



Software, firmware, hardware design

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ReflowViewer2

Simple Reflow Soldering Thermal Profiling Application

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Thank you for your purchase of ESTechnical products. If you have any questions or comments please let us know, we are always keen to hear feedback about our products.

Currently in Beta testing

Beta test release please report any bugs to bugs@esttechnical.co.uk

About ReflowViewer2

ReflowViewer2 is a simple to use thermal profiling application for use with:

- ESTechnical Desktop Reflow Oven 220v version [<http://www.esttechnical.co.uk/reflow-ovens/esttechnical-reflow-oven-220>]
- ESTechnical Desktop Reflow Oven 110v version [<http://www.esttechnical.co.uk/reflow-ovens/esttechnical-reflow-oven-110>]
- any reflow oven equipped with ESTechnical Reflow Controller Upgrade [<http://www.esttechnical.co.uk/products/reflow-oven-controllers>] that includes the optional USB connection (Complete Upgrade Packages).

Key Features

- Simple to operate live graphing of reflow soldering temperature profile on a computer
- Edit, save and recall reflow profile settings
- Advanced settings menu
- Work with Windows, Linux and Mac

Instructions for ReflowViewer2

Precautions

ESTechnical accept no responsibility or liability for personal injury or damage to property – Perform testing on waste boards until you are confident the settings are correct for your oven, boards and parts density etc.

Place the reflow oven on a hard, level and heat resistant surface. Do not cover any holes in the oven housing – the airflow is necessary, damage to the oven and/or your PCBs will result if airflow is impeded.

Always allow the oven to cool to below 50 degrees (as reported on the display) before stopping the cycle or attempting to remove the boards from the drawer. Do not stop a reflow cycle and begin another without first allowing the oven to cool to near ambient air temperature.

Never start a reflow cycle with hot PCB(s) - allow to cool first.

Ensure adequate ventilation in the work area, air extraction is essential if working in a confined space.

Place boards to be soldered centrally in the drawer of the oven. If a small board is being soldered, it is best to position this below the thermocouple towards the front of the oven. This will provide the most accurate temperature control. Always ensure there is PCB below the oven thermocouple.

Installation Procedure

To use ReflowViewer2 a working Java 7 Runtime Environment is required. Please refer to <https://java.com/en/download/> [<https://java.com/en/download/>] or the documentation for your operating system.

Download ReflowViewer2 and extract the files to a location of your choice.

Running ReflowViewer2

To run ESTechnical ReflowViewer2 choose the method that suits your operating system:

Windows

To run ReflowViewer2 open the folder where the files are extracted and double click on the icon `run.bat`. A shortcut to this batch file can be made on the desktop.

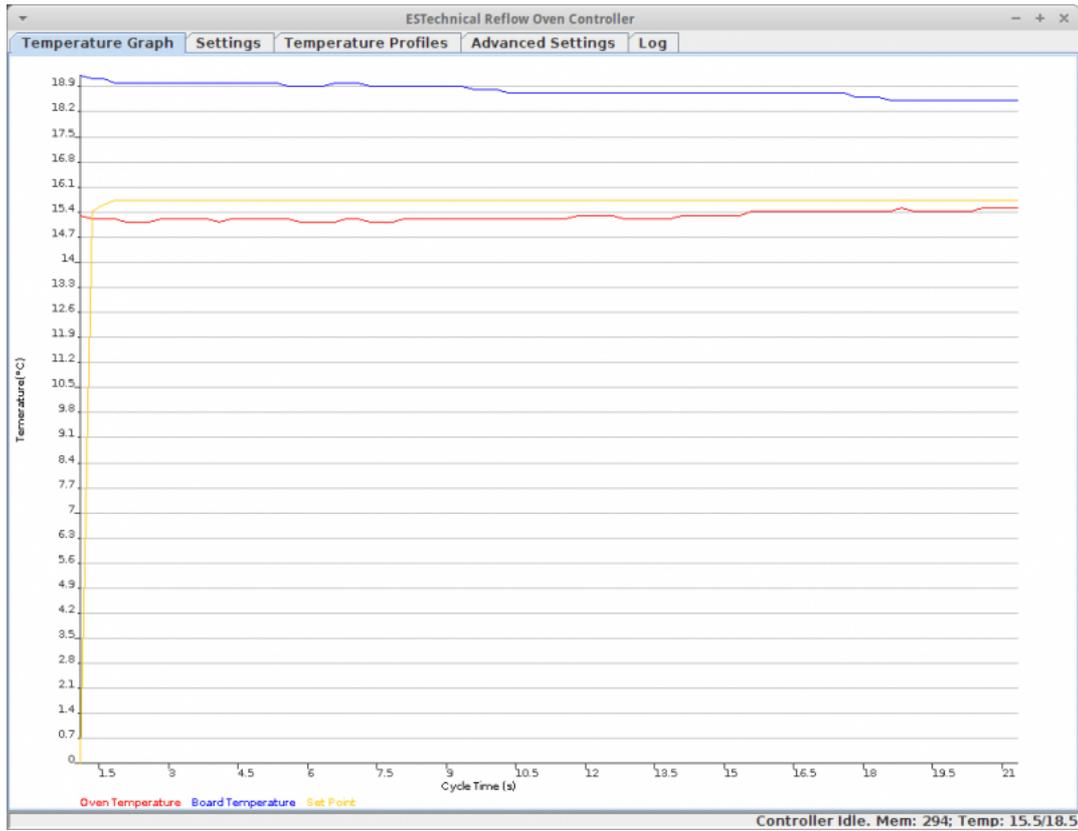
Linux & Mac

To run ReflowViewer2 there are multiple options:

- open a terminal and cd to the ReflowViewer2 directory, run the jar file using the command `java -jar ESTechnicalReflow.jar` - this method allows you to capture any debugging output from the program.
- Navigate to the location where you extracted the ReflowViewer2 files and double click on `run.sh`. You may need to make this file executable the first time you do this.

About this application

Temperature graph tab



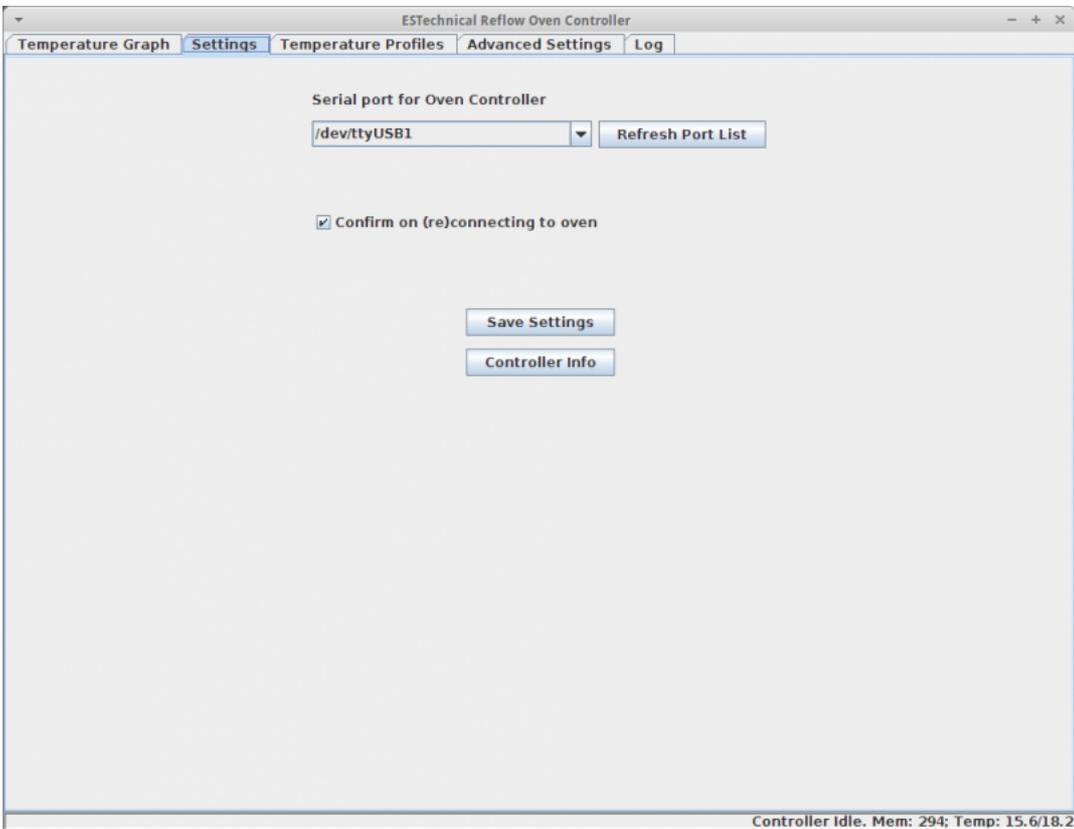
Temperature graph display

The Temperature Graph tab displays a live graph of temperature versus time. Depending on the run state of the ESTechnical Reflow Controller, the graph will display one, two or three plots.

- Oven thermocouple temperature
- Board thermocouple temperature
- Reflow profile temperature setpoint

The graph is displayed in Degrees Celcius (°C) vs. Seconds (S).

Settings tab

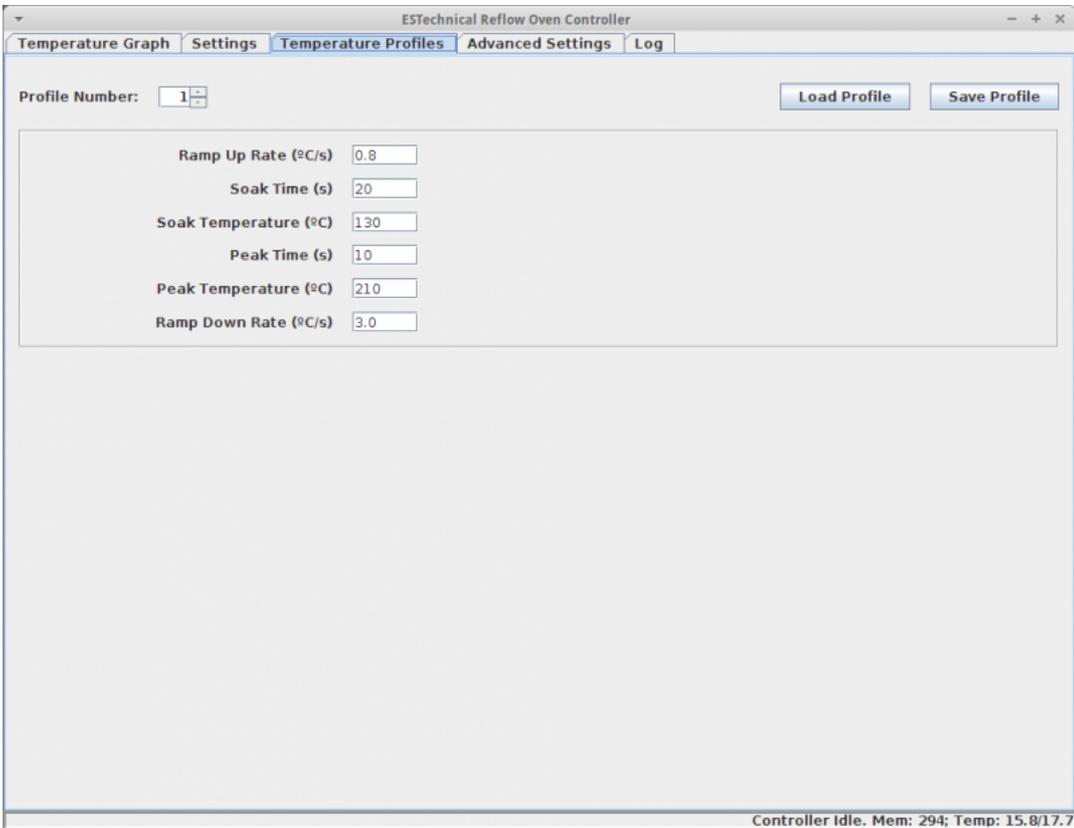


Settings tab

The Settings tab allows selecting the USB to serial port used to communicate with the ESTechnical Reflow Controller.

The checkbox Confirm on (re)connection to the oven enables/disables a warning that displays before opening a connection to the oven. Pre v2.4 ESTechnical reflow controllers will automatically reset when the serial port is opened by the computer, thus aborting any currently running reflow cycle. Version 2.4 and onwards ESTechnical Reflow Controllers are equipped with an 'auto-reset enable' jumper.

Temperature Profiles tab



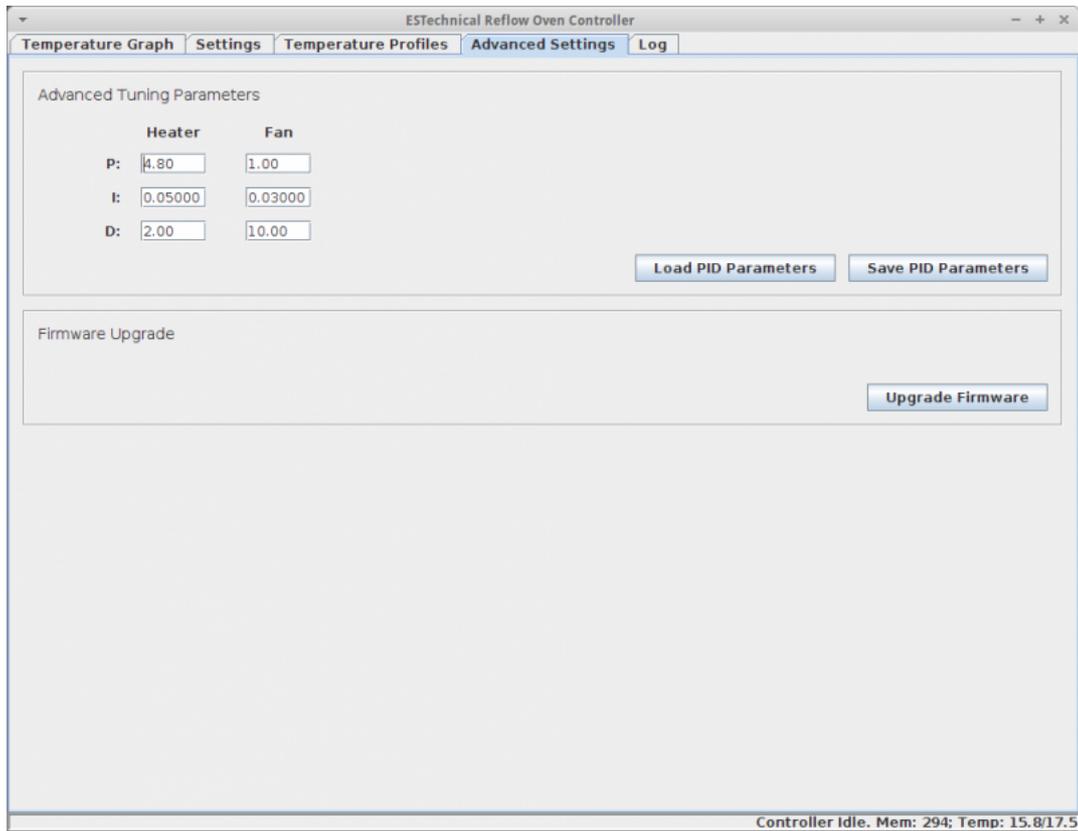
Temperature Profiles tab

The Temperature Profiles tab allows editing and viewing of reflow profile settings.

To view profile settings first select the desired profile number and click Load Profile. The settings of the chosen profile number will be displayed in the data entry fields.

To edit the profile settings, change the values as needed and click Save Profile. The values will be saved to the memory of the controller.

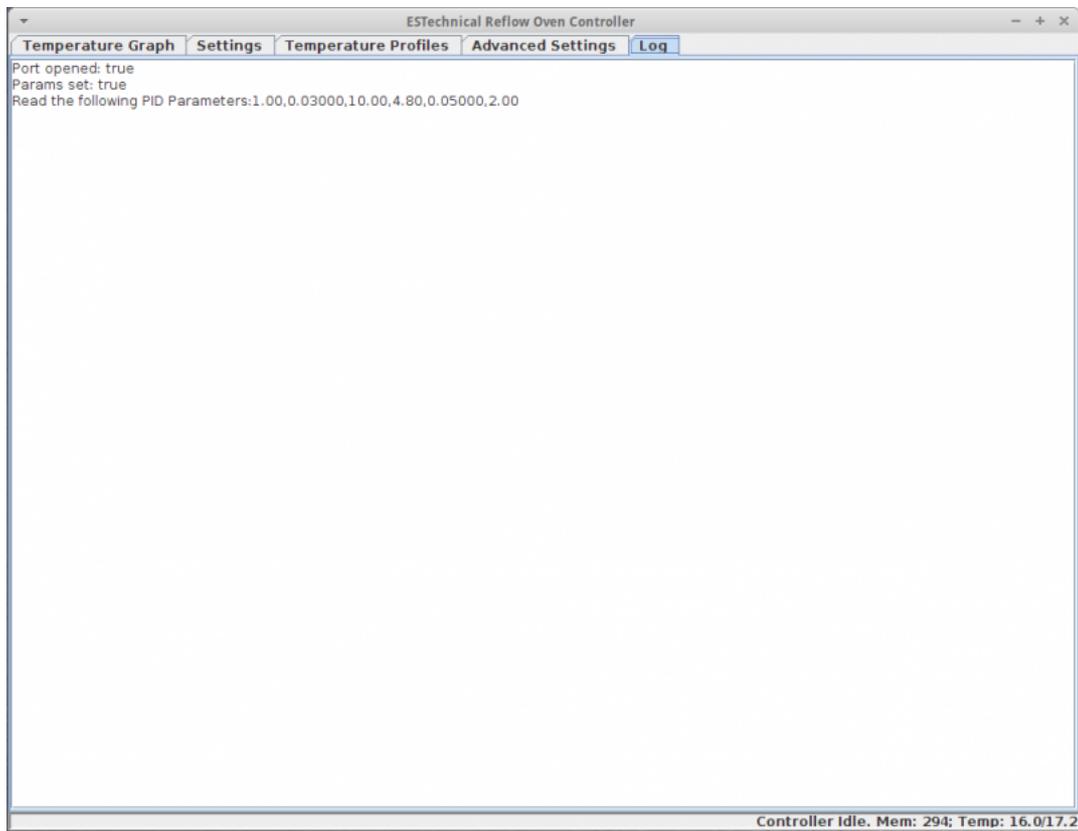
Advanced Setting tab



Advanced Settings tab

The Advanced Settings tab allows adjustment of the PID parameters used for heater and fan control & controller firmware updates.

Log tab



Log tab

The log displays information that is gathered during use. When reporting any issues with ReflowViewer2 please include information shown in the log tab.

Operating Instructions

Initial setup and saving settings

- Ensure the USB cable is connected between the computer and the Reflow Oven.
- Run the ReflowViewer2 application (refer to the instructions for your OS above).
- The first time the program starts (or if the USB to serial port has changed) it is necessary to select the appropriate USB to serial port:
 - Select the Settings tab
 - Choose the USB to serial port that corresponds to the Reflow Oven (if no ports are shown or the wrong ports are shown, clicking Refresh Port List will reload the list of available serial ports).
 - Depending on the setting of the auto-reset jumper on the ESTechnical Reflow Controller, decide whether to check the Confirm on (re)connecting with the oven checkbox - if the jumper is open (not connected) it is OK to un-tick this checkbox.
 - Click Save settings - the application will now try to connect to the oven.
 - If the application fails to connect to the ESTechnical Reflow Controller, double check the serial port that corresponds to the oven (this process depends on your operating system) and repeat the steps above to correctly set the serial port.
- Once the application is connected to the ESTechnical Reflow Controller, the Temperature Graph panel will begin to update.

Editing and Saving Reflow Profile Settings

To edit reflow profile settings stored on the ESTechnical Reflow Controller, switch to the Temperature Profiles tab.

To load a saved profile

- Select the desired profile number (0-29) in the Editing profile number: field.
- Click Load Profile - this loads the chosen profile settings and displays them in the profile settings fields. The chosen profile is also set as the active profile on the ESTechnical Reflow Controller. If Cycle start is commanded on the ESTechnical Reflow Controller, the chosen profile will be run.

To edit a saved profile

- Carry out the steps in To load a saved profile (above) to load the profile to edit.
- Edit the settings displayed as needed.
- Save the profile settings to the ESTechnical Reflow Controller by clicking the Save Profile button.

Advanced settings

PID settings

Warning
 PID settings affect the behaviour of the reflow oven - ensure changes are tested using scrap PCB(s) carefully

To view or adjust the PID settings, click Load PID Parameters - the currently saved PID settings will be read from the controller and displayed.

After making adjustments to PID settings clicking on Save PID Parameters will save the values to the controller memory.

Firmware Update

Warning
 Firmware updates completely replace the firmware of the controller. Updating between certain versions of firmware require a factory reset of the controller. Please ensure you have noted important profile settings before performing firmware update/factory reset.

To perform a firmware update of the ESTechnical Reflow Controller click on Upgrade Firmware. A file chooser dialog is displayed. Navigate to the location where you extracted the ESTechnical ReflowViewer2 software, inside this directory there is a directory named firmwares - choose the latest version number for compatibility with ReflowViewer2.

Performing Reflow Profile Testing

Reflow profile testing is an iterative process which allows you to refine the performance of the reflow soldering cycle. First it is necessary to approximately determine the profile settings needed to properly reflow a given design of PCB. Starting by performing a test cycle using the default profile settings will give a clear indication of what needs to be adjusted when comparing the resulting profile with the required profile for the solder paste and parts used on the PCB. Once profile settings have been found that correctly reflow the solder paste on all joint on the PCB, it is a good idea to test several locations on the PCB in successive tests without changing any settings to determine how much variation in temperature there is across the PCB.

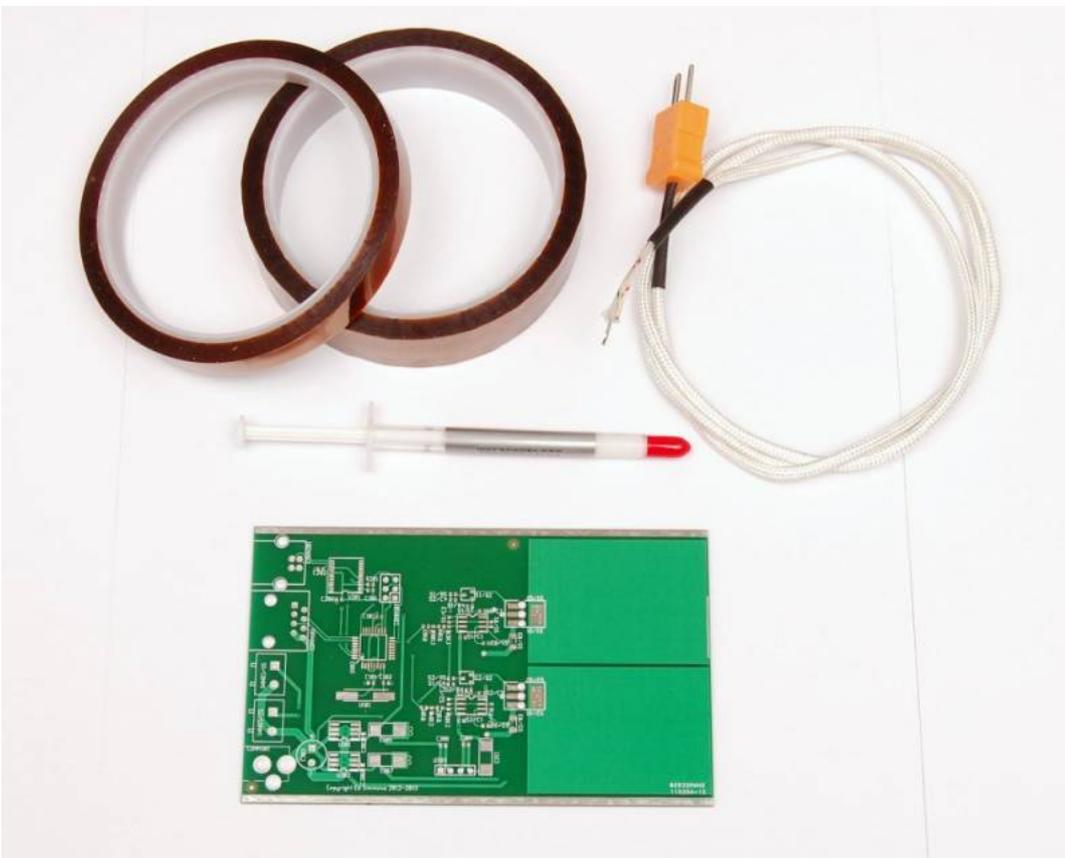
Example profile test locations

- Next to heavy parts eg inductors (pay attention to adequate time above liquidous)
- Next to sensitive parts (pay attention to the peak temperature and compare to the manufacturer's datasheet)
- On top of tall parts or highly sensitive parts
- On a sparsely populated area (pay attention to peak temperature)

Profile board preparation

Profile testing should be carried out for each design of board to be soldered.

To carry out profile testing, you will require a test PCB, kapton tape and heatsink compound.

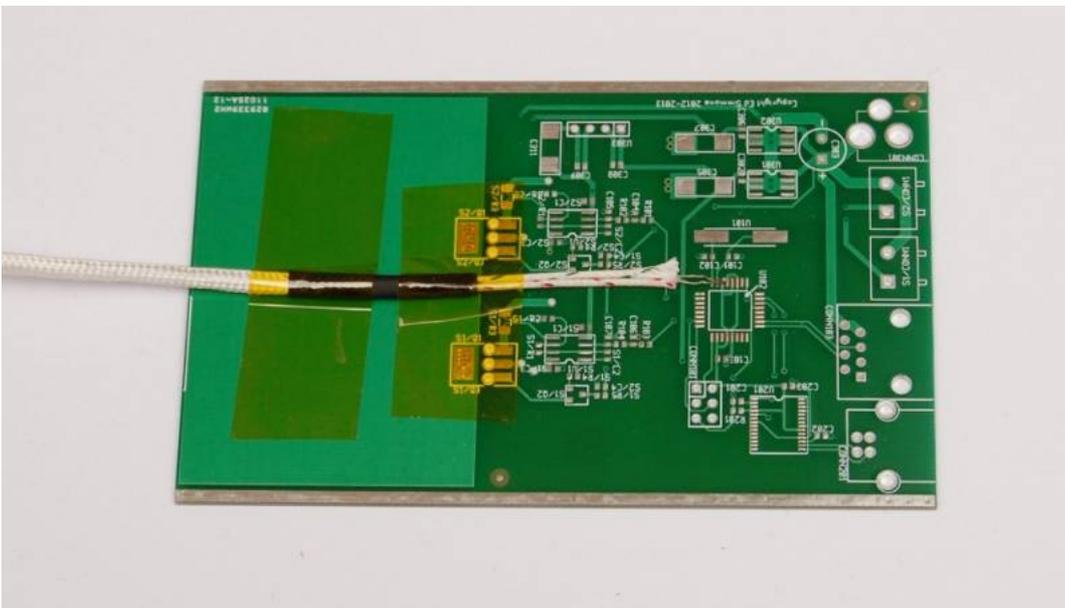


Test PCB, kapton tape, heatsink paste and thermocouple

Decide where to place the thermocouple. Where you place the thermocouple on the PCB depends largely on the design. Densely populated areas or areas with large copper fills are a good choice for initial testing. Other areas of the board (for example, the top of tall parts) should also be measured once a suitable reflow profile has been set up to ensure the peak temperature is not exceeding the manufacturer's stated limits.

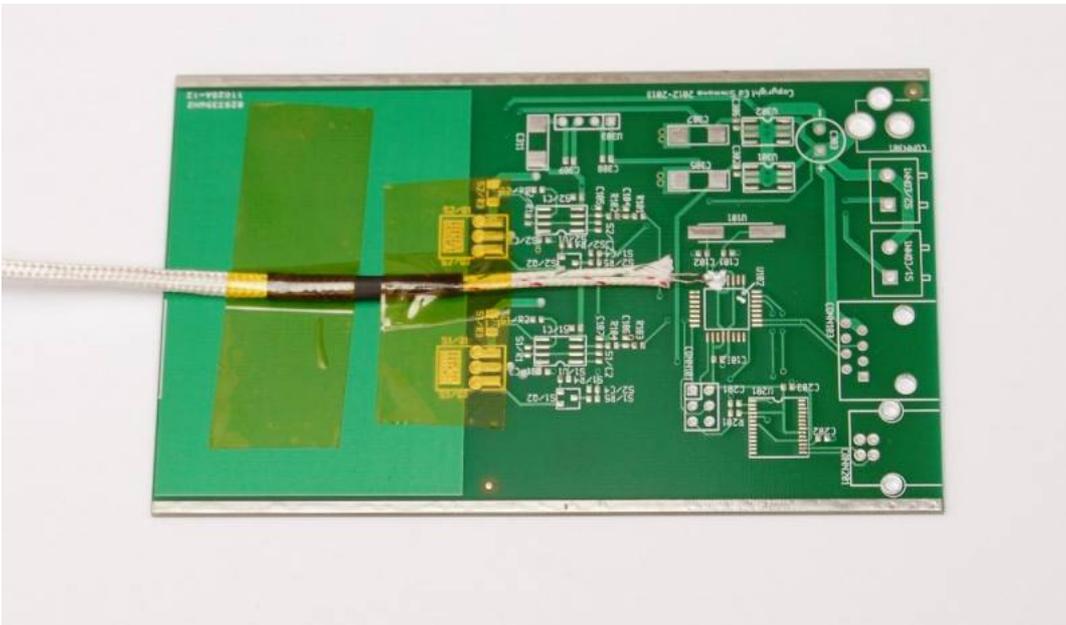
Small boards with few parts are often easy to profile correctly with no parts present, as the parts comprise a very small amount of the overall mass of the board. More densely populated boards may require further adjustments to the profile to adequately reflow all solder joints. Further testing is advised to ensure safe margins are kept from the maximum temperature specified for the most sensitive parts.

Secure the thermocouple cable with kapton tape while holding the tip in the correct location. Ensure the cable is well stuck down to provide some strain relief to prevent the tip of the thermocouple moving. It can help to strip back some of the outer layer of thermocouple sleeve.



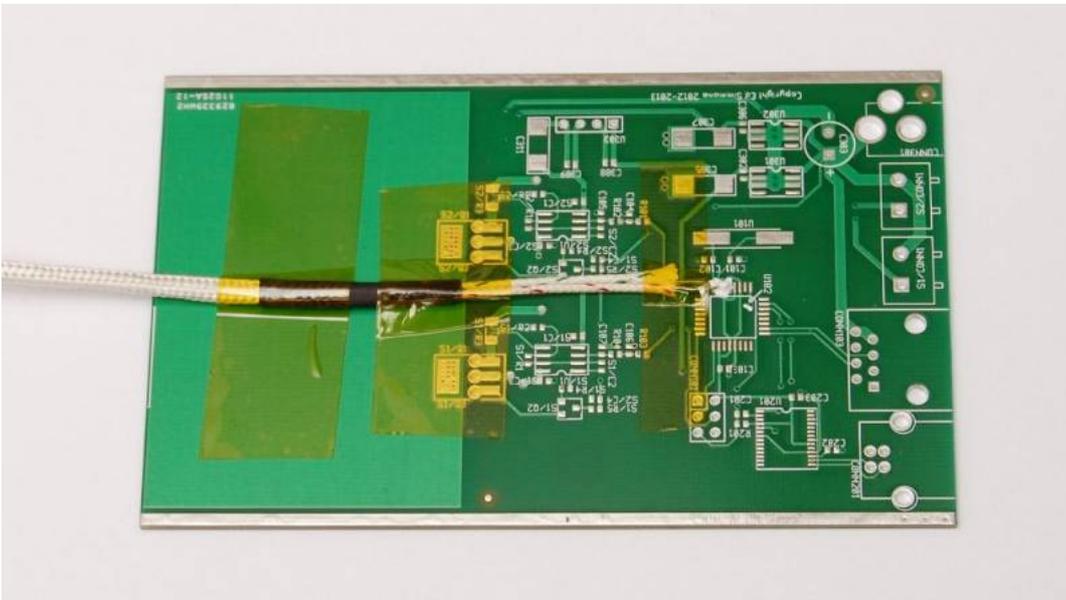
Stick down the thermocouple cable securely with the tip held in the correct location

Apply heat sink paste to the tip of the thermocouple. Only apply a very small amount to ensure good thermal coupling between the PCB and the tip.



Apply heatsink compound to the thermocouple tip

Apply a thin strip of kapton tape over the thermocouple wires, very close to but not touching the tip of the thermocouple. Ensure this is well stuck down and the tip is making good contact with the PCB.



Apply more kapton tape to ensure good contact between the thermocouple tip and the PCB

Place the prepared PCB in the reflow oven, route the thermocouple cable out of the drawer at one side and fully close the drawer. Ensure the PCB is placed underneath the thermocouple mounted in the front of the oven. Plug the thermocouple into the thermocouple socket on the side of the reflow oven.

Run a test cycle and observe the temperature profile of the PCB. Make adjustments as necessary to the profile settings after each test profile, repeat until the profile temperature measured on the board is suitable for your parts and solder paste recommendations. Ensure the maximum temperature for the most sensitive part(s) are not exceeded.

Reflow Profile Testing

- Place the prepared PCB in the reflow oven (if using T962A ensure the PCB is below the front thermocouple in the oven when the drawer is closed).
- Route the thermocouple cable carefully to the edge of the drawer, up and over the edge.
- Connect the thermocouple connector to the thermocouple socket on the Reflow Oven.
- Load the initial profile settings. For a new design of PCB, try the default profile settings (load an unused profile number) as a starting point.
- Run the reflow cycle by selecting Cycle start and pressing OK on the ESTechnical Reflow Controller.
- Observe the temperature profile reported on the Temperature Graph tab in ReflowViewer2 application.
- Compare the temperature profile(s) you record in a spreadsheet by opening the logged data stored **fixme**
- Check the profile against the maximum temperatures of the parts used and the profile suggested by the solder paste manufacturer.