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Agilent Medalist 5DX Series 5000
Automated X-Ray Inspection (AXI)
Data Sheet

Industry-Leading Defect Coverage for Higher Yields and Lower Repair Costs

- The Agilent Medalist 5DX Series 5000 offers 3D X-ray inspection capability enabling inspection of both sides of a double-sided panel in one pass
- Designed for in-line or off-line automated process testing of solder connections on printed circuit board (PCB) assemblies, with pass-thru or pass-back loading
- Designed with ease-of-use in mind, time to production is typically under a day for an experienced user for programming an entire panel
- Digital cross-sectional X-ray images of solder joints are automatically generated and analyzed, including average solder thickness, solder thickness distributions, pin/pad/fillet positional relationships, and other solder features that are related to the quality of the solder

Algorithm Capability

Component types supported

- Ball grid array (BGA) – non-collapsible and collapsible
- Column grid array (CGA)
- Capacitor – chip and polarized
- Chip scale package (CSP)
- Surface mount technology (SMT) connector
- Direct field effect transistor (FET)
- Flip chip
- Leadless chip carrier (LCC)
- Metal electrical face (MELF)
- Plated throughhole (PTH)
- Pressfit Connector
- Quad-flatpack no lead (QFN)
- Chip resistor
- Surface mount technology (SMT) socket
- Small outline transistor (SOT)

SPECIFICATIONS

Performance specifications	
Total test speed	80 to 140 joints/second (approximately 1.0 in^2/sec) (1)
Image acquisition time	Up to 5 images per second
Alignment time	3 to 8 seconds (depending on panel size)
Load/unload time	12 seconds per panel for pass-through mode, 15 seconds for pass-back mode
Surface map time (points/second)	Up to 5 points/sec (typical map density is 1 point/645 to 2,580 sq mm (1 to 4 sq in))
False call rate	Typical false call rate of 500 to 1000 ppm (2)
Minimum feature detection capability	
Joint pitch	• Model 5300: 0.3 mm & up (0.012 in & up) (3) • Model 5400: 0.2 mm & up (0.008 in & up) (3)
Short width (at 5 mm (0.2 in) FOV) (4)	• Model 5300: 0.045 mm (0.0018 in) • Model 5400: 0.035 mm (0.0014 in)
Solder height	0.0127 mm (0.0005 in)

(1) Total test speed varies depending panel size and the density of the component layout and of the panel; estimates include image acquisition, alignment, surface map and board handling time

(2) False call rates vary depending on program quality, adherence to on-going program and hardware maintenance, panel volume and mix

(3) Assuming pad width is 50% of pitch

(4) The reported values for minimum feature detection assume that the feature is in a single plane of focus and that there are no X-ray absorbers in the X-ray path or in the immediate area of the feature other than those found in a typical multi-layer printed circuit board

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Algorithm test reports
- Output formats: file, printed and graphical
- Defect report includes device name, pin number, serial number, defect type, and panel name and number
- Medalist Repair Tool is provided as a graphical repair tool at a remote PC, showing exact defect locations
- Medalist Quality Tool provides statistical quality control (SQC) analysis capability

Thresholds
- Thresholds are fully adjustable by user for modification of accept/reject levels.

Defects detected
- Shorts
- Misalignment
- Missing component
- Non-wetting
- Billboards
- Solderball
- Void (BGA, paste)
- Opens
- Insufficient solder
- Lifted leads
- Tombstones
- Reversed tantalum capacitor
- Excess solder

Software System

Operating environment
- Microsoft® Windows XP operating system Service Pack 2

Modes of operation
- Operator – bar code scan, manual or automatic
- Supervisor – complete system control and access

System confirmation and adjustment
The system automatically adjusts for the following:
- X-ray beam and rotary detector synchronization
- X, Y, and Z homing position
- Gray-scale to solder thickness
- Plane of focus

Test development environment

Test Link	Microsoft Windows-based graphical user interface to input and translate panel layout data into machine-readable format
CAMCAD Professional	Optional software available to translate CAD data to Agilent's format
Agilent support application programming (ASAP)	Standardized best-practice procedures for test development
Package library	Central management of all test parameters across all panel types
Test development workstation	Offline test development
Test development time (typical)	Less than 30 minutes to translate and verify CAD data (using CAMCAD Professional), 4 hours to 3 days to set up panel program

Panel & specifications

Panel handling size (width x length)	
Maximum	457 x 609 mm (18.0 x 24.0 in) (1)
Minimum	102 x 127 mm (4.0 x 5.0 in) (2)
Aspect ratio	length ≥ 0.5 x panel width (1)
Maximum inspection area	445 x 597 mm (17.5 x 23.5 in)
Panel thickness (3)	
Maximum	3.2 mm (0.125 in)
Minimum	0.5 mm (0.020 in)
Clearance	
Top clearance	9.4 to 25.0 mm (0.37 to 1.0 in) (4)
Bottom clearance	30 mm (1.2 in) (4)
Panel edge clearance	3 mm (0.118 in) on parallel edges of the panel
Panel width tolerance	± 0.7 mm (0.0275 in)
Panel weight (including optional panel carrier)	
Maximum	4.5 kg (10 lb)
Minimum	0.03 kg (0.066 lb)
Maximum acceptable panel temperatures (at time of load)	40 °C (104 °F)
Panel warp (after reflow and wave soldering)	Warp of less than 1% of any linear dimension (0.01 in/in or 0.01 mm/mm), maximum panel warp cannot exceed 2 mm (0.08 in) (5)
Use of panel carriers	Allowed – Specific carrier design required to ensure no panel bounce or shift during inspection

(1) Panels are handled on the width edges
(2) Smaller panels are possible with the use of panel carriers
(3) Maximum and minimum panel thickness limits can be exceeded with the use of panel carriers
(4) Measured from the bottom of the circuit panel including a maximum warp of 1.5 mm (0.060 in) if components at the maximum top clearance are used, slices cannot extend more than 0.5 mm (0.020 in) below the bottom surface of the panel
(5) Panels with larger warp percentages can be inspected, but will require additional surface map points and analysis views; panel must still fit general clearance specifications

Line integration specifications

Board flow	Flow-through with automatic adjustable rail width Passback mode supported Manual width adjustment
Transport heights	Transport height levels between 881 mm (34.7 in) to 922 mm (36.3 in) Transport heights adjustable 19 mm (0.75 in)
Standards compatibility	SMEMA

Hardware system & installation specifications

Computer system	Intel® Core 2 duo processors
Data transfer interfaces	Floppy, USB and Ethernet ports, CD/DVD RW
System footprint	3 x 4 m (10 x 13 ft) including electronics cabinet and monitor cart
Total system weight	
Maximum cabinet weight	3400 kg (7500 lb)
Electronics rack weight	3100 kg (6840 lb)
Monitor cart	254 kg (560 lb)
Average floor loading –	45 kg (100 lb)
Total system weight/service area	317 kg/sqm (65 lb/sf) (1)
Main cabinet concentrated loads	776 kg (1,710 lb) on 15.2 cm (6 in) diameter pad, 4 pads on 127 cm (50 in) x 107 cm (42 in) centers
Electronics cabinet concentrated loads	63 kg (140 lb) on 3.5 cm (1-3/8 in) diameter pads, 4 pads on 70 cm (27.5 in) x 52 cm (20.5 in) centers

Power specifications

Voltage requirements	200 to 240 VAC three phase; 380 to 415 VAC three phase wye (± 5%) (50 or 60 Hz)
Total harmonic distortion (THD)	THD = less than 5%, Single harmonic = less than 3%
Ground to neutral voltage	Voltage = less than 1 VRMS
Momentary voltage	Interruptions, defined as: voltage drop on one or more phase conductors below 180 VAC for greater than 10 ms
Primary power rating	7.5 KVA (minimum)
Maximum in rush current	58 amps rms
Circuit breaker rating	10,000 amps interrupting capacity (AIC) for voltages up to 240 VAC, 14,000 AIC for voltages greater than 240 VAC
5DX wiring requirements	Reference the *Agilent 5DX Installation Guide* (part number N7200-90116) for hookup wiring configurations, full load amperes, circuit breaker size/# poles and conductor size. Note: local electrical wiring codes take precedence
Air requirements	80 psi compressed air
Temperature requirements	16 to 30 ºC, 60 to 86 ºF
Humidity requirements	Relative humidity 20% to 60%

(1) Service area = 388 x 277 cm (153 x 109 in). Weight of customer added equipment inside service area should be added into calculation for average floor loading.

Safety

Design

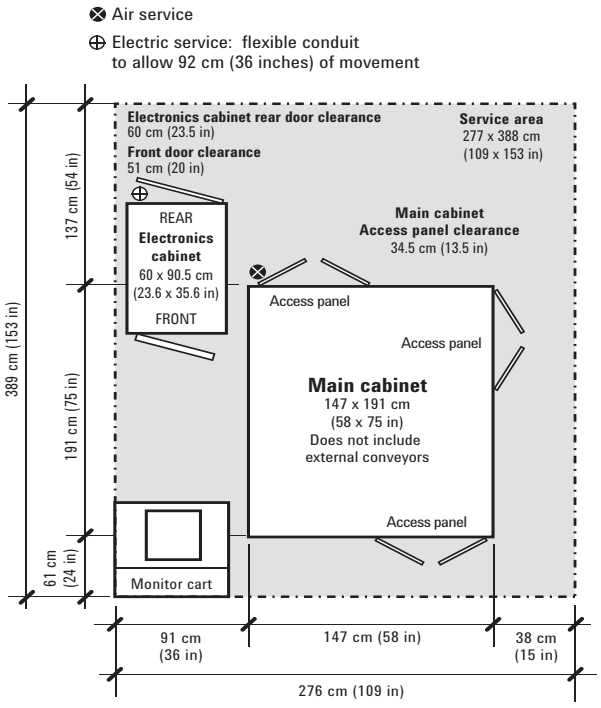
The system is designed to prevent electrical, mechanical, or radiation hazards to the operator. The system is fully certified to meet all U.S. federal specifications regarding the use of cabinet X-ray systems in and industrial environment. All design requirements meet or exceed 21 CFR 1020.40, subchapter J. The system meets the applicable international government radiation emission standards (including German and Japanese standards).

Safety interlocks

Redundant safety interlocks are used to eliminate the possibility of accidental X-ray exposure, laser exposure, and physical harm.

NRTL/C

Agilent 5DX System Floor Space Requirements



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Product specifications and descriptions in this document subject to change without notice.

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