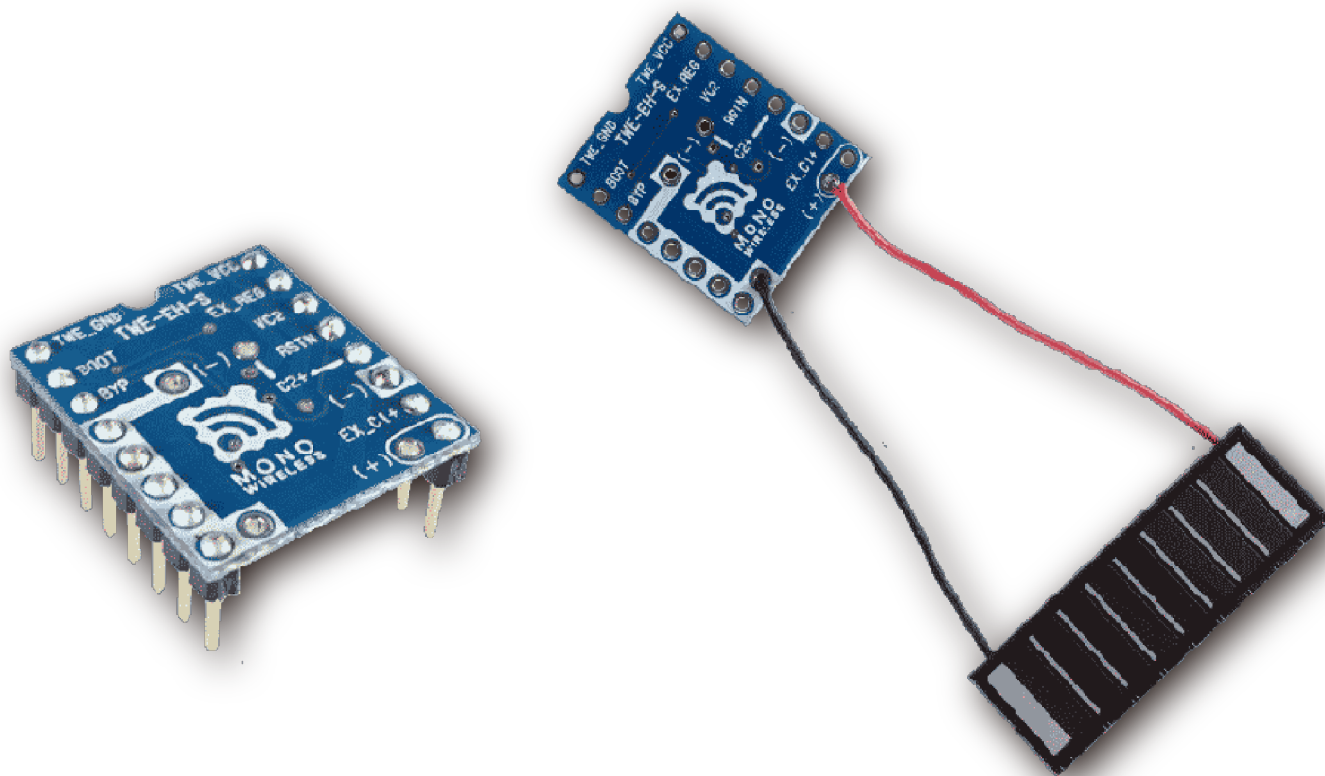


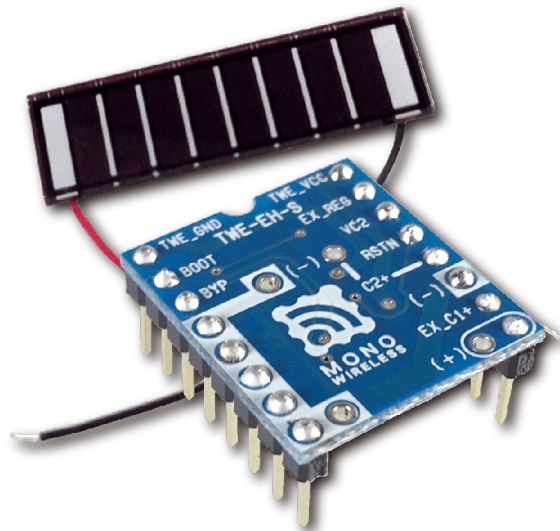


Solar power management module
TWE-EH SOLAR

TWE-EH SOLAR (Energy Harvest Solar) is a power management module that converts light



Using a fingertip-sized solar panel, it's possible to operate the device even on cloudy days or with minimal indoor light. TWE-EH SOLAR (Energy Harvest Solar) enables battery-less wireless sensors. ^{Twilight} TWELITE



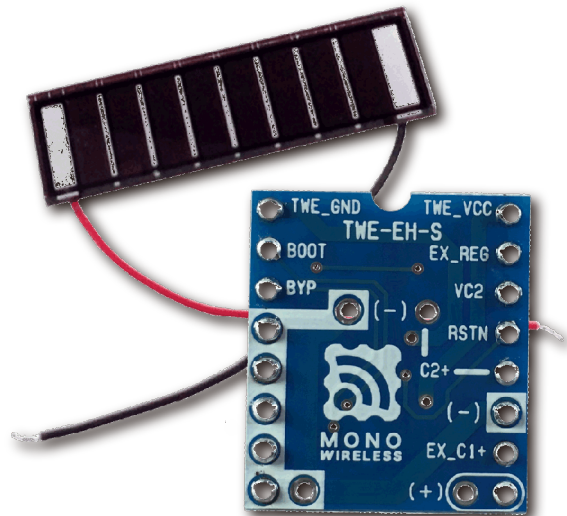
Pin headers already installed

Product Name: TWE-EH SOLAR

Model Number: TWE-EH-S-DI

JAN: 4589512170327

Remarks: Pin header pre-installed, small solar panel included (soldering required)



Pin header not implemented

Product Name: TWE-EH SOLAR

Model Number: TWE-EH-S-DP

JAN: 4589512170334

Remarks: Pin header not installed, small solar panel included (soldering required)

assignment

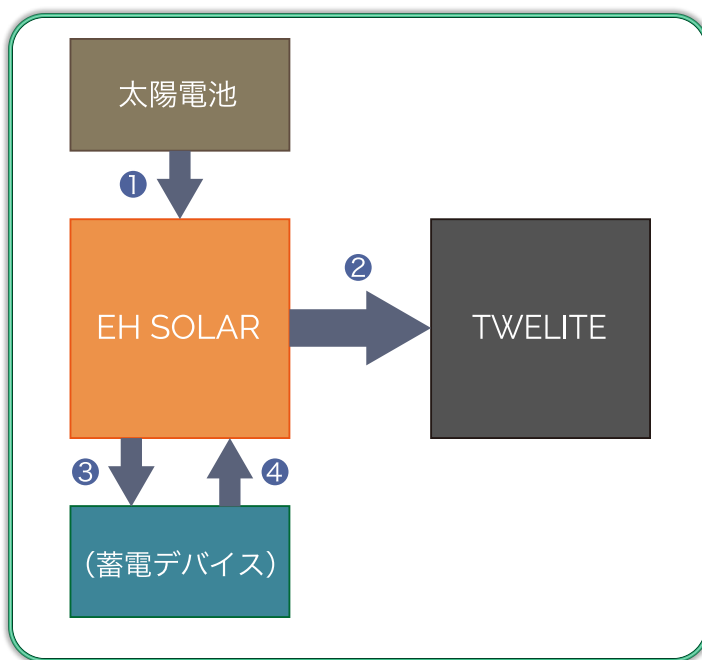
- The amount of environmental energy that can be harvested is very small.
- Environmental energy is unstable.



Features

- ✓ It can harvest the small amount of energy from cloudy days or indoor light to supply electricity.
- ✓ When there is no light, power can be supplied from the energy storage device.
- ✓ It can notify you of the voltage of the energy storage device.

function



- 1 Harvesting electricity from small solar cells
- 2 Supplying power to TWELITE
- 3 Send surplus power to an external energy storage device.
- 4 If there is no power supply from the solar panels, stored power will be supplied.

Usage

Hardware explanation

- [Printable instruction manual](#) (PDF)

software

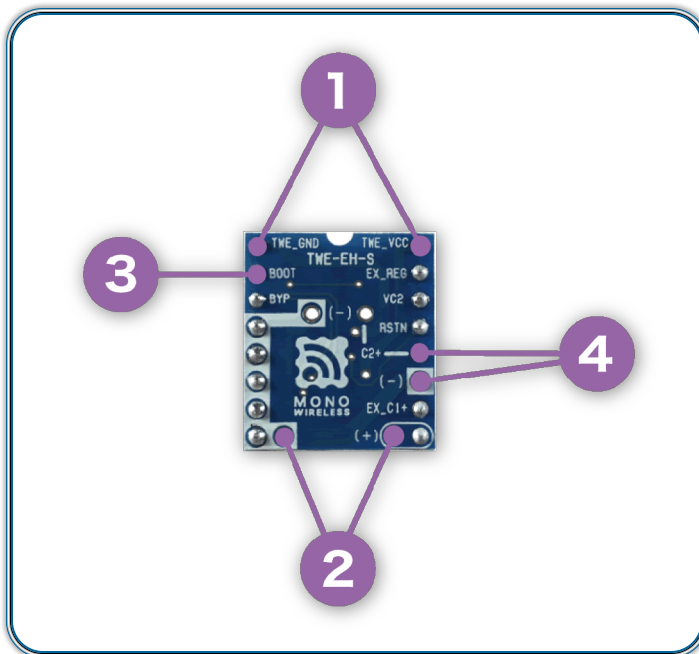

[Wireless tag app >](#)


To operate with TWE-EH SOLAR, be sure to set option bit ?????4?? in [interactive mode](#) to disable OTA at power-up. Note that OTA will work if you set the M2 pin to Low and power on.



Even when using sensors, it is recommended to initially test the system independently without connecting the sensors (for example, by operating in analog sensor mode with AI3 unconnected).

Explanation of each part



- 1 Power output terminals
- 2 Solar panel connection terminals
- 3 Energy storage device connection terminal
- 4 BOOT terminal

1 Power output terminals

Twilight
TWELITE This is a terminal for connecting to the power input.

2 Solar panel connection terminals

These are connectors for connecting solar panels.



the red lead is positive (VCC) and the black lead is negative (GND).

3 Energy storage device connection terminal

These are terminals for connecting electric double-layer capacitors.

By storing energy in the energy storage device, the stored power can be supplied even when there is no light. Energy storage is not possible if there is insufficient light. If the energy storage function is not needed, there is no need to connect the energy storage device. It will operate even without it connected.

4 BOOT terminal

Twilight
TWELITE These are terminals for control purposes.

Twilight
TWELITE Please connect to DO1. It will not work without this connection.

Pin assignment

Signal name	PIN number	PIN number	Signal name
TWE_GND	1	16	TWE_VCC
BOOT	2	15	EX_REG
BYP	3	14	VC2
(-)	4	13	RSTN
(-)	5	12	C2+



(-)	7	10	EX_C1+
(-)	8	9	(+)

TWE_GND

Twilight

TWELITE

Connect to GND.

BOOT

Twilight

TWELITE

Connect to DO1. After TWELITE starts, quickly set it to Low. The voltage conditions follow the voltage conditions of [the device/device].TWELITE

BYP

Twilight

TWELITE

Connect to DO2. Setting it to Low bypasses the diode connected between the energy storage device and TWE_VCC. When power is supplied to the device while the energy storage device is at 2.3V, the voltage drop across the diode causes TWE_VCC to drop to approximately 2.0V, causing it to stop operating. Bypassing it allows the energy storage device to operate down to approximately 2.0V. The voltage follows the voltage conditions of the device.

Twilight

TWELITE

Twilight

TWELITE

Twilight

TWELITE

GND(-)

Connect the negative terminal (-) of the solar panel, the energy storage device, and the capacitor added to EX_C1.

(+)

EX_C1+



between EX_C1+ and GND(-) will connect it in parallel with the built-in capacitor C1 (220uF), increasing its capacitance. With only C1, the operating time of the wireless module is limited, but adding a capacitor here can extend the operating time. The voltage range is 0~3.6V.

C2+

Connect a rechargeable energy storage device between C2+ and GND(-) to store excess energy. The voltage range is 0 to 3.6V.

RSTN

^{Twilight}
TWELITE This indicates the operating status. (Hi: TWELITE is running, Low: TWELITE is stopped)

VC2

You can monitor the charging status of the energy storage device. Connect to AI1. VC2 is the pin where the voltage across C2+ is divided by two resistors (10MΩ).

Furthermore, a 0.1uF capacitor is connected between VC2 and TWE_GND to stabilize the voltage measurement. Doubling the VC2 reading will give you the voltage of the energy storage device.
^{Twilight} TWELITE ^{Twilight} TWELITE
^{Twilight} TWELITE

EX_REG

Please refer to "Available Solar Panels" below.

TWE_VCC



Available solar panels

You can also use solar panels other than the included one. If you do, please select a panel with an open-circuit voltage of 4V to 6V and a maximum output power of 300mW or less.

To use a solar panel with a maximum output power of 10mW or more, connect an additional resistor between TWE_VCC and EX_REG. This will prevent malfunctions and overheating due to overvoltage or overcurrent. An additional resistor is not necessary when using the included solar panel (Panasonic AM-5815: maximum output power 6mW, 5.2V, 1.1mA).

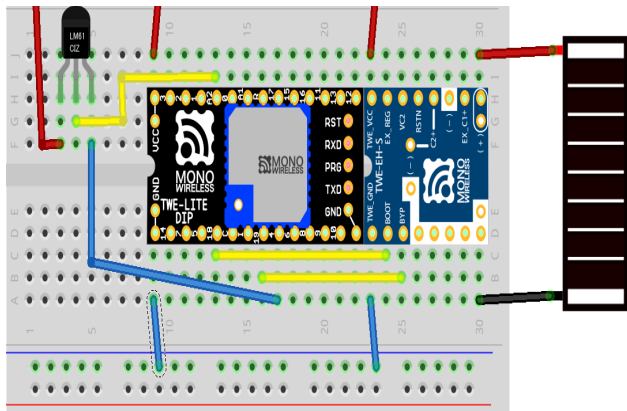
The power rating of the additional resistor should be equal to or greater than the maximum output power of the solar panel being used.

The following are some guidelines.

Maximum output power of solar panels [mW]	Additional resistance [Ω]
10 or less	Unnecessary
11-100	100 (Rated power 1/4W)
101-300	33 (rated power 1/2W)

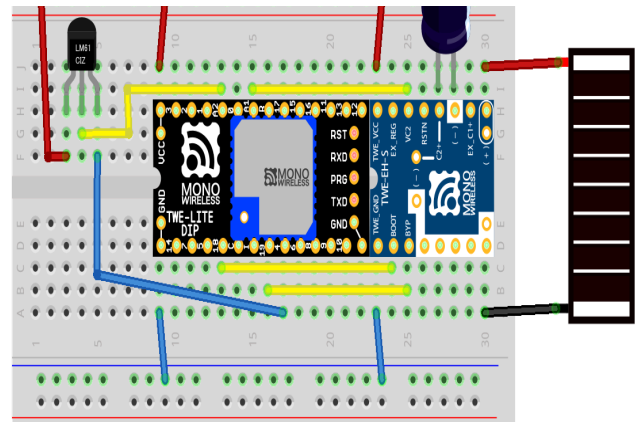
Connection example

This is an example of connecting the LM61 temperature sensor.



No energy storage device

fritzing

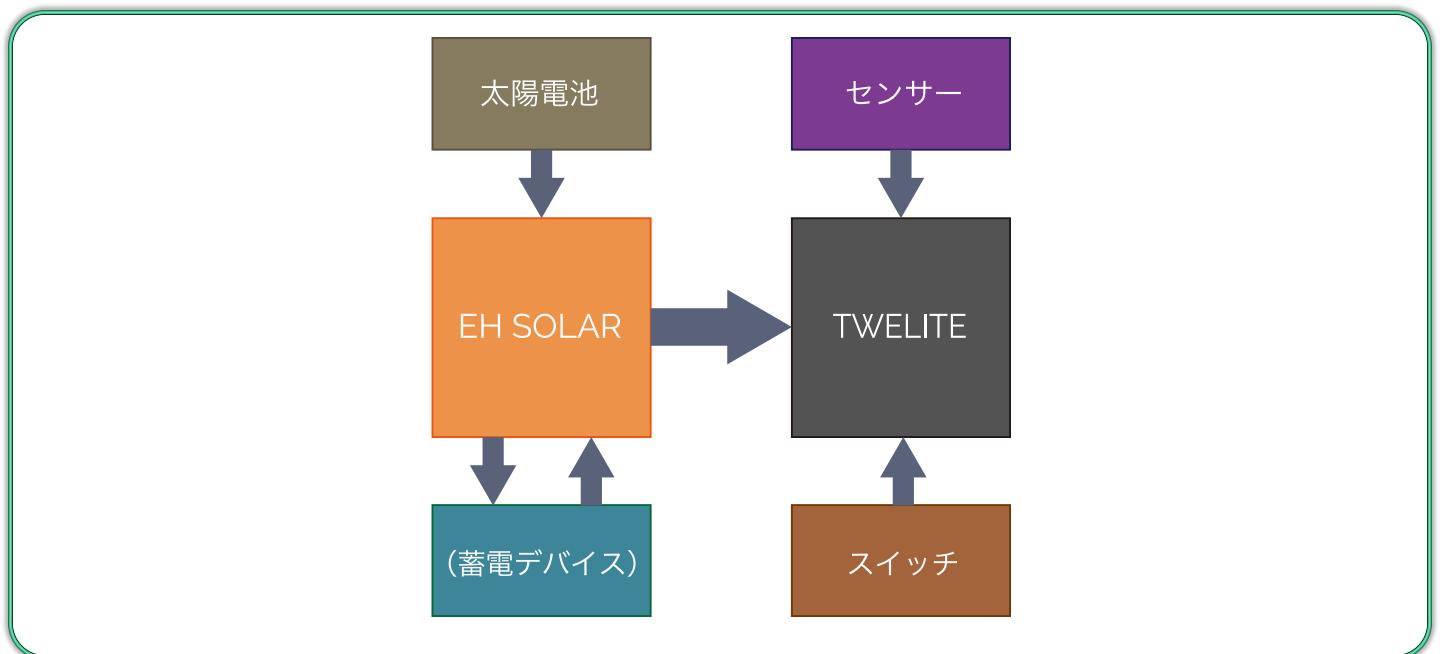


Includes energy storage device

fritzing

How to use energy storage devices >

Examples of production



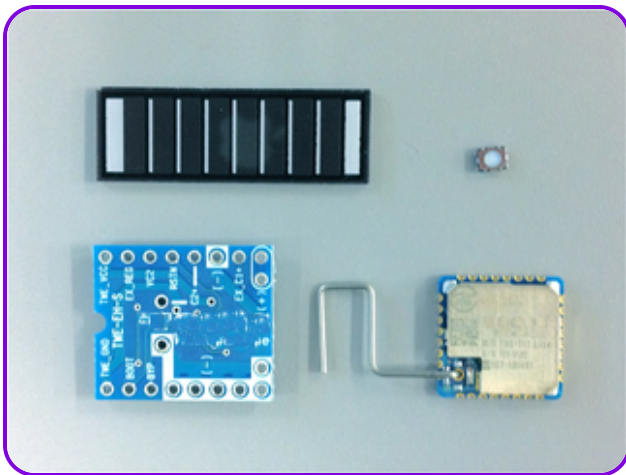
Ultra-compact battery-less remote control switch

This is an example of implementing an ultra-compact remote control switch that operates without a battery. It can be completed simply by wiring the following components.



- TWE-EH SOLAR (Energy Harvest Solar)
- Ultra-compact solar panel (included with TWE-EH SOLAR)
- ^{Twilight} TWELITE + Question mark shaped antenna
- Push switch

[How to connect a switch >](#)



Battery-less, slim wireless temperature sensor

This is an example of a battery-less wireless temperature sensor implementation. It uses an electric double-layer capacitor as an energy storage device, allowing it to continue operating even in the absence of light.

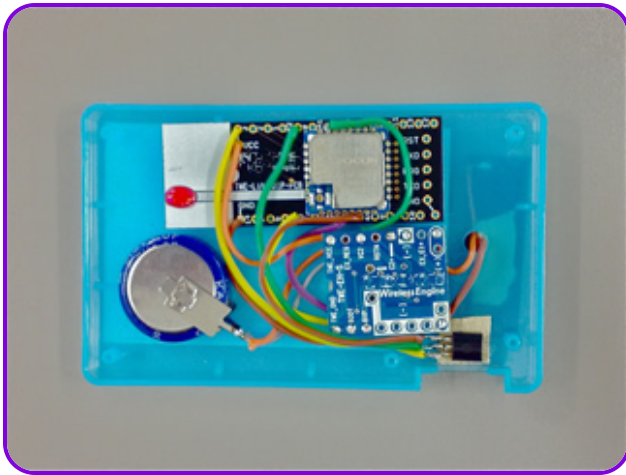


Parts used

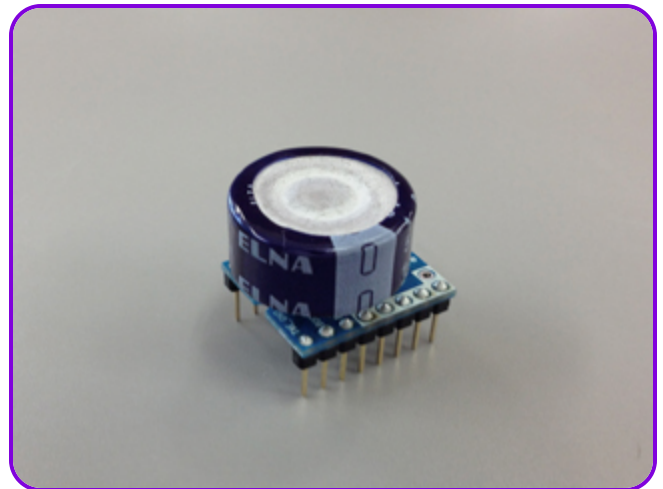
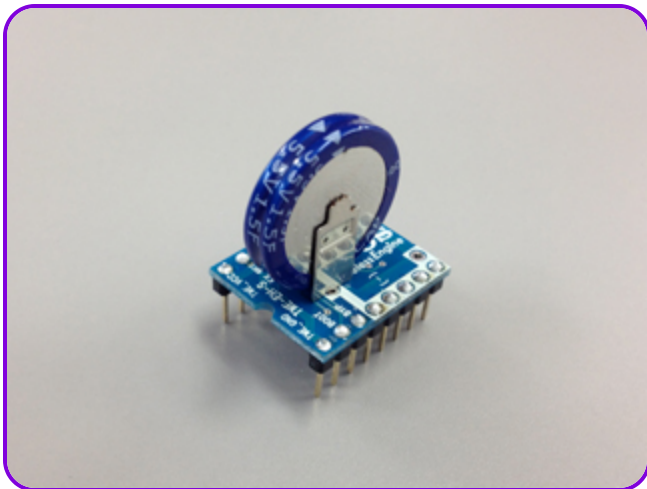
- TWE-EH SOLAR (Energy Harvest Solar)
- Ultra-compact solar panel (included with TWE-EH SOLAR)
- ^{Twilight} TWELITE ^{Dip} PCB antenna
- Electric double-layer capacitor (KAM SE-5R5-D105VYV)



How to connect a temperature
sensor >



Electric double-layer capacitor implementation



Electric double-layer capacitors can also be fixed to the through-holes of the TWE-EH SOLAR.



Monowireless products can be purchased at physical stores or online.

