Cirrus HD-OCT:
How to read the Cirrus reports
Cirrus™ HD-OCT analysis reports offer clinically relevant qualitative and quantitative information in an easy-to-read format. Analysis results can be printed, viewed via Cirrus Review Software, or integrated with other instrument data through the FORUM® Eye Care data management system. This guide explains the various areas of each report and the valuable information it provides for your clinical assessment.

This guide is intended to help provide basic information, it is not intended to replace your User Manual.
Based on the 6 mm x 6 mm data cube captured by the Optic Disc Cube 200x200 scan, this report shows assessment of RNFL and ONH for both eyes.

1. **Key parameters**, compared to normative data, are displayed in table format.

2. **Nerve Fiber Layer (RNFL)** thickness map is a topographical display of RNFL. An hourglass shape of yellow and red colors is typical of normal eyes.

3. **The RNFL Deviation Map** shows deviation from normal. OCT en face fundus image shows boundaries of the cup and disc and the RNFL calculation circle.

4. **Neuro-retinal Rim Thickness** profile is matched to normative data.

5. **RNFL TSNIT graph** displays patient’s RNFL measurement along the calculation circle, compared to normative data.

6. **RNFL Quadrant and Clock Hour** average thickness is matched to normative data.

7. **Horizontal and vertical B-scans** are extracted from the data cube through the center of the disc. RPE layer and disc boundaries are shown in black. ILM and cup boundaries are shown in red.

8. **RNFL calculation circle** is automatically centered on the optic disc and extracted from the data cube. Boundaries of the RNFL layer segmentation is illustrated.
Cirrus HD-OCT RNFL and ONH Analysis Report

Key parameters, compared to Normative Data, are displayed in table and chart formats.

Cirrus normative comparison for ONH parameters is based on the patient’s age and disc size and for RNFL it is based on the patient’s age. For a particular age and disc size, the patient is expected to have rim volume, C/D ratio, etc. within certain ranges. Those parameters will be shaded red, yellow, green and white based on how they compare to normal ranges. Consequently, disc area values are not compared to normative data, and therefore shaded gray on the summary table. When the disc area is outside normal limits, normative data comparison, is not applied. When there is no normative data available for comparison, the parameters are shaded gray instead of the green yellow, red shown in this example. The normative database is not available for patient’s under 18 years of age.

The Disc Area values of patients in the Cirrus ethnically diverse normative database (see User Manual for details on the study) fell within these ranges: one third of patients had Disc Area values less than 1.58 mm², one third of patients had Disc Area values between 1.58 and 1.88 mm², and one third of patients had Disc Area values larger than 1.88 mm².

In the table of values, Rim Area, Average C/D Ratio, Vertical C/D Ratio and Cup Volume have a grey background color when the Disc Area is less than 1.3mm² or greater than 2.5 mm². The normative data is not applicable because the database has insufficient number of subjects with the disc areas of these sizes.

The values below are based on a 69-year old patient.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal Range*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average RNFL Thickness</td>
<td>75.0 - 107.2</td>
</tr>
<tr>
<td>RNFL Symmetry</td>
<td>76% - 95%</td>
</tr>
<tr>
<td>Rim Area</td>
<td>1.015 - 1.615</td>
</tr>
<tr>
<td>Average C/D Ratio</td>
<td>0.618 - 0.169</td>
</tr>
<tr>
<td>Vertical C/D Ratio</td>
<td>0.594 - 0.165</td>
</tr>
<tr>
<td>Cup Volume</td>
<td>0.288 - 0.004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal Range*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temporal Quadrant</td>
<td>45.1 - 82.2</td>
</tr>
<tr>
<td>Superior Quadrant</td>
<td>88.9 - 136.7</td>
</tr>
<tr>
<td>Nasal Quadrant</td>
<td>50.0 - 86.2</td>
</tr>
<tr>
<td>Inferior Quadrant</td>
<td>89.4 - 138.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clock Hour</th>
<th>Normal Range*</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>36.4 - 67.4</td>
</tr>
<tr>
<td>10</td>
<td>52.7 - 100.5</td>
</tr>
<tr>
<td>11</td>
<td>87.2 - 154.6</td>
</tr>
<tr>
<td>12</td>
<td>70.7 - 155.7</td>
</tr>
<tr>
<td>1</td>
<td>72.6 - 133.9</td>
</tr>
<tr>
<td>2</td>
<td>52.4 - 109.7</td>
</tr>
<tr>
<td>3</td>
<td>41.7 - 70.4</td>
</tr>
<tr>
<td>4</td>
<td>44.8 - 89.0</td>
</tr>
<tr>
<td>5</td>
<td>61.9 - 125</td>
</tr>
<tr>
<td>6</td>
<td>85.7 - 163.2</td>
</tr>
<tr>
<td>7</td>
<td>84.8 - 159.4</td>
</tr>
<tr>
<td>8</td>
<td>42.2 - 90.2</td>
</tr>
</tbody>
</table>

* Normal range is in micrometers. See User Manual for more information on normative data.
RNFL and ONH Analysis Report
Optional Patient Education Page

1. **RNFL Deviation Map** facilitates discussion with patient.

2. **RNFL peripapillary thickness** profile is shown for each eye.

**Distribution of Normals**

- **N/A**
- 95% 5% 1%

Color coded indication of normative data comparison for RNFL and ONH.

**Distribution of Normals:**
The thickest 5% of measurements fall in the white area.
90% of measurements fall in the green area.
The thinnest 5% of measurements fall in the yellow area or below.
The thinnest 1% of measurements fall in the red area. Measurements in red are considered outside normal limits.
ONH values will be shaded gray if disc area is not within the central 90% of normal range.

See User Manual for more information on normative data.
With Guided Progression Analysis™ (GPA™), Cirrus HD-OCT can aid in the identification of glaucoma progression through RNFL thickness event analysis and trend analysis. Event analysis assesses change from baseline compared to expected variability. If change is outside the range of expected variability, it is identified as progression. Trend analysis looks at the rate of change over time, using linear regression to determine rate of change.

1. **RNFL Thickness Maps** provide a topographical display of RNFL for each exam.

2. **RNFL Thickness Change Maps** demonstrate change in RNFL thickness. Up to 6 exams are automatically registered to baseline for precise point-to-point comparison. Areas of statistically significant change are color-coded yellow when first noted and then red when the change is sustained over consecutive visits.

3. **Average RNFL Thickness** values are plotted for each exam. Yellow marker denotes change when it is first noted. Red marker denotes change sustained over consecutive visits. Rate and significance of change is shown in text.

4. **RNFL Thickness Profiles.** TSNIT values from exams are plotted. Areas of statistically significant change are color-coded yellow when first noted and red when the change is sustained over consecutive visits.

5. **RNFL Summary** summarizes Guided Progression Analysis (GPA) analyses and indicates with a check mark if there is possible or likely loss of RNFL:
   - RNFL Thickness Map Progression (best for focal change)
   - RNFL Thickness Profiles Progression (best for broader focal change)
   - Average RNFL Thickness Progression (best for diffuse change)
Cirrus HD-OCT Anterior Segment Cube

Based on the 4 mm x 4 mm data cube captured by the Anterior Segment Cube 512x128 scan, this analysis provides qualitative and quantitative evaluation of the cornea, including visualization of pathology and measurement of central corneal thickness.

1. Location of the scan is shown on the iris image.

2. **Slice navigator** enables a simultaneous view of a selected point on the cornea image and OCT image displays.

3. **Central corneal thickness**, in microns, is measured with calipers.

4. Framed in blue, this image corresponds to the horizontal crosshair line on the iris image above.

5. Framed in pink, this image corresponds to the vertical crosshair line on the iris image above.
Cirrus HD-OCT Anterior Segment 5 Line Raster

The Anterior Segment 5 Line Raster is used for the assessment and documentation of the cornea and irido-corneal angle.

1. Scan angle and spacing length are adjustable. Parameters for the scan are indicated.
2. Location of scan lines is shown on the iris image.
3. The enlarged image corresponds with the location of the blue line on iris image above. The default is the center (third) scan of the five.
4. Legend on each scan image indicates which of the 5 scan lines is displayed.
Cirrus HD-OCT Enhanced HD Raster Report

The Enhanced HD 5 Line Raster scan protocol collects more data per scan location than the other Cirrus scans, and proprietary Selective Pixel Profiling™ evaluates all of the pixel data to construct the best possible image.

1. Scan angle, spacing, and length are adjustable. Parameters for the scan are indicated.

2. Location of scan lines is shown on the LSO fundus image.

3. Each of the 5 lines is scanned 4 times and, with Selective Pixel Profiling, the optimal image is displayed. The enlarged image corresponds with the location of the blue line on fundus image above. The default is the center (third) scan of the five.

4. Legend on each scan image indicates which of the 5 scan lines is displayed.
The Enhanced HD 5 Line Raster scan protocol can be used to scan a single high-density line.

Scan angle, spacing, and length are adjustable. Parameters for the scan are indicated.

Location of scan line is shown on the LSO fundus image.

With 0 mm spacing, the 20 lines of the Enhanced HD raster are collapsed into a single line scanned 20 times and with Selective Pixel Profiling, the optimal image is displayed.
Based on the 6 mm x 6 mm data cube captured by the Macular Cube 512x128 or 200x200 scan, this analysis provides qualitative and quantitative evaluation of the retina.

1. **LSO fundus image** is shown here with an ILM-RPE retinal thickness map overlay.

2. **Slice navigator** enables a simultaneous view of a selected point on LSO image, OCT fundus image, retinal thickness map, layer maps, and OCT image displays.

3. **ETDRS grid** is automatically centered on the fovea with **Fovea Finder™** Retinal thickness values, from ILM to RPE, in microns, are compared to normative data.

4. **OCT fundus image** is shown.

5. **Fovea Finder** enables precise placement of ETDRS grid.

6. Framed in blue, this image corresponds to the horizontal crosshair line of the fundus image above.

7. Framed in pink, this image corresponds to the vertical crosshair line of the fundus image above.

8. **3D macular thickness map** shows retinal thickness in a topographical display.

9. Segmented **ILM map**.

10. Segmented **RPE map**.

11. **Macular parameters**, compared to normative data.

* Normal range is in micrometers.

See User Manual for more information on normative data.
Cirrus HD-OCT Macular Change Analysis Report

Change analysis can be performed with Macular Cube 512x128 or 200x200 scans. Post-acquisition registration and Fovea Finder™ ensures the repeatability of thickness measurements, even in subjects with AMD, DME or VRI disorders. Data is displayed for prior and current scans.

1. Macular thickness (ILM to RPE) over the 6 mm x 6 mm cube of data is displayed in color-coded map for both exams.

2. Macular thickness values are displayed for each sector of the ETDRS grid.

3. Placement of the cube scan is visualized on the LSO fundus image. The Fovea Finder™ feature automatically centers the analysis on the fovea.

4. OCT fundus image from follow-up exam is AUTOMATICALLY REGISTERED to previous.

5. Change analysis map shows difference from previous, in micrometers and represented in color.

6. A B-Scan image from the previous scan and a precisely registered image from the current scan are viewed side by side. Simultaneous visualization of corresponding images from the two scans is possible on screen in a movie mode, or by moving the slice navigators.

### Macular Change: Macular Cube 512x128

<table>
<thead>
<tr>
<th>Name:</th>
<th>Previous</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID:</td>
<td>Exam Date:</td>
<td>10/4/2010</td>
</tr>
<tr>
<td>DOB:</td>
<td>Exam Time:</td>
<td>3:49 PM</td>
</tr>
<tr>
<td>Order:</td>
<td>Serial Number:</td>
<td>10/19</td>
</tr>
</tbody>
</table>

**Registration:** Automatic

Exam from 10/4/2010 3:49 PM

Exam from 2/7/2011 2:24 PM

**Fovea:** 240, 62

**Fovea:** 240, 62

**Change Analysis Map:** Difference from previous, in micrometers and represented in color.
Cirrus HD-OCT Advanced Visualization Custom Report

From the Macular Cube 512x128 or 200x200 scan analysis, Advanced Visualization™ displays cross-sections of the image cube through three dimensions. B-scans through the X and Y axis and C-scans, or C-slabs, through the Z axis reveal unique views of the retinal tissue.

The custom print mode generates a single or multi-page report of tagged images from any Advanced Visualization analysis screen. Each selection is displayed with a description or companion image. Shown here are some examples.

Other overlays are possible.

User-defined borders of the ILM slab, RPE-fit slab, or RPE slab (shown here) can be seen on horizontal and vertical b-scans images.

The resulting RPE slab image represents an average signal intensity value for each A-scan location through the defined depth of the slab. This provides a C-scan image of the RPE.

LSO fundus image with ILM slab overlay reveals features of epiretinal membrane.

B-scan image corresponds to the horizontal crosshair line on the fundus image.
This report provides an at-a-glance overview of a single eye, and helps you identify if additional analysis is necessary. Showing an analysis of the macula, RNFL and ONH, it is valuable for patient education and peace of mind.

1. OCT fundus image is shown.
2. The analysis is automatically centered on the fovea post-acquisition with Fovea Finder™.
3. Retinal Thickness (ILM to RPE) over the 6mm x 6mm cube of data is displayed in a color-coded map.
4. Retinal thickness values, in microns, are compared to normative data.
5. Cross section through the fovea center is shown.
6. OCT fundus image of the ONH is shown.
7. Analysis is automatically centered on the optic disc, post acquisition.
8. RNFL calculation circle shows where the TSNIT analysis is extracted from the cube of data.
9. The RNFL Deviation Map shows deviation from normal.
10. Key parameters, compared to normative data, are displayed in table format.
11. RNFL thickness over the 6mm x 6mm cube of data is displayed in a color-coded map.
12. RNFL TSNIT graph plots measurements along the calculation circle, compared to normative data.
13. A horizontal B-scan is extracted from the data cube through the center of the disc.
Available exclusively with the ZEISS FORUM management system, the combined report is generated automatically from Cirrus HD-OCT and HFA data. It provides a summary of structural and functional exams in a single page display.

**HFA Visual Field Section**
1. HFA Graytone Plot, OD
2. HFA Testing Strategy
3. HFA Total Deviation and Pattern Deviation Plots, OS
4. HFA Reliability Indices, OS
5. HFA Global Indices, OS

**Cirrus HD-OCT Section**
6. RNFL Thickness Graph, OU
7. Table of RNFL and optic disc parameters with normative data comparison, OU
8. RNFL Thickness Map
9. RNFL Quadrants and Clock Hours
10. RNFL Deviation Map
11. Neuro-retinal Rim Thickness Graph, OU
12. Legend of distribution of normals