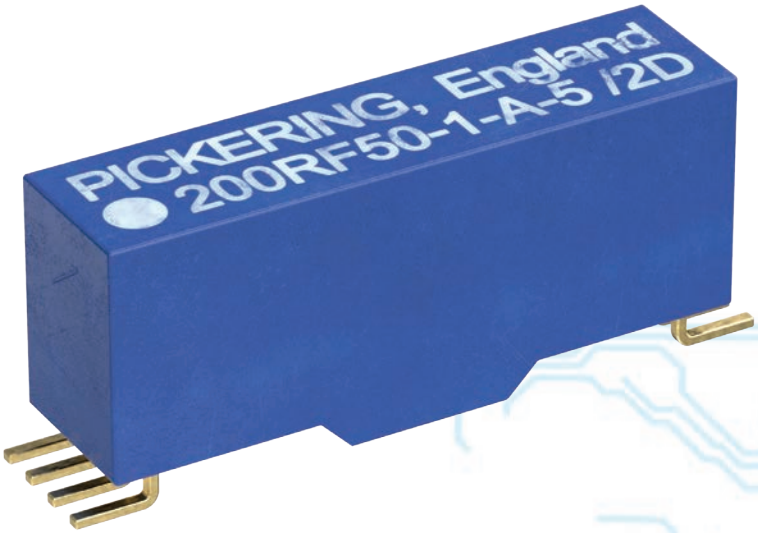
Surface Mount Reed Relays
Series 200 User Guide



Introduction

Pickering Series 200 Surface Mount Reed Relays have recommended PCB footprints, a moisture sensitivity level, peak reflow classification, recommended handling procedures and packing options as outlined in this document.

Contents

PCB Footprints

RF Design Considerations

While low frequency use of soldered surface mount relays may pose few problems in terms of board design, higher frequency use requires careful board design to reduce impedance variability at the leg/pad interface. The recommended footprint for the 200RF relay is detailed below:

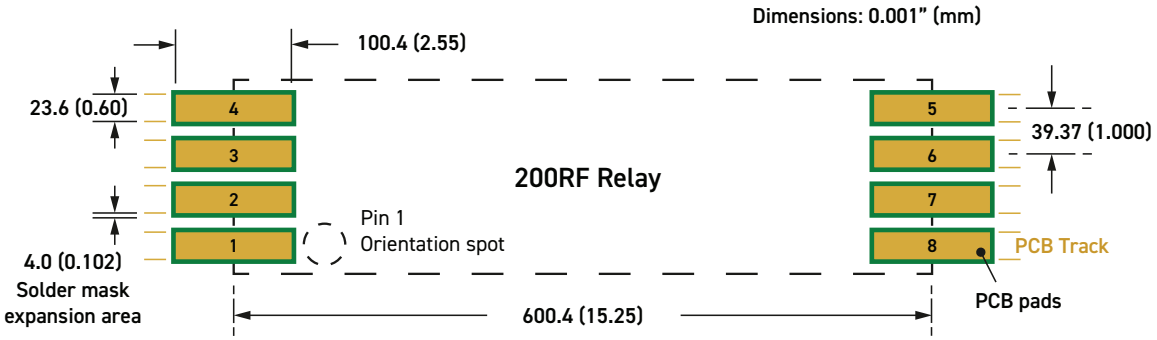


Figure 1. 200RF Footprint (1 Form A, Package Number 2)

An FR4 pcb substrate with a 14 thou dielectric thickness to ground plane will give 50 Ohm for a 23.6 thou microstrip track.

Lower Frequency Footprints

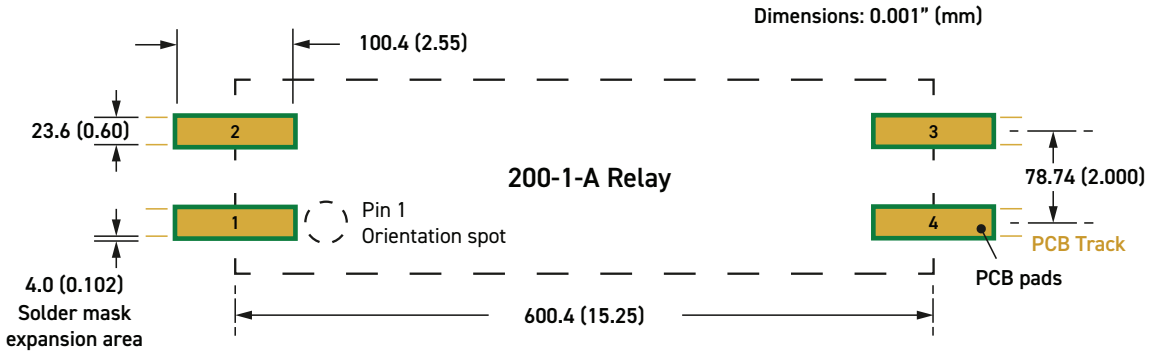


Figure 2. 200-1-A Footprint (1 Form A, Package Number 1)

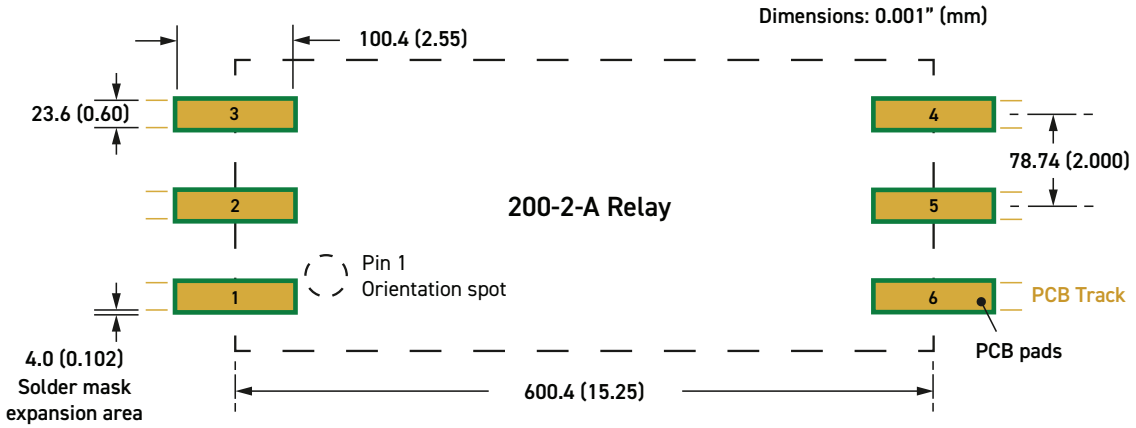


Figure 3. 200-2-A Footprint (2 Form A, Package Number 3)

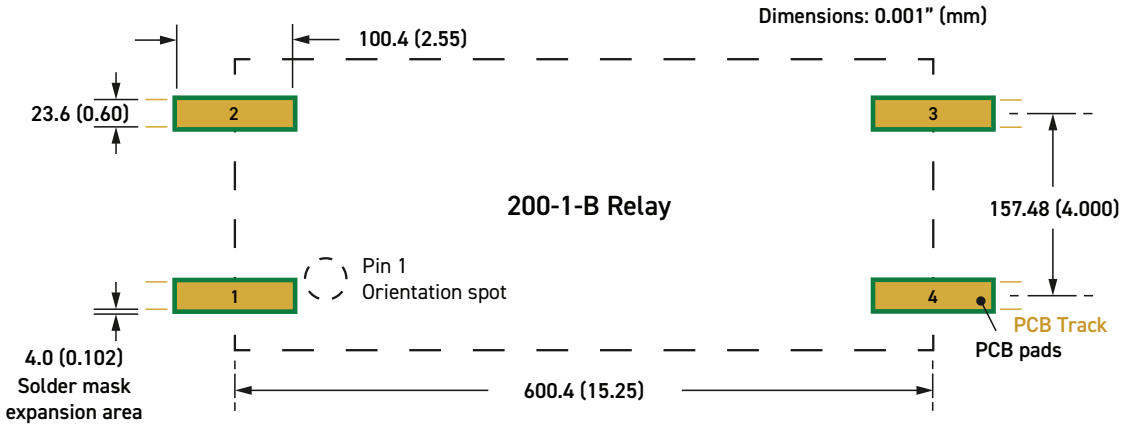


Figure 4. 200-1-B Footprint (1 Form B, Package Number 4)

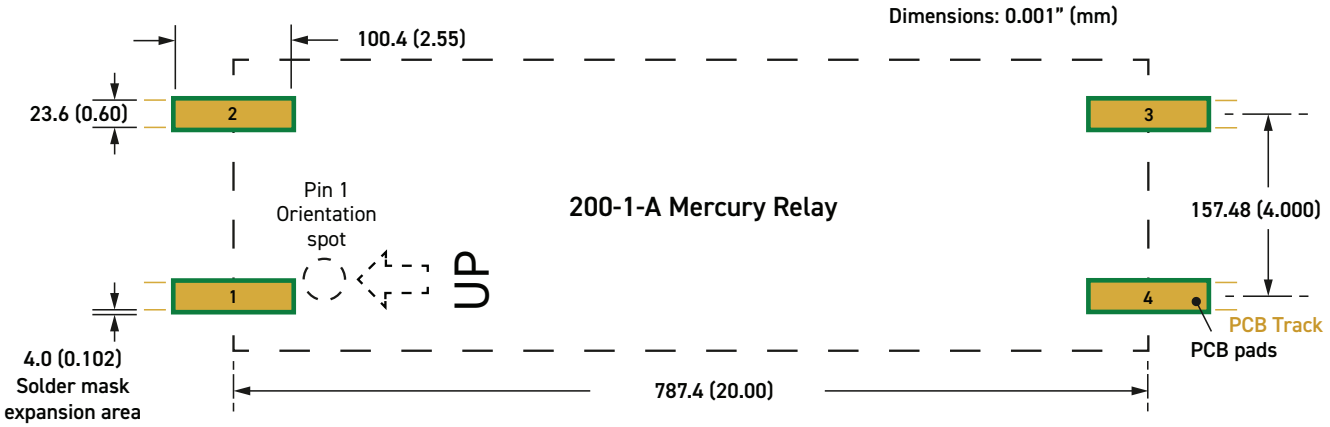


Figure 5. 200-1-A Mercury Relay Footprint (1 Form A, Package Number 5)

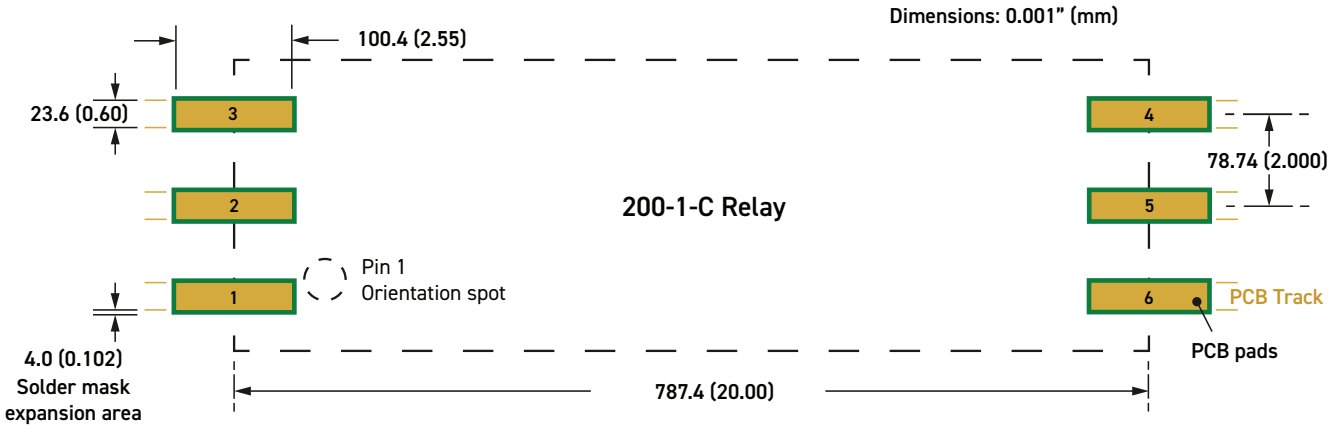


Figure 6. 200-1-C Footprint (1 Form C, Package Number 6)

Handling Procedures

Moisture Sensitivity of Surface Mount Reed Relays

Quality and reliability concerns regarding internal damage, cracks and delamination from the solder reflow process have demanded standardised procedures regarding moisture control for some surface mount devices. Pickering Series 200 Surface Mount Reed Relays are classified to IPC/JEDEC J-STD-020 MSL1, and thus dry packs and special procedures are not required.

Packing

Pickering 200 Series relays are provided in waffle trays as standard with a minimum order quantity of 730 pieces. The relays can be provided in tape and reel format, the maximum number of relays per reel being 750.

Figure 7. Relays in a Waffle Tray (200-2-A)

Shelf and Floor Life

Through their moisture sensitivity level 1 classification 200 Series relays have an “infinite floor life” when the conditions are 30 °C/85% RH.

Soldering

Manual and Oven Soldering

To avoid co-planarity and provide acceptable solder joints and performance a suitable soldering profile must be used. The recommended soldering temperatures and times are detailed below:

	Manual Soldering	SMD Reflow
Recommended tip/peak temperature	340 °C/3 secs	245 °C/30 secs
Maximum tip/peak temperature	400 °C/5 secs	270 °C/30 secs
Typical profile	-	See Graph 1
Notes: a. Temperatures based on using a lead-free (SAC) alloy. b. Maximum conditions based on limited trials. c. Solder wetting is affected by many factors such as storage conditions, handling; choice of alloy, equipment, ventilation, the board thermal mass and AQL (ref IPC-A-610 class 1,2 or 3). d. We recommend the customer performs appropriate tests to verify their suitability.		

Table 1. SMD Reflow Temperatures/Times

Hand Solder Special Instructions:

The tip should be set to the minimum temperature required to produce a consistent solder joint.

It should first be accurately measured using calibrated equipment (traceable to National and International standards) to determine whether there is an offset. We recommend any offset is adjusted out by recalibrating the solder iron because the offset may not be linear across the temperature range.

It may be possible to solder at a lower temperature than indicated and this should always be the aim of an assembler soldering any type of component. Lower temperatures reduce heat stresses and the possibility of flux within the solder wire being burnt off too quickly which can create dry joints. Lower temperatures will also help to maximize the tip life.

The solder alloy and tip size will also have an influence. We always recommend using as large a tip size as possible because this improves the contact. It will also have a better heat mass which means its temperature is less likely to reduce as contact is made with the component lead and printed circuit board (pcb).

The pcb will also act as a thermal mass. Single layer boards can generally be soldered at a lower temperature than multi-layer boards or those with extensive grounding.

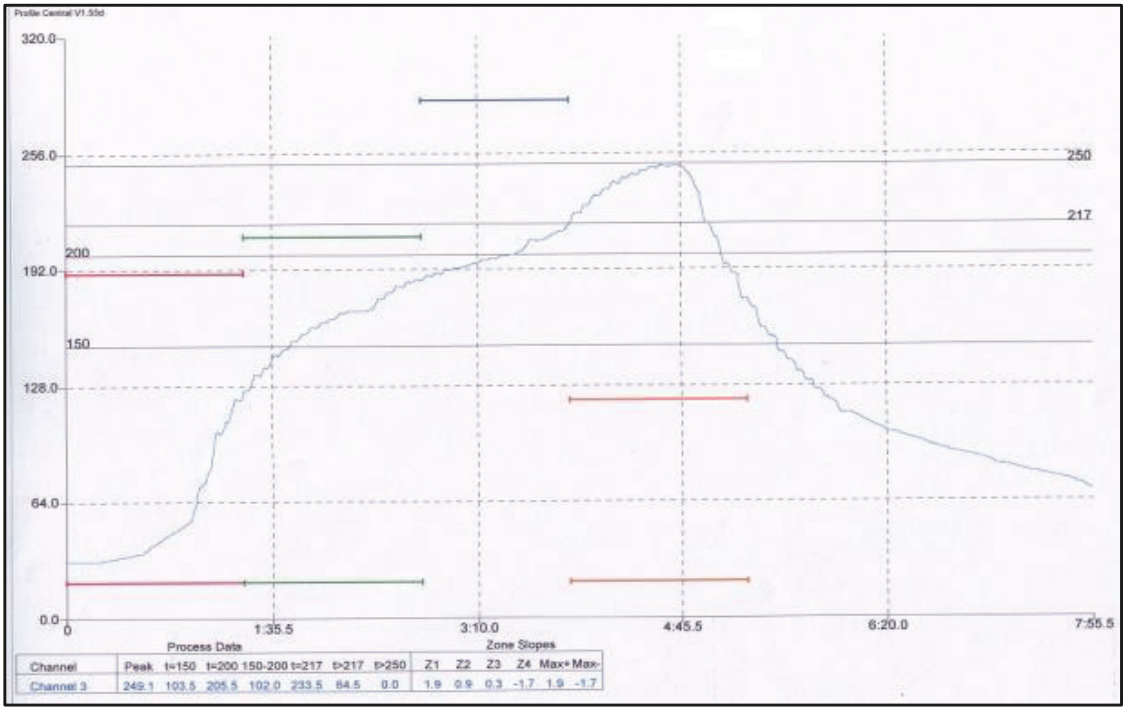
We recognise there may be other components on pcb that require a higher temperature and/or different tip etc. It may seem possible to find a set up that works for all components, but this can lead to stresses on the most sensitive components. A common mistake is to set an iron at its maximum temperature.

In summary, incorrect calibration, tip degradation, insufficient tip contact time/position and thermal mass can mistakenly be overcome by increasing the temperature. Too hot can be as bad as too cold.!!!

Optimizing the tip size to take into the above variables will usually mean it's possible to use much lower tip temperature.

Convection Oven

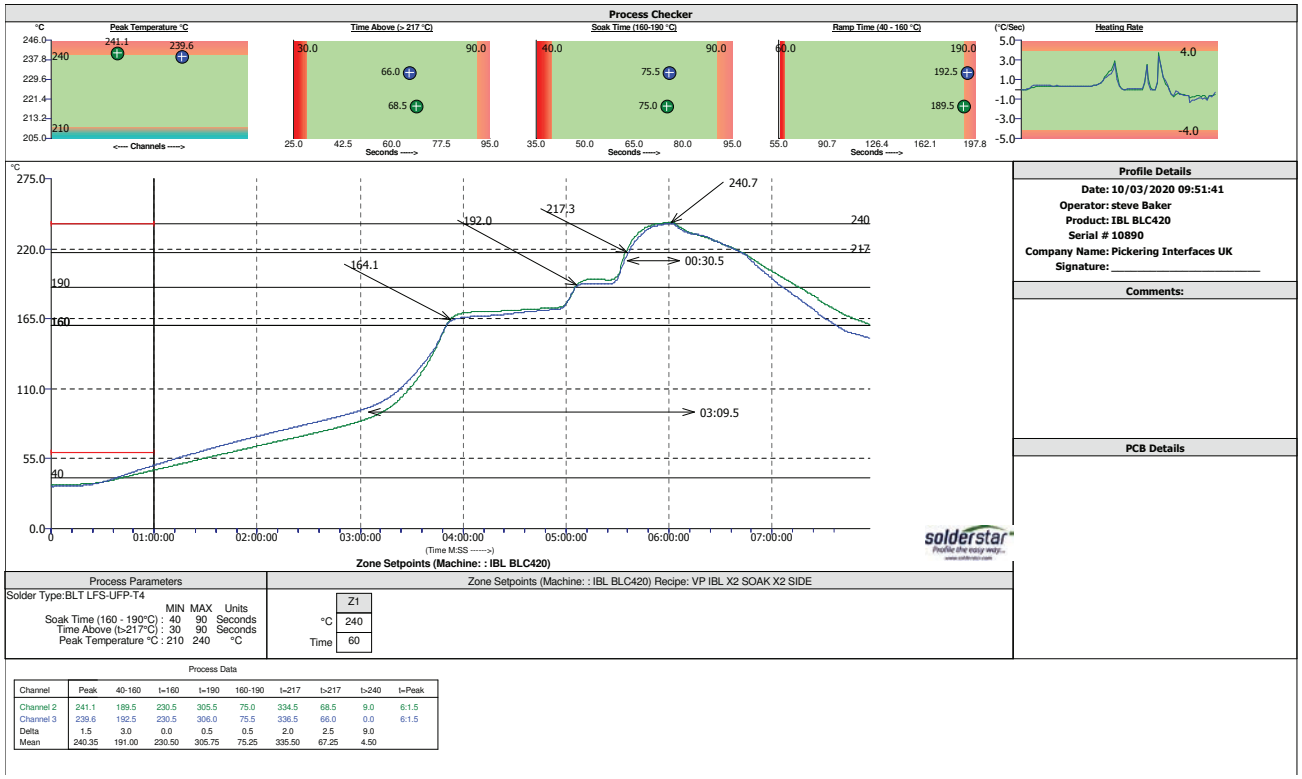
A typical Convection Oven profile can be found below:



Graph 1. Recommended Lead-free SMD Reflow Profile

Vapor Phase Soldering

A typical Vapor Phase profile can be found below:



Graph 2. Vapor Phase Profile

Wave Soldering

Although physically capable of surviving the heat, the height of Series 200 relays may make them unsuitable for passing through a wave solder machine on the underside of the board.

Rework

Occasionally relays may need to be replaced due to contact failure from overload. Localized heating is recommended, although components can be removed/refitted using a standard soldering iron. The manual soldering guidelines on page 5 of this document should be followed.

Disposal

It is recommended that these components are disposed of in a legal and environmentally friendly manner.

Standards

Standard	Detail
IPC/JEDEC J-STD-033	The industry standard for handling, packing, shipping, and use of moisture/reflow and process sensitive devices that have been classified to the levels defined in J-STD-020 or J-STD-075.
IPC/JEDEC J-STD-020	Applies to all non-hermetic SMDs in packages, which, because of absorbed moisture, could be sensitive to damage during solder reflow.
ECA/IPC/JEDEC J-STD-075	Classification of Non-IC Electronic Components for Assembly Processes. Establishes a set of worst case solder process limits which can safely be used for assembling non-semiconductor electronic components on common substrates i.e. FR4.
IPC-A-610	Acceptability of Electronics Assemblies.
IPC-7711/7721	Rework, Modification and Repair of Electronic Assemblies.

About Pickering Electronics

Pickering Electronics was formed in January 1968 to design and manufacture high quality reed relays, intended principally for use in instrumentation and automatic test equipment.

Today, the UK facility is responsible for Product Development, Technical Back-up, Sales, Marketing and Administration.

Manufacturing is shared between the UK factory and a large modern plant in Trinec, Czech Republic, with strict Quality Control and ISO 9001 certification at both facilities. Pickering Electronics s.r.o. is 100% owned by Pickering Electronics Ltd., England.

Pickering Electronics offer an extensive range of high quality instrumentation grade reed relays designed for applications requiring the highest levels of performance and reliability at an affordable price. Through the experience of supporting the most demanding manufacturers of large ATE systems with high relay counts the company has refined its assembly and quality control methods to optimize its manufacturing methods.

Working with its sister company, Pickering Interfaces (pickeringtest.com), Pickering Electronics has developed innovative reed relay solutions designed to provide high coil efficiency, low switch volume and low PCB footprint solutions to meet the demands of modern equipment manufacturers.

Pickering Resources and Downloads

Pickering Reed RelayMate Book

This educational book provides an overview of how reed relays work, how they are constructed and how to interpret their specifications and make best use of them in their applications.
Visit **pickeringrelay.com/relaymate-request**

Pickering Concise Technical Guide

The concise technical guide will help you maximize the reliability of your design.
Visit **pickeringrelay.com/techguide-request**

Pickering Glossary of Terms

A handy terminology guide explaining the resource content.
Visit **pickeringrelay.com/glossary**

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pickering Direct Sales & Support Offices

Main contact:
UK Headquarters: email: sales@pickeringrelay.com | Tel. +44 1255 428141
Technical Sales: email: techsales@pickeringrelay.com | Tel. +44 1255 428141

Worldwide contacts:
USA: email: ussales@pickeringrelay.com | Tel. +1 781 897 1710
Germany: email: desales@pickeringtest.com | Tel. +49 89 125 953 160
France: email: frsales@pickeringtest.com | Tel. +33 9 72 58 77 00
Nordic:. email: info@pickering.se | Tel. +46 (0)340 690669
China: email: chinasales@pickeringtest.com | Tel. +86 4008-799-765

For a full list of agents and representatives visit: **pickeringrelay.com/agents**

Pickering Electronics maintains a commitment to continuous product development, consequently we reserve the right to vary from the descriptions given in this document.

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