General

The Capstick and Surfilm capacitors Type CB, CS and ST use PET as the film dielectric and have been thermally stabilized to withstand reflow soldering temperatures for a maximum of 220°C for 30 seconds, with 1.5 minutes of allowable time at temperatures above 183°C., while products with the "-FS" suffix can be reflow soldered at a maximum of 245°C for 30 seconds, with 1.5 minutes of allowable time at temperatures above 217°C.

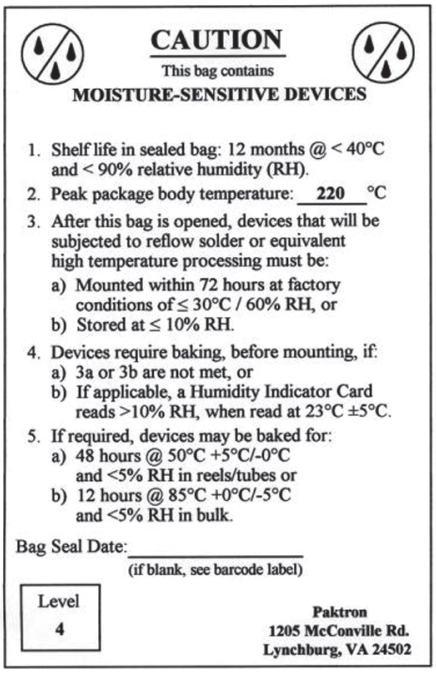
Dielectric Film		
Type	Name	Code
CB	polyethylene terephthalate	PET
CS	polyethylene terephthalate	PET
ST	polyethylene terephthalate	PET

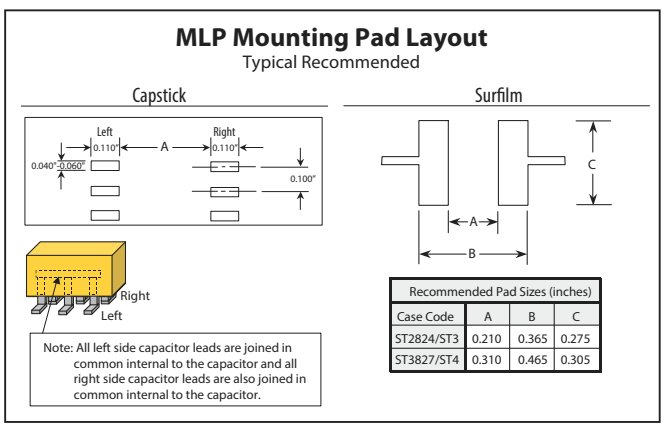
To prevent excessive changes to both the electrical and mechanical characteristics, Paktron recommends that the following soldering guidelines be observed when processing Capstick and Surfilm capacitors.

Pre-Conditioning

In case of high humidity storage and short cycle reflow soldering profiles, it is recommended that the capacitors be pre-conditioned in an 85°C oven for a minimum of 12 hours prior to reflow soldering to minimize any effects caused by the rapid vaporization of the moisture.

Solder Paste Thickness





Depending upon pad geometry, the recommended solder paste thickness is .006" (6 mils) to .010" (10 mils). For optimum performance, 8 mils to 10 mils should be used. In the case where small pitch components do not allow extra paste thickness, use of a "step screen" should be considered.

Board Attachment

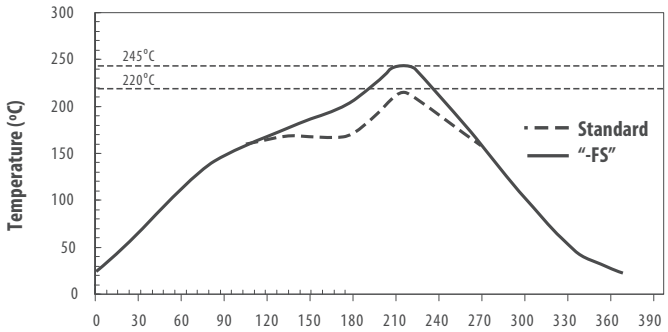
Due to their low mass, it is recommended that for optimum soldering results, Surfilm capacitors be spot glued to the substrate.

Maximum Solder Reflow Temperatures

Do not exceed the following temperatures:

Manufacturing Solder Method	Maximum Temperature			
	CB	CS	ST	"-FS"
Conductive Reflow	220°C	220°C	220°C	245°C
Convection Reflow	220°C	220°C	220°C	245°C
IR Reflow	220°C	220°C	220°C	245°C
Vapor Phase Reflow	NA	NA	220°C	NA
Soldering Iron	220°C	220°C	220°C	245°C
Wave Solder	NA	NA	NA	NA
Wave Solder (thru-hole)	260°C	260°C	NA	245°C

Typical Convection Reflow Solder Profiles



Profile Criteria	CB, CS, ST	"-FS"
Average Ramp-Up Rate	3°C/second max	3°C/second max
Preheat:		
Temperature Min	100°C	150°C
Temerature Max	150°C	200°C
Time	60 - 120 seconds	60 - 180 seconds
Time Above:		
Temperature	183°C	217°C
Time	90 seconds	90 seconds
Peak Temperature	220°C	245°C
Time within 5°C of Peak	30 seconds	30 seconds
Ramp-Down Rate	6°C/seconds max	6°C/second max
Time from 25°C to Peak	360 seconds max	480 seconds max

Board Cleaning

When cleaning the boards, avoid the use of alcohol based solvents. These may cause a temporary drop in the insulation resistance of the capacitor. The manufacturer's safety data sheet should also be studied carefully before using any solvent.

Hand Soldering Surfilm Capacitors

The following hand soldering method has proven to be satisfactory for soldering small quantities of Surfilm capacitors to printed circuit pads.

Materials and Equipment:

a. Use a soldering iron that will control the iron tip temperature to 220°C maximum. The Weller EC 2002C Soldering station and the EC1201P Iron will provide the temperature control needed

b. To reduce the heat exposure time, use a low temperature solder alloy with a low residue solder flux.

c. For ease of handling, prevention of contamination and personal injury, a pair of small tweezers should be employed to position the units for hand soldering.

Procedure:

1. Flow a thin bead of solder to one printed circuit pattern.

2. Center the capacitor to be soldered on the printed circuit electrode and place a small quantity of solder on the iron tip. Place the iron point at the junction of the capacitor electrode and printed circuit electrode and reflow the solder while applying a force to the top surface of the capacitor so that it will seat flush against the printed circuit pattern.

3. Clean the iron tip and apply the tip and solder to the opposite printed circuit and capacitor electrode junction until the solder wets the full length of the PC electrode and capacitor electrode. Do not apply a force to the top of the capacitor when soldering the second electrode.

4. Examine the first side soldered and repeat step 3 on the first side if required. The first solder application of step 2 is to mechanically position the capacitor on the board and hold it in place so that both hands are free to apply both the solder and iron tip to the second electrode. A full solder wetting may not be accomplished in step 2.

Important Points In MLP Soldering

1. Reflow Temperature: The maximum reflow solder temperature for capacitors made with PET based film dielectric is specified at 220°C. Type CB, CS and ST are made with low shrinkage PET dielectric film that has been thermally stabilized to withstand reflow soldering temperatures for a maximum of 220°C for 30 seconds, with 1.5 minutes of allowable time at temperatures above 183°C. The exception to this is product with the "-FS" suffix which is capable of withstanding reflow soldering temperatures for a maximum of 245°C for 30 seconds, with 1.5 minutes of allowable time at temperatures above 217°C. Typical reflow temperature profiles are shown on the proceeding page. Exceeding the recommended maximum temperature is one of the leading causes of soldering problems. On Type ST Product, excessive reflow temperatures can cause product swelling and shrinkage/curling of the white coverplates, which can lift the terminations out of the solder paste and create a "drawbridge" condition that prevents complete soldering.

2. Solder Paste Thickness: While reliable solder joints have been formed using paste thicknesses as low as 4 mils, for optimum performance, 8 mils to 10 mils should be used.

3. Mounting Pad Sizes: The recommended pad size geometry is shown on the proceeding page.

4. Board Attachment: Due to the low mass of the Type ST product, it is recommended that the chips be spot glued to the substrate for optimum soldering results.

5. Storage Conditions and Floor Life: The Capstick and Surfilm component reel packaging from the factory is "dry pack." Dry packing involves sealing the reel of product with a desiccant inside a moisture-barrier bag. This type of packaging provides moisture protection for 12 months @ <40°C / <90% RH. The Floor Life or "out-of-bag" exposure time is categorized according to the "JEDEC Moisture-Sensitivity Level" specification. The Capstick and Surfilm products meet "Level 4" which allows for "out-of-bag" exposure time @ 30°C / 60% RH of 3 days (72 hours).

6. In the case of open exposure to high humidity storage, it is recommended that the capacitors be pre-conditioned prior to reflow soldering to minimize any effects caused by the rapid vaporization of the moisture. The capacitors can be pre-conditioned either while still in the reels and tubes @ 50°C for 48 hours or in bulk/loose @ 85°C for 12 hours at <5% RH.