

## Mounting and Soldering of PC and BC Series Products

Maxwell PC and BC family of products are designed to be mounted to PC boards and to accept solder as a means of attaching those products to their substrate. Maxwell has converted these products to be compliant with the requirements of the RoHS directive and as such has moved to lead free preparations that require adjustments in the processes which are used to interconnect these compliant products with their substrates.

NOTE: Please note that the process and parameters described in this document were developed on specific equipment. The parameters will apply to that equipment and it is very likely that alternative pieces of equipment will require adjustment and fine tuning of those parameters to achieve an optimized result.

### PC Products

PC products covered by the application note include the Maxwell PC5 and PC 10 pictured below:



PC-5



PC-10

The changes to these parts as necessitated by RoHS and the lead free specifications required that Maxwell change the tinning on the leads of the part to a lead free composition. That in turn requires adjustment to the soldering processes needed for these components.

### Hand Soldering PC Products

In order to hand solder PC products good soldering practices must apply. It is assumed in this document that the user has experience with hand soldering of electronic components and that fundamental soldering processes are understood.

Maxwell has transitioned to a lead free tin on the leads of the PC parts. In addition, there has been a move toward lead free board designs which means that lead free soldering techniques

must be employed. The tinning process as Maxwell has applied a thin film of lead free alloy to the leads. The composition of that alloy is:

96.5 Sn ,3.0 Ag ,0.5 Cu  
Melting Point: 217C

This is the solder used on the leads of the parts when they are manufactured.

In general, lead free soldering by hand requires higher heat and more active fluxes than solder containing lead as a constituent. Therefore new thermal profiles must be adopted and new cleaning agents should be utilized.

The following are the parameters and materials that should be used for lead free hand soldering of PC products:

**Recommended Solder tip temperature** - 343°C / 650°F

**Solder Composition and size** - Sn96.5Ag3.0Cu0.5 alloy, .062 dia

**Recommended solder** – Kester SN96227558 – includes flux core, other solders are available on the market which will be equivalent to this type.

**Flux** – If not using flux core wire, use a halide free, activated rosin based flux. There are many such fluxes available on the market.

**Maximum contact time with component leads** – 10 seconds

NOTE: Excessive time in contact with the component leads will potentially damage the device. Limit lead contact time to 10 seconds

### **Wave Soldering PC Components**

In order to wave solder PC components special attention must be paid to the dwell time and total time at temperature since the ultracapacitors are a temperature sensitive component. Below are the recommendations for wave soldering PC components from Maxwell.

NOTE: Maxwell wave soldering parameters represent recommended parameters for specific equipment. Other equipment may require adjustment of the parameters

Equipment used for parameter development: Electrovert Econopack 03

**Recommended Solder Pot Temperature** - 248°C / 478°F

**Solder Composition** - Sn96.5Ag3.0Cu0.5 alloy

**Recommended Flux** – Kester 2331ZX

**Recommended Preheat** – Preheat board from bottom side only, bring top of board to 100C maximum immediately before soldering, preheat time will depend upon heating efficiency.

**Conveyor speed** – 2.8cm / sec

**Dwell time** – 2.5 seconds

NOTE: Do not exceed 100°C on the top of the board, exceeding this temperature may result in damage to the parts

## BC Products

BC products covered by this document include the Maxwell BCAP350, BCAP 310, BCAP140 and BCAP120. All products comprising the BC series product line are RoHS compliant.



## General Precautions

Excessive heat applied to the ultracapacitor during soldering processes may damage the component causing deterioration in performance and life. The following precautions should be followed when soldering the Maxwell BOOSTCAP® ultracapacitor.

- 1) The ultracapacitor is polarized. Reference the label for positive and negative potentials.
- 2) The ultracapacitor case is at the negative potential. Insure that the case is adequately insulated from other components.

## Solder Tab Composition

The lead tabs are comprised aluminum alloy. The earlier A01, A03 versions of the BCAP 350/310 and the BCAP140/120 are nickel-plated, 200-400 microns thick followed by gold plating 3 microns thick. The new B01 version of the BCAP350/310 are nickel plated - 1um thick, followed by tin flash over nickel 2.5um thick

## Wave Soldering BC Components

Components are wave solderable. Wave soldering is used in the fabrication of BPAK and BMOD products based on the BC series capacitors. The recommended schedule for wave soldering is provided below. The recommendations are based on specific wave soldering equipment. Adjustments may be necessary due to equipment. The equipment used for establishing the following recommendation is **Electrovert Econopack 03**.

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The following recommendations are also specific to the type of solder chosen. With RoHS compliant materials:

Solder: **Sn96.5 Ag3.0 Cu0.5 alloy**

Flux: **Kester 2331ZX**

Solder pot temperature - 260 °C

Preheat bottom side only. Board temperature at top of board should be 100 °C just before tinning

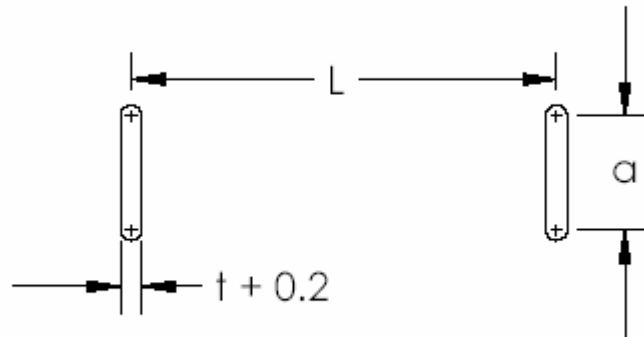
Conveyor speed - 2.8 cm/sec

Dwell time - 2.5 seconds

**Note: Selection of different soldering alloys and equipment may necessitate modifications to recommendations.**

### Mounting Recommendations

The tab style is similar to a fast on connector. Fast on connections may not be suitable for the RMS current for the application; therefore, the recommended mounting method is to solder. When soldering the recommended circuit board cut out is depicted in the following diagram in mm.



Product Series	L	a	t
BCAP0140- E&P	50.25	5.0	0.5
BCAP0350- E&P	61.25	6.6	0.8

If lead tabs projecting through the PCB are not permitted, it is recommended to precut the tabs prior to installation. The cut length should be the thickness of the PCB plus 1.5 mm minimum. If permissible the preferred cut length is PCB plus 2.0 mm.

The end to end spacing for mounting capacitors in series may be dependent on certification requirements and system voltage level.

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The tab connections are not intended to support the capacitor weight during shock and vibration in an application. The products are designed to provide a 1 mm body standoff of the capacitor body to the PCB. Provisions should be made to alleviate the tabs from supporting the capacitor weight during mounting. It is recommended that the ultracapacitor body be seated against the PCB with RTV sealant. Make sure the ultracapacitors are seated and aligned. To ensure even flow during soldering, the PCB slots should be aligned in the flow direction during soldering.