PRISMARK PRESENTATION

Prepared For:

iNEMI

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CONSUMPTION OF BGA AND CSP PACKAGES IN HIGH RELIABILITY ENVIRONMENTS

Prepared By:

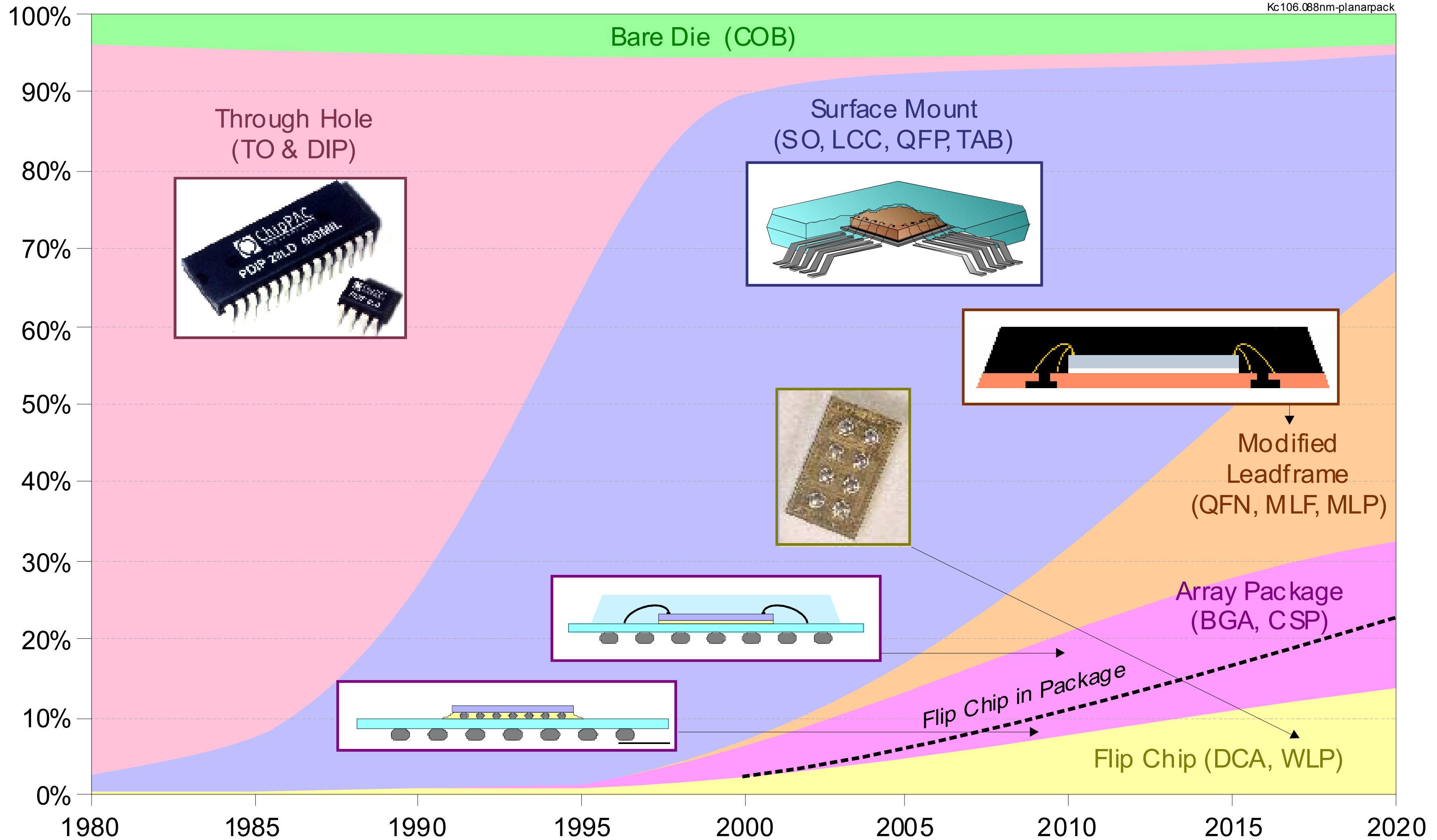
PRISMARK PARTNERS LLC
130 Main Street Cold Spring Harbor NY 11724
Tel: 631 367-9187 Fax: 631 367-9223
e-mail: partners@prismark.com
www.prismark.com

OBJECTIVE AND METHODOLOGY

- Provide an analysis of BGA and CSP consumption used in high reliability systems by units and approximate value
- Methodology based on segmentation of BGA and CSP package consumption by device type, translated into end-market segment
- Further estimates provided on silicon and system value for the high reliability segments

PLANAR PACKAGING INTERCONNECT TRENDS

Percent of Total ICs



PACKAGE DEFINITIONS

- BGA includes all 1.0mm → 1.27mm pitch array packages such as PBGA, TBGA, cavity PBGA, TE-PBGA, FC-PBGA, CBGA, CCGA. Does not include LGA, PGA variations
- CSP includes all 0.8mm → 0.5mm pitch array packages using rigid, flex, or ceramic substrates. Does not include LGA/RF module packages

SYSTEM SEGMENTATION DEFINITIONS

Home/Office:	Includes all desktops, notebooks, PC servers, office equipment and related peripherals (printers, etc.)
Servers/Storage:	**Includes only high-end servers/workstations, high-end storage systems**
Home/Networking:	Set top box, cable/DSC modems, SOHO routers/switches, WLAN, Layer 2-3 switches
Network Infrastructure:	**All service provider systems, Enterprise routers, high-end switches**
Consumer:	Game systems, digital cameras/camcorders, MP3 players, Flash cards
Automotive Drivetrain/Safety:	**Engine control, transmission control, ABS systems, airbags, etc.**
Automotive Infotainment:	Navigation/telematics, radio, etc.

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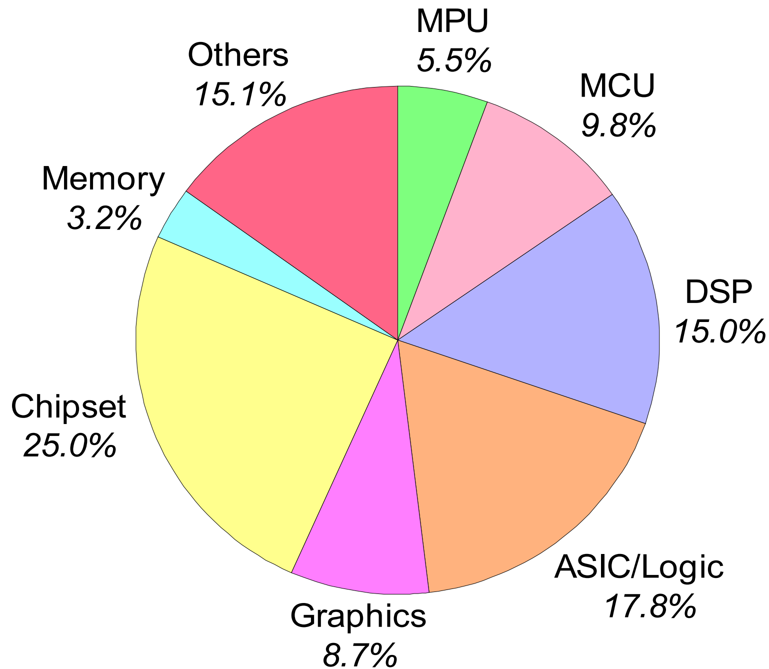
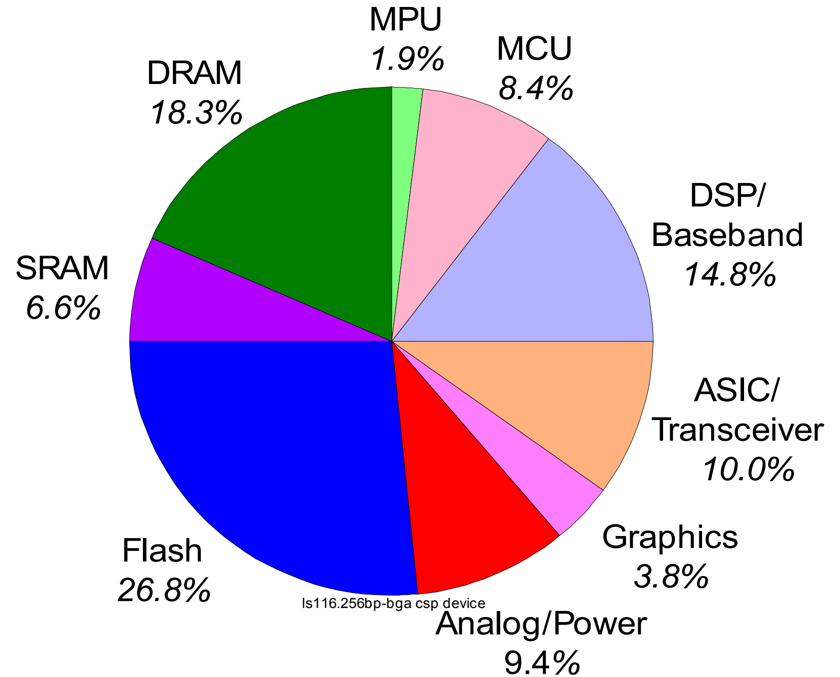
BGA AND CSP SEGMENTATION BY DEVICE TYPE 2005

BGA



TOTAL: 1,733M Units

CSP



TOTAL: 9,515M Units

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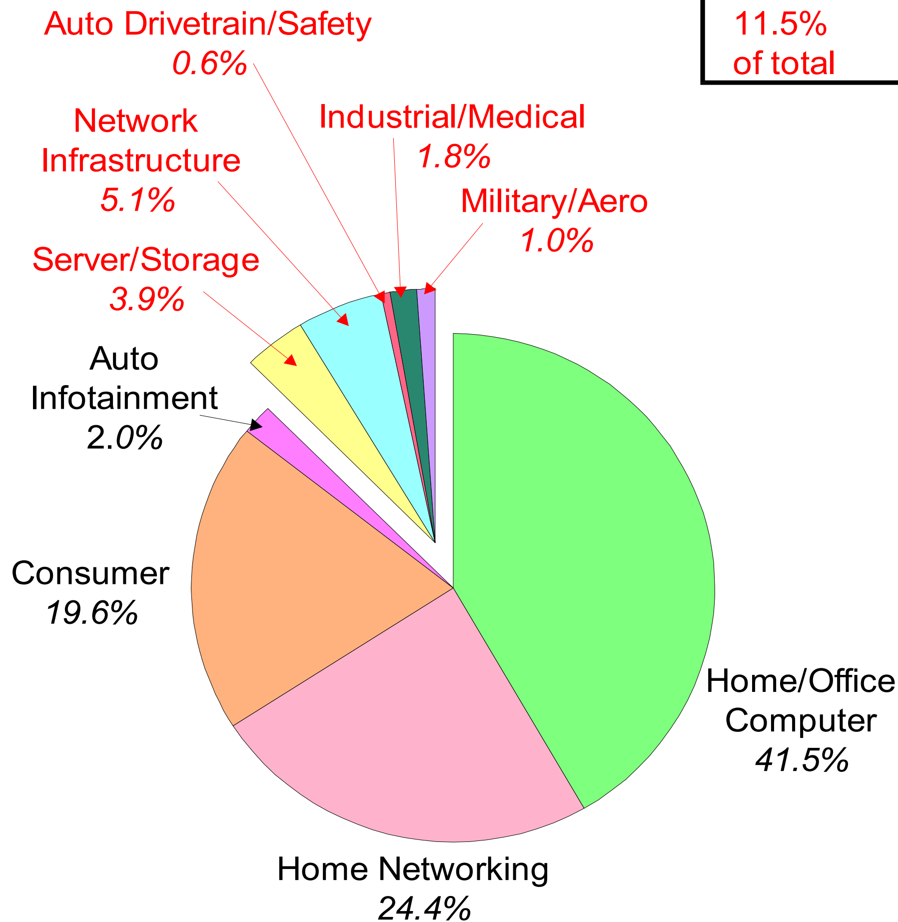
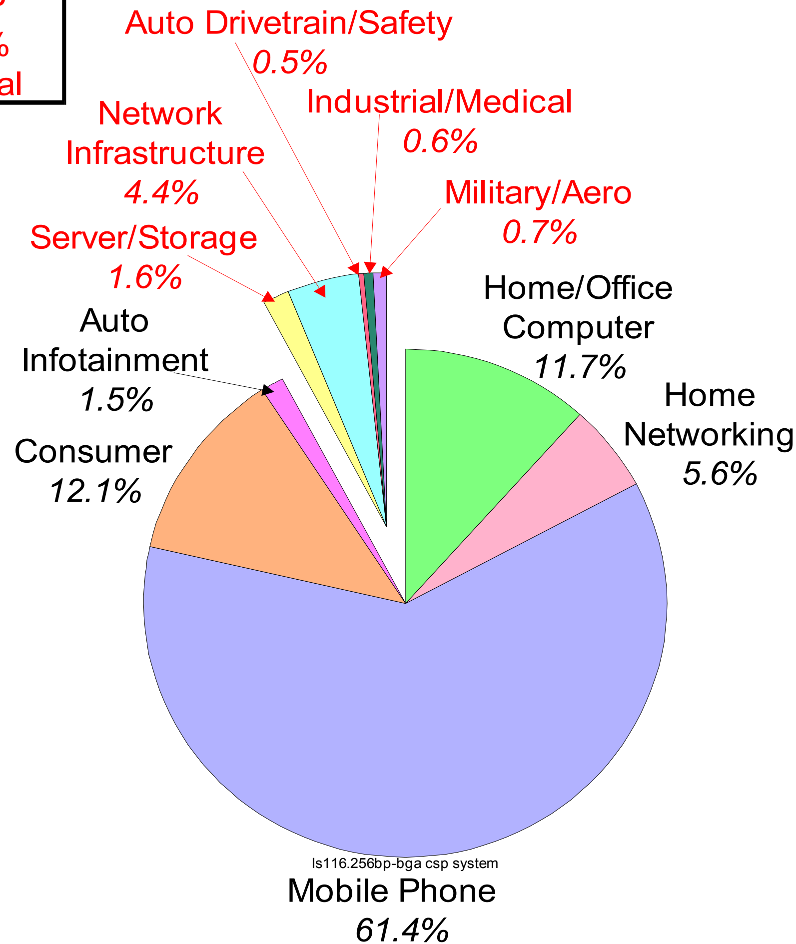
BGA AND CSP SEGMENTATION BY SYSTEM TYPE 2005

High Reliability Totals

BGA	CSP
11.5% of total	7.1% of total



TOTAL: 1,733M Units



TOTAL: 9,515M Units

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TOTAL HIGH RELIABILITY BY DEVICE TYPE – BGAs 2005

	Total BGA (M Units)	High Rel BGA (M Units)	% of Total BGA	High Rel as % of BGA Total Device Value
MPU	95	32	33.7%	63%
MCU	170	18	10.7%	19%
Chipset	434	20	4.6%	6%
Graphics	150	8	5.3%	7%
ASIC/Logic	308	35	11.4%	15%
DSP	260	27	10.4%	15%
Memory	55	48	87.3%	93%
Others	261	11	4.2%	6%
Total	1,733	199	11.5%	18%

Note: Total High Reliability BGA – Packaged Silicon Value $4.15Bn

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TOTAL HIGH RELIABILITY BY DEVICE TYPE – CSPs 2005

	Total CSP (M Units)	High Rel CSP (M Units)	% of Total CSP	High Rel as % of CSP Total Device Value
DSP/Baseband	1,404	120	8.5%	19%
MPU	185	0	0.0%	0%
MCU	800	60	7.5%	14%
ASIC/Transceiver	947	10	1.1%	4%
Analog/Power	896	0	0.0%	0%
Graphics	362	0	0.0%	0%
Flash	2,550	180	7.1%	6%
SRAM	631	50	7.9%	26%
DRAM	1,740	260	14.9%	15%
Total	9,515	680	7.1%	12%

Note: Total High Reliability CSP – Packaged Silicon Value $5.01Bn

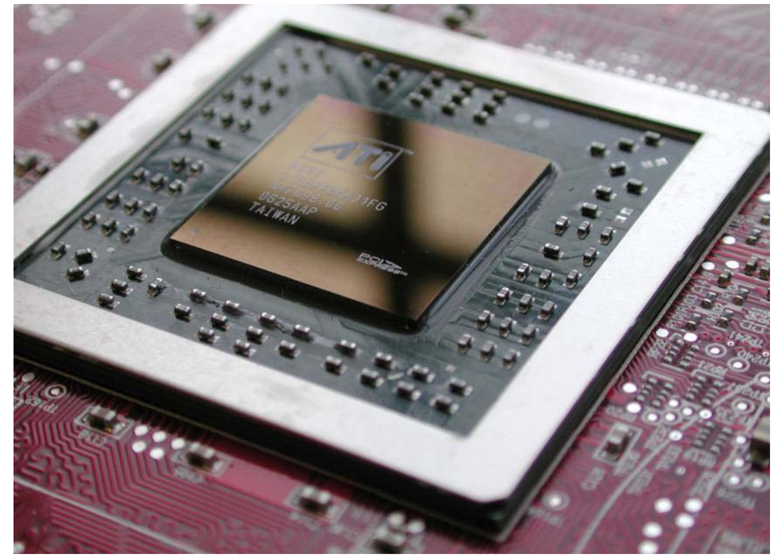
VALUE OF HIGH RELIABILITY ELECTRONICS SYSTEMS USING BGA AND CSP PACKAGES 2005

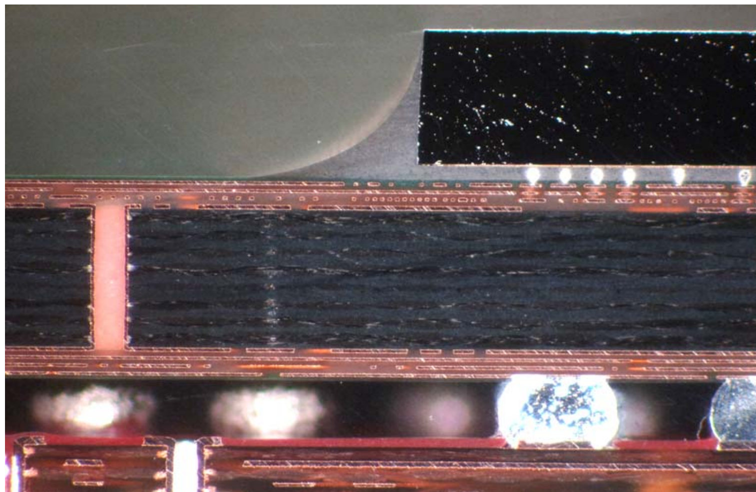
Segment	Value	System Penetration
Servers/Storage	$38Bn	Nearly 100%
Network Infrastructure	$56Bn	Nearly 100%
Automotive	$6Bn	Only select ECU, ABS, etc.
Industrial/Medical	$20Bn	Only ATE, medical diagnostic, other select
Military/Aerospace	$20Bn	Only select high density systems
Total	$140Bn	About 12.4% of all electronics systems

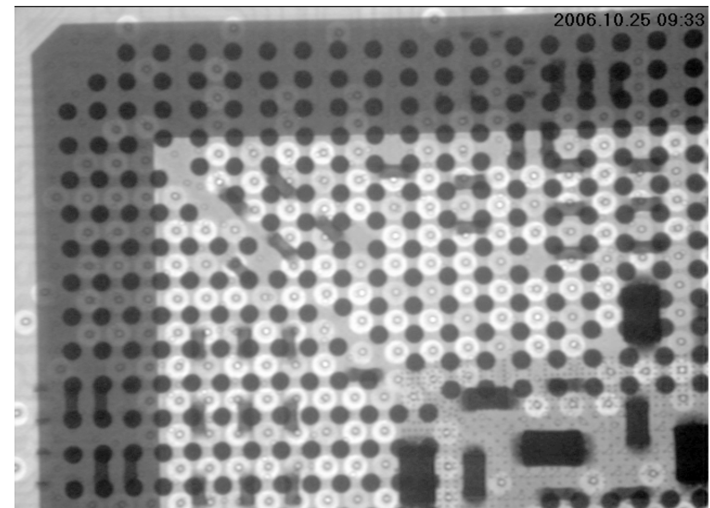
Note: All high reliability systems (using all package types) account for about $285Bn or 25.3% of $1,126Bn electronics industry

ATI RADEON GRAPHIC CHIP

- R580 Graphics Core
  - 90nm technology from TSMC
  - 348M transistors, 650MHz clock
  - 84 pipelines
- 1309 FC-PBGA package
  - 18.2 x 19.0 x 0.7mm die size
  - 230μm bump pitch for high lead bumps
- 3+ 2+ 3 microvia substrate
  - 42.5 x 42.5 x 1.2mm
  - 20μm L/S, 75μm vias on build up layer
  - 200μm diameter PTH, 800μm core







Photos source: Prismark/Binghamton University

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