

Midcom Policy Statement on RoHS Compliance And Lead-Free Products

General Environmental Policy

Midcom is committed to the manufacture of environmentally-friendly products and is accomplishing this in part through the elimination of *lead* and other hazardous substances in its manufacturing processes and products. This is in compliance with the European Union's RoHS and WEEE directives, other international regulations, and customer's 'Green Procurement' guidelines.

Elimination of Banned Substances and Lead-free Compliance

The European Parliament and the Council of the European Union created a program that standardizes the restriction and use of hazardous substances within the EU while contributing to the protection of human health and the environment. This directive is called The Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC. A companion directive is called Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC. Midcom is committed to eliminating the use of the hazardous substances listed in the RoHS directive and will do so well ahead of the 1 July 2006 deadline. The restricted hazardous substances listed are lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium (Cr VI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

As part of this directive, the deliberate use of *lead* in terminal (pin) plating and solder connections is replaced with 100% tin (Sn) coatings and *lead-free* solder alloys. Midcom *lead-free* products are offered to the customer with terminals (pins) that are 100% Tin (Sn), Tin-Silver (Sn96Ag4), Tin-Copper (Sn98Cu2), or Tin-Silver-Copper (Sn96Ag3.5Cu0.5) coated. High melting temperature solders that contain more than 85% *lead* are currently exempt under the RoHS directive because of the lack of a suitable high temperature, *lead-free* replacement. This type of solder is typically used for internal connections only while the external terminals (pins) are *lead-free**

**Lead-free* is not completely free of *lead* as the name implies but contains a trace amount as an impurity. An impurity is defined as a substance not intentionally used or added but whose presence is naturally occurring and technically impossible to eliminate during raw material refining processes.

Lead-free Implementation

Midcom is transitioning to *lead-free* products according to specific customer requests while continuing to provide *lead-based* products for those customers that are not *lead-free*. Midcom expects that throughout 2004 and 2005 a significant portion of products will become *lead-free*, although customers may continue to order *lead-based* product at any time. Products that are *lead-free* and/or RoHS-compliant are identified on the specification sheet and by an 'LFX' after the part number. The 'x' denotes the *lead-free* solder alloy or plating on the terminals (pins) that interconnects with the printed circuit board.

Qualification

Midcom products are classified according to IPC/JEDEC J-STD-020C.

Reflow Profiles

Surface Mount Devices (SMD)

Midcom recommends solder profiles based on IPC/JEDEC J-STD-020C. Figure 1 shows a typical profile. Tables 1 and 2 list the reflow parameters and temperatures. Exceeding these conditions may cause lowered product reliability.

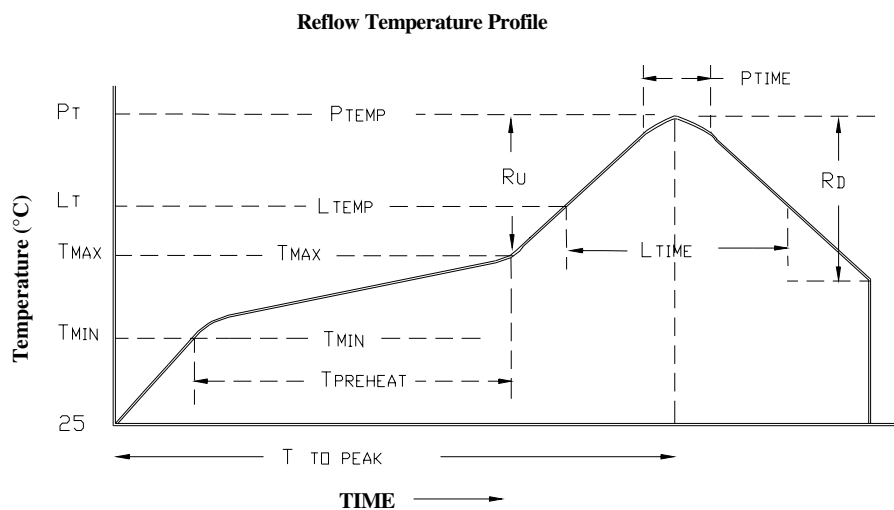


Figure 1

REFLOW PARAMETER	TEMPERATURE
Preheat Temperature ($T_{MIN}-T_{MAX}$)	150°C - 200°C
Preheat Time ($T_{PREHEAT}$)	60 - 180 seconds
Ramp-up Rate ($Ru T_{MAX}-P_{TEMP}$)	3°C/second maximum
Time Above 217°C (L_{TEMP})	60 - 150 seconds
Peak Temperature (P_{TEMP})	See Table 2
Time Within 5°C of Peak (P_{TIME})	20 - 40 seconds
Ramp-down Rate (R_D)	6°C/second maximum
25°C to Peak Temperature ($T_{TO PEAK}$)	8 minutes maximum

Table 1

Peak Temperatures – Lead-Free

PACKAGE THICKNESS	VOLUME mm ³		
	<350	350 - 2000	>2000
<1.6mm	260 +0-5°C	260 +0-5°C	260 +0-5°C
1.6mm - 2.5mm	260 +0-5°C	250 +0-5°C	245 +0-5°C
≥2.5mm	250 +0-5°C	245 +0-5°C	245 +0-5°C

Temperature measured on top surface of component body

Table 2

Through-Hole Devices (THD)

These products are able to withstand a maximum wave solder temperature of 260°C for 10 seconds. Table 3 shows a typical temperature/time profile.

PREHEAT TEMP/TIME	SOAK TEMP/TIME	REFLOW TEMP/TIME	COOL TEMP/TIME
25°C - 150°C 60s	150°C - 160°C 120s	160°C - 230°C 30 - 60s	230°C - 150°C 60s

Table 3

Conclusion

Midcom is transitioning to *lead-free* products according to specific customer requests while continuing to provide *lead-based* products for those customers that are not *lead-free*. Midcom closely monitors *lead-free* and *tin whisker growth* research and development projects and initiatives. Midcom is continually researching cost effective materials capable of withstanding the higher temperatures that are associated with *lead-free* soldering.

FAQ's

Does the RoHS Directive only apply to lead (Pb)?

Lead is just one of several banned substances in the directive. While the industry has adopted the phrase '*lead-free*', removing only *lead* will not achieve RoHS compliance.

What is the composition of the lead-free plating material on the terminals (pins)?

Plating is pure matte tin with an underlying layer of nickel.

Is this plating compatible with lead-based PCB materials and processes?

Pure matte tin is compatible with *lead-based* and *lead-free* printed circuit board solder processes and solder alloys.

How are lead-free products identified?

Lead-free products will have an 'LFx' identifier after the part number. The 'x' denotes the *lead-free* solder type. A 'Pb-free' symbol will be present on all minimum packaging containers.

Will all products transition to lead-free at the same time?

The *lead-free* implementation schedule is based on the market and customer's requirements.

Is there a cost-adder for lead-free products?

Midcom does not expect a significant increase in cost but we reserve the right to make adjustments if component changes occur or additional processing is required because of revised moisture sensitivity classification levels, more stringent solder profiles, or material cost increases.

Are there differences in product reliability or performance?

Midcom expects no change in reliability or electrical performance because of the changeover to *lead-free* practices, although a change in the moisture sensitivity classification level on certain products may occur.

Will Midcom provide recommended lead-free solder profiles?

Midcom will provide at the request of the customer recommended *lead-free* solder profiles for the type of product that the customer purchases.

Pure tin plating is susceptible to "tin whisker growth". What controls are in place to mitigate this growth?

The phenomenon called whisker growth was first documented in 1946. While its existence has been known for more than 50 years, the mechanisms that control the whisker formation and growth and its prevention remain elusive. Nevertheless, certain whisker mitigation practices such as reflowed tin, hot dipped tin, matte tin over nickel, and annealed matte tin over copper are in use today. Midcom uses a matte tin terminal (pin) plating with a nickel underlay to mitigate the whisker growth.

How can I obtain samples of lead-free products?

The toll-free telephone number is 1-800-643-2661.