
EnFilm™ micro battery EFL700A39 automatic or semi-automatic mounting on PCB

Introduction:

STMicroelectronics has developed micro battery products (EnFilm™) with reduced thickness and weight.

This document provides recommendations for automatic mounting of the EnFilm™ micro battery EFL700A39 on printed circuit boards (PCB) for evaluation as well as for production purposes.

The mounting process uses mono-component polymers with low curing temperatures compatible with the use of EnFilm™ micro batteries.

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1 Handling precautions

1.1 Temperature

The maximum operating temperature of the EnFilm™ is 60 °C. Standard board mounting techniques (example: high temperature soldering) are not compatible with these products and should not be used.

1.2 Mounting conditions

1. Due to its light weight, the EnFilm™ can easily slide out of its initial position during the mounting process. It is recommended to apply a weight on the EnFilm™ to hold it down during mounting and curing (around 20 g on each EnFilm™).
2. If possible (depending on PCB design and the number of layers), it is recommended to embed the EnFilm™ in the printed circuit board and substrate to avoid movement of the EnFilm™ during glue curing.
3. For small Engineering runs, a light and removable adhesive tape can be used to hold down the EnFilm™ during mounting and curing - a 'post it® note' adhesive type will work fine and can easily be removed after glue curing.

1.3 Silver filled conductive glue properties

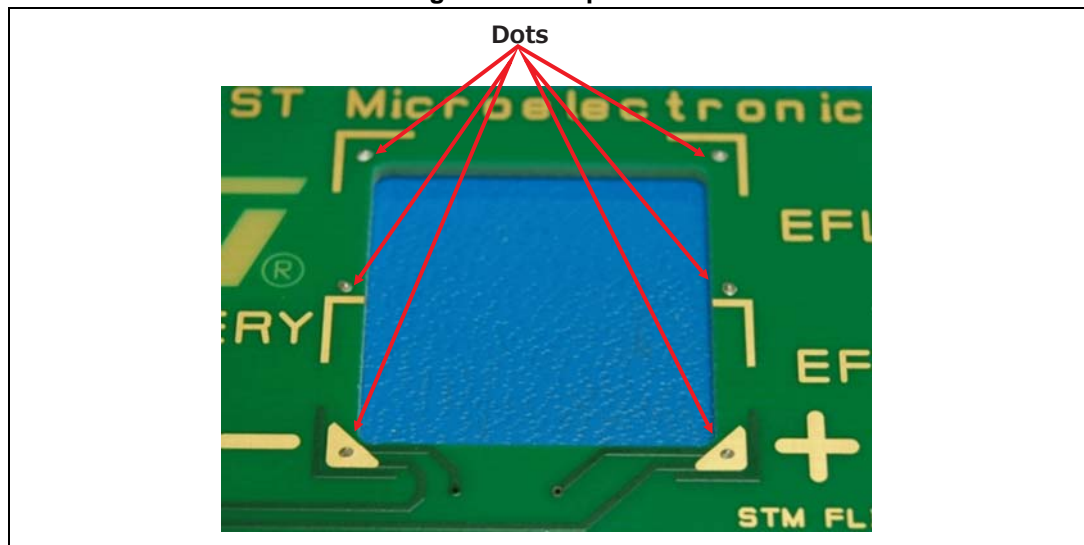
1. A silver filled glue has good adhesion properties on various different substrates.
2. Uncured and non-polymerized silver filled glue will have weak adhesion strength between the substrate and the EnFilm™.
3. Unlike normal solder paste, no shrinkage phenomenon occurs during the curing of silver filled glues.

1.4 Glue attachment

The EnFilm™ has to be attached on the substrate with at least one dot of conductive glue on each pad.

To enhance component adhesion and mechanical stability additional dots on two other corners can be done.

Figure 1. Multiple dots



1.5 Electrostatic

Depending on the working environment and the type of support used, the dispensing quality of the glue can be affected by the presence of static electricity to the extent of generating glue splatters. It is recommended to take precautions to dissipate the static charges in order to prevent these glue splatters which can result to potential short circuits. The risk of generating glue splatters increases when the glue has been installed in a machine for several hours in an uncontrolled environment due to the formation of tails in the dispensing needle.

1.6 Preparation

Prepare the board contact surfaces by cleaning with Iso Propyl Alcohol (IPA) before mounting the EnFilm™.

1.7 Important

It is mandatory to avoid short-circuiting the pads of the EnFilm™ at any time.

Thus, the EnFilm™ contacts must not be placed on the same conductive surface.

Respect the polarities of the connections: EnFilm™ interconnection positive (+) pad with printed circuit board (PCB) positive (+) pad.

2 Glue dispensing guidelines and recommended practice

2.1 Storage and use of silver filled conductive glue

- The silver filled glues are perishable material and needs to be stored with care. The shipping container must be designed to protect the material in transit for up to 2 days. Use carbon ice to store the material at minus 40 °C (or other temperature versus TDS supplier).
- Immediately upon receipt, unpack the shipping container and freeze the material at minus 40 °C (or other temperature versus TDS supplier). Syringes containing silver filled glues must be stored vertically with their caps on.
- Glue shelf life at minus 40 °C depends on the glue material; please check the shelf life information with the supplier.
- It is not recommend to refreeze used material and to redistribute or repack glues pack in syringes because syringes are packaged by special techniques to ensure no air bubbles are trapped inside the syringe; it is instead recommend to choose smaller syringe size like 5 cc or 3 cc.

For equipment set up purposes (and some engineering runs), thawed materials staying at room temperature of less than 4 hours (including thawing time) can be refrozen 3 times maximum. This refrozen material must not be used for production runs due to potential reliability and quality risk (mechanical and electrical contact reliability can be downgraded).

For production runs, silver filled conductive glues can usually be used during 2 hours without the need of adjusting and correcting input parameters (pressure, time). Beyond 2 hours, it is recommended to check and adjust input parameters to assure the same dispensing quantity.

2.2 Receiving inspection and preparation for use

Silver conductive glues should be removed from cold storage and thawed at room temperature.

Immediately, do not remove back end cap from the syringe, remove front end cap and install needle according to [Table 1](#).

The required thawing time will be dependent upon the syringe size; a good indication that the material is ready is when condensation on the syringe disappears. Typical time is from 30 minutes to 1 hour for 5 cc syringe size. Thawing must be done with the syringes standing vertically.

Never use heat to accelerate the thawing. Do not place syringes near any heat source (ovens, furnaces) or immerse in hot and warm water. These practices will adversely affect performance.

Syringes should be inspected prior to use; any evidence of separation (material, plunger), large air voids or discoloration or dark aspect are indications of thermal excursions rendering the syringe unfit for use.

After the syringe has reached ambient room temperature, it is ready for use:

- Remove the back end cap from the syringe.

For setting up the dispensing quantity of a dispenser, it is recommended to use a scale (0.1 mg) function rather than using the time function of the time-pressure dispenser.

Due to the very small deposited quantity, it is necessary first to weigh a minimum of 30 dots to calculate the weight average. This value must be kept in reference.

Various silver filled conductive adhesive have been evaluated, please find here below the main dispensing parameters used (refer to [Table 1](#)).

Table 1. Input parameters

Gauge	Inside diameter		Color code	Length	Dispense time (ms)	Pressure (Bars)	Total weight 30 deposits	Weight average	Silver filled conductive adhesive
	Inch	mm							
25	0.010	0.25	Red	6.35	150 to 300	2	4.1 mg	0.14 mg	QMI 516 IE Henkel
					600 to 800	1	2.2 mg	0.07 mg	PU 1000 Polytec
					160	2	4.1 mg	0.14 mg	ACE 40810 Protavic

2.3 Preparation of dispensing equipment

2.3.1 Input parameters

- Pressure
- Dispense time in milliseconds: ms.
- Internal diameter of needle

2.3.2 Relation between time pressure and deposit quantity

A high pressure with a short time increases flow (debit), whereas low pressure during a long time increases precision.

The adjustment of the pressure should always be done in an increasing step. If a lower pressure is needed, it must be reduced well below the desired pressure and then increased to the desired level.

2.3.3 Needle choice

It is recommended using 6.3 mm needle length instead of a 12.7 mm needle length. It is not recommended using conic needles due to the low viscosity of glue materials.

2.3.4 For semi-automatic mode

Manual operation with time pressure dispenser:

- The needle must be inclined at an angle between 45° to 80°.
- The needle must be in contact with the surface during dispensing.
- Do not move the needle while releasing the glue.
- Lift up the needle perpendicularly after dispensing the glue.

Figure 2. Step1: Contact

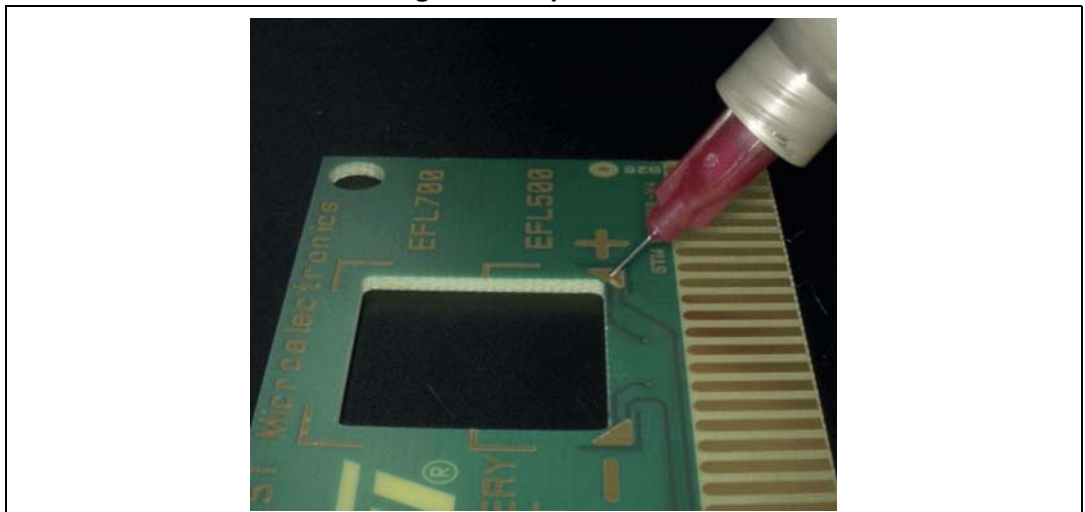


Figure 3. Step2: Dispense

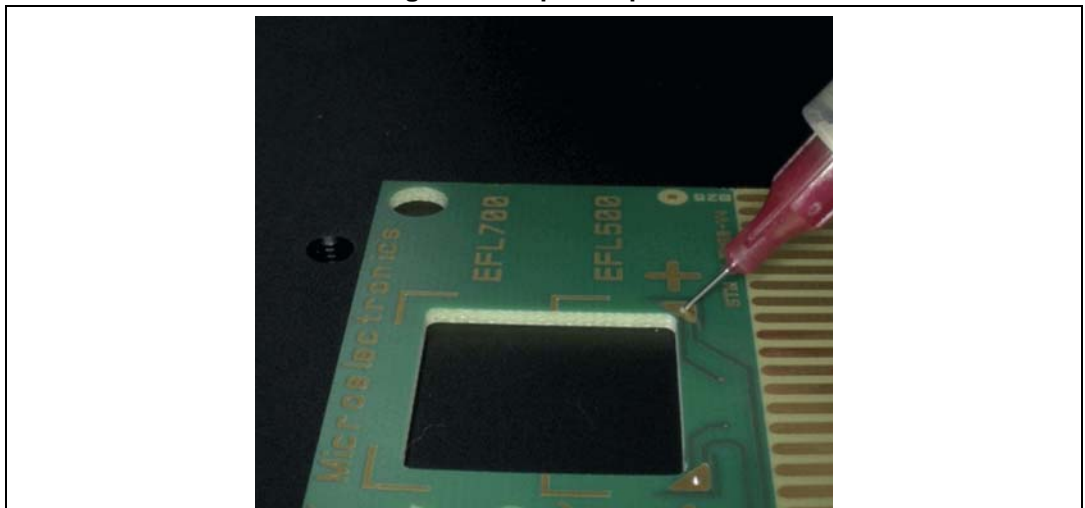


Figure 4. Step3: Set back

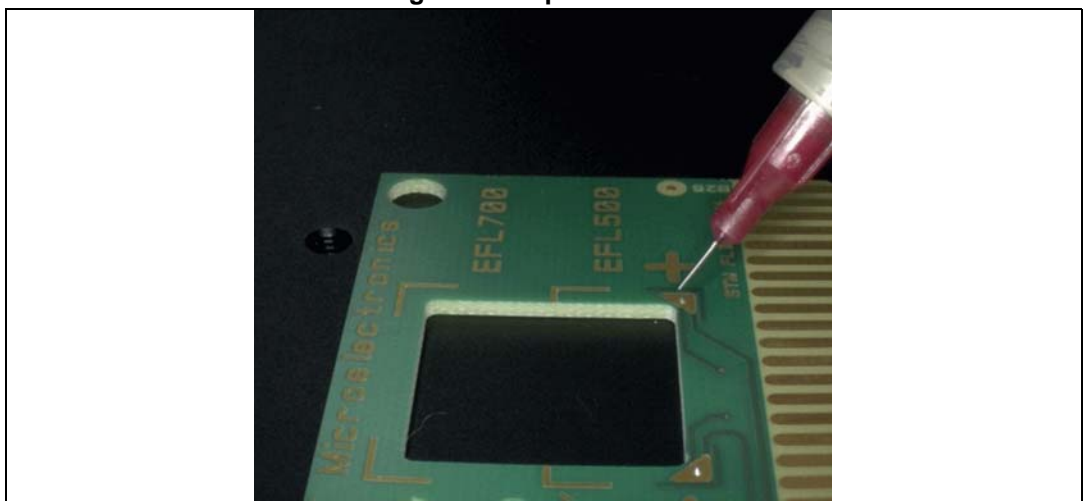


Figure 5. EnFilm deposit



2.3.5 For automatic mode

If needle is positioned vertically, a stand-off value between 0.05 to 0.2 mm with a typical value of 0.15 mm is recommended.

Figure 6. Automatic dispense valve

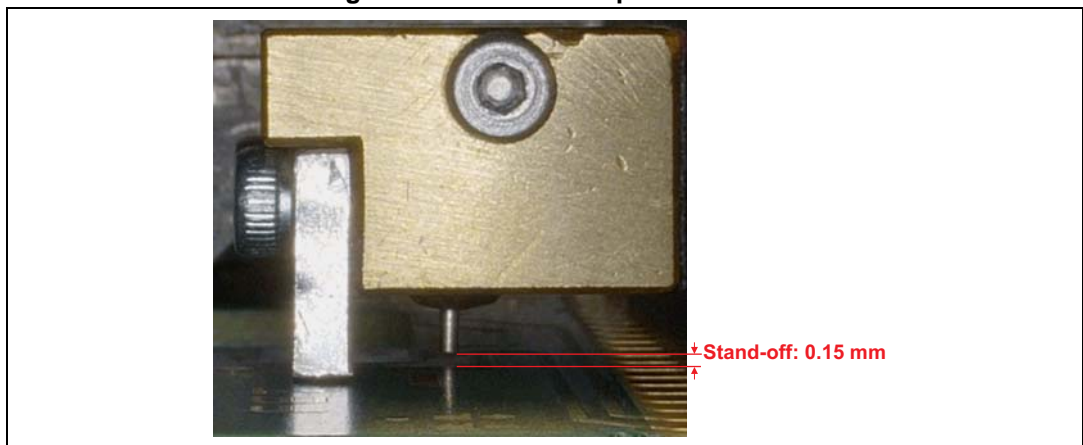
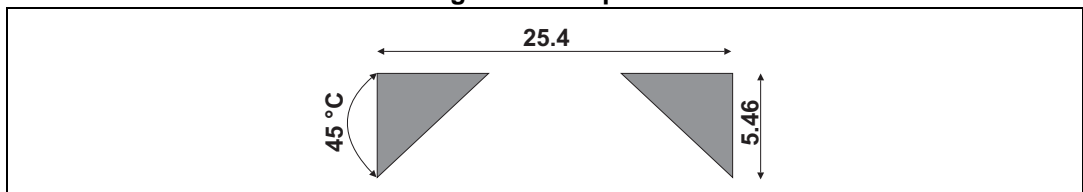


Table 2. Recommended material (adhesive) for low temperature interconnection and thermal profiles

Supplier	Reference	Temperature	Time
Henkel	QMI 516 IE	60 °C	90 mn
Polytec	PU 1000	25 °C	60 mn
Protavic	ACE 40810	60 °C	900 mn

Figure 7. Footprint



3 Revision history

Table 3. Document revision history

Date	Revision	Changes
27-Sep-2013	1	Initial release.

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