

*Pb-FREE SOLDER PAST TLF-SERIES*  
***LFSOLDER TLF-204-111 M***

LFSOLDER TLF-204-111M is Pb-free solder paste using Pb-free, spherical solder powder and special flux. As the paste contains no Pb, it will largely contribute to the protection of global environment. Furthermore, excellent reliability can be obtained with the flux without washing.

### 1. Outstanding Features

- 1) Pb-free (Sn/Ag/Cu series) solder alloy is used.
- 2) Stable printability is obtained with little change in viscosity during continuous printing.
- 3) It is excellent effective for void decrement.
- 4) Chip-side ball seldom occur.
- 5) In preheating, the possibility of slump is very rare.
- 6) Excellent solderability can be attained for a high peak temperature.
- 7) Excellent solderability can be attained at small pattern of 0.5mm pitch CSP.

### 2. Characteristics

Characteristics of LFSOLDER TLF-204-111M is shown in Table 1 and Table 2.

Table 1 - Characteristics of LFSOLDER TLF-204-111M

Items	Characteristics	Test methods
Alloy composition	Sn 96.5 / Ag 3.0 / Cu 0.5	JIS Z 3282(1999)
Melting point	216 ~ 220	According to DSC measurement
Particle size of solder powder	25 ~ 38 $\mu$ m	According to laser diffraction method
Shape of solder powder	Spherical	Annex 1 to JIS Z 3284(1994)
Flux content	10.9%	JIS Z 3284 (1994)
Chlorine content	0.0%	JIS Z 3197 (1986) 6.5
Viscosity	220 Pa·s	Annex 6 to JIS Z 3284(1994) Viscometer, type PCU, manufactured by Malcom, at 25

Result of examination in flux.

Table 2 - Characteristics of LFSOLDER TLF-204-111M

Items	Characteristics	Test methods
Water solution resistance test	More than $5 \times 10^4$ $\Omega \cdot \text{cm}$	JIS Z 3197 (1999)
Insulation resistance test	More than $1 \times 10^9$	Board type 2, Annex 3 to JIS Z 3284(1994)
Slump test	Less than 0.2mm	Print the paste on ceramics board and heat for 60 seconds at 150 . Measure sagging width from before and after heating. STD-092b
Solder ball test	Solder balls seldom occur.	Print the paste on ceramics board. After melting and heating, observe with a microscope of 50 times. STD-009e
Solder spread test	More than 76%	JIS Z 3197 (1986) 6.10
Copper plate corrosion test	No corrosion	JIS Z 3197 (1986) 6.6.1
Tackiness test of residue	Pass	Annex 12 to JIS Z 3284(1994)

Test method of our company

### 3. Quality Guarantee Period

The quality guarantee period shall be 6 months after manufacture if the products are stored in sealed containers at temperature below 10 .

### 4. Product Packaging Units

Table 3 - Packaging units of products

Containers	Packaging units
Wide-mouthed polyethylene	500g, 1kg

## 5. Cautions for Use

### (1) Stirring of Solder Paste

#### (1.1) In the Case of Manual Stirring

Thoroughly stir solder paste stored in refrigerators with spatula or the like after returning to room temperature without fail (It takes about three, four hours if left standing at 25 °C). If the seal is broken the paste will absorb moisture to cause solder balls.

#### (1.2) In the Case of Using Automatic Stirring Apparatus

An automatic stirring apparatus is utilized at times to use solder paste stored in refrigerators by returning it to room temperature in a short period of time. Even if such automatic stirring apparatus is used, no change will occur to the characteristics of the solder paste. With the lapse of stirring time, the temperature of solder paste will rise as shown in Fig.1: If the stirring time is lengthened, it will lead to the possibility of throwing solder paste with temperature higher than the working environment onto boards and thus causing bleeding during printing. So, be careful. Conduct adequate test beforehand since the stirring time will vary according to the specifications of apparatus, ambient temperature, and other conditions. (In case of using solder softener SS-1, appropriate stirring time will be about 20 minutes).

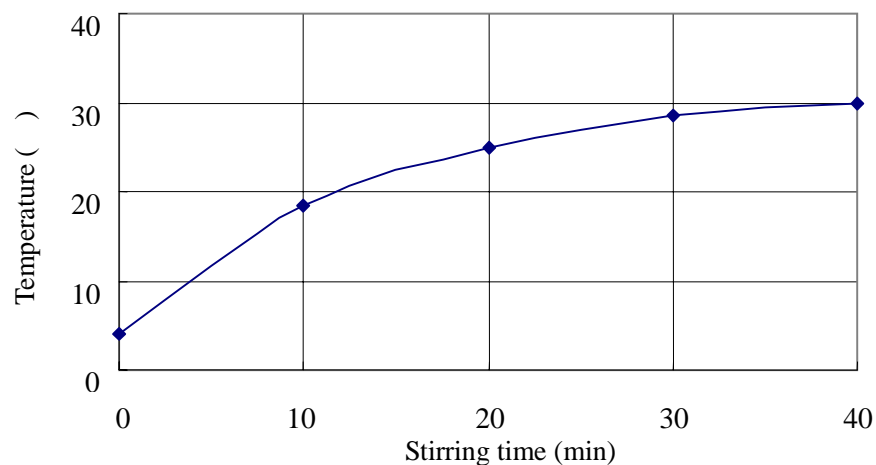


Fig.1 - Stirring time and temperature rise of solder paste when using automatic stirring apparatus  
Apparatus: Solder softener SS-1 manufactured by Malcom

## (2) Conditions for Printing

Printing conditions recommended for LFSOLDER TLF-204-111M is shown in Table 4:

Table 4 - Printing conditions recommended

Items	Setting range
Metal mask	Laser machined, manufactured by additive (or those having flat opening side)
Squeegee	Metal, Urethane (hardness 80 to 90 degrees)
Squeegee angle	50 to 70 degrees
Squeegee speed	20 ~ 60mm/s
Printing pressure	100 ~ 200kPa

## (3) Parts Mounting Time

Mount the parts within 12 hours after printing the solder paste. If left standing for a long time after printing, the surface of solder paste will dry up to cause mount error of parts.

## (4) Reflow Conditions

Recommended temperature profile of air reflow is shown in Fig.2.

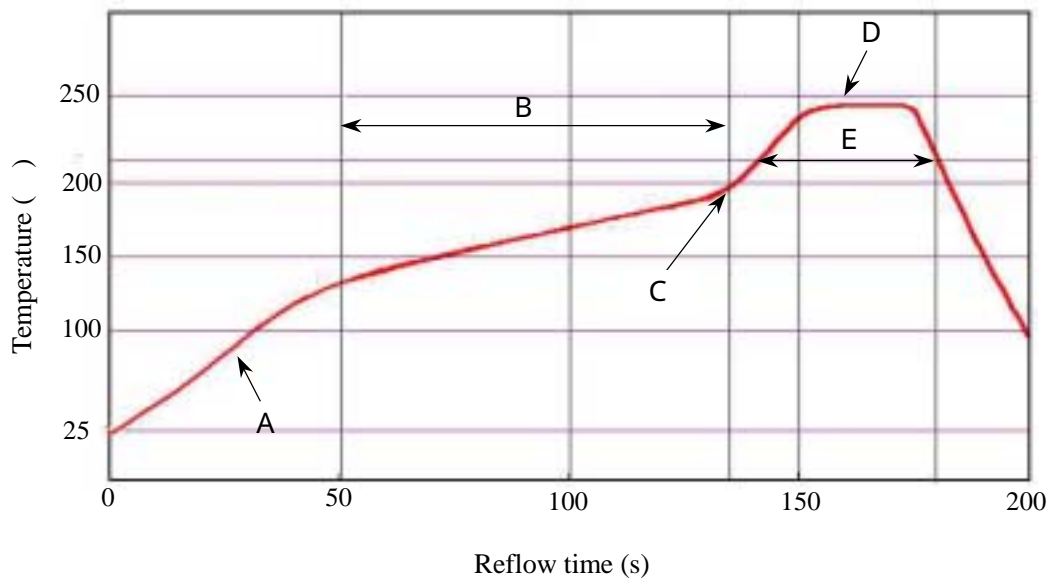


Fig.2 - Temperature profile of air reflow

## [Precautions]

### 1) Preheat

- Set the temperature rising speed A at a rate of 2~4 °/s. Careful about rapid temperature rise in preheat zone as it may cause excessive slumping of the solder paste .
- Appropriate preheat time B will be from 60 to 120 seconds. If the preheat is insufficient, rather large solder balls tend to be generated. Conversely, if performed excessively, fine balls and large balls will generate in clusters at a time.
- Appropriate preheat ending temperature C will be from 180 to 200 °C. If the temperature is too low, non-melting tends to be caused in the area with large heat capacity after reflow.

### 2) Heating

- Careful about sudden rise in temperature as it may worsen the slump of solder paste.
- Set the peak temperature D in the range from 230 to 240 °C .
- Adjust the melting time that the time over 220 °C, E, will be from 20 to 40 seconds.

### 3) Cooling

- Careful about slow cooling as it may cause the positional shift of parts and decline in joining strength at times.

Perform adequate test in advance as the reflow temperature profile will vary according to the conditions of parts and boards, and the specifications of the reflow furnace.

## 6. Cautions from Standpoints of Safety and Sanitation

- 1) Physiological interaction varies by individuals. As a prudent policy, therefore, care, should be exercised not to inhale gas of fume of solvent emitted during operations and not to have your skin exposed (especially mucous membrane and other parts vulnerable to stimuli) for a long time.
- 2) This paste is contains the organic solvent , but it is no flammable.
- 3) If the paste sticks to the skin, wipe it off with ethanol and the like, and wash thoroughly with soapy water.

\*The flux ingredients in the paste contain nonionic halogen based activator.

\*The physical chemistry-character among written contents etc. is not a guarantee value. The evaluation of danger and noxiousness is based and makes material, information, and the data, etc. which can be acquired now. However, it is not because all material was covered and note handling enough, please. As for notes, it is the one intended for usual handling. Special handling is not assumed. Please observe the restriction of related various regulations, and use after executing suitable safety measures for the usage. Before using it in your company, it is related with process conditions or reliability. Please conduct sufficient examination surely performed.

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