

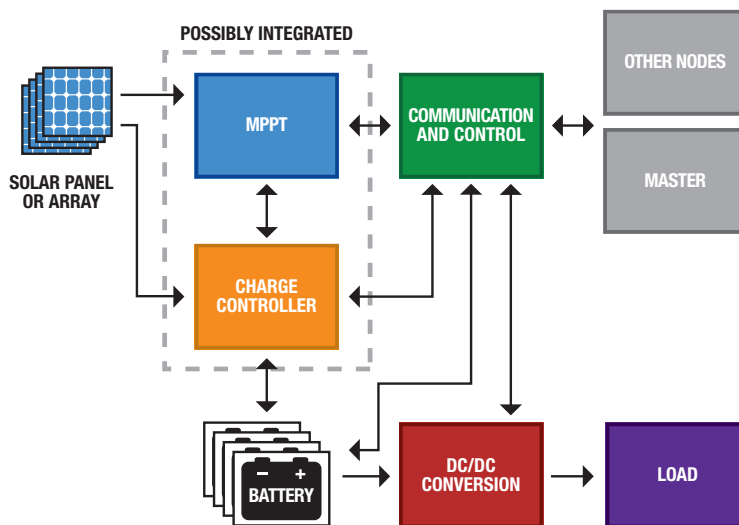


Avnet Electronics Marketing Americas

# Energy Harvesting & Off-Grid Solar Applications Selector Guide

Engineers face many challenges when designing off-grid solar applications. Naturally, choosing and sizing solar modules is important; however, this is just the beginning of the design. Maximizing energy transfer from the modules, energy storage and energy conversion are also crucial elements in creating an efficient design. Avnet brings together industry-leading solar technologies from the world's foremost semiconductor, electromechanical and solar module manufacturers, along with best-in-class technical expertise and supply chain management services. From design to delivery, Avnet offers whatever assistance is necessary to bring products to market.

## SOLAR BATTERY CHARGER BLOCK DIAGRAM



## SOLAR BATTERY CHARGER INTEGRATED DEVICES

INTEGRATED DEVICES									
Supplier	Part Number	Panel Voltage	Battery Voltage	Battery Chemistry	Max Charge Current	Integrated FETs?	MPPT Type	Topology	Comments
Texas Instruments	BQ24650	5 - 28 V	2.6 - 26 V	Lithium Ion/Lead Acid, Lithium Ion Phosphate	10 A	No	Temperature compensated voltage	Buck	Buck mode, so panel voltage must be higher than battery voltage to charge
Texas Instruments	BQ24210	3.5 - 7 V		Lithium Ion / Single Cell	800 mA	Yes	None		Single Cell Lithium Ion Charge, can be used with Solar Cell input.
STMicroelectronics	SPV1040	0.3 - 5 V	1 - 5 V	Trickle Charge	1 A	Yes	Perturb / observe algorithm	Boost	Boost mode, so panel voltage must always be lower than battery voltage
National Solar Magic	SM72442, SM72295	Programmed	9 - 100 V	Programmed	Programmed	No	Proprietary algorithm	Buck, Boost	Programmable chipset
NXP Semiconductors	MPT612	Programmed	5 - 50 V	Programmed	Programmed	No	Proprietary algorithm	Buck or Boost	MPPT Only

## SOLAR BATTERY CHARGER REFERENCE DESIGNS AND DEMO BOARDS

CHIPSETS/DISCRETE DESIGNS									
Supplier	Part Number	Panel Voltage	Battery Voltage	Battery Chemistry	Max Charge Current	Integrated FETs?	MPPT Type	Topology	Comments
STMicroelectronics	STEVAL-ISV0022V1	< 50 V	12 V	Lead Acid	6 A	No	Perturb / observe algorithm	Buck	Boost HBLE output driver 2.45 A, 12 V
STMicroelectronics	EVALST-JSV006V1	0.3 - 5 V	1 - 5 V	Trickle Charge	1 A	Yes	Perturb / observe algorithm	Boost	Evaluation board for the STMicro SPV1040
Texas Instruments	BQ24650EVM-639	5 - 28 V	2.6 - 26 V	Lithium Ion/Lead Acid, Lithium Ion Phosphate	10 A	No	Temperature compensated voltage	Buck	Evaluation board for the BQ24650 integrated charger
Texas Instruments	BQ24210EVM-678	3.5 - 7 V		Lithium Ion	800 mA	Yes	None		Evaluation board for the BQ24210 integrated charger
National Solar Magic	RD-189	9 - 100 V	50 V	Programmable	Up to 100 A	No	Proprietary algorithm	Buck - Boost	
ON Semiconductor	NCP1294	12 - 24 V	12 V	12 V Lead Acid	2 A	No	Analog	Buck	
Cypress	AN56778	12 - 24 V	12 V	12 V Lead Acid	9.5 A	No	Proprietary algorithm	Buck	Buck (8 V, 1 A) and Boost (40 V, 1 A) HBLE output drivers

## MICRO ENERGY HARVESTING DEVICES

### MICROENERGY HARVESTING

Supplier	Part Numbers	Energy Source	Power Range	Vout
PowerFilm	LL3-37	Solar / Indoor light	40 uW - 1 mW	0 - 3 V
Midé	PEH20W, PEH25W, V20W, V25W, V21B, V21BL, V22B, V22BL	Vibration	.2 - 10 mW	1 - 25 V
Nextreme	EteghV14, EteghV37, EteghV56	Thermal Differential	1 - 250 mW	0 - 5 V

## ENERGY STORAGE

### ENERGY STORAGE

Supplier	Product Type	Chemistry	Capacity	Voltage Range
House of Batteries	Batteries	Lead Acid, Li, Li-Ion, Li-Poly, NiCd, NiMH, Silver-Oxide, Zinc-Air, Alkaline, Carbon-Zinc	1 mAh - 625 Ahr	.1 - 2700 V
Cymbet Corporation	Batteries	Solid State Thin Film	1 uAhr - 50 uAhr	3.3 or 3.8 V
AVX - BestCap	Super capacitor	Double layer capacitor	10 mF - 1 F	3.5 - 16 V

## SOLAR MODULES

### SOLAR MODULES - OUTDOOR ONLY

Supplier	Technology	Voltage Range	Power Range
Solartech Power	Multicrystalline	12 - 24 V	5 - 200 W
PowerFilm	Amorphous Silicon	3.3 - 12 V	75 mW - 20 W

Note: Avnet has the capability with these (and other partners) to create solar panels with custom sizes and shapes. Please contact Avnet for more information.

## MICRO ENERGY HARVESTING REFERENCE DESIGNS

### MICROENERGY HARVESTING REFERENCE DESIGN

Supplier	Description	Part Number	Energy Harvesting Type	Comments
Texas Instruments	The ez430-RF2500-SEH is a complete Solar Energy Harvesting development kit to help create a perpetually powered wireless sensor network based on the ultra-low-power MSP430 microcontroller.	EZ430-RF2500-SEH	Solar	Solar powered wireless sensor network development kit
Cymbet Corporation	BC-EVAL-08 EnerChip Solar Energy Harvesting Evaluation Kit is used to create Zero-power designs for sensors, controllers, embedded systems, medical applications, environmental control systems and any "un-tethered" system.	BC-EVAL-08	Solar	Solar powered demo board/development kit for thin film batteries
Cymbet Corporation	CBC-EVAL-09 EnerChip EP Universal Energy Harvesting Evaluation Kit accepts inputs from solar, piezoelectric, thermoelectric or electromagnetic EH transducers. Features the EnerChip EP CBC915 Energy Processor Chip and EnerChip Solid State Batteries	CBC-EVAL-09	Solar, Vibration, Thermoelectric, Electromagnetic	Demo board/development kit for thin film batteries powered by various energy harvesting sources
Cymbet Corporation	CBC-EVAL-10 EnerChip CC Solar Energy Harvesting Evaluation Kit uses the EnerChip CC CBC3150 to provide a simple single chip solution for EH power conversion, energy storage and power management. A low cost solution for solar-based sensors.	CBC-EVAL-10	Solar	Solar powered demo board/development kit for thin film batteries
Microchip	The XLP 16-bit Energy Harvesting Development Kit is a true development platform for realizing energy harvesting applications, featuring the Microchip nanoWatt XLP PIC MCU. Powered only by light, the XLP kit enables rapid prototyping of low power applications such as RF sensors, temperature/environmental sensors, utility meters, remote controls, and security sensors to name just a few.	DV164133	Solar	Solar powered development kit for designs using the ultra low power XLP micros.

## BRANCH LOCATIONS

### UNITED STATES

Atlanta	770-623-4400
Austin	512-219-3700
Baltimore	410-720-3400
Boston	987-898-4400
Chicago	847-396-7300
Clearwater	727-507-5000
Cleveland	440-349-7600
Columbus	614-865-1400
Connecticut	203-284-5700
Dallas	214-553-4300
Dayton	937-312-2750
Denver	303-790-1662
Detroit	734-416-5800
El Paso	480-643-5724
Fort Lauderdale	407-657-3300
Houston	281-243-7330
Huntsville	256-774-2600
Indianapolis	317-575-3500
Irvine	949-789-4100
Kansas City	913-663-7900
Long Island	631-582-7700
Los Angeles	818-594-8200
Milwaukee	262-513-1500
Minneapolis	952-346-3000
North Jersey	973-515-1641
Orlando	407-657-3300
Phoenix	480-643-5600
Pittsburgh	724-934-6703
Portland	503-526-6200
Raleigh	919-859-9159
Rio Grande	956-687-8706
Rochester	585-350-2800
Sacramento	408-435-3530
Salt Lake City	801-365-3800
San Diego	858-385-7500
San Jose	408-435-3500
Seattle	425-882-7000
South Jersey	856-355-7400
St. Louis	314-770-6300

### CANADA

Montreal	514-335-1000
Ottawa	613-226-1700
Toronto	905-812-4400
Vancouver/Calgary	604-444-3810

### MEXICO

Baja/Nogales	480-643-5724
Jalisco	333-134-2324

### ARGENTINA

Buenos Aires	54-11-5199-8300 x308
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### BRAZIL

Avnet do Brasil	480-643-5720
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### COLOMBIA

Bogota	57-1-256-7766
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### PUERTO RICO

Puerto Rico	787-706-1888
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