4984B – AdVantis Platform
AX-72e, AI-42e

GS-415-01 Rev. **
CR # 1008069
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General
Specification

Reference Assy. #50419802

Table of Contents

Glossary of Acronyms and Specialized Terms

Acronym/Term	Meaning
AC	Alternating Current: type of electrical power generation
APE	Advanced Product Editor (Universal brand name)
ASCII	American National Standard Code for Information Interchange
AWG	American Wire Gauge: wire size standard
CAD	Computer-Aided Design
CD-ROM	Compact Disc-Read Only Memory
CE	Conformité Europeanne: European safety standard
CFM	Cubic Feet per Minute: measurement of air flow
CPH	Components per Hour
CTA	Component Transfer Assembly
DC	Direct Current: type of electrical power generation
EIA	Electronic Industries Alliance: Industry Standards Organization
GEM	Generic Equipment Model
GS	General Specification (Universal brand name)
GUI	Graphical User Interface
HSMS	High Speed SECS Message Service: implements SECS2 messaging over a network link
Hz	Hertz (cycles per second): measurement of electrical frequency
I/O	Input/Output
IEC	International Electrotechnical Commission: Industry Standards Organization
IP	Index of Protection: resistance of machine to contamination by foreign objects
IPC	IPC: Industry Standards Organization
JEDEC	JEDEC Solid State Technology Association: Industry Standards Organization
LED	Light Emitting Diode: electrical component
MIT	Machine Interface Translator (VME to I/O bus)
MMIT	Mini Machine Interface Translator (VME to I/O bus)
P.C.	Personal Computer
PCB (or PC board)	Printed Circuit Board
PPM	Parts Per Million: measurement of machine performance
SCFM	Standard Cubic Feet per Minute: measurement of airflow
SECS	Semiconductor Equipment Communications Standard: interface between host computer and assembly machines
SEMI	Semiconductor Equipment & Materials International
SMC	Surface Mount Components
SMEMA	Surface Mount Equipment Manufacturers Association
TCP/IP	Transfer Control Protocol/Internet Protocol: network communication protocol
UICS	Universal Instruments Control Software (Universal brand name)
UPS	Universal Platform Software (Universal brand name)
VA	Volt-Amps: measurement of electrical power consumption
VAC	Volts Alternating Current
VDC	Volts Direct Current
VGA	Video Graphics Array: type of CRT monitor standard
VME®	Versa Module Eurocard (Motorola brand name): industry standard for 32-bit computer bus

All specifications are subject to periodic review and may be changed without notice. Illustrations may not be drawn to scale.
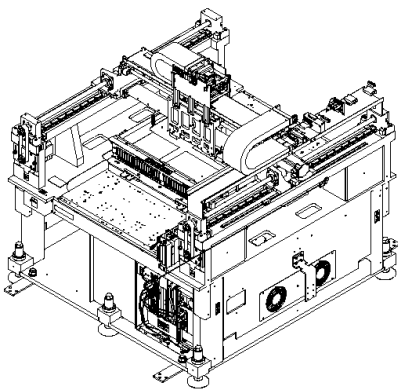
Introduction

Concept

Universal's AdVantis platform is a high-speed modular mounter, specifically engineered for application flexibility and long-term reliability. The AdVantis is cost-effective and is perfectly suited to the production environments of today's manufacturers.

The AdVantis is specifically designed to provide:

- Superior throughput
- High pick performance
- Fewer maintenance requirements
- Ease of use
- Rapid Changeover
- Superior New Product Introduction

Consistent with the original platform concept, the AdVantis employs common mechanical, electrical, and software interfaces that allow Universal to develop options (heads, cameras, feeders, etc.) in response to changing production demands.

Many options developed for original GSM Platforms are still compatible with the AdVantis. The AdVantis uses the exact machine length and similar locations for air and power connections to simplify migration and reduce installation expenses.

In consideration of essential health and safety requirements, the AdVantis Platform can be UL and CSA certified.

The AdVantis 4984B Platform shall comply with Appendix A of ESD-SP10.1-2000 for all markets.

Figure 1

Construction

The AdVantis is an automated electronic assembly machine built to assist in the manufacture of printed circuit boards (PCBs). Its primary function is to accurately place components on printed circuit boards.

The AdVantis Platform is built on a solid welded steel plate frame and employs a single gantry, dual-drive leadscrew positioning system. This allows a unique combination of high positional repeatability with high-speed component placement. Multi-spindle heads, which can be located on each side of the beam, pick components from various fixed feeder locations. Choices of seven-spindle, and four-spindle inline head configurations are available. The components are vision inspected and then placed on a stationary PCB.

Figure 2

5

Features

Welded Base Frame

The welded steel base frame is designed to minimize tolerance accumulation from subassembly to subassembly. All major subassemblies are edge-justified or dowel-pin registered to precision datum surfaces or holes in the base frame. This ensures that the positional relationships are held mechanically, not through adjustment. Torsional stiffness has been greatly improved, maintaining reliability and reducing setup time associated with installing or relocating the machine on the factory floor. *(Figure 2)*

Models

AX-72e

The AdVantis AX-72e has been developed to be an advanced flexible placement platform with a FlexJet 3, 2.6mil or 1.1mil per pixel head on the front of the beam and a choice of InLine4 on the rear of the beam. The machine can also be equipped with a choice of upward looking digital cameras on the front and/or rear of the machine and additional nozzle changers in the rear.

AI-42e

The AdVantis AI-42e model has been developed as a low cost flexible placement platform. The machine is equipped with an Inline4 head on the front of the beam and a choice of upward looking digital cameras on the front and/or rear of the machine and additional nozzle changers in the rear.

See Appendix A for model specifications.

Custom Configurations

Machines still can be configured in non-model configurations. However, extended lead times and restrictions identified in the GS apply.

For further details, please contact AdVantis Product Team.

Standard Equipment
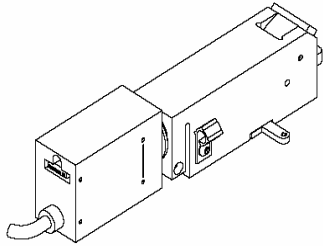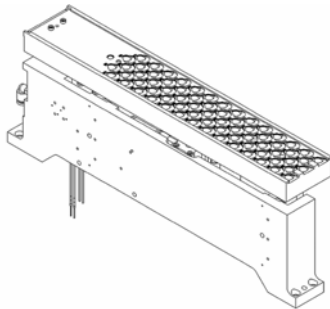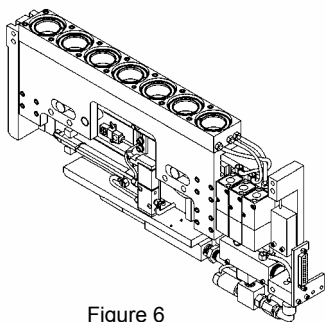
Vision

Fiducial Inspection Cameras

Fiducials are features located on the PCB that help the machine register the board in the machine and compensate for linear board distortions (stretch, shrink, and non-orthogonality). Local fiducials are used to measure local board distortions. A downward-looking pattern error correction (PEC) fiducial inspection camera is mounted under the X-beam. The field of view for these 1-mil/pixel cameras is approximately 12mm square. . The Fiducial inspection coverage is 703.58mm (27.7 inches) in the X direction, and 497.84mm (19.6 inches) in the Y direction.

The PEC camera can process bad board and bad circuit sense features. It also utilizes three different illumination wavelengths (red, blue, green), which can be programmed independently or in concert to create white light. Each wavelength expands the types of substrates or fiducials that can be imaged. *(Figure 4)*

Note: Maximum of 25 fiducials per board can be inspected. Maximum of 254 Bad Sense Marks can be inspected.

Figure 4

Nozzle Changers

High Capacity Flexjet Nozzle Changer

Two high capacity nozzle changers can store up to 140 individual nozzles. The High Capacity Nozzle Changers are mounted between the rear feeder banks and board transfer rails, thereby maximizing online nozzle capacity without compromising board size or feeder capacity. Different nozzles accommodate components of various sizes with different vacuum requirements. To maximize throughput, gang and individual nozzle changing is supported at any time during production. The default mounting locations are in the left rear (primary location) and right rear (additional location) feeder banks. *(Figure 5)*

Figure 5

Large Bore Nozzle Changer

The Large Bore nozzle changer is a variation of Flex Nozzle Changer that accommodates Large Bore nozzles, such as Quick Change Grippers, and some special application nozzles for the InLine4 head. *(Figure 6)*
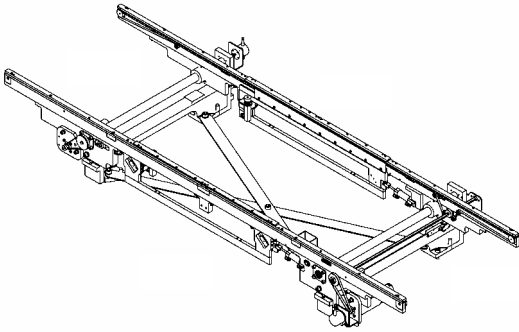
Figure 6
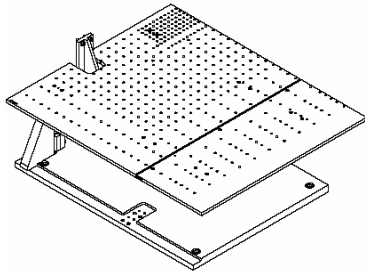
Figure 7

Figure 8

Board Handling

Staged Board Handling II features automatic width control based on programmed board parameters. While one board is being populated, the next board is buffered within the lane. Board transfer capabilities include left-to-right (default), pass-through, and right-to-left, with 3mm edge clearance. Mechanized board stops are standard and accommodate unique board shapes. Staged Board Handling II supports board sizes from 50mm x 50mm x .5mm up to 508mm x 457mm x 5mm *(Figure 7). See pg 29 for additional board size capabilities*

Standard SMEMA interface is used to communicate to up-line and down-line modules.

Board Support

Board supports minimize the effects of board warp, sag, and/or flex by supporting the board during component placement. The board support uses a grid pattern containing removable pins. *(Figure 8)*

PrecisionPro™ Feeder Interfaces

The AdVantis platform includes the PrecisionPro Feeder Interface for PrecisionPro Tape feeders, and feeder bank change support. The PrecisionPro Feeder interface incorporates the following features:

- 3-Point registration of 8mm and 12mm for improved pick performance when using PrecisionPro tape feeders
- 42V DC drive voltage for faster index rate of PrecisionPro tape feeders and increased throughput
- Self-ID control of PrecisionPro tape feeders with feeder serial number, cycle count tracking, and the ability to support multiple tape inputs in a single slot
- Support for PrecisionPro tape feeders, Electric tape feeders, and all previous generation Multi-pitch and Pneumatic tape feeders. Note: 24V Transformer kit required to operate Multi-pitch feeders
- Support for 18-slot Feeder Banks
- All PrecisionPro feeders are splice compatible, and are available with an option that detects when a reel has been removed, thus requiring the barcode on the new reel be scanned to ensure that the correct reel has been spliced.
- Dual Track 8mm PrecisionPro feeders do not need to be removed from the machine for removal of Mylar.

Nozzles

Each machine comes with a standard nozzle kit. The variety of nozzles in these kits depends on the combination of component placement heads chosen.

Software

AdVantis Platform Machine Control System Architecture

- VME (Versa Module European) Bus
- Intel Pentium-based embedded CPU, with on board Ethernet controller, and 1Gb RAM
- IDE hard disk drive
- Motorola Power PC-based machine controller
- Intelligent DSP-based motion controllers
- CDR/W and floppy drives, and USB Port

Microsoft Windows 2000 Operating System

The AdVantis platform uses Microsoft's Windows 2000 operating system. Windows 2000 provides:

- Simple and widely supported network connectivity
- Expanded system security
- Easy data transfer and manipulation
- Multiple language support
- Better software development and test tools

UPS+ (Universal Platform Software +)

Universal's UPS+ software represents the first platform software offering to run on the Microsoft® Windows® 2000 operating system. It provides state-of-the-art programming, operation, and diagnostic tools for use with the AdVantis Platform. This software is the same software found on all Genesis and Advantis platforms. Benefits of this commonality are:
- Common product editor across all machines
- Common component database across all machines
- Common user interface across all machines

Basic features of UPS+ include:

- Graphic user interface with user configurable icons and machine status
- Graphical pattern programming tools with spreadsheet–style data entry
- Networked component, nozzle, fiducial and feeder databases
- User-configurable optimization aid
- Offline/Online Simulation tool for indicating expected machine/line performance for a given product
- Comprehensive data import/export
- Powerful query tools
- Programmable feeder templates for developing common feeder setups
- On-the-fly vision inspection, using cutting-edge ESI™ vision engine technology and algorithms
- Automatic Pick Update and Automatic Z Update at Pick and Place increases pick yields and outgoing board quality, while improving overall machine reliability and increases intrinsic availability.
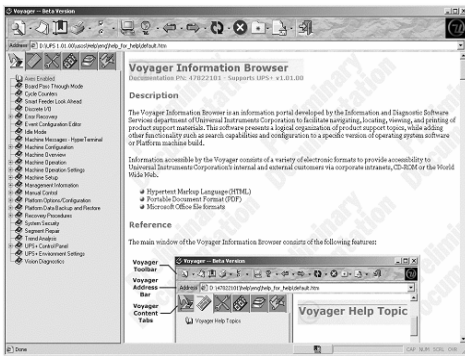
9

- Automatic Pick Update increases pick yields and outgoing board quality, while improving overall machine reliability and increases intrinsic availability.
- Powerful NPI tools that allow on-the-fly editing of component descriptions and product data, simplifying component and board programming by teaching images allowing on-the-fly editing
- Powerful diagnostic and manual axis control tools
- Online documentation

In addition to running the machine, UPS+ can run conveniently on your off-line-PC or laptop for developing products/programs for the machine off-line.

Expanded System Security

- Administrator-level control to access levels (by individual or group)
- Access to individual UPS+ software files and folders, and operating system functions can be limited or denied based on user
- User-level event tracking
- User accounts can be imported and exported easily to other machines

Internet driven hyperlinks directly to Universal via Microsoft Internet Explorer web browser to access:

- Software updates and revision notes
- Documentation and procedure updates
- Service and support contact information
- GSM knowledge base technical database
- Technical service bulletins

On-line Documentation via the VOYAGER information browser for access to the following:

- Operation
- Programming
- Maintenance Support
- Feeder Topics
- General Information
- Related information Links
- User created annotations and F1 "Quick Help" links
(Figure 9)

Detailed Event Messages

- Improved message descriptions
- Expanded access to further details and corrective action recommendations
- Search function within event messaging
- Color-coded severity based on event significance.

Detailed Error and Warning Messages

- Provides instructions and correct machine-stop conditions
- Warning events proactively alert user to potential machine-stop conditions
- Error-recovery screen automatically disappears when all errors and warnings have been addressed.

Figure 9
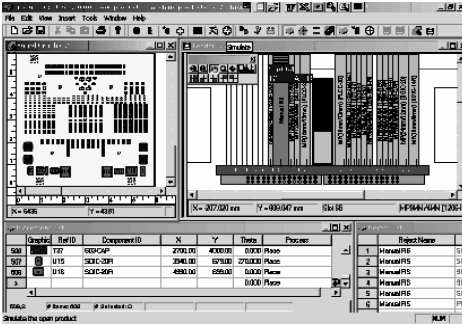
Figure 10

Figure 11

Figure 12

Advanced Product Editor

- Allows overlapping circuits and unrestricted positioning of leads, components, fiducials and feeders for a wide range of applications
- Centroid-based CAD import utility (columnar or separator format)
- Programmable placement order within each task block
- Supports Component ID's up to 32 characters
- Real time simulator
- Platform Tray Feeder (PTF) programming with JEDEC trays
- Custom macro scripting
- Saves invalid products for future editing
- Optimizer includes quick or optional iterative long optimization
- CI2 Comprehensive Import incorporates an intuitive, flexible layout and supports partial import/export of individual components, feeders, or fiducials
- Product data status windows track 3 levels of error types, displays clear instructions that lead to valid product generation, and a "Go To" button to quickly view root-cause data
- Independent fiducial and nozzle databases.

(Figure 10)

UPS+ component database
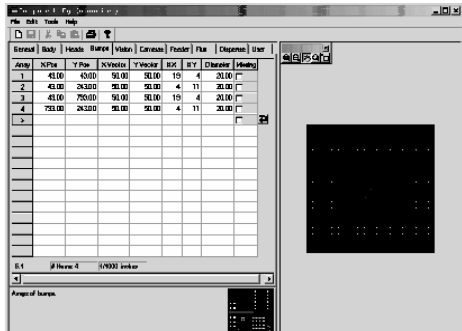
- Incorporates a new intuitive layout that incorporates data by tabs
- Unique programming values for multiple head and camera types that facilitates the existence of a factory-wide sharing of single component database
- Includes over 1,200 industry-standard default component definitions
- New spreadsheet –style data entry with tool tip information for each field streamlines data entry
- Supports offset pick and place centroid coordinates for a wider range of applications

(Figure 11)

Customizable User Interface templates for the following user levels:

Default templates:	Additional User Groups:
Operator	Operator (advanced)
Technician/maintenance	Backup operator
Programmer	Guest
Line Engineer	Power user
Manager/Supervisor	Replicator
	User

UPS+ allows for customer template and user group criteria, and simple import/export of user templates and accounts.

Operator Interface and Production Setup Tools

- Automatic nozzle changing during production, or component setup teach
- Quick Image capture tool facilitates simple export of actual vision image bitmap file
- Nozzle setup routine guides operator through nozzle configuration setup during product changeover
- Runs in full screen mode (Operators can't access operating system)
- Includes quick access icon for nozzle and feeder performance data
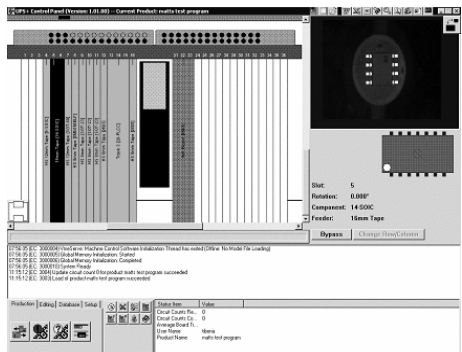
(Figure 12)

Auto-Pick Update and Auto-Z Update

- Auto-Pick Update automatically tunes feeder pick point based on vision results for optimal small-part pick performance. This feature is selectable by head and/or by Component ID.
- Auto-Z Update is a selectable feature that can be used at pick and/or place.

When activated at pick, the machine learns the impact height for each spindle from each feeder the respective spindles pick. This assures the component remains stable in its carrier during pick and minimizes nozzle wear. This is a selectable feature.

When activated at place, the machine learns the impact height of each spindle at its respective placement location for a user selectable number of boards (default is one PCB). This compensates for improperly programmed component thickness and other machine related variables. This feature assures delicate handling of components during placement, and minimizes nozzle wear. This is a selectable feature.

Please note, Auto-Pick Update and Auto-Z Update are not supported on the InLine4 head.

Skip Component Quick Bypass

- Selecting "Skip Component" within the feeder repair window quickly bypasses component
- Component remains bypassed until next product changeover
- Supports multiple component bypasses
- Configurable to standard or quick bypass skip component

True-to-scale Configuration Graphics

- Represent current real-time configuration of machine
- Add Hardware Wizard streamlines reconfiguration process
- Easy system-wide switch between English and Metric units of measure

Management Information System

- Powerful, flexible charting tools and graphics provide quick access to production detractors
- Configurable data query period by time interval, product, or operator
- Displays metrics as percentage, parts per million (PPM), or quantity
- Report generators
- Configurable screens
- Data sort function
- Custom query capability

(Figure 13)
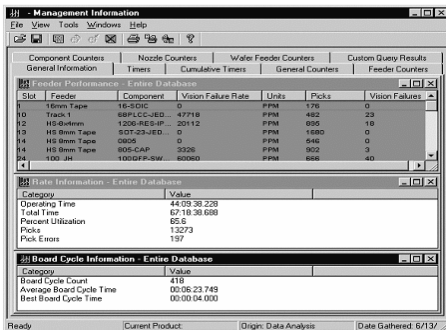
Figure 13

Diagnostic Tools

- Trend analysis graphically displays event history with powerful sorting, filtering, and statistical analysis tools for troubleshooting and maintenance
- Manual Axis Control feature incorporates user-friendly interface, vision image from PEC camera, and programmable intervals up to 10%
- Manual diagnostics feature provides advanced digital I/O diagnostics
- Pattern diagnostics feature facilitates motion control macros to cycle axes at programmable intervals and monitor servo motor performance.

New AX-72, and AI-42 Supported Features

- New Product Introduction
- Level 2 diagnostics for on-the-head-camera lighting and pin mirror
- Level 2 diagnostics for XY life testing
- New XP-style interface for NPI mode
- MMI AT (auto-trim)
- Supports Direct Pick Tray Feeder
- Circuit bypass
- Component pre-pick prior to board loading can be turned on or off

Recommended off-line PC Configuration:

- Microsoft Windows 2000 operating system
- 10 GB available hard disk space
- Pentium 4, 1.4 Giga-Hertz processor
- 256 MB RAM

Minimum off-line PC Configuration:

- Microsoft Windows 2000 operating system
- 4 GB available hard disk space
- Pentium 3, 400 Mega-Hertz processor
- 128 MB RAM

Optional Equipment
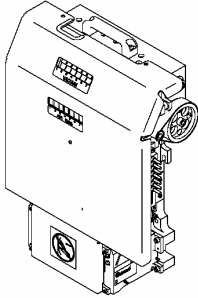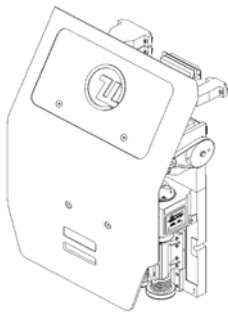
Heads

Figure 15

FlexJet3 Placement Head

Universal's FlexJet3 placement head offers a mix of flexibility and speed for many surface mount applications. The head delivers high-speed small part placement of 0201's to 24mm square components. It uses seven on-the-head cameras to inspect components during travel to the PCB. *(Figure 15)*

For parts over 24mm square, the customer must employ a stationary upward looking camera. When using the upward looking camera, images are captured on the fly, as the head travels over the camera.

The FlexJet head provides great application flexibility. It accommodates component thickness with a range of 0.15mm up to 11.68mm utilizing the on-the-head camera, and up to 25mm tall when utilizing the upward looking camera. In addition, it delivers from 150grams up to 1000grams of placement force. Please consult the product team for higher force capability requirements.

On-The-Head Cameras

An on-the-head camera mounts directly to the FlexJet3 head and maximizes machine efficiency by imaging components while the head travels from the feeders directly to the PCB. The FlexJet head supports either a high or standard magnification on-the-head camera. The high magnification camera can image components from 0201s to 10mm square. The standard magnification camera can image components from 0402 to 24mm square. This will serve to maximize component range. On-the-head cameras are equipped with front, side, and on-axis lighting, which can be activated individually or in concert to best illuminate a component's critical features.

InLine4 Placement Head

Figure 16

The InLine4 Flexible Pick and Place Head accommodates the broadest range of components on the AdVantis Platform. The higher placement force range of 150 g to 2500 g accommodates placement of flip chip, and odd-form components (axial, radial, headers, connectors, snap-in-devices, etc.) as well as the full range of standard surface mount devices.
On the InLine4 Head, 4 spindles are arranged in 40 mm spacing for full gang picking from 8, 12, 16, 24, and 32mm feeders. Each spindle accepts a wide variety of placement nozzles including grippers to accommodate the broadest range of components and applications. Vision inspection requires an Upward Looking Camera station. *(Figure 16)*

FlexJet Placement Head without On-The-Head Cameras

A FlexJet3 placement head without On-The-Head Cameras is also available to enhance the capability for placing taller components. This option, which requires an Upward Looking Camera, allows placement of components up to 37mm square and up to 25mm tall.
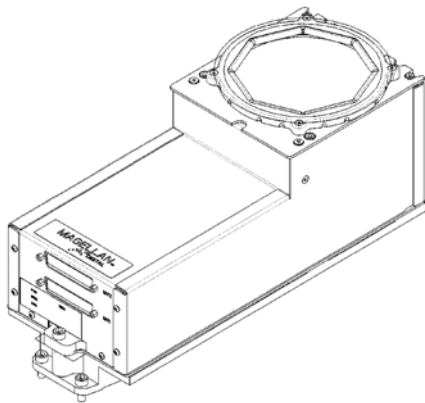
Figure 17

Vision

Magellan and Magellan Lite Upward Looking Cameras

The AdVantis platform supports an optional Magellan upward looking camera (ULC) in the center of the front feeder bank area, and/or one in the rear feeder bank area. The addition of a Magellan upward looking camera expands the range of components beyond the range of the on-the-head camera by leveraging Megapixel technology, which doubles the size of a component that can be centered while imaging a component's features (i.e. leads, bumps) of the same size.

The standard magnification Magellan 2.3 mpp camera is capable of centering 0402s and up to 55mm square components on the fly without taking multiple snap shots.

The Magellan 0.5mpp Camera is capable of centering 0201s and up to 12.5mm square components on the fly without taking multiple snap shots

The Magellan Lite Camera is capable of centering 0402s and up to 35mm square components on the fly without taking multiple snap shots.

For components larger than the specified range, the machine can take multiple snap shots. In this mode, machine throughput is reduced while part range is expanded.

> The Magellan upward looking camera is equipped with front, side, and on-axis lighting that can be activated individually or in concert to best illuminate a component's critical features. *(Figure 17)*

Rear User Interface

Includes additional monitor and keyboard for the rear of the machine.(AdVantis base machine includes 1 monitor and keyboard in the front of the machine). This will assist in operator intervention when access to both sides of the machine is required.

Inside Feeder Bank
Configuration with no ULC
36 Slots available per side

Outside Feeder Bank
Configuration with ULC
30 Slots Available per side
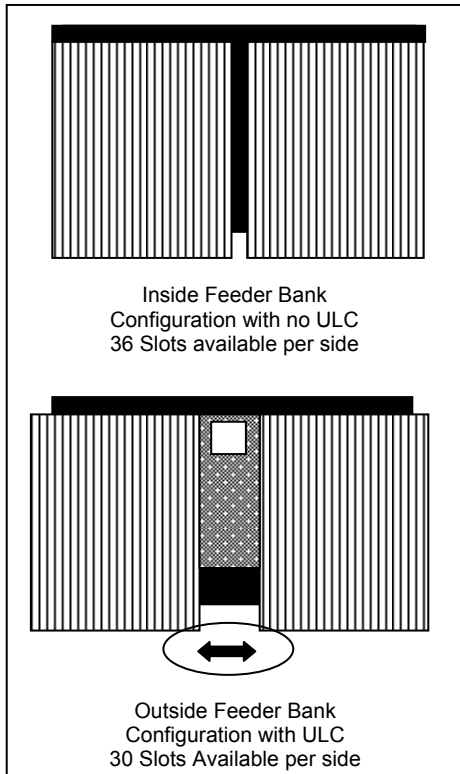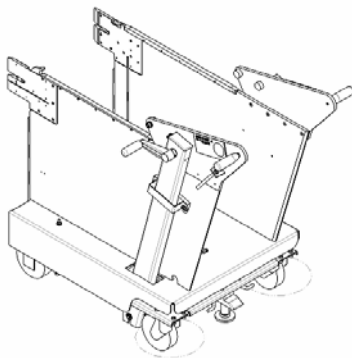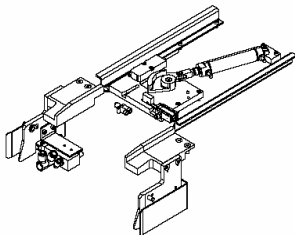
Figure 18

Figure 19

Figure 20

Feeder Interfaces

18 Slot Modular Feeder Banks

Four Feeder Banks may be installed on the base of the machine in either the inside position or outside position (see *Figure 17*). Feeder banks come in two forms: fixed and removable. Any combination of fixed/removable banks are supported, however all four banks must be mounted for the machine to operate.

The inside position allows two 18-slot feeder banks to be positioned side by side, allowing 36 useable feeder slots on each side of the machine providing up to 72 useable feeder slots. With the addition of a dual-lane 8mm tape feeder, capacity grows from 72 8mm inputs up to 144.

The outside position allows for two 18-slot feeder banks to be located for the installation of any of the Magellan Upward Looking cameras. In the outside position, two slots located in the outer positions in both banks and a single slot next to the camera are not accessible for feeder installations. *(Figure 18)*

Feeder Bank Change Cart

The rolling Feeder Bank Change Cart option is used for Feeder Bank installation, removal, or transport. Only one feeder bank on each side of the machine may be serviced at one time. Insertion or removal of a feeder bank requires the machine to be in a stopped condition. *(Figure 19)*

A 1524mm (5') aisle space is required to properly maneuver the feeder bank change cart and service feeders. This equates to 4389mm (14.4') minimum machine spacing from front board handling fixed rail to rail.

Docking Module

A Docking Module is required to enable feeder bank change for any particular feeder bank location. Any combination of the four quadrants may be fitted with docking modules. *(Figure 20)*

Docking module selection requires you to define which bank location you desire to mount this option.
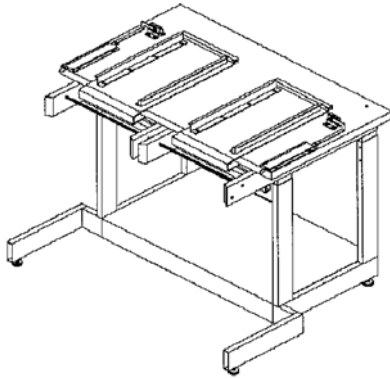
Figure 21

Removable Feeder Bank Storage Table

The feeder bank storage table provides off-line storage for two feeder banks with or without feeders. The feeder storage table can be used for offline bank setup to minimize job change time. *(Figure 21)*

Recommended Configuration for a completely Bank Changeable Machine

	Fully Bank Changeable Machine
Feeder Bank Change Cart	2
Removable Banks	8
Docking Modules[1]	4
Feeder Storage Tables	4

1 Must identify which bank location to receive appropriate docking

It is important to note that all AdVantis removable banks are designed to conform to CE safety standards. AdVantis removable feeder banks are not GSM compatible and vise versa. Any attempt to use feeder banks not designed for the AdVantis machine violates CE safety compliance standards.

Feeder Bank Change can be configured on a per bank basis. For feeder bank locations that are not to be bank change capable, fixed feeder banks must be installed.

Board Handling

Optional Board Support Systems

A board support system is available for applications that require it.

Optional Large Board kits

The AdVantis Platform can be configured with various Large Board Kits via RFQ. In the outbound position, the machine is capable of transferring boards up to 457mm wide and 508mm long. Extra Large kits are available to expand the board length to 635mm 25"

Calibration

MCCM Calibration Fixtures

The AdVantis platform supports an optional MCCM Calibration system, utilizing fixtures that can permanently reside within the machine. This allows calibration to occur without disrupting product setups. Depending on machine configuration, this may limit the use of certain nozzle changers.

For customers with multiple AdVantis machines, a portable set of MCCM fixtures offers a more cost-effective solution. An easy to use, portable calibration kit can be mounted to the feeder uprights in the machine. This occurs with a minimal disruption in product setup.

MCCM also benefits customers in the following ways:

- All camera light levels can be calibrated to ensure illumination remains consistent across an entire factory over time
- Interruptions caused by user errors (i.e. fixture upside down), can be recovered during calibration thereby greatly reducing calibration time
- Any individual subsystem or complete system can be calibrated, thereby streamlining the calibration process
- Spindle tip locations may be calibrated to improve pick yields
- Calibration fixtures remain in the machine, eliminating storage and time required to find fixtures, minimizing down-time (fixed only)

See GS-416-00 for more MCCM information.

Auto-Trim/MMI Kit

Auto-Trim is a secondary calibration process that is required in order to dial-in spindle offsets. The Machine Measuring Itself (MMI) option allows the user to measure the placement accuracy and repeatability of the AdVantis machine using the machine positioning system and optics. This kit is part of complete calibration process to ensure the highest level of placement accuracy.

See GS-416-00 for more AT/MMI information.

Software

Machine Level Software Options

GEM

Generic Equipment Model (GEM) software driver coupled with a host software application such as Dimensions Line Control Box provides a set of communication, data collection, and command and control tools for the AdVantis platform. This software driver based on the Semiconductor Equipment and Materials International standard (SEMI E30-93) opens the system architecture for integration into factory data collection and automation systems.

New Product Introduction Tools

Universal's newest software tools address reducing the amount of time required introducing new products and ramp to full production. AC30L capability release TBD. Please contact product team for details.

Tools include:
- Ability to verify location and orientation of components at their placement locations and fiducials using the downward looking camera prior to part placement
- Ability to verify feeder pick points, component orientations, and feeder pitch settings prior to components being picked
- Ability to reject, skip, place anyway, or modify component definitions of components rejected by the vision system.
- Ability to post-placement verify programmed placements to assure placements are on-pad and/or the correct orientation via the downward looking camera.
- NPI is a one-time option purchase that is applied on a per machine basis. This means that the customer, who originally purchases the machine from UIC, receives any future NPI enhancements as a component of a UPS+ upgrade.

Platform Traceability

Traceability at the component and board level gives you a closed-loop feedback system that can both confirm quality and zero in on potential problems – quickly, easily, accurately, and automatically.

This capability is now available through the Dimensions Manufacturing Automation software, in combination with Universal's bar code tracking options for product identification and component validation.
Traceability is optional on Universal's AdVantis Platform.

Bar Code Product Changeover

Introduction

The AdVantis Platform is capable of handling bar code changeovers if it is equipped with the Bar Code Changeover option. This option allows for seamless product changeovers without requiring the user to manually load product data or press the start button. The changeover is accomplished based on a bar code string received; a lookup is performed in a cross-reference lookup table to verify what product should be executed for a given bar code.

This option is completely local to the AdVantis Platform. No external host machine is required. It is a separate purchased option to the UPS+ software. This feature is available via RFQ only; please contact your Universal Sale Engineer for more details.

Restrictions / Limitations

Each bar code reader requires a serial line to the serial board, which is mounted in the AdVantis VME cage. Serial I/O option is required.

Only printed circuit boards for the current product will be allowed in the machine. Any board requiring a product changeover will be maintained outside the machine until all current board have exited the machine and the product changeover has been performed.

Before the AdVantis Platform can be placed into either Line Monitor or Changeover mode, it must be powered up and the amplifiers enabled by pressing the "hard" start button. If pallets are utilized, only one bar code in the set is used as the main product identification.

Universal applied bar code readers and conveyors are recommended. Should different conveyors or scanners be desired, there will be additional fees for integration, consulting and required labor/parts.

The scanner selected must scan fast enough to obtain good reads for the speed rate of the input conveyor. The customer will need to place the bar code labels in a location that will allow the scanner to read the label successfully without adjusting the scanner location.

Bar Code Types

See Appendix B for Bar Code Types

Platform Setup Validation (PSV)

Introduction

The AdVantis platform also supports Platform Setup Validation (PSV), which prevents operator-related errors during feeder setup or reloading by verifying the correct components are loaded into the correct feeder slots. PSV minimizes product costs by reducing rework, thereby improving product yield while providing a validation log, which tracks each feeder dismount, scan, and mount routines. Minimal operator training is required due to the simple closed-loop operation and common look of the graphical user validation.

Incorporating PSV provides numerous benefits:

Prevents operator related loading errors: The closed-loop feedback system ensures the correct feeders and components are loaded into the appropriate feeder slot whenever a tape feeder is mounted or spliced on the AdVantis platform

Eliminates costly rework: Since PSV will never enable a mismatched component and feeder slot; the wrong components are simply not picked, thus preventing any associated rework.

Improved product yield: Again, PSV ensures correct component usage. This means you will never be forced to rework boards because the wrong part was placed. Hence, your first product pass product yield may increase

Increases operational efficiency: when integrated with Dimensions and GEM software, component consumption can be monitored / integrated into a customer's MRP system to assure parts are replenished without production interruption.

Bottom line, Universal's closed-loop bar code scanning option saves time and money, while ensuring the production of high quality boards.

PSV on PTF and DPTF Assumptions and Limitations

- Components loaded into the PTF or DPTF are typically a stack of matrix trays, encased in ESD packaging with barcode labels affixed to the bag that identifies the components and date / lot code information. The connection between the bar code label and the components is broken when the operator removes the stack of trays from the bag and places it in the PTF Pallet. Maintaining this connection is outside the scope of the PSV system. The quality of the validation and traceability function is completely dependent on the quality of the user's solution for maintaining the connection between the components and the barcode labels that identify them.
- A pallet can be programmed to contain two differing stacks of components. There is no electrical signal that will allow PSV to detect activity for each individual stack. PSV will require that the data for both stacks be scanned every time that a PTF or DPTF pallet is removed from its magazine. The operator will indicate which stack is acted upon, by first scanning a stack identifying barcode label on the top of the magazine. The contents of this label will not be tracked by PSV; PSV will use it only to associate scanned data to the proper stack in the pallet. There is no way to ensure that components are placed and scanned in the proper stack of the PTF or DPTF pallet.

- It is recommended that pallets be run until they are empty. If not, then lot code traceability is compromised, since there is no way to know when a stack of trays of a specific lot has been consumed, and is no longer being placed on boards. This becomes more of a problem if matrix trays from differing lots are mixed together. PSV will report the component ID and additional scanned lot / date code data for the component most recently scanned into each stack of each pallet in the PTF or DPTF.
- PSV on PTF or DPTF requires Barcode Plaque Kits. See Platform Feeders GS-412.

Line Level Software Options:

Please refer to GS-414, Dimensions General Specification, for more information on line level software.

Specifications / Performance

Specifications

Installation Considerations

Machine Dimensions: 4984B AdVantis

	Length[1]	Depth[2]	Height[3]	Weight
Base Machine	1676mm (66")	1689mm (66.5")	2212mm (87.1")	2600kg (5700lbs)
Domestic Shipping	1905mm (75")	2591mm (102")	1854mm (73")	3089kg (6809lbs)
Air Freight	1930mm (76")	2616mm (103")	1854mm (73")	3302kg (7279lbs)
Sea Freight	Same as Air	Same as Air	Same as Air	3373kg (7435lbs)

1 Length is in the direction of board flow
2 Depth does not include user interface screen
3 Machine light tower included in height

Floor Loading Requirements (*see following diagrams*)

Units	AdVantis 4984B	Comments
Static Floor Loading (N/m^2)	9600	w/o Feeders
Static Floor Loading (lb/ft^2)	200	w/o Feeders
Static Floor Loading (N/m^2)	11000	w/Feeders
Static Floor Loading (lb/ft^2)	230	w/Feeders
Dynamic Load/Area (N/m^2)	1700	
Dynamic Load/Area (lb/ft^2)	30	
Total Load/Area (N/m²)	124000	
Total Load/Area (lb/ft²)	2600	

Notes:
All loads are assuming machine is properly leveled and the load evenly is distributed.
Loads are based on 6" (150mm) reinforced concrete on compacted soil sub-base.
Loads are calculated as average over the area occupied by the machine leveling system.
Loads per unit area are concentrated about leveling legs.
Weights with Feeders are based on 72 Dual Track 8mm Feeders with 2 - 7" Reels.
All loads are vertical.
Dynamic loads will be applied upward and downward.
It is the customer's responsibility to determine appropriate structural requirements to support the machine.

The following diagrams illustrate the effects of Static and Dynamic floor loading. The Static diagram illustrates the footprint of the machine and the locations of the footpads to determine the surface area affected by the Static Floor Loading. The Dynamic diagram illustrates the forces applied to the floor as the positioning system moves.

This information is supplied for illustrative purposes only. It is recommended that a Structural Engineer be consulted to determine the proper floor loading requirements.

Dynamic
Floor Loading

Static Floor Loading
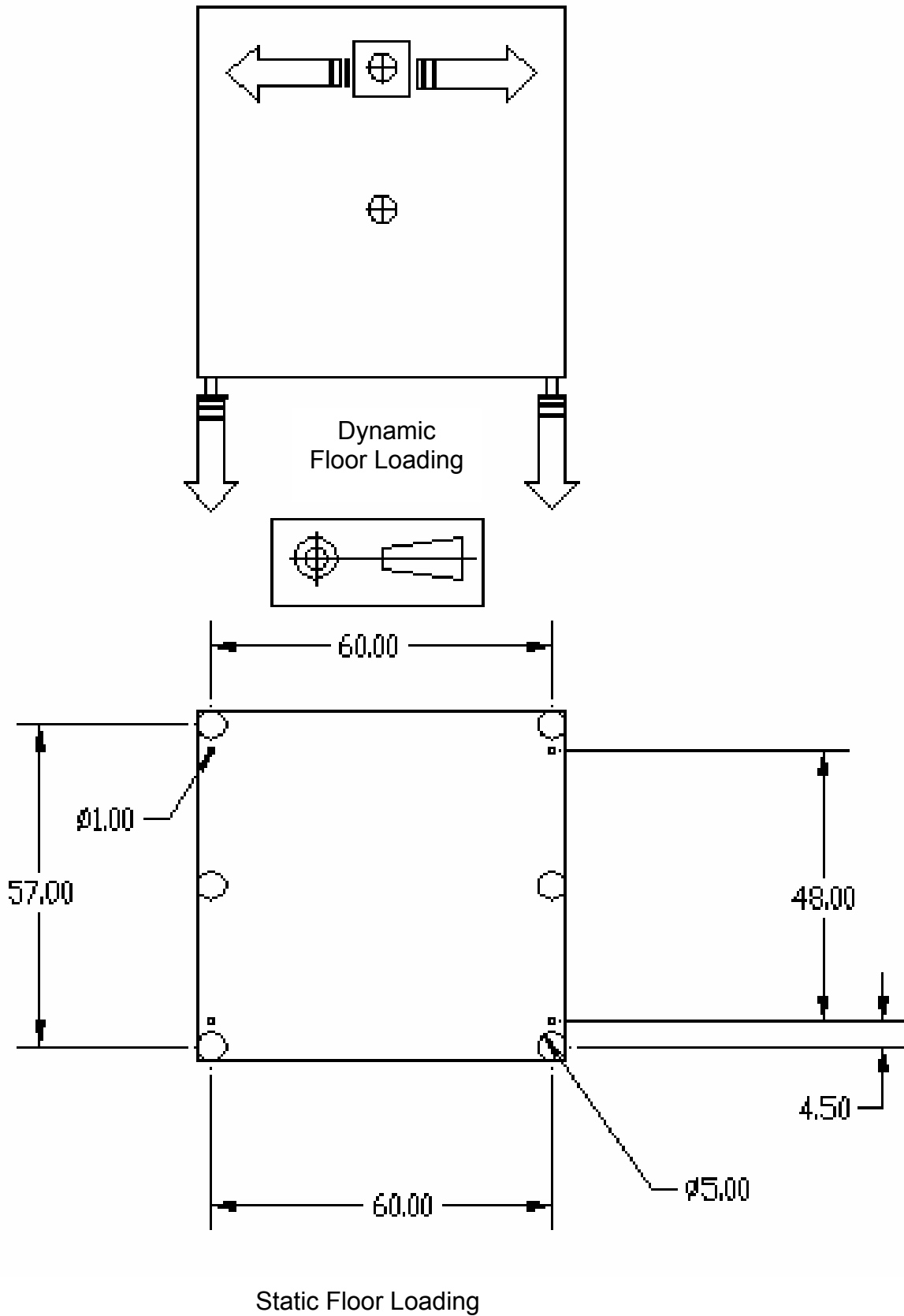
AdVantis Platform Installation hardware:

10k lb. Lift Truck with 10ft length forks

Service Requirements

Electrical[1]	200-240VAC or 380-415VAC[3, 6], nominal
Frequency	47-63 Hz
Phases	3
Numbers of Wires	4(3 Phases and Ground)
Service Configuration [4,5]	Must be grounded Delta, or Wye
Branch Circuit Size	35 Amps
Distortion	<10% total Harmonic distortion
Average Power	7800 watts
Electrical Connection[2]	158.8mm (6.25") from left front corner 673.1mm (26.5") from floor

1. Service choices of 200-240 or 380-415 VAC are available and must be selected at time of order . If a customer retrofits a pre-G Block PTF to their AdVantis, the input voltage must be 230VAC, and held within +/- 10%
2. Electrical interface in the machine is in a similar location to the GSM Platform
3. If 24VAC feeder option is selected, the applied input voltage should have a maximum tolerance of +/- 10%, and the unit must be tapped for the respective nominal input voltage.
4. A customer-supplied transformer **cannot be a** "SPLIT-PHASE AUTOTRANSFORMER." Split-phase transformers are typically two small autotransformers that get wired in series with the machine. The machine warranty will be voided if a customer attempts to operate AdVantis in this configuration.
5. Do not hipot test the AdVantis machine due to risk of damage to the machine's electronics.   AdVantis utilizes a transformer-less AC Input System. Subjecting the machine to hipot testing will void the machine's warranty.
6. If customer has either the 24vac Feeder Kit, or a G-block (or newer) PTF, it will be necessary to set the taps for the respective input voltage (range increments of 200vac, 210vac, 220vac, 230vac or 240vac).

Pneumatics (clean air)

AdVantis Platform with FlexJet3 or Inline4 heads

Air Flow[2]	3CFM @ 90psi (85 liters/min) @ 6.2 bars
Air Consumption[1]	10.5 SCFM (223.2 S liters/min)
Pneumatic Connection	12.7mm(1/2") or larger to machine

1. Air consumption is an average for air used by the base machine during a normal machine cycle and is measured in standard cubic feet per minute. It accounts for heads and feeders and does not consider peripheral options such as PTF, which must be added to the base machine requirements
2. Air Flow values are used to represent momentary peaks of demand for the machine to size input airlines to the machine. As with air consumption, it accounts for heads only and does not consider peripheral options such as PTF, which must be added to base machine requirements. Requirements of options must be taken into account in addition to the base machine for line and compressor sizing

Clean Air is defined as:

1	Dew Point	Must be 20 degrees F (11 degrees C) below ambient temperature
2	Oil	.08 ppm at 82 degrees F (82 degrees C)
3	Input Air	Filtered to 5 microns particle size
Pneumatic Connection		254mm (10.0") from left front corner, 593.7mm (23.4") from floor. Internal thread connection is 1/2 NPT and provided with the machine. Equipment is adequately protected against ingress of solid and liquid contaminants.

Environmental Requirements

	Minimum	Maximum
Operating Temperature	4.4 Degrees C 40 Degrees F	35 Degrees C 95 Degrees F
Operating Temperature Change Tolerance		6 Degrees C/Hr 10.8 Degrees F/Hr
Storage Temperature	-20 Degrees C -4 Degrees F	65 Degrees C 149 Degrees F
Operating Humidity	10% non-condensing	90% non-condensing
Operating Altitude		2500 Meters 8202 Feet
Noise Level[1]		72dbA

1 In accordance with National Machine Toolbuilders Assoc. Noise Measurement Technique Standard –
 June 1986

ESD Emissions

Charge generations shall be less than 50 volts within 20cm (8 inches) of any device or assembly path tested in 12% RH environment. All UIC supplied machine nozzles are ESD compliant.

2213.4mm
(87.14")

1632.5mm
(64.25")

647.8mm
(25.5")

570.4mm
(22.45")

1689.4mm
(66.5")

567.7mm
(22.35")

148.1mm
(5.83")

1676.6mm
(66.0")
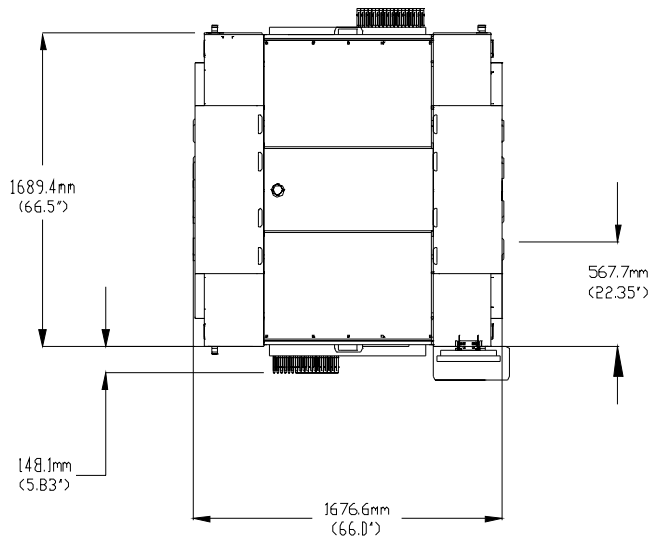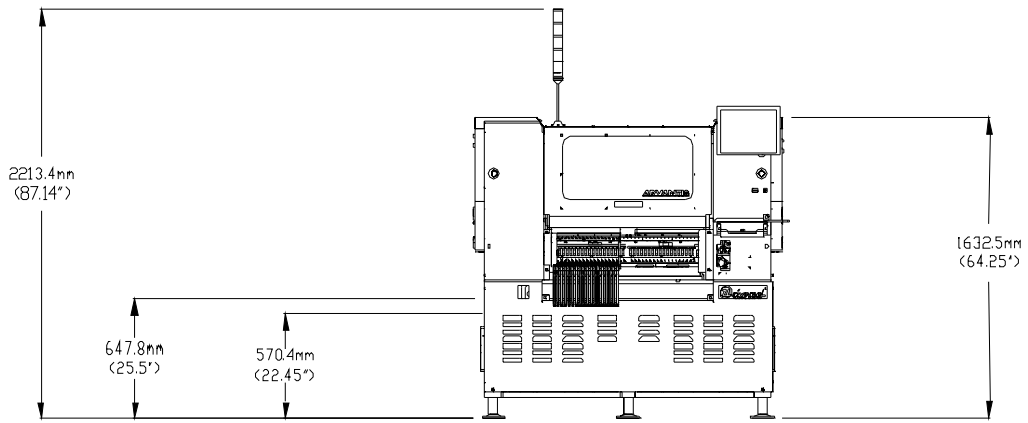
AdVantis Platform Footprint:

AdVantis Positioning System Specifications

Axis	
X Axis Travel	703.6mm (27.7")
Y Axis Travel	1090.7mm (42.9")
Resolution	.0010mm (.00004")
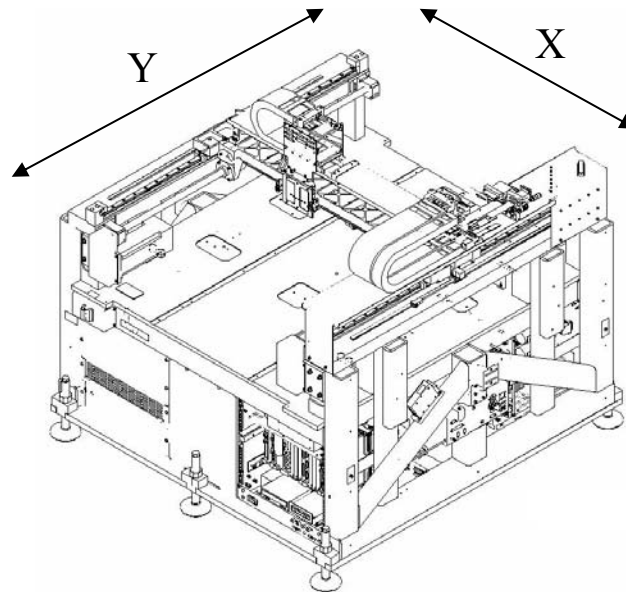
Board Specifications

		Minimum	Maximum
Length		50.8mm (2")	508mm (20") [1]
Width		50.8mm (2") [2]	457mm (18") [1]
Thickness		.508mm (.02")	5.08mm (.2")
Weight			2.72kg (6lbs) [3]
Allowable Warp	For Board Transfer		5.537mm (.218") minus board thickness
	For Placement		.75% of board length (per IPC-2221), not to exceed 3.175mm (.125") total

1. Standard tooling accommodates board lengths up to 508mm in length, for board capability up to 635mm(RFQ), see large board kits section – limitations apply. 457mm board width requires outbound feeder position (Maximum width is 355mm in the standard feeder position)
2. The component reject bin must be relocated and one mechanical stop removed to accommodate board width between 50.8mm(2") and 88.9mm(3.5"). Software reconfiguration is required.
3. Represents the sum of all board weights within the AdVantis platform board handling system and components placed.

Board Clearance

Topside Clearance	25.4mm (1.00")
Bottom Side Clearance	25.4mm (1.00")

Board Handling Transfer Specifications

	Minimum	Maximum
Transfer Height	899mm(35.4")	965.2mm(38")
Transfer Time		2.5 sec[1]
Edge Clearance	Standard	3mm(.195"), +/- .4mm(.016")

1 With staged board handling and boards 508mm long or less. Assumes Left to Right transfer direction.
 Right to Left transfer time is 2.3 sec.

Large Board Kits

The AdVantis platform supports optional kits that expand the board handling capability beyond its default maximum range of 457mm (355mm inbound) x 508mm x 5mm.

Kit	Minimum Length (mm)	Min Width (mm)	Min Thickness (mm)	Max Length (mm)	Max Width (mm)	Max Thickness (mm)	Mass (kg)
Standard	50	50[1]	.5	508	457	5	2.7[2]
635mm Length	50	50[1]	.5	635	457	5	2.7[2]

1 The component reject bin must be relocated and one mechanical stop removed to accommodate board width between 50.8mm(2")
 and 88.9mm(3.5"). Software reconfiguration is required.
2 Represents the sum of all board weights within the AdVantis platform board handling system and components placed

Large Board Kit Limitations:

- An alternate board zero location is used for boards up to 635mm in length. This location is defined by a second set of board stops and software configuration parameters.
- To accommodate boards longer than 508mm, the single lane staged board handling system can accommodate only one board in the system at any time – no staging within the AdVantis can occur.

Limitations for Board Lengths between 508mm (20") and 584.2mm (23"):

- The board support length is the same as the width in the standard configuration, resulting in no board support in the left-most 44.5mm and the right-most 76.2mm. Extended Board support kits are required.
- Board clamp is limited. Single lane staged board handling system does not facilitate top/bottom clamp on the right-most 38.1mm on a 584.2mm board.

Limitations for Board Lengths between 584.2mm (23") and 635mm (25"):

- The board support length is the same as the width in the standard configuration, resulting in no board support in the left-most 69.9mm and the right-most 101.6mm
- Board clamp is limited. Single lane staged board handling system does not facilitate top/bottom clamp on the right-most 63.5mm on a 635mm board. Extended Board support kits are required.
- Some placement spindles cannot reach outer placement locations

Heads

FlexJet3 Head Specifications

Component Handling Capabilities			FlexJet3[1]	
			mm	inch
On-the-Head Camera[2]	Maximum (without theta rotation in the camera housing)	Length[3]	24.00	0.945
		Width[3]	24.00	0.945
		Height	11.68	0.460
	Maximum (with theta rotation in the camera housing)	Length	17.96	0.707
		Width	17.96	0.707
		Height	11.68	0.460
	Minimum	Length[4]	0.38	0.015
		Width[4]	0.19	0.007
		Height	0.15	0.006
W/O On-The-Head-Camera (ULC only)[11]	Maximum	Length	35	1.378
		Width	35	1.378
		Height[10]	26	1.0236
	Minimum		See ULC specifications on pg 40	
Upward Looking Camera[5]	Maximum (without theta rotation in the camera housing)	Length	24.00	0.945
		Width	24.00	0.945
		Height	25.00	0.984
	Maximum (with component below the camera housing) Single FOV	Length	55.00	2.200
		Width	55.00	2.200
		Height	11.68	0.500
	Maximum (with component below the camera housing) Multiple FOV	Diag.	150.00	5.900
		Height	11.68	0.323
	Minimum		See ULC specifications on pg 40	
Component Characteristics	Minimum Lead Width		On-the-Head Camera Dependent - Refer to Appendix C, "Cameras" for details	
	Minimum Lead Pitch			
	Minimum Bump Diameter			
	Minimum Bump Spacing			
	Task Block Thickness Range[6]		6.35 / 3.18	.25 / .125
	Placement Force Range (10 gram Increments)		150 - 1000 grams	
	Maximum Component Mass		27 grams[9, 10]	
	Practical Component Range		Standard SM components from chips to large leaded and array components including a limited range of Oddform surface mount packages.[8]	

Notes:

1 The FlexJe3 head has limited Gripper capability. Additional considerations include the lack of backlighting capability and coplanarity support.

2 Actual component dimensions will vary depending on the pick tolerance applied

3 Maximum Component length and width dependent on On-the-Head optics magnification: 24mm x 24mm is based on 2.6 mil/pixel OTHC, and 10mm x 10mm based on a 1.1 mil/pixel

4 Minimum Component length and width dependent on On-the-Head optics magnification: .375mm x .187mm is based on 1.1 mil/pixel OTHC, and .792mm x .396mm based on a 2.6 mil/pixel

5 Actual component dimensions will vary depending on the pick tolerance. Also Special situations exist where specified constraints can be alleviated to accommodate non-standard applications. The AdVantis platform has placed a 146mm x 12.95mm SM Connector

6 Depth of field is dependent on the magnification of the On-the-head Camera. 2.6 mil/pixel camera allows for a range of parts in a given task block to range within 6.35mm and 3.18 for the 1.1 mil/pixel. This factor only applies to On-the-head camera

7 Special situations exist where specified constraints can be alleviated to accommodate non-standard applications. The AdVantis Platform can place an 80-gram CCGA using a specific vacuum nozzle.

8 The FlexJet component range is expanding continually. Consult SM Applications engineering for a review of specific components

9 Using standard nozzles, for applications that require >27 grams, please contact the AdVantis product team

10 For component heights that exceed 26mm, contact product team

11 Allows for 2mm pick tolerance and part rotation at scan height. Standard large part stipulations apply. Dependant on specific Head and Camera Configuration

InLine4 Head Specifications

Component Handling Capabilities			InLine4	
			mm	**inch**
On-the-Head Camera[1]	Maximum (without theta rotation in the camera housing)	Length	This head requires the use of an upward-looking camera for image acquisition. Refer to Appendix A, "Cameras" for applicable component considerations	
		Width	N/A	N/A
		Height	N/A	N/A
	Maximum (with theta rotation in the camera housing)	Length	N/A	N/A
		Width	N/A	N/A
		Height	N/A	N/A
	Minimum (0201 Capability pending)	Length	N/A	N/A
		Width	N/A	N/A
		Height	N/A	N/A
Upward-Looking Camera[2]	Maximum (Camera Selection Dependent)	Length	55.000[5]	2.200
		Width	55.000[5]	2.200
		Height	12.700	0.500
	Minimum (Camera Selection Dependent)	Length	**See ULC Specs pg 34**	
		Width		
		Height		
Component Characteristics	Minimum Lead Width		Upward-Looking Camera Selection Dependent Refer to pg 34 "Cameras", for details.	
	Minimum Lead Pitch			
	Minimum Bump Diameter			
	Minimum Bump Pitch			
	Task Block Thickness Range[3]		N/A	
	Placement Force Range		150 to 2,500	
	Maximum Component Weight		27[4]	
	Practical Component Range		Mid to large leaded and array components, including Odd Form IM or SM packages requiring up to 2,500g placement pressure	

Notes:
1 Actual component dimensions will vary depending on the pick tolerance applied.
2 Special situations exist where specified constraints can be alleviated to accommodate non-standard applications. The GSM Platform has placed a 146.1 mm (5.75") x 12.95 mm (0.510") SM connector with special considerations.
3 Some component applications may require an upward looking camera.
4 For Applications in excess of 27 grams please contact the AdVantis Product Team
5 Pick tolerance is ± 2mm, Dependant on specific Head and Camera Configuration

Spindle Reach for AX-72e, AI-42e

Under normal operation conditions, the outermost feeder slots on the feeder banks cannot be reached by all of the spindles on In-Line 4 and FlexJet3 heads. The following diagrams illustrate the limits of each head while picking parts from the feeders. The, "Head Operating Region", dimensions reference the maximum reach of spindles 1 and 4 for the In-Line 4 head and 1 and 7 for the FlexJet3 Head.
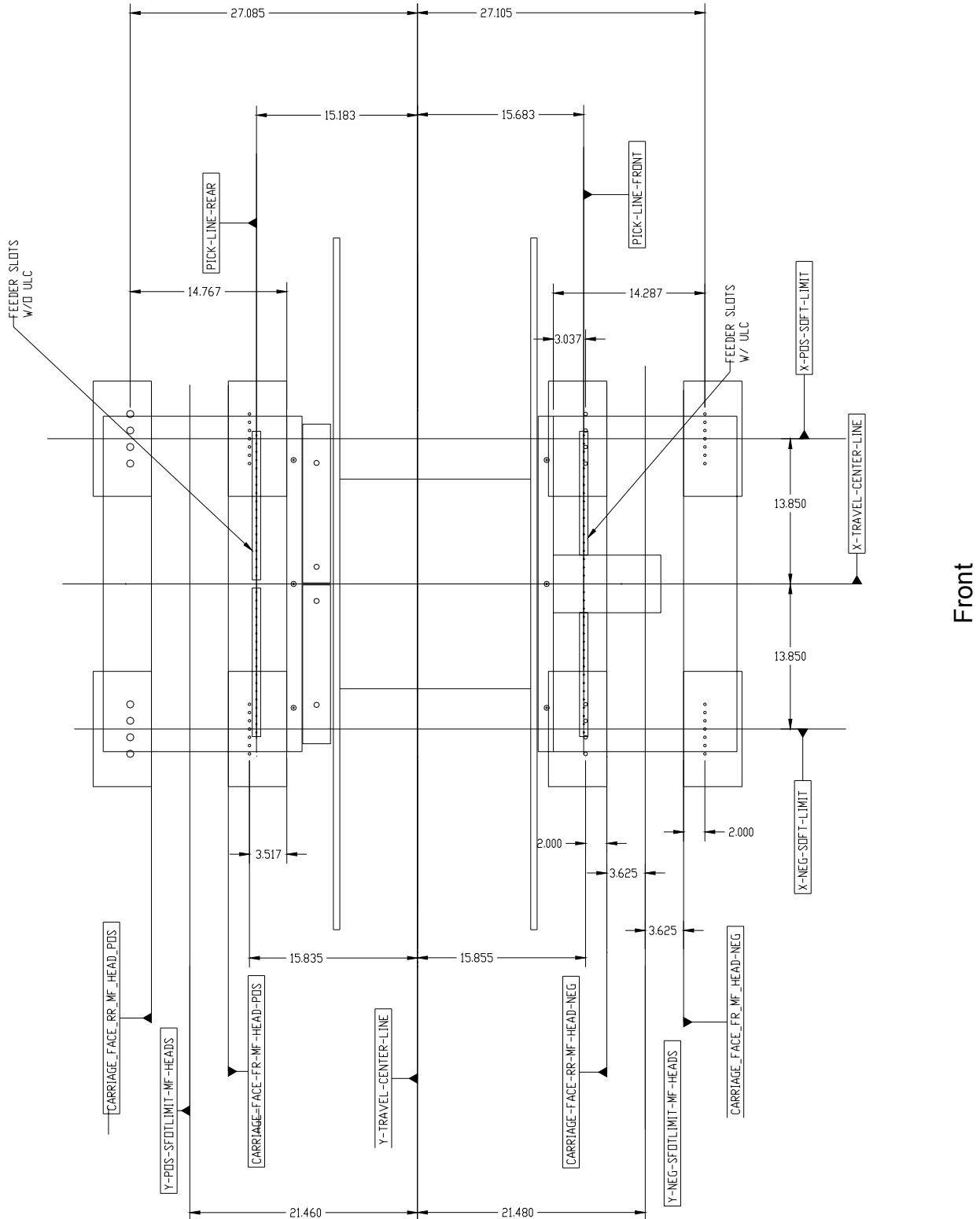
Nozzles

FlexJet3 Nozzle Compatibility

FlexJet3 nozzles are designed to provide a robust coupling between the spindle and nozzle assembly. As a result of this new design, FlexJet3 nozzles are not compatible with the first Generation of FlexJet heads used on the GSM or AdVantis 4982 series of machines.

FlexJet3 ceramic tipped nozzles (multi-port and Blade versions) are designed to last 9-11 million cycles. Compliant-tipped nozzles are designed to last 2-3 million cycles.

FlexJet3 Nozzle/Component Range Matrix

FlexJet 2 and FlexJet 3 Head Nozzles	Sample Component Range (Size, weight, & height dependant)
1320 Melf Nozzle Tip	Smaller MELFs, coils, and cylindrical diodes
1340 Melf Nozzle Tip	Larger MELFs, coils, and cylindrical diodes
1020 Ceramic Blade Nozzle Tip	0201 Chips in .010-.015" placement density
1040 Ceramic Blade Nozzle Tip	0402 Chips in .010-.015" placement density
1120 Ceramic Multi-Port Nozzle Tip, Ceramic	402, 603, 805, 1206, Tant Caps, SOT-23
1060 Ceramic Blade Nozzle Tip	0603 Chips in .010-.015" placement density
1140 Ceramic Multi-Port Nozzle Tip	0805 – SOIC 14
1220 Compliant Nozzle Tip	SOIC 8 – PLCC 20
1240 Compliant Nozzle Tip	SOIC 14 – PLCC 52
1260 Compliant Nozzle Tip	SOIC 20 – QFP 304
1280 Compliant Nozzle Tip	PLCC 32 – QFP 304

With the purchase of an AdVantis platform, a starter nozzle kit is included with each head. The starter kit for a FlexJet head includes quantity two each of 1040, 1060, 1120, 1140, 1220, 1240, 1320, and 1340.   The starter kit for an InLine4 head includes four each of 10MPF, 125F, 234F, and 340F. Additional quantities can be ordered as required by your application/environment.

Adjustable FlexJet3 Gripper

Gripper tooling is used for components with no flat surface for vacuum picking. Ribbon cable connectors, inter-board headers, and potting forms are examples of the components handled by this tooling. The gripping action is accomplished using the same vacuum and air kiss as the standard nozzle tips. The Adjustable Gripper can accommodate a variety of different components. The gripper range is shown in the following table.

Gripper Range (mm)	Gripper Range (inches)
Standard Orientation	
0 – 4.445	0 - .175
3.302 – 9.144	0.130 – 0.360
Reversed Orientation	
6.858 – 13.208	0.270 – 0.520

Note:
  The gripper is not nozzle changer compatible

InLine4 Head Nozzle/Component Range Matrix

InLine4 Head Nozzles	Sample Component Range (Size, weight, & height dependant)
042MF Melf Nozzle Tip	Smaller MELFs, coils, and cylindrical diodes
083MF Melf Nozzle Tip	Larger MELFs, coils, and cylindrical diodes
08MPF Mini Multi-Port	0402 – 0805
10MPF Large Multi-Port	0603 – SOIC 14
234F Molded	SOIC 14 – PLCC 68
340 Molded	SOIC 20 – QFP 304
120F Molded	Tantalum – SOIC 16
125F Compliant Tip	SOIC 8 – PLCC 25
160F Compliant Tip	SOIC 8 – PLCC 44
360F Compliant Tip	PLCC 32 – PLCC 124
460XF Suction Cup Tip	PLCC 32 – QFP 240
10MF	Larger MELFs, coils, and cylindrical diodes
QC Adjustable Gripper Assembly	Components with no flat surface for vacuum pickup

Adjustable InLine4 Gripper

Gripper tooling is used for components with no flat surface for vacuum picking. Ribbon cable connectors, inter-board headers, and potting forms are examples of the components handled by this tooling. The gripping action is accomplished using the same vacuum and air kiss as the standard nozzle tips. The Adjustable Gripper can accommodate a variety of different components. The gripper range is shown in the following table.

Gripper Range (mm)	Gripper Range (inches)
Standard Orientation	
0 – 2.667	0 - .105
2.667 – 5.207	0.105 – 0.205
5.207 – 7.747	0.205 – 0.305
7.747 – 10.287	0.305 – 0.405
Reversed Orientation	
10.287 – 12.827	0.405 – 0.505
12.827 – 15.367	0.505 – 0.605
15.367 – 17.907	0.605 – 0.705
17.907 – 20.447	0.705 – 0.805

Odd-Form Componentry: Special FJ3 Nozzles and InLine4 Spindle

Universal offers several configurations of special nozzles for handling connectors, and other odd-form components. If there are components you wish to place please send your sample components along with a description of your machine and head type to:

Universal Instruments Corp
33 Corporate Parkway
Conklin, NY 13748
C/0 Phyllis Ganow

Camera Specifications

Magnification	mpp	Magellan Upward-looking Cameras[7]						FlexJet3 On-The-Head Cameras[8]			
		0.5 MPP		2.3 MPP LITE		2.3 MPP		2.6 MPP		1.1 MPP	
Units	Required Pixels	mm	in	mm	in	mm	in	mm	in	mm	in
Maximum Component(single Field of View)[1 & 2]	n/a	8.74	0.344	35.00	2.096	55.00	2.096	24	0.945	11.430	0.450
Maximum Component Height[4]		25.00	0.984	25.00	0.984	25.00	0.984	11.68	.46	11.68	0.433
Maximum Component Height[3]		11.68[9]	0.46[9]	11.68[9]	0.46[9]	11.68[9]	0.46[9]	n/a	n/a	n/a	n/a
Minimum Pixels: Leadless Components											
Length	12	0.158	0.006	0.713	0.028	0.713	0.028	0.792	0.031	0.375	0.015
Width	6	0.079	0.003	0.357	0.014	0.357	0.014	0.396	0.016	0.187	0.007
Minimum Pixels: Leaded Components											
Pitch[5]	4	0.053	0.002	0.238	0.009	0.238	0.009	0.264	0.010	0.125	0.005
Length/Width - Centering	2	0.026	0.001	0.119	0.005	0.119	0.005	0.132	0.005	0.062	0.002
Length/Width - Inspection	2.5	0.033	0.0013	0.149	0.006	0.149	0.006	0.165	0.007	0.078	0.003
Pitch Inspection on	5	0.066	0.0026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Minimum Pixels: Multi-Pattern components											
Centering	6	0.079	0.003	0.357	0.014	0.357	0.014	0.396	0.016	0.187	0.007
Inspection	6.5	0.086	0.0034	0.386	0.015	0.386	0.015	0.429	0.017	0.203	0.008
Minimum Pixels: BGA & C4											
Minimum Pitch (see calculation below)	8[10]	0.135	0.005	0.623	0.025	0.623	0.025	0.704	0.028	0.298	0.012
Min Ball Spacing (see calculation below)	4[10]	0.068	0.003	0.312	0.013	0.312	0.013	0.352	0.014	0.149	0.006
Bump Dia.[6]	4[10]	0.068	0.003	0.312	0.013	0.312	0.013	0.352	0.014	0.149	0.006

Notes
1 Actual component dimensions will vary depending on pick tolerance applied
2 Assumes a default of +/- 1.905mm(.075:") pick tolerance
3 Max Component Height is restricted by component size. Assumes length and width of greater than 24mm
4 Max Component Height is restricted by component size. Assumes length and width of 24mm or less
5 Assumes a 2.0 pixel minimum separation distance between leads
6 Maximum numbers of bumps is 4000 with the ESI 650 vision system
7 Option used in conjunction with FlexJet-configured AdVantis Machines
8 Only one FlexJet On-the-Head Camera Magnification is supported on a given FlexJet head
9 Maximum height of 25mm via RFQ
10 Assumes 75% reflectivity of actual ball size. Any applications outside of this spec may be reviewed via RFQ

Calculating Minimum Pitch

Minimum Ball Dia. = Minimum Ball Spacing
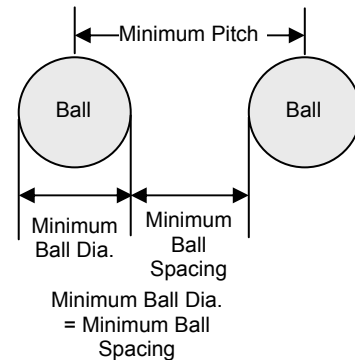
Performance

FlexJet3 Head

Component Placement Force Range	150g to 1kg(10g incr.)
Final Placement Performance	50 DPM
Intrinsic Availability	98%
Average Maintenance Interval	5.7 man-hrs / 6 weeks

Placement Capability – Measured with Glass slugs on Glass plates

Camera Type	Part Type	X/Y Spec Limits (um)	Theta Spec Limits (deg)	Min Cpk
1.1 m/p OTHC	Leadless	75	N/A	1.33
	Leaded	50	.2	1.33
	Bumped	45	.2	1.33
2.6 m/p OTHC	Leadless	90	N/A	1.33
	Leaded	62.5	.2	1.33
	Bumped	62.5	.2	1.33
2.3 m/p ULCS	Leadless	90	N/A	1.33
	Leaded	50	.2	1.33
	Bumped	50	.2	1.33

Note:
Assumes FJ3 head

IPC Machine Speed (AX-72)

(IPC9850 4- board Performance)

CPH	Part Type	X/Y Spec Limits (um)	Theta Spec Limits (deg)	Min Cpk
13,000	1608	75	N/A	1.33
3700	100 QFP	50	.2	1.33

Maximum Machine Speed (AX-72)

CPH	Part Type	X/Y Spec Limits (um)	Theta Spec Limits (deg)	Min Cpk
19,300	1608	75	N/A	1.33
5600	100 QFP	50	.2	1.33

InLine4 Head

- Provides four spindles on 40mm centers to mount vacuum pickup or gripper type nozzles for component pickup.
- Most pickup nozzles can be changed under program control.
  40 mm spindle pitch allows gang picking of components presented on 40 mm pitch, or independent picking of components not presented on 40 mm pitch.
- Allows 360° rotation of components and utilizes vision for detection of component presence and absence.
- Simple design incorporates a single z-axis motor and a single theta motor for all four spindles.
- Incorporates both spindle up and touch down sensors to ensure safe machine operation.
- Supports a force range tolerance specification of:
  - 150 to 500g, the mean shift cannot exceed +/- 50g.
  - 501 to 2500g, the mean shift cannot exceed +/- 10% of the programmed pressure.
  - 150 to 2500g, (1) STD deviation cannot be >35 grams.

Component Placement Force Range   150g to 2500g
Final Placement Performance   50 DPM
Intrinsic Availability   98%
Average Maintenance Interval   4 man-hrs / 6 weeks

Placement Capability – Measured with Glass slugs on Glass plates

Camera Type	Part Type	X/Y Spec Limits (um)	Theta Spec Limits (deg)	Min Cpk
ULC	Leaded	45	.2	1.33

Machine Throughput (AI-42)

(Preliminary IPC9850 4-board Performance)

CPH	Part Type	X/Y Spec Limits (um)	Theta Spec Limits (deg)	Min Cpk
1550	100 QFP	45	.2	1.33

Maximum Machine Speed (AI-42)

CPH	Part Type	X/Y Spec Limits (um)	Theta Spec Limits (deg)	Min Cpk
8000	1608	75	N/A	1.33
N/A	100 QFP	50	.2	1.33

AdVantis Platform Supported Head Configurations

AdVantis 4984B	
Front of Beam	**Rear of Beam**
Flexjet Head	N/A
FlexJet Head	Inline4
InLine4 Head	N/A
InLine4 Head	InLine4

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Feeder Capacity

Without the upward looking camera installed, 36 8mm feeders can be installed as seen on banks 1 and 2 in the diagram below. With a Magellan camera installed, only 30 8mm feeder slots are available as seen on banks 3 and 4 in the diagram below. With the use of Dual Lane 8mm feeders, the feeder capacity increases to 144 8mm feeders or 132 8mm feeders respectively.
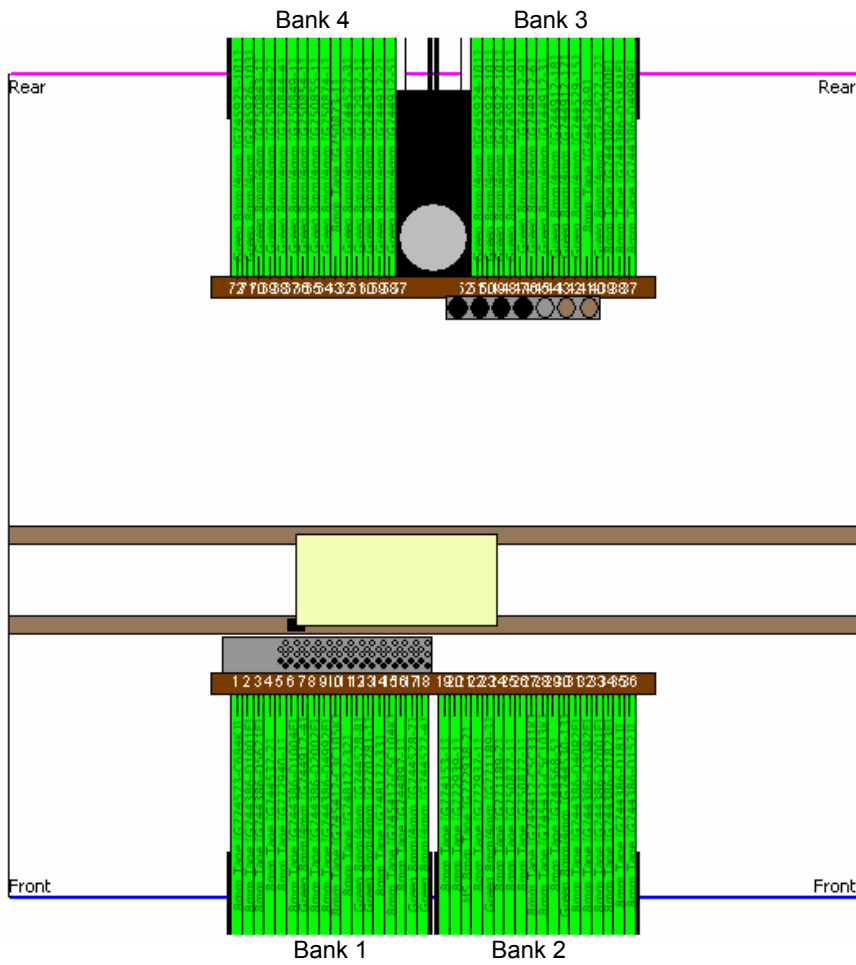
Available Slots per Camera Configuration

ULC	Slots
No ULC	144
Front or Rear ULC	132
Front and Rear ULC	120

Appendix A

Model Specifications

AX-72e

The AX-72 is a mixed-technology machine, supporting multiple placement heads. It is capable of handling the widest range of components and application types. The AX-72e comes with the following standard equipment:

1 digital upward looking camera cable kit
Single-beam dual-drive positioning system
Single Lane Staged Board Handling
508mm x 457.2mm large board kit (20.0" x 18.0")
Programmable Width Control
Automated Nozzle changer
Nozzle kit
Front user interface/control
Light tower/audible alarm
Downward-looking PEC camera for fiducial inspection
NPI Software Tools
Power supply
UIC Voyager CD ROM (Electronic Documentation)
Basic Machine Diagnostics Module
Installation and fundamental onsite training included
1-year non-transferrable warranty

Available options include:

Fixed or Removeable Feeder Banks
Choice of upward looking cameras (digital)
Choice of IL4 rear placement head
Additional Nozzle Changer
Rear user interface/control
Board support
Off-line feeder setup tools
Platform Tray Feeder (PTF) installation and support kit
Traceability Package
Platform Setup Validation
Bar Code Product Changeover
Additional digital upward looking camera cable kit

AI-42e
Uses a flexible four-spindle placement head and upward looking optics to place large parts (24mm square and larger) and specialty components (e.g. connectors, snap-ins, pin-in-paste, odd form applications) on PCBs. The AI-42e can support multiple placement heads and comes with the following standard equipment:

Flexible Inline 4-spindle placement head
1 digital upward looking camera cable kit
Single-beam dual-drive positioning system
Single Lane Staged Board Handling
508mm x 355mm (20.0" x 14.0") standard board size
Automated nozzle changer
Nozzle kit
Front user interface/control
Light tower/audible alarm
Programmable width control
Downward-looking PEC camera for fiducial inspection
NPI Software Tools
Power supply
UIC Voyager CD ROM (Electronic Documentation)
Basic Machine Diagnostics Module
Installation and fundamental onsite training included
1-year non-transferrable warranty

Available options include:

508mm x 457.2mm large board kit (20.0" x 18.0")
Choice of rear IL4 placement head
Choice of upward looking cameras (digital)
Off-line feeder setup tools
Fixed or Removeable Feeder Banks
Rear user interface/control
Additional Nozzle Changer
Board support
Traceability Package
Platform Setup Validation
Bar Code Product Changeover
Platform Tray Feeder (PTF) support kit
Additional digital upward looking camera cable kit

Appendix B

Bar Code Types

The scanner is a high-density .127mm (.005") line width, capable of reading the following bar code types:

Code 39; UPS; Codabar; Code 128; Interleaved 2 of 5

Narrow Bar Width	Read Range	Maximum Scan Width
High Density, Right Angle Down		
0.127 mm (0.0050")	50.8 mm to 78.7 mm (2" to 3.1")	53.3 mm (2.1")
0.191 mm (0.0075")	50.8 mm to 102 mm (2" to 4")	91.4 mm (3.6")
Low Density		
0.191 mm (0.0075")	63.5 mm to 140 mm (2.5" to 5.5")	102 mm (4")
0.254 mm (0.0100")	50.8 mm to 165 mm (2" to 6.5")	127 mm (5")
0.381 mm (0.0150")	50.8 mm to 190 mm (2" to 7.5")	152 mm (6")
0.508 mm (0.0200")	50.8 mm to 254 mm (2" to 10")	178 mm (7")
0.762 mm (0.0300")	50.8 mm to 254 mm (2" to 10")	178 mm (7")
1.02 mm (0.0400")	50.8 mm to 254 mm (2"to 10")	178 mm (7")
Right Angle Down		
0.191 mm (0.0075")	31.8 mm to 102 mm (0.25" to 4")	102 mm (4")
0.254 mm (0.0100")	25.4 mm to 127 mm (1" to 5")	127 mm (5")
0.381 mm (0.0150")	25.4 mm to 152 mm (1" to 6")	152 mm (6")
0.508 mm (0.0200")	25.4 mm to 216 mm (1" to 8.5")	178 mm (7")
0.762 mm (0.0300")	25.4 mm to 216 mm (1" to 8.5")	178 mm (7")
1.02 mm (0.0400")	25.4 mm to 216 mm (1" to 8.5")	178 mm (7")

Direction of label travel

Scan Line

Direction of label travel

Scan Line
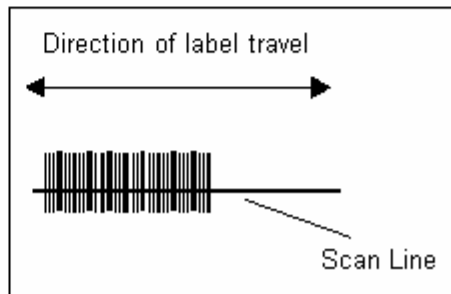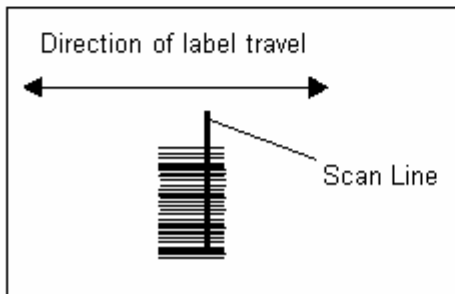
Appendix C

Acceptance Criteria

SRVC001.1.Rev. H

Core Machine Acceptance Testing

This document outlines the standard and optional protocols for Factory QAC Testing at Universal and Final Acceptance Testing (commissioning) at the customer's facility. Standard protocols are included at no additional cost to the customer. Optional protocols proceed through Universal's Request For Quote (RFQ) process to determine the additional cost and schedule impacts.

- Systems: **see separate Systems Acceptance Testing section below.**
- OFA Division **assembly products are processed through RFQ and are not covered by these processes.**

Standard Factory QAC: Factory Quality Assurance Checklist (QAC) testing and inspection is performed by Universal personnel in accordance with detailed processes to assure that the machine(s)/systems we deliver meet Universal's exacting quality standards. Throughput, accuracy, yield, and intrinsic availability are tested in accordance to established Universal and Industry standards. Results are documented and verified against published specifications. If any process is found to be outside acceptable performance parameters, testing is halted, the root cause of the failure is determined and corrected, and testing is restarted. Machines that pass the requisite QAC processes are approved for shipment.

Factory testing outside these parameters is considered "optional" and fall under Universal's Request For Quote (RFQ) process.

Standard On-site Acceptance: After delivery of the machine(s) to the customer's facility, Universal will commission the equipment to prepare it for production use by the customer. We will:

1.   Inspect all items to make sure the delivery is complete against the ordered items.
2.   Position the machine(s) in its final installation location. (Customer is responsible for unloading and moving the equipment on the factory floor.)
3.   Level the machine(s), make the mechanical and electrical connections into the line (if required), and make all power connections. Facility must be prepared per the GS (General Specification) requirements. UIC is not responsible for any facility modifications, or for integration of / communication with any customer / 3rd party equipment or computer networking. UIC will undertake standard mechanical and electrical connections.
4.   Cycle the machine(s) through its standard operational routine and prepare it for acceptance.
5.   Create programs for up to two customer products, based on standard GS (General Specification) parameters and within the constraints of the "as delivered" equipment configuration.
6.   Provide 4 hours of basic operator training for up to 6 persons.
7.   Machine testing:
7.1.   If customer product was not run for factory acceptance testing and conforming* customer product is available for on-site final acceptance testing, then our standard process defaults to preparing the machine(s) to run the conforming product for a maximum 4 hour period or 10,000 placements / insertions, while meeting the standard acceptance criteria per the tables below. Customer is responsible to make the necessary materials available for immediate use in acceptance testing.
*Conforming product means product where the substrates, components, fiducials and all other characteristics fall within the machine parameters as stated in the applicable GS (General Specification).
7.2.   If customer product was not run for factory acceptance testing and conforming customer product is not available, then our standard acceptance process defaults to dry cycling the machine(s) for four (4) hours to demonstrate operation and complete final acceptance testing.
7.3.   If customer specific product was run during factory testing (conforming or non-conforming), then our standard acceptance process includes preparing the machine(s) to run that same product, and running it for a maximum 4 hour period or 10,000 placements / insertions for that product, while meeting the performance standards per the below tables. Customer is responsible to make the necessary product materials available on-site for immediate use in acceptance testing.
7.4.   If Universal provided acceptance materials are ordered for final acceptance testing via a Request For Quote (RFQ), then our standard process defaults to running the acceptance to demonstrate the machine(s) meets the stated operational capabilities per the GS (General Specification).
7.5.   If any process is found to be outside acceptable performance parameters, testing is halted, the root cause of the failure is determined and corrected, and testing is restarted.
8.   Upon successful completion of the above, the machine(s) will have met the final acceptance criteria. Customer will be asked to sign off on our Customer Service Report, acknowledging this milestone has been achieved.
9.   As described in the Terms and Conditions of Sale document, any use of product for purposes other than inspection and test shall constitute acceptance.

Note: Acceptance testing outside these standard parameters must be processed through Universal's RFQ process, and will result in additional cost and schedule.

Minimum acceptance levels - Core Machines

Surface Mount

Universal Facility			Customer Facility		
Prod Code	Placements	Placement DPM	Placements	Placement DPM	IA
4687A	5000	50	4 Hr Run	50	98%
4687B	5000	50	4 Hr Run	50	98%
4699	Fact Quote	Fact Quote	Fact Quote	Fact Quote	--
4982	6850	50	4 Hr Run	50	98%
4983A	13600	100	4 Hr Run	100	98%
4984B	6850	50	4 Hr Run	50	98%
4797 L/S/B/ X/R	27,500 5000	100 50	4 Hr Run 4 Hr Run	100 50	98% 98%
4988	6850	75	4 Hr Run	75	98%
4990	13,600	75	4 Hr Run	75	98%
5588A	27,500	50	4 Hr Run	50	98%
5685	Fact Quote	Fact Quote	Fact Quote	Fact Quote	--
5785	Fact Quote	Fact Quote	Fact Quote	Fact Quote	--

Intrinsic Availability = IA   DPM = Defects Per Million

Line Level Software Products

	Universal Facility		Customer Facility			
Prod Code	Performance		Performance		DPM	IA
8684X	Fact Quote	Note 1	Fact Quote	Note 1	N/A	98%

Notes:
1.   **Application and configuration dependant.**

Optional acceptance testing scenarios requiring Request For Quote (RFQ):

Optional factory acceptance at Universal (Factory acceptances void all published machine lead times)**:**
1.   Factory acceptance testing using customer specific product: In addition to the standard QAC process, the customer may request a demonstration of the machine's capability to produce a specific circuit assembly product. If this is requested by the customer, specific details regarding product design, quantity to be run, schedule for delivery of substrates, components, CAD and BOM files, etc. to Universal, and other relevant factors, must be agreed prior to the time of order placement. Please note:
1.1. These activities are outside the scope of standard factory QAC, and will result in an additional charge to the customer and additional time to ship.
1.2. Customer provided product (boards and components) that fall outside the stated GS (General Specification) parameters may result in additional cost (and schedule) to configure the machine for the specific product (change to the customer's purchase order).
1.3. Customer specific product that is run in the Universal factory will also be used for Final Acceptance Testing at the customer's site. Deviations to this must be processed through a separate RFQ process, at additional cost.
1.4. If any process is found to be outside acceptable performance parameters, testing is halted, the root cause of the failure is determined and corrected, and testing is restarted
2.   Factory acceptance testing using Universal supplied acceptance material: If the customer does not have specific product to run, but still wants to witness its machine in an operating mode before it leaves the factory, Universal may be asked to provide a quotation for an acceptance material that can be used to demonstrate the standard placement or insertion capabilities of the machine. (If these optional acceptance materials are used for factory acceptance, then additional materials and lead time will be required to demonstrate the same operational capabilities during final acceptance testing at the customer's site.)   The decision to proceed with the acceptance material purchase must be made prior to the time of order placement. Delivery lead times and cost will be affected.

Optional on-site final acceptance testing. Any on-site acceptance testing that is outside the standard parameters defined above requires a Request For Quote (RFQ). This may include, but is not limited to, the following scenarios:

1. Extended acceptance testing to include set-up and running of additional customer products (more than one); longer test runs for products; creation of additional pattern programs (more than two), etc.

2. Any situation where the customer wants to run non-conforming product on-site, and Universal has not been made aware of and been given complete product definition prior to the time of order placement. The RFQ may result in recommended changes to the machine configuration, accessory equipment, as well as time and material for supporting the additional acceptance testing.

3. Any non-standard testing scenario not covered above.

4. If any process is found to be outside acceptable performance parameters, testing is halted, the root cause of the failure is determined and corrected, and testing is restarted

Any non-standard acceptance testing activities that were not defined / quoted at the time of order placement are outside the scope of the original order, and payment for delivered equipment is expected based on the standard acceptance test processes outlined above. Payment for the additional (RFQ) activities shall be made per separate agreement between Universal and the customer.

System Acceptance Testing - System acceptances are available on a Request For Quote (RFQ) basis. Due to the logistics associated with assembling a system, it is very important to give consideration to order cycle timing. Universal is not responsible for the installation and/or integration, or operation, of non-Universal brand equipment included in the system. Universal will cooperate with all other vendors to provide necessary electrical, mechanical and software handshake information to facilitate total system installation and testing.

I. Factory Acceptance Option One

System acceptance tests may be designed to validate the operation of the equipment as an assembly system. Core machines within a system will have individually completed the Core Machine Acceptance tests and as such, these tests are not repeated as part of the standard system procedure.

1. Operational walk through and visual inspection.

a. Visual inspection of all equipment.

2. Capability test of the material handling system.

a. The printed circuit board (PCB) transfer system is tested by performing a board "pass through" run.

I. Quantity of boards transferred is dependent on size and complexity of system. Minimum quantity is 100. The acceptance criteria is 100% reliable transfer of the PCB's (no PCB jams, miss-locations or dropped boards).

II. Factory Acceptance Option Two

1. Capability test on the assembly system using UIC material.

a. Through Hole Assembly System

I. Assemble 100 PCB's on the system

a. Populated PCB's are examined for part insertions, clinch angles, lead lengths, component stability and DPM level.

b. Surface Mount Assembly System

I. Assemble two PCB's on the system, using conforming customer material. Applicable sections (a-g) are performed.

a. Verify placement accuracy (relative to pad location and coverage) complies with published machine specifications. **

- Print solder paste on five sample boards. (customer screens and paste required)

b. Verify print consistency and accuracy complies with specifications for the screen printer.

c. Apply adhesive dots to two sample PCB's.**

- Verify dot consistency and accuracy complies with published specifications.

d. Monitor temperature profiles from the process oven.

- Verify required profile temperatures are maintained throughout the process.

e. Assemble two sample PCB's on the system.

- Verify system performance to achieve baseline for final acceptance run.

f. Perform a 100 PCB assembly run.

- Verify machine performance and availability complies with machine specification.

- Compare system throughout rate with pre-established estimate.

g. The acceptance criteria for placement reliability are based on the individual DPM specifications on a per machine basis.

III. Field Acceptance, On-Site at Customer's Facility

On-site customer acceptances for systems will follow the same outline as the Factory Acceptance test for systems.

IV. Special Products/OFA Acceptance Testing

Acceptance criteria for all special products or custom engineered solutions are defined at the time of quotation. Unless otherwise specified, customer supplied materials are required for machine setup, debug and acceptance for special applications.

• Accuracy verification methodology to be defined during the RFQ process, otherwise defaulting to 75% part to pad placement. Alternatives include MMI or CeTaQ as defined at time of quotation.

END OF DOCUMENT

Field Acceptance Kit

The field acceptance kit includes the parts see in the following table. This kit is intended for use in the absence of customer supplied boards and components. This kit is designed to accommodate FlexJet, InLine 4, and Lightning head equipped machines whether single beam or dual beam. This kit requires an RFQ.

NQAP Board
1206 Capacitor
1206 Resistor
0402 Capacitor
0402 Resistor
0603 Capacitor
0603 Resistor
0805 Capacitor
0805 resistor
Resistor Network
SOT23
SOT89
SSOP8
QFP100
Double Sided Tape