

### **iC-Haus Lead-Free Policy**

With the adoption of EU directive RoHS (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) the ban on lead (Pb) and other hazardous substances now has a legal basis and a fixed schedule. Japanese manufacturers in particular have in the past few years pushed the introduction of lead-free electronics, especially those found in home entertainment and household appliances. It is thus to be expected that a widespread adaptation of such goods will take place long before the statutory deadline of July 1 2006.

The legal directives RoHS, WEEE (Waste Electrical and Electronic Equipment) and ELV (End-of-Life Vehicles) stipulate a number of special rules and exemptions which are applicable to areas where particularly high demands are made on reliability. These include industrial electronics, certain sections of communications technology (e.g. servers and exchanges), medical equipment and automotive electronics. Considerable progress on lead-free devices has been made towards achieving levels of reliability comparable to that for products which contain lead and have an existing long-term experience. The spread of the ban on lead to areas of the electronics industry currently exempt from these restrictions is thus only a question of time.

Products manufactured by iC-Haus are largely concentrated in the areas of industrial and automotive engineering to which the directives' exemptions presently apply. Thus iC-Haus ensures that tin/lead platings will continue to be available, but on clients' special request, only. Following the regularly updated time schedule (<http://www.ichaus.de>) iC-Haus provides its customers with products which are lead-free. The main alternatives to tin/lead-plated pins are pure (matte) tin platings or what are known as pre-plated surfaces (nickel/palladium/gold or NiPdAu and nickel/palladium or NiPd platings).

The next step from lead-free component surface to lead-free printed board requires that components are processed using lead-free solders. Most of the established, lead-free solders have higher melting temperatures. In their joint standard J-STD-020 from June 2007 IPC and JEDEC differentiate between "tin/lead eutectic" and "lead-free" soldering with regard to permitted reflow temperatures. The conversion to lead-free soldering thus requires to reassess moisture sensitivity levels (the permitted processing time after the moisture-proof bag has been opened).

EU directive 2002/95/EC Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS): <http://europa.eu.int>

EU directive 2002/96/EC Waste Electrical and Electronic Equipment (WEEE): <http://europa.eu.int>

EU directive 2000/53/EC End-of-Life Vehicles (ELV): <http://europa.eu.int>

IPC/JEDEC J-STD 020 Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices: <http://www.jedec.org>

IPC/JEDEC J-STD 033 Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices: <http://www.jedec.org>

## Handling and soldering

### General Precautions With Moisture-Sensitive Devices

Plastic and COB-assembled ICs are sensitive to temperature shocks and especially to reflow soldering (the popcorn effect).

The cause of the popcorn effect is the enclosed moisture which can lead to cracks in the package with a sudden rise in temperature. All shapes and sizes of package for surface-mounted components are sensitive to this effect; the sensitivity increases with the thermal stress from the respective soldering process.

Components delivered without any form of protection against moisture should therefore either be baked or stored permanently in a dry environment, in both cases until immediately prior to soldering. The user is responsible for the qualification of the preparation and further processing of the ICs. The iC-Haus guarantee does not cover damage which may occur during processing, such as that caused by the popcorn effect during soldering.

Optionally, iC-Haus can deliver devices sealed in damp-proof bags with a drying agent and moisture indicator. Even in the case of unfavorable storage conditions, such as temperatures of up to 40 °C and 90% relative humidity (RH), devices in dry packs can be stored for at least 12 months from their sealing date. If the indicated residual moisture inside the dry pack exceeds 10% RH, the devices should be baked before soldering.

## Assembly Hints / Preconditioning

### Standard Plastic SMD-Package Models

After opening the dry pack, devices must be mounted within the time specified on the label (in factory conditions of maximum 30 °C / 60% RH) or must be stored at < 10% RH. Devices require baking before mounting if the Humidity Indicator Card shows > 10% when read at 23 °C ±5 °C or if the conditions mentioned above are not met. Devices may be baked for 48 hours at 125 °C using high-temperature device containers.

### Tape-and-Reel

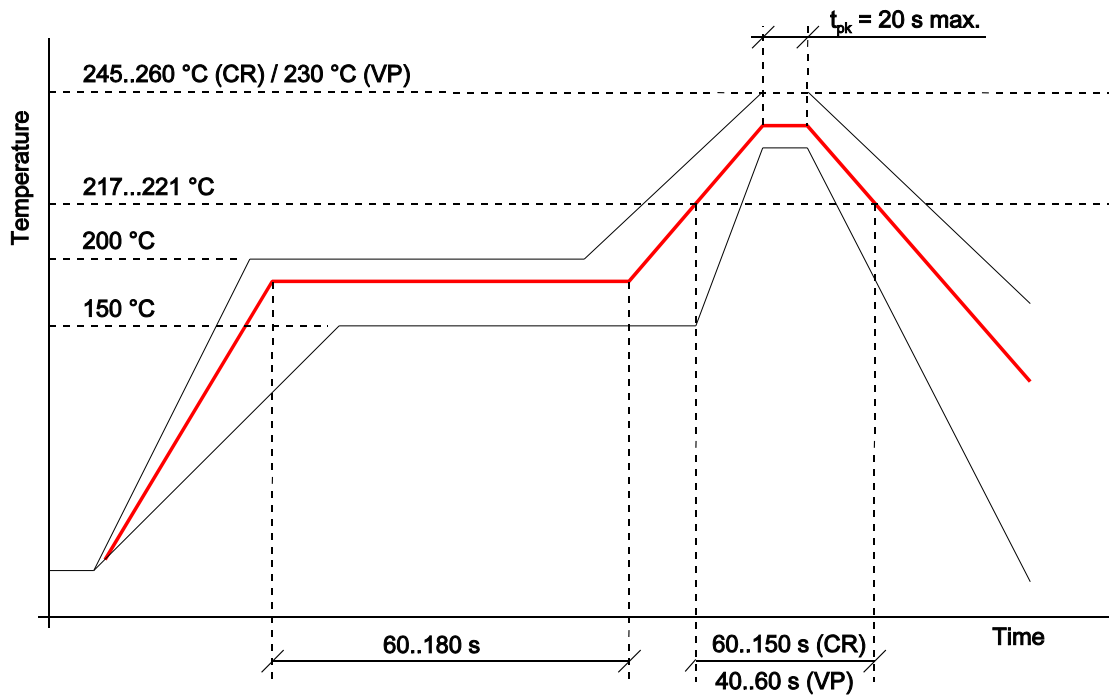
These containers cannot be subjected to high temperature. Reference IPC/JEDEC J-STD-033 for bake procedure.

### COB-Package Models

After opening the dry pack, devices must be mounted within 8 hours (in factory conditions of maximum 30 °C / 60% RH) or must be stored at < 10% RH. Devices require baking before mounting if the Humidity Indicator Card shows > 10% when read at 23 °C ±5 °C or if the conditions mentioned above are not met. Devices may be baked for 72 hours at 100 °C using high-temperature device containers (trays).

Repetitive or excessive baking may reduce the solderability and shall be avoided.

**Recommended Reflow Soldering Conditions following IPC/JEDEC J-STD-020**



	maximum
Temperature maintained between 150 and 200 °C	180 s
Temperature maintained above 217 °C	
Convection Reflow (CR)	150 s
Vapor Phase (VP)	60 s
Ramp-Up Rate	+3 °C/s
Peak Temperature ( $t_{pk}$ )	
Convection Reflow (CR) <sup>1)</sup>	245 to 260 °C
Vapor Phase (VP)	230 °C
Time to Peak Temperature	8 min
Time within 5 °C of actual Peak Temperature	20 s
Ramp-Down Rate	-6 °C/s

1) Stated on the outer package label. Depends on MSL and body size. See also J-STD-020D for details.