



CHAPTER 7 TRAYS

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INTRODUCTION

Trays are used instead of tubes to protect higher pincount packages from electrical and mechanical damage during handling and shipment. Trays are also suitable for product presentation to board assembly equipment. As standard practice, the following AMD packages are shipped in trays: CCGA, CPGA, C μ PGA, LQFP, OBGA, OPGA, O μ PGA, PBGA, PQFP, and TQFP. Additionally, the standard carrier option for select SSOP packages is trays.

DESIGN AND MATERIALS

All trays are uniformly sized, in compliance with standard JEDEC outlines. As much as possible, AMD procures trays that are made of 25 percent recycled material (see *page 7-5* for a listing of AMD's tray suppliers). The fiber tray material is either carbon-filled or antistatically coated to provide ESD protection. AMD's trays are made of static dissipative polysulfone material, or equivalent.

The temperature at which each tray can withstand continuous operation varies. See the notes section of each tray dimensions drawing for specific information.

Pin One Orientation. Packages are placed in the trays so that the device pin one is oriented to the notched corner of the tray, enabling pick-and-place equipment setups to be compatible for all packages and pincounts.

DEVICE COUNT PER TRAY AND BOX

The quantity of devices per tray are standardized across all AMD products by the package family and pin/ballcount. These standard quantities are listed in the table beginning on *page 7-3*. For definitions of AMD's package codes, see *Chapter 1 Codes and Carrier Options*.

For shipment, a stack of six trays are secured with straps; five containing parts and the sixth serving as a cover. The diagrams and tables that follow show tray dimensions per package and the quantities of parts per tray. See *Chapter 13 Packing Methods and Labels* for details on how trays are packed in boxes for shipment.



Figure 7.1 Trays protect product during shipping and handling and are suitable for product presentation to a pick-and-place system.

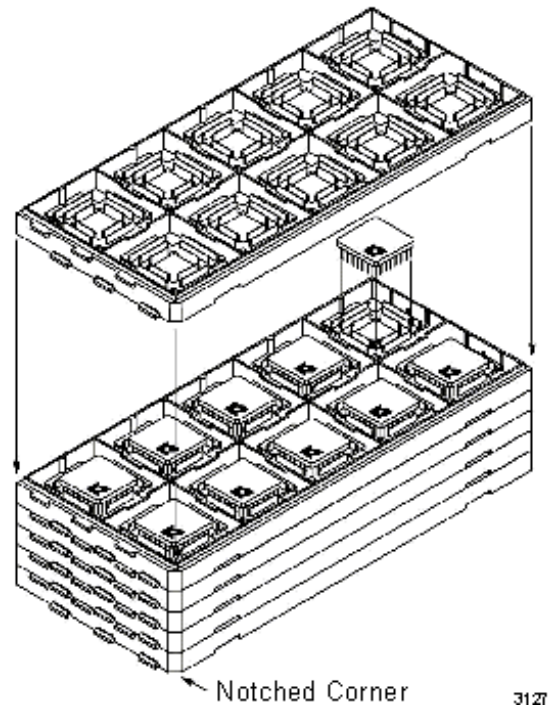


Figure 7.2 Five trays of product are stacked for shipment, with a sixth tray serving as a cover.

Device Count per Tray and Box

| Package | Ballcount/Pincount | Devices per Tray | Devices per Box ¹ |
|---------------------------------------------------|-------------------------|------------------|------------------------------|
| Ceramic Column Grid Array (CCF, C2F) | 575 CCF | 27 | 135 |
| | 949 C2F | 12 | 60 |
| Ceramic Micro Pin Grid Array (UCG) | UCG 940 | 12 | 60 |
| Ceramic Pin Grid Array (CGF) | 321 CGF | 10 | 50 |
| | 453 CGF | 10 | 50 |
| Low Profile Quad Flat Package (PQL, PDL) | 48 PQL | 250 | 1250 |
| | 64 PQL | 160 | 800 |
| | 100 PDL, PQL | 90 | 450 |
| | 144 PDL, PQL | 60 | 300 |
| | 160 & 176 PQL | 40 | 200 |
| | 208 PQL | 36 | 180 |
| Organic Ball Grid Array (OBF) | 349 OBF | 44 | 220 |
| | 564 OLF | 27 | 135 |
| | 829 OLF | 21 | 105 |
| Organic Micro Pin Grid Array (UOG) | 563 UOG | 24 | 120 |
| | 638 UOG | 24 | 120 |
| | 754 UOG | 12 | 60 |
| Organic Pin Grid Array (OGF) | 453 OGF | 10 | 50 |
| Plastic Ball Grid Array (BGA, BGD, BGT, LBA, LBB) | 256 BGD (27 mm x 27 mm) | 40 | 200 |
| | 256 BGT (19 mm x 19 mm) | 84 | 420 |
| | 272 BGA (27 mm x 27 mm) | 40 | 200 |
| | 292 BGA (27 mm x 27 mm) | | |
| | 328 BGA (27 mm x 27 mm) | | |

Notes:

1 In all cases, there are six trays per box, with the top tray being empty and serving as a cover.

Device Count per Tray and Box (Continued)

| Package | Ballcount/Pincount | Devices per Tray | Devices per Box ¹ |
|--------------------------------------------------------|-----------------------------|------------------|------------------------------|
| Plastic Ball Grid Array (continued) | 352 BGD (35 mm x 35 mm) | 24 | 120 |
| | 388 BGA (35 mm x 35 mm) | | |
| | 420 BGD (35 mm x 35 mm) | | |
| | 492 BGA (35 mm x 35 mm) | | |
| | 569 BGA (37.5 mm x 37.5 mm) | 21 | 105 |
| | 176 LBA (13 mm x 13 mm) | 160 | 800 |
| | 399 LBA (17 mm x 17 mm) | 90 | 450 |
| | 424 LBA (19 mm x 19 mm) | 84 | 420 |
| | 324 LBB (23 mm x 23 mm) | 60 | 300 |
| Plastic Quad Flat Package (PDH, PQB, PQE, PQR, PRH) | 44 PQR | 96 | 480 |
| | 80 PQR | 66 | 330 |
| | 100 PQB | 55 | 275 |
| | 100 PQR, PRH | 66 | 330 |
| | 120 PQR | 24 | 120 |
| | 132 PQB | 36 | 180 |
| | 144 PQR, PRH | 24 | 120 |
| | 160 PQE, PQR, PRH | 24 | 120 |
| | 168 PQR | 24 | 120 |
| | 208 PQR, PRH, PDH, PDE, PQE | 24 | 120 |
| | 240 PQE | 24 | 120 |
| Shrink Small Outline Package (SSO) | 56 SSO | 72 | 360 |
| Thin Profile Quad Flat Package (PQT) | 44 PQT | 160 | 800 |
| | 48 PQT | 250 | 1250 |
| | 64 PQT | 160 | 800 |
| | 80 PQT | 119 | 595 |

Notes:

1 In all cases, there are six trays per box, with the top tray being empty and serving as a cover.

Tray Suppliers per Package Type

| Package | Ballcount/ Pincount | Supplier's P/N | Tray Supplier |
|------------------------------------------|------------------------|----------------|------------------------------------|
| Ceramic Column Grid Array (CCF, C2F) | 575 CCF | CX 761-10 | Camtex |
| | 949 C2F | CX 787-10 | Camtex |
| Ceramic Mico Pin Grid Array (UCG) | 940 UCG | CX 812-10 | Camtex |
| Ceramic Pin Grid Array (CGF) | 321 CGF ¹ | D 771 ABS | DaeWon Semiconductor Packaging Co. |
| | | M 771 PS | Mardec Industrial Plastics, |
| | 453 CGF ¹ | D 771 ABS | DaeWon Semiconductor Packaging Co. |
| | | M 771 PS | Mardec Industrial Plastics, |
| Low Profile Quad Flat Package (PQL, PDL) | 48 PQL | KS-8308 | Kostat |
| | 64 PQL | KS-8505 | Kostat |
| | 100 PDL, PQL | KS-8505 | Kostat |
| | 144 PDL, PQL | 123-2020-213 | DaeWon Semiconductor Packaging Co. |
| | 160, 176 PQL | Am1212778 A | DaeWon Semiconductor Packaging Co. |
| | 208 PQL | D1252240 B | DaeWon Semiconductor Packaging Co. |
| Organic Ball Grid Array (OBF, OLF) | 349 OBF | CX 799-10 | Camtex |
| | 564 OLF | CX 810-10 | Camtex |
| | 829 OLF | CX 822-10 | Camtex |
| Organic Micro Pin Grid Array (UOG) | 563 UOG | D 1F4-3333-126 | DaeWon Semiconductor Packaging Co. |
| | 638 UOG | CX 833-02 | Camtex |
| | 754 UOG | CX811-10 | Camtex |
| Organic Pin Grid Array (OGF) | 453 OGF ² | D 771 | DaeWon Semiconductor Packaging Co. |
| | | M 771 | Mardec Industrial Plastics |

Notes:

- Both Daewon Semiconductor Packaging Co. and Mardec Industrial Plastics are primary source tray suppliers for packages 321 CGF and 453 CGF.
- Both Daewon Semiconductor Packaging Co. and Mardec Industrial Plastics are primary source tray suppliers for 453 OGF.

Tray Suppliers per Package Type (Continued)

| Package | Ballcount/ Pincount | Supplier's P/N | Tray Supplier |
|-----------------------------------------------------------------|----------------------------------------------|----------------|------------------------------------|
| Plastic Ball Grid Array (BGA, BGD, BGT, LBA, LBB) | 256 BGT | D 127-1919-113 | DaeWon Semiconductor Packaging Co. |
| | 272, 292, 328 BGA | CX 745-10 | Camtex |
| | 420 BGD | CX 629-10 | Camtex |
| | 388, 492 BGA | CX 744-10 | Camtex |
| | 569 BGA | CX 822-10 | Camtex |
| | 176 LBA | 1F3-1313-D13 | DaeWon Semiconductor Packaging Co. |
| | 324 LBB | KS-8801 | Kostat |
| | 399 LBA | KS-8809 | Kostat |
| | 424 LBA | KS-880A | Kostat |
| Plastic Quad Flat Pack- age (English) (PQB) | 100 PQB | TMHT-051101-01 | Precision Connector Tooling |
| | 132 PQB | TMHT-040901-01 | Precision Connector Tooling |
| Plastic Quad Flat Pack- age (Metric) (PQR, PRH, PDH, PDE) | 44 PQR | CX 603-01 | Camtex |
| | 80, 100 PQR, PRH | TMHT-061102-01 | Precision Connector Tooling |
| | 100 PQR | THMT-061102-06 | Precision Connector Tooling |
| | 120, 144, 160, 168, 208 (all versions) | CX 712-10 | Camtex |
| Shrink Small Outline Package (SSO) | 56 SSO | D-12G-56LD-A13 | DaeWon Semiconductor Packaging Co. |
| Thin Profile Quad Flat Package (PQT) | 44 PQT | CX 627-01 | Camtex |
| | 48 PQT | D 123-0707-213 | DaeWon Semiconductor Packaging Co. |
| | 64 PQT | CX 627-01 | Camtex |
| | 80 PQT | D 1212753B | DaeWon Semiconductor Packaging Co. |

Contact Information for AMD's Tray Suppliers. The following table provides contact information for AMD's tray suppliers.

| Name | Address | Telephone/Fax Numbers |
|------------------------------------|--------------------------------------------------|----------------------------------------|
| Camtex | Fremont, CA | P: (510) 490-5888 F: (510) 661-0512 |
| DaeWon Semiconductor Packaging Co. | Seoul, Korea (through branch in San Jose, CA) | P: (408) 562-6172 F: (408) 562-6173 |
| Kostat | San Jose, CA | P: (408) 261-0885 F: (408) 261-0985 |
| Mardec Industrial Plastics | Penang, Malaysia | P: 604-641-4302 F: 604-643-8784 |
| Precision Connector Tooling | Singapore | P: 65-741-9148 F: 65-741-9142 |

TRAY DIMENSIONS

The dimensional drawings show the dimensions of the tray for each package and ball/pin/lead count.

“Ceramic Column Grid Array” on page 7-8

“Ceramic Micro Pin Grid Array” on page 7-12

“Ceramic Pin Grid Array” on page 7-14

“Low Profile Quad Flat Package” on page 7-18

“Organic Ball Grid Array” on page 7-28

“Organic Micro Pin Grid Array” on page 7-34

“Organic Pin Grid Array” on page 7-40

“Plastic Ball Grid Array” on page 7-44 (BGA, BGD, BGT)

“Plastic Ball Grid Array” on page 7-54 (LBA, LBB)

“Plastic Quad Flat Package” on page 7-62

“Shrink Small Outline Package” on page 7-72

“Thin Profile Quad Flat Package” on page 7-74