



Implementation of Lead Free Products At Microsemi Power Products Group - Switching Compliance with the RoHS 2002/95 Directive

In response to the increased focus on environmental preservation across the globe, the need for highly-reliable and environmentally-friendly components suitable for use in electronic assemblies is receiving increasing attention within the semiconductor manufacturing industry.

To facilitate one of these global environmental initiatives, Microsemi Power Products Group (Switching) is committed to work with our customers to support the directives enacted by the European Union titled "The Restrictions of the use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2004 " (commonly referred to as "RoHS").

The principle impact of these directives on Microsemi Power Products Group (Switching) is the requirement to eliminate the use of lead containing solders for our terminal finishes. In this regard, Microsemi Power Products Group (Switching), has developed products with lead-free terminal finishes that comply with the requirements of these directives. These regulations take affect in July of 2006.

While the industry is in the transition phase, Microsemi Power Products Group (Switching) will strive to minimize any impact on our customers that the move to RoHS compliant products will entail. We believe that our preferred lead-free terminal solder (SAC solder) is compatible with the majority of solders used in our industry (a variety of leaded and lead-free solders have been tested by various industry groups in combination with SAC solders). However, the customer must confirm the use of SAC solder in their specific applications.

Based on the input from our customers, for most of our standard product lines, we plan to phase out the use of leaded terminal solders before the July 2006 dead line. Leaded solders will continue to be an option for custom products, as requested by the customer.

With the exception of the use of leaded terminal solder, all of Microsemi Power Products Group (Switching) products are already in full compliance with all the other substances as listed in the current version of the RoHS directives. These are hexavalent chromium, mercury, cadmium, polybrominated biphenyls, and polybrominated diphenyl ethers.

Frequently Asked Questions:

- **When will Microsemi Power Products Group (Switching) have RoHS compliant products available?:** As of Jan 2005, Microsemi Power Products Group (Switching) has developed and tested and is prepared to supply all standard commercial products with lead-free external terminal finishes. These products will be in full compliance to the RoHS directives.

- What is Microsemi Power Products Group (Switching) RoHS transition plan?: By July 2006, which is the deadline for implementation of the RoHS directives, Microsemi Power Products Group (Switching) plans to transition all our standard products to RoHS compliant products. We will work with our customers to minimize any disruptions during this transition. Non-RoHS compliant parts may still be available as a custom option as required by the customer.
- Why do we call our products “RoHS Compliant” vs “Lead-Free”?: The RoHS directives are commonly referred to as the “Lead-free” regulations. Many in our industry use the term “Lead-Free” even though the directive covers a number of other hazardous materials and it contains a number of exemptions allowing the use of lead in certain cases. The internal die-attach solder materials used in all Microsemi Power Products Group (Switching) standard products fit one of these exemption from the RoHS directives since they are high melting point solders which contain more than 85% lead. This exemption may be found in RoHS Directive 2002/95/EC, Schedule 3 line item 7. This exemption was granted by the RoHS Committee because no suitable lead-free alternative material has been identified within the industry for high reliability die attach applications. Therefore, Microsemi Power Products Group (Switching) RoHS compliant products are not “Lead-Free”.
- What is SAC Solder?: The primary RoHS compliant lead-free terminal finish adopted for use at Microsemi Power Products Group (Switching) will be 96.5Sn/3.0Ag/0.5Cu solder (tin-silver-copper), or SAC. SAC solder is one of the main lead-free alternative materials being adopted in the electronics industry. There is a vast amount of literature available on SAC solder. SAC solder has a melting point of 217-220 C. Many studies tend to indicate that SAC solders are compatible in mixed applications of leaded and lead-free solders (the customer must verify this with their own specific applications).
- What Microsemi Power Products Group (Switching) packages will be moving to SAC terminal solder?: SAC solder will be Microsemi Power Products Group (Switching) standard RoHS compliant option for TO-220, TO-247, T-Max, TO-264, TO-264-Max. Microsemi Power Products Group (Switching) will offer SAC solder as an option for all hermetic packages.
- What about Microsemi Power Products Group (Switching) surface mount packages?: For TO-268 (surface mount) packages, only pure annealed matte tin plate will be available for RoHS compliant products.
- What about Microsemi Power Products Group (Switching) SOT-227 packaged products?: The existing design of Microsemi Power Products Group (Switching) SOT-227 (ISOTOP) packages are already fully RoHS compliant (the terminals are lead-free). No changes in the design of are planned for SOT-227 packaged products in response to RoHS.
- What other RoHS compliant terminal solders are available at Microsemi Power Products Group (Switching)?: Microsemi Power Products Group (Switching) has also qualified pure matte tin plating for terminal finishing. For some customers, this may be the preferred option. Matte-tin plated terminal finish will be available as an alternate custom option for most products. If matte tin plate is required, please contact Microsemi Power Products Group (Switching) to determine availability, etc.

- How will Microsemi Power Products Group (Switching) identify RoHS compliant parts?:
Note: This applies for all Microsemi Power Products Group (Switching) standard RoHS compliant products except SOT-227. All Microsemi Power Products Group (Switching) standard RoHS compliant products will carry the current existing part number with the letter “G” added to the end as a suffix. In addition, the parts will be marked in compliance with the JEDEC JESD97 May 2004 revision titled “Marking, Symbols, and Labels for Identification of Lead (Pb) Free Assemblies, Components and Devices.” Based on this standard, RoHS compliant parts will be marked with an oval containing a symbol to indicate the terminal finish solder material, as follows: e1 = SAC and e3 = pure matte tin. Microsemi Power Products Group (Switching) may choose to drop this additional marking once the transition is complete.
- Availability of non-RoHS compliant parts after July 2006?: During the transition period, many Microsemi Power Products Group (Switching) standard products will continue to be available with the existing terminal finish as well as SAC. However, new production of all Microsemi Power Products Group (Switching) standard products will phase over to SAC terminal finish by the deadline date. Customers that prefer to continue using leaded terminal finishes after the deadline will need to work with Microsemi Power Products Group (Switching) to set up custom part numbers. Announcements will be made at a later date to provide more specific details of the phase-out timing by product line. All future product lines developed by Microsemi Power Products Group (Switching) will use RoHS compliant terminal finishes as the standard option.