Product Discontinued - Not for New Designs

EnerChip™ CBC012

Rechargeable Solid State Energy Storage: 12µAh, 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

Electrical Properties

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

Physical Properties

Package size (DFN):	5 mm x 5 mm x 0.9 mm
Operating temperature:	-40°C to 70°C
Storage temperature:	-40°C to 125°C

Applications

- **Standby supply** for non-volatile SRAM, real-time clocks, controllers, supply supervisors, and other system-critical components.
- **Wireless sensors and RFID tags** and other powered, low duty cycle applications.
- **Localized power source** to keep microcontrollers and other devices alert in standby mode.
- **Power bridging** to provide backup power to system during exchange of primary batteries.
- **Embedded Energy** where bare die can be embedded into modules or co-packaged with other ICs

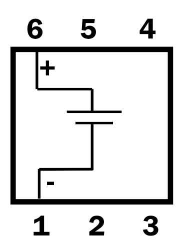
Pin Number(s)	Description
1	V-
2,3,4,5	NIC
6	V+
Note: NIC = No Internal Connection	

5 mm x 5 mm
DFN SMT Package

The EnerChip™ CBC012 is a surface-mount, solid state, thin film, rechargeable energy storage device rated for 12µAh 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 CBC012 is a superior alternative to button cell batteries and super-capacitors.

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.

The CBC012 is based on a patented, all solid state, rechargeable energy cell with a nominal 3.8V output. Recharge is fast and simple, with a direct connection to a 4.1V voltage source and no current limiting components. Recharge time is 10 minutes to 80% capacity. Robust design offers thousands of charge/discharge cycles. The CBC012 is packaged in a 5 mm x 5 mm 6-pin DFN package. It is shipped in tubes, tape-and-reel, or waffle pack trays.



CBC012 Schematic Representation
Top View

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	Variable - see App. Note 1025			-
Cell Resistance (25°C)	Charge cycle 2	-	2.15	5.35	kΩ
	Charge cycle 1000	-	10.7	21.3	
Self-Discharge (5-yr. average; 25°C)	Non-recoverable	-	2.5	-	% per year
	Recoverable	-	1.5[3]	-	% per year
Operating Temperature	-	-40	25	+70	°C
Storage Temperature	-	-40	-	+125[4]	°C
Recharge Cycles (to 80% of rated capacity; 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)[5]	Charge cycle 2	-	10	22	minutes
	Charge cycle 1000	-	45	70	
Capacity	50µA discharge; 25°C	12	-	-	µAh

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

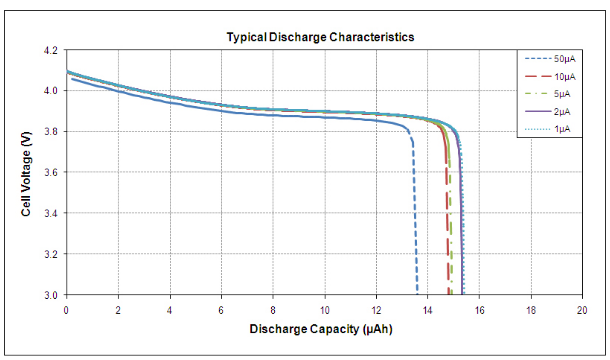
(2) *Charging at 4.0V will charge the cell to approximately 70% of its rated capacity.*

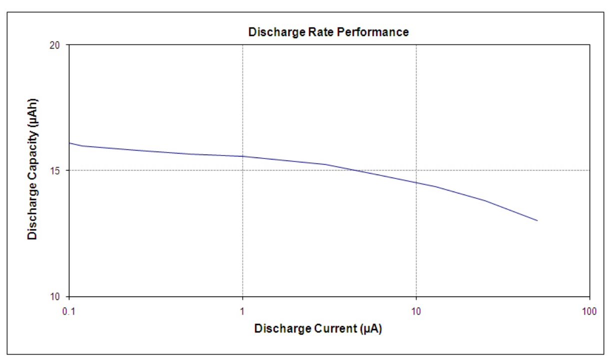
(3) *First month recoverable self-discharge is 4% average.*

(4) *Storage temperature is for uncharged EnerChip.*

(5) *EnerChip charging time and cell resistance increase approximately 2x per 10°C decrease in temperature.*

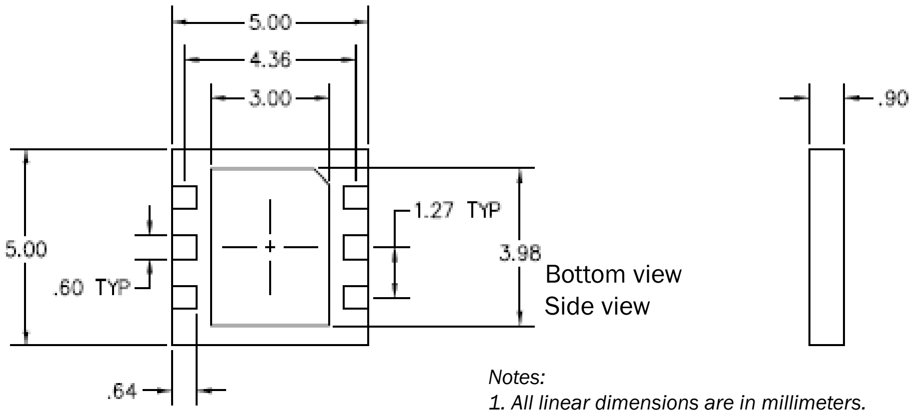
EnerChip Discharge Characteristics





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

Package Dimensions - 6-pin DFN (package code D5)



Cymbet Logo

Lot Number
Part Number
Date Code

Chip Labeling Information Placement

Notes:
1. All linear dimensions are in millimeters.

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

Printed Circuit Board (PCB) Layout Guidelines and Recommendations

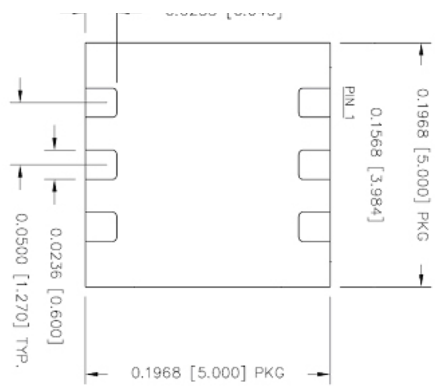
Electrical resistance of solder flux residue on PCBs can be low enough to partially or fully discharge the backup energy cell and in some cases can be comparable to the load typically imposed on the cell when delivering power to an integrated circuit in low power mode. Therefore, solder flux must be 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. In this scenario, solder flux residue can wick from the positive solder pad, covering both the positive pad and the via. This results in a high resistance current path between the EnerChip terminals. Such a current path will make the cell appear to be defective or make the application circuit appear to be drawing too much current. To avoid this situation, make sure positive and negative traces are routed outside of the package footprint, thus ensuring 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.

For the CBC012-D5C the PCB layout of Figure 4 is recommended. Note that there should NOT be a center pad on the PCB that could contact the exposed die pad on the D5C package. Again, this is to reduce the possible number and severity of leakage paths between the EnerChip terminals.



Recommended PCB layout to accommodate CBC012 package.

ADDITIONAL PCB LAYOUT GUIDELINES

There are several PCB layout considerations that must be taken into account when using the EnerChip:

- All capacitors should be placed as close as possible to the EnerChip.
- Power connections should be routed on the layer the EnerChip is placed.
- Any flying capacitor connections must be as short as possible and routed on the same layer as the EnerChip is placed.
- A ground (GND) plane in the PCB should be used for optimal performance of the EnerChip.
- Very low parasitic leakage currents from the VBAT pin to power, signal, and ground connections, can result in unexpected drain of charge form the integrated power source. Maintain sufficient spacing of traces and vias from the VBAT pin and any traces connected to the VBAT pin in order to eliminate parasitic leakage currents that can arise from solder flux or contaminants on the PCB.
- On the EnerChip CC, Pin 1 VBAT and Pin 4 VCHG must be tied together for proper operation.
- See the section on assembly repair techniques for additional information on board layout guidelines.

HAND SOLDERING TECHNIQUES

When soldering the EnerChip using by hand at a soldering station, adhere to the following guidelines:

- Observe the ESD precautions outlined in this document.
- Never solder an EnerChip that has been partially or fully charged, even if the EnerChip is in a discharged state. This includes wave soldering and reflow soldering.
- Minimize the amount of time that heat is applied to the EnerChip. Using a tweezer-type soldering iron tip that applies heat to two opposite sides or the entire perimeter of the device simultaneously will result in more uniform heating of the package and for a shorter period of time than when soldering one pin or package edge at a time.
- If possible, apply solder paste to the solder pads on the PCB prior to placing the EnerChip on the board; this will promote wetting of the solder and reduce the amount of time the soldering iron is applied to the component and solder pads.
- Place the EnerChip onto the PCB by hand and solder in place rather than grabbing the EnerChip with a heated tweezer-type tip and placing the EnerChip on the board with the iron. This will minimize the amount of time the EnerChip is exposed to heat.
- Most surface mount packages have metal leadframe tie points that do not extend to the bottom surface of the package but are exposed on two more of the package sidewalls. When soldering, ensure that solder does not cover these tie points, as this situation could result in package pins being shorted to one another through the metal leadframe.

ENERCHIP ASSEMBLY REPAIR TECHNIQUES

Should the need arise to replace an EnerChip that has already been soldered to a circuit board, due to battery failure, improper package placement, or other circumstances, it is recommended that the EnerChip being replaced be discarded and replaced with a new EnerChip. When removing the EnerChip from the board, use a tweezer-type soldering iron tip that heats opposite sides of the package simultaneously and lift the package from the board. When applying the new EnerChip to the board, follow the hand soldering guidelines in the previous section.

For QFN-style packages, use a hot air rework station to remove a defective or misplaced EnerChip package. If there are other EnerChips in the vicinity of the EnerChip being replaced, use proper heat shielding to protect the adjacent EnerChip package from the heat source and turn off any heat source that would otherwise be used to heat the bottom of the board during removal of the EnerChip. This will prevent the adjacent EnerChip(s) from being damaged during the rework procedure.

If it is not possible to replace the EnerChip with a new EnerChip, use extreme care when removing the EnerChip from the board to minimize the amount of time heat is applied to the package during removal and re-soldering. Follow the guidelines in the previous section pertaining to hand soldering. Under no circumstances should an EnerChip that has been partially or fully charged - even if subsequently discharged - be subjected to reflow, wave, or hand soldering.

Conductive epoxy may also be used as an attachment method. If the cure temperature is above 70°C, then a new (i.e., never charged) EnerChip must be used.

Ordering Information - available for Last Time Buy until September 12, 2014

EnerChip Part Number	Description	Notes
CBC012-D5C	12µAh EnerChip in 6-pin DFN, tube	Not for new designs
CBC012-D5C-TR1	12µAh EnerChip in 6-pin DFN, Tape/Reel 1k parts	Not for new designs
CBC012-D5C-TR5	12µAh EnerChip in 6-pin DFN, Tape/Reel 5k parts	Not for new designs
CBC012-D5C-WP	12µAh EnerChip in 6-pin DFN, Waffle Pack	Not for new designs

Disclaimer of Warranties; As Is

The information provided in this data sheet is provided "As Is" and Cymbet Corporation disclaims all representations or warranties of any kind, express or implied, relating to this data sheet and the Cymbet EnerChip product described herein, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, non-infringement, title, or any warranties arising out of course of dealing, course of performance, or usage of trade. Cymbet EnerChip products are not approved for use in life critical applications. Users shall confirm suitability of the Cymbet EnerChip product in any products or applications in which the Cymbet EnerChip product is adopted for use and are solely responsible for all legal, regulatory, and safety-related requirements concerning their products and applications and any use of the Cymbet EnerChip product described herein in any such product or applications.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Cymbet:

CBC012-D5C-TR1