MULTICORE

Technical Data Sheet

# HF 2W

June 2022

## PRODUCT DESCRIPTION

**HF 2W** provides the following product characteristics:

| | |
|---|---|
| **Technology** | Solder paste |
| **Application** | Halogen-free, Water washable flux, Pb-based soldering |

**HF 2W** shows excellent solderability when reflowed in both air and nitrogen across a wide range of challenging surface finishes including OSP-Cu, ENIG and Silver.

This material is available with standard tin lead Sn63 eutectic alloy and HARIMA proprietary anti-tombstoning 63S4 alloy.

## FEATURES AND BENEFITS

- Water washable, tin-lead solder paste
- Halogen-free flux passes IPC-TM-650 2.3.34/EN14582, flux class '0', J-STD004B ORM0
- Suitable for fine pitch, high speed printing
- Excellent resistance to hot slump @ 150°C
- Good humidity resistance to solder balling
- Excellent solderability in air
- Available with anti-tombstoning alloy technology for improved resistance to tombstone defects
- Residues designed for easy removal when cleaned with water
- Residues designed for easy removal when cleaned with deionized water

## TYPICAL PROPERTIES

**Solder Powder:**

The solder powders of **HF 2W** solder pastes are produced by atomizing alloys conforming to the purity requirements of ANSI/J- STD-006 and EN 29453. The anti-tombstoning alloy 63S4 offers an advantage where tombstoning is a particular process problem. 63S4 is a blend of different melting point alloys with a special mix of solder powder particle sizes. This modification extends the melting range of the alloy reducing the probability that one solder deposit at a component termination can fully reflow before the other.

Careful control of production processes ensure that the solder powder is at least 97% spherical (aspect ratio <1.5) and contains less than a minimum level of contaminants that would adversely affect solder paste performance. A typical maximum oxide contamination level of 80 ppm (expressed as oxygen in the solder) is regularly achieved.

**Particle Size Distribution (PSD)** ***(J-STD 005A)***

| Harima Powder Description | Powder Particle Size Distribution | IPC EQUIVALENT |
|---|---|---|
| T3 | 45-20 µm | Type 3 |
| ACP | 45-15 µm | (N/A) |

**Solder Alloy** ***(J-STD 006)***

| Harima Code | Alloy | Melting Point,ºC |
|---|---|---|
| Sn63 | Sn63Pb37 | 183 |
| 63S4 | Sn62.8Pb36.8Ag0.4 | 179 to 183 |

***Based on T3 powder***

**Solder Paste Typical Properties**

| | |
|---|---|
| Alloy | Sn63 |
| Metal Content, % | 90.5 |
| Application Type | Printing |
| Brookfield Viscosity @ 25ºC, mPa.s (cP)<br>Spindle TF, Speed 5 rpm, 2 minutes | 1,000,000 |
| Malcom Viscosity, 25ºC, 10 rpm, Pa.s | 225 |
| Thixotropic Index (Ti)<br>Ti = log (1.8/18 $s^{-1}$ ) | 0.55 |
| IPC Slump , mm<br>*25°C, 10 minutes*<br>0.33 x 2.03 mm pads<br>0.63 x 2.03 mm pads | <br><br>0.10<br>0.33 |
| IPC Slump , mm<br>*150°C, 10 minutes*<br>0.33 x 2.03 mm pads<br>0.63 x 2.03 mm pads | <br><br>0.15<br>0.33 |

***Based on HARIMA Proprietary Powder***

**Solder Paste Typical Properties**

| | |
|---|---|
| Alloy | 63S4 |
| Metal Content, % | 90.5 |
| Application Type | Printing |
| Brookfield Viscosity @ 25ºC, mPa.s (cP)<br>Spindle TF, Speed 5 rpm, 2 minutes | 840,000 |
| Malcom Viscosity, 10 rpm, Pa.s | 225 |
| Thixotropic Index (Ti)<br>Ti = log (1.8/18 $s^{-1}$) | 0.5 |
| IPC Slump , mm<br>*25°C, 10 minutes*<br>0.33 x 2.03 mm pads<br>0.63 x 2.03 mm pads | <br><br>0.10<br>0.33 |
| IPC Slump , mm<br>*150°C, 10 minutes*<br>0.33 x 2.03 mm pads<br>0.63 x 2.03 mm pads | <br><br>0.15<br>0.33 |

## DIRECTIONS FOR USE

**Application:**

1. **HF 2W** is designed for high volume stencil printing applications at speeds up to 150 $mm/sec^{-1}$ (6"/s) using typical stencil and metal squeegees.
2. Sufficient pressure should be applied to achieve a clean wipe of the stencil topside surface.
3. Under laboratory conditions acceptable print quality on 0.8 mm ball devices and 0.4 mm QFP patterns have been achieved after printer abandon times of 2 hours without requiring a knead cycle.

NOT FOR PRODUCT SPECIFICATIONS

THE TECHNICAL INFORMATION CONTAINED HEREIN IS INTENDED FOR REFERENCE YOUR NEAREST HARIMA LOCATION FOR ASSISTANCE AND RECOMMENDATIONS ON SPECIFICATIONS FOR THIS PRODUCT.

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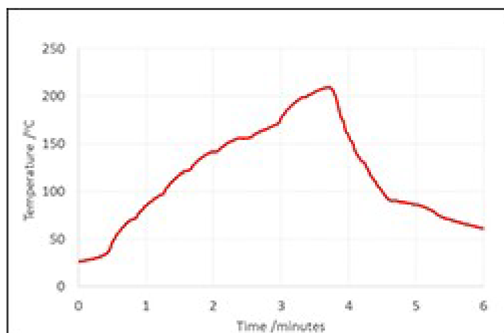
**Reflow:**
**HF 2W** has been formulated for reflow in air over a wide range of temperature profiles.

Reflow has been assessed using a typical convection reflow oven. Optimal aerobic reflow can be achieved by ramping to a peak temperature of 195 to 225ºC at 0.8 to 1.2ºC/second and with a soak above the reflow temperature (183ºC) for 15 to 60 seconds.

An example profile that has shown good performance for reflow and subsequent cleaning is presented below. Reflow soldering can also be carried out in a nitrogen atmosphere. Other profiles may also give good results, depending on board design factors.

For more information on the appropriate reflow profile contact your nearest HARIMA location.




**Cleaning:**
The post-soldering residues of **HF 2W** must be removed. Residues are designed to be removed from assemblies in an aqueous cleaner without the use of rinse aids and/or saponifiers, typically using water at 40 to 60ºC with deionized water for the final rinse. Cleaning can be performed using spray in air, spray under immersion or ultrasonic cleaning methods.

## RELIABILITY PROPERTIES

**Solder Paste Medium:**
**HF 2W** medium contains a stable water-washable resin system and slow evaporating solvents. This formulation has been tested to the requirements of ANSI/J-STD-004B and has the IPC flux classification ORM0.

| | | |
|---|---|---|
| Copper Mirror | J-STD004B (2.3.32D) | Pass |
| Corrosion | IPC TM-650-2.6.15c | Pass |
| Halogen Content | EN 14582, O2 Bomb Test | Pass |
| SIR (Boards cleaned same day as reflow) | IPC TM-650-2.6.3.3 | Pass (cleaned) |
| SIR (Cleaned after delay of 1 week) | IPC TM-650-2.6.3.3 | Pass (cleaned) |
| SIR (5V/200 µm spacing) | IPC TM-650 2.6.3.7 | Pass (cleaned) |
| Electromigration (ECM) (When cleaned) | IPC TM-650-2.6.14.1 | Pass (cleaned) |
| Flux Activity Classification | J-STD004B, Dec 2008 | ORM0 |

## DATA RANGES

The data contained herein may be reported as a typical value and/or a range. Values are based on actual test data and are verified on a periodic basis.

**Not for Product Specifications**
The technical information contained herein is intended for reference only. Please contact your nearest HARIMA location for assistance and recommendations on specifications for this product.

## HANDLING INSTRUCTIONS

**Storage:**
It is recommended that **HF 2W** solder paste is stored under refrigerated conditions (typically 0 to10ºC/ 32 to 50ºF).

**Before Use:**
On removal from refrigerated storage, **HF 2W** solder paste should be allowed to equilibrate to room temperature for at least four hours before opening and use. Failure to do this may result in condensation forming on the paste which may adversely affect the performance during printing and/or reflow.

**Work Environment:**
**HF 2W** solder paste performs best when used in a controlled environment. Maintaining an ambient temperature of between 20 to 25ºC (68 to 77ºF), at a relative humidity of 30 to 55% RH will ensure consistent performance and maximum life of the paste.

**HF 2W** solder pastes show good short-term stability at room temperature. Paste can be kept in a sealed jar at room temperature during use for at least 14 days.

**Stirring:**
To restore **HF 2W** solder paste to its specified rheology, it can be stirred using a non-metallic or round-edged spatula for 1 to 2 minutes before application to the printer. Solder paste dispensed from a cartridge does not require stirring as the rheology is restored during the dispensing and printing (knead) process.

**HF 2W** solder paste packed in jars may show some separation on storage. If this is occurs, the paste can be restored by stirring until it appears homogeneous.

For print and reflow guidelines refer to local procedures and/or the Technical Data Sheet or Engineer's Manual for **HF 2W** solder paste.

**Thinning:**
The addition of any additional material to **HF 2W** solder paste is not recommended.

**Paste Life:**
As a general rule, **HF 2W** solder paste can be used on the stencil for up to 8 hours at 55% RH or below. It is preferable to store used paste in a separate container. Do not mix fresh paste with used paste unless adding more to the printer itself.

**Disposal:**
Used solder paste should be stored in a sealed container and disposed of in accordance with local authority requirements, refer to the Safety Data Sheet (SDS).

**Cleaning:**
For stencil cleaning, **HF 2W** solder paste can be cleaned using typical solvent cleaners used for solder paste. As **HF 2W** flux is water-soluble, it is also acceptable to clean stencils with water. It is recommended that all equipment is cleaned and dried thoroughly immediately after use. For best results, scrubbing in the solution by either ultrasonic action or brush will ensure all solder particles are completely removed.

## SHIPPING

**HF 2W** solder paste is packed in standard cases, cartridges are packed and shipped tip-down to minimize the risk of separation.

**Shipping Method:**
**HF 2W** solder paste is shipped in conventional boxes with cold packs to maintain cool conditions, typically 2 to 8ºC (36 to 46ºF) during transit.

**RECEIVING**

**Time to transfer to controlled storage:**

On receipt, the paste should be transferred to a cool area for storage in accordance with the storage conditions recommended on the Technical Data Sheet (0 to 10ºC/ 32 to 50ºF).

**Conversions**

(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

**Disclaimer**

**Note:**

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. HARIMA is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product. Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.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