

Overview

This compact module controls the current charging to and discharging from a supercapacitor or bank of capacitors to a system where the power source cannot provide full input power. The module is intended to be used with low power energy harvesting systems/sources (solar, vibration, wireless energy, thermal gradient) where low currents need to be transformed into a periodic high output currents. This module enables users to store the harvested power until an upper predetermined voltage ($V_{HIGH}=5.4V/3.2V/2.6V$ depending upon jumper settings) is reached on the capacitor. The module then automatically switches on this output voltage (DC OUT) to power the system for a short period of time until $V_{LOW}=1.0V$ is reached and the cycle repeats. The charging time is determined by the energy harvesting rate and the capacitor value. The discharging time depends on the R-C time constant of the load presented by the application and the capacitor value used.

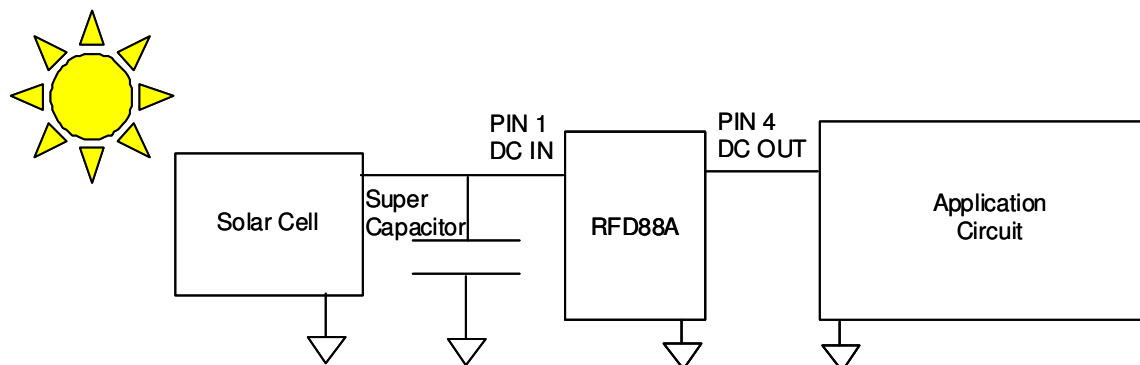


Figure 1. Block diagram for the RFD88A in a solar energy harvesting system.

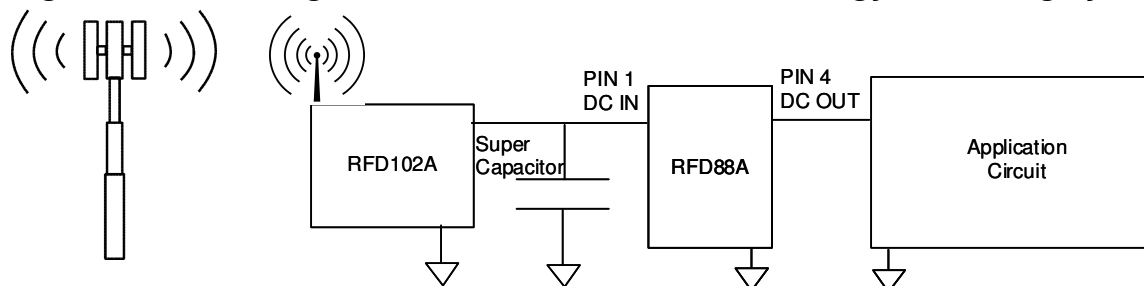
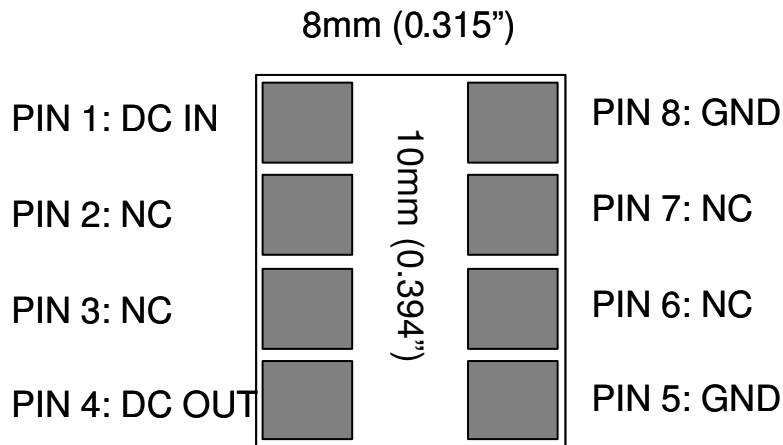
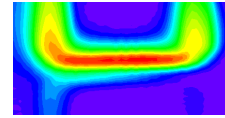
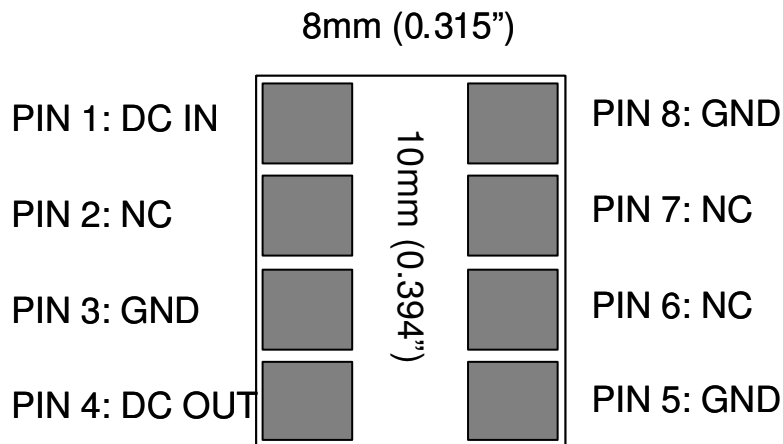


Figure 2. Block diagram for the RFD88A in a wireless energy harvesting system.



Top View

Figure 3a. RFD88A energy charge/discharge module pinout for VHIGH=5.4V, VLOW=1.0V. Pins 2 & 3 should be left not connected (NC) for VHIGH=5.4V.



Top View

Figure 3b. RFD88A energy charge/discharge module pinout for VHIGH=3.2V, VLOW=1.0V. Pin 3 is grounded and reduces VHIGH from 5.4V to 3.2V. Pin 2 must be open (not connected) for this mode.

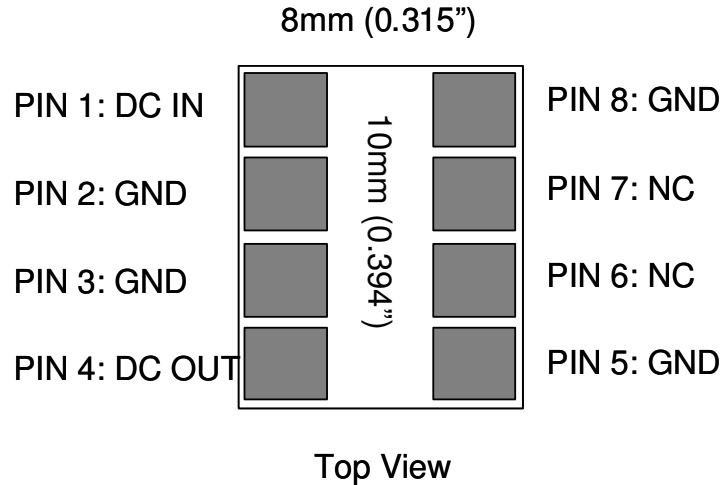
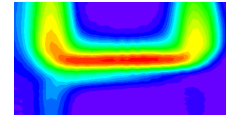


Figure 3c. RFD88A energy charge/discharge module pinout for VHIGH=2.6V, VLOW=1.0V. Pin 2 & 3 are grounded to reduce VHIGH from 5.4V to 2.6V.

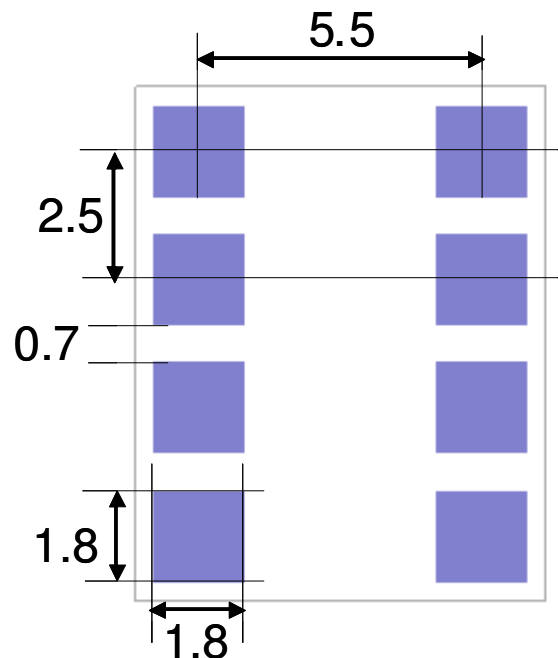
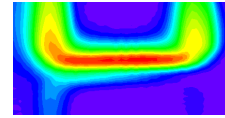


Figure 4. Recommended PCB footprint. Package size is 8mm x 10mm. Dimensions are in millimeters.



Pin Description:

Pin 1: DC Input. Connect this pin to the low power energy harvesting source.

Pin 2: VSET LOW. This pin should be left open if VHIGH=5.4V or 3.2V is desired.

Ground Pin 2 if VHIGH=2.6V is desired.

Pin 3: VSET MID: This pin should be left open if VHIGH=5.4V is desired. Ground Pin 3 and leave open Pin 2 if VHIGH=3.2V is desired.

Pin 4: DC Output. Connect this pin to the application circuit positive voltage input.

Pin 5: Ground. This pin must be connected to an external ground for proper operation. The pin is also internally connected to Pin 8.

Pin 6: Not Connected. This pin may be left open or grounded and does not affect the operation of the module.

Pin 7: Not Connected. This pin may be left open or grounded and does not affect the operation of the module.

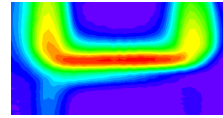
Pin 8: Ground. This pin must be connected to an external ground for proper operation. The pin is also internally connected to Pin 5.

Additional Technical Information

Maximum Ratings and Output Voltage Protection

The RFD88A includes the following features:

- +10V maximum on the DC input line (Pin 1).
- +6V maximum on the DC output line (Pin 4)
- Externally adjustable upper voltage. See figures 3a,b,c.
- 500mA maximum output current.
- Exceeding the above limits can cause partial or permanent module damage.



Disclaimer

This module is guaranteed to be defect free upon shipment. However the module is not intended for use in critical applications such as medical devices, automotive safety, or anywhere else where poor performance can result in injury, loss of life or property. The user agrees to assume all risks arising from use of the module and releases RF Diagnostics from all liability for its malfunction or misuse.

Specifications listed on datasheets are subject to change without notice.