

Pb-free solder paste for fine parts LFSOLDER TLF-204G-HFW

LFSOLDER TLF-204G-HFW is a solder paste corresponding to N₂ reflow, consisting of high-reliability flux and Pb-free solder alloy fine powder with developed for printing fine parts. TLF-204G-HFW has stable printability for 0201-chip size pattern, enough tackiness to prevent parts mount error during mounting and excellent defluxibility of flux residue after reflow with semi-water-based cleaner.

1. Features

- 1) A minute solder powder of 15μm or less is used.
- 2) A stable printability for 0201-chip size pattern is possible.
- 3) An excellent wettability is attained at fine patterns.
- 4) Halogen-free flux is used.
- 5) Flux residue after reflow can be removed by semi-water based cleaning solvents.

2. Characteristics

Characteristics of LFSOLDER TLF-204G-HFW is shown in Table 1.

Table 1 Characteristics of LFSOLDER TLF-204G-HFW

Items	Characteristics	Test methods
Alloy composition	Sn96.5/Ag3/Cu0.5 (Symbol:204)	According to ICP measurement
Melting point	216~220°C	According to DSC measurement
Particle size of solder powder	5~15μm	According to laser diffraction method
Flux content	11.3%	JIS Z 3284 (2012)
Chlorine content*	0.0%	JIS Z 3197 (2012)
Viscosity	190 Pa·s	Annex 6 to JIS Z 3284 (1994) Viscometer, type PCU, manufactured by Malcom, at 25°C

(The written characteristics is not a guarantee value.)

3. Quality Guarantee Period

The quality guarantee period is 180 days after manufacture if stored in sealed containers at temperature below 10°C.

4. Packing Units of Products

Table 2 Packaging units of products

Containers	Packaging units
150cc plastic container	500g

5. Detailed characteristics

5-1. Physical properties

(1) Appearance of solder powder

Fig.1 shows the appearance of the solder powder taken by SEM photography.

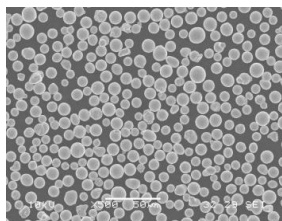


Fig.1 SEM photograph of solder powder

(2) Particle size distribution of solder powder

Table 3 Particle size of solder powder

Items	Particle size
Mean	10μm
Volume frequency	Less than 5μm less than 10 %
	15-25μm less than 10%

(Measuring equipment: LS-13-320 as manufactured by Coulter)

(3) Viscosity Characteristics

Table 4 shows the thixotropic index of viscosity as measured in accordance with JIS Z 3284 (1994).

Table 4 Thixotropy index of viscosity

Item	Measured values
Thixotropy index	0.51

(4) Temperature dependency

The relationship between temperature and viscosity is shown in Fig.2.

The viscosity changes with the temperature and as a result the printability. Therefore it is important to control the temperature of the working environment.

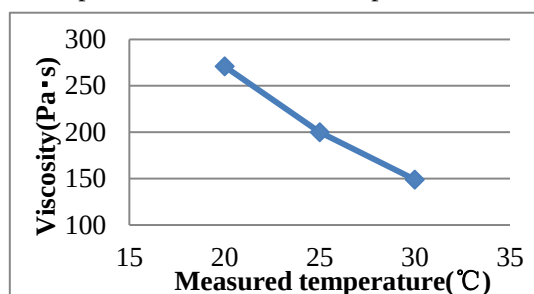


Table 5 Relationship between temperature and viscosity

Measured temperature(°C)	20	25	30
Viscosity (Pa·s)	271	200	149

Fig.2 Relationship between temperature and viscosity

(Viscometer: PCU manufactured by Malcom)

5. Reliability

(1) Washability

The result of washability under chip parts Fig.3 shows.

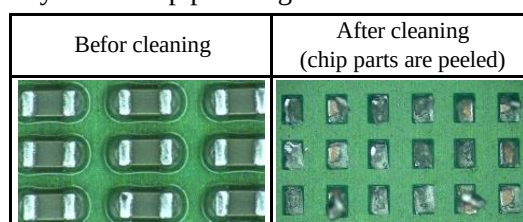


Fig.3 Washability (PINEALPA ST-180K)

Cleaning temp : 70 °C, US, Cleaning time : 10 min

Rince temp : 20 °C, Rince 2 time : 10 min

Blower temp : 80 °C, Blower time : 10 min

※Perform adequate test in advance as the washability will vary according to the conditions of boards and creaner.

(2) Insulation resistance test and Migration test

Shown in Table 3 and Table 4 is the result of the chabge in the values of insulation resistance and migration test measured in accordance with JIS Z 3284 (1994).

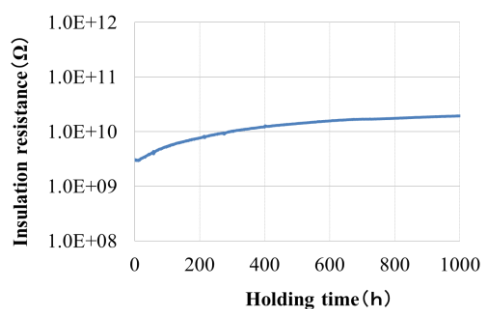


Fig.4 Change in insulation resistance

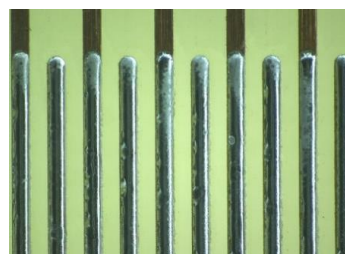


Fig.5 Migration test

(3) Water solution resistance test

Table 6 shows the result of water solution resistance test as measured in accordance with JIS Z 3197.

Table 6 water solution resistance test

Items	Measured values
Insulation resistance	$1.2 \times 10^3 \Omega\text{cm}$

5-3. Printability

(1) Appropriate printing conditions

Printing conditions recommended for LFSOLDER TLF-204G-HFW is shown in Table 7.

Table 7 Open type squeegee printing conditions recommended (Panasonic SP-70)

Items	Setting range
Metal mask	Manufactured by additive (or those having flat opening side)
	Thickness 40~50 μm
	Aspect ratio 1.7~2.2
Squeegee	Metal
Squeegee speed	5~50mm/s
Separation speed	1~10mm/s
Printing pressure	$20 \sim 40 \times 10^{-2} \text{ N}$
Environment	23~27°C

※Perform adequate test in advance as the printing will vary according to the conditions of printer and boards and metal mask.

5-4. Solderability

The result of Solderability Fig.6 shows.



Fig.6 Meltability

Reflow Conditions : Recommended temperature profile

5-5. Shelf life

The change in viscosity during storage at temperature of 10 °C is shown in Fig.7.

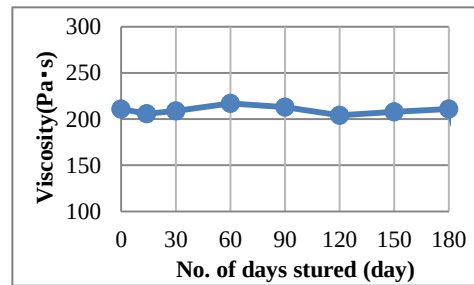


Fig.7 Change in viscosity during storage (10°C)

Viscometer: PCU manufactured by Malcom (25 °C)

5-6. Reflow Conditions

Recommended temperature profile of N₂ reflow is shown in Fig.8.

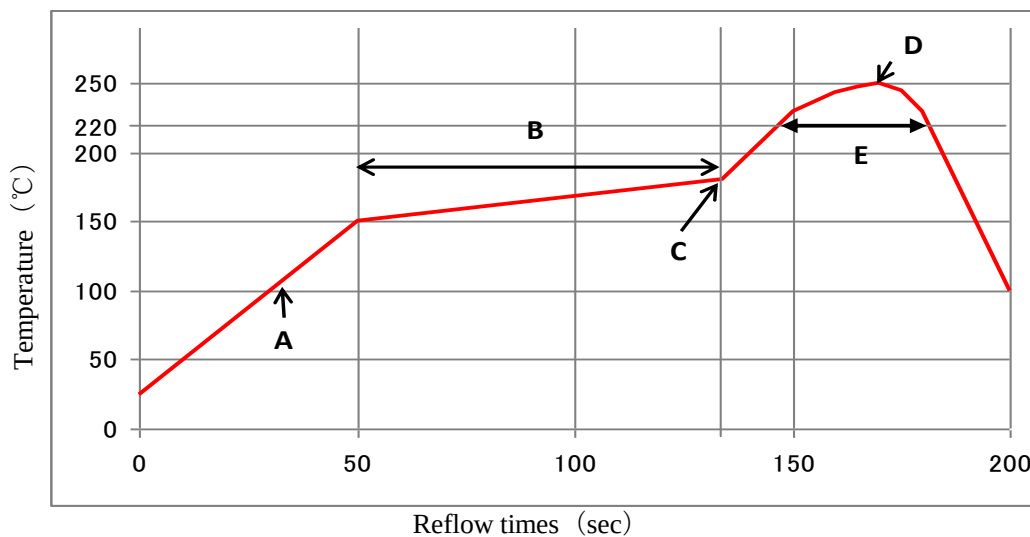


Fig.8 Recommended temperature profile

O₂ concentration : Less than 1000ppm

[Precautions]

1) Preheat

- Set the temperature rising speed A at a rate of 2~4°C /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 150 to 180°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 of 235 to 250°C.
- Adjust the melting time that the time over 220°C, E will be from 30 to 60 seconds.

3) Cooling

- Careful about slow cooling as it may cause decline in joining strength at times.

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

6. Cautions from Standpoints of Safety and Sanitation

- 1) Prior to use, return to room temperature without fail (It takes three to four hours at 25°C).
- 2) The flux residue of corrosive so that thorough cleaning and removal is necessary. Clean it with the warm semi-water based cleaning solvents of about 70°C. Since the washability varies according to boards and cleaning conditions, determine them after conducting thorough test in advance.

Waste water treatment is required for water used for cleaning. in case of using much solder paste, it is necessary to dispose of waste cleaning water so as to meet local regulation for environmental protection (COD and BOD).

- 3) If the paste sticks to the skin, wipe it off with ethanol and the like, and wash thoroughly with soapy water.

*Please refer to the SDS before you use this solder paste.

*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 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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