

| Current Production Information       |                                      |                       |                   |                                 |                |                       |                |
|--------------------------------------|--------------------------------------|-----------------------|-------------------|---------------------------------|----------------|-----------------------|----------------|
| TI Part Number                       |                                      | PGA2311U/1KG4         |                   | Assembly Site                   |                | TI TAIWAN A/T         |                |
| Lead/Ball Finish                     |                                      | CU NIPDAU             |                   | Package Type / Pins             |                | DW   16               |                |
| Planned Lead/Ball Finish             |                                      |                       |                   | Package Body Size (WxLxH) mm    |                | 7.52x10.28x2.35       |                |
| MSL / Reflow Ratings                 |                                      | Level-2-260C-1 YEAR   |                   | Total Device Mass (mg)          |                | 420.37374300000005    |                |
| Environmental Ratings Information    |                                      |                       |                   |                                 |                |                       |                |
| Part Number Type                     |                                      | Pb-Free               |                   | JIG Material Content Compliance |                | Level A & B           |                |
| RoHS & High-Temp Compliant           |                                      | Y                     |                   | Green Compliant                 |                | Y                     |                |
| Pb-Free (RoHS) Conversion Date       |                                      | 01-Apr-2006 (DC 0614) |                   | Green Conversion Date           |                | 01-Apr-2006 (DC 0614) |                |
| Pb-Free (RoHS) Available Supply Date |                                      | 06-Nov-2006           |                   | Green Available Supply Date     |                | 06-Nov-2006           |                |
| Component Information                |                                      |                       |                   |                                 |                |                       |                |
| Component                            | Substance                            | CAS Number            | Amount (mg)       | Homogeneous Material Level      |                | Component Level       |                |
|                                      |                                      |                       |                   | Percentage %                    | ppm            | Percentage %          | ppm            |
| <b>Bond Wire</b>                     |                                      |                       |                   |                                 |                |                       |                |
| Metallurgy                           | Gold                                 | 7440-57-5             | 0.199975          | 99.9925                         | 999924         | 0.0476                | 475            |
| Trace Metal                          | Beryllium                            | 7440-41-7             | 0.000002          | 0.001                           | 10             | 0                     | 0              |
| Trace Metal                          | Calcium                              | 7440-70-2             | 0.000002          | 0.001                           | 10             | 0                     | 0              |
| Trace Metal                          | Indium                               | 7440-74-6             | 0.000006          | 0.003                           | 30             | 0                     | 0              |
| Trace Metal                          | Silver                               | 7440-22-4             | 0.000005          | 0.0025                          | 25             | 0                     | 0              |
| <b>Sub-Total</b>                     |                                      |                       | <b>0.19999</b>    | <b>100</b>                      | <b>1000000</b> | <b>0.0476</b>         | <b>475</b>     |
| <b>Die Attach Adhesive</b>           |                                      |                       |                   |                                 |                |                       |                |
| Conductive Material                  | Silver                               | 7440-22-4             | 0.21              | 70                              | 69999          | 0.05                  | 499            |
| Polymer                              | Epoxy                                |                       | 0.039             | 13                              | 129999         | 0.0093                | 92             |
| Polymer                              | Proprietary Resin                    |                       | 0.0165            | 5.5                             | 54999          | 0.0039                | 39             |
| Reactive Diluent                     | Proprietary Material                 |                       | 0.0345            | 11.5                            | 115000         | 0.0082                | 82             |
| <b>Sub-Total</b>                     |                                      |                       | <b>0.3</b>        | <b>100</b>                      | <b>1000000</b> | <b>0.0714</b>         | <b>712</b>     |
| <b>Lead Frame</b>                    |                                      |                       |                   |                                 |                |                       |                |
| Base Metal                           | Copper                               | 7440-50-8             | 105.914617        | 97.425                          | 974250         | 25.1953               | 251953         |
| Base Metal                           | Iron                                 | 7439-89-6             | 2.609136          | 2.4                             | 23999          | 0.6207                | 6206           |
| Base Metal                           | Lead                                 | 7439-92-1             | 0.032614          | 0.03                            | 299            | 0.0078                | 77             |
| Base Metal                           | Phosphorus                           | 7723-14-0             | 0.016307          | 0.015                           | 149            | 0.0039                | 38             |
| Base Metal                           | Tin                                  | 7440-31-5             | 0.032614          | 0.03                            | 299            | 0.0078                | 77             |
| Base Metal                           | Zinc                                 | 7440-66-6             | 0.108714          | 0.1                             | 999            | 0.0259                | 258            |
| <b>Sub-Total</b>                     |                                      |                       | <b>108.714002</b> | <b>100</b>                      | <b>1000000</b> | <b>25.8613</b>        | <b>258609</b>  |
| <b>Lead Frame Plating</b>            |                                      |                       |                   |                                 |                |                       |                |
| Plating                              | Gold                                 | 7440-57-5             | 0.000671          | 0.7802                          | 7802           | 0.0002                | 1              |
| Plating                              | Nickel                               | 7440-02-0             | 0.081803          | 95.1198                         | 951197         | 0.0195                | 194            |
| Plating                              | Palladium                            | 7440-05-3             | 0.003526          | 4.1                             | 41000          | 0.0008                | 8              |
| <b>Sub-Total</b>                     |                                      |                       | <b>0.086</b>      | <b>100</b>                      | <b>1000000</b> | <b>0.0205</b>         | <b>203</b>     |
| <b>Mold Compound</b>                 |                                      |                       |                   |                                 |                |                       |                |
| Coloring                             | Carbon Black                         | 1333-86-4             | 0.920321          | 0.3                             | 2999           | 0.2189                | 2189           |
| Filler                               | Fused Silica                         | 60676-86-0            | 233.148052        | 76                              | 760000         | 55.4621               | 554620         |
| Flame Retardant Additive             | Proprietary Non Halide               |                       | 10.737081         | 3.5                             | 34999          | 2.5542                | 25541          |
| Hardener                             | Phenolic Novolac                     |                       | 23.008031         | 7.5                             | 74999          | 5.4732                | 54732          |
| Other additives                      | Catalyst Mold Release Adhesion Agent |                       | 11.350629         | 3.7                             | 37000          | 2.7001                | 27001          |
| Polymer                              | Cresol Novolac Epoxy                 |                       | 23.008031         | 7.5                             | 74999          | 5.4732                | 54732          |
| Stress Relief Agent                  | Proprietary                          |                       | 4.601606          | 1.5                             | 14999          | 1.0946                | 10946          |
| <b>Sub-Total</b>                     |                                      |                       | <b>306.773751</b> | <b>100</b>                      | <b>1000000</b> | <b>72.9764</b>        | <b>729761</b>  |
| <b>Semiconductor Device</b>          |                                      |                       |                   |                                 |                |                       |                |
| Silicon Chip                         | Doped Silicon                        | 7440-21-3             | 4.3               | 100                             | 1000000        | 1.0229                | 10228          |
| <b>Sub-Total</b>                     |                                      |                       | <b>4.3</b>        | <b>100</b>                      | <b>1000000</b> | <b>1.0229</b>         | <b>10228</b>   |
| <b>Total</b>                         |                                      |                       | <b>420.373743</b> |                                 |                | <b>100</b>            | <b>1000000</b> |

**Important Part Information**

There is a remote possibility the Customer Part Number (CPN) your company uses could reference more than one TI part number. This is due to two or more users (EMSI's or subcontractors) using the same CPN for different TI part numbers. If this occurs, please check your Customer Part Number and cross reference it with the TI part number seen on this page.

**Product Content Methodology**

[For an explanation of the methods used to determine material weights, See Product Content Methodology.](#)

## Material Declaration Certificate for Semiconductor Products

TI certifies that the material content information provided by TI as of the date of disclosure is representative and accurate. TI semiconductor products designated by TI as "Pb-Free" or "Green" (defined below) do not exceed any of the Joint Industry Guide (JIG) Level-A Substance thresholds and are compliant with the requirements of the European Union's Restriction on Use of Hazardous Substances ("RoHS") Directive, 2002/95/EC.

For TI semiconductor products NOT designated as "Pb-Free" or "Green", these products are RoHS compliant with the exception of Lead (Pb) which may be found in the leadframe plating or solder balls, or in RoHS exempt applications such as high-temperature solder die attach (exemption 7a) and flip-chip solder bumps (exemption 15). This situation is known as RoHS-5 or "5 of 6" compliant.

| <b>JIG Level-A Banned Substances</b>  | <b>Threshold, Homogeneous Level (1)</b>                      |
|---|--|
| Asbestos  | Not intentionally added                                      |
| Azo colorants   | Not intentionally added                                      |
| RoHS - Cadmium/Cadmium Compounds  | 75 ppm, Not intentionally added<br>(RoHS threshold = 100ppm) |
| RoHS - Hexavalent Chromium/Hex.Chromium.Compounds                                   | 1000 ppm, Not intentionally added                            |
| RoHS - Lead/Lead Compounds  | 1000 ppm, Not intentionally added                            |
| RoHS - Mercury/Mercury Compounds  | 1000 ppm, Not intentionally added                            |
| Ozone Depleting Substances  | Class I : Not intentionally added<br>Class II : 1000ppm      |
| RoHS - Polybrominated Biphenyls (PBBs)  | 1000 ppm, Not intentionally added                            |
| RoHS - Polybrominated Diphenyl Ethers (PBDEs)                                       | 1000 ppm, Not intentionally added                            |
| Polychlorinated Biphenyls (PCBs)  | 1000 ppm, Not intentionally added                            |
| Polychlorinated Naphthalenes (>3 Chlorine atoms)                                    | 1000 ppm, Not intentionally added                            |
| Radioactive Substances  | 1000 ppm, Not intentionally added                            |
| Shortchain Chlorinated Paraffins  | 1000 ppm, Not intentionally added                            |
| Tributyl Tin (TBT) and Triphenyl Tin (TPT)  | 1000 ppm, Not intentionally added                            |
| Tributyl Tin Oxide (TBTO)   | 1000 ppm, Not intentionally added                            |
| (1) Threshold does not apply to applications covered by a RoHS substance exemption. |  |

Regarding the EU Directive 2004/12/EC concerning Packaging and Packaging Waste, TI's packing materials (boxes, trays, etc) comply with the directive's requirement that the total concentration of the 4 heavy metals (cadmium, hexavalent chromium, lead, and mercury) must not exceed 100 ppm. Material content details for TI's packing materials are available at [www.ti.com/eoinfo](http://www.ti.com/eoinfo).

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Signature: [\(click here for signed certificate\)](#)

Name/Title: Cindy Allen, Vice President, Worldwide Quality

Date: September 27, 2006

**Pb-Free:** TI defines "Pb-Free" or "RoHS Compliant" to mean semiconductor products that are compliant with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials unless exempt. Where designed to be soldered at high temperatures, TI "Pb-Free" and "RoHS Compliant" products are suitable for use in specified lead-free processes.

**Green:** TI defines "Green" to mean Pb-Free/RoHS Compliant and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material).