

**Increased Reliability and Quality with the Assistance by IPC Standards**

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## ABSTRACT

The use of electronics in modern societies has from the beginning of 1950<sup>th</sup> increased dramatically. The number of PCBA (Printed Circuit Boards Assembled) used/consumed in the whole world reach several billion per year. At the same time the complexity of components and bare boards been goon from simple circuits to a sophisticated electronic product, which needs to play together with the components, design, and choice of base material, PCB (Printed Circuit Board “bare board”, assembling, soldering, touch up, cleaning, conformal coating and test. To be able to do that it is a need of international accepted standards to avoid problems in the reliability and quality of the electronic products we all need today.

## HISTORICAL BACKGROUND

How many remember today that 1958 the state of the art regarding components was a radio tube, see Figure 1.

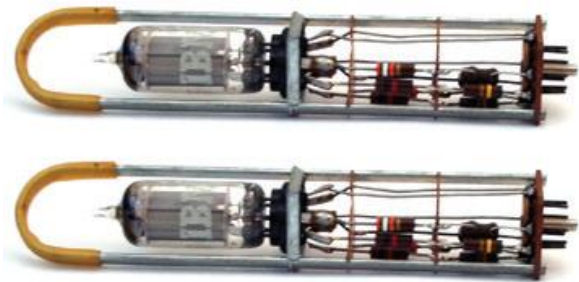


Figure 1. Radio Tube 1958

Just 4 years later 1962 the electronic industry was producing the following type of PCBA, see Figure 2.

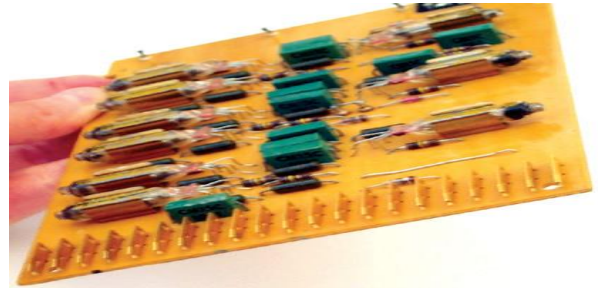


Figure 2. A PCBA 1962

Ten years later in the middle of 1970<sup>th</sup> the market saw the first microprocessor and in the end of the same decade Motorola launched the MC68000. A PCBA could look like Figure 3.

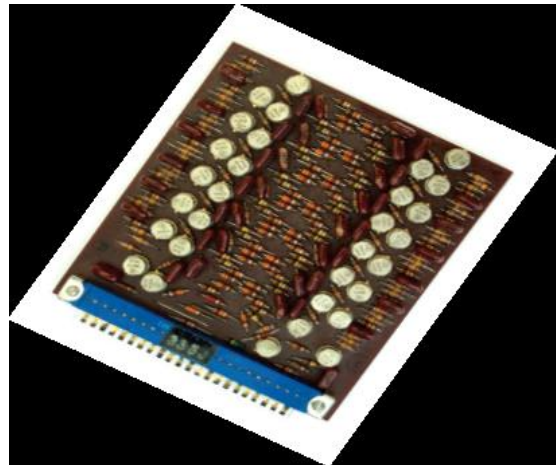


Figure 3. PCBA 1981

During the last 10 years the component development have passed at least two revolutions, see figure 4.

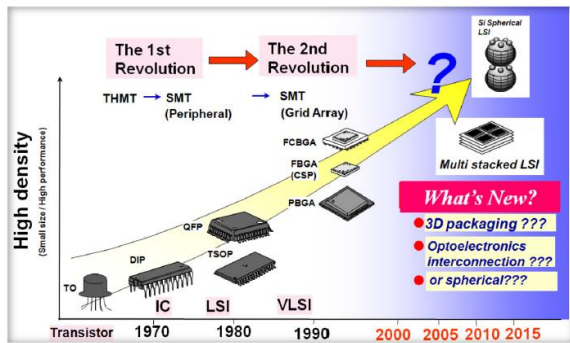


Figure 4. The Japan Jisso Technology revolution towards the 21st Century.

Parallel with the components development the PCB had also gone from single sided boards without any PTH (Plated Through Holes) to PCBs with MV (Micro Vias) and embedded components, see figure 5.

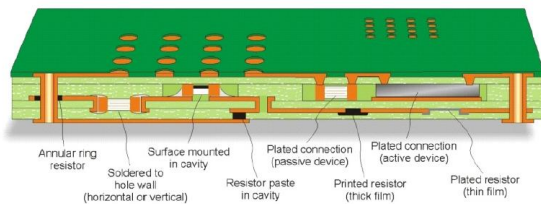


Figure 5. PCB with MV and embedded components.

The coming years both the development of the components and the PCBs will continue and POP (Package On Package) will be more common, see Figure 6.

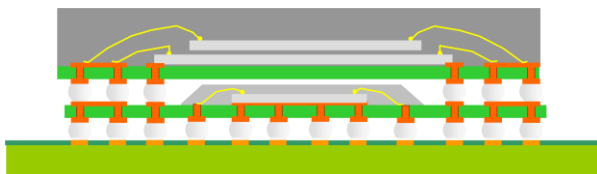
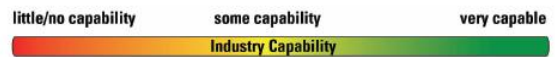


Figure 6. POP

## NEW DEMANDS AND CHALLENGES

Not only have the technical improvements been given the electronic industry some challenges over the last 60-70 years. Also environmental legislations like RoHS 1 and 2 plus REACH, EUP and conflict materials have been factors which have made the production of electronic hardware more difficult. See Figure 7.



PCBA Technology	63Pb/37Sn		
	Connection Type	SAC Alloys	
	Non-SAC Alloys		
	Solderless		
Device Size	0603	0603	0402
	0402	0201	01005

Figure 7. PCBA Technology and RoHS

## HOW CAN IPC STANDARDS ASSIST?

In many areas in the electronic industry the OEM (Original Equipment Manufacturer) are demanding that the EMS (Electronic Manufacturing Service) shall deliver IPC Class 3 according to IPC-610E. What a majority of the OEMs forget that it will be very difficult for the EMS companies to reach IPC Class 3 if not the design have the same IPC class. To be able to do that many IPC standards have to be followed, see Figure 8.

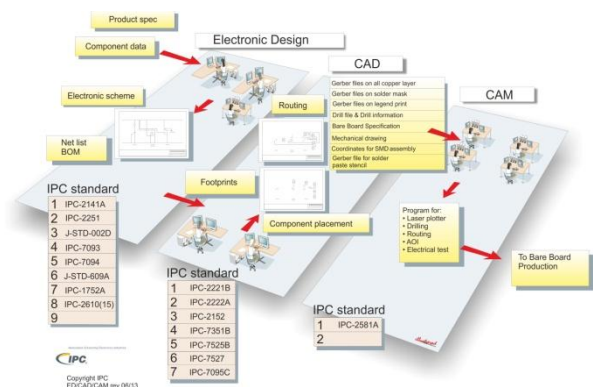


Figure 8. IPC Standards in the design area



## NEED OF AN IPC CHECKLIST

This chain of hardware production include around 30 parameters, where every parameter have a number of different variables. If every variable have an influence on all other variables the theoretical number of combinations will be, see figure 12.

## Number of Combinations

4200 000 000 000 000 000 0

4,2 E19!!

Figure 12. Number of combinations

To be able to have some control of all this combinations you need an IPC Checklist, see figure 13.

## IPC CHECKLIST for producing Rigid PCBA's



Developed by: Lars Wallin, IPC European Representative

Figure 13. IPC Checklist.

## CONCLUSION

Without a systematical use of IPC standards throughout the entire production chain of electronic hardware it will be hard to obtain a good yield for PCBAs and put them on the market as legal.