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Surface Mount Technology PCB Formats & Hand Wiring & Soldering Surface Mount Devices

Surface Mount Technology – Hand Wiring and Soldering Surface Mount Devices

The techniques can be applied to Surface Mount Technology.

The SMT-C series of boards (MP005895, MP005896, MP005897 and MP005898) are designed for the combined assembly and wiring of Surface Mount Technology with traditional component technology.

The SMT-C boards have specially designed component pads for hand soldering with fan-out leads to solder pads that provide for making connections with Solderable Enamel wire.

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All four boards in the Series have provision and space for piggy-back boards to include additional Surface Mount Devices. Two methods of soldering are available to prototypers with limited resources:

Traditional hand soldering, with lead-free resin cored flux solder and using Solder Paste.

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Hand Soldering

The following hand soldering process will get you started but you may need to fine tune temperatures dependant on the soldering equipment and solder used – particularly when using lead free solders.

- SMD manufacturers generally recommend a hand soldering temperature of around 220°C. In practice, this will need to be increased, due to the heat sinking effects of the components and pads
- To prevent contamination and personal injury and for ease of handling, tweezers should be used

Method:

- Flow a thin line of solder to one component pad pattern (to tin the pad)
- Place a small amount of solder on the relevant device lead (to tin the lead). Carefully centre the device to be soldered on the component foot-print. Place the iron tip at the junction of the device and circuit pad and reflow the solder whilst applying pressure to the top surface of the device to ensure that it will seat flush to the component footprint on the PCB. For multi-leaded components, solder a lead on the opposite corner of the device to ensure the device is flush to the PCB.
- Clean and tin the iron tip.
- Apply the tip and solder to the other device lead(s). Do not apply force to the top of the device when soldering the remaining lead(s). Otherwise the component may be permanently under stress. Solder one side of the device before starting on the other side.
- Examine the first soldered joint and effect a proper solder joint. The first step serves to mechanically position the device on the board and hold it in place to allow both hands to be free to apply solder and iron tip to the remaining component leads
- (Remember that you will need to have available a temperature controlled soldering iron set to 220-300°C for component soldering and 400-420°C+ for Solderable Enamel Wire soldering).
- To wire to the fan-out pads using the Wiiring Pencil extend, say, 4mm from the pencil tip and tin, say, 3mm. Tin the fanout solder pad and make the connection.
- Use the 'Okta Star Points' for multiple connections
- · Route wires at random, being sure to allow for subsequent component and wire connections
- Wires may be routed through holes to lessen wire congestion and also to retain wires close to the board.
- When dealing with Surface Mount Devices, pre-tinning of wire is recommended prior to making the joint.
- · Magnification is recommended to aid the integrity of soldering.

Using Solder Paste

We would recommend a lead free solder paste. Typically, type 'T5' by Chip Quick or similar. This contains very small globules of solder in flux, making soldering a simple process.

- · Dispense a small amount of solder paste onto component pads
- Using tweezers, carefully place the component, say, an SOT-23, 3 legged package type, on to the pads and solder one joint, whilst applying pressure to the top of the component. Ensure the paste flows nicely. No conventional soldder is required.
- Solder the other 2 leads. Then return to the first lead and swiftly resolder to ensure that any tension in the first lead is removed.

There are other soldering methods for Surface Mount Devices, but they are for production applications. The above processes are for prototypes only.

Soldering Iron Tips

• Either chisel or flat type solder tips can be used dependant on the application. With the right solder paste, flux, tip, temperature and timing, multi-legged components can also be soldered effectively.

Soldering Iron Tip Care

• Prior to soldering, 'tin' the tip; that is, apply conventional solder to the tip and wipe clean on a moist sponge or brass sponge. When the work is completed, apply solder to the tip and turn off the soldering iron temperature without removing the excess solder. This will protect the tip and prevent it from oxidation when not in use.

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Equipment and Tools Required

Fume Extractor, Soldering Iron, Tweezers, Cutters, Wiring Pencil, Solderable Enamel Wire, Magnifyer (optional), solder wire and Solderpaste – dispensed from Syringe.

Surface Mount Technology (SMT-C) Series of Eurocards

Oktapad Format for MP005895, Single Sided & MP005896, Double Sided (same SMT pattern both sides, Colander Ground Plane on component side)



Stripboard Format for MP005897, Single Sided & MP005898, Double Sided (same SMT pattern both sides, Colander Ground Plane on component side)



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Provision on all boards for the following Surface Mount Device Footprints:

1 x SO-8 3 x SO-16 1 x SO-20W 1 x SO-28 16 x 0805 8 x SOT23 1 x TAJC 2 x OCTAPOINT

Op Amps/Audio Drivers/Interfaces Logic/Memory AD Converters/Analogue Switches etc **Resistors/Capacitors** Transistors **Tantalum Capacitor** 1 x TAJD Multi Solder Point

1 x SOT23-5 2 x STARTPOINT

Transistor/Fet/Power Reg/Voltage Reg Tantalum Capacitor Multi Solder Point

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