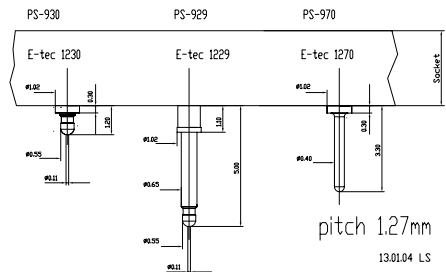
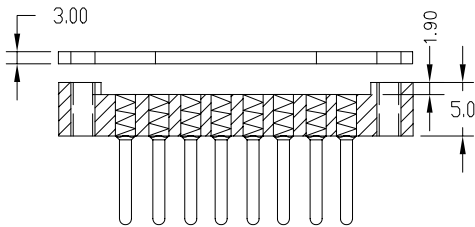


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| ECN NO. | REV. | DESCRIPTION OF CHANGE | EFFECTIVE DATE | ORIGINATOR |
|---------|------|---|----------------|------------|
| 000130 | 0 | Initial | 4/30/99 | Ray Kuang |
| 2001393 | 1 | add torque limiting screw driver info on page 2, 3 and 4 | 08/15/2001 | Lijie Zhao |
| 2004088 | 2 | add e-tec socket pin detail drawing change Actel doc # from 1-07-09037 to 1-07-11032 | 02/24/2004 | Lijie Zhao |
| 2005028 | 3 | Remove word "Actel Confidential" from drawing | 01/15/2005 | Lijie Zhao |

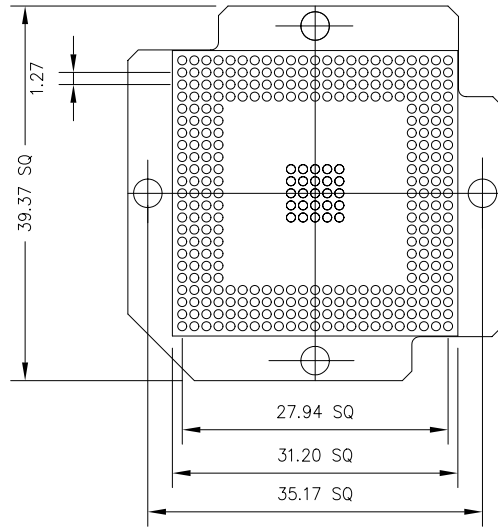


e-tec socket pin detail drawing



NOTES: Dim: mm

- PIN MATERIAL: BRASS ALLOY 360, 1/2 HARD.
- PIN FINISH: 10 μm GOLD OVER 50 μm NICKEL.
- INSULATOR MATERIAL: FR-4 GLASS EPOXY
- Contact: BeCu with gold plated



E-TEC PART#: BPW329-1270-23AB11
E-TEC PATENTS PENDING

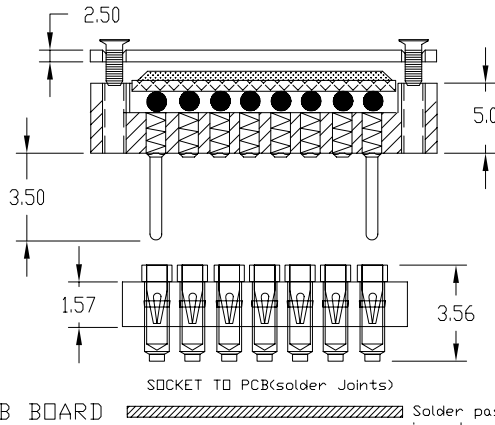
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS | | PROJECTION | | ACTEL CORPORATION 8081 Shilrin Court Mountain View, CA 94043-4655 | |
|--|-----------|------------|---------|---|--------------------|
| DECIMAL | ANGULAR | APPROVALS | | TITLE | |
| X.X ±0.10 | ±1° | DRAWN | DATE | 329-31x31mm, 1.27mm E-TEC BGA SOCKET | |
| X.XX ±0.05 | | Ray Kuang | 4/27/99 | VENDOR NAME: | E-TEC |
| X.XXX ±0.03 | | CHECKED | | ACTEL DWG. NUMBER | 1-07-11032 |
| MATERIAL | SEE NOTES | ENG'R | | VENDOR DWG. NUMBER | REV 3 |
| FINISH | SEE NOTES | RELEASED | | SIZE | B |
| DO NOT SCALE DRAWING | | | | VENDOR SUB(PART) NUMBER | BPW329-1270-23AB11 |
| | | | | Actel Part#: | SE-BG329-A |
| | | | | SCALE: | NONE |
| | | | | | SHEET 1 OF 2 |

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 BE MAINTAINED IN STRICT CONFIDENCE, AND SHALL NOT BE RELEASED TO ANY THIRD PARTY WITHOUT THE EXPRESS
 WRITTEN PERMISSION OF ACTEL.

| ECN NO. | REV. | DESCRIPTION OF CHANGE | EFFECTIVE DATE | ORIGINATOR |
|---------|------|---|----------------|------------|
| 090198 | 0 | Initial | 4/30/99 | Ray Kuang |
| 2001983 | 1 | add torque limiting screw driver info on page 3, 3 and 4 | 09/12/2001 | Lijie Zhao |
| 2004068 | 2 | add e-tec socket pin detail drawing change Actel doc # from 1-07-09037 to 1-07-11032 | 06/24/2004 | Lijie Zhao |
| 2005028 | 3 | Remove word "Actel Confidential" from drawing | 01/15/2005 | Lijie Zhao |

ASSEMBLY FLOW

Retention Frame
 ↓
 BGA PACKAGE
 ↓
 BGA SOCKET
 SE-BG329-A
 ↓
 BGA ADAPTER
 SOCKET
 (see Sm-BG329-B)
 ↓
 PCB BOARD



Torque Limiting Screw Driver

Solder past thickness need to be at least 0.20mm(or 0.008 inch)
 in order to have reliable solder joint

Note: Dim: mm Please see detail drawing for part number

- To remove BGA socket from adapter socket, Use removal tool from Mill-Max
- Mill-Max phone: 516-922-6000
- Refer E-Tec "Screw Lock Type Instruction" (on page 3) for more information.
- Must use torque limiting screw driver to tighten screws (refer Mountz minimaster 020074 gold, preset 7cNm/10ozf.in on page 4).
 Under torque limit tighten could fail continuity and over torque limit tighten could crack package .

| | | | | | |
|--|--|------------------|--|---|--------------|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MILLIMETERS DECIMAL ANGULAR X.X ±0.10 ±1° X.XX ±0.05 X.XXX ±0.03 | PROJECTION | | ACTEL CORPORATION 2001 Stevin Court Mountain View, CA 94043-4655 | | |
| | APPROVALS DATE DRAWN Ray Kuang 4/27/99 | | TITLE 329-31x31mm, 1.27mm E-TEC BGA SOCKET (329 BGA E-TEC Socket Assembly) | | |
| | MATERIAL SEE NOTES | CHECKED | VENDOR NAME: e-tec VENDOR ID(PART) NUMBER B | ACTEL DWG. NUMBER 1-07-11032 VENDOR Dwg. NUMBER | REV 3 |
| | FINISH SEE NOTES DO NOT SCALE DRAWING | ENGR RELEASED | Actel Part#: SE-BG329-A | SCALE: NONE | SHEET 2 OF 2 |

Ball / Land Grid Array Sockets

Screw Lock Type

EP patents 0829188, 0897655
 US patents 6190181, 6249440
 Patented in other countries.

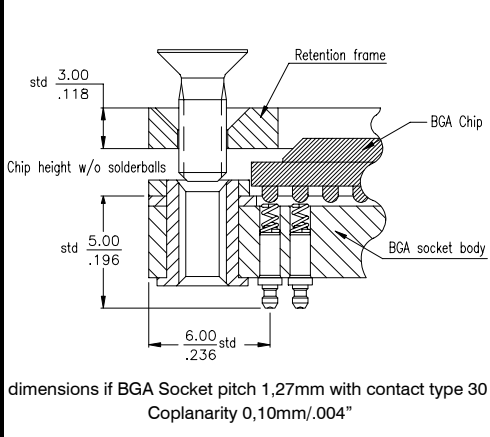
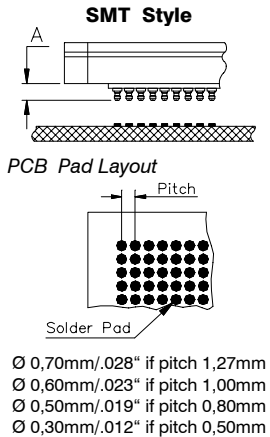
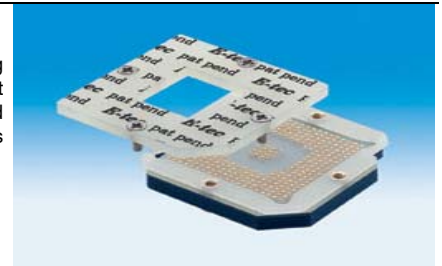


E-tec is now the leading BGA socket manufacturer.

Sockets range from 5 x 5 upwards and some of the existing patterns are shown on the following pages. Many more exist and your exact requirements can easily be added to our extensive product library. The SMT socket is simply placed and reflowed onto the PCB in the same way as the chip and occupies only a small amount of additional board space. The 1.27mm pitch screw lock socket extends ~ 6,00 mm beyond the outer ball row with no fixing holes.

We aim to solve your requirements - many different terminals and configurations are available. Your custom sets our standards!

Please note, we will always request the chip data to ensure we offer a compatible socket.

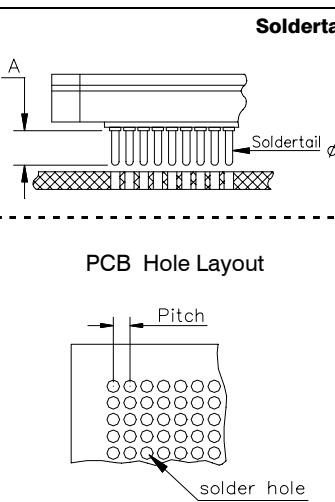


Important Note:

Please check the ball diameters & heights of your chip prior to ordering the standard E-tec BGA (BPW/BCW) sockets. Any deviation has to be communicated to E-tec in order to check compatibility with the standard socket design and if necessary to obtain a special order code adapted to your chip dimensions.

The standard solderball diameters & heights are the following:

| Pitch | ball diameters min/max | ball height min/max |
|----------------------------|---------------------------|------------------------|
| 0.50mm | 0.25mm / 0.35mm | 0.15mm / 0.30mm |
| 0.65mm | 0.25mm / 0.50mm | 0.15mm / 0.30mm |
| 0.75mm & 0.80mm | 0.40mm / 0.55mm | 0.25mm / 0.45mm |
| 1.00mm | 0.50mm / 0.70mm | 0.30mm / 0.50mm |
| 1.27mm & 1.50mm | | |
| a) plastic chips (BPW) | 0.60mm / 1.00mm | 0.50mm / 0.70mm |
| b) ceramic chips (BCW) | 0.60mm / 1.00mm | 0.80mm / 1.00mm |



Soldertail:

Ø 0,45mm/.017" if pitch 1,27mm
 Ø 0,29mm/.011" if pitch 1,00mm
 Ø 0,29mm/.011" if pitch 0,80mm
 Ø 0,25mm/.010" if pitch 0,50mm

PCB solder hole:

Ø 0,60mm/.024" if pitch 1,27mm
 Ø 0,50mm/.020" if pitch 1,00mm
 Ø 0,40mm/.016" if pitch 0,80mm
 Ø 0,35mm/.014" if pitch 0,50mm

| Specifications | |
|----------------------------------|---|
| Mechanical data | |
| Contact life | 10.000 cycles min. |
| Retention System life | 1.000 cycles min. |
| Solderability | exceeds MIL-STD-202 Method 208 |
| Individual contact force | 40 grams max. |
| Max. torque for retention screws | up to 800 pins = 7cN per meter or 10 oz per inch as of 800 pins = 7cN to 10cN per meter or 10 oz to 14 oz per inch |
| Material | |
| Insulator | Glass Epoxy FR 4 |
| Terminal | Brass |
| Contact | BeCu |
| Electrical data | |
| Contact resistance | < 100 mΩ |
| Current rating | 500 mA max. |
| Insulation resistance at 500V DC | 100 MΩ if 0.50 to 0.80mm pitch 500 MΩ 1.00mm pitch upwards |
| Breakdown voltage at 60 Hz | 500V min. |
| Capacitance | < 1 pF |
| Inductance | < 2 nH |
| Operating temperature | -55°C to +130°C ; 220°C for 10 sec. |
| Recommendations | |
| Torque limiting screw driver | Refer to page "Tools" of this catalog |
| Solder paste | Please use a solderpaste w/o any silver! |
| Solder profile | Please refer to our website www.e-tec.ch |

The pitch dimension depends on your Ball Grid Array

How to order

X X W x x x x - x x x x - x x x x x x

| | | | | | |
|---|---|---|---|---|---|
| <p>Device Type</p> <p>B = Ball Grid L = Land Grid C = Column Grid</p> | <p>Device Material</p> <p>C = Ceramic P = Plastic</p> | <p>Pitch</p> <p>05 = 0,50mm 06 = 0,65mm 07 = 0,75mm 08 = 0,80mm</p> <p>10 = 1,00mm 12 = 1,27mm 15 = 1,50mm</p> | <p>Grid Code</p> <p>please refer to the footprint pages 38 to 45</p> | <p>Config Code</p> <p>will be given by the factory after receipt of the chip datasheet</p> | <p>Plating</p> <p>01 = tin/gold</p> |
|---|---|---|---|---|---|

Nbr of contacts

please refer to the footprint pages 38 to 45

Contact Type

| | |
|-----------|--|
| 30 | = standard SMT... („A“ = 1,20mm if 1,27mm pitch; 0,80mm if 1,00mm, 0,60 if 0,80mm pitch; 0,40mm if 0,50mm pitch) |
| 29 | = raised SMT..... („A“ = 5,00mm if 1,27mm pitch; 3,20mm if 1,00mm; 2,80mm if 0,80mm pitch, 2,30mm if 0,50mm pitch) |
| 28 | = special raised SMT - only for 1.00 & 0.80mm pitch..... („A“ = 4,50mm) |
| 70 | = standard solder tail..... („A“ = 3,30 if 1,27mm pitch, 2,80 if 1,00mm or 0,80mm pitch, 2,30mm if 0,50mm pitch) |
| 65 | = special short solder tail - only for 1,27mm pitch..... („A“ = 2,80mm) |

TLS



Torque Screwdrivers Limiting, Internally Adjustable

Designed and manufactured to meet or exceed the accuracy and repeatability requirements of ISO 6789:1992.

Various models that range from 0.7 ozf.in to 120 lbf.in.

Precision radial ball clutch "slips-free" when the preset torque is reached preventing overtorquing.

Thrust bearings insure that the torque setting is independent of any end load applied by the operator.

Tamper-proof internal adjustment.

All models provide bi-directional operation. Available with a one-way clutch system so the screwdriver will operate in one direction but lock solid in the opposite direction for easy screw removal.

Can be clean room modified upon request.

Four different colored lightweight aluminum handles allow color coding of specific torque values in production areas.

| Model | 1/4" MALE SQUARE DRIVES | | 1/4" FEMALE HEX DRIVES | | Presettable Torque Ranges | | | Weight | |
|------------------|-------------------------|-------|------------------------|-------|---------------------------|-----------------|-----------------------|--------|-----|
| | Item# | Color | Item# | Color | American | S.I. | Metric | oz. | g. |
| Micro Minimaster | - | - | 020083 | Red | 3 - 32 ozf.in | 2 - 22 cN.m | 216 - 2300 gf.cm | 1.8 | 50 |
| Minimaster | - | - | 020074 | Gold | 0.7 - 32 ozf.in | 0.5 - 22 cN.m | 50 - 2306.2 gf.cm | 2.5 | 72 |
| Minor | 020062 | Blue | 020066 | Blue | 3 ozf.in - 12 lbf.in | 2 - 135 cN.m | 200 gf.cm - 14 kgf.cm | 7.4 | 210 |
| | 020063 | Gold | 020067 | Gold | | | | | |
| | 020064 | Green | 020068 | Green | | | | | |
| | 020065 | Red | 020069 | Red | | | | | |
| Standard | 020075 | Blue | 020079 | Blue | 8 ozf.in - 36 lbf.in | 6 - 406 cN.m | 600 gf.cm - 40 kgf.cm | 9.9 | 280 |
| | 020076 | Gold | 020080 | Gold | | | | | |
| | 020077 | Green | 020081 | Green | | | | | |
| | 020078 | Red | 020082 | Red | | | | | |
| TLS 1360 | 020060 | Black | 020061 | Black | 10 - 120 lbf.in | 113 - 1360 cN.m | 11 - 138 kgf.cm | 11.5 | 325 |