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METCAL
Precision Systems for the Electronics Bench
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BGA CSP

BGA & CSP Rework Systems.
The comprehensive solution to array package rework.

METCAL
Precision Systems for the Electronics Bench

leadership technology

Metcal. Your quality assurance in Electronics Assembly Systems.

Over 50 years of experience in ongoing product development and manufacturing position Metcal as a leader in electronics assembly systems. Systems that assure our customers complete process control.

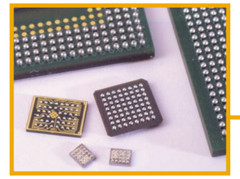
Keeping with our commitment to be on the leading edge of rapidly changing component technology, we now introduce our redesigned Metcal BGA and CSP array package rework systems.

These new models combine our extensive industry expertise with our long-established relationships with technology leaders in the computer, telecommunications and components industries.

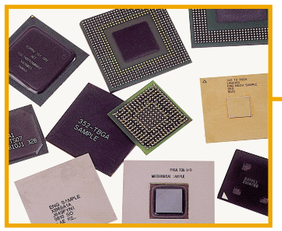
These enhanced systems offer greater ease-of-use, and are cost effective production systems with the flexibility to handle today's expanding range of components.

What is an Array Package?

BGA Ball Grid Array indicates an array of solder balls, underneath the component, used to connect it to the circuit board, instead of peripheral leads as used with a QFP or PLCC.



This enables the space under the device to be used, allowing increased numbers of connections with reduced component sizes. BGAs come in different forms such as PBGA (plastic package), TBGA (tape carrier package) and CBGA (ceramic package).



These components are assembled using the normal surface mount process. However, some components "float" on eutectic solder balls, while other heavier components (such as the ceramics) are supported by non-melt solder balls. These factors may affect the subsequent rework process chosen.

CSP Chip Scale Package has been described as "a component whose overall size is no greater than 1.2 X the size of the silicon die inside the component." CSPs are generally smaller than BGAs and have a typical ball pitch of between 0.5 and 1mm.

These parts are increasingly common on products where space is at a premium and the ultimate volumes are expected to far exceed that of BGA. CSPs offer new challenges in terms of accurate placement and material deposition during rework.

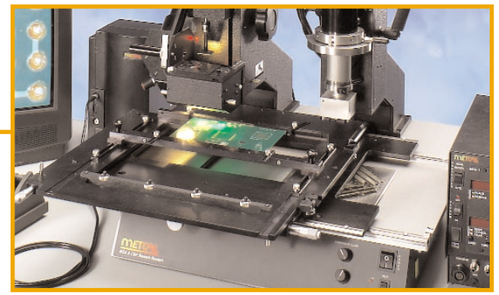
Flip Chip A bare silicon die that has solder bumps attached and is assembled face down onto a substrate. This package offers the smallest possible component size, with the fastest possible operating speeds. There are concerns to the protection of the die and thermal stability after attachment. Normally, these components are encapsulated or under-filled, making subsequent rework impossible.

Flip Chips are used predominantly in low-cost disposable consumer products or in high speed (above 500 MHz) computing applications.

visionary

Metcal BGA/CSP Rework Systems

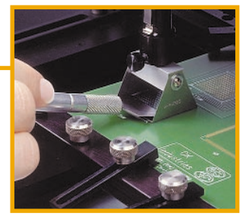
The rework of an array package requires process control and repeatability, to replicate the original assembly thermal process. When reworking BGA, a greater level of process control is required to reduce the risk of a defect and to ensure the perfect result: right first time.



To enhance performance, the newly redesigned Metcal BGA and CSP Rework Systems have incorporated new features that facilitate easier use and improve process control.

- **Improved ergonomics and simplified controls** make using the system easy and natural for the operator.
- **Improved vision clarity** provides better control of component placement.
- **Larger pre-heater** provides increased power for thermally demanding boards.

Metcal Vision System The BGA-3590 and CSP-3500 both offer an integral vision system for accurate component and stencil alignment. The vision system utilizes a prism that allows the user to look simultaneously at the topside of the printed circuit board (PCB), and a superimposed image of the underside of the component.

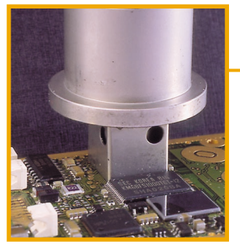


Using micrometer adjustment, the images can be accurately aligned in the X, Y & Theta axis, prior to placement. The BGA 3590 incorporates a corner overlay mechanism to facilitate alignment on large components, while the CSP 3500 offers higher magnification and greater clarity for smaller components with reduced ball pitches.

The vision systems include facilities for either solder paste or flux application to the rework area — without the need to remove the board from the machine. Consistent solder paste deposits can be printed using the vision-mounted stencils that allow accurate alignment and co-planarity adjustment.

Dip Transfer Flux dipping is a process pioneered by Metcal in conjunction with a British university and a major industrial partner. The process involves dipping the component into a known depth of gel flux, depositing an exact amount onto each solder ball. The process is quick, consistent, clean, and negates the need for cleaning after reflow. Both processes have proven successful, even on fine pitch CSP.

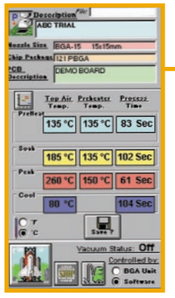
Reflow Profiling As with production reflow oven technology, both Metcal Rework Systems use low airflow forced convection heating. The Patented Micro Oven reflow head delivers temperature uniformity, assuring safe and simultaneous reflow of the component being removed — without disruption to adjacent parts.



The systems are fitted with an under-board heater. The CSP version has a 1000W convection heater suitable for smaller PCBs, while the BGA version is fitted with a 1400W large area heater with the capacity to work with thermally demanding multi-layer boards. This eliminates problems associated with warped boards.

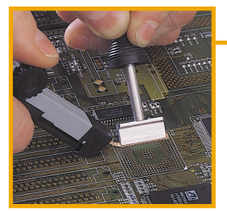
innovation

Windows Based Software This interactive software precisely controls both heaters, making profile set up simple. Using closed loop feedback monitoring, the user-friendly software controls the four stages of the reflow profile: Preheat, Soak, Reflow and Cooling.



The board temperature can be monitored using the integrated flying thermocouple, and real time adjustments can be made to the times and temperatures — while the profile is running.

Metcal Soldering System To assist with pad cleaning and preparation, all units are supplied with a Metcal MX Direct Power Soldering System that reduces the risk of track and pad damage caused by overheating.



integration

Integrated solutions for flux and paste applications

Nozzles There is a comprehensive range of standard reflow nozzles available to suit most common array packages. In addition, Metcal offers the flexibility of custom manufactured nozzles for unusual or odd shaped components, such as EMI shields and plastic surface mount connectors.

BGA REFLOW NOZZLES

PART NUMBER	INTERNAL DIMENSIONS IN MM
BGA-220-220	22mm x 22mm
BGA-228-228	22.8mm x 22.8mm
BGA-252-291	25.2mm x 29.1mm
BGA-276-276	27.6mm x 27.6mm
BGA-315-315	31.5mm x 31.5mm
BGA-380-380	38mm x 38mm
BGA-403-403	40.3mm x 40.3mm
BGA-450-450	45mm x 45mm
BGA-490-490	49mm x 49mm
BGA-NA	Nozzle adapter for FCR Nozzles

CSP NOZZLES

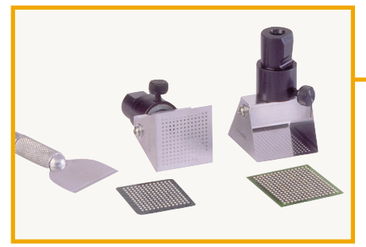
PART NUMBER	INTERNAL DIMENSIONS IN MM
CSP-060-060	6mm x 6mm
CSP-077-095	7.7mm x 9.5mm
CSP-080-080	8mm x 8mm
CSP-080-095	8mm x 9.5mm
CSP-085-099	8.5mm x 9.9mm
CSP-085-102	8.5mm x 10.2mm
CSP-091-132	9.1mm x 13.2mm
CSP-093-090	9.3mm x 9mm
CSP-096-118	9.6mm x 11.8mm
CSP-097-144	9.7mm x 14.4mm
CSP-097-184	9.7mm x 18.4mm
CSP-100-100	10mm x 10mm
CSP-100-122	10mm x 12.2mm
CSP-110-110	11mm x 11mm
CSP-120-120	12mm x 12mm
CSP-130-130	13mm x 13mm
CSP-150-150	15mm x 15mm
CSP-180-180	18mm x 18mm

Stencils The unique vision stencil-printing feature allows the user to perform accurate stencil alignment and co-planarity adjustments under high magnification, taking the guesswork out of single component solder-paste printing. The vision system can also be used for solder-paste print inspection.

Metcal can supply a wide range of standard and custom stencils to suit most ball & lead patterns. Please contact your local Metcal representative for details.

STENCIL ACCESSORIES

PART NUMBER	DESCRIPTION
BGA-SPAT-L	BGA Spatula assortment large
BGA-SPAT-S	BGA Spatula assortment small
CSP-SPAT	CSP Spatula assortment
QFP-SPAT	QFP Spatula assortment
21149	Co-Planar stencil adapter



Dip Transfer Plates Metcal dip transfer plate sets are available for QFP, BGA and CSP applications as listed below. All kits are supplied with a metal squeegee blade.

DIP TRANSFER PLATES

PART NUMBER	DESCRIPTION
DTP-BGA	Set of 3 plates, apertures 28, 35 & 45mm, depth 0.012"
DTP-CSP	Set of 3 plates, apertures 10, 16 & 21mm, depth 0.006"
DTP-QFP	Set of 3 plates, apertures 30, 35 & 45mm, depth 0.012"

Training and Applications Engineering Support Metcal offers expertise in process engineering and can provide solutions to your application problems via phone or on-site. In addition to our standard products, we also produce custom stencils, nozzles and other accessories to help you work with non-standard components and boards. Please contact your Metcal representative for more information.

www.metcal.com

systems and specifications

BGA-3590/CSP-3500 SYSTEMS AND SPECIFICATIONS

Standard units are supplied with a self-contained air pump providing easy installation and flexibility.

PART NUMBERS	DESCRIPTION
BGA-3591	BGA rework system with high power under-board heater, split field vision system & monitor 115v NTSC
BGA-3592	BGA rework system with high power under-board heater, split field vision system & monitor 230v PAL (Contact Metcal for NTSC format)
CSP-3501	CSP rework system with under-board heater, high magnification vision system & monitor 115v NTSC
CSP-3502	CSP rework system with under-board heater, high magnification vision system & monitor 230v PAL (Contact Metcal for NTSC format)

Please note: Monitor will be supplied locally and specification will vary

SYSTEM INCLUDES:

MX-500S	Metcal soldering system
SMTC-062	Blade style desoldering tip
19759	Windows Software (RS232 connection lead supplied)
FS-24	Footswitch
19984 & 21104	Thermocouples (thick & fine gauge)
19782	Adjustable centering nest BGA
21077/21095/21137	Vacuum pick up heads for placer (3 sizes)
19219	Rubber vacuum cups (4 sizes)
20066	Calibration tooling set
19993	Component height adjustment block
20534	Squeegee blade holder
21149	Co-planar stencil adapter
20092	SVHS connection lead
BGA-BS	Under board support rail
AC-CLAMPSET	Set of board holding clamps (5 small & 5 large)
Various	Allen key sets for calibration adjustment
CSP versions include BGA/CSP/UG upgrade kit	Extra magnification lenses (21097 & 21118)
	Flat mirror assembly
	CSP vacuum pipette set (CSP-VAC)
	CSP Adjustable pick up nest (20987)
	SMTC-1167 Mini hoof tip

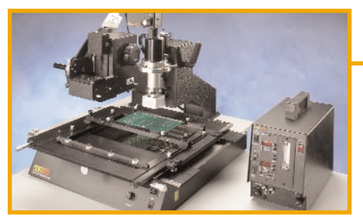
Minimum Hardware Requirements The following minimum PC specifications are required to run software: PC 486 or higher running Windows 95, 98, 2000 or NT; 8MB of memory space; 20MB Hard-disk; VGA screen; mouse; and a free RS232 com port.

SPARE PARTS & ADDITIONAL ACCESSORIES

PART NUMBERS	DESCRIPTION
BGA-BS	Under board support rail
AC-CLAMPSET	Set of board holding clamps (5 small & 5 large)
BGA-BH-30	Upgrade kit for board holder (Includes rails and clamps)
CSP-VAC	Vacuum needle accessory kit for CSP pick up
BGA-CSP-UG	Conversion kit to CSP configuration (Optics & Vacuum)
SPARE-101	Level 1 spares kit for BGA/CSP 3501/3591 100/115v
SPARE-102	Level 1 spares kit for BGA/CSP 3502/3592 230v
SPARE-201	Level 2 spares kit for BGA/CSP 3501/3591 115v
SPARE-202	Level 2 spares kit for BGA/CSP 3502/3592 230v
AC-525-PH-SET	Set of 525W pre-heater elements (1 pair)
AC-700-PH-SET	Set of 700W pre-heater elements (1 pair)

DEMONSTRATION EQUIPMENT

PART NUMBERS	DESCRIPTION
BGA-K3	BGA demo board kit including bare PCB, 5 x PBGA169 & 5 x PBGA225 components
CSP-C10	Pack of 10 Micro BGA dummy components for use with BGA K3 kit



systems and specifications

BGA/CSP 115V & 230V SYSTEMS SPECIFICATIONS

	BGA-3590 SERIES	CSP-3500 SERIES
Input voltage 230v Models	230v AC, 50/60Hz	230v AC, 50/60Hz
Input voltage 115v Models	115v AC, 50/60Hz	115v AC, 50/60Hz
Power consumption		
Base unit	1400W	1050W
Control box	420W max	420W max
Reflow head heater element	All voltages: 28v AC 280W max	
Temperature control	Closed-loop K-type thermocouple feedback	
Maximum source temperature		
Under-board heater	200°C (572°F)	200°C (572°F)
BGA reflow head	400°C (752°F)	400°C (752°F)
Airflow	3-20l/min	3-20l/min
Component maximum weight	55g (.92 oz.)	55g (.92 oz.)
Maximum PCB dimensions	17" (432mm) x open frame	
PCB thickness	0.8 to 3.2mm	0.8 to 3.2mm
Vision system magnification range	10 to 50X	20 to 100X
Maximum field of vision at lowest magnification	46 x 46mm	18 x 18 mm
Mirror type	Split field mirror	Flat Mirror
Dimensions		
Base unit	22" x 24" x 19" (560 x 610 x 485mm)	
Control box	13" x 6" x 9.5" (330 x 153 x 241mm)	
Weight		
Base unit	76.5 lbs. (34.7 kg)	76.5 lbs. (34.7 kg)
Control box	20 lb. 7 oz. (9.27kg)	20 lb. 7 oz. (9.27kg)
System warranty	1 year excluding consumables	

100v systems are available for Japan. Please contact your Metcal representative for more information.

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LifeElectronics
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С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

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- *Оценку стоимости проекта по компонентам.*
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