

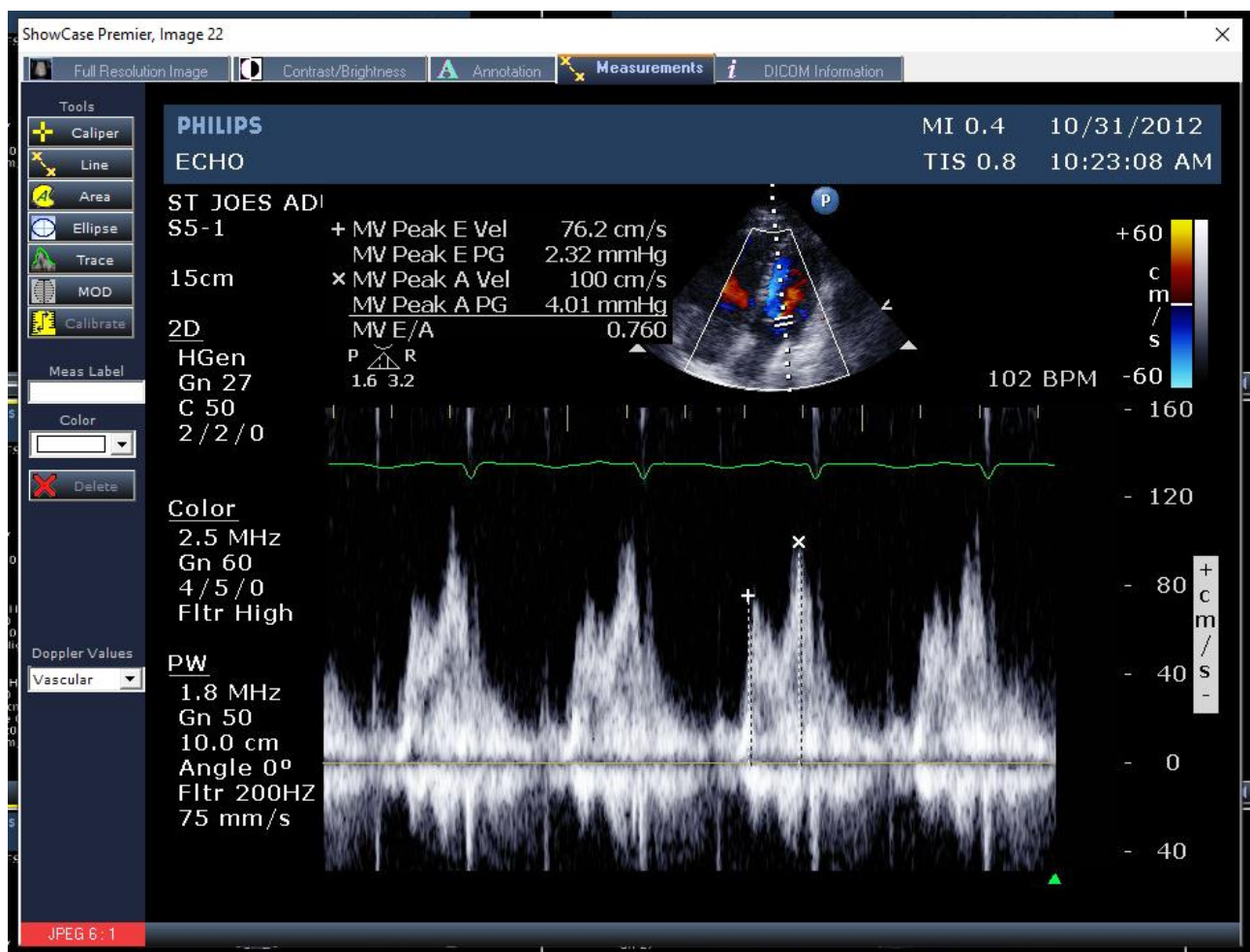


## Making Image Measurements in SHOWCASE®

ShowCase Premier provides a set of simple measurement tools for distance, area, volume, and Doppler measurements. Measurement tools include **Line**, **Ellipse**, free form **Area** and **Volume**. On ultrasound images, the **Line** tool provides measurements over the 2D, M-Mode, and Spectral Doppler regions. The Doppler trace tool provides measurements for both Cardiac and Vascular images. All ShowCase measurements are temporary; they are not added to structured report data or saved in an editable format. You can burn them into the image, or you can export them in a spreadsheet.

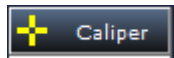
### Making Measurements

To access the measurement tools, double-click on an image and select the **Measurements** tab.

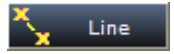


The **Tools** are on the left side of the window. After selecting (clicking on) a tool, move the cursor over the image to make a measurement. The cursor changes when it is over an area of the image where the tool is valid. The measurement values are displayed in a box adjacent to the measurement. This box can be positioned by selecting it and dragging it to a new location. A measurement can be selected by clicking on the measurement itself or on the box containing the measurement values. Once selected, the measurement can be edited by grabbing and moving the highlighted grab points.

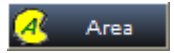
The **Meas Label** on the left allows you to label a selected measurement. The **Color** drop down allows you to select a color for the current measurement. The **Delete** button removes the selected measurement.



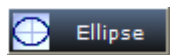
The **Caliper** tool gives a velocity measurement and peak gradient when placed on a doppler strip.



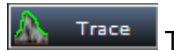
The **Line** tool gives a distance measurement when placed on a 2D image or 2D region of an ultrasound image. When placed on an M-Mode region, it provides a length, the vertical dimension, dT, the change in time, and a Slope. The Line tool also provides measurements in Spectral Doppler regions.



The **Area** tool lets you draw a free form area. It provides the area in square centimeters and the perimeter in centimeters.



The **Ellipse** tool lets you draw an ellipse to measure its area in square centimeters and its perimeter in centimeters.



The **Spectral Doppler Trace** tool is enabled for ultrasound images that include a Doppler strip. It allows you to click and drag or multiple-click a tracing over one cardiac cycle from begin systole to end diastole. For accurate results, please do not cross time discontinuities or trace multiple cycles.



The Cardiac **Method of Disks** tool is used on 2D images to calculate volumes using Simpson's Method of Disks. It also measures apical length. The resulting volumes can be used to calculate the left ventricular ejection fraction manually.

### Measuring a volume - click and drag method

1. Double click on a 2D image with the heart chamber you wish to measure.
2. Click the Measurements tab
3. Position the clip to the frame you want to measure using the clip controls at the bottom of the image.
4. Click on the MOD button on the left. The cursor will turn into a crosshair.
5. Move the cursor to the base of the chamber and press and hold down the left mouse button
6. Keep holding down the button and trace the chamber wall to the other side of the valve
7. Release the mouse button. The tool will draw disks and an apex line and you will see a volume calculation.

### Measuring a Volume - click-click-click method

1. Double click on a 2D image with the heart chamber you wish to measure.
2. Click the Measurements tab
3. Position the clip to the frame you want to measure using the clip controls at the bottom of the image.
4. Click on the MOD button on the left. The cursor will turn into a crosshair.
5. Move the cursor to the base of the chamber and press and release the left mouse button
6. Move to the next point along the chamber and press and release the left mouse button. A straight line will be drawn between the previous point and the current mouse position.
7. Repeat until you have properly placed lines all along the chamber wall.
8. When you reach the other side of the valve, double-click the mouse.
9. The tool will draw disks and an apex line and you will see a volume calculation.

## Repositioning the Apex

Once you're finished drawing your MOD measurement, you can reposition the apex line if needed:

1. Move the mouse over the end of the apex line until the cursor turns into a crosshair
2. Click and hold the left mouse button and drag the end of the apex to the desired location.
3. Let go of the left mouse button.

Please note the preceding instructions are for how to use the MOD tool to measure volumes, and should not be considered a diagnostic guide for how to trace along the chamber wall for accurate measurement. For that information, please consult the appropriate clinical reference work.



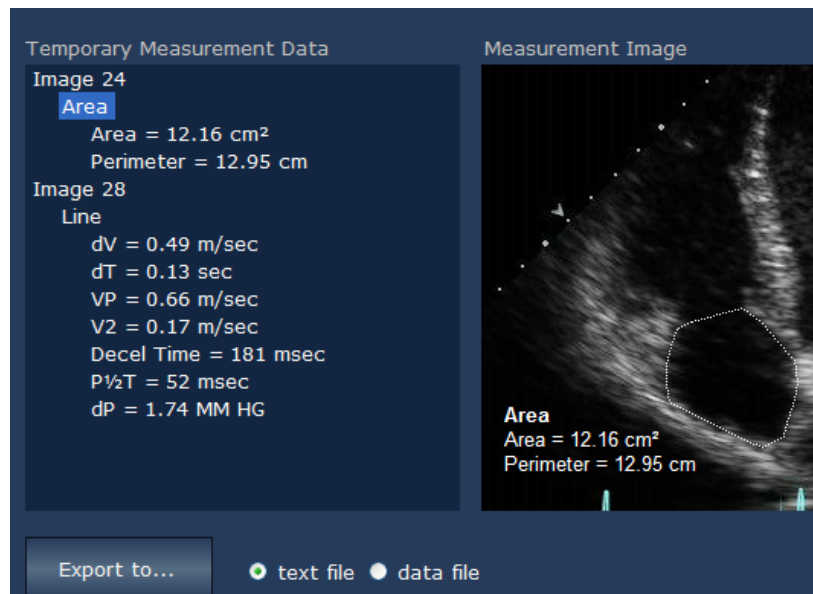
When calibration information is not provided by the imaging machine, the **Calibrate** tool can be used to calibrate ShowCase to be able to calculate distances. The calibration requires use of markings on the image with known, accurate distances. To calibrate a distance, click the **Calibrate** tool, then follow the instructions displayed.

**Caution** – The **Calibrate** tool is for distances only and needs to be used with care due to the possibility of inaccurate results if the calibration is not done correctly.

## Reviewing and Exporting Measurements



All the measurements from an image series can be reviewed and exported from the Series Information dialog invoked by the Series Information button on the toolbar.



The **Temporary Measurement Data** area on the left contains a scrolling list of all the measurements in the series organized by image. Selecting a measurement causes the corresponding image to appear on the right.

The **Export to...** button provides the ability to export all the measurements listed to a text file or to a comma separated value (csv) file which can be read by database or spreadsheet programs like Excel.

## ShowCase Measurements & Calculations

### 2D region

#### *Line tool*

Distance, the length of the line in cm.

#### *MOD Tool*

Length - the length of midpoint of valve to the apex of the chamber, in cm

Volume – the volume as calculated using Simpson's Method of Disks

### M-mode region

#### *Line tool*

Vertical line- length of the line in cm.

Non-vertical line

Vertical length of the line in cm.

dT – Elapsed time in sec between the left most point and the right most point.

Velocity - in m/sec (the slope of the line)

### Spectral Doppler region – Image from a Cardiac Study

#### *Caliper tool*

V – Velocity in m/s

Pk Grade – Peak Gradient ( $4v^2$ )

#### *Line tool*

dV – Change in velocity between the end points of the line in m/sec

dT – Change in time between the end points of the line in sec

VP – Peak velocity in m/sec

V2 – Velocity at the second end point in m/sec

Decel Time – Deceleration time in msec

$P\frac{1}{2}T$  - Pressure half-time in msec

dP – Pressure gradient in mm HG

#### *Trace Tool*

Velocity Time Integral (VTI)

Max Velocity in m/sec

Mean Velocity in m/sec

Peak Gradient in mmHg

Mean Gradient in mmHg.

### Spectral Doppler region – Image from a Vascular Study

#### *Line Tool*

V1 – Velocity at the first point in m/sec

V2 – Velocity at the second point in m/sec

RI – Resistivity index  $(MaxV - MinV) / MaxV$

S/D – Systolic to diastolic ratio  $V1/V2$

dV – Change in velocity in m/sec

dT - Change in time in sec

*Trace Tool*

Peak Systolic Velocity in m/sec

End Diastolic Velocity in m/sec

Acceleration Time in sec

Resistivity Index

Systolic/Diastolic Ratio

Velocity Time Integral (VTI).

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