Global Power Technologies Group

Pb-Free/RoHS/Green Information

Environmental Policy:

Global Power Technologies Group is committed to protecting the environment and individual health and safety. We shall comply with all environmental regulations, health and safety laws applicable to our business. We employ continual efforts to minimize the environmental impact from our products.

RoHS Requirement:

RoHS is a European Union (EU) directive for the restriction of certain hazardous materials which are harmful to the health and environment. These substances identified by RoHS directive include:

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Hexavalent chromium (Cr^{+6})
- Polybrominated biphenyl (PBB)
- Polybrominated diphenyl ether (PBDE)

RoHS/Green Limit Requirement:

Limit restrictions for these harmful materials are as follows in 2 different levels:

1. RoHS compliant
2. Green compliant

3.

Table 1: Hazardous Materials Limitation

	Level	Restricted Elements	Symbol	Max. Limit	
1	RoHS Compliant	**L**ead	Pb	1000ppm	
		Mercury	Hg	1000ppm	
		Cadmium	Cd	100ppm	
		Chromium	Cr^{+6}	1000ppm	
		Polybrominated Biphenyls	PBB	1000ppm	
		Polybrominated Diphenyl Ethers	PBDE	1000ppm	
2	Green	MEETS RoHS requirements	PLUS the following restrictions:		
		Bromine	Br	900ppm	1500ppm total
		Chlorine	Cl	900ppm	
		Antimony	Sb (Sb_2O_3)	900ppm	
Note: Green by definition is halogen-free					

Product Types from GPTG:

1. **All** GPTG products are RoHS compliant regardless of lead finish, i.e. free from mercury, cadmium, hexavalent chromium, PBB, and PBDE. Products are compliant.

2. Restricted substances for China RoHS are the same as EU RoHS and GPTG is committed to full compliance with China's Management Methods on the Control of Pollution from Electronic Information Products.

Table 2: Product Part Numbering Differentiation

Different Environmental Levels of Products			
Product Suffix	**Level**	**Lead Finish/Ball Composition**	**Comment**
None	contains Pb	Sn/Pb	-
- L	RoHS Compliant	Lead frame:100% matte Sn BGA: SAC (Sn/Ag/Cu) balls	Flip-chip bumps containing Pb is currently exempted by EU from Pb-free compliance
- F	Green		completely Pb-free and halogen-free
Symbol:	Sn(tin), Pb(lead), Ag(silver), Cu(copper), Ni(nickel), Pd(palladium), Au(gold)		
Notes:			
1	Small % of Power products use Ni/Pd/Au lead finish instead of 100% matte Sn in Sc70/TSOT/QFN packages If datasheet specify RoHS. All Products families are already green.		

4. Pb-free products are also compatible with standard Sn/Pb solder board assembly.

5. GPTG's goal is to migrate away from Sn/Pb solder but will support customers' needs to the best we can. Please contact your local GPTG sales representative or distribution partner for specific or further information.

6. GPTG is in the process of migrating to green according to industry demand.

Frequently Asked Questions:

1. ***What is the lead finish for the product I order?***
   Please refer to Table 2 for the information

2. ***Are Pb-free products from GPTG RoHS compliant?***
   Yes

3. ***Do GPTGproducts include annealing for matte tin plating lead finish?***
   Yes. Annealing is done @ 150^{O}C for 1 hour post plating to mitigate tin whisker growth

4. ***How long has GPTG had Pb-free and green programs in place?***
   GPTG initiated these programs in 2011.

5. ***How long has GPTG been shipping Pb-free/green products to customers?***
   GPTG began shipping these products to customers in 2012.

6. ***Does GPTG participate in industry consortiums that deal with Pb-free/green initiatives?***
   GPTG is committed to the advancement of the semiconductor industry with participation in many industry consortiums. GPTG closely works with its assembly subcontractors to maintain the required level of certification for continual business.

7. ***Is there any marking differentiation for the different environmental levels of products?***
   No. All product are RoHS and Green compliant.

8. ***Why is there Legislation Control on Halogens?***
   Halogens are highly reactive oxidizing agents. They can be harmful or lethal to biological organisms in sufficient quantities.

   Halogens are fluorine (F), chlorine (Cl), bromine (Br), iodine (I) and astatine (At). Some halogens were widely used as flame retardants. ***Brominated*** flame retardants are often most effective when cost/performance are considered, and have been widely used in semiconductor materials.

9. ***Are there any functional or electrical differences among products?***
   There is no difference