What is REL-PRO®?

REL-PRO® is an innovative way to make reliable surface mount contacts and signal transitions between two printed circuit surfaces. REL-PRO® nulls the need for contacts that have castellations, which are basically larger diameter plated through holes routed or punched to create the plated through inter-surface contact. The REL-PRO® contact is more reliable than the castellation contact because the punching, routing and alignment processes are not as critical. The result of switching to the REL-PRO® process is higher yields, and more reliable connections. Unlike the castellation process, there is no exposed copper resulting from the punching or routing of the plated through holes. Exposed copper can have long term reliability implications resulting from oxidation and corrosion.

Since there is no lateral surface contact in REL-PRO®, how can the connection be inspected for good solder adhesion?

Conventional solder joints using the castellation contact, can be visually inspected by verifying proper solder adhesion to the edge of the lateral plated surface, though this is not a safe process because the metal layer is weak and may have surface cracks at the horizontal to vertical transition. Further, it is difficult to inspect the solder joint underneath the contact, without reverting to expensive inspection x-ray methods. REL-PRO® makes the transition between surfaces by one or more plated contacts that can easily be inspected for solder coverage, adhesion and alignment with simple use of a common microscope. See figures 1 and 2 for examples of inspection criteria of the REL-PRO® contact. Proper wetting and solder flow can easily be viewed.

The industry is changing to "Lead Free and RoHs" compliant parts, is REL-PRO® compliant with the Lead Free requirements?

REL-PRO® contacts are plated with Electroless Nickel Immersion Gold (ENIG) process that allows for soldering the internal components with high temperature melting lead free solders. REL-PRO® is also a real solution to the lead free problem.

Is there a need to change the footprint in my p.c. board layout if I am already using an older part from Synergy that uses the conventional castellation contacts?

Switching to the REL-PRO® process will allow for the same footprint and no changes are necessary by the user.

REL-PRO® is a patented technology of Synergy Microwave Corporation. Patent Number 7,612,296.

Layout & Soldering Recommendation For REL-PRO® Contacts

Layout Recommendation:

For REL-PRO® contacts all previously recommended layouts are valid and sufficient. However, there are ways to make them easier to use/assemble if the following recommendations are followed:

- If mainly hand soldering is planned, extending the pad size 20 mil (0.5mm) towards the outside makes it easier for less experienced operators to solder the parts. Ground contacts should NOT be tied with solid copper to a large ground plane. This wasn't recommended for the old style contacts either, as it usually didn't yield in good solder joints unless the PCB was severely heated. Best practice is to have 3 to 4 "ground straps". (Fig. 3)

- Board surface should be level

- Motherboard contacts should NOT be HASL as it usually leads to "humps of solder". As this technology is aimed for lead-free boards, either ENIG or silver plated boards are highly recommended.

Fig. 1

Soldering Procedure:

Manual soldering of the REL-PRO® contacts is slightly different from the old style castellation contacts. There is NO change if one uses reflow soldering or vapor phase soldering (recommended). *(Caution! See note for max temp limitation!)*

For manual assembly there are two options of equal performance.

1. Solder paste:

- Apply a sufficient amount of solder paste to all contacts. Heat one contact at a time with a small tip "hot-air-pencil" with the majority of the airflow directed towards the pad on the motherboard

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- heat one contact at a time with a small tip but good heat capacity soldering iron with the tip mainly touching the pad on the motherboard.

2. Standard solder:

- Align the module within the solder pad outlines of the motherboard.

- Apply a small amount of flux to the contact area to be soldered.

- Heat the pad on the motherboard to be soldered with either a "hot-air-pencil" or a small tip but good heat capacity soldering iron.

- After a few seconds, feed solder to the pad to flow in between the board and the module pad until some solder can be seen inside the REL-PRO® inspection holes.

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Inspection of Solder Quality:

One of the biggest advantages of the REL-PRO® contact is that it allows the user to inspect the quality of the solder joint underneath the module through the "inspection holes". The acceptable solder connection must have at least 0.005" wetting on the bottom of the vertical cylindrical hole. In case of manual soldering with solder in wire form, the solder will usually penetrate somehow up the holes. If soldered with solder paste (manual or machine), the amount of solder is too low to "climb up" the hole(s). In this case a nice solder shoulder inside the hole is a criteria for a good connection.

Examples of solder paste soldering

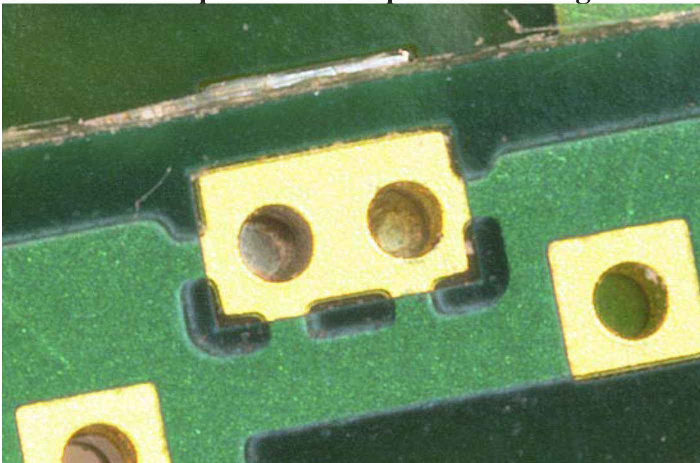

Fig. 1: Good solder

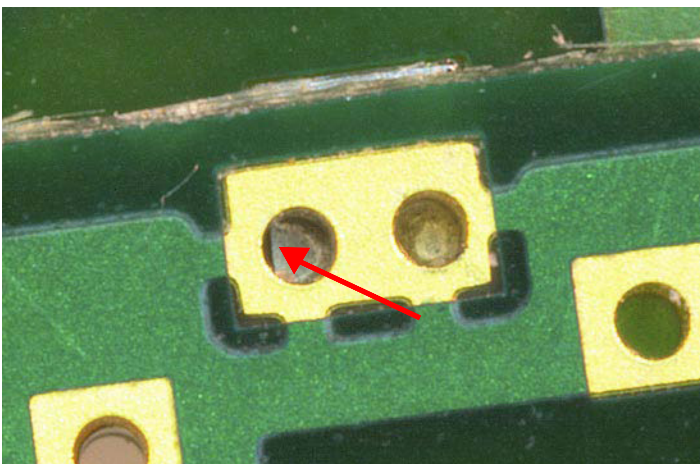

Fig. 2: solder joint but visible misalignment

FEATURES:

- New REL-PRO® Solder Pads with ENIG surface finished boards for solder bonding reliability.
- Via inspection holes enabling visual solder inspection.
- Assembled using lead free solder, suitable for manual or automated placement.
- Industry standard footprint compatibility for easier transition to the new lead free component.

Note:

Maximum reflow temperature limits.

Some parts manufactured with the REL-PRO® process are soldered internally with solder having a reflow temperature melting point of 235 ºC. If the maximum reflow profile does not exceed 228 ºC, no special cooling precautions are required. In cases where the application requires the solder profile to exceed 228 ºC, care has to be taken so that the module will not be exposed to any vibration, as the molten solder can shift component placement. The molten solder must be allowed to re-solidify with no vibration until the device cools down to below 220 ºC. This allows for any residual heat trapped in the device to cool below the solder melting temperature, which is usually hotter inside the device.

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