



The World OF **IXYS**



Welcome To The World Of IXYS

I am pleased to introduce you to the inaugural issue of our quarterly newsletter *The IXYS Beat*. This publication is designed to serve as a communication channel with our distribution partners and customer community. The *IXYS Beat* provides you with news and updates from IXYS divisions, information about product releases, and industry trends and events.



The World of IXYS encompasses a global company where many technologies have been strategically assembled to create a wide array of platform- and system-level solutions. When reviewing this diversified product base of specialized power semiconductors, RF systems, and integrated circuits that IXYS currently offers, it is easy to determine that several technologies are an excellent fit for a broad range of products and services. The company's foundational objective had a strong high power focus, and IXYS continues to stay true to its roots. However, over the years, as the company invests in new technologies through acquisition and internal R&D, the breadth and depth of its product offerings has expanded to span the entire power spectrum and extended into emerging high growth markets, including energy management and power quality.

The power semiconductor and IC industry has rapidly grown into a complicated technology arena where designs increasingly emphasize the importance of an integrated approach, which has become the desired standard. While engineering sourcing and tight developmental timelines present a continual challenge, companies such as IXYS provide the peace of mind that comes from having tried and true solutions that work well together. IXYS goes even further than simply offering a list of products; rather, it creates reference designs to shorten development time and demonstrate how the company's products are integrated together to help improve the performance, reliability, and cost effectiveness of our customers' applications. Whether it is power discrete devices, drivers, MCUs, SSRs, opto-isolators, or solar cells, the World of IXYS offers a large portfolio of reference designs in which all the key components work together to provide a great jump start on many present-day application needs.

In our rapidly evolving industry, we believe customers value companies that strive to innovate and provide the services and support they depend on to grow their own business. IXYS continues to invest heavily in new technologies and products that meet today's high standards to ensure we offer a wide range of products to suit all major market segments. As new technologies emerge, be they in materials science, digital power management, or creating the best components for new designs, IXYS continues to pioneer development across a range of products to meet our customers' needs.

As we stay focused on growing our business through our technology-driven product offerings, I hope *The IXYS Beat* will keep you informed about what's happening at IXYS. Please share your thoughts on how we can continue to improve and innovate. Welcome to the World of IXYS!

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Featured Products



IXOLAR™ High Efficiency Solar Cell 22% Monocrystalline Silicon

IXOLAR™ SolarMD is an IXYS product line of Solar Modules made of monocrystalline, high efficiency solar cells. The IXOLAR™ SolarMD is ideal for charging various battery powered and handheld consumer products such as mobile phones, cameras, PDAs, MP3-Players and toys. They are also suitable for industrial applications such as wireless sensors, portable instrumentation and for charging emergency backup batteries. With a cell efficiency of typically 22%, SolarMD gives the ability to extend run time even in “low light” conditions and increase battery life and run time in a small footprint, which can be easily accommodated in the design of portable products. The design allows connecting SolarMD flexibly in series and/or parallel to perfectly meet the custom-specific application’s power requirements. IXOLAR™ products have a very good photonic response over a wide range of wavelengths and therefore can be used in both indoor and outdoor applications.

Applications:

- Battery chargers for portables such as cellphones, PDAs, and GPS-systems
- “Green” electricity generation
- Power backup for UPS, sensors, wearables



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Digitally-programmed Variable Capacitors

The programmable capacitors are active integrated circuits offering a variable capacitance value that can be easily programmed through a digital protocol. Mainly used for calibrating frequency devices like crystal oscillators, VCXOs, OCXOs and/or any other wireless front-end –reducing the errors and tolerances-, these capacitors are able to modify their value in small steps (down to femtofarads), providing an accurate tuning for the radiofrequency devices.

The possibility of storing the calibrated values in a non-volatile memory makes this solution a suitable replacement of any analog varactor, making easier the operational tuning through a digital programming, as well as reducing the bill of materials since no biasing circuitry is needed.

Applications:

- Frequency calibration in VCXOs, OCXOs, crystal oscillators manufacturing.
- Antenna tuning for wireless systems
- Capacitive sensors calibration
- Adaptive capacitance loops for RF applications
- Tunable filters and tunable matching networks



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Zilog’s Z32F128 ARM Cortex M-3 32-bit MCU for Motor Control Applications

The new Cortex M3 microcontrollers are special-purpose MCUs for first class motor applications that offer cost effective, high performance 32-bit computing capabilities. This family of MCUs provides 3-phase PWM generator units which are suitable for inverter motor drive systems. Most of the MCUs within the ZNEO32! family offer two built-in channels for the generators to control two individual inverter motors simultaneously.

Our ZNEO32! series of microcontrollers are supported by a number of third party development tools including Segger, Keil, IAR, and GCC.

Applications:

- BLDC/ PMSM motors
- Outdoor air conditioning
- Washing machines
- Refrigerators



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850V Ultra-Junction X-class HiPerFET Power MOSFETS

The 850V Ultra-Junction X-Class Power MOSFETs with fast body diodes represent a new power semiconductor product line from IXYS Corporation. Developed using the charge compensation principle and proprietary process technology, the new 850V devices exhibit the lowest on-state resistances (33 milliohm in the SOT-227 package and 41 milliohm in the PLUS264, for instance), along with low gate charges and superior dv/dt performance. Their avalanche capability also enhances the device ruggedness. In addition, thanks to the fast soft-recovery body diode, these Ultra-Junction MOSFETs help reduce switching losses and electromagnetic interference (EMI).

Applications:

- Industrial switched-mode and resonant-mode power supplies
- Electric vehicle battery chargers
- AC and DC motor drives
- DC-DC converters
- Renewable-energy inverters
- Power factor correction (PFC) circuits
- Robotics and servo control



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Featured Products



CPC2907B Optically Isolated Solid State Power Relays (MOSFET-based)

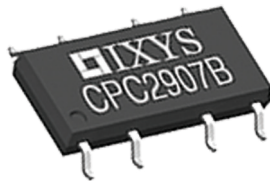
CPC2907B is a dual, normally open (1-Form-A) Solid State Relay that comprises two independent, optically coupled MOSFET switches. The combination of highly efficient LEDs and photovoltaic die makes possible an input to output isolation of 4000Vrms.

The optically coupled output driver, which uses the patented OptoMOS architecture, is controlled by a highly efficient infrared LED.

Dual OptoMOS relays provide a more compact design solution than discrete single-pole relays in a variety of applications, saving board space by incorporating both switches in a single 8-pin package.

Applications:

- Security
- Instrumentation
- Multiplexers
- Industrial control



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2.2kV 'Wespack' Rectifier Diode

The new 2.2kV rectifier diode is the first in a new package size, presenting the ultimate in power rating for weight and volume, without compromising on quality and reliability.

The new device comprises 50mm silicon wafer die directly bonded to a metallic disc using IXYS UK's most advanced processing. The device is packaged in a low profile 'Wespack' outline. The structure offers both optimised transient thermal conditions and overall robustness while limiting the overall package size. The thermal capacity of the metal disc and its direct fusion to the silicon enhances performance and presents excellent transient thermal and surge current ratings, while the low profile package minimises the thermal path from the silicon to the heat sink. The optimised thermal resistance of the package allows for maximum current ratings with an average current of 4295 amperes, at a heat sink temperature of 55 degrees centigrade. The device has a surge rating of 31,000 amperes and a maximum operating junction temperature of 175 degrees centigrade.

Applications:

- Utilities and chemical power supplies
- DC power supplies
- Front end rectifiers and bridges



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PCX-6425 150A 120V Pulsed Laser Diode Driver

The PCX-6425 is an air-cooled, high-power current source designed to drive laser diodes, bars, and arrays. The output current can be set from 1 A to 150 A. The load voltage can be set from 0 V to 120 V. The pulse width is adjustable from 100 μ s to 5,000 μ s with a frequency range from single shot to 100 Hz.

The PCX-6425 output current and output voltage is set with the encoder on the front of the system. The display allows the user to view all settings on the home screen. These settings are the current output, voltage output, current trip point, and voltage trip point. The pulse width and frequency is controlled with the trigger input at the front panel BNC Gate connection.

Applications:

- Research
- Laboratory
- Scientific
- Industrial



[Product Page](#)

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Phase-Leg Modules with Voltage Rating of 2200V in TO-240 package

The latest addition of 2200 volt products to the TO-240 portfolio is complementing IXYS' product line to now offer a wide current range from 25 to 140 amps at a case temperature of 100 degrees C with lowest forward voltage drop and high performance in the reverse blocking direction. This will allow designers the freedom to build applications with the highest power densities while maintaining IXYS' well know quality performance. In addition, IXYS' offerings for the corresponding thyristor module outline a maximum junction temperature of 140 degrees C and 150 degrees C for diode modules. The isolation voltage of 4800 volts meets industry requirements and underlines the outstanding capabilities and the high reliability of the IXYS' TO-240 product line.

Applications:

- Diode for main rectification
- For single and three phase bridge configurations
- Supplies for DC power equipment
- Input rectifiers for PWM inverter
- Battery DC power supplies
- Field supply for DC motors



[Product Page](#)

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Design Corner

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World of Motors Reference Design

The World of Motors (WoM) Reference Design Board is a development platform built on Zilog's series of Mini-Z stamp modules. It is designed to provide engineers, students, and enthusiasts a simple-to-use platform for developing prototypes and projects related to motor control. The WoM Board is designed to work with Zilog's series of Mini-Z modules. Additionally, it is compatible with the basic stamp modules available from multiple vendors. The WoM reference board includes an FTDI USB-to-serial converter for serial communication capability.

Potential Applications:

- Robotics
- Security locks
- Fans
- Navigation systems
- Instrumentation
- Automated sprinkler systems



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IXYS
Efficiency Through Technology

Digital Inrush Current Controller

The Digital Inrush Current Controller reference design combines IXYS' Digital Power Control technology with the capabilities of Zilog's 8-bit Z8F3281 microcontroller, a member of the Z8 Encore! XP F6482 Series of MCUs, to display a unique approach to control inrush current in AC-DC rectifiers or AC-DC converters. The objective of this reference design is twofold – to highlight the advantages of digital control that overcome many of the shortcomings of current technology, and to enhance interest in digital control of high power converters, potentially stimulating the development of next generation converters.

Features:

- Input voltage range from 80V to 240V RMS
- Steady load current up to 3A
- Programmable overload protection
- Power Good status signal
- High endurance
- Not sensitive to power outage or brownout
- Not sensitive to ambient temperature variations
- Voltage ripples 15% at 2.5A load and output capacitance of 720µF
- Option to expand bulk capacitor value using external capacitors



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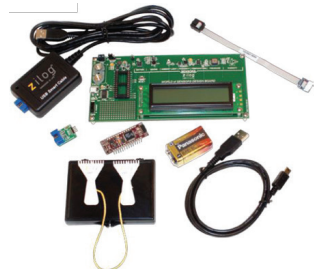
World of Sensors (WoS) Design Board and Development Kit

The World of Sensors (WoS) Design Board allows developers greater freedom to design products that may require several types of sensing solutions within the same design. It's a complete and easy-to-use development platform for Zilog's series of Mini-Z stamp modules, and is designed to provide engineers, students and enthusiasts a simple-to-use platform for developing prototypes and projects that will incorporate multiple sensors.

The World of Sensors Design Board includes seven sensors, each with unique peripherals. It is designed to work with Zilog's Mini-Z modules, which best showcase the interaction of these sensors.

Sensors:

- Accelerometer
- Ambient Light
- Humidity
- Microphone
- Pressure
- Proximity
- Temperature



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Digital Signage Reference Design

The Zilog LED Digital Signage Control Display is a state-of-the-art communications platform. It uses eight 5x7 LED matrix elements to display any message up to 255 characters. The architecture allows for further development of custom displays, static or blinking messages with special characters. Additionally, animations can also be implemented. In normal operation the message scrolls from right to left in fine resolution as opposed to character-wide increments.

The platform can be powered via a 9V battery for mobile applications or by an AC to DC wall adapter. Most importantly, the text to be displayed can be programmed-in by means of an Android smart phone or tablet, applications via Bluetooth or alternately by means of a MS Windows console program. The platform also includes a feature to save battery life through a motion sensor. When there is no human traffic the platform goes to sleep and only wakes up when there is movement in front of it.

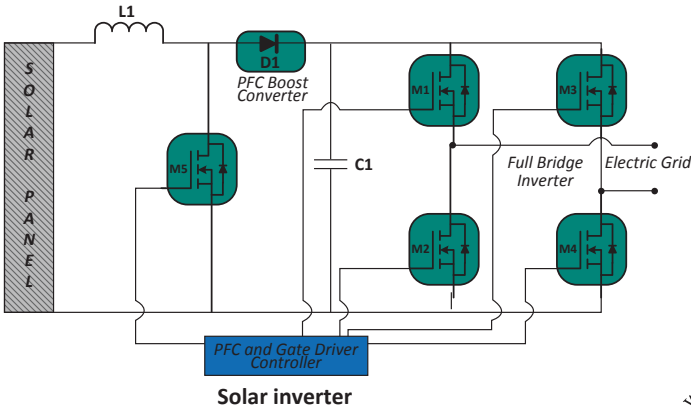


Product Coming Soon

Tech Center Application-Specific Solutions and FAQs

Renewable Energy :
Solar inverter

650V X2-class HiPerFET™
Family Power MOSFETS



The circuit on the left depicts a generic solar inverter circuit comprised of a Power Factor Correction (PFC) boost converter and full-bridge power inverter stage. The input power from the solar panel enters the PFC converter and then the full-bridge inverter, before interfacing with the electrical grid. Four IXFH80N65X2 Ultra-Junction HiPerFET™ MOSFETs (M1, M2, M3, and M4) can be utilized to construct the full-bridge stage. The IXTH80N65X2 (M5), one of our previously released Ultra Junction devices optimized for hard-switching applications, can be used to realize the PFC.



Product Brief
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FAQs

Featured Product: Zilog's Cortex 32-Bit
Microcontrollers

Question:

Which 3rd Party Vendors support the Zilog 32-Bit Cortex Products?

Answer:

Keil, IAR, Segger, and GCC ARM 32-Bit development tools and compilers all support the Zilog 32-Bit Cortex Products.

Question:

How much Flash & SRAM memory are on each Zilog 32-Bit Cortex Products and which one can execute out of SRAM?

Answer:

Z32F3841 has 384KB program Flash & 16KB general purpose SRAM.
Z32F1281 has 128KB program Flash & 12KB general purpose SRAM.
Z32F0641 has 64KB program Flash & 8KB general purpose SRAM.
All of the devices can execute out of SRAM.

Question:

Does the Zilog 32-Bit Cortex Products support Thumb-2?

Answer:

Thumb-2 is supported by having 16 bit instructions with 'w' extensions to more 32 bit instructions

Question:

What type of user definable Exception Handlers are available?

Answer:

The user definable Exception Handlers adds extra capabilities such as in paging and as in system services.

The available handlers are as follows: Non-Maskable Interrupt, Hard Fault, MPU Fault, Usage Fault, SVCall Fault, pending SV request, System Timer, and Interrupt handlers.

Question:

When will the individual development kits and sample parts be available?

Answer:

Development kits and sample parts are available through authorized Zilog Distributors.

Question:

Is a tail-chaining feature available?

Answer:

The Interrupt Controller supports nested vector interrupts and also supports tail-chaining, which allows for back-to-back interrupts to be performed without the overhead of state savings and restoring so that the interrupt latency is decreased.

Question:

Is Thread Mode with privileges supported?

Answer:

There are 2 modes (Handler & Thread) with privileges and 2 stacks. Handler mode is always privileged and uses the main stack while Thread mode can be either privileged or unprivileged and can use either main stack or process stack.

Question:

What are the target applications for the Zilog 32-bit products?

Answer:

Applications that need cost effective, high performance, low power 32-bit computing capabilities such as motor control, as well as many other applications including air conditioning, air purifiers, electric fans, inverter motors, washing machines, refrigerators and other white goods, residential boilers, consumer electronics, industrial and telecommunications.

News and Events

IoT Trends and the Growing Demand for Connectivity

One of the most exciting trends in technology, the Internet of Things (IoT) has taken the world by force. The IoT has made it into our cars, our watches, our kitchen appliances, and even our businesses. The IoT has become so prevalent that some have begun calling it "The Internet of Everything!" Not only does the IoT automate work processes and improve industrial efficiency, but for consumers it is improving lives as seen with the sales boom in fitness/ health wearables, and smart home technology. According to the research firm Gartner, Internet connected devices will increase from around 4 billion devices to above 20.8 billion by the year 2020. In terms of revenue, Gartner has consumer and business spending on IoT technology at

over \$3 trillion dollars in 2020. Additionally, over the next 15 years General Electric predicts that investments in the industrial Internet of things will top \$60 Trillion.

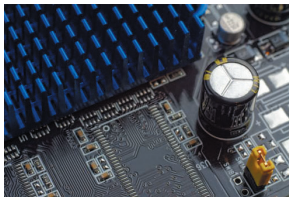
What is the foundation of this technology?

Hardware, Software, and Connectivity between devices through many forms including Bluetooth, ZigBee and WiFi. The number of embedded Digital UARTS specifically, will see growth that parallels that of IOT devices. With the growth in smart technology, comes the growing importance in finding the quality hardware and software to use in products designs. To find out how our Digital UARTS can improve your product designs check out our [product page](#).



19th Annual Needham & Company Conference 2017

Needham & Company hosted their 19th annual Growth Conference in New York City on January 10 – 12, 2017. IXYS was fortunate enough to have our Founder and CEO speak to investors about our diverse product portfolio, our innovative technology, and our opportunity for growth during the ongoing IoT and Electric Car trends. Here is our takeaway from CEO and Founder Nathan Zommer's presentation.



IXYS was created in the early days of Silicon Valley. Since the original founding as a Power Conversion company, IXYS has diversified its product offerings through R&D and multiple acquisitions. Our diverse product offering has allowed IXYS to weather global trends in the market place and shift the IXYS pie chart of technologies to overcome the cyclical industrial industry from which IXYS was initially founded to support.

With over 3,000 customers worldwide, IXYS develops high end products featured in applications for technologies including Solar, Motion Detection, Security, Auto, Aerospace and More! IXYS' focus on merging efficiency with innovation has created opportunities for technologies that require high efficiency power conversion. Specifically, our efficient and light weight power conversion products are ideal for Electric Cars, Hyperloop technology, Drones, and the Auto industry as a whole by helping to create lighter automobiles with higher gas mileage. For a more comprehensive review of the event, visit the [Needham Conference website](#).



PCIM Europe May, 2017

PCIM Europe (Power Conversion and Intelligent Motion) is the leading international exhibition for Power Electronics, Intelligent Motion, Renewable Energy, and Energy Management. The tradeshow will be taking place May 16-18th, 2017 in Nuremberg Germany. The three day event hosts three exhibition halls featuring the latest trends and developments in the electronics industry. While at the show, you will be able to see vendor presentations, become involved with panel discussions, and discover over 400 different exhibitors. 2016 brought over 10,000 visitors from across North America, Europe, and Asia. This conference is an excellent opportunity to network with designers, executives, and influencers across a range of industries.

While at the Conference be sure to find the IXYS team who will be located in HALL 9 BOOTH 305. To learn more, visit the [PCIM Europe Website](#).



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HALL 9
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NUREMBERG
GERMANY
May 16-18, 2017

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