SMD Assembly Process Guide

Recommendations for Solder Attachment of DLI Brand Filters, Couplers, Power Dividers and Custom Thin Film SMD Parts

For more information contact
KCCsales@knowles.com

SMD Assembly Recommendations

Surface Mount Devices (SMD) for Solder Attach

Many DLI brand parts are designed for solder attachment. This enables high volume production environments to assemble these parts just like any others in an automated surface mount line, with flexibility for low volume assembly as well. SMD filters will have a product code ending in “S”.

Typically these parts have I/Os or terminations that need to be soldered to carry the signal. Often there is also a ground plane under the component. To achieve optimal RF performance, solder joints need to be continuous with low levels of voiding.

Termination finish: ENIG, a solderable Ni layer covered with 3-6 µ inches of Gold unless otherwise stated

Shielding: All SMD filters have an integrated RF shielded cover

Handling: Plastic tipped tweezers or a vacuum pick-up tool are recommended for handling the components. For parts without an integrated shield, where there is an exposed pattern on top, extra care should be taken not to scratch the metal pattern.

Assembly:

- PCB layout recommendations can be found on our website and product data sheets.
- Performance is designed considering **2-3 mils finished solder standoff** between the board and part once assembled. Use this goal to calculate the necessary solder apertures considering your desired stencil thickness.
- Solder is not intended to fill the I/O castellations (as you would expect for a via). Solder wetting will form a fillet at the bottom; around 70% of the height of the castellation is acceptable.
- It is recommended to use a profile as recommended by your solder material supplier.
- If using a hot plate for reflow, do not place the board directly onto the hot plate. Using a stainless steel or alumina slab under the board will slow the rate of heat transfer.

Stencil design:

- Stencil apertures should be designed with reduced area from the pad size to get the desired solder joint.
- Too little solder risks a solder joint that is not robust under stresses, while too much solder may affect the part’s function.
- **Excess solder risks flowing up castellations or plated vias to invade the inside of the part, which will impact RF performance.**
- For parts with internal plated vias, the most successful pattern will avoid depositing solder paste directly under vias.

Rework:

- These parts may be reworked, but only at the risk of altering the intended RF performance.
- Touch up or rework with a soldering iron is not recommended. Contacting the ceramic substrate with a hot soldering iron may thermal shock the component, resulting in cracks.
- Hot air rework in combination with base plate heating will mitigate concerns from soldering irons. It is critical to heat the entire part/solder fillet, if rework is necessary.

Reflow Process Recommendations

Solder material recommendations: *See solder alloy recommendations below*

- Solder may be applied as a stencil printing paste or dispensed paste
- The solder alloy listing below shows recommendations for the most common alloys, if planning to use something else, our applications team can provide recommendations

Alloy Composition	Liquidus (˚C)	Typical Peak Temp (˚C)	Typical TAL (sec)	Typical Reflow Cycles
Eutectic Tin-Lead				
63Sn/37Pb	183	210 (max 230)	40-60 (max 90)	2
Near-Eutectic Tin-Lead				
62Sn/36Pb/2Ag	181	210 (max 230)	40-60 (max 90)	2
62.6Sn/37Pb/0.4Ag	182	210 (max 230)	40-60 (max 90)	2
60Sn/40Pb	191	220 (max 240)	40-60 (max 90)	2
Near-Eutectic Pb-free				
95.5Sn/3.8Ag/0.7Cu	220	240 (max 250)	30-60 (max 100)	2
96.5Sn/3Ag/0.5Cu	220	240 (max 250)	30-60 (max 100)	2
95.5Sn/4Ag/0.5Cu	225	245 (max 255)	30-60 (max 100)	2
98.5Sn/1Ag/0.5Cu	227	245 (max 255)	30-60 (max 100)	2

Reflow of Solder Paste:

- It is recommended to use a profile as recommended by your solder material supplier.
- Reflow profiling should be conducted with a thermocouple nearby to ensure parts don't see excessively high temperatures.
- These parts are robust enough to withstand Pb-free temperatures and multiple reflows, with concerns only arising from excessive temperatures or heating/cooling rates
- Exposure to temperatures above 260˚C may affect part integrity and shielding.
- The figure below outlines critical parts of the reflow profile