

MB39C831

Ultra Low Voltage Boost Power Management IC for Solar/Thermal Energy Harvesting

The MB39C811-breakout module from Bazinga is an easy-to-use breakout for your energy harvesting projects. The module is capable of accepting solar, piezoelectric, or any high impedance AC or DC source.

Energy harvesting is the process by which energy is derived from external sources (e.g. solar or light energy, thermal energy, and kinetic energy) and stored for small, wireless autonomous devices like those used in Wireless Sensor Nodes (WSNs).

Links

http://www.spansion.com/downloads/MB39C831_DS405-00014-E.pdf

<http://www.spansion.com/fjdocuments/fj/DATASHEET/e-ds/MB39C811-DS405-00013-0v01-E.pdf>

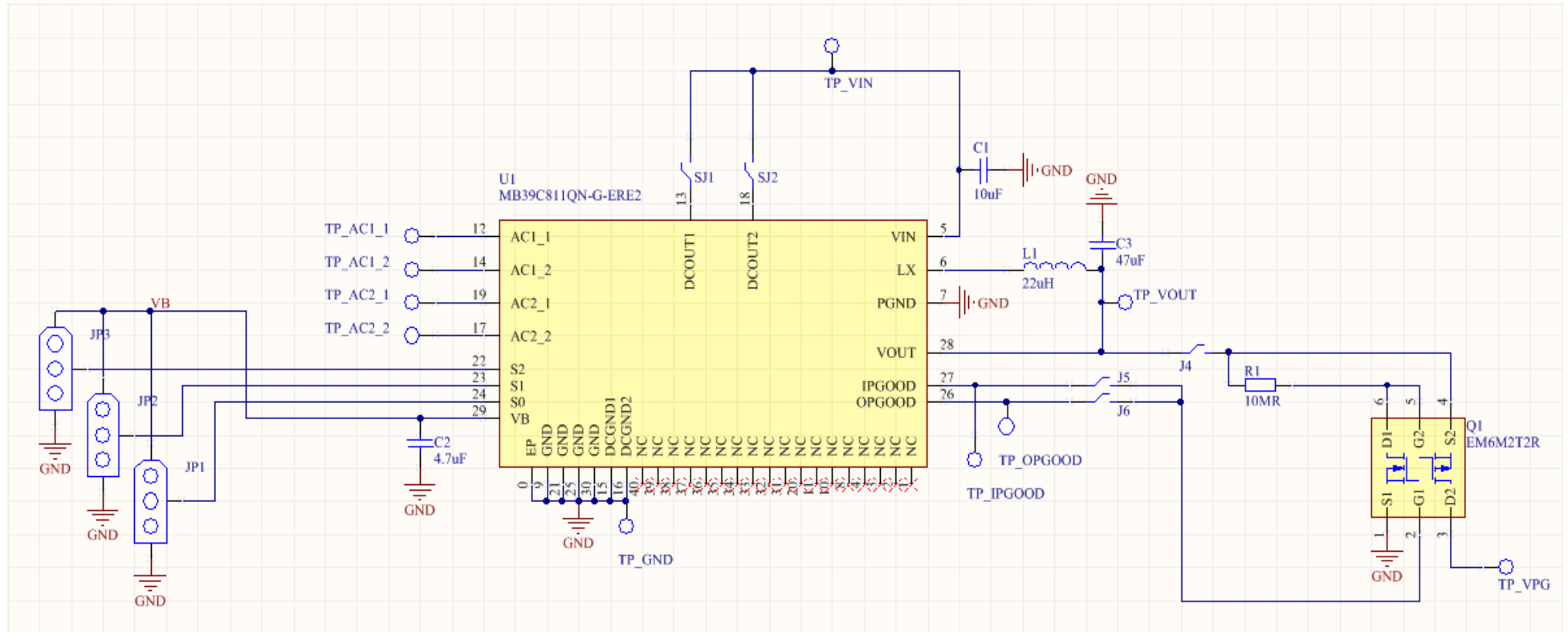
<http://www.spansion.com/fjdocuments/downloads/EDG/binary/pdf/catalogs/AD405-00008.pdf>

<http://www.spansion.com/fjdocuments/downloads/EDG/binary/pdf/catalogs/ad405-00010.pdf>

Quick Start Instructions

1. Refer to Table 4-2 and short the necessary jumpers/switches with solder
2. Connect the solar cell/piezo element to AC1 or AC2 or both
3. Monitor VOUT and/or VPG once harvested input is greater than ULVO release voltage to start up MB39C811

MB39C811 Breakout Schematic View



MB39C811 Breakout PCB View

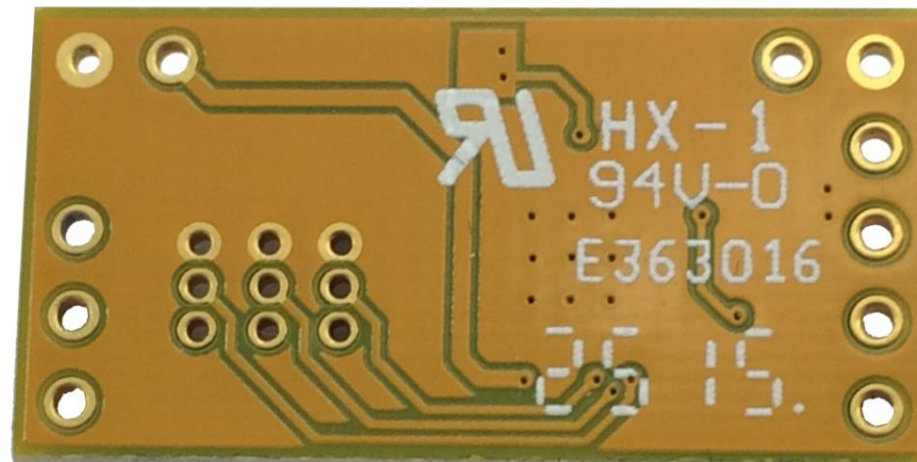
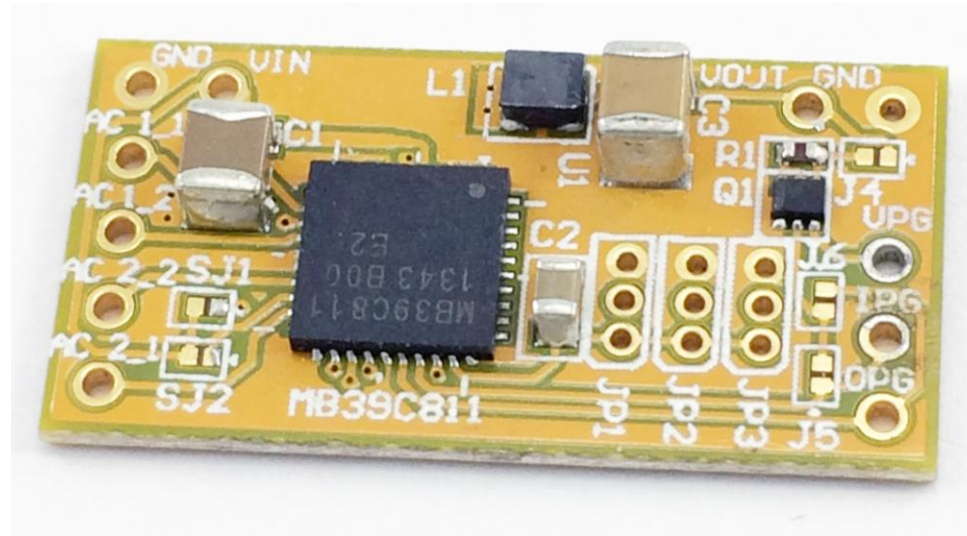


Table 2-1 Evaluation Board Specification

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|----------------------------|-------------------------------|----------------------------|------|------|------|------|
| Input voltage | VIN | - | 2.6 | - | 23 | V |
| Input slew rate | VIN | VIN ≥ 7V | - | - | 0.25 | V/ms |
| Input current | VIN | - | - | - | 100 | mA |
| AC pin input voltage | AC1-1, AC1-2, AC2-1, AC2-2 | - | - | - | 23 | V |
| AC pin input current | AC1-1, AC1-2, AC2-1, AC2-2 | - | - | - | 50 | mA |
| Output voltage | VOUT | See Table 4-3 | 1.5 | - | 5 | V |
| Output current | VOUT | Up to 100 mA | - | - | 100 | mA |
| UVLO release voltage | VOUT | JP3=L, JP2=L, JP1=L (1.5V) | 3.8 | 4.0 | 4.2 | V |
| | | JP3=L, JP2=L, JP1=H (1.8V) | | | | |
| | | JP3=L, JP2=H, JP1=L (2.5V) | | | | |
| | | JP3=L, JP2=H, JP1=H (3.3V) | 4.94 | 5.2 | 5.46 | V |
| | | JP3=H, JP2=L, JP1=L (3.6V) | | | | |
| | | JP3=H, JP2=L, JP1=H (4.1V) | | | | |
| | | JP3=H, JP2=H, JP1=L (4.5V) | | | | |
| JP3=H, JP2=H, JP1=H (5.0V) | 6.84 | 7.2 | 7.56 | V | | |
| Forward bias voltage | AC1-1, AC1-2, AC2-1, AC2-2 | IF=10 μA | 150 | 280 | 450 | mV |

Please see the MB39C811 datasheet (DS405-00013) for more information.

Table 4-1 Input/Output Pin Descriptions

| Pin Number | Pin Symbol | I/O | Function Description |
|------------|------------|-----|--|
| TP1 | AC1-1 | I | Bridge rectifier 1, AC input 1 |
| TP2 | AC1-2 | I | Bridge rectifier 1, AC input 2 |
| TP4 | AC2-1 | I | Bridge rectifier 2, AC input 1 |
| TP3 | AC2-2 | I | Bridge rectifier 2, AC input 2 |
| TP5 | VIN | I | DC power input It supplies power through the bridge rectifier from DCOUT1/2 to the VIN pin. |
| TP6 | GND | - | GND pin |
| TP7 | VOUT | O | VOUT pin |
| TP8 | GND | - | GND pin |
| TP9 | VPG | O | Power Gating VOUT pin |
| TP10 | GND | - | GND pin |
| TP11 | IPGOOD | O | Input power good monitor pin |
| TP12 | OPGOOD | O | Output power good monitor pin |

Table 4-2 Jumper, Switch Descriptions

| Jumper, Switch | Function Description | Initial Setting |
|----------------|--|-----------------|
| SJ1 | Connection jumper between the DC output pin (DCOUT1) of bridge rectifier 1 and DC input pin (VIN) of DC/DC converter | Pattern short |
| SJ2 | Connection jumper between the DC output pin (DCOUT2) of bridge rectifier 2 and DC input pin (VIN) of DC/DC converter to "open/short" | Pattern short |
| JP1 | High/Low selecting switch for S0. See Table 4-3. | H |
| JP2 | High/Low selecting switch for S1. See Table 4-3. | H |
| JP3 | High/Low selecting switch for S2. See Table 4-3. | L |
| JP4 | Short between VOUT and Power Gating Circuit | Short |
| JP5 | Short between IPGOOD and Nch-Gate of Power Gating Circuit | Short |
| JP6 | Short between OPGOOD and Nch-Gate of Power Gating Circuit | Open |

*: Open/Short by soldering

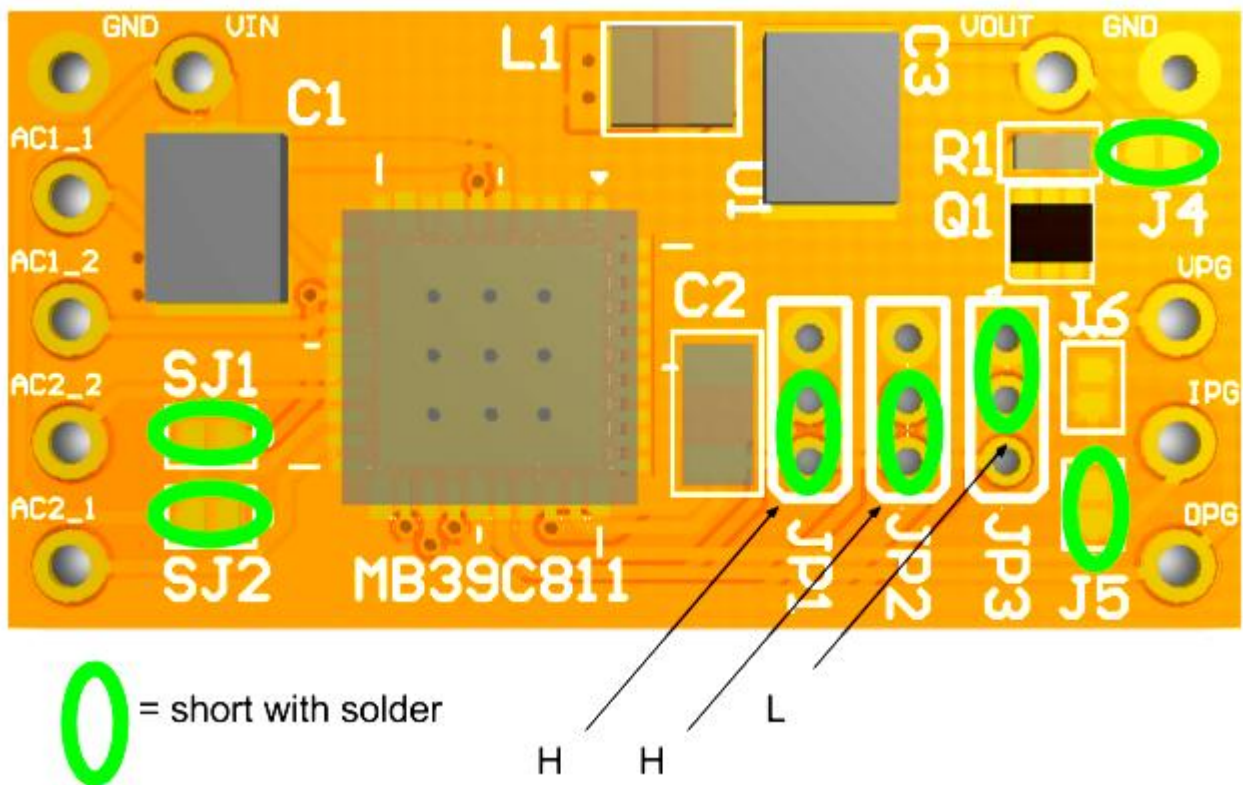
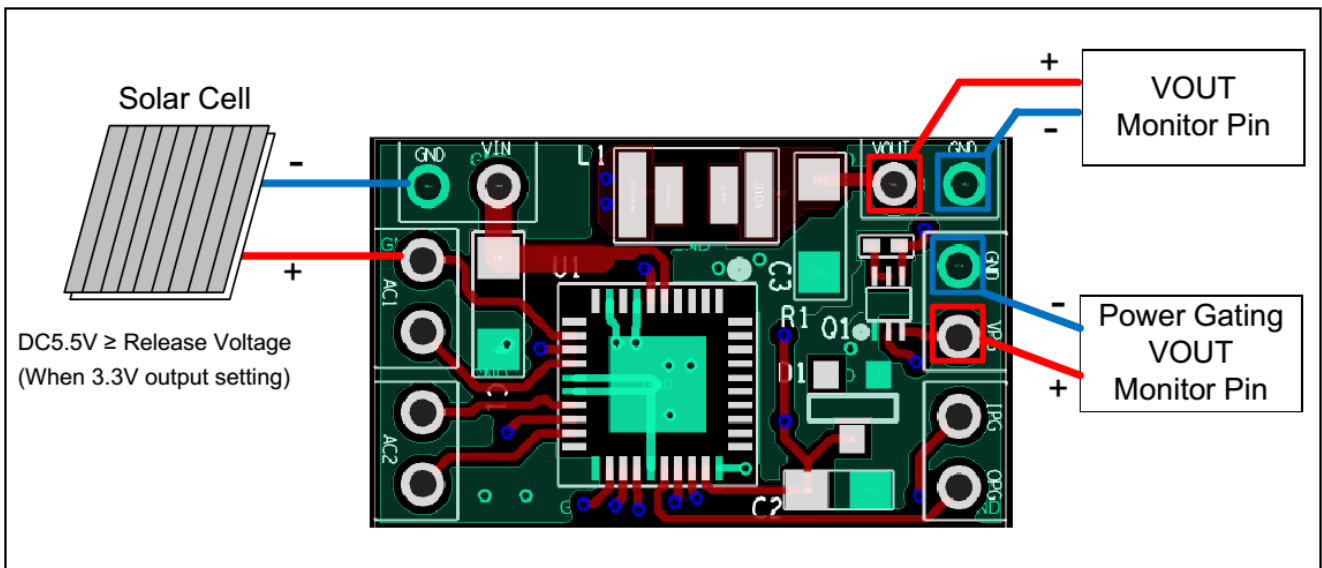


Table 4-3 Output Voltage Settings

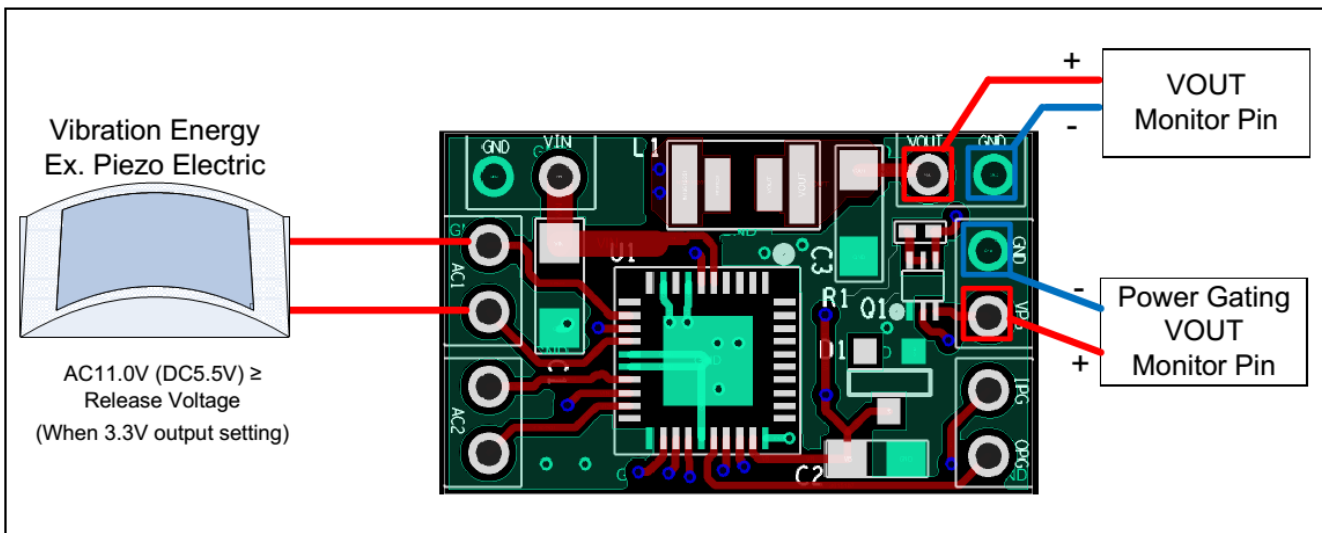
| S2 Pin (JP3) | S1 Pin (JP2) | S0 Pin (JP1) | Preset Output Voltage |
|--------------|--------------|--------------|-----------------------|
| L | L | L | 1.5 |
| L | L | H | 1.8 |
| L | H | L | 2.5 |
| L | H | H | 3.3 (Initial setting) |
| H | L | L | 3.6 |
| H | L | H | 4.1 |
| H | L | L | 4.5 |
| H | H | H | 5.0 |

Solar Energy Harvesting with MB39C811 Breakout



1. To output 3.3V voltage to VOUT pin, input a DC 5.5V or more voltage into TP1 (AC1-1). Recommend solar cell of 8cells or more, if connect solar cell. The number of plus for UVLO release voltage (5.2Vtyp@3.3V setting) and the forward bias voltage of diode (0.28Vtyp) are required to start up (see the Table 2-1).
2. 3.3V is output to TP7 (VOUT) and TP9 (VPG).
3. To change the output voltage, change the jumper settings (see the Table 4-3) using soldering.

Vibration Energy Harvesting with MB39C811 Breakout



1. To output 3.3V voltage to VOUT pin, input AC 11V (DC5.5V) or more voltage into TP1 and TP2 (AC1-1 and AC1-2). The number of plus for UVLO release voltage (5.2Vtyp@3.3V setting) and the forward bias voltage of diode (0.28Vtyp) are required to start up (see the Table 2-1).
2. 3.3V is output to TP7 (VOUT) and TP9 (VPG).
3. To change the output voltage, change the jumper settings (see the Table 4-3) using soldering.