Rechargeable Solid State Energy Storage: 50µAh, 3.8V

Features
- All Solid State Construction
- SMT Package and Process
- Lead-Free Reflow Tolerant
- Thousands of Recharge Cycles
- Low Self-Discharge
- Eco-friendly, RoHS compliant

Applications
- Standby supply
- Wireless sensors and RFID tags
- Localized power source
- Power Bridging
- Energy Harvesting
- Embedded Energy

Part Numbering Example: CCBC050 T- A5

CCBC050	T	-	A5
SERIES	SHIPPING PKG	PACKAGE STYLE	OPERATING TEMP.
	T = Tube	Blank = 16-pin QFN	-20°C to 70°C
	Z1 = 1K		
	Z5 = 5K		

Operating Characteristics

Parameter		Condition	Min	Typical	Max	Units
Discharge Cutoff Voltage		25°C	3.0[1]	-	-	V
Charge Voltage		25°C	4.0[2]	4.1	4.3	V
Pulse Discharge Current		25°C	300[3]	-	-	µA
Cell Resistance (25°C)		Charge Cycle 2	-	750	2000	Ω
		Charge Cycle 1000	-	4200	7000	
Self- Discharge (5-yr Average; 25°C)		Non- recoverable	-	2.5	-	% per year
		Recoverable	-	1.5[4]	-	% per year
Operating Temperature		-	-20	25	+70	°C
Storage Temperature		-	-40	-	+125[5]	°C
Recharge Cycles (to 80% of rated caapacity; 4.1V charge voltage)	25°C	10% depth-of-discharge	5000	-	-	cycles
		50% depth-of-discharge	1000	-	-	cycles
	40°C	10% depth-of-discharge	2500	-	-	cycles
		50% depth-of-discharge	500	-	-	cycles
Recharge Time (to 80% of rated capacity; 4.1V charge voltage)		Charge cycle 2	-	20	35	minutes
		Charge cycle 1000	-	60	95	
Capacity		100µA discharge; 25°C	50	-	-	µAh

1. Failure to cutoff the discharge voltage at 3.0V will result in EnerChip ™ performance degradation

2. Charging at 4.0V will charge the cell to approximately 70% of its rated capacity

3. Typical pulse duration = 20 milliseconds.

4. First month recoverable self-discharge is 5% average.

5. Storage temperature is for uncharged EnerChip ™.

Note: All specifications contained within this document are subject to change without notice

Electrical Properties

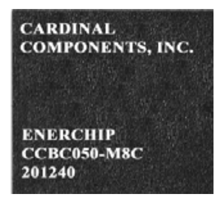
Output voltage:	3.8V
Capacity (typical):	12µAh
Charging source:	4.00V to 4.15V
Recharge time to 80%:	20 minutes
Charge/discharge cycles:	>5000 to 10% DOD

Physical Properties

Package size:	8 mm x 8 mm
Operating temperature:	-20°C to 70°C
Storage temperature:	-40°C to 125°C

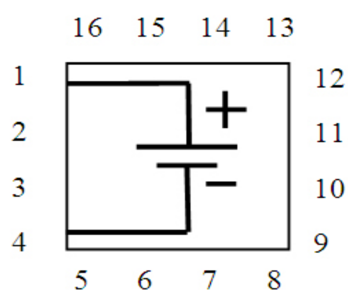
Pin Number(s)	Description
1	V+
4	V-
2,3	NIC
5-16	NIC
Note: NIC = No Internal Connection	

The EnerChip™ CCBC050 is a surface-mount, solid state, thin film, rechargeable energy storage device rated for 50µAh at 3.8V. It is ideal as a localized on-board power source for SRAMs, real-time clocks and microcontrollers which require standby power to retain time or data. It is also suitable for RFID tags, smart sensors, and remote applications which require a miniature, low-cost, and rugged power source. For many applications, the CCBC050 is a superior alternative to coin cell batteries and super-capacitors.



8mm x 8mm
QFN SMT
Package

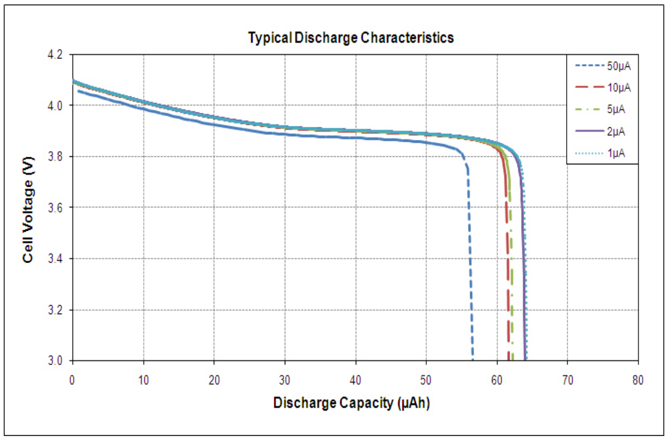
Because of their solid state design, EnerChip™ storage devices are able to withstand solder reflow temperatures and can be processed in high-volume manufacturing lines similar to conventional semiconductor devices. There are no harmful gases, liquids or special handling procedures, in contrast to traditional rechargeable batteries.

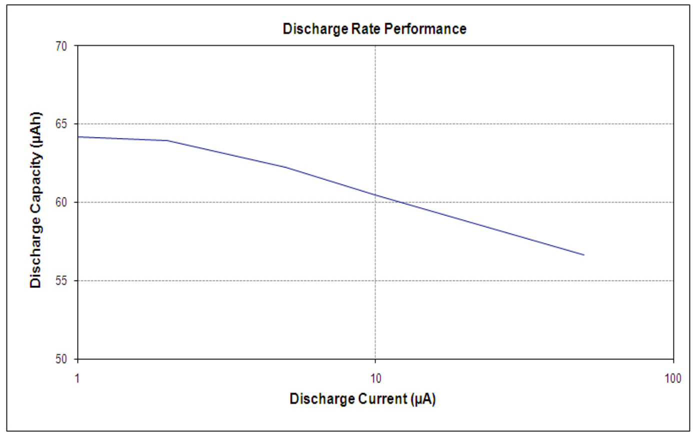


CCBC050 Schematic Top View

The EnerChip™ recharge is fast and simple, with a direct connection to a 4.1V voltage source and no current limiting components. Recharge time is 20 minutes to 80% capacity. Robust design offers thousands of charge/ discharge cycles. The CCBC050 is packaged in an 8 mm x 8 mm quad flat package. It is available in reels for use with automatic insertion equipment.

EnerChip™ Discharge Characteristics





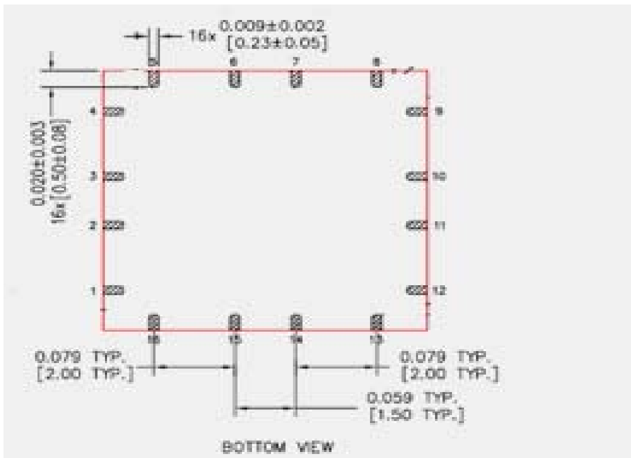
Printed Circuit Board (PCB) Layout Guidelines and Recommendations

Electrical resistance of solder flux residue on PCBs can be low enough to partially or fully discharge the backup energy cell and in some cases can be comparable to the load typically imposed on the cell when delivering power to an integrated circuit in low power mode. Therefore, solder flux must be thoroughly washed from the board following soldering. The PCB layout can make this problem worse if the cell's positive and negative terminals are routed near each other and under the package, where it is difficult to wash the flux residue away.

To avoid this situation, make sure positive and negative traces are routed outside of the package footprint to ensure that flux residue will not cause a discharge path between the positive and negative pads. Similarly, a leakage current path can exist from the package lead solder pads to the exposed die pad on the underside of the package as well as any solder pad on the PCB that would be connected to that exposed die pad during the reflow solder process. Therefore, it is strongly recommended that the PCB layout not include a solder pad in the region where the exposed die pad of the package will land. It is sufficient to place PCB solder pads only where the package leads will be. That region of the PCB where the exposed die pad will land must not have any solder pads, traces, or vias.

When placing a silk screen on the PCB around the perimeter of the package, place the silk screen outside of the package and all metal pads. Failure to observe this precaution can result in package cracking during solder reflow due to the silk screen material interfering with the solder solidification process during cooling.

A recommended CCBC050 PCB layout is shown in Figure 1 below. Notice that there should not be a center pad on the PCB to mate with the exposed die pad on the CCBC050 package. Again, this is to reduce the possible number and severity of leakage paths between the EnerChip™ terminals.



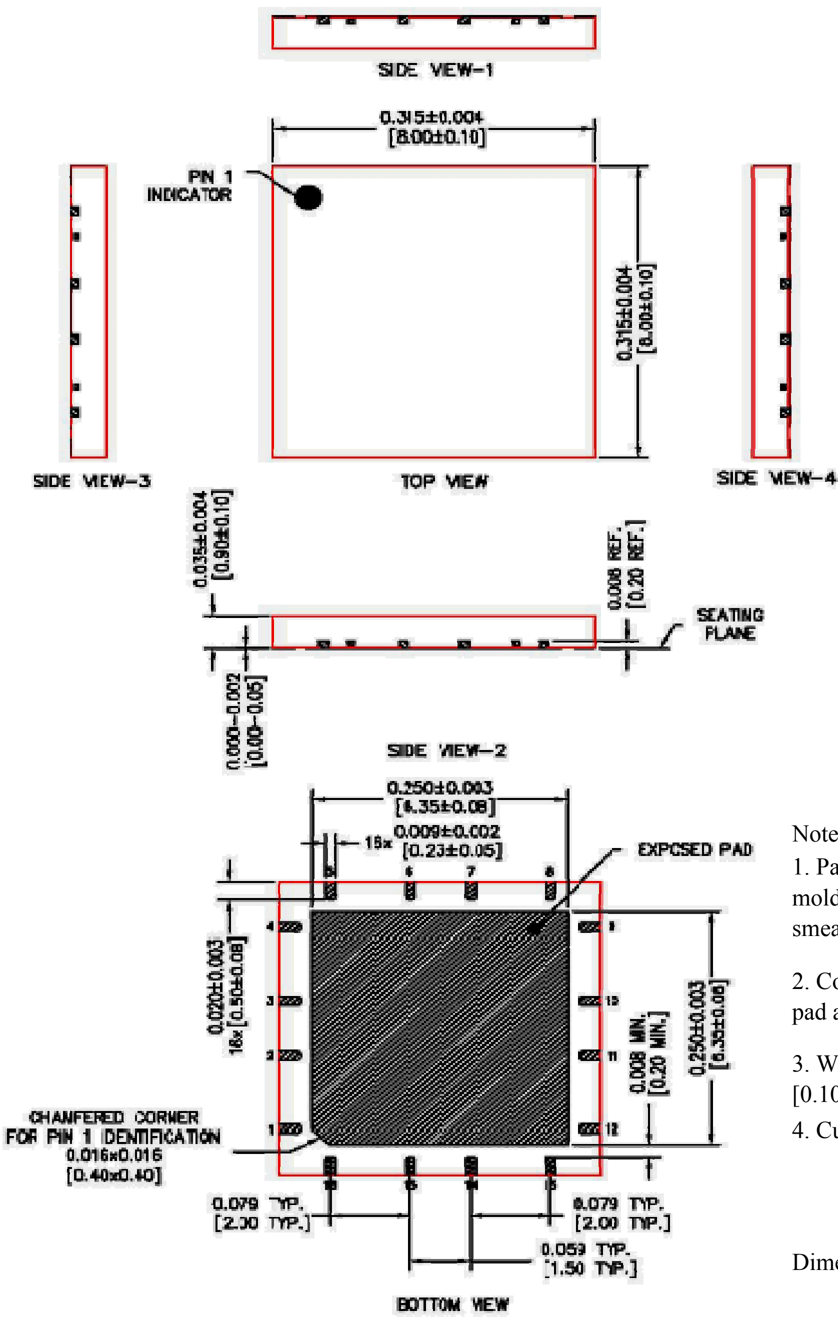
Dimensions in inches [mm]

Figure 1: Recommended PCB layout for the CCBC050 package. Do not route signal traces under the EnerChip™ as they could become shorted to the die pad (as shown by the dotted lines) on the package underside.

Soldering, Rework, and Electrical Test

Refer to Cardinal Components, Inc.

Package Dimensions - 16-pin QFN (package code M8)



Notes:

1. Package dimension does not include mold flash, protrusions, burrs or metal smearing.
2. Coplanarity applies to the exposed pad as well as the exposed terminals.
3. Warpage shall not exceed 0.004 [0.10]
4. Custom Package.

Dimensions in Inches [mm]

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