

2015/2

impulse



QUECTEL: Mini-PCIe Modules

ISABELLENHÜTTE's Shunt Resistors

FunctionMAX™-Family from HIROSE

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QUECTEL Wireless Solutions announced the EC20 and EC20 Mini PCIe modules. The new generation of LTE modules adopt the 3GPP Rel. 9 LTE technology, delivering 100Mbps downlink and 50Mbps uplink data rates and offering multi-band FDD-LTE (B1/B3/B5/B7/B8/B20) along with HSPA and GPRS/EDGE.

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IMPRINT: Issued by CODICO GmbH
 Zwingenstr. 6-8, A-2380 Perchtoldsdorf
 Design: www.rittbergerknapp.com | date of issue: 30-10-2015

20 Years with Quality Austria

This year CODICO is celebrating not only 20 years of ISO certification, but also 20 years of highly successful and close co-operation with Quality Austria. And to mark the occasion, in September Mag. (FH) Dr. Andreas Bürgmayr honored us with an award.

Quality Austria is Austria's leading contact for the economy and society in general for all matters relating to integrated management systems, based on quality, environmental, safety, and health management, and for CODICO a reliable partner in ensuring that our own quality management will continue to develop in future exactly as it should do.

The revision of the world's most successful standard, ISO 9001, has almost been completed, and we are looking forward to the opportunities this will provide for our company, and to working together with Quality Austria to put it into effect.

D01

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Petra Huynh takes the Quality Austria award for CODICO.



Sven Krumpel
CEO CODICO

Dear Readers,

CODICO – I like it!

By pressing the »Like« button on social networks we are able nowadays to express our views on a huge variety of topics, and I would like to take the opportunity of this edition of Impulse to post my great »Like« for the staff, partners, associates, suppliers, and customers of CODICO.

While the component distribution sector in general grew by 2.4 percent in the second quarter of 2015, CODICO even topped this figure. Growth like that is not just a brief period of success for us; it has been a constant trend for years. We are always looking forwards – and looking into the future, with some circumspection, we still see this development as confirmation of our strategies. And we're not simply satisfied with defining them – we're putting them into action!

Growth means an above-average readiness for change and open attitudes. That is what CODICO stands for. Seeking out opportunities, finding them, and putting them to advantage, are guidelines which we are happy to integrate into our strategy. Whether this means looking for manufacturers with the skills and abilities we want, putting interesting projects into action, or mastering new markets, turning opportunities into action is one of the challenges we're happy to accept.

And although I am not normally the kind of person who likes banging a drum, I do want to take this opportunity to press my »Like« button – for a shared aim, for strategic growth, and for opportunities taken up and put to advantage!

D02

▶ Sven Krumpel



EC20



QUECTEL Launches EC20 and EC20 Mini PCIe Modules – Multi-mode LTE Modules with High Sensitivity and Robust Functionality.

QUECTEL Wireless Solutions announced the EC20 and EC20 Mini PCIe modules. The new generation of LTE modules adopt the 3GPP Rel. 9 LTE technology, delivering 100Mbps downlink and 50Mbps uplink data rates and offering multi-band FDD-LTE (B1/B3/B5/B7/B8/B20) along with HSPA and GPRS/EDGE.

EC20 series includes EC20-E (supports European FDD-LTE/WCDMA/GSM band), EC20-A (supports American FDD-LTE/WCDMA/GSM band), and 5-mode/13-band EC20-C (China FDD-LTE/TDD-LTE/TD-SCDMA/WCDMA/GSM band). EC20 Mini PCIe contains two variants EC20 Mini PCIe-A and EC20 Mini PCIe-E, which makes them backward-compatible with existing EDGE and GSM/GPRS networks to ensure that it can connect even in remote areas devoid of 4G or 3G coverage.

»LTE series modules cater to customer demands on 4G networks with more stable network connection and reliable data communication«, said Delbert

Sun, QUECTEL Marketing Director. »Moreover, EC20 module is fallback compatible with QUECTEL UMTS/HSPA+UC20 module in the compact and unified form factor, enabling network migration within a single design while ensuring long-lasting, future-proof applications. LTE modules give customers the ability to embed support for the latest mobile broadband technology in a variety of connected devices and provide an even faster or real long lifetime mobile Internet experience with 4G LTE technology.«

LTE modules support Multiple-input multiple-output (MIMO), a cutting edge antenna technology, transmitting multiple data streams on multiple

transmitters to multiple receivers. The antennas at each end of the communications circuit are combined to minimize errors and optimize data speed. They also combine high-speed wireless connectivity with embedded multi-constellation high-sensitivity positioning GPS+GLONASS receiver. A rich set of Internet protocols, industry-standard interfaces (USB/PCM/USIM/NETLIGHT/UART) and abundant functionalities (USB drivers for Windows XP, Windows Vista, Windows 7, Windows 8/8.1, Linux, Android/eCall/DFOTA/GNSS) extend the applicability of the module to a wide range of M2M applications such as CPE, router, data card, rugged tablet, automotive, security and industry PDA.

For more information please contact

A01

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QUICK SPECS

Frequency Bands	EC20-E	
	FDD LTE: B1/B3/B5/B7/B8/B20	
	UMTS: B1/B5/B8	
	GSM: 850/900/1800/1900MHz	
	(Different frequency bands for American and Chinese version)	
LTE Version	3GPP E-UTRA Release 9	
Bandwidth	1,4/3/5/10/15/20MHz	
Antenna	DL MIMO 2x2, supports Rx-diversity	
Supply Voltage Range	3,4 to 4,3V, 3,8V typ.	
Operation Temperature	-40°C to +85°C	
Dimensions	32,0x29,0x2,5mm, LCC Package	
Weight	Approx. 4.9g	
Data	LTE	LTE-FDD Max 100Mbit/s (DL) / Max 50Mbit/s (UL)
	DC-HSPA+	Max 42Mbit/s (DL) / Max 5.76Mbit/s (UL)
	UMTS	Max 384Kbit/s (DL) / Max 384Kbit/s (UL)
	TD-SCDMA	Max 4.2Mbit/s (DL) / Max 2.2Mbit/s (UL)
	EDGE	Max 236.8Kbit/s (DL) / Max 236.8Kbit/s (UL)
	GPRS	Max 85.6Kbit/s (DL) / Max 85.6Kbit/s (UL)
Protocols	SMS, Voice call, Sleep, PPP, CUMX, FILE, DFOTA, Firmware update via USB	
	GPS/GLONASS, TCP/UDP, FTP, HTTP, SMTP, NITZ, NTP, PING, MMS, DTMF	
Driver	Windows XP, Windows Vista, Windows 7, Windows 8/8.1, Linux 2.6 oder höher, Android 2.3 /4.0/4.2/4.4/5.0, RIL, ECM, Windows NIDS, GobiNet, Linux_qmi_wwan	
Special Feature	eCall, USIM Detection, QuecLocator, DFOTA, GNSS, VoLTE	
Interfaces	Digital Audio PCM interface, I2C, USB 2.0 High Speed, UART, USIM, 2x Netlight, 2x ADC, RTC, Antenna primary, diversity, GNSS, QMI	



802.11AC WITH MU-MIMO 4x4



MU-MIMO stands for multi-user multiple-input multiple-output, and refers to a new distribution technology between AP and clients supported by the 802.11ac standard. The new 802.11ac DAXA-ED5 module by WISTRON supports this technology in a 4x4 antenna configuration.



DAXA-ED5

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IEEE 802.11ac is an improved version of the widespread IEEE 802.11n standard, the primary objective being to further increase data transfer speeds. While 11n is approved for both 2.4GHz and 5GHz bands (though only 2.4GHz is mostly used in practice), 11ac uses exclusively the 5GHz frequency band. Both standards are based on the same OFDM (Orthogonal Frequency Division Multiplexing) frequency multiplexing method, in which data is encoded in each individual sub-carrier through modulation in amplitude and phase.

Though in 11n modulation is limited to a maximum 64 QAM per sub-carrier (6bits/carrier), modulation in 11ac was increased to 256QAM (8bits/carrier). In addition, 11ac also supports the use of a channel bandwidth of 80MHz or even 160MHz, while 11n only allows 40MHz/20MHz at 5GHz and 20MHz at 2.4GHz. With the 11ac using the highest channel bandwidth (160MHz) in combination with the highest possible modulation

(256QAM), this results in a single-channel throughput of up to 867 megabits per second. A MIMO system with 4 antennas would thus deliver a maximum raw data speed of $4 \times 867 = 3468$ mbps, and 8 antennas (11n provides for a maximum of 4, 1ac for a maximum of 8) would theoretically be capable of even 6936mbps.

WISTRON has been offering WLAN modules as PCIe cards supporting the 802.11ac standard since late 2013. Using a 3x3 or 2x2 MIMO technology and a channel bandwidth of 80MHz, these cards are capable of delivering raw data speeds of 1.3gbps (3x3) or 867mbps (2x2). These data speeds are more than adequate for most applications, yet demand for MU-MIMO 4x4 is on the rise, a distribution method supported by 11ac for the first time. In general, an MU-MIMO system can direct data streams to different clients at the same time. Until now, widespread WLAN modules not yet based on the multi-user principle functioned according to a phasing method, in which one client after the other was served. In a MU-MIMO 4x4 configuration (8x8 is also theoretically possible but hardly encountered in practice), several independent data streams can be sent to several clients simultaneously.

With the introduction of the new QCA9980 Wi-Fi chipset from QUALCOMM-ATHEROS at the beginning of the year, WISTRON was given the opportunity for the first time to develop a 802.11ac module that supports this transfer technology. Despite the fact that the channel bandwidth has remained at 80MHz as with the predecessors, the additional fourth antenna increases the raw

DAXA-ED5 FEATURES

- QCA9980 based PCIe (2.0) Wi-Fi module
- 802.11a/ac/n @ 5GHz, Single Band
- Support for IEEE 802.11d, e, h, i, j, k, r, u, v time stamp, w, and z standards
- External PA and LNA for Extreme Performance
- Supports 20/40/80MHz at 5GHz and up to 256QAM
- Data rates of up to 1.733Gbps in 802.11ac 80MHz channels using reduced (short) guard interval (GI)
- 11ac Wave II support MU-MIMO 4x4
- TCP and UDP checksum offload
- Dynamic frequency selection (DFS) in required 5-GHz bands when used as an AP
- Maximal likelihood (ML) decoding
- Supports spatial multiplexing, cyclic-delay diversity (CDD), low-density parity check (LDPC), maximal ratio combining (MRC), Space Time Block Code (STBC)
- AMSDU and AMPDU frame aggregation
- 802.11e-compatible bursting
- Digital predistortion
- Support for locationing (RSSI- and RTT-based, 802.11REVmc compliant)



SECURITY

- AES-CCMP at 128/256 bits
- AES-GCMP at 128/256 bits
- WEP, TKIP hardware encryption
- WAPI hardware encryption

data rate as compared to the MIMO 3x3 modules, to reach 1.7Gbps. Below a summary of the key features.

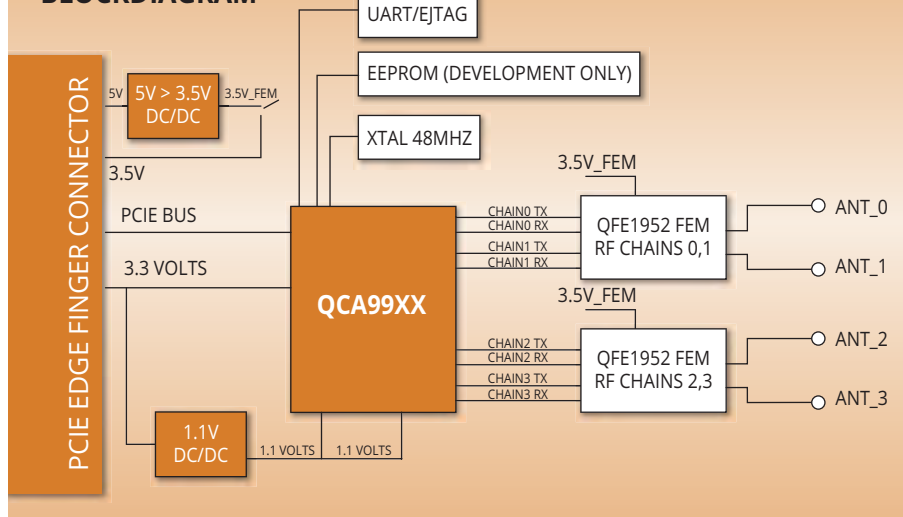
As a result of the complex RF front-end design, a MU-MIMO 4x4 design cannot be implemented in the size of a conventional PCIe card. Measuring 73.7mm x 47.6mm, it is relatively large in comparison to conventional MIMO 3x3 and 2x2 cards. When integrating the module, it should be taken into account that a heat sink should be installed on the back to ensure the smooth operation of the card.

Should you have any further questions, please contact

A02

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BLOCKDIAGRAM





BLUE MAGIC

The new GaN-on-Silicon LED die!

PLESSEY today announced the release of its range of MAGIC™ LED die, manufactured on the company's patented GaN-on-Silicon technology.

The blue die, sometimes referred to as blue pump for their ability to pump phosphor to a white colour range, are the latest innovation in high brightness LED die designed for a wide range of medium to high power applications including general lighting, signage, commercial, residential and street lighting.

The manufacturing process produces a vertical LED structure which has the anode as bottom contact, and the cathode formed in the top metal layer. The layout of the top metal layer is optimised for a particular LED size and die operating current, and includes one or more bond pads for connecting to the cathode.

PLESSEY offers its range of blue die in various wavelength options. Capable of generating over 60% light output efficiency, sometimes referred to as wall plug efficiency (WPE), the die are supplied to a standard thickness of 150µm, whilst other thicknesses can be supplied, down to a minimum of 75µm.

The die are supplied on a blue tape in single intensity and colour bins to provide close uniformity, and are intended to be used with standard pick-and-place machines. Samples are available in a variety of die pack formats with blue die wavelengths ranging from 420nm to 480nm and from 3mW to 10W with the PExS4500 range

having a typical optical output power of 4000mW from a 3A drive current.



A03

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THE FAMILY JUST GOT BIGGER



EOS Power India Pvt. adds two more power ratings to the WLP range (currently 225 and 350W) with 75 and 100W nominal.

The major advantage of the product range – the low profile of 1" (25.4mm) for the 75W and 1" above PCB/1.18" (30.1mm) in total for the 120W – goes hand in hand with the smaller footprint of tiny 2x3" (50.8x76.2mm).

The 2x3" standard was in jeopardy for a long time, as many suppliers were promoted on board modules for anything below 2x4". However, the higher power density due to increased efficiency at 93% typ. allows a migration from 2x4" to 2x3".

The WLP range from EOS can do more however as the products are compliant to the ErP directive (2009/125/EC, standby power <0.3W). The 75 and the 120W versions come with optional screw terminals, in class I and II versions. Enhanced safety features like a thermal shut-



down feature, cover now all overload conditions and make the power supply inherently safe.

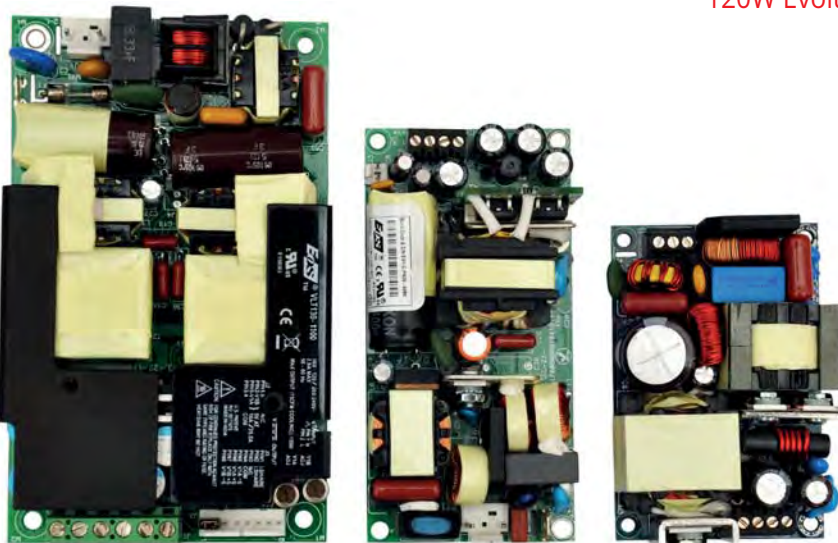
There is also a medical version of the product which is not only B(NC) rated but also BF (body floating) for direct patient contact with patient leakage current of max 100µA. Given the BF rating, the Class II version of this product can be used in portable devices, i.e. all homecare equipment.

EOS has smartly approved the power supply to manufacture any output voltage between 12 and 58VDC without incremental cost. The device can operate already from -40°C ambient temperature up to 70°C and delivers 75W (WLP75) and 100W (WLP120) with convection cooling only. The WLP120 has an auxiliary output with 12VDC to power a fan. This feature allows the WLP120 to support applications of 120W nominal.

A04

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120W Evolution



POWER SUPPLI ICs & MODULES



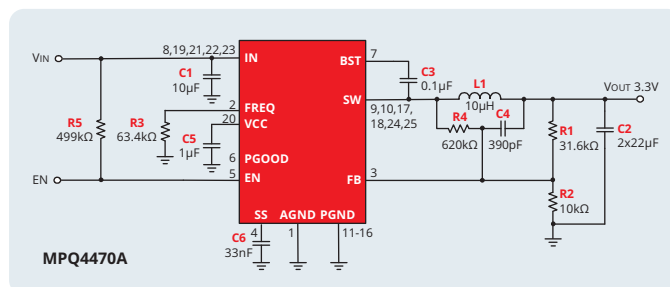
Power supplies for RF applications are required to meet a number of demands, which in part may be contradictory: Low radiation, Radiation only at specific frequencies, High efficiency, very good compensation for sudden load variations, Low induced current consumption, Buffer storage and Low costs.

High efficiency means, for example, hard switching edges with switching controllers, which in turn means high radiation. If the intention is that the controller should react rapidly to sudden load variations, its induced current consumption will be relatively high. If it is intended that a transmitter should continue to transmit without any problems even with short power supply drops, then it needs appropriate buffer storage, and that drives up the costs. There are two energy sources which are frequently used: Supply from the mains or from a battery or accumulator. Both sources impose different demands on the voltage regulators: A regulator of a mains-fed supply should be able to compensate for short voltage drops and peaks as far as possible without any problems, while when the network is switched off the supply should still continue for a short while in order to allow for shut down in a properly ordered manner. Conversely, a battery-fed voltage regulator should have the lowest possible losses, and, in most cases even more important, it should have the lowest possible standby consumption. All this means that there is no single golden rule in the power supply for RF applications. Rather, the supply must fulfil the specific requirements in each individual case. And, often enough, that means making compromises and setting priorities.

Supply for RF applications from the mains network

With mains-fed RF applications, the reliability of supply often has top priority, and efficiency takes second place. It may be desirable to have a buffer storage resource. Interference from the mains network should be blocked as effectively as possible. Sudden load shifts must be compensated for, effectively and rapidly. For these reasons, a supply direct from an AC/DC power unit should be avoided. A more favourable approach is for the supply voltage for the RF application (in most cases 3.3V) to be generated from 12 or 24VDC. 12VDC or 24VDC are to be preferred over a 5VDC supply, because the control range is greater, and that means drops and peaks can be better evened out by the controller.

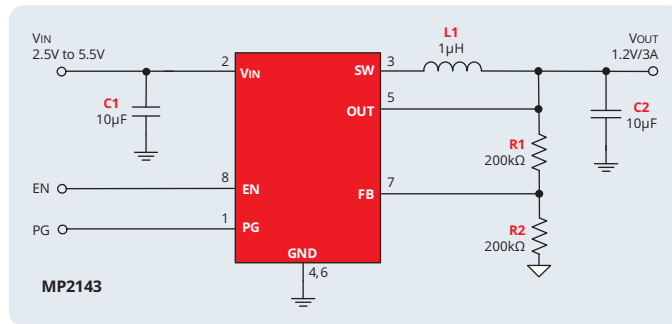
A suitable solution for this is, for example, the module MPQ4470A (36V/5A):



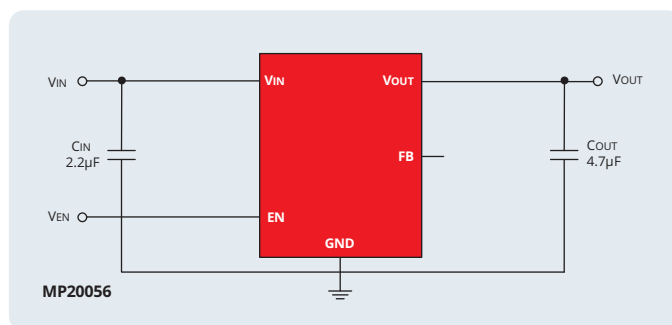
Its advantages are: Very rapid load control, Interference suppression, High efficiency and Protection functions. The MPQ4470A is very well suited to supply power-hungry RF applications, such as, for example, GSM.

ES FOR RF APPLICATIONS

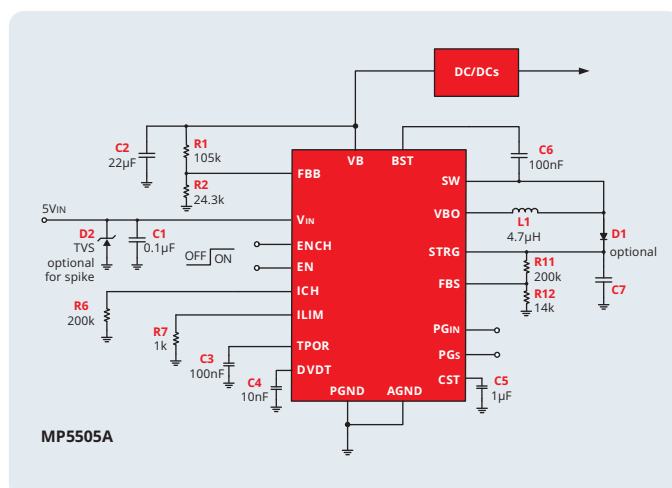
Often enough, however, with mains-fed applications there is also a very powerful 5V voltage, which can also be used to supply RF applications. In that case, for example, the MPS module MP2143 is a good solution. This controller has the same advantages as the MPQ4470A:



For low power RF applications, an LDO that produces 3.3V from 5V, such as the MP20056, can also come into consideration. This LDO has very good load control, but that means that with respect to induced current consumption no peak values can be attained.



If energy is also still required briefly after switch-off, or if the 5V bus is not stable enough, a buffer store may be needed. The MP5505A loads the C7 capacitor with the power supply still present, and provides the consuming component with the energy from the capacitor if the supply is interrupted:



Feed for RF applications from batteries/accumulators

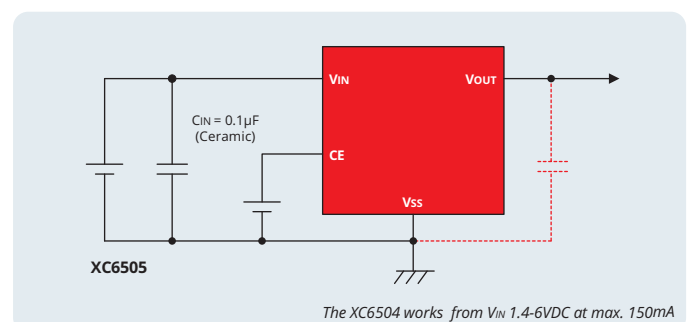
With battery supply, the controller must be able to deal with other challenges. The first hurdle is to adjust the battery voltage to the input voltage of the RF application. The input voltage for most RF applications lies between 2.5VDC – 3.6VDC.

There are a number of frequently used combinations:

- 3x Alkaline 1.5V cells (becoming unfashionable) > 2.7VDC – 4.89VDC
- 2x Alkaline 1.5V cells (most frequent at present) > 1.8VDC – 3.26VDC
- 1x Alkaline 1.5V cell (increasingly popular) > 0.9VDC – 1.63VDC
- 3x NiMh accumulator (becoming unfashionable) > 3VDC – 4.05VDC
- 1x Lilon battery > 3VDC – 3.7VDC
- 1x Lilon accumulator (always popular) > 3.5VDC – 4.2VDC
- 1x LiPo accumulator > 3.5VDC – 4.3VDC

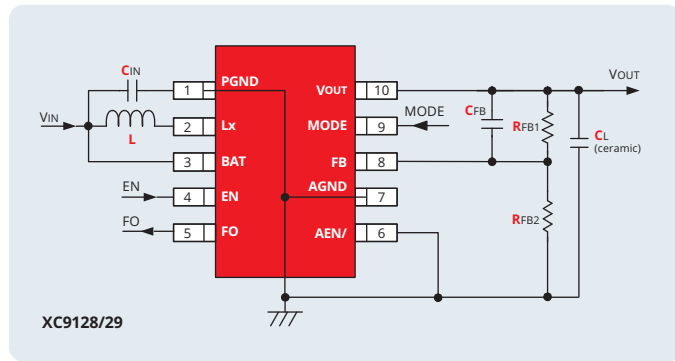
As can be seen, none of the sources match the voltage range with that of the consumer. Only with the Lilon battery would the 0.1V overvoltage not cause a problem – as a rule. Because of the high internal resistance, alkaline cells are only suitable for low power RF applications. They are not well-suited for GSM, WLAN, and other RF applications with high peak currents. Conversely, due to the very low internal resistance, NiMh accumulators are very well-suited for RF applications with high peak currents and sharp load changes. Unfortunately, the range of cells with low self-discharge is extremely modest, which means that NiMh is coming under increasing pressure from Lilon.

The way things look at present is that in the near future Lilon and LiPo accumulators will come to absolutely predominate as power sources for RF applications. Although the internal resistance is higher, and the charge/discharge cycles are substantially lower than with NiMh, they are adequate for almost all RF applications. Moreover, the low self-discharge and long service life (chemical degradation over time) are unbeatable. This means that suitable LDOs for low power RF applications from 3 alkaline cells, 1x Lilon battery and accumulator, and 1x LiPo accumulator, are those with very low intrinsic current consumption (although not so good load control properties). The RF application is then operated at a fixed voltage of between 2.5VDC and 3.3VDC. To be recommended in this case would be the TOREX module XC6504 with only 0.6µA intrinsic current consumption:

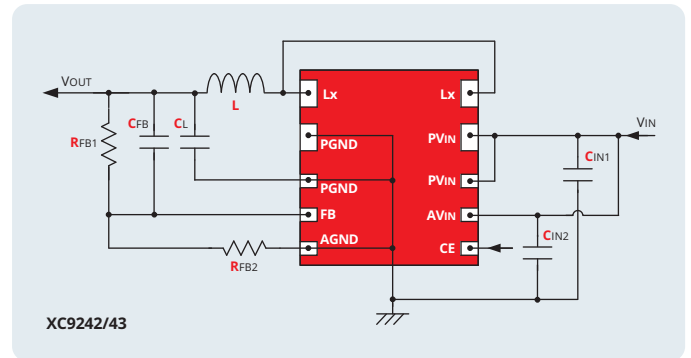


With the operation of low power RF applications from 1-2 alkaline cells, a step-up or boost converter is needed as the voltage controller. The RF application is then operated at between 3.3 and 3.6VDC. This converter should likewise require next to nothing for itself.

The TOREX modules XC9128/29 can be set into a Standby mode. Intrinsic current consumption in operation is about 30uA, and Standby consumption only 2uA. VIN 0.8-6VDC, 500mA.



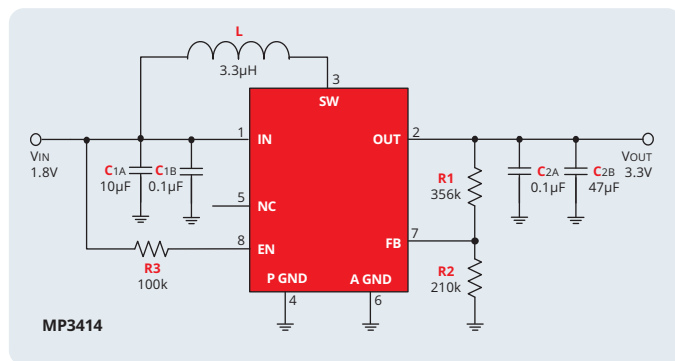
Or from TOREX the controller XC9242/43 with 2.7-6V, 2A, 2.4MHz, I_{STB} = 1uA:



Avoiding interference to the RF application from controller radiation

In general, switching controllers with high pulse frequencies are better suited for RF applications. With high switching frequencies, the harmonics are spaced further apart, and it is easier to place the RF frequency band between two harmonics. Many of the controllers proposed have the possibility of adjusting the switching frequency, which then means that the harmonics can also be displaced accordingly.

Or from MPS, the module MP3414, VIN 0.6-4V, I_q = 35uA, I_{STB} = 1uA.



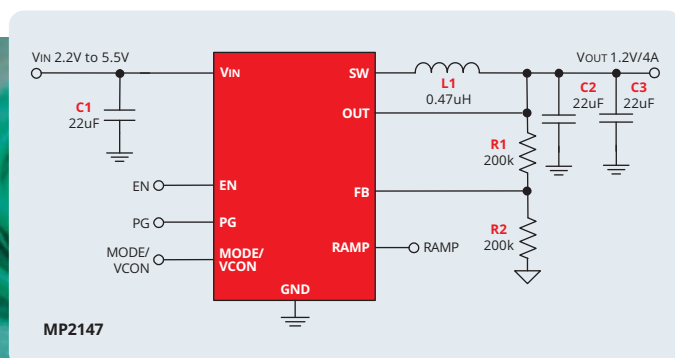
A very important factor here is the layout for the controller. Both MPS and TOREX have proposals in this situation which have proved their worth in practice and which should be taken into careful consideration. There are evaluation boards available for most controllers, which allow for very rapid testing.

This article cannot cover the entire spectrum of RF applications and possible power supplies. Please contact us if you have any questions or if your application has not been adequately dealt with here.

A05

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RF applications with high peak currents, such as GSM and WLAN, are frequently operated from 3x NiMh or Lilon or LiPo accumulators. The RF application tends to be operated in a range between 2.5VDC and 3.5VDC. Voltage reduction units with high efficiency are very well-suited for this. By way of example, the MPS module MP2147: 2.8-5.5VDC, 4A, 1.2MHz.



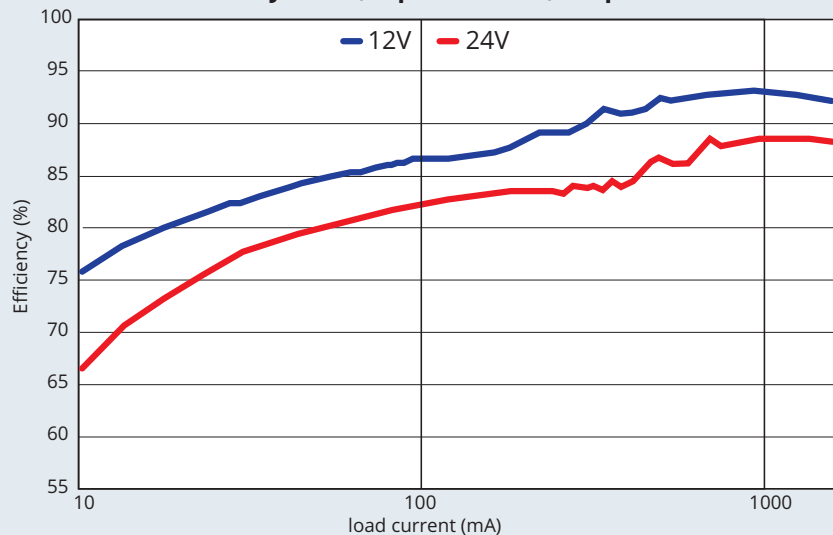
Author: Jens Hedrich, MPS Senior Field Applications Engineer

MPM3510A

36V/1.2A MINIATURE STEP-DOWN CONVERTER MODULE IN A 3x5mm PACKAGE!



Efficiency curve, input 12V/24V, output 5V



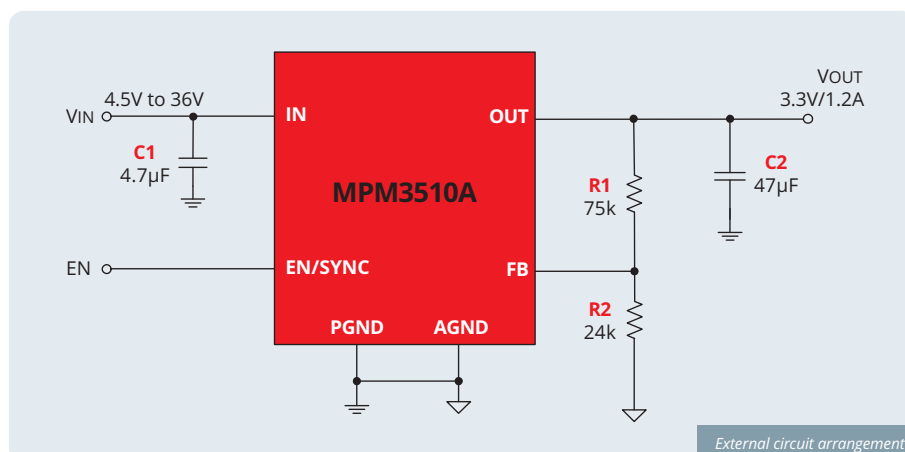
The MPM3510A module from Monolithic Power Systems (MPS) provides a very compact solution for voltage supplies in the industrial and automobile sectors. On a surface area of 3x5mm and with a height of only 1.6mm, the module provides a continuous output current of 1.2A. As external components, only the input and output capacitors and the resistor divider are needed to adjust the output voltage. The module consists of a synchronous step-down converter with Peak Current Mode regulation, an inductor, and two capacitors.

In addition to a combined EN and SYNC input, the module offers a PowerGood (PG) output, which on reaching 87.5% of the nominal output

voltage, changes its state; for a falling voltage at the output, this threshold is at 82.5%. For regulation to 3.3V, this results in 2.89V (rising) and 2.72V (falling), and for regulation to 5V this results

accordingly in 4.375V and 4.125V. The internal switching frequency of 1.15MHz can be displaced via the EN/SYNC input with a corresponding signal in the range from 800kHz to 2MHz. Thanks to the Current Mode regulation, the module achieves very good suppression of input voltage fluctuations and good sudden load change behaviour. The module is protected against output short-circuit and works with a hiccup mode.

With the aid of a special light load mode (AAM), efficiency is very high over a wide load range. In a 12V to 5V application, efficiency at 1A load current is over 93%, incurring only 370mW losses.



A06

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Authors: Jens Hedrich and Mario Willeit, both Senior FAEs at MPS

MASTER OF CURRENT

The MPQ2908A provides efficient voltage supply for all systems with an input range from 5V to 60V. Output voltage is limited to maximum 24V.



Demo-Board for the MPQ2908A

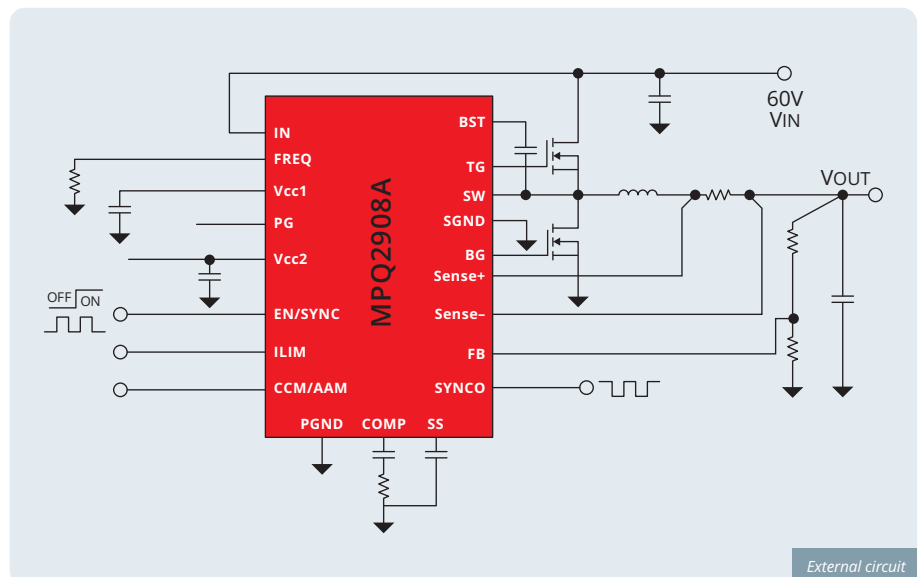
The controller, with fixed-frequency Peak Current Mode architecture, works with 5V Gate actuation for logic-level MOSFETs. So as to optimize switching losses for every input voltage and load current combination, the MPQ2908A offers an adjustment setting range from 100kHz to 1MHz. The MPQ2908A can also be synchronized with an external oscillator source. Two modules can be operated via the SYNCO output 180° as phase-displaced, which reduces the input RMS current of the entire circuit.

If the output voltage lies in the range from ±10% of the nominal output voltage, the Open Drain PowerGood (PG) output is high-ohmic; if the output voltage is outside this range, then the output is switched to ground potential.

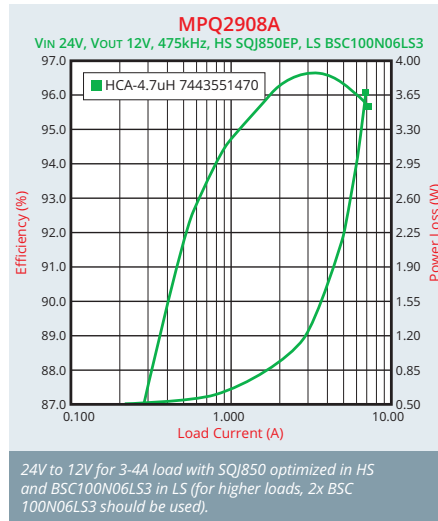
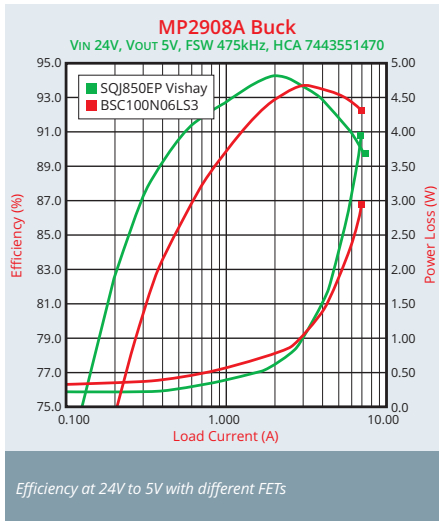
The threshold voltage for the output current limitation can be adjusted at the ILIM input, with three threshold values specified of 25mV (ILIM=GND), 50mV (ILIM=Vcc1), and 75mV (ILIM=Open). This makes the choice of Sense resistor easier, and with a selection of 25mV the power loss at high currents can be reduced.

Whether the MPQ2908A is to be used at low output currents in an efficiency-boosting light-load mode (AAM), or with fixed switching frequency (CCM) is to provide a low output-voltage ripple, can be defined by the user by way of the CCM/AAM input. At high input and output voltages between 5V and 16V, the internal VCC1 linear con-

troller from Vin can be disconnected by imposing a voltage of between 4.7V and 16V at Vcc2. This reduces the power loss in the MPQ2908A, in particular with the use of very low-ohmic MOSFETs with high gate charge. The low-drop linear controller from Vcc2 to Vcc1 has a nominal output voltage of 7.5V.



External circuit



The efficiency data of an MPQ2908A circuit from 24V to 5V at 475kHz has been measured once with Vishay SQJ850EP FETs (26mΩ type at 25°C) and once with Infineon BSC100N06LS3 FETs (12mΩ type at 25°C). Up to a load current of 3A (15W), the SQJ850 delivers higher efficiency; from 3A to 7A the BSC100N06LS3 provide higher efficiency, due to their lower R_DS_ON. The Vishay FET has somewhat lower switching losses due to its lower parasitic capacitances, and that means higher efficiency in the lower load range. Depending on the input and output voltage ratio, it may be advantageous to use a FET with higher R_ON and therefore lower load losses for the upper FET (TG), and to select a MOSFET optimized to low R_ON for the lower FET (BG).

In general, for the upper FET (TG) MOSFETs with a lower gate-drain capacitance or low Q_GD

specification should always be used. This capacitance must be transferred with the input voltage and the gate voltage when switching the upper FET driver (TG).

To protect the converter itself, as well as protecting the components supplied from damage, the MPQ2908A has implemented a number of different mechanisms. For example, the module is provided with an undervoltage recognition feature at the input, as well as an overvoltage and overcurrent protection at the output. At temperatures above 170°C, the module in general switches off. The undervoltage recognition ensures that a sufficiently high input voltage is provided for reliable operation of the converter.

The overvoltage protection (OVP) at the output ensures that the module being supplied is not

damaged by too high an output voltage. To achieve this, if the voltage is exceeded at the feedback pin by about 10%, the MOSFET which is set to earth is switched on, which reduces the output voltage. Once the output voltage reaches the normal range once again, operation continues in normal mode.

The overcurrent protection (OCP) interrupts the switching cycle (high-side MOSFET is switched off) when a predetermined value is reached. Depending on the switching state of the ILIM pin (GND, VCC, open), three different values can be set for the »current limit« (25/50/75mV). The actual current measurement takes place by way of an external resistor (dedicated current measurement resistor or internal resistance of the chokes), which delivers a proportional voltage to both the measurement inputs (Sense+, Sense-). The actual current limit is determined by the value of the external measured resistance and the »current limit« (25/50/75mV) which has been set at the Sense inputs. By the selection of the disconnection voltage at the Sense inputs, the circuit can be optimized extremely well with regard to power loss and precision. If a short-circuit is identified at the output (feedback voltage Vfb below a specific threshold value), then, in addition, the switching frequency is reduced, so that the current in the choke cannot rise again at each start attempt.

For applications in which input and output voltage are very close, the MPQ2908A is likewise ideally suited (referred to as the low drop-out mode). The table below shows the behaviour of the controller at different output currents and at an input voltage of 5V (the output voltage of the controller is set to 5V).

The voltage drop at 3A output current is only about 140mV. This is achieved by a special bootstrap circuit, which allows for the operation of the N-channel MOSFET connected to the Vin, even at a very high pulse duty factor (duty cycle=99%).

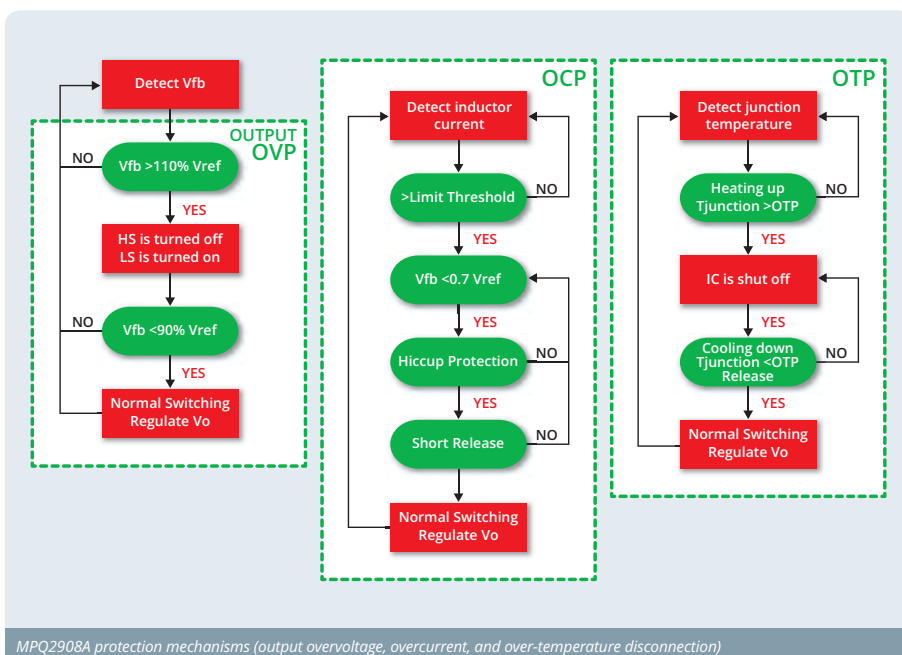
I _{OUT}	0A	0.5A	1A	2A	3A
V _{OUT}	4,99V	4,97V	4,95V	4,90V	4,86V

V_{IN}=5V

This makes the MPQ2908A a universal solution for applications at higher performance requirements and for input voltages up to 60V.

A07

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ATMEL LOW POWER CORTEX M0+ FAMILY

NOW WITH LCD SEGMENT DRIVER TOO!



Atmel

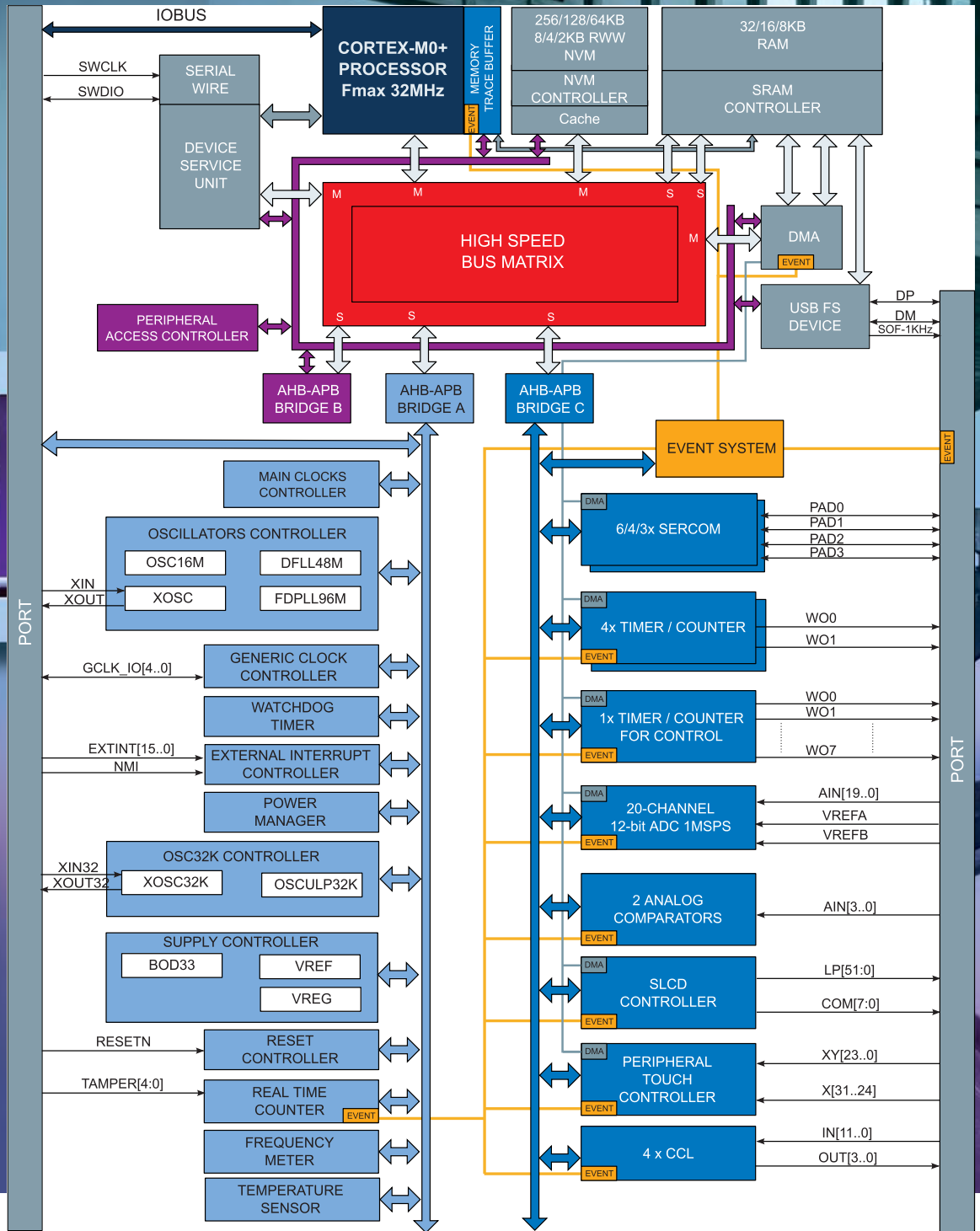
With the SAM L21 series, ATMEL has already had an Ultra Low Power Cortex M0+ Controller family in its product range. This involves a classic microcontroller with a very low current consumption of only 35 μ A/MHz.

The newly available Ultra-Low Power ATMEL SMART SAM L22 units are satisfied with only 39 μ A/MHz in active operation, but there are also a Segment LCD Controller, Touch Controller, and special back-up elements for battery-operated applications. The target markets are the industry, consumer, and medical sectors.

In principle, almost all manufacturers of micro-controllers have low power families in their product ranges. But the SMART SAM L series from ATMEL, according to an independent low power benchmark, the EEMBC ULPBench, is rated as the best product on the market. The test results can be viewed on the Website of eembc.org under »EEMBC ULPBench«. With 185.50 points, ATMEL was the outright winner.

One of the driving factors at the present time is the Internet of Things (IoT), which brings a lot of battery-operated devices into connection with the Internet. This has imposed additional new demands on applications. Aspects such as security have suddenly become extremely important too. In order for users to achieve greatest possible security in the application, the SAM L22 series offers special security elements in the hardware. These include a 256-bit AES module, CRC Check, a random generator, flash memory protection, and Tamper Detection. All this must of course be associated with the lowest possible current consumption, and that's why the modules are produced using ATMEL's own Pico Power technology.

Also used in the module are the periphery elements, developed especially for lowest possible



consumption. These elements also work independently of the core, which can even be in sleep mode.

The Segment LCD module can run up to 320 segments (8 x 40). As well as the security elements already mentioned, the SAM L22 series has integrated up to 256KB flash and 32KB SRAM memories, a USB device interface (works without external quartz), programmable serial communications modules (SERCOM), and the Event System

and Sleepwalking Technology patented by AMTEL. All these modules also make the unit ideal for thermostats, electricity/gas/water meters, domestic control systems, medical applications, and access systems.

For straightforward software development, there is an SAM L22 »ATMEL Xplained Pro Kit«. This is a professional evaluation board with an on-board debugger. ATMEL Studio, the free development software with integrated compiler, now also has

an additional software tool, a Power Profiling tool for optimization of power consumption in the application.

The ATMEL SAM L22 series is already available as samples, with mass production planned for the end of 2015.

A08

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FLYBACK



Optimizing control of both the synchronous rectifier and primary MOSFET in flyback power supplies improves efficiency & reliability.

Overcomes the limitations of Schottky diode rectifier designs without the complexity of traditional synchronous rectifier implementations.

Designers of flyback power supplies have generally used Schottky diode rectification in the output stage due to its simplicity and low cost. Diode-rectifier designs have proven adequate in meeting the efficiency demands of yesterday, particularly for low current (0.5-1A) outputs.

New market requirement

However, as regulators take aim at the operating efficiency of small power supplies used in stand-alone charger/adapters and as bias-supplies for high power applications, the impressive performance of synchronous rectification becomes very attractive. Smart phones with larger screens and much higher performance provide a great example of a device that requires an increase in power and a tightening of efficiency rules, while enjoying a phenomenal rise in popularity. Smart phone battery size has increased by more than 300% from a typical capacity of 700-900mAh just a few years ago to around 3000 mAh today. For phablets and tablets it is even higher, ranging from 6000 to 10,000mAh.

This is driving an increase in the power supply rated current – up to 400% in some cases – from 5 watts USB (5V, 1A) for traditional adapters to 10-20 watts (5V, 2-4A) for rapid charging devices.

In addition to the higher power and current, new stringent efficiency regulations such as mandatory DOE-6 (Department of Energy - Level 6) in USA and CoC V5 Tier 2 regulation in Europe have now created a pressing need for much higher efficiency.

This combination of higher power requirement, higher performance and compact size with low external touch-temperature – while still meeting the new efficiency regulations – has challenged Schottky rectifier implementations in both performance and cost.

Schottky diode vs. SR (Synchronous Rectifier)

Schottky diodes typically have a forward voltage drop of 0.4 to 0.5V which means that in a standard 5V output just the Schottky diode alone can result in a power loss of up to 10%.

Synchronous Rectification (SR) can be used to boost the efficiency and reduce the heat by eliminating the lossy Schottky diodes and replacing them with an actively controlled SR MOSFET. This is made possible by the very low resistance, $R_{DS(on)}$ of SR MOSFETs when conducting – down to below 10m Ω . So the forward drop in a SR MOSFET can be just 20-40mV for a 2-4A output current. In high current applications, this represents a dramatic reduction in power loss from 10% for a Schottky diode to less than 1% for a SR FET – a 10-fold improvement. Therefore, a SR technique together with secondary side regulation control is suited to enable improvements in

efficiency and thermal performance. However the complexity and cost of traditional SR has prevented its wider adoption, restricting it to complex and higher power designs.

Limitations of traditional Synchronous Rectifier (SR) alternatives

The complexity of traditional SR architecture stems from the fact that the timing control in a traditional SR FET architecture is very difficult. When comparing non-synchronous and synchronous rectifiers, it is important to understand that the synchronous rectification MOSFET doesn't simply replace the traditional Schottky diode: complex control circuitry is also required to sense and then drive the MOSFET at the correct instant to allow current to flow only in the correct direction.

Any time that the primary side FET turns on before the secondary side FET has turned off, it will cause simultaneous conduction in both the secondary and primary circuit. This effective short-circuit across the primary transformer winding results in the dreaded »shoot-through« that will destroy the primary FET. On the other hand, once the primary FET turns off if there is a delay in turning on the secondary SR FET the result is a reduction in efficiency. So designers are faced with a difficult dilemma and a significant increase in design complexity is required to overcome these design challenges.

Traditional SR solutions deploy a separate secondary-side controller to drive the SR FET. This adds



STOP PRESS

cost and complexity to the circuit, restricting its uptake due to the extra cost burden. Also, with two separate controllers these designs include a delay period, called »dead-time«, providing margin and preventing switching overlap of the primary and secondary MOSFETs (shoot-through) that can result in highly destructive cross-conduction currents. The synchronous rectification MOSFET contains an integral, parasitic body diode that operates during this dead time.

Unfortunately, this body diode is also lossy and slow to turn off, so it too can contribute a 1% to 2% drop in efficiency. To overcome this loss in efficiency a small Schottky diode, which conducts only during the dead time, can be placed in parallel with the synchronous rectification MOSFET, ensuring that the body diode never conducts. The Schottky diode used in this way is smaller and cheaper than the part required for a diode rectification design because the average diode current is low, however an efficiency loss of >0.5% can still be expected.

So although traditional synchronous rectification (SR) has some obvious advantages, it can be very difficult to implement because the timing of the MOSFETs turn-off signal is so critical. For optimum performance it is necessary to know exactly when the primary switch is on and off.

Although the state of the MOSFET can be inferred from the secondary winding, this approach does not provide the accuracy required. If a conservative prediction is made efficiency suffers; if an overly-aggressive prediction is made, shoot-through can occur. This is challenging during normal operation but becomes increasingly difficult to guarantee shoot-through doesn't occur under transient conditions such as output short-circuit, start-up, AC line drop outs and load steps.

In order to address target auxiliary and standby power supplies in higher power applications, POWER INTEGRATIONS has introduced a new version of InnoSwitch, InnoSwitch™-EP, that is rated up to 725V. Featuring excellent multi-output cross regulation and exceeding efficiency standards even at no load, the InnoSwitch-EP family of off-line CV/CC fly-back switching ICs can be used to produce highly-efficient, very accurate and ultra-reliable PSU circuits for home appliances such as microwaves, washers and dryers, stand-by power supplies for PC/server, air conditioning systems, displays, TVs, and smart lighting ballasts. InnoSwitch-EP ICs also enable designers of monitors to meet new ENERGY STAR 7 efficiency standards.

An innovative new approach

But this is about to change with POWER INTEGRATIONS' new InnoSwitch™ family of ICs. For the first time, users have a shoot-through-proof design with the simplicity of a single integrated IC (Figure 1) that completely controls both the primary and secondary FET rather than two separate primary and secondary controller ICs with optocoupled SSR (secondary side regulation).

This single IC also incorporates a very high bandwidth communication link between the primary and secondary controllers - called Fluxlink™. This high speed digital communication link is incorporated in the device package through a magne-

tic coupling but without any magnetic cores. The material used for the manufacture of the IC package remains the same. The secondary controller acts as the master which initiates the switching process for both the secondary and primary MOSFETs, so no prediction or inference as to the state of the two MOSFETs is required. It is shoot-through-proof because the two MOSFETs are controlled deterministically and never turned on simultaneously. Using this innovative and near instantaneous communication afforded by FluxLink technology provides the secondary controller precise control of both primary MOSFET and the secondary SR MOSFET. The system achieves almost optimum turn-on and

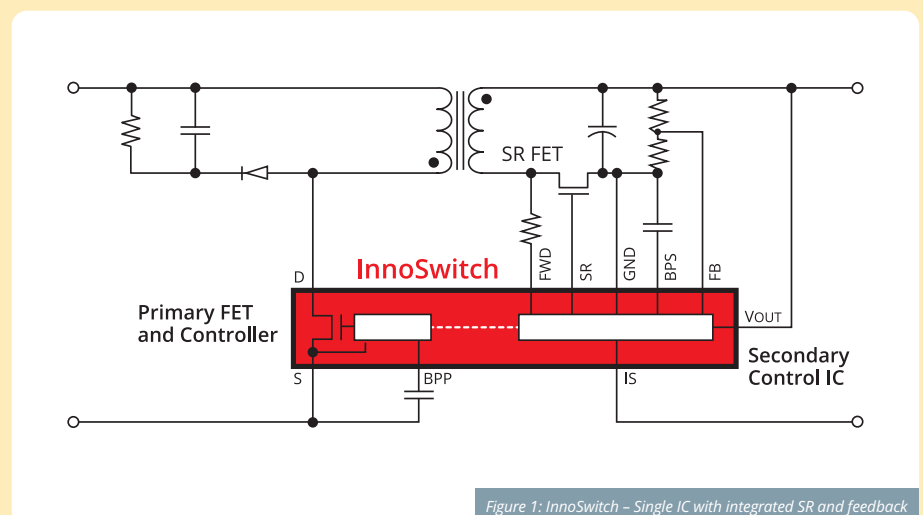


Figure 1: InnoSwitch – Single IC with integrated SR and feedback



InnoSwitch IC Benefits

- **High efficiency:** Meets all global safety standards
- **High performance:** Fast transient response with secondary side control
- **High reliability:** Shoot-through-proof design
- **Very low No-load:** Less than 10mW
- **Low component count:** Just 30 components for a 5V, 2A adapter design
- **Improved manufacturability:** Simpler and variation-tolerant transformer design
- **Elimination of SR FET parallel diode:** Lower cost
- **No extra components required for high output voltages:** Forward pin supports 12V output

turn-off times across the entire load range, whether the power supply is operating in discontinuous mode, continuous mode, and even under fault conditions. Therefore, the power supply is intrinsically safe and it is always working at maximum efficiency.

InnoSwitch ICs also maintain full internal galvanic isolation and are safety approved to UL1577, TÜV60950. They also meet CQC China 5,000 meter altitude requirement for creepage (see Figure 2). An external pin-to-pin creepage gap of over 9.65mm is achieved using a custom surface-mount package that has been specially designed for this IC family (Figure 2).

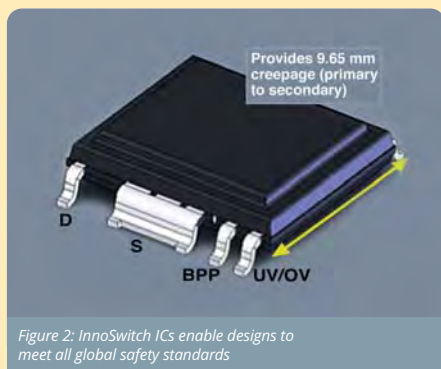


Figure 2: InnoSwitch ICs enable designs to meet all global safety standards

Being a recognized safety component the InnoSwitch ICs can be placed in the primary-to-secondary isolation barrier area on the PCB, so effectively the ICs take up no useable space at all

(Figure 3). Also, the design allows for direct and simple resistor divider sensing of the power supply output voltage with excellent load transient performance and keeps the no-load power consumption below 10mW. Direct sensing is significant as it reduces the physical volume of the output capacitors required, critical to fitting designs in ever shrinking enclosure sizes. The power supply output current measurement in an InnoSwitch IC is fully integrated inside the package, eliminating external current sense circuitry altogether. This results in higher power density, reliability and improved manufacturability.

Now synchronous rectification can be used safely and reliably in higher power chargers, even those with adaptive voltage outputs such as QUALCOMM's Quickcharge™ 2.0 and MediaTek™ PE+. The ability to deliver high currents at high efficiency also makes InnoSwitch an excellent fit for the newly announced USB-PD standard that requires support for 3A and 5A output load currents.

In summary, InnoSwitch ICs combine the benefit of an advanced Synchronous Rectification (SR) technique with secondary side control and communication link into a single IC to meet new market requirements for higher power, performance, density, reliability and efficiency (see Figure 1).

The benefits and, indeed, the use of InnoSwitch ICs are not limited to cell phone adapters. This new powerful architecture can also be used in any application that demands greater efficiency with higher secondary currents.

A09

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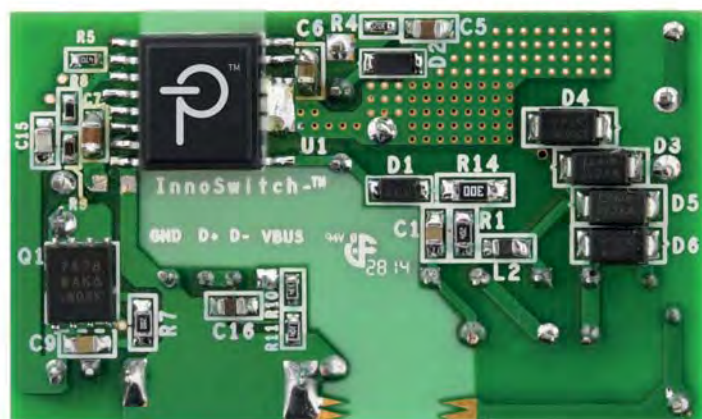


Figure 3: An InnoSwitch IC is placed across an isolation area

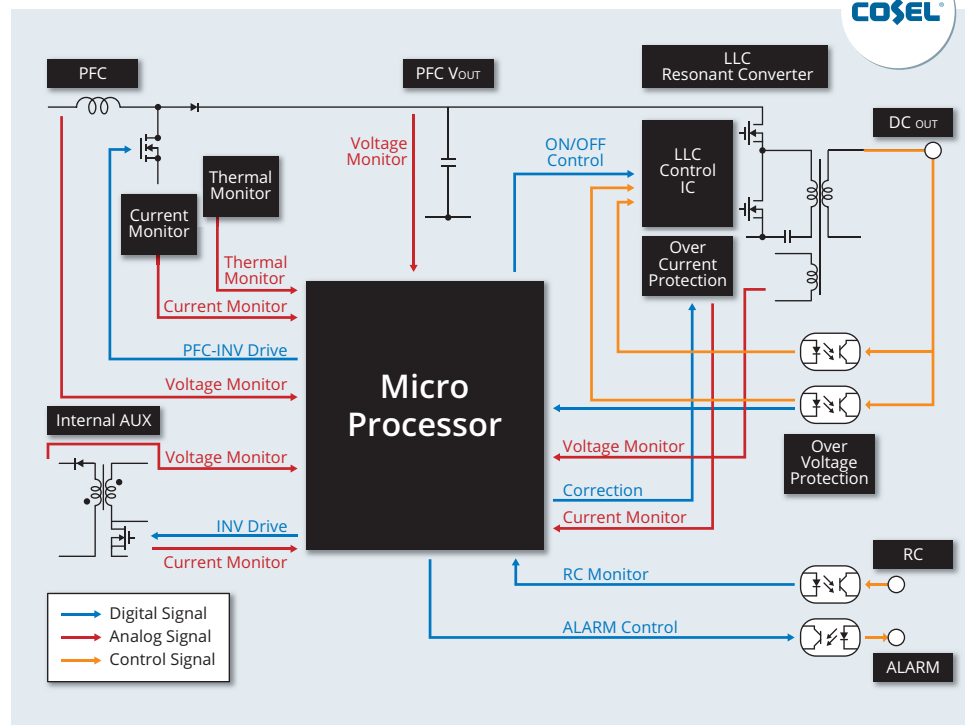
FOR CONDUCTION COOLING: GHA

COSEL's new 3"x5" Power Supply - the GHA series - has the highest in class Power density of 24.1W/inch³ (thanks to a combination of convection and conduction cooling). The GHA series targets applications where Small Size, High Power, High Efficiency (up to 92%) and High Isolation are critical.

The 300W version of GHA series comes without baseplate, its bigger brother, the GHA500 comes with Aluminum Baseplate, on which all PFC components are integrated. This technology helps to minimize the temperature on main PFC components, which results low Power loss and High Efficiency. In addition, it is also possible to reduce the size of the components, which ultimately results High Power density in Small size. Different cooling possibilities make this Product unique in the market. Under Forced Air, the GHA500F can deliver up to 500W supported by conduction cooling.

Another major factor in achieving the high efficiency with small size is Digital Control, enabling considerable reduction of component numbers and optimization of component characteristics. The microchip with COSEL's proprietary software controls not only the PFC and DCDC circuits, but also simultaneously various protection functions, offering a level of control, which is impossible with a conventional design. E.g. the over current protection: Components are usually selected to cope with a wide tolerance of OCP trigger point. COSEL's chip, however, corrects this wide variation efficiently enough to allow the use of smaller components, reducing size overall.

The PFC uses digital control and Critical Conduction Mode (CRM), while the DCDC uses LLC resonant circuit. The latter allows reduction in the number of components while maintaining high



efficiency and ZVS (Zero Voltage Switching) reduces switching loss. Full-wave current resonance results in a current peak value reduced by nearly 50%, preventing overheating of the transformer and reducing ripple current at the output capacitor.

GHA Series offers several optional functions like Remote On/Off, two auxiliary voltages (5V@1A and 12V@1A), optional parallel operation (including ORing diodes), alarm functions and a new

SNF option (Housing with FAN). The GHA comes with a number of protection features such as Over Current, Short Circuit, Over Voltage and Over Temperature protection. Besides Industrial Standards (IEC60950-1), the 3"x5" open card device is approved to Medical Standards (IEC60601-1) with 2x MOPP between Primary-Secondary, which is suitable for many medical applications where 4kVac (reinforced) are required.

The GHA meets EMI class B limits (EN55022) without any additional Noise filter. The conduction cooling power supply comes with 5 years warranty and a with life time expectancy over 10 years.

Model Name	GHA300	GHA500
Input Voltage	Universal 85 to 264VAC	
Efficiency	91%–92% typ. at 230VAC	90%–92% typ. at 230VAC
Power Factor	0.95 typ. at 120VAC, 0.90 typ. at 230VAC	
Output Voltage	12V, 24V, 48V	12V, 15V, 24V, 48V
Derating (Forced Air)	50°C 100%, 70°C 50%	
Dimensions	76.2×35×127 mm (WxHxD)	
Options	Remote on/off, Parallel, 2x AUX (5V, 12V), Alarm, FAN mit Cover	

A10

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medications
blood pressure



patient #08001

A HAND FULL OF MEDICAL ADAPTERS!



PHIHONG launches five new series of external adapters, all compliant to DoE (US Department of Energy) Level VI and ErP 2009/125/EC Tier 2 (Energy Reduction Program) and compliant to medical EN60601-1:2005+A1:2012 2xMOPP. Their no-load power consumption is less than 75mW, and their efficiencies reach up to 89%.

The 10, 18, 36W are wallmount adapters with various detachable plugs for Europe, US, UK, Brazil, India, etc. available for global use. 5, 6, 9, 12 and 24VDC versions are available, all BF (body floating) rated with a patient leakage current of less than 35µA. The wall plug adapters were designed for blood glucose meters, blood pressure

systems, beauty care electronics, nebulizers, patient monitoring and portable medical devices.

The 60 and 100W come with both, IEC320 - C8 and - C14 AC inlets setting up the scenery for wide range of applications. C14 is only applicable for professional equipment. Medical equipment

for home care must not have PE plug for safety reasons, PHIHONG's new generation of power adapters can be used in both.

In addition the 60W version offers a power boost of 140%, the 100W 125% of the rated output power with a maximum duration of 3 seconds and a duty cycle of 10% or less.

The power supply is inherently safe, as the whole family bears a LPS (limited power source) logo meaning the output current must not exceed 8A. The built in OVP, OCP, SCP, OTP features make

Everything but basic



COSEL

COSEL expands the KL series to their existing Din Rail Portfolio. The KL range is a straightforward and cost efficient solution with no bells and whistles.


With five year warranty, 90% efficiency, -20°C up to 70°C operating temperature and 24 und 48VDC output voltage, 120 and 240W rated output power, the KL is everything but basic.

The new add is very slim, only 38mm in width for the 120W and 50 for the 240W version and works also from DC input voltage from 120-370V in addition to 85-264VAC and comes with optional conformal coating for additional protection under harsh environments.

The KL series is obviously approved to the applicable standards being uL/cUL/IEC-EN 60950-1 and meets UL508.

With the two new Din Rails 120 and 240W, COSEL completes their portfolio now comprising 30-480W and voltages from 5-48Vdc. Whereas the established KH series offers a premium of features such as Remote on/off, Alarm signals and provides peak power of 150% of the nominal rated output power, the KLA still offers highest reliability without the gimmicks.

/ John Adams

gender 

age 23

HR 95 bpm

120/60

ECHO D

CD PWR<500

Frq 2.0 MHz

1800 mm

AO 100%



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60W



100W



the adapters ideal for mobile physician workstations, portable dialysis and respirators.

A11

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A12

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POWER FROM THE FUTURE

700W Power Brick including PFC!

COSEL extends their TUNS range, a combination of the previously released PFC modules (DPG, DPF, DPA) and a high voltage DC/DC module (DHS, DBS, DAS), creating a truly integrated AC/DC print module.

The brick format (LxHxW = 4.62x0.5x2.42 inches, 117.3x12.7x61.5mm), single output converter comes with three different voltages – widely adjustable (9.60-14.40, 22.40-33.60, 38.40-52.80VDC) and is inherently safe (built in over-current, voltage and temperature protection).

The TUNS Series operates on input voltages from 85 up to 264VAC at 50/60Hz. Thanks to PFC (power factor correction) it reaches a «cos Phi» of up to 0.96. The Harmonic Attenuation com-

plies with IEC61000-3-2 Class A. The relinquishment of tantalum and aluminium capacitors, makes the compact converter designed for conduction cooling highly reliable (5 years warranty).

The new series now embraces 300, 500 and 700W versions together with the already existent 50 and 100W power ratings. The thermal performance is top of the art. The TUNS will deliver 100% of the rated output power at a base plate temperature of up to 100°C. It is also in good sha-



TUHS series

pe at the low end of the temperature scale. The minimum start – up temperature sits at -40°C and allows usage in outdoor applications in very harsh environments, the combination of very low and extra high makes the product perfect for applications requiring compact size, high efficiency and reliability. Furthermore, the product does not require any forced cooling. The conduction cooling design supports noise sensitive applications, aside from Telecom and semiconductor manufacturing equipment, also RF, broadcasting, military and display applications plus medical products with no direct or indirect contact to the patient. Safety comprises UL60950, cUL, CE and EN60950-1 and makes the product fit for global market.

The TUNS series aligns with the TUHS family, the low power end of COSEL's compelling range of



TUNS series

Circular OLED: WISECHIP extends



TU series



AC/DC-print modules. The TUHS series, introduced in our Impulse issue 1-2014, remains the smallest standby Power Supply available on the market as per today. The single output converter comes in five power ratings 3/5/10/15/25W and three different output voltages 5/12/24VDC.

The print module is suitable for industrial applications with ambient temperatures ranging from -40 to 85°C. The class II converter is approved according to EN60950-1, cUL and UL and meets EN55022 Level B. Worldwide usage due to an input voltage range of 90-264VAC at 50/60Hz makes it the perfect companion for countless applications.

A13

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Up to now, the range of WISECHIP semiconductors has included only conventional rectangular OLED designs. Thanks to the many advantages which OLED technology has to offer in comparison with LCDs, the smaller OLED displays have already gained a foothold on the Wearable market.

They are used not only in the consumer market; there is a range of applications in industry, medical technology, and the automotive sector which can already be handled by OLEDs. The extremely wide range of temperatures, from -40°C to +85°C, the high contrast, and the low current consumption are also major plus points. The strict forms, in particular on the Wearable market, have up to now presented a challenge to customers. Now a circular OLED, the UG-3660TSWAG01, has made the product range of WISECHIP semiconductors even richer. The new type has all these features to offer:

NEW!
The circular
OLED made by
WISECHIP



- Monochrome Graphics OLED
- 1.07"
- White
- 136x160 pixels
- COG Type
- 4-wire SPI Interface

A full-colour variant of these types is already being planned at WISECHIP.

A14

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Getting even bigger: 17" and 19" Displays

Up to now, the range of TFT displays from AMPIRE ended at 15" diagonals, but now the recently launched 17" (AM-12801024A series) and 19" (AM-12801024B series) variants have extended the sizes available still further, aimed in particular at applications in industrial PCs, maritime applications, and uses in medical technology. Both display sizes come in resolution 1280x1024, with LVDS interface, 500cd/m² or 1000cd/m² brightness, an extended operating temperature range from -30°C to +80°C, and the option of a capacitive touch panel.

Also already available for these two sizes is the Nano Optical Lamination Technology. This feature, as well as the optional adhesive tapes to improve shock resistance and avoid the penetration of air humidity between the TFT and the capacitive touch panel, make these two new display sizes fit and ready for outside use.

A15

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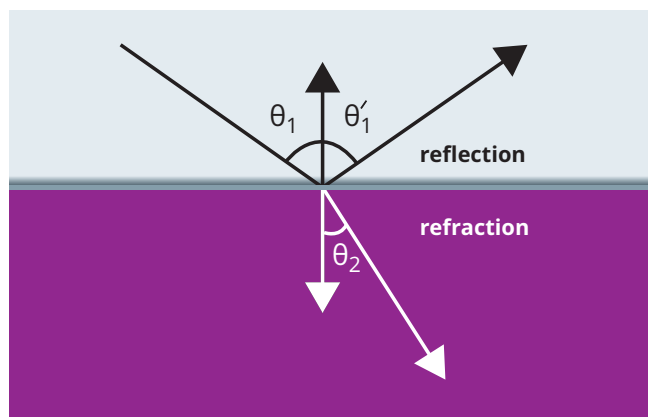
NANO OPTICA

Sunlight readability for your

When light falls on a surface, at least one of the following three effects occurs: The light is reflected directly from the surface concerned, it »breaks through« the surface, which means that its direction is deflected, (referred to as light refraction), and/or it is absorbed by the material.

Display applications, especially for use in the open air, which consist of a TFT and a capacitive touch panel, need to be readable in sunlight. Standards such as double-sided adhesive tape and the resultant air gap, are only suitable for indoor situations.

The expensive high-quality technology of »Optical Bonding«, as OCA (Optical Clear Adhesive) or OCR (Optical Clear Resin) variants, can restrain reflections and at the same time increase brightness and improve the contrast. These incur appreciable extra costs, however, because of the low production output.



One Interface Family with AMPIRE



L LAMINATION

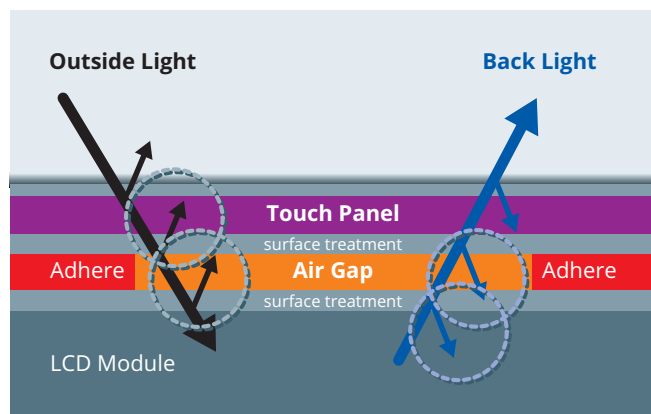
display & capacitive touch unit

That's why AMPIRE has brought the NANO OPTICAL LAMINATION technology onto the market, a competitive bonding technology. The optical performance corresponds to the optical bonding technology, but with significantly less extra expenditure. With NANO OPTICAL LAMINATION, the reflection rate can be reduced to 0.1%. In addition to this, for special requirements which involve vibrations and air humidity, the appropriate adhesive tapes are used so as to equip the display and touch unit for even the toughest environments.

The nano coating, patented by AMPIRE, on the TFT surface and on the underside of the touch panel sensor, suppresses the reflections incurred, improves the absorption rate and therefore the optical representation of your surface.

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The wide variety of TFT displays on the market means just as many interfaces and plug formats. From the simple SPI interface and a handful of pins through to the more complex variants, including a wider range of interfaces and formats with up to 60 pins, everything is available. There's a huge selection, depending on the display size.

On the other hand, if there's a new project or a specific application coming up, but with the same plug solution and the same interface, it was difficult in the past to combine different display diagonals for a rapid platform development. Typically, the PCBs had to have more than one plug to connect the TFT displays. But by far the most troublesome issue was still having to provide an additional interface for connecting the displays.

AMPIRE, our partners for many years for LCD and TFT displays, can now offer a new interface family for the sizes 3.5", 4.3", 5.7" and 7" by way of one platform: This new series is aimed especially at applications which need to use the same hardware by way of different display sizes. With the 3.5" this then means the low-end version is covered, and with the 7" the high-end version.

The four sizes mentioned come in the resolutions 320x240 (QVGA) to 800x480 (WVGA), in the 18bit RGB interface, with a 40-pin FFC plug and LED driver included.

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POWER SAVING FOR «WEARABLES»

Wearable devices such as wrist-watches, wristbands, anklets, clothes, glasses and head mount displays provide users with important information anytime, anywhere. The market is expected to reach more than 20 million units by 2018, demonstrating an extraordinary growth among existing electronic products.

Development challenges for these wearable devices include the achievement of light-weight and space saving solutions that can be worn comfortably, but also low power consumption in order to achieve longer hours of operation between charges.

Power Supply Specifications Wearable Devices

Figure 1 shows an example of a power supply configuration diagram of an activity tracker (wearable physical activity meter). It consists of a microcontroller, Accelerometer, OLED or LCD and Flash memory with Bluetooth Low Energy (BLE) or ANT RF connectivity. It is necessary to make it as simple and as small as possible because activity trackers are normally worn by the user. Equally, the miniaturization of lithium-ion/lithium-polymer batteries is also essential for them to be used in active trackers. This inevitably means the use of low-capacity batteries, and hence, further power and space savings are required for the system.

TOREX can provide extremely low power and ultra small power management solutions that are

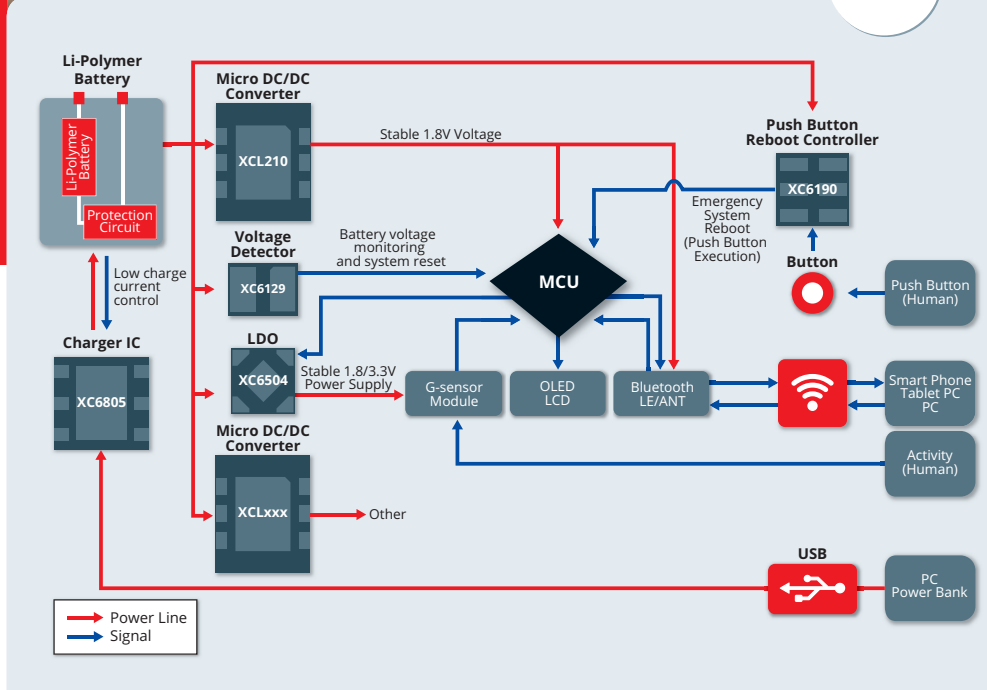


Fig. 1: Activity Tracker Power Supply Configuration Example

ideally suited to this type of power and size sensitive application. Some of the most suitable solutions are shown in Figure 1.

XCL210 Series

The XCL210 Series is an ultra low power, synchronous step-down Micro DC/DC converter with integrated coil. It provides a stable output voltage whilst only consuming 0.5µA in operation making it ideal for applications that run from batteries for long periods of time. Only 2 capacitors are needed externally so the required PCB area is kept to a minimum.

When a system requires a current of 50µA or less, a low power LDO regulator IC is commonly used. However, using the XCL210 Series instead gives much better efficiency compared to a LDO and at such low load current levels, the XCL210 provides even better efficiency than conventional step-down DC/DC converter (Figure 2).

Thus, the XCL210 Series helps to maximise battery life (Fig. 3) and because of the tiny package (2.5×2.0×1.0mm), it also contributes to space saving in addition. Optional features available for the series include output voltage setting from

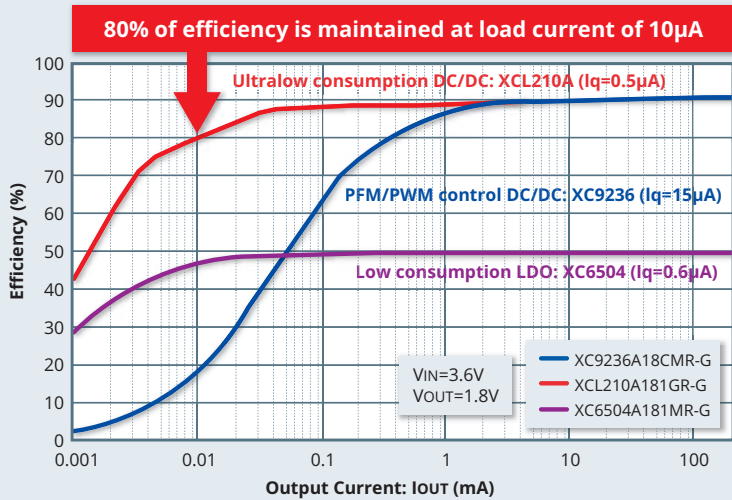


Fig.2: Better Efficiency at Low Load Current

1.0V to 4.0V ($\pm 2\%$, 0.1V steps); optional CL discharge function and output current choices of either 50mA or 200mA.

XC6190 Series

Many wearable devices use a communication system, and hence, it is necessary to consider a way of forcibly rebooting the system in case of a system freeze. The following are methods for such a system reboot and we also list the different challenges that accompany them:

Reboot using a conventional RESET button

> Challenges: Deterioration of design quality, weakening of waterproof property, necessity for users to always carry a needle or pen!

Reboot by extraction and re-insertion of battery > Challenges: Weakening of waterproof property, breakage of device;

Reboot by insertion and extraction of a cable to an interface such as USB > Challenges: Necessity to always carry a USB cable;

Reboot by the long press of the button on the device > Challenges: One or more buttons must be provided;

The XC6190 Series achieves system reboot through a long press of the button on the device as described in the last method. It is an ultra low current, push-button reset timer. The XC6190

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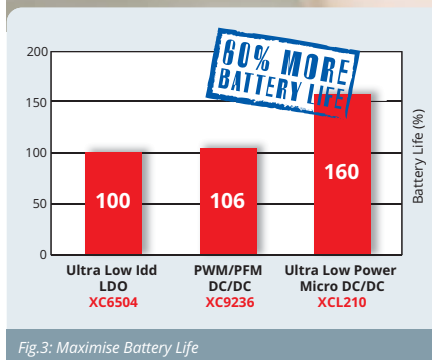


Fig.3: Maximise Battery Life

uses a long timing setup delay to provide the intended system reset, and avoid resets from short push-button closures or key presses. This reset configuration also allows for differentiation between software interrupts and hard system resets.

Two versions are available; with the XC6190A the reboot delay time (TDL) can be set as desired by changing the external resistance R_T within the range 1s to 20s. With the XC6190B, the TDL is fixed internally with a choice of two settings. When the TS pin is set to »H« level, the delay time is 12.5s. When the TS pin is set to »L« level, the delay time is 7.5s. As the XC6190B does not require an external resistor for time adjustment, this specification is advantageous for space saving as well.

XC6803, XC6804, XC6805 Series

The proliferation of smart phones, tablet computers and power banks has led to the development of advanced lithium-ion batteries with larger capacities. By contrast, batteries with smaller capacities, as compared to those for other applications, are used for various kinds of wearable devices (Table 1).

APPLICATIONS	BATTERY CAPACITY
Activity Tracker	10mAh~100mAh
Smart Watch	100mAh~300mAh
GPS Watch	200mAh~400mAh
Smart Phone	1500mAh~3500mAh

Table 1: Capacity of Lithium-Ion/Polymer Rechargeable Batteries for Wearable Devices

In terms of charging current for lithium-ion batteries, 0.5C charging with respect to the battery capacity has been common with consideration given to the safety and life cycle of the batteries.

However, even lower charging current than conventional charging current is required for low-capacity batteries that are used in wearable devices. The XC6803, XC6804 and XC6805 Series of single-

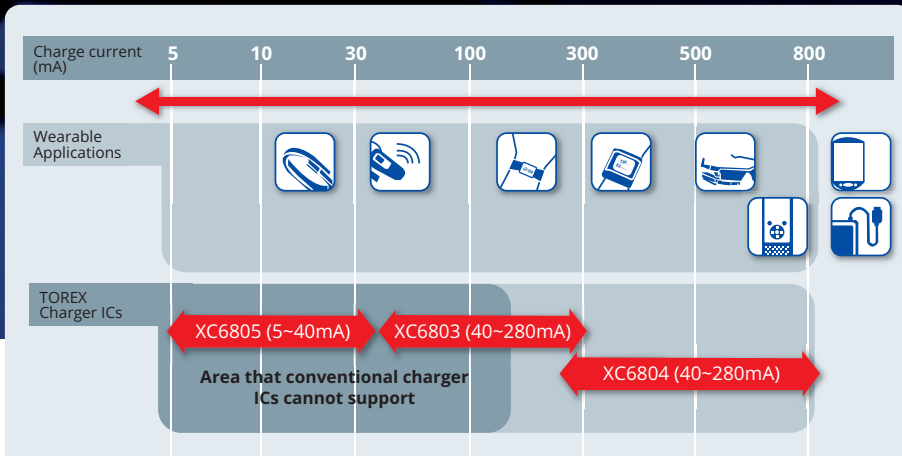


Fig.4: Charge Current Range of the XC6803, XC6804 and XC6805 Series

cell lithium-ion/lithium-polymer charger ICs with a built-in temperature detection function (based on JEITA), specialize in such low charging current.

With the three series combined, these charger ICs are able to cover charging current from 5 to 800mA (Fig. 4). Moreover, these ICs consume a very small current of only 0.5µA when they are

not charging. Hence, they are effective in reducing battery drain whilst the end products may still be in storage prior to being sold. Adopting the USP-6EL (2.0×1.8×0.4mm) package also contributes to space saving.

Low Power Consumption Solutions

XC6504 Series

The XC6504 Series is a 0.6µA, ultra low power consumption, capacitor-less LDO regulator that is capable of supplying a stable voltage without the need for an output capacitor! By using the USPQ-4B04 (1.0×1.0×0.6mm) package, it can contribute to space saving as well.

XC6129 Series

The XC6129 Series is a low power consumption

voltage detector with an external capacitor delay function that accurately monitors system and battery voltage levels. A release delay time or detect delay time can be set freely by connecting an external capacitor to the Cd pin. Hence, it can provide the appropriate system reset.

XCL Series

The XCL Series of Micro DC/DC converters integrate a vertically stacked or horizontally arranged coil in a single package with the DC/DC and is incredibly space saving. It also features a lower electromagnetic interference (EMI) radiation noise level compared with conventional DC/DC converters due to the short wire length to the coil and the shield effect of the coil itself. In addition, the time from design to production can be reduced as the XCL Series uses silicon chips and IC products that are already in mass production.

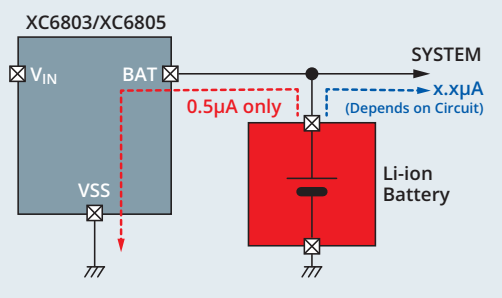


Fig.5: XC6803/XC6805 Contributes to Power Saving

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RECOM enters the DIN Rail market by launching their first two models comprising 45 and 60W. Both come with an astonishing 7 year warranty – more than double than most of its competitors. The fit and forget solution – a partner to rely on.



A PARTNER TO RELY ON!

RECOM

The Power Supplies are available with standard output voltages of 12VDC and 24VDC, adjustable by a front cover potentiometer. The excellent line & load regulation of the REDIN series ensures a stable constant voltage output, which is signaled through a front panel »DC-OK« lamp. The modules are also equipped with voltage-free »DC-OK« contacts, to either directly control a remote indicator lamp or to send a signal to a central monitoring station. Contacts of multiple modules can be daisy-chained to generate a general »System Power OK« signal.

The operating temperature ranges from -20°C to +70°C. The efficiency reaches up to 87% and low stand-by losses (<0.5W) reduce energy consumption and heat generation to a minimum. Most power supply failures occur because of input voltage surges and transients, so special care was given to designing a robust input filter. In addition, a long hold-up time of 50ms at full load ensures a stable output even with unreliable mains inputs. The power supplies are equipped with numerous safety protection measures as standard; besides short circuit and over-current protection with automatic restart, they are also over-temperature and over-voltage protected with a latching function. The power supplies are fully certified by UL to IEC/EN/UL60950, CE and UL508.

A universal input voltage range of 85VAC to 264VAC and altitude up to 5000m means that they are suitable for worldwide use.



The compact DIN-rail power supplies with dimensions of 88.6x41.1x101.4mm (LxWxH) save DIN-rail space because the modules can be installed next to each other without the need for any spaces between.

As an alternative to end-mounting, the power supplies can also be side mounted for use in

low-profile cabinets. The 100% burn in tested power supply is designed for 24/7 operation documented by HALT test truly is a partner to rely on!

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POWER GIANT



RECOM enters the Open card market by launching their first two series of AC/DC power supplies designed for medical applications: the RACM100 and RACM150.

These compact, high efficiency power supplies provide 100W or 135W maximum power in a semi-enclosed case without forced cooling while meeting two means of patient protection, a must for high-grade medical applications. The RACM150 is also available as /F version with fan to deliver up to 150W in the same package.

12V, 15V, 24V and 48VDC single outputs are provided from a universal 85-264VAC under Class II operation. All models feature efficiencies up to 92%, require no minimum load and can be used at temperatures between -25°C and +80°C. The output voltages are fully regulated and have tolerances of less than ±0.2% over the entire input voltage range and less than ±0.5% over the entire

load range. The space saving 3"x2" or 4"x2" modules offer 4KVAC reinforced isolation between input and output, 1.5kVAC between output and case, and also meet the requirements for medical applications with patient contact (2xMOPP, 8mm creepage & clearance, 250VAC working voltage).

The modules are approved to medical safety standard IEC/ES/EN60601-1 3rd edition and feature B and BF rated outputs with less than 100µA leakage current. All models are compliant with Class B EMI to FCC, EN60601-1-2 and EN55022

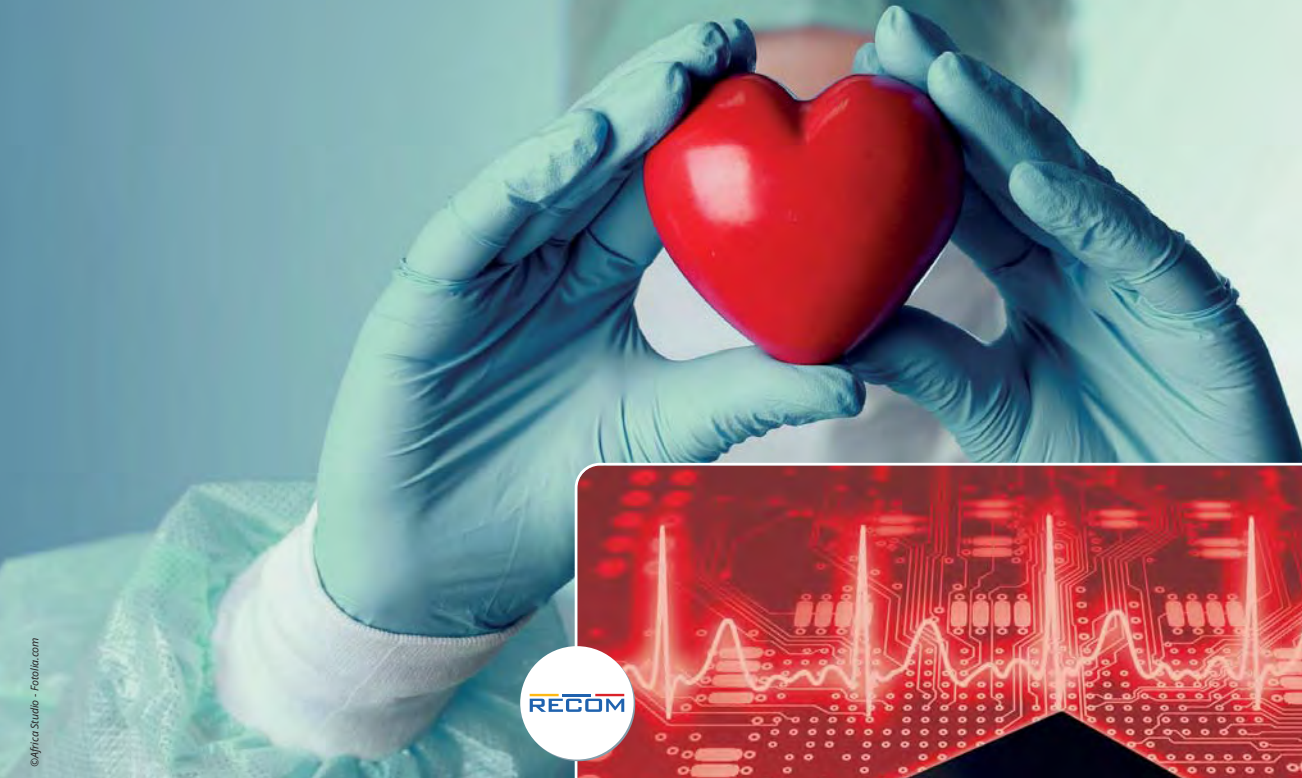
standards, can operate at 5,000m altitude and offer a 5 year warranty. An accessory kit is available on request. The RACM series is a reliable, medically approved power supply with high power density and an expected life time beyond eight years (70khrs continuous operation at operating temperature 40°C working temperature) – perfect for all kinds of medical applications.

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THE EXPERT FOR CRITICAL APPLICATIONS



RECOM's DC/DC-CONVERTER for critical applications – suitable for CF applications.

The all new REM3, REM6 and REM10 series offer 3W, 6W or 10W output power in a DIP24 standard pin out. Despite this compact case size, all series feature reinforced isolation rated at 250VAC (continuous) working voltage, 5KVDC galvanic isolation, 8mm creepage and clearance and low 2 μ A leakage currents. The converter therefore bears 2xMOPP isolation and can be used to set up a safe barrier for patient contact applications. Given the very low leakage current of 2 μ A under NFC (non-failure condition) and max. 50 μ A under SFC (single failure condition) the REM series in combination with an adequate power supply may be used for CF (cardiac floating) applications.

The entire family is available with 2:1 or 4:1 input voltage ranges, single or dual (bipolar) outputs



from 3.3V up to 24V. The high efficiency of 89% in combination with the maximum case temperature from -40°C to 105°C makes the converter ideal for countless applications. The REM series are IEC60601-1 and ANSI/AAMI 60601 certified

and come with a 5-year warranty.

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DHAN-S



Finally, the long-awaited ULE module solution from DSP!



For the first time, DSP Group's new wireless module allows for a quick and easy integration of the ULE (Ultra Low Energy) standard in IoT applications.

We already extensively reported in an Impulse issue back in 2013 about the advantages of the ULE wireless communication standard for home and building automation, security, energy management, or IoT in general. The characteristics of this DECT-based standard can be summarised as follows:

- A protected frequency band (1.9GHz) guarantees that ULE products installed today will be working reliable for many years to come. This guarantee cannot be given with technologies working with free frequency bands such as 2.4GHz or 868MHz.
- Long range (at least 30m in buildings and 300m outdoors), combined with high security thanks to state-of-the-art encryption methods and signatures.
- Thanks to the star topology, just as with DECT, installation is remarkably easy.
- Very short latency times, allowing for real-time communication.
- Very low power consumption.
- Integration in home gateways providing easy access to the Internet. In Germany alone, DECT can be found in more than 5 million home gateways.
- Today, approximately 200 million DECT chips are sold each year. These synergies can be exploited to offer ULE products at an attractive price as well.

In this context, we had introduced the DHX91 chipset (see image 1) from DSP Group, which is optimized for power-saving applications and quick reaction times. Apart from the usual DECT

and ULE functions tested in various interoperability events with other DECT/ULE manufacturers, the chipset integrates a sensor/actuator (SA) unit and special low-power modes. These functions allow for a particularly energy-saving integration of sensor and actuator applications, rendering the use of an external MCU completely unnecessary. We had shown a few examples in our article in this regard.

Until now, however, customers were always bound to a customer-specific design implementation with ULE products, which required a great amount of know-how, especially regarding RF design, calibration, and, subsequently, certification. Therefore, many customers considered the implementation of a product integrating the ULE standard only in case of large volumes, so as to justify the higher development costs. DSP Group has now responded to this problem and developed a ULE wireless module based on the DHX91, optimising the RF design specifically for this chip-

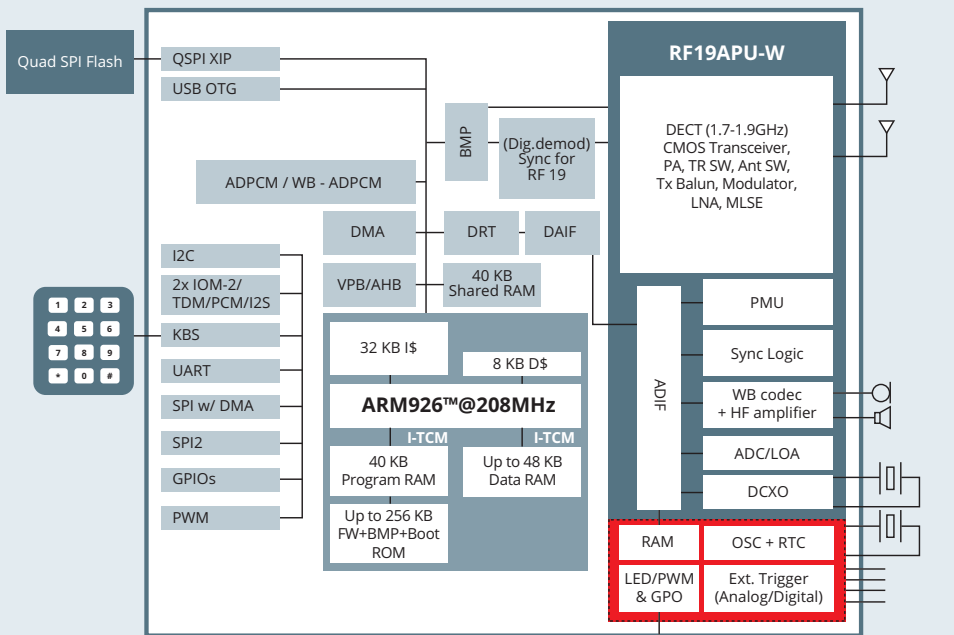
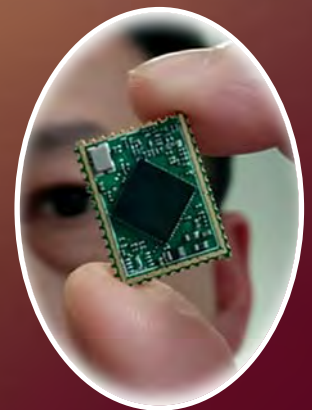


Image 1: DHX91 block diagram (SA unit in red)

set. The module is calibrated during production to meet the highest Rx/Tx requirements, and was certified for Europe, the U.S., and Japan. Since the interfaces of the DHX91 chipset are provided on the module, all above-mentioned functions of the DHX91 are available to the user. The following summarises the most important features of the so-called DHAN-S (DSPG Home Area Network – Small) module:

- Processor: (ARM926 32-bit RISC)
- Integrated HAN-FUN ULE SW stack for connection to an external host MCU
- Stand-alone: application runs directly on the ARM926, no need for an external MCU
- Tx power: +23.5dBm
- Rx sensitivity: -96dBm@1000 ppm
- Hibernation mode: <2µA
- Support for EU, U.S. and other regional DECT bands
- Certification: EN301406, FCC part 15.329 & ARIB STD-T101
- Small form factor: 15mm x 19.5mm
- Low residual BOM
- Well-adapted RF port facilitates the connection
- Temperature range: -40°C to +85°C

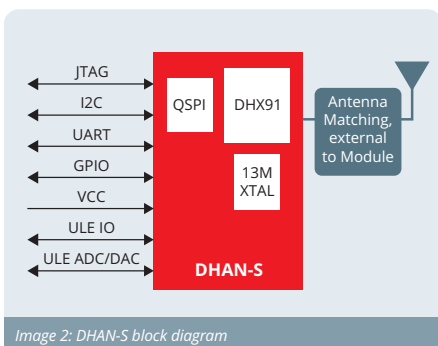


Image 2: DHAN-S block diagram

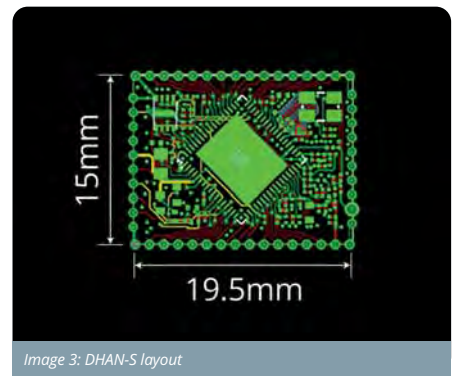


Image 3: DHAN-S layout

is integrated in the ARM CPU. The module, however, can also be used as a modem, when a customer simply wants to expand an existing design by adding wireless connectivity. In this case, the module can be addressed by an external MCU via a UART interface. Should you have any questions, please contact

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The module (see image 2 and 3) can be used as a stand-alone solution in which the application

RUBYCON

EXTENSION OF THE HYBRID PORTFOLIO

The aluminium-polymer hybrid electrolytic capacitors which we introduced in our last edition of Impulse have now been extended by additional versions. This means that following product range presented here is now available, covering a voltage range of 25V – 63V:

- PEV – 105°C SMD with 10,000h
- PZE – 105°C THT with 10,000h
- PFV – 125°C SMD with 4,000h
- PZF – 125°C THT with 4,000h

The following table shows the 105°C versions:

Voltage (V)	Capacitance (uF)	Case size DxH (mm) PEV-series (SMD)	Case size DxH (mm) PZE-series (THT)	ESR mOhm max @20°C/100kHz	Ripple current mA@105°C/100kHz
25	220	8x10.5	8x9	27	2,300
25	330	10x10.5	10x9	20	2,500
35	150	8x10.5	8x9	27	2,300
35	270	10x10.5	10x9	20	2,500
50	68	8x10.5	8x9	30	1,800
50	100	10x10.5	10x9	28	2,000
63	33	8x10.5	8x9	40	1,700
63	56	10x10.5	10x9	30	1,800



SMD LOW-ESR ELECTROLYTIC CAPACITOR

With the TRV, RUBYCON is pleased to present a low-ESR SMD e-cap capacitor which provides a guaranteed lifetime of 10,000h at 105°C and full ripple current capability.

- Temperature range: -40°C to +105°C
- Voltage range: 6.3V to 50V
- Capacitance range: 10uF to 8.200uF
- Lifetime: 5,000h to 10,000h

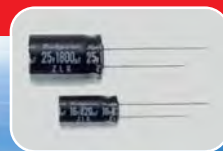
Voltage (V)	Capacitance (uF)	Case size DxH (mm)	ESR Ohm max @20°C/100kHz	Ripple current mA@105°C/100kHz	Guaranteed lifetime (h)
35	100	8x10.5	0.15	600	8,000



MINIATURIZED LOW-ESR ELECTROLYTIC CAPACITOR

Thanks to new and improved materials and content substances, RUBYCON has succeeded in achieving really impressive miniaturization among the low-ESR e-caps. The new ZLQ, for example, in dimensions 6.3x11, can provide 6.3V/680uF, and at 12.5x25, 10V/ 5600uF. Outstandingly high ripple current capability is achieved in addition. The following table will provide you with a short overview:

Voltage (V)	Capacitance (uF)	Case size DxH (mm)	ESR Ohm max @20°C/100kHz	Ripple current mA@105°C/100kHz	Guaranteed lifetime (h)
6,3	680	6.3x11	0.092	620	3,000
10	5.600	12.5x25	0.013	3.140	6,000
16	150	5x11	0.21	400	3,000
16	820	10x12.5	0.035	1.470	5,000
25	1.200	10x20	0.018	2.130	5,000
35	2.200	12.5x35	0.01	3.800	6,000

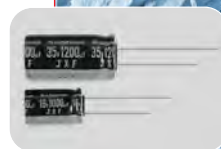


FOR TEMPERATURES WELL BELOW ZERO

The main feature of this new radial leaded JXF series is the extended temperature range well below zero. That makes this low-ESR electrolytic capacitor particularly well-suited for power supply applications which require excellent performance at temperatures well below zero. The guaranteed lifetime is 8,000h.

- Temperature range: -55°C to +105°C
- Voltage range: 16V to 35V
- Capacitance range: 470uF to 10,000uF
- Lifetime: 6,000h to 8,000h

Voltage (V)	Capacitance (uF)	Case size DxH (mm)	ESR Ohm max @20°C/100kHz	Ripple current mA@105°C/100kHz	Guaranteed lifetime (h)
35	470	10x16	0.061	1.180	6,000
35	1.000	12.5x20	0.038	1.780	8,000
35	3.900	18x30	0.018	3.240	8,000



NEWS



DC LINK ELECTROLYTIC CAPACITORS – PENCIL TYPE

To meet the special requirements in power supply design, the QXW and CXW series have been supplemented by case sizes with a diameter of 8mm. And because they are available from the production plant with wires bended by 90°, for horizontal mounting, they are particularly well-suited for applications with limited heights.

Here's a small selection:

Series	Voltage (V)	Capacitance (uF)	Case size DxH (mm)	Ripple current A@105°C/120Hz	Guaranteed lifetime (h)
QXW	450	12	8x25	0.15	2,000
QXW	450	22	8x45	0.23	2,000
CXW	450	10	8x25	0.12	5,000
CXW	450	22	8x50	0.22	5,000



PCB

DOUBLE-LAYER CAPACITORS FOR 85°C

With the new DMH series, RUBYCON provides a double-layer capacitor which is well-suited for use at ambient temperatures of up to 85°C. The range available here is from 2.3V/2F in 8x16mm to 2.3V/10F in 10x35mm.



ALUMINIUM POLYMER CAPACITORS WITH HIGHER CAPACITANCE VALUES

With the SLG, SW and SWZ series of what are known as the PC-CONS, higher capacitance values are now available. The following list will provide you with an overview of the range. The difference between the individual series is the case height.

SLG (1.1mm case height):

- Temperature range: -55 to +105°C
- Voltage range: 2V to 10V
- Capacitance range: 22uF to 220uF
- ESR: down to 9mOhm

SWZ (1.9mm case height):

- Temperature range: -55 to +105°C
- Voltage range: 2V to 10V
- Capacitance range: 47uF to 470uF
- ESR: down to 4.5mOhm

SW (2.7 – 2.9mm case height):

- Temperature range: -55 to +105°C
- Voltage range: 2V to 8V
- Capacitance range: 68uF to 470uF
- ESR: down to 9mOhm

HIGH CAPACITANCE VALUES – COMPACT DIMENSIONS

The AX series providing high capacitance values and high ripple current load capability in compact case sizes was developed especially for ultra-compact power adapter. The range has now been extended by these values:

Voltage (V)	Capacitance (uF)	Case size DxH (mm)	Ripple current mA@105°C/120Hz	Guaranteed lifetime (h)
400	7.5	8x10.8	75	2,000
400	10	8x16	90	2,000
400	12	10x12.5	110	2,000
400	15	8x20	130	2,000
400	18	10x16	150	2,000
400	22	12.5x16	180	2,000
400	24	12.5x16	190	2,000



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P01

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CAPACITORS FOR THE INDUSTRY

Future generations of industrial applications, such as alternative energy, but also white goods, are going to require improved designs for large can type electrolytic capacitors.

Miniaturized Snap-in Electrolytic Capacitors

In order to comply with one of the major saving space, RUBYCON continues the development of high-quality miniaturized snap-in e-caps with the USK (85°C) and VXK (105°C long life) series.

With the know-ledge gained from the development of the MXK, which was introduced as the leading extremely compact 105°C format, the two new versions have now been developed. These provide up to 18% smaller case sizes, with the same voltage and capacitance values in comparison with the previous smallest snap-ins.

To achieve this new level of miniaturization, RUBYCON has made use of its very latest aluminium foil technology. This has additionally made new can sizes with heights from 50 to 60mm possible. And to guarantee more stability on the PCB, or as protection against wrong polarity,

RUBYCON also offers 3-pin versions on request.

USK

- Can size: 22x25mm to 35x60mm
- Temperature range: -25°C to +85°C
- Voltage range: 400V to 450V
- Capacitance range: 120uF to 1.200uF
- Lifetime: 3,000h

VXK

- Can size: 22x25mm to 35x60mm
- Temperature range: -25°C to +105°C
- Voltage range: 400V to 450V
- Capacitance range: 120uF to 1.200uF
- Lifetime: 5,000h

4-Pin Snap-in Electrolytic Capacitors

Large can electrolytic capacitors are used in the most different industrial applications, such as inverters or UPS. To reduce the number of capacitors used in parallel connection, often screw-terminal electrolytic capacitors are used. If a PCB mounting is required, a large number of smaller snap-ins nevertheless need to be connected in parallel.

To achieve a solution with an acceptable number of capacitors, RUBYCON has developed larger multi-pin e-caps with dimensions from 35x50mm to 45x100mm. The higher capacitance values which this makes available means that not only a miniaturization of the power supply can be achieved, but costs are saved as well.



HFH & UFG

RUBYCON introduces two versions. The UFG series provides a guaranteed life time of 10,000h at 85°C. With the HFG, a high ripple current capability at 105°C and 5,000h is achieved. Both series are designed as 4-pin versions in order to support PCB mounting and achieve a strong connection to the board.

In addition to the use of the very latest aluminium foil technology, these capacitors are produced on the newest automatic and precise production machines, providing the highest quality for your applications.

UFG

- Can size: 35x50mm to 45x100mm
- Temperature range: -25°C to +85°C
- Voltage range: 350V to 450V
- Capacitance range: 470uF to 2.700uF
- Lifetime: 10,000h

HFG

- Can size: 35x50mm to 45x100mm
- Temperature range: -25°C to +105°C
- Voltage range: 350V to 450V
- Capacitance range: 390uF to 2.700uF
- Lifetime: 5.000h

P02

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VXK & USK



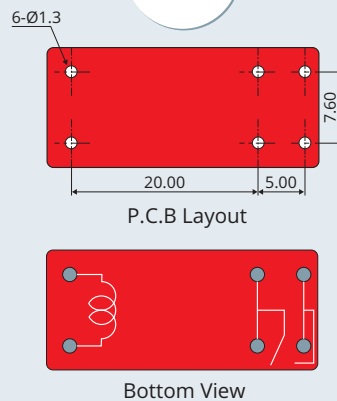
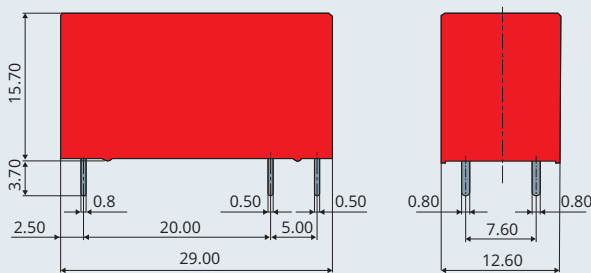
LET THERE BE LIGHT

Power PCB Relay EML

The EML from GOODSKY is designed to switch high inrush peaks up to 165A/20ms in a very compact housing as space is a limiting factor in most of the typical applications for this component.

Requirements for this switching capability may be found in lighting controls, movement sensors, home automation and security systems such as bus systems and remote switching, energy management and motor controls to name some of the main applications.

DIMENSIONS ($\leq 5\text{mm} +0.2\text{mm}$, $>5\text{mm} +0.3\text{mm}$, the tolerance of PCB thru hole: $+0.1\text{mm}$)



The inrush capability is achieved by using an innovative contact system that incorporates a tungsten pre-make contact with an AgSnO main contact. From the outside the relay is seen as a 1 form A (NO) contact system. The special inside design ensures that the tungsten contact closes before the main contact and takes the inrush peak. Tungsten has a high melting point of 3422°C and thus contact welding is prevented. Shortly after the AgSnO closes and secures a low contact resistance as Tungsten has the disadvantage of a high resistivity.

With its compact dimensions of 29.0x12.6x15.7mm the EML offers advantages in compact designs such as actuators built in wall sockets. The EML has been applied for UL for the following loads:

- Tungsten lamp 3.000W/230VAC at 40°C for 50.000 cycles
- 16A/250VAC cosphi 1 at 85°C for 100.000 cycles

Additionally the following loads were tested at 45°C ambient temperature and a voltage of 230VAC for a minimum of 25.000 cycles:

- High voltage halogen lamp 2.500W
- Fluorescent lamps parallel compensated 1.200VA (140 μ F)
- Low voltage halogen lamps with inductive transformer 1.200VA (230VAC to 12VDC)
- Synthetic load to simulate 400W LED retrofit-lightbulbs (235A peak & 24,5A²s) in process

P03

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FEATURES

- 165A/20ms inrush peak current
- 16A/250VAC rated load
- Typical 5mm footprint
- 1 form A (NO) contact system (Tungsten pre-make & AgSnO)
- DC coil from 3 to 60 Volts with low power consumption of 400mW only
- Compact dimensions of 29.0x12.6x15.7mm (L/W/H)
- Reinforced insulation: > 8mm creepage and clearance safety distances with 5kV dielectric strength between coil and contacts
- Ambient temperature -45°C to 85°C
- Flux proof and wash tight version available
- UL listing applied

SMALL, COMPACT AND POWERFUL

FLAT WIRE POWER INDUCTORS FOR HIGH CURRENTS!

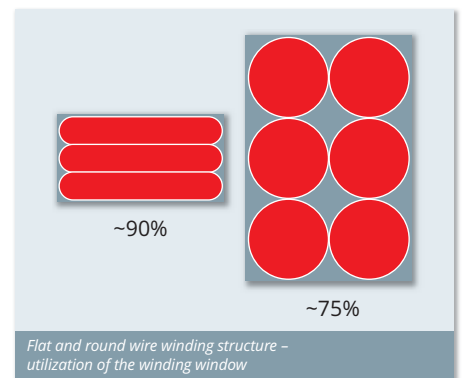
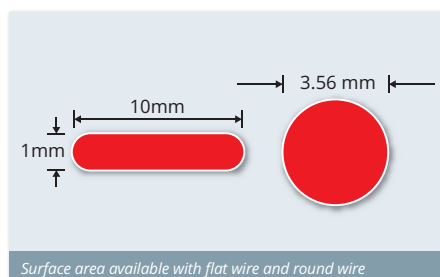


SMD Power Inductors: CBH and CDEP series from SAGAMI and SUMIDA.

Power Chokes from SAGAMI and SUMIDA have been proving their worth for years as reliable and innovative components in automobiles and industrial applications. The high requirements for power and miniaturization in the electrical industry are imposing constantly tougher demands on components, materials, and processing technologies. That means that switching controllers handling high power need the suitable inductors. Whether it's for energy storage, input and output filtering, or for DC/DC transformers, CBH and CDEP choke coils from CODICO's manufacturers provide ideal solutions.

The component design for both series is based on optimum ferrite cores and flat wire technology. In comparison with conventional round wire

techniques, flat wire winding allows for substantially higher currents and very compact dimensions. The flat wire provides a much larger surface than a round wire, and in high-frequency technology this has a particular advantage, by minimizing what is known as the «skin effect*», meaning that the flat wire inductor can therefore deliver much higher power.



Due to the tight winding structure of the flat wires, the ohmic resistance is reduced on the one hand, while, on the other, the winding window is used to optimum effect. The unused space between the individual windings is consequently substantially reduced, and a winding factor of more than 90% is achieved.

FEATURES

- Flat wire winding design
- Optimum filling factor
- Magnetically shielded
- High current capacity
- Low DC resistance
- Operating temperature from -40°C to +150°C
- AEC-Q200 compatible

CBH and CDEP inductors are characterized by high current capacities and low DC resistances. The power range extends up to 55A and covers an inductance range from 0.5uH to 33uH. The great majority of these inductors are certified in accordance with AEC-Q200, which means they can also be used in automobile modules.

Detailed overview of different parameters:

FLAT WIRE INDUCTORS	INDUCTANCE (μH)	DC RESISTANCE (mΩ)	SATURATION CURRENT (A)
SAGAMI CBH	0.5 ~ 33	1.6 ~ 40	5.5 ~ 30
SUMIDA CDEP	0.15 ~ 22	0.95 ~ 19.8	4.3 ~ 55

For more details and samples please feel free to contact us.

P04

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*Skin-effect = Current displacement. Depending on the frequency, an alternating current will be displaced to the surface of the conductor. Current density is much higher in the outer area of the conductor than in the inner part. Reference: www.itwissen.info/definition/lexikon/Skineffekt-skin-effect.html

ELECTROLYTIC CAPACITOR POLYMER-HYBRID-NEWS

HIGH TEMPERATURES
LOW ESR



SMD HYBRID ELECTROLYTIC CAPACITORS UP TO 150°C

Just as it was with the general market introduction of polymer aluminium hybrid electrolytic capacitors, SUN is in the lead once again. SUN is the first manufacturer to present a version which is designed for operation from -55°C to 150°C. The new SMD Series HVJ of what has come to be known as »EP-Caps«, provides a high ripple current capability at high temperatures, while at the same time being very compact in dimensions. With planned production start in the first quarter of 2016, the 25V and 35V versions will be the first to become available, with extension to 50V already in preparation.

The table below shows an extract from the data sheet:

Series	Voltage (V)	Capacitance (µF)	ESR (mOhm max@100kHz, 20°C)	Ripplecurrent (mA @100kHz, 150°C)	Case size (mm)	Lifetime (h)
HVJ	25	150	27	740	8x10,5	1.000
HVJ	25	270	22	850	10x10,5	1.000
HVJ	25	330	16	970	10x12,5	1.000
HVJ	35	100	30	710	8x10,5	1.000
HVJ	35	150	23	830	10x10,5	1.000
HVJ	35	220	17	950	10x12,5	1.000

SUN is focusing on the further development of these hybrid capacitors. A number of new and different series are planned over the next few years. The aim on the one hand is to achieve higher capacitances; on the other, improvements in ripple current load capability and ESR are already in preparation. The specified maximum ambient temperature depending on the series will be between 105°C and 150°C.





LOW-ESR SMD ELECTROLYTIC CAPACITORS

In addition to hybrid types, SUN also introduces two new conventional SMD electrolytic capacitors, which provides very low ESR, and therefore extremely high ripple current capability. The CE-ZX Series, in comparison with the previous low ESR type (CE-KX), provides an ESR reduced by up to 50%. With the CE-ZC, SUN is again improving miniaturization in relation to the CE-ZX, and therefore significantly higher capacitances at same case size and the same electrical data.

The following tables show a small extract from the datasheets:



Series	Voltage (V)	Capacitance (uF)	ESR (Ohm max@100kHz, 20°C)	Ripplecurrent (mA @100kHz, 105°C)	Case size (mm)	Lifetime (h)
CE-ZX	6,3	330	0,16	600	6.3x7.7	2.000
CE-ZX	10	1000	0,06	1190	10x10.5	2.000
CE-ZX	16	470	0,08	850	8x10.5	2.000
CE-ZX	25	47	0,26	300	6.3x6.0	2.000
CE-ZX	25	330	0,08	850	8x10.5	2.000
CE-ZX	25	560	0,08	850	10x10.5	2.000
CE-ZX	35	220	0,08	850	8x10.5	2.000
CE-ZX	35	390	0,08	850	10x10.5	2.000
CE-ZX	35	470	0,06	1190	10x13.5	2.000
CE-ZX	50	220	0,12	900	10x10.5	2.000
CE-ZC	25	470	0,08	850	8x10.5	2.000
CE-ZC	25	820	0,06	1190	10x10.5	2.000
CE-ZC	35	330	0,08	850	8x10.5	2.000
CE-ZC	35	560	0,06	1190	10x10.5	2.000

HIGH-TEMPERATURE SMD ELECTROLYTIC CAPACITORS

There are also some news to report at the electrolytic capacitors designed for higher ambient temperatures: With the 125°C Series CE-PS, higher capacitance is achieved per case size. 25V and 35V versions are available, with a capacitance range from 150uF to 470uF, and 100uF to 330uF respectively.

Completely new is a 135°C e-cap CE-TH (16V to 50V; 47uF to 1000uF) and the extension to the Series CE-PH by a 50V version and the case size 6.3x6.0mm. And a 150°C version, the CE-JX, has been announced for the end of the year.

The following tables show a small extract from the datasheets:

Series	Voltage (V)	Capacitance (uF)	ESR (Ohm max@100kHz, 20°C)	Ripplecurrent (mA @100kHz, 125°C)	Case size (mm)	Lifetime (h)
CE-PS	25	330	0,30	300	8x10.5	2.000
CE-PS	35	100	0,60	220	6.3x7.7	1.000
CE-PH	16	47	1,60	110	6.3x6.0	2.000
CE-PH	50	1000	0,05	1650	18x21.5	5.000
CE-TH	16	330	0,30	240	8x10.5	2.000
CE-TH	25	680	0,10	750	12.5x13.5	2.000
CE-TH	35	220	0,20	400	10x10.5	2.000
CE-TH	50	47	0,60	160	8x10.5	2.000

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HEAT LOSSES ON SHUNTS EFFICIENTLY DISSIPATED

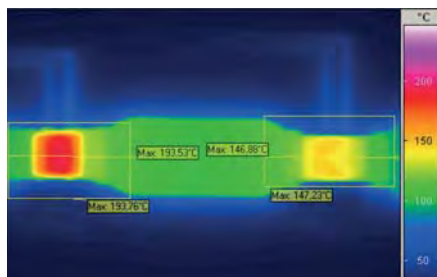


A key parameter of shunt resistors is their load capacity (power). Load capacity is limited by the power dissipation (heat losses), however, and that in turn reduces the operational range of a shunt. Heat is one of the critical factors for shunts, and, if there is continuous overloading, heat can damage them.

When a manufacturer, such as ISABELLENHÜTTE, has understood how to get a grip on heat losses, the next step is to increase the load capacity, and therefore also the measured current. And it's precisely here that the intimate knowledge of the materials, really professional R&D team, and the great depth of manufacturing characterising ISABELLENHÜTTE really come into their own. ISABELLENHÜTTE is the only manufacturer in the world who is capable of offering shunts with a very high load capacity in a relatively small housing.

Figure 1 shows a comparison between the VMS shunt (2512, 10mΩ) from ISABELLENHÜTTE and a competitor component (also a 2512, 10mΩ

shunt). With a current loading of 17A, the competitor product becomes perceptibly hotter, and that means less loadable. On the left it can be seen how hot the competing product becomes; on the right, the shunt from ISABELLENHÜTTE remains relatively cold.

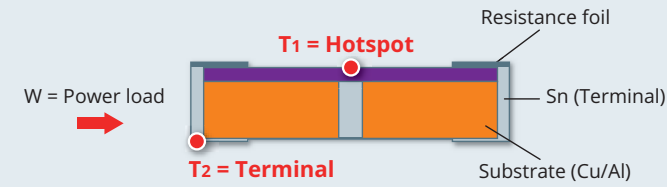


Picture 1: Comparison measurement between the VMS series (right) and the competitor component (left)

When it comes to developing shunts, ISABELLENHÜTTE concentrates in particular on heat dissipation as critical parameters. Thanks to the special design of the measuring resistor, the carefully selected materials, and sophisticated production techniques, ISABELLENHÜTTE has succeeded in keeping the internal heat resistance R_{thi} extremely low and the heat dissipation from the hotspot via the contacts point to the PCB efficient.

As can be seen in Figure 2, the critical path is between the hotspot (T1) and the solder pads (T2). In this area the internal heat resistance (given in Kelvin per Watt) with VMS shunts from ISABELLENHÜTTE is only $R_{thi}=25K/W$, while with the direct competitor model it measures 50K/W. And that is precisely why VMS shunts remain about -46° colder than the comparable component from the competitor. Certain conclusions could be drawn from this, and this consideration can be made: If the shunt from ISABELLENHÜTTE

ISA-PLAN® cross-section view



Picture 2: Cross-section of the SMS/VMS series

remains »colder« under the same load, should this shunt also be able to »withstand« a higher current, and therefore accept more power, or could it be possible to use a smaller form factor? This consideration is absolutely correct, and is unquestionably identified in Figure 3.

A comparison with the SMS series instead of the VMS units is exciting, too: The R_{thi} with the SMS series is only 20K/W, and that makes the difference between ISABELLENHÜTTE's product and the competitor product even clearer.

Figure 3 makes the massive differences in heat dissipation between the two shunts very clear. Here we can see precisely the connection between the internal heat resistance and the load capacity. Not only is the load capacity of the SMS series higher than that of the comparable competitor model; the power derating with the competitor model starts from 70°C, and at 110°C the resistor can only withstand a maximum of 60% of the rated load.



ISABELLENHÜTTE's alloys are among the finest in the world, as reflected in the wide range of potential applications.

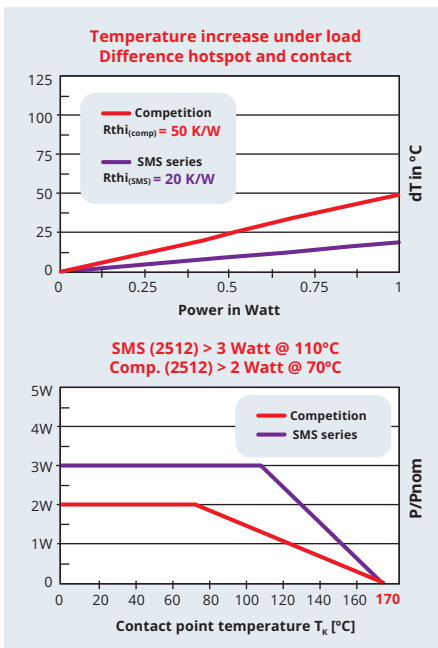
How ISABELLENHÜTTE does it?

Nowadays, a resistor is regarded as »nothing particular«, nothing more than a basic component, and many users believe that »anyone« is capable of manufacturing them. This is only true if all that's needed is for the resistor to meet the standard requirements. But when it comes to making high-quality precision and high capacity resistors in the low-Ohm range for the most widely differing applications, which achieve the best possible measuring results in the smallest possible space, then only one manufacturer can deliver what's needed: ISABELLENHÜTTE.

sting and inspection, at one location, flexible and entirely independent production can be achieved. And that's how ISABELLENHÜTTE can always guarantee highest possible quality, with development, production, quality management, and quality assurance all in one place and all under absolute control.

And that's also the reason why ISABELLENHÜTTE products meet the highest demands for load capacity, temperature coefficients (TC), low thermoelectric voltage against Cu, long-term stability, and low inductivity. Because these properties are influenced both by the resistance material used, as well as by the type of construction and technology, every single development and production process is always of the greatest importance.

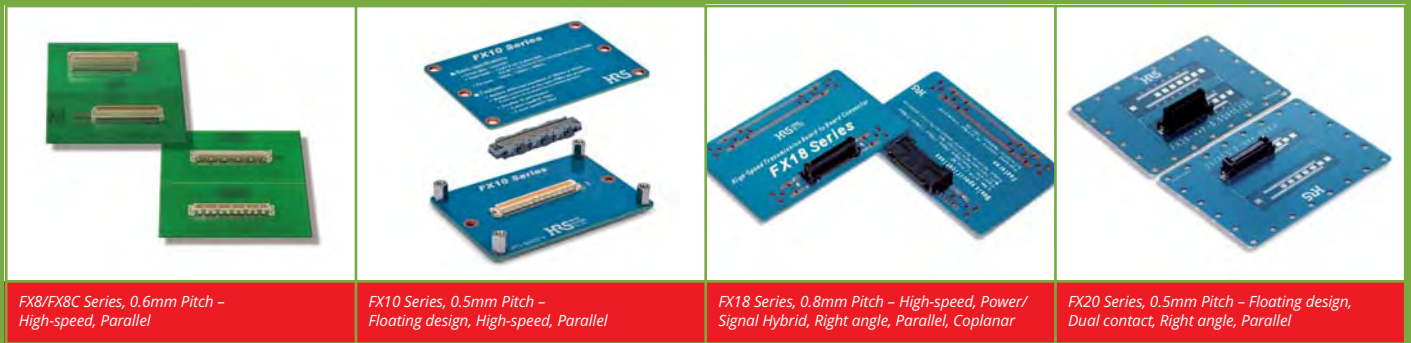
To achieve the greatest possible manufacturing depth in the value creation processes, the different department of the company interact in a way that may well be unique, anywhere in the world. Thanks to the concentration of all the manufacturing stages, from the melt to the rolling mill, the wire drawing plant, and complete component manufacture, right through to final te-



Picture 3: Connection between internal temperature resistance and power acceptance

P06

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FX8/FX8C Series, 0.6mm Pitch – High-speed, Parallel

FX10 Series, 0.5mm Pitch – Floating design, High-speed, Parallel

FX18 Series, 0.8mm Pitch – High-speed, Power/Signal Hybrid, Right angle, Parallel, Coplanar

FX20 Series, 0.5mm Pitch – Floating design, Dual contact, Right angle, Parallel



FunctionMAX

The FunctionMAX family comprises of board-to-board power connectors that have floating structures and high speed transmission capability for industrial applications.

As the name »FunctionMAX« implies, this product family is a series of board-to-board connectors from HIROSE that have been designed to meet the requirements of the industrial market with maximum functionality.

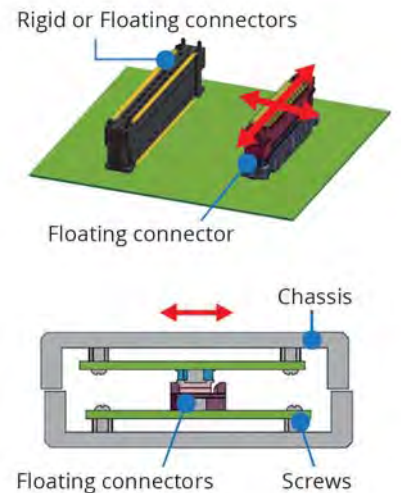
The FX8/C, FX20, FX22, FX30B, FX23 & FX10 series allow alignment compensation by either embedded floating structure or using interposers and high misalignment absorption. This offers a degree of »play« between the contacts during mating and allows the connector to absorb alignment errors. The benefits of the floating or misalignment absorption allow multiple connec-

tors to be used on the same board. These connectors contribute to the device design by absorbing assembly errors and help to reduce the need for corrective re-work operations.

The FX20, FX22, FX30B series incorporate highly reliable dualcontacts. Each contact has a different vibration characteristic due to different contact forces that widens the frequency range to avoid resonance. This allows high vibration resistance and increased contact reliability.

The FX23, FX18, FX8/C & FX10 series are designed on a differential transmission system and offers

The benefits of HIROSE's floating structure

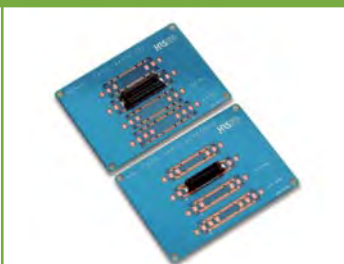




FX22 Series, 0.5mm Pitch – Floating design, Dual contact, Coplanar



FX23 Series, 0.5mm Pitch – Floating design, High-speed, Power/Signal Hybrid, Right angle, Parallel



FX23L Series, 0.5mm Pitch – Floating design, Dual contact, Coplanar



FX30B Series, 3.81/7.62mm Pitch – Floating design, Dual contact, Right angle, Parallel

FunctionMAX™

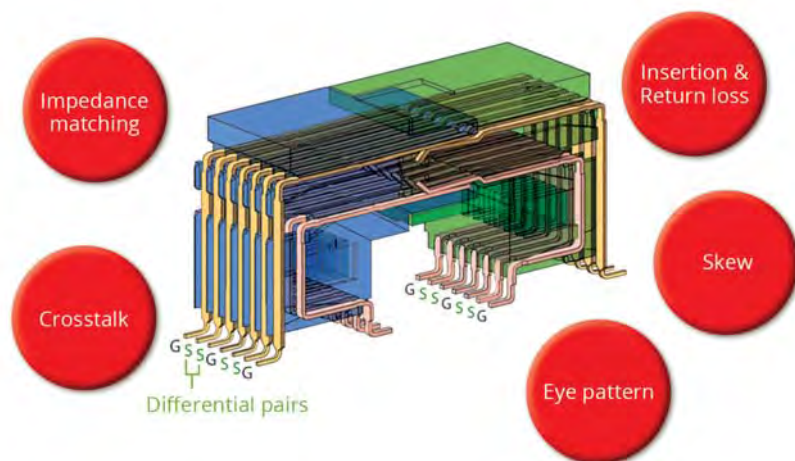
excellent noise resistance and high-speed signal transmission. Why have a floating function?

The benefits of HIROSE's floating structure

The floating structure is embedded into the fixed base of the connector housing and allows movement with the aid of springs. This offers a degree of »play« between the contacts during mating and allows the connector to absorb alignment errors.

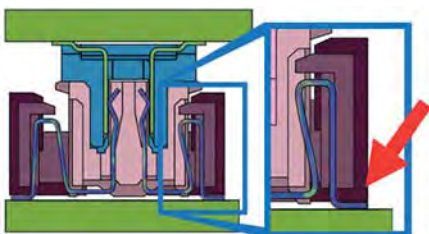
The benefits of the floating function allow multiple connectors to be used on the same board. These connectors contribute to the device design by absorbing assembly errors and help to reduce the need for corrective re-work operations. The spring portion of the terminal absorbs stress imparted by alignment errors, and the stress applied to the mounted parts. This enhances reliability and prevents solder cracking. Why high-speed transmission?

The benefits of HIROSE's high-speed transmission



Designed to meet high-speed transmission needs.

Floating connections correct alignment issues due to assembly errors.



Spring portion of the terminal absorbs stress imparted by alignment errors. This reduces the stress applied to the mounted parts. This also enhances reliability and prevents solder cracking.

The benefits of HIROSE's high-speed transmission

The requirement for applications needing higher and faster data transfer rates has significantly increased. Particularly in the area of IoT (The Internet of Things) which focuses on more physical objects »things« being embedded with electronics and connectivity to exchange data, and/or allow objects to be sensed and controlled remotely across a network structure.

This is a particular benefit to the industrial market due to the opportunities for increased automation with efficiencies and cost saving benefits.

FunctionMAX has been designed to provide high performance connectivity solutions for industrial applications.

FunctionMAX high-speed connectors are designed on a differential transmission system and offers excellent noise resistance and high-speed signal transmission.

For more information on impedance, crosstalk, insertion/return loss, skew, eye pattern and signal integrity (SI) characteristics, please contact us.

Suitable applications are devices that utilise multiple connectors on a PCB; also industrial controllers, medical equipment, servers, smart meters, BTS, PLC, measurement equipment, industrial motors, IoT (Internet of Things) devices and many others.

S01

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EnerBee

The EnerBee family from HIROSE comprises of wire-to-board and board-to-board power connectors to provide technically advanced connectivity solutions for industrial power sources.

Named after the tiny, yet energetic insect, the EnerBee name represents the shared concept of this product family – compact size with high-end performance. In addition to its high-current capability and superior performance, EnerBee offers connectors with many more features and benefits that deliver robust connectivity solutions to the demanding areas of industrial power supply and power sources.

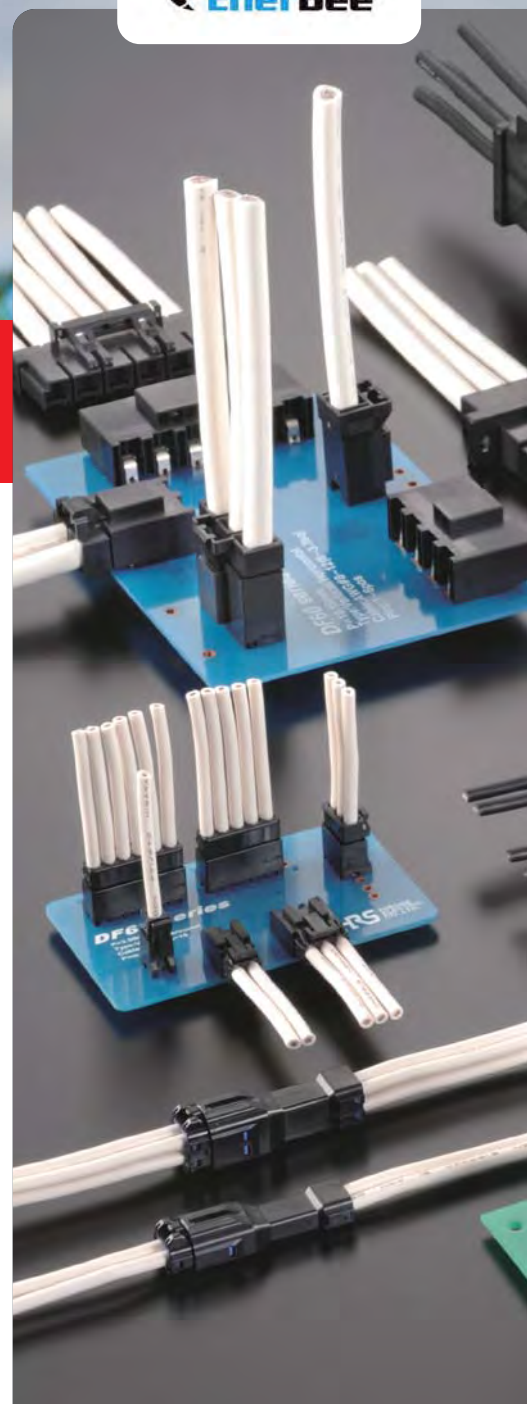
EnerBee's compact design maximises space on the PCB to give greater design flexibility. Secure locking is guaranteed by the robust positive locks that give a clear tactile click when mated. This confirms the connector is fully engaged guaranteeing complete electrical and mechanical connection. The centre locks prevent uneven locking and cable entanglement which is common with side locks. Safe connection is ensured by the polarization keys that prevent incorrect insertion of the mating half connector.

DF60, DF63 and DF22 incorporate a multi-point contact structure. These are unique contacts with independent springs to allow movement to ensure superior vibration resistance and contact points to guarantee a secure connection. DF33C, DF63, DF22 can be potted. This is a process to protect mounted components from moisture, dust and dirt. The lower part of the connector housing is sealed to prevent potting material wicking into the connector body. Please refer to the table below for the applicable specification for each series.

Suitable applications are robots, industrial controllers, automotive devices, medical, servers, servo amplifiers, smart meters, gaming equipment, motors, IoT (Internet of Things) devices and many others.

S02

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ABOUT HIROSE

HIROSE Electric Co., Ltd is a world-class Japanese manufacturer of high quality connectors, with sales of over €1 billion to customers worldwide.

Established in 1937, HIROSE uses advanced engineering services, excellent customer service and worldwide manufacturing capabilities to provide technically advanced connector solutions for many industries including: industrial, automotive, consumer, computer and telecommunications.

FH41-SERIES




FEATURES

- 28, 30, 31, 40, 50 & 60 contact sizes
- High speed transmission speed up to 3.75Gbps
- Robust lock structure
- Shielded
- 20 mating cycles

HIROSE FH41 Series, 0.5mm Pitch, High Speed Transmission FFC Connector.

HIROSE has an established reputation in the industry for quality, reliability and utilising leading-edge technology. Recognising the rapid and challenging technological developments in the field of electronics, HIROSE have introduced smaller yet faster performing connectors.

The FH41 has the capacity to handle high transmission speeds of up to 3.75Gbps. Shielded impedance matched FFC cable with ground contacts can be used for effective impedance matching (Differential Impedance: $100\Omega \pm 10\%$).

The housing incorporates an innovative robust lock structure. The special impedance controlled contacts form a reliable hinge point for the rotating actuator instead of relying on the housing walls. This allows the actuator to fully support the whole length of the connector which guarantees superior performance and reliable connection. A stronger thicker actuator is provided that will not come loose even with rough operation. Insertion of the FFC into the actuator is made easier with a wide opening of 110 degrees. A firm and clear tactile click confirm that correct locking of the FFC has been completed.

Further benefits of using FH41 are the side catches that hold the tabbed FFC in place which allows a temporary holding facility for the FFC with easy and accurate guided positioning. A high retention force of 47N max can be applied to the FFC.

S03

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FCI NEWS



New RotaConnect® Solutions

Minitek MicroSpace™



FCI announced the extension of the RotaConnect® family with a Wire-to-Board solution. The Wire-to-Board (WtB) connector mates horizontally with the existing Board-to-Board version, which is hermaphroditic and surface mount soldered to the PCB.

The 3.00mm pitch RotaConnect® WtB features a dual beam spring contact design, delivering high-performance and reliability. Designed with a passive latch for housing retention, the housing protects the pins and prevents mis-matching. Housings are available in 2 and 4 positions.

RotaConnect® WtB provides power to the LED printed circuit board in a string of rigid printed circuit board light strips. The contacts accept stranded copper wire with wire ranges from 30 to 22AWG and the maximum current rated is up to 5A. The operating voltage is 125VAC and temperature range of -40°C up to +125°C.

The RoHS Compliant RotaConnect® Wire-to-Board is ideal for control boards, sensors, actuators, rigid LED strips and automatic lighting. For more information contact

S04

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RotaConnect®:
High-performance and reliability!



The unique design of Minitek MicroSpace™ 1.27/1.5mm connector enables contact pitch compatibility with the LV214 Severity-2 standard.

Minitek MicroSpace™ 1.27/1.5mm connectors are ideal when high vibration endurance is required. The design features primary and secondary contact retention, Poka-yoke polarization and a visual mismatch prevention system that eliminates application errors. A Terminal Positioning Assurance system allows this solution to be easily and quickly installed.

Addressing the growing demand for miniaturization, this connector's compact design requires a PCB footprint which is half of the current market offering.

The Minitek MicroSpace™ 1.27/1.5mm contact current carrying capacity is 4A. The external diameter of the cable is up to 1.3mm (22AWG). The 4N normal force guarantees good resilience against vibration, while the connector locking can withstand 70N force.

This product application range is suitable for automotive, car lighting, industrial & instrumen-



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ABOUT FCI

FCI is an international connector and cable assembly solutions manufacturer of Backplane Connectors, Power Solutions, Board/Wire to Board Connectors, Input/Output Connectors, Optical Interconnect, Cable Assemblies, Terminal Blocks and Flex Connectors. Our interconnect solutions are designed and manufactured for various market applications such as automotive motorized vehicles, telecommunications, data storage, consumer electronics, medical, industrial & instrumentation as well as renewable energy. FCI employs 7,300 employees worldwide in 2014. With a global footprint comprising of the Americas, Asia Pacific, Europe, Middle East and Africa, we are well renowned and respected for our technological leadership, as well as innovative connector and cable assembly solutions.

tation markets and harsh environment. For more information contact:

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Pwr TwinBlade® Expanding

Minitek MicroSpace™



New: Pwr TwinBlade® Hot-Swap Connector



FCI is proud to announce the release of the 100Amp Pwr TwinBlade® Hot-Swap cable connector. The new connector accepts up to a 25mm² (4AWG) wire and includes engagement sensing contacts to indicate when the power contacts are connected, eliminating potential damage from hot-plug conditions. The Pwr TwinBlade® cable connector is a next generation cable-to-board DC power distribution connector supporting >140 amps per linear inch. It is rated at 100A per power contact without exceeding a 30°C temperature rise in still air, using 25mm² wire. The connector is offered in both straight and right angle cable exits and can be terminated to either a printed circuit board or a Busbar.

»The Pwr TwinBlade® power cables are an ideal way to distribute from 1kW to 5kW of DC power between circuit boards, Busbars or sub-assemblies, with minimal power loss«, says Michael Blanchfield, Portfolio Director for Power Solutions at FCI. Pwr TwinBlade® was designed to meet the performance and qualification requirements common in the telecom & datacom, server & data storage and industrial control industries.

S06

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PLUGGING MADE EASY!



To meet the increasing requirements of the market for ergonomics, plugging safety and security, and high functional performance, STOCKO has now extended its range of quick-connect receptacles even further.



The demand is steadily growing for quick-connect receptacles with low insertion forces, tolerance against incorrect plugging, an audible click when the right plugging position is reached, or after active locking as well.

And that's why STOCKO CONTACT developed new quick-connect receptacles which have now been adopted into the range. Thanks to a wide range of wire cross-section values and material/surface combinations, STOCKO can provide the right contact for a vast number of applications.

dance with IEC 60 335/GWT 750 and V0, fulfilling the requirements of the domestic appliance industry.

S07

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RSB 8238, 6.3mm quick-connect receptacles

A main feature of these 6.3mm quick-connect receptacles is a new contact design with an enlarged and strengthened entry zone. The highly flexible spring elements reduce insertion force to 25N and less, as well as allowing for incorrect plugging by up to 5°. The engagement tongue has been improved as well, with a detent cam which produces the desired click effect at the end of the plugging process.

Main features at a glance

- Tab width: 6.3mm
- Insertion angle: ±5°
- Click effect: Flexible snap-in tongue
- Insertion force: <25N
- Matching insulation sleeve: EH 750

These new contacts are ideally suited for difficult plugging situations, in which the contacts must be covered or can only be plugged with difficulty. The new developments are rounded off by the matching insulation sleeves, approved in accor-



RSB 8270, 4.8mm quick-connect receptacle

The RSB 8270 receptacle now provides an easy-plugging format for the 4.8mm tab width as well.

Main features at a glance

- Tab width: 4.8mm
- Tab thickness: 0.5 or 0.8mm
- Insertion force: <22N
- Matching insulation sleeve: EH 650.100



RSB 8261, 2.8mm quick-connect receptacle

The lockable RSB 8261 quick-connect receptacle has been developed for a tab width of 2.8mm. The crimp contact is easy to fit, and engages with the mating connector, allowing for high retaining forces to be achieved to prevent unintentional release of the connection. After the detent cam has been unlocked, conveniently low draw-off forces are ensured.

Main features at a glance

- Tab width: 2.8mm
- Tab thickness: 0.5 or 0.8mm
- Insertion force: <14N
- Retaining force with active locking: > 62N
- Matching insulation sleeve: EH 761

CODICO PRESENTS: POGO PINS FROM C.C.P.

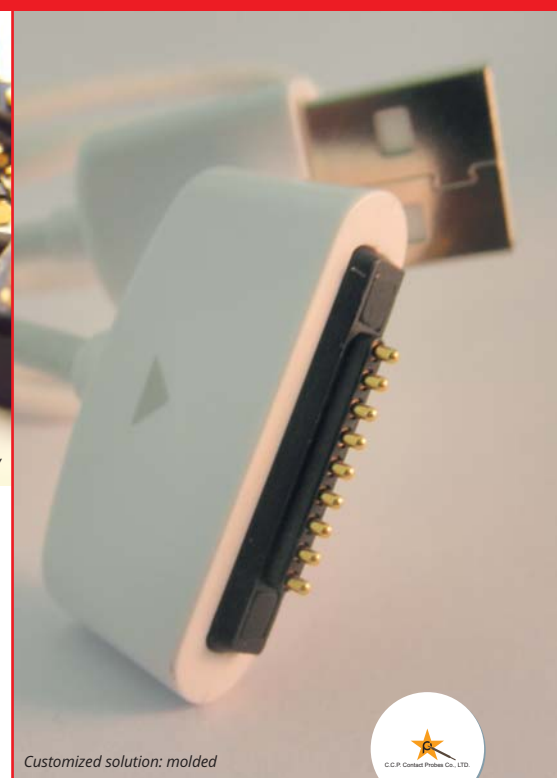
Pogo pins also known as spring contacts can be used for a various range of applications.



Pogo pins



Pogo pin assembly



Customized solution: molded



C.C.P.'s pogo pin product range offers solutions for:

- EMI applications
- signal/low current applications (<1A)
- high current applications (<10A)
- waterproof & magnetic applications

Different platings are possible:

- Gold
- PdNi (color silver)
- CCP Black (color metallic black)
- Nickel-free solution for allergic due to nickel release

Besides a various range of different pogo pin designs (pin type, length, diameter, barrel etc) and connector assemblies C.C.P. offers a huge range of standard catalogue items:

- Pogo pins: Length = 1.60-9.50mm
- Connector assemblies: 2P; 1.70mm pitch – 44P; 3mm pitch

C.C.P.'s experience, knowledge and flexibility enables customization service for special needs in pogo pin connector field! Even for rough environ-

ment applications: up to IPX8 is possible such as airtight solutions.

About C.C.P.

C.C.P. was founded in 1983 in Taiwan. Its focus was on productlines for semiconductor industry such as test probes for IC testequipment, IC sockets and more.

In 2000 C.C.P. founded their factory in China, Dong Guan focusing on design and production of pogo pin connectors and traditional contacts. Since their foundation it has been C.C.P.'s target and focus to produce high quality products. To ensure high quality all design, production and quality processes are done in-house.

One of their other targets is to offer high and flexible service as well as high customer focus. Even the flexibility in their production enables the production of high and small quantities. Success confirms the objectives and principles of C.C.P.: Its customers include leading manufacturers of consumer products and electronics mobile phones and devices of medical technology and more.

Quality and certificates:

- All products are ROHS compliant and halogene-free
- AFAQ ISO 9001:2008
- IECQ QC080000
- ISO 14000:2011
- ISO/TS16949

Product range:

- PCB test probes
- Pogo pins (spring contacts) – single pins and connector assemblies
- IC test probes

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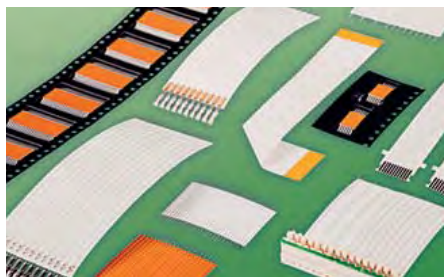
OPTIMIZED

PROCESS

Process-optimized flat conductor technology made in Germany!

SUMIDA flexible connections manufactures flexible ribbon cables. Based on the core technology of laminating, the company has developed an extensive product range of flat conductor cables and FFC interconnect and complete cable assemblies belong.

For automotive applications and industrial electronics, the flexible flat cables have become indispensable, because of their reduced space and low weight. But also in other applications, for example in an industrial environment, developers can benefit from the flexible flat conductor technology.



The product development process at SUMIDA extends from the idea to the prototypes to serial production. The experience of the company pays it out especially for the design and dimensioning of the ribbon cable and flexible printed circuit board connections.

The new PANTA SMD jumpers from 4-pin to 25-pin and the new PANTA SMD jumper in pitch size 0.5 mm from 8-pin to 40-pin are the latest product news from SUMIDA. The PANTA SMD jumper represents an economical alternative to rigid-flexible printed circuit boards and a technically optimized solution to gradually milled PCBs.

PANTA SMD jumpers are optimized for automatic

assembly in large quantities and are supplied on blister Tape and Reel for removal and positioning by pick-and-place. While conventional flexible connections must be manually placed on printed circuit boards and are then further processed by a separate selective soldering process, PANTA SMD jumpers can be fitted directly on the printed circuit board in standard reflow solder process.

Thus, significant cost savings in the printed circuit board assembling process can be achieved. Another advantage of the PANTA SMD jumper is, that it can be tested for soldering performance and positioning during the AOI process (Automatic Optic Inspection). This eliminates a possible subsequent visual inspection.

Learn more under

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INSULATION DISPLACEMENT CONNECTORS



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When it comes to the drive for machine tool heads, in processing insulation displacement connectors, STOCKO CONTACT has developed the WA 30 crimp press adapter.

The production of cable harnesses with insulation displacement connectors in small series, pilot series, or as sample cable harnesses calls for an economical and flexible solution for the processing of connectors.

And for these applications STOCKO offers system-specific tool heads for all IDC connector series. With the WA 30, an adapter has now been adopted into the range with which conventional commercially available crimp presses can be used to drive tool heads.

In this arrangement, the adapter is integrated into the crimp press instead of a crimp tool, and then fitted with a STOCKO tool head. The process is set in motion by starting the crimp press by



Crimp press adapter WA 30

Crimp press with WA 30 and tool head

FEATURES

The main features of the WA 30 are:

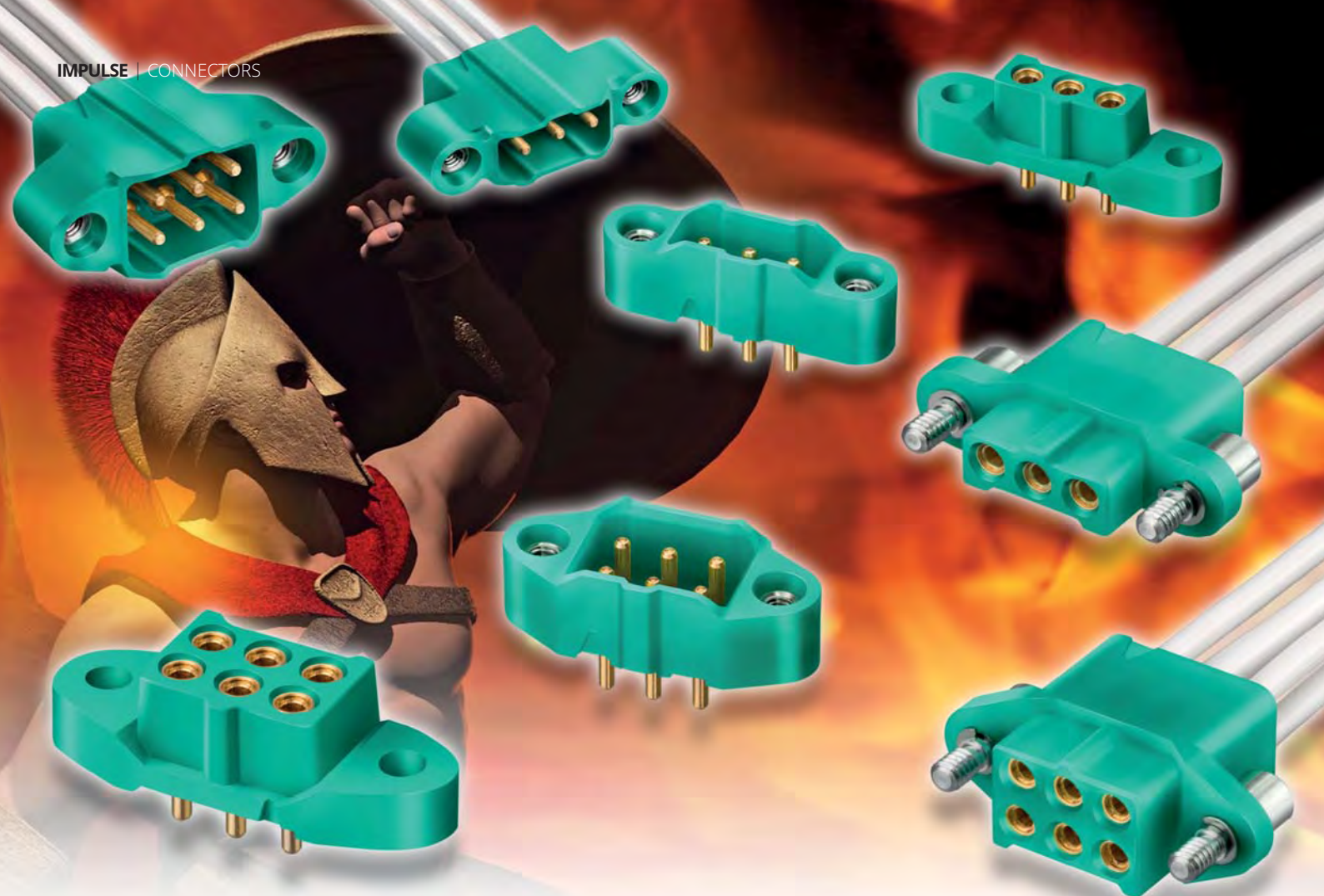
- Adapter for driving STOCKO tool heads with conventional commercial crimp presses
- Suitable for all STOCKO tool heads for insulation displacement connectors
- Easy replacement of the tool heads when changing to another connector system
- High flexibility in the production of small to medium series

means of a foot-operated switch. By simply changing the head, the unit consisting of the crimp press and adapter can be reset for contacting with another STOCKO connector system.

The WA 30 crimp press adapter now provides an economical drive unit for STOCKO tool heads which can be used on conventional commercial crimp presses.

S10

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HI-REL-CONNECTORS

HARWIN

HARWIN M300 5 & 10A Power Connectors: High Reliability Connectors for Power Applications.

HARWIN's M300 series is a 3.00mm pitch, high reliability high performance connector system suited to aerospace, defense, industrial and other harsh environments.

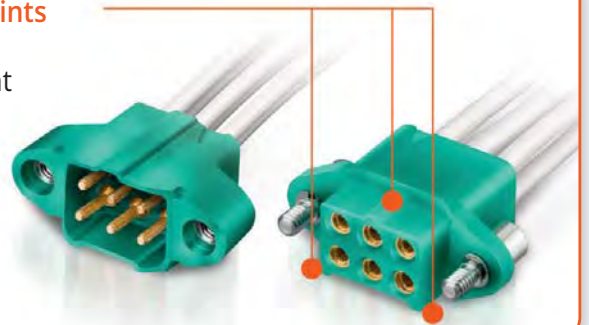
M300 provides a dual and single row cable to board and board to board solution for applications requiring up to 10A of power in a small space envelope. Featuring an extended rear potting wall for additional strain relief, the housings are clearly marked with a »position 1« identifier.

Moldings are manufactured from Halogen and Red Phosphorus free glass filled thermoplastic and all M300 connector assemblies are RoHS compliant.

S11

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Keyway Polarisation Points
3 polarising points on each component prevent mis-mating.



Jackscrew Retention System
Optional Jackscrews for security of connection



M300

Potting Wall

Cable connectors feature a rear potting wall adding an extra level of strain relief.



Four Finger Beryllium Copper Contact

Unique high-reliability contact design ensures signal integrity under extremes of bump, vibration and shock.



No. 1 Position identified

Housings are clearly marked with identifier for fast visual inspection.



Environmentally Friendly Materials

Mouldings are manufactured from halogen & Red Phosphorus free, glass-filled thermoplastic, an environmentally friendly material. All M300 connectors are RoHS compliant.



FEATURES



- Small PCB Footprint
- Up to 5 and up to 10 Amp versions
- Up to 1,000 operations
- Jackscrew security system
- Keyway Polarising position points prevent mis-mating
- Extremes of temperature: -65°C to +175°C
- Four finger contact ensures connectivity in high vibration environments
- Prevents damage to contacts in blind mating conditions
- Manufactured from environmentally friendly materials
- 3mm pin spacing



YAMAICHI Electronics has extended their core competences to include a new series UHSII SD card reader. UHS-II is the version 2 of the Ultra High Speed (UHS) bus classification for the SD Flash memory cards. Since the introduction of SD (Secure Digital) cards in 1999, YAMAICHI Electronics has gained a reputation as one of the leading providers of SD card readers.

In the meantime, this segment has become a large product family that serves different markets including consumer, automotive, and industrial with a wide range of products.

Now YAMAICHI also offers the FPS017T series which not only extends both the SD card reader family but also represents a practical extension to the High Speed product line, for which YAMAICHI offers a variety of internal and I/O connectors.

The FPS017T series was developed for generation 4.0 SD cards and therefore meets UHS-II requirements. That means that instead of the usual nine contacts, this reader now has 17 contacts to support transmission rates of up to 312Mbit per second.

YAMAICHI offers this new generation of card readers in top and reverse mount versions (FPS017T-1000-x or FPS017T-2000-x). A closed metal housing with four tabs for connection to the circuit



FPS017T standard upper side

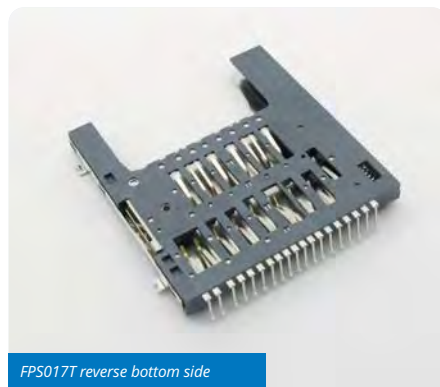
board ensures good EMC shielding. The FPS017T series offers a convenient push/push mechanism, that is, the card engages when pressed once. When it is pressed again, the mechanism releases it and the card can safely be removed. A card brake provides the definitive ejection of the card.

A card presence switch ensures that the read/write process only starts or stops when the card is completely inserted or removed. This guarantees data transmission and prevents data loss. Depending on customer requirements and the application, contacts are available in different gold plating variants – from Gold flash to 30µinch.

The card readers are delivered in trays or tape-and-reel packaging as needed, offering the greatest possible flexibility in assembly.



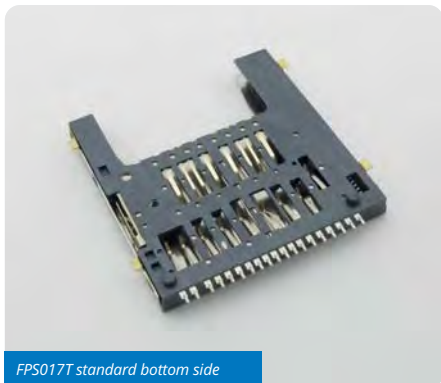
FPS017T reverse upper side



FPS017T reverse bottom side



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FPS017T standard bottom side

With this new series, YAMAICHI has once again extended two of its core competences in the area of card readers and high speed with an interesting, high-quality product.

YAMAICHI Electronics offers not only these components, but also many other card connectors for all available Flash and SIM card types with different form factors, such as Micro-SIM, microSD, MMCmicro, CompactFlash, multi-card versions, etc. An extensive line of high-speed products includes various board-to-cable connectors, high-speed FPC, floating board-to-board connectors and I/O interfaces for high transmission rates at 100Ohm differential impedance.

S12

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CID1 – The simple answer for easy connections!



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With its CID1 series CVILUX fulfills the requirements of the market for simple, internal connections. CID1 is produced in SMT, pitch 4.00mm and is available in 1, 2 and 3Pin version. Furthermore it can be used at ambient temperatures from -35°C until +105°C and was developed for the usage with AWG18 solid wires. Rated current and voltage are 9A, 300VAC (r.m.s)/DC.

Among others CID1 series can be used for applications in lighting industries:

- Automatic pick and place process is possible because of T&R packing
- Its material PPA 33% GF suits the requirements of THR soldering process
- Easy but effective termination technique: strip off wire – mate – ready!

CID1 –
2p version
from CIVILUX



KEY FEATURES

Technology	SMT
Pitch	4,00mm
Pin counts	1, 2 and 3
Ambient temperature	-35°C until 105°C
Wire size	AWG18 (solid wire)
Rated current and voltage	9A, 300V AC (r.m.s)/DC
Packing	Tape & Reel

Among others CID1 series can be used for applications in lighting industries.

S13

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IDEAL FOR OUTDOOR APPLICATIONS



SOURIAU (part of the Esterline Connection Technologies group) is pleased to introduce the UTL series. The UTL series is the ideal connector for outdoor applications.

SOURIAU's UTL is a power & control connector intended for outdoor applications such as architectural and street lighting, portable power tools, and telecom relays. Conforming to the latest UL and IEC standards it can handle currents up to 16A and voltages up to 600V.

With a latch system which secures the connector, UTL features IP68/69K-rated ingress protection and compatible with the latest Underwriters Laboratories (UL) and International Electrotechnical Commission (IEC) standards applicable to luminaries (UL 1598, IEC 60598), telecom relays, and portable power tools.

Suited to the most demanding climates, it withstands all weather conditions, and in particular

UV radiation, thanks to the use of a new molded polyamide.

S14

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FEATURES

- Compatible with UL 1598 & IEC 60598 standards
- UV Resistant
- Moisture Proof and Dynamic Waterproof IP68/69K
- Current Breaking Capacity
- Withstands vibrations according to standard IEC 60512-4 from 10 to 2000Hz
- Designed for overmolding
- Temperature Range: - 40°C to + 105°C
- 1000 hours salt spray resistant



CODICO @ BUSINESS RUN 2015



»There were runners from almost all CODICO departments taking part – and that's great when it comes to swapping stories about the run between different departments afterwards.«

»Unfortunately I was just over my personal best time, but I'll make up for it next year. I'll have to put in a little more training.«

»Thanks to the highly motivating running shirts provided this year, participation in this event was once again great fun for our colleagues. And thanks too to the weather, which this year smiled on us yet again, I was very pleased with my time for the run. And with that in mind I'm already looking forward to the next Vienna Energy Business Run in 2016.«

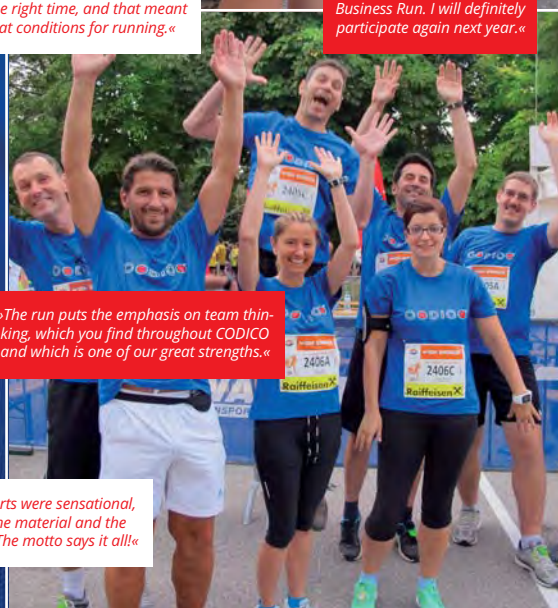
»The previous period of hot weather ended just at the right time, and that meant we had great conditions for running.«

»I have really enjoyed the Business Run. I will definitely participate again next year.«



»The run puts the emphasis on team thinking, which you find throughout CODICO and which is one of our great strengths.«

»The shirts were sensational, both the material and the design. The motto says it all!«



Three teams line up at the start with CODICO running shirts and the motto »NEVER CHANGE A WINNING TEAM«!

The weather was perfect on Thursday, 3 September 2015, when more than 30,000 lady runners gathered at the Ernst Happel Stadium to take part in the Vienna Energy Business Run 2015, the 15th time the event has been held. CODICO was there again with three teams at the start line, determined to prove their sportive ambitions.

The 4.1 kilometre course ran through the Vienna Prater park and ended with a 3/4 circuit in Vienna's Ernst Happel Stadium. CODICO's runners made light work of the distance. New features this year were the blue running shirts, which CODICO had made for all the employees taking part. Moreover, the runners were able to keep the shirts after the event as a memento, and as incentive for more sporting activities in the future.

With the motto »NEVER CHANGE A WINNING TEAM«, the Business Run not only strengthened team spirit, but also boosted the sense of belonging to something greater than the individual's own department. We offer our warmest congratulations to the participants and look forward to next year, with another vigorous and exciting Business Run 2016!

D03

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CODICO TEAM

Hello readers!

Dirk Plässer

And now here's someone from Dortmund. I have been involved in distribution for 20 years, 90% of the time dealing with the passive component sector. I have been a member of the CODICO German sales team since January 2012. I work in the home office, and at CODICO I'm responsible for the external service marketing of passive components. My job is to present these to my customers engaged in development and purchasing, some of them have been with us for many years and some of them are new, in the area of Greater North Rhine-Westphalia and a bit beyond – and I do it personally. The technical and commercial requirements of my customers are on my To Do list every single day. In this situation, I support the development departments with technical solutions for new developments when specific needs arise, as well as with improvements by way of new products and forthcoming trends. I also keep the purchasing side constantly provided with the latest information and details of new opportunities.



There are always new requirements from the most widely varying industrial sectors, and that means that this job is always varied, and always exciting. Of course, there are parts of my life outside work which are important too. First among my family. Being married with two children, aged 11 and 13, family life can be turbulent, exciting, and a lot of fun, and naturally I dedicate a lot of time to this. Going on holiday with the family is absolutely great (and even better when the weather in Germany and the North Sea decides to co-operate). And there's even some time over for my personal hobbies. I love riding my motorcycle. Holiday planning and the family permitting, I go off once a year on a tour with some friends, which takes me to the Austrian, Swiss, or French Alps, and, if the mood takes us, we go round again. On the electronics side, ever since my student days I have been fascinated by the pleasures of audio entertainment, which also provides me with a certain amount of relaxation – as much as the excitements of domestic life will allow. And – of course – I'm a big BVB fan! It's true that I don't watch every game on TV, and I don't get to the stadium all that often, but that's the league for me. All the best – until we meet again!

D04

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David Dallos

Dear Impulse readers, after having worked 8 years in the company, my time has finally come to introduce myself in the current issue. My name is David Dallos and, as already mentioned, I've been part of the CODICO family since 2007.

During my studies, in an effort to finance »student life« with a side job, I responded to a vacancy announcement in a student job exchange and applied immediately for a post as a temporary worker in the warehouse team. Right from the start, I was delighted by the friendly and informal atmosphere among the colleagues and the warm reception I got from the warehouse team. In 2012, after completing my studies - and a few years of work in the warehouse – I accepted the offer to join the logistics department. Apart from the pleasant atmosphere and positive collaboration, what I particularly like about logistics is that no two days are ever alike. There are always new challenges to manage, which may seem unsolvable at first but offer new opportunities for personal improvement all the same. Apart from the operational tasks, I am most thrilled by the preparation and implementation of projects, the requirements of which continue to grow with a successful company.

In my private life, I try to spend as much time as possible with my family, friends, my partner, and our son. Since we live in a small community in the south of Vienna and have a large circle of friends, there's always something to do, be it hiking, mountain biking on our »backyard mountain«, or a pleasant visit to one of our many »Heurigen« taverns. What I have really come to appreciate over the years are long-standing friendships, most of which date back to my kindergarten time.

One of my great passions is music, and playing the guitar in a rock band is exactly the healthy distraction from work that I yearn for. Although live performances during the weekends are not exactly relaxing, I wouldn't want to miss them for the world. The connection between my work at CODICO and playing music? Both require a certain degree of creativity and improvisation, and they leave you with a great feeling when you manage a demanding task as a team.



D05

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Ingrid Hrusa-Hrabec

Dear friends and CODICO Impulse readers, today is my big moment, and I would like to introduce myself to you: My name is Ingrid Hrusa-Hrabec and I have been part of the team in the "Passive Components" group since 1 May 2011, where I am responsible for submitting offers, i.e. in presales. Since June 2012, my sales force colleague Dirk Plässer and I have been in charge of the German states with postal codes 3, 4, 5, and 6. In spring 2013, I was also assigned to postal code 9 area with sales force member Donato Urso.

After having spent more than three decades working in various different areas, sales was not a completely new experience for me, but the real challenge was the different types of electronic components. My curiosity and my thirst for knowledge and new experiences helped me quickly cope with this challenge. At this point, I would like to thank my colleagues in the back office and the colleagues in the sales force, as well as the product managers who always supported me and answered my questions with great patience.

Patience is an important virtue not only in the working world but also in private life, especially when one has a family. As a mother of an almost 29 year-old daughter and a 25 year-old son, it was not always easy to reconcile job, family, and one's own needs, especially since I had to provide room for my partner to follow his professional career. Nevertheless, I found the time to complete three kinds of training in the field of medicine. I am particularly fascinated by homeopathy as an alternative to conventional medicine. Meanwhile, my children are living their own lives and are fully independent.

This gives me and my partner time to enjoy our hobbies together, which all involve some physical activity outdoors. This means that we usually march over green lawns and try to get a white plastic ball into a tiny hole with as few swings of a metal club as possible. For a change, we sometimes use larger rackets strung with nylon threads to send small yellow felt balls over a net. But sometimes we climb on wheeled metal frames and ride through the forest, or put on shoes fitted with wheels to run faster on asphalted pathways. In the winter, we exchange our normal shoes for ones on blades and the asphalt for frozen water. When there's enough water in crystalline form, we climb up the mountain on planks with skins, only to then swing back down to the valley on them without the skins. The positive feedback from our customers is always an incentive for me to further improve my skills and my personal service. Therefore, I really wish to thank you for your support and appreciation!

D06

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Thomas Kämpfer



Dear Impulse Readers, my name is Thomas Kämpfer, and I'm 37 years old. I actually started my career in the German coal mining industry, where, after training, I was responsible for installing complex electrical energy supply systems underground. After five and a half years I decided to pursue a completely different line of work, and I swapped my mining overalls for a shirt and tie. I then worked for 10 years for a cable manufacturing company in the technical project calculation department, until in

October 2011 I took up the interesting and exciting challenge of driving ahead with CODICO as a marketing engineer in the development and expansion of connection technology in parts of Germany, the Netherlands, and Denmark. The combination of experience gained, the friendly acceptance at CODICO, and the support of my colleagues made it pretty easy for me to find my way into the design-oriented distribution business. I look after my region from the office in the area of the beautiful Lower Rhine, where I and my family have our home and where I find the way to balance my day between work and private life. I have been the proud father of twins for two years now, which keeps me young and fit. We make our priorities pleasure, fun, and enthusiasm. Whatever »other« leisure time I had, has long been dedicated entirely to football. I stopped my active playing career when I turned 33, but in parallel with this I have enjoyed 15 years as an honorary trainer and coach for children and young people, as well as eight years as a youth leader. As the holder of two DFB licences, I have also spent the last three years as a trainer with a senior citizens team in the Lower Rhine Football Association, although for the first time in 30 years I am now on standby, so that I can spend more time with my family.

CODICO offers me variety in my work, and a lot of it. On the one hand, I have a lot of room for manoeuvre on my own initiative; on the other, I have a strong team to back me up, all of them good friends, who are a great help in enabling me to make my contribution to our success. Customers, manufacturers, and colleagues from the whole international spectrum also provide me with the opportunity to develop, both personally and professionally. I am looking forward to the tasks still to come with CODICO, and I am going to stay absolutely focussed, whatever the next challenge may be.

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