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Date: **May 18, 2005** [\[Last Table Update: May 5, 2008\]](#)  
Update: **March 6, 2008** (*document reviewed for accuracy. No changes to text; however the table was updated to reflect current conditions.*)  
Subject: RoHS Compliance Status of Coto Relay Products

Coto Technology is committed to finding appropriate, feasible, and cost-effective ways to comply with RoHS requirements in its products. To accomplish this mission, Coto is working proactively with other companies in the industry to identify compatible technologies to support the migration away from tin-lead solder. Currently, the majority of Coto products are RoHS compliant. Knowing that our customer's board level processes were mainly eutectic tin-lead based, our relay designs incorporated higher temperature technology already. Coto utilizes pure matte tin finishes on leadframes, I/O pins, and component leads; pure tin solder and tin-antimony alloys in assembly; and shells and casings that are free of heavy metals.

Some of our older designs, mainly potted encapsulated relays, use tin-lead solder in the assembly of the relay. In addition, some of our molded SIPs utilize leadframes with tin-lead finish. Our experience with pure tin finishes and lead free alloys are enabling a smooth transition of these products to RoHS compliancy.

Coto's approach is to define compliance in accordance to EU Directive 2002/95/EC. Coto will source RoHS compliant components and not intentionally add non-compliant substances during manufacturing.

### **RoHS Roadmap**

#### ➤ *Timeline to RoHS Compliance –*

Coto Technology has targeted the end of 2005 for implementation of our RoHS initiatives. Currently, all of our SMD products are RoHS compliant with the exception of sphere and sphere attachment processes on our BGA products. However, our current SMD products are limited to maximum reflow conditions of 226°C for 1 minute. The 95Sn/5Sb solder used for internal connections in the SMD products will be replaced to allow for higher reflow processing. Similarly, some of our through-hole products contain small amounts of lead. Work is ongoing to remove the balance of lead from our products and processes.

#### ➤ *Package Lead Finish –*

##### **Leads/Pins**

###### Current Situation –

The majority of our products utilize pure matte tin finish on I/O leads/pins. Some of our molded SIPs and DIPs leadframes are tin-lead finished.



## Leads/Pins (cont.)

### RoHS plan –

Coto will expand the use of pure tin matte finish to include all through hole SIPs and DIPs that currently use tin-lead finish. Other Pb free finishes may also be used as appropriate, depending on the product or package involved.

Pure matte tin provides stable plating that is highly compatible with existing tin-lead processes and also other processes such as those using tin-silver-copper (SAC) alloys. Pure matte tin is a good choice from a manufacturing standpoint as it is easier to control than multi-element alloys with a fixed composition. In addition to its significant use in the electronics industry, Coto has many years of experience in using pure tin in manufacturing of our products.

For SMD relays Coto will substitute a gold flash over nickel strike on the base leadframe material. The removal of pure tin and replacement with this finish will allow us to raise the process temperature to the industry required 260°C for one minute.

## **BGA**

### Current Situation –

Tin-lead spheres and solder paste are used in our BGA package sphere attach process.

### RoHS plan –

SAC alloy 96.5Sn/3Ag/0.5Cu will be used for sphere and paste composition. This SAC alloy is eutectic at 217°C and is suitable for both SnPb and RoHS compliant processing.

### ➤ *Internal Relay Assembly –*

## **Molded Through-hole Relays**

### Current Situation –

All over-molded devices are constructed with RoHS compliant alloys. Coto uses pure tin for through-hole relay assemblies.

### RoHS plan –

The current alloys and processes will continue to be used as they meet maximum wave solder conditions of 270°C for 10 seconds.

## **Molded SMD Relays**

### Current Situation –

All over molded devices are constructed with RoHS compliant alloy 95Sn/5Sb. Use of this alloy, however, limits the maximum reflow conditions to 226°C for 1 minute.



#### RoHS plan –

For SMD relays, the current alloy will be replaced with a high Pb (>85%) RoHS compliant alloy of 88Pb/10Sn/2Ag for internal connections to increase the allowable maximum reflow condition to 260°C for 1 minute. This alloy has liquidus and solidus temperatures of 299°C and 267°C respectively. High Pb lead solders are allowed by RoHS exception 7.1. We will be RoHS compliant but not lead free.

#### **Potted Encapsulated Relays**

##### Current Situation –

Tin-lead and tin-copper alloys are used for assembly.

##### RoHS plan –

Pure tin, tin-copper, or SAC alloy will be used as appropriate, depending on the product or package involved.

#### ➤ *Relay Components –*

All components used in relay assembly have been verified to be RoHS compliant and capable of withstanding the higher processing temperatures required. Specific components include: coils, reed switches, diodes, internal shields, encapsulant (potting compound and thermo-set molding compound), and external shells and cases.

#### ➤ *Solderability –*

Testing to industry standards has shown that both pure matte tin finish and gold flash finish provide good solderability in both forward (RoHS compliant) and backward (tin-lead) process compatibility. Forward process compatibility was demonstrated in solderability tests using SAC alloy at 245°C. Backward process compatibility was confirmed in solderability tests using standard tin-lead eutectic alloy at temperatures as low as 215°C. Solderability results show that Coto RoHS compliant products can be utilized in either RoHS compliant or tin-lead board assembly processes.

#### ➤ *Board Assembly –*

##### Through Hole Devices

Our current through hole devices are rated at 270°C (measured on leads where lead exits package) maximum for 10 seconds, which is acceptable for industry standard wave solder processes. The change over to pure matte tin leadframe finish and RoHS compliant internal solder will not negatively impact this.



### Surface Mount Devices

With 88Pb/10Sn/2Ag internal solder, SMD's are rated at 260°C (measured on leads where lead exits package) maximum for 1 minute. Testing has confirmed that RF, parametric and mechanical performance of the relays is not affected by use of the high Pb alloy.

### Samples

Process conditions will depend on the choice of alloy used in board assembly. Samples are available for process verification.

#### ➤ *RoHS Part Marking –*

It is Coto's intent that RoHS compliant products will completely replace those currently offered. Since there will be no difference in fit, form or function, the part marking will remain the same. We will identify RoHS converted product with specific break-in date codes.

#### ➤ *RoHS Package Labeling –*

"RoHS Compliant" labels or permanent "RoHS Compliant" marking on the inner and outer cartons will be used to identify product that is RoHS compliant.

#### ➤ *Customer Support –*

Please contact your local Coto Technology Sales representative or Coto Technology Customer Service for RoHS compliant product samples, additional information or technical support. During the transition to RoHS compliant products, there will be inventory that may have been built before the change. For this reason, if specific samples are needed for RoHS compliance verification, please note this on the sample request so that we can ensure the latest construction is used.

#### ➤ *RoHS Status Detail By Product Series –*

(see table on following page)



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RoHS Compliance Status

Key:

Meets RoHS Requirements

Does not Meet RoHS Requirements

Product Series Information		RoHS Substance <sup>(1)</sup>						ADDITIONAL INFORMATION			
Coto Series Number	Package Type	Pb in bulk material	Termination Lead finish	Hexavalent Chromium	Mercury	Polybrominated Biphenyl (PBB) & diphenyl ether (PBDE)	Cadmium	Maximum Process Temp/Time	Moisture Sensitivity Level (J-STD-020C)	Production Break-in date code	Issues / Comments
1200	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
1300	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
2200	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
2300	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
2900	Potted THT		Sn100		See Comments			270C / 10 Sec. Wave	2	0525	2920 Series uses Hg wetted switch
3500	Potted THT		Sn100		See Comments			270C / 10 Sec. Wave	2	0525	3520 Series uses Hg wetted switch
3600	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
4000	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
5500	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
5800	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
7000	Potted THT		Sn100		See Comments			270C / 10 Sec. Wave	2	0525	7200 Series uses Hg wetted switch
8200	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
8300	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
8600	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
8700	Potted THT		Sn100					270C / 10 Sec. Wave	2	0525	
8000/8L	Molded THT	<sup>(3)</sup>	Sn100		See Comments			270C / 10 Sec. Wave	2	0540	Ex 8061/8L61 SMD types (See 9200)
9000	Molded THT		Sn100					270C / 10 Sec. Wave	2	0545	
9007	Molded THT		Sn100					270C / 10 Sec. Wave	2	0545	
9011	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9012	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9090	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9092	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9081	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9104	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9117	Molded THT		Sn100					270C / 10 Sec. Wave	2	0501	
9200	Molded SMT	<sup>(3)</sup>	Gold Flash					260C / 1 Min. Reflow	2	0812	RoHS compliant. See Note <sup>(3)</sup>
9290	Molded SMT	<sup>(3)</sup>	Gold Flash					260C / 1 Min. Reflow	2	0816	RoHS compliant. See Note <sup>(3)</sup>
9300	Molded SMT	<sup>(3)</sup>	Gold Flash					260C / 1 Min. Reflow	2	0641	RoHS compliant. See Note <sup>(3)</sup>
9400	Molded SMT	<sup>(3)</sup>	Gold Flash					260C / 1 Min. Reflow	2	0805	RoHS compliant. See Note <sup>(3)</sup>
9852	Molded SMT	<sup>(3)</sup>	Gold Flash					226C / 1 Min. Reflow	2	TBD	Currently RoHS compliant. Will not withstand 260C reflow <sup>(2)</sup>
9802,9814	Molded SMT	<sup>(3)</sup>	Gold Flash					260C / 1 Min. Reflow	2	0748	RoHS compliant. See Note <sup>(3)</sup>
9900	Molded SMT	<sup>(3)</sup>	Gold Flash					260C / 1 Min. Reflow	2	0601	RoHS compliant. See Note <sup>(3)</sup>
B10	Molded BGA		Sn 63/Pb 37					226C / 1 Min. Reflow	5A	TBD	Will not withstand 260C reflow <sup>(2)</sup>
B40/B41	Molded BGA		Sn 63/Pb 37					226C / 1 Min. Reflow	5A	TBD	Will not withstand 260C reflow <sup>(2)</sup>
CT10-G4/A2	Molded SMT	<sup>(3)</sup>	Sn100					260C / 1 Min. Reflow	2	TBD	Currently RoHS compliant. Will not withstand 260C reflow <sup>(2)</sup>
CT05-G1/J1	Molded SMT		Sn100					260C / 1 Min. Reflow	2	0501	
CT10-G1	Molded SMT		Sn100					260C / 1 Min. Reflow	2	0501	

(1) Substance matrix represents product when Pb is removed from devices. See compliant availability date and Production Break-in date code for actual conversion.

(2) Molded SMT devices currently use 95Sn/5Sb alloy for internal interconnects, which limits the maximum processing temperature. Coto is currently evaluating RoHS exempt high Pb alloys to attain higher processing temperatures.

(3) For molded SMT Products after Production Break-in date code. Parts will be RoHS compliant but not lead free (exception #7, Directive 2002/95/EC, Annex).