Frequently Asked Questions on RoHS (Multilayer Ceramic Capacitors)

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GENERAL INFORMATION

1. What exactly is RoHS?

RoHS is an abbreviation for **R**estriction **o**f the use of certain **H**azardous **S**ubstances. As part of environmental legislation, it is a directive first issued by the EU (European Union) in Feb 2003 (Directive 2002/95/EC of the European Parliament) and requires electrical and electronic equipment (some exemptions allowed) belonging to classification as specified by WEEE (2002/96/EC) to have restrictions on the following hazardous substances by July 1, 2006: lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE). Please refer to details on RoHS through several publications or public web-sites or the Official Journal of the European Union.

2. *Is compliance mandatory?*

The purpose of this directive is to "approximate the laws of the Member states (EU) in this field and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment". Thus, the member states are required to create their own laws based on this directive. Since, all "producers" in those member states are required to comply with the domestic laws, in essence compliance becomes mandatory.

3. What is the definition of "producer"?

Article 3b of EU directive 2002/95/EC defines "producers" as any person who, irrespective of the selling technique used, including means of distance communication according to Directive 97/7/EC of the European parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts:

(i) manufactures and sells electrical and electronic equipment under his own brand
(ii) resells under his own brand equipment produced by other suppliers, a reseller not being regarded as the "producer" if the brand of the producer appears on the equipment; or
(iii) imports or exports electrical and electronic equipment on a professional basis into a Member State.

4. *Is compliance mandatory outside the EU?*

Since RoHS is a EU directive, in the strict sense, compliance outside the EU is not mandatory. However, this directive is under review/consideration in several countries (Japan, China, Korea) and states within the US. In fact RoHS has been legislated as a law in California and Thailand (therefore compliance is mandatory there). Since almost all large and medium sized "producers" of electric & electronic equipment have a global reach, most of them have decided to comply with RoHS requirements. The final decision regarding compliance in non-legislated regions is of course dependent on the company's market, supply chain and policy. Most major global manufacturers have decided to pro-actively move towards compliance.

5. ***Are any exemptions to this legislations permitted?***

Yes, there are some very specific exemptions permitted (some with a time constraint). For example, some very specific applications like space, medical and high reliability electronics have been granted a few years exemption from this directive. Some applications like mercury based fluorescent lamps for special purposes, lead based glass cathode ray tubes, etc are granted exemption. Furthermore, this Directive does not apply to spare parts for repair, or to the reuse, of electrical and electronic equipment put on the market before July 1, 2006. Further details may be obtained from the EU directive.

6. ***Where can we get more information on RoHS?***

RoHS information is available in public domain (try search engines like Google). Information is also available from leading industry consortiums such as EIA, JEDEC, IEC, JEITA, etc. Also refer to the Official Journal of the European Union.

7. ***What are Murata's plan for RoHS compliance?***

Being an industry leader and an environmentally conscious company, we have decided to be RoHS compliant by June 2005, a year ahead of schedule (this will afford enough time for our customers to deplete their inventories of non-RoHS compliant products). Murata has invested considerable resources in restricting/removal of hazardous materials from its designs, products and manufacturing sites wherever possible. In many cases this has meant development of new products and processes. As the leading supplier of electronic components, we plan to be RoHS compliant well ahead of schedule.

CAPACITOR SPECIFIC

8. ***Does Murata have a complete line-up of RoHS compliant capacitor products?***

Yes, Murata has a complete line-up of RoHS compliant capacitor products. Most importantly, all Murata EI products like capacitors, inductors, ferrites, etc are available as RoHS compliant. Please refer to Murata catalog K28E-1 "MURATA PRODUCTS Available Products List for RoHS Restriction" for further information on our RoHS activities.

9. ***Are RoHS compliant capacitor samples available and how can a customer get them?***

Yes, samples are readily available for all RoHS compliant capacitor products. Please contact your local Murata sales representative for qualification samples. Our sales and marketing staff is ready to answer all your inquiries regarding samples and to help you approve our parts.

10. ***How can one distinguish between RoHS compliant and non-compliant Murata capacitors?***

There are two ways of distinguishing between RoHS compliant and non-compliant parts.

(a) First is through our Global Part Numbering system (GPN). An example of our 18 digit part number is given below:

G R **M** 1 5 5 R 7 1 A 1 0 4 K A 0 1 L (M= pure tin plating; no lead; RoHS compliant)

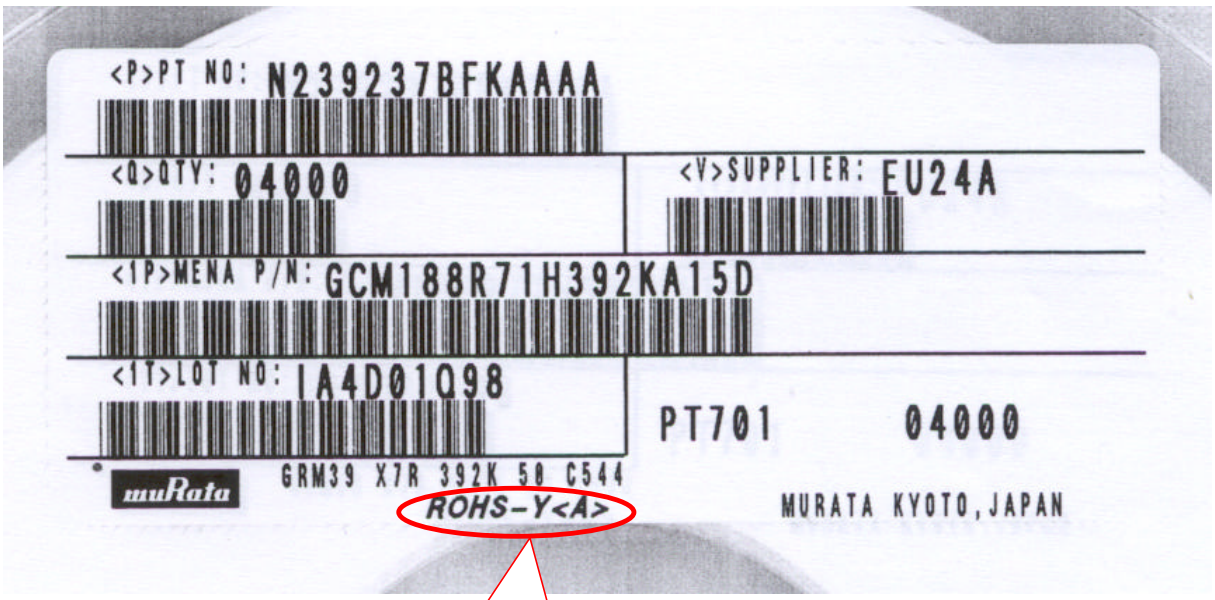
G R **P** 1 5 5 R 7 1 A 1 0 4 K A 0 1 L (P= lead in termination; RoHS non-compliant)

Therefore all ***parts that do not have P as the 3rd digit are RoHS compliant***. All other products (like RPE series, LL* series, GMA series, GA* series) are RoHS compliant and shall have no change in GPN. The only exceptions are:

- GJ2, GJ4 series (to be obsoleted by June 2005) RoHS compliant replacements available

- GJ6 series Replacement available in GJM series.
- ERA series
- DD/DV series : to be obsoleted by Mar 2005.

(b) The second way is via our shipping labels. Starting January, 2005, Murata shall label all its capacitor products as either RoHS compliant or not on their shipping labels. **Please see the sample label below. The highlighted area shows the RoHS declaration on the material label**.



RoHS Declaration – The coding after "ROHS-" indicates the compliance of the contained parts. Codes are:

-**ROHS-Y(A)** - RoHS Compliant Material
-**ROHS-N(A)** - RoHS Non-Compliant Material

11. ***How do customers order Lead Free/RoHS compliant capacitor parts?***
As described above, the best way to order lead free/RoHS compliant parts is to order chip capacitors which do not have **P** as the 3rd digit. Thus parts starting with GRM, GCM, GJM, GQM, GRJ, RPE, etc are all RoHS compliant parts. Also, care must be taken not to order any obsoleted parts (Murata system would not accept them beyond Mar 2005), i.e. please order their replacements if not done so already. If in doubt, please consult your local Murata sales representative.

12. ***Does it mean that except for a minor change (from P to M) in some parts, Murata's capacitor part number would remain the same?***
    Yes, that is true. Murata had the foresight to include an indicator for lead versus lead free in its global part numbering (GPN) system when it was introduced four years ago. Since our global conversion rate to GPN is more than 98% complete, RoHS compliance would not require any more part number changes. In fact most of our customers would not need to make any changes as all their capacitor parts are fully RoHS compliant and identifiable via our GPN. This is unlike some of our competitors, where you would have to go through a complete part number change.

13. ***How do Distributors order Lead Free/RoHS compliant capacitor parts?***
    Distributors should also order exactly the same way as our end customers (see above).

14. ***Are all Murata RoHS compliant capacitors lead free?***
    The RoHS directive restricts the use of free (elemental) lead. This is usually present in plating of terminations and lead wires. However, lead within the ceramic body (part of dielectric formulation) is exempt. Although all Murata RoHS compliant capacitors have no lead in terminations, Murata has taken a pro-active approach in restricting use of lead based dielectrics wherever replacements (economically and technically feasible) are possible.

15. ***What fraction of current Murata capacitors are RoHS compliant?***
    In terms of quantity shipped, over 95% of current Murata capacitors are fully RoHS compliant. Therefore unless you are using case sizes equal to or smaller than 0402, chances are your products are already RoHS compliant. In fact many of our customers for smaller case sizes are already RoHS compliant because they made switch to 100% tin terminations a year or so ago.

16. When did Murata start manufacturing capacitor parts with lead free terminations (plating)?
    Murata has been supplying bulk of its parts with no lead in terminations for over 10 years now. In fact our lead free termination parts have an excellent track record in the industry. This has made the switch of remaining parts to lead free very smooth and easy for our customers.

17. ***Will Murata continue to support capacitors with solder terminations for some special applications?***
    Murata's policy is to be RoHS compliant by June 30, 2005. Although no decision has yet been taken, there might be some very specific applications (exempted by EU directive) where Murata could provide solder plated parts. In such exceptions, a decision would be made on a case-by-case basis. For all practical purposes though, Murata does not intend to supply solder terminations any more.

18. ***Does Murata plan to inform its customers of this change?***
    Yes, Murata plans to notify and/or get approval for all its direct customers regarding this change. This also includes informing the Distributor head quarters. However, for any customer who is buying to Murata standard catalog part (via distribution or otherwise), there will be no formal notification from us. We expect the distributors to inform their end customers of this change.

19. Will there be any change in electrical or mechanical specifications for RoHS compliant parts?
    For all practical purposes, there would be no change in electrical or mechanical specifications or performance for RoHS compliant parts.

20. ***Where can customers get a list of Murata RoHS compliant replacements for RoHS non-compliant capacitor parts?***
The first place to look for RoHS compliant replacements is to visit our new and improved web-site. That has an added advantage of having specifications available as PDF files. If for some reason you do not find that part on the web-site, please contact your local Murata sales representative.

21. ***Will the Murata Web-site have all the information required?***
Murata's web site should have most of the part information available. However, as part of continuous improvement, we will populate our web site with more part numbers and list all useful information. This would include recommended parts, available parts, parts being phased out, obsoleted parts, information on RoHS compliance, etc. The web site should be fully updated by April 2005. However, for now if there is information you do not find on the web site, please contact your local Murata sales representative.

22. ***How does a customer manage parts in its MRP system?***
As mentioned above, Murata would start labeling all its capacitor parts as RoHS compliant or not starting January 2005. And after June 30, 2005, Murata shall only ship RoHS compliant capacitors. So this means that till June 30, 2005, there will be both RoHS compliant and non-compliant capacitors being shipped as long as all RoHS non-compliant parts are not switched over to RoHS compliant capacitors. However, this should be of no concern because both the RoHS compliant and non-compliant capacitors have similar characteristics and may be used in current manufacturing process at the customer (though an evaluation run is recommended). In other words both solder and 100% tin plated parts may be used in the current process using eutectic solders. However, if the customer wishes to change to lead free solders then they must ensure that all their inventory of lead plated parts is depleted and then optimize their process for LF solders. This is the reason why Murata opted to be RoHS compliant a year ahead of the deadline; to give time to our customers to manage their inventory and become RoHS compliant by the June 2006 deadline.

23. ***How will distributors manage customer bonded inventory?***
As mentioned above, once the customer approves RoHS/lead free compliant parts, distribution may still continue to bleed their inventory of solder plated parts to the customer. However, since Murata will only ship lead free (LF) parts after Jun 30th, 2005, there are 2 options available for distributors and their end customers:

    (a) Ensure that the customer switches over to RoHS compliant parts by June 30th, 2005.
    (b) For customers who cannot switch over by June 30th, 2005, there would be a need to obtain a firm road map for approval and forecast beyond June 30th, 2005. Based on that data, it is recommended that the distributor make a last time buy by March 2005 for RoHS non-compliant parts to service that customer beyond June 2005. Please note that Murata will not accept any orders for RoHS non-compliant parts beyond March 2005 (shipping will continue till June 30, 2005).

24. ***Will Murata accept returns for non-RoHS compliant products?***
As mentioned above, the deadline for RoHS compliance is July 1st, 2006. Plus the fact that RoHS compliant parts may be used in current manufacturing process, Murata will not accept any returns of RoHS non-compliant parts. We recommend that our customers bleed off their RoHS non-compliant inventory (FIFO) first, before switching over to RoHS compliant parts. We would like to re-emphasize that there is no need to return your existing inventory (of RoHS non-compliant parts). Murata will cooperate with you in phasing-in RoHS compliant products.

25. Are there any changes required in the customer's manufacturing process to handle RoHS compliant parts?

In principle there should be no changes required in customer's manufacturing process to use Murata RoHS compliant parts (see Cat No K28E-1:MURATA PRODUCTS Available Products List for RoHS Restriction). However, we recommend that the customer verify the mounting/soldering condition of parts after switching over. Furthermore, if the customer is simultaneously switching over to a LF solder process, then changes are required in their production process (soldering temperature profiles, pre-heating, solder printing, etc) and they should plan detailed evaluation runs.

26. ***How does Murata plan to assist their customers in changing the production process for lead free solders?***

Since Murata is a supplier of components only and not involved directly with customer manufacturing process, we do not plan to offer any technical assistance in this area. However, Murata is performing some standard tests internally with commercially available LF solders and will publish a brief application guide for our customers. We plan to release this to our customers sometimes in 2005. Furthermore, many industry alliances/consortium are working towards a common standard for LF solders. It is recommended that our customers use those guidelines as a starting point.

27. Would the customer need new pick and place equipment for RoHS compliant parts?

The customer does not need to change their current pick and place equipment to use Murata's RoHS compliant parts.

28. ***Are there any problems associated by switching terminations containing lead to 100% tin?***

The short answer is no. Although there have been some isolated reports in literature on the growth of tin whiskers for 100% tin plated parts, it is a very rare phenomenon and occurred only under conditions far removed from normal. The component industry has shipped well over 2 Trillion (yes, that is 1 followed by 12 ZEROS) components with pure tin terminations over the past 5 years or so, and there has never been any reported case of field failure in commercial applications due to parts being 100% tin plated. An industry statement to this respect is also posted on the EIA/ECA web site.

29. ***Is the customer going to see any price increase for capacitors***?

No, there is no price increase planned due to this change. The RoHS compliant capacitors would not be more expensive than the non-compliant ones.

30. Who should I contact to get information on IMDS, etc?

Please contact your local Murata sales representative with any such requests. They shall pass on your request to the proper contacts within Murata and respond back to you within a reasonable amount of time.

31. ***Who should I contact if there are any further questions?***

For any other questions related to this topic, please contact your local Murata sales representatives.