

# Soldering on a Griddle

The AD9834 DDS chip used in the LD-1 is packaged in a 20-lead TSSOP, which stands for "thin shrink small-outline package". They started with a small-outline package (SOP), then shrank it, then made it thin. In other words, it's small. Really small. Other than that, it looks like a baby DIP package with the pins all bent out. The pins are on .025 inch centers, and if the PCB is designed with the recommended footprint (also called a "land pattern") the clearance between neighboring pads is .008 inch. That's about the thickness of AWG 32 wire.

Apparently there are people who use conventional soldering techniques with parts this small, judging by posts on other blogs. The technique often involves using solder wick to remove the inevitable bridges between the tiny pads, and I'm sure that does work. In my opinion, it's better to avoid (or at least minimize) the bridges, and this can be done without investing a fortune in equipment and tools.

First, use solder paste. Make sure it's intended for electronics work, not for jewelry or something like that. I use Amtech LF-4300, a lead-free, no-clean, water-soluble paste. There are websites that sell it in a syringe, but the needle is WAY too big, so I transfer it to small veterinary syringes from a local farm supply store (Tractor Supply, there might be one in your area). I buy needles separately, and use a #22 needle for fine work. I cut the needle to a length of about 1/4 inch using a Dremel tool with a cutoff wheel; this gets rid of the point for safety, and the short needle passes the paste much better than a long one.

My hands are not very steady, they never have been. I've found that using both hands to hold the syringe steadies them, though. If you get a little bit of paste between pads, it doesn't necessarily result in a solder bridge. When the solder melts, the surface tension draws it toward the pads, because it can wet the metal but not the solder mask or substrate between the pads.

To reflow the solder, I use a Presto electric griddle from Walmart. After applying the solder paste and placing the surface-mount parts, **AND BEFORE PLACING ANY THROUGH-HOLE PARTS** put the board on the griddle and turn it on. Use an inexpensive infrared thermometer from Harbor Freight Tools or a similar discount tool store (I think I paid \$15 or so for mine) to monitor the temperature, and when it approaches the melting point of the solder (around 200 degrees C for lead-free solder, somewhat lower for conventional solder), use a hot-air blower to take it the rest of the way. For a hot air blower, I normally use a Weller butane soldering iron with a hot-air blower tip.

You can use an electric skillet instead of a griddle, but it's easier and safer to use a griddle because it doesn't have the sides which get in the way. My griddle cost \$20.

These are a few of the tricks I've picked up. I'll be sharing more of them in the near future, along with photos and maybe a video or two.