

Frequently Asked Questions About Toshiba Semiconductor Company's RoHS-Compatible(*) and "Lead(Pb)-Free"() Semiconductors and Support for Customers Converting to RoHS-Compatible Manufacturing**

* Toshiba Semiconductor Company defines "RoHS-Compatible" semiconductor products as products that either (i) contain no more than a maximum concentration value of 0.1% by weight in Homogeneous Materials for Lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) and no more than 0.01% by weight in Homogeneous Materials for cadmium; or (ii) fall within one of the stated exemptions set forth in the Annex to the 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 (the "RoHS Directive").

**"Lead(Pb)-Free" is defined for purposes of this document as no more than 0.1 percent Lead(Pb) by weight in Homogeneous Materials ([click here for definitions](#)).

1. What are the environmental initiatives driving the electronics industry's offering of alternative products?

In response to evolving and tightening environmental laws and restrictions around the world, the electronics industry must offer semiconductor products that comply with applicable regulations. Current environmental initiatives facing electronics manufacturers include requirements under a variety of regulations and proposed regulations from jurisdictions around the world that will regulate or restrict the use of Lead(Pb) and other substances, or impose additional requirements when these substances are used in products. The RoHS Directive, which took effect on July 1, 2006, states that the use of Lead(Pb) and certain other substances must be regulated in products put on the market in the European Union. Other international markets, such as China and Korea, also plan hazardous substances regulations in the near future.

Currently, in the United States, a majority of the individual states have proposed or adopted legislation that will regulate or restrict the use of Lead(Pb) or impose additional requirements for products that contain Lead(Pb) or other substances such as mercury and cadmium. Some of these regulations are linked to the RoHS Directive and the so-called WEEE Directive (Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment). For example, California's Electronic Waste Recycling Act (SB20/50), effective January 1, 2007, prohibits certain electronic video display devices from being sold or offered for sale in California if the device is prohibited from being sold in the EU on or after the date of its manufacture due to the presence of restricted substances.

Important Legal Note. The information contained herein is intended to assist those using Toshiba Semiconductor Company products in complying with the RoHS Directive and other environmental regulations. Certain of the information contained herein is simplified guidance based on complex and changing legislation, and does not constitute legal advice. The RoHS Directive and other applicable laws themselves should always be read and understood (as they constitute the law), in contrast with the information contained herein, which is intended to be informative but has no legal authority. You should refer to the RoHS Directive and other applicable laws themselves for a full statement of the legal requirements and in the case of any doubt take independent advice, including your own legal advice. The RoHS Directive and other applicable laws may be revised from time to time, so users should take care to keep themselves informed.

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2. *What are the differences between Lead(Pb)-Free, Lead(Pb)-Free Finish, and RoHS-Compatible?*

Please see our [definition sheet](#) for precise definitions of these three terms as used by Toshiba Semiconductor Company.

As a result of various regulations limiting the use of Lead(Pb) in products, the term “Lead(Pb)-Free” or “Pb-Free” has become a commonly used term in the electronics industry to designate products that are intended to satisfy these regulations. Toshiba Semiconductor Company and Toshiba America Electronic Components, Inc. (“TAEC”) define Lead(Pb)-Free in accordance with current industry standards as no more than 0.1 percent Lead(Pb) by weight in Homogeneous Materials.

This restriction on Lead(Pb) content is one of the requirements of the RoHS Directive, but to be RoHS-Compatible, a device must also contain no more than the specified maximum threshold level of any of five other regulated substances, or fall within the scope of an exemption. In addition to Lead(Pb), these substances are cadmium, hexavalent chromium, mercury, polybrominated biphenyls and polybrominated diphenyl ethers. For more information, please see the RoHS Directive itself. A link to the Official Journal of the European Union’s information on the [RoHS Directive](#) is provided for convenience.

TAEC also offers selected semiconductor products that have Lead(Pb)-Free terminals but may contain greater than 0.1 percent Lead(Pb) by weight in Homogeneous Materials in portions of the product other than the terminals. These products, which are referred to as “Lead(Pb)-Free Finish,” can be processed on the new higher-temperature Lead(Pb)-Free soldering lines, enabling manufacturers that have transitioned to RoHS-Compatible manufacturing for some products to continue to support existing applications that are exempt under the RoHS Directive without maintaining dual soldering lines.

3. *Why does there seem to be greater emphasis in the semiconductor industry on eliminating Lead(Pb) than any of the other substances?*

Of the six substances regulated by the RoHS Directive, Lead(Pb) is the most widely used in semiconductor manufacturing. In addition, Lead(Pb)-based solder has been widely used in the electronics industry for the last 50 years with great success and high reliability. The transition to Lead(Pb)-free plating alternatives and Lead(Pb)-free solder requires additional qualification tests to ensure manufacturability and long term reliability. In addition, Lead(Pb)-free components generally require a higher soldering temperature, along with a complete bill of materials compatible with the higher temperature profile. As a result, the elimination of Lead(Pb) requires more change throughout the entire supply chain and manufacturing process. This accounts for the greater emphasis on Lead(Pb)-free materials than on the other regulated substances.

4. *What is Toshiba Semiconductor Company’s status in eliminating all six of the substances regulated by the RoHS Directive, and which products are currently RoHS-Compatible?*

Toshiba Semiconductor Company has been proactively eliminating the six substances regulated by the RoHS Directive -- mercury, cadmium, Lead(Pb), hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers -- from our manufacturing processes for the past several years. RoHS-Compatible versions of most of TAEC’s semiconductor product portfolio are now available. However, TAEC will continue to supply a limited number of selected devices that contain Lead(Pb) to ensure continuity of supply for customers that are not transitioning to Lead(Pb)-Free manufacturing due to RoHS Directive exemptions or exclusions.

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5. How does TAEC indicate that a product is RoHS-Compatible?

In April 2006, Toshiba Semiconductor Company implemented packaging labels that include product classifications indicating compatibility status with the RoHS Directive. The current product classifications for labels are described below. Please note that Toshiba Semiconductor Company is gradually phasing out “Lead(Pb)-Free” and “Lead(Pb)-Free Finish” packaging labels, but customers may still encounter these classifications in the interim. For more detailed RoHS-related [definitions](#) and [label descriptions](#), please click the links.

Table 1. Toshiba Semiconductor Company Product Classifications for Packaging Labels (Apr. 2007)

Classification/Description	Packaging Label (Example)
<p>Lead(Pb)-Free – This label indicates products that contain no more than 0.1 percent Lead(Pb) by weight in Homogeneous Materials. This does not mean that Toshiba Semiconductor products labeled “Lead(Pb)-Free” are entirely free of Lead(Pb).</p>	<p>Lead(Pb)-Free</p>
<p>Lead(Pb)-Free Finish - In addition to Lead(Pb)-Free products (products containing no more than 0.1 percent lead(Pb) by weight in Homogeneous Materials), Toshiba Semiconductor Company will offer products that have Lead(Pb)-Free terminals, which will be referred to as “Lead(Pb)-Free Finish.” The Lead(Pb)-Free Finish products may contain greater than 0.1 percent Lead(Pb) by weight in Homogeneous Materials in portions of the product other than the terminals, but any such Lead(Pb) usage would fall within the application exemption(s) in the RoHS Directive, such as in internal solder used to connect the semiconductor silicon to the package. This does not mean that Toshiba Semiconductor products that are labeled “Lead(Pb)-Free Finish” have terminals that are entirely free of Lead(Pb).</p>	<p>Lead(Pb)-Free Finish</p>
<p>Labels for Products that are compatible with the RoHS Directive</p>	
<p>[[G]]RoHS COMPATIBLE will be used on standard package labels of products, except for electrical and electronic equipment, and “RoHS COMPATIBLE” will be used on standard package labels of electrical and electronic equipment for products determined to be RoHS-Compatible by Toshiba Semiconductor Company by virtue of containing no more than the tolerated maximum concentration values of the chemical substances restricted by the RoHS Directive, by percentage by weight in Homogeneous Materials. (See Table 2 below.) This does not mean that Toshiba Semiconductor Company products labeled “[[G]]/RoHS COMPATIBLE” or “RoHS COMPATIBLE” are entirely free of substances controlled by the RoHS Directive and does not constitute a warranty or guarantee that such products will comply with the specific laws and/or regulations adopted in any particular jurisdiction.</p>	<p>[[G]]/RoHS COMPATIBLE or RoHS COMPATIBLE</p> <p>Note: The [[G]] is added for products other than electric and electronic devices, e.g. semiconductors.</p>

Table 1. Toshiba Semiconductor Company Product Classifications for Packaging Labels, cont.

Classification/Description	Packaging Label (Example)
Labels for Products that are compatible with the RoHS Directive, cont.	
<p>Electronic products that are compatible with the RoHS Directive and contain the restricted chemical substances for uses approved as exemptions – “RoHS COMPATIBLE, [[Chemical symbol(s) of controlled substance(s)]]>MCV” will be used on standard package labels of electrical and electronic equipment that may contain one or more of the controlled substances under the RoHS Directive in quantities exceeding the maximum concentration values designated by Toshiba Semiconductor Company, but which fall under one or more of the application exemptions in the RoHS Directive. The chemical symbol(s) indicated on the label reflect the substance(s) that may exceed the maximum concentration values. For example, electrical and electronic equipment would be labeled “RoHS COMPATIBLE, [[Pb]]>MCV” when it contains more than a maximum concentration value of 0.1% by weight in Homogeneous Materials of Lead(Pb), but where such application falls within an exemption contained in the Annex to the RoHS Directive and the product otherwise contains no more than the maximum concentration values of the controlled substances. This does not mean that electrical and electronic equipment of Toshiba Semiconductor Company labeled “RoHS COMPATIBLE, [[Chemical symbol(s) of controlled substance(s)]]>MCV” is entirely free of controlled substances under the RoHS Directive and does not constitute a warranty that such products will comply with the specific laws and/or regulations adopted in any particular jurisdiction.</p>	<p>RoHS COMPATIBLE, [[Pb]]>MCV</p> <p>Sample label for Lead [Pb] used as an approved exemption in an electric or electronic product, e.g. Lead(Pb) in glass of an electronic device</p>
<p>Non-electric or non-electronic devices and products that are compatible with the ROHS Directive and contain restricted chemical substances for uses approved as exemptions under the ROHS Directive – [[G]]/RoHS [[Chemical symbol(s) of controlled substance(s)]]” will be used on standard package labels of products, except for electrical and electronic equipment, that may contain one or more of the controlled substances under the RoHS Directive in quantities exceeding the maximum concentration values designated by Toshiba Semiconductor Company, but which fall under one or more of the application exemptions in the RoHS Directive. The chemical symbol(s) indicated on the label reflect the substance(s) that may exceed the maximum concentration value(s). For example, a product would be labeled “[[G]]/RoHS [[Pb]]” when it contains more than a maximum concentration value of 0.1% by weight in Homogeneous Materials of Lead(Pb), but where such application falls within an exemption contained in the Annex to the RoHS Directive and the product otherwise contains no more than the maximum concentration values of the controlled substances. This does not mean that Toshiba Semiconductor Company products labeled “[[G]]/RoHS [[Chemical symbol(s) of controlled substance(s)]]” are entirely free of controlled substances under the RoHS Directive and does not constitute a warranty that such products will comply with the specific laws and/or regulations adopted in any particular jurisdiction.</p>	<p>[[G]]/RoHS [[Pb]]</p> <p>Sample label for a non-electric or non-electronic product (e.g. a semiconductor) when Lead(Pb) is used as an approved exemption, e.g. high melting-point solder</p>

Table 1. Toshiba Semiconductor Company Product Classifications for Packaging Labels, cont.

Labels for Products that are NOT compatible with the RoHS Directive	
<p>Non-electric or non-electronic products that are not compatible with the RoHS Directive due to controlled substances that exceed the maximum concentration value -- “[[Chemical symbol(s) of controlled substance(s)]] /Includes>MCV” will be used on package labels of products, except for electric or electronic equipment, that Toshiba Semiconductor Company has determined <u>NOT</u> to be RoHS Compatible. The chemical symbol(s) indicated on the label reflect the substance(s) that exceed the maximum concentration value as specified by Toshiba Semiconductor Company to determine if specific products are RoHS Compatible. MCV stands for maximum concentration value. For example, a semiconductor product would be labeled [[Pb]]/INCLUDES > MCV when it contains more than a maximum concentration value of 0.1% by weight of Lead(Pb) in Homogeneous Materials, and none of the exemptions contained in the Annex to the RoHS Directive apply.</p>	<p>[[Pb]]/INCLUDES > MCV</p> <p>Sample label for a non-electric or non-electronic product (e.g. a semiconductor) that uses Lead(Pb) in the terminal coating process.</p>
<p>Electric or electronic products that are not compatible with the RoHS Directive due to controlled substances that exceed the maximum concentration value – NON-RoHS, [[Chemical symbol(s) of controlled substance(s)]]>MCV will be used on package labels of electrical and electronic equipment that Toshiba Semiconductor Company has determined <u>NOT</u> to be RoHS Compatible. The chemical symbol(s) indicated on the label reflect the substance(s) that exceed the maximum concentration value as specified by Toshiba Semiconductor Company to determine if specific products are RoHS-Compatible. MCV stands for maximum concentration value. For example, electrical and electronic equipment would be labeled NON-RoHS, [[Pb]] > MCV when it contains more than a maximum concentration value of 0.1% by weight of Lead(Pb) in Homogeneous Materials, and none of the exemptions contained in the Annex to the RoHS Directive apply.</p>	<p>NON-RoHS, [[Pb]]>MCV</p> <p>Sample label for an electric or electronic product that contains more than a maximum concentration value of 0.1% by weight of Lead(Pb) in Homogeneous Materials, and none of the exemptions in the Annex to the RoHS Directive apply.</p>
Labels for Products for which compatibility with the RoHS Directive has not been determined	
<p>NON-RoHS Toshiba Semiconductor Company has not confirmed, for each substance controlled by the RoHS Directive, whether or not products designated on standard package labels as “NON-RoHS” contain such controlled substances in more than the maximum concentration values by weight in Homogeneous Materials permitted by the RoHS Directive.</p>	<p>NON-RoHS</p>
<p>RoHS N/A “RoHS N/A” will be used on standard package labels of products that Toshiba Semiconductor Company has determined are not currently covered or regulated by the RoHS Directive.</p>	<p>RoHS N/A</p>
<p>Legal Note - These definitions are not intended to interpret the RoHS Directive or any other applicable law or regulation (collectively the “Laws”) and do not constitute legal advice. The Laws should always be read and</p>	

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understood (as they constitute the law), in contrast with the information contained herein, which is intended to be informative but has no legal authority. You should refer to the Laws for a full statement of the legal requirements and in the case of any doubt take independent advice, including your own legal advice. The Laws may be revised from time to time, so users should take care to keep themselves informed.

Table 2. Maximum Concentration Values of Chemical Substances Restricted by the RoHS Directive

Restricted Chemical Substances (Chemical Symbol)	Maximum Concentration Values (percentage by weight in Homogeneous Materials)
Lead (Pb)	0.1%
Mercury (Hg)	0.1%
Cadmium (Cd)	0.01%
Hexavalent Chromium (Cr6)	0.1%
Polybrominated Byphenyls (PBBs)	0.1%
Polybrominated Dyphenyl Ethers (PBDEs)	0.1%

Sample packing labels for a RoHS-Compatible component are shown below in Fig. 1 and Fig. 2 For comparison, a label for a part that is not RoHS-Compatible, and contains greater than the maximum allowable concentration (0.1% by weight in Homogeneous Materials) of Lead(Pb) is shown in Fig. 3. In addition, Toshiba Semiconductor Company RoHS-Compatible parts can be identified by the part number that appears on the packing label affixed to the boxes and on the standard Enterprise Application Integration (EAI) barcode label on the outer box (see question 6).

Upon request, TAEC can provide a signed materials declaration, on a component by component basis, to confirm that the specified semiconductor product does not have more than the applicable maximum concentration values of each of the six regulated substances, subject to the exemptions set forth in the RoHS Directive. Alternatively, TAEC may also provide the materials composition for the applicable semiconductor product. There are many regulations in addition to the RoHS Directive that regulate the use of Lead(Pb) and other chemical substances, so our materials declarations focus on the composition of the device, rather than a specific environmental regulation.

Figure 1. Toshiba Semiconductor Company Packing Label.



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Figure 2. RoHS-Compatible Standard EAI Packing Label (Barcode)











TOSHIBA AMERICA ELECT COMP C/O TOSHIBA LOGISTICS AMERICA, INC 9740 IRVINE BLVD DOCK A IRVINE, CA 92618	COMPANY NAME ADDRESS CITY STATE ZIP
(Q) QUANTITY:  9000	SHIP ID: 410035
(1P) TOSHIBA P/N: TC7SET00FU(TE85L,F 	
(K) TRANS ID: 8011356 	
(P) CUSTOMER ITEM NO: COJBAC000412 	
CUSTOMER WORK ORDER NO: CARTON ID: WFZ02LDS	COO: JP 
[[G]]/RoHS COMPATIBLE	PACKAGE COUNT: 1 OF 1 ELECTRONIC COMPONENTS

Figure 3. Standard EAI Packing Label (Barcode) for a part that contains Lead(Pb) in excess of maximum allowable concentrations under the RoHS Directive without an applicable exemption

TOSHIBA AMERICA ELECT COMP C/O TOSHIBA LOGISTICS AMERICA, INC 9740 IRVINE BLVD DOCK A IRVINE, CA 92618	COMPANY NAME ADDRESS CITY STATE ZIP
(Q) QUANTITY:  750	SHIP ID: 410059
(1P) TOSHIBA P/N: U5ZA27C(T24L,DENSO 	
(K) TRANS ID: DO# 60526008 	
(P) CUSTOMER ITEM NO: TN949569 - 30406X 	
CUSTOMER WORK ORDER NO: CARTON ID: WFZ02LE5	COO: JP 
[[Pb]]/INCLUDES > MCV	PACKAGE COUNT: 1 OF 1 ELECTRONIC COMPONENTS

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6. When did TAEC begin to implement Lead(Pb)-Free Manufacturing?

As part of the company's commitment to be an environmentally conscious manufacturer, TAEC launched its first Lead(Pb)-Free products in 2003.

7. What technology have you selected as a Lead(Pb)-Free, RoHS-Compatible alternative?

Toshiba Semiconductor Company uses a variety of alternatives depending on the product, country/region of manufacture, cost, materials availability, and thermal environment of the product. Six primary alternatives selected by Toshiba Semiconductor Company include tin-silver (SnAg), tin-silver-copper (SnAgCu), nickel-palladium-gold, (NiPdAu), gold (Au), silver (Ag) and tin-copper (SnCu), among others.

8. Do you see any impact on performance with Lead(Pb)-Free semiconductors?

No, the packaging change to eliminate Lead(Pb) has not created performance issues. Our reliability tests show no significant difference in performance. We stand by our published specifications.

9. How is TAEC assisting customers converting to Lead(Pb)-Free or RoHS-Compatible manufacturing?

TAEC assists customers with the needed testing, qualification and re-qualification of parts.

10. How can I get more information about TAEC's Lead(Pb)-Free and/or RoHS-Compatible semiconductor products?

You may contact TAEC quality assurance at rohs@taec.toshiba.com or use the [RoHS request form](#) to email us your environmental question.

11. How do I submit a request for a Certificate Regarding RoHS Controlled Substances on semiconductors?

Please contact your authorized sales representative, or email us using the [RoHS request form](#).

Visit www.rohs.toshiba.com for more information.

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