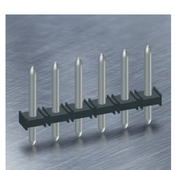
Overview
Connection Technology on Printed Circuit Boards



for catalogues 1 – 6

Electronic

What is THR ?

Through hole technology became popular in the 1950s with the resurgence of the second generation computer and continued its popularity until surface mount technology was developed. Surface mount technology then gained popularity over the through hole technology and became a standard thereafter.

In the beginning, every printed circuit board was assembled using Through Hole Technology. All components were inserted through holes drilled in the circuit boards and soldered either by hand or on the wave.

Over the years, the process was automated and the reflow soldering method with automated assembling (Pick & Place) became widely accepted especially with the enforcement of lead free soldering (RoHS).

Nowadays many electronic components are already surface mounted. A much higher density of components and many more connections per component are possible on a printed circuit board without holes.

Some components, such as terminal blocks, plug connectors, switches or electrolytic capacitors, still had to be soldered on the wave or by hand on the printed circuit board, because they were not suitable for the high mechanical and thermal load.
Due to a mixture of through hole and surface mount components, the soldering process could not be automated completely and therefore incurred greater production costs. To rectify the problem, the components, which were not suitable for this kind of processing, had to be made compatible for the reflow soldering method.

This gave rise to the SMarTconn family of products through which WECO was able to identify and subsequently invent technical solutions to successfully resolve these problems:

1. The through hole reflow technology (THR) was steadily developed and addressed the through-hole reflow applications.

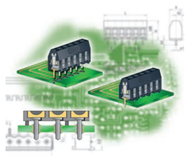
2. The patented product program in genuine SMD technology was invented. Terminal blocks and plug connectors from a size of 3.5 mm pitch and larger could now be surface-mounted.

The Through Hole Reflow Process ...

The through hole reflow process enables the automated assembling and the reflow soldering technique normally used on surface mount components to be applied to THR components as well.

... or the “Pin-in-Paste”-Method

The basis for the integration of THR components in the reflow soldering process is the pin in paste procedure. Precondition for the use of THR components is a printed circuit board with drillings and a correctly cut out and positioned template. Soldering paste is laid via a screen printing system in order to receive an appropriate borehole filling. The arising amount of pushed through solder paste is intended. The components are then placed on the PCB. The pins of the components dip into the holes and push the solder paste through the holes to the other side of the PCB. The action of pushing the solder paste through the holes forms a characteristic match head around each pin. This is followed by the reflow



soldering process. The solder joints created are mechanically and electrically comparable to the classical wave soldering process.

Conclusion

With THR devices, the integration of electrical components into the reflow soldering process enables the production of a single soldering process. This approach is beneficial in substantially reducing production cost and results in process optimisation. In addition, the THR device high-temperature-resistant thermoplastic body is configured for RoHS-compliant production, resulting in the possibility of variant reductions.

What is SMD?

„SMD“ is the abbreviation for Surface Mounted Devices and reunite all surface-assembled components on one circuit board. Often certain manufacturers of electronic and electrical components also use the term “SMD” for THR (Through Hole Reflow) components, but unlike thru hole devices that require drilling holes through which the pins go through the board and are soldered underneath, SMD components are positioned on the PCB surface and soldered afterwards. No more need for holes in the printed circuit board.

History of the SMD

The beginnings of surface mount technology go back to the 1960s, but only became widely used in the 1980s. Mid 1980s, the production of conventional leaded devices soldered directly on the circuit path became a standard.

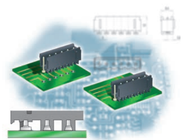
Surface mounted devices (SMD) made it possible to increase the number of components and therefore contributed to many more connections per component. Furthermore, SMD components can be placed on both sides of a printed circuit board. Components are usually secured temporarily with adhesive on the lower side of the PCB, and as soon as the adhesive is hardened, the printed circuit board can be turned upwards to populate the other side. This is followed by the soldering process.

WECO SMD terminals and plug connectors

To fully take advantage of a pure SMD production, the customer needs a wide product range of SMD components. This should include terminals and plug connectors. SMD terminal blocks and plug connectors are undoubtedly a good deal more difficult to achieve than components which are not exposed to a mechanical load, as for example resistors and condensers.

The most important criterion is good and durable soldering at the printed circuit board level. A terminal block or a plug connector has a substantially larger volume than conventional „chip components“ and offers a much larger attack region in order to lever the component off the PCB surface. Therefore soldering connections only at the pins would not be sufficient, and additional reinforcement would be required. Often the problem is resolved by providing additional support with lugs or with separate screw fixation. From our point of view, this is not an ideal solution because using pure SMD technology drillings in a printed circuit board should be avoided. WECO’s range of SMD terminal blocks and plug connectors (pinstrips) are equipped with lateral soldering cylinders, which are placed off-center in order to create a counter anchoring to the pins. Thus, the pins do not have to carry the entire departure load. In addition, these soldering cylinders create a larger soldering surface and achieve a reliable adhesive force on the printed circuit board.

A further challenge in SMD technology for terminal blocks and plug connectors starting at sizes of 3.5 mm pitch and larger, is to ensure an accurate soldering connection of the pins over the entire length of the component. Deviations of the components, within



given tolerances, linear extensions under thermal load during the soldering process and unevenness of the PCB surface, all contribute to factors of mismatch.

To correct this problem, WECO developed the patented principle of movable soldering elements. WECO’s line of SMD terminals and plug connector are equipped with soldering pins and anchor elements, called “floating anchors”. This ensures a freedom of movement in both lateral and vertical directions, which in turn ensures excellent co-planarity performance.

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Extract of connection technology on PCBs

WECO®

Pitch	3,5 mm			
Series	Series 110	Series 210	Series 93	Series 93
Rated cross section	1,5 mm²	1 mm²	1 mm²	- - -
Approvals (UL)	300 V/8 A/30-16 AWG [1]	300 V/10 A/30-16 AWG	300 V/10 A/26-16 AWG	150 V/6 A
Approvals (CSA)	300 V/8 A/30-16 AWG [1]	300 V/10 A/30-16 AWG	300 V/10 A/26-16 AWG	150 V/6 A
Type of product	110-A-111 (1) 2-24 poles	210-A-111 (1) 2-24 poles	930 (1) 2-24 poles	931-SLR-THR (1)(6) 2-16 poles
	110-M-211 (1) 2-24 poles	210-A-121 (1) 2-24 poles	930-THR (1)(6) 2-12 poles	931-SLT-SMD-1,3 (1)(6) 2-16 poles
	110-M-221-THR (1)(6) 2-12 poles	210-A-126-SMD (1)(6) 2-12 poles	931 (1) 2-24 poles	931-SLR-THR-1,1 (1)(6) 2-16 poles
	110-P-215 (1) 4-44 poles	210-A-SMD (1)(6) 2-12 poles	934-THR-DS (1)(6) 2-24 poles	931-SLR-THR-1,3 (1)(6) 2-16 poles
	110-V-215 (1) 2-22 poles		938-FLDS (1) 6 A/28-20 AWG 2-16 poles	931-FST (1) poles

Pitch	5 mm						
Series	Series 120	Series 140	Series 95	Series 95 / Series 115	Series 97	Series 97	Series 97
Rated cross section	2,5 mm²	1,5 mm²	1,5 mm²	1,5 mm²	2,5 mm²	2,5 mm²	- - -
Approvals (UL)	300 V/15 A/26-12 AWG [1]	300 V/10 A/30-14 AWG	300 V/15 A/26-14 AWG	300 V/10 A/26-14 AWG [1]	300 V/20 A/22-12 AWG [2]	300 V/20 A/22-12 AWG	300 V/10 A
Approvals (CSA)	300 V/15 A/26-12 AWG [1]	300 V/15 A/30-14 AWG	300 V/15 A/26-14 AWG	300 V/10 A/26-14 AWG [1]	300 V/20 A/26-12 AWG [2]	300 V/20 A/26-12 AWG	300 V/10 A
Type of product	120-A-111 (2) 2-24 poles	140-A-111 (2) 2-24 poles	950 (2) 2-32 poles	950-FL-DS (2) 2-24 poles	970 (2) 2-32 poles	971 (2) 2-32 poles	971-SLR-SMD-1,3 (2)(6) 2-12 poles
	120-D-121 (2) 2-24 poles	140-A-126-SMD (2)(6) 2-12 poles	950-D-SMD-DS (2)(6) 2-12 poles	950-RFL-DS (2) 2-12 poles	970-EN (2) 4-24 poles	971-LH (2) 2-12 poles	971-SLR-THR (2)(6) 2-12 poles
	120-M-151 (2) 4-48 poles	140-B-111 (2) 2+3 poles	950-THR (2)(6) 2-12 poles	958-FLDS (2) 2-8 poles	970-LH (2) 2-12 poles	971-THM (2) 2+3 poles	971-SLS (2) 2-24 poles
	120-M-191 (2) 2-24 poles	140-C-111 (2) 2-24 poles	951-LH (2) 2-12 poles	950-SLS (2) 2-24 poles	970-THR (2)(6) 2-12 poles	974-D-SMD (2)(6) 18-12 AWG 2-12 poles	971-SLT-SMD (2)(6) 2-12 poles
	120-M-221-SMD (2)(6) 2-12 poles		951-THG (2) 2+3 poles	115-F-111 (2) 2-12 poles	970-TX.. (2) 1 poles		971-SLW (2) 2-24 poles

Pitch	5,08 mm			
Series	Series 121	Series 141	Series 94	Series 96
Rated cross section	2,5 mm²	1,5 mm²	1,5 mm²	2,5 mm²
Approvals (UL)	300 V/15 A/26-12 AWG [1]	300 V/10 A/30-14 AWG	300 V/15 A/26-14 AWG	300 V/20 A/22-12 AWG
Approvals (CSA)	300 V/15 A/26-12 AWG [1]	300 V/15 A/30-14 AWG	300 V/15 A/26-14 AWG	300 V/20 A/26-12 AWG
Type of product	121-A-111 (3) 2-24 poles	141-A-111 (3) 2+3 poles	940 (3) 2-32 poles	960 (3) 2-32 poles
	121-C-111 (3) 2-24 poles	141-A-121 (3) 2+3 poles	940-T (3) 2+3 poles	961 (3) 2-32 poles
	121-M-121 (3) 2-24 poles	141-C-111 (3) 2+3 poles	941 (3) 2-32 poles	964-T (3) 2+3 poles
	121-M-161 (3) 4-48 poles		941-T (3) 2+3 poles	968 (3) 2-32 poles

Pitch	7,5 mm		10 mm	10,16 / 12,7 mm
Series	Series 122	Series 97	Series 91	Series 158/159
Rated cross section	2,5 mm²	2,5 mm²	4 mm²	10 mm²
Approvals (UL)	300 V/15 A/26-12 AWG	300 V/15 A/22-12 AWG	300 V/25 A/18-10 AWG	cULus
Approvals (CSA)	300 V/15 A/26-12 AWG	300 V/20 A/26-12 AWG	300 V/25 A/22-10 AWG	300 V/60 A/20-6 AWG
Type of product	122-A-111 (4) 2-12 poles	977 (4) 2-8 poles	910 (5) 2-12 poles	158-A-111 (5) 2-12 poles
	122-D-111 (4) 2-12 poles	977-OPSG (4) 2-19 poles	910-Y (5) 2-12 poles	158-A-211 (5) 2-12 poles
	122-M-111 (4) 2-12 poles	977-T (4) 2+3 poles		cULus 600 V/60 A/20-6 AWG
	122-M-121 (4) 2-12 poles			159-A-111 (5) 2-12 poles
				159-A-211 (5) 2-12 poles

Catalogues
1 Pitch 3,5 mm
2 Pitch 5 mm
3 Pitch 5,08 mm
4 Pitch 7,5 mm
5 Pitch >10 mm
6 SMD & THR

[1] AWG information not valid for pin strips
[2] AWG information not valid for socket terminals (..-FB)

Technical modification reserved.
For detailed information please see our data sheet on www.wecogroup.com