



KONICA MINOLTA

# VIVID 910

NON-CONTACT 3-D DIGITIZER

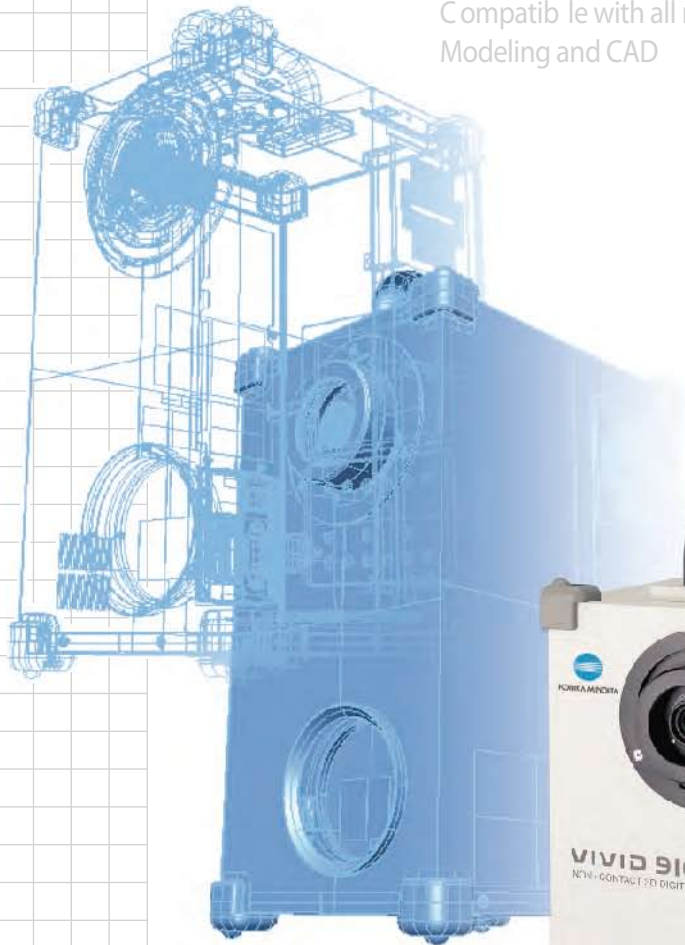


## 3-D Digitizing - Breakthrough in Process Innovation

Konica Minolta's VIVID 910 the ideal 3D capture device for industrial applications in product design and manufacturing inspection.

### VIVID 910

PET: Polygon editing software  
EAT: Easy alignment target-based registration  
Compatible with all major 3D software for Modeling and CAD, CAM and CAE



The essentials of imaging

# The Konica Minolta VIVID 910, Innovation in 3D Digitizing for both Product Design and Manufacturing.

The VIVID 910 is a non-contact 3-D digitizer, offering fast, precise capture of 3-D shapes. VIVID is ideal for applications in both product design and production. The designers find VIVID invaluable for “reverse engineering” or creating CAD data from physical models and design mock-ups. Production personnel use VIVID for Inspection and computer-aided dimensional testing (CAT). What's more, VIVID improves concurrent engineering by inexpensively making 3D data available throughout the enterprise.

## Typical Applications of the VIVID 910

The VIVID 910 is employed in a variety of industries for the following applications :

### Reverse Engineering (RE)/Rapid Prototyping (RP)

- Generation of design CAD data from physical models and data for detecting interference among mechanical parts from mock-ups.
- Generation of data of parts for which 3-D CAD data is unavailable.
- Verification and comparison of competitor's products with in-house products. Database creation.
- Generation and refinement of designs using actual models created through RP.
- Capture of data for finite element analysis.

### Inspection (CAT)/CAE

- Alignment verification and dimensional inspection of components such as:
  - metal castings & forgings,
  - tooling dies and molds,
  - plastic parts (pressure formed, rotational molds, injection),
  - sheet metal stampings,
  - wood products,
  - composites and foam products.

### Other Applications

- Food production
- Cultural Antiquities cataloging and publishing
- Dental & orthodontic appliances
- Cosmetic & Maxillofacial surgery
- Machine Vision



# The Digitizer with camera like simplicity and refinement, Designed to excel in your Industrial Application VIVID 910

## Your assurance of highly reliable data

The VIVID 910 offers the highest level of accuracy and reliability among non-contact digitizers. It excels at accurate and high-speed measurement of a variety of objects. In fact, as evidence of its accuracy, we offer a test report \* (by special order) that measures its performance against artifacts traceable to national standards organizations. Konica Minolta is famous for our highly-reliable, measuring instruments that conform to ISO 9000 standards.

\* VIVID 910 Certification of Performance is available by special order. KM offers a certification quantifying the VIVID's accuracy when measuring traceable artifacts. This service is of benefit to those who are implementing the ISO 9000 series of standards for quality assurance systems.

## Measures objects of every size.

The VIVID 910 is provided with three interchangeable lenses that can accommodate measurement objects of various sizes and distances from the lens. A single scan is capable of capturing an angular field of view of approximately 10 square centimeters to 1 square meter.

## Automatic configuration of detailed settings

The VIVID 910 incorporates the same automatic focus technology used in modern cameras. The optimal measurement distance is automatically detected through both passive and active AF (autofocus). In addition, the optimal laser intensity is obtained automatically through AE technology. The result is highly reliable measurements.



## Provides 24-bit color images for outstanding texture mapping.

The CCD and RGB filter acquire rich, 24-bit full-color images. Since the acquired color images are on the same optical axis as the 3-D data, they can be used to create stunning, true-color models.



## High-speed scanning capability

VIVID 910 is capable of capturing an object's shape and color in as little as 2.5 seconds. Our proprietary CCD readout technology measures up to 300,000 points at unsurpassed speed. When the subject is a moving object e.g. children, the human body and for other applications requiring higher speeds, an even faster mode is available that can complete a scan in a mere 0.3 seconds.

Fine Mode : 307,200 points/2.5 seconds

Fast Mode : 76,800 points/0.3 seconds

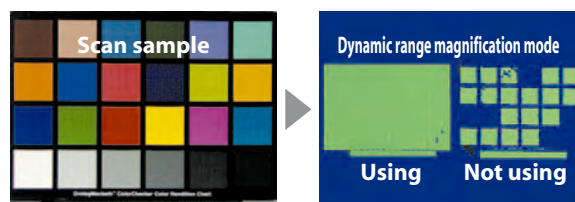
## Designed to be portable and versatile

The VIVID 910 features a lightweight and compact body. It can operate without a host computer by recording data onto Compact Flash memory card. VIVID's integral LCD viewfinder can be used to set camera parameters and as a view-finder to frame the shot or review the data. As a result, the VIVID 910 offers convenience similar to that of a digital camera, so you can operate it wherever your subject may be located.



## Dynamic range magnification mode

Objects with very dark to very bright regions are no longer a problem. The dynamic range magnification mode reduces the need for surface processing of objects with high-contrast surfaces (surfaces with both very light and very dark areas). This feature enables you to complete a measurement in only one operation.



## Benefit from the wide-ranging support provided by Konica Minolta, a leading maker of measuring instruments.

The VIVID 910 incorporates the services and expertise developed by Konica Minolta in the field of industrial measuring instruments such as colorimeters and measuring instruments for displays. We ensure your satisfaction by offering a wide range of optional support programs; that includes a periodical calibration service, a training by factory certified trainers and a network of consultants and systems integrators for custom installations.

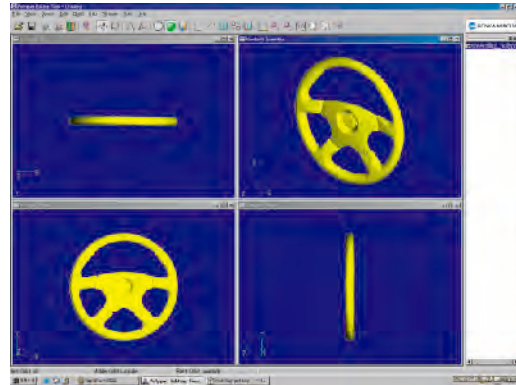
# Polygon Editing Tool (standard accessory)

## Edit scanned data with complete freedom.

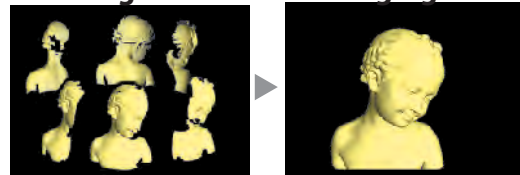
Our proprietary Polygon Editing Tool (PET) comes standard with the VIVID 910. PET enables you to control the VIVID 910 and easily scan, polygonize, edit, and convert the scanned data into any of several common data formats. Multiple scans can be easily registered and merged into a single watertight polygonal model. Editing functions include: fill holes; filter irregular polygons and noise; and perform smoothing. PET exports data in industry-standard formats including: DXF, STL etc. for accurate transfer to a variety of Modeling, Inspection CAD, CAM and CAT 3-D applications. In addition, a SDK (software development kit) is included to enable you to drive the VIVID 910 from your own software application.

### Features

<b>Data read</b>	Proprietary formats: CAM, CDM, VVD, SCN General format: STL
<b>Data conversion</b>	Converts from proprietary format to various common formats. Polygon: DXF, Wavefront, Softimage, VRML 2.0, STL, MGF Point group: ASCII
<b>Functions</b>	Automatic data registration, data merging, smoothing, sub-sampling and curvature-based decimation, polygon checking, texture blending, and other functions
<b>Editing</b>	Rotation, transfer, elimination of point groups, and hole filling with data interpolation
<b>Remote camera operation</b>	Image capture, reference depth of field setting, dynamic range magnification mode, laser power setting, readout of camera data
<b>Display</b>	Wireframe, shading, texture mapping



### Data Registration and Merging



### Computer Requirements

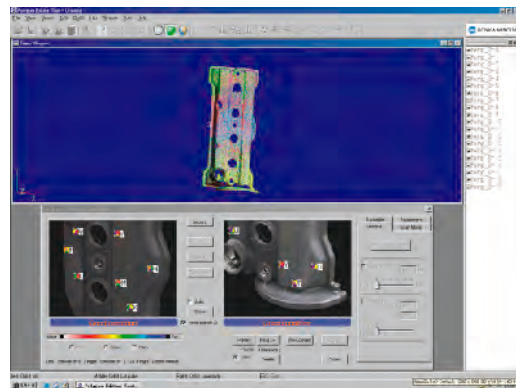
	PC/AT-compatible workstation capable of running, Windows® 2000 or Windows® XP
<b>Operating system</b>	Windows® 2000 Professional SP4, Windows® XP Professional SP2 (x64 Edition not supported)
<b>CPU</b>	Pentium 4 or higher
<b>Memory</b>	1024 MB minimum (2048 MB recommended)
<b>Display</b>	1024 x 768 minimum 1280 x 1024 or higher is recommended when using Easy Align Tool for automatic marker registration.
<b>Graphics</b>	OpenGL-compatible video card(Contact us for details.)
<b>SCSI</b>	Adaptec SCSI interface card Note: Contact us for details of tested models.
<b>Drive</b>	CD-ROM drive

# Easy Align Tool automatic target-based registration software (optional)

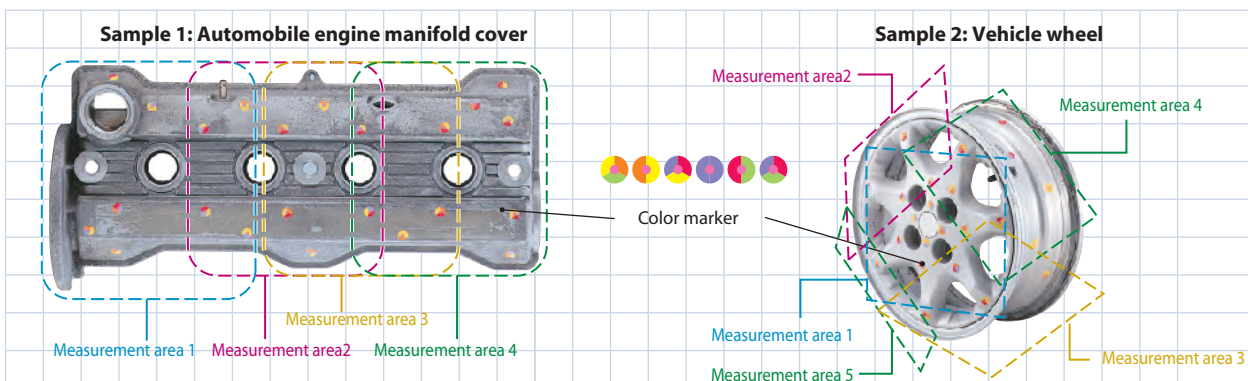
The automatic data registration tool that's simple and user-friendly.  
Reduces registration time by 66%!

### Automatic Alignment:

Alignment of individual scans has been a challenging task for some. But no longer, Easy Alignment Tool has changed all that. Simply place one of Konica Minolta's proprietary color markers on or near the object to be measured. Now, scan the same object from a different perspective with enough overlap so that at least three of the same markers are included in the second scan. The new data is automatically registered (with coordinates aligned) with the previously scan. You can see what has been scanned and what has been missed, greatly reducing the time required for capture and post processing. EAT's takes the work out of the measurement of objects (Sample 1) that cannot be placed on a Rotary turn table, or objects (Sample 2) that require multiple measurements from varying points of view.

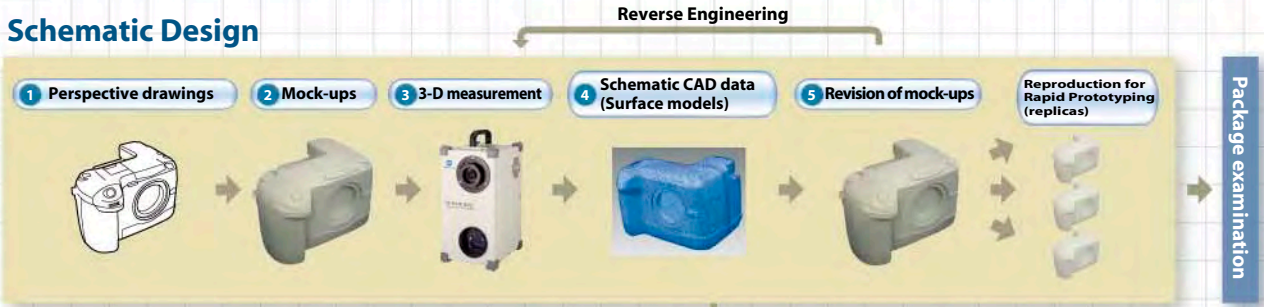


\* This software is an optional add-on to the Polygon Editing Tool. Requires Polygon Editing Tool ver. 1.2 or higher.

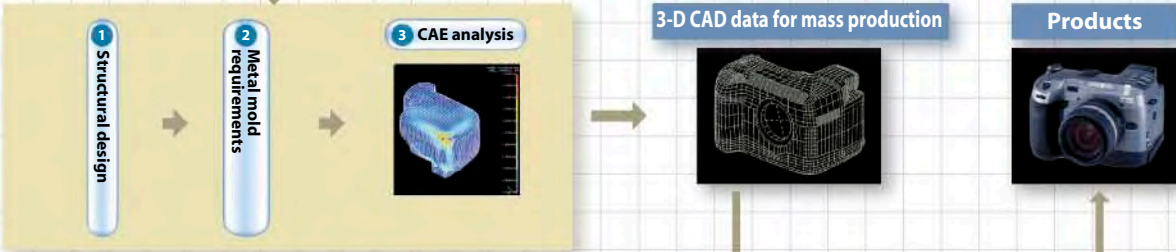


# Process Innovation with the VIVID 910

## Schematic Design



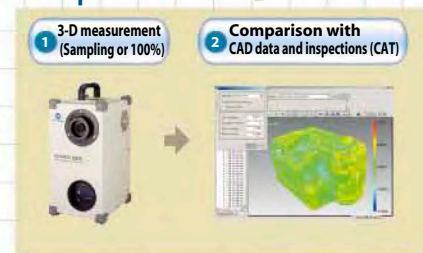
## Structural Design



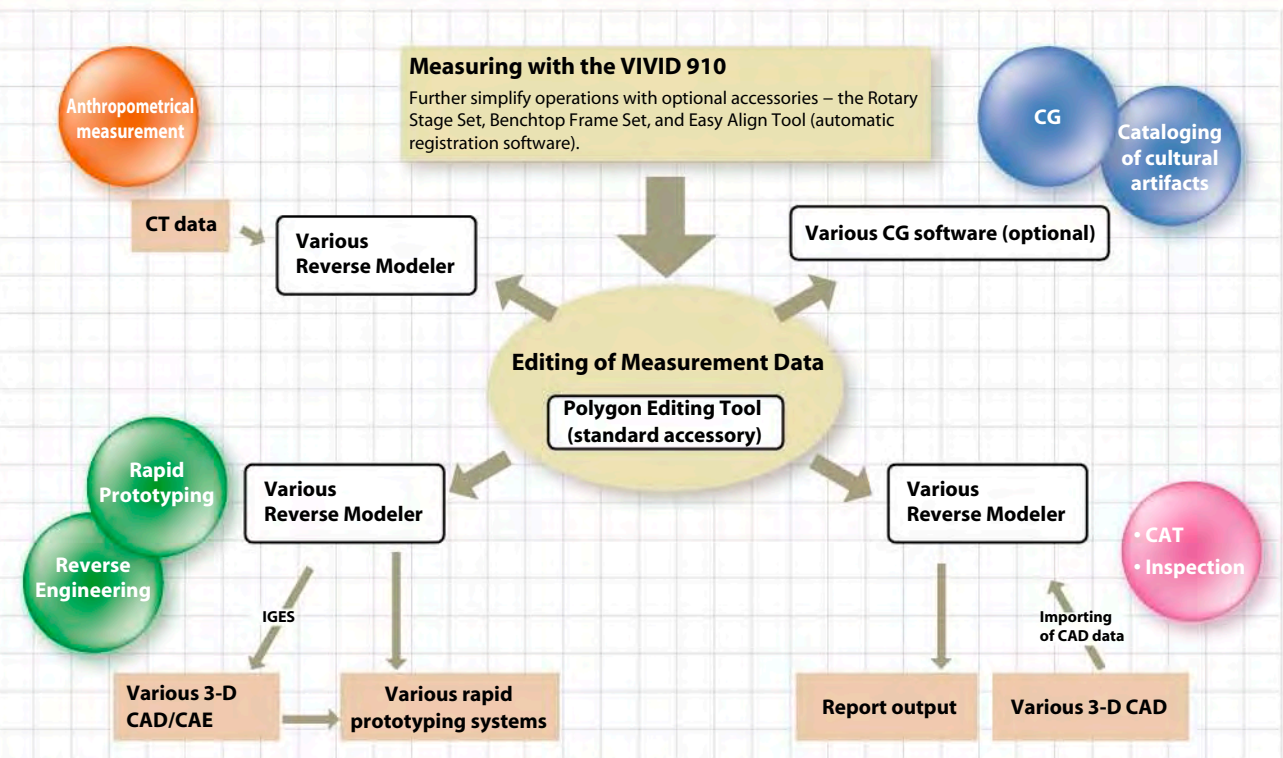
## Approval of Metal Molds



## Inspection of Mass-produced Parts



# Applications and Data Flow for the VIVID 910



# Theory of Operation

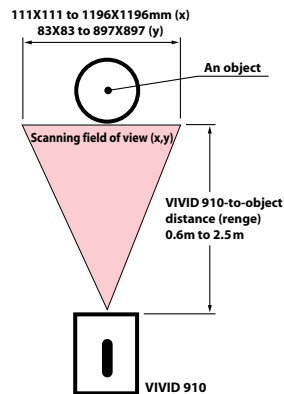
## Basic Principle

The VIVID 910 uses LASER triangulation. The object is scanned by a plane of laser light coming from the VIVID's source aperture. The plane of light is swept across the field of view by a mirror, rotated by a precise galvanometer. This LASER light is reflected from the surface of the scanned object. Each scan line is observed by a single frame, captured by the CCD camera. The contour of the surface is derived from the shape of the image of each reflected scan line. The entire area is captured in 2.5 seconds (0.3 seconds in FAST mode), and the surface shape is converted to a lattice of over 300,000 vertices (connected points). VIVID gives you more than a point cloud; a polygonal-mesh is created with all connectivity information retained, thereby eliminating geometric ambiguities and improving detail capture. A brilliant (24-bit) color image is captured at the same time by the same CCD. Unlike other scanners, the VIVID has no parallax error, its "spot - on"!

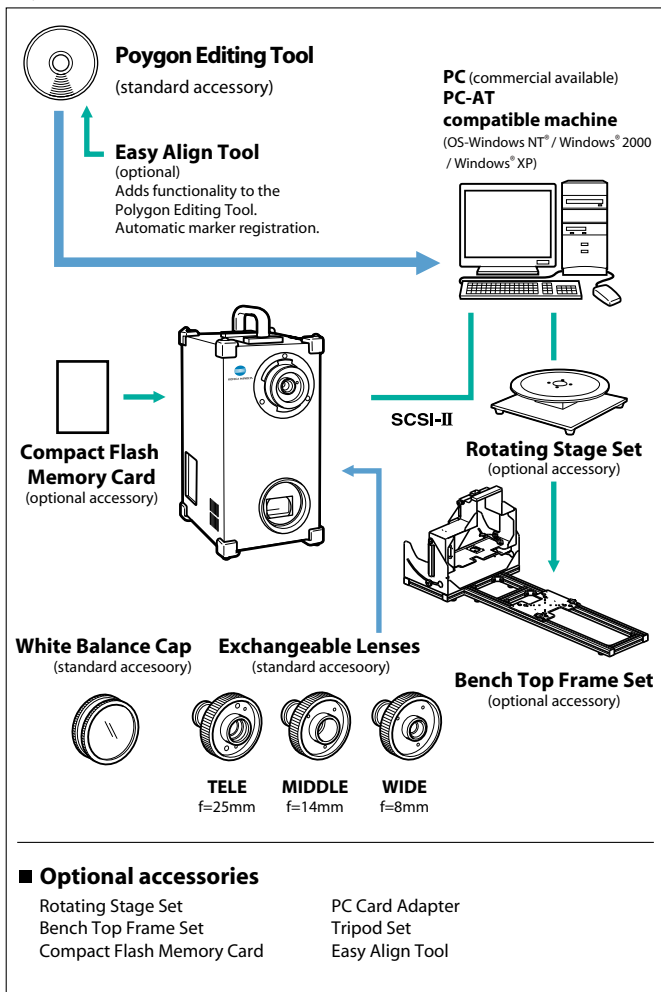
## High Accuracy Measurement

A high-accuracy scanner and a high-accuracy Calibration facility unit to be used for calculation of 3-D data have been developed for the VIVID 910.

The 3-D reference chart traceable to the national standards has also been established to utilize the technology and algorithm that enable higher accuracy measurement.



## System Block Diagram



## Specifications

Type	Non-contact 3D digitizer VIVID 910
Measuring method	Triangulation light block method
Auto Focus method	Image surface AF (contrast method), active AF
Light-Receiving Lens (Exchangeable)	TELE: Focal distance f=25mm MIDDLE: Focal distance f=14mm WIDE: Focal distance f=8mm
Scan Range (Depth of field)	0.6 to 2.5m (2m for WIDE)
Optimal 3D measurement Range	0.6 to 1.2m
Laser class	Class 2 (IEC 60825-1), Class 1 (FDA)
Laser Scan Method	Galvanometer-driven rotating mirror
X Direction Input Range (Varies with the distance)	111 to 463mm (TELE), 198 to 823mm (MIDDLE), 359 to 1196mm (WIDE)
Y Direction Input Range (Varies with the distance)	83 to 347mm (TELE), 148 to 618mm (MIDDLE), 269 to 897mm (WIDE)
Z Direction Input Range (Varies with the distance)	40 to 500mm (TELE), 70 to 800mm (MIDDLE), 110 to 750mm (WIDE/FINE mode)
Accuracy	TELE X: ±0.22mm, Y: ±0.16mm, Z: ±0.10mm to the Z reference plane (Conditions: TELE/FINE mode, Konica Minolta's standard)
Input Time	0.3 sec (FAST mode), 2.5 sec (FINE mode), 0.5 sec (COLOR)
Transfer Time to Host Computer	Approx. 1 sec (FAST mode), 1.5 sec (FINE mode)
Ambient Lighting Condition	Office Environment, 500 lx or less
Imaging Element	3-D data: 1/3-inch frame transfer CCD (340,000 pixels) Color data: 3-D data is shared (color separation by rotary filter).
Number of Output Pixels	3-D data : 307,000 (for FINE mode), 76,800 (for FAST mode) Color data : 640 x 480 x 24 bits color depth
Output Format	3-D data : Konica Minolta format, & (STL, DXF, OBJ), ASCII points, VRML (Converted to 3-D data by the Polygon Editing Software/ standard accessory) Color data : RGB 24-bit raster scan data
Recording Medium	Compact Flash memory card (128MB)
Data File Size	Total 3-D and color data capacity: 1.6MB per data (for FAST mode), 3.6MB per data (for FINE mode)
Viewfinder	5.7-inch LCD (320 x 240 pixels)*1
Output Interface	SCSI II (DMA synchronous transfer)
Power	Commercial AC power 100 to 240V (50 to 60Hz), rated current 0.6A (when 100Vac is input)
Dimensions (WxHxD)	213 x 413 x 271 mm (8-3/8 x 16-1/4 x 10-11/16 in.)
Weight	Approx. 11kg (25 lbs)
Operating temperature/humidity range*2	10 to 40°C, relative humidity 65% or less with no condensation
Storage temperature/humidity range	-10 to 50°C, relative humidity 85% or less (at 35°C) with no condensation

\*1 Contains Mercury in the backlighting of LCD used for display, Dispose According to Local, State or Federal Laws.

\*2 Operating temperature/humidity range of products for North America : 10 to 40°C, relative humidity 50% or less (at 40°C) with no condensation.  
• Specifications are subject to change without notice.  
• Product names in this brochure are trademarks of their respective companies.

### SAFETY PRECAUTIONS

Read all safety and operating instructions before operating the VIVID 910.



- Use only a power source of the specified rating. Improper connection may cause a fire or electric shock.
- Do not stare into the laser beam. (MAX. 30mW 690nm / CLASS 1 (FDA), CLASS 2 (IEC) LASER PRODUCT)

### CAUTION

レーザー光  
ビームのぞきこまないこと  
LASER RADIATION  
DO NOT STARE INTO BEAM  
LASER STRAHLUNG  
NICHT IN DEN STRAHL SEHEN  
MAX 30mW 690nm  
クラス1-準 CLASS 2 LASER PRODUCT  
Complied with IEC Publication 60825-1:1993, Amendment-2:2001

CLASS 1 LASER PRODUCT

Complies with 21 CFR Chapter 1, Subchapter J.



Certificate No : YKA 0937154  
Registration Date : March 3, 1995



Certificate No : JQA-E-80027  
Registration Date : March 12, 1997



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