

**Würth Electronics Midcom Inc.**  
121 Airport Drive · P.O. Box 1330 · Watertown SD 57201-6330, USA  
T: +1 (605) 886 4385 · Toll Free: +1 (800) 643 2661  
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## Würth Electronics Midcom Policy Statement on RoHS Compliance And Lead-Free Products

### General Environmental Policy

Würth Electronics 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 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. The EU has published Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment and Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast). These directives are commonly referred to as the RoHS and RoHS2 directives. The restricted hazardous substances listed in the directives are lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium (Cr VI), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE).

Würth Electronics Midcom has eliminated the use of the hazardous substances and did so well ahead of the 1 July 2006 deadline.

As part of this directive, the use of *lead* in terminal (pin) plating and solder connections is replaced with 100% tin (Sn) coatings and *lead-free* solder alloys. Würth Electronics 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.

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## Lead-free Implementation

Würth Electronics Midcom has transitioned to *lead-free* products while continuing to provide *lead-based* products for those customers that are not *lead-free*. Customers may continue to order *lead-based* product at any time. RoHS and *lead-free* compliance are identified on the product specification sheet. Also identified is the *lead-free* solder alloy or plating on the terminals (pins) that interconnects with the printed circuit board.

## Qualification

Würth Electronics Midcom products are classified according to IPC/JEDEC J-STD-020D.1

## Reflow Profiles

Surface Mount Devices (SMD)

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

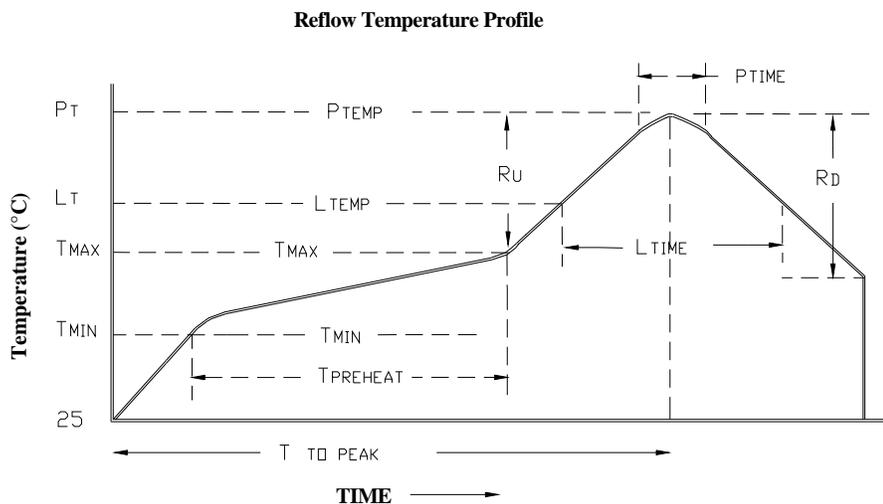


Figure 1

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REFLOW PARAMETER	TEMPERATURE
Preheat Temperature ( $T_{MIN}-T_{MAX}$ )	150°C - 200°C
Preheat Time ( $T_{PREHEAT}$ )	60 - 120 seconds
Ramp-up Rate ( $R_u T_{MAX}-P_{TEMP}$ )	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 ( $P_{TIME}$ )	30 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 <sup>3</sup>	VOLUME mm <sup>3</sup>	VOLUME mm <sup>3</sup>
	<350	350 - 2000	>2000
<1.6mm	260°C	260°C	260°C
1.6mm - 2.5mm	260°C	250°C	245°C
≥2.5mm	250°C	245°C	245°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

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## ***Conclusion***

Würth Electronics Midcom has transitioned to *lead-free* products while continuing to provide *lead-based* products for those customers that are not *lead-free*. Würth Electronics Midcom closely monitors *lead-free* research and development projects and initiatives. Würth Electronics 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 substances are banned in the RoHS Directive?***

The banned substances are:

Mercury (Hg  $\leq$ 1000ppm), lead (Pb  $\leq$ 1000ppm), cadmium (Cd  $\leq$ 100ppm), hexavalent chromium (Cr<sup>6</sup>  $\leq$ 1000ppm), polybrominated biphenyls (PBB  $\leq$ 1000ppm), polybrominated diphenyl ether (PBDE  $\leq$ 1000ppm), decabromodiphenyl ether (DecaBDE  $\leq$ 1000ppm), octabromodiphenyl ether (OctaBDE  $\leq$ 1000ppm), pentabromodiphenyl ether (PentaBDE  $\leq$ 1000ppm).

However, some products may contain *lead* in applications that are exempted from the restriction in Article 4(1). The exemptions are listed in Annex III and those that are applicable to some Midcom products are:

- 6(a) - *Lead* as an alloying element in steel for machining purposes and I galvanneal galvanized steel containing up to 0.35 % lead by weight.
- 6(c) - Copper alloy containing up to 4 % lead by weight.
- 7(a) - *Lead* in high melting temperature type solders (i.e. lead- based alloys containing 85 % by weight or more *lead*)
- 7(b) - *Lead* in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission, and network management for telecommunications.

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- 7(c)-I - Electrical and electronic components containing *lead* in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound.
- 7(c)-II - *Lead* in dielectric ceramic in capacitors for a rated voltage of 125 VAC or 250 VDC or higher.

***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?***

All *lead-free* products are identified on the product specification sheet.

Some *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?***

All products are *lead-free*. Customers may continue to order *lead-based* products.

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

Würth Electronics Midcom reserves 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?***

Würth Electronics 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 Würth Electronics Midcom provide recommended lead-free solder profiles?***

A *lead-free* solder profile and other information is available on the Würth Electronics Midcom website located at [www.we-online.com/midcom](http://www.we-online.com/midcom). Click on About Us/ Certifications and Registrations/Environmental Compliance.

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

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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. Würth Electronics 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.