

Power Matters.

## Microsemi Photovoltaic Solutions



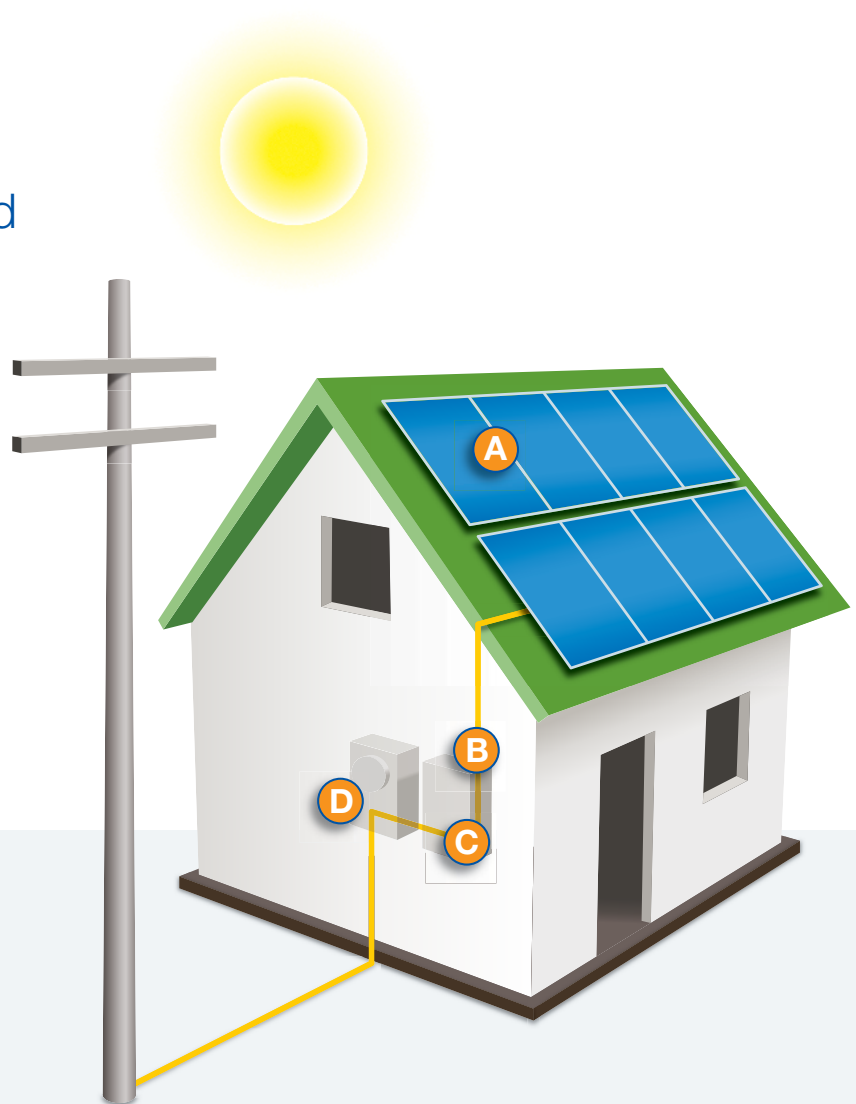
The Comprehensive Solar Technology Portfolio



# Microsemi Photovoltaic Solutions

Renewable energy is more important than ever, with governments around the world offering grants and tax incentives to encourage and support its development. Microsemi contributes by offering an extensive range of solutions for the photovoltaic (PV) market, supporting a wide array of applications in power harvesting, power management, power switching and power monitoring. With these products the PV designer can develop highly efficient and reliable, cost sensitive applications to meet the ever increasing demand of PV deployments worldwide. Microsemi carries an assortment of analog, mixed signal and digital devices, such as bypass devices, MOSFETs and IGBTs, DC-DC converters, mixed signal Customizable System-on-Chip (cSoC), PWM modules, ultra low power radios and much more.

→ Microsemi has a broad array of products to meet your PV and programmable logic requirements



## GET STARTED

- Mixed Signal cSoC—SmartFusion™
- Low Power FPGA—IGLOO®
- Bypass Devices
- Power MOS 8™ IGBTs
- CoolMOS® C6MOSFETs
- DC-DC Converters
- cSoC and FPGA Development Kits
- PWM Core
- Short Range Wireless RFIC

## Power Harvesting

### Award Winning Bypass Solution

The LX2400 IDEAL™ Solar Bypass device with Microsemi's patented CoolRUN™ technology provides a bypass path in PV module applications. With the industry's lowest forward voltage drop, resulting in negligible heat generation and temperature rise during operation, the LX2400 is best in class for reliability and robustness.

- Negligible heat generation
  - Less than 10°C rise at 10 A
- High reliability
  - Designed for 30 year product life
- Extreme environment survivability
  - Fully functional from -50°C to +150°C
- IEC61215, section 10.18 compliant

### World's Thinnest Solar Diodes

At only 0.74 mm high, Microsemi's new Schottky barrier PV bypass diodes are the thinnest in the world. Designed specifically for solar panels, the SFDS series of 10 A and 18A diodes are packaged with unique flexible copper leads that offer satellite-proven reliability.

- 0.74 mm thick
- 10 A and 18 A solar bypass diodes
- Weld or solder mount under glass panel
- Eliminates junction box
- High temperature operation

## Power Management and Control

### Mixed Signal and Low Power FPGAs

Design techniques such as pulse-width modulation (PWM) are used widely to convert from DC to AC. Microsemi's programmable logic devices allow for an increased number of PWM state machines as compared to current DSPs. Losses due to heat must be minimized, so flash-based low power technology is a big advantage, reducing operational expense in the form of smaller chassis fans.

Providing higher levels of integration while keeping footprint, power and cost down is a key advantage. Microsemi's product offering of low power and mixed signal FPGAs is ideal for helping inverter designers integrate more board-level functionality into a smaller footprint.

### Pulse-Width Modulation

- Microsemi's ultra low power flash FPGAs are ideal for implementing PWMs commonly used in inverter topologies

### Low Power Consumption

- With power consumption as low as 2  $\mu$ W, you have the assurance that your energy conversion efforts will not be wasted in unnecessary heat loss

### Protect Your Hard Work

- Microsemi's single-chip flash programmable solutions protect your IP through 256-bit AES encryption and DPA countermeasures
- Handles both algorithm and supervisory functions
- Mixed signal integration

## Power Switches

### Low Profile Modules

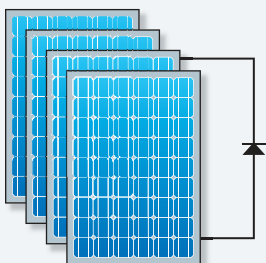
With more than 25 years of experience in the power semiconductor module industry, Microsemi develops and manufactures semiconductor inverter modules with mix-and-match components and assembly materials to offer the best combination of cost, size, performance and reliability. Microsemi also offers a complete range of input and output diode bridge modules (recovery diodes, FRED and SiC diodes). Boost and buck choppers and resonant inverter topologies are available in the same low profile packages.

### Discrete Switching Solution

The new 600 V CoolMOS C6 devices feature fifth-generation high voltage superjunction technology for extremely low conduction and switching losses, enabling the design of switching systems that offer new levels of efficiency and power density. CoolMOS C6 devices are easy to design in, more compact, lighter and cooler. They are well suited for high power, high performance switch mode applications.

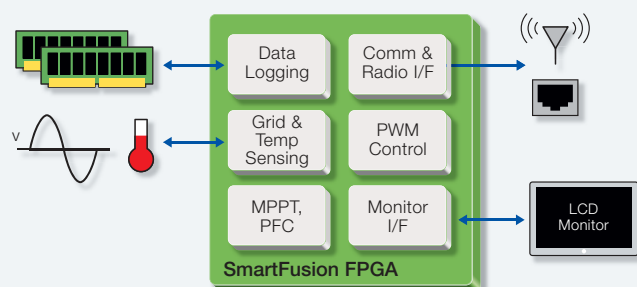
### A Power Harvesting PV Panels, Manufacture and Test Equipment

- Bypass and blocking diodes for thermal protection and high reliability
- Thin film deposition equipment and PV test equipment



### B Power Management and Control String and Micro Inverters

- Low power and mixed signal cSoCs
- Complete sense and power control



The new Power MOS 8™ IGBT has been optimized for low frequency operation (10 KHz – 30 KHz), where conduction loss dominates overall system losses. The MOS 8 PT IGBT portfolio already provides low conduction loss options at 2.0 V (600 V<sub>BR(CES)</sub>) and 2.5 V (900 V<sub>BR(CES)</sub>). The new APT44GA60BD30C reduces this to 1.5 V, enabling further increases in overall system efficiency for 600 V designs. Input is rated at 44 A with a 38 A maximum recommended at 10 KHz and 27 A at 30 KHz. Microsemi's ultra fast reverse recovery DQ diode is incorporated as an anti-parallel free wheeling diode.

- Low cost
- Simple gate driver circuitry
- Fast switching
- Ultra fast recover Combi diode for zero-voltage-switching (ZVS) topologies

### DC-DC Regulators and Controllers

Microsemi's growing DC-to-DC product family supports up to 40 V input voltages across a wide range of current output, up to 40 amps. The family includes switching regulators with built-in power FETs as well as controllers that use external power FETs and can operate at frequencies up to 2 MHz.

### Power Monitoring

#### Smart Meter Power Management Capability

Microsemi's power IC design group has extensive experience developing custom and standard off-the-shelf power management ICs. Key features of recently developed products include:

- Battery management
- Power failure, over-current and thermal detection
- Temperature compensation
- Power reset
- Energy conservation during power loss

#### Mixed Signal cSoCs and Low Power FPGAs

Understanding energy consumption and providing the ability to change usage models in real time is being made possible by

smart meters. Technological advances such as the mixed signal SmartFusion cSoC which includes an analog front-end, embedded processor and programmable logic fabric in a single IC platform, give designers the ability to develop smart meter systems that meet current and future needs.

A single computing platform that includes a processor and FPGA fabric gives the designer flexibility to partition designs into software and hardware elements. The embedded ARM® Cortex™-M3 operates at 100 MHz, provides 125 Dhrystone MIPs performance and includes up to 512 Kb flash memory and 128 Kb of SRAM. These abundant resources provide the ability to tackle system-level algorithms such as power management, communication interfaces, and encryption.

- Accurate real-time load data
- Secure two-way communication to a host network or the internet
- Ability to connect/disconnect non-essential loads dependent on preset parameters or user feedback
- Rugged, reliable, low power operation

### ISM-Band Communications & Radio Interface

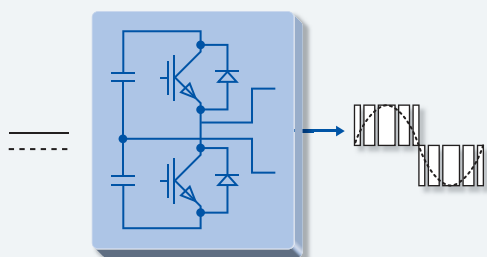
#### Lowest Power Miniature-Sized Sub-GHz Radio for Continuous Monitoring, Wireless Sensor Applications

For wireless nodes powered from rechargeable batteries that are typically used with energy-harvesting power sources, the ZL70250 is proving to be the first choice, and in some cases the only choice, due to the low peak power capacities of these batteries.

- Ultralow transmit and receive current of less than 2 mA enables extremely long battery life, very small battery size, or energy harvesting
- Operates in 915-MHz ISM band in North America; 868-MHz ISM band in Europe
- Integrated MAC performs all basic link layer functions, enabling simple and low-power controller functions
- Low supply voltage of 1.2 V to 1.8 V further reduces power consumption
- High data rate (186 kbit/s raw) allows short data bursts and bidirectional voice communication

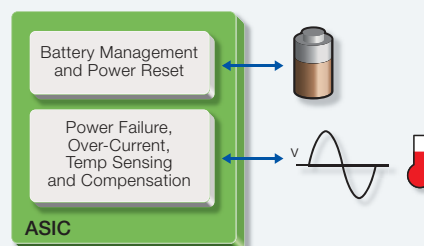
### C Power Switching IGBTs/MOSFETs, DC-DC Converters

- Discrete, modules and custom designs
- High speed and efficient



### D Power Monitoring Smart Grid / Meters / Appliances

- Mixed signal and low power cSoCs, FPGAs and ASICs
- Power consumption monitoring
- Secure/encrypted communication



Learn more about Microsemi Solar Products, visit [www.microsemi.com/solar](http://www.microsemi.com/solar)  
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Microsemi Corporation (NASDAQ: MSCC) offers the industry's most comprehensive portfolio of semiconductor technology. Committed to solving the most critical system challenges, Microsemi's products include high-performance, high-reliability analog and RF devices, mixed signal integrated circuits, FPGAs and customizable SoCs, and complete subsystems. Microsemi serves leading system manufacturers around the world in the defense, security, aerospace, enterprise, commercial, and industrial markets. Learn more at [www.microsemi.com](http://www.microsemi.com).

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