

MEASURES FOR ENVIRONMENTAL HAZARDOUS MATERIALS

Today, the disruption of the global environment has been taken up as a serious issue for human beings and a mission for its safeguard has become all the important. We, at KOA, started active management of chemical substances included in our products, and complied with EU RoHS Directive in July of 2006 and IT Products Pollution Control Act in the People's Republic of China (Chinese RoHS) in March of 2007. "Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals" has further been enforced in June of 2007 as a new chemical regulation in Europe. Social demand to environmental statutes is increasing like this, and we are actively addressing to the compliance with these laws and regulations. In addition to the compliance, we are also advancing various activities such as halogen-free specifications to reduce hazardous substances and certification as a laboratory according to ISO/IEC 17025.

What is EU-RoHS?

The Restriction of Hazardous Substances Directive (RoHS, EU Directive 2002/95/EC) requires the usage restriction of following six hazardous materials in the manufacture of electronic and electrical equipment placed on the market after 1st July 2006.

- Lead
- Mercury
- Cadmium
- Hexavalent chromium
- PBB : Polybrominated biphenyls
- PBDE : Polybrominated diphenyl ethers

However for the applications specified in the appendix to the directive, ban of such substances is exempted.

KOA's products applicable with this exemption to EU RoHS are as follows (as of September, 2009):

- Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
- Lead as an alloying element in steel containing up to 0.35% lead by weight, aluminium containing up to 0.4% lead by weight and as a copper alloy containing up to 4% lead by weight.
- Lead in high melting temperature type solders (i.e. lead-based solder alloys containing 85% by weight or more lead)
- Lead in electronic ceramic parts (e.g. piezoelectronic devices)

To meet EU-RoHS, you have to choose lead (Pb) free material for termination surface material when our product has both type designation, leaded and lead free.

Please contact our sales representatives for details.

CHINA-RoHS

Chinese administration on the control of pollution caused by electronic information products (China-RoHS) took effect as of 1st March 2007.

Index page of this catalog shows the products that contain six hazardous materials less than threshold level, indicated by ○-mark.

For each product, we disclose the content information of the six hazardous materials directed by China-RoHS. Please contact our sales representatives for details.

REACH

"Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals" (REACH) has been enforced on June 1 of 2007 in EU area.

This regulation is aiming at safety evaluation and risk management of chemical substances, which are required to register according to the amount if used in businesses. Substance of Very High Concern (SVHC) must be registered if it is included in article. Information on such substances is also required through supply chain.

PRECAUTIONS FOR USE

The types and the specifications in this catalog are typical ones. Before use, please make sure of specifications and precautions in use with the contents of specifications for supply or ask our sales offices for the specifications.

★Particulars common to all kinds of product types

●Applications

- Our components are targeted for general electronic devices. When they are used for special applications requiring high reliability (automotives, life maintenance equipment, atomic energy, airplanes, artificial satellites, etc.), contact us beforehand. Make sure to evaluate and verify the components in a state that they are mounted on actual equipment.

●Soldering

- Soldering shall be performed within the specified temperature, time and number of times for each component. If the components are heated to high temperature for a long time, the colors and characteristics may change, and disconnection, etc. may occur.
- After soldering, keep the component from stress until it is cooled down.
- After soldering, be sure not to give any mechanical stress on the terminal section by warping of the printed board, etc.
- When repairing chip resistors by a soldering iron, pay attention to the following points.
 - Work under the prescribed temperature of the iron-tip by the individual product type.
 - Preheat component and P.W.B. as much as possible.
 - Work so that the tip of the soldering iron does not touch direct the body of a component or terminal electrodes.
 - If you put the component up with tweezers, be sure not to add damage to the protection coats or electrodes.
 - After the repair of film resistors, washing of flux should be done after they get well cooled. The remnants of ionic substances may degrade resistances to humidity/corrosion.

●Instructions in case of mounting with lead - free solder

- There is a possibility of solder temperature rising higher than usual in the soldering process than eutectic solder depending on a solder composition. Please use it after checking beforehand that there is no problem under actual conditions.
- In case that the parts are inserted to the double-sided P.W.B. with through hole, check in advance with the actual P.W.B. before inserting because lift-off phenomenon may cause degradation of the strength of soldering connection when using lead free solder.
- Please use them after checking the influence of flux remnants contained in the solder to components. Confirm the influence in advance of the flux contained in the lead-free solder by the examination of reliability.

●Insertion and mounting

- The coating is covered to ensure the performance of components. Do not give any damage or excessive impacts on the products with pliers or pincette, or improper adjustment of an automatic mounter. They may cause characteristic changes, disconnection, crack, etc.
- Do not use the components dropped at the time of mounting or ones removed from the printed boards.
- Make sure to avoid heat radiation generated by other heated components.
- In case boards are sealed by molding or coated after mounting components, consult with us beforehand.
- Take care not to have electrostatics applied to the components when assembling.
- Check and adjust in advance "height positioning in vertical direction", "pressure of chucking" and "abrasion of positioning nails" when you use them and adjust the position in parallel direction after adsorbing chip components by an automatic mounter. Insufficient adjustment of the automatic mounter may cause large stress to the components, break cracks, bad mounting position, etc.
- If the nozzle of the automatic mounter is too low, it causes the force which makes the parts hit to P.W.B., the hit marks on the protection coat of the parts surface to bring about change in resistance and deterioration of the performance, and the break and cracks of the components. Mount the components by slowing down the nozzle speed or by correcting the warp of P.W.B. right before mounting.
- Resistance values of resistors/sensors in film types change by excessive voltage of static electricity. Take care that static electricity (ESD), which occur in the assembly process (automatic mounters/inspection monitors/human bodies, etc.), or at transportation of the components, are not applied to the components.
- Ionic impurities such as perspiration and salt should not be put onto the outer coat or terminals of the parts. It may cause degradation of resistances to humidity/corrosion.

Contact our sales representatives before you use our products for applications including automotives, medical equipment and aerospace equipment. Malfunction or failure of the products in such applications may cause loss of human life or serious damage.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order/use.

PRECAUTIONS FOR USE

● Use environment

- Our components are NOT designed for the application under special environment unless otherwise noticed. When they are used under the below conditions, study the effect on reliability and performance enough.
 1. Direct sunshine, outdoor exposure, dusty place
 2. In liquid like water, oil, organic solvent, chemical
 3. See breeze, corrosive gas(SO₂, H₂S, chlorine, acid, alkali, NO₂ etc)
 4. With strong electrostatics, electromagnetic wave
 5. Dew condensation on component
 6. When a component or the P.C.B. with mounted component is to be sealed and coated by moisture-proof resin etc
 7. Oil mist from lubrication oil

● Resistance to pulse

- In case of the circuits where excessive overload (single pulse, repeated pulse) like pulse or surge etc. are applied to, there are fears of the degradation of performance (disconnection, resistance change, etc.), decline of reliability if voltage/current/power over than ratings are applied. Confirm sufficiently with the actual circuit considering the dispersion of constant of other components. Consult with us in advance if you need the data of anti-pulse characteristics.

● Storage

- Store the components at the less dusty places avoiding high temperature/humidity, condensation, direct sunray, heat, sea breeze, corrosive gas(SO₂, H₂S, chlorine, acid, alkali, NH₃ etc.), oil mist from lubricating oil. Use desiccant as occasion demands.
- Please inquire of us about the storage term of components.

● Storage of products with Pb-free terminations

- Pay much more attention to storage condition (temperature, humidity) for products with Pb-free terminations, than those with Sn/Pb terminations.
- If they are stored in bad condition, terminations and solderability may be deteriorated in shorter time than it happens to products with Sn/Pb terminations.
- The storage condition and period vary depending on product type. Please contact us for further details.

● Washing

- Consider not to remain ionic substances contained in solder flux, after washing of soldering. Ionic impurities may deteriorate resistances to humidity and corrosion of the components especially for film resistors. Especially when non-washing-soldering, water washing or water-soluble detergent is used, it is essential to confirm reliability of the components before use. Particularly in lead-free soldering, much of ionic substances may be contained. Use RMA soldering or flux, or wash them well enough. Thorough washing shall be done in case that ionic substances like perspiration, salt, etc. are attached. Ionic substances may not be removed totally in case of insufficient care of washing fluid. Consult with us in advance when you use detergents other than alcohol or wash by acid/alkali.
- A resonance phenomenon may destruct the components by an ultrasonic cleaning. Also confirm sufficiently on the actual board as the surface electrodes may be damaged by a strong water pressure cleaning.

● Sulfuration

- The resistance values of the components that use silver electrodes, may increase when the conductors are changed into insulators by a sulfuration phenomenon. One of the causes is the sulfur contained as impurities in sulfide gas (H₂S, SO₃, etc.) or in sulfide compound that are attached to the components by being included in oil mist. Take measures to sulfuration in case of using under those environments.

● How to use for improving reliability

- The smaller the impressed power against rated power is, the smaller the power stress becomes, which leads to the decline of the trouble rate of resistors. The trouble rate can be smaller, if machines are so designed that the ambient temperature of the resistors may be close to the normal temperature.
- In case of using for the purpose requiring high reliability, consider thoroughly fail-safe designing. Keep the system security by preparing protecting or diffuse circuits, etc. not to become unsafe in the single trouble of this component.

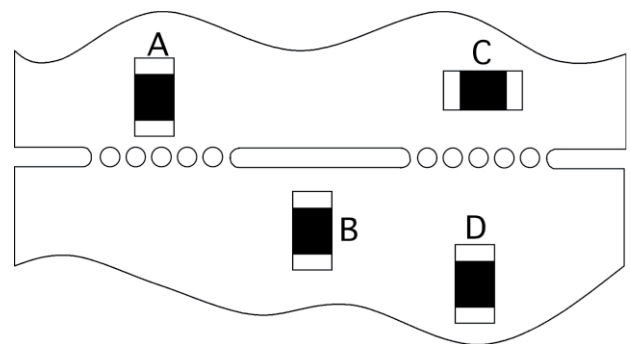
● General

- For basic particulars for cautions, refer to EIAJ "RCR-1001 Safety application guide for electronic parts", the technical report is issued by Electronic Information Technical Industry Association.

★ Particulars common to chip components

- **Warping of printed boards, which is caused by heat, gives stress directly to components when boards are cooled down. Be careful of the following particulars:**

- The arrangement of electrodes of chip components should go along with the fiber direction (vertical direction) of printed boards.
- The component made of ceramic as its base may cause cracks on the solder at the connecting section(solder fillet) due to the difference in heat expansion coefficient from the mounting P.W.B. if heat stress like heat shock etc. are continuously given. The occurrence of crack is affected depending on size of the pad for mounting, solder amount, heat radiation volume of mounting P.W.B., etc., so pay special attention when designing especially for the big types(5.0×2.5mm or larger).
- The components or electrodes may be destructed by much stress when the components are placed near the dividing groove of the P.W.B. Please refer to the following figure and mount them to the positions and directions of small stress.



Improper A<B<C~D Proper

- In case of placing the components near the surrounding of P.W.B. or connectors, be sure not to give any stress to the components at assembling equipment or at insertion/extraction of connectors.
- When using a back-up pin to mount the components, those on the opposite side of P.W.B. may be damaged unless they are placed properly. In case of poulticing adhere by using a dispenser, take care not to touch the printed board when setting up the bottom dead center of the dispenser.
- The difference in sizes of right and left pads causes the difference in amounts of right and left solder, then stress moves to one side at the time of cooling solder to make the chip stand up or get stress. In order to prevent such abnormalities, the sizes of the pads must be corrected to be equal on both sides by using solder resist, etc.
- When the components are placed near bigger parts compared with itself, stress is pulled to the bigger components side at the time of solder stiffening, so take the positioning and directions into consideration.

★ Particulars common to leaded components

- **To avoid mechanical force to components, pay attention to following the particulars:**

- Be careful not to create resonance by vibration.
- The bodies of the leaded components should be free from twisting or bending.
- The bodies of the large components should be firmly fixed.
- When the lead wires need to be bent, try to make larger radius of curve in order to avoid excessive force at the foot of the terminals. Excessive force, if applied, may damage the components by desorption of the caps fitted on the ceramic cores.
- When cutting or clinching the lead wires on the mounter, be careful not to apply excessive forces to them.