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2014/2

impulse

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POWER INTEGRATIONS: DIODES

HIROSE's floating connectors

New power chokes from SAGAMI

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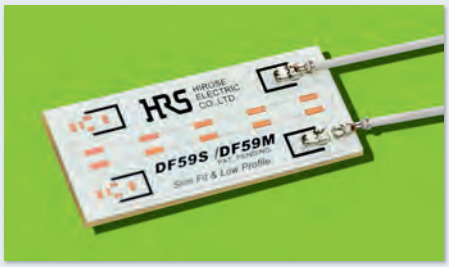
ACTIVE COMPONENTS

PASSIVE COMPONENTS



CONNECTORS

CODICO IN-HOUSE

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The CODICO QUALITY AWARD goes to...

At CODICO, we see a close and successful co-operation with our suppliers as indispensable for offering quality to our customers on all levels. It is the main prerequisite for our work, and is therefore annually assessed on the basis of comparable criteria.

Supplier evaluations do not merely constitute a standard specification for all companies that introduce quality management systems and are certified according to ISO 9001:2008, but also a proven method for easily and conclusively identifying particular achievements amongst our suppliers.

In 2014, CODICO evaluated all suppliers with a purchase volume of over EUR 500,000. Our sales staff was involved in this evaluation, which was based on criteria such as delivery reliability, service, and environmental management. The 2014 CODICO QUALITY AWARDS for performance during 2013 were presented to

1	AKM 97%	6	Rubycon 94%
2	Torex 97%	7	Dinkle 93%
3	Celain 96%	8	Murata 92%
4	Taitek 95%	9	Sagami 91%
5	MPS 94%		

Congratulations and many thanks to our suppliers for their outstanding performance and their trustful cooperation!

D01

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Sven Krumpel
CEO CODICO

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PS: CODICO looks forward to welcoming you at the electronica 2014. Visit us in Hall 5, Stand 507!

Editorial

Dear Readers,

Not a day goes by without some sometimes literally earth-shattering news from some of the many focal points of crisis all around the globe. These might be diseases (possible cases of Ebola in Europe that nobody would have expected), environmental disasters, and economic and financial crises. And slowly the feel-good factor of trust in the way we live is ebbing away, to be replaced by mistrust and skepticism. Our trust is plainly coming to grief in the face of reality, or the reporting of reality. People have stopped trusting, because they cannot rely on the world developing towards something positive. If we consider a definition of reliability, we are immediately confronted with deficiencies, and with key features which are often simply missing. Reliability is described as a state which prevails when there are no errors and no problems. And the realization soon dawns that, according to the literature, no product in the technical or technological sphere is 100 percent reliable – because then it would be free of any possibility of its use becoming defective.

As an entrepreneur I ask myself how we can counteract these negative tendencies which currently beset us from all sides. Trust and reliability represent values which are of paramount significance for our company, and which we, despite any rumors in our world, both live, encourage, and promote.

With the CODICO Quality Management System, we ensure that our customers remain shielded from crises and unrest in their business relations with us. We can attest to our reliability by criteria which are truly tried and trusted. By way of example, every year we assess our supplier relationships with regard to delivery reliability, service, and environmental management. Read more about these achievements in the accompanying articles.

And as well as measurable criteria, which I can present to you, contributing towards bringing more trust and reliability into this world, it is above all the trust which I have in my staff, my suppliers, and my customers, on which I truly rely.

Sven Krumpel D02

NON COOKIE-CUTTER POWER SUPPLY

Whilst external power supplies – more and more considered as mass produced consumer goods - often lack the endeavour for more reliable solutions, the tremendous cost pressure has created a niche for high reliable power sources that make the tiny but significant difference.

Billions of external power sources, the majority bearing USB connectors, are being imported from China at very little cost. 105°C electrolytic capacitors with lifetimes beyond a year are rare to find as well as industrial ratings for harsh environments including protection against water ingress. Not mentioning approvals that are not »self–approvals« done by the manufacturer, which is a problem in itself, because what exactly happens if something happens? Well in the European Union it is the importer or the person or company supplying the product, who is responsible for damage.*

A great share of the low cost imports have come to an end ever since the introduction of the Energy saving legislation (Energy Reduction Program - ErP 2009/125/EC**). The directive has led to the need of not only reducing the power consumption at no-load condition but also raised the bar, for the overall efficiencies of external power supplies. For external devices also the power loss over the output cord has to be taken into the equation, not only the power supply itself. However, the outcome led to unintended consequences. It turned out being impossible, maintaining the standard length of 1,850mm at such low cost and being compliant to the ErP directive. Hence, the output wires simply got shorter (1,300-1,500mm). Whereas the diameter, sometimes, even got thinner. Obviously, the cryptic AWG (American Wire Gauge) nomenclature made it difficult at a first glance to realise that the cable just got shorter, rather than using an output cord of greater quality. After all, a power supply is only a complementary part, swapped easily, right? More than ever applications turn out to require more. More power, more reliability, more non cookie-cutter solutions. External power supplies turn out to be more a quality statement for applications designed to run 24/7 – Routers, Gateways, Switches, Set-Top-Boxes, Medical Equipment and even simple white and brown goods that bear a brand standing for reliability and – more than ever – eco-friendliness.

AWG vs European Labeling

AWG	DIAMETER (mm)	WIDTH (mm²)	R (Ω/km)
16	1,29	1,31	13,6
17	1,15	1,038	17,1
18	1,024	0,823	21,6
19	0,912	0,653	27,3
20	0,812	0,518	34,4
21	0,723	0,410	43,4
22	0,644	0,326	54,7
23	0,573	0,258	67
24	0,511	0,205	87
25	0,455	0,162	110
26	0,405	0,129	138

CODICO works with two major players in the industry – PHIHONG and GLOBTEK – that fulfil the need for semi-custom solutions that make the tiny but significant difference. Products are approved and/or recognized by authorized, external test houses only. Certificates and Reports (e.g. CB-Scheme) are available on demand without additional cost. Custom cable assemblies – strongly supported by CODICO's connector division – in various colours, diameters, lengths and shapes connect your application to a part that can be anything you need using high – reliable electrolytic capacitors. The device may operate with constant current or voltage characteristics, even both if required by the application. Whenever combined with a battery, the power supply becomes the charger. GLOBTEK offers custom specific battery packs (Ni-Cad/NiMH/Lead Acid/

PHIHONG and GLOBTEK – that fulfil the need for semi-custom solutions that make the tiny but significant difference. Products are approved and/or recognized by authorized, external test houses only!

Li-ON/Li-Polymer with Shrink Wraps/Plastic Cases) equipped with Over load protection, Low voltage (deep discharge protection), Over current and short circuit protection, communication interface and gas gauge (status of charge).

The power supply is self-contained, inherently safe, potted (to protect the device against water ingress), IP rated, class I or II, coloured, custom-labelled or fitted with a custom cable to match the application. Customers can choose between a fixed AC inlet or an interchangeable plug systems, which are available for both, wall-mount and desktop adapters (worldwide usage due to exchangeable primary cord).

For simple handling CODICO offers custom specific packaging and labelling. Obviously the power supply itself can even bear a custom logo and country specific approvals as PSE*** for Japan, or wherever the device may be sold to.

A01

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4 Bay

GS-2066 5 Bay

Custom

3457

Interchangeable Clipset

New 5 Bay

USBsocket

USBminiPS

Smart Battery Chargers
GTM91128

** http://europa.eu/legislation_summaries/consumers/consumer_safety/l32012_en.htm; Council Directive 85/374/EEC*
***(Energy Reduction Program - ErP 2009/125/EC) - Next edition coming into force as of 2016; no load power consumption <75mW (EU); <100mW (USA).*
****PSE - Product Safety Electrical Appliance and Material Safety Law by the Japan Electrical Testing Laboratories (JET)*

SEALED POWER

ARTESYN Embedded Technologies introduces their all new LCC600. A fully enclosed 600 Watt power supply operating in a wide temperature range of -40 to +85°C. Other than its contestants requiring a power derating at app. 55°C, the LCC600 works up to +85°C baseplate temperature even at 110 Vac input voltage.

The LCC600 power supply features a universal 90-264VAC input with optional 180-305VAC input – enabling it to be used virtually anywhere in the world without adjustment. The first model features a single 28VDC output with wide adjustment (23.5-28.5VDC) and 5VDC standby voltage output. Other voltage output models (such as 48VDC) are on their way. Conduction and convection-cooled variants are available. It has a 4x9 inch footprint and is less than 1U (1.57 inches) high (228x101x39.8mm). Typical efficiency sits at 93%.

The ARTESYN LCC600 power supply is housed in a robust fully-sealed enclosure with optional IP64 protection against the ingress of dust and water. The IP64 model comes with IP/OP wires, whereas the standard model bears screw terminals. This makes it ideal for applications that require the power supply to be located in the same outdoor environment as the equipment it is powering, such as bulk power for outdoor signage and for telecom installations such as antenna and base station equipment. The power supply is equally suitable for indoor use, such as in control consoles, indoor signage and medical applications, where the absence of cooling fans can help minimize dust and noise.

The LCC600 power supply is fully approved to the EN60601-1 medical safety and EN60950-1 ITE standard and can be used in non-patient contact, non-patient critical equipment and industrial applications. Approvals include CE, UL, CSA, TUV and CCC (China). Features include: remote on/off, I²C Bus, AC and DC ok Signals.

The LCC600 is the bigger brother of the LCC250, available since end of 2012 (Impulse 2012) available in three output versions: 12/24/48VDC trimable, constant current and voltage operation, optional heat sinks, as well as control input for remote adjustment of output voltage and current, enabling usage even in LED lighting applications.

A02

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Next level potted DC/DC conversion

ARTESYN Embedded Technologies launches two new product families the AXA and AEE series.

The AXA series is an enclosed 1.0x1.0x0.4 inch (25.4x25.4x10.16mm) package delivering up to 20Watts. AEE, its bigger brother, comes in a 1x2 inch (25.4x50.8mm) package delivering up to 50W. Both designed to be used in applications such as battery-operated equipment, instrumentation, distributed power architectures in communications and industrial electronics and other space critical-applications.

The two siblings are fully potted in a metal cased construction making it the ideal choice for harsh environments and enables the modules to operate between minus 40°C and plus 85°C. Given its metal case, the compact solution can be delivered with an optional clip-on heat sink to extend the thermal performance of the unit for both – convection or forced-air – environment.

The ARTESYN AXA and AEE series modules cover an ultra-wide 4:1 input voltage range of 9 to 36VDC and 18 to 75VDC. The first models available offer single output models with voltages of 3.3, 5, 12, 15 and 24V along with dual output models offering ±12 or 15V, all with tight output voltage regulation.

The efficiency of the all new series reaches up to 92 percent, reducing heat dissipation. Additional features such as overload protection, short circuit protection, remote on/off control making the converter ideal for a wide variety of applications.

1,500VDC input-to-output isolation, output adjustability (±10 percent), tight line and load regulations (0.2%) and low ripple and noise (75mV for 5VDC output models) push the CSA/NTRL/IEC/EN 60950-1 approved module to the next level.

A03

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Peak Power with understatement

ARTESYN Embedded Technologies launches their all new LPS360-M series, actually a simple 360W power supply.

Actually simple but strong: ARTESYN's LPS360

However, the 1U (1.37 inch/34.83mm) – 3x5 inch (76.2x127mm) device comes with considerable extra margin. 20% extra – to be accurate, for less than 30s and 10% duty cycle. Single 12, 15, 24, and 48V adjustable outputs deliver continuous 240W with convection cooling and 360W with forced air cooling, plus 72W. The product comes with 5VDC standby output (1A) and an isolated 12Vdc (500mA) for a cooling fan.

With a 90-264VAC or 120-300 VDC input range, the LPS360-M series also offers active power factor correction (PFC typically 0.99) and an efficiency of up to 92 percent at full load. It is approved for both, EN60950/60601-1, Class I and II (TUV, cUL, UL, CE, CB, CCC), can be ordered with an optional mating connector kit (AC, DC, signal and auxiliary mating connectors) – or, and – an enclosure kit. While the standard operating temperature of open card power supplies usually range between 0°C and 50°C, the LPS360-M is designed to operate up to 70°C and starting at minus 20°C already.

The new series offers additional features such as protection from overvoltage, overload and thermal overload, remote sense, power fail and a digital I2C interface using the industry standard PMBus™ protocol.

A04

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AXA&AEE: Perfect for space critical-applications

LOW- & MIDPOWER LEDs

ADVANTAGES

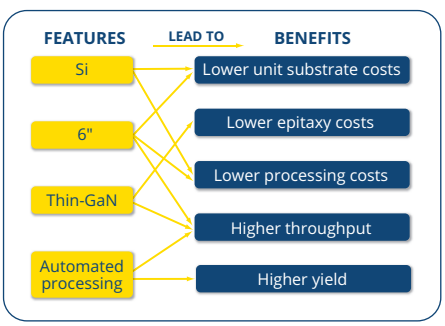
The use of standard silicon (Si) substrates forms the foundation for the PLESSEY competitive advantage. Si-substrates are available in higher quantities and at lower prices than sapphire and silicon carbide (SiC) substrates, which are used for most of today's LED productions. So the race for the industrialization of the GaN-on-Si technology, which has been running for years, is now at an end. And PLESSEY is really pleased to have come in first.

PLESSEY Semiconductors has recently covered the LED range with CODICO up to 1W. From the pure blue chip in the sizes 180x180 – 3000x3000µm, up to the big 5630 Package, a number of conventional packages are available.

To make sure they stand out from the competition, PLESSEY Semiconductors have brought a new technology for the manufacture of the chips to series readiness.

GaN–on–Silicon Technology

LEDs are made of gallium-nitride (GaN), a semiconductor material which features the very best light-emitting characteristics. PLESSEY's process is an innovative concept for LED production. The basis of this method is to exploit the costs advantage of using 6" standard silicon substrates, on which the ultra-thin 2.5µm GaN layer is built up. PLESSEY achieves this thanks to the company's patented technology. Difficulties such as different thermal coefficients or crystallographic differences between the two materials have been ironed out in the manufacturing process, and prevent the wafer from breaking or bending.



A05

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Low Power & Mid Power LEDs

PRODUCT	PACKAGE	COLOR	NOMINAL FLUX (LM)	CCT (K)	NOMINAL RADIANT POWER (MW)	TYPICAL VF (V)	IF (MA)
PEM119020	3528	RGB				3,3	20
PLB010003	Die	Blue			3	2,9	5
PLB010020	Die	Blue			20	3,3	20
PLB010050	Die	Blue			55	3,1	60
PLB010090	Die	Blue			84	3,3	100
PLB010330	Die	Blue			300	3	350
PLB111020	3528	Blue			20	3,2	20
PLB113020	T1 (3mm)	Blue			20	3,3	20
PLB114050	3020	Blue			45	3,2	60
PLB11A090	5630	Blue			83	3,2	100
PLB138003	1005	Blue			3	3,3	5
PLW111020	3528	White	2.0	2870 - 6020		3,2	20
PLW114050	3020	White	10.0	2870 - 6020		3,2	60
PLW117020	T1 (5mm)	White	2.0	4600 - 15000		3,3	20
PLW11A090	5630	White	20.0	2870 - 6020		3,2	100
PLW138003	1005	White	0.7			3,3	5

CAPACITIVE TOUCHPANELS DESIGN-IN SUPPORT

Together with smartphones, capacitive touch panels are well on the way to winning. Industrial applications without them are by now almost unthinkable; they make the user interface so much easier, and so also the entire application. In fact, intuitive operation and the bigger pads make all the applications easier.

They come in a whole range of dimensions and variants. Sizes at present run from 3.5" to 15", with driver IC's already included. As standard touch panel interfaces, I²C or USB are available. Control panels are becoming more and more complex, which means simultaneous multiple operation is also called for. And that's why the original single or surface capacitive touch has now been replaced by the multi or projective capacitive touch format.

AMPIRE sets its focus to the entire touch panel product range on the two Taiwanese IC manufacturers SITRONIX and EETI. The final decision as to which of the two controller families is selected for the particular display size is finally made on the basis of the application involved.

Use is made no less frequently of cover glass elements as design features or as a protective device. Depending on the customer's requirements, these glasses can be manufactured in almost any shape or form, and pressed into place. By way of example, company logos can be located directly onto the touch panel, or with mobile phone, where the glass surfaces are coloured outside the display viewing area. This means that by enlarging the touch panel an even surface can be achieved. There's another possibility too: »Soft buttons« replace hardware keys and so reduce overall costs, because additional components can be done away with. The solution here is a specific printing pattern for the touch panel sensors and an enlarged touch panel as well.

And now glass thicknesses of up to 4mm, and 2mm in the case of PMMA, are possible as well, and supported over the entire size range. Drivers and software are available for every operating system. To guarantee touch performance, initial adaptations can be carried out jointly by the customer and CODICO, by way of tuning boards and the appropriate software to go with them. A final fine tuning, so as to calibrate the touch in the series product, is ultimately carried out at the suppliers. This design-In support from AMPIRE is not only entirely in line with CODICO basic principles, it also gives us another major advantage over the competition.

A06

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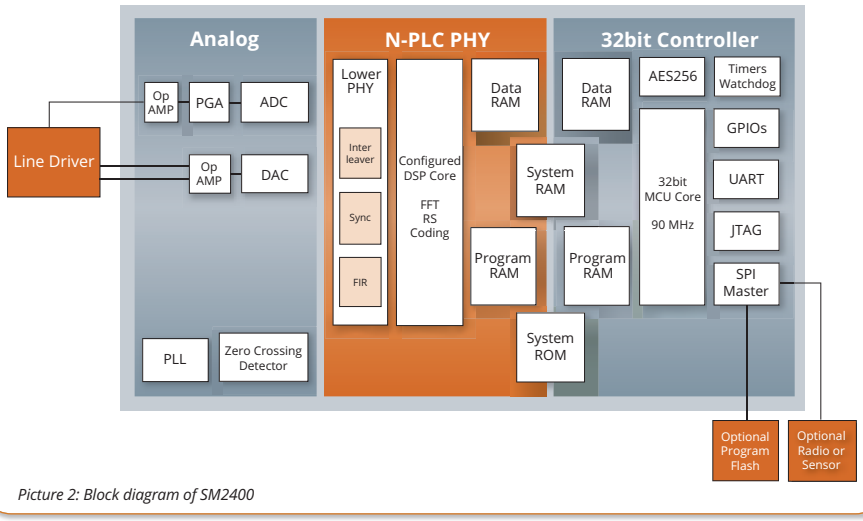
DISPLAY SIZE	CONTROL IC	FEATURE	SUPPORT COVER LENS THICKNESS	INTERFACE	SUPPORT OS / DRIVER
3.5" 4:3	ST1332 / Sitronix	2 points	2.0mm	I2C	Android / Linux
3.5" 4:3 (new)	ST1633	5 points	1~3mm/5 points and 4mm~5mm/2 points	I2C	Android / Linux
4.3" 16:9	ST1332 / Sitronix	2 points	2.0mm	I2C	Android / Linux
4.3" 16:9	ST1633	5 points	1-3/5 points and 4mm~5mm/2 points	I2C	Android / Linux
5" 16:9	ST1332 / Sitronix	2 points/ 5 points	2.0mm	I2C	Android
5" 16:9	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	UBS/I2C	Android, Linux and Windows driver
5.7" 4:3	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	UBS/I2C	Android, Linux and Windows driver
7" 16:9	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	UBS/I2C	Android, Linux and Windows driver
8" 4:3	ILITEK 2105+M2I	2 points	2.0mm	USB/I2C	WinXP/Win7/ Linux Android
8.4" 4:3	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
8" 16:9	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
9" 16:9	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
10.1" 1024x600	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
10.1" 1280x800	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
10.4" 4:3	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
10.4" 4:3	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	UBS/I2C	Android, Linux and Windows driver
12.1" 4:3	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver
15" 4:3	EXC7200+EX5404	2-4 points	4mm/1-2 points and 2mm/4 points	USB/I2C	Android, Linux and Windows driver

NEW STANDARD

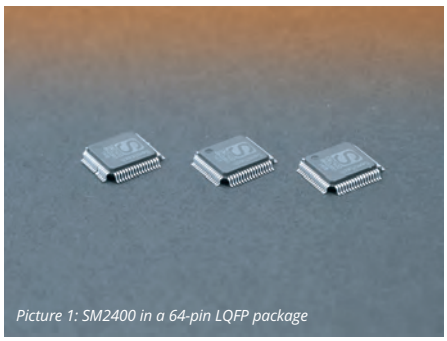
Narrow Band Power Line Communications solutions according IEEE 1901.2



Picture 2: Block diagram of SM2400

It took quite a while until the IEEE, the world's largest professional association for the advancement of technology, developed the Standard IEEE 1901.2(TM) »Standard for Low-Frequency (less than 500kHz) Narrowband Power-Line Communications for Smart-Grid Applications«.

The standard has been developed to specify secure Power Line Communication (PLC) with data rates of up to 500kbps and transmission frequencies up to 500kHz.



Picture 1: SM2400 in a 64-pin LQFP package

Because of the fact of several important changes during the path of the formation of the IEEE 1901.2, it took long time until the semiconductor manufacturer could develop Integrated Circuits (IC) that support the frequencies, modulations schemes, security aspects and all the other functions. With the SM2400 Semitech Semiconductor now is one of the first supplier worldwide who can deliver a IEEE 1901.2 conform IC (Picture 1).

The SM2400 combines cost effective design optimized for N-PLC applications with high level of programmability to address a multitude of communications schemes and evolving standards. Besides the new standard IEEE 1901.2 the chip supports the existing ones like PRIME, G3-PLC, CTIA/EIA709.2 etc. as well and can be easily adapted to custom specific requirements. With that it is well suited for all kind of applications including the energy sector, industrial automation, transport sector, street lighting, mining, medical care and many other areas of application.

The chip is based on a dual core architecture. An optimized Digital Signal Processor (DSP) covers all N-PLC-PHY functions. The second 32 bit core takes care of all the Data Link Layer and protocol functionality like IEEE 1901.2, G3-PLC, PRIME, IEC61334-4-32 as well as the IP adaption layer IPv4 and 6LoWPAN and AES256 Bit encryption functions.

On chip and in addition to the two cores there is a mixed signal area providing digital-to-analog converter, analog to digital converter, programmable gain amplifier, operational amplifier and zero cross detection. Picture 2 shows the block diagram of SM2400 (Picture 2).

SM2400 operates in the frequency range of 5kHz to 500kHz and with that supports CENELEC, FCC and ARIB band applications. It supports FSK and OFDM modulations as well as differential and coherent BPSK, QPSK, 8PSK and coherent 16QAM modulations. Choosing all possible carrier frequencies and select best in class modulation schemes one can reach 500kbps line data rate.

In terms of Forward Error Correction schemes Convolutional, Reed-Salomon and Viterbi coding are supported. Received Signal Strength Indication (RSSI), Link Quality Indication (LQI), Signal-to-Noise Ratio (SNR) measurement and Cyclic Redundancy Check (CRC16) are further functions of the the SM2400. Based on the SM2400 IC there is a reference design module available – SM8400 (Picture 3).

The SM8400 contains an OPA564 as line driver, all the transmit and receive filter, protection circuitry and a signal transformer to couple the PLC signal into the 230V mains. Onboard there is also a DC/DC converter, boot flash memory and an oscillator.

SM8400 is available in several versions with filter adaptations for the different CENELEC bands and for e.g. FCC applications.

For easy and in-depth evaluations of Narrowband Power-Line Communication in conjunction with SM2400 there is an evaluation and development kit – SM9400 – available which is based on SM8400 modules. SM9400 provides additionally an AC/DC power supply, status LEDs, signal coupling into mains connector and a miniUSB interface to connect with a PC (Picture 4).

A feature rich software named »KoalaConfig GUI« with graphical user interface provides easy configuration and operation of SM9400 EVM in order the test the different functionalities of the SM2400 chip (Picture 5).

A07

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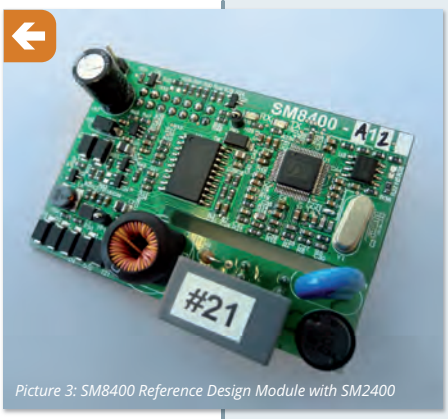
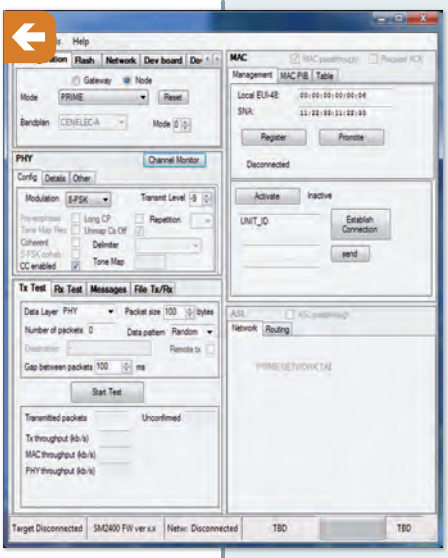


Picture 3: SM8400 Reference Design Module with SM2400

SM8400 Referenz-Design Module with SM2400

Picture 4: SM9400 Evaluation and Development Kit

SM9400 Developement- & Evaluation-board



With Software: »KoalaConfig GUI«

VITESSE fortifies for Gigabit Wi-Fi

To advance these WLAN upgrades, Vitesse Semiconductor introduced its SparX-IV™ family – VSC7442, VSC7444 and VSC7448 – the industry's only Ethernet switches optimized for 802.11ac WLAN Enterprise deployments.

Ideal for Gigabit Wi-Fi access and aggregation, the new SparX-IV Ethernet switches are also well-suited for industrial Internet of Things (IoT) applications including motion control, factory automation and smart grid. Optimized To Advance Networks To Gigabit WLAN Speeds.

VITESSE's SparX-IV Ethernet switches deliver advanced feature integration including:

- **High Density Port Configurations:** The SparX-IV Ethernet switches can be flexibly configured based on connectivity needs for 1G or 2.5G Ethernet uplinks;
- **Sophisticated Traffic Classification:** Featuring a highly optimized TCAM architecture with more classification capabilities than the competition, the SparX-IV family readily enables policy management and policy-based traffic engineering;
- **Expanded Routing & Layer 3 Support:** With added Layer 3 routing support, the SparX-IV Ethernet switches offer larger routing tables than comparable options, giving customers unprecedented flexibility in Quality of Service (QoS) and IPv4/IPv6 routes; and
- **Ruggedized for Industrial Environments:** The SparX-IV family is industrial-hardened for rugged environments: industrial temperature range support for operating temperatures of -40°C to 125°C; VeriTime™ IEEE 1588 timing and synchronization; and hardware-based failover performance.

A08

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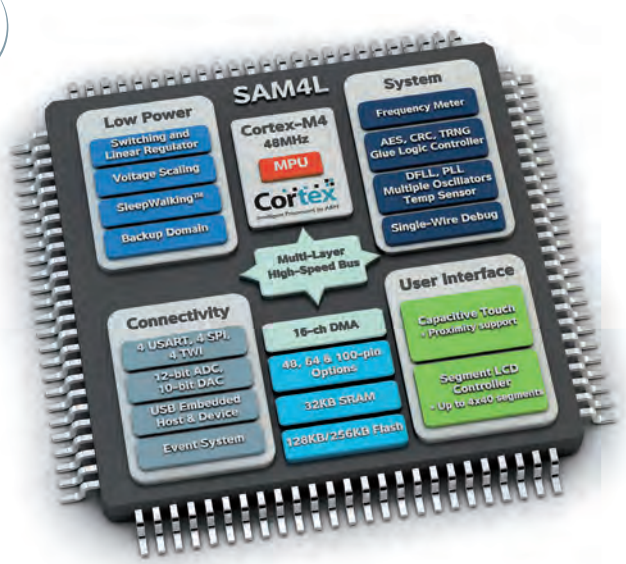
SAM4L CORTEX-M4 MCUs

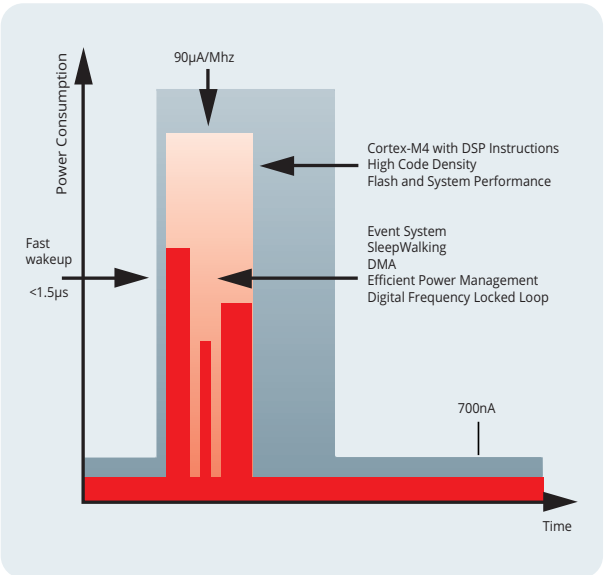


The SAM4L family integrates ATMEL's own picoPower technology on an ARM Cortex M4 controller. This has meant reworking the entire design from the ground up, from the transistors to the pulse options, which has made extremely low current consumption values achievable.

Rapid wake-up times and innovative power-saving modes make for a further reduction in current consumption. The ATMEL SleepWalking System is also implemented, which under certain conditions allows for individual periphery elements to wake up the entire MCU. In most cases, the entire power consumption depends not only on the MCU, but is also influenced extremely by the intelligence of the system.

SAM4L microcontrollers redefine the benchmark for power consumption. In Active Mode, 90µA/MHz can be achieved, while in Sleep Mode values of as low as 1.5µA are possible, with full RAM data retention, and still lower values in Back-Up Mode. During performance a value of 28 CoreMark/mA is attained. As a compiler, use is made here of the IAR Embedded Workbench, Version 6.40. The wake-up time of only 1.5µs from DeepSleep Mode is also impressive. All these features make the controllers ideal for battery-operated or power-sensitive designs in the industrial and medical environments.

Basically, the controller provides a 48MHz ARM Cortex M4 core, with 128KB-512KB Flash at 32KB-64KB SRAM. Serial interfaces such as USARTs, I2C, I2S and SPI are also available. On the analog side, there is a 10-bit DAC and a 15-channel 12-bit ADC.



An LCD segment driver for 4x40 segments is likewise available. USB and Hardware Touch support are also provided. An AES algorithm and DMA support come as well, and there are a range of package variants depending on the storage configuration. For package shapes, basically QFP, QFN and BGA are available.

And it goes without saying that an economically-priced Starter Kit for the evaluation and complete integration into the AVR Studio environment can also be provided.

A09

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CARAMBOLA-2

WLAN Router at 28x38mm

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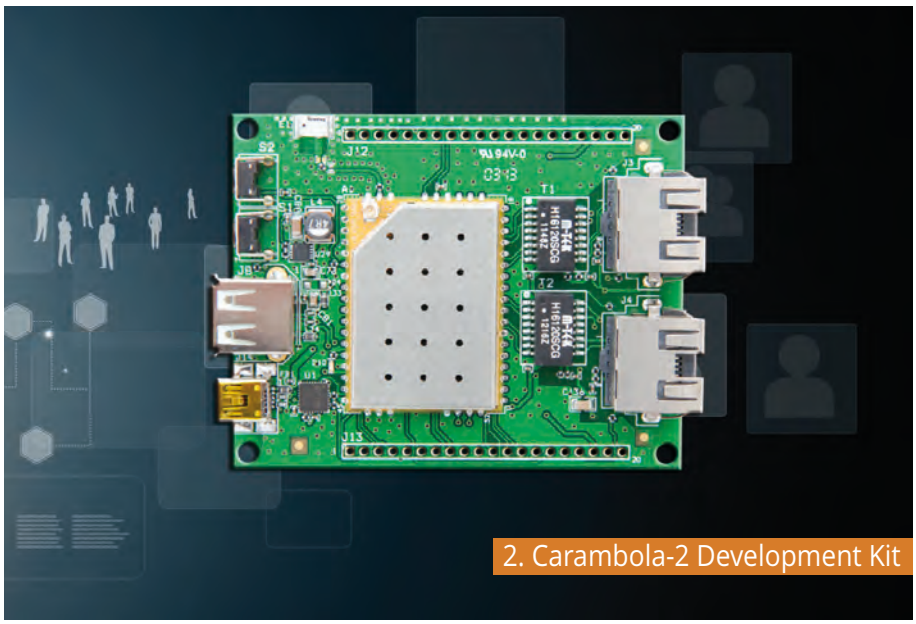
1. Carambola-2

with Shielding *without Shielding*

The new Carambola-2 module (Picture 1) from 8DEVICES is essentially a WLAN router, capable of being extended by a whole range of peripherals.

Carambola-2 is based on the well-known WiFi SoC AR9331 from QUALCOMM ATHEROS, which is on the market in large numbers of access points and routers. The integrated MIPS processor, with a clock speed of 400MHz, has all the calculation capacity needed to integrate OpenWRT completely, and with OpenWrt users not only have the Linux-Kernel at their fingertips, they also have a Read/Write file system and a mass of software packages for the Open Source Community; among others, there's also VPN, VoIP, Firewall and a web interface.

The module contains 16MByte Flash and 64MB DDR2 RAM. As well as a USB (Host/Slave) interface, Carambola-2 also has 2x Fast Ethernet interfaces, which can be tested on the Development-Kit (Picture 2).



2. Carambola-2 Development Kit

QUICK SPECS

- 802.11 b/g/n, 2.4GHz, 1x1 SISO, 150MBps max data rate, 21dB output power
- U.FL connector or external pin for external antenna
- 16MB FLASH, 64MB DDR2 RAM
- Linux friendly, OpenWRT flash image and source code are available
- CPU – AR9331, 400MHz clock speed
- 28 by 38mm Size – small and easy to embed
- Surface mountable
- Power supply – 3.3V, power consumption 0.5W
- Available interfaces – USB host/slave, serial port, 2x Ethernet, I2S, SLIC, SPDIF, 23x GPIO

At just 28x38mm, Carambola-2 can even be integrated in flush-fitted sockets. The module is CE, FCC and IC certified.

A10

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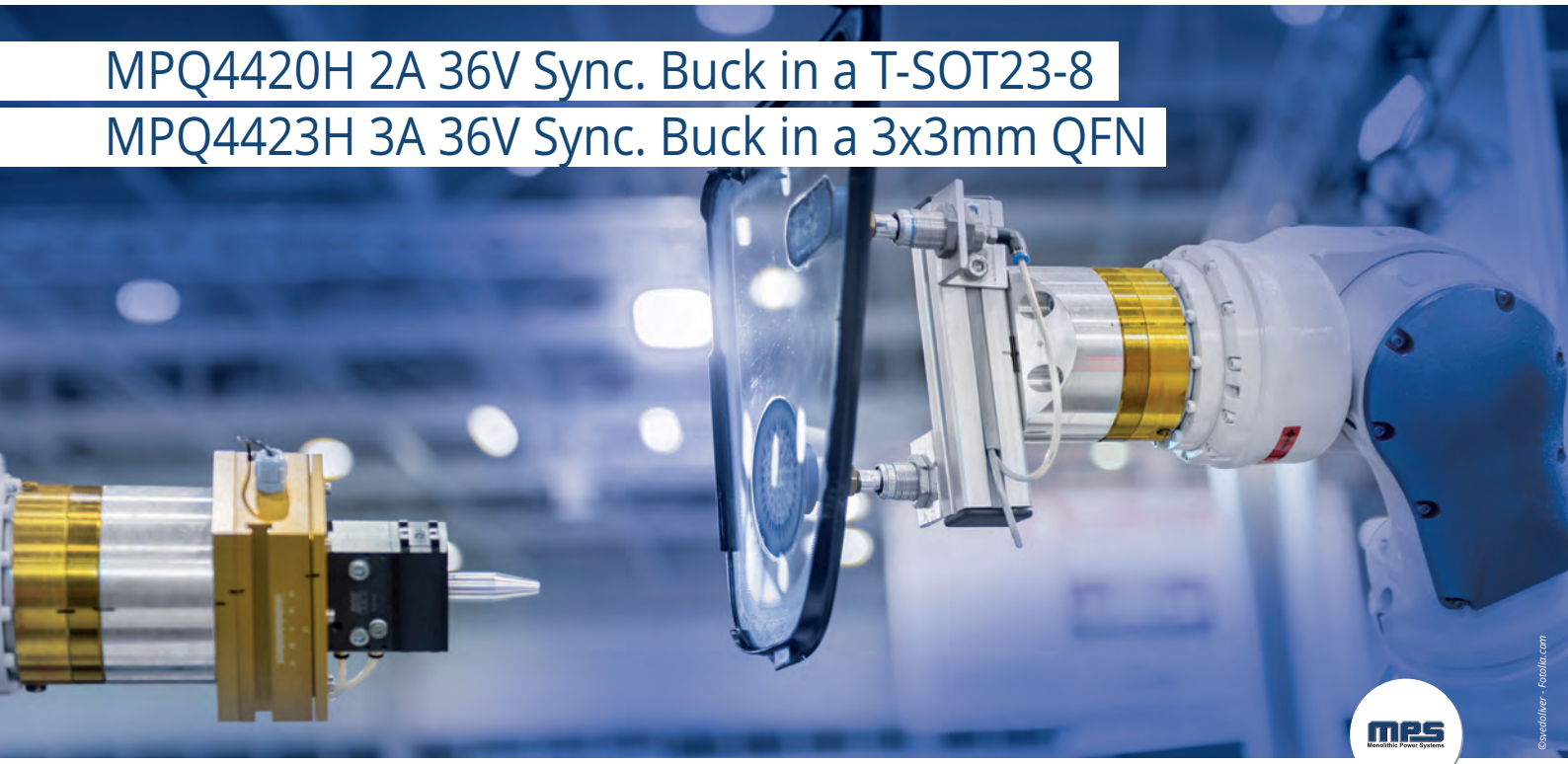
Authors: Thorsten Horak, MPS Senior Field Applications Engineer & Jens Hedrich, MPS Senior Field Applications Engineer

INDUSTRIAL & AUTOMOTIVE NEWS

MPQ4420H 2A 36V Sync. Buck in a T-SOT23-8
MPQ4423H 3A 36V Sync. Buck in a 3x3mm QFN



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Monolithic Power Systems (MPS) presents MPQ4420H and MPQ4423H, two new 2A/3A monolithic synchronous step-down regulators for industrial and automotive applications.

Both switching regulators feature a wide input supply range of 4V to 36V, thus providing application developers with an extremely compact and highly efficient solution. The MPQ4420H has 90mΩ and a 55mΩ MOSFETs (HS/LS) integrated in an 8-pin TSOT-23 package for an output current of up to 2A. The MPQ4423, on the other hand, features 85mΩ and 55mΩ MOSFETs (HS/LS) in a small 3x3mm QFN package, with the accordingly lower thermal resistance. The two models are also available as automotive components pursuant to AECQ100-G1 (-40°C to 125°C).

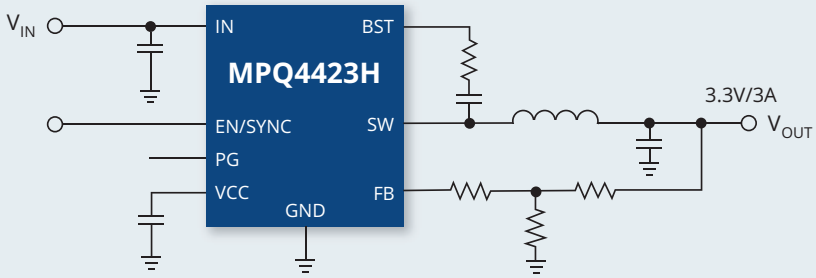
As a result of the synchronous architecture of the regulators and the small number of external components, both models represent a very compact solution.

These converter ICs are based on a peak current mode architecture, which allows for a quick load transient response at a simple loop compensation. The peak current mode offers a very good solution in managing input voltage fluctuations.

The compensation network is already integrated and covers a wide input supply and load range. Using the shown T configuration of the feedback network (see illustration 1 of the example circuit), it is possible to additionally adjust loop amplification regardless of the required divider ratio.

In addition, the regulator was designed for operation with ceramic output capacitors.

Illustration 1: Circuit diagram of MPQ4423H with 410kHz



For output voltage monitoring and for a simple sequential start-up of several voltage regulators, the MPQ4420/23H features a Power Good output. During start-up, this open drain pin switches with a 90µs delay at 90% of the set output voltage. When undervoltage at the output is below 16%, the output is set to LOW.

The IC can be started using a voltage divider through an EN/SYNC input with a 1.4V threshold voltage at a defined input voltage, or through the input voltage using a high-Ohm resistor. In the second case, the resistor must be chosen to a ensure that the current in the internal 6.5V Zener diode is under 100 µA at maximum input voltage.

$$\frac{(V_{IN\ max} - 6.5V)}{R_{EN}} < 100\mu A$$

Using the EN/SYNC pin, the MPQ442xH can be synchronized in the range of 200kHz to 2.4MHz.

Please observe: Switching losses will increase linearly with the switching frequency and quadratically with the input voltage. Moreover, the synchronization frequency must be chosen in accordance with the input voltage and the load current. Continuous operation at 36V input voltage, 2.4MHz switching frequency and 3A load is thermally not possible, nor does it make any sense.

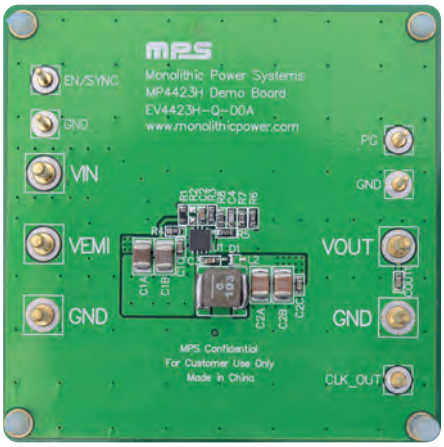
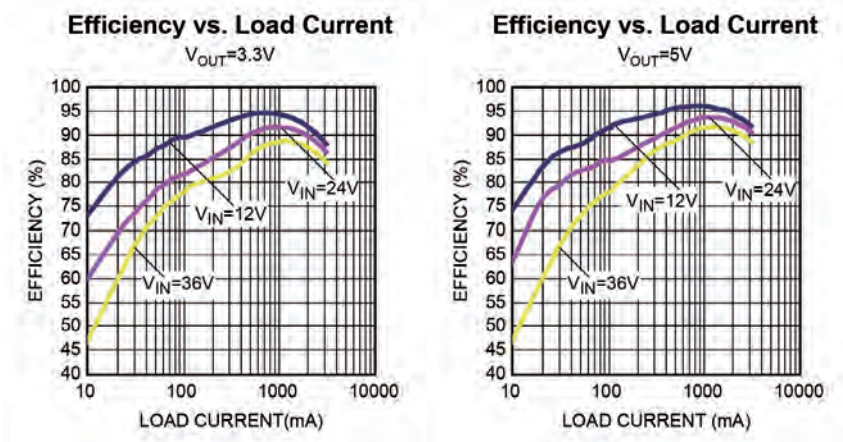


Illustration 2: MPQ4423H Evaluation Board – with up to 95 % efficiency at Vout=3.3 V

As with many other regulators, MPS provides the corresponding evaluation boards for these two models. The circuit is designed for maximum efficiency and low output ripple. To allow users maximum freedom in choosing the output voltage, two 1210 size capacitors with a dielectric strength of 16V were used. These 22µF types offer sufficient capacitance at the output even at 5V and 12V. During design, the electric circuits with a high $\frac{di}{dt}$ and the nodes with a high $\frac{du}{dt}$ were kept as small as possible. The 4-layer structure features a continuous ground plane in layer 2. Sensitive signals and the connection to the input and output terminals were routed to layer 3 to minimize interference coupling from the area of the switching regulator on the upper side.

Illustration 3: MPQ4423H – high efficiency and low switching loss thanks to good MOSFETs even at a high input voltage

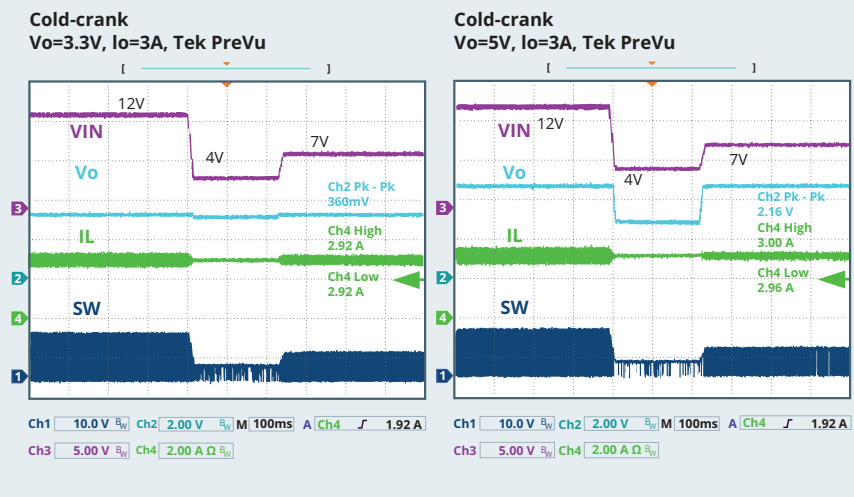


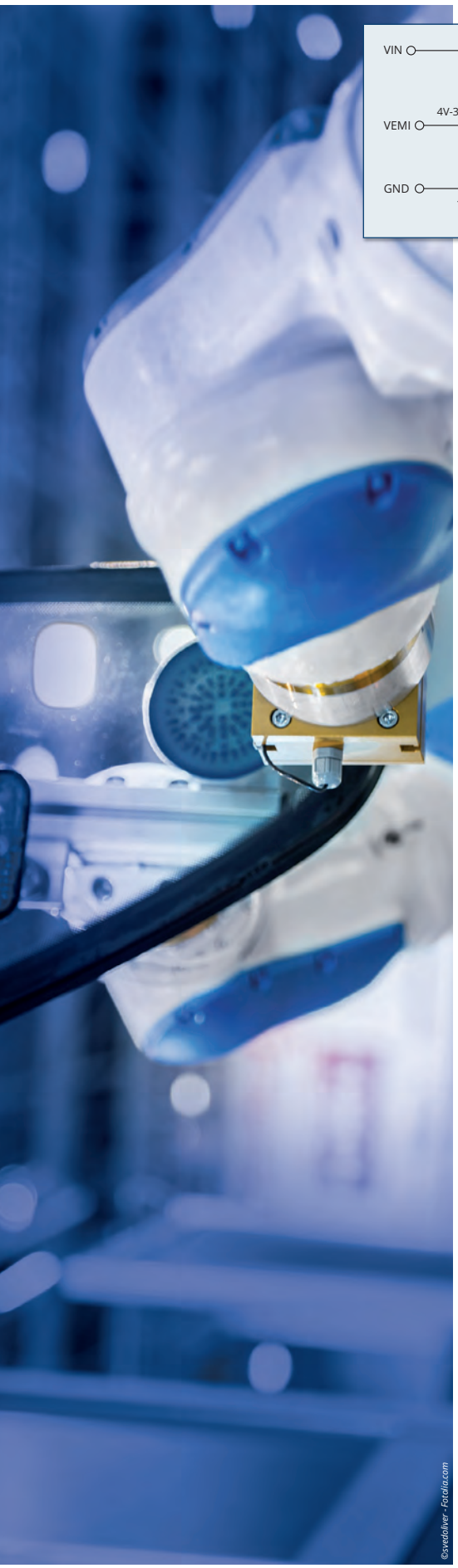
Operation at a high duty cycle or in dropout mode

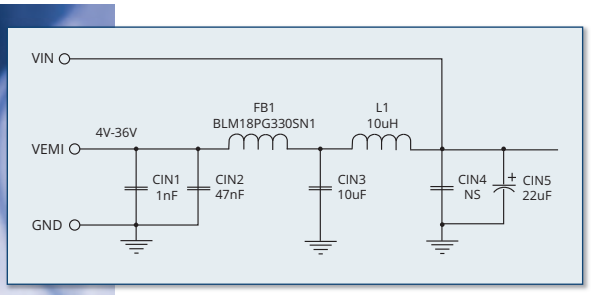
An important criterion in the use of switching regulators, e.g. in the automotive industry, is their behaviour under cold-crank conditions, emulated with impulses 4/4B. Illustration 4 shows the behaviour in dropout operation.

MPQ4420 and MPQ4423 support this operating mode and reliably return to the regulated state when Vin increases. >

Illustration 4: Dropout operation when input voltage falls from 12V to 4V







The MPQ4420H/23H and its EMC behaviour

The MPQ4423H evaluation board offers users a second input voltage terminal with the corresponding EMC filters (VEMI).

The filter consists of two levels, a filter for the base frequency and the first harmonics with L1=10µH and CIN3=10µF. The second level for high frequencies consists of an SMD ferrite (FB1) and a 47nF capacitor (CIN2). The optional 1nF capacitor (CIN1) is not mounted.

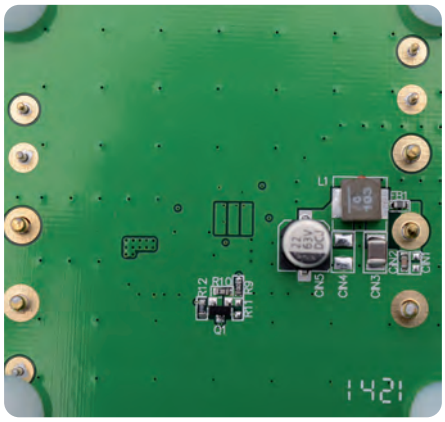


Illustration 5: EMC input filter on the back of the board

This evaluation board was tested against the CISPR25/EN55025 Class 5 requirements for conducted emissions. During this measurement, a network simulation with 5µH is used, measuring the range of 150kHz to 30MHz with a bandwidth of 9kHz, and the range of 30MHz to 108MHz with 120kHz. The evaluation board was operated during the test with an input voltage of 14V and an output voltage of 5V at a load of 2A. The illustration shows the result of the »average« measurement. The evaluation board of the MPQ4423H stays below the strict limits of class 5. Depending on the requirements and the system, the EMC filters can be further reduced.

A11

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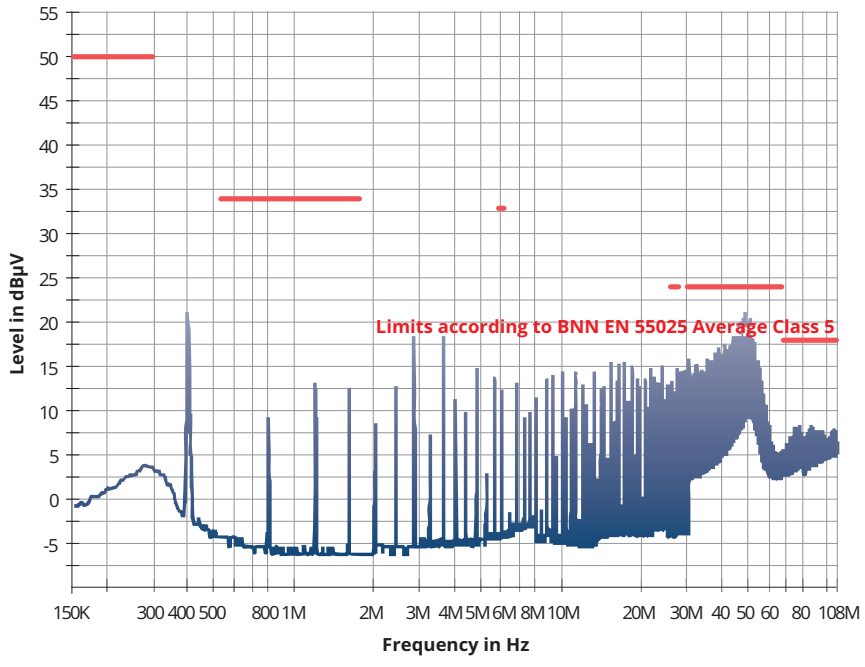
Illustration 6: Evaluation board measured for conducted emissions in accordance with CISPR25/EN55025 class 5



BIPOLAR DC/DC-CONVERTERS

For IGBT applications

FEATURES

- Optimised bipolar output voltages for IGBT/MOSFET gate drives
- Basic/supplementary insulation to UL 60950 pending
- 5.2kVDC isolation test voltage
- Ultra low coupling capacitance
- +15V/-5V, +15V/-8.7V and +20V/-5V outputs
- Operation to 100°C
- Characterised dv/dt immunity

MURATA's all new MGJ2 series offers 2 Watt high isolation bipolar DC/DC-converter in a compact, encapsulated design suitable for powering both – high side and low side – in bridge circuits using insulated-gate bipolar transistors (IGBTs) and MOSFETs.

Packaged in an industry-standard SIP format, they occupy a 1.96cm squared footprint and achieve a power density of 0.81 Watts per cm cubed. The series comprises 12 models offering nominal input voltages of 5, 12, 15 or 24VDC. For each input voltage there are three output voltage combinations available: +15/-5VDC, +15/-8.7VDC or +20/-5VDC.

Offering basic and supplementary insulation, with an isolation test voltage of 5.2 kVDC and conforming to the internationally recognized safety standard UL60950 (pending), the MGJ2 series can provide a key element of the end-product's safety insulation system.

The converters have a characterized dv/dt immunity, suiting reliable operation in fast switching applications. The converter comes with ultra-low isolation capacitance <4pF.

The MGJ2 series guarantees flawless operation in an astonishing -40°C to 100°C ambient temperature being perfect for a wide range of industrial applications including but not limited to high power AC/DC conversion, motor drives and solar power inverters. The Certification to the medical safety standard UL60601 3rd edition is pending.

A12

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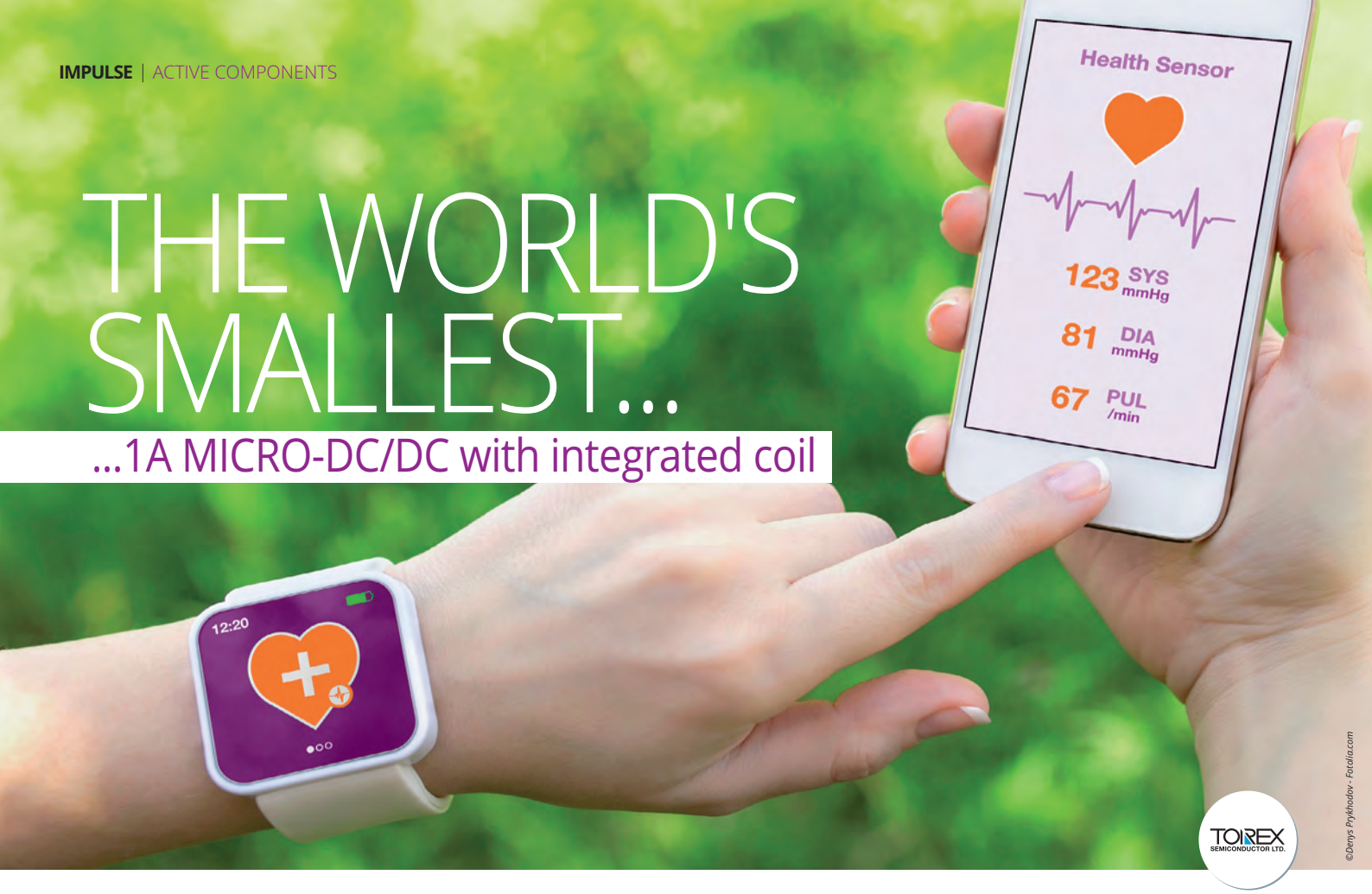
THE WORLD'S SMALLEST...

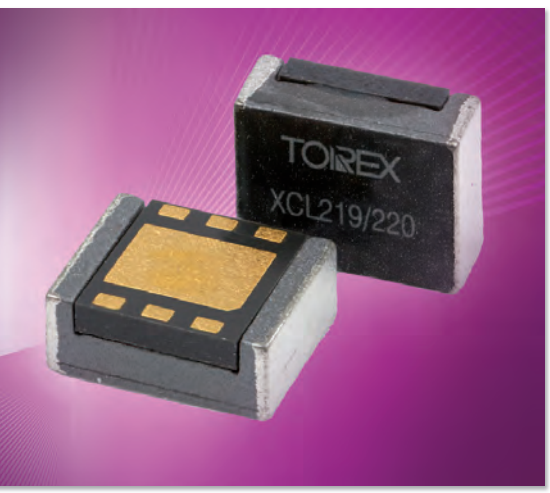
...1A MICRO-DC/DC with integrated coil



The XCL219/XCL220 is a family of 1A micro DC/DC Step-Down Converter with integrated coil. Measuring only 2.5x2.0x1.0mm, the XCL219/XCL220 series is designed to minimize EMC emissions and maximize efficiency, while delivering a very stable output with low peak to peak ripple Voltage (<10mV).

Utilising HiSAT-COT, TOREX's Constant ON Time architecture gives the XCL219/220 extremely fast load transient response performance in comparison to standard DC/DC solutions.

HiSAT-COT also provide less fluctuation in oscillation frequency against load and input voltage when compared to traditional COT control architectures.



Operating from input voltages as low as 2.5V up to 5.5V and consuming only 25µA when operating with no load, the XCL219/XCL220 is a perfect fit for applications where PCB space is at a premium. Internally the XCL utilizes a simple package construction with low production costs resulting in a truly cost effective solution for high volume consumer applications.

Radiated Noise or EMC is a constant concern for many electronic design engineers. The XCL219/XCL220 has been designed to minimize this unwanted noise, making it ideal for sensitive RF applications. When tested and compared with a conventional DC/DC circuit with an external coil, the XCL219/XCL220 with its integrated coil, shows a significant reduction in radiated noise achieved across all frequency bands.

With a nominal 3.0MHz (±15%) switching frequency as standard, the output voltage can be fixed internally within a range of 0.8V to 3.6V in 50mV steps (accuracy: ±2.0%). The XCL219 operates with fixed frequency PWM control, where as the XCL220 has automatic PWM/PFM switching control providing fast response, low ripple and high efficiency over the full range of load conditions (from light load to heavy load). The XCL219/220 series include a high speed soft-start function for quick turn-on, a chip enable pin to turn the IC on and off and an optional CL discharge function to quickly discharge the output capacitor when the IC is turned off. A thermal shutdown circuit is also built in which shuts down the IC when the chip's temperature reaches 150°C and re-starts it when the temperature drops to 120°C (TYP.) or less.

Other features include a built-in UVLO (Under Voltage Lock Out) circuit whose threshold is 1.6V (typ). The XCL219/220 will stop operating when the input voltage decreases below this threshold, and will resume normal operation when the input voltage rises above this threshold. The ambient temperature is specified from -40°C to 105°C.

The XCL219/XCL220 is readily available in the CL2025 package. Additionally a fully populated EVB can be provided upon request.

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ECONOMICAL

Ultra Low Power Synchronous Step-Down PFM DC/DC Converter

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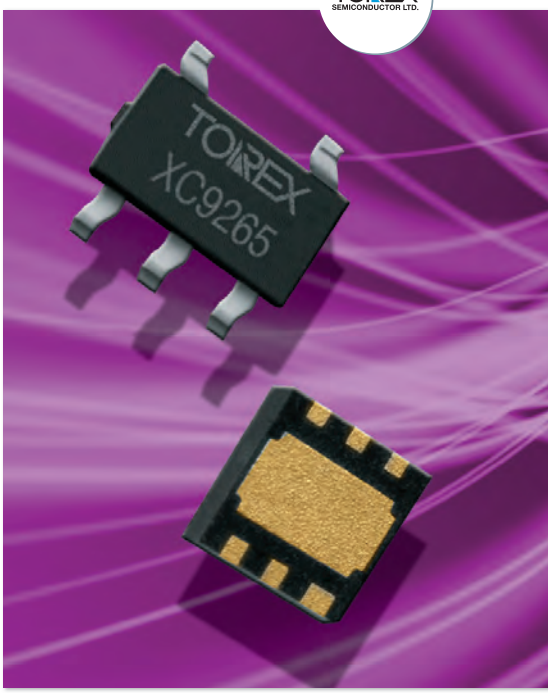


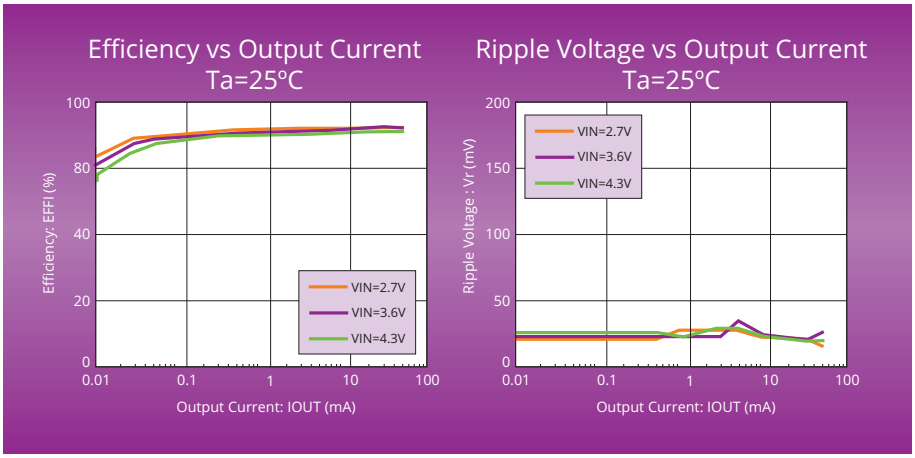
TOREX announced the release of their first ever PFM-only step-down DC/DC converter that has been developed specifically for ultra low power applications.

The new XC9265 series consumes only 0.5µA during operation making it ideal for applications that run from batteries for long periods of time. This ultra low quiescent current is achieved by implementing a synchronous PFM architecture to minimize the switching losses during low loads.

Developed using TOREX's proprietary CMOS process, the XC9265 integrates a 0.5Ω P-ch driver transistor and a 0.5Ω synchronous N-ch switching transistor to ensure high levels of efficiency and superior performance for demanding battery powered applications.

Only one inductor and two ceramic capacitors are needed externally and the XC9265 is able to operate from 6.0V down to inputs as low as 2.0V to help further maximise battery life in portable applications. The output voltage is set internally between 1.0V to 4.0V (±2%) in 0.1V increments.

The XC9265 series also features a soft-start circuit, an enable pin to turn the IC on and off and an optional CL discharge function that can quickly discharge the output capacitor when the IC is turned off. During stand-by, all circuits are shutdown to reduce consumption to less than 0.1µA.



An optional UVLO function can also be used to reduce the leakage of potassium hydroxide from small batteries by stopping IC operation while battery voltage is declining. The standard release voltage of UVLO is 1.75V (±3.0%) and selectable voltages range from 1.6V~2.7V in 0.1V steps.

A short overview about the possible performance can be seen in the two pictures below. For booth graphs an output Voltage of 1,2V is used. In the left graph you can see the efficiency while in the right graph the ripple voltage is displayed.

The XC9265 is now readily available in the USP-6EL package for applications that require a small form factor or in the industry standard SOT-25 package. Additionally, fully populated EVBs can be provided upon request.

A14

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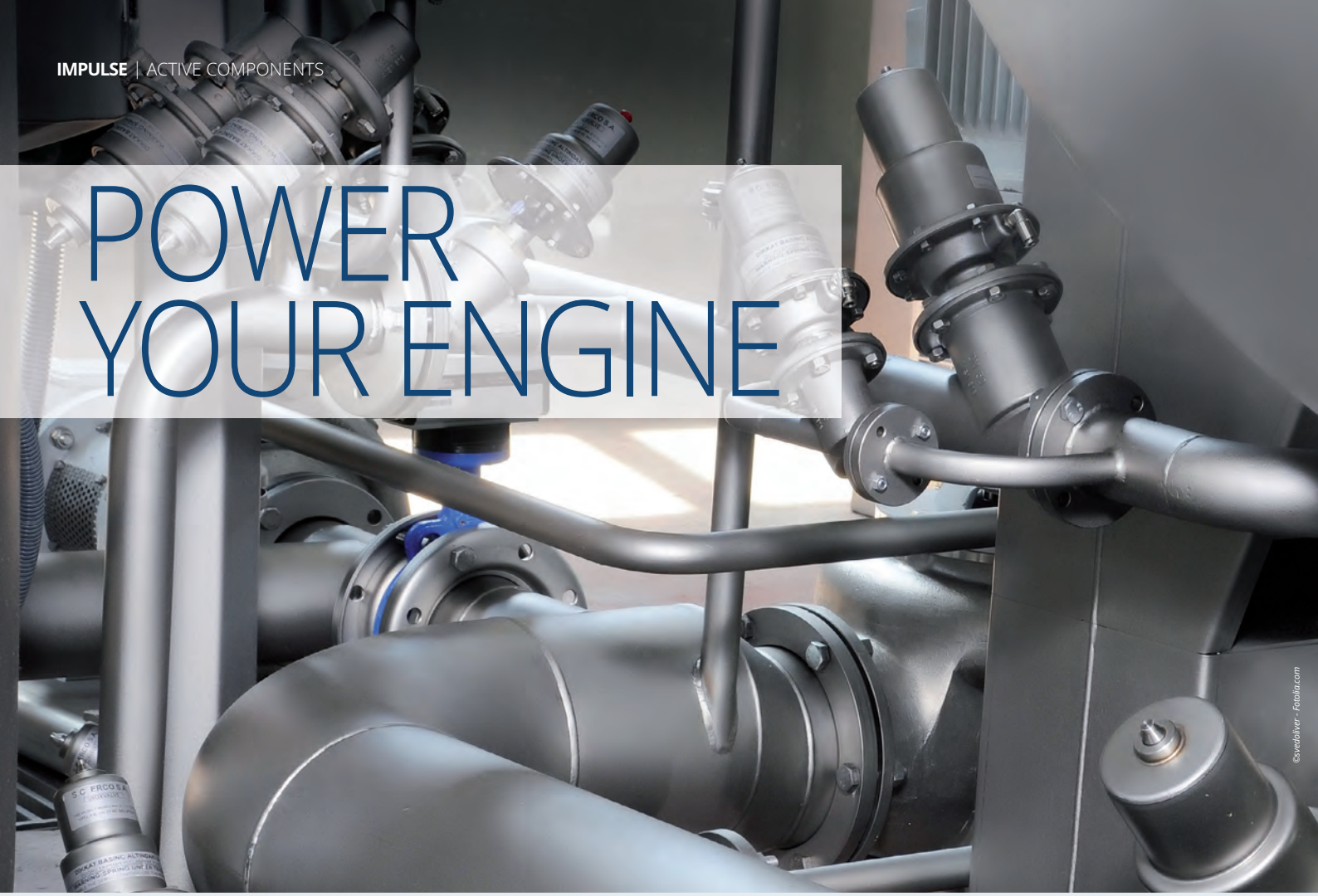
POWER YOUR ENGINE



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COSEL launches the first high peak (Peak/Duration/Cycle – 200%/10s/40%) capable power supply targeting medical machinery equipped with valves, motors, etc. Power ratings comprise 100, 150 and 240W nominal and 200, 300 and 480W peak. The peak power is available for a duration of up to 10s and a duty cycle of 40%.

The medical rated power supply comes with ANSI/AAMI ES60601, EN60601-1 3rd approvals and meets class B EMI standards (FCC-B, CISPR22-B, EN55011-B, EN55022-B, VCCI-B) despite low leakage requirements.

The footprint is designed for tight, long installation slots where no or limited forced air cooling is available – the rated power is available up to 50°C without the need to derate its output power – scaling only: 2.44x1.30x6.10 inches [62x33x155mm] for 100 Watt, 2.95x1.44x6.30 inches [75x36.5x160mm] for 150 Watt and 3.31x1.81x7.09 inches [84x46x180mm] for 240 Watt.

Optional cover and chassis, remote on/off, low leakage and additional coating are available to target dusty and harsh environments.

For applications with no need for peak power, Cosel also introduced a cost efficient version targeting other medical applications with no direct patient contact. This is the next level of COSEL's approach offering scalable solutions. The LFA series for industrial applications, LFP for peak power and LMA with and without peak power capability, for medical applications. The new LMA product line comes like all newer COSEL AC/DCs with 5 year warranty and makes the newest add from the Japanese power forge a reliable power source to trust in.

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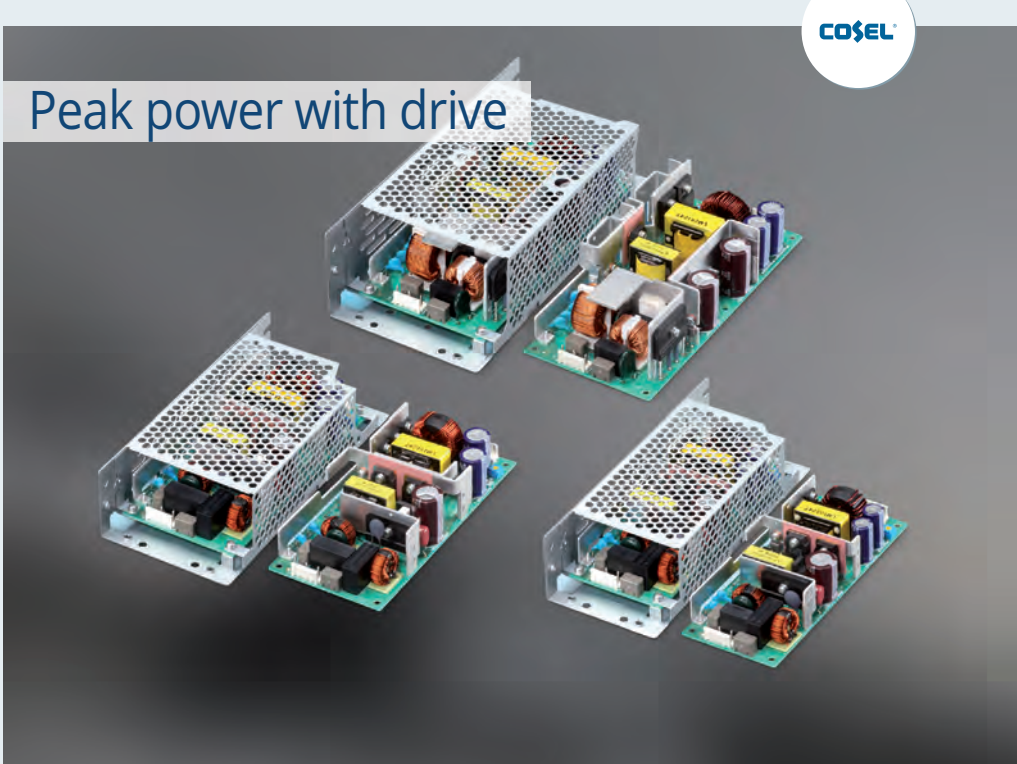
COSEL



POWER IN A CAGE

PLA series

COSEL extends their PLA portfolio with 15, 30 and 50W modules. The new additions complement the existing range of 100 to 600W.

The PLA series is available in a well-known standard housing with screw terminals on the front side for primary and secondary side – and – IP20 cover.

The series has a calculated life time of 10 years and comes with five years warranty. The efficiency was forced up to an astonishing 90%, which makes the outer dimensions up to 25% smaller than its reference low – cost types. An ErP (Energy Reduction Program 2009/125/EC) compliant version is available as an option.

The PLA series offers a wide range of output voltages from 5 to 48VDC (5/12/15/24/36/48VDC). The newly added come, as their bigger brothers, with UL508 approval and a very long list of options, including low leakage, Din Rail Attachments and conformal coating.

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Wide Line-Up

CODE	MODEL	PLA600F	PLA300F	PLA150F	PLA100F	PLA50F	PLA30F	PLA15F
Output Voltage Variation	5V	■	■			NEW	NEW	NEW
	12V	■	■	■	■	NEW	NEW	NEW
	15V	■	■	■	■	NEW	NEW	NEW
	24V	■	■	■	■	NEW	NEW	NEW
	36V							
	48V	■	■	■	■			

Optional Functions

CODE	FUNCTION	PLA15F	PLA30F	PLA50F	PLA100F	PLA150F	PLA300F	PLA600F
– C	Conformal coating	○	○	○	○	○	○	○
– J	Connector type ※2	○	○	○	○	○		
– T	Vertical terminal block	○	○	○	○	○		
– T2	Horizontal terminal block (without proof-to-lose)						○	○
– L	Low power consumption: 0.5W max. at AC240Vin				○	○		
– R	Remote on/off control (external power source required)				○	○	○	○
– W	Remote sensing, parallel operation and alarm							○
– G	Low leakage current						○	○
– U	Lower input voltage stop (AC50V) to meet SEMI-F47	※1	※1	※1	※1	※1	○	○
– V	External potentiometer for output voltage adjustment						○	○
– N1	With DIN rail attachment	○	○	○	○	○		
– F4	Low noise fan						○	○

※1This function is standard with PLA 15/30/50/100/150; ※2 Excluding UL508

INVISIBLE BUT ESSENTIAL

AIMTEC extends their AMEL print module AC/DC series ranging with 1 to 3 Watt types on the smallest footprint ever, including AC Delta voltage – single phase.

The AMEL3-AZ series are packaged in a miniature length, width and height of only

- 1.10x0.90x0.57 inches (28.00x23.00x14.50mm) for single phase AC input, and
- 1.10x0.90x0.67 inches (28.00x23.00x17.00mm) – optional BAZ for delta voltage-single phase.

The converters have EMI (EN55022, class B) filtering built-in eliminating the need for external components.

FEATURES INCLUDE

Input/Output Isolation of 3000VAC, Over Load Protection, Over Voltage Protection, Short Circuit Protection, Soft Start, Energy Star Compliant, ErP 2009/125/EC compliant (No-load power consumption less than 0.3 Watt).

These new AC-DC power converters will expedite and simplify industrial and commercial product design in a highly affordable solution while offering the smallest possible footprint. Further cost savings benefit by eliminating the need to add step down / 3 phase transformer from industrial 528VAC voltage sources, saving application footprint, weight, and investment.

The standard package is available with 3.3, 5, 12, 15 and 24VDC output ranges, with a universal input of 90 to 305VAC (optional 90-528 VAC), 47 to 440Hz (aeronautics), or 130 to 430VDC (optional 130-745VDC). Operational temperature range of all models is -40°C to 85°C (industrial standard) and safety approvals including cULus, CB and CE making the ultra – small package ideal for countless applications.

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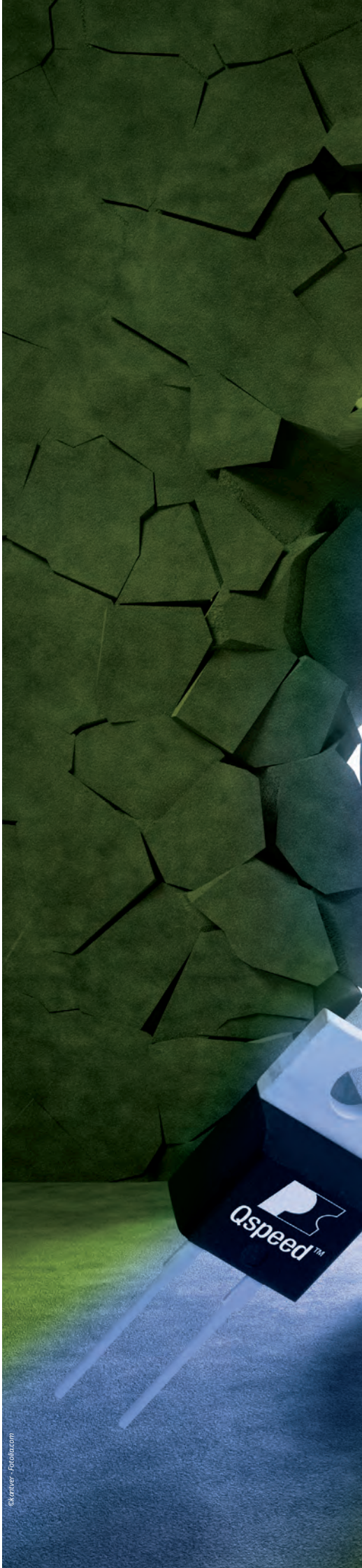

Author: Klaus Pietrczak,
Product Marketing Director
at POWER INTEGRATIONS

DIODES

CRACKING THE COMPROMISE

Applying VLSI memory design and production techniques to the humble power diode has enabled the development of a device combining the best characteristics of Schottky and PIN diodes while eliminating the undesirable one.

The days of analog power systems are long gone, giving way to modern power systems that invariably apply switching topologies in their operation. Today's systems, such as power factor correction, motor drives, DC-AC inverters, bridge converters and DC-DC converters are all called upon to operate at high levels of efficiency, generate low EMI, be physically small, light in weight and low cost to manufacture. These requirements all point to high-frequency switching, the higher frequency the better, provided that EMI regulations can be met. Successfully meeting requirements often relies on the characteristics of what may be regarded as a relatively simple component, the rectifier diode.

Whenever an inductor is switched in a power circuit, a diode is generally present to carry the freewheel current through the inductor during each cycle. When a power electronic system is scanned for temperature rise while operating, the components found to be dissipating most heat will often be the rectifier diodes, so attention given to careful selection of diodes at the design stage will be well rewarded. A range of technologies and architectures are now applied in the manufacture of diodes, attempting to produce the ideal diode for each application. A number of diode technologies are identified in Table 1.

The first four technologies employ bulk silicon and the fifth uses a compound semiconductor material to achieve breakdown voltages higher than achievable with silicon. The simplest is the silicon standard diode which consists of P-type and N-type silicon forming a single junction at the interface. If reverse bias is applied while the diode is conducting a high forward current, a finite amount of time (tRR) is required for minority carriers to be removed from the junction and a depletion region established. Because the tRR of standard diodes is in the range 1-2 ms they are limited to only low-frequency applications.

A Schottky diode is produced by replacing the P-type material with a metal contact. Current flow is only carried by electrons so there are no minority carriers. When reverse bias is applied,

Diode Technologies

TYPE	V_{BR} V	V_F (25°C) V	t_{RR} (25°C) ns
Si standard diode	50 - 1000	1,0	1000 - 2000
Si Schottky barrier diode	15 - 200	0,3 - 0,8	<10
Si ultra-fast diode	50 - 1000	1,35 - 1,75	25 - 75
Qspeed® (merged PIN-Schottky) diodes	200 - 600	0,77 - 2,3	<10 - 20
Silicon carbide Schottky barrier diode	600-1200	1,5 - 2,3	<15

Table 1:. Comparison of diode technologies

DIODES: CRACKING THE

electrons are attracted to the opposite pole, creating a depletion region to block current. Because there are no minority carriers and the depletion region is very thin, the Schottky diode reverse recovery is much faster than with a standard silicon diode. The penalty is that the breakdown voltage for silicon Schottky is limited to around 200V and leakage can be significant. Higher breakdown voltages can be achieved by using compounds such as silicon carbide instead of silicon, but the high material cost, limits the use of silicon carbide only to the most demanding applications.

The P intrinsic N (PIN), often known as ultra-fast, diode uses a region of lightly doped N-type silicon between the normally doped P and N regions. The lightly doped N region is often doped with platinum to create recombination centers that reduce minority carrier lifetime. When the diode is reverse biased, holes and electrons are attracted to the recombination centers in the drift region where they recombine. This creates a much faster reverse recovery than with a standard diode.

The larger junction thickness results in a much higher forward voltage to carry the same amount of current when compared with a Schottky diode.

As can be seen from Table 1, the Schottky diode has lower VF and faster tRR than ultra-fast diodes but is limited to 200V VBR. The ultra-fast diode can be used above 200V but efficiency is compromised.

There is another disadvantage of ultra-fast diodes in that the platinum doping causes high peak reverse recovery currents (IRR) with an abrupt or snappy cutoff. This tends to generate EMI, often requiring the use of energy sapping snubbers to contain it.

The ideal solution would be to combine the best characteristics of Schottky and ultra-fast diodes. POWER INTEGRATIONS Inc. produced the novel Qspeed diodes, merging the PIN-Schottky range of diodes thus realizing this ideal solution (Ref 1). The Qspeed diodes are manufactured using three-dimensional diffusion and deposition techniques more commonly found in the world of memories and microprocessors. Figure 1 provides a simplified diagram of the structure.

Figure 1: Qspeed diode structure

Tubular trenches of P-type silicon are deposited into lightly doped N-type material. The side walls of the trenches are coated in insulating material so conduction can occur only at the bottom of the trenches where there is a junction between the P- and lightly doped N-type silicon. This creates a PIN diode.

A metal contact is then deposited across the tops of the trenches to create a Schottky junction with the N-material in between the P wells. So QSpeed diodes contain both Schottky and PIN diodes within them.

Figure 2: Forward conduction.

When forward biased the Schottky junctions conduct immediately and electrons flow between the P-type trenches. At higher current levels, a voltage drop builds up in the channels and the PIN junctions at the base of the trenches start to conduct, providing an additional forward current path. The combination of junction types provides fast early turn-on and high current density capability.

When the diode is reverse biased the Schottky diode elements stop conducting almost immediately, followed by the PIN junctions. Once

COMPROMISE

reverse recovery is complete, the depletion layers formed around the base of the trenches build up and overlap. These create a continuous barrier pinching off the channels through to the Schottky diodes.

Figure 3: Reverse bias. Depletion regions overlap.

Thus, the reverse breakdown voltage and leakage current is determined by the strong depletion layers, not the Schottky junctions. This enables the QSpeed diode to exhibit the fast turn on characteristics of the Schottky diode together with the high reverse-voltage capability (up to 600V) and low leakage characteristics of the PIN diode.

The combination of Schottky and PIN diodes provides another very important benefit. It overcomes the snappy switching of platinum doped ultra-fast diodes and produces very soft turnoff characteristics as shown in Figure 4.

The area of the curve encompassing the negative current phase for each device type is equal to the reverse recovery charge QRR. This energy is wasted each time the diode turns off. Also the reverse current passes through any driving elements, meaning they have to be rated to accommodate the peak current. Therefore, for high efficiency the QRR should be as low as possible.

The trace for the platinum-doped, ultra-fast diode shows a much lower QRR, but the peak reverse current is still high and the turn off is very abrupt. The abrupt or 'snappy' turn off causes oscillation, hence EMI. The green trace for a Qspeed diode reaches a peak reverse current half that of the ultra-fast diode and there is little oscillation.

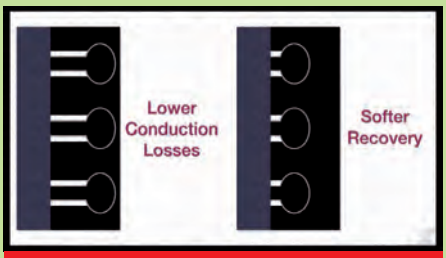

Figure 5: Effect of different trench depths.

By altering the depth of the trenches in Qspeed diodes the conduction voltage of the PIN diodes can be adjusted, giving different tradeoffs between conduction losses and soft recovery. This tradeoff has been exploited by POWER INTEGRATIONS Inc. in the development of three Qspeed families, providing optimized performance for different applications. The Q-Series has highest softness, the X-Series lowest conduction losses and the H-Series lowest switching losses.

Qspeed diodes are the result of applying VLSI design and production techniques to a power device. They offer greater efficiency than Schottky diodes at any frequency above 50kHz without exhibiting the leakage problematic in Schottky diodes. Qspeed diodes are faster and more efficient than ultra-fast diodes at any frequency and the soft switching of Qspeed diodes eliminates the need for snubbers in many cases.

In fact, Qspeed diodes challenge the performance of silicon carbide diodes at 600V at a small fraction of the cost. The power electronics designer can choose the ideal diode for every application without need to compromise.

A18

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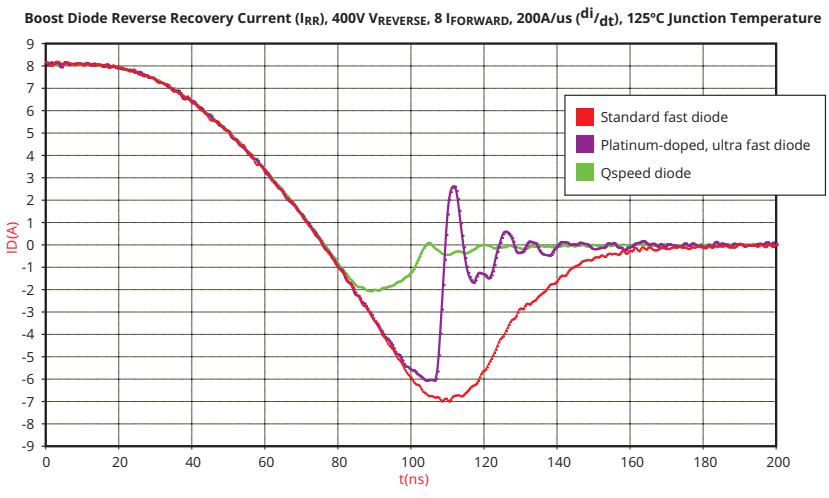
References:
Qspeed diodes, Power Integrations Inc.
http://www.powerint.com/en/products/qspeed-family

Figure 4: The IRR waveforms of some commonly used PIN-junction boost diodes



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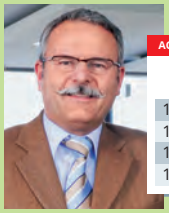

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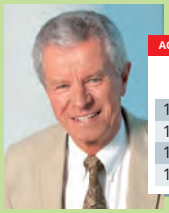

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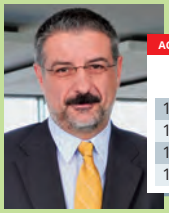

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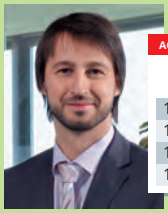

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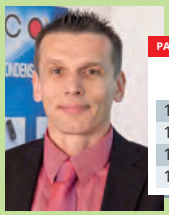

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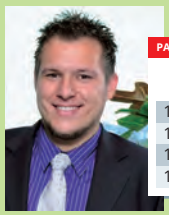

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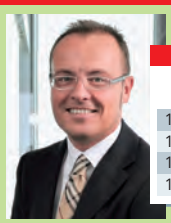

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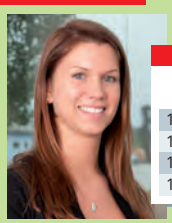

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FLOATING CONNECTOR

FX23 Series, 0.5mm Pitch: Board-to-Board Connectors for High Speed Transmission

HRS HIROSE ELECTRIC EUROPE B.V.

The FX23 series has been introduced to meet the requirement for floating connectors that can handle high current ratings and high speed transmission.

The FX23 series has been introduced to meet the requirement for floating connectors that can handle high current ratings and high speed transmission.

The connector range consists of headers and receptacles that allow a parallel or right angle board-to-board connection. The header has a unique floating structure embedded inside the fixed base of the housing. This allows an alignment movement in XY directions of ±0.6mm minimum (max) to absorb mounting misalignment, vibration and dimensional errors when mated.

High speed transmission of up to 6Gbps (max) is supported by the innovative contact design to ensure impedance matching. The ground contacts are situated between the adjacent differential pair contacts to reduce crosstalk for better performance. The connector has a hybrid structure featuring power and signal contacts. Four built-in power contacts that can carry up to 3A (Amps) current rating each are located along the mating guides to save space. The signal contacts can carry 0.5A each. By using a PCB thickness of 1.6mm the top and bottom sides of a PCB can be utilised to mount the FX23 series.

This is due to the design of the single metal post that does not protrude out to the other side of the PCB allowing space saving. For the metal posts the pin-in-hole soldering is applicable. Ideal applications are industrial equipment, broadcast equipment, POS terminals, medical devices, BTS, servo motors, PLC and car navigation equipment.

HIGHLIGHTS

- Contact sizes: 80, 100, 120 (other sizes under development)
- Current rating: 0.5A signal/ 3A power (4x power contacts total = 12A)
- Pitch: 0.5mm
- Versions: Right angle, Parallel
- Stack height: 15, 20, 25 & 30mm (some heights under development, please check availability)
- Voltage rating: 50V
- Mating cycles: 100

For more information please contact Hirose.
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www.hiroseeurope.com

S01

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RUGGED READY OVER-MOLDED SOLUTIONS

Turning your custom specifications into real products through creativity and innovation

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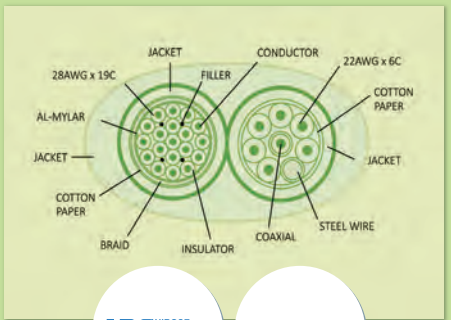
CODICO does not just provide cable assemblies. We also provide together with our cable assembly partners vertically integrated total solutions that encompass 3D molding design service, in-house tooling shop, raw cable design and extrusion, testing, and automation of the assembly process. The extensive range of solutions that we offer can even be tailored to customers´ needs. From mold designs and mold tooling, to the design and production of a new product from the ground up, we have experts to make sure customers´ requirements are perfectly met. We are more than pleased to model your drawfted idea (even on a napkin) and make the product deliverable to the market.

Together with our partners we have extensive knowledge of raw cable design that we can help customers select suitable materials to meet their requirements for impedance control and environmental ruggedness, such as oil, chemical, UV and wear resitance as well as low temperature flexibility.

Example of Hybrid Raw Cable



Picture 3

We have already existing molding tools for some popular Hirose connector families, representative examples are I/O Series 3500 (Picture 3), Push-Pull Circular connectors HR30 (Picture 4) or Full Metal Circular connector series LF (Picture 5). We can also offer customer specific solutions for RF CABLE ASSEMBLY and Antenna Frequency/ Technology (Picture 6).

Are you interested? Just send your enquiries and we will support you!

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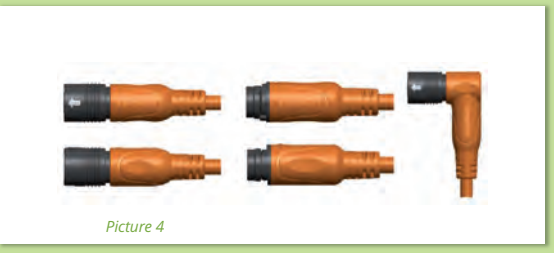
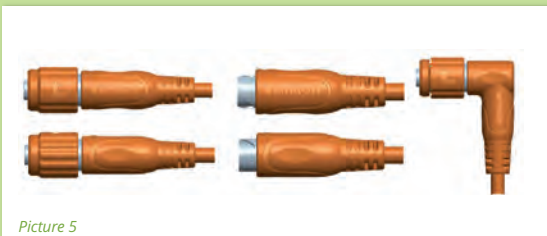


Picture 4

Picture 6



Picture 5

OFFSPRING

New Generation of LED plug connectors – DF59M Family Series from HIROSE

The DF59M series bridges the gap. As well as the linear board-to-board connectors from the DF59S Series and the DF59SN miniature format, the wire-to-board connections from the DF59M Series for power supply are now here. This means that Hirose can now offer a complete system, specially developed for LED applications – and the ideal solution.

S03

Gerhard Strobl, +43 1 86305 137, gerhard.strobl@codico.com

Series DF59M

single-pole Wire to Board connector

- Horizontal Mate, single-pole Wire to board Connector
- Housing-less small and low profile
- 3-point Contact design for best reliability
- Clear tactile click and high mating force with positive lock
- High current capability rated up to 6 Amps using AWG#22 cable
- Wire Range AWG#28 to 22 with jacket outer diameter 0,9 to 1,6mm
- Will be UL certified
- Useable for power supply (W-t-B) or coplanar Junction (B-t-B Jumper)

Series DF59S & Series DF59SN

slim line plug and ultra slim line plug

- Contact positions: 1
- Current rating: 3 Amps
- Voltage rating: AC/DC 350V (max)
- Mating cycles: 10
- Temperature rating: -35°C to +105°C
- Floating Structure
- Halogen free

FX30B-SERIES

3.81mm Pitch, 10A Power
Board to Board Connector with misalignment absorption structure

The FX30B series has been introduced to meet the requirement for board to board connectors with high current capacity and the ability to absorb mating tolerances where multiple connectors are used.

The connector range features a special innovative contact structure that allows movement in XY directions of up to ±0.3mm and +1mm in Z direction to absorb mating misalignment, vibration and dimensional errors. This is achieved by the blade contacts on the header and the unique spring contacts on the receptacle that are staggered to maintain sufficient deflection range in the limited space.

In addition, the gold plated contacts feature four independent angled contact points that guarantee advantageous contact. The effective mating length of 2mm also contributes to ensuring high contact reliability.

The moulded guide posts on the header engage with the ribs on the receptacle to allow for a mating alignment movement of ±1.3mm in XY directions to simplify the mating operation and prevent incorrect insertion. In addition, there are six keys around the mating face that further prevent reverse insertion.

Three different variations are available to allow a vertical, parallel or coplanar board to board connection.

HIROSE's popular FX18 high speed connector can be used on the same board as FX30B to offer a flexible, high speed and high current capability.

S04
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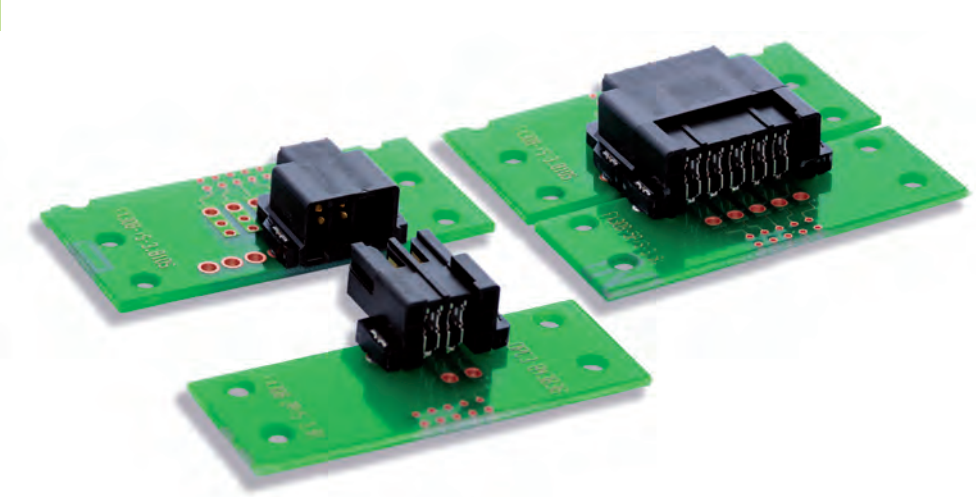
POWER meets SIGNAL – COMBINE HIROSE's FX30B & FX18 Series
Combinable on the same board because of identically stack heights (20, 25 & 30mm)!
Suitable for coplanar, vertical and horizontal board-to-board connections!



Combine them on the same board to achieve a flexible, high speed and high current capability!

HIGHLIGHTS

FX18 Series
- 10+ Gbps High Speed Transmission
- 0.80mm pitch
- Number of pins: 40, 60, 80, 100, 120 and 140

FX30B Series
- Up to 17A, 250V AC/DC
- 3.81mm pitch
- Number of pins: 2, 3, 4, and 5

FROM AUTOMOTIVE TO MILITARY

Mezzostack®

FCI announced that it has strengthened the portfolio of its Mezzostak® Mezzanine connectors with the addition of 80 and 90 position offerings.

These new variations' stub-less contact interface supports PCIeGen2 compatibility and facilitates high speed performance of up to 5Gb. These characteristics enable the connectors to support communications and networking applications with higher signal transmission while allowing engineers to still tap on this category's core value propositions – cost-savings, easy mating and space optimization.

The Mezzostak® Mezzanine connectors features an innovative hermaphroditic »mate-to-itself« design that reduces product mix and simplifies connector selection, documentation and component maintenance. This allows engineers to significantly reduce cost and time spent in the design and maintenance phase.

In addition, this unique design catalyzes the consolidation of part numbers and components, which helps to increase the relative volume of this connector category and further drive down manufacturing cost. The consolidation also alleviates supply chain and inventory burdens for electronics component distributors and manufacturers alike. The significant cost savings that FCI's Mezzostak® Mezzanine connectors provide make them a viable low cost alternative to high-speed mezzanine connectors across many industries.

Easy mating is another value proposition that these solutions provide. The four guidance »scoops« integrated in their design permit easy mating and precise connections even when misaligned. Their polarization feature also eliminates the chance of mis-mating and prevents errors in Printed Circuit Board (PCB) placement. This helps OEMs to save assembly time during the production stage and accelerate time-to-market. This also safeguards the quality of end products by reducing assembly errors.

This family of 0.5mm fine pitched, high density mezzanine connectors is also compact and allows design engineers to save real estate on the PCB. This space-optimizing feature allows design engineers to use the freed PCB space to integrate more functions or boost existing performance, while still retaining an overall compact design.

»Cost savings, easy mating and space optimization have always been behind the Mezzostak® Mezzanine connectors' huge success and popularity across different industries,« said Fabrizio Stango, Commercial Portfolio Director at FCI. *»By building on these connectors' core value propositions and expanding our product offerings with the 80 and 90 position variations, we hope to boost this product family's applicability and ensure that these connector solutions will continue to stay relevant in today's rapidly developing technology and industrial sectors.«*

Since its debut in 2011, FCI has shipped over 100 million lines of these popular connectors to over 200 end-customers from a myriad of industries. This includes manufacturers in the portable and mobile electronics, communications and networking, automotive and military sectors. For more information about FCI's Mezzostak® Mezzanine Connector product category, please contact us!

S05

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Terminal Blocks with Wire-to-Board Spring Clamp System

FCI is proud to introduce the new NQ SMT Wire-to-Board Spring Clamp system as an extension of its Terminal Blocks portfolio.

The NQ SMT Spring Clamp includes a robust design, versatile modular system, secure electrical contacts, low wire insertion and high wire retention forces. Its user-friendly lever latch is engineered for effortless wire removal, while its compact industry-standard PCB design makes it a noteworthy space-saver.

With a low profile 5.00mm height, the NQ SMT Spring Clamp is highly ideal for LED devices and other compact applications, such as LED lighting modules. It is also suitable for consumer electronics, factory automation equipment, and applications which require easy-to-use wire insertion and extraction methods.

Two contact pitch sizes are available, 2.5mm with a current rating of 5A (150V), and 4.0mm with a current rating of 7A (300V). Both models are end-to-end stackable and feature 1 to 10 contact positions.

»The NQ series marks another significant step forward for FCI in the LED lighting application segment, especially where compact and cost-effective solutions are required in the market. In addition, our extensive manufacturing and distribution footprint also ensures the NQ SMT Spring Clamp is conveniently and widely available at a global level,« adds Fabrizio Stango, Director for Commercial Portfolio at FCI.

For more information about FCI's Terminal Block NQ SMT Spring Clamp system, please contact us!

S06

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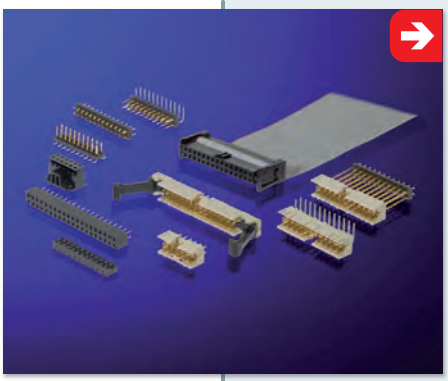
Darling of Industry: FCI Minitek™

The Minitek™ series are products from the manufacturer FCI, for board-to-board and wire-to-board connections in 2.00mm pitch.

Minitek™ Series



FCI's brandnew Spring Clamp System

At first glance, this looks like a »simple and normal« series. But take a second look, and it's clear that the Minitek™ series connectors have a whole lot of details that stand out from the crown of what appear to be comparable products: The pitch size of 2.00mm achieves space savings of 38% in comparison with the »big brother«, the Dubox series, in 2.54mm pitch.

The plating: All the products from the Minitek™ series can be provided with a gold coating of 0.76µm (30µ"). This has already established itself as the standard for applications in the industrial sector. Another highlight is the operating temperature range. For most products, this extends from -55°C to +125°C. The fact that products from the Minitek™ series are often used in applications in the industrial sector also is attributable to this feature.

An added bonus to round off the series is the development of a crimp housing with active latch. It locks securely and with an audible »click«, and is designed to be totally plug-in reliable, also known as Poke Yoka. In addition to pin troughs in standard solder-in technology, design formats for pin-in-paste are also available.

The Minitek™ series has also been adopted into the Basics+ range, with the particular advantage of short delivery times.

S07

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POWER ON: HPCE® MEZZANINE

FCI augments its power solutions with the introduction of HPCE® Mezzanine connectors. Building upon the existing HPCE® product family, the new HPCE® Mezzanine connectors provide an economical solution for transmitting power and low-speed signals between two parallel circuit boards with a wide variety of spacing options.

Designed for applications requiring variable heights, this compact Mezzanine solution delivers a current density of up to 200A per inch with a mezzanine stack height ranging from 32mm to 45mm. The power contacts and housing design of HPCE® Mezzanine connectors are made for high current density power distribution applications, and are ideal for 1U/2U servers, switches, storage enclosures, telecommunications equipment, industrial computers, as well as industrial controls and instrumentation.

»Following the success of our HPCE® connectors for co-planar and right angle applications, we wanted to extend to mezzanine applications as well where more power is required,« says Michael Blanchfield, Portfolio Director for Power Solutions at FCI. *»With its high power density and variable stack height, we are confident this new product offering will meet requirements of most design engineers seeking reliable and flexible mezzanine board-to-board interconnect solutions.«*

HPCE® Mezzanine connectors are available in a wide variety of sizes to accommodate varying amounts of power and signal. The inserted Bridge Board activates a positive lock in the HPCE® connector to secure one of the mating halves. The mating mezzanine board is easily inserted or removed, and both connector halves offer greater than 3mm contact wipe for improved reliability. The connectors are also equipped with a highly ventilated housing design to improve heat dissipation. These are crucial features in server and data storage applications to help avert overheating issues, thus increasing the equipments' reliability.

The connectors offer unparalleled electrical performance plus improved airflow and energy efficiency. These next-generation power connectors have the potential to improve existing electronic designs and possibly empower new innovations across different sectors.

For more information about HPCE® Mezzanine power connectors by FCI, please contact us.

S08

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BRILLIANT: DATAMATE HIGH POWER CONTACTS

Features

- 0A Nominally (see de-rating chart)
- Gold plated to 30µ" (0.76µm)
- Suitable for use with 10awg MIL-W-16878/4 (Type E) and NEMA HP-3 Type E wire
- Standard off-the-shelf versions of the popular Datamate Mix-Tek range
- Operating temperature range: -55°C to +125°C
- RoHS compliant and ideal for COTS requirements

Benefits

- High current rating over a wide temperature range
- Gold plated contacts offer high durability
- Meets customer demand for high current contacts in a compact space
- Miniature connector system with high performance contacts reduces space and weight
- Suited for use in harsh environments where high vibration, shock and extremes temperatures are experienced

Part numbers – off the shelf:

Female Cable

- M80-4000000F1-02-PF5-00-000
- M80-4000000F1-04-PF5-00-000
- M80-4000000F1-06-PF5-00-000

Male Jackscrew w/ Board Mount, Vertical

- M80-5000000M2-02-PM1-00-000
- M80-5000000M2-04-PM1-00-000
- M80-5000000M2-06-PM1-00-000

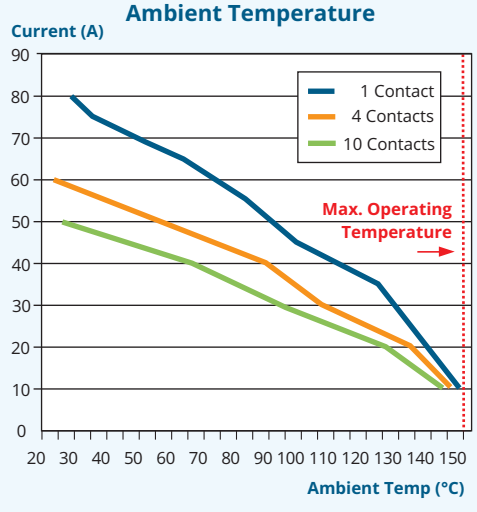
Male, Jackscrew Only, Vertical

- M80-5000000M1-02-PM1-00-000
- M80-5000000M1-04-PM1-00-000
- M80-5000000M1-06-PM1-00-000

Male Jackscrew w/ Board Mount, Horizontal

- M80-5000000M5-02-PM3-00-000
- M80-5000000M5-04-PM3-00-000
- M80-5000000M5-06-PM3-00-000

De-Rate Curves for Current versus Ambient Temperature



Applications

- Industrial machine control
- Medial applications
- And any application where a high current is used particularly at high temperatures.

S09

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DINKLE IS DIFFERENT

The Taiwanese manufacturer of terminal blocks, DIN rail products and solutions and products in the barrier style, has been winning more and more recognition on the market over the past few years. BUT – what are the details that really make DINKLE stand out?

As a manufacturer, DINKLE accepts the challenge of providing products of absolute top quality. And to ensure this, all processes and manufacturing stages are carried out in-house. This starts with development and the preparation of drawings, on to tool production, and through to the manufacture of the insulators, as well as in-house manufacture of metal components (punching, coating, etc.).

About two years ago, an individual company was even established for the production of screws, so as to keep this detail fully under control and supervision as well. The definition of the processes in accordance with ISO 9001:2008 is something we need only mention in passing.

This knowledge, experience, and flexibility come down to one major point of focus at DINKLE:

The great strength at DINKLE is to adapt standard products to the demands of the specific application.

- Customer-specific colors (for the perfect corporate design)
- Special prints (to ensure, for example, that the component assignment is correct)
- Coding
- Modifications to housings (adaptation of the design, adding of a logo, etc.)
- Special packing arrangements
- And a lot more besides

CODICO of course offers a wide range of standard products from DINKLE, with terminal blocks, DIN rail products and solutions and terminal blocks in the barrier style.

The product spectrum includes solutions in screw-fitted and spring-force design, and covers applications in the miniature range through to the high-power sector. The product portfolio is rounded off with solutions for the THR solder process, as well as with terminals with integrated light bars for visual displays.

S10

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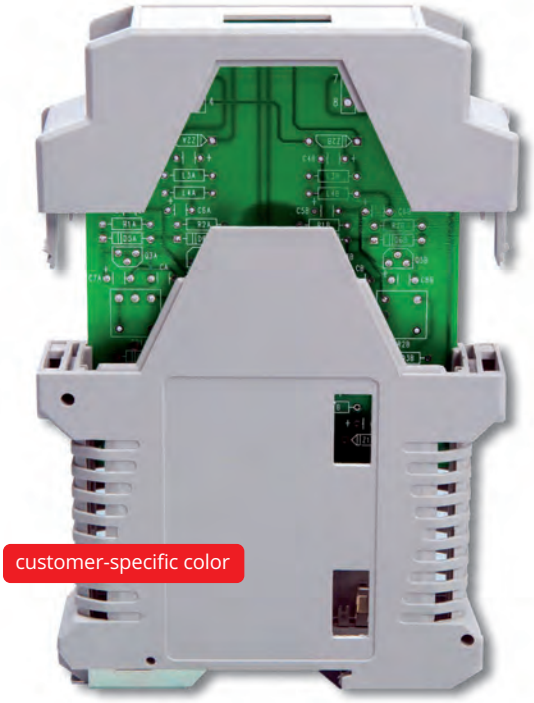
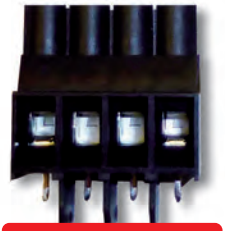
EXAMPLES OF CUSTOMER-SPECIFIC SOLUTIONS



customer-specific color

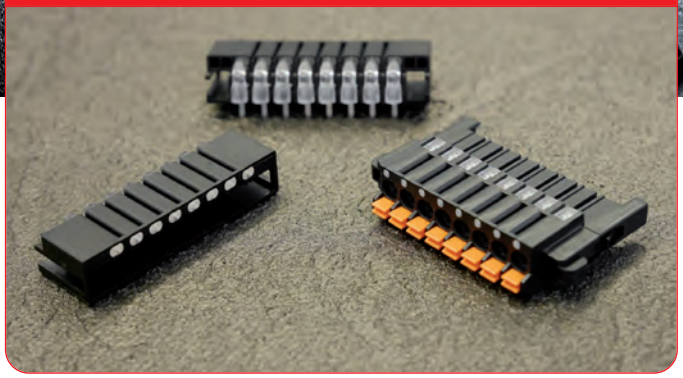


walls were extended

customer-specific printing

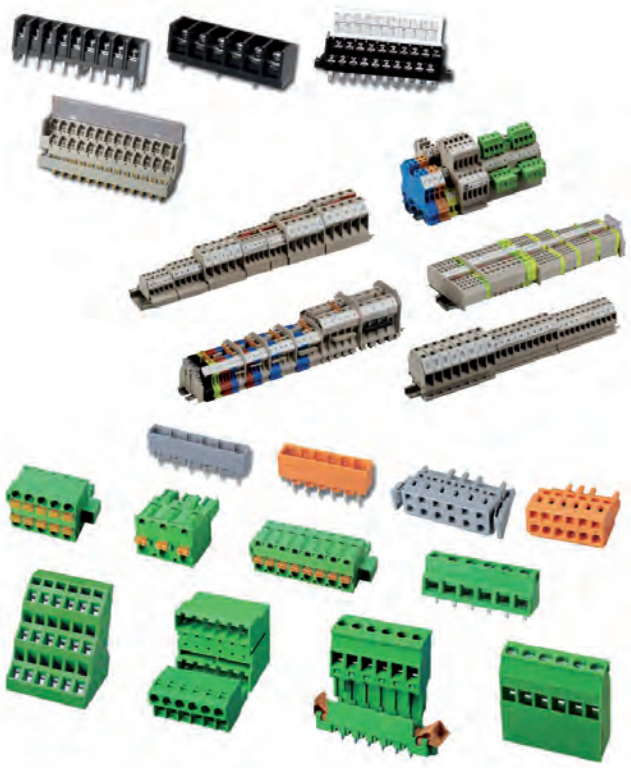
A DIN rail housing's cap was modified to enable a display function with 4 LEDs

TERMINAL BLOCKS WITH INTEGRATED LIGHT BARS



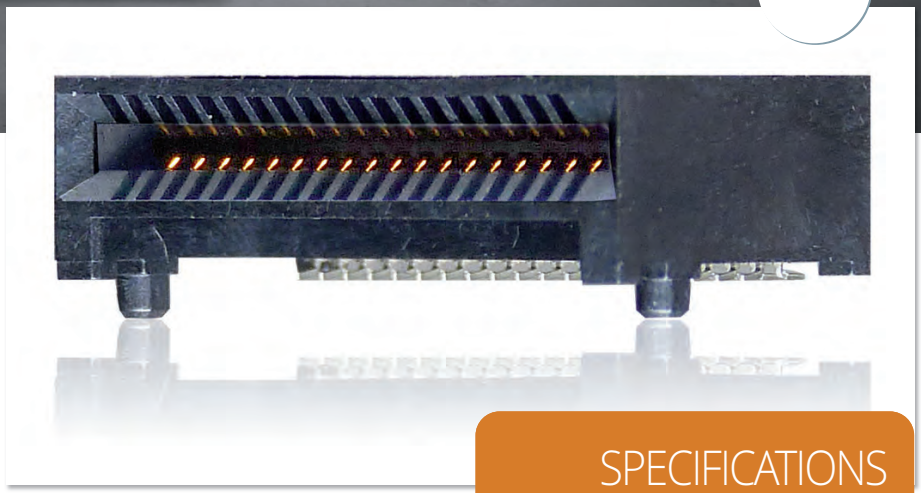
PRODUCT EXAMPLE FOR THE THR SOLDERING PROCESS

PRODUCT EXAMPLES FROM THE STANDARD PORTFOLIO



eQSFP+

Pluggable plus connector for 40/100GbE Ethernet and InfiniBand



After working directly with the QSFP MSA (Multi-Source Agreement) over the past few years, YAMAICHI Electronics is very proud to be leading the high speed connector market by announcing the release of their eQSFP+ product series as the solution for next generation 40GbE/100GbE Ethernet applications.

With the recent increasing demand for a faster and more reliable form factor signal transmission interface, Yamaichi Electronics proudly presents our high-speed 32Gbps enhanced Quad Small Form-factor Pluggable plus (eQSFP+) host connector, CN120-038-000*. This host connector establishes the high-speed connection with QSFP transceiver modules.

The CN120-038 series and its cage accessories is 100% footprint compatible with existing 10Gbps & 25Gbps QSFP standards. The connector is also compatible with many existing and new generation InfiniBand & Ethernet QSFP modules on the market. With these features, CN120-038-000* provides maximum signal performance with the convenience for designing and upgrading your systems.

Features

- Ultra High-Speed performance more than 32Gbps transmission speed per channel
- Compatible with existing and new QSFP modules (such as 40Gb & 100Gb Ethernet modules, InfiniBand: QDR/FDR/EDR)

S11

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SPECIFICATIONS

- Current per contact: 0.5A max.
- Voltage Rating: 120V AC
- Operating Temperature: -55°C ~ +85°C
- Mating Life Cycle:
  0.76µm Au Plating = 250 cycles
  0.38µm Au Plating = 50 cycles

SOURIAU's new UTL series

POWER+CONTROL+DESIGN

A unique hybrid layout combines Power and Control!

SOURIAU

The contact arrangement was designed to optimize signal integrity for RS-485 transmission (DMX, etc) while simultaneously delivering power supply to eliminate added connector costs.

The UTL Series is a plastic connector range that meets current safety standards like UL, VDE, CE. The stainless steel latch coupling system is simple to use. With only one finger, connectors are mated with an audible and sensitive »click«.

The Key hole of the coupling system allows blind mating. In dark conditions the mechanical discriminations allow easy mating to avoid connector damage. The UTL Series is rated at IP68/IP69K even in dynamic conditions and remains sealed even when used continuously underwater or cleaned using a high pressure hose and cable is moving. It uses an outdoor rated material per UL.

SOURIAU can also offer overmolded cable assembly solutions. This value added service allows customers to reduce the number of suppliers and take advantage of the »best in class« quality of the Souriau group. Overmolding is a process that further enhances the sealing properties and helps to minimize stress on the cable termination to the connector. In addition, the wires are encapsulated inside the molding which creates a barrier preventing liquid/moisture from entering the equipment through the connector or cable jacket if breached.

HIGHLIGHTS

- Waterproof IP68/69K
- UL and IEC compliant
- UV resistant
- 1.000 matings & unmatings
- Electrical: acc. UL 600V, 16A, UL84 5VA
- First Mate, Last Break contact mating on ground line

S12

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News from STOCKO

Proven series were renamed!

As part of a new system solution for a uniform product naming a new naming concept is applied in the future.

In preparing this name concept it has been specified that some existing names of article series need to be adjusted.

OLD	NEW
STO-GRID 2.54mm	S-GRID 2.54
STO-FIT 4.20mm	S-FIT 4.20
STO-LOCK 6.35mm	S-LOCK 6.35

To get more information about STOCKO and its products please contact

S13

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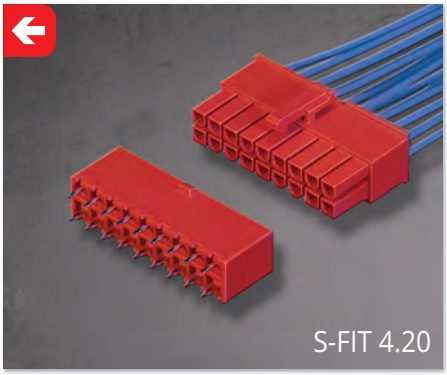
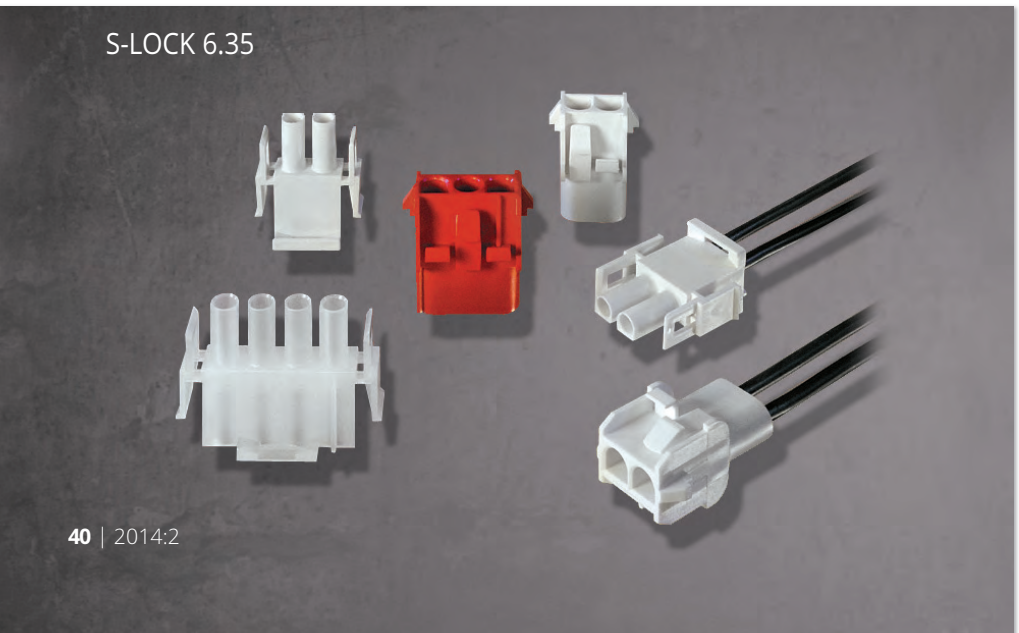




RUBYCON NEWS 2015

RUBYCON NEWS 2015

ALUMINIUM-POLYMER CAPACITORS

The radial leades version of these polymer solid-electrolyte capacitors, already introduced, has now been supplemented by three SMD series. With PAV, PCV, and PZC a temperature range of up to 125°C is available.

RADIAL ELECTROLYTIC CAPACITORS

With ZLS RUBYCON has an economical solution to offer in the low-ESR electrolytic capacitor sector. In terms of technology and price, this fits between ZL and ZLH.

For automotive applications, HGX series has been developed, offering a temperature range of up to 135°C and high ripple current capability.

The compact long-life YXM Series now has an extended temperature range of down to -40°C.

AX – high ripple currents in compact dimensions, now also in 16~35V!

In the upper voltage range of TXW Series, the guaranteed life time has now been extended to 12,000 hours.

SMD ELECTROLYTIC CAPACITORS

TPV is another achievement in miniaturization in the low-ESR electrolytic capacitor sector.

RUBYCON has now extended the 105°C Standard Series SGV by a 400V version, a series that up to now was only available on special request.

DOUBLE LAYER CAPACITORS

DMC – Rated voltage raised to 3V!

SNAP-IN

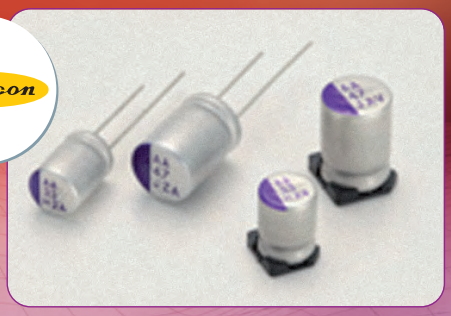
MXC – MXG – MXH – **MXK**:
With MXK, Rubycon has achieved further miniaturization of the 105°C versions.

MXG Series has been extended by the low-voltage range of 10~35V.

SCREW TERMINALS

The product range of screw-terminal electrolytic capacitors has been extended by the Series LSA (85°C, 20,000h) and LSC (105°C, 5,000h, high ripple current capability).

LSU Series (85°C, 5,000h) will also be available with 550V in future.



P01

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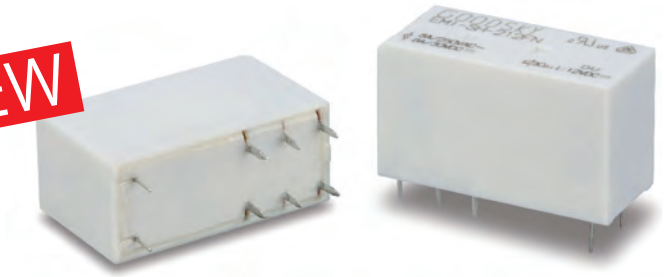
EMI-2P SERIES

The new »Design to Performance«
8 Ampere 2 pole general purpose relay

NEW



This new relay finds its way in numerous industries such as home appliances, industrial machinery and building management. The use ranges from light control, power supply, IO modules, audio equipment and door opening control just to name some applications.

Here are the technical details at a glance:

- New inside structure for improved technical performance and cost efficiency
- Standardized 5mm pinning
- 3 contact forms available: 2CO/2NO/2NC
- Excellent VDE rating of 30.000 operations at the CO version at 85°C
- AgSnO-Indium, AgNi or AgSnO contacts as standard for proper performance with resistive loads but also with inductive and capacitive loads such as motors or lamps which may cause high inrush currents
- DC coil – low power consumption of 400mW
- Compact dimensions of 29.4x12.8x17.45mm (L/W/H)
- > 8mm creepage and clearance safety distances with 5kV dielectric strength between coil and contacts
- VDE and UL & C-UL listed
- Product is in accordance with IEC 60335-1 and IEC 60730-1
- UL class F insulation available
- Halogen Free series available

As all focus products from GOODSKY also this new relay is produced fully automated on a complete new invested production equipment. The highlight of the line is the automated adjustment module, an own development of GOODSKY securing highest adjustment precision and consequently a high and homogeneous electrical performance.

P02

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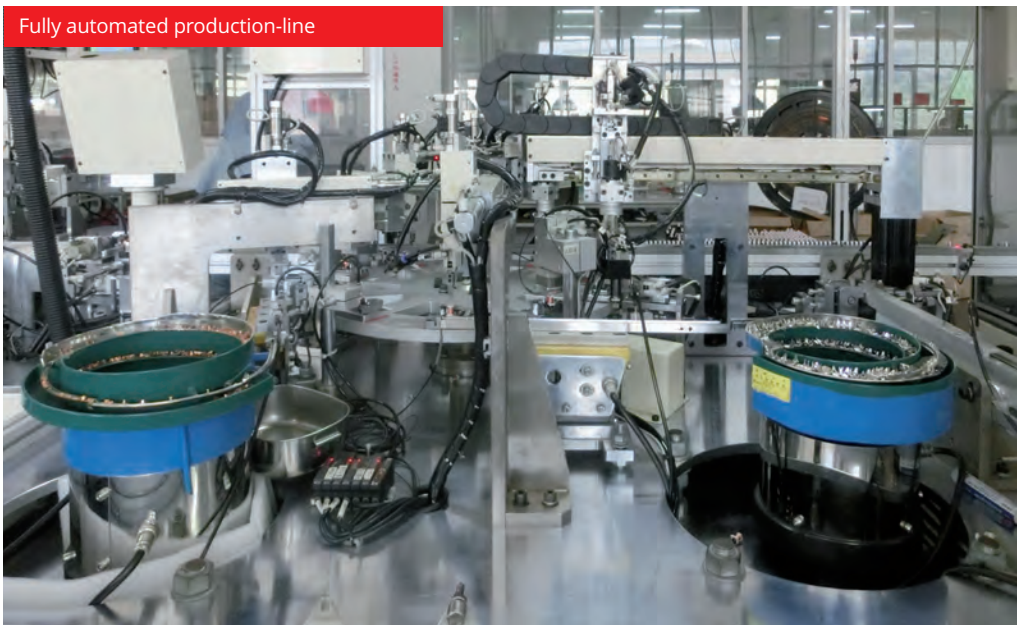
Fully automated production-line



RECYCLABLE RESONANCE TRANSFORMER

SUMIDA's new EVD Series is ideal for LED applications – and it's recyclable too!

LLC resonance topology has been marked in the last few years by the generally increased demand for optimized energy efficiency in view of profitability and legal requirements, as well as due to the need for power supplies with high output capacities, especially for applications such as LED lighting.

With the new EVD Series, SUMIDA now covers the needs of LED technology and fulfils all the specified standards. Thanks to the new structure, which does not use any potting, the relevant components of the resonance transformer can be disposed of separately. This means that the EVD Series meets the European »Waste of Electrical and Electronic Equipment« (WEEE) Directive, which is aimed at avoiding, reducing, and environmentally-friendly disposal of electrical waste. Because of the missing potting there is a further positive impact related to the manufacturing costs. In comparison with similar transformers, the EVD Series provides an economical solution for most LED applications.

We have summarized the most important technical data and standards of the EVD Series for you

- Design according to EN 61 347-1
- All materials according to insulation system class B – ISOSAFE 512
- Creepage and clearance distance ≥ 7mm
- High voltage test begin-end 1.5 kVPP
- The standard DIN EN 61558 specifies safety requirements for transformers, chokes, power units, and similar elements for supply voltages of up to 1100V
- The standard DIN EN 61347 specifies general and safety requirements for lamp controlgear for use on d.c. supplies up to 250V and/or a.c. supplies up to 1000V at 50Hz or 60Hz

1 | < 70 Watt / height ≤ 20.1mm
2 | < 50 Watt / height ≤ 17.5mm
3 | < 40 Watt / height ≤ 13.8mm

The resonance transformer is available in three different performance classes and dimensions

1. < 70 Watt / height ≤ 20.1mm
2. < 50 Watt / height ≤ 17.5mm
3. < 40 Watt / height ≤ 13.8mm

P03

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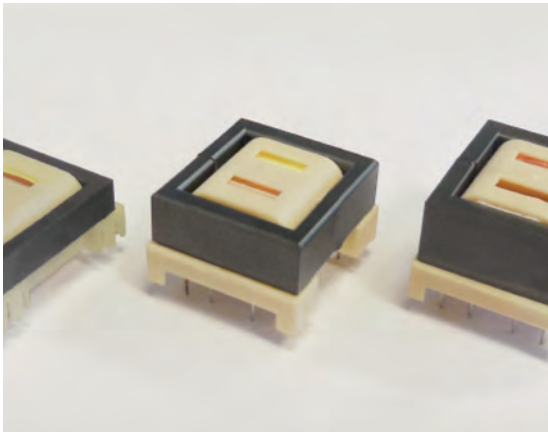

CRYSTAL FOR SMART CARDS

Recent trends in electronic equipment are moving toward smaller size and lower profile, but with higher performance and functionality. KDS develops their components to follow the same trends.

An excellent example of continuous development of new products is release of extra thin (0,35mm) tuning fork crystal in 1.6x1.0mm size (DST1610AL). DST1610AL can even meet requirements according to standard specification for smart cards.

Smart Cards have become an everyday item, typically used for Electronic Banking. The amount of information stored on a smart card is substantially larger than on a conventional magnetic stripe card. Accordingly, it has become necessary to enhance smart card security, which includes cards capable of generating one-time password.

Such cards need to have a built-in tuning fork crystal oscillator to provide an accurate source clock frequency. However, it is difficult to embed a conventional tuning fork crystal oscillator into a smart card whose thickness must be 0.76mm. The challenge for KDS has been to reduce the height of crystal oscillators to 0.35mm at maximum.

Generally, when downsized, a tuning fork crystal component noticeably degrades in electrical characteristics since its series resistance increases. Moreover, in element mounting, the conventional use of electrically conductive adhesive is subject to design limitations, if the aim is to make the product smaller and thinner. To solve these problems, KDS has refined the element design (patented) first employed in the existing model DST210A.

Due to its long experience, KDS is able to reduce oscillation leaks to the base section and keep serial resistance at 90kΩmax.

Furthermore, in terms of characteristics, the DST1610AL is equivalent in performance and reliability to the existing model DST210A (2,0x1,0mm).

P04

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The small SMD piezoelectric sounder for big missions

Ultra compact light and low power SMD piezoelectric sounder suits portable health care devices.

MURATA recently announced to commence mass production of, what they believe to be the smallest and lightest surface mount piezoelectric sounder available.

Occupying significantly less surface area, and with a combined weight and area reduction of 44% compared to previous MURATA products, the PKMCS0909E4000-R1 measures just 9x9x 1.9mm and weighs only 160mg.

Sound pressure level output, measured 10cm from sounder, is higher than 65dB when driven with a ±1.5V 4kHz square wave. Maximum peak-to-peak voltage is ±12.5V. Power consumption is typically 0.6mW, which helps preserve battery life in power budget constrained consumer electronic devices. Since the sounder does not use any magnets or coils to create sound it doesn't generate any electrical noise and therefore has minimum impact on surrounding circuitry.

Typical applications for the PKMCS0909E4000-R1 include blood glucose meters, personal thermometers, camera strobe flash and bluetooth dongles.

FEATURES

- Small, thin and lightweight
- 9.0mm x 9.0mm x 1.9mm
- 44% less than current one
- Low power consumption
- The piezo based brings in noiseless because of magnet less

Combined weight & area reduction

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P05

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Class D Amplifiers: Inductor for 200W

New power chokes from SAGAMI for Class D amplifiers. Extremely low ohmic resistance with high current values.

One of the basic constituent parts of every sound-reproducing system is the power amplifier or the audio output amplifier. In devices from the consumer and automobile electronics sector, as well as the professional or high-end range, integrated audio output amplifiers are hugely popular.

SAGAMI offers a wide range of inductors for the power classes from 10W to 300W, and is the market leader in this sector of Class-D technology.

For applications in 200W with Class-D amplifiers, SAGAMI has developed the new KG23B Series, manufactured with costs-optimized solutions in mind.

The new KG23B Series

The new KG23B Series is available with inductance values of 10µH, 12µH, 15µH, 18µH and 22µH and with saturation currents of 18A to 36A.

Samples available on enquiry. We looking forward to hearing from you soon.

P06

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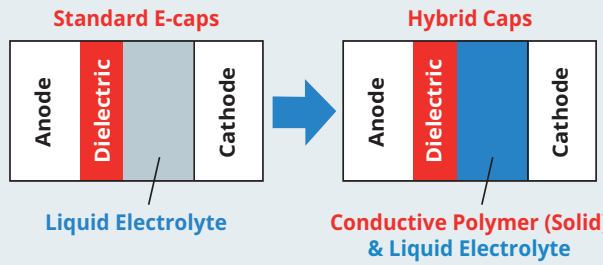
ALUMINIUM-HYBRID-

Thanks to a combination of liquid electrolyte and highly conductive polymer, EP caps from SUN provide low ESR values and high ripple current capability in compact case sizes. While polymer capacitors are often over-specified and therefore too expensive, this technology saves costs, as well as saving space in comparison with conventional low-ESR electrolytic capacitors.

Internal structure



SUN EP-caps will satisfy with following characteristics

- Low ESR
- High ripple current capability
- Nearly stable ESR over the whole temperature range (see graphic)
- Low ESR at high frequencies (see graphic)
- High rated voltage
- No voltage derating to take into account

SUN offers a wide range of different series, giving you the opportunity to choose the fitting product for your application. The following tables show details of the excellent features and performance values of this technology.

The 105°C-SMD-Series

HVA-series (SMD 105°C standard)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/105°C	DIMENSIONS (mm)	LIFETIME (h)
6.3	100	36	1630	6.3x6.0	3.000
6.3	1000	15	3890	10x10.5	5.000
10	330	18	2800	8x10.5	5.000
16	150	20	2920	10x10.5	5.000

HVH-series (SMD 105°C long life)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/105°C	DIMENSIONS (mm)	LIFETIME (h)
16	560	15	3000	10x12.5	7.000
25	27	95	800	6.3x4.5	2.000
35	47	60	1300	6.3x7.7	5.000
40	120	18	2750	10x12.5	10.000
50	56	25	2320	10x10.5	10.000
63	22	40	1560	8x10.5	10.000
80	18	50	1830	10x12.5	10.000
100	15	60	1660	10x12.5	10.000
125	10	90	1250	10x10.5	10.000

HVHZ-series (SMD 105°C high ripple current)

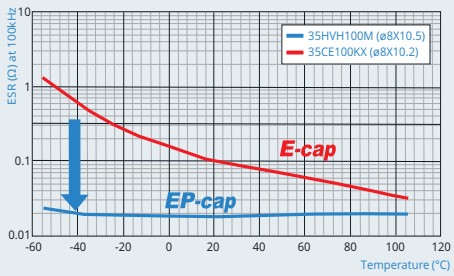
VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/105°C	DIMENSIONS (mm)	LIFETIME (h)
16	82	38	1890	6.3x6.0	2.000
16	560	14	4340	10x12.5	5.000
25	68	35	1980	6.3x7.7	2.000
25	270	19	3580	10x10.5	5.000
35	100	28	2550	8x10.5	5.000
40	120	16	3870	10x12.5	5.000

HVHF-series (SMD 105°C long life, high ripple current, miniaturized) NEW 2015

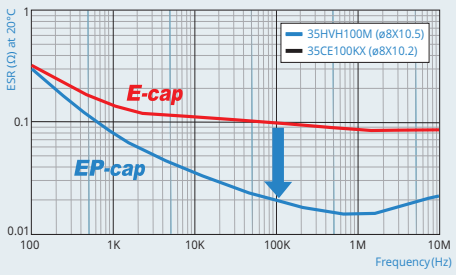
VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/105°C	DIMENSIONS (mm)	LIFETIME (h)
25	56	50	1300	6.3x6.0	10.000
25	470	16	2800	10x12.5	10.000
35	68	35	2000	6.3x7.7	10.000
50	150	19	2300	10x12.5	10.000
63	56	30	1800	10x10.5	10.000
80	22	45	1550	8x10.5	10.000

ELKOS

Temperature characteristics



Frequency characteristics



And for applications with a higher request to ambient temperature, versions which meet this requirement have also been developed.

P07

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The SMD-Format

HVBF-series (SMD 125°C standard)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/125°C	DIMENSIONS (mm)	LIFETIME (h)
6.3	150	36	920	6.3x6.0	1.500
6.3	560	16	1780	8x10.5	2.000
10	100	35	1020	6.3x7.7	1.500
16	150	20	1650	10x10.5	2.000

HVP-series (SMD 125°C long life)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/125°C	DIMENSIONS (mm)	LIFETIME (h)
16	560	15	2320	10x12.5	2.500
25	150	27	1330	8x10.5	3.000
35	47	60	910	6.3x7.7	2.000
40	56	32	1220	8x10.5	3.000
50	82	19	1590	10x12.5	3.000
63	33	30	1260	10x10.5	3.000
80	15	70	900	10x10.5	3.000
100	15	60	1000	10x12.5	3.000
125	10	90	750	10x10.5	3.000

HVPZ-series (SMD 125°C high ripple current)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/125°C	DIMENSIONS (mm)	LIFETIME (h)
16	120	32	1440	6.3x7.7	1.500
16	470	18	2620	10x10.5	2.500
25	47	40	1260	6.3x6.0	1.500
25	150	25	1880	8x10.5	3.000
35	220	15	2800	10x12.5	3.000
40	100	21	2360	10x10.5	3.000

HVPF-series (SMD 125°C long life, high ripple current, miniaturized) NEU 2015

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/125°C	DIMENSIONS (mm)	LIFETIME (h)
25	100	30	1400	6.3x7.7	4.000
25	470	16	2260	10x12.5	4.000
35	47	60	900	6.3x6.0	4.000
50	120	28	1600	10x10.5	4.000
63	68	22	1650	10x12.5	4.000
80	22	45	1030	8x10.5	4.000

HVT-series (SMD 135°C)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/135°C	DIMENSIONS (mm)	LIFETIME (h)
25	68	45	780	6.3x7.7	1.000
35	220	17	1360	10x12.5	2.000
40	56	32	980	8x10.5	2.000
50	56	25	1110	10x10.5	2.000
63	10	100	590	6.3x7.7	1.000

The radial leaded versions (105-125°C)

HEH-series (radial leaded 105°C long life)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/105°C	DIMENSIONS (mm)	LIFETIME (h)
16	470	21	2600	10x9.5	7.000
25	330	16	2900	10x11.5	10.000
35	47	60	1300	6.3x7.2	5.000
40	100	24	2400	10x9.5	10.000
50	33	35	1670	8x9.5	10.000
63	10	100	1060	6.3x7.2	5.000
80	12	70	1600	10x9.5	10.000
100	15	60	1660	10x11.5	10.000

HEHZ-series (radial leaded 105°C high ripple current)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/105°C	DIMENSIONS (mm)	LIFETIME (h)
16	470	18	3750	10x9.5	5.000
25	330	14	4140	10x11.5	5.000
35	47	45	1840	6.3x7.2	2.000
40	100	21	3380	10x9.5	5.000

HEPZ-series (radial leaded 125°C)

VOLTAGE (V)	CAPACITANCE (uF)	ESR (mΩ) max @100kHz/20°C	RIPPLE CURRENT (mA) @100kHz/125°C	DIMENSIONS (mm)	LIFETIME (h)
16	120	32	1440	6.3x7.2	1.500
25	150	25	1880	8x9.5	3.000
35	220	15	2800	10x11.5	3.000
40	27	48	1230	6.3x7.2	2.000

VARISTORS

Thermally Protected - offered by THINKING

Continuous over-voltage, which is mostly caused by the line imbalance of neutral to ground in AC line or abnormal connection of power system, triggers a varistor into a continuous clamping condition and results in fire or smoke.

Therefore, THINKING offers thermally protected varistor, TVT series, to effectively disconnect the varistor from circuit under abnormal over-voltage and limited current condition (requirement of UL 1449 3rd Edition, Section 39.4 and TÜV) to ensure user safety.

In addition to the two terminal wires of the varistor, THINKING offers device which has a third terminal that may be used to send warning signals to an LED, for instance, to indicate that the fuse has been activated.

Thanks to TVT's patented design, the components offer short disconnection time and more reliable operation to replace thermal fuse in circuit, so that reduces part count. In addition, thermal fuse is not suitable for wave soldering. TVT's excellent heat resistance solves this problem and enables automatic production. In other words, TVT series is a good solution for over-voltage protection and cost control.

Those components are available in a body size of 14mm, 20mm, 25mm, 32mm and 34mm (diameter), with an operating voltage ranged from 130VACto 750VAC, and a withstanding current capability raged from 6000A to 40000A. TVT series is recommended over-voltage protection components for various applications:

- Power Supply
- Household appliances
- TVSS module
- Solar Inverters

P08

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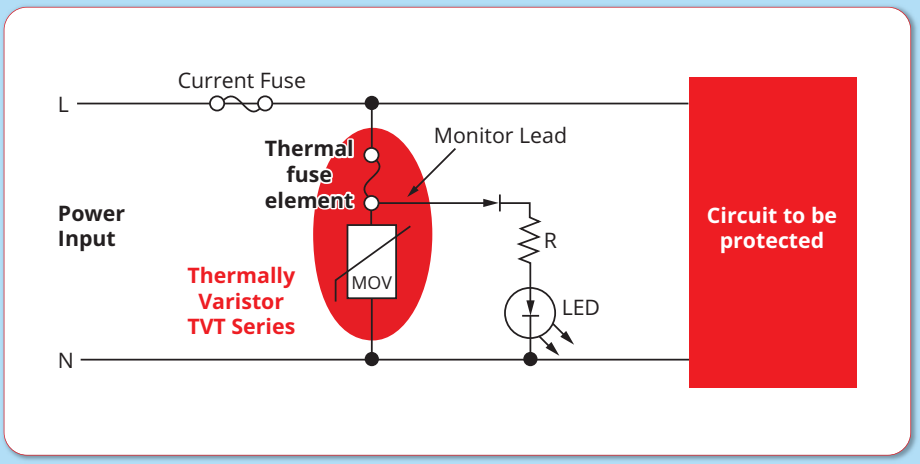

The sporty side of CODICO

Elisabeth Streiter-Bax in »Action«

In June two CODICO people hit the high spots: Elisabeth Streiter-Bax and René Haller took part in the European Triathlon Championship, held in Austria for the third time, this time in the city of Kitzbühel.

Over 2,400 athletes from 40 nations were at the start line in Tirol this year, but our colleagues are anything but beginners when it comes to triathlon competition. In 2011 Lisa won herself a place on the podium in the Austrian Ironman contest, with a phenomenal 3rd place. For René, too, competitions like these are a familiar environment; in 2000, by way of example, he was the fifth best Austrian to complete the course in the Ironman World Championship in Hawaii. With a team like this, CODICO was there at the start line in Kitzbühel, with Lisa Streiter-Bax and René Haller raring to go.

The weather was ideal in the run-up to the competition, but on Triathlon day things changed and our two participants set off in rain and at a temperature of some 14°C.

The first discipline consisted of a 750 meter swim in Lake Schwarzsee, followed by a 20 kilometer cycle race, with the mountains of the Tirol providing gradients of up to 20% to conquer. After that, 5 kilometers of running, which with elevations of some 60 meters called for a lot of effort.

Looking back, our two triathletes had an eventful time of it. We congratulate René Haller on an excellent 14th place, which he more than fought for!

And on 4 September 2014 CODICO was back on the start line, this time at the annual Business Run in Vienna. This year CODICO fielded three teams. The draw of sports attracted no less than nine of our colleagues to do their best over the course. In a great atmosphere, nearly 48,000 runners took part, and with summer temperatures no longer quite lukewarm, most of our people covered the 4.2 kilometres with no problem.

D03

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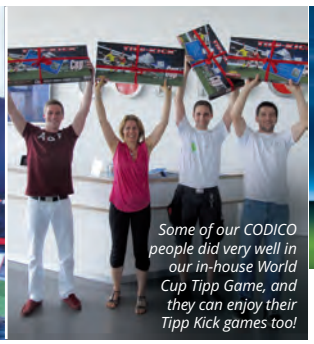
Place 1: Axel Schmidt (left)

Place 22


Some of our CODICO people did very well in our in-house World Cup Tipp Game, and they can enjoy their Tipp Kick games too!

That was the CODICO Football World Cup

No sooner does a world championship begin, than it seems to be over! The 2014 World Cup in Brazil was a nail-biter, edge-of-seat event, colorful, loud... and simply wonderful.

And our customers were able to take part, too. Thanks to the World Cup Calendar designed by CODICO, the results could be recorded as they happened, and the events followed as they unfolded. For the German fans among our clients there were accessories in the form of our Germany fan make-up, which made one or another public viewing all the sweeter. But CODICO really brought football home with our Online Tipp Game. On our own CODICO World Cup Tipp Website, assessments about the outcome of the games could be entered and points collected. And for the winners there were some great prizes on offer: For places 3 to 33, Tipp Kick games were awarded, to keep the football spirit going even longer.

Second place went to Mr. Haarseim from Schilling Marking Systems in Tuttlingen, who can enjoy a VIP football day for two with the world champion goalkeeper Jean-Marie Pfaff in Munich. And Mr. Axel Schmidt from ebm-papst in Mulfingen, with 176 points, was right on top of the podium: As first prize he and a companion won VIP tickets to a game featuring the new World Champions fresh back from their victory, in Dortmund. He already saw the start of the European Cup qualifying games, with Germany meeting the Scottish national team in the first round. Mr. Schmidt watched the excitement from VIP GOLD seats to cheer the German national eleven on!

We would be really pleased if you too were to catch the football fever with CODICO, and provide some pictures from a time that was pure excitement!

D04

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CODICO TEAM

Hello readers!

Andreas Schuster

A very good day to you, my name is Andreas Schuster and, with one short interruption, I have been with CODICO for almost eight years. I started in the Active Components section and for three years I have been with the »Passives«, working in consultancy external service. Before working at CODICO, I had already been able to gather a number of years of experience, and I have become familiar with the work both in major industrial groups as well as in smaller companies.

This means that I can't describe in one sentence what I really like about working at CODICO. On the one hand, there's the really good working atmosphere inside this family-run business, where the decision-making channels are short, where everyone knows everyone else, where age differences mean nothing – and I now count myself among the old timers – and we all pull together to achieve the same goals.

On the other hand, I'd never before worked in a company where the corporate values of »We bear responsibility«, »We live like a family«, and »We are dynamic« are the everyday reality, wherever you stand within the firm. In my view, another important factor is to make a summary at the end of the day as to what I've contributed towards achieving what we set out to do, and what I've succeeded in »doing for the customer« – job satisfaction is enormously important to me.

This is a business of extremes, and by its nature that means that things can very often get very hectic. So when it comes to leisure time, I like to go walking, cycling, or meeting up with friends. Sometimes I even get caught out with my company Blackberry switched off... ;-).

As I live close to the company, I also often go to the home games of the football club Admira Wacker, because as a youngster I got onto the pitch there myself. As well as that, I find it very important, especially in a time when profit-grabbing and egotism are features of everyday life, to become socially engaged, and I am an active member of the Lions Club of Biedermannsdorf, my home municipality. This social commitment towards helping other people has very often shown me how quickly values change, and that's why I live my life by the motto: Enjoy the day, but do one good deed a day, above and beyond the job!

And in this spirit I look forward to the further developing and strengthening of our customer relationships ;-)

D05

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Harvey Wilson

I've been asked to write a little about myself so here goes. I joined Codico in June 2011 and work as a Product Manager and FAE for Europe. I previously worked as a European application engineer for VITESSE Semiconductor for 10 years, mainly supporting Telecommunication and Ethernet products.

I'm 46 and live In Southport in the UK with my Fiancée and two fantastic children. They have the power to make me feel like a 10 year old and a 90 year old all within the space of an hour.

I love to travel and experience new cultures (which comes in very handy with my job) I've been very lucky and managed to visit many fantastic places. Luckily there is always more to see and do and one place I have never been is Asia, which I hope to visit soon.

I love watching Liverpool football Club (until recently my home town). I used to play a lot of football myself along with kick boxing and running. My hobbies nowadays are much more sedate. Archery, horse riding and walking in the country. I also like to draw, photography and listen to music.

D06

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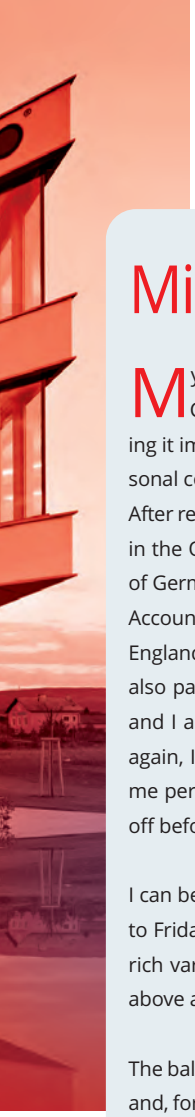

Michaela Menghini

My name is Michaela Menghini, and I have been part of the CODICO Team since March 2007. As always, I'm still enjoying it immensely, and having a lot of fun in making my own personal contribution to the success of a dynamic young company. After returning from maternity leave (06/2009 – 03/2011) I'm now in the Order Processing Department, responsible for the areas of Germany Postcode 7, for Switzerland, and also for major Key Accounts in Austria and Germany, with representation abroad in England, Switzerland, Poland, China and Mexico. Because I was also partially involved with these areas before I went on leave, and I am in a position to work with the same clients and contacts again, I found it particularly easy to get back to work again. It gave me personally a great deal of pleasure to take up again where I left off before the birth of my second child.

I can be reached by my clients for a total of 29 hours/week, Monday to Friday, and every day is an exciting new challenge, answering the rich variety of enquiries and requests from all over the world, and, above all, keeping the customer satisfied.

The balance to this is my family, my husband, my grown up daughter, and, for five years already, our sun shine Lucas. He's a happy, friendly, fair-headed very inquisitive boy, who is keen to know everything. Every minute I spend with him is a joy, and it's a treat to see how quickly he's developing, and how fast he's growing up. Someone once said that »anyone who says richness is everything has never seen a child laugh«, and I can confirm that 100%. Every free minute with him is a pure pleasure.

We arrange our leisure time so as to ring the changes. At the weekend we take trips together, go cycling, swimming, skating, and most recently playing football. We mostly spend our holidays abroad, and my professional life before CODICO (17 years with a travel agency) comes in very handy in those situations. We visit foreign countries, and we always do that little bit more to get to know the country, the people, and the music that little but better – and we've always succeeded in getting our little man to really enjoy himself.

One of my favorite quotations, which comes to my mind over and over again, is this: »Take a child by the hand and let him lead you. Look at the stones he picks up, and listen carefully to what he tells you. Your reward will be to go back to a world that you'd long forgotten«. In this spirit, then, I look forward to hearing from you.

D07

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Angelika Stöffl

My name is Angelika Stöffl and this year I'm celebrating ten years of being with CODICO. It was ten years ago that I first had the opportunity to introduce myself, and since then there have been some changes in my life.

I met my husband, did some conversion work on his parents' house, and at the same time planned and organized our wedding, and 10 months later we moved to Vienna. Two years later we had our »sprog«, Fabian, and he's kept us on our toes ever since.

My hobbies then were motorbike riding, hiking, and dancing, but I have had to reduce these to a minimum, and now things are developing in another direction entirely – organizing children's parties, setting up parent and child gatherings at the local vicarage, making little trips away and going for walks, or spending enjoyable afternoons with like-minded friends and families.

After my two years maternity leave, I have been able to get back working part-time in my old department of Logistics/Customs administration, and since then I have been giving my best in support of my colleagues for three days a week. Among my tasks are incoming/outgoing goods, Customs clearance, suppliers' declarations, and the article origin checks that go with this, the preparation of routing orders, transport price calculation, and acting as representative in freight forwarders invoice auditing.

Over the years I have grown with my tasks with CODICO, in all senses – I have become an adult. The varied nature of my work and the friendly working environment at CODICO provide a pleasing balance to my private life as housewife and mother that I find very refreshing.

Our son still talks about our CODICO Family Day, which was a really impressive experience for him – quite apart from the excitement of the high-stack machine. Maybe next time I make an anniversary report, I'll be able to say that our son is doing his summer practical work at CODICO.

D08

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