Pin grid array sockets are designed to accept high pin count ICs. They use low force 6-finger contacts to ease insertion/extraction of the device. Standard low force (M-M #32) contact is used for pin counts up to 150, ultra-low force (M-M #35) contact is recommended for 150 pins or more but less than 250 pins. The "ultra lite" (M-M #43) is recommended for 250 pins or more.

PGA sockets all have precision-machined pins, this offers the lowest possible profile. The closed bottom design also eliminates flux and solder contamination, and the pins are in-line with contact entry.

Insulator bodies are molded from high temp. PCT polyester suitable for all forms of soldering including wave, infra-red reflow and vapor phase.

**TECHNICAL SPECIFICATIONS**

**Materials**

- **Insulator body:** High Temp. glass-filled thermoplastic polyester (PCT)
  - Heat deflection temperature (HDT @ 264 PSI) = 255°C(490°F)
  - Self-extinguishing, rated UL94V-0

- **Receptacle (Sleeve):** Screw machined brass (ASTM-B16-00), plated 0,25μm gold, 5,08μm tin or 5,08μm tin-lead (SnPb 90/10) over 2,54μm nickel.

- **Pin:** Screw machined brass (ASTM-B16-00), plated 0,25μm gold, 5,08μm tin or 5,08μm tin-lead (SnPb 90/10) over 2,54μm nickel.

- **Contact (clip):** Stamped beryllium-copper (ASTM-B194-01), plated 0,25μm or 0,76μm gold over 1,27μm nickel.

**Mechanical Data**

- **Insertion characteristics:**
  - Measured with a polished steel gauge 0,46 diameter
  - Low force M-M#32 (01 suffix) typ. insertion force 50 grams typ. extraction force 30 grams
  - Ultra-low force M-M#35 (02 suffix) typ. insertion force 25 grams typ. extraction force 15 grams
  - "Ultra lite" M-M#43 (03 suffix) typ. insertion force 12.5 grams typ. extraction force 7.5 grams

- **Mechanical life:** 100 cycles min.

**Electrical & Environmental Data**

- See general specifications on page 4.

**DIMENSIONS OF PGA SOCKET INSULATORS**

DIMENSIONS A, B, and C can be calculated as follows:

- **N1** = GRID SIZE (# of pins per side, outer most row only for interstitial patterns)
- **N2** = WINDOW SIZE

\[
A = N1 \times 2.54 \\
B = (N1-1) \times 2.54 \\
C = (N2 \times 2.54) - 0.41
\]
### TECHNICAL SPECIFICATIONS FOR 540 SERIES PLCC SOCKETS

**MATERIALS:**
- Insulator: Glass filled thermoplastic, self-extinguishing rated, UL94V-0, color black.
- Contact: Plated copper alloy overall nickel underplating, tin finish.

**MECHANICAL DATA:**
- Contact pressure (per contact): 150 grams min.
- Mechanical data (cycles): 25 cycles min.

**ELECTRICAL DATA:**
- Rated current: SMD types: 1A
  - Thru-hole types: 2A
- Contact resistance: 20 mΩ max.
- Insulation resistance: 10,000 MΩ min.
- Dielectric strength: 600 VRMS
- Capacitance: 2pF max.

**ENVIRONMENTAL DATA:**
- Operating temperature: -55/+125 °C
- Vibration (No electrical discontinuity greater than 1μs): 10-2000 HZ, 15 g
- Climactic category (EIA): 365-17A

### TECHNICAL SPECIFICATIONS FOR 940 SERIES PLCC SOCKETS

**MATERIALS:**
- Insulator: PPS Polyphenylene Sulfide, Rated UL94V-0.
- Contact: Phosphor Bronze with a tin finish and nickel underplate.

**MECHANICAL DATA:**
- Contact pressure (per contact): 150 grams min.
- Mechanical data (cycles): 50 cycles min.

**ELECTRICAL DATA:**
- Rated current: SMD types: 1A
  - Thru-hole types: 2A
- Contact resistance: 30 mΩ max.
- Insulation resistance: 10,000 MΩ min.
- Dielectric strength: 600 VAC
- Capacitance: 1pF max.

**ENVIRONMENTAL DATA:**
- Operating temperature: -55/+105 °C
- Vibration (No electrical discontinuity greater than 1μs): 10-2000 HZ, 15 g
- Climactic category (EIA): 365-17A

### TECHNICAL SPECIFICATIONS FOR BGA ADAPTER SYSTEM

**Materials:**
- Socket contact: Three finger, stamped beryllium copper alloy 172, HT (Mill-Max type #04 or #05); plated 0.25μm gold over 1.27μm nickel.
- Socket shell and adapter pins: Precision machined brass alloy; plated 0.25μm gold over 2.54μm nickel.
- Insulator material: 1.19 or 1.57 thick glass-epoxy type FR-4, rated UL94V-0. TCE = 10-13ppm/°C, εr = 5.0

**Mechanical:**
- Insertion and withdrawal forces (using 0.25 dia. polished steel gage pin): Insertion: 36N typ. per pin
  - Withdrawal: 20N typ. per pin
- Insertion force of an actual 225 pin device: 90N
- Durability: 100 cycles
- Coplanarity: ≤0.13

**Electrical:**
- Current rating (per pin): 1 A
- Working voltage: 100 VRMS/150 VDC max.
- Low level contact resistance: 10 mΩ max.
- Insulation resistance @ 500 VRMS: 1,000,000 MΩ min.
- After climatic tests: 10,000 MΩ min.
- Dielectric withstanding voltage: 500 VRMS
- Capacitance between adjacent contacts: 1 pF max.
- Self inductance per pin: 2 nH max.
- Electrical length: 31 pS

**Environmental:**
- Operating temperature range: -55 °C to +125 °C
- BGA adapter/socket systems have withstood the following environmental tests without mechanical or electrical failure:
  - Damp heat, steady state: 40 °C, 93% rH, 21 days
  - Damp heat, cyclic: 25/55 °C, 6 days
  - Dry heat: 100°C, 1,000 hours
  - Thermal shock: -55 to +125 °C, 5 cycles
  - Random vibration: 50 to 500 Hz, 8g, 20 min. per axis
  - Shock: 50 g per axis
  - solderability: 235 °C, 2 seconds
  - Resistance to soldering heat: 270 °C, 10 seconds
  - Resistance to corrosion:
    - Salt spray: 48 hours
    - Sulphur dioxide: 96 hours @ 25 ppm SO2, 25 °C, 75% rH
    - Hydrogen sulphide: 96 hours @ 12 ppm H2S, 25°C, 75% rH
• Series 510, 511, 514, 515, 522 & 523 PGA sockets are available on 2,54 centers.

• Series 513 and 518 PGA sockets are available for Interstitial patterns.

• Choice of three low force clips to cover all applications.

• Hi-Temp PCT polyester insulator material suitable for all forms of soldering.

For Electrical, Mechanical & Environmental Data, See pg. 112

For RoHS compliance select plating code.

Visit www.mill-max.com/pga
To configure a formal Part Number

Visit www.mill-max.com

For RoHS 2002/95/EC

<table>
<thead>
<tr>
<th>PIN GRID ARRAY SOCKETS</th>
<th>Series 510, 511, 513, 514, 515, 518, 522, 523</th>
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<tbody>
<tr>
<td><strong>STANDARD SOLDER TAIL</strong></td>
<td><strong>SERIES 510</strong></td>
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<tr>
<td>0,38–0,64 Ø</td>
<td>2,41</td>
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<tr>
<td>2,70</td>
<td>3,71</td>
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<tr>
<td>4,19</td>
<td>0,51 DIA.</td>
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<td>3,18</td>
<td></td>
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</table>

| **LONG SOLDER TAIL** | **SERIES 511** |
| 0,38–0,64 Ø | 2,62 |
| 2,79 | 3,81 |
| 4,19 | 0,51 DIA. |
| 4,32 |

| **SMT RECEPTACLE** | **SERIES 513** |
| 0,25 |
| 1,17 DIA. |
| 2,79, 3,43, 3,68 |
| 5,08 |

| **SMT RECEPTACLE** | **SERIES 514** |
| 0,38–0,64 Ø | 2,44 |
| 2,79 | 3,84 |
| 3,1 |
| 4,32 |

| **LOW PROFILE SOLDER TAIL** | **SERIES 515** |
| 0,76 DIA. |
| 0,20 VERTICAL MOVEMENT |
| 2,74 |

| **SOLDER TAIL (Without Heatsink Tabs)** | **SERIES 518** |
| 0,38–0,64 Ø | 2,11 |
| 2,79 | 3,68 |
| 4,19 |
| 2,54, 3,18, or 3,68 |

XX=Plating Code

RoHS 2002/95/EC

SLEEVE (PIN) 0,25µm Au 5,08µm SnPb 5,08µm Sn
CONTACT (CLIP) 0,76µm Au 0,76µm Au 0,76µm Au

Visit www.mill-max.com/pga
To configure a formal Part Number

RoHS 2002/95/EC
• Series 551 and 599 headers are available on 2,54 centers.

Series 507 & 550 PGA sockets are available for Interstitial patterns.

• Hi-Temp PCT polyester insulator material suitable for all forms of soldering.

**SMT HEADER PIN TYPE 0737**  
**SERIES 507**

**HEADER PIN TYPE 5012**  
**SERIES 550**

**HEADER PIN TYPE 5503**  
**SERIES 551**

**HEADER PIN TYPE 5504 & 5505**  
**SERIES 551**

**SMT HEADER PIN TYPE 9976**  
**SERIES 599**

**SPECIFY PLATING CODE XX=**  
**10◊**  
**90**  
**40◊**

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<tr>
<th>Pin Plating</th>
<th>0,25μ Au</th>
<th>5,08μ Sn/Pb</th>
<th>5,08μ Sn</th>
</tr>
</thead>
</table>

Visit [www.mill-max.com/pga](http://www.mill-max.com/pga) To configure a formal Part Number

For Electrical, Mechanical & Environmental Data, See pg. 112

For RoHS compliance select ◊ plating code.
• Series 614 & 605 PGA carrier sockets offer 4 receptacle styles.
• Many combinations of receptacles and clips to cover all applications.
• Hi-Temp PCT polyester insulator material suitable for all forms of soldering.
• Carrier sockets provide a convenient way of loading groups of receptacles onto a PC board.

**APPLICATION OF PGA SOCKET CARRIERS**

**LOW PROFILE SOCKET**
SERIES 614...001, 002, 003

- Carriers offer 4 receptacle styles.
- Many combinations of receptacles and clips to cover all applications.
- Hi-Temp PCT polyester insulator material suitable for all forms of soldering.
- Carrier sockets provide a convenient way of loading groups of receptacles onto a PC board.

**MINIATURE SOCKET**
SERIES 614...007

- Carriers offer 4 receptacle styles.
- Many combinations of receptacles and clips to cover all applications.
- Hi-Temp PCT polyester insulator material suitable for all forms of soldering.
- Carrier sockets provide a convenient way of loading groups of receptacles onto a PC board.

**LOWEST PROFILE SOCKET**
SERIES 614...012

- Carriers offer 4 receptacle styles.
- Many combinations of receptacles and clips to cover all applications.
- Hi-Temp PCT polyester insulator material suitable for all forms of soldering.
- Carrier sockets provide a convenient way of loading groups of receptacles onto a PC board.

**REDUCED BARREL SOCKET**
SERIES 605...048

- Carriers offer 4 receptacle styles.
- Many combinations of receptacles and clips to cover all applications.
- Hi-Temp PCT polyester insulator material suitable for all forms of soldering.
- Carrier sockets provide a convenient way of loading groups of receptacles onto a PC board.

Visit www.mill-max.com/pgacarrier To configure a formal Part Number

**SPECIFY PLATING CODE**

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<tbody>
<tr>
<td>Sleeve (Pin)</td>
<td>0.25µm Au</td>
<td>5.08µm SnPb</td>
<td>5.08µm Sn</td>
</tr>
<tr>
<td>Contact (Clip)</td>
<td>0.76µm Au</td>
<td>0.76µm Au</td>
<td>0.76µm Au</td>
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</tbody>
</table>

**RoHS Compliance**

For Electrical, Mechanical & Environmental Data, See pg. 112

For RoHS compliance select plating code.
BGA adapter/socket systems are a reliable way to make BGAs pluggable. They may also be used as a high density board-to-board interconnect.

The BGA device for a 0.8mm or 1mm grid is soldered to a 9929 adapter (or a 7929 adapter is soldered to a PCB), then either one can be plugged into a 9942 (0.8mm grid) or 9928 (1mm grid) surface mount socket.

The BGA device for a 1.27 grid is soldered to a 8737/4048 adapter (or a 4098/4054 adapter is soldered to a PCB), then either one can be plugged into a 8214 surface mount socket.

Both socket and adapter have the same footprint as the BGA device.

Insertion force is .4N per pin for standard pins 7929/9929, 8737/4098. Tapered EZ-IN pins 4048/4054 reduce insertion force to only .08N, and are recommended for pin counts greater than 500.

Insulator material is FR-4 epoxy having a TCE to match the BGA device and circuit board.

For 0.8mm & 1mm Grid Only

For 0.8mm & 1mm Grid Only

For 1.27 Grid Only

For 0.8mm Grid Only

For 1mm Grid Only

For 1.27 Grid Only

For 0.8mm Grid Only

For 1mm Grid Only

For 1.27 Grid Only

Visit www.mill-max.com/bga To configure a formal Part Number

SPECIFY PLATING CODE XX=

PLATING CODE XX=

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
<th>Description</th>
<th>Material</th>
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</thead>
<tbody>
<tr>
<td>Sleeve</td>
<td>11</td>
<td>Pin Plating</td>
<td>0.25µm Au</td>
</tr>
<tr>
<td>Contact</td>
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<td>Pin Plating</td>
<td>0.25µm Au</td>
</tr>
</tbody>
</table>

www.mill-max.com  516-922-6000