

MLP SOLDERING GUIDELINES

Capstick® & Surfilm® Capacitors

Type CB, CS and ST

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.

Type	Dielectric Film	
	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.

METHOD II PACKAGE

PACKAGED WITH DESICCANT
DO NOT OPEN
UNTIL READY FOR USE OR INSPECTION

CAUTION
This bag contains
MOISTURE-SENSITIVE DEVICES

- Shelf life in sealed bag: 12 months @ < 40°C and < 90% relative humidity (RH).
- Peak package body temperature: _____ °C
- After this bag is opened, devices that will be subjected to reflow solder or equivalent high temperature processing must be:
 - Mounted within 72 hours at factory conditions of ≤ 30°C / 60% RH, or
 - Stored at ≤ 10% RH.
- Devices require baking, before mounting, if:
 - 3a or 3b are not met, or
 - If applicable, a Humidity Indicator Card reads >10% RH, when read at 23°C ±5°C.
- If required, devices may be baked for:
 - 48 hours @ 50°C +5°C/-0°C and <5% RH in reels/tubes or
 - 12 hours @ 85°C +0°C/-5°C and <5% RH in bulk.

Bag Seal Date: _____
(if blank, see barcode label)

Level
4

ITW Paktron
1205 McConville Rd.
Lynchburg, VA 24502

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.

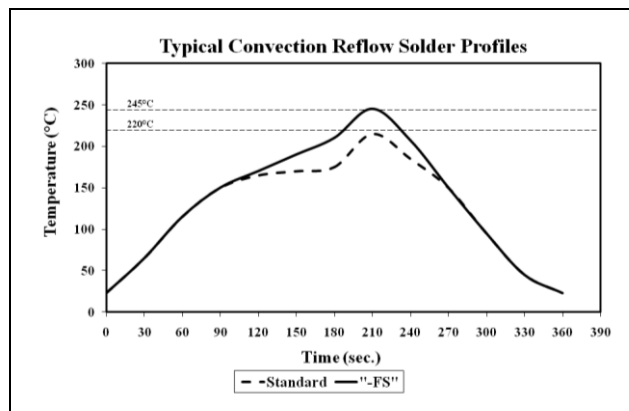
Board Attachment

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	N.A.	N.A.	220°C	N.A.
Soldering Iron	220°C	220°C	220°C	245°C
Wave Solder	N.A.	N.A.	N.A.	N.A.
Wave Solder (Thru-Hole)	260°C	260°C	N.A.	260°C



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
Temperature 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/second max	6°C/second max
Time from 25°C to Peak	360 seconds max	480 seconds max

Profiles are compliant with JEDEC J-STD-020

All temperatures refer to capacitor body topside surface

Pad Layout

MLP Mounting Pad Layout

Capstick

Typical Recommended

Surfilm

Case Code	A	B	C
ST2824	0.210	0.365	0.275
ST3827	0.310	0.465	0.305

Note: All left side capacitor leads are joined in common internal to the capacitor and all right side capacitor leads are also joined in common internal to the capacitor.

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. A 0.030" diameter X32B cored solder with an alloy of 43 % Tin, 43 % Lead, and 14% Bismuth has a soldering range of 143°C to 163°C (289°F to 325°F).
- 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 preceding 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 preceding 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.