

## Lead Free HFC-4S Product Change Notification

### Lead-free Package

Cologne Chip's leaded HFC-4S is replaced by a lead-free version. Pinning of lead-free HFC-4S remains the same. It is assured that existing PCB layouts do not require any adaption.

Also the part number of lead-free HFC-4S remains unchanged, but the new version can be clearly identified by week code: Week codes dated later

than 2004-19 reveal lead-free ICs (chip marking code: WWYY, e.g. 1904). Moreover the commonly used logos for "Pb-free" and "RoHS compliant" are printed next to the part number barcodes on the Cologne Chip bag label (see Illustration 1).

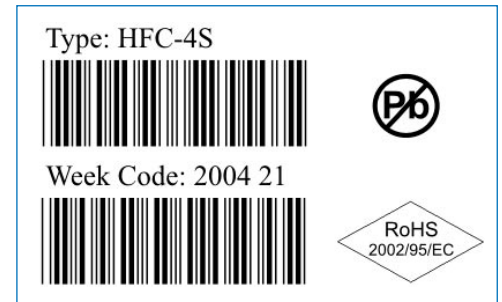


Illustration 1: Bag label for Pb-free products

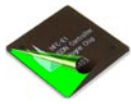
### Compatibility

Cologne Chip's lead-free MQFP packages are **backward compatible** to conventional leaded manufacturing methodologies. This backward compatibility allows customers to surface mount lead-free packages onto lead-based PCBs and/or use Pb-free packaging with lead-containing solders. Customers can now procure a single, lead-free component from Cologne Chip and use it in either a leaded or lead-free manufacturing environment without any issues. This capability greatly simplifies the inventory management challenges associated with migration from conventional lead-based to lead-free manufacturing.

Cologne Chip lead-free packages of HFC-4S have MSL3 classification (Moisture Sensitivity Level 3) and comply with the most current JEDEC JSTD-020C standard (more detailed information on these standards is available upon request). Moreover lead-free HFC-4S is fully RoHS compliant.

### Solder Reflow Profile for lead-free HFC-4S

The reflow soldering process for lead-free MQFP packages is very similar to conventional solder reflow process (e.g. Sn-Pb eutectic assembly). Often the same equipment set and process steps used for leaded soldering can be used for lead-free soldering. The applied solder reflow profile for standard surface mount components accords to JEDEC JSTD-020C.



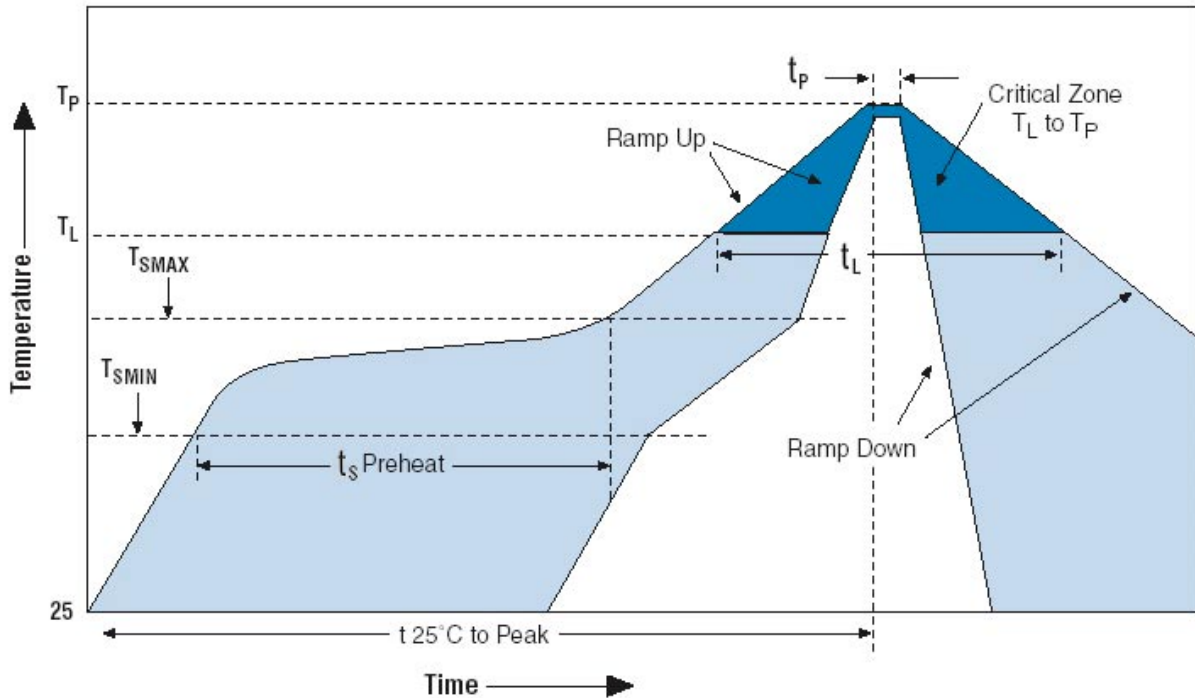
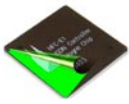
However there are some important facts that must be taken into account for lead-free soldering as the material set used for lead-free soldering is different and higher reflow temperatures are required. Lead-free solder typically melts at a temperature 35°C higher than traditional tin/lead solder. Therefore two important differences in solder reflow profile are the higher melting temperature at 217°C as well as higher peak reflow temperature at 245°C.

Both types of assemblies are represented in following Table 1: **Sn-Pb eutectic** (conventional leaded solder paste) and **Pb-free** (lead-free solder paste). Please take note of the characteristic differences in profil.

The corresponding graph for both types of profile is shown in Graph 1.

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C/second max.	3°C/second max.
Preheat <ul style="list-style-type: none"> <li>– Temperature Min (<math>T_{SMIN}</math>)</li> <li>– Temperature Max (<math>T_{SMAX}</math>)</li> <li>– Time (min to max) (<math>t_S</math>)</li> </ul>	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
$T_{SMAX}$ to $T_L$ <ul style="list-style-type: none"> <li>– Ramp-up Rate</li> </ul>		3°C/second max
Time maintained above: <ul style="list-style-type: none"> <li>– Temperature (<math>T_L</math>)</li> <li>– Time (<math>t_L</math>)</li> </ul>	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature ( $T_P$ )	225 +0/-5°C	245 +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_p$ )	10-30 seconds	20-40 seconds
Ramp-down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

**Table 1:** Soldering Reflow Profile of HFC-4S for Sn-Pb Eutectic and Pb-free Assembly



**Graph 1:** Soldering Reflow Profile of HFC-4S

The Sn-Ag-Cu (tin-silver-copper) family of solder alloys is most commonly used for replacing Sn-Pb solder in SMT manufacturing. The major factors contributing to the development of an optimal thermal profile are the size and weight of the assembly, the density of components, the mix of large and small components and the solder paste chemistry being used.

Should you require more detailed information on this issue or have any questions regarding the conversion of Cologne Chip products, please write an e-mail to [support@colognechip.com](mailto:support@colognechip.com) We will be glad to assist.

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Relevant sources of this information can be downloaded from the following websites:

1. JEDEC JSTD-020C: <http://www.jedec.org/>