

## APPLICATION NOTE

# Solder Reflow Information

Assembly of a surface mount device depends on many process material and equipment parameters. Two of the most common processes used are infrared (IR) and convection reflow. Skyworks products come in three different termination finishes, depending on the package.

- Au (Cu/Ni/Au) for MCM and LGA (laminate-based) packages
- SnPb (Sn 70 to 90%, Pb 30 to 10%, 300 to 1,000 micro-inches thick) for lead frame-based solder plated products
- Sn (100% 300 to 1,000 micro-inches thick) or Ni/Pd/Au as a lead (Pb)-free replacement for SnPb

This finish is compatible with all commonly used processes. The most common attachment process is the convection reflow process.

The reflow process requires applying solder and flux in the form of a paste to the areas of the substrate or PC board where the surface mount component connections are to be made. The solder and flux are applied to the circuit by screening, stenciling, or dot placement. This paste acts as a temporary adhesive holding the device in place until reflow soldering takes place. Optionally, a chip-bonding epoxy can be used to hold the device in place.

Solder paste manufacturers generally provide a recommended profile for the specific solder being used. The manufacturer's profile or the typical solder reflow profiles table in this document can be used as a starting point for profiling the process.

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*Caution: Please contact your solder paste manufacturer for exact solder profile requirements.*

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When using thermocouples for profiling, it should be noted that the outside edges and corners of an assembly heat up faster than the center, and components of greater thermal mass will heat more slowly than those of lesser thermal mass.

A thermal reflow process profile typically undergoes five transitions:

- 1. Preheat:** Brings the assembly from 25 °C to preheat zone and evaporates solvents from solder paste. A slow ramp-up rate will prevent any damage due to thermal shock. The time and temperature to evaporate the solvents will depend upon the solder paste that is used.
- 2. Flux Activation (Preheat-TL):** Dried solder paste is heated to a temperature in which the flux will react with the oxide and contaminants on the surfaces to be joined. The time and temperature should be long enough to allow the flux to fully clean these surfaces but not too long that the flux may be exhausted before soldering takes place.
- 3. Thermal Equalization (Preheat-TL):** Achieves temperature equalization approximately 20–40 °C below the peak reflow temperature. Time and temperature will depend upon the mass and materials.
- 4. Reflow (TL-TP):** In this stage, the assembly is briefly brought to the temperature sufficient to produce reflow of solder.
- 5. Cool Down:** This is the final stage in the solder process. Gradual cooling should be used. The end result should be as fast as possible without causing thermal shock to the components. Cool down in this manner will produce a finer grain structure in the solder joint, which will yield a more fatigue-resistant solder joint.

# Application Note Solder Reflow Information Skyworks

**Ning-Cheng Lee**



## **Application Note Solder Reflow Information Skyworks:**

**Reflow Soldering Processes** Ning-Cheng Lee, 2002-01-11 Focused on technological innovations in the field of electronics packaging and production this book elucidates the changes in reflow soldering processes its impact on defect mechanisms and accordingly the troubleshooting techniques during these processes in a variety of board types Geared toward electronics manufacturing process engineers design engineers as well as students in process engineering classes Reflow Soldering Processes and Troubleshooting will be a strong contender in the continuing skill development market for manufacturing personnel Written using a very practical hands on approach Reflow Soldering Processes and Troubleshooting provides the means for engineers to increase their understanding of the principles of soldering flux and solder paste technology The author facilitates learning about other essential topics such as area array packages including BGA CSP and FC designs bumping technique assembly and rework process and provides an increased understanding of the reliability failure modes of soldered SMT components With cost effectiveness foremost in mind this book is designed to troubleshoot errors or problems before boards go into the manufacturing process saving time and money on the front end The author's vast expertise and knowledge ensure that coverage of topics is expertly researched written and organized to best meet the needs of manufacturing process engineers students practitioners and anyone with a desire to learn more about reflow soldering processes Comprehensive and indispensable this book will prove a perfect training and reference tool that readers will find invaluable Provides engineers the cutting edge technology in a rapidly changing field Offers in depth coverage of the principles of soldering flux solder paste technology area array packages including BGA CSP and FC designs bumping technique assembly and the rework process

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## **Table of Contents Application Note Solder Reflow Information Skyworks**

1. Understanding the eBook Application Note Solder Reflow Information Skyworks
  - The Rise of Digital Reading Application Note Solder Reflow Information Skyworks
  - Advantages of eBooks Over Traditional Books
2. Identifying Application Note Solder Reflow Information Skyworks
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Application Note Solder Reflow Information Skyworks
  - User-Friendly Interface
4. Exploring eBook Recommendations from Application Note Solder Reflow Information Skyworks
  - Personalized Recommendations
  - Application Note Solder Reflow Information Skyworks User Reviews and Ratings
  - Application Note Solder Reflow Information Skyworks and Bestseller Lists

5. Accessing Application Note Solder Reflow Information Skyworks Free and Paid eBooks
  - Application Note Solder Reflow Information Skyworks Public Domain eBooks
  - Application Note Solder Reflow Information Skyworks eBook Subscription Services
  - Application Note Solder Reflow Information Skyworks Budget-Friendly Options
6. Navigating Application Note Solder Reflow Information Skyworks eBook Formats
  - ePub, PDF, MOBI, and More
  - Application Note Solder Reflow Information Skyworks Compatibility with Devices
  - Application Note Solder Reflow Information Skyworks Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Application Note Solder Reflow Information Skyworks
  - Highlighting and Note-Taking Application Note Solder Reflow Information Skyworks
  - Interactive Elements Application Note Solder Reflow Information Skyworks
8. Staying Engaged with Application Note Solder Reflow Information Skyworks
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Application Note Solder Reflow Information Skyworks
9. Balancing eBooks and Physical Books Application Note Solder Reflow Information Skyworks
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Application Note Solder Reflow Information Skyworks
10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Application Note Solder Reflow Information Skyworks
  - Setting Reading Goals Application Note Solder Reflow Information Skyworks
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Application Note Solder Reflow Information Skyworks
  - Fact-Checking eBook Content of Application Note Solder Reflow Information Skyworks
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

### 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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