



**FLEXIBLE
SOLUTIONS**
FOR **Electronics Assembly
Automation**

APS-1 Hybrid

Hybrid Module Assembly System

The APS-1H combines a solid foundation and advanced technology to handle complex hybrid assembly at high throughput rates.

Foundation

The APS-1H features a rigid frame with a servo-driven, linear motor positioning system. A closed-loop feedback system with linear scale encoders continually monitors the exact location of the dual-spindle placement head and ensures outstanding repeatability. This solid foundation enables the APS-1H to attain $\pm 0.0005"$ (0.012mm), 3 sigma placement repeatability.

Capability

The APS-1H meets hybrid module production challenges with highly repeatable performance and configuration flexibility. To complement its accuracy, the APS-1H supports a variety of die presentation formats, including wafer, GEL-PAK, Surftape and waffle packs. The APS-1H features a large, flexible tabletop that accepts up to 108 two-inch waffle packs, or a custom configuration tailored to meet your unique application requirements.

Advanced Alignment

The APS-1H provides multiple methods for component alignment and upward vision. Components are optically aligned during travel from pickup to placement, maximizing throughput and utilization. The upward vision system provides a second means to align devices such as flip chips, BGAs, and QFPs. Our unique alignment system, combined with upward vision, provides optimal imaging for the full range of die and SMT components.



Features and Benefits

- Assembles advanced packages, hybrid circuits and microelectronic modules
- Provides $\pm 0.0005"$ (0.012mm), 3 sigma placement repeatability
- Processes die as small as 0.008" (0.2mm)
- Reconfigures easily to meet changing production needs
- Handles substrates from 1.0 to 19.3" (25 to 490mm) wide

APS-1H - General Specifications

Placement Repeatability Performance

Up to 2,000 cph	0.0005" (0.012mm) @ 3 sigma
Up to 5,000 cph	0.0040" (0.101mm) @ 3 sigma

Vu 10 (standard) Upward Vision Component Processing

Size	0.02" - 2.20" (0.508mm - 55.880mm)
Minimum Pitch	0.006" (0.152mm)
Minimum Interconnect Size	
Bump, ball, pad	0.005" (0.127mm)
Lead	0.003" (0.076mm)
Minimum Interconnect Spacing	0.002" (0.051mm)
Bump, ball, pad inspection	Pitch, missing, lead-to-pad fit, diameter check

In-Process Component Processing

Size	0.008" - 1.0" (0.203mm - 25.4mm)
Minimum Pitch	0.0197" (0.500mm)
Minimum Stand-Off	0.0100" (0.254mm)
Minimum Interconnect Spacing	0.0120" (0.305mm)
Minimum Component Thickness	0.0100" (0.254mm)
Lead Alignment	Standard

Feeder Capacity*

8mm Feeders	120
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Number of Placement Spindles

	2
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Number of Heads

	1
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Placement Repeatability

Chips	0.0033" (85µm) @ 3 Sigma
Fine Pitch	0.0024" (60µm) @ 3 Sigma

Placement Force

	85 - 850 grams
	(190 - 310 grams, standard)

16" Feeder Base Capacity*

	6
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Machine Dimensions

Length	79" (2006mm)
Depth	50" (1270mm)
Height (without/light tower)	54" (1370mm)
Height (with light tower)	71" (1803mm)

Floor Space Requirements

Length (w/PC console)	102" (2591 mm)
Depth (w/7" reels and PC console)	90" (2286mm)

Power Requirements

Input Line Voltage	200 - 240 VAC
Input Line Frequency	50/60 Hz
Power	3.5 KVA peak

Compressed Air Requirements

Pressure	80 psi (5.5 bar)
Flow	7 SCFM maximum

Operational Temperature Range

	50° - 95° F (13° - 32°C)
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Relative Humidity

	30% - 90% noncondensing
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Shipping Dimensions (L x W x H)

	96" x 52" x 82" (2438 x 1321 x 2083mm)
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Shipping Weight

	4200 lbs (1890 kg)
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Accessories Box

Dimensions	42" x 42" x 42" (107cm x 107cm x 107cm)
Weight	300 lbs (135 kg)

* Consult applications department for other configurations

Positioning System

X-Y Drive System	Brushless DC-servo direct drive linear motors
X-Y Encoder Type	Linear encoder
X-Y Axis Resolution	0.00005" (0.00127mm)
Z Drive System	Brushless DC-servo motor, rack & pinion
Z Encoder Type	Glass, rotary
Z Axis Resolution	0.0002" (0.005mm)
Theta Drive System	Brushless DC-servo motor, direct drive
Theta Encoder Type	Glass, rotary
Theta Axis Resolution	0.0035"
Theta Axis Repeatability	±0.01"
Number of Nozzles	6 standard
Nozzle Changers	2 standard

Board Handling

Substrate Size (typical**)

Maximum (width x length)	PCB, leadframe, boat, flex (pallet), ceramic 19.3" x 25.0" (490mm x 635mm)
Minimum (width x length)	0.98" x 3.0" (25 x 76mm) w/o Vu8
Maximum Thickness (including warpage)	0.200" (5.08mm)
Minimum Thickness	0.008" (0.203mm)
Weight	4.4 lbs (2.0 kg)

Conveyor

Height	37.5" ± 0.5" (952.5mm ± 12.7mm) SMEMA
Board Flow	Left to right, right to left (without input & output magazines)

Registration Type

	Fiducial
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Edge Clearance

	0.125" (3.2mm)
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Underside Board Clearance

	0.787" (20.0mm)
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Topside Board Clearance

	0.590" (15.0mm)
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Underside Board Support

	Magnetic supports, vacuum supports
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Transport Speed

	7 - 13 in/s (177 - 330mm/s), (programmable)
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**Consult applications department for specific machine configurations

Control System

Programming Capabilities

Machine Operating System	QSOFT-2
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User Interface	Windows® 98
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Camera Teach Capability	Standard
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Array Programming Capabilities

Multi-Image Panels	Standard
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Rotated Board Images	Standard
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Off-Line Programming Interface

CAD / ASCII Data Input	Standard
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Gerber Conversion	Optional - GC-Place
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Board Scanning	Optional
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Digitize	Optional - DigiCad and QScan
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Feeder Setup Optimization	Standard - QSOFT-2
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Placement Sequence Optimization	Standard - QSOFT-2
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Line Balancing	Optional
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Integrated PC Controller

	Dual Pentium processors with SVGA monitor
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Vision System

Vision Engine

	ICOS MVS 360, 256 grayscale
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Vision Operation

	12.1" viewable flat screen monitor
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Downward Vision System

Fiducial Alignment Types	Vu7+ (standard), Vu11 (optional)
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Fiducial Target Types	Panel, image, local
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Fiducial Size	Any unique, high-contrast image
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Vu7+	0.020" - 0.100" (0.508 - 2.540mm)
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Vu11	0.025" - 0.005" (0.127 - 0.635mm)
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Synthetic Fiducial Capability	Square, circle, rectangle, etc
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Bad Image Marks	Contrast method
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Lighting Type	LEDs with programmable image
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Light Level Adjust	Automatic
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Field of View (FOV)	
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Vu7+	0.287" x 0.386" (7.18 x 9.65mm)
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Vu11	0.086" x 0.110" (2.18 x 2.80mm)
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Upward Vision System

Field of View	
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Vu10	0.390" x 0.500" (9.9mm x 12.7mm)
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Vu12	1.8" x 1.4" (46.0mm x 35.0 mm)
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Optics Type	Telecentric
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Illumination	LEDs with programmable intensity
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Optional Equipment

Wafer Presentation	Reject Belt Handling
Wafer Cassette Handler Option	Input & Output Magazines [†]
Die Flipper Option	Vu11 High Mag Downward Imaging system
Small Die Option	Vu12 Upward Imaging System
Wafer Mapping Option [†]	Detachable Feeder Base and Cart
Flux Pot	Automatic Matrix Tray Handler
Waffle Pack Presentation	Stationary Matrix Tray Holder
GEL-PAK Handling	Tube Feeder Handling
8mm to 56mm Tape Feeders	Programmable Bond Force [†]

[†]Consult factory for availability

