision of a more efficient and cleaner energy supply.	ELT is a Spanish business group specialised in the design, manufacture and marketing of LED drivers and which, over its more than 40 years, has achieved a leading position in the market.	Decades of experience puts Fulham at the forefront of innovative technology in essential lighting products, intelligent lighting controls combined with healthcare and sanitation that offer quality, versatility and sustainability that add value for their customers.	Since 1899, Bender+Wirth has been supplying the global lighting industry with the highest quality components. Their current product portfolio includes LED holders, LED connectors and lamp sockets.	TE Connectivity designs and manufactures an extensive range of advanced connectors. LUMAWISE LED mounts feature an LED snap-in function, eliminating the need for soldering. Poke-in wire connections provide tool-less termination of solid, fused and strande wire.	With a global footprint, Cooliance is a designer and manufacturer of a wide range of high reliability thermal solutions & heat sinks.
Applications	Interior and Exterior Lighting Tunnel and stadium Lighting Industrial Lighting Horticulture	Interior and Exterior Lighting Shop Lighting Industrial Lighting Smart Lighting	Interior and Exterior Lighting	Interior Lighting	General Lighting	Spot Lights Down Lights Track Lights Street Lights General Lighting	General Lighting Custom design
Specifics	Mx & MGS Series for Horticulture Applications	Dali2 DT8 LED driver LF-GS-DxxxYG Series Triac Dimming LFAAT Series		Lumo Series European LED Drivers	COB holder for UV-C (430 series made of a UV-resistant mineral)		

Capacitors



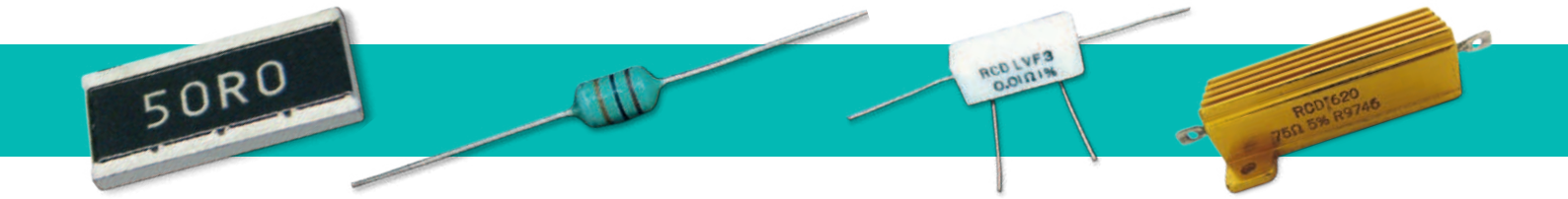
Manufacturer		Panasonic	PDC	SunCon
SMD	Electrolytic			■
	Hybrid			■
	Polymer	■		
	MLCC		■	
THT	Electrolytic			■
	Hybrid			■
	Polymer	■		
	MLCC			

Features

Certifications	IATF16949 partly, ISO 14001, AEC-Q200 partly	ISO 9001, IATF 16949, ISO 14000, OHSAS 18000, AS 9100	IATF 16949, ISO 14001, AEC-Q200
General Information	Inventor as well as leading manufacturer of polymer technology Life time up to 5.000 h / 105 °C > 100.000 h / 85 °C Low ESR, up to 5 mOhm High ripple load (@ Oscon SVPE 10 x 13 mm) Poscap / Oscon / SP-cap Voltage range: 2 ... 35 V Capacity range: up to 1500 uF	PDC is the only manufacturer of MLCC in Taiwan with true vertical integration. PDC manufactures the finished products as well as the ceramic powder for them. The product range includes MLCC capacitors for special requirements, such as High voltages: up to 10 kV High capacitance: up to 330 µF Tight tolerance: up to +/-1 %. For safety relevant applications: X1/Y2, X2 Large sizes: 3035 / 4252 / 5550 / 5780 / 6560/ 7680/ 8850/ 13060 Further features such as low ESR, soft termination, AEC-Q200 qualification and many more.	Large portfolio of SMD and polymer hybrid capacitors **Hybrid technology:** Aluminium electrolyte capacitor combined with polymer hybrid material Extremly high ampacity in comparison with identical SMD capacitors High voltage, up to 125 V in a temperaturerange from 105 °C ... 150 °C Radial type HEH up to 100 V / 10.000 h
Applications	Automotive Telecommunication Computer & IT Measurement Sensors Consumer Power Supplies Industrial Medical	Automotive Telecommunication Power Supplies Industrial	Automotive Telecommunication Computer & IT Measurement Sensors Consumer Power Supplies Industrial Medical
Specifics	Voltage range up to 50 V for Poscap Ultra low SP-cap with 3 mOhm		For 2017 new SMD series with higher capacity in same case size, available for 105 °C and 125 °C

Panasonic PDC SunCon

Resistors



Manufacturer	E&C	PDC	RCD	Susumu
Thin Film Resistors				■
Current Sense Resistors (Shunts)		■	■	■
High Frequency Resistors				■
Thick Film Resistors		■	■	
Special Resistors	■	■	■	■

Features

Certifications	ISO 9001	ISO 9001 IATF 16949	ISO 9001	ISO 9001 IATF 16949
General Information	Specialized in high ohmic values in the range of Mega Ohm to Peta Ohm High voltages up to 750,000 V Custom types available	Thick film chip resistors optimized for special purposes Surge resistors with double/triple power rating High voltage safety resistors with UL certificate	Industries' widest portfolio containing film- foil- wire-woundceramic-, metal glaze-, metal oxide-resistors in chip, melf, though hole, leaded, ceramic, heat sink construction Custom types available SWIFT „TM" program for faster production	Thin film chip resistors with excellent long term stability Metal foil current sensing resistors with short- & longside terminals. High frequency products such as attenuators, terminators and splitters
Applications	Industrial Test & Measurement Medical Equipment Sensors Institutes and Universities	Automotive Industrial White Goods Medical Equipment General Purpose	Industrial White Goods Medical Equipment Aerospace & Avionic General Purpose	Automotive Industrial Test & Measurement White Goods Medical Equipment
Specifics	HC Series: Smallest high Ohm chip resistor in the market Case 0402 is available vup to 150 G Ohm	Thin film melf resistors with improved reliability Green resistors with lead content less than 100 ppm (10 times lower than RoHS requirement for chip resistors)	CM300 type – ultra low profile 300 Watt power film resistor with proprietary flame retardant epoxy insulation Attached to a suitable air- or water-cooled heat sink CM300 ensures optimal environmental protection & dielectric strength	Precision chip resistors with fuse function Chip attenuator for frequency up to 50 GHz Thin film resistors with extended Ohm ranges up to 7.5 Mega Ohm

E&C PDC RCD SUSUMU Thin Film Specialist and Innovator

Inductive Components



Manufacturer	ABC	PDC	Inpaq
Chip Inductors	■	■	■
Power Inductors	■	■	■
Line Filters	■	■	■
Chip Ferrit Beads	■	■	■
Transformers and Through Hole	■	■	

Features

Certifications	ISO 9001 IATF 16949	ISO 9001, ISO 14000 IATF 16949	ISO 9001 IATF 16949
General Information	Very wide range of SMD and THT inductors for DC/DC power – HF and general purpose applications Following the trend of automatic production, ABC is still capable to maintain a very high flexibility for small MOQ and quick delivery Holding more than 100 patents, ABC offers products of high quality by following the popular shapes in the market ABC is capable to produce semi custom and custom inductors and transformers	PDC offers a wide portfolio of standard inductors. The focus of PDC's investments is on the modernization of production facilities and the expansion of production capacities. The product range includes: HF inductors: Wire-wound, also as common mode and common or differential mode filters, air core coils and baluns Power and filter chokes: unshielded, shielded, with iron powder- or ferrite core as choke, filter or transformer	RF components such as chip beads and line filters in the technologies: multilayer, wire wound and thin film Power components such as wire wound chip inductors and high current chip beads Inpaq's WIP series is referenced by Qualcomm for their Snapdragon platforms
Applications	Automotive Industrial White Goods Medical Equipment General Purpose	Industrial Telecommunikation Power Supply White Goods	Automotive Industrial White Goods Medical Equipment General Purpose
Specifics	Extended lineup for iron powder high current power choke coils: HC series: very low profile CIP: middle size, with focus on lowest DCR or highest current rating HE series: universal series from ~4 x 4 mm to 17 x 18 mm		TNF0605 is the smallest thin film common mode choke in the market supporting USB 3.0 for up to 10 GHz cutoff frequency WIP-Y performance upgrade to the existing WIP-P and WIP-S types. WPASX / WPAPX series is qualified according to AEC-Q200 for automotive applications

Acoustics



Manufacturer	Baolong	BSE	ChinaSound	KOTL	Ariose	Vansonic
Piezoelectric Transducer			■			
Piezoelectric Buzzer			■			
Piezoelectric Speaker			■			
Piezoelectric Element			■			
E-magnetic Transducer					■	
E-magnetic Buzzer					■	
Dynamic Speakers			■			■
SMD Microphones, Reflow Solderable		■				■
Standard Microphones		■				■
MEMS Microphones		■				
Coin Type Vibration Motors	■			■		
Cylinder Type Vibration Motors	■			■		
SMD Vibration Motors	■			■		
Linear Vibration Motors	■			■		

Features

Certificates	ISO9001, ISO14001, OHSAS18001	ISO9001, ISO14001, IATF 16949	ISO9001, ISO14001	ISO9001, ISO14001	ISO 9001:2015	ISO9001, ISO14001, IATF 16949
General Information	Baolong is located in Wenzhou, established in 1986. Focus: Micro vibration motors, micro driving motors, possibility of customization Advantage: Long life, small size, light weight and low power consumption.	BO SUNG ELECTRONICS Co., Ltd. (B S E) was founded in 1987 in Incheon, South Korea. Later renamed into BSE (Best Sound Electronics) BSE develops and produces acoustic solutions, consisting of ECM & MEMS microphones	Chinasound is producing in Changzhou (China) Main focus are piezo parts and buzzers, also alarm buzzers and mylar speakers,own R&D facilities	KOTL has its location in Wenzhou Focus: micro vibration motors; well experienced in mechanical engineering, stable construction motors with excellent performance, light weight, low power consumption	Company located in Taiwan, was founded in 1996. Manufacturer of electronic acoustic products, such as buzzers, speakers and microphones, as well as piezoelectric ceramic elements. Quality and customer satisfaction has the highest priority	Main subject are speakers of all kind, also microphones (ECM technology, conventional & reflowable) Strong commitment to R&D, state-of-the-art laboratories, meets customer requirements with regard to size, sound and/or power consumption
Applications	Mobile Phones Sports Bracelets Smart Watches Electronic Cigarette High-end Electric Toothbrushes Devices with Haptic Feedback, etc.	Mainly Utilized in the leading consumer mobile devices MP3 Computers Communication Automotive Applications	Piezo Alarms for Fire and Security Industry Home Appliances POS	Vibration Alarm Silent Alarm Haptic Feedback Smartphone Razor Toothbrush	Automotive Medical instruments Home appliances	Waterproof speakers, microphones and receivers (up to IP67) Speakers in small boxes SMD-loudspeaker
Specifics	Smallest SMT vibration motor-BLT-3211H Small coin vibration motor 0720 & 0625 LRA vibration motor 0832 & 0412	Earphone receiver	Customer specific piezo alarms SMD loudspeaker	Reflow solderable SMD types Linear vibration motors	Soon automotive certification IATF16949 in quarter 01/2023 Smallest existing electromagnetic transducer	Waterproof speakers, microphones and receivers (up to IP67) Speakers in small boxes SMD-loudspeaker

Connectors



Manufacturer		Adam Tech	ECE	Amphenol Industrial	TE connectivity
Data	USB	■	■	■	■
	RJ	■	■	■	■
	D-Sub	■		■	■
	HDMI / SATA	■			■
	FFC / FPC	■	■		■
	IDC / Flat Cable	■		■	■
Power	Terminal Blocks	■	■		■
	Header / Housing	■		■	■

Features

Certificates	ISO 9001 TS 16949 ISO 13485	ISO 9001 TS 16949 ISO 9000 ISO 14001	ISO 9001 TS 16949 ISO14001 VG und TüV New: IRIS Certification	ISO 9001 TS 16949 ISO 14001 OHSAS 18001 TüV (Solar)
General Information	Producer of connectors for data- and power connections Best price/performance ratio	High value PCB connectors	Wide variety of quality connectors for high end performance applications	TE-Connectivity is a unique component manufacturer for automotive industry as well as further branches
Applications	Telecommunication Automotive Computer & IT Sensors Retail Industry Power Units	Telecommunication Automotive Computer & IT Sensors Retail Industry Power Untis	Telecommunication Automotive Computer & IT Power Units Industry Military Marine Railway Audio LED Cabling Solar Connectors AC/DC	Telecommunication Automotive Computer & IT Measurement Systems Sensors Retail Industry Power Units Industry Solar
Specifics	USB Type-C (USB4 Gen 3) High speed data (HSD) FAKRA connectors Magnetic cable assemblies and connectors		ComboLock® Wire-to-Board Minitek® Pwr PCIe® BarKlip® BK200 I/O	Dynamic series USB Type-C (USB4 Gen 3) Mini I/O

Batteries / Power Supplies






Manufacturer	EVE	Fanso	Friwo
Li-SOCl2 / Li-MnO2	■	■	
Super Pulse Cap	■	■	
Lithium 9 V		■	
Li-Ion / Li-Polymer	■		■
AC/DC Switching Power Supply			■
DC/DC Converter			■ (in the future))
Custom Design Batteries			■

Features

Certificates	ISO 9001, ISO 14001, IATF 16949	ISO 9001, UL, RoHs, UN38.3, IATF16949	ISO 8000, ISO 9001, ISO 14001, ISO 13485, TS 16949, SIQ (ENEC), UL, C-Tick, UKCA, PSA, CCC, EAC, UN38.3
General Information	One of the biggest manufacturers for lithium primary cells Own engineering and production facility Li-SOCl2 and Li-MnO2 High temperature cells Temp.: - 40 ... + 145 °C SPC – super pulse capacitors Customized battery packs with PCB ICR18650 with 2000 mAh and 2900 mAh	Qualified manufacturer of primary lithium batteries specialied in: 3.6 V Li-SOCl2 batteries and 3.0 V Li-MnO2 batteries Ultra thin Li-SoCl2 / Li-MnO2 pouch batteries 9 V lithium batteries Super capacitors SLS1016/1025	Leading manufacturer of power supplies Plug-in power supplies 6-60W AC/DC converter Table power supplies 6-60W AC/DC converter AC/DC switching power supplies 6 - 175 W (with/without active PFC) Enclosures: plug-in, desktop and openframe Certifications according to SIQ (ENEC), UL, C-Tick, UKCA, PSA, CCC, EAC Professional technical support and own production facilities
Applications	Automotive Industrial White Goods Medical Equipment General Purpose	FANSO Batteries are mainly applied to Commercial Market – LWD & MWD for Oil Exploration, Electronic Pressure Gauge, Flow Meter, TPMS, Smart Meters, RFID, RAM and CMOS Circuit, Geothermal Heat Detector, Underwater Ordnance, Sonar, GPS and IoT Devices	Industry Tools Medical Technology E-Mobility
Specifics		Revolutionary Li-MnO2 ultra-thin battery CP104851 Ultra thin Li-MnO2 battery pack for medical application Super capacitor 1520 and 1550	Openframe power supplies HERC up to 175W FOXNeo series 6-30W IPX2 protection

EVE ENERGY VERY ENDURE

FANSO

FRIWO

Batteries / Power Supplies



Manufacturer	Jauch	maxell	Mornsun
Li-MnO2		■	
Li-Ion / Li-Polymer	■		
AC/DC Converter			■
DC/DC Converter			■
Powerbanks	■		
Custom Design Batteries	■		
Transceiver Modul			■
AC/DC Switching Power supply			■
Mangan Dioxide		■	
Alkaline		■	
Silver Oxide		■	

Features

Certificates	ISO 9001, UL, RoHs, UN38.3, IATF16949	ISO 9001, ISO 14001, UL	ISO 9001, ISO 14001, IATF 16949
General Information	German leading specialist for battery technology recognized for in-depth technical consulting, high application and certification expertise on: Li-Ion / Li-Po batteries Li-SoCl2 / Li-MnO2 Li-button cells Lithium iron phosphate NiMH batteries Mobile lithium energy storage (XT Powerbanks)	Leading manufacturer of batteries Primary batteries CR manganese dioxide button cells CR manganese dioxide cylindrical cells SR silver oxide button cells Alkaline batteries Rechargeable batteries ML lithium manganese button cells Solid state batteries Professional technical support and own production Facilities	Leading manufacturer of modules for power supply Successful in research and use of electromagnetic insulation technologies Isolated 0.25 – 200 W DC/DC converter Isolated 1 – 350 W AC/DC converter Isolated CAN/RS-485/RS-232 transceiver modules Enclosed AC/DC power supply 35 – 350 W (with/without active PFC) Different power pupply IC solutions Packages: SMD, SIP, DIP, DIN rail etc. Certifications according to EN, UL, CB and CSA Professional technical support Own production sites
Applications	JAUCH Batteries are mainly integrated in: Industrial Electronics, Medical Technologies, Measurement & Control Tech., Safety Engineering, Automotive Tooling Equipment, Military & Defense, E-Mobility, Smart metering, Communication Technologies	Industry, Automotive, Medical Technology, Telecommunication, Consumer, Transportation, Test and Measurement	Industry Transportation Energy Technology, Medical Testing and Measuring Technology Automotive, Telecommunications, Consumer, Photovoltaics
Specifics	New battery own brand „JAUCH“ with own lithium polymer, lithium ion, lithium manganese dioxide and lithium thionyl chloride batteries.	Solid batteries	3W AC/DC converter with transient ouput power up to 12 W – LDE03-20Bxx-O Ultra-compact size 5 – 15 W AC/DC converter – LSxx-13Bxx

Batteries / Power Supplies

Only available in Switzerland







Manufacturer	Yuasa	Energizer	Ansmann
PB Battery 6 V and 12 V (VRLA / Industry)	■		
NiMH Battery	■		
Chargers for PB Battery 6 V, 12 V and 24 V	■		
Alkaline Batteries 1,5 V		■	
Lithium Metal Batteries 1,5 V		■	
NiMH Battery 1,2 V		■	■
Button Cells 3V		■	■
Chargers for NiMH Battery			■
Power Supplies			■
Li-Ion Battery Packs			■
Portable Spotlight			■

Features

Certificates	ISO9001, UL, VDS (only some types from NP series), IATA (No limitation), UN2800	ISO9001, UL, UN3090 (Lithium metal cells), IATA 62nd Edition, ICAO, IEC 60086-1	ISO9001, UL, UN3480 (Lithium-ion Battery Packs), UN3496 (NiMH-Batteries), IEC 60086-1, IATA
General Information	One of the leading manufacturers of lead-acid batteries Sealed construction Maintenance free Valve regulated (low pressure) Leak proof Can be operated in any position without loss of capacity, except continuous upside down operation Electrolyte bonded in fiberglass mat Gas recombination cycle Excellent fast charge and discharge characteristics Cycle operation or continuous charging possible Low self discharge Easily recyclable No restriction for air transport (IATA) UL listed, File No.: MH12970	One of the leading manufacturers of alkaline cells Leak proof Low self discharge Long storage time No restriction for air transport (IATA) UL listed	A manufacturer of NiMH battery Leak proof Low self discharge Long storage time
Applications	Emergency power systems / Emergency lighting Fire protection Cyclic applications such as golf cars and e-mobility Wind energy systems UPSs Medical (not for life support equipment) Electric drives in industry	Batteries for professional applications Fire protection Small applications, sensors, remote controls Medical (not for life support equipment)	Batteries for professional applications Small applications, sensors, remote controls

Passive Components

	Panasonic	SunCon	E&C	PDC	RCD	Susumu	ABC	Inpaq
Capacitors								
Electrolytic (SMD, THT)		✓						
Hybrid (SMD, THT)		✓						
Polymer (SMD, THT)	✓							
MLCC				✓				
Inductive Components								
Chip Inductors				✓			✓	✓
Power Inductors				✓			✓	✓
Line Filters				✓			✓	✓
Chip Ferrit Beads				✓			✓	✓
Transformers and Throug Hole				✓			✓	
Resistors								
Thin Film Resistors						✓		
Current Sense Resistors (Shunts)				✓	✓	✓		
High Frequency Resistors						✓		
Thick Film Resistors				✓	✓			
Special Resistors			✓	✓	✓	✓		

Sensors

	Crocus Technology	Everlight	Micronas	Nicera	Panasonic	Audiowell	Nisshinbo	Micro Sensor	RFbeam	OmniPreSense	Semitec	Tateyama	Tewa
Grid Eye – Thermopile Array					✓								
Magnetic Field	✓		✓	✓									
Infrared		✓		✓									
Solar Cells					✓								
Radar						✓		✓	✓				
Ultrasonic						✓							
Pressure							✓						
Current Sensors	✓		✓	✓									
Temperature Sensors													
NTC, SMD										✓	✓	✓	
NTC leaded										✓		✓	
PTC leaded											✓		
NTC Film Type										✓		✓	
NTC Thermistor Probes										✓	✓	✓	
PTC Thermistor Probes												✓	
Assembled Sensors										✓	✓	✓	

Displays / Embedded Systems

	DLogic	Faytech	FS Elektronik Systeme	Eagleey Tech	Logic Technologies	Multi-Inno	Raystar	RiT	SGD
Touch PCs	✓	✓							
Touch Monitors	✓	✓							
Boxed Industrial PCs		✓							
Embedded Boards			✓						
TFT-Displays				✓	✓	✓	✓		✓
Monochrome LC-Displays				✓	✓	✓	✓		✓
Passive Matrix OLED-Displays						✓	✓	✓	
E-Paper				✓					

Semiconductors

Analog ICs	Azoteq	Holtek	MPS	Nisshinbo	SG Micro	Alliance	ESMT	Fidelix	GigaDevice
Analog Switches			✓	✓	✓				
Audio ICs		✓	✓	✓	✓		✓		
Communication ICs		✓		✓					
Display Drivers		✓		✓					
GaAs MMIC				✓					
LED-Driver		✓	✓				✓		
Micro Controller		✓							✓
Motor ICs		✓	✓	✓	✓				
Operational Amplifiers		✓	✓	✓	✓				
Power Supply ICs		✓	✓	✓	✓		✓		
Video ICs		✓		✓	✓				
Logic ICs					✓				
Touch & Multisensor IC	✓	✓							
Memory ICs									
SRAM/pSRAM						✓	✓	✓	
SDRAM/DDR/DDR2/DDR3/DDR4						✓	✓	✓	
Flash						✓	✓	✓	✓
MCP							✓	✓	

Protection Devices

Overcurrent Protection	CT Micro	cosmo	Eris	ECE	Inpaq	Protek	Semitec	SFI
PPTC				✓				
Power Thermistor						✓		
CRD						✓		
Coupler/SSR								
Opto Coupler	✓	✓						
MOS Relay	✓	✓		✓				
Solid State Relay		✓		✓				
Overvoltage Protection								
TVS Diode-/Array			✓			✓		
Multilayer Varistor					✓			✓
CSPD (Chip Surge Protection Device)								✓
ESD Suppressor					✓			
Protection Thyristor						✓		
Protection Module						✓		

Batteries / Power Supplies

	EVE	Fanso	Friwo	Jauch	maxell	Mornsun
Li-SOCl2 / Li-MnO2	✓	✓		✓	✓	
Super Pulse Cap	✓	✓		✓		
Li-Ion / Li-Polymer	✓	✓	✓	✓		
AC/DC Converter						✓
DC/DC Converter			✓			✓
Transceiver Module						✓
AC/DC Power Supplies			✓			✓

LED

	Citizen	Everlight	Harvatek	Dominant	osa opto light	Audax	Ledil	Crystal IS	Inventronics	LiFud	ELT	Fulham	Bender + Wirth	TE Connectivity	cooliance
Low Power LED, SMD	✓	✓	✓	✓	✓										
Low Power LED, THT		✓	✓	✓	✓										
7-Segment Displays		✓	✓												
Power Supplies								✓	✓	✓	✓				
Optics							✓								
Heat Sink															✓
Connection Elements													✓	✓	
Light Engines (Zhaga)						✓									

RF Products

	Cheqers	Citizen	Maruwa	SiTime	SMI	TST	2J antennas	Aurel	Fibocom	Locosys	Panasonic	Inpaq	Feasycom
Crystals / Oscillators / Filter													
Quartz Crystals (MHz) / (kHz)	✓	✓			✓	✓							
Ceramic Resonators	✓												
Oscillators	✓	✓	✓	✓	✓	✓							
MCF / SAW Filters	✓				✓	✓							
Dielectric Filters	✓		✓			✓							
Ceramic Filters / Resonators	✓												
RF Modules / Antennas													
RF Modules (315 MHz … 2.4 GHz)								✓					
WiFi™-, Bluetooth®-Modules											✓		✓
GPS/GNSS Modules									✓				
LPWA (Cat NB1/NB2, Cat M1) Modules								✓					
GSM/UMTS/LTE Modules								✓					
5G Modules								✓					
Antennas f. ISM Band, WiFi™, Bluetooth®							✓					✓	
Antennas f. GPS/GNSS							✓					✓	
Antennas f. Cellular							✓					✓	
Antennas f. Car2Car Communication												✓	
Antennas f. NFC (Near Field Comm.)												✓	
WPC (Wireless Power Charging)												✓	
LoRa™ Transceiver							✓						

Acoustics

	Baolong	BSE	ChinaSound	KOTL	Ariose	Vansonic
Piezoel. Transducers			✓			
Magnetic Transducers					✓	
Dynamic Speakers (4 … 50 Ω)			✓			✓
Electret Condenser Microphones		✓				✓
MEMS Microphones		✓				
Vibration Motors	✓			✓		

Electromechanics

	Sinwan	ADDA	Ecofit	Fulltech	MinebeaMitsumi	QianYuan	Thoptec	ECE	Diptronics	knitter-switch	win	Adam Tech	Amphenol Industrial	TE connectivity
Air Mover														
Fan	✓	✓	✓	✓	✓									
Heatsink		✓												
Fan Accessories						✓	✓							
Customized Complete Systems	✓	✓												
Switches/Keypads														
Tactile Switches									✓	✓				
Push-Button Switches									✓	✓				
Micro Switches								✓	✓	✓				
Silicone Keypads & Membrane Keyboards										✓	✓			
Relays								✓						
Tilt Switches								✓		✓				
DIP-/ Piano Switch								✓	✓					
Rotary Dip Switch								✓	✓	✓				
Slide Switch								✓	✓					
Industiral Control Switch								✓	✓					
Detectors-/Manipulation Switches								✓						
Connectors														
Data								✓				✓	✓	✓
Power								✓				✓	✓	✓

Batteries / Power Supplies (CH only)

	Yuasa	Energizer	Ansmann
PB Battery 6 V and 12 V (VRLA / Industry)	✓		
NiMH Battery	✓		
Chargers for PB Battery 6 V, 12 V and 24 V	✓		
Alkaline Batteries 1,5 V		✓	
Lithium Metal Batteries 1,5 V		✓	
NiMH Battery 1,2 V		✓	✓
Button Cells 3 V		✓	✓
Chargers for NiMH Battery			✓
Power Supplies			✓
Li-Ion Battery Packs			✓
Portable Spotlight			✓

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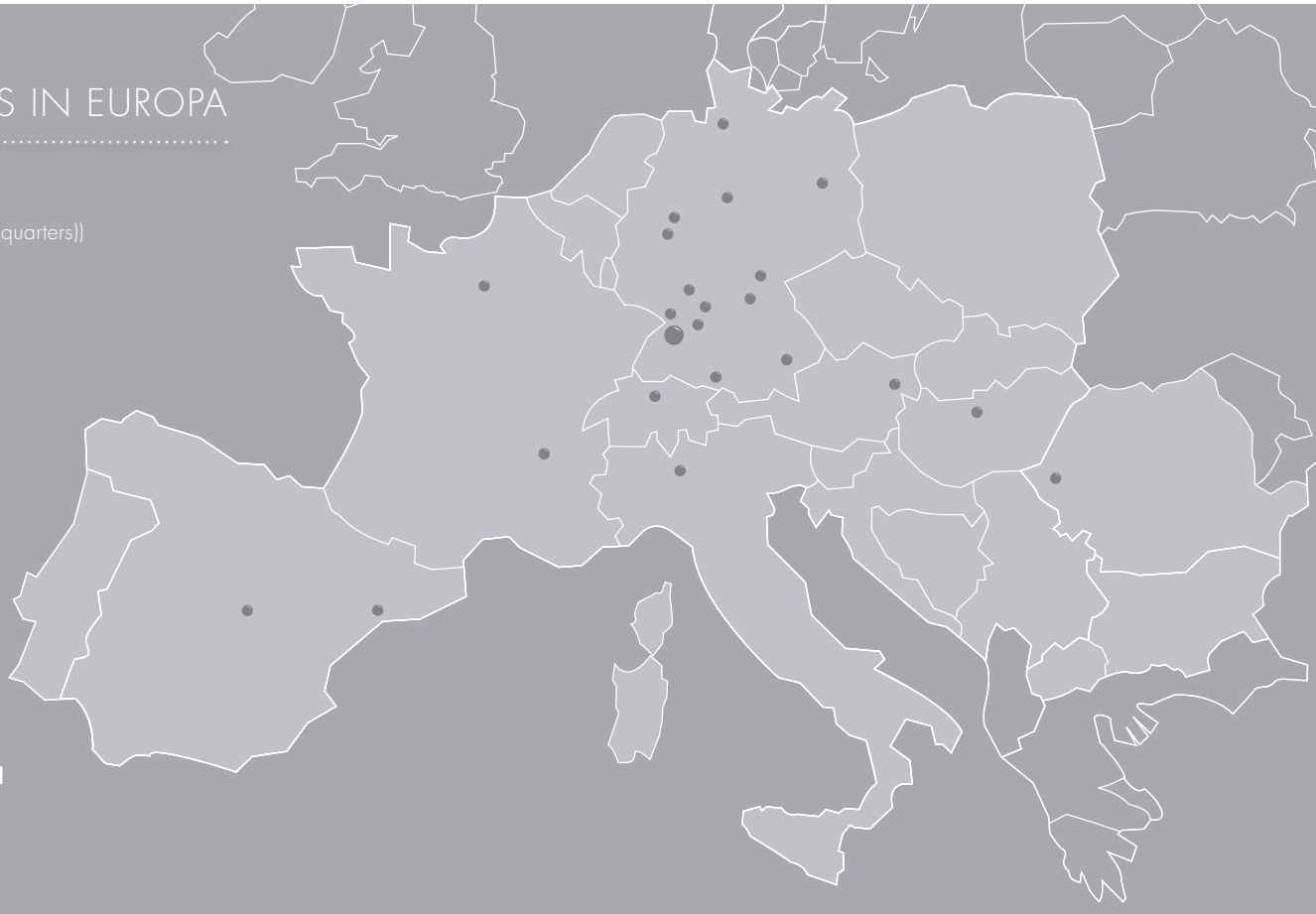
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