

Hand Soldering

Module One: Component Identification

Through Hole Component Identification

Terms and Definitions

- Passive Component Packages
- Axial Devices
 - Resistor
 - Capacitor
 - Diode
 - Rectifier
- Radial Devices
 - Capacitor
 - Single In-Line Packages (SIP)
- Active Component Packages
 - Transistor
 - Dual Inline Package Integrated Circuit (DIP)
 - Flat Pack (IC)

Surface Mount Component Identification

Terms and Definitions

- Passive Component Packages
 - Chip Resistors (Ceramic)
 - Chip Capacitors (Ceramic)
 - MELF (Resistor)
 - MELF (Diode)
 - Tantalum Capacitor
 - Miscellaneous
- Active Component Packages
 - Small Outline Integrated Circuit (SOIC, SOMIC, SOLIC)
 - Plastic Leaded Chip Carrier (PLCC)
 - Leadless Ceramic Chip Carrier (LCCC)
- Quad Flat Pack (QFP) and (PQFP, BQFP, MQFP CERQAD, ETC.)
 - Small Outline Packages (TSOP, VSOP, SSOP)
 - Small Outline Package J Leaded (SOJ)
 - Ball Grid Array and Variations (PBGA, CBGA, etc.)



Module Two: Electro-Static Discharge (ESD)

Terms and Definitions

- Principles of Static Electricity-
 - Nature of Static Electricity - What is ESD
 - Triboelectric Series - How is ESD generated
- Damage Caused by ESD
- Susceptibility of items to ESD
 - ESD Protective Material and Equipment
 - Conductive Protective Material
 - Static-dissipative Protective Material
 - Anti-static Protective Material
 - Storage Containers
 - Handling and Storage of Parts
 - Personnel Ground Straps
 - Personnel Apparel
 - Grounded Work Benches
 - Ionizers/Humidifiers
 - Protected areas

Module Three: Tools & Equipment (Use and Care)

Terms and Definitions

- Cleanliness
- Tool Selection
 - Wire Strippers
 - Holding Devices
 - Bending Tools
 - Clinching Tools
 - Wire and Lead Cutting Tools
 - Heat Source
 - Thermal Shunts/Heat Sinks
 - Magnification Aids
 - Soldering Irons
 - Soldering Iron Tips
 - Holders
 - Wiping Pads

Module Four: Materials

Terms and Definitions

- Solder (J-STD-006)
 - Definition
- Forms (bar, wire, paste, preforms)



- Eutectic Solder
- Flux (J-STD-004)
 - Types
 - Rosin Flux (R, RMA, RA)
 - Water Soluble
 - Low Residue/No-Clean
 - Purpose
 - Definition
 - Cleaning Methods
- Cleaning Agents
- Temporary Maskants
- Conformal Coating
 - Types
 - Definition
- Spacers (Permanent and Temporary)
- Adhesives

Module Five: Preparing to Solder

Terms and Definitions

- Solderability
- Fundamental Requirements for a good solder joint
 - Thermal Requirements
 - Solderability Requirements
- Materials Selection
 - Solder wire diameter
 - When to use external flux
 - Flux - Choosing the right one for the job
 - Liquid
 - Paste
 - Soldering Iron Tip/Temperature Selection
- Thermal mass
 - Temperature selection
 - Solder Wetting
 - Capillary flow
 - Solder flow
 - Flux flow

Module Six: Through Hole Soldering

Terms and Definitions

- Component Preparation
 - Solderability
 - Part markings
 - Lead preparation/forming
 - Insertion
 - Lead cutting



- Soldering
 - Heat bridge
 - Solder feeding
- Inspection (IPC-A-610B)
 - Cause and corrective action
- Cleaning
- Demonstration (Through hole assembly and soldering)

Module Seven: SMT Soldering

Terms and Definitions

- Set-up and Preparation
 - Choosing a tip
 - Selecting a temperature
 - Flux and solder review
- Site and Component Preparation
 - Site preparation techniques
 - Pad crowing (adding solder)
 - Wicking solder (removing excess solder)
 - Pad and part co planarity
 - Tacking the part
- Solder Feeding and Fluxing
 - Adding solder
 - Solder wire
 - Molten solder
 - Adding Flux
 - Liquid flux
 - Paste flux
- Required Solder Joint Attributes
 - Heel fillet, toe fillet, side fillet, pad wetting
- Inspection (IPC-A-610B)
 - Cause and corrective action
- Soldering Demonstration (SMT Soldering)

Section Eight: Localized Cleaning Introduction

- When to clean
- What to clean
- What to clean with
- Proper techniques for localized cleaning
- Section Nine: Basic Rework Techniques
- Rework Vs. Repair
- Solder Wick
- Continuous Vacuum
- Demonstration (Basic Through hole/SMT rework)