PBGA-SD

Plastic Ball Grid Array – Stacked Die

- **Stacking of die enables more functionality and integration in a conventional PBGA package**

FEATURES

- Increased sub-system performance achieved by integrating multiple chips into a single package
- Die to die bonding capability for device/signal integration
- 15 x 15mm to 40 x 40mm body sizes available
- Ball counts up to >1000 balls
- 0.80, 1.00, 1.27 and 1.5mm ball pitch
- SnPb and Pb-free balls available
- Full in-house design capability with wide range of custom and open tool designs
- Full in-house electrical, thermal and mechanical simulation and measurements capability
- Multiple chip design and optional passive/discrete components available
- Standard 2, 4 and 6 layer substrates as well as high density substrate options
- Pb free and green material set options
- Multiple routing layers and dedicated ground/power planes available for improved electrical and thermal performance

APPLICATIONS

- DSPs and Memory
- Gate Arrays
- ASICs
- PC Chipsets and Peripherals
- Microprocessors/Controllers
- Others

DESCRIPTION

STATS ChipPAC's chip stack technology offers the flexibility of stacking 2 to 7 die in a single package. The Stacked Die Plastic Ball Grid Array (PBGA-SD) package takes advantage of the proven high electrical and thermal performance of STATS ChipPAC's PBGA packages, with efficient use of space made possible through die stacking technology. STATS ChipPAC's PBGA-SD packages using laminate substrates are available in a variety of body sizes and ball counts, combining advanced assembly processes and proven material sets for enhanced yield, reliability and performance.

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Plastic Ball Grid Array – Stacked Die

SPECIFICATIONS

Die Thickness	75-300µm (3-12mils)
Mold Cap Thickness	0.80, 1.17mm
Marking	Laser/ink
Packing Options	JEDEC tray/tape and reel

RELIABILITY

Moisture Sensitivity Level	JEDEC Level 3, 260°C reflow
Temperature Cycling	Condition C (-65°C to 150°C), 1000 cycles
High Temperature Storage	150°C, 1000 hrs
Pressure Cooker Test	121°C/100% RH/2 atm, 168 hrs
Temperature/Humidity Test	85°C/85% RH, 1000 hrs
Unbiased HAST	130°C/85% RH, 2 atm, 96 hrs

ELECTRICAL PERFORMANCE

Electrical parasitic data is highly dependent on the package layout. 3D electrical simulation can be used on the specific package design to provide the best prediction of electrical behavior. First order approximations can be calculated using parasitics per unit length for the constituents of the signal path. Data below is for a frequency of 100MHz and assumes 1.0 mil gold bonding wire.

Conductor Component	Length (mm)	Resistance (mOhms)	Inductance (nH)	Inductance Mutual (nH)	Capacitance (pF)	Capacitance Mutual (pF)
Wire	2	120	1.65	0.45 - 0.85	0.1	0.01 - 0.02
Net (2L)	2 - 7	34 - 119	1.3 - 4.55	0.26 - 2.28	0.25 - 0.95	0.06 - 0.42
Total (2L)		154 - 239	2.95 - 6.2	0.71 - 3.13	0.35 - 1.05	0.07 - 0.44
Wire	2	120	1.65	0.45 - 0.85	0.1	0.01 - 0.02
Net (4L)	2 - 7	34 - 119	0.9 - 3.15	0.18 - 1.58	0.35 - 1.1	0.06 - 0.42
Total (4L)		154 - 239	2.55 - 4.80	0.63 - 2.43	0.45 - 1.2	0.07 - 0.44

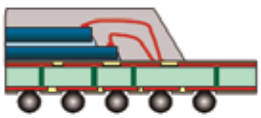
Note: Net = Total Trace Length + Via + Solder Ball.

THERMAL PERFORMANCE

The thermal performance of each die in the stack is influenced by other die in the stack. Thermal performance is highly dependent on package size, die size, substrate layers and thickness, and solder ball configuration. Simulation for specific applications should be performed.

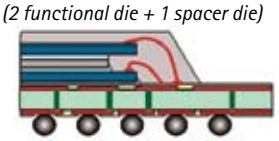
CROSS-SECTION

2 die



3 die

(2 functional die + 1 spacer die)



4 die

(3 functional die + 1 spacer die)

PACKAGE CONFIGURATIONS

Body Size (mm)	Ball Count
14 x 22	119
15 x 15	160, 176, 196
17 x 17	192, 196, 208, 217, 252, 256
19 x 19	272, 289, 292, 296, 297, 300, 301, 305, 324, 376
21 x 21	400, 456, 484
23 x 23	169, 192, 208, 217, 233, 241, 288, 301, 304, 305, 318, 320, 324, 338, 340, 348, 352, 360, 376, 385, 388, 420, 456, 480, 484, 492
27 x 27	225, 256, 272, 277, 292, 300, 312, 316, 320, 324, 336, 352, 384, 388, 400, 416, 456, 472, 480, 484, 496, 508, 512, 544, 580, 585, 636, 650, 676
31 x 31	304, 320, 353, 385, 421, 433, 434, 448, 458, 460, 480, 540, 556, 560, 564, 604, 608, 609, 640, 644, 652, 676, 688, 692, 701, 721, 772, 896
35 x 35	304, 312, 313, 340, 352, 385, 388, 400, 420, 426, 432, 448, 452, 454, 456, 458, 474, 480, 484, 492, 496, 512, 516, 532, 542, 544, 548, 556, 564, 573, 580, 611, 624, 640, 648, 661, 665, 676, 680, 688, 700, 716, 729, 736, 740, 748, 756, 792, 816, 824, 840, 867, 868, 1012, 1156
37.5 x 37.5	435, 480, 552, 600, 601, 625, 627, 685, 701, 785, 788, 804, 840, 841
40 x 40	503, 557, 569, 596, 600, 745, 776, 928, 961, 1253

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